

## AMEL10-277HAVZ

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Encapsulated

AMEL10-277HAVZ series is an efficient 10W AC-DC power supply module. Offering a commercial input voltage range of 85-305VAC, output voltage ranges from 3.3-24V, low power consumption, high efficiency and high reliability.

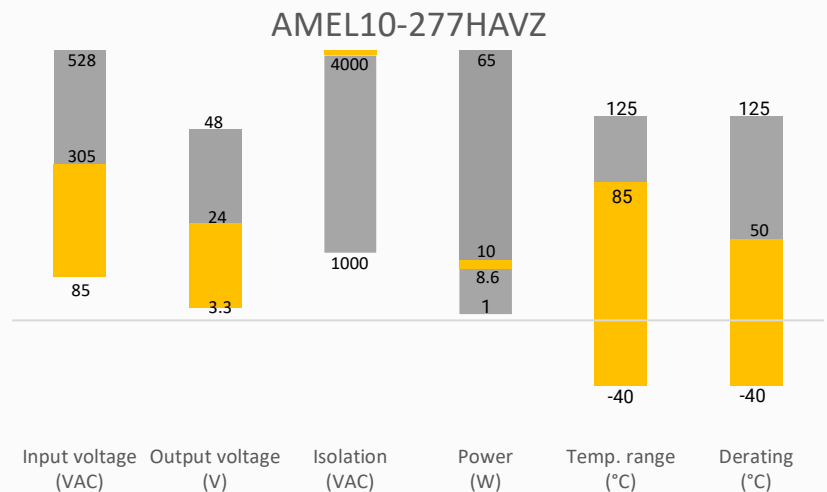
This new series offers great operating temperatures, from -40°C to 85°C with full power up to 50°C and features an isolation of 4000VAC for improved reliability and system safety. Furthermore, a high MTBF of 3200,000h, output short circuit protection (OSCP), output over-current protection (OCP) and an output over-voltage protection (OVP) come standard with the series.

The AMEL10-277HAVZ is suitable for grid power, instrumentation, industrial controls, communication, and civil applications.

## Features

- Universal Input: 85 - 305VAC/100 - 430VDC
- Operating Temp: -40 °C to +85 °C
- High isolation voltage: 4000VAC
- Low ripple & noise, 100mV(p-p), max.
- Output short circuit, over-current, over-voltage protection
- Regulated Output
- Efficiency up to 85%
- Certified: UL62368-1, EN61558-1:2005+A1:2009, EN61558-2-16:2009+A1:2013
- Designed to meet: IEC/EN62368-1, EN60335-1, IEC/EN60601-1 (2xMOPP), IEC61558-2-16

## Summary



## Training



Product Training Video  
(click to open)



Press Release

Coming Soon!

Application Notes

## Applications



Power Grid



Industrial



Telecom



Instrumentation

## Models & Specifications

### Single Output

| Model                                                                                               | Input Voltage (VAC/Hz) | Input Voltage (VDC) | Max Output wattage (W) | Output Voltage (V) | Output Current max (A) | Maximum capacitive load (μF) | Efficiency @ 230VAC Typ. (%) |
|-----------------------------------------------------------------------------------------------------|------------------------|---------------------|------------------------|--------------------|------------------------|------------------------------|------------------------------|
| AMEL10-3S277HAVZ                                                                                    | 85-305/47-60           | 100-430             | 8.6                    | 3.3                | 2.6                    | 6600                         | 74                           |
| AMEL10-5S277HAVZ   | 85-305/47-60           | 100-430             | 10                     | 5                  | 2                      | 5000                         | 79                           |
| AMEL10-9S277HAVZ                                                                                    | 85-305/47-60           | 100-430             | 10                     | 9                  | 1.1                    | 3600                         | 81                           |
| AMEL10-12S277HAVZ  | 85-305/47-60           | 100-430             | 10                     | 12                 | 0.83                   | 2000                         | 84                           |
| AMEL10-15S277HAVZ                                                                                   | 85-305/47-60           | 100-430             | 10                     | 15                 | 0.66                   | 820                          | 84                           |
| AMEL10-24S277HAVZ                                                                                   | 85-305/47-60           | 100-430             | 10                     | 24                 | 0.41                   | 470                          | 85                           |

#### Note:

- Use suffix "ST" for chassis and suffix "STD" for DIN-Rail mounting (ex. AMEL10-3S277HAVZ -ST is chassis mounting and AMEL10-3S277HAVZ -STD is DIN-Rail mounting version).
- Add suffix "-B" for single unit packaging or "-60" for volume packaging (ex. AMEL10-3S277HAVZ-B is single unit packaging and AMEL10-3S277HAVZ-60 is volume packaging).
- Packaging information is not printed on the product label and is only used for ordering the product.
- Models marked with  that have an alternate options with higher start-up time and power consumption. Use suffix "-002" for the shorter lead time option. (ex. AMEL10-5S277HAVZ-002 is the shorter lead time version).

