CUI INC
a bel group

SERIES: PGNP1-S | DESCRIPTION: DC-DC CONVERTER

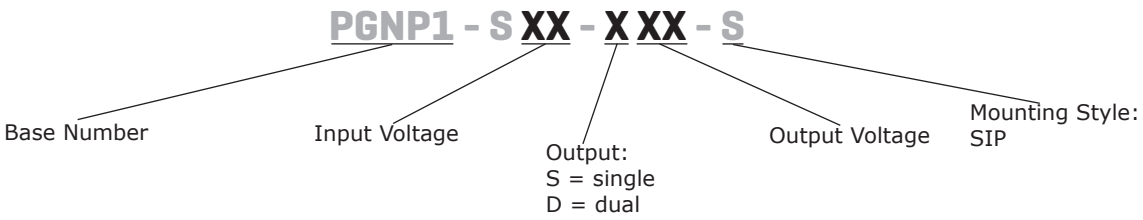
FEATURES

- 6,000 Vdc isolation
- unregulated single/dual outputs
- certified to EN/UL 60601-1 (2x MOPP)
- designed to meet EN 62368-1
- leakage current less than 2 µA
- -40 °C ~ 105 °C operating temperature
- continuous output short circuit protection
- reinforced insulation

MODEL	input voltage		output voltage	output current		output power	ripple & noise[1]	efficiency[2]
	typ (Vdc)	range (Vdc)	(Vdc)	min (mA)	max (mA)	max (W)	max (mVp-p)	typ (%)
PGNP1-S12-S3-S	12	10.8~13.2	3.3	31	303	1	150	76
PGNP1-S12-S5-S	12	10.8~13.2	5	20	200	1	120	79
PGNP1-S12-S9-S	12	10.8~13.2	9	12	111	1	120	81
PGNP1-S12-S12-S	12	10.8~13.2	12	9	84	1	120	83
PGNP1-S12-S15-S	12	10.8~13.2	15	7	67	1	120	83
PGNP1-S12-S24-S	12	10.8~13.2	24	4	42	1	120	82
PGNP1-S12-D5-S	12	10.8~13.2	±5	±10	±100	1	120	79
PGNP1-S12-D9-S	12	10.8~13.2	±9	±6	±56	1	120	79
PGNP1-S12-D12-S	12	10.8~13.2	±12	±5	±42	1	120	81
PGNP1-S12-D15-S	12	10.8~13.2	±15	±4	±34	1	120	81
PGNP1-S15-D5-S	15	13.5~16.5	±5	±10	±100	1	120	77
PGNP1-S15-D12-S	15	13.5~16.5	±12	±5	±42	1	120	79
PGNP1-S15-D15-S	15	13.5~16.5	±15	±4	±33	1	120	79
PGNP1-S24-S5-S	24	21.6~26.4	5	20	200	1	120	76
PGNP1-S24-S9-S	24	21.6~26.4	9	12	111	1	120	76
PGNP1-S24-S12-S	24	21.6~26.4	12	9	84	1	120	76
PGNP1-S24-S15-S	24	21.6~26.4	15	7	67	1	120	76
PGNP1-S24-S24-S	24	21.6~26.4	24	4	42	1	120	76
PGNP1-S24-D5-S	24	21.6~26.4	±5	±10	±100	1	120	75
PGNP1-S24-D9-S	24	21.6~26.4	±9	±6	±56	1	120	75
PGNP1-S24-D12-S	24	21.6~26.4	±12	±5	±42	1	120	76
PGNP1-S24-D15-S	24	21.6~26.4	±15	±4	±34	1	120	76

Notes:
1. Measured at nominal input, 20 MHz bandwidth oscilloscope.
2. Measured at full load.
3. All specifications are measured at Ta=25°C, humidity < 75%, nominal input voltage, and rated output load unless otherwise specified.

