

M2109 SERIES

SINGLE-OUTPUT, UP TO 1KW AC/DC POWER SUPPLY

The M2109 is a series of mechanically robust, base plate cooled, high performance, 1kW single output AC to DC power supplies, for Navy shipboard, Airborne, and ground applications.

The M2109 converts 115VAC 50/60/400Hz or 230VAC 50/60/400Hz, to a well-regulated, filtered and protected DC Output.



THE MAIN FEATURES OF THE M2109 ARE:

- AC/DC Single output power supply up to 1kW
- 115VAC or 230VAC Standard Input version 50/60/400 Hz, single-phase
- For extended input version - **Please contact factory for more details**
- Very low input THDA
- Near unity power factor (>0.99)
- Input / Output isolation
- EMI filters included
- Remote sense compensation
- Remote Inhibit (On/Off)
- Fixed switching frequency
- External sync capability
- Parallel connection option
- Inrush Current Limiter
- Non-latching protections:
 - Overload/Short-circuit
 - Output Overvoltage
 - Over Temperature
 - Input Undervoltage Lockout

M2109 Series– AC/DC Power Supply

Standard Models List (for other voltages – consult factory)

Part number	Input		Output	
	Voltage range	Frequency	Voltage	Current
M2109-100	115V _{AC} / 50-400Hz / Single-phase	50 to 400 Hz	5 V _{DC}	70 A
M2109-101	115V _{AC} / 50-400Hz / Single-phase	50 to 400 Hz	12 V _{DC}	70 A
M2109-102	115V _{AC} / 50-400Hz / Single-phase	50 to 400 Hz	24 V _{DC}	42 A
M2109-103	115V _{AC} / 50-400Hz / Single-phase	50 to 400 Hz	28 V _{DC}	36 A
M2109-104	115V _{AC} / 50-400Hz / Single-phase	50 to 400 Hz	48 V _{DC}	21 A
M2109-200	230V _{AC} / 50-400Hz / Single-phase	50 to 400 Hz	5 V _{DC}	70 A
M2109-201	230V _{AC} / 50-400Hz / Single-phase	50 to 400 Hz	12 V _{DC}	70 A
M2109-202	230V _{AC} / 50-400Hz / Single-phase	50 to 400 Hz	24 V _{DC}	42 A
M2109-203	230V _{AC} / 50-400Hz / Single-phase	50 to 400 Hz	28 V _{DC}	36 A
M2109-204	230V _{AC} / 50-400Hz / Single-phase	50 to 400 Hz	48 V _{DC}	21 A

- Additional standard configurations available. **Contact factory for more details.**
- All our products can be configured to comply with EU REACH regulations. **Contact factory for more details.**

SPECIFICATIONS:

AC Input	Voltage Range	Option 1: 85-150VAC/50-400Hz/1 phase Option 2: 150-265VAC/50-400Hz/1 phase. For extended input version - Please contact factory for more details
	Isolation	Input to Output: 1000 VDC Input to Case: 1000 VDC
	Spikes	Optional to withstand 1000 V spikes IAW MIL-STD-1399-300B. please consult factory
	Current Waveform	Complies with the Harmonic Current limits of MIL-STD-1399-300B.
DC Output	Rating	See table on page 8
	Voltage Regulation	±1% (Nominal voltage range, from 10% load to full load, –40 °C to +85 °C at baseplate).
	Remote Sense	<p>SENSE (connector J2, pin 19) The SENSE line is used to achieve accurate voltage regulation at load terminals. To use this feature, connect this pin directly to load's positive terminal. If this function is not required, short SENSE pin to OUTPUT pins.</p> <p>SENSE RTN (connector J2, pin 18) The SENSE RTN line is used to achieve accurate voltage regulation at load terminals. To use this feature, connect this pin directly to load's negative terminal. If this function is not required, short SENSE RTN pin to OUT RTN pins.</p> <p>Note: For output voltage above 8V, the use of remote sense has a max limit of 0.25V voltage dropout between converter's output and load terminals. For output voltage above 12V, the use of remote sense has a max limit of 0.5V voltage dropout between converter's output and load terminals.</p>
	Ripple and Noise	(max. 1%) measured at load across 1 μF and 0.1 μF ceramic capacitors.
	Isolation	Output to Case: 200 V _{DC}
	Current Limit & Overload	Overload / Short-Circuit (HIC-UP) The converter shuts down (H.C) and restarts periodically while fault condition exists. Threshold set 120% ± 10% above maximum current
	Efficiency	87% typical (nominal line voltage, full load, room temperature)

