CHB150W12 SERIES
150 WATT 12:1 INPUT ISOLATED DC-DC CONVERTER

Features

- Efficiency Up to 91%
- Fixed Switching Frequency
- Regulated Outputs
- Remote On/Off
- Fully Protected (OTP/OCP/OVP/UVLO)
- 3000Vac I/O Isolation
- Operating Case Temperature -40 to +100℃
- Half Brick Size Meet Industrial Standard 2.28×2.40x0.50
- CB Test Certificate IEC 62368-1
- UL 62368-1 2nd (Reinforce Insulation) Approval
- EN 50155 Compliant with External Circuits
- Shock & Vibration EN 50155 (EN 61373) Compliant
- Fire & Smoke EN 45545-2 Compliant
- 5000m Operating Altitude

c UL us E176177 CE CB Railway System

MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.		CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD	(1)	(2)	
CHB150W12-72S05	14-160 VDC	5 VDC	0 mA	25 A	50 mA	1929 mA	90	90	25000uF
CHB150W12-72S12	14-160 VDC	12 VDC	0 mA	12.5 A	50 mA	2289 mA	91	90	16700uF
CHB150W12-72S15	14-160 VDC	15 VDC	0 mA	10 A	50 mA	2315 mA	90	90	10000uF
CHB150W12-72S24	14-160 VDC	24 VDC	0 mA	6.25 A	50 mA	2341 mA	89	89	6250μF
CHB150W12-72S48	14-160 VDC	48 VDC	0 mA	3.2 A	50 mA	2370 mA	90	89	1500μF

NOTE:

1. Nominal Input Voltage 72 VDC.
2. Measured at Input Voltage 110 VDC.
3. An External Input Capacitor 100uF for All Models are Recommended to Reduce Input Ripple Voltage.
4. An External Electrolytic Capacitor at least 240uF connected between BUS and -Vin is necessary.

PART NUMBER

Series	Nominal Input Voltage	Number of Outputs	Nominal Output Voltage	Remote On/Off Logic	Mounting Inserts
CHB150W12-	II	O	XX	L	-Y (Option)
CHB150W12	72：72 VDC	S：Single	05：5VDC 12：12VDC 15：15VDC 24：24VDC 48：48VDC	None：Positive N：Negative	None：M3x0.5 Mounting Inserts -C：Clear Mounting Inserts (3.2mm DIA.)

Part Number Example:

CHB150W12-72S12N-C: Half Brick, 150W, 12:1 14-160Vdc Input, Single 12Vdc Output, Negative Logic, Clear Mounting Insert

TECHNICAL SPECIFICATIONS

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

ABSOLUTE MAXIMUM RATINGS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Input Voltage	Continuous	All	-0.3		160	V_{dc}
Input Surge Voltage	100ms max.	All			180	V_{dc}
Operating Case Temperature	At the center part of base plate	All	-40		100	℃
Storage Temperature		All	-55		125	℃

INPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Operating Input Voltage		All	14	72	160	V_{dc}
Input Under Voltage Lockout						
Turn-On Voltage Threshold		All	12.5	13	13.5	V_{dc}
Turn-Off Voltage Threshold		All	10.5	11	11.5	V_{dc}
Lockout Hysteresis Voltage		All		2		V_{dc}
Maximum Input Current	V_{in}=16.5V, Full load	All		12		A
No-Load Input Current	V_{in}=72V, I_o=0A	See Model Number Table				mA
Input Filter	Pi filter.	All				
Inrush Current (I^2t)	As per ETS300 132-2	All			0.1	A^2s
Input Reflected Ripple Current	P-P thru 12uH inductor, 5Hz to 20MHz	All		50		mA

OUTPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Voltage Set Point Accuracy	V_{in}=72V, Full load, T_c=25℃	All	-1.0		+1.0	%
Output Voltage Regulation						
Load Regulation	Full load to no load	All			±0.2	%
Line Regulation	V_{in}=High line to low line, full load	All			±0.2	%
Temperature Coefficient	T_c=-40℃ to 100℃	All			±0.02	%/℃
Output Voltage Ripple and Noise (5Hz to 20MHz bandwidth)						
Peak-to-Peak	Full load, 10uF tantalum and 1uF ceramic capacitors (for V_o=48V: Full Load 10uF aluminum and 1uF ceramic capacitors)	5Vo			150	mV
		12Vo			200	
		15Vo			200	
		24Vo			240	
		48Vo			240	
RMS.		5Vo			60	mV
		12Vo			80	
		15Vo			60	
		24Vo			100	
		48Vo			100	
Output Current Range	V_{in}= 16.5 to 160V	See Model Number Table				A
	V_{in}= 14 to 16.5V	See Model Number Table,Full Load 10S				
Over Current Protection	<90% V_o	All	110	125	140	%
Short Circuit Protection	Hiccup mode. Auto recovery	All	Continuous, Auto Recovery			
External Load Capacitance	Full load (constant resistive load)	See Model Number Table				uF
Output Voltage Trim Range	$P_o \leqq$ max. rated power, $I_o \leqq I_{o\_max.}$	All	-20		+15	%
Output Voltage Remote Sense Range	$P_o \leqq$ max. rated power, $I_o \leqq I_{o\_max.}$ % of nominal V_o	All			+15	%
Over Voltage Protection	Limited voltage, % of nominal V_o	All	117	125	140	%

EFFICIENCY

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
100% Load	V_{in}=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 $I_{o\_max.}$ step load change di/dt=0.1A/us (within 1% V_{out} nominal)	All			±5	%
Recovery Time		All			250	us
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		100		ms
Turn-On Delay Time, From Input	V_{in_min} to 10%V_{o_set}, Power up	All		100		ms
Output Voltage Rise Time	10%V_{o_set} to 90%V_{o_set}	All		100		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 4200	V_{ac} V_{dc}
	1 Minute; input to case (base plate)	All			3000 4200	V_{ac} V_{dc}
	1 Minute; output to case (base plate)	All			500 700	V_{ac} V_{dc}
Isolation Resistance	Input to output	All	100			MΩ
Isolation Capacitance	Input to output Input to case (base plate) Output to case (base plate)	All		500 None 2000		pF

FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Switching Frequency	Output ripple frequency	All	432	480	528	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	All	3.5		160	V
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	3.5		160	V
Logic Low (Module On)	$V_{on/off}$ at $I_{on/off}$=1.0mA	All	0		1.2	V
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		15	20	mA
Over Temperature Shutdown	Temperature at the center part of base plate, non-latching	All		105		℃
Over Temperature Recovery		All		95		℃

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℃	72S05 72S12 72S15 72S24 72S48		455 495 545 655 565		K hours
Weight		All		105		grams

GENERAL SPECIFICATIONS

Case Material	Plastic, DAP, UL 94V-0		
Base plate Material	Aluminum		
Potting Material	UL 94V-0		
Pin Material	Base: Copper Plating: Nickel with Matte Tin		
Shock/Vibration	MIL-STD-810F/EN 61373 Compliant		
Humidity	95% RH max. Non condensing		
Altitude	5000m Operating altitude, 12000m Transport altitude		
Thermal Shock	MIL-STD-810F		
Fire & Smoke	EN 45545-2 Compliant		
EMI	Meets EN 55032 & EN 50155 Compliant (with external filter)		Class A
ESD	EN 61000-4-2	Level 3: Air ±8kV, Contact ±6kV	Perf. Criteria A
Radiated Immunity	EN 61000-4-3	Level 3: 80~1000MHz, 20V/m	Perf. Criteria A
Fast Transient	EN 61000-4-4	Level 3: On power input port, ±2kV, external input capacitor required,	Perf. Criteria A
Surge	EN 61000-4-5	Level 4: Line to earth, ±4kV, Line to line, ±2KV (EN 50155) external components required	Perf. Criteria A
Conducted Immunity	EN 61000-4-6	Level 3: 0.15~80MHz, 10V	Perf. Criteria A
Interruptions of Voltage Supply	EN 50155	Class S3: 20ms interruptions	Perf. Criteria A
Supply Change Over	EN 50155	Class C2: During a supply break of 30ms	Perf. Criteria A
Application Note Link			CHB150W12-72S Series App Notes
Packaging Information Link			Packaging Information

