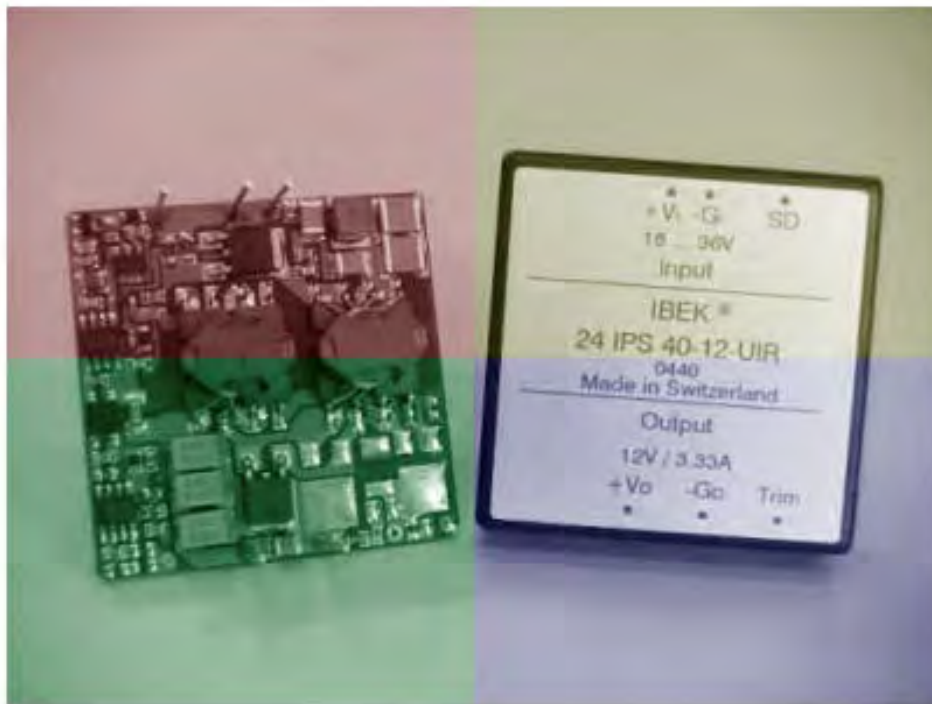


Distributed by:



Edition 2009/6

DC-DC-Converters and Switching Regulators



IBEK®

The Company

IBEK is a Swiss company located in Wettingen which was founded in 1976.

We are a manufacturer of an extensive variety of low power switch mode DC-DC-Converters and Switching Regulators for PCB mounting, the latest in the power range from 1 to 50 watts.

Our engineering, manufacturing and marketing departments are all under the same roof. This simplifies the internal communication and improves the quality assurance. Proving almost 35 years experience we stand out in competence and professionalism.

Furthermore these make us very strong in responding to custom specific requirements. Optimal solutions we work out in a fast and very efficient way.

Technology

Characteristics:

- Carefully evaluated quality components and materials ensure increased reliability
- Large-scaled power and magnetic components are used to improve the efficiency and to keep temperature low
- Perfect product designs result in low electromagnetic emissions
- Solutions for safe galvanic isolations to meet safety standards are available

Quality

Since 1993 we have been organised by a full quality management, described in the Quality Manual. It has been in accordance with ISO 9001 and in the meantime replaced by ISO 9001:2000 to meet highest standard at all times. 100% of the products have past several optical and electrical tests when coming out of production.

Service

You may expect:

- Competent technical advice because of our extensive experience in the market, applications and standards
- Fast reaction time
- High flexibility
- Short, confirmed deliveries because of the in-house manufacturing
- Efficient after sales support

Market

We are well established in:

- Industrial equipment (e.g. control and monitoring systems for machines, terminals and PC's, power stations etc.)
- Transportation (aircraft, vehicles, railways - on board and track side)
- Telecommunication (e.g. analogue and digital voice and data transmitters etc.)
- Military (e.g. autopilot in helicopters etc.)

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DC-DC-Converters

Input to output isolated

	Family	Power	Input	Output	Case	Page
	IWR1	1 W	Nominal	Single, double, dual & quadruple	DIL24	3
	IZR1	1 W	Nominal	Single, double & dual - High isolated	DIL24	4
	CPE3	3 W	1:2 wide	Single, double with +/- and +/- voltage	DIL24	5
	IPS3	3 W	1:4 ultra wide	Single, double, dual & triple	DIL24	6
	CPL3 / CPS3	3 W	1:4 ultra wide	Single & double	DIL24	7
	IPX3	3 W	1:4 ultra wide	Single & double - High isolated	DIL24	8
NEW	CPM4	4 W	1:4 ultra wide	Single & double	DIL24	9
NEW	INX4	4 W	1:4 ultra wide	Single & double - High isolated	DIL24	10
	NPE4	4 W	1:4 ultra wide	Single & double	DIL24	11
	CPE6	6 W	1:2 wide	Single & double	DIL24	12
NEW	CPI6	6 W	1:4 ultra wide	Single & double	DIL24	13
NEW	IPL7	7 W	1:4 ultra wide	Dual	2" x 1"	14
	IPR10	10 W	1:2 wide	Single - High performance	DIL24	15
	IPN10	10 W	1:2 wide	Single & double	2" x 1"	16
	IPS10	10 W	1:4 ultra wide	Single & double	2" x 2"	17
NEW	IPN12	12 W	1:4 ultra wide	Single & double	2" x 1"	18
NEW	IPN15	15 W	1:2 wide	Single & double - High performance	2" x 1"	19
	IPS15/18	15/18 W	1:2 wide	Single & double	2" x 2"	20
NEW	IPR20 / IPS20	20 W	1:4 ultra wide / 1:2 wide	Single & triple - High performance	2" x 2"	21
NEW	INR30	30 W	1:4 ultra wide	Single - High performance	2" x 1.6"	22
NEW	IPS30 / IPS40	30/40 W	1:4 ultra wide / 1:2 wide	Single - High performance	2" x 2"	23

Switching Regulators

Non-isolated

Family	Power	Input	Output	Case	Page
ISC5	5 W	1:5 ultra wide	Single & Low voltage KSC-types	DIL24	24
ISR15 / ISR25	15/25 W	1:5 ultra wide	Single	2" x 2"	25
20ISN / 40ISN	15..45 W	1:5 ultra wide	Single	2" x 2"	26

Long-running Products

DC-DC-Converters

Input to output isolated

Switching Regulators

Non-isolated

Family	Page
ICR1, IXR1, IYR1, IPW3, IPS4, ICR5/6, IPD6, IPE6, IPS6	27
IPS10 (alternative pinning), IPL10, IPL13, IPL15, IPR15	28
ISD5, ISR5, ISR10	

Application Notes

Important advices

Contents	Page
Connection in Series	29
Connection in Parallel	29
Shutdown Description	29
Cleaning	29
Liquid Flux	29

Pb free / RoHS

General guideline

Contents	Page
RoHS	30
Availability of RoHS-compliant products / General guideline	30
Recommendable temperature profiles for lead-free solder processes (THT wave soldering), Liquid Flux	30

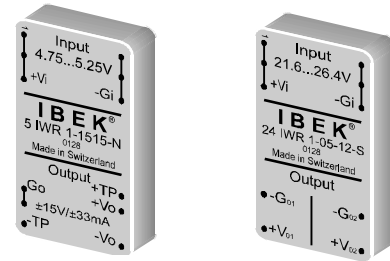
Type Key

Contains a lot of information

Example	Page
24 IPS20-051212-UI	31

Single, double, dual & quadruple outputs
Input to output isolated
Dual & quadruple outputs: Output to output isolated

- Input voltage tolerance $\pm 10\%$ ($\pm 5\%$)
- Pi-input filter
- I/O Electric strength test voltage 1500 VDC
- High reliability
- Linear regulated output voltages
- Extended ambient temperature range $-40...+85^{\circ}\text{C}$
- No derating
- Made in Switzerland, accordingly ISO 9001:2000
- 2 years warranty

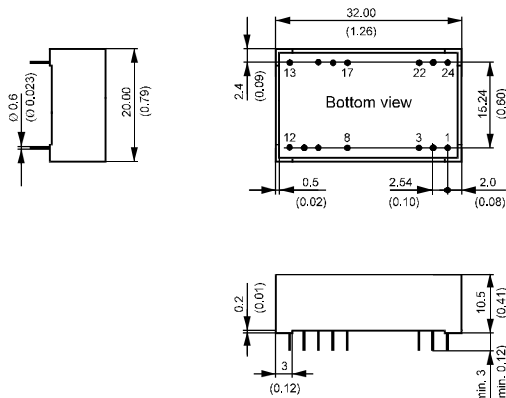


Electromagnetic emission EN 55022 < B
Conducted and radiated emissions

	5 IWR	12 IWR	15 IWR	24 IWR	
No load input current	15...85	15...35	15...30	15	mA typ.
Output voltage noise (20 MHz BW)	25...60	35...60	40...60	45...60	mVpp typ.
Switching frequency			25 ... 260		kHz typ.
Output voltage accuracy			$\pm 5\%$; 5 VDC outputs $\pm 3\%$		max.
Static line regulation			$\pm 0.2\%$; 5 VDC outputs $\pm 0.3\%$		typ.
Static load regulation FL to NL			$\pm 0.1\%$; 5 VDC outputs $\pm 0.3\%$		typ.
Efficiency			58% ... 68% (± 5 VDC outputs 40%)		typ.
I/O Electric strength test voltage			1500 VDC		
O/O Electric strength test voltage			1500 VDC		
I/O Clearance and creepage distances			≥ 1 mm		
Coupling capacitance			10 ... 30 pF		typ.
Ambient temperature range			-N: $0...+71^{\circ}\text{C}$		
- Extended			-T: $-25...+71^{\circ}\text{C}$; -S: $-40...+85^{\circ}\text{C}$		
Case temperature range			-N: $0...+91^{\circ}\text{C}$		
- Extended			-T: $-25...+91^{\circ}\text{C}$; -S: $-40...+105^{\circ}\text{C}$		
Storage temperature range			All: $-55...+105^{\circ}\text{C}$		
Case material			Non-conductive plastic, UL94 V-0 rated		
MTBF, GB @ 40°C case (MIL-HDBK-217F, Notice 2)			$> 5.700.000$ hours		

Max. admissible capacitive load 10 μF ; 5 VDC outputs 22 μF

Dimensions in mm (inches)



Standard Types ¹	Input voltage VDC	Output 1		Output 2	
		VDC	mA	VDC	mA
Single output	4.75...5.25 (nominal 5)	5	200	-	-
xx IWR1-05-N		12	80	-	-
xx IWR1-12-N		15	66	-	-
Double output	10.8...13.2 (nominal 12)	± 5	± 50	-	-
xx IWR1-0505-N		± 12	± 40	-	-
xx IWR1-1212-N		± 15	± 33	-	-
Dual output	13.5...16.5 (nominal 15)	5	100	5	100
xx IWR1-05-05-N		5	100	12	40
xx IWR1-05-12-N		5	100	15	33
xx IWR1-12-12-N		12	40	12	40
xx IWR1-15-15-N		15	33	15	33
Quadruple output		± 5	± 50	± 5	± 50
xx IWR1-2x0505-N		± 12	± 20	± 12	± 20
xx IWR1-2x1212-N		± 15	± 17	± 15	± 17

¹ To complete type number replace "xx" by the required nominal input voltage, e.g. 5 IWR1-1515-N.

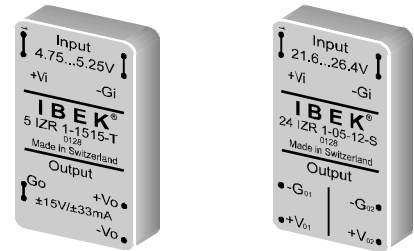
Extended temperature ranges -T and -S are available for all types. Replace -N by -T or -S on type number, e.g. 24 IWR1-05-12-S.

Modifications and customs are available upon request.

Pin Configuration				
Pin	Single output	Double output	Dual output	Quadruple output
1	+Vi	+Vi	+Vi	+Vi
2	+Vi	+Vi	+Vi	+Vi
3	+Vi	+Vi	+Vi	No Pin
8	No Pin	No Pin	-Go1	-Vo1
10	No Pin	Go	No Pin	Go1
11	No Pin	Go	No Pin	No Pin
12	-Go	-TP	+Vo1	+Vo1
13	+Vo	-Vo	+Vo2	+Vo2
15	No Pin	+Vo	No Pin	Go2
16	No Pin	+TP	-Go2	No Pin
17	+TP	No Pin	No Pin	-Vo2
22	-Gi	-Gi	-Gi	No Pin
23	-Gi	-Gi	-Gi	-Gi
24	-Gi	-Gi	-Gi	-Gi

Single, double & dual outputs
Input to output high isolated
I/O Electric strength test voltage 7 kVDC, 5 kVrms
Dual outputs: Output to output isolated

- Input voltage tolerance $\pm 10\%$ ($\pm 5\%$)
- I/O Clearance and creepage distances 5 mm
- High efficiency up to 65%
- High reliability
- Linear regulated output voltages
- Continuous no-load and short-circuit proof
- Extended ambient temperature range $-40...+85^{\circ}\text{C}$
- Made in Switzerland, accordingly ISO 9001:2000
- 2 years warranty



Electromagnetic emission EN 55022 < B
 Conducted and radiated emissions

	5 IZR	12 IZR	15 IZR	24 IZR	
No load input current	55	25	20	12	mA typ.
Output voltage noise (20 MHz BW)	20	30	35	40	mVpp typ.
Switching frequency	260 kHz typ.				
Output voltage accuracy	$\pm 4\%$; 5 VDC outputs $\pm 3\%$ max.				
Static line regulation	$\pm 0.2\%$ typ.				
Static load regulation FL to NL	$\pm 0.3\%$ typ.				
Efficiency	60% to 65% typ.				
I/O Electric strength test voltage	7.0 kVDC, 5.0 kVrms (50 Hz, 1 min.)				
O/O Electric strength test voltage	1.5 kVDC, 1.0 kVrms (50 Hz, 1 min.)				
I/O Clearance and creepage distances	5 mm				
Coupling capacitance	5 pF				
Ambient temperature range	-T: $-25...+71^{\circ}\text{C}$; -S: $-40...+85^{\circ}\text{C}$				
Case temperature range	-T: $-25...+91^{\circ}\text{C}$; -S: $-40...+105^{\circ}\text{C}$				
Storage temperature range	-T: $-55...+105^{\circ}\text{C}$; -S: $-55...+105^{\circ}\text{C}$				
Case material	Non-conductive plastic, UL94 V-0 rated				
MTBF, GB @ 40°C case (MIL-HDBK-217F, Notice 2)	$> 5.700.000$ hours				
Max. admissible capacitive load	100 μF				

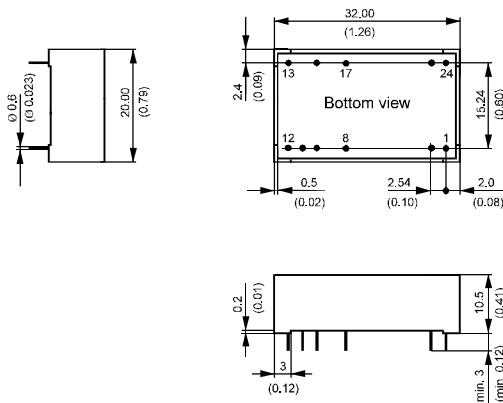
Standard Types ¹	Input voltage VDC	Output 1		Output 2	
		VDC	mA	VDC	mA
Single output xx IZR1-05-T xx IZR1-12-T xx IZR1-15-T	4.75...5.25 (nominal 5)	5	200	-	-
		12	80	-	-
		15	66	-	-
Double output xx IZR1-0505-T xx IZR1-1212-T xx IZR1-1515-T	10.8...13.2 (nominal 12)	± 5	± 50	-	-
		± 12	± 40	-	-
		± 15	± 33	-	-
Dual output xx IZR1-05-05-T xx IZR1-05-12-T xx IZR1-05-15-T xx IZR1-12-12-T xx IZR1-15-15-T	13.5...16.5 (nominal 15)	5	100	5	100
		5	100	12	40
		5	100	15	33
		12	40	12	40
		15	33	15	33

¹ To complete type number replace "xx" by the required nominal input voltage, e.g. 5 IZR1-1515-T.