### Input Specifications

| Parameters     | Conditions         | Typical | Maximum | Units  |
|----------------|--------------------|---------|---------|--------|
| Input current  | 115VAC             |         | 230     | mA     |
|                | 230VAC             |         | 150     | mA     |
| Inrush current | 115VAC             | 25      |         | A      |
|                | 230VAC             | 40      |         | A      |
| Leakage        | 277VAC, 50Hz       |         | 0.1     | mA RMS |
| Fuse           | 2A/300V, Slow blow |         |         |        |

### Output Specifications

| Parameters       | Conditions                                                                                                  | Typical | Maximum | Units  |
|------------------|-------------------------------------------------------------------------------------------------------------|---------|---------|--------|
| Voltage accuracy |                                                                                                             | ±2      |         | %      |
| Line regulation  | Full load                                                                                                   | ±0.5    |         | %      |
| Load regulation  | 0-100% load                                                                                                 | ±1      |         | %      |
| Ripple & Noise*  | 20MHz bandwidth                                                                                             | 50      | 100     | mV p-p |
| Start-up time    | Standard models                                                                                             | 1       |         | S      |
|                  |  Models with suffix -002 | 2       |         | S      |
| Hold up time     | 115VAC                                                                                                      | 8       |         | ms     |
|                  | 230VAC                                                                                                      | 40      |         | ms     |

\* Ripple and Noise are measured at 20MHz bandwidth with a 10μF electrolytic capacitor and a 1μF ceramic capacitor. Please refer to the application note for specific details.

### Isolation Specification

| Parameters         | Conditions                        | Typical | Maximum | Units      |
|--------------------|-----------------------------------|---------|---------|------------|
| Tested I/O voltage | 60 sec, leakage $\leq 5\text{mA}$ | 4000    |         | VAC        |
| Resistance         | 500VDC                            | >100    |         | M $\Omega$ |

### General Specifications

| Parameters                   | Conditions                                | Typical                                              | Maximum | Units     |
|------------------------------|-------------------------------------------|------------------------------------------------------|---------|-----------|
| Protection class             | Class II                                  |                                                      |         |           |
| Overvoltage category         | OVC III                                   |                                                      |         |           |
| Over current protection      | Auto recovery                             | ≥ 110                                                |         | % of Iout |
| Over voltage protection      | 3.3, 5Vout, voltage clamp, hiccup         |                                                      | 7.5     | VDC       |
|                              | 9Vout, voltage clamp, hiccup              |                                                      | 15      | VDC       |
|                              | 12, 15Vout, voltage clamp, hiccup         |                                                      | 20      | VDC       |
|                              | 24Vout, voltage clamp, hiccup             |                                                      | 30      | VDC       |
| Short circuit protection     | Hiccup, Continuous, Auto recovery         |                                                      |         |           |
| Switching Frequency          |                                           | 65                                                   |         | KHz       |
| Operating altitude           |                                           |                                                      | 5000    | m         |
| Operating temperature        | See derating graph                        | -40 to +85                                           |         | °C        |
| Storage temperature          |                                           | -40 to +85                                           |         | °C        |
| Reflow soldering temperature | Duration 5 - 10s                          | 260                                                  |         | °C        |
| Manual soldering temperature | Duration 3 - 5s                           | 360                                                  |         | °C        |
| No-load power consumption    | 230VAC, standard models                   | 0.1                                                  |         | W         |
|                              | ⊙ 230VAC, models with suffix -002         | 0.2                                                  |         | W         |
| Power Derating               | -40 °C to -25 °C, 85VAC to 115VAC         | 2.2                                                  |         | %/°C      |
|                              | +50 °C to +70 °C, 3.3/5Vout               | 2.5                                                  |         | %/°C      |
|                              | +55 °C to +70 °C, 9/12/15/24Vout          | 3.33                                                 |         | %/°C      |
|                              | +70 °C to +85 °C                          | 0.66                                                 |         | %/°C      |
|                              | 85VAC to 140VAC                           | 0.83                                                 |         | %/VAC     |
|                              | 2000 - 5000m                              | 6.7                                                  |         | %/km      |
| Temperature coefficient      |                                           | ±0.02                                                |         | %/°C      |
| Cooling                      | Free air convection                       |                                                      |         |           |
| Humidity                     | Non-condensing                            |                                                      | 95      | % RH      |
| Case material                | Plastic (flammability to UL 94V-0)        |                                                      |         |           |
| Weight                       | PCB mountable models                      | 34                                                   |         | g         |
|                              | With optional -ST mounting plate          | 54                                                   |         | g         |
|                              | With optional -STD mounting plate         | 74                                                   |         | g         |
| Dimensions (L x W x H)       | PCB mountable models                      | 1.58 x 1.00 x 0.83 inches (40.00 x 25.40 x 21.00 mm) |         |           |
|                              | With optional -ST mounting plate          | 2.99 x 1.24 x 1.17 inches (76.00 x 31.50 x 29.80 mm) |         |           |
|                              | With optional -STD mounting plate         | 2.99 x 1.24 x 1.35 inches (76.00 x 31.50 x 34.40 mm) |         |           |
| MTBF                         | > 3 200 000 hrs (MIL-HDBK -217F, t=+25°C) |                                                      |         |           |

