# **SERIES:** PQDE6W-Q110 | **DESCRIPTION:** DC-DC CONVERTER

## FEATURES

- up to 6W isolated output
- industry standard pinout
- ultra-wide 4:1 input range (40~160)
- single/dual outputs
- 2250 Vdc isolation
- output short circuit, over current and over voltage protection
- input undervoltage protection
- wide operating temp: -40°C to +85°C
- EN62368 approved
- meets EN50155 railway standard



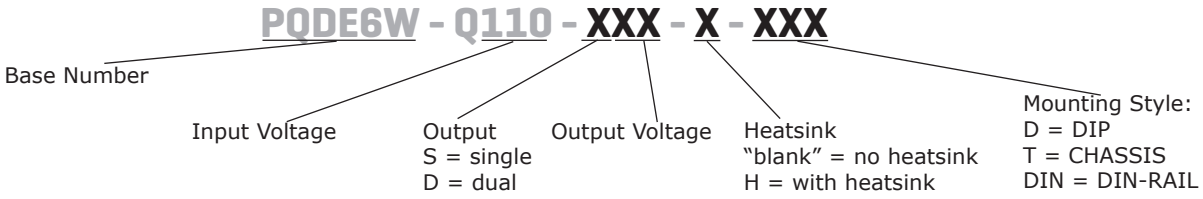
RoHS CE

## MODEL

| MODEL | input voltage | | output voltage | output current | | output power | ripple & noise[1] | efficiency[2] |
|---|---|---|---|---|---|---|---|---|
| | typ (Vdc) | range (Vdc) | (Vdc) | min (mA) | max (mA) | max (W) | max (mVp-p) | min/typ (%) |
| PQDE6W-Q110-D5 | 110 | 40~160 | ±5 | 0 | ±600 | 6 | 100 | 78/80 |
| PQDE6W-Q110-D12 | 110 | 40~160 | ±12 | 0 | ±250 | 6 | 100 | 82/84 |
| PQDE6W-Q110-D15 | 110 | 40~160 | ±15 | 0 | ±200 | 6 | 100 | 83/85 |
| PQDE6W-Q110-S5 | 110 | 40~160 | 5 | 0 | 1200 | 6 | 100 | 78/80 |
| PQDE6W-Q110-S12 | 110 | 40~160 | 12 | 0 | 500 | 6 | 100 | 82/84 |
| PQDE6W-Q110-S15 | 110 | 40~160 | 15 | 0 | 400 | 6 | 100 | 83/85 |
| PQDE6W-Q110-S24 | 110 | 40~160 | 24 | 0 | 250 | 6 | 100 | 84/86 |

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 and rated output load.

## PART NUMBER KEY






Please read our datasheet & drawing disclaimer here.

Downloaded from Arrow.com.

## INPUT

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| operating input voltage | | 40 | | 170 | Vdc |
| start-up voltage | | | | 40 | Vdc |
| surge voltage | for maximum of 1 second | -0.7 | | 180 | Vdc |
| current | full load / no load | | 68/3 | 70/8 | mA |
| filter | Pi filter | | | | |
| CTRL | module on: CTRL open or pulled high (3.5~12 V)<br>module off: CTRL pulled low to GND (0~1.2 V) | | | | |

## OUTPUT

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| maximum capacitive load | output voltage<br>5 Vdc dual output<br>12 Vdc dual output<br>15 Vdc dual output<br>5 Vdc single output<br>12 Vdc single output<br>15 Vdc single output<br>24 Vdc single output | | | <br>470<br>100<br>100<br>1000<br>470<br>220<br>100 | <br>µF<br>µF<br>µF<br>µF<br>µF<br>µF<br>µF |
| voltage accuracy | 0%~100% load | | ±1 | ±3 | % |
| line regulation | from low line to high line, full load<br>+Vo<br>-Vo | | <br>±0.2<br>±0.5 | <br>±0.5<br>±1 | <br>%<br>% |
| load regulation | 5%~100% load<br>+Vo<br>-Vo | | <br>±0.5<br>±0.5 | <br>±1<br>±1.5 | <br>%<br>% |
| switching frequency | 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<br>5 Vdc, ±5 Vdc output<br>other outputs | | <br>±3<br>±3 | <br>±8<br>±5 | <br>%<br>% |
| temperature coefficient | at full load | | ±0.02 | ±0.03 | %/°C |



Please read our datasheet & drawing disclaimer here.

Downloaded from Arrow.com.

