

**FEATURES**

- Wide Temperature performance at full 2 Watt load, -40°C to 85°C
- Dual Output from a Single Input Rail
- Industry Standard Pinout
- Power Sharing on Output
- 1kVDC Isolation
- Efficiency to 86%
- Power Density up to 1.44W/cm<sup>3</sup>
- 5V, 12V, 24V & 48V Input
- 5V, 9V, 12V and 15V Output
- Footprint from 1.46cm<sup>2</sup>
- UL 94V-0 Package Material
- No Heatsink Required
- Internal SMD Construction
- Toroidal Magnetics
- Fully Encapsulated
- No External Components Required
- MTTF up to 2.0 Million hours
- Custom Solutions Available
- No Electrolytic or Tantalum Capacitors

**DESCRIPTION**

The NMH series of industrial temperature range DC-DC converters are the standard building blocks for on-board point-of-use power systems. They are ideally suited for providing dual rail supplies on single rail boards with the added benefit of galvanic isolation to reduce circuit noise. All of the rated power may be drawn from a single pin provided the total load does not exceed 2W.

Pin compatibility with the NMA 1 watt series ensures minimal effort in upgrading distributed power systems.

**SELECTION GUIDE**

	Nominal Input Voltage	Output Voltage	Output Current	Input Current at Rated Load	Efficiency	Isolation Capacitance	MTTF <sup>1</sup>	Package Style <sup>2</sup>
Order Code	(V)	(V)	(mA)	(mA)	(%)	(pF)	kHrs	
<b>NMH0505S</b>	5	5	±200	500	80	24	1574	SIP
<b>NMH0509S</b>	5	9	±111	494	81	28	663	
<b>NMH0512S</b>	5	12	±83	488	82	30	338	
<b>NMH0515S</b>	5	15	±67	476	84	33	187	
<b>NMH1205S</b>	12	5	±200	208	80	35	490	SIP
<b>NMH1209S</b>	12	9	±111	201	83	55	343	
<b>NMH1212S</b>	12	12	±83	198	84	63	229	
<b>NMH1215S</b>	12	15	±67	198	84	66	148	
<b>NMH2405S</b>	24	5	±200	103	81	41	318	SIP
<b>NMH2409S</b>	24	9	±111	98	85	75	249	
<b>NMH2412S</b>	24	12	±83	97	86	95	183	
<b>NMH2415S</b>	24	15	±67	97	86	104	127	
<b>NMH4805S</b>	48	5	±200	51	82	45	235	SIP
<b>NMH4809S</b>	48	9	±111	51	82	74	195	
<b>NMH4812S</b>	48	12	±83	49	85	90	152	
<b>NMH4815S</b>	48	15	±67	49	85	112	112	

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	
	Continuous operation, 24V input types	21.6	24	26.4	
	Continuous operation, 48V input types	43.2	48	52.8	
Reflected Ripple Current	5V input types		50		mA p-p
	12V input types		70		
	24V input types		130		
	48V input types		200		

**OUTPUT CHARACTERISTICS**

Parameter	Conditions	MIN	TYP	MAX	Units
Rated Power <sup>2</sup>	T <sub>A</sub> = -40°C to 85°C			2	W
Output Voltage Accuracy	NMH0505	-5		7.5	%
	All other types	-5		5	
Line Regulation	High V <sub>IN</sub> to low V <sub>IN</sub>		1.0	1.2	%/%
Load Regulation	10% load to rated load, 5V output types		5	10	%
	10% load to rated load, 9V output types				
	10% load to rated load, 12V output types		3	10	
	10% load to rated load, 15V output types				
Ripple & Noise	BW=DC to 20MHz, 5V output types		150	200	mV p-p
	BW=DC to 20MHz, 9V output types		100	150	
	BW=DC to 20MHz, 12V output types		80	150	
	BW=DC to 20MHz, 15V output types		70	150	

**ABSOLUTE MAXIMUM RATINGS**

Short circuit duration <sup>3</sup>	1second
Internal power dissipation	300mW
Lead temperature 1.5mm from case for 10 seconds	300°C
Input voltage V <sub>IN</sub> , NMH05 types	7V
Input voltage V <sub>IN</sub> , NMH12 types	15V
Input voltage V <sub>IN</sub> , NMH24 types	28V
Input voltage V <sub>IN</sub> , NMH48 types	54V

1 Calculated using MIL-HDBK-217F with nominal input voltage at full load.

2 See derating curve

3 Supply voltage must be discontinued at the end of the short circuit duration.

4 Replace suffix "S" with "D" for DIP package style.

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

# NMH SERIES

## Isolated 2W Dual Output DC-DC Converters

### ISOLATION CHARACTERISTICS

Parameter	Conditions	MIN	TYP	MAX	Units
Isolation Test Voltage	Flash tested for 1 second	1000			VDC
Resistance	Viso=500V	1	10		G

### GENERAL CHARACTERISTICS

Parameter	Conditions	MIN	TYP	MAX	Units
Switching Frequency	5V input types		95		kHz
	12V input types		90		
	24 & 48V input types		80		

### TEMPERATURE CHARACTERISTICS

Parameter	Conditions	MIN	TYP	MAX	Units
Specification	All output types	-40		85	°C
Storage		-50		130	°C
Case Temperature Above Ambient	5V output types		30		°C
	12V output types		25		
Cooling	Free air convection				

