

## Series AMEL20-MAZ

### 20 Watt | AC-DC / DC-DC Converter



#### FEATURES:

- I/O Isolation 4000VAC
- Operating Temp: -40°C to +70°C
- Over load, Over Voltage, Short Circuit Protection
- Universal Input: 90-264VAC, 47-440Hz, or 130-170VDC
- Energy Star compliant
- Ultra-small package
- Up to 82% efficiency

#### Models 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 (%) |         |
|----------------|------------------------|---------------------|------------------------|-------------------|------------------------|------------------------------|----------------|---------|
|                |                        |                     |                        |                   |                        |                              | 115 VAC        | 230 VAC |
| AMEL20-3.3SMAZ | 90-264/47-440          | 130-370             | 13.2                   | 3.3               | 4                      | 5600                         | 74             | 71      |
| AMEL20-5SMAZ   | 90-264/47-440          | 130-370             | 20                     | 5                 | 4                      | 4700                         | 77             | 77      |
| AMEL20-12SMAZ  | 90-264/47-440          | 130-370             | 20                     | 12                | 1.66                   | 3300                         | 80             | 79      |
| AMEL20-15SMAZ  | 90-264/47-440          | 130-370             | 20                     | 15                | 1.33                   | 2200                         | 80             | 81      |
| AMEL20-24SMAZ  | 90-264/47-440          | 130-370             | 20                     | 24                | 0.84                   | 1000                         | 77             | 79      |

#### Models Asymmetric Dual output

| Model             | Input Voltage (VAC/Hz) | Input Voltage (VDC) | Max Output wattage (W) | Output Voltage (V) | Rated Output Current (A) | Maximum capacitive load (μF) | Efficiency (%) |         |
|-------------------|------------------------|---------------------|------------------------|--------------------|--------------------------|------------------------------|----------------|---------|
|                   |                        |                     |                        |                    |                          |                              | 115 VAC        | 230 VAC |
| AMEL20-3.35DMAZ   | 90-264/47-440          | 130-370             | 17.5                   | 3.3/5              | 1.4/2.5                  | 1000                         | 75             | 76      |
| AMEL20-3.312DMAZ  | 90-264/47-440          | 130-370             | 18                     | 3.3/12             | 1.4/1.1                  | 1000                         | 78             | 78      |
| AMEL20-3.315DMAZ  | 90-264/47-440          | 130-370             | 18                     | 3.3/15             | 1.4/0.89                 | 1000                         | 77             | 77      |
| AMEL20-3.324DMAZ  | 90-264/47-440          | 130-370             | 18                     | 3.3/24             | 1.4/0.55                 | 1000                         | 76             | 76      |
| AMEL20-512DMAZ    | 90-264/47-440          | 130-370             | 18                     | 5/12               | 1.6/0.83                 | 680                          | 76             | 77      |
| AMEL20-515DMAZ    | 90-264/47-440          | 130-370             | 18                     | 5/15               | 1.6/0.66                 | 680                          | 78             | 79      |
| AMEL20-524DMAZ    | 90-264/47-440          | 130-370             | 18                     | 5/24               | 1.6/0.46                 | 680                          | 75             | 76      |
| AMEL20-1215DMAZ   | 90-264/47-440          | 130-370             | 18                     | 12/15              | 0.66/0.66                | 560                          | 77             | 78      |
| AMEL20-1224DMAZ   | 90-264/47-440          | 130-370             | 18                     | 12/24              | 0.58/0.42                | 560                          | 79             | 80      |
| AMEL20-1524DMAZ   | 90-264/47-440          | 130-370             | 18                     | 15/24              | 0.54/0.42                | 560                          | 80             | 81      |
| AMEL20-3.3N5DMAZ  | 90-264/47-440          | 130-370             | 14.8                   | -3.3/5             | -0.7/2.5                 | 680                          | 75             | 76      |
| AMEL20-3.3N12DMAZ | 90-264/47-440          | 130-370             | 18                     | -3.3/12            | -1.4/1.1                 | 680                          | 76             | 77      |
| AMEL20-3.3N15DMAZ | 90-264/47-440          | 130-370             | 18                     | -3.3/15            | -1.4/0.89                | 680                          | 76             | 77      |
| AMEL20-5N5DMAZ    | 90-264/47-440          | 130-370             | 14                     | -5/5               | -0.8/2                   | 680                          | 75             | 76      |
| AMEL20-5N12DMAZ   | 90-264/47-440          | 130-370             | 18                     | -5/12              | -1.6/0.83                | 470                          | 75             | 76      |
| AMEL20-5N15DMAZ   | 90-264/47-440          | 130-370             | 18                     | -5/15              | -1.6/0.66                | 470                          | 75             | 76      |
| AMEL20-12N12DMAZ  | 90-264/47-440          | 130-370             | 18                     | -12/12             | -0.66/0.83               | 470                          | 77             | 78      |
| AMEL20-12N15DMAZ  | 90-264/47-440          | 130-370             | 18                     | -12/15             | -0.66/0.66               | 330                          | 76             | 77      |

