

OUTPUT CHARACTERISTICS

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|----------------------------|---|------|------|------|-------|
| Rated Power ² | T _A = -40°C to 85°C | | | 2 | W |
| Voltage Set Point Accuracy | See tolerance envelopes | | | | |
| Line regulation | High V _{IN} to low V _{IN} | | 1.0 | 1.2 | %/% |

ISOLATION CHARACTERISTICS

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|--------------------------------------|--------------------------------|------|------|------|-------|
| Isolation test voltage | Flash tested for 1 second | 5200 | | | VDC |
| Resistance | Viso= 500VDC | | 1 | | GΩ |
| Isolation capacitance | | | 4 | | pF |
| Continuous barrier withstand voltage | Non-safety barrier application | | | 2400 | V |
| Safety standard | UL60950-1 | | | 200 | Vrms |
| | ANSI/AAMI ES60601-1 | | | 200 | |
| | 1 MOOP | | | | |

GENERAL CHARACTERISTICS

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|---------------------|------------|------|------|------|-------|
| Switching frequency | All types | | 45 | | kHz |

TEMPERATURE CHARACTERISTICS

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|--------------------------------|--|------|------|------|-------|
| Specification | All output types (see safety approval section for limitations) | -40 | | 85 | °C |
| Storage | | -55 | | 125 | |
| Case Temperature above ambient | MEJ2S0509SC, MEJ2S0512SC, MEJ2S0515SC, MEJ2S1209SC, MEJ2x1212SC, MEJ2S1215SC, MEJ2S1509SC, MEJ2S1512SC, MEJ2S1515SC | | 27 | | |
| | MEJ2S0503SC, MEJ2S0505SC, MEJ2S1203SC, MEJ2S1205SC, MEJ2x1505SC, MEJ2S1515SC, MEJ2D0512SC, MEJ2D0515SC, MEJ2D1209SC, MEJ2D1215SC | | 30 | | |
| | MEJ2S0305SC, MEJ2S0303SC, MEJ2S1203SC, MEJ2D0505SC, MEJ2D0509SC, MEJ2D1205SC, MEJ2D1509SC, MEJ2D1512SC | | 33 | | |
| | MEJ2D01203SC, MEJ2D0503SC | | 37 | | |
| Cooling | Free air convection | | | | |

ABSOLUTE MAXIMUM RATINGS

| | |
|---|--|
| Short-circuit protection | 10 minutes |
| Lead temperature 1mm from case for 10 seconds | 260°C |
| Wave Solder | Wave Solder profile not to exceed the profile recommended in IEC 61760-1 Section 6.1.3. Please refer to application notes for further information. |
| Input voltage V _{IN} , MEJ2x03xxSC | 5V |
| Input voltage V _{IN} , MEJ2x05xxSC | 7V |
| Input voltage V _{IN} , MEJ2x12xxSC | 15V |
| Input voltage V _{IN} , MEJ2x15xxSC | 18V |

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 MEJ2 series of DC-DC converters are all 100% production tested at their stated isolation voltage. This is 5.2kVDC for 1 second.

The MEJ2 series is recognised by Underwriters Laboratory, please see safety approval section for more information. When the insulation in the MEJ2 series is not used as a safety barrier, i.e. provides functional isolation only, continuous or switched voltages across the barrier up to 2.4kV are sustainable. This is established by measuring the partial discharge inception voltage in accordance with IEC 60270. Please contact Murata for further information.

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. 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.

SAFETY APPROVAL

ANSI/AAMI ES60601-1

The MEJ2 series have recognised by Underwriters Laboratory (UL) to ANSI/AAMI ES60601-1 and provides 1 MOOP (Means Of Operator Protection) based upon a working voltage of 200 Vrms max and 280 Vpk max., between Primary and Secondary and between Primary and its Enclosure, in a maximum ambient temperature of 85°C and/or case temperature limit of 130°C (case temperature measured on the face opposite the pins).

File Number E202895 applies.

UL60950

The MEJ2 series have been recognised by Underwriters Laboratory (UL) to UL60950 for basic/supplementary insulation to a working voltage of 200Vrms in a maximum ambient temperature of 85°C and/or case temperature limit of 130°C (case temperature measured on the face opposite the pins).

File number E151252 applies.

Creepage and clearance 2mm

Working altitude 4000m

FUSING

The MEJ2 Series of converters are not internally fused so to meet the requirements of UL an anti-surge input line fuse should always be used with ratings as defined below.

