M7009 SERIES

DC/DC POWER SUPPLY

PRODUCT HIGHLIGHTS

- **MINIATURE**

- **HIGH DENSITY**

- **SINGLE OUTPUT**

- **DC/DC POWER SUPPLY**

- **UP TO 75 W**

Applications

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

Special Features

- Miniature size
- High efficiency
- Input / Output isolation

- Fixed switching freq.
- EMI filters included
- Remote inhibit (On/Off)

- Non-latching protections:
  - Input under/over voltage
  - Overload/Short-circuit
  - Over temperature

Electrical Specifications

DC Input
Normal steady-state voltage range:
18 to 36 V_{DC}

DC Output
Voltage range: 3.3 to 56 V
Current range: 0 to 10 A
Power range: 0 to 75 W

Isolation
Input to Output: 200 V_{DC}
Input to Case: 200 V_{DC}
Output to Case: 100 V_{DC}

Abnormal transient protection[†]
MIL-STD-1275A (100 V for 50 ms)
MIL-STD-704A (80 V for 0.1 s)

Efficiency
80% typical (28V variant, at nominal input voltage, full load, room temperature)

EMC
Meets[*] MIL-STD-461F
CE102, CS101, CS114, CS115, CS116, RE102, RS103.
Designed to meet[*] MIL-STD-461F
CE101, RE101, RS101

Output voltage regulation
Less than ±1% (low to high input voltage, no load to full load, –55 °C to +85 °C at baseplate).

Ripple and Noise
100-150 mV_{p-p}, typical (max. 1%) without external capacitance.

Turn-on Transient
No overshoot.

[†]   Converter will not be damaged, but may shutdown during the transient, and restart once input voltage is back within range.

[*]   Compliance achieved with 5µH LISN, shielded harness and static resistive load.

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Protections **

Input

- **Under-Voltage Lockout**
  Converter shuts if input voltage is below 16 ± 1V.
- **Over-Voltage Lockout**
  Converter shuts down if input voltage is above 51 ± 2V.

Output

- **Active Over-Voltage Protection**
  Passive transorb selected at 110% ± 5% at output.
- **Passive Over-Voltage Protection**
  Transorb at output selected 20% ± 5% above nominal voltage.
- **Overload / Short-Circuit Protection**
  Output voltage turns off and on periodically with low duty-cycle (hiccup) to protect system conductors and converter from short circuit.

General

- **Over Temperature Protection**
  Shutdown if baseplate temperature exceeds +105 °C ± 5 °C.
  Automatic recovery upon cooldown to below +95 °C ± 5 °C.

Environmental Conditions

Designed to meet MIL-STD-810G

Temperature
Methods 501.5 & 502.5
Operating: –55 °C to +85 °C (at baseplate)
Storage: –55 °C to +125 °C (ambient)

Vibration
Method 514.6

Category 7: Aircraft – Jet, IAW figure C-6, 13.7grms, 1 hour per axis.

Category 24: Minimum integrity, IAW figure E-3, 7.7 grms, 1 hour per axis.

Altitude
Method 500.5
Procedures I – up to 70,000 ft. (non-operational)
Procedure II – up to 70,000 ft. (operational)

Shock
Method 516.6
Operational shock: 30 g, 11 ms, half-sine
Crash safety: 100 g, 6 ms, half-sine

Humidity
Method 507.5
Up to 95% RH

Salt Fog
Method 509.5

Reliability

150,000 hours, calculated per MIL-STD-217F Notice 2 at +85°C baseplate, Ground Fix environment.
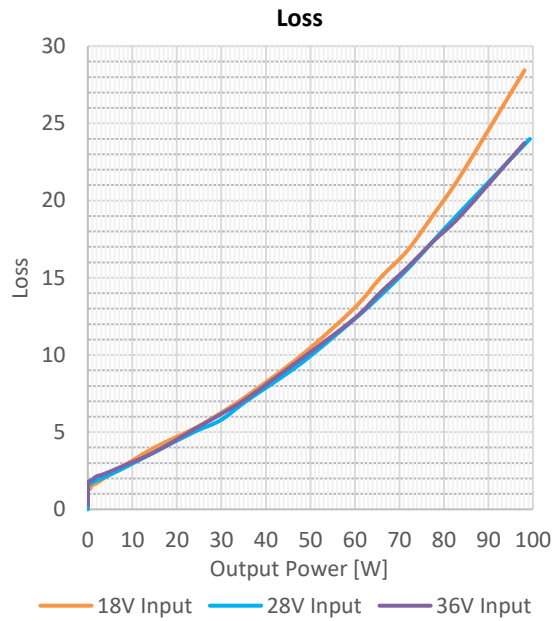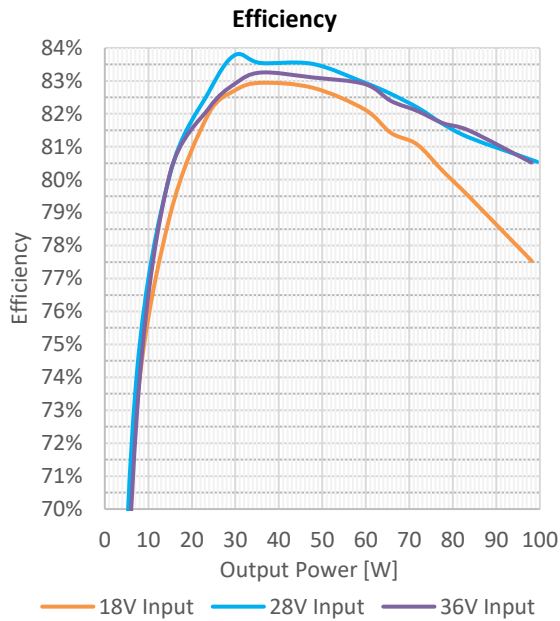
Environmental Stress Screening (ESS)

