C&C for Human Potential

NEC

SEMICONDUCTOR SELECTION GUIDE

GUIDE BOOK

Microcomputer 1

IC Memory 2

Semi-Custom IC 3

Particular Purpose IC 4

General Purpose Linear IC 5

Transistor / Diode / Thyristor 6

Microwave Device / Consumer Use High Frequency Device 7

Optical Device 8

Packages 9

Index (Quick Reference by Type Number) 10

Oct. 1995

Microcomputer

4-Bit Single Chip Microcomputer 2
- 75XL Series 2
- 75X Series 8
- μPD7500 Series 17
- 17K Series 18
- μPD1700 Series 23
- μPD6133 Series 24

8-Bit Single Chip Microcomputer 26
- 87AD Series 26

8/16-Bit Single Chip Microcomputer 28
- 78K Series 28

V Series™ 54
- 16-Bit 54
- 32-Bit 57
- 32-Bit RISC – V800 Series – 58

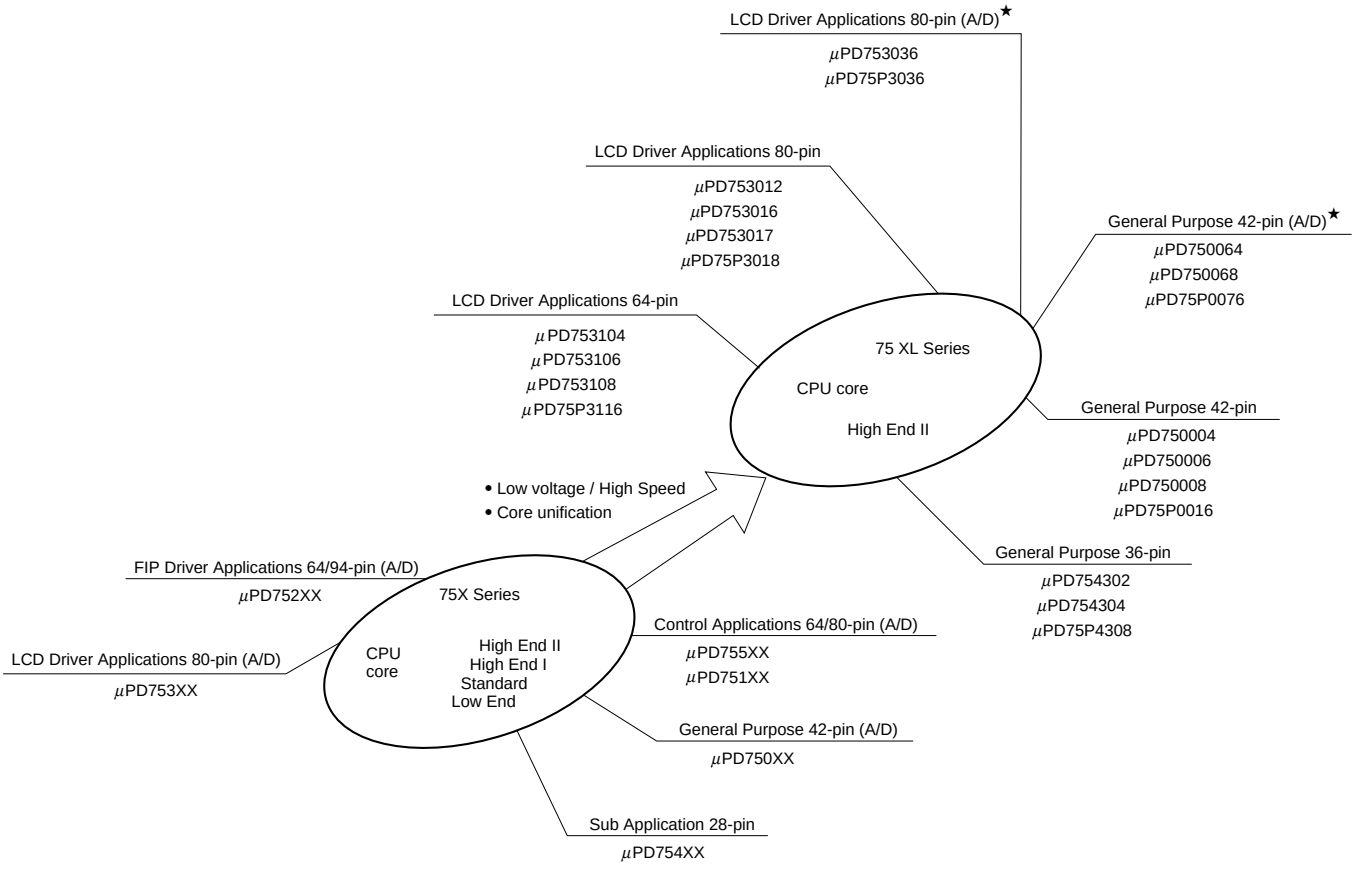
VR Series™ 60

Microcomputer Peripheral LSI 61

4-Bit Single Chip Microcomputer

75XL Series

■ 75XL series product evolution



★ : Under development

4-Bit Single Chip Microcomputer

General Purpose Series

■ μPD750008 series

Type number		μPD750004/0006/0008		μPD75P0016
ROM (bytes)		4096/6144/8192		16384 (PROM)
RAM (∞ 4 bits)		512		
General registers		(4-bit ∞ 8) ∞ 4 banks or (8-bit ∞ 4) ∞ 4 banks		
Instruction cycle		Selectable from 0.95 μs/1.91 μs/3.81 μs/15.3 μs (at main clock 4.19 MHz), 0.67 μs/1.33 μs/2.67 μs/10.7 μs (at main clock 6.0 MHz) and 122 μs (at subclock 32 kHz)		
Input/ output ports	CMOS inputs	34	8 (also serve as INT, SIO)	Can be pulled up by software except P00
	CMOS inputs/outputs		18 (can drive LED)	
	N-ch inputs/outputs		8 (can drive LED, withstand voltage 12 V, can be pulled up by mask option except PROM version)	
Timer/Counters		4 channels • Timer/event counter • Basic interval timer/watchdog timer • Watch timer • 8-bit timer		
Serial interface		NEC standard serial bus interface/3-line serial interface		
Interrupts		• Vector interrupts: 7 (external: 3, internal: 4), • Test inputs: 2 (external: 1, internal: 1)		
Clock output (PCL)		• Φ, 524 kHz, 262 kHz, 65.5 kHz (Main system clock: 4.19 MHz) • Φ, 750 kHz, 375 kHz, 93.7 kHz (Main system clock: 6.0 MHz)		
Buzzer output (BUZ)		• 2 kHz, 4 kHz, 32 kHz (Main system clock: 4.19 MHz or subsystem clock: 32.768 kHz) • 2.86 kHz, 5.72 kHz, 45.8 kHz (Main system clock: 6.0 MHz)		
Instruction set		• Bit data set/reset/test/boolean operation instructions • 4/8-bit data transfer/operation/increment/decrement/compare instructions		
Supply voltage		2.2 to 5.5 V (when external clock used V_{DD} = 1.8 to 5.5 V)		
Package		• 42-pin plastic SDIP, • 44-pin plastic QFP		

■ μPD754304 series

Type number		μPD754302/4304		μPD75P4308
ROM (bytes)		2048/4096		8192 (PROM)
RAM (∞ 4 bits)		256		
General registers		(4-bit ∞ 8) ∞ 4 banks or (8-bit ∞ 4) ∞ 4 banks		
Instruction cycle		Selectable from 0.95 μs/1.91 μs/3.81 μs/15.3 μs (at main clock 4.19 MHz), 0.67 μs/1.33 μs/2.67 μs/10.7 μs (at main clock 6.0 MHz)		
Input/ output ports	CMOS inputs	30	8 (also serve as INT, SIO)	Can be pulled up by software except P00
	CMOS inputs/outputs		18 (4 can drive LED)	
	N-ch inputs/outputs		4 (can drive LED, withstand voltage 12 V, can be pulled up by mask option except PROM version)	
Timer/Counters		3 channels • Timer/event counter ∞ 2 ch. (Applicable at a 16-bit Timer/Event counter by Cascade connection) • Basic interval timer, • Watchdog timer		
Serial interface		2-line/3-line serial interface		
Interrupts		• Vector interrupts: 7 (external: 3, internal: 4), • Test inputs: 1 (external: 1)		
Clock output (PCL)		• Φ, 524 kHz, 262 kHz, 65.5 kHz (Main system clock: 4.19 MHz) • Φ, 750 kHz, 375 kHz, 93.7 kHz (Main system clock: 6.0 MHz)		
Instruction set		• Bit data set/reset/test/boolean operation instructions • 4/8-bit data transfer/operation/increment/decrement/compare instructions		
Supply voltage		1.8 to 5.5 V		
Package		• 36-pin plastic SSOP (300 mil, 0.8 mm pitch)		

4-Bit Single Chip Microcomputer

General Purpose Series

■ μPD750068 series

Type number		μPD750064★/0068★		μPD75P0076★
ROM (bytes)		4096/8192		16384 (PROM)
RAM (∞ 4 bits)		512		
General registers		(4-bit ∞ 8) ∞ 4 banks or (8-bit ∞ 4) ∞ 4 banks		
Instruction cycle		Selectable from 0.95 μs/1.91 μs/3.81 μs/15.3 μs (at main clock 4.19 MHz), 0.67 μs/1.33 μs/2.67 μs/10.7 μs (at main clock 6.0 MHz) and 122 μs (at subclock 32 kHz)		
Input/ output ports	CMOS inputs	32	12 (also serve as INT, SIO)	Can be pulled up by software except P00
	CMOS inputs/outputs		12 (can drive LED)	
	N-ch inputs/outputs		8 (can drive LED, withstand voltage 12 V, can be pulled up by mask option except PROM version)	
A/D converter		• 8-bit ∞ 8 ch		
Timer/Counters		4 channels • Timer/event counter ∞ 2 ch. (Applicable at a 16-bit Timer/Event counter by Cascade connection) • Basic interval timer/watchdog timer • Watch timer		
Serial interface		2-line/3-line serial interface		
Interrupts		• Vector interrupts: 7 (external: 3, internal: 4), • Test inputs: 2 (external: 1, internal: 1)		
Clock output (PCL)		• Φ, 524 kHz, 262 kHz, 65.5 kHz (Main system clock: 4.19 MHz) • Φ, 750 kHz, 375 kHz, 93.7 kHz (Main system clock: 6.0 MHz)		
Buzzer output (BUZ)		• 2 kHz, 4 kHz, 32 kHz (Main system clock: 4.19 MHz or subsystem clock: 32.768 kHz) • 2.86 kHz, 5.72 kHz, 45.8 kHz (Main system clock: 6.0 MHz)		
Instruction set		• Bit data set/reset/test/boolean operation instructions • 4/8-bit data transfer/operation/increment/decrement/compare instructions		
Supply voltage		1.8 to 5.5 V		
Package		• 42-pin plastic SDIP, • 44-pin plastic QFP		

★: Under development

4-Bit Single Chip Microcomputer

LCD Driver Series

■ μPD753017 series

Type number		μPD753012	μPD753016	μPD753017	μPD75P3018
ROM (bytes)		12288	16384	24576	32768 (PROM)
RAM (∞ 4 bits)		1024			
General registers		(4-bit ∞ 8) ∞ 4 banks or (8-bit ∞ 4) ∞ 4 banks			
Instruction cycle		Selectable from 0.95 μs/1.91 μs/3.81 μs/15.3 μs (at main clock 4.19 MHz) , 0.67μs/1.33 μs/2.67 μs/10.7 μs (at main clock 6.0 MHz) and 122 μs (at subclock 32 kHz)			
Input/ output ports	CMOS inputs	40	8 (also serve as INT, SIO)	Can be pulled up by software except P00	
	CMOS inputs/outputs		16 (can drive LED)		
	N-ch inputs/outputs		8 (can drive LED, withstand voltage 12 V, can be pulled up by mask option except PROM version)		
	CMOS outputs		4/8 (also serve as segment outputs, selection by software)		
LCD controller		• Segment outputs: 32 ∞ 4 (MAX.), • Display mode (static, 1/2, 1/3, 1/4 duty) • LCD drive voltage generation step down registor (except PROM version)			
Timer/Counters		5 channels • Timer/event counter ∞ 3 ch. (Applicable as a 16-bit Timer/Event counter by Cascade connection, Infrared remote control carrier generator) • Basic interval timer/watchdog timer • Watch timer			
Serial interface		NEC standard serial bus interface/3-line serial interface			
Interrupts		• Vector interrupts: 8 (external: 3, internal: 5), • Test inputs: 2 (external: 1, internal: 1)			
Clock output (PCL)		• Φ, 524 kHz, 262 kHz, 65.5 kHz (Main system clock: 4.19 MHz) • Φ, 750 kHz, 375 kHz, 93.7 kHz (Main system clock: 6.0 MHz)			
Buzzer output (BUZ)		• 2 kHz, 4 kHz, 32 kHz (Main system clock: 4.19 MHz or subsystem clock: 32.768 kHz) • 2.86 kHz, 5.72 kHz, 45.8 kHz (Main system clock: 6.0 MHz)			
Instruction set		• Bit data set/reset/test/boolean operation instructions • 4/8-bit data transfer/operation/increment/decrement/compare instructions • 8-bit data transfer instructions			
Supply voltage		2.2 to 5.5 V (when External clock used V_{DD} = 1.8 to 5.5 V)			
Package		• 80-pin plastic QFP (0.5/0.65 mm pitch)			

4-Bit Single Chip Microcomputer

LCD Driver Series

■ μPD753108 series

Type number		μPD753104	μPD753106	μPD753108	μPD75P3116
ROM (bytes)		4096	6144	8192	16384 (PROM)
RAM (∞ 4 bits)		512			
General registers		(4-bit ∞ 8) ∞ 4 banks or (8-bit ∞ 4) ∞ 4 banks			
Instruction cycle		Selectable from 0.95 μs/1.91 μs/3.81 μs/15.3 μs (at main clock 4.19 MHz) , 0.67μs/1.33 μs/2.67 μs/10.7 μs (at main clock 6.0 MHz) and 122 μs (at subclock 32 kHz)			
Input/ output ports	CMOS inputs	32	8 (also serve as INT, SIO)	Can be pulled up by software except P00	
	CMOS inputs/outputs		12 (4 can drive LED)		
	N-ch inputs/outputs		4 (can drive LED, withstand voltage 12 V, can be pulled up by mask option except PROM version)		
	CMOS outputs		8 (also serve as segment outputs, selection by software)		
LCD controller		• Segment outputs: 24 ∞ 4 (MAX.) • Display mode (static, 1/2, 1/3, 1/4 duty) • LCD drive voltage generation step down registor (except PROM version)			
Timer/Counters		5 channels • Timer/event counter ∞ 3 ch. (Applicable as a 16-bit Timer/Event counter by Cascade connection, Infrared remote control carrier genrator) • Basic interval timer/watchdog timer • Watch timer			
Serial interface		NEC standard serial bus interface/3-line serial interface			
Interrupts		• Vector interrupts: 6 (external: 3, internal: 3) • Test inputs: 2 (external: 1, internal: 1)			
Clock output (PCL)		• Φ, 524 kHz, 262 kHz, 65.5 kHz (Main system clock: 4.19 MHz) • Φ, 750 kHz, 375 kHz, 93.7 kHz (Main system clock: 6.0 MHz)			
Buzzer output (BUZ)		• 2 kHz, 4 kHz, 32 kHz (Main system clock: 4.19 MHz or subsystem clock: 32.768 kHz) • 2.86 kHz, 5.72 kHz, 45.8 kHz (Main system clock: 6.0 MHz)			
Instruction set		• Bit data set/reset/test/boolean operation instructions • 4-bit data transfer/operation/increment/decrement/compare instructions • 8-bit data transfer instructions			
Supply voltage		1.8 to 5.5 V			
Package		• 64-pin plastic QFP (0.65/0.8 mm pitch)			

4-Bit Single Chip Microcomputer

LCD Driver Series

■ μPD753036 series

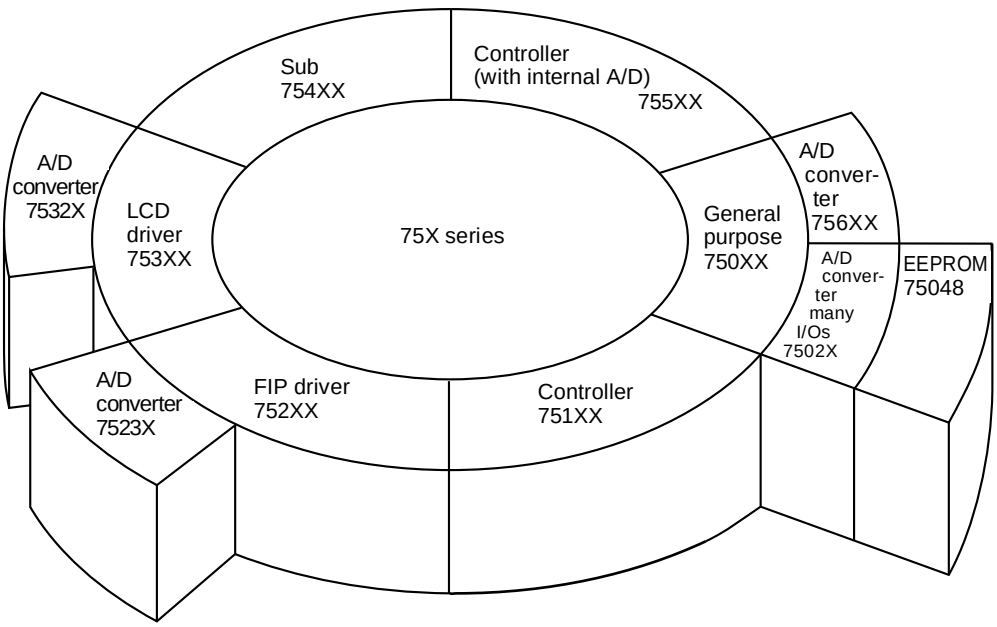
Type number		μPD753036★		μPD75P3036★
ROM (bytes)		16384		16384 (PROM)
RAM (∞ 4 bits)		768		
General registers		(4-bit ∞ 8) ∞ 4 banks or (8-bit ∞ 4) ∞ 4 banks		
Instruction cycle		Selectable from 0.95 μs/1.91 μs/3.81 μs/15.3 μs (at main clock 4.19 MHz) , 0.67μs/1.33 μs/2.67 μs/10.7 μs (at main clock 6.0 MHz) and 122 μs (at subclock 32 kHz)		
Input/ output ports	CMOS inputs	44	8 (also serve as INT, SIO)	Can be pulled up by software except P00
	CMOS inputs/outputs		20 (can drive LED)	
	N-ch inputs/outputs		8 (can drive LED, withstand voltage 12 V, can be pulled up by mask option except PROM version)	
	CMOS outputs		4/8 (also serve as segment outputs, selection by software)	
A/D converter		• 8-bit ∞ 8 ch		
LCD controller		• Segment outputs: 20 ∞ 4 (MAX.), • Display mode (static, 1/2, 1/3, 1/4 duty) • LCD drive voltage generation step down registor (except PROM version)		
Timer/Counters		5 channels • Timer/event counter ∞ 3 ch. (Applicable as a 16-bit Timer/Event counter by Cascade connection, Infrared remote control carrier generator) • Basic interval timer/watchdog timer • Watch timer		
Serial interface		NEC standard serial bus interface/3-line serial interface		
Interrupts		• Vector interrupts: 8 (external: 3, internal: 5), • Test inputs: 2 (external: 1, internal: 1)		
Clock output (PCL)		• Φ, 524 kHz, 262 kHz, 65.5 kHz (Main system clock: 4.19 MHz) • Φ, 750 kHz, 375 kHz, 93.7 kHz (Main system clock: 6.0 MHz)		
Buzzer output (BUZ)		• 2 kHz, 4 kHz, 32 kHz (Main system clock: 4.19 MHz or subsystem clock: 32.768 kHz) • 2.86 kHz, 5.72 kHz, 45.8 kHz (Main system clock: 6.0 MHz)		
Instruction set		• Bit data set/reset/test/boolean operation instructions • 4/8-bit data transfer/operation/increment/decrement/compare instructions • 8-bit data transfer instructions		
Supply voltage		1.8 to 5.5 V		
Package		• 80-pin plastic QFP (0.5/0.65 mm pitch)		

★: Under development

4-Bit Single Chip Microcomputer

75X Series

■ 75X series product evolution



4-Bit Single Chip Microcomputer

Controller Series

■ μPD751XX series (1/2)

Type number		μPD75104/106/108/112/116	μPD75104A/108A	μPD75108F/112F/116F
ROM (bytes)		4096/6016/8064/12160/16256	4096/8064	8064/12160/16256
RAM (x 4 bits)		320/320/512/512/512	320/512	512
General registers		(4-bit x 8) ∞ 4 banks or (8-bit ∞ 4) ∞ 4 banks		
Instruction cycle		Selectable from 0.95 μs/1.91 μs/15.3 μs (at 4.19 MHz)		
Minimum instruction execution time		0.95 μs (V_{DD} = 4.5 V) 3.81 μs (V_{DD} = 2.7 V)		0.95 μs (V_{DD} = 4.5 V) 1.91 μs (V_{DD} = 2.7 V)
Input/ output ports	CMOS inputs	54	10 (also serve as INT, SIO, 4 can be pulled up at μPD75104A/108A only)	
	CMOS inputs/outputs		32 (capable of driving LED, 24 can be pulled up at μPD75104A/108A only)	
	N-ch inputs/outputs		12 (capable of driving LED, withstand voltage 12 V, can be pulled up)	
Comparator inputs		4-bit resolution ∞ 4 channels		
Timer/Counters		3 channels • Timer/event counter ∞ 2, • Basic interval timer		
Serial interface		3-line serial interface		
Interrupts		• Vector interrupts: 7 (external: 3, internal: 4), • External test inputs: 2		
Instruction set		• Bit data set/reset/test/boolean operation instructions • 4/8-bit data transfer/operation/increment/decrement/compare instructions		
Supply voltage		2.7 to 6.0 V		2.7 to 5.0 V (Ta = –40 to +50 ·C) 2.8 to 5.0 V (Ta = –40 to +60 ·C)
Package		• 64-pin plastic SDIP • 64-pin plastic QFP (1.0 mm pitch)	• 64-pin plastic QFP (0.8 mm pitch)	• 64-pin plastic QFP (1.0 mm pitch)

■ μPD751XX series (2/2)

Type number		μPD75P108B	μPD75P116	μPD75116H/117H	μPD75P117H
ROM (bytes)		8064 (PROM)	16256 (PROM)	16256/24448	24448 (PROM)
RAM (x 4 bits)		512		768	
General registers		(4-bit x 8) ∞ 4 banks or (8-bit ∞ 4) ∞ 4 banks			
Instruction cycle		Selectable from 0.95 μs/1.91 μs/15.3 μs (4.19 MHz)			
Minimum instruction execution time		0.95 μs (V_{DD} = 4.5 V) 3.81 μs (V_{DD} = 2.7 V)	0.95 μs	0.95 μs (V_{DD} = 2.7 V) 1.91 μs (V_{DD} = 1.8 V)	
Input/ output ports	CMOS inputs	54	10 (also serve as INT, SIO)	54	10 (also serve as INT, SIO)
	CMOS inputs/outputs		32 (capable of driving LED)		32 (8 can drive LED)
	N-ch inputs/outputs		12 (capable of driving LED, withstand voltage 12 V)		12 (withstand voltage 6 V, can be pulled up except PROM version)
Comparator inputs		4-bit resolution ∞ 4 channels			
Timer/Counters		3 channels • Timer/event counter ∞ 2, • Basic interval timer			
Serial interface		3-line serial interface			
Interrupts		• Vector interrupts: 7 (external: 3, internal: 4), • External test inputs: 2			
Instruction set		• Bit data set/reset/test/boolean operation instructions • 4/8-bit data transfer/operation/increment/decrement/compare instructions			
Supply voltage		2.7 to 6.0 V	4.5 to 5.5 V	1.8 to 5.5 V (Ta = –40 to +60 ·C)	
Package		• 64-pin ceramic SDIP with window (μPD75P108B only) • 64-pin plastic SDIP • 64-pin plastic QFP (1.0 mm pitch)		• 64-pin plastic QFP (0.65/0.8 mm pitch) • 64-pin ceramic WQFN (0.8 mm pitch: μPD75P117H only)	

4-Bit Single Chip Microcomputer

Controller Series

■ μPD755XX series

Type number		μPD75512/516	μPD75P516	μPD75517/518	μPD75P518
ROM (bytes)		12160/16256	16256 (PROM)	24448/32640	32640 (PROM)
RAM (∞ 4 bits)		512		1024	
General registers		(4-bit ∞ 8) ∞ 4 banks or (8-bit ∞ 4) ∞ 4 banks			
Instruction cycle		Selectable from 0.95 μs/1.91 μs/15.3 μs (at main clock 4.19 MHz) and 122 μs (at subclock 32 kHz)		Selectable from 0.67 μs/1.33 μs/2.67 μs/10.7 μs (at main clock 6 MHz) and 122 μs (at subclock 32 kHz)	
Input/ output ports	CMOS inputs	64	16 (also serve as INT, SIO, A/D inputs)	7 can be pulled up by software	
	CMOS inputs/outputs		28 (4 can drive LED)	4 can be pulled down by musk option except PROM version 16 can be pulled up by software	
	N-ch inputs/outputs		20 (8 can drive LED, withstand voltage 9 V, can be pulled up by mask option except PROM version)		
A/D converter		8-bit resolution ∞ 8 channels			
Timer/Counters		3 channels • Timer/event counter, • Basic interval timer, • Watch timer			
Serial interface		2 channels • NEC standard serial bus interface/3-line serial interface • 3-line serial interface			
Interrupts		• Vector interrupts: 7 (external: 3, internal: 4), • Test inputs: 2 (external: 1, internal: 1)			
Instruction set		• Bit data set/reset/test/boolean operation instructions • 4/8-bit data transfer/operation/increment/decrement/compare instructions			
Supply voltage		2.7 to 6.0 V	4.75 to 5.5 V	2.7 to 6.0 V	
Package		• 80-pin plastic QFP	• 80-pin plastic QFP • 80-pin ceramic WQFN	• 80-pin plastic QFP	• 80-pin plastic QFP • 80-pin ceramic WQFN

General Purpose Series

■ μPD7500X series

Type number		μPD75004/006/008		μPD75P008
ROM (bytes)		4096/6016/8064		8064 (PROM)
RAM (∞ 4 bits)		512		
General registers		4-bit ∞ 8 or 8-bit ∞ 4		
Instruction cycle		Selectable from 0.95 μs/1.91 μs/15.3 μs (at main clock 4.19 MHz) and122 μs (at subclock 32 kHz)		
Input/ output ports	CMOS inputs	34	8 (also serve as INT, SIO)	Can be pulled up by software except P00
	CMOS inputs/outputs		18 (4 can drive LED)	
	N-ch inputs/outputs		8 (can drive LED, withstand voltage 10 V, can be pulled up by mask option except PROM version)	
Timer/Counters		3 channels • Timer/event counter, • Basic interval timer, • Watch timer		
Serial interface		NEC standard serial bus interface/3-line serial interface		
Interrupts		• Vector interrupts: 6 (external: 3, internal: 3), • Test inputs: 2 (external: 1, internal: 1)		
Instruction set		• Bit data set/reset/test/boolean operation instructions • 4-bit data transfer/operation/increment/decrement/compare instructions • 8-bit data transfer instructions		
Supply voltage		2.7 to 6.0 V		4.5 to 5.5 V
Package		• 42-pin plastic SDIP, • 44-pin plastic QFP		

4-Bit Single Chip Microcomputer

General Purpose Series

■ μPD7502X series

Type number		μPD75028/036	μPD75P036	μPD75048	μPD75P048
ROM (bytes)		8064/16256	16256 (PROM)	8064	8064 (PROM)
RAM (∞ 4 bits)		512/1024	1024	512	
EEPROM (∞ 4 bits)		None		1024	
General registers		4-bit ∞ 8 or 8-bit ∞ 4			
Instruction cycle		Selectable from 0.95 μs/1.91 μs/15.3 μs (at main clock 4.19 MHz) and 122 μs (at subclock 32 kHz)			
Input/output ports	CMOS inputs	48	12 (also serve as INT, SIO, A/D inputs)	27 can be pulled up by software 4 can be pulled down by software	
	CMOS inputs/outputs		24 (4 can drive LED)		
	N-ch inputs/outputs		12 (can drive LED, withstand voltage 10 V, can be pulled up by mask option except PROM version)		
A/D converter		8-bit resolution ∞ 8 channels			
Timer/Counters		4 channels • Timer/event counter • Basic interval timer • Watch timer • Multi-function timer (can be used for integration A/D converter)			
Serial interface		NEC standard serial bus interface/3-line serial interface			
Interrupts		• Vector interrupts: 7 (external: 3, internal: 4) • Test inputs: 2 (external: 1, internal: 1)		• Vector interrupts: 9 (external: 3, internal: 6) • Test inputs: 2 (external: 1, internal: 1)	
Instruction set		• Bit data set/reset/test/boolean operation instructions • 4-bit data transfer/operation/increment/decrement/compare instructions • 8-bit data transfer instructions			
Supply voltage		2.7 to 6.0 V			
Package		• 64-pin plastic SDIP • 64-pin ceramic WQFN (μPD75P036 only) • 64-pin plastic QFP			

4-Bit Single Chip Microcomputer

General Purpose Series

■ μPD7506X series

Type number		μPD75064/066/068		μPD75P068
ROM (bytes)		4096/6016/8064		8064 (PROM)
RAM (∞ 4 bits)		512		
General registers		4-bit ∞ 8 or 8-bit ∞ 4		
Instruction cycle		Selectable from 0.95 μs/1.91 μs/15.3 μs (at main clock 4.19 MHz) and 122 μs (at subclock 32 kHz)		
Input/ output ports	CMOS inputs	32	12 (also serve as INT, SIO)	19 can be pulled up by software
	CMOS inputs/outputs		12 (4 can drive LED, also serve as A/D inputs)	
	N-ch inputs/outputs		8 (can drive LED, withstand voltage 10 V, also serve as A/D inputs, can be pulled up by mask option except PROM version)	
A/D converter		8-bit resolution ∞ 8 channels		
Timer/Counters		3 channels • Timer/event counter • Basic interval timer • Watch timer		
Serial interface		NEC standard serial bus interface/3-line serial interface		
Interrupts		• Vector interrupts: 6 (external: 3, internal: 3) • Test inputs: 2 (external: 1, internal: 1)		
Instruction set		• Bit data set/reset/test/boolean operation instructions • 4-bit data transfer/operation/increment/decrement/compare instructions • 8-bit data transfer instructions		
Supply voltage		2.7 to 6.0 V		
Package		• 42-pin plastic SDIP • 44-pin plastic QFP		

Slave Series

■ μPD754XX series

Type number		μPD75402A		μPD75P402
ROM (bytes)		1920		1920 (PROM)
RAM (∞ 4 bits)		64		
General registers		4-bit ∞ 4 or 8-bit ∞ 2		
Instruction cycle		Selectable from 0.95 μs/1.91 μs/15.3 μs (at 4.19 MHz)		
Input/ output ports	CMOS inputs	22	6 (also serve as INT, SIO)	16 can be pulled up by software
	CMOS inputs/outputs		12 (8 can drive LED)	
	N-ch inputs/outputs		4 (can drive LED, withstand voltage 10 V, can be pulled up by mask option except PROM version)	
Timer/Counters		Basic interval timer		
Serial interface		NEC standard serial bus interface/3-line serial interface		
Interrupts		• Vector interrupts: 3 (external: 1, internal: 2) • External test inputs: 1		
Instruction set		• Bit data set/reset/test/boolean operation instructions • 4-bit data transfer/increment/boolean operation/compare instructions • 8-bit data transfer instructions		
Supply voltage		2.7 to 6.0 V		4.5 to 5.5 V
Package		• 28-pin plastic DIP • 28-pin plastic SDIP • 44-pin plastic QFP		

4-Bit Single Chip Microcomputer

FIP Driver Series

■ μPD752XX series

Type number		μPD75206/208	μPD75212A/216A/217/218	μPD75P216A	μPD75P218	μPD75268
ROM (bytes)		6016/8064	12160/16256/24448/32640	16256	32640	8064
RAM (∞ 4 bits)		369/497	512/512/768/1024	512	1024	512
General registers		(4-bit ∞ 8) ∞ 4 banks or (8-bit ∞ 4) ∞ 4 banks				4-bit x 8 or 8-bit x 4
Instruction cycle		Selectable from 0.95 μs/1.91 μs/15.3 μs (at main clock 4.19 MHz) and 122 μs (at subclock 32 kHz)				
Input/ output ports	CMOS inputs	32	8 (also serve as INT, SIO)			
	CMOS inputs/outputs		20 (8 can drive LED, 4 can be pulled down by mask option except PROM version)			
	P-ch outputs		4 (also serve as segment pins, can be pulled down by mask option except PROM version)			
FIP controller		9 to 12 segments, 9 to 16 digits (can be pulled down by mask option)	9 to 16 segments, 9 to 16 digits (can be pulled down by mask option)	9 to 16 segments, 9 to 16 digits		9 to 16 segments, 9 to 16 digits (can be pulled down by mask option)
Timer/Counter		4 channels • Timer/event counter • Basic interval timer • Watch timer • Timer/pulse generator (can output 14-bit PWM)				3 channels • Timer/event counter • Basic interval timer • Watch timer
Serial interface		3-line serial interface/serial bus interface				
Interrupts		• Vector interrupts: 8 (external: 3, internal: 5) • Test inputs: 2 (external: 1, internal: 1)				• Vector interrupts: 6 (external: 3, internal: 3) • Test inputs: 3 (external: 1, internal: 2)
Instruction set		• Bit data set/reset/test/boolean operation instructions • 4-bit data transfer/operation/increment/decrement/compare instructions • 8-bit data transfer/operation/increment/decrement/compare instructions (transfer only at μPD75268)				
Supply voltage		2.7 to 6.0 V		4.5 to 5.5 V	2.7 to 6.0 V	2.7 to 6.0 V
Package		• 64-pin plastic SDIP • 64-pin plastic QFP (except μPD75P216A)				

4-Bit Single Chip Microcomputer

FIP Driver Series

■ μPD7523X series

Type number		μPD75236			μPD75237/238	μPD75P238
ROM (bytes)		16256			24448/32640	32640 (PROM)
RAM (∞ 4 bits)		768			1024	1024
General registers		(4-bit ∞ 8) ∞ 4 banks or (8-bit ∞ 4) ∞ 4 banks				
Instruction cycle		Selectable from 0.95 μs/1.91 μs/3.81 μs/15.3 μs (at main clock 4.19 MHz) and 122 μs (at subclock 32 kHz)			Selectable from 0.67 μs/1.33 μs/2.67 μs/10.7 μs (at main clock 6 MHz) 122 μs (at subclock 32 kHz)	
Input/ output ports	CMOS inputs	64	16 (also serve as INT, SIO, A/D inputs)	19 can be pulled up by software 4 can be pulled down by mask option		Same as left (however, no mask option)
	CMOS inputs/outputs		16			
	N-ch inputs/ outputs		8 (withstand voltage 10 V, can be pulled up by mask option)			
	P-ch outputs		24 (also serve as segment pins, can be pulled down by mask option)			
FIP controller		9 to 24 segments, 9 to 16 digits (can be pulled down by mask option except μPD75P238)				
A/D converter		8-bit resolution x 8 channels				
Timer/Counters		5 channels • Timer/event counter • Event counter • Basic interval timer • Watch timer • Timer/pulse generator (can output 14-bit PWM)				
Serial interface		2 channels • NEC standard serial bus interface/3-line serial interface • 3-line serial interface				
Interrupts		• Vector interrupts: 8 (external: 3, internal: 5) • Test inputs: 3 (external: 1, internal: 2)				
Instruction set		• Bit data set/reset/test/boolean operation instructions • 4/8-bit data transfer/operation/increment/decrement/compare instructions				
Supply voltage		2.7 to 6.0 V				
Package		• 94-pin plastic QFP				• 94-pin plastic QFP • 94-pin ceramic WQFN

4-Bit Single Chip Microcomputer

LCD Driver Series

■ μPD7530X series

Type number		μPD75304/306/308/312/316		μPD75P316A	μPD75304B/306B/308B	μPD75312B/316B	μPD75P316B
ROM (bytes)		4096/6016/8064/12160/16256		16256 (PROM)	4096/6016/8064	12160/16256	16256 (PROM)
RAM (∞ 4 bits)		512		1024	512	1024	
General registers		4-bit ∞ 8 or 8-bit ∞ 4					
Instruction cycle		Selectable from 0.95 μs/1.91 μs/15.3 μs (at main clock 4.19 MHz) and 122 μs (at subclock 32 kHz)					
Input/ output ports	CMOS inputs	32 (40 MAX.)	8 (also serve as INT, SIO)		Can be pulled up by software except P00		
	CMOS inputs/outputs		16 (4 can drive LED)				
	N-ch inputs/outputs		8 (can drive LED, withstand voltage 10 V, can be pulled up by mask option except PROM version)				
	CMOS outputs		4/8 (also serve as segment outputs, selection by software)				
LCD controller		• Segment outputs: 32 ∞ 4 (MAX.) • Display mode (static, 1/2, 1/3, 1/4 duty) • LCD drive voltage generation step down registor (except PROM version)					
Timer/Counters		3 channels • Timer/event counter • Basic interval timer • Watch timer					
Serial interface		NEC standard serial bus interface/3-line serial interface					
Interrupts		• Vector interrupts: 6 (external: 3, internal: 3) • Test inputs: 2 (external: 1, internal: 1)					
Instruction set		• Bit data set/reset/test/boolean operation instructions • 4-bit data transfer/operation/increment/decrement/compare instructions • 8-bit data transfer instructions					
Supply voltage		2.7 to 6.0 V			2.0 to 6.0 V	2.0 to 6.0 V	
Package		• 80-pin plastic QFP (0.8 mm pitch) • 80-pin ceramic WQFN (0.8 mm pitch: μPD75P316A only)			• 80-pin plastic QFP (0.5/0.65/0.8 mm pitch)	• 80-pin plastic QFP (0.65/0.8 mm pitch) • 80-pin ceramic WQFN (0.65 mm pitch: μPD75P316B only)	

4-Bit Single Chip Microcomputer

LCD Driver Series

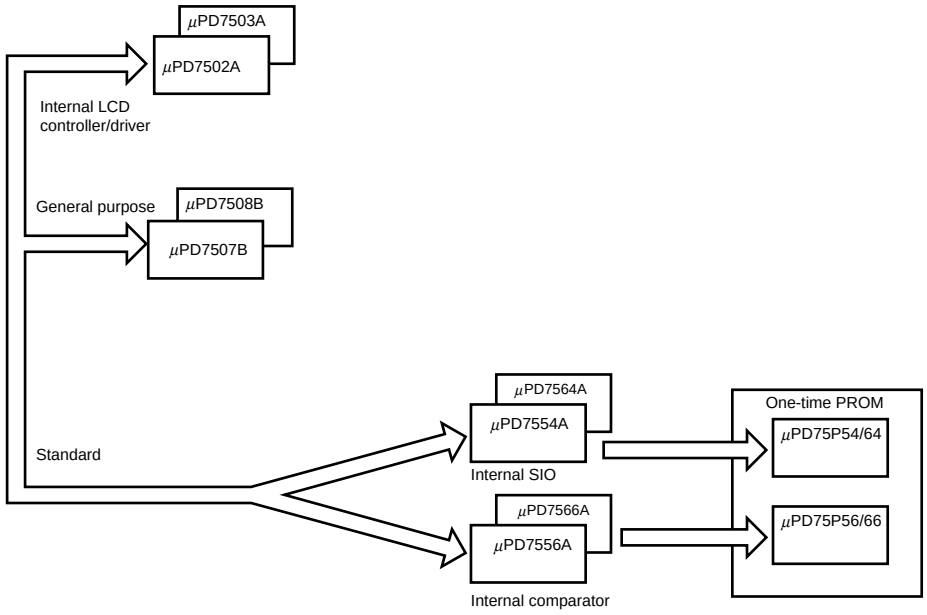
■ μPD7532X series

Type number		μPD75328	μPD75P328	μPD75336	μPD75P336
ROM (bytes)		8064	8064 (PROM)	16256	16256 (PROM)
RAM (∞ 4 bits)		512		768	
General registers		4-bit ∞ 8 or 8-bit ∞ 4		(4-bit ∞ 8) ∞ 4 banks or (8-bit ∞ 4) x 4 banks	
Instruction cycle		Selectable from 0.95 μs/1.91 μs/15.3 μs (at main clock 4.19 MHz) and 122 μs (at subclock 32 kHz)			
Input/ output ports	CMOS inputs	44	8 (also serve as INT, SIO)	Can be pulled up by software except P00	
	CMOS inputs/outputs		20		
	N-ch inputs/outputs		8 (can drive LED, withstand voltage 10 V, can be pulled up by mask option except PROM version)		
	CMOS outputs		8 (also serve as segment outputs)		
LCD controller		• Segment outputs: 20 ∞ 4 (MAX.) • Display mode (static, 1/2, 1/3, 1/4 duty) • LCD drive voltage generation step down resistor (except PROM version)			
A/D converter		8-bit resolution ∞ 6 channels		8-bit resolution ∞ 8 channels	
Timer/Counters		3 channels • Timer/event counter • Basic interval timer • Watch timer		4 channels • Timer/event counter ∞ 2 • Basic interval timer • Watch timer	
Serial interface		NEC standard serial bus interface/3-line serial interface			
Interrupts		• Vector interrupts: 6 (external: 3, internal: 3) • Test inputs: 2 (external: 1, internal: 1)		• Vector interrupts: 7 (external: 3, internal: 4) • Test inputs: 2 (external: 1, internal: 1)	
Instruction set		• Bit data set/reset/test/boolean operation instructions • 4-bit data transfer/operation/increment/decrement/compare instructions • 8-bit data transfer/operation/increment/decrement/compare instructions (transfer only except μPD75336)			
Supply voltage		2.7 to 6.0 V	4.75 to 5.25 V	2.7 to 6.0 V	
Package		• 80-pin plastic QFP (0.65 mm pitch)		• 80-pin plastic QFP (0.5, 0.65 mm pitch)	

4-Bit Single Chip Microcomputer

μPD7500 Series

■ μPD7500 series product evolution



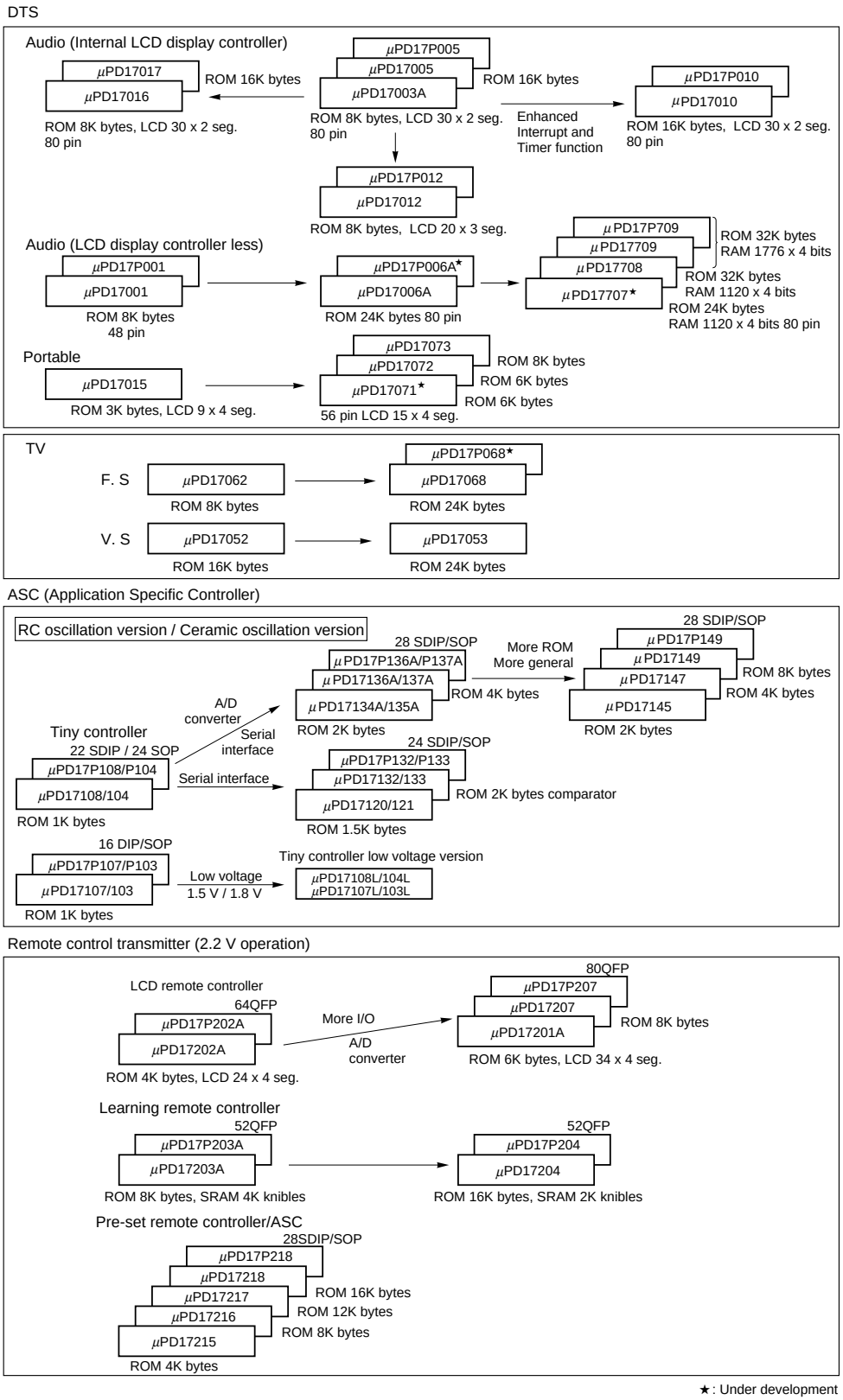
■ μPD7500 series

Type number	Features			ROM (∞8)	RAM (∞4)	I/O	Package	Supply voltage
μPD7502A	Internal LCD controller/driver		24 SEG	2K	128	23	• 64-pin QFP	2.5 to 6.0 V
μPD7503A				4K	224			
μPD7507B	General purpose		High speed (2.86 μs)	2K	128	32	• 40-pin SDIP • 44-pin QFP	2.2 to 6.0 V
μPD7508B				4K	224			
μPD7554A	Standard device	Internal serial interface	R oscillation External clock input	1K	64	16	• 20-pin SDIP • 20-pin SOP	2.0 to 6.0 V
μPD7564A			Ceramic oscillation			15		2.7 to 6.0 V
μPD7556A		Internal comparator	R oscillation External clock input			20	• 24-pin SDIP • 24-pin SOP	2.0 to 6.0 V
μPD7566A			Ceramic oscillation			19		2.7 to 6.0 V
μPD75P54	OTP	For 7554A		1K	64	16	• 20-pin SDIP • 20-pin SOP	4.5 to 6.0 V
μPD75P64		For 7564A				15		
μPD75P56		For 7556A				20	• 24-pin SDIP • 24-pin SOP	
μPD75P66		For 7566A				19		

4-Bit Single Chip Microcomputer

17K Series

■ 17K series product evolution



★: Under development

4-Bit Single Chip Microcomputer

■ μPD170XX (DTS) (1/3)

	μPD17001	μPD17003A	μPD17005	μPD17006A	μPD17010	μPD17012	μPD17707★	μPD17708★	μPD17709★
Typical applications	High performance tuner, car radio								
Package	• 48-pin QFP	• 80-pin QFP				• 64-pin QFP	• 80-pin QFP		
Supply voltage	+5 V ±10 %								
Supply current (CPU)	500 μA TYP.								
ROM size	3836 ∞ 16 bits	3836 ∞ 16 bits	7932 ∞ 16 bits	12288 ∞ 16 bits	7932 ∞ 16 bits	4096 ∞ 16 bits	12288 ∞ 16 bits	16384 ∞ 16 bits	
RAM size	224 ∞ 4 bits	320 ∞ 4 bits	432 ∞ 4 bits	896 ∞ 4 bits	432 ∞ 4 bits	316 ∞ 4 bits	1120 ∞ 4 bits		1776 ∞ 4 bits
Number of instructions	35								
Display	———	Internal LCD driver Segments: 30 Common : 2		———	Internal LCD driver Segments: 30 Common : 2	Internal LCD driver Segments: 20 Common : 3	———		
Input ports	8 lines	8 lines		8 lines	8 lines	8 lines	12 lines		
Output ports	12 lines	9 (+30) lines		13 lines	9 (+30) lines	8 (+20) lines	4 lines		
Input/output ports	12 lines	16 lines		40 lines	16 lines	14 lines	46 lines		
VDP (D/A converter)	4	4		4	4	3	3		
A/D converter	6	6		6	6	2	6		
Crystal oscillator	4.5 MHz								
PLL reference frequency	1, 1.25, 2.5, 3, 5, 6.25, 9, 10, 12.5, 25, 50, 100 kHz						1, 1.25, 2.5, 3.5, 6.25, 9, 10, 12.5, 18, 20, 25, 50, 100 kHz		
Applicable prescaler	Internally provided (130 MHz)	Internally provided (150 MHz)				Internally provided (250 MHz)	Internally provided (130 MHz)		
One-time PROM version	μPD17P001	μPD17P005		μPD17P006A★	μPD17P010	μPD17P012	μPD17P709★		

★: Under development

■ μPD170XX (DTS) (2/3)

	μPD17015	μPD17016	μPD17017	μPD17071★	μPD17072	μPD17073
Typical applications	Portable tuner radio	High performance tuner, car radio		Portable tuner radio		
Package	• 38-pin shrink SOP	• 80-pin QFP		• 56-pin QFP		
Supply voltage	1.8 ~ 3.6 (PLL is operating)	+5 ±10%		1.8 ~ 3.6 (V)		
Supply current (CPU)	30 μA	500 μA TYP.		30 μA		
ROM size	1528 ∞ 16 bits	3836 ∞ 16 bits	7932 ∞ 16 bits	3072 ∞ 16 bits		4096 ∞ 16 bits
RAM size	97 ∞ 4 bits	320 ∞ 4 bits	432 ∞ 4 bits	176 ∞ 4 bits		
Number of instructions	35					
Display	Internal LCD driver Segments: 9 Common : 4	Internal LCD driver Segments: 30 Common : 2		Internal LCD driver Segments: 15 Common : 4		
Input ports	3 lines	8 lines		4 lines		
Output ports	7 lines	9 (+8) lines		9 lines		
Input/output ports	2 lines	16 lines		8 lines		
VDP (D/A converter)	———	2		———		
A/D converter	———	6		———	2	
Crystal oscillator	75 kHz	4.5 MHz		75 kHz		
PLL reference frequency	1, 3, 5, 12.5 kHz	1, 1.25, 2.5, 3.5, 6.25, 9, 10, 12.5, 25, 50, 100 kHz		1, 3, 5, 6.25, 12.5, 25 kHz		
Applicable prescaler	Internal provided (220 MHz)	Internal provided (150 MHz)		Internal provided (230 MHz)		
One-time PROM version	———	μPD17P005		———		

★: Under development

4-Bit Single Chip Microcomputer

■ μPD170XX (DTS) (3/3)

	μPD17062	μPD17068	μPD17052	μPD17053
Typical applications	TV, CATV, LCD TV			
Package	• 48-pin shrink DIP • 64-pin QFP	• 100-pin QFP	• 64-pin shrink DIP	• 64-pin shrink DIP
Supply voltage	+5 V ±10 %			
Supply current (CPU)	500 μA TYP.			
ROM size	3968 x 16 bits	12032 x 16 bits	8192 x 16 bits	12288 x 16 bits
RAM size	336 x 4 bits	1007 x 4 bits	448 x 4 bits	672 x 4 bits
Number of instructions	35			
Display	IDC (internally provided) 99 characters max. per frame Display: 14 rows ∞ 19 columns 120 different characters	IDC (internally provided) 192/350 character Display: 17/15 rows ∞ 24 columns 255 different characters	IDC (internally provided) 99 characters max. per frame Display: 14 rows ∞ 19 columns 128 different characters	IDC (internally provided) 99 characters max. per frame Display: 14 rows ∞ 19 columns 256 different characters
Input ports	4 lines	4 lines	4 lines	
Output ports	8 lines	21 lines	20 lines	
Input/output ports	15 lines	19 lines	20 lines	
VDP (D/A converter)	4	9	4	
A/D converter	6	8	8	
Crystal oscillator	8 MHz		8 MHz (ceramic resonator)	
PLL reference frequency	6.25, 12.5, 25 kHz	5, 6.25, 10, 12.5, 25 kHz	Voltage synthesizer (14-bit D/A converter internally provided)	
Applicable prescaler	μPB595 (1 GHz)		———	
One-time PROM version	———	μPD17P068★	———	

★: Under development

4-Bit Single Chip Microcomputer

■ μPD17103 Sub-series (ASC) (1/3)

Item	μPD17103	μPD17104	μPD17103L	μPD17104L	μPD17107	μPD17108	μPD17107L	μPD17108L
ROM size	512 ∞ 16 bits							
RAM size	16 ∞ 4 bits							
Input/output ports Parentheses indicate number of N-ch open-drain pins	11 lines (3 lines)	16 lines (4 lines)	11 lines (3 lines)	16 lines (4 lines)	11 lines (3 lines)	16 lines (4 lines)	11 lines (3 lines)	16 lines (4 lines)
System clock	Ceramic oscillation				RC oscillation			
Supply voltage	2.7 to 6.0 V (at 2MHz) 4.5 to 6.0 V (at 8 MHz)		1.8 to 3.6 V (at 2 MHz)		2.7 to 6.0 V (at 250 kHz) 4.5 to 6.0 V (at 1 MHz)		1.5 to 3.6 V (at 200 kHz)	
Package	• 16-pin DIP • 16-pin SOP	• 22-pin shrink DIP • 24-pin SOP	• 16-pin DIP • 16-pin SOP	• 22-pin shrink DIP • 24-pin SOP	• 16-pin DIP • 16-pin SOP	• 22-pin shrink DIP • 24-pin SOP	• 16-pin DIP • 16-pin SOP	• 22-pin shrink DIP • 24-pin SOP
PROM version	μPD17P103	μPD17P104	μPD17P103	μPD17P104	μPD17P107	μPD17P108	μPD17P107	μPD17P108

■ μPD17120 Sub-series/μPD17134A Sub-series (ASC) (2/3)

Item	μPD17120	μPD17121	μPD17132	μPD17133	μPD17134A	μPD17135A	μPD17136A	μPD17137A
ROM size	768 ∞ 16 bits		1024 ∞ 16 bits		1024 ∞ 16 bits		2048 ∞ 16 bits	
RAM size	64 ∞ 4 bits		111 ∞ 4 bits		112 ∞ 4 bits		112 ∞ 4 bits	
Input/output ports	19 lines (input: 1)				22 lines (input: 2)			
External interrupt	1 line				1 line			
Analog inputs	——		Comparator 4 channels*		A/D converter 4 channels			
Timers	1 channel				3 channels			
Serial interface	1 channel				1 channel			
Power-on reset	Provided (Built-in)				Provided (Built-in)			
System clock	RC oscillation	Ceramic oscillation	RC oscillation	Ceramic oscillation	RC oscillation	Ceramic oscillation	RC oscillation	Ceramic oscillation
Instruction execution time	8 μs: @2 MHz	2 μs: @8 MHz	8 μs: @2 MHz	2 μs: @8 MHz	8 μs: @2 MHz	2 μs: @8 MHz	8 μs: @2 MHz	2 μs: @8 MHz
Supply voltage	2.7 to 5.5 V				2.7 to 5.5 V (When using A/D converter 5 V ±10 %)			
Package	• 24-pin shrink DIP • 18-pin SOP				• 28-pin shrink DIP • 28-pin SOP			
One-time PROM version	μPD17P132	μPD17P133	μPD17P132	μPD17P133	μPD17P136A	μPD17P137A	μPD17P136A	μPD17P137A

*: can be used as low-resolution A/D converter by software

■ μPD17145 Sub-series (ASC) (3/3)

Item	μPD17145	μPD17147	μPD17149
ROM size	1024 ∞ 16 bits	2048 ∞ 16 bits	4096 ∞ 16 bits
RAM size	110 ∞ 4 bits		
Input/output ports	23 lines (input: 3)		
External interrupt	1 line		
Analog inputs	A/D converter 4 channels		
Timers	3 channels		
Serial interface	1 channel		
Power-on reset	Provided (Mask option)		
System clock	Ceramic oscillation		
Instruction execution time	2 μs: @8 MHz		
Supply voltage	2.7 to 5.5 V (when using A/D converter 4.0 ~ 5.5 V, V_{REF} = 2.5 ~ V_{DD})		
Package	• 28-pin shrink DIP • 28-pin SOP		
One-time PROM version	μPD17P149		

4-Bit Single Chip Microcomputer

■ μPD172XX (remote control transmitter) (1/2)

	μPD17201A	μPD17207	μPD17202A	μPD17203A	μPD17204
ROM size	3072 ∞ 16 bits	4096 ∞ 16 bits	2048 ∞ 16 bits	4096 ∞ 16 bits	7936 ∞ 16 bits
RAM size	336 ∞ 4 bits		112 ∞ 4 bits	336 ∞ 4 bits	
Stack level	5 levels		5 levels	5 levels	7 levels
Input/output ports	19 lines		16 lines	28 lines	
External interrupt	1 line				
Timers	2 lines		2 lines	4 lines	
Static RAM	None		None	4K knibles	2K knibles
Infrared remote control carrier generator	Internally provided				
Infrared remote control signal receive amplifier	None			Internally provided	
LCD controller/driver	136 segments max.		96 segments max.	None	
8-bit A/D converter	4 channels		None		
Low voltage detection circuit	None				
Subclock (32 kHz)	Internally provided				
Operation voltage range	2.2 to 5.5 V				
Instruction execution time (4 MHz)	4 μs				
Package	• 80-pin plastic QFP		• 64-pin plastic QFP	• 52-pin plastic QFP	• 52-pin plastic QFP
One-time PROM version	μPD17P207★		μPD17P202A	μPD17P203A	μPD17P204

★: Under development

■ μPD172XX (remote control transmitter/ASC) (2/2)

	μPD17215	μPD17216	μPD17217	μPD17218
ROM size	2048 ∞ 16 bits	4096 ∞ 16 bits	6144 ∞ 16 bits	8192 ∞ 16 bits
RAM size	111 ∞ 4 bits		223 ∞ 4 bits	
Stack level	5 levels			
Input/output ports	20 lines			
External interrupt	1 line			
Timers	2 lines			
Infrared remote control carrier generator	Internally provided			
Low voltage detection circuit	Internally provided ($\overline{\text{WDOUT}}$)			
Operation voltage range	2.2 to 5.5 V (4 μs) 2.0 to 5.5 V (8 μs)			
Instruction execution time (4 MHz)	4 μs (high speed mode)			
Package	• 28-pin plastic SOP • 28-pin shrink DIP			
One-time PROM version	μPD17P218			

4-Bit Single Chip Microcomputer

■ μPD1700series (DTS) (1/2)

	μPD1708A	μPD1709A	μPD1713A
Typical applications	Car radio, tuner	TV, CATV	Car radio, tuner
Package	• 52-pin QFP	• 28-pin shrink DIP	• 52-pin QFP
Supply voltage	5 V ±10 %		
Supply current (CPU)	400 μA TYP.	600 μA TYP.	400 μA TYP.
ROM	16 bits x 1528 steps	16 bits x 1526 steps	16 bits x 1528 steps
RAM	4 bits x 96 words	4 bits x 64 words	4 bits x 96 words
Number of instructions	77	82	79
Display	LCD (1/2 duty)	LED	LCD (1/2 duty)
Segments	Internal LCD driver provided Segments: 23 Commons: 2	7 (internal LED driver provided)	Internal LCD driver provided Segments: 21 Commons: 2
Digits		2	
Input ports	4 (K_0 to K_3)	0	4 (K_0 to K_3) + 2
Output ports	8	2	7
I/O ports	4	6 (internal serial I/O provided)	4
VDP (D/A converter)	0	1	0
A/D converter	0	1	0
Crystal oscillator	4.5 MHz		
PLL reference frequency	1, 5, 6.25, 9, 10, 12.5, 25 kHz		
Applicable prescaler	Internally provided (150 MHz)	μPB595 (1 GHz)	Internally provided (150 MHz)

■ μPD1700series (DTS) (2/2)

	μPD1715	μPD1716	μPD1720A	μPD1721	μPD1723
Typical applications	Portable radio	TV, VCR, car radio, high performance tuber	Car radio (for AM radio)	TV, VCR	High performance tuner, car radio
Package	• 54-pin QFP	• 28-pin shrink DIP	• 52-pin QFP	• 28-pin shrink DIP	• 64-pin QFP
Supply voltage	2.0 V to 3.6 V	5 V ±10 %			
Supply current (CPU)	30 μA TYP.	500 μA TYP.	400 μA TYP.	600 μA TYP.	500 μA TYP.
ROM	16 bits ∞ 1528 steps	16 bits ∞ 1016 steps	16 bits ∞ 1016 steps	16 bits ∞ 1526 steps	16 bits ∞ 2040 steps
RAM	4 bits ∞ 96 words	4 bits ∞ 64 words	4 bits ∞ 64 words	4 bits ∞ 64 words	4 bits ∞ 256 words
Number of instructions	76	82	78	82	94
Display	LCD (1/3 duty)	–	LCD (1/2 duty)	LED	LCD (1/2 duty)
Segments	Internal LCD driver provided Segments: 16 Commons: 3	–	Internal LCD driver provided Segments: 21 Commons: 2	7	Internal LCD driver provided Segments: 28 Commons: 2
Digits		–		2	
Input ports	4 (K_0 to K_3)	0	4 (K_0 to K_3)	0	4 (K_0 to K_3)
Output ports	9	5	7	2	12
I/O ports	4	8	4	6 (internal serial I/O provided)	8 (internal serial I/O provided)
VDP (D/A converter)	1	0	0	1	1
A/D converter	0	1	0	1	1
Crystal oscillator	75 kHz	4.5 MHz			
PLL reference frequency	1, 3, 5, 6.25, 12.5, 25 kHz	1, 5, 6.25, 9, 10, 12.5, 25 kHz			
Applicable prescaler	Internally provided (130 MHz)	Internally provided (150 MHz) μPB587 (1 GHz)	–	μPB595 (1 GHz)	Internally provided (150 MHz)

4-Bit Single Chip Microcomputer

■ μPD6133 series (remote control transmitter/ASC)

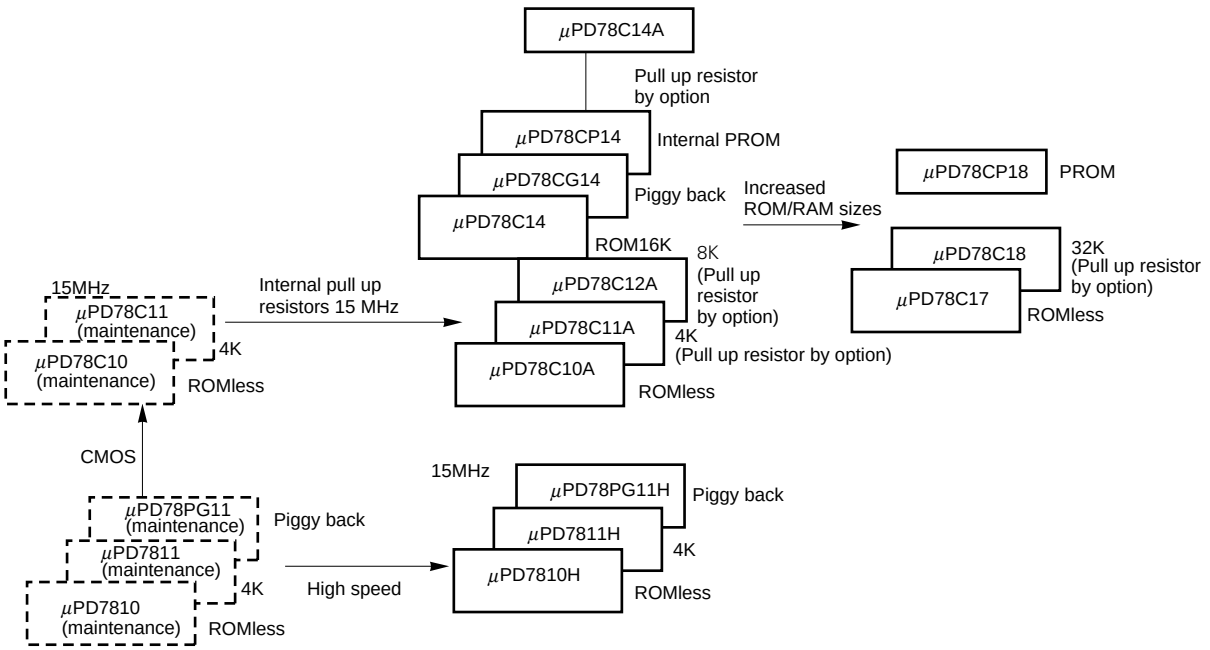
Type number	**μPD6133**	**μPD63★**	**μPD6134**	**μPD64★**	**μPD6604**
Operating voltage range	1.8 to 3.6 V				
Operation clock (f_X)	300 k to 1 MHz	2 M to 8 MHz	300 k to 1 MHz	2 M to 8 MHz	300 k to 1 MHz
	Ceramic oscillator			CR oscillator	
ROM size	512 × 10 bits		1002 × 10 bits		
RAM size	32 × 4 bits				
Modulation carrier frequency	f_X, $f_X/2$, $f_X/8$, $f_X/12$, $f_X/16$, $f_X/24$, High level				
9 bits timer	1 ch				
Number of keys	8 × 6 = 48				
Low voltage detection circuit	Provided (Mask-option)				
Package	• 20-pin SOP		• 20-pin SOP • 20-pin shrink DIP		• 20-pin shrink SOP • 20-pin SOP
Flash EEPROM version	μPD61F35★				

★: Under development

8-Bit Single Chip Microcomputer

87AD Series

■ 87AD series product evolution



■ 87AD series (1/2)

Item		**μPD7811H/10H**
Number of instructions		158
Minimum instruction execution cycle		0.8 μs/15 MHz
Internal memory	ROM size	4096 × 8 bits (μPD7810H is ROMless)
	RAM size	256 × 8 bits
Inter-rupts	External sources	3 (NMI, INT 1, 2)
	Internal sources	8 (INTT 0, 1), (INTE 0, 1), (INTEIN, INTAD), (INTSR, INTST)
Timer/Counters		8-bits × 2, 16-bit × 1
I/O pins	Input ports	8-bit (AN)
	Input/output ports	8-bit × 5 (PA, PB, PC, PD, PF)
	Serial I/O	1 channel (PC 0/TxD), (PC 1/RxD), (PC 2/SCK)
Features		• 8 analog signal input pins. Internal 8-bit high precision A/D converter (absolute accuracy: 0.4 % ±1/2 LSB) • Serial interface can accommodate asynchronous, synchronous, and I/O interface (capable of 9600 bps in asynchronous mode). • Enhanced timer/counters for control applications • Internal zero-cross detection function for time or phase control. Enhanced interrupt function for effective utilization of abundant internal functions.
Process		N-MOS
Package		• 64-pin QUIP/SDIP
Piggy back or EPROM version		**μPD78PG11H**

8-Bit Single Chip Microcomputer

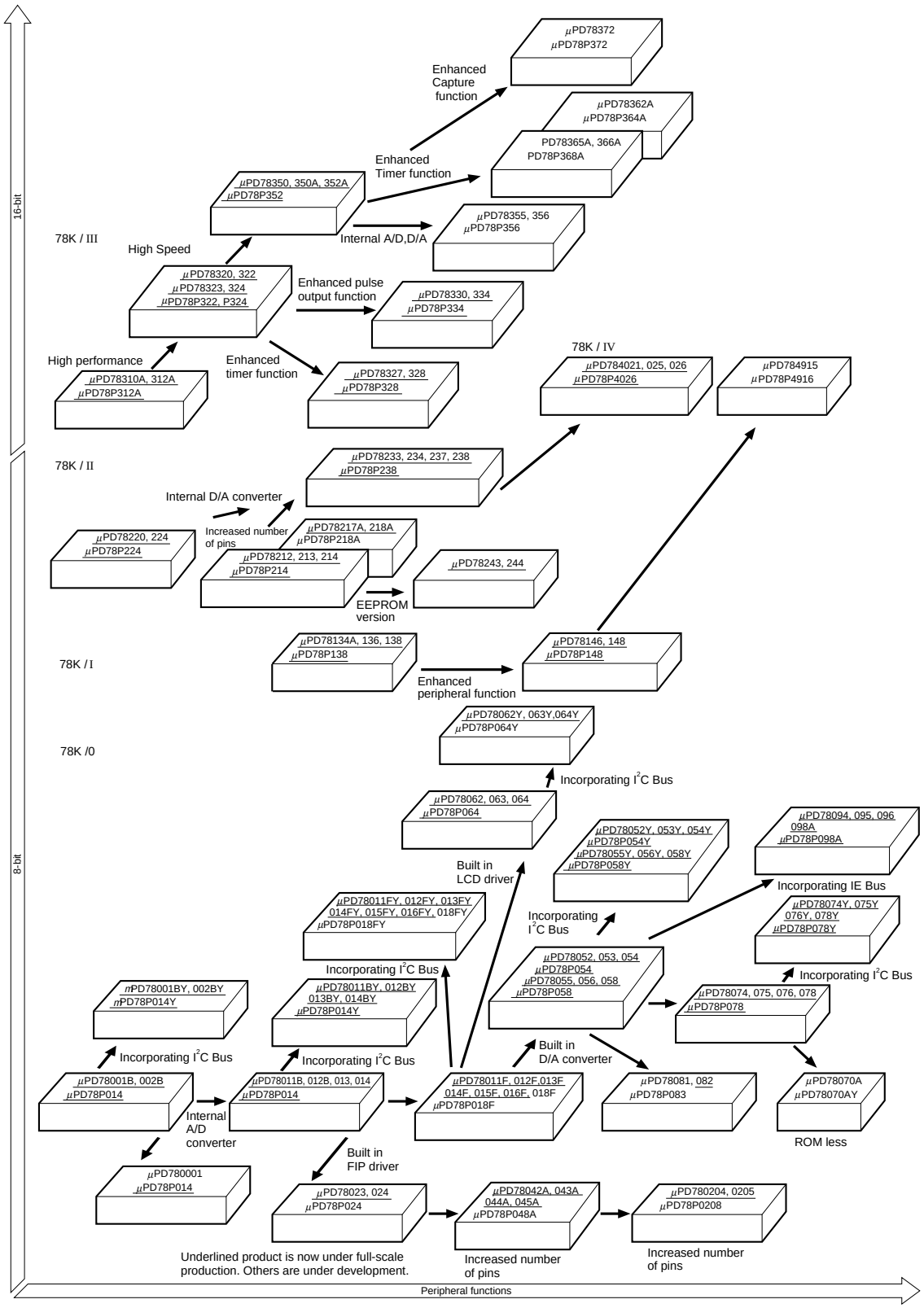
■ 87AD series (2/2)

Item		μPD78C11A/10A	μPD78C12A	μPD78C14	μPD78C14A	μPD78C18/17
Number of instructions		159				
Minimum instruction execution cycle		0.8 μs/15 MHz				
Internal memory	ROM size	4K bytes (μPD78C10A is ROMless)	8K bytes	16K bytes		32K bytes (μPD78C17 is ROMless)
	RAM size	256 × 8-bits				1024 × 8-bits
Inter-rupts	External sources	3				
	Internal sources	8				
Timer/Counters		8-bits × 2, 16-bit × 1				
I/O pins	Input ports	8-bit (AN)				
	Input/output ports	8-bit × 5 (PA, PB, PC, PD, PF)				
	Serial I/O	1 channel (PC 0/TxD), (PC 1/RxD), (PC 2/$\overline{SCK}$)				
Features		• Full CMOS version of μPD7811H • Enhanced standby function (STOP mode) • Low power consumption: 1μA at 2.5 V (typ.) • Internal pull up resistors can be specified for ports A, B, and C, by mask option for μPD78C11A.	• 8K-byte ROM version of μPD78C11A • Internal pull up resistors can be specified.	• 16K-byte ROM version of μPD78C11	• Same functions as μPD78C14 • Internal pull up resistors can be specified. • Package size: 14 mm × 14 mm • Pin pitch: 0.8 mm For super miniature size system.	• Large internal ROM/RAM ROM: 32K bytes (μPD78C18) RAM: 1024 bytes • Internal pull up resistors can be specified (μPD78C18)
Process		CMOS				
Package		• 64-pin QUIP/SDIP/QFP (14 mm × 20 mm) • 68-pin QFJ			• 64-pin QFP (□ 14 mm)	• 64-pin QUIP/SDIP/QFP (14 mm × 20 mm)
Piggy back or EPROM version		**μPD78CG14, μPD78CP14**				**μPD78CP18**

8/16-Bit Single Chip Microcomputer

78K Series

■ 78K series product evolution



8/16-Bit Single Chip Microcomputer

■ 78K/0 series (General purpose series)

Type number		μPD780001★	μPD78001B	μPD78002B	μPD78011B	μPD78012B	μPD78013	μPD78014	μPD78P014
Number of instruction		63	61		63				
Instruction cycle	Main system clock	0.4 μs, 0.8 μs, 1.6 μs, 3.2 μs, 6.4 μs (10 MHz operation)							
	Sub system clock	122 μs (32.768 kHz operation)							
Memory space extension function		64K bytes							
General register		8-bit ∞ 8 ∞ 4 banks							
Internal memory	ROM size	8K bytes		16K bytes	8K bytes	16K bytes	24K bytes	32K bytes	
	Internal high speed RAM	192 bytes	256 bytes	384 bytes	512 bytes		1024 bytes		
	Buffer RAM size	–		–	32 bytes		32 bytes		
Interrupt	Internal source	7			10				
	External source	4	5		5				
I/O port	CMOS input	4	2		2				
	CMOS input/output	35	47		47				
	N-ch open-drain I/O	–	4		4				
Timer/Counter		8-bit timer ∞ 2 Watchdog timer ∞ 1	8-bit timer ∞ 2 Watch timer ∞ 1 Watchdog timer ∞ 1		16-bit timer ∞ 1 8-bit timer ∞ 2 Watch timer ∞ 1 Watchdog timer ∞ 1				
Serial interface		Clock synchronized ∞ 1 ch			Clock synchronized ∞ 1 ch Clock synchronized with automatic TX/RX function ∞ 1 ch				
A/D converter		8-bit ∞ 8 ch	–		8-bit ∞ 8 ch				
Operation voltage		2.7 to 6.0 V			2.7 to 6.0 V				
Package		• 64-pin plastic shrink DIP • 64-pin plastic QFP (□14 mm)			• 64-pin plastic shrink DIP • 64-pin plastic QFP (□14 mm)				• 64-pin plastic shrink DIP • 64-pin plastic QFP (□14 mm) • 64-pin ceramic shrink DIP with window

★: Under development

8/16-Bit Single Chip Microcomputer

■ 78K/0 series (General purpose with I^2C bus interface series)

Type number		μPD78001BY	μPD78002BY	μPD78011BY	μPD78012BY	μPD78013Y	μPD78014Y	μPD78P014Y
Number of instruction		61		63				
Instruction cycle	Main system clock	0.4 μs, 0.8 μs, 1.6 μs, 3.2 μs, 6.4 μs (10 MHz operation)						
	Sub system clock	122 μs (32.768 kHz operation)						
Memory space extension function		64K bytes						
General register		8-bit × 8 × 4 banks						
Internal memory	ROM size	8K bytes	16K bytes	8K bytes	16K bytes	24K bytes	32K bytes	
	Internal high speed RAM	256 bytes	384 bytes	512 bytes		1024 bytes		
	Buffer RAM size	–	–	32 bytes		32 bytes		
Interrupt	Internal source	7		10				
	External source	5		5				
I/O port	CMOS input	2		2				
	CMOS input/output	47		47				
	N-ch open-drain I/O	4		4				
Timer/Counter		8-bit timer × 2 Watch timer × 1 Watchdog timer × 1		16-bit timer × 1 8-bit timer × 2 Watch timer × 1 Watchdog timer × 1				
Serial interface		Clock synchronized × 1 ch		I^2C bus interface × 1 ch Clock synchronized with automatic TX/RX function × 1 ch				
A/D converter		–		8-bit × 8 ch				
Operation voltage		2.7 to 6.0 V		2.7 to 6.0 V				
Package		• 64-pin plastic shrink DIP • 64-pin plastic QFP (□14 mm)		• 64-pin plastic shrink DIP • 64-pin plastic QFP (□14 mm)				• 64-pin plastic shrink DIP • 64-pin plastic QFP (□14 mm) • 64-pin ceramic shrink DIP with window

8/16-Bit Single Chip Microcomputer

■ 78K/0 series (General purpose series)

Type number		μPD78011F	μPD78012F	μPD78013F	μPD78014F	μPD78015F	μPD78016F	μPD78018F★	μPD78P018F★
Number of instruction		63							
Instruction cycle	Main system clock	0.4 μs, 0.8 μs, 1.6 μs, 3.2 μs, 6.4 μs (10 MHz operation)							
	Sub system clock	122 μs (32.768 kHz operation)							
Memory space extension function		64K bytes							
General register		8-bit × 8 × 4 banks							
Internal memory	ROM size	8K bytes	16K bytes	24K bytes	32K bytes	40K bytes	48K bytes	60K bytes	
	Internal high speed RAM	512 bytes		1024 bytes		1536 bytes		2048 bytes	
	Buffer RAM size	32 bytes							
Interrupt	Internal source	10							
	External source	5							
I/O port	CMOS input	2							
	CMOS input/output	47							
	N-ch open-drain I/O	4							
Timer/Counter		16-bit timer × 1 8-bit timer × 2 Watch timer × 1 Watchdog timer × 1							
Serial interface		Clock synchronized × 1 ch Clock synchronized with automatic TX/RX function × 1 ch							
A/D converter		8-bit × 8 ch							
Operation voltage		1.8 to 5.5 V							
Package		• 64-pin plastic shrink DIP • 64-pin plastic QFP (□12 mm) • 64-pin plastic QFP (□14 mm)							• 64-pin plastic shrink DIP • 64-pin plastic QFP (□12 mm) • 64-pin plastic QFP (□14 mm) • 64-pin ceramic shrink DIP with window • 64-pin ceramic WQFN with window (□14 mm)

