



3
YEARS
WARRANTY

ROHS
COMPLIANT

REACH
COMPLIANT



Railway



Defense



Industry



Automation



Datacom



Measurement



Telecom



Automobile



Boat



Charger



Medical



PV

NON
-isolation

4 : 1
Wide
Input
Range

MIL-STD
1275D
Compliant

MIL-STD
461G

INRUSH
CURRENT
LIMIT

REVERSE
POLARITY
PROTECTION

REMOTE
ON
OFF

OCP

OTP

OVP

SCP

UVP

TECHNICAL SPECIFICATION All specifications are typical at nominal input, full load and 25°C unless otherwise noted

INPUT SPECIFICATIONS

| Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------|--|--|------|------|------|
| Operating input voltage range | | 9 | 28 | 36 | VDC |
| Inrush current | With 1000µF connected to the output | | 5 | | A |
| Start up voltage | | | | 9 | VDC |
| Shutdown voltage | | 5.5 | 6 | 6.5 | VDC |
| Remote ON/OFF | Referred to -Vin pin DC-DC ON DC-DC OFF | Open or Short or 0 ~ 1.2VDC 4 ~ 12VDC | | | |
| Transient voltage | 1 second, max. | | | 50 | VDC |
| | 50 ms, max. | | | 100 | VDC |
| Spikes | 70µs , 2J | -250 | | 250 | VDC |
| Reverse polarity protection | Internal series MOSFET is held in an off state to avoid reverse current flow | -36 | | 0 | VDC |

OUTPUT SPECIFICATIONS

| Parameter | Conditions | Min. | Typ. | Max. | Unit |
|--------------------------|------------------------------|---------------------------------|-------|------|------|
| Output voltage | | | Vin-1 | Vin | VDC |
| Clamping voltage | Input transient voltage mode | | 40 | | VDC |
| Efficiency | | | 98 | | % |
| Output current | | | | 15 | A |
| Output power range | | | | 250 | W |
| Over load protection | Hiccup mode | | 35 | | A |
| Short circuit protection | | Continuous, automatics recovery | | | |

GENERAL SPECIFICATIONS

| Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-------------------|--|---------------------------------------|----------------------|------|------|
| Standard meets | Compliance with standards voltage transient immunity | MIL-STD-1275E | Surge Susceptibility | | |
| | | MIL-STD-704F | Surge Susceptibility | | |
| | | RTCA DO-160G | Surge Susceptibility | | |
| Isolation voltage | 1 minute Input (Output) to Case | 2250 | | | VDC |
| Case material | | Aluminum base-plate with plastic case | | | |
| Potting material | | Silicone (UL94 V-0) | | | |
| Weight | | 64g (2.26oz) | | | |
| MTBF | MIL-HDBK-217F, Full load | 6.095 x 10 ⁵ hrs | | | |

ENVIRONMENTAL SPECIFICATIONS

| Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------|---------------|------|------|------|--------------|
| Operating ambient temperature | With derating | -40 | | +105 | °C |
| Maximum case temperature | | | | 105 | °C |
| Over temperature protection | | | 115 | | °C |
| Storage temperature range | | -55 | | +125 | °C |
| Thermal shock | | | | | MIL-STD-810F |
| Vibration | | | | | MIL-STD-810F |
| Relative humidity | | | | | 5% to 95% RH |

EMC SPECIFICATIONS

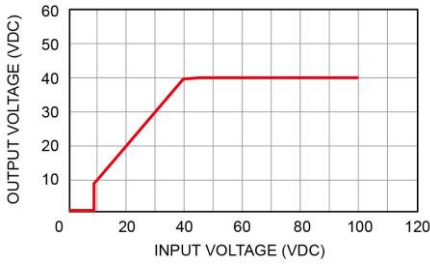
| Parameter | Conditions | Level |
|-----------|--|--------------|
| EMI | CE101-4 Curve #2 With external components CE102-1 Basic curve RE101-2 Navy RE102-3 Fixed Wing internal, ≥ 25 Meters Nose to Tail | MIL-STD-461G |
| EMS | CS101-1 Curve #2 With external components CS114-1 Curve #5 CS115-1 Basic waveform CS116-2 I _{max} .=10A | MIL-STD-461G |

Note:

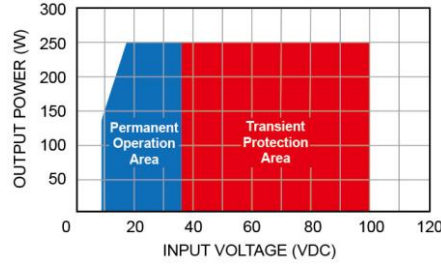
- The MCF-028015-001 is a DC front-end module that provides EMI filtering and transient protection. The module enables designers using P-DUKE's 24V DC/DC converters to meet conducted emission and conducted susceptibility per MIL-STD-461G.
- The recommended external components are specified in the document of "EMC Considerations". Please contact P-DUKE for more detailed information.

