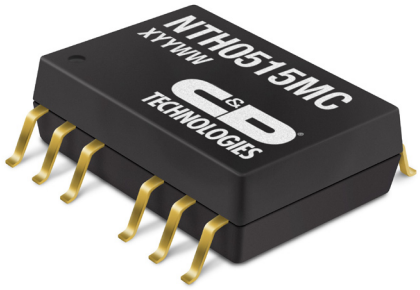
NTH SERIES

Isolated 2W Dual Output SM DC/DC Converters



FEATURES

- RoHS compliant
- Efficiency up to 84%
- Wide temperature performance at full 2 Watt load, –40°C to 85°C
- UL 94V-0 Package material
- Lead frame technology
- 5V & 12V Input
- 5V, 9V, 12V & 15V Output
- Internal SMD construction
- Dual isolated output
- 1kVDC Isolation
- MTTF up to 2.17 million hours
- Power density 1.61W/cm^3
- No heatsink required
- Custom solutions available
- Multi layer ceramic capacitors

DESCRIPTION

The NTH series of miniature surface mounted DC/DC converters employ leadframe technology and transfer moulding techniques to bring all of the benefits of IC style packaging to hybrid circuitry. The component lead termination of this product range is lead-free compatible, therefore the converter can be soldered in a lead-free soldering process. Co-planarity of the lead positions is based upon IEC 191-6:1990. The devices are suitable for all applications where high volume production is envisaged.

SELECTION GUIDE

Order Code[1]	Nominal Input Voltage	Output Voltage	Output Current	Input Current at Rated Load	Efficiency	Isolation Capacitance	MTTF[2]
	V	V	mA	mA	%	pF	kHrs
NTH0505MC	5	±5	±200	500	80	27	2175
NTH0509MC	5	±9	±111	494	81	34	913
NTH0512MC	5	±12	±83	488	82	39	465
NTH0515MC	5	±15	±67	476	84	37	257
NTH1205MC	12	±5	±200	208	80	35	675
NTH1209MC	12	±9	±111	201	83	57	472
NTH1212MC	12	±12	±83	198	84	66	315
NTH1215MC	12	±15	±67	198	84	63	204

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	5V input types		40		mA p-p
	12V input types		30		

OUTPUT CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Rated power[3]	T_A=-40°C to 85°C			2.0	W
Voltage set point accuracy	NTHXX05, 10% to 100% load	-5.0		7.5	%
	All other variants, 10% to 100% load	-5.0		5.0	
Line regulation	High V_{IN} to low V_{IN}		1.0	1.2	%/%
Load regulation[2]	10% load to rated load, 5V output types		5.0	10	%
	10% load to rated load, all other output types		3.0	10	
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	

ISOLATION CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Isolation test voltage	Flash tested for 1 second	1000			VDC
Resistance	Viso= 500VDC	1	10		GΩ

GENERAL CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Switching frequency	All 5V input types		95		kHz
	All 12V input types		90		

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection[4]	1 second
Lead temperature 1.5mm from case for 10 seconds	300°C
Internal power dissipation	550mW
Input voltage V_{IN}, NTH05 types	7V
Input voltage V_{IN}, NTH12 types	15V

1. If components are required in tape and reel format suffix order code code with -R, e.g. NTH0505MC-R.
2. Calculated using MIL-HDBK-217F with nominal input voltage at full load.
3. See derating graph.
4. 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

TEMPERATURE CHARACTERISTICS

Parameter	Conditions	MIN.	TYP.	MAX.	Units
Specification	All output types	-40		85	°C
Storage		-55		125	
Case temperature rise above ambient	5V output types		30		
	All other output types		25		
Cooling	Free air convection				

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 NTH series of DC/DC converters are all 100% production tested at their stated isolation voltage. This is 1kVDC for 1 second.

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 NTH 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.

