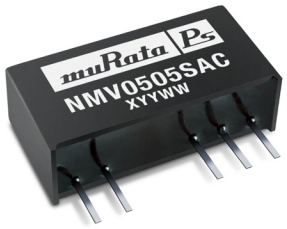
Murata Power Solutions

NMV 5V, 12V & 15V Series

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



FEATURES

- RoHS compliant
- Efficiency to 79%
- Power density up to 0.85W/cm³
- Wide temperature performance at full 1 Watt load, –40°C to 85°C
- Single or dual output
- UL 94V-0 package material
- No heatsink required
- Footprint from 1.17cm²
- Industry standard pinout
- Power sharing on dual output
- 3kVDC isolation (1 minute)
- 5V, 12V, & 15V input
- 5V, 9V, 12V and 15V output
- Internal SMD construction
- Fully encapsulated with toroidal magnetics
- No external components required
- MTTF up to 4.2 million hours
- No electrolytic or tantalum capacitors

PRODUCT OVERVIEW

The NMV series of industrial temperature range DC/DC converters are the standard buliding blocks for on-board distributed power systems. They are ideally suited for providing local supplies on control system boards with the added benefit of 3kVDC galvanic isolation to reduce switching noise. Available in SIP and DIP with dual and single output pinout. All of the rated power may be drawn from a single pin provided the total load does not exceed 1 watt.

RoHS COMPLIANT 2002/95/EC

For full details go to www.murata-ps.com/rohs

SELECTION GUIDE

Order Code	Nominal Input Voltage	Output Voltage	Output Current	Input Current at Rated Load	Load Regulation (Typ)	Load Regulation (Max)	Ripple & Noise (Typ)	Ripple & Noise (Max)	Efficiency	Isolation Capacitance	MTTF[1]	Package Style
	V	V	mA	mA	%		mVp-p		%	pF	kHrs	
NMV0505DAC	5	5	200	294	14.6	15	15	17	68	23	4241	DIP
NMV0509DAC	5	9	111	267	9.3	10	11.3	15	75	30	3376	
NMV0512DAC	5	12	84	260	7.4	8.0	10.5	16	77	26	2555	
NMV0515DAC	5	15	67	256	6.7	7.3	8.7	11	78	27	1838	
NMV0505SAC	5	5	200	294	14.6	15	16	23	68	23	4241	SIP
NMV0509SAC	5	9	111	267	9.3	10	12	15	75	30	3376	
NMV0512SAC	5	12	84	260	7.4	8.0	11	15	77	26	2555	
NMV0515SAC	5	15	67	256	6.7	7.3	11	14	78	27	1838	
NMV1205DAC	12	5	200	121	14.6	15	9.5	14	69	26	2664	DIP
NMV1209DAC	12	9	111	113	9.3	10	7	8.5	74	35	2295	
NMV1212DAC	12	12	84	108	7.4	8.0	8	19	77	43	1883	
NMV1215DAC	12	15	67	108	6.7	7.3	8	17	77	42	1462	
NMV1205SAC	12	5	200	121	14.6	15	11	16	69	26	2664	SIP
NMV1209SAC	12	9	111	113	9.3	10	7.5	14	74	35	2295	
NMV1212SAC	12	12	84	108	7.4	8.0	9	22	77	43	1883	
NMV1215SAC	12	15	67	108	6.7	7.3	8.5	17	77	42	1462	
NMV1505SAC	15	5	200	93	8.3	10	15.5	17	67	21	2747	
NMV1512SAC	15	12	84	85	3.3	4.0	11.2	14	75	45	1365	
NMV1515SAC	15	15	67	84	2.8	4.0	11	13	77	50	941	
NMV0505DC	5	±5	±100	280	9.0	10	11	14	71.5	21	3106	DIP
NMV0509DC	5	±9	±55	263	7.5	8.5	7.5	9	76	24	2258	
NMV0512DC	5	±12	±42	256	6.8	7.5	6.7	9	78	26	1579	
NMV0515DC	5	±15	±33	253	6.8	8.5	6	9	79	27	1065	
NMV0505SC	5	±5	±100	280	9.0	10	11	17	71.5	21	3106	SIP
NMV0509SC	5	±9	±55	263	7.5	8.5	7	9.4	76	24	2258	
NMV0512SC	5	±12	±42	256	6.8	7.5	6.7	8	78	26	1579	
NMV0515SC	5	±15	±33	253	6.8	8.5	6.3	8.2	79	27	1065	
NMV1205DC	12	±5	±100	117	9.0	10	8.6	12	71	27	2148	DIP
NMV1209DC	12	±9	±55	113	7.5	8.5	6.5	9	74	35	1705	
NMV1212DC	12	±12	±42	111	6.8	7.5	6.2	8.5	75	42	1287	
NMV1215DC	12	±15	±33	110	6.8	8.5	5.5	8	76	41	924	
NMV1205SC	12	±5	±100	117	9.0	10	10	13	71	27	2148	SIP
NMV1209SC	12	±9	±55	113	7.5	8.5	8	11	74	35	1705	
NMV1212SC	12	±12	±42	111	6.8	7.5	6	10	75	42	1287	
NMV1215SC	12	±15	±33	110	6.8	8.5	6.5	13	76	41	924	
NMV1505SC	15	±5	±100	91	5.5	10	11	12	69	39	1941	
NMV1512SC	15	±12	±42	87	2.6	3.0	7.5	9	75	68	789	
NMV1515SC	15	±15	±33	84	2.3	3.0	7.5	9	77	84	522	

