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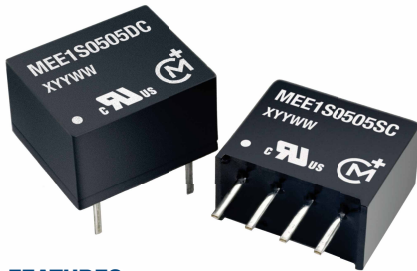
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### FEATURES

- UL60950 recognized
- Operation to zero load
- Single isolated output
- 1kVDC isolation 'Hi Pot Test'
- Efficiency up to 87% typical
- Wide temperature performance at full 1 watt load, -40°C to 85°C
- Power density from 1.305W/cm<sup>3</sup>
- Industry standard pinout
- 3.3V, 5V, 12V, 15V & 24V input
- 3.3V, 5V, 9V, 12V and 15V output
- Custom solutions available
- Pin compatible with LME, NME, NKE & NML series
- PCB mounting

### DESCRIPTION

The MEE1 series is the new high performance version of our 1W NME series. The MEE1 series is more efficient and offers improved regulation performance for applications where a wide output voltage variation can not be tolerated. They are ideally suited for providing local supplies on control system boards with the added benefit of 1kVDC galvanic isolation to reduce switching noise.

### SELECTION GUIDE

| Order Code  | Nominal Input Voltage | Output Voltage | Output Current | Load Regulation (Typ) | Load Regulation (Max) | Ripple & Noise (Typ) | Ripple & Noise (Max) | Input Current at Rated Load | Efficiency (Min) | Efficiency (Typ) | Isolation Capacitance (Typ) | MTTF | Package Style |     |
|-------------|-----------------------|----------------|----------------|-----------------------|-----------------------|----------------------|----------------------|-----------------------------|------------------|------------------|-----------------------------|------|---------------|-----|
|             | V                     | V              | mA             | %                     | %                     | mVp-p                | mVp-p                | mA                          | %                | %                | pF                          | kHrs |               |     |
| MEE1S0303SC | 3.3                   | 3.3            | 303            | 10                    | 12                    | 26                   | 50                   | 377                         | 76               | 78.5             | 42                          | 3852 | SIP           |     |
| MEE1S0305SC | 3.3                   | 5              | 200            | 9.2                   | 11                    | 23                   | 50                   | 360                         | 79               | 81.5             | 44                          | 4008 |               |     |
| MEE1S0309SC | 3.3                   | 9              | 111            | 10                    | 12                    | 15                   | 40                   | 361                         | 79               | 81.5             | 47                          | 4930 |               |     |
| MEE1S0312SC | 3.3                   | 12             | 83             | 8.7                   | 11                    | 14                   | 40                   | 352                         | 81               | 84               | 48                          | 4040 |               |     |
| MEE1S0315SC | 3.3                   | 15             | 67             | 7.8                   | 10                    | 12                   | 35                   | 350                         | 82               | 84.5             | 50                          | 3792 |               |     |
| MEE1S0503SC | 5                     | 3.3            | 303            | 8                     | 10                    | 22                   | 45                   | 246                         | 76               | 80               | 39                          | 3213 |               |     |
| MEE1S0505SC | 5                     | 5              | 200            | 5.6                   | 7                     | 19                   | 40                   | 237                         | 80               | 83               | 46                          | 3990 |               |     |
| MEE1S0509SC | 5                     | 9              | 111            | 6.8                   | 9                     | 13                   | 35                   | 238                         | 80               | 83.5             | 53                          | 4526 |               |     |
| MEE1S0512SC | 5                     | 12             | 83             | 6.5                   | 8                     | 11                   | 35                   | 233                         | 81               | 85               | 49                          | 3756 |               |     |
| MEE1S0515SC | 5                     | 15             | 67             | 5.7                   | 8                     | 9                    | 30                   | 230                         | 83               | 85.5             | 46                          | 3240 |               |     |
| MEE1S1205SC | 12                    | 5              | 200            | 5                     | 7                     | 16                   | 40                   | 97                          | 79               | 83.5             | 47                          | 3857 |               |     |
| MEE1S1209SC | 12                    | 9              | 111            | 5.8                   | 8                     | 12                   | 35                   | 97                          | 79               | 84               | 77                          | 4370 |               |     |
| MEE1S1212SC | 12                    | 12             | 83             | 4.8                   | 6                     | 10                   | 35                   | 97                          | 82               | 85               | 79                          | 3774 |               |     |
| MEE1S1215SC | 12                    | 15             | 67             | 4.2                   | 7                     | 9                    | 35                   | 95                          | 81               | 86.5             | 81                          | 3779 |               |     |
| MEE1S1505SC | 15                    | 5              | 200            | 4.2                   | 6                     | 15                   | 40                   | 79                          | 77               | 83.5             | 41                          | 3312 |               |     |
| MEE1S1509SC | 15                    | 9              | 111            | 5.1                   | 7                     | 12                   | 35                   | 79                          | 77               | 83               | 65                          | 3451 |               |     |
| MEE1S1512SC | 15                    | 12             | 83             | 4.3                   | 5                     | 11                   | 35                   | 77                          | 78               | 85               | 77                          | 3940 |               |     |
| MEE1S1515SC | 15                    | 15             | 67             | 3.8                   | 5                     | 8                    | 30                   | 76                          | 83               | 86.5             | 100                         | 3420 |               |     |
| MEE1S2405SC | 24                    | 5              | 200            | 3.6                   | 5                     | 19                   | 50                   | 49                          | 75               | 83               | 51                          | 3983 |               |     |
| MEE1S2409SC | 24                    | 9              | 111            | 4                     | 6                     | 17                   | 40                   | 50                          | 74               | 83               | 70                          | 4255 |               |     |
| MEE1S2412SC | 24                    | 12             | 83             | 3.4                   | 5                     | 11                   | 35                   | 49                          | 79               | 85.5             | 89                          | 3991 |               |     |
| MEE1S2415SC | 24                    | 15             | 67             | 3                     | 5                     | 9                    | 35                   | 49                          | 78               | 86               | 101                         | 3532 |               |     |
| MEE1S0303DC | 3.3                   | 3.3            | 303            | 10                    | 12                    | 26                   | 50                   | 377                         | 76               | 78.5             | 42                          | 3852 |               | DIP |
| MEE1S0305DC | 3.3                   | 5              | 200            | 9.2                   | 11                    | 23                   | 50                   | 360                         | 79               | 81.5             | 44                          | 4008 |               |     |
| MEE1S0309DC | 3.3                   | 9              | 111            | 10                    | 12                    | 15                   | 40                   | 361                         | 79               | 81.5             | 47                          | 4930 |               |     |
| MEE1S0312DC | 3.3                   | 12             | 83             | 8.7                   | 11                    | 14                   | 40                   | 352                         | 81               | 84               | 48                          | 4040 |               |     |
| MEE1S0315DC | 3.3                   | 15             | 67             | 7.8                   | 10                    | 12                   | 35                   | 350                         | 82               | 84.5             | 50                          | 3792 |               |     |
| MEE1S0503DC | 5                     | 3.3            | 303            | 8                     | 10                    | 22                   | 45                   | 246                         | 76               | 80               | 39                          | 3213 |               |     |
| MEE1S0505DC | 5                     | 5              | 200            | 5.6                   | 7                     | 19                   | 40                   | 237                         | 80               | 83               | 46                          | 3990 |               |     |
| MEE1S0509DC | 5                     | 9              | 111            | 6.8                   | 9                     | 13                   | 35                   | 238                         | 80               | 83.5             | 53                          | 4526 |               |     |
| MEE1S0512DC | 5                     | 12             | 83             | 6.5                   | 8                     | 11                   | 35                   | 233                         | 81               | 85               | 49                          | 3756 |               |     |
| MEE1S0515DC | 5                     | 15             | 67             | 5.7                   | 8                     | 9                    | 30                   | 230                         | 83               | 85.5             | 46                          | 3240 |               |     |
| MEE1S1205DC | 12                    | 5              | 200            | 5                     | 7                     | 16                   | 40                   | 97                          | 79               | 83.5             | 47                          | 3857 |               |     |
| MEE1S1209DC | 12                    | 9              | 111            | 5.8                   | 8                     | 12                   | 35                   | 97                          | 79               | 84               | 77                          | 4370 |               |     |
| MEE1S1212DC | 12                    | 12             | 83             | 4.8                   | 6                     | 10                   | 35                   | 97                          | 82               | 85               | 79                          | 3774 |               |     |
| MEE1S1215DC | 12                    | 15             | 67             | 4.2                   | 7                     | 9                    | 35                   | 95                          | 81               | 86.5             | 81                          | 3779 |               |     |
| MEE1S1505DC | 15                    | 5              | 200            | 4.2                   | 6                     | 15                   | 40                   | 79                          | 77               | 83.5             | 41                          | 3312 |               |     |
| MEE1S1509DC | 15                    | 9              | 111            | 5.1                   | 7                     | 12                   | 35                   | 79                          | 77               | 83               | 65                          | 3451 |               |     |
| MEE1S1512DC | 15                    | 12             | 83             | 4.3                   | 5                     | 11                   | 35                   | 77                          | 78               | 85               | 77                          | 3940 |               |     |
| MEE1S1515DC | 15                    | 15             | 67             | 3.8                   | 5                     | 8                    | 30                   | 76                          | 83               | 86.5             | 100                         | 3420 |               |     |
| MEE1S2405DC | 24                    | 5              | 200            | 3.6                   | 5                     | 19                   | 50                   | 49                          | 75               | 83               | 51                          | 3983 |               |     |
| MEE1S2409DC | 24                    | 9              | 111            | 4                     | 6                     | 17                   | 40                   | 50                          | 74               | 83               | 70                          | 4255 |               |     |
| MEE1S2412DC | 24                    | 12             | 83             | 3.4                   | 5                     | 11                   | 35                   | 49                          | 79               | 85.5             | 89                          | 3991 |               |     |
| MEE1S2415DC | 24                    | 15             | 67             | 3                     | 5                     | 9                    | 35                   | 49                          | 78               | 86               | 101                         | 3532 |               |     |

