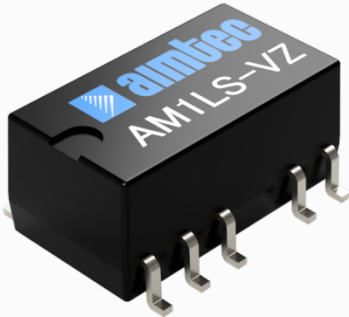


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AM1LS-VZ



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 3.3-24VDC and an output voltage range from 3.3-24V, this series will offer many benefits to your new system design.

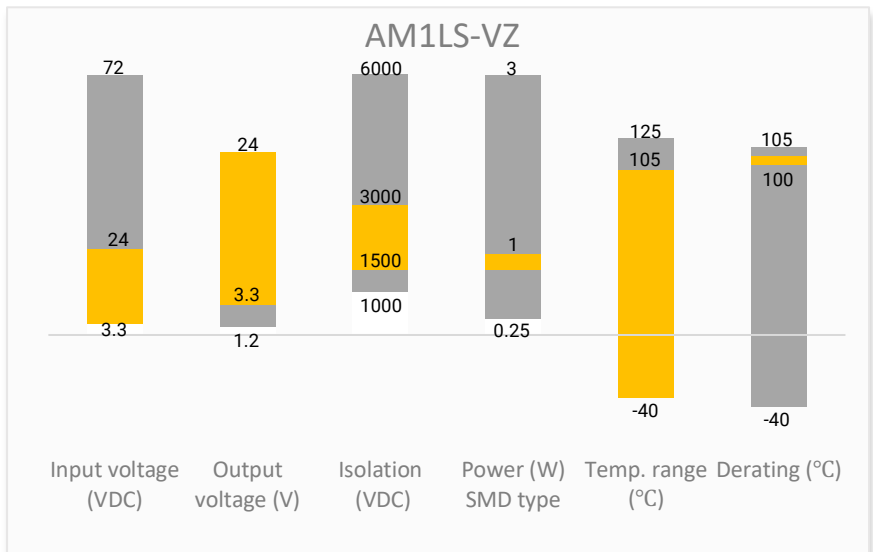
This new series offers great operating temperatures, from -40°C to 105°C with full power up to 100°C. It also features an isolation of 1500VDC or 3000VDC for improved reliability and system safety. Furthermore, a higher MTBF of 3500,000h and output short circuit protection (OSCP) come standard with the series.

The AM1LS-VZ is perfect for information technology, instrumentation, industrial applications, communication and civil applications.

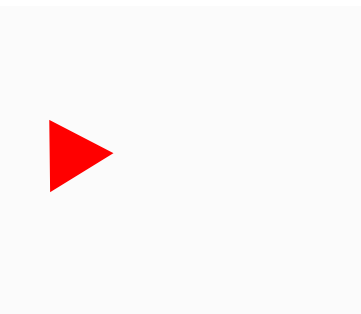
Features

- 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

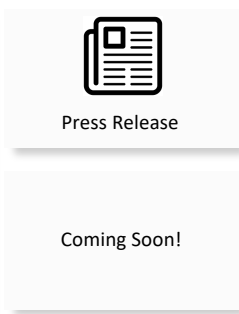
Summary



Training



Product Training Video
(click to open)