CAUTION: This power module is not internally fused. An input line fuse must always be used.

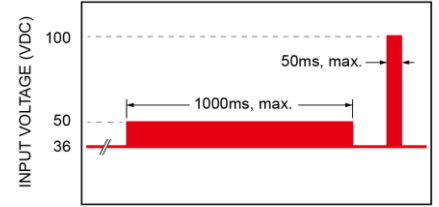
CHARACTERISTIC CURVE



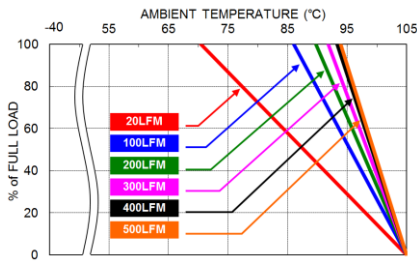
Transfer Function



Pout vs. Input Voltage



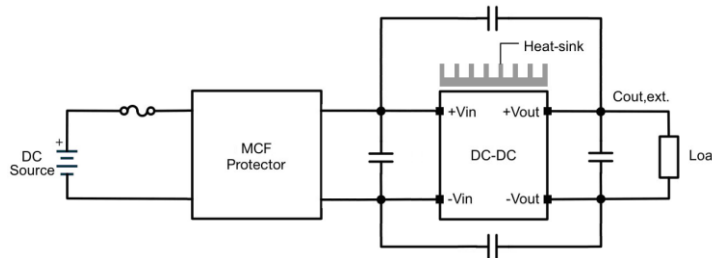
Transient Limitation



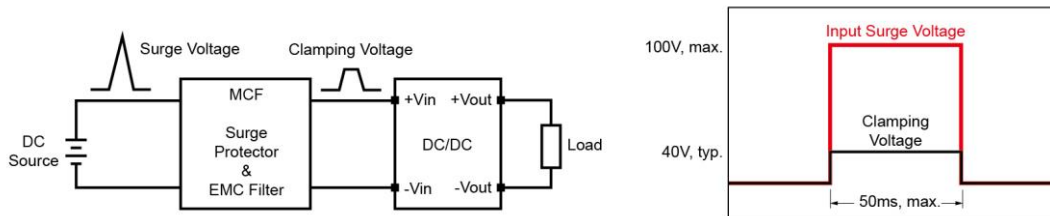
Derating Curve

TYPICAL APPLICATION

1. The schematic for typical application is shown as below.



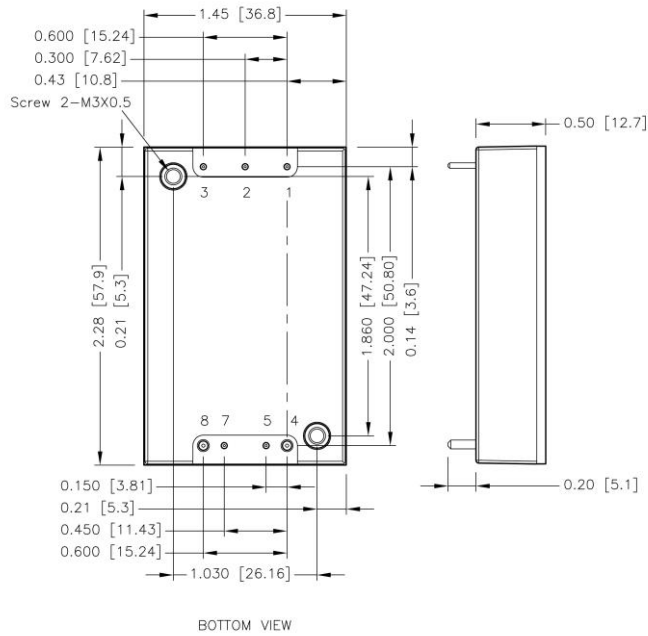
2. Surge protector clamps over-voltage to a safe value in order to protect the power module from damaging. According to MIL-STD-1275E, the module should keep working during input surge occurs.



