



FEATURES

- RoHS compliant
- Lead frame technology
- Single isolated output
- 1kVDC Isolation
- Efficiency up to 78%
- Power density 1.8W/cm³
- Wide temperature performance at full 1 Watt load, -40°C to 85°C
- UL 94V-0 Package material
- Footprint over pins 1.37cm²
- 3.3V, 5V & 12V Input
- 3.3V, 5V, 9V, 12V & 15V output
- No heatsink required
- Internal SMD construction
- Toroidal magnetics
- MTTF up to 6.8 million hours
- Custom solutions available
- Multi-layer ceramic capacitors

PRODUCT OVERVIEW

The NTE 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 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.



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 |
| NTE0303MC | 3.3 | 3.3 | 303 | 410 | 73 | 30 | 5348 |
| NTE0305MC | 3.3 | 5 | 200 | 390 | 78 | 35 | 3847 |
| NTE0309MC | 3.3 | 9 | 111 | 400 | 77 | 31 | 3134 |
| NTE0312MC | 3.3 | 12 | 83 | 400 | 77 | 28 | 3473 |
| NTE0315MC | 3.3 | 15 | 66 | 400 | 77 | 29 | 2473 |
| NTE0503MC | 5 | 3.3 | 303 | 270 | 74 | 40 | 5515 |
| NTE0505MC | 5 | 5 | 200 | 294 | 68 | 35 | 6857 |
| NTE0505MEC | 5 | 5 | 200 | 260 | 77 | 40 | 3933 |
| NTE0506MC | 5 | 6 | 167 | 278 | 72 | 39 | 6677 |
| NTE0509MC | 5 | 9 | 111 | 267 | 75 | 43 | 5501 |
| NTE0512MC | 5 | 12 | 83 | 260 | 77 | 42 | 3957 |
| NTE0515MC | 5 | 15 | 66 | 256 | 78 | 44 | 2747 |
| NTE1205MC | 12 | 5 | 200 | 124 | 67 | 47 | 4683 |
| NTE1209MC | 12 | 9 | 111 | 114 | 73 | 77 | 4008 |
| NTE1212MC | 12 | 12 | 83 | 113 | 74 | 88 | 3121 |
| NTE1215MC | 12 | 15 | 66 | 111 | 75 | 95 | 2316 |

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, 3.3V input types | 2.97 | 3.3 | 3.63 | V |
| | Continuous operation, 5V input types | 4.5 | 5.0 | 5.5 | |
| | Continuous operation, 12V input types | 10.8 | 12.0 | 13.2 | |
| Reflected ripple current | | | 30 | 47 | mA p-p |

ISOLATION CHARACTERISTICS

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|-------------------|---------------------------|------|------|------|-------|
| Isolation voltage | Flash tested for 1 second | 1000 | | | VDC |
| Resistance | Viso= 1000VDC | 10 | | | GΩ |

GENERAL CHARACTERISTICS

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|---------------------|------------------|------|------|------|-------|
| Switching frequency | All output types | | 110 | | kHz |

ABSOLUTE MAXIMUM RATINGS

| | |
|---|----------|
| Short-circuit protection ³ | 1 second |
| Lead temperature 1.5mm from case for 10 seconds | 300°C |
| Internal power dissipation | 600mW |
| Input voltage V _{IN} , NTE03 types | 5.5V |
| Input voltage V _{IN} , NTE05 types | 7V |
| Input voltage V _{IN} , NTE12 types | 15V |

1. If components are required in tape and reel format suffix order code code with -R, e.g. NTE0505MC-R.

2. Calculated using MIL-HDBK-217 FN2 calculation model with nominal input voltage at full load.

3. 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.

