

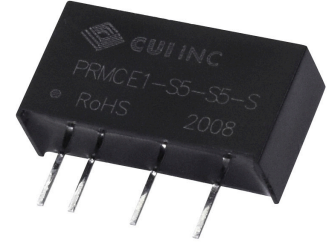


**THE DATASHEET OF  
PRMCE1-S5-S3-S**



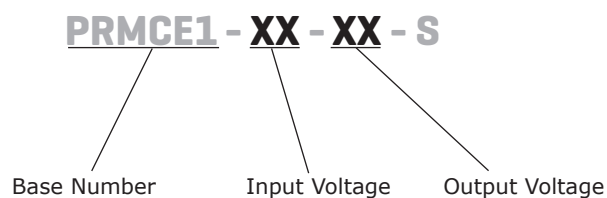
**SERIES:** PRMCE1-S | **DESCRIPTION:** DC-DC CONVERTER**FEATURES**

- 1W isolated output
- 3000 Vdc isolation
- compact SIP package
- continuous short circuit protection
- no-load input current as low as 5mA
- wide temperature range: -40°C to +85°C
- high efficiency up to 73%
- UL 62368 certified
- designed to meet EN/BS EN 62368



| MODEL                        | input voltage |             | output voltage | output current |          | output power | ripple and noise | efficiency |
|------------------------------|---------------|-------------|----------------|----------------|----------|--------------|------------------|------------|
|                              | typ (Vdc)     | range (Vdc) | (Vdc)          | min (mA)       | max (mA) | max (W)      | max (mVp-p)      | typ (%)    |
| PRMCE1-S5-S3-S               | 5             | 4.75~5.25   | 3.3            | 25             | 250      | 1            | 75               | 67         |
| PRMCE1-S5-S5-S <sup>1</sup>  | 5             | 4.75~5.25   | 5              | 20             | 200      | 1            | 75               | 70         |
| PRMCE1-S5-S9-S <sup>1</sup>  | 5             | 4.75~5.25   | 9              | 12             | 110      | 1            | 75               | 71         |
| PRMCE1-S5-S12-S <sup>1</sup> | 5             | 4.75~5.25   | 12             | 9              | 84       | 1            | 75               | 72         |
| PRMCE1-S5-S15-S <sup>1</sup> | 5             | 4.75~5.25   | 15             | 7              | 67       | 1            | 75               | 73         |
| PRMCE1-S5-S24-S              | 5             | 11.4~12.6   | 24             | 4              | 41       | 1            | 100              | 73         |
| PRMCE1-S12-S5-S              | 12            | 11.4~12.6   | 5              | 20             | 200      | 1            | 100              | 73         |
| PRMCE1-S12-S9-S              | 12            | 11.4~12.6   | 9              | 12             | 111      | 1            | 100              | 73         |
| PRMCE1-S12-S12-S             | 12            | 11.4~12.6   | 12             | 9              | 83       | 1            | 100              | 73         |
| PRMCE1-S12-S15-S             | 12            | 11.4~12.6   | 15             | 7              | 67       | 1            | 150              | 75         |
| PRMCE1-S15-S5-S              | 15            | 14.25~15.75 | 5              | 20             | 200      | 1            | 100              | 73         |
| PRMCE1-S15-S15-S             | 15            | 14.25~15.75 | 15             | 7              | 67       | 1            | 150              | 75         |
| PRMCE1-S24-S3-S              | 24            | 22.8~25.2   | 3.3            | 25             | 250      | 1            | 100              | 71         |
| PRMCE1-S24-S5-S              | 24            | 22.8~25.2   | 5              | 20             | 200      | 1            | 100              | 73         |
| PRMCE1-S24-S9-S              | 24            | 22.8~25.2   | 9              | 12             | 111      | 1            | 100              | 73         |
| PRMCE1-S24-S12-S             | 24            | 22.8~25.2   | 12             | 9              | 83       | 1            | 100              | 73         |
| PRMCE1-S24-S15-S             | 24            | 22.8~25.2   | 15             | 7              | 67       | 1            | 150              | 73         |

Note: 1. Model is UL and CB certified.

