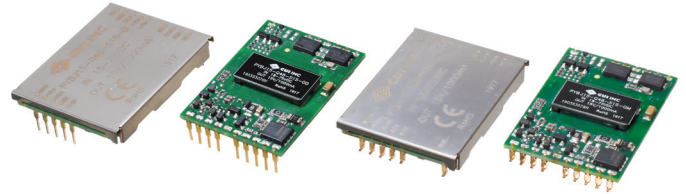


SERIES: PYBJ15 | **DESCRIPTION:** DC-DC CONVERTER

FEATURES

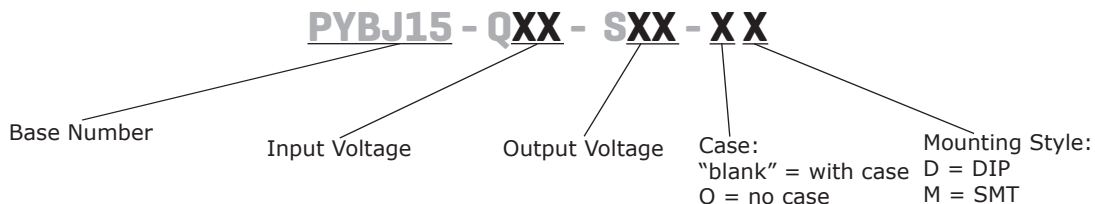
- up to 15 W isolated output
- ultra wide 4:1 input voltage range
- single regulated output
- output short circuit, over current, over voltage protection
- efficiency up to 89%
- DIP and SMT mounting styles
- available with or without case
- 1500 Vdc isolation
- EN/BS EN 62368-1



| MODEL | input voltage | | output voltage (Vdc) | output current | | output power max (W) | ripple & noise ¹ max (mVp-p) | efficiency ² typ (%) |
|-----------------------------|---------------|----------------|-------------------------|----------------|-------------|----------------------------|---|---------------------------------------|
| | typ (Vdc) | range (Vdc) | | min (mA) | max (mA) | | | |
| PYBJ15-Q24-S3 ³ | 24 | 9~36 | 3.3 | 0 | 4500 | 14.85 | 100 | 88 |
| PYBJ15-Q24-S5 ³ | 24 | 9~36 | 5 | 0 | 3000 | 15 | 100 | 88 |
| PYBJ15-Q24-S12 ³ | 24 | 9~36 | 12 | 0 | 1250 | 15 | 100 | 89 |
| PYBJ15-Q24-S15 ³ | 24 | 9~36 | 15 | 0 | 1000 | 15 | 100 | 89 |
| PYBJ15-Q48-S3 | 48 | 18~75 | 3.3 | 0 | 4500 | 14.85 | 100 | 88 |
| PYBJ15-Q48-S5 | 48 | 18~75 | 5 | 0 | 3000 | 15 | 100 | 88 |
| PYBJ15-Q48-S12 | 48 | 18~75 | 12 | 0 | 1250 | 15 | 100 | 89 |
| PYBJ15-Q48-S15 | 48 | 18~75 | 15 | 0 | 1000 | 15 | 100 | 89 |

