Murata Power Solutions

NMT Series

Triple Output 3W DC/DC Converters



FEATURES

- RoHS compliant
- Triple outputs (-24V, -48V & -72V)
- Input/output isolation 1kVDC
- Power sharing on outputs
- Industrial temperature range
- UL 94V-0 package material
- Internal SMD construction
- Toroidal magnetics
- No external components required
- Power density 1.65W/cm^3

DESCRIPTION

The NMT series is a range of DC/DC converters offering three output voltages of -24V, -48V and -72V from a single isolated 5V or 12V input voltage. The product is designed for use with telecommunications circuits requiring an on board supply for the -72V RING-TIP connection service generated from a nominal 5V or 12V DC input supply rail. The device also offers battery level voltages of -24V and -48V for access control and data pump IC's. The product is packaged in an 8 pin SIP case for minimum PCB footprint. The rated power may be shared or drawn from any one output providing the total output load does not exceed 3W.

RoHS COMPLIANT 2002/95/EC

For full details go to www.murata-ps.com/rohs

SELECTION GUIDE

Order Code	Nominal Input Voltage	Output	Rated Output Current	Output Current[1]		Output Current[2]		MTTF[3]
				Min. Load	Full Load	Min. Load	Full Load	
	V		V	mA	mA	mA	mA	kHrs
NMT0572SC	5	-V_{OUT1}	-24	1.4	42	4.2	126	145
		-V_{OUT2}	-48	0.7	21	2.1	63	
		-V_{OUT3}	-72	0.5	14	1.4	42	
NMT1272SC	12	-V_{OUT1}	-24	1.4	42	4.2	126	145
		-V_{OUT2}	-48	0.7	21	2.1	63	
		-V_{OUT3}	-72	0.5	14	1.4	42	

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	NMT0572SC	4.5	5.0	5.5	V
	NMT1272SC	10.8	12	13.2	
Ripple current (I_{RIPPLE})	NMT0572SC		85		mA
	NMT1272SC		66		
Zero load input current (I_{CCZL})	NMT0572SC, 0% output load		50	80	mA
	NMT1272SC, 0% output load		27.5	50	

OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Total Rated Power (P_{OUT})	Total of all outputs or any single output	0.1		3.0	W
Single Channel Voltage Set Point Accuracy	P_{OUT} = 100mW	0		10	%
	P_{OUT} = 3W	-7.5		2.5	
Output Voltage - $V_{OUT}1$	P_{OUT} = 100mW	24		26.4	V
	P_{OUT} = 3W	22.2		24.6	
Output Voltage - $V_{OUT}2$	P_{OUT} = 100mW	48		52.8	
	P_{OUT} = 3W	44.4		49.2	
Output Voltage - $V_{OUT}3$	P_{OUT} = 100mW	72		79.2	
	P_{OUT} = 3W	66.6		73.8	
Line regulation	V_{IN} = 90% to 110% of nominal		1.01	1.2	%
Load regulation	P_{OUT} = 100mW to 3W		8	15	
Ripple & Noise	DC to 20MHz single channel (24V)		220	400	mV

ISOLATION CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test voltage	Flash tested for 1 second	1000			VDC
Isolation Capacitance	NMT0572SC, 1MHz, 1V		65		pF
	NMT1272SC, 1MHz, 1V		130		
Insulation Resistance	1000VDC	1	10		GΩ

ABSOLUTE MAXIMUM RATINGS

Short-circuit protection[4]	1 second
Lead temperature 1.5mm from case for 10 seconds	300°C
Input Voltage V_{IN}, NMT0572SC	7V
Input voltage V_{IN}, NMT1272SC	15V

1. Assuming all 3 channels are equally loaded.
2. Assuming only 1 channel is loaded.
3. Calculated using MIL-HDBK-217F with nominal input voltage at full load.
4. Supply voltage must be disconnected 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.

GENERAL CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Efficiency	All channels or any single channel	75	85		%
Switching frequency			85		kHz

TEMPERATURE CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating temperature		-40		85	°C
Storage		-50		125	
Case temperature rise above ambient	1 litre static air chamber		27		

OUTPUT VOLTAGE CONFIGURATION

Although the output is described for negative rails, the input and output circuits are iternally isolated hence positive rails can also be generated, or a mixture of positive and negative. The output +V_{OUT} rail reference can be taken from any of the output terminals to give the range of outputs as described in the Output Voltage Configurations table below.