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.

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_A=25°C, nominal input voltage and rated output current unless otherwise specified.

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	
	Continuous operation, 15V input types	13.5	15	16.5	
Reflected ripple current			20	40	mA p-p

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection[2]	1 second
Lead temperature 1.5mm from case for 10 seconds	300°C
Internal power dissipation	560mW
Input voltage V_{IN}, NMV05 types	7V
Input voltage V_{IN}, NMV12 types	15V
Input voltage V_{IN}, NMV15 types	18V

OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Rated Power[2]	T_A=-40°C to 120°C			1	W
Voltage Set Point Accuracy	See tolerance envelope				
Line regulation	High V_{IN} to low V_{IN}		1.0	1.2	%/%

ISOLATION CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test voltage	Flash tested for 1 minute	3000			VDC
Resistance	Viso= 1000VDC	10			GΩ

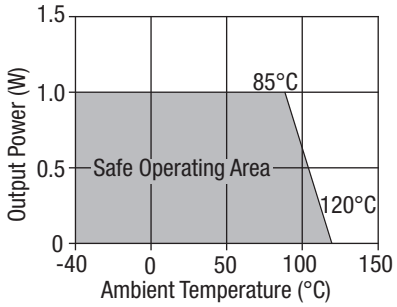
GENERAL CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency	5V input types		120	135	kHz
	12V input types		150	170	
	15V input types		90	110	

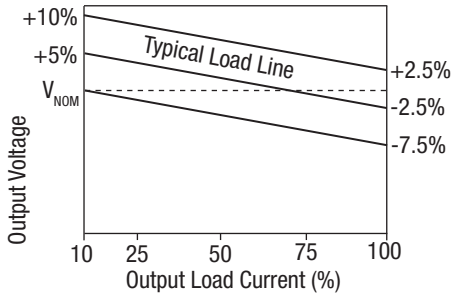
TEMPERATURE CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	All output types	-40		85	°C
Storage		-50		125	
Case Temperature above ambient	5V output types			28	
	All other output types			25	
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 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.

RIPPLE & NOISE CHARACTERISATION METHOD

All measurement to be taken with the following components connected to the UUT as detailed below.

50 Ohm coax cable, solder connections one end, BNC plug at the other end.

C1 – 1µF X7R multilayer ceramic capacitor rated at minimum 3 x the output voltage of the UUT

C2 – 10µF tantalum capacitor rated at minimum 1.5 x the output voltage of the UUT with ESR of less than 100 milliohms at 100 kHz e.g. AVX TPS series.

