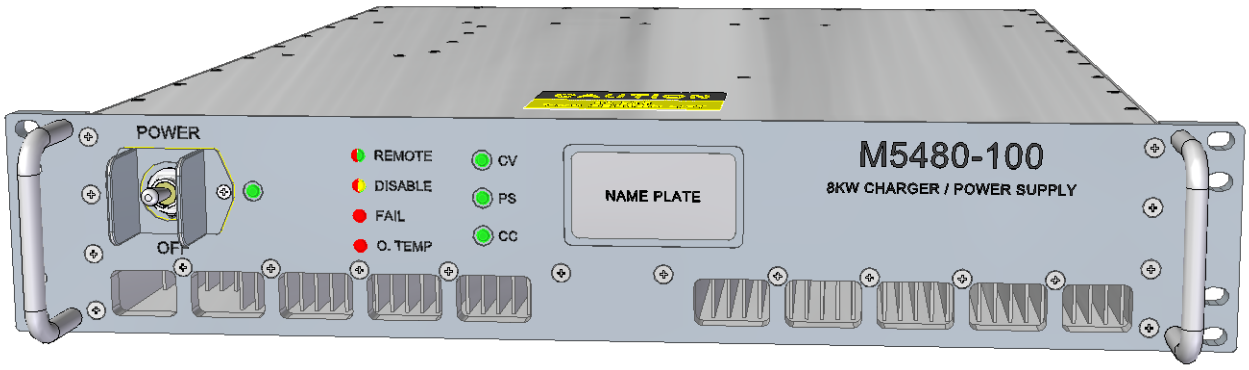
# M5480-100 (Preliminary)

## 8.75 kW AC to DC Programable 350VDC/25Amp Power Supply/Charger

The M5480-100 is a mechanically robust, high performance, AC to DC converter designed for Navy shipboard applications. The M5480-100 converts MIL-STD-1399-300B 3-Phase 440VAC (Delta) 60Hz shipboard power to a well-regulated, filtered and protected DC Output. When used as a DC Power Supply, the output voltage can be set to any voltage between 150 to 350 VDC, and the current limit to any level between 5 to 25 Amp. When used as a programable Battery Charger, the user can set the C.V. and C.C. to any level within the above range. The M5480-100 is a self-cooled (internal fans), 19” Rackmount unit, 2U high and 19” deep.

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# The main features of the M5480-100 are:

- Can be supplied as a fixed voltage DC Power Supply or a Programable Battery Charger
- Complies with the User Interface Requirements of MIL-STD-1399-300B.
- Self-cooled unit - cooling air is confined to a close-channel heatsink
- TCP/IP and RS-232 Control and Monitor.
- Hard-wire safety interlock/EPO pins on the DC Output connector.
- Clean sine-wave input current – less than 3% harmonic current.
- Full-load Power Factor (PF) of 0.99.
- Inrush current limiting.
- Overload, Overtemperature, Overvoltage and Missing-phase protections.
- Full galvanic isolation between Input, Chassis and Outputs.
- Supports parallel connection for higher power.
- Withstands MIL-STD-1399-300B 2,500 V spikes.
- Design to meet MIL-STD-461F for shipboard application.
- Complies with MIL-STD-167-1 (Type I) shipboard vibration.
- Robust mechanical design, intended for systems that should withstand MIL-DTL-901E high impact shocks.
- J-STD-001B and IPC-610A Class-3 workmanship.
- Conformal Coating per MIL-I-46058C and IPC-CC-830.

## Specifications:

| | | |
|---|---|---|
| **AC Input** | ***Voltage and Frequency*** | MIL-STD-1399-300B, Type I, 440Vac/60Hz, 3-Phase Ungrounded Delta.<br>Steady state: 377VAC to 486VAC, 44Hz to 67Hz.<br>Transient: down to 329VAC for up 3 seconds, and up to 594VAC for up to 2 minutes.<br>No damage for any voltage between 0 to the above limits. |
| | ***Power Factor*** | >0.99 at full load and 50/60Hz. |
| | ***Spikes*** | Withstand 2,500 V spikes IAW MIL-STD-1399-300B. |
| | ***Inrush Current*** | Internally limited such that the peak RMS current is less than 30Arms and recovers to below 12Arms within 50mS. |
| | ***Isolation*** | Input is galvanically isolated from output and chassis (> 20 MΩ at 1,500 Vdc).<br>Capacitance between AC input to chassis is less than 0.1µF per line (MIL-STD-1399-300B compliant). |
| | ***Current Waveform*** | Low-distortion Sinusoidal, complies with the Harmonic Current limits of MIL-STD-1399-300B. |
| | ***Missing Phase Protection*** | Protected from missing phase. Output gracefully shuts down upon missing phase detection. |
| **DC Output** | ***Power Rating*** | 8.75KW |
| | ***Setting Range*** | 150 to 350Vdc, 5 to 25Amp |
| | ***Voltage Regulation*** | Worst case deviation from the Voltage set-point is less than ±1% or ±1Vdc (the higher) for all operating and environmental conditions |
| | ***Current Regulation*** | Typical deviation from the Current set-point is less than ±5% or ±1.0Amp (the higher) for all operating and environmental conditions. |
| | ***Step Load Response*** | When operating in Voltage Regulation mode, the over/under shoot for a step load between 10Amp to 20Amp with a rise/fall time of 50µS or longer, is less than ±10V and recovers within 5mS. |
| | ***Ripple Voltage*** | Less than 0.25% for all operating and environmental conditions (resistive load with 1uF or higher). |
| | ***Isolation*** | Output is galvanically isolated ("floating") from chassis (> 20 MΩ at 1,500 $V_{DC}$). |
| | ***Overload Protection*** | A sustained overload that pulls the output voltage below a user programmable O.L. Tripping Threshold (typically set 50% of the regulated voltage setting) for more than a user programable O.L. Tripping Delay (typically 50mS) will trip the Overload protection and disable the output. Output recovers upon receiving a Fault Reset command, or when AC Power is re-cycled. |
| | ***Efficiency*** | 92% minimum (93% typical) at full load. |
| | ***Overvoltage Protection*** | Automatic shutdown in case of a fault that causes the output voltage to exceed 115±5% of the Set voltage. Output recovers upon receiving a Fault Reset command, or when AC Power is re-cycled. |
| | ***Over Temp. Protection*** | In case of an Overtemperature, the output will shut down and could be turned back On when the temperature will drop to within normal range. |

