## Typical Characteristics

- Wide input range (4:1), Output: 30W
- Conversion efficiency: 88%(Typ.)
- Isolation voltage: 1500Vdc
- Ultra-low standby power consumption: 0.036W(Typ.)
- Ultra-fast startup: 1ms (Typ.)
- Working temperature: -40℃~+85℃
- Protection: input undervoltage, output short-circuit, overcurrent, overvoltage
- Metal housing, low output ripple
- Industrial standard pin out, through-hole mounting on PCBs

30W, ultra-wide input voltage range, isolated regulated single- or dual-output, DIP package, DC-DC power module




RoHS

*URB_LD-30WR3 and URA_LD-30WR3 series feature an output power of 30W, a 4:1 wide input voltage range, efficiency up to 88%, a standard isolation voltage of 1500 VDC, an operating temperature range of -40° C to +85° C, and features input undervoltage protection as well as output overvoltage, overcurrent, and short-circuit protection. The bare board complies with CISPR 32/EN 55032 Class A and is widely used in medical, industrial control, power, instrumentation, communications, and railway applications.*

## Model Number Description

UR x xx xx LD - 30 W R3

- R3 — Suffix (3rd-generation product)
- 30 — Rated output power (30W)
- LD — Package type (50.8 x 25.4 mm)
- xx — Output voltage (rated)
- xx — Input voltage (rated)
- x — No. of output channels ( B: single, A: dual, 1500 Vdc isolation )
- UR — Product series (UR indicates 4:1 input)

## Product Selection Table

| Certification | Model number | Input voltage range (Vdc) | | Output Voltage/Current | | Ripple and Noise | Maximum capacitive load② | Efficiency@ Full load |
|---|---|---|---|---|---|---|---|---|
| | | Rated (range) | Max③ | Output V (Vdc) | Output I (mA) (Max. Min.) | Full load (mVp-p) (Typ./Max. | μF Max. | % (Min./ Typ.) |
| | URB2403LD-30WR3 | 24 (9-36) | 40 | 3.3 | 6000/0 | 50/80 | 10000 | 83/85 |
| | URB2405LD-30WR3 | | | 5 | 6000/0 | 50/80 | 10000 | 84/86 |
| | URB2412LD-30WR3 | | | 12 | 2500/0 | 50/80 | 2700 | 86/88 |
| | URB2415LD-30WR3 | | | 15 | 2000/0 | 50/80 | 1680 | 86/88 |
| | URB2424LD-30WR3 | | | 24 | 1250/0 | 50/80 | 680 | 86/88 |
| | URA2405LD-30WR3 | | | ±5 | ±3000/0 | 30/50 | 2000 | 84/86 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | URA2412LD-30WR3 | | | ±12 | ±1250/0 | 50/80 | 1250 | 86/88 |
| | URA2415LD-30WR3 | | | ±15 | ±1000/0 | 50/80 | 680 | 86/88 |
| | URA2424LD-30WR3 | | | ±24 | ±625/0 | 50/80 | 470 | 86/88 |
| | URB4803LD-30WR3 | 48 (18-75) | 80 | 3.3 | 6000/0 | 50/80 | 10000 | 84/86 |
| | URB4805LD-30WR3 | | | 5 | 6000/0 | 50/80 | 10000 | 85/87 |
| | URB4812LD-30WR3 | | | 12 | 2500/0 | 50/80 | 2700 | 86/88 |
| | URB4815LD-30WR3 | | | 15 | 2000/0 | 50/80 | 1680 | 86/88 |
| | URB4824LD-30WR3 | | | 24 | 1250/0 | 50/80 | 680 | 86/88 |
| | URA4805LD-30WR3 | 48 (18-75) | 80 | ±5 | ±3000/0 | 50/80 | 2000 | 84/86 |
| | URA4812LD-30WR3 | | | ±12 | ±1250/0 | 50/80 | 1250 | 86/88 |
| | URA4815LD-30WR3 | | | ±15 | ±1000/0 | 50/80 | 680 | 86/88 |
| | URA4824LD-30WR3 | | | ±24 | ±625/0 | 50/80 | 300 | 87/89 |
| | URB1D03LD-30WR3 | 110 (40-160) | 180 | 3.3 | 6000/0 | 50/80 | 10000 | 83/85 |
| | URB1D05LD-30WR3 | | | 5 | 6000/0 | 50/80 | 10000 | 84/86 |
| | URB1D09LD-30WR3 | | | 9 | 3333/0 | 50/80 | | 84/86 |
| | URB1D12LD-30WR3 | | | 12 | 2500/0 | 50/80 | 2200 | 86/88 |
| | URB1D15LD-30WR3 | | | 15 | 2000/0 | 50/80 | 1000 | 86/88 |
| | URB1D24LD-30WR3 | | | 24 | 1250/0 | 50/80 | 470 | 86/88 |
| | URA1D05LD-30WR3 | | | ±5 | ±3000/0 | 50/80 | 4000 | 84/86 |
| | URA1D12LD-30WR3 | | | ±12 | ±1250/0 | 50/80 | 1000 | 86/88 |
| | URA1D15LD-30WR3 | | | ±15 | ±1000/0 | 50/80 | 470 | 86/88 |
| | URA1D24LD-30WR3 | | | ±24 | ±625/0 | 50/80 | 220 | 86/88 |

