CFDQR100-110 Series

DC/DC CONVERTER

FEATURES:

- Ultra-wide input voltage range:43-160VDC
- High efficiency up to 91%
- Low no-load power consumption
- Reinforced insulation,input-output isolation test voltage:3kVAC,input-case isolation test voltage:2.1kVAC
- Operating ambient temperature range:-40℃ to+105℃
- Input under-voltage protection,output short-circuit,over-current,over-voltage, over-temperature protection
- Industry standard 1/4 brick
- Meets EN50155 railway standard
- 3 Yeare Warranty

100W isolated DC-DC converter

Ultra-wide input and regulated single output

RoHS

Selection Guide

PartNo.①	Input Voltage(VDC)		Output		Full Load Efficiency(%) Min./Typ.	Max.Capacitive Load(μF)
	Nominal (Range)	Max.②	Voltage(VDC)	Current(mA) Max./Min.		
CFDQR100-110S03(S)	110 (43-160)	170	3.3	22727/0	84/86	40000
CFDQR100-110S05(S)			5	20000/0	86/88	20000
CFDQR100-110S12(S)			12	8333/0	87/89	6000
CFDQR100-110S15(S)			15	6667/0	87/89	4700
CFDQR100-110S24(S)			24	4167/0	89/91	3000
CFDQR100-110S28(S)			28	3571/0	86/88	3000
CFDQR100-110S48(S)			48	2083/0	86/88	480

Note:①Use"S"suffix for heat sink mounting.We recommend to choose modules with a heat sink for enhanced heat dissipation and applications with extreme temperature requirements;
②Exceeding 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	3.3VDC output	--	793/10	812/20	mA
		24,28VDC output	--	1000/10	1022/20	
		12,15VDC output	--	1022/10	1045/20	
		5VDC,48VDC output	--	1034/10	1058/20	
Reflected Ripple Current	Nominal input voltage		--	100	--	
Surge Voltage(1sec.max.)			-0.7	--	180	VDC
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)			
	Input current when off		--	2	10	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 highat full load	3.3VDC,5VDC output	--	--	±0.5	
		Others	--	±0.1	±0.3	
Load Regulation	Nominal input voltage, 10%-100% load	3.3VDC,5VDC output	--	±0.5	±1.0	
		Others	--	±0.3	±0.5	
Transient Recovery Time	25% load step change		--	200	500	μs
TransientResponseDeviation		3.3VDC,5VDC output	--	±6	±9	%
		Others	--	±3	±5	
Temperature Coefficient	Full load		--	--	±0.03	%℃
Ripple/Noise*	20MHz bandwidth, 10%Io-100%Io load	48VDC output	--	200	300	mVp-p
		Others	--	100	200	
Trim			90	--	110	%
Output Voltage Remote Compensation(sense)			--	--	105	
Over-voltage Protection	Input voltage range	3.3VDC,5VDC output	110	--	160	%Vo
		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 aleakage current of 5mA max.	3000	--	--	VAC
	Input-case		2100	--	--	
	Output-case	Electric Strength test for 1minute with a leakage current of 1mAmax.	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℃		500	--	--	K hours

Environmental Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Operating Temperature Range	See temperature derating curves	-40	--	+105	℃
Over-temperature Protection	Out-case temperature	--	--	+115	
Storage Humidity	Non-condensing	5	--	95	%RH
Storage Temperature		-55	--	+125	℃
Pin Soldering Resistance Temperature	Soldering spot is1.5mm away from case for 10 seconds	--	--	+300	
Cooling Test		EN60068-2-1			
Dry Heat		EN60068-2-2			
Damp Heat		EN60068-2-30			
Shockand Vibration Test		IEC/EN61373-Category1,Grade B			

Mechanical Specifications

Case Material	Aluminum alloy case;Black plastic bottom,flame-retardant and heat-resistant(UL94V-0)	
Dimensions	With outheatsink	60.8×39.2×12.7mm
	With heatsink	60.8×39.2×27.8mm
Weight	With outheatsink	78.0g(Typ.)
	With heatsink	109.0g(Typ.)
Cooling Method	Free air convection or forced convection	

