

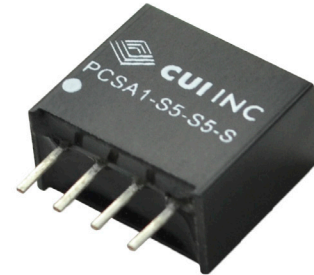


**THE DATASHEET OF
PCSA1-S24-S12-S**



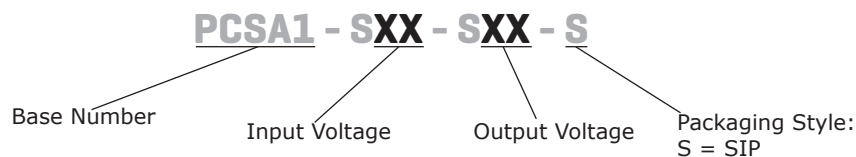
SERIES: PCSA1-S | DESCRIPTION: DC-DC CONVERTER
FEATURES

- up to 1 W isolated output
- industry standard SIP package
- nominal input voltages: 5, 12, 24 Vdc
- single unregulated output
- 1,000 Vdc isolation voltage
- low ripple and noise
- -40 to 100°C
- efficiency up to 82%


MODEL

| MODEL | input voltage | | output voltage (Vdc) | output current | | output power max (W) | ripple & noise ¹ max (mVp-p) | efficiency typ (%) |
|-----------------|---------------|----------------|-------------------------|----------------|-------------|----------------------------|---|--------------------------|
| | typ (Vdc) | range (Vdc) | | min (mA) | max (mA) | | | |
| PCSA1-S5-S5-S | 5 | 4.5~5.5 | 5 | 0 | 200 | 1 | 100 | 79 |
| PCSA1-S5-S12-S | 5 | 4.5~5.5 | 12 | 0 | 84 | 1 | 100 | 79 |
| PCSA1-S5-S15-S | 5 | 4.5~5.5 | 15 | 0 | 67 | 1 | 100 | 80 |
| PCSA1-S12-S5-S | 12 | 10.8~13.2 | 5 | 0 | 200 | 1 | 100 | 81 |
| PCSA1-S12-S12-S | 12 | 10.8~13.2 | 12 | 0 | 84 | 1 | 100 | 81 |
| PCSA1-S12-S15-S | 12 | 10.8~13.2 | 15 | 0 | 67 | 1 | 100 | 82 |
| PCSA1-S24-S5-S | 24 | 21.6~26.4 | 5 | 0 | 200 | 1 | 100 | 80 |
| PCSA1-S24-S12-S | 24 | 21.6~26.4 | 12 | 0 | 84 | 1 | 100 | 80 |
| PCSA1-S24-S15-S | 24 | 21.6~26.4 | 15 | 0 | 67 | 1 | 100 | 81 |

Notes: 1. At full load, nominal input, 20 MHz bandwidth oscilloscope, with a 0.33 μ F ceramic capacitor on the output.
 2. Required to add a 2.2 μ F (5 & 12 Vdc input models) or 4.7 μ F (24 Vdc input models) ceramic capacitor to the input to reduce input voltage stress.
 3. All specifications are measured at $T_a=25^\circ\text{C}$, nominal input voltage, and rated output load unless otherwise specified.

PART NUMBER KEY


INPUT

| parameter | conditions/description | min | typ | max | units |
|-----------------------------------|--|------|-----|------|-------|
| operating input voltage | 5 Vdc input models | 4.5 | 5 | 5.5 | Vdc |
| | 12 Vdc input models | 10.8 | 12 | 13.2 | Vdc |
| | 24 Vdc input models | 21.6 | 24 | 26.4 | Vdc |
| surge voltage | for maximum of 100 ms | | | | |
| | 5 Vdc input models | | | 9 | Vdc |
| | 12 Vdc input models | | | 18 | Vdc |
| | 24 Vdc input models | | | 30 | Vdc |
| current | 5 Vdc input models | | 250 | | mA |
| | 12 Vdc input models | | 105 | | mA |
| | 24 Vdc input models | | 55 | | mA |
| filter | capacitive | | | | |
| input reverse polarity protection | no | | | | |
| input fuse | 0.5 A time delay fuse for all models (recommended) | | | | |

Notes: 1. Required to add a 2.2 μ F (5 & 12 Vdc input models) or 4.7 μ F (24 Vdc input models) ceramic capacitor to the input to reduce input voltage stress.