Notes: 1. From 5~100% load, nominal input, 20 MHz bandwidth oscilloscope, with 10 µF tantalum and 1 µF ceramic capacitors on the output. From 0~5% load, ripple and noise is <5% Vo.
 2. Measured at nominal input voltage, full load.
 3. Model is not CE 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 | 24 Vdc input models | 9 | 24 | 36 | Vdc |
| | 48 Vdc input models | 18 | 48 | 75 | Vdc |
| start-up voltage | 24 Vdc input models | | | 9 | Vdc |
| | 48 Vdc input models | | | 18 | Vdc |
| surge voltage | 24 Vdc input models for 1 second max | -0.7 | | 50 | Vdc |
| | 48 Vdc input models for 1 second max | -0.7 | | 100 | Vdc |
| under voltage shutdown | 24 Vdc input models | 5.5 | 6.5 | | Vdc |
| | 48 Vdc input models | 12 | 15.5 | | Vdc |
| current | 24 Vdc input models | 3, 5 Vdc output models 12, 15 Vdc output models | | 727 718 | mA mA |
| | 48 Vdc input models | 3.3 Vdc output models 5 Vdc output models | | 363 360 | mA mA |
| start-up current | 24 Vdc input models | | | 3,000 | mA |
| | 48 Vdc input models | | | 1,500 | mA |
| remote on/off (CTRL) ⁴ | turn on (CTRL pin pulled low to GND (0~1.2 Vdc)) turn off (CTRL pin open or pulled high (3.5~12 Vdc)) input current when switched off | | 6 | 15 | mA |
| alarm indication (ALM) | Valm (relative to GND), when under voltage protection is going to happen, and during the over voltage protection working status. | | 0.2 | 1.2 | Vdc |
| | Valm (relative to GND), other working status | 3.5 | 9 | | Vdc |
| filter | Pi filter | | | | |
| no load power consumption | | | 0.36 | | W |

Notes: 4. The voltage of the CTRL pin is referenced to input GND pin.

OUTPUT

| parameter | conditions/description | min | typ | max | units |
|--------------------------------------|---|-----|------|-------|-------|
| maximum capacitive load ⁵ | 3.3, 5 Vdc output models | | | 4,700 | μF |
| | 12 Vdc output models | | | 1,000 | μF |
| | 15 Vdc output models | | | 820 | μF |
| voltage accuracy | from 0% to full load | | ±1 | ±2 | % |
| line regulation | from low line to high line, full load | | ±0.2 | ±0.5 | % |
| load regulation ⁶ | from 5% to full load | | ±0.5 | ±1 | % |
| switching frequency ⁷ | PWM mode | | 300 | | kHz |
| transient recovery time | 25% load step change, nominal input voltage | | 300 | 500 | μs |
| transient response deviation | 25% load step change, nominal input voltage | | ±3 | ±8 | % |
| | 3.3, 5 Vdc output models all other output models | | ±3 | ±5 | % |
| temperature coefficient | at full load | | | ±0.03 | %/°C |

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

6. At 0~100% load, the max load regulation is ±3%.

7. Value is based on full load. At loads <50%, the switching frequency decreases with decreasing load for efficiency improvement.

PROTECTIONS

| parameter | conditions/description | min | typ | max | units |
|--------------------------|-----------------------------------|-----|-----|-----|-------|
| over voltage protection | output shut down | 110 | | 160 | % |
| over current protection | hiccup, auto recovery | 110 | 180 | 230 | % |
| short circuit protection | hiccup, continuous, auto recovery | | | | |

