

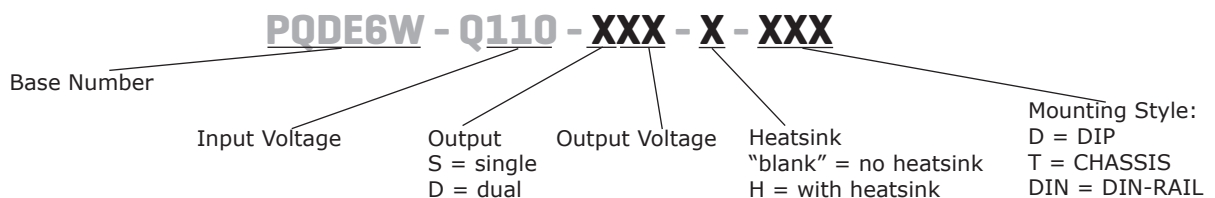
SERIES: PQDE6W-Q110 | DESCRIPTION: DC-DC CONVERTER
FEATURES

- 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


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


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) module off: CTRL pulled low to GND (0~1.2 V) | | | | |

OUTPUT

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

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 input/output to case | 2,250 1,600 | | | Vdc 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 | | | | |

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 |

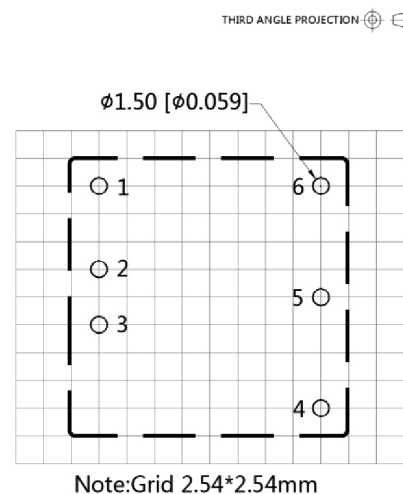
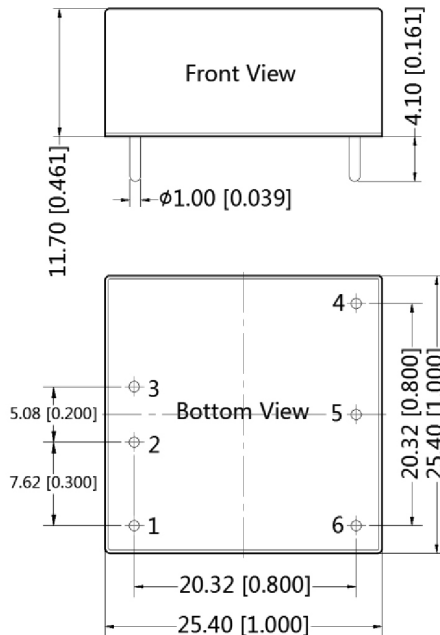
MECHANICAL DRAWING

units: mm [inch]

tolerance: ±0.50[±0.020]

pin diameter tolerance: ±0.10[±0.004]

