

ISOLATED DC-DC CONVERTER**CFDHR300 SERIES**

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MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.		CAPACITIVE LOAD MAX. ⁽⁴⁾
			MIN.	MAX.	NO LOAD	FULL LOAD	(2)	(3)	
CFDHR300-24S05	9-36VDC	5VDC	0mA	60A	200mA	14.12A	88	88.5	470-10000uF
CFDHR300-24S12		12VDC		25A	200mA	13.74A	91	91	330-10000uF
CFDHR300-24S15		15VDC		20A	250mA	13.74A	91	91	0-10000uF
CFDHR300-24S24		24VDC		12.5A	80mA	14.20A	88	88	220-4700uF
CFDHR300-24S28		28VDC		10.7A	80mA	14.12A	88.5	88.5	220-4700uF
CFDHR300-24S48		48VDC		6.25 A	100mA	14.20A	88	88	220-2200uF
CFDHR300-48S05		5VDC		60A	100mA	6.94A	89	90	0-10000uF
CFDHR300-48S12		12VDC		25A	100mA	6.94A	92	92	0-10000uF
CFDHR300-48S15		15VDC		20A	130mA	6.80A	92	92	0-10000uF
CFDHR300-48S24		24VDC		12.5A	60mA	6.98A	90	89	0-4700uF
CFDHR300-48S28		28VDC		10.7A	60mA	6.94A	91	89.5	0-4700uF
CFDHR300-48S48		48VDC		6.25A	80mA	7.02A	90	89	220-2200uF

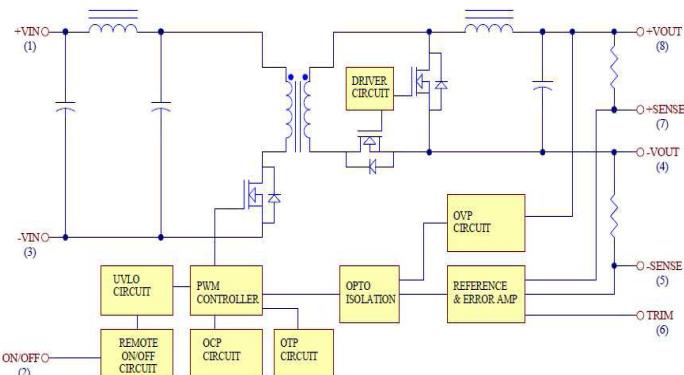
1. Introduction This specification describes the features and functions of CHEWINS's CFDHR300 series of isolated DC-DC converters. These are highly efficient, reliable and compact, high power density, single output DC/DC converters. The modules can be used in the field of telecommunications, data communications, wireless communications, servers etc. The CFDHR300 series can deliver up to 60A output current and provide a precisely regulated output voltage over a wide range of 9-36VDC and 18-75VDC. The modules can achieve high efficiency up to 92%. The module offers direct cooling of dissipative components for excellent thermal performance. Standard features include remote on/off(positive or negative), remote sense, output voltage adjustment, over voltage, over current and over temperature protection.

2. DC-DC Converter Features

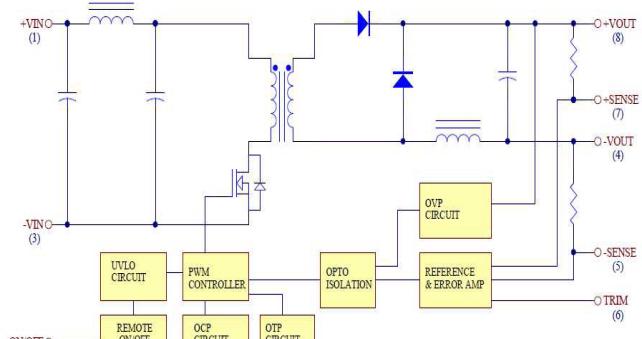
- ◆ 300W Isolated Output
- ◆ Efficiency to 92%
- ◆ Fixed Switching Frequency
- ◆ Input Under Voltage Protection
- ◆ Over Temperature Protection
- ◆ Over Voltage/Current Protection
- ◆ Remote On/Off
- ◆ Industry Standard Half-Brick Package
- ◆ Fully Isolated 1500VDC
- ◆ UL60950-1 2nd Approval

3. Electrical Block Diagram

Electrical Block Diagram for 5Vout, 12Vout and 15Vout



Electrical Block Diagram for other modules



4. Technical Specifications

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

ABSOLUTE MAXIMUM RATINGS

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only, functional operation of the device is not implied at these or any other conditions in excess of those given in the operations sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect the device reliability.

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Input Voltage						
Continuous		Vin=24VDC	-0.3		36	V _{DC}
		Vin=48VDC	-0.3		75	
Operating Case Temperature	All	-40		100	125	°C
Storage Temperature	All	-55		125	150	°C
Input/Output Isolation Voltage	1 minute	All	1500			V _{DC}

INPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Operating Input Voltage						
Operating Input Voltage		Vin=24VDC	9	24	36	V _{DC}
		Vin=48VDC	18	48	75	
Input Under Voltage Lockout						
Turn-On Voltage Threshold		Vin=24VDC	8	8.5	9	V _{DC}
		Vin=48VDC	16	17	18	
Turn-Off Voltage Threshold		Vin=24VDC	8	8.8	9	V _{DC}
		Vin=48VDC	16	17	18	
Lockout Hysteresis Voltage		Vin=24VDC		0.8		V _{DC}
		Vin=48VDC		1		
Maximum Input Current	100% Load, V _{in} =9V _{DC}	Vin=24VDC			40	A
	100% Load, V _{in} =18V _{DC}	Vin=48VDC			19	
No-Load Input current		24S05	200			mA
		24S12	200			
		24S15	250			
		24S24	80			
		24S28	80			
		24S48	100			
		48S05	100			A
		48S12	100			
		48S15	130			
		48S24	60			
		48S28	60			
		48S48	80			
Inrush Current(I^2t)	All			1		A ² S
Recommended Input Fuse	Fast blow type	Vin=24VDC		45		A
		Vin=48VDC		30		
Input Capacitance (External)	<0.7Ω ESR	Vin=24VDC	1000			uF
		Vin=48VDC	220			

OUTPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Output Voltage Set Point	$V_{in} = \text{Nominal } V_{in}$, $I_o = I_{o_max}$, $T_c = 25^\circ C$	$V_o = 5.0V$	4.95	5	5.05	V_{dc}
		$V_o = 12V$	11.88	12	12.12	
		$V_o = 15V$	14.85	15	15.15	
		$V_o = 24V$	23.76	24	24.24	
		$V_o = 28V$	27.72	28	28.28	
		$V_o = 48V$	47.52	48	48.48	
Output Voltage Regulation						
Load Regulation	$I_o = I_{o_min}$ to I_{o_max}	All			± 0.2	%
Line Regulation	$V_{in} = \text{low line to high line}$	All			± 0.2	%
Temperature Coefficient	$T_c = -40^\circ C$ to $100^\circ C$	All			± 0.03	%/ $^\circ C$
Output Voltage Ripple and Noise						
Peak-to-Peak	5Hz to 20MHz bandwidth, Full load, 10uF tantalum (for 24S05 with 330uF tantalum, 24S12 with 100uF tantalum and 48Vout with 10uF aluminum) and 1uF ceramic capacitor across output	$V_o = 5.0V$			100	mV
		$V_o = 12V$			120	
		$V_o = 15V$			200	
		$V_o = 24\&28V$			280	
		$V_o = 48V$			480	
RMS	5Hz to 20MHz bandwidth, Full load, 10uF tantalum (for 24S05 with 330uF tantalum, 24S12 with 100uF tantalum and 48Vout with 10uF aluminum) and 1uF ceramic capacitor across output	$V_o = 5.0V$			40	mV
		$V_o = 12V$			60	
		$V_o = 15V$			80	
		$V_o = 24/28V$			100	
		$V_o = 48V$			200	
Operating Output Current Range		$V_o = 5.0V$	0		60	A
		$V_o = 12V$	0		25	
		$V_o = 15V$	0		20	
		$V_o = 24V$	0		12.5	
		$V_o = 28V$	0		10.7	
		$V_o = 48V$	0		6.25	
Output Peak Power	3 Seconds with maximum duty cycle of 10%, average output power not to exceed 300W	All			350	Watt
Output Current Limit Inception	Output Voltage=90% Nominal Output Voltage	All	120	125	160	%
Output Capacitance	Full load (resistive)	24S05	470		10000	uF
		24S12	330		10000	
		24S15	0		10000	
		24S24	220		4700	
		24S28	220		4700	
		24S48	220		2200	
		48S05	0		10000	
		48S12	0		10000	
		48S15	0		10000	
		48S24	0		4700	
		48S28	0		4700	
		48S48	220		2200	

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Output Capacitance	Full load (resistive)	48S05 48S12 48S15 48S24 48S28 48S48	0 0 0 0 0 220		10000 10000 10000 4700 4700 2200	uF

DYNAMIC CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Output Voltage Current Transient						
Step Change in Output Current	d _i /d _t =0.1A/us, Load change from 75% to 100% to 75% of I _{o,max} .	All			±5	%V _o
Setting Time(within 1% V _{out} nominal)	d _i /d _t =0.1A/us	All			500	us
Turn-On Delay and Rise Time						
Turn-On Delay Time,From On/Off Control	V _{on/off} to 90%V _{o_set}	All		40	75	ms
Turn-On Delay Time,From Input	V _{in_min} to 90%V _{o_set}	All		120	250	ms
Output Voltage Rise Time	10%V _{o_set} to 90%V _{o_set}	All		25	50	ms

EFFICIENCY

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Efficiency	V _{in} =1/2Nominal V _{in} , 100% Load	24S05 24S12 24S15 24S24 24S28 24S48 48S05 48S12 48S15 48S24 48S28 48S48		88 91 91 88 88.5 88 89 92 92 90 91 90		%
		24S05 24S12 24S15 24S24 24S28 24S48		88.5 91 91 88 88.5 88		

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Efficiency	V _{in} =Nominal V _{in} ,100% Load	48S05 48S12 48S15 48S24 48S28 48S48	90 92 92 90 89.5 89			%

ISOLATION CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Isolation Voltage	Input to Output,Input to Case, Output to Case,1minute	All			1500	V _{DC}
Isolation Resistance		All	10			MΩ
Isolation Capacitance	Input to Output	All		2000		pF

FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Switching Frequency		All		220		KHz
On/Off Control, Positive Remote On/Off Logic						
Logic Low (Module Off)		All	0		1.2	V
Logic High (Module On)		All	3.5 or Open Circuit		75	V
On/Off Control, Negative Remote On/Off Logic						
Logic High (Module Off)		All	3.5 or Open Circuit		75	V
Logic High (Module On)		All	0		1.2	V
On/Off Current (for both remote on/off logic)	I _{on/off} at V _{on/off} =0.0V	All			1	mA
Leakage Current (for both remote on/off logic)	Logic High, V _{on/off} =15V	All			1	mA
Off Converter Input Current	Shutdown input idle current	All		7	10	mA
Output Voltage Trim Range	V _{in} =18-23V I _{out} =max rated current	48S28	-10		0	% %
	V _{in} =23-75V,P _{out} =max rated power I _{out} =max rated current	48S28	-10		+10	
	P _{out} =max rated power	Others	-10		+10	
Output Over Voltage Protection		All	115	125	140	%
Over-Temperature Shutdown		All		110		°C

GENERAL SPECIFICATIONS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
MTBF	I _o =100% of I _{o_max} :T _a =25 °C per MIL-HDBK-217F	All		600		K hours
Weight		All		114		grams

5. Main Features and Functions

5.1 Operating Temperature Range

The CFDHR300 series converters can be operated within a wide case temperature range of -40°C to 100°C. Consideration must be given to the de-rating curves when ascertaining maximum power that can be drawn from the converter. The maximum power drawn from half brick models is influenced by usual factors, such as:

- Input voltage range
- Output load current
- Forced air or natural convection

5.2 Output Voltage Adjustment

Section 6.8 describes in detail how to trim the output voltage with respect to its set point. The output voltage on 5V/12V/15V/24V/28V/48V models is adjustable within the range of +10% to -10%. For 48S28 models, see input& output trim curves.

5.3 Over Current Protection

The converter is protected against over current or short circuit conditions. At the instance of current-limit inception, the module enters a hiccup mode of operation, whereby it shuts down and automatically attempts to restart. While the fault condition exists, the module will remain in this hiccup mode, and can remain in this mode until the fault is cleared. The unit operates normally once the output current is reduced back into its specified range.

5.4 Output Over Voltage Protection

The converter is protected against output over voltage conditions. When the output voltage is higher than the specified range, the module enters a hiccup mode of operation. The operation is identical with over current protection.

5.5 Remote On/Off

The On/Off input pin permits the user to turn the power module on or off via a system signal. Two remote on/off options are available. Positive logic turns the module on during a logic high voltage on the on/off pin, and off during a logic low. Negative logic remote on /off turns the module off during a logic high and on during a logic low. The on/off pin is internally pulled up through a resistor. A properly de-bounced mechanical switch, open collector transistor, or FET can be used to drive the input of the on/off pin.

If not using the remote on/off feature:

For positive logic, leave the on/off pin open.

For negative logic, short the on/off pin to Vin (-).

5.6 UVLO (Under Voltage Lock Out)

Input under voltage lockout is standard with this converter. At input voltages below the input under voltage lockout limit, the module operation is disabled.

5.7 Over Temperature Protection

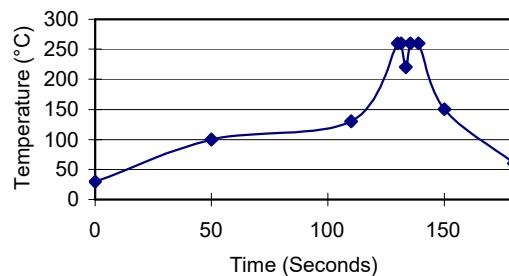
These modules have an over temperature protection circuit to safeguard against thermal damage. When the case temperature rises above over temperature shutdown threshold, the converter will shut down to protect it from overheating. The module will automatically restart after it cools down.

