

FEATURES:

- ◆ Ultra-Wide 4:1 input voltage range
- ◆ High efficiency up to 91.5%
- ◆ No-load power consumption as low as 0.096W
- ◆ I/O isolation test voltage 1500V_{DC}
- ◆ Input under-voltage protection, output short-circuit, over-current, over-voltage, over-temperature protection
- ◆ Operating ambient temperature range: -40°C to +70°C
- ◆ Compliant with EN55032 standard
- ◆ Warranty period of three years

40W isolated DC-DC converter in 1x1 inch
Ultra-wide input and regulated single output



Selection Guide

Certification	Part No.	Input Voltage(V _{DC})		Output		Full Load Efficiency ^② (%)Min./Typ.	Capacitive Load (μF)Max.
		Nominal (Range)	Max. ^①	Voltage(V _{DC})	Current(mA) Max./Min.		
	CFDA40-24S03	24 (9-36)	40	3.3	10000/0	87/89.5	7200
	CFDA40-24S05			5	8000/0	88/90	7200
	CFDA40-24S12			12	3333/0	89/91.2	2000
	CFDA40-24S15			15	2667/0	89/91.5	1500
	CFDA40-24S24			24	1667/0	88/90.1	1000
	CFDA40-24S28			28	1429/0	88/90.1	1000
	CFDA40-48S03	48 (18-75)	75	3.3	10000/0	87/89	7200
	CFDA40-48S05			5	8000/0	88/90	7200
	CFDA40-48S12			12	3333/0	89/91	2000
	CFDA40-48S15			15	2667/0	89/91	1500

Notes:

- ① Exceeding the maximum input voltage may cause permanent damage;
 ② Efficiency is measured in nominal input voltage and rated output load;
 ③ Rated output load is derated to 75% at minimum input voltage.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current(full load/ no-load)	24V _{DC} nominal input series, nominal input voltage	3.3V output	--	1545/4	1580/12	mA
		Others	--	1852/4	1894/12	
	48V _{DC} nominal input series, nominal input voltage	3.3V output	--	772/7	790/15	
		Others	--	926/7	947/15	
Reflected Ripple Current	nominal input series		--	100	--	
Surge Voltage(1sec.max.)	24V _{DC} nominal input series		-0.7	--	50	V _{DC}
	48V _{DC} nominal input series		-0.7	--	100	
Start-up Voltage	24V _{DC} nominal input series		--	--	9	
	48V _{DC} nominal input series		--	--	18	
Input under-voltage protection	24V _{DC} nominal input series		5.5	7.5	--	
	48V _{DC} nominal input series		12	15	--	

Start-upTime	Nominal input voltage/constant resistance load	--	30	100	ms
Input Filter		Capacitance filter			
Hot Plug		Unavailable			
CNT *	Module on	CNT pin open or pulledhigh(TTL3.5-12V _{DC})			
	Module off	CNT pin pulledlow to GND(0-1.2V _{DC})			
	Input current when off	--	6	12	mA

Note: *The CNT pin voltage is referenced to input GND.

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Voltage Accuracy ^①	5%-100% load	--	±1	±3	%
Linear Regulation	Input voltage variation from low to high at full load	--	±0.2	±0.5	
Load Regulation ^②	5%-100% load	--	±0.5	±1	
Transient Recovery Time	25%load step change, nominal input voltage	--	250	500	μs
Transient Response Deviation	25%load step change, input voltage range	--	±5	±8	%
Temperature Coefficient	Full load	--	--	±0.03	%/°C
Ripple/Noise ^③	20MHz bandwidth, nominal input voltage, 5%-100% load	--	100	150	mVp-p
Trim	Input voltage range	90	--	110	%V _o
Over-temperature Protection	Max.Case Temperature	--	125	--	°C
Over-voltage Protection	Input voltage range	110	140	160	%V _o
Over-current Protection		110	140	200	%I _o
Shortcircuit Protection		Hiccup,continuous,self-recovery			

Note:
^①Output voltage accuracy for 0%-5%load is ±5%max;
^②Load regulation for 0%-100%load increases to ±3%
^③③Under 0%-5%load conditions, ripple & noise does not exceed 5%V_o. By measuring method issued for Ripple and Noise test, please refer to Fig. 2. for recommended circuit.

