60W 2"x1" Package DC/DC Converter

LPA60W Series

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Description

The LPA60W series is a compact 60W 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 ,EN50155 and EN55032/35 standards, it is ideal for industrial control, Tele-cimmunucation and Railway applications.

Features

- High Efficiency 60W power in compact size 2x1” package
- No minimum load required
- Wide operating temperature from -40˚C to +105˚C
- Continuous short circuit protection
- EMI class A without external circuit
- Over load protection/ over voltage protection/ over temperature protection
- Six-sided continuous shield

Applications

- Industry Control System
- Electric Power Instrumentation
- Telecommunicattions
- Industrial
- Railway

Model Numbering

LPA 60 W 4 – 24 12 D

- D → Output Voltage: (±) output voltage
- 12 → Output Voltage: 3.3V/5V/12V/15V/24V/±12V/±15V/±24V
- 24 → Input Voltage: 24V/48V
- 4 → Input Range: 4:1 (9~36 VDC; 18~75 VDC)
- 60 W → Wattage: 60W
- 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	Input Current @ No Load	Efficiency (1) (Typ.)	Capacitor Load (2) (Max.)
LPA60W4-243.3	9-36 VDC Nom. 24VDC	3.3VDC	12000mA	15mA	89%	28000μF
LPA60W4-2405		5VDC	12000mA	15mA	91%	28000μF
LPA60W4-2412		12VDC	5000mA	15mA	91%	5850μF
LPA60W4-2415		15VDC	4000mA	15mA	92%	3900μF
LPA60W4-2424		24VDC	2500mA	15mA	92%	2000μF
LPA60W4-2412D		±12VDC	±1666mA	15mA	91%	±3900μF
LPA60W4-2415D		±15VDC	±1333mA	15mA	91%	±2400μF
LPA60W4-2424D		±24VDC	±833mA	15mA	90%	±1000μF
LPA60W4-483.3	18-75 VDC Nom. 48VDC	3.3VDC	12000mA	15mA	89%	28000μF
LPA60W4-4805		5VDC	12000mA	15mA	91%	28000μF
LPA60W4-4812		12VDC	5000mA	15mA	92%	5850μF
LPA60W4-4824		15VDC	4000mA	15mA	92%	3900μF
LPA60W4-4815		24VDC	2500mA	15mA	92%	2000μF
LPA60W4-4812D		±12VDC	±1666mA	15mA	90%	±3900μF
LPA60W4-4815D		±15VDC	±1333mA	15mA	90%	±2400μF
LPA60W4-4824D		±24VDC	±833mA	15mA	90%	±1000μF

Notes

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

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

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

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

Electrical Specification

Model Number		LPA60W4-☐☐
Input		
Input Filter		Pi type
Input Voltage Range	24Vin	9V-36VDC
	48Vin	18-75VDC
Start-Up Time (100% load at nominal Vin)		50ms
Start-Up Voltage (0%-100% load)	24Vin	9VDC
	48Vin	18VDC
Under Voltage Lockout (0%-100% load)	24Vin	8VDC
	48Vin	16VDC
Input Surge Voltage	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 (LL to HL 100% load)	Single Output	± 0.2%
	Dual Output	± 0.5%
Load Regulation (10% to 100% Load)	Single Output	± 0.5%
	Dual Output	± 1.0%
Cross Regulation		± 5% (Asymmetrical load 25%/100%)
Ripple & Noise (20MHZ BW at Vin range 0%~100% load, with a 1μF/50V X7R MLCC)		100 mVp-p (3.3V, 5V)
		125 mVp-p (12V, 15V, ±12V, ±15V)
		200 mVp-p (24V, ±24V)
Minimum Load		0%
Voltage Adjustability		± 10%

Operating Frequency		250 KHz
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)		205 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 (Zener Diode Clamp)	3.3V output	3.7-5.3VDC
	5V output	5.6-8.0VDC
	12V output	13.4-19.2VDC
	15V output	16.8-24.0VDC
	24V output	26.9-38.4VDC
	± 12V output	±13.4-±19.2VDC
	± 15V output	±16.8-±24.0VDC
	± 24V output	±26.9-±38.4VDC
Over Temperature Protection		115 ˚C TC (Case Temperature)
Safety Approvals		EN62368-1/ IEC62368-1/ EN50155/ EN55032&35
Physical		
Case Material		Metal Case
Potting Material		Silicone (94V-0)

Cooling Method	Natural convection
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: EMI class A without external circuit, and class B suggestion circuit, please check suggestion circuit.