PART NUMBER KEY



INPUT

parameter	conditions/description	min	typ	max	units
operating input voltage (full load/ no load)	12 Vdc input models		106/10	116/-	mA
	15 Vdc input models		90/10	100/-	mA
	24 Vdc input models		56/12	59/-	mA
surge voltage	for maximum of 1 second				
	12 Vdc input models	-0.7		18	Vdc
	15 Vdc input models	-0.7		21	Vdc
	24 Vdc input models	-0.7		30	Vdc
reflected ripple current[4]			200		mA
filter	filter capacitor				

Note: 4. Refer to DC-DC Converter Application notes for detailed description of reflected ripple current test

OUTPUT

parameter	conditions/description	min	typ	max	units
maximum capacitive load[5]	3.3, 5 Vdc output models			2,200	µF
	9 Vdc output models			680	µF
	±9, 12, 15 Vdc output models			470	µF
	24, ±12, ±15 Vdc output models			220	µF
	±5 Vdc output models			1,000	µF
voltage accuracy	see tolerance envelope curves				
line regulation	for Vin change of 1%				
	3.3 Vdc output models			1.5	%
	all other models			1.2	%
load regulation	from 10% to full load				
	3.3 & 5 Vdc output models			20	%
	all other models			15	%
switching frequency	at nominal input, full load		200		kHz
temperature coefficient	at full load		±0.02		%/°C

Note: 5. The capacitive loads of positive and negative outputs are identical.

PROTECTIONS

parameter	conditions/description	min	typ	max	units
short circuit protection	continuous, auto recovery				

SAFETY AND COMPLIANCE

parameter	conditions/description	min	typ	max	units
isolation voltage	input to output for 1 minute at 1 mA	5,000 6,000			Vac Vdc
isolation resistance	input to output at 500 Vdc	1,000			MΩ
leakage current[6]	at 230 Vac, 50/60 Hz			2	µA
isolation capacitance	input to output, 100 kHz / 0.1 V		4		pF
safety approvals	certified to 60601-1: EN, UL designed to meet 62368-1: EN/BS EN				

SAFETY AND COMPLIANCE (CONTINUED)

parameter	conditions/description	min	typ	max	units
conducted emissions	CISPR32/EN55032 CLASS B (see Fig. 4. for recommended circuit) EN60601-1-2/CISPR 11 GROUP1 CLASS B (see Fig. 4. for recommended circuit)				
radiated emissions	CISPR32/EN55032 CLASS B (see Fig. 4. for recommended circuit) EN60601-1-2/CISPR 11 GROUP1 CLASS B (see Fig. 4. for recommended circuit)				
ESD	EN60601-1-2 (IEC/EN61000-4-2) Air ±15kV, Contact ±8kV, perf. Criteria B				
MTBF	as per MIL-HDBK-217F, 25°C	19,360,000			hours
creepage & clearance distance		8			mm
RoHS	yes				

Note: 6. Leakage current and reinforced insulation is based on 250 VAC, 50/60 Hz system input voltag

ENVIRONMENTAL

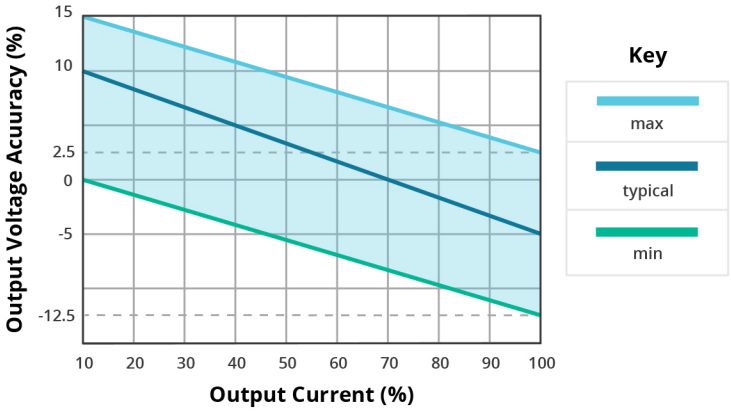
parameter	conditions/description	min	typ	max	units
operating temperature	see derating curves	-40		105	°C
storage temperature		-55		125	°C
storage humidity	non-condensing	5		95	%
case temperature rise			25		°C

