



### FEATURES

- RoHS compliant
- UL1950 recognised
- Efficiency to 82%
- Power density up to 0.44W/cm<sup>3</sup>
- Dual outputs
- Low profile package
- UL 94V-0 package material
- No heatsink required
- Footprint 4.75cm<sup>2</sup>
- 6kVDC isolation
- 5V & 12V inputs
- 5V output
- Internal SMD construction
- Fully encapsulated with toroidal magnetics
- MTTF up to 747 kHrs
- PCB mounting

### DESCRIPTION

The NMS series of DC-DC converters are UL1950 recognised which makes them ideal for all telecom and safety applications where approved isolation is required. The low profile package allows mounting in rack systems without risk of touching other boards. The output configuration allows all of the rated power to be drawn from a single pin provided the total load does not exceed 2 watts. The devices feature low noise and low isolation capacitance suitable for applications in high noise environments, e.g. heavy electrical machine interface.



For full details go to [www.murata.com/en-global/products/power/rohs](http://www.murata.com/en-global/products/power/rohs)

### SELECTION GUIDE

| Order Code      | Nominal Input Voltage | Output Voltage | Output Current | Efficiency | Isolation Capacitance | MTTF <sup>1</sup> | Recommended Alternative |
|-----------------|-----------------------|----------------|----------------|------------|-----------------------|-------------------|-------------------------|
|                 | V                     | V              | mA             | %          | pF                    | kHrs              |                         |
| <b>NRND</b>     |                       |                |                |            |                       |                   |                         |
| <b>NMS0505C</b> | 5                     | ±5             | ±200           | 74         | 1.8                   | 747               | MEJ2D0505SC             |
| <b>NMS1205C</b> | 12                    | ±5             | ±200           | 78         | 1.9                   | 365               | MEJ2D1205SC             |

| <b>To be discontinued</b> |    |     |      |    |     |     |             |
|---------------------------|----|-----|------|----|-----|-----|-------------|
| <b>NMS0509C</b>           | 5  | ±9  | ±111 | 76 | 1.9 | 327 | MEJ2D0509SC |
| <b>NMS0512C</b>           | 5  | ±12 | ±83  | 77 | 2.0 | 169 | MEJ2D0512SC |
| <b>NMS0515C</b>           | 5  | ±15 | ±67  | 78 | 2.1 | 93  | MEJ2D0515SC |
| <b>NMS1209C</b>           | 12 | ±9  | ±111 | 81 | 2.0 | 224 | MEJ2D1209SC |
| <b>NMS1212C</b>           | 12 | ±12 | ±83  | 82 | 2.1 | 136 | MEJ2D1212SC |
| <b>NMS1215C</b>           | 12 | ±15 | ±67  | 82 | 2.2 | 82  | MEJ2D1215SC |

When operated with additional external load capacitance the rise time of the input voltage will determine the maximum external capacitance value for guaranteed start up. The slower the rise time of the input voltage the greater the maximum value of the additional external capacitance for reliable start up.

### INPUT CHARACTERISTICS

| Parameter     | Conditions                            | Min. | Typ. | Max. | Units |
|---------------|---------------------------------------|------|------|------|-------|
| Voltage range | Continuous operation, 5V input types  | 4.5  | 5    | 5.5  | V     |
|               | Continuous operation, 12V input types | 10.8 | 12   | 13.2 |       |

### OUTPUT CHARACTERISTICS

| Parameter                  | Conditions                                  | Min. | Typ. | Max. | Units  |
|----------------------------|---|------|------|------|--------|
| Rated Power <sup>2</sup>   | T <sub>A</sub> =0°C to 70°C                 |      |      | 2    | W      |
| Voltage Set Point Accuracy | See tolerance envelope                      | -7.5 |      | 10   | %      |
| Line regulation            | High V <sub>IN</sub> to low V <sub>IN</sub> |      | 1.0  | 1.2  | %/%    |
|                            | 10% load to rated load, 5V output types     |      | 10   | 15   |        |
| Load Regulation            | 10% load to rated load, 9V output types     |      | 6    | 15   | %      |
|                            | 10% load to rated load, 12V output types    |      | 6    | 15   |        |
|                            | 10% load to rated load, 15V output types    |      | 6    | 15   |        |
| Ripple and Noise           | BW=DC to 20MHz, all output types            |      |      | 200  | mV p-p |