## PROTECTIONS

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| over voltage protection | | 110 | | 160 | %Vo |
| over current protection | | 120 | | 210 | % |
| short circuit protection | continuous, auto recovery | | | | |

## SAFETY AND COMPLIANCE

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| isolation voltage | input to output<br>input/output to case | 2,250<br>1,600 | | | Vdc<br>Vdc |
| isolation resistance | input to output at 500 Vdc | 1,000 | | | MΩ |
| isolation capacitance | input to output, 100 kHz / 0.1 V | | 1,000 | | pF |
| safety approvals | EN/IEC 62368 | | | | |
| EMI/EMC | CISPR 32/EN 55032 Class B | | | | |
| conducted emissions | EN 50121-3-2 150kHz-500kHz 99dBuV, 500kHz-30MHz 93dBuV (see Fig.3 or Fig.4 for recommended circuit) | | | | |
| radiated emissions | EN 50121-3-2 30MHz-230MHz 40dBuV/m at 10m, 230MHz-1GHz 47dBuV/m at 10m (see Fig.3 or Fig.4 for recommended circuit) | | | | |
| ESD | IEC/EN 61000-4-2 Contact ±6KV/Air ±8KV, EN 50121-3-2 Contact ±6KV/Air ±8KV, perf. Criteria B | | | | |
| radiated immunity | IEC/EN 61000-4-3 20 V/m, EN50121-3-2 20 V/m, perf. Criteria A | | | | |
| EFT/burst | IEC/EN 61000-4-4 ±4KV, EN 50121-3-2 ±2kV 5/50ns 5kHz, perf. Criteria B | | | | |
| surge | IEC/EN 61000-4-5 line to line ±2KV/line to ground ±4KV, EN 50121-3-2 line to line ±1KV (42Ω, 0.5μF) line to ground ±2KV (42Ω, 0.5μF), perf. Criteria B (see Fig.3 for recommended circuit) | | | | |
| conducted immunity | IEC/EN 61000-4-6 10 Vr.m.s, EN50121-3-2 0.15MHz-80MHz 10Vr.m.s, perf. Criteria B | | | | |
| MTBF | as per MIL-HDBK-217F, 25°C | 1,000 | | | K hours |
| RoHS | yes | | | | |

## ENVIRONMENTAL

| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| operating temperature | see derating curve | -40 | | 85 | °C |
| storage temperature | | -55 | | 125 | °C |
| storage humidity | non-condensing | 5 | | 95 | % |
| vibration | IEC61373 - Category 1, Grade B | | | | |



Please read our datasheet & drawing disclaimer here.

Downloaded from Arrow.com.

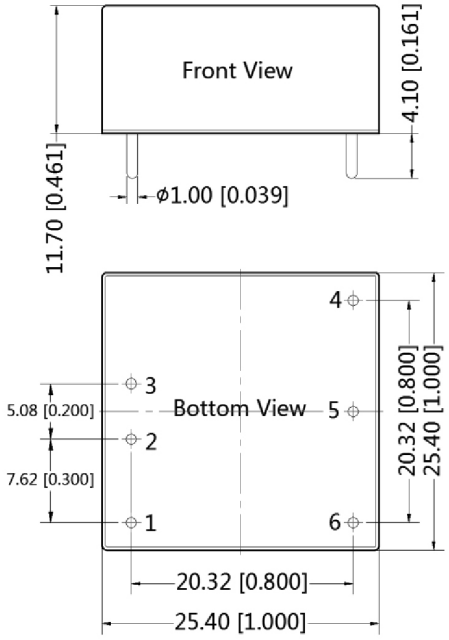
## MECHANICAL

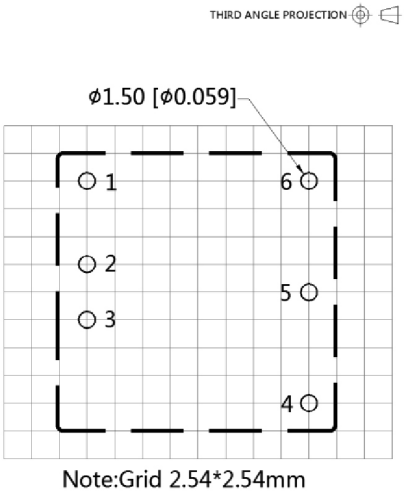
| parameter | conditions/description | min | typ | max | units |
|---|---|---|---|---|---|
| dimensions | 25.40 × 25.40 × 11.70 Horizontal package (without heat sink) | | | | mm |
| | 25.40 × 25.40 × 16.20 Horizontal package (with heat sink) | | | | mm |
| | 76.00 × 31.50 × 21.20 A2S wiring package (without heat sink) | | | | mm |
| | 76.00 × 31.50 × 25.20 A2S wiring package (with heat sink) | | | | mm |
| | 76.00 × 31.50 × 25.80 A4S rail package (without heat sink) | | | | mm |
| | 76.00 × 31.50 × 29.80 A4S rail package (with heat sink) | | | | mm |
| case material | aluminum alloy | | | | |
| weight | Horizontal package without heatsink | | 12.5 | | g |
| | A2S wiring package without heatsink | | 36.0 | | g |
| | A4S rail package without heatsink | | 56.0 | | g |
| | Horizontal package with heatsink | | 17.0 | | g |
| | A2S wiring package with heatsink | | 40.0 | | g |
| | A4S rail package with heatsink | | 59.0 | | g |