### PIN CONNECTIONS

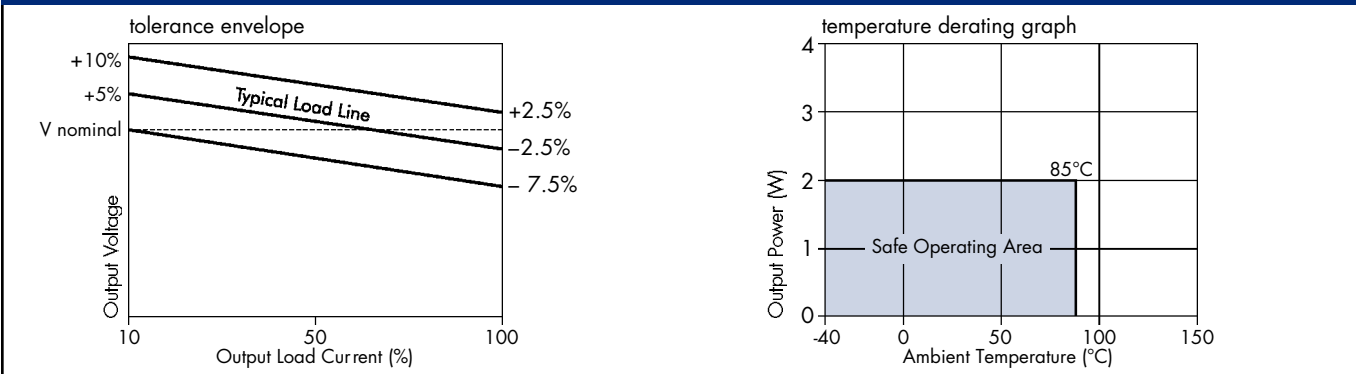
14 Pin DIP

PIN	
1	GND
7	NC
8	0V
9	+V
11	-V
14	VIN

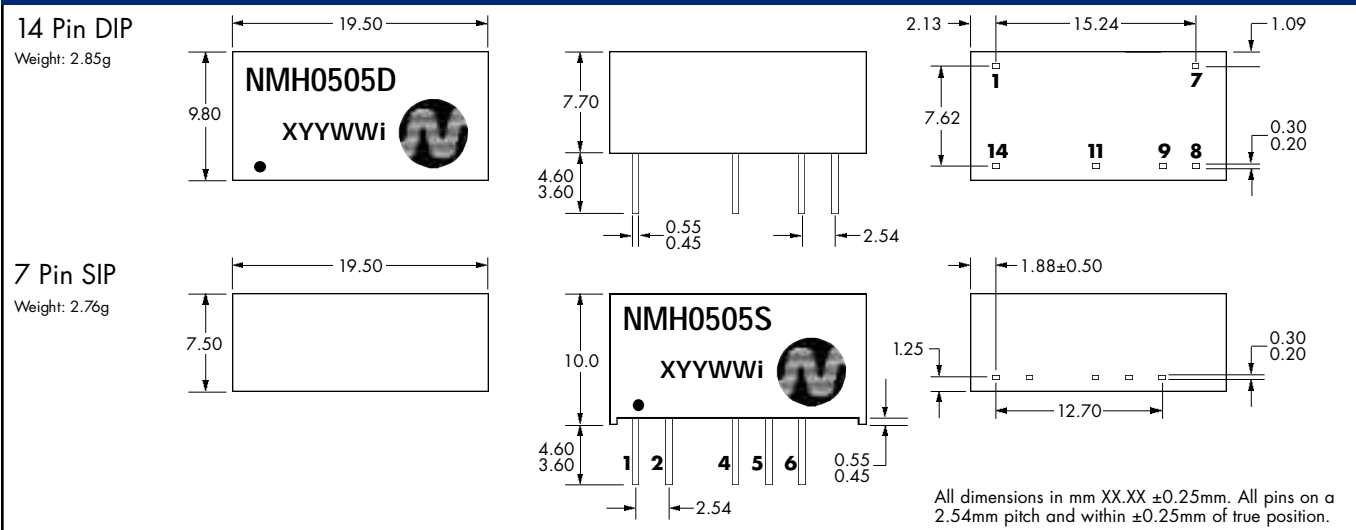
7 Pin SIP

PIN	
1	VIN
2	GND
4	-V
5	0V
6	+V

### PERFORMANCE CHARACTERISTICS



### MECHANICAL DIMENSIONS



C&D Technologies (NCL) Limited reserve the right to alter or improve the specification, internal design or manufacturing process at any time, without notice. Please check with your supplier or visit our web site to ensure that you have the current and complete specification for your product before use.

© C&D Technologies (NCL) Limited 2001

NDC NMH.3

No part of this publication may be copied, transmitted or stored in a retrieval system or reproduced in any way including, but not limited to, photography, photocopy, magnetic or other recording means, without prior written permission from C&D Technologies (NCL) Limited.

Instructions for use are available from [www.dc-dc.com](http://www.dc-dc.com)

#### C&D Technologies (NCL) Ltd

Tanners Drive, Blakelands North  
Milton Keynes MK14 5BU, England  
Tel: +44 (0)1908 615232  
Fax: +44 (0)1908 617545  
email: [info@cdechno-ncl.com](mailto:info@cdechno-ncl.com)

[www: http://www.dc-dc.com](http://www.dc-dc.com)

#### C&D Technologies (NCL), Inc.

5816 Creedmoor Road, Raleigh  
NC 27612, USA  
Tel: +1 (919) 571-9405  
Fax: +1 (919) 571-9262  
email: [info@us.cdechno-ncl.com](mailto:info@us.cdechno-ncl.com)