



# CQB50W12-CMFC(D) SERIES 30-50 WATT 12:1 INPUT ISOLATED DC-DC CONVERTERS

## Features

- Efficiency Up to 89%
- Fixed Switching Frequency
- Regulated Outputs
- Remote On/Off
- Low No Load Power Consumption
- Fully protected (OTP/OCP/OVP/UVLO)
- 3000Vdc I/O Isolation
- Operating Case Temperature -40 to +100°C
- UL60950-1 2<sup>nd</sup> (Basic Insulation) Approval for DC Modules
- EN50155 for EMC, Environmental and Characteristic
- Shock & Vibration EN50155 (EN61373) Compliant
- Fire & Smoke EN45545-2 Compliant
- Safety Meets IEC/EN/UL 60950-1
- Build-In EMI Filter
- Chassis Mount, Baseplate Cooled



MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
CQB50W12-72S05□-CMFC CQB50W12-72S05□-CMFD	14-160 VDC	5 VDC	0 mA	6.0 A	8 mA	530 mA	83	10000uF
CQB50W12-72S12□-CMFC CQB50W12-72S12□-CMFD	14-160 VDC	12 VDC	0 mA	4.2 A	8 mA	810 mA	87	6800uF
CQB50W12-72S24□-CMFC CQB50W12-72S24□-CMFD	14-160 VDC	24 VDC	0 mA	2.1 A	8 mA	810 mA	89	3300μF
CQB50W12-72S48□-CMFC CQB50W12-72S48□-CMFD	14-160 VDC	48 VDC	0 mA	1.05 A	12 mA	810 mA	88	680μF

### NOTE:

1. Nominal Input Voltage 72 VDC, Input Voltage Range: 14-16.8 VDC (t ≤ 60 sec.)
2. □ = N or none
3. VR1 is Used for Output Voltage Adjustment.
4. Refer to Application Note for Thermal Resistance and Derating Information.
5. TVS is Included for Input Surge Voltage Protection.
6. Recommend an External Fuse for Input Reverse Polarity Protection (shunt diode is included inside).
7. Output connector CN3 wafer with TAIWAN KING PIN TERMINAL P110I series and mate with JST housing PH series or equivalent.
8. CN1 & CN2 connection: DINKLE EK500V-04P series or equivalent, suitable electric wire: 24~12AWG (IEC 0.5~2.5mm<sup>2</sup>).

## PART NUMBER

Series	Nominal Input Voltage	Number of Outputs	Nominal Output Voltage	Remote On/Off Logic	Chassis Mount Type	
CQB50W12-	II	O	XX	L	-YYY	Z
CQB50W12	72: 72 VDC	S: Single	05: 5VDC 12: 12VDC 24: 24VDC 48: 48VDC	None: Positive N: Negative	CMF: Chassis Mount Built in Filter	C: Open Frame D: With Cover

### Part Number Example:

**CQB50W12-72S12N-CMFC:** Chassis Mount, 50W, 12:1 14-160Vdc Input, Single 12Vdc Output, Negative Logic, Open Frame



# CQB50W12 CMFC(D) Series

## TECHNICAL SPECIFICATIONS

(All specifications are typical at nominal input, full load at 25°C unless otherwise noted.)

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Input Voltage	Continuous	All	-0.3		160	V <sub>dc</sub>
Input Surge Voltage	100ms max.	All			200	V <sub>dc</sub>
Operating Case Temperature	At the center part of base plate	All	-40		100	°C
Storage Temperature		All	-40		105	°C

### INPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Operating Input Voltage		All	14	72	160	V <sub>dc</sub>
Input Under Voltage Lockout						
Turn-On Voltage Threshold	Full load	All	14.2	14.6	15	V <sub>dc</sub>
Turn-Off Voltage Threshold	Full load	All	11.6	12.6	13	V <sub>dc</sub>
Lockout Hysteresis Voltage	Full load	All		2.0		V <sub>dc</sub>
Maximum Input Current	V <sub>in</sub> =16.8V, Full load	72S05 Other		2.3 4		A
No-Load Input Current	V <sub>in</sub> =72V, I <sub>o</sub> =0A	See Model Number Table				mA

### OUTPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units	
Voltage Set Point Accuracy	V <sub>in</sub> =72V, Full Load, T <sub>c</sub> =25°C	All	-1.0		+1.0	%	
Output Voltage Regulation							
Load Regulation	Full load to no load	All			±0.2	%	
Line Regulation	V <sub>in</sub> =High line to low line, full load	All			±0.2	%	
Temperature Coefficient	T <sub>c</sub> =-40°C to 100°C	All			±0.02	%/°C	
Output Voltage Ripple and Noise (5Hz to 20MHz bandwidth)							
Peak-to-Peak	Full load, 1uF ceramic capacitors	All				100	mV
RMS.						40	
Output Current Range	V <sub>in</sub> = 14 to 160V	See Model Number Table				A	
Over Current Protection	Hiccup mode. Auto recovery	All	110	180	220	%	
Short Circuit Protection		All	Continuous, Auto Recovery.				
External Load Capacitance	Full load (resistive)	See Model Number Table				uF	
Output Voltage Trim Range	P <sub>o</sub> ≤ max rated power, I <sub>o</sub> ≤ I <sub>o,max</sub>	All	-20		+10	%	
Output Voltage Remote Sense Range	P <sub>o</sub> ≤ max rated power, I <sub>o</sub> ≤ I <sub>o,max</sub> % of nominal V <sub>o</sub>	All			+10	%	
Over Voltage Protection	Limited voltage, % of nominal V <sub>o</sub>	All	115	125	140	%	

### EFFICIENCY

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
100% Load	V <sub>in</sub> =72V, 110V	See Model Number Table				%

### DYNAMIC CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units	
Output Voltage Current Transient							
Error Band	75% to 100% of I <sub>o,max</sub> step load change d <sub>i</sub> /d <sub>t</sub> =0.1A/us (within 1% V <sub>out</sub> nominal)	All				±5	%
Recovery Time						250	us



# CQB50W12 CMFC(D) Series

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Turn-On Delay and Rise Time	Full load (Constant resistive load)					
Turn-On Delay Time, From On/Off Control	$V_{on/off}$ to 10% $V_{o\_set}$ , Remote on	All		15		ms
Turn-On Delay Time, From Input	$V_{in\_min}$ to 10% $V_{o\_set}$ , Power up	All		15		ms
Output Voltage Rise Time	10% $V_{o\_set}$ to 90% $V_{o\_set}$	All		10		ms

## ISOLATION CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Isolation Voltage (100% factory Hi-Pot tested @2sec.)	1 minute; Input to output	All			3000	$V_{dc}$
	1 minute; Input to case (base plate)				2500	
	1 minute; Output to case (base plate)				500	
Isolation Resistance	Input to output	All	200			MΩ
Isolation Capacitance	Input to output	All			3000	pF
	Input to case (base plate)				5000	
	Output to case (base plate)				10000	

## FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Switching Frequency	Pulse wide modulation (PWM), Fixed	All	215	240	265	KHz
On/Off Control, Positive Remote On/Off logic, Refer to -Vin pin.						
Logic Low (Module Off)	$V_{on/off}$ at $I_{on/off}=1.0mA$	All	0		1.2	V
Logic High (Module On)	$V_{on/off}$ at $I_{on/off}=0.0uA$ , Pin open=on					
On/Off Control, Negative Remote On/Off logic, Refer to -Vin pin						
Logic High (Module Off)	$V_{on/off}$ at $I_{on/off}=0.0uA$ , Pin open=off	All	4.0		160	V
Logic Low (Module On)	$V_{on/off}$ at $I_{on/off}=1.0mA$					
On/Off Current (for both remote on/off logic)	$I_{on/off}$ at $V_{on/off}=0V$	All		0.3	1	mA
Leakage Current (for both remote on/off logic)	Logic High, $V_{on/off}=15V$	All			30	uA
Off Converter Input Current	Shutdown input idle current	All		3	5	mA
Over Temperature Shutdown	Temperature at the center part of base plate, non-latching	All			110	°C
Over Temperature Recovery					100	