Extended temperature range -S is available for all types. Replace -T by -S on type number, e.g. 24 IZR1-05-12-S.

Modifications and customs are available upon request.

Dimensions in mm (inches)

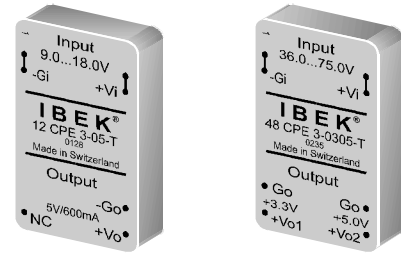


Pin Configuration			
Pin	Single output	Double output	Dual output
1	+Vi	+Vi	+Vi
2	+Vi	+Vi	+Vi
8	No Pin	No Pin	-Go1
10	No Pin	Go	No Pin
11	No Pin	Go	No Pin
12	-Go	No Pin	+Vo1
13	+Vo	-Vo	+Vo2
15	No Pin	+Vo	No Pin
17	No Pin	No Pin	-Go2
23	-Gi	-Gi	-Gi
24	-Gi	-Gi	-Gi

Single outputs

Double outputs with +/- and +/+ voltages
Input to output isolated

- Four wide 1:2 input voltage ranges
- Very high efficiency up to 85%
- Very low output voltage noise
- High reliability
- Continuous no-load and short-circuit proof
- DIL 24 case with industrial standard pinning
- No derating
- Made in Switzerland, accordingly ISO 9001:2000
- 2 years warranty



Electromagnetic emission EN 55022 < B

Conducted and radiated emissions

5 CPE3-types: EN 55022 < A

	5 CPE	12 CPE	24 CPE	48 CPE	
No load input current	40	20	10	5	mA typ.
Switching frequency	150 kHz min.				
Output voltage accuracy	± 2% max.				
Static line regulation	± 10 mV max.				
Static load regulation FL to 10%	0...20 mV; +/- outputs 0...1% max.				
Output voltage noise (20 MHz BW)	20 mVpp typ.				
Output current limitation response	130% typ.				
Efficiency	76% to 85% typ.				
I/O Electric strength test voltage	1500 VDC				
Coupling capacitance	1000 pF				
Ambient temperature range	-25...+71°C				
Case temperature range	-25...+95°C				
Storage temperature range	-55...+105°C				
Case material	Non-conductive plastic, UL94 V-0 rated				
MTBF, GB @ 40°C case (MIL-HDBK-217F, Notice 2)	> 4.300.000 hours				

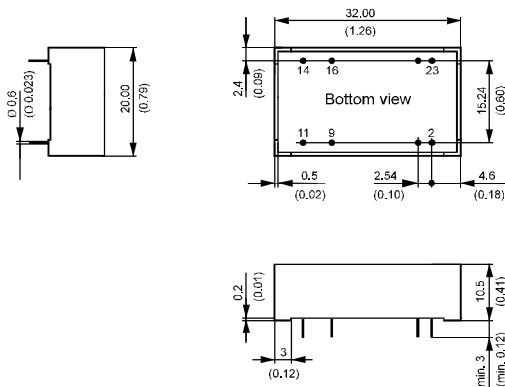
Standard Types	Input voltage VDC	Output	
		VDC	mA
Single output 5 CPE3-03-T 5 CPE3-05-T 5 CPE3-12-T 5 CPE3-15-T	4.5...9 (nominal 5)	3.3	600
		5	500
		12	250
		15	200
		Double output +/-	
Double output +/- 5 CPE3-0303-T ¹ 5 CPE3-0505-T ¹ 5 CPE3-1212-T ¹ 5 CPE3-1515-T ¹		± 3.3	± 300
		± 5	± 250
		± 12	± 125
		± 15	± 100
		Single output	
Single output xx CPE3-03-T ² xx CPE3-05-T ² xx CPE3-12-T ² xx CPE3-15-T ²	9...18 (nominal 12)	3.3	700
		5	600
		12	250
		15	200
		Double output +/-	
Double output +/- xx CPE3-0303-T ^{1,2} xx CPE3-0505-T ^{1,2} xx CPE3-1212-T ^{1,2} xx CPE3-1515-T ^{1,2}	18...36 (nominal 24)	± 3.3	± 350
		± 5	± 300
		± 12	± 125
		± 15	± 100
		Double output +/+	
Double output +/+ xx CPE3-0305-T ² xx CPE3-2503-T ² xx CPE3-2505-T ²	36...75 (nominal 48)	+ 3.3 / + 5	+ 455 / + 300
		+ 2.5 / + 3.3	+ 600 / + 455
		+ 2.5 / + 5	+ 600 / + 300

¹ Double outputs should have symmetrical load conditions to comply with the specifications listed on the left side.

² To complete type number replace "xx" by the required nominal input voltage, e.g. 12 CPE3-05-T.

Modifications and customs are available upon request.

Dimensions in mm (inches)

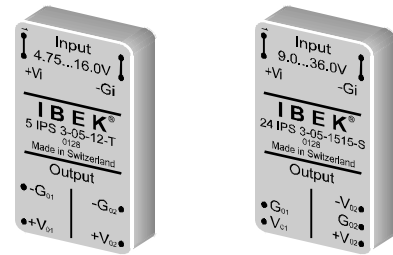


Pin Configuration			
Pin	Single output	Double output +/-	Double output +/-
2	-Gi	-Gi	-Gi
3	-Gi	-Gi	-Gi
9	No Pin	Go	Go (common)
11	NC	-Vo	+Vo1
14	+Vo	+Vo	+Vo2
16	-Go	Go	Go (common)
22	+Vi	+Vi	+Vi
23	+Vi	+Vi	+Vi

Specifications subject to change without notice

Single, double, dual & triple outputs
Input to output isolated
Dual & triple outputs: Output1 to output2(3) isolated

- Ultra wide 1:4 input voltage ranges
- Shutdown input
- Very high efficiency up to 83%
- High reliability
- Continuous no-load and short-circuit proof
- Extended ambient temperature range -40...+85°C
- No derating
- Made in Switzerland, accordingly ISO 9001:2000
- 2 years warranty



Electromagnetic emission EN 55022 < B

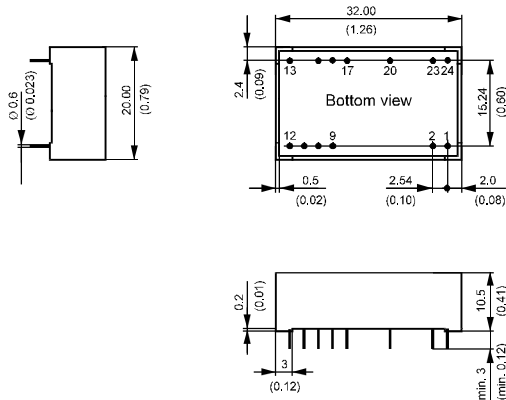
Conducted and radiated emissions
(Triple outputs upon request)

	5 IPS	24 IPS	48 IPS	
No load input current	25	5	3	mA typ.
Input current in shutdown condition	1.3 mA typ.			
Switching frequency	130 kHz typ.			
Output voltage accuracy	± 2% max.			
Static line regulation	± 15 mV typ.			
Static load regulation FL to ¼ L	0...2%; 5 VDC outputs 0...5% typ.			
Output voltage noise (20 MHz BW)	100 mVpp typ.			
Efficiency	79% to 83% typ.			
I/O Electric strength test voltage	1500 VDC			
O/O Electric strength test voltage	700 VDC			
Coupling capacitance	300 pF			
Shutdown input (SD)	Apply -0.3...+1.35 VDC / 100...200 µA ¹ to shut down (switch off) the output voltage(s). Normal operation with open pin.			

Ambient temperature range	-T: -25...+71°C; -S: -40...+85°C
Case temperature range	-T: -25...+95°C; -S: -40...+105°C
Storage temperature range	-T: -55...+105°C; -S: -55...+105°C
Case material	Non-conductive plastic, UL94 V-0 rated
MTBF, GB @ 40°C case (MIL-HDBK-217F, Notice 2)	> 2.200.000 hours

¹ 5 IPS3-types: -0.3...+0.6 VDC / 500...700 µA

Dimensions in mm (inches)



Standard Types ²	Input voltage VDC	Output 1		Output 2	
		VDC	mA	VDC	mA
Single output xx IPS3-05-T xx IPS3-12-T xx IPS3-15-T	4.75...16 (nominal 5)	5 12 15	500 250 200	- - -	- - -
Double output ³ xx IPS3-0505-T xx IPS3-1212-T xx IPS3-1515-T	9...36 (nominal 24) 45 V for 10 ms repetition rate 10 s	± 5 ± 12 ± 15	± 250 ± 125 ± 100	- - -	- - -
Dual output xx IPS3-05-05-T xx IPS3-05-12-T xx IPS3-05-15-T xx IPS3-12-12-T xx IPS3-15-15-T	18...75 (nominal 48)	5 5 5 12 15	250 250 250 125 100	5 12 15 12 15	250 125 100 125 100
Triple output ⁴ xx IPS3-05-1212-T xx IPS3-05-1515-T		5 5	300 300	± 12 ± 15	± 62 ± 50

² To complete type number replace "xx" by the required nominal input voltage, e.g. 5 IPS3-05-12-T.

³ Double outputs should have symmetrical load conditions to comply with the specifications listed on the left side.

⁴ Not available with input voltage range 4.75...16 VDC.

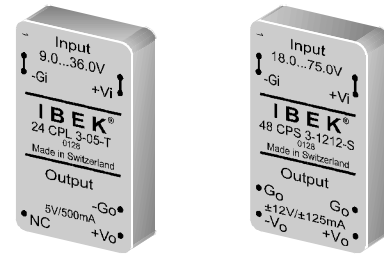
Extended temperature range -S is available for all types. Replace -T by -S on type number, e.g. 24 IPS3-05-1515-S.

Modifications and customs are available upon request.

Pin Configuration				
Pin	Single output	Double output	Dual output	Triple output
1	+Vi	+Vi	+Vi	+Vi
2	+Vi	+Vi	+Vi	+Vi
9	No Pin	No Pin	-Go1	No Pin
10	No Pin	Go	No Pin	Go1
11	No Pin	Go	No Pin	No Pin
12	-Go	No Pin	+Vo1	Vo1
13	+Vo	-Vo	+Vo2	+Vo2
15	No Pin	+Vo	No Pin	Go2
16	No Pin	No Pin	-Go2	No Pin
17	No Pin	No Pin	No Pin	-Vo2
20	SD	SD	SD	SD
23	-Gi	-Gi	-Gi	-Gi
24	-Gi	-Gi	-Gi	-Gi

Single & double outputs
Input to output isolated

- Ultra wide 1:4 input voltage ranges
- Very high efficiency up to 83%
- High reliability
- Continuous no-load and short-circuit proof
- CPS3: Extended ambient temperature range -40...+85°C
- DIL 24 case with industrial pinning
- No derating
- Made in Switzerland, accordingly ISO 9001:2000
- 2 years warranty



Electromagnetic emission EN 55022 < B
Conducted and radiated emissions

	24 CPL	48 CPL	24 CPS	48 CPS	
No load input current	5	3	5	3	mA typ.
Switching frequency	130 kHz typ.				
Output voltage accuracy	± 2% max.				
Static line regulation	± 15 mV typ.				
Static load regulation FL to ¼ L	0...2%; 5 VDC outputs 0...5% typ.				
Output voltage noise (20 MHz BW)	100 mVpp typ.				
Efficiency	79% to 83% typ.				
I/O Electric strength test voltage	1500 VDC				
Coupling capacitance	300 pF				
	CPL3		CPS3		
Ambient temperature range	-T: -25...+71°C;		-S: -40...+85°C		
Case temperature range	-T: -25...+95°C;		-S: -40...+105°C		
Storage temperature range	-T: -55...+105°C;		-S: -55...+105°C		
Case material	Non-conductive plastic, UL94 V-0 rated				
MTBF, GB @ 40°C case (MIL-HDBK-217F, Notice 2)	> 2.300.000 hours				

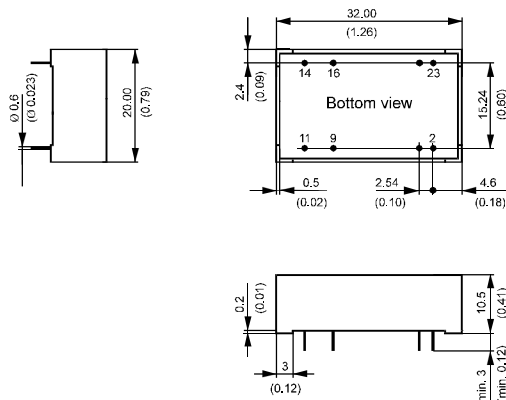
Standard Types ¹	Input voltage VDC	Output	
		VDC	mA
Single output xx CPL3-05-T xx CPL3-12-T xx CPL3-15-T	9...36 (nominal 24) 45 V for 10 ms repetition rate 10 s	5	500
		12	250
		15	200
Double output ² xx CPL3-0505-T xx CPL3-1212-T xx CPL3-1515-T	18...75 (nominal 48)	± 5	± 250
		± 12	± 125
		± 15	± 100
Single output xx CPS3-05-S xx CPS3-12-S xx CPS3-15-S		5	500
		12	250
		15	200
Double output ² xx CPS3-0505-S xx CPS3-1212-S xx CPS3-1515-S		± 5	± 250
		± 12	± 125
		± 15	± 100

¹ To complete type number replace "xx" by the required nominal input voltage, e.g. 24 CPL3-05-T.

