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A subsidiary of EMRISE Electronics

# DC/DC CONVERTER VM-12101

- **Input Voltage 18 – 35V DC Steady State**
- **17.8mm (0.7") profile, ¾ & 1 ATR box compatible.**
- **VME compatible AC FAIL* and SYSRESET* lines**
- **250W, 5V/30A, 3.3V/15A, ±12V/2.0A, 5V STANDBY/0.2A**
- **True current sharing**
- **4ms hold-up capability**
- **EMI to MIL-STD-461D**
- **-55 C to +85 C operation**

The VM-12101 forms part of a family of rugged, high reliability and compact switch mode power supplies which have been designed to support electrically demanding and environmentally hostile applications.

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# DC/DC CONVERTER VM - 12101

### Input Voltage

18V TO 35V DC Steady State.
Operation to 16V for up to 1second.
The unit is NOT reverse polarity protected.

### Input Power Characteristics

MIL-STD-704E, all transient conditions excluding under voltage surge of Figure 11.
BS2G100 and BS3G100 excluding limits 2 & 4 *
RTCA DO-160D excluding line dropouts >4ms *
** Additional external hold-up will be required.*

### Inrush Curret Limit

3 x steady state input current at full load and minimum input voltage.

### Output Voltage

Output Voltage Setting

| Output | MIN | TYP | MAX |
|---|---|---|---|
| +5 | 4.95V | 5.05V | 5.15V |
| ±12 | 11.87V | 12.12V | 12.36V |
| +3.3 | 3.26V | 3.34V | 3.42V |
| 5V standby | 4.95V | 5.05V | 5.15V |

Output Current

| Output | MIN | MAX |
|---|---|---|
| +5 | 0A | 28A |
| ±12 | 0A | 2.0A |
| +3.3 | 0A | 15.0A |
| 5V standby | 0A | 0.2A |

Output Ripple
<50mV peak to peak (10MHz bandwidth)
Line Regulation 18V(16V) to 35V, 50% load

| Output | TYP | MAX |
|---|---|---|
| +5 | 0.01% | 0.1% |
| ±12 | 0.01% | 0.2% |
| +3.3 | 0.01% | 0.1% |
| 5V standby | 0.01% | 0.2% |

Load Regulation 28Vin, 0% to 100% Load

| Output | TYP | MAX |
|---|---|---|
| +5 | 0.05% | 0.2% |
| ±12 | 0.05% | 0.4% |
| +3.3 | 0.05% | 0.2% |
| 5V standby | 0.05% | 0.4% |

Load Transient 50% to 100% load, 1A/us

| Output | Transient | Recovery |
|---|---|---|
| +5 | 5% of Vout | 1ms |
| ±12 | 5% of Vout | 1ms |
| +3.3 | 5% of Vout | 1ms |
| 5V standby | 2% of Vout | 1ms |

Temperature Regulation -55°C to +85°C base plate temperature

| Output | TYP | MAX |
|---|---|---|
| +5 | ±0.05% | ±1.0% |
| ±15 | ±0.05% | ±1.0% |
| +3.3 | ±0.05% | ±1.0% |
| 5V standby | ±0.05% | ±1.0% |

### EMI:

The units meet the following requirements of MIL-STD-461D CE101 (Figure CE101-4), CE102, CS101, CS114 (Curve #3),CS115, CS116 (Air Force).

### Isolation:

| | |
|---|---|
| Input to Output | 50MΩ @ 500V DC |
| Input to Chassis | 50MΩ @ 500V DC |
| Outputs to Chassis | 10MΩ @ 100V DC |

All outputs have separate power returns to prevent ground loops however there is no electrical isolation between outputs and it is intended that power returns are linked at the load.

### Grounding:

The maximum dc resistance from the chassis to the connector earth terminal is 20 milliohms.

### Efficiency:

Not less than 78% (80% typically) for output power 50% max load at an input voltage of 28Vand at 25ºC baseplate temperature.

### Output Protection:

All outputs are protected against indefinite overload and short circuit. The outputs have cycle by cycle current limit operating at 110-130% of full rated current. Recovery is automatic.