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	<p><i>Overvoltage Protection</i></p>	<p>Over-Voltage active Internal control shuts output down (H.C) if voltage exceeds 110% ± 5% of nominal.</p> <p>Over-Voltage Passive Passive transorb, chosen at 120% ± 5% of nominal voltage.</p>
	<p><i>Over Temp. Protection</i></p>	<p>The converter shuts down if baseplate temperature exceeds +105 °C ± 5 °C. Automatic recovery upon cool down to below +95 °C ± 5 °C.</p>

Specifications (Cont.):

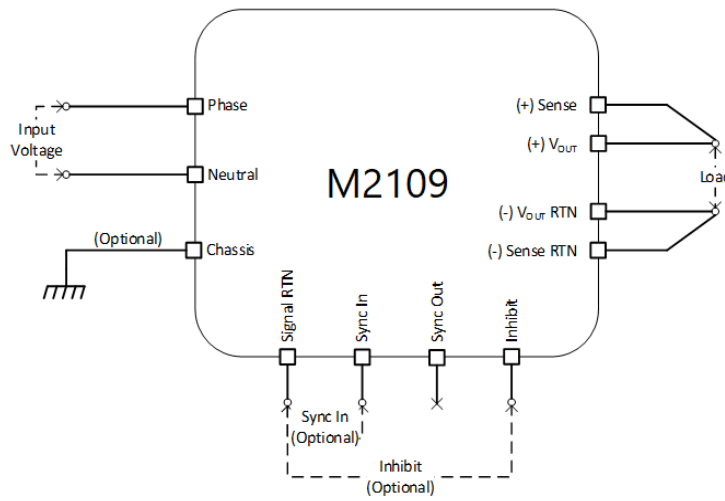
Control & Indication	<i>INHIBIT Input</i>	<p>INHIBIT (connector J2, pin 20) The INHIBIT signal is used to turn the power supply ON and OFF. TTL “1” or OPEN – Power supply active (output turned on). TTL “0” or SHORT to Signal RTN – Power supply inhibited (output turned off). If this function is not required, leave this pin unconnected. This signal is referenced to SIGNAL RTN (connector J2, pin 21)</p>
	<i>SIGNAL RTN</i>	<p>SIGNAL RTN (connector J2, pin 21) The SIGNAL RTN is a reference ground for the control signals SYNC IN, SYNC OUT and INHIBIT. This ground is floating from other parts of the power supply.</p>
	<i>SYNC IN</i>	<p>SYNC IN (connector J2, pin 62) The SYNC signal is used to synchronize the power supply's switching frequency to system's clock. Valid external clock frequency is 250 kHz ± 10 kHz. If this function is not required, leave this pin unconnected - the power supply will use its internal clock. This signal is referenced to SIGNAL RTN (connector J2, pin 21)</p>
	<i>SYNC OUT</i>	<p>SYNC OUT (connector J2, pin 42) The SYNC OUT signal is a buffered clock with the same frequency as that of the converter's actual switching frequency of 250 kHz ± 10 kHz. This signal can be used to synchronize other power supplies in the system in a master-slave setup. This signal is referenced to SIGNAL RTN (connector J2, pin 21)</p>
	<i>PWR GOOD</i>	<p>Power good: OK - 88% +/- 3% FAIL - under 80% Between 80-85% undefined so the voltage can be OK or FAIL Only above 85% it will be OK all the time, under 80% it will be FAIL all the time.</p>
Environment Designed to meet MIL-STD-810F	<i>Temperature</i>	<p>Methods 501.5 & 502.5 Procedure I (storage): –55 °C to +125 °C (ambient) Procedure II (operation): –40 °C to +85 °C (at baseplate)</p>
	<i>Humidity</i>	<p>Method 507.5 Up to 95% RH</p>
	<i>Salt-fog</i>	<p>Method 509.5</p>