SOLDERABILITY

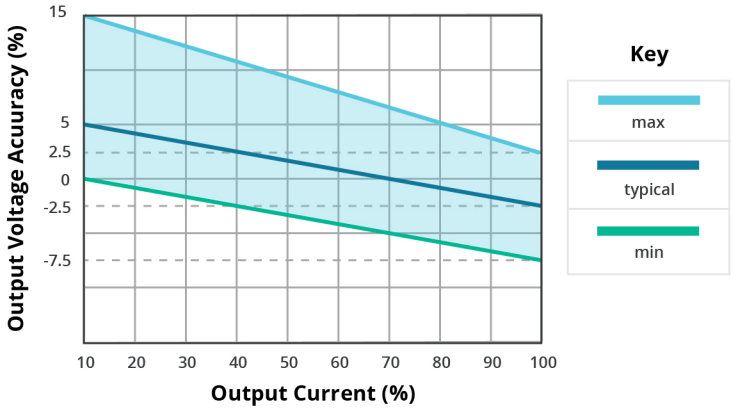
parameter	conditions/description	min	typ	max	units
pin soldering temperature	1.5 mm from case for 10 seconds			300	°C

DERATING CURVES

OUTPUT REGULATION CURVE
3.3 Vdc output model
(nominal input)

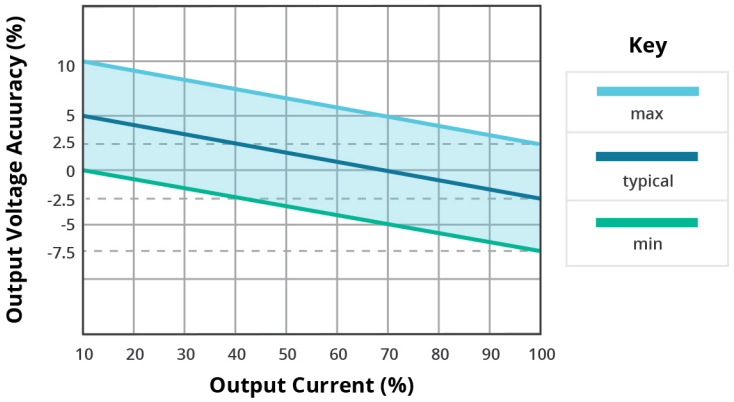


OUTPUT REGULATION CURVE
5 Vdc output model
(nominal input)

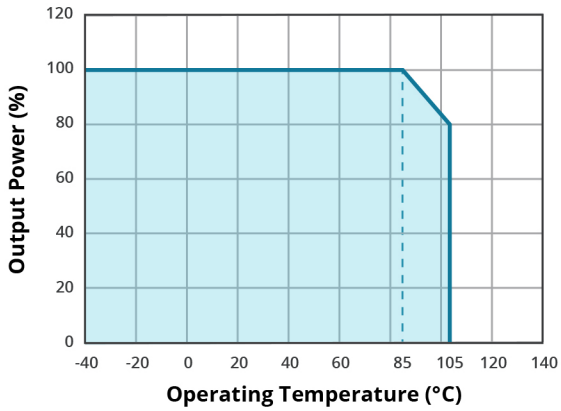


DERATING CURVES (CONTINUED)

OUTPUT REGULATION CURVE
3.3 Vdc output model
(nominal input)