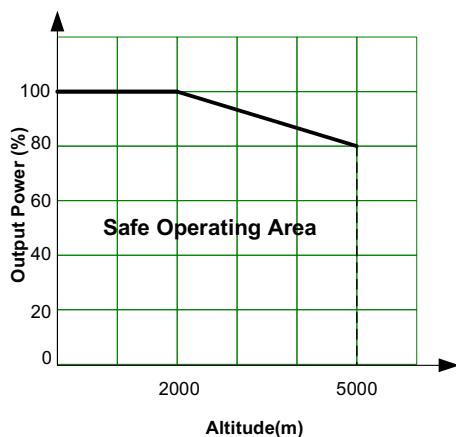
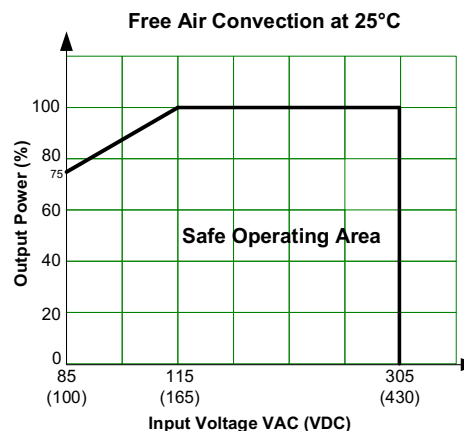
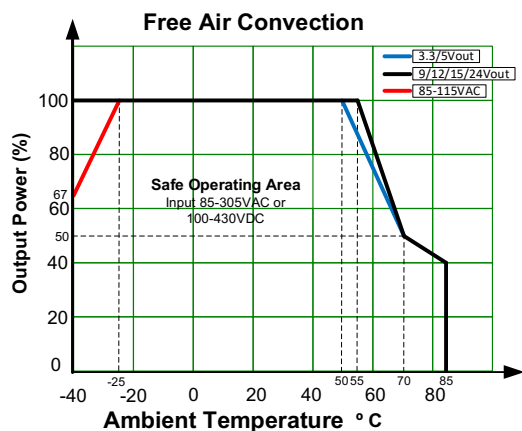
NOTE: All specifications in this datasheet are measured at an ambient temperature of 25°C, humidity<75%, nominal input voltage and at rated output load unless otherwise specified.

