

## M8186 SERIES

*DC/DC POWER SUPPLY*



### PRODUCT HIGHLIGHTS

- COMPACT
- HIGH DENSITY
- SINGLE OUTPUT
- DC/DC CONVERTER
- UP TO 2000W

## M8186 SERIES DC/DC POWER SUPPLY

<p><b>Applications</b></p> <p>Military Power Supply (Airborne, ground-fix, shipboard), Ruggedized, Telecom, Industrial Power Supply</p>											
<p><b>Special Features</b></p> <ul style="list-style-type: none"> <li>• Miniature size</li> <li>• High efficiency</li> <li>• Wide input range</li> <li>• High density: up to 30.5 W/in<sup>3</sup></li> <li>• Input / Output isolation</li> <li>• Limited Inrush Current</li> <li>• Remote Inhibit (On/Off)</li> <li>• Fixed switching freq. (400 kHz)</li> <li>• EMI filters included</li> <li>• Cos <math>\phi</math> &gt; 0.92 from 75% load</li> <li>• Non-latching protections: <ul style="list-style-type: none"> <li>○ Output overload</li> <li>○ Output short-circuit</li> <li>○ Output over-voltage</li> <li>○ Over temperature</li> </ul> </li> </ul>											
<p><b>Electrical Specifications</b></p> <table border="0" style="width: 100%;"> <tr> <td style="width: 33%; vertical-align: top;"> <p><b>Normal Input Voltage</b></p> <p>DC voltage range: 220 to 350 V<sub>DC</sub></p> </td> <td style="width: 33%; vertical-align: top;"> <p><b>DC Output:</b></p> <p>Voltage range: 5 to 60 V<sub>DC</sub> Current range: 0 to 80 A Power range: 0 to 2000 W</p> </td> <td style="width: 33%; vertical-align: top;"> <p><b>Isolation</b></p> <p>Input to Output: 500 V<sub>DC</sub> Input to Case: 500 V<sub>DC</sub> Output to Case: 100 V<sub>DC</sub></p> </td> </tr> <tr> <td style="vertical-align: top;"> <p><b>Line/Load regulation</b></p> <p>Up to <math>\pm 1\%</math> (no load to full load, <math>-55\text{ }^{\circ}\text{C}</math> to <math>+85\text{ }^{\circ}\text{C}</math> and over input voltage range).</p> </td> <td style="vertical-align: top;"> <p><b>Efficiency</b></p> <p>90% - Typical (nominal line voltage, 28 V<sub>DC</sub> output, full load, standard room temperature)</p> </td> <td style="vertical-align: top;"> <p><b>EMC</b></p> <p>Designed to meet MIL-STD-461C: CE102, CS101, CS114, CS115, CS116, RE102, RS101, RS103</p> </td> </tr> <tr> <td style="vertical-align: top;"> <p><b>Ripple and Noise</b></p> <p>100 to 150 mV<sub>p-p</sub>, typical (max. 1% of nominal voltage) measured across a 1<math>\mu</math>F ceramic capacitor.</p> </td> <td style="vertical-align: top;"> <p><b>Transient Over-and-undershoot</b></p> <p>Voltage change less than 10% of nominal value for load step from 50% to 100%. Return to regulation in under 1 ms.</p> </td> <td style="vertical-align: top;"> <p><b>Turn on Transient</b></p> <p>No Voltage overshoot during turn on.</p> </td> </tr> </table>			<p><b>Normal Input Voltage</b></p> <p>DC voltage range: 220 to 350 V<sub>DC</sub></p>	<p><b>DC Output:</b></p> <p>Voltage range: 5 to 60 V<sub>DC</sub> Current range: 0 to 80 A Power range: 0 to 2000 W</p>	<p><b>Isolation</b></p> <p>Input to Output: 500 V<sub>DC</sub> Input to Case: 500 V<sub>DC</sub> Output to Case: 100 V<sub>DC</sub></p>	<p><b>Line/Load regulation</b></p> <p>Up to <math>\pm 1\%</math> (no load to full load, <math>-55\text{ }^{\circ}\text{C}</math> to <math>+85\text{ }^{\circ}\text{C}</math> and over input voltage range).</p>	<p><b>Efficiency</b></p> <p>90% - Typical (nominal line voltage, 28 V<sub>DC</sub> output, full load, standard room temperature)</p>	<p><b>EMC</b></p> <p>Designed to meet MIL-STD-461C: CE102, CS101, CS114, CS115, CS116, RE102, RS101, RS103</p>	<p><b>Ripple and Noise</b></p> <p>100 to 150 mV<sub>p-p</sub>, typical (max. 1% of nominal voltage) measured across a 1<math>\mu</math>F ceramic capacitor.</p>	<p><b>Transient Over-and-undershoot</b></p> <p>Voltage change less than 10% of nominal value for load step from 50% to 100%. Return to regulation in under 1 ms.</p>	<p><b>Turn on Transient</b></p> <p>No Voltage overshoot during turn on.</p>
