FEATURES:

500W, wide voltage input, isolated and stabilized single output

- Wide input voltage range (2:1)
- Efficiency up to 94%
- Isolation voltage 2250VDC
- Input undervoltage protection, output short circuit, overcurrent, overvoltage protection, over temperature protection
- Equipped with parallel current sharing function
- Working temperature range of aluminum substrate: -40 ℃ to +100 ℃
- International standard 1/2 brick
- Three year warranty period

Model Selection Table

	Model	ON/OFF logic①	INPUT VOLTAGE(VDC)		Output		Full load efficiency (%) Min./Typ.	Maximum capacity load (μF)③	Minimum capacitive load (μF)
			Nominal value (range value)	Maximum value②	Voltage (VDC)	Current (A) Max./Min.			
--	CFDH500-24S12R3-N	N	24 (18-36)	40	12	42/0	91/93	12000	470
	CFDH500-24S15R3-N				15	34/0	92/94	10000	470
	CFDH500-24S24R3-N				24	21/0	91/93	6000	470
	CFDH500-24S28R3-N				28	18/0	92/94	5000	470

Note:
① "P" represents positive logic, "N" represents negative logic;
② The input voltage cannot exceed this value, otherwise it may cause permanent and irreparable damage;
③ To ensure the stability of the output voltage, a minimum capacitive load must be connected to the output side of the product.

Input characteristics

Project	Working conditions		Min.	Typ.	Max.	Unit
Input current (full load/no load)	24VDC input	12V, 24V output	-	22.58/0.34	23.08/0.38	A
		15V, 28V output	-	22.61/0.34	23.1/0.38	
reflected ripple current	24VDC input		--	500	--	
Impulse Voltage(1sec.max.)			-0.7	--	50	VDC
starting voltage			--	--	18	
Under voltage protect			15.5	--	--	
Start Time	Nominal input voltage and constant resistance load		--	--	100	ms
Input filter type			capacitor filter			
Hot Plug			Not Supported			
Remote control foot (ON/OFF)	Module shutdown		ON/OFF suspended or connected to TTL high level (3.5-12VDC)			
	Module enabled		ON/OFF to GND or low level (0-1.2VDC)			
	Input current during shutdown		--	25	40	mA

Note: The voltage of the ON/OFF control pin is relative to the input pin - Vin.

Output characteristic

Project	Working conditions		Min.	Typ.	Max.	Unit
voltage accuracy	0% -100% load		--	±1	±3	%Vo
Linear regulation rate	Full load, input voltage from low voltage to high voltage		--	±0.2	±0.5	
Load regulation rate	5% -100% load		--	±0.25	±0.75	
Transient Recovery Time	25% load step change, 2A/us		--	300	500	μs
Transient response deviation			--	±3	±5	%Vo
Temperature drift coefficient	Nominal full load		--	--	±0.03	%/℃
Ripple/noise①	24VDC nominal input voltage	12V, 15V output	--	--	150	mVp-p
	20MHz bandwidth, 5% -100%load	24V, 28V output	--	--	220	
Parallel current sharing accuracy②	24VDC nominal input voltage, 100% load, 2pcs in parallel		--	±8	±10	%Io
Adjustable output voltage(Trim)	Input Voltage		90	--	110	%Vo
Remote compensation(Sense)			--	--	110	
Overvoltage protection			110	115	130	
Overcurrent protection			110	115	130	%Io
Short circuit protection			Hiccup style, sustainable, self-healing			
Over Temperature Protection	Product surface temperature		--	110	120	℃

Note:
① 0% -5% of the load ripple/noise is less than or equal to 5% Vo. The testing method for ripple and noise adopts the reliable measurement method. The recommended peripheral measurement method is 1uF ceramic capacitor+10uF tantalum capacitor+"minimum capacitive load".
② Number of parallel connections: 4pcs max, with current sharing accuracy limited to 2pcs products for reference when connected in parallel.