## MECHANICAL DRAWING

units: mm [inch]
tolerance: ±0.50[±0.020]
pin diameter tolerance: ±0.10[±0.004]

| PIN Out | | |
|---|---|---|
| PIN | Single | Dual |
| 1 | no pin | ctrl |
| 2 | GND | GND |
| 3 | Vin | Vin |
| 4 | +Vo | +Vo |
| 5 | no pin | 0V |
| 6 | 0V | -Vo |





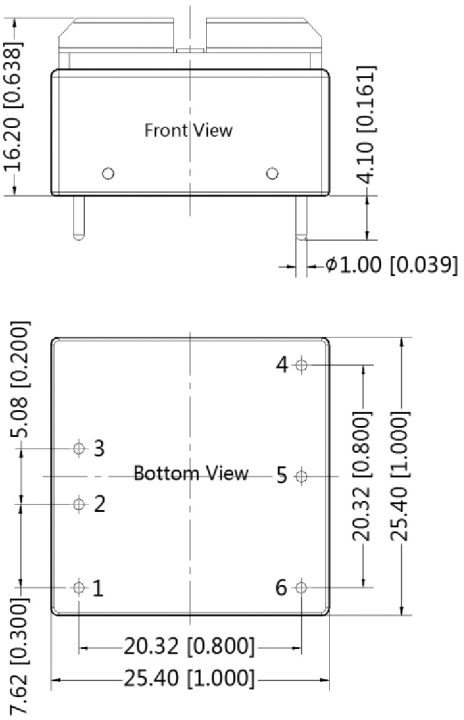

Please read our datasheet & drawing disclaimer here.

Downloaded from Arrow.com.

## MECHANICAL DRAWING

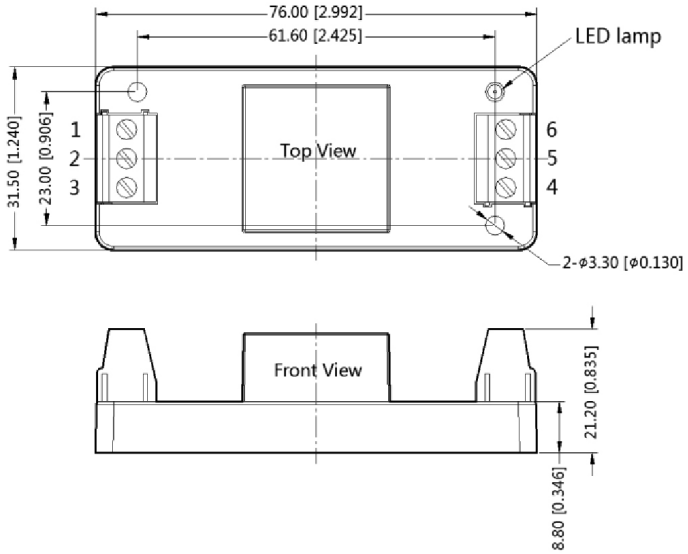
units: mm [inch]
tolerance: ±0.50[±0.020]
pin diameter tolerance: ±0.10[±0.004]

| PIN Out | | |
|---|---|---|
| PIN | Single | Dual |
| 1 | no pin | ctrl |
| 2 | GND | GND |
| 3 | Vin | Vin |
| 4 | +Vo | +Vo |
| 5 | no pin | 0V |
| 6 | 0V | -Vo |




units: mm [inch]
wire range: 24-12 AWG
tightening torque: max 0.4 N·m
tolerance: ±0.50 [±0.020]

| PIN Out | | | | | | |
|---|---|---|---|---|---|---|
| PIN | 1 | 2 | 3 | 4 | 5 | 6 |
| Single | NC | GND | Vin | +Vo | NC | 0V |
| Dual | ctrl | GND | Vin | +Vo | 0V | -Vo |