6. Applications

6.1 Recommended Layout, PCB Footprint and Soldering Information

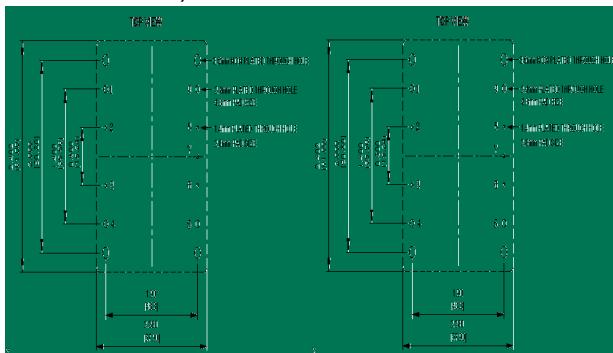
The system designer or end user must ensure that metal and other components in the vicinity of the converter meet the spacing requirements for which the system is approved. Low resistance and inductance PCB layout traces are the norm and should be used where possible. Due consideration must also be given to proper low impedance tracks between power module, input and output grounds. The recommended soldering profile and PCB layout are shown below.

Lead Free Wave Soldering Profile



Note :

1. Soldering Materials:Sn/Cu/Ni
2. Ramp up rate during preheat:1.4 °C/Sec (From 50°C to 100°C)
3. Soaking temperature:0.5 °C/Sec (From 100°C to 130°C),60±20 seconds
4. Peak temperature:260 °C,above 250°C 3~6 Seconds
5. Ramp up rate during cooling:-10.0 °C/Sec (From 260°C to 150°C)



6.2 Convection Requirements for Cooling

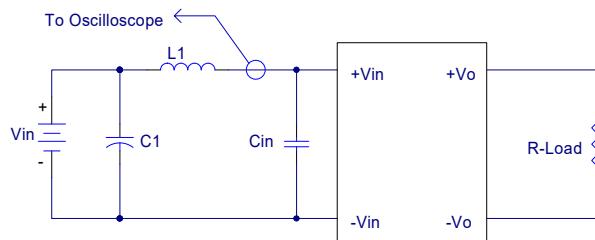
To predict the approximate cooling needed for the half brick module, refer to the power de-rating curves in section 6.5. These de-rating curves are approximations of the ambient temperatures and airflows required to keep the power module temperature below its maximum rating. Once the module is assembled in the actual system, the module's temperature should be monitored to ensure it does not exceed 100 °C as being measured at the center of the top of the case (thus verifying proper cooling).

6.3 Thermal Considerations

The power module operates in a variety of thermal environments; however, sufficient cooling should be provided to help ensure reliable operation of the unit. Heat is removed by conduction, convection, and radiation to the surrounding environment. The test data is presented in section 6.5. The power output of the module should not be allowed to exceed rated power ($V_{o_set} \times I_{o_max}$).

6.4 Input Capacitance at the Power Module

The converters must be connected to low AC source impedance. To avoid problems with loop stability source inductance should be low. Also, the input capacitors (C_{in}) should be placed close to the converter input pins to decouple distribution inductance. However, the external input capacitors are chosen for suitable ripple handling capability. Low ESR capacitors are good choice. Circuit as shown as below represents typical measurement methods for reflected ripple current. C_1 and L_1 simulate a typical DC source impedance. The input reflected-ripple current is measured by current probe to oscilloscope with a simulated source inductance (L_1).



L1:12uH

C1:NC

C_{in} :1000uF for 24Vin, 220uF for 48Vin models

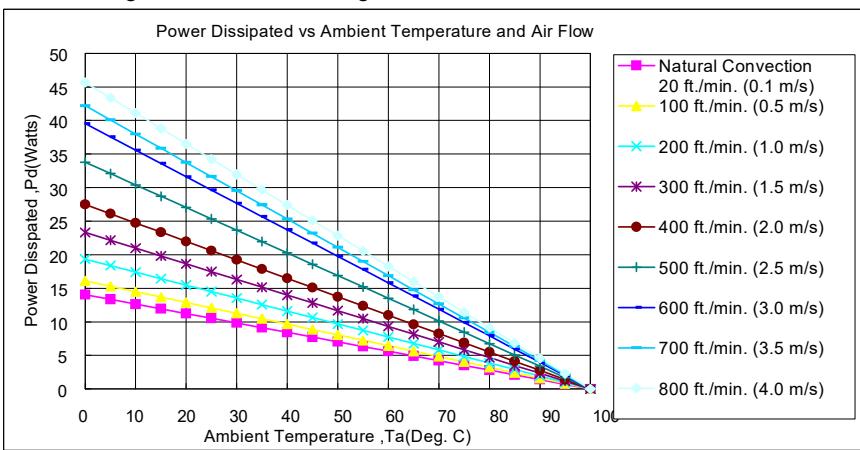
ESR<0.7ohm@100KHz

Input Reflected-Ripple Test Setup

6.5 Power De-rating

The operating case temperature range of CFDHR300 series is -40°C to +100°C. When operating the CFDHR300 series, proper de-rating or cooling is needed. The maximum case temperature under any operating condition should not exceed 100°C.

The following curve is the de-rating curve of CFDHR300 series without heat sink.



AIR FLOW RATE	TYPICAL Rca °C
Natural Convection 20ft./min. (0.1m/s)	7.12°C/W
100 ft./min. (0.5m/s)	6.21°C/W
200 ft./min. (1.0m/s)	5.17°C/W
300 ft./min. (1.5m/s)	4.29°C/W
400 ft./min. (2.0m/s)	3.64°C/W
500 ft./min. (2.5m/s)	2.96°C/W
600 ft./min. (3.0m/s)	2.53°C/W
700 ft./min. (3.5m/s)	2.37°C/W
800 ft./min. (4.0m/s)	2.19°C/W

Example (without heatsink):

What is the minimum airflow necessary for a CFDHR300-48S05 operating at nominal line voltage, an output current of 60A, and a maximum ambient temperature of 20°C

Solution:

Given:

$$V_{in}=48Vdc, V_o=5Vdc, I_o=60A$$

Determine Power dissipation (Pd):

$$P_d = P_i - P_o = P_o(1-\eta)/\eta$$

$$P_d = 5V \times 60A \times (1-0.90)/0.90 = 33.4 \text{ Watts}$$

Determine airflow:

$$\text{Given: } P_d = 33.4 \text{ W and } T_a = 20 \text{ °C}$$

Check Power De-rating curve:

$$\text{Minimum airflow} = 800 \text{ ft./min.}$$

Verify:

Maximum temperature rise is

$$\Delta T = P_d \times R_{ca} = 33.4W \times 2.19 = 73.1 \text{ °C}$$

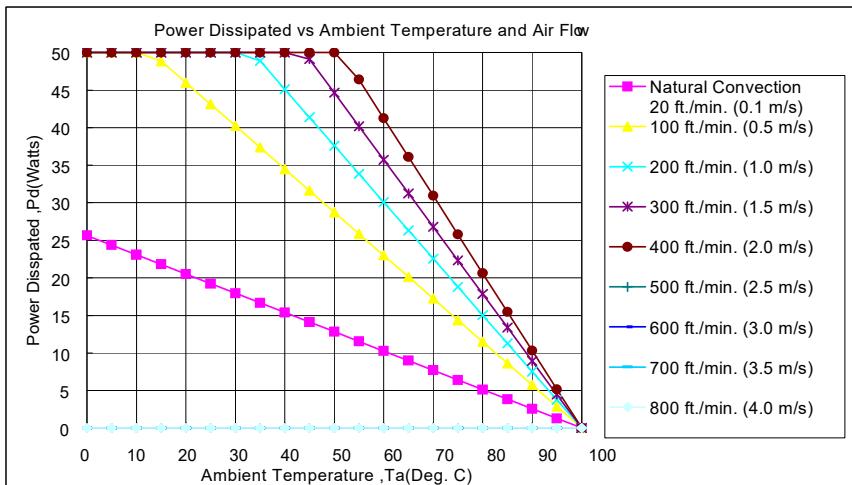
Maximum case temperature is

$$T_c = T_a + \Delta T = 93.1 \text{ °C} < 100 \text{ °C}$$

Where:

The Rca is thermal resistance from case to ambient environment.