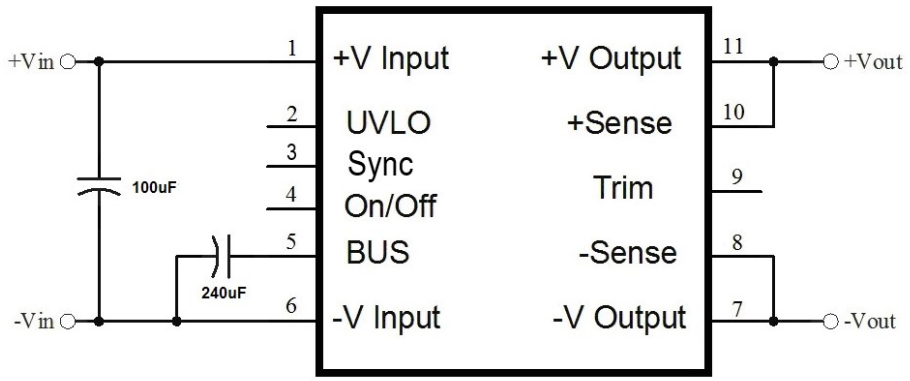
Immunity to Environmental Conditions.

Phenomenon	EN 50155; 2017 Reference Clause(s)	Reference Standard	Test Conditions	Result
Low Temperature Start-up test	13.4.4	EN 60068-2-1	Class OT6 Temperature: -40℃ Duration: 2 hrs	Pass
Dry Heat Test	13.4.5	EN 60068-2-2	Class OT6 & ST0 Temperature: 85℃ Duration: 6 hrs Extended temperature: 100℃ Extended Duration: 10min	Pass
Low Temperature Storage Test	13.4.6	EN 60068-2-1	Temperature: -40℃ Duration: 16 hrs	Pass
Cyclic Damp Heat Test	13.4.7	EN 60068-2-30	Temperature: 25℃-55℃ Humidity: 90% RH Duration: 48 hrs	Pass
Random Vibration Test	13.4.11	EN 61373	Temperature: 20℃±3℃ Humidity: 66%±5% RH Frequency range: 5 ~ 150 Hz Vertical: 1.01 m/s^2 Transverse: 1.01 m/s^2 Longitudinal: 1.01 m/s^2 Duration: 10 min / axis	Pass
Simulated Long Life Test at Increased Random Vibration Levels	13.4.11	EN 61373	Temperature: 20℃±3℃ Humidity: 66% ±5% RH Frequency range: 5 ~ 150 Hz Vertical: 5.72 m/s^2 Transverse: 5.72 m/s^2 Longitudinal: 5.72 m/s^2 Duration: 5 hrs / axis	Pass
Shock Test	13.4.11	EN 61373	Temperature: 20℃±3℃ Humidity: 66% ±5% RH Frequency range: 5 ~ 150 Hz ±Vertical: 50 m/s^2 ±Transverse: 50 m/s^2 ±Longitudinal: 50 m/s^2 Duration: 30ms x18 (Each axis 3 shocks)	Pass

EN 45545-2 Fire & Smoke Test Conditions.

