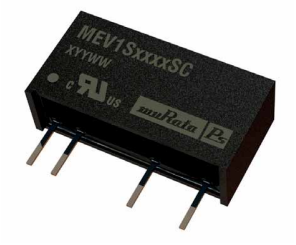
Murata Power Solutions

# MEV1 Series

3kVDC Isolated 1W Single & Dual Output DC-DC Converters




## FEATURES

- UL 60950 recognised
- Efficiency to 89% (Typ.)
- Wide temperature performance at full 1 Watt load, –40°C to 85°C
- Industry standard pinout
- 3kVDC isolation (1 minute) 'Hi Pot Test'
- 5V, 12V, 15V, 24V & 48V inputs
- 5V, 9V, 12V & 15V outputs
- No external components required
- No electrolytic or tantalum capacitors
- Pin compatible with MEV3, NMK & NMV series

## PRODUCT OVERVIEW

The MEV series is the new high performance version of our 1W NMV series. The MEV series is more efficient and offers improved regulation performance from 1.8% for applications where a wide output voltage variation can not be tolerated. They are ideally suited for providing local supplies on control system boards with the added benefit of 3kVDC galvanic isolation to reduce switching noise. The MEV series is currently available in an industry SIP 7 or DIP 14 package.

**SELECTION GUIDE - SINGLE OUTPUT[1]**

| Order Code | Nominal Input Voltage | Output Voltage | Output Current | Input Current at Rated Load | Load Regulation (Typ) | Load Regulation (Max) | Ripple & Noise (Typ)[2] | Ripple & Noise (Max)[2] | Efficiency (Min) | Efficiency (Typ) | Isolation Capacitance | MTTF[3] | Package Style | Recommended Alternative |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | V | V | mA | | % | | mVp-p | | % | | pF | kHrs | | |
| Recommended / In Production | | | | | | | | | | | | | | |
| **MEV1S0505SC** | 5 | 5 | 200 | 233 | 5.4 | 6.2 | 20 | 30 | 81 | 84 | 38 | 7684 | SIP | |
| **MEV1S0509SC** | 5 | 9 | 111 | 227 | 4.2 | 5.5 | 12 | 20 | 83.5 | 86.5 | 42 | 7698 | SIP | |
| **MEV1S0512SC** | 5 | 12 | 84 | 226 | 4.6 | 5.5 | 10 | 20 | 84 | 87 | 40 | 7175 | SIP | |
| **MEV1S0515SC** | 5 | 15 | 67 | 225 | 4.5 | 5 | 8 | 15 | 85 | 87.5 | 39 | 6496 | SIP | |
| **MEV1S1205SC** | 12 | 5 | 200 | 98 | 4.5 | 5 | 12 | 15 | 80 | 84 | 28 | 7569 | SIP | |
| **MEV1S1209SC** | 12 | 9 | 111 | 96 | 3 | 3.3 | 8 | 15 | 83 | 86 | 50 | 7317 | SIP | |
| **MEV1S1212SC** | 12 | 12 | 84 | 94 | 3 | 3.6 | 7 | 15 | 85.5 | 88 | 70 | 6647 | SIP | |
| **MEV1S1505SC** | 15 | 5 | 200 | 79 | 4 | 5 | 10 | 20 | 80 | 83.5 | 32 | 7167 | SIP | |
| **MEV1S1515SC** | 15 | 15 | 67 | 76 | 2.5 | 3.5 | 6 | 15 | 85 | 89 | 87 | 5916 | SIP | |
| **MEV1S2405SC** | 24 | 5 | 200 | 50 | 3.3 | 5 | 12 | 20 | 79 | 84 | 38 | 7391 | SIP | |
| **MEV1S2409SC** | 24 | 9 | 111 | 48 | 2.2 | 3.5 | 8 | 20 | 81 | 86.5 | 56 | 6490 | SIP | |
| **MEV1S2412SC** | 24 | 12 | 84 | 48 | 2 | 3.5 | 7 | 15 | 82 | 87.5 | 72 | 6772 | SIP | |
| **MEV1S2415SC** | 24 | 15 | 67 | 48 | 1.8 | 3 | 7 | 15 | 82 | 87.5 | 83 | 5957 | SIP | |
| In Production | | | | | | | | | | | | | | |
| **MEV1S0505DC** | 5 | 5 | 200 | 234 | 5.4 | 6.5 | 15 | 30 | 81 | 84 | 39 | 6884 | DIP | |
| **MEV1S0512DC** | 5 | 12 | 84 | 228 | 5.0 | 5.7 | 8 | 15 | 84 | 87 | 39 | 6153 | DIP | |
| **MEV1S1205DC** | 12 | 5 | 200 | 98 | 4.6 | 5.5 | 11 | 20 | 80 | 84 | 34 | 6644 | DIP | |
| Discontinued | | | | | | | | | | | | | | |
| MEV1S0509DC | 5 | 9 | 111 | 228 | 4.2 | 5.5 | 9 | 20 | 83 | 86.5 | 40 | 6732 | DIP | MEV1S0509SC |
| MEV1S0515DC | 5 | 15 | 67 | 226 | 4.4 | 5.5 | 8 | 15 | 84 | 87.5 | 38 | 5419 | DIP | MEV1S0515SC |
| MEV1S1209DC | 12 | 9 | 111 | 96 | 3 | 3.5 | 8 | 15 | 82 | 86 | 50 | 6434 | DIP | MEV1S1209SC |
| MEV1S1212DC | 12 | 12 | 84 | 93 | 3.1 | 3.7 | 7 | 15 | 84 | 88 | 52 | 5653 | DIP | MEV1S1212SC |
| MEV1S1215DC | 12 | 15 | 67 | 94 | 2.5 | 3.3 | 6 | 15 | 83 | 88 | 60 | 5267 | DIP | NMV1215SAC |
| MEV1S1215SC | 12 | 15 | 67 | 94 | 2.5 | 2.9 | 7 | 15 | 83.5 | 88 | 59 | 6279 | SIP | NMV1215SAC |
| MEV1S1505DC | 15 | 5 | 200 | 79 | 4 | 5.2 | 11 | 25 | 79 | 83.5 | 32 | 6332 | DIP | MEV1S1505SC |
| MEV1S1509DC | 15 | 9 | 111 | 77 | 2.6 | 3.3 | 7 | 20 | 81 | 86.5 | 52 | 6114 | DIP | Contact Murata |
| MEV1S1509SC | 15 | 9 | 111 | 77 | 2.5 | 3.5 | 8 | 20 | 82.5 | 86.5 | 52 | 6906 | SIP | Contact Murata |
| MEV1S1512DC | 15 | 12 | 84 | 76 | 2.3 | 3 | 6 | 15 | 83 | 87.5 | 63 | 5767 | DIP | Contact Murata |
| MEV1S1512SC | 15 | 12 | 84 | 76 | 2.3 | 3.5 | 6 | 15 | 83.5 | 87.5 | 63 | 6523 | SIP | Contact Murata |
| MEV1S1515DC | 15 | 15 | 67 | 75 | 2.5 | 3.2 | 6 | 15 | 84 | 89 | 87 | 5002 | DIP | MEV1S1515SC |
| MEV1S2405DC | 24 | 5 | 200 | 50 | 3.4 | 4.5 | 16 | 30 | 79 | 84 | 38 | 6488 | DIP | MEV1S2405SC |
| MEV1S2409DC | 24 | 9 | 111 | 48 | 2.3 | 3.3 | 9 | 20 | 82 | 86.5 | 55 | 5693 | DIP | MEV1S2409SC |
| MEV1S2412DC | 24 | 12 | 84 | 48 | 2 | 3 | 7 | 15 | 83 | 87.5 | 73 | 5736 | DIP | MEV1S2412SC |
| MEV1S2415DC | 24 | 15 | 67 | 48 | 1.8 | 3 | 6 | 15 | 83 | 87.5 | 84 | 4915 | DIP | MEV1S2415SC |
| MEV1S4805SC | 48 | 5 | 200 | 26 | 3.3 | 5 | 19 | 35 | 75.5 | 79.5 | 34 | 7354 | SIP | MER1S4805SC |
| MEV1S4809SC | 48 | 9 | 111 | 25 | 2.4 | 3.5 | 13 | 25 | 78.5 | 82 | 54 | 7120 | SIP | Contact Murata |
| MEV1S4812SC | 48 | 12 | 84 | 26 | 2 | 3 | 10 | 20 | 78 | 82 | 63 | 7088 | SIP | MER1S4812SC |
| MEV1S4815SC | 48 | 15 | 67 | 26 | 1.9 | 3 | 9 | 20 | 79 | 82.5 | 74 | 7238 | SIP | MER1S4815SC |