TEMPERATURE DERATING CURVE



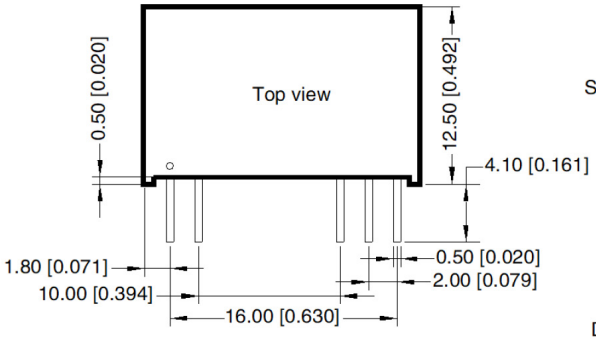
MECHANICAL

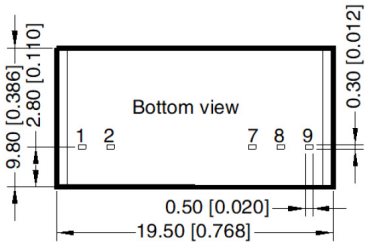
parameter	conditions/description	min	typ	max	units
dimensions	19.50 x 9.80 x 12.50 [0.768 x 0.386 x 0.492 inch]				mm
case material	black flame-retardant and heat-resistant plastic (UL94V-0)				
weight			4		g

MECHANICAL DRAWING

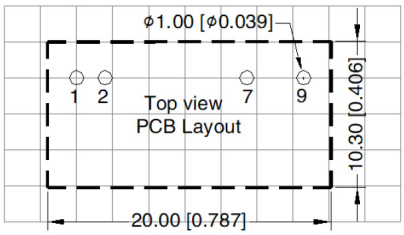
units: mm [inch]
tolerance: ±0.50[±0.020]
pin section tolerance: ±0.10[±0.004]

PIN CONNECTIONS		
PIN	Function	
	Single	Dual
1	Vin	Vin
2	GND	GND
7	0V	-Vout
8	No Pin	0V
9	+Vout	+Vout

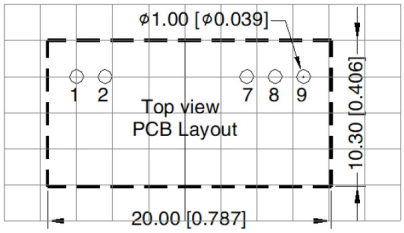




Single



Dual



Note: Grid 2.54*2.54mm

APPLICATION CIRCUIT

If it is required to further reduce input and output ripple, a filter capacitor can be connected to the input and output terminals, see Fig. 1 & 2. Moreover, choosing suitable filter capacitor is very important, start-up problems may be caused by too large capacitance. To ensured the modules running well, the recommended capacitive load values as shown in Tables 1 & 2.

Figure 1
Single Output Models

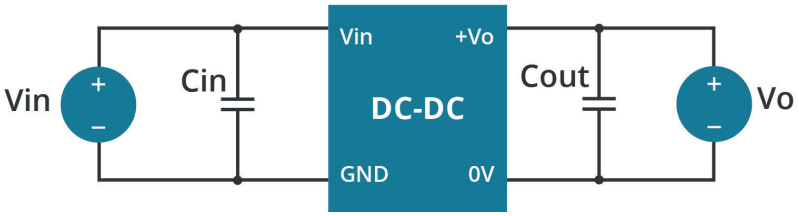


Table 1

Vin (Vdc)	Cin (µF/V)	Vo (Vdc)	Cout (µF/V)
12	10µF/25V	3.3, 5	10µF/16V
15	1µF/25V	9	10µF/16V
24	2.2µF/50V	12	2.2µF/25V
-	-	15	1µF/25V
-	-	24	0.47µF/50V