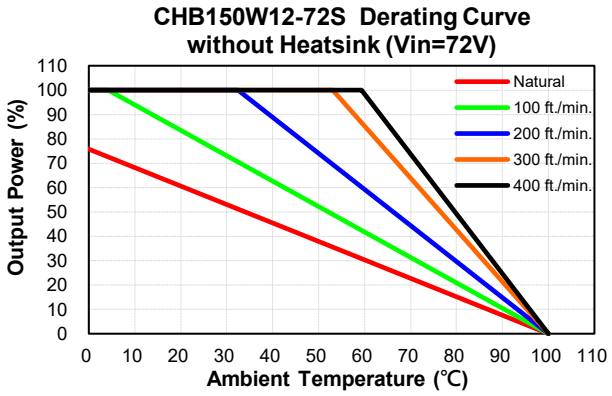
Item		Standard	Hazard Level
R22	Oxygen Index Test	EN 45545-2: 2013+A1:2015 EN ISO 4589-2: 2017	HL1, HL2, HL3
	Smoke Density Test	EN 45545-2: 2013+A1:2015 EN ISO 5659-2: 2017	HL1, HL2, HL3
	Smoke Toxicity Test	EN 45545-2: 2013+A1:2015 NF X70-100-1 and -2: 2006	HL1, HL2, HL3
R23	Oxygen Index Test	EN 45545-2: 2013+A1:2015 EN ISO 4589-2: 2017	HL1, HL2, HL3
	Smoke Density Test	EN 45545-2: 2013+A1:2015 EN ISO 5659-2: 2013	HL1, HL2, HL3
	Smoke Toxicity Test	EN 45545-2: 2013+A1:2015 NF X70-100-1 and -2: 2006	HL1, HL2, HL3
R24	Oxygen Index Test	EN 45545-2: 2013 EN ISO 4589-2	HL1, HL2, HL3
R25	Glow - Wire Test	EN 45545-2+A1:2016 EN 60695-2-11:2014	HL1, HL2, HL3
R26	Vertical Flame Test	EN 45545-2: 2013 EN 60695-11-10: 2013	HL1, HL2, HL3