1. For dual output variants, see page 2.
2. See Ripple & Noise characterisation method.
3. Calculated using MIL-HDBK-217F FN2 with nominal input voltage at full load.

All specifications typical at $T_A$=25°C, nominal input voltage and rated output current unless otherwise specified.

RoHS COMPLIANT

For full details go to https://www.murata.com/en-global/products/power/rohs

c UL us

## SELECTION GUIDE - DUAL OUTPUT[1]

| Order Code | Nominal Input Voltage | Output Voltage | Output Current | Input Current at Rated Load | Load Regulation (Typ) | Load Regulation (Max) | Ripple & Noise (Typ)[2] | Ripple & Noise (Max)[2] | Efficiency (Min) | Efficiency (Typ) | Isolation Capacitance | MTTF[3] | Package Style | Recommended Alternative |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | V | V | mA | | % | | mVp-p | | % | | pF | kHrs | | |
| Recommended / In Production | | | | | | | | | | | | | | |
| **MEV1D0505SC** | 5 | ±5 | ±100 | 233 | 5.1 | 6.5 | 14 | 35 | 82 | 85 | 42 | 4585 | SIP | |
| **MEV1D0512SC** | 5 | ±12 | ±42 | 228 | 4.2 | 5.4 | 9 | 25 | 85 | 87.5 | 38 | 4114 | SIP | |
| **MEV1D0515SC** | 5 | ±15 | ±33 | 225 | 4.0 | 5.2 | 9 | 25 | 85 | 88 | 38 | 3544 | SIP | |
| **MEV1D1205SC** | 12 | ±5 | ±100 | 98 | 3.8 | 4.5 | 13 | 35 | 81 | 85 | 33 | 4179 | SIP | |
| **MEV1D1212SC** | 12 | ±12 | ±42 | 93 | 2.7 | 3.4 | 8 | 20 | 85 | 89.5 | 64 | 3932 | SIP | |
| **MEV1D2409SC** | 24 | ±9 | ±56 | 47 | 1.9 | 2.7 | 12 | 35 | 83 | 86 | 52 | 4574 | SIP | |
| **MEV1D2412SC** | 24 | ±12 | ±42 | 47 | 1.8 | 2.7 | 10 | 30 | 85 | 88 | 78 | 4009 | SIP | |
| **MEV1D2415SC** | 24 | ±15 | ±33 | 47 | 1.5 | 2.4 | 9 | 25 | 84 | 88 | 81 | 3232 | SIP | |
| **MEV1D4805SC** | 48 | ±5 | ±100 | 26 | 2.6 | 3.3 | 21 | 50 | 77 | 80 | 32 | 4791 | SIP | |
| **MEV1D4809SC** | 48 | ±9 | ±56 | 25 | 1.6 | 2.4 | 14 | 40 | 80 | 83 | 54 | 3843 | SIP | |
| In Production | | | | | | | | | | | | | | |
| **MEV1D2412DC** | 24 | ±12 | ±42 | 47 | 1.8 | 2.7 | 10 | 30 | 85 | 88 | 78 | 4009 | DIP | |
| **MEV1D2415DC** | 24 | ±15 | ±33 | 47 | 1.5 | 2.4 | 9 | 25 | 84 | 87.5 | 81 | 3232 | DIP | |
| Discontinued | | | | | | | | | | | | | | |
| MEV1D0505DC | 5 | ±5 | ±100 | 233 | 5.1 | 6.5 | 14 | 35 | 82 | 85 | 42 | 4585 | DIP | NMV0505DC |
| MEV1D0509DC | 5 | ±9 | ±56 | 228 | 4.1 | 5.2 | 11 | 30 | 84 | 87 | 42 | 4565 | DIP | NKA0509SC |
| MEV1D0509SC | 5 | ±9 | ±56 | 228 | 4.1 | 5.2 | 11 | 30 | 84 | 87 | 42 | 4565 | SIP | MEJ2S0509SC |
| MEV1D0512DC | 5 | ±12 | ±42 | 228 | 4.2 | 5.4 | 9 | 25 | 85 | 87.5 | 38 | 4114 | DIP | MEJ1D0512SC |
| MEV1D0515DC | 5 | ±15 | ±33 | 225 | 4.0 | 5.2 | 9 | 25 | 85 | 88 | 38 | 3544 | DIP | MEV1D0515SC |
| MEV1D1205DC | 12 | ±5 | ±100 | 98 | 3.8 | 4.5 | 13 | 35 | 81 | 85 | 33 | 4179 | DIP | MEV1D1205SC |