**Note:** Optional mounting plate version can be ordered by adding "-ST" suffix to part number (ex. AMEL20-5SMAZ-ST)

\*Output power must not exceed the listed values

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.

#### Input Specifications

| Parameters                       | Conditions | Typical | Maximum | Units |
|----------------------------------|------------|---------|---------|-------|
| Current (full load)              | 115VAC     |         | 500     | mA    |
|                                  | 230VAC     |         | 350     | mA    |
| Inrush current <2ms (cold start) | 115VAC     |         | 30      | A     |
|                                  | 230VAC     |         | 50      | A     |

### Input Specifications (continued)

| Parameters        | Conditions                 | Typical | Maximum | Units |
|-------------------|----------------------------|---------|---------|-------|
| Leakage current   |                            |         | 0.25    | mA    |
| External fuse     | Recommended slow blow type | 1.5     |         | A     |
| Input dissipation | 110/230Vac                 |         | ≤1      | W     |
| Start up time     |                            | 50      |         | ms    |

### Output Specifications

| Parameters                      | Conditions               | Typical | Maximum | Units     |
|---------------------------------|--------------------------|---------|---------|-----------|
| Voltage accuracy                |                          | ±2      |         | %         |
| Line regulation                 |                          | ±1      |         | %         |
| Load regulation (single output) | 0-100% load              | ±2      |         | %         |
| Load regulation (dual output)   | Unbalanced (0-100%) load | ±3      |         | %         |
| Transient recovery time         |                          | 500     |         | µs        |
| Transient response deviation    | 25% load step            | ±2      |         | % of Vout |
| Ripple & Noise*                 | 3.3 & 5V models          | 100     | 150     | mV p-p    |
|                                 | 12, 15 & 24V models      | 150     | 200     |           |
| Hold-up time                    | 110VAC                   | 10      |         | ms        |
|                                 | 230VAC                   | 25      |         |           |

\*Ripple and Noise are measured at 20MHz bandwidth & 230VAC by using a 0.1µF (M/C) and 47µF (E/C) parallel capacitor.

### Isolation Specifications

| Parameters           | Conditions | Typical | Rated | Units |
|----------------------|------------|---------|-------|-------|
| Tested I/O voltage   | 60 sec     |         | 4000  | VAC   |
| Isolation resistance |            | >1000   |       | MΩ    |

### General Specifications

| Parameters               | Conditions                                                                                                                        | Typical    | Maximum | Units  |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------|---------|--------|
| Switching frequency      |                                                                                                                                   | 65         |         | KHz    |
| Over load protection     | Foldback                                                                                                                          | 150        |         | %      |
| Over voltage protection  | Zener Diode Clamp                                                                                                                 |            |         |        |
| Short circuit protection | Auto recovery                                                                                                                     |            |         |        |
| Protection class         | Class II                                                                                                                          |            |         |        |
| Operating temperature    | See derating table                                                                                                                | -40 to +70 |         | °C     |
| Maximum case temperature |                                                                                                                                   |            | 100     | °C     |
| Storage temperature      |                                                                                                                                   | -45 to +95 |         | °C     |
| Temperature coefficient  |                                                                                                                                   | ±0.02      |         | % / °C |
| Cooling                  | Free air convection                                                                                                               |            |         |        |
| Humidity                 | Non condensing                                                                                                                    | 20 ~ 95    |         | % RH   |
| Case material            | Plastic (flammability to UL 94V-0)                                                                                                |            |         |        |
| Weight                   |                                                                                                                                   | 70         |         | g      |
| Dimensions (L x W x H)   | 2.22 x 1.21 x 0.99 inches 56.48 x 30.86 x 25.10mm                                                                                 |            |         |        |
| MTBF                     | > 400 000 hrs (MIL-HDBK -217F, t=+25°C)/Full Load<br>> 100,000 hrs (MIL-HDBK -217F, t=at highest operating temperature)/Full Load |            |         |        |