Note: 1. Due to space limitations, the above is only a list of representative products. For products not included in this list, please contact our Sales Department.

2. The maximum capacitive load indicates the maximum capacitive load that can be connected to +Vo or -Vo; if this value is exceeded, the product will not start properly.

3. Exceeding the maximum input voltage may cause permanent damage to the product.

Test Conditions: Unless otherwise specified, all parameter measurements were taken at the rated input voltage, with a purely resistive rated load, and at an ambient temperature of 25℃.

## Input characteristics

| Items | Working conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Input Current (Full Load/No Load) | 24VDC rated input series, rated input voltage | 3.3V | - | 970/160 | 993/100 | mA |
| | | 5V | - | 1453/60 | 1488/100 | |
| | | 12V | - | 1420/6 | 1488/16 | |
| | | 15V | - | 1420/6 | 1488/16 | |
| | | 24V | - | 1420/6 | 1488/16 | |
| | | ±5V | - | 1436/5 | 1470/15 | |
| | | ±12V | - | 1420/6 | 1488/16 | |
| | | ±15V | - | 1420/6 | 1488/16 | |
| | | ±24V | - | 1420/6 | 1488/16 | |
| | 48VDC rated input series, rated input voltage | 3.3V | - | 480/20 | 491/30 | |
| | | 5V | - | 718/20 | 735/35 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 12V | - | 710/5 | 744/10 | |
| | | 15V | - | 710/5 | 744/10 | |
| | | 24V | - | 710/5 | 744/10 | |
| | | ±5V | - | 710/5 | 726/10 | |
| | | ±12V | - | 710/5 | 744/10 | |
| | | ±15V | - | 710/5 | 744/10 | |
| | | ±24V | - | 710/5 | 744/10 | |
| | 110VDC rated input series, rated input voltage | 3.3V | - | 211/10 | 217/20 | mA |
| | | 5V | - | 310/10 | 317/20 | |
| | 110VDC rated input series, rated input voltage | 12V | - | 309/3 | 317/5 | |
| | | 15V | - | 309/3 | 317/5 | |
| | | 24V | - | 309/3 | 317/5 | |
| | | ±5V | - | 309/3 | 317/5 | |
| | | ±12V | - | 309/3 | 317/5 | |
| | | ±15V | - | 309/3 | 317/5 | |
| | | ±24V | - | 309/3 | 317/5 | |
| Reflected ripple current | Rated input voltage | | - | 40 | - | mA |
| Impulse voltage (I sec. max) | 24VDC rated input series | | -0.7 | - | 50 | VDC |
| | 48VDC rated input series | | -0.7 | - | 100 | |
| | 110VDC rated input series | | -0.7 | - | 180 | |
| Startup voltage | 24VDC rated input series | | - | - | 9 | |
| | 48VDC rated input series | | - | - | 18 | |
| | 110VDC rated input series | | - | - | 40 | |
| Input undervoltage protection | 24VDC rated input series | | 5.5 | 6.5 | - | |
| | 48VDC rated input series | | 12 | 15.5 | - | |
| | 110VDC rated input series | | 30 | 34 | - | |
| Startup time | Rated input voltage and constant-resistance load | | - | 10 | - | mS |
| Input filter type | | | PI type | | | |
| Hot swap | - | | Not supported | | | |
| Remote control (Ctrl) * | Module on | | Ctrl floating or connected to a TTL high level (3.5-12VDC) | | | |
| | Module off | | Connect Ctrl to GND or a low level (0-1.2VDC) | | | |
| | Input current while turn-off | | - | 5 | 8 | mA |
| Note: *The voltage of the Ctrl control pin is relative to the input pin GND. | | | | | | |

