



### FEATURES

- RoHS compliant
- Efficiency to 85%
- Power density up to 0.85W/cm<sup>3</sup>
- Single or dual output
- UL 94V-0 package material
- No heatsink required
- Footprint from 1.17cm<sup>2</sup>
- Industry standard pinout
- Power sharing on dual output
- 3kVDC isolation (1 minute)
- 24V & 48V input
- 5V, 9V, 12V and 15V output
- Internal SMD construction
- Fully encapsulated with toroidal magnetics
- No external components required
- No electrolytic or tantalum capacitors

### DESCRIPTION

The NMV series offers single or dual output versions in the same size package as the popular NMA series. The higher isolation is particularly useful in control type applications where the standard 1kV is not sufficient.

# NMV 24V & 48V Series

3kVDC Isolated 1W Single & Dual Output DC-DC Converters

### SELECTION GUIDE

| Order Code          | Nominal Input Voltage | Output Voltage | Output Current | Load Regulation (Max) | Ripple & Noise (Max) | Efficiency | Isolation Capacitance | MTTF | Package Style | RECOMMENDED ALTERNATIVES |
|---------------------|-----------------------|----------------|----------------|-----------------------|----------------------|------------|-----------------------|------|---------------|--------------------------|
|                     | V                     | V              | mA             | %                     | mV p-p               | %          | pF                    | kHrs |               |                          |
| <b>Discontinued</b> |                       |                |                |                       |                      |            |                       |      |               |                          |
| NMV2405DAC          | 24                    | 5              | 200            | 15                    | 150                  | 70         | 33                    | 201  | DIP           | MEV1S2405DC              |
| NMV2409DAC          | 24                    | 9              | 111            | 10                    | 150                  | 80         | 40                    | 185  | DIP           | MEV1S2409DC              |
| NMV2412DAC          | 24                    | 12             | 84             | 10                    | 150                  | 80         | 55                    | 163  | DIP           | MEV1S2412DC              |
| NMV2415DAC          | 24                    | 15             | 67             | 10                    | 150                  | 80         | 70                    | 136  | DIP           | MEV1S2415DC              |
| NMV2405SAC          | 24                    | 5              | 200            | 15                    | 150                  | 70         | 33                    | 201  | SIP           | MEV1S2405SC              |
| NMV2409SAC          | 24                    | 9              | 111            | 10                    | 150                  | 80         | 40                    | 185  | SIP           | MEV1S2409SC              |
| NMV2412SAC          | 24                    | 12             | 84             | 10                    | 150                  | 80         | 55                    | 163  | SIP           | MEV1S2412SC              |
| NMV2415SAC          | 24                    | 15             | 67             | 10                    | 150                  | 80         | 70                    | 136  | SIP           | MEV1S2415SC              |
| NMV4805DAC          | 48                    | 5              | 200            | 15                    | 150                  | 70         | 48                    | 213  | DIP           | MEV1S4805SC              |
| NMV4809DAC          | 48                    | 9              | 111            | 10                    | 150                  | 80         | 59                    | 194  | DIP           | MEV1S4809SC              |
| NMV4812DAC          | 48                    | 12             | 84             | 10                    | 150                  | 80         | 70                    | 169  | DIP           | MEV1S4812SC              |
| NMV4815DAC          | 48                    | 15             | 67             | 10                    | 150                  | 80         | 81                    | 140  | DIP           | MEV1S4815SC              |
| NMV4805SAC          | 48                    | 5              | 200            | 15                    | 150                  | 70         | 48                    | 213  | SIP           | MEV1S4805SC              |
| NMV4809SAC          | 48                    | 9              | 111            | 10                    | 150                  | 80         | 59                    | 194  | SIP           | MEV1S4809SC              |
| NMV4812SAC          | 48                    | 12             | 84             | 10                    | 150                  | 80         | 70                    | 169  | SIP           | MEV1S4812SC              |
| NMV4815SAC          | 48                    | 15             | 67             | 10                    | 150                  | 80         | 81                    | 140  | SIP           | MEV1S4815SC              |
| NMV2405DC           | 24                    | ±5             | ±100           | 15                    | 150                  | 70         | 45                    | 194  | DIP           | MEV1D2405DC              |
| NMV2409DC           | 24                    | ±9             | ±55            | 10                    | 150                  | 80         | 52                    | 166  | DIP           | MEV1D2409DC              |
| NMV2412DC           | 24                    | ±12            | ±42            | 10                    | 150                  | 80         | 65                    | 134  | DIP           | MEV1D2412DC              |
| NMV2415DC           | 24                    | ±15            | ±33            | 10                    | 150                  | 80         | 70                    | 101  | DIP           | MEV1D2415DC              |
| NMV2405SC           | 24                    | ±5             | ±100           | 15                    | 150                  | 70         | 45                    | 194  | SIP           | MEV1D2405SC              |
| NMV2409SC           | 24                    | ±9             | ±55            | 10                    | 150                  | 80         | 52                    | 166  | SIP           | MEV1D2409SC              |
| NMV2412SC           | 24                    | ±12            | ±42            | 10                    | 150                  | 80         | 65                    | 134  | SIP           | MEV1D2412SC              |
| NMV2415SC           | 24                    | ±15            | ±33            | 10                    | 150                  | 80         | 70                    | 101  | SIP           | MEV1D2415SC              |
| NMV4805DC           | 48                    | ±5             | ±100           | 15                    | 150                  | 70         | 45                    | 205  | DIP           | MEV1D4805SC              |
| NMV4809DC           | 48                    | ±9             | ±55            | 10                    | 150                  | 80         | 58                    | 175  | DIP           | MEV1D4809SC              |
| NMV4812DC           | 48                    | ±12            | ±42            | 10                    | 150                  | 80         | 68                    | 137  | DIP           | MEV1D4812SC              |
| NMV4815DC           | 48                    | ±15            | ±33            | 10                    | 150                  | 80         | 75                    | 102  | DIP           | MEV1D4815SC              |
| NMV4805SC           | 48                    | ±5             | ±100           | 15                    | 150                  | 70         | 45                    | 205  | SIP           | MEV1D4805SC              |
| NMV4809SC           | 48                    | ±9             | ±55            | 10                    | 150                  | 80         | 58                    | 175  | SIP           | MEV1D4809SC              |
| NMV4812SC           | 48                    | ±12            | ±42            | 10                    | 150                  | 80         | 68                    | 137  | SIP           | MEV1D4812SC              |
| NMV4815SC           | 48                    | ±15            | ±33            | 10                    | 150                  | 80         | 75                    | 102  | SIP           | MEV1D4815SC              |

