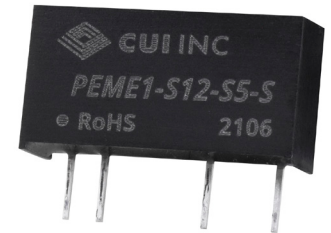


**SERIES:** PEME1-S | **DESCRIPTION:** DC-DC CONVERTER

**FEATURES**

- 1 W isolated output
- unregulated output
- single/dual output models
- continuous short circuit protection
- extended temperature range (-40~105°C)
- 3k Vdc isolation
- no load input current as low as 5 mA
- certified to UL 62368-1
- efficiency up to 85%
- designed to meet EN/BS EN 62368


**MODEL**

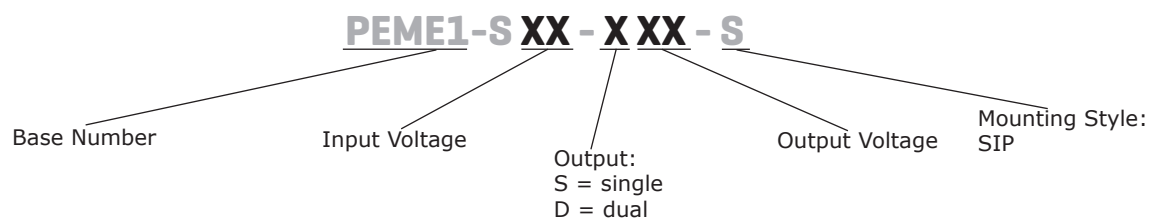
| MODEL                       | input voltage |                | output voltage<br>(Vdc) | output current |             | output power<br>max<br>(W) | ripple & noise <sup>1</sup><br>max<br>(mVp-p) | efficiency <sup>2</sup><br>typ<br>(%) |
|-----------------------------|---------------|----------------|-------------------------|----------------|-------------|----------------------------|-----------------------------------------------|---------------------------------------|
|                             | typ<br>(Vdc)  | range<br>(Vdc) |                         | min<br>(mA)    | max<br>(mA) |                            |                                               |                                       |
| PEME1-S3-D3-S <sup>3</sup>  | 3.3           | 2.97~3.63      | ±3.3                    | ±15            | ±150        | 1                          | 75                                            | 78                                    |
| PEME1-S3-D5-S <sup>3</sup>  | 3.3           | 2.97~3.63      | ±5                      | ±10            | ±100        | 1                          | 75                                            | 82                                    |
| PEME1-S3-D9-S <sup>3</sup>  | 3.3           | 2.97~3.63      | ±9                      | ±6             | ±56         | 1                          | 75                                            | 85                                    |
| PEME1-S3-D12-S <sup>3</sup> | 3.3           | 2.97~3.63      | ±12                     | ±5             | ±42         | 1                          | 75                                            | 82                                    |
| PEME1-S3-D15-S <sup>3</sup> | 3.3           | 2.97~3.63      | ±15                     | ±4             | ±34         | 1                          | 75                                            | 82                                    |
| PEME1-S3-D24-S <sup>3</sup> | 3.3           | 2.97~3.63      | ±24                     | ±2             | ±21         | 1                          | 100                                           | 84                                    |
| PEME1-S3-S3-S <sup>3</sup>  | 3.3           | 2.97~3.63      | 3.3                     | 30             | 303         | 1                          | 75                                            | 79                                    |
| PEME1-S3-S5-S <sup>3</sup>  | 3.3           | 2.97~3.63      | 5                       | 20             | 200         | 1                          | 75                                            | 82                                    |
| PEME1-S3-S9-S <sup>3</sup>  | 3.3           | 2.97~3.63      | 9                       | 11             | 111         | 1                          | 75                                            | 85                                    |
| PEME1-S3-S12-S <sup>3</sup> | 3.3           | 2.97~3.63      | 12                      | 8              | 83          | 1                          | 75                                            | 82                                    |
| PEME1-S3-S15-S <sup>3</sup> | 3.3           | 2.97~3.63      | 15                      | 7              | 67          | 1                          | 75                                            | 82                                    |
| PEME1-S3-S24-S <sup>3</sup> | 3.3           | 2.97~3.63      | 24                      | 4              | 42          | 1                          | 100                                           | 84                                    |
