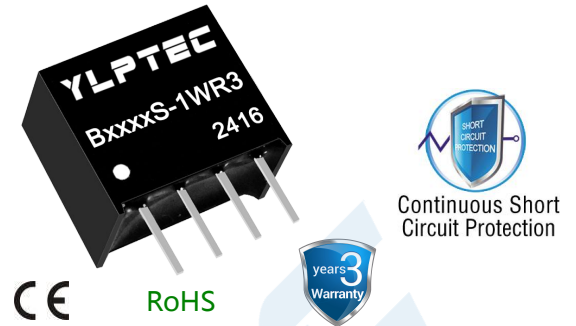


FEATURES

- Continuous short-circuit protection
- No-load input current as low as 8mA
- Operating ambient temperature range: -40°C to +105°C
- High efficiency up to 85%
- I/O isolation test voltage: 1.5k VDC
- Industry standard pin-out

1W isolated DC-DC converter

Fixed input voltage, unregulated single output



B_S-1WR3 series are specially designed for applications where an isolated voltage is required in a distributed power supply system. They are suitable for: pure digital circuits, low frequency analog circuits, relay-driven circuits and data switching circuits.

Selection Guide

| Certification | Part No. | Input Voltage (VDC) | Output | | Full Load Efficiency (%) Min./Typ. | Capacitive Load(μF) Max. |
|---------------|-------------|---------------------|-------------------|---------------------------|---------------------------------------|-----------------------------|
| | | Nominal (Range) | Voltage (VDC) | Current (mA) Max./Min. | | |
| -- | B0303S-1WR3 | 3.3 (2.97-3.63) | 3.3 | 303/30 | 75/79 | 2400 |
| | B0305S-1WR3 | | 5 | 200/20 | 78/82 | 2400 |
| | B0309S-1WR3 | | 9 | 111/11 | 81/85 | 1000 |
| | B0312S-1WR3 | | 12 | 83/8 | 78/82 | 560 |
| | B0315S-1WR3 | | 15 | 67/7 | 78/82 | 560 |
| | B0324S-1WR3 | | 24 | 42/4 | 80/84 | 220 |
| | B0503S-1WR3 | 5 (4.5-5.5) | 3.3 | 303/30 | 70/74 | 2400 |
| | B0505S-1WR3 | | 5 | 200/20 | 78/82 | 2400 |
| | B0509S-1WR3 | | 9 | 111/12 | 79/83 | 1000 |
| | B0512S-1WR3 | | 12 | 84/9 | 79/83 | 560 |
| | B0515S-1WR3 | | 15 | 67/7 | 79/83 | 560 |
| | B0524S-1WR3 | | 24 | 42/4 | 81/85 | 220 |
| | B1203S-1WR3 | 12 (10.8-13.2) | 3.3 | 303/30 | 71/75 | 2400 |
| | B1205S-1WR3 | | 5 | 200/20 | 76/80 | 2400 |
| | B1209S-1WR3 | | 9 | 111/12 | 76/80 | 1000 |
| | B1212S-1WR3 | | 12 | 83/9 | 76/80 | 560 |
| | B1215S-1WR3 | | 15 | 67/7 | 77/81 | 560 |
| | B1224S-1WR3 | | 24 | 42/5 | 77/81 | 220 |
| | B1505S-1WR3 | 15 (13.5-16.5) | 5 | 200/20 | 76/80 | 2400 |
| | B1509S-1WR3 | | 9 | 111/12 | 76/80 | 1000 |
| | B1512S-1WR3 | | 12 | 83/9 | 76/80 | 560 |
| | B1515S-1WR3 | | 15 | 67/7 | 77/81 | 560 |
| | B1524S-1WR3 | | 24 | 42/5 | 77/81 | 220 |
| | B2403S-1WR3 | | 24 (21.6-26.4) | 3.3 | 303/30 | 69/75 |
| B2405S-1WR3 | 5 | 200/20 | | 73/79 | 2400 | |
| B2409S-1WR3 | 9 | 111/12 | | 74/80 | 1000 | |
| B2412S-1WR3 | 12 | 83/9 | | 75/81 | 560 | |
| B2415S-1WR3 | 15 | 67/7 | | 75/81 | 560 | |
| B2424S-1WR3 | 24 | 42/5 | | 75/81 | 220 | |