| OUTPUT CHARACTERISTICS | | | | | |
|------------------------------|---|------|------|------|--------|
| Parameter | Conditions | Min. | Typ. | Max. | Units |
| Rated power | T _A =-40°C to 85°C | | | 1.0 | W |
| Voltage set point accuracy | See tolerance envelope | | | | |
| Line regulation | High V _{IN} to low V _{IN} | | 1.0 | 1.2 | %/% |
| Load regulation ¹ | 10% load to rated load, 03XXMC, 0503MC, 0505MEC | | 10 | 14 | % |
| | 10% load to rated load, 0505MC & 1205MC | | 12.8 | 15 | |
| | 10% load to rated load, 0506MC | | 9.2 | 10 | |
| | 10% load to rated load, 0509MC & 1209MC | | 8.3 | 9.0 | |
| | 10% load to rated load, 0512MC & 1212MC | | 6.8 | 7.5 | |
| | 10% load to rated load, 0515MC & 1215MC | | 6.3 | 7.0 | |
| Ripple and noise | BW=DC to 20MHz, 03XXMC, 0503MC, 0505MEC | | 40 | 60 | mV p-p |
| | BW=DC to 20MHz, 0505MC & 1205MC | | 62 | 85 | |
| | BW=DC to 20MHz, 0506MC | | 103 | 170 | |
| | BW=DC to 20MHz, 0509MC & 1209MC | | 49 | 75 | |
| | BW=DC to 20MHz, 0512MC & 1212MC | | 39 | 65 | |
| | BW=DC to 20MHz, 0515MC & 1215MC | | 38 | 76 | |

| TEMPERATURE CHARACTERISTICS | | | | | |
|-------------------------------------|---|------|------|------|-------|
| Parameter | Conditions | Min. | Typ. | Max. | Units |
| Specification | All output types | -40 | | 85 | °C |
| Storage | | -55 | | 125 | |
| Case temperature rise above ambient | 0305MC, 0309MC, 0315MC | | 25 | | |
| | 0303MC, 0312MC, 0503MC, 0505MEC, 0509MC, 0512MC, 0515MC | | 30 | | |
| | 0505MC, 1205MC | | 43 | | |
| | 1209MC, 1212MC, 1215MC | | 40 | | |
| 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.

Murata Power Solutions NTE 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?"

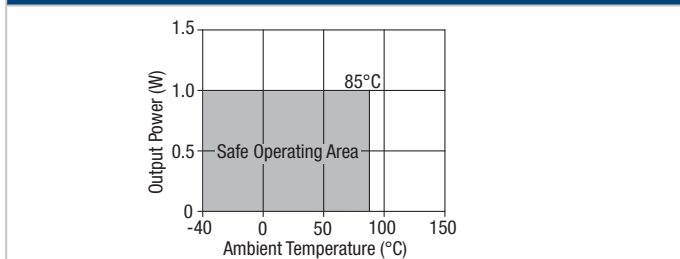
For a part holding no specific agency approvals, such as the NTE series, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an 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 NTE 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.

TEMPERATURE DERATING GRAPH



1. 12V input types have typically 3% less load regulation change.

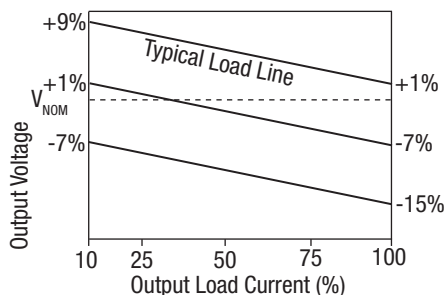
RoHS COMPLIANCE INFORMATION



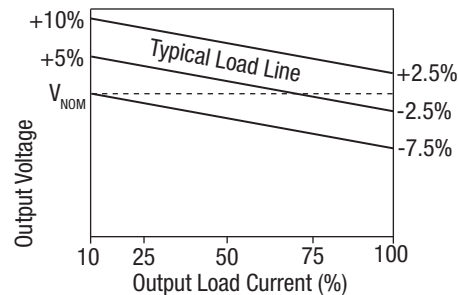
This series is compatible with RoHS soldering systems with a peak reflow solder temperature of 245°C and time above liquidus of 217°C for 60 seconds. The pin termination finish on this product series is Gold, plating thickness 0.1 microns minimum. The series is backward compatible with Sn/Pb soldering systems. For further information, please visit www.murata-ps.com/rohs

TOLERANCE ENVELOPES

3.3V output types.