1. Calculated using MIL-HDBK-217F FN2 with nominal input voltage at full load.

All specifications typical at T<sub>A</sub>=25°C, nominal input voltage and rated output current unless otherwise specified.



For full details go to  
[www.murata-ps.com/rohs](http://www.murata-ps.com/rohs)



### INPUT CHARACTERISTICS

| Parameter                | Conditions                             | Min. | Typ. | Max. | Units  |
|--------------------------|--|------|------|------|--------|
| Voltage range            | Continuous operation, 3.3V input types | 2.97 | 3.3  | 3.63 | V      |
|                          | Continuous operation, 5V input types   | 4.5  | 5.0  | 5.5  |        |
|                          | Continuous operation, 12V input types  | 10.8 | 12.0 | 13.2 |        |
|                          | Continuous operation, 15V input types  | 13.5 | 15   | 16.5 |        |
|                          | Continuous operation, 24V input types  | 21.6 | 24   | 26.4 |        |
| Reflected ripple current | 3.3V, 5V & 12V Input types             |      | 5    | 20   | mA p-p |
|                          | 15V Input types                        |      | 3    | 10   |        |
|                          | 24V Input types                        |      | 4    | 10   |        |

### OUTPUT CHARACTERISTICS

| Parameter                  | Conditions                                  | Min.             | Typ. | Max. | Units |
|----------------------------|---|------------------|------|------|-------|
| Rated Power                | T <sub>A</sub> =-40°C to 85°C               |                  |      | 1.0  | W     |
| Voltage Set Point Accuracy | See tolerance envelope                      |                  |      |      |       |
| Line regulation            | High V <sub>IN</sub> to low V <sub>IN</sub> | 3.3V Input       | 1.0  | 1.15 | %/%   |
|                            |   | All other inputs | 1.0  | 1.1  |       |

### ISOLATION CHARACTERISTICS

| Parameter              | Conditions                | Min. | Typ. | Max. | Units |
|------------------------|---------------------------|------|------|------|-------|
| Isolation test voltage | Flash tested for 1 second | 1000 |      |      | VDC   |
| Resistance             | Viso= 1000VDC             | 10   |      |      | GΩ    |

### GENERAL CHARACTERISTICS

| Parameter           | Conditions       | Min. | Typ. | Max. | Units |
|---------------------|------------------|------|------|------|-------|
| Switching frequency | 3.3V input types |      | 47   |      | kHz   |
|                     | 5V input types   |      | 60   |      |       |
|                     | 12V input types  |      | 70   |      |       |
|                     | 15V input types  |      | 77   |      |       |
|                     | 24V input types  |      | 80   |      |       |

### TEMPERATURE CHARACTERISTICS

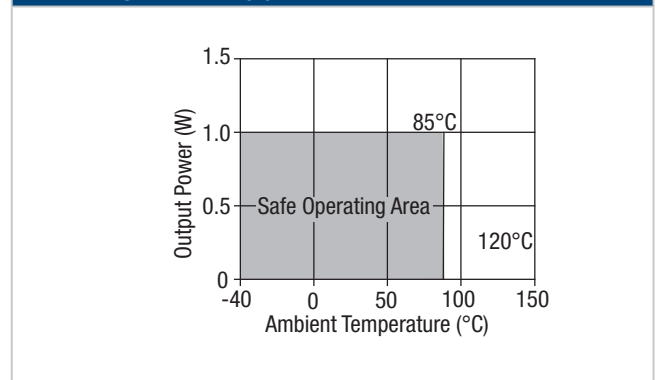
| Parameter                      | Conditions          | Min. | Typ. | Max. | Units |
|--------------------------------|---------------------|------|------|------|-------|
| Specification                  | All output types    | -40  |      | 85   | °C    |
| Storage                        |                     | -50  |      | 125  |       |
| Case Temperature above ambient | MEE1S0303XC         |      |      | 30   |       |
|                                | All other types     |      |      | 25   |       |
| Cooling                        | Free air convection |      |      |      |       |

### ABSOLUTE MAXIMUM RATINGS

|   |       |
|---|-------|
| Lead temperature 1.5mm from case for 10 seconds | 260°C |
| Internal power dissipation                      | 450mW |
| Input voltage V <sub>IN</sub> , MEE1S03 types   | 5.5V  |
| Input voltage V <sub>IN</sub> , MEE1S05 types   | 7V    |
| Input voltage V <sub>IN</sub> , MEE1S12 types   | 15V   |
| Input voltage V <sub>IN</sub> , MEE1S15 types   | 18V   |
| Input voltage V <sub>IN</sub> , MEE1S24 types   | 28V   |

All specifications typical at T<sub>A</sub>=25°C, nominal input voltage and rated output current unless otherwise specified.

