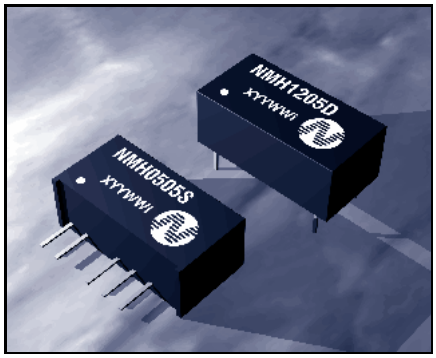
C&D TECHNOLOGIES
Power Solutions

NMH SERIES

Isolated 2W Dual Output DC-DC Converters



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^3
- 5V, 12V, 24V & 48V Input
- 5V, 9V,12V and 15V Output
- Footprint from 1.46cm^2
- 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.

www.dc-dc.com

SELECTION GUIDE

	Nominal Input Voltage	Output Voltage	Output Current	Input Current at Rated Load	Efficiency	Isolation Capacitance	MTTF[1]	Package Style[4]
Order Code	(V)	(V)	(mA)	(mA)	(%)	(pF)	kHrs	
NMH0505S	5	5	±200	500	80	24	1574	SIP
NMH0509S	5	9	±111	494	81	28	663	
NMH0512S	5	12	±83	488	82	30	338	
NMH0515S	5	15	±67	476	84	33	187	
NMH1205S	12	5	±200	208	80	35	490	SIP
NMH1209S	12	9	±111	201	83	55	343	
NMH1212S	12	12	±83	198	84	63	229	
NMH1215S	12	15	±67	198	84	66	148	
NMH2405S	24	5	±200	103	81	41	318	SIP
NMH2409S	24	9	±111	98	85	75	249	
NMH2412S	24	12	±83	97	86	95	183	
NMH2415S	24	15	±67	97	86	104	127	
NMH4805S	48	5	±200	51	82	45	235	SIP
NMH4809S	48	9	±111	51	82	74	195	
NMH4812S	48	12	±83	49	85	90	152	
NMH4815S	48	15	±67	49	85	112	112	

i When operated **without** additional external load capacitance, the output voltage of the devices is guaranteed to be within 95% of its steady state value within 100ms after the input voltage has reached 95% of its steady state value, **irrespective of the rise time of the input voltage**.

ii 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[2]	T_A= –40°C to 85°C			2	W
Output Voltage Accuracy	NMH0505	–5		7.5	%
	All other types	–5		5	
Line Regulation	High V_{IN} to low V_{IN}		1.0	1.2	%/%
Load Regulation	10% load to rated load, 5V output types		5	10	%
	10% load to rated load, 9V output types		3	10	
	10% load to rated load, 12V output types				
	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[3]	1second
Internal power dissipation	300mW
Lead temperature 1.5mm from case for 10 seconds	300°C
Input voltage V_{IN}, NMH05 types	7V
Input voltage V_{IN}, NMH12 types	15V
Input voltage V_{IN}, NMH24 types	28V
Input voltage V_{IN}, 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_A=25°C, nominal input voltage and rated output current unless otherwise specified.

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ISOLATION CHARACTERISTICS

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

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

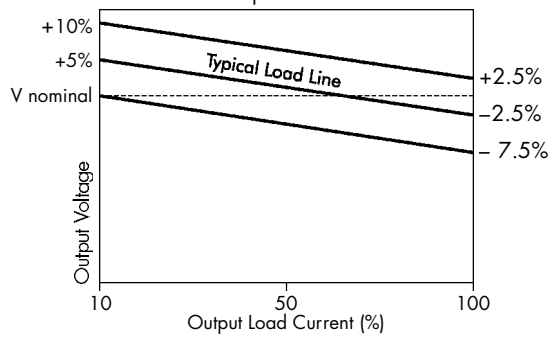
PIN	
1	GND
7	NC
8	0V
9	+V
11	–V
14	VIN

7 Pin SIP

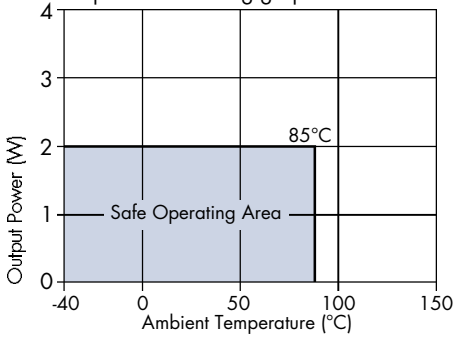
PIN	
1	VIN
2	GND
4	–V
5	0V
6	+V

PERFORMANCE CHARACTERISTICS

tolerance envelope



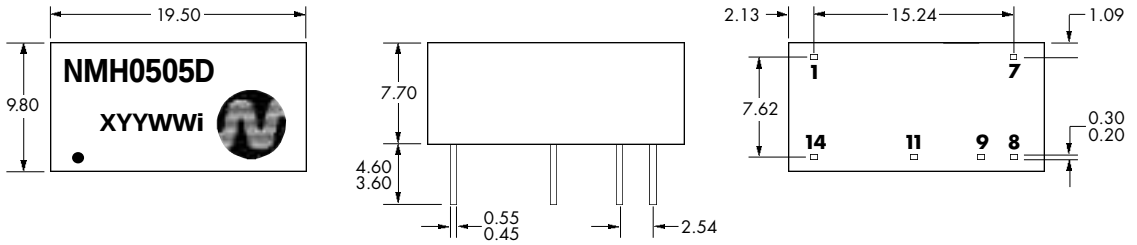
temperature derating graph



MECHANICAL DIMENSIONS

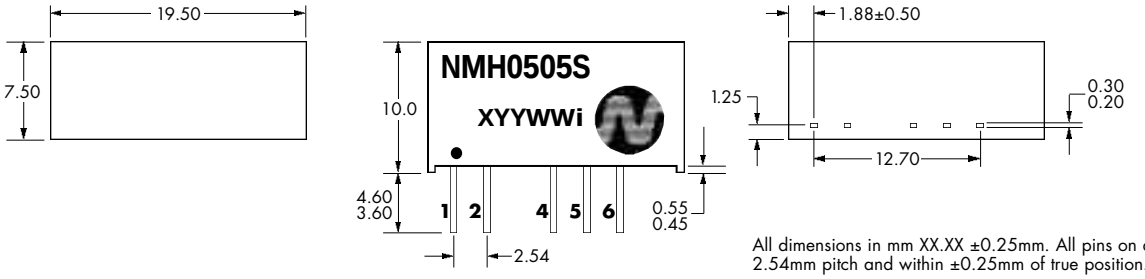
14 Pin DIP

Weight: 2.85g



7 Pin SIP

Weight: 2.76g



All dimensions in mm XX.XX ±0.25mm. All pins on a 2.54mm pitch and within ±0.25mm of true position.

Instructions for use are available from www.dc-dc.com

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