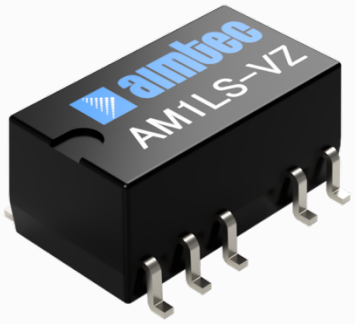
# AM1LS-VZ

Click to ORDER samples




SMD

The new AM1LS-VZ is a DC/DC converter that is a direct replacement to the AM1L-NZ. Offering much greater cost effectiveness due to material normalization and production automation which increases the reliability and performance of this new component. Offering a commercial input voltage range of 5-24VDC and an output voltage range from 3.3-24V, this series will offer many benefits to your new system design.
This new series offers great operating temperatures, from -40°C to 105°C with full power up to 100°C. It also features an isolation of 1500VDC or 3000VDC for improved reliability and system safety. Furthermore, a higher MTBF of 3500,000h and output short circuit protection (OSCP) come standard with the series.
The AM1LS-VZ is perfect for information technology, instrumentation, communication and civil applications.

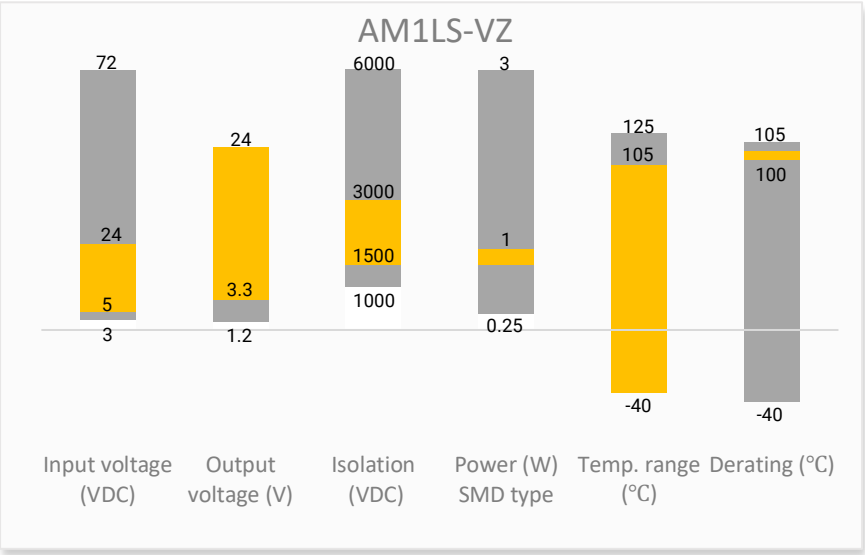
## Features

- No load input current as low as 4mA
- Operating Temp: -40 °C to +105 °C
- High I/O isolation voltage : 1500 to 3000 VDC
- Output short circuit protection
- High efficiency up to 85%
- SMD type package, Industry standard pin-out

RoHS

3yr Warranty

## Summary




## Training

Product Training Video (click to open)

Press Release

Coming Soon!