SAFETY AND COMPLIANCE

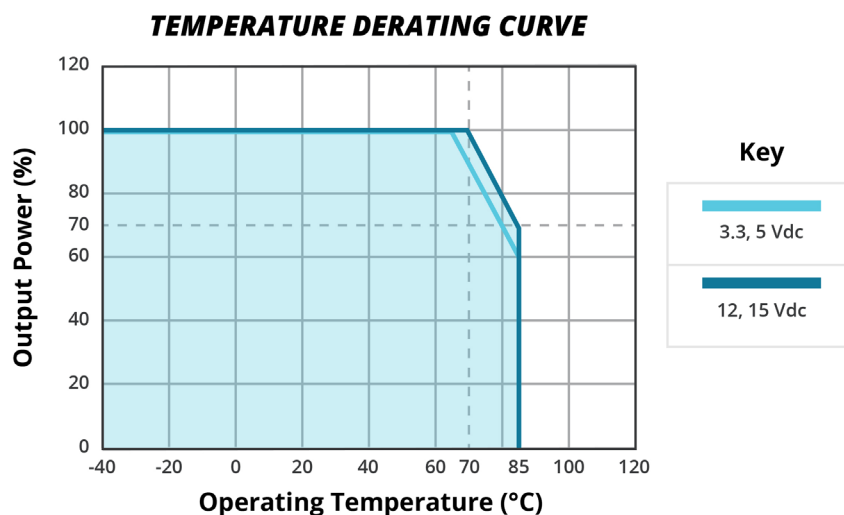
| parameter | conditions/description | min | typ | max | units |
|-----------------------|--|-----------|-------|-----|-------|
| isolation voltage | input to output for 1 minute at 1 mA | 1,500 | | | Vdc |
| | input to case ⁸ for 1 minute at 1 mA | 500 | | | Vdc |
| | output to case ⁸ for 1 minute at 1 mA | 500 | | | Vdc |
| isolation resistance | input to output at 500 Vdc | 100 | | | MΩ |
| | input to case ⁸ at 500 Vdc | 100 | | | MΩ |
| | output to case ⁸ at 500 Vdc | 100 | | | MΩ |
| isolation capacitance | input to output, 100 kHz / 0.1 V | | 1,000 | | pF |
| safety approvals | certified to 62368-1: EN, BS EN | | | | |
| conducted emissions | CISPR32/EN55032, class B (external circuit required, see Figure 2-a) | | | | |
| radiated emissions | CISPR32/EN55032, class B (external circuit required, see Figure 2-a) | | | | |
| ESD | IEC/EN61000-4-2, contact ±6 kV, class B | | | | |
| radiated immunity | IEC/EN61000-4-3, 10 V/m, class A | | | | |
| EFT/burst | IEC/EN61000-4-4, ±2 kV, class B (external circuit required, see Figure 2-b) | | | | |
| surge | IEC/EN61000-4-5, line-line ±2 kV, class B (external circuit required, see Figure Figure 2-b) | | | | |
| conducted immunity | IEC/EN61000-4-6, 3 Vr.m.s, class A | | | | |
| MTBF | as per MIL-HDBK-217F, 25°C | 1,000,000 | | | hours |
| RoHS | yes | | | | |

Note: 8. Only applies to versions with case.

ENVIRONMENTAL

| parameter | conditions/description | min | typ | max | units |
|-----------------------|--|-----|-----|-----|-------|
| operating temperature | see derating curves | -40 | | 85 | °C |
| storage temperature | | -55 | | 125 | °C |
| storage humidity | non-condensing | 5 | | 95 | % |
| vibration | 10~150 Hz, for 60 minutes on each axis | | 5 | | G |

