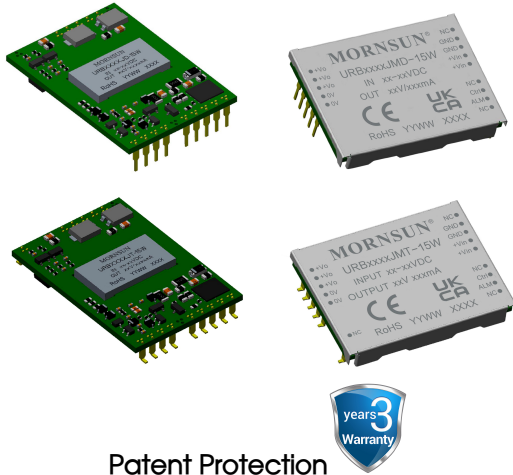


15W isolated DC-DC converter in DIP/SMD package
Ultra-wide input and regulated single output



Patent Protection
CE Report EN62368-1
UKCA Report BS EN62368-1
RoHS

FEATURES

- Ultra-wide 4:1 input voltage range
- Ultra-thin DIP/SMD Package
- High efficiency up to 89%
- No-load power consumption as low as 0.36W
- I/O isolation test voltage 1.5kVDC
- Operating ambient temperature range
-40°C to +85°C
- Input under-voltage protection, output short-circuit, over-current, over-voltage protection

URB_J(M)D/T-15W series of isolated 15W DC-DC converter products with an ultra-wide 4:1 input voltage range. They feature efficiencies up to 89%, 1500VDC I/O isolation, input under-voltage protection, output short-circuit, over-current and over-voltage protection. They are ideally and widely used in applications such as industrial control, electric power, instruments and communications.

Selection Guide

| Certification | Part No. ① | Input Voltage (VDC) | | Output | | Full Load Efficiency ^③ (%)Min./Typ. | Capacitive Load (μF)Max. |
|---------------|--------------------|---------------------|--------|--------------|---------------------------|---|-----------------------------|
| | | Nominal (Range) | Max. ② | Voltage(VDC) | Current (mA) Max./Min. | | |
| EN/BS EN | URB2403J(M)D/T-15W | 24 (9-36) | 40 | 3.3 | 4500/0 | 86/88 | 4700 |
| | URB2405J(M)D/T-15W | | | 5 | 3000/0 | 86/88 | 4700 |
| | URB2412J(M)D/T-15W | | | 12 | 1250/0 | 87/89 | 1000 |
| | URB2415J(M)D/T-15W | | | 15 | 1000/0 | 87/89 | 820 |
| | URB4803J(M)D/T-15W | 48 (18-75) | 80 | 3.3 | 4500/0 | 86/88 | 4700 |
| | URB4805J(M)D/T-15W | | | 5 | 3000/0 | 86/88 | 4700 |
| | URB4812J(M)D/T-15W | | | 12 | 1250/0 | 87/89 | 1000 |
| | URB4815J(M)D/T-15W | | | 15 | 1000/0 | 87/89 | 820 |

Notes:

- ① URBxxxxJ(M)D/T-15W contains 4 types of products, include URBxxxxJD-15W(DIP package without case), URBxxxxJMD-15W(DIP package with case), URBxxxxJT-15W(SMD package without case) and URBxxxxJMT-15W(SMD package with case);
- ② Exceeding the maximum input voltage may cause permanent damage;
- ③ Efficiency is measured in nominal input voltage and rated output load.