C3 – 100nF multilayer ceramic capacitor, general purpose

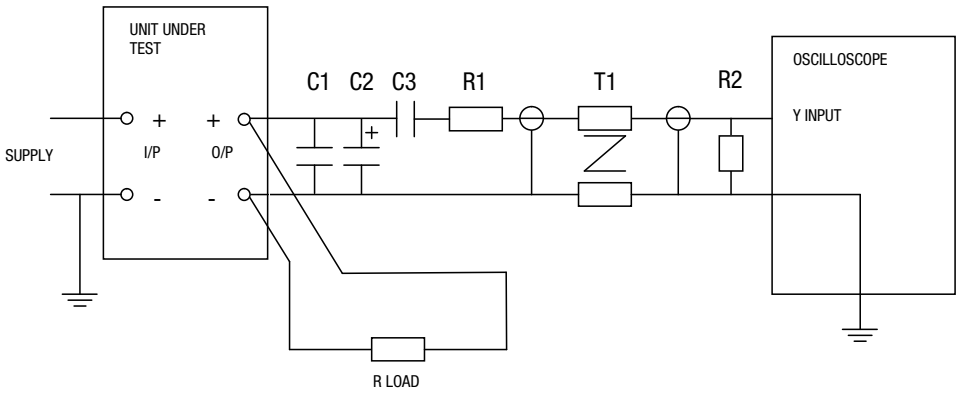
R1 – 450 Ohm resistor, carbon film, ±1%

R2 – 50 Ohm BNC termination

T1 – 3T of the coax cable through a ferrite toroid eg Ferroxcube TN32/19/13-3E25

RLOAD – Resistive load at the UUT maximum rating. Connections via twisted wires.

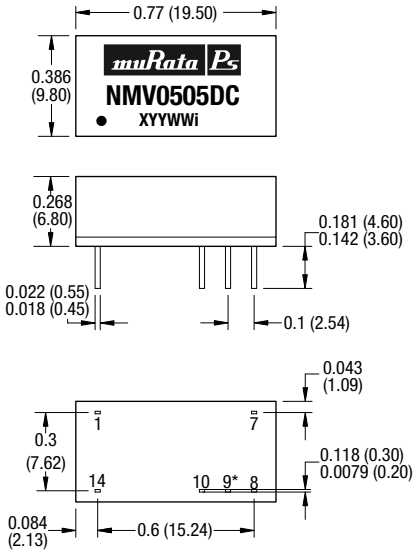
Differential Mode Noise Test Schematic



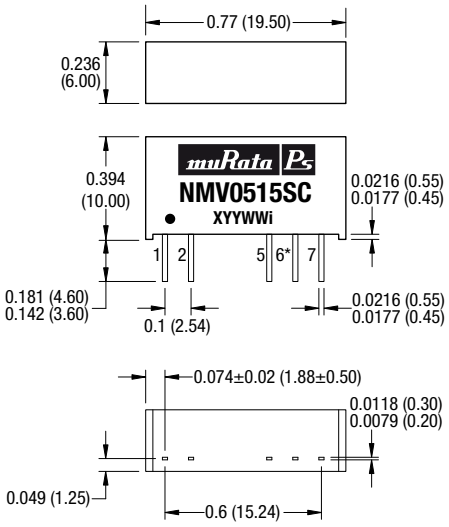
PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

DIP package



SIP package



* Pin not fitted on single output variants.

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.

Weight: 2.4g (DIP) 2.1g (SIP)

PIN CONNECTIONS

Single output variants

14 Pin DIP	
Pin	Function
1	$-V_{IN}$
7	NC
8	$+V_{OUT}$
10	$-V_{OUT}$
14	$+V_{IN}$

7 Pin SIP	
Pin	Function
1	$+V_{IN}$
2	$-V_{IN}$
5	$-V_{OUT}$
7	$+V_{OUT}$

Dual output variants

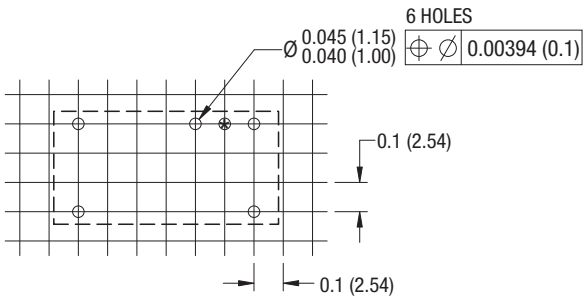
14 Pin DIP	
Pin	Function
1	$-V_{IN}$
7	NC
8	$+V_{OUT}$
9	0V
10	$-V_{OUT}$
14	$+V_{IN}$

7 Pin SIP	
Pin	Function
1	$+V_{IN}$
2	$-V_{IN}$
5	$-V_{OUT}$
6	0V
7	$+V_{OUT}$

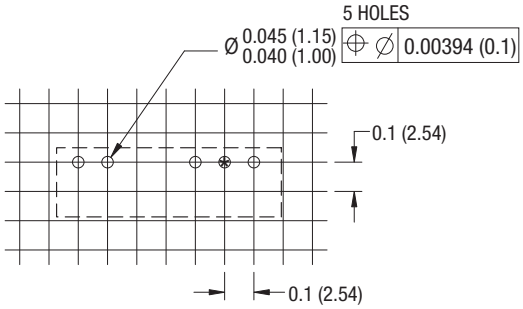
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