### Environment Approval

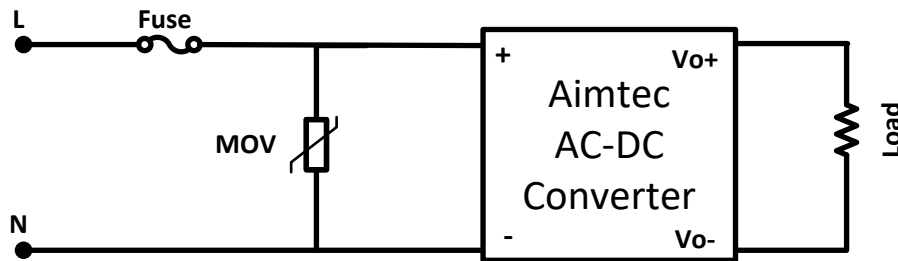
| Test      | Parameters             | Conditions                                       |
|-----------|------------------------|--------------------------------------------------|
| Shock     | Wave form              | Half sine wave                                   |
|           | Acceleration amplitude | 5gn                                              |
|           | Bump duration          | 30 ms                                            |
|           | Converter operation    | before and after test, body mounted (on chassis) |
|           | Number of bumps        | 18 (3 in each direction for every axis)          |
| Vibration | Test mode              | Sweep sine                                       |
|           | Displacement           | 1mm                                              |
|           | Acceleration           | 3g                                               |
|           | Converter operation    | 10-100Hz, speed 0.05Hz/s                         |

## Safety Specifications

| Parameters       |                                            |                                                                            |
|------------------|--------------------------------------------|----------------------------------------------------------------------------|
| Agency approvals | cULus, CE, CB                              |                                                                            |
| Standards        | Medical Electrical Equipment               | IEC\EN\UL 60601-1, 2 x MOOP, CSA-C22.2 No. 601.1-M90                       |
|                  | Information technology Equipment           | EN 60950-1:2006+A11:2009                                                   |
|                  | EMI - Conducted and radiated emission      | EN55022, class B                                                           |
|                  | Harmonic Current Emissions                 | IEC/EN 61000-3-2, Class A                                                  |
|                  | Voltage fluctuations and flicker           | IEC/EN 61000-3-3, (EN60555-3)                                              |
|                  | Electrostatic Discharge Immunity           | IEC 61000-4-2, Contact $\pm 4\text{KV}$ /Air $\pm 8\text{KV}$ , Criteria A |
|                  | RF, Electromagnetic Field Immunity         | IEC 61000-4-3, 3V/m, Criteria A                                            |
|                  | Electrical Fast Transient/Burst Immunity   | IEC 61000-4-4, $\pm 1\text{KV}$ , Criteria A                               |
|                  | Surge Immunity                             | IEC 61000-4-5, $\pm 2\text{KV}$ , Criteria A                               |
|                  | RF, Conducted Disturbance Immunity         | IEC 61000-4-6, 3Vrms, Criteria A                                           |
|                  | Voltage dips, Short Interruptions Immunity | IEC 61000-4-11                                                             |
|                  | Information Technology Equipment           | UL 60950-1:2007                                                            |
|                  | Information Technology Equipment           | CAN/CSA-C22.2 No.60950-1-07                                                |

## Additional Surge Protective Circuitry

The AMEL20-MAZ series design level surge protection is certified to IEC 61000-4-5 surge Line to Line of 1KV. However greater protection can be enhanced by adding protective devices to ingress circuitry. For example, by adding an MOV (Metal Oxide Varistor) device example TVR10471KSY to the N / L input lines 2KV surge protection or greater, can be achieved.