| PEME1-S5-D3-S <sup>3</sup>  | 5             | 4.5~5.5        | ±3.3                    | ±15            | ±152        | 1                          | 75                                            | 74                                    |
| PEME1-S5-D5-S               | 5             | 4.5~5.5        | ±5                      | ±10            | ±100        | 1                          | 75                                            | 82                                    |
| PEME1-S5-D9-S               | 5             | 4.5~5.5        | ±9                      | ±6             | ±56         | 1                          | 75                                            | 83                                    |
| PEME1-S5-D12-S              | 5             | 4.5~5.5        | ±12                     | ±5             | ±42         | 1                          | 75                                            | 83                                    |
| PEME1-S5-D15-S              | 5             | 4.5~5.5        | ±15                     | ±4             | ±34         | 1                          | 75                                            | 83                                    |
| PEME1-S5-D24-S              | 5             | 4.5~5.5        | ±24                     | ±3             | ±21         | 1                          | 100                                           | 85                                    |
| PEME1-S5-S3-S               | 5             | 4.5~5.5        | 3.3                     | 30             | 303         | 1                          | 75                                            | 74                                    |
| PEME1-S5-S5-S               | 5             | 4.5~5.5        | 5                       | 20             | 200         | 1                          | 75                                            | 82                                    |
| PEME1-S5-S9-S               | 5             | 4.5~5.5        | 9                       | 12             | 111         | 1                          | 75                                            | 83                                    |
| PEME1-S5-S12-S              | 5             | 4.5~5.5        | 12                      | 9              | 84          | 1                          | 75                                            | 83                                    |
| PEME1-S5-S15-S              | 5             | 4.5~5.5        | 15                      | 7              | 67          | 1                          | 75                                            | 83                                    |
| PEME1-S5-S24-S              | 5             | 4.5~5.5        | 24                      | 4              | 42          | 1                          | 100                                           | 85                                    |
| PEME1-S12-D3-S              | 12            | 10.8~13.2      | ±3.3                    | ±15            | ±152        | 1                          | 75                                            | 75                                    |
| PEME1-S12-D5-S              | 12            | 10.8~13.2      | ±5                      | ±10            | ±100        | 1                          | 75                                            | 80                                    |
| PEME1-S12-D12-S             | 12            | 10.8~13.2      | ±12                     | ±5             | ±42         | 1                          | 75                                            | 81                                    |
| PEME1-S12-D15-S             | 12            | 10.8~13.2      | ±15                     | ±4             | ±34         | 1                          | 75                                            | 81                                    |
| PEME1-S12-D24-S             | 12            | 10.8~13.2      | ±24                     | ±2             | ±21         | 1                          | 100                                           | 80                                    |