### ISOLATION CHARACTERISTICS

| Parameter              | Conditions                | Min. | Typ. | Max. | Units |
|------------------------|---------------------------|------|------|------|-------|
| Isolation test voltage | Flash tested for 1 second | 6000 |      |      | VDC   |
| Resistance             | Viso= 500VDC              |      | 10   |      | GΩ    |

### GENERAL CHARACTERISTICS

| Parameter           | Conditions      | Min. | Typ. | Max. | Units |
|---------------------|-----------------|------|------|------|-------|
| Switching frequency | All input types |      | 35   |      | kHz   |

### ABSOLUTE MAXIMUM RATINGS

|   |  |
|---|--|
| Short-circuit protection <sup>3</sup>           | 1 second   |
| Wave Solder                                     | Wave Solder profile not to exceed the profile recommended in IEC 61760-1 Section 6.1.3. Please refer to <a href="#">application notes</a> for further information. |
| Lead temperature 1.5mm from case for 10 seconds | 300°C  |
| Internal power dissipation                      | 900mW  |
| Input voltage V <sub>IN</sub> , NMS05 types     | 7V   |
| Input voltage V <sub>IN</sub> , NMS12 types     | 15V  |

1. Calculated using MIL-HDBK-217F with nominal input voltage at full load.
  2. See derating graph.
  3. Supply voltage must be disconnected at the end of the short circuit duration.
- All specifications typical at T<sub>A</sub>=25°C, nominal input voltage and rated output current unless otherwise specified.

**TEMPERATURE CHARACTERISTICS**

| Parameter                      | Conditions          | Min. | Typ. | Max. | Units |
|--------------------------------|---------------------|------|------|------|-------|
| Specification                  | All output types    | 0    |      | 70   | °C    |
| Storage                        |                     | -50  |      | 130  |       |
| Case Temperature above ambient | All output types    |      |      | 32   |       |
| Cooling                        | Free air convection |      |      |      |       |

**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 NMS series of DC-DC converters are all 100% production tested at their stated isolation voltage. This is 6kVDC for 1 second.

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

The NMS series has been recognised by Underwriters Laboratory to a working voltage of 300Vrms for Supplementary Insulation system and 150Vrms for Reinforced Insulation systems.

**REPEATED HIGH-VOLTAGE ISOLATION TESTING**

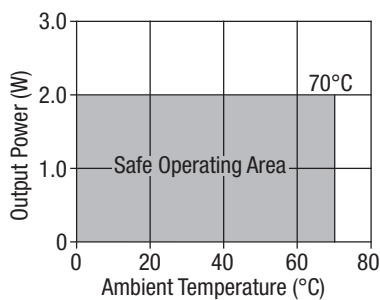
It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

**RoHS COMPLIANCE INFORMATION**

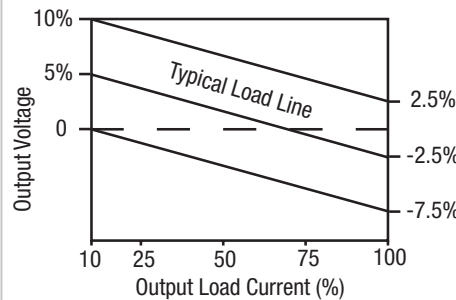


This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300°C for 10 seconds. Please refer to [application notes](#) for further information. The pin termination finish on this product series is Matte Tin over Nickel Preplate. The series is backward compatible with Sn/Pb soldering systems. For further information, please visit [www.murata-ps.com/rohs](http://www.murata-ps.com/rohs)