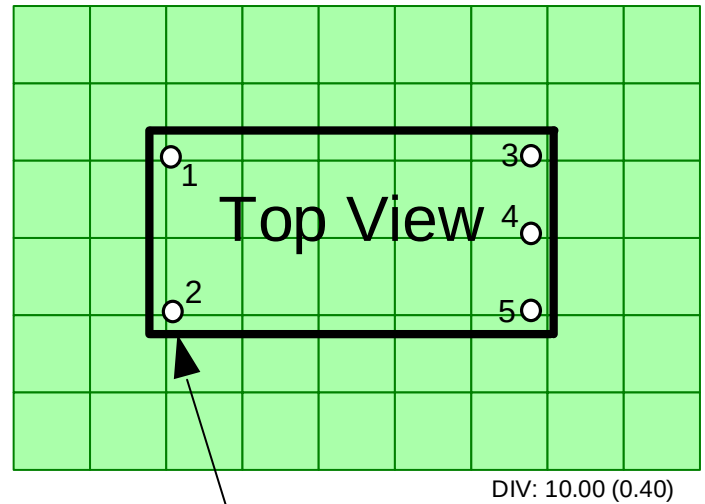
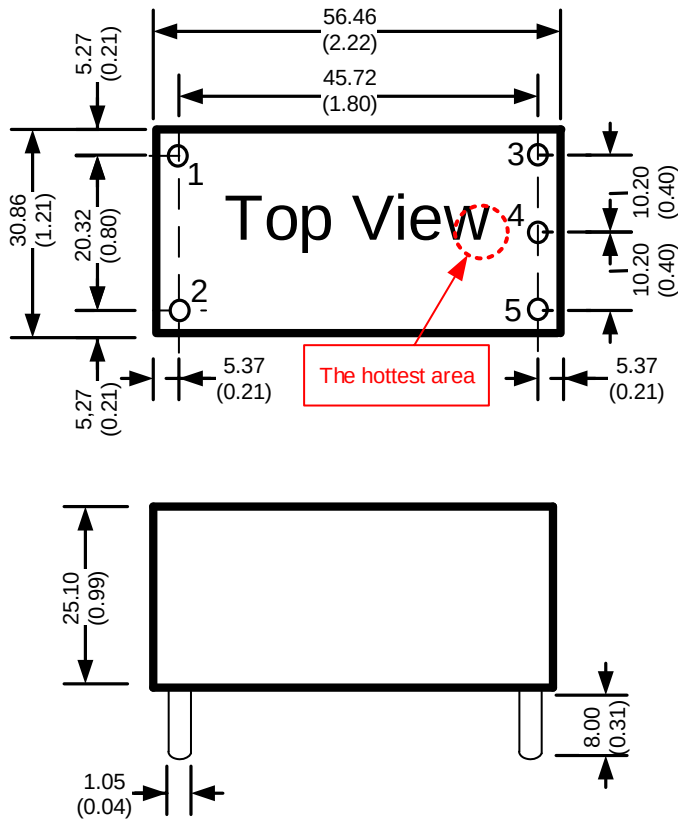


| MOV PN      | Vrms<br>V | Vdc<br>V | Wmax (2ms)<br>J | Pmax<br>W |
|-------------|-----------|----------|-----------------|-----------|
| TVR10471KSY | 300       | 385      | 70              | 0.4       |

## Pin Out Specifications

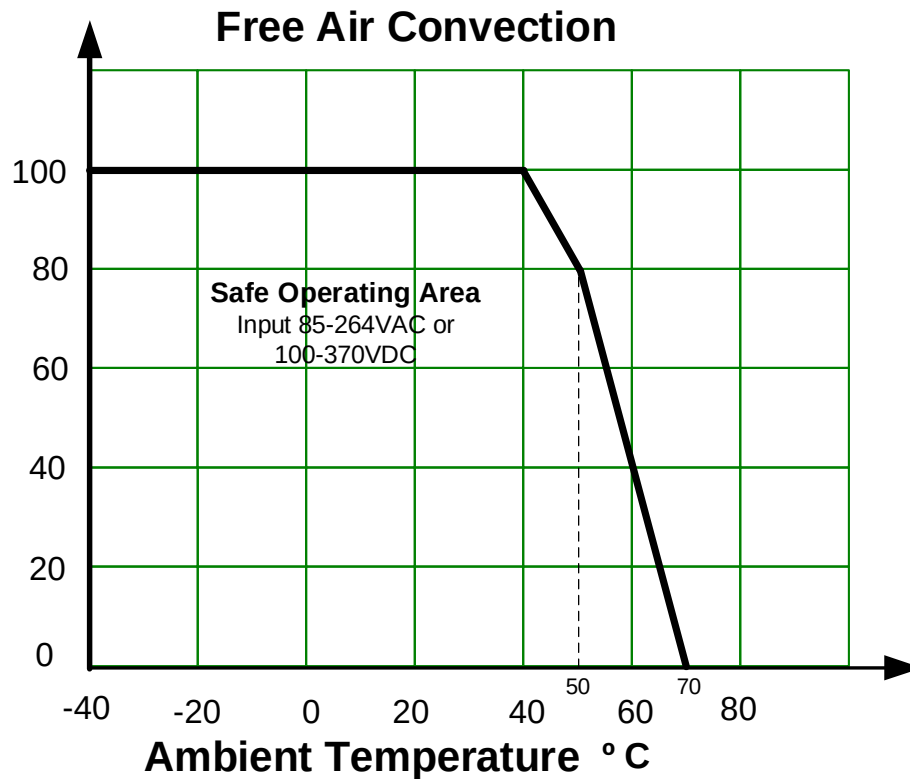
| Pin | Single       | Dual positive | Dual negative/positive |
|-----|--------------|---------------|------------------------|
| 1   | AC Input (L) | AC Input (L)  | AC Input (L)           |
| 2   | AC Input (N) | AC Input (N)  | AC Input (N)           |
| 3   | +V Output    | +V1 Output    | +V1 Output             |
| 4   | -V Output    | Common        | Common                 |
| 5   | No pin       | +V2 Output    | -V2 Output             |