Input Specifications

| Item | Operating Conditions | | | Min. | Typ. | Max. | Unit |
|--|-----------------------|-----------|-----------------|------|--------|--------|------|
| Input Current (full load / no-load) | Nominal input voltage | 24V input | 3.3V, 5V output | -- | 710/40 | 727/60 | mA |
| | | | 12V, 15V output | -- | 702/15 | 718/30 | |
| | | 48V input | 3.3V, 5V output | -- | 355/30 | 363/45 | |
| | | | 12V, 15V output | -- | 351/10 | 360/25 | |
| Reflected Ripple Current | Nominal input voltage | | | -- | 30 | -- | VDC |
| Surge Voltage (1sec. max.) | 24V input | | | -0.7 | -- | 50 | |
| | 48V input | | | -0.7 | -- | 100 | |
| Start-up Voltage | 24V input | | | -- | -- | 9 | |
| | 48V input | | | -- | -- | 18 | |
| Input Under-voltage Protection | 24V input | | | 5.5 | 6.5 | -- | |
| | 48V input | | | 12 | 15.5 | -- | |

| | | | | | |
|------------------|--|--|-----|------|-----|
| Start-up Current | 24V input | -- | -- | 3000 | mA |
| | 48V input | -- | -- | 1500 | |
| Input Filter | | Pi filter | | | |
| Hot Plug | | Unavailable | | | |
| Ctrl* | Module on | Ctrl pin open, Ctrl pin pulled low to GND or pulled low (0-1.2VDC) | | | |
| | Module off | Ctrl pin pulled high (3.5-12VDC) | | | |
| | Input current when off | -- | 6 | 15 | mA |
| Alarm | Valm(relative to GND), when under-voltage protection is going to happen and during the over-voltage protection working status. | -- | 0.2 | 1.2 | VDC |
| | Valm(relative to GND), other working status | 3.5 | 9 | -- | |

Note: *The voltage of Ctrl pin is relative to input pin GND.

Output Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|--------------------------------|---|-----------------------------------|------|-------|-------|
| Output Voltage Accuracy | 0% -100% load | -- | ±1 | ±2 | % |
| Linear Regulation | Input voltage variation from low to high at full load | -- | ±0.2 | ±0.5 | |
| Load Regulation ^① | 5% -100% load | -- | ±0.5 | ±1 | |
| Transient Recovery Time | | -- | 300 | 500 | μs |
| Transient Response Deviation | 25% load step change, nominal input | 3.3V, 5V output | ±3 | ±8 | % |
| | | Other output | ±3 | ±5 | |
| Temperature Coefficient | Full load | -- | -- | ±0.03 | %/°C |
| Ripple & Noise ^② | 20MHz bandwidth, 5% -100% load | -- | 50 | 100 | mVp-p |
| Output Over-voltage Protection | Input voltage range | 110 | -- | 160 | %Vo |
| Output Over-current Protection | | 110 | 180 | 230 | %Io |
| Short-circuit Protection | | Hiccup, continuous, self-recovery | | | |

Note: ① Load regulation for 0% -100% load increases to ±3%;

② Under 0% -5% load conditions, ripple & noise does not exceed 5%Vo. The "parallel cable" method is used for ripple and noise test, please refer to DC-DC Converter Application Notes for specific information.

General Specification

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|--------------------------------------|--|---|------|------|------|
| Isolation | Input-output Electric Strength Test for 1 minute with a leakage current of 1mA max. | 1500 | -- | -- | VDC |
| | Input-case Electric Strength Test for 1 minute with a leakage current of 1mA max. (Only for URB_JMD/JMT-15W series products) | 500 | -- | -- | |
| | Output-case Electric Strength Test for 1 minute with a leakage current of 1mA max.(Only for URB_JMD/JMT-15W series products) | 500 | -- | -- | |
| Insulation Resistance | Input-output Resistance at 500VDC, Ta=25°C, humidity=70%RH | 100 | -- | -- | MΩ |
| | Input-case Resistance at 500VDC, Ta=25°C, humidity=70%RH (Only for URB_JMD/JMT-15W series products) | 100 | -- | -- | |
| | Output-case Resistance at 500VDC, Ta=25°C, humidity=70%RH (Only for URB_JMD/JMT-15W series products) | 100 | -- | -- | |
| Isolation Capacitance | Input-output capacitance at 100kHz/0.1V | -- | 1000 | -- | pF |
| Operating Temperature | See Fig. 1 | -40 | -- | +85 | °C |
| Storage Temperature | | -55 | -- | +125 | |
| Storage Humidity | Non-condensing | 5 | -- | 95 | %RH |
| Pin Soldering Resistance Temperature | Soldering spot is 1.5mm away from case for 10 seconds | -- | -- | +300 | °C |
| Reflow soldering Temperature | Only for URB_J(M)T-15W series products | Peak temp.≤245°C, maximum duration time≤60s over 217°C. For actual application, please refer to IPC/JEDEC J-STD-020D.1. | | | |