#2: External input capacitor required 680μF/100V.

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

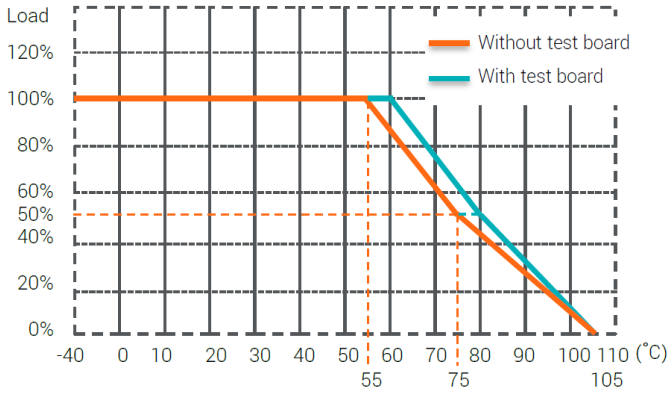
#3: Derating measured with nominal line. Mounted test board.
(90 x 80 mm and each power pin with 43 x 40 mm, 2Oz double layer)

Mechanical Specification

Derating Curve

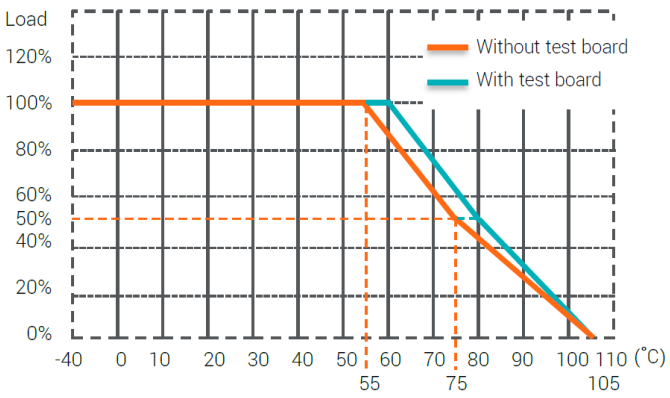
Ambient temperature

LPA60W4-243.3