★: Under development

8/16-Bit Single Chip Microcomputer

■ 78K/0 series (General purpose series)

Type number		μPD78011FY	μPD78012FY	μPD78013FY	μPD78014FY	μPD78015FY	μPD78016FY	μPD78018FY★	μPD78P018FY★
Number of instruction		63							
Instruction cycle	Main system clock	0.4 μs, 0.8 μs, 1.6 μs, 3.2 μs, 6.4 μs (10 MHz operation)							
	Sub system clock	122 μs (32.768 kHz operation)							
Memory space extension function		64K bytes							
General register		8-bit × 8 × 4 banks							
Internal memory	ROM size	8K bytes	16K bytes	24K bytes	32K bytes	40K bytes	48K bytes	60K bytes	
	Internal high speed RAM	512 bytes		1024 bytes		1536 bytes		2048 bytes	
	Buffer RAM size	32 bytes							
Interrupt	Internal source	10							
	External source	5							
I/O port	CMOS input	2							
	CMOS input/output	47							
	N-ch open-drain I/O	4							
Timer/Counter		16-bit timer × 1 8-bit timer × 2 Watch timer × 1 Watchdog timer × 1							
Serial interface		I^2C bus interface × 1 ch Clock synchronized with automatic TX/RX function × 1 ch							
A/D converter		8-bit × 8 ch							
Operation voltage		1.8 to 5.5 V							
Package		• 64-pin plastic shrink DIP • 64-pin plastic QFP (□12 mm) • 64-pin plastic QFP (□14 mm)							• 64-pin plastic shrink DIP • 64-pin plastic QFP (□12 mm) • 64-pin plastic QFP (□14 mm) • 64-pin ceramic shrink DIP with window • 64-pin ceramic WQFN with window (□14 mm)

★: Under development

8/16-Bit Single Chip Microcomputer

■ 78K/0 series (FIP series)

Type number		μPD78023	μPD78024	μPD78P024★
Number of instruction		63		
Instruction cycle	Main system clock	0.4 μs, 0.8 μs, 1.6 μs, 3.2 μs, 6.4 μs (5 MHz operation)		
	Sub system clock	122 μs (32.768 kHz operation)		
General register		8-bit ∞ 8 ∞ 4 banks		
Internal memory	ROM size	24K bytes	32K bytes	
	Internal high speed RAM	512 bytes		
	Display data RAM size	32 bytes		
Interrupt	Internal source	11		
	External source	4		
I/O port	CMOS input	2		
	CMOS input/output	26		
	P-ch open-drain output	18		
	P-ch open-drain I/O	8		
Timer/Counter		16-bit timer ∞ 1 8-bit timer ∞ 2 Watch timer ∞ 1 Watchdog timer ∞ 1		
Serial interface		Clock synchronized ∞ 2 ch		
A/D converter		8-bit ∞ 8 ch		
Operation voltage		2.7 to 6.0 V		
Package		• 64-pin plastic QFP (14 mm ∞ 20 mm) • 64-pin plastic shrink DIP		• 64-pin plastic QFP (14 mm ∞ 20 mm) • 64-pin plastic shrink DIP • 64-pin ceramic shrink DIP with window

★: Under development

8/16-Bit Single Chip Microcomputer

■ 78K/0 series (FIP series)

Type number		μPD78042A	μPD78043A	μPD78044A	μPD78045A	μPD78P048A
Number of instruction		63				
Instruction cycle	Main system clock	0.4 μs, 0.8 μs, 1.6 μs, 3.2 μs, 6.4 μs (5 MHz operation)				
	Sub system clock	122 μs (32.768 kHz operation)				
General register		8-bit × 8 × 4 banks				
Internal memory	ROM size	16K bytes	24K bytes	32K bytes	40K bytes	60K bytes
	Internal high speed RAM	512 bytes		1024 bytes		
	Buffer RAM size	64 bytes				
	Display data RAM size	48 bytes				
Interrupt	Internal source	12				
	External source	4				
I/O port	CMOS input	2				
	CMOS input/output	27				
	N-ch open-drain I/O	5				
	P-ch open-drain output	18				
	P-ch open-drain I/O	16				
Timer/Counter		16-bit timer × 1 8-bit timer × 2 Watch timer × 1 Watchdog timer × 1 6-bit Up/Down counter × 1				
FIP controller/driver		Display output: 34 • Segment output: 9-24 • Digit output: 2-16				
Serial interface		Clock synchronized × 1 ch Clock synchronized with automatic TX/RX function × 1 ch				
A/D converter		8-bit × 8 ch				
Operation voltage		2.7 to 6.0 V				
Package		• 80-pin plastic QFP (14 mm × 20 mm)				• 80-pin plastic QFP (14 mm × 20 mm) • 80-pin ceramic WQFN (14 mm × 20 mm)

8/16-Bit Single Chip Microcomputer

■ 78K/0 series (FIP series)

Type number		μPD780204	μPD780205	μPD78P0208★
Number of instruction		63		
Instruction cycle	Main system clock	0.4 μs, 0.8 μs, 1.6 μs, 3.2 μs, 6.4 μs (5 MHz operation)		
	Sub system clock	122 μs (32.768 kHz operation)		
General register		8-bit ∞ 8 ∞ 4 banks		
Internal memory	ROM size	32K bytes	40K bytes	60K bytes
	Internal high speed RAM	1024 bytes		
	Internal extended RAM	–	–	1024 bytes
	Buffer RAM size	64 bytes		
	Display data RAM size	80 bytes		
Interrupt	Internal source	12		
	External source	4		
I/O port	CMOS input	2		
	CMOS input/output	27		
	N-ch open-drain I/O	5		
	P-ch open-drain output	24		
	P-ch open-drain I/O	16		
Timer/Counter		16-bit timer ∞ 1 8-bit timer ∞ 2 Watch timer ∞ 1 Watchdog timer ∞ 1 6-bit Up/Down counter ∞ 1		
FIP controller/driver		Display output: 53 • Segment output: 9-40 • Digit output: 2-16		
Serial interface		Clock synchronized ∞ 1 ch Clock synchronized with automatic TX/RX function ∞ 1 ch		
A/D converter		8-bit ∞ 8 ch		
Operation voltage		2.7 to 6.0 V		
Package		• 100-pin plastic QFP (14 mm ∞ 20 mm)		• 100-pin plastic QFP (14 mm ∞ 20 mm) • 100-pin ceramic WQFN (14 mm ∞ 20 mm)

★: Under development

8/16-Bit Single Chip Microcomputer

■ 78K/0 series (General purpose series)

Type number		μPD78052	μPD78053	μPD78054	μPD78P054	μPD78055	μPD78056	μPD78058	μPD78P058
Number of instruction		63							
Instruction cycle	Main system clock	0.4 μs, 0.8 μs, 1.6 μs, 3.2 μs, 6.4 μs 12.8 μs (5.0 MHz operation)							
	Sub system clock	122 μs (32.768 kHz operation)							
General register		8-bit ∞ 8 ∞ 4 banks							
Internal memory	ROM size	16K bytes	24K bytes	32K bytes		40K bytes	48K bytes	60K bytes	
	Internal high speed RAM	512 bytes	1024 bytes						
	Buffer RAM size	32 bytes							
	Internal extended RAM	—						1024 bytes	
Interrupt	Internal source	15							
	External source	8							
I/O port	CMOS input	2							
	CMOS input/output	63							
	N-ch open-drain I/O	4							
Timer/Counter		16-bit timer ∞ 1 8-bit timer ∞ 2 Watch timer ∞ 1 Watchdog timer ∞ 1							
Serial interface		Clock synchronized ∞ 1 ch Clock synchronized with automatic TX/RX function ∞ 1 ch Clock synchronized or UART ∞ 1 ch							
A/D converter		8-bit ∞ 8 ch							
D/A converter		8-bit ∞ 2 ch							
Operation voltage		2.0 to 6.0 V							
Package		• 80-pin plastic QFP (□12 mm) • 80-pin plastic QFP (□14 mm)			• 80-pin plastic QFP (□12 mm) • 80-pin plastic QFP (□14 mm) • 80-pin ceramic WQFN (□14 mm)	• 80-pin plastic QFP (□14 mm)			• 80-pin plastic QFP (□14 mm) • 80-pin ceramic WQFN (□14 mm)

8/16-Bit Single Chip Microcomputer

■ 78K/0 series (General purpose with I²C bus interface series)

Type number		μPD78052Y	μPD78053Y	μPD78054Y	μPD78P054Y	μPD78055Y	μPD78056Y	μPD78058Y	μPD78P058Y
Number of instruction		63							
Instruction cycle	Main system clock	0.4 μs, 0.8 μs, 1.6 μs, 3.2 μs, 6.4 μs 12.8 μs (5.0 MHz operation)							
	Sub system clock	122 μs (32.768 kHz operation)							
General register		8-bit ∞ 8 ∞ 4 banks							
Internal memory	ROM size	16K bytes	24K bytes	32K bytes		40K bytes	48K bytes	60K bytes	
	Internal high speed RAM	512 bytes	1024 bytes						
	Buffer RAM size	32 bytes							
	Internal extended RAM	—						1024 bytes	
Interrupt	Internal source	15							
	External source	8							
I/O port	CMOS input	2							
	CMOS input/output	63							
	N-ch open-drain I/O	4							
Timer/Counter		16-bit timer ∞ 1 8-bit timer ∞ 2 Watch timer ∞ 1 Watchdog timer ∞ 1							
Serial interface		Clock synchronized with I²C bus interface function ∞ 1 ch Clock synchronized with automatic TX/RX function ∞ 1 ch Clock synchronized or UART ∞ 1 ch							
A/D converter		8-bit ∞ 8 ch							
D/A converter		8-bit ∞ 2 ch							
Operation voltage		2.0 to 6.0 V							
Package		• 80-pin plastic QFP (□12 mm) • 80-pin plastic QFP (□14 mm)			• 80-pin plastic QFP (□12 mm) • 80-pin plastic QFP (□14 mm) • 80-pin ceramic WQFN (□14 mm)	• 80-pin plastic QFP (□14 mm)			• 80-pin plastic QFP (□14 mm) • 80-pin ceramic WQFN (□14 mm)

8/16-Bit Single Chip Microcomputer

■ 78K/0 series (LCD series)

Type number		μPD78062	μPD78063	μPD78064	μPD78P064
Number of instruction		63			
Instruction cycle	Main system clock	0.4 μs, 0.8 μs, 1.6 μs, 3.2 μs, 6.4 μs, 12.8 μs (5.0 MHz operation)			
	Sub system clock	122 μs (32.768 kHz operation)			
General register		8-bit × 8 × 4 banks			
Internal memory	ROM size	16K bytes	24K bytes	32K bytes	
	Internal high speed RAM	512 bytes	1024 bytes		
	Display data RAM size	40 × 4-bit			
Interrupt	Internal source	14			
	External source	7			
I/O port	CMOS input	2			
	CMOS input/output	55			
Timer/Counter		16-bit timer/event counter × 1 8-bit timer/event counter × 2 Watch timer × 1 Watchdog timer × 1			
Serial interface		Clock synchronized × 1 ch Clock synchronized or UART × 1 ch			
A/D converter		8-bit × 8 ch			
LCD controller/driver		• Segment output : 40 (max) • Common output : 4 (max) • Display mode : 1/2, 1/3 duty			
Operation voltage		2.0 to 6.0 V			
Package		• 100-pin plastic QFP (□14 mm, 0.5 mm pitch) • 100-pin plastic QFP (14 mm × 20 mm, 0.65 mm pitch)			• 100-pin plastic QFP (□14 mm) • 100-pin plastic QFP (14 mm × 20) • 100-pin ceramic WQFN (14 mm × 20 mm)

8/16-Bit Single Chip Microcomputer

■ 78K/0 series (LCD series)

Type number		μPD78062Y	μPD78063Y	μPD78064Y	μPD78P064Y★
Number of instruction		63			
Instruction cycle	Main system clock	0.4 μs, 0.8 μs, 1.6 μs, 3.2 μs, 6.4 μs, 12.8 μs (5.0 MHz operation)			
	Sub system clock	122 μs (32.768 kHz operation)			
General register		8-bit × 8 × 4 banks			
Internal memory	ROM size	16K bytes	24K bytes	32K bytes	
	Internal high speed RAM	512 bytes	1024 bytes		
	Display data RAM size	40 × 4-bit			
Interrupt	Internal source	14			
	External source	7			
I/O port	CMOS input	2			
	CMOS input/output	55			
Timer/Counter		16-bit timer/event counter × 1 8-bit timer/event counter × 2 Watch timer × 1 Watchdog timer × 1			
Serial interface		Clock synchronized with I^2C bus interface function × 1 ch Clock synchronized or UART × 1 ch			
A/D converter		8-bit × 8 ch			
LCD controller/driver		• Segment output : 40 (max) • Common output : 4 (max) • Display mode : 1/2, 1/3 duty			
Operation voltage		2.0 to 6.0 V			
Package		• 100-pin plastic QFP (□14 mm, 0.5 mm pitch) • 100-pin plastic QFP (14 mm × 20 mm, 0.65 mm pitch)			• 100-pin plastic QFP (□14 mm) • 100-pin plastic QFP (14 mm × 20) • 100-pin ceramic WQFN (14 mm × 20 mm)

★: Under development

8/16-Bit Single Chip Microcomputer

■ 78K/0 series (General purpose series)

Type number		μPD78074	μPD78075	μPD78076	μPD78078	μPD78P078
Number of instruction		63				
Instruction cycle	Main system clock	0.4 μs, 0.8 μs, 1.6 μs, 3.2 μs, 6.4 μs, 12.8 μs (5.0 MHz operation)				
	Sub system clock	122 μs (32.768 kHz operation)				
Memory space extension function		64K bytes				
General register		8-bit × 8 × 4 banks				
Internal memory	ROM size	32K bytes	40K bytes	48K bytes	60K bytes	60K bytes
	Internal high speed RAM	1024 bytes				
	Internal extended RAM	———		1024 bytes		
	Buffer RAM size	32 bytes				
Interrupt	Internal source	17				
	External source	8				
I/O port	CMOS input	2				
	CMOS input/output	78				
	N-ch open-drain I/O	8				
Timer/Counter		16-bit timer × 1 8-bit timer × 4 Watch timer × 1 Watchdog timer × 1				
Serial interface		Clock synchronized × 1 ch Clock synchronized with automatic TX/RX function × 1 ch Clock synchronized or UART × 1 ch				
A/D converter		8-bit × 8 ch				
D/A converter		8-bit × 2 ch				
Operation voltage		1.8 to 5.5 V				
Package		• 100-pin plastic QFP (□14 mm) • 100-pin plastic QFP (14 mm × 20 mm)				• 100-pin plastic QFP (□14 mm) • 100-pin plastic QFP (14 mm × 20 mm) • 100-pin ceramic WQFN (14 mm × 20 mm)

8/16-Bit Single Chip Microcomputer

■ 78K/0 series (General purpose series)

Type number		μPD78074Y	μPD78075Y	μPD78076Y	μPD78078Y	μPD78P078Y
Number of instruction		63				
Instruction cycle	Main system clock	0.4 μs, 0.8 μs, 1.6 μs, 3.2 μs, 6.4 μs, 12.8 μs (5.0 MHz operation)				
	Sub system clock	122 μs (32.768 kHz operation)				
Memory space extension function		64K bytes				
General register		8-bit × 8 × 4 banks				
Internal memory	ROM size	32K bytes	40K bytes	48K bytes	60K bytes	60K bytes
	Internal high speed RAM	1024 bytes				
	Internal extended RAM	—		1024 bytes		
	Buffer RAM size	32 bytes				
Interrupt	Internal source	17				
	External source	8				
I/O port	CMOS input	2				
	CMOS input/output	78				
	N-ch open-drain I/O	8				
Timer/Counter		16-bit timer × 1 8-bit timer × 4 Watch timer × 1 Watchdog timer × 1				
Serial interface		Clock synchronized with I^2C bus interface function × 1 ch Clock synchronized with automatic TX/RX function × 1 ch Clock synchronized or UART × 1 ch				
A/D converter		8-bit × 8 ch				
D/A converter		8-bit × 2 ch				
Operation voltage		1.8 to 5.5 V				
Package		• 100-pin plastic QFP (□14 mm) • 100-pin plastic QFP (14 mm × 20 mm)				• 100-pin plastic QFP (□14 mm) • 100-pin plastic QFP (14 mm × 20 mm) • 100-pin ceramic WQFN (14 mm × 20 mm)

8/16-Bit Single Chip Microcomputer

■ 78K/0 series (General purpose series)

Type number		μPD78070A	μPD78070AY
Number of instruction		63	
Instruction cycle	Main system clock	0.4 μs, 0.8 μs, 1.6 μs, 3.2 μs, 6.4 μs, 12.8 μs (5.0 MHz operation)	
	Sub system clock	122 μs (32.768 kHz operation)	
Memory space extension function		64K bytes	
General register		8-bit × 8 × 4 banks	
Internal memory	Internal high speed RAM	1024 bytes	
	Buffer RAM size	32 bytes	
Interrupt	Internal source	17	
	External source	8	
I/O port	CMOS input	2	
	CMOS input/output	78	
	N-ch open-drain I/O	8	
Timer/Counter		16-bit timer × 1 8-bit timer × 4 Watch timer × 1 Watchdog timer × 1	
Serial interface		Clock synchronized × 1 ch Clock synchronized with automatic TX/RX function × 1 ch Clock synchronized or UART × 1 ch	Clock synchronized with I^2C bus interface function × 1 ch Clock synchronized with automatic TX/RX function × 1 ch Clock synchronized or UART × 1 ch
A/D converter		8-bit × 8 ch	
D/A converter		8-bit × 2 ch	
Operation voltage		1.8 to 5.5 V	
Package		• 100-pin plastic QFP (□14 mm) • 100-pin plastic QFP (14 mm × 20 mm)	

8/16-Bit Single Chip Microcomputer

■ 78K/0 series (General purpose series)

Type number		μPD78081★	μPD78082	μPD78P083★
Number of instruction		63		
Instruction cycle	Main system clock	0.4 μs, 0.8 μs, 1.6 μs, 3.2 μs, 6.4 μs, 12.8 μs (5.0 MHz operation)		
Memory space extension function		64K bytes		
General register		8-bit × 8 × 4 banks		
Internal memory	ROM size	8K bytes	16K bytes	24K bytes
	Internal high speed RAM	256 bytes	384 bytes	512 bytes
Interrupt	Internal source	8		
	External source	3		
I/O port	CMOS input	1		
	CMOS input/output	32		
Timer/Counter		8-bit timer × 2 Watch timer × 1		
Serial interface		Clock synchronized or UART × 1 ch		
A/D converter		8 bit × 8 ch		
Operation voltage		1.8 to 5.5 V		
Package		• 42-pin plastic shrink DIP • 44-pin plastic QFP (10 mm × 10 mm)		• 42-pin plastic shrink DIP • 44-pin plastic QFP (10 mm × 10 mm) • 42-pin ceramic shrink DIP with window

★: Under development

8/16-Bit Single Chip Microcomputer

■ 78K/0 series (IEBus controller series)

Type number		μPD78094	μPD78095	μPD78096	μPD78098A	μPD78P098A
Number of instruction		63				
Instruction cycle	Main system clock	0.5 μs, 1.0 μs, 2.0 μs, 4.0 μs, 8.0 μs 16.0 μs (6.0 MHz operation)				
	Sub system clock	122 μs (32.768 kHz operation)				
General register		8-bit × 8 × 4 banks				
Internal memory	ROM size	32K bytes	40K bytes	48K bytes	60K bytes	
	Internal high speed RAM	1024 bytes			3072 bytes	
	Buffer RAM size	32 bytes				
Interrupt	Internal source	16				
	External source	8				
I/O port	CMOS input	2				
	CMOS input/output	63				
	N-ch open-drain I/O	4				
Timer/Counter		16-bit timer × 1 8-bit timer × 2 Watch timer × 1 Watchdog timer × 1				
Serial interface		Clock synchronized × 1 ch Clock synchronized with automatic TX/RX function × 1 ch Clock synchronized or UART × 1 ch				
IE bus controller		TX/RX speed: 26k bps (max.)				
A/D converter		8-bit × 8 ch				
D/A converter		8-bit × 2 ch				
Operation voltage		2.7 to 6.0 V				
Package		• 80-pin plastic QFP (□14 mm)			• 80-pin plastic QFP (□14 mm) • 80-pin ceramic WQFN (□14 mm)	

8/16-Bit Single Chip Microcomputer

■ 78K/I series

Type number		μPD78134	μPD78134A	μPD78136	μPD78138	μPD78P138	μPD78146	μPD78148	μPD78P148
Number of instruction		63	64						
Minimum instruction execution cycle		333 ns/12 MHz							
Data memory space extension function		64K bytes					—		
Internal memory	ROM size	16K bytes		24K bytes	32K bytes	32K bytes (PROM)	24K bytes	32K bytes	32K bytes (PROM)
	RAM size	384 bytes		640 bytes			688 bytes*	816 bytes*	
Inter-rupt	External sources	5					5		
	Internal sources	12					20		
I/O pins	Input ports	10					24		
	Output ports	12					12		
	Input/output ports	36					40		
Analog input		8-bit A/D converter 8 channels					8-bit A/D converter 15 channels		
OP-amp		———					2 channels		
Timer/Counter		16-bit timer ∞ 3 7-bit timer ∞ 1 18-bit free-running-counter ∞ 1					16-bit timer ∞ 3 8-bit timer ∞ 1 22-bit free-running-counter ∞ 1 8-bit up-down-counter ∞ 1		
PWM output		12-bit PWM ∞ 2 (carrier freq. 23.4 KHz)	12-bit PWM ∞ 2 (carrier freq. 23.4 KHz/46.9 KHz)				12-bit PWM ∞ 2 (carrier freq. 23.4 KHz/46.9 KHz) 8-bit PWM ∞ 3 (carrier freq. 5.9 KHz) 14-bit PWM ∞ 1 (carrier freq. 5.9 KHz)		
Multiplier		———					Hardware multiplier is included		
Serial interface		Clock synchronized (can accommodate SBI) 1 channel					Clock synchronized (can accommodate SBI) 1 channel Clock synchronized (automatic data transmit function) 1 channel		
Features		• System-control and servo control for VCR • Multi-function timer set for software servo control application such as VCR					• System-control and servo control for VCR • Multi-function timer set for software-servo control application such as VCR • High-speed multiply with hardware multiplier • Low-voltage and low-current count operation with Hardware clock function		
Package		• 80-pin QFP				• 80-pin QFP • 80-pin WQFN	• 100-pin QFP		• 100-pin QFP • 100-pin WQFN

*: contained automatic data transmit buffer 48 byte

8/16-Bit Single Chip Microcomputer

■ 78K/II series (1/2)

Type number		μPD78212	μPD78213	μPD78214	μPD78P214	μPD78217A	μPD78218A	μPD78P218A	μPD78243	μPD78244
Number of instructions		65								
Minimum instruction execution cycle		333 ns/ 12 MHz	500 ns/ 12 MHz	333 ns/12 MHz		500 ns/ 12 MHz	333 ns/12 MHz		500 ns/ 12 MHz	333 ns/ 12 MHz
Data memory space extension function		1M bytes								
Internal memory	ROM size	8K bytes	–	16K bytes	16K bytes (PROM)	–	32K bytes	32K bytes (PROM)	–	16K bytes
	RAM size	384 bytes	512 bytes			1024 bytes			512 bytes	
	EEPROM size	–							512 bytes	
Inter-rupts	External sources	7								
	Internal sources	12							14	
I/O pins	Inputs	14 (of these, 6 can be pulled up by software)								
	Outputs	12 (of these, 8 can directly drive transistor.)								
	Input/output ports	28 (can be pulled up by software)	10 (can be pulled up by software)	28 (can be pulled up by software). Of these, 16 can directly drive LED.		10 (can be pulled up by software)	28 (can be pulled up by software). Of these, 16 can directly drive LED.		10 (can be pulled up by software)	28 (can be pulled up by software)
Analog inputs		8-bit A/D converter: 8 channels								
Timer/Counter		16-bit timer/counter x 1 8-bit timer/counter x 3								
Serial interface		UART (internal dedicated baud rate generator) ááá 1 channel Clock synchronized (can accommodate SBI) áááá 1 channel								
Features		• Real-time output port for stepping motor control				• Internal memory extended from μPD78214			• First EEPROM version in 78K series	
Package		• 64-pin SDIP • 64-pin QUIP (except μPD78212) • 68-pin QFJ (except μPD78212) • 64-pin QFP • 74-pin QFP			Same as left • 64-pin SDIP with window	• 64-pin SDIP • 64-pin QFP		Same as left • 64-pin SDIP with window	• 64-pin SDIP • 64-pin QFP	

8/16-Bit Single Chip Microcomputer

■ 78K/II series (2/2)

Type number		μPD78220	μPD78224	μPD78P224	μPD78233	μPD78234	μPD78237	μPD78238	μPD78P238
Number of instructions		65							
Minimum instruction execution cycle		500 ns/ 12 MHz	333 ns/12 MHz		500 ns/ 12 MHz	333 ns/ 12 MHz	500 ns/ 12 MHz	333 ns/12 MHz	
Data memory space extension function		1M bytes							
Internal memory	ROM size	–	16K bytes	16K bytes (PROM)	–	16K bytes	–	32K bytes	32K bytes (PROM)
	RAM size	640 bytes			640 bytes		1024 bytes		
Inter-rupts	External sources	8			7				
	Internal sources	9			12				
I/O pins	Inputs	8			16				
	Outputs	12	20		12				
	Input/output ports	25 (of these, 8 can directly drive LED)	35 (of these, 8 can directly drive LED)		18 (can be pulled up by software. 8 can directly drive LED)	36 (can be pulled up by software. 24 can directly drive LED)	18 (can be pulled up by software. 8 can directly drive LED)	36 (can be pulled up by software. 24 can directly drive LED)	
Analog inputs		Variable threshold voltage input port (16 steps): 8			8-bit A/D converter 8 channels				
Analog outputs		—			8-bit D/A converter: 2 outputs				
Timer/Counter		16-bit timer/counter ∞ 1 8-bit timer/counter ∞ 2			16-bit timer/counter ∞ 1 8-bit timer/counter ∞ 3				
Serial interface		UART (internal dedicated baud rate generator) áá 1 channel Clock synchronized (can accommodate SBI) áááá 1 channel							
Features		• Real-time output port for stepping motor control			• Real-time output port for stepping motor control • Two 12-bit PWM outputs				
Package		• 94-pin QFP • 84-pin QFJ			• 84-pin QFJ • 80-pin QFP • 94-pin QFP				Same as left • 94-pin WQFN

8/16-Bit Single Chip Microcomputer

■ 78K/III series (1/6)

Type number		μPD78310A	μPD78312A	μPD78P312A	μPD78320	μPD78322	μPD78P322	μPD78323	μPD78324	μPD78P324
Number of instructions		96			111					
Minimum instruction execution cycle		500 ns/12 MHz			250 ns/16 MHz					
Internal memory	ROM size	–	8K bytes	8K bytes (PROM)	–	16K bytes	16K bytes (PROM)	–	32K bytes	32K bytes (PROM)
	RAM size	256 bytes			640 bytes			1024 bytes		
Inter-rupts	External sources	4			8					
	Internal sources	14			13					
I/O pins	Inputs	8			16					
	Outputs	–			–					
	Input/output ports	24	40		21	39		21	39	
Analog inputs		8-bit A/D converter 4 channels			10-bit A/D converter 8 channels					
Timer/Counter		16-bit up/down counter ∞ 2 16-bit interval timer ∞ 2			18/16-bit free running timer ∞ 1 16-bit timer/event counter ∞ 1					
Serial interface		UART/clock synchronized ···· 1 channel			UART ····· 1 channel Clock synchronized (can accommodate SBI) ···· 1 channel					
Features		• Compared to μPD78310/ μPD78312 and μPD78P312, 16-bit data transfer instructions and 4-multiplied count mode added. • Suitable for servo control			• Real-time pulse unit which functions as a high performance pulse generator.					
Package		• 64-pin SDIP • 68-pin QFJ • 64-pin QUIP • 64-pin QFP		Same as left • 64-pin SDIP with window • 64-pin QUIP with window	• 68-pin QFJ • 74-pin QFP • 80-pin QFP		Same as left • 68-pin WQFN • 74-pin WQFN • 80-pin WQFN	• 68-pin QFJ • 74-pin QFP		Same as left • 68-pin WQFN • 74-pin WQFN

8/16-Bit Single Chip Microcomputer

■ 78K/III series (2/6)

Type number		μPD78327	μPD78328	μPD78P328	μPD78330	μPD78334	μPD78P334
Number of instructions		111					
Minimum instruction execution cycle		250 ns/16 MHz			250 ns/16 MHz		
Internal memory	ROM size	–	16K bytes	16K bytes (PROM)	–	32K bytes	32K bytes (PROM)
	RAM size	512 bytes			1K bytes		
Inter-rupts	External sources	4			• Processing mode can be selected from 3 different modes (vector interrupt, macro service, context switching) • 3 levels of priority orders can be specified by software.		
	Internal sources	11					
I/O pins	Inputs	11			24 (16 can also serve as analog input pins)		
	Outputs	—			—		
	Input/output ports	23	41		28	46	
Analog inputs		10-bit A/D converter 8 channels			10-bit A/D converter 16 channels		
Timer/Counter		6-bit timer ∞ 2 16-bit timer/event counter ∞ 1 Abundant compare registers and capture registers			18/16-bit timer/counter ∞ 1 16-bit timer/counter ∞ 3 Abundant compare registers and capture registers		
Serial interface		UART áááááááááááááááááááááááááááááááááááá 1 channel Clock synchronized (can accommodate SBI) ááááá 1 channel					
Features		• Real-time pulse unit which functions as high performance pulse generator.					
		High performance internal PWM output suitable for inverter control.					
Package		• 64-pin SDIP • 64-pin QFP		Same as left • 64-pin SDIP with window	• 84-pin QFJ • 94-pin QFP		• 84-pin QFJ • 94-pin QFP • 84-pin WQFN • 94-pin WQFN

8/16-Bit Single Chip Microcomputer

■ 78K/III series (3/6)

Type number		μPD78350	μPD78350A	μPD78352A	μPD78P352	μPD78355	μPD78356	μPD78P356
Number of instructions		113				115		
Minimum instruction execution cycle		160 ns/25 MHz	125 ns/32 MHz			125 ns/32 MHz		
Internal memory	ROM size	–		32K	–	–	48K bytes	–
	PROM size	–			32K	–	–	48K bytes
	RAM size	640 bytes				2K bytes		
Inter-rupts	External sources	5				5		
	Internal sources	4				25		
I/O pins	Inputs	6				8 (8 can also serve as analog input pins)		
	Outputs	–				–		
	Input/output ports	24		44		49	68	
PWM unit		8-bit PWM output 2channels				12-bit PWM output 2 channels		
Analog inputs		–				10-bit A/D converter 8 channels		
						High speed conversion time 2 μs		
Analot outputs		–				8-bit D/A converter 2 channels		
Timer/Counter		16-bit timer ∞ 3				16-bit timer ∞ 2 16-bit counter ∞ 3 10-bit timer ∞ 1		
Serial interface		–				UART áááááááááááááááááááá 1 channel Clock synchronized (can accommodate SBI) áááááááááááááááááááá 1 channel Clock synchronized (with pin switching function) áááááááááááááááááááá 1 channel		
Features		• Sum of products operation instructions • Suitable as ASIC control				• Fine pitch package (0.5 mm pitch) • Low voltage operation (2.7 to 5.5 V) • High performance internal A/D converter and D/A converter suitable for analog data		
Package		• 64-pin QFP (t = 2.7 mm)	• 64-pin QFP (t = 1.5 mm)		• 64-pin WQFN	• 100-pin plastic QFP • 120-pin plastic QFP		• 120-pin ceramic WQFN

8/16-Bit Single Chip Microcomputer

■ 78K/III series (4/6)

Type number		μPD78362A★	μPD78P364A★
Number of instructions		115	
Minimum instruction execution cycle		125 ns/8 MHz (internal 16 MHz)	
Internal memory	ROM size	24K bytes	32K bytes (PROM)
	RAM size	768 bytes	2K bytes
Inter-rupts	External sources	6	
	Internal sources	14	
I/O pins	Inputs	14 (8 can also serve as analog input pins)	
	Outputs	–	
	Input/output ports	38	
Analog inputs		10-bit A/D converter 8 channels	
Timer/Counter		16-bit timer ∞ 3 16-bit timer/event counter ∞ 2	
Serial interface		UART áááááááááááááááááááááááááááááááá 1 channel Clock synchronized ááááááááááááááááááááá 1 channel	
Features		• High performance internal PWM out put suitable for inverter control • Real time pulse unit which function as high performance pulse generator	
Package		• 64-pin SDIP	• 64-pin SDIP • 64-pin SDIP with window

★: Under development

■ 78K/III series (5/6)

Type number		μPD78365A★	μPD78366A★	μPD78P368A★
Number of instructions		115		
Minimum instruction execution cycle		125 ns/8 MHz (internal 16 MHz)		
Internal memory	ROM size	–	32K bytes	48K bytes
	RAM size	2K bytes		
Inter-rupts	External sources	6		
	Internal sources	14		
I/O pins	Inputs	14 (8 can also serve as analog input pins)		
	Outputs	–		
	Input/output ports	31	49	
Analog inputs		10-bit A/D converter 8 channels		
Timer/Counter		16-bit timer ∞ 3 16-bit timer/event counter ∞ 2		
Serial interface		UART áááááááááááááááááááááááááááááááá 1 channel Clock synchronized (can accommodate SBI) ááá 1 channel		
Features		• High performance internal PWM out put suitable for inverter control • Real time pulse unit which function as high performance pulse generator		
Package		• 80-pin QFP	• 80-pin QFP • 80-pin WQFN	

★: Under development

8/16-Bit Single Chip Microcomputer

■ 78K/III series (6/6)

Type number		μPD78370★	μPD78372★	μPD78P372★
Number of instructions		115		
Minimum instruction execution cycle		125 ns/32 MHz		
Internal memory	ROM size	–	24K bytes	24K bytes (PROM)
	RAM size	768 bytes		
Inter-rupts	External sources	11		
	Internal sources	18		
I/O pins	Inputs	17 (16 can also serve as analog input pins)		
	Outputs	–		
	Input/output ports	24	43	
Analog inputs		10-bit A/D converter 8 channels		
Timer/Counter		18-bit timer ∞ 1 16-bit timer counter ∞ 1		
Serial interface		UART áááááááááááááááááááááááááááááá 1 channel Clock synchronized áááááááááááááááááááááá 1 channel		
Features		• Real time pulse unit which function as high performance pulse generator		
Package		• 80-pin QFP	• 80-pin QFP • 80-pin WQFN	

★: Under development

■ 78K/IV series (1/2)

Type number		μPD784020	μPD784021	μPD784025	μPD784026	μPD78P4026
Number of instructions		113				
Minimum instruction execution cycle		160 ns/25 MHz				
Memory space		1M bytes				
Internal memory	ROM size	–		48K bytes	64K bytes	64K bytes (PROM)
	RAM size	512 bytes	2048 bytes			
Inter-rupts	External sources	7				
	Internal sources	16				
I/O pins	Inputs	8				
	Outputs	4		–		
	Input/output ports	34 (can be pulled up by software. 8 can directly drive LED)		56 (can be pulled up by software. 24 can directly drive LED)	56 (can be pulled up by software. 24 can directly drive LED)	
Analog inputs		8-bit A/D converter 8 channels				
Analog outputs		8-bit D/A converter: 2 outputs				
Timer/Counter		16-bit timer/counter ∞ 4				
Serial interface		UART (internal dedicated baud rate generator)/IOE áááááááá 2 channels Clock Synchronized (can accommodate SBI) áááááááááááá 1 channel				
Features		• Real-time output port for stepping motor control • Two 12-bit PWM outputs				
Package		• 80-pin QFP			• 80-pin QFP • 80-pin WQFN	

8/16-Bit Single Chip Microcomputer

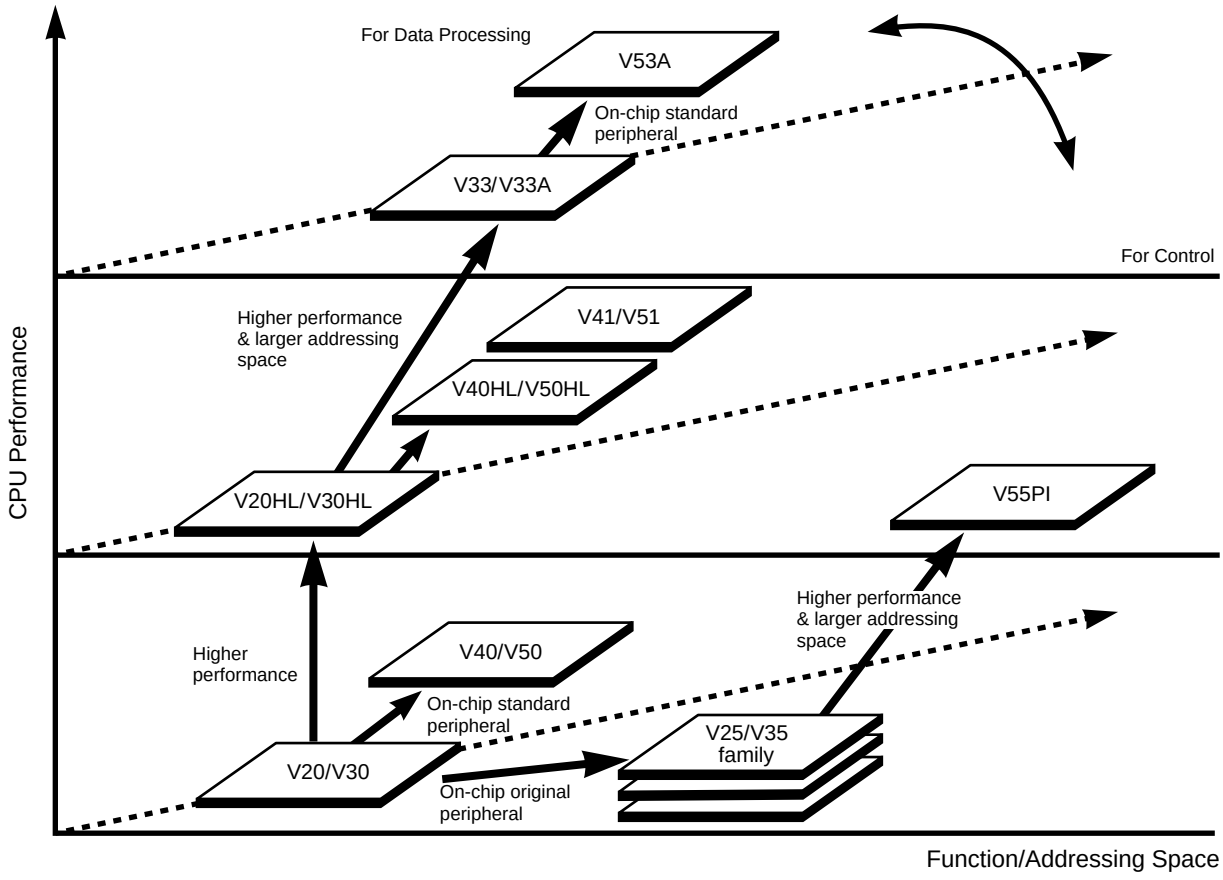
■ 78K/IV series (2/2)

Type number		μPD784915★	μPD78P4916★
Number of instructions		113	
Minimum instruction execution cycle		250 ns/16 MHz	
Internal memory	ROM size	48K bytes	62K bytes (PROM)
	RAM size	1280 bytes	2048 bytes
Inter-rupts	External sources	9	
	Internal sources	20	
I/O pins	Inputs	8	
	Outputs	0	
	Input/output ports	46	
A/D converter		8-bit resolution ∞ 12 channels	
Analog circuit for VCR		CTL amplifier, RECCTL driver CFG amplifier DFG amplifier, DPG comparater, DPFG separation circuit Reel-FG comparater (2 channels) Csync comparater	
Timer/Counter		22-bit FRC counter ∞ 1 16-bit timer ∞ 6 8-bit counter ∞ 2 5-bit UDC counter ∞ 1	
PWM output		16-bit PWM ∞ 3 (carrier freq.: 62.5 kHz) 8-bit PWM ∞ 3 (carrier freq.: 62.5 kHz)	
Serial interface		Clock synchronized ∞ 2 channels	
Features		• System-control and servo-control and timer-control for VCR • Super-timer-unit and Analog circuit for software servo control application such as VCR • CPU operation by subsystem clock (Low power operation)	
Package		• 100-pin QFP (14 ∞ 20 mm)	

★: Under development

V Series™

■ 16-Bit V series product evolution



V Series

■ 16-Bit (1/2)

Type number	Alias	Features	Internal bus	External bus	Real memory space	Operating frequency	Package
μPD70108	V20™	CMOS process High speed, low power consumption Upward software and pin compatible, including interfacing with peripheral controller Measures taken to increase speed • Dual data bus system • Effective address generation circuit • Multiplication/division by programmable shifter • High speed processing by dedicated register Two operating modes • 8080 emulation mode added Standby function	16 bits	8 bits	1M bytes	5/8/10 MHz	• 40-pin DIP • 44-pin QFJ • 52-pin QFP
μPD70116	V30™		16 bits	16 bits			
μPD70108H	V20HL™	V20/V30 compatible, high speed low voltage operation • Capable of operating at 16 MHz (at 5 V) • Capable of operating at 3 V (at 8 MHz) • Clock can be stopped	16 bits	8 bits	1M bytes	10/12.5/16 MHz	• 40-pin DIP • 44-pin QFJ • 52-pin QFP • 52-pin TQFP
μPD70116H	V30HL™		16 bits	16 bits			
μPD70136A	V33A™	Performance is approximately 4 times higher than V30 16M-byte address extension mode Internal bus sizing function 1 bus cycle = 2 clocks Internal floating point processor (μPD72291) interface function	16 bits	8/16 bits (Selectable)	16M bytes	10/12.5/16 MHz	• 68-pin PGA • 68-pin QFJ
μPD70136	V33™						• 68-pin PGA • 68-pin QFJ • 74-pin QFP
μPD70208	V40™	V20/V30 + peripheral controllers V20/V30 CPU plus the following peripheral functions: • 4-ch DMA controller • 3-ch 16-bit timer/counter • Interrupt controller • Clock generator • DRAM refresh controller • Programmable wait generator (Internal peripheral controllers are subset functions of μPD7105X series)	16 bits	8 bits	1M bytes	8/10 MHz	• 68-pin QFJ • 68-pin PGA • 80-pin QFP
μPD70216	V50™		16 bits	16 bits			
μPD70208H	V40HL™	V40/V50 upper compatible, high speed low voltage operation • Capable of operating at 20 MHz (at 5 V) • Capable of operating at 3 V (at 10 MHz) • Selectable clock frequency • Enhanced peripheral functions	16 bits	8 bits	1M bytes	10/12.5/16/20 MHz	• 68-pin QFJ • 80-pin QFP • 80-pin TQFP
μPD70216H	V50HL™		16 bits	16 bits			
μPD70236A	V53A™	V33A + enhanced peripheral functions of V40/V50 • DMA capable of supporting 16MB space • Dedicated BRG for timer/counter • Low power control · Stop mode · Halt mode · Variable clock mode • Capable of operating at 3 V and 10 MHz (only for V53A) • Capable of operating at 4 V and 16 MHz (only for V53A)	16 bits	8/16 bits (Selectable)	16M bytes	10/12.5/16/20 MHz	• 132-pin PGA • 120-pin QFP (0.8, 0.5 or 0.4 mm pin pitch)

V Series

■ 16-Bit (2/2)

Type number	Alias	Features	Internal bus	External bus	Real memory space	Operating frequency	Package
μPD70270	V41™	V20HL/30HL + Peripheral control unit Each product is a microcomputer with a CPU core comprising NEC's "V20HL/V30HL" and peripheral circuits compatible with PC/XT™ • EMS Ver 4.0 support circuit • DMA control unit (equivalent to μPD71037) • Interrupt control unit (equivalent to μPD71059) • Timer/counter unit (equivalent to μPD71037) • Keyboard control unit • Memory control unit • External I/O decoder • ROM decoder	16 bits	8 bits	16M bytes	16 MHz	• 160-pin QFP
μPD70280	V51™		16 bits	16 bits			
μPD70433	V55PI™	Software compatible with V20/30/25/35 • 16 general purpose register banks (512-byte internal RAM) Following various peripheral features for mechanical control • Multi-mode interrupt controller (Vectored/Register bank switching/Macro service) • 2 real time output ports for controlling stepping moters • 8-bit A/D converter with 4 inputs • 2 DMA controllers with intelligent modes • 5 16-bit timer/counters • 2 asynchronous/synchronous serial controllers • 8-bit parallel interface • Watchdog timer • MH/MR codec instructions	16 bits	8/16 bits (Selectable)	16M bytes	12.5/16 MHz	• 120-pin QFP (0.8 or 0.5 mm pin pitch) • 132-pin PGA
μPD70320	V25™	Software compatible with V20/V30. Following additional peripheral features including RAM: • 2-ch DMA controller • 2-ch serial controller • 2-ch 16-bit timer/counter • Interrupt controller • 24 general purpose I/O port pins • 8 general purpose register banks • RAM 256B	16 bits	8 bits	1M bytes	8 MHz	• 84-pin QFJ • 94-pin QFP
μPD70330	V35™		16 bits	16 bits			
μPD79011	V25HS™	CPU with built-in RTOS (internal ROM of V25/V35 to which real-time OS is transplanted)	16 bits	8 bits	1M bytes	8 MHz	• 84-pin QFJ • 94-pin QFP
μPD79021	V35HS™		16 bits	16 bits			
μPD70325	V25+™	High speed version of V25/V35 DMA transfer function	16 bits	8 bits	1M bytes	8/10 MHz	• 84-pin QFJ • 94-pin QFP
μPD70335	V35+™		16 bits	16 bits			

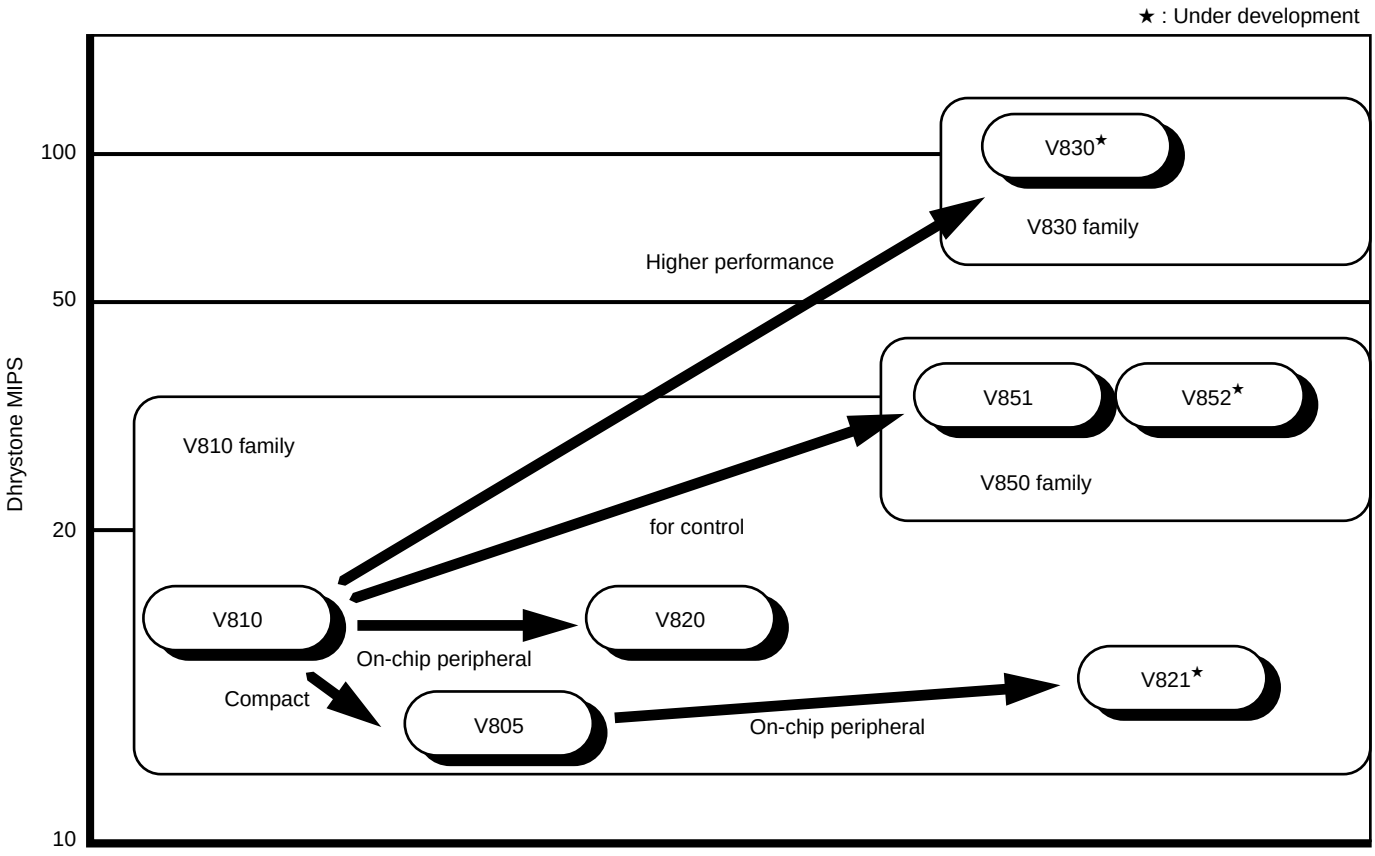
V Series

■ 32-Bit

Type number	Alias	Features	Address/data bus	Memory space	Operating frequency	Package
μPD70616	V60™	• Virtual memory (paging method) • Level protection architecture 4-level hierarchical protection function for system multi-programming. • Abundant general registers Thirty two 32-bit general registers for optimizing compiler • Refined instruction set 2-address method: Arbitrary addressing mode can be used independently for source operand and destination operand. • Abundant address modes and data types Auto increment/decrement mode for string process, and memory indirect addressing for pointer operation • Multiprocessor system FRM function for increasing system reliability using two or more processors. • V20/V30 simulation mode	24 bits/ 16 bits	4G bytes	16 MHz	• 68-pin PGA
μPD70632	V70™		32 bits/ 32 bits		20 MHz	• 132-pin PGA • 200-pin QFP
μPD70615	V60	• Identical with μPD70616 except that FRM function and V20/V30 emulation function are eliminated. High cost-to-performance chip	24 bits/ 16 bits		16 MHz	• 120-pin QFP

V Series

■ 32-Bit RISC V800 Series product evolution



V Series

■ 32-Bit RISC – V800 Series –

Type number	Alias	Features	Address/data bus	Memory space	Performance/ frequency	Package
μPD70732	V810™	• 32-bit RISC architecture · 1-instruction/clock with 5-stage pipeline 32 · 32-bit general purpose registers • 1K-byte instruction cache • Operation supply voltage 2.2 to 5.5 V • Consumption power (TYP.) · 500mW (V810 5 V, 25 MHz) · 280mW (V805 5 V, 20 MHz)	32 bits/ 32 bits	4G bytes	18MIPS/25 MHz (Dhrystone)	• 120-pin QFP • 176-pin PGA
μPD70731	V805™		32 bits/ 16 bits		13MIPS/20 MHz (Dhrystone)	• 100-pin QFP
μPD70742	V820™	• V810 core + peripheral controllers • 2-ch Serial I/O • 3-ch 16-bit timer/counter • 4-ch 32-bit DMA controller • Access controller • Interrupt controller • Clock generator	32 bits/ 32 bits		18MIPS/25 MHz (Dhrystone)	• 208-pin QFP • 280-pin PGA
μPD70741★	V821™	•V810 core + peripheral controllers • Memory controller (DRAM, Page-ROM) • 2-ch Serial I/O (UARTx1, CSIx1) • 2-ch 16-bit timer/counter • 2-ch DMA controller • Interrupt controller • Watchdog timer	24 bits/ 16 bits	4G bytes (Internal) 64M bytes (external MAX)	16MIPS/25 MHz (Dhrystone)	• 100-pin QFP
μPD705100★	V830™	• High-performance RISC processor (V830 core) • Multiplier (32 ∞ 32 ∅ 64-bit) • Internal memory · 4K-byte instruction cache · 4K-byte data cache · 4K-byte RAM for instruction · 4K-byte RAM for data • Consumption power (TARGET) 500mW (3.3 V, 100 MHz)	32 bits/ 32 bits	4G bytes	118MIPS/100 MHz (Dhrystone)	• 144-pin QFP
μPD703000/ 70P3000/ 703001	V851™	• 32-bit RISC (V850 core) 1 chip microcomputer • Multiplier (16 ∞ 16 ∅ 32-bit) • Internal memory · 32K-byte ROM (μPD703001: ROM less), 1K-byte RAM • 2-ch Serial I/O (UARTx1, CSIx1) • 2-ch 16-bit timer/counter • Interrupt controller • Operation supply voltage 2.0 to 5.5 V (Mask ROM, ROM less) 2.7 to 5.5 V (PROM) • Consumption power (TYP.) · 207mW (5 V, 25 MHz), 267mW (5 V, 33 MHz)★	24 bits/ 16 bits	4G bytes (Internal) 16M bytes (external MAX)	29MIPS/25 MHz 38MIPS/33 MHz★ (Dhrystone, Except μPD703001)	• 100-pin QFP (μPD703000/ 70P3000/ 703001) • 120-pin WQFN (μPD70P3000)
μPD703002★**/ 70P3002**	V852™	• 32-bit RISC (V850 core) 1 chip microcomputer • Multiplier (16 ∞ 16 ∅ 32-bit) • Internal memory · 90K-byte ROM, 3K-byte RAM • 4-ch Serial I/O (UARTx1, CSIx3) • 2-ch 16-bit timer/counter • Interrupt controller • Operation supply voltage 2.0 to 5.5 V (Mask ROM) 2.7 to 5.5 V (PROM) • Low consumption power	24 bits/ 16 bits	4G bytes (Internal) 16M bytes (external MAX)	29MIPS/25 MHz (Dhrystone)	• 100-pin QFP (μPD703000/ 70P3000) • 120-pin WQFN (μPD70P3002)

★: Under development

VR Series™

Type number	Alias	Features	Address/ data bus	Virtual memory space	Performance	Package
μPD30400	VR4000PC™	• 64-bit architecture • 2 operation per 1 clock execution with superpipelined processing • On chip floating point processing unit • On chip primary cache memory (instruction 8K + data 8K Byte) • Software uppered compatible with VR3000A • Internal 100 MHz, external 50 MHz operation	36/64	Kernel: 16EXA bytes User : 64G bytes	41 SPEC int92 43 SPEC fp92 (Internal 100 MHz)	• 179-pin PGA
μPD30401	VR4000SC™	• Same function with VR4000PC, furthermore on chip secondary cache memory controller supported • Internal 100 MHz, external 50 MHz operation	36/64	Kernel: 16EXA bytes User : 64G bytes	62 SPEC int92 63 SPEC fp92 (Internal 100 MHz)	• 447-pin PGA
μPD30410	VR4400PC™	• VR4000PC compatible • On chip primary cache (I16KB + D16KB) • Internal 200 MHz, external 100 MHz operation★	36/64	Kernel: 16EXA bytes User : 64G bytes	83 SPEC int92 92 SPEC fp92 (Internal 200 MHz)	• 179-pin PGA
μPD30412	VR4400MC™	• Same function with VR4400PC, furthermore on chip secondary cache memory controller and correspond to multiprocessing system supported	36/64	Kernel: 16EXA bytes User : 64G bytes	141 SPEC int92 143 SPEC fp92 (Internal 200 MHz)	• 447-pin PGA
μPD30450	VR4200™	• VR4000PC compatible • Low power (1.5 W typ) • On chip primary cache (I16KB + D8KB) • Internal 80 MHz, external 40 MHz operation	33/64	Kernel: 16EXA bytes User : 8G bytes	55 SPEC int92 30 SPEC fp92 (Internal 80 MHz)	• 208-pin QFP • 179-pin PGA
μPD30100★	VR4100™	• Low poewr (100 mW @33 MHz, 2.2 V) • 2 level power management • 64 bit architecture • On chip MMU	32/32	Kernel: 16EXA bytes User : 4G bytes	40 MIPS (Internal 133 MHz)	• 100-pin QFP
μPD30200★	VR4300™	• High speed operation from 100 MHz pipe • Large on chip cache I16K + D8K byte • 64 bit architecture • High speed floating operation • On chip MMU	32/32	Kernel: 16EXA bytes User : 4G bytes	70 SPEC int 45 SPEC fp92 (Internal 100 MHz)	• 120-pin QFP

★: Under development

Microcomputer Peripheral LSI

Type number	Process	Function	Supply voltage	Clock frequency	Package	Remarks
μPD77C30	CMOS	PCM × ADPCM (Coding/decoding)	+5 V	8.192 MHz	• 28-pin DIP • 44-pin QFJ	—

■ V series peripheral LSI

Type number	Process	Function	Supply voltage	Package
μPD71037	CMOS	8-bit DMA controller	+5 V	• 40-pin DIP • 44-pin QFP • 44-pin QFJ
μPD71051		Serial control unit		• 28-pin SOP • 28-pin DIP • 44-pin QFP • 28-pin QFJ
μPD71054		Programmable timer/counter		• 24-pin DIP • 44-pin QFP • 28-pin QFJ
μPD71055		Parallel interface unit		• 40-pin DIP • 44-pin QFP • 44-pin QFJ
μPD71059		Interrupt control unit		• 28-pin SOP • 28-pin DIP • 44-pin QFP • 44-pin QFJ
μPD71071		16-bit DMA controller		• 48-pin DIP • 52-pin QFP • 52-pin QFJ
μPD71082		8-bit latch Non-invert type		• 20-pin DIP • 20-pin SOP
μPD71083		8-bit latch Invert type		
μPD71011		Clock generator		• 18-pin DIP • 20-pin SOP
μPD71084		Clock generator		• 18-pin DIP • 20-pin SOP
μPD71086		8-bit bus transceiver Non-invert type		• 20-pin DIP • 20-pin SOP
μPD71087		8-bit bus transceiver Invert type		
μPD71088		Bus controller		
μPD71101		Composite peripheral LSI integrating μPD71051 ∞ 2, μPD71054, μPD71055, μPD71059, and BRG		• 120-pin QFP
μPD71611		Clock generator for V60		• 20-pin DIP
μPD71613		System controller for V60		
μPD71621		Clock generator for V70		
μPD71641		Cache memory controller		• 132-pin PGA
μPD72291		Floating point processor		• 68-pin PGA
μPD72691				

■ VR series peripheral LSI

Type number	Process	Function	Supply voltage	Package
μPD30311 (VR3010A)	CMOS	Floating point coprocessor (40/33 MHz operation)	+5 V	• 84-pin PGA • 84-pin PPGA
μPD31441		Chip set for VR4000, VR4200, VR4400	+3.3 V	• 240-pin QFP
μPD31442				

EMPTY PAGE

IC Memory

Dynamic RAM 64

Dynamic RAM Module 72

Static RAM 75

Mask ROM 78

PROM 79

Flash MEMORY 80

Other 81

- Dual-Port Graphic Buffer 81
- Synchronous Graphics RAM 81
- Graphic Memory 81
- Silicon File 82
- Field/Line Buffer 82

Dynamic RAM

■ Low Voltage Operation 64M Dynamic RAM

Organization (words ∞ bits)	Part number	Access time MAX. (ns)	Refresh cycle (cycles/ ms)	Maximum supply current		Supply voltage (V)	Package	Remarks
				Active (mA)	Standby (mA)			
16M ∞ 4	**μPD4264400**	50 60 70	8K/64*	100 90 80	0.5	3.3±0.3	• 32-pin SOJ (400 mil) • 32-pin TSOP II (400 mil)	Fast page
	μPD4265400	50 60 70	4K/64	130 110 100				
8M ∞ 8	**μPD4264800**	50 60 70	8K/64*	105 95 85				–
	μPD4265800	50 60 70	4K/64	135 115 105				
4M ∞ 16	**μPD4264160**	50 60 70	8K/64*	110 100 90			• 50-pin TSOP II (400 mil)	Fast page + Byte read/write
	μPD4265160	50 60 70	4K/64	140 120 110				

* CBR/Hidden Refresh: 4K/64

■ Low Voltage Operation 64M Dynamic RAM with Self Refresh

Organization (words ∞ bits)	Part number	Access time MAX. (ns)	Refresh cycle (cycles/ ms)	Maximum supply current				Supply voltage (V)	Package	Remarks
				Active (mA)	Standby (mA)	Self refresh (μA)	Long refresh (μA)			
16M ∞ 4	**μPD42S64400**★	50 60 70	8K/128*	100 90 80	0.2	300	300	3.3±0.3	• 32-pin SOJ (400 mil) • 32-pin TSOP II (400 mil)	Fast page
	μPD42S65400★	50 60 70	4K/128	130 110 100						
8M ∞ 8	**μPD42S64800**★	50 60 70	8K/128*	105 95 85						
	μPD42S65800★	50 60 70	4K/128	135 115 105						
4M ∞ 16	**μPD42S64160**★	50 60 70	8K/128*	110 100 90					• 50-pin TSOP II (400 mil)	
	μPD42S65160★	50 60 70	4K/128	140 120 110						

* CBR/Hidden Refresh: 4K/128

★: Under development

Dynamic RAM

■ 16M Dynamic RAM

Organization (words ∞ bits)	Part number	Access time MAX. (ns)	Refresh cycle (cycles/ ms)	Maximum supply current		Supply voltage (V)	Package	Remarks
				Active (mA)	Standby (mA)			
4M ∞ 4	**μPD4216400**	50 60 70 80	4K/64	100 90 80 70	1	5±10 %	• 26-pin SOJ (300 mil) • 26-pin TSOP II (300 mil)	Fast page
	μPD4217400	50 60 70 80	2K/32	10 110 100 90				
2M ∞ 8	**μPD4216800**	50 60 70 80	4K/64	100 90 80 70			• 28-pin SOJ (400 mil) • 28-pin TSOP II (400 mil)	
	μPD4217800	50 60 70 80	2K/32	120 110 100 90				
1M ∞ 16	**μPD4216160**	60 70 80	4K/64	100 90 80			• 42-pin SOJ (400 mil) • 50-pin TSOP II (400 mil)	Fast page + Byte read/write
	μPD4218160	60 70 80	1K/16	160 150 140				

■ 16M Dynamic RAM with Self Refresh

Organization (words ∞ bits)	Part number	Access time MAX. (ns)	Refresh cycle (cycles/ ms)	Maximum supply current				Supply voltage (V)	Package	Remarks
				Active (mA)	Standby (mA)	Self refresh (μA)	Long refresh (μA)			
4M ∞ 4	**μPD42S16400**	50 60 70 80	4K/128	100 90 80 70	0.25	250	450	5±10 %	• 26-pin SOJ (300 mil) • 26-pin TSOP II (300 mil)	Fast page
	μPD42S17400	50 60 70 80	2K/128	120 110 100 90			400			
2M ∞ 8	**μPD42S16800**	50 60 70 80	4K/128	100 90 80 70			450		• 28-pin SOJ (400 mil) • 28-pin TSOP II (400 mil)	
	μPD42S17800	50 60 70 80	2K/128	120 110 100 90			400			
1M ∞ 16	**μPD42S16160**	60 70 80	4K/128	100 90 80			450		• 42-pin SOJ (400 mil) • 50-pin TSOP II (400 mil)	Fast page + Byte read/write
	μPD42S18160	60 70 80	1K/128	160 150 140			350			

Dynamic RAM

■ Low Voltage Operation 16M Dynamic RAM

Organization (words ∞ bits)	Part number	Access time MAX. (ns)	Refresh cycle (cycles/ ms)	Maximum supply current		Supply voltage (V)	Package	Remarks
				Active (mA)	Standby (mA)			
4M ∞ 4	**μPD4216400L**	60 70 80	4K/64	80 70 60	0.5	3.3±0.3	• 26-pin SOJ (300 mil) • 26-pin TSOP II (300 mil)	Fast page
	μPD4217400L	60 70 80	2K/32	100 90 80				
2M ∞ 8	**μPD4216800L**	60 70 80	4K/64	80 70 60			• 28-pin SOJ (400 mil) • 28-pin TSOP II (400 mil)	–
	μPD4217800L	60 70 80	2K/32	100 90 80				
1M ∞ 16	**μPD4216160L**	60 70 80	4K/64	90 80 70			• 42-pin SOJ (400 mil) • 50-pin TSOP II (400 mil)	Fast page + Byte read/write
	μPD4218160L	60 70 80	1K/16	150 140 130				

■ Low Voltage Operation 16M Dynamic RAM with Self Refresh

Organization (words ∞ bits)	Part number	Access time MAX. (ns)	Refresh cycle (cycles/ ms)	Maximum supply current				Supply voltage (V)	Package	Remarks
				Active (mA)	Standby (mA)	Self refresh (μA)	Long refresh (μA)			
4M ∞ 4	**μPD42S16400L**	60 70 80	4K/128	80 70 60	0.15	150	220	3.3±0.3	• 26-pin SOJ (300 mil) • 26-pin TSOP II (300 mil)	Fast page
	μPD42S17400L	60 70 80	2K/128	100 90 80			200			
2M ∞ 8	**μPD42S16800L**	60 70 80	4K/128	80 70 60			220		• 28-pin SOJ (400 mil) • 28-pin TSOP II (400 mil)	
	μPD42S17800L	60 70 80	2K/128	100 90 80			200			
1M ∞ 16	**μPD42S16160L**	60 70 80	4K/128	90 80 70			220		• 42-pin SOJ (400 mil) • 50-pin TSOP II (400 mil)	Fast page + Byte read/write
	μPD42S18160L	60 70 80	1K/128	150 140 130			180			

Dynamic RAM

■ 16M Dynamic RAM (Hyper Page Mode*)

Organization (words ∞ bits)	Part number	Access time MAX. (ns)	Refresh cycle (cycles/ ms)	Maximum supply current		Supply voltage (V)	Package	Remarks
				Active (mA)	Standby (mA)			
4M ∞ 4	**μPD4216405**	50 60 70 80	4K/64	100 90 80 70	1	5±10 %	• 26-pin SOJ (300 mil) • 26-pin TSOP II (300 mil)	Hyper page
	μPD4217401	50 60 70 80	2K/32	10 110 100 90				
2M ∞ 8	**μPD4217801**	50 60 70 80	2K/32	120 110 100 90			• 28-pin SOJ (400 mil) • 28-pin TSOP II (400 mil)	
1M ∞ 16	**μPD4216161**	60 70 80	4K/64	100 90 80			• 42-pin SOJ (400 mil) • 50-pin TSOP II (400 mil)	Hyper page + Byte read/write
	μPD4218161	60 70 80	1K/16	160 150 140				

*: Hyper Page Mode is equivalent to EDO

■ 16M Dynamic RAM with Self Refresh (Hyper Page Mode*)

Organization (words ∞ bits)	Part number	Access time MAX. (ns)	Refresh cycle (cycles/ ms)	Maximum supply current				Supply voltage (V)	Package	Remarks
				Active (mA)	Standby (mA)	Self refresh (μA)	Long refresh (μA)			
4M ∞ 4	**μPD42S16405**	50 60 70 80	4K/128	100 90 80 70	0.25	250	450	5±10 %	• 26-pin SOJ (300 mil) • 26-pin TSOP II (300 mil)	Hyper page
	μPD42S17401	50 60 70 80	2K/128	120 110 100 90			400			
2M ∞ 8	**μPD42S17801**	50 60 70 80	2K/128	120 110 100 90			400		• 28-pin SOJ (400 mil) • 28-pin TSOP II (400 mil)	
1M ∞ 16	**μPD42S16161**	60 70 80	4K/128	100 90 80			450		• 42-pin SOJ (400 mil) • 50-pin TSOP II (400 mil)	Hyper page + Byte read/write
	μPD42S18161	60 70 80	1K/128	160 150 140			350			

*: Hyper Page Mode is equivalent to EDO

Dynamic RAM

■ Low Voltage Operation 16M Dynamic RAM (Hyper Page Mode*)

Organization (words ∞ bits)	Part number	Access time MAX. (ns)	Refresh cycle (cycles/ ms)	Maximum supply current		Supply voltage (V)	Package	Remarks
				Active (mA)	Standby (mA)			
4M ∞ 4	**μPD42164005L**	60 70 80	4K/64	80 70 60	0.5	3.3±0.3	• 26-pin SOJ (300 mil) • 26-pin TSOP II (300 mil)	Hyper page
	μPD4217401L	60 70 80	2K/32	100 90 80				
2M ∞ 8	**μPD4217801L**	60 70 80	2K/32	100 90 80			• 28-pin SOJ (400 mil) • 28-pin TSOP II (400 mil)	–
1M ∞ 16	**μPD4216161L**	60 70 80	4K/64	90 80 70			• 42-pin SOJ (400 mil) • 50-pin TSOP II (400 mil)	Hyper page + Byte read/write
	μPD4218161L	60 70 80	1K/16	150 140 130				

*: Hyper Page Mode is equivalent to EDO

■ Low Voltage Operation 16M Dynamic RAM with Self Refresh (Hyper Page Mode*)

Organization (words ∞ bits)	Part number	Access time MAX. (ns)	Refresh cycle (cycles/ ms)	Maximum supply current				Supply voltage (V)	Package	Remarks
				Active (mA)	Standby (mA)	Self refresh (μA)	Long refresh (μA)			
4M ∞ 4	**μPD42S16401L**	60 70 80	4K/128	80 70 60	0.15	150	220	3.3±0.3	• 26-pin SOJ (300 mil) • 26-pin TSOP II (300 mil)	Hyper page
	μPD42S17401L	60 70 80	2K/128	100 90 80			200			
2M ∞ 8	**μPD42S17801L**	60 70 80	2K/128	100 90 80			200		• 28-pin SOJ (400 mil) • 28-pin TSOP II (400 mil)	
1M ∞ 16	**μPD42S16161L**	60 70 80	4K/128	90 80 70			220		• 42-pin SOJ (400 mil) • 50-pin TSOP II (400 mil)	Hyper page + Byte read/write
	μPD42S18161L	60 70 80	1K/128	150 140 130			180			

*: Hyper Page Mode is equivalent to EDO

Dynamic RAM

■ 4M Dynamic RAM

Organization (words ∞ bits)	Part number	Access time MAX. (ns)	Refresh cycle (cycles/ ms)	Maximum supply current			Supply voltage (V)	Package	Remarks
				Active (ms)	Standby (mA)	Long refresh (μA)			
1M ∞ 4	**μPD424400**	60 70	1K/16	120 100	1	–	5±10 %	• 26-pin SOJ (300 mil) • 26-pin TSOP II (300 mil)	Fast page
	μPD424400-L	60 70	1K/128	120 100	0.2	300			
512K ∞ 8	**μPD424800**	60 70 80	1K/16	105 105 95	1	–		• 28-pin SOJ (400 mil) • 28-pin TSOP II (400 mil)	
256K ∞ 16	**μPD424260**	60 70 80	512/8	160 160 145				• 40-pin SOJ (400 mil) • 44-pin TSOP II (400 mil)	Fast page Byte read/write

■ 4M Dynamic RAM with Self Refresh

Organization (words ∞ bits)	Part number	Access time MAX. (ns)	Refresh cycle (cycles/ ms)	Maximum supply current				Supply voltage (V)	Package	Remarks
				Active (ms)	Standby (mA)	Self refresh (μA)	Long refresh (μA)			
1M ∞ 4	**μPD42S4400**	60 70	1K/128	120 100	0.15	150	200	5±10 %	• 26-pin SOJ (300 mil) • 26-pin TSOP II (300 mil)	Fast page
512K ∞ 8	**μPD42S4800**	60 70 80	1K/128	105 105 95					• 28-pin SOJ (400 mil) • 28-pin TSOP II (400 mil)	
256K ∞ 16	**μPD42S4260**	60 70 80	512/128	160 160 145					• 40-pin SOJ (400 mil) • 44-pin TSOP II (400 mil)	Fast page Byte read/write

■ Low Voltage Operation 4M Dynamic RAM

Organization (words ∞ bits)	Part number	Access time MAX. (ns)	Refresh cycle (cycles/ ms)	Maximum supply current		Supply voltage (V)	Package	Remarks
				Active (ms)	Standby (mA)			
256K ∞ 16	**μPD424260AL**	60 70 80	512/8	80 70 60	0.5	3.3±0.3	• 40-pin SOJ (400 mil) • 44-pin TSOP II (400 mil)	Fast page Byte read/write

■ Low Voltage Operation 4M Dynamic RAM with Self Refresh

Organization (words ∞ bits)	Part number	Access time MAX. (ns)	Refresh cycle (cycles/ ms)	Maximum supply current				Supply voltage (V)	Package	Remarks
				Active (ms)	Standby (mA)	Self refresh (μA)	Long refresh (μA)			
256K ∞ 16	**μPD42S4260AL**	60 70 80	512/128	80 70 60	0.08	80	100	3.3±0.3	• 40-pin SOJ (400 mil) • 44-pin TSOP II (400 mil)	Fast page Byte read/write

Dynamic RAM

■ 4M Dynamic RAM (Hyper Page Mode*)

Organization (words ∞ bits)	Part number	Access time MAX. (ns)	Refresh cycle (cycles/ ms)	Maximum supply current			Supply voltage (V)	Package	Remarks
				Active (ms)	Standby (mA)	Long refresh (μA)			
256K ∞ 16	**μPD424210**	60-G 70	512/8	160 150	1	–	5±10 %	• 40-pin SOJ (400 mil) • 44-pin TSOP II (400 mil)	Hyper page Byte read/write

*: Hyper Page Mode is equivalent to EDO

■ 4M Dynamic RAM with Self Refresh (Hyper Page Mode*)

Organization (words ∞ bits)	Part number	Access time MAX. (ns)	Refresh cycle (cycles/ ms)	Maximum supply current				Supply voltage (V)	Package	Remarks
				Active (ms)	Standby (mA)	Self refresh (μA)	Long refresh (μA)			
256K ∞ 16	**μPD42S4210**	60-G 70	512/128	160 150	0.15	150	200	5±10 %	• 40-pin SOJ (400 mil) • 44-pin TSOP II (400 mil)	Hyper page Byte read/write

*: Hyper Page Mode is equivalent to EDO

■ Low Voltage Operation 4M Dynamic RAM (Hyper Page Mode*)

Organization (words ∞ bits)	Part number	Access time MAX. (ns)	Refresh cycle (cycles/ ms)	Maximum supply current		Supply voltage (V)	Package	Remarks
				Active (ms)	Standby (mA)			
256K ∞ 16	**μPD424210AL**	60 70 80	512/8	80 70 60	0.5	3.3±0.3	• 40-pin SOJ (400 mil) • 44-pin TSOP II (400 mil)	Hyper page Byte read/write

*: Hyper Page Mode is equivalent to EDO

■ Low Voltage Operation 4M Dynamic RAM with Self Refresh (Hyper Page Mode*)

Organization (words ∞ bits)	Part number	Access time MAX. (ns)	Refresh cycle (cycles/ ms)	Maximum supply current				Supply voltage (V)	Package	Remarks
				Active (ms)	Standby (mA)	Self refresh (μA)	Long refresh (μA)			
256K ∞ 16	**μPD42S4210AL**	60 70 80	512/128	80 70 60	0.08	80	100	3.3±0.3	• 40-pin SOJ (400 mil) • 44-pin TSOP II (400 mil)	Hyper page Byte read/write

*: Hyper Page Mode is equivalent to EDO

Dynamic RAM

■ Synchronous DRAM

Organization (words ∞ bits)	Part number	Cycle time MIN. (ns)	Refresh cycle (cycles/ ms)	Maximum supply current			Inter-face	Supply voltage (V)	Package
				Active Normal/Burst (Grade-10, C.L.=3) (mA)	Standby (Power down Mode) (mA)	Self refresh (mA)			
4M ∞ 4	**μPD4516421**	10 (100 MHz) 12 (83 MHz) 13 (75 MHz) 15 (66 MHz)	2K/32	80 mA/150 mA (MAX.)	2	2	LVTTL	3.3±0.3	• 44-pin TSOP II (400 mil)
2M ∞ 8	**μPD4516821**			85 mA/165 mA (MAX.)					
1M ∞ 16	**μPD4516161**			90 mA/210 mA (MAX.)					• 50-pin TSOP II (400 mil)

C.L. = CAS Latency

■ Rambus™ DRAM (under development)

Organization (words ∞ bits)	Part number		Operating frequency (MHz)	Supply voltage (V)	Maximum supply current (mA)	Package
2M ∞ 9	**μPD488170L**	**–A50**	250	3.3 ±0.15	250	• 32-pin SVP • 72/36-pin SSOP
		–A40	200			
2M ∞ 8	**μPD488130L**	**–A50**	250			
		–A40	200			

Dynamic RAM Module

■ SIMM

Capacity (byte)	Organization (words ∞ bits)	Part number	Access time MAX. (ns)	Maximum supply current		Supply voltage (V)	Package	Remarks
				Active (mA)	Standby (mA)			
32M	8M ∞ 36	**MC-428000A36**	60 70 80	1420 1260 1140	24	5±10 %	• 72-pin SIMM socket type (solder-coated/gold-plated)	Fast page
	8M ∞ 32	**MC-428000A32**	60 70 80	860 780	16			
		MC-428000F32	60 70	940 860	16			Hyper page (EDO)
16M	4M ∞ 36	**MC-424000A36**	60 70 80	1360 1200 1080	12		• 72-pin SIMM socket type socket type (solder-coated/gold-plated)	Fast page
	4M ∞ 32	**MC-424000A32**	60 70 80	880 800 720	8			
		MC-424000F32	60 70	880 800	8			Hyper page (EDO)
8M	2M ∞ 36	**MC-422000A36**	60 70 80 100	1300 1180 1060 940	24			Fast page
	2M ∞ 32	**MC-422000A32**	60 70 80	324 304 284	4			Fast page 16M DRAM Base
		MC-422000F32	60 70	324 304	4			Hyper page (EDO)
4M	1M ∞ 36	**MC-421000A36**	60 70 80 100	1240 1120 1000 880	12		• 72-pin SIMM socket type socket type (solder-coated/gold-plated)	Fast page
	1M ∞ 32	**MC-421000A32**	60 70 80	320 300 280	2			Fast page 16M DRAM Base
		MC-421000F32	60 70	320 300	2			Hyper page (EDO)

■ SOD (SOD: Small Outline DIMM, DIMM: Dual Inline Memory Module)

Organization (words ∞ bits)	Bank	Part number	Access time MAX. (ns)	Refresh cycle (cycles/ ms)	Maximum supply current			Supply voltage (V)	Package	Mounted devices	Remarks
					Active (mA)	Standby (mA)	Self refresh (μA)				
1M ∞ 32	1	**MC-42S1000LAD32S**	60 70 80	1K/128	300 280 260	1	360	3.3±0.3	• 72-pin SOD Socket type (Gold plated)	D42S18160LG5 ∞ 2 pcs.	Fast page Self refresh
2M ∞ 32	1	**MC-42S2000LAB32S**	60 70 80	2K/128	400 360 320	2	600			D42S17800LG5 ∞ 4 pcs.	
	2	**MC-42S2000LAD32S**	60 70 80	1K/128	301 281 261		720			D42S18160LG5 ∞ 4 pcs.	
4M ∞ 32	1	**MC-42S4000LAC32S**	60 70 80	2K/128	800 720 640	4	1200			D42S17400LG3 ∞ 8 pcs.	
	2	**MC-42S4000LAB32S**	60 70 80		405 365 325		1200			D42S17800LG5 ∞ 8 pcs.	