OUTPUT

| parameter | conditions/description | min | typ | max | units |
|-------------------------|------------------------------|-----|-----|------------|---------|
| maximum capacitive load | at full load | | | 220 | μ F |
| voltage accuracy | | | | ± 3.0 | % |
| line regulation | 1.0% change in input voltage | | | ± 1.2 | % |
| load regulation | from 100% to 20% load | | | ± 10 | % |
| switching frequency | at nominal Vin, full load | | | | |
| | 5, 12 Vdc input models | | 90 | | kHz |
| | 24 Vdc input models | | 80 | | kHz |
| temperature coefficient | | | | ± 0.05 | %/°C |

PROTECTIONS

| parameter | conditions/description | min | typ | max | units |
|--------------------------|------------------------|-----|-----|-----|-------|
| short circuit protection | momentary | | | 1 | s |

SAFETY AND COMPLIANCE

| parameter | conditions/description | min | typ | max | units |
|-----------------------|--|-------|-----------|-----|------------|
| isolation voltage | input to output for 1 minute | 1,000 | | | Vdc |
| isolation resistance | input to output | 1,000 | | | M Ω |
| isolation capacitance | input to output | | 10 | | pF |
| conducted emissions | EN 55022 Class A & Class B (external circuit required, see Figure 3) | | | | |
| MTBF | as per MIL-HDBK-217F, full load, GB, 25°C | | 1,700,000 | | hours |
| RoHS | 2011/65/EU | | | | |

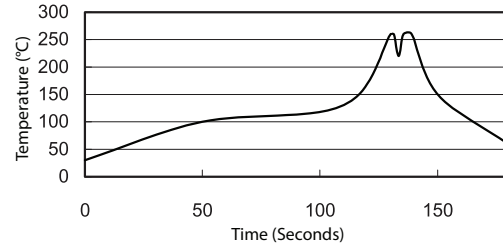
ENVIRONMENTAL

| parameter | conditions/description | min | typ | max | units |
|-----------------------|------------------------|-----|-----|-----|-------|
| operating temperature | see derating curve | -40 | | 100 | °C |
| storage temperature | | -55 | | 125 | °C |
| operating humidity | non-condensing | | | 95 | % |

SOLDERABILITY

| parameter | conditions/description | min | typ | max | units |
|----------------|----------------------------|-----|-----|-----|-------|
| wave soldering | see wave soldering profile | | | 260 | °C |

- Notes:
1. Soldering materials: Sn/Cu/Ni
 2. Ramp up rate during preheat: 1.4°C/s (from 50°C to 100°C)
 3. Soaking temperature: 0.5°C/s (from 100°C to 130°C), 60±20 seconds
 4. Peak temperature: 260°C, above 250°C for 3~6 seconds
 5. Ramp down rate during cooling: -10°C/s (from 260°C to 150°C)



MECHANICAL

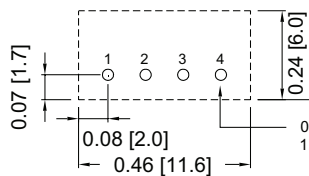
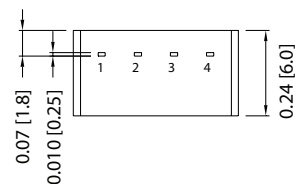
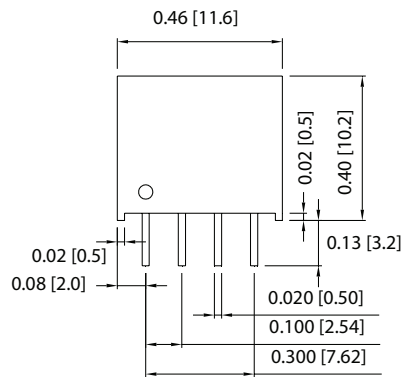
| parameter | conditions/description | min | typ | max | units |
|---------------|--|-----|------------|-----|------------------|
| dimensions | 5,12 Vdc input models: 0.46 x 0.24 x 0.40 [11.6 x 6.0 x 10.2 mm] 24 Vdc input models: 0.46 x 0.30 x 0.40 [11.6 x 7.5 x 10.2 mm] | | | | inches inches |
| case material | non-conductive black plastic | | | | |
| weight | 5, 12 Vdc input models 24 Vdc input models | | 1.3 1.7 | | g g |

