# 40W 2”x1” Package DC/DC Converter

## LPA40W Series


Learn More

## Description

The LPA40W series is a compact 40W isolated DC-DC converter housed in a 2”x1” package, supporting wide nominal input voltages of 24Vand 48V DC. It provides stable single outputs from 3.3V to 15V with efficiencies up to 92%, high isolation up to 1.6kVDC, and reliable operation from −40°C to +105°C. Designed to meet EN62368-1 standards, it is ideal for industrial control, Tele-cimmunucation and Railway applications.

## Features

- High Efficiency 40W power in compact size 2”x1” package
- Low no-load power 10mA
- -40°C to +105°C operating temperature with derating
- Continuous short circuit protection
- EMI class A without external circuit
- Over load protection/ over voltage protection/ over temperature protection
- RoHS compliant

## Applications

- Industry Control System
- Electric Power Instrumentation
- Battery Mangement Control
- Telecommunicattions
- Railway

## Model Numbering

**LPA 40 W 4 – 24 12 D**

- 12 → Output Voltage: (±) output voltage
- D → Output Voltage: 3.3V/5V/12V/15V/±12V/±15V±24V
- 24 → Input Voltage: 24V/48V
- 4 → Input Range: 4:1 (9~36 VDC; 18~75 VDC)
- 40 W → Wattage: 40W
- LPA → Series Name

No. 90, Jian 1st Rd., Zhonghe Dist., New Taipei City 23545, Taiwan

## Model Selection Guide

| Part No. | Input Voltage | Output Voltage | Output Current @ Full Load | Ripple & Noise | Efficiency | | Capacitor Load (2) (Max.) |
|---|---|---|---|---|---|---|---|
| | | | | | Tye. | Min. | |
| LPA40W4-243.3 | 9-36 VDC Nom. 24VDC | 3.3 VDC | 10000mA | 100mVp-p | 89% | 88% | 26600μF |
| LPA40W4-2405 | | 5 VDC | 8000mA | 100mVp-p | 90% | 89% | 20000μF |
| LPA40W4-2412 | | 12 VDC | 3333mA | 125mVp-p | 92% | 91% | 3900μF |
| LPA40W4-2415 | | 15 VDC | 2667mA | 125mVp-p | 92% | 91% | 2600μF |
| LPA40W4-2412D | | ±12VDC | ±1666mA | 125mVp-p | 90% | 89% | ±2600μF |
| LPA40W4-2415D | | ±15VDC | ±1333mA | 125mVp-p | 90% | 89% | ±1600μF |
| LPA40W4-2424D | | ±24VDC | ±833mA | 200mVp-p | 91% | 90% | ±650μF |
| LPA40W4-483.3 | 18-75 VDC Nom. 48VDC | 3.3 VDC | 10000mA | 100mVp-p | 89% | 88% | 26600μF |
| LPA40W4-4805 | | 5 VDC | 8000mA | 100mVp-p | 90% | 89% | 20000μF |
| LPA40W4-4812 | | 12 VDC | 3333mA | 125mVp-p | 92% | 91% | 3900μF |
| LPA40W4-4815 | | 15 VDC | 2667mA | 125mVp-p | 92% | 91% | 2600μF |
| LPA40W4-4812D | | ±12VDC | ±1667mA | 125mVp-p | 90% | 89% | ±1600μF |
| LPA40W4-4815D | | ±15VDC | ±1333mA | 200mVp-p | 90% | 89% | ±650μF |
| LPA40W4-4824D | | ±24VDC | ±833mA | 100mVp-p | 90% | 89% | 26600μF |

## Notes

#1: T Measured with 20MHz bandwidth and 1μF ceramic capacitor.

#2: The efficiency is test by nominal input and max. full load @25℃

#3: The capacitive load is test by minimum input and constant resistive load.

#4: All specifications valid at nominal input voltage, full load and 25℃ after warm-up time unless otherwise stated.

#5: The product information and specifications are subject to change without prior notice.