Ta is ambient temperature and Tc is case temperature



Example with heatsink HBL210 (M-C308):

What is the minimum airflow necessary for a CFDHR300-48S05 operating at nominal line voltage, an output current of 60A, and a maximum ambient temperature of 40 °C

Solution:

Given:

$$V_{in}=48Vdc, V_o=5Vdc, I_o=60A$$

Determine Power dissipation (Pd):

$$P_d = P_i - P_o = P_o(1 - \eta)/\eta$$

$$P_d = 5V \times 60A \times (1 - 0.90)/0.90 = 33.4 \text{ Watts}$$

Determine airflow:

$$\text{Given: } P_d = 33.4 \text{ W and } T_a = 40 \text{ °C}$$

Check Power De-rating curve:

$$\text{Minimum airflow} = 100 \text{ ft./min.}$$

Verify:

Maximum temperature rise is

$$\Delta T = P_d \times R_{ca} = 33.4 \text{ W} \times 1.74 = 58.1 \text{ °C}$$

Maximum case temperature is

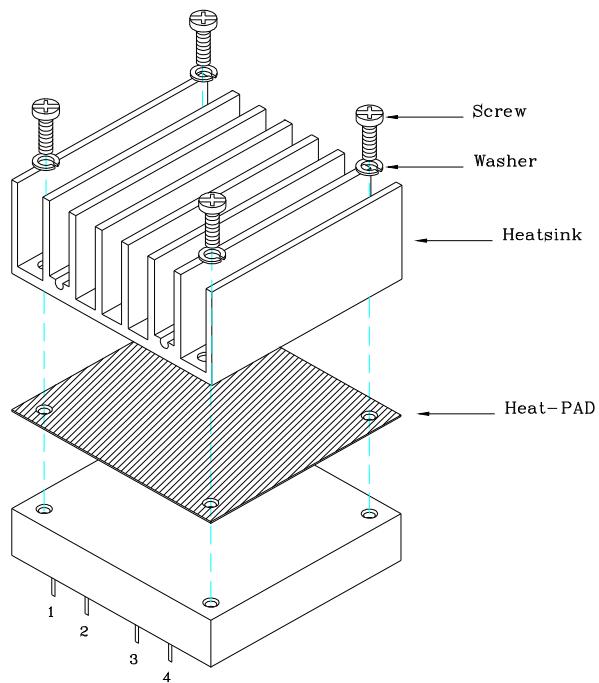
$$T_c = T_a + \Delta T = 98.1 \text{ °C} < 100 \text{ °C}$$

Where:

The R_{ca} is thermal resistance from case to ambient environment.

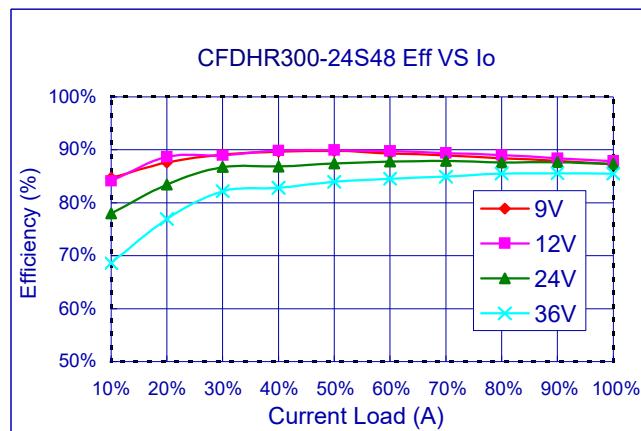
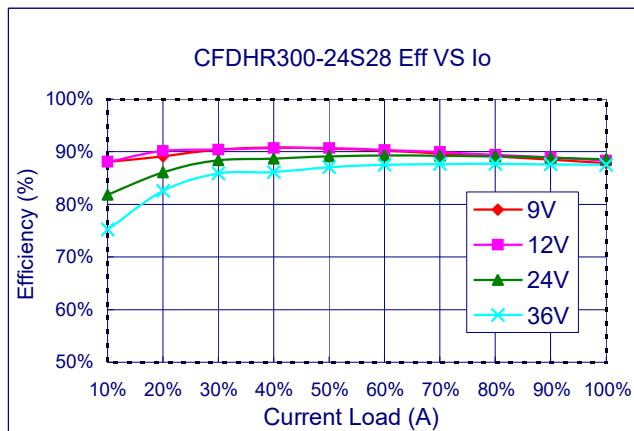
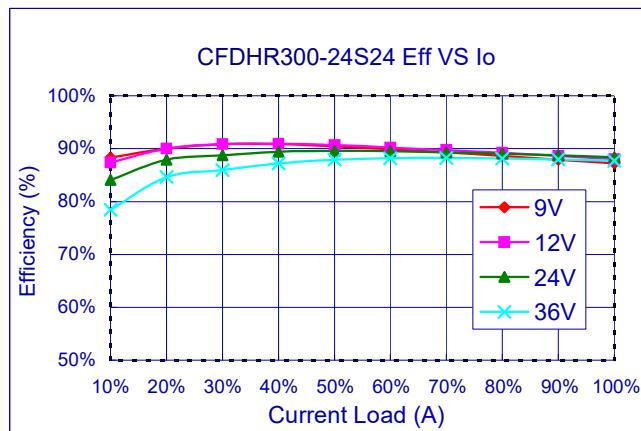
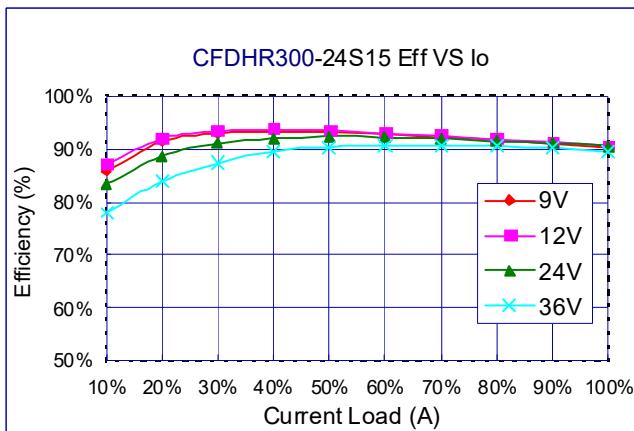
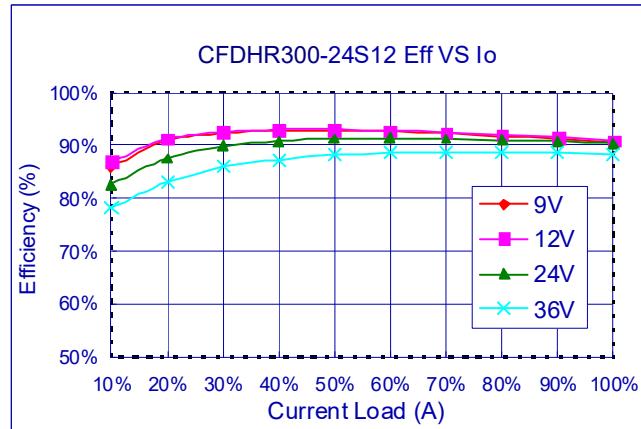
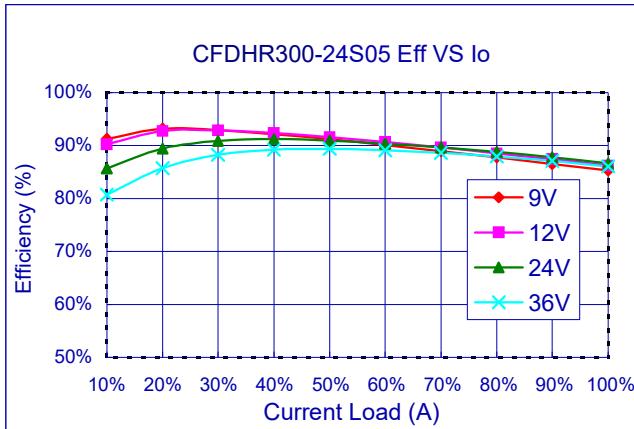
T_a is ambient temperature and T_c is case temperature