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



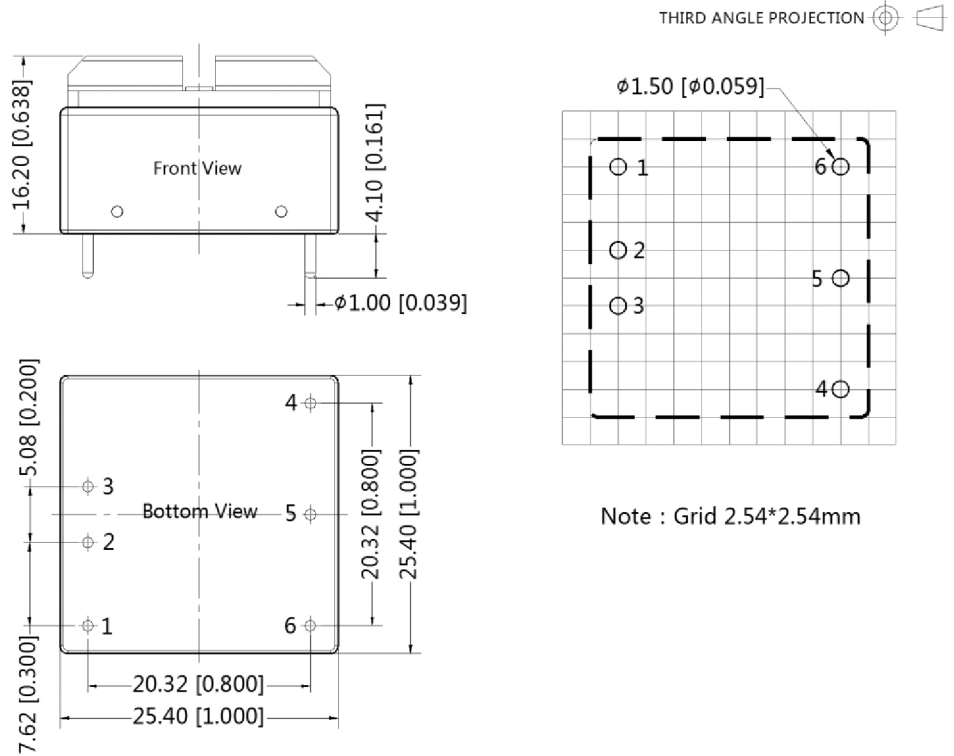
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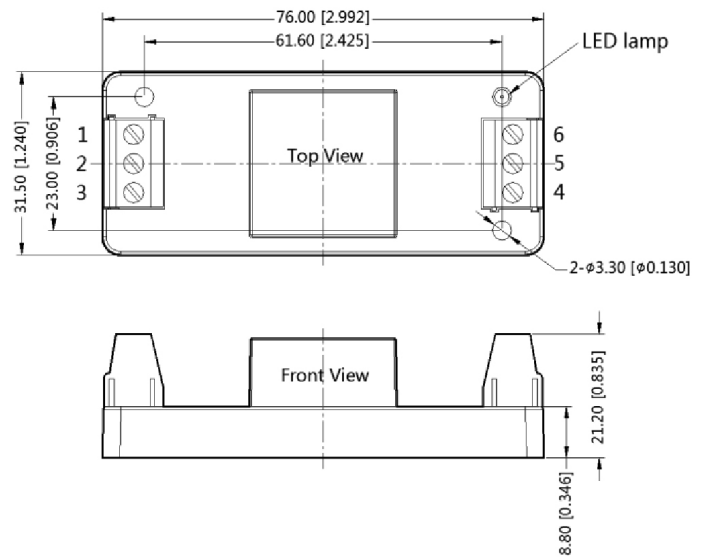
units: mm [inch]

wire range: 24-12 AWG

tightening torque: max 0.4 N·m

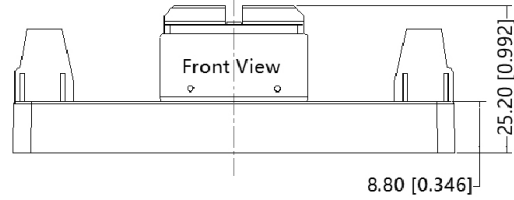
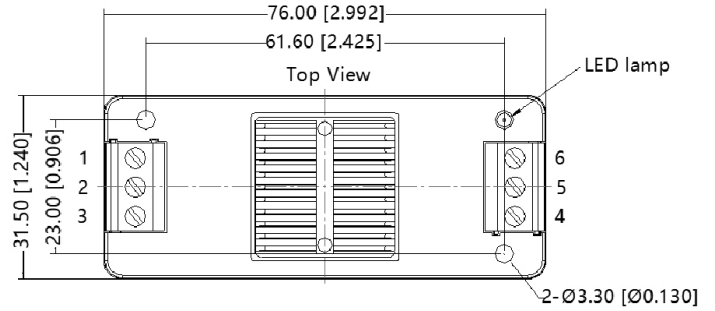
tolerance: ± 0.50 [± 0.020]

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



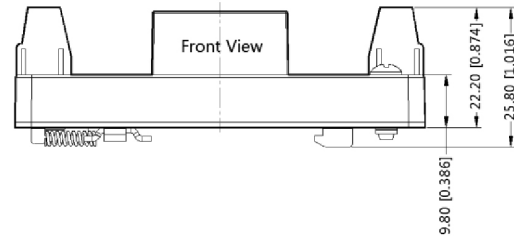
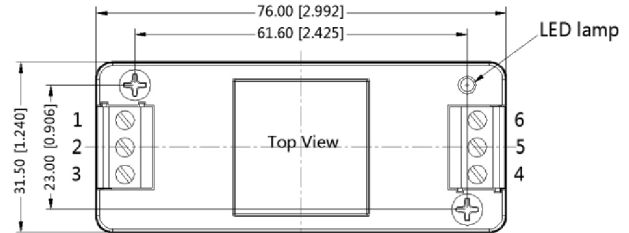
units: mm [inch]
 wire range: 24-12 AWG
 tightening torque: max 0.4 N·m
 tolerance: ±1.00 [±0.039]