**MODEL  
(CONTINUED)**

|                 | input voltage |             | output voltage | output current |          | output power | ripple & noise <sup>1</sup> | efficiency <sup>2</sup> |
|-----------------|---------------|-------------|----------------|----------------|----------|--------------|-----------------------------|-------------------------|
|                 | typ (Vdc)     | range (Vdc) |                | min (mA)       | max (mA) |              | max (mVp-p)                 | typ (%)                 |
| PEME1-S12-S3-S  | 12            | 10.8~13.2   | 3.3            | 30             | 303      | 1            | 75                          | 75                      |
| PEME1-S12-S5-S  | 12            | 10.8~13.2   | 5              | 20             | 200      | 1            | 75                          | 80                      |
| PEME1-S12-S9-S  | 12            | 10.8~13.2   | 9              | 12             | 111      | 1            | 75                          | 80                      |
| PEME1-S12-S12-S | 12            | 10.8~13.2   | 12             | 9              | 83       | 1            | 75                          | 80                      |
| PEME1-S12-S15-S | 12            | 10.8~13.2   | 15             | 7              | 67       | 1            | 75                          | 81                      |
| PEME1-S12-S24-S | 12            | 10.8~13.2   | 24             | 5              | 42       | 1            | 100                         | 81                      |
| PEME1-S15-D5-S  | 15            | 13.5~16.5   | ±5             | ±10            | ±100     | 1            | 75                          | 80                      |
| PEME1-S15-D12-S | 15            | 13.5~16.5   | ±12            | ±5             | ±42      | 1            | 75                          | 80                      |
| PEME1-S15-D15-S | 15            | 13.5~16.5   | ±15            | ±4             | ±34      | 1            | 75                          | 81                      |
| PEME1-S15-S5-S  | 15            | 13.5~16.5   | 5              | 20             | 200      | 1            | 75                          | 80                      |
| PEME1-S15-S9-S  | 15            | 13.5~16.5   | 9              | 12             | 111      | 1            | 75                          | 80                      |
| PEME1-S15-S12-S | 15            | 13.5~16.5   | 12             | 9              | 83       | 1            | 75                          | 80                      |
| PEME1-S15-S15-S | 15            | 13.5~16.5   | 15             | 7              | 67       | 1            | 75                          | 81                      |
| PEME1-S24-D5-S  | 24            | 21.6~26.4   | ±5             | ±10            | ±100     | 1            | 75                          | 80                      |
| PEME1-S24-D12-S | 24            | 21.6~26.4   | ±12            | ±5             | ±42      | 1            | 75                          | 81                      |
| PEME1-S24-D15-S | 24            | 21.6~26.4   | ±15            | ±4             | ±34      | 1            | 75                          | 79                      |
| PEME1-S24-D24-S | 24            | 21.6~26.4   | ±24            | ±2             | ±21      | 1            | 100                         | 80                      |
| PEME1-S24-S3-S  | 24            | 21.6~26.4   | 3.3            | 30             | 303      | 1            | 75                          | 75                      |
| PEME1-S24-S5-S  | 24            | 21.6~26.4   | 5              | 20             | 200      | 1            | 75                          | 79                      |
| PEME1-S24-S9-S  | 24            | 21.6~26.4   | 9              | 12             | 111      | 1            | 75                          | 80                      |
| PEME1-S24-S12-S | 24            | 21.6~26.4   | 12             | 9              | 83       | 1            | 75                          | 81                      |
| PEME1-S24-S15-S | 24            | 21.6~26.4   | 15             | 7              | 67       | 1            | 75                          | 81                      |
| PEME1-S24-S24-S | 24            | 21.6~26.4   | 24             | 5              | 42       | 1            | 100                         | 81                      |

Notes:

1. Measured at nominal input, 20 MHz bandwidth oscilloscope, with 10  $\mu$ F tantalum and 1  $\mu$ F ceramic capacitors on the output.
2. Measured at nominal input voltage, full load.
3. Model is not UL certified.
4. 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 | 3.3 Vdc input models                    | 2.97 | 3.3 | 3.63 | Vdc   |
|                         | 5 Vdc input models                      | 4.5  | 5   | 5.5  | Vdc   |
|                         | 12 Vdc input models                     | 10.8 | 12  | 13.2 | Vdc   |
|                         | 15 Vdc input models                     | 13.5 | 15  | 16.5 | Vdc   |
|                         | 24 Vdc input models                     | 21.6 | 24  | 26.4 | Vdc   |
| surge voltage           | for maximum of 1 second                 |      |     |      |       |
|                         | 3.3 Vdc input models                    | -0.7 |     | 5    | Vdc   |
|                         | 5 Vdc input models                      | -0.7 |     | 9    | Vdc   |
|                         | 12 Vdc input models                     | -0.7 |     | 18   | Vdc   |
|                         | 15 Vdc input models                     | -0.7 |     | 21   | Vdc   |
|                         | 24 Vdc input models                     | -0.7 |     | 30   | Vdc   |
| current                 | at full load                            |      |     |      |       |
|                         | 3.3 Vdc input models; 3.3 Vdc output    |      |     | 405  | mA    |
|                         | 3.3 Vdc input models; all other outputs |      |     | 389  | mA    |
|                         | 5 Vdc input models; 3.3, 5 Vdc output   |      |     | 286  | mA    |
|                         | 5 Vdc input models; 9, 12 Vdc output    |      |     | 254  | mA    |
|                         | 5 Vdc input models; 15, 24 Vdc output   |      |     | 254  | mA    |
|                         | 12 Vdc input models                     |      |     | 118  | mA    |
|                         | 15 Vdc input models                     |      |     | 88   | mA    |
|                         | 24 Vdc input models                     |      |     | 59   | mA    |
| filter                  | filter capacitor                        |      |     |      |       |