| | | | | | |
|----------------------------------|------------------------|---------------------------------------|-----|----|---------|
| Vibration | | 10-150Hz, 5G, 60Min. along X, Y and Z | | | |
| Switching Frequency * | PWM mode | -- | 300 | -- | kHz |
| MTBF | MIL-HDBK-217F@25°C | 1000 | -- | -- | k hours |
| Moisture Sensitivity Level (MSL) | IPC/JEDEC J-STD-020D.1 | Level 1 | | | |

Note: *Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.

Mechanical Specifications

| | | |
|----------------|----------------------------|--|
| Case Material | | Aluminum alloy |
| Dimension | URB_JD-15W series | 38.70 x 27.20 x 6.20 mm (3.3V/5V output), 38.70 x 27.20 x 5.80 mm (other output) |
| | URB_JT-15W series | 39.90 x 27.20 x 6.20 mm (3.3V/5V output), 39.90 x 27.20 x 5.80 mm (other output) |
| | URB_JMD-15W series | 39.10 x 29.50 x 6.80 mm (3.3V/5V output), 39.10 x 29.50 x 6.40 mm (other output) |
| | URB_JMT-15W series | 39.90 x 29.50 x 6.80 mm (3.3V/5V output), 39.90 x 29.50 x 6.40 mm (other output) |
| Weight | URBxx03/05JD/T-15W series | 11.0g(Typ.) |
| | URBxx12/15JD/T-15W series | 8.8g(Typ.) |
| | URBxx03/05JMD/T-15W series | 13.8g(Typ.) |
| | URBxx12/15JMD/T-15W series | 11.5g(Typ.) |
| Cooling method | | Free air convection (20LFM) or forced convection |

Electromagnetic Compatibility (EMC)

| | | | | |
|-----------|-------|-----------------|---|------------------|
| Emissions | CE | CISPR32/EN55032 | CLASS B (see Fig.3-① for recommended circuit) | |
| | RE | CISPR32/EN55032 | CLASS B (see Fig.3-① for recommended circuit) | |
| Immunity | ESD | IEC/EN61000-4-2 | Contact ±6kV | perf. Criteria B |
| | RS | IEC/EN61000-4-3 | 10V/m | perf. Criteria A |
| | EFT | IEC/EN61000-4-4 | ±2kV (see Fig.3-② for recommended circuit) | perf. Criteria B |
| | Surge | IEC/EN61000-4-5 | line to line ±2kV (see Fig.3-② for recommended circuit) | perf. Criteria B |
| | CS | IEC/EN61000-4-6 | 3 Vr.m.s | perf. Criteria A |