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 (μ F) | Efficiency Full Load Typ. (%) |
|------------------|---------------------|----------------------|------------------------|-----------|---------------------|-----------|-----------------|------------------------------------|-------------------------------|
| | | | No Load | Full Load | No Load | Full Load | | | |
| AM1LS-0303SVZ | 3.3 (2.97-3.63) | 3.3 | - | 416 | 30 | 303 | 1500 | 2400 | 77 |
| AM1LS-0305SVZ | 3.3 (2.97-3.63) | 5 | - | 389 | 20 | 200 | 1500 | 2400 | 82 |
| 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-0515SVZ | 5 (4.5-5.5) | 15 | 30 | 254 | 7 | 67 | 1500 | 470 | 83 |
| AM1LS-1205SVZ | 12 (10.8-13.2) | 5 | - | 107 | 20 | 200 | 1500 | 2400 | 82 |
| AM1LS-1209SVZ | 12 (10.8-13.2) | 9 | - | 106 | 12 | 111 | 1500 | 1000 | 83 |
| AM1LS-1212SVZ | 12 (10.8-13.2) | 12 | - | 106 | 9 | 84 | 1500 | 560 | 83 |
| AM1LS-1215SVZ | 12 (10.8-13.2) | 15 | - | 106 | 7 | 67 | 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 | - | 107 | 20 | 200 | 3000 | 2400 | 82 |
| AM1LS-1212SH30VZ | 12 (10.8-13.2) | 12 | - | 107 | 9 | 84 | 3000 | 560 | 83 |
| AM1LS-1215SH30VZ | 12 (10.8-13.2) | 15 | - | 107 | 7 | 67 | 3000 | 560 | 83 |
| AM1LS-2405SH30VZ | 24 (21.6-26.4) | 5 | - | 57 | 20 | 200 | 3000 | 2400 | 80 |
| AM1LS-2415SH30VZ | 24 (21.6-26.4) | 15 | - | 57 | 7 | 67 | 3000 | 560 | 80 |

Note: Use suffix "TR" for tape & reel packing (ex. AM1LS-0303SVZTR).

Dual Output

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

Note: Use suffix "TR" for tape & reel packing (ex. AM1LS-0503DH30VZTR).

Input Specification

| Parameters | Conditions | Typical | Maximum | Units |
|-------------------------|-----------------------------|---------|---------|-------|
| Filter | Capacitor | | | |
| Absolute maximum rating | Maximum duration 1s, 3.3Vin | > -0.7 | 5 | VDC |

| | | | | |
|--------------------------------|----------------------------|--------|----|-----|
| Input reflected ripple current | Maximum duration 1s, 5Vin | > -0.7 | 9 | VDC |
| | Maximum duration 1s, 12Vin | > -0.7 | 18 | VDC |
| | Maximum duration 1s, 24Vin | > -0.7 | 30 | VDC |
| | 3.3Vin models | 30 | | mA |
| | Others | 15 | | mA |

| Output Specification | | | | |
|-------------------------|--|---------|---------|----------|
| Parameters | Conditions | Typical | Maximum | Units |
| Voltage accuracy | See Typical Characteristic | | | |
| Line regulation | Per 1% Vin change, 3.3Vout models | | ±1.5 | % |
| | Per 1% Vin change, Others | | ±1.2 | % |
| Load regulation | 10-100% load, 3.3Vout models | | 20 | % |
| | 10-100% load, 3.3/5Vin 5/15Vout 1.5KV isolation models | | 15 | % |
| | 10-100% load, 5Vin 5Vout 3KV isolation models | | 15 | % |
| | 10-100% load, 5Vin 15Vout 3KV isolation models | | 10 | % |
| | 10-100% load, 5Vin 9/12/24Vout models | | 10 | % |
| | 10-100% load, 12/24Vin 5Vout models | 5 | 15 | % |
| | 10-100% load, 12/24Vin 9/12/15Vout models | | 10 | % |
| Temperature coefficient | Full load | ±0.02 | | %/°C |
| Ripple & Noise* | 5Vin 3.3/5/9/12/15Vout & 12Vin SVZ series models | 30 | 75 | mV pk-pk |
| | AM1LS-0515SVZ & others | | 100 | mV pk-pk |