General characteristics

Project	Working conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input output, test time 1 minute, leakage current less than 1mA	2250	--	--	VDC
	Input/Output - Housing, test time 1 minute, leakage current less than 1mA	2250	--	--	
Insulation resistance	Input output, insulation voltage 500VDC	100	--	--	MΩ
Isolation capacitor	Input output, 100kHz/0.1V	--	3000	--	pF
Operation temperature	Shell temperature Tc	-40	--	+100	℃
Storage temperature		-55	--	+125	
Pin resistance to welding temperature	Welding point distance from the shell 1.5mm, 10 seconds	--	--	+300	
Storage humidity	No condensation	5	--	95	%RH
Vibrate		10-150Hz,5G,0.75mm.along X,Y and Z			
Switching frequency (PWM mode)	PWM Mode	--	280	--	kHz
Mean time between failures	MIL-HDBK-217F@25℃	1000	--	--	k hours

Physical property

Housing material	Aluminum alloy+black flame retardant and heat-resistant plastic
Size	61.0×57.9×12.7mm
Weight	130.0g(Typ.)
Cooling method	Natural air cooling or forced air cooling

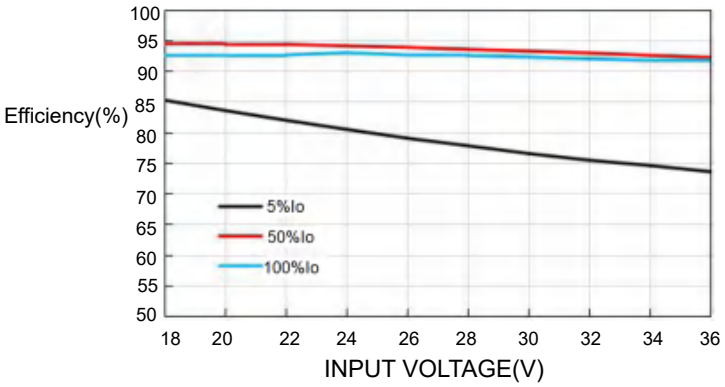
EMC characteristic

EMI	Conducted interference	CISPR32/EN55032 CLASS A(Plus peripheral) (Recommended circuit as shown in Figure 4)
	Radiated Interference	CISPR32/EN55032 CLASSA(Plus peripheral) (Recommended circuit as shown in Figure 4)

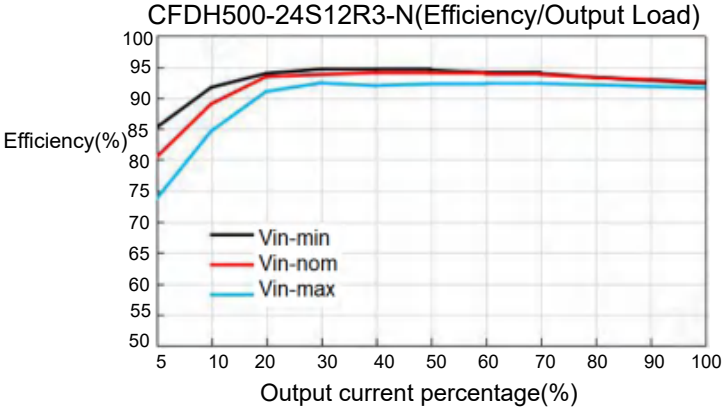
EMS	Electrostatic Discharge	IEC/EN61000-4-2	Contact ±6kV,Air±8kV	perf.Criteria B
	Radiation anti-interference degree	IEC/EN61000-4-3	10V/m(Recommended circuit (see Figure 4)	Perf.Criteria A
	Pulse group anti-interference degree	IEC/EN61000-4-4	±2kV(Recommended circuit (see Figure 4)	Perf.Criteria A
	Surge immunity	IEC/EN61000-4-5	line to line ±2kV(Recommended circuit (see Figure 4)	Perf.Criteria B
	Conducted interference immunity	IEC/EN61000-4-6	10Vr.m.s(Recommended circuit (see Figure 4)	Perf.Criteria A

