

# M7528 SERIES

## SINGLE-OUTPUT, 1000W DC TO DC BASEPLATE COOLED POWER SUPPLY

The M7528 is a series of mechanically robust, base-plate cooled, high performance, power supplies, designed for Airborne (MIL-STD-704), Ground Mobile (MIL-STD-1275) and other Hi-Reliability applications. The M7528 converts MIL-STD-704F and MIL-STD-1275E 28V power, to a well regulated, filtered and protected DC Output.



## M7528 Series– DC/DC Power Supply

**Standard Models List** (for other voltages – consult factory)

| Part Number | Output             |         | Power | Special features   |
|-------------|--------------------|---------|-------|--|
|             | Voltage            | Current |       |  |
| M7528-101   | 12 V <sub>DC</sub> | 50 A    | 600W  |  |
| M7528-102   | 15 V <sub>DC</sub> | 50 A    | 750W  |  |
| M7528-103   | 24 V <sub>DC</sub> | 42 A    | 1008W |  |
| M7528-104   | 28 V <sub>DC</sub> | 36 A    | 1008W |  |
| M7528-105   | 48 V <sub>DC</sub> | 20A     | 960W  |  |
| M7528-106   | 28 V <sub>DC</sub> | 36A     | 1008W | Parallel operation via output voltage droop. Voltage regulation is $\pm 2\%$ . |
| M7528-107   | 48 V <sub>DC</sub> | 20A     | 960W  | Parallel operation via output voltage droop. Voltage regulation is $\pm 2\%$ . |

- Additional standard configurations available. **Contact factory for more details.**
- All of our products can be configured to comply with EU REACH regulations. **Contact factory for more details.**
- Rides through transients IAW MIL-STD-1275E and MIL-STD-704F.

## M7528 Series– DC/DC Power Supply

### THE MAIN FEATURES OF THE M7528 ARE:

- DC/DC Single outputs power supply up to 1000W
- Standard Input version IAW MIL-STD-704F
- Standard Input version IAW MIL-STD-1275E
- Rides through transients IAW MIL-STD-1275E and MIL-STD-704F
- High efficiency – up to 88% (depending on output voltage).
- Full galvanic isolation between Input, Chassis and Outputs
- External Inhibit (On/Off)
- Fixed switching freq. (250 kHz)
- EMI filters included
- Remote sense compensation
- Indefinite short circuit protection with auto-recovery
- Over-voltage protection
- Over temperature shutdown with auto-recovery
- High density
- Conduction cooled via the baseplate

## M7528 Series– DC/DC Power Supply

### SPECIFICATIONS:

|                                  |                                      |   |
|----------------------------------|--------------------------------------|---|
| <b>DC Input</b>                  | <b><i>Voltage Range</i></b>          | 28VDC input IAW MIL-STD-704F and MIL-STD-1275E  |
|                                  | <b><i>Transients</i></b>             | Rides through transients IAW MIL-STD-1275E and MIL-STD-704F:<br>12V, 1sec<br>16V, 30sec<br>18V Continuous<br>50V Continuous<br>100V, 50msec   |
|                                  | <b><i>Isolation</i></b>              | Input to Output: 200 VDC<br>Input to Case: 200 VDC  |
|                                  | <b><i>Input Reverse Polarity</i></b> | Protection for unlimited time   |
|                                  | <b><i>Under-Voltage Lock-Out</i></b> | Unit shuts down when input voltage falls below 10.5VDC ±1VDC<br><b>Please consult factory for more details.</b>   |
|                                  | <b><i>Over-Voltage Lock-Out</i></b>  | Unit shuts down when input voltage rises above 104V <sub>DC</sub> ±2V <sub>DC</sub><br><b>Please consult factory for more details.</b>  |
|                                  | <b>DC Output</b>                     | <b><i>Rating</i></b>  |
| <b><i>Voltage Regulation</i></b> |                                      | Better than or equal to ±1%<br>(low to high line voltage, no load to full load, –55 °C to +85 °C at baseplate).   |
| <b><i>Remote Sense</i></b>       |                                      | <u>Description:</u> Used to achieve accurate voltage regulation at load terminals, to compensate for voltage drop across the leads connecting the converter to the load, 0.25 V ± 0.1 V<br><u>Use:</u> Connect SENSE line directly to the load's positive terminal, and SENSE RTN directly to the load's negative terminal.<br>If not used, connect SENSE to OUTPUT and SENSE RTN to OUTPUT RTN. Do not leave open! |
| <b><i>Ripple</i></b>             |                                      | Less than 50mV <sub>p-p</sub> , typical (max. 1%) without external capacitance. When connected to system capacitance ripple drops significantly.  |
| <b><i>Isolation</i></b>          |                                      | Output to Case: 100 VDC   |

## M7528 Series– DC/DC Power Supply

|  |  |  |
|--|--|--|
|  | <b><i>Overvoltage Protection</i></b>       | <ul style="list-style-type: none"> <li>• <b>Active Over-Voltage Protection:</b><br/>The secondary control circuit takes the over if output voltage exceeds <math>110\% \pm 5\%</math> of nominal voltage. Beyond this, output voltage clamps.</li> <li>• <b>Passive Over-Voltage Protection:</b><br/>Zener diode installed on output terminals, selected at <math>120\% \pm 10\%</math> of nominal voltage.</li> </ul> |
|  | <b><i>Efficiency</i></b>                   | <p>For 18 to 48Vdc input with 28V/36A output: 88-89% typical</p> <p>For 12-100Vdc input with 28V/36A output: 85% typical</p>   |
|  | <b><i>Current Limit &amp; Overload</i></b> | Output voltage turns off and on periodically with low duty cycle (hiccup) to protect system conductors and converter from short circuit  |
|  | <b><i>Over Temp. Protection</i></b>        | Output shuts down if base plate temperature exceeds $+105^{\circ}\text{C} \pm 5^{\circ}\text{C}$ . Automatic recovery when baseplate temperature returns to below $+95^{\circ}\text{C} \pm 5^{\circ}\text{C}$ .  |

