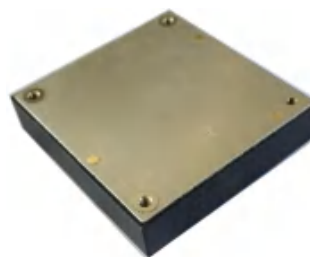


FEATURES

- ◆ Ultra-wide input voltage range:43-160V_{DC}
- ◆ High efficiency up to 90%
- ◆ Low no-load power consumption
- ◆ Reinforced insulation,input-output isolation test voltage:3kV_{AC},input-case isolation test voltage:2100V_{AC}
- ◆ Operating ambient temperature range:-40℃~+100℃
- ◆ Input under-voltage protection,output short-circuit,over-current,over-voltage, over-temperature protection
- ◆ Industry standard 1/2 brick
- ◆ Meets EN50155 railway standard
- ◆ Three year warranty

150W isolated DC-DC converter

Ultra-wide input and regulated single output



Selection Guide

PartNo. ①	Input Voltage(Vdc)			Output		Nominal Full Load Efficiency (%)Min./Typ.	Max.Capacitive Load(μF)
	Nominal	Range	Max. ②	Voltage(Vdc)	Current(mA) Max./Min.		
CFDHR150-110S05	110	43-66	170	5	19200/0	86/88	26400
		66-160			24000/0		33000
CFDHR150-110S12		43-66		12	10000/0	87/89	10000
		66-160			12500/0		12500
CFDHR150-110S15		43-66		15	8000/0	87/89	5400
		66-160			10000/0		6800
CFDHR150-110S24		43-66		24	4375/0	88/90	3080
		66-160			6250/0		4400
CFDHR150-110S48		43-66		48	2496/0	86/88	800
		66-160			3120/0		1000

Note: ① Use "S" suffix for heat sink mounting, "Z" suffix for DIN-Rail mounting, We recommend to choose modules with a heat sink for enhanced heat dissipation and applications with extreme temperature requirements;

② Exceeding the maximum input voltage may cause permanent damage.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current(full load/no-load)	Nominal input voltage	5VDC output	--	1240/25	1586/45	mA
		12VDC,15VDC output	--	1533/25	1568/45	
		24VDC output	--	1516/25	1550/45	
		48VDC output	--	1548/25	1584/45	
Reflected Ripple Current	Nominal input voltage		--	100	--	VDC
Surge Voltage(1sec.max.)			-0.7	--	180	
Start-up Voltage			--	--	43	
Under-voltage Protection			--	40	--	
Input Filter			Pi filter			
Hot Plug			Unavailable			
CNT*	Module on		CNT pin open or pulled high(3.5-12Vdc)			
	Module off		CNT pin -Vin or pulled low(0-1.2Vdc)			

CNT *	Input current when off	--	2	8	mA
Note: *The CNT pin voltage is referenced to input -Vin.					

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Voltage Accuracy	Nominal input voltage,0%-100% load		--	±1	±3	%
Linear Regulation	Input voltage variation from low to high at full load		--	±0.1	±0.3	
Load Regulation	Nominal input voltage,0%-100% load		--	±0.3	±0.5	
Transient Recovery Time	25% load step change, nominal input voltage		--	200	500	μs
Transient Response Deviation		5Vdc output	--	--	±10	%
		Others	--	±3	±5	
Temperature Coefficient	Full load		--	--	±0.03	%/℃
Ripple/Noise *	20MHz bandwidth, 10%-100%Io load	48VDC output	--	200	300	mVp-p
		Others	--	100	200	
Trim			90	--	110	%Vo
Output Voltage Remote Compensation (sense)			--	--	105	
Over-voltage Protection	Input voltage range	5VDC output	110	--	160	
		Others	110	--	140	
Over-current Protection	Input voltage range		110	140	190	%Io
Short-circuit Protection			Hiccup, continuous, self-recovery			
Note: *Ripple & Noise for 48Vdc output at 0%Io-100%Io load ≤400mV,others outputs at 0%Io-100%Io load ≤300mV.The measuring method of ripple and noise, please refer to Fig. 1 .						

General Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Isolation	Input-output	Electric Strength test for 1 minute with a leakage current of 5mA max.	3000	--	--	VAC
	Input-case		2100	--	--	
	Output-case	Electric Strength test for 1 minute with a leakage current of 1mA max.	1500	--	--	VDC
Insulation Resistance	Input-output resistance at 500VDC		1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100KHz/0.1V		--	2200	--	pF
Switching Frequency	PFM mode		--	170	--	KHz
MTBF	MIL-HDBK-217F@25°C		500	--	--	K hours

Environmental Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Operating Temperature Range	According to the operating temperature range		-40	--	+100	℃
Over-temperature Protection	Out-case temperature		--	--	+115	
Storage Humidity	Non-condensing		5	--	95	%RH
Storage Temperature			-55	--	+125	℃
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds		--	--	+300	
Thermal Resistance	CFDHR150-110S05 CFDHR150-110S12 CFDHR150-110S15	100LFM	4.3	--	--	℃/W
	CFDHR150-110S24 CFDHR150-110S48	200LFM	2.8	--	--	
	CFDHR150-110S05	Natural convection	3.5	--	--	
		100LFM				
	CFDHR150-110S12S CFDHR150-110S15S CFDHR150-110S24S CFDHR150-110S48S	Natural convection	3.4	--	--	
		100LFM	2.8	--	--	℃/W
Vibration			IEC/EN61373-Category 1, Grade B			

Mechanical Specifications

Case Material	Black plastic; flame-retardant and heat-resistant (UL94-V0)& Aluminum alloy case	
Dimensions	Without heatsink	61.0×57.9×13.8mm
	With heatsink	62.0×58.0×31.8mm
Weight	Without heatsink	125.0g(Typ.)
	With heatsink	180.0g(Typ.)
Cooling Method	Free air convection or forced convection	

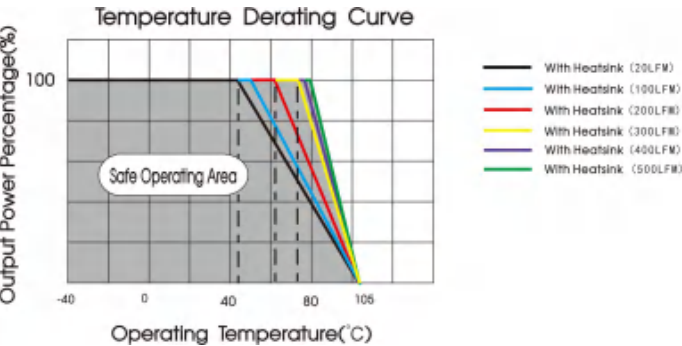
Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	150KHz-30MHz Class B(see Fig.2 for recommended circuit)		
	RE	CISPR32/EN55032	30MHz-1GHz Class B(see Fig.2 for recommended circuit)		
Immunity	ESD	IEC/EN61000-4-2	GB/T17626.2 Contact ±6KV,Air ±8KV		perf.Criteria A
	RS	IEC/EN61000-4-3	GB/T17626.3 20V/m		perf.Criteria A
	CS	IEC/EN61000-4-6	GB/T17626.6 10Vr.m.s		perf.Criteria A
	EFT	IEC/EN61000-4-4	GB/T17626.4 ±2KV(5KHz,100KHz) (see Fig.2 for recommended circuit)		perf.Criteria A
	Surge	IEC/EN61000-4-5	GB/T17626.5 line to line ±2KV(1.2μs/50μs 2Ω) (see Fig.2 for recommended circuit)		perf.Criteria A

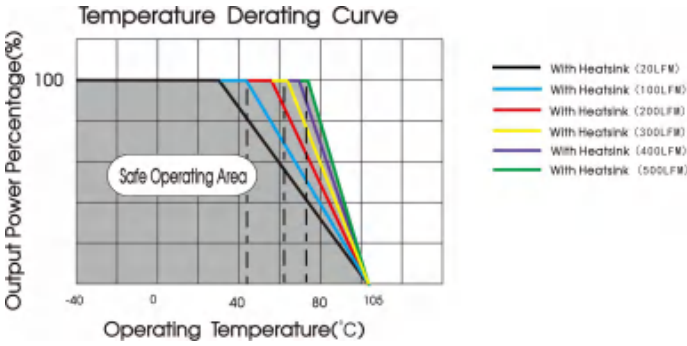
Electromagnetic Compatibility (EMC)