DERATING CURVES

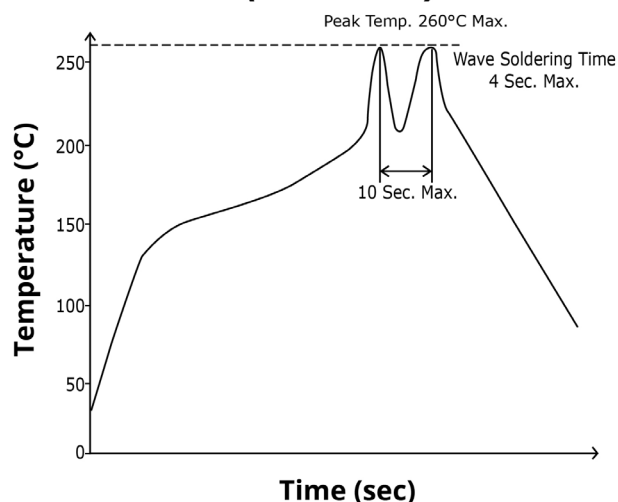


SOLDERABILITY

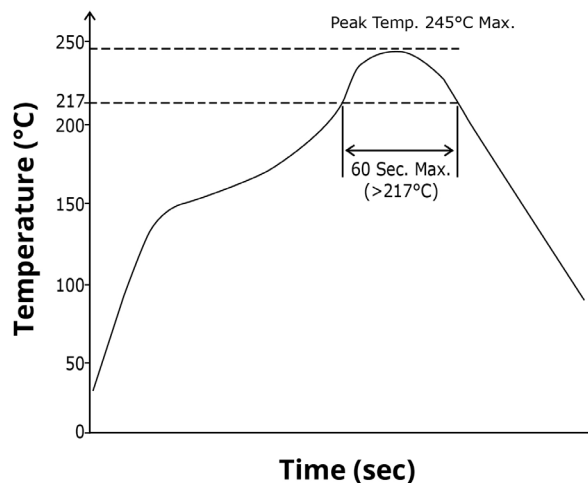
| parameter | conditions/description | min | typ | max | units |
|--------------------------------|---|-----|-----|-----|-------|
| hand soldering | 1.5 mm from case for 10 seconds | | | 300 | °C |
| wave soldering ⁹ | see wave soldering profile | | | 260 | °C |
| reflow soldering ¹⁰ | see reflow soldering profile Maximum duration >217°C is 60 seconds. For actual application, refer to IPC/JEDEC J-STD-020D.1 | | | 245 | °C |

Note: 9. For DIP models only.
10. For SMT models only.

WAVE SOLDERING PROFILE (DIP models)



REFLOW SOLDERING PROFILE (SMT models)



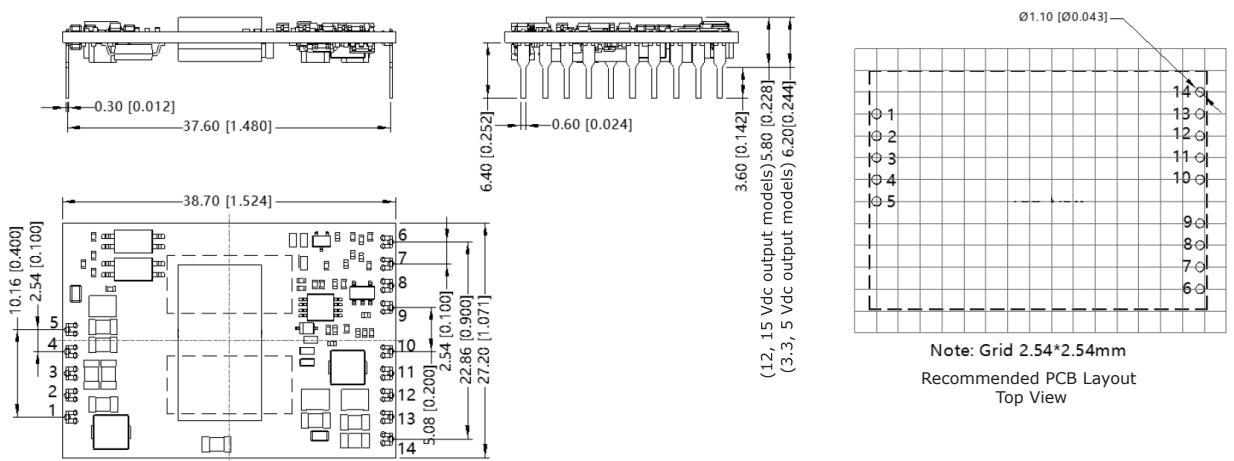
MECHANICAL

| parameter | conditions/description | min | typ | max | units |
|---------------|---|-----|------|-----|-------|
| dimensions | DIP without case: 3.3, 5 Vdc output models: 38.70 x 27.20 x 6.20 [1.524 x 1.071 x 0.244 inch] 12, 15 Vdc output models: 38.70 x 27.20 x 5.80 [1.524 x 1.071 x 0.228 inch] | | | | mm |
| | DIP with case: 3.3, 5 Vdc output models: 39.10 x 29.50 x 6.80 [1.539 x 1.161 x 0.268 inch] 12, 15 Vdc output models: 39.10 x 29.50 x 6.40 [1.539 x 1.161 x 0.252 inch] | | | | mm |
| | SMT without case: 3.3, 5 Vdc output models: 38.70 x 27.20 x 6.20 [1.524 x 1.071 x 0.244 inch] 12, 15 Vdc output models: 38.70 x 27.20 x 5.80 [1.524 x 1.071 x 0.228 inch] | | | | mm |
| | SMT with case: 3.3, 5 Vdc output models: 39.10 x 29.50 x 6.80 [1.539 x 1.161 x 0.268 inch] 12, 15 Vdc output models: 39.10 x 29.50 x 6.40 [1.539 x 1.161 x 0.252 inch] | | | | mm |
| case material | aluminum alloy | | | | |
| weight | without case 3.3, 5 Vdc output models | | 11.0 | | g |
| | without case 12, 15 Vdc output models | | 8.8 | | g |
| | with case 3.3, 5 Vdc output models | | 13.8 | | g |
| | with case 12, 15 Vdc output models | | 11.5 | | g |