## M7528 Series– DC/DC Power Supply

### Specifications (Cont.):

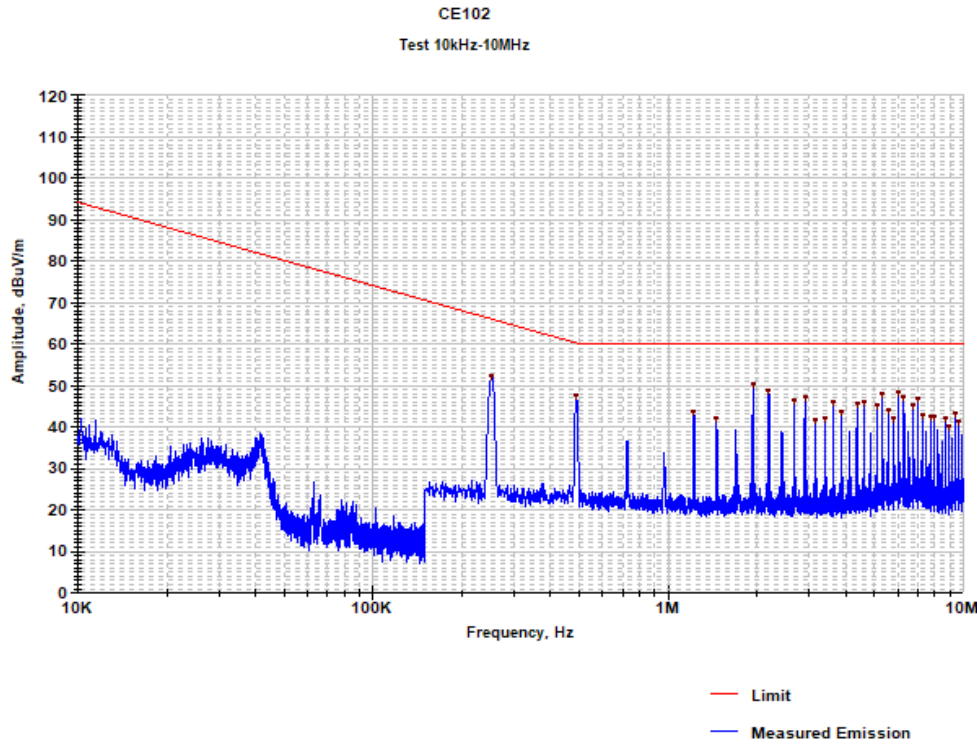
|  |                                |   |
|--|--------------------------------|---|
| <b>Control &amp; Indication</b>                  | <b><i>INHIBIT Signal</i></b>   | <p><u>Description:</u> Inhibits output.<br/> <u>Use:</u> Apply short circuit or TTL "LOW" to turn off the power supply.<br/>           Leave open or apply TTL "HIGH" to turn on the power supply.<br/> <u>Referenced to:</u> SIGNAL RTN</p>  |
|  | <b><i>SYNC</i></b>             | <p><u>Description:</u> Synchronizes internal switching frequency to system clock. <u>Use:</u> Apply TTL level, 250 kHz ± 10 kHz, 50% duty-cycle clock.<br/>           Leave open if unused. In this case, the switching frequency will be set by the internal clock (250 kHz)<br/> <u>Referenced to:</u> SIGNAL RTN</p> |
|  | <b><i>SIGNAL RTN</i></b>       | <p><u>Description:</u> Signals return reference.<br/> <u>Referenced to:</u> Connected by a 100 Ω resistor to INPUT RTN</p>  |
|  | <b><i>POR Optional</i></b>     | <p><u>Description:</u> The <b>POR</b> signal disables the input under voltage lockout, input over voltage lockout, over temperature protection and peak load duration limiter.<br/> <b>Please consult factory for details.</b></p>  |
| <b>Environment Designed to meet MIL-STD-810F</b> | <b><i>Temperature</i></b>      | <p>Methods 501.4 &amp; 502.4<br/>           Operating: –55 °C to +85 °C (at baseplate)<br/>           Storage: –55 °C to +125 °C (ambient)</p>  |
|  | <b><i>Humidity</i></b>         | <p>Method 507.4<br/>           Up to 95% RH</p>   |
|  | <b><i>Salt-fog</i></b>         | <p>Method 509.4</p>   |
|  | <b><i>Altitude</i></b>         | <p>Method 500.4<br/>           Procedures I – Storage/Air transport:<br/>           up to 70,000 ft. (non-operational)<br/>           Procedure II – Operation/Air Carriage:<br/>           up to 70,000 ft. (operational)</p>  |
|  | <b><i>Mechanical Shock</i></b> | <p>Method 516.5<br/>           Procedure I<br/>           30 g / 11 ms terminal peak saw-tooth</p>  |
|  | <b><i>Vibration</i></b>        | <p>Method 514.5<br/>           Category 4 - General minimum integrity exposure<br/>           IAW Figure 514.5C-17<br/>           1 hour per axis.</p>  |
|  | <b><i>Fungus</i></b>           | <p>Does not support fungus growth, in accordance with the guidelines of MIL-STD-454, Requirement 4-</p>   |