Dynamic RAM Module

■ 8 Byte DIMM (DIMM: Dual Inline Memory Module)

Organization (words ∞ bits)	Part number	Access time MAX. (ns)	Refresh cycle (cycles/ ms)	Maximum supply current		Supply voltage (V)	Package	Remarks
				Active (mA)	Standby (mA)			
1M ∞ 64	**MC-421000AA64**	60 70 80	1K/16	650 610 570	68	5.0±0.25	• 168-pin DIMM Socket type (Gold plated)	Fast page
	MC-421000FA64	60 70		650 610				Hyper page (EDO)
2M ∞ 64	**MC-422000AA64**	60 70 80		660 620 580	72			Fast page
	MC-422000FA64	60 70		660 620				Hyper page (EDO)
1M ∞ 72 (ECC)	**MC-421000AD72**	60 70 80		890 810 750	70			Fast page
2M ∞ 72 (ECC)	**MC-422000AB72**	60 70 80	2K/32	1000 910 820	73			Fast page
	MC-422000FB72	60 70		1000 910				Hyper page (EDO)
	MC-422000LAB72	60 70 80		910 820 730	14	3.3±0.3		Fast page
	MC-422000LFB72	60 70		910 820				Hyper page (EDO)
4M ∞ 72 (ECC)	**MC-424000AB72**	60 70 80		1990 1810 1630	82	5.0±0.25		Fast page
	MC-424000AC72	60 70 80	4K/64	1630 1480 1270				
	MC-424000FB72★	60 70	2K/32	1990 1810				Hyper page (EDO)
	MC-424000FC72	60 70	4K/64	1630 1450				
	MC-424000LAB72	60 70 80	2K/32	1810 1630 1450	19	3.3±0.3		Fast page
	MC-424000LAC72	70 80	4K/64	1270 1090				Hyper page (EDO)
	MC-424000LFB72★	60 70	2K/32	1810 1630				
	MC-424000LFC72	60 70	4K/64	1450 1270				

★: Under development

Dynamic RAM Module

■ Synchronous DRAM DIMM

Organization (words ∞ bits)	Part number	Mnimum cycle time MAX. (ns)	Refresh cycle (cycles/ ms)	Maximum supply current		Supply voltage (V)	Package	Remarks
				Active (mA)	Standby (mA)			
2M ∞ 72	**MC-452AA72**	10 12 13	2K/32	765 720 675	18	3.3±0.3	• 200-pin DIMM Socket type (Gold plated)	Unbuffered
	MC-452BA72	10 12 13		TBD	TBD			Buffered
2M ∞ 80	**MC-452AA80**	10 12 13		850 800 750	20			Unbuffered
	MC-454BA80	10 12 13		TBD	TBD			Buffered
4M ∞ 72	**MC-454BA/BC72**	10 12 13						
4M ∞ 80	**MC-454BA/BC80**	10 12 13						

Static RAM

■ Low Power Static RAM

Capacity (bits)	Organization (words × bits)	Part number	Access time MAX. (ns)	Maximum supply current			Supply voltage (V)	Package	Remarks
				Active (mA)	Standby (mA)	Data retention (μA)			
256K	32K × 8	**μPD43256B**	70	45	0.1	50	5±10 %	• 28-pin DIP (600 mil)	L version
		with $\overline{CS}$, $\overline{OE}$	85	45	0.05	20		• 28-pin SOP (450 mil)	LL version
								• 32-pin TSOP I (600 mil)	
								• 28-pin TSOP I (8 × 13.4 mm)	
		μPD43257B	70	45	0.1	50		• 28-pin DIP (600 mil)	L version
		with $\overline{CE1}$, CE2	85	45	0.05	20		• 28-pin SOP (450 mil)	LL version
1M	128K × 8	**μPD431000A**	70	70	0.1	50		• 32-pin DIP (600 mil)	L version
		with $\overline{CE1}$, CE2, $\overline{OE}$	85		0.05	20		• 32-pin SOP (525 mil)	LL version
			100					• 32-pin TSOP I (8 × 20 mm)	

■ Low Power Static RAM Low Voltage (2.7 to 5.5 V) Operation

Capacity (bits)	Organization (words × bits)	Part number	Access time MAX. (ns)	Maximum supply current			Supply voltage (V)	Package
				Active (mA)	Standby (μA)	Data retention (μA)		
256K	32K × 8	**μPD43256B-B12**	120	20	25	20	3±10 %	• 28-pin SOP (450 mil)
				45	50		3.3 < V_{CC} < 4.5	• 32-pin TSOP I (600 mil)
		with $\overline{CS}$, $\overline{OE}$	85				5±10 %	• 28-pin TSOP I (8 × 13.4 mm)
1M	128K × 8	**μPD431000A-B15**	150	20	25	20	3±10 %	• 32-pin SOP (525 mil)
				70	50		3.3 < V_{CC} < 4.5	• 32-pin TSOP I (8 × 20 mm)
		with $\overline{CE1}$, CE2, $\overline{OE}$	100				5±10 %	

■ Low Power Static RAM Low Voltage (3.0 to 5.5 V) Operation

Capacity (bits)	Organization (words × bits)	Part number	Access time MAX. (ns)	Maximum supply current			Supply voltage (V)	Package
				Active (mA)	Standby (mA)	Data retention (μA)		
256K	32K × 8	**μPD43256B-A10**	100	45	50	20	3.3 ± 0.3 V	• 28-pin SOP (450 mil)
			85				5±10 %	• 32-pin TSOP I (600 mil)
		μPD43256B-A12	120				3.3 ± 0.3 V	• 28-pin TSOP I (8 × 13.4 mm)
			85				5±10 %	

Static RAM

■ Fast Static RAM

Capacity (bits)	Organization (words × bits)	Part number	Access time MAX. (ns)	Maximum supply current			Supply voltage (V)	Package	Remarks
				Active (mA)	Standby (mA)	Data retention (μA)			
1M	128K × 8	**μPD431008**	15 17 20	160 150 140	10	–	5±10 %	• 32-pin SOJ (400 mil)	–
	128K × 9	**μPD431009**	15 17 20	160 150 140				• 36-pin SOJ (400 mil)	
	64K × 16	**μPD431016**	15 17 20	240 230 220				• 44-pin SOJ (400 mil)	
	64K × 18	**μPD431018**	15 17 20	240 230 220					
4M	1M × 4	**μPD434004**	20 25	150 140				• 32-pin SOJ (400 mil)	
	512K × 8	**μPD434008**	20 25	190 170				• 36-pin SOJ (400 mil)	

■ Fast Static RAM Low Voltage (3.0 to 3.6 V) Operation

Capacity (bits)	Organization (words × bits)	Part number	Access time MAX. (ns)	Maximum supply current			Supply voltage (V)	Package
				Active (mA)	Standby (mA)	Data retention (μA)		
1M	128K × 8	**μPD431008L**	17 20	120 100	5	–	3.3±0.3	• 32-pin SOJ (400 mil)
	128K × 9	**μPD431009L**						• 36-pin SOJ (400 mil)
	64K × 16	**μPD431016L**						• 44-pin SOJ (400 mil)
	64K × 18	**μPD431018L**						

■ Synchronous Static RAM

Capacity (bits)	Organization (words × bits)	Part number	Access time MAX. (ns)	Maximum supply current			Supply voltage (V)	Package	Remarks
				Active (mA)	Standby (mA)	Data retention (μA)			
1M	32K × 32	**μPD431232L**	8 9 12	250	2	–	3.3±0.2	• 100-pin TQFP	–

Static RAM

■ BiCMOS Fast Static RAM

Capacity (bits)	Organization (words × bits)	Part number	Access time MAX. (ns)	Maximum supply current			Supply voltage (V)	Package	Remarks
				Active (mA)	Standby (mA)	Data retention (μA)			
256K	32K × 8	**μPD46258**	6 7	–	–	–	5±10 %	• 32-pin SOJ (300 mil)	–
1M	128K × 8	**μPD461008**	8 9 10	185				• 32-pin SOJ (400 mil)	

■ BiCMOS Fast Static RAM (3.3 V ± 0.3 V)

Capacity (bits)	Organization (words × bits)	Part number	Access time MAX. (ns)	Maximum supply current			Supply voltage (V)	Package	Remarks
				Active (mA)	Standby (mA)	Data retention (μA)			
256K	32K × 8	**μPD46259L**	12	130	20	–	3.3±0.3	• 32-pin SOJ (300 mil)	–
1M	64K × 16	**μPD461016L**	10 12	260	70		$3.3^{+0.3}_{-0.15}$	• 44-pin SOJ (400 mil)	
							3.3±0.3		
	64K × 18	**μPD461018L**	10 12	260			$3.3^{+0.3}_{-0.15}$	• 44-pin TSOP II (400 mil)	
							3.3±0.3		

■ BiCMOS Synchronous Static RAM

Capacity (bits)	Organization (words × bits)	Part number	Access time MAX. (ns)	Maximum supply current			Supply voltage (V)	Package	Remarks
				Active (mA)	Standby (mA)	Data retention (μA)			
1M	32K × 18	**μPD461318**★	2 2.5 3 7 8.5 10	TBD	TBD	–	3.3±0.3	• 119-pin BGA	User-option ① Dual-CLK R/L ② Single-CLK R/R
	32K × 36	**μPD461336**★	2 2.5 3 7 8.5 10						

★: Under development

Mask ROM

■ Mask ROM

Capacity (bits)	Organization (words × bits)	Part number	Access time MAX. (ns)	Maximum supply current		Supply voltage (V)	Package	Remarks
				Active (mA)	Standby (mA)			
32M	2M × 16 or 1M × 32 (selectable)	**μPD23C32140**★	100/30	120	0.1	5 ±10 %	• 70-pin SSOP (500 mil) • 70-pin TSOP II (400 mil)	with page access read mode
	4M × 8 or 2M × 16 (selectable)	**μPD23C32000**	120	70			• 44-pin SOP (600 mil) • 48-pin TSOP I (12 × 18 mm)★ • 44-pin TSOP II (400 mil)★	–
16M	2M × 8 or 1M × 16 (selectable)	**μPD23C16000W** **μPD23C16040A**	120 120/35	70 100			• 42-pin DIP (600 mil) • 44-pin SOP (600 mil) • 48-pin TSOP I (12 × 18 mm) • 44-pin TSOP II (400 mil)	μPD16040A … with page access read mode
8M	1M × 8 or 512K × 16 (selectable)	**μPD23C8000W**	120	70				Pin-compatible with PROM μPD27C8000
	1M × 8	**μPD23C8001EJ**	120	50			• 32-pin DIP (600 mil) • 32-pin SOP (525 mil)	Pin-compatible with PROM μPD27C8001
4M	512K × 8 or 256K × 16 (selectable)	**μPD23C4000S** **μPD23C4040**	100 10/50	100 150			• 40-pin DIP (600 mil) • 40-pin SOP (525 mil)	Pin-compatible with PROM μPD27C4000 μPD23C4040 … with page access read mode
	512K × 8	**μPD23C4001EJ**	120	50			• 32-pin DIP (600 mil) • 32-pin SOP (525 mil) • 40-pin TSOP I (10 × 20 mm)	Pin-compatible with PROM μPD27C4001
2M	256K × 8	**μPD23C2001E**	200	40				Pin-compatible with PROM μPD27C2001
1M	128K × 8	**μPD23C1001EA**	150	40				Pin-compatible with PROM μPD27C1001A
		μPD23C1000EB					• 32-pin DIP (600 mil)	Pin-compatible with PROM μPD27C1000A
		μPD23C1000B **μPD23C1010B**					• 28-pin DIP (600 mil)	–

★: Under development

■ Mask ROM (Low Voltage Operation)

Capacity (bits)	Organization (words × bits)	Part number	Access time MAX. (ns)	Maximum supply current		Supply voltage (V)	Package	Remarks
				Active (mA)	Standby (mA)			
32M★	4M × 8 or 2M × 16 (selectable)	**μPD23C32000**	200	20	20	3.0±0.3	• 44-pin SOP (600 mil) • 48-pin TSOP I (12 × 18 mm) • 44-pin TSOP II (400 mil)	–
16M	2M × 8 or 1M × 16 (selectable)	**μPD23C16000LW**	200	20	20		• 42-pin DIP (600 mil) • 44-pin SOP (600 mil) • 48-pin TSOP I (12 × 18 mm) • 44-pin TSOP II (400 mil)	
8M	1M × 8 or 512K × 16 (selectable)	**μPD23C8000LW**	230	30	30			

★: Under development

PROM

■ UV EPROM

Capacity (bits)	Organization (words × bits)	Part number	Access time MAX. (ns)	Maximum supply current		Supply voltage (V)	Package	Remarks
				Active (mA)	Standby (mA)			
8M	1M × 8 or 512K × 16 (selectable)	**μPD27C8000**	120 150 170	50	0.1	V_{PP} = 12.5±0.3 V_{CC} = 5 ±10 %	• 42-pin DIP (600 mil)	Pin-compatible with Mask ROM μPD23C8000 series
	1M × 8	**μPD27C8001**	120 150 170	30			• 32-pin DIP (600 mil)	Pin-compatible with Mask ROM μPD23C8001E series
4M	512K × 8 or 256K × 16 (selectable)	**μPD27C4000**	150 170 200	50			• 40-pin DIP (600 mil)	Pin-compatible with Mask ROM μPD23C4000 series
	256K × 16	**μPD27C240**	100 120 150					–
	512K × 8	**μPD27C4001**	120★ 150 170 200	30			• 32-pin DIP (600 mil)	Pin-compatible with Mask ROM μPD23C4001E series
		μPD27C040	100 120 150	50				
2M	256K × 8	**μPD27C020**	120 150	30				Pin-compatible with Mask ROM μPD23C2001E series
1M	128K × 8	**μPD27C010A**	100 120 150					Pin-compatible with Mask ROM μPD23C1001E series
	64K × 16	**μPD27C210A**	120 150	50			• 40-pin DIP (600 mil)	Pin-compatible with Mask ROM μPD23C1024E series

★: Under development

■ ONE TIME PROM

Capacity (bits)	Organization (words × bits)	Part number	Access time MAX. (ns)	Maximum supply current		Supply voltage (V)	Package	Remarks
				Active (mA)	Standby (mA)			
8M	1M × 8 or 512K × 16 (selectable)	**μPD27C8000**	150 170	50	0.1	V_{PP} = 12.5±0.3 V_{CC} = 5 ±10 %	• 42-pin DIP (600 mil) • 44-pin SOP (600 mil) • 48-pin TSOP I (12 × 18 mm)	Pin-compatible with Mask ROM μPD23C8000 series
	1M × 8	**μPD27C8001**	150 170	30			• 32-pin DIP (600 mil) • 32-pin SOP (525 mil)	Pin-compatible with Mask ROM μPD23C8001E series
4M	512K × 8 or 256K × 16 (selectable)	**μPD27C4000**	150 170 200	50			• 40-pin DIP (600 mil) • 40-pin SOP (525 mil)	Pin-compatible with Mask ROM μPD23C4000 series
	512K × 8	**μPD27C4001**	120★ 150 170 200	30			• 32-pin DIP (600 mil) • 32-pin SOP (525 mil) • 40-pin TSOP I (10 × 20 mm)	Pin-compatible with Mask ROM μPD23C4001E series

★: Under development

PROM

■ EEPROM

Capacity (bits)	Organization (words ∞ bits)	Part number	Access time MAX. (ns)	Maximum supply current		Supply voltage (V)	Package	Remarks
				Active (mA)	Standby (mA)			
256K	32K ∞ 8	**μPD28C256**	200 250	50	0.1	5 ±10 %	• 28-pin DIP (600 mil)	–
64K	8K ∞ 8	**μPD28C64A**	150 200				• 28-pin DIP (600 mil) • 28-pin SOP (450 mil) • 32-pin TSOP I (600 mil)	

■ SERIAL EEPROM

Capacity (bits)	Organization (words ∞ bits)	Part number	Serial interface	Active current (mA)	Standby current (mA)	Supply voltage (V)	Package
2K	256 ∞ 8	**μPD6252**	CE, CS, SCL, SDA (2-wire BUS)	1.5	0.02	5 V ±10 %	• 8-pin DIP (300 mil) • 8-pin SOP (300 mil)
1K	128 ∞ 8	**μPD6253**					
4K	512 ∞ 8	**μPD6254**					
2K	256 ∞ 8	**μPD6272**	CE, CS, I^2C BUS				
1K	128 ∞ 8	**μPD6273**					
4K	512 ∞ 8	**μPD6274**					
2K	256 ∞ 8	**μPD6255**	CS, SCL, SDA (2-wire BUS)	1.0	0.005	1.8 to 3.5 V	
4K	512 ∞ 8	**μPD6257**	CS, SCK, SI, SO (3-wire BUS)	1.5	0.003	5 V ±10 %	
8K	1024 ∞ 8	**μPD6258**					

Flash MEMORY

■ Flash MEMORY

Capacity (bits)	Organization (words ∞ bits)	Part number	Access time MAX. (ns)	Maximum supply current		Supply voltage (V)	Package	Remarks
				Active (mA)	Standby (mA)			
1M	128K ∞ 8	**μPD28F001**	80 100 120	50	0.1	V_{PP} = 12±0.6 V_{CC} = 5 ±10 %	• 32-pin SOP (525 mil) • 32-pin TSOP I (8 ∞ 20 mm) • 32-pin QFJ	–

Other

■ Dual-Port Graphic Buffer

Capacity (bits)	Organization (words ∞ bits)	Part number	Random access time MAX. (ns)	Serial read cycle time (ns)	Maximum supply current		Supply voltage (V)	Package	Remarks
					Active (mA)	Standby (mA)			
4M	256K ∞ 16	**μPD482444**	60 70 80	20 22 25	130 110 90	10	5±10 %	• 64-pin SSOP (525 mil)	2WE Byte Control Fast Page Flash/Block Write Split Buffer Stopping Column
		μPD482445	60 70 80	20 22 25	130 110 90			• 64-pin SSOP (525 mil) • 70-pin TSOP II (400 mil)	2WE Byte Control Hyper Page Flash/Block Write Split Buffer Stopping Column
		μPD482445L	70 80	22 25	110 90	7	3.3±0.3		
2M	256K ∞ 8	**μPD482234**	60 70 80	20 22 25	155 195 190	10	5±10 %	• 40-pin SOJ • 44-pin TSOP II	Fast page Flash write Block write Split buffer
		μPD482235	60 70 80	20 22 25	155 195 190				Hyper page Flash write Block write Split buffer

■ Synchronous Graphics RAM

Capacity (bits)	Organization	Part number	Cycle time MIN. (ns)	Refresh cycle (cycles/ ms)	Maximum supply current (mA)			Interface	Supply voltage (V)	Package	Function
					Active Normal/Burst (Grade–10, C.L=3)	Standby power down mode	Self refresh				
8M	128K ∞ 2 banks ∞ 32 bits	**μPD481850**	10 (100 MHz) 12 (83 MHz) 15 (66 MHz)	1024/16	105/365 90/310 85/285	3	2	LVTTL	3.3±0.3	• 100-pin QFP (14 ∞ 20 mm)	Sychronous Interface Write-per-bit (Old Mask) 8 column Block Write

■ Graphic Memory

Capacity (bits)	Organization (words ∞ bits)	Part number	Random access time MAX. (ns)	Page mode access time MAX. (ns)	Maximum supply current		Supply voltage (V)	Package	Remarks
					Active (mA)	Standby (mA)			
4M	256K ∞ 16	**μPD481440**	70 80	35 40	180 165	2	5±10 %	• 40-pin SOJ (400 mil)	2WE Byte Control Flash write Block write

Other

■ Silicon File

Capacity (bits)	Organization (words ∞ bits)	Part number	Random access time MAX. (ns)	Page mode access time MAX. (ns)	Maximum supply current		Supply voltage (V)	Package
					Active (mA)	Self refresh (μA)		
16M	16M ∞ 1	**μPD426171**	60 70 80	40 45 50	100 90 80	Ta=0 to 55 °C: 30 (–L) Ta=0 to 55 ·C: 50	3.3±0.3	• 26-pin SOJ (300 mil) • 26-pin TSOP II (300 mil)
	4M ∞ 4	**μPD426174**	60 70 80	40 45 50	100 90 80			
4M	4M ∞ 1	**μPD42641**	80	20	90	Ta=0-70·C: 240 Ta=0-60·C: 120 Ta=0-50·C: 60	5±10 %	• 26-pin SOJ • 26-pin TSOP II
	1M ∞ 4	**μPD42644**						
	4M ∞ 1	**μPD42641-L**				Ta=0-70·C: 120 Ta=0-60·C: 60 Ta=0-50·C: 30		
	1M ∞ 4	**μPD42644-L**						

■ Field/Line Buffer

Capacity (bits)	Organization (words ∞ bits)	Part number	Read/Write cycle time MIN. (ns)	Data hold period (ms)	Maximum supply current active (mA)	Supply voltage (V)	Package	Remarks
2M	256 ∞ 8	**μPD42280**	30/30 40/40 60/60	–	90 75 60	5±10 %	• 28-pin SOP • 28-pin ZIP	Field buffer FIFO structure
80K	10096 ∞ 8 5048 ∞ 16	**μPD485506**	25/25 27/27 35/35		140		• 44-pin TSOP II	FAX, PPC Line buffer FIFO structure
40K	5048 ∞ 8	**μPD485505**	25/25 27/27 35/35		90		• 24-pin SOP	
7K	910 ∞ 8	**μPD42101**	34/34 34/69 69/69	1	70 60 35		• 24-pin DIP • 24-pin SOP	NTSC Line buffer FIFO structure
9K	1135 ∞ 8	**μPD42102**	25/25 28/28 28/56 56/56		80 80 70 40			PAL Line buffer FIFO structure

Semi-Custom IC

Gate Array 84

- CMOS Gate Array 84
- BiCMOS Gate Array 89
- ECL Gate Array 90

UNIVERSAL PCI 90

MV Series 91

Cell Based IC 92

Analog Master 94

Gate Array

CMOS Gate Array

■ CMOS-6 family (channelless type)

Type number		μPD65658	μPD65664	μPD65672	μPD65676
Integration	Internal gates	42240	72576	119232	177408
	Usable gate number	31680	54432	89424	133056
	Pad number *	236	304	384	464
Delay time	Internal gate	0.5 ns (fan-outs: 2, wiring length: 2 mm)/0.4 ns (power gate, fan-outs: 2, wiring length: 2 mm)			
	Input buffer	1.0 ns			
	Output buffer	2.0 ns (C_L = 15 pF)			
Output drive capability		I_{OL} = 4.5, 9.0, 13.5, 18.0, 24.0 mA			
Supply voltage		5 V			

*: V_{DD}, GND terminals included. Number of pin which can be actually used depends on package.

■ CMOS-6A family (channelless type)

Type number		μPD65630	μPD65636	μPD65640	μPD65646	μPD65650	μPD65654	μPD65656	μPD65662
Integration	Internal gates	5376	8000	11520	16240	21120	30720	40480	70272
	Usable gate number	3225	4800	6912	9744	12672	18432	24288	42163
	Pad number *	100	116	136	156	176	208	220	288
Delay time	Internal gate	0.5 ns (fan-outs: 2, wiring length: 2 mm)/0.4 ns (power gate, fan-outs: 2, wiring length: 2 mm)							
	Input buffer	1.0 ns							
	Output buffer	2.0 ns (C_L = 15 pF)							
Output drive capability		I_{OL} = 4.5, 9.0, 13.5, 18.0, 24.0 mA							
Supply voltage		5 V							

*: V_{DD}, GND terminals included. Number of pin which can be actually used depends on package.

■ CMOS-6V family (channelless type) (1/2)

Type number		μPD65631	μPD65641	μPD65644	μPD65647
Integration	Internal gates	5544	11520	14040	16240
	Usable gate number	3326	6912	8424	9744
	Pad number *	156	176	176	176
Delay time	Internal gate	0.5 ns (fan-outs: 2, wiring length: 2 mm)/0.4 ns (power gate, fan-outs: 2, wiring length: 2 mm)			
	Input buffer	1.0 ns			
	Output buffer	2.0 ns (C_L = 15 pF)			
Output drive capability		I_{OL} = 4.5, 9.0, 13.5, 18.0, 24.0 mA			
Supply voltage		5 V			

*: V_{DD}, GND terminals included. Number of pin which can be actually used depends on package.

■ CMOS-6V family (channelless type) (2/2)

Type number		μPD65648	μPD65651	μPD65652	μPD65655
Integration	Internal gates	18600	21120	26640	30720
	Usable gate number	11160	12672	15984	18432
	Pad number *	176	236	236	236
Delay time	Internal gate	0.5 ns (fan-outs: 2, wiring length: 2 mm)/0.4 ns (power gate, fan-outs: 2, wiring length: 2 mm)			
	Input buffer	1.0 ns			
	Output buffer	2.0 ns (C_L = 15 pF)			
Output drive capability		I_{OL} = 4.5, 9.0, 13.5, 18.0, 24.0 mA			
Supply voltage		5 V			

*: V_{DD}, GND terminals included. Number of pin which can be actually used depends on package.

Gate Array

CMOS Gate Array

■ CMOS-6X family (channelless type)

Type number		μPD65612	μPD65622	μPD65626	μPD65632
Integration	Internal gates	2244	4260	5760	8148
	Usable gate number	1346	2556	3456	4888
	Pad number *	80	100	120	120
Delay time	Internal gate	0.5 ns (fan-outs: 2, wiring length: 2 mm)/0.4 ns (power gate, fan-outs: 2, wiring length: 2 mm)			
	Input buffer	1.0 ns			
	Output buffer	2.0 ns (C_L = 15 pF)			
Output drive capability		I_{OL} = 4.5, 9.0, 13.5, 18.0, 24.0 mA			
Supply voltage		5 V			

*: V_{DD}, GND terminals included. Number of pin which can be actually used depends on package.

■ CMOS-8 family (channelless type) 2-Metal-layer (1/2)

Type number		μPD65800	μPD65801	μPD65802	μPD65803
Integration	Internal gates	11712	21504	32000	42688
	Usable gate number	7027	12902	19200	25612
	Pad number *	172	228	268	308
Delay time	Internal gate	0.34 ns (fan-outs: 2, wiring length: 2 mm)/0.29 ns (power gate, fan-outs: 2, wiring length: 2 mm)			
	Input buffer	0.44 ns			
	Output buffer	1.6 ns (C_L = 15 pF)			
Output drive capability		I_{OL} = 3, 6, 9, 12, 18, 24 mA			
Supply voltage		5 V			

*: V_{DD}, GND terminals included. Number of pin which can be actually used depends on package.

■ CMOS-8 family (channelless type) 3-Metal-layer (2/2)

Type number		μPD65804	μPD65806	μPD65808	μPD65810	μPD65811	μPD65812	μPD65813
Integration	Internal gates	42688	58752	82432	103680	138776	176720	233280
	Usable gate number	32016	44064	61824	77760	104082	132540	174960
	Pad number *	308	340	404	452	524	588	676
Delay time	Internal gate	0.34 ns (fan-outs: 2, wiring length: 2 mm)/0.29 ns (power gate, fan-outs: 2, wiring length: 2 mm)						
	Input buffer	0.44 ns						
	Output buffer	1.6 ns (C_L = 15 pF)						
Output drive capability		I_{OL} = 3, 6, 9, 12, 18, 24 mA						
Supply voltage		5 V						

*: V_{DD}, GND terminals included. Number of pin which can be actually used depends on package.

■ CMOS-8L family (channelless type) 2-Metal-layer (1/3)

Type number		μPD65840	μPD65841	μPD65842	μPD65843	μPD65845
Integration	Internal gates	10912	20832	30192	40592	52528
	Usable gate number	6547	12499	18115	24355	31516
	Pad number *	164	204	212	244	276
Delay time	Internal gate	0.13 ns (fan-outs: 1, wiring length: 0 mm), 0.33 ns (fan-outs: 2, wiring length: 2 mm)/ 0.21 ns (power gate, fan-outs: 2, wiring length: 2 mm)				
	Input buffer	0.40 ns				
	Output buffer	1.67 ns (FO01, C_L = 15 pF)				
Output drive capability		I_{OL} = 3, 6, 9, 12, 18, 24 mA				
Supply voltage		3.3 V ±0.3 V				

*: V_{DD}, GND terminals included. Number of pin which can be actually used depends on package.

Gate Array

CMOS Gate Array

■ CMOS-8L family (channelless type) 2-Metal-layer (2/3)

Type number		μPD65846	μPD65848	μPD65849	μPD65850	μPD65851
Integration	Internal gates	61904	81984	102272	120768	148256
	Usable gate number	37142	49190	61363	72460	88953
	Pad number *	300	340	380	412	452
Delay time	Internal gate	0.13 ns (fan-outs: 1, wiring length: 0 mm), 0.33 ns (fan-outs: 2, wiring length: 2 mm)/ 0.21 ns (power gate, fan-outs: 2, wiring length: 2 mm)				
	Input buffer	0.40 ns				
	Output buffer	1.67 ns (FO01, C_L = 15 pF)				
Output drive capability		I_{OL} = 3, 6, 9, 12, 18, 24 mA				
Supply voltage		3.3 V ±0.3 V				

*: V_{DD}, GND terminals included. Number of pin which can be actually used depends on package.

■ CMOS-8L family (channelless type) 2-Metal-layer (3/3)

Type number		μPD65852	μPD65853	μPD65855	μPD65858	μPD65859
Integration	Internal gates	202752	255744	342000	488720	627328
	Usable gate number	121651	153446	205200	293232	376396
	Pad number *	524	588	676	804	908
Delay time	Internal gate	0.13 ns (fan-outs: 1, wiring length: 0 mm), 0.33 ns (fan-outs: 2, wiring length: 2 mm)/ 0.21 ns (power gate, fan-outs: 2, wiring length: 2 mm)				
	Input buffer	0.40 ns				
	Output buffer	1.67 ns (FO01, C_L = 15 pF)				
Output drive capability		I_{OL} = 3, 6, 9, 12, 18, 24 mA				
Supply voltage		3.3 V ±0.3 V				

*: V_{DD}, GND terminals included. Number of pin which can be actually used depends on package.

■ CMOS-8L family (channelless type) 3-Metal-layer (1/3)

Type number		μPD65860	μPD65861	μPD65862	μPD65863	μPD65865
Integration	Internal gates	10912	20832	30192	40592	52528
	Usable gate number	8184	15624	22644	30444	39396
	Pad number *	164	204	212	244	276
Delay time	Internal gate	0.13 ns (fan-outs: 1, wiring length: 0 mm), 0.33 ns (fan-outs: 2, wiring length: 2 mm)/ 0.21 ns (power gate, fan-outs: 2, wiring length: 2 mm)				
	Input buffer	0.40 ns				
	Output buffer	1.67 ns (FO01, C_L = 15 pF)				
Output drive capability		I_{OL} = 3, 6, 9, 12, 18, 24 mA				
Supply voltage		3.3 V ±0.3 V				

*: V_{DD}, GND terminals included. Number of pin which can be actually used depends on package.

■ CMOS-8L family (channelless type) 3-Metal-layer (2/3)

Type number		μPD65866	μPD65868	μPD65869	μPD65870	μPD65871
Integration	Internal gates	61904	81984	102272	120768	148256
	Usable gate number	46428	61488	76704	90576	111192
	Pad number *	300	340	380	412	452
Delay time	Internal gate	0.13 ns (fan-outs: 1, wiring length: 0 mm), 0.33 ns (fan-outs: 2, wiring length: 2 mm)/ 0.21 ns (power gate, fan-outs: 2, wiring length: 2 mm)				
	Input buffer	0.40 ns				
	Output buffer	1.67 ns (FO01, C_L = 15 pF)				
Output drive capability		I_{OL} = 3, 6, 9, 12, 18, 24 mA				
Supply voltage		3.3 V ±0.3 V				

*: V_{DD}, GND terminals included. Number of pin which can be actually used depends on package.

Gate Array

CMOS Gate Array

■ CMOS-8L family (channelless type) 3-Metal-layer (3/3)

Type number		μPD65872	μPD65873	μPD65875	μPD65878	μPD65879
Integration	Internal gates	202752	255744	342000	488720	627328
	Usable gate number	152064	191808	256500	366540	470496
	Pad number *	524	588	676	804	908
Delay time	Internal gate	0.13 ns (fan-outs: 1, wiring length: 0 mm), 0.33 ns (fan-outs: 2, wiring length: 2 mm)/ 0.21 ns (power gate, fan-outs: 2, wiring length: 2 mm)				
	Input buffer	0.40 ns				
	Output buffer	1.67 ns (FO01, C_L = 15 pF)				
Output drive capability		I_{OL} = 3, 6, 9, 12, 18, 24 mA				
Supply voltage		3.3 V ±0.3 V				

*: V_{DD}, GND terminals included. Number of pin which can be actually used depends on package.

■ CMOS-8LCX family (channelless type) 3-Metal-layer (1/2)

Type number		μPD65823	μPD65825	μPD65826	μPD65828	μPD65830
Integration	Internal gates	39856	50880	60320	80400	103360
	Usable gate number	29892	38160	45240	60300	77520
	Pad number *	284	316	340	388	436
Delay time	Internal gate	0.21 ns (fan-outs: 1, wiring length: 0 mm), 0.40 ns (fan-outs: 2, wiring length: 2 mm)/ 0.30 ns (power gate, fan-outs: 2, wiring length: 2 mm)				
	Input buffer	–				
	Output buffer	–				
Output drive capability		I_{OL} = 1, 2, 3, 6, 9, 12, 18, 24 mA				
Supply voltage		3.3 V ±0.3 V				

*: V_{DD}, GND terminals included. Number of pin which can be actually used depends on package.

■ CMOS-8LCX family (channelless type) 3-Metal-layer (2/2)

Type number		μPD65831	μPD65832	μPD65833	μPD65835	μPD65838
Integration	Internal gates	153264	200120	255360	347200	486048
	Usable gate number	114948	150090	191520	260400	364536
	Pad number *	524	596	668	772	908
Delay time	Internal gate	0.21 ns (fan-outs: 1, wiring length: 0 mm), 0.40 ns (fan-outs: 2, wiring length: 2 mm)/ 0.30 ns (power gate, fan-outs: 2, wiring length: 2 mm)				
	Input buffer	–				
	Output buffer	–				
Output drive capability		I_{OL} = 1, 2, 3, 6, 9, 12, 18, 24 mA				
Supply voltage		3.3 V ±0.3 V				

*: V_{DD}, GND terminals included. Number of pin which can be actually used depends on package.

Gate Array

CMOS Gate Array

■ CMOS-9 family (1/2)

[2-Metal-layer]

Type number		μPD65906	μPD65907	μPD65908	μPD65909	μPD65910
Inte-gration	Internal gates *1	190152	249948	317904	376740	462088
	Usable gate counts *2	76060	99979	127161	150696	184835
Delay time	Internal gates	138 ps (2-input NAND, fan-out = 1, standard wiring length)				
	Input buffer *3	188 ps				
	Output buffer *4	874 ps				
Output drive capacity		I_{OL} = 1, 2, 3, 6, 9, 12, 18, 24 mA				
Supply voltage		3.3 V ±0.3 V				

*1: 1 gate = 2-input NAND gate. *2: usable gate: 40%

*3: fanout = 2, wiring length = 2 mm *4: C_L = 15pF, I_{OL} = 18 mA

■ CMOS-9 family (2/2)

[2-Metal-layer]

Type number		μPD65911	μPD65913	μPD65915	μPD65917	μPD65919
Inte-gration	Internal gates *1	629824	805580	1076032	1545240	1990600
	Usable gate counts *2	251929	322232	430412	618096	796240
Delay time	Internal gates	138 ps (2-input NAND, fan-out = 1, standard wiring length)				
	Input buffer *3	188 ps				
	Output buffer *4	874 ps				
Output drive capacity		I_{OL} = 1, 2, 3, 6, 9, 12, 18, 24 mA				
Supply voltage		3.3 V ±0.3 V				

*1: 1 gate = 2-input NAND gate. *2: usable gate: 40%

*3: fanout = 2, wiring length = 2 mm *4: C_L = 15pF, I_{OL} = 18 mA

■ CMOS-9 family (1/2)

[3-Metal-layer]

Type number		μPD65926	μPD65927	μPD65928	μPD65929	μPD65930
Inte-gration	Internal gates *1	190152	249948	317904	376740	462088
	Usable gate counts *2	114091	149968	190742	226044	277252
Delay time	Internal gates	138 ps (2-input NAND, fan-out = 1, standard wiring length)				
	Input buffer *3	188 ps				
	Output buffer *4	874 ps				
Output drive capacity		I_{OL} = 1, 2, 3, 6, 9, 12, 18, 24 mA				
Supply voltage		3.3 V ±0.3 V				

*1: 1 gate = 2-input NAND gate. *2: usable gate: 60%

*3: fanout = 2, wiring length = 2 mm *4: C_L = 15pF, I_{OL} = 18 mA

■ CMOS-9 family (2/2)

[3-Metal-layer]

Type number		μPD65931	μPD65933	μPD65935	μPD65937	μPD65939
Inte-gration	Internal gates *1	629824	805580	1076032	1545240	1990600
	Usable gate counts *2	377894	483348	645619	927144	1194360
Delay time	Internal gates	138 ps (2-input NAND, fan-out = 1, standard wiring length)				
	Input buffer *3	188 ps				
	Output buffer *4	874 ps				
Output drive capacity		I_{OL} = 1, 2, 3, 6, 9, 12, 18, 24 mA				
Supply voltage		3.3 V ±0.3 V				

*1: 1 gate = 2-input NAND gate. *2: usable gate: 60%

*3: fanout = 2, wiring length = 2 mm *4: C_L = 15pF, I_{OL} = 18 mA

Gate Array

BiCMOS Gate Array

■ BiCMOS-5 family

Type number		μPD67021	μPD67031	μPD67050	μPD67070	μPD67101	μPD67240
Inte-gration	Maximum Number	2208	3240	5320	7216	10152	24528
	Maximum number of input pins	80	96	124	148	176	272
	Maximum number of output pins	80	96	124	148	176	272
Delay time	Internal gate	0.4 ns (fan-outs: 2, wiring length: 2 mm)					
	Input buffer	0.9 ns (TTL)					
		3.3 ns (TTL/ECL)					
		2.5 ns (ECL)					
	Output buffer	2.3 ns (TTL)					
		3.5 ns (TTL/ECL)					
		1.3 ns (ECL)					
Output drive capability		I_{OL} = 24, 48, 72 mA					
Supply voltage		V_{CC} = 5 V (CMOS/TTL) V_{EE} = –5.2 V (ECL-10KH) –4.5 V (ECL-100K)					

■ BiCMOS-8 family

Type number		μPD67804 (Logic Type)	μPD67852 (ECL mounted)
Inte-gration	CMOS Internal gates	236 K	57 K
	CMOS Usable gate number	165 K	40 K
	ECL Internal gates	–	5.0 K
	ECL Usable gate number	–	2.5 K
	Signal pin number	320	156
Delay time	Internal CMOS gate	180 ps (fun-outs: 1, wiring length: 0 mm) 370 ps (fun-outs: 2, wiring length: 2 mm)	
	Internal ECL gate	–	130 ps (fun-outs: 0, wiring length: 0 mm)
	Input buffer	0.23 ns (ECL: fun-outs: 1, wiring length: 0 mm) 0.43 ns (LVTTL: fun-outs: 1, wiring length: 0 mm) 1.17 ns (GTL: fun-outs: 1, wiring length: 0 mm)	
	Output buffer	1.37 ns (LVTTL: C_L = 15 pF) 0.98 ns (GTL: C_L = 15 pF) 0.99 ns (Slew rate GTL: C_L = 15 pF)	
Supply voltage	ECL-100K	V_{EE1} = –2.0 V ±5% V_{EE2} = –4.5 V ±0.3 V	
	ECL-10KH	V_{EE1} = –2.0 V ±5% V_{EE2} = –5.2 V ±5%	
	LV-TTL	V_{CC} = 3.3 V ±5%	
	GTL	V_{CC} = 3.3 V ±5%	

Gate Array

ECL Gate Array

■ ECL-4A family

Type number		μPB63020	μPB63040	μPB63060	μPB63080	μPB63100
Inte-gration	Internal gates	2400	4000	6000	8000	10000
	Maximum number of input pins	102	140	174	200	236
	Maximum number of output pins	58	84	90	108	120
Delay time	Internal gate	0.27 ns (fan-outs: 3, wiring length: 3 mm)				
	Input buffer	0.3 ns (fan-outs: 1, wiring length: 3 mm)				
		0.7 ns (TTL, fan-outs: 1, wiring length: 3 mm)				
	Output buffer	0.65 ns (ECL-100K, C_L = 15 pF), 0.63 ns (ECL-10K, C_L = 15 pF)				
		2.5 ns (TTL, C_L = 15 pF)				
Supply voltage		–5.2 V (ECL-10KH)				
		–4.5 V (ECL-100K)				
		5 V (TTL)				

UNIVERSAL PCI

■ UNIVERSAL PCI series (2-Metal-layer)

Type A *1		μPD66001	μPD66002	μPD66004	μPD66006	μPD66008	μPD66010	μPD66011	μPD66012
Type B *2		μPD66081	μPD66082	μPD66084	μPD66086	μPD66088	μPD66090	μPD66091	μPD66092
Inte-gration	Internal gates	23392	32640	46464	68208	87648	121684	155584	209712
	Usable gate number	14035	19584	27878	40925	52589	73008	93350	125827
	Pad number *3	268	308	356	420	468	524	588	676
Delay time	Internal gate	0.14 ns (fan-out: 1, wiring length: 0 mm), 0.29 ns (fan-out: 2, wiring length: 2 mm)/ 0.20 ns (power gate, fan-out: 2, wiring length: 2 mm)							
	Input buffer	0.86 ns (3.3 V), 0.34 ns (5 V)							
	Output buffer	1.61 ns (3.3 V, C_L = 15 pF), 1.34 ns (5 V, C_L = 15 pF)							
Output drive capability		I_{OL} = 3, 6, 9, 12, 18, 24 mA							
Supply voltage		5 V ±5%, 3.3 V ±0.3 V							

*1: 5 V, 3.3 V, universal power supply interface

*2: 5 V, universal power supply interface

*3: V_{DD}, GND terminals included. Number of pin which can be actually used depends on package.

■ UNIVERSAL PCI series (3-Metal-layer)

Type A *1		μPD66024	μPD66026	μPD66028	μPD66030	μPD66031	μPD66032
Type B *2		μPD66104	μPD66106	μPD66108	μPD66110	μPD66111	μPD66112
Inte-gration	Internal gates	46464	68208	87648	121684	155584	209712
	Usable gate number	34848	51156	65736	91260	116688	157284
	Pad number *3	356	420	468	524	588	676
Delay time	Internal gate	0.14 ns (fan-out: 1, wiring length: 0 mm), 0.29 ns (fan-out: 2, wiring length: 2 mm)/ 0.20 ns (power gate, fan-out: 2, wiring length: 2 mm)					
	Input buffer	0.86 ns (3.3 V), 0.34 ns (5 V)					
	Output buffer	1.61 ns (3.3 V, C_L = 15 pF), 1.34 ns (5 V, C_L = 15 pF)					
Output drive capability		I_{OL} = 3, 6, 9, 12, 18, 24 mA					
Supply voltage		5 V ±5%, 3.3 V ±0.3 V					

*1: 5 V, 3.3 V, universal power supply interface

*2: 5 V, universal power supply interface

*3: V_{DD}, GND terminals included. Number of pin which can be actually used depends on package.

MV Series

■ MV series (1/2)

[2-Metal-layer]

Type number		μPD66041	μPD66042	μPD66044	μPD66046	μPD66048	μPD66050	μPD66051	μPD66052
Inte-gration	Internal gates *1	23392	32640	46464	68208	87648	121648	155584	209712
	Usable gate counts *2	14035	19584	27878	40925	52589	73000	93350	125827
	Pad number *3	268	308	356	420	468	524	588	676
Delay time	Internal gates	0.14 ns (fan-outs = 1, wiring length = 0 mm) 0.29 ns (fan-outs = 2, wiring length = 2 mm) 0.20 ns (fan-outs = 2, wiring length = 2 mm) (power gate)							
	Input buffer *4	0.86 ns (3.3 V), 0.34 ns (5 V)							
	Output buffer *5	1.61 ns (3.3 V), 1.34 ns (5 V)							
Output drive capacity		I_{OL} = 3, 6, 9, 12, 18, 24 mA							
Supply voltage		5 V ±5%, 3.3 V ±0.3 V							

*1: 1 gate = 2-input NAND gate. *2: usable gate: 60%

*3: V_{DD}, GND terminals included. Number of pin which can be actually used depends on package.

*4: fanout = 2, wiring length = 2 mm *5: C_L = 15pF

■ MV series (2/2)

[3-Metal-layer]

Type number		μPD66064	μPD66066	μPD66068	μPD66070	μPD66071	μPD66072
Inte-gration	Internal gates *1	46464	68208	87648	121684	155584	209712
	Usable gate counts *2	34848	51156	65736	91263	116688	157284
	Pad number *3	356	420	468	524	588	676
Delay time	Internal gates	0.14 ns (fan-outs = 1, wiring length = 0 mm) 0.29 ns (fan-outs = 2, wiring length = 2 mm) 0.20 ns (fan-outs = 2, wiring length = 2 mm) (power gate)					
	Input buffer *4	0.86 ns (3.3 V), 0.34 ns (5 V)					
	Output buffer *5	1.61 ns (3.3 V), 1.34 ns (5 V)					
Output drive capacity		I_{OL} = 3, 6, 9, 12, 18, 24 mA					
Supply voltage		5 V ±5%, 3.3 V ±0.3 V					

*1: 1 gate = 2-input NAND gate. *2: usable gate: 75%

*3: V_{DD}, GND terminals included. Number of pin which can be actually used depends on package.

*4: fanout = 2, wiring length = 2 mm *5: C_L = 15pF

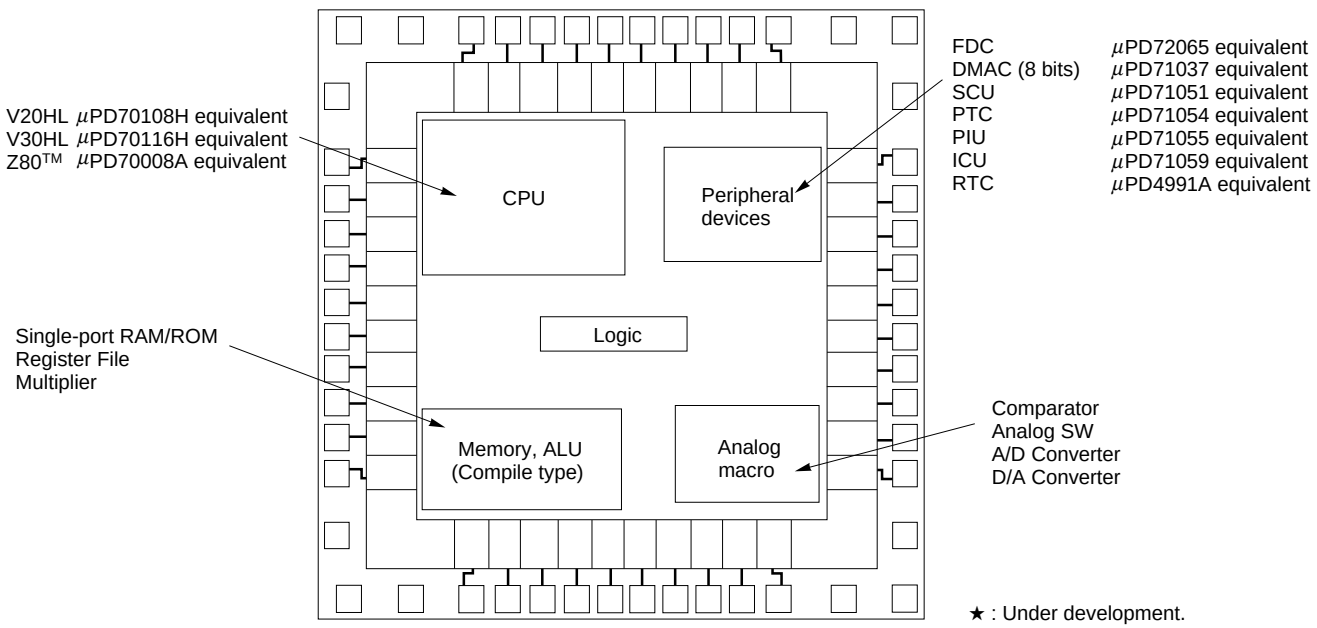
Cell Based IC

■ CB-C7 family

- CPU core and memory macro are mounted on high integration IC achieved by the advanced 0.8 μm processing technology.
- Three different types of user logic block; TAT intended type (FT type) and high integration intended type (HD type and VX type).

Type number			μPD93XXX	μPD94XXX	μPD951XX	μPD961XX
Integration *			120 K gate (max.) (2-layer wiring) / 180 K gate (max.) (3-layer wiring) / 270 K gate (max.) (VX, 3-layer wiring)			
Maximum number of input/output signal lines			440			
Delay time	Internal gate		0.18 ns (@5 V) / 0.43 ns (@3 V) (fan-outs: 1, wiring length: 0 mm), 0.44 ns (@5 V) / 0.90 ns (@3 V) (fan-outs: 2, wiring length: 2 mm)			
	Power gate		0.33 ns (@5 V) / 0.67 ns (@3 V) (fan-outs: 2, wiring length: 2 mm)			
	Input buffer		0.60 ns (@5 V) / 0.76 ns (@3 V) (fan-outs: 2, wiring length: 2 mm)			
	Output buffer		1.6 ns (@5 V, 8 mA buffer) / 3.2 ns (@3 V, 4.4 mA buffer) (C_L = 15 pF)			
Library	Input/output buffer		Same as NEC's Gate Array and Interface block with test mode, oscillator block			
	Function block		Same as NEC's Gate Array			
	Macro	CPU	–		V20HL, V30HL, Z80, etc.	
		Peripheral devices	–		μPD71037/5X, FDC, etc.	
		Memory	RAM	RAM, ROM	RAM	RAM, ROM
		Analog	A/D Converter, D/A Converter, etc. (Under development)			
Power consumption			6.5 μW/MHz/Cell (@5 V) / 2.6 μW/MHz/Cell (@3 V)			
Output drive capability			I_{OL} = 4, 8, 12, 24, 48 mA (@5 V) / I_{OL} = 2.2, 4.4, 6.6 mA (@3 V)			
Interface level			CMOS, TTL compatible / 3 V Interface			
Process			0.8 μm rule CMOS process, aluminum 2-layer/3-layer wiring			

*: When not mounting hard macro



Cell Based IC

■ CB-C8 family

- High integration and high speed IC achieved by the most advanced 0.5 μm processing technology.
- Low power consumption (power supply: 3.3 V ±0.3 V)
- Lower power type of Y-block is available.

Type number			μPD93600	μPD94600	μPD95600	μPD96600
Integration *			400 K gate (MAX.) (2-layer wiring) 600 K gate (MAX). (3-layer wiring)			
Maximum number of input/output signal lines			880			
Delay time	Internal gate		0.13 ns (fan-outs: 1, wiring length: 0 mm) 0.29 ns (fan-outs: 2, wiring length: 2 mm)			
	Power gate		0.22 ns (fan-outs: 2, wiring length: 2 mm)			
	Input buffer		0.36 ns (fan-outs: 2, wiring length: 2 mm)			
	Output buffer		1.46 ns (9 mA buffer) (C_L = 15 pF)			
Library	Input/output buffer		Input buffer: 3 V, 3.3 V, 5 V TTL-I/F buffer Output buffer: 3, 6, 9, 12, 18, 24, 48 mA (3.3 V, 3 V I/F) 1, 2, 3, 6, 9 mA (5 V I/F)			
	Macro	CPU	–		V30MX, Z80, etc.	
		Memory	RAM	ROM, RAM	RAM	ROM, RAM
		Peripheral	–	–	FDC, DMAC, 7105x, etc.	
		Analog	A/D Converter, D/A Converter (Under development)			
Power consumption			1.5 μW/MHz/Cell (3.3 V), 1.1 μW/MHz/Cell (Y-block, 3.3 V)			
Output drive capability			I_{OL} = 1, 2, 3, 6, 9, 12, 18, 24 mA			
Interface level			LV-TTL interface (V_{IL} = 0.8 V, V_{IH} = 2.2 V)			
Process			0.5 μm rule CMOS process, aluminum 2-layer/3-layer wiring			

*: When not mounting hard macro

Library

Macro	CPU	V30MX *1 μPD70008 *2
	Peripheral	FDC, DMAC, 7105x
	Memory	ROM, RAM
	Analog	A/D Converter, D/A Converter, Analog switch
	Others	Register file
Special block★		Scan, Rambus™, PLL, GTL, PCI

*1: New developed original CPU core for CB-C8 family.
Software compatible with V20HL/V30HL CPU.

*2: Compatible with Z80

★: Under development

Analog Master

The Analog Master is a semi-custom LSI for creating analog circuits on a master wafer by inter-connecting pre-defused elements (bipolar transistors, resistors, and capacitors, already formed on the wafter) with the user-defined wiring.

■ Feature

■ Very short development period

Four to eight weeks from layout design to ES (Engineering Sample) production

■ Suitable in case of small lot production

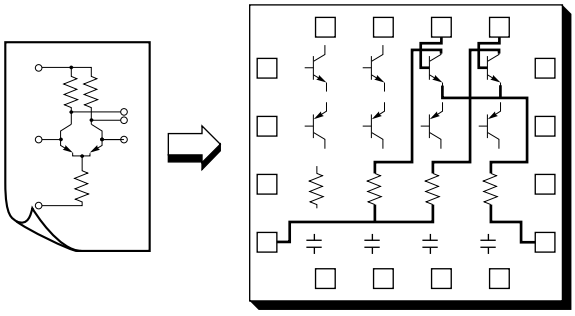
A few thousand LSIs per lot (six months) in case of simulation level interface (the number depends on product)

■ Powerful line-up

4 families (14 masters) are provided to cover wide range of operating frequency, withstand voltage, and number of elements used.

■ Various macro libraries

To reduce user's works, variety of macros are provided such as operational amplifier, comparator, regulator, etc.



bipolar transistors, resistors, and capacitors, already formed on master wafer.

■ Product list

Item \ Family name	CHS family					CHS-A family			V-CHS family	M-CHS family				
Process	High speed bipolar								Super high speed bipolar	High speed, high breakdown voltage bipolar				
Absolute maximum ratings	14 V								11 V	44 V				
Features	Allows high speed signal transaction of analog circuit									• High breakdown voltage: V_{CCMax} = 44 V • f ≦ Several MHz				
	f ≦ Several ten of MHz								f ≦ 1 GHz					
						• Driver • Increase pincounts • Large resistor								
Product name	μPC5020	μPC5021	μPC5022	μPC5023	μPC5024	μPC5031	μPC5032	μPC5034	μPC5102	μPC5200	μPC5201	μPC5202	μPC5203	μPC5204
Number of Pad	28	32	50	22	80	36	56	82	24	24	28	40	52	62
Total number of element	1628	2328	3042	727	6152	576	1472	2252	1367	658	1038	1799	3104	4578
NPN Transistor (Driver Transistor)	260	368	476	129	836	118 (13)	298 (18)	446 (26)	186	105	163	283	484	710
PNP Transistor	224	320	416	116	672	105	280	450	65	84	140	252	448	672
Resistors	1116	1600	2098	468	4560	338	854	1266	1090	456	712	1225	2108	3108
Capacitors	28	40	52	14	84	15	40	90	26	9	15	27	48	72
Micro library	Operational amplifier, Comparator, Regulator Filter, ECL, Switch, Timer, Super White TEG *					Super White TEG *, Another macro library is under development.			–	Operational amplifier, Comparator, Regulator, Switch				
Package	DIP, S-DIP, SOP, S-SOP, QFP, TQFP					S-DIP, SOP, S-SOP, QFP, TQFP			DIP, S-DIP, SOP	DIP, S-DIP, SOP, S-SOP, QFP, TQFP				

*: Super White TEG (Test Element Group) includes function macro libraries (regulator, operational amplifier, comparator, zero-cross-comparator, reset, driver, switch)

Particular Purpose IC

Speech Synthesis IC 96
DSP 97
Liner CCD Sensor 98
Communication IC 99
Mass Storage IC 105
Display IC 106
Motor Driver 109
Image IC 109
MPEG IC 109
Audio IC 110
TV IC 112
Digital Image IC 113
Multisync Monitor IC 114
On-Screen Character Display IC 115
VCR IC 116
Video Camera IC 117
Remote Control IC 117
Clock IC 118
Rotary Encoder IC 118
A/D Converter IC 118
D/A Converter IC 119
Line Driver Receiver IC 119
Vehicle Communication IC 120

Speech Synthesis IC

■ Fixed phrase play back

Item \ Device		μPD7755	μPD7756A	μPD7757	μPD7758A	μPD77P56	μPD7759
Synthesis method		ADPCM, PCM + waveform element					
Sampling frequency		5, 6, 8 kHz					
Speech data memory		96 Kbit mask ROM	256 Kbit mask ROM	512 Kbit mask ROM	1 Mbit mask ROM	256 Kbit one time PROM	1 Mbit external
Synthesizing time	Speech* (ADPCM)	4 seconds typ.	12 seconds typ.	24 seconds typ.	50 seconds typ.	12 seconds typ.	50 seconds typ.
	Melodies & sound effects (PCM+waveform element)	30 seconds typ.	85 seconds typ.	170 seconds typ.	340 seconds typ.	85 seconds typ.	340 seconds typ.
Package		• 18-pin DIP (300 mil) • 24-pin SOP (375 mil, 450 mil)				• 20-pin DIP (300 mil) • 24-pin SOP (450 mil)	• 40-pin DIP • 52-pin QFP

*: The synthesis time for the speech is the value for a 6 kHz sampling.

■ Record/play back

		μPD77501	
Speech coding method		ADPCM	
Sampling frequency		6 kHz	
Compressed speech data rate		2 bits (12 kbps), 3 bits (18 kbps), 4 bits (24 kbps)	
External memory type		DRAM area (4M bits ∞ 4 max.)	ROM/SRAM area (1M bits max.)
Applications		Message record/play back	Fixed phrase play back, response message record/play back
Record/play back time	12kbps	Approximately 23 minutes and 18 seconds	Approximately 1 minute and 27 seconds
	18kbps	Approximately 15 minutes and 30 seconds	Approximately 1 minute
	24kbps	Approximately 11 minutes and 30 seconds	Approximately 44 seconds
Internal functions		• DTMF receiver • Band-pass filter • Microphone amplifier (fixed/variable gain)	• 10-bit over sampling A/D, D/A converters • ADPCM encoder/decoder • Host CPU interface
Supply voltage		4.75 to 5.25 V	
Supply current		35 mA typ. (6 mA max. during power down)	
Process		CMOS	
Package		• 80-pin QFP (0.65 mm pitch)	

	μPD77502	
Speech coding method	FLC Merhod (Fixed point Low bit rate Coding) (FLC is a unique NEC method based on CELP) (CELP = Code Exited Linear Predictive coding)	
Sampling frequency	8 kHz	
Compressed speech data rate	4 kbps	
External memory type	DRAM area (4M bits ∞ 4 or 16M bits ∞ 1)	ROM (or SRAM) area (16M bits max.)
Applications	In Coming Message	Fixed. OGM *1, Users OGM *1
Record/play time length	60 minutes	60 minutes
Functions	• FLC Encoder/Decoder • Echo Canceller (For Full duplex speaker phone application) • DTMF/Sine Wave/etc, Generator	• μ/A low PCM I/F • Host CPU I/F • Silence Compression
Supply voltage	5 V ±10%	
Supply current	120 mA (operate mode), 20 mA (power down mode)	
Process	CMOS	
Package	• 100-pin QFP (0.65 mm pitch)	

*1 : OGM: Out Going Message

DSP

		μPD77C25	μPD77C25-10	μPD77220-10	μPD77230A	μPD77240
Instruction cycle (ns)		122	100	100	150	90
Data type *1		fixed		fixed	fixed/floating	fixed/floating
Multiplier precision (bits)		16 ∞ 16 ∅ 31		24 ∞ 24 ∅ 47	32 ∞ 32 ∅ 55	32 ∞ 32 ∅ 55
ALU precision (bit)		16		47	55	55
Internal memory (words ∞ bits)	Program ROM	2K ∞ 24		2K ∞ 32	2K ∞ 32	2K ∞ 32 *2
	Program RAM	–		–	–	–
	Data ROM	1K ∞ 16		1K ∞ 24	1K ∞ 32	1K ∞ 32 *2
	Data RAM	256 ∞ 16		512 ∞ 24	1K ∞ 32	1K ∞ 32
External memory (words x bits)		–		8K ∞ 24	8K ∞ 32	62K ∞ 32 (program) 16M ∞ 32 (data)
Package		• 28-pin DIP • 44-pin QFJ • 32-pin SOP	• 28-pin DIP • 28-pin QFJ • 32-pin SOP	• 68-pin PGA • 68-pin QFJ	• 68-pin PGA	• 132-pin PGA

*1: fixed: Fixed point decimal floating: Floating point decimal

*2: Internal library program

		μPD77016	μPD77017	μPD77018	μPD77015
Instruction cycle (ns)		30	30	30	30
Data type *1		fixed	fixed	fixed	fixed
Multiplier precision (bits)		40 + 16 ∞ 16 ∅ 40	40 + 16 ∞ 16 ∅ 40	40 + 16 ∞ 16 ∅ 40	40 + 16 ∞ 16 ∅ 40
ALU precision (bit)		40	40	40	40
Internal memory (words ∞ bits)	Program ROM	–	12K ∞ 32	24K ∞ 32	4K ∞ 32
	Program RAM	1.5K ∞ 32	256 ∞ 32	256 ∞ 32	256 ∞ 32
	Data ROM	–	8K ∞ 16	24K ∞ 16	4K ∞ 16
	Data RAM	4K ∞ 16	4K ∞ 16	6K ∞ 16	2K ∞ 16
External memory (words x bits)		48K ∞ 32 (program) 96K ∞ 16 (data)	32K ∞ 16 (data)	32K ∞ 16 (data)	32K ∞ 16 (data)
Package		• 160-pin QFP	• 100-pin TQFP	• 100-pin TQFP	• 100-pin TQFP

*1: fixed: Fixed point decimal floating: Floating point decimal

Liner CCD sensor

■ Black-and-white

Type number	Effective number of picture element (bit)	Sensitivity (TYP.) (V/Lx·s)	Data rate (MAX.) (MHz)	Package	Remarks
μPD35H74	2592	5.4	10	• 22-pin DIP	High sensitivity 2.5K-bit sensor
μPD35H71A	5000	5.2	40	• 22-pin DIP	High speed 5K-bit sensor
μPD3594	2592	144	2	• 22-pin DIP	Built in timing gen., S/H, variable output Amp.
μPD3732	1760	90	2	• 22-pin DIP	Built in S/H, output Amp.
μPD3733	2088	90	2	• 22-pin DIP	Built in S/H, output Amp.
μPD3734	2660	70	3	• 22-pin DIP	Built in S/H, output Amp.
μPD3743	2088	90	2	• 22-pin DIP	Built in output Amp. CS output
μPD3737	5150	7.5	20	• 22-pin DIP	
μPD3753	2088	90	2	• 22-pin DIP	Single 5 V power supply Built in reset/clamp pulse gen.

■ Color

Type number	Effective number of picture element (bit)	Sensitivity (TYP.) (V/Lx·s)	Data rate (MAX.) (MHz)	Package
μPD3725D-01	5000 ∞ 3	R 3.87 G 3.80 B 2.07	16	• 24-pin DIP
μPD3726	3648 ∞ 3	R 1.50 G 1.52 B 0.84	8	• 22-pin DIP
μPD3727	5300 ∞ 3	R 2.20 G 2.00 B 1.20	10	• 22-pin DIP
μPD3723	G 2048 R, B 1024	R 9.2 G 7.5 B 3.8	1	• 22-pin DIP

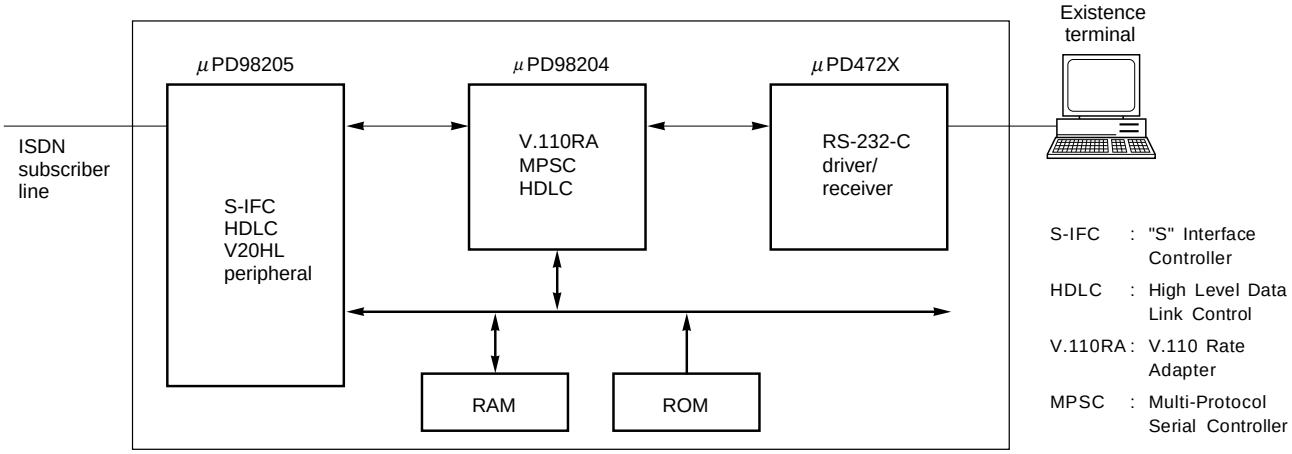
Communication IC

■ Communication LSI

Type number	Function	Features	Package
μPD72001-11	Multi-protocol serial controller	Allows communication in ASYNC, COP, and BOP mode (2 ch) μPD72001-11: 5 V Operation μPD72001-A8: 3.3 V Operation	• 40-pin DIP • 52-pin QFP • 52-pin QFJ • 44-pin TQFP
μPD72001-A8			• 40-pin DIP • 52-pin QFJ • 52-pin QFP
μPD72002-11	Multi-protocol serial controller	Allows communication in ASYNC, COP, and BOP mode (1 ch)	• 40-pin DIP • 44-pin QFP • 44-pin QFJ • 44-pin TQFP
μPD72103	HDLC controller	HDLC frame control, link/separation are possible, internal DMA controller	• 64-pin SDIP • 68-pin QFJ • 80-pin QFP
μPD72103A★		8 Mbps operation	
μPD72105	LAN controller	Accommodates CSMA/ACK	• 48-pin DIP • 52-pin QFJ
μPD72107	Packet communication control LSI (X.25 communication control)	Can accommodate high speed transmission (4 MHz) Conforms ITU-T recommendation X.25 (LAP-B '84 ver)	• 64-pin shrink DIP • 68-pin QFJ • 80-pin QFP
μPD72305	LAP-D protocol processing LSI	Supports LAP-D protocol of ITU-T recommenda-tion	• 64-pin shrink DIP • 68-pin QFJ • 80-pin QFP
μPD98201	S interface transceiver for NT or TE	4-wire full duplexed communication (basic access) Conforms to ITU-T recommendation I430	• 64-pin QFP
μPD98203	S interface transceiver for NT	Conforms to ITU-T recommendation I430	• 20-pin DIP
μPD98204	ISDN rate adapter	RA + MPSC + HDLC on 1 chip small/thin package	• 80-pin TQFP
μPD98205	ISDN basic rate interface controller	S-IFC + HDLC + V20HL + peripheral on 1 chip small/thin package	• 144-pin LQFP
μPD9951	7 kHz-band linear codec	7 kHz-band 16-bit A/D, D/A	• 52-pin QFP
μPD9952	SB-ADPCM codec	SB-ADPCM on 1 chip	• 32-pin SOP • 28-pin DIP
μPD6316	D2B controller/driver	Conforms to D2B interface	• 16-pin DIP/SOP
μPD6708	IE Bus™ controller/driver	Transmit data buffer: 4 bytes Receive data buffer: 20 bytes	• 16-pin SOP (300 mil)
μPD72042A **μPD72042B**		Transmit data buffer: 33 bytes Receive data buffer: 40 bytes	• 16-pin SOP (375 mil)
μPC2590	IE Bus™ driver/receiver	Can connect to μPD7809X	• 8-pin SOP

★: Under development

[ISDN Terminal Adapter]

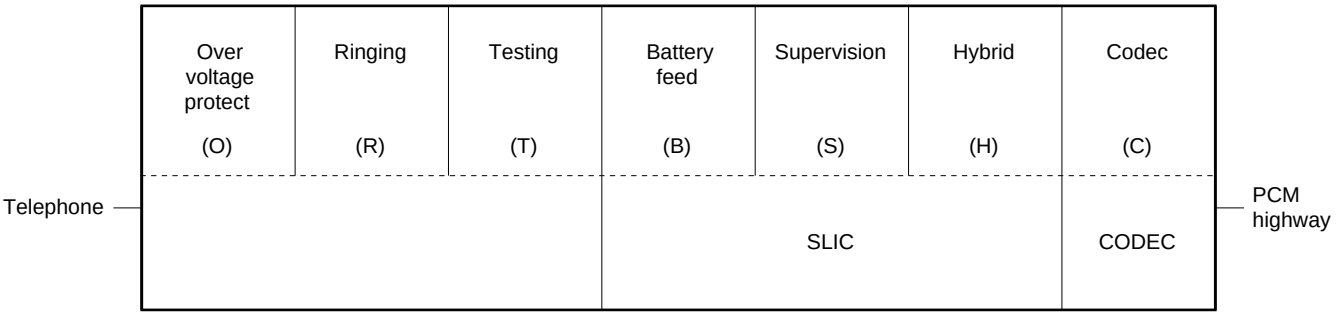


Communication IC

■ Chip Set for ATM-LAN

Type number	Function	Features	Package
μPD98401A	Local ATM SAR chip	• Comforms to ITU-TS, ANSI (T1S1) and ATM Forum Recommendations • Implements the required AAL-5 SAR sublayer and ATM layer function	• 208-pin QFP (Fine Pitch)
μPD98402A	Local ATM SONET Frammer	• ATM physical layer having the TC sublayer function • Comforms to ATM Forum UNI specifications • SONET STS-3c frame format	• 160-pin QFP (Fine Pitch)

■ Analog Line Card LSI

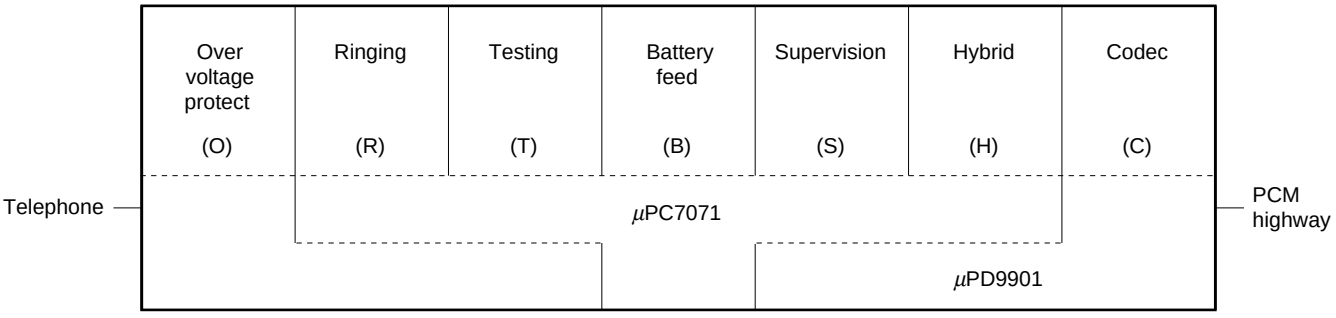


SLIC (BSH-LSI)

μPC7151	Constant resistance feeding method (–48V)	• 32-pin QFJ
μPC7063	Constant current feeding method (–24V)	
μPC7161	Constant current feeding method (–48V)	

CODEC (PCM CODEC)

μPD9604A	μ-law, internal PLL, DGS	• 16-pin DIP
μPD9605A	A-law, internal PLL, DGS	
μPD9621	A-law, internal PLL	• 16-pin DIP • 18-pin QFJ
μPD9622	μ-law, internal PLL	
μPD9624	μ-law, internal PLL, DGS	• 18-pin QFJ
μPD9625	A-law, internal PLL, DGS	



BS-SLIC

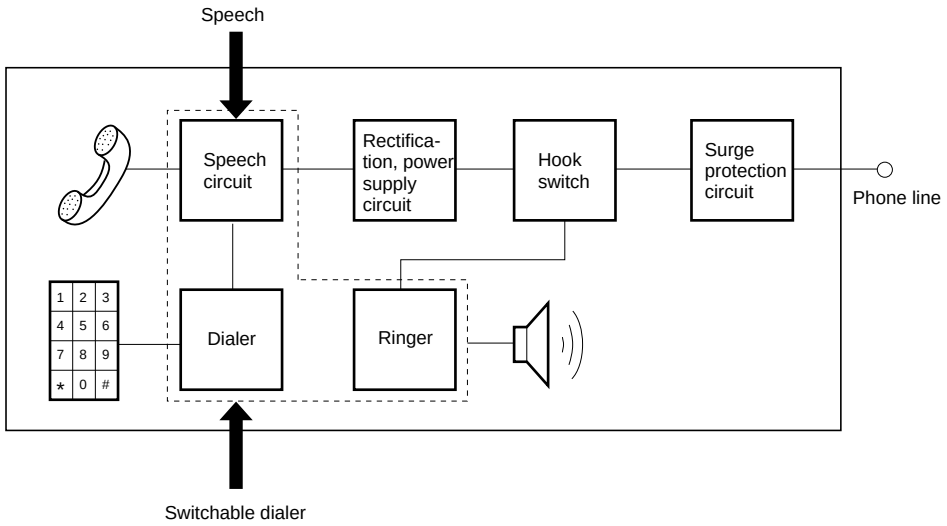
μPC7071	• Tip-Ring polarity reverse • 3 relay drivers	• 32-pin QFJ

Digital·CODEC

μPD9901	• Terminal impedance and Hybrid balance network can be selected by combining μPC7071	• 28-pin QFJ

Communication IC

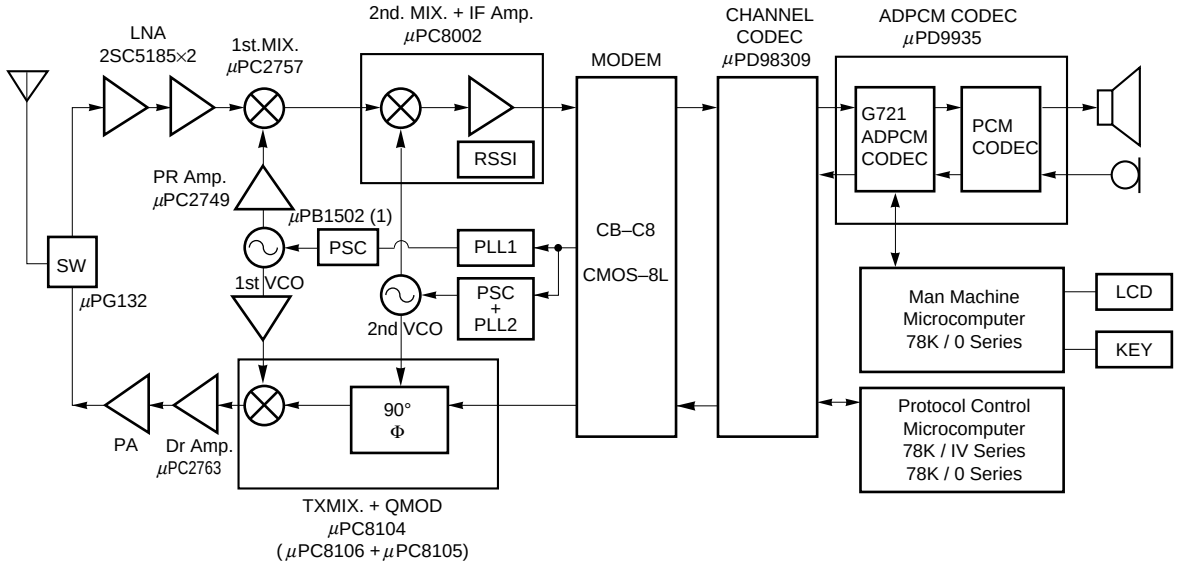
■ Telephone LSI



Speech	**μPC7002**	Auto/manual pad function Adjustable receiver gain, internal receiver amplifier	• 28-pin SDIP