**PART NUMBER KEY**

**INPUT**

| parameter                  | conditions/description | min                     | typ  | max    | units  |    |
|----------------------------|------------------------|-------------------------|------|--------|--------|----|
| input voltage              |                        | 4.75                    | 5    | 5.25   | Vdc    |    |
|                            |                        | 11.4                    | 12   | 12.6   | Vdc    |    |
|                            |                        | 14.25                   | 15   | 15.75  | Vdc    |    |
|                            |                        | 22.8                    | 24   | 25.2   | Vdc    |    |
| filter                     | capacitance filter     |                         |      |        |        |    |
| current                    | 5 Vdc input model      | 3.3,5 Vdc output model  |      | 286/5  | 303/10 | mA |
|                            |                        | 9,12 Vdc output model   |      | 282/12 | 299/20 | mA |
|                            |                        | 15,24 Vdc output model  |      | 274/18 | 290/30 | mA |
|                            | 12 Vdc input model     | 5,9,12 Vdc output model |      | 115/8  | 121/-  | mA |
|                            |                        | 15 Vdc output model     |      | 112/8  | 118/-  | mA |
|                            | 15 Vdc input model     | 5 Vdc output model      |      | 92/8   | 97/-   | mA |
|                            |                        | 15 Vdc output model     |      | 89/8   | 94/-   | mA |
|                            | 24 Vdc input model     | 3.3 Vdc output model    |      | 59/8   | 65/-   | mA |
| 5,9,12,15 Vdc output model |                        | 58/8                    | 63/- | mA     |        |    |

**OUTPUT**

| parameter               | conditions/description                 | min | typ   | max   | units |
|-------------------------|--|-----|-------|-------|-------|
| output capacitance      | 3.3 Vdc output models                  |     |       | 2400  | μF    |
|                         | 5 Vdc output models                    |     |       | 2400  | μF    |
|                         | 9 Vdc output models                    |     |       | 1000  | μF    |
|                         | 12 Vdc output models                   |     |       | 560   | μF    |
|                         | 15 Vdc output models                   |     |       | 560   | μF    |
|                         | 24 Vdc output models                   |     |       | 100   | μF    |
| line regulation         | input voltage change: ±1%              |     |       | ±0.25 | %     |
| load regulation         | 3.3 Vdc output, 10%-100% load          |     |       | ±3    | %     |
|                         | all other output models, 10%-100% load |     |       | ±2    | %     |
| switching frequency     | 100% load, nominal input voltage       |     | 270   |       | kHz   |
| temperature coefficient | 100% load                              |     | ±0.02 |       | %/°C  |

**PROTECTIONS**

| parameter                | conditions/description    | min | typ | max | units |
|--------------------------|---------------------------|-----|-----|-----|-------|
| short circuit protection | continuous, self-recovery |     |     |     |       |

## SAFETY AND COMPLIANCE

| parameter                     | conditions/description   | min   | typ | max | units  |
|-------------------------------|--|-------|-----|-----|--------|
| isolation voltage             | input-output electric strength test for 1 minute with a leakage current of 1mA max | 3,000 |     |     | Vdc    |
| isolation resistance          | input-output resistance at 500 Vdc   | 1,000 |     |     | MΩ     |
| isolation capacitance         | input-output capacitance at 100 KHz / 0.1 V  |       | 20  |     | pF     |
| safety approvals <sup>1</sup> | certified to 62368: UL<br>designed to meet 62368: EN/BS EN                         |       |     |     |        |
| EMI /EMC                      | CISPR32/EN55032 Class B (see recommended circuit)                                  |       |     |     |        |
| ESD                           | IEC/EN61000-4-2 Air ±8kV, Contact ±4kV perf. Criteria B                            |       |     |     |        |
| RoHS                          | yes  |       |     |     |        |
| MTBF                          | as per MIL-HDBK-217F at 25°C   | 3,500 |     |     | kHours |

Note: 1. Refer to the model table.