## Electrical Specification

| Model Number | | LPA40W4-☐☐ |
|---|---|---|
| **Input** | | |
| Input Filter | | Pi type |
| Input Voltage Range | 24Vin | 9V-36VDC |
| | 48Vin | 18-75VDC |
| No Load Input Current | | 15mA @ nominal Vin |
| Start-Up Time<br>(100% load at nominal Vin) | | 40ms |
| Start-Up Voltage<br>(0%-100% load) | 24Vin | 9VDC |
| | 48Vin | 18VDC |
| Under Voltage Lockout<br>(0%-100% load) | 24Vin | 8VDC |
| | 48Vin | 16VDC |
| Input Surge Voltage<br>(0.1s max) | 24Vin | 50VDC |
| | 48Vin | 100VDC |
| Remote ON/OFF | DC-DC ON | Open or 3.5 < Vr < 15VDC |
| | DC-DC OFF | Short or 0 < Vr < 1.2VDC |
| **Output** | | |
| Voltage Accuracy | | ± 1% (100% load at nominal Vin) |
| Line Regulation<br>(LL to HL 100% load) | Single Output | ± 0.2% |
| | Dual Output | ± 0.5% |
| Load Regulation<br>(10% to 100% Load) | Single Output | ± 0.5% |
| | Dual Output | ± 1.0% |
| Cross Regulation | | ± 5% (Asymmetrical load 25%/100%) |
| Ripple & Noise (20MHz)<br>Io= Full Load | | 75 mVp-p |
| Minimum Load | | 0% |
| Voltage Adjustability | | ± 10% |
| Operating Frequency | | 250 KHz typ. (220-285KHz) |

| | |
|---|---|
| Transient Response Recovery Time | 500μs (25% load step change; 75%-100% load) |
| **Environment** | |
| Operating Temperature | -40-+105 ˚C with derating |
| Storage Temperature | -55-+125 ˚C |
| Max. Case Temperature | 110˚C |
| Temperature Coefficient | ± 0.05%/ ˚C |
| Relative Humidity | 5%-95% RH |
| MTBF (MIL-HDBK-217F) | 779 KHours (25˚C) |
| Vibration | MIL-STD-202G |
| **Function** | |
| Isolation Voltage | 1.6 KVDC 1min. Input to Output |
| Isolation Resistance | 1000 MΩ |
| Isolation Capacitance | 1500 pF |
| Short Circuit Protection | Continuous, automatic recovery |
| Over Load Protection | 175% |
| Over Voltage Protection | 112%-160% of Vout |
| Safety Approvals | EN62368-1/ IEC62368-1/ EN55032 |
| **Physical** | |
| Case Material | Metal Case |
| Potting Material | Silicone (94V-0) |
| Base Material | FR4 PCB |
| Dimension | 50.8(L) x 25.4(W) x 10.5(H) mm |
| Weight | 37.6 g |
| **Electromagnetic Compatibility** | |
| Electromagnetic Interference | EN 55032 (Class A/B) |
| Electrostatic Discharge(1) | IEC 61000-4-2, Air±8kV; Contact±6kV (Criteria A) |
| Radiated Immunity(1) | IEC 61000-4-3, 10V/m (Criteria A) |
| Electrical Fast Transient(1) | IEC 61000-4-4, ±2kV (Criteria A) |
| Surge Immunity(1) | IEC 61000-4-5, ±2kV (Criteria A) |

| | |
|---|---|
| Conducted Immunity(1) | IEC 61000-4-6, 10V/m (Criteria A) |
| Magnetic Field Immunity(2) | IEC 61000-4-8, 10A/m(Criteria A) |

## Notes

#1: MTBF is test by MIL-HDBK-217F @Ta=25 °C, Full load, GB

#2: The EMI need external filter circuit for class A/B. (See the application note)

#3: Test with E-CAP 680μF/100Vat input terminal.

#4: Derating measured with nominal line. Mounted test board.