14 Pin DIP Package



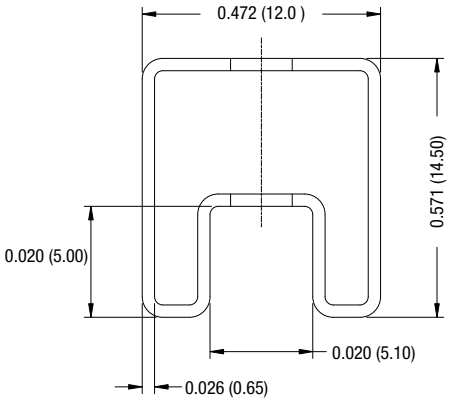
7 Pin SIP Package



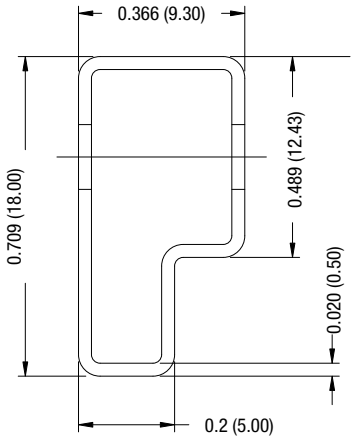
*Hole not required for single output variants.

TUBE OUTLINE DIMENSIONS

14 Pin DIP Tube



7 Pin SIP Tube



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

Tube Quantity : 25

RoHS COMPLIANCE INFORMATION

RoHS COMPLIANT 2002/95/EC

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 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

Murata Power Solutions

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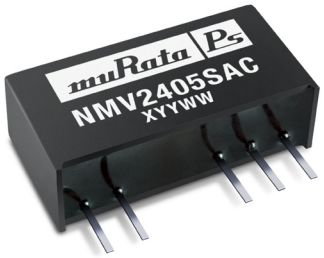
Murata Power Solutions

NMV 24V & 48V Series

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



FEATURES

- RoHS compliant
- Efficiency to 85%
- Power density up to 0.85W/cm^3
- Single or dual output
- UL 94V-0 package material
- No heatsink required
- Footprint from 1.17cm^2
- 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.

SELECTION GUIDE

Order Code	Nominal Input Voltage	Output Voltage	Output Current	Load Regulation (Max)	Ripple & Noise (Max)	Efficiency	Isolation Capacitance	MTTF[1]	Package Style
	V	V	mA	%	mV p-p	%	pF	kHrs	
NMV2405DAC	24	5	200	15	150	70	33	201	DIP
NMV2409DAC	24	9	111	10	150	80	40	185	
NMV2412DAC	24	12	84	10	150	80	55	163	
NMV2415DAC	24	15	67	10	150	80	70	136	
NMV2405SAC	24	5	200	15	150	70	33	201	SIP
NMV2409SAC	24	9	111	10	150	80	40	185	
NMV2412SAC	24	12	84	10	150	80	55	163	
NMV2415SAC	24	15	67	10	150	80	70	136	
NMV4805DAC	48	5	200	15	150	70	48	213	DIP
NMV4809DAC	48	9	111	10	150	80	59	194	
NMV4812DAC	48	12	84	10	150	80	70	169	
NMV4815DAC	48	15	67	10	150	80	81	140	
NMV4805SAC	48	5	200	15	150	70	48	213	SIP
NMV4809SAC	48	9	111	10	150	80	59	194	
NMV4812SAC	48	12	84	10	150	80	70	169	
NMV4815SAC	48	15	67	10	150	80	81	140	
NMV2405DC	24	±5	±100	15	150	70	45	194	DIP
NMV2409DC	24	±9	±55	10	150	80	52	166	
NMV2412DC	24	±12	±42	10	150	80	65	134	
NMV2415DC	24	±15	±33	10	150	80	70	101	
NMV2405SC	24	±5	±100	15	150	70	45	194	SIP
NMV2409SC	24	±9	±55	10	150	80	52	166	
NMV2412SC	24	±12	±42	10	150	80	65	134	
NMV2415SC	24	±15	±33	10	150	80	70	101	
NMV4805DC	48	±5	±100	15	150	70	45	205	DIP
NMV4809DC	48	±9	±55	10	150	80	58	175	
NMV4812DC	48	±12	±42	10	150	80	68	137	
NMV4815DC	48	±15	±33	10	150	80	75	102	
NMV4805SC	48	±5	±100	15	150	70	45	205	SIP
NMV4809SC	48	±9	±55	10	150	80	58	175	
NMV4812SC	48	±12	±42	10	150	80	68	137	
NMV4815SC	48	±15	±33	10	150	80	75	102	

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, 24V input types	21.6	24	26.4	V
	Continuous operation, 48V input types	43.2	48	52.8	

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection[2]	1 second
Lead temperature 1.5mm from case for 10 seconds	300°C
Input voltage V_{IN}, NMV24 types	28V
Input voltage V_{IN}, NMV48 types	54V

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_A=25°C, nominal input voltage and rated output current unless otherwise specified.