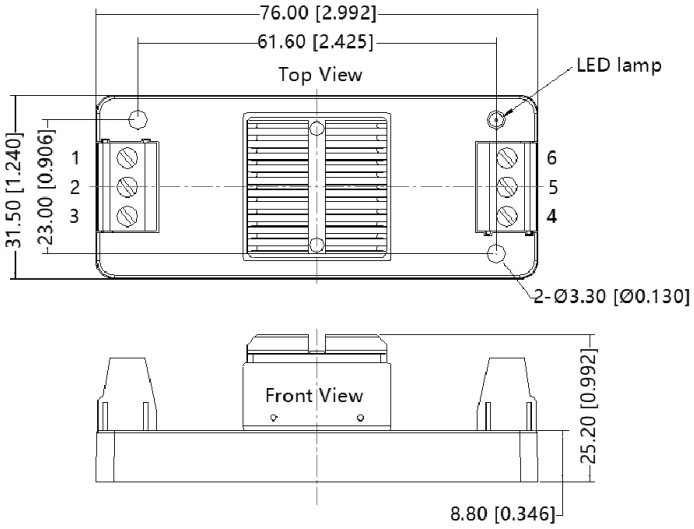



Please read our datasheet & drawing disclaimer here.

Downloaded from Arrow.com.

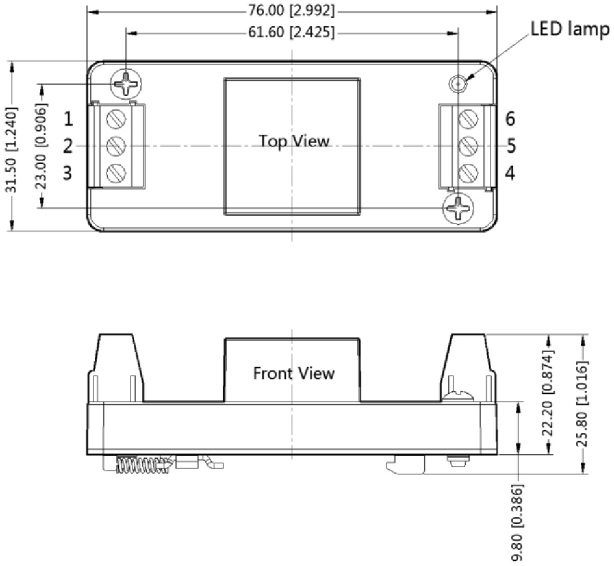
units: mm [inch]
wire range: 24-12 AWG
tightening torque: max 0.4 N·m
tolerance: ±1.00 [±0.039]

| PIN Out | | | | | | |
|---|---|---|---|---|---|---|
| PIN | 1 | 2 | 3 | 4 | 5 | 6 |
| Single | NC | GND | Vin | +Vo | NC | 0V |
| Dual | ctrl | GND | Vin | +Vo | 0V | -Vo |



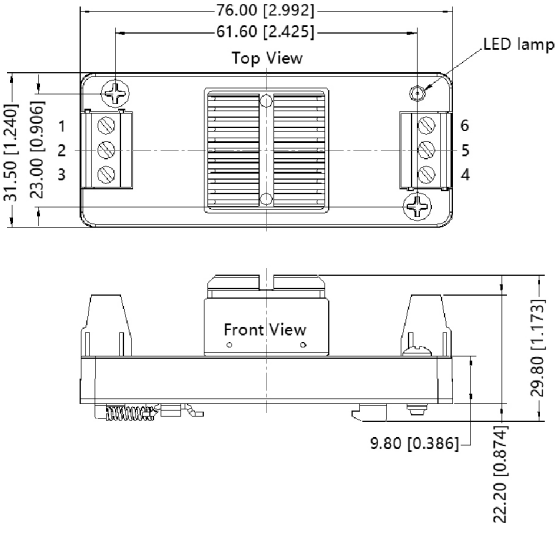

units: mm [inch]
mounting rail: TS35
wire range: 24-12 AWG
tightening torque: max 0.4 N·m
tolerance: ±1.00 [±0.039]

| PIN Out | | | | | | |
|---|---|---|---|---|---|---|
| PIN | 1 | 2 | 3 | 4 | 5 | 6 |
| Single | NC | GND | Vin | +Vo | NC | 0V |
| Dual | ctrl | GND | Vin | +Vo | 0V | -Vo |




units: mm [inch]
mounting rail: TS35
wire range: 24-12 AWG
tightening torque: max 0.4 N·m
tolerance: ±1.00 [±0.039]

| PIN Out | | | | | | |
|---|---|---|---|---|---|---|
| PIN | 1 | 2 | 3 | 4 | 5 | 6 |
| Single | NC | GND | Vin | +Vo | NC | 0V |
| Dual | ctrl | GND | Vin | +Vo | 0V | -Vo |