## Dimensions

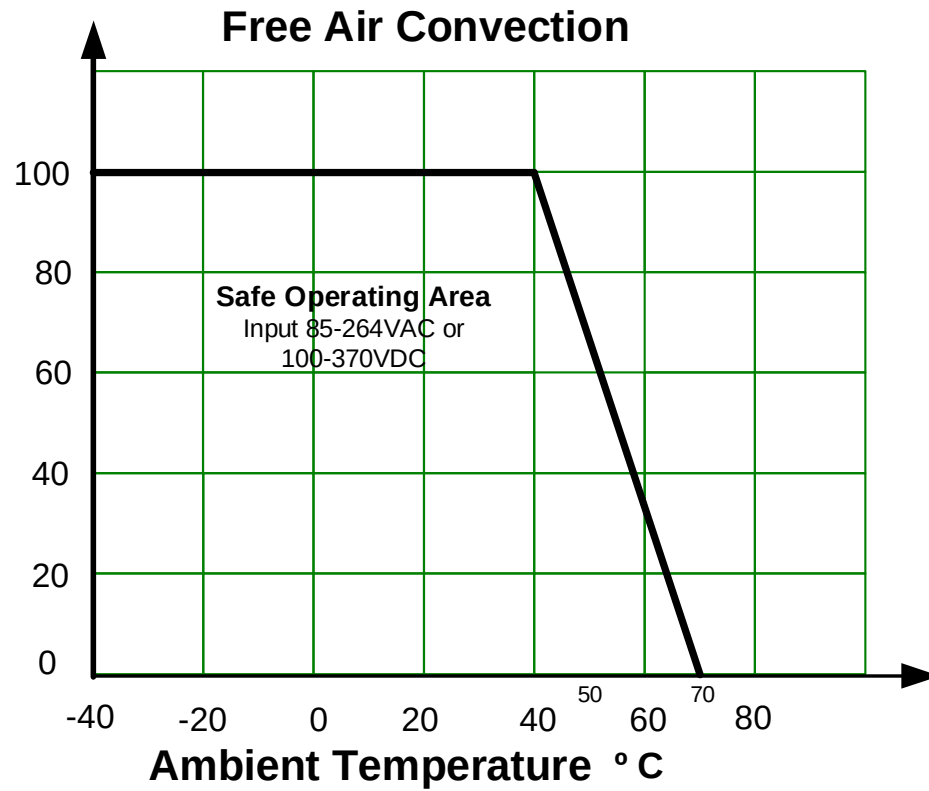


Dimensions mm (inch)  
Case Tolerance  $\pm 0.50$  ( $\pm 0.02$ )  
Pin Diameter  $1.0 \pm 0.05$  ( $0.04 \pm 0.002$ )  
Pin Pitch Tolerance  $\pm 0.35$  ( $\pm 0.014$ )

