

# DATA SHEET

## **74F125, 74F126** Quad buffers (3-State)

Product specification  
IC15 Data Handbook

1989 March 28

# Quad buffers (3-State)

# 74F125, 74F126

## FEATURE

- High impedance NPN base inputs for reduced loading (20µA in High and Low states)

TYPE	TYPICAL PROPAGATION DELAY	TYPICAL SUPPLY CURRENT (TOTAL)
74F125	5.0ns	23mA
74F126	5.0ns	26mA

## ORDERING INFORMATION

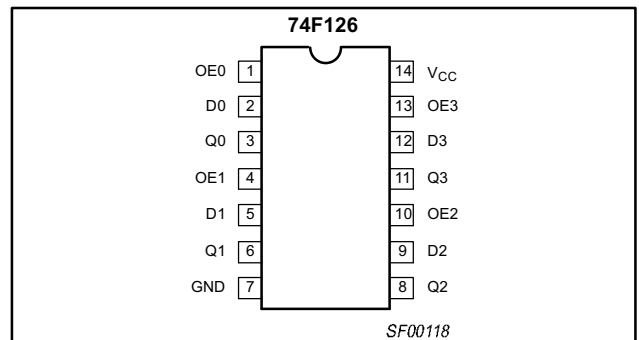
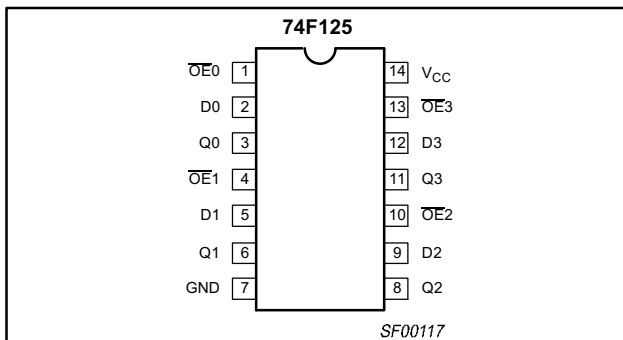
DESCRIPTION	COMMERCIAL RANGE V <sub>CC</sub> = 5V ±10%, T <sub>amb</sub> = 0°C to +70°C	PKG DWG #
14-pin plastic DIP	N74F125N, N74F126N	SOT27-1
14-pin plastic SO	N74F125D, N74F126D	SOT108-1

## INPUT AND OUTPUT LOADING AND FAN OUT TABLE

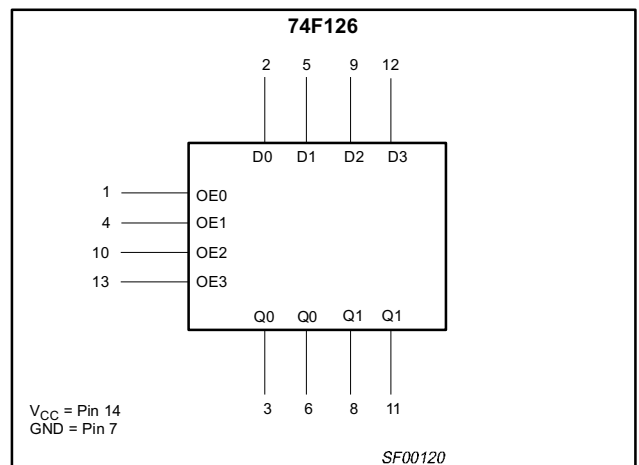
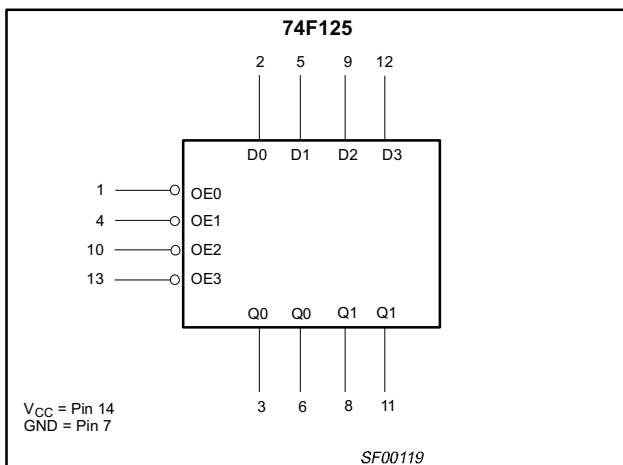
PINS	DESCRIPTION	74F (U.L.) HIGH/LOW	LOAD VALUE HIGH/LOW
D0–D3	Data inputs	1.0/0.033	20µA/20µA
$\overline{OE}0$ – $\overline{OE}3$	Output Enable inputs (active Low), 74F125	1.0/0.033	20µA/20µA
OE0–OE3	Output Enable inputs (active High), 74F126	1.0/0.033	20µA/20µA
Q0–Q3	Data outputs	750/106.7	15mA/64mA