MEJ2x03xxxC: 2A

MEJ2x05xxxC: 2A

MEJ2x12xxxC: 750mA

MEJ2x15xxxC: 750mA

All fuses should be UL recognised and rated to at least the maximum allowable DC input voltage.

RoHS COMPLIANCE INFORMATION



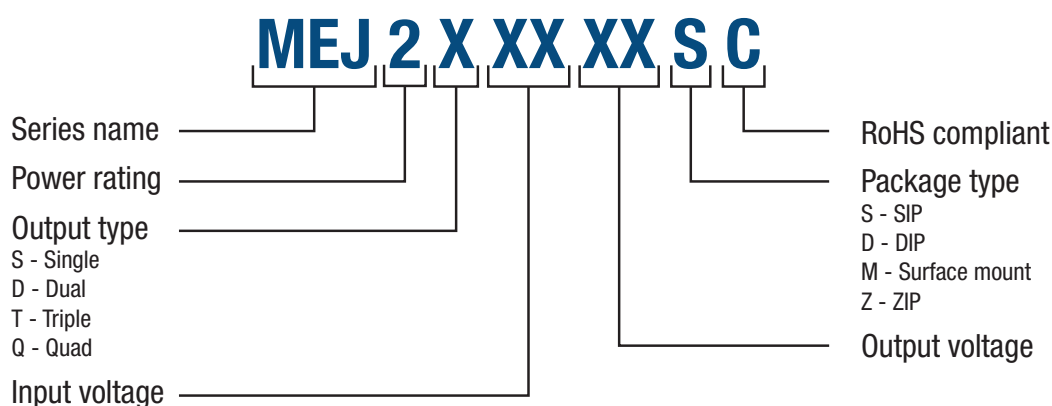
This series is compatible with RoHS soldering systems with a peak wave solder temperature of 260°C for 10 seconds. Please refer to [application notes](#) for further information. The pin termination finish on this product series is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The series is backward compatible with Sn/Pb soldering systems. For further information, please visit www.murata-ps.com/rohs

ENVIRONMENTAL VALIDATION TESTING

The following tests have been conducted on this product series, as part of our design verification process. The datasheet characteristics specify user operating conditions for this series, please contact Murata if further information about the tests is required.

| Test | Standard | Condition |
|-------------------------------|---|--|
| Temperature cycling | MIL-STD-883 Method 1010, Condition B | 10 cycles between two chambers set to achieve -55°C and +125°C. The dwell time shall not be less than 10min. |
| Humidity bias | JEDEC JESD22-A101 | 85°C ± 2°C, 85% ± 5% R.H. for >1000 hours. |
| Storage life | JEDEC JESD22-A103, Condition A | 125°C +10/-0°C for ≥1000 hours. |
| Vibration | MIL-STD-883 Method 2007, Condition A | 1.5mm pk-pk / 20g pk min, 20-2000Hz, 4 sweeps in each of 3 mutually perpendicular axis at 3 oct/min. |
| Shock | MIL-STD-883 Method 2002, Condition A | 500g 1.0ms half sine, 5 shocks in each direction of 3 mutually perpendicular axes. |
| ESD | JESD22-A114 | HBM Testing Standard at 3 stress levels; 2.0kV, 4.0kV and 8.0kV. |
| Bump | IEC Class 4M5 of IEC 60068-2-27 | Shock Spectrum Type II, 6ms duration, 250m/s ² 500 bumps in 6 directions. |
| Solderability | IPC/ECA J-STD-002, Test A and A1 | SnPb (Test A) For leaded solderability the parts are conditioned in a steam ager for 8 hours ±15 min. at a temperature of 93±3°C. Dipped in solder at 245°C ±5°C for 5 +0/-0.5 seconds. Pb-free (Test A1) For lead free solderability the parts are conditioned in a steam ager for 8 hours ± 15 min. at a temperature of 93±3°C. Dipped in solder at 255°C ±5°C for 5 +0/-0.5 seconds. |
| Solder heat | JEDEC JESD22-B106 | The test sample is subjected to a molten solder bath at 260 ±5°C for 10 seconds (96SC tin/silver/copper). |
| Solder heat (hand) | MIL-STD-202 Method 210, Condition A | The soldering iron is heated to 350°C ± 10°C and applied to the terminations for a duration of 4 to 5 seconds. |
| Solvent cleaning | Resistance to cleaning agents. | Solvent – Novec 71IPA & Topklean EL-20A. Pulsed ultrasonic immersion 45°C- 65°C. |
| Solvent Resistance | MIL-STD-883 Method 2015 | Separate samples subjected to solvent A, solvent B and solvent D. |
| Lead Integrity (Adhesion) | MIL-STD-883 Method 2025 | Leads are bent through 90° until a fracture occurs. |
| Lead Integrity (Fatigue) | MIL-STD-883 Method 2004, condition B ₂ | The leads are bent to an angle of 15°. Each lead is subjected to 3 cycles. |
| Lead Integrity (Tension/Pull) | MIL-STD-883 Method 2004, Condition A ₁ | Pull of 0.227kg applied for 30 seconds. The force is then increased until the pins snap. |

