



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
per MIL-STD-704A.

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

Line/Load regulation:

Less than ±1% (low line to high line voltage, no load to full load, -55 °C to +85 °C).

Ripple and Noise:

50-150 mV_{p-p}, typical (max. 1%) without external capacitance. Additional load capacitance reduces ripple significantly.

DC Output

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

Efficiency

90% - Typical (full load, room temperature)

Turn on Transient

No Voltage over shoot during power on.

Isolation

Input to Output: 500 V_{DC}
Input to Case: 500 V_{DC}
Output to Case: 100 V_{DC}

EMC

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

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.



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.**



Pin Assignment

J1 - Input Connector

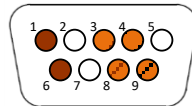
Connector type: M24308/24-37F or eq.

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

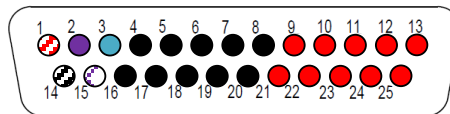
Connector type: M24308/23-39F or eq.

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 \pm 10 kHz and duty-cycle of 50% \pm 10%, TTL level.

If not required, leave open. The power supply will work at 250 kHz \pm 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.

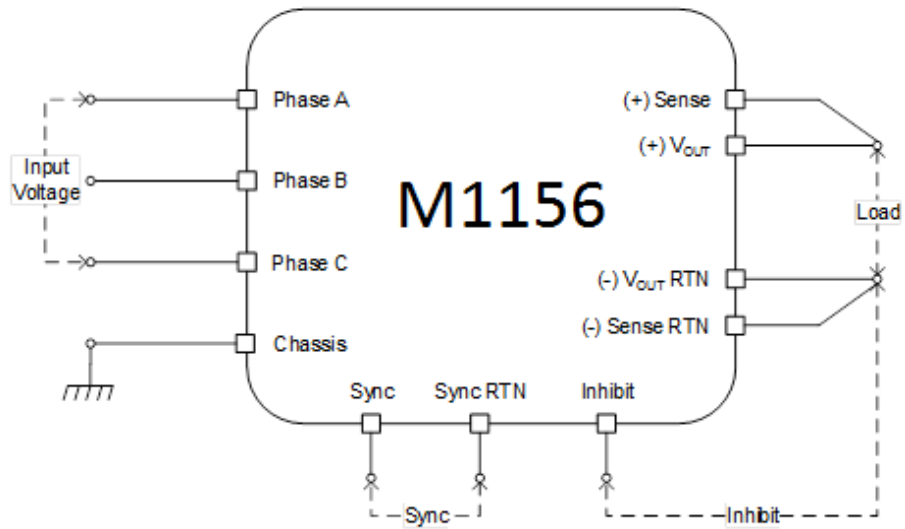
Note that if sense correction function is not needed, the sense lines must be shorted to their respective output pins: **SENSE** (pin 1) to **OUT** pins (9-13, 21-25) and **SENSE RTN** (pin 14) to **OUT RTN** (pins 4-8, 16-20).

Signal Type: 5V TTL

Return line: This signal is referenced to **SENSE RTN** (connector J2, pin 14).

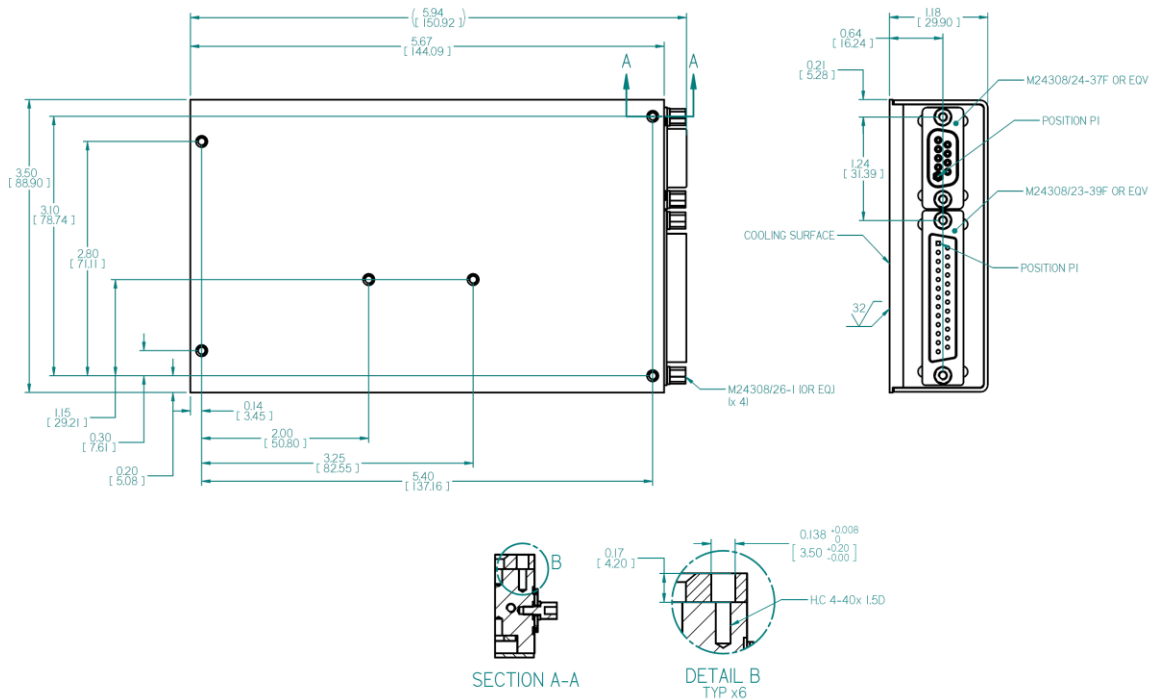


Typical Connection Diagram





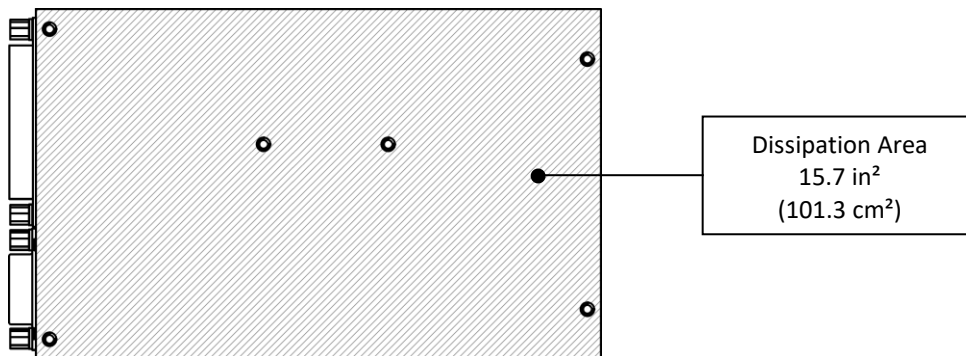
Outline Drawing



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]





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