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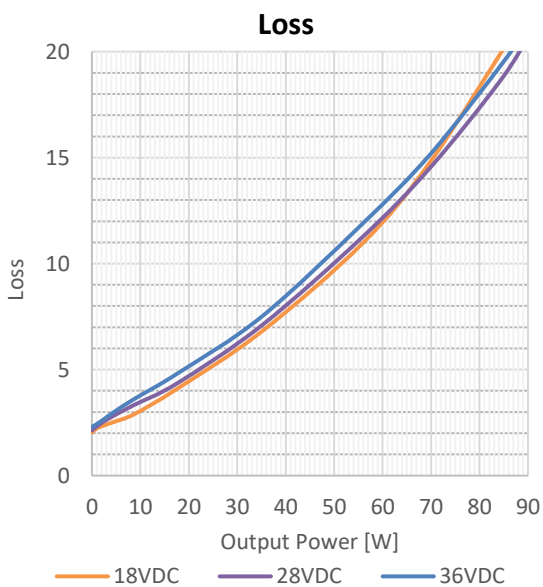

** Thresholds and protections can be modified / removed – please consult factory.

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Typical Efficiency/Loss Curves

M7009-101 (12 V$_{DC}$ output)
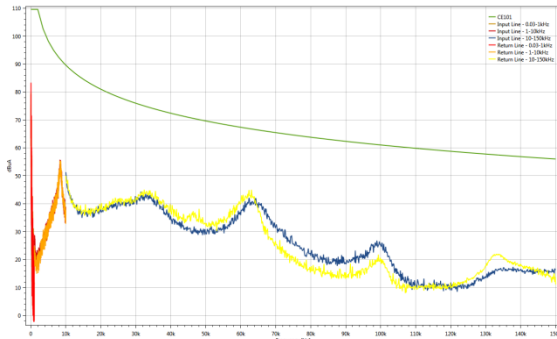

M7009-104 (28 V$_{DC}$ output)
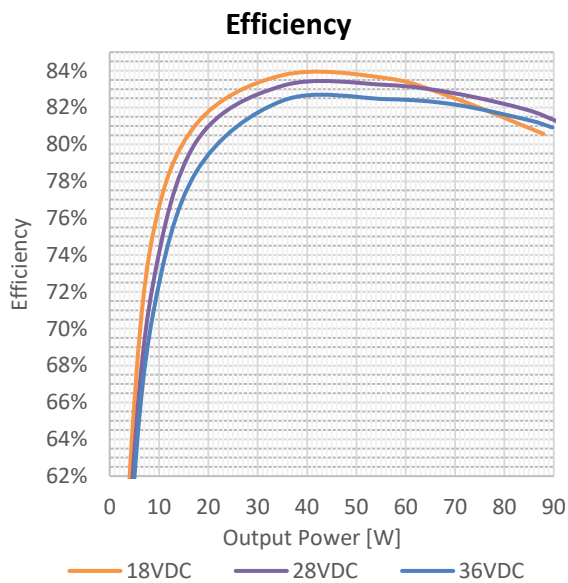
Typical MIL-STD-461F Conducted Emissions Plots
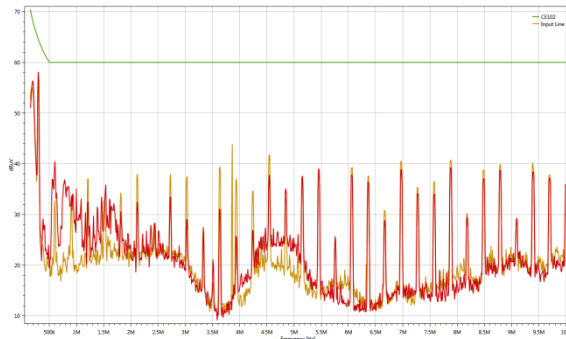
The following measurements were performed with 5 µH LISNs

M7009-101 (12 V_{DC} output)

Test conditions:

Input	Voltage: 28.074 V_{DC}		
Output	Voltage: 12.018 V_{DC}	Current: 6.048 A	Power: 72.68 W

CE101 (30 Hz to 150 kHz)

CE102 (150 kHz to 10 MHz)

M7009-104 (28 V_{DC} output)

Test conditions:

Input	Voltage: 28.01 V_{DC}		
Output	Voltage: 28.015 V_{DC}	Current: 2.8524 A	Power: 79.9 W
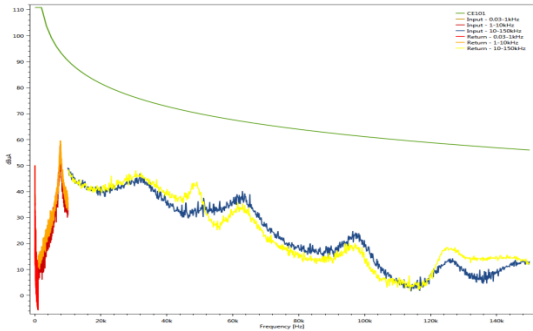
CE101 (30 Hz to 150 kHz)

CE102 (150 kHz to 10 MHz)

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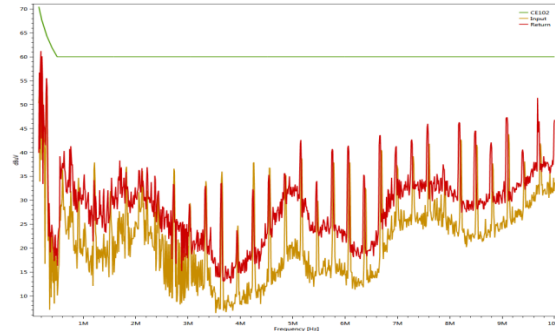
Functions and Signals

INHIBIT (pin 8)
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. For constant operation, leave this pin unconnected.
Applying "0" or shorting this pin to its return line will turn the power supply OFF.
(Optional to change the logic of this signal. Please consult with factory.)

Signal Type: 5V TTL or dry contact (open/short).

Return line: This signal is referenced to **INHIBIT RTN** pin.

Optional to change the logic of these signals. Please consult with the factory.

SENSE (pin 2) & SENSE RTN (pin 3)
Description: The **SENSE** is used to compensate for voltage drop across the output wires by sensing the voltage at the load and correcting the increasing the output voltage accordingly, to provide the desired voltage at the load's terminals.
Operation: Connect the **SENSE** pin to the positive load terminal, and the **SENSE RTN** pin to the negative (return) load terminal.
The sense compensation is typically limited to 5% or 0.5V – the lesser of the two.
If not used, connect **SENSE** directly to **OUTPUT** pins, and the **SENSE RTN** pin directly to the **OUTPUT RTN** pins.
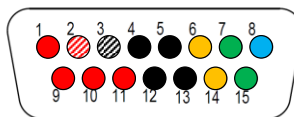**IMPORTANT: to avoid damage to the converter and/or the load - DO NOT LEAVE THE SENSE/SENSE RTN PINS UNCONNECTED.**

Pin Assignment

Connector: M24308/24-38F or eq.

Mates with: M24308/2-2F or eq.

Pin No.	Function			Pin No.	Function		
1	OUTPUT	+	🔴	9	OUTPUT	+	🔴
2	SENSE	+	◕	10	OUTPUT	+	🔴
3	SENSE RTN	–	◑	11	OUTPUT	+	🔴
4	OUTPUT RTN	–	⚫	12	OUTPUT RTN	–	⚫
5	OUTPUT RTN	–	⚫	13	OUTPUT RTN	–	⚫
6	INPUT RTN	–	🟡	14	INPUT RTN	–	🟡
7	INPUT	+	🟢	15	INPUT	+	🟢
8	INHIBIT	+	🔵				

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Outline Drawing

3.26 +0.02/-0.02
(82.7)

1.83
(46.5)

1.527
(38.8)

A   A

3.059
(77.7)

.10
(2.5)

.72
(18.2)

COOLING SURFACE

M24308/24−38

M24308/26−1(OR EQ.)
2 PLACES

.38
(9.6)

ø.126
(ø3.2)

.087
(2.2)

CRE'S INSERT
4−40x1.5D

SECTION A−A
TYP 4 PL

Notes
1. Dimensions are in inches [mm]
2. Tolerance is:
   .XX ± 0.01 in
   .XXX ± 0.005 in
3. Weight: 4.76 oz [135 g]

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Standard Configurations

This PN can be configured to any output voltage within its possible range (see 'DC Output – Voltage range' in 'Electrical Specifications' table).

Part Number	Output Voltage	Max Output Current
M7009-100	5 V_{DC}	10 A
M7009-101	12 V_{DC}	6 A
M7009-102	15 V_{DC}	5 A
M7009-103	24 V_{DC}	3 A
M7009-104	28 V_{DC}	2.5 A
M7009-105	48 V_{DC}	1.5 A

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

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