## M7528 Series– DC/DC Power Supply

|                             |  |   |
|-----------------------------|--|---|
| <b>EMI</b>                  | <i>MIL-STD-461F</i>  | <p>Designed to meets* MIL-STD-461F CE101, CE102, CS101, CS114, CS115, CS116, RE101, RE102, RS101, RS103</p> <hr/> <p>*EMI Compliance achieved with 5<math>\mu</math>H LISN, shielded harness and static resistive load.</p> |
| <b>Reliability</b>          | 150,000 hours, calculated per MIL-HDBK-217F Notice 2 at +85 °C baseplate, Ground Fix conditions.   |   |
| <b>Cooling Requirements</b> | The M7528 is a baseplate cooled unit. The base of the M7528 should be thermally attached to a suitable heatsink that maintains it below +85 °C.  |   |
| <b>Form factor</b>          | 4.76" wide, 1.29" high and 6.40" deep. For detailed dimensions and tolerances see Drawing: TBD.  |   |
| <b>Weight</b>               | Approx. 1100 g.  |   |
| <b>Connectors</b>           | <p><b>Input connector</b> - J1 Connector type: M24308/24-40F or eq<br/> <b>Mates with:</b> M24308/2-4F or eq.</p> <p><b>Output connector</b> – J2 Connector type: M24308/23-39F or eq<br/> <b>Mates with:</b> M24308/4-3F or eq.</p> |   |

**M7528 Series– DC/DC Power Supply**

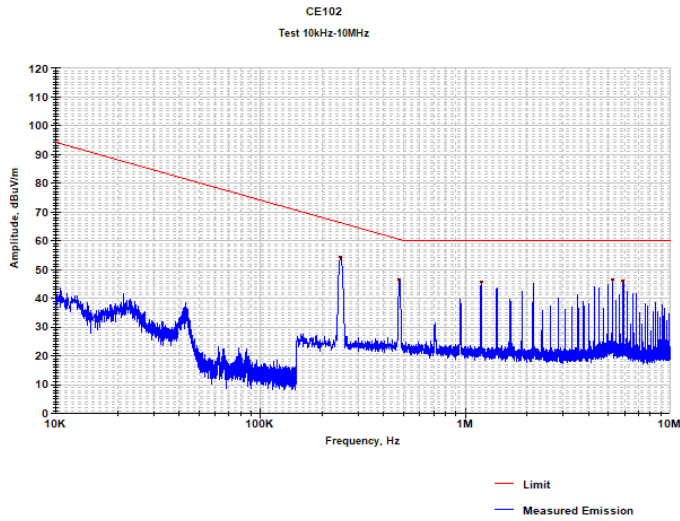
**Vin 28V**



| Frequency (MHz) | Measured Emission (dBuV/m) | Limit (dBuV/m) | Delta (dB) |
|-----------------|----------------------------|----------------|------------|
| 1.938           | 50.1                       | 60.0           | -9.9       |
| 2.191           | 48.7                       | 60.0           | -11.3      |
| 5.323           | 48.0                       | 60.0           | -12.0      |
| 6.041           | 48.2                       | 60.0           | -11.8      |

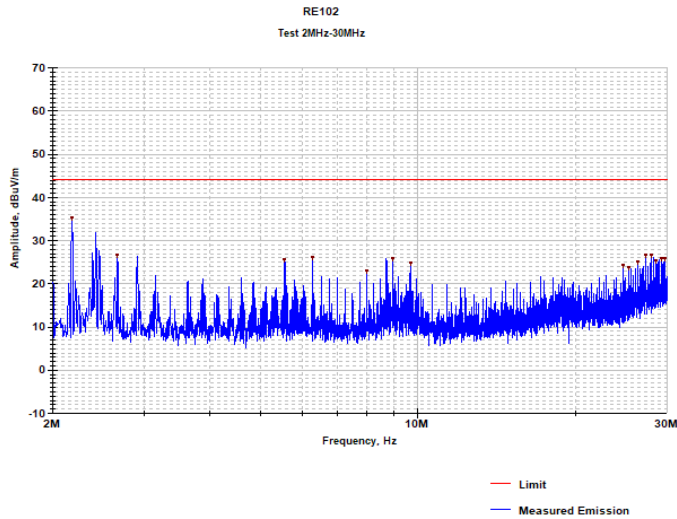
**M7528 Series– DC/DC Power Supply**

**Vin 28V RTN**



| Frequency (MHz) | Measured Emission (dBuV/m) | Limit (dBuV/m) | Delta (dB) |
|-----------------|----------------------------|----------------|------------|
| 0.247           | 54.0                       | 66.1           | -12.2      |
| 0.477           | 46.2                       | 60.4           | -14.2      |
| 1.195           | 45.3                       | 60.0           | -14.7      |
| 5.207           | 46.3                       | 60.0           | -13.7      |
| 5.904           | 45.9                       | 60.0           | -14.1      |

**RE 102**  
**2-30 MHz**  
**TEST**



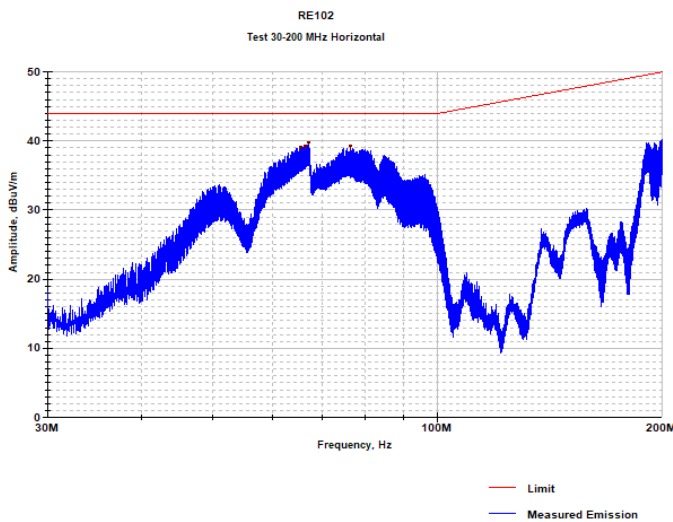
| Frequency (MHz) | Measured Emission (dBuV/m) | Limit (dBuV/m) | Delta (dB) |
|-----------------|----------------------------|----------------|------------|
| 2.179           | 35.2                       | 44.0           | -8.8       |
| 2.661           | 26.5                       | 44.0           | -17.5      |
| 5.562           | 25.6                       | 44.0           | -18.4      |
| 6.290           | 26.1                       | 44.0           | -17.9      |
| 7.981           | 23.1                       | 44.0           | -20.9      |
| 8.944           | 25.8                       | 44.0           | -18.2      |
| 9.672           | 24.8                       | 44.0           | -19.2      |
| 24.652          | 24.3                       | 44.0           | -19.7      |