Typical Characteristic Curve

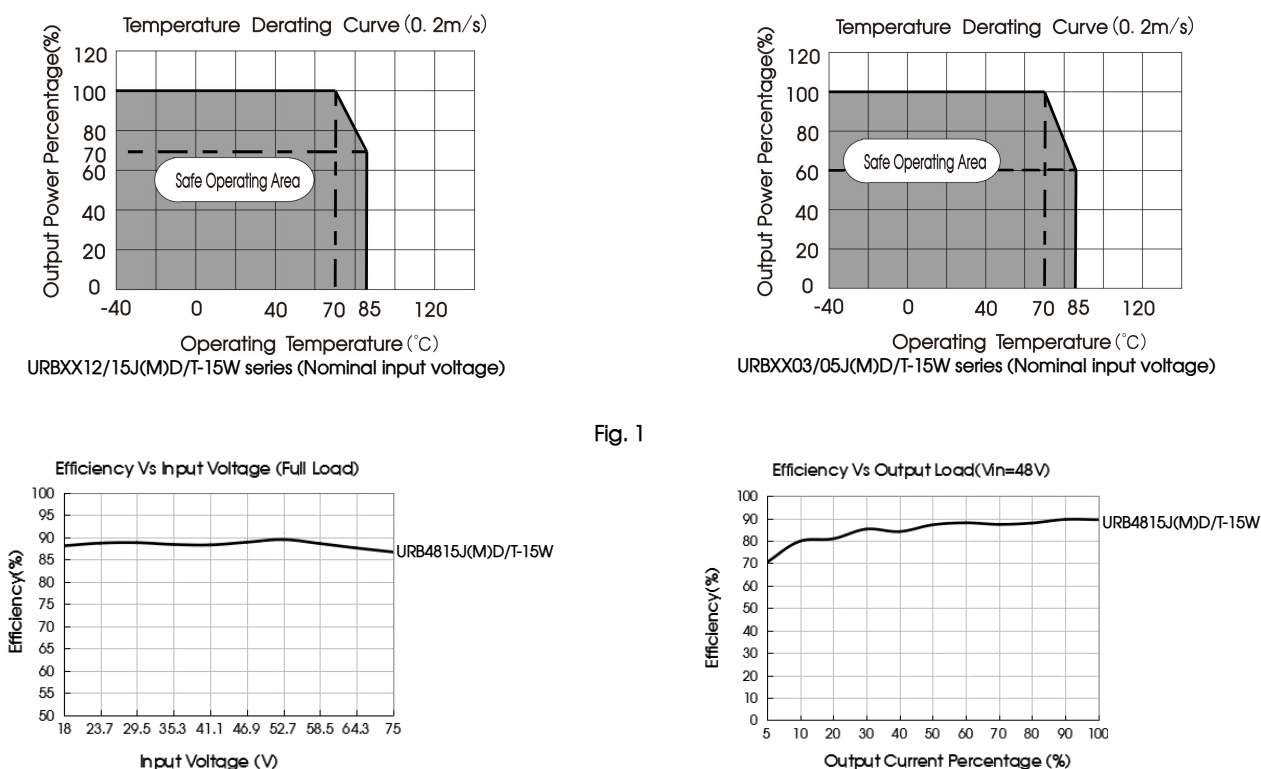
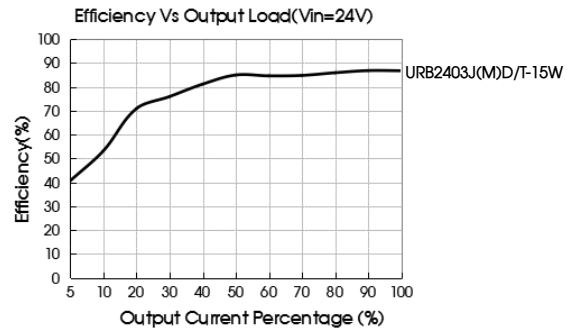
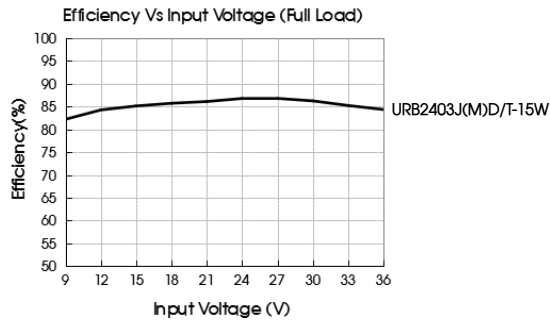