Emissions	CE	EN50121-3-2	150kHz-500kHz 99dBuV(see Fig.2 for recommended circuit)		
		EN55016-2-1	500kHz-30MHz 93dBuV(see Fig.2 for recommended circuit)		
Immunity	RE	EN50121-3-2	30MHz-230MHz 40dBuV/m at 10m(see Fig.2 for recommended circuit)		
		EN55016-2-1	230MHz-1GHz 47dBuV/m at 10m(see Fig.2 for recommended circuit)		
	ESD	EN50121-3-2	Contact ±6KV/Air ±8KV		perf. Criteria A
	RS	EN50121-3-2	20V/m		perf. Criteria A
	EFT	EN50121-3-2	±2kV 5/50ns 5kHz (see Fig.2 for recommended circuit)		perf. Criteria A
	Surge	EN50121-3-2	line to line ±1KV(42Ω, 0.5μF) (see Fig.2 for recommended circuit)		perf. Criteria A
	CS	EN50121-3-2	0.15MHz-80MHz 10Vr.m.s		perf. Criteria A

Typical Characteristic Curves

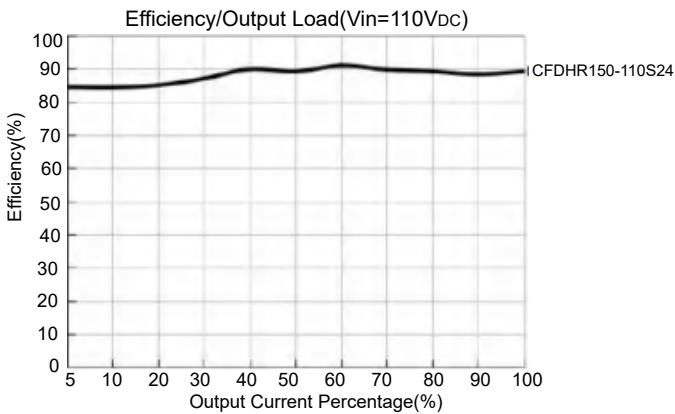
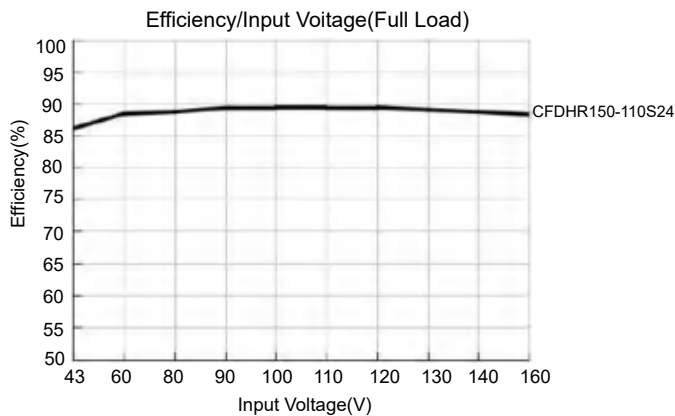
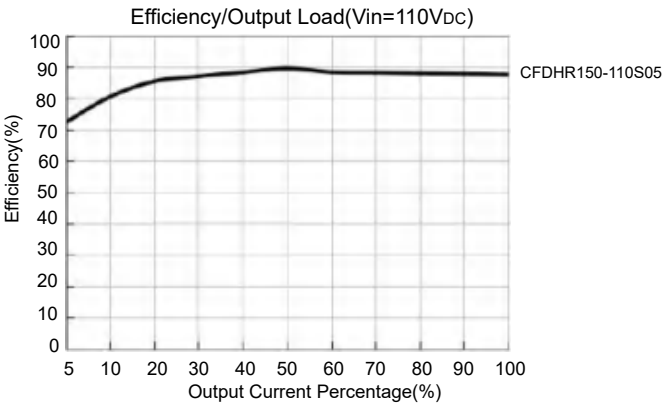
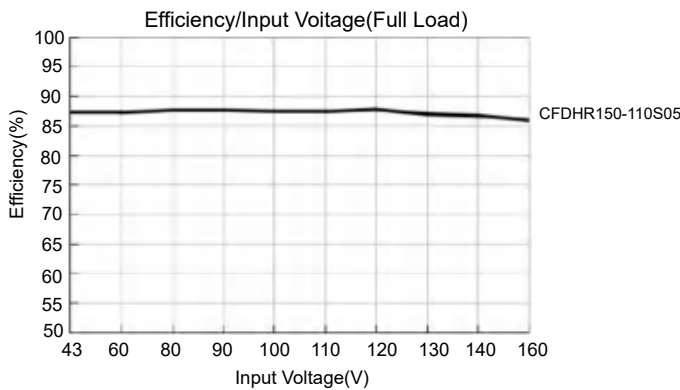


CFDHR150-110S05S temperature derating curve (Vin=110V)



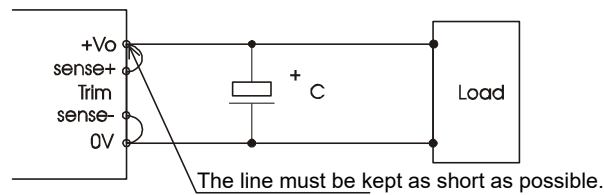
CFDHR150-110S48S temperature derating curve (Vin=110V)

Notes:
1. Temperature derating curves and efficiency curves are typical test values.