Application Notes

## Applications

IoT

Industrial

Telecom

Instrumentation

# Models & Specifications

## Single Output

| Model | Input Voltage (VDC) | Output Voltage (VDC) | Input Current Max (mA) | | Output Current (mA) | | Isolation (VDC) | Maximum Capacitive Load (µF) | Efficiency Full Load Typ. (%) |
|---|---|---|---|---|---|---|---|---|---|
| | | | No Load | Full Load | No Load | Full Load | | | |
| AM1LS-0503SVZ | 5 (4.5-5.5) | 3.3 | 10 | 286 | 30 | 303 | 1500 | 2400 | 74 |
| AM1LS-0505SVZ | 5 (4.5-5.5) | 5 | 10 | 286 | 20 | 200 | 1500 | 2400 | 82 |
| AM1LS-0509SVZ | 5 (4.5-5.5) | 9 | 20 | 254 | 12 | 111 | 1500 | 1000 | 83 |
| AM1LS-0512SVZ | 5 (4.5-5.5) | 12 | 20 | 254 | 9 | 84 | 1500 | 560 | 83 |
| AM1LS-0503SH30VZ | 5 (4.5-5.5) | 3.3 | 10 | 286 | 30 | 303 | 3000 | 2400 | 74 |
| AM1LS-0505SH30VZ | 5 (4.5-5.5) | 5 | 10 | 286 | 20 | 200 | 3000 | 2400 | 82 |
| AM1LS-0509SH30VZ | 5 (4.5-5.5) | 9 | 20 | 254 | 12 | 111 | 3000 | 1000 | 83 |
| AM1LS-0512SH30VZ | 5 (4.5-5.5) | 12 | 20 | 254 | 9 | 84 | 3000 | 560 | 83 |
| AM1LS-0515SH30VZ | 5 (4.5-5.5) | 15 | 30 | 254 | 7 | 67 | 3000 | 560 | 83 |
| AM1LS-0524SH30VZ | 5 (4.5-5.5) | 24 | 30 | 254 | 4 | 42 | 3000 | 220 | 85 |
| AM1LS-1205SH30VZ | 12 (10.8-13.2) | 5 | 8 | 107 | 20 | 200 | 3000 | 2400 | 82 |
| AM1LS-1212SH30VZ | 12 (10.8-13.2) | 12 | 8 | 107 | 9 | 84 | 3000 | 560 | 83 |
| AM1LS-1215SH30VZ | 12 (10.8-13.2) | 15 | 8 | 107 | 7 | 67 | 3000 | 560 | 83 |
| AM1LS-2405SH30VZ | 24 (21.6-26.4) | 5 | 8 | 57 | 20 | 200 | 3000 | 2400 | 80 |
| AM1LS-2415SH30VZ | 24 (21.6-26.4) | 15 | 8 | 57 | 7 | 67 | 3000 | 560 | 80 |

## Dual Output

| Model | Input Voltage (VDC) | Output Voltage (VDC) | Input Current Max (mA) | | Output Current (mA) | | Isolation (VDC) | Maximum Capacitive Load (µF) | Efficiency Full Load Typ. (%) |
|---|---|---|---|---|---|---|---|---|---|
| | | | No Load | Full Load | No Load | Full Load | | | |
| AM1LS-0503DH30VZ | 5 (4.5-5.5) | ±3.3 | 10 | 286 | ±15 | ±151 | 3000 | 1200 | 74 |
| AM1LS-0505DH30VZ | 5 (4.5-5.5) | ±5 | 10 | 286 | ±10 | ±100 | 3000 | 1200 | 82 |
| AM1LS-0509DH30VZ | 5 (4.5-5.5) | ±9 | 20 | 254 | ±6 | ±56 | 3000 | 470 | 83 |
| AM1LS-0512DH30VZ | 5 (4.5-5.5) | ±12 | 20 | 254 | ±5 | ±42 | 3000 | 220 | 83 |
| AM1LS-0515DH30VZ | 5 (4.5-5.5) | ±15 | 30 | 254 | ±4 | ±34 | 3000 | 220 | 83 |
| AM1LS-0524DH30VZ | 5 (4.5-5.5) | ±24 | 30 | 254 | ±2 | ±21 | 3000 | 100 | 85 |
| AM1LS-1215DH30VZ | 12 (10.8-13.2) | ±15 | 8 | 107 | ±3 | ±33 | 3000 | 220 | 83 |

## Input Specification

| Parameters | Conditions | Typical | Maximum | Units |
|---|---|---|---|---|
| Filter | Capacitor | | | |
| Absolute maximum rating | Maximum duration 1s, 5Vin | >0.7 | 9 | VDC |
| | Maximum duration 1s, 12Vin | >0.7 | 18 | VDC |
| | Maximum duration 1s, 24Vin | >0.7 | 30 | VDC |
| Input reflected ripple current | | 15 | | mA |