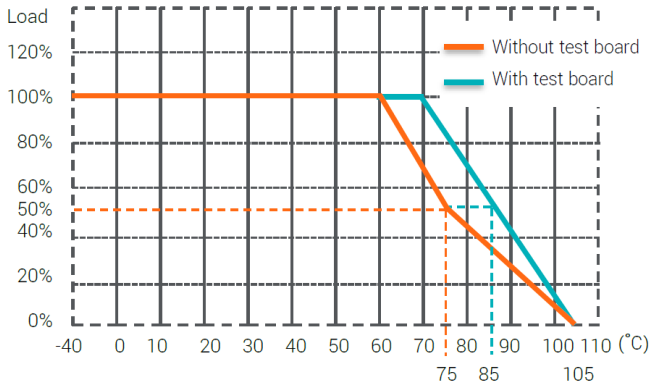
(90 x 80 mm and each power pin with 43 x 40 mm, 2Oz double layer)

## Mechanical Specification

### Derating Curve

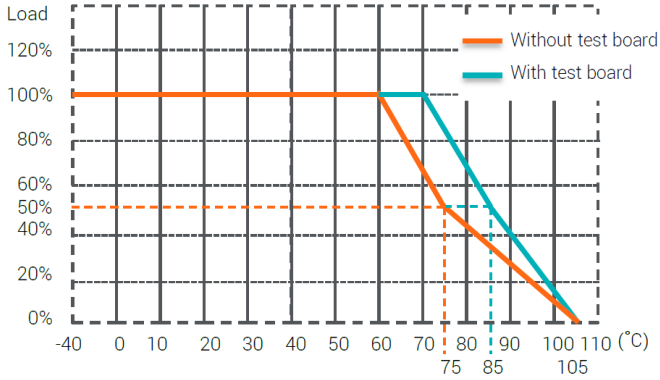
Ambient temperature

LPA40W4-243.3



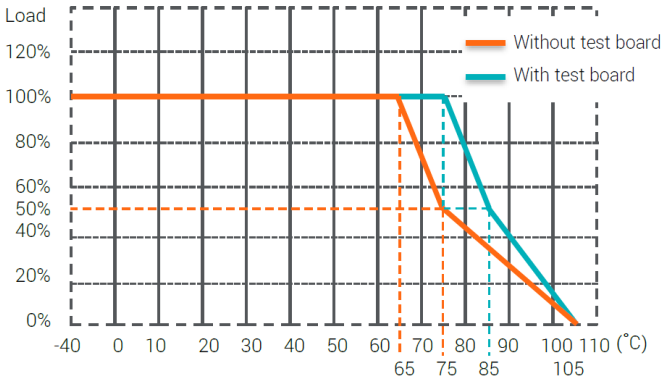

Ambient temperature

LPA40W4-2405



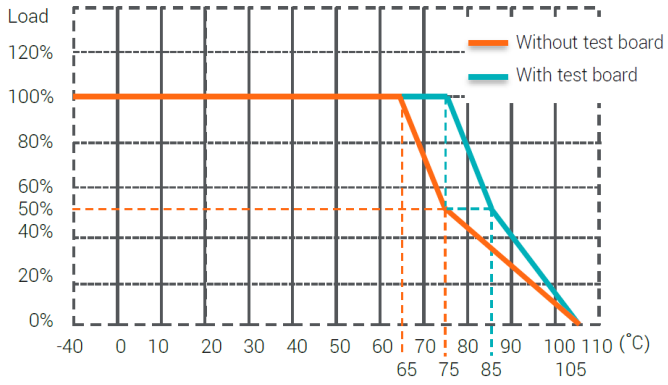

Ambient temperature

LPA40W4-2412



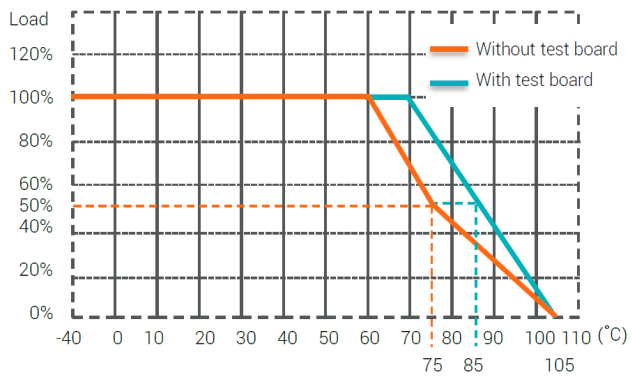