Remote Sense Application

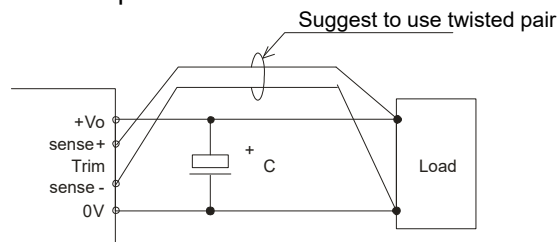
1.Remote Sense Connection if not used



Notes

- (1) If the sense function is not used for remote regulation the user must connect the +Sense to +Vo and -Sense to 0V at the DC-DC converter pins and will compensate for voltage drop across pins only.
- (2) The connections between Sense lines and their respective power lines must be kept as short as possible, otherwise they may be picking up noise, interference and/or causing unstable operation of the power module.

2.Remote Sense Connection used for Compensation



Notes:

- (1) Using remote sense with long wires may cause unstable output, please contact technical support if long wires must be used.
- (2) PCB-tracks or cables/wires for Remote Sense must be kept as short as possible. Twisted pair or shielded wires are suggested for remote compensation and must be kept as short as possible.
- (3) We recommend using adequate cross section for PCB-track layout and/or cables to connect the power supply module to the load in order to keep the voltage drop below 0.3V and to make sure the power supply's output voltage remains within the specified range.
- (4) Note that large wire impedance may cause oscillation of the output voltage and/or increased ripple. Consult technical support or factory for further advice of sense operation.

Design Reference

1. Ripple & Noise

All the DC-DC converters of this series are tested before delivery using the recommended circuit shown in Fig.1.

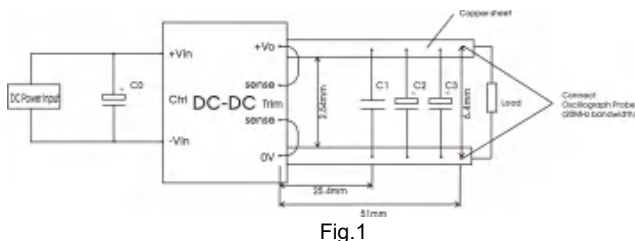


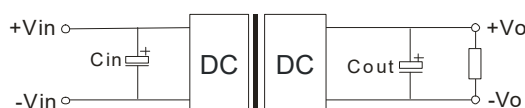
Fig.1

Capacitors value	C0(μF)	C1(μF)	C2(μF)	C3(μF)
Output voltage	100μF/ 200V	1μF/16V	10μF/16V	330μF/16V
5VDC		1μF/25V	10μF/25V	330μF/25V
12VDC		1μF/25V	10μF/25V	330μF/25V
15VDC		1μF/50V	10μF/50V	330μF/50V
24VDC		1μF/100V	10μF/100V	330μF/100V
48VDC		1μF/100V	10μF/100V	330μF/100V

2. Typical application

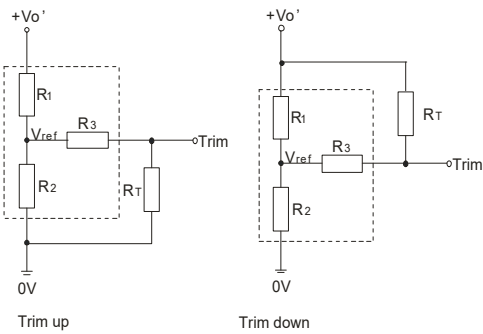
We recommended using CHEWINS's EMC circuit, otherwise please ensure that at least a 100μF electrolytic capacitors is connected at the input in order to ensure adequate voltage surge suppression and protection.