### Safety Specifications

| Parameters      |                                                                               |
|-----------------|-------------------------------------------------------------------------------|
| Agency Approval | UL 62368-1, EN61558-2-16:2009+A1:2013, EN61558-1:2005+A1:2009                 |
| Standards       | Design to meet IEC/EN 62368-1, EN60335-1, IEC61558-2-16                       |
|                 | EMC - Conducted and radiated emission CISPR32 / EN55032, class B (without PE) |

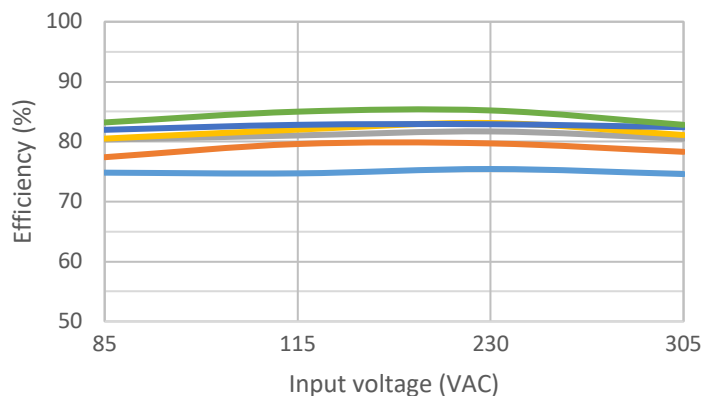
|                                            |                                                                                                                                                                                                                                                                              |
|--------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                            | CISPR32 / EN55032, class B with the recommended EMC circuit 2 (with PE)<br>EN55014-1                                                                                                                                                                                         |
| Electrostatic Discharge Immunity           | IEC 61000-4-2 Contact $\pm 8\text{KV}$ , Air $\pm 15\text{KV}$ , Criteria B<br>EN55014-2, Criteria B                                                                                                                                                                         |
| RF, Electromagnetic Field Immunity         | IEC 61000-4-3 $10\text{V/m}$ , Criteria A<br>EN55014-2, Criteria A                                                                                                                                                                                                           |
| Electrical Fast Transient/Burst Immunity   | IEC 61000-4-4 $\pm 2\text{KV}$ , Criteria B<br>IEC 61000-4-4 $\pm 4\text{KV}$ , Criteria B with the recommended EMC circuit 1<br>IEC 61000-4-4 $\pm 4\text{KV}$ , Criteria A with the recommended EMC circuit 2<br>EN55014-2, Criteria B                                     |
| Surge Immunity                             | IEC 61000-4-5 L-L $\pm 1\text{KV}$ , Criteria B<br>IEC 61000-4-5 L-L $\pm 2\text{KV}$ , Criteria B with the recommended EMC circuit 1<br>IEC 61000-4-5 L-L $\pm 2\text{KV}$ , L-LG $\pm 4\text{KV}$ , Criteria A with the recommended EMC circuit 2<br>EN55014-2, Criteria B |
| RF, Conducted Disturbance Immunity         | IEC 61000-4-6 $10\text{Vr.m.s}$ , Criteria A<br>EN55014-2, Criteria A                                                                                                                                                                                                        |
| Voltage dips, Short Interruptions Immunity | IEC 61000-4-11 0%, 70%, Criteria B<br>EN55014-2, Criteria B                                                                                                                                                                                                                  |

## Derating



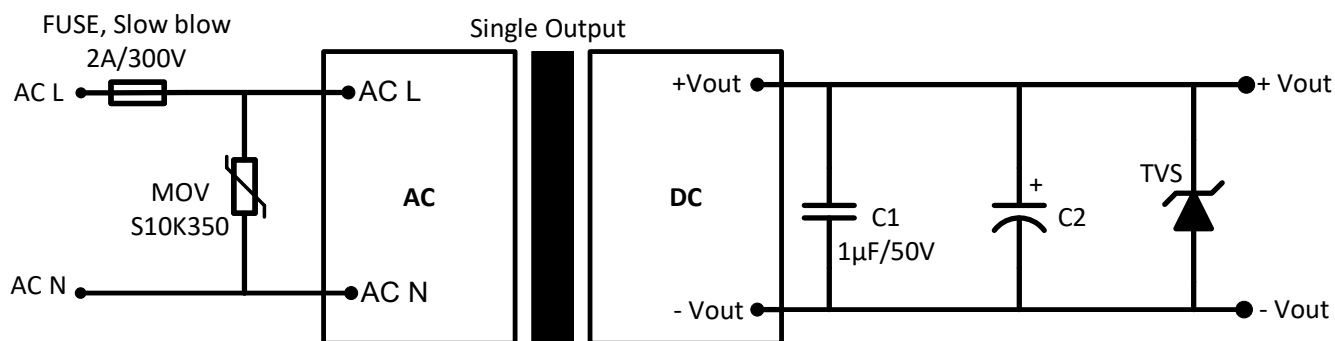
## Efficiency vs input voltage

Efficiency vs input voltage (Full load)