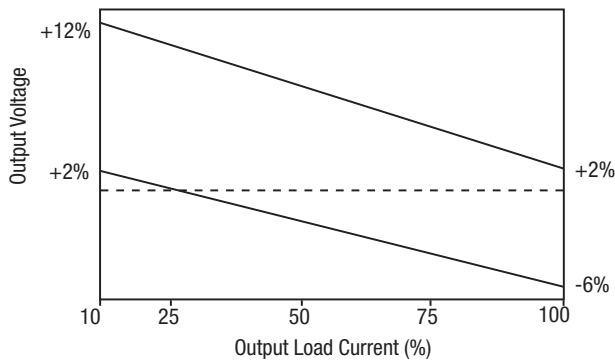
### TEMPERATURE DERATING GRAPH



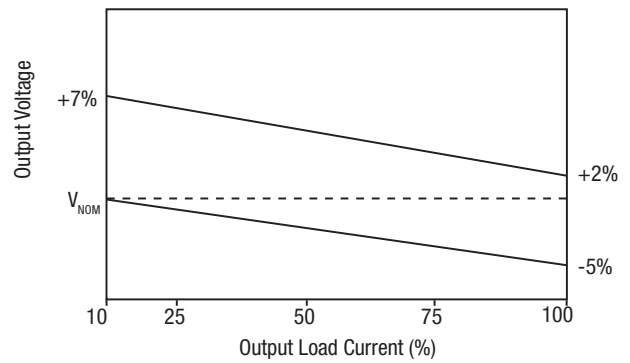
## TOLERANCE ENVELOPES

The voltage tolerance envelopes show typical load regulation characteristics for this product series. The tolerance envelope is the maximum output voltage variation due to changes in output loading and set point accuracy.