Input Specifications

| Item | Operating Conditions | | Min. | Typ. | Max. | Unit |
|--|----------------------|-------------------------|--------------------|--------|--------|------|
| Input Current (full load / no-load) | 3.3V input | 3.3VDC output | -- | 384/10 | 405/-- | mA |
| | | Other output | -- | 370/18 | 389/-- | |
| | 5V input | 3.3VDC output | -- | 271/8 | 286/-- | |
| | | 5VDC output | -- | 244/8 | 257/-- | |
| | | 9VDC/12VDC/15VDC output | -- | 241/12 | 254/-- | |
| | | 24VDC output | -- | 241/18 | 254/-- | |
| | 12V input | 3.3VDC output | -- | 112/8 | 118/-- | |
| | | 5VDC/9VDC/12VDC output | -- | 105/8 | 110/-- | |
| | | 15VDC/24VDC output | -- | 103/8 | 109/-- | |
| | 15V input | 5VDC/9VDC/12VDC output | -- | 84/8 | 88/-- | |
| | | 15VDC/24VDC output | -- | 83/8 | 87/-- | |
| | 24V input | 3.3VDC output | -- | 56/8 | 61/-- | |
| | | 5VDC output | -- | 53/8 | 58/-- | |
| | | 9VDC output | -- | 53/8 | 57/-- | |
| 12VDC/15VDC/24VDC output | | -- | 52/8 | 56/-- | | |
| Reflected Ripple Current | | | -- | 15 | -- | |
| Surge Voltage(1sec. max.) | 3.3VDC input | | -0.7 | -- | 5 | VDC |
| | 5VDC input | | -0.7 | -- | 9 | |
| | 12VDC input | | -0.7 | -- | 18 | |
| | 15VDC input | | -0.7 | -- | 21 | |
| | 24VDC input | | -0.7 | -- | 30 | |
| Input Filter | | | Capacitance filter | | | |
| Hot Plug | | | Unavailable | | | |
| Note: * Refer to DC-DC Converter Application Notes for detailed description of reflected ripple current test method. | | | | | | |

Output Specifications

| Item | Operating Conditions | | Min. | Typ. | Max. | Unit | |
|-------------------|--|-----------------------------|---------------------------------------|------|------|------|----|
| Voltage Accuracy | | | See output regulation curves (Fig. 1) | | | | |
| Linear Regulation | Input voltage change: $\pm 1\%$ | 3.3VDC output | -- | -- | 1.5 | -- | |
| | | Other output | -- | -- | 1.2 | | |
| Load Regulation | 3.3VDC input 10%-100% load | 3.3VDC output | -- | 12 | 18 | % | |
| | | Other output | -- | 8 | 15 | | |
| | | 5VDC input 10%-100% load | 3.3VDC output | -- | 15 | | 20 |
| | | | 5VDC output | -- | 10 | | 15 |
| | 9VDC output | | -- | 8 | 10 | | |
| | 12VDC output | | -- | 7 | 10 | | |
| | 12VDC/15VDC/24VDC input 10%-100% load | 15VDC output | -- | 6 | 10 | | |
| | | 24VDC output | -- | 5 | 10 | | |
| | | 3.3VDC output | -- | 8 | 20 | | |
| | | 5VDC output | -- | 5 | 15 | | |
| | | | 9VDC output | -- | 3 | | 10 |
| | | | 12VDC output | -- | 3 | | 10 |
| | | 15VDC output | -- | 3 | 10 | | |
| | | 24VDC output | -- | 2 | 10 | | |

| | | | | | | |
|---|-----------------|--------------|---------------------------|-------|-----|-------|
| Ripple & Noise* | 20MHz bandwidth | Other output | -- | 30 | 75 | mVp-p |
| | | 24VDC output | -- | 50 | 100 | |
| Temperature Coefficient | Full load | | -- | ±0.02 | -- | %/°C |
| Short-Circuit Protection | | | Continuous, self-recovery | | | |
| Note:* The "parallel cable" method is used for Ripple and Noise test, please refer to DC-DC Converter Application Notes for specific information. | | | | | | |