## Output Specification

| Parameters | Conditions | Typical | Maximum | Units |
|---|---|---|---|---|
| Voltage accuracy | See Typical Characteristic | | | |
| Line regulation | Per 1% Vin change ,3.3V output model | | 1.5 | % |
| | Per 1% Vin change, Others | | 1.2 | % |
| Load regulation | 10-100% load, 5Vin 3.3Vout model | 15 | 20 | % |
| | 10-100% load, 5Vin 5Vout model | 10 | 15 | % |
| | 10-100% load, 5Vin 9Vout model | 8 | 10 | % |
| | 10-100% load, 5Vin 12Vout model | 7 | 10 | % |
| | 10-100% load, 5Vin 15Vout model | 6 | 10 | % |
| | 10-100% load, 5Vin 24Vout model | 5 | 10 | % |
| | 10-100% load, 12/24Vin 5Vout models | 5 | 15 | % |
| | 10-100% load, 12/24Vin 12/15Vout models | 2 | 10 | % |
| Temperature coefficient | Full load | ±0.02 | | %/ °C |
| Ripple & Noise* | 5Vin 3.3/5/9/12/15Vout models | 30 | 75 | mV pk-pk |
| | others | 50 | 100 | mV pk-pk |

* Ripple and Noise are measured at 20MHz bandwidth. Please refer to the application note for specific details.

## Isolation Specification

| Parameters | Conditions | Typical | Maximum | Units |
|---|---|---|---|---|
| Tested I/O voltage | 60 sec, 1mA max | 1500 / 3000 | | VDC |
| Resistance | Input to output resistance at 500Vdc | >1000 | | MOhm |
| Capacitance | Input to output, 100KHz/0.1V | 20 | | pF |

## General Specifications

| Parameters | Conditions | Typical | Maximum | Units |
|---|---|---|---|---|
| Switching frequency | Full load, nominal input voltage, 5Vin models | 270 | | KHz |
| | Full load, nominal input voltage, 12/24Vin models | 260 | | KHz |
| Operating temperature | See derating graph | -40 to +105 | | °C |
| Storage temperature | | -55 to +125 | | °C |
| Case temperature rise | Ambient temp 25°C, 5Vin 5/9/12/15/24Vout models | 15 | | °C |
| | Ambient temp 25°C, others | 25 | | °C |
| Maximum case temperature | | | 95 | °C |
| Reflow Temperature | Maximum duration ≤60s over 217°C. | | 245 | °C |
| Lead-free reflow solder process | IPC/JEDEC J-STD-020D.1 | | | |
| Short circuit protection | Continuous, auto-recovery | | | |
| Cooling | Free air convection | | | |
| Vibration | 10-150Hz, 5G, 0.75mm, along all axis (Except 5Vin models) | | | |
| Humidity | Non-condensing | | 95 | % RH |
| Case material | Heat resistant black Plastic (flammability to UL 94V-0) | | | |
| Weight | | 1.3 | | g |
| Dimensions (L x W x H) | 1500VDC isolated models | 0.52 x 0.45 x 0.29inches (13.20 x 11.40 x 7.25mm) | | |
| | 3000VDC isolated models | 0.60 x 0.45 x 0.29inches (15.24 x 11.40 x 7.25mm) | | |
| MTBF | > 3 500 000 hrs (MIL-HDBK -217F, t=+25°C) / Full Load | | | |
| Moisture sensitivity level (MSL) | IPC/JEDEC J-STD-020D.1 | Level 1 | | |