### INPUT CHARACTERISTICS

| Parameter     | Conditions                            | Min. | Typ. | Max. | Units |
|---------------|---------------------------------------|------|------|------|-------|
| Voltage range | Continuous operation, 24V input types | 21.6 | 24   | 26.4 | V     |
|               | Continuous operation, 48V input types | 43.2 | 48   | 52.8 |       |



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

1. Calculated using MIL-HDBK-217F with nominal input voltage at full load.
  2. Supply voltage must be discontinued 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.

### ABSOLUTE MAXIMUM RATINGS

|   |  |
|---|--|
| Short-circuit protection <sup>2</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 | 260°C  |
| Input voltage $V_{IN}$ , NMV24 types            | 28V  |
| Input voltage $V_{IN}$ , NMV48 types            | 54V  |

### OUTPUT CHARACTERISTICS

| Parameter                  | Conditions                                      | Min. | Typ. | Max. | Units |
|----------------------------|---|------|------|------|-------|
| Rated Power <sup>1</sup>   | $T_A=0^{\circ}\text{C}$ to $70^{\circ}\text{C}$ |      |      | 1    | W     |
| Voltage Set Point Accuracy | See tolerance envelope                          |      |      |      |       |
| Line regulation            | High $V_{IN}$ to low $V_{IN}$                   |      |      | 1.2  | %/%   |