General Specifications

| 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 |
| | 5V input, input-output electric strength test for 1 second with a leakage current of 1mA max. | | 3000 | -- | -- | |
| Insulation Resistance | Input-output resistance at 500VDC | | 1000 | -- | -- | MΩ |
| Isolation Capacitance | Input-output capacitance at 100kHz/0.1V | | -- | 20 | -- | pF |
| Operating Temperature | 3.3V input | Derating when operating temperature ≥ 100°C, (see Fig. 2) | -40 | -- | 105 | °C |
| | Other output | Derating when operating temperature ≥ 85°C, (see Fig. 2) | | | | |
| Storage Temperature | | | -55 | -- | 125 | |
| Case Temperature Rise | Ta=25°C | | -- | 25 | -- | |
| Pin Soldering Resistance Temperature | Soldering spot is 1.5mm away from case for 10 seconds | | -- | -- | 300 | |
| Storage Humidity | Non-condensing | 5V input | -- | -- | 95 | |
| | | Other output | 5 | -- | 95 | |
| Vibration | 3.3V/12V/15V/24V input | | 10-150Hz, 5G, 0.75mm. along X, Y and Z | | | |
| Switching Frequency | 3.3V input, full load, nominal input voltage | | -- | 220 | -- | kHz |
| | 5V input, full load, nominal input voltage | | -- | 270 | -- | |
| | 12V/15V/24V input, full load, nominal input voltage | | -- | 260 | -- | |
| MTBF | MIL-HDBK-217F @ 25°C | | 3500 | -- | -- | k hours |

Mechanical Specifications

| | |
|----------------|--|
| Case Material | Black plastic; flame-retardant and heat-resistant (UL94 V-0) |
| Dimensions | 11.60 x 6.00 x 10.16 mm |
| Weight | 1.3g (Typ.) |
| Cooling Method | Free air convection |

Electromagnetic Compatibility (EMC)

| | | |
|--|-----|---|
| Emissions | CE | CISPR32/EN55032 CLASS B |
| | RE | CISPR32/EN55032 CLASS B |
| Immunity | ESD | IEC/EN61000-4-2 Air ±8kV, Contact ±6kV perf. Criteria B |
| Note: Refer to Fig.4 for recommended circuit test. | | |

Typical Characteristic Curves

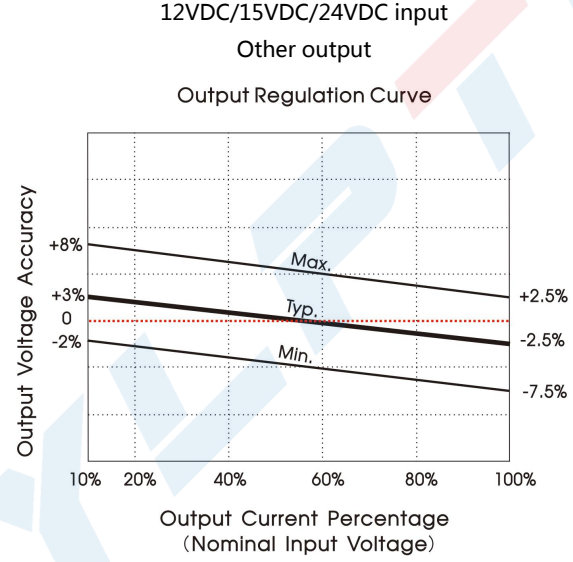
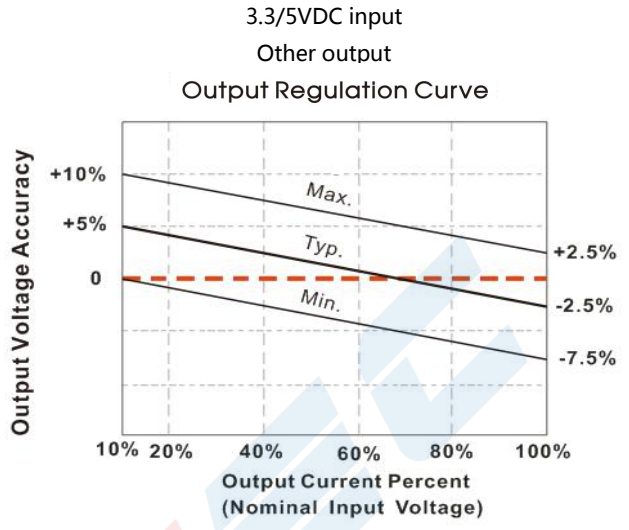
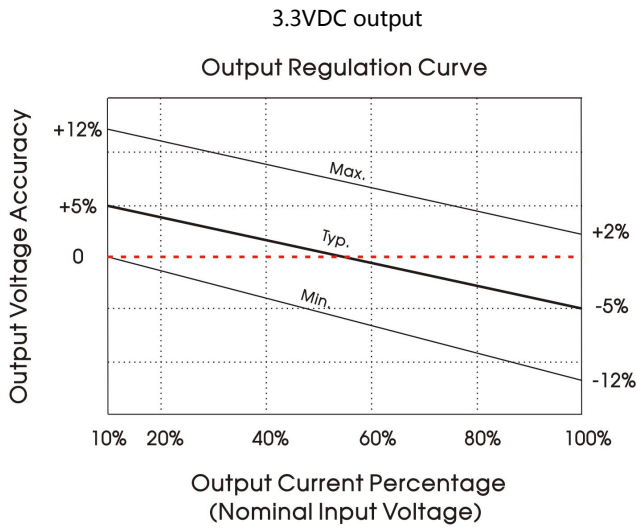