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input-output Electric Strength Test for 1 minute with a leakage current of 1mA max.	1500	--	--	V _{DC}
Insulation Resistance	Input-output resistance at 500V _{DC}	1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	24V _{DC} input series	--	10	nF
		48V _{DC} input series	--	2.2	
Operating Temperature	See Fig.1	-40	--	+70	°C
Max.Case Temperature	Rated output load	--	110	--	
Storage Temperature		-55	--	+125	
Storage Humidity	Non-condensing	5	--	95	%RH
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	+300	°C
Vibration		10-150Hz,5G,0.75mm.along X,Y and Z			
Switching Frequency *	PWM mode	--	400	--	kHz
MTBF	MIL-HDBK-217F@25°C	1000	--	--	k hours

Note: *Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement

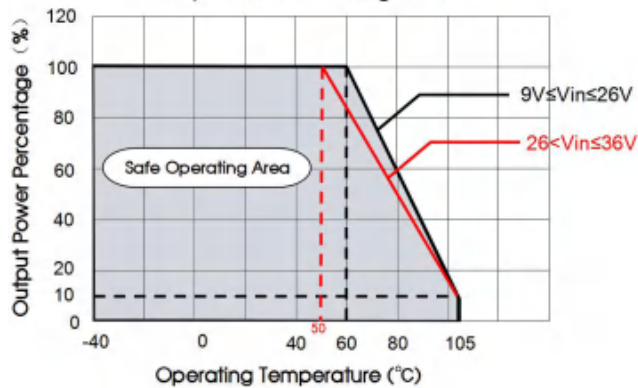
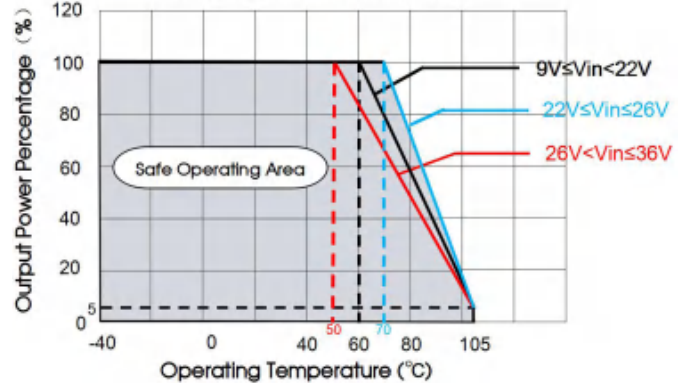
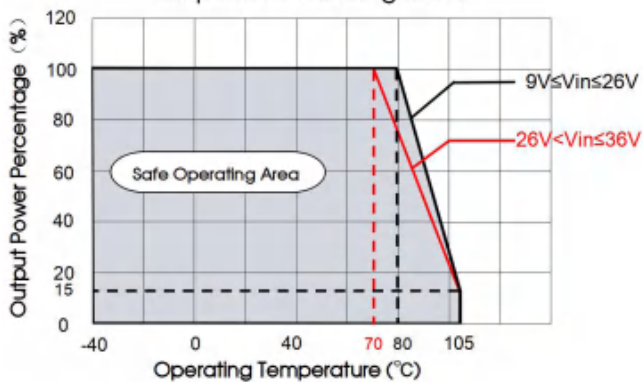
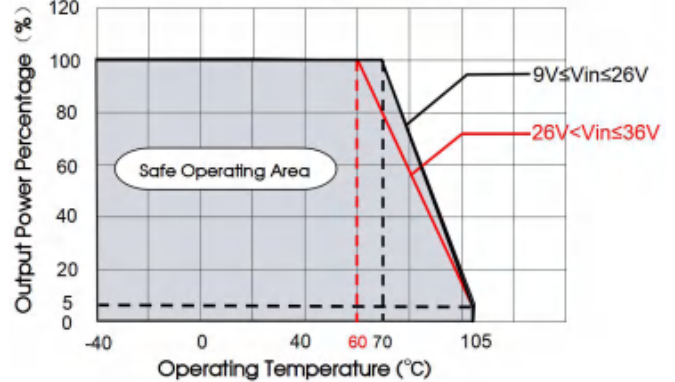
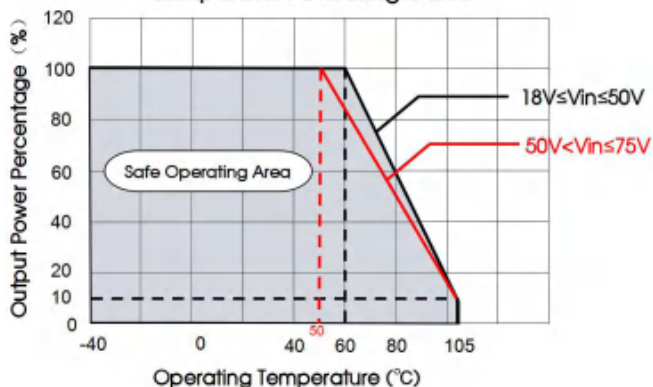
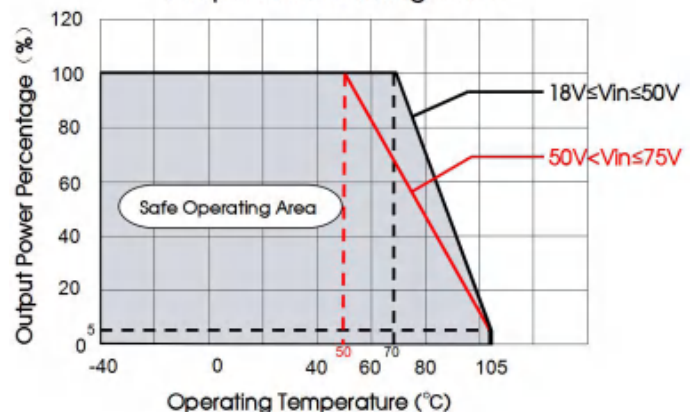
Mechanical Specifications

