



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/cm³

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.

SELECTION GUIDE

| Order Code | Nominal Input Voltage V | Output | Nominal Output Voltage V | Output Current ¹ | | Output Current ² | | MTTF ³ kHrs |
|------------|----------------------------|--------------------|-----------------------------|-----------------------------|-----------------|-----------------------------|-----------------|---------------------------|
| | | | | Min. Load mA | Full Load mA | Min. Load mA | Full Load mA | |
| 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 (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 _{OUT1} | P _{OUT} = 100mW | 24 | | 26.4 | V |
| | P _{OUT} = 3W | 22.2 | | 24.6 | |
| Output Voltage - V _{OUT2} | P _{OUT} = 100mW | 48 | | 52.8 | V |
| | P _{OUT} = 3W | 44.4 | | 49.2 | |
| Output Voltage - V _{OUT3} | P _{OUT} = 100mW | 72 | | 79.2 | V |
| | 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

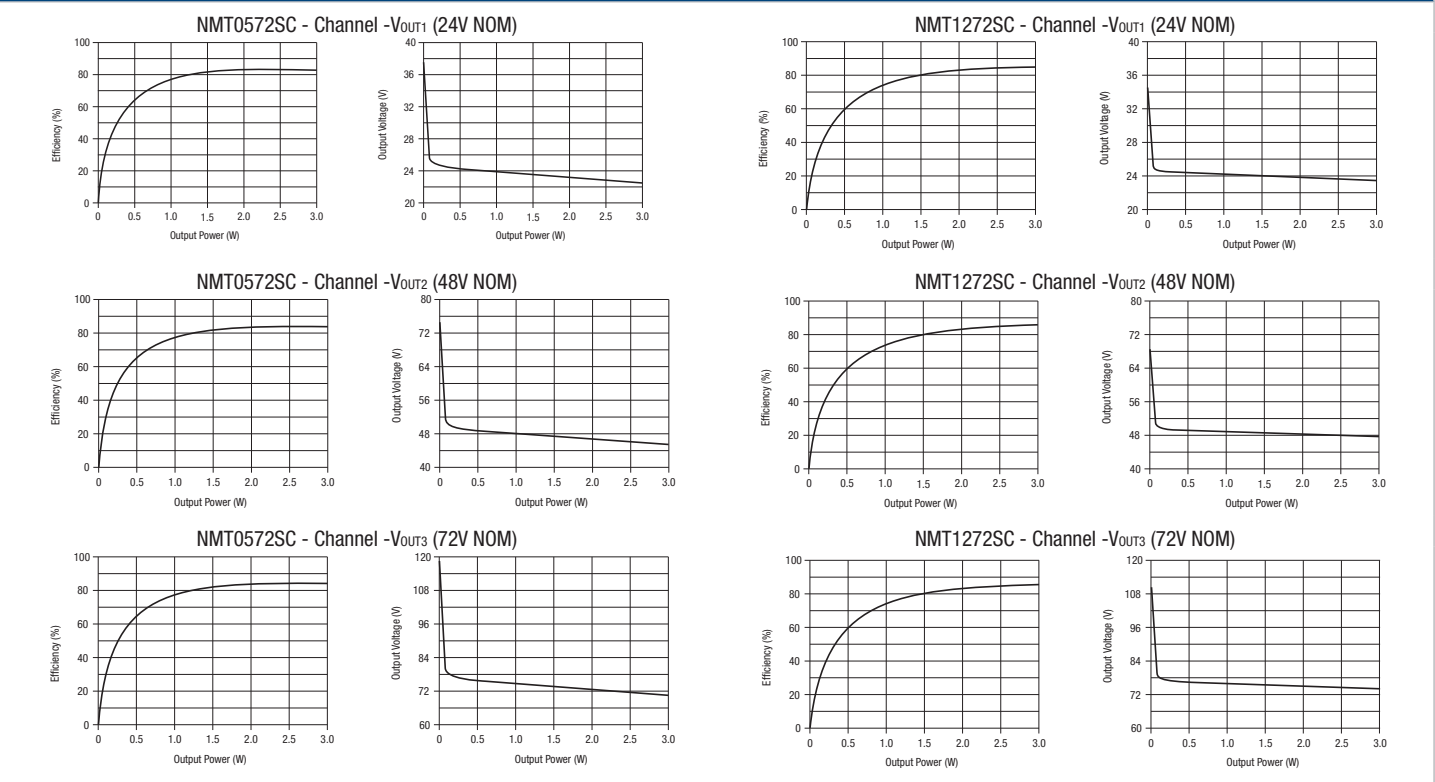
Although the output is described for negative rails, the input and output circuits are internally isolated hence positive rails can also be generated, or a mixture of positive and negative. The output +V_{OUT} rail reference can be taken from any of the output terminals to give the range of outputs as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



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 performance 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.