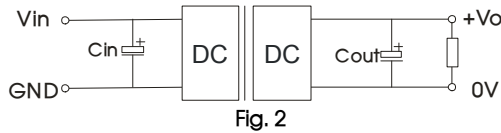
Fig. 1



Design Reference

1. Typical application

All the DC/DC converters of this series are tested according to the recommended circuit (see Fig. 2) before delivery. If it is required to further reduce input and output ripple, properly increase the input & output of additional capacitors C_{in} and C_{out} or select capacitors of low equivalent impedance provided that the capacitance is no larger than the max. capacitive load of the product.



| Vin (VDC) | Vout (VDC) | Cin | Cout |
|-----------|------------|------------|----------|
| 24 | 3.3/5 | 100μF/50V | 10μF/16V |
| | 12/15 | | 10μF/25V |
| 48 | 3.3/5 | 100μF/100V | 10μF/16V |
| | 12/15 | | 10μF/25V |

2. EMC compliance recommended circuit

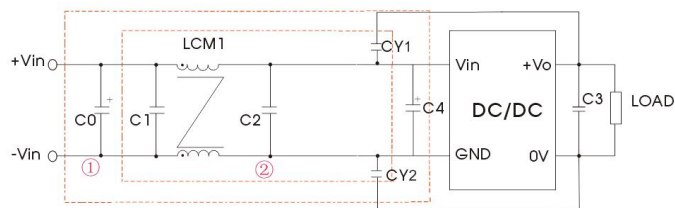


Fig. 3

Notes: Part ① in the Fig. 3 is used for immunity test and part ② for emissions filtering. Selecting based on needs.

Parameter description:

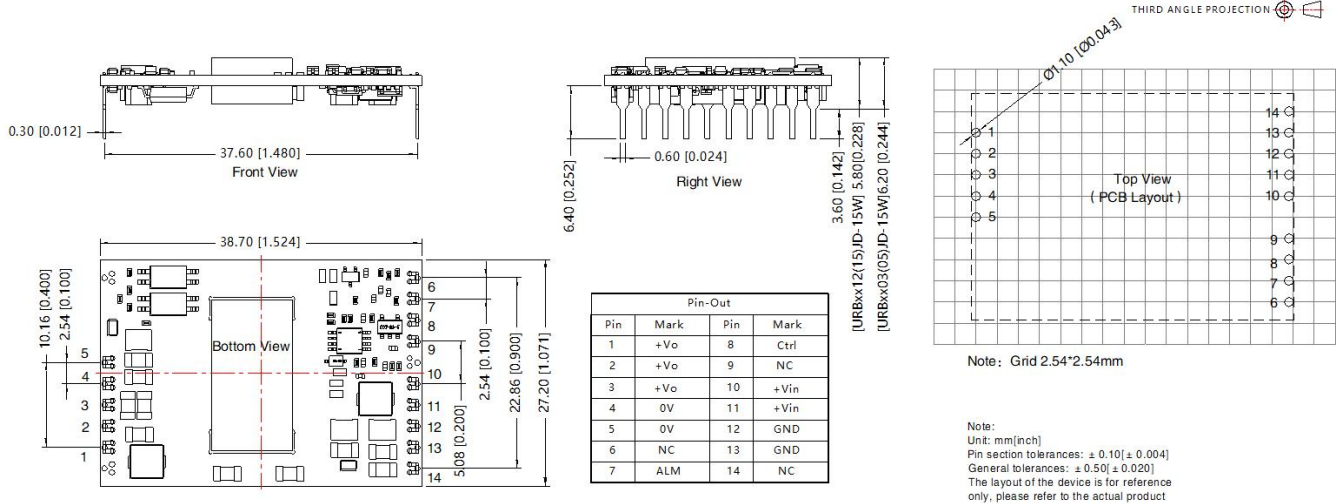
| Model | Vin: 24VDC | Vin: 48VDC |
|---------|--|------------|
| FUSE | Choose according to actual input current | |
| C0 | 470μF/50V | 680μF/100V |
| C1/C2 | 4.7μF/50V | 4.7μF/100V |
| C4 | 330μF/50V | 330μF/100V |
| C3 | Refer to the Cout in Fig.2 | |
| LCM1 | FL2D-30-472 | |
| CY1/CY2 | 2000pF/2kV | |

Note: *For URBxxxJMD/T-15W, the case should be connected to input pin GND when testing EMC performance.