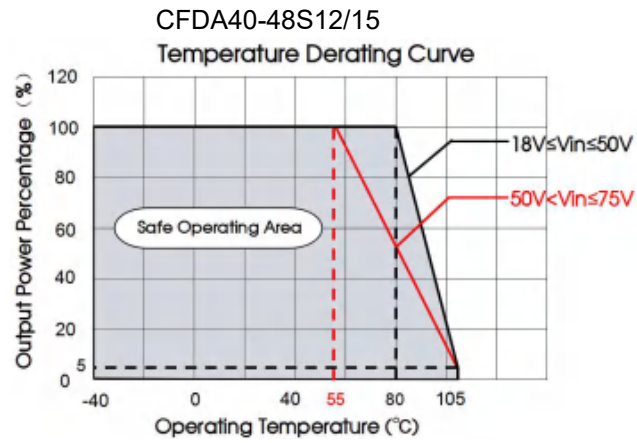
Case Material	Aluminum alloy
Dimensions	25.4×25.4×11.7mm
Weight	20.0g(Typ.)
Cooling method	Free air convection

Electromagnetic Compatibility(EMC)

Emissions	CE	CISPR32/EN55032	CLASS B(seeFig.3-②for recommended circuit)	
	RE	CISPR32/EN55032	CLASS B(seeFig.3-②for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2	Contact±6kV	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±2kV(see Fig.3-①for recommended circuit)	perf. Criteria A
	Surge	IEC/EN61000-4-5	line to line ±2kV(see Fig.3-①for recommended circuit)	perf. Criteria A
	CS	IEC/EN61000-4-6	3Vr.m.s	perf. Criteria A