NOTE: One (1.0) FAST unit load is defined as: 20µA in the High state and 0.6mA in the Low state.

## PIN CONFIGURATIONS



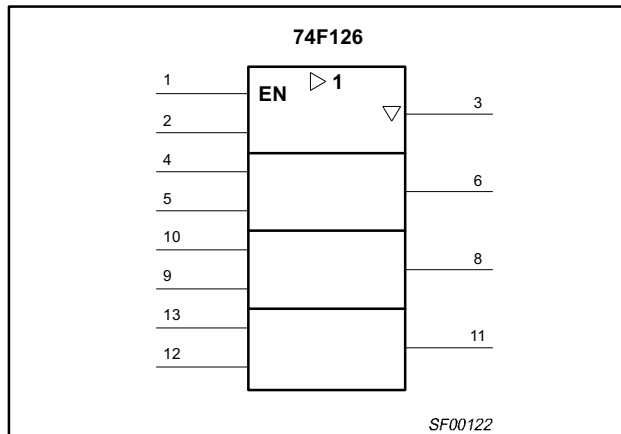
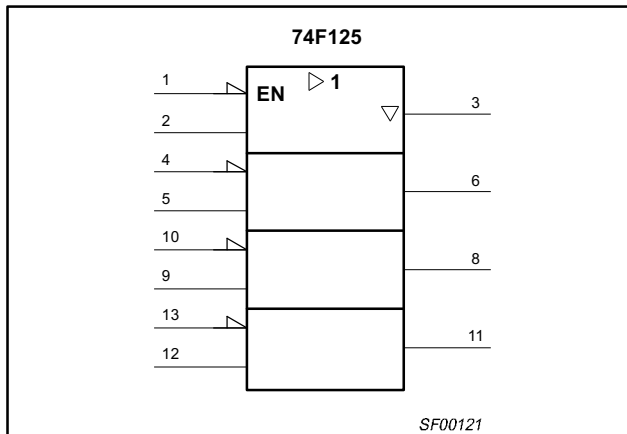
## LOGIC SYMBOLS



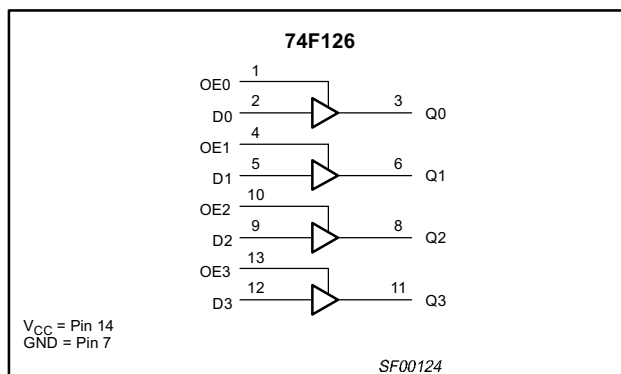
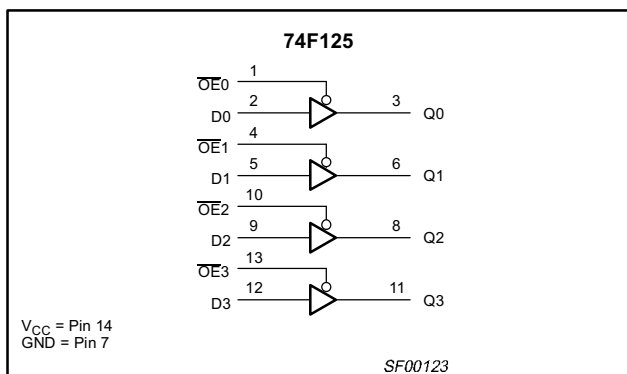
# Quad buffers (3-State)