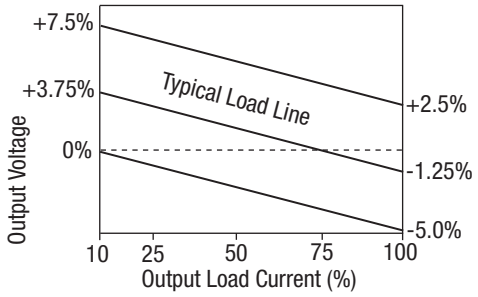
REPEATED HIGH-VOLTAGE ISOLATION TESTING

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 NTH 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.

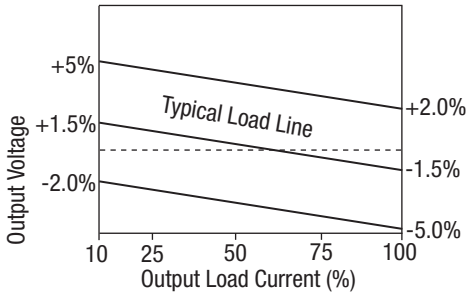
This consideration equally applies to agency recognized parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

TOLERANCE ENVELOPE

5V output types



All other output types



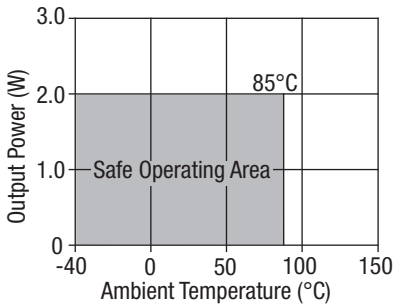
RoHS COMPLIANCE INFORMATION

RoHS COMPLIANT 2002/95/EC

This series is compatible with RoHS soldering systems with a peak reflow solder temperature of 245ºC and time above liquidus of 217ºC for 80 seconds. The pin termination finish on this product series is Gold, plating thickness 0.1 microns minimum. The series is backward compatible with Sn/Pb soldering systems.

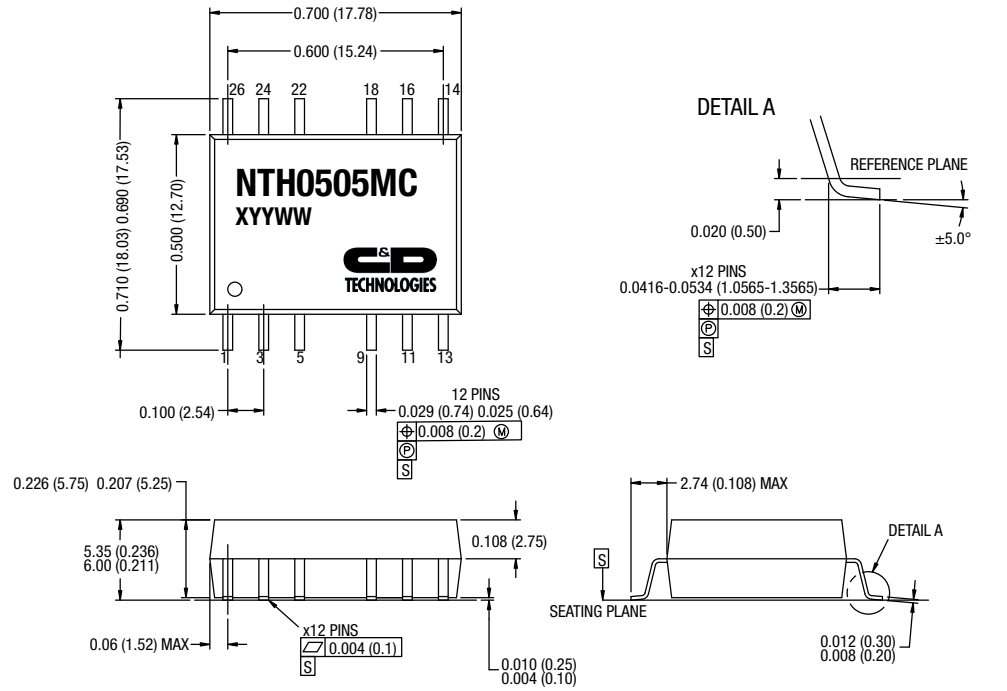
For further information, please visit www.cd4power.com/rohs

TEMPERATURE DERATING GRAPH



PACKAGE SPECIFICATIONS

MECHANICAL DIMENSIONS



All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch.