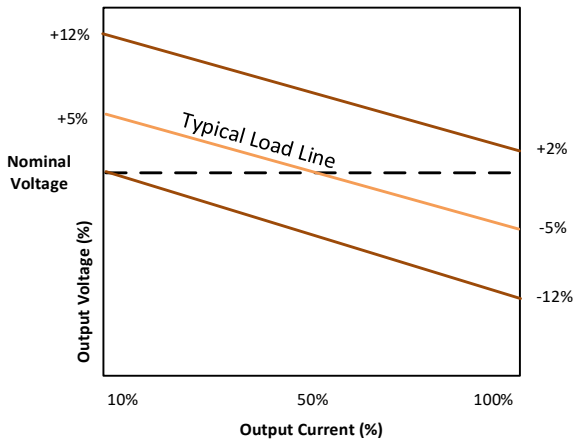
All specifications in this datasheet are measured at an ambient temperature of 25°C, humidity<75%, nominal input voltage and at rated output load unless otherwise specified.

| Safety Specifications | | |
|---|---|---|
| **Parameters** | | |
| **Standards** | Design to meet IEC62368/UL62368/EN62368 (5Vin models only) | |
| | EMC - Conducted and radiated emission | CISPR32/EN55032, Class B the recommended EMI circuit |
| | Electrostatic Discharge Immunity | IEC 61000-4-2 Air ±8KV, Contact ±4KV, Criteria B (5Vin models)<br>IEC 61000-4-2 Air ±8KV, Contact ±6KV, Criteria B with the recommended EMI circuit (12/24Vin models) |