### Output Overvoltage Protection:

The output voltages shall not exceed the values shown below under any circumstances. If the voltages reach these levels the unit shall trip and latch off.
An emergency operation override is available.

| Output | Maximum voltage |
|---|---|
| +5V | +6V |
| +12V | +14.5V |
| -12V | -14.5V |
| +3.3V | +3.9V |

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**Remote Sense:**

Fitted on the 5V and 3.3V outputs only and capable of a maximum voltage offset of 100mV. If this feature is not used then the 5V and 3.3V output will be regulated at the output connector. Protection is provided in the event of misconnection of the sense lines.

**Current Share:**

These connections are used to permit paralleling of power supplies, 5V, 3V3 and ±12V only. Connect the respective share pins with an impedance of < 1ohm. Sharing is ± 10%.

**Power Up:**

From the application of input power all outputs shall be within specification limits in less than 500ms. All outputs rise monotonically and are sequenced. The nominal power up order is 5V standby, +5V, +3V3 then ±12V.

**Input Under Voltage Operation:**

The PSU will not be damaged at inputs below 16V DC.

**Operating Temperature:**

Full specified performance with the card edge temperature maintained within the range –55ºC to +85ºC.

**Hold Up:**

4ms minimum at full load and any input voltage within specified ranges. After 4ms (may be longer dependant on the load) all outputs apart from the 5V standby will shut down. 5V standby continues to provide power for a minimum of 300ms.

*Holdup Pins are provided for additional capacitance to increase the holdup time. Refer to factory for guidance in utilising this function.*

**Inhibit:**

If this input is pulled logic low the 5V, 3V3 & ±12V outputs will be disabled. 5Vstandby will remain operational.

**Over-temperature Shutdown**

If the internal temperature exceeds 100°C, the PSU will shut down and remain off until the internal temperature drops below 85°C and the input power is recycled.

**Override:**

If this input is pulled logic low, the over-voltage and overtemperature fault protection functions will be disabled.

*Note: In the event of a hard power supply fault activation of this function may result in permanent damage to the unit.*

**SIGNALS**

**PSUGOOD:**

This open collector output in the OFF state indicates that all output voltages are within normal regulation limits.

Maximum sink current is 48mA with Vout <0.6V. Recommended pull up to +5V via a 5Kohm resistance.

**TEMP WARNING:**

This signal provides an over-temperature warning at 92°C. This is an open collector style signal which is LOW when the temperature exceeds 92°C. Maximum sink current is 48mA with Vout <0.6V. Recommended pull up to +5V via a 5Kohm resistance.

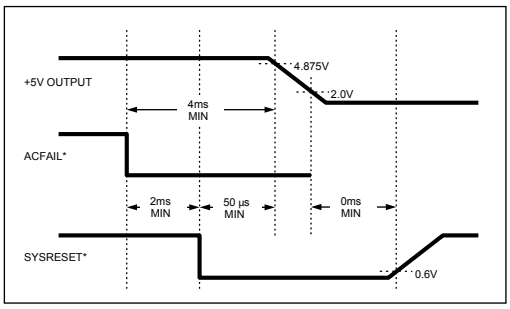
**TEMP Signal:**

This provides an output voltage proportional to the ambient internal temperature. The signal has been scaled to 28.57mV /°C, -55°C = 0V, +120°C = 5V, and is capable of driving into a 5Kohm resistive load.

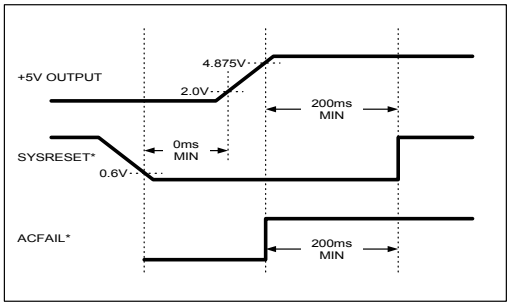
**ACFAIL* & SYSRESET* Signals:**

ACFAIL*, SYRESET* as per ANSI /VITA 1-1994. Recommended pull up to +5V via a 5Kohm resistance.