<p><b>Normal Input Voltage</b></p> <p>DC voltage range: 220 to 350 V<sub>DC</sub></p>	<p><b>DC Output:</b></p> <p>Voltage range: 5 to 60 V<sub>DC</sub> Current range: 0 to 80 A Power range: 0 to 2000 W</p>	<p><b>Isolation</b></p> <p>Input to Output: 500 V<sub>DC</sub> Input to Case: 500 V<sub>DC</sub> Output to Case: 100 V<sub>DC</sub></p>									
<p><b>Line/Load regulation</b></p> <p>Up to <math>\pm 1\%</math> (no load to full load, <math>-55\text{ }^{\circ}\text{C}</math> to <math>+85\text{ }^{\circ}\text{C}</math> and over input voltage range).</p>	<p><b>Efficiency</b></p> <p>90% - Typical (nominal line voltage, 28 V<sub>DC</sub> output, full load, standard room temperature)</p>	<p><b>EMC</b></p> <p>Designed to meet MIL-STD-461C: CE102, CS101, CS114, CS115, CS116, RE102, RS101, RS103</p>									
<p><b>Ripple and Noise</b></p> <p>100 to 150 mV<sub>p-p</sub>, typical (max. 1% of nominal voltage) measured across a 1<math>\mu</math>F ceramic capacitor.</p>	<p><b>Transient Over-and-undershoot</b></p> <p>Voltage change less than 10% of nominal value for load step from 50% to 100%. Return to regulation in under 1 ms.</p>	<p><b>Turn on Transient</b></p> <p>No Voltage overshoot during turn on.</p>									
<p><b>Protections *</b></p> <table border="0" style="width: 100%;"> <tr> <td style="width: 33%; vertical-align: top;"> <p><b>Input</b></p> <ul style="list-style-type: none"> <li>• <b>Inrush Current Limiter</b> Up to 6 times the maximum input current for less than 50 <math>\mu</math>s.</li> </ul> </td> <td style="width: 33%; vertical-align: top;"> <p><b>Output</b></p> <ul style="list-style-type: none"> <li>• <b>Over-voltage Protection</b> Passive transorb on output, 120% <math>\pm</math> 10% of nominal voltage.</li> <li>• <b>Current limiting</b> Continuous protection (10 to 30% above maximum current) for unlimited time.</li> </ul> </td> <td style="width: 33%; vertical-align: top;"> <p><b>General</b></p> <ul style="list-style-type: none"> <li>• <b>Over temperature protection</b> Shutdown at baseplate temperature of <math>+105\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}</math>. Automatic recovery at base plate temperature lower than <math>+95\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}</math>.</li> </ul> </td> </tr> </table>			<p><b>Input</b></p> <ul style="list-style-type: none"> <li>• <b>Inrush Current Limiter</b> Up to 6 times the maximum input current for less than 50 <math>\mu</math>s.</li> </ul>	<p><b>Output</b></p> <ul style="list-style-type: none"> <li>• <b>Over-voltage Protection</b> Passive transorb on output, 120% <math>\pm</math> 10% of nominal voltage.</li> <li>• <b>Current limiting</b> Continuous protection (10 to 30% above maximum current) for unlimited time.</li> </ul>	<p><b>General</b></p> <ul style="list-style-type: none"> <li>• <b>Over temperature protection</b> Shutdown at baseplate temperature of <math>+105\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}</math>. Automatic recovery at base plate temperature lower than <math>+95\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}</math>.</li> </ul>						
<p><b>Input</b></p> <ul style="list-style-type: none"> <li>• <b>Inrush Current Limiter</b> Up to 6 times the maximum input current for less than 50 <math>\mu</math>s.</li> </ul>	<p><b>Output</b></p> <ul style="list-style-type: none"> <li>• <b>Over-voltage Protection</b> Passive transorb on output, 120% <math>\pm</math> 10% of nominal voltage.</li> <li>• <b>Current limiting</b> Continuous protection (10 to 30% above maximum current) for unlimited time.</li> </ul>	<p><b>General</b></p> <ul style="list-style-type: none"> <li>• <b>Over temperature protection</b> Shutdown at baseplate temperature of <math>+105\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}</math>. Automatic recovery at base plate temperature lower than <math>+95\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}</math>.</li> </ul>									

\* Thresholds and protections can be modified / removed – please consult factory.