## GENERAL SPECIFICATIONS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
MTBF	$I_o=100\%$ of $I_{o\_max}$ ; MIL-HDBK - 217F_Notice 1, GB, 25°C	72S05		506		K hours
		36S12		484		
		36S24		515		
		36S48		513		
Weight		-CMFC		215		grams
		-CMFD		250		
Base plate Material	Aluminum					
Potting Material	UL 94V-0 (DC Module)					
Shock/Vibration	EN50155 (EN61373) Compliant					
Humidity	95% RH max. Non Condensing					
Altitude	5000m Operating Altitude, 12000m Transport Altitude					
Thermal Shock	MIL-STD-810F					
Fire & Smoke	EN45545-2 Compliant					
EMI	EN55032 & EN50155 Compliant (with external output filter)					Class A
ESD	EN61000-4-2	Level 3: Air ±8kV, Contact ±6kV				Perf. Criteria A
Radiated immunity	EN61000-4-3	Level 3: 80~1000MHz, 20V/m				Perf. Criteria A
Fast Transient	EN61000-4-4	Level 3: On power input port, ±2kV				Perf. Criteria A
Surge	EN61000-4-5	Level 4: Line to earth, ±4kV, Line to line, ±2kV				Perf. Criteria A



# CQB50W12 CMFC(D) Series

Conducted immunity	EN61000-4-6	Level 3: 0.15~80MHz, 10V	Perf. Criteria A
Interruptions of Voltage Supply	EN50155	Class S3: 20ms interruptions	Perf. Criteria A
Supply Change Over	EN50155	Class C2: During a supply break of 30ms	Perf. Criteria A
Application Note Link	<a href="#">CQB50W12-72S CMFC(D) Series App Notes</a>		
Packaging Information Link	<a href="#">Packaging Information</a>		

## Immunity to Environmental Conditions.

Phenomenon	EN50155; 2017 Reference Clause(s)	Reference Standard	Test Conditions	Result
Low Temperature Start-up test	13.4.4	EN 60068-2-1	Class OT4 Temperature: -40°C Duration: 2 hrs	Pass
Dry Heat Test	13.4.5	EN 60068-2-2	Class OT4 & ST2 Temperature: 70°C Duration: 6 hrs Extended temperature: 85°C Extended Duration: 10min	Pass
Low Temperature Storage Test	13.4.6	EN 60068-2-1	Temperature: -40°C Duration: 16 hrs	Pass
Cyclic Damp Heat Test	13.4.7	EN 60068-2-30	Temperature: 25°C - 55°C Humidity: 90 ~ 96% RH Duration: 48 hrs	Pass
Random Vibration Test	13.4.11	EN 61373	Temperature: 26°C +/- 3°C Humidity: 50% +/-25% RH Frequency range: 5 ~ 150 Hz Vertical: 1.01 $m/s^2$ Transverse: 0.450 $m/s^2$ Longitudinal: 0.700 $m/s^2$ Duration: 10 min / axis	Pass
Simulated Long Life Test at Increased Random Vibration Levels	13.4.11	EN 61373	Temperature: 26°C +/-3°C Humidity: 70% +/-5% RH Frequency range: 5 ~ 150 Hz Vertical: 5.72 $m/s^2$ Transverse: 2.55 $m/s^2$ Longitudinal: 3.96 $m/s^2$ Duration: 5 hrs / axis	Pass
Shock Test	13.4.11	EN 61373	Temperature: 26°C +/-3°C Humidity: 70% +/-5% RH Frequency range: 5 ~ 150 Hz +/-Vertical: 30 $m/s^2$ +/-Transverse: 30 $m/s^2$ +/-Longitudinal: 50 $m/s^2$ Duration: 30ms x18 (Each axis 3 shocks)	Pass

## EN45545-2 Fire & Smoke Test Conditions.

Item		Standard	Hazard Level
R22	Oxygen Index Test	EN 45545-2: 2013 EN ISO 4589-2: 2006	HL1, HL2, HL3
	Smoke Density Test	EN 45545-2: 2013 EN ISO 5659-2: 2013	HL1, HL2
	Smoke Toxicity Test	EN 45545-2: 2013 NF X70-100: 2006	HL1, HL2, HL3
R23	Oxygen Index Test	EN 45545-2: 2013 EN ISO 4589-2: 2006	HL1, HL2, HL3
	Smoke Density Test	EN 45545-2: 2013 EN ISO 5659-2: 2013	HL1, HL2, HL3
	Smoke Toxicity Test	EN 45545-2: 2013 NF X70-100: 2006	HL1, HL2, HL3
R24	Oxygen Index Test	EN45545-2: 2013 EN ISO 4589-2	HL1, HL2, HL3
R25	Glow - Wire Test	EN 45545-2:2013 EN 60695-2-11:2001	HL1, HL2, HL3
R26	Vertical Flame Test	EN 45545-2: 2013 EN 60695-11-10: 2013	HL1, HL2, HL3