Electromagnetic Compatibility (EMC)

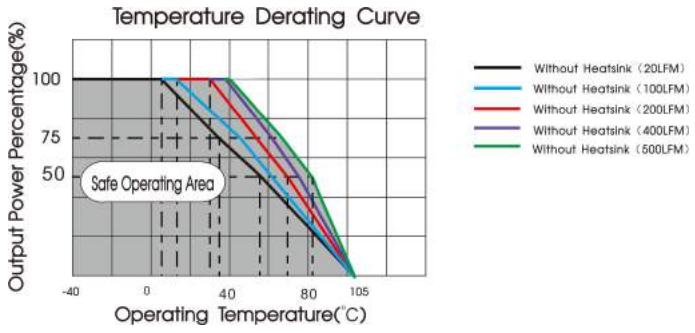
Emissions	CE	CISPR32/EN55032	150KHz-30MHz	Class B (see Fig.3 for recommended circuit)	
	RE*	CISPR32/EN55032	30MHz-1GHz	Class B (see Fig.3 for recommended circuit)	
Immunity	ESD	IEC/EN61000-4-2	GB/T17626.2	Contact ±6KV,Air ±8KV	perf.Criteria A
	RS	IEC/EN61000-4-3	GB/T17626.3	20V/m	perf.Criteria A
	CS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

Note:*The standard only suit for CFDQR50-110 series(withou theatsink).

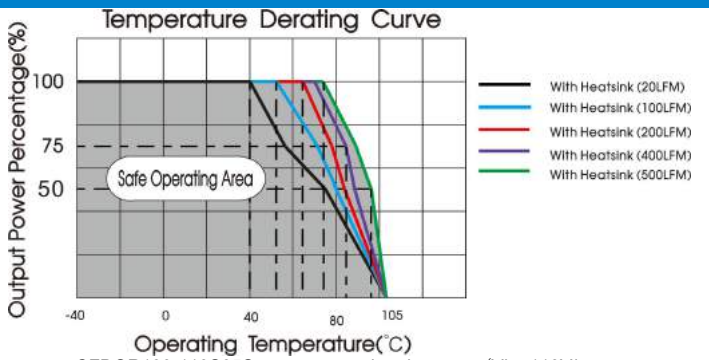
Electromagnetic Compatibility (EMC) (EN50155)

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)	
	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)	
Immunity	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

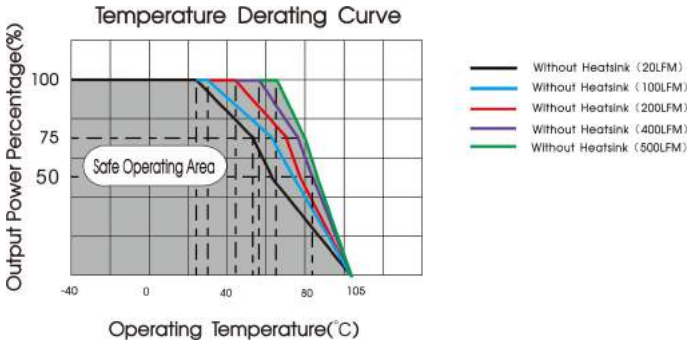
Typical Characteristic Curves



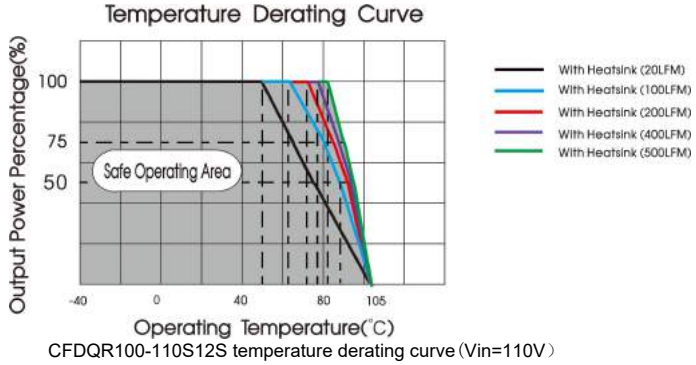
CFDQR100-110S05 temperature derating curve（Vin=110V）