Ambient temperature

LPA40W4-2415



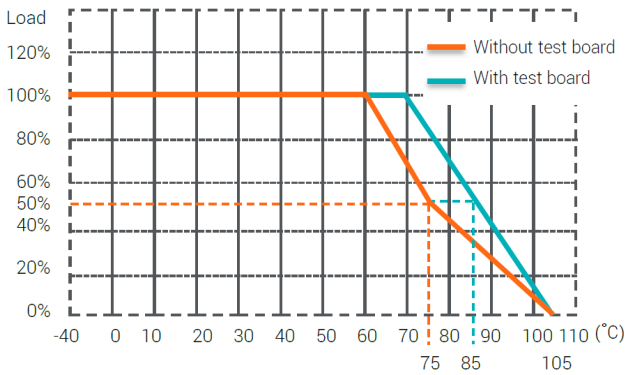

Ambient temperature

LPA40W4-2412D



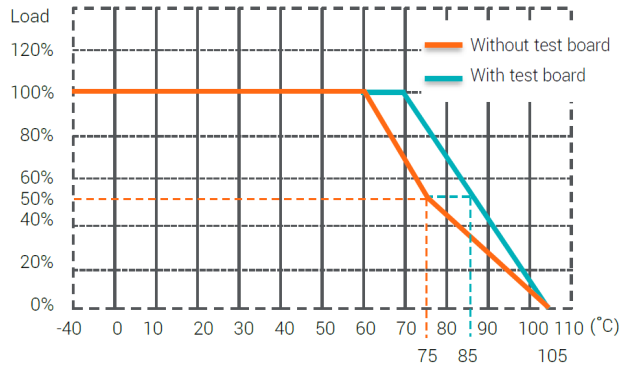

Ambient temperature

LPA40W4-2415D



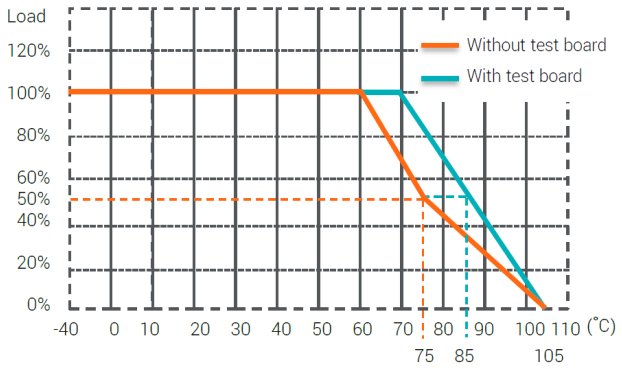
Ambient temperature

LPA40W4-483.3



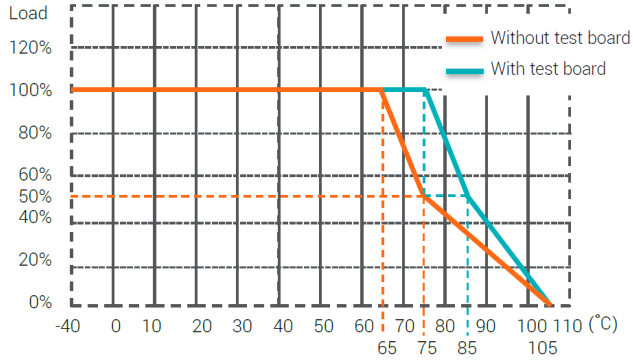

Ambient temperature

LPA40W4-4805



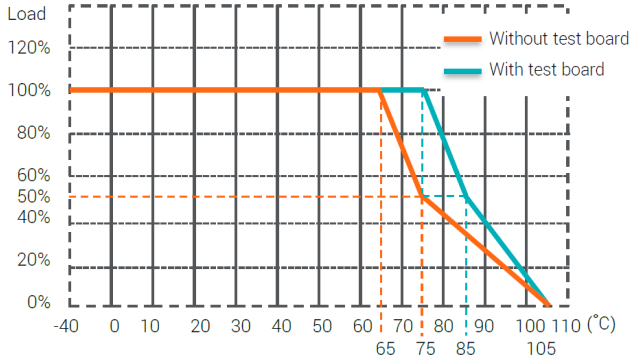