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## IEC/IEEE SYMBOLS



## LOGIC DIAGRAMS



## FUNCTION TABLE, 74F125

I NPUTS		OUTPUT
OE <sub>n</sub>	D <sub>n</sub>	Q <sub>n</sub>
L	L	L
L	H	H
H	X	Z

## FUNCTION TABLE, 74F126

I NPUTS		OUTPUT
OE <sub>n</sub>	D <sub>n</sub>	Q <sub>n</sub>
H	L	L
H	H	H
L	X	Z

### NOTES TO THE FUNCTION TABLES:

- H = High voltage level
- L = Low voltage level
- X = Don't care
- Z = High impedance "off" state

## ABSOLUTE MAXIMUM RATINGS

(Operation beyond the limit set forth in this table may impair the useful life of the device. Unless otherwise noted these limits are over the operating free-air temperature range.)

SYMBOL	PARAMETER	RATING	UNIT
V <sub>CC</sub>	Supply voltage	-0.5 to +7.0	V
V <sub>IN</sub>	Input voltage	-0.5 to +7.0	V
I <sub>IN</sub>	Input current	-30 to +5	mA
V <sub>OUT</sub>	Voltage applied to output in High output state	-0.5 to V <sub>CC</sub>	V
I <sub>OUT</sub>	Current applied to output in Low output state	128	mA
T <sub>amb</sub>	Operating free-air temperature range	0 to +70	°C
T <sub>stg</sub>	Storage temperature range	-65 to +150	°C

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## RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	LIMITS			UNIT
		MIN	NOM	MAX	
V <sub>CC</sub>	Supply voltage	4.5	5.0	5.5	V
V <sub>IH</sub>	High-level input voltage	2.0			V
V <sub>IL</sub>	Low-level input voltage			0.8	V
I <sub>IK</sub>	Input clamp current			-18	mA
I <sub>OH</sub>	High-level output current			-15	mA
I <sub>OL</sub>	Low-level output current			64	mA
T <sub>amb</sub>	Operating free air temperature range	0		+70	°C

## DC ELECTRICAL CHARACTERISTICS

(Over recommended operating free-air temperature range unless otherwise noted.)