| MEV1D1209DC | 12 | ±9 | ±56 | 95 | 2.7 | 3.5 | 10 | 25 | 83 | 87 | 53 | 4679 | DIP | Contact Murata |
| MEV1D1209SC | 12 | ±9 | ±56 | 95 | 2.7 | 3.5 | 10 | 25 | 83 | 87 | 53 | 4679 | SIP | MEV1D0512SC |
| MEV1D1212DC | 12 | ±12 | ±42 | 93 | 2.7 | 3.4 | 8 | 20 | 85 | 89.5 | 64 | 3932 | DIP | MEV1D1212SC |
| MEV1D1215DC | 12 | ±15 | ±33 | 94 | 2.2 | 3 | 7 | 20 | 85 | 88.5 | 74 | 3362 | DIP | NMV1215DC |
| MEV1D1215SC | 12 | ±15 | ±33 | 94 | 2.2 | 3 | 7 | 20 | 85 | 88.5 | 74 | 3362 | SIP | NMV1215SC |
| MEV1D1505DC | 15 | ±5 | ±100 | 78 | 3.3 | 4 | 14 | 35 | 81 | 84.5 | 33 | 4058 | DIP | Contact Murata |
| MEV1D1505SC | 15 | ±5 | ±100 | 78 | 3.3 | 4.0 | 14 | 35 | 81 | 84.5 | 33 | 4058 | SIP | Contact Murata |
| MEV1D1509DC | 15 | ±9 | ±56 | 76 | 2.2 | 2.9 | 10 | 30 | 83 | 87 | 47 | 4171 | DIP | Contact Murata |
| MEV1D1509SC | 15 | ±9 | ±56 | 76 | 2.2 | 2.9 | 10 | 30 | 83 | 87 | 47 | 4171 | SIP | Contact Murata |
| MEV1D1512DC | 15 | ±12 | ±42 | 76 | 2.1 | 3.0 | 8 | 25 | 84 | 88 | 67 | 3746 | DIP | Contact Murata |
| MEV1D1512SC | 15 | ±12 | ±42 | 76 | 2.1 | 3.0 | 8 | 25 | 84 | 88 | 67 | 3746 | SIP | Contact Murata |
| MEV1D1515DC | 15 | ±15 | ±33 | 75 | 2.3 | 3.0 | 7 | 20 | 87 | 90.5 | 112 | 3127 | DIP | NMV1515SC |
| MEV1D1515SC | 15 | ±15 | ±33 | 75 | 2.3 | 3.0 | 7 | 20 | 87 | 90.5 | 112 | 3127 | SIP | NMV1515SC |
| MEV1D2405DC | 24 | ±5 | ±100 | 49 | 2.9 | 4 | 13 | 35 | 81 | 84 | 36 | 4648 | DIP | Contact Murata |
| MEV1D2405SC | 24 | ±5 | ±100 | 49 | 2.9 | 4.0 | 13 | 35 | 81 | 84 | 36 | 4648 | SIP | Contact Murata |
| MEV1D2409DC | 24 | ±9 | ±56 | 47 | 1.9 | 2.7 | 12 | 35 | 83 | 86 | 52 | 4574 | DIP | MEV1D2409SC |
| MEV1D4812SC | 48 | ±12 | ±42 | 25 | 1.4 | 2.2 | 13 | 35 | 81 | 84 | 79 | 3301 | SIP | Contact Murata |
| MEV1D4815SC | 48 | ±15 | ±33 | 25 | 1.3 | 2.2 | 12 | 30 | 82 | 85 | 79 | 2977 | SIP | Contact Murata |

1. For single output variants, see page 1.
2. See Ripple & Noise characterisation method.
3. Calculated using MIL-HDBK-217F FN2 with nominal input voltage at full load.

All specifications typical at $T_A$=25°C, nominal input voltage and rated output current unless otherwise specified.

## INPUT CHARACTERISTICS

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Voltage range | Continuous operation, 5V input types | 4.5 | 5 | 5.5 | V |
| | Continuous operation, 12V input types | 10.8 | 12 | 13.2 | |
| | Continuous operation, 15V input types | 13.5 | 15 | 16.5 | |
| | Continuous operation, 24V input types | 21.6 | 24 | 26.4 | |
| | Continuous operation, 48V input types | 43.2 | 48 | 52.8 | |
| Reflected ripple current | 5V input types | | 11 | 20 | mA p-p |
| | 12V input types | | 5 | 15 | |
| | 15V input types | | 3.5 | 10 | |
| | 24V input types | | 4.7 | 15 | |
| | 48V input types | | 22 | 50 | |

