# M1156 SERIES

**PRELIMINARY**

**COMPACT, HIGH DENSITY, HIGH EFFICIENCY, SINGLE OUTPUT,**
**THREE-PHASE AC / DC CONVERTERS**
Up to 500 W

## *Applications*

Military (Airborne, ground-fix, shipboard), Ruggedized, Telecom, Industrial Power Supply

## *Special Features*

- Miniature size
- High efficiency
- Wide input range
- Input / Output isolation
- Remote Inhibit (On/Off)
- Fixed internal switching freq.
- External sync. capability
- Power factor 0.8-0.9 @ full load
- EMI filters included
- Non-latching protections:
  - Overload / short-circuit
  - Over temperature

## *Electrical Specifications*

***AC Input***
Voltage range:
115 (103-127)* $V_{AC,L-N}$ 50/60/400 Hz, 3-phase

*Optional extended range:
(95-140 $V_{AC}$) Consult factory

***DC Output***
Voltage range: 5 to 50 $V_{DC}$
Current: 0 to 25 A
Power output: 0 to 500 W

***Isolation***
Input to Output: 500 $V_{DC}$
Input to Case: 500 $V_{DC}$
Output to Case: 100 $V_{DC}$

***Line/Load regulation***:
Less than ±1% (low line to high line voltage, no load to full load, –55 °C to +85 °C).

***Efficiency***
90% - Typical (full load, room temperature)

***EMC***
Designed to meet† MIL-STD-461F (CE102, CS101, CS114, CS115, CS116, RE101, RE102, RS101, RS103) with M1289 line filter

***Ripple and Noise***:
50-150 $mV_{p-p}$, typical (max. 1%) without external capacitance. Additional load capacitance reduces ripple significantly.

***Turn on Transient***
No Voltage over shoot during power on.

Designed to also meet CE101 with M1289 line filter, for loads up to 200W.

## *Protections* **

**General**

- **Over temperature protection**
  Shutdown at base plate temperature of +105 °C ± 5 °C. Automatic recovery at base plate temperature lower than +95 °C ± 5 °C.

***Output***

- **Passive transorb on outputs**
  20% above nominal voltage.
- **Current limiting**
  Continuous protection (10-30% above maximum current) for unlimited time.

** Thresholds and protections can be modified / removed – please consult factory.
† Compliance achieved when tested with shielded cables and static resistive load

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### *Environmental Conditions*

Designed to meet MIL-STD-810F

***Temperature***
Operating:
–55 °C to +85 °C (at baseplate)
Storage:
–55 °C to +125 °C (ambient)

***Altitude***
Method 500.4
Procedure I (non-operational): Up to 70,000 ft.
Procedure II (operational):
Up to 40,000 ft.

***Salt Fog***
Method 509.4

***Humidity***
Method 507.4
Up to 95% RH

***Vibration***
Method 514.5
Category 24 - General minimum integrity exposure
1 hour per axis

***Shock***
Method 516.5
Saw-tooth, 20 g peak, 11 ms.

### *Reliability*

At least 150,000 hours.
Calculated IAW MIL-HDBK-217F Notice 2 with +85 °C baseplate temperature at Ground Fix conditions.

### *Environmental Stress Screening (ESS)*

Including random vibration and thermal cycles is also available. **Please consult factory for details.**

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## *Pin Assignment*

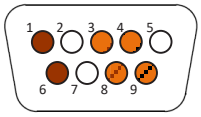
**J1 - Input Connector**

**Connector type:** M24308/24-37F or eq.
**Mating connector type:** M24308/2-1F or eq.

| Pin # | Function | |
|---|---|---|
| 1 | Phase A | |
| 2 | N.C. | |
| 3 | Phase B | |

| Pin # | Function | |
|---|---|---|
| 4 | Phase C | |
| 5 | Chassis | |
| 6 | Phase A | |

| Pin # | Function | |
|---|---|---|
| 7 | N.C. | |
| 8 | Phase B | |
| 9 | Phase C | |