3. This surge protector can be used for 28V battery system of MIL-STD-1275E application. Input range of DC/DC converters also has to meet 24V system input range.

| Standard | Un (VDC) | Permanent Operating Input Range (VDC) | Transient | Spike |
|-----------------------|----------|---------------------------------------|----------------------------|--------------|
| MIL-STD-1275E | 28 | 23 – 33 | 40V / 500ms 100V / 50ms | ±250V / 70µs |
| MIL-STD-704F | 28 | 22 – 29 | 50V / 50ms | N/A |
| RTCA DO-160G Cat. A/Z | 28 | 20.5 – 32.2 | 80V / 100ms | ±600V / 10µs |

MECHANICAL DRAWING

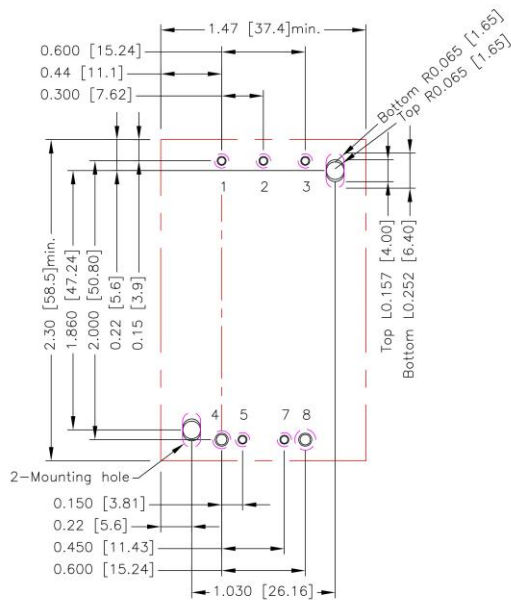


PIN CONNECTION

| PIN | DEFINE | DIAMETER |
|-----|--------|-----------|
| 1 | - Vin | 0.04 Inch |
| 2 | Ctrl | 0.04 Inch |
| 3 | + Vin | 0.04 Inch |
| 4 | - Vout | 0.06 Inch |
| 5 | - Emi | 0.04 Inch |
| 7 | + Emi | 0.04 Inch |
| 8 | + Vout | 0.06 Inch |

1. All dimensions in inch [mm]
2. Tolerance :x.xx±0.02 [x.x±0.5]
x.xxx±0.010 [x.xx±0.25]
3. Pin dimension tolerance ±0.004[0.10]
4. The screw locked torque:MAX 3.5kgf-cm [0.34N-m]

RECOMMENDED PAD LAYOUT



All dimensions in inch[mm]

Pad size(lead free recommended)

Through hole 1.2.3.5.7: $\varnothing 0.051$ [1.30]

Through hole 4.8: $\varnothing 0.075$ [1.90]

Through hole of mounting: $\varnothing 0.126$ [3.20]

Top view pad 1.2.3.5.7: $\varnothing 0.064$ [1.63]

Top view pad 4.8: $\varnothing 0.094$ [2.38]

Top view pad of mounting:Groove R0.065[1.65]L0.157[4.00]

Bottom view pad 1.2.3.5.7: $\varnothing 0.102$ [2.60]

Bottom view pad 8: $\varnothing 0.150$ [3.80]

Bottom view pad 4: $\varnothing 0.130$ [3.30]

Bottom view pad of mounting:Groove R0.065[1.65]L0.252[6.40]

THERMAL CONSIDERATIONS

The power module operates in a variety of thermal environments.

However, sufficient cooling should be provided to help ensure reliable operation of the unit.

Heat is removed by conduction, convection, and radiation to the surrounding environment.

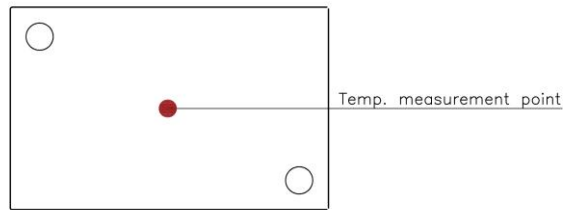
Proper cooling can be verified by measuring the point as the figure below.

The temperature at this location should not exceed "Maximum case temperature".

When operating, adequate cooling must be provided to maintain the test point temperature at or below "Maximum case temperature".

You can limit this temperature to a lower value for extremely high reliability.

- Thermal test condition with vertical direction by natural convection (20LFM).



BASE PLATE