## Output characteristics

| Items | Working and test conditions | +Vo1 | | | -Vo2 | | |
|---|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | Min. | Typ. | Max. |
| Output load | Load percentage | 0% | - | 100% | 0% | - | 100% |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Output voltage accuracy | | - | ±1.0% | ±2.0% | - | ±2.0% | ±3.0% |
| Line Regulation | Input voltage range | - | ±0.2% | ±0.5% | - | ±1.5% | ±2% |
| Load Regulation | 20% to 100% rated load, balanced load | - | ±0.5% | ±1% | - | ±4.0% | ±5.0% |
| Ripple & Noise | Pure resistive load, 20 MHz bandwidth, peak-to-peak value | - | 50mVp-p | 80mVp-p | - | 50mVp-p | 80mVp-p |
| Startup delay | | - | 1ms | - | - | 1ms | - |
| Output voltage adjustment | Input voltage range | - | Non-adjustable | - | - | Non-adjustable | - |
| Dynamic response to a step disturbance | 25% of the rated load step | - | ±3.0% | ±5.0% | - | ±3.0% | ±5.0% |
| Dynamic response recovery time | | - | 300μs | 500μs | - | 300μs | 500μs |
| Output overvoltage protection | Full voltage range input | 110% Vo | - | 160%Vo | | | |
| Output overcurrent protection | Full voltage range input | 110% Io | 150% Io | 200% Io | | | |
| Output short-circuit protection | Full voltage range input | Sustainable, self-recovering | | | | | |

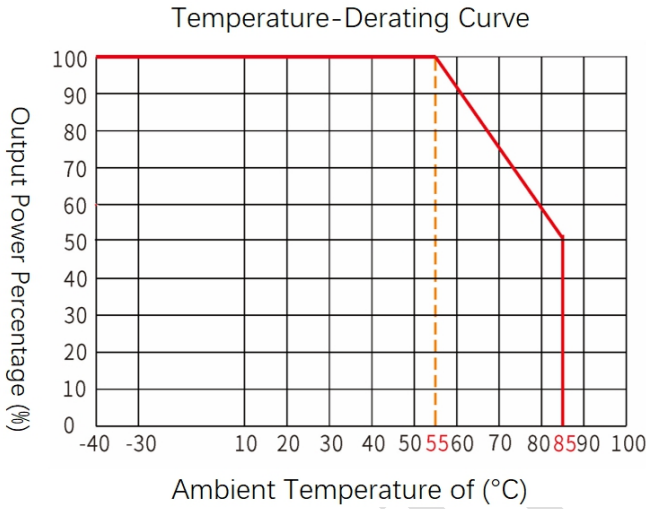
Note: ① For product models with output voltages of ±5 VDC and ±9 VDC, the maximum output voltage accuracy under 0%-5% load conditions is ±5%;
② When tested under 0%-100% load conditions, the load regulation is ±5%;
③ Load ripple and noise at 0%-5% load is less than or equal to 5% of Vo. The test method for ripple and noise is the twisted-pair test; a capacitive load can be applied to the output to reduce light-load ripple.

## General characteristics

| Items | Working conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Insulation voltage | Input-output, test duration: 1 minute, leakage current less than 1 mA. | 1500 | -- | -- | VDC |
| Insulation resistance | Input-output, insulation voltage 500 VDC. | 1000 | -- | -- | MΩ |
| Isolation capacitor | Input-Output, 100 kHz/0.1 V | -- | 1000 | -- | pF |
| Working temperature | Use the reference temperature derating curve | -40 | -- | +85 | ℃ |
| Storage temperature | | -40 | -- | +125 | |
| Maximum operating case temperature | | -- | -- | +100 | |

| | | | | | |
|---|---|---|---|---|---|
| Storage humidity | No condensation | 5 | -- | 95 | %RH |
| Pin soldering temperature resistance | The solder joint is 1.5 mm from the housing; 10 seconds | -- | -- | +300 | ℃ |
| Switching frequency | PWM mode | -- | 250 | -- | KHz |
| Vibration | | 10-55Hz, 10G, 30 Min. along X, Y and Z | | | |
| Housing material | | Aluminum alloy housing | | | |
| Minimum mean time between failures | MIL-HDBK-217F@25℃ | -- | $2X10^5$ | -- | Hrs |