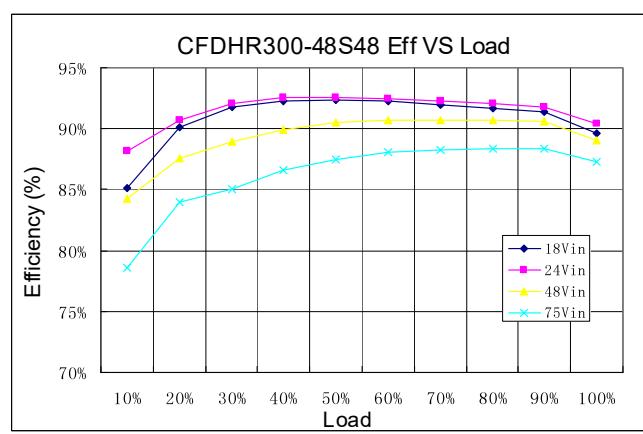
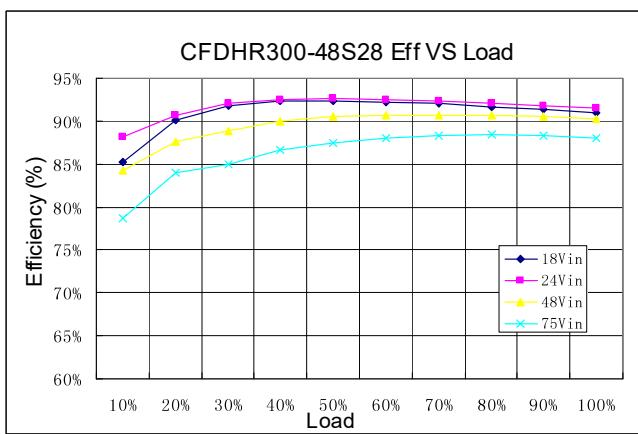
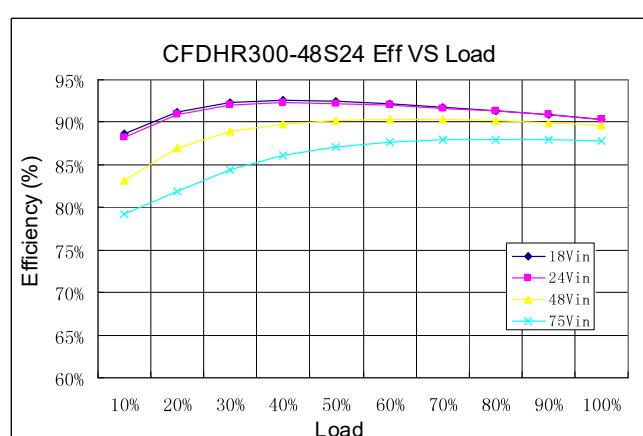
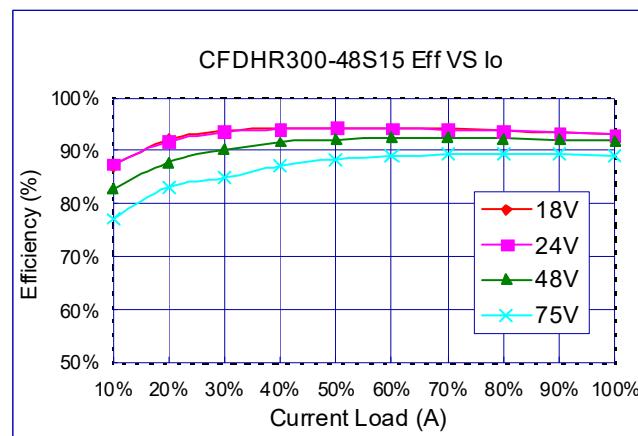
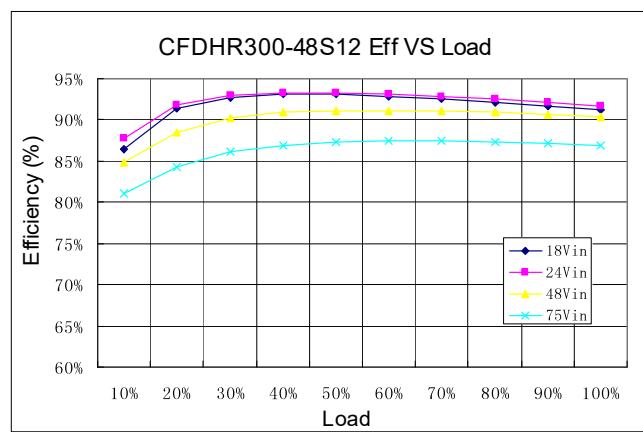
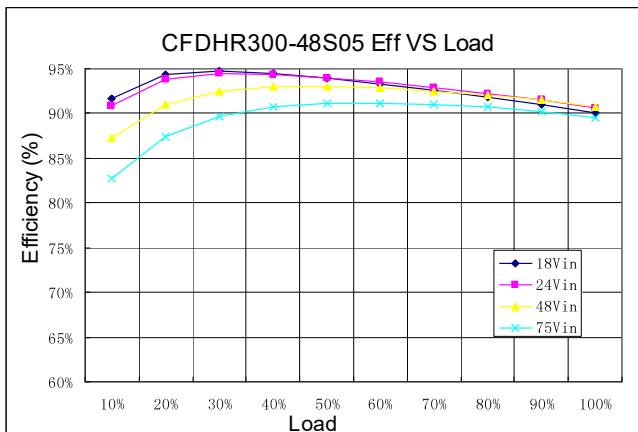
6.6 Half Brick Heat Sinks:



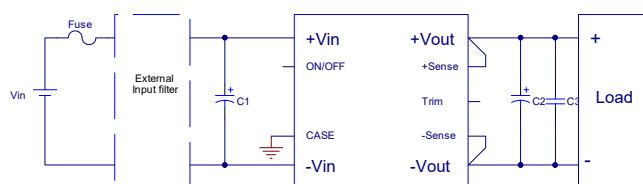
THERMAL PAD PH01: SZ 56.9*60*0.25 mm (G6135041091)
SCREW & Washer: M3*8L (G75A1300322) & WS3.2N (G75A47A0752)

6.7 Efficiency VS. Load





6.8 Test Set-Up



Typical Electrical Connection (Positive Logic)

For typical electrical connection, please refer to the connection above.

