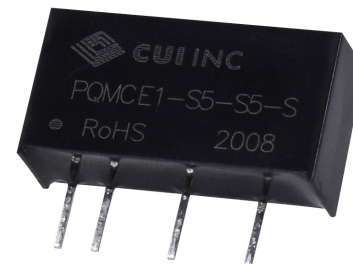
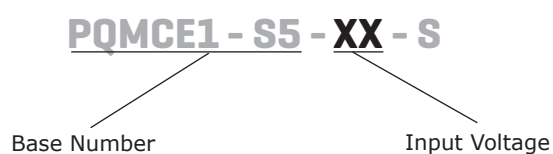


**SERIES:** PQMCE1-S | **DESCRIPTION:** DC-DC CONVERTER**FEATURES**

- 1W isolated output
- 1500 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 approval



| MODEL           | input<br>voltage<br>typ<br>(Vdc) | output<br>voltage<br>(Vdc) | output<br>current<br>max<br>(mA) | output<br>power<br>max<br>(W) | ripple<br>and noise<br>max<br>(mVp-p) | efficiency<br>typ<br>(%) |
|-----------------|----------------------------------|----------------------------|----------------------------------|-------------------------------|---------------------------------------|--------------------------|
| PQMCE1-S5-S3-S  | 5                                | 3.3                        | 250                              | .83                           | 75                                    | 67                       |
| PQMCE1-S5-S5-S  | 5                                | 5                          | 200                              | 1                             | 75                                    | 70                       |
| PQMCE1-S5-S9-S  | 5                                | 9                          | 110                              | 1                             | 75                                    | 71                       |
| PQMCE1-S5-S12-S | 5                                | 12                         | 84                               | 1                             | 75                                    | 72                       |
| PQMCE1-S5-S15-S | 5                                | 15                         | 67                               | 1                             | 75                                    | 73                       |
| PQMCE1-S5-S24-S | 5                                | 24                         | 41                               | 1                             | 100                                   | 73                       |

**PART NUMBER KEY**

## INPUT

| parameter     | conditions/description | min  | typ    | max    | units |
|---------------|------------------------|------|--------|--------|-------|
| input voltage |                        | 4.75 | 5      | 5.25   | Vdc   |
| filter        | capacitance filter     |      |        |        |       |
| current       | (full load / no-load)  |      |        |        |       |
|               | 3.3 Vdc / 5 Vdc output |      | 286/5  | 303/10 | mA    |
|               | 9 Vdc / 12 Vdc output  |      | 282/12 | 299/20 | mA    |
|               | 15 Vdc / 24 Vdc output |      | 274/18 | 290/30 | 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    | %     |
|                         | others, 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 to output electric strength test for 1 minute with a leakage current of 1mA max | 1500 |     |     | Vdc     |
| isolation resistance  | input to output resistance at 500 Vdc                                                 | 1000 |     |     | MΩ      |
| isolation capacitance | input to output capacitance at 100 KHz / 0.1 V                                        |      | 20  |     | pF      |
| safety approvals      | 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 @ 25°C                                                           | 3500 |     |     | k Hours |

## 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

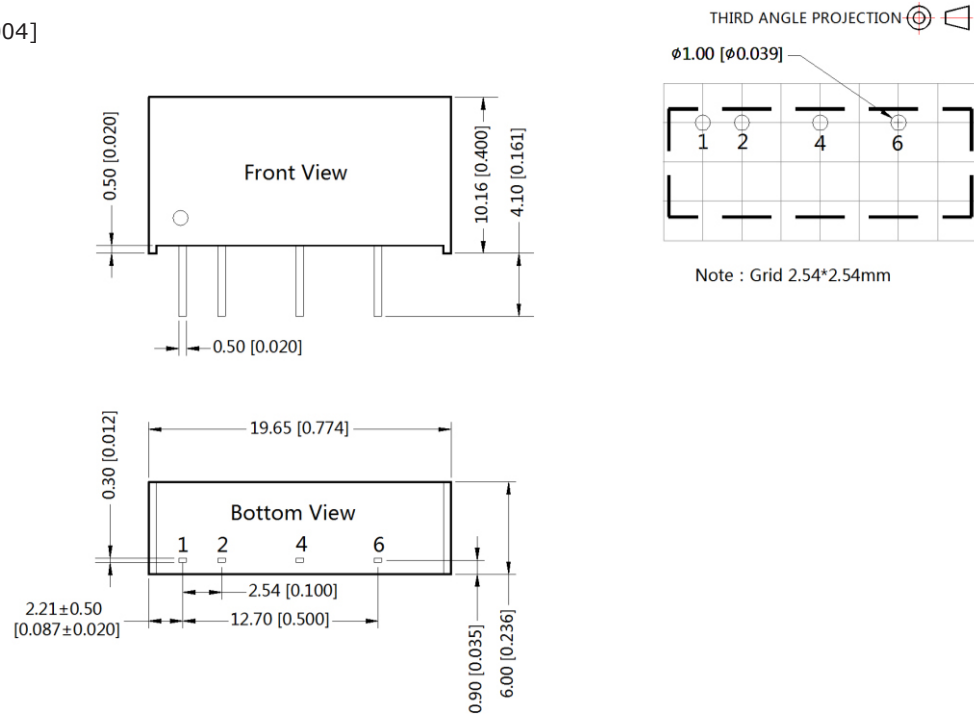
| parameter     | conditions/description                                       | min | typ | max | units |
|---------------|--------------------------------------------------------------|-----|-----|-----|-------|
| dimensions    | 19.65 x 6.00 x 10.16                                         |     |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