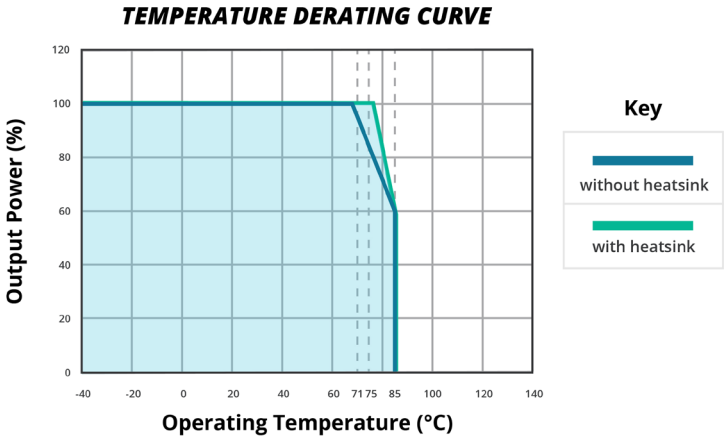



Please read our datasheet & drawing disclaimer here.

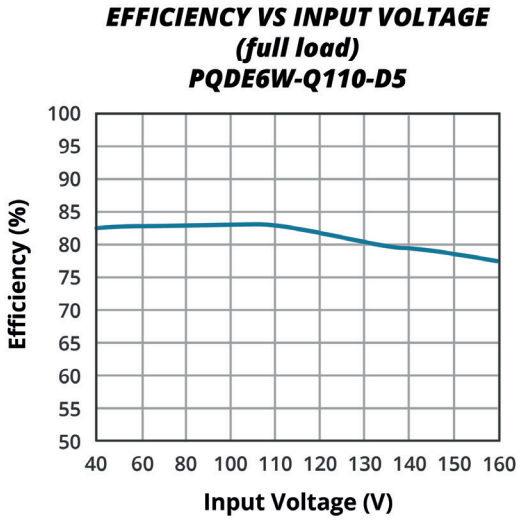
Downloaded from Arrow.com.