CFDQR100-110S05S temperature derating curve（Vin=110V）

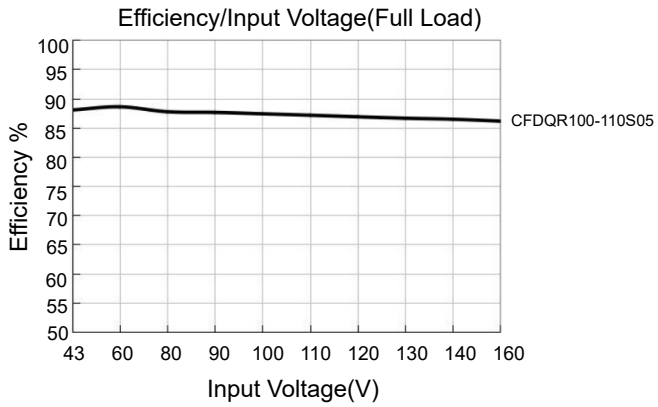


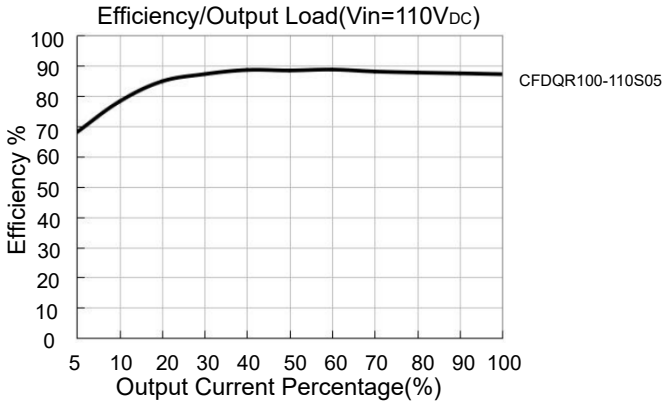
CFDQR100-110S12 temperature derating curve（Vin=110V）

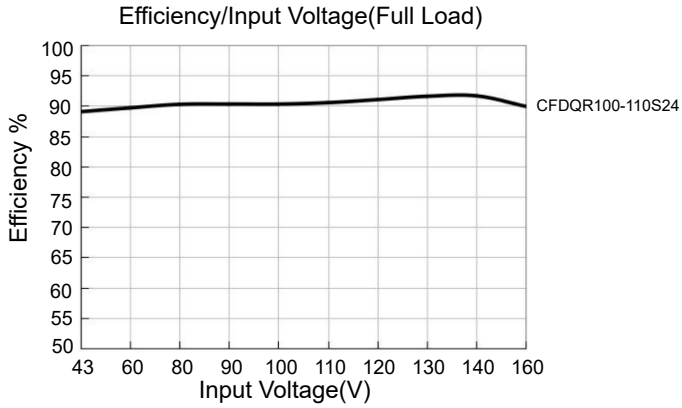


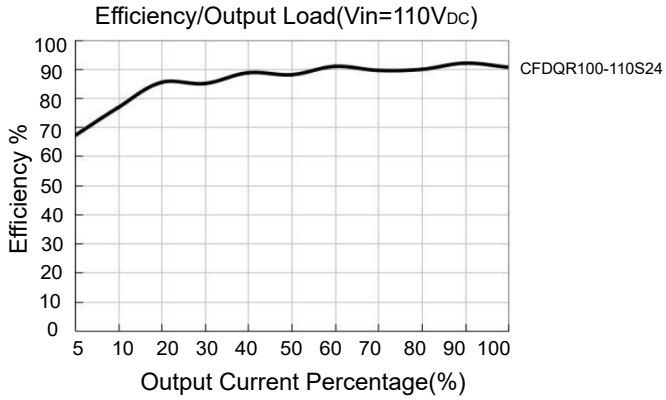
CFDQR100-110S12S temperature derating curve（Vin=110V）

Notes:
1:Temperature derating curves and efficiency curvesare typicaltest values.
2:Temperature derating curve in accordance with our laboratory test conditions for testing,the actual use of environmental conditions if the customer is not consistent,to ensure that the product a luminum shell temperature doesnot exceed100℃,can be used within any rated load range.