## MECHANICAL DRAWING

units: mm [inches]

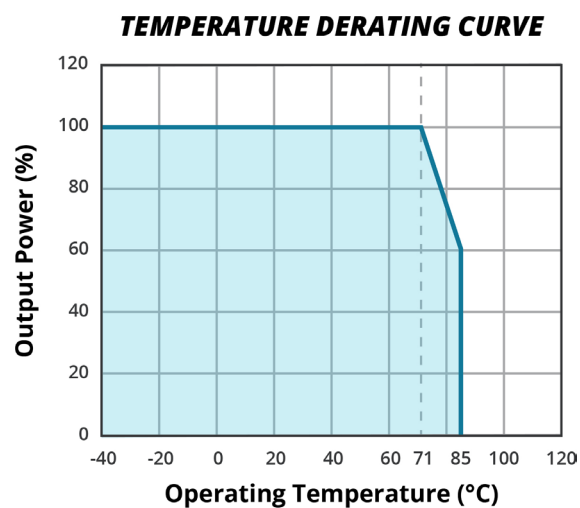
tolerance:  $\pm 0.25$  [ $\pm 0.010$ ]pin section tolerances:  $\pm 0.10$  [ $\pm 0.004$ ]

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



## DERATING CURVE

Figure 1

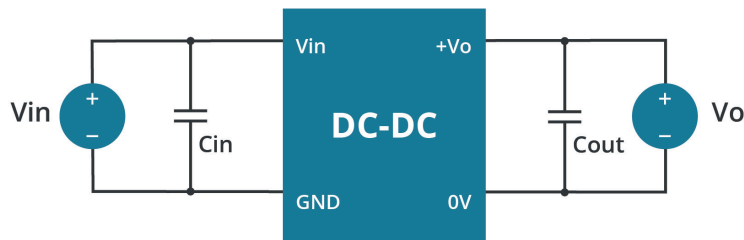


## APPLICATION CIRCUIT

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**

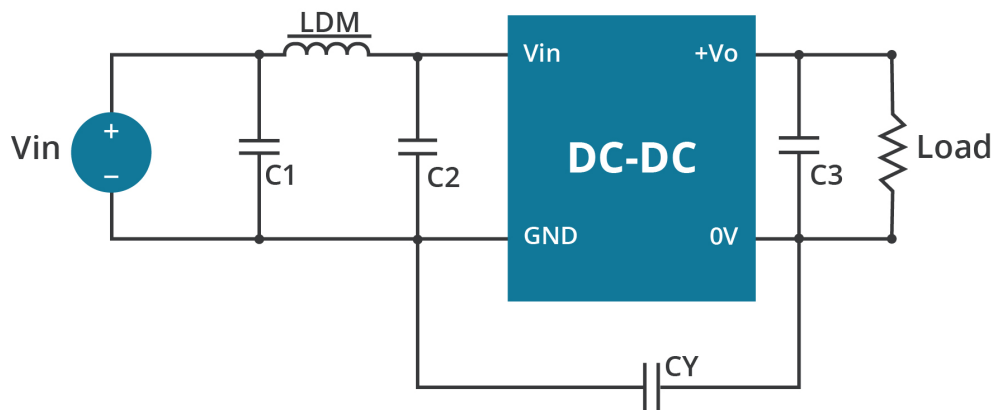


**Table 1**

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

## EMC RECOMMENDED CIRCUITS

**Figure 3**



**Table 2**

| Recommended EMC Filter Values |            |            |           |                     |       |
|-------------------------------|------------|------------|-----------|---------------------|-------|
| Model                         | C1         | C2         | CY        | C3                  | LDM   |
| PQMCE1-S5-S3-S                | 4.7μF /25V | 4.7μF /25V | - -       | see Cout in table 1 | 6.8μH |
| PQMCE1-S5-S5-S                | 4.7μF /25V | 4.7μF /25V | - -       | see Cout in table 1 | 6.8μH |
| PQMCE1-S5-S9-S                | 4.7μF /25V | 4.7μF /25V | - -       | see Cout in table 1 | 6.8μH |
| PQMCE1-S5-S12-S               | 4.7μF /25V | 4.7μF /25V | 1nF/4KVdc | see Cout in table 1 | 6.8μH |
| PQMCE1-S5-S15-S               | 4.7μF /25V | 4.7μF /25V | 1nF/4KVdc | see Cout in table 1 | 6.8μH |
| PQMCE1-S5-S24-S               | 4.7μF /25V | 4.7μF /25V | 1nF/4KVdc | see Cout in table 1 | 6.8μH |

## REVISION HISTORY

| rev. | description                                | date       |
|------|--------------------------------------------|------------|
| 1.0  | initial release                            | 03/09/2020 |
| 1.01 | datasheet update                           | 12/14/2020 |
| 1.03 | derating curve and circuit figures updated | 06/30/2021 |
| 1.04 | CE certification removed                   | 11/16/2022 |

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



**Headquarters**  
20050 SW 112th Ave.  
Tualatin, OR 97062  
**800.275.4899**

Fax 503.612.2383  
**cui.com**  
techsupport@cui.com

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