AMEL10-3S277HAVZ    AMEL10-5S277HAVZ  
 AMEL10-9S277HAVZ    AMEL10-12S277HAVZ  
 AMEL10-15S277HAVZ    AMEL10-24S277HAVZ

## Typical Application Circuit

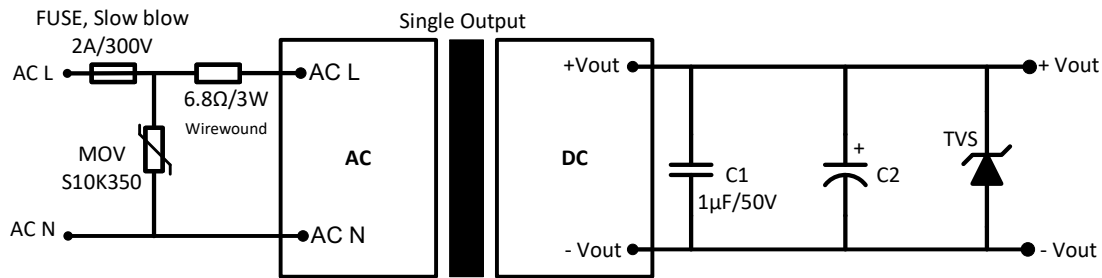


| Model      | C2        | TVS |
|------------|-----------|-----|
| 3.3, 5Vout | 220μF/16V | 7V  |
| 9Vout      | 100μF/25V | 12V |
| 12, 15Vout | 100μF/25V | 20V |
| 24Vout     | 100μF/35V | 30V |

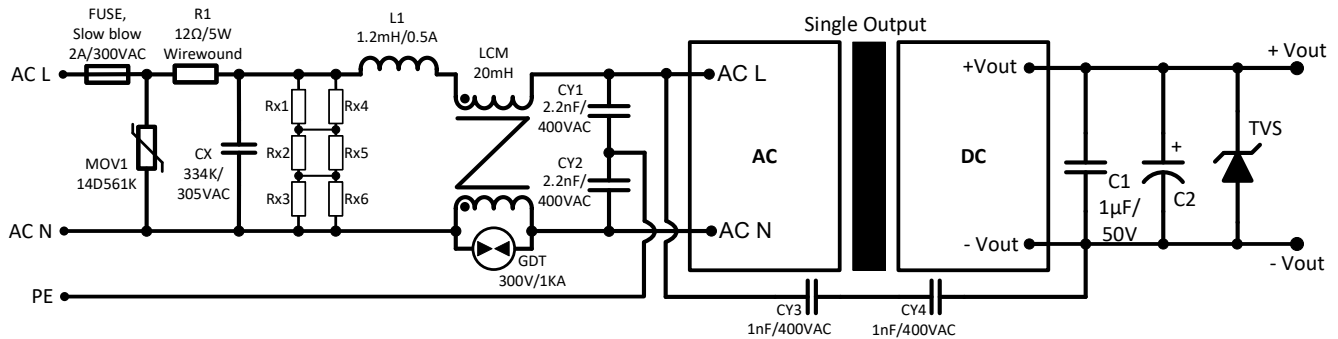
### For filtering components:

The input fuse is recommended to use slow blow type. Choose capacitors with at least 20% voltage margin. The C2 capacitor is recommended to use electrolytic type with high frequency and low ESR rating. The C1 capacitor is recommended to use ceramic type for filtering high-frequency noise.