Product characteristic curve

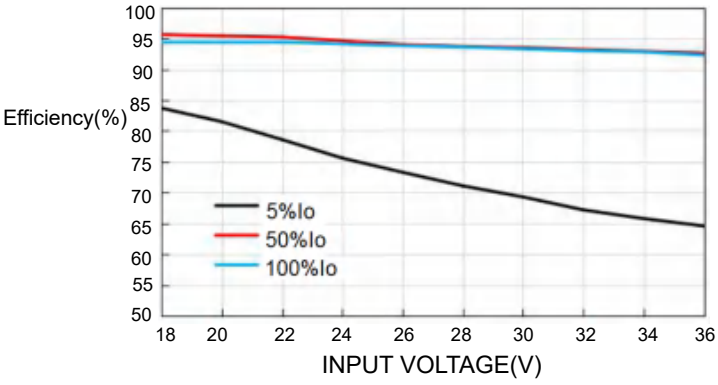
CFDH500-24S12R3-N(Efficiency/Input Voltage)



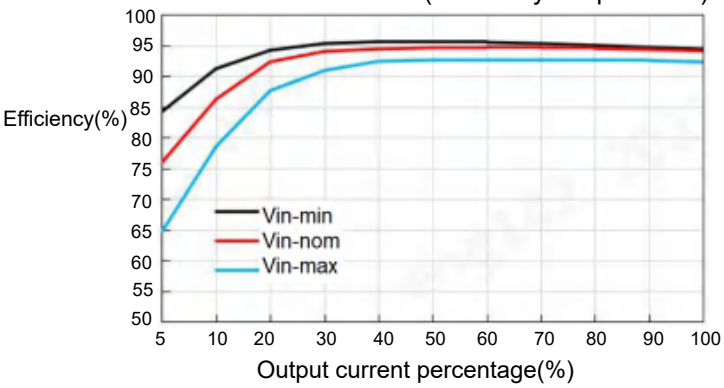
CFDH500-24S12R3-N(Efficiency/Output Load)



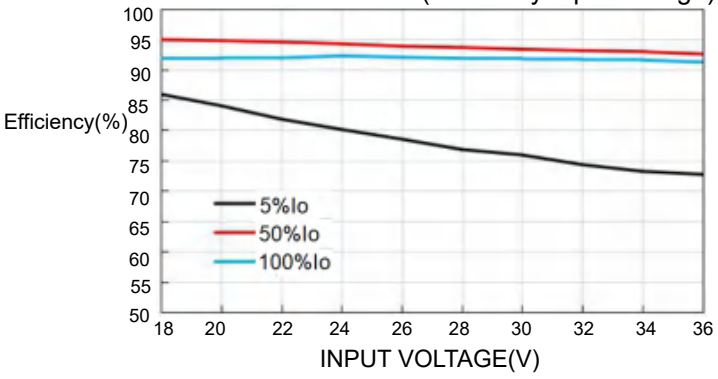
CFDH500-24S15R3-N(Efficiency/Input Voltage)



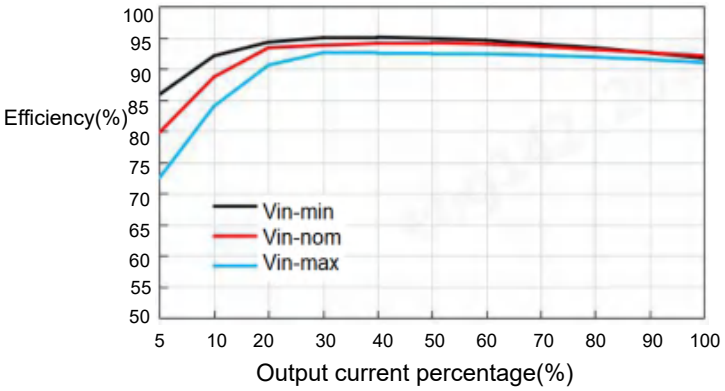
CFDH500-24S15R3-N(Efficiency/Output Load)



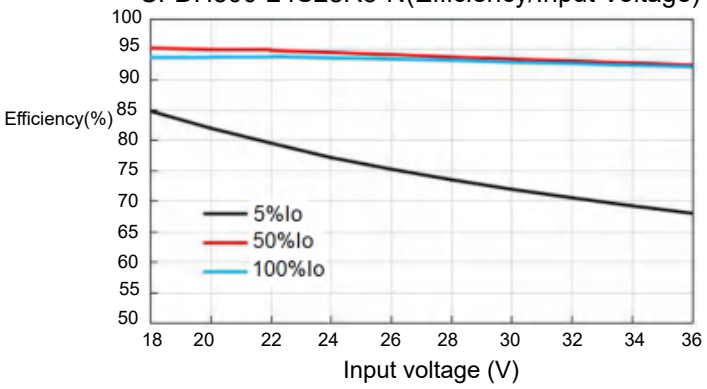
CFDH500-24S24R3-N(Efficiency/Input Voltage)