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 lightning 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_{BAT1}), the -48V rail is used to supply in line access circuitry (V_{BAT2}) 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.

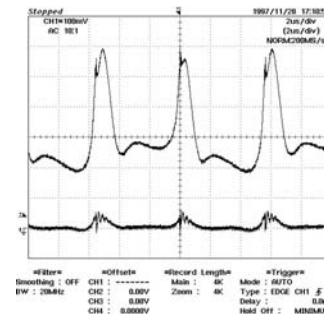


Figure 1. V_{OUT3} Output Ripple
Top: No external capacitors
Bottom: 1µF per channel external capacitors

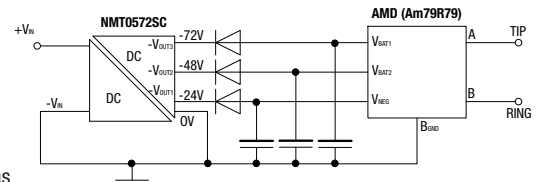


Figure 2. Supply for Ringing SLIC Device

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.

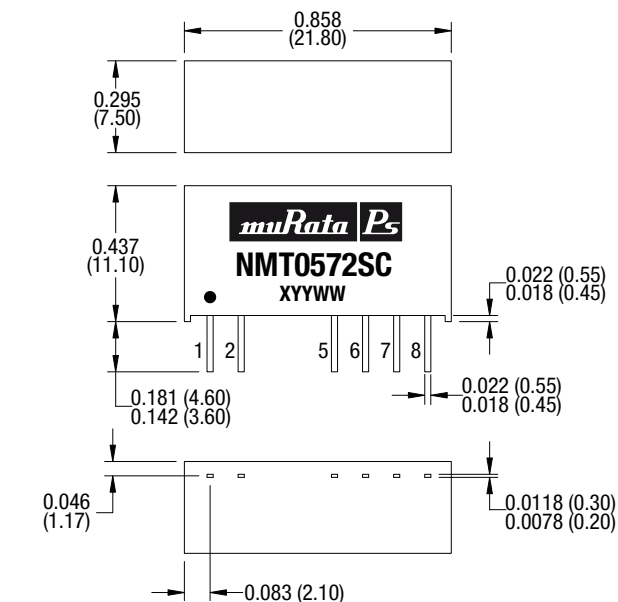
REPEATED HIGH-VOLTAGE ISOLATION TESTING

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

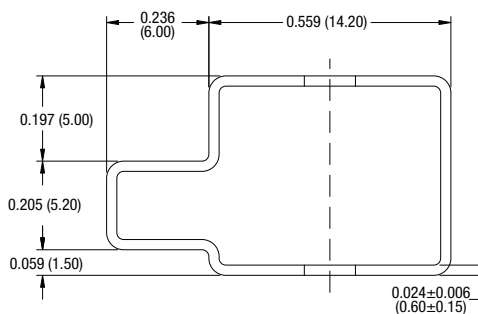


All dimensions in inches ± 0.01 (mm ± 0.25 mm). All pins on a 0.1 (2.54) pitch and within ± 0.01 (0.25) of true position. Weight: 3.85g

PIN CONNECTIONS - 8 PIN SIP

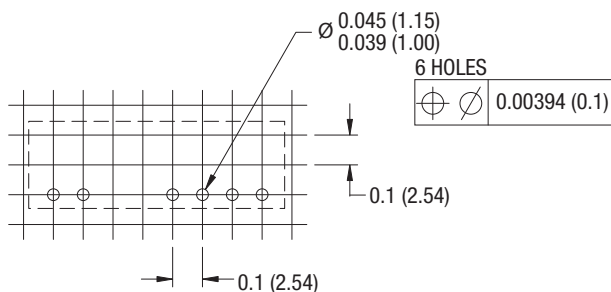
| Pin | Function |
|-----|----------|
| 1 | +VIN |
| 2 | -VIN |
| 5 | +VOUT |
| 6 | -VOUT1 |
| 7 | -VOUT2 |
| 8 | -VOUT3 |

TUBE OUTLINE DIMENSIONS



Unless otherwise stated all dimensions in inches ± 0.02 (mm ± 0.5 mm). Tube length : 20.47 ± 0.079 (520mm ± 2 mm). Tube Quantity : 23

RECOMMENDED FOOTPRINT DETAILS*



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

RoHS COMPLIANT INFORMATION



This series is compatible with RoHS soldering systems with a peak wave solder temperature of 300°C 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



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