1. Put input capacitor C1, more than 1000uF for 24Vin, 220uF for 48Vin, If the ambient temperature is less than -20°C, use 3 pieces of the recommended capacitor above. If the impedance of input line is high, input capacitor must be more than above.
2. Put output capacitor, C2 and C3 according to minimum and maximum capacitor recommendation on page 5. If the ambient temperature is less than -20 °C ,use at least 3 pieces of the recommended minimum capacitors.
3. Use external fuse for each unit. The basic test set-up to measure parameters such as efficiency and load regulation is shown below. When testing the modules under any transient conditions please ensure that the transient response of the source is sufficient to power the equipment under test. We can calculate:
 - Efficiency
 - Load regulation and line regulation.

The value of efficiency is defined as:

$$\eta = \frac{V_o \times I_o}{V_{in} \times I_{in}} \times 100\%$$

Where:

V_o is output voltage,
 I_o is output current,
 V_{in} is input voltage,
 I_{in} is input current.

The value of load regulation is defined as:

$$\text{Load.reg} = \frac{V_{FL} - V_{NL}}{V_{NL}} \times 100\%$$

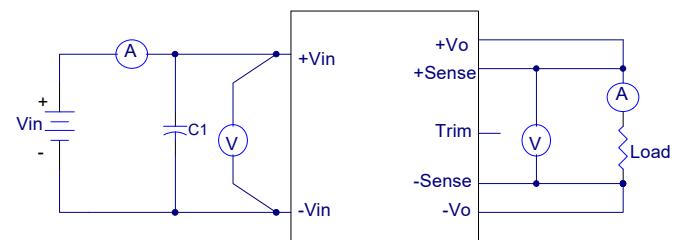
Where:

V_{FL} is the output voltage at full load
 V_{NL} is the output voltage at no load

The value of line regulation is defined as:

$$\text{Line.reg} = \frac{V_{HL} - V_{LL}}{V_{LL}} \times 100\%$$

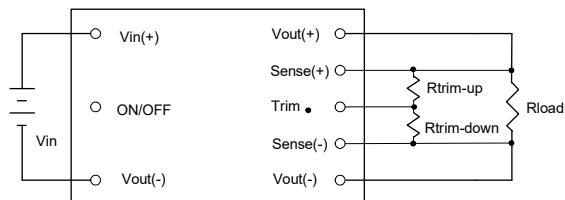
Where: V_{HL} is the output voltage of maximum input voltage at full load. V_{LL} is the output voltage of minimum input voltage at full load.



CFDHR300 Series Test Setup

6.9 Output Voltage Adjustment

The Trim input permits the user to adjust the output voltage up or down 10%. This is accomplished by connecting an external resistor between the Trim pin and either the $V_{out}(+)$ pin or the $V_{out}(-)$ pin (COM pin), see Figure



Output voltage trim circuit configuration

The Trim pin should be left open if trimming is not being used. Connecting an external resistor ($R_{trim-down}$) between the Trim pin and the $V_{out}(-)$ (or Sense(-))pin decreases the output voltage. The following equation determines the required external resistor value to obtain a down percentage output voltage change of $\Delta\%$

$$R_{trim-down} = \left[\frac{511}{\Delta\%} - 10.22 \right] k\Omega$$

Where

$$\Delta\% = \left(\frac{V_{o,set} - V_{desired}}{V_{o,set}} \right) \times 100$$

For example, to trim-down the output voltage of 12V module(CFDHR300-48S12) by 5% to 11.4V, $R_{trim-down}$ is calculated as follow:

$$\Delta\% = 5$$

$$R_{trim-down} = \left(\frac{511}{5} - 10.22 \right) k\Omega$$

$$R_{trim-down} = 91.98 k\Omega$$

Connecting an external resistor ($R_{trim-up}$) between the Trim pin and the $V_{out}(+)$ (or Sense(+)) pin increases the output voltage. The following equations determine the required external resistor value to obtain a up percentage output voltage change of $\Delta\%$.

$$R_{trim-up} = \left[\frac{5.11V_{out}(100 + \Delta\%)}{1.24 \times \Delta\%} - \frac{511}{\Delta\%} - 10.22 \right] k\Omega$$

Where

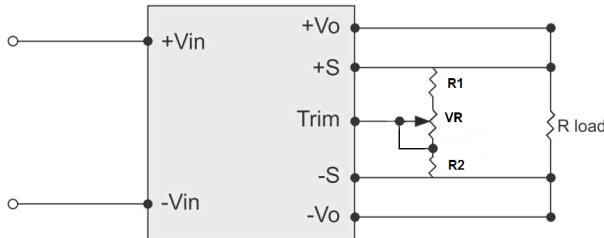
$$\Delta\% = \left(\frac{V_{o, \text{set}} - V_{\text{desired}}}{V_{o, \text{set}}} \right) \times 100$$

For example,to trim-up the output voltage of 12V module (CFDHR300-48S12) by 5% to 12.6V,R_{trim-up} is calculated as follow:

$$\Delta\% = 5$$

$$R_{\text{trim-up}} = \left(\frac{5.11 \times 12 \times (100 + 5)}{1.24 \times 5} - \frac{511}{5} - 10.22 \right) k\Omega$$

$$R_{\text{trim-up}} = 926 k\Omega$$



Output voltage trim circuit configuration with VR

Recommend Resistor Values:

V _{out} (V)	R1 (kΩ)	R2 (kΩ)	VR (kΩ)
5	13	5.6	10
12	33	4.7	20
15	36	3.9	20
24	47.5	3	20
28	51	2.7	20
48	56	1.65	20

$$R1+VR \geq \frac{37.089 \times R2 \times V_o - 40.88 \times R2}{40.88 - R2} \quad (1) \quad (\text{k}\Omega)$$

$$R1 \leq \frac{45.331 \times R2 \times V_o - 61.32 \times R2}{61.32 + R2} \quad (2) \quad (\text{k}\Omega)$$

Ex:CFDHR300-48S24

IF R2=3kΩ

$$R1+VR \geq \frac{37.089 \times 3 \times 24 - 40.88 \times 3}{40.88 - 3} = 67.259 \text{ k}\Omega$$

$$R1 \leq \frac{45.331 \times 3 \times 24 - 61.32 \times 3}{61.32 + 3} = 47.884 \text{ k}\Omega$$