SYMBOL	PARAMETER	TEST CONDITIONS <sup>1</sup>	LIMITS			UNIT		
			MIN	TYP <sup>2</sup>	MAX			
V <sub>OH</sub>	High-level output voltage	V <sub>CC</sub> = MIN, V <sub>IL</sub> = MAX, V <sub>IH</sub> = MIN	I <sub>OH</sub> = -3mA	±10%V <sub>CC</sub>	2.4		V	
				±5%V <sub>CC</sub>	2.7	3.3	V	
			I <sub>OH</sub> = -15mA	±10%V <sub>CC</sub>	2.0		V	
				±5%V <sub>CC</sub>	2.0		V	
V <sub>OL</sub>	Low-level output voltage	V <sub>CC</sub> = MIN, V <sub>IL</sub> = MAX, V <sub>IH</sub> = MIN	I <sub>OH</sub> = MAX	±10%V <sub>CC</sub>		0.55	V	
				±5%V <sub>CC</sub>		0.42	0.55	V
V <sub>IK</sub>	Input clamp voltage	V <sub>CC</sub> = MIN, I <sub>I</sub> = I <sub>IK</sub>			-0.73	-1.2	V	
I <sub>I</sub>	Input current at maximum input voltage	V <sub>CC</sub> = 0.0V, V <sub>I</sub> = 7.0V				100	μA	
I <sub>IH</sub>	High-level input current	V <sub>CC</sub> = MAX, V <sub>I</sub> = 2.7V				20	μA	
I <sub>IL</sub>	Low-level input current	V <sub>CC</sub> = MAX, V <sub>I</sub> = 0.5V				-20	μA	
I <sub>OZH</sub>	Off-state output current, High-level voltage applied	V <sub>CC</sub> = MAX, V <sub>O</sub> = 2.7V				50	μA	
I <sub>OZL</sub>	Off-state output current, Low-level voltage applied	V <sub>CC</sub> = MAX, V <sub>O</sub> = 0.5V				-50	μA	
I <sub>OS</sub>	Short circuit output current <sup>3</sup>	V <sub>CC</sub> = MAX			-100		-225	mA
I <sub>CC</sub>	Supply current (total)	74F125	V <sub>CC</sub> = MAX	OE <sub>n</sub> = GND, D <sub>n</sub> = 4.5V		17	24	mA
				OE <sub>n</sub> = D <sub>n</sub> = GND		28	40	mA
				OE <sub>n</sub> = D <sub>n</sub> = 4.5V		25	35	mA
		74F126	V <sub>CC</sub> = MAX	OE <sub>n</sub> = D <sub>n</sub> = 4.5V		20	30	mA
				OE <sub>n</sub> = 4.5V, D <sub>n</sub> = GND		32	48	mA
				OE <sub>n</sub> = GND, D <sub>n</sub> = 4.5V		26	39	mA

## NOTES:

- For conditions shown as MIN or MAX, use the appropriate value specified under recommended operating conditions for the applicable type.
- All typical values are at V<sub>CC</sub> = 5V, T<sub>amb</sub> = 25°C.
- Not more than one output should be shorted at a time. For testing I<sub>OS</sub>, the use of high-speed test apparatus and/or sample-and-hold techniques are preferable in order to minimize internal heating and more accurately reflect operational values. Otherwise, prolonged shorting of a High output may raise the chip temperature well above normal and thereby cause invalid readings in other parameter tests. In any sequence of parameter tests, I<sub>OS</sub> tests should be performed last.

Quad buffers (3-State)