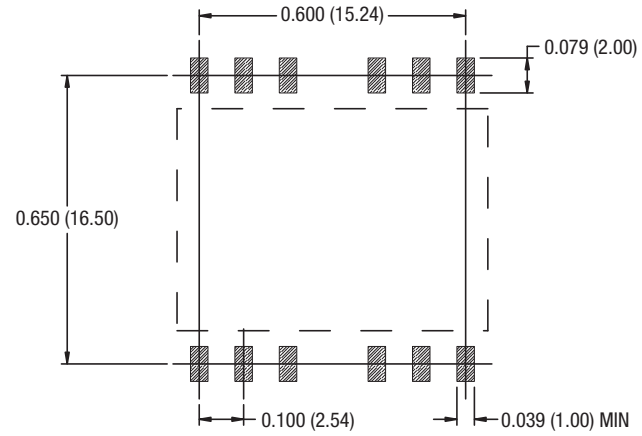
Weight: 2.75g

PIN CONNECTIONS

Pin	Function
1	$-V_{IN}$
3	$+V_{IN}$
5	NA
9	$-V_{OUT}$
11	0V
13	$+V_{OUT}$
14	NA
16	NA
18	$-V_{OUT}$
22	NC
24	NA
26	NA

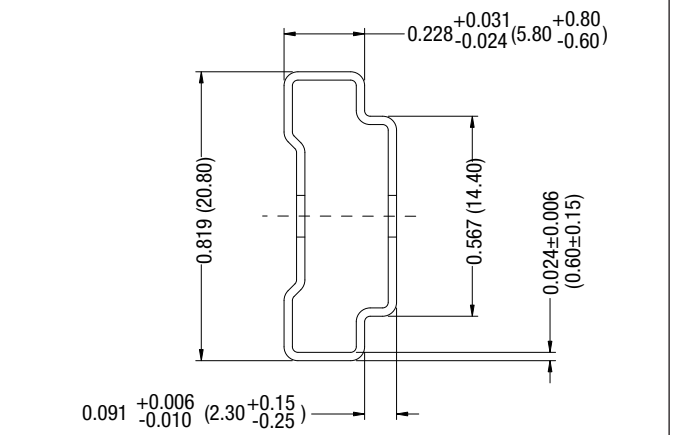
NA - Not available for electrical connection.
NC - No internal electrical connection.-

RECOMMENDED FOOTPRINT DETAILS



All dimensions in inches ±0.02 (mm±0.5)

TUBE OUTLINE DIMENSIONS

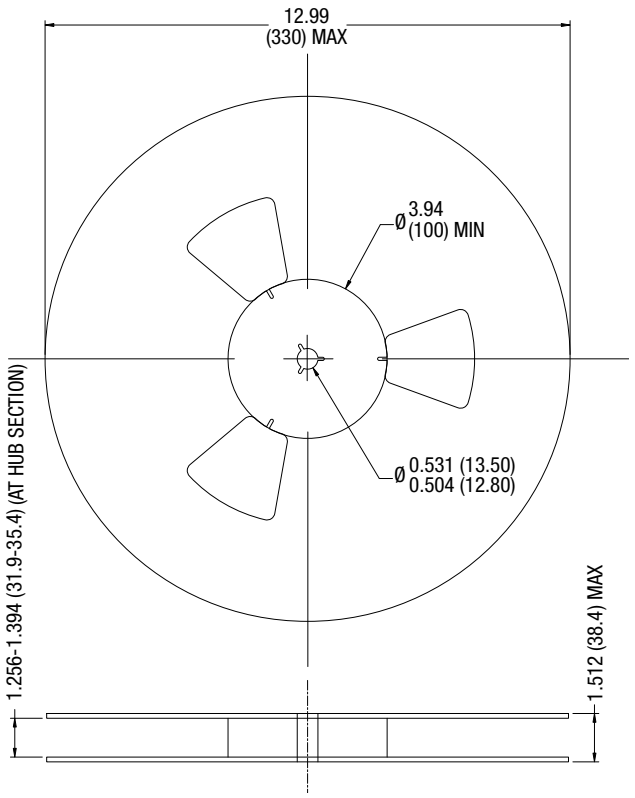


All dimensions in inches ±0.02 (mm±0.5).
Tube length : 18.70±0.079 (475±2.0).