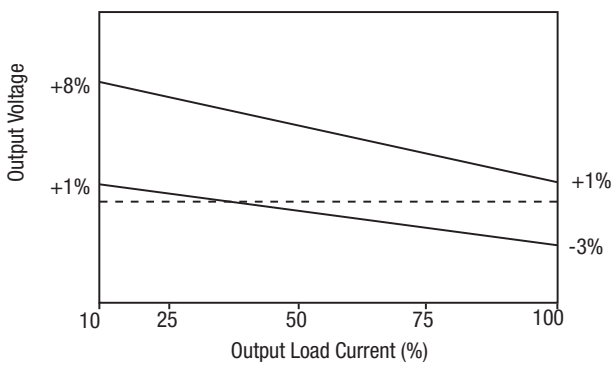
**3.3V Input & 0503**



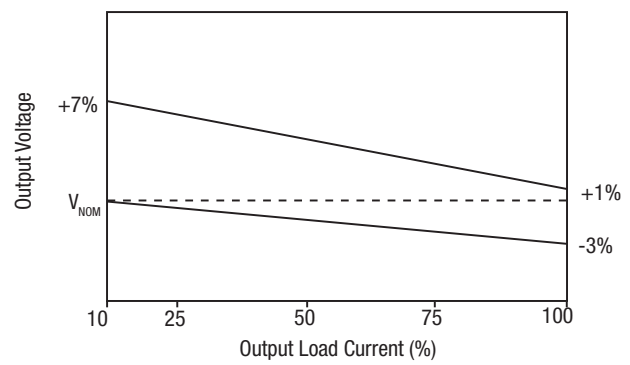
**5V Output**



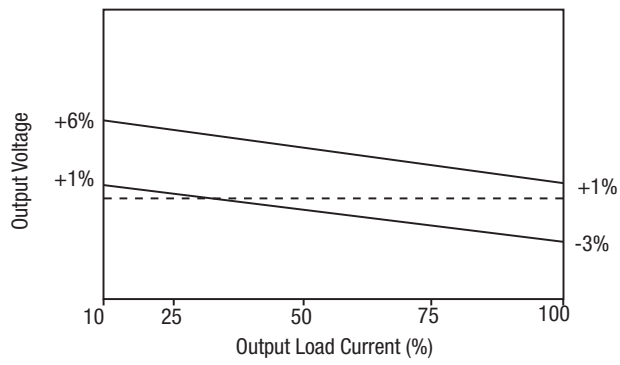
**9V Output**



**12V Output**



**15V Output**



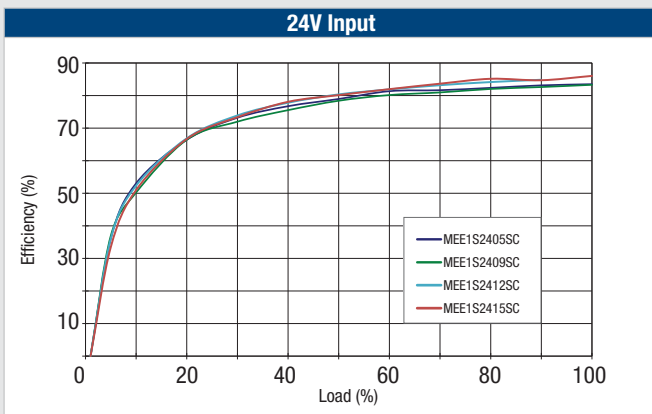
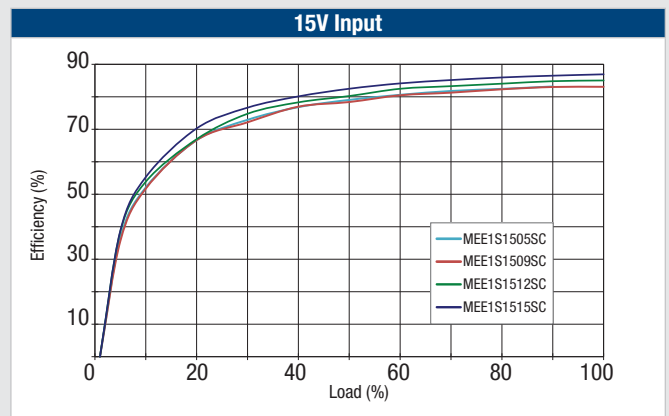
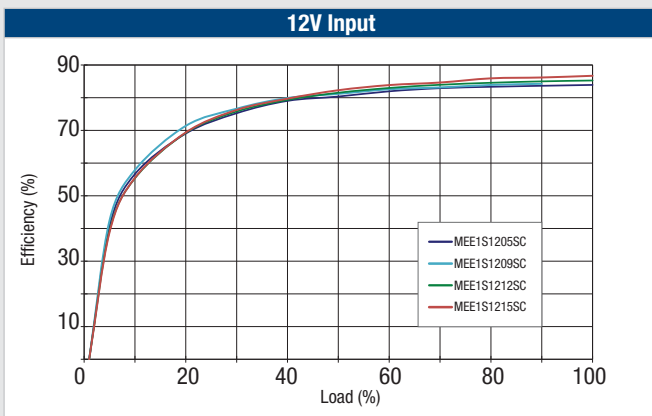
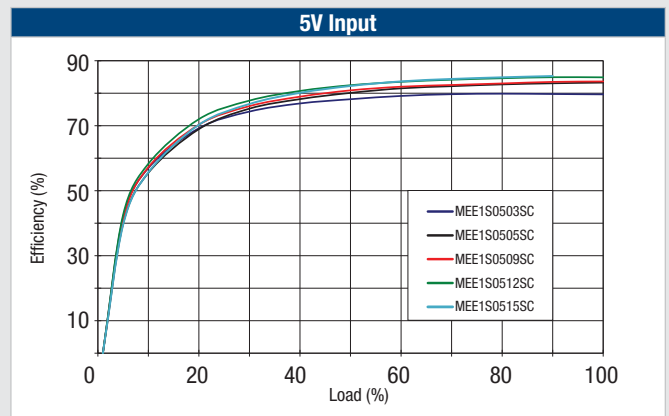
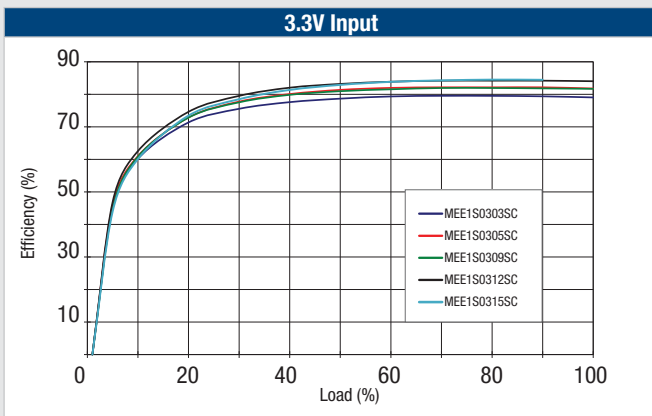
### RoHS COMPLIANCE INFORMATION



This series is compatible with RoHS soldering systems with a peak wave solder temperature of 260°C for 10 seconds. The pin termination finish on the SIP package type is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The DIP types are Matte Tin over Nickel Preplate. Both types in this series are backward compatible with Sn/Pb soldering systems.

For further information, please visit [www.murata-ps.com/rohs](http://www.murata-ps.com/rohs)

### EFFICIENCY VS LOAD



**APPLICATION NOTES**

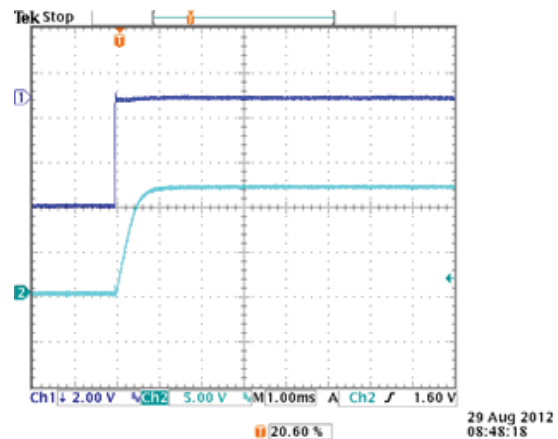
**Minimum Load**

The minimum load to meet datasheet specification is 10% of the full rated load across the specified input voltage range. Lower than 10% minimum loading will result in an increase in output voltage, which may rise to typically 1.25 times the specified output voltage if the output load falls to less than 5%.

**Capacitive loading and start up**

Typical start up times for this series, with a typical input voltage rise time of 2.2µs and output capacitance of 10µF, are shown in the table below. The product series will start into a capacitance of 47µF with an increased start time, however, the maximum recommended output capacitance is 10µF.

|             | Start-up time |  |             | Start-up time |  |
|-------------|---------------|--|-------------|---------------|--|
|             | µs            |  |             | µs            |  |
| MEE1S0303XC | 355           |  | MEE1S1209XC | 818           |  |
| MEE1S0305XC | 622           |  | MEE1S1212XC | 1285          |  |
| MEE1S0309XC | 1542          |  | MEE1S1215XC | 2052          |  |
| MEE1S0312XC | 2410          |  | MEE1S1505XC | 260           |  |
| MEE1S0315XC | 3346          |  | MEE1S1509XC | 642           |  |
| MEE1S0503XC | 334           |  | MEE1S1512XC | 993           |  |
| MEE1S0505XC | 402           |  | MEE1S1515XC | 1574          |  |
| MEE1S0509XC | 1316          |  | MEE1S2405XC | 221           |  |
| MEE1S0512XC | 1776          |  | MEE1S2409XC | 541           |  |
| MEE1S0515XC | 2232          |  | MEE1S2412XC | 860           |  |
| MEE1S1205XC | 285           |  | MEE1S2415XC | 1049          |  |



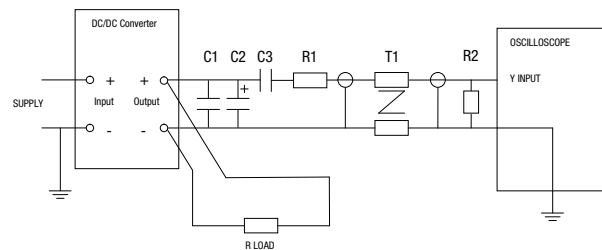
**Ripple & Noise Characterisation Method**

Ripple and noise measurements are performed with the following test configuration.

|       |  |
|-------|--|
| C1    | 1µF X7R multilayer ceramic capacitor, voltage rating to be a minimum of 3 times the output voltage of the DC/DC converter                                |
| C2    | 10µF tantalum capacitor, voltage rating to be a minimum of 1.5 times the output voltage of the DC/DC converter with an ESR of less than 100mΩ at 100 kHz |
| C3    | 100nF multilayer ceramic capacitor, general purpose  |
| R1    | 450Ω resistor, carbon film, ±1% tolerance  |
| R2    | 50Ω BNC termination  |
| T1    | 3T of the coax cable through a ferrite toroid  |
| RLOAD | Resistive load to the maximum power rating of the DC/DC converter. Connections should be made via twisted wires  |

Measured values are multiplied by 10 to obtain the specified values.

**Differential Mode Noise Test Schematic**



**APPLICATION NOTES (continued)**

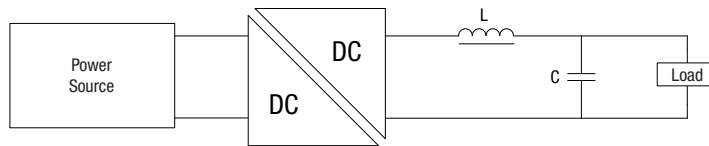
**Output Ripple Reduction**

By using the values of inductance and capacitance stated, the output ripple at the rated load is lowered to 5mV p-p max.