## GENERAL CHARACTERISTICS

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Switching frequency - single output types | 5V input types | | 60 | | kHz |
| | 12V input types & MEV1Sx1515xC | | 75 | | |
| | 24V input types & MEV1Sx1505SxC, MEV1Sx1509SxC, MEV1Sx1512SxC | | 85 | | |
| | 48V input types | | 65 | | |
| Switching frequency - dual output types | MEV1D4812xC, MEV1D4815xC | | 55 | | |
| | MEV1D05xxC, MEV1D1212xC, MEV1D1515xC, MEV1D4805xC, MEV1D4809xC | | 60 | | |
| | MEV1D1205xC, MEV1D2412xC | | 75 | | |
| | MEV1D1209xC, MEV1D1215xC, MEV1D1505xC, MEV1D1512xC, MEV1D2405xC, MEV1D2415xC | | 80 | | |
| | MEV1D1509xC, MEV1D2409xC | | 90 | | |

## OUTPUT CHARACTERISTICS

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Rated Power | $T_A$=-40°C to 85°C | | | 1 | W |
| Voltage Set Point Accuracy | See tolerance envelope | | | | |
| Line regulation | High $V_{IN}$ to low $V_{IN}$ | | 1.05 | 1.1 | %/% |

## ISOLATION CHARACTERISTICS

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Isolation test voltage | Flash tested for 1 minute | 3000 | | | VDC |
| Resistance | Viso= 1000VDC | 10 | | | GΩ |

## TEMPERATURE CHARACTERISTICS

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Specification | All output types, see safety approval section for UL temperature specification | -40 | | 85 | °C |
| Storage | | -50 | | 125 | |
| Case Temperature above ambient | 24V & 48V input types | | | 20 | |
| | All other types | | | 15 | |
| Cooling | Free air convection | | | | |

## ABSOLUTE MAXIMUM RATINGS

| | |
|---|---|
| Lead temperature 1.5mm 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 $V_{IN}$, MEV05 types | 7V |
| Input voltage $V_{IN}$, MEV12 types | 15V |
| Input voltage Vin, MEV15 types | 18V |
| Input voltage Vin, MEV24 types | 28V |
| Input voltage Vin, MEV48 types | 54V |

## 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 MEV1 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?"

The MEV1 has been recognised by Underwriters Laboratory for functional insulation, 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 MEV1 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.

## SAFETY APPROVAL

The MEV1 series has been recognised by Underwriters Laboratory (UL) to UL60950 for functional insulation in a maximum still air ambient temperature of 85°C and/or case temperature limit (case temperature measured on the face opposite the pins) as follows:
MEV1SxxxxSC: 130ºC
MEV1SxxxxDC: 130ºC
MEV1DxxxxSC: 94ºC
MEV1DxxxxDC: 96ºC

The MEV1 Series of converters are not internally fused so to meet the requirements of UL60950 an anti-surge input line fuse should always be used with ratings as defined below.
MEV1x05xxxC: 1A
MEV1x12xxxC: 0.375A
MEV1x15xxxC: 0.375A
MEV1x24xxxC: 0.2A
MEV1x48xxxC: 0.1A

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

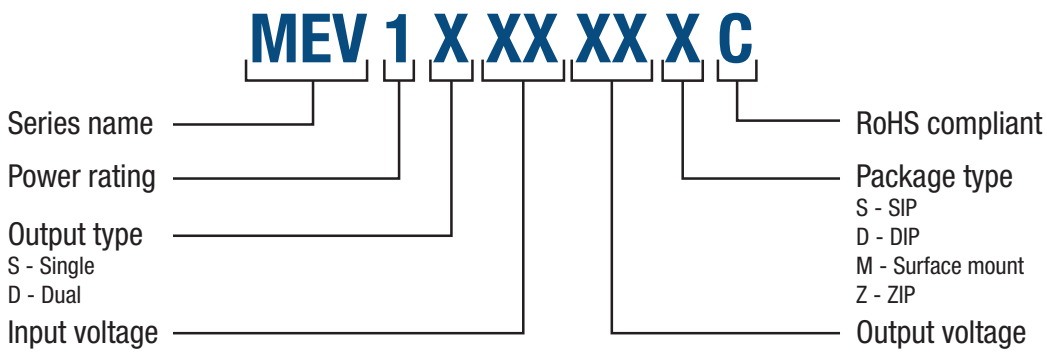
File number E151252 applies.

## RoHS COMPLIANT INFORMATION

RoHS COMPLIANT

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 the SIP package type is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The DIP types are Matte Tin over Nickel Preplate. Both types in this series are backward compatible with Sn/Pb soldering systems. For further information, please visit www.murata.com/en-global/products/power/rohs

## PART NUMBER STRUCTURE



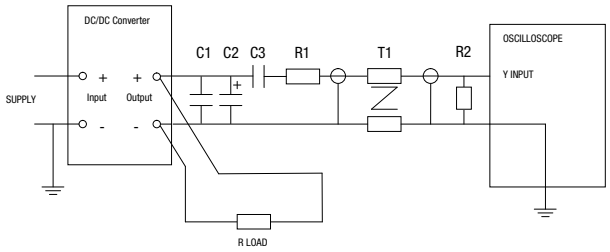
## CHARACTERISATION TEST METHODS

### Ripple & Noise Characterisation Method

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

| | |
|---|---|
| C1 | 1µF X7R multilayer ceramic capacitor, voltage rating to be a minimum of 3 times the output voltage of the DC-DC converter |
| C2 | 10µF 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 100mΩ at 100 kHz |
| C3 | 100nF multilayer ceramic capacitor, general purpose |
| R1 | 450Ω resistor, carbon film, ±1% tolerance |
| R2 | 50Ω 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%.