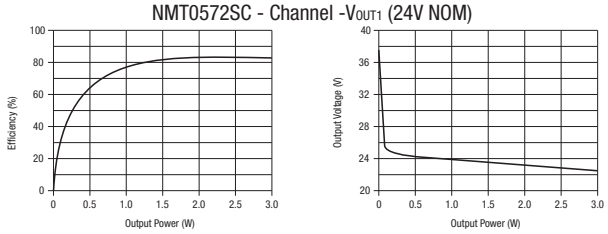
Channel Name	Standard Ref	Option 1	Option 2	Option 3
+V_{OUT}	0V	+24V	+48V	+72V
-V_{OUT1}	-24V	0V	+24V	+48V
-V_{OUT2}	-48V	-24V	0V	+24V
-V_{OUT3}	-72V	-48V	-24V	0V

POWER SHARING

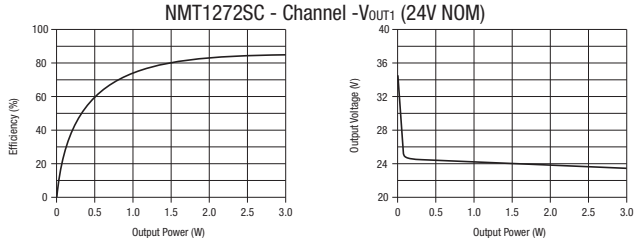
The 3W total power delivery can be taken from either a single channel, or from any combination of all three channels. This allows an enormous amount of flexibility, especially when combined with the selectable output 0V reference. For example, using the option 2 output configuration; -24V at 0.5W, +24V at 1W and +48V at 1.5W power supplies are available from a single NMT device.

PERFORMANCE CHARACTERISTICS

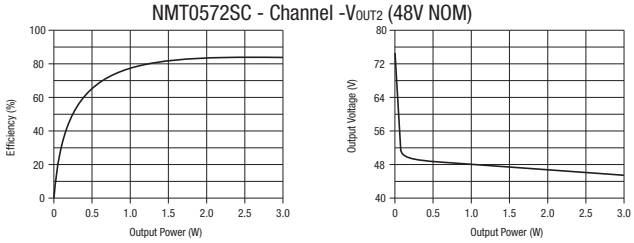
NMT0572SC - Channel -V_{OUT1} (24V NOM)



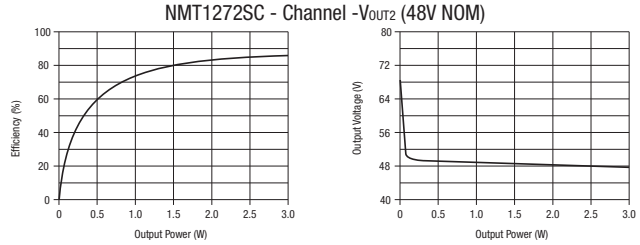
NMT1272SC - Channel -V_{OUT1} (24V NOM)



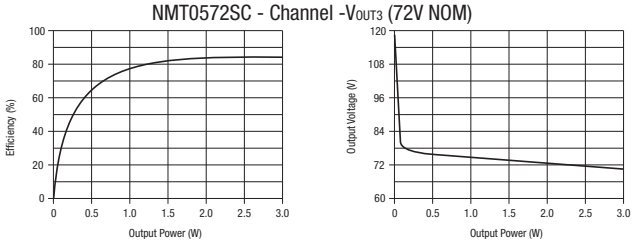
NMT0572SC - Channel -V_{OUT2} (48V NOM)



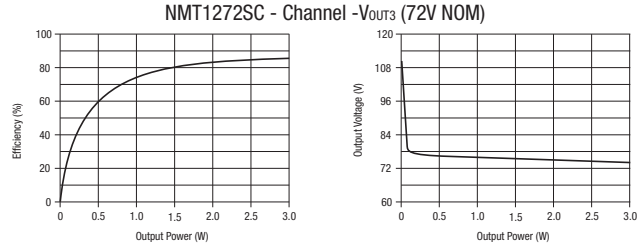
NMT1272SC - Channel -V_{OUT2} (48V NOM)



NMT0572SC - Channel -V_{OUT3} (72V NOM)



NMT1272SC - Channel -V_{OUT3} (72V NOM)



APPLICATION NOTES

RIPPLE SPECIFICATION

The output ripple for the NMT series is higher than standard for a Murata Power Solutions DC/DC converter. This is due to using low value ceramic capacitors internally for longer life perfomance of the component and the superimposition of ripples between each output channel. Consequently with a maximum 400mV ripple per output channel, at -72V the ripple is potentially three times this value (1.2V). The ripple will always be additively superimposed since the output windings are synchronized.

To reduce ripple, external capacitors are recommended with a value of 1µF per channel (see figure 1). This typically reduces the ripple to 50mV per channel. Further ripple reduction can be achieved by use of series inductors on each output channel plus additional external capacitors to form a pi-filter with the internal capacitors of the device.

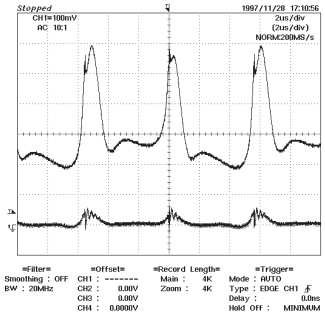


Figure 1. V_{OUT3} Output Ripple
Top: No external capacitors
Bottom: 1µF per channel external capacitors

SLIC CIRCUITS

The primary application for the NMT series is in subscriber line interface circuits (SLIC's), particularly for the Integrated Services Digital Network (ISDN). The NMT can also be used in standard telecommunications circuits where a local power source is preferred to the telephone system power due to either the power quality of the telecommunications system power supply or to avoid potential power line disturbances, such as lightening strikes and access switching, which will effect the target circuit function.