**Component selection**

**Capacitor:** It is required that the ESR (Equivalent Series Resistance) should be as low as possible, ceramic types are recommended. The voltage rating should be at least twice (except for 15V output), the rated output voltage of the DC/DC converter.

**Inductor:** The rated current of the inductor should not be less than that of the output of the DC/DC converter. At the rated current, the DC resistance of the inductor should be such that the voltage drop across the inductor is <2% of the rated voltage of the DC/DC converter. The SRF (Self Resonant Frequency) should be >20MHz.

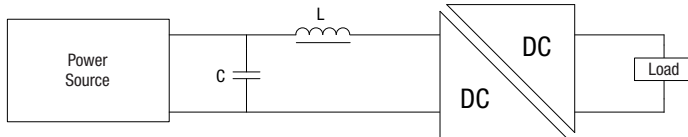


|             | Inductor   |        |              | Capacitor  |
|-------------|------------|--------|--------------|------------|
|             | L, $\mu$ H | SMD    | Through Hole | C, $\mu$ F |
| MEE1S0303XC | 4.7        | 82472C | 11R472C      | 10         |
| MEE1S0305XC | 10         | 82103C | 11R103C      | 4.7        |
| MEE1S0309XC | 22         | 82223C | 11R223C      | 2.2        |
| MEE1S0312XC | 47         | 82473C | 11R473C      | 1          |
| MEE1S0315XC | 47         | 82473C | 11R473C      | 1          |
| MEE1S0503XC | 4.7        | 82472C | 11R472C      | 10         |
| MEE1S0505XC | 10         | 82103C | 11R103C      | 4.7        |
| MEE1S0509XC | 22         | 82223C | 11R223C      | 2.2        |
| MEE1S0512XC | 47         | 82473C | 11R473C      | 1          |
| MEE1S0515XC | 47         | 82473C | 11R473C      | 1          |
| MEE1S1205XC | 10         | 82103C | 11R103C      | 4.7        |
| MEE1S1209XC | 22         | 82223C | 11R223C      | 2.2        |
| MEE1S1212XC | 47         | 82473C | 11R473C      | 1          |
| MEE1S1215XC | 47         | 82473C | 11R473C      | 1          |
| MEE1S1505XC | 10         | 82103C | 11R103C      | 4.7        |
| MEE1S1509XC | 22         | 82223C | 11R223C      | 2.2        |
| MEE1S1512XC | 47         | 82473C | 11R473C      | 1          |
| MEE1S1515XC | 47         | 82473C | 11R473C      | 1          |
| MEE1S2405XC | 10         | 82103C | 11R103C      | 4.7        |
| MEE1S2409XC | 22         | 82223C | 11R223C      | 2.2        |
| MEE1S2412XC | 47         | 82473C | 11R473C      | 1          |
| MEE1S2415XC | 47         | 82473C | 11R473C      | 1          |

**EMC FILTERING AND SPECTRA**

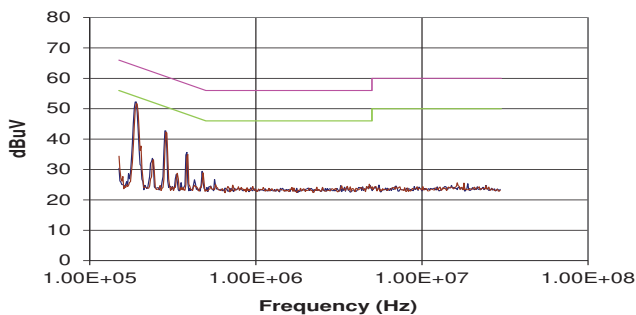
**FILTERING**

An input capacitor and inductor is required to meet EN 55022 Curve B, Quasi-Peak EMC limit, as shown in the following plots. The following plots show positive and negative quasi peak and CISPR22 Average Limit B (pink line) and Quasi Peak Limit B (green line) adherence limits.

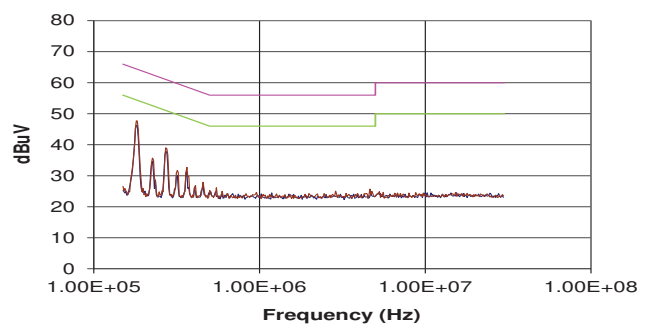


|             | Inductor   |        |              | Capacitor<br>C, $\mu$ F |
|-------------|------------|--------|--------------|-------------------------|
|             | L, $\mu$ H | SMD    | Through Hole |                         |
| MEE1S0303XC | 10         | 82103C | 11R103C      | 1                       |
| MEE1S0305XC | 10         | 82103C | 11R103C      | 1                       |
| MEE1S0309XC | 10         | 82103C | 11R103C      | 1                       |
| MEE1S0312XC | 10         | 82103C | 11R103C      | 1                       |
| MEE1S0315XC | 10         | 82103C | 11R103C      | 1                       |
| MEE1S0503XC | 10         | 82103C | 11R103C      | 0.68                    |
| MEE1S0505XC | 10         | 82103C | 11R103C      | 0.68                    |
| MEE1S0509XC | 10         | 82103C | 11R103C      | 0.68                    |
| MEE1S0512XC | 10         | 82103C | 11R103C      | 0.68                    |
| MEE1S0515XC | 10         | 82103C | 11R103C      | 0.68                    |
| MEE1S1205XC | 10         | 82103C | 11R103C      | 0.68                    |
| MEE1S1209XC | 10         | 82103C | 11R103C      | 0.68                    |
| MEE1S1212XC | 10         | 82103C | 11R103C      | 2.2                     |
| MEE1S1215XC | 10         | 82103C | 11R103C      | 2.2                     |
| MEE1S1505XC | 10         | 82103C | 11R103C      | 2.2                     |
| MEE1S1509XC | 10         | 82103C | 11R103C      | 2.2                     |
| MEE1S1512XC | 10         | 82103C | 11R103C      | 2.2                     |
| MEE1S1515XC | 10         | 82103C | 11R103C      | 2.2                     |
| MEE1S2405XC | 10         | 82103C | 11R103C      | 4.7                     |
| MEE1S2409XC | 10         | 82103C | 11R103C      | 4.7                     |
| MEE1S2412XC | 10         | 82103C | 11R103C      | 4.7                     |
| MEE1S2415XC | 10         | 82103C | 11R103C      | 4.7                     |