MECHANICAL DRAWING (DIP WITHOUT CASE)

units: mm [inch]
 tolerance: $\pm 0.50[\pm 0.020]$
 pin section tolerance: $\pm 0.10[\pm 0.004]$

| PIN CONNECTIONS | |
|-----------------|----------|
| PIN | Function |
| 1 | +Vo |
| 2 | +Vo |
| 3 | +Vo |
| 4 | 0V |
| 5 | 0V |
| 6 | NC |
| 7 | ALM |
| 8 | CTRL |
| 9 | NC |
| 10 | +Vin |
| 11 | +Vin |
| 12 | GND |
| 13 | GND |
| 14 | NC |

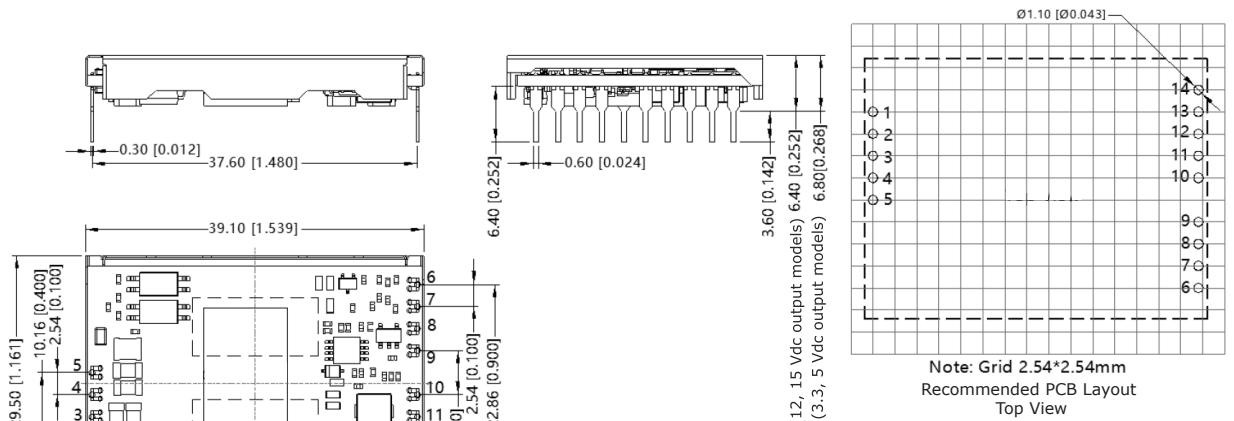


Note: NC = no connect

MECHANICAL DRAWING (DIP WITH CASE)

units: mm [inch]
 tolerance: $\pm 0.50[\pm 0.020]$
 pin section tolerance: $\pm 0.10[\pm 0.004]$

| PIN CONNECTIONS | |
|-----------------|----------|
| PIN | Function |
| 1 | +Vo |
| 2 | +Vo |
| 3 | +Vo |
| 4 | 0V |
| 5 | 0V |
| 6 | NC |
| 7 | ALM |
| 8 | CTRL |
| 9 | NC |
| 10 | +Vin |
| 11 | +Vin |
| 12 | GND |
| 13 | GND |
| 14 | NC |