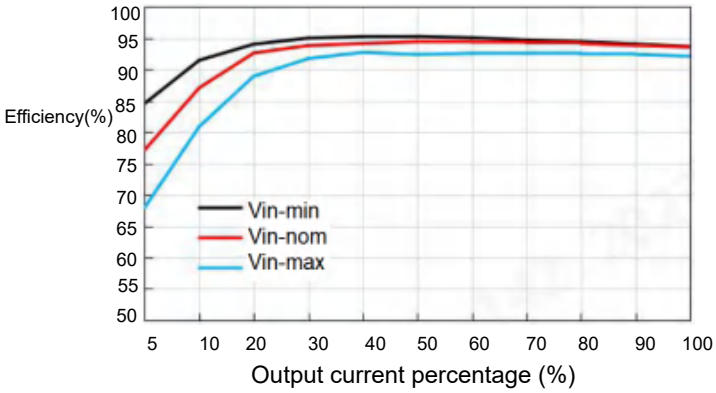
CFDH500-24S24R3-N(Efficiency/Output Load)



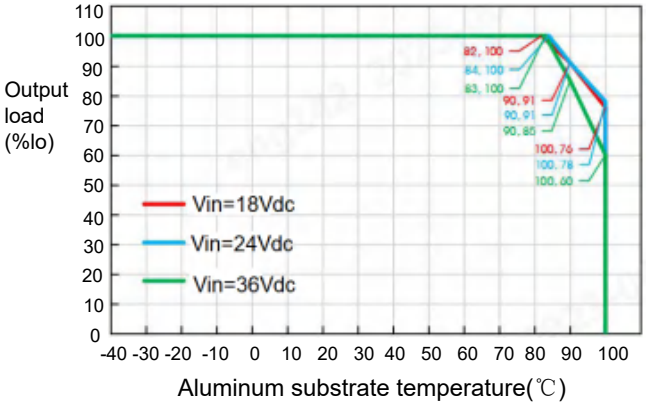
CFDH500-24S28R3-N(Efficiency/Input Voltage)



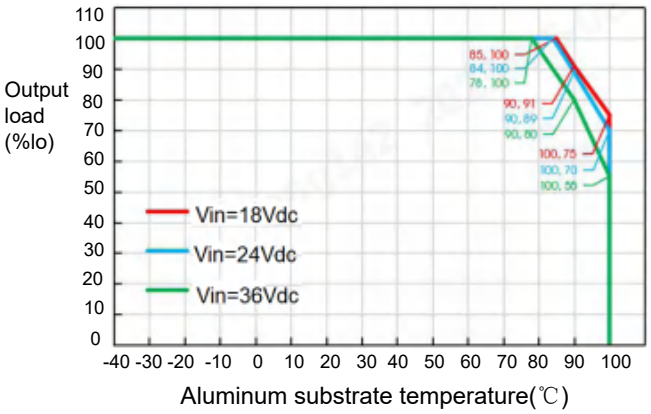
CFDH500-24S28R3-N(Efficiency/Output Load)



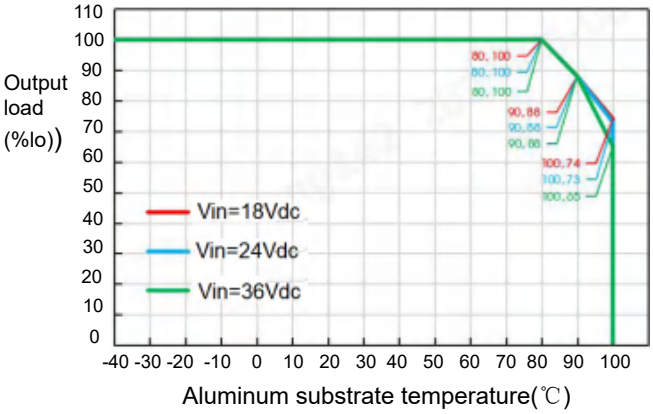
CFDH500-24S12R3-N(Temperature Derating Curve)