## Temperature Characteristic Curve




## Reference for Design

1、 Recommended Test Circuit

Recommended capacitors: C1: 47－100μF; C2, C3: 10－22μF. All DC/DC converters in this series are tested using the test circuit shown in Figure 1 before shipment.

If further reduction of input and output ripple is required, the external input and output capacitors C1, C2, and C3 can be increased in value or capacitors with low equivalent series impedance (ESL) can be selected; however, the capacitance must not exceed the product's maximum capacitive load.

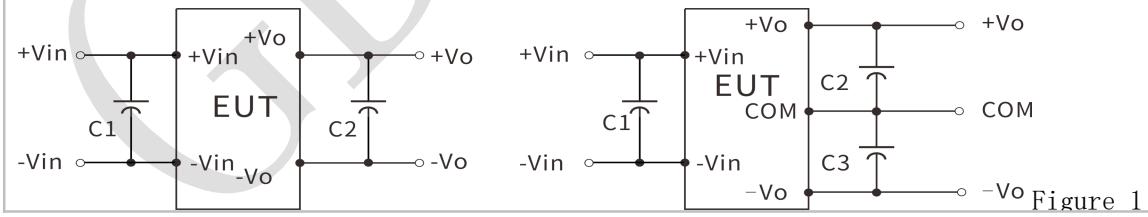
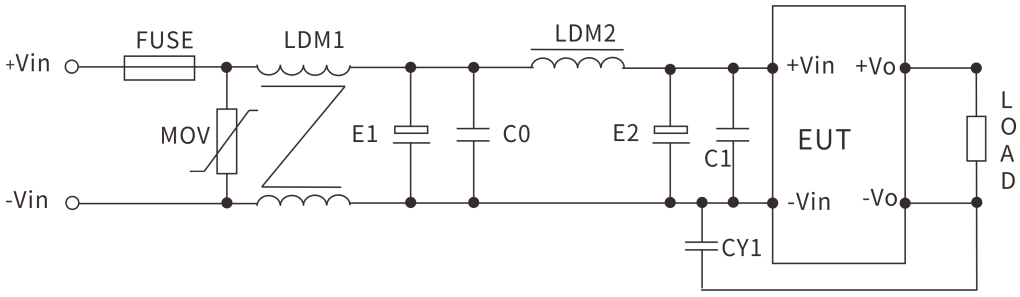



Figure 1

2、Recommended Output Filter Circuit

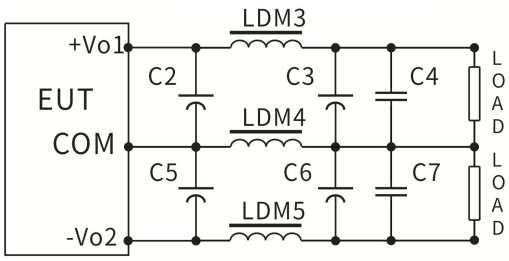



Recommended parameters:

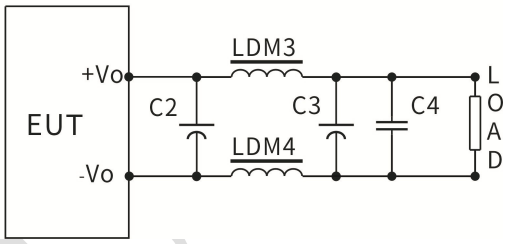
| Component code | 24V Input | 48V Input | 110V Input |
|---|---|---|---|
| FMSE fuse | Connect the appropriate fuse based on customer requirements | | |
| MOV varistor | 14D560K | 14D101K | 14D201K |
| LDM1 common-mode inductor | 10 mH | 15 mH | 30 mH |
| E1、E2 electrolytic capacitor | 100μF/50V | 100μF/100V | 63μF/200V |
| C0、D1 ceramic capacitor | 1μF/50V | 1μF/100V | 0.47μF/250V |
| LDM2 common-mode inductor | 10 μH | 15 μH | 68 μH |
| CY1 safety Y2 capacitors | 1nF/250Vac | | |

3、Recommended Output Filter Circuit

Positive and negative dual output product




Single output product




For general ripple and noise requirements, it is recommended to use only C2 and C5 in the external circuit; for strict ripple and noise requirements, it is recommended to use the circuit shown in the figure above.

