



### FEATURES

- RoHS compliant
- UL1950 recognized
- 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 input
- 5V, 9V, 12V and 15V 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 recognized 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.

### SELECTION GUIDE

Order Code	Nominal Input Voltage	Output Voltage	Output Current	Efficiency	Isolation Capacitance	MTTF <sup>1</sup>
	V	V	mA	%	pF	kHrs
<b>NMS0505C</b>	5	±5	±200	74	1.8	747
<b>NMS0509C</b>	5	±9	±111	76	1.9	327
<b>NMS0512C</b>	5	±12	±83	77	2.0	169
<b>NMS0515C</b>	5	±15	±67	78	2.1	93
<b>NMS1205C</b>	12	±5	±200	78	1.9	365
<b>NMS1209C</b>	12	±9	±111	81	2.0	224
<b>NMS1212C</b>	12	±12	±83	82	2.1	136
<b>NMS1215C</b>	12	±15	±67	82	2.2	82

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
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.

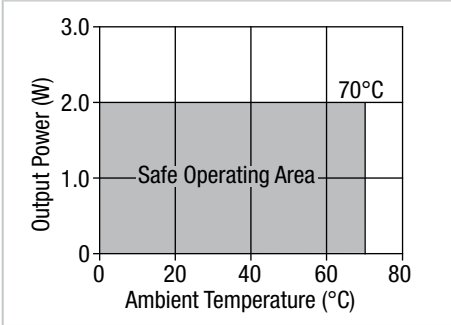
All specifications typical at T<sub>A</sub>=25°C, nominal input voltage and rated output current unless otherwise specified.



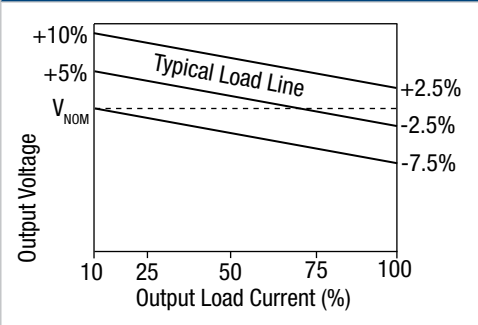
**TEMPERATURE CHARACTERISTICS**

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				

**TEMPERATURE DERATING GRAPH**



**TOLERANCE ENVELOPE**



**SAFETY APPROVAL**

The NMS series has been recognised by Underwriters Laboratory (UL) to UL 60950 for supplementary insulation up to 300Vrms and reinforced insulation up to 150Vrms working voltage. File number E151252 applies.

**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?"

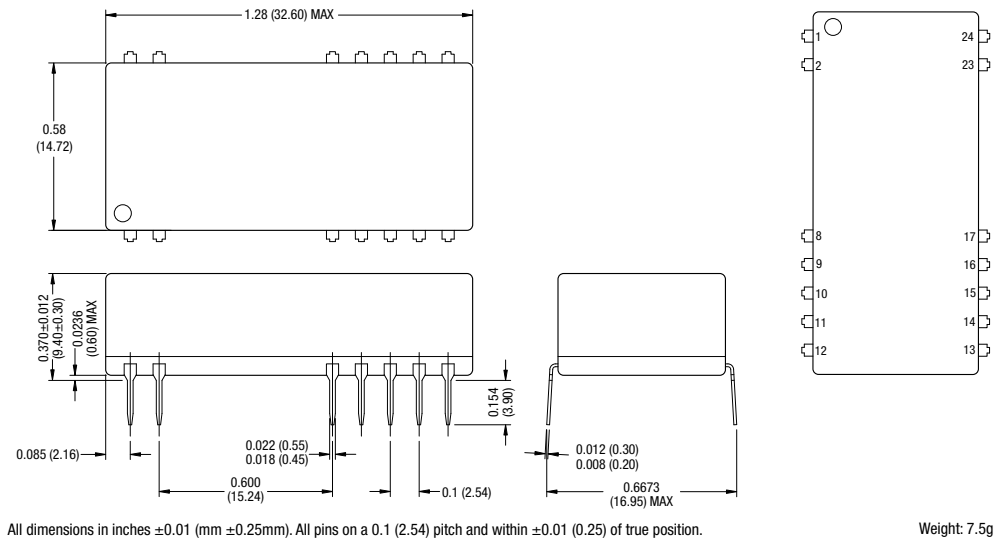
The NMS series has been recognized by Underwriters Laboratory to a working voltage of 300Vrms for Supplementary Insulation system and 150Vrms for Reinforced Insulation systems.

**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.

**PACKAGE SPECIFICATIONS**

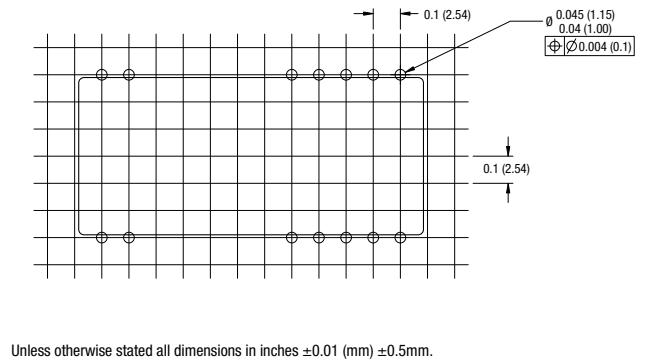
**MECHANICAL DIMENSIONS**



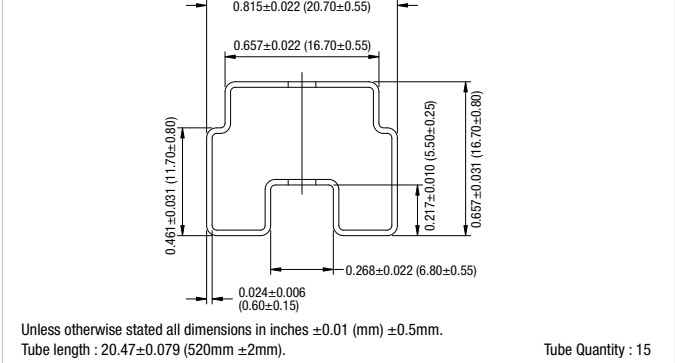
**PIN CONNECTIONS**

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**



**TUBE OUTLINE DIMENSIONS**



**RoHS COMPLIANCE INFORMATION**



This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300°C for 10 seconds. 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)

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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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