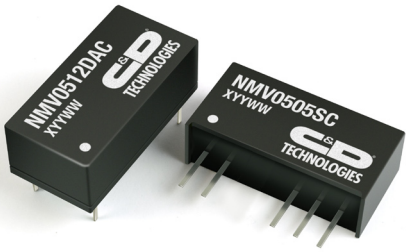
NMV 5V & 12V SERIES

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



FEATURES

- RoHS compliant
- Efficiency to 78%
- Power density up to 0.85W/cm^3
- 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 1.17cm^2
- Industry standard pinout
- Power sharing on dual output
- 3kVDC isolation (1 minute)
- 5V & 12V input
- 5V, 9V, 12V and 15V output
- Internal SMD construction
- Fully encapsulated with toroidal magnetics
- No external components required
- MTTF up to 2.4 million hours
- No electrolytic or tantalum capacitors

DESCRIPTION

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

SELECTION GUIDE

Order Code	Nominal Input Voltage (V)	Output Voltage (V)	Output Current (mA)	Input Current at Rated Load (mA)	Load Regulation (Typ) %	Load Regulation (Max) %	Ripple & Noise (Typ) mVp-p	Ripple & Noise (Max) mVp-p	Efficiency %	Isolation Capacitance pF	MTTF[1] kHrs	Package Style
NMV0505DAC	5	5	200	294	14.6	15	64	80	68	23	2414	DIP
NMV0509DAC	5	9	111	267	9.3	10	47	57	75	30	1173	
NMV0512DAC	5	12	84	260	7.4	8.0	35	49	77	26	633	
NMV0515DAC	5	15	67	256	6.7	7.3	32	44	78	27	360	
NMV0505SAC	5	5	200	294	14.6	15	64	80	68	23	2414	SIP
NMV0509SAC	5	9	111	267	9.3	10	47	57	75	30	1173	
NMV0512SAC	5	12	84	260	7.4	8.0	35	49	77	26	633	
NMV0515SAC	5	15	67	256	6.7	7.3	32	44	78	27	360	
NMV1205DAC	12	5	200	121	14.6	15	64	80	69	26	624	DIP
NMV1209DAC	12	9	111	113	9.3	10	47	57	74	35	490	
NMV1212DAC	12	12	84	108	7.4	8.0	35	49	77	43	361	
NMV1215DAC	12	15	67	108	6.7	7.3	32	44	77	42	252	
NMV1205SAC	12	5	200	121	14.6	15	64	80	69	26	624	SIP
NMV1209SAC	12	9	111	113	9.3	10	47	57	74	35	490	
NMV1212SAC	12	12	84	108	7.4	8.0	35	49	77	43	361	
NMV1215SAC	12	15	67	108	6.7	7.3	32	44	77	42	252	
NMV0505DC	5	±5	±100	280	9.0	10	33	40	71.5	21	1697	DIP
NMV0509DC	5	±9	±55	263	7.5	8.5	29	36	76	24	682	
NMV0512DC	5	±12	±42	256	6.8	7.5	27	32	78	26	343	
NMV0515DC	5	±15	±33	253	6.8	8.5	24	32	79	27	188	
NMV0505SC	5	±5	±100	280	9.0	10	33	40	71.5	21	1697	SIP
NMV0509SC	5	±9	±55	263	7.5	8.5	29	36	76	24	682	
NMV0512SC	5	±12	±42	256	6.8	7.5	27	32	78	26	343	
NMV0515SC	5	±15	±33	253	6.8	8.5	24	32	79	27	188	
NMV1205DC	12	±5	±100	117	9.0	10	33	40	71	27	563	DIP
NMV1209DC	12	±9	±55	113	7.5	8.5	29	36	74	35	377	
NMV1212DC	12	±12	±42	111	6.8	7.5	27	32	75	42	244	
NMV1215DC	12	±15	±33	110	6.8	8.5	24	32	76	41	154	
NMV1205SC	12	±5	±100	117	9.0	10	33	40	71	27	563	SIP
NMV1209SC	12	±9	±55	113	7.5	8.5	29	36	74	35	377	
NMV1212SC	12	±12	±42	111	6.8	7.5	27	32	75	42	244	
NMV1215SC	12	±15	±33	110	6.8	8.5	24	32	76	41	154	

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			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

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.

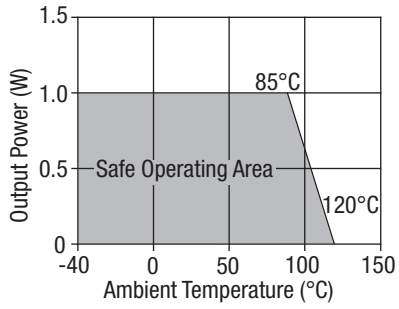
OUTPUT CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Rated Power[2]	T_A=-40°C to 120°C			1	W
Voltage Set Point Accuracy	See tolerance envelope				
Line regulation	High V_{IN} to low V_{IN}		1.0	1.2	%/%

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

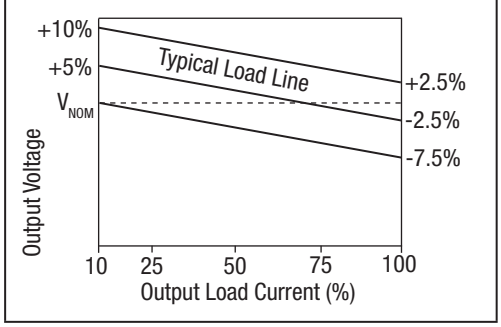
GENERAL CHARACTERISTICS					
Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency	5V input types		120	135	kHz
	12V input types		150	170	

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.