PART NUMBER STRUCTURE



CHARACTERISATION TEST METHODS

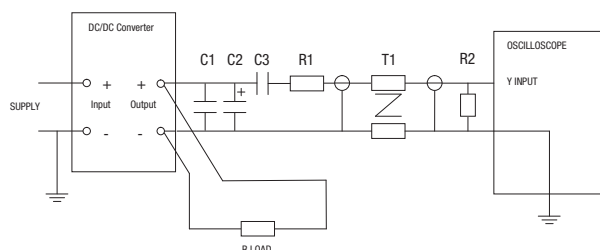
Ripple & Noise Characterisation Method

Ripple and noise measurements are performed with the following test configuration.

| | |
|-------|--|
| C1 | 1 μ F X7R multilayer ceramic capacitor, voltage rating to be a minimum of 3 times the output voltage of the DC-DC converter |
| C2 | 10 μ F tantalum capacitor, voltage rating to be a minimum of 1.5 times the output voltage of the DC-DC converter with an ESR of less than 100m Ω at 100 kHz |
| C3 | 100nF multilayer ceramic capacitor, general purpose |
| R1 | 450 Ω resistor, carbon film, $\pm 1\%$ tolerance |
| R2 | 50 Ω BNC termination |
| T1 | 3T of the coax cable through a ferrite toroid |
| RLOAD | Resistive load to the maximum power rating of the DC-DC converter. Connections should be made via twisted wires |

Measured values are multiplied by 10 to obtain the specified values.

Differential Mode Noise Test Schematic



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%.

Gate Drive Applications Advisory Note

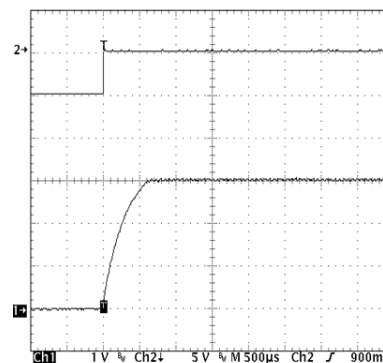
For general guidance for product usage in gate drive applications please refer to ["gate drive application notes"](#).

Capacitive loading and start up

Typical start up times for this series, with a typical input voltage rise time of 2.2 μ s and output capacitance of 10 μ F, are shown in the table below. The product series will start into a capacitance of 47 μ F with an increased start time, however, the maximum recommended output capacitance is 10 μ F.

| Start-up time | | Start-up time | | Start-up time | |
|---------------|---------|---------------|---------|---------------|---------|
| | μ s | | μ s | | μ s |
| MEJ2S0303SC | 0.89 | MEJ2S1509SC | 3.37 | MEJ2D1505SC | 1.79 |
| MEJ2S0305SC | 1.89 | MEJ2S1512SC | 4.47 | MEJ2D1509SC | 5.16 |
| MEJ2S0503SC | 1.08 | MEJ2S1515SC | 6.05 | MEJ2D1512SC | 7.04 |
| MEJ2S0505SC | 2.04 | MEJ2D0503SC | 1.57 | MEJ2D1515SC | 10.48 |
| MEJ2S0509SC | 6.5 | MEJ2D0505SC | 1.79 | | |
| MEJ2S0512SC | 8.29 | MEJ2D0509SC | 9.32 | | |
| MEJ2S0515SC | 11.4 | MEJ2D0512SC | 14.9 | | |
| MEJ2S1203SC | 0.73 | MEJ2D0515SC | 20.84 | | |
| MEJ2S1205SC | 1.61 | MEJ2D1203SC | 1.03 | | |
| MEJ2S1209SC | 4.04 | MEJ2D1205SC | 2.51 | | |
| MEJ2S1212SC | 5.51 | MEJ2D1209SC | 6.46 | | |
| MEJ2S1215SC | 7.61 | MEJ2D1212SC | 9.94 | | |
| MEJ2S1505SC | 1.33 | MEJ2D1215SC | 14.54 | | |