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.



capacitor value	Cin(μF)	Cout(μF)
OOutput Voltage	100μF/200V	330μF/16V
5VDC		330μF/25V
12VDC		330μF/25V
15VDC		330μF/50V
24VDC		330μF/100V
48VDC		330μF/100V

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



TRIM resistor connection (dashed line shows internal resistor network)

Trim resistor calculation:

up: $R_T = \frac{aR_2}{R_2 - a} - R_3$ $a = \frac{V_{ref}}{V_{o'} - V_{ref}} \cdot R_1$

down: $R_T = \frac{aR_1}{R_1 - a} - R_3$ $a = \frac{V_{o'} - V_{ref}}{V_{ref}} \cdot R_2$

Table1

Vo resistance	5(Vdc)	12(Vdc)	15(Vdc)	24(Vdc)	48(Vdc)
R1(KΩ)	2.87	11	14.49	24.87	58.69
R2(KΩ)	2.87	2.87	2.87	2.87	3.21
R3(KΩ)	4	11	16	21	7.89
Vref(V)	2.5	2.5	2.5	2.5	2.5

Note:
Value for R1,R2,R3,and Vref refer to the above table 1.RT:Resistance of Trim.a:User-defined parameter,no actual meanings.Vo':The trim up/down voltage.

4. EMC compliance circuit

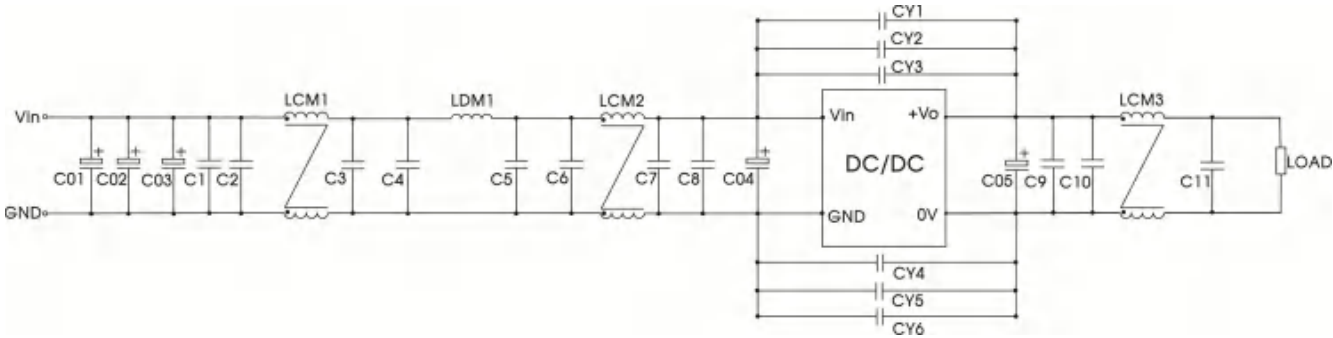
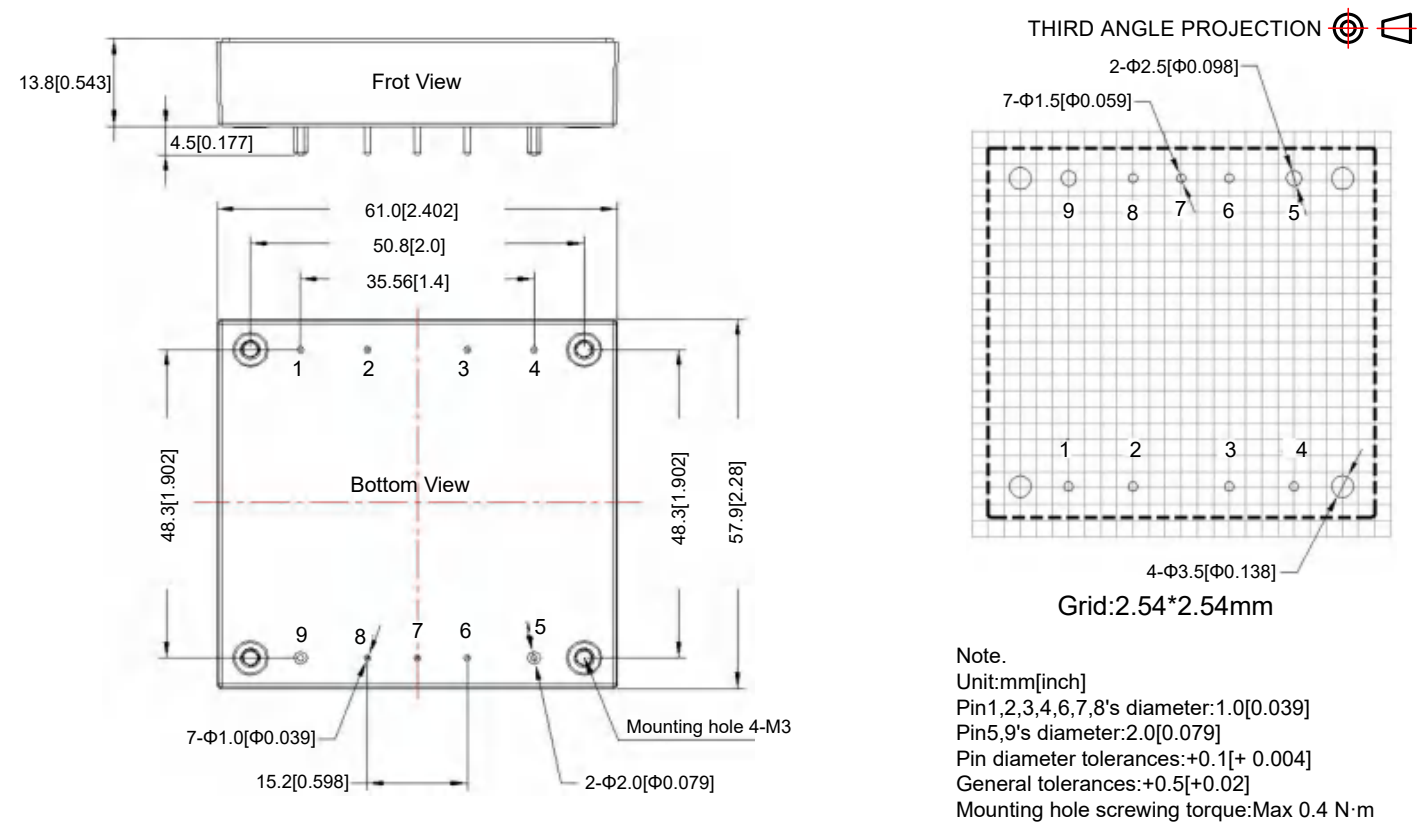