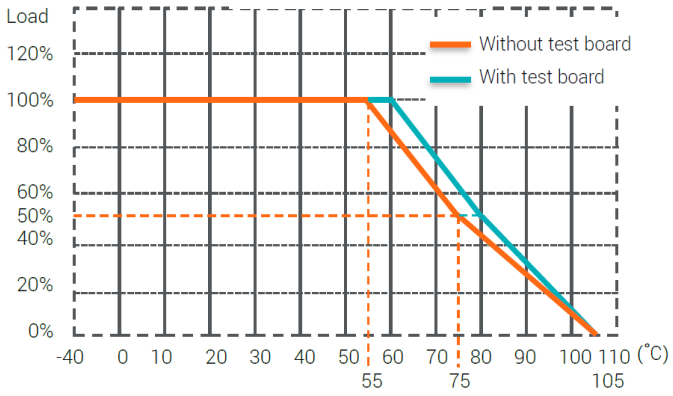
Ambient temperature

LPA60W4-2405



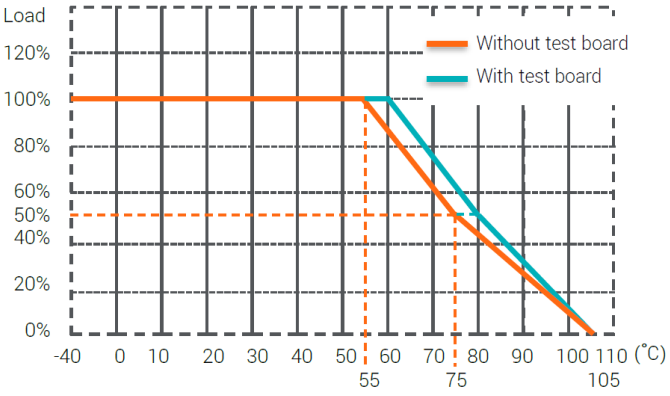
Ambient temperature

LPA60W4-2412



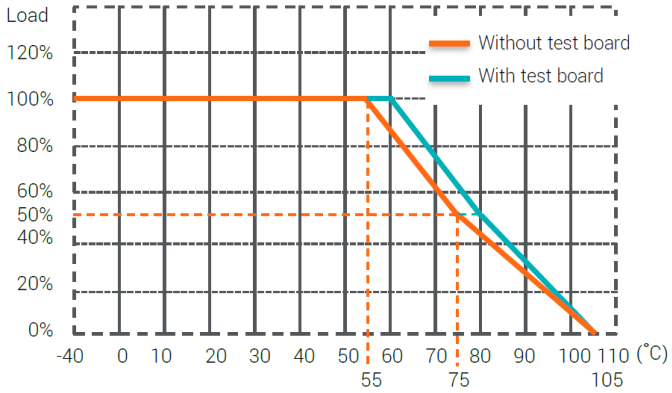
Ambient temperature

LPA60W4-2415



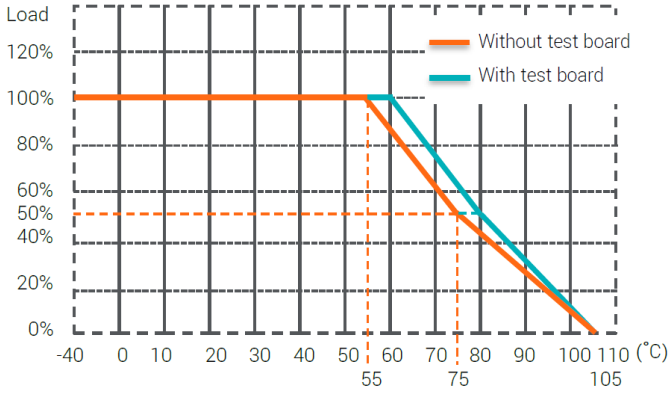
Ambient temperature

LPA60W4-2424



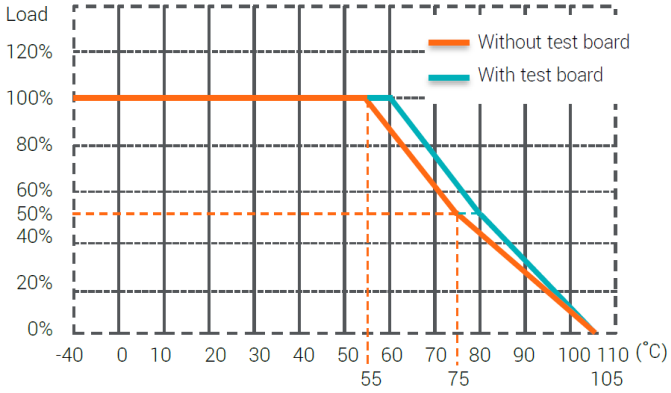
Ambient temperature

LPA60W4-2412D