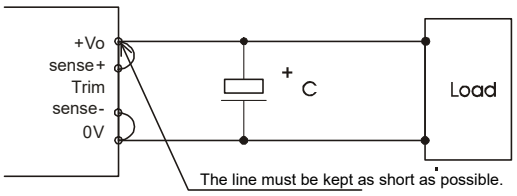






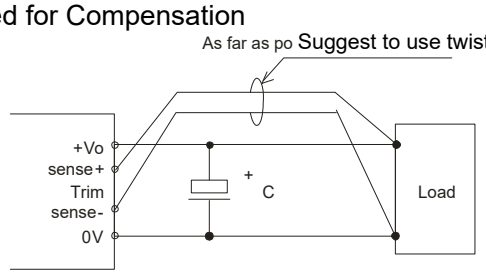
Remote Sense Application

1. Remote Sense Connectionif 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 theDC-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 wairs 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 powersupply'soutput 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 befor edelivery using the recommended circuit shown in Fig.1.

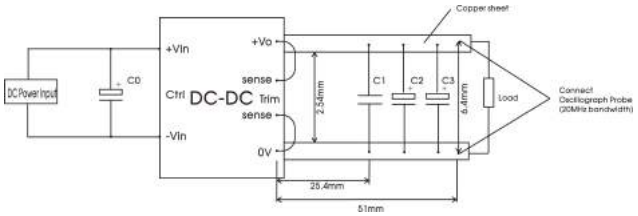


Fig.1

Output voltage \ Capacitors value	C0(μF)	C1(μF)	C2(μF)	C3(μF)
3.3VDC	100	1	10	1000
5VDC				680
12VDC				220
15VDC				
24VDC				
48VDC				

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 Cin and Cout and/or by selecting capacitors with a low ESR (equivalentseriesresistance).Also make sure that the capacitance is not exceeding the specified max.capacitive load value of the product.

Output voltage \ Capacitors value	Cout(μF)	Cin(μF)
3.3VDC	1000	100
5VDC	680	
12VDC	220	
15VDC		
24VDC		
48VDC		

3. EMC compliance recommendedcir cuit

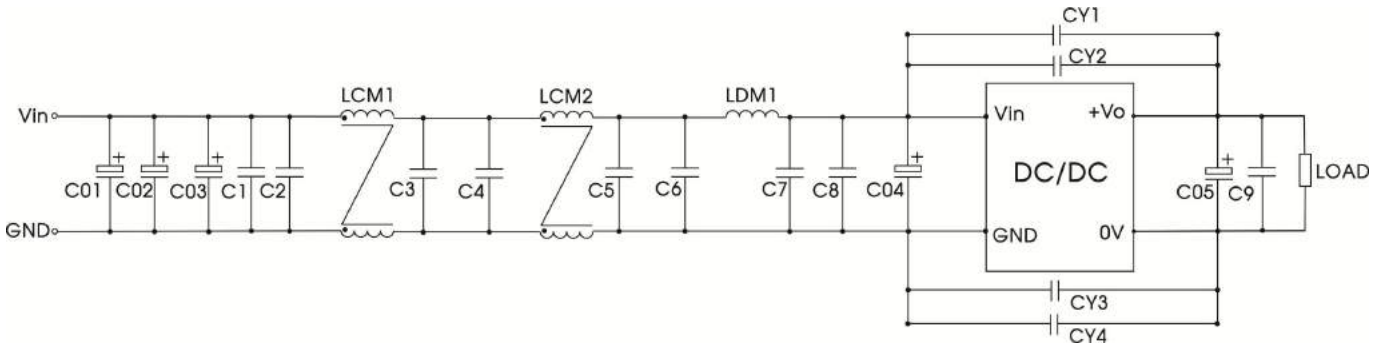


Fig.2

C01,C02,C03,C04	220uF/200V(electrolytic capacitor)
C05	220uF/63V(electrolyti ccapacitor)
LDM1	1.5uH(Shielded inductor)
C1,C2,C3,C4,C5,C6,C7,C8,C9	2.2uF/250V
CY1,CY2,CY3,CY4	2200pF/400VAC(Ysafety capacitor)
LCM1	15mH
LCM2	2.2mH