Fig. 1

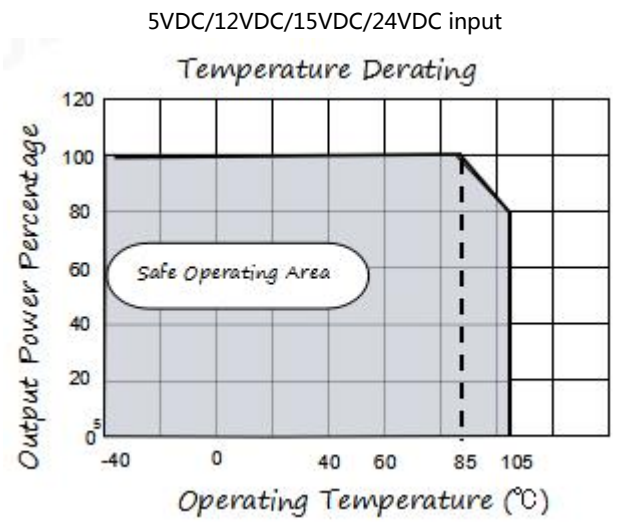
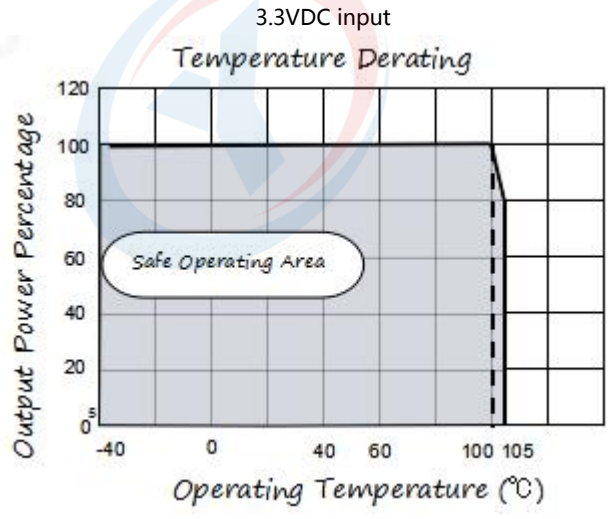
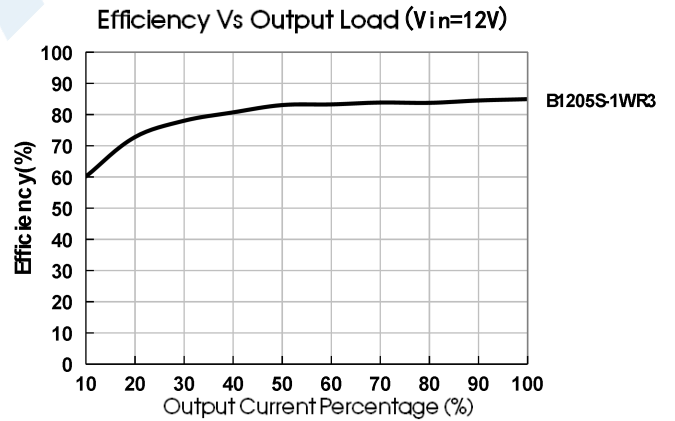
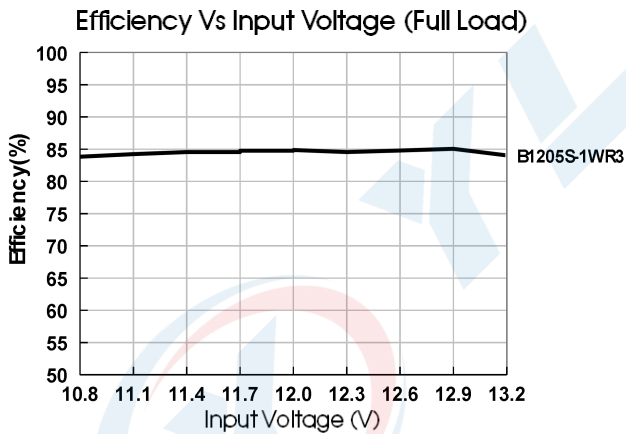
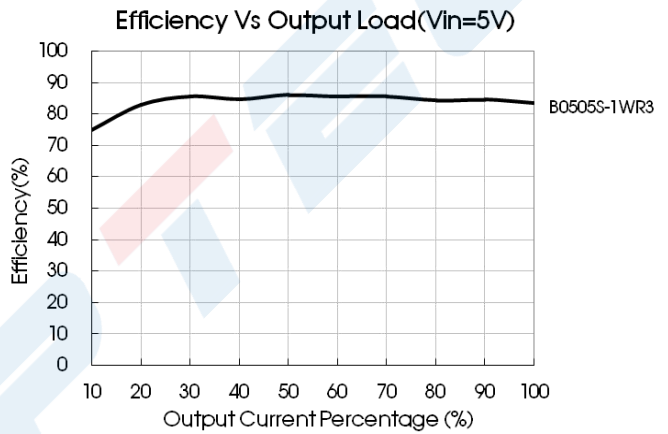
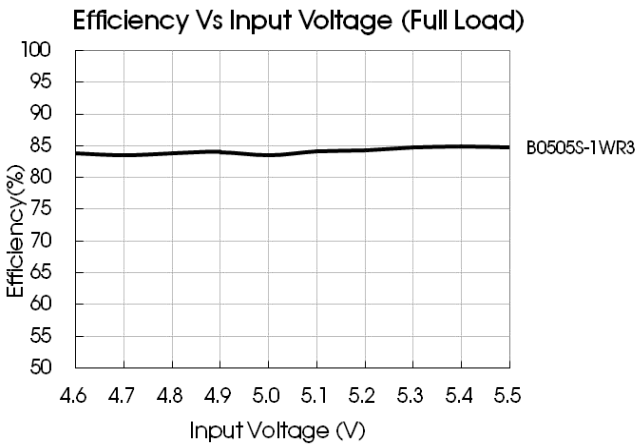