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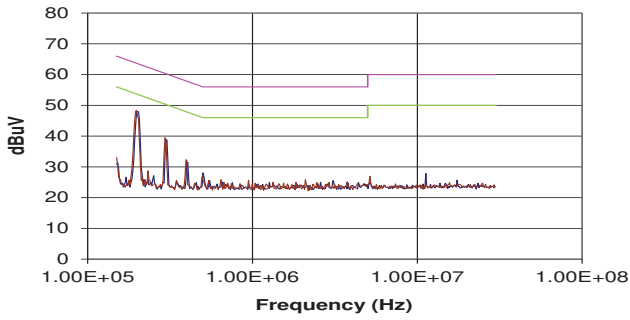
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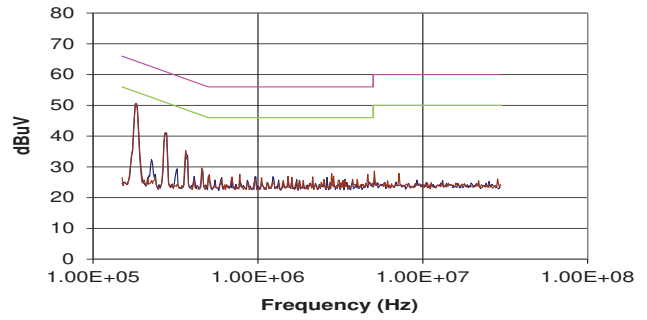


**EMC FILTERING AND SPECTRA**

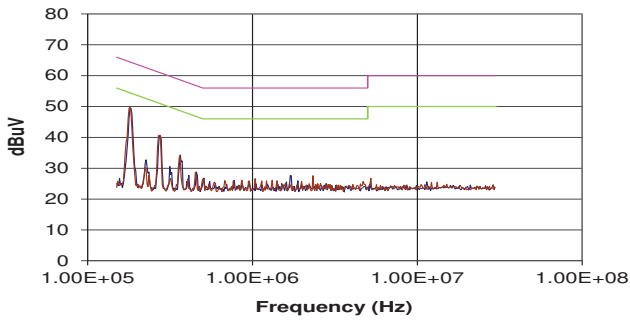
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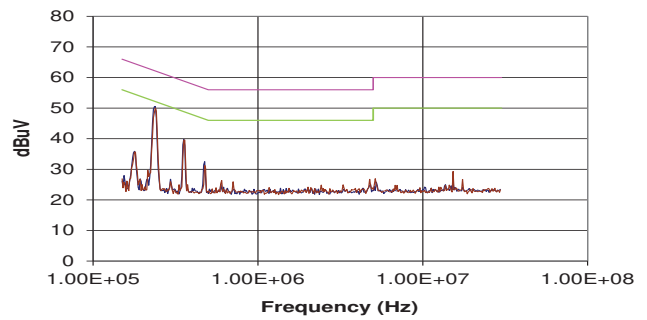
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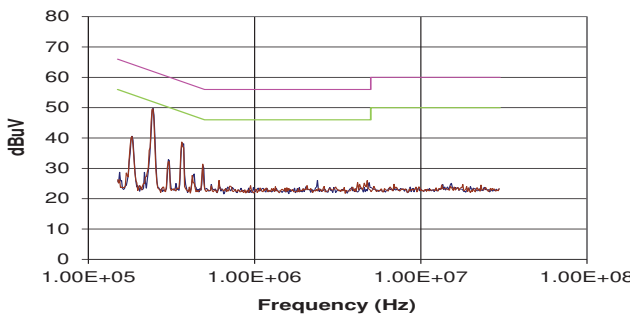
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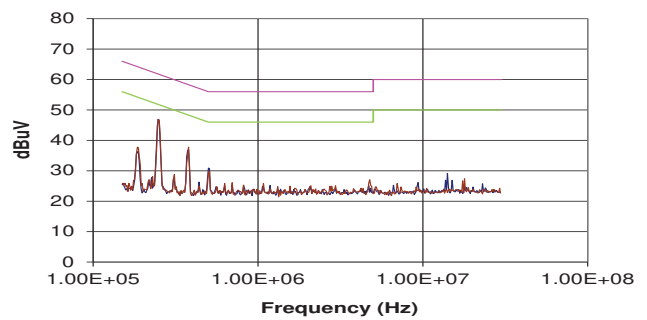
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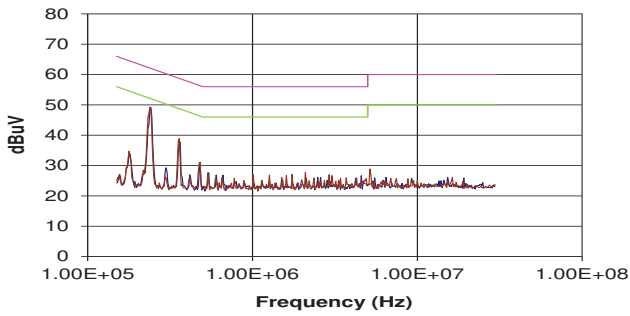


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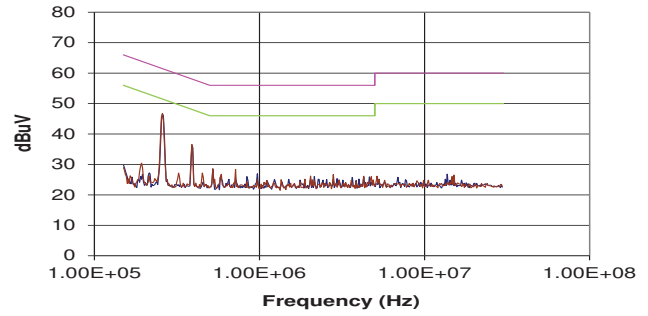