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



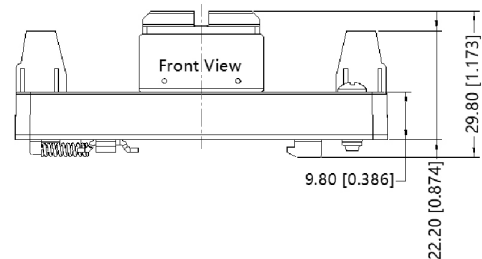
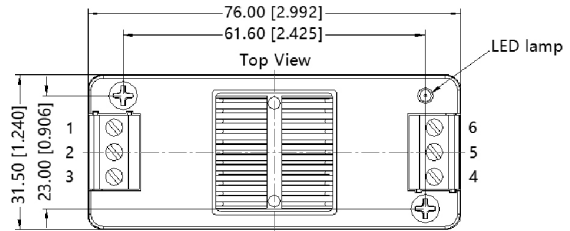
units: mm [inch]
 mounting rail: TS35
 wire range: 24-12 AWG
 tightening torque: max 0.4 N·m
 tolerance: ±1.00 [±0.039]

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



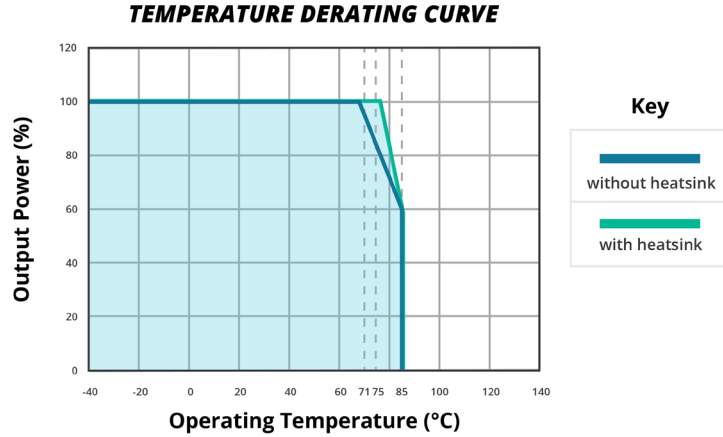
units: mm [inch]
 mounting rail: TS35
 wire range: 24-12 AWG
 tightening torque: max 0.4 N·m
 tolerance: ±1.00 [±0.039]