## M8186 SERIES DC/DC POWER SUPPLY

### Environmental Conditions

Designed to Meet MIL-STD-810F

#### Temperature

Methods 501.4 & 502.4

Operating: -55°C to +85°C (at baseplate)

Storage: -55°C to +125°C (ambient)

#### Altitude

Method 500.4

Procedure I – Storage/Air transport:

up to 70,000 ft. (non-operational)

Procedure II – Operation/Air Carriage:

up to 40,000 ft. (operational)

#### Humidity

Method 507.4

Up to 95% RH

#### Vibration

Method 514.5

Procedure I, Category 24

General minimum integrity exposure

IAW Figure 514.5C-17

1 hour per axis.

#### Shock

Method 516.5

Procedure I

20 g / 11 ms terminal peak sawtooth shock pulse

#### Salt Fog

Method 509.4

### Reliability

150,000 hours, calculated IAW MIL-HDBK-217F Notice 2 at +85 °C baseplate, Ground fixed conditions.

### Environmental Stress Screening (ESS)

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

### Pin Assignment

Pin No.	Function	Pin No.	Function	Pin No.	Function
1	Signal RTN	10	VIN (+)	19	N/C
2	- SENSE †	11	VIN (+)	20	VIN (-)
3	N/C	12	N/C	21	N/C
4	N/C	13	N/C	22	N/C
5	N/C	14	Inhibit	23	VIN (+)
6	N/C	15	+ SENSE †	24	N/C
7	VIN (-)	16	N/C	25	Chassis
8	VIN (-)	17	N/C		
9	N/C	18	N/C		

† Please inform factory if sense lines are required to be tied to the output from within, or if the remote sense compensation function will be used.

## M8186 SERIES DC/DC POWER SUPPLY

### Functions and Signals

#### INHIBIT

The **INHIBIT** signal is used to turn the power supply ON and OFF. OPEN – will turn on the power supply. SHORT – between pin 14 and pin 1 will turn off the power supply. This signal is referenced to the **SIGNAL RTN** pin.

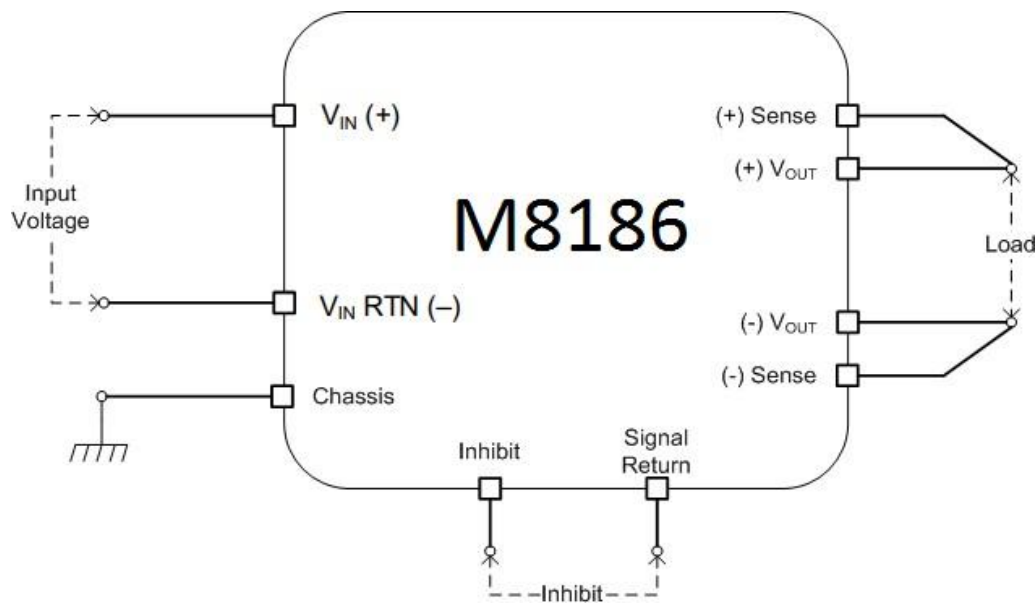
#### SENSE

The SENSE is used to achieve accurate load regulations at load terminals (this is done by connecting the pins directly to the load's terminals).

The use of remote sense has a limit of voltage dropout between converter's output and load terminals of 2-10% of voltage output (up to 2V).