² Double outputs should have symmetrical load conditions to comply with the specifications listed on the left side.

Modifications and customs are available upon request.

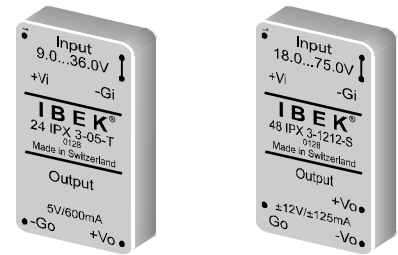
Dimensions in mm (inches)



Pin Configuration		
Pin	Single output	Double output
2	-Gi	-Gi
3	-Gi	-Gi
9	No Pin	Go
11	NC	-Vo
14	+Vo	+Vo
16	-Go	Go
22	+Vi	+Vi
23	+Vi	+Vi

Single & double outputs
Input to output high isolated
I/O Electric strength test voltage 4.2 kVDC, 3 kVrms

- Ultra wide 1:4 input voltage ranges up to 156 VDC
- I/O Clearance and creepage distances 2 mm
- High reliability
- Continuous no-load and short-circuit proof
- Extended ambient temperature range -40...+85°C
- DIL 24 case, h = 0.41"
- No derating
- Made in Switzerland, accordingly ISO 9001:2000
- 2 years warranty



Safety according to EN 60950 / UL 1950

- Insulation between adjacent primary circuits or between primary and secondary circuits:
- Operational-, Basic- and Supplementary insulation for working voltages up to 420 VDC / 300 VAC
 - Reinforced insulation for working voltages up to 210 VDC / 150 VAC

- Insulation between adjacent secondary circuits:
- Operational-, Basic-, Supplementary and Reinforced insulation for working voltages up to 420 VDC / 300 VAC

Electromagnetic emission EN 55022 < B

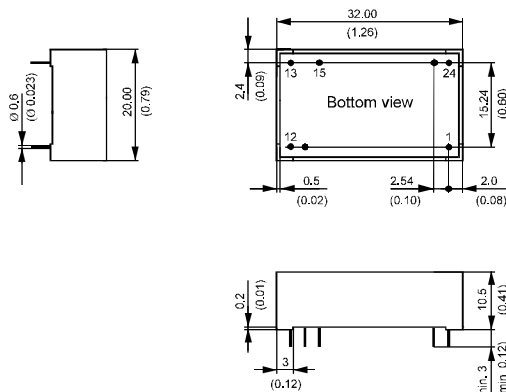
Conducted and radiated emissions
110 IPX3-types: EN 55022 < A; with external coupling capacitor Cio = 1 nF < B

	5 IPX	24 IPX	48 IPX	110 IPX	
No load input current	25	5	3	1.5	mA typ.
Switching frequency	130 kHz typ.				
Output voltage accuracy	± 1% max.; 5 VDC outputs +1/-2% max.				
Static line regulation	± 0.5% typ.				
Static load regulation FL to ¼ L	0...5% typ.				
Output voltage noise (20 MHz BW)	5 VDC	12 VDC	15 VDC	outputs mVpp typ.	
Efficiency	100 120 150				
I/O Electric strength test voltage	78% to 83% typ.				
I/O Clearance and creepage distances	4.2 kVDC, 3 kVrms (50 Hz, 1 min.)				
Coupling capacitance	2 mm all over (incl. transformer) approx. 7 pF				
Ambient temperature range	-T: -25...+71°C; -S: -40...+85°C				
Case temperature range	-T: -25...+95°C; -S: -40...+105°C				
Storage temperature range	-T: -55...+105°C; -S: -55...+105°C				
Case material	Non-conductive plastic, UL94 V-0 rated				
MTBF, GB @ 40°C case	> 3.900.000 hours				
(MIL-HDBK-217F, Notice 2)					

Standard Types ¹	Input voltage VDC	Output	
		VDC	mA
Single output	4.75...16 (nominal 5)	5	600
xx IPX 3-05-T	9...36 (nominal 24) 45 V for 10 ms repetition rate 10 s	12	250
xx IPX 3-12-T		15	200
xx IPX 3-15-T			
Double output ²	18...75 (nominal 48)	± 5	± 300
xx IPX 3-0505-T	36...156 (nominal 110)	± 12	± 125
xx IPX 3-1212-T		± 15	± 100
xx IPX 3-1515-T			

¹ To complete type number replace "xx" by the required nominal input voltage, e.g. 24 IPX3-05-T.
² Double outputs should have symmetrical load conditions to comply with the specifications listed on the left side.
Extended temperature range -S is available for all types. Replace -T by -S on type number, e.g. 48 IPX3-1212-S.
Modifications and customs are available upon request.

Dimensions in mm (inches)



Pin Configuration		
Pin	Single output	Double output
1	+Vi	+Vi
11	No Pin	Go
12	-Go	No Pin
13	+Vo	-Vo
15	No Pin	+Vo
23	-Gi	-Gi
24	-Gi	-Gi

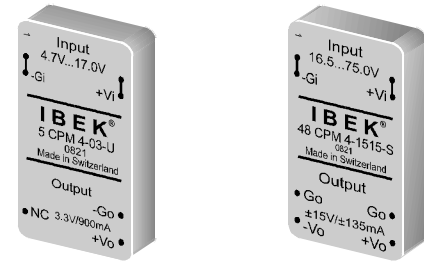
Specifications subject to change without notice

Single & double outputs
Input to output isolated
I/O Electric strength test voltage 2.0 kVDC

- Ultra wide 1:4 input voltage ranges
- Very high efficiency up to 84%
- Very low output voltage noise
- Continuous no-load and short-circuit proof
- Extended ambient temperature range -40...+85°C
- DIL 24 case, h = 0.41"
- No derating
- Made in Switzerland, accordingly ISO 9001:2000
- 2 years warranty

NEW!

PRELIMINARY



Electromagnetic emission EN 55011

Conducted and radiated emissions

	5 CPM	24 CPM	48 CPM	
No load input current	90	15	10	mA typ.
Switching frequency	400 kHz typ.			
Output voltage accuracy	± 1%; 3.3 VDC outputs ± 1.5% max.			
Static line regulation	± 0.2% max.			
Static load regulation FL to 10%	0...0.5% max.			
Output voltage noise (20 MHz BW)	30 mVpp typ.			
Output current limitation response	130% typ.			
Efficiency	77% to 84% typ.			
I/O Electric strength test voltage	2000 VDC			
Coupling capacitance	1000 pF			
Ambient temperature range	-U: -40...+71°C;		-S: -40...+85°C	
Case temperature range	-U: -40...+95°C;		-S: -40...+105°C	
Storage temperature range	-U: -40...+105°C;		-S: -40...+105°C	
Case material	Non-conductive plastic, UL94 V-0 rated			
MTBF, GB @ 40°C case	3.300.000 hours			
(MIL-HDBK-217F, Notice 2)				

Standard Types ¹	Input voltage VDC	Output	
		VDC	mA
Single output	4.7...17 ³ (nominal 5)	3.3	900
xx CPM4-03-U		5	700
xx CPM4-05-U		12	340
xx CPM4-12-U	8.0...36 (nominal 24)	15	270
xx CPM4-15-U			
Double output ²	16.5...75 (nominal 48)	± 3.3	± 450
xx CPM4-0303-U		± 5	± 350
xx CPM4-0505-U		± 12	± 170
xx CPM4-1212-U		± 15	± 135
xx CPM4-1515-U			

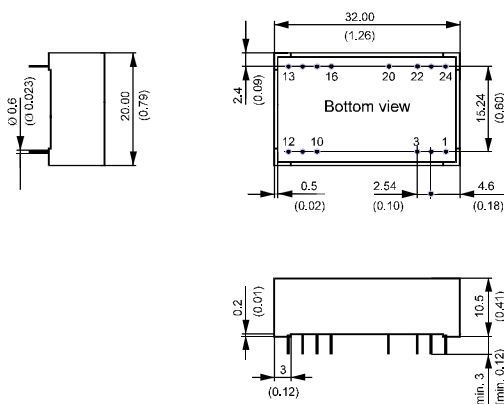
¹ To complete type number replace "xx" by the required nominal input voltage, e.g. 5 CPM4-03-U.

² Double outputs should have symmetrical load conditions to comply with the specifications listed on the left side.

³ Extended temperature range -S is available, except for the Standard Types 5 CPM 4...
Replace -U by -S on type number, e.g. 48 CPM4-1515-S.

Modifications and customs are available upon request.

Dimensions in mm (inches)



Pin Configuration		
Pin	Single output	Double output
1 ⁴	+Vi	+Vi
2	-Gi	-Gi
3	-Gi	-Gi
10	NC	No pin
11	No Pin	-Vo
12 ⁴	-Go	No pin
13 ⁴	+Vo	-Vo
14	+Vo	+Vo
15 ⁴	No pin	+Vo
16	-Go	Go
20 ⁵	i	i
22	+Vi	+Vi
23	+Vi	+Vi
24 ⁴	-Gi	-Gi

⁴ To specify alternative pin configuration (compatible with IPS3-Family) add K to type number, e.g. 24 CPM4-03-UK.

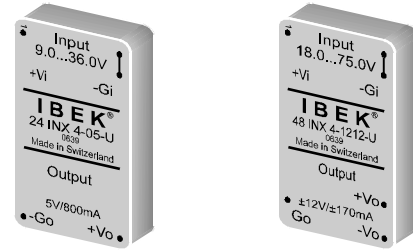
⁵ Optional inhibit pin. If required add i to type number, e.g. 24 CPM4-03-Ui, 24 CPM4-03-UiK.

Specifications subject to change without notice

Single & double outputs
Input to output high isolated
I/O Electric strength test voltage 4.2 kVDC, 3 kVrms

NEW!

- Ultra wide 1:4 input voltage ranges up to 156 VDC
- I/O Clearance and creepage distances 2 mm
- High reliability
- Continuous no-load and short-circuit proof
- Extended ambient temperature range -40...+71°C
- DIL 24 case, h = 0.41"
- No derating
- Made in Switzerland, accordingly ISO 9001:2000
- 2 years warranty



Safety according to EN 60950 / UL 1950

Insulation between adjacent primary circuits or between primary and secondary circuits:

- Operational-, Basic- and Supplementary insulation for working voltages up to 420 VDC / 300 VAC
- Reinforced insulation for working voltages up to 210 VDC / 150 VAC

Insulation between adjacent secondary circuits:

- Operational-, Basic-, Supplementary and Reinforced insulation for working voltages up to 420 VDC / 300 VAC

Electromagnetic emission EN 55022 < B

Conducted and radiated emissions

110 INX4-types: EN 55022 < A; with external coupling capacitor Cio = 1 nF < B

	24 INX	48 INX	110 INX	
No load input current	8	7	6	mA typ.
Switching frequency	130 kHz typ.			
Output voltage accuracy	± 1% max.			
Static line regulation	± 0.2% typ.			
Static load regulation FL to 10%	0...0.5% max.			
Output voltage noise (20 MHz BW)	150 mVpp typ.			
Efficiency	78% to 83% typ.			
I/O Electric strength test voltage	4.2 kVDC, 3 kVrms (50 Hz, 1 min.)			
I/O Clearance and creepage distances	2 mm all over (incl. transformer)			
Coupling capacitance	approx. 7 pF			
Ambient temperature range	-U: -40...+71°C			
Case temperature range	-U: -40...+95°C			
Storage temperature range	-U: -40...+105°C			
Case material	Non-conductive plastic, UL94 V-0 rated			
MTBF, GB @ 40°C case	> 3.500.000 hours			
(MIL-HDBK-217F, Notice 2)				

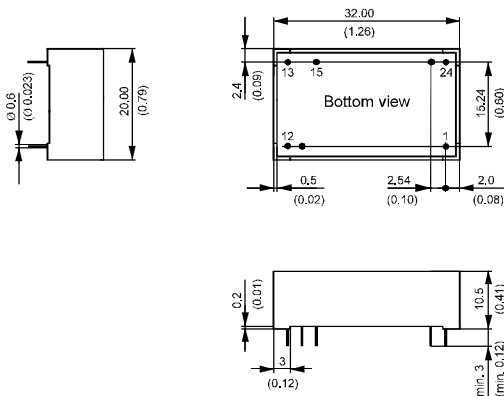
Standard Types ¹	Input voltage VDC	Output	
		VDC	mA
Single output	9...36 (nominal 24)	3.3	900
		5	800
	45 V for 10 ms repetition rate 10 s	12	340
		15	270
Double output ²	18...75 (nominal 48)	± 3.3	± 450
		± 5	± 400
	36...156 (nominal 110)	± 12	± 170
		± 15	± 135

¹ To complete type number replace "xx" by the required nominal input voltage, e.g. 24 INX4-05-U.

² Double outputs should have symmetrical load conditions to comply with the specifications listed on the left side.

Modifications and customs are available upon request.