**EMC FILTERING AND SPECTRA**

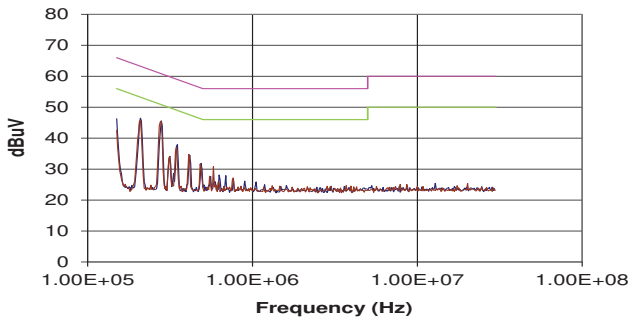
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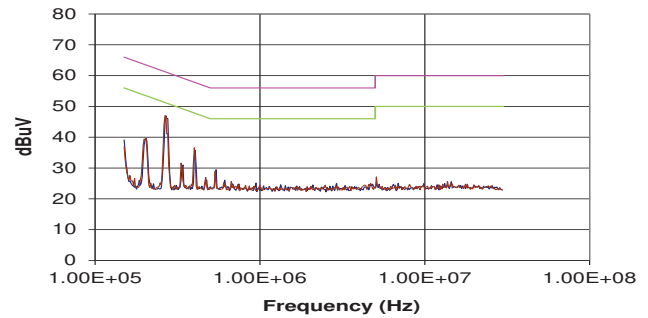
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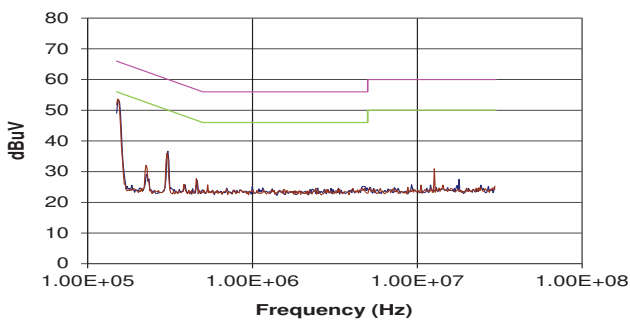
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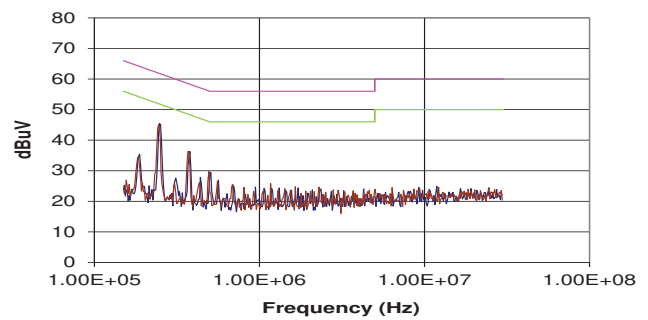
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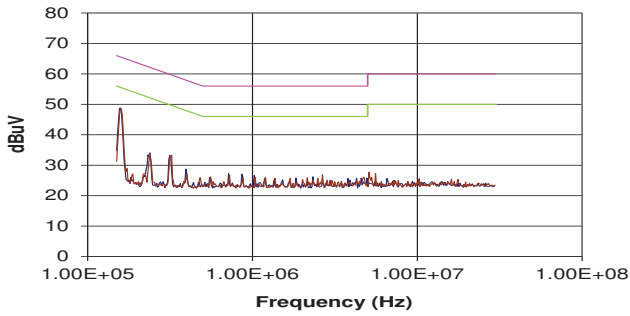


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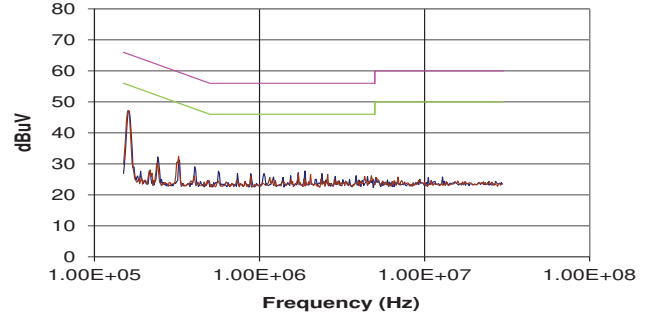


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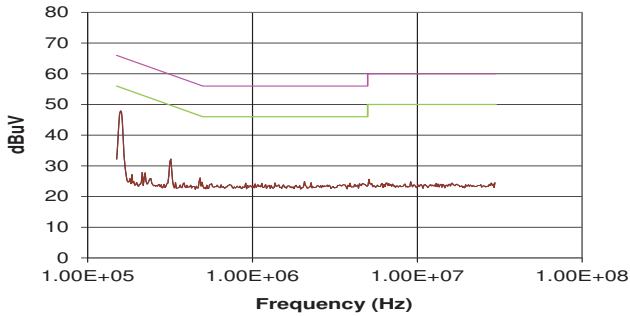
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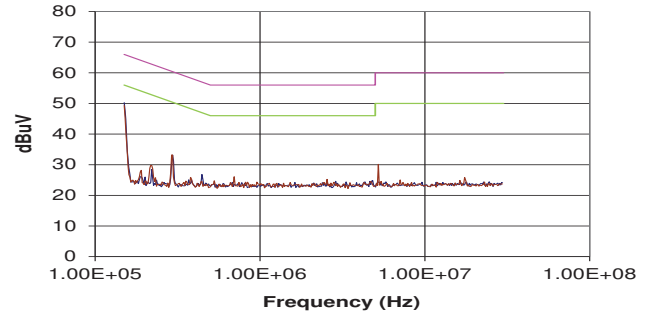
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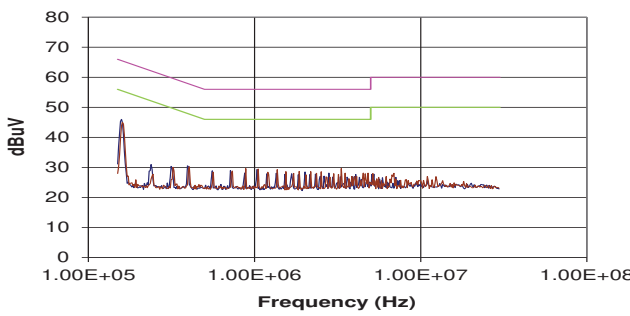
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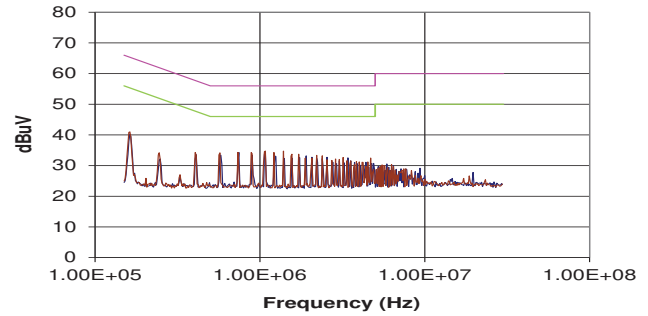
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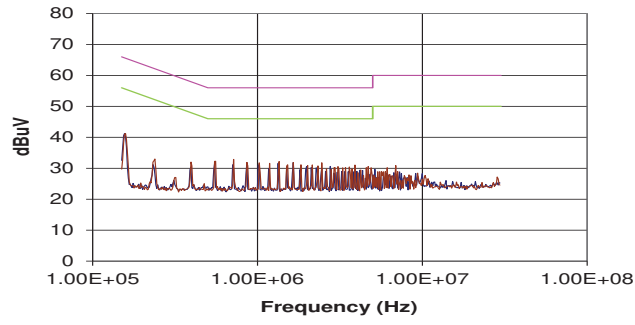


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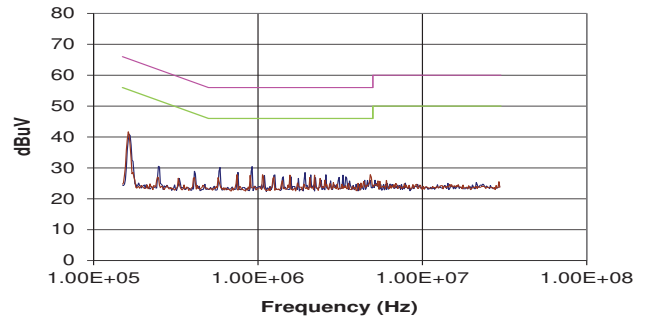


**EMC FILTERING AND SPECTRA**

**MEE1S2412XC**



**MEE1S2415XC**



### TECHNICAL NOTES

#### ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

Murata Power Solutions MEE1 series of DC/DC converters are all 100% production tested at their stated isolation voltage. This is 1kVDC for 1 second.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