MECHANICAL DRAWING

units: inches [mm]
tolerance: X.XX ±0.01 [±0.25]
pin section tolerance: ±0.002[±0.05]

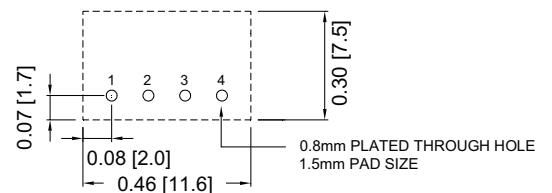
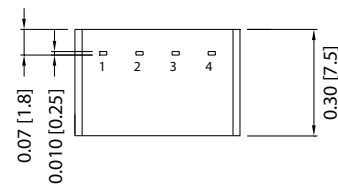
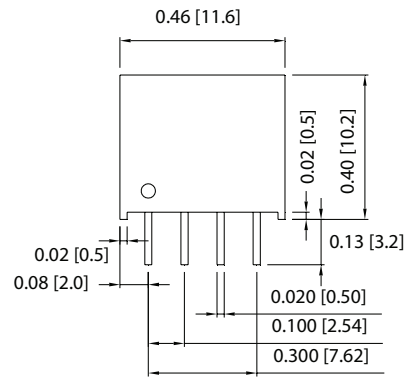
| PIN CONNECTIONS | |
|-----------------|----------|
| PIN | Function |
| 1 | -Vin |
| 2 | +Vin |
| 3 | -Vout |
| 4 | +Vout |