Note: 1. Use high-frequency, low-impedance electrolytic capacitors for C2, C3, C5, and C6. The total capacitance must not exceed the maximum capacitive load specified in the manual; otherwise, the module will fail to start normally.

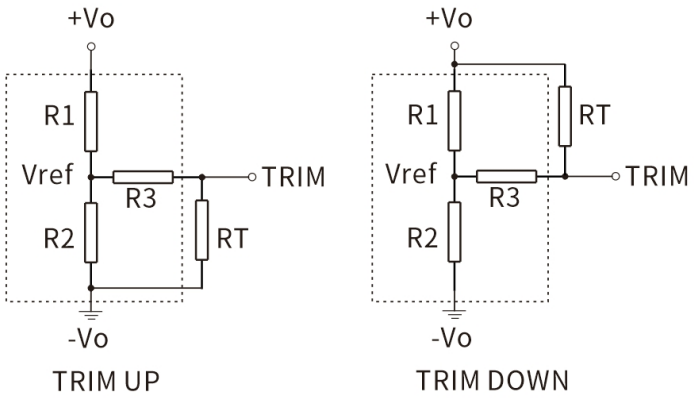
2. When applying a capacitive load, ensure that the minimum load is 3%; otherwise, it will cause abnormal module output.

3. The LDM5 is intended for use only in dual-output products.

Recommended parameters:

| Component code | 3.3V Output | ±5V or 5V Output | ±9V/12V or 9V/12V Output | ±15V or 15V Output | ±24V or 24V Output |
|---|---|---|---|---|---|
| LDM3 inductor | 0.47μH | 1μH | 2.2 μH | 2.2 μH | 4.7 μH |
| LDM4 inductor | 0.47μH | 1μH | 2.2 μH | 2.2 μH | 4.7 μH |
| LDM5 inductor | - | 1μH | 2.2 μH | 2.2 μH | 4.7 μH |
| C2、C3 electrolytic capacitor | 220μF | 220μF | 100μF | 100μF | 68μF |
| C5、C6 electrolytic capacitor | 220μF | 220μF | 100μF | 100μF | 68μF |
| C4、C7 ceramic capacitor | 1μF/50V | | | | |

4、The Use of Trim and the Calculation of Trim Resistors.




Trim Formula for Calculating Resistance:

UP: $RT=\frac{®*R2}{R2-®}-R3$ $®=\frac{Vref}{Vo-Vref}*R1$

down: $RT=\frac{®*R1}{R1-®}-R3$ $®=\frac{Vo-Vref}{Vref}*R2$

RT stands for TRIM resistor

® is a custom parameter with no practical significance.

Trim's application circuit (the dotted box indicates the interior of the product)

Reference Descriptions:

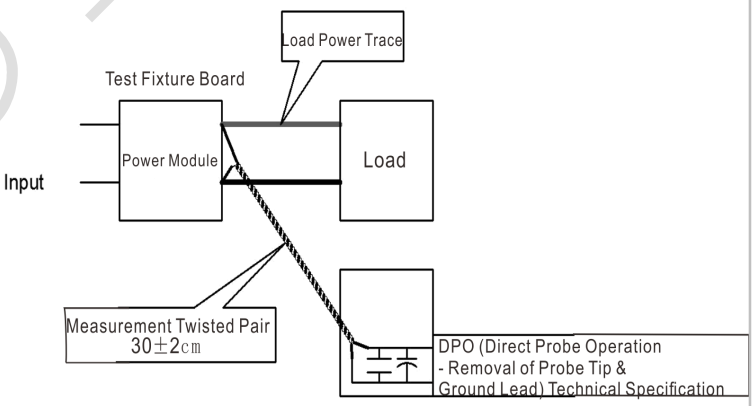
| Vout(V) | R1(KΩ) | R2(KΩ) | R3(KΩ) | Vref(V) |
|---|---|---|---|---|
| 3.3 | 30 | 18.261 | 84.5 | 1.25 |
| 5 | 45.3 | 14.778 | 84.5 | 1.25 |
| 9 | 30 | 11.441 | 84.5 | 2.5 |
| 12 | 56 | 14.571 | 84.5 | 2.5 |
| 15 | 56 | 11.218 | 84.5 | 2.5 |
| 24 | 84.5 | 9.791 | 84.5 | 2.5 |