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

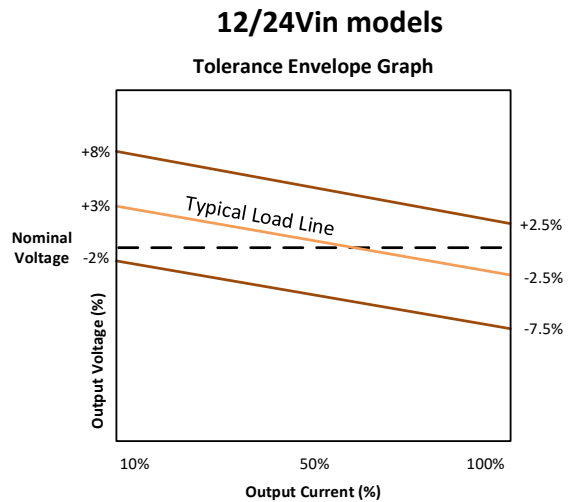
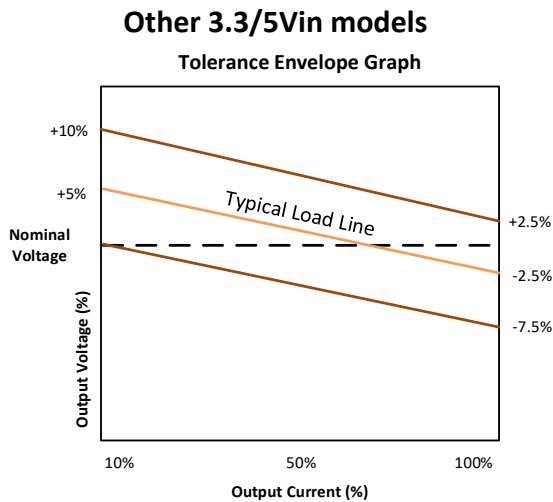
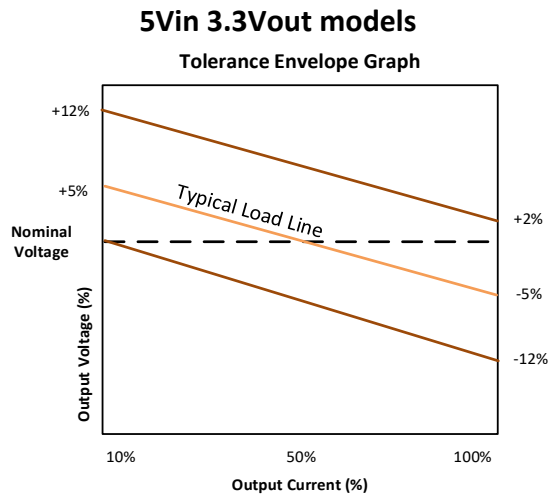
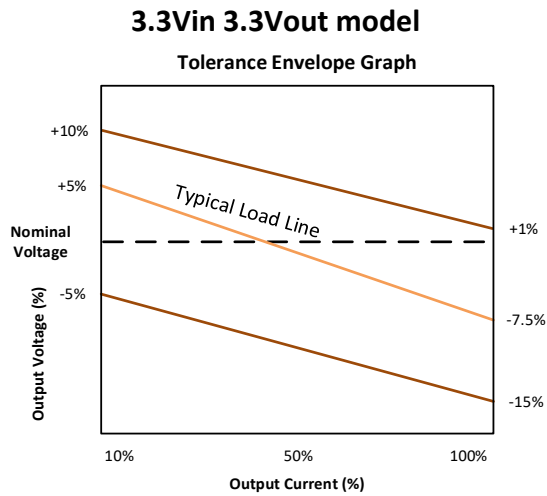
| Isolation Specification | | | | |
|-------------------------|--------------------------------------|-------------|---------|-------|
| Parameters | Conditions | Typical | Maximum | Units |
| Tested I/O voltage | 60 sec, 1mA max | 1500 / 3000 | | VDC |
| Resistance | Input to output resistance at 500Vdc | >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, AM1LS-0515SVZ | 300 | | KHz |
| | Full load, nominal input voltage, 5Vin models | 270 | | KHz |
| | Full load, nominal input voltage, 12/24Vin models | 260 | | KHz |
| | Full load, nominal input voltage, 3.3Vin models | 220 | | 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 |
| 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 H30 series 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) |
| | | IEC 61000-4-2 Air ±8KV, Contact ±6KV, Criteria B with the recommended EMI circuit (3.3/12/24Vin models) |