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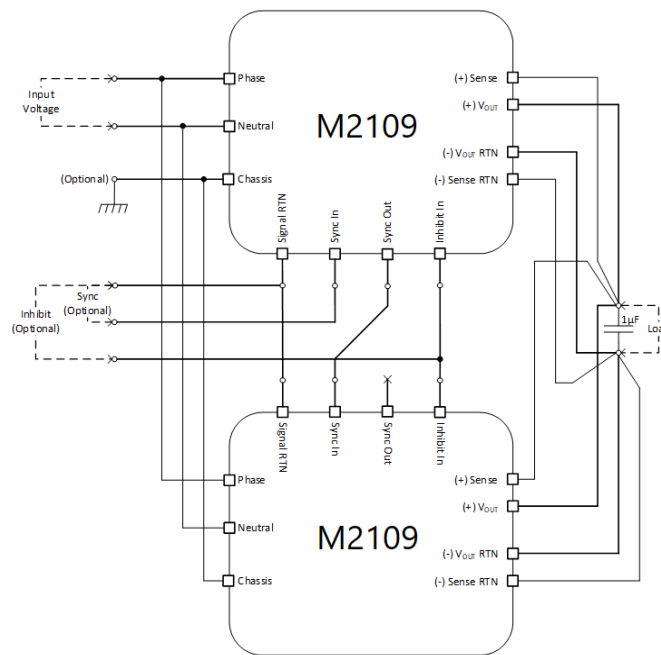
	Altitude	Method 500.5 Procedure I – Storage/Air transport: Up to 70 000 ft Procedure II – Operation/Air Carriage: Up to 40 000 ft
	Mechanical Shock	Method 516.6 Procedure I - Functional Shock Terminal peak sawtooth pulse, 20 g peak, 11 ms
	Vibration	<u>Vibration (Random)</u> Method 514.6 Procedure I Category 24 - General minimum integrity exposure <u>Vibration (Shipboard Equipment)</u> Method 528 Type I
	Fungus	Does not support fungus growth, in accordance with the guidelines of MIL-STD-454, Requirement 4-
EMI	MIL-STD-461F	Designed to meet* MIL-STD-461F CE101, CE102, CS101, CS114, CS115, CS116, RE101, RS101, RS103
Reliability	100,000 hours, calculated per MIL-STD-217F Notice 2 at +85 °C baseplate, Ground Fixed. 60,000 hours, calculated per MIL-STD-217F Notice 2 at +85 °C baseplate, Naval Sheltered.	
Cooling Requirements	The M2109 is a baseplate cooled unit. The base of the M2109 should be thermally attached to a suitable heatsink that maintains it below +85 °C.	
Form factor	5.51" wide, 1" high and 10.63" deep. For detailed dimensions and tolerances see Drawing: M2109001	
Weight	Estimated weight 1.8kg	
Connectors	See Page 12-13	

*Compliance achieved with shielded harness and static resistive load.