**M7528 Series– DC/DC Power Supply**

|               |             |             |              |
|---------------|-------------|-------------|--------------|
| <b>25.374</b> | <b>23.6</b> | <b>44.0</b> | <b>-20.4</b> |
| <b>26.343</b> | <b>24.9</b> | <b>44.0</b> | <b>-19.1</b> |
| <b>27.306</b> | <b>26.5</b> | <b>44.0</b> | <b>-17.5</b> |
| <b>28.034</b> | <b>26.7</b> | <b>44.0</b> | <b>-17.3</b> |
| <b>28.516</b> | <b>25.4</b> | <b>44.0</b> | <b>-18.6</b> |
| <b>29.238</b> | <b>25.7</b> | <b>44.0</b> | <b>-18.3</b> |
| <b>29.720</b> | <b>25.8</b> | <b>44.0</b> | <b>-18.2</b> |

**30-200MHz**

**Test horizontal**

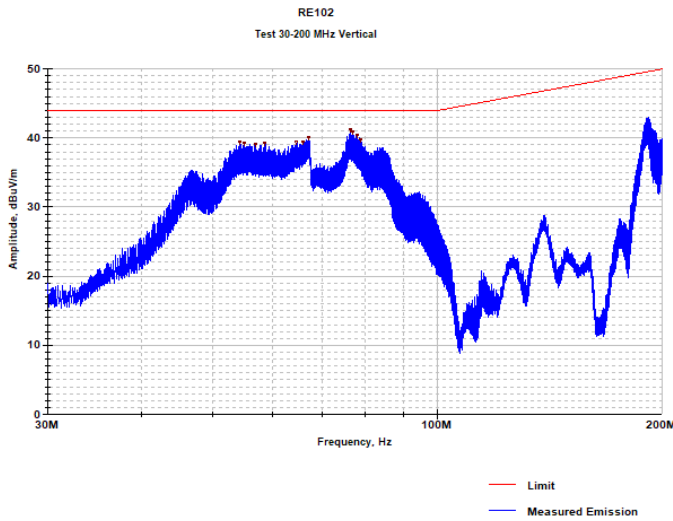


| <b>Frequency (MHz)</b> | <b>Measured Emission (dBuV/m)</b> | <b>Limit (dBuV/m)</b> | <b>Delta (dB)</b> |
|------------------------|-----------------------------------|-----------------------|-------------------|
| <b>65.462</b>          | <b>39.1</b>                       | <b>44.0</b>           | <b>-4.9</b>       |
| <b>66.414</b>          | <b>39.3</b>                       | <b>44.0</b>           | <b>-4.7</b>       |

**M7528 Series– DC/DC Power Supply**

|               |             |             |             |
|---------------|-------------|-------------|-------------|
| <b>67.128</b> | <b>39.7</b> | <b>44.0</b> | <b>-4.3</b> |
| <b>76.291</b> | <b>39.3</b> | <b>44.0</b> | <b>-4.7</b> |

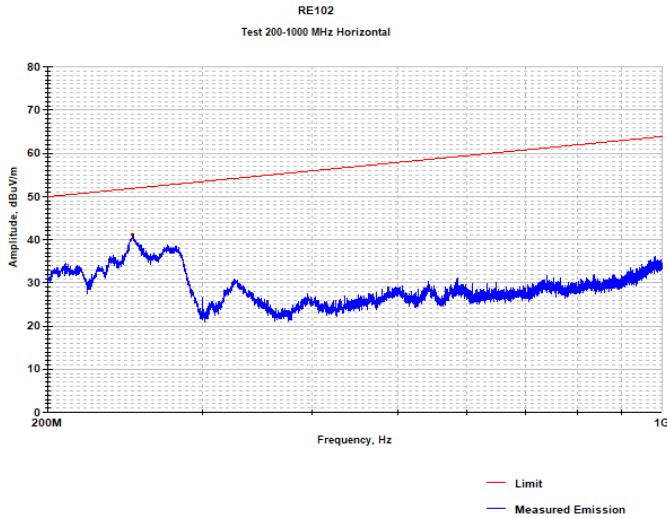
**Test vertical**



| <b>Frequency (MHz)</b> | <b>Measured Emission (dBuV/m)</b> | <b>Limit (dBuV/m)</b> | <b>Delta (dB)</b> |
|------------------------|-----------------------------------|-----------------------|-------------------|
| <b>65.462</b>          | <b>39.1</b>                       | <b>44.0</b>           | <b>-4.9</b>       |
| <b>66.414</b>          | <b>39.3</b>                       | <b>44.0</b>           | <b>-4.7</b>       |
| <b>67.128</b>          | <b>39.7</b>                       | <b>44.0</b>           | <b>-4.3</b>       |
| <b>76.291</b>          | <b>39.3</b>                       | <b>44.0</b>           | <b>-4.7</b>       |

**200MHz-1000MHz**

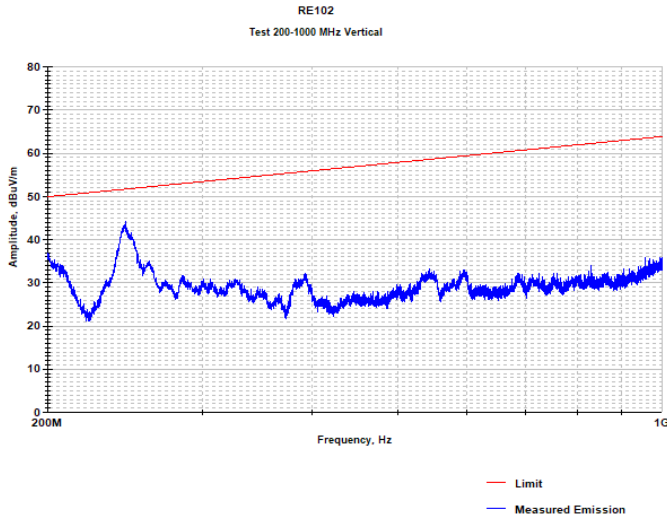
**Test horizontal**



| Frequency (MHz) | Measured Emission (dBuV/m) | Limit (dBuV/m) | Delta (dB) |
|-----------------|----------------------------|----------------|------------|
| 249.760         | 41.13                      | 51.93          | -10.80     |