**Power Monitor Failure Timing**




**Power Monitor System Restart Timing**



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## ENVIRONMENTAL

**Cooling:**
Conduction cooled through the coldwall surface, see mechanical outline.

**Humidity:**
MIL-STD-810F, Method 507.4.

**Shock:**
MIL-STD-810F, Method 516.5 Procedure I. Amplitude 20g / 15ms

**Vibration:**
The unit will perform to specification during and after the vibration profile detailed in MIL-STD-810F, Method 514.5 for Propeller aircraft, Jet aircraft and Ship board environments.

**Acceleration:**
MIL-STD-810F, Method 513.5, Procedure I & II Aircraft.

**Salt Fog:**
MIL-STD-810F, Method 509.4.

**Explosion Atmosphere:**
MIL-STD-810E, method 511.4.

**Storage Temperature:**
-55ºC to +105ºC.

**Altitude:**
The PSU is capable of operation from -17,500 to +55,000 feet.

**Construction:**
Chassis is of non hermetic construction utilising Aluminium alloy with Chromate conversion coating. Printed Circuit assemblies are conformal coated with Humiseal 1B31 coating or equivalent.
Input and output connections DIN 41612 type M Class 1. See connector pin out.

**Component Selection:**
All components are selected for use over the specified operating and storage temperatures. Components are selected from well known high quality manufacturers. Component de-rating is in general accordance with NAVMAT P4855-1A.

**Mass:**
Less than 1.2 kilogram's.

**Maintainability:**
No routine servicing or adjustment required. The units are repairable down to component level.

**Shelf Life:**
The shelf life of the units is a minimum of 10 years at a maximum temperature of +40ºC.

**ESS:**
Each unit is subjected to 10 minutes of random vibration, perpendicular to the plane of the PCB, followed by 48 hours of temperature cycling between -55ºC and +85ºC with the outputs fully loaded.

**Reliability** [Calculated Using MIL- HDBK-217F]

| Environment | Temperature | MTBF |
|---|---|---|
| AUF | 85ºC | 7,000 hrs |
| ARW | 50ºC | 11,980 hrs |
| NS | 40ºC | 56,000 hrs |
| GM | 25ºC | 47,000 hrs |

**Warranty:**
Minimum warranty of 12 months from date of delivery. Anyn additional warranty to be agreed with Pascall Sales on a case by case basis.

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## CONNECTORS

### Input:- PL1

Power supply is fitted with DIN 41612 type M/2 5 way plug shell, fitted with high current pins.
P/N : Cambridge Connectors TPM-2005-ZZZZ0 or equivalent fitted with 31T-0039-18 Pins.

| PIN | FUNCTION |
|---|---|
| 1b | Not fitted (blanked off) |
| 2b | Not fitted (blanked off) |
| 3b | 28V Return |
| 4b | +28V |
| 5b | Chassis |

### Output:- PL2

Power supply is fitted with DIN 41612 type M, plug, 24 signal + 8 way power with high current pins marked *
P/N : Cambridge Connectors TPM-1248-C01A0 or equivalent fitted with 31T-0039-18 Pins.

| PIN | FUNCTION |
|---|---|
| 2b* | +5V |
| 5b* | +5V RETURN |
| 8b* | -12V |
| 11b* | +12V |
| 13a | Reserved for test purposes, connection to this terminal is prohibited |
| 13c | ACFAIL |
| 14a | SYSRESET |
| 14c | Reserved for test purposes, connection to this terminal is prohibited |
| 15a | +5V SENSE |
| 15b | Reserved for test purposes, connection to this terminal is prohibited |
| 15c | PSU GOOD |
| 16a | TEMP OUT |
| 16b | +5V I-SHARE |
| 16c | +5V SENSE RETURN |
| 17a | CONTROL RETURN |
| 17c | INHIBIT |
| 18a | +5V STANDBY |
| 18b | +12V I-SHARE |
| 18c | +5V STANDBY RETURN |
| 19a | TEMP WARNING |
| 19b | 12V I-SHARE |
| 19c | OVERRIDE |
| 20a | +3V3 SENSE RETURN |
| 20b | +3V3 I-SHARE |
| 20c | +3V3 SENSE |
| 22b* | n/c |
| 25b* | ±12V RETURN |
| 28b* | +3V3 |
| 31b* | +3V3 RETURN |