C&D Technologies 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

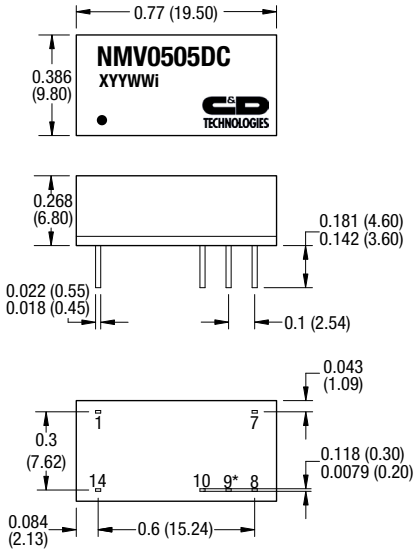
It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The NMV series has toroidal isolation transformers, with no additional insulation between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

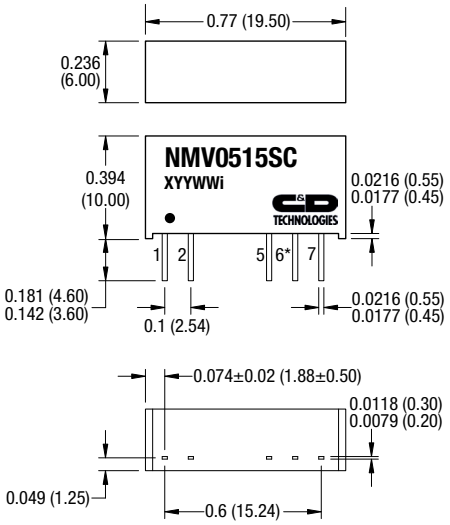
PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS

DIP package



SIP package



* 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

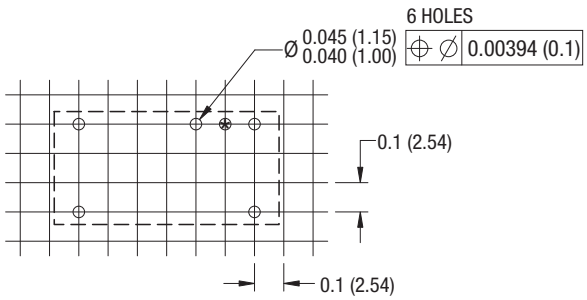
14 Pin DIP	
Pin	Function
1	-V_{IN}
7	NC
8	+V_{OUT}
9	0V
10	-V_{OUT}
14	+V_{IN}

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

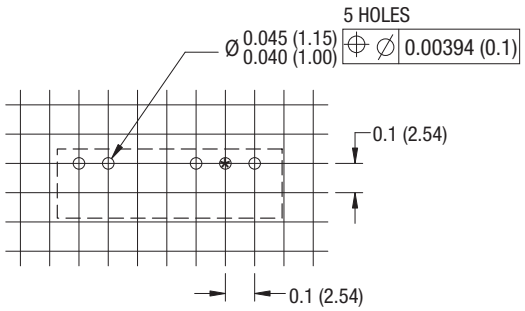
PACKAGE SPECIFICATIONS (continued)

RECOMMENDED FOOTPRINT DETAILS

14 Pin DIP Package



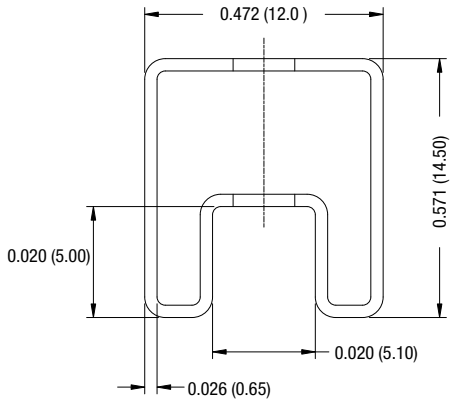
7 Pin SIP Package



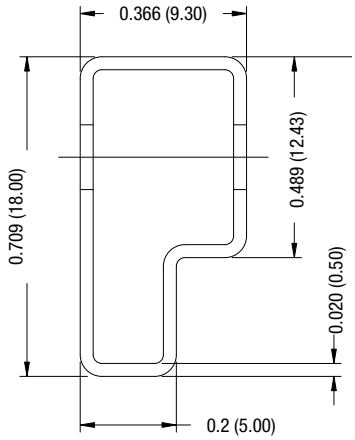
*Hole not required for single output variants.

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 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.cd4power.com/rohs

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