TYPICAL STAND-ALONE CONNECTION DIAGRAM



TYPICAL PARALLEL CONNECTION DIAGRAM

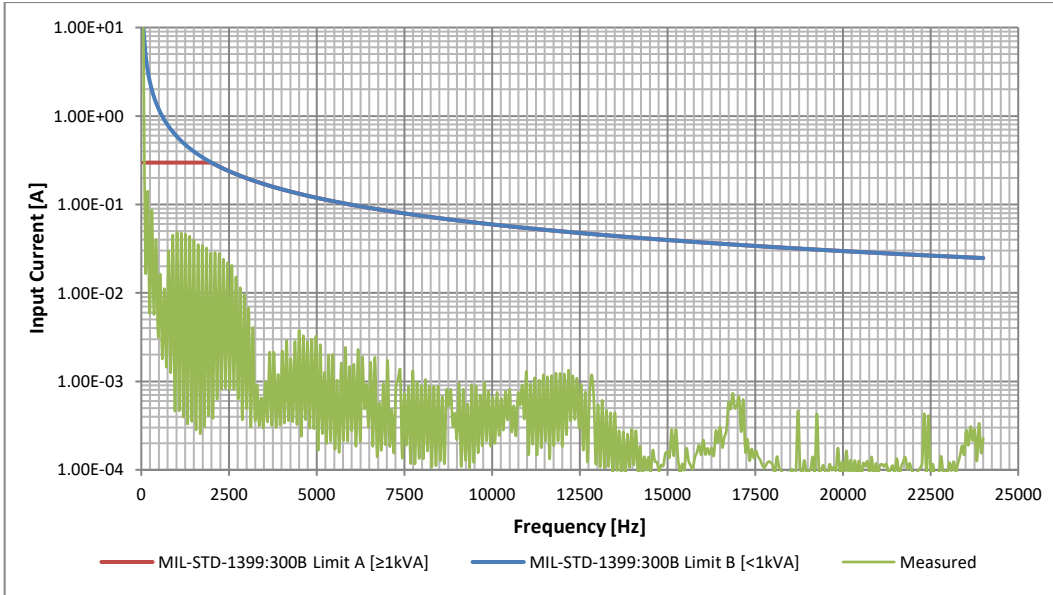


Note: Parallel operation via output voltage droop. Voltage regulation is ±2%.

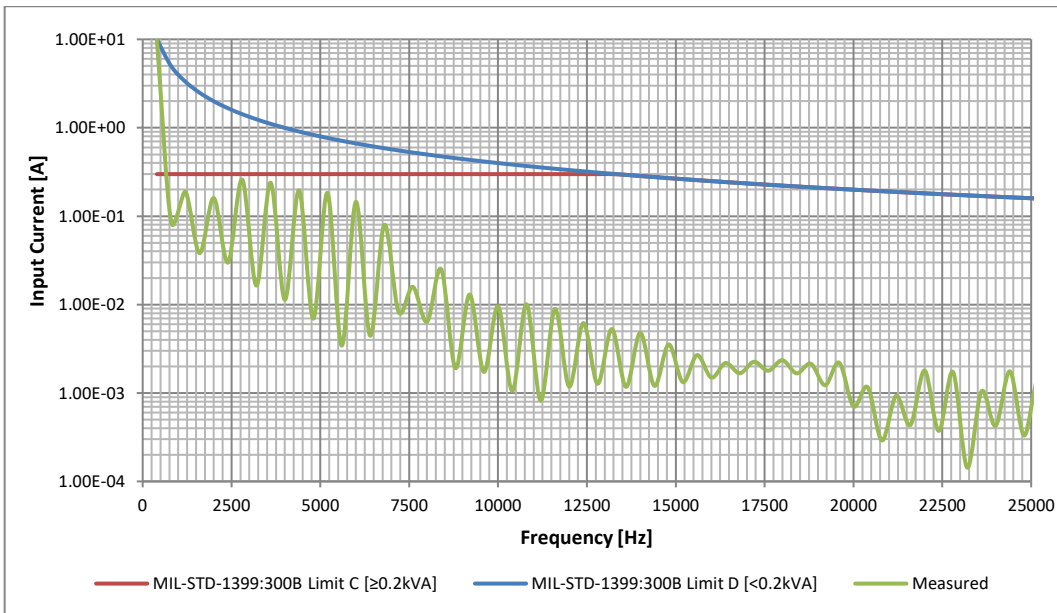
HIGHLIGHTS AND TYPICAL CHARACTERISTICS

INPUT CURRENT HARMONICS

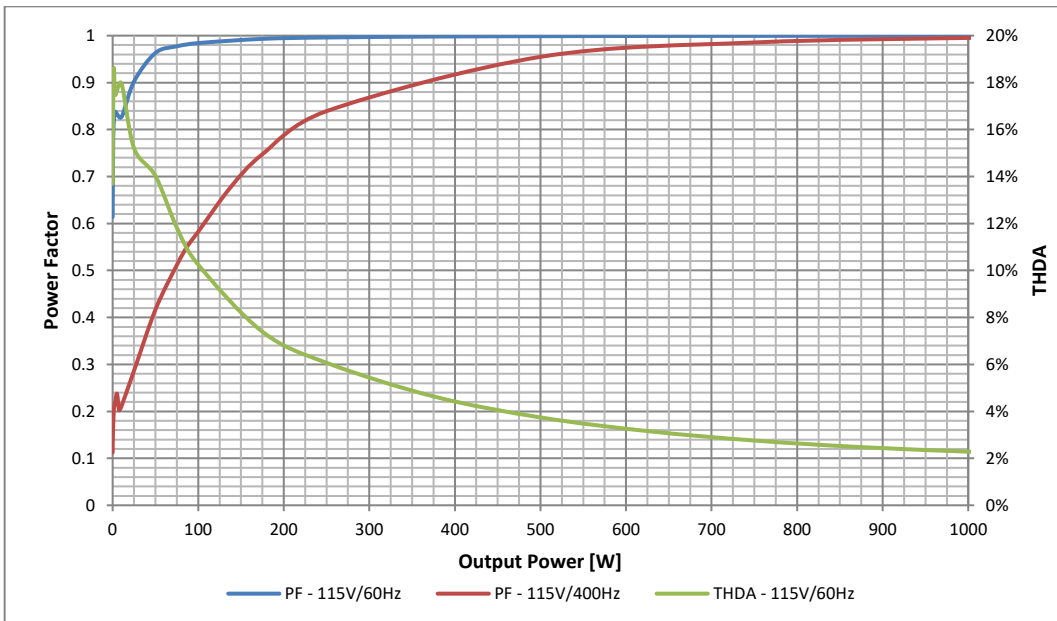
Input: 115 V_{AC} / 60 Hz , Output: 28 V_{DC} / 36 A (1 000 W)