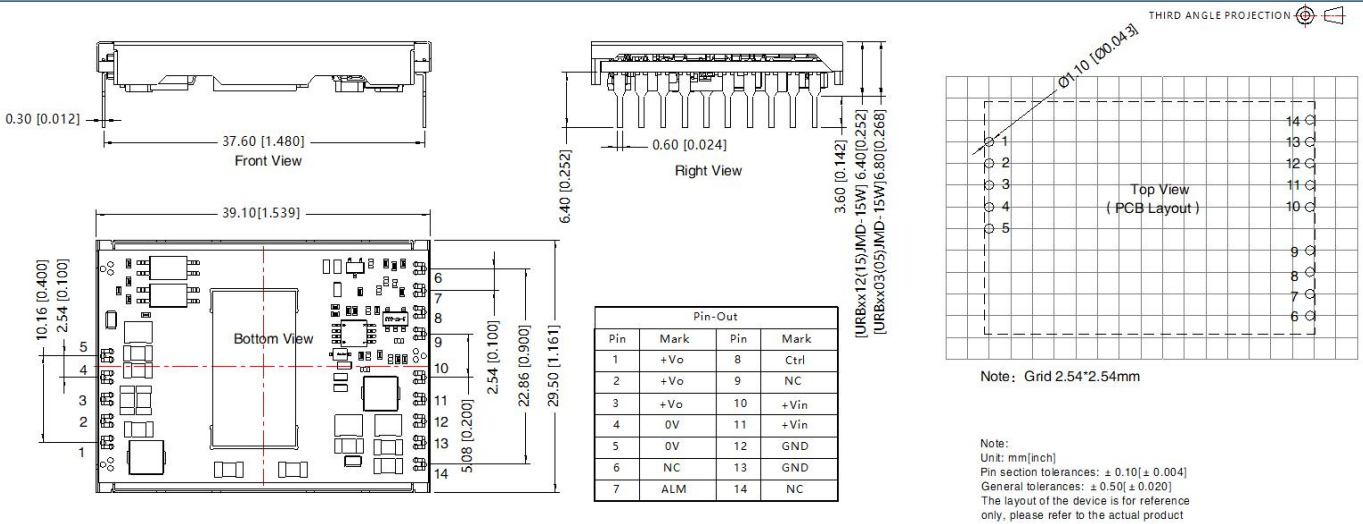
3. For additional information please refer to DC-DC converter application notes on

www.mornsun-power.com

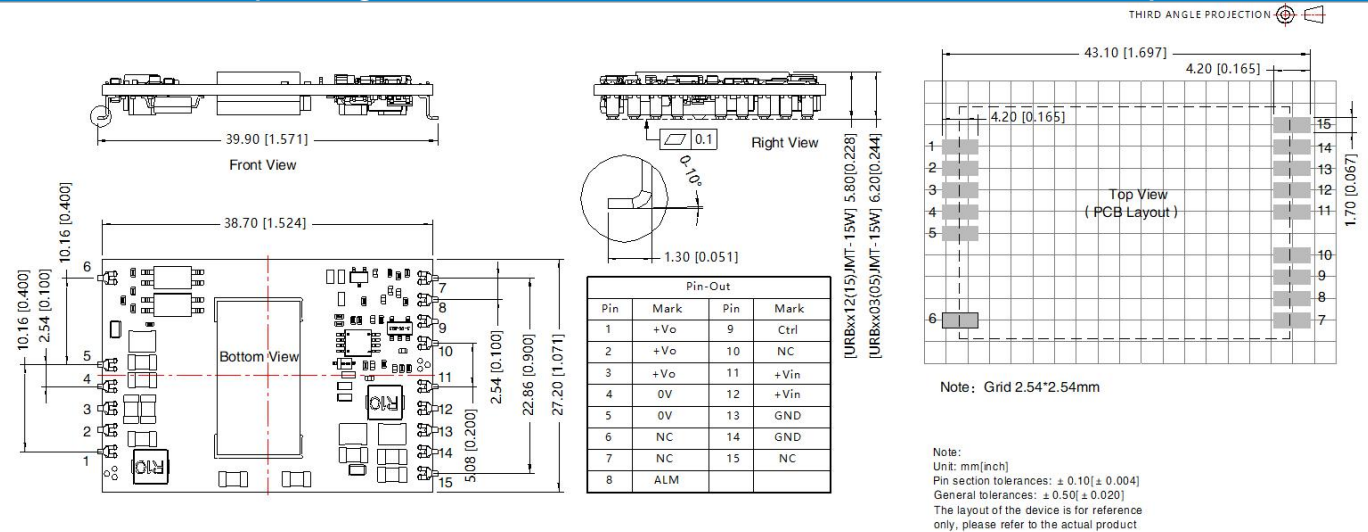
URB_JD-15W (DIP package without case) Dimensions and Recommended Layout