## Specifications (Cont.):

| | | |
|---|---|---|
| **Control & Indication** | ***On/Off Switch*** | Disconnects the 3-Ph AC power from the AC to DC converter. |
| | ***TCP/IP Control & Monitor*** | Allows the user to set the unit to Charger/Power-supply modes, to Enable/Disable the DC Output, to set the CC and CV levels, and resets faults. Provides Configuration data, set levels, operational status, actual voltage and current levels, and internal hot-spot temperature. See document M5480_EID. |
| | ***Interlock/EPO*** | When Open, disables the DC Output. |
| | ***Front Panel LEDs*** | **PWR ON** Green LED **Disabled** Yellow LED<br>**CC Mode** Green LED **Over-temp.** Red LED<br>**CV Mode** Green LED **Fail** Red LED<br>**PS Mode** Green LED **Remote** Green/Red LED |
| **Environment** | ***Ambient Temperature*** | Non-operating : -18°C to +70°C<br>Operating: -10 to + 50°C. |
| | ***Humidity*** | Up to 95% RH, Per MIL-STD-810F, Method 507.4 |
| | ***Salt-fog*** | Per MIL-STD-810F, Method 509.4 |
| | ***Altitude*** | Non-operating: (Air transport) up to 40,000 feet. |
| | ***Mechanical Shock*** | 40g/11ms and 25g/30mS (Terminal Peak Sawtooth, all directions).<br>Designed for systems that need to comply with MIL-DTL-901E |
| | ***Vibration*** | Type I vibration IAW MIL-STD-167-1.<br>Random Vibration Per MIL-STD-810G, Cat. 24, Fig 514.6E-1. |
| | ***Inclination*** | Capable of operation in any orientation and inclination. |
| | ***Fungus*** | Does not support fungus growth, in accordance with the guidelines of MIL-STD-454, Requirement 4. |
| **EMI** | ***MIL-STD-461F*** | Design to meet CE101, CE102, CS101, CS114 (10 kHz to 400 MHz, Curve #5), CS115, CS116, RE102, RS101 and RS103 (2 MHz to 18 GHz 50 V/m). Surface-ship and Internal-submarine limits. All tests are at full load and in accordance with the provisions of MIL-STD-461F – with shielded Output and Signals cables. |
| **Reliability** | MTBF>125,000 hours, Excluding FAN, for a typical Naval (NS) environment. | |
| **Form-factor** | 19" Rackmount, 2U high and 19" deep. All I/O connectors are on the rear panel. Air inlet at the front, air outlet at the rear panel. For detailed dimensions and tolerances see Drawing: M5480001. | |
| **Weight** | 39.5 Pounds. | |
| **Connectors** | See below | |

## Pin Assignment:

| J1 - Input | | |
|---|---|---|
| D38999/20WE6PN (or eq.) | | |
| **Pin** | **Fucntion** | **AWG#** |
| A | N/C | 12 |
| B | PHASE A | 12 |
| C | CHASSIS | 12 |
| D | PHASE C | 12 |
| E | N/C | 12 |
| F | PHASE B | 12 |

| J4 – Ethernet |
|---|
| RJFTV2SA5GF459 (or eq.) |
| |
| Standard Ethernet RJ45 |

| J2 – DC Output | | |
|---|---|---|
| TVP00RW17-20S (or eq.) | | |
| **Pin** | **Fucntion** | **AWG#** |
| A | +VDC | 12 |
| B | +VDC | 12 |
| C | VDC_RTN | 12 |
| D | VDC_RTN | 12 |
| 1 | N/C | 22 |
| 2 | N/C | 22 |
| 3 | N/C | 22 |
| 4 | N/C | 22 |
| 5 | N/C | 22 |
| 6 | N/C | 22 |
| 7 | N/C | 22 |
| 8 | N/C | 22 |
| 9 | N/C | 22 |
| 10 | N/C | 22 |
| 11 | N/C | 22 |
| 12 | INTERLOCK_IN | 22 |
| 13 | INTERLOCK_OUT | 22 |
| 14 | N/C | 22 |
| 15 | N_SENSE | 22 |
| 16 | P_SENSE | 22 |

| J3 - Signals | | |
|---|---|---|
| D38999/20WB35SN (or eq.) | | |
| **Pin** | **Fucntion** | **AWG#** |
| 1 | LOAD_SHARE | 22 |
| 2 | LOAD_SHARE_RTN | 22 |
| 3 | N/C | 22 |
| 4 | COM_TX | 22 |
| 5 | COM_RX | 22 |
| 6 | ID_1 | 22 |
| 7 | ID_2 | 22 |
| 8 | ID_3 | 22 |
| 9 | N/C | 22 |
| 10 | N/C | 22 |
| 11 | N/C | 22 |
| 12 | COM_RTN | 22 |
| 13 | ID_4 | 22 |