Communication IC

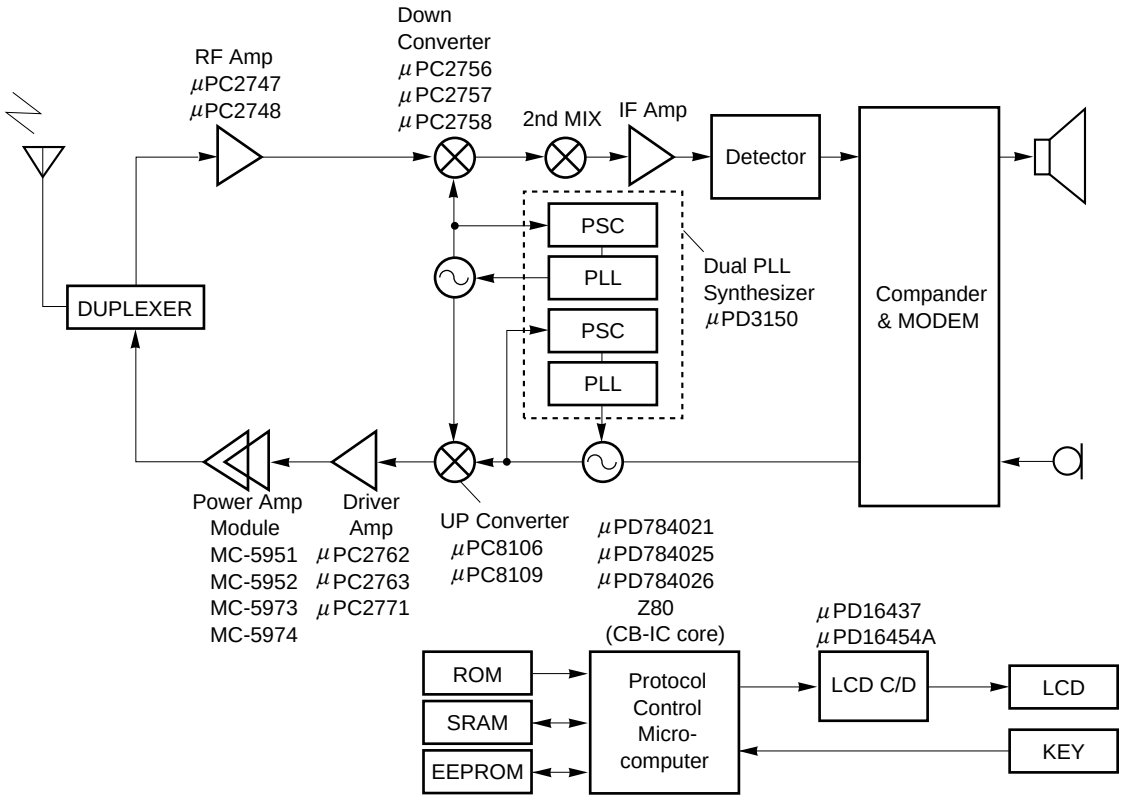
■ Digital Cordless Telephone (Hand Set) LSI



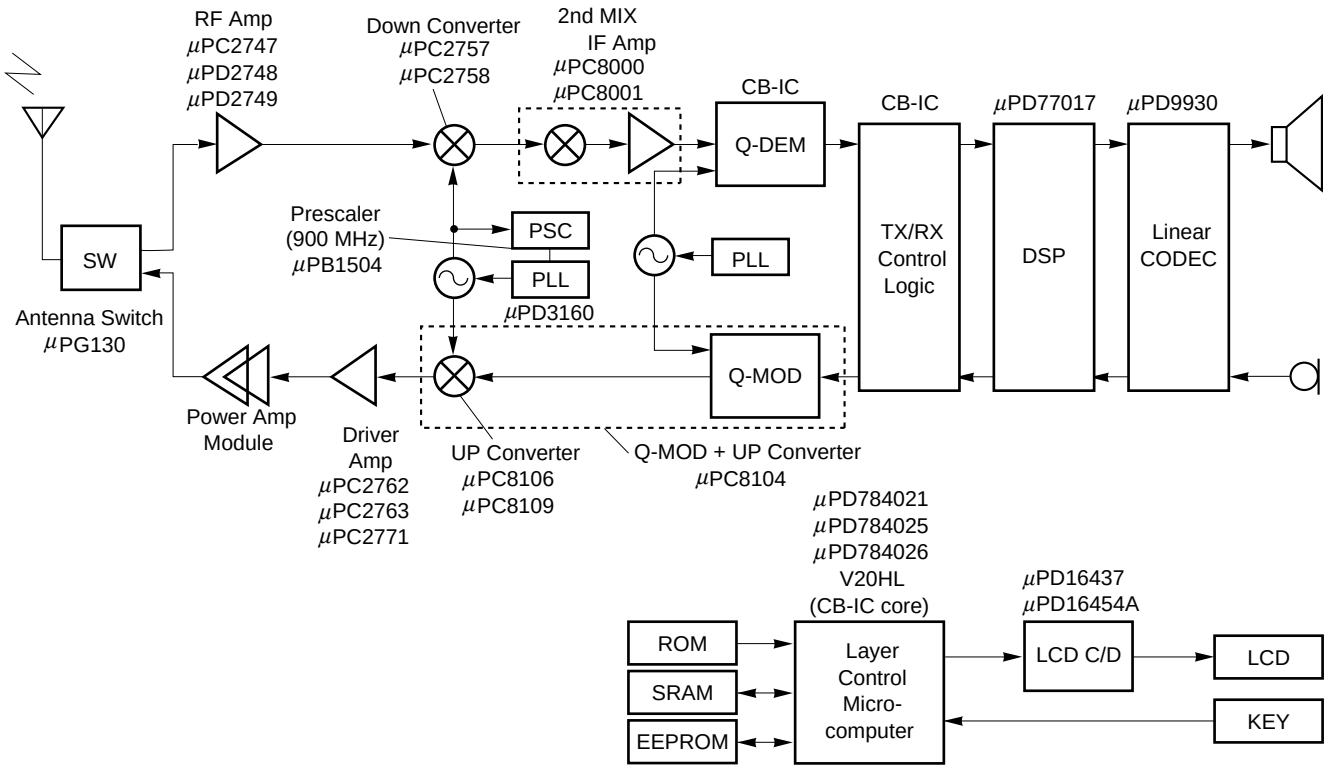
Type number	Function	Features	Package
μPG132	SW: Antena Switch (L-SPDT SW)	Low Power Loss: 0.6 dB (TYP.), @f = 2 GHz Hi speed switching time: 40 ns, 3 V operation	• 8-pin SSOP
2SC5185	LNA: Low Noise Transistor	NF: 1.3 dB (TYP.), @2V, 3 mA, f = 2 GHz fT: 13 GHz (TYP.), @2 V, 20 mA, f = 2GHz	• 4-pin super mini-mold
μPC2757	1st MIX.: L Band Down Converter	NF: 16 dB (TYP.), SSB mode, @f_{RF} = 2GHz, f_{IF} = 250 MHz, Power Consumption: V_{CC} = 3 V, I_{CC} = 5.6 mA	• 6-pin mini-mold
μPC2749	Pr Amp.: Low Noise Amp	NF: 4.0 dB (TYP.), @, f = 1.9 GHz, V_{CC} = 3 V GP: 16 dB (TYP.), @f = 1.9 GHz, V_{CC} = 3 V	• 6-pin mini-mold
μPC8002	2nd. MIX. + IF Amp.	Input Frequency Range: f_{MIX} = 250 MHz (TYP.) ~ 500 MHz (MAX.) Power Consumption: V_{CC} = 3 V, I_{CC} = 3.4 mA	• 20-pin SSOP
μPB1502(1)	PSC: ~ 2 GHz Prescaler	Operation Frequency: ~ 2 GHz, Input Power Sensivity: 130 ~ 220 mVp-p, Power Consumption: V_{CC} = 3 V, I_{CC} = 6.7 mA	• 8-pin SOP
μPC8104	TX MIX + QMOD: Up Converter + Quadrature Modulater	Operation Frequency Range: f_{RFout} = 900 MHz ~ 2 GHz QMOD: f_{Lo1in} = f_{MODout} = 100 MHz ~ 400 MHz, @V_{CC} = 3 V	• 20-pin SSOP
μPC8105	400 MHz Quadrature Modulator For Digital Mobile Communication	Operation Frequency: f_{LO} = 100 MHz ~ 400 MHz, $f_{I/Q}$ = DC ~ 10 MHz Low Current Dissipation: 16 mA (TYP.)	• 16-pin SSOP
μPC8106	2.0 GHz Up Converter ICs For Cellular and Cordless Telephones	Operation Frequency Range: f_{RFout} = 0.4 GHz ~ 2.0 GHz, f_{IFin} = 100 MHz ~ 400 MHz Low Current Dissipation: 9 mA	• 6-pin-mini-mold
μPC2763	Dr Amp.: Midium Power Amp.	Output Level Po (sat): +8.0 dBm, @f = 1.9 GHz, V_{CC} = 3 V NF: 5.5 dB (TYP.), @f = 1.9 GHz, V_{CC} = 3 V	• 6-pin mini-mold
μPD658XX	Modem: CMOS G/A	Supply Voltage: V_{DD} = 3.3 V, 0.5 μm rule, 10 K ~ 627 K gate on Chip	(EX.) QFP (0.5P): 304 pins, PGA: 528 pins
μPD98309	Digital Cordless Telephone (PHS) Channel Codec	1 slot TDMA/TDD control conforming to RCRSTD-28 (for PS/CS), V_{DD} = 2.7 ~ 3.3 V, I_{DD} = 2 mA at 3 V	• 100-pin QFP
μPD9935	ADPCM Codec	Internal allowing operation with 8 kHz frame Low Power Consumption: V_{DD} = 3 V, I_{DD} = 7 mA	• 38-pin SSOP
78K/IV Series	Protocol Control 16-bit Single Chip Microcomputer	Supply Voltage Range: 2.7 V ~ 5.5 V, Memory Space: 1 M, Power Management Function	• 80-pin QFP
78K/0 Series	Protocol Control/Man Machine 8-bit Single Chip Microcomputer	Supply Voltage Range: V_{DD} = 2 ~ 6 V, Low Power Consumption: V_{DD} = 3 V, I_{DD} = 0.8 mA	• 80-pin QFP • 80-pin WQFN

Communication IC

■ Analog Cellular Telephone IC



■ Digital Cellular Telephone IC



Communication IC

Type number	Function	Features	Package
MC-5951	GaAs Power Amp for AMPS	V_{DD} = 5.8 V $P_{OUT} \geq$ 30.5 dBm, $G_P \geq$ 24 dB	metal package 17 ∞ 12 ∞ 4 mm
MC-5952	GaAs Power Amp for E-TACS	V_{DD} = 5.8 V $P_{OUT} \geq$ 30.5 dBm, $G_P \geq$ 24 dB	
MC-5973	GaAs Power Amp for AMPS	V_{DD} = 4.6 V $P_{OUT} \geq$ 30.5 dBm, $G_P \geq$ 24 dB	
MC-5974	GaAs Power Amp for E-TACS	V_{DD} = 4.6 V $P_{OUT} \geq$ 30.5 dBm, $G_P \geq$ 24 dB	
μPG130	GaAs Antenna Switch (100 MHz ~ 2 GHz)	low power loss; 0.5 dB (at 1 GHz)	• 8-pin SOP/ SSOP
μPC2747	Low Noise RF Amp (900 MHz)	+3 V single power source, NF = 3.3 dB, f_u = 1.8 GHz	• 6-pin mini-mold
μPC2748		+3 V single power source, NF = 2.8 dB, high gain (19 dB)	
μPC2749	Low Noise RF Amp (2 GHz)	+3 V single power source, low power consumption (I_{CC} = 6 mA)	• 6-pin mini-mold
μPC2757	Down Converter (900 MHz ~ 2 GHz)	+3 V single power source, low power consumption	• 6-pin mini-mold
μPC2758		+3 V single power source, low distortion	
μPC8106	Up Converter (100 MHz ~ 2 GHz)	+2.7 ~ 5.5 V low distortion (IP3 = +4.5 dBm)	• 6-pin mini-mold
μPC8109		+2.7 ~ 5.5 V low power consumption (I_{CC} = 5 mA)	
μPC2771	Driver Amp (900 MHz ~ 1.5 GHz)	+3 V single power source, high output power (+12 dBm @900 MHz, +11 dBm @1.5 GHz)	• 6-pin mini-mold
μPC2762	Driver Amp (~ 2 GHz)	+3 V single power source, f_u = 2.9 GHz	• 6-pin mini-mold
μPC2763		+3 V single power source, high gain (20 dB)	
μPC8000	5 V 2nd Mixer + IF Amp (455 kHz)	+5 V single power source, high limitting sensitivity (–90 dBm) wide RSSI dynamic range (90 dB) linearity ≤ ±2dB	• 14-pin SSOP
μPC8001	3 V 2nd Mixer + IF Amp (455 kHz)	+3 V single power source, on-chip RSSI resister high speed power on time (174 μs)	• 14-pin SSOP
μPC8104	Up Converter + Quadrature Modulator	+2.7 ~ 5.5 V single power source, high phase variation stability, wide output range (0.9 ~ 1.9 GHz)	• 20-pin SSOP
μPD3150	Dual PLL Synthesizer for Analog Cellular	+2.7 ~ 5.5 V power source, on-chip prescaler possible to switch lock sensitivity	• 20-pin SSOP
μPB1504	Prescaler (500 MHz ~ 1.1 GHz)	+3 V single power source high input sensitivity (–19 ~ +4 dBm) low power consumption (2.4 mA)	• 8-pin SOP
μPD77017	16-bit DSP	V_{DD} = 3 V high performance (33 MIPS) GUI-based high integrated development tools low power consumption	• 100-pin QFP
μPD9930	13-bit Linear CODEC	programmable tone generator (DTMF, GSM triple tone) mic./receiver Amp, GSM DAI	• 44-pin QFP
μPD784021 **μPD784025** **μPD784026**	16-bit Single Chip Microcomputer	V_{DD} = 2.7 ~ 6.0 V, low power consumption, 1 M byte linear addressing on-chip timers, serial I/O, A/D, D/A, ROM, RAM	• 80-pin QFP
V20HL (CB-IC core)	16-bit Microprocessor	3 V operation 1 M byte memory space peripheral options (CB-IC macro) (times, serial I/O, A/D, D/A, ROM, RAM etc.)	QFP etc.
Z80 (CB-IC core)	8-bit Microprocessor	3 V operation (full static) peripheral options (CB-IC macro) (timers, serial I/O, A/D, D/A, ROM, RAM etc.)	QFP etc.
μPD16454A	LCD Controller/Driver	on-chip DC/DC Converter (5 V ∅ 10 V), 24 ∞ 2	• TAB bare chip
μPD16437	3 V LCD Controller/ Driver	on-chip DC/DC Converter (3 V ∅ 9 V, 5 V ∅ 10 V) 12 ∞ 2	• TAB bare chip

Mass Storage IC

Type number	Function	Features	Package
μPD72065B	Floppy disk controller	Low power consumption by CMOS	• 40-pin DIP • 52-pin QFP • 44-pin QFJ
μPD72068	Floppy disk controller	Internal VFO write compensation circuit Internal register for accommodating IBM-PC/AT	• 80-pin QFP • 84-pin QFJ
μPD72064	Floppy disk controller	Internal VFO for accommodating IBM-PC/AT	• 52-pin QFP • 44-pin QFJ
μPD72070	Floppy disk controller	Functional superset of μPD765A, supports 4MB, 16-byte FIFO in the data resister	• 64-pin QFP
μPD72611	SCSI-2 controller	Conforms to ANSI ∞ 3T9.2/86-109 Rev. 10C High speed synchronous transfer 10 MBytes/s	• 100-pin QFP
μPD72050	MO (Magneto-Optical) disk controller	Support 3.5" (230 MB max), 5.25" (1.3 GB max) Enbedded SCSI-2 controller/driver Buffer memory control up to 4 MB	• 160-pin QFP
μPD6378A	CD ROM decoder LSI	Conforms to CD-ROM XA format Supports CD triple-speed playback	• 100-pin QFP
μPD63701	CD ROM decoder LSI	Supports 512K bytes of external DRAM	• 100-pin QFP
μPD63721	1 chip CD-ROM controller	Digital Servo, Data Processor, CD-ROM Decoder, Host I/F on 1 chip Supports Quadruple speed operation, ATAPI Include automatic adjust servo function Wide capture range Internal Digital Attenuator Supports PIO mode 3, DMA mode 1 Internal Buffer Memory Controller (128K word ∞ 4 bi-512K word ∞ 8 bit DRAM/256K byte SRAM)	• 160-pin QFP
μPC2138 **μPC2132**	R/W amplifier for hard disk drive MIG Head	Low noise, low input capacitance, and high recording density	• 20-pin SSOP
μPC2133	R/W amplifier for hard disk drive TF Head	Low noise, low input capacitance, and high recording density	• 20-pin SSOP
μPC2102	R/W amplifier for floppy disk controller	Low power Internal PLA, D/A	• 20-pin SSOP
μPD72051	PD controller	PCR format controller/Error Correction CD-ROM Decoder/Error Correction ATA-2 controller (Support ATAPI) Buffer Manager	• 144-pin QFP

Display IC

■ Fluorescence indicator panel (FIP) driver IC

Type number	Drives	Number of outputs	Withstand voltage (V)	Output current (mA)	Output type	Package	Main applications
μPD6300	Static	20	40	5	Pch-O.D	• 28-pin DIP	Automotive (instrument panel)
μPD6320 **μPD6321**	Static	39	18	1	CMOS	• 52-pin QFP	Car stereo
μPD6323B	Static	21	40	5	Pch-O.D	• 28-pin DIP	Automotive (instrument panel)
μPD6340	Dynamic	20	80	25	NPN+Nch	• 52-pin QFP	ECR, PPC
μPD6700	Static	47	18	1	CMOS	• 56-pin QFP	Car stereo
μPD16304	Dynamic	40	200	20	CMOS	• 80-pin QFP*	Graphic FIP module
μPD16306	Dynamic	64	80	50	CMOS	• 100-pin QFP	
μPD16306A	Dynamic	64	80	25	CMOS	• 100-pin QFP	
μPD16310	Dynamic	40	80	50	CMOS	• 80-pin QFP*	
μPD16325★	Dynamic	40	150	150	CMOS	• 80-pin QFP*	
μPD16326★	Dynamic	32	150	20	CMOS	• 44-pin QFP	

*: Three direction lead

★: Under development

■ Fluorescence indicator panel (FIP®) controller/driver IC

Type number	Drives	Duty (Max.)	Number of outputs		Number of characters*	Logic voltage (V)/ Drive voltage (V)	Package	Main application	Remarks
			Segments	Grids					
μPD16311	Segment	1/16	12	16	192 segments	5/35	• 52-pin QFP	VCR	Included key scan
μPD16312	Segment	1/11	11	11	121 segments	5/35	• 44-pin QFP	VCR	
μPD16313	Segment	1/11	11	11	121 segments	5/35	• 44-pin QFP	VCR	Included key scan (μPD16312 mirror)

*: At maximum duty

Display IC

■ Liquid crystal display (LCD) controller/driver IC

Type number	Drives	Duty (MAX.)	Number of outputs		Number of characters*1	Logic voltage (V)/ Drive voltage (V)	Package	Main application	Remarks
			Segments	Commons					
μPD7225	Segment	1/4	32	4	128 segments	2.7 ~ 5.5/ 2.7 ~ 5.5	• 52-pin QFP • 56-pin QFP		
μPD7227	DOT character	1/16	40	8	8 ∞ 1 characters	5/5	• 64-pin QFP		
μPD7228	DOT character	1/16	42	16	8 ∞ 2 characters	5/5	• 80-pin QFP		
μPD7228A	DOT character	1/16	42	16	8 ∞ 2 characters	5/12	• 80-pin QFP		
μPD7229	DOT character	1/16	42	16	8 ∞ 2 characters	5/5	• 80-pin QFP		Custom ROM only
μPD7229A	DOT character	1/16	42	16	8 ∞ 2 characters	5/12	• 80-pin QFP		Custom ROM only
μPD16430A	Segment	1/4	60	4	240 segments	3.5 ~ 6/ 3.5 ~ 14	• 80-pin QFP	Car audio	
μPD16431A	Segment	1/4	56	4	224 segments	2.7 ~ 5.5/ 2.7 ~ 6.5	• 80-pin QFP	Car audio	Included key scan
μPD16432B★	DOT character	1/15	60/65	15/8	12 ∞ 2 characters + 60 pictographs	2.7 ~ 5.5/12	• 100-pin QFP	Car audio	Included key scan
μPD16434	DOT character	1/16	42	16	8 ∞ 2 characters	2.7 ~ 5.5/12	• 80-pin QFP		
μPD16435 **μPD16435A**	Graphic	1/73	119	73	119 ∞ 71 dots + 119 ∞ 2 pictographs	2.7 ~ 5.5/10*2	• TCP	Mobile phone	Included DC/DC Converter
μPD16437	DOT character	1/16	60	16	12 ∞ 2 characters + 60 ∞ 2 pictographs	3.0 ~ 5.5/10*2	• TCP	Mobile phone	Included DC/DC Converter
μPD16437A★	DOT character	1/16	60	16	12 ∞ 2 characters + 60 ∞ 2 pictographs	2.7 ~ 5.5/10*2	• TCP	Mobile phone	Included DC/DC Converter
μPD16454A	DOT character	1/14	120	14	24 ∞ 2 characters	5/10*2	• TCP	Mobile phone	Included DC/DC Converter
μPD16670★	DOT character	1/33	60	33	12 ∞ 4 characters + 60 pictographs	2.7 ~ 3.6/12*2	• CHIP	Mobile phone	Included DC/DC Converter
μPD16675★	Graphic	1/36	128	34	128 ∞ 32 dots + 128 ∞ 32 pictographs	2.7 ~ 5.5/10*2	• TCP	Pager	Included DC/DC Converter
μPD16676★ **μPD16676A**★	Graphic	1/32	61	16	61 ∞ 16 dots	2.7 ~ 5.5/12	• TCP	Pager	–

*1 : At maximum duty

*2 : Internal DC/DC Converter

★: Under development

Display IC

■ Liquid crystal display (LCD) driver IC

Type number	Drives	Number of outputs	Withstand voltage (V)	Package	Main applications
μPD6320 μPD6321	Static	39	18	• 52-pin QFP	Car stereo
μPD16443B	TFT (source) 8 gray scale	192	20	• TCP (slim type)	LCD module for OA
μPD16444A	TFT (source) 8 gray scale	192	20	• TCP (slim type)	LCD module for OA
μPD16445	TFT (source) 8 gray scale	192	20	• TCP (slim type)	LCD module for OA
μPD16446	TFT (gate)	120	31	• TCP (slim type)	LCD-TV & for OA
μPD16650★	TFT (gate)	120/128	40	• TCP (slim type)	LCD-TV & for OA
μPD16405	TFT (source)	120	20	• TCP	LCD-TV
μPD16447	TFT (source)	120	15	• TCP	LCD-TV for Automobile
μPD16448★	TFT (source)	240	5	• TCP	LCD-TV
μPD16406	TFT (source)	120	20	• TCP	LCD-HDTV
μPD16407	TFT (source)	120	20	• TCP (slim type)	LCD-HDTV
μPD16404	TFT (gate)	140	25	• TCP	LCD-TV
μPD16429A	TFT (source) 8 gray scale	192	20	• TCP	EWS
μPD16408	TFT (source) Analog	192	20	• TCP	EWS
μPD16601★	TFT (source) Analog	192	15	• TCP (slim type)	EWS
μPD16409A★	TFT (source) Analog	192	20	• TCP	VGA
μPD16620★	TFT (source) 64 gray scale	240	5	• TCP (slim type)	For VGA standard (logic; 5 V)
μPD16622	TFT (source) 64 gray scale	240	5	• TCP (slim type)	For VGA standard (logic; 5 V)
μPD16623	TFT (source) 64 gray scale	240	5	• TCP (slim type)	For VGA standard (logic; 3.3 V)
μPD16624	TFT (source) 64 gray scale	240	5	• TCP (slim type)	For SVGA standard (logic; 5 V)
μPD16625	TFT (source) 64 gray scale	240	5	• TCP (slim type)	For SVGA standard (logic; 3.3 V)
μPD16629★	TFT (source) 64 gray scale	240	5	• TCP (slim type)	For SVGA standard (logic; 3.3 V)
μPD16630	TFT (source) 64 gray scale	240	15	• TCP (slim type)	For VGA/SVGA standard
μPD16640★	TFT (source) 64 gray scale	300/309	5	• TCP (slim type)	For SVGA/XGA standard (drive; 3.3/5 V)
μPD16641★	TFT (source) 64 gray scale	240	5	• TCP (slim type)	For VGA standard (drive; 3.3/5 V)
μPD16661★	STN (column) 4 gray scale included RAM	160	5	• TCP	For PDA (1/8 VGA ~ VGA)
μPD16666★	STN (row)	240	31	• TCP	For PDA (1/8 VGA ~ VGA)

★: Under development

■ Plasma display, EL display driver IC

Type number	Drives	Number of outputs	Withstand voltage (V)	Output current (mA)	Output type	Package
μPD6337	AC-PDP row/column	32	200	300	Nch-O.D	• 52-pin QFP
μPD16300	DC-PDP row	41	150	500	NPN-O.C	• 80-pin QFP*
μPD16301	DC-PDP column	64	200	3	Pch-O.D	• 80-pin QFP
μPD16302	EL column	40	250	100	CMOS	• 80-pin QFP*
μPD16305	AC-PDP row	40	200	400	CMOS	• 80-pin QFP*
μPD16306	AC-PDP/EL column	64	80	50	CMOS	• 100-pin QFP
μPD16306A	AC-PDP/EL column	64	80	25	CMOS	• 100-pin QFP
μPD16307	DC-PDP row	41	150	300	NPN-O.C	• 80-pin QFP*
μPD16309	DC-PDP column	64	200	3	Pch-O.D	• 100-pin QFP
μPD16325★	AC-PDP row	40	150	150	CMOS	• 80-pin QFP*
μPD16327★	AC-PDP column	64	150	40	CMOS	• 100-pin QFP

*: Three direction lead

★: Under development

Display IC

■ Other driver IC

Type number	Number of outputs	Withstand voltage (V)	Output current (mA)	Output type	Package	Main applications
μPD6320 **μPD6321**	4 ∞ 4	18	20	NPN+Nch	• 52-pin QFP	Car stereo (LED)
μPD6322	4 ∞ 6	7	20	NPN+Nch	• 20-pin DIP	Car stereo (LED)
μPD6345	8	40	100	NPN-O.C	• 16-pin DIP • 16-pin SOP	Thermal head, LED, solenoid
μPD16320A	48	20	130	Nch-O.D	• 80-pin QFP	Thermal head, LED
μPD16322	32	250	50	Nch-O.D	• 52-pin QFP	Ink jet printer

Pch-O.D : P-ch open-drain output (source driver), Nch-O.D: N-ch open-drain output (sink driver)
NPN-O.C: NPN open-collector output (sink driver)

Motor Driver

Type number	Function		Recommended operating voltage range (V)	Output current (A)	Package	Main application
μPD16804	Control the revolution direction of the DC motor	H Bridge 1 circuit	3.0 to 7.5	0.5	• 16-pin SOP	Camera motor
μPD16805				1.0		
μPD16823		H Bridge 1.5 circuits		0.5	• 20-pin SOP	

Image IC

Type number	Function	Package
μPD42101	NTSC high speed line buffer	• 24-pin DIP • 24-pin SOP
μPD42102	PAL high speed line buffer	• 24-pin DIP • 24-pin SOP
μPD42280	2M bits high speed field buffer (256K words ∞ 8 bits)	• 28-pin ZIP • 28-pin SOP
μPD72020	Graphics display controller	• 40-pin DIP • 52-pin QFP
μPD72123	Advanced graphics display controller	• 84-pin QFJ • 94-pin QFP
μPD72185	Advanced compression expansion engine	• 64-pin shrink DIP • 68-pin QFJ • 80-pin QFP
μPD72186	Advanced compression expansion engine	• 100-pin QFP
μPD72187	Advanced Bi-level image compression expansion	• 100-pin PQFP

MPEG IC

Type number	Function	Package
μPD61000	MPEG1 Audio Decompression LSI	• 100-pin PQFP
μPD61010	MPEG1 Audio/Video Decompression LSI	• 160-pin PQFP

Audio IC

■ Radio frequency amplification

Type number	Recommended operating voltage range (V)	Function					Recommended application	Package
		AM tuner	FM front end	FM IF amplification	FM detection	Other functions	Car radio	
μPC2535	7.5 to 8.5			●	●	Quadrature detection Internal NC+MPX	●	• 48-pin QFP
μPC2533	7.5 to 8.5	●				Double super heterodyne DTS use	●	• 36-pin SOP

■ FM stereo demodulation

Type number	Recommended operating voltage range (V)	Voltage gain (monaural)	Function			Recommended application	Package
			Pilot canceler	Lamp driving	Noise canceler	Car radio	
MC-5720 MC-5720A	7.5 to 15	–1 dB	●	●	●	●	• 16-pin SIP

■ Pre-amplifier

Type number	Recommended operating voltage range (V)	Function				Recommended application		Package
		Play back amplifier	Recording amplifier	MIC amplifier	Other functions	Radio cassette recorder	Car radio	
μPC1228	6 to 16	●			Dual	●	●	• 8-pin SIP
μPC1313	4 to 15	●	●		Dual, ALC	●	●	• 9-pin SIP

■ Power amplifier

Type number	Recommended operating voltage range (V)	Electrical characteristics (typical value)			Function	Recommended application			Package
		P_O (W)	V_{CC} (V)	R_L (Ω)		Home stereo	Radio cassette recorder	Car radio	
μPC1188	±17 to ±23	18	±22	8		●			• 10-pin SIP
μPC1238	±6 to ±15	8.4	±13	8		●			• 5-pin V-DIP
μPC1308	9 to 16	15	13.2	4	BTL, standby switch			●	• 14-pin V-VIP
μPC1310	9 to 16	5.8	13.2	4	Dual, standby switch			●	• 14-pin V-DIP
μPC1316	3 to 16	1.2	9	8	Dual		●		• 14-pin DIPTAB
		0.5	6	8	Low pop noise				
μPC1318A	9 to 16	20	13.2	4	BTL, standby switch			●	• 14-pin V-DIP
μPC2002	8 to 18	4.5	13.2	4	Low pop noise			●	• 5-pin V-DIP
μPC2500A	9 to 16	40	13.2	2	BTL, standby switch			●	• 12-pin SIP
		24	13.2	4					
μPC2502	9 to 16	19	13.2	4	BTL, DUAL, standby switch			●	• 15-pin V-DIP
μPC2505	9 to 16	40	13.2	2	BTL, standby switch Low pop noise			●	• 12-pin SIP
		24	13.2	4					
μPC2506	9 to 16	40	13.2	2	BTL, standby switch Low pop noise differential input			●	• 15-pin V-DIP
		24	13.2	4					

Audio IC

■ D/A converter for audio system

Type number	Recommended operating voltage range (V)	Function	Recommended application			Package
			Home stereo	Portable	Car stereo	
μPD6376	4.5 to 5.5	16-bit D/A converter	●	●	●	• 16-pin DIP • 16-pin SOP
μPD6379	3.0 to 5.5	16-bit D/A converter	●	●	●	• 8-pin SOP
μPD63200	4.5 to 5.5	18-bit D/A converter	●	●	●	• 16-pin SOP
μPD63210	3.0 to 5.5	16-bit D/A converter with digital filter	●	●	●	• 28-pin SOP

■ DSP for audio system

Type number	Recommended operating voltage range (V)	Function	Recommended application			Package
			Home stereo	Portable	Car stereo	
μPD6382	4.5 to 5.5	DSP for audio (19 bit)	●	●	●	• 80-pin QFP
μPD6383	4.75 to 5.5	DSP for audio (24 bit)	●	●	●	• 100-pin QFP
μPD6384	4.5 to 5.5	Expander/Compressor DSP (19-bit)	●	●	●	• 16-pin SOP

■ Device kit for CD

Type number	Recommended operating voltage range (V)	Function	Recommended application			Package
			Home stereo	Portable	Car stereo	
μPC2572	4.5 to 5.5	RF amp, error amp, APC for CD player			●	• 36-pin SOP
μPD63702	4.5 to 5.5	Digital servo, data processor, DAC for CD player			●	• 80-pin QFP
μPD63703	4.5 to 5.5	Digital servo, data processor, ATT for CD player			●	• 80-pin QFP

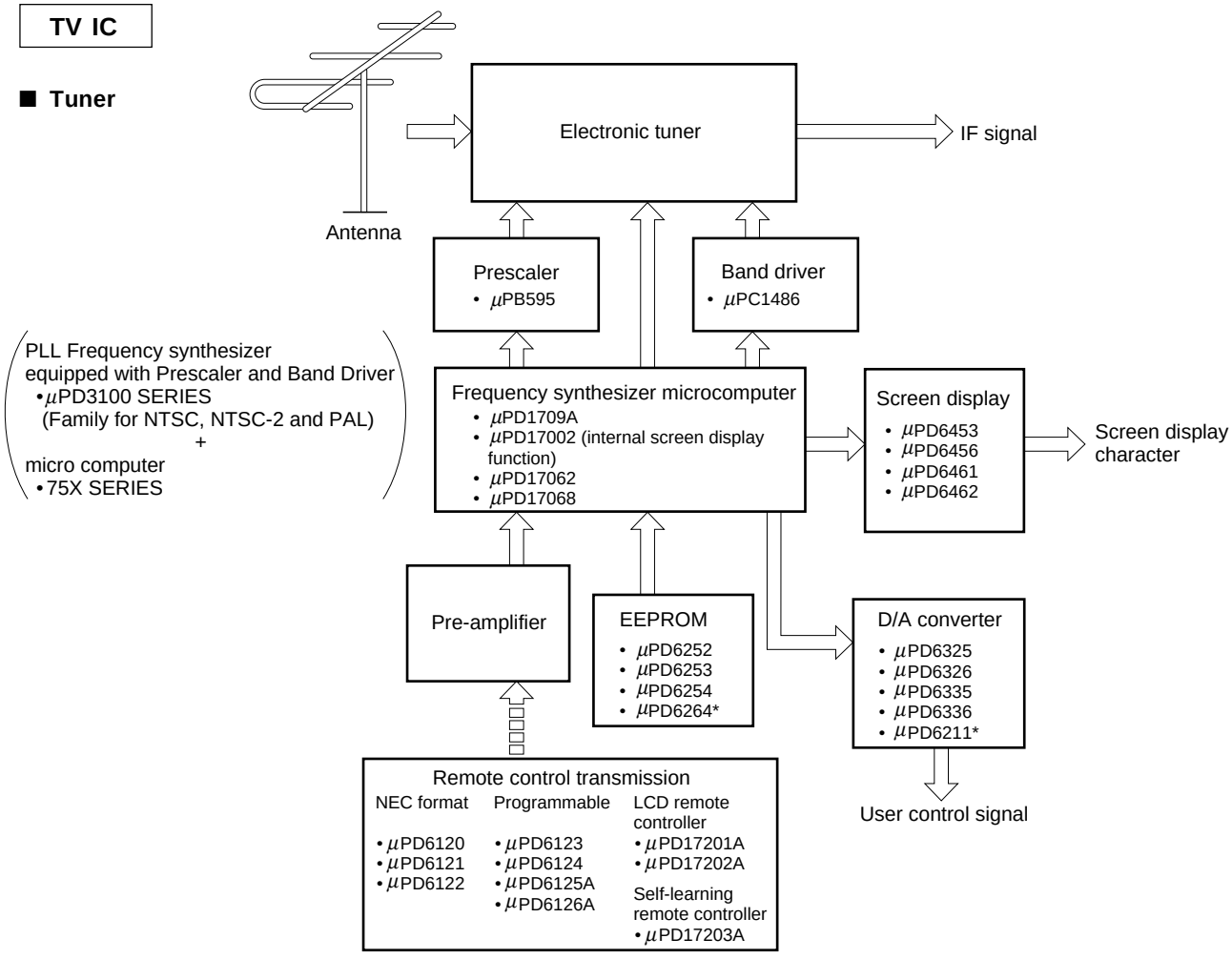
■ Other functions

Type number	Recommended operating voltage range (V)	Function	Recommended application			Package
			Home stereo	Tape deck	Radio cassette recorder	
μPC1225	±18 to ±36	30 to 50 W power amplifier driver	●			• 10-pin SIP
μPC1237	25 to 60	Stereo power amplifier protection circuit	●			• 8-pin SIP
μPC1270	±18 to ±36	30 to 50 W power amplifier driver	●			• 10-pin SIP
μPC1297	8 to 18	Dolby HX PRO system		●		• 18-pin S-DIP
μPC1298	±20 to ±46	50 to 80 W power amplifier driver	●			• 14-pin V-DIP
μPC1330	4.5 to 14.4	Head selection switch circuit		●		• 9-pin SIP • 14-pin SOP
μPC1342	±20 to ±52	50 to 110 W power amplifier driver	●			• 14-pin V-DIP
μPC2560	8.1 to 13.2	Surround, Vocal cancel, Bass boost	●		●	• 36-pin SSOP
μPC2581	±20 to ±75	100 to 130 W dual power amplifier driver	●			• 15-pin V-DIP

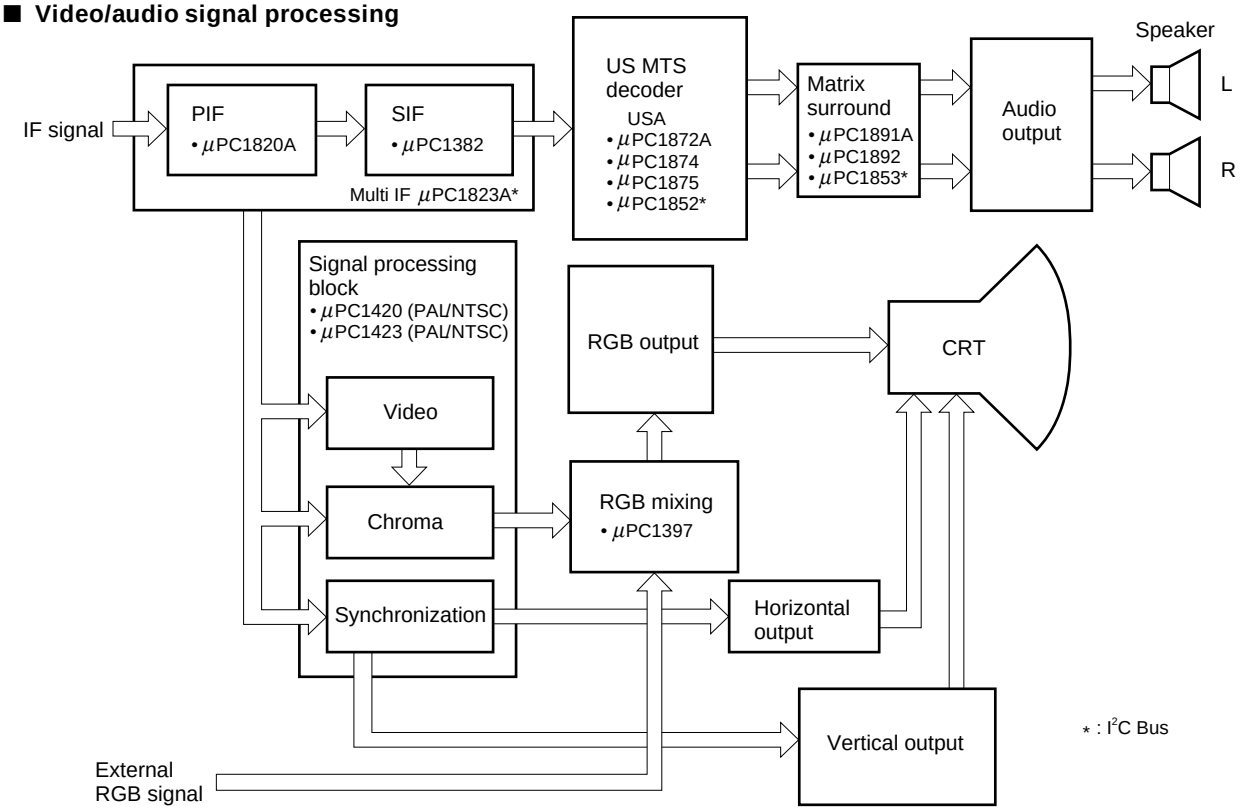
★: Under development

TV IC

■ Tuner



■ Video/audio signal processing



TV IC

■ US MTS Decoder

US MTS: Multi Television Sound for USA specifications

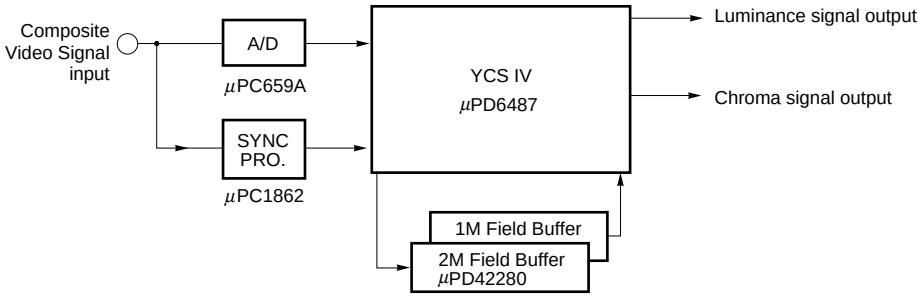
Type number	Function	Package
μPC1872A	dbx NR, SAP Decoder, Normal Output	• 42-pin SDIP • 48-pin QFP
μPC1874	dbx NR, Stereo only	• 28-pin SDIP
μPC1875	Input Selector (1 ch), dbx NR, Stereo only	• 30-pin SDIP
μPC1851	I²C Bus, Input Selector (3 ch), dbx NR, SAP Decoder, Tone/Volume control	• 42-pin SDIP
μPC1852A	I²C Bus, dbx NR, SAP Decoder, Normal Output	• 28-pin SDIP

■ Matrix Surround

Type number	Function	Package
μPC1891A	Matrix Surround (Phase Shift)	• 20-pin DIP
μPC1892	Matrix Surround (Phase Shift), Tone/Balance/Volume, L + R output	• 30-pin SDIP
μPC1853	I²C bus, BASS boost, Matrix Surround, Tone/Balance/Volume, Audio output, L + R output	• 30-pin SDIP

Digital Image IC

■ Three-Dimensional Y-C separation system block diagram



■ 3DYC LSI

Type number	Function	Package
μPD6487	3D Dimensional Y/C separation (I²C Bus)	• 100-pin QFP

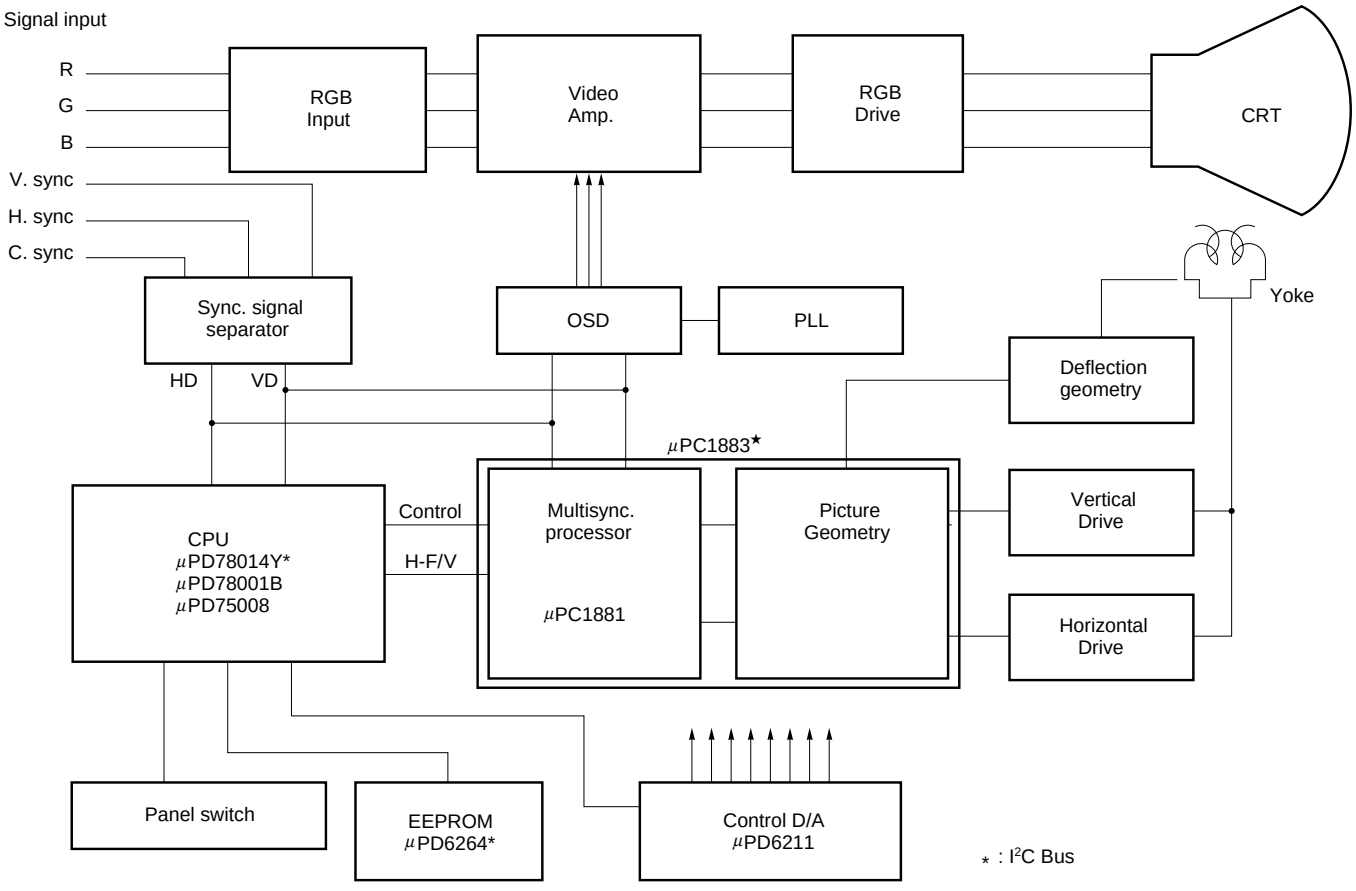
■ Clock generator

Type number	Function	Package
μPC1860	Burst signal locked clock generator	• 36-pin SOP
μPC1862	Burst signal locked clock generator (External Burst gate input available)	• 36-pin SOP

■ Analog Frontend IC

Type number	Function	Package
μPC1830	5 V operation chroma decoder NTSC/PAL, 525/625 line, 50/60 Hz selectable, Matrix circuit	• 42-pin SOP

Multisync Monitor IC



■ Multisync. monitor IC

Type number	Function	Package
μPC1881	Horizontal Vertical sync. processor	• 30-pin SDIP
μPC1883★	Horizontal Vertical sync. processor, Picture geometry processor	• 30-pin SDIP

★: Under development

On-Screen Character Display IC

■ Video type

Function \ Type number	μPD6450	μPD6454	μPD6458	μPD6464	μPD6465
Number of character types	128 (ROM)	256 (ROM)	128 (ROM)	128 (ROM)	256 (ROM)
Number of display characters	288 (12 lines ∞ 24 digits)				
Character configuration	12 ∞ 18				
Character color	Single (White)	The level of a character can be set in 9 stages per field (from white to black)		Single (white, the luminance level of a character can be set in 2 stages.)	
Character size	1 dot/1H, 2H, 3H, 4H (per line)			1 dot/1H, 2H (per line)	
Internal video signal color	White/Black/Red/ Green/Blue	8 color		White/Black/Blue/Green	
Background	None/Fringed/Squared/Solid (per field)				
Applicable video signal mode	NTSC/PAL			NTSC/PAL/PAL-M/SECAM	
Supply Voltage	4.5 to 5.5 V				
Package	• 18-pin DIP (300 mil) • 20-pin SOP (375 mil)	• 24-pin SDIP (300 mil) • 24-pin SOP (375 mil)			

• Internal sync. process circuit (μPD6454, μPD6458)

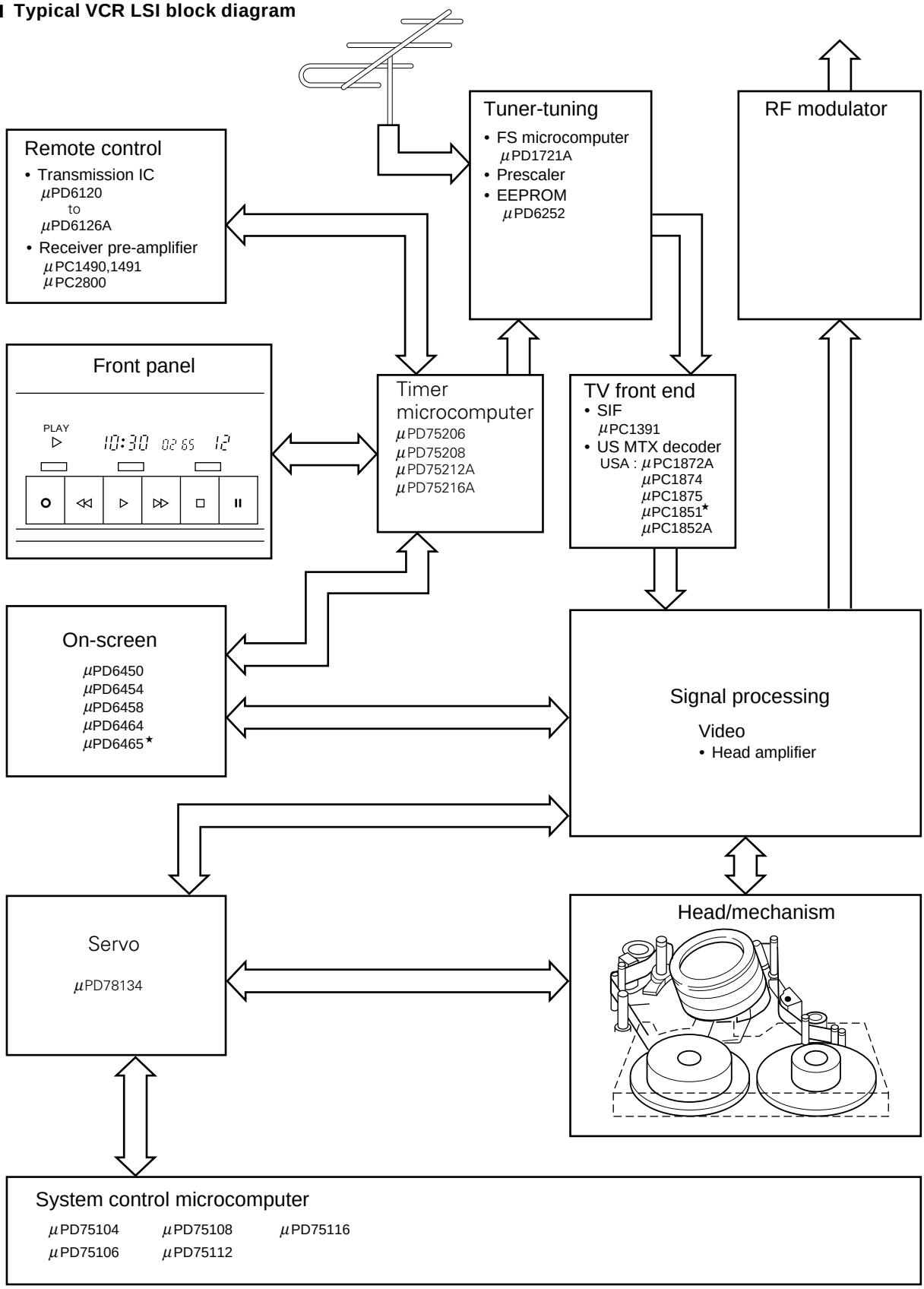
■ RGB type

Function \ Type number	μPD6451A	μPD6453	μPD6456	μPD6461	μPD6462	μPD6466
Number of character types	128 (ROM)	240 (ROM) 16 (RAM)	128 (ROM)	256 (ROM)	128 (ROM)	512 (ROM)
Number of display characters	288 (12 lines ∞ 24 digits)					
Character configuration	12 ∞ 18					
Character color	8 colors		Single color (White)	8 colors		
Character size (per line)	1 dot/1H, 2H, 3H, 4H		1 dot/1H, 2H			1 dot/1H, 2H, 3H, 4H
Character color reverse (per character)	None			Black character/No friged		Black character/ No friged White character/ Friged
Background (per frame)	None Square (8 colors) Solid (8 colors)		None Square (Black) Solid (Black)	None Square (8 colors) Solid (8 colors)		
Fringed (per frame)	Single color (Black)	Two colors (Black, White)	Single color (Black)	Two colors (Black, White)		
Supply voltage	4.5 to 5.5 V		3.0 to 5.5 V	2.7 to 5.5 V		
Package	• 18-pin DIP (300 mil) • 20-pin SOP (375 mil)	• 20-pin DIP (400 mil) • 20-pin SOP (375 mil)	• 16-pin SOP (300 mil) • 16-pin SOP (375 mil)	• 20-pin SSOP (300 mil) • 24-pin SOP (375 mil)	• 20-pin SSOP (300 mil)	• 20-pin SOP (375 mil)

• Double speed TV switching is possible by command (μPD6451A, μPD6453)
• Making ideally suited for camcoders (μPD6461, μPD6462)
• μPD6461 and μPD6462 are commands conpertible and pins conpertible for 20-pin SSOP package.
• μPD6466 has a blue background and character mirror reverse function.

VCR IC

■ Typical VCR LSI block diagram



★ : Under development

Video Camera IC

■ CCD driver circuit

Type number	Function	Package
μPD16501	Area sensor vertical drive interface	• 16-pin SOP
μPD16502	Area sensor vertical drive interface	• 20-pin SOP
μPD16503	Area sensor VOD shutter driver	• 8-pin SOP
μPD16506	Area sensor vertical, VOD shutter driver	• 20-pin SOP • 20-pin SSOP
μPD16510	Area sensor vertical, VOD shutter driver, for low voltage logic	• 22-pin SSOP

■ AGC process amplifier

Type number	Function	Package
μPC2372	3ch AGC·process amplifier circuit	• 88-pin QFP

■ Sample and hold circuit

Type number	Function	Package
μPC2394	Dedicated area sensor use sample and hold circuit	• 8-pin SOP

Remote Control IC

■ Infrared remote control preamplifiers IC

Type number	Supply voltage	Features	Package	Remarks
μPC2800A **μPC2801A**	5 V ± 10%	Internal high trap circuit	• 8-pin SOP	Active low type Active high type
μPC2803				Active low type

■ Infrared remote control IC

Type number	**μPD6121-001**	**μPD6122-001**
Operating voltage range	2.0 to 3.3 V	
Operation clock (f_{OSC})	400 to 500 kHz ceramic oscillator	
Transmission format	Leader | Custom code 16-bit | Data code 8-bit	Data code 8-bit
Modulation mode	P.P.M. 0 ····⎍⎍⎍⎍⎍⎍ 1····⎍⎍⎍⎍⎍⎍ 38 kHz • carrier modulation(f_{OSC} = 455 kHz)	
Custom code	16-bit set*	
Data code	32 ∞ 2	64 ∞ 2
Number of keys	32	64
Package	• 20-pin SOP	•24-pin SOP

*: All codes except code “00FFH” are managed by NEC.

Clock IC

Type number	Function	Features	Package
μPD4990A	Serial I/O real-time clock	Wide operating voltage range, low power consumption	• 14-pin DIP • 16-pin SOP
μPD4991A	4-bit parallel I/O real-time clock	Wide operating voltage range, low power consumption	• 18-pin DIP • 20-pin SOP
μPD4992	8-bit parallel I/O real-time clock	Wide operating voltage range, low power consumption	• 20-pin DIP • 20-pin SOP

Rotary Encoder IC

Type number	Function	Features	Package
μPD4701A	12-bit incremental encoder counter	Direct mouse connection is possible	• 20-pin DIP • 24-pin SOP
μPD4702	8-bit incremental encoder counter	High speed count f = 3.6 MHz	• 20-pin DIP • 20-pin SOP
μPD4704	μPD4702 extension 8-bit counter		• 20-pin DIP • 20-pin SOP

A/D Converter IC

■ A/D Converter

Type number	Resolution (bits)	Linearity (%FSR)	Conversion time (μs)	Supply voltage (V)	Data format	Output format	Package	Remarks
μPC650	12	0.05	45	+5 –15	Binary	12-bit parallel	• 28-pin DIP	Successive approximation
μPD7001	8	0.8	140 (TYP.)	+5	Binary	Serial	• 16-pin DIP	Parallel approximation, microcomputer I/F, 4-channel MPX input
μPD7002	10	0.2	15 (ms)	+5	Binary	8-bit parallel	• 28-pin DIP	Integrative approximation, microcomputer I/F, 8-channel MPX input
μPD7003	8	0.5	4	+5	Binary	8-bit parallel	• 24-pin DIP	Parallel approximation, microcomputer I/F
μPD7004	10	0.1	104	+5	Binary 2's complement	8-bit parallel/ serial	• 28-pin DIP (400mil)	Successive approximation, microcomputer I/F, 8-channel MPX input

■ A/D Converter for Video processing

Type number	Resolution (bits)	Linearity (%FSR)	Sampling time (MSPS)	Supply voltage (V)	Data format	Output format	Package	Remarks
μPC668★	10	0.2	20	+5	Binary	10-bit parallel	• 30-pin SOP	Parallel aproximation Video processing
μPC659A	8	0.2	20	+5	Binary	8-bit parallel	• 24-pin SOP	Parallel approximation Video processing
μPC660	6	0.8	20	+5	Binary	6-bit parallel	• 16-pin SOP	Parallel approximation Video processing
μPC661	6	0.8	20	+5	Binary	6-bit parallel	• 24-pin SOP	4-input multiplexer Video processing
μPD6952★	10	0.2	20	+5	Binary	10-bit parallel	• 24-pin SOP	Parallel approximation Video processing

★: Under development

D/A Converter IC

■ D/A Converter

Type number	Resolution (bits)	Linearity (%FSR)	Settling time (μs)	Supply voltage (V)	Input format	Output format	Package	Remarks
μPC610	10	0.2	6	±15	Sign+Binary	Voltage output	• 18-pin DIP	Parallel input
μPC624	8	0.19	150 (ns)	±5 to ±15	Binary	Current output	• 16-pin DIP	Parallel input
μPC648	12	0.05	400 (ns)	±15	Binary	Current output	• 20-pin DIP	Parallel input
μPD6325 **μPD6335**	6 (4 circuits)	Monotonicity	10	+5 to +15 +5	Binary	Voltage output	• 16-pin DIP • 16-pin SOP	Serial input, CMOS
μPD6326 **μPD6336**	6 (8 circuits)	Monotonicity	10	+5 to +15 +5	Binary	Voltage output	• 16-pin DIP	Serial input, CMOS
μPD6211	8 (8 circuits)	0.39	10	+5	Binary	Voltage output	• 20-pin DIP • 20-pin SOP	I^2C-bus compatible Internal Output CMOS' Buffer
μPD7011	8	0.2 0.4	3	+5	Binary 2's complement	Current output	• 18-pin DIP	Parallel/serial input microcomputer I/F, NMOS

■ D/A Converter for Video processing

Type number	Resolution (bits)	Linearity (%FSR)	Sampling rate (MSPS)	Supply voltage (V)	Input format	Output format	Package	Remarks
μPC667	10	0.1	60	+5	Binary	Voltage output	• 30-pin SDIP	Parallel input Video processing
μPC662	8 (3 circuits)	0.2	35	+5	Binary	Voltage output	• 48-pin QFP	Parallel input, 3 circuits Video processing
μPC664	8 (2 circuits)	0.2	35	+5	Binary	Voltage output	• 36-pin SOP	Parallel input, 2 circuits Video processing
μPC665	8	0.2	35	+5	Binary	Voltage output	• 16-pin SOP	Parallel input Video processing
μPC666	6 (3 circuits)	0.8	35	+5	Binary	Voltage output	• 36-pin SOP	Parallel input, 3 circuits Video processing

Line Driver Receiver IC

Type number	Function	Features	Package
μPD4711B	RS-232 line driver/receiver Drivers: 2, Receivers: 2	+5V power source, standby function	• 20-pin DIP • 20-pin SOP
μPD4712	RS-232 line driver/receiver Drivers: 4, Receivers: 4	+5V power source, standby function	• 28-pin DIP • 28-pin SOP
μPD4713A	RS-232 line driver/receiver Drivers: 3, Receivers: 3	+5V power source, standby function	• 24-pin DIP • 24-pin SOP
μPD4714A	RS-232 line driver/receiver Drivers: 3, Receivers: 5	+5V power source, standby function	• 28-pin DIP • 28-pin SOP
μPD4715A	RS-232 line driver/receiver Drivers: 5, Receivers: 3	+5V power source, standby function	• 28-pin DIP • 28-pin SOP
μPD4721	RS-232 line driver/receiver Drivers: 2, Receivers: 2	+3.3V or +5V power source, standby function	• 20-pin SSOP
μPD4722	RS-232 line driver/receiver Drivers: 4, Receivers: 4	+3.3V or +5V power source, standby function	• 30-pin SSOP
μPD4723	RS-232 line driver/receiver Drivers: 3, Receivers: 3	+3.3V or +5V power source, standby function	• 30-pin SSOP
μPD4724	RS-232 line driver/receiver Drivers: 3, Receivers: 5	+3.3V or +5V power source, standby function	• 30-pin SSOP
μPD4726	RS-232 line driver/receiver Drivers: 4, Receivers: 7	+5V power source, standby function, for PC	• 36-pin SSOP

Vehicle Communication IC

Type number	Function	Features	Package
μPD72005★	CAN (Controller Area Network) Controller	Support the standard and extended message identifiers in CAN spec 2.0 2-wire serial communication bus Multimaster architecture Multicast message transfer Transfer rate up to 1M bit per second	• 52-pin QFP • 52-pin QFJ

★: Under development

General Purpose Linear IC

Operational Amplifier 122

Comparator 123

Fixed Output Voltage, 3-Terminal Regulator 123

Variable Output Voltage Regulator 124

Regulator with System Reset 124

High Precision Reference Voltage 124

Switching Regulator Control Circuit 125

Functional Block 125

Operational Amplifier

Type number		Function*1			Recommended power supply voltage*2 (V)	Common mode input voltage range TYP. (V) T_A = +25 ƒC	Input stage transistor	GND Input/ Output on single power	Low V_{IO} Low T_A drift	Low input bias current	High speed	Wide band	Low noise	Low power	Packages*3				Number of pins
Communication/industry use	General use	Single	Dual	Quad											D ED	C	G2	HA	
μPC151	μPC741	○			±7.5 to ±16	V^-+2 to V^+–0.5	NPN		○						○	○	○		8
μPC251	μPC1458		○												○	○	○		8
μPC254		○			±3 to ±16	V^-+1 to V^+–1	NPN		◎	◎			○		○				8
μPC354		○			±3 to ±16	V^-+1 to V^+–1	NPN		◎	◎			○		○				8
μPC454			○												○				14
μPC815		○			±3 to ±20	V^-+1.5 to V^+–2.5	NPN		◎	○			◎		○	○			8
μPC816		○			±3 to ±20	V^-+1.5 to V^+–2.5	NPN		◎	○	○	◎	◎		○	○			8
μPC157	μPC301A	○			±5 to ±16	V^-+2 to V^+	NPN		○						○	○			8
μPC159	μPC318	○			±5 to ±18	V^-+2.5 to V^+–2	NPN				◎	◎			○	○			8
μPC802	μPC4250	○			±1 to ±16	V^-+0.2 to V^+–0.6	PNP		○	○				◎		○	○		8
μPC801	μPC4081	○			±5 to ±16	V^-+2.3 to V^+	J–FET			◎	○	○				○	○		8
μPC803	μPC4082		○													○	○		8
μPC804	μPC4084			○												○			14
μPC811		○			±5 to ±16	V^-+3 to V^+–1	J–FET		○	◎	○	○	○			○	○		8
μPC812			○													○	○		8
μPC813		○			±5 to ±16	V^-+3 to V^+–1	J–FET		○	◎	◎	○	○			○	○		8
μPC814			○													○	○		8
μPC821	μPC4071	○			±5 to ±16	V^-+2 to V^+	J–FET			◎	○	○	○			○	○		8
μPC822	μPC4072		○													○	○	○	8*4
μPC824	μPC4074			○												○	○		14
μPC831	μPC4061	○			±2 to ±16	V^-+2 to V^+	J–FET			◎				○		○	○		8
μPC832	μPC4062		○													○	○		8
μPC834	μPC4064			○												○	○		14
μPC258	μPC4558		○		±4 to ±16	V^-+1 to V^+–1	PNP		○			○	○		○	○	○		8
μPC458	μPC4741			○											○	○	○		14
μPC259	μPC4560		○		±4 to ±16	V^-+1 to V^+–1	PNP		○			○	○			○	○		8
	μPC4556		○		±4 to ±16	V^-+1 to V^+–1	PNP		○		○	◎	○			○	○		8
	μPC4557		○		±4 to ±16	V^-+1 to V^+–1	PNP		○			○	○			○			8
	μPC4559		○		±4 to ±16	V^-+1 to V^+–1	PNP		○			○	○			○			8
	μPC4570		○		±4 to ±16	V^-+1 to V^+–1	PNP		○		○	◎	◎			○	○	○	8*4
	μPC4574			○												○	○		14
	μPC4572		○		±2 to ±7	V^-+1 to V^+–1	PNP		○		○	◎	◎			○	○	○	8*4
μPC1251	μPC358		○		+3 to ±30	GND to V^+–1.5	PNP	○		○				○	○	○	○	○	8*4
μPC451	μPC324			○											○	○	○		14
μPC452	μPC3403			○	+3 to ±32	GND to V^+–1.5	PNP	○		○						○	○		14
μPC842			○		±3 to ±32	GND to V^+–1.8	PNP	○			○	○				○	○		8
μPC844				○												○	○		14

○: Recommended for designing ◎: High performance ◎: Very high performance

*1 : Single type has a offset adjust pin.

*2 : For product indicated by +/– voltage, single supply voltage operation is possible if the input/output voltage range is observed.

*3 : C, D, ED, G2 or HA shows Package Type, as follows.
- C : Plastic DIP (300 mil)
- D, ED : Ceramic DIP (300 mil)
- G2 : Plastic SOP (225 mil)
- HA : 9-pin plastic slim SIP

*4 : HA has 9 pins.

Comparator

Type number		Function			Recommended power supply voltage (V)	Common mode input voltage range TYP. (V) T_A = +25 ƒC	Input stage transistor	GND Input on single power	High speed	Low power	Output circuit type		Packages*1				Number of pins
Communication/ industry use	General use	Single	Dual	Quad							Open-collector	Emitter-follower	DED	C	G2	HA	
μPC271	**μPC311**	○			+5 to +32	V^-+0.3 to V^+–1.2	PNP		○		○	○	○	○	○		8
μPC272	**μPC319**		○		+5 to +32	V^-+2 to V^+–2	NPN		○		○		○	○	○		14
μPC277	**μPC393**		○		+2 to +32	GND to V^+–1.5	PNP	○		○	○		○	○	○	○	8*2
μPC177	**μPC339**			○									○	○	○		14

*1 : C, D, ED, G2 or HA shows Package Type, as follows.
C : Plastic DIP (300 mil)
C : Plastic DIP (300 mil)
D, ED : Ceramic DIP (300 mil)
G2 : Plastic SOP (225 mil)
HA : 9-pin plastic slim SIP
*2 : HA has 9 pins.

Fixed Output Voltage, 3-Terminal Regulator

Type	Type number	Output current (A)	Output voltage (V)												Absolute maximum ratings		Package	Remarks
			3	3.3	4	5	6	7	8	9	10	12	15	18	24	Input voltage (V)	Total power dissipation (W)*1		
Positive voltage output	**μPC78L00**	0.1				○	○	○	○							30	0.7/2*3	• TO-92 • SOT-89	
											○	○	○			35			
	μPC78N00	0.3				○			○		○	○	○	○		35	12.5	• TO-126	
															○	40			
	μPC78M00A	0.5				○	○	○	○	○	○	○	○	○		35	15	• MP-45*2	Improved version of μPC78M00
															○	40			
	μPC7800A	1.0				○			○			○	○	○		35	15	• MP-45*2	Improved version of μPC7800
															○	40			
	μPC2600	0.5				○					○					35 (DC) ±100 (surge)	20	• TO-220AB	
	μPC29L00	0.1	○	○	○	○										16	0.7/2*3	• TO-92 • SOT-89	Low dropout voltage type
	μPC29M00★	0.5	○	○		○						○				20	1.0/2.0*4 15	• MP-3 • MP-3Z*5 • MP-45*2	Low dropout voltage type
	μPC2900★	1.0	○	○		○						○				20	1.0/2.0*4 15	• MP-3 • MP-3Z*5 • MP-45*2	Low dropout voltage type
	μPC24A00	2.0				○						○	○			36	20	• MP-45*2	Low dropout voltage type
	μPC24M00A	0.5				○	○	○	○	○	○	○	○	○		36	15	• MP-45*2	Low dropout voltage type
	μPC2400A	1.0				○	○	○	○	○	○	○	○	○		36	15	• MP-45*2	Low dropout voltage type
Negative voltage output	**μPC79L00**	0.1				○			○							–30	0.7	• TO-92	
												○	○			–35			
	μPC79N00	0.3				○			○			○	○	○		–35	12.5	• TO-126	
															○	–40			
	μPC79M00	0.5				○			○			○	○	○		–35	15	•MP-45*2	
															○	–40			
	μPC7900A	1.0				○			○			○	○	○		–35	15	• MP-45*2	Improved version of μPC7900
															○	–40			

*1 : Limited by internal circuit
*2 : Plastic insulated package
*3 : With 16 cm^2 ∞ 0.7 mm ceramic substrate
*4 : With 7.5 cm^2 ∞ 0.7 mm ceramic substrate
*5 : Surface mount package of MP-3

★: Under development

Variable Output Voltage Regulator

Type	Type number	Output current (A)	Output voltage range (V)	Absolute maximum ratings		Package	Remarks
				Input voltage (V)	Total power dissipation (W)		
Positive voltage output	**μPC141/305***3	0.05	4.5 to 30	40	0.35, 0.5/0.35, 0.44	• 8-pin DIP (plastic/ceramic) • 8-pin SOP	
	μPC317	1.5	1.3 to 30	40	20*1, 15*1	• TO-220AB • MP-45*2	3-pin regulator
	μPC1093	0.15	2.5 to 36	37	0.48, 0.7, 2*4	• 8-pin SOP • TO-92 • SOT-89	Shunt regulator
	μPC1943	0.05	1.26 to 24	25	1.6*4	• SOT-89	Shunt regulator
	μPC1944	0.05	1.26 to 24	25	0.385, 0.56	• 8-pin SOP • TO-92	Shunt regulator
Negative voltage output	**μPC337**	1.5	–1.3 to –30	–40	20*1	• TO-220AB	3-pin regulator

*1 : Limited by internal circuit
*2 : Plastic insulated package
*3 : μPC141 is for communication/industry use.
*4 : When mounted on 16 cm^2 (0.7 mm thick) ceramic board

Regulator with System Reset

Type	Type number	Output current (A)	Output voltage (V)	Reset start voltage (V)	Reset output logic		Absolute maximum ratings		Package	Remarks
					Active low	Active high	Input voltage (V)	Total power dissipation (W)		
Positive voltage output	**μPC2251**	0.1	3	2.85	○		12	1.2*	• TO-126 (4-pin)	Low dropout type
	μPC2252	0.1	3	2.85		○	12	1.2*	• TO-126 (4-pin)	Low dropout type
	μPC2253	0.1	5	2.85	○		12	1.2*	• TO-126 (4-pin)	Low dropout type
	μPC2254	0.1	5	2.85		○	12	1.2*	• TO-126 (4-pin)	Low dropout type
	μPC2255	0.1	5	4.75	○		12	1.2*	• TO-126 (4-pin)	Low dropout type
	μPC2256	0.1	5	4.75		○	12	1.2*	• TO-126 (4-pin)	Low dropout type
	μPC2260	0.5	5	4.85	○		35	20*	• TO-220 (5-pin)	Low dropout type
Supervisory for Microprocessor	**μPC2270A**	–	–	4.3	○	○	8	0.35	• 8-pin DIP	Manual Reset Input
								0.44	• 8-pin SOP	
								0.35	• 9-pin Slim SIP	
	μPC1074A	0.01	2 ~ 5.18	Adjustable	○		40	0.5	•16-pin SOP	Watch-dog Timer

*: Limited by internal circuit

High Precision Reference Voltage

Type number	Input voltage range (V)	Output voltage (V)	Output current (mA)	Total power dissipation (mW)	Output voltage vs. temperature (ppm/ƒC)	Package
μPC1060	4.5 to 40	2.5 ±0.025	10	350, 500	40	• 8-pin DIP (plastic, ceramic)

Switching Regulator Control Circuit

Type number	Input voltage range (V)	Absolute maximum ratings		Package	Output circuit operation mode	Applications
		Output current (mA)	Total power dissipation (W)			
μPC494	7 to 40	250	1, 0.78*2, 0.65*2	• 16-pin DIP (plastic) • 16-pin SOP*1	Push-pull/single selectable	General purpose
μPC1094	11 to 24	1200 (peak)	0.57, 0.55	• 14-pin DIP (plastic) • 14-pin SOP	Totem pole circuit configuration Single mode	Can operate up to 500 kHz General purpose
μPC1099	11.5 to 24	1200 (peak)	1, 0.694	• 16-pin DIP (plastic) • 16-pin SOP	Totem pole circuit configuration Single mode	Can operate up to 500 kHz General purpose
μPC1905	16.5 to 30	1200 (peak)	1, 0.694	• 16-pin DIP (plastic) • 16-pin SOP	Totem pole circuit configuration Single mode	Can operate up to 500 kHz General purpose
μPC1906	16.5 to 30	1200 (peak)	1, 0.694	• 16-pin DIP (plastic) • 16-pin SOP	Totem pole circuit configuration Single mode	Can operate up to 500 kHz General purpose
μPC1900	12 to 30	1200 (peak)	1.225, 0.775	• 24-pin DIP (plastic) • 24-pin SOP	Totem pole circuit configuration 2 outputs	Can operate up to 500 kHz General purpose
μPC1394	6.6 $V_{TYP.}$ (shunt type)	10	0.15 (T_a=75ƒC)	• 14-pin DIP (plastic) • 14-pin SOP	Single mode	TV/VCR
μPC1100	3.6 to 40	25	1, 0.694	• 16-pin DIP (plastic) • 16-pin SOP	2 outputs (synchronous control possible) If one output is shorted, both outputs will be turned OFF.	DC/DC converter
μPC1150	3.6 to 40	25	1, 0.694	• 16-pin DIP (plastic) • 16-pin SOP	2 outputs (synchronous control possible) If one output is shorted, only the output will be turned OFF.	DC/DC converter

*1 : μPC494G is 375 mil. μPC494GS is 300 mil.
*2 : When mounted on 5 ∞ 5 cm^2 (1.6 mm thick) glass epoxy board.