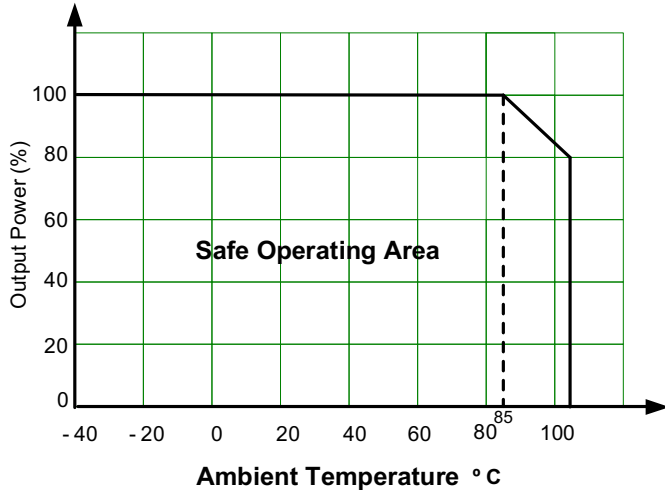
Typical Characteristic



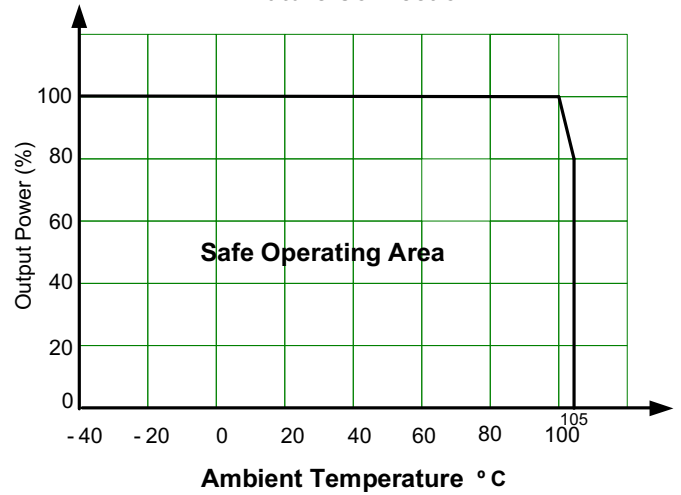
Derating



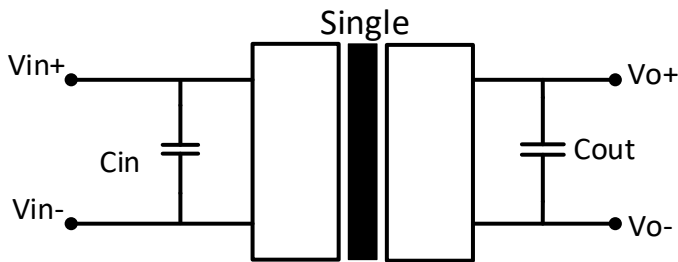
3.3Vin models
Nature Convection



Other models
Nature Convection

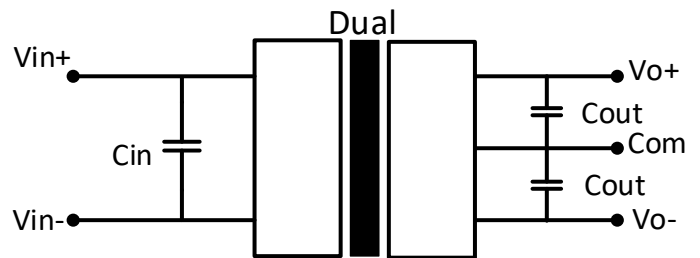


Typical Application Circuit



| Vin | Cin |
|-----|-----------------|
| 3.3 | 4.7 μ F/16V |
| 5 | 4.7 μ F/16V |
| 12 | 2.2 μ F/25V |
| 24 | 1 μ F/50V |