URB_JMD-15W (DIP package with case) Dimensions and Recommended Layout

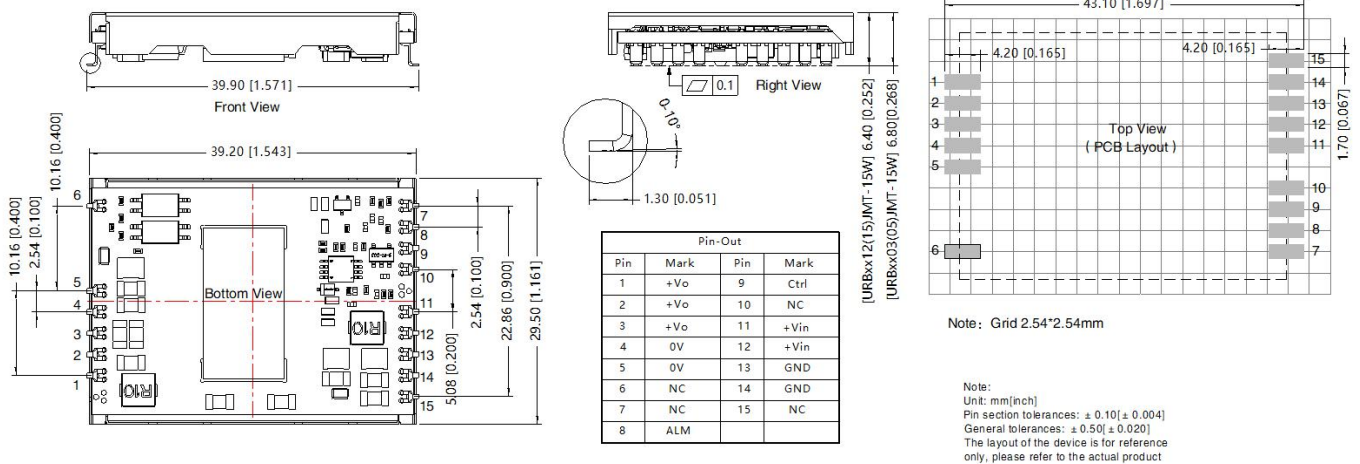


URB_JT-15W (SMD package without case) Dimensions and Recommended Layout



URB_JMT-15W (SMD package with case) Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



Note:

- For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number 58210126;
- If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
- The maximum capacitive load offered were tested at input voltage range and full load;
- Unless otherwise specified, parameters in this datasheet were measured under the conditions of $T_a=25^{\circ}\text{C}$, humidity<75%RH with nominal input voltage and rated output load;
- All index testing methods in this datasheet are based on company corporate standards;
- We can provide product customization service, please contact our technicians directly for specific information;
- Products are related to laws and regulations: see "Features" and "EMC";
- Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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