Tube Quantity : 25

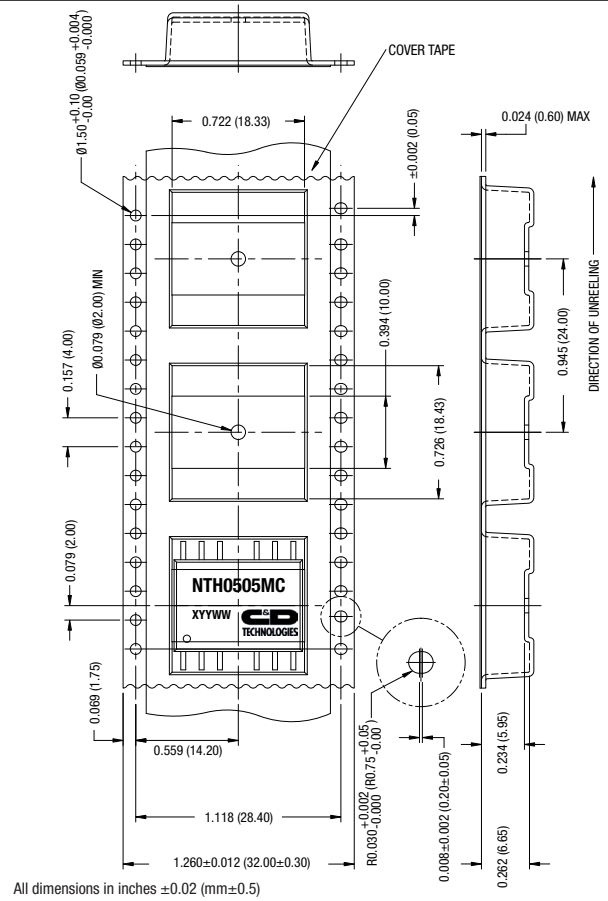
TAPE & REEL SPECIFICATIONS

REEL OUTLINE DIMENSIONS



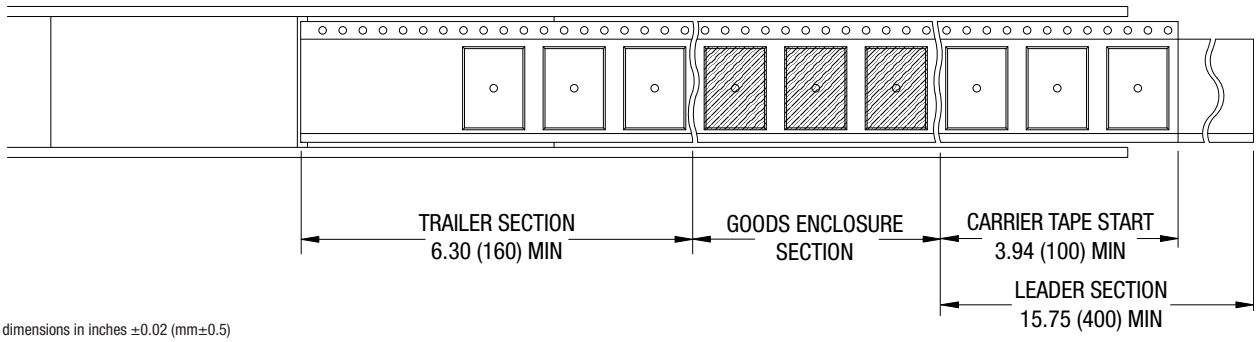
All dimensions in inches ±0.02 (mm±0.5)

TAPE OUTLINE DIMENSIONS



All dimensions in inches ±0.02 (mm±0.5)

REEL PACKAGING DETAILS



All dimensions in inches ±0.02 (mm±0.5)

Reel Quantity : 400

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