5, 12 Vdc input models



Recommended PCB Layout
Top View

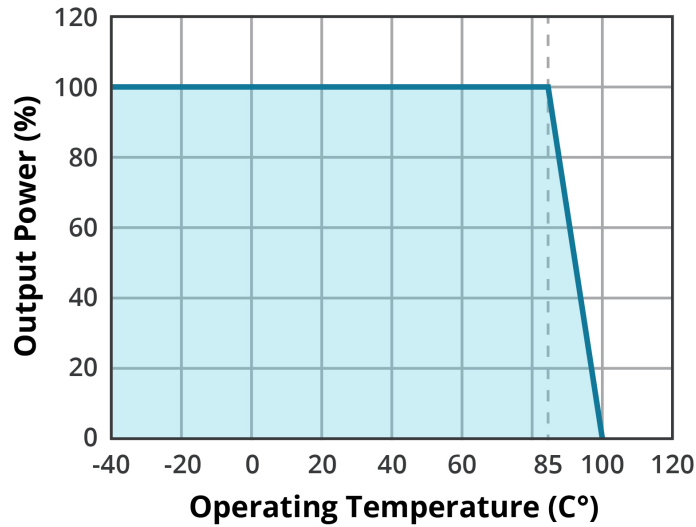
24 Vdc input models



Recommended PCB Layout
Top View

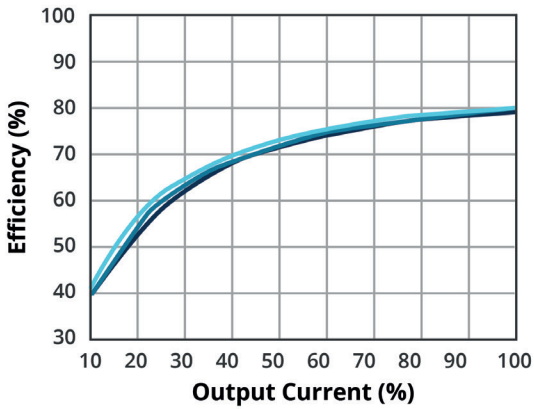
DERATING CURVE

TEMPERATURE DERATING CURVE

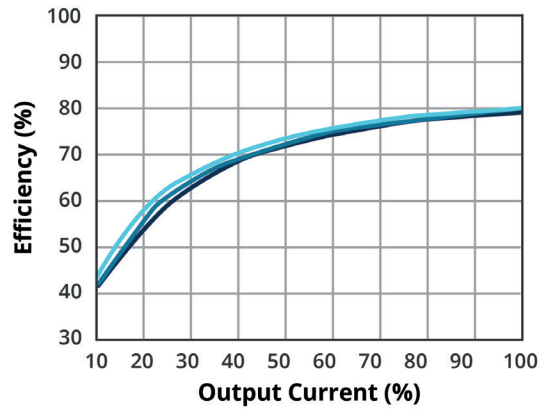


EFFICIENCY CURVES

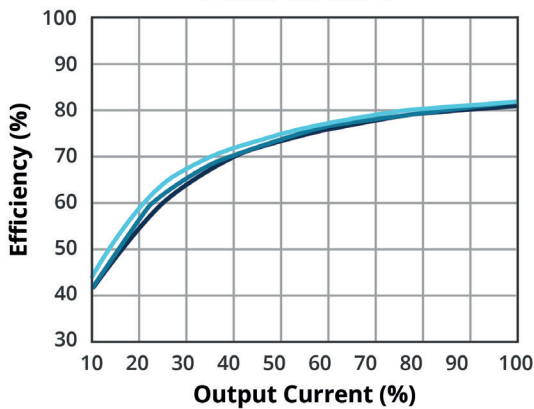
**EFFICIENCY VS OUTPUT LOAD
PCSA1-S5-S5-S**



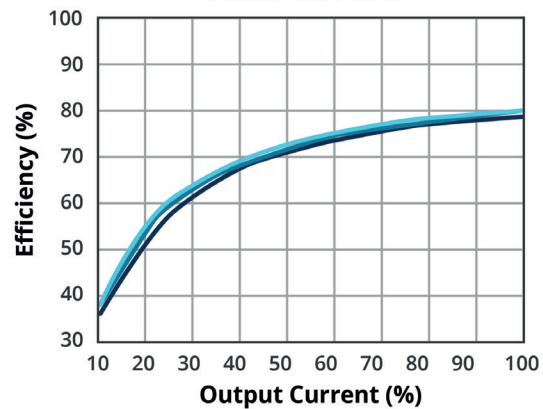
**EFFICIENCY VS OUTPUT LOAD
PCSA1-S5-S12-S**



**EFFICIENCY VS OUTPUT LOAD
PCSA1-S5-S15-S**

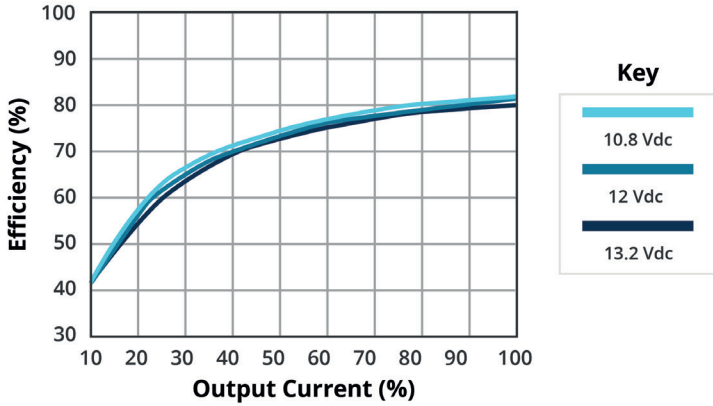


**EFFICIENCY VS OUTPUT LOAD
PCSA1-S12-S5-S**

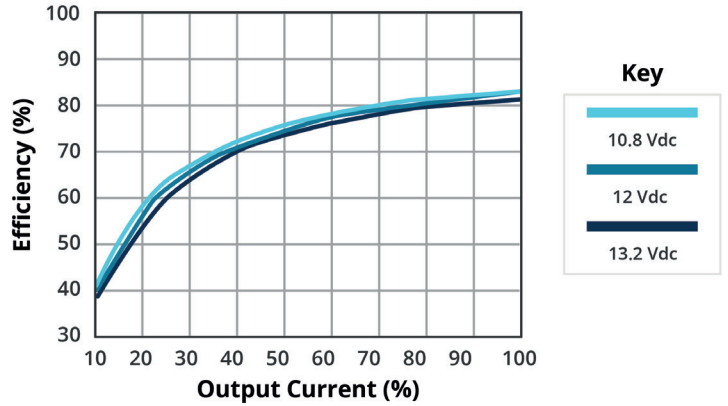


EFFICIENCY CURVES (CONTINUED)