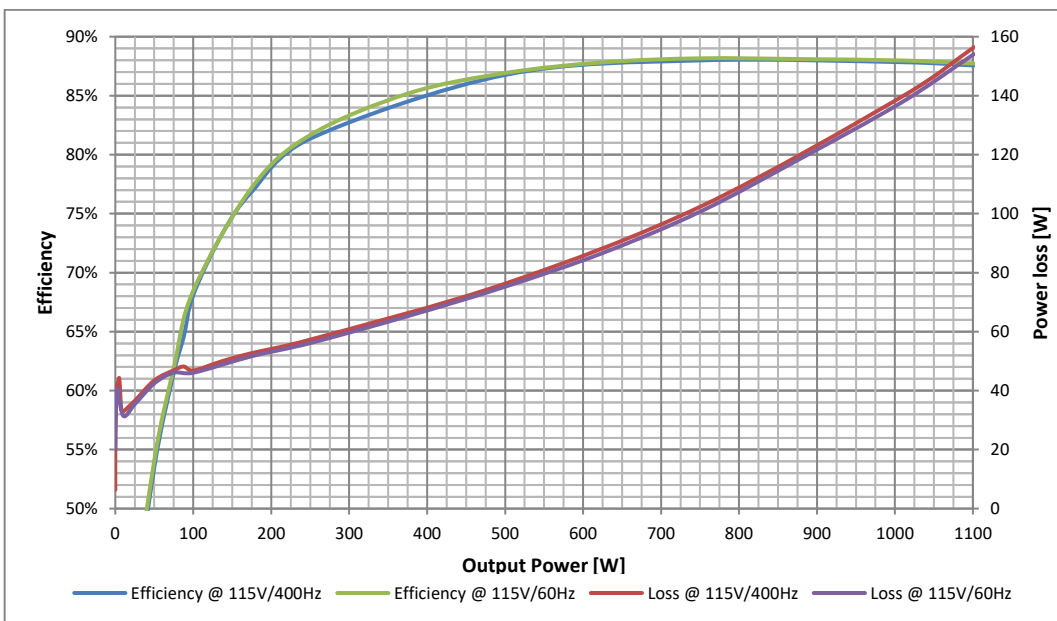
Input: 115 V_{AC} / 400 Hz , Output: 28 V_{DC} / 36 A (1 000 W)



POWER FACTOR AND INPUT CURRENT TOTAL HARMONIC DISTORTION (THDA)