Ambient temperature

LPA40W4-4812



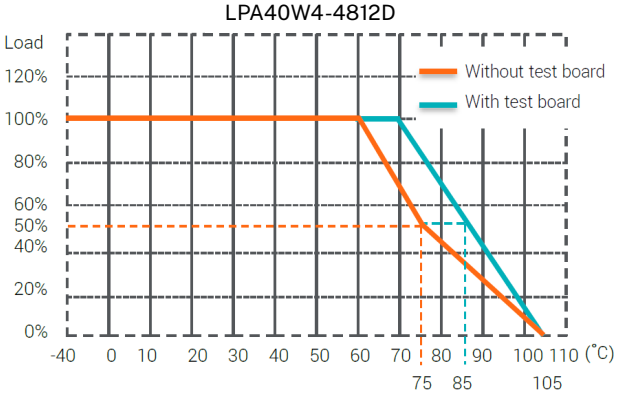

Ambient temperature

LPA40W4-4815



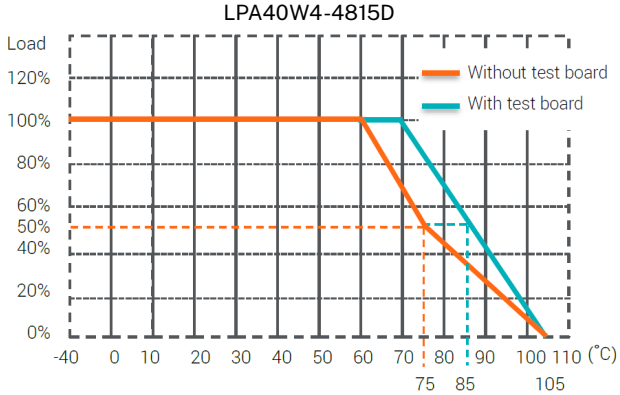

Ambient temperature

LPA40W4-4812D




Ambient temperature

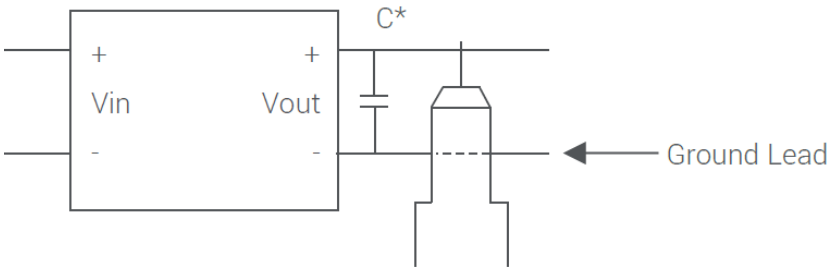
LPA40W4-4815D




The derating curve was measured at nominal Vin in chamber with nature convection.

The derating curve was measured with nominal line. Mounted test board.