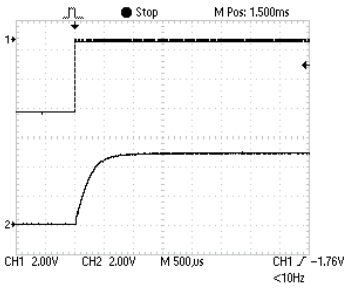
### Capacitive loading and start up

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

| | Start-up time µs |
|---|---|
| MEV1x0505xC | 585 |
| MEV1x0509xC | 1550 |
| MEV1x0512xC | 2700 |
| MEV1x0515xC | 4320 |
| MEV1x1205xC | 605 |
| MEV1x1209xC | 1750 |
| MEV1x1212xC | 3000 |
| MEV1x1215xC | 4800 |
| MEV1x1505xC | 660 |
| MEV1x1509xC | 1720 |

| | Start-up time µs |
|---|---|
| MEV1x1512xC | 3045 |
| MEV1x1515xC | 4445 |
| MEV1x2405xC | 440 |
| MEV1x2409xC | 4355 |
| MEV1x2412xC | 1855 |
| MEV1x2415xC | 2930 |
| MEV1x4805SC | 580 |
| MEV1x4809SC | 1320 |
| MEV1x4812SC | 2075 |
| MEV1x4815SC | 3235 |

Typical Start-Up Wave Form



## APPLICATION NOTES (Continued)

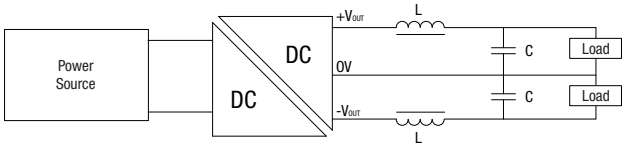
### Output Ripple Reduction

By using the values of inductance and capacitance stated, the output ripple at the rated load is lowered to 5mV p-p max.

**Component selection**

Capacitor: It is required that the ESR (Equivalent Series Resistance) should be as low as possible, ceramic types are recommended.
The voltage rating should be at least twice (except for 15V output), the rated output voltage of the DC-DC converter.

Inductor: The rated current of the inductor should not be less than that of the output of the DC-DC converter. At the rated current, the DC resistance of the inductor should be such that the voltage drop across the inductor is <2% of the rated voltage of the DC-DC converter. The SRF (Self Resonant Frequency) should be >20MHz.

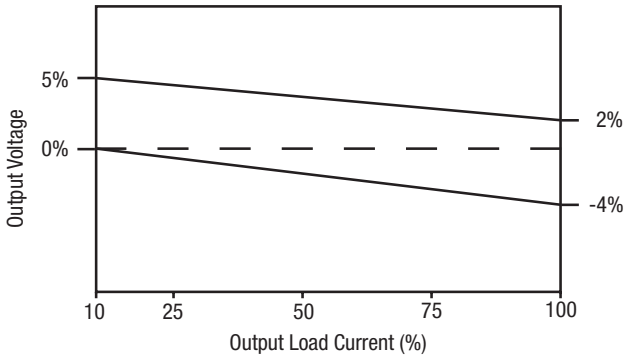



| | Inductor | | | Capacitor |
|---|---|---|---|---|
| | L, µH | SMD | Through Hole | C, µF |
| MEV1x0505xC | 10 | 82103C | 11R103C | 4.7 |
| MEV1x0509xC | 22 | 82223C | 11R223C | 2.2 |
| MEV1x0512xC | 47 | 82473C | 11R473C | 1 |
| MEV1x0515xC | 47 | 82473C | 11R473C | 1 |
| MEV1x1205xC | 10 | 82103C | 11R103C | 4.7 |
| MEV1x1209xC | 22 | 82223C | 11R223C | 2.2 |
| MEV1x1212xC | 47 | 82473C | 11R473C | 1 |
| MEV1x1215xC | 47 | 82473C | 11R473C | 1 |
| MEV1x1505xC | 10 | 82103C | 11R103C | 4.7 |
| MEV1x1509xC | 22 | 82223C | 11R223C | 2.2 |
| MEV1x1512xC | 47 | 82473C | 11R473C | 1 |
| MEV1x1515xC | 47 | 82473C | 11R473C | 1 |
| MEV1x2405xC | 10 | 82103C | 11R103C | 4.7 |
| MEV1x2409xC | 22 | 82223C | 11R223C | 2.2 |
| MEV1x2412xC | 47 | 82473C | 11R473C | 1 |
| MEV1x2415xC | 47 | 82473C | 11R473C | 1 |
| MEV1x4805SC | 10 | 82103C | 11R103C | 4.7 |
| MEV1x4809SC | 22 | 82223C | 11R223C | 2.2 |
| MEV1x4812SC | 47 | 82473C | 11R473C | 1 |
| MEV1x4815SC | 47 | 82473C | 11R473C | 1 |

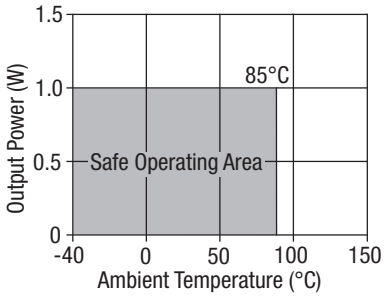
## TOLERANCE ENVELOPES

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.