**M7528 Series– DC/DC Power Supply**

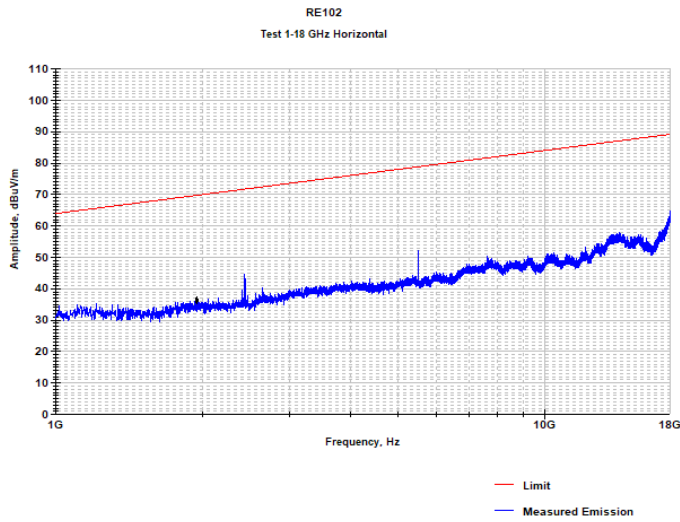
**Test vertical**



| Frequency (MHz) | Measured Emission (dBuV/m) | Limit (dBuV/m) | Delta (dB) |
|-----------------|----------------------------|----------------|------------|
| 245.280         | 44.07                      | 51.78          | -7.71      |

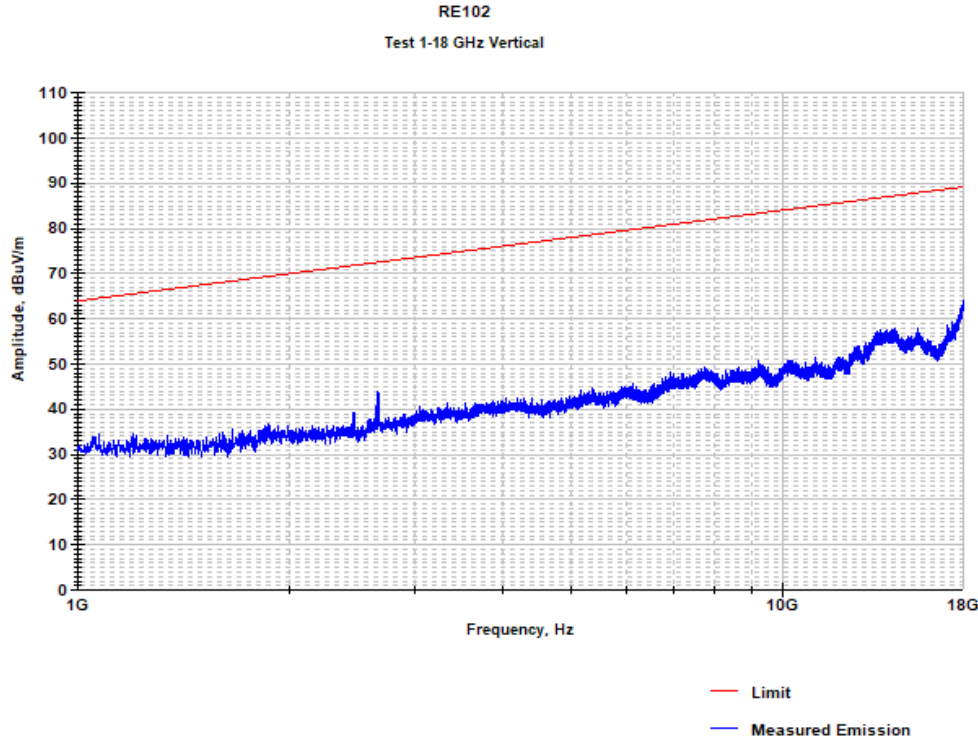
**1000MHz-18GHz**

**Test horizontal**



**M7528 Series– DC/DC Power Supply**

**Test vertical**



## M7528 Series– DC/DC Power Supply

### Efficiency Test for M7528 for 704 Input to 28V Output Version

Temp=+25°

| $V_{IN}=18Vdc$<br>Pout (w) | $\eta$ (%) |
|----------------------------|------------|
| 600                        | 88.25      |
| 800                        | 87.46      |
| 1080                       | 86.68      |

| $V_{IN}=22Vdc$<br>Pout (w) | $\eta$ (%) |
|----------------------------|------------|
| 600                        | 89.37      |
| 800                        | 89.11      |
| 1080                       | 88.34      |

| $V_{IN}=28Vdc$<br>Pout (w) | $\eta$ (%) |
|----------------------------|------------|
| 600                        | 89.61      |
| 800                        | 89.52      |
| 1080                       | 89.39      |

| $V_{IN}=40Vdc$<br>Pout (w) | $\eta$ (%) |
|----------------------------|------------|
| 600                        | 89.14      |
| 800                        | 89.43      |
| 1080                       | 89.07      |