Fig.2

Components	Value	Reference
C01,C02,C03,C04	220uF/200V	RUBYCON
C05	220uF/63V	RUBYCON
LDM1	1.5uH	Shielded inductor
C1,C2,C3,C4,C5,C6,C7,C8,C9,C10,C11	2.2uF/250V	2220MLCC
CY1,CY2,CY3,CY4,CY5,CY6	2200pF/400Vac	Y safety capacitor
LCM2	22uH±10%	TN40H-T18*10*10
LCM3	360uH±10%	TL13-T18*10*10

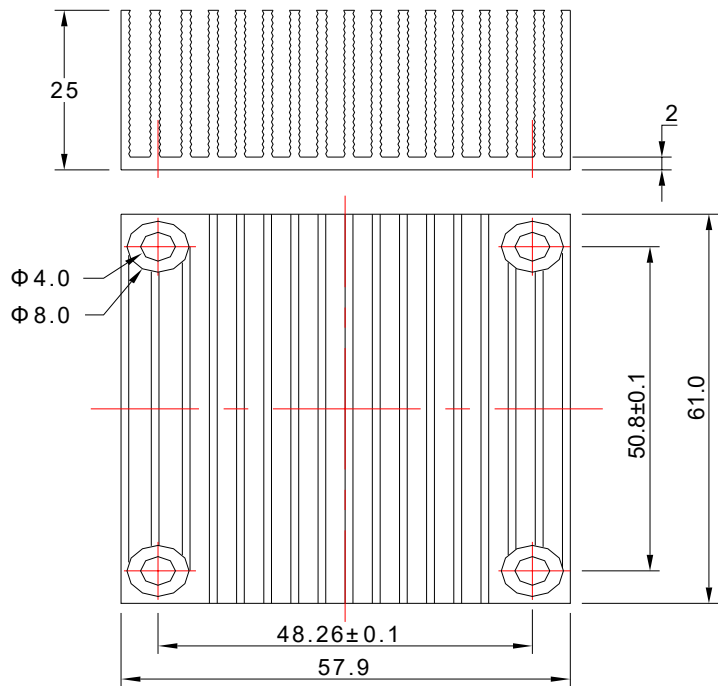
5.The products do not support parallel connection of their output

CFDHR150-110S12 Dimensions (without heatsink)



Pin	1	2	3	4	5	6	7	8	9
Function	-Vin	CNT	Case	-Vin	-Vo	-S	TRIM	+S	+Vo

CFDHR150-110S12S Dimensions (with heatsink)



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