Functional Block

Function	Type number	Features	Package
Analog Multiplexer	**μPD5205**	Single-pole 8 position mode/double-pole 4 position mode Supply Voltage: 44 V, ON Resistance: 270 ý TYP.	• 24-pin shrink DIP • 24-pin SOP
Precision Timer	**μPC1555**	CR Timer, Operating Temperature: –20 ~ +80°C Supply Voltage: 4.5 ~ 16 V, Free Running Frequency: 0.1 ~ 100 kHz	• 8-pin DIP • 8-pin SOP
	μPC617	CR Timer, Operating Temperature: –20 ~ +80°C Supply Voltage: 4.5 ~ 16 V, Free Running Frequency: 0.1 ~ 100 kHz	• 8-pin DIP • 8-pin SOP
	μPD5555	CMOS CR Timer, CMOS Type of μPC1555 Supply Voltage: 3 ~ 16 V, Free Running Frequency: 0.1 ~ 500 kHz	• 8-pin DIP • 8-pin SOP
	μPD5556	CMOS CR Timer Dual Type of μPD5555	• 8-pin DIP • 8-pin SOP
Sample and Hold	**μPC398**	Sample and Hold, Operating Temperature: 0 ~ +70°C Supply voltage: ±5 ~ ±15 V, Acquisition Time: 2.5 μs TYP.	• 8-pin DIP
	μPC649	Sample and Hold, Operating Temperature: –20 ~ +70°C Supply voltage: ±5 ~ ±15 V, Acquisition Time: 2.5 μs TYP.	• 8-pin DIP

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Transistor/Diode/Thyristor

Transistor 128

- Quick Reference by Package 128
- Quick Reference Table by Function/Application 138

Field Effect Transistor 145

- Small Signal FET 145
- Power MOS FET 148

Transistor with Internal Resistor 154

Transistor for Array 158

Power MOS IC 159

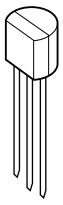
Transistor Array 159

Zener Diode 161

Thyristor 163

Quick Reference by Package

■ TO-92 Type Transistor



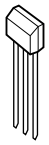
TO–92

V_{CEO} (V) / I_C (A)	~15	~30	~50	~70	~100	~150	~200	~250	~400
~20 m		2SC1674							
~30 m		2SC1675	2SA1005						
~50 m	2SA1206**					2SA988 2SA992 2SC1841 2SC1845			
~100 m			2SA733 2SA987 2SA990 2SA1151 2SC945 2SC945 Ⓛ 2SC1840 2SC1842 2SC1843 2SC2718 AA1[ ] AN1[ ]	2SA991 2SC1844	2SA675[1)]		2SA1376 2SA1376A 2SC3478 2SC3478A	2SA1544	
~200 m	2SC2901**	2SA1409* (25 V/ 150 mA)	2SC3622* (150 mA) 2SC3622A* (150 mA)						
~500 m			2SC3615* (300 mA)	2SA953 2SC2002	2SA954 2SA1152 2SC2003 2SC2719				2SA1625
~1.0		2SA952 2SC2001 2SC3616* (25 V/ 700 mA) AB1[ ] (25 V/ 700 mA) AP1[ ] (25 V/ 700 mA)	2SB1116 2SD1616	AD1[ ] AD2[ ]*** AR1[ ] 2SB1116A (60 V) 2SD1616A (60 V) 2SD1701*** (60 V)	2SD1698 (80 V)				
~2.0		2SD1513 (16 V/2.0 A) 2SB1068 (16 V/2.0 A) AC1[ ] (20 V/2.0 A) AQ1[ ] (20 V/2.0 A)		2SD1939 (60 V/1.5 A)					
~3.0		2SB1300 (16 V/3 A) AC2[ ] (16 V/3 A) AQ2[ ] (16 V/3 A)							

1) V_{CES} ☐: Darlington transistor, ⋆: High h_{FE} transistor, ⋆⋆: High speed switching, ⋆⋆⋆: Contains internal zener diode

Quick Reference by Package

■ SST Type Transistor

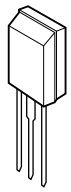

SST

V_{CEO} (V) / I_C (A)	~15	~20	~30	~50	~120
~20 m	2SC2786	BA3[ ] BN3[ ]	2SC2787		
~50 m	2SA1459**				2SA1174 2SC2784
~100 m				2SA1175 2SC2785 2SC3623* BA1[ ] BN1[ ] BA2[ ] BN2[ ]	
~200 m	2SC3732**	2SA1410* (150 mA)		2SA1458** (40 V) 2SC3623A* (150 mA) 2SC3731** (40 V)	
~700 m		2SB810 2SD1020	BB1[ ] (25 V) BP1[ ] (25 V)		
~1.0		2SB811 2SD1021			

*: High h_{FE} transistor, **: High speed switching

Quick Reference by Package

■ SP-8 Type Transistor



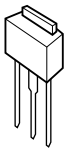
SP–8

V_{CEO} (V) / I_C (A)	~16	~25	~50	~80	~140	~160	~300	~400	~600
~50 m					2SA915 2SC1940	2SA916 2SC1941			
~200 m							2SC3209 2SC4000 (250 V/ 100 mA)		
~500 m					2SA1221 2SC2958	2SA1222 2SC2959			
~700 m			2SB605 2SA1154 2SD571 2SC2721						
~1.0		2SB564 2SD471	2SA1460** 2SB734 2SC3733** 2SD774 2SD1582*	2SB984 2SB1093 2SD1312 2SD1579 2SD1697 (800 mA) 2SD1700*** (60 V/ 800 mA) 2SD1843*** (60 V)					2SA1627
~2.0	2SB733 2SD773	2SD1581*	2SD2463	2SD1779* (60 V) 2SD1780* (60 V) CE1[ ]*** (60 V) CE2[ ]* (60 V)				2SA1626	
~3.0		2SB1117			2SB1318 (100 V)				
~5.0		2SA1897							

: Darlington transistor, *: High h_{FE} transistor, **: High speed switching, ***: Internal zener diode

Quick Reference by Package

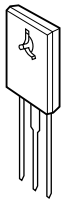
■ MP-3 Type Transistor


MP–3

V_{CEO} (V) / $I_{C(DC)}$ (A)	~20	~40	~60	~100	~150	~300	~400	~600
~0.5						2SC2802	(2SA1400 2SC3588	
~1.0			(2SB963 2SD1286 2SC4337					(2SA1413 2SC3632
~2.0	2SD1583 ●	2SD992	2SD1164	2SC4338	(2SB768 2SD1033 2SD1557	2SC2885 2SC2946 2SC2946(1)	(2SA1412 2SC3631	
~3.0		2SB962 ◎	2SD1448 2SD1584 ● (2SB1261 ◎ 2SD1899 ◎	2SC4339				
~5.0			(2SA1385 ◎ 2SC3518 ◎ (2SA1648 ◎ 2SC4332 ◎	(2SA1647 ◎ 2SC4331 ◎ 2SC4345			2SC4346	
10	2SA1615 ◎	(2SA1649 2SC4333	2SC4344	2SC4343				

▭: Darlington transistor, (: Complementary pair, ●: Single High h_{FE}, ◎: Low V_{CE}(sat)

■ MP-5 (TO-126) Type Transistor

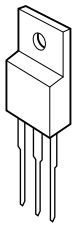

MP–5
(TO–126)

V_{CEO} (V) / $I_{C(DC)}$ (A)	~20	~45	~60	~80	~120	~160	~300	~400	~600
~1.0						(2SA1142 2SC2682	2SC2371 (2SA1546 2SC4001		
~0.5							2SC2688	(2SA1156 2SC2752	
~1.0			(2SB731 2SD809(1) 2SD1630 * 2SC4340	2SB548 2SD414	(2SB549 2SD415				(2SA1486 2SC3840
~2.0		2SD1695 *	(2SB794 2SD985 (2SB1111 * 2SD1491 *	(2SB795 2SD986 2SC4341	(2SA1220 2SC2690	(2SA1220A 2SC2690A			
~3.0		(2SB744 2SD794 (2SB772 ◎ 2SD882 ◎ 2SC1449	2SB744A 2SD794A (2SB1150 * 2SD1693 * 2SD1694 ● (2SB1217 ◎ 2SD1818 ◎		2SA1714 (2SB1149 2SD1692 2SC4342				
~5.0	2SD741 ◎		(2SB1151 ◎ 2SD1691 ◎						

▭: Darlington transistor, (: Complementary pair, ⋆: Internal zener diode between C-B, ◎: Low $V_{CE(sat)}$,
○: Single Hight h_{FE}

Quick Reference by Package

■ MP-25 (TO-220) Type Transistor

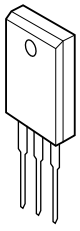


MP–25
(TO–220)

V_{CEO} (V) / $I_{C(DC)}$ (A)	~40	~60	~80	~100	~150	~200	~250	~300	~400	~800
~0.5						2SA1383 2SC3514		2SC1505 2SC1506 2SC1507		
~2.0		2SD1481* 2SD1629*		2SA1008 2SC2331 2SA985 2SC2275	2SA985A 2SC2275A 2SA1006 2SC2336 2SB536 2SB537 2SD381 2SD382 2SB546A 2SB547A 2SD401A 2SD402A	2SA1006A 2SC2336A	2SA1006B 2SC2336B	2SA1009	2SA1009A 2SC2333	
~3.0	2SD795	2SD288 2SD289								2SC3531
~5.0		2SA1069 2SC2516	2SA1069A 2SC2516A 2SB703 2SD743	2SA1644 ◎ 2SC4328 ◎ 2SB601 2SD560 2SB703A 2SD743A 2SC2517				2SD1162	2SC2518 2SD987	
~7.0	2SA1129 2SC2654	2SB707 2SD568	2SB708 2SD569	2SA1010 2SC2334 2SC2373 2SA1645 ◎ 2SC4329 ◎					2SC2335	
~8.0				2SA1716 2SC4496*						
~7.0				2SA1717 2SA1646 ◎ 2SC4330 ◎						

▭: Darlington transistor, 〔: Complementary pair, ⋆: Internal zener diode between C-B, ◎: Low $V_{CE(sat)}$

■ MP-40 Type Transistor

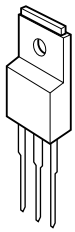


MP–40

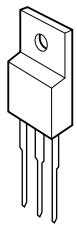
V_{CEO} (V) / $I_{C(DC)}$ (A)	~40	~60	~80	~100	~150	~200	~250	~300	~400	~800
~3.0		2SB1038 2SD1310								
~4.0				2SD1311						2SC3532
~5.0		2SD1392* 2SC4347*		2SB974 2SD1308 2SC4348					2SC3431 ☆	
~7.0									2SC3158 2SC3432 ☆	
~8.0				2SB975 2SD1309 2SC4349						
~10				2SA1261 2SC3157 2SC4350					2SC3159	

▭: Darlington transistor, 〔: Complementary pair, ⋆: Internal zener diode between C-B, ☆: High speed switching

Quick Reference by Package



MP–45
(MP-25 Insulated type)



MP–45F
(MP-25 Insulated type)

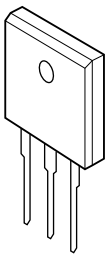
■ MP-45, MP-45F (TO-220 Insulated Type) Transistor

V_{CEO} (V) / Package / $I_{C(DC)}$ (A)	~60		~100		~150	~300	~400
	MP-45	MP-45F	MP-45	MP-45F	MP-45	MP-45	MP-45
~2.0			2SA1395 2SC3567		2SB1096 2SD1587		2SC3569
~3.0	2SB1094 2SD1585 2SD1593 ●	2SD2164 ●					
~4.0			2SD1586				
~5.0	2SA1394 2SC3566 2SA1441 ◎ 2SC3691 ◎ 2SC4351 * 2SD1595 *	2SA1741 ◎ 2SC4549 ◎	2SA1718 2SC4352 2SB1098 2SD1589 2SA1650 ◎ 2SC4334 ◎	2SB1430 2SD2161		2SD1592	2SC3570
~6.0			2SD1594 ●	2SD2165 ●			
~7.0	2SB1097 2SD1588 2SA1442 ◎ 2SC3692 ◎	2SA1742 ◎ 2SC4550 ◎	2SC4062 2SA1651 ◎ 2SC4335 ◎	2SC4553			2SC3571
~8.0			2SA1719 2SD1928 2SB1099 2SD1590	2SA1833 2SB1431 2SD2162			
~10	2SA1443 ◎ 2SC3693 ◎	2SA1743 ◎ 2SC4551 ◎	2SA1396 2SC3568 2SA1652 ◎ 2SC4336 ◎ 2SA1720 2SC4353 2SB1100 2SD1591	2SB1432 2SD2163			2SC3572
~15	2SA1444 ◎ 2SC3694	2SA1744 ◎ 2SC4552 ◎	2SC4063	2SC4554			

▭: Darlington transistor, 〔: Complementary pair, *: Internal zener diode between C-B, ◎: Low $V_{CE(sat)}$,
●: Single High h_{FE}

Quick Reference by Package

■ MP-80 Type Transistor

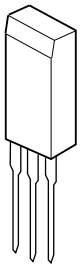


MP–80

$I_{C(DC)}$ (A) \ V_{CEO} (V)	~80	~100	~120	~130	~140	~160	~250	~400	~800
~2.0							2SD1017		
~5.0		2SC2908					2SD1018		2SC3533 2SC3534
~7.0			2SB849A / 2SD1110A 2SB965 / 2SD1288						2SC3535
~1.0	2SD1070	2SA1141 2SB897 2SD1210	2SB966 / 2SD1289	2SA1232 / 2SC3012				2SC2749 2SC3434☆ 2SD1298	2SC3536
~15		2SC2750 2SD1296			2SA1227 / 2SC2987	2SA1227A / 2SC2987A		2SC2751 2SC3435☆	
~25		2SD1297							

▭: Darlington transistor, 〔: Complementary pair, ☆: High speed switching

■ MP-10 Type Transistor



MP–10

$I_{C(DC)}$ (A) \ V_{CEO} (V)	~60	~100
2.5		2SC4814 ●
~5	2SA1843 ◎ / 2SC4815 ◎	2SA1840 / 2SC4810 2SA1845 ◎ / 2SC4817 ◎
~7	2SA1844 ◎ / 2SC4816 ◎	2SA1846 ◎ / 2SC4818 ◎ 2SC4813 ●
~8		2SA1841 / 2SC4811
~10		2SA1842 / 2SC4812 2SA1847 ◎ / 2SC4819 ◎

▭: Darlington transistor, 〔: Complementary pair, ●: Low V_{CE}(sat) High h_{FE}, ◎: Low V_{CE}(sat)

Quick Reference by Package

Mini mold
SC-59

■ Mini-Mold Transistor

V_{CEO} (V) / I_C (mA)	~15	~20	~30	~40	~50	~60	~80	~120	~200	~300
~10	2SC3663 (8 V, 5 mA)									
~20		2SC2223 2SC2758	2SK160							2SD2383
~30		2SC4568		2SA1226						
~50	2SA1424 (–12 V) 2SA1462 2SC2757 2SC2759 2SC3545 2SC3583 (10 V, 65 mA) 2SC3585 (10 V, 35 mA)	2SC4095 (35 mA)	2SC1009A					2SA811A 2SA1247 2SC1622A 2SC3115	2SC1653 (130 V) 2SC1654 (160 V)	
~100	2SC2351 (70 mA) 2SC3356 (12 V)	2SC4093 2SC4094 (65 mA) 2SC4569 (60 mA)	2SC4092 (25 V, 70 mA) FN2[ ] (–25 V)		2SA812 2SC1623 FA1[ ] FN1[ ]	FA2[ ]			2SA1330 2SC3360	
~150			2SA1411 (–25 V)		2SC3624 2SC3624A					
~200	2SC3735	2SC1621		2SA1461 2SC3734						
~300						2SB736 2SD780	2SB736A 2SD780A			
~500				2SA1464 2SC3739						
~700			2SB624 (–25 V) 2SD596 (25 V) FB1[ ] (25 V) FP1[ ] (–25 V)							
~1000			2SA1467 (–25 V) 2SC3742 (25 V)							

Quick Reference by Package

Power mini mold
SC-62

■ Power Mini-Mold Transistor

V_{CEO} (V) / I_C (A)	~20	~25	~50	~60	~80	~100	~120	~140	~300
~50 m								2SA1173 2SC2780	
~200 m	2SC2954 (18 V, 150 mA) 2SC3357 (12 V, 100 mA)								2SC3554
~300 m			2SC3617		2SB800 2SD1001				
~0.7		2SC3618	2SB799 2SD1000			2SB805 2SD1006	2SB806 2SD1007		
~1.0		2SB798 2SD999	2SA1463 2SB1115 2SC3736 2SD1615 2SD1702	2SB1115A 2SD1615A HD1[ ] HD2[ ] HR1[ ]	2SB804 2SD1005 2SD1699				
~2.0	2SB1114 2SD1614 HC1[ ] HQ1[ ]	2SD1950 2SJ179 (30 V, 1.5 A)							
~3.0	2SB1301 HC2[ ] (16 V) HQ2[ ] (–16 V)			2SB1572 2SD2403					
~5.0			2SB1571 2SD2402						

: Darlington connection

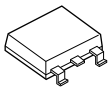
MP-2

■ MP-2 Type Transistor

V_{CEO} (V) / I_C (A)	~20	~60	~100	~400	~600
~1.0					2SA1871 2SC4942
~3.0	2SB1581				
~5.0		2SB1578 2SD2425			

Quick Reference by Package

■ MP-3 Type (SC-63) Transistor



MP-3

V_{CEO} (V) / I_C (A)	~20	~30	~45	~60	~100	~200	~300	~400	~600
~0.2							2SC2802		
~0.5								2SA1400-Z 2SC3588-Z	
~1.0				2SB963-Z 2SD1286-Z					2SA1413-Z 2SC3632-Z
~2.0	2SD1583-Z	2SD992-Z		2SD1164-Z (1.5 A)		2SB768 (150 V) 2SD1033 (150 V) 2SC2946(1)		2SA1412-Z 2SC3631-Z	
~3.0		2SB962-Z	2SD1448-Z	2SB1261-Z 2SD1584-Z 2SD1899-Z					
~5.0				2SA1385-Z 2SC3518-Z					
~10	2SA1615-Z								

□: Darlington connection

Small mini mold

■ Small Mini-Mold Transistor

V_{CEO} (V) / I_C (mA)	~15	~20	~30	~40	~50	~120	~160
~10							
~20		2SC4178					
~30							
~50	2SA1610		2SC4179			2SA1612 2SC4180	2SA1609
~100					2SA1611 2SC4177 GA1[ ] GN1[ ]		
~150		2SA1613 (25 V)			2SC4181		
~200	2SC4176	2SC4175					
~500			2SB1475 (–25 V) 2SD2228 (25 V)	2SA1608 2SC4173			

■ Ultra Small Mini-Mold Transistor

V_{CEO} (V) / I_C (mA)	~50
~100	2SA1836 2SC4783

Ultra small mini mold

Quick Reference Table by Function/Application

■ Small Signal Transistor (1/2)

	TO-92	SP-8	SST	SMALL MINI MOLD	MINI MOLD	POWER MINI
FM/FM RF	2SA1005				2SA1226	
RF/MIX/CON	2SC1674		2SC2786	2SC4178	2SC2223	
FM AM/FM/AM MIX/OSC/IF	2SC1675		2SC2787	2SC4179	2SC1009A	
Audio Frequency Amplification	2SA733		2SA1175	2SA1611	2SA812	
	2SA987				(2SA812)	
	2SA988			2SA1612	2SA811A	
	2SA1409		2SA1410	2SA1613	2SA1411	
	2SC945		2SC2785	2SC4177	2SC1623	
	2SC945 Ⓛ				(2SC1623)	
	2SC1840				(2SC1623)	
	2SC1841				2SC1622A	
	2SC3622/A		2SC3623/A	2SC4181	2SC3624/A	
Low Noise Amplification	2SA990					
	2SA991					
	2SA992		2SA1174		2SA1247	
	2SC1842					
	2SC1843					
	2SC1844					
	2SC1845		2SC2784		2SC3115	
		2SA1138				
Driver Output	2SA952		2SB810		2SB624	
	2SA953				2SB736	
	2SA954				2SB736A	2SB800
	2SA1376				2SA1330	
		2SA915				2SA1173
		2SA916		2SA1609		
		2SB564	2SB811			2SB798
		2SB605				2SB799
		2SB733				
		2SB734				
	2SB1068					2SB1114
	2SB1116					2SB1115
	2SB1116A					2SB1115A
						2SB804
						2SB805
						2SB806
	2SC2001		2SD1020		2SD596	
	2SC2002				2SD780	
	2SC2003				2SD780A	2SD1001
	2SC3478				2SC3360	

Quick Reference Table by Function/Application

■ Small Signal Transistor (2/2)

	TO-92	SP-8	SST	SMALL MINI MOLD	MINI MOLD	POWER MINI
Driver Output		2SC1940			2SC1653	2SC2780
		2SC1941			2SC1654	
		2SC3209				2SC3554
	2SC3615					2SC3617
	2SC3616					2SC3618
		2SD471				2SD999
		2SD571				2SD1000
		2SD773				
		2SD774				
	2SD1513					2SD1614
	2SD1616					2SD1615
	2SD1616A					2SD1615A
						2SD1005
						2SD1006
						2SD1007
	2SD1698	2SD1697				2SD1699
	2SD1701	2SD1700				2SD1702
		2SD1581				2SD1950
Switching	2SA1206		2SA1459	2SA1610	2SA1462	
	2SA1153			2SA1608	2SA1464	
		2SA1460				2SA1463
			2SA1458		2SA1461	
	2SC2720			2SC4173	2SC3739	
	2SC2901		2SC3732	2SC4176	2SC3735	
		2SC3733				2SC3736
			2SC3731		2SC3734	

Quick Reference Table by Function/Application

Power Transistor

■ Low $V_{CE(sat)}$ Transistor

Characteristics V_{CEO}, $I_{C(DC)}$	SP-8	MP-2	MP-3	MP-5 (TO-126)	MP-25	MP-10	MP-45	MP-45F
16 V, 3 A		2SB1581						
20 V, 5 A				2SD741				
20 V, 10 A	2SA1897 (5A)		2SA1615					
25 V, 3 A	2SB1117							
30 V, 3 A			2SB962	2SB772 2SD882				
30 V, 10 A			2SA1649 2SC4333					
60 V, 3A			2SB1261 2SD1899	2SB1217 2SD1818				
60 V, 5 A		2SB1578 2SD2425	2SA1385 2SC3518	2SB1151 2SD1691		2SA1843 2SC4815		
			2SA1648 2SC4332				2SA1441 2SC3691	2SA1741 2SC4549
60 V, 7 A			2SC4344			2SA1844 2SC4816	2SA1442 2SC3692	2SA1742 2SC4550
60 V, 10 A							2SA1443 2SC3693	2SA1743 2SC4551
60 V, 15 A							2SA1444 2SC3694	2SA1744 2SC4552
100 V, 5 A			2SA1647 2SC4331		2SA1644 2SC4328	2SA1845 2SC4817	2SA1650 2SC4334	
100 V, 7 A			2SC4343		2SA1645 2SC4329	2SA1846 2SC4818	2SA1651 2SC4335	
100 V, 10 A					2SA1646 2SC4330	2SA1847 2SC4819	2SA1652 2SC4336	

■ High h_{FE} Transistor

Characteristics V_{CEO}, $I_{C(DC)}$	SP-8	MP-3	MP-5 (TO-126)	MP-10	MP-45	MP-45F
20 V, 2 A		2SD1583				
25 V, 2 A	2SD1581					
50 V, 1 A	2SD1582					
60 V, 3 A		2SD1584	2SD1694		2SD1593	2SD2164
100 V, 2.5 A				2SC4814*		
100 V, 6 A					2SD1594	2SD2165
100 V, 7.5 A				2SC4813*	2SC4062	2SC4553*
100 V, 15 A					2SC4063	2SC4554*

*: Low VCE(sat) & High hFE

Quick Reference Table by Function/Application

■ Low Voltage, High Speed Switching Transistor

Characteristics V_{CEO}, $I_{C(DC)}$	SP-8	MP-25	MP-45	MP-80
45 V, 1 A	2SA1460 2SC3733			
60 V, 5 A		2SA1069 2SC2516	2SA1394 2SC3566	
100 V, 2 A		2SA1008 2SC2331	2SA1395 2SC3567	
100 V, 5 A		2SC2517		
100 V, 7 A		2SA1010 2SC2334		
100 V, 7.5A		2SC2373		
100 V, 10 A			2SA1396 2SC3568	
100 V, 15 A				2SC2750

■ High Voltage, High Speed Switching Transistor

Characteristics V_{CEO}, $I_{C(DC)}$	MP-3	MP-5 (TO-126)	MP-25 (TO-220)	MP-40	MP-45	MP-80
200 V, 2 A	2SC2885 2SC2946 2SC2946(1)					
350 V, 2 A			2SA1009			
400 V, 0.5 A	2SA1400 2SC3588	2SA1156 2SC2752				
400 V, 2 A	2SC3631		2SA1009A 2SC2333		2SC3569	
400 V, 5 A			2SC2518		2SC3570	
400 V, 7 A			2SC2335	2SC3158	2SC3571	
400 V, 10 A				2SC3159	2SC3572	2SC2749
400 V, 15 A						2SC2571
600 V, 2 A	2SA1413 2SC3632	2SA1486 2SC3840				

■ 800 V, High Speed Switching Transistor (t_f = 0.5 μs MAX.)

Characteristics V_{CEO}, $I_{C(DC)}$	MP-25 (TO-220)	MP-40	MP-80
800 V, 3 A	2SC3531		2SC3533
800 V, 4 A		2SC3532	2SC3534
800 V, 6 A			2SC3535
800 V, 10 A			2SC3536

■ High Voltage, High Speed Switching Transistor (t_f = 0.3 μs MAX.)

Characteristics V_{CEO}, $I_{C(DC)}$	MP-3	MP-40	MP-80
400 V, 5 A	2SC4346	2SC3431	
400 V, 7 A		2SC3432	
400 V, 10 A			2SC3434
400 V, 15 A			2SC3435

Quick Reference Table by Function/Application

■ Audio Frequency Amplification Transistor

Characteristics V_{CEO}, $I_{C(DC)}$	MP-3	MP-5 (TO-126)	MP-25 (TO-220)	MP-40	MP-45	MP-80	MP-85
30 V, 2 A	2SD992						
45 V, 3 A	2SD1448	2SB744 2SD794	2SD795				
50 V, 1 A		2SB731 2SD809(1)					
60 V, 3 A		2SB744A 2SD794A	2SB1089 2SD1567 2SD288 2SD289	2SB1038 2SD1310	2SB1094 2SD1585		
60 V, 7 A			2SB707 2SD568		2SB1097 2SD1588		
60 V, 10 A						2SD1070	
80 V, 0.8 A		2SB548 2SD414					
80 V, 4 A			2SB703 2SD743				
80 V, 7 A			2SB708 2SD569				
100 V, 0.8 A		2SB549 2SD415					
100 V, 4 A			2SB703A 2SD743A 2SD1568	2SD1311	2SD1586		
120 V, 1.5 A			2SB536 2SB537 2SD381 2SD382				
120 V, 7 A						2SB849A 2SD1110A 2SB965 2SD1288	
120 V, 8 A						2SB966 2SD1289	2SB1315 2SD1977
150 V, 2 A	2SB768 2SD1033 2SD1557		2SB546A 2SB547A 2SD401A 2SD402A		2SB1096 2SD1587		
250 V, 2 A						2SD1017	
250 V, 4 A						2SD1018	

Quick Reference Table by Function/Application

■ High Frequency Amplification Transistor

Characteristics V_{CEO}, $I_{C(DC)}$	SP-8	MP-3	MP-5 (TO-126)	MP-25 (TO-220)	MP-80
35 V, 2 A			2SC1449		
40 V, 7 A				2SA1129 2SC2654	
120 V, 1.2 A			2SA1220 2SC2690		
120 V, 1.5 A				2SA985 2SC2275	
130 V, 10 A					2SA1232 2SC3012
140 V, 12 A					2SA1227 2SC2987
150 V, 1.5 A				2SA985A 2SC2275A	
160 V, 1.2 A			2SA1220A 2SC2690A		
160 V, 12 A					2SA1227A 2SC2987A
180 V, 1.5 A				2SA1006 2SC2336	
200 V, 1.5 A				2SA1006A 2SC2336A	
250 V, 0.1 A	2SC4000		2SA1546 2SC4001		
250 V, 1.5 A				2SA1006B 2SC2336B	
300 V, 0.1 A			2SC2371		
300 V, 0.2 A	2SC3209	2SC2802	2SC2688		
				2SC1505 2SC1506 2SC1507	

Quick Reference Table by Function/Application

■ Darlington Transistor

Characteristics V_{CEO}, $I_{C(DC)}$	SP-8	MP-3	MP-5 (TO-126)	MP-25 (TO-220)	MP-10	MP-40	MP-45	MP-45F	MP-80
31 V, 2 A	2SD2463*		2SD1695*						
60 V, 0.8 A	2SD1700*								
60 V, 1 A	2SD1843	2SB963 2SD1286 2SC4337◎	2SD1630* 2SC4340◎						
60 V, 1.5 A		2SD1164	2SB794 2SD985						
			2SB1111* 2SD1491*						
60 V, 3 A			2SB1150* 2SD1693*						
60 V, 5 A				2SD1564*		2SD1392* 2SC4347◎*	2SD1595* 2SC4351◎		
80 V, 0.8 A	2SD1697								
80 V, 1.5 A	2SB1093 2SD1579		2SB795 2SD986						
80 V, 2 A		2SC4338◎	2SC4341						
100 V, 3 A		2SC4339	2SB1149 2SD1692 2SA1714◎ 2SC4342◎						
100 V, 5 A		2SC4345		2SB601 2SD560	2SA1840 2SC4810	2SA1715◎ 2SC4348◎	2SA1718◎ 2SC4352◎		
				2SB1087 2SD1565		2SB974 2SD1308	2SB1098 2SD1589	2SB1430 2SD2161	
100 V, 8 A					2SA1841 2SC4811	2SA1716◎ 2SC4349◎ 2SB975 2SD1309	2SA1719◎ 2SD1928◎ 2SB1099 2SD1590	2SB1431 2SD2162 2SA1833◎	
100 V, 10 A					2SA1842 2SC4812	2SA1717◎ 2SC4350◎	2SA1720◎ 2SC4353◎ 2SB1100 2SD1591	2SB1432 2SD2163	2SB897 2SD1210
100 V, 15 A									2SD1296
100 V, 25 A									2SD1297
300 V, 5 A				2SD1162			2SD1592		
400 V, 5 A				2SD987					
400 V, 10 A									2SD1298

◎: High speed darlington transistor, ⋆: Internal zener diode between C-B

Field Effect Transistor

Small Signal FET

■ 2SK type (Junction type)

Type number	Package	Absolute maximum ratings (T_A = 25 ƒC)			Electrical characteristics (T_A = 25 ƒC)		Applications
		V_{GDO} (V)	I_D (mA)	P_T (mW)	$\|Y_{fs1}\|$ (ms)	I_{DSS} (mA)	
2SK104	TO-92	30	20	250	2.5 TYP.	2.5 TYP.	HF amplification
2SK105	TO-92	50	20	250	2.1	2.5	AF amplification
2SK162	TO-92	40	50	400	45	18	AF low noise amplification
2SK163	TO-92	50	30	400	9.0	8.0	AF low noise amplification
2SK193	SST	20	10	250	3.5	2.5	FM tuner
2SK195	TO-92	20	10	250	3.5	2.5	FM tuner
2SK505	TO-92	15	50	400	19	20	Video band RF amplification
2SK507	SST	15	50	350	19	20	Video band RF amplification
2SK514	SST	50	20	250	1.8	3.5	AF amplification
2SK518	TO-92	30	50	400	17	60	HF amplification
2SK519	SST	30	50	350	17	60	HF amplification
2SK523	TO-92	50	30	400	9.0	8.0	AF low noise amplification
2SK533	TO-92	50	30	400	9.0	8.0	AF low noise amplification
2SK660	SST	20	10	100	150 (MAX.)	0.5 (MAX.)	ECM impedance conversion
2SK997	SST	20	10	100	0.27	0.5 (MAX.)	ECM impedance conversion
2SK998	TO-92	20	35	350	16	20	HF amplification
2SK1000	SST	22*	50	250	28	20	AM tuner, HF amplification
2SK1109	Mini mold	20	10	80	0.48	0.6 (MAX.)	ECM impedance conversion

*: V_{GSD}

■ 2SK type (MOS type) (1/2)

Type number	Package	Absolute maximum rating (T_A = 25 ƒC)				Electrical characteristics (T_A = 25 ƒC)							Applications
		V_{DSS} (V)	I_D		P_T (W)	$\|y_{fs}\|$ (S)			$R_{DS(on)}$ (ý)				
			DC (A)	Pulse (A)		V_{DS} (V)	I_D (A)	MIN.	V_{GS} (V)	I_D (A)	TYP.	MAX.	
2SK679A	TO-92	30	±0.5	±1.5	0.75	10	0.5	0.4	4	0.5	0.6	1.0	Switching
2SK680A	SC-62	30	±1.0	±2.0	1.0	10	0.5	0.4	4	0.5	0.6	1.0	
2SK681A	SP-8	30	±1.0	±2.0	1.0	10	0.5	0.4	4	0.5	0.6	1.0	
2SK1132	SST	50	0.1	0.2	0.25	5	0.02	0.03	4	0.02	30	50	
2SK1133	SC-59	50	0.1	0.2	0.2	5	0.02	0.03	4	0.02	30	50	
2SK1272	TO-92	60	±1.0	±2.0	0.75	10	0.5	0.4	4	0.5	—	1.0	
2SK1273	SC-62	60	±2.0	±4.0	2.0	10	0.5	0.4	4	0.5	—	1.0	

Field Effect Transistor

■ 2SK type (MOS type) (2/2)

Type number	Package	Absolute maximum rating (T_A = 25 ƒC)				Electrical characteristics (T_A = 25 ƒC)							Applications
		V_{DSS} (V)	I_D		P_T (W)	$\|y_{fs}\|$ (S)			$R_{DS(on)}$ (ý)				
			DC (A)	Pulse (A)		V_{DS} (V)	I_D (A)	MIN.	V_{GS} (V)	I_D (A)	TYP.	MAX.	
2SK1274	SP-8	60	±1.5	±3.0	1.0	10	0.5	0.4	4	0.5	—	1.0	Switching
2SK1398	SST	50	0.1	0.2	0.25	3	0.01	0.02	2.5	0.005	20	40	
2SK1399	SC-59	50	0.1	0.2	0.2	3	0.01	0.02	2.5	0.005	20	40	
2SK1482	TO-92	30	±1.5	±3.0	0.75	10	0.5	0.4	4	0.5	0.19	0.8	
2SK1483	SC-62	30	±2.0	±4.0	2.0	10	0.5	0.4	4	0.5	0.19	0.8	
2SK1484	TO-92	100	±0.5	±1.0	0.75	10	0.5	0.4	4	0.5	0.62	1.2	
2SK1485	SC-62	100	±1.0	±2.0	2.0	10	0.5	0.4	4	0.5	0.62	1.2	
2SK1580	SC-70	16	0.1	0.2	0.15	3	0.01	0.02	2.5	0.001	9	15	
2SK1581	SC-59	16	0.2	0.4	0.2	3	0.01	0.02	2.5	0.001	3.2	5	
2SK1582	SC-59	30	0.2	0.4	0.2	5	0.01	0.02	4	0.01	2.2	5	
2SK1583	SC-62	16	±0.5	±1.0	2.0	5	0.3	0.4	2.5	0.3	1.2	2.0	
2SK1584	SC-62	30	±0.5	±1.0	2.0	5	0.3	0.4	2.5	0.3	1.2	2.0	
2SK1585	SC-62	16	±1.0	±2.0	2.0	5	0.5	0.4	2.5	0.5	0.8	1.2	
2SK1586	SC-62	30	±1.0	±2.0	2.0	5	0.5	0.4	4	0.5	—	1.0	
2SK1587	SC-62	16	±2.0	±4.0	2.0	5	1.0	0.4	2.5	1.0	0.55	0.8	
2SK1588	SC-62	16	±3.0	±6.0	2.0	3	1.0	0.4	2.5	1.0	0.34	0.5	
2SK1589	SC-59	100	0.1	0.2	0.2	5	0.01	0.02	4	0.01	19	30	
2SK1590	SC-59	60	0.2	0.4	0.2	5	0.01	0.02	4	0.01	3.2	6	
2SK1591	SC-59	100	0.2	0.4	0.2	5	0.01	0.02	4	0.01	5.8	8	
2SK1592	SC-62	60	±0.5	±1.0	2.0	10	0.5	0.4	4	0.5	1.6	2.5	
2SK1593	SC-62	100	±0.5	±1.0	2.0	10	0.5	0.4	4	0.5	4.0	6.0	
2SK1824	3-pin ultra super mini	30	0.1	0.2	0.2	3	0.01	0.02	2.5	0.001	7	13	
2SK1958	SC-70	16	0.1	0.2	0.15	3	0.01	0.02	1.5	0.001	30	50	
2SK1959	SC-62	16	±2.0	±4.0	2.0	3	1.0	1.0	1.5	0.05	0.08	0.8	
2SK1960	SC-62	16	±3.0	±6.0	2.0	3	1.5	2.0	1.5	0.1	0.35	0.8	
2SK2053	MP-2	16	±5	±10	2.0	3	2.5	0.4	1.5	0.5	0.2	0.4	
2SK2054	MP-2	60	±3	±6	2.0	10	1.5	2.0	4	1.5	0.18	0.25	
2SK2055	MP-2	100	±2	±4	2.0	10	1.0	2.0	4	1.0	0.28	0.45	
2SK2070	SP-8	100	±1	±2	2.0	10	1.0	2.0	4	1.0	0.28	0.45	
2SK2090	SC-70	50	±0.1	±0.2	0.15	3	0.01	0.02	2.5	0.01	20	40	
2SK2109	SC-62	60	±0.5	±1.0	2.0	10	0.3	0.4	4	0.3	0.55	1.5	
2SK2110	SC-62	100	±0.5	±1.0	2.0	10	0.3	0.4	4	0.3	0.90	2.0	
2SK2111	SC-62	60	±1.0	±2.0	2.0	10	0.5	0.4	4	0.5	0.35	1.0	
2SK2112	SC-62	100	±1.0	±2.0	2.0	10	0.5	0.4	4	0.5	0.67	1.5	
2SK2157	MP-2	30	±5	±10	2.0	10	2.5	2.0	4	2.5	0.08	0.15	
2SK2158	SC-59	50	0.1	0.2	0.2	3	0.01	0.02	1.5	0.001	21	50	
2SK2159	SC-62	60	±2	±4	2.0	10	1.0	0.4	1.5	0.1	0.26	0.7	
2SK2541	SST	50	±0.1	±0.2	0.2	3	0.01	0.02	1.5	0.001	21	50	

Field Effect Transistor

■ 2SJ type (Junction type)

Type number	Package	Absolute maximum ratings (T_A = 25 ƒC)			Electrical characteristics (T_A = 25 ƒC)		Applications
		V_{GDO} (V)	I_D (mA)	P_T (mW)	$\|Y_{fs1}\|$ (mS)	I_{DSS} (mA)	
2SJ44	TO-92	40	30	400	9.0 TYP.	9.0 TYP.	AF low noise amplification
2SJ45	TO-92	40	30	400	9.0	9.0	AF amplification

■ 2SJ type (MOS type)

Type number	Package	Absolute maximum rating (T_A = 25 ƒC)				Electrical characteristics (T_A = 25 ƒC)							Applications
		V_{DSS} (V)	I_D		P_T T_C = 25 °C (W)	$\|y_{fs}\|$ (S)			$R_{DS(on)}$ (ý)				
			DC (A)	Pulse (A)		V_{DS} (V)	I_D (A)	MIN.	V_{GS} (V)	I_D (A)	TYP.	MAX.	
2SJ165	SST	−50	∓0.1	∓0.2	0.25	−5	−0.02	0.03	−4	−0.02	22	50	Switching
2SJ166	SC-59	−50	∓0.1	∓0.2	0.2	−5	−0.02	0.03	−4	−0.02	22	50	
2SJ178	TO-92	−30	∓1.0	∓2.0	0.75	−10	−0.5	0.4	−4	−0.5	—	1.5	
2SJ179	SC-62	−30	∓1.5	∓3.0	2.0	−10	−0.5	0.4	−4	−0.5	—	1.5	
2SJ180	SP-8	−30	∓1.0	∓2.0	1.0	−10	−0.5	0.4	−4	−0.5	—	1.5	
2SJ184	SST	−50	∓0.1	∓0.2	0.25	−5	−0.02	0.02	−2.5	−0.05	25	40	
2SJ185	SC-59	−50	∓0.1	∓0.2	0.2	−5	−0.02	0.02	−2.5	−0.05	25	40	
2SJ196	TO-92	−60	∓1.0	∓2.0	0.75	−10	−0.5	0.4	−4	−0.5	0.89	1.5	
2SJ197	SC-62	−60	∓1.5	∓3.0	2.0	−10	−0.5	0.4	−4	−0.5	0.89	1.5	
2SJ198	TO-92	−100	∓0.5	∓1.0	0.75	−10	−0.5	0.4	−4	−0.5	1.7	2.0	
2SJ199	SC-62	−100	∓1.0	∓2.0	2.0	−10	−0.5	0.4	−4	−0.5	1.7	2.0	
2SJ202	SC-70	−16	∓0.1	∓0.2	0.15	−3	−0.01	0.02	−2.5	−0.001	—	60	
2SJ203	SC-59	−16	∓0.2	∓0.4	0.2	−3	−0.01	0.02	−2.5	−0.001	16	20	
2SJ204	SC-59	−30	∓0.2	∓0.4	0.2	−3	−0.01	0.02	−2.5	−0.001	8.8	15	
2SJ205	SC-62	−16	∓0.5	∓1.0	2.0	−5	−0.3	0.4	−2.5	−0.3	2.2	5.0	
2SJ206	SC-62	−30	∓0.5	∓1.0	2.0	−5	−0.3	0.4	−2.5	−0.3	2.8	3.0	
2SJ207	SC-62	−16	∓1.0	∓2.0	2.0	−5	−0.5	0.4	−2.5	−0.5	1.5	2.0	
2SJ208	SC-62	−16	∓2.0	∓4.0	2.0	−5	−1.0	0.4	−2.5	−1.0	0.6	1.5	
2SJ209	SC-59	−100	∓0.1	∓0.2	0.2	−5	−0.01	0.02	−4	−0.01	60	100	
2SJ210	SC-59	−60	∓0.2	∓0.4	0.2	−5	−0.01	0.02	−4	−0.01	10	15	
2SJ211	SC-59	−100	∓0.2	∓0.4	0.2	−5	−0.01	0.02	−4	−0.01	18	30	
2SJ212	SC-62	−60	∓0.5	∓1.0	2.0	−10	−0.5	0.4	−4	−0.5	1.8	4.0	
2SJ218	SC-62	−100	∓0.5	∓1.0	2.0	−10	−0.5	0.4	−4	−0.5	2.7	5.0	
2SJ243	3-pin ultra super mini	−30	∓0.1	∓0.2	0.2	−3	−0.01	0.02	−2.5	−0.0005	55	100	
2SJ353	SP-8	−60	∓1.5	∓3.0	1.0	−10	−1	1.0	−4	−0.8	0.58	0.68	
2SJ411	SP-8	−30	∓5	∓20	1.0	−10	−2.5	3.0	−4	−2.5	0.096	0.24	
2SJ460	SST	−50	∓0.1	∓0.2	0.25	−3	−0.01	0.01	−2.5	−0.003	75	100	
2SJ461	SC-59	−50	∓0.1	∓0.2	0.2	−3	−0.01	0.01	−2.5	−0.003	75	100	
2SJ462	MP-2	−12	∓2.5	∓5.0	2.0	−3	−1	1.5	−2.5	−0.5	0.23	0.3	
2SJ463	SC-70	−30	∓0.1	∓0.2	0.15	−3	−0.01	0.02	−2.5	−0.001	30	60	

Field Effect Transistor

Power MOS FET

■ **2SK type (1/5)**

Type number	Package	Absolute maximum rating (T_A = 25 ƒC)				Electrical characteristics (T_A = 25 ƒC)							Applications
		V_{DSS} (V)	I_D		P_T T_C = 25 °C (W)	$\|y_{fs}\|$ (S)			$R_{DS(on)}$ (ý)				
			DC (A)	Pulse (A)		V_{DS} (V)	I_D (A)	MIN.	V_{GS} (V)	I_D (A)	TYP.	MAX.	
2SK459	MP-25	200	±10	±15	60	10	3	1	10	3	0.35	0.5	Switching
2SK591	MP-45	60	±15	±60	35	10	6	5	4	6	0.05	0.07	
2SK611	MP-3	100	±1	±3	10	10	0.5	0.2	4	0.2	5.0	6.0	
2SK612	MP-3	100	±2	±8	10	10	1	1	4	0.8	0.35	0.6	
2SK654	MP-3	100	±1	±3	10	10	0.5	0.5	4	0.2	1.7	4.0	
2SK659	MP-45	60	±12	±60	35	10	6	5	4	6	0.08	0.095	
2SK699	MP-5	100	±2.0	±6.0	15	10	1	0.5	4	1	1.0	1.5	
2SK700	MP-5	80	±2	±6	15	10	1	0.5	4	1	0.8	1.0	
2SK701	MP-5	60	±2	±6	15	10	1	0.5	4	1	0.6	0.85	
2SK702	MP-25	100	±5	±20	50	10	3	5	4	5	0.25	0.5	
2SK703	MP-45	100	±5	±20	35	10	3	5	4	5	0.25	0.5	
2SK704	MP-25	60	±5	±20	50	10	3	5	4	5	0.17	0.3	
2SK705	MP-45	60	±5	±20	35	10	3	5	4	5	0.17	0.3	
2SK707	MP-80	250	±25	±100	120	10	13	5	10	13	0.14	0.18	
2SK719	MP-80	900	±5	±10	120	20	3	1	10	3	3.2	4.0	
2SK720A	MP-80	250	±20	±80	120	10	10	5	10	10	0.18	0.23	
2SK735	MP-88	450	±10	±30	120	10	5	3	10	5	0.6	0.8	
2SK736	MP-45	100	±15	±60	35	10	6	5	4	6	0.055	0.10	
2SK737	MP-45	100	±12	±60	35	10	6	5	4	6	0.08	0.20	
2SK738	MP-3	30	±2	±8	20	10	1	1	4	0.8	0.13	0.25	
2SK739	MP-3	60	±2	±8	20	10	1	1	4	0.8	0.25	0.35	
2SK773	MP-80	500	±12	±40	120	10	6	5	10	6	0.47	0.6	
2SK774	MP-80	500	±18	±60	120	10	9	8	10	9	0.35	0.45	
2SK784	MP-88	450	±20	±80	150	10	10	9	10	10	0.25	0.35	
2SK785	MP-88	500	±20	±80	150	10	10	9	10	10	0.3	0.4	
2SK786	MP-25	900	±3	±6	50	20	1.5	0.8	10	1.5	6.0	7.5	
2SK787	MP-88	900	±8	±16	150	10	4	1	10	4	1.25	1.6	
2SK797	MP-88	60	±40	±120	150	10	6	5	4	20	—	0.025	
2SK798	MP-88	100	±40	±120	150	10	6	5	4	20	—	0.04	
2SK799	MP-80	450	±12	±40	120	10	6	5	10	6	0.4	0.5	
2SK800	MP-80	450	±18	±60	120	10	9	8	10	9	0.32	0.38	
2SK801	MP-3	30	±2	±8	12	10	1	1	4	1	0.3	0.5	
2SK802	MP-5	30	±2	±8	15	10	1	1	4	1	0.3	0.5	
2SK810	MP-25	100	±14	±56	60	10	8	4	4	8	0.15	0.25	
2SK811	MP-45	100	±12	±48	35	10	8	4	4	8	0.15	0.25	
2SK812	MP-25	60	±27	±108	60	10	15	6	4	15	0.1	0.15	
2SK813	MP-45	60	±21	±84	35	10	15	6	4	15	0.1	0.15	
2SK814	MP-45	30	±15	±60	35	10	8.0	6	4	8.0	0.07	0.1	

Field Effect Transistor

■ 2SK type (2/5)

Type number	Package	Absolute maximum rating (T_A = 25 ƒC)				Electrical characteristics (T_A = 25 ƒC)							Applications
						|yfs| (S)			RDS(on) (ý)				
		V_{DSS} (V)	I_D DC (A)	I_D Pulse (A)	P_T T_C = 25 °C (W)	V_{DS} (V)	I_D (A)	MIN.	V_{GS} (V)	I_D (A)	TYP.	MAX.	
2SK815	MP-45	100	±21	±84	35	10	15	6	4	15	0.09	0.15	
2SK817	MP-45	60	±26	±104	35	10	15	8	4	15	0.06	0.08	
2SK819	MP-88	500	±10	±30	120	10	5.0	3	10	5.0	0.7	1.0	
2SK820	MP-85	250	±18	±72	80	10	10	5	10	10	0.18	0.23	
2SK821	MP-88	250	±20	±80	150	10	10	5	10	10	0.18	0.23	
2SK822	MP-85	250	±22	±88	90	10	13	5	10	13	0.12	0.15	
2SK823	MP-88	250	±25	±100	150	10	13	5	10	13	0.12	0.15	
2SK824	MP-85	450	±12	±40	90	10	7.5	5	10	7.5	0.4	0.5	
2SK825	MP-88	450	±15	±40	150	10	7.5	5	10	7.5	0.4	0.5	
2SK826	MP-85	450	±15	±60	95	10	9.0	8	10	9.0	0.32	0.38	
2SK827	MP-88	450	±18	±60	150	10	9.0	8	10	9.0	0.32	0.38	
2SK828	MP-85	500	±12	±40	90	10	7.5	5	10	7.5	0.47	0.6	
2SK829	MP-88	500	±15	±40	150	10	7.5	5	10	7.5	0.47	0.6	
2SK830	MP-85	500	±15	±60	95	10	9.0	8	10	9.0	0.35	0.45	
2SK831	MP-88	500	±18	±60	150	10	9.0	8	10	9.0	0.35	0.45	
2SK832	MP-85	900	±4	±10	85	10	3.0	1	10	3.0	3.2	4.0	
2SK833	MP-88	900	±5	±10	150	20	3.0	1	10	3.0	3.2	4.0	
2SK854	MP-25	450	±5	±20	50	10	2.5	2.5	10	2.5	1.0	1.4	
2SK855	MP-25	500	±5	±20	50	10	2.5	2.5	10	2.5	1.2	1.5	
2SK871	MP-88	900	±4	±8	120	10	2.0	1	10	2.0	4.0	5.5	
2SK872	MP-88	900	±6	±12	150	10	3.0	2	10	3.0	1.7	2.5	
2SK873	MP-88	450	±8	±32	100	10	4.0	3	10	4.0	0.8	1.1	
2SK874	MP-88	500	±8	±32	100	10	4.0	3	10	4.0	0.9	1.2	
2SK875	MP-88	450	±12	±48	120	10	6.0	5	10	6.0	0.5	0.6	
2SK876	MP-88	500	±12	±48	120	10	6.0	5	10	6.0	0.6	0.7	
2SK926	MP-25	250	±10	±40	60	10	5.0	2.5	10	5.0	0.4	0.5	
2SK928	MP-45	450	±5	±10	40	10	2.5	2.5	10	2.5	1.0	1.4	
2SK929	MP-45	500	±5	±10	40	10	2.5	2.5	10	2.5	1.2	1.5	
2SK946	MP-45	900	±3	±8	40	10	2.0	1	10	2.0	4.0	5.5	
2SK991	MP-25	100	±4	±8	35	10	2.0	1	4	2.0	0.5	0.7	
2SK992	MP-45	100	±4	±8	30	10	2.0	1	4	2.0	0.5	0.7	
2SK993	MP-25	60	±8	±16	35	10	4.0	1.5	4	4.0	0.3	0.4	
2SK994	MP-45	60	±7	±14	30	10	4.0	1.5	4	4.0	0.3	0.4	
2SK1059	MP-3	60	±5	±20	20	10	3.0	4	4	3.0	0.15	0.22	
2SK1060	MP-3	100	±5	±20	20	10	3.0	4	4	3.0	0.22	0.38	
2SK1122	MP-88	100	±40	±160	100	10	20	12	4	20	0.05	0.07	
2SK1123	MP-88	60	±40	±160	100	10	20	12	4	20	0.03	0.05	
2SK1149	MP-85	100	±40	±160	75	10	20	12	4	20	0.05	0.07	
2SK1150	MP-85	60	±40	±160	75	10	20	12	4	20	0.03	0.05	
2SK1198	MP-45	700	±2	±8	35	10	1.0	1	10	1.0	2.5	3.2	

Field Effect Transistor

■ 2SK type (3/5)

Type number	Package	Absolute maximum rating (T_A = 25 ƒC)				Electrical characteristics (T_A = 25 ƒC)							Applications
		V_{DSS} (V)	I_D		P_T T_C = 25 °C (W)	$\|y_{fs}\|$ (S)			$R_{DS(on)}$ (ý)				
			DC (A)	Pulse (A)		V_{DS} (V)	I_D (A)	MIN.	V_{GS} (V)	I_D (A)	TYP.	MAX.	
2SK1271	MP-88	1400	±5	±10	150	20	3.0	1.5	10	3.0	3.5	4.0	Switching
2SK1281	MP-88	700	±4	±8	120	10	2.0	1.0	10	2.0	2.5	3.2	
2SK1282	MP-3	60	±3	±12	20	10	2.0	2.4	4	2.0	0.2	0.3	
2SK1283	MP-5	60	±3	±12	20	10	2.0	2.4	4	2.0	0.2	0.3	
2SK1284	MP-3	100	±3	±12	20	10	2.0	2.4	4	2.0	0.32	0.45	
2SK1285	MP-5	100	±3	±12	20	10	2.0	2.4	4	2.0	0.32	0.45	
2SK1286	MP-45F	60	±15	±60	35	10	8.0	7	4	8.0	0.075	0.095	
2SK1287	MP-25	60	±20	±80	60	10	8.0	7	4	8.0	0.075	0.095	
2SK1288	MP-45F	100	±15	±60	35	10	8.0	7	4	8.0	0.12	0.14	
2SK1289	MP-25	100	±20	±80	60	10	8.0	7	4	8.0	0.12	0.14	
2SK1290	MP-45F	60	±25	±100	35	10	15	12	4	15	0.045	0.06	
2SK1291	MP-25	60	±30	±120	60	10	15	12	4	15	0.045	0.06	
2SK1292	MP-45F	100	±20	±100	35	10	15	12	4	15	0.07	0.085	
2SK1293	MP-25	100	±30	±120	60	10	15	12	4	15	0.07	0.085	
2SK1294	MP-45F	60	±40	±160	35	10	20	12	4	20	0.03	0.05	
2SK1295	MP-45F	100	±30	±160	35	10	20	12	4	20	0.06	0.075	
2SK1491	MP-88	250	±25	±100	120	10	13	7.0	10	13	0.12	0.15	
2SK1492	MP-88	250	±35	±140	140	10	18	10	10	18	0.08	0.1	
2SK1493	MP-25	450	±3.0	±12	50	10	2.0	1.0	10	2.0	2.2	2.8	
2SK1494	MP-25	500	±3.0	±12	50	10	2.0	1.0	10	2.0	2.4	3.0	
2SK1495	MP-25	450	±7.0	±28	50	10	4.0	3.0	10	4.0	0.7	0.9	
2SK1496	MP-25	450	±7.0	±28	50	10	4.0	3.0	10	4.0	0.8	1.0	
2SK1497	MP-88	450	±20	±80	130	10	10	7.5	10	10	0.28	0.35	
2SK1498	MP-88	500	±20	±80	130	10	10	7.5	10	10	0.32	0.40	
2SK1499	MP-88	450	±25	±100	160	10	13	8.0	10	13	0.20	0.25	
2SK1500	MP-88	500	±25	±100	160	10	13	8.0	10	13	0.22	0.27	
2SK1501	MP-25	900	±4.0	±8.0	70	10	2.0	1.0	10	2.0	2.8	4.0	
2SK1502	MP-88	900	±7.0	±14	120	10	4.0	2.0	10	4.0	1.7	2.0	
2SK1594	MP-45F	30	±20	±80	30	10	10	7.0	4	10	0.05	0.08	
2SK1595	MP-45F	30	±30	±120	35	10	15	12	4	15	0.03	0.05	
2SK1596	MP-45F	30	±40	±160	35	10	20	20	4	20	0.02	0.03	
2SK1664	MP-45F	700	±2.0	±8.0	35	10	1.0	0.5	10	1.0	0.5	0.6	
2SK1748	MP-3	60	±8.0	±32	20	10	4.0	5.0	4	4.0	0.11	0.16	
2SK1749	MP-88	60	±50	±200	150	10	25	20	4	25	0.022	0.025	
2SK1750	MP-25	450	±5.0	±20	50	10	2.5	1.0	10	2.5	1.1	1.4	
2SK1751	MP-25	500	±5.0	±20	50	10	2.5	1.0	10	2.5	1.2	1.5	
2SK1752	MP-88	450	±10	±40	100	10	5.0	3.5	10	5.0	0.7	0.9	
2SK1753	MP-88	500	±10	±40	100	10	5.0	3.5	10	5.0	0.8	1.0	
2SK1756	MP-88	450	±15	±60	120	10	8.0	5.0	10	8.0	0.4	0.5	
2SK1757	MP-88	500	±15	±60	120	10	8.0	5.0	10	8.0	0.5	0.6	

Field Effect Transistor

■ 2SK type (4/5)

Type number	Package	Absolute maximum rating (T_A = 25 ƒC)				Electrical characteristics (T_A = 25 ƒC)							Applications
						|yfs| (S)			RDS(on) (ý)				
		V_{DSS} (V)	I_D DC (A)	I_D Pulse (A)	P_T T_C = 25 °C (W)	V_{DS} (V)	I_D (A)	MIN.	V_{GS} (V)	I_D (A)	TYP.	MAX.	
2SK1758	MP-45F	600	±2.0	±8.0	30	10	1.0	0.5	10	1.0	2.8	4.2	Switching
2SK1760	MP-88	900	±5.0	±10	100	20	3.0	1.0	10	3.0	3.1	4.0	
2SK1784	MP-88	450	±12	±48	100	10	6.0	1.5	10	6.0	0.5	0.6	
2SK1785	MP-88	500	±12	±48	100	10	6.0	1.5	10	6.0	0.6	0.7	
2SK1793	MP-25	900	±3.0	±6.0	75	20	2.0	0.8	10	2.0	6.2	7.5	
2SK1794	MP-88	900	±6.0	±12	100	20	3.0	2.0	10	3.0	1.8	2.8	
2SK1795	MP-88	900	±8.0	±16	140	20	4.0	1.0	10	4.0	1.3	1.6	
2SK1796	MP-88	900	±10	±20	150	20	5.0	1.5	10	5.0	1.0	1.2	
2SK1850	MP-10	60	±10	±40	1.8	10	5.0	7.0	4	5.0	0.08	0.095	
2SK1851	MP-10	60	±15	±60	1.8	10	7.5	12	4	7.5	0.045	0.06	
2SK1852	MP-10	100	±10	±40	1.8*	10	5.0	7.0	4	5.0	0.15	0.2	
2SK1853	MP-10	100	±15	±60	1.8*	10	7.5	12	4	7.5	0.08	0.1	
2SK1953	MP-45F	600	±2.0	±6.0	25*	20	1.0	0.5	10	1.0	4.2	5.0	
2SK1954	MP-3	180	±4.0	±16	20*	10	2.0	0.5	10	2.0	0.5	0.65	
2SK1987	MP-45F	250	±7.0	±28	30	10	4.0	2.1	10	4.0	0.4	0.5	
2SK1988	MP-45F	450	±2.5	±10	30	10	1.5	0.9	10	1.5	2.2	2.8	
2SK1989	MP-45F	500	±2.5	±10	30	10	1.5	0.9	10	1.5	2.4	3.0	
2SK1990	MP-45F	450	±4.5	±18	30	10	2.5	1.5	10	2.5	1.1	1.4	
2SK1991	MP-45F	500	±4.5	±18	30	10	2.5	1.5	10	2.5	1.2	1.5	
2SK1992	MP-45F	450	±6.0	±24	35	10	3.0	2.8	10	3.0	0.7	0.9	
2SK1993	MP-45F	500	±6.0	±24	35	10	3.0	2.8	10	3.0	0.8	1.0	
2SK1994	MP-45F	900	±2.0	±4.0	30	20	1.0	0.6	10	1.0	6.2	7.5	
2SK1995	MP-45F	900	±3.0	±6.0	35	20	2.0	1.0	10	2.0	3.2	4.0	
2SK2040	MP-3	600	±2.0	±6.0	20	20	1.0	0.5	10	1.0	4.2	5.0	
2SK2131	MP-45F	150	±15	±60	35	10	8.0	10	10	8.0	0.1	0.12	
2SK2132	MP-10	180	±4	±16	1.8	10	2.0	0.5	10	2.0	0.52	0.65	
2SK2133	MP-25	250	±16	±64	75	10	8.0	4.0	10	8.0	0.21	0.26	
2SK2134	MP-25	200	±13	±52	70*	10	7.0	2	10	7.0	0.32	0.4	
2SK2135	MP-45F	200	±14	±56	35	10	7.0	4	10	7.0	0.14	0.18	
2SK2136	MP-25	200	±20	±80	75	10	10	4	10	10	0.14	0.18	
2SK2137	MP-45F	600	±4	±16	30	10	20	1	10	2.0	2.0	2.4	
2SK2138	MP-25	600	±5	±20	70	10	2.5	1	10	2.5	2.0	2.4	
2SK2139	MP-45F	600	±5	±20	35	10	2.5	1.5	10	2.5	1.25	1.5	
2SK2140	MP-25	600	±7	±28	75	10	3.5	1.5	10	3.5	1.25	1.5	
2SK2141	MP-45F	600	±6	±24	40	10	3.0	2.0	10	3.0	0.9	1.1	
2SK2234	MP-45F	500	±8	±32	40	10	4.0	3.0	10	4.0	0.5	0.6	
2SK2275	MP-45F	900	±3.5	±7.0	35	20	2.0	4.0	10	2.0	2.4	2.8	
2SK2341	MP-45F	250	±11	±44	35	10	6.0	3.0	10	6.0	0.21	0.26	
2SK2409	MP-45F	60	±40	±160	35	10	20	20	4	20	0.03	0.05	
2SK2410	MP-45F	60	±30	±120	35	10	15	15	4	15	0.04	0.06	

*: T_A = 25°C

Field Effect Transistor

■ 2SK type (5/5)

Type number	Package	Absolute maximum rating (T_A = 25 ƒC)				Electrical characteristics (T_A = 25 ƒC)							Applications
		V_{DSS} (V)	I_D		P_T T_C = 25 °C (W)	|y_{fs}| (S)			$R_{DS(on)}$ (ý)				
			DC (A)	Pulse (A)		V_{DS} (V)	I_D (A)	MIN.	V_{GS} (V)	I_D (A)	TYP.	MAX.	
2SK2411	MP-25	60	±30	±120	75	10	15	15	4	15	0.04	0.06	Switching
2SK2412	MP-45F	60	±20	±80	30	10	10	7	4	10	0.067	0.095	
2SK2413	MP-10	60	±10	±40	1.8*	10	5	7	4	10	0.07	0.095	
2SK2414	MP-3	60	±10	±40	20	10	5	7	4	10	0.07	0.095	
2SK2415	MP-3	60	±8.0	±32	20	10	4	5	4	4	0.1	0.15	
2SK2461	MP-45F	100	±20	±80	35	10	10	12	4	10	0.07	0.1	
2SK2462	MP-45F	100	±15	±60	30	10	8	7	4	8	0.12	0.17	
2SK2476	MP-45F	800	±3.0	±9.0	40	20	2	1	10	2	3.4	5.0	
2SK2477	MP-45F	800	±10	±30	150	20	5	3.5	10	5	0.65	1.0	
2SK2478	MP-88	900	±2.0	±8.0	30	20	1	0.6	10	1	5.0	7.5	
2SK2479	MP-25	900	±3.0	±8.0	70	20	2	0.8	10	2	5.6	7.5	
2SK2480	MP-45F	900	±3.5	±12	35	20	2	1	10	2	3.2	4.0	
2SK2481	MP-25	900	±4.0	±12	70	20	2	1	10	2	3.2	4.0	
2SK2482	MP-88	900	±5.0	±12	100	20	3	1	10	3	3.2	4.0	
2SK2483	MP-45F	900	±3.5	±10.5	40	20	2	1	10	2	2.2	2.8	
2SK2484	MP-25	900	±5.0	±10	75	20	3	2	10	3	2.2	2.8	
2SK2485	MP-88	900	±6.0	±12	100	20	3	2	10	3	2.2	2.8	
2SK2486	MP-88	900	±7.0	±18	120	20	4	2.5	10	4	1.4	2.0	
2SK2487	MP-88	900	±8.0	±20	140	20	4	3.0	10	4	1.1	1.6	
2SK2488	MP-88	900	±10	±30	150	20	5	6	10	5	1.0	1.2	
2SK2498	MP-45F	60	±50	±200	35	10	25	20	4	25	0.011	0.014	
2SK2499	MP-25	60	±50	±200	75	10	25	20	4	25	0.011	0.014	
2SK2510	MP-45F	60	±40	±160	35	10	20	13	4	20	0.024	0.03	
2SK2511	MP-88	60	±40	±160	80	10	20	10	4	20	0.032	0.04	
2SK2512	MP-45F	60	±45	±180	35	10	23	15	4	23	0.016	0.023	
2SK2513	MP-25	60	±45	±180	75	10	23	15	4	23	0.016	0.023	
2SK2514	MP-88	60	±50	±200	150	10	25	15	4	25	0.016	0.023	
2SK2515	MP-88	60	±50	±200	150	10	25	20	4	25	0.011	0.014	

*: T_A = 25°C

■ Power SOP8 series

Type number	Package	Absolute maximum rating (T_A = 25 ƒC)				Electrical characteristics (T_A = 25 ƒC)							Applications
		V_{DSS} (V)	I_D		P_T T_C = 25 °C (W)	|y_{fs}| (S)			$R_{DS(on)}$ (ý)				
			DC (A)	Pulse (A)		V_{DS} (V)	I_D (A)	MIN.	V_{GS} (V)	I_D (A)	TYP.	MAX.	
μPA1700★	PowerSOP8	30	±7	±28	2.0*	10	3.5	5.0	4	3.5	0.040	0.050	
μPA1701★	PowerSOP8	20	±7	±28	2.0*	10	3.5	5.0	2.5	3.5	0.031	0.048	

*: T_A = 25°C, Mounted on ceramic substrate of 1200 mm² ∞ 0.7 mm

★: Under development

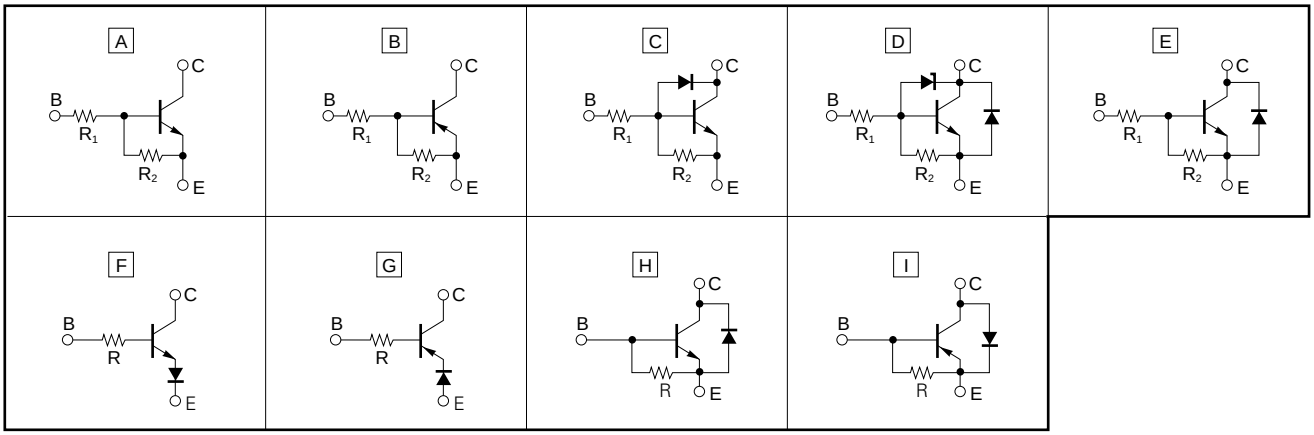
Field Effect Transistor

■ 2SJ type

Type number	Package	Absolute maximum rating (T_A = 25 ƒC)				Electrical characteristics (T_A = 25 ƒC)							Applications
						|yfs| (S)			RDS(on) (ý)				
		V_{DSS} (V)	I_D DC (A)	I_D Pulse (A)	P_T T_C = 25 °C (W)	V_{DS} (V)	I_D (A)	MIN.	V_{GS} (V)	I_D (A)	TYP.	MAX.	
2SJ128	MP-3	−100	∓2	∓8	20	–10	–1	1	–4	–0.8	1.1	1.5	Switching
2SJ132	MP-3	−30	∓2	∓8	20	–10	–1	1	–4	–0.8	0.47	0.6	
2SJ133	MP-3	−60	∓2	∓8	20	–10	–1	1	–4	–0.8	0.7	1.3	
2SJ134	MP-25	−100	∓6	∓24	40	–10	–3.5	1	–4	–3.5	0.5	0.9	
2SJ135	MP-45	−100	∓5	∓20	30	–10	–3.5	1	–4	–3.5	0.5	0.9	
2SJ136	MP-25	−60	∓12	∓48	40	–10	–6.5	2	–4	–6.5	0.45	0.5	
2SJ137	MP-45	−60	∓10	∓40	30	–10	–6.5	2	–4	–6.5	0.45	0.5	
2SJ138	MP-25	−100	∓12	∓48	60	–10	–6.5	2	–4	–6.5	0.3	0.45	
2SJ139	MP-45	−100	∓10	∓40	35	–10	–6.5	2	–4	–6.5	0.3	0.45	
2SJ140	MP-25	−60	∓19	∓76	60	–10	–10	5	–4	–8	0.3	0.4	
2SJ141	MP-45	−60	∓13	∓52	35	–10	–10	5	–4	–8	0.3	0.4	
2SJ142	MP-45	−100	∓13	∓52	35	–10	–10	5	–4	–8	0.25	0.3	
2SJ143	MP-45	−60	∓16	∓64	35	–10	–10	5	–4	–10	0.22	0.25	
2SJ151	MP-25	−100	∓3.0	∓6.0	35	–10	–1.5	0.8	–4	–1.5	—	1.8	
2SJ152	MP-45	−100	∓3.0	∓6.0	30	–10	–1.5	0.8	–4	–1.5	—	1.8	
2SJ153	MP-25	−60	∓6.0	∓12	40	–10	–3.5	0.9	–4	–1.5	—	0.9	
2SJ154	MP-45	−60	∓5.0	∓10	30	–10	–3.5	0.9	–4	–1.5	—	0.9	
2SJ302	MP-25	−60	∓16	∓64	75	–10	– 8	6.0	–4	– 6	0.13	0.24	
2SJ303	MP-45F	−60	∓14	∓56	35	–10	– 7	5.0	–4	– 6	0.13	0.24	
2SJ324	MP-3	−30	∓2.0	∓8.0	20	–10	–1.0	1.0	–4	–0.8	0.40	0.52	
2SJ325	MP-3	−30	∓4.0	∓16	20	–10	–2.0	3.0	–4	–1.6	0.15	0.24	
2SJ326	MP-3	−60	∓2.0	∓8.0	20	–10	–1.0	1.0	–4	–0.8	0.5	0.68	
2SJ327	MP-3	−60	∓4.0	∓16	20	–10	–2.0	3.0	–4	–1.6	0.22	0.34	
2SJ328	MP-25	−60	∓20	∓80	75	–10	–10	8.0	–4	–8	0.085	0.11	
2SJ329	MP-45F	−60	∓15	∓60	35	–10	–8	8.0	–4	–6	0.085	0.11	
2SJ330	MP-45F	−60	∓20	∓80	35	–10	–10	10	–4	–8	0.065	0.09	
2SJ331	MP-88	−60	∓30	∓120	150	–10	–15	15	–4	–12	0.04	0.055	

Transistor with Internal Resistor

■ Equivalent circuit



■ AA1[ ], AN1[ ], BA1[ ], BN1[ ] series (TO-92, SST)

Type number		Equivalent circuit and applications	Absolute maximum ratings (T_A = 25 ƒC)						Electrical characteristics (T_A = 25 ƒC)					Remarks
TO-92	SST		V_{CBO} (V)	V_{CEO} (V)	V_{EBO} (V)	I_C (mA)	P_T (mW)	T_j (ƒC)	R_1 (kΩ)	R_2 (kΩ)	h_{FE}	V_{CE} (V)	I_C (mA)	
AA1A4M	**BA1A4M**	Refer to equivalent circuit A Switching	60	50	10	100	250	150	10	10	35 to 100	5.0	5.0	
AA1A4P	**BA1A4P**		60	50	5	100	250	150	10	47	35 to 340	5.0	5.0	
AA1F4M	**BA1F4M**		60	50	10	100	250	150	22	22	60 to 195	5.0	5.0	
AA1F4N	**BA1F4N**		60	50	5	100	250	150	22	47	85 to 340	5.0	5.0	
AA1L4M	**BA1L4M**		60	50	10	100	250	150	47	47	85 to 340	5.0	5.0	
AA1L4L	**BA1L4L**		60	50	15	100	250	150	47	22	60 to 195	5.0	5.0	
AA1L3Z	**BA1L3Z**		60	50	5	100	250	150	4.7	–	135 to 600	5.0	5.0	
AA1A4Z	**BA1A4Z**		60	50	5	100	250	150	10	–	135 to 600	5.0	5.0	
AA1F4Z	**BA1F4Z**		60	50	5	100	250	150	22	–	135 to 600	5.0	5.0	
AA1L4Z	**BA1L4Z**		60	50	5	100	250	150	47	–	135 to 600	5.0	5.0	
AA1L3M	**BA1L3M**		60	50	10	100	250	150	4.7	4.7	20 to 80	5.0	5.0	
AA1L3N	**BA1L3N**		60	50	5	100	250	150	4.7	10	35 to 100	5.0	5.0	
AA1A3Q	**BA1A3Q**		60	50	5	100	250	150	1.0	10	35 to 100	5.0	5.0	
AN1A4M	**BN1A4M**	Refer to equivalent circuit B	–60	–50	–10	–100	250	150	10	10	35 to 100	–5.0	–5.0	
AN1A4P	**BN1A4P**		–60	–50	–5	–100	250	150	10	47	85 to 340	–5.0	–5.0	
AN1F4M	**BNN1F4M**		–60	–50	–10	–100	250	150	22	22	60 to 195	–5.0	–5.0	
AN1F4N	**BN1F4N**		–60	–50	–5	–100	250	150	22	47	85 to 340	–5.0	–5.0	
AN1L4M	**BN1L4M**		–60	–50	–10	–100	250	150	47	47	85 to 340	–5.0	–5.0	
AN1L4L	**BN1L4L**		–60	–50	–15	–100	250	150	47	22	60 to 195	–5.0	–5.0	
AN1L3Z	**BN1L3Z**		–60	–50	–5	–100	250	150	4.7	–	135 to 600	–5.0	–5.0	
AN1A4Z	**BN1A4Z**		–60	–50	–5	–100	250	150	10	–	135 to 600	–5.0	–5.0	
AN1F4Z	**BN1F4Z**		–60	–50	–5	–100	250	150	22	–	135 to 600	–5.0	–5.0	
AN1L4Z	**BN1L4Z**		–60	–50	–5	–100	250	150	47	–	135 to 600	–5.0	–5.0	
AN1L3M	**BN1L3M**		–60	–50	–10	–100	250	150	4.7	4.7	20 to 80	–5.0	–5.0	
AN1L3N	**BN1L3N**		–60	–50	–5	–100	250	150	4.7	10	35 to 100	–5.0	–5.0	
AN1A3Q	**BNN1A3Q**		–60	–50	–5	–100	250	150	1.0	10	35 to 100	–5.0	–5.0	

Transistor with Internal Resistor

■ AB1[ ], AP1[ ], BB1[ ], BP1[ ] series (TO-92, SST)

Type number		Equivalent circuit and applications	Absolute maximum ratings (T_A = 25 ƒC)							Electrical characteristics (T_A = 25 ƒC)					
			V_{CBO}	V_{CEO}	V_{EBO}	I_C	P_T (mW)		T_j	R_1	R_2	h_{FE}	V_{CE}	I_C	Re-
TO-92	SST		(V)	(V)	(V)	(A)	TO-92	SST	(ƒC)	(kΩ)	(kΩ)		(V)	(A)	marks
AB1A4A	**BB1A4A**	Refer to equivalent circuit [A] Switching	30	25	10	0.7	750	250	150	–	10	300 ~	2.0	0.5	
AB1L2Q	**BB1L2Q**		30	25	10	0.7	750	250	150	0.47	4.7	300 ~	2.0	0.5	
AB1A3M	**BB1A3M**		30	25	10	0.7	750	250	150	1.0	1.0	100 ~	2.0	0.5	
AB1F3P	**BB1F3P**		30	25	10	0.7	750	250	150	2.2	10	300 ~	2.0	0.5	
AB1J3P	**BB1J3P**		30	25	10	0.7	750	250	150	3.3	10	300 ~	2.0	0.5	
AB1L3N	**BB1L3N**		30	25	10	0.7	750	250	150	4.7	10	300 ~	2.0	0.5	
AB1A4M	**BB1A4M**		30	25	10	0.7	750	250	150	10	10	300 ~	2.0	0.5	
AP1A4A	**BP1A4A**	Refer to equivalent circuit [B] Switching	–25	–25	–10	–0.7	750	250	150		10	100 ~	–2.0	–0.5	
AP1L2Q	**BP1L2Q**		–25	–25	–10	–0.7	750	250	150	0.47	4.7	100 ~	–2.0	–0.5	
AP1A3M	**BP1A3M**		–25	–25	–10	–0.7	750	250	150	1.0	1.0	100 ~	–2.0	–0.5	
AP1F3P	**BP1F3P**		–25	–25	–10	–0.7	750	250	150	2.2	10	100 ~	–2.0	–0.5	
AP1J3P	**BP1J3P**		–25	–25	–10	–0.7	750	250	150	3.3	10	100 ~	–2.0	–0.5	
AP1L3N	**BP1L3N**		–25	–25	–10	–0.7	750	250	150	4.7	10	100 ~	–2.0	–0.5	
AP1A4M	**BP1A4M**		–25	–25	–10	–0.7	750	250	150	10	10	100 ~	–2.0	–0.5	

■ AC1[ ], AQ1[ ] series (TO-92)

Type number	Equivalent circuit and applications	Absolute maximum ratings (T_A = 25 ƒC)						Electrical characteristics (T_A = 25 ƒC)					
		V_{CBO}	V_{CEO}	V_{EBO}	I_C	P_T	T_j	R_1	R_2	h_{FE}	V_{CE}	I_C	Remarks
TO-92		(V)	(V)	(V)	(A)	(mW)	(ƒC)	(kΩ)	(kΩ)		(V)	(A)	
AC1A4A	Refer to equivalent circuit [A] Switching	20	20	10	2.0	750	150	–	10	300 ~	2.0	1.0	
AC1F2Q		20	20	10	2.0	750	150	0.22	2.2	300 ~	2.0	1.0	
AC1L2N		20	20	10	2.0	750	150	0.47	1.0	300 ~	2.0	1.0	
AC1L2Q		20	20	10	2.0	750	150	0.47	4.7	300 ~	2.0	1.0	
AC1A3M		20	20	10	2.0	750	150	1.0	1.0	300 ~	2.0	1.0	
AC1F3M		20	20	10	2.0	750	150	2.2	2.2	300 ~	2.0	1.0	
AC1F3P		20	20	10	2.0	750	150	4.7	10	300 ~	2.0	1.0	
AQ1A4A	Refer to equivalent circuit [B] Switching	–20	–20	–10	–2.0	750	150	–	10	150 ~	–2.0	–1.0	
AQ1F2Q		–20	–20	–10	–2.0	750	150	0.22	2.2	150 ~	–2.0	–1.0	
AQ1L2N		–20	–20	–10	–2.0	750	150	0.47	1.0	150 ~	–2.0	–1.0	
AQ1L2Q		–20	–20	–20	–10	750	150	0.47	4.7	150 ~	–2.0	–1.0	
AQ1A3M		–20	–20	–10	–2.0	750	150	1.0	1.0	150 ~	–2.0	–1.0	
AQ1F3M		–20	–20	–10	–2.0	750	150	2.2	2.2	150 ~	–2.0	–1.0	
AQ1F3P		–20	–20	–10	–2.0	750	150	4.7	10	150 ~	–2.0	–1.0	

Transistor with Internal Resistor

■ AC2[ ], AQ2[ ] series (TO-92)

Type number	Equivalent circuit and applications	Absolute maximum ratings (T_A = 25 ƒC)						Electrical characteristics (T_A = 25 ƒC)					
TO-92		V_{CBO} (V)	V_{CEO} (V)	V_{EBO} (V)	I_C (A)	P_T (mW)	T_j (ƒC)	R_1 (kΩ)	R_2 (kΩ)	h_{FE}	V_{CE} (V)	I_C (A)	Remarks
AC2A4A	Refer to H	20	16	6.0	±3.0	750	150	–	10	135 ~	2.0	0.1	
AQ2A4A	Refer to I	–20	–16	–6.0	±3.0	750	150	–	10	135 ~	–2.0	–0.1	

■ AD1[ ], AD2[ ], AR1[ ] series (TO-92)