Figure 2
Dual Output Models

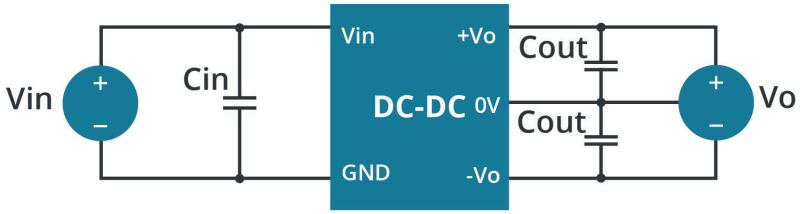


Table 2

Vin (Vdc)	Cin (µF/V)	Vo (Vdc)	Cout (µF/V)
12	10µF/25V	±5, ±9	4.7µF/16V
15	1µF/25V	±5, ±9	4.7µF/16V
24	2.2µF/50V	±12, ±15	1µF/25V

EMC CLASS B RECOMMENDED CIRCUIT

12 V INPUT MODELS

Figure 3

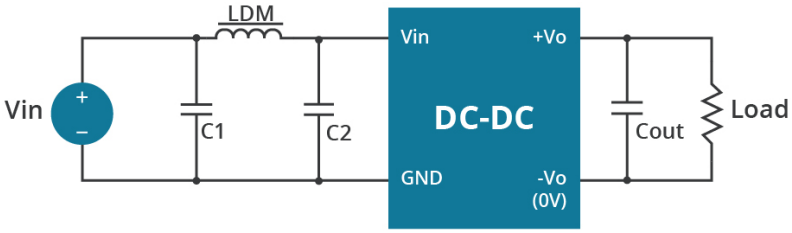


Table 3

Recommended External Circuit Components	
Vin	12 V
C1/C2	4.7 µF / 25 V
Cout	refer to Cout in Tables 1, 2
LDM	22 µH

EMC CLASS B RECOMMENDED CIRCUIT (CONTINUED)

24 V INPUT MODELS

Figure 4

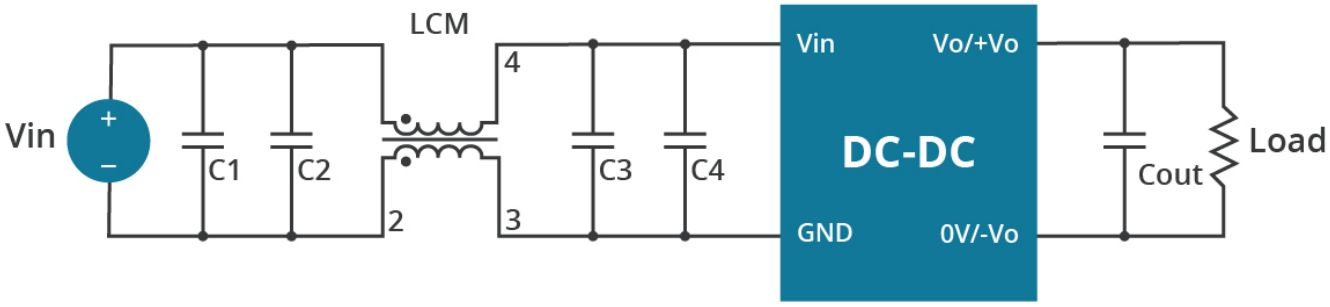


Table 4

Recommended External Circuit Components		
Vin	24 V	
C1/C2	4.7 µF / 50 V	
C3	dual 24V outputs	100 µF / 50 V
	all other outputs	4.7 µF / 50 V
C4	dual 24V outputs	--
	all other outputs	4.7 µF / 50 V
Cout	refer to Cout in Tables 1, 2	
LCM	22 µH	

Minimum Output Load Requirement
For a reliable and efficient operation of the converter, the minimum load should never be less than 10% of the rated output load. If the totalrequired output power is below 10%, a parallel bleeding resistor is required on the output, ensuring that the sum of the power consumption isalways maintained at 10% minimum.

REVISION HISTORY

rev.	description	date
1.0	initial release	08/08/2023
1.01	table 4 updated	09/26/2023

The revision history provided is for informational purposes only and is believed to be accurate.

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