Another application area is in fibre-in-the-loop (FITL) or radio-in-the-loop (RITL) interfacing via a standard telecommunication SLIC, where the usual telecommunication battery voltage is not available due to the transmission media in use (fibre or radio). In particular, FITL/RITL interfaces directly on PC cards, in local monitor and boost circuits and at exchanges between the fibre/radio and wire media.

The supply rails can be used for ringing generators as well as SLIC circuits or where both are combined, such as in the AMD AM79R79 Ringing SLIC device (see figure 2). The -72V rail is used primarily for the generation of the ringing signal ($V_{BAT}1$), the -48V rail is used to supply in line access circuitry ($V_{BAT}2$) and the -24V supply for the on-chip regulator for the logic interface (V_{NEG}). Alternative devices from other manufacturers could use the -24V output for their internal circuit supply and -72V for ringing.

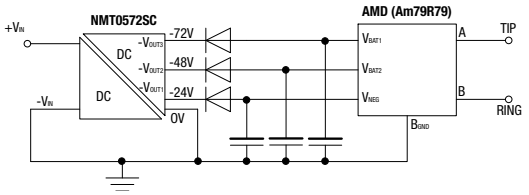


Figure 2. Supply for Ringing SLIC Device

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 NMT 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 NMT 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.

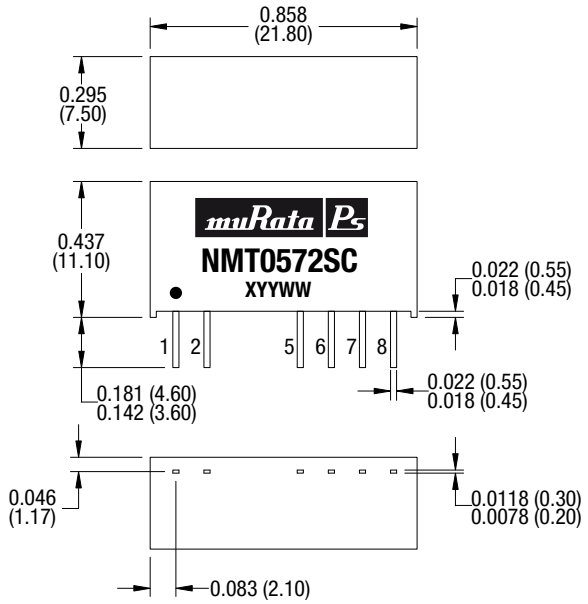
REPEATED HIGH-VOLTAGE ISOLATION TESTING

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 NMT 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



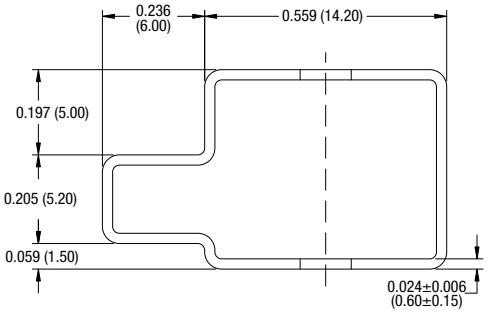
All dimensions in inches ±0.01 (mm ±0.25mm). All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.

Weight: 3.85g

PIN CONNECTIONS - 8 PIN SIP

Pin	Function
1	$+V_{IN}$
2	$-V_{IN}$
5	$+V_{OUT}$
6	$-V_{OUT1}$
7	$-V_{OUT2}$
8	$-V_{OUT3}$

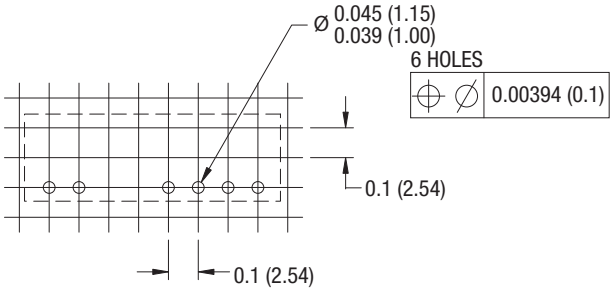
TUBE OUTLINE DIMENSIONS



Unless otherwise stated all dimensions in inches ±0.02 (mm ±0.5mm).
Tube length : 20.47±0.079 (520mm±2mm).

Tube Quantity : 23

RECOMMENDED FOOTPRINT DETAILS`



Unless otherwise stated all dimensions in inches ±0.02 (mm ±0.5mm).

RoHS COMPLIANT INFORMATION

RoHS COMPLIANT 2002/95/EC

This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300ºC for 10 seconds. The pin termination finish on this product series is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The series is backward compatible with Sn/Pb soldering systems.

For further information, please visit www.murata-ps.com/rohs

Murata Power Solutions

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