Type number	Equivalent circuit and applications	Absolute maximum ratings (T_A = 25 ƒC)						Electrical characteristics (T_A = 25 ƒC)					
TO-92		V_{CBO} (V)	V_{CEO} (V)	V_{EBO} (V)	I_C (A)	P_T (mW)	T_j (ƒC)	R_1 (kΩ)	R_2 (kΩ)	h_{FE}	V_{CE} (V)	I_C (A)	Remarks
AD1A3M	Refer to equivalent circuit A Switching	80	60	10	1.0	750	150	1.0	1.0	200 ~	2.0	0.5	
AD1F3P		80	60	10	1.0	750	150	2.2	10	300 ~	2.0	0.5	
AD1L3N		80	60	10	1.0	750	150	4.7	10	300 ~	2.0	0.5	
AD1A4M		80	60	10	1.0	750	150	10	10	300 ~	2.0	0.5	
AD1L2Q		80	60	10	1.0	750	150	0.47	4.7	300 ~	2.0	0.5	
AD1F2Q		80	60	10	1.0	750	150	0.22	2.2	300 ~	2.0	0.5	
AD1A4A		80	60	10	1.0	750	150	–	10	300 ~	2.0	0.5	
AD2A3M	Refer to equivalent circuit C Switching	60 ±10	60 ±10	10	1.0	750	150	1.0	1.0	200 ~	2.0	0.5	
AD2F3P		60 ±10	60 ±10	10	1.0	750	150	2.2	10	300 ~	2.0	0.5	
AD2L3N		60 ±10	60 ±10	10	1.0	750	150	4.7	10	300 ~	2.0	0.5	
AD2A4M		60 ±10	60 ±10	10	1.0	750	150	10	10	300 ~	2.0	0.5	
AD2L2Q		60 ±10	60 ±10	10	1.0	750	150	0.47	4.7	300 ~	2.0	0.5	
AD2F2Q		60 ±10	60 ±10	10	1.0	750	150	0.22	2.2	300 ~	2.0	0.5	
AD2A4A		60 ±10	60 ±10	10	1.0	750	150	–	10	300 ~	2.0	0.5	
AR1A3M	Refer to equivalent circuit B Switching	–60	–60	–10	–1.0	750	150	1.0	1.0	100 ~	–2.0	–0.5	
AR1F3P		–60	–60	–10	–1.0	750	150	2.2	10	100 ~	–2.0	–0.5	
AR1L3N		–60	–60	–10	–1.0	750	150	4.7	10	100 ~	–2.0	–0.5	
AR1A4M		–60	–60	–10	–1.0	750	150	10	10	100 ~	–2.0	–0.5	
AR1L2Q		–60	–60	–10	–1.0	750	150	0.47	4.7	100 ~	–2.0	–0.5	
AR1F2Q		–60	–60	–10	–1.0	750	150	0.22	2.2	100 ~	–2.0	–0.5	
AR1A4A		–60	–60	–10	–1.0	750	150	–	10	100 ~	–2.0	–0.5	

■ CE1[ ], CE2[ ] series (SP-8)

Type number	Equivalent circuit and applications	Absolute maximum ratings (T_A = 25 ƒC)						Electrical characteristics (T_A = 25 ƒC)				
SP-8		V_{CBO} (V)	V_{CEO} (V)	V_{EBO} (V)	I_C (A)	P_T (W)	T_j (ƒC)	R_1 (kΩ)	R_2 (kΩ)	h_{FE}	V_{CE} (V)	I_C (A)
CE1A3Q	Refer to D	60 ±10	60 ±10	15	±2.0	1.0	150	1.0	10	1000 to 3000	5.0	1.0
CE1F3P		60 ±10	60 ±10	15	±2.0	1.0	150	2.2	10	1000 to 3000	5.0	1.0
CE1N2R		60 ±10	60 ±10	15	±2.0	1.0	150	0.68	10	1000 to 3000	5.0	1.0
CE2A3Q	Refer to E	60	60	15	±2.0	1.0	150	1.0	10	1000 to 3000	5.0	1.0
CE2F3P		60	60	15	±2.0	1.0	150	1.0	10	1000 to 3000	5.0	1.0

Transistor with Internal Resistor

■ BA2[ ], BN2[ ] series (SST)

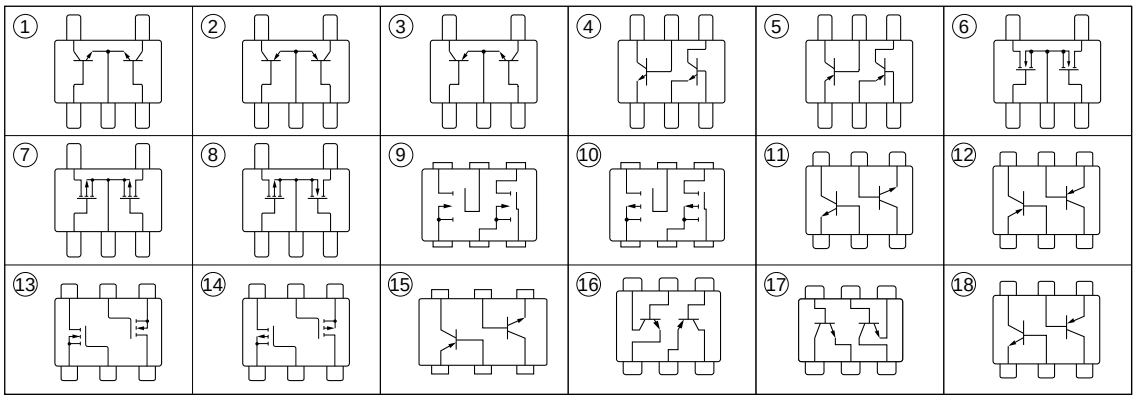
Type number	Equivalent circuit and applications	Absolute maximum ratings (T_A = 25 ƒC)						Electrical characteristics (T_A = 25 ƒC)					
SST		V_{CBO} (V)	V_{CEO} (V)	V_{EBO} (V)	I_C (mA)	P_T (mW)	T_j (ƒC)	R_1 (kΩ)	R2 (kΩ)	h_{FE}	V_{CE} (V)	I_C (mA)	Remarks
BA2A4M	Refer to equivalent circuit [A] Switching	60	50	20	100	250	150	10	10	60 to 105	5.0	5.0	
BA2A4P		60	50	10	100	250	150	10	47	230 to 460	5.0	5.0	
BA2F4M		60	50	20	100	250	150	22	22	125 to 230	5.0	5.0	
BA2F4N		60	50	15	100	250	150	22	47	230 to 460	5.0	5.0	
BA2L4M		60	50	20	100	250	150	47	47	230 to 460	5.0	5.0	
BA2L4L		60	50	30	100	250	150	47	22	125 to 230	5.0	5.0	
BA2L3Z		60	50	10	100	250	150	4.7	–	1000 to 3200	5.0	5.0	
BA2A4Z		60	50	10	100	250	150	10	–	1000 to 3200	5.0	5.0	
BA2F4Z		60	50	10	100	250	150	22	–	1000 to 3200	5.0	5.0	
BA2L4Z		60	50	10	100	250	150	47	–	1000 to 3200	5.0	5.0	
BA2L3M		60	50	20	100	250	150	4.7	4.7	30 to 50	5.0	5.0	
BA2L3N		60	50	15	100	250	150	4.7	10	60 to 105	5.0	5.0	
BA2A3Q		60	50	10	100	250	150	1.0	10	60 to 105	5.0	5.0	
BN2A4M	Refer to equivalent circuit [B] Switching	–25	–25	–20	–100	250	150	10	10	55 to 90	–5.0	–5.0	
BN2A4P		–25	–25	–10	–100	250	150	10	47	200 to 350	–5.0	–5.0	
BN2F4M		–25	–25	–20	–100	250	150	22	22	115 to 200	–5.0	–5.0	
BN2F4N		–25	–25	–15	–100	250	150	22	47	200 to 350	–5.0	–5.0	
BN2L4M		–25	–25	–20	–100	250	150	47	47	200 to 350	–5.0	–5.0	
BN2L4L		–25	–25	–30	–100	250	150	47	22	115 to 200	–5.0	–5.0	
BN2L3Z		–25	–25	–10	–100	250	150	4.7	–	800 to 1200	–5.0	–5.0	
BN2A4Z		–25	–25	–10	–100	250	150	10	–	800 to 1200	–5.0	–5.0	
BN2F4Z		–25	–25	–10	–100	250	150	22	–	800 to 1200	–5.0	–5.0	
BN2L4Z		–25	–25	–10	–100	250	150	47	–	800 to 1200	–5.0	–5.0	
BN2L3M		–25	–25	–20	–100	250	150	4.7	4.7	30 to 45	–5.0	–5.0	
BN2L3N		–25	–25	–15	–100	250	150	4.7	10	55 to 90	–5.0	–5.0	
BN2A3Q		–25	–25	–10	–100	250	150	1.0	10	65 to 90	–5.0	–5.0	

■ BA3[ ], BN3[ ] series (SST)

Type number	Equivalent circuit and applications	Absolute maximum ratings (T_A = 25ƒC)					Electrical characteristics (T_A = 25ƒC)				
		V_{CBO} (V)	V_{CEO} (V)	V_{EBO} (V)	V_R (V)	P_T (mW)	T_j (kΩ)	R (kΩ)	h_{FE}	V_{CE} (V)	I_C (mA)
BA3L4Z	Refer to [F]	20	20	5	6	250	150	47	30 ~	2.0	1.0
BN3L4Z	Refer to G	–20	–20	–5	6	250	150	47	30 ~	–2.0	–1.0

Transistor for Array

Equivalent Circuit



■ Bipolar Transistor

Type number	Equivalent circuit	V_{CEO} (V)	$I_{C(DC)}$ (mA)	P_T* (mW)	h_{FE}	V_{CE} (V)	I_C (mA)	Package
μPA570T	●	50	100	200	90 to 600	6	1	• 5-pin Super Mini-Mold
μPA571T	●	−50	−100	200		−6	−1	
μPA574T	●	50/−50	100/−100	300		6/−6	1/−1	
μPA670T	●	50	100	200		6	1	• 6-pin Super Mini-Mold
μPA671T	●	−50	−100	200		−6	−1	
μPA500T	●	50	100	300		6	1	• 5-pin Mini-Mold
μPA501T	●	−50	−100	300		−6	−1	
μPA504T	●	50/−50	100/−100	300		6/−6	1/−1	
μPA600T	●	50	100	300		6	1	• 6-pin Mini-Mold
μPA601T	●	−50	−100	300		−6	−1	
μPA604T	●	50	100	300		6	1	
μPA605T	●	−50	−100	300		−6	−1	
μPA608T	●	50 −16	100 −500	300	90 to 600 110 to 400	6 −1	1 −100	
μPA609T	●	40 −40	500 −500	300	75 to 300 75 to 300	1 −1	150 −150	
μPA673T	●	15	200	200	82 to 180	6	1	• 6-pin Super Mini-Mold
μPA674T	●	15 −15	200 −50	200	40 to 200 50 to 150	1 −1	10 −10	

*: Total

■ MOS FET

Type number	Equivalent circuit	V_{DSS} (V)	$I_{D(DC)}$ (mA)	P_T* (mW)	$R_{DS\ (on)}$ (Ω) MAX	V_{GS} (V)	I_D (mA)	Package
μPA572T	●	30	100	200	13	2.5	10	• 5-pin Super Mini-Mold
μPA573T	●	−30	−100	200	60	−2.5	−10	
μPA502T	●	50	100	300	30	4	10	
μPA503T	●	−50	−100	300	100	−4	−10	• 5-pin Mini-Mold
μPA505T	●	50/−50	100/−100	300	30/100	4/−4	10/−10	
μPA602T	●	50	100	300	30	4	10	• 6-pin Mini-Mold
μPA603T	●	−50	−100	300	100	−4	−10	
μPA606T	●	50	100	300	30	4	10	
μPA607T	●	−50	−100	300	100	−4	−10	
μPA672T	●	50	100	200	40	2.5	10	• 6-pin Super Mini-Mold

*: Total

Power MOS IC

Type number	Function	Withstand Voltage (V)	Output Current (A)	Package	Main Application
μPD16804	Control the revolution direction of the DC motor (1 unit)	6.5/8.0*	0.5	• 16-pin SOP	Camera motor drive
μPD16805			1.0		
μPD16823	Control the revolution direction of the DC motor (1.5 unit)		0.5	• 20-pin SOP	
μPD16812A★	· High side switch · Protection for over current and over heating	60 (τ ≦ 250 ms)	2.0	• 5-pin MP-45F	Automotive solenoid driver

*: Charge Pump Circuit used / Charge Pump Circuit not used

★: Under development

Transistor Array

■ Signal transistor array

Type Number	Number of circuits				Output voltage V_O (V)	Output current I_O (mA/Unit)	Surge absorber diode	Input impedance	Ative level		Input/output relationship		Output current relationship		Remarks	Number of pins
	5	6	7	8					"H"	"L"	Inverter type	Non-iverter type	Source type	Sink type		
μPA53C	○				30	400	–	20 kΩ	○		○			○	Darlington	14
μPA56C			○		40	100	–	–	○			○	○		Single (Common collector)	16
μPA57C		○			30	400	–	4 kΩ	○		○			○	Darlington	14 with tab
μPA67C		○			30	70	–	22 kΩ	○		○			○	Darlington	14
μPA79C			○		20	150*1	○	20 KΩ	○		○			○	Low saturation driver	16
μPA80C, GR			○		60	50	–	20 kΩ		○	○		○		Darlington	16
μPA81C			○		45	400*2	–	20 kΩ	○		○			○	FIP driver	18
μPA2001C, GR			○		60	500	○	–	○		○			○	Darlington	16
μPA2002C, GR			○		60	500	○	7VZDi +10.5 kΩ	○		○			○	Darlington	16
μPA2003C, GR			○		60	500	○	2.7 kΩ	○		○			○	Darlington	16
μPA2004C, GR			○		60	500	○	10.5 kΩ	○		○			○	Darlington	16
μPA2981C				○	50	500	○	3 kΩ	○			○	○		Darlington output stage	18
μPA2982C				○	50	500	○	8.5 kΩ	○			○	○		Darlington output stage	18
μPA2987C			○		50	500	○	3 kΩ	○			○	○		Darlington output stage	16
μPA6118C				○	85	40	–	37 kΩ	○			○	○		FIP driver	18

*1: PW ≦30 ms, duty cycle ≦10% (7 circuits operation)
*2: PW ≦10 ms, duty cycle ≦10% (7 circuits operation)

Transistor Array

■ Power transistor array

Type Number	Number of circuits	Collector-emitter voltage V_{CE} (V)	Collector current I_C (A)	Surge absorber diode	Input impedance	Output current relationship		Remarks	Number of pins
						Source type	Sink type		
μPA1424H	4	60 ±10	±2.0	○	680 Ω		○	High beta	10
μPA1426H	4	80	±2.0	–	–		○	Darlington	10
μPA1427H	4	–80	∓2.0	–	–	○		Darlington	10
μPA1428H **μPA1428AH**	4	60 ±10	±2.0	○	–		○	Darlington	10
μPA1434H	4	60	3.0	–	–		○	High beta	10
μPA1436H **μPA1436AH**	4	100	±3.0	–	–		○	Darlington	10
μPA1437H	4	–100	∓3.0	–	–	○		Darlington	10
μPA1438H	4	60 ±10	±3.0	○	–		○	Darlington	10
μPA1452H	4	60	5.0	–	–		○	Low $V_{CE(sat)}$	10
μPA1453H	4	–60	5.0	–	–	○		Low $V_{CE(sat)}$	10
μPA1454H	4	100	5.0	–	–		○	High beta	10
μPA1456H	4	100	±5.0	–	–		○	Darlington	10
μPA1457H	4	–100	∓5.0	–	–	○		Darlington	10
μPA1458H	4	60 ±10	±5.0	○	–		○	Darlington	10
μPA1476H	4	100 ±15	±2.0	○	–		○	Darlington	10
μPA1478H	4	31 ±4	±2.0	○	–		○	Darlington	10

■ Power MOS FET array

Type Number	Number of circuits			V_{DSS} (V)	I_D (A/Unit)	Surge absorber diode	4 V driving	Active level		Input/output relationship		Output current relationship		Number of pins
	4	7	8					"H"	"L"	Inverter type	Non-inverter type	Source type	Sink type	
μPA1500H/1500BH	○			60	±3	○	○	○		○			○	12
μPA1501H	○			120	±3	○	○	○		○			○	12
μPA1520H/1520BH	○			30	±2	–	○	○		○			○	10
μPA1522H	○			60	±2	–	○	○		○			○	10
μPA1523H/1523BH★	○			–60	∓2	–	○		○		○	○		10
μPA1524H	○			80	±2	–	○	○		○			○	10
μPA1526H	○			100	±2	–	○	○		○			○	10
μPA1527H	○			–100	∓2	–	○		○		○	○		10
μPA1550H	○			30	±5	–	○	○		○			○	10
μPA1552H/1552AH **μPA1552BH**	○			60	±5	–	○	○		○			○	10
μPA1556H/1556AH	○			100	±5	–	○	○		○			○	10
μPA1570H	○			30	±2	–	○	○		○			○	10
μPA1572H	○			60	±2	–	○	○		○			○	10
μPA1576H	○			100	±2	–	○	○		○			○	10

★: Under development

■ Monolithic MOS FET array

Type Number	Number of circuits			V_{DSS} (V)	I_D (A/Unit)	Surge absorber diode	4 V driving	Active level		Input/output relationship		Output current relationship		Number of pins
	4	7	8					"H"	"L"	Inverter type	Non-inverter type	Source type	Sink type	
μPA1600CX/GS			○	30	0.5	–	○	○		○			○	20
μPA1601CX/GS		○		30	0.43	–	○	○		○			○	16
μPA1602CX/GS		○		30	0.43	–	○		○		○		○	16
μPA1603CX	○			30	0.87	○	○	○		○			○	16
μPA1604CX	○			30	0.87	○	○		○		○		○	16
μPA1640GS			○	30	0.1	–	○	○		○			○	20

Zener Diode

■ Zener Diode Quick Reference (1/2)

Vz (V)	P (W)						
TYP.	0.15		0.2			1.0	
2.0		RD2.0UM	RD2.0M		RD2.0S	RD2.0P	
2.2		RD2.2UM	RD2.2M		RD2.2S	RD2.2P	
2.4		RD2.4UM	RD2.4M	RD2.4MW	RD2.4S	RD2.4P	
2.7		RD2.7UM	RD2.7M	RD2.7MW	RD2.7S	RD2.7P	
3.0		RD3.0UM	RD3.0M	RD3.0MW	RD3.0S	RD3.0P	
3.3		RD3.3UM	RD3.3M	RD3.3MW	RD3.3S	RD3.3P	
3.6		RD3.6UM	RD3.6M	RD3.6MW	RD3.6S	RD3.6P	
3.9		RD3.9UM	RD3.9M	RD3.9MW	RD3.9S	RD3.9P	
4.3		RD4.3UM	RD4.3M	RD4.3MW	RD4.3S	RD4.3P	
4.7	RD4.7UJ	RD4.7UM	RD4.7M	RD4.7MW	RD4.7S	RD4.7P	RD4.7FM
5.1	RD5.1UJ	RD5.1UM	RD5.1M	RD5.1MW	RD5.1S	RD5.1P	RD5.1FM
5.6	RD5.6UJ	RD5.6UM	RD5.6M	RD5.6MW	RD5.6S	RD5.6P	RD5.6FM
6.2	RD6.2UJ	RD6.2UM	RD6.2M	RD6.2MW	RD6.2S	RD6.2P	RD6.2FM
6.8	RD6.8UJ	RD6.8UM	RD6.8M	RD6.8MW	RD6.8S	RD6.8P	RD6.8FM
7.5	RD7.5UJ	RD7.5UM	RD7.5M	RD7.5MW	RD7.5S	RD7.5P	RD7.5FM
8.2	RD8.2UJ	RD8.2UM	RD8.2M	RD8.2MW	RD8.2S	RD8.2P	RD8.2FM
9.1	RD9.1UJ	RD9.1UM	RD9.1M	RD9.1MW	RD9.1S	RD9.1P	RD9.1FM
10	RD10UJ	RD10UM	RD10M		RD10S	RD10P	RD10FM
11	RD11UJ	RD11UM	RD11M		RD11S	RD11P	RD11FM
12	RD12UJ	RD12UM	RD12M		RD12S	RD12P	RD12FM
13	RD13UJ	RD13UM	RD13M		RD13S	RD13P	RD13FM
15	RD15UJ	RD15UM	RD15M		RD15S	RD15P	RD15FM
16	RD16UJ	RD16UM	RD16M		RD16S	RD16P	RD16FM
18	RD18UJ	RD18UM	RD18M		RD18S	RD18P	RD18FM
20	RD20UJ	RD20UM	RD20M		RD20S	RD20P	RD20FM
22	RD22UJ	RD22UM	RD22M		RD22S	RD22P	RD22FM
24	RD24UJ	RD24UM	RD24M		RD24S	RD24P	RD24FM
27	RD27UJ	RD27UM	RD27M		RD27S	RD27P	RD27FM
30	RD30UJ	RD30UM	RD30M		RD30S	RD30P	RD30FM
33	RD33UJ	RD33UM	RD33M		RD33S	RD33P	RD33FM
36	RD36UJ	RD36UM	RD36M		RD36S	RD36P	RD36FM
39	RD39UJ	RD39UM	RD39M		RD39S	RD39P	RD39FM
43			RD43M			RD43P	RD43FM
47			RD47M			RD47P	RD47FM
51						RD51P	RD51FM
56						RD56P	
62						RD62P	
68						RD68P	
75						RD75P	
82						RD82P	
91						RD91P	
100						RD100P	
110						RD110P	
120						RD120P	
Package	2-pin ultra mini-mold		Mini-mold (SC·59)		2-pin mini-mold	Power mini-mold (SC·62)	2-pin power mini-mold
	Low noise	General Purpose					

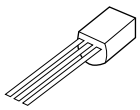
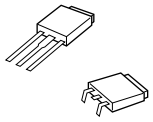
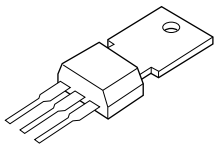
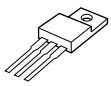
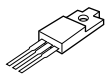
Zener Diode

■ Zener Diode Quick Reference (2/2)

Vz (V)	P (W)				
TYP.	0.25	0.4	0.4	0.5	1.0
2.0	RD2.0HS		RD2.0ES	RD2.0E	RD2.0F
2.2	RD2.2HS		RD2.2ES	RD2.2E	RD2.2F
2.4	RD2.4HS		RD2.4ES	RD2.4E	RD2.4F
2.7	RD2.7HS		RD2.7ES	RD2.7E	RD2.7F
3.0	RD3.0HS		RD3.0ES	RD3.0E	RD3.0F
3.3	RD3.3HS		RD3.3ES	RD3.3E	RD3.3F
3.6	RD3.6HS		RD3.6ES	RD3.6E	RD3.6F
3.9	RD3.9HS		RD3.9ES	RD3.9E	RD3.9F
4.3	RD4.3HS		RD4.3ES	RD4.3E	RD4.3F
4.7	RD4.7HS	RD4.7JS	RD4.7ES	RD4.7E	RD4.7F
5.1		RD5.1JS	RD5.1ES	RD5.1E	RD5.1F
5.6		RD5.6JS	RD5.6ES	RD5.6E	RD5.6F
6.2		RD6.2JS	RD6.2ES	RD6.2E	RD6.2F
6.8		RD6.8JS	RD6.8ES	RD6.8E	RD6.8F
7.5		RD7.5JS	RD7.5ES	RD7.5E	RD7.5F
8.2		RD8.2JS	RD8.2ES	RD8.2E	RD8.2F
9.1		RD9.1JS	RD9.1ES	RD9.1E	RD9.1F
10		RD10JS	RD10ES	RD10E	RD10F
11		RD11JS	RD11ES	RD11E	RD11F
12		RD12JS	RD12ES	RD12E	RD12F
13		RD13JS	RD13ES	RD13E	RD13F
15		RD15JS	RD15ES	RD15E	RD15F
16		RD16JS	RD16ES	RD16E	RD16F
18		RD18JS	RD18ES	RD18E	RD18F
20		RD20JS	RD20ES	RD20E	RD20F
22		RD22JS	RD22ES	RD22E	RD22F
24		RD24JS	RD24ES	RD24E	RD24F
27		RD27JS	RD27ES	RD27E	RD27F
30		RD30JS	RD30ES	RD30E	RD30F
33		RD33JS	RD33ES	RD33E	RD33F
36		RD36JS	RD36ES	RD36E	RD36F
39		RD39JS	RD39ES	RD39E	RD39F
43				RD43E	RD43F
47				RD47E	RD47F
51				RD51E	RD51F
56				RD56E	RD56F
62				RD62E	RD62F
68				RD68E	RD68F
75				RD75E	RD75F
82				RD82E	RD82F
91				RD91E	
100				RD100E	
110				RD110E	
120				RD120E	
Package	DO-34	DO-34	D0-34	DO-35	DO-41

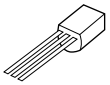
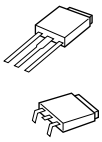
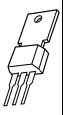
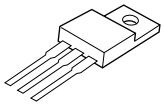
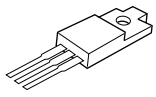
Thyristor

■ SCR

Package / Electrical characteristics		SOT-89	TO-92			MP-3			TO-202AA					TO-220AB		TO-220-like insulated type	
														 MP–25		 MP–45C	
$I_{T(RMS)}$ (A)		0.47	0.47			4.7	8	12.6	4	4	4	4.7	4.7	8	12	8	12
$I_{T(AV)}$ (A)		0.3	0.3			3	5	8	2	2	2.5	3	3	5	8	5	8
I_{TSM} (A)		6	8			35	65	80	20	20	35	65	–	80	100	80	100
T_j (°C)		125	125			125			125					125		125	
V_{DRM} V_{RRM} (V)	200	03P2J	03P2M	–	–	–	–	–	–	2S2M	–	–	–	–	8P2M	–	8P2SM
	400	03P4J	03P4M	–	03P4MG	3P4J 3P4J-Z	5P4J 5P4J-Z	8P4J 8P4J-Z	2P4M	2S4M	2V5P4M	3P4MH	3S4M	5P4M	8P4M	5P4SM	8P4SM
	500	03P5J	–	03P4MF	03P5MG	–	–	–	2P5M	–	–	3P5MH	–	5P5M	–	–	–
	600	–	–	–	03P6MG	–	5P6J 5P6J-Z	–	2P6M	–	–	3P6MH	–	5P6M	–	5P6SM	–
I_{GT} (mA)		0.2	0.2	50 μA	3-50 μA	0.1	0.2	10*	0.2	0.3	0.1	0.2	30	10	10	10	10
t_q (TYP.) (μs)		25	25	100	60	80	100	50	30	15*	80	80	5*	50	100	50	100

*: indicates MAX.

■ TRIAC

Package / Electrical characteristics		SOT-89	TO-92		MP-3		TO-202AA	TO-220AB					TO-220AB-like insulated type					
								 MP–25						 MP–45C					
$I_{T(RMS)}$ (A)		1.0	0.8	1.0	3	5	3	5	8	10	12	16		3	5	8	10	12	16
$I_{TSM(50\ Hz)}$ (A)		7.0	7	10	30	50	30	50	80	80	100	150		30	50	80	80	100	150
T_j (°C)		125	125		125		125	125						125					
V_{DRM} V_{RRM} (V)	400	AC01DJM	AC0V 8DGM	AC01 DGM	AC03 DJM AC03 DJM-Z	AC05 DJM AC05 DJM-Z	AC03 DGM	AC05 DGM	AC08 DGM	AC10 DGM	AC12 DGM	AC16 DGM		AC03 DSM	AC05 DSM	AC08 DSM	AC10 DSM	AC12 DSM	AC16 DSM
	500	–	–	–	–	–	–	AC05 EGM	AC08 EGM	AC10 EGM	AC12 EGM	AC16 EGM		–	AC05 ESM	AC08 ESM	AC10 ESM	AC12 ESM	–
	600	–	–	–	AC03 FJM AC03 FJM-Z	AC05 FJM AC05 FJM-Z	AC03 FGM	AC05 FGM	AC08 FGM	AC10 FGM	AC12 FGM	AC16 FGM		AC03 FSM	AC05 FSM	AC08 FSM	AC10 FSM	AC12 FSM	AC16 FSM
I_{GT} (mA)	I	5	5	3	12	10	12	10	20	20	20	30		12	10	20	20	20	30
	II	10	10	5	–	–	–	–	–	–	–	–		–	–	–	–	–	–
	III	5	5	3	12	10	12	10	20	20	20	30		12	10	20	20	20	30
	IV	10	10	3	12	10	12	10	20	20	20	30		12	10	20	20	20	30
$(dv/dt)_C$ (V/μs)	MIN.	0.5	1	0.5	5	5	5	5	10	10	10	10		5	5	10	10	10	10

EMPTY PAGE

Microwave Device/Consumer-Use High Frequency Device

Microwave Device 166

- GaAs MMIC 166
- GaAs MCIC 166
- Field Effect Transistor 167
- Transistor 168
- Diode 169

Consumer-Use High Frequency Device 170

- MMIC 170
- Transistor, FET 176
- Diode 177

GaAs MMIC

■ Analog IC

Type number	Function	Features	Package
μPG100	Wide band, low noise amplifier	f = 50 MHz to 3 GHz Gp ≧ 14 dB, N_F ≦ 3.5 dB	• 8-pin ceramic, Chip
μPG101	Wide band, medium output amplifier	f = 50 MHz to 3 GHz P_O (1dB) ≧ 16 dBm	• 8-pin ceramic, Chip
μPG103	Wide band, low noise amplifier	f = 50 MHz to 3 GHz Gp ≧ 10 dB, N_F ≦ 5 dB	• 8-pin ceramic, Chip
μPG105	S band, low noise amplifier	f = 2.7 to 4.2 GHz Gp ≧ 21 dB, N_F ≦ 2.2 dB	• 16-pin ceramic
μPG106	AGC amplifier	f = 100 kHz to 2.5 GHz Gp ≧ 16 dB, G_{AGC} ≧ 25 dB	• 8-pin ceramic
μPG107	SPDT switch	f = DC to 3.4 GHz Lins ≦ 1.7 dB, t_{sw} = 5 ns (typ.)	• 8-pin ceramic chip, Chip
μPG110	Wide band, medium output amplifier	f = 2 to 8 GHz P_O (1dB) ≧ 10 dBm, Gp ≧ 12 dB	• 4-pin ceramic chip, Chip
μPG130	SPDT switch (for digital cellular)	f = 0.1 to 1 GHz, P_O (1 dB) = 33 dBm Lins = 0.5 dB, I_{SO} = 30 dB at 1 GHz	• 8-pin SOP • 8-pin SSOP
μPG131	SPDT switch (for digital cordless)	f = 0.1 to 2 GHz, P_O (1 dB) = 28 dBm Lins = 0.6 dB, I_{SO} = 23 dB at 2 GHz	• 8-pin SOP • 8-pin SSOP
μPG132	SPDT switch (for digital cordless)	f = 0.1 to 2 GHz, P_O (1 dB) = 28 dBm Lins = 0.6 dB, I_{SO} = 23 dB at 2 GHz	• 8-pin SSOP

■ Prescaler IC

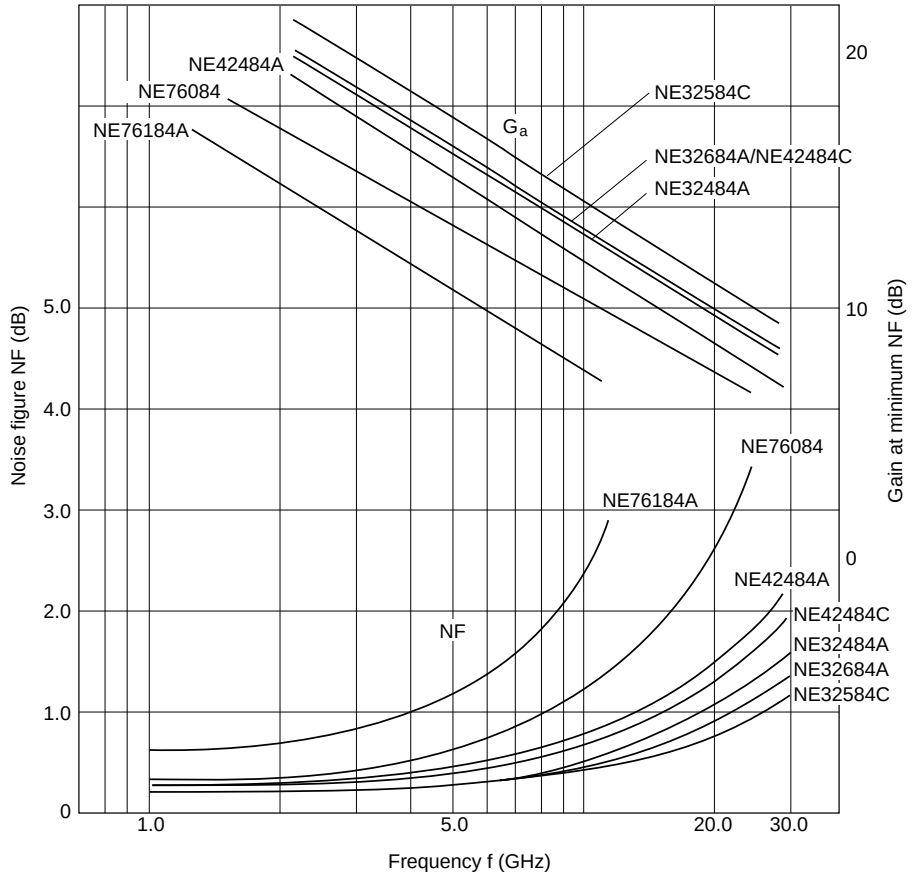
Type number	Function	Features	Package
μPG501	5 GHz, 1/4 static type prescaler	f = 1.5 to 5 GHz @Pin = +10 dBm	• 8-pin ceramic, Chip
μPG502	5 GHz, 1/2 static type prescaler	f = 1 to 5 GHz @Pin = +10 dBm	• 8-pin ceramic, Chip
μPG503	9 GHz, 1/4 dynamic type prescaler	f = 3.5 to 90 GHz @Pin = +10 dBm	• 8-pin ceramic, Chip
μPG504	9 GHz, 1/2 dynamic type prescaler	f = 2.0 to 9.0 GHz @Pin = +10 dBm	• 8-pin ceramic, Chip
μPG506	14 GHz, 1/8 dynamic type prescaler	f = 8 to 14 GHz @Pin = 6 dBm	• 8-pin ceramic, Chip
μPG508	14 GHz, 1/4 dynamic type prescaler	f = 8 to 14 GHz @Pin = 6 dBm	• 8-pin ceramic, Chip

GaAs MCIC

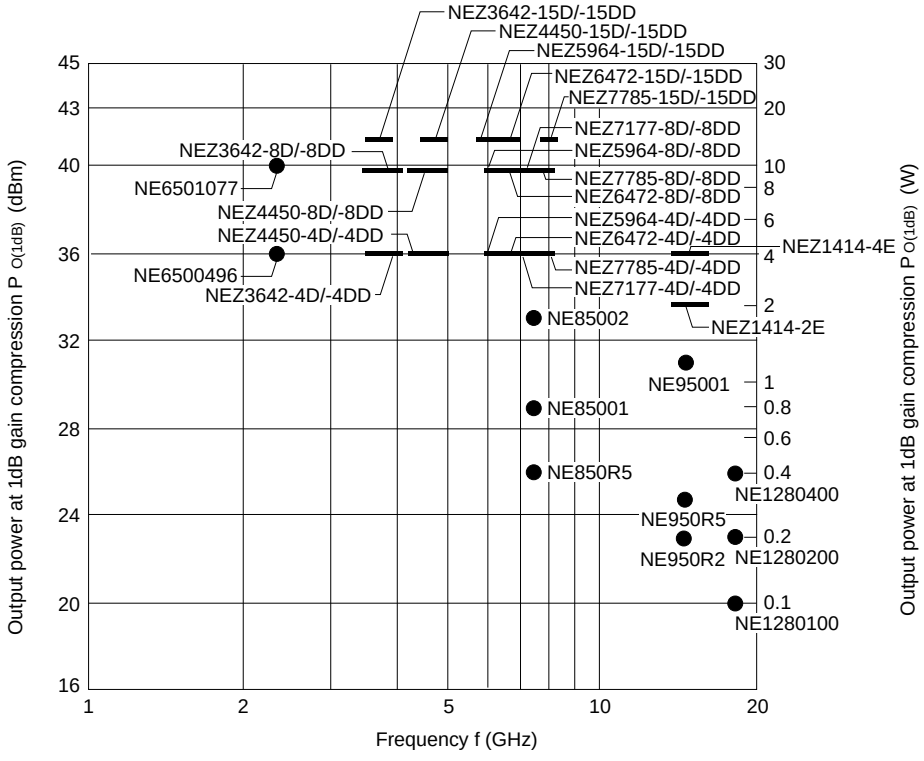
Type number	Function	Features	Package
MC-5950	for Japan Analog f = 925 to 942 MHz	V_{DD} = 5.8 V, Pout ≧30.8 dBm Gp ≧24 dB, η_T = 63%	Metal package 17 ∞ 12 ∞ 4 mm
MC-5951	for AMPS f = 824 to 849 MHz	V_{DD} = 5.8 V, Pout ≧30.5 dBm Gp ≧24 dB, η_T = 63%	
MC-5952	for E-TACS f = 872 to 905 MHz	V_{DD} = 5.8 V, Pout ≧30.5 dBm Gp ≧24 dB, η_T = 63%	
MC-5973	for AMPS f = 824 to 849 MHz	V_{DD} = 4.6 V, Pout ≧30.5 dBm Gp ≧24 dB, η_T = 63%	
MC-5974	for E-TACS f = 872 to 905 MHz	V_{DD} = 4.6 V, Pout ≧30.5 dBm Gp ≧24 dB, η_T = 63%	
MC-7620	for Japan Digital f = 940 to 956 MHz	V_{DD} = 3.4 V, Pout = 31.2 dBm Gp ≧25.2 dB, η_T = 45%	14.2 ∞ 11.3 ∞ 2.7 mm
MC-7621	for Japan Digital f = 1429 to 1453 MHz	V_{DD} = 3.4 V, Pout = 31.2 dBm Gp ≧20.2 dB, η_T = 45%	

Field Effect Transistor

■ Low Noise GaAs FET Quick Reference Graph



■ Power GaAs FET Quick Reference Graph



Transistor

■ Low Noise Transistor Quick Reference Table

Frequency (MHz) \ NF (dB)	2.5	3.5	4.0	5.0 or higher
200	———	———	2SC1044 2SC1426	———
500	———	2SC2148	2SC1275 2SC1424	———
2000	2SC3604	2SC3603	2SC2149	———
4000	2SC3587	———	———	2SC2150

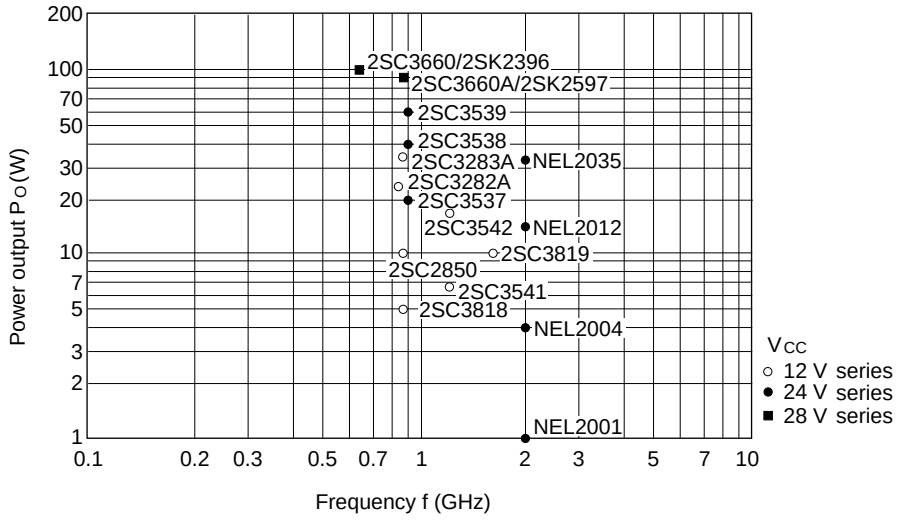
■ Power Transistor Quick Reference Table (for fixed radio station)

Frequency \ Output power	10 W or higher
500 MHz or higher	2SC3660
800 MHz or higher	2SC3217-M 2SC3218-M 2SC3660A 2SK2396
900 MHz or higher	2SC3537 2SC3538 2SC3539 2SK2597
1900 MHz or higher	NEL2000 SERIES

■ Power Transistor Quick Reference Table (for mobile and portable radio station)

Frequency \ Output power	0.1 W or higher	1 W or higher	10 W or higher
500 MHz or higher		2SC2762	
800 MHz or higher	———	2SC2850-KA/MA	2SC3282A 2SC3283A
1000 MHz or higher	2SC3817	2SC3541 2SC3818 2SC3819	2SC3542

Output Power vs. Freguency



Diode

■ Schottky Barrier Diode

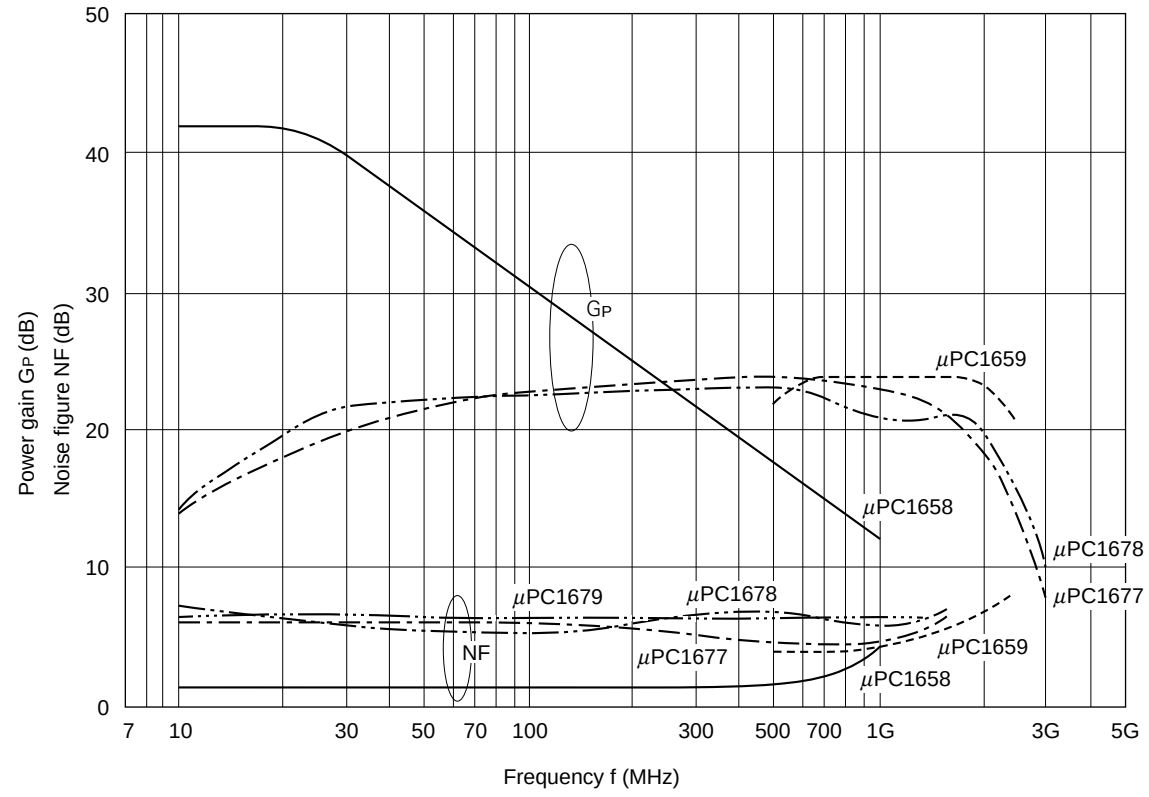
Type number	Application	Electrical characteristics (TYP.)			
		V_R (V)	V_F (V)	I_F (mA)	C_t (pF)
ND487C1-3P	Double balanced modulator	–	~ 0.7	–	~ 1.0
ND487C2-3P	Double balanced modulator	–	~ 1.0	–	~ 1.0

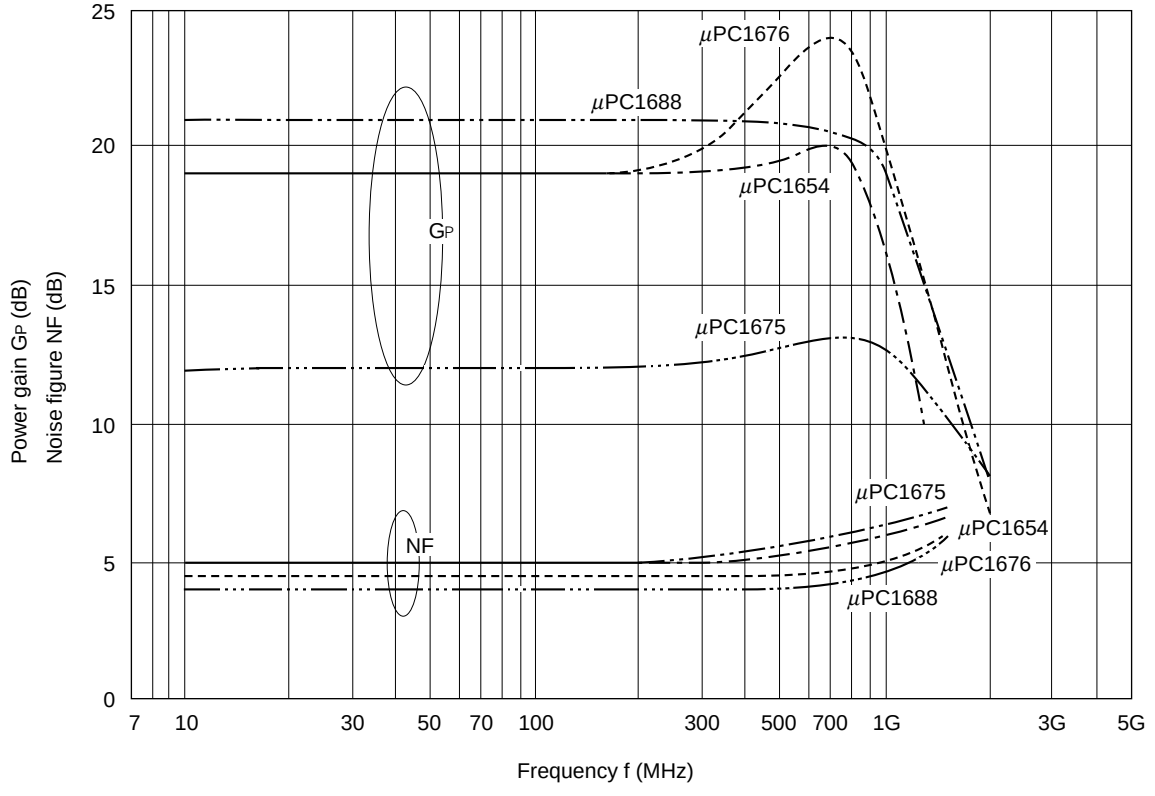
MMIC

Type number	Function	Features	Package
μPC1652	General purpose HF wide band amplifier	BW = 1.2 GHz, Gp = 18 dB, NF = 5.5 dB	• 8-pin SOP
μPC1653		BW = 1.3 GHz, Gp = 18 dB, NF = 5.5 dB	• TO-72 CAN equivalent
μPC1654		BW = 1.1 GHz, Gp = 19 dB, NF = 5.5 dB	• TO-12 CAN equivalent
μPC1655		BW = 1.0 GHz, Gp = 18 dB, NF = 5.5 dB	• 8-pin DIP
μPC1656		BW = 0.85 GHz, Gp = 19 dB, NF = 5.5 dB	• 8-pin DIP
μPC1675		BW = 1.9 GHz, Gp = 12 dB, NF = 5.5 dB	• 4-pin mini-mold
μPC1676		BW = 1.2 GHz, Gp = 22 dB, NF = 4.5 dB	• 4-pin mini-mold
μPC1688		BW = 1.1 GHz, Gp = 21 dB, NF = 4 dB	• 4-pin mini-mold
μPC1658	Low noise HF wide band amplifier	Gp = 31 dB/f = 100 MHz, GP = 17 dB/f = 500 MHz, (GAIN CONTROLABLE) NF = 1.5 dB/f = 100 MHz, NF = 2.0 dB/f = 500 MHz	• 8-pin CAN • 8-pin SOP • 8-pin DIP
μPC1659	Ultra wide band amplifier	BW = 0.6 to 2.3 GHz, Gp = 19.5 dB, NF = 5 dB	• 4-pin CAN
		BW = 0.6 to 2.3 GHz, Gp = 23 dB, NF = 5 dB	• Ceramic
		BW = 0.7 to 1.75 GHz, Gp = 23 dB, NF = 5 dB	• 8-pin SOP
μPC1663	Ultra high speed video amplifier	BW = 700 MHz/Ga = 20 dB, GAIN CONTROLABLE INPUT NOISE 3 μVr.m.s.	• 8-pin DIP • 8-pin SOP
μPC1677	Wide band, medium output amplifier	BW = 1.8 GHz, Gp = 24 dB, NF = 6 dB, P_O = 19.5 dBm	• 8-pin DIP
μPC1678		BW = 2.0 GHz, Gp = 23 dB, NF = 6 dB, P_O = 17.5 dBm	• 8-pin SOP
μPC1668	High isolation IF amplifier	Ga = 14.5 dB, ISL = 55 dB/f = 70 MHz	• 8-pin DIP
μPC1669		Ga = 10.5 dB, ISL = 55 dB/f = 70 MHz	• 8-pin DIP
μPC1670		Ga = 7.0 dB, ISL = 55 dB/f = 70 MHz	• 8-pin DIP
μPC2708	Middle power wide band amplifier	BW = 2.9 GHz, Po (sat) = +10 dBm, Gp = 15 dB	• 6-pin mini-mold
μPC2709		BW = 2.3 GHz, Po (sat) = +11.5 dBm, Gp = 23 dB	
μPC2710		BW = 1.0 GHz, Po (sat) = +13.5 dBm, Gp = 33 dB	
μPC2711	Low noise wide band amplifier	BW = 2.9 GHz, Gp = 13 dB, NF = 5.0 dB	• 6-pin mini-mold
μPC2712		BW = 2.6 GHz, Gp = 20 dB, NF = 4.5 dB	
μPC2713		BW = 1.2 GHz, Gp = 29 dB, NF = 3.2 dB	
μPC2714	Low power consumption wide band amplifier	BW = 1.8 GHz, Icc = 4.5 mA, Vcc = 3.4 V	• 6-pin mini-mold
μPC2715		BW = 1.2 GHz, Icc = 4.5 mA, Vcc = 3.4 V	
μPC2745		BW = 2.7 GHz, Icc = 7.5 mA, Vcc = 3.0 V, Gp = 12 dB	
μPC2746		BW = 1.5 GHz, Icc = 7.5 mA, Vcc = 3.0 V, Gp = 19 dB	
μPC2747	900 MHz Band Low noise amplifier	BW = 0.1 – 1.8 GHz, Icc = 5.0 mA, Vcc = 3.0 V, Gp = 12 dB	• 6-pin mini-mold
μPC2748		BW = 0.3 – 1.5 GHz, Icc = 6.0 mA, Vcc = 3.0 V, Gp = 19 dB	
μPC2749	1.9 GHz Low noise amplifier	BW = 2.9 GHz, Icc = 6 mA, Gp = 16 dB, NF = 4 dB	• 6-pin mini-mold
μPC2762	Medium power amplifier	BW = 2.9 GHz, Icc = 26.5 mA, Gp = 14.5 dB, P_{1dB} = 7 dBm	• 6-pin mini-mold
μPC2763		BW = 2.4 GHz, Icc = 27 mA, Gp = 19.5 dB, P_{1dB} = 6.5 dBm	
μPC2771		BW = 2.1 GHz, Icc = 36 mA, Gp = 21 dB, P_{1dB} = +11.5 dBm	
μPC2723	1.1 GHz AGC amplifier	BW = 1.1 GHz, Gpmax. = 13 dB, GCR = 38 dB, Vcc = 5.0 V	• 6-pin mini-mold
μPC2726	1.6 GHz differential amplifier	BW = 1.6 GHz, Icc = 11.5 mA, Gp = 15 dB, Vcc = 5.0 V	• 6-pin mini-mold
μPC8104	1.9 GHz Up Converter + QPSK MOD	Vcc = 2.7 ~ 5.5 V, Icc = 28 mA	• 20-pin SSOP
μPC8105	400 MHz QPSK MOD	Vcc = 2.7 ~ 5.5 V, Icc = 16 mA	• 16-pin SSOP
μPC8110	900 MHz QPSK MOD	Vcc = 2.7 ~ 3.6 V, Icc = 24 mA	• 20-pin SSOP

MMIC

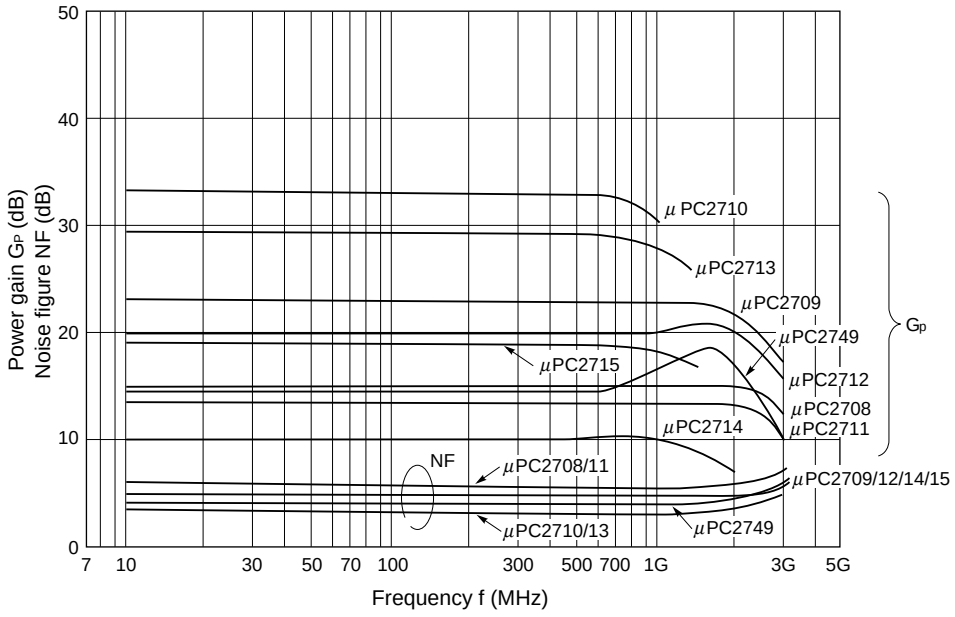
Power gain, noise figure vs. frequency



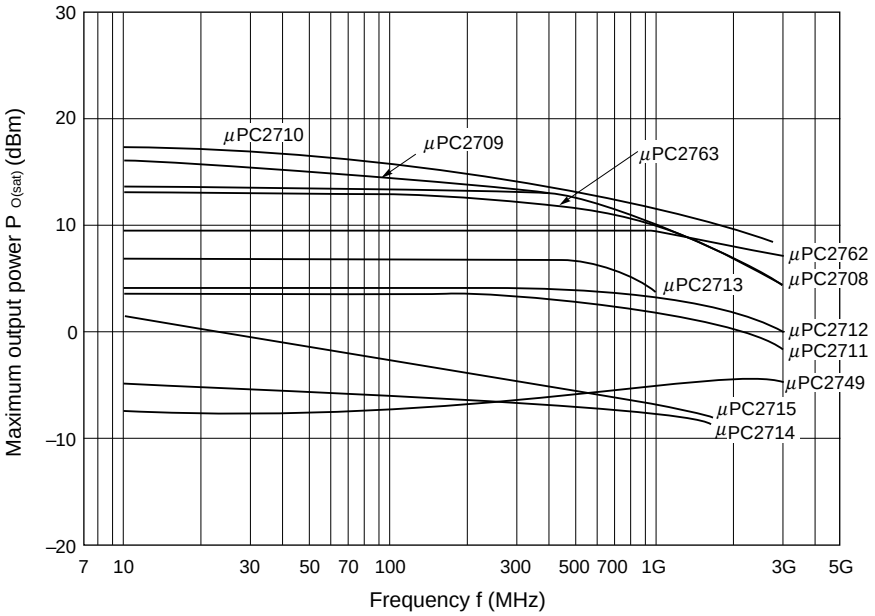


MMIC

Power gain, noise figure vs. frequency

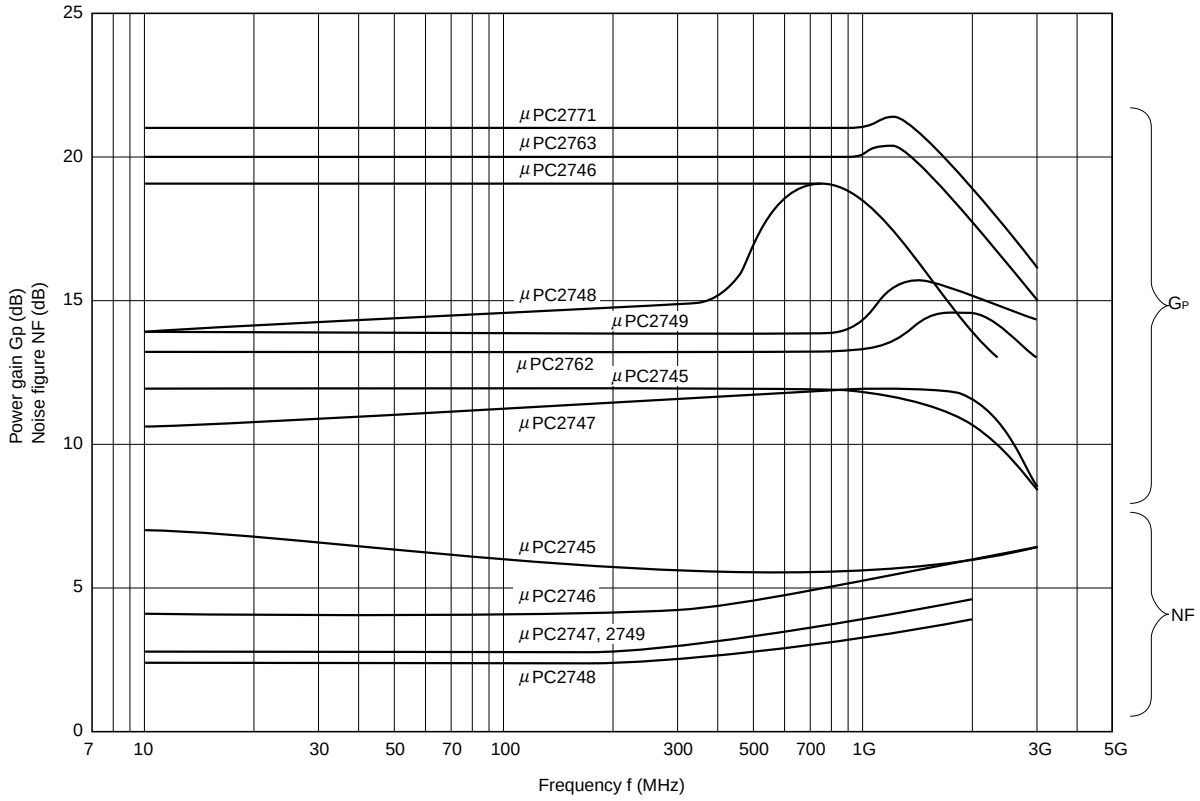


$P_{O(sat)}$ vs. frequency

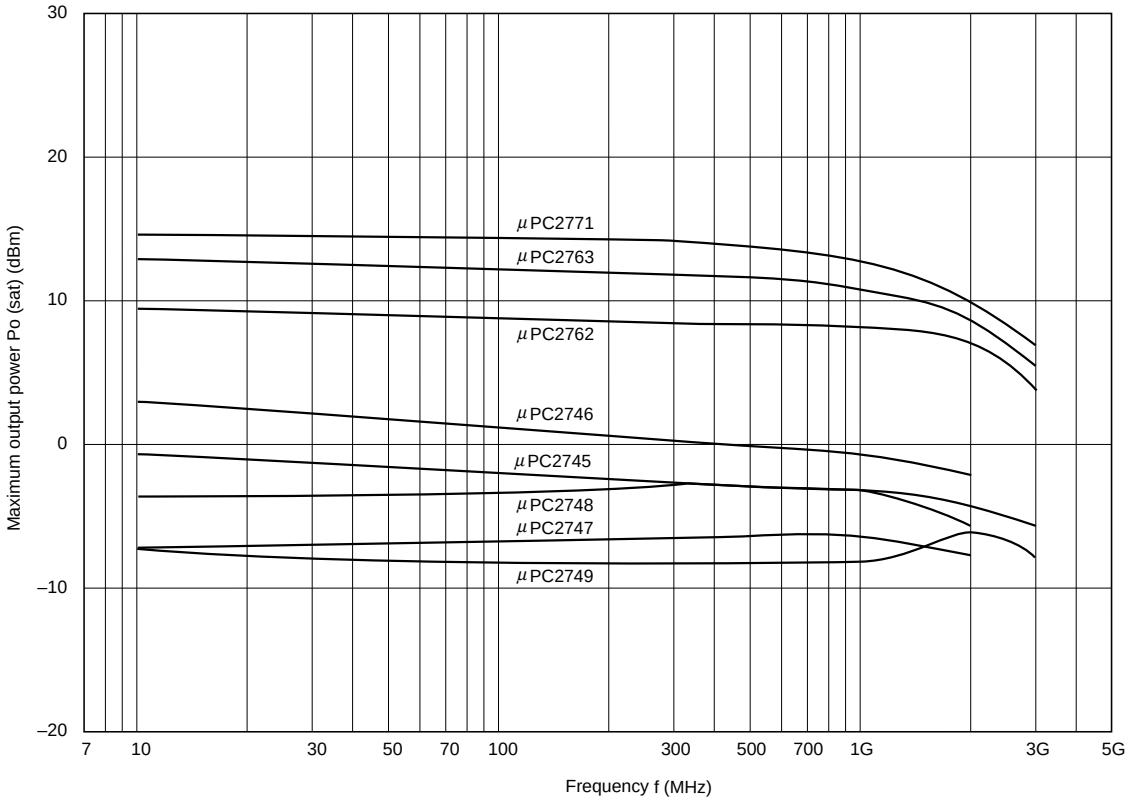


MMIC

Power gain, noise figure vs. frequency



Po (sat) vs. frequency

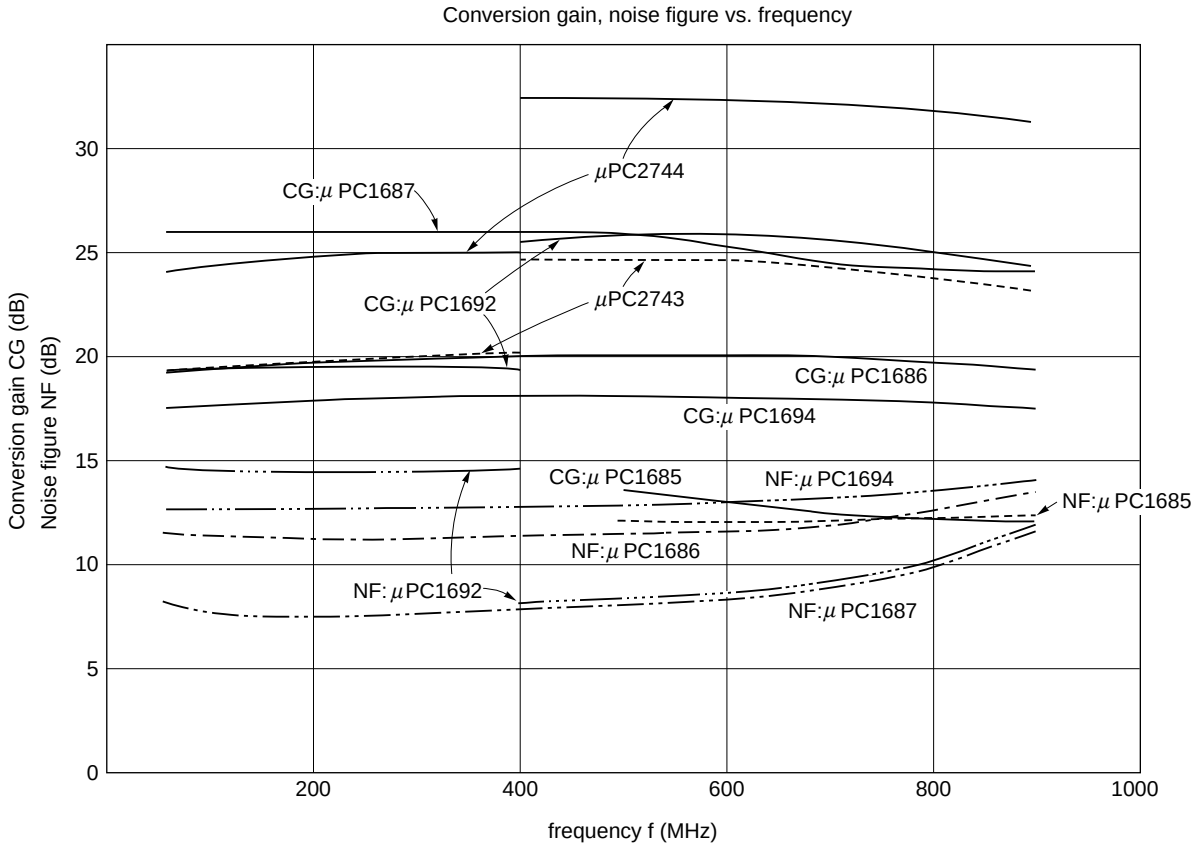


MMIC

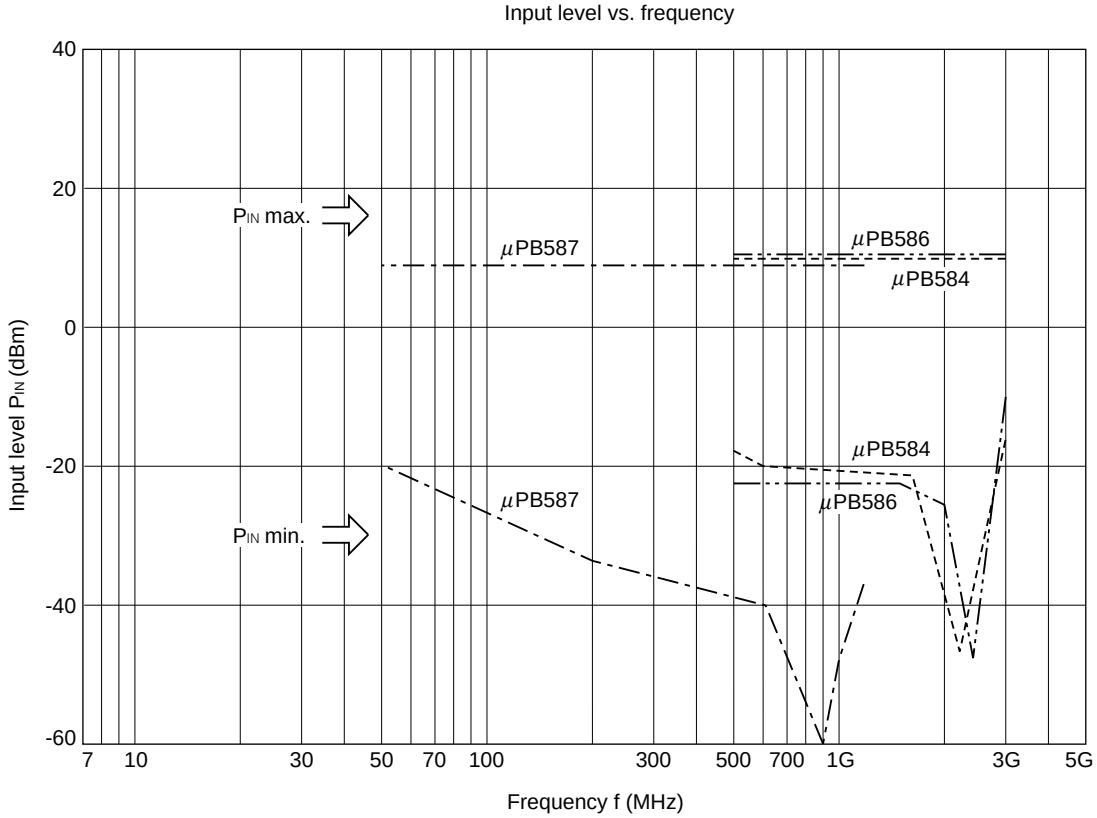
Type number	Function	Features	Package
μPC1685	Down converter (MIX/OSC/IF amplifier)	CG = 12 dB, NF = 12.5 dB, CM = 86 dB μ, @900 MHz	• 8-pin SOP
μPC1686		CG = 20 dB, NF = 12 dB, CM = 94 dB μ, @470 MHz	• 8-pin SOP
μPC1687		CG = 24 dB, NF = 10 dB, CM = 89 dB μ, @900 MHz	• 8-pin SOP
μPC1673		CG = 23 dB, NF = 11.0 dB, CM = 92 dB μ, @470 MHz	• 16-pin SOP
μPC1692		CG = 19 dB @470 MHz, CG = 24 dB @890 MHz	• 20-pin SOP
μPC1694		CG = 18 dB, NF = 12.5 dB, CM = 103 dB μ, @470 MHz	• 14-pin SOP
μPC2743		CG = 20 dB, @470 MHz, CG = 23 dB @890 MHz	• 20-pin SOP
μPC2744		CG = 25 dB, @470 MHz, CG = 31 dB @890 MHz	• 20-pin SOP
μPC2721		CG = 20 dB, NF = 11 dB, f_{RF} = 0.9 ~ 2.0 GHz	• 8-pin SOP
μPC2722		CG = 15 dB, NF = 11 dB, f_{RF} = 0.9 ~ 2.0 GHz	
μPC2731	AGC Amplifier + Down converter	CG = 14 dB, NF = 12 ~ 17 dB, f_{RF} = 0.9 ~ 2.0 GHz, GCR = 65 dB	• 20-pin SOP
μPC2734	Down converter (MIX/OSC/IF Amp.)	CG = 10 ~ 13 dB, NF = 9 ~ 14 dB, f_{RF} = 0.9 ~ 2.1 GHz @f_{IF} = 402.8 MHz	• 20-pin SSOP
μPC2757	Down converter (MIX/Lo Amp./IF Amp.)	f_{RF}BW = 2.0 GHz, CG = 15 dB, Icc = 5.6 mA, Vcc = 3.0 V	• 6-pin mini-mold
μPC2758		f_{RF}BW = 2.0 GHz, CG = 15 dB, Icc = 11 mA, Vcc = 3.0 V	
μPC2753	Down converter	fin = DC ~ 400 MHz, CG_{MAX} = 79 dB, 3 V, 6.5 mA	• 20-pin SSOP
μPC8106	Up converter	CG = 10 dB, I_{CC} = 9 mA, OIP_3 = +7 dBm, 3 ~ 5 V	• 6-pin mini-mold
μPC8109		CG = 7 dB, I_{CC} = 5 mA, OIP_3 = +5 dBm, 3 ~ 5 V	
μPC8100	Up/Down converter	Up converter + Down converter 1 chip IC	• 20-pin SSOP
μPB584	Prescaler	1/2, fmax. = 2.5 GHz	• 8-pin SOP
μPB585		1/4, fmax. = 2.5 GHz	• 8-pin SOP
μPB586		1/256, 1/512, fmax. = 2.5 GHz	• 8-pin SOP
μPB587		1/2, 1/4, 1/8 fmax. = 1 GHz	• 8-pin SOP
μPB588		1/64, 1/128, fmax. = 2.5 GHz	• 8-pin SOP
μPB581		1/2, fmax. = 2.8 GHz	• 8-pin CAN
μPB582		1/4, fmax. = 2.8 GHz	• 8-pin CAN
μPB1502	Prescaler with power save mode	fmax. = 1.7 GHz, 64/65, 128/129, Vcc = 3.0 V	• 8-pin SOP
μPB1502(1)		fmax. = 2.0 GHz, 64/65, 128/129, Vcc = 3.0 V	
μPB1504	Prescaler	fmax. = 1.1 GHz, 64/65, 128/129, 3 V, 1.9 mA	
μPB1505		fmax. = 3.0 GHz, “256, “128, “64, 5 V, 14 mA	
μPA101	Transistor array	MULTI PLAYER	• 14-pin ceramic • 8-pin SOP
μPA102		2 DIFF AMP	• 14-pin ceramic • 14-pin SOP
μPA103		3 Trs+1 PIAR Tr	• 14-pin ceramic • 14-pin SOP
μPA104		ADDER	• 14-pin ceramic • 14-pin SOP

MMIC

[Down converter]



[Prescaler]

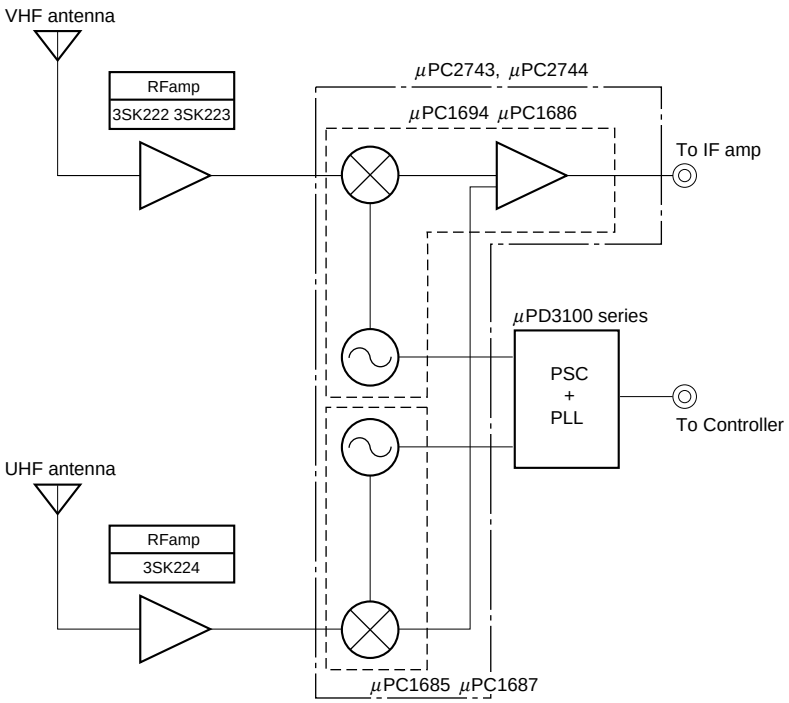


Transistor, FET

■ TV tuner

Application		Bi-polar transistor		Dual gate FET	
		Mini-mold (3-pin)	Small mini-mold (3-pin)	Mini-mold (4-pin)	Super mini-mold (4-pin)
VHF band	RF			**3SK131** **3SK222** **3SK223** **3SK230** **3SK252**	**3SK242** **3SK246** **3SK243** **3SK254**
	MIX	**2SC3545**	**2SC4182** **2SC4184**	**3SK131**	**3SK242**
	OSC	**2SC3545**	**2SC4182** **2SC4184**		
UHF band	RF (λ/4)		**2SC4183**	**3SK135A** **3SK224** **3SK231** **3SK253**	 **3SK244** **3SK255**
	RF (λ/2)			**3SK134B**	**3SK245**
	RF (GaAs FET)			**3SK177** **3SK206**	
	MIX	**2SC3545** **2SC3841**	**2SC4183** **2SC4185** **2SC4184** **2SC4186**		
	OSC	**2SC3545** **2SC3841**	**2SC4182** **2SC4184** **2SC4185**		

Application Block Diagram

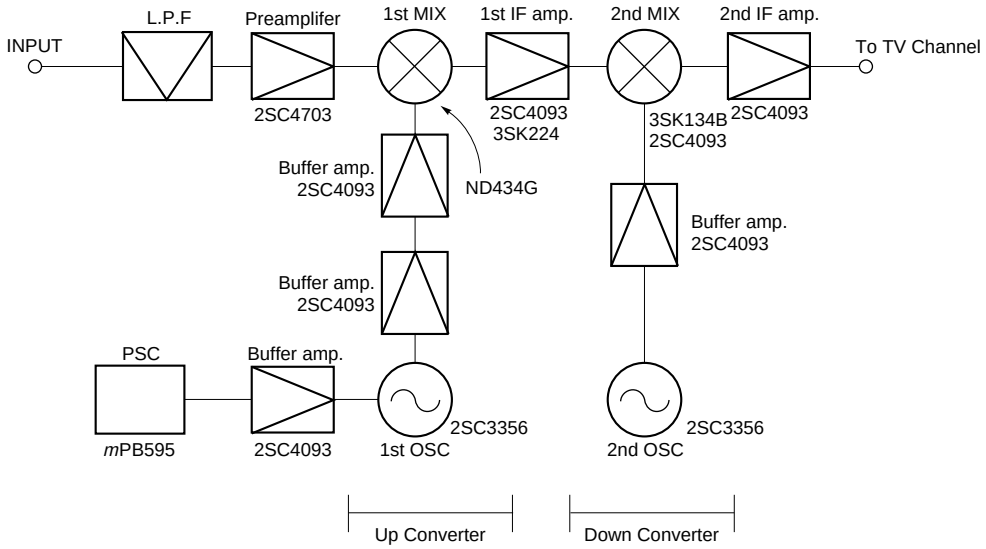


Transistor, FET

■ CATV converter

Application	Type number						Electrical characteristics	
	TO-92	Mini-mold		Super mini-mold		Ultrasuper mini-mold	f_T (GHz)	NF (dB)
		3-pin	4-pin	3-pin	4-pin	3-pin		
Pre Amp.	**2SC3355**	**2SC3356**	**2SC4093**	**2SC4228**	**2SC5013**	**2SC5008**	7 (20 mA)	1.1 (1 GHz)
	2SC2570A	**2SC2351**	**2SC4092**				5 (20 mA)	1.5 (1 GHz)
Buffer Amp.				**2SC4185**			2 (5 mA)	3 (0.5 GHz)
	2SC2570A	**2SC2351**	**2SC4092**				5 (20 mA)	1.5 (1 GHz)
1st IF Amp.	**2SC3355**	**2SC3356**	**2SC4093**	**2SC4226**	**2SC5011**	**2SC5006**	7 (20 mA)	1.1 (1 GHz)
	2SC2570A	**2SC2351**	**2SC4092**				5 (20 mA)	1.5 (1 GHz)
1st and 2nd OSC		**2SC3545**		**2SC4184**			1.8 (5 mA)	
				2SC4185			2 (5 mA)	
		2SC4568		**2SC4570**		**2SC5005**	5.5 (5 mA)	
		2SC4569		**2SC4571**		**2SC5004**	5 (5 mA)	
2nd IF Amp.				**2SC4185**			2 (5 mA)	

Application Block Diagram



Diode

■ Mixer diode

Plastic mold package				Electrical characteristics (TYP.)		
4-pin mold (pair, each separate)	4-pin mini-mold (pair/PIN common)	6-pin mini- mold (QUAD)	8-pin SOP (QUAD)	V_F (V) (I_F = 1.0 mA)	I_F (mA) (V_F = 1.0 V)	C_t (pF)
ND414G-2 **ND413G-2**	**ND412G-2** **ND411G-2**	**ND487C1T/R1T** **ND487C2T/R2T**	**ND434G** **ND433G**	~ 0.41 ~ 0.23	35 ~ 30 ~ (V_F = 0.5 V)	1.0 0.9

EMPTY PAGE

Optical Device

Fiber Optic Communication/Light Beam Application Device 180

- Laser Diodes 181
- Detectors 183

Light Emitting Element 185

- Infrared Ray Emitting Diode 185

Light Receiving Element 186

- Photo-transistor 186
- PIN Photo-diode 187
- Light Receiving IC 188

Photocoupler 189

Photointerrupter 191

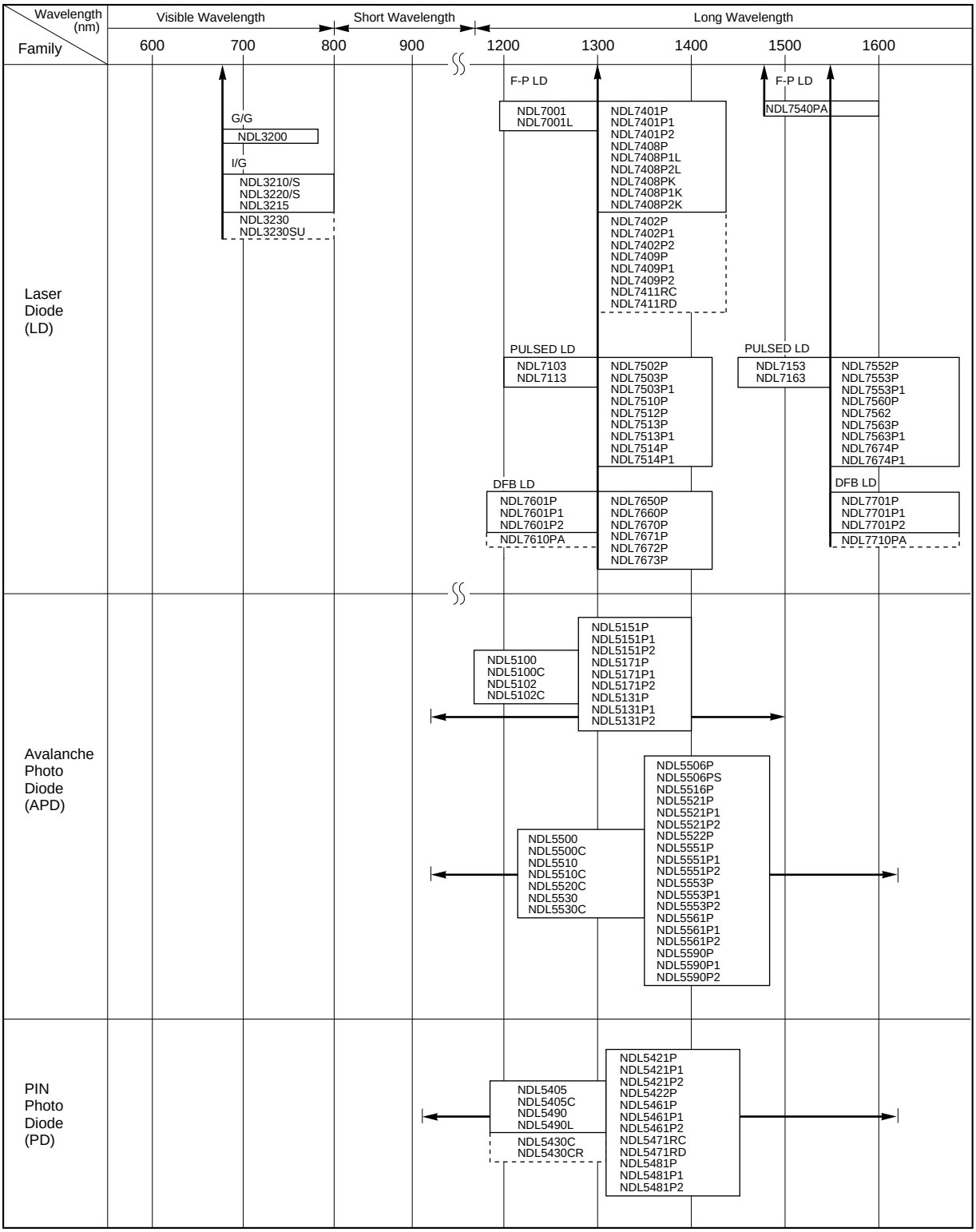
Opto MOS FET Relay 194

Light Transmission Link 195

Infra-Red Link Unit 196

Fiber Optic Communication/Light Beam Application Devices

■ Product map of optical communication/light beam application device



: Under development ⟶ : Mark wavelength or operating range

Modules are available with FC-PC or SC-PC connector.