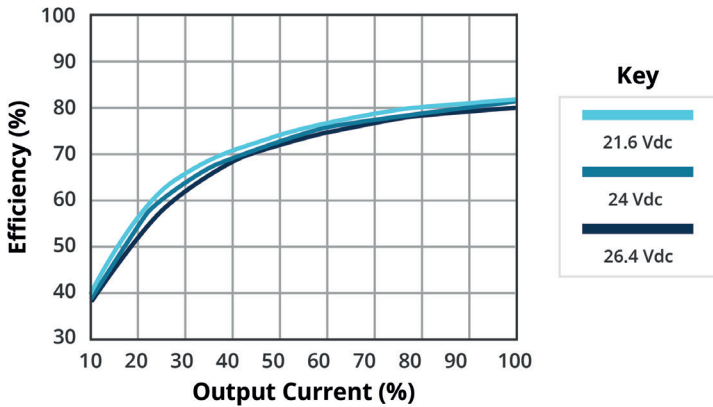
**EFFICIENCY VS OUTPUT LOAD
PCSA1-S12-S12-S**



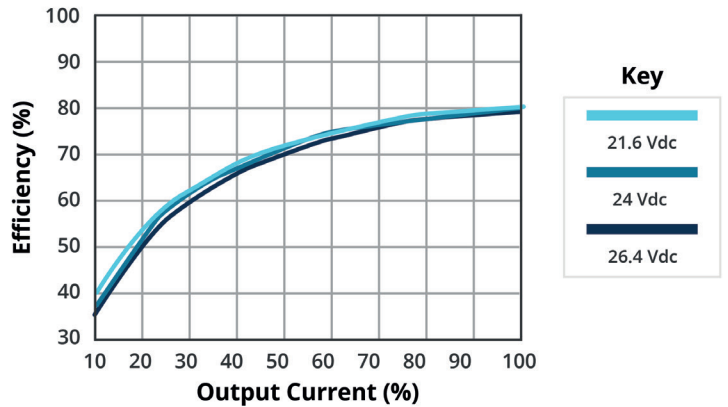
**EFFICIENCY VS OUTPUT LOAD
PCSA1-S12-S15-S**



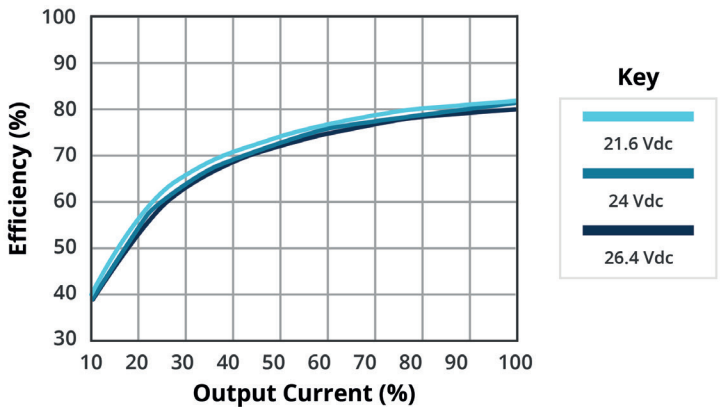
**EFFICIENCY VS OUTPUT LOAD
PCSA1-S24-S5-S**