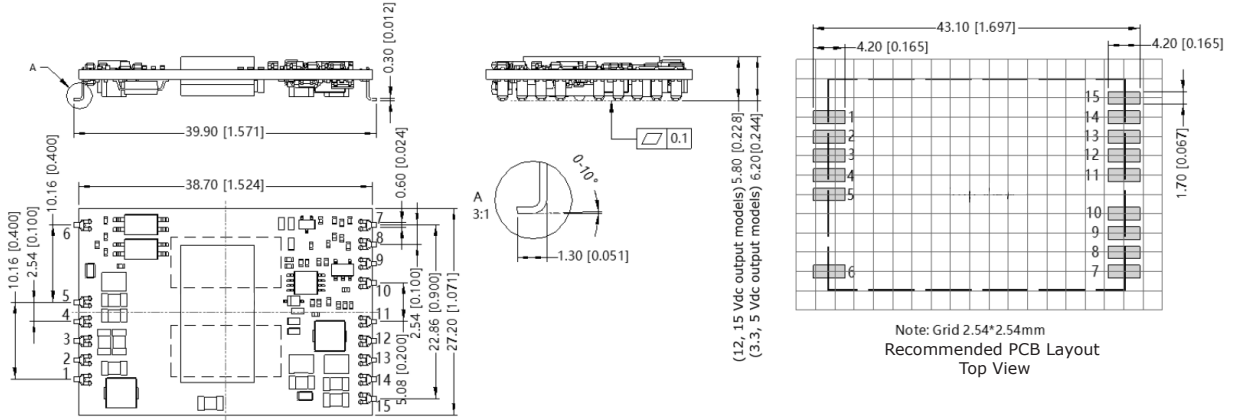


Note: NC = no connect

MECHANICAL DRAWING (SMT WITHOUT CASE)

units: mm [inch]
 tolerance: $\pm 0.50[\pm 0.020]$
 pin section tolerance: $\pm 0.10[\pm 0.004]$

| PIN CONNECTIONS | |
|-----------------|----------|
| PIN | Function |
| 1 | +Vo |
| 2 | +Vo |
| 3 | +Vo |
| 4 | 0V |
| 5 | 0V |
| 6 | NC |
| 7 | NC |
| 8 | ALM |
| 9 | CTRL |
| 10 | NC |
| 11 | +Vin |
| 12 | +Vin |
| 13 | GND |
| 14 | GND |
| 15 | NC |

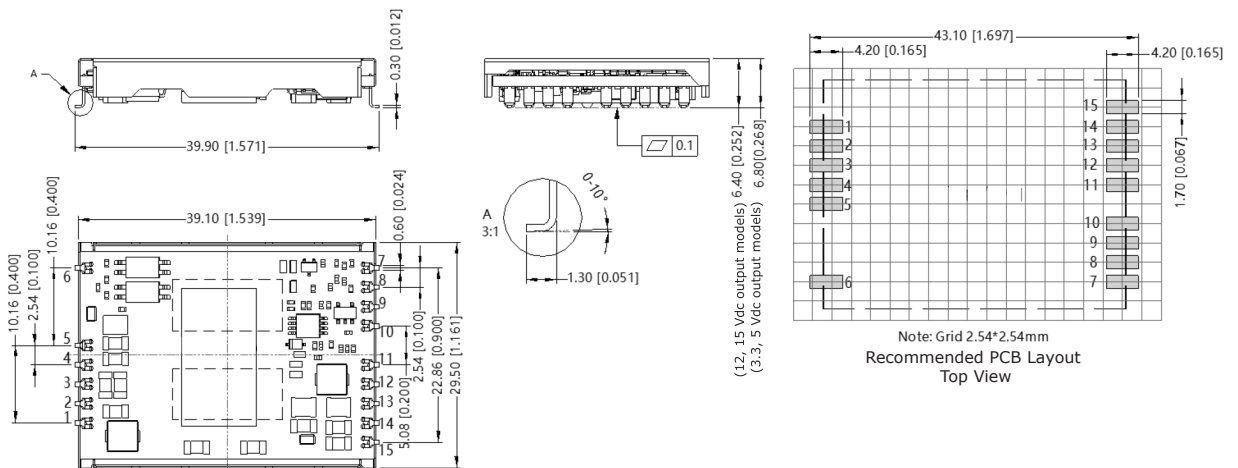


Note: NC = no connect

MECHANICAL DRAWING (SMT WITH CASE)