### ISOLATION CHARACTERISTICS

| Parameter              | Conditions                | Min. | Typ. | Max. | Units |
|------------------------|---------------------------|------|------|------|-------|
| Isolation test voltage | Flash tested for 1 minute | 3000 |      |      | VDC   |
| Resistance             | Viso= 1000VDC             | 1    |      |      | GΩ    |

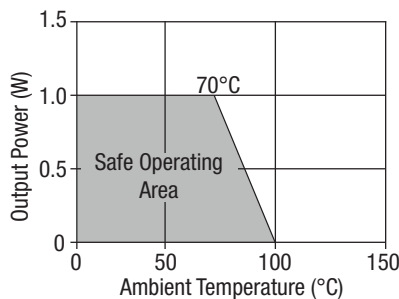
### GENERAL CHARACTERISTICS

| Parameter           | Conditions      | Min. | Typ. | Max. | Units |
|---------------------|-----------------|------|------|------|-------|
| Switching frequency | All input types |      | 100  |      | kHz   |

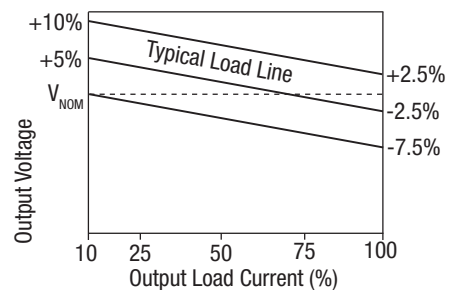
### TEMPERATURE CHARACTERISTICS

| Parameter     | Conditions          | Min. | Typ. | Max. | Units |
|---------------|---------------------|------|------|------|-------|
| Specification | All output types    | 0    |      | 70   | °C    |
| Storage       |                     | -55  |      | 150  |       |
| Cooling       | Free air convection |      |      |      |       |

### TEMPERATURE DERATING GRAPH



### TOLERANCE ENVELOPE



### 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 NMV series of DC-DC converters are all 100% production tested at their stated isolation voltage. This is 3kVDC for 1 minute.

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

For a part holding no specific agency approvals, such as the NMV series, 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 offset 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

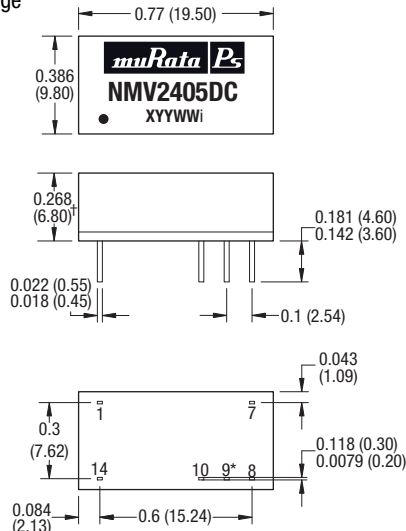
It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The NMV series has toroidal isolation transformers, with no additional insulation between primary and secondary windings of enamelled 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 recognised 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.

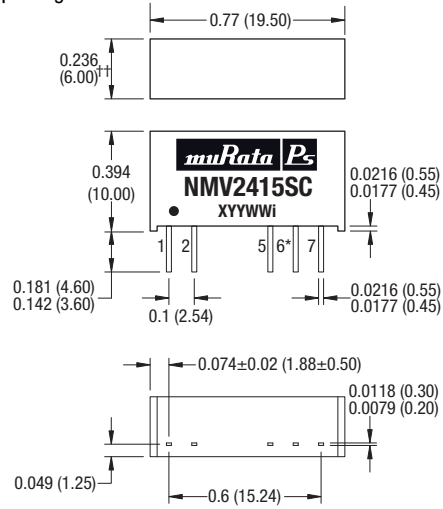
**PACKAGE SPECIFICATIONS**

**MECHANICAL DIMENSIONS**

DIP package



SIP package



† 0.303 (7.70) for 48V variants  
 †† 0.300 (7.50) for 48V variants

\* Pin not fitted on single output variants.