## Ripple & Noise Measure Method

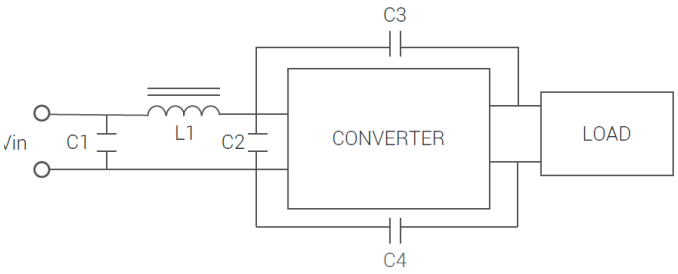



C*

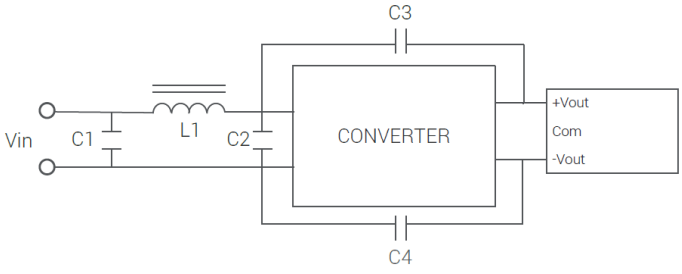
PCB40WR4-24xx and 48xx measured with 20MHz bandwidth and 1μF ceramic capacitor.

## EMI Filtering-Suggestion for Class B

Single output EN55032 CLASS B

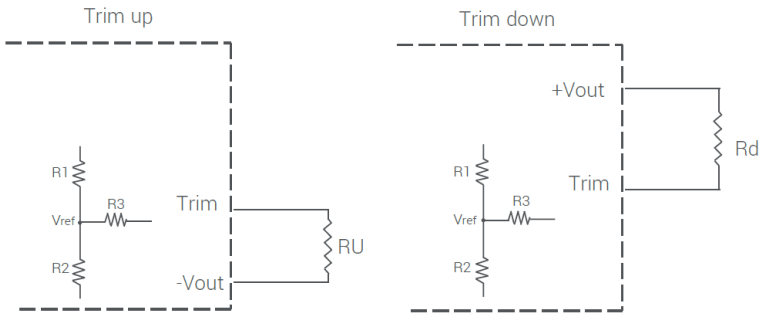



Dual output EN55032 CLASS B




| Vin | C1 | L1 | C2 | C3 | C4 |
|---|---|---|---|---|---|
| 24 V | 10 μF | 1.5 μH | 10 μF | 2200 pF | 2200 pF |
| 48 V | 4.7 μF | 3.3 μH | 4.7 μF | 2200 pF | 2200 pF |

## External Output Voltage Trimming




Formula for trim resistor:

UP: $Ru=\frac{aR_2}{R_2-a}-R_3$ $a=\frac{V_{ref}}{V_o'-V_{ref}}\cdot R_1$

DOWN: $Rd=\frac{bR_1}{R_1-b}-R_3$ $b=\frac{V_o'-V_{ref}}{V_{ref}}\cdot R_2$

Note:

1.Ru, Rd is mean trim resistor, please check the formula.