**M7528 Series– DC/DC Power Supply**
Temp=-55°

|                              |              |
|------------------------------|--------------|
| <b>V<sub>IN</sub>= 18Vdc</b> | <b>η (%)</b> |
| <b>Pout (w)</b>              |              |
| <b>600</b>                   | <b>88.98</b> |
| <b>800</b>                   | <b>88.73</b> |
| <b>1080</b>                  | <b>87.81</b> |

|                              |              |
|------------------------------|--------------|
| <b>V<sub>IN</sub>= 22Vdc</b> | <b>η (%)</b> |
| <b>Pout (w)</b>              |              |
| <b>600</b>                   | <b>89.63</b> |
| <b>800</b>                   | <b>89.57</b> |
| <b>1080</b>                  | <b>89.01</b> |

|                              |              |
|------------------------------|--------------|
| <b>V<sub>IN</sub>= 28Vdc</b> | <b>η (%)</b> |
| <b>Pout (w)</b>              |              |
| <b>600</b>                   | <b>89.72</b> |
| <b>800</b>                   | <b>89.10</b> |
| <b>1080</b>                  | <b>89.46</b> |

|                              |              |
|------------------------------|--------------|
| <b>V<sub>IN</sub>= 40Vdc</b> | <b>η (%)</b> |
| <b>Pout (w)</b>              |              |
| <b>600</b>                   | <b>88.96</b> |
| <b>800</b>                   | <b>89.37</b> |
| <b>1080</b>                  | <b>89.25</b> |

**M7528 Series– DC/DC Power Supply**
Temp=+85°

| <b>V<sub>IN</sub>= 18Vdc</b> | <b>η (%)</b> |
|------------------------------|--------------|
| <b>Pout (w)</b>              |              |
| <b>600</b>                   | <b>87.20</b> |
| <b>800</b>                   | <b>86.31</b> |
| <b>1080</b>                  | <b>85.03</b> |

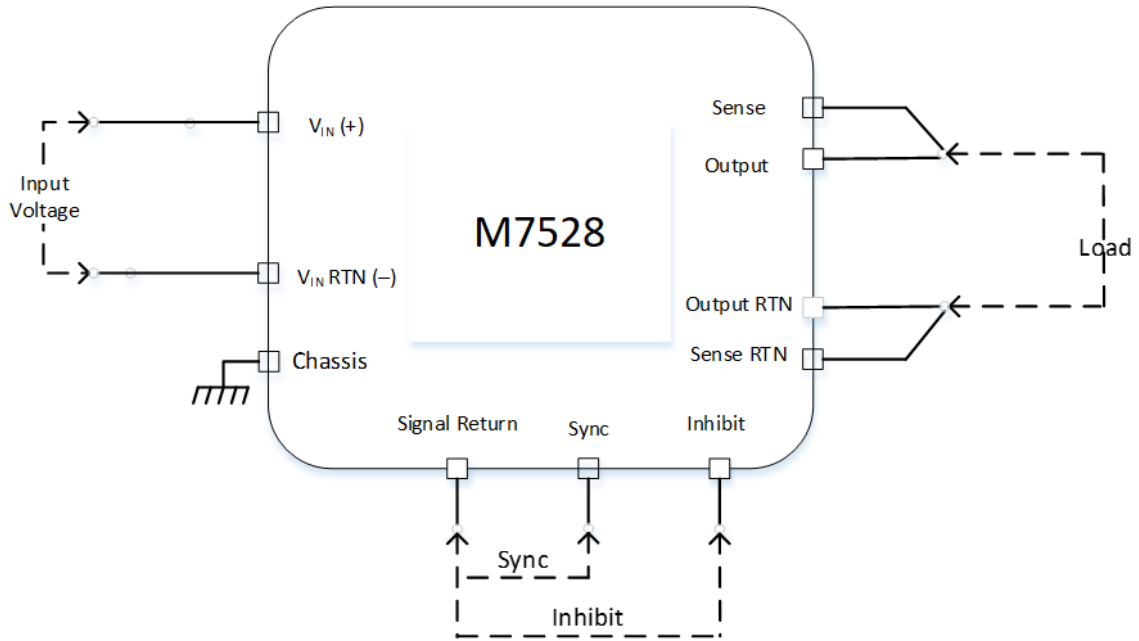
| <b>V<sub>IN</sub>= 22Vdc</b> | <b>η (%)</b> |
|------------------------------|--------------|
| <b>Pout (w)</b>              |              |
| <b>600</b>                   | <b>88.71</b> |
| <b>800</b>                   | <b>88.60</b> |
| <b>1080</b>                  | <b>87.73</b> |

| <b>V<sub>IN</sub>= 28Vdc</b> | <b>η (%)</b> |
|------------------------------|--------------|
| <b>Pout (w)</b>              |              |
| <b>600</b>                   | <b>89.32</b> |
| <b>800</b>                   | <b>89.36</b> |
| <b>1080</b>                  | <b>88.84</b> |

| <b>V<sub>IN</sub>= 40Vdc</b> | <b>η (%)</b> |
|------------------------------|--------------|
| <b>Pout (w)</b>              |              |
| <b>600</b>                   | <b>88.07</b> |
| <b>800</b>                   | <b>88.47</b> |
| <b>1080</b>                  | <b>88.25</b> |