# Typical Characteristic

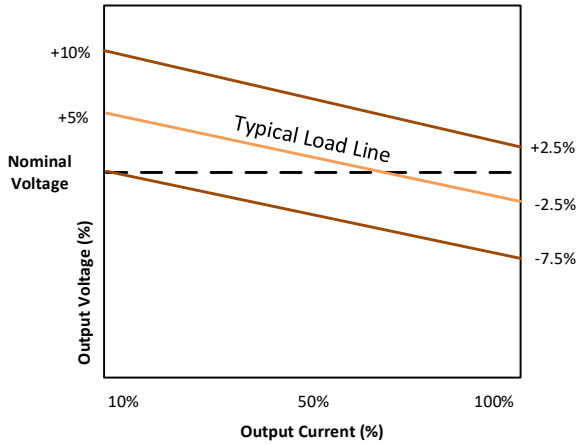
### 5Vin 3.3Vout models

**Tolerance Envelope Graph**



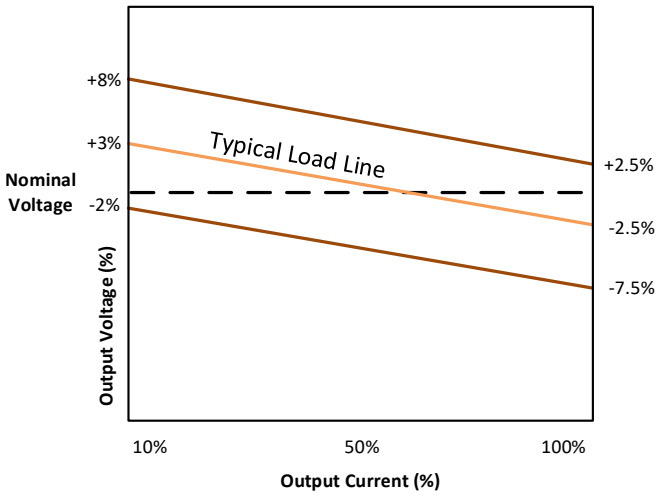

### Other 5Vin models

**Tolerance Envelope Graph**

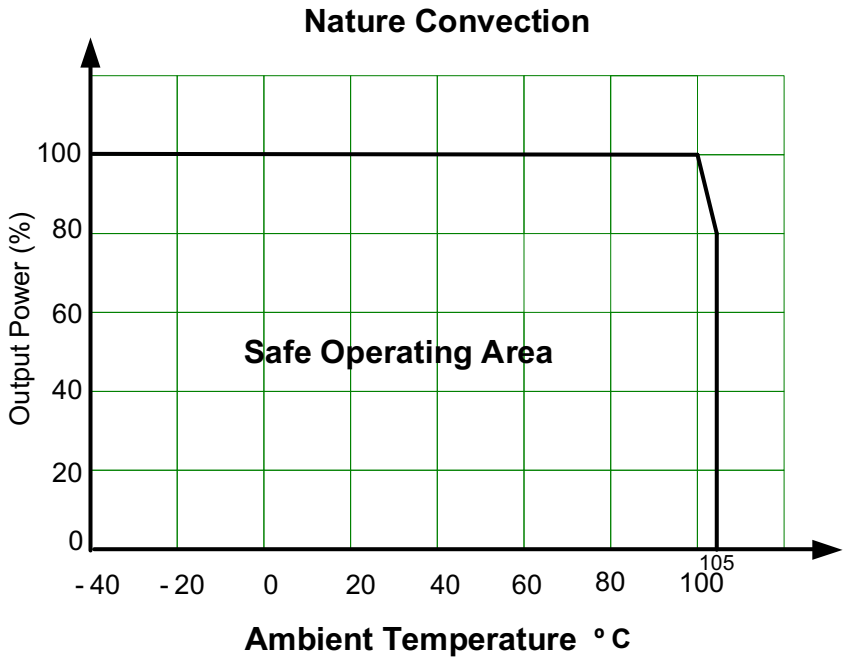



### 12/24Vin models

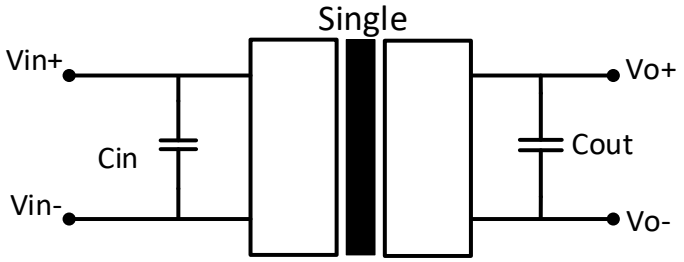
**Tolerance Envelope Graph**



## Derating

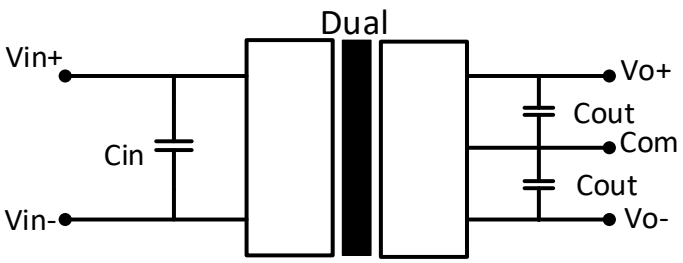



## Typical Application Circuit




| Vin | Cin |
|---|---|
| 5 | 4.7 µF |
| 12 | 2.2µF |
| 24 | 1µF |

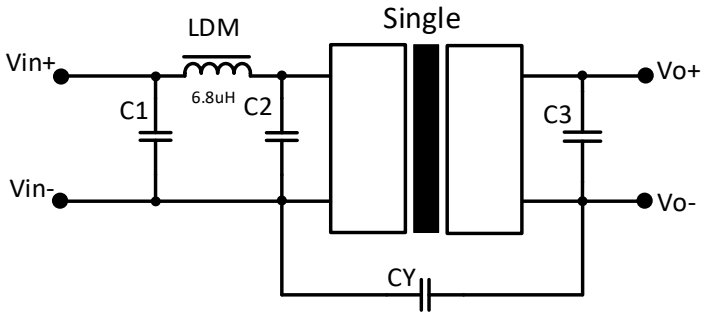
| Vout | Cout |
|---|---|
| 3.3 V | 10µF |
| 5 V | 10µF |
| 9 V | 4.7µF |
| 12 V | 2.2µF |
| 15 V | 1µF |
| 24V | 0.47µF |