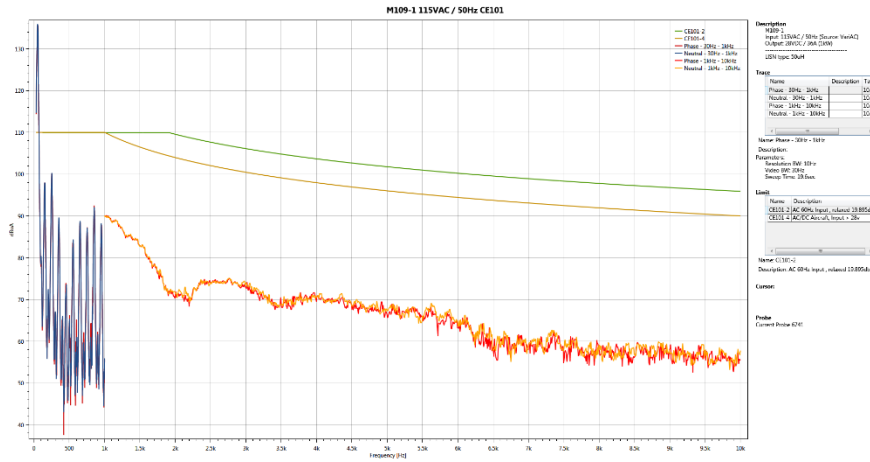


EFFICIENCY AND LOSS

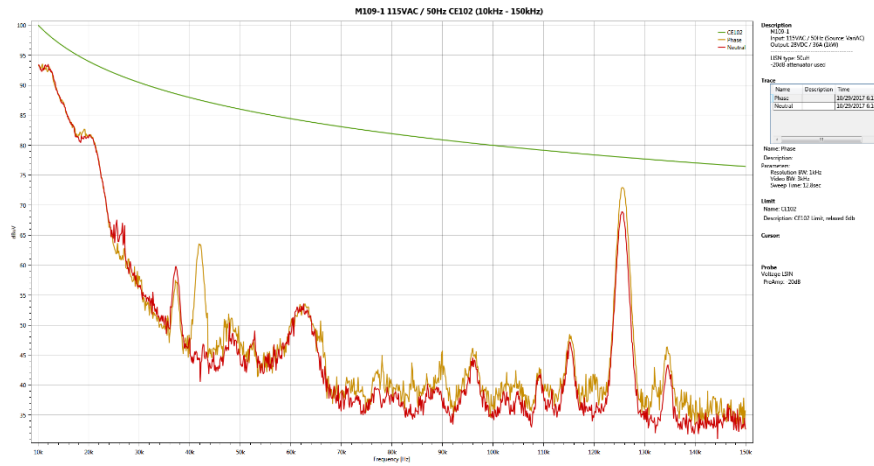


CONDUCTED EMISSIONS (IAW MIL-STD-461F)

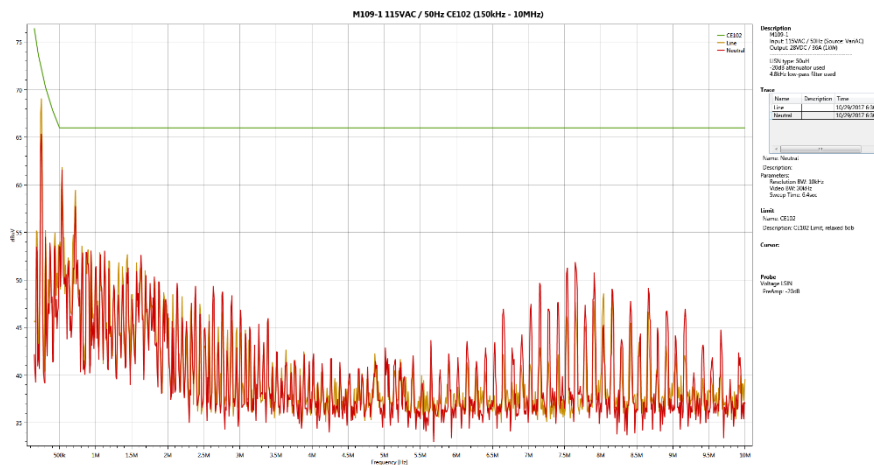
CE101 - 30 Hz to 10 kHz:



CE102 - 10 kHz to 150 kHz:



CE102 - 150 kHz to 10 MHz:



PIN ASSIGNMENT: J1 - INPUT CONNECTOR

Connector type: Input male connector: P/N - CBM9W4M75000C OR EQ.

Mates with: Shell P/N - CBM9W4F2000C.

Power pins P/N - FS4012D (4 units per set).

Pin No.	Function
A1	LINE
A2	N/C
A3	NEUTRAL
A4	GND
1	N/C
2	N/C
3	N/C
4	N/C
5	N/C

Note: All pins with identical function/designation should be connected together for optimal performance.