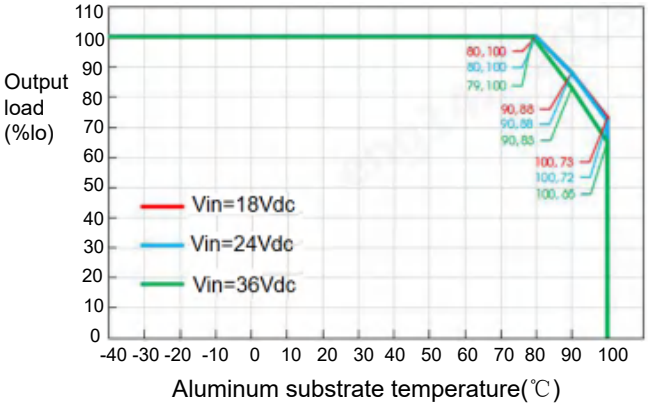
CFDH500-24S15R3-N(Temperature Derating Curve)



CFDH500-24S24R3-N(Temperature Derating Curve)



CFDH500-24S28R3-N(Temperature Derating Curve)



Usage and precautions of Sense

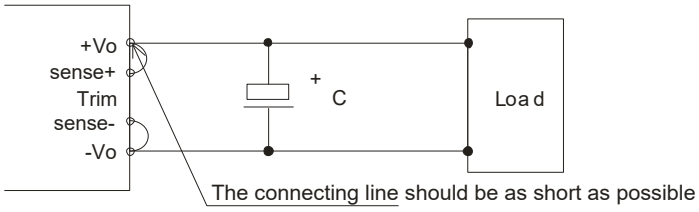


Figure 1

Note:

1. When remote compensation is not used, ensure that+Vo and Sense+, - Vo and Sense - are short circuited;
2.The connection between Vo and Sense+, - Vo and Sense - should be as short as possible and close to the terminal; Avoid forming a larger circuit area, as noise entering this circuit may cause instability of the module.

2. When using remote compensation:

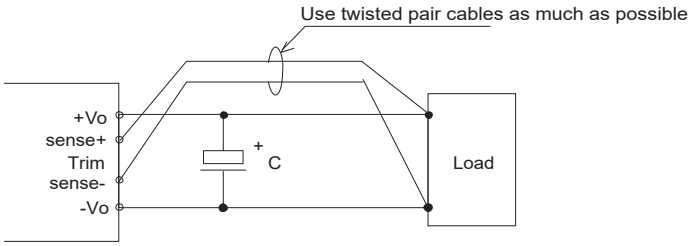


Figure 2

Note:

1. If the remote compensation lead is too long, it may cause unstable output voltage. If it is necessary to use a longer remote compensation lead, please contact our technical personnel.
2. If using remote compensation, please use twisted pair or shielded wire and make the lead as short as possible.
3. Please use wide PCB leads or thick wires between the power module and the load, and keep the line voltage drop below 0.3V; Ensure that the output voltage of the power module remains within the specified range.
4. The impedance of the lead wire may cause output voltage oscillation or large ripple. Please make sufficient evaluation before use.

Reference

1.Application circuit

All DC/DC converters in this series are tested according to the recommended testing circuit (Figure 3) before leaving the factory.

If further reduction of input and output ripple is required, the external capacitance Cin and Cout of the input and output can be increased or a capacitor with a small series equivalent impedance value can be selected, but the capacitance value cannot exceed the maximum capacitive load of the product.