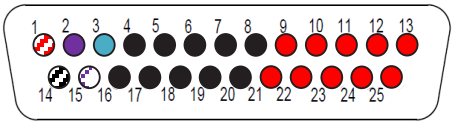

**J2 - Output Connector**

**Connector type:** M24308/23-39F or eq.
**Mating connector type:** M24308/4-3F or eq.

| Pin # | Function | P | |
|---|---|---|---|
| 1 | SENSE | + | |
| 2 | SYNC | + | |
| 3 | INHIBIT | + | |
| 4 | OUT RTN | – | |
| 5 | OUT RTN | – | |
| 6 | OUT RTN | – | |
| 7 | OUT RTN | – | |
| 8 | OUT RTN | – | |
| 9 | OUT | + | |

| Pin # | Function | P | |
|---|---|---|---|
| 10 | OUT | + | |
| 11 | OUT | + | |
| 12 | OUT | + | |
| 13 | OUT | + | |
| 14 | SENSE RTN | – | |
| 15 | SYNC RTN | – | |
| 16 | OUT RTN | – | |
| 17 | OUT RTN | – | |
| 18 | OUT RTN | – | |

| Pin # | Function | P | |
|---|---|---|---|
| 19 | OUT RTN | – | |
| 20 | OUT RTN | – | |
| 21 | OUT | + | |
| 22 | OUT | + | |
| 23 | OUT | + | |
| 24 | OUT | + | |
| 25 | OUT | + | |
| | | | |
| | | | |




**Note:** All output pins with same designation should be connected together for best performance.

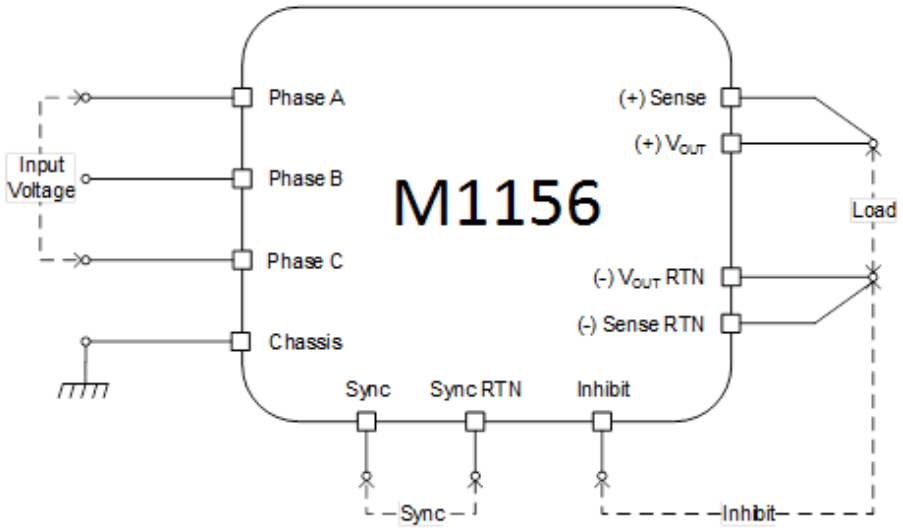
## *Functions and Signals*

**INHIBIT** (connector J2, pin 3)
Description: The ***INHIBIT*** signal is used to turn the power supply ON and OFF.
Operation: Applying "1"or leaving open will turn the power supply ON.
Applying "0" or shorting this pin to ***OUT RTN*** will turn the power supply OFF.
For constant operation, leave this pin unconnected.
Signal Type: 5V TTL or dry contact (open/short).
Return line: This signal is referenced to ***OUT RTN*** (connector J2, pins 4-8, 16-20).

**SYNC** (connector J2, pin 2)
Description: The ***SYNC*** signal can be used to allow the power supply switching frequency to synchronize with a system clock.
Operation: Apply a square wave clock with frequency in the range of 250 kHz ± 10 kHz and duty-cycle of 50% ± 10%., TTL level.
If not required, leave open. The power supply will work at 250 kHz ± 10 kHz (internal clock).
Signal Type: 5V TTL
Return line: This signal is referenced to ***SYNC RTN*** (pin 15).

**SENSE** (connector J2, pin 1)
Description: The ***SENSE*** function is used to achieve accurate load regulation at load terminals.
Operation: Connect the pins directly to the load terminals.
The correction ability is limited to 2 to 10% of nominal voltage output, and up to 2 V.
Note that if sense correction function is not needed, the sense lines must be shorted to their respective output pins: ***SENSE*** (pin 1) to ***OUT*** pins (9-13, 21-25) and ***SENSE RTN*** (pin 14) to ***OUT RTN*** (pins 4-8, 16-20).
Signal Type: 5V TTL
Return line: This signal is referenced to ***SENSE RTN*** (connector J2, pin 14).