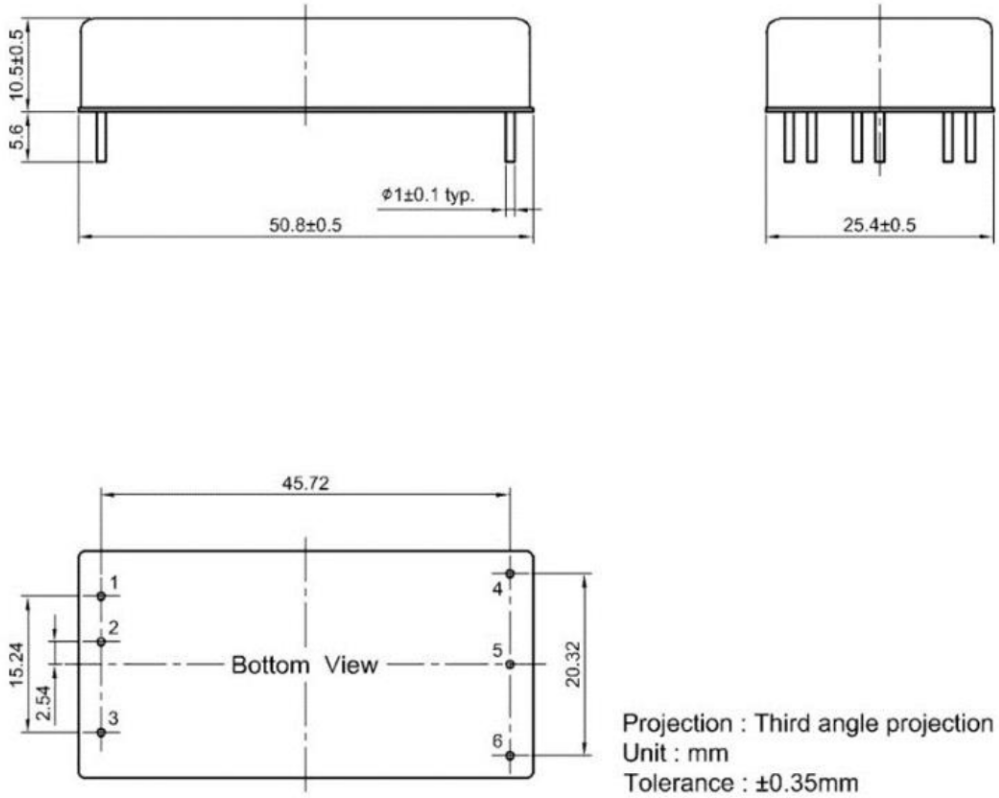
2.a & b: user define parameter, no actual meanings.

3. $V_o'$ is mean trim up/down voltage.

4. Value for R1, R2, R3 and Vref refer to below table.

| Vin | Vout | Vref | R1 | R2 | R3 |
|---|---|---|---|---|---|
| 24,48 V | 3.3 V | 1.24V | 8.5K | 5.1K | 27K |
| 24,48 V | 5 V | 1.24V | 15.47K | 5.1K | 33K |
| 24,48 V | 12 V | 2.50V | 12.62K | 3.3K | 22K |
| 24,48 V | 15 V | 2.50V | 15.1K | 3K | 22K |

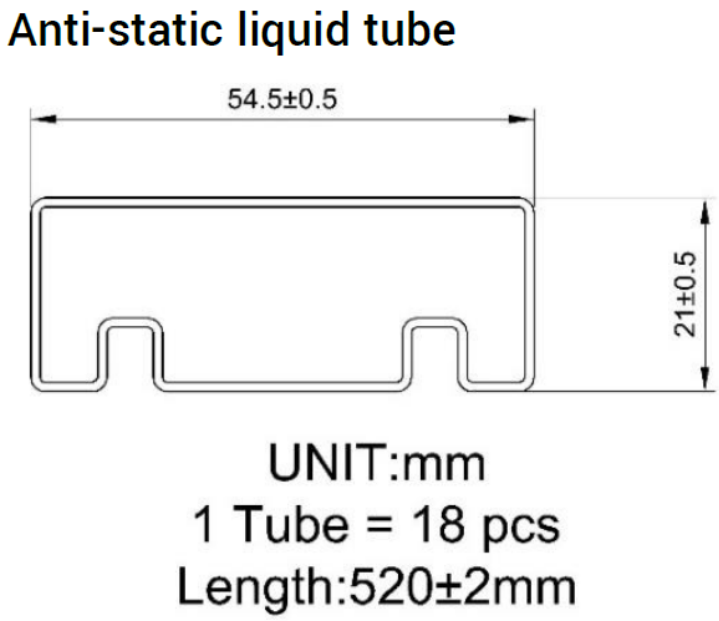
## Mechanical Dimension & Pinning




Projection : Third angle projection
Unit : mm
Tolerance : ±0.35mm

| Pin | Single | Dual |
|---|---|---|
| 1 | +Vin | +Vin |
| 2 | -Vin | -Vin |
| 3 | Ctrl | Ctrl |
| 4 | +Vout | +Vout |
| 5 | -Vout | COM |
| 6 | Trim | -Vout |

## Package




## Recommend Footprint