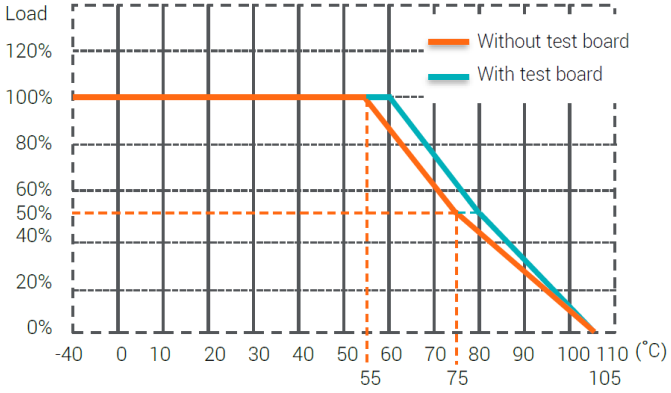
Ambient temperature

LPA60W4-2415D



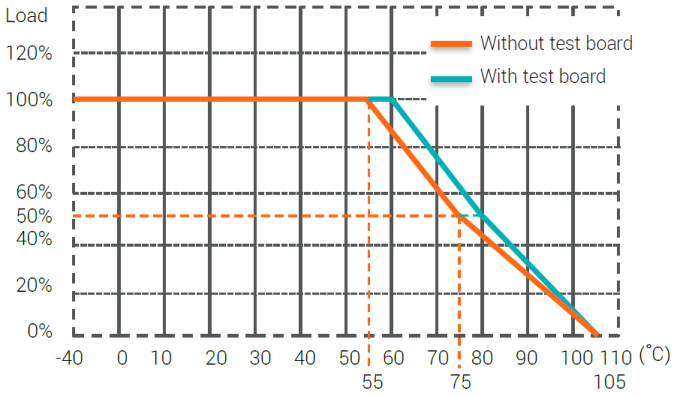
Ambient temperature

LPA60W4-483.3



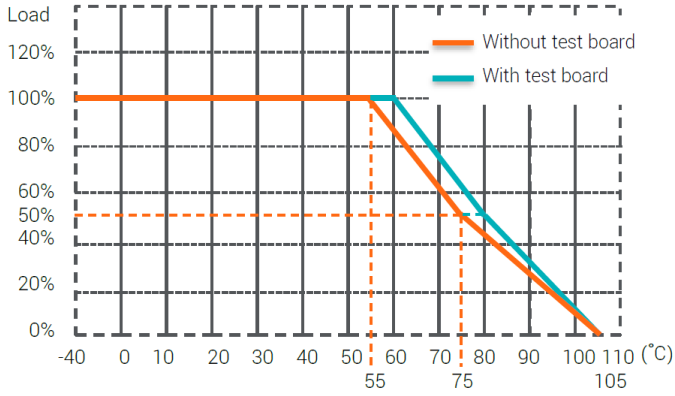
Ambient temperature

LPA60W4-4805



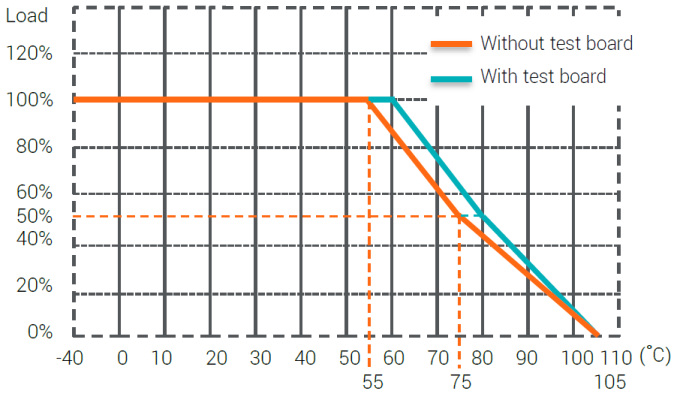
Ambient temperature

LPA60W4-4812



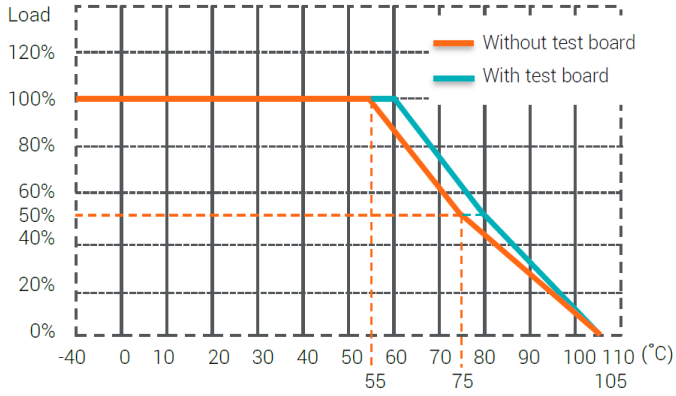
Ambient temperature

LPA60W4-4815