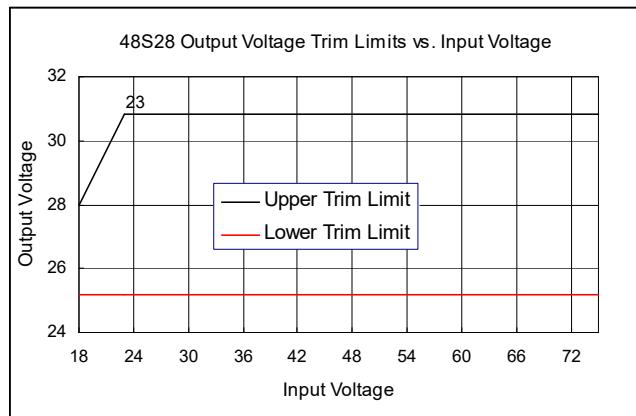
$$VR \geq 67.259 - 47.884 = 19.375 \text{ k}\Omega$$

R1 use 47.5K, VR use 20K

Note:Although the output voltage can be increased by both the remote sense and by the trim,the maximum increase for the output voltage is not the sum of both. The maximum increase is the larger of either the remote sense or the trim.The amount of power delivered by the module is defined as the voltage at the output terminals multiplied by the output current.When using remote sense and trim,the output voltage of the module can be increased and consequently increase

the power output of the module if output current remains unchanged.Care should be taken to ensure that the maximum output power of the module remains at or below the maximum rated power(Maximum rated power=V_{o, set} × I_{o, max})

The output voltage on 5V/12V/15V/24V/28V/48V model is adjustable within the range of +10% to -10%. For 48S28 model see input/output trim curves for trim up and trim down is -10%.



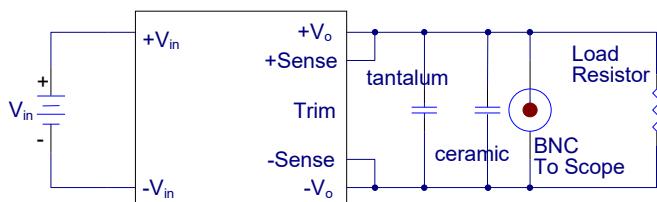
6.10 Output Remote Sensing

The CFDHR300 Series converter has the capability to remotely sense both lines of its output.This feature moves the effective output voltage regulation point from the output of the unit to the point of connection of the remote sense pins.This feature automatically adjusts the real output voltage of the CFDHR300 series in order to compensate for voltage drops in distribution and maintain a regulated voltage at the point of load.The remote-sense voltage range is:

$$[(+V_{\text{out}}) - (-V_{\text{out}})] - [(+Sense) - (-Sense)] \leq 10\% \text{ of } V_{o, \text{nominal}}$$

If the remote sense feature is not to be used,the sense pins should be connected locally.The +Sense pin should be connected to the +Vout pin at the module and the -Sense pin should be connected to the -Vout pin at the module.

6.11 Output Ripple and Noise



Output ripple and noise is measured with 10uF solid tantalum (for 24S05 with 330uF tantalum, 24S12 with 100uF tantalum and 48Vout with 10uF aluminum) and 1uF ceramic capacitors across the output.

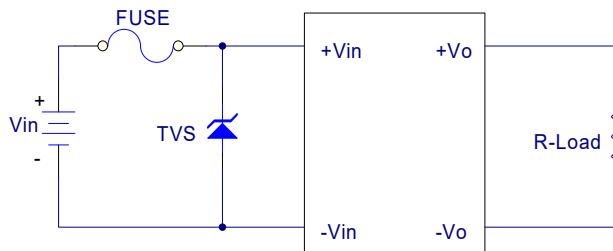
6.12 Output Capacitance

For good transient response, low ESR output capacitors should be located close to the point of load. PCB design emphasizes low resistance and inductance tracks in consideration of high current applications. Output capacitors with their associated ESR values have an impact on loop stability and bandwidth. Must increase three or four times the minimum output capacitance when operating below -20°C and the absolute maximum value of CFDHR300 series' output capacitance, please refer to Page5 Maximum Output Capacitance. For values larger than this please contact local CHEWINS's representative.