### All versions

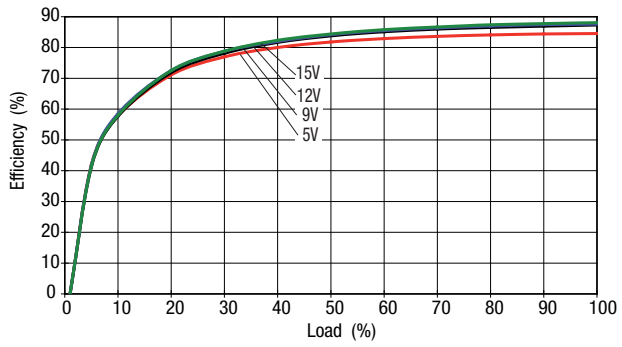



## TEMPERATURE DERATING GRAPH

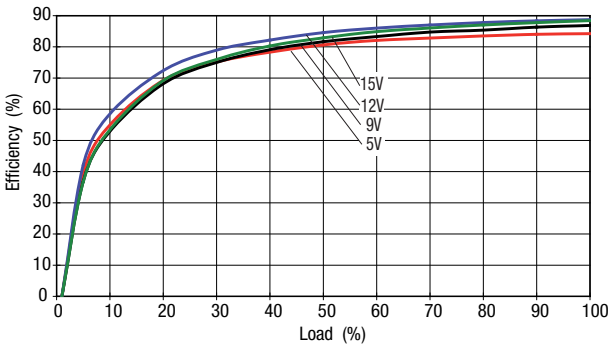


## EFFICIENCY VS LOAD

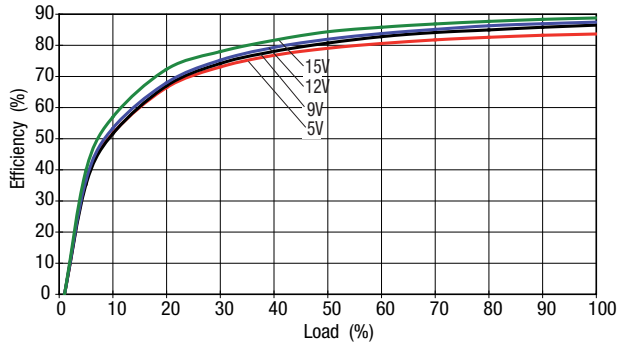
### MEV1x05xxSC



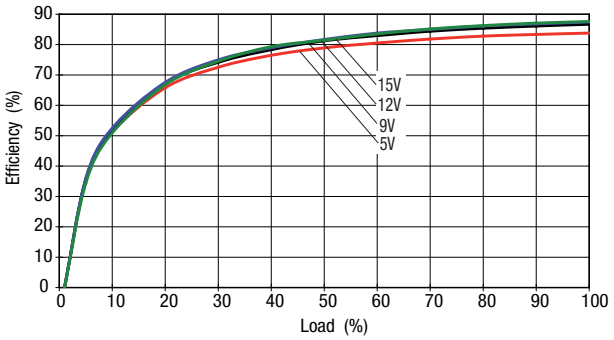

### MEV1x12xxSC



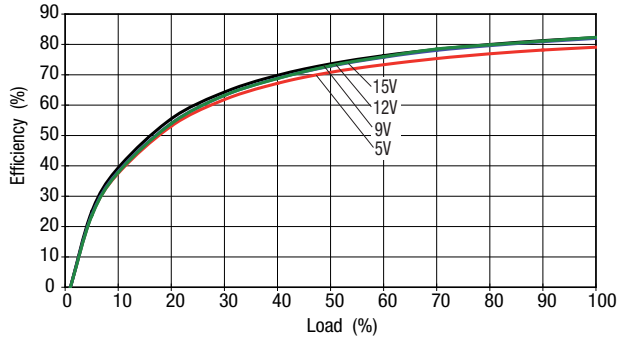

### MEV1x15xxSC




### MEV1x24xxSC

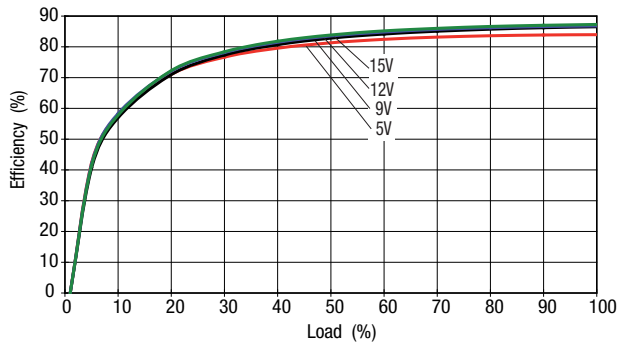



### MEV1x48xxSC

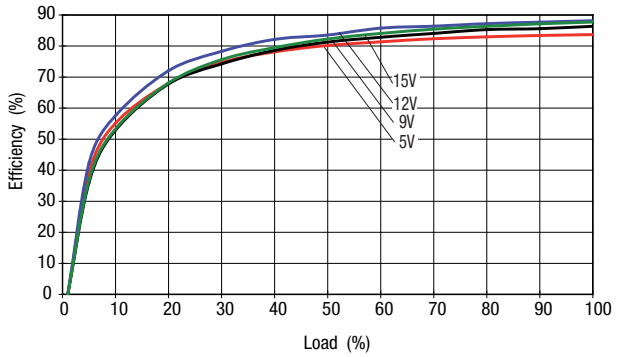


## EFFICIENCY VS LOAD (Continued)

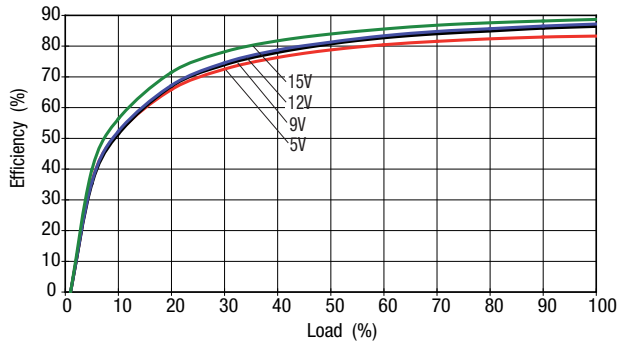
### MEV1x05xxDC



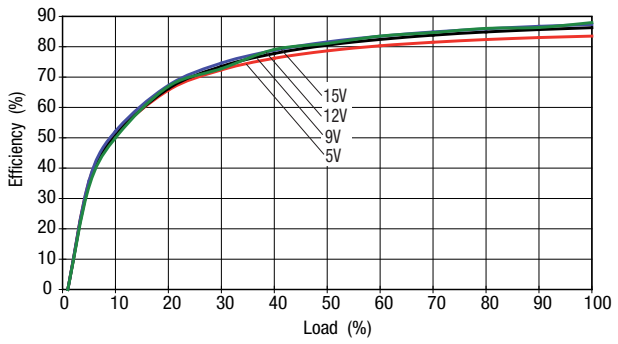

### MEV1x12xxDC




### MEV1x15xxDC



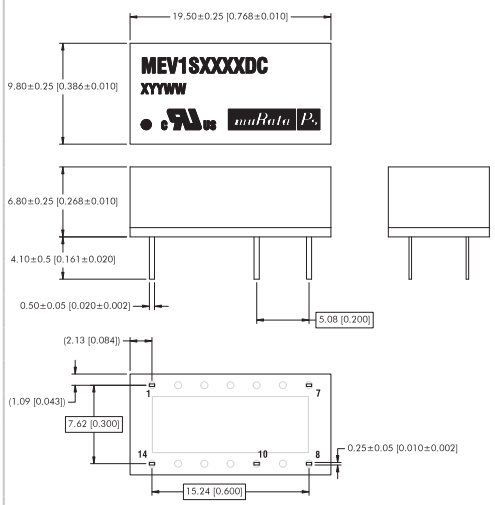

### MEV1x24xxDC



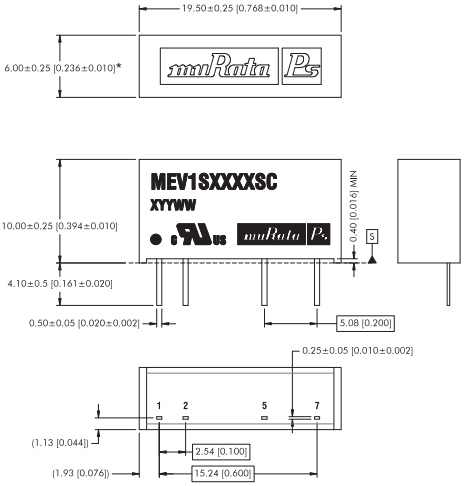
## PACKAGE SPECIFICATIONS

### MECHANICAL DIMENSIONS - SINGLE

DIP package




SIP package




*48V input variants 7.65 (0.301) MAX
All dimensions in mm (inches). Controlling dimensions is mm.
SIP: All pins on a 2.54 (0.100) pitch and within ±0.1 (0.004) of true position from pin 1 at seating plane 'S'.
DIP: All pins on a 2.54 (0.100) pitch and within ±0.1 (0.004) of true position.
For SIP products, excluding MEV1S48XXSC, from date code D2224 onwards, products have an embossed logo on the top of the case. Prior to this date, SIP products have a flat surface finish.