5. Ripple & Noise Testing: (Twisted-pair Method, 20 MHz Bandwidth)

Test Method:

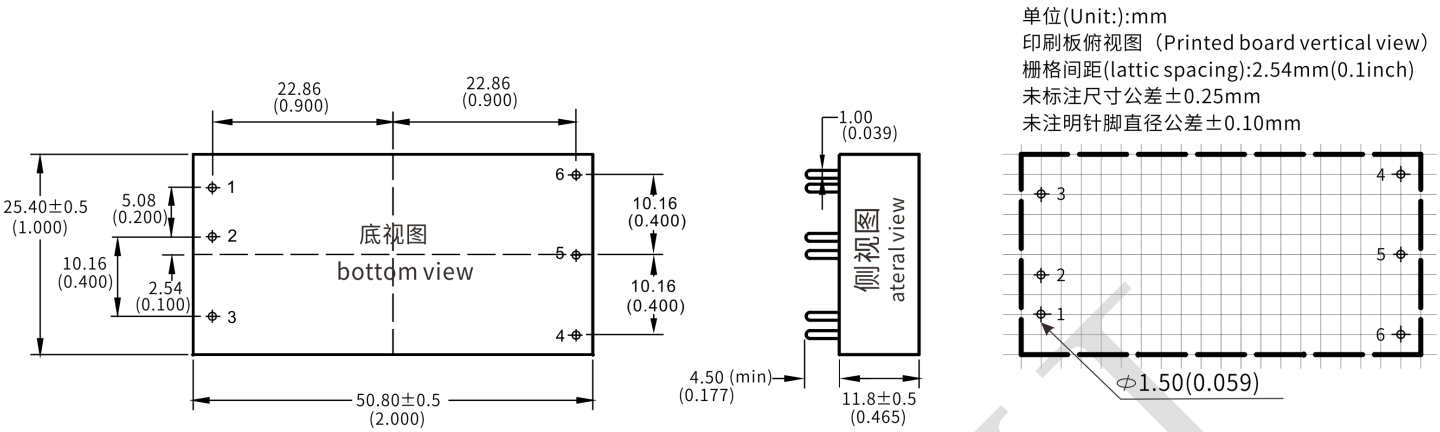
1. For ripple and noise testing, use a Category 12 twisted-pair cable. Set the oscilloscope bandwidth to 20 MHz and use a 100 MHz bandwidth probe. Connect a 0.1μF polypropylene capacitor and a 47μF high-frequency, low-impedance electrolytic capacitor in parallel at the probe tip. Set the oscilloscope to "Sample" mode.

2. Schematic diagram for output ripple and noise testing:




Connect the power supply input to the input power source. Connect the power supply output to the electronic load via the fixture board. For testing, use a 30 cm ± 2 cm sampling lead to take a direct sample from the power supply output port. Select insulated wires with appropriate gauge based on the magnitude of the output current.

## Package Dimensions and Pin Function Diagram




| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Single (URB) | +Vin | -Vin | CTRL | Trim | -Vo | +Vo |
| | Positive input | Negative input | Remote control | Voltage regulating | Negative output | Positive output |
| Dual (URA) | +Vin | -Vin | CTRL | -Vo2 | COM | +Vo1 |
| | Positive input | Negative input | Remote control | Negative output 2 | Common | Positive output 1 |

*Note: If the pin definitions of the power module differ from those in the selection guide, refer to the labels on the actual product.

## Package Description

| Package code | L x W x H | |
|---|---|---|
| LD | 50.8 X25.4X11.8mm | 2.000X 1.000 X0.464 inch |

## Contact

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