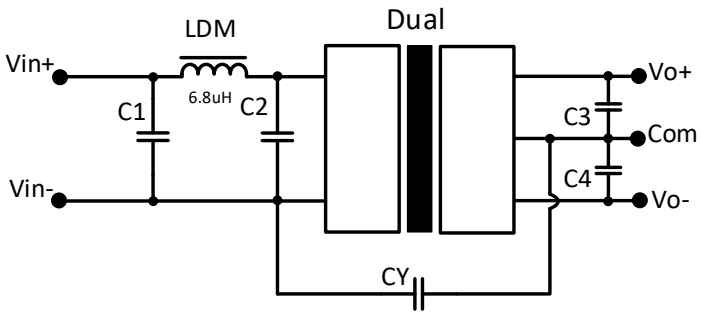



| 24Vin Dual output model | |
|---|---|
| Vout | Cout |
| ±15V | 0.47µF |

| 1500VDC isolation models | |
|---|---|
| Vout | Cout |
| 15V | 2.2µF |

## EMI Recommended Circuit



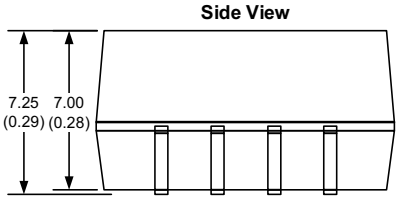



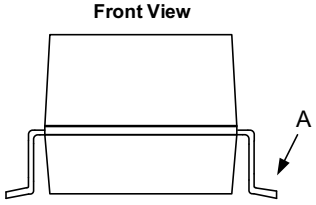

| Input voltage | C1/C2 | C3/C4 |
|---|---|---|
| 5V | 4.7µF/25V | Refer to Cout in typical circuit |
| 12V | 4.7µF/50V | Refer to Cout in typical circuit |
| 24V | 4.7µF/50V | Refer to Cout in typical circuit |

| Input voltage | Output voltage | CY1 |
|---|---|---|
| 5V | 3.3/5/9V | N/C |
| | 12/15/24V | 1nF/4KVDC for 3KV isolation<br>1nF/2KVDC for 1.5KV isolation |
| 12V | All | 270pF/3KVDC |
| 24V | All | 270pF/3KVDC |

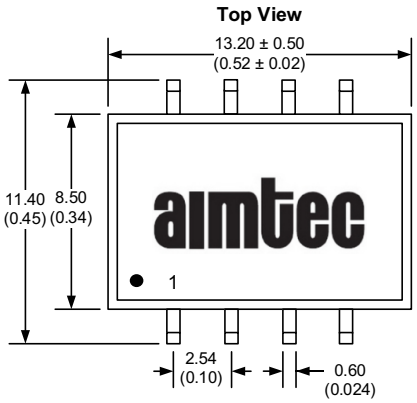
## Dimensions

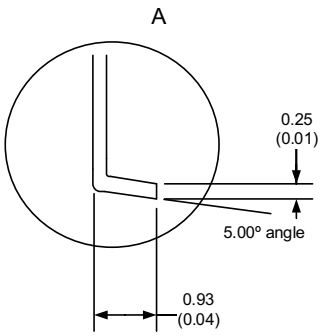
### Dimensions for 1500VDC isolated models

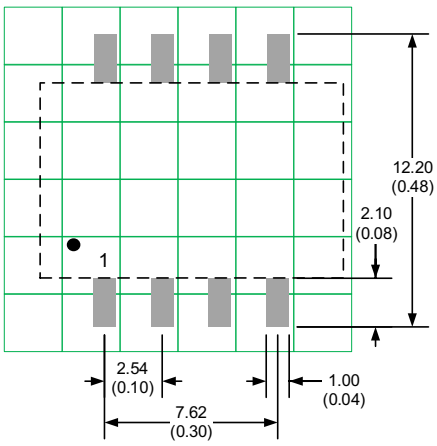



| Pin Out Specifications | |
|---|---|
| Pin | Single |
| 1 | -V Input |
| 2 | +V Input |
| 4 | -V Output |
| 5 | +V Output |
| Other Pins | NC |
| NC: Pin to be isolated from circuitry | |