PIN ASSIGNMENT: J2 - OUTPUT CONNECTOR

Connector type: Output female connector: P/N – M24308/2-14F OR EQ.

Mates with: M24308/4-14F

Pin No.	Function	P
1	OUT	+
2	OUT	+
3	OUT	+
4	OUT	+
5	OUT	+
6	OUT	+
7	OUT	+
8	OUT	+
9	OUT RTN	-
10	OUT RTN	-
11	OUT RTN	-
12	OUT RTN	-
13	OUT RTN	-
14	OUT RTN	-
15	OUT RTN	-
16	OUT RTN	-
17	OUT RTN	-
18	SENSE RTN	-
19	SENSE	+
20	INHIBIT	+
21	SIGNAL RTN	-

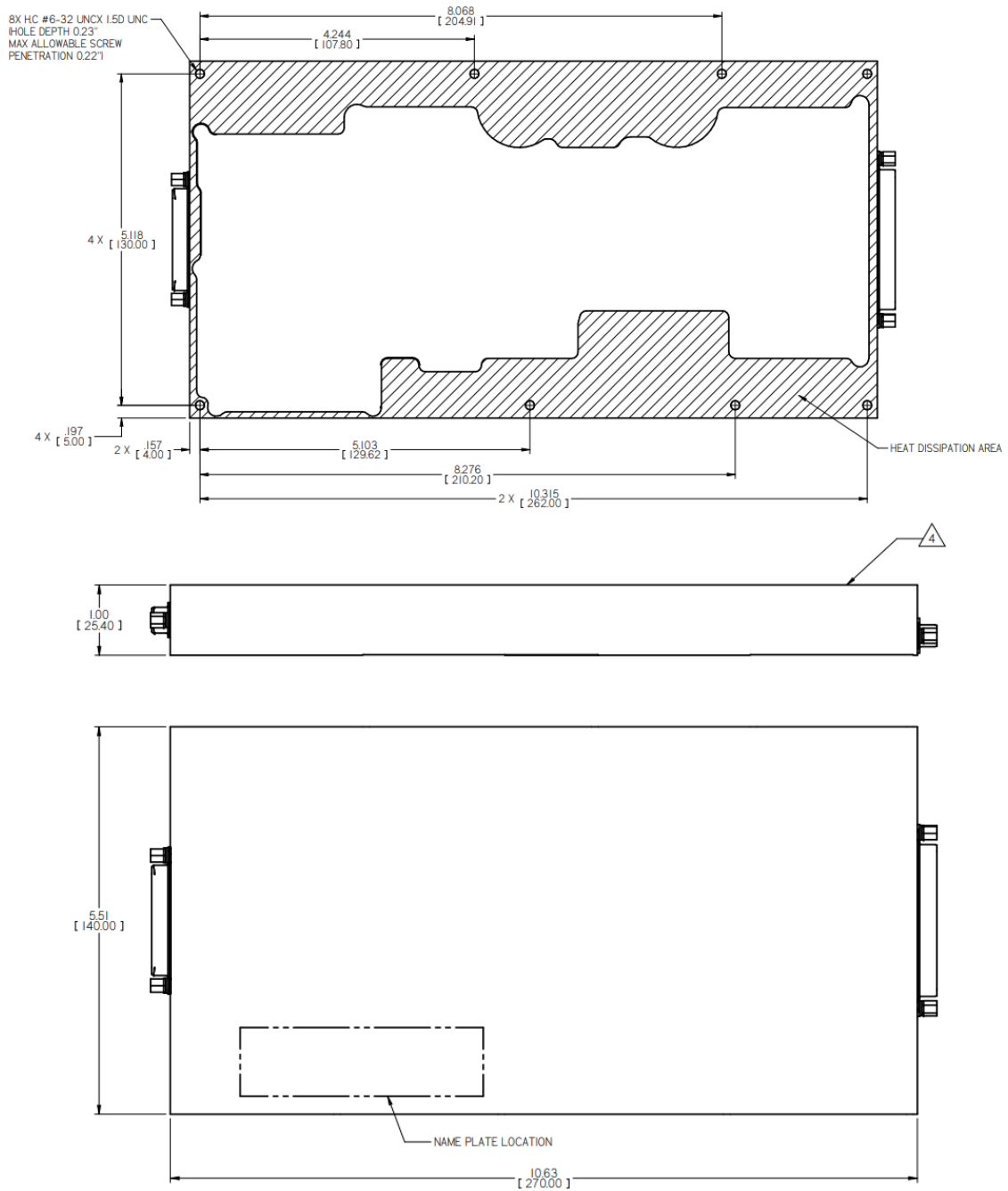
Pin No.	Function	P
22	OUT	+
23	OUT	+
24	OUT	+
25	OUT	+
26	OUT	+
27	OUT	+
28	OUT	+
29	OUT	+
30	OUT	+
31	OUT RTN	-
32	OUT RTN	-
33	OUT RTN	-
34	OUT RTN	-
35	OUT RTN	-
36	OUT RTN	-
37	OUT RTN	-
38	OUT RTN	-
39	OUT RTN	-
40	PWR GOOD	
41	PWR GOOD RTN	
42	SYNC OUT	+