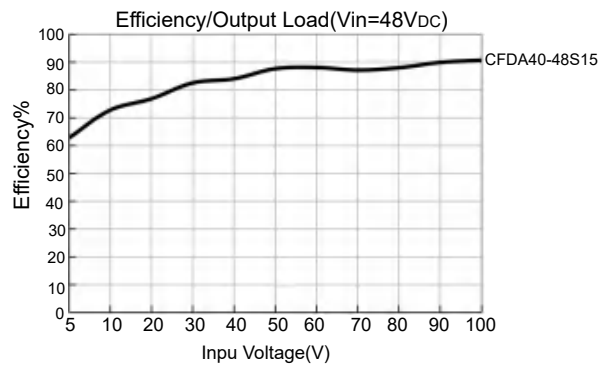
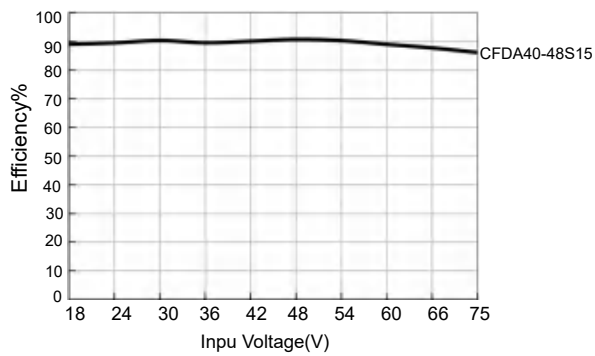
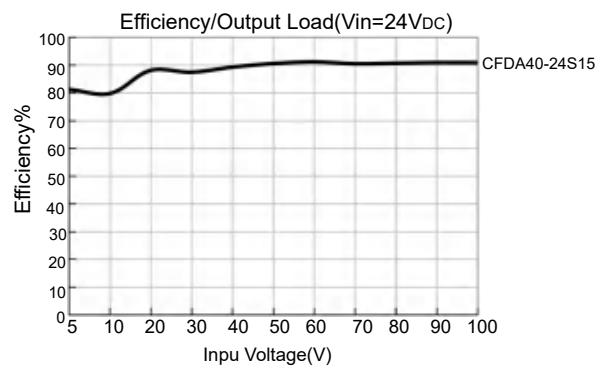
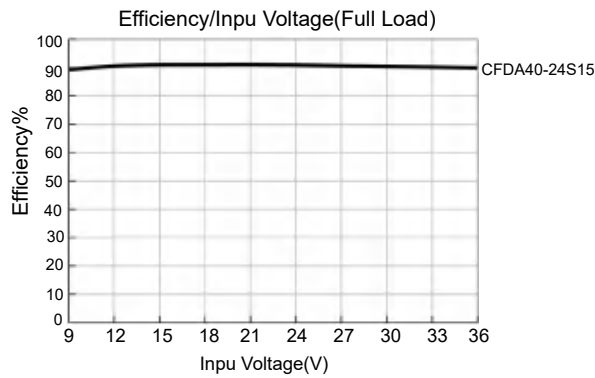
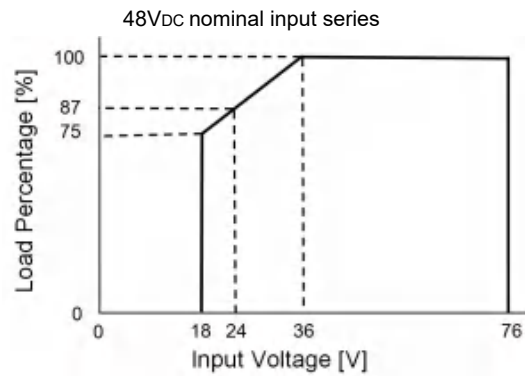
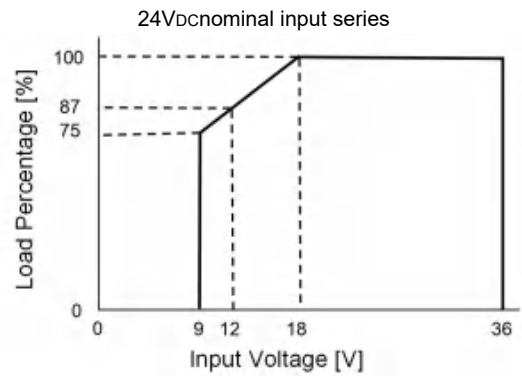
Typical Characteristic Curves

CFDA40-24S03
Temperature Derating CurveCFDA40-24S05
Temperature Derating CurveCFDA40-24S12
Temperature Derating CurveCFDA40-24S24/28
Temperature Derating CurveCFDA40-48S03
Temperature Derating CurveCFDA40-24S05
Temperature Derating Curve



Note: The data is for reference only, the curve is based on the industry common standards and enterprise temperature rise test specifications. In order to ensure the heat dissipation effect, it is recommended to evaluate whether the heat dissipation conditions are met according to the "thermal test point" when using.