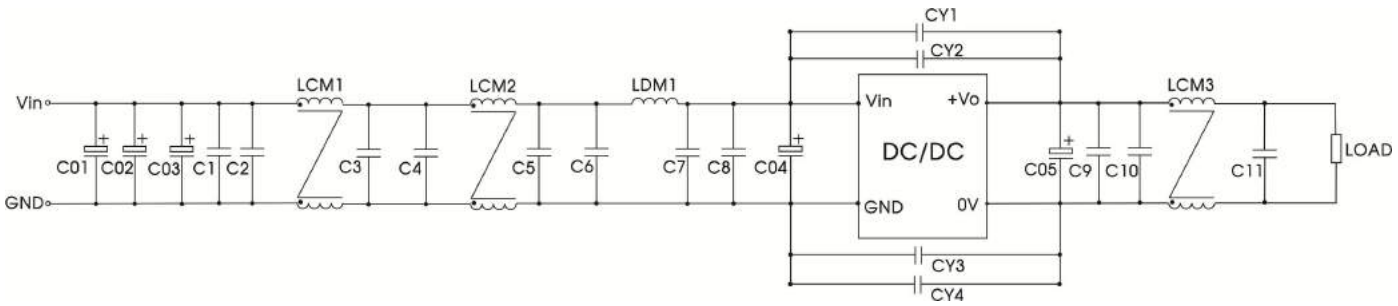
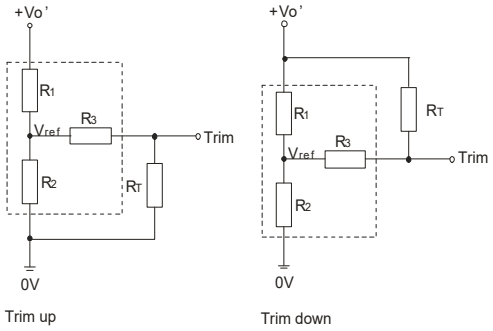


Fig.3

C01, C02, C03, C04	220uF/200V(electrolytic capacitor)
C05	220uF/63V(electrolytic capacitor)
LDM1	1.5uH(Shielded inductor)
C1,C2,C3,C4,C5, C6,C7,C8,C9,C10,C11	2.2uF/250V
CY1,CY2,CY3,CY4	2200pF/400VAC(Ysafetycapa citor)
LCM1	15mH(UU common mode inductance)
LCM2	2.2mH(UU common mode inductance)
LCM3	22uH±10%

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



TRIM resistor connection(dashed line shows internal resistor network)

Trim resistor calculation:

$$up{:}R_T=\frac{aR_2}{R_2-a}-R_3 \qquad a=\frac{Vref}{Vo'-Vref}\cdot R_1$$

$$down{:}R_T=\frac{aR_1}{R_1-a}-R_3 \qquad a=\frac{Vo'-Vref}{Vref}\cdot R_2$$

table 1

Vo / resistance	3.3(VDC)	5(VDC)	12(VDC)	15(VDC)	24(VDC)	48(VDC)
R1(KΩ)	4.83	8.80	11	14.49	24.87	58.7
R2(KΩ)	2.87	2.87	2.87	2.87	2.87	3.21
R3(KΩ)	9.66	11	11	16	21	11
Vref(V)	1.24	1.24	2.5	2.5	2.5	2.5