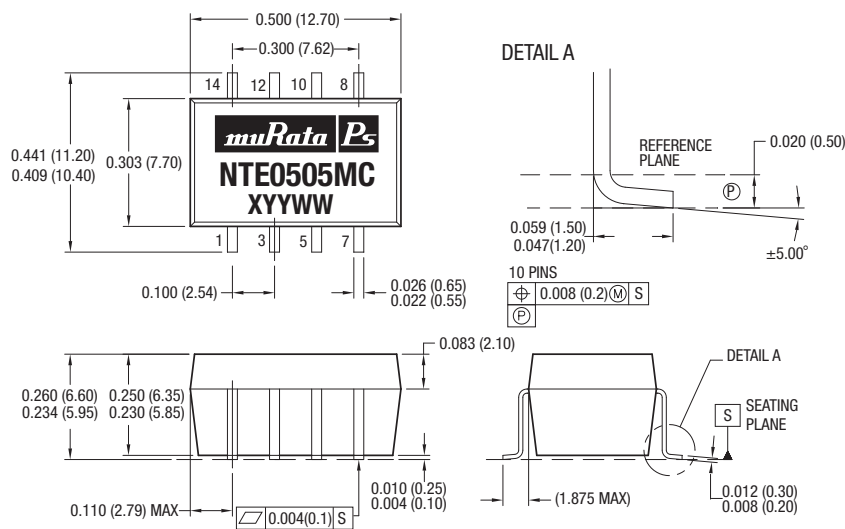


All other types.



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.

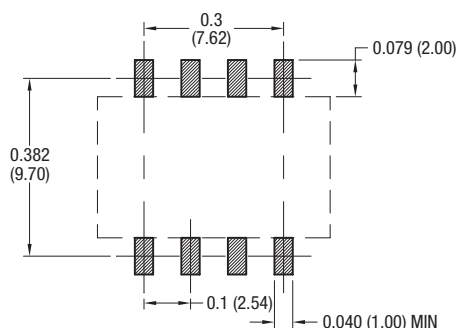
Weight: 1.21g

PIN CONNECTIONS

| Pin | Function |
|-----|-------------------|
| 1 | -V _{IN} |
| 3 | +V _{IN} |
| 5 | NA |
| 7 | -V _{OUT} |
| 8 | +V _{OUT} |
| 10 | NA |
| 12 | NA |
| 14 | NA |

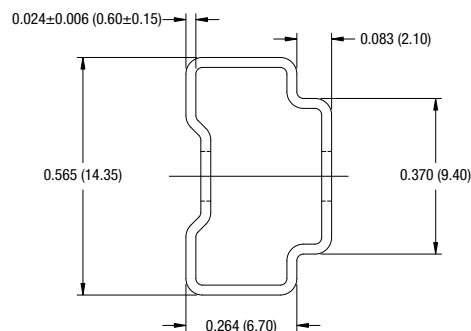
NA - Not available for electrical connection.

RECOMMENDED FOOTPRINT DETAILS



All pins on a 2.54mm pitch.
Unless otherwise stated all dimensions in inches (mm) ± 0.5 mm.