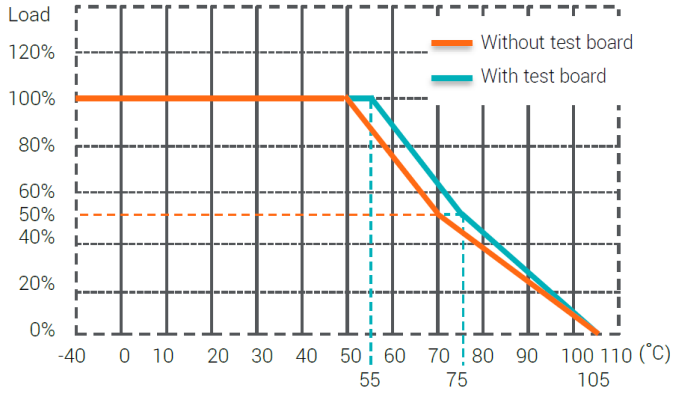
Ambient temperature

LPA60W4-4824



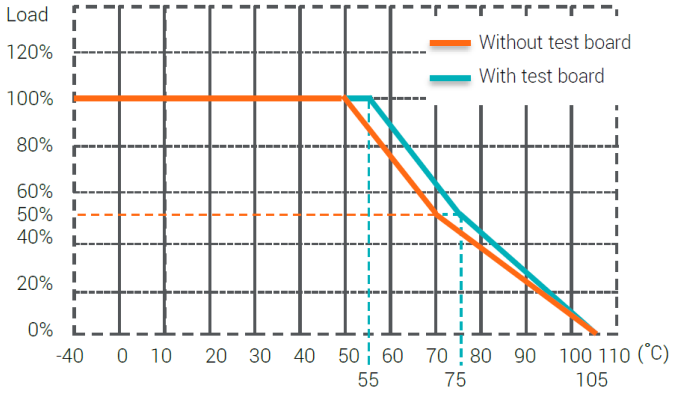
Ambient temperature

LPA60W4-4812D



Ambient temperature

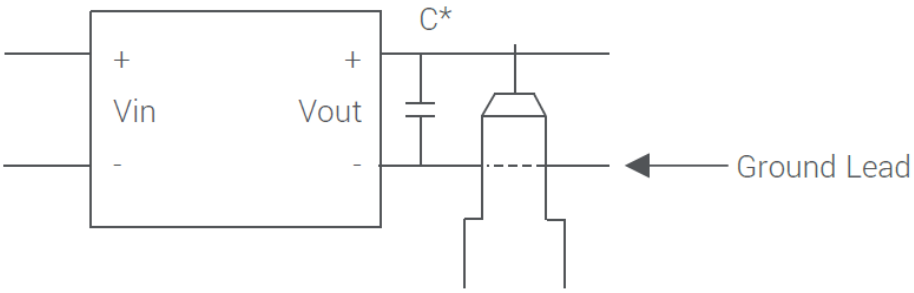
LPA60W4-4815D



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



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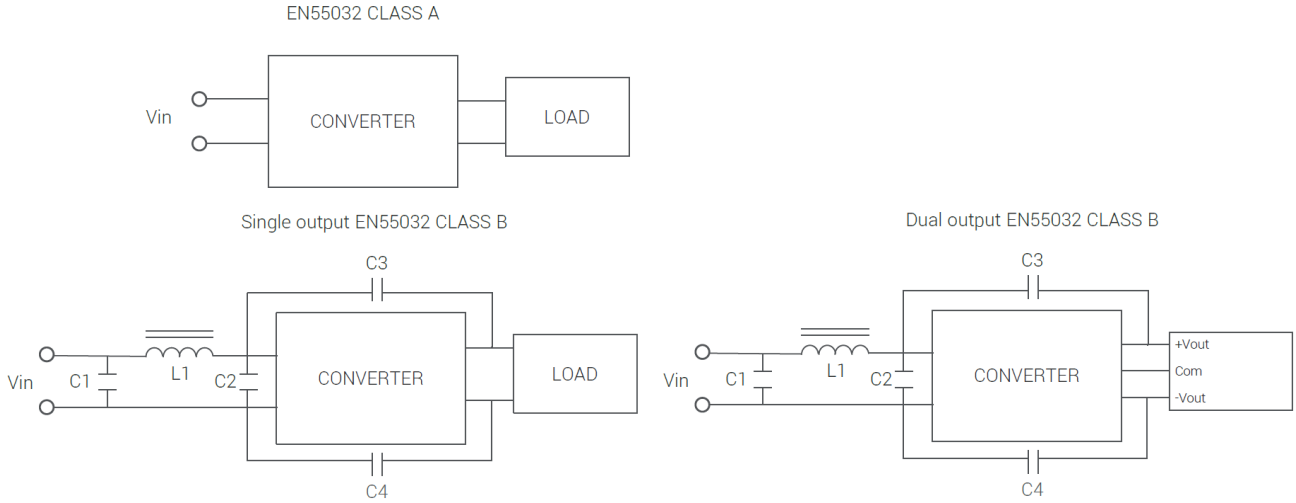
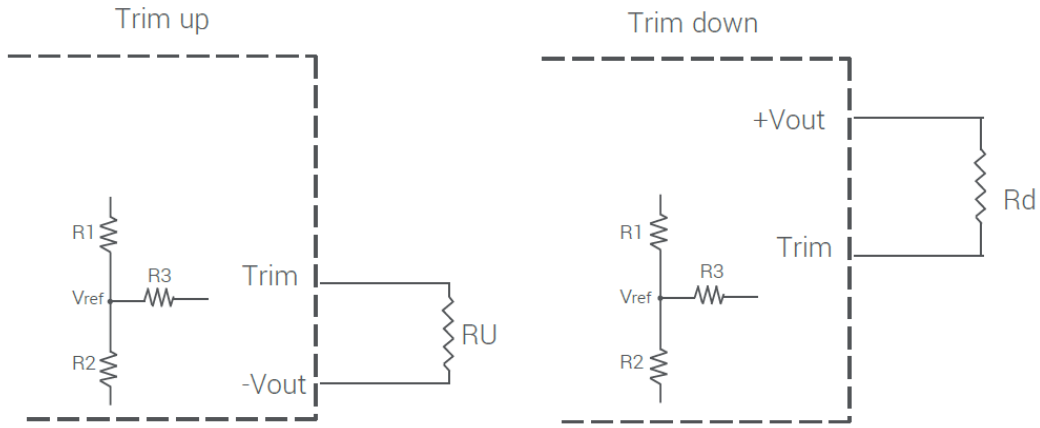