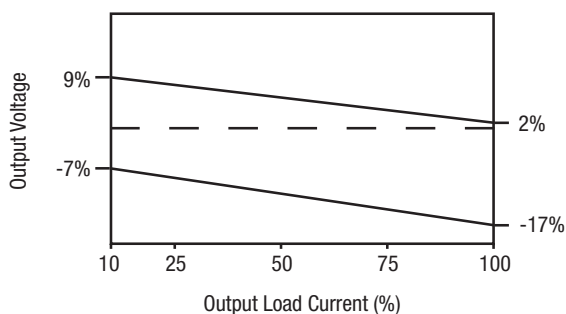
Typical Start-Up Wave Form



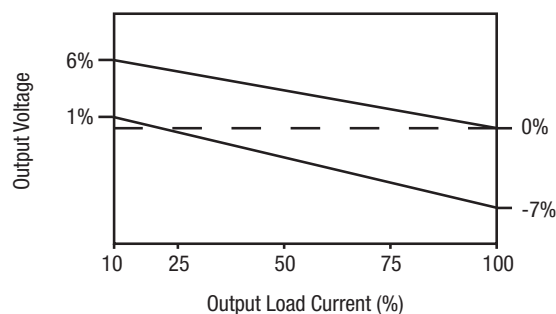
TOLERANCE ENVELOPES

The voltage tolerance envelope shows typical load regulation characteristics for this product series. The tolerance envelope is the maximum output voltage variation due to changes in output loading.

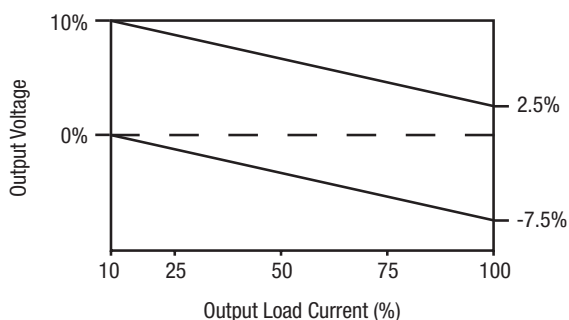
MEJ2X0303SC



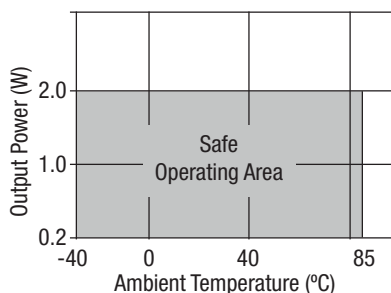
MEJ2D0515SC



All Other Variants



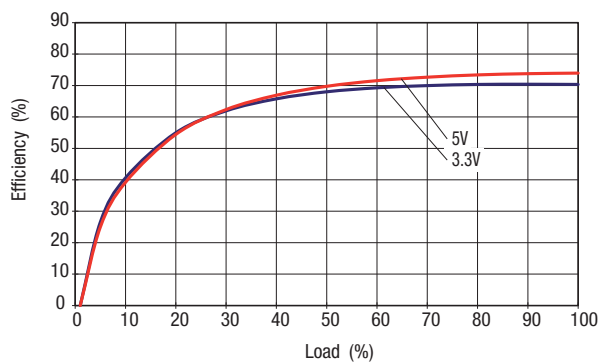
TEMPERATURE DERATING GRAPH



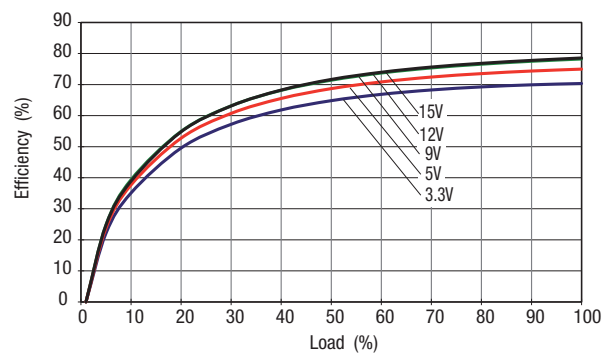
UL60950 recognition to a maximum ambient temperature of 85°C and/or case temperature limit of 155°C, measured on the face opposite the pins.