RoHS COMPLIANT 2002/95/EC

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For full details go to www.murata-ps.com/rohs

OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Rated Power[1]	T_A=0°C to 70°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

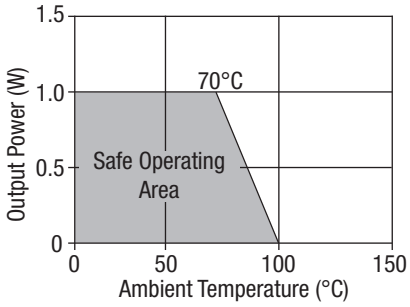
GENERAL CHARACTERISTICS

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

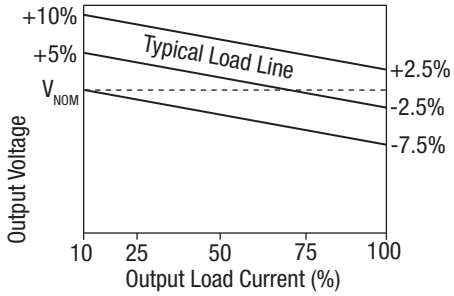
TEMPERATURE CHARACTERISTICS

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

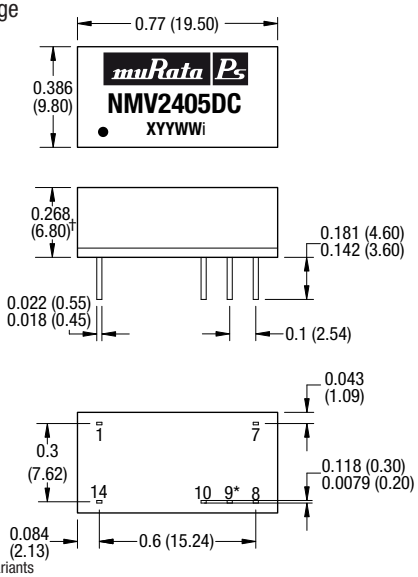
It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The NMV series has toroidal isolation transformers, with no additional insulation between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

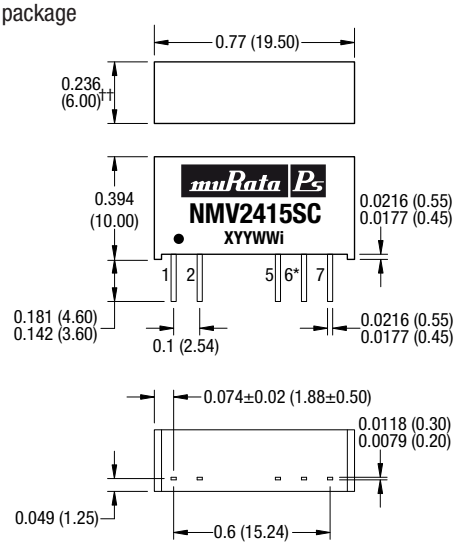
PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

DIP package



SIP package



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

Weight: 2.11g (DIP and SIP)

PIN CONNECTIONS

Single output variants

14 Pin DIP	
Pin	Function
1	$-V_{IN}$
7	NC
8	$+V_{OUT}$
10	$-V_{OUT}$
14	$+V_{IN}$

7 Pin SIP	
Pin	Function
1	$+V_{IN}$
2	$-V_{IN}$
5	$-V_{OUT}$
7	$+V_{OUT}$

Dual output variants

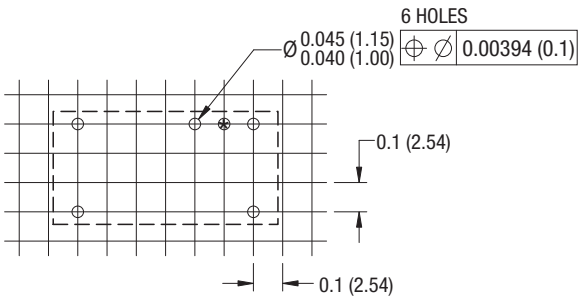
14 Pin DIP	
Pin	Function
1	$-V_{IN}$
7	NC
8	$+V_{OUT}$
9	0V
10	$-V_{OUT}$
14	$+V_{IN}$