**TEMPERATURE DERATING GRAPH**



**TOLERANCE ENVELOPE**

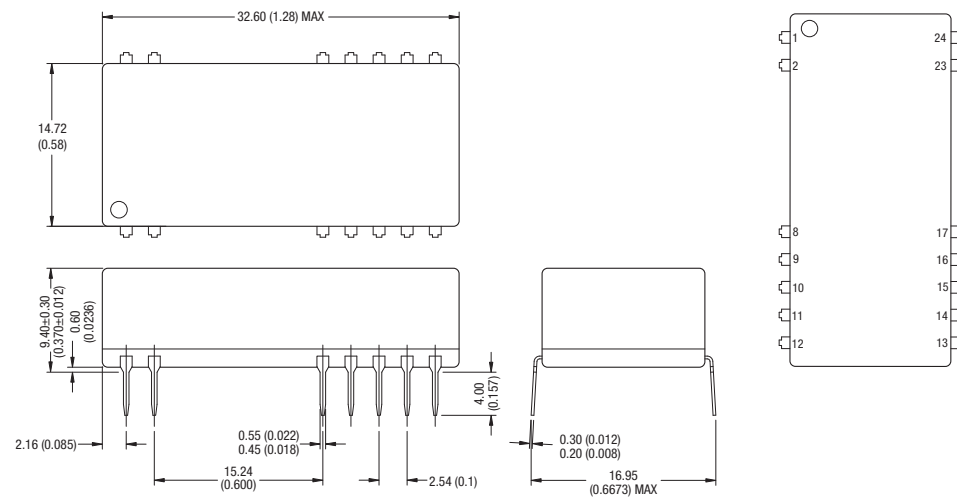


**SAFETY APPROVAL**

The NMS series has been recognised by Underwriters Laboratory (UL) to UL1950 for supplementary insulation up to 300Vrms and reinforced insulation up to 150Vrms working voltage. File number E151252 applies.

**PACKAGE SPECIFICATIONS**

**MECHANICAL DIMENSIONS**

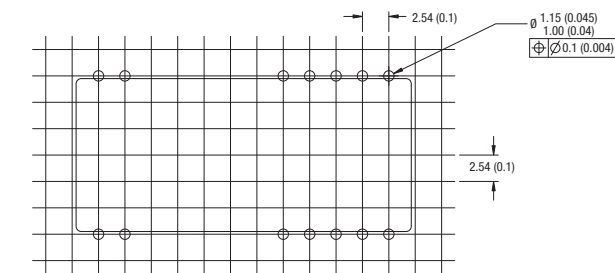


All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

**PIN CONNECTIONS**

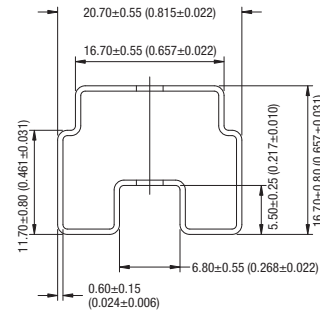
| Pin | Function |
|-----|----------|
| 1   | +VIN     |
| 2   | -VIN     |
| 8   | -VOUT    |
| 9   | NC       |
| 10  | OV       |
| 11  | NC       |
| 12  | +VOUT    |
| 13  | +VOUT    |
| 14  | NC       |
| 15  | OV       |
| 16  | NC       |
| 17  | -VOUT    |
| 23  | NC       |
| 24  | NC       |

**RECOMMENDED FOOTPRINT DETAILS**



Unless otherwise stated all dimensions in inches ±0.01 (mm) ±0.5mm.

**TUBE OUTLINE DIMENSIONS**



Unless otherwise stated all dimensions in inches ±0.01 (mm) ±0.5mm.  
Tube length : 20.47±0.079 (520mm ±2mm).

Tube Quantity: 15

**DISCLAIMER**

Unless otherwise stated in the datasheet, all products are designed for standard commercial and industrial applications and NOT for safety-critical and/or life-critical applications.

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- Undersea equipment
- Power plant control equipment
- Medical equipment
- Transportation equipment (automobiles, trains, ships, etc.)
- Traffic signal equipment
- Disaster prevention / crime prevention equipment
- Data Processing equipment

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