Dimensions in mm (inches)

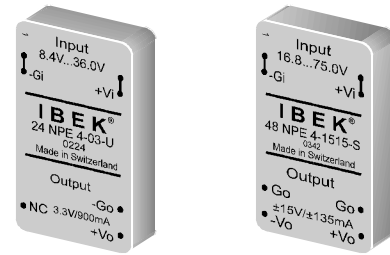


Pin Configuration		
Pin	Single output	Double output
1	+Vi	+Vi
11	No Pin	Go
12	-Go	No Pin
13	+Vo	-Vo
15	No Pin	+Vo
23	-Gi	-Gi
24	-Gi	-Gi

Specifications subject to change without notice

Single & double outputs
Input to output isolated

- 1:2 and 1:4 wide input voltage ranges
- Very high efficiency up to 84%
- Very low output voltage noise
- Continuous no-load and short-circuit proof
- Extended ambient temperature range -40...+85°C
- DIL 24 case, h = 0.41"
- No derating
- Made in Switzerland, accordingly ISO 9001:2000
- 2 years warranty



Electromagnetic emission EN 55022 < B¹

Conducted and radiated emissions

	5 NPE	24 NPE	48 NPE	
No load input current	80	15	10	mA typ.
Switching frequency	100 kHz min.			
Output voltage accuracy	± 1%; 3.3 VDC outputs ± 1.5% max.			
Static line regulation	± 0.2% max.			
Static load regulation FL to 10%	0...0.5% max.			
Output voltage noise (20 MHz BW)	30 mVpp typ.			
Output current limitation response	130% typ.			
Efficiency	77% to 84% typ.			
I/O Electric strength test voltage	1500 VDC			
Coupling capacitance	1000 pF			
Ambient temperature range	-U: -40...+71°C; -S: -40...+85°C			
Case temperature range	-U: -40...+95°C; -S: -40...+105°C			
Storage temperature range	-U: -40...+105°C; -S: -40...+105°C			
Case material	Non-conductive plastic, UL94 V-0 rated			
MTBF, GB @ 40°C case	4.300.000 hours			
(MIL-HDBK-217F, Notice 2)				

¹ 5 NPE4-types require an external input filter of:

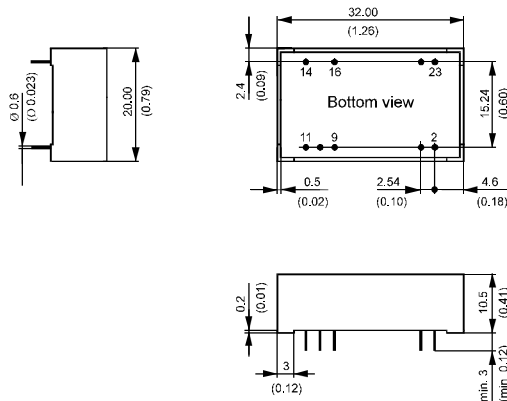
- One MURATA Ceramic capacitor GRM42- 2X5R 226K16R, 22µF/16V
- One FERROXCUBE EMI suppression bead BDS3/3/89-3S1 installed in the +Vi line between the capacitor and the input pins.

Standard Types	Input voltage VDC	Output	
		VDC	mA
Single output	4.5...9 (nominal 5)	3.3	900
5 NPE4-03-U		5	700
5 NPE4-05-U		12	340
5 NPE4-12-U		15	270
5 NPE4-15-U			
Double output ²	8.4...36 (nominal 24)	± 3.3	± 450
5 NPE4-0303-U		± 5	± 350
5 NPE4-0505-U		± 12	± 170
5 NPE4-1212-U		± 15	± 135
5 NPE4-1515-U			
Single output	16.8...75 (nominal 48)	3.3	900
xx NPE4-03-U ^{3,4}		5	700
xx NPE4-05-U ^{3,4}		12	340
xx NPE4-12-U ^{3,4}		15	270
xx NPE4-15-U ^{3,4}			
Double output ²	16.8...75 (nominal 48)	± 3.3	± 450
xx NPE4-0303-U ^{3,4}		± 5	± 350
xx NPE4-0505-U ^{3,4}		± 12	± 170
xx NPE4-1212-U ^{3,4}		± 15	± 135
xx NPE4-1515-U ^{3,4}			

- ² Double outputs should have symmetrical load conditions to comply with the specifications listed on the left side.
- ³ To complete type number replace "xx" by the required nominal input voltage, e.g. 24 NPE4-03-U.
- ⁴ Extended temperature range -S is available. Replace -U by -S on type number, e.g. 48 NPE4-1515-S.

Modifications and customs are available upon request.

Dimensions in mm (inches)

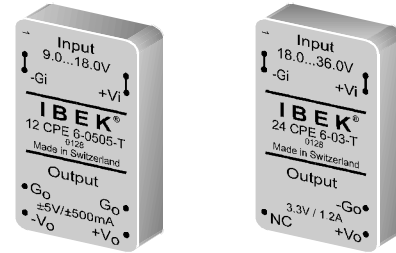


Pin Configuration		
Pin	Single output	Double output
2	-Gi	-Gi
3	-Gi	-Gi
9	No Pin	Go
10	NC	No pin
11	No Pin	-Vo
14	+Vo	+Vo
16	-Go	Go
22	+Vi	+Vi
23	+Vi	+Vi

Specifications subject to change without notice

Single & double outputs
Input to output isolated

- Three wide 1:2 input voltage ranges
- Very high efficiency up to 87%
- Very low output voltage noise
- High reliability
- Continuous no-load and short-circuit proof
- DIL 24 case with industrial standard pinning
- No derating
- Made in Switzerland, accordingly ISO 9001:2000
- 2 years warranty



Electromagnetic emission EN 55022 < B
Conducted and radiated emissions

	12 CPE	24 CPE	48 CPE	
No load input current	30	20	10	mA typ.
Switching frequency	200 kHz min.			
Output voltage accuracy	± 2% max.			
Static line regulation	± 10 mV max.			
Static load regulation FL to 10%	0...25 mV max.			
Output voltage noise (20 MHz BW)	20 mVpp typ.			
Output current limitation response	130% typ.			
Efficiency	up to 87%			
I/O Electric strength test voltage	1500 VDC			
Coupling capacitance	1000 pF			
Ambient temperature range	-25...+71°C			
Case temperature range	-25...+95°C			
Storage temperature range	-55...+105°C			
Case material	Non-conductive plastic, UL94 V-0 rated			
MTBF, GB @ 40°C case (MIL-HDBK-217F, Notice 2)	4.300.000 hours			

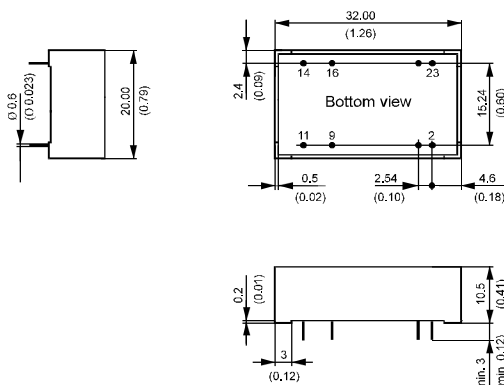
Standard Types ¹	Input voltage VDC	Output	
		VDC	mA
Single output			
xx CPE6-03-T	9...18	3.3	1200
xx CPE6-05-T	(nominal 12)	5	1000
xx CPE6-12-T		12	500
xx CPE6-15-T	18...36	15	400
Double output ²	(nominal 24)		
xx CPE6-0303-T		± 3.3	± 600
xx CPE6-0505-T	36...75	± 5	± 500
xx CPE6-1212-T	(nominal 48)	± 12	± 250
xx CPE6-1515-T		± 15	± 200

¹ To complete type number replace "xx" by the required nominal input voltage, e.g. 12 CPE6-0505-T.

² Double outputs should have symmetrical load conditions to comply with the specifications listed on the left side.

Modifications and customs are available upon request.

Dimensions in mm (inches)



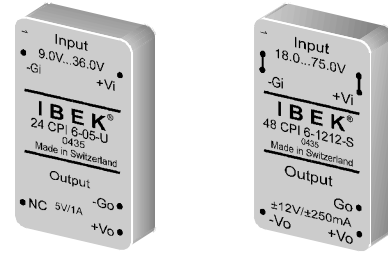
Pin Configuration		
Pin	Single output	Double output
2	-Gi	-Gi
3	-Gi	-Gi
9	No Pin	Go
11	NC	-Vo
14	+Vo	+Vo
16	-Go	Go
22	+Vi	+Vi
23	+Vi	+Vi

Specifications subject to change without notice

Single & double outputs
Input to output isolated

- Ultra wide 1:4 input voltage ranges
- Very high efficiency up to 86%
- Very low output voltage noise
- High reliability
- Continuous no-load and short-circuit proof
- Extended ambient temperature range -40...+85°C
- DIL 24 case, h = 0.41"
- Made in Switzerland, accordingly ISO 9001:2000
- 2 years warranty

NEW!



Electromagnetic emission EN 55022 < A
Conducted and radiated emissions

	24 CPI	48 CPI	
No load input current	12	10	mA typ.
Switching frequency	400 kHz typ.		
Output voltage accuracy	± 1% max.		
Static line regulation	± 0.4% max.		
Static load regulation FL to 10%	0...0.4% max.		
Output voltage noise (20 MHz BW)	50 mVpp typ.		
Efficiency	81% to 86% typ.		
I/O Electric strength test voltage	1500 VDC		
Coupling capacitance	1000 pF		
Ambient temperature range	-U: -40...+71°C; -S: -40...+85°C ¹		
Case temperature range	-U: -40...+95°C; -S: -40...+105°C		
Storage temperature range	-U: -55...+105°C; -S: -55...+105°C		
Case material	Non-conductive plastic, UL94 V-0 rated		
MTBF, GB @ 40°C case (MIL-HDBK-217F, Notice 2)	> 2.300.000 hours		

¹ Power derating 4%/°C above 80°C

Standard Types ²	Input voltage VDC	Output	
		VDC	mA
Single output	9...36 (nominal 24) 45 V for 10 ms repetition rate 10 s	3.3	1500
xx CPI6-03-U		5	1000
xx CPI6-12-U		12	500
xx CPI6-15-U		15	400
Double output ³	18...75 (nominal 48)	± 3.3	± 600
xx CPI6-0303-U		± 5	± 500
xx CPI6-0505-U		± 12	± 250
xx CPI6-1212-U		± 15	± 200

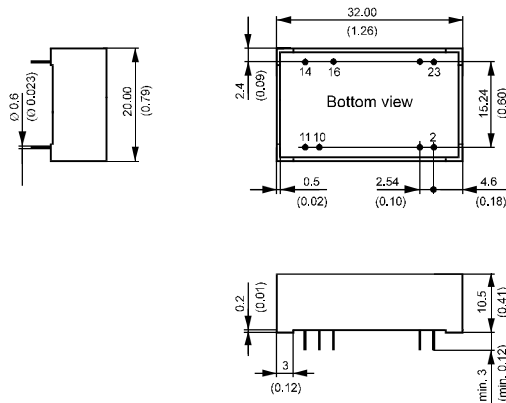
² To complete type number replace "xx" by the required nominal input voltage, e.g. 24 CPI6-05-U.

³ Double outputs should have symmetrical load conditions to comply with the specifications listed on the left side.

Extended temperature range -S is available for all types. Replace -U by -S on type number, e.g. 48 CPI6-1212-S.

Modifications and customs are available upon request.

Dimensions in mm (inches)



Pin Configuration		
Pin	Single output	Double output
2	-Gi	-Gi
3	No Pin	-Gi
10	NC	No Pin
11	No Pin	-Vo
14	+Vo	+Vo
16	-Go	Go
22	No Pin	+Vi
23	+Vi	+Vi

Dual outputs
Input to output isolated
Output to output isolated

- Ultra wide 1:4 input voltage ranges up to 156 VDC
- Inhibit input
- Very high efficiency up to 85%
- Low output voltage noise
- Continuous no-load and short-circuit proof
- Extended ambient temperature range -40...+85°C
- No derating
- Made in Switzerland, accordingly ISO 9001:2000
- 2 years warranty

NEW!



Electromagnetic emission EN 55022 < B
Conducted and radiated emissions

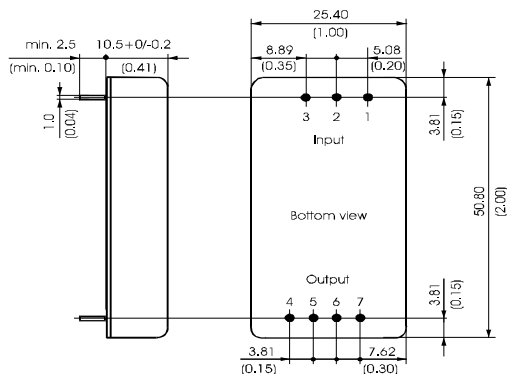
	24 IPL	48 IPL	72 IPL	110 IPL	
No load input current	12	8	5	5	mA typ.
Input current in inhibited condition	3 mA max.				
Switching frequency	350 kHz typ.				
Output voltage accuracy	± 1% max. at 50% L				
Static line regulation	± 1% max.				
Static symmetrical load regulation	± 3% max. FL to 10%				
Static cross load regulation	± 3% max. FL - 10% to 10% - FL				
Output voltage noise (20 MHz BW)	50 mVpp typ.				
Efficiency	82% to 85% typ.				
I/O Electric strength test voltage	1500 VDC				
O/O Electric strength test voltage	150 VDC				
Coupling capacitance	1000 pF				

Inhibit input (i) :

- All Apply -10...+0.8 VDC to operate (switch on) the unit.
 - 24 IPL Apply +2.4...+36 VDC to inhibit (switch off) the unit.
 - 48 IPL / 72 IPL / 110 IPL Apply +2.4...+75 VDC to inhibit (switch off) the unit.
- With open pin the unit is inhibited.

Ambient temperature range	-U: -40...+71°C; -S: -40...+85°C
Case temperature range	-U: -40...+95°C; -S: -40...+105°C
Storage temperature range	-U: -55...+105°C; -S: -55...+105°C
Case material	Non-conductive plastic, UL94 V-0 rated
MTBF, GB @ 40°C case (MIL-HDBK-217F, Notice 2)	> 1.500.000 hours

Dimensions in mm (inches)



Standard Types	Input voltage VDC	Output 1		Output 2	
		VDC	mA	VDC	mA
Dual output 1					
24 IPL7-05-05-U	8.4...36	5	600	5	600
24 IPL7-12-12-U	(nominal 24)	12	250	12	250
24 IPL7-15-15-U		15	200	15	200
24 IPL7-24-24-U		24	130	24	130
Dual output 1					
xx IPL7-05-05-U 2	16.8...75	5	700	5	700
xx IPL7-12-12-U 2	(nominal 48)	12	300	12	300
xx IPL7-15-15-U 2	36...121	15	240	15	240
xx IPL7-24-24-U 2	(nominal 72)	24	150	24	150
	55...156				
	(nominal 110)				

¹ For single output modules connect the dual outputs in parallel.

² To complete type number replace "xx" by the required nominal input voltage, e.g. 48 IPL7-05-05-U.

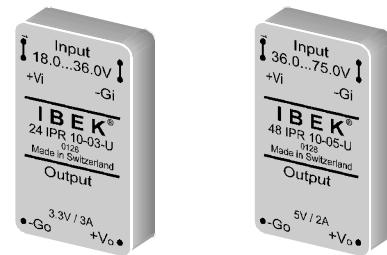
Extended temperature range -S is available for all types. Replace -U by -S on type number, e.g. 72 IPL7-24-24-S.