Fig. 1



Design Reference

1. Typical application

All DC-DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 2. Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values C_{in} and C_{out} and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product.

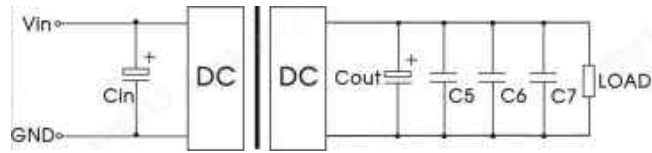


Fig. 2

Vin (Vdc)	Vout (Vdc)	Cin	Cout	C5	C6	C7
24	3.3-5	100uF/50V	470uF/50V	22uF/16V	1uF/16V	10uF/16V
	12/15			22uF/25V	1uF/25V	10uF/25V
	24/28			22uF/50V	1uF/50V	10uF/50V
48	3.3/5	100uF/100V		22uF/16V	1uF/16V	10uF/16V
	12/15			22uF/25V	1uF/25V	10uF/25V

2. EMC compliance circuit

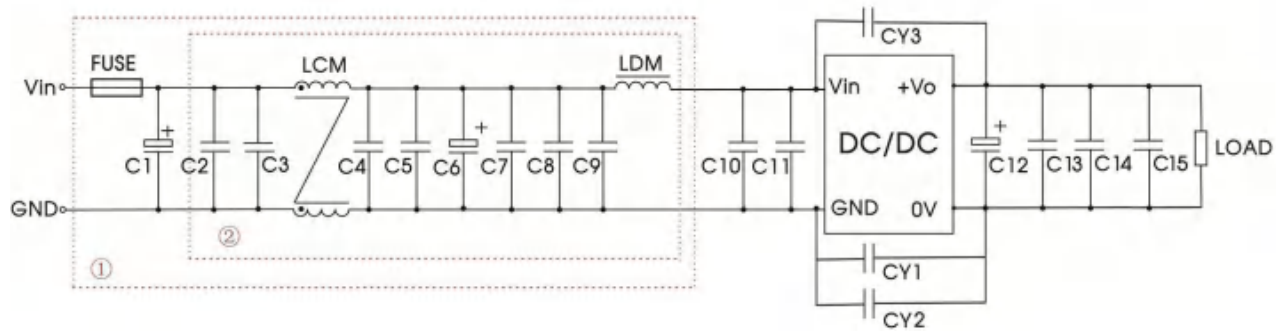


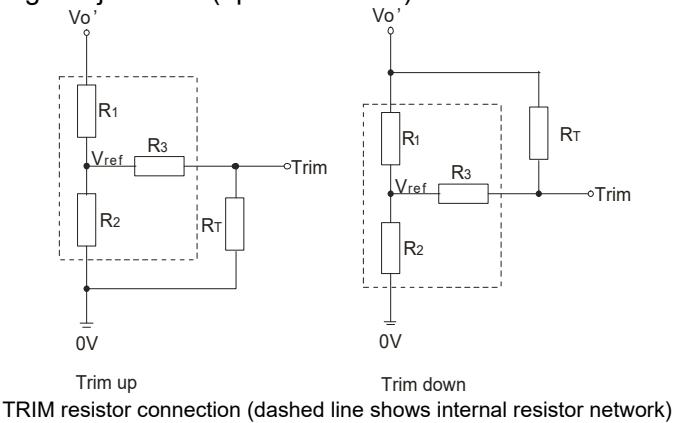
Fig.3

Notes: We use Part ① in Fig. 3 for Immunity tests and Part ② for Emissions test. Selecting based on needs.
Parameter description:

Components	Vin:24Vdc	Vin:48Vdc
FUSE	Choose according to actual input current	
C1	1000uF/50V	680uF/100V
C2/C3/C4/C5/ C7/C8/C9	4.7uF/50V	4.7uF/100V
LCM	350uH*2	10mH*2
C6	220uF/50V	100uF/100V
LDM	2.2uH	6.8uH
C12	Refer to the Cout in Fig.2	
C13/C14	Refer to the C5, C6 in Fig.2	
C15	/	Refer to the C7 in Fig.2
C10/C11	/	4.7uF/100V
CY1	Y2/222K/250VAC	2200PF/3000VDC
CY2/CY3	/	2200PF/3000VDC

Note: The Part ② of the circuit can be simplified, and ClassA can be satisfied by removing the LCM.