7 Pin SIP	
Pin	Function
1	$+V_{IN}$
2	$-V_{IN}$
5	$-V_{OUT}$
6	0V
7	$+V_{OUT}$

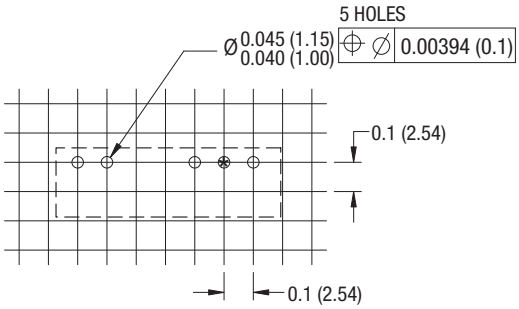
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

14 Pin DIP Package



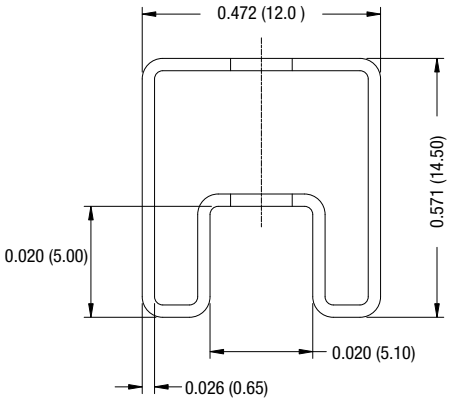
7 Pin SIP Package



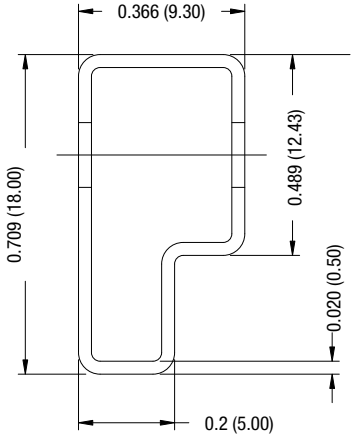
*Hole not required for single output variants.

TUBE OUTLINE DIMENSIONS

14 Pin DIP Tube



7 Pin SIP Tube



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

Tube Quantity : 25

RoHS COMPLIANCE INFORMATION

RoHS COMPLIANT 2002/95/EC

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 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

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Germany: München, Tel: +49 (0)89-544334-0, email: munich@murata-ps.com
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Murata Power Solutions

NMK Series

3kVDC Isolated 2W Single Output DC/DC Converters

FEATURES

- RoHS compliant
- Efficiency from 80%
- Power density 1.33W/cm³
- Wide temperature performance at full 2 Watt load, –40°C to 85°C
- UL 94V-0 package material
- No heatsink required
- Industry standard pinout
- 3kVDC isolation (1 minute)
- 5V & 12V input
- 5V, 9V, 12V, & 15V output
- Fully encapsulated with toroidal magnetics
- No external components required
- No electrolytic or tantalum capacitors

PRODUCT OVERVIEW

The NMK series of industrial temperature range DC/DC converters, available in industry standard SIP packaging offers a power upgrade path from the 1W NMV series. The NMK offers 3kVDC isolation with 5V output minimum efficiency of 80% at 2W. The un-regulated NMK series has superior output voltage set point accuracy of 6% in conjunction with excellent load regulation for this converter type.

SELECTION GUIDE

Order Code	Nominal Input Voltage	Output Voltage	Output Current	Input Current at Rated Load	Load Regulation (Typ)	Load Regulation (Max)	Ripple & Noise (Typ)[1]	Ripple & Noise (Max)[1]	Efficiency (Min.)	Efficiency (Typ.)	Isolation Capacitance	MTTF[2]
	V	V	mA	mA	%		mVp-p		%	%	pF	kHrs
NMK0505SAC	5	5	400	470	5.7	7.3	18	20	80	83	28	3998
NMK0509SAC	5	9	222	455	4.2	5.9	20	25	83	86	36	3718
NMK0512SAC	5	12	167	450	3.8	5.1	18	20	83	87	36	3328
NMK0515SAC	5	15	133	450	3.4	4.5	17	20	85	87	34	2855
NMK1205SAC	12	5	400	200	4.2	4.9	25	30	80	83	33	3532
NMK1209SAC	12	9	222	190	2.6	3.1	19	20	83	87	53	2417
NMK1212SAC	12	12	167	190	2.4	2.9	17	23	85	88	62	2246
NMK1215SAC	12	15	133	185	2.0	2.4	14	16	84	89	56	2020