## OUTPUT

| parameter                            | conditions/description                      | min | typ   | max   | units |
|--------------------------------------|---------------------------------------------|-----|-------|-------|-------|
| maximum capacitive load <sup>5</sup> | 3.3, 5 Vdc output models                    |     |       | 2,400 | μF    |
|                                      | 9 Vdc output models                         |     |       | 1,000 | μF    |
|                                      | 12, 15 Vdc output models                    |     |       | 560   | μF    |
|                                      | 24, ±12, ±15 Vdc output models              |     |       | 220   | μF    |
|                                      | ±3.3, ±5 Vdc output models                  |     |       | 1,200 | μF    |
|                                      | ±9 Vdc output models                        |     |       | 470   | μF    |
|                                      | all other models                            |     |       | 100   | 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 Vdc input; 3.3 Vdc output               |     |       | 18    | %     |
|                                      | 3.3 Vdc input; all other outputs            |     |       | 15    | %     |
|                                      | 5, 12 & 15 Vdc input; 3.3 Vdc output models |     |       | 20    | %     |
|                                      | 5, 12 & 15 Vdc input; 5 Vdc output models   |     |       | 15    | %     |
|                                      | all other models                            |     |       | 10    | %     |
| switching frequency                  | at nominal input, full load                 |     |       |       |       |
|                                      | 3.3 Vdc input                               |     | 220   |       | kHz   |
|                                      | all other models                            |     | 270   |       | kHz   |
| temperature coefficient              | at full load                                |     | ±0.02 |       | %/°C  |

Note: 5. Tested at input voltage range and full load.

## 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 for 1 minute at 1 mA | 3,000 |     |     | Vdc   |
| isolation resistance  | input to output at 500 Vdc           | 1,000 |     |     | MΩ    |
| isolation capacitance | input to output, 100 kHz / 0.1 V     |       | 20  |     | pF    |

## SAFETY AND COMPLIANCE

| parameter                     | conditions/description                                             | min       | typ | max | units |
|-------------------------------|--------------------------------------------------------------------|-----------|-----|-----|-------|
| safety approvals <sup>6</sup> | certified to 62368-1: UL<br>designed to meet 62368: EN/BS EN       |           |     |     |       |
| conducted emissions           | CISPR32/EN55032, class B (external circuit required, see Figure 3) |           |     |     |       |
| radiated emissions            | CISPR32/EN55032, class B (external circuit required, see Figure 3) |           |     |     |       |
| ESD                           | IEC/EN61000-4-2, air $\pm 8$ kV; contact $\pm 4$ kV, class B       |           |     |     |       |
| MTBF                          | as per MIL-HDBK-217F, 25°C                                         | 3,500,000 |     |     | hours |
| RoHS                          | yes                                                                |           |     |     |       |