## ENVIRONMENTAL

| parameter             | conditions/description                         | min | typ | max | units |
|-----------------------|--|-----|-----|-----|-------|
| operating temperature | derating when operating temperature up to 71°C | -40 |     | 85  | °C    |
| storage temperature   |  | -55 |     | 125 | °C    |
| humidity              | non-condensing                                 |     |     | 95  | %     |
| shock/vibration       | 10-150Hz, 5G, 30 Min. along X, Y and Z         |     |     |     |       |

## MECHANICAL

| parameter     | conditions/description                                       | min | typ | max | units |
|---------------|--|-----|-----|-----|-------|
| dimensions    | 19.65 x 6.00 x 10.16   |     |     |     | mm    |
| case material | black plastic; flame-retardant and heat-resistant (UL94 V-0) |     |     |     |       |
| weight        |  |     | 2.1 |     | g     |

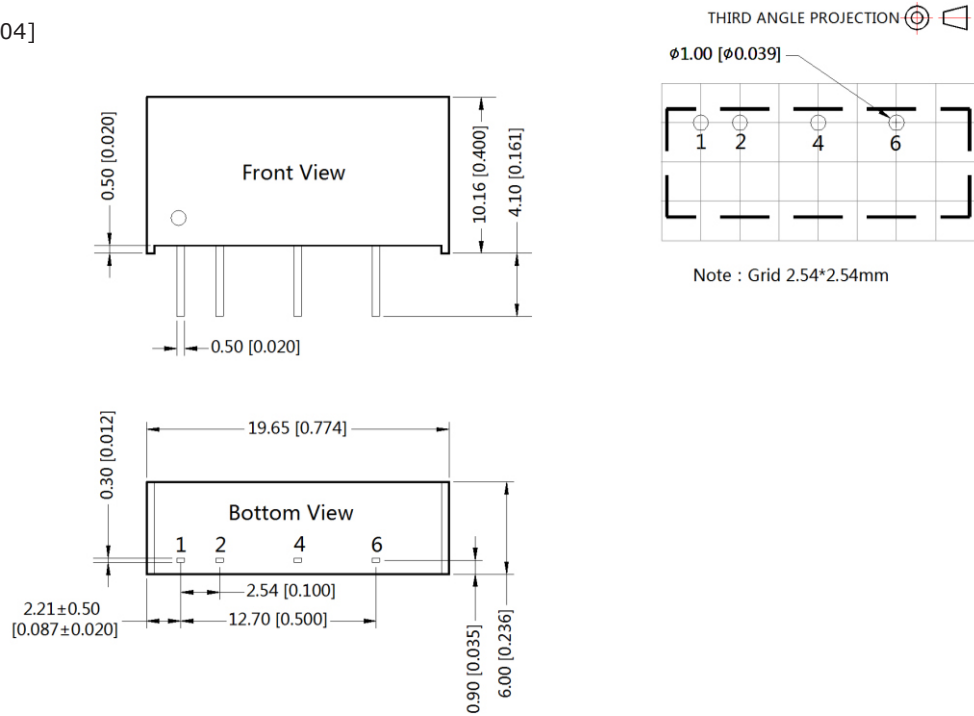
## MECHANICAL DRAWING

units: mm [inches]

tolerance: ± 0.25 [±0.010]

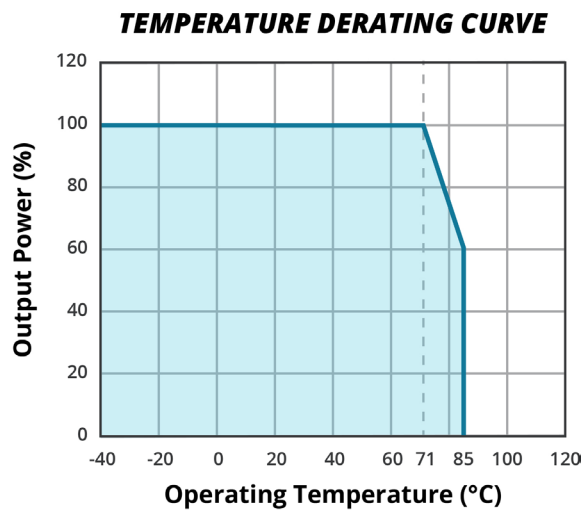
pin section tolerances: ± 0.10 [±0.004]

| PIN-OUT |          |
|---------|----------|
| PIN     | FUNCTION |
| 1       | Vin      |
| 2       | GND      |
| 4       | 0V       |
| 6       | +Vo      |



## DERATING CURVE

Figure 1



## APPLICATION CIRCUIT

Input and/or output ripple can be further reduced, by connecting a filter capacitor from the input and/or output terminals to ground as shown in Fig.2.

Choosing suitable filter capacitor values is very important for a smooth operation of the modules, particularly to avoid start-up problems caused by capacitor values that are too high. For recommended input and output capacitor values refer to Table 1.