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

Weight: 2.11g (DIP and SIP)

**PIN CONNECTIONS**

Single output variants

| 14 Pin DIP |          | 7 Pin SIP |          |
|------------|----------|-----------|----------|
| Pin        | Function | Pin       | Function |
| 1          | -VIN     | 1         | +VIN     |
| 7          | NC       | 2         | -VIN     |
| 8          | +VOUT    | 5         | -VOUT    |
| 10         | -VOUT    | 7         | +VOUT    |
| 14         | +VIN     |           |          |

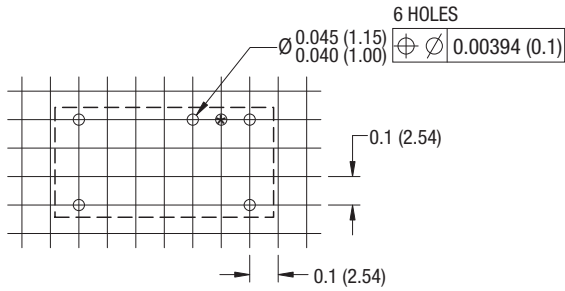
Dual output variants

| 14 Pin DIP |          | 7 Pin SIP |          |
|------------|----------|-----------|----------|
| Pin        | Function | Pin       | Function |
| 1          | -VIN     | 1         | +VIN     |
| 7          | NC       | 2         | -VIN     |
| 8          | +VOUT    | 5         | -VOUT    |
| 9          | OV       | 6         | OV       |
| 10         | -VOUT    | 7         | +VOUT    |
| 14         | +VIN     |           |          |

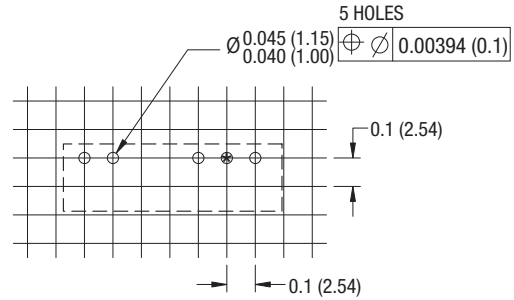
**PACKAGE SPECIFICATIONS (continued)**

**RECOMMENDED FOOTPRINT DETAILS**

14 Pin DIP Package



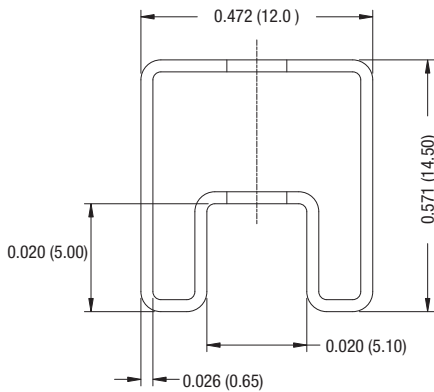
7 Pin SIP Package



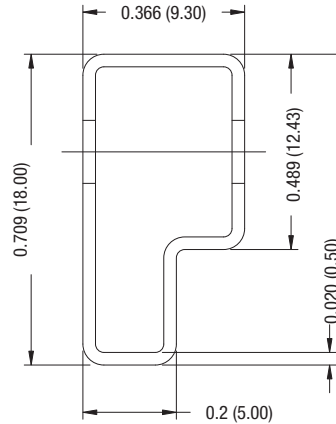
\*Hole not required for single output variants.

**TUBE OUTLINE DIMENSIONS**

14 Pin DIP Tube



7 Pin SIP Tube



Unless otherwise stated all dimensions in inches (mm)  $\pm 0.5$ mm.  
 Tube length (14 Pin DIP) : 20.47 (520mm  $\pm 2$ mm).  
 Tube length (7 Pin SIP) : 20.47 (520mm  $\pm 2$ mm).

Tube Quantity : 25

**RoHS COMPLIANCE INFORMATION**



This series is compatible with RoHS soldering systems with a peak wave solder temperature of 260°C for 10 seconds. Please refer to [application notes](#) for further information. 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)

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