EFFICIENCY VS LOAD

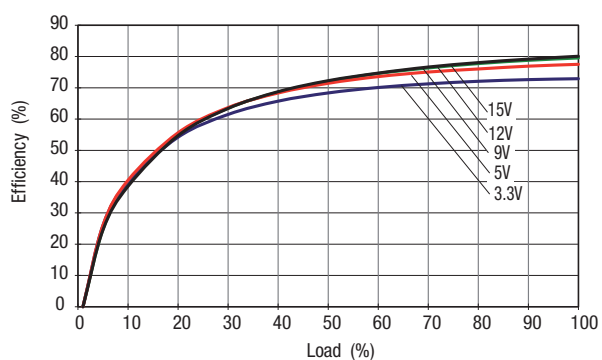
MEJ2S03XXSC



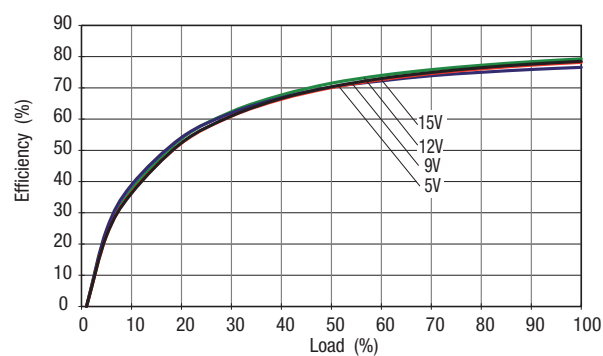
MEJ2S05XXSC



MEJ2S12XXSC

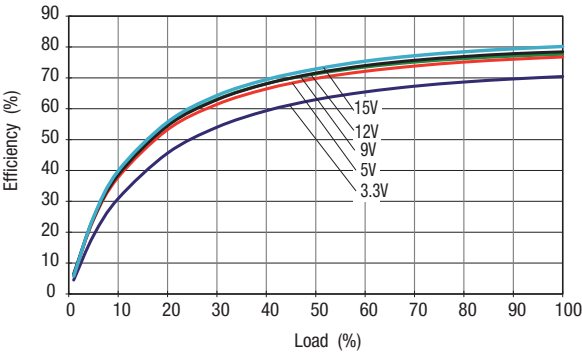


MEJ2S15XXSC

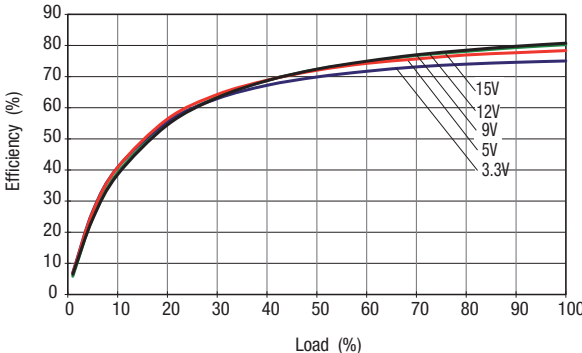


EFFICIENCY VS LOAD (Continued)

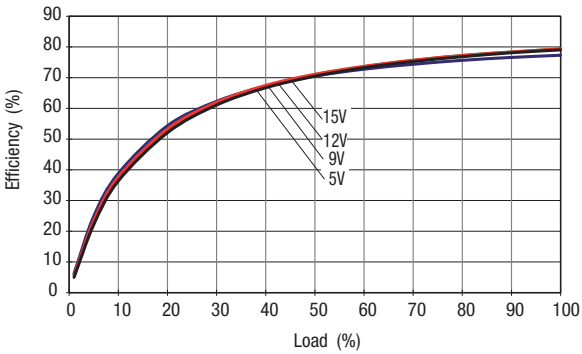
MEJ2D05XXSC



MEJ2D12XXSC



MEJ2D15XXSC



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- Undersea equipment
- Power plant control equipment
- Medical equipment
- Transportation equipment (automobiles, trains, ships, etc.)
- Traffic signal equipment
- Disaster prevention / crime prevention equipment
- Data Processing equipment

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