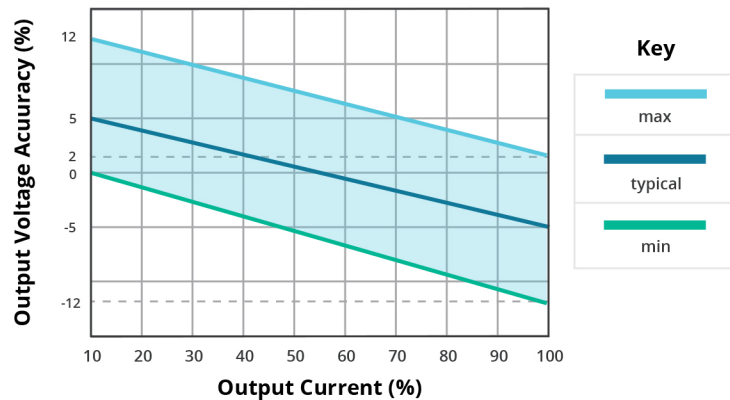
Note: 6. See the model table for additional info.

## ENVIRONMENTAL

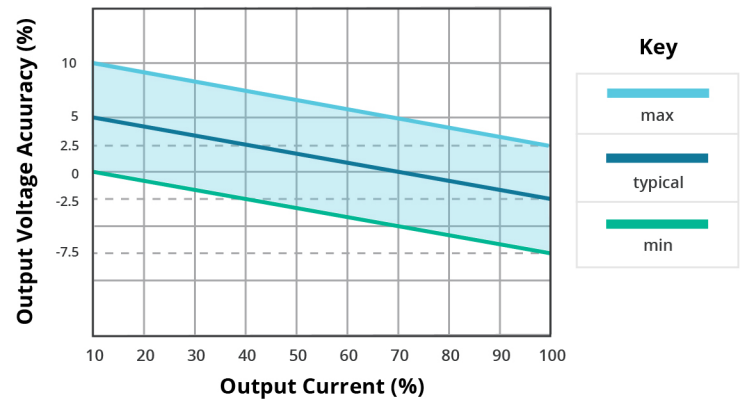
| parameter             | conditions/description                                   | min | typ      | max | units    |
|-----------------------|----------------------------------------------------------|-----|----------|-----|----------|
| operating temperature | see derating curves                                      | -40 |          | 105 | °C       |
| storage temperature   |                                                          | -55 |          | 125 | °C       |
| storage humidity      | non-condensing                                           |     |          | 95  | %        |
| case temperature rise | 3.3 Vdc output model at 25°C<br>all other models at 25°C |     | 25<br>15 |     | °C<br>°C |

## DERATING CURVES

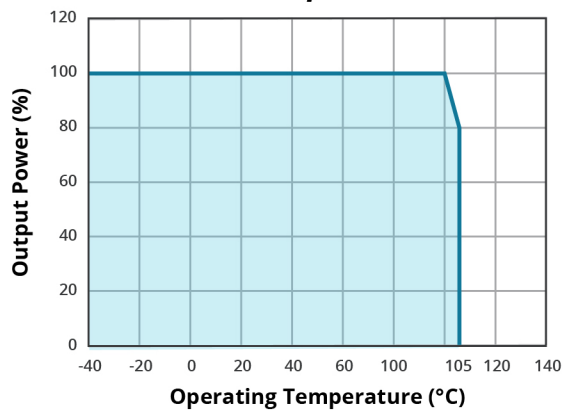
**OUTPUT REGULATION CURVE**  
**3.3 Vdc output model**  
**(nominal input)**



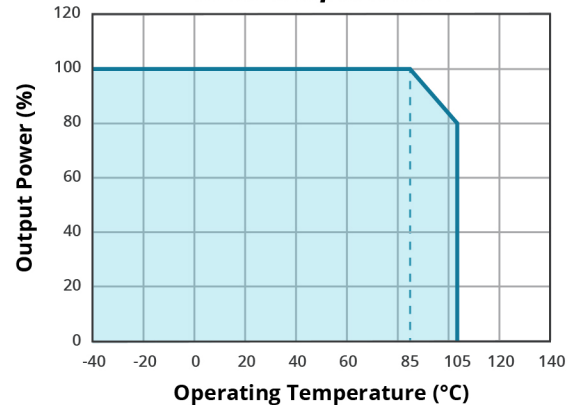
**OUTPUT REGULATION CURVE**  
**all other output models**  
**(nominal input)**