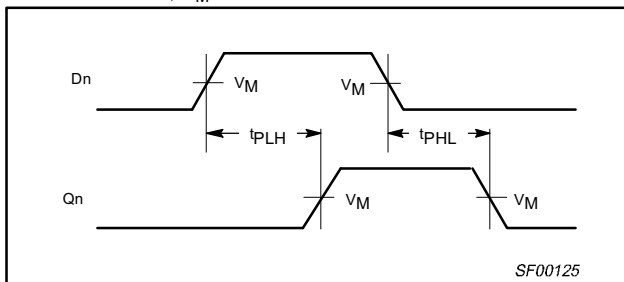
74F125, 74F126

AC ELECTRICAL CHARACTERISTICS

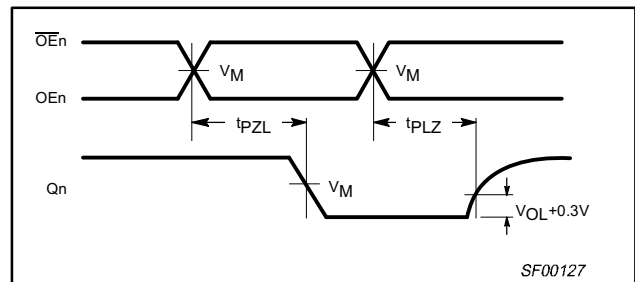
SYMBOL	PARAMETER	TEST CONDITION	LIMITS						UNIT
			V <sub>CC</sub> = +5.0V T <sub>amb</sub> = +25°C C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω			V <sub>CC</sub> = +5.0V ± 10% T <sub>amb</sub> = 0°C to +70°C C <sub>L</sub> = 50pF, R <sub>L</sub> = 500Ω			
			MIN	TYP	MAX	MIN	MAX		
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay Dn to Qn	74F125	Waveform 1	2.0	4.0	6.0	2.0	6.5	ns
			Waveform 2 Waveform 3	3.0	5.5	7.5	3.0	8.0	
t <sub>PZH</sub> t <sub>PZL</sub>	Output Enable time to High or Low level	74F125	Waveform 2	3.5	5.5	7.5	3.5	8.5	ns
			Waveform 3	4.0	6.0	8.0	4.0	9.0	
t <sub>PHZ</sub> t <sub>PLZ</sub>	Output Disable time from High or Low level	74F125	Waveform 2	1.5	3.5	5.0	1.5	6.0	ns
			Waveform 3	1.5	3.5	5.5	1.5	6.0	
t <sub>PLH</sub> t <sub>PHL</sub>	Propagation delay Dn to Qn	74F126	Waveform 1	2.0	4.0	6.5	2.0	7.0	ns
			Waveform 2 Waveform 3	3.0	5.5	8.0	3.0	8.5	
t <sub>PZH</sub> t <sub>PZL</sub>	Output Enable time to High or Low level	74F126	Waveform 2	4.0	6.0	7.5	3.5	8.5	ns
			Waveform 3	4.0	6.0	8.0	3.5	8.5	
t <sub>PHZ</sub> t <sub>PLZ</sub>	Output Disable time from High or Low level	74F126	Waveform 2	2.0	4.5	6.5	2.0	7.5	ns
			Waveform 3	3.0	5.5	7.5	3.0	8.0	

AC WAVEFORMS

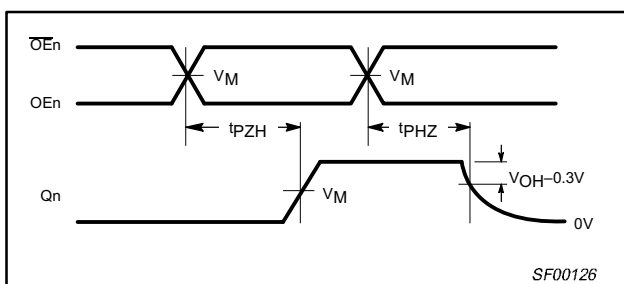
For all waveforms, V<sub>M</sub> = 1.5V.



Waveform 1. Propagation Delay for Input to Output



Waveform 3. 3-State Output Enable Time to Low Level and Output Disable Time from Low Level

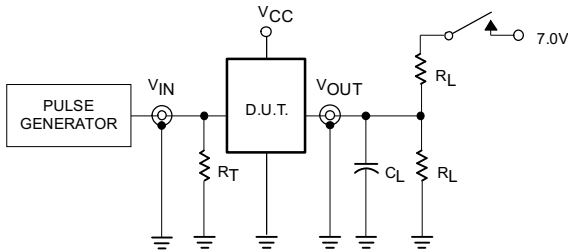


Waveform 2. 3-State Output Enable Time to High Level and Output Disable Time from High Level

# Quad buffers (3-State)

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## TEST CIRCUIT AND WAVEFORM



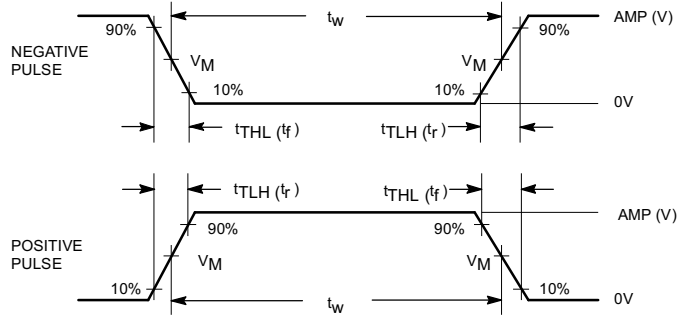
Test Circuit for Open Collector Outputs

**SWITCH POSITION**

TEST	SWITCH
$t_{PLZ}$	closed
$t_{PZL}$	closed
All other	open

**DEFINITIONS:**

- $R_L$  = Load resistor; see AC electrical characteristics for value.
- $C_L$  = Load capacitance includes jig and probe capacitance; see AC electrical characteristics for value.
- $R_T$  = Termination resistance should be equal to  $Z_{OUT}$  of pulse generators.