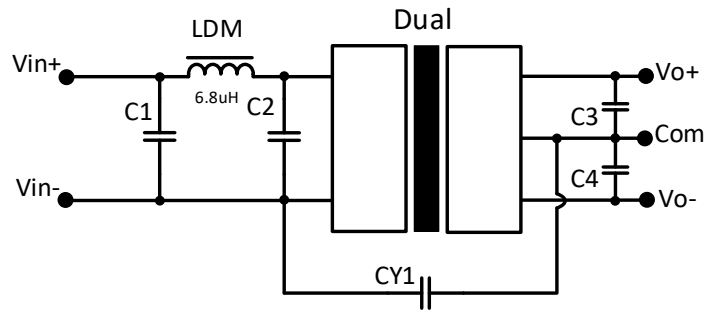
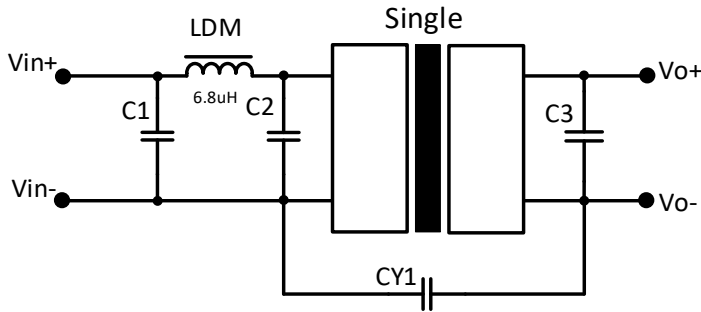
| Vout | Cout |
|-------|------------------|
| 3.3 V | 10 μ F/16V |
| 5 V | 10 μ F/16V |
| 9 V | 4.7 μ F/25V |
| 12 V | 2.2 μ F/25V |
| 15 V | 1 μ F/25V |
| 24V | 0.47 μ F/50V |



| 12Vin Dual output model | |
|-------------------------|------------------|
| Vout | Cout |
| \pm 15V | 0.47 μ F/25V |

| 1500VDC isolation models | |
|--------------------------|-----------------|
| P/N | Cout |
| AM1LS-0515SVZ | 2.2 μ F/25V |
| AM1LS-1209SVZ | 2.2 μ F/16V |

EMI Recommended Circuit

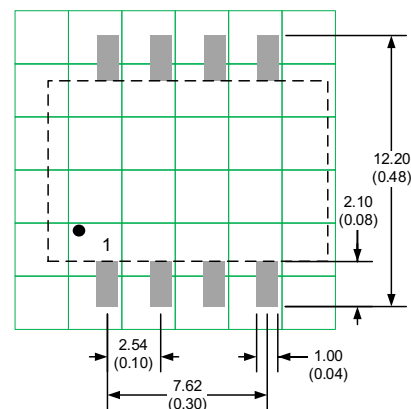
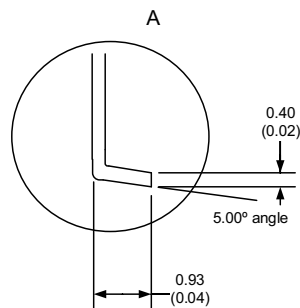
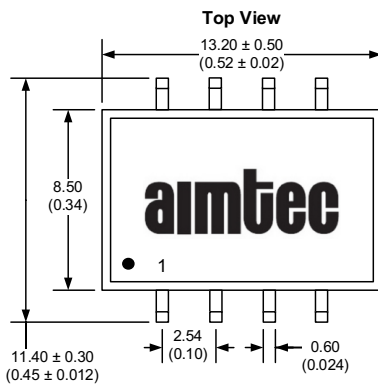
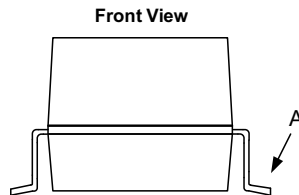
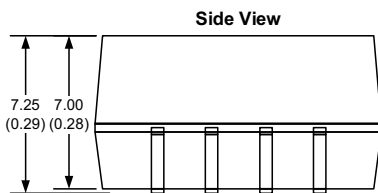


| Input voltage | C1/C2 | C3/C4 |
|---------------|-----------|----------------------------------|
| 3.3V | 4.7μF/16V | Refer to Cout in typical circuit |
| 5V | 4.7μF/25V | Refer to Cout in typical circuit |
| 12V | 4.7μF/50V | Refer to Cout in typical circuit |
| 24V | 4.7μF/50V | Refer to Cout in typical circuit |