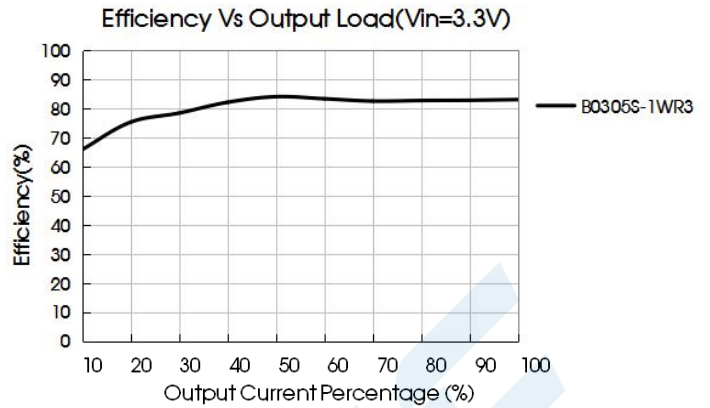
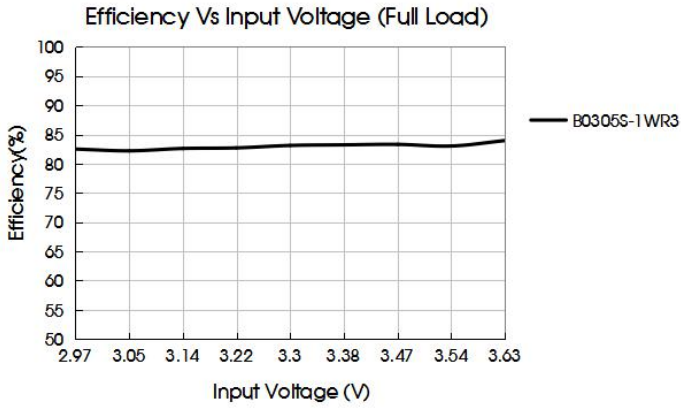


Fig. 2



Design Reference

1. Typical application

Input and/or output ripple can be further reduced, by connecting a filter capacitor from the input and/or output terminals to ground as shown in Fig.3.