Weight:
2.6g (DIP)
2.8g (SIP - 48V variants)
2.5g (all other SIP)

### PIN CONNECTIONS - 14 PIN DIP

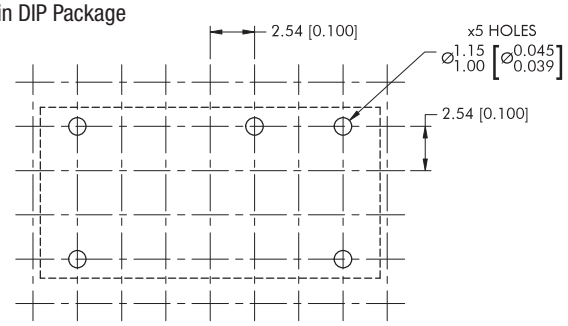
| Pin | Function |
|---|---|
| 1 | -$V_{IN}$ |
| 7 | NC |
| 8 | +$V_{OUT}$ |
| 10 | -$V_{OUT}$ |
| 14 | +$V_{IN}$ |

### PIN CONNECTIONS - 7 PIN SIP

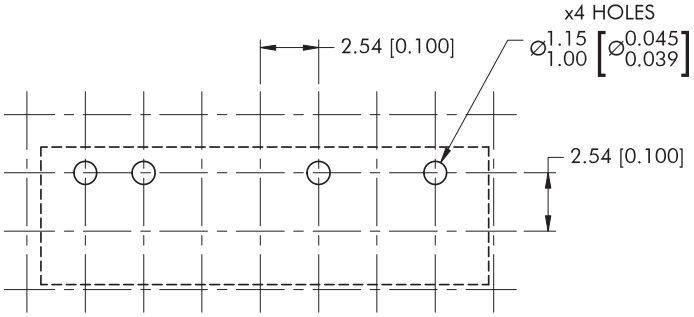
| Pin | Function |
|---|---|
| 1 | +$V_{IN}$ |
| 2 | -$V_{IN}$ |
| 5 | -$V_{OUT}$ |
| 7 | +$V_{OUT}$ |

### RECOMMENDED FOOTPRINT DETAILS

14 Pin DIP Package



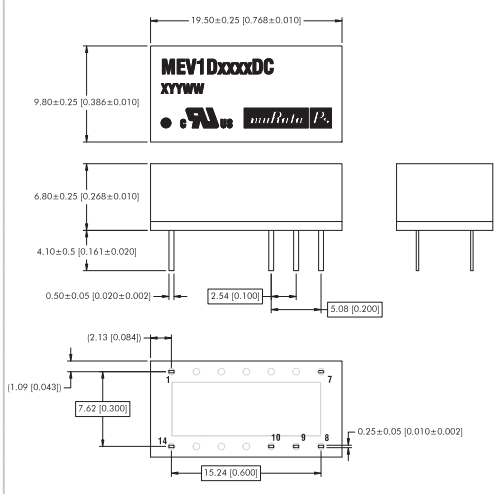

7 Pin SIP Package



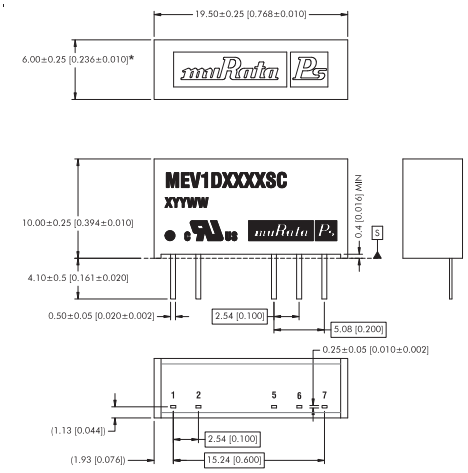
## PACKAGE SPECIFICATIONS

### MECHANICAL DIMENSIONS - DUAL

DIP package




SIP package




*48V input variants 7.65 (0.301) MAX
All dimensions in mm (inches). Controlling dimensions is mm.
SIP: All pins on a 2.54 (0.100) pitch and within ±0.1 (0.004) of true position from pin 1 at seating plane 'S'.
DIP: All pins on a 2.54 (0.100) pitch and within ±0.1 (0.004) of true position.
For SIP products, from date code D2224 onwards, products have an embossed logo on the top of the case.
Prior to this date, SIP products have a flat surface finish.