**TEMPERATURE DERATING CURVE**  
**3.3 Vdc input models**



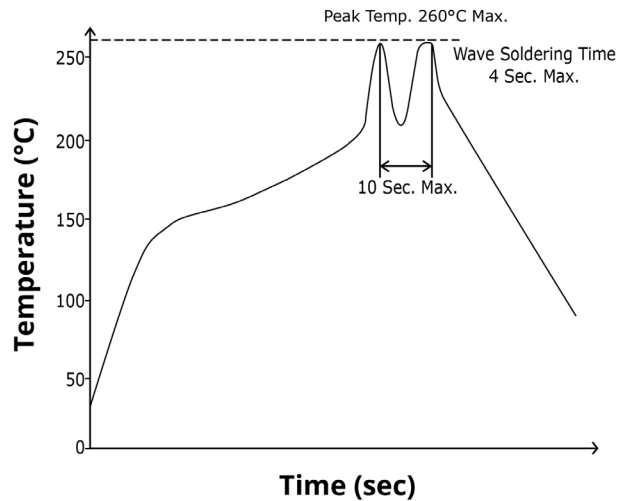
**TEMPERATURE DERATING CURVE**  
**all other input models**



## SOLDERABILITY

| parameter      | conditions/description          | min | typ | max | units |
|----------------|---------------------------------|-----|-----|-----|-------|
| hand soldering | 1.5 mm from case for 10 seconds |     |     | 300 | °C    |
| wave soldering | see wave soldering profile      |     |     | 260 | °C    |

### WAVE SOLDERING PROFILE



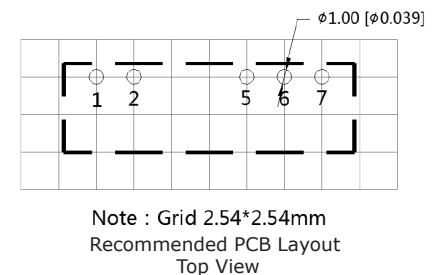
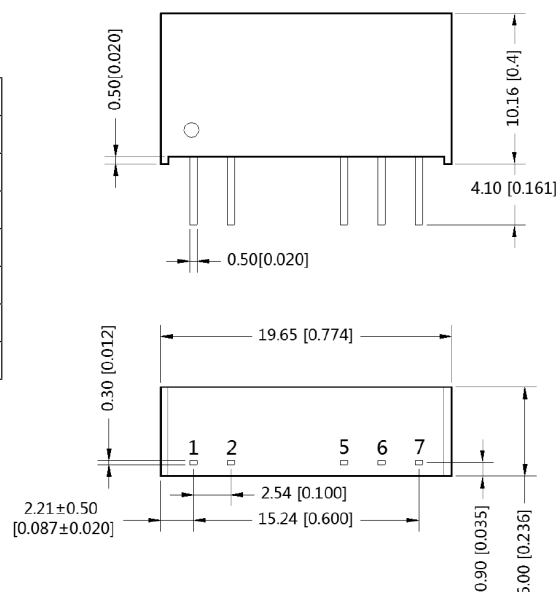
## MECHANICAL

| parameter     | conditions/description                                     | min | typ | max | units |
|---------------|------------------------------------------------------------|-----|-----|-----|-------|
| dimensions    | 19.65 x 6.00 x 10.16 [0.774 x 0.236 x 0.400 inch]          |     |     |     | mm    |
| case material | black flame-retardant and heat-resistant plastic (UL94V-0) |     |     |     |       |
| weight        |                                                            |     | 2.1 |     | g     |

## MECHANICAL DRAWING

units: mm [inch]  
 tolerance:  $\pm 0.25 [\pm 0.010]$   
 pin section tolerance:  $\pm 0.10 [\pm 0.004]$