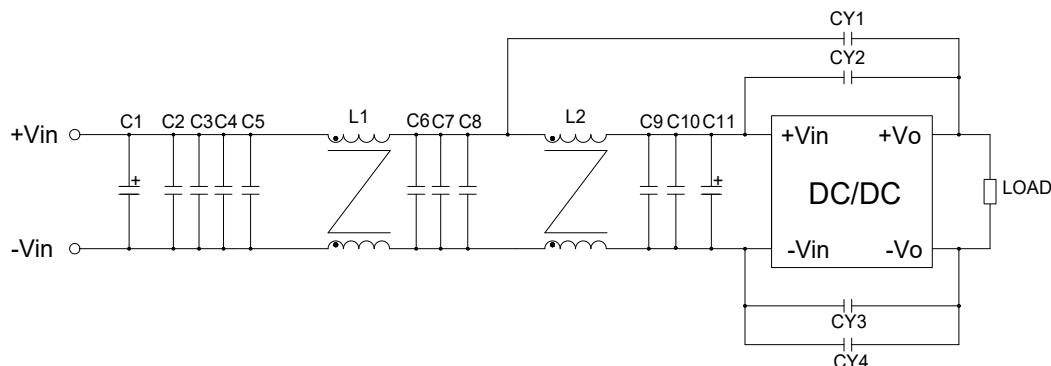
7. Safety & EMC

7.1 Input Fusing and Safety Considerations

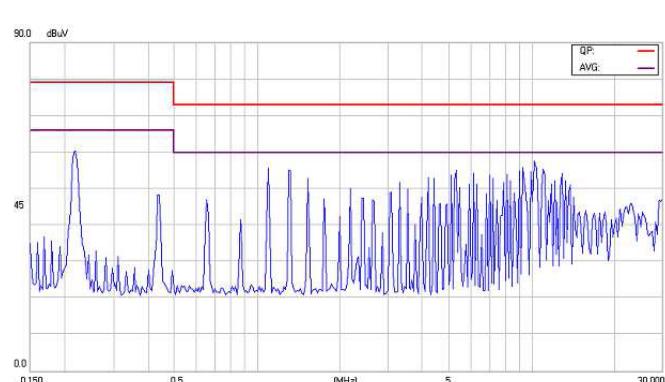
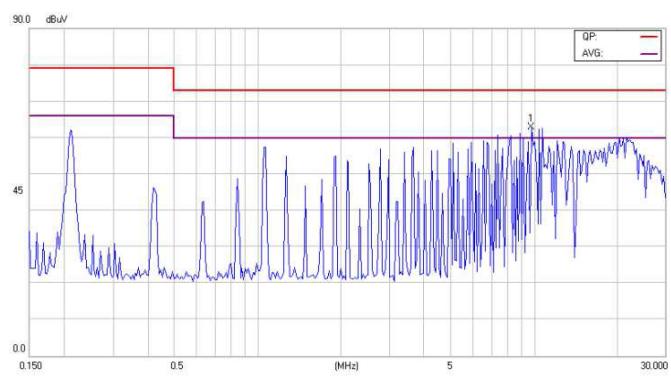
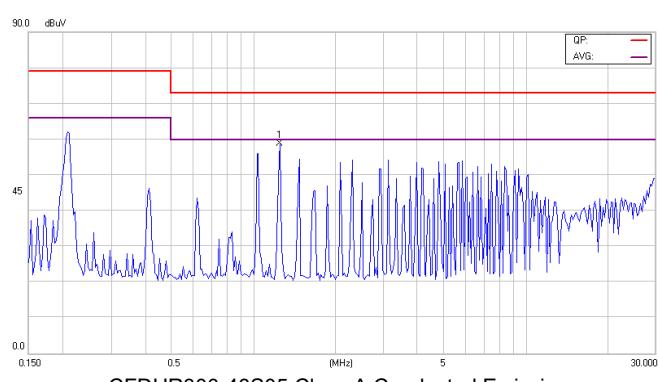
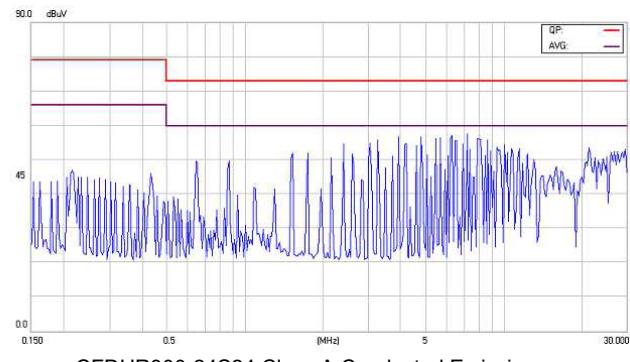
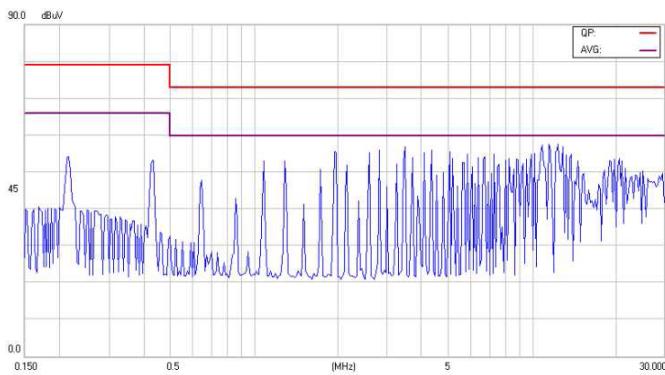
The CFDHR300 series converters have no internal fuse. Inorder to achieve maximum safety and system protection, always use an input line fuse. It is recommended that the circuit have a transient voltage suppressor diode (TVS) across the input terminal to protect the unit against surge or spike voltage and input reverse voltage (as shown).



7.2 EMC Considerations



CLASS A	CLASS B	器件参数	器件功能
C1		150μF电解电容	满足传导骚扰及辐射骚扰
C11		47μF电解电容	
C2,C3,C4,C5,C6,C7,C8,C9,C10		10μF陶瓷电容	
L1,L2		1.6mH共模电感	
CY3	CY1,CY2	2.2nFY1安规电容	
	CY3,CY4	1nFY1安规电容	



8. Part Number

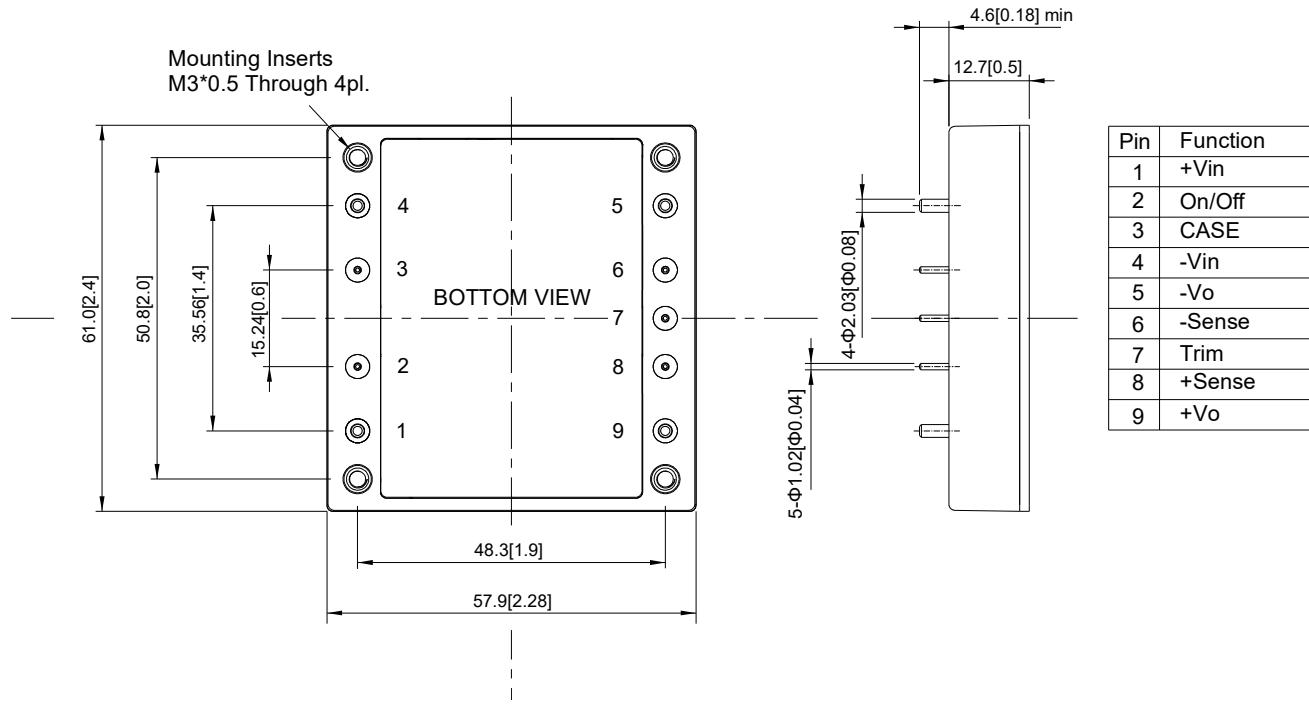
Parameter	Series	Nominal Input Voltage	Number of Outputs	Output Voltage	Remote On/Off Logic	Mounting Inserts
Symbol	CFDHR300	II	X	OO	L	Y (Option)
Value	CFDHR300	24:24Volts 48:48Volts	S:Single	5:5Vdc 12:12Vdc 15:15Vdc 24:24Vdc 28:28Vdc 48:48Vdc	None:Positive N:Negative	C Clear Mounting Insert

9. Mechanical Specifications

9.1 Mechanical Outline Diagrams

All Dimensions In mm(Inches)

Tolerances Inches:X.XX=±0.02,X.XXX=±0.01
 Millimeters:X.X=±0.5,X.XX=±0.25



CFDHR300 Mechanical Outline Diagram

NOTE:

1. Suffix “-C” to the Model Number with Clear Mounting Insert (3.2mm DIA)



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