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

Dimensions

Dimensions for 1500VDC isolated models

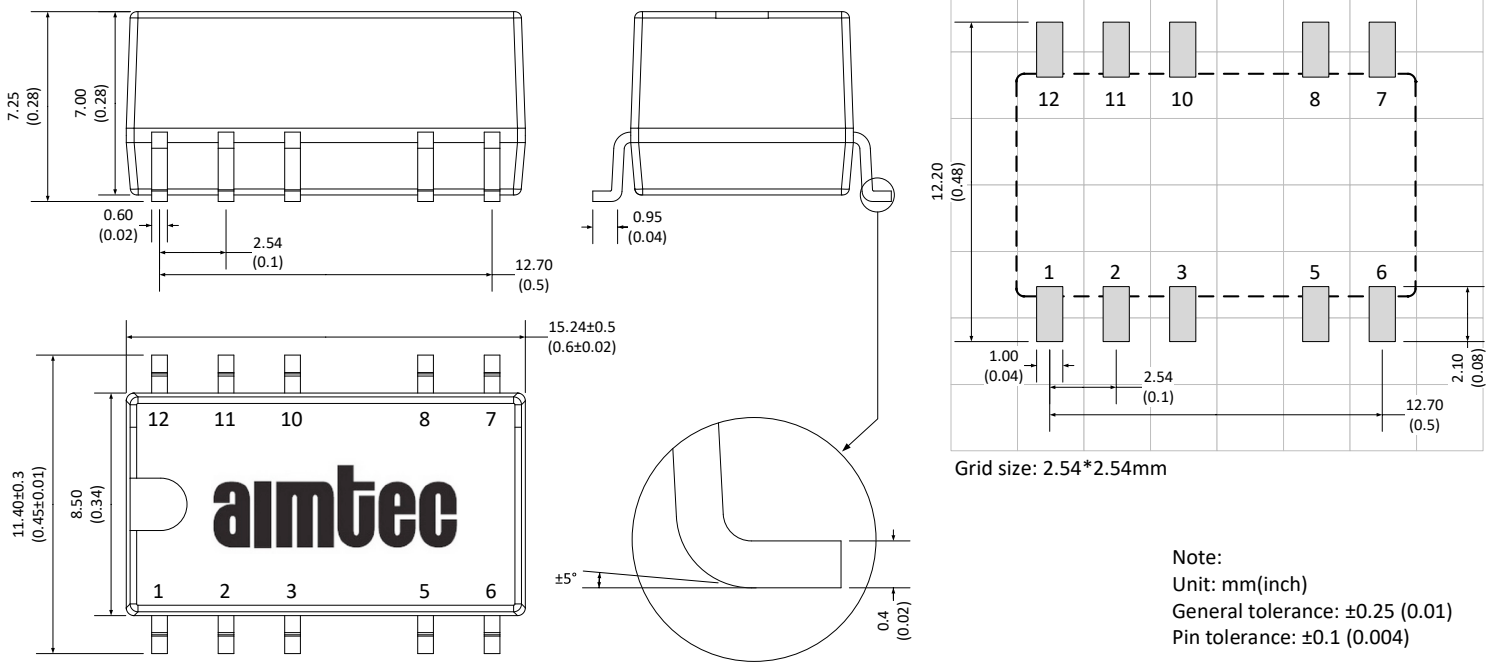


| Pin Out Specifications | |
|------------------------|-----------|
| Pin | Single |
| 1 | -V Input |
| 2 | +V Input |
| 4 | -V Output |
| 5 | +V Output |
| Other Pins | NC |