**EFFICIENCY VS OUTPUT LOAD
PCSA1-S24-S12-S**



**EFFICIENCY VS OUTPUT LOAD
PCSA1-S24-S15-S**



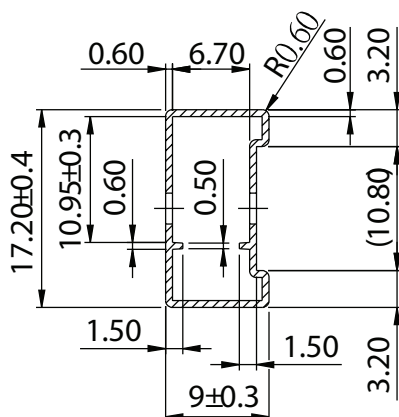
PACKAGING

5, 12 Vdc input models

units: mm

Tube size: 17.2 x 9 x 340 mm

QTY: 26 pcs

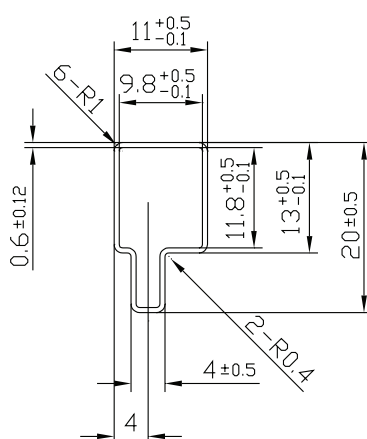


24 Vdc input models

units: mm

Tube size: 20 x 11 x 340 mm

QTY: 26 pcs



TEST CONFIGURATIONS

Input Ripple Current & Output Noise

Figure 1 Measuring Input Ripple Current

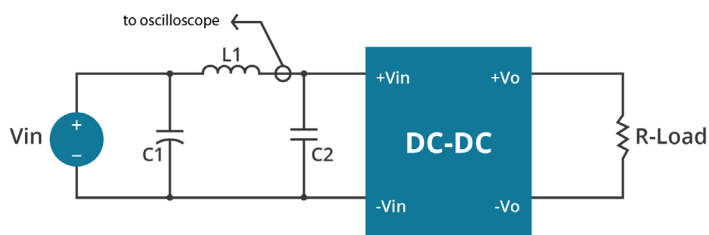


Figure 2 Measuring Output Ripple And Noise

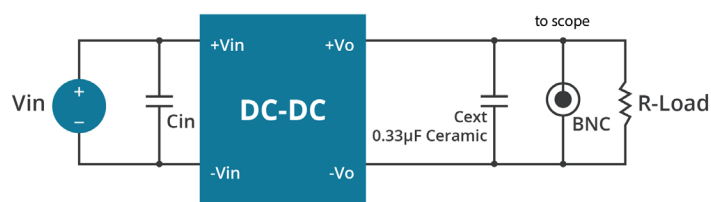


Table 1

| Input Voltage (Vdc) | L1 | C1 | C2 |
|---------------------|-------|---------------------------|----|
| 5 | 12 µH | 2.2 µF tantalum capacitor | NC |
| 12 | 12 µH | 2.2 µF tantalum capacitor | NC |
| 24 | 12 µH | 4.7 µF ceramic capacitor | NC |

Table 2

| Input Voltage (Vdc) | Cin |
|---------------------|--------------------------|
| 5 | 2.2 µF ceramic capacitor |
| 12 | 2.2 µF ceramic capacitor |
| 24 | 4.7 µF ceramic capacitor |

EMC RECOMMENDED CIRCUIT

Test Condition

Input Voltage: Nominal

Output Load: Full Load

Figure 3 Conducted Emissions Test Circuit

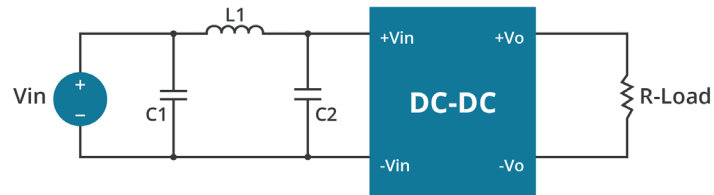


Table 3

| EN55022 Class A Recommended External Circuit Components | | |
|--|--------------------|-------------|
| C1 ¹ | C2 ¹ | L1 |
| 4.7 μ F / 50 V | 4.7 μ F / 50 V | 3.3 μ H |

Notes: 1. Ceramic Capacitor

Table 4

| EN55022 Class B Recommended External Circuit Components | | |
|--|-------------------|-------------|
| C1 ¹ | C2 ¹ | L1 |
| 10 μ F / 50 V | 10 μ F / 50 V | 7.5 μ H |

Notes: 1. Ceramic Capacitor

REVISION HISTORY

| rev. | description | date |
|------|--|------------|
| 1.0 | initial release | 07/26/2016 |
| 1.01 | company logo updated | 03/30/2021 |
| 1.02 | derating curves, efficiency curves and figures updated | 06/29/2021 |

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



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