## Recommended EMC Circuit 1

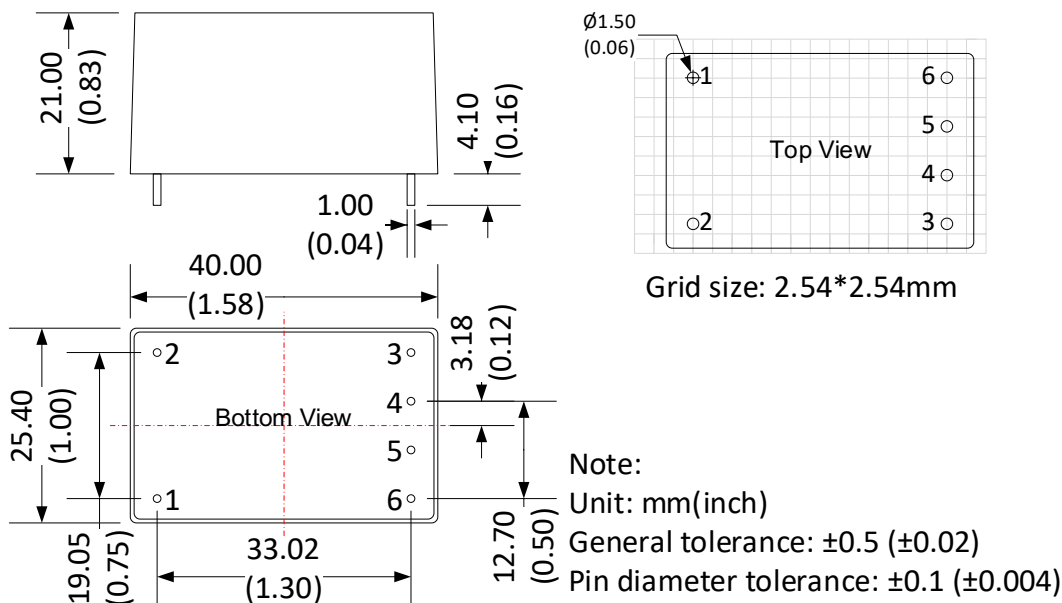


## Recommended EMC Circuit 2



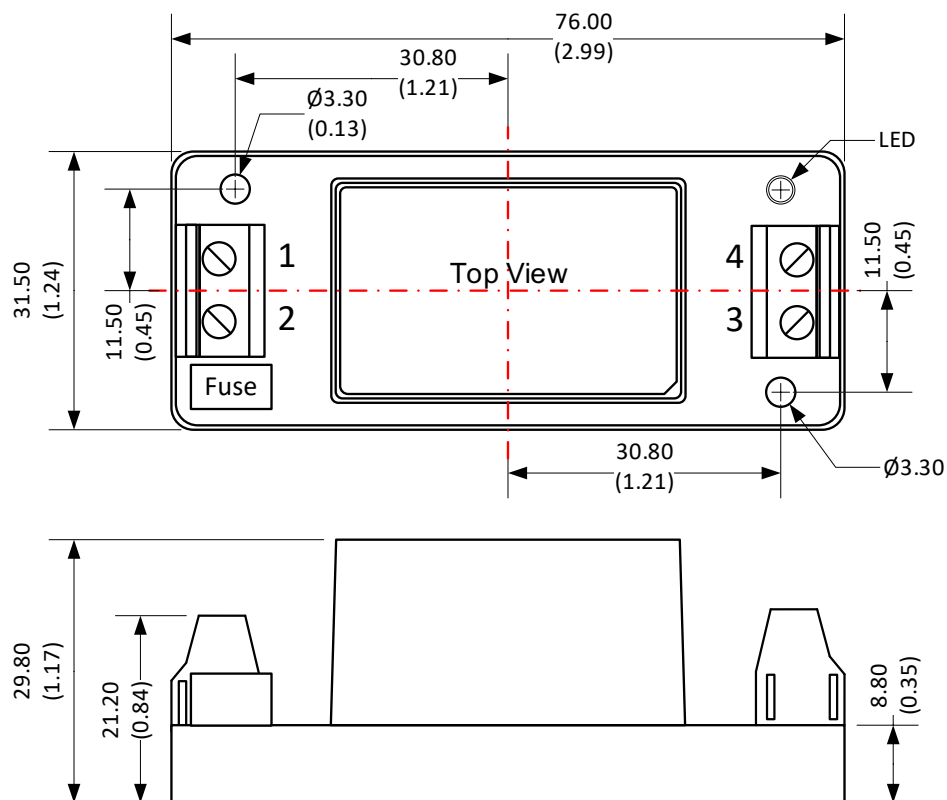
Rx1, Rx2, Rx3, Rx4, Rx5, Rx6  
1.5MΩ/150VDC

## Dimensions



| Pin Output Specifications |              |
|---------------------------|--------------|
| Pin                       | Function     |
| 1                         | AC Input (L) |
| 2                         | AC Input (N) |
| 3                         | No Pin       |
| 4                         | +V Output    |
| 5                         | No Pin       |
| 6                         | -V Output    |