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



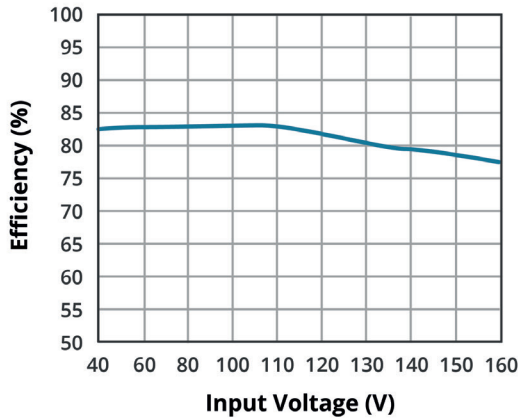
DERATING CURVE

Figure 1

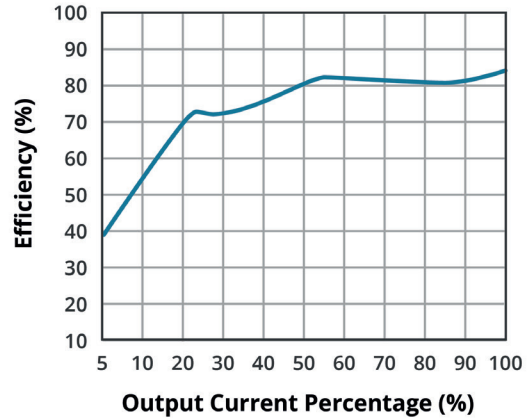


EFFICIENCY CURVES

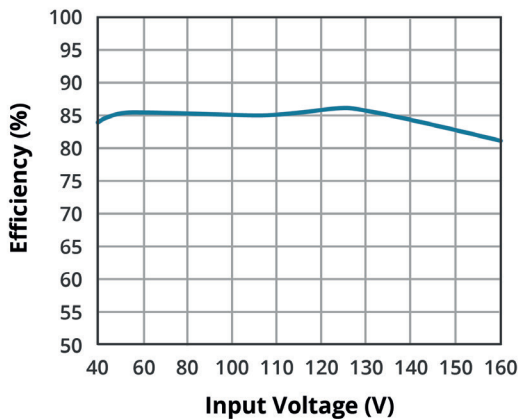
**EFFICIENCY VS INPUT VOLTAGE
(full load)
PQDE6W-Q110-D5**



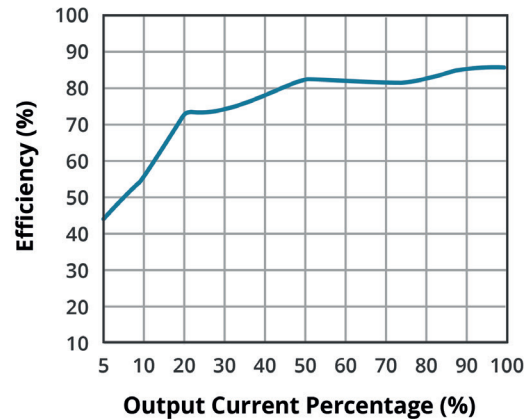
**EFFICIENCY VS OUTPUT LOAD
(Vin = 110V)
PQDE6W-Q110-D5**



**EFFICIENCY VS INPUT VOLTAGE
(full load)
PQDE6W-Q110-D5**

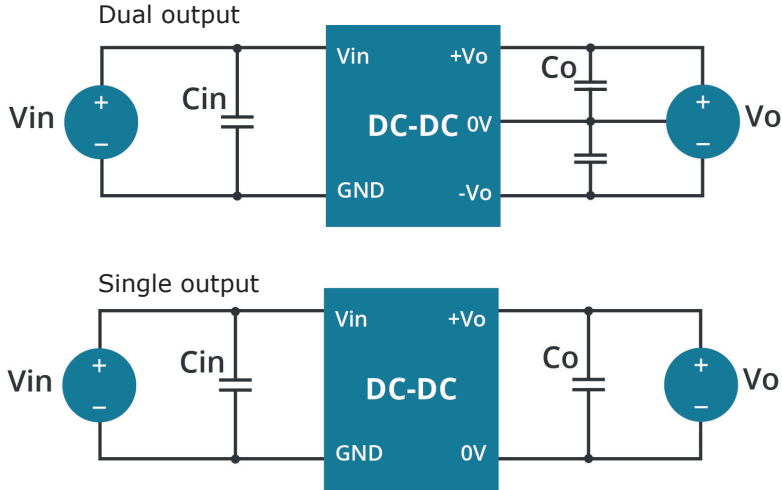


**EFFICIENCY VS OUTPUT LOAD
(Vin = 110V)
PQDE6W-Q110-D5**



APPLICATION CIRCUIT

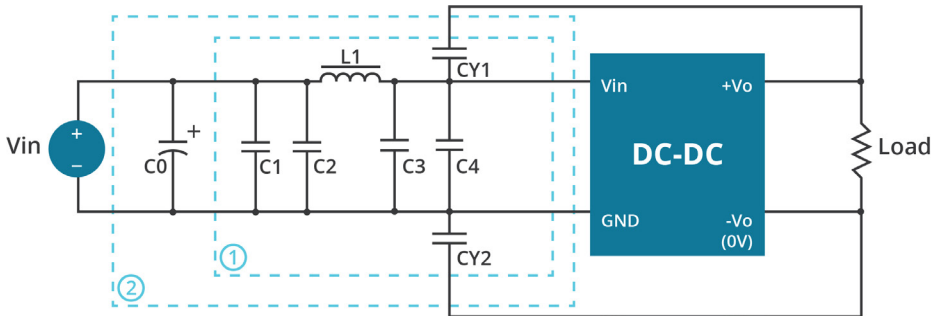
Figure 2



| | |
|------------------------|------------|
| Cin | Cout |
| 10 μ F -47 μ F | 10 μ F |

EMC RECOMMENDED CIRCUIT

Figure 3



Parameter description

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

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.



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