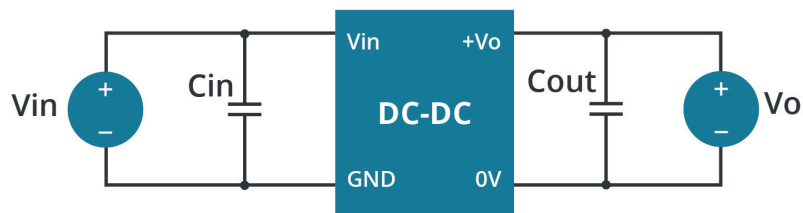
| PIN CONNECTIONS |          |       |
|-----------------|----------|-------|
| PIN             | Function |       |
|                 | Single   | Dual  |
| 1               | Vin      | Vin   |
| 2               | GND      | GND   |
| 5               | 0V       | -Vout |
| 6               | No Pin   | 0V    |
| 7               | +Vout    | +Vout |



## APPLICATION CIRCUIT

If you want to further reduce the input and output ripple, a filter capacitor may be connected to the input and output terminals (Figures 1 & 2) provided that the capacitance is less than the maximum capacitive load of the model, otherwise start-up problems may be caused if the capacitance is too large.

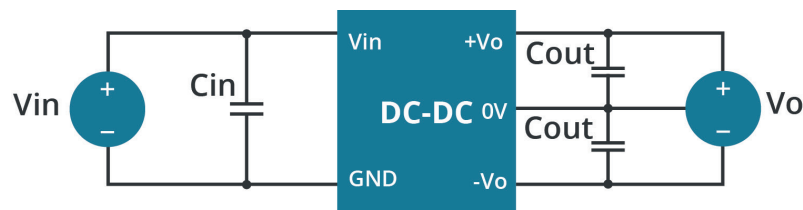
**Figure 1**  
Single Output Models



**Table 1**

| Vin (Vdc) | Cin (μF/V)  | Vo (Vdc) | Cout (μF/V) |
|-----------|-------------|----------|-------------|
| 3.3       | 10 μF/16 V  | 3.3, 5   | 10 μF/16 V  |
|           |             | 9, 12    | 2.2 μF/25 V |
|           |             | 15, 24   | 1 μF/50 V   |
| 5         | 4.7         | 3.3, 5   | 10 μF/16 V  |
|           |             | 9, 12    | 2.2 μF/25 V |
|           |             | 15, 24   | 1 μF/50 V   |
| 12        | 2.2 μF/25 V | 3.3      | 10 μF/16 V  |
| 15        | 2.2 μF/25 V | 5        | 10 μF/16 V  |
| 24        | 1 μF/50 V   | 9        | 2.2 μF/16 V |
| -         | -           | 12       | 2.2 μF/25 V |
| -         | -           | 15       | 1 μF/25 V   |
| -         | -           | 24       | 1 μF/50 V   |