## Dimensions with ST Optional



| Pin Output Specifications |              |
|---------------------------|--------------|
| Pin                       | Function     |
| 1                         | AC Input (N) |
| 2                         | AC Input (L) |
| 3                         | -V Output    |
| 4                         | +V Output    |

### Note:

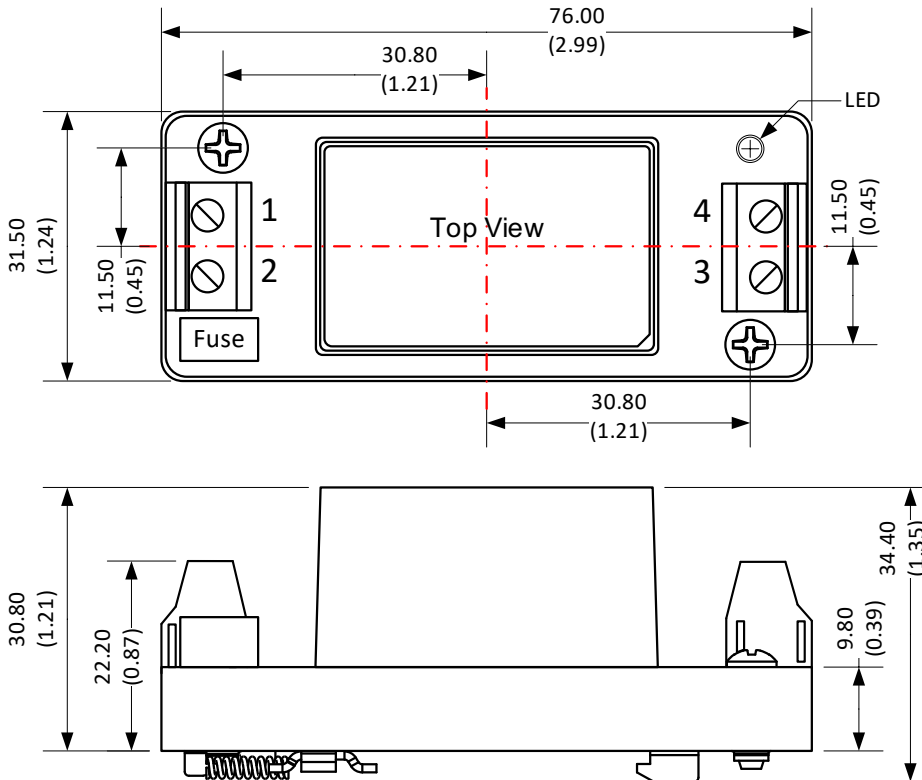
Unit: mm(inch)

Wire range : 24-12 AWG

Tightening torque : Max 0.4 N.m

General tolerance  $\pm 1.00$  : ( $\pm 0.04$ )

## Dimensions with STD Optional



| Pin Output Specifications |              |
|---------------------------|--------------|
| Pin                       | Function     |
| 1                         | AC Input (N) |
| 2                         | AC Input (L) |
| 3                         | -V Output    |
| 4                         | +V Output    |

### Note:

Unit: mm(inch)

Wire range : 24-12 AWG

Mounting rail: TS35

Tightening torque : Max 0.4 N.m

General tolerance  $\pm 1.00$  : ( $\pm 0.04$ )

Mounting rail must be grounded.

**NOTE:** 1. Datasheets are updated as needed and as such, specifications are subject to change without notice. Once printed or downloaded, datasheets are no longer controlled by Aimtec; refer to [www.aimtec.com](http://www.aimtec.com) for the most current product specifications. 2. Product labels shown, including safety agency certifications on labels, may vary based on the date manufactured. 3. Mechanical drawings and specifications are for reference only. 4. All specifications are measured at an ambient temperature of 25°C, humidity<75%, nominal input voltage and at rated output load unless otherwise specified. 5. Aimtec may not have conducted destructive testing or chemical analysis on all internal components and chemicals at the time of publishing this document. CAS numbers and other limited information are considered proprietary and may not be available for release. 6. This product is not designed for use in critical life support systems, equipment used in hazardous environments, nuclear control systems or other such applications which necessitate specific safety and regulatory standards other the ones listed in this datasheet. 7. Warranty is in accordance with Aimtec's standard Terms of Sale available at [www.aimtec.com](http://www.aimtec.com).