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	
Reflected ripple current			7.5	15	mA p-p

ABSOLUTE MAXIMUM RATINGS

Lead temperature 1.5mm from case for 10 seconds	300°C
Internal power dissipation	550mW
Input voltage V_{IN}, NMK05 types	7V
Input voltage V_{IN}, NMK12 types	15V

OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Rated Power	T_A=-40°C to 85°C			2	W
Voltage Set Point Accuracy	See tolerance envelope				
Line regulation	High V_{IN} to low V_{IN}		1.05	1.2	%/%

ISOLATION CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test voltage	Flash tested for 1 minute	3000			VDC
Resistance	Viso= 1000VDC	10			GΩ

GENERAL CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency			60		kHz

TEMPERATURE CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	All output types	-40		85	°C
Storage		-50		125	
Case Temperature above ambient	5V output types			28	
	All other output types			25	
Cooling	Free air convection				

1. See Ripple & Noise characterisation method.
2. Calculated using MIL-HDBK-217F FN2 with nominal input voltage at full load.

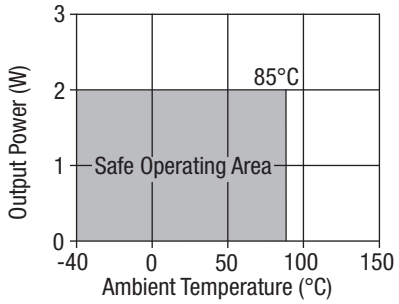
All specifications typical at T_A=25°C, nominal input voltage and rated output current unless otherwise specified.

RoHS COMPLIANT 2002/95/EC

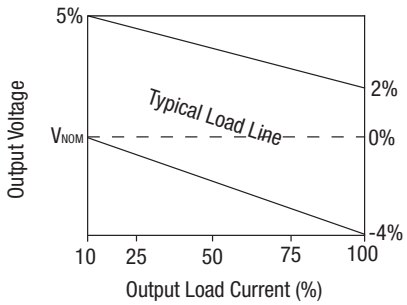
25

For full details go to
www.murata-ps.com/rohs

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 NMK 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 NMK 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

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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.

RoHS COMPLIANT INFORMATION

RoHS COMPLIANT 2002/95/EC

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 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

RIPPLE & NOISE CHARACTERISATION METHOD

All measurement to be taken with the following components connected to the UUT as detailed below.

50 Ohm coax cable, solder connections one end, BNC plug at the other end.

C1 – 1µF X7R multilayer ceramic capacitor rated at minimum 3 x the output voltage of the UUT

C2 – 10µF tantalum capacitor rated at minimum 1.5 x the output voltage of the UUT with ESR of less than 100 milliohms at 100 kHz e.g. AVX TPS series.