LPA60W4-24xx and 48xx measured with 20MHz BW at Vin range 0%~100% load with 1uF/50V X7R MLCC.

EMI Filtering-Suggestion for 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: $R_u = \frac{aR_2}{R_2 - a} - R_3$ $a = \frac{V_{ref}}{V_o' - V_{ref}} \cdot R_1$

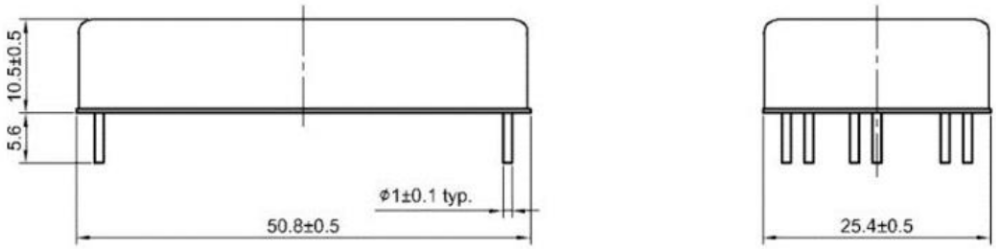
DOWN: $R_d = \frac{bR_1}{R_1 - b} - R_3$ $b = \frac{V_o' - V_{ref}}{V_{ref}} \cdot R_2$