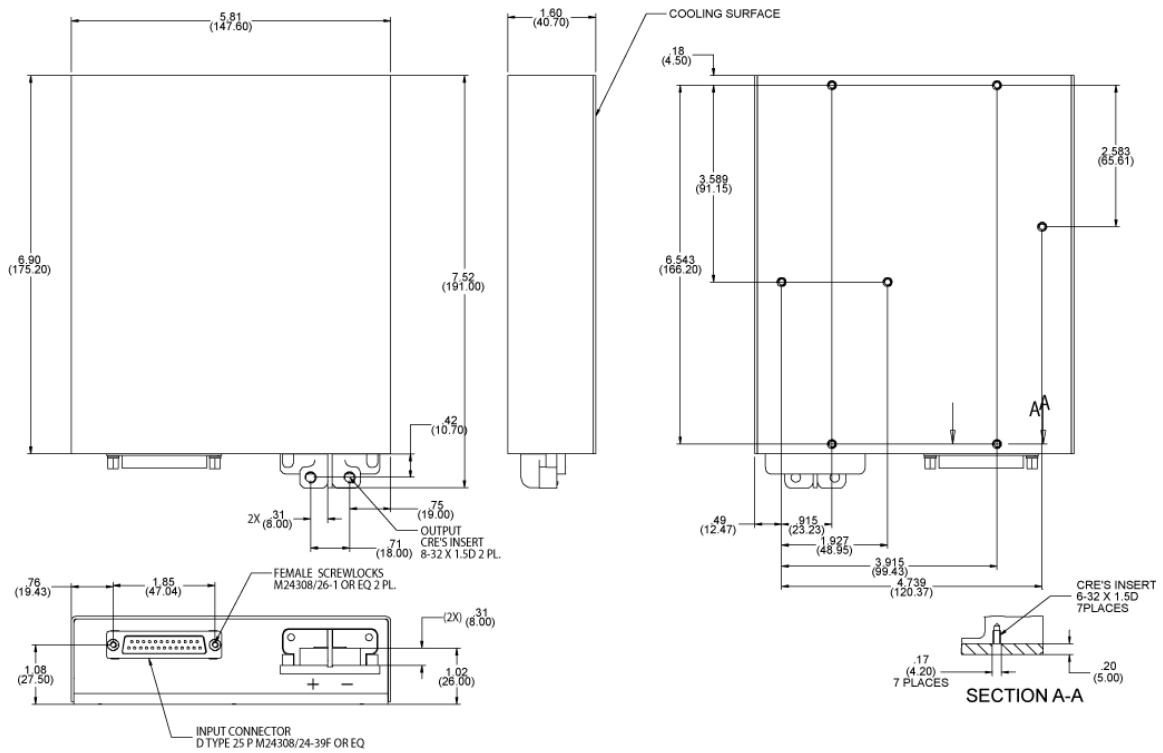
Please note that if sense lines are not used the output may rise as much as 2V above nominal outputs. If sense lines are not to be used in the application, please inform factory for internal connection to output pins.

### Typical Connection Diagram

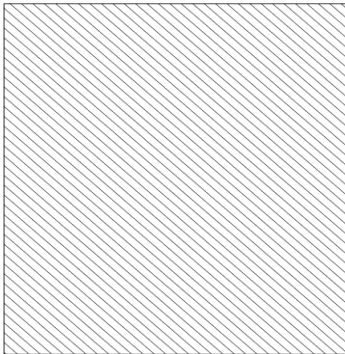


# M8186 SERIES DC/DC POWER SUPPLY

## Outline\* Drawing



## Heat Dissipation Surface



Dissipation Area  
40.08 in<sup>2</sup> (258.6 cm<sup>2</sup>)

### Notes

1. Dimensions are in inches [mm]
2. Tolerance is:  
.XX ± 0.025 in  
.XXX ± 0.010 in
3. Weight: Approx. 4.4 lbs [2 kg]

## M8186 SERIES DC/DC POWER SUPPLY

### Standard Configurations

Part number	Input	Output	
	Voltage range	Voltage	Current
M8186-100	220 to 350 Vdc	28 V <sub>DC</sub>	70 A
M8186-101	220 to 350 Vdc	28 V <sub>DC</sub>	70 A
M8186-102	220 to 350 Vdc	28 V <sub>DC</sub>	70 A

### Special Features

- **M8186-101:**
  - Parallel operation via output voltage droop. Voltage regulation is  $\pm 2\%$ .
- **M8186-102:**
  - Output voltage sense wires tied internally to the unit.

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