Weight:
2.6g (DIP)
2.8g (SIP - 48V variants)
2.5g (all other SIP)

### PIN CONNECTIONS - 14 PIN DIP

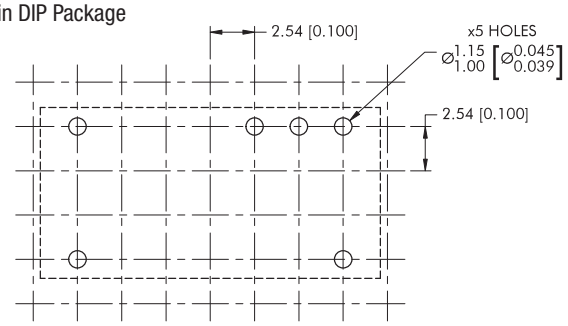
| Pin | Function |
|---|---|
| 1 | -$V_{IN}$ |
| 7 | NC |
| 8 | +$V_{OUT}$ |
| 9 | 0V |
| 10 | -$V_{OUT}$ |
| 14 | +$V_{IN}$ |

### PIN CONNECTIONS - 7 PIN SIP

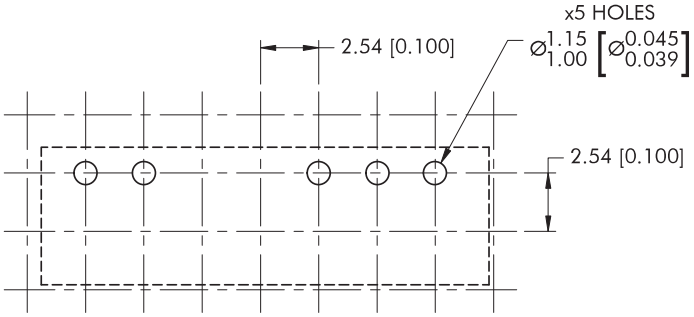
| Pin | Function |
|---|---|
| 1 | +$V_{IN}$ |
| 2 | -$V_{IN}$ |
| 5 | -$V_{OUT}$ |
| 6 | 0V |
| 7 | +$V_{OUT}$ |

### RECOMMENDED FOOTPRINT DETAILS

14 Pin DIP Package



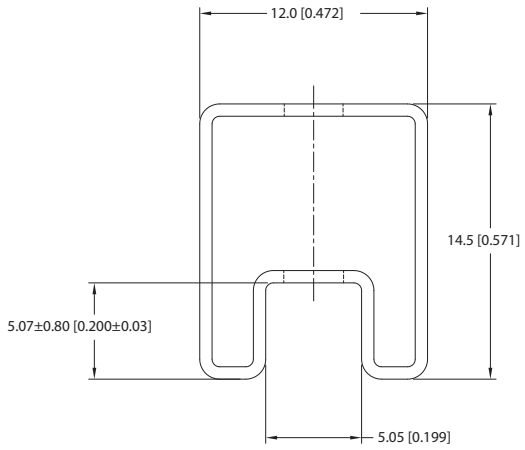

7 Pin SIP Package



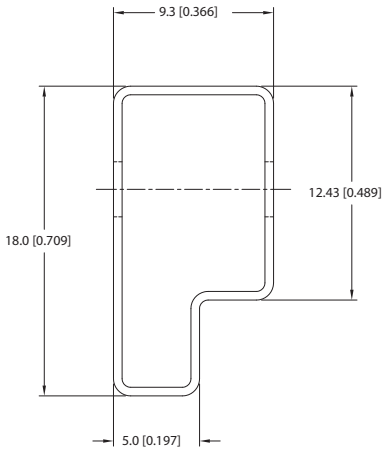
## PACKAGE SPECIFICATIONS (Continued)

### TUBE OUTLINE DIMENSIONS

14 Pin DIP Tube




7 Pin SIP Tube




Unless otherwise specified all dimensions in mm [inches] ±0.55mm [0.022].
Tube length (14 Pin DIP) : 520mm [20.472] ±2.0 [0.079].
Tube length (7 Pin SIP) : 520mm [20.472] ±2.0 [0.079].

Tube Quantity : 25

## DISCLAIMER

Unless otherwise stated in the datasheet, all products are designed for standard commercial and industrial applications and NOT for safety-critical and/or life-critical applications.

Particularly for safety-critical and/or life-critical applications, i.e. applications that may directly endanger or cause the loss of life, inflict bodily harm and/or loss or severe damage to equipment/property, and severely harm the environment, a prior explicit written approval from Murata is strictly required. Any use of Murata standard products for any safety-critical, life-critical or any related applications without any prior explicit written approval from Murata shall be deemed unauthorised use.

These applications include but are not limited to:

- Aircraft equipment
- Aerospace equipment
- 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

Murata makes no express or implied warranty, representation, or guarantee of suitability, fitness for any particular use/purpose and/or compatibility with any application or device of the buyer, nor does Murata assume any liability whatsoever arising out of unauthorised use of any Murata product for the application of the buyer. The suitability, fitness for any particular use/purpose and/or compatibility of Murata product with any application or device of the buyer remain to be the responsibility and liability of the buyer.

Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards that anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm, and take appropriate remedial actions. Buyer will fully indemnify and hold Murata, its affiliated companies, and its representatives harmless against any damages arising out of unauthorised use of any Murata products in any safety-critical and/or life-critical applications.

Remark: Murata in this section refers to Murata Manufacturing Company and its affiliated companies worldwide including, but not limited to, Murata Power Solutions.