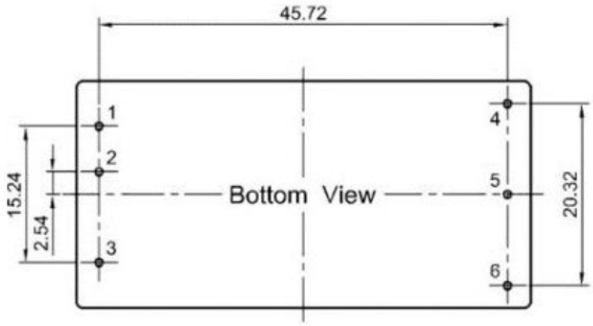
Note:

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 the table below.

Vin	Vout	Vref	R1	R2	R3
24 V	3.3 V	1.24 V	8.5 kΩ	5.1 kΩ	27.0 kΩ
24 V	5 V	2.50 V	10.0 kΩ	10.0 kΩ	35.7 kΩ
24 V	12 V	2.50 V	38.0 kΩ	10.0 kΩ	68.0 kΩ
24 V	15 V	2.50 V	50.0 kΩ	10.0 kΩ	73.2 kΩ
24 V	24 V	2.50 V	86.0 kΩ	10.0 kΩ	75.0 kΩ
Vin	**Vout**	**Vref**	**R1**	**R2**	**R3**
48 V	3.3 V	1.24 V	8.5 kΩ	5.1 kΩ	27.0 kΩ
48 V	5 V	1.24 V	15.47 kΩ	5.1 kΩ	33.0 kΩ
48 V	12 V	2.50 V	38.0 kΩ	10.0 kΩ	68.0 kΩ
48 V	15 V	2.50 V	50.0 kΩ	10.0 kΩ	73.2 kΩ
48 V	24 V	2.50 V	86.0 kΩ	10.0 kΩ	75.0 kΩ

Mechanical Dimension & Pinning

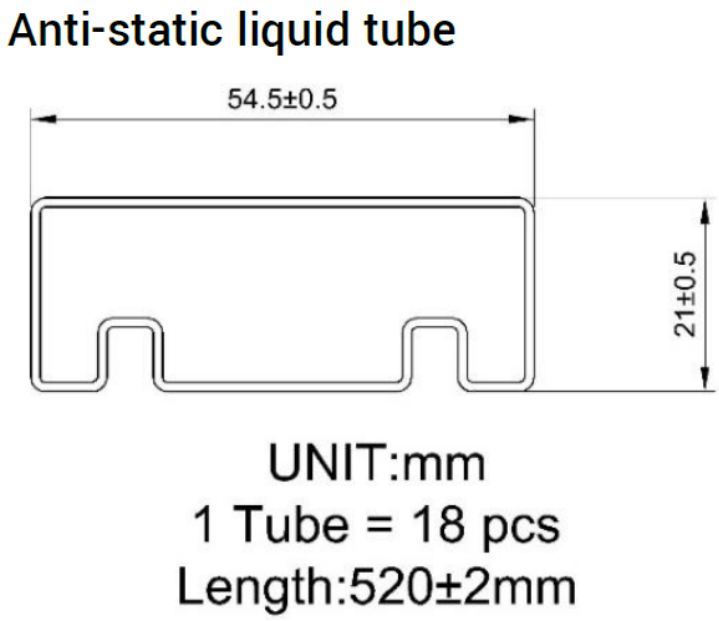




Projection : Third angle projection
Unit : mm
Tolerance : ±0.35mm

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

Package



Recommend Footprint