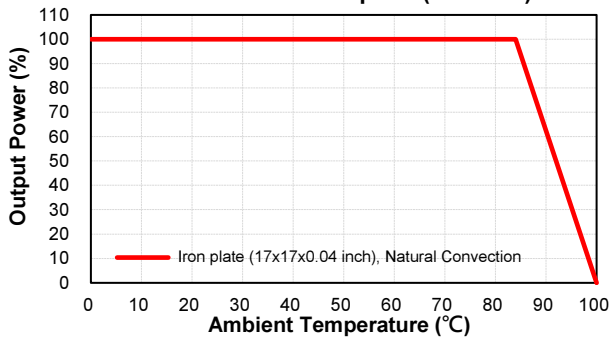


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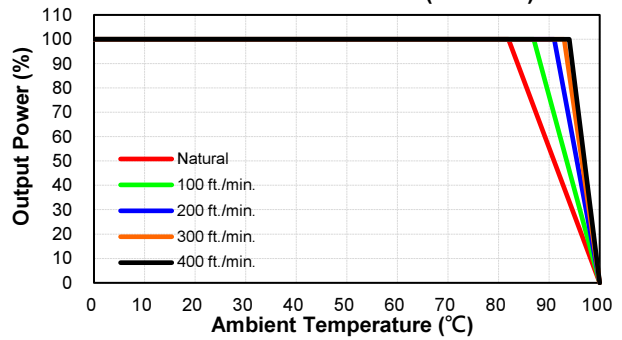
## CHARACTERISTIC CURVE

### Power Derating Curve

CQB50W12-72S CMFC(D) Derating Curve with Heatsink Iron plate (Vin=72V)

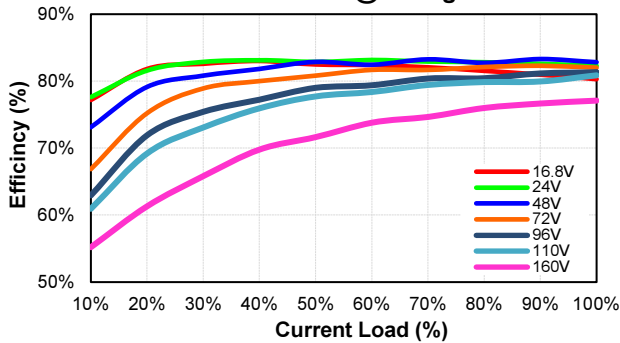


CQB50W12-72S CMFC(D) Derating Curve with Heatsink FBL254 (Vin=72V)

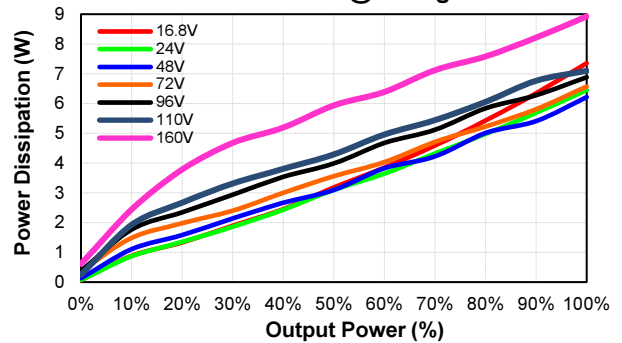


### Performance Data

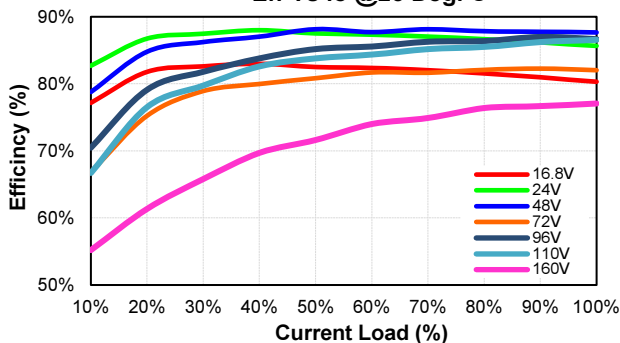
CQB50W12-72S05-CMFC Eff Vs Io @25 Deg. C