**Figure 2**  
Dual Output Models

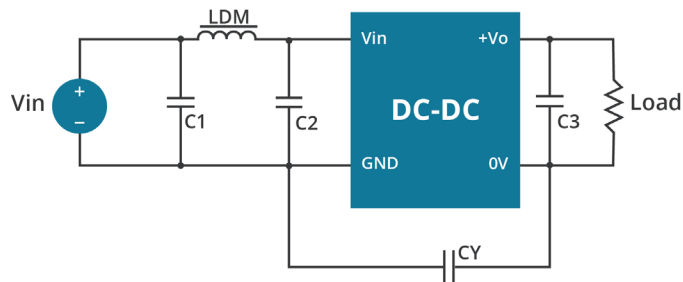


**Table 2**

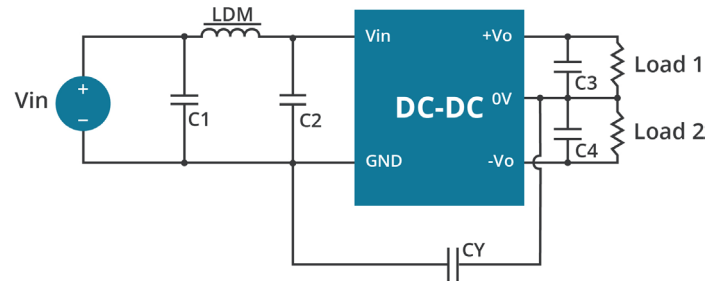
| Vin (Vdc) | Cin (μF)    | Vo (Vdc) | Cout (μF)    |
|-----------|-------------|----------|--------------|
| 3.3       | 10 μF/16 V  | ±3.3, ±5 | 10 μF/16 V   |
|           |             | ±9, ±12  | 2.2 μF/25 V  |
|           |             | ±15, ±24 | 1 μF/50 V    |
| 5         | 4.7 μF/16 V | ±3.3, ±5 | 4.7 μF/16 V  |
|           |             | ±9, ±12  | 1 μF/25 V    |
|           |             | ±15, ±24 | 0.47 μF/50 V |
| 12        | 2.2 μF/25 V | ±3.3     | 4.7 μF/16 V  |
| 15        | 2.2 μF/25 V | ±5       | 4.7 μF/16 V  |
| 24        | 1 μF/50 V   | ±12      | 1 μF/25 V    |
| -         | -           | ±15      | 0.47 μF/25 V |
| -         | -           | ±24      | 0.47 μF/50 V |

## EMC RECOMMENDED CIRCUIT

**Figure 3**  
Single Output Models



**Figure 4**  
Dual Output Models



**Table 3**

| Recommended External Circuit Components |          |                              |                    |
|-----------------------------------------|----------|------------------------------|--------------------|
| Vin (Vdc)                               | Vo (Vdc) | 3.3, 5                       | 9,12, 15, 24       |
| 3.3                                     | C1/C2    | 4.7 nF/16 V                  | 4.7 nF/16 V        |
|                                         | CY       | --                           | 270 pF/4 kVdc      |
|                                         | C3       | refer to Cout in Tables 1, 2 |                    |
|                                         | LDM      | 6.8 $\mu$ H                  | 6.8 $\mu$ H        |
| Vin (Vdc)                               | Vo (Vdc) | 3.3, 5, 9                    | 12, 15, 24         |
| 5                                       | CY       | --                           | 1 nF / 4kVdc       |
|                                         | C3       | refer to Cout in Tables 1, 2 |                    |
|                                         | C1, C2   | 4.7 $\mu$ F / 25 V           | 4.7 $\mu$ F / 25 V |
|                                         | LDM      | 6.8 $\mu$ H                  | 6.8 $\mu$ H        |
| Vin (Vdc)                               | Vo (Vdc) | 3.3, 5, 9, 12, 15, 24        |                    |
| 12/15/24                                | C1/C2    | 4.7 $\mu$ F / 50 V           | 4.7 $\mu$ F / 50 V |
|                                         | CY       | 270 pF/3 kVdc                | 270 pF/3 kVdc      |
|                                         | C3, C4   | refer to Cout in Tables 1, 2 |                    |
|                                         | LDM      | 6.8 $\mu$ H                  | 6.8 $\mu$ H        |

## REVISION HISTORY

| rev. | description                                                     | date       |
|------|-----------------------------------------------------------------|------------|
| 1.0  | initial release                                                 | 05/10/2019 |
| 1.01 | safeties updated in features and safety line, packaging removed | 01/14/2021 |
| 1.02 | model table updated                                             | 03/08/2021 |
| 1.03 | derating curves and circuit figures updated                     | 07/07/2021 |
| 1.04 | CE certification removed                                        | 11/04/2022 |
| 1.05 | 3.3 Vin models added                                            | 08/24/2023 |

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



**CUI INC**  
a bel group

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

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

CUI offers a two (2) year limited warranty. Complete warranty information is listed on our website.

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