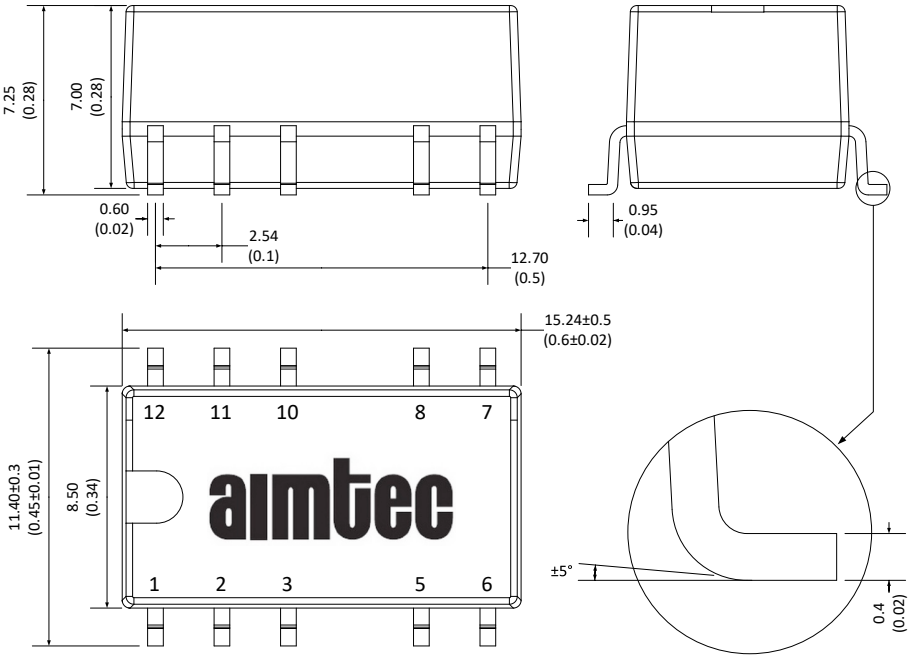



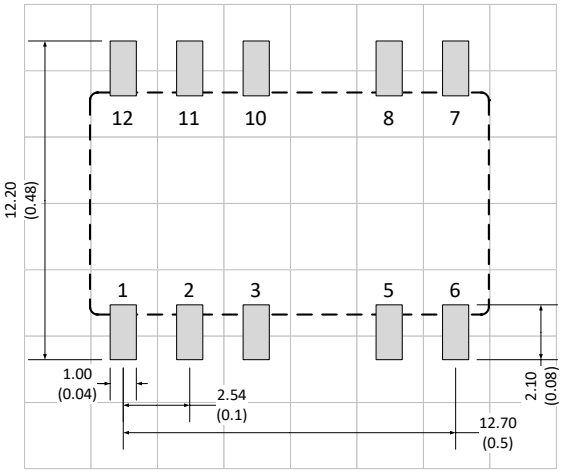




Note: Grid 2.54*2.54mm

Notes:
All dimensions are typical in millimeters (inches).
Pin section tolerances : ± 0.10 (± 0.004)
General tolerances : ± 0.25 (± 0.01)

## Dimensions for 3000VDC isolated models




Grid size: 2.54*2.54mm

Note:
Unit: mm(inch)
General tolerance: ±0.25 (0.01)
Pin tolerance: ±0.1 (0.004)

| Pin Out Specifications | | |
|---|---|---|
| Pin | Single | Dual |
| 1 | -V Input | -V Input |
| 2 | +V Input | +V Input |
| 5 | -V Output | Common |
| 6 | NC | -V Output |
| 8 | +V Output | +V Output |
| Other Pins | NC | NC |
| NC: Pin to be isolated from circuitry | | |