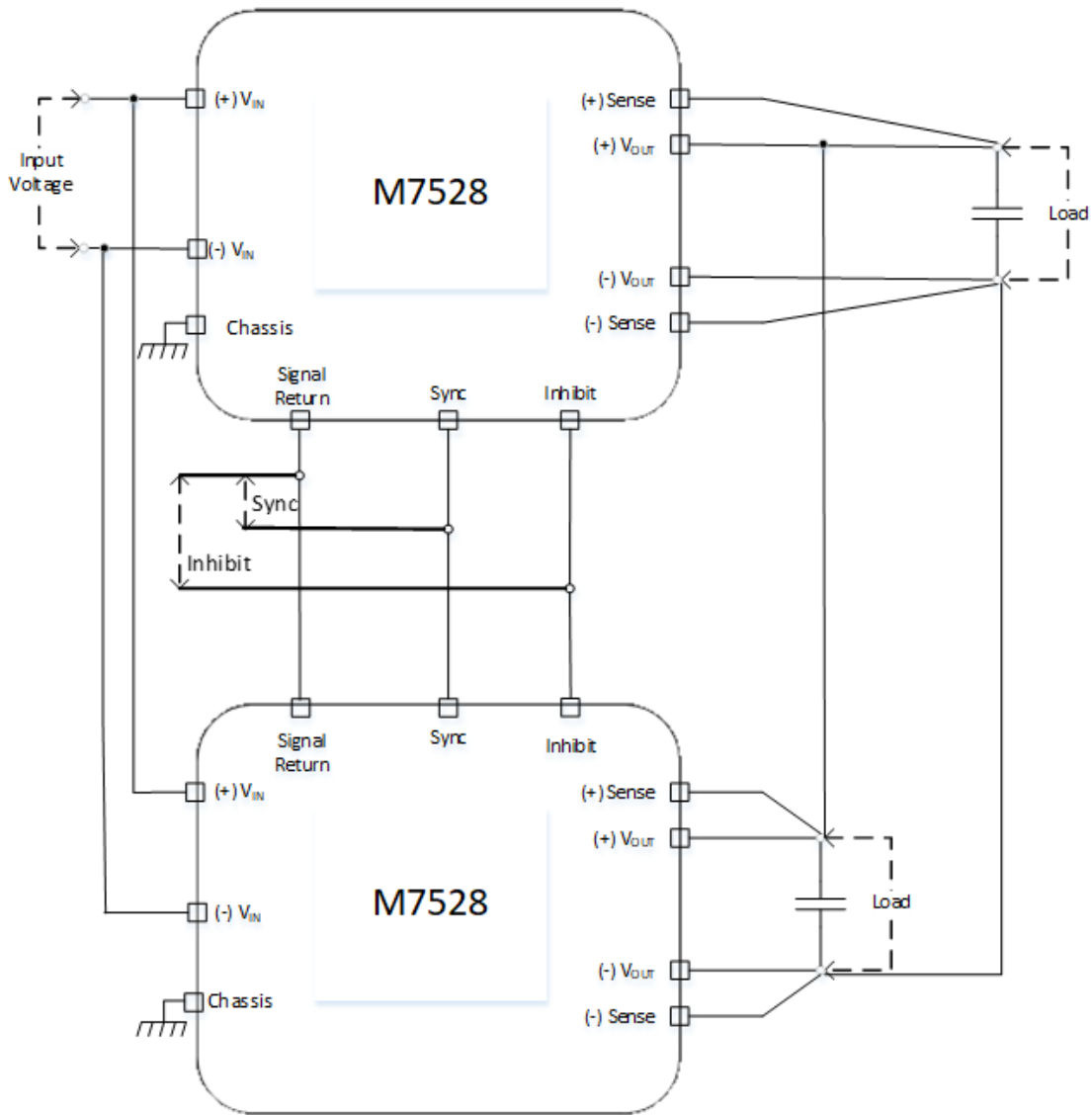
**M7528 Series— DC/DC Power Supply**

**TYPICAL CONNECTION DIAGRAM**



**M7528 Series— DC/DC Power Supply**

**PARALLEL CONNECTION DIAGRAM**



**Note:** Parallel operation via output voltage droop. Voltage regulation is  $\pm 2\%$ .

## M7528 Series– DC/DC Power Supply

### PIN ASSIGNMENT:

**Input connector** - J1 Connector type: M24308/24-40F or eq

**Mates with:** M24308/2-4F or eq.

| Pin No. | Function  | P | Pin No. | Function  | P | Pin No. | Function   | P |
|---------|-----------|---|---------|-----------|---|---------|------------|---|
| 1       | INPUT     | + | 14      | INPUT RTN | - | 27      | INPUT      | + |
| 2       | INPUT     | + | 15      | INPUT RTN | - | 28      | INPUT RTN  | - |
| 3       | INPUT     | + | 16      | INPUT RTN | - | 29      | INPUT RTN  | - |
| 4       | INPUT     | + | 17      | N.C.      |   | 30      | INPUT RTN  | - |
| 5       | INPUT     | + | 18      | INHIBIT   | + | 31      | INPUT RTN  | - |
| 6       | INPUT     | + | 19      | SYNC      | + | 32      | INPUT RTN  | - |
| 7       | INPUT     | + | 20      | INPUT     | + | 33      | INPUT RTN  | - |
| 8       | INPUT     | + | 21      | INPUT     | + | 34      | INPUT RTN  | - |
| 9       | INPUT RTN | - | 22      | INPUT     | + | 35      | INPUT RTN  | - |
| 10      | INPUT RTN | - | 23      | INPUT     | + | 36      | CHASSIS    |   |
| 11      | INPUT RTN | - | 24      | INPUT     | + | 37      | SIGNAL RTN | - |
| 12      | INPUT RTN | - | 25      | INPUT     | + |         |            |   |
| 13      | INPUT RTN | - | 26      | INPUT     | + |         |            |   |