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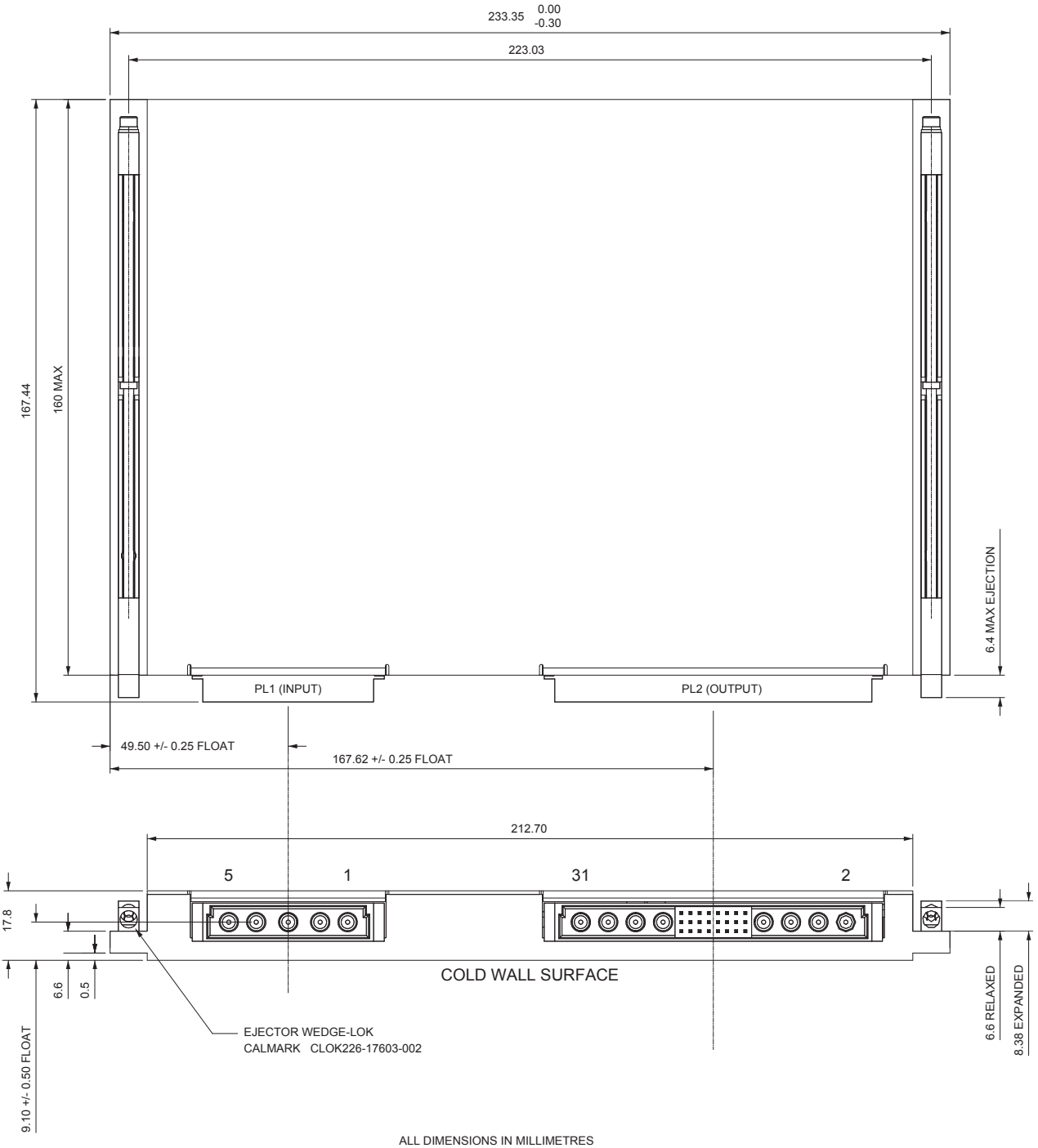
## Mechanical Configuration




ALL DIMENSIONS IN MILLIMETRES
TOLERANCES (UNLESS SHOWN OTHERWISE)
DIMENSIONS TO 1 DEC. PLACE ±0.15
DIMENSIONS TO 2 DEC. PLACE ±0.07
OTHER DIMENSIONS ±0.5