Fiber Optic Communication/Light Beam Application Devices

Laser Diodes

■ Visible LD for Beam Applications

Type number	Absolute maximum ratings			Typical characteristics						Remarks
	P_O/P_f (mW)	T_C (°C)	T_{stg} (°C)	I_{th} (mA)	I_{op} (mA)	P_O/P_f (mW)	λ_C (nm)	$\theta\perp$ (deg)	$\theta\parallel$ (deg)	
				TYP.	TYP.	TYP.	TYP.	TYP.	TYP.	
NDL3200	4	−10 to +50	−40 to +85	80	85	3	670	34	7	for BCR, Measurement etc.
NDL3210	6	−10 to +50	−40 to +85	40	60	5	670	34	9	for BCR, Measurement etc.
NDL3210S	5	−10 to +50	−40 to +85	40	60	4	670	34	9	for BCR, Measurement etc.
NDL3220	6	−10 to +60	−40 to +85	20	30	5	670	30	8	Low threshold current, High temperature operating
NDL3220S	6	−10 to +60	−40 to +85	20	30	5	670	30	8	Small package
NDL3215	10	−10 to +50	−40 to +85	50	60	10	670	31	8	for Long Distance BCR etc.
NDL3230★	35	−10 to +60	−40 to +85	50	100	30	685	20	9	for Magnetic Optical Disk, High Power application
NDL3230SU★	35	−10 to +60	−40 to +85	50	100	30	685	20	9	Small package
NDL3310★	4	−10 to +50	−40 to +85	70	80	3	650	34	9	Short wavelength

★: Under development

■ For Fiber Optic Communications

• Fabry Perrot LD

Type number	Absolute maximum ratings			Typical characteristics (25°C)					Remarks
	I_F (mA)	T_C (°C)	T_{stg} (°C)	P_O/P_f (mW)	I_{th} (mA)	λ_p (nm)	σ * (nm)	t_r/t_f (ns)	
					TYP.	TYP.	TYP.	MAX.	
NDL7001	–	−40 to +85	−55 to +125	5.0	12	1310	1.0	0.5/0.5	with monitor PD, small package
NDL7001L	–	−40 to +85	−55 to +125	5.0	12	1310	1.0	0.5/0.5	with monitor PD, small package
NDL7401P/P1/P2	I_{th}+50	−40 to +85	−40 to +85	2.0	12	1310	1.3	0.5/0.5	with monitor PD
NDL7402P/P1/P2★	100	−40 to +85	−40 to +85	2.0	5	1310	1.5	0.5/0.5	with monitor PD
NDL7408PL/1L/2L	I_{th}+50	−40 to +85	−40 to +85	0.2	12	1310	1.3	0.5/0.5	with monitor PD
NDL7408PK/1K/2K	I_{th}+50	−40 to +85	−40 to +85	1.0	12	1310	1.3	0.5/0.5	with monitor PD
NDL7409P/P1/P2★	100	−40 to +85	−40 to +85	0.2	5	1310	1.5	0.5/0.5	with monitor PD
NDL7411RC/RD★	100	−40 to +85	−40 to +85	0.2	12	1310	1.3	0.5/0.5	with monitor PD, FC/SC receptacle

*: RMS (–20 dB)

★: Under development

• DFBLD

Type number	Absolute maximum ratings				Typical characteristics				Remarks
	I_F (mA)	P_O/P_f (mW)	T_C (°C)	T_{stg} (°C)	P_O/P_f (mW)	I_{th} (mA)	λ_p (nm)	t_r/t_f (ns)	
						TYP.	TYP.	TYP.	
NDL7601P/P1/P2	I_{th}+50	5	−20 to +85	−20 to +85	2.0	15	1310	0.5/0.5	with monitor PD
NDL7610PA★	150	5	−20 to +65	−40 to +70	2.0	20	1310	0.1/0.17	with monitor PD, isolator and TEC
NDL7701P/P1/P2	I_{th}+50	5	−20 to +85	−20 to +85	2.0	15	1550	0.5/0.5	with monitor PD
NDL7710PA★	150	5	−20 to +65	−40 to +70	2.0	25	1550	0.1/0.17	with monitor PD, isolator and TEC

★: Under development

Fiber Optic Communication/Light Beam Application Devices

Laser Diodes

■ For Analog Applications

Type number	Absolute maximum ratings				Typical characteristics (25°C)						Remarks
	I_F (mA)	P_f (mW)	T_C (°C)	T_{stg} (°C)	I_{th} (mA)	P_f (mW)	λ_p (nm)	RIN (dB/Hz)	CSO (dBc)	CTB (dBc)	
					TYP.	MIN.	TYP.	TYP.	TYP.	TYP.	
NDL7650P	150	15	−20 to +65	−40 to +70	20	4	1310	−155	−62	−70	with monitor PD, isolator and TEC
NDL7660P	150	15	−20 to +65	−40 to +70	20	6	1310	−155	−62	−70	with monitor PD, isolator and TEC
NDL7670P	150	15	−20 to +65	−40 to +70	20	8	1310	−155	−58	−65	with monitor PD, isolator and TEC
NDL7671P	150	15	−20 to +65	−40 to +70	20	10	1310	−155*	−58	−65	with monitor PD, isolator and TEC
NDL7672P	150	25	−20 to +65	−40 to +70	20	12	1310	−158	−60	−65	with monitor PD, isolator and TEC
NDL7673P	150	25	−20 to +65	−40 to +70	20	16	1310	−158	−60	−65	with monitor PD, isolator and TEC

*: MAX.

■ For EDFA Pumping and High Power OTDR Applications

Type number	Absolute maximum ratings			Typical characteristics						Remarks
	I_{FL} (mA)	T_C (°C)	T_{stg} (°C)	I_{th} (mA)	I_{op} (mA)	P_o / P_f (mW)	λ_C (nm)	σ *2 (nm)	t_r / t_f (ns)	
				TYP.	TYP.	TYP.	TYP.	MAX.	TYP.	
NDL7540PA	600	−20 to +70	−40 to +85	40	500	110	1480	8	–	with TEC, thermistor and m-PD
NDL7103	1200*3	−40 to +70	−55 to +125	35	1000*3	320*3	1310*3	7	1.5/1.7	ø5.6 can
NDL7113	600*3	−40 to +70	−55 to +125	20	400*3	175*3	1310*3	10	0.5/0.7	ø5.6 can
NDL7502P	1200*3	−20 to +65	−40 to +70	35	1000*3	190*3	1310*3	10	2/2*1	with TEC
NDL7503P/P1	1200*3	−20 to +60	−40 to +85	35	1000*3	180*3	1310*3	10	1.5/1.7	
NDL7510P	600*3	−20 to +65	−40 to +70	20	400*3	55*3	1310*3	10	0.5/0.7	with TEC
NDL7512P	600*3	−20 to +65	−40 to +70	20	400*3	110*3	1310*3	10	1/1*1	with TEC
NDL7513P/P1	600*3	−20 to +60	−40 to +85	20	400*3	110*3	1310*3	10	1/1*1	
NDL7514P/P1	600*3	−20 to +60	−40 to +85	20	400*3	50*3	1310*3	10	1/1*1	
NDL7153	1200*3	−40 to +70	−55 to +125	45	1000*3	240*3	1550*3	8	1.5/1.7	ø5.6 can
NDL7163	600*3	−40 to +70	−55 to +125	30	400*3	120*3	1550*3	10	0.5/0.7	ø5.6 can
NDL7552P	1200*3	−20 to +65	−40 to +70	40	1000*3	125*3	1550*3	10	2/2*1	with TEC
NDL7553P/P1	1200*3	−20 to +60	−40 to +85	45	1000*3	145*3	1550*3	10	2/2*1	
NDL7560P	600*3	−20 to +65	−40 to +70	20	400*3	30*3	1550*3	10	0.5/0.7	with TEC
NDL7562P	600*3	−20 to +65	−40 to +70	40	400*3	75*3	1550*3	10	1/1*1	with TEC
NDL7563P/P1	600*3	−20 to +60	−40 to +85	40	400*3	80*3	1550*3	10	1/1*1	
NDL7564P/P1	600*3	−20 to +60	−40 to +85	40	400*3	40*3	1550*3	10	1/1*1	

*1 : MAX.

*2 : RMS (–20 dB)

*3 : Pulse conditions; measurement of wavelength
pulse width = 1 μs, duty = 1%
measurement of optical output power
pulse width = 10 μs, duty = 1% (modules)
pulse width = 1 μs, duty = 1% (ø5.6 can)

Fiber Optic Communication/Light Beam Application Devices

Detectors

■ PIN Photo Diodes

Type number	Absolute maximum ratings				Detecting area size (μm)	Typical characteristics								Remarks	Package
	I_F (mA)	I_R (mA)	T_C ($^\circ$C)	T_{stg} ($^\circ$C)		I_D (nA)		C_t (pF)		S (A/W)		f_C (GHz)	t_r / t_f (ns)		
						V_R (V)	TYP.	V_R (V)	TYP.	λ (nm)	TYP.	MIN.	TYP.		
NDL5405	10	0.5	−40 to +85	−55 to +150	ø80	5	0.1	5	1.0	1300	0.89	–	0.3		CAN Package
										1550	1.00				
NDL5405C	10	0.5	−40 to +85	−55 to +150	ø80	5	0.1	5	1.0	1300	0.89	–	0.3		Chip on carrier
										1550	1.00				
NDL5430C/CR	10	3.0	−40 to +85	−55 to +150	ø30	5	5.0*	–	–	1300	0.89	2.5	–	for 10 Gb/s CR: With Resistance	Chip on carrier
										1550	1.00				
NDL5471RC/RD	10	0.5	−40 to +85	−40 to +85	ø120	5	0.1	5	1.1	1300	0.89	1.5	–	RC: FC receptacle RD: SC receptacle	Receptacle module
										1550	1.00				
NDL5461P/P1/P2	10	–	−40 to +85	−40 to +85	ø80	5	0.1	5	1.0	1300	0.89	2.5	–	P: Without flange P1: With flat mount flange P2: With vertical flange	Coaxial module (With MMF)
										1550	0.94				
NDL5481P/P1/P2	10	–	−40 to +85	−40 to +85	ø80	10	0.1	10	0.7	1300	0.85	2.5	–	for analog applications P: Without flange P1: With flat mount flange P2: With vertical flange	Coaxial module (With SMF)
NDL5421P/P1/P2	10	0.5	−40 to +85	−40 to +85	ø50	5	0.1	5	1.0	1300	0.89	2.5	–	P: Without flange P1: With flat mount flange P2: With vertical flange	Coaxial module (With MMF)
										1550	0.94				
NDL5490	10	0.5	−40 to +85	−40 to +85	ø50	5	2.0*	–	–	1330	0.78	1.0	–	With Pre-AMP $\overline{P}$ = −24 dBm typ. 1 Gb/s	CAN Package
NDL5490L	10	0.5	−40 to +85	−40 to +85	ø50	5	2.0*	–	–	1330	0.78	1.0	–	With Pre-AMP $\overline{P}$ = −24 dBm typ. 1 Gb/s	CAN Package with ball lens
NDL5422P	–	0.5	−40 to +70	−40 to +85	ø50	5	0.1	–	–	1330	0.89	2.5	–	With Pre-AMP $\overline{P}$ = −23 dBm typ. 2.5 Gb/s	BFY Package (6-pin) (With MMF)
										1550	1.00				

*: MAX.

Fiber Optic Communication/Light Beam Application Devices

Detectors

■ Avalanche Photo Diodes

Type	Type number	Absolute maximum ratings				Detecting area size (μm)	Typical characteristics									Remarks	Package
		I_F (mA)	I_R (mA)	T_C ($^\circ$C)	T_{stg} ($^\circ$C)		$V_{(BR)R}$ (V)	I_D (nA)		S (A/W)		M	f_C (GHz)	t_r / t_f (ns)		
							TYP.	V_R (V)	TYP.	λ (nm)	TYP.	TYP.	MIN.	TYP.		
Ge-APD	**NDL5100**	50	0.5	−40 to +60	−55 to +125	ø100	48*2	$V_{(BR)R}$−0.9	200	1300	0.78	40	–	0.5		CAN Package
	NDL5100C	50	0.5	−40 to +60	−55 to +125	ø100	48*2	$V_{(BR)R}$−0.9	200	1300	0.78	40	–	0.5		Chip on carrier
	NDL5102	50	0.5	−40 to +60	−55 to +125	ø30	35	$V_{(BR)R}$−0.9	80	1300	0.78	50	–	0.3		CAN Package
	NDL5102C	50	0.5	−40 to +60	−55 to +125	ø30	35	$V_{(BR)R}$−0.9	80	1300	0.78	50	–	0.3		Chip on carrier
	NDL5171P /P1/P2	50	0.5	−40 to +85	−40 to +85	ø100	48*2	$V_{(BR)R}$−0.9	200	1300	0.84	40	–	0.5	P: Without flange P1: With flat mount flange P2: With vertical flange	Coaxial module (With MMF)
	NDL5151P /P1/P2	50	0.5	−40 to +85	−40 to +85	ø50	35	$V_{(BR)R}$−0.9	150	1300	0.84	50	–	0.4	P: Without flange P1: With flat mount flange P2: With vertical flange	Coaxial module (With MMF)
	NDL5131P /P1/P2	50	0.5	−40 to +85	−40 to +80	ø30	35	$V_{(BR)R}$−0.9	80	1300	0.84	40	–	0.3	P: Without flange P1: With flat mount flange P2: With vertical flange	Coaxial module (With SMF)
InGaAs-APD	**NDL5510**	10	0.5	−40 to +70	−55 to +100	ø80	75	$V_{(BR)R}$−0.9	8	1300	0.89	40	0.7	–		CAN Package
										1550	1.00					
	NDL5510C	10	0.5	−40 to +70	−55 to +100	ø80	75	$V_{(BR)R}$−0.9	8	1300	0.89	40	0.7	–		Chip on carrier
										1550	1.00					
	NDL5500	10	0.5	−40 to +70	−55 to +100	ø50	70	$V_{(BR)R}$−0.9	5	1300	0.89	40	1.0	–		CAN Package
										1550	1.00					
	NDL5500C	10	0.5	−40 to +70	−55 to +100	ø50	70	$V_{(BR)R}$−0.9	5	1300	0.89	40	1.0	–		Chip on carrier
										1550	1.00					
	NDL5520C	10	0.5	−40 to +70	−55 to +100	ø50	55	$V_{(BR)R}$−0.9	5	1300	0.89	40	2.5	–	for 2.5 Gb/s (ø50)	Chip on carrier
										1550	1.00					
	NDL5530	10	0.5	−40 to +85	−55 to +100	ø30	70	$V_{(BR)R}$−0.9	5	1300	0.94	40	2.5	–		CAN Package
										1550	0.96					
	NDL5530C	10	0.5	−40 to +85	−55 to +100	ø30	70	$V_{(BR)R}$−0.9	5	1300	0.89	40	1.0	–		Chip on carrier
										1550	1.00					
	NDL5561P /P1/P2	10	0.5	−40 to +85	−40 to +85	ø80	75	$V_{(BR)R}$−0.9	8	1300	0.94	40	1.0	–	P: Without flange P1: With flat mount flange P2: With vertical flange	Coaxial Module (With MMF GI-62.5)
										1550	0.96					
	NDL5551P /P1/P2	10	0.5	−40 to +85	−40 to +85	ø50	70	$V_{(BR)R}$−0.9	5	1300	0.94	40	1.0	–	P: Without flange P1: With flat mount flange P2: With vertical flange	Coaxial module (With MMF)
										1550	0.96					
	NDL5521P /P1/P2	10	0.5	−40 to +85	−40 to +85	ø50	70	$V_{(BR)R}$−0.9	5	1300	0.94	40	2.5	–	for 2.5 G Applications P: Without flange P1: With flat mount flange P2: With vertical flange	Coaxial module (With MMF)
										1550	0.96					
	NDL5553P /P1/P2	10	0.5	−40 to +85	−40 to +85	ø50	70	M = 20	50	1300	0.89	20*1	–	0.5*2	for OTDR Applications P: Without flange P1: With flat mount flange P2: With vertical flange	Coaxial module (With MMF)
										1550	0.94					
	NDL5516P	10	0.5	−20 to +55	−40 to +85	ø80	75	$V_{(BR)R}$−0.9 I_C=1.1A@55°C	2	1300	0.89	40	0.7	–	for OTDR Applications With TEC $\Delta T \geqq 45K$	DIP module (With MMF GI-62.5)
										1550	1.00					
	NDL5506P /PS	10	0.5	−20 to +55	−40 to +85	ø50	70	$V_{(BR)R}$−0.9 I_C=1.1A@55°C	2	1300	0.89	40	1.0	–	for OTDR Applications With TEC $\Delta T \geqq 45K$ P: With MMF, PS: With SMF	DIP module
										1550	1.00					
	NDL5590P /P1/P2	–	0.5	−40 to +85	−40 to +85	ø50	70	$V_{(BR)R}$−0.9	5	1300	0.94	–	1.0	–	With Pre-AMP $\bar{P}$ = −36 dBm typ. 622 Mb/s P: Without flange P1: With flat mount flange P2: With vertical flange	Coxial module (With MMF)
										1550	0.96					
	NDL5522P	–	0.5	−40 to +70	−40 to +85	ø50	55	$V_{(BR)R}$−0.9	5	1300	0.89	–	2.5	–	With Pre-AMP $\bar{P}$ = −33 dBm typ. 2.5 Gb/s	BFY Package (6-pin) (With MMF)
										1550	1.00					

*1: MIN.

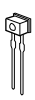
*2: MAX.

Light Emitting Element

■ Infrared Ray Emitting Diode

Type number	Materials	Features	Absolute maximum ratings (T_a = 25 ƒC)			Electrical characteristics (T_a = 25 ƒC)		Package (package No.)
			P (mW)	I_F (mA)	V_F TYP. (V) (I_F=300 mA)	λpTYP.(nm) (I_F=30 mA)	P_OTYP.(mW) (I_F=30 mA)	
SE301A	GaAs	High output, high reliability	150	100	1.2 (I_F = 50 mA)	940	6 (I_F = 50 mA)	P1
SE302A	GaAs	Ultra miniature double end	75	50	1.2	940	1.5	P2
SE303	GaAs	High output, narrow beam	150	100	1.25 (I_F = 50 mA)	940	3 (I_F = 50 mA)	P4
SE303A-C	GaAs	High output, wide beam	150	100	1.25 (I_F = 50 mA)	940	8 (I_F = 50 mA)	P4
SE304	GaAs	Horizontal output	100	50	1.2	940	1.5	P5
SE306	GaAs	Horizontal output with lens	100	50	1.1 (I_F = 10 mA)	940	0.5 mW/sr (I_F = 10mA)	P6
SE307-C	GaAs	High output, narrow beam	150	100	1.25 (I_F = 50 mA)	940	30 mW/sr (I_F = 50 mA)	P4
SE308	GaAs	Small horizontal output with lens	100	50	1.1 (I_F = 20 mA)	940	0.85 mW/sr (I_F = 20 mA)	P7
SE310	GaAs	Vertical high output with lens	150	60	1.25 (I_F = 50 mA)	940	11 mW/sr (I_F = 50 mA)	P3
SE313	GaAs	High output with moderately wide beam	150	100	1.25 (I_F = 50 mA)	940	25 mW/sr (I_F = 50 mA)	P4
SE314	GaAs	Miniature Type	75	50	1.2 (I_F = 10 mA)	940	0.2 (I_F = 10 mA)	P5
SE316(L)	GaAs	Ultra miniature double end	75	50	1.2 (I_F = 10 mA)	940	0.4 (I_F = 10 mA)	P14
SE1003-C	GaAlAs on GaAs	Ultra high output with wide beam	150	100	1.27 (I_F = 50 mA)	950	20 mW/sr (I_F = 50 mA)	P4
SE1103	GaAlAs	High speed (3 MHz)	150	50	1.6 (I_F = 50 mA)	890	7 mW/sr (I_F = 50 mA)	P4

Package (package appearance)

Package	TO-18 glass	Small resin mold		Domed resin mold	Square resin mold		
							
Package No.	P1	P2	P3	P4	P5	P6	P7

Light Receiving Element

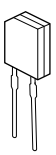
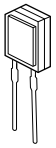
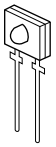
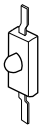
■ Photo-transistor

Type number	Features	Absolute maximum ratings (T_a = 25 ƒC)			Electrical characteristics (T_a = 25ƒC)			Package (package No.)
		P_C (mW)	I_C (mA)	V_{CEO} (V)	I_{CEO} (nA) V_{CE} = 10 V, L = 0	$V_{CE\ (sat)}$ (V) (L = 1000 lx)	I_L (μA) V_{CE} = 2 V, L = 100 lx	
PH101	Small Darlington connection	100	50	20	~ 500 (V_{ce} = 15 V)	~ 1.5	10mA ~	P8
PH102	Small High speed response	100	40	30	~ 200	~ 0.3	50 ~	P8
PH103	Darlington connection	100	50	30	~ 400	~ 1.5	2 mA ~	P9
PH104	High speed response	100	40	30	~ 100	~ 0.3	20 ~	P9
PH105	ϕ4.8 lens package	150	50	30	~ 200	~ 0.3	500 ~ (V_{CE} = 10 V)	P4
PH106	Horizontal type with lens High speed response	100	40	30	~ 100	~ 1.3	60 ~	P6
PH107	Horizontal type with lens Darlington connection	100	50	30	~ 400	~ 1.5	10 mA ~	P6
PH108	Small horizontal type with lens High speed response	100	40	30	~ 100	~ 0.3 (H = 5 m W/cm*)	0.3 mA ~ V_{CE} = 5 V, H = 0.5 mW/cm*	P7
PH108A	Horizontal type with lens High speed response, visible ray cut resin	100	40	30	~ 100	~ 0.3 (H = 5 m W/cm*)	0.2mA ~ V_{CE} = 5 V, H = 0.5 mW/cm*	P7
PH109	Horizontal type with lens Darlington connection	100	50	30	~ 400	~ 1.2	10 mA ~	P7
PH110	Horizontal type with lens High sensitivity, visible ray cut resin	100	40	30	~ 100	~ 0.3 (H = 500 μ W/sr)	200 ~ V_{CE} = 5 V, H = 50 μW/cm*	P3
PH114	Miniature type	75	25	30	~ 100	~ 0.4	40 ~	P5
PH116(L)	Ultra miniature double end	75	25	30	~ 100	~ 0.4	40 ~	P14

*: Measured with infrared of λ_P = 940 nm (peak emission wavelength)

Package (package appearance)

Package	TO-18 glass	Small resin mold		Domed resin mold	Square resin mold		
Package No.	P1	P2	P3	P4	P5	P6	P7

Package	Small resin mold	Square					
							
Package No.	P8	P9	P10	P11	P12	P13	P14

Light Receiving Element

PIN Photo-diode

■ PIN photo-diode for remote control application

Type number	Features	Absolute maximum ratings (T_a = 25 ƒC)			Electrical characteristics (T_a = 25 ƒC)		Package (package No.)
		V_R (V)	P_C (mW)	Sensitivity (nA/lx) (V_R = 5 V)	I_D (nA) (V_R = 10 V)	t_r (ns) (R_L = 1 kΩ)	
PH302	Mold case	32	150	50*1 (6 (μA)*2)	~ 30	50	P10
PH302C	Mold case Visible ray cut filter	32	150	32*1 (5 (μA)*2)	~ 30	50	P10
PH309	Small mold case with lens Visible ray cut resin	32	150	32*1 (5 (μA)*2)	~ 10	30	P12
PH310	Small mold case with lens Visible ray cut resin	32	150	32*1 (5 (μA)*2)	~ 10	30	P13
PH320	Small mold case with lens Visible ray cut resin	32	150	4.3 (μA)*2	~ 10	30	P13

*1: Light source color temperature 2854K
*2: Sensitivity (@H = 0.1 mW/cm^2) for infrared ray (λ_P = 940 nm)

■ PIN photo-diode for CD, VD

Type number	Absolute maximum ratings (T_a = 25 ƒC)				Electrical-optical typical characteristics (T_a = 25 ƒC)							Remarks
					I_D		Ct		S		t_r, t_f	
	I_F (mA)	I_L (mA)	V_R (V)	T_{stg} (ƒC)	V_R (V)	(nA) MAX.	Focus (pF) TYP.	Tracking (pF) TYP.	λ (nm)	(A/W) TYP.	(ns) TYP.	
PH315	10	5	20	–40 to +100	15	4	1.6	1.9	780	0.52	1	6 unit PD

Light Receiving Element

Light Receiving IC

■ Light Receiving IC with built-in Schmidt trigger circuit

Type number	Features	Absolute maximum ratings (T_a = 25 ƒC)		Electrical characteristics (T_a = 25 ƒC)		Package
		V_{CC} (V)	I_{OL} (mA)	Threshold irradiance ($\mu W/cm^2$) (V_{CC} = 5 V) λ = 940 nm	V_{OL} (V) I_{OL} = 16 mA V_{CC} = 5 V	
PH502HR	Active high (without incidence: low level) Internal pull-up resistor	17	50	~ 50	~ 0.4	• 3-pin square resin mold
PH502HC	Active high (without incidence: low level) Open-collector output	17	50	~ 50 (R_L = 280 Ω)	~ 0.4 (R_L = 280 Ω)	• 3-pin square resin mold
PH502LR	Active low (without incidence: high level) Internal pull-up resistor	17	50	~ 50	~ 0.4	• 3-pin square resin mold
PH502LC	Active low (without incidence: high level) Open-collector output	17	50	~ 50 (R_L = 280 Ω)	~ 0.4 (R_L = 280 Ω)	• 3-pin square resin mold
PH514HR	Active high (without incidence: low level) Internal pull-up resistor	17	50	~ 500	~ 0.4	• 3-pin square resin mold
PH514HC	Active high (without incidence: low level) Open-collector output	17	50	~ 500 (R_L = 280 Ω)	~ 0.4 (R_L = 280 Ω)	• 3-pin square resin mold
PH514LR	Active low (without incidence: high level) Internal pull-up resistor	17	50	~ 500	~ 0.4	• 3-pin square resin mold
PH514LC	Active low (without incidence: high level) Open-collector output	17	50	~ 500 (R_L = 28 Ω)	~ 0.4 (R_L = 280 Ω)	• 3-pin square resin mold
PH516HR(L)	Active high (without incidence: low level) Internal pull-up resistor	17	50	~ 60	~ 0.4	• Ultra miniature double end
PH516HC(L)	Active high (without incidence: low level) Open-collector output	17	50	~ 60 (R_L = 280 Ω)	~ 0.4 (R_L = 280 Ω)	• Ultra miniature double end
PH516LR(L)	Active low (without incidence: high level) Internal pull-up resistor	17	50	~ 60	~ 0.4	• Ultra miniature double end
PH516LC(L)	Active low (without incidence: high level) Open-collector output	17	50	~ 60 (R_L = 280 Ω)	~ 0.4 (R_L = 280 Ω)	• Ultra miniature double end

■ PIN photo-diode with built-in amplifier for CD

Type number	Absolute maximum ratings (T_a = 25 ƒC)				Light-electrical typical characteristics (T_a = 25 ƒC)						Remarks
	V_{CC} (V)	I_{CC} (mA)	P_D (mW)	T_{stg} (ƒC)	V_{CC} (V)	V_O Focus (mV)	V_O Tracking (mV)	S λ (nm)	S (A/W)	f_T (MHz)	
					TYP.	TYP.	TYP.		TYP.	TYP.	
PH522	11	–	100	–30 to +85	5	110	500	780	–	8	6 unit PD with internal amplifier
PH525	11	–	100	–40 to +85	5	340	710	780	–	8	6 unit PD with internal amplifier

Photocoupler

Type number	Features	BV_{1-2}	I_F (mA)	V_{CEO} (V)	CTR (%)	Package	Remarks
PS1001		1 kV_{DC}	60	30	20 ~	TO-5	Single transistor output
PS2501-1 to -4	High isolation voltage	5 kVr.m.s.	80	80	80 to 600	• 4- to 16-pin DIP (multi)	
PS2502-1 to -4				40	200 ~		Darlington transistor output
PS2503-1 to -4			50	40	100 to 400		Single transistor output
PS2505-1 to -4			±80	80	80 to 600		AC input Single transistor output
PS2506-1 to -4				40	200 ~		AC input Darlington transistor output
PS2521-1 to -4	High isolation voltage Large current input	5 kVr.m.s.	150	80	20 to 80	• 4-pin DIP	Single transistor
PS2525-1 to -4			±150				Darlington transistor
PS2532-1 to -4	High isolation voltage	5 kVr.m.s. (3.75 kVr.m.s.)	80	300	1500 to 6500	• 4- to 16-pin DIP (multi)	Darlington transistor
PS2533-1 to -4				350	1500 to 6500		
PS2561-1 to -2	High isolation voltage (VDE0884 Approved)			80	80 to 400		Single transistor
PS2562-1 to -2					200 ~		Darlington transistor
PS2565-1 to -2			±80		80 to 400		Single transistor
PS2566-1 to -2					200 ~		Darlington transistor
PS2601	High isolation voltage		80	80	80 to 600	• 6-pin DIP	Single transistor With base
PS2602							Single transistor Without base
PS2603				40	200 ~		Darlington transistor With base
PS2604							Darlington transistor Without base
PS2605			±80	80	80 to 600		AC input Single transistor With base
PS2606							AC input Single transistor Without base
PS2607				40	200 ~		AC input Darlington transistor With base
PS2608							AC input Darlington transistor Without base
PS2621	High isolation voltage Large current input		150	80	20 to 50	• 6-pin DIP	Single transistor With base
PS2622							Single transistor Without base
PS2625			±150				AC input Single transistor With base
PS2626							AC input Single transistor Without base
PS2633	High isolation voltage High V_{CEO}		80	300	1000 to 15000		Darlington transistor Without base
PS2634							Darlington transistor Without base
PS2651	High isolation voltage (VDE0884 Approved)			80	50 to 400	• 6-pin DIP (lead forming)	Single transistor With base
PS2652							Single transistor Without base
PS2653				40	200 ~		Darlington transistor With base
PS2654							Darlington transistor Without base

Photocoupler

■ SOP Photocoupler

Type number	Features	BV_{1-2}	I_F(mA)	V_{CEO}(V)	CTR(%)	Package	Remarks
PS2701-1,-2,-4	High isolation voltage	2.5 kVr.m.s.	50	40	50 to 300	• SOP (2.54 pitch)	Single transistor
PS2702-1,-2,-4					200 ~		Darlington transistor
PS2703-1,-2,-4				120	50 to 400		Single transistor
PS2705-1,-2,-4			±50	40	50 to 300		AC input, Single transistor
PS2706-1,-2,-4					200 ~		AC input, Darlington transistor
PS2707-1,-2,-4				120	50 to 400		AC input, Single transistor
PS2732-1,-2,-4	High isolation voltage High V_{CEO}		50	300	1500 to 6500		Darlington transistor
PS2733-1,-2,-4				350			
PS2801-1	High isolation voltage		50	80	80 to 600	• SOP (1.27 pitch)	Single transistor
PS2802-1				40	200 ~		Darlington transistor
PS2805-1			±50	80	80 to 600		AC input, Single transistor
PS2806-1			50	40	200 ~		AC input, Darlington transistor
PS2801-4				80	80 to 600		Single transistor
PS2802-4				40	200 ~		Darlington transistor
PS2805-4			±50	80	80 to 600		AC input, Single transistor
PS2806-4			50	40	200 ~		AC input, Darlington transistor

■ High Speed Photocoupler

Type number	Features	BV_{1-2}	I_F (mA)	V_{CC} (V)	CTR (%)	Package	Remarks
PS2041	High speed response	2.5 kVr.m.s.	25	–0.5 to 15	15 ~	• 6-pin DIP	Photodiode + transistor
PS2043						• 8-pin DIP	
PS2044							
PS2741					10 ~	• 5-pin SOP	
PS8601		5 kVr.m.s.		35	15 ~	• 8-pin DIP	Photodiode + transistor without base
PS8602							Photodiode + transistor

■ High Speed Photocoupler

Type number	Features	BV_{1-2}	I_F (mA)	V_{CC} (V)	t_{PHL}, t_{PLH} (ns)	Package	Remarks
PS9601	High speed response (IC output)	5 kVr.m.s.	20	7	50 (TYP.)	• 8-pin DIP	—
PS9701		2.5 kVr.m.s.	30		50 (TYP.)	• 5-pin SOP	

■ Inverter Control Photocoupler

Type number	Features	BV_{1-2}	I_F (mA)	V_{CC} (V)	I_{O2} (A)	Package	Remarks
PS9634	High output, high noise immunity	5 kVr.m.s.	30	18	0.8	• 8-pin DIP	Built-in amplifier

■ IGBT Drive Photocoupler

Type number	Features	BV_{1-2}	I_F (mA)	V_{CC} (V)	t_{PHL}, t_{PLH} (μs)	Package	Remarks
PS9636	High output	5 kVr.m.s.	20	35	0.5 (TYP.)	• 8-pin DIP	Built-in amplifier

Photocoupler

■ Photo TRIAC Photocoupler

Type number	Features	BV_{1-2}	I_{FT} (mA)	V_{DRM} (V)	I_T (mA)	Package	Remarks
PS3601	High isolation voltage	5 kVr.m.s.	~ 5	600	0.1	• 5-pin DIP	without zerocross
PS3602				400			
PS3611★				600			with zerocross
PS3612★				400			
PS3701	Small size (SOP type) High isolation voltage	3.75 kVr.m.s.	~ 5	600	0.1	• 4-pin SOP	without zerocross
PS3702				400			
PS3711★				600			with zerocross
PS3712★				400			
PS3901	High output power (1.2 A) High isolation voltage	5 kVr.m.s.	~ 5	600	1.2	• 10-pin DIP	without zerocross
PS3911★				600			
PS3912★				400			with zerocross

★: Under development

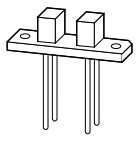
Photointerrupter

PS4XXX Family (phototransistor type)

■ PS40XX - PS45XX family

Type number	Current transfer ratio			Features
	CTR (%)	I_F (mA)	V_{CE} (V)	
PS4001	20 ~	10	2	Light receiving window: 1mm■, Darlington transistor output
PS4003	15 ~	10	2	Darlington transistor output
PS4005, PS4007 PS4009, PS4010	20 ~	10	2	Darlington transistor output
PS4008	0.5 ~	10	2	Single transistor output
PS4011	20 ~	10	2	Light receiving window: 1mm■, Darlington transistor output
PS4015	3 ~	10	2	Light receiving window: 1mm■, Single transistor output
PS4016	270 ~	10	2	Light receiving window: 0.5mm Darlington transistor output
PS4501	0.5 ~	10	2	Light receiving window: 0.5mm Slit, Single transistor output
PS4502	200 ~	10	2	Light receiving window: 0.5mm Slit, Darlington transistor output
PS4503A	270 ~	10	2	Light receiving window: 0.5mm Slit, Darlington transistor output
PS4504A	270 ~	10	2	Light receiving window: 0.5mm Slit, Darlington transistor output
PS4506	2.5 ~	20	2	Light receiving window: 0.5mm Slit, Single transistor output

PS4501

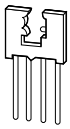


Photointerrupter

■ PS46XX family

Type number	Current transfer ratio			Features
	CTR (%)	I_F (mA)	V_{CE} (V)	
PS4601	1.5 ~	5	2	Small all-in-one type (2.5 mm thick) Single transistor output
PS4602	1.5 ~	5	2	Small all-in-one type (PS4601 with light shield case) Single transistor output
PS4602(1)	1.5 ~	5	2	Small all-in-one type (PS4602 short lead type) Single transistor output
PS4651	40 ~	5	2	Small all-in-one type (2.5 mm thick) Darlington transistor output
PS4652	40 ~	5	2	Small all-in-one type (PS4651 with light shield case) Darlington transistor output
PS4652(1)	40 ~	5	2	Small all-in-one type (PS4652 short lead type) Darlington transistor output

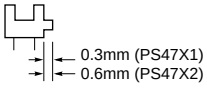
PS4601



■ PS47XX Family

Type number	Current transfer ratio			Features
	CTR (%)	I_F (mA)	V_{CE} (V)	
PS4701 **PS4702**	5 ~	5	0.6	Miniature type (4 x 4 x 4 mm) Single transistor output Light receiving window: 0.3mm slit
PS4703	1.3 ~	10	0.6	Snap-in type Single transistor output Light receiving window: 0.5mm slit
PS4704	1.0 ~	10	0.6	Miniature type (3.8 x 4 x 4 mm) Single transistor output Light receiving window: 0.15mm slit
PS4751 **PS4752**	100 ~	5	2	Miniature type (4 x 4 x 4 mm) Darlington transistor output Light receiving window: 0.3mm slit

PS4701



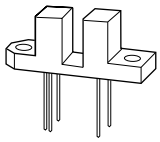
Photointerrupter

PS5XXX Family (photo IC type)

■ PS50XX Family

Type number	Threshold current (mA)	V_{CC} (V)	R_L (Ω)	Features
PS5001HR **PS5002HR** **PS5003HR**	(I_{FLH}) ~ 5	5	–	Internal Schmidt trigger circuit Active high type Internal pull-up resistor Light receiving window: 0.5mm slit (equivalent to 0.5mm■)
PS5001HC **PS5002HC** **PS5003HC**	(I_{FLH}) ~ 5	5	280	Internal Schmidt trigger circuit Active high type Open-collector output Light receiving window: 0.5mm slit (equivalent to 0.5mm■)
PS5001LR **PS5002LR** **PS5003LR**	(I_{FLH}) ~ 5	5	–	Internal Schmidt trigger circuit Active low type Internal pull-up resistor Light receiving window: 0.5mm slit (equivalent to 0.5mm■)
PS5001LC **PS5002LC** **PS5003LC**	(I_{FLH}) ~ 5	5	280	Internal Schmidt trigger circuit Active low type Open-collector output Light receiving window: 0.5mm slit (equivalent to 0.5mm■)

PS5001HR



■ PS57XX Family

Type number	Threshold current (mA)	V_{CC} (V)	R_L (Ω)	Features
PS5701HR **PS5702HR**	(I_{FLH}) ~ 5	5	–	Miniature type (4 ∞ 4 ∞ 4 mm, Light receiving window: 0.3 mm) Internal Schmidt trigger circuit Active high type/internal pull-up resistor
PS5701HC **PS5702HC**	(I_{FLH}) ~ 5	5	280	Miniature type (4 ∞ 4 ∞ 4 mm, Light receiving window: 0.3 mm) Internal Schmidt trigger circuit Active high type/open-collector output
PS5701LR **PS5702LR**	(I_{FLH}) ~ 5	5	–	Miniature type (4 ∞ 4 ∞ 4 mm, Light receiving window: 0.3 mm) Internal Schmidt trigger circuit Active low type/internal pull-up resistor
PS5701LC **PS5702LC**	(I_{FLH}) ~ 5	5	280	Miniature type (4 ∞ 4 ∞ 4 mm, Light receiving window: 0.3 mm) Internal Schmidt trigger circuit Active low type/open-collector output
PS5732LR-R	(I_{FLH}) ~ 3	3	–	Miniature type (4 ∞ 4 ∞ 4 mm, Light receiving window: 0.3 mm) Low supply voltage (1.4 to 7 V) Internal Schmidt trigger circuit Active low type/internal pull-up resistor

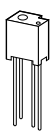
PS5701HR

0.3 mm (PS5701XX)
0.6 mm (PS5702XX)

■ PS6XXX family (reflective type sensor)

Type number	Light current I_L (μA)	I_F (mA)	V_{CE} (V)	Features
PS6001A	100 ~ (Metal reflection surface)	≒ 30	5	Single transistor output
PS6002A	400 ~ (White reflection surface)	10	2	Single transistor output Long detection distance (effective detection distance: 3 to 10 mm) Visible ray cut resin used (light receiving side)

PS6002A



Opto MOS FET Relay

Type number	Features	V_{I-O} (V)	V_{BOUT} (V)	I_L (mA)	R_{on} (ý)	Working I_F (mA)	Package	Remarks
PFA101A	General use	1500	60	150	10.0	10	6-pin DIP	AC/DC
PFA112A			100	200	6.0			
PFA113A			100	350	2.5			
PFA122A			200	250	5.0			
PFA141A			400	150	10.0			
PFD102A			60	200	5.0			DC
PFD112A			100	250	3.0			
PFD114A			100	450	1.3			
PFD123A			200	350	2.5			
PFD142A			400	200	5.0			
PFA112B	High sensitivity	2500	100	200	6.0	5	6-pin DIP	AC/DC
PFA113B			100	350	2.5			
PFA122B			200	250	5.0			
PFA141B			400	150	10.0			
PFA160B			600	100	50.0			
PFD112B			100	250	3.0			DC
PFD114B			100	450	1.3			
PFD123B			200	350	2.5			
PFD142B			400	200	5.0			
PFD161B			600	140	25.0			
PFA141C	High isolation voltage	5000	400	150	10.0	10	6-pin DIP	AC/DC
PFA160C			600	90	50.0			
PFD142C			400	200	5.0			DC
PFD161C			600	120	25.0			
PFA141E		2500	400	120	50.0	5	6-pin DIP	AC/DC
PFA201A	General use 2-channel	1500	60	100	10.0	5	8-pin DIP	AC/DC
PFA213A			100	300	2.5			
PFA222A			200	200	5.0			
PFA260A			600	90	50.0			

Light Transmission Link

Type number	Absolute maximum rating (T_a = 25 ƒC)		Electrical characteristics (T_a = 25 ƒC)			
	V_{CC} (V)	Topt (ƒC)	Transmission capacity (bps, NRZ)	Transmission distance (m)	I_{CC} (mA) TYP.	Light output (dBm)
PLX101 series			DC to 6M	0.2 to 5		
PLT101	–0.5 to +7	–20 to +70			15 (R_L = 8.2 kΩ)	–21 to –15
PLR101	–0.5 to +7	–20 to +70			25	
PLX102 series			DC to 6M	0.2 to 5		
PLT102	–0.5 to +7	–20 to +70			15 (R_L = 8.2 kΩ)	–21 to –15
PLR102	–0.5 to +7	–20 to +70			25	
PLX104 series			DC to 6M	0.2 to 5		
PLT104	–0.5 to +7	–20 to +70			15 (R_L = 8.2 kΩ)	–21 to –15
PLR104	–0.5 to +7	–20 to +70			25	
PLX1101 series			DC to 6M	0.1 to 50		
PLT1101	–0.5 to +7	–20 to +70			15 (R_L = 8.2 kΩ)	–21 to –11
PLR1101	–0.5 to +7	–20 to +70			25	
PLX201 series			DC to 6M	0.1 to 50		
PLD201A	–0.5 to +7	–20 to +70				–21 to –11

Configuration

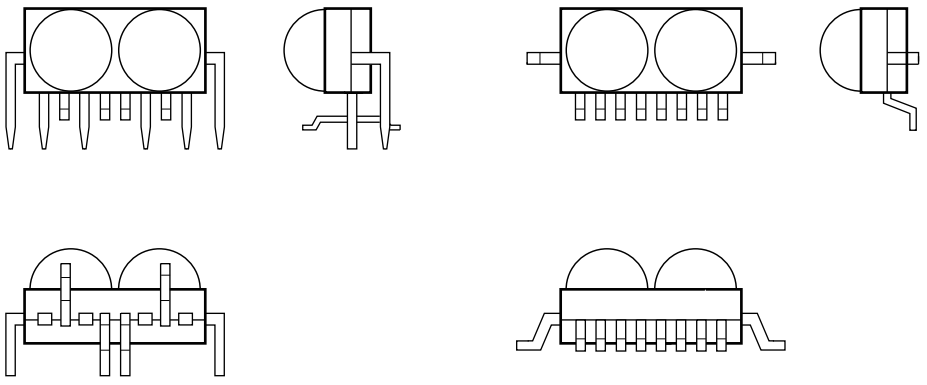
Link name	Optical transmission module	Optical receive module	Optical transmission/ receive module	Remarks
PLX101 series	PLT101	PLR101	———	BS tuner TV with BS tuner Audio equipment
PLX102 series	PLT102	PLR102		
PLX104 series	PLT104	PLR104★	———	BS tuner TV with BS tuner Audio equipment
PLX1101 series	PLT1101	PLR1101		FA, OA, measurement and test equipment
PLX201 series	———		PLD201A	

★: Under development

Infra-Red Link Unit

Conform to IrDA Ver. 1.0 / Ver. 2.0

Type number	Absolute maximum rating (T_A = 25 ƒC)		Electrical characteristics (T_A = 25 ƒC)			Package (package No.)
	V_{CC} (V)	Topt (ƒC)	Data rate (bps)	Transmission distance (m)	Viewing angle (°C)	
PLS4001L1	−0.5 to +7.0	0 to +70	2.4 k to 4 M	~ 1.0	30	P1
PLS4001L2						P2

Package	
Package No.	P1 P2

Packages

Plastic DIP 198

Ceramic DIP 201

Plastic SOP 202

Plastic TSOP 204

Plastic QFP 205

QFJ 208

Ceramic PGA 209

Plastic SIP 210

Plastic V-DIP 211

Plastic ZIP 211

Plastic Mold 212

Note: Only typical packages are shown here.

Plastic DIP (Dual In-line Package)

Units in mm

8-pin plastic DIP (300mil)

P8C-100-300B, C

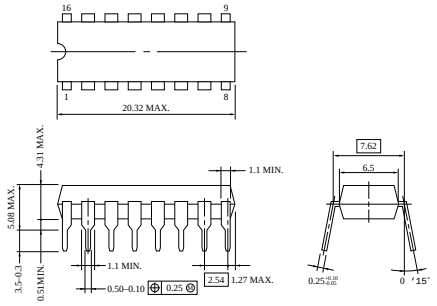
14-pin plastic DIP (300mil)

P14C-100-300B1

14-pin plastic shrink DIP (300mil)

P14C-70-300B

16-pin plastic DIP (300mil)



P16C-100-300B-1

16-pin plastic shrink DIP (300mil)

P16C-70-300B

16-pin plastic DIP with TAB (300mil)

P16CT-100-300B

18-pin plastic DIP (mil)

P18C-100-300A, C

18-pin plastic shrink DIP (300mil)

P18C-70-300B

Plastic DIP (Dual In-line Package)

Units in mm

20-pin plastic DIP (300mil)

P20C-100-300A, C

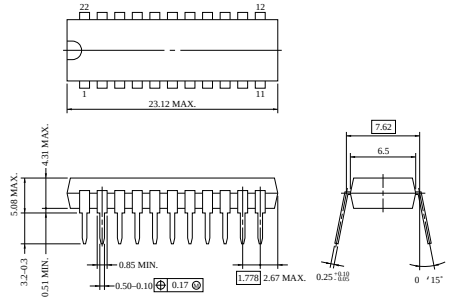
20-pin plastic shrink DIP (300mil)

P20C-70-300B

22-pin plastic DIP (300mil)

P22C-100-300WA

22-pin plastic shrink DIP (300mil)

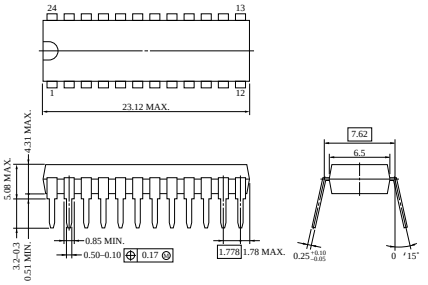


S22C-70-300B-1

24-pin plastic DIP (300mil)

P24C-100-300A

24-pin plastic shrink DIP (300mil)



S24C-70-300B-1

28-pin plastic DIP (400mil)

P28C-100-400

28-pin plastic shrink DIP (400mil)

S28C-70-400B

Plastic DIP (Dual In-line Package)

Units in mm

30-pin plastic shrink DIP (400mil)

S30C-70-400B

40-pin plastic DIP (600mil)

P40C-100-600A

40-pin plastic shrink DIP (600mil)

P40C-70-600A

42-pin plastic DIP (600mil)

P42C-100-600A, B

42-pin plastic shrink DIP (600mil)

P42C-70-600A

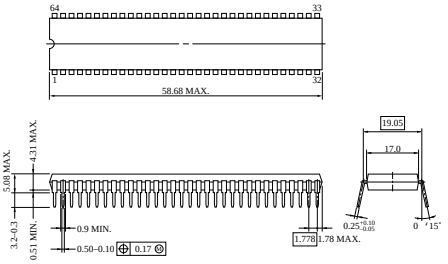
48-pin plastic DIP (600mil)

P48C-100-600A

48-pin plastic shrink DIP (600mil)

P48C-70-600B

64-pin plastic shrink DIP (750mil)

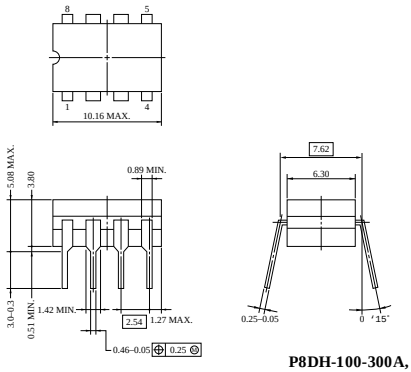


P64C-70-750A, C-1

Ceramic DIP (Dual In-line Package)

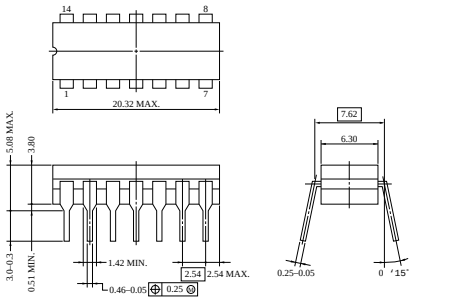
Units in mm

8-pin ceramic DIP (300mil)



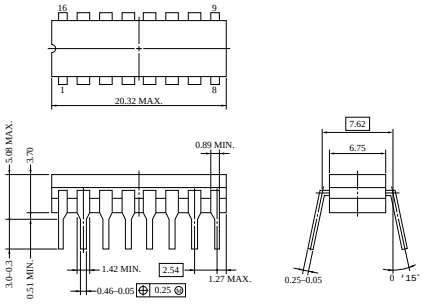
P8DH-100-300A, B-1

14-pin ceramic DIP (300mil)



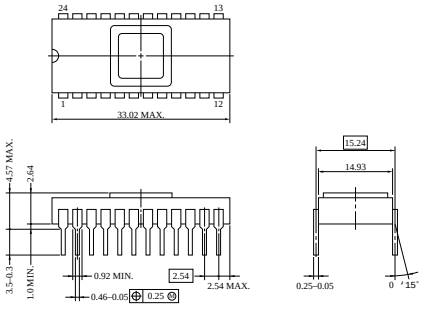
P14DH-100-300A1, B-1

16-pin ceramic DIP (300mil)



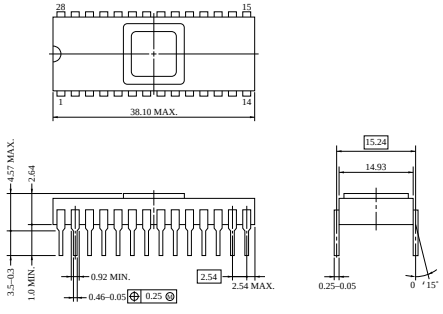
P16DH-100-300A1-1

24-pin ceramic DIP (600mil)



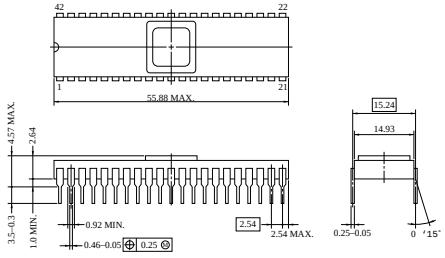
P24D-100-600A-1

28-pin ceramic DIP (600mil)



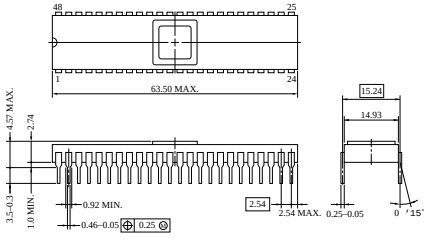
P28D-100-600A1-1

42-pin ceramic DIP (600mil)



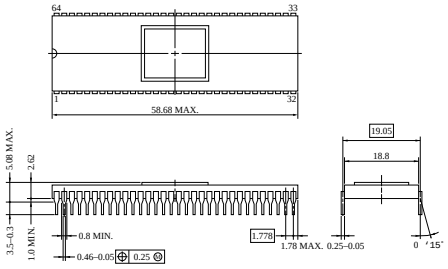
P42D-100-600A-1

48-pin ceramic DIP (600mil)



P48D-100-600A-1

64-pin ceramic DIP (750mil)

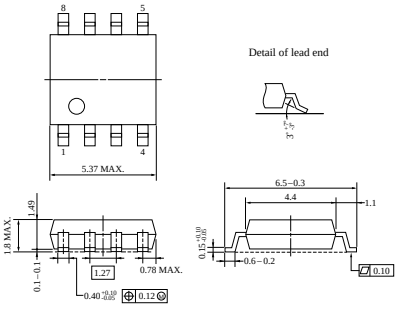


P64D-70-750A-1

Plastic SOP (Small Out-line Package)

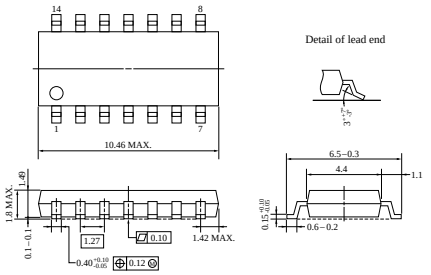
Units in mm

8-pin plastic SOP (225mil)



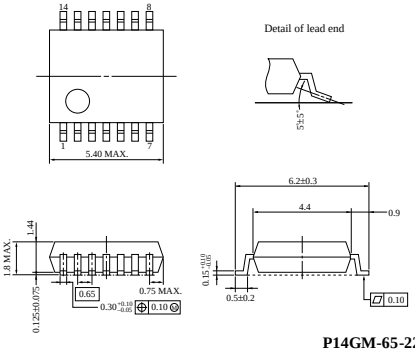
S8GM-50-225B-4

14-pin plastic SOP (225mil)



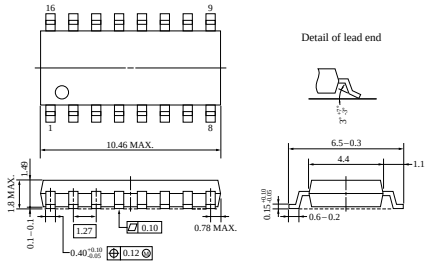
S14GM-50-225B, C-4

14-pin plastic shrink SOP (225mil)



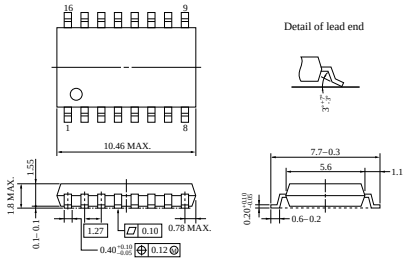
P14GM-65-225B-2

16-pin plastic SOP (225mil)



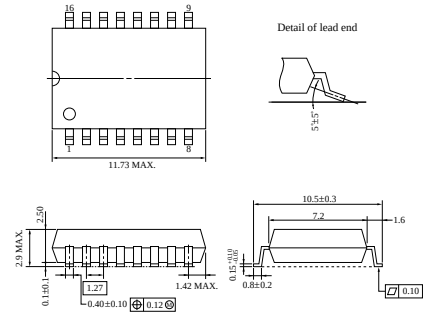
S16GM-50-225B, C-4

16-pin plastic SOP (300mil)



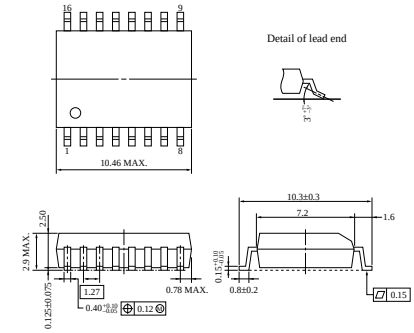
P16GM-50-300B-4

16-pin plastic SOP (375mil)



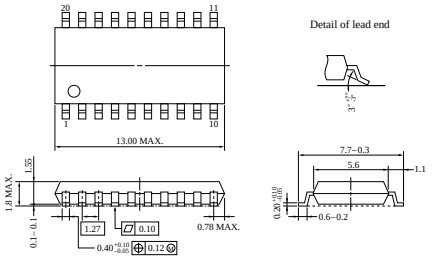
P16GM-50-375A-2

16-pin plastic SOP (575mil)



P16GM-50-375B-3

20-pin plastic SOP (300mil)

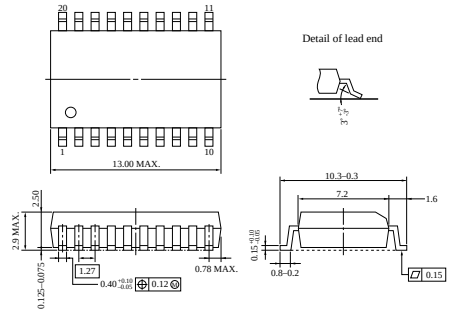


P20GM-50-300B, C-4

Plastic SOP (Small Out-line Package)

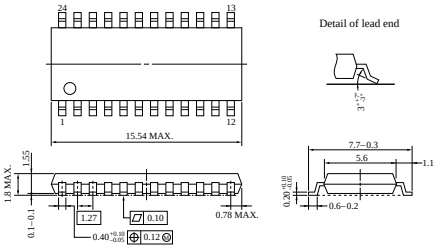
Units in mm

20-pin plastic SOP (375mil)



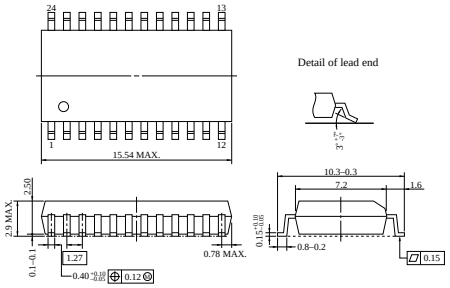
P20GM-50-375B-4

24-pin plastic SOP (300mil)



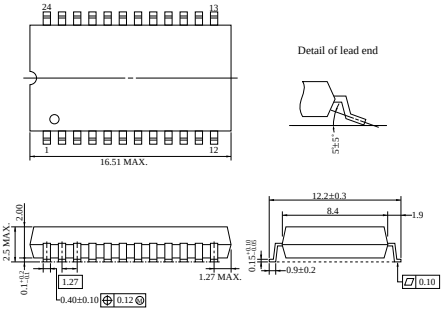
P24GM-50-300B-4

24-pin plastic SOP (375mil)



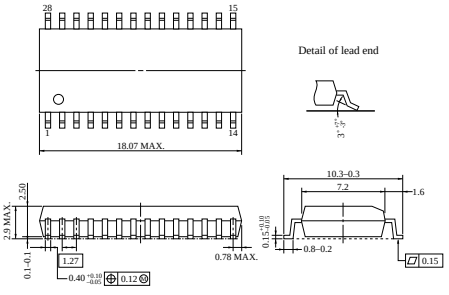
P24GM-50-375B-3

24-pin plastic SOP (450mil)



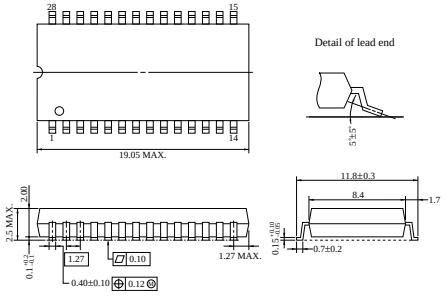
P24GM-50-450A-2

28-pin plastic SOP (375mil)



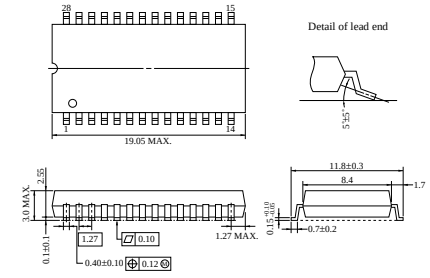
P28GM-50-375B-3

28-pin plastic SOP (450mil)



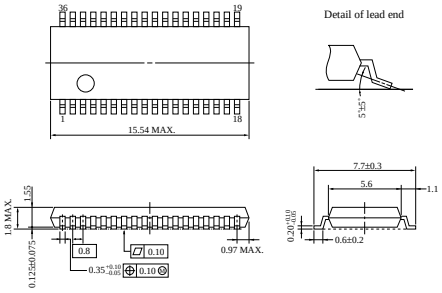
P28GM-50-450A1-2

28-pin plastic SOP (450mil)



P28GM-50-450A2-2

36-pin plastic shrink SOP (300mil)

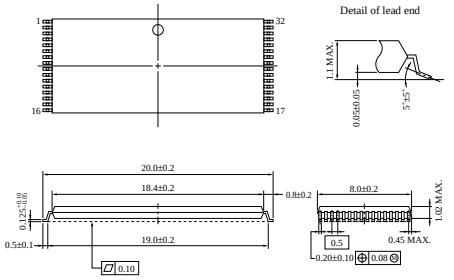


P36GM-80-300B-3

Plastic TSOP (Thin Small Out-line Package)

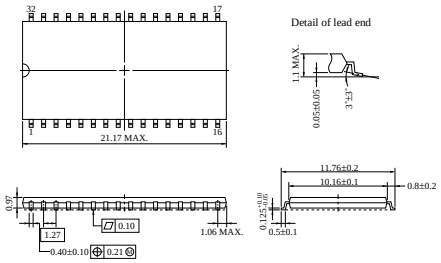
Units in mm

32-pin plastic TSOP(I) (8 ∞ 20)



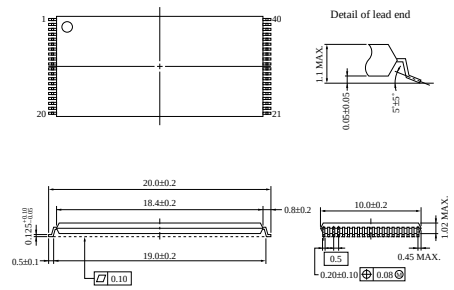
S32GZ-50-KJH-1

32-pin plastic TSOP(II) (400mil)



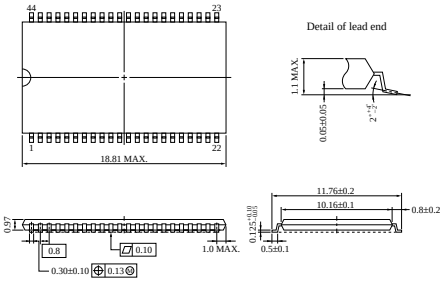
S32G5-50-7JD-2

40-pin plastic TSOP(I) (10 ∞ 20)



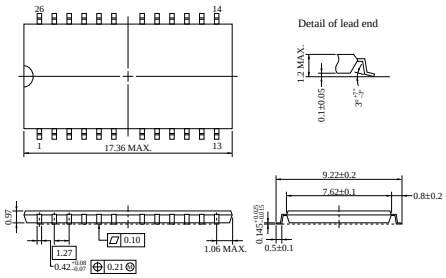
S40GZ-50-LJH-1

44-pin plastic TSOP(II) (400mil)



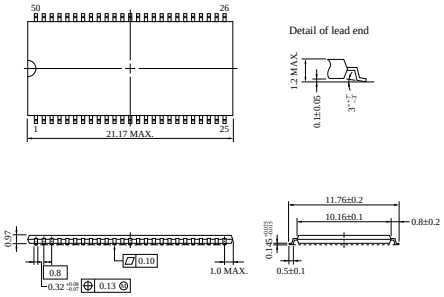
S44G5-80-7JF1-1

26-pin plastic TSOP(II) (300mil)



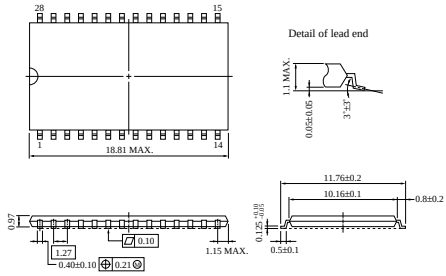
S26G3-50-7JD1

50-pin plastic TSOP(II) (400mil)



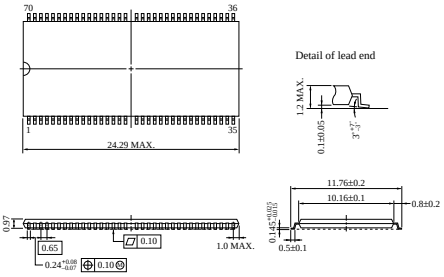
S50G5-80-7JF2

28-pin plastic TSOP(II) (400mil)



S28G5-50-7JD-2

70-pin plastic TSOP(II) (400mil)

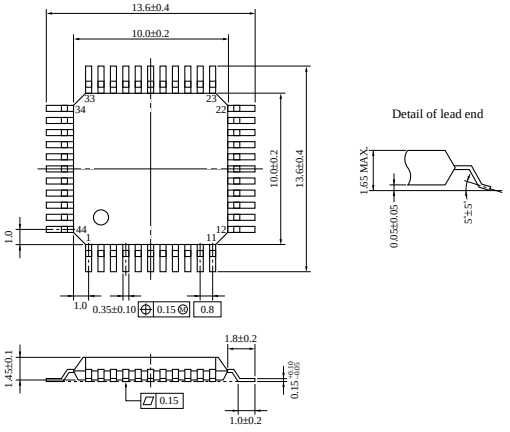


S70G5-65-7JG

Plastic QFP (Quad Flat Package)

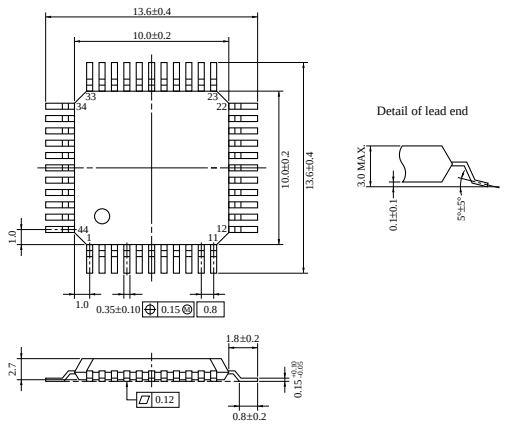
Units in mm

44-pin plastic QFP



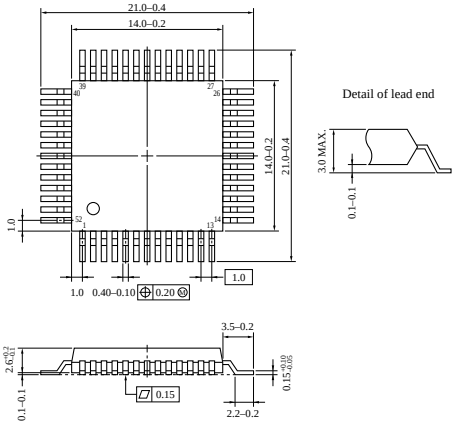
P44G-80-22-2

44-pin plastic QFP



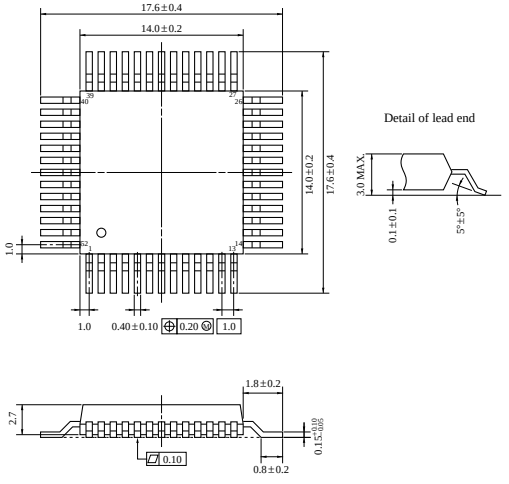
P44GB-80-3B4-2

52-pin plastic QFP



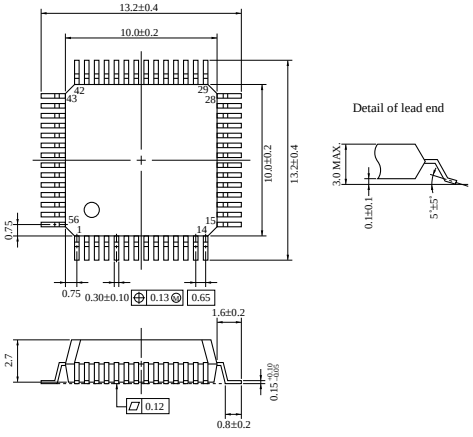
P52G-100-00-2

52-pin plastic QFP



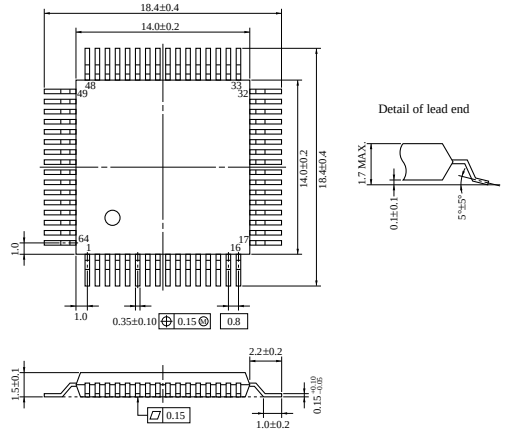
P52GC-100-3B6, 3BH-2

56-pin plastic QFP



S56GB-65-3B7-2

64-pin plastic QFP

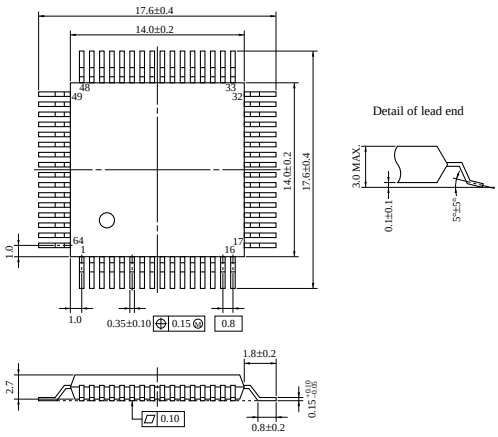


P64G-80-22-2

Plastic QFP (Quad Flat Package)

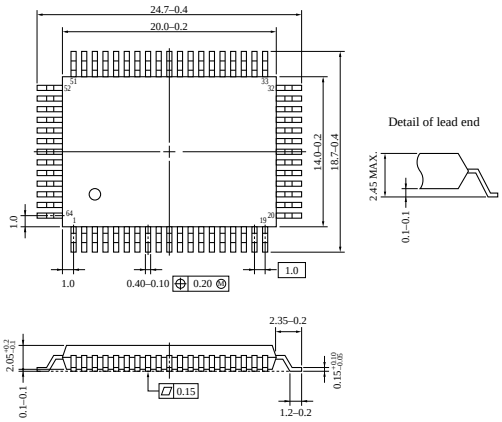
Units in mm

64-pin plastic QFP



P64GC-80-3BE-2

64-pin plastic QFP

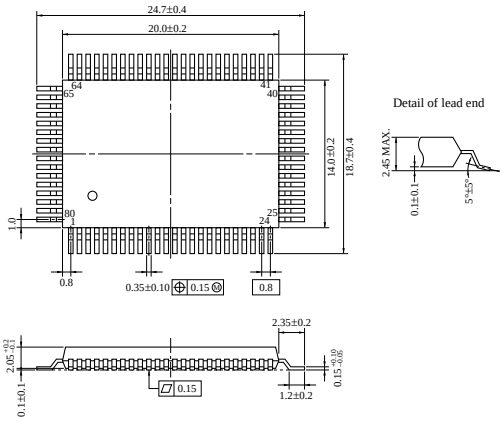


P64G-100-12, 1B-2

64-pin plastic QFP

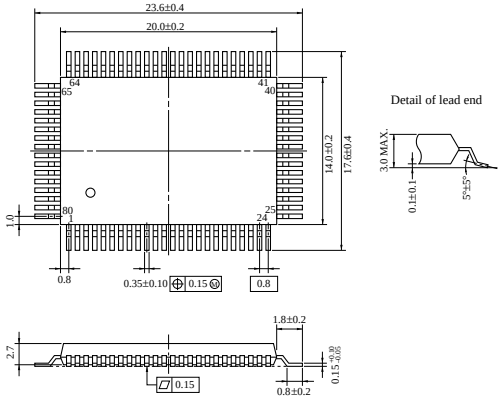
P64GF-100-3B8, 3BE-1

80-pin plastic QFP



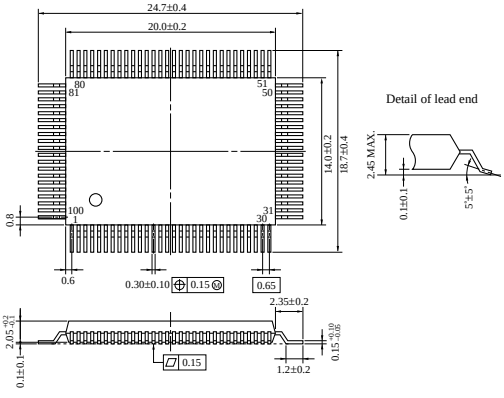
P80G-80-12-2

80-pin plastic QFP



P80GF-80-3B9-2

100-pin plastic QFP

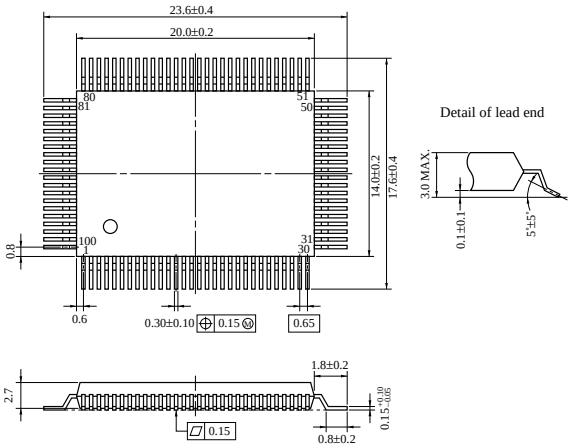


P100G-65-12-2

Plastic QFP (Quad Flat Package)