**Output connector** – J2 Connector type: M24308/23-39F or eq.

**Mates with:** M24308/4-3F or eq.

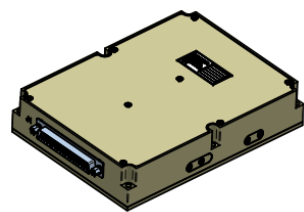
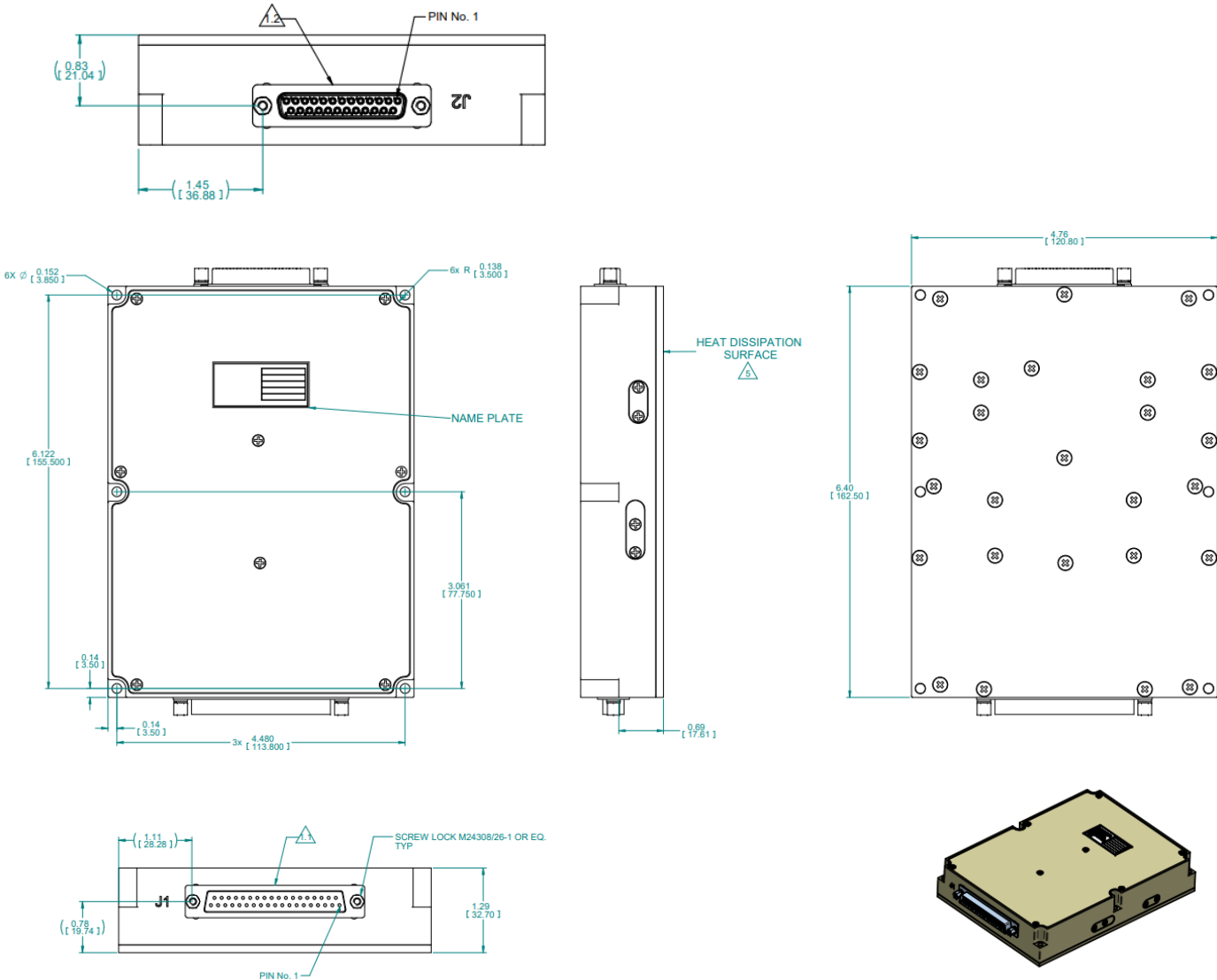
| Pin No. | Function   | P | Pin No. | Function   | P | Pin No. | Function   | P |
|---------|------------|---|---------|------------|---|---------|------------|---|
| 1       | SENSE      | + | 10      | OUTPUT RTN | - | 19      | OUTPUT     | + |
| 2       | OUTPUT     | + | 11      | OUTPUT RTN | - | 20      | OUTPUT RTN | - |
| 3       | OUTPUT     | + | 12      | OUTPUT RTN | - | 21      | OUTPUT RTN | - |
| 4       | OUTPUT     | + | 13      | SENSE RTN  | - | 22      | OUTPUT RTN | - |
| 5       | OUTPUT     | + | 14      | OUTPUT     | + | 23      | OUTPUT RTN | - |
| 6       | OUTPUT     | + | 15      | OUTPUT     | + | 24      | OUTPUT RTN | - |
| 7       | N.C.       |   | 16      | OUTPUT     | + | 25      | OUTPUT RTN | - |
| 8       | OUTPUT RTN | - | 17      | OUTPUT     | + |         |            |   |
| 9       | OUTPUT RTN | - | 18      | OUTPUT     | + |         |            |   |

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

**M7528 Series– DC/DC Power Supply**

**OUTLINE DRAWING:**

For detailed dimensions and tolerances see Drawing: M7528001



**NOTES :**

1. CONNECTORS:
  - 1.1 - INPUT PLUG D-TYPE CONN. 37P, P/N: M24308/24-40F OR EQ.
  - 1.2 - OUTPUT SOCKET D-TYPE CONN. 25P, P/N: M24308/23-39F OR EQ.
2. WORKMANSHIP SHALL BE MIL-STD-454, REQT. 9
3. MTL. AL 6061-T651& AL 5052-H32
4. CHROMATE CONVERSION COATING PER MIL-DTL-5541F, TYPE 1 CLASS 1A
5. HEAT DISSIPATION SURFACE: 30.43 in<sup>2</sup> [19,630 mm<sup>2</sup>]
6. ENGRAVING:
  - CHARACTERS HEIGHT: 0.157in [4mm] DEPTH: 0.157in [4mm].
  - FILL ENGRAVING WITH BLACK LUSTERLESS EPOXY PAINT COLOR PER FED-STD 595 NO : 37038.

DIMENSIONS ARE IN INCH [MM]  
DO NOT SCALE DRAWING

GENERAL TOLERANCES  
X.XX ± .02 [0.50]  
X.XXX ± .006 [0.15]  
ANGLES ± 1°

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