units: mm [inch]
 tolerance: $\pm 0.50[\pm 0.020]$
 pin section tolerance: $\pm 0.10[\pm 0.004]$

| PIN CONNECTIONS | |
|-----------------|----------|
| PIN | Function |
| 1 | +Vo |
| 2 | +Vo |
| 3 | +Vo |
| 4 | 0V |
| 5 | 0V |
| 6 | NC |
| 7 | NC |
| 8 | ALM |
| 9 | CTRL |
| 10 | NC |
| 11 | +Vin |
| 12 | +Vin |
| 13 | GND |
| 14 | GND |
| 15 | NC |



Note: NC = no connect

APPLICATION CIRCUIT

This series has been tested according to the following recommended circuit (Figure 1) before leaving the factory. If you want to further reduce the input and output ripple, you can increase the input and output capacitors or select capacitors of low equivalent impedance provided that the capacitance is less than the maximum capacitive load of the model.

Figure 1

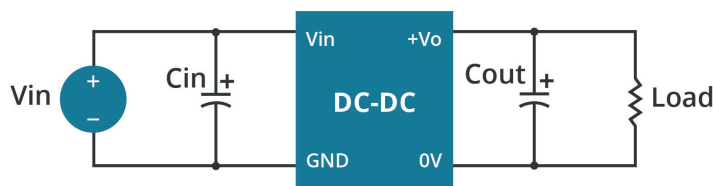


Table 1

| V_{out} (Vdc) | C_{in} (μF) | C_{out} (μF) |
|-----------------|----------------------|-----------------------|
| 3.3/5/12/15 | 100 | 10 |

EMC RECOMMENDED CIRCUIT

Figure 2

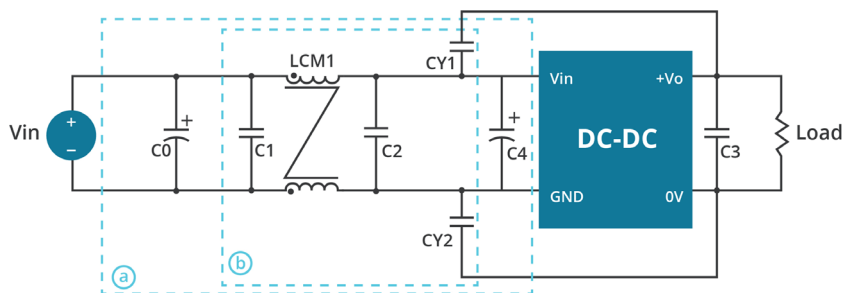


Table 2

| Recommended External Circuit Components | | |
|---|--|---------------------|
| V_{in} (Vdc) | 24 | 48 |
| FUSE | choose according to actual input current | |
| C_0 | 470 μF / 50 V | 680 μF / 100 V |
| C_1, C_2 | 4.7 μF / 50 V | |
| C_3 | refer to the C_{out} in Table 1 | |
| C_4 | 330 μF / 50 V | 330 μF / 100 V |
| $LCM1$ | 4.7 μH | |
| $CY1, CY2$ | 2000 pF / 2 kV | |

REVISION HISTORY

| rev. | description | date |
|------|---|------------|
| 1.0 | initial release | 06/24/2019 |
| 1.01 | packaging removed, safeties updated in features and safety line | 01/14/2021 |
| 1.02 | derating curve and circuit figures updated | 07/28/2021 |
| 1.03 | CE certification updated for 24V models | 12/05/2022 |

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



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

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