***Typical Connection Diagram***

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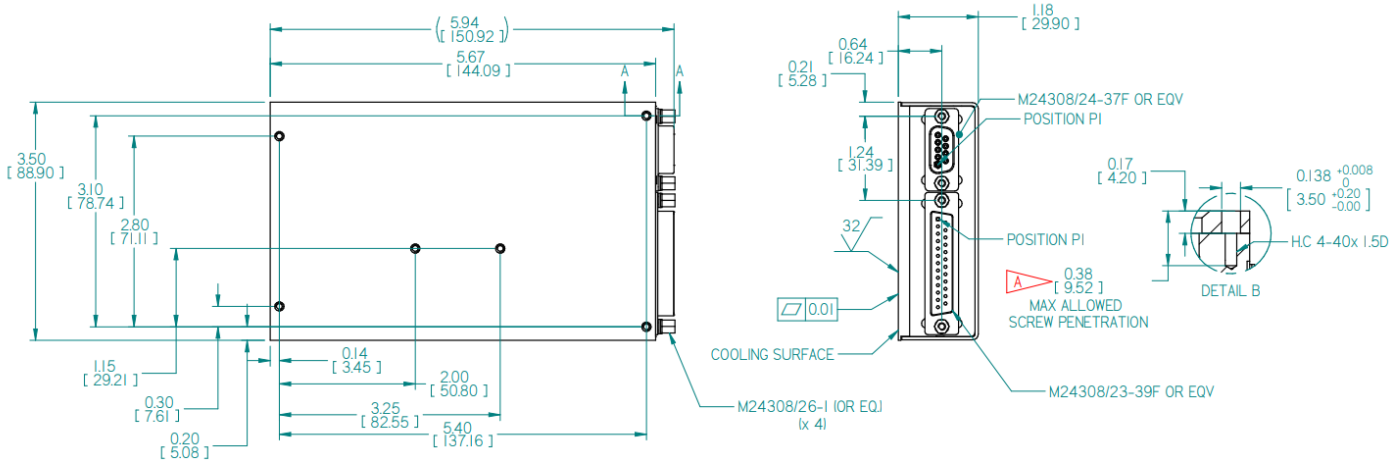
## *Outline Drawing*




NOTES :

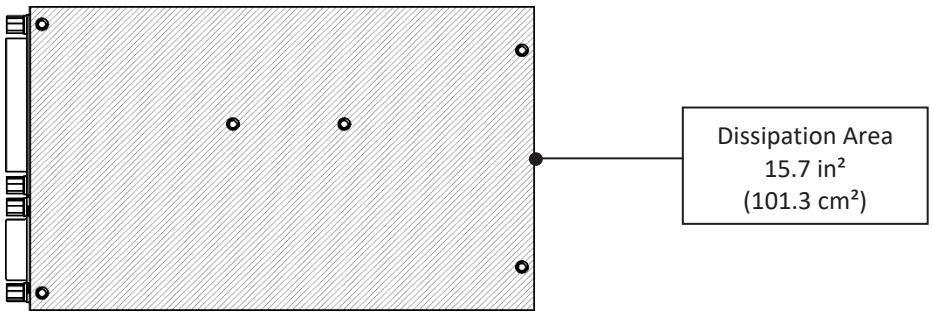
1. HEAT DISSIPATION AREA - TOTAL AREA 19.1 IN²
2. WORKMANSHIP SHALL BE MIL-STD-454, REQT. 9
3. MTL. AL 6061-T651& AL 5052-H32
4. CONVERSION COATING PER MIL -C-5541 CL 1A

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCH [MM].
TOLERANCES ARE:

| DECIMALS | ANGLES |
|---|---|
| .XX ± 0.02 | ± 5° |
| .XXX ± 0.01 | |

DO NOT SCALE DRAWING

## *Heat Dissipation Surface*




**Notes**

1. Dimensions are in Inches [mm]
2. Tolerance is:
   .XX ± 0.02 IN
   .XXX ± 0.01 IN
3. Weight: Approx. 1.534 lbs [696 g]

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## *Standard Variants*

| Part number | Normal input voltage range | Output configuration |
|---|---|---|
| M1156-100 | 103 to 127 $V_{AC}$ / 50 to 400 Hz | 5 $V_{DC}$ / 20 A |
| M1156-101 | 103 to 127 $V_{AC}$ / 50 to 400 Hz | 12 $V_{DC}$ / 20 A |
| M1156-102 | 103 to 127 $V_{AC}$ / 50 to 400 Hz | 15 $V_{DC}$ / 20 A |
| M1156-103 | 103 to 127 $V_{AC}$ / 50 to 400 Hz | 24 $V_{DC}$ / 20 A |
| M1156-104 | 103 to 127 $V_{AC}$ / 50 to 400 Hz | 28 $V_{DC}$ / 18 A |
| M1156-105 | 103 to 127 $V_{AC}$ / 50 to 400 Hz | 48 $V_{DC}$ / 10.4 A |

***Note: Specifications are subject to change without prior notice by the manufacturer***

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