# **NTV Series**





#### FEATURES

- RoHS compliant
- Efficiency up to 82%
- Wide temperature performance at full 1 Watt load, -40°C to 85°C
- UL 94V-0 package material
- Footprint over pins 1.64cm<sup>2</sup>
- Lead frame technology
- Dual isolated output
- 5V & 12V inputs
- 5V, 9V, 12V & 15V outputs
- Internal SMD construction
- Toroidal magnetics
- Plastic encapsulated
- 3kVDC isolation (1 minute)
- MTTF up to 1.7 million hours
- Power density 1.36W/cm<sup>3</sup>
- No heatsink required
- Custom solutions available
- Multi layer ceramic capacitors

### **PRODUCT OVERVIEW**

The NTV series of 3kV isolation 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 co-planarity of the pin positions is based upon IEC 191-6:1990. The devices are suitable for all applications where high volume production is envisaged.



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### 3kVDC Isolated 1W Dual Output SM DC-DC Converters

	Nominal Input	Output	Output	Input Current at	Efficiency	Isolation	MTTF <sup>2</sup>	nded ive	
Order Code <sup>1</sup>	Voltage	Voltage	Current	Rated Load	,	Capacitance		scommende Alternative	
	V	V	mA	mA	%	pF	kHrs	Recommended Alternative	
		Rec	omme	nded In P	roductic	n			
NTV0505MC	5	±5	±100	282	71	33	1697		
NTV0509MC	5	±9	±55	260	77	38	682		
NTV0515MC	5	±15	±33	250	80	43	188		
NTV1212MC	12	±12	±42	104	80	89	243		
NTV1215MC	12	±15	±33	101	82	100	154		
			Di	iscontinue	d				
NTV0512MC	5	±12	±42	253	79	44	343	NKA0512SC	
NTV1205MC	12	±5	±100	114	73	50	559	NKA1205SC	
NTV1209MC	12	±9	±55	105	79	72	375	MEJ1D1209S0	

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.	Тур.	Max.	Units	
Voltage range	Continuous operation, 5V input types	4.5	5	5.5	V	
vollage range	Continuous operation, 12V input types	10.8	12	13.2	V	
Reflected ripple current			41	47	mA p-p	

GENERAL CHARACTERISTICS					
Parameter	Conditions	Min.	Тур.	Max.	Units
Curitoping froguenou	5V input types		115		kHz
Switching frequency	12V input types		120		κΠΖ

OUTPUT CHARACTERISTICS						
Parameter	Conditions	Min.	Тур.	Max.	Units	
Rated Power	T <sub>A</sub> =-40°C to 85°C			1.0	W	
Voltage Set Point Accuracy	See tolerance envelope					
Line regulation	High VIN to low VIN		1.0	1.2	%/%	
	10% load to rated load, 5V output types		10	12	%	
Load Regulation <sup>3</sup>	10% load to rated load, 9V output types		6.5	8.0		
Luau negulaliuli	10% load to rated load, 12V output types		6.0	8.5		
	10% load to rated load, 15V output types		6.0	7.0		
	BW=DC to 20MHz, 5V output types		50	75	mV p-p	
Dinale and Naise	BW=DC to 20MHz, 9V output types		40	65		
Ripple and Noise	BW=DC to 20MHz, 12V output types		40	60		
	BW=DC to 20MHz, 15V output types		40	60		

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

1. If components are required in tape and reel format suffix order code code with -R, e.g. NTV0505MC-R.

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

3. 12V input types have typically 3% less load regulation change.

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

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TEMPERATURE CHARACTERISTICS					
Parameter	Conditions	Min.	Тур.	Max.	Units
Specification	All output types	-40		85	
Storage		-55		125	00
Case temperature above embient	5V output types		33		
Case temperature above ambient	All other output types		25		
Cooling	Free air convection				

ABSOLUTE MAXIMUM RATINGS				
Internal power dissipation	550mW			
Input voltage V <sub>IN</sub> , NTV05 types	7V			
Input voltage Vii, NTV12 types	15V			

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#### **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 NTV 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 NTV 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 NTV series has toroidal isolation transformers, with no additional insulation between primary and secondary windings of enamelled 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 recognised 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 COMPLIANCE, MSL AND PSL INFORMATION**



This series is compatible with RoHS soldering systems and is also backward compatible with Sn/Pb soldering systems. The NTV series has a process, moisture, and reflow sensitivity classification of MSL1 PSL R7F as defined in J-STD-020 and J-STD-075. This translates to: MSL1 = unlimited floor life, PSL R7F = Peak reflow temperature 245°C with a limitation on the time above liquidus (217°C) which for this series is 60sec max. Please refer to application notes for further information. The pin termination finish on this product series is Gold with a plating thickness of 0.05 microns minimum.

For further information please visit www.murata.com/en-global/products/power/rohs

### PART NUMBER STRUCTURE



### APPLICATION NOTES

#### Minimum load

The minimum load to meet datasheet specification is 10% of the full rated load across the specified input voltage range. Lower than 10% minimum loading will result in an increase in output voltage, which may rise to typically double the specified output voltage if the output load falls to less than 5%.

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