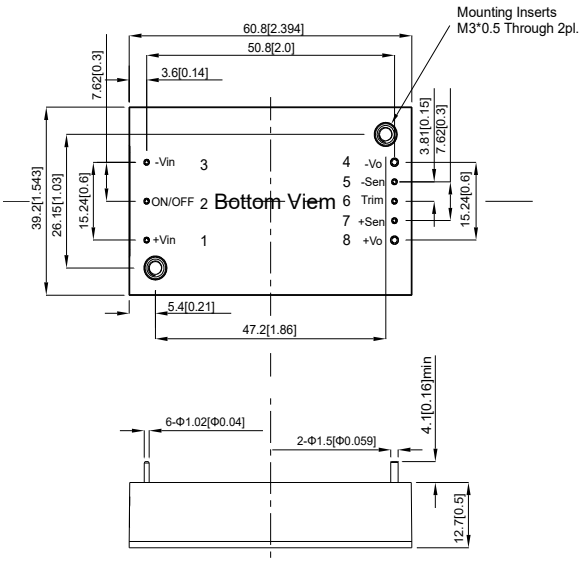
Note：

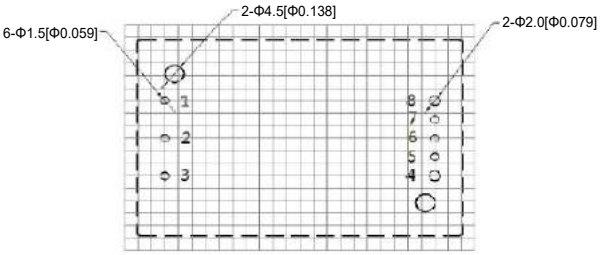
For R1,R2,R3 and Vref values refer to table 1.RT=Trim Resistor value; a=self-defined parameter Vo'=desired output voltage

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

6. For additional information please refer to DC-DC converter application notes on www.chewins.net

CFDQR100-110S05 Dimensions (without heatsink)

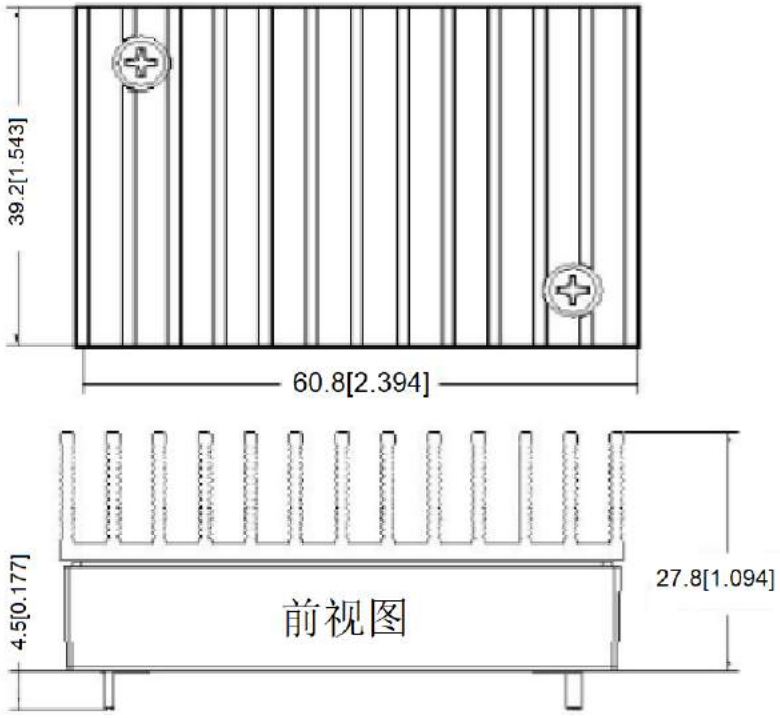




Note:Grid:2.54*2.54mm

Note:
Unit:mm[inch]
Pin:1,2,3,5,6,7 diameter:1.0[0.039]
Pin:4,8 diameter:1.5[0.059]
Pin diameter tolerances:±0.5[±0.02]
Mounting hole screwing torque:Max.0.4N.m

CFQR100-110S05S Dimensions (with heatsink)



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.

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