Modifications and customs are available upon request.

Pin Configuration	
Pin	Dual output
1	+Vi
2	-Vi
3	i
4	-Vo1
5	+Vo1
6	-Vo2
7	+Vo2

Single outputs
Input to output isolated
High performance

- Wide 1:2 input voltage ranges
- Very high efficiency, typical 88%
- Synchronous rectifier (3.3 VDC and 5 VDC outputs)
- Highest power density
- Continuous no-load and short-circuit proof
- DIL 24 case, h = 0.41"
- No derating
- Made in Switzerland, accordingly ISO 9001:2000
- 2 years warranty



Electromagnetic emission EN 55022 < A

Conducted and radiated emissions

	24 IPR	48 IPR	
No load input current	20	15	mA typ.
Switching frequency	400 kHz typ.		
Output voltage accuracy	± 1% max.		
Static line regulation	± 0.2% typ.		
Static load regulation FL to 10%	0...1% typ.		
Output voltage noise (20 MHz BW)	100 mVpp typ. ¹		
Efficiency	88% typ.		
I/O Electric strength test voltage	1500 VDC		
Coupling capacitance	1000 pF		
Ambient temperature range	-40...+65°C		
Case temperature range	-40...+100°C		
Storage temperature range	-55...+105°C		
Case material	Metal, moulded		
MTBF, GB @ 40°C case	2.000.000 hours		
(MIL-HDBK-217F, Notice 2)			

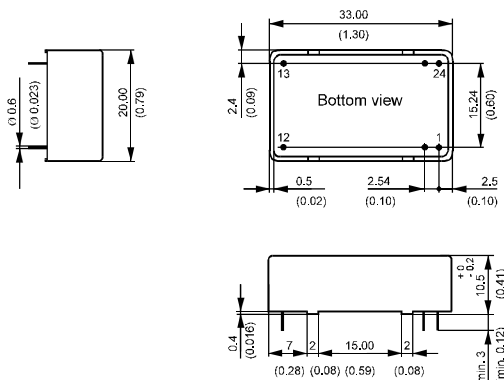
Standard Types ²	Input voltage VDC	Output	
		VDC	mA
Single output	18...36		
xx IPR10-03-U	(nominal 24)	3.3	3000
xx IPR10-05-U		5	2000
xx IPR10-12-U	36...75	12	833
xx IPR10-15-U	(nominal 48)	15	667

² To complete type number replace "xx" by the required nominal input voltage, e.g. 24 IPR10-03-U.

Modifications and customs are available upon request.

¹ Requires two external 0.47µF multi-layer ceramic capacitors installed across the output pins.

Dimensions in mm (inches)

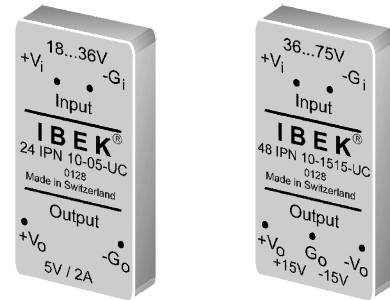


Pin Configuration	
Pin	Single output
1	+Vi
2	+Vi
12	-Go
13	+Vo
23	-Gi
24	-Gi

Specifications subject to change without notice

Single & double outputs
Input to output isolated

- Wide 1:2 input voltage ranges
- Shutdown input (optional)
- Very high efficiency up to 85%
- Low output voltage noise
- Continuous no-load and short-circuit proof
- 2" x 1" x 0.41" case with industrial standard pinning
- No derating
- Made in Switzerland, accordingly ISO 9001:2000
- 2 years warranty



Electromagnetic emission EN 55022 < A
Conducted and radiated emissions

	12 IPN	24 IPN	48 IPN	
No load input current	20	15	10	mA typ.
Input current in shutdown condition	1.3 mA typ.			
Switching frequency	400 kHz typ.			
Output voltage accuracy	± 1% max.			
Static line regulation	± 0.3% typ.			
Static load regulation FL to 10%	0...0.5% typ.			
Output voltage noise (20 MHz BW)	50 mVpp typ. ¹			
Efficiency	79% to 85% typ.			
I/O Electric strength test voltage	1500 VDC			
Coupling capacitance	1000 pF			
Shutdown input (SD) :	Apply -0.3...+0.6 VDC to shut down (switch off) the output voltage(s). Normal operation with open pin.			
Ambient temperature range	-40...+65°C			
Case temperature range	-40...+100°C			
Storage temperature range	-55...+105°C			
Case material	Metal with plastic bottom cover, UL94 V-0 rated			
MTBF, GB @ 40°C case	> 1.500.000 hours			
(MIL-HDBK-217F, Notice 2)				

Standard Types ²	Input voltage VDC	Output	
		VDC	mA
Single output			
xx IPN10-03-UC	9...18	3.3	2400
xx IPN10-05-UC	(nominal 12)	5	2000
xx IPN10-12-UC		12	833
xx IPN10-15-UC	18...36	15	667
Double output ³	(nominal 24)		
xx IPN10-0505-UC		± 5	± 1000
xx IPN10-1212-UC	36...75	± 12	± 417
xx IPN10-1515-UC	(nominal 48)	± 15	± 333

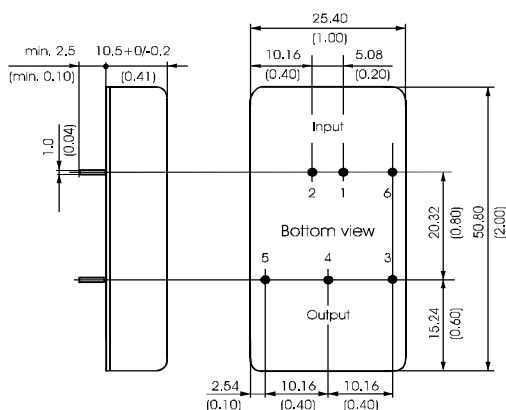
² To complete type number replace "xx" by the required nominal input voltage, e.g. 24 IPN10-05-UC.

³ Double outputs should have symmetrical load conditions to comply with the specifications listed on the left side.

Modifications and customs are available upon request.

¹ The negative (-) line of a double output unit requires two multi-layer ceramic capacitors of 0.47µF installed across the output pins to achieve this value.

Dimensions in mm (inches)



Pin Configuration		
Pin	Single output	Double output
1	+Vi	+Vi
2	-Gi	-Gi
3	+Vo	+Vo
4	No pin	Go
5	-Go	-Vo
6 ⁴	SD	SD

⁴ Optional shutdown pin. If required replace C by G on type number, e.g. 24 IPN10-05-UG.

Single & double outputs
Input to output isolated

- Ultra wide 1:4 input voltage ranges
- Shutdown input (optional)
- Very high efficiency, typical 84%
- High reliability
- Continuous no-load and short-circuit proof
- Extended ambient temperature range -40...+85°C
- 2" x 2" x 0.41" case with industrial standard pinning
- Made in Switzerland, accordingly ISO 9001:2000
- 2 years warranty

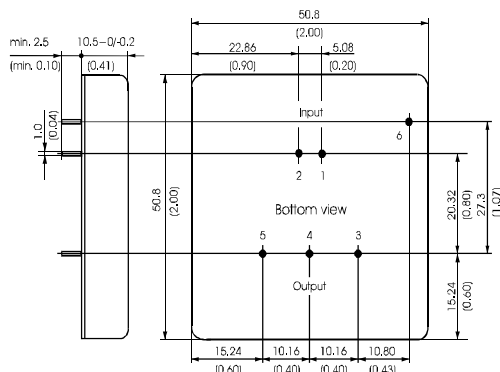


Electromagnetic emission EN 55022 < B
Conducted and radiated emissions

	24 IPS	48 IPS	
No load input current	15	10	mA typ.
Input current in shutdown condition	3 mA typ.		
Switching frequency	400 kHz typ.		
Output voltage accuracy	± 1% max.		
Static line regulation	± 15 mV typ.		
Static load regulation FL to NL	0...50 mV typ.		
Output voltage noise (20 MHz BW)	5 VDC 50	12 VDC 120	15 VDC 150 mVpp typ.
Efficiency	84% typ.		
I/O Electric strength test voltage	1500 VDC		
Coupling capacitance	1000 pF		
Shutdown input (SD)	Apply -0.3...+2 VDC to shut down (switch off) the output voltage(s). Normal operation with open pin.		
Ambient temperature range	-T: -25...+71°C; -S: -40...+85°C ¹		
Case temperature range	-T: -25...+95°C; -S: -40...+105°C		
Storage temperature range	-T: -55...+105°C; -S: -55...+105°C		
Case material	Metal with plastic bottom cover, UL94 V-0 rated		
MTBF, GB @ 40°C case (MIL-HDBK-217F, Notice 2)	> 1.850.000 hours		

¹ Power derating from 100% to 80% load for 71°C to 85°C

Dimensions in mm (inches)



Standard Types ²	Input voltage VDC	Output	
		VDC	mA
Single output	10...33		
xx IPS10-05-TC	(nominal 24)	5	2000
xx IPS10-12-TC	35 V for 500 ms	12	833
xx IPS10-15-TC	repetition rate 50 s	15	667
Double output ³	45 V for 10 ms		
xx IPS10-0505-TC	repetition rate 10 s	± 5	± 1000
xx IPS10-1212-TC	18...75	± 12	± 417
xx IPS10-1515-TC	(nominal 48)	± 15	± 333

² To complete type number replace "xx" by the required nominal input voltage, e.g. 24 IPS10-0505-TC.

³ Double outputs should have symmetrical load conditions to comply with the specifications listed on the left side.

Extended temperature range -S is available for all types. Replace -T by -S on type number, e.g. 24 IPS10-0505-SC.

Modifications and customs are available upon request.

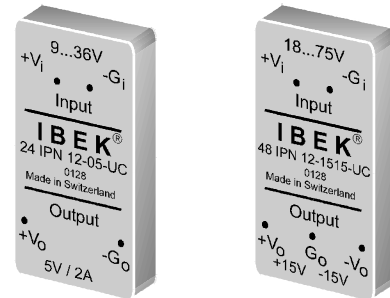
Pin Configuration		
Pin	Single output	Double output
1	+Vi	+Vi
2	-Gi	-Gi
3	+Vo	+Vo
4	No Pin	Go
5	-Go	-Vo
6 ⁴	SD	SD

⁴ Optional shutdown pin. If required replace C by G on type number, e.g. 24 IPS10-05-TG.

Single & double outputs
Input to output isolated

- Ultra wide 1:4 input voltage ranges
- Shutdown input (optional)
- Very high efficiency up to 85%
- Low output voltage noise
- Continuous no-load and short-circuit proof
- 2" x 1" x 0.41" case with industrial standard pinning
- No derating
- Made in Switzerland, accordingly ISO 9001:2000
- 2 years warranty

NEW!



Electromagnetic emission EN 55022 < A
Conducted and radiated emissions

	24 IPN	48 IPN
No load input current	15	10
Input current in shutdown condition	1.3 mA typ.	
Switching frequency	400 kHz typ.	
Output voltage accuracy	± 1% max.	
Static line regulation	± 0.3% typ.	
Static load regulation FL to 10%	0...0.5% typ.	
Output voltage noise (20 MHz BW)	50 mVpp typ. ¹ ; 3.3 VDC outputs 30 mVpp typ.	
Efficiency	80% to 85% typ.	
I/O Electric strength test voltage	1500 VDC	
Coupling capacitance	1000 pF	
Shutdown input (SD) :	Apply -0.3...+0.6 VDC to shut down (switch off) the output voltage(s). Normal operation with open pin.	
Ambient temperature range	-40...+65°C	
Case temperature range	-40...+100°C	
Storage temperature range	-55...+105°C	
Case material	Metal with plastic bottom cover, UL94 V-0 rated	
MTBF, GB @ 40°C case (MIL-HDBK-217F, Notice 2)	> 1.500.000 hours	

Standard Types ²	Input voltage VDC	Output	
		VDC	mA
Single output	9...36 (nominal 24)	3.3	2400
xx IPN12-03-UC		5	2000
xx IPN12-05-UC		12	1000
xx IPN12-12-UC		15	800
Double output ³	18...75 (nominal 48)	± 5	± 1000
xx IPN12-0505-UC		± 12	± 500
xx IPN12-1212-UC		± 15	± 400
xx IPN12-1515-UC			

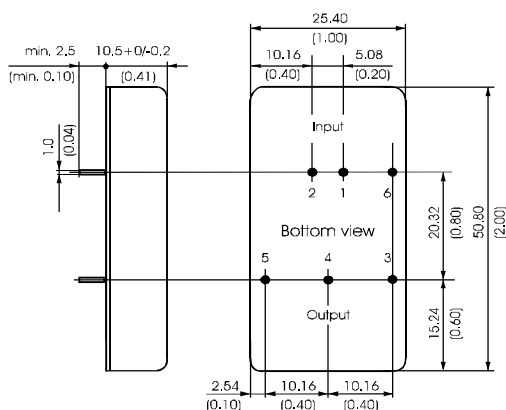
² To complete type number replace "xx" by the required nominal input voltage, e.g. 24 IPN12-05-UC.

³ Double outputs should have symmetrical load conditions to comply with the specifications listed on the left side.

Modifications and customs are available upon request.

¹ The negative (-) line of a double output unit requires two multi-layer ceramic capacitors of 0.47µF installed across the output pins to achieve this value.

Dimensions in mm (inches)



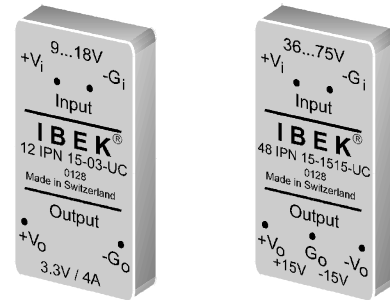
Pin Configuration		
Pin	Single output	Double output
1	+Vi	+Vi
2	-Gi	-Gi
3	+Vo	+Vo
4	No pin	Go
5	-Go	-Vo
6 ⁴	SD	SD

⁴ Optional shutdown pin. If required replace C by G on type number, e.g. 24 IPN12-05-UG.

Single & double outputs
Input to output isolated
High performance

- Wide 1:2 input voltage ranges
- Shutdown input (optional)
- Very high efficiency up to 88%
- Low output voltage noise
- Highest power density
- Continuous no-load and short-circuit proof
- 2" x 1" x 0.41" case with industrial standard pinning
- Made in Switzerland, accordingly ISO 9001:2000
- 2 years warranty

NEW!



Electromagnetic emission EN 55022 < A
Conducted and radiated emissions

	12 IPN	24 IPN	48 IPN	
No load input current	20	15	10	mA typ.
Input current in shutdown condition	1.3 mA typ.			
Switching frequency	400 kHz typ.			
Output voltage accuracy	± 1% max.			
Static line regulation	± 0.3% typ.			
Static load regulation FL to 10%	0...0.5% typ.			
Output voltage noise (20 MHz BW)	50 mVpp typ. ¹			
Efficiency	82% to 88% typ.			
I/O Electric strength test voltage	1500 VDC			
Coupling capacitance	1000 pF			
Shutdown input (SD) :	Apply -0.3...+0.6 VDC to shut down (switch off) the output voltage(s). Normal operation with open pin.			
Ambient temperature range	-40...+65°C			
Power derating	3.3 VDC & 5 VDC outputs: 2.5%/°C above 60°C ²			
Case temperature range	-40...+100°C			
Storage temperature range	-55...+105°C			
Case material	Metal with plastic bottom cover, UL94 V-0 rated			
MTBF, GB @ 40°C case (MIL-HDBK-217F, Notice 2)	> 1.500.000 hours			

Standard Types ³	Input voltage VDC	Output	
		VDC	mA
Single output			
xx IPN15-03-UC	9...18	3.3	4000
xx IPN15-05-UC	(nominal 12)	5	3000
xx IPN15-12-UC		12	1250
xx IPN15-15-UC	18...36	15	1000
(nominal 24)			
Double output ⁴			
xx IPN15-0505-UC		± 5	± 1500
xx IPN15-1212-UC	36...75	± 12	± 625
xx IPN15-1515-UC	(nominal 48)	± 15	± 500

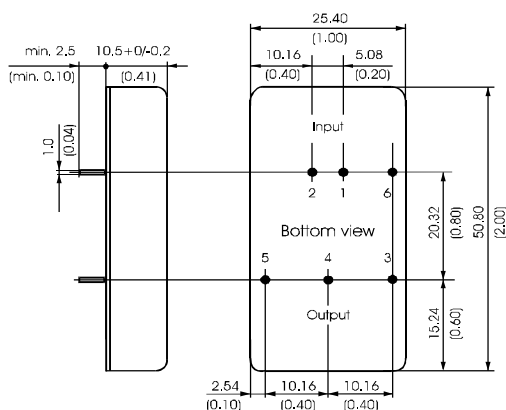
³ To complete type number replace "xx" by the required nominal input voltage, e.g. 12 IPN15-03-UC.

⁴ Double outputs should have symmetrical load conditions to comply with the specifications listed on the left side.

Modifications and customs are available upon request.

¹ The negative (-) line of a double output unit requires two multi-layer ceramic capacitors of 0.47µF installed across the output pins to achieve this value.
² 12 IPN15-03-UC: 2.3%/°C above 55°C

Dimensions in mm (inches)



Pin Configuration		
Pin	Single output	Double output
1	+Vi	+Vi
2	-Gi	-Gi
3	+Vo	+Vo
4	No pin	Go
5	-Go	-Vo
6 ⁵	SD	SD

⁵ Optional shutdown pin. If required replace C by G on type number, e.g. 12 IPN15-03-UG.

Single & double outputs
Input to output isolated

- Wide 1:2 input voltage ranges
- Shutdown input (optional)
- Very high efficiency, up to 90%
- High reliability
- Continuous no-load and short-circuit proof
- Extended ambient temperature range -40...+85°C
- 2" x 2" x 0.41" case with industrial standard pinning
- Made in Switzerland, accordingly ISO 9001:2000
- 2 years warranty



Electromagnetic emission EN 55022 < B
Conducted and radiated emissions

	24 IPS	48 IPS
No load input current	15	10
Input current in shutdown condition	3 mA typ.	
Switching frequency	400 kHz typ.	
Output voltage accuracy	± 1% max.	
Static line regulation	± 10 mV; 5 VDC outputs ± 20 mV max.	
Static load regulation FL to NL	0...30 mV max.	
Output voltage noise (20 MHz BW)	75 mVpp max.	
Efficiency	up to 90% typ.	
I/O Electric strength test voltage	1500 VDC	
Coupling capacitance	1000 pF	
Shutdown input (SD)	Apply -0.3...+2 VDC to shut down (switch off) the output voltage(s). Normal operation with open pin.	
Ambient temperature range	-T: -25...+71°C; -S: -40...+85°C ¹	
Case temperature range	-T: -25...+95°C; -S: -40...+105°C	
Storage temperature range	-T: -55...+105°C; -S: -55...+105°C	
Case material	Metal with plastic bottom cover, UL94 V-0 rated	
MTBF, GB @ 40°C case	> 1.500.000 hours	
(MIL-HDBK-217F, Notice 2)		

¹ Power derating from 100% to 80% for 71°C to 85°C

Standard Types ²	Input voltage VDC	Output	
		VDC	mA
Single output	18...36 (nominal 24)	5	3000
xx IPS15-05-TC		12	1500
xx IPS18-15-TC		15	1200
Double output ³	36...75 (nominal 48)	± 5	± 1500
xx IPS15-0505-TC		± 12	± 750
xx IPS18-1212-TC		± 15	± 600

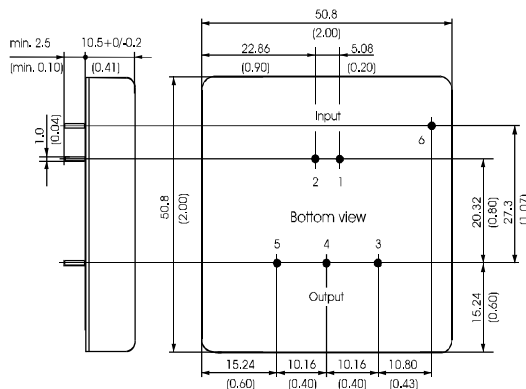
² To complete type number replace "xx" by the required nominal input voltage, e.g. 24 IPS18-15-TC.

³ Double outputs should have symmetrical load conditions to comply with the specifications listed on the left side.

Extended temperature range -S is available for all types. Replace -T by -S on type number, e.g. 24 IPS18-15-SC.

Modifications and customs are available upon request.

Dimensions in mm (inches)



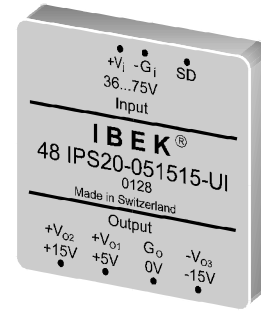
Pin Configuration		
Pin	Single output	Double output
1	+Vi	+Vi
2	-Gi	-Gi
3	+Vo	+Vo
4	No Pin	Go
5	-Go	-Vo
6 ⁴	SD	SD

⁴ Optional shutdown pin. If required replace C by G on type number, e.g. 24 IPS18-15-TG.

Single & triple outputs
Input to output isolated
High performance

- 1:2 and 1:4 wide input voltage ranges
- Very high efficiency up to 89%
- IPR20: Synchronous rectifier
- Low output voltage noise
- Continuous no-load and short-circuit proof
- IPR20: Extended ambient temperature range -40...+85°C
- 2" x 2" x 0.5" case
- Made in Switzerland, accordingly ISO 9001:2000
- 2 years warranty

NEW!



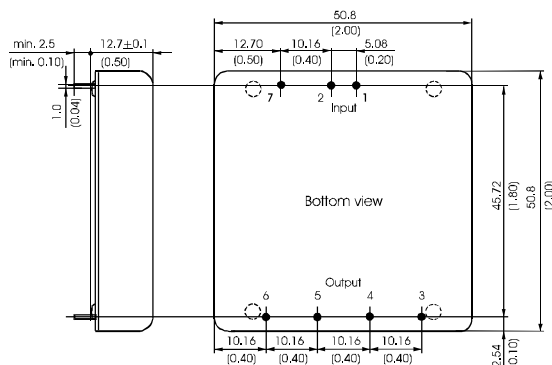
Electromagnetic emission EN 55022 < A

Conducted and radiated emissions

	24 IPR	48 IPR	24 IPS	48 IPS	
No load input current	50	30	20	12	mA typ.
Switching frequency	200	200	400	400	kHz typ.
Input current in shutdown condition	3 mA typ.				
Output voltage accuracy	± 1% max.				
Static line regulation	+Vo1	+Vo2	-Vo3		max.
Static load regulation FL to 10%	± 20mV	± 3%	± 3%		max.
Output voltage noise (20 MHz BW)	All outputs 100 mVpp max.				
Efficiency	up to 89% typ.				
I/O Electric strength test voltage	1500 VDC				
Coupling capacitance	1000 pF				
Shutdown input (SD)	Apply -0.3...+0.6 VDC to shut down (switch off) the output voltage(s). Normal operation with open pin.				
Ambient temperature range	-U: -40...+71°C;		-S: -40...+85°C		
Case temperature range	-U: -40...+95°C ¹ ;		-S: -40...+105°C		
Storage temperature range	-U: -55...+105°C;		-S: -55...+105°C		
Case material	Metal with plastic bottom cover, UL94 V-0 rated				
MTBF, GB @ 40°C case (MIL-HDBK-217F, Notice 2)	> 500.000 hours				

¹ IPS20: -40...+100°C

Dimensions in mm (inches)



Standard Types ²	Input voltage VDC	Output 1		Output 2	
		VDC	mA	VDC	mA
Single output	9...36 (nominal 24)	3.3	6000	-	-
xx IPR20-03-UI		5	4000	-	-
xx IPR20-05-UI	18...75 (nominal 48)	3.3	5000	-	-
xx IPR20-03-SI ³		5	3300	-	-
xx IPR20-05-SI ³					
Single output	18...36 (nominal 24)	3.3	4000	-	-
xx IPS20-03-UI		5	4000	-	-
xx IPS20-05-UI	36...75 (nominal 48)	12	1660	-	-
xx IPS20-12-UI		15	1330	-	-
xx IPS20-15-UI	24	833	-	-	-
xx IPS20-24-UI					
Triple output					
xx IPS20-051212-UI		5	2660	± 12	± 277
xx IPS20-051515-UI		5	2660	± 15	± 222

² To complete type number replace "xx" by the required nominal input voltage, e.g. 48 IPS20-051515-UI.

³ Extended ambient temperature range -40...+85°C.

Modifications and customs are available upon request.

Option R: Trim function for single outputs.

The output voltage can be adjusted with an external resistor in the range of ± 10%.

Pin Configuration		
Pin	Single output	Triple output
1	+Vi	+Vi
2	-Gi	-Gi
3	No Pin	+Vo2
4	+Vo	+Vo1
5	Go	Go
6	Trim ⁴	-Vo3
7	SD	SD

⁴ Optional Trim pin. If required add R to type number, e.g. 24 IPS20-03-UIR.

Single outputs
Input to output isolated
High performance

- Ultra wide 1:4 input voltage ranges
- Very high efficiency up to 95%
- Output voltage trim function $\pm 10\%$ (Option R)
- Very low output voltage noise
- Continuous no-load and short-circuit proof
- 2" x 1.6" x 0.41" case
- No derating
- Made in Switzerland, accordingly ISO 9001:2000
- 2 years warranty

NEW!

PRELIMINARY



Electromagnetic emission EN 55022 < A
Conducted and radiated emissions

	24 INR	48 INR	
No load input current	60	40	mA typ.
Input current in shutdown condition	3 mA typ.		
Switching frequency	200 kHz typ.		
Output voltage accuracy	$\pm 1\%$ max.		
Static line regulation	$\pm 20\text{mV}$ max.		
Static load regulation FL to 10%	$\pm 30\text{mV}$ max.		
Output voltage noise (20 MHz BW)	80 mVpp typ.		
Efficiency	90% to 95% typ.		
I/O Electric strength test voltage	1500 VDC		
Coupling capacitance	2200 pF		
Inhibit input (i)	Apply -0.3...+0.6 VDC to shut down (switch off) the output voltage(s). Normal operation with open pin.		
Ambient temperature range	-U: -40...+71°C;		
Case temperature range	-U: -40...+105°C;		
Storage temperature range	-U: -55...+105°C;		
Case material	Metal with plastic bottom cover, UL94 V-0 rated		
MTBF, GB @ 40°C case (MIL-HDBK-217F, Notice 2)	> 500.000 hours		

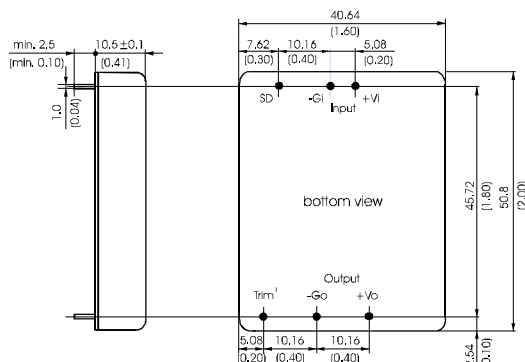
Standard Types ¹	Input voltage VDC	Output	
		VDC	mA
Single output			
xx INR30-02-UI	9...36	2.5	8000
xx INR30-03-UI	(nominal 24)	3.3	6000
xx INR30-05-UI		5	6000
xx INR30-12-UI	18...75	12	2500
xx INR30-15-UI	(nominal 48)	15	2000

¹ To complete type number replace "xx" by the required nominal input voltage, e.g. 24 INR30-02-UI.

Modifications and customs are available upon request.

Option R: Trim function for single outputs.
The output voltage can be adjusted with an external resistor in the range of $\pm 10\%$.

Dimensions in mm (inches)



Pin Configuration	
Pin	Single output
1	+Vi
2	-Gi
3	No Pin
4	+Vo
5	Go
6	Trim ²
7	SD

² Optional Trim pin. If required add R to type number, e.g. 24 INR30-02-UIR.

Single outputs
Input to output isolated
High performance

- 1:2 and 1:4 wide input voltage ranges
- Very high efficiency up to 92%
- Output voltage trim function $\pm 10\%$ (Option R)
- Very low output voltage noise
- Continuous no-load and short-circuit proof
- 2" x 2" x 0.5" case
- No derating
- Made in Switzerland, accordingly ISO 9001:2000
- 2 years warranty

NEW!



Electromagnetic emission EN 55022 < A
Conducted and radiated emissions

	24 IPS	48 IPS	
No load input current	20	12	mA typ.
Input current in shutdown condition	3 mA typ.		
Switching frequency	200 kHz typ.		
Output voltage accuracy	$\pm 1\%$ max.		
Static line regulation	$\pm 20\text{mV}$ max.		
Static load regulation FL to 10%	$\pm 30\text{mV}$ max.		
Output voltage noise (20 MHz BW)	60 mVpp typ.		
Efficiency	89% to 92% typ.		
I/O Electric strength test voltage	1500 VDC		
Coupling capacitance	2000 pF		
Inhibit input (i)	Apply -0.3...+0.6 VDC to shut down (switch off) the output voltage(s). Normal operation with open pin.		
Ambient temperature range	-U: -40...+71°C;		
Case temperature range	-U: -40...+105°C;		
Storage temperature range	-U: -55...+105°C;		
Case material	Metal with plastic bottom cover, UL94 V-0 rated		
MTBF, GB @ 40°C case (MIL-HDBK-217F, Notice 2)	> 500.000 hours		

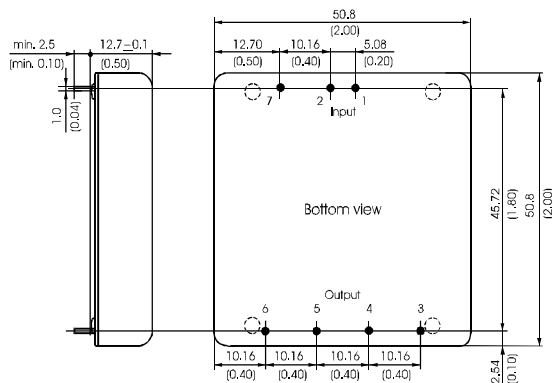
Standard Types ¹	Input voltage VDC	Output	
		VDC	mA
Single output xx IPS30-12-UI xx IPS30-15-UI	9...36 (nominal 24) 18...75 (nominal 48)	12 15	2500 2000
Single output xx IPS40-12-UI xx IPS40-15-UI	18...36 (nominal 24) 36...75 (nominal 48)	12 15	3330 2670

¹ To complete type number replace "xx" by the required nominal input voltage, e.g. 24 IPS40-12-UI.

Modifications and customs are available upon request.

Option R: Trim function for single outputs.
The output voltage can be adjusted with an external resistor in the range of $\pm 10\%$.

Dimensions in mm (inches)

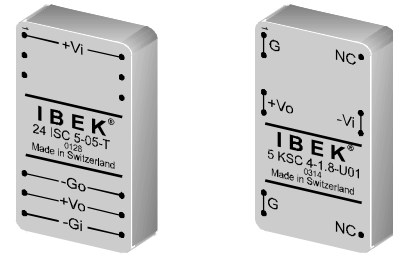


Pin Configuration	
Pin	Single output
1	+Vi
2	-Gi
3	No Pin
4	+Vo
5	Go
6	Trim ²
7	SD

² Optional Trim pin. If required add R to type number, e.g. 24 IPS40-12-UIR.

Single outputs
Non-isolated
Low voltage KSC-types

- Ultra wide input voltage ranges
- Very high efficiency up to 92%
- Very low output voltage noise
- Excellent dynamic load regulation
- Continuous no-load and short-circuit proof
- Extended ambient temperature range -40...+85°C
- No derating
- Made in Switzerland, accordingly ISO 9001:2000
- 2 years warranty



Electromagnetic emission EN 55022 < B

Conducted and radiated emissions

KSC-types: EN 55022 < A

	ISC5	KSC4	KSC7	
No load input current	3	30	22	mA typ.
Switching frequency	260 kHz; KSC-types: 500 kHz typ.			
Output voltage accuracy	± 1%; 5.1 VDC output ± 1.4% max. KSC-types: ± 3% max.			
Static line regulation	± 0.5% max.			
Static load regulation FL to NL	0...1% max.			
Output voltages noise (20 MHz BW)	30 mVpp; KSC-types: 40 mVpp typ.			
Efficiency	82% to 92% typ.			
Dynamic load regulation	± 1% max. ¹ ; 24 ISC5-03-T: ±1.5% max. ¹ KSC-types: ± 60 mV max. ¹			
Load transient recovery time	100 µs typ. ¹			
Ambient temperature range	-U: -40...+71°C;		-S: -40...+85°C	
Case temperature range	-U: -40...+95°C;		-S: -40...+105°C	
Storage temperature range	-U: -55...+105°C;		-S: -55...+105°C	
Case material	Non-conductive plastic, UL94 V-0 rated			
MTBF, GB @ 40°C case	> 4.000.000 hours			
(MIL-HDBK-217F, Notice 2)				

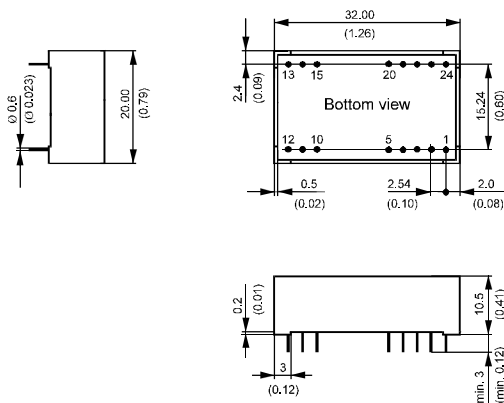
Standard Types	Input voltage VDC	Output		Efficiency % typ.
		VDC	mA	
Family ISC				
24 ISC5-03-T ²	7...40	3.3	1000	82
24 ISC5-05-T ²	8...40	5	1000	86
24 ISC5-12-T ²	16...40	12	417	89
24 ISC5-15-T ²	19...40 (nominal 24)	15	333	89
KSC-types				
5 KSC4-01-U01	4.3...6 (nominal 5)	1.8	2300	85
5 KSC7-03-U01		3.3	2000	92

² Extended temperature range -S is available.
Replace -T by -S on type number, e.g. 24 ISC5-05-S.

Modifications and customs are available upon request.

¹ For 33% load variation with a rise/fall time of ≥ 50 µs

Dimensions in mm (inches)



Pin Configuration		
Pin	Family ISC	KSC-types
1	+Vi	G
2	NC	G
3	NC	No Pin
4	No Pin	+Vo
5	No Pin	+Vo
10	-Go	No Pin
11	+Vo	G
12	-Gi	G
13	-Gi	NC
14	+Vo	No Pin
15	-Go	No Pin
20	No Pin	+Vi
21	No Pin	+Vi
22	NC	No Pin
23	NC	No Pin
24	+Vi	NC

**Single outputs
Non-isolated**

- Ultra wide input voltage ranges
- Very high efficiency up to 93%
- Inhibit input (optional)
- Excellent dynamic load regulation
- Continuous no-load and short-circuit proof
- ISR15: Extended ambient temperature range -40...+85°C
- 2" x 2" x 0.41" case
- Made in Switzerland, accordingly ISO 9001:2000
- 2 years warranty



Electromagnetic emission EN 55022 < B
Conducted and radiated emissions

No load input current	15 mA max.
Input current in inhibit mode	3 mA max.
Switching frequency	150 kHz typ.
Output voltage accuracy	± 1%; 5.1 VDC output ± 1.4% max.
Static line regulation	± 0.3% typ.
Static load regulation FL to NL	0...0.7% typ.
Output voltage noise (20 MHz BW)	50 mVpp; 5.1 VDC output 30 mVpp typ.
Efficiency	87% to 93% typ.
Dynamic load regulation	ISR15: ± 100mV; 5.1 VDC output ± 80 mV max. ¹ ISR25: ± 150mV; 5.1 VDC output ± 100 mV max. ¹
Load transient recovery time	ISR15: 300 µs; 5.1 VDC output 100 µs typ. ¹ ISR25: 500 µs; 5.1 VDC output 200 µs typ. ¹
Inhibit input (i)	Open or apply -0.3...+0.8 VDC for normal operation. Apply +2.4...+5.5 VDC to switch off the output voltage.
Ambient temperature range	-T: -25...+71°C ² ; -S: -40...+85°C
Case temperature range	-T: -25...+95°C; -S: -40...+105°C
Storage temperature range	-T: -55...+105°C; -S: -55...+105°C
Case material	Metal with plastic bottom cover, UL94 V-0 rated
MTBF, GB @ 40°C case	> 2.150.000 hours
(MIL-HDBK-217F, Notice 2)	

¹ For 33% load variation with a rise/fall time of ≥ 50 µs
² 24 ISR25-05-T: Power derating 2.9%/°C above 60°C

Standard Types	Input voltage VDC	Output	
		VDC	mA
Single output			
24 ISR15-05-T ³	8...40	5.1	3000
24 ISR15-12-T ³	16...40	12	1250
24 ISR15-15-T ³	19...40	15	1000
	(nominal 24)		
Single output			
24 ISR25-05-T	10...40 ⁴	5.1	5000
24 ISR25-12-T	16...40	12	2100
24 ISR25-15-T	19...40	15	1700
	(nominal 24)		

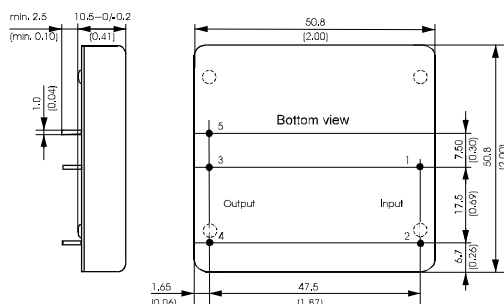
³ Extended temperature range -S is available for all ISR15-types. Replace -T by -S on type number, e.g. 24 ISR15-05-S.

Attention: Operation in extended temperature range requires an external input capacitor of 220 µF, connected as close as possible to the input pins.

⁴ Down to 8 VDC at reduced output current of 2000 mA.

Modifications and customs are available upon request.

Dimensions in mm (inches)



Pin Configuration	
Pin	Single output
1	+Vi
2	-Gi
3	+Vo
4	-Go
5 ⁵	i

⁵ Optional inhibit pin. If required add i to type number, e.g. 24 ISR15-05-Ti.

**Single outputs
Non-isolated**

- Ultra wide input voltage ranges
- Very high efficiency up to 95%
- Inhibit input (optional)
- Output voltage trim function (optional)
- Excellent dynamic load regulation
- Continuous no-load and short-circuit proof
- 2" x 2" case, h = 0.5"
- Made in Switzerland, accordingly ISO 9001:2000
- 2 years warranty



Electromagnetic emission EN 55022 < B
Conducted and radiated emissions

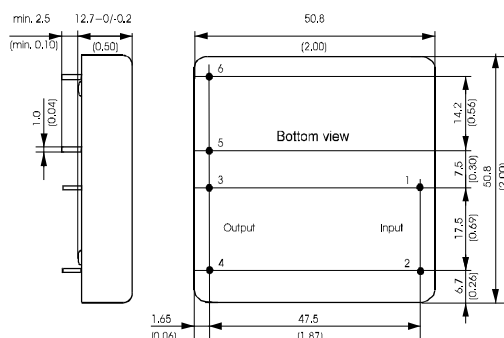
No load input current	10 mA max.
Input current in inhibit mode	3 mA typ.
Switching frequency	250 kHz typ.
Output voltage accuracy	± 1%; 5.1 VDC output ± 1.4% max.
Static line regulation	± 0.3% typ.
Static load regulation FL to NL	0...0.3% typ.
Output voltage noise (20 MHz BW)	50 mVpp; 5.1 VDC output 30 mVpp typ.
Efficiency	91% to 95% typ.
Dynamic load regulation	20 ISN: ± 100mV ¹ 40 ISN: ± 150mV ¹
Load transient recovery time	20 ISN: 300 µs typ. 40 ISN: 500 µs typ.
Inhibit input (i)	Open or apply -0.3...+0.8 VDC for normal operation. Apply +2.4...+5.5 VDC to switch off the output voltage.
Ambient temperature range	-T: -25...+71°C
Case temperature range	-T: -25...+95°C
Storage temperature range	-T: -55...+105°C
Case material	Metal, moulded
MTBF, GB @ 40°C case	> 2.150.000 hours
(MIL-HDBK-217F, Notice 2)	

¹ For 33% load variation with a rise/fall time of ≥ 50 µs

Standard Types	Input voltage VDC	Output	
		VDC	mA
Single output			
20 ISN15-05-T	7...40	5.1	3000
20 ISN25-05-T	7...40	5.1	5000
20 ISN36-12-T	15...40	12	3000
20 ISN45-15-T	19...40	15	3000
	(nominal 20)		
Single output			
40 ISN15-05-T	8...75	5.1	3000
40 ISN20-05-T	8...75	5.1	4000
40 ISN30-12-T	15...75	12	2500
40 ISN38-15-T	19...75	15	2500
	(nominal 40)		

Modifications and customs are available upon request.

Dimensions in mm (inches)



Option R: Trim function for single outputs.

The output voltage can be adjusted with an external resistor in the range of +10%.

Pin Configuration	
Pin	Single output
1	+Vi
2	-Gi
3	+Vo
4	-Go
5 ²	i
6 ³	R

² Optional Inhibit pin. If required add i to type number, e.g. 20 ISN25-05-Ti.

³ Optional Trim pin. If required add R to type number, e.g. 20 ISN25-05-TiR.

DC-DC-Converters Input to output isolated	Standard Types ¹			Input voltage VDC	Extended Temperature ²	Case
	Single output	Double output	Dual output			
Family ICR1 I/O Electric strength test voltage: 700 VDC O/O Electric strength test voltage: 700 VDC	xx ICR1-05-N xx ICR1-12-N xx ICR1-15-N	xx ICR1-0505-N xx ICR1-1212-N xx ICR1-1515-N	xx ICR1-05-05-N xx ICR1-12-12-N xx ICR1-15-15-N	5 (4.75...5.25) 12 (10.8...13.2) 15 (13.5...16.5) 24 (21.6...26.4)	-T -S	DIL24
Family IXR1 I/O Electric strength test voltage: 3.5 kVDC, 2.5 kVrms O/O Electric strength test voltage: 1.5 kVDC, 1.0 kVrms	xx IXR1-05-N xx IXR1-12-N xx IXR1-15-N	xx IXR1-0505-N xx IXR1-1212-N xx IXR1-1515-N	xx IXR1-05-05-N xx IXR1-05-12-N xx IXR1-05-15-N xx IXR1-12-12-N xx IXR1-15-15-N	5 (4.75...5.25) 12 (10.8...13.2) 15 (13.5...16.5) 24 (21.6...26.4)	-T -S	DIL24
Family IYR1 I/O Electric strength test voltage: 5.3 kVDC, 3.75 kVrms O/O Electric strength test voltage: 1.5 kVDC, 1.0 kVrms	xx IYR1-05-N xx IYR1-12-N xx IYR1-15-N	xx IYR1-0505-N xx IYR1-1212-N xx IYR1-1515-N	xx IYR1-05-05-N xx IYR1-05-12-N xx IYR1-05-15-N xx IYR1-12-12-N xx IYR1-15-15-N	5 (4.75...5.25) 12 (10.8...13.2) 15 (13.5...16.5) 24 (21.6...26.4)	-T -S	DIL24
Family IPW3 I/O Electric strength test voltage: 1.5 kVDC, 1.06 kVrms O/O Electric strength test voltage: 700 VDC	xx IPW3-05-T xx IPW3-12-T xx IPW3-15-T	xx IPW3-0505-T xx IPW3-1212-T xx IPW3-1515-T	xx IPW3-05-05-T xx IPW3-05-12-T xx IPW3-05-15-T xx IPW3-12-12-T xx IPW3-15-15-T	10...33 (nominal 24) 18...75 (nominal 48)	-S	DIL24
Family IPS4 I/O Electric strength test voltage: 1500 VDC	xx IPS4-05-T ³ xx IPS4-12-T ³ xx IPS4-15-T ³	xx IPS4-0505-T ³ xx IPS4-1212-T ³ xx IPS4-1515-T ³		9...36 (nominal 24) 18...75 (nominal 48)	-S ³	DIL24
Family ICR5/6 I/O Electric strength test voltage: 700 VDC	xx ICR5-05-TB xx ICR6-12-TB xx ICR6-15-TB	xx ICR6-1212-TB xx ICR6-1515-TB		5 (4.65... 5.50) 12 (11.16...13.20) 15 (13.95...16.50) 24 (22.32...26.40) 28 (26.04...30.80) 48 (44.64...52.80)	-SB -SC	2" x 2"
Family IPD6 I/O Electric strength test voltage: 700 VDC O/O Electric strength test voltage: 700 VDC	xx IPD6-05-T xx IPD6-12-T xx IPD6-15-T		xx IPD6-05-05-T xx IPD6-05-12-T xx IPD6-05-15-T xx IPD6-12-12-T xx IPD6-15-15-T	9...36 (nominal 24) 18...75 (nominal 48)	-S	DIL24
Family IPE6 I/O Electric strength test voltage: 1500 VDC	xx IPE6-05-T xx IPE6-12-T xx IPE6-15-T	xx IPE6-0505-T xx IPE6-1212-T xx IPE6-1515-T		9...36 (nominal 24) 18...75 (nominal 48)		DIL24
Family IPS6 I/O Electric strength test voltage: 1500 VDC	xx IPS6-05-TC ⁴ xx IPS6-12-TC ⁴ xx IPS6-15-TC ⁴	xx IPS6-0505-TC ⁴ xx IPS6-1212-TC ⁴ xx IPS6-1515-TC ⁴		9...36 (nominal 24) 18...75 (nominal 48)	-SC ⁴	2" x 1"

¹ To complete type number replace „xx“ by the required nominal input voltage, e.g. 5 ICR1-05-N

² For extended temperature range replace -N by -T or -S on type number, e.g. 5 ICR1-05-S

³ Optional shutdown input available. If required add i to type number, e.g. 24 IPS 4-05-Ti

⁴ Optional shutdown input available. If required replace C by G on type number, e.g. 24 IPS6-05-TG

DC-DC-Converters Input to output isolated	Standard Types ¹			Input voltage VDC	Extended Temperature ²	Case
	Single output	Double output	Triple output			
Family IPS10 I/O Electric strength test voltage: 1500 VDC	xx IPS10-05-TB ³ xx IPS10-12-TB ³ xx IPS10-15-TB ³	xx IPS10-0505-TB ³ xx IPS10-1212-TB ³ xx IPS10-1515-TB ³		10...33 (nominal 24) 18...75 (nominal 48)	-SB ³	2" x 2"
Family IPL10 I/O Electric strength test voltage: 1500 VDC	xx IPL10-05-TC ³ xx IPL10-12-TC ³ xx IPL10-15-TC ³	xx IPL10-0505-TC ³ xx IPL10-1212-TC ³ xx IPL10-1515-TC ³		9...36 (nominal 24) 18...75 (nominal 48)		2" x 1"
Family IPL13 I/O Electric strength test voltage: 1500 VDC			xx IPL13-051212-TE ³ xx IPL13-051515-TE ³	9...36 (nominal 24) 18...75 (nominal 48)		2" x 2"
Family IPL15 I/O Electric strength test voltage: 1500 VDC	xx IPL15-05-TC ³ xx IPL15-12-TC ³ xx IPL15-15-TC ³	xx IPL15-0505-TC ³ xx IPL15-1212-TC ³ xx IPL15-1515-TC ³		9...18 (nominal 12) 18...36 (nominal 24) 36...75 (nominal 48)		2" x 1"
Family IPR15 I/O Electric strength test voltage: 1500 VDC	xx IPR15-03-UC ³ xx IPR15-05-UC ³ xx IPR15-12-UC ³ xx IPR15-15-UC ³			9...18 (nominal 12) 18...36 (nominal 24) 36...75 (nominal 48)		2" x 1"

¹ To complete type number replace „xx“ by the required nominal input voltage, e.g. 24 IPS10-05-TC

² For extended temperature range replace -T by -S on type number, e.g. 24 IPS10-05-SC

³ Optional shutdown input available. If required replace C by G, B by F or E by I on type number, e.g. 24 IPS10-05-TF

Switching Regulators Non-isolated	Standard Types ¹			Input voltage VDC	Extended Temperature ²	Case
	Single output	Double output	Triple output			
Family ISD5		xx ISD5-0505-T xx ISD5-1212-T xx ISD5-1515-T	xx ISD5-051212-T xx ISD5-051515-T	8...33 (nominal 24)		DIL24
Family ISR5	xx ISR5-05-N ³ xx ISR5-12-N ³ xx ISR5-15-N ³			8...40 16...40 19...40 (nominal 24)	-T -S	DIL40
Family ISR10	xx ISR10-05-N ³			8...40 (nominal 24)	-T -S	2" x 2"

¹ To complete type number replace „xx“ by the required nominal input voltage, e.g. 24 ISR5-05-N

² For extended temperature range replace -N by -T or -S on type number, e.g. 24 ISR5-05-S

³ Optional inhibit input available. If required add i to type number, e.g. 24 ISR5-05-Ni

Specifications and Pin configurations about all Long-running Products see on www.ibek.ch

Connection in Series

If the outputs of one or more units are connected in series each individual output should be protected by a low power shottky diode, e.g. NIHON EC21QS04, to avoid reverse polarity at any output.

Reverse voltages may happen at the switch-on cycle of the converter(s), if the output voltages do not rise at the same time. Via the load, the „faster“ output(s) could supply the „slower“ output(s) with a reverse voltage and destroy that or even the whole converter.

The maximum output current is limited by the lowest current limitation.

Connection in series is not recommended for the Families CPE3, NPE4, CPE6 and IPE6.

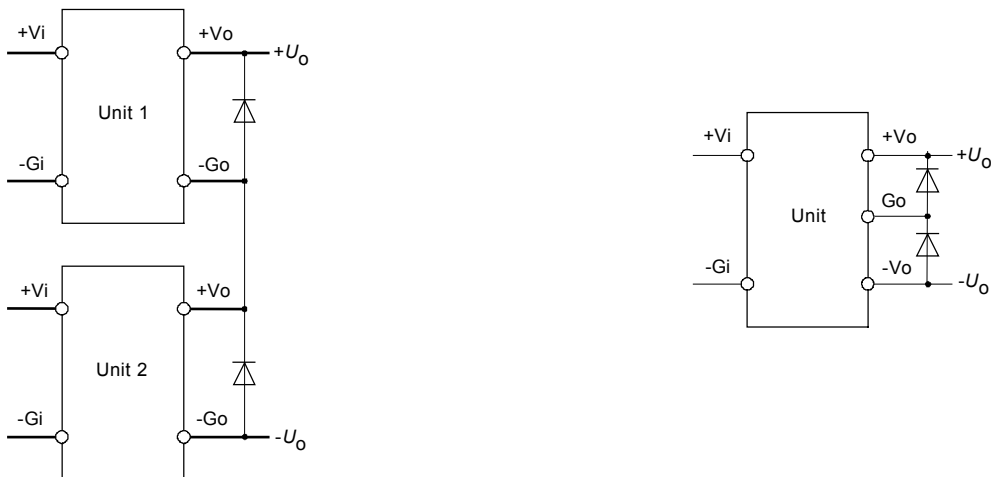


Figure 1: External protection for the outputs of two units connected in series.

Figure 2: External protection for two outputs of the same unit connected in series.

Connection in Parallel

The connection of the outputs of one ore more units in parallel is not permitted. Except the outputs of the Family IPL7.

Shutdown Description

For some product families there is a shutdown facility available. It offers to switch the output voltage(s) of the converter on and off via a control signal by using a transistor open collector drive.

The output voltage(s) is (are) switched on when the shutdown terminal is open circuit and switched off (shutdown) when a low voltage value ¹ is applied to the shutdown terminal. Note that the function of the Family IPL7 is inverse.

At an open shutdown pin max. 12 VDC appears.

¹ Value is depending on product family and specified for each individual product family.

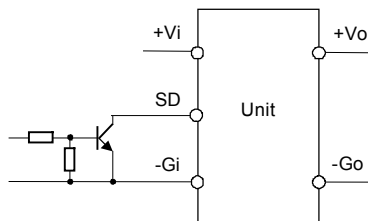


Figure 3: External shutdown control circuitry

Cleaning

Any submersion of the units in water or cleaning solvent is not permitted with the exception of the Families IXR1, IYR1, IZR1, IPX3, INX4, IPD6, IPR10 and ISR5.

Liquid Flux

For wave-soldering the following liquid flux is recommended: EO-Flux „GSP-2533/RX“, (acc. to DIN-EN 29454: 1.2.3.A)

RoHS

The directive 2002/95/EC of the European Parliament and of the Council on the **R**estriction of the use of certain **h**azardous **s**ubstances in electrical and electronic equipment becomes effective on July 1st, 2006. "RoHS" affects the use of the following substances

- lead (Pb)
 - mercury (Hg)
 - cadmium (Cd)
 - hexavalent chromium (Cr⁺⁶)
 - polybrominated biphenyls (PBB) *
 - polybrominated diphenylethers (PBDE) *
- * flame retardant

These substances should either completely be missing or not exceed established limits.

Availability of RoHS-compliant products

DC/DC-Converters			
Family	RoHS	Family	RoHS
ICR 1	not compliant	IPE 6	compliant
IWR 1	not compliant	IPS 6	compliant
IXR 1	not compliant	IPL 7	compliant
IYR 1	not compliant	IPL 10	compliant
IZR 1	not compliant	IPN 10	compliant
CPE 3	compliant	IPR 10	compliant
CPL 3	compliant	IPS 10	compliant
CPS 3	compliant	IPN 12	compliant
IPS 3	compliant	IPL 13	compliant
IPW 3	compliant	IPL 15	compliant
IPX 3	compliant	IPN 15	compliant
CPM 4	compliant	IPR 15	compliant
INX 4	compliant	IPS 15	compliant
IPS 4	compliant	IPS 18	compliant
NPE 4	compliant	IPR 20	not compliant
ICR 5	not compliant	IPS 20	not compliant
CPE 6	compliant	INR 30	compliant
CPI 6	compliant	IPS 30	compliant
ICR 6	not compliant	IPS 40	not compliant
IPD 6	compliant		

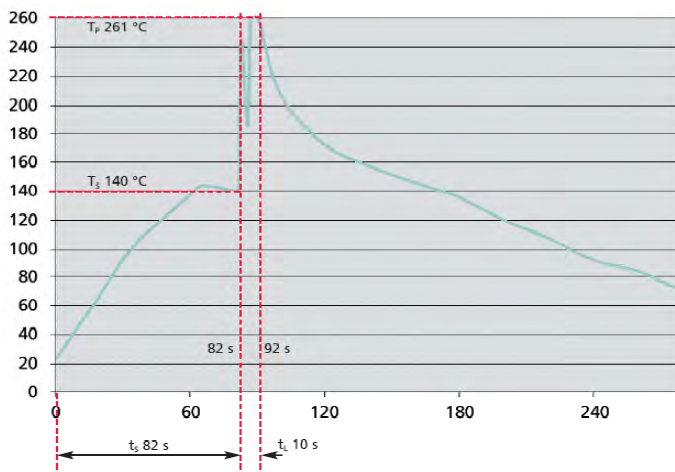
Switching Regulators	
Family	RoHS
ISC 5	compliant
ISD 5	compliant
ISR 5	upon request
ISR 10	compliant
ISR 15	compliant
ISR 25	compliant
20 ISN	compliant
40 ISN	compliant

- RoHS-compliant
- upon request
- not RoHS-compliant

General guideline

- min. order quantities : 100 pcs.
- warranty : 2 years
- ordering code : add RoHS to type number, e.g. 24 ISC 5-05-T RoHS

Recommendable temperature profiles for lead-free solder processes (THT wave soldering)



- T_S preheat temperature
- T_P peak temperature
- t_S preheat time
- t_L soldering time

Liquid Flux

The following liquid flux is recommended:
EO-Flux „GSP-2533/RX“,
(acc. to DIN-EN 29454: 1.2.3.A)

Example	24 IPS20-051212-UI	Standard Values
Nominal input voltages [VDC]	24	5, 12, 15, 24, 28, 48, 72, 110
Family	IPS	(see Selection Guide page 1)
Nominal output power [W]	20	1...45
Dash	-	-
Output voltage of output 1 [VDC]	05	01 (1.8), 02 (2.5), 03 (3.3), 05, 12, 15, 24
Dash, if output 1 to output 2,3 galvanically isolated	-	Available for ICR1, IWR1, IXR1, IYR1, IZR1, IPS3, IPW3, IPD6, IPL7
Output voltage of output 2 [VDC]	12	03 (3.3), 05, 12, 15, 24
Output voltage of output 3 [VDC]	12	12, 15
Dash	-	-
Operating ambient temperature range With 2" x 1", 2" x 1.6" and 2" x 2" cases	U	N (0...+71°C), T (-25...+71°C), S (-40...+85°C), U (-40...+65°C/+71°C)
Pin configuration, to specify for families	I	C, E, (B) without shutdown input G, I, (F) with shutdown input
Output voltage trim function	R	IPR20, IPS20 (single outputs only), INR30, IPS30, IPS40, 20ISN, 40ISN
RoHS-compliant product	RoHS	(see Pb free / RoHS page 30)

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