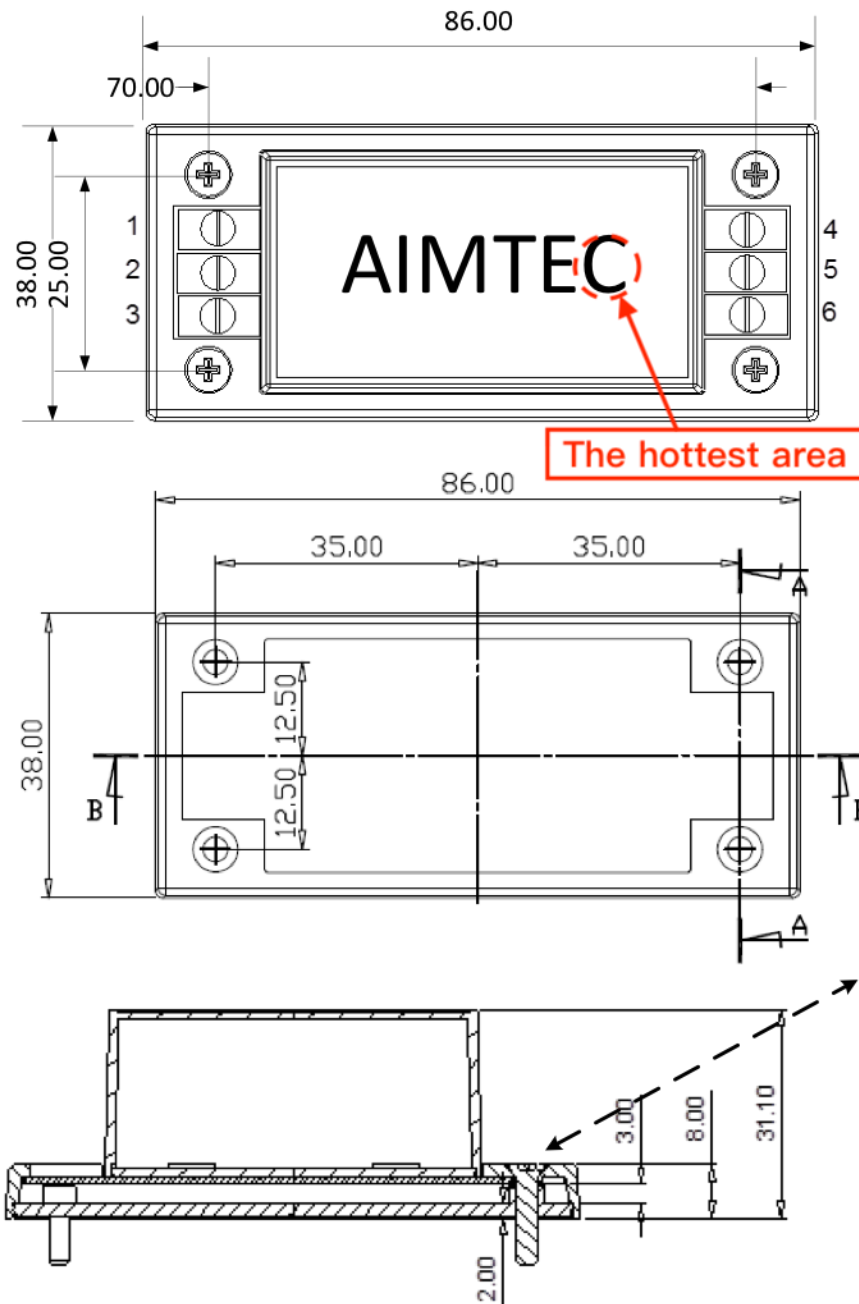
## Derating



**Derating (Dual Output Models)**

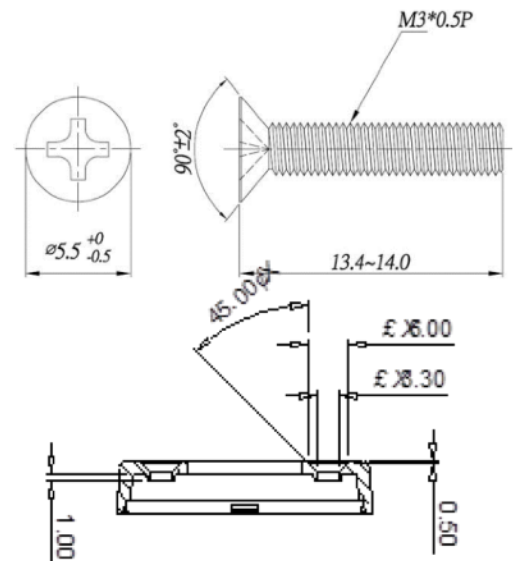


### Dimensions of Optional ST Mounting Plate Version



## Pin Out Specification ST Version

| Pin | Single       | Dual positive | Dual negative / positive |
|-----|--------------|---------------|--------------------------|
| 1   | AC Input (L) | AC Input (L)  | AC Input (L)             |
| 2   | No pin       | No pin        | No pin                   |
| 3   | AC Input (N) | AC Input (N)  | AC Input (N)             |
| 4   | +V Output    | +V1 Output    | +V1 Output               |
| 5   | Common       | Common        | Common                   |
| 6   | No pin       | +V2 Output    | -V2 Output               |



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