Pin No.	Function	P
43	OUT	+
44	OUT	+
45	OUT	+
46	OUT	+
47	OUT	+
48	OUT	+
49	OUT	+
50	OUT	+
51	OUT	+
52	OUT RTN	-
53	OUT RTN	-
54	OUT RTN	-
55	OUT RTN	-
56	OUT RTN	-
57	OUT RTN	-
58	OUT RTN	-
59	OUT RTN	-
60	N/C	
61	N/C	
62	SYNC IN	+

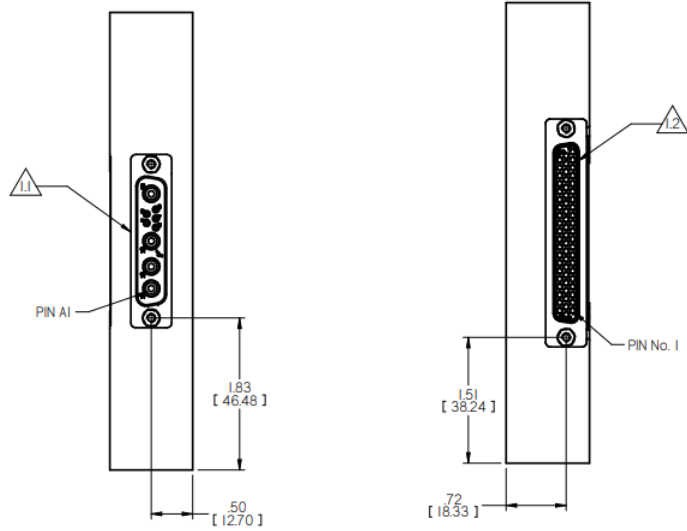
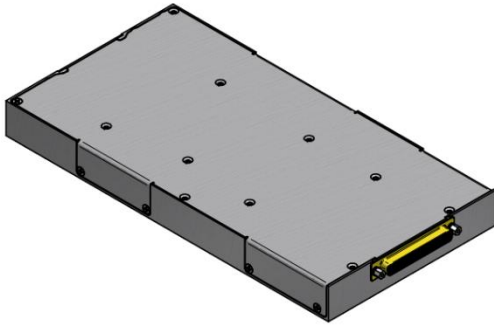
Note: All pins with identical function/designation should be connected together for optimal performance.

OUTLINE DRAWING:

For detailed dimensions and tolerances see Drawing: M2109001



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ENERCON SCD NUMBER	
UNLESS OTHERWISE SPECIFIED	
DIMENSIONS ARE IN [IN]	GENERAL TOLERANCES
DO NOT SCALE DRAWING	.XX ± .03 .XXX ± .010 ANGLES ± .5°

NOTES :

1. CONNECTORS LIST:
 - 1.1. J1: INPUT MALE CONNECTOR:
POSITRONIC CBM9W4M75000C OR EQ
 - 1.2. J2: OUTPUT FEMALE CONNECTOR: M24308/2-14F OR EQ
2. MTL. AL 6061-T651 & AL 5052-H32.
3. FINISH:
 - 3.1. CHROMATE CONVERSION COATING PER MIL -DTL-554I, LAST REVISION, TYPE I, CLASS IA.
4. COOLING:
HEAT DISSIPATION AREA- 19.7 [IN²].
5. WORKMANSHIP SHALL BE MIL-STD-454, REQ. 9

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