Input Pulse Definition

family	INPUT PULSE REQUIREMENTS					
	amplitude	$V_M$	rep. rate	$t_w$	$t_{TLH}$	$t_{THL}$
74F	3.0V	1.5V	1MHz	500ns	2.5ns	2.5ns

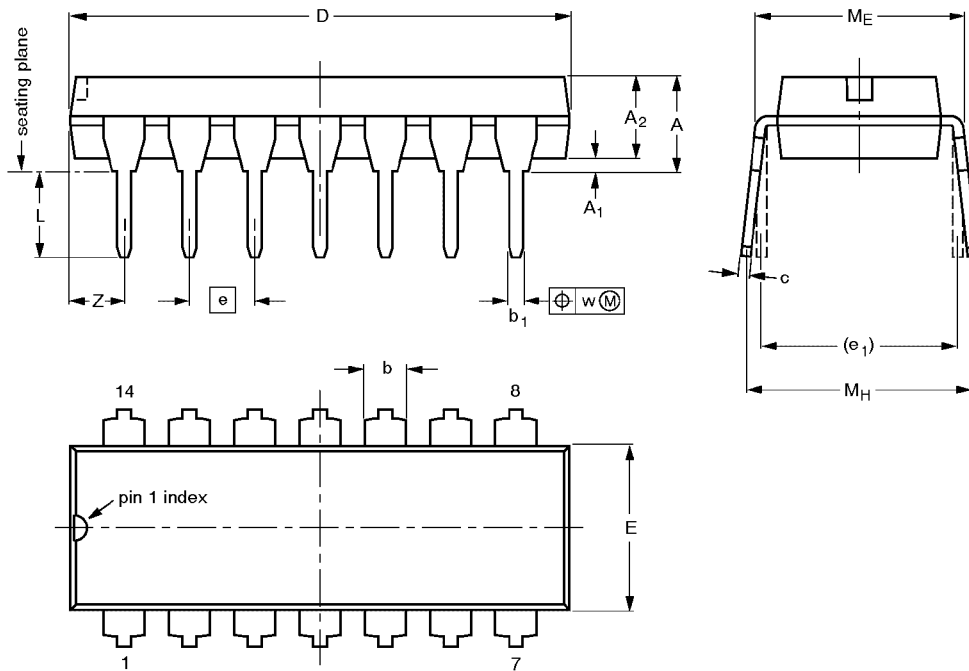
SF00128

Quad buffers (3-State)

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DIP14: plastic dual in-line package; 14 leads (300 mil)

SOT27-1



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A <sub>1</sub> min.	A <sub>2</sub> max.	b	b <sub>1</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	e <sub>1</sub>	L	M <sub>E</sub>	M <sub>H</sub>	w	Z <sup>(1)</sup> max.
mm	4.2	0.51	3.2	1.73 1.13	0.53 0.38	0.36 0.23	19.50 18.55	6.48 6.20	2.54	7.62	3.60 3.05	8.25 7.80	10.0 8.3	0.254	2.2
inches	0.17	0.020	0.13	0.068 0.044	0.021 0.015	0.014 0.009	0.77 0.73	0.26 0.24	0.10	0.30	0.14 0.12	0.32 0.31	0.39 0.33	0.01	0.087