Choosing suitable filter capacitor values is very important for a smooth operation of the modules, particularly to avoid start-up problems caused by capacitor values that are too high. For recommended input and output capacitor values refer to Table 1.

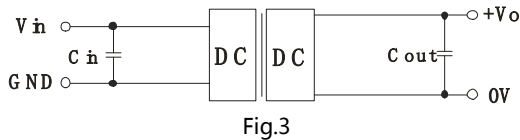


Table 1: Recommended input and output capacitor values

| V_{in} | C_{in} | V_o | C_{out} |
|----------|-----------------|--------|-----------------|
| 3.3VDC | 10 μ F/25V | 3.3VDC | 10 μ F/16V |
| 5VDC | 4.7 μ F/16V | 5VDC | 10 μ F/16V |
| 12VDC | 2.2 μ F/25V | 9VDC | 2.2 μ F/16V |
| 15VDC | 2.2 μ F/25V | 12VDC | 2.2 μ F/25V |
| 24VDC | 1 μ F/50V | 15VDC | 1 μ F/25V |
| -- | -- | 24VDC | 1 μ F/50V |

2. EMC compliance circuit

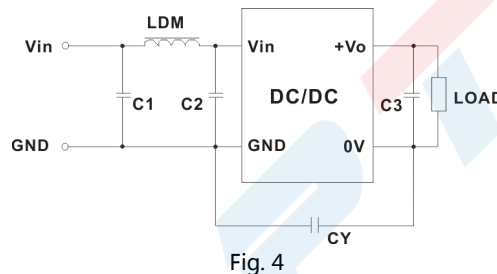
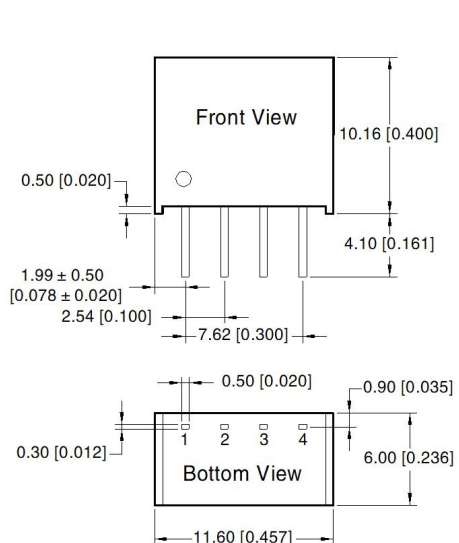


Table 2: Recommended EMC filter values

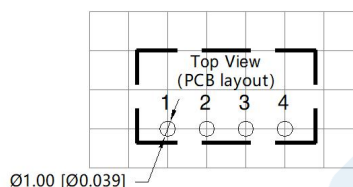
| Input voltage | 3.3DVC | | 5DVC | | 12/15/24DVC | |
|----------------|----------|-----------------------------------|-------------------------------------|-----------------|-----------------|-----------|
| Output voltage | 3.3/5VDC | 9/12/15/24VDC | 3.3/5/9VDC | 12/15/24VDC | -- | |
| Emissions | C1/C2 | 4.7 μ F /16V | 4.7 μ F/16V | 4.7 μ F/25V | 4.7 μ F/50V | |
| | CY | -- | 270pF /4kVDC VISHAY HGZ102MBP | 100pF/4kV | 1000pF/4kV | 270pF/2kV |
| | C3 | Refer to the C_{out} in table 1 | | | | |
| | LDM | 6.8 μ H | | | | |

Dimensions and Recommended Layout



Note:
Unit: mm[inch]
Pin section tolerances: ± 0.10 [± 0.004]
General tolerances: ± 0.25 [± 0.010]

THIRD ANGLE PROJECTION



Note: Grid 2.54*2.54mm

| Pin | Mark |
|-----|------|
| 1 | GND |
| 2 | Vin |
| 3 | 0V |
| 4 | +Vo |