3. Trim Function for Output Voltage Adjustment (open if unused)



Calculating Trim resistor values:

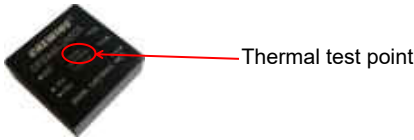
$$\text{up: } R_T = \frac{aR_2}{R_2 - a} - R_3$$
$$\text{down: } R_T = \frac{aR_1}{R_1 - a} - R_3$$

$$a = \frac{V_{ref}}{V_o' - V_{ref}} \cdot R_1$$
$$a = \frac{V_o' - V_{ref}}{V_{ref}} \cdot R_2$$

R_T is Trim resistance
 a is a self-defined parameter,
with no real meaning.

Vout(V)	R1(kΩ)	R2(kΩ)	R3(kΩ)	Vref(V)
3.3	4.83	2.87	4.7	1.25
5	2.87	2.87	5.6	2.5
12	10.91	2.87	15	2.5
15	14.35	2.87	15	2.5
24	24.77	2.87	17.4	2.5
28	29.41	2.87	17.4	2.5

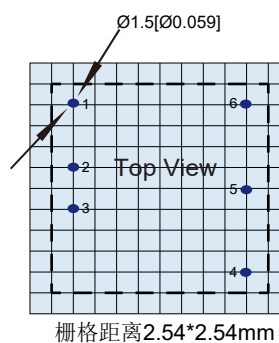
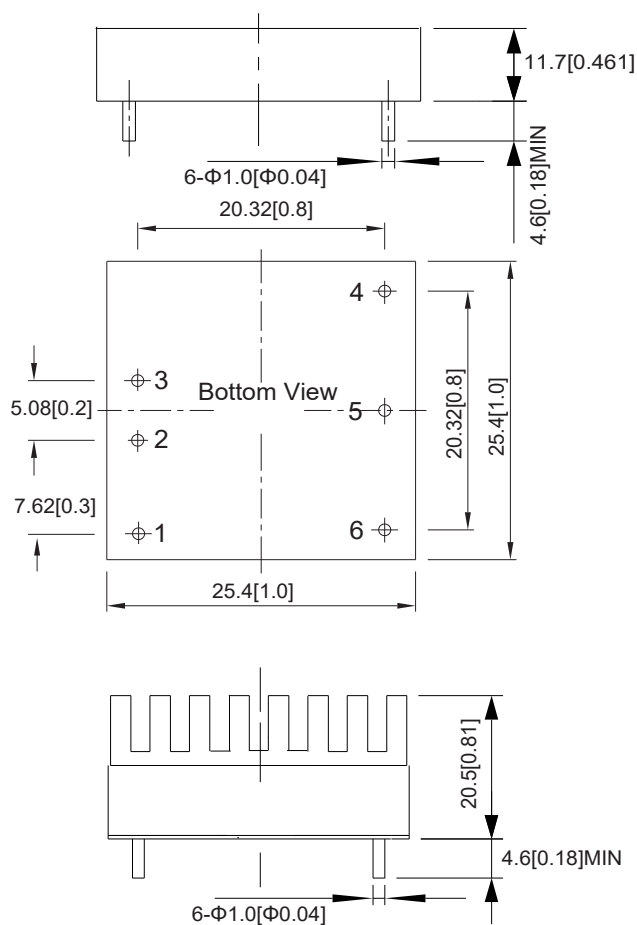
4. Recommended scheme for thermal testing



The heat dissipation conditions can be verified by measuring the temperature of the thermal test point in the figure below. Note that the temperature of the thermal test point should not exceed 110℃, otherwise the internal components of the product may be damaged due to excessive temperature.

5. The products do not support parallel connection of their output

Dimensions and Recommended Layout

Third angle projection 

Note:
 Unit:mm[inch]
 Pin diameter tolerances:+0.1[+0.004]
 General tolerances:+0.5[+0.02]

Pin	1	2	3	4	5	6
Single	CNT	-Vin	+Vin	+Vo	Trim	-Vo



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