The MEE1 has been recognized by Underwriters Laboratory for functional insulation, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts off-set applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

#### REPEATED HIGH-VOLTAGE ISOLATION TESTING

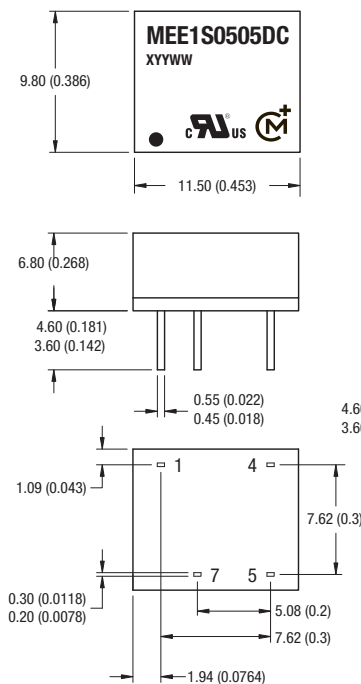
It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The MEE1 series has toroidal isolation transformers, with no additional insulation between primary and secondary windings of enameled wire. While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation. Any material, including this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

This consideration equally applies to agency recognized parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

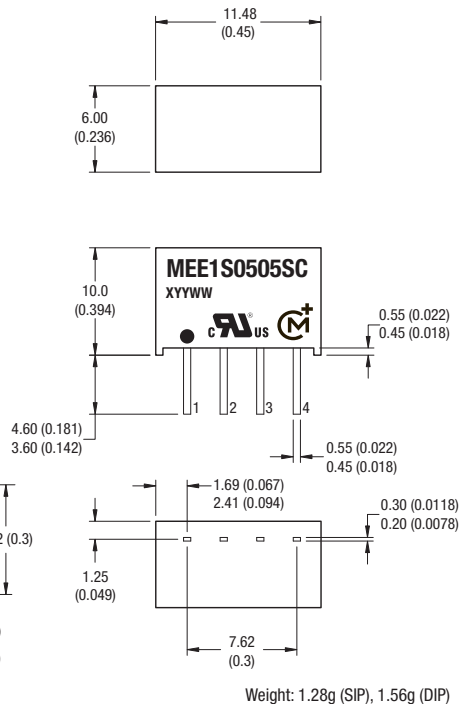
### PACKAGE SPECIFICATIONS

#### MECHANICAL DIMENSIONS

##### DIP Package



##### SIP Package



Weight: 1.28g (SIP), 1.56g (DIP)

All dimensions in mm  $\pm 0.25$ mm (inches  $\pm 0.01$ ). All pins on a 2.54 (0.1) pitch and within  $\pm 0.25$  (0.01) of true position.

#### PIN CONNECTIONS - 8 PIN DIP

| Pin | Function |
|-----|----------|
| 1   | -VIN     |
| 4   | +VIN     |
| 5   | +VOUT    |
| 7   | -VOUT    |

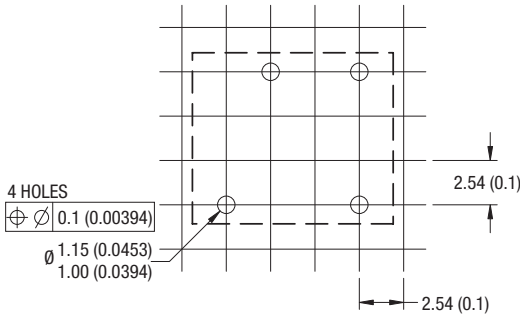
#### PIN CONNECTIONS - 4 PIN SIP

| Pin | Function |
|-----|----------|
| 1   | -VIN     |
| 2   | +VIN     |
| 3   | -VOUT    |
| 4   | +VOUT    |

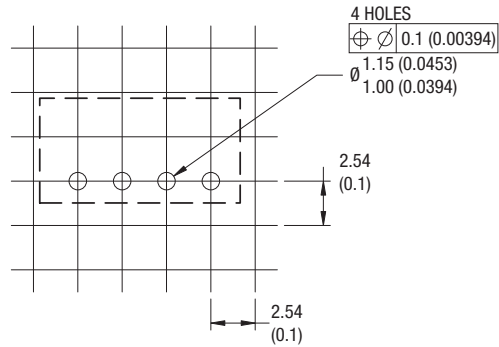
**PACKAGE SPECIFICATIONS (continued)**

**RECOMMENDED FOOTPRINT DETAILS**

8 Pin DIP Package

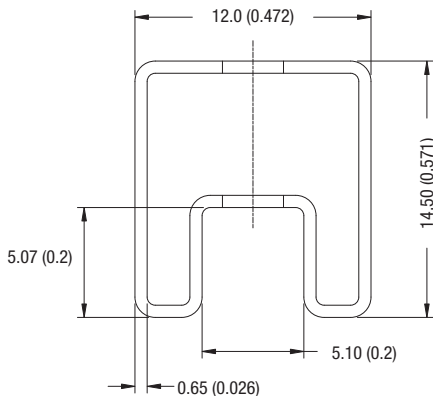


4 Pin SIP Package

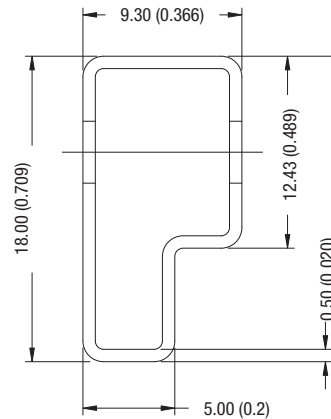


**TUBE OUTLINE DIMENSIONS**

8 Pin DIP Tube



4 Pin SIP Tube



Unless otherwise stated all dimensions in mm (inches)  $\pm 0.5$ mm.  
 Tube length (8 Pin DIP) : 520mm  $\pm 2$ mm (20.47).  
 Tube length (4 Pin SIP) : 520mm  $\pm 2$ mm (20.47).

Tube Quantity : 35

**SAFETY APPROVAL**

The MEE1 series has been recognized by Underwriters Laboratory (UL) to UL 60950 for functional insulation in a maximum ambient temperature for 3.3V & 5V input models of 60°C and for 12V, 15V and 24V models of 85°C. File number E151252 applies. The MEE1 Series of converters are not internally fused so to meet the requirements of UL 60950 an anti-surge input line fuse should always be used with ratings as defined below.

- MEE1S03xxxC: 1A
- MEE1S05xxxC: 0.7A
- MEE1S12xxxC: 0.2A
- MEE1S15xxxC: 0.2A
- MEE1S24xxxC: 0.16A

All fuses should be UL approved and rated to at least the maximum allowable DC input voltage.

Murata Power Solutions, Inc.  
 11 Cabot Boulevard, Mansfield, MA 02048-1151 U.S.A.  
 ISO 9001 and 14001 REGISTERED



This product is subject to the following **operating requirements** and the **Life and Safety Critical Application Sales Policy**:  
 Refer to: <http://www.murata-ps.com/requirements/>

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