TUBE OUTLINE DIMENSIONS

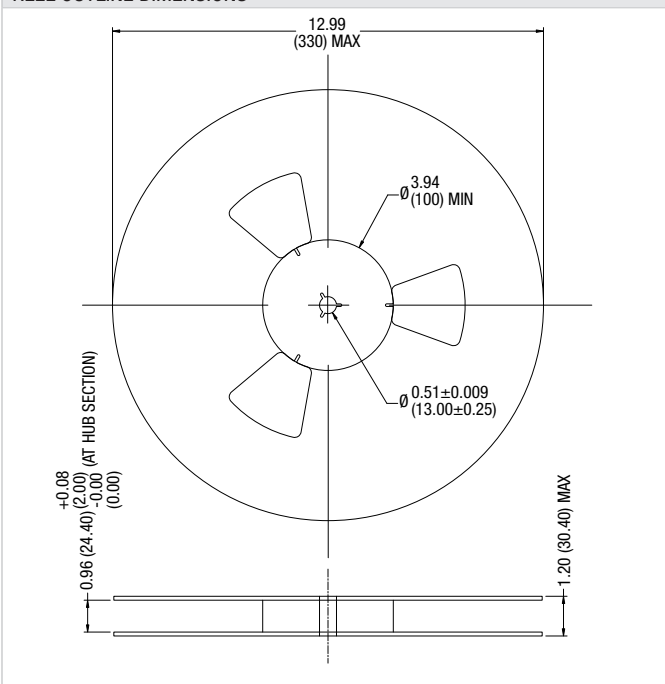


Unless otherwise stated all dimensions in inches ± 0.02 (mm ± 0.5 mm).
Tube length : 18.70 ± 0.07 (475 ± 2.0).

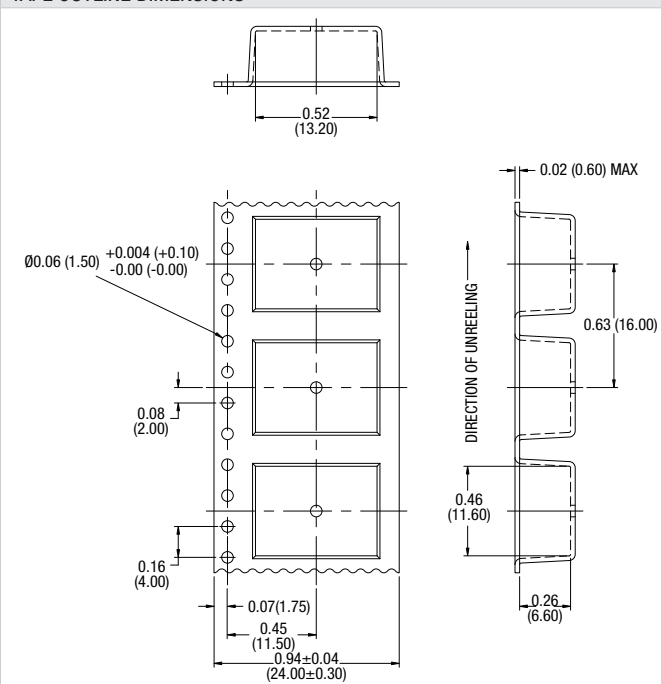
Tube Quantity : 35

TAPE & REEL SPECIFICATIONS

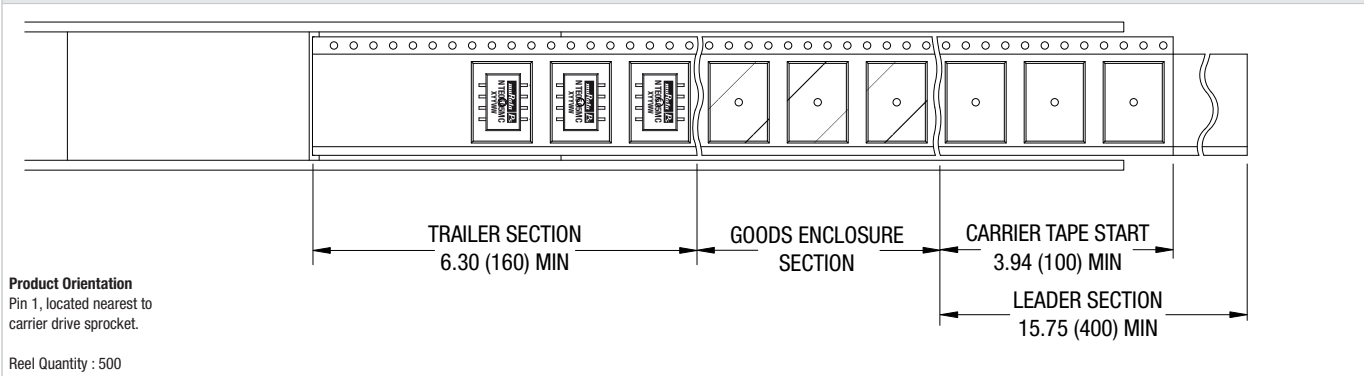
REEL OUTLINE DIMENSIONS



TAPE OUTLINE DIMENSIONS



REEL PACKAGING DETAILS



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