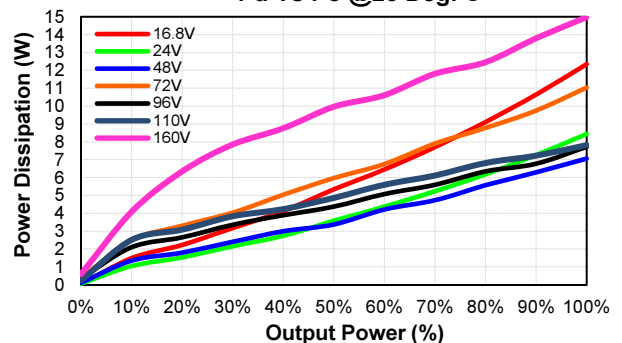
CQB50W12-72S05-CMFC Pd Vs Po @25 Deg. C



CQB50W12-72S12-CMFC Eff Vs Io @25 Deg. C



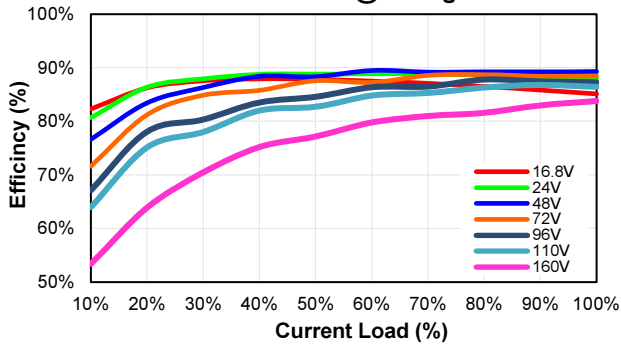
CQB50W12-72S12-CMFC Pd Vs Po @25 Deg. C



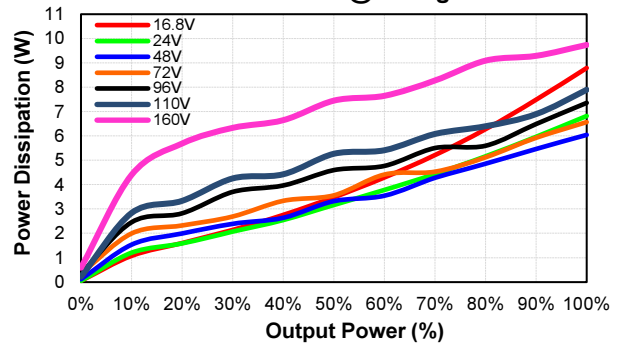


# CQB50W12 CMFC(D) Series

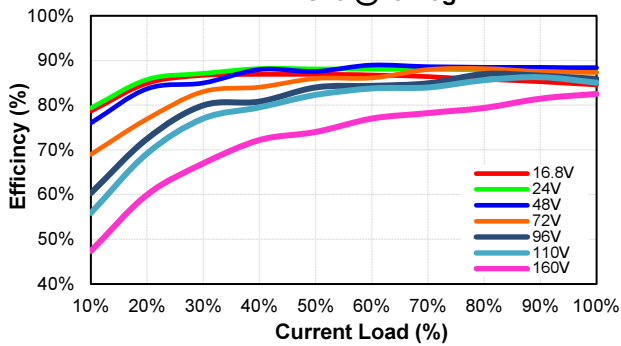
**CQB50W12-72S24-CMFC**  
Eff Vs Io @25 Deg. C



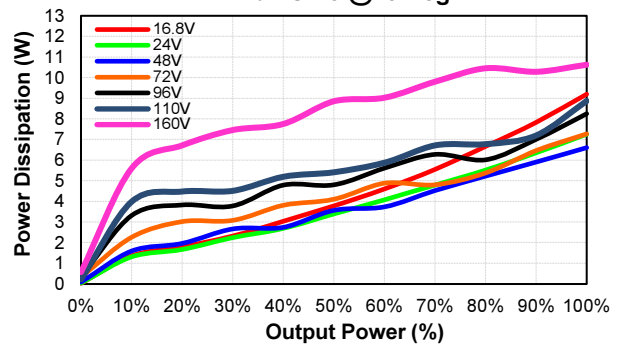
**CQB50W12-72S24-CMFC**  
Pd Vs Po @25 Deg. C