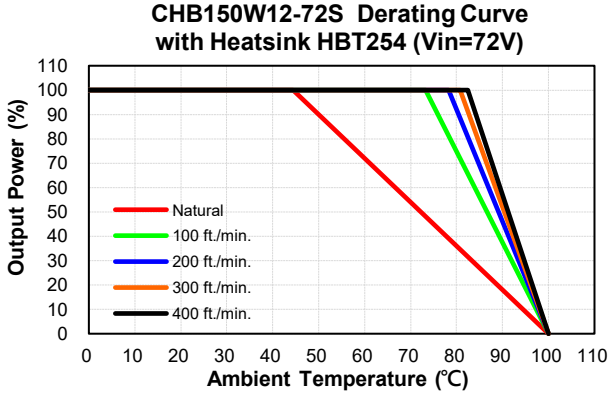
CHARACTERISTIC CURVE

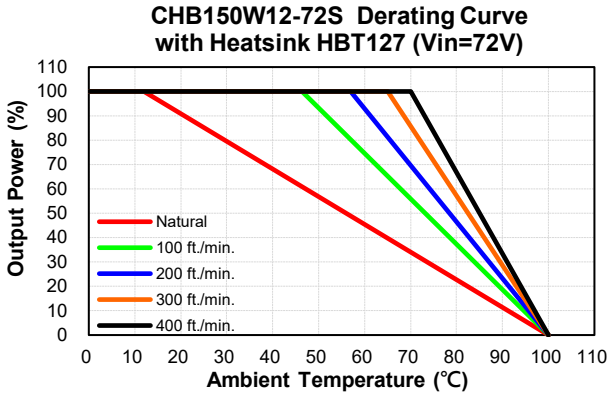


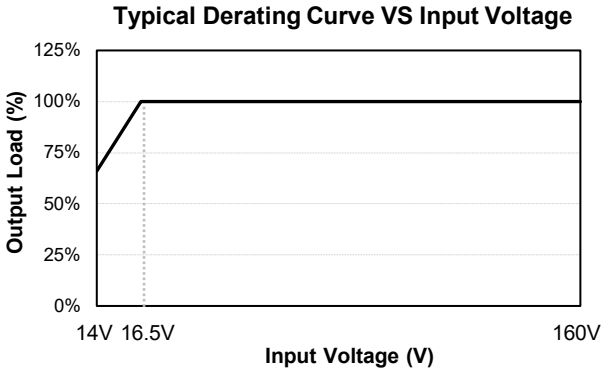
Simplified Application Circuit

Power Derating Curve









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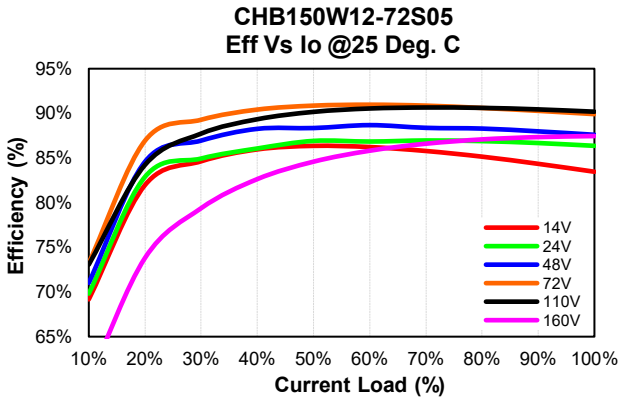
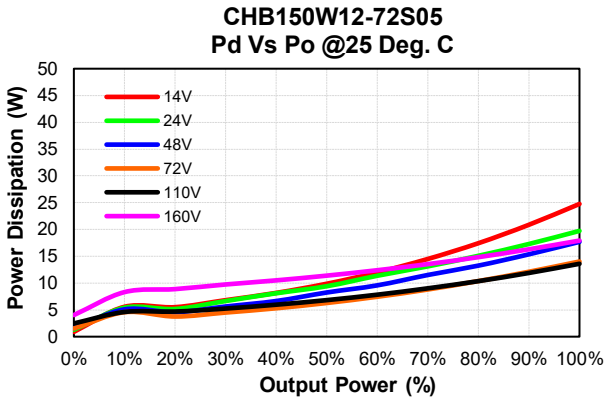
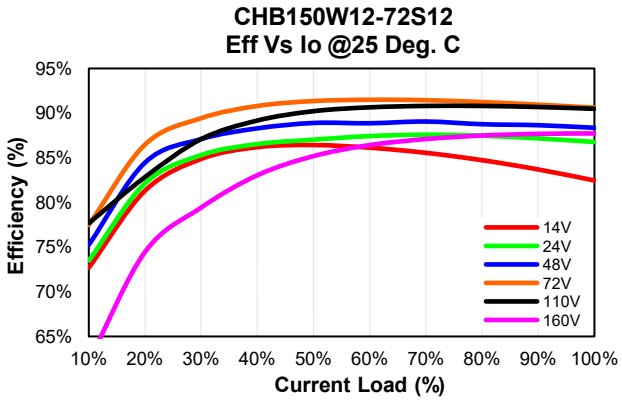
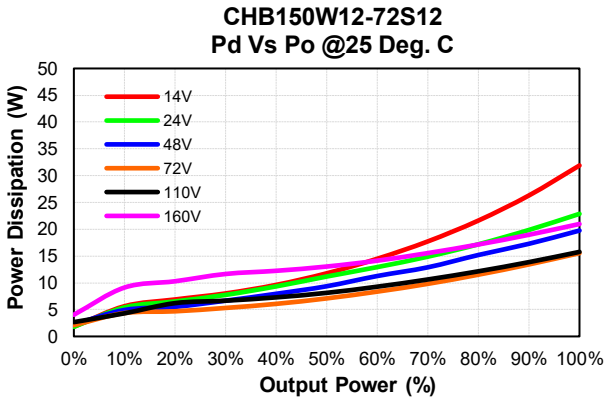
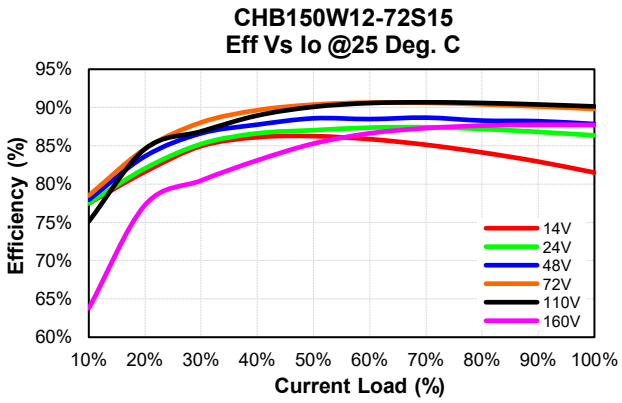