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

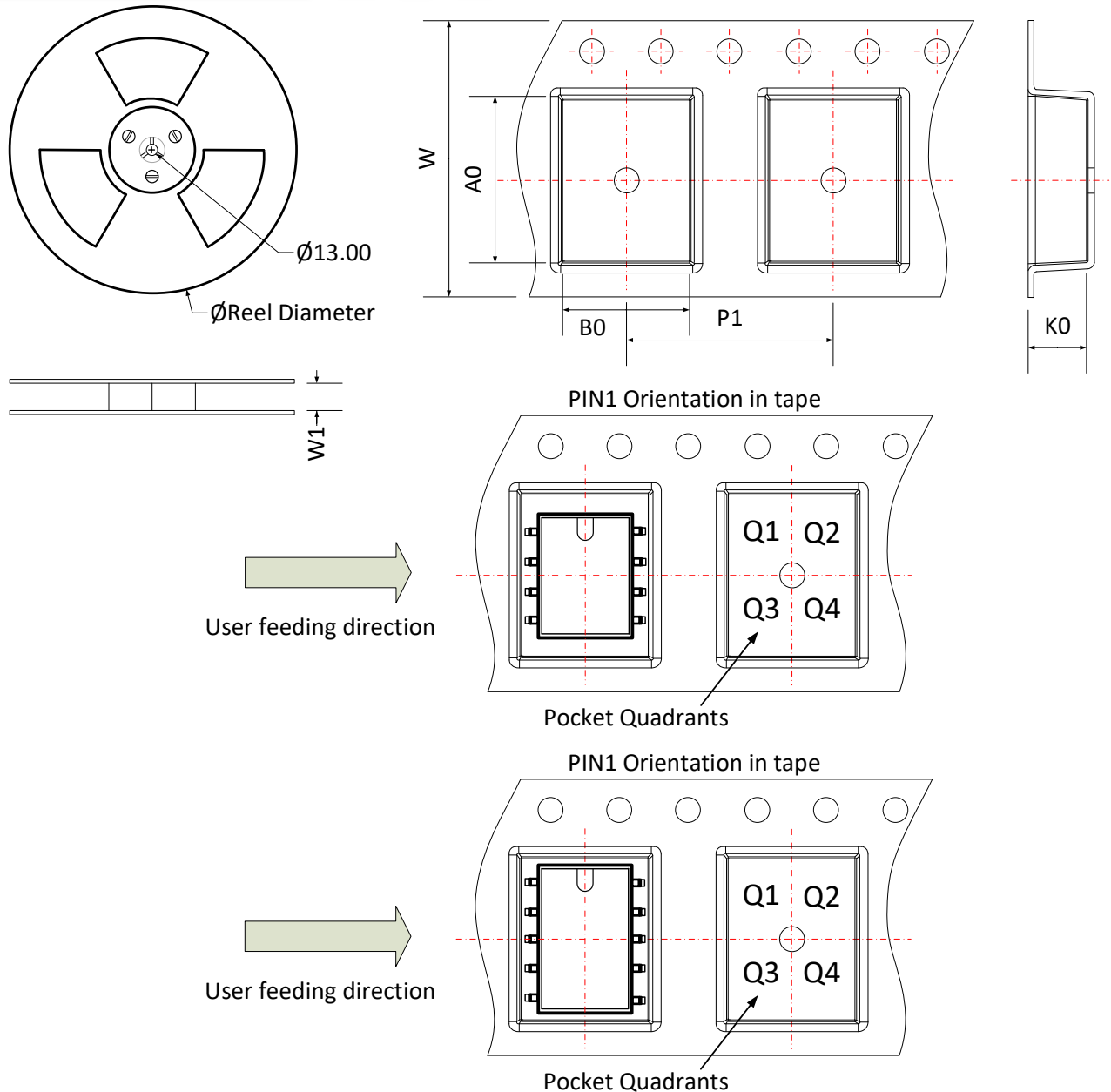


Note:
Unit: mm(inch)
General tolerance: ±0.25 (0.01)
Pin tolerance: ±0.1 (0.004)

| 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

Packing Information



| Device | Package Type | Pin | MPQ | Reel Diameter (mm) | Reel Width W1 (mm) | A0 | B0 | K0 | P1 | W | P1 Quadrant |
|------------------------|--------------|-----|-----|--------------------|--------------------|------|------|------|------|------|-------------|
| 1.5KV isolation models | SMD | 8 | 500 | 330.0 | 24.5 | 13.4 | 11.7 | 7.5 | 16.0 | 24.0 | Q1 |
| 3KV isolation models | SMD | 10 | 500 | 330.0 | 24.5 | 15.6 | 12.4 | 7.45 | 16.0 | 24.0 | Q1 |

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