C3 – 100nF multilayer ceramic capacitor, general purpose

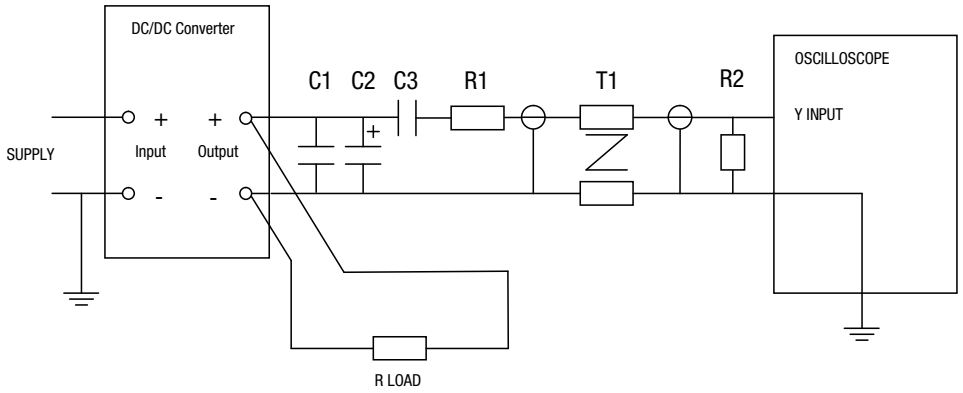
R1 – 450 Ohm resistor, carbon film, ±1%

R2 – 50 Ohm BNC termination

T1 – 3T of the coax cable through a ferrite toroid eg Ferroxcube TN32/19/13-3E25

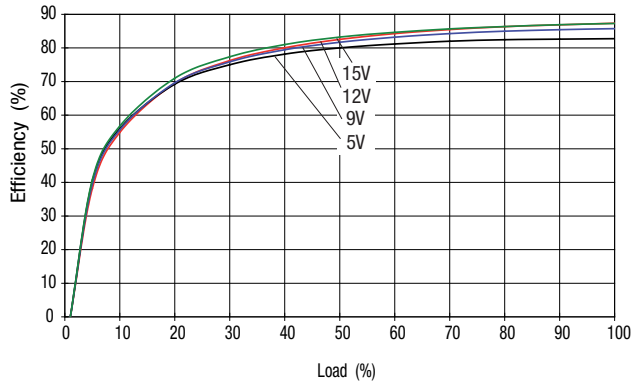
RLOAD – Resistive load at the UUT maximum rating. Connections via twisted wires.

Differential Mode Noise Test Schematic

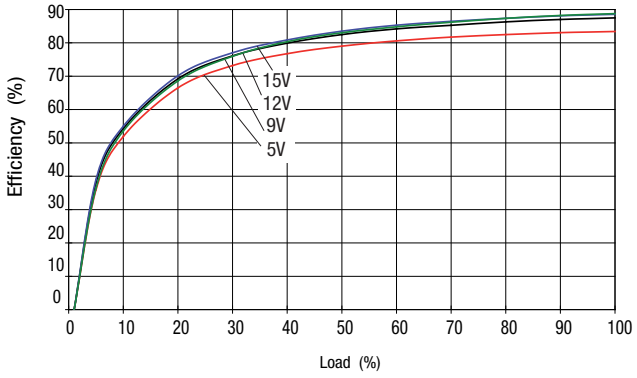


EFFICIENCY VS LOAD

NMK 5V Input Voltage

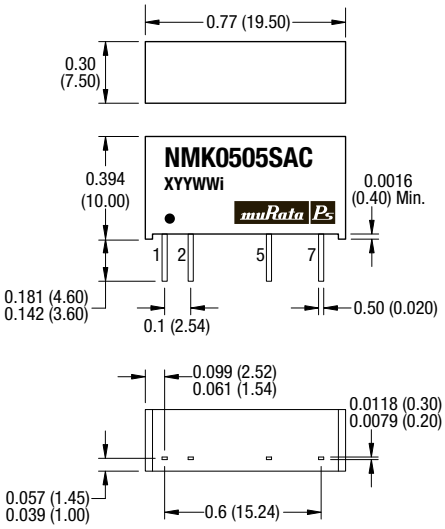


NMK 12V Input Voltage



PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS



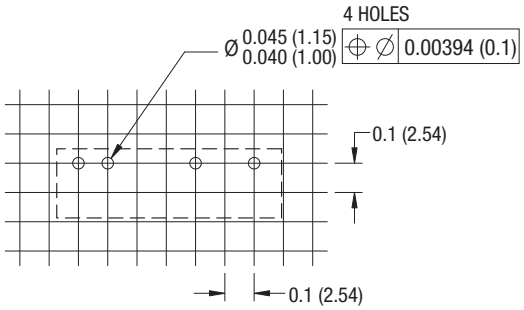
Weight: 2.8g

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

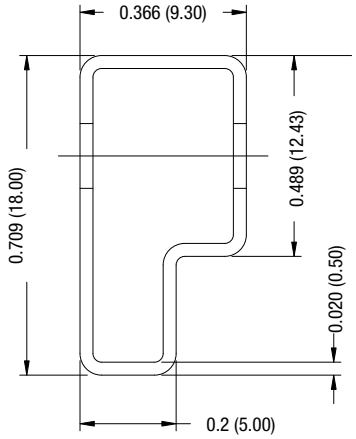
Pin	Function
1	$+V_{IN}$
2	$-V_{IN}$
5	$-V_{OUT}$
7	$+V_{OUT}$

RECOMMENDED FOOTPRINT DETAILS



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

TUBE OUTLINE DIMENSIONS



Tube Quantity : 25

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

Murata Power Solutions

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Guangzhou, Tel: +86 208 221 8066, email: guangzhou@murata-ps.com