**CQB50W12-72S48-CMFC**  
Eff Vs Io @25 Deg. C



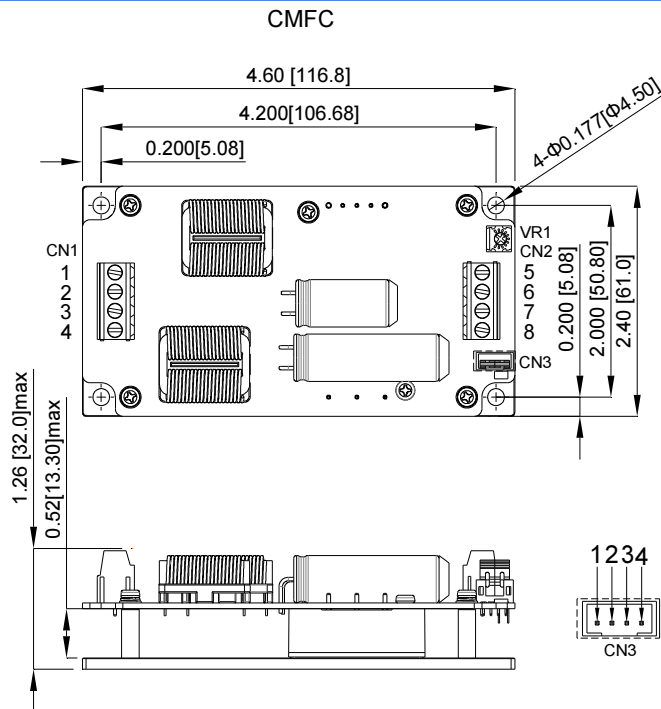
**CQB50W12-72S48-CMFC**  
Pd Vs Po @25 Deg. C





# CQB50W12 CMFC(D) Series

## MECHANICAL SPECIFICATION

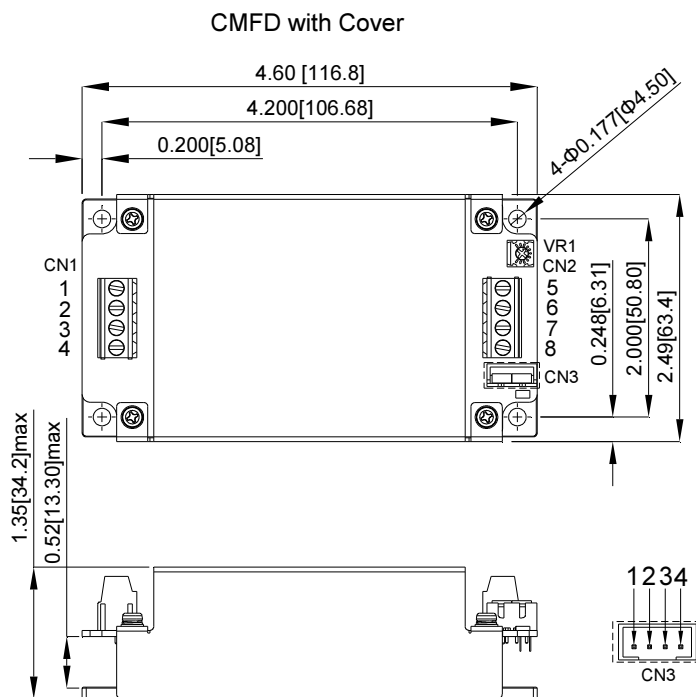


**CN1&CN2  
PIN CONNECTION**

Pin	Function
1	+V Input
2	-V Input
3	Remote
4	Case
5	+V Output
6	+V Output
7	-V Output
8	-V Output

**CN3  
PIN CONNECTION**

Pin	Function
1	-V Output
2	-Sense
3	+Sense
4	+V Output



**CN1&CN2  
PIN CONNECTION**

Pin	Function
1	+V Input
2	-V Input
3	Remote
4	Case
5	+V Output
6	+V Output
7	-V Output
8	-V Output

**CN3  
PIN CONNECTION**

Pin	Function
1	-V Output
2	-Sense
3	+Sense
4	+V Output

All Dimensions in Inches(mm)  
 Tolerance Inches: x.xx=±0.02, X.XXX=±0.010  
 Millimeters: x.x=±0.5, XXX=±0.25

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