Figure 2

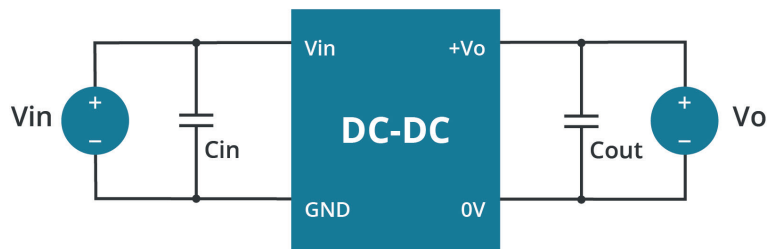


Table 1

| Recommended Input & Output Capacitor Values |              |          |               |
|---|--------------|----------|---------------|
| Vin (Vdc)                                   | Cin (μF / V) | Vo (Vdc) | Cout (μF / V) |
| 5   | 4.7 / -      | 3.3/5    | 10            |
| --  | --           | 9/12     | 2.2           |
| --  | --           | 15       | 1             |
| 12  | 2.2 / 25     | 3.3      | 10 / 16       |
| 15  | 2.2 / 25     | 5        | 10 / 16       |
| 24  | 1 / 50       | 9        | 2.2 / 16      |
| --  | --           | 12       | 2.2 / 16      |
| --  | --           | 15       | 1 / 25        |

## EMC RECOMMENDED CIRCUITS

Figure 3

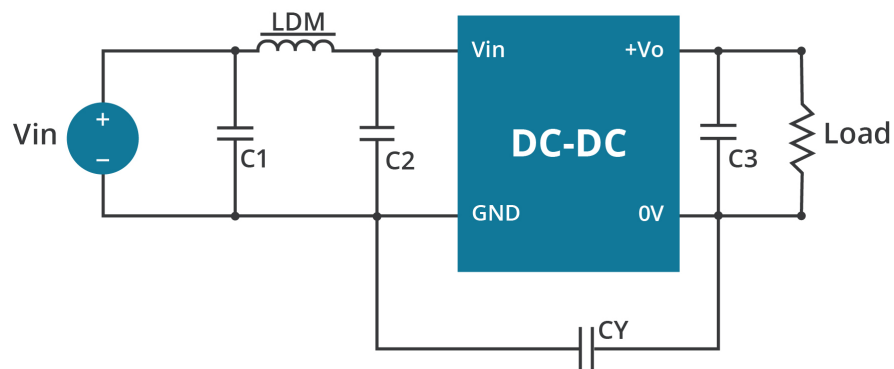


Table 1

| Recommended EMC Filter Values |            |            |             |                     |       |
|-------------------------------|------------|------------|-------------|---------------------|-------|
| Model                         | C1         | C2         | CY          | C3                  | LDM   |
| PRMCE1-S5-S3-S                | 4.7μF /25V | 4.7μF /25V | --          | see Cout in table 1 | 6.8μH |
| PRMCE1-S5-S5-S                | 4.7μF /25V | 4.7μF /25V | --          | see Cout in table 1 | 6.8μH |
| PRMCE1-S5-S9-S                | 4.7μF /25V | 4.7μF /25V | --          | see Cout in table 1 | 6.8μH |
| PRMCE1-S5-S12-S               | 4.7μF /25V | 4.7μF /25V | 1nF/4KVDC   | see Cout in table 1 | 6.8μH |
| PRMCE1-S5-S15-S               | 4.7μF /25V | 4.7μF /25V | 1nF/4KVDC   | see Cout in table 1 | 6.8μH |
| PRMCE1-S5-S24-S               | 4.7μF /25V | 4.7μF /25V | 1nF/4KVDC   | see Cout in table 1 | 6.8μH |
| all other models              | 4.7μF /50V | 4.7μF /50V | 270pF/3KVDC | see Cout in table 1 | 6.8μH |

## REVISION HISTORY

| rev. | description                                | date       |
|------|--|------------|
| 1.0  | initial release                            | 03/09/2020 |
| 1.01 | derating curve and circuit figures updated | 07/06/2021 |
| 1.02 | datasheet updated                          | 09/16/2021 |
| 1.03 | datasheet updated                          | 10/06/2021 |
| 1.04 | CE certification updated                   | 11/29/2022 |
| 1.05 | min output current value added             | 10/18/2023 |

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



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