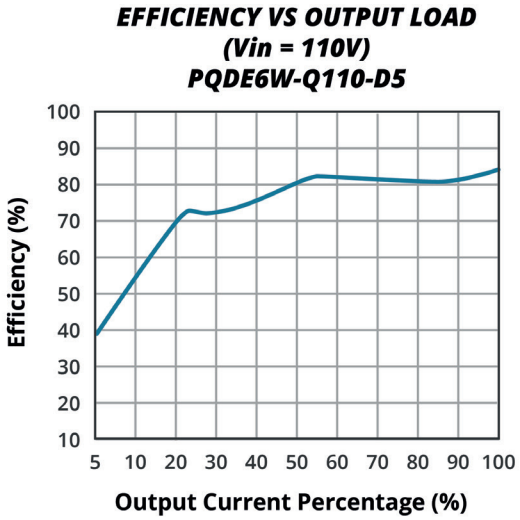
## DERATING CURVE

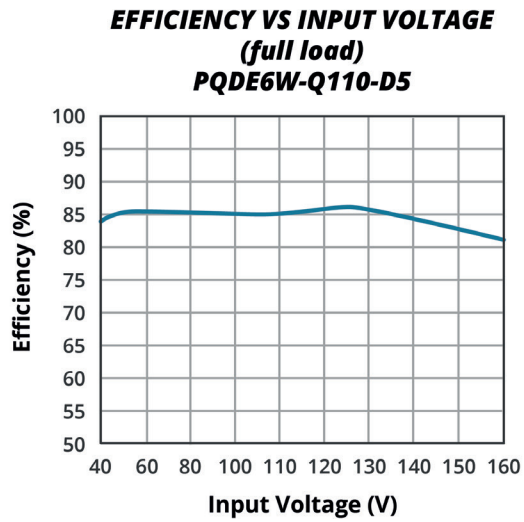
**Figure 1**

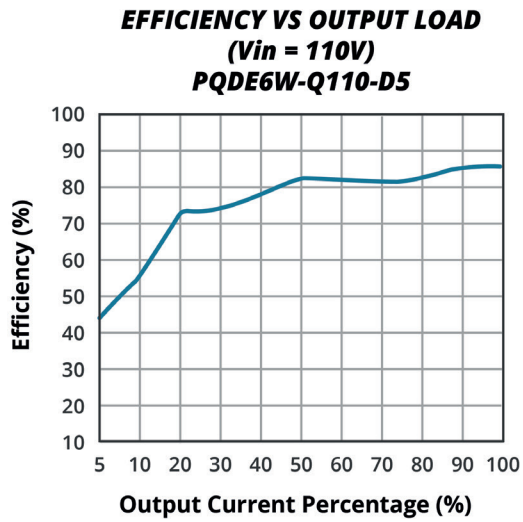



## EFFICIENCY CURVES



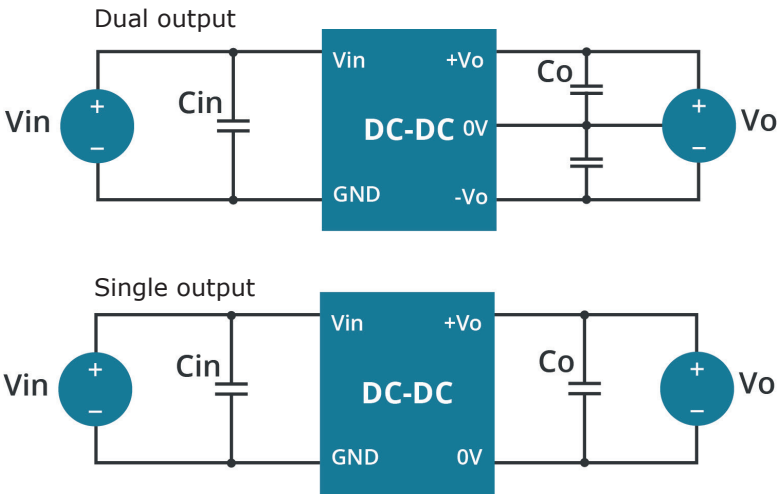



Please read our datasheet & drawing disclaimer here.

Downloaded from Arrow.com.

## APPLICATION CIRCUIT

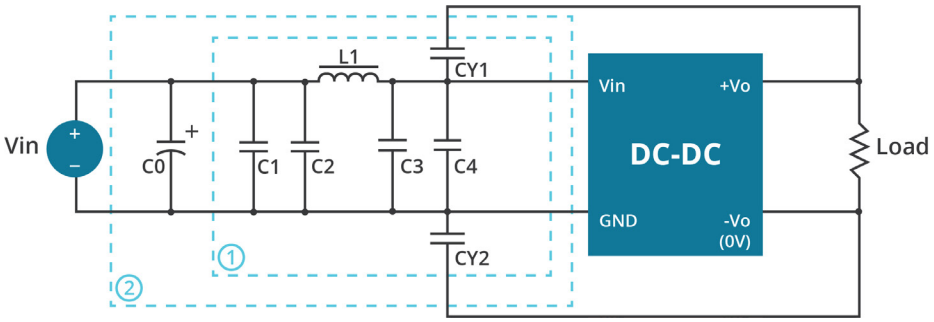
**Figure 2**




| Cin | Cout |
|---|---|
| 10μF -47μF | 10μF |

## EMC RECOMMENDED CIRCUIT

**Figure 3**




**Parameter description**

| | |
|---|---|
| C0 | 100uF/200V |
| C1, C2, C3, C4 | 0.22uF/250V |
| L1 | 68μH |
| CY1, CY2 | 1nF/3KV |



Please read our datasheet & drawing disclaimer here.

Downloaded from Arrow.com.

## REVISION HISTORY

| rev. | description | date |
|---|---|---|
| 1.0 | initial release | 08/11/2020 |
| 1.01 | operating temperature; curves and figures updated | 06/02/2021 |

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.

CUI reserves the right to make changes to the product at any time without notice. Information provided by CUI is believed to be accurate and reliable. However, no responsibility is assumed by CUI for its use, nor for any infringements of patents or other rights of third parties which may result from its use.

CUI products are not authorized or warranted for use as critical components in equipment that requires an extremely high level of reliability. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

Please read our datasheet & drawing disclaimer here.

Downloaded from Arrow.com.