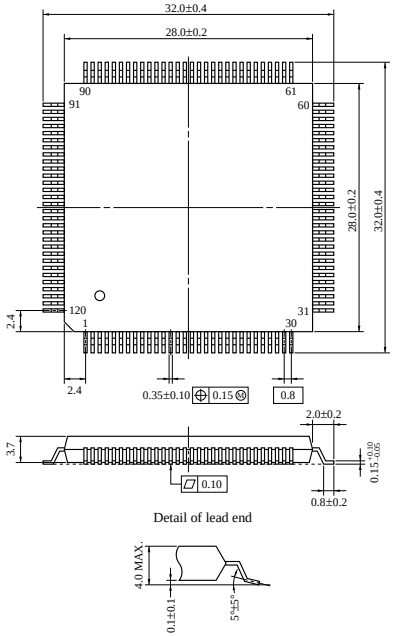
Units in mm

100-pin plastic QFP



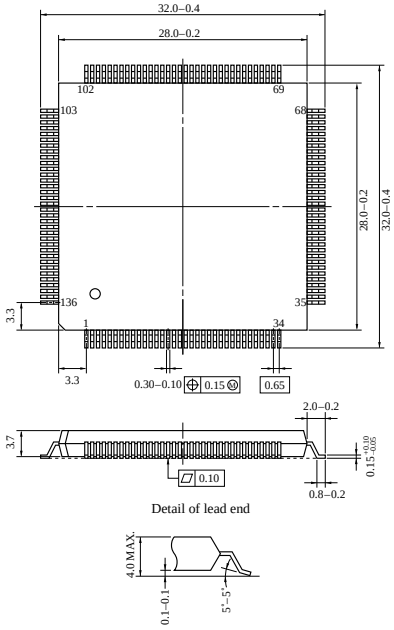
P100GF-65-3BA-2

120-pin plastic QFP



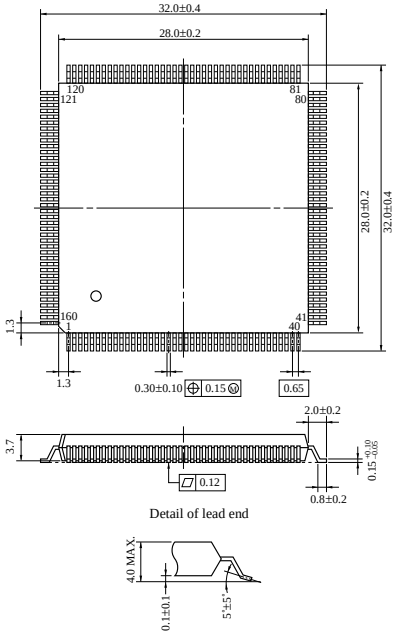
P120GD-80-5BB-3

136-pin plastic QFP



P136GD-65-5BC-3

160-pin plastic QFP

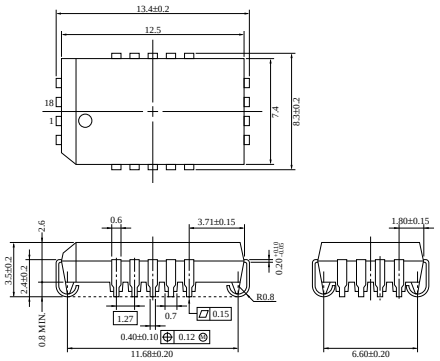


P160GD-65-5BD-2

QFJ (Quad Flat J-Lead)

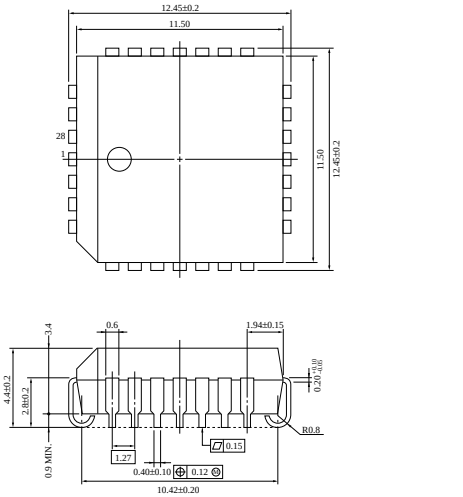
Units in mm

18-pin QFJ



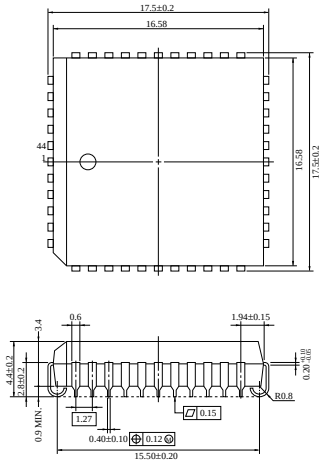
P18L-50A-2

28-pin QFJ



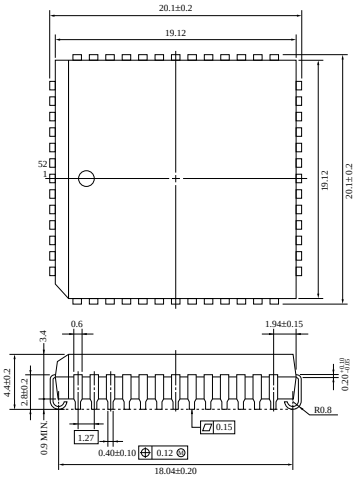
P28L-50A1-2

44-pin QFJ



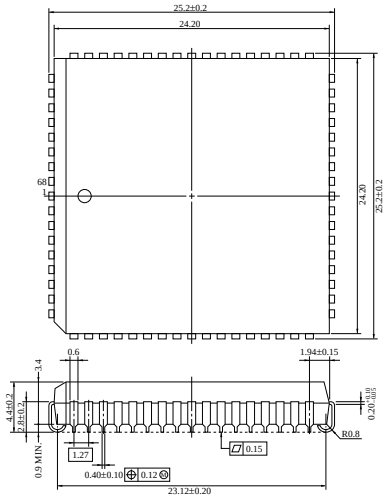
P44L-50A1-2

52-pin QFJ



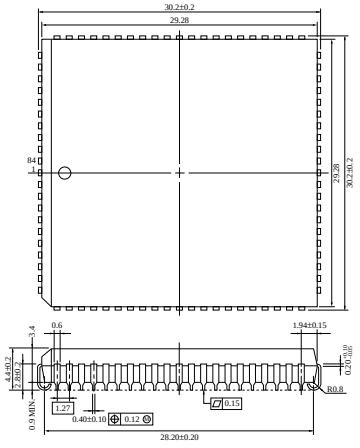
P52L-50A1-2

68-pin QFJ



P68L-50A1-2

84-pin QFJ



P84L-50A3-2

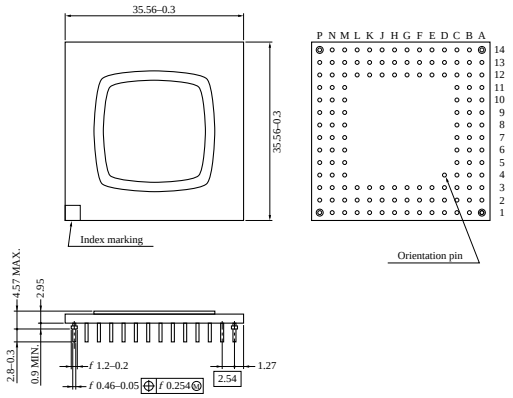
Ceramic PGA (Pin Grid Array)

Units in mm

68-pin ceramic PGA

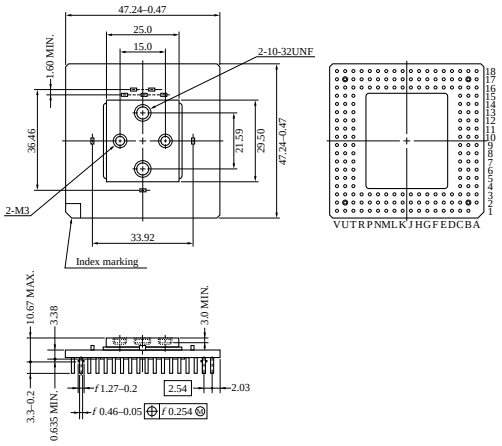
X68R-100A-1

132-pin ceramic PGA



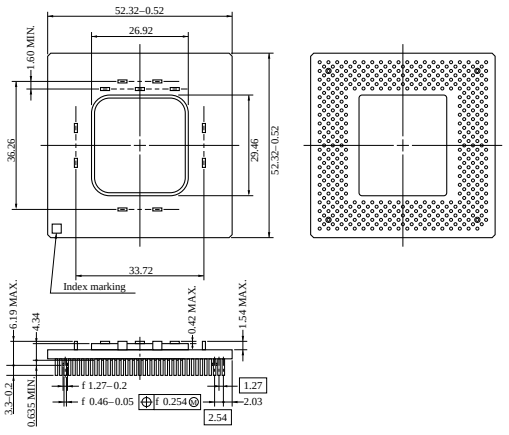
X132R-100A-1

179-pin ceramic PGA



X179RP-100A

447-pin ceramic PGA



X447RG-50A-2

Plastic SIP (Single In-line Package) **Units in mm**

7-pin plastic slim SIP **P7HA-254B**	**7-pin plastic power SIP** **P7HP-254B**
8-pin plastic slim SIP **P8HA-254B**	**8-pin plastic power SIP** **P8HP-254B**
9-pin plastic slim SIP **P9HA-254B**	**9-pin plastic power SIP** **P9HP-254B-1**
10-pin plastic slim SIP **P10HP-254B1**	**12-pin plastic power SIP** **P12HP-154B2**

Plastic V-DIP
(Vertical Dual In-line Package)

Plastic ZIP
(Zigzag In-line Package)

Units in mm

5-pin plastic power V-DIP **P5VP-340B3-1**	**16-pin plastic ZIP** **P16V-254A-1**
11-pin plastic power V-DIP **P11VP-340B**	**19-pin plastic ZIP** **P19V-254B-1**
14-pin plastic power V-DIP **P15VP-254B**	**20-pin plastic ZIP** **P20V-254A-1**
14-pin plastic power V-DIP **P14VP-340B**	**24-pin plastic ZIP** **P24V-254-400A-1**

Plastic Mold **Units in mm**

2-pin ultra super mini mold	**3-pin super mini mold (SC-70)**
2-pin super mini mold	**3-pin mini mold (SC-59)**
2-pin power mini mold	**3-pin power mini mold (SC-62)**
3-pin ultra super mini mold	**MP-2**

Plastic Mold **Units in mm**

MP-3Z (SC-64)	**6-pin super mini mold**
MP-25Z	**6-pin mini mold**
5-pin super mini mold	
5-pin mini mold	

Plastic Mold **Units in mm**

TO-92	**SST**
SP-8	**MP-3 (SC-63)**
MP-25 (TO-220)	**MP-45F**
MP-10	**MP-88**

INDEX

Type number	Page
[Numerals]	
03P2J	163
03P2M	163
03P4J	163
03P4M	163
03P4MF	163
03P4MG	163
03P5J	163
03P5MG	163
03P6MG	163
2P4M	163
2P5M	163
2P6M	163
2S2M	163
2S4M	163
2SA1005	128,138
2SA1006	132,143
2SA1006A	132,143
2SA1006B	132,143
2SA1008	132,141
2SA1009	132,141
2SA1009A	132,141
2SA1010	132,141
2SA1069	132,141
2SA1069A	132
2SA1129	132,143
2SA1138	138
2SA1141	134
2SA1142	131
2SA1151	128
2SA1152	128
2SA1153	139
2SA1154	130
2SA1156	131,141
2SA1173	136,138
2SA1174	129,138
2SA1175	129,138
2SA1206	128,139
2SA1220	131,143
2SA1220A	131,143
2SA1221	130
2SA1222	130
2SA1226	135,138
2SA1227	134,143
2SA1227A	134,143
2SA1232	134,143
2SA1247	135,138
2SA1261	132
2SA1330	135,138
2SA1376	128,138
2SA1376A	128
2SA1383	132
2SA1385	131,140
2SA1385-Z	137
2SA1394	133,141
2SA1395	133,141
2SA1396	133,141
2SA1400	131,141
2SA1400-Z	137
2SA1409	128,138
2SA1410	129,138
2SA1411	135,138
2SA1412	131
2SA1412-Z	137
2SA1413	131,141
2SA1413-Z	137
2SA1424	135
2SA1441	133,140
2SA1442	133,140
2SA1443	133,140
2SA1444	133,140
2SA1458	129,139
2SA1459	129,139
2SA1460	130,139,141
2SA1461	135,139
2SA1462	135,139
2SA1463	136,139
2SA1464	135,139
2SA1467	135
2SA1486	131,141
2SA1544	128
2SA1546	131,143
2SA1608	137,139
2SA1609	137,138
2SA1610	137,139
2SA1611	137,138
2SA1612	137,138
2SA1613	137,138
2SA1615	131,140
2SA1615-Z	137
2SA1625	128
2SA1626	130
2SA1627	130
2SA1644	132,140
2SA1645	132,140
2SA1646	132,140
2SA1647	131,140
2SA1648	131,140
2SA1649	131,140
2SA1650	133,140
2SA1651	133,140
2SA1652	133,140
2SA1714	131,144
2SA1715	144
2SA1716	132,144
2SA1717	132,144
2SA1718	133,144
2SA1719	133,144
2SA1720	133,144
2SA1741	133,140
2SA1742	133,140
2SA1743	133,140
2SA1744	133,140
2SA1833	133,144
2SA1836	137
2SA1840	134,144
2SA1841	134,144
2SA1842	134,144
2SA1843	134,140
2SA1844	134,140
2SA1845	134,140
2SA1846	134,140
2SA1847	134,140
2SA1871	136
2SA1897	130,140
2SA675	128
2SA733	128,138
2SA811A	135,138
2SA812	135,138
2SA915	130,138
2SA916	130,138
2SA952	128,138
2SA953	128,138
2SA954	128,138
2SA985	132,143
2SA985A	132,143
2SA987	128,138
2SA988	128,138
2SA990	128,138
2SA991	128,138
2SA992	128,138
2SB1038	132,142
2SB1068	128,138
2SB1087	144
2SB1089	142
2SB1093	130,144
2SB1094	133,142
2SB1096	133,142
2SB1097	133,142
2SB1098	133,144
2SB1099	133,144
2SB1100	133,144
2SB1111	131,144
2SB1114	136,138
2SB1115	136,138
2SB1115A	136,138
2SB1116	128,138
2SB1116A	128,138
2SB1117	130,140
2SB1149	131,144
2SB1150	131,144
2SB1151	131,140
2SB1217	131,140
2SB1261	131,140
2SB1261-Z	137
2SB1300	128
2SB1301	136
2SB1315	142
2SB1318	130
2SB1430	133,144
2SB1431	133,144
2SB1432	133,144
2SB1475	137
2SB1571	136
2SB1572	136
2SB1578	136,140
2SB1581	136,140
2SB536	132,142
2SB537	132,142
2SB546A	132,142
2SB547A	132,142
2SB548	131,142
2SB549	131,142
2SB564	130,138
2SB601	132,144
2SB605	130,138
2SB624	135,138
2SB703	132,142
2SB703A	132,142
2SB707	132,142
2SB708	132,142
2SB731	131,142
2SB733	130,138
2SB734	130,138
2SB736	135,138
2SB736A	135,138
2SB744	131,142
2SB744A	131,142
2SB768	131,137,142
2SB772	131,140
2SB794	131,144
2SB795	131,144
2SB798	136,138
2SB799	136,138
2SB800	136,138
2SB804	136,138
2SB805	136,138
2SB806	136,138
2SB810	129,138
2SB811	129,138
2SB849A	134,142
2SB897	134,144
2SB962	131,140
2SB962-Z	137
2SB963	131,144
2SB963-Z	137
2SB965	134,142
2SB966	134,142
2SB974	132,144
2SB975	132,144
2SB984	130
2SC1009A	135,138
2SC1044	168
2SC1275	168
2SC1424	168
2SC1426	168
2SC1449	131,143
2SC1505	132,143
2SC1506	132,143
2SC1507	132,143
2SC1621	135
2SC1622A	135,138
2SC1623	135,138
2SC1653	135,139
2SC1654	135,139
2SC1674	128,138
2SC1675	128,138
2SC1840	128,138
2SC1841	128,138
2SC1842	128,138
2SC1843	128,138
2SC1844	128,138
2SC1845	128,138
2SC1940	130,139
2SC1941	130,139
2SC2001	128,138
2SC2002	128,138
2SC2003	128,138
2SC2148	168
2SC2149	168
2SC2150	168
2SC2223	135,138
2SC2275	132,143
2SC2275A	132,143
2SC2331	132,141
2SC2333	132,141
2SC2334	132,141
2SC2335	132,141
2SC2336	132,143
2SC2336A	132,143
2SC2336B	132,143
2SC2351	135,177
2SC2371	131,143
2SC2373	132,141
2SC2516	132,141
2SC2516A	132
2SC2517	132,141
2SC2518	132,141
2SC2570A	177
2SC2571	141
2SC2654	132,143
2SC2682	131
2SC2688	131,143
2SC2690	131,143
2SC2690A	131,143
2SC2718	128
2SC2719	128
2SC2720	139
2SC2721	130
2SC2749	134,141
2SC2750	134,141
2SC2751	134
2SC2752	131,141
2SC2757	135
2SC2758	135
2SC2759	135
2SC2762	168
2SC2780	136,139
2SC2784	129,138
2SC2785	129,138
2SC2786	129,138
2SC2787	129,138
2SC2802	131,137,143
2SC2850-KA	168
2SC2850-MA	168
2SC2885	131,141
2SC2901	128,139
2SC2908	134
2SC2946	131,141
2SC2946(1)	131,137,141
2SC2954	136
2SC2958	130
2SC2959	130
2SC2987	134,143
2SC2987A	134,143
2SC3012	134,143
2SC3115	135,138
2SC3157	132
2SC3158	132,141
2SC3159	132,141
2SC3209	130,139,143
2SC3217-M	168
2SC3218-M	168
2SC3282A	168
2SC3283A	168
2SC3355	177
2SC3356	135,177
2SC3357	136
2SC3360	135,138
2SC3431	132,141
2SC3432	132,141
2SC3434	134,141
2SC3435	134,141
2SC3478	128,138
2SC3478A	128
2SC3514	132
2SC3518	131,140
2SC3518-Z	137
2SC3531	132,141
2SC3532	132,141

Type number	Page
2SC3533	134,141
2SC3534	134,141
2SC3535	134,141
2SC3536	134,141
2SC3537	168
2SC3538	168
2SC3539	168
2SC3541	168
2SC3542	168
2SC3545	135,176,177
2SC3554	136,139
2SC3566	133,141
2SC3567	133,141
2SC3568	133,141
2SC3569	133,141
2SC3570	133,141
2SC3571	133,141
2SC3572	133,141
2SC3583	135
2SC3585	135
2SC3587	168
2SC3588	131,141
2SC3588-Z	137
2SC3603	168
2SC3604	168
2SC3615	128,139
2SC3616	128,139
2SC3617	136,139
2SC3618	136,139
2SC3622	128,138
2SC3622A	128,138
2SC3623	129,138
2SC3623A	129,138
2SC3624	135,138
2SC3624A	135,138
2SC3631	131,141
2SC3631-Z	137
2SC3632	131,141
2SC3632-Z	137
2SC3660	168
2SC3660A	168
2SC3663	135
2SC3691	133,140
2SC3692	133,140
2SC3693	133,140
2SC3694	133,140
2SC3731	129,139
2SC3732	129,139
2SC3733	130,139,141
2SC3734	135,139
2SC3735	135,139
2SC3736	136,139
2SC3739	135,139
2SC3742	135
2SC3817	168
2SC3818	168
2SC3819	168
2SC3840	131,141
2SC3841	176
2SC4000	130,143
2SC4001	131,143
2SC4062	133,140
2SC4063	133,140
2SC4092	135,177
2SC4093	135,177
2SC4094	135
2SC4095	135
2SC4173	137,139
2SC4175	137
2SC4176	137,139
2SC4177	137,138
2SC4178	137,138
2SC4179	137,138
2SC4180	137
2SC4181	137,138
2SC4182	176
2SC4183	176
2SC4184	176,177
2SC4185	176,177
2SC4186	176
2SC4226	177
2SC4228	177
2SC4328	132,140
2SC4329	132,140
2SC4330	132,140
2SC4331	131,140
2SC4332	131,140
2SC4333	131,140
2SC4334	133,140
2SC4335	133,140
2SC4336	133,140
2SC4337	131,144
2SC4338	131,144
2SC4339	131,144
2SC4340	131,144
2SC4341	131,144
2SC4342	131,144
2SC4343	131,140
2SC4344	131,140
2SC4345	131,144
2SC4346	131,141
2SC4347	132,144
2SC4348	132,144
2SC4349	132,144
2SC4350	132,144
2SC4351	133,144
2SC4352	133,144
2SC4353	133,144
2SC4496	132
2SC4549	133,140
2SC4550	133,140
2SC4551	133,140
2SC4552	133,140
2SC4553	133,140
2SC4554	133,140
2SC4568	135,177
2SC4569	135,177
2SC4570	177
2SC4571	177
2SC4783	137
2SC4810	134,144
2SC4811	134,144
2SC4812	134,144
2SC4813	134,140
2SC4814	134,140
2SC4815	134,140
2SC4816	134,140
2SC4817	134,140
2SC4818	134,140
2SC4819	134,140
2SC4942	136
2SC5004	177
2SC5005	177
2SC5006	177
2SC5008	177
2SC5011	177
2SC5013	177
2SC5185	102
2SC945	128,138
2SC945 (L)	128,138
2SD1000	136,139
2SD1001	136,138
2SD1005	136,139
2SD1006	136,139
2SD1007	136,139
2SD1017	134,142
2SD1018	134,142
2SD1020	129,138
2SD1021	129
2SD1033	131,137,142
2SD1070	134,142
2SD1110A	134,142
2SD1162	132,144
2SD1164	131,144
2SD1164-Z	137
2SD1210	134,144
2SD1286	131,144
2SD1286-Z	137
2SD1288	134,142
2SD1289	134,142
2SD1296	134,144
2SD1297	134,144
2SD1298	134,144
2SD1308	132,144
2SD1309	132,144
2SD1310	132,142
2SD1311	132,142
2SD1312	130
2SD1392	132,144
2SD1448	131,142
2SD1448-Z	137
2SD1481	132
2SD1491	131,144
2SD1513	128,139
2SD1557	131,142
2SD1564	144
2SD1565	144
2SD1567	142
2SD1568	142
2SD1579	130,144
2SD1581	130,139,140
2SD1582	130,140
2SD1583	131,140
2SD1583-Z	137
2SD1584	131,140
2SD1584-Z	137
2SD1585	133,142
2SD1586	133,142
2SD1587	133,142
2SD1588	133,142
2SD1589	133,144
2SD1590	133,144
2SD1591	133,144
2SD1592	133,144
2SD1593	133,140
2SD1594	133,140
2SD1595	133,144
2SD1614	136,139
2SD1615	136,139
2SD1615A	136,139
2SD1616	128,139
2SD1616A	128,139
2SD1629	132
2SD1630	131,144
2SD1691	131,140
2SD1692	131,144
2SD1693	131,144
2SD1694	131,140
2SD1695	131,144
2SD1697	130,139,144
2SD1698	128,139
2SD1699	136,139
2SD1700	130,139,144
2SD1701	128,139
2SD1702	136,139
2SD1779	130
2SD1780	130
2SD1818	131,140
2SD1843	130,144
2SD1899	131,140
2SD1899-Z	137
2SD1928	133,144
2SD1939	128
2SD1950	136,139
2SD1977	142
2SD2161	133,144
2SD2162	133,144
2SD2163	133,144
2SD2164	133,140
2SD2165	133,140
2SD2228	137
2SD2383	135
2SD2402	136
2SD2403	136
2SD2425	136,140
2SD2463	130,144
2SD288	132,142
2SD289	132,142
2SD381	132,142
2SD382	132,142
2SD401A	132,142
2SD402A	132,142
2SD414	131,142
2SD415	131,142
2SD471	130,139
2SD560	132,144
2SD568	132,142
2SD569	132,142
2SD571	130,139
2SD596	135,138
2SD741	131,140
2SD743	132,142
2SD743A	132,142
2SD773	130,139
2SD774	130,139
2SD780	135,138
2SD780A	135,138
2SD794	131,142
2SD794A	131,142
2SD795	132,142
2SD809(1)	131,142
2SD882	131,140
2SD985	131,144
2SD986	131,144
2SD987	132,144
2SD992	131,142
2SD992-Z	137
2SD999	136,139
2SJ128	153
2SJ132	153
2SJ133	153
2SJ134	153
2SJ135	153
2SJ136	153
2SJ137	153
2SJ138	153
2SJ139	153
2SJ140	153
2SJ141	153
2SJ142	153
2SJ143	153
2SJ151	153
2SJ152	153
2SJ153	153
2SJ154	153
2SJ165	147
2SJ166	147
2SJ178	147
2SJ179	136,147
2SJ180	147
2SJ184	147
2SJ185	147
2SJ196	147
2SJ197	147
2SJ198	147
2SJ199	147
2SJ202	147
2SJ203	147
2SJ204	147
2SJ205	147
2SJ206	147
2SJ207	147
2SJ208	147
2SJ209	147
2SJ210	147
2SJ211	147
2SJ212	147
2SJ218	147
2SJ243	147
2SJ302	153
2SJ303	153
2SJ324	153
2SJ325	153
2SJ326	153
2SJ327	153
2SJ328	153
2SJ329	153
2SJ330	153
2SJ331	153
2SJ353	147
2SJ411	147
2SJ44	147
2SJ45	147
2SJ460	147
2SJ461	147
2SJ462	147
2SJ463	147
2SK1000	145
2SK104	145
2SK105	145

Type number	Page
2SK1059	149
2SK1060	149
2SK1109	145
2SK1122	149
2SK1123	149
2SK1132	145
2SK1133	145
2SK1149	149
2SK1150	149
2SK1198	149
2SK1271	150
2SK1272	145
2SK1273	145
2SK1274	146
2SK1281	150
2SK1282	150
2SK1283	150
2SK1284	150
2SK1285	150
2SK1286	150
2SK1287	150
2SK1288	150
2SK1289	150
2SK1290	150
2SK1291	150
2SK1292	150
2SK1293	150
2SK1294	150
2SK1295	150
2SK1398	146
2SK1399	146
2SK1482	146
2SK1483	146
2SK1484	146
2SK1485	146
2SK1491	150
2SK1492	150
2SK1493	150
2SK1494	150
2SK1495	150
2SK1496	150
2SK1497	150
2SK1498	150
2SK1499	150
2SK1500	150
2SK1501	150
2SK1502	150
2SK1580	146
2SK1581	146
2SK1582	146
2SK1583	146
2SK1584	146
2SK1585	146
2SK1586	146
2SK1587	146
2SK1588	146
2SK1589	146
2SK1590	146
2SK1591	146
2SK1592	146
2SK1593	146
2SK1594	150
2SK1595	150
2SK1596	150
2SK160	135
2SK162	145
2SK163	145
2SK1664	150
2SK1748	150
2SK1749	150
2SK1750	150
2SK1751	150
2SK1752	150
2SK1753	150
2SK1756	150
2SK1757	150
2SK1758	151
2SK1760	151
2SK1784	151
2SK1785	151
2SK1793	151
2SK1794	151
2SK1795	151
2SK1796	151
2SK1824	146
2SK1850	151
2SK1851	151
2SK1852	151
2SK1853	151
2SK193	145
2SK195	145
2SK1953	151
2SK1954	151
2SK1958	146
2SK1959	146
2SK1960	146
2SK1987	151
2SK1988	151
2SK1989	151
2SK1990	151
2SK1991	151
2SK1992	151
2SK1993	151
2SK1994	151
2SK1995	151
2SK2040	151
2SK2053	146
2SK2054	146
2SK2055	146
2SK2070	146
2SK2090	146
2SK2109	146
2SK2110	146
2SK2111	146
2SK2112	146
2SK2131	151
2SK2132	151
2SK2133	151
2SK2134	151
2SK2135	151
2SK2136	151
2SK2137	151
2SK2138	151
2SK2139	151
2SK2140	151
2SK2141	151
2SK2157	146
2SK2158	146
2SK2159	146
2SK2234	151
2SK2275	151
2SK2341	151
2SK2396	168
2SK2409	151
2SK2410	151
2SK2411	152
2SK2412	152
2SK2413	152
2SK2414	152
2SK2415	152
2SK2461	152
2SK2462	152
2SK2476	152
2SK2477	152
2SK2478	152
2SK2479	152
2SK2480	152
2SK2481	152
2SK2482	152
2SK2483	152
2SK2484	152
2SK2485	152
2SK2486	152
2SK2487	152
2SK2488	152
2SK2498	152
2SK2499	152
2SK2510	152
2SK2511	152
2SK2512	152
2SK2513	152
2SK2514	152
2SK2515	152
2SK2541	146
2SK2597	168
2SK459	148
2SK505	145
2SK507	145
2SK514	145
2SK518	145
2SK519	145
2SK523	145
2SK533	145
2SK591	148
2SK611	148
2SK612	148
2SK654	148
2SK659	148
2SK660	145
2SK679A	145
2SK680A	145
2SK681A	145
2SK699	148
2SK700	148
2SK701	148
2SK702	148
2SK703	148
2SK704	148
2SK705	148
2SK707	148
2SK719	148
2SK720A	148
2SK735	148
2SK736	148
2SK737	148
2SK738	148
2SK739	148
2SK773	148
2SK774	148
2SK784	148
2SK785	148
2SK786	148
2SK787	148
2SK797	148
2SK798	148
2SK799	148
2SK800	148
2SK801	148
2SK802	148
2SK810	148
2SK811	148
2SK812	148
2SK813	148
2SK814	148
2SK815	149
2SK817	149
2SK819	149
2SK820	149
2SK821	149
2SK822	149
2SK823	149
2SK824	149
2SK825	149
2SK826	149
2SK827	149
2SK828	149
2SK829	149
2SK830	149
2SK831	149
2SK832	149
2SK833	149
2SK854	149
2SK855	149
2SK871	149
2SK872	149
2SK873	149
2SK874	149
2SK875	149
2SK876	149
2SK926	149
2SK928	149
2SK929	149
2SK946	149
2SK991	149
2SK992	149
2SK993	149
2SK994	149
2SK997	145
2SK998	145
2V5P4M	163
3P4J	163
3P4J-Z	163
3P4MH	163
3P5MH	163
3P6MH	163
3S4M	163
3SK131	176
3SK134B	176
3SK135A	176
3SK177	176
3SK206	176
3SK222	176
3SK223	176
3SK224	176
3SK230	176
3SK231	176
3SK242	176
3SK243	176
3SK244	176
3SK245	176
3SK246	176
3SK252	176
3SK253	176
3SK254	176
3SK255	176
5P4J	163
5P4J-Z	163
5P4M	163
5P4SM	163
5P5M	163
5P6J	163
5P6J-Z	163
5P6M	163
5P6SM	163
8P2M	163
8P2SM	163
8P4J	163
8P4J-Z	163
8P4M	163
8P4SM	163
[A]	
AA1[ ]	128,154
AB1[ ]	128,155
AC01DGM	163
AC01DJM	163
AC03DGM	163
AC03DJM	163
AC03DJM-Z	163
AC03DSM	163
AC03FGM	163
AC03FJM	163
AC03FJM-Z	163
AC03FSM	163
AC05DGM	163
AC05DJM	163
AC05DJM-Z	163
AC05DSM	163
AC05EGM	163
AC05ESM	163
AC05FGM	163
AC05FJM	163
AC05FJM-Z	163
AC05FSM	163
AC08DGM	163
AC08DSM	163
AC08EGM	163
AC08ESM	163
AC08FGM	163
AC08FSM	163
AC0V8DGM	163
AC1[ ]	128,155
AC10DGM	163
AC10DSM	163
AC10EGM	163
AC10ESM	163
AC10FGM	163
AC10FSM	163
AC12DGM	163
AC12DSM	163

Type number	Page
AC12EGM	163
AC12ESM	163
AC12FGM	163
AC12FSM	163
AC16DGM	163
AC16DSM	163
AC16EGM	163
AC16FGM	163
AC16FSM	163
AC2[ ]	128,156
AD1[ ]	128,156
AD2[ ]	128,156
AN1[ ]	128,154
AP1[ ]	128,155
AQ1[ ]	128,155
AQ2[ ]	128,156
AR1[ ]	128,156
[B]	
BA1[ ]	129,154
BA2[ ]	129,157
BA3[ ]	129,157
BB1[ ]	129,155
BN1[ ]	129,154
BN2[ ]	129,157
BN3[ ]	129,157
BP1[ ]	129,155
[C]	
CE1[ ]	130,156
CE2[ ]	130,156
[F]	
FA1[ ]	135
FA2[ ]	135
FB1[ ]	135
FN1[ ]	135
FN2[ ]	135
FP1[ ]	135
[G]	
GA1[ ]	137
GN1[ ]	137
[H]	
HC1[ ]	136
HC2[ ]	136
HD1[ ]	136
HD2[ ]	136
HQ1[ ]	136
HQ2[ ]	136
HR1[ ]	136
[M]	
MC-421000A32	72
MC-421000A36	72
MC-421000AA64	73
MC-421000AD72	73
MC-421000F32	72
MC-421000FA64	73
MC-422000A32	72
MC-422000A36	72
MC-422000AA64	73
MC-422000AB72	73
MC-422000F32	72
MC-422000FA64	73
MC-422000FB72	73
MC-422000LAB72	73
MC-422000LFB72	73
MC-424000A32	72
MC-424000A36	72
MC-424000AB72	73
MC-424000AC72	73
MC-424000F32	72
MC-424000FB72	73
MC-424000FC72	73
MC-424000LAB72	73
MC-424000LAC72	73
MC-424000LFB72	73
MC-424000LFC72	73
MC-428000A32	72
MC-428000A36	72
MC-428000F32	72
MC-42S1000LAD32S	72
MC-42S2000LAB32S	72
MC-42S2000LAD32S	72
MC-42S4000LAB32S	72
MC-42S4000LAC32S	72
MC-452AA72	74
MC-452AA80	74
MC-452BA72	74
MC-454BA72	74
MC-454BA80	74
MC-454BC72	74
MC-454BC80	74
MC-5720	110
MC-5720A	110
MC-5950	166
MC-5951	104,166
MC-5952	104,166
MC-5973	104,166
MC-5974	104,166
MC-7620	166
MC-7621	166
μPA101	174
μPA102	174
μPA103	174
μPA104	174
μPA1424	160
μPA1426	160
μPA1427	160
μPA1428	160
μPA1428A	160
μPA1434	160
μPA1436	160
μPA1436A	160
μPA1437	160
μPA1438	160
μPA1452	160
μPA1453	160
μPA1454	160
μPA1456	160
μPA1457	160
μPA1458	160
μPA1476	160
μPA1478	160
μPA1500	160
μPA1500B	160
μPA1501	160
μPA1520	160
μPA1520B	160
μPA1522	160
μPA1523	160
μPA1523B	160
μPA1524	160
μPA1526	160
μPA1527	160
μPA1550	160
μPA1552	160
μPA1552A	160
μPA1552B	160
μPA1556	160
μPA1556A	160
μPA1570	160
μPA1572	160
μPA1576	160
μPA1600	160
μPA1601	160
μPA1602	160
μPA1603	160
μPA1604	160
μPA1640	160
μPA1700	152
μPA1701	152
μPA2001	159
μPA2002	159
μPA2003	159
μPA2004	159
μPA2981	159
μPA2982	159
μPA2987	159
μPA500	158
μPA501	158
μPA502	158
μPA503	158
μPA504	158
μPA505	158
μPA53	159
μPA56	159
μPA57	159
μPA570	158
μPA571	158
μPA572	158
μPA573	158
μPA574	158
μPA600	158
μPA601	158
μPA602	158
μPA603	158
μPA604	158
μPA605	158
μPA606	158
μPA607	158
μPA608	158
μPA609	158
μPA6118	159
μPA67	159
μPA670	158
μPA671	158
μPA672	158
μPA673	158
μPA674	158
μPA79	159
μPA80	159
μPA81	159
μPB1502	174
μPB1502(1)	102,174
μPB1504	104,174
μPB1505	174
μPB581	174
μPB582	174
μPB584	174
μPB585	174
μPB586	174
μPB587	174
μPB588	174
μPB63020	90
μPB63040	90
μPB63060	90
μPB63080	90
μPB63100	90
μPC1060	124
μPC1074A	124
μPC1093	124
μPC1094	125
μPC1099	125
μPC1100	125
μPC1150	125
μPC1188	110
μPC1225	111
μPC1228	110
μPC1237	111
μPC1238	110
μPC1251	122
μPC1270	111
μPC1297	111
μPC1298	111
μPC1308	110
μPC1310	110
μPC1313	110
μPC1316	110
μPC1318A	110
μPC1330	111
μPC1342	111
μPC1394	125
μPC141	124
μPC1458	122
μPC151	122
μPC1555	125
μPC157	122
μPC159	122
μPC1652	170
μPC1653	170
μPC1654	170
μPC1655	170
μPC1656	170
μPC1658	170
μPC1659	170
μPC1663	170
μPC1668	170
μPC1669	170
μPC1670	170
μPC1673	174
μPC1675	170
μPC1676	170
μPC1677	170
μPC1678	170
μPC1685	174
μPC1686	174
μPC1687	174
μPC1688	170
μPC1692	174
μPC1694	174
μPC177	123
μPC1830	113
μPC1851	113
μPC1852A	113
μPC1853	113
μPC1860	113
μPC1862	113
μPC1872A	113
μPC1874	113
μPC1875	113
μPC1881	114
μPC1883	114
μPC1891A	113
μPC1892	113
μPC1900	125
μPC1905	125
μPC1906	125
μPC1943	124
μPC1944	124
μPC2002	110
μPC2102	105
μPC2132	105
μPC2133	105
μPC2138	105
μPC2251	124
μPC2252	124
μPC2253	124
μPC2254	124
μPC2255	124
μPC2256	124
μPC2260	124
μPC2270A	124
μPC2372	117
μPC2394	117
μPC2400A	123
μPC24A00	123
μPC24M00A	123
μPC2500A	110
μPC2502	110
μPC2505	110
μPC2506	110
μPC251	122
μPC2533	110
μPC2535	110
μPC254	122
μPC2560	111
μPC2572	111
μPC258	122
μPC2581	111
μPC259	122
μPC2590	99
μPC2600	123
μPC2708	170
μPC2709	170
μPC271	123
μPC2710	170
μPC2711	170
μPC2712	170
μPC2713	170
μPC2714	170
μPC2715	170
μPC272	123
μPC2721	174
μPC2722	174
μPC2723	170
μPC2726	170
μPC2731	174

Type number	Page
μPC2734	174
μPC2743	174
μPC2744	174
μPC2745	170
μPC2746	170
μPC2747	104,170
μPC2748	104,170
μPC2749	102,104,170
μPC2753	174
μPC2757	102,104,174
μPC2758	104,174
μPC2762	104,170
μPC2763	102,104,170
μPC277	123
μPC2771	104,170
μPC2800A	117
μPC2801A	117
μPC2803	117
μPC2900	123
μPC29L00	123
μPC29M00	123
μPC301A	122
μPC305	124
μPC311	123
μPC317	124
μPC318	122
μPC319	123
μPC324	122
μPC337	124
μPC339	123
μPC3403	122
μPC354	122
μPC358	122
μPC393	123
μPC398	125
μPC4061	122
μPC4062	122
μPC4064	122
μPC4071	122
μPC4072	122
μPC4074	122
μPC4081	122
μPC4082	122
μPC4084	122
μPC4250	122
μPC451	122
μPC452	122
μPC454	122
μPC4556	122
μPC4557	122
μPC4558	122
μPC4559	122
μPC4560	122
μPC4570	122
μPC4572	122
μPC4574	122
μPC458	122
μPC4741	122
μPC494	125
μPC5020	94
μPC5021	94
μPC5022	94
μPC5023	94
μPC5024	94
μPC5031	94
μPC5032	94
μPC5034	94
μPC5102	94
μPC5200	94
μPC5201	94
μPC5202	94
μPC5203	94
μPC5204	94
μPC610	119
μPC617	125
μPC624	119
μPC648	119
μPC649	125
μPC650	118
μPC659A	118
μPC660	118
μPC661	118
μPC662	119
μPC664	119
μPC665	119
μPC666	119
μPC667	119
μPC668	118
μPC7002	101
μPC7063	100
μPC7071	100
μPC7151	100
μPC7161	100
μPC741	122
μPC7800A	123
μPC78L00	123
μPC78M00A	123
μPC78N00	123
μPC7900A	123
μPC79L00	123
μPC79M00	123
μPC79N00	123
μPC8000	104
μPC8001	104
μPC8002	102
μPC801	122
μPC802	122
μPC803	122
μPC804	122
μPC8100	174
μPC8104	102,104,170
μPC8105	102,170
μPC8106	102,104,174
μPC8109	104,174
μPC811	122
μPC8110	170
μPC812	122
μPC813	122
μPC814	122
μPC815	122
μPC816	122
μPC821	122
μPC822	122
μPC824	122
μPC831	122
μPC832	122
μPC834	122
μPC842	122
μPC844	122
μPD16300	108
μPD16301	108
μPD16302	108
μPD16304	106
μPD16305	108
μPD16306	106,108
μPD16306A	106,108
μPD16307	108
μPD16309	108
μPD16310	106
μPD16311	106
μPD16312	106
μPD16313	106
μPD16320A	109
μPD16322	109
μPD16325	106,108
μPD16326	106
μPD16327	108
μPD16404	108
μPD16405	108
μPD16406	108
μPD16407	108
μPD16408	108
μPD16409A	108
μPD16429A	108
μPD16430A	107
μPD16431A	107
μPD16432B	107
μPD16434	107
μPD16435	107
μPD16435A	107
μPD16437	104,107
μPD16437A	107
μPD16443B	108
μPD16444A	108
μPD16445	108
μPD16446	108
μPD16447	108
μPD16448	108
μPD16454A	104,107
μPD16501	117
μPD16502	117
μPD16503	117
μPD16506	117
μPD16510	117
μPD16601	108
μPD16620	108
μPD16622	108
μPD16623	108
μPD16624	108
μPD16625	108
μPD16629	108
μPD16630	108
μPD16640	108
μPD16641	108
μPD16650	108
μPD16661	108
μPD16666	108
μPD16670	107
μPD16675	107
μPD16676	107
μPD16676A	107
μPD16804	109,159
μPD16805	109,159
μPD16812A	159
μPD16823	109,159
μPD17001	19
μPD17003A	19
μPD17005	19
μPD17006A	19
μPD17010	19
μPD17012	19
μPD17015	19
μPD17016	19
μPD17017	19
μPD17052	20
μPD17053	20
μPD17062	20
μPD17068	20
μPD17071	19
μPD17072	19
μPD17073	19
μPD1708A	23
μPD1709A	23
μPD17103	21
μPD17103L	21
μPD17104	21
μPD17104L	21
μPD17107	21
μPD17107L	21
μPD17108	21
μPD17108L	21
μPD17120	21
μPD17121	21
μPD17132	21
μPD17133	21
μPD17134A	21
μPD17135A	21
μPD17136A	21
μPD17137A	21
μPD1713A	23
μPD17145	21
μPD17147	21
μPD17149	21
μPD1715	23
μPD1716	23
μPD17201A	22
μPD17202A	22
μPD17203A	22
μPD17204	22
μPD17207	22
μPD1720A	23
μPD1721	23
μPD17215	22
μPD17216	22
μPD17217	22
μPD17218	22
μPD1723	23
μPD17707	19
μPD17708	19
μPD17709	19
μPD17P001	19
μPD17P005	19
μPD17P006A	19
μPD17P010	19
μPD17P012	19
μPD17P068	20
μPD17P103	21
μPD17P104	21
μPD17P107	21
μPD17P108	21
μPD17P132	21
μPD17P133	21
μPD17P136A	21
μPD17P137A	21
μPD17P149	21
μPD17P202A	22
μPD17P203A	22
μPD17P204	22
μPD17P207	22
μPD17P218	22
μPD17P709	19
μPD23C1000B	78
μPD23C1000EB	78
μPD23C1001EA	78
μPD23C1010B	78
μPD23C16000LW	78
μPD23C16000W	78
μPD23C16040A	78
μPD23C2001E	78
μPD23C32000	78
μPD23C32140	78
μPD23C4000S	78
μPD23C4001EJ	78
μPD23C4040	78
μPD23C8000LW	78
μPD23C8000W	78
μPD23C8001EJ	78
μPD27C010A	79
μPD27C020	79
μPD27C040	79
μPD27C210A	79
μPD27C240	79
μPD27C4000	79
μPD27C4001	79
μPD27C8000	79
μPD27C8001	79
μPD28C256	80
μPD28C64A	80
μPD28F001	80
μPD30100	60
μPD30200	60
μPD30311	61
μPD30400	60
μPD30401	60
μPD30410	60
μPD30412	60
μPD30450	60
μPD31441	61
μPD31442	61
μPD3150	104
μPD3594	98
μPD35H71A	98
μPD35H74	98
μPD3723	98
μPD3725D-01	98
μPD3726	98
μPD3727	98
μPD3732	98
μPD3733	98
μPD3734	98
μPD3737	98
μPD3743	98
μPD3753	98
μPD42101	82,109
μPD42102	82,109
μPD4216160	65
μPD4216160L	66
μPD4216161	67
μPD4216161L	68
μPD4216400	65

Type number	Page
μPD42164005L	68
μPD4216400L	66
μPD4216405	67
μPD4216800	65
μPD4216800L	66
μPD4217400	65
μPD4217400L	66
μPD4217401	67
μPD4217401L	68
μPD4217800	65
μPD4217800L	66
μPD4217801	67
μPD4217801L	68
μPD4218160	65
μPD4218160L	66
μPD4218161	67
μPD4218161L	68
μPD42280	82,109
μPD424210	70
μPD424210AL	70
μPD424260	69
μPD424260AL	69
μPD424400	69
μPD424400-L	69
μPD424800	69
μPD426171	82
μPD426174	82
μPD42641	82
μPD42641-L	82
μPD4264160	64
μPD42644	82
μPD42644-L	82
μPD4264400	64
μPD4264800	64
μPD4265160	64
μPD4265400	64
μPD4265800	64
μPD42S16160	65
μPD42S16160L	66
μPD42S16161	67
μPD42S16161L	68
μPD42S16400	65
μPD42S16400L	66
μPD42S16401L	68
μPD42S16405	67
μPD42S16800	65
μPD42S16800L	66
μPD42S17400	65
μPD42S17400L	66
μPD42S17401	67
μPD42S17401L	68
μPD42S17800	65
μPD42S17800L	66
μPD42S17801	67
μPD42S17801L	68
μPD42S18160	65
μPD42S18160L	66
μPD42S18161	67
μPD42S18161L	68
μPD42S4210	70
μPD42S4210AL	70
μPD42S4260	69
μPD42S4260AL	69
μPD42S4400	69
μPD42S4800	69
μPD42S64160	64
μPD42S64400	64
μPD42S64800	64
μPD42S65160	64
μPD42S65400	64
μPD42S65800	64
μPD431000A	75
μPD431000A-B15	75
μPD431008	76
μPD431008L	76
μPD431009	76
μPD431009L	76
μPD431016	76
μPD431016L	76
μPD431018	76
μPD431018L	76
μPD431232L	76
μPD43256B	75
μPD43256B-A10	75
μPD43256B-A12	75
μPD43256B-B12	75
μPD43257B	75
μPD434004	76
μPD434008	76
μPD4516161	71
μPD4516421	71
μPD4516821	71
μPD461008	77
μPD461016L	77
μPD461018L	77
μPD461318	77
μPD461336	77
μPD46258	77
μPD46259L	77
μPD4701A	118
μPD4702	118
μPD4704	118
μPD4711B	119
μPD4712	119
μPD4713A	119
μPD4714A	119
μPD4715A	119
μPD4721	119
μPD4722	119
μPD4723	119
μPD4724	119
μPD4726	119
μPD481440	81
μPD481850	81
μPD482234	81
μPD482235	81
μPD482444	81
μPD482445	81
μPD482445L	81
μPD485505	82
μPD485506	82
μPD488130L	71
μPD488170L	71
μPD4990A	118
μPD4991A	118
μPD4992	118
μPD5205	125
μPD5555	125
μPD5556	125
μPD61000	109
μPD61010	109
μPD6121-001	117
μPD6122-001	117
μPD6133	24
μPD6134	24
μPD61F35	24
μPD6211	119
μPD6252	80
μPD6253	80
μPD6254	80
μPD6255	80
μPD6257	80
μPD6258	80
μPD6272	80
μPD6273	80
μPD6274	80
μPD63	24
μPD6300	106
μPD6316	99
μPD6320	106,108,109
μPD63200	111
μPD6321	106,108,109
μPD63210	111
μPD6322	109
μPD6323B	106
μPD6325	119
μPD6326	119
μPD6335	119
μPD6336	119
μPD6337	108
μPD6340	106
μPD6345	109
μPD63701	105
μPD63702	111
μPD63703	111
μPD63721	105
μPD6376	111
μPD6378A	105
μPD6379	111
μPD6382	111
μPD6383	111
μPD6384	111
μPD64	24
μPD6450	115
μPD6451A	115
μPD6453	115
μPD6454	115
μPD6456	115
μPD6458	115
μPD6461	115
μPD6462	115
μPD6464	115
μPD6465	115
μPD6466	115
μPD6487	113
μPD65612	85
μPD65622	85
μPD65626	85
μPD65630	84
μPD65631	84
μPD65632	85
μPD65636	84
μPD65640	84
μPD65641	84
μPD65644	84
μPD65646	84
μPD65647	84
μPD65648	84
μPD65650	84
μPD65651	84
μPD65652	84
μPD65654	84
μPD65655	84
μPD65656	84
μPD65658	84
μPD65662	84
μPD65664	84
μPD65672	84
μPD65676	84
μPD65800	85
μPD65801	85
μPD65802	85
μPD65803	85
μPD65804	85
μPD65806	85
μPD65808	85
μPD65810	85
μPD65811	85
μPD65812	85
μPD65813	85
μPD65823	87
μPD65825	87
μPD65826	87
μPD65828	87
μPD65830	87
μPD65831	87
μPD65832	87
μPD65833	87
μPD65835	87
μPD65838	87
μPD65840	85
μPD65841	85
μPD65842	85
μPD65843	85
μPD65845	85
μPD65846	86
μPD65848	86
μPD65849	86
μPD65850	86
μPD65851	86
μPD65852	86
μPD65853	86
μPD65855	86
μPD65858	86
μPD65859	86
μPD65860	86
μPD65861	86
μPD65862	86
μPD65863	86
μPD65865	86
μPD65866	86
μPD65868	86
μPD65869	86
μPD65870	86
μPD65871	86
μPD65872	87
μPD65873	87
μPD65875	87
μPD65878	87
μPD65879	87
μPD658XX	102
μPD65906	88
μPD65907	88
μPD65908	88
μPD65909	88
μPD65910	88
μPD65911	88
μPD65913	88
μPD65915	88
μPD65917	88
μPD65919	88
μPD65926	88
μPD65927	88
μPD65928	88
μPD65929	88
μPD65930	88
μPD65931	88
μPD65933	88
μPD65935	88
μPD65937	88
μPD65939	88
μPD66001	90
μPD66002	90
μPD66004	90
μPD66006	90
μPD66008	90
μPD66010	90
μPD66011	90
μPD66012	90
μPD66024	90
μPD66026	90
μPD66028	90
μPD66030	90
μPD66031	90
μPD66032	90
μPD6604	24
μPD66041	91
μPD66042	91
μPD66044	91
μPD66046	91
μPD66048	91
μPD66050	91
μPD66051	91
μPD66052	91
μPD66064	91
μPD66066	91
μPD66068	91
μPD66070	91
μPD66071	91
μPD66072	91
μPD66081	90
μPD66082	90
μPD66084	90
μPD66086	90
μPD66088	90
μPD66090	90
μPD66091	90
μPD66092	90
μPD66104	90
μPD66106	90
μPD66108	90
μPD66110	90
μPD66111	90
μPD66112	90
μPD6700	106
μPD67021	89
μPD67031	89
μPD67050	89
μPD67070	89
μPD6708	99

Type number	Page	Type number	Page	Type number	Page	Type number	Page	Type number	Page
μPD67101	89	μPD72050	105	μPD753017	5	μPD7757	96	μPD78076	40
μPD67240	89	μPD72051	105	μPD753036	7	μPD7758A	96	μPD78076Y	41
μPD67804	89	μPD72064	105	μPD75304	15	μPD7759	96	μPD78078	40
μPD67852	89	μPD72065B	105	μPD75304B	15	μPD77C25	97	μPD78078Y	41
μPD6952	118	μPD72068	105	μPD75306	15	μPD77C25-10	97	μPD78081	43
μPD7001	118	μPD72070	105	μPD75306B	15	μPD77C30	61	μPD78082	43
μPD7002	118	μPD72103	99	μPD75308	15	μPD77P56	96	μPD78094	44
μPD7003	118	μPD72103A	99	μPD75308B	15	μPD780001	29	μPD78095	44
μPD7004	118	μPD72105	99	μPD753104	6	μPD78001B	29	μPD78096	44
μPD70108	55	μPD72107	99	μPD753106	6	μPD78001BY	30	μPD78098A	44
μPD70108H	55	μPD72123	109	μPD753108	6	μPD78002B	29	μPD7810H	26
μPD7011	119	μPD72185	109	μPD75312	15	μPD78002BY	30	μPD7811H	26
μPD70116	55	μPD72186	109	μPD75312B	15	μPD78011B	29	μPD78134	45
μPD70116H	55	μPD72187	109	μPD75316	15	μPD78011BY	30	μPD78134A	45
μPD70136	55	μPD7225	107	μPD75316B	15	μPD78011F	31	μPD78136	45
μPD70136A	55	μPD7227	107	μPD75328	16	μPD78011FY	32	μPD78138	45
μPD70208	55	μPD7228	107	μPD75336	16	μPD78012B	29	μPD78146	45
μPD70208H	55	μPD7228A	107	μPD75402A	12	μPD78012BY	30	μPD78148	45
μPD70216	55	μPD7229	107	μPD754302	3	μPD78012F	31	μPD78212	46
μPD70216H	55	μPD72291	61	μPD754304	3	μPD78012FY	32	μPD78213	46
μPD70236A	55	μPD7229A	107	μPD75512	10	μPD78013	29	μPD78214	46
μPD70270	56	μPD72305	99	μPD75516	10	μPD78013F	31	μPD78217A	46
μPD70280	56	μPD72611	105	μPD75517	10	μPD78013FY	32	μPD78218A	46
μPD703000	59	μPD72691	61	μPD75518	10	μPD78013Y	30	μPD78220	47
μPD703001	59	μPD750004	3	μPD7554A	17	μPD78014	29	μPD78224	47
μPD703002	59	μPD750006	3	μPD7556A	17	μPD78014F	31	μPD78233	47
μPD70320	56	μPD750008	3	μPD7564A	17	μPD78014FY	32	μPD78234	47
μPD70325	56	μPD75004	10	μPD7566A	17	μPD78014Y	30	μPD78237	47
μPD70330	56	μPD75006	10	μPD75P0016	3	μPD78015F	31	μPD78238	47
μPD70335	56	μPD750064	4	μPD75P0076	4	μPD78015FY	32	μPD78243	46
μPD70433	56	μPD750068	4	μPD75P008	10	μPD78016F	31	μPD78244	46
μPD705100	59	μPD75008	10	μPD75P036	11	μPD78016FY	32	μPD78310A	48
μPD70615	57	μPD75028	11	μPD75P048	11	μPD78018F	31	μPD78312A	48
μPD70616	57	μPD7502A	17	μPD75P068	12	μPD78018FY	32	μPD78320	48
μPD70632	57	μPD75036	11	μPD75P108B	9	μPD780204	35	μPD78322	48
μPD70731	59	μPD7503A	17	μPD75P116	9	μPD780205	35	μPD78323	48
μPD70732	59	μPD75048	11	μPD75P117H	9	μPD78023	33	μPD78324	48
μPD70741	59	μPD75064	12	μPD75P216A	13	μPD78024	33	μPD78327	49
μPD70742	59	μPD75066	12	μPD75P218	13	μPD78042A	34	μPD78328	49
μPD70P3000	59	μPD75068	12	μPD75P238	14	μPD78043A	34	μPD78330	49
μPD70P3002	59	μPD7507B	17	μPD75P3018	5	μPD78044A	34	μPD78334	49
μPD71011	61	μPD7508B	17	μPD75P3036	7	μPD78045A	34	μPD78350	50
μPD71037	61	μPD75104	9	μPD75P3116	6	μPD78052	36	μPD78350A	50
μPD71051	61	μPD75104A	9	μPD75P316A	15	μPD78052Y	37	μPD78352A	50
μPD71054	61	μPD75106	9	μPD75P316B	15	μPD78053	36	μPD78355	50
μPD71055	61	μPD75108	9	μPD75P328	16	μPD78053Y	37	μPD78356	50
μPD71059	61	μPD75108A	9	μPD75P336	16	μPD78054	36	μPD78362A	51
μPD71071	61	μPD75108F	9	μPD75P402	12	μPD78054Y	37	μPD78365A	51
μPD71082	61	μPD75112	9	μPD75P4308	3	μPD78055	36	μPD78366A	51
μPD71083	61	μPD75112F	9	μPD75P516	10	μPD78055Y	37	μPD78370	52
μPD71084	61	μPD75116	9	μPD75P518	10	μPD78056	36	μPD78372	52
μPD71086	61	μPD75116F	9	μPD75P54	17	μPD78056Y	37	μPD784020	52
μPD71087	61	μPD75116H	9	μPD75P56	17	μPD78058	36	μPD784021	52,104
μPD71088	61	μPD75117H	9	μPD75P64	17	μPD78058Y	37	μPD784025	52,104
μPD71101	61	μPD75206	13	μPD75P66	17	μPD78062	38	μPD784026	52,104
μPD71611	61	μPD75208	13	μPD77015	97	μPD78062Y	39	μPD784915	53
μPD71613	61	μPD75212A	13	μPD77016	97	μPD78063	38	μPD78C10A	27
μPD71621	61	μPD75216A	13	μPD77017	97,104	μPD78063Y	39	μPD78C11A	27
μPD71641	61	μPD75217	13	μPD77018	97	μPD78064	38	μPD78C12A	27
μPD72001-11	99	μPD75218	13	μPD77220-10	97	μPD78064Y	39	μPD78C14	27
μPD72001-A8	99	μPD75236	14	μPD77230A	97	μPD78070A	42	μPD78C14A	27
μPD72002-11	99	μPD75237	14	μPD77240	97	μPD78070AY	42	μPD78C17	27
μPD72005	120	μPD75238	14	μPD77501	96	μPD78074	40	μPD78C18	27
μPD72020	109	μPD75268	13	μPD77502	96	μPD78074Y	41	μPD78CG14	27
μPD72042A	99	μPD753012	5	μPD7755	96	μPD78075	40	μPD78CP14	27
μPD72042B	99	μPD753016	5	μPD7756A	96	μPD78075Y	41	μPD78CP18	27

Type number	Page
μPD78P014	29
μPD78P014Y	30
μPD78P018F	31
μPD78P018FY	32
μPD78P0208	35
μPD78P024	33
μPD78P048A	34
μPD78P054	36
μPD78P054Y	37
μPD78P058	36
μPD78P058Y	37
μPD78P064	38
μPD78P064Y	39
μPD78P078	40
μPD78P078Y	41
μPD78P083	43
μPD78P098A	44
μPD78P138	45
μPD78P148	45
μPD78P214	46
μPD78P218A	46
μPD78P224	47
μPD78P238	47
μPD78P312A	48
μPD78P322	48
μPD78P324	48
μPD78P328	49
μPD78P334	49
μPD78P352	50
μPD78P356	50
μPD78P364A	51
μPD78P368A	51
μPD78P372	52
μPD78P4026	52
μPD78P4916	53
μPD78PG11H	26
μPD79011	56
μPD79021	56
μPD93600	93
μPD93XXX	92
μPD94600	93
μPD94XXX	92
μPD951XX	92
μPD95600	93
μPD9604A	100
μPD9605A	100
μPD961XX	92
μPD9621	100
μPD9622	100
μPD9624	100
μPD9625	100
μPD96600	93
μPD98201	99
μPD98203	99
μPD98204	99
μPD98205	99
μPD98309	102
μPD98401A	100
μPD98402A	100
μPD9901	100
μPD9930	104
μPD9935	102
μPD9951	99
μPD9952	99
μPG100	166
μPG101	166
μPG103	166
μPG105	166
μPG106	166
μPG107	166
μPG110	166
μPG130	104,166
μPG131	166
μPG132	102,166
μPG501	166
μPG502	166
μPG503	166
μPG504	166
μPG506	166
μPG508	166
[N]	
ND411G-2	177
ND412G-2	177
ND413G-2	177
ND414G-2	177
ND433G	177
ND434G	177
ND487C1-3P	169
ND487C1T	177
ND487C2-3P	169
ND487C2T	177
ND487R1T	177
ND487R2T	177
NDL3200	181
NDL3210	181
NDL3210S	181
NDL3215	181
NDL3220	181
NDL3220S	181
NDL3230	181
NDL3230SU	181
NDL3310	181
NDL5100	184
NDL5102	184
NDL5131P	184
NDL5131P1	184
NDL5131P2	184
NDL5151P	184
NDL5151P1	184
NDL5151P2	184
NDL5171P	184
NDL5171P1	184
NDL5171P2	184
NDL5405	183
NDL5405C	183
NDL5421P	183
NDL5421P1	183
NDL5421P2	183
NDL5422P	183
NDL5430C	183
NDL5430CR	183
NDL5461P	183
NDL5461P1	183
NDL5461P2	183
NDL5471RC	183
NDL5471RD	183
NDL5481P	183
NDL5481P1	183
NDL5481P2	183
NDL5490	183
NDL5490L	183
NDL5500	184
NDL5506P	184
NDL5506PS	184
NDL5510	184
NDL5516P	184
NDL5520	184
NDL5521P	184
NDL5521P2	184
NDL5522P	184
NDL5530	184
NDL5551P	184
NDL5551P1	184
NDL5551P2	184
NDL5553P	184
NDL5553P1	184
NDL5553P2	184
NDL5561P	184
NDL5561P1	184
NDL5561P2	184
NDL5590P	184
NDL5590P1	184
NDL5590P2	184
NDL7001	181
NDL7001L	181
NDL7103	182
NDL7113	182
NDL7153	182
NDL7163	182
NDL7401P	181
NDL7401P1	181
NDL7401P2	181
NDL7402P	181
NDL7402P1	181
NDL7402P2	181
NDL7408P1K	181
NDL7408P1L	181
NDL7408P2K	181
NDL7408P2L	181
NDL7408PK	181
NDL7408PL	181
NDL7409P	181
NDL7409P1	181
NDL7409P2	181
NDL7411RC	181
NDL7411RD	181
NDL7502P	182
NDL7503P	182
NDL7503P1	182
NDL7510P	182
NDL7512P	182
NDL7513P	182
NDL7513P1	182
NDL7514P	182
NDL7514P1	182
NDL7540PA	182
NDL7552P	182
NDL7553P	182
NDL7553P1	182
NDL7560P	182
NDL7562P	182
NDL7563P	182
NDL7563P1	182
NDL7564P	182
NDL7564P1	182
NDL7601P	181
NDL7601P1	181
NDL7601P2	181
NDL7610PA	181
NDL7650P	182
NDL7660P	182
NDL7670P	182
NDL7671P	182
NDL7672P	182
NDL7673P	182
NDL7701P	181
NDL7701P1	181
NDL7701P2	181
NDL7710PA	181
NE1280100	167
NE1280200	167
NE1280400	167
NE32484A	167
NE32584C	167
NE32684A	167
NE42484A	167
NE42484C	167
NE6500496	167
NE6501077	167
NE76084	167
NE76184A	167
NE85001	167
NE85002	167
NE850R5	167
NE95001	167
NE950R2	167
NE950R5	167
NEL2000	168
NEZ1414	167
NEZ3642	167
NEZ4450	167
NEZ5964	167
NEZ6472	167
NEZ7177	167
NEZ7785	167
[P]	
PFA101A	194
PFA112A	194
PFA112B	194
PFA113A	194
PFA113B	194
PFA122A	194
PFA122B	194
PFA141A	194
PFA141B	194
PFA141C	194
PFA141E	194
PFA160B	194
PFA160C	194
PFA201A	194
PFA213A	194
PFA222A	194
PFA260A	194
PFD102A	194
PFD112A	194
PFD112B	194
PFD114A	194
PFD114B	194
PFD123A	194
PFD123B	194
PFD142A	194
PFD142B	194
PFD142C	194
PFD161B	194
PFD161C	194
PH101	186
PH102	186
PH103	186
PH104	186
PH105	186
PH106	186
PH107	186
PH108	186
PH108A	186
PH109	186
PH110	186
PH114	186
PH116(L)	186
PH302	187
PH302C	187
PH309	187
PH310	187
PH315	187
PH320	187
PH502HC	188
PH502HR	188
PH502LC	188
PH502LR	188
PH514HC	188
PH514HR	188
PH514LC	188
PH514LR	188
PH516HC(L)	188
PH516HR(L)	188
PH516LC(L)	188
PH516LR(L)	188
PH522	188
PH525	188
PLD201A	195
PLR101	195
PLR102	195
PLR104	195
PLR1101	195
PLS4001L1	196
PLS4001L2	196
PLT101	195
PLT102	195
PLT104	195
PLT1101	195
PS1001	189
PS2041	190
PS2043	190
PS2044	190
PS2501-1	189
PS2501-2	189
PS2501-3	189
PS2501-4	189
PS2502-1	189
PS2502-2	189
PS2502-3	189
PS2502-4	189
PS2503-1	189
PS2503-2	189
PS2503-3	189
PS2503-4	189
PS2505-1	189
PS2505-2	189
PS2505-3	189

Type number	Page	Type number	Page	Type number	Page	Type number	Page	Type number	Page
PS2505-4	189	PS2732-2	190	PS5701LC	193	RD15FM	161	RD20M	161
PS2506-1	189	PS2732-4	190	PS5701LR	193	RD15JS	162	RD20P	161
PS2506-2	189	PS2733-1	190	PS5702HC	193	RD15M	161	RD20S	161
PS2506-3	189	PS2733-2	190	PS5702HR	193	RD15P	161	RD20UJ	161
PS2506-4	189	PS2733-4	190	PS5702LC	193	RD15S	161	RD20UM	161
PS2521-1	189	PS2741	190	PS5702LR	193	RD15UJ	161	RD22E	162
PS2521-2	189	PS2801-1	190	PS5732LR-R	193	RD15UM	161	RD22ES	162
PS2521-3	189	PS2801-4	190	PS6001A	193	RD16E	162	RD22F	162
PS2521-4	189	PS2802-1	190	PS6002A	193	RD16ES	162	RD22FM	161
PS2525-1	189	PS2802-4	190	PS8601	190	RD16F	162	RD22JS	162
PS2525-2	189	PS2805-1	190	PS8602	190	RD16FM	161	RD22M	161
PS2525-3	189	PS2805-4	190	PS9601	190	RD16JS	162	RD22P	161
PS2525-4	189	PS2806-1	190	PS9634	190	RD16M	161	RD22S	161
PS2532-1	189	PS2806-4	190	PS9636	190	RD16P	161	RD22UJ	161
PS2532-2	189	PS3601	191	PS9701	190	RD16S	161	RD22UM	161
PS2532-3	189	PS3602	191			RD16UJ	161	RD24E	162
PS2532-4	189	PS3611	191	**[R]**		RD16UM	161	RD24ES	162
PS2533-1	189	PS3612	191	RD100E	162	RD18E	162	RD24F	162
PS2533-2	189	PS3701	191	RD100P	161	RD18ES	162	RD24FM	161
PS2533-3	189	PS3702	191	RD10E	162	RD18F	162	RD24JS	162
PS2533-4	189	PS3711	191	RD10ES	162	RD18FM	161	RD24M	161
PS2561-1	189	PS3712	191	RD10F	162	RD18JS	162	RD24P	161
PS2561-2	189	PS3901	191	RD10FM	161	RD18M	161	RD24S	161
PS2562-1	189	PS3911	191	RD10JS	162	RD18P	161	RD24UJ	161
PS2562-2	189	PS3912	191	RD10M	161	RD18S	161	RD24UM	161
PS2565-1	189	PS4001	191	RD10P	161	RD18UJ	161	RD27E	162
PS2565-2	189	PS4003	191	RD10S	161	RD18UM	161	RD27ES	162
PS2566-1	189	PS4005	191	RD10UJ	161	RD2.0E	162	RD27F	162
PS2566-2	189	PS4007	191	RD10UM	161	RD2.0ES	162	RD27FM	161
PS2601	189	PS4008	191	RD110E	162	RD2.0F	162	RD27JS	162
PS2602	189	PS4009	191	RD110P	161	RD2.0HS	162	RD27M	161
PS2603	189	PS4010	191	RD11E	162	RD2.0M	161	RD27P	161
PS2604	189	PS4011	191	RD11ES	162	RD2.0P	161	RD27S	161
PS2605	189	PS4015	191	RD11F	162	RD2.0S	161	RD27UJ	161
PS2606	189	PS4016	191	RD11FM	161	RD2.0UM	161	RD27UM	161
PS2607	189	PS4501	191	RD11JS	162	RD2.2E	162	RD3.0E	162
PS2608	189	PS4502	191	RD11M	161	RD2.2ES	162	RD3.0ES	162
PS2621	189	PS4503A	191	RD11P	161	RD2.2F	162	RD3.0F	162
PS2622	189	PS4504A	191	RD11S	161	RD2.2HS	162	RD3.0HS	162
PS2625	189	PS4506	191	RD11UJ	161	RD2.2M	161	RD3.0M	161
PS2626	189	PS4601	192	RD11UM	161	RD2.2P	161	RD3.0MW	161
PS2633	189	PS4602	192	RD120E	162	RD2.2S	161	RD3.0P	161
PS2634	189	PS4602(1)	192	RD120P	161	RD2.2UM	161	RD3.0S	161
PS2651	189	PS4651	192	RD12E	162	RD2.4E	162	RD3.0UM	161
PS2652	189	PS4652	192	RD12ES	162	RD2.4ES	162	RD3.3E	162
PS2653	189	PS4652(1)	192	RD12F	162	RD2.4F	162	RD3.3ES	162
PS2654	189	PS4701	192	RD12FM	161	RD2.4HS	162	RD3.3F	162
PS2701-1	190	PS4702	192	RD12JS	162	RD2.4M	161	RD3.3HS	162
PS2701-2	190	PS4703	192	RD12M	161	RD2.4MW	161	RD3.3M	161
PS2701-4	190	PS4704	192	RD12P	161	RD2.4P	161	RD3.3MW	161
PS2702-1	190	PS4751	192	RD12S	161	RD2.4S	161	RD3.3P	161
PS2702-2	190	PS4752	192	RD12UJ	161	RD2.4UM	161	RD3.3S	161
PS2702-4	190	PS5001HC	193	RD12UM	161	RD2.7E	162	RD3.3UM	161
PS2703-1	190	PS5001HR	193	RD13E	162	RD2.7ES	162	RD3.6E	162
PS2703-2	190	PS5001LC	193	RD13ES	162	RD2.7F	162	RD3.6ES	162
PS2703-4	190	PS5001LR	193	RD13F	162	RD2.7HS	162	RD3.6F	162
PS2705-1	190	PS5002HC	193	RD13FM	161	RD2.7M	161	RD3.6HS	162
PS2705-2	190	PS5002HR	193	RD13JS	162	RD2.7MW	161	RD3.6M	161
PS2705-4	190	PS5002LC	193	RD13M	161	RD2.7P	161	RD3.6MW	161
PS2706-1	190	PS5002LR	193	RD13P	161	RD2.7S	161	RD3.6P	161
PS2706-2	190	PS5003HC	193	RD13S	161	RD2.7UM	161	RD3.6S	161
PS2706-4	190	PS5003HR	193	RD13UJ	161	RD20E	162	RD3.6UM	161
PS2707-1	190	PS5003LC	193	RD13UM	161	RD20ES	162	RD3.9E	162
PS2707-2	190	PS5003LR	193	RD15E	162	RD20F	162	RD3.9ES	162
PS2707-4	190	PS5701HC	193	RD15ES	162	RD20FM	161	RD3.9F	162
PS2732-1	190	PS5701HR	193	RD15F	162	RD20JS	162	RD3.9HS	162

Type number	Page
RD3.9M	161
RD3.9MW	161
RD3.9P	161
RD3.9S	161
RD3.9UM	161
RD30E	162
RD30ES	162
RD30F	162
RD30FM	161
RD30JS	162
RD30M	161
RD30P	161
RD30S	161
RD30UJ	161
RD30UM	161
RD33E	162
RD33ES	162
RD33F	162
RD33FM	161
RD33JS	162
RD33M	161
RD33P	161
RD33S	161
RD33UJ	161
RD33UM	161
RD36E	162
RD36ES	162
RD36F	162
RD36FM	161
RD36JS	162
RD36M	161
RD36P	161
RD36S	161
RD36UJ	161
RD36UM	161
RD39E	162
RD39ES	162
RD39F	162
RD39FM	161
RD39JS	162
RD39M	161
RD39P	161
RD39S	161
RD39UJ	161
RD39UM	161
RD4.3E	162
RD4.3ES	162
RD4.3F	162
RD4.3HS	162
RD4.3M	161
RD4.3MW	161
RD4.3P	161
RD4.3S	161
RD4.3UM	161
RD4.7E	162
RD4.7ES	162
RD4.7F	162
RD4.7FM	161
RD4.7HS	162
RD4.7JS	162
RD4.7M	161
RD4.7MW	161
RD4.7P	161
RD4.7S	161
RD4.7UJ	161
RD4.7UM	161
RD43E	162
RD43F	162
RD43FM	161
RD43M	161
RD43P	161
RD47E	162
RD47F	162
RD47FM	161
RD47M	161
RD47P	161
RD5.1E	162
RD5.1ES	162
RD5.1F	162
RD5.1FM	161
RD5.1JS	162
RD5.1M	161
RD5.1MW	161
RD5.1P	161
RD5.1S	161
RD5.1UJ	161
RD5.1UM	161
RD5.6E	162
RD5.6ES	162
RD5.6F	162
RD5.6FM	161
RD5.6JS	162
RD5.6M	161
RD5.6MW	161
RD5.6P	161
RD5.6S	161
RD5.6UJ	161
RD5.6UM	161
RD51E	162
RD51F	162
RD51FM	161
RD51P	161
RD56E	162
RD56F	162
RD56P	161
RD6.2E	162
RD6.2ES	162
RD6.2F	162
RD6.2FM	161
RD6.2JS	162
RD6.2M	161
RD6.2MW	161
RD6.2P	161
RD6.2S	161
RD6.2UJ	161
RD6.2UM	161
RD6.8E	162
RD6.8ES	162
RD6.8F	162
RD6.8FM	161
RD6.8JS	162
RD6.8M	161
RD6.8MW	161
RD6.8P	161
RD6.8S	161
RD6.8UJ	161
RD6.8UM	161
RD62E	162
RD62F	162
RD62P	161
RD68E	162
RD68F	162
RD68P	161
RD7.5E	162
RD7.5ES	162
RD7.5F	162
RD7.5FM	161
RD7.5JS	162
RD7.5M	161
RD7.5MW	161
RD7.5P	161
RD7.5S	161
RD7.5UJ	161
RD7.5UM	161
RD75E	162
RD75F	162
RD75P	161
RD8.2E	162
RD8.2ES	162
RD8.2F	162
RD8.2FM	161
RD8.2JS	162
RD8.2M	161
RD8.2MW	161
RD8.2P	161
RD8.2S	161
RD8.2UJ	161
RD8.2UM	161
RD82E	162
RD82F	162
RD82P	161
RD9.1E	162
RD9.1ES	162
RD9.1F	162
RD9.1FM	161
RD9.1JS	162
RD9.1M	161
RD9.1MW	161
RD9.1P	161
RD9.1S	161
RD9.1UJ	161
RD9.1UM	161
RD91E	162
RD91P	161
[S]	
SE1003-C	185
SE1103	185
SE301A	185
SE302A	185
SE303	185
SE303A-C	185
SE304	185
SE306	185
SE307-C	185
SE308	185
SE310	185
SE313	185
SE314	185
SE316(L)	185
[V]	
V20	55
V20HL	55
V25	56
V25+	56
V25HS	56
V30	55
V30HL	55
V33	55
V33A	55
V35	56
V35+	56
V35HS	56
V40	55
V40HL	55
V41	56
V50	55
V50HL	55
V51	56
V53A	55
V55PI	56
V60	57
V70	57
V805	59
V810	59
V820	59
V821	59
V830	59
V851	59
V852	59
VR3010A	61
VR4000PC	60
VR4000SC	60
VR4100	60
VR4200	60
VR4300	60
VR4400MC	60
VR4400PC	60
[Z]	
Z80	104

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