Note

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

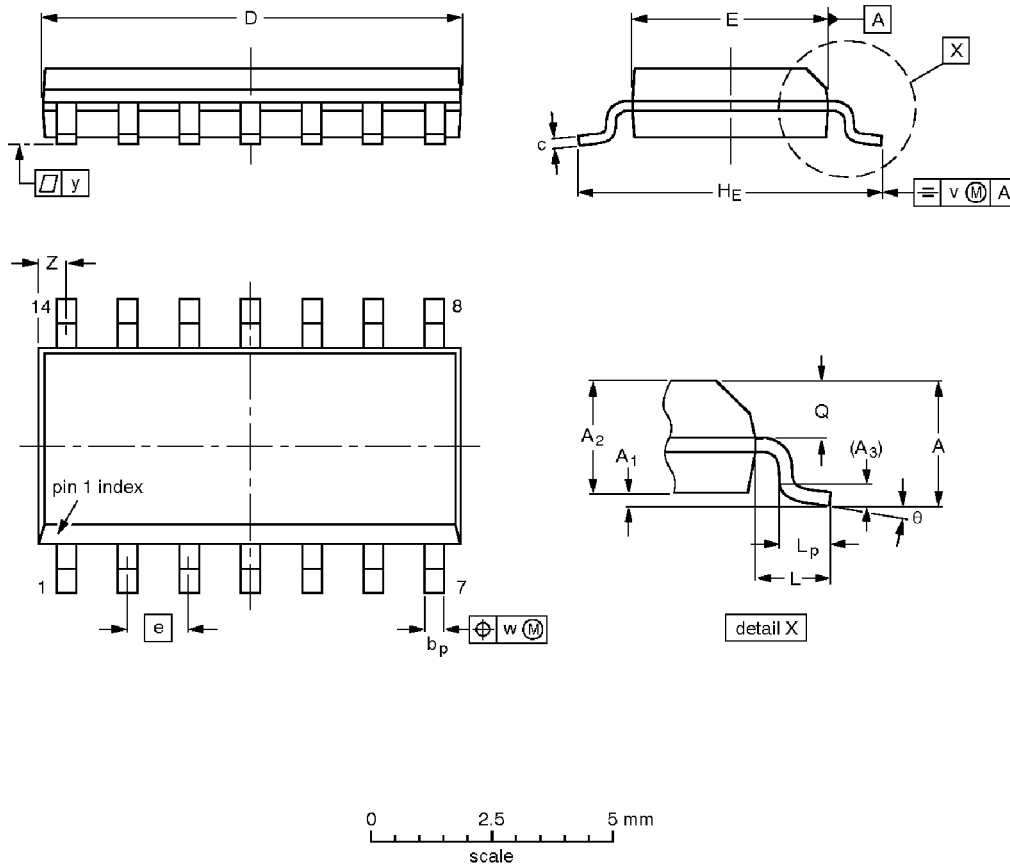
OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ		
SOT27-1	050G04	MO-001AA			92-11-17 95-03-11

Quad buffers (3-State)

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SO14: plastic small outline package; 14 leads; body width 3.9 mm

SOT108-1



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	b <sub>p</sub>	c	D <sup>(1)</sup>	E <sup>(1)</sup>	e	H <sub>E</sub>	L	L <sub>p</sub>	Q	v	w	y	Z <sup>(1)</sup>	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	8.75 8.55	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8° 0°
inches	0.069	0.010 0.004	0.057 0.049	0.01	0.019 0.014	0.0100 0.0075	0.35 0.34	0.16 0.15	0.050	0.244 0.228	0.041	0.039 0.016	0.028 0.024	0.01	0.01	0.004	0.028 0.012	

Note

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT108-1	076E06S	MS-012AB				95-01-23 97-05-22



Quad buffers (3-State)

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**NOTES**

## Quad buffers (3-State)

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## Data sheet status

Data sheet status	Product status	Definition [1]
Objective specification	Development	This data sheet contains the design target or goal specifications for product development. Specification may change in any manner without notice.
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Product specification	Production	This data sheet contains final specifications. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.

[1] Please consult the most recently issued datasheet before initiating or completing a design.

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**Limiting values definition** — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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print code

Date of release: 10-98

Document order number:

9397-750-05073

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