图 3

Capacitance value / Output voltage	Cout(min.)	Cin
12V/15V/24V/28V	470μF/35V	220μF/63V

2. EMC Solutions - Recommended Circuits

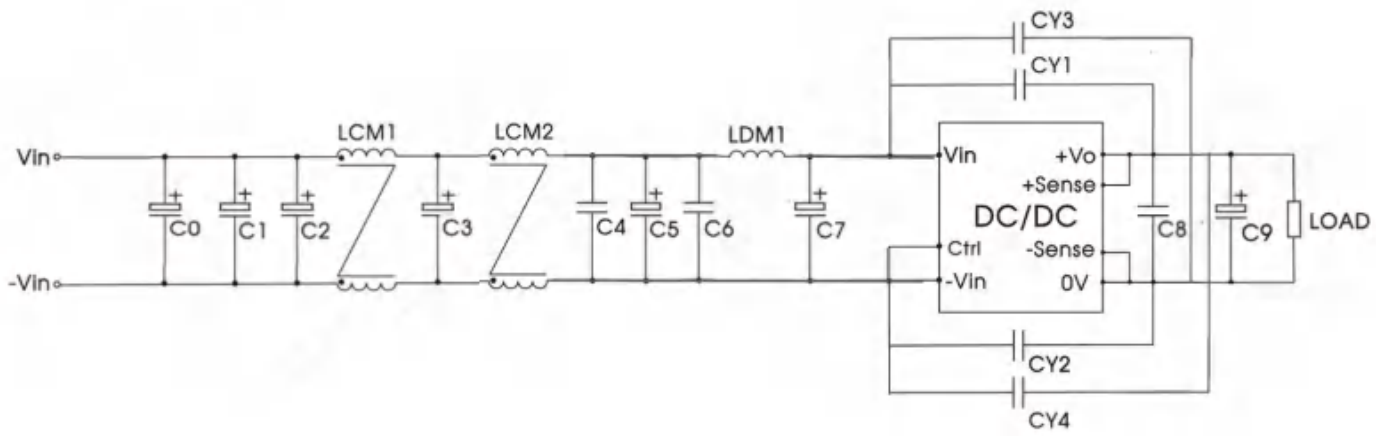
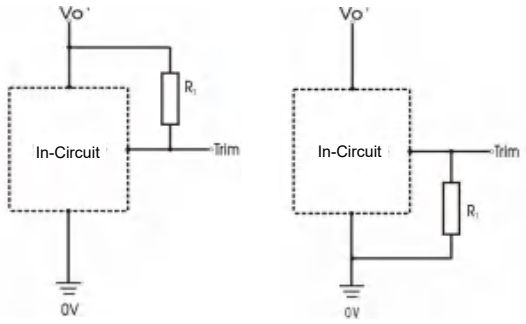


Figure 4

Device	Parameter Description
C0,C1,C2,C3,C5,C7	330μF/63V electrolytic capacitor
C4,C6,C8	2.2μF/100V ceramic capacitor
C9	470μF/63V electrolytic capacitor
LCM1	560uH
LCM2	200uH
LDM1	10uH
CY1,CY2,CY3,CY4	4.7nF/400VAC safety Y-capacitor

3. Use of Trim and Calculation of Trim Resistance



Trim up Trim down

Figure 5: Usage circuit of Trim
(dashed boxes represent the interior of the product)

The calculation formula for Trim resistance:

Trimup

$$R_T = \left(\frac{5.11V_{nom}(100+\Delta\%)}{1.225\Delta\%} - \frac{511}{\Delta\%} - 10.22 \right)(k\Omega)$$

Trim down

$$R_T = \left(\frac{511}{\Delta\%} \right) - 10.22(k\Omega)$$

注:

RT is a Trim resistor

$$\Delta\% = \left| \frac{V_{nom} - V_{out}}{V_{nom}} \right| \times 100$$

Vnom is a typical output voltage

Vout is used to set the output voltage

4. Reflection ripple current test

The input reflection ripple current should be tested according to the peripheral circuit in the diagram.

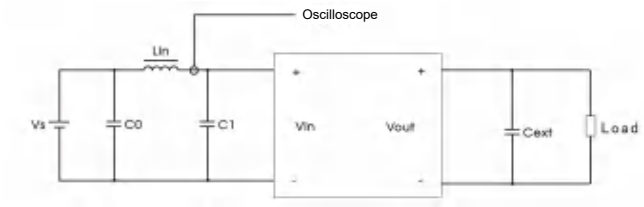


Figure 6

Device	Parameter Description
C0	220μF/63V
Lin	10uH/40A
C1	470μF/63V
Cext	470μF/35V

5.The product supports output parallel power increase

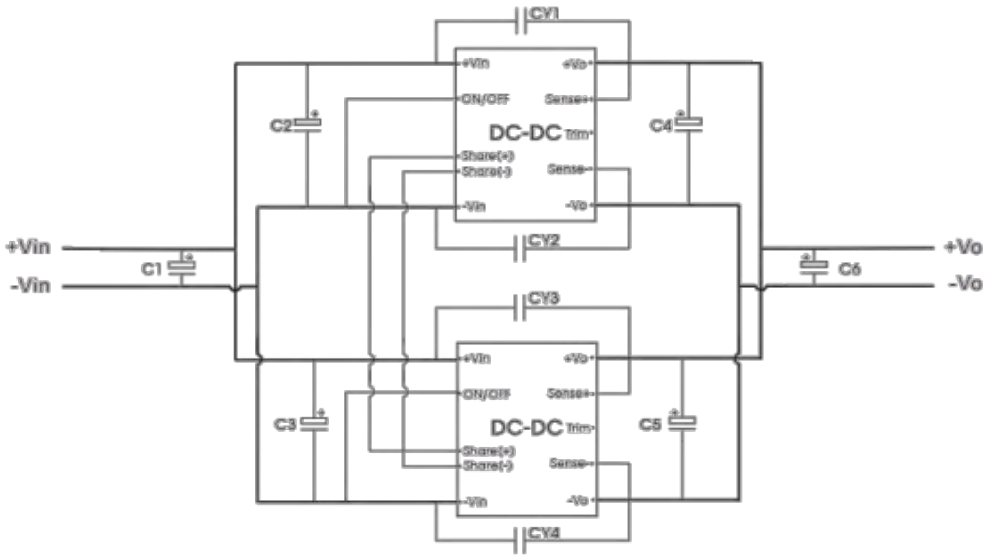


Figure 7 Parallel current sharing wiring diagram

When using the parallel current sharing function, it is necessary to ensure that the wiring length of each power module is equal as much as possible, and the maximum number of parallel connections is 4.

Vin(VDC)	Vo(VDC)	C1/C2/C3	C4/C5/C6	CY1/CY2/CY3/CY4
24	12/15/24/28	220uF/63V	470uF/35V	222M/Y2

6. Recommended hot testing plan

During the application process, the thermal design of the product can be evaluated by combining the temperature reduction curve of the product, or the stable working range of the product can be determined by testing the temperature of the thermal test point in Figure 8; When the temperature at point A is below 100℃, it is the stable working range of the product.

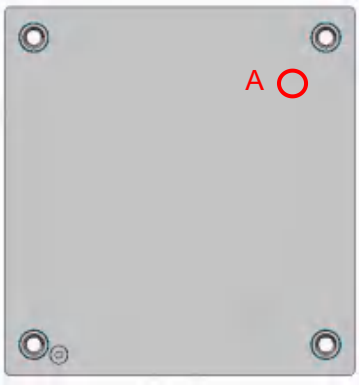
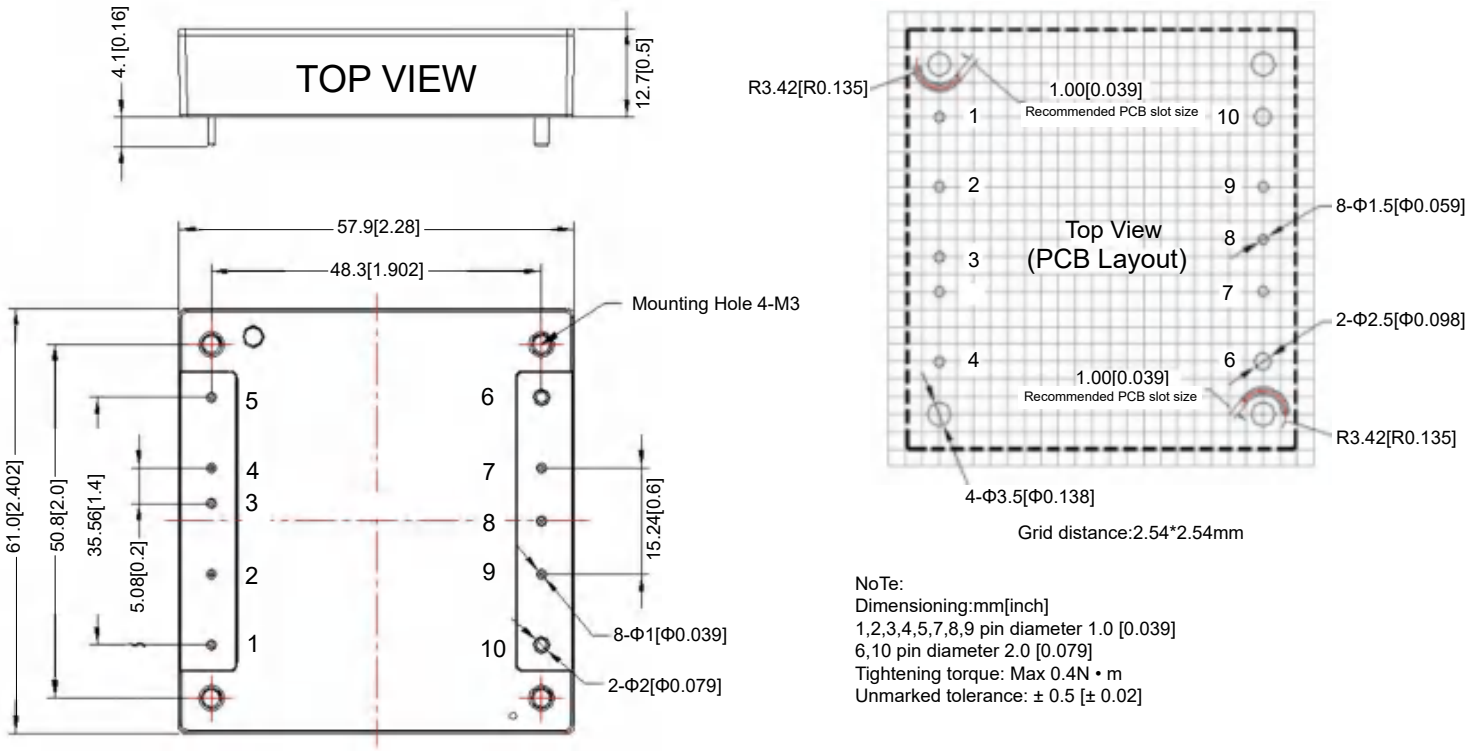


Figure 8 Top view of the product

Packaging size and printing layout:

Third leg projection



NoTe:
Dimensioning:mm[inch]
1,2,3,4,5,7,8,9 pin diameter 1.0 [0.039]
6,10 pin diameter 2.0 [0.079]
Tightening torque: Max 0.4N • m
Unmarked tolerance: ± 0.5 [± 0.02]

Pin	1	2	3	4	5	6	7	8	9	10
Function	+Vin	ON/OFF	+Share	-Share	-Vin	-Vo	-Sense	Trim	+Sense	+Vo

1.The recommended unbalance degree of the dual output module load is ≤±5%; if the degree exceeds ±5%, than the product performance cannot be guaranteed to comply with all parameters in the datasheet. Please contact our technicians directly for specific information;
2. The maximum capacitive load offered were tested at nominal input voltage and full load;
3. Unless otherwise specified,parameters in this datasheet were measured under the conditions of Ta=25℃,humidity<75% with nominal input voltage and rated output load;
The maximum capacitive load offered were tested at nominal input voltage and full load;
4.All index testing methods in this datasheet are based on our Company's corporate standards;
5.The performance parameters of the product models listed in this manual are as above, but some parameters of non-standard model products may exceed the requirements mentioned above.Please contact our technicians directly for specific information;
6.Specifications are subject to change without prior notice.

Beijing Huayang Changfeng Technology Co.,Ltd.
Address:No.25,torch South Street,Zhuozhou Development Zone,Hebei Province,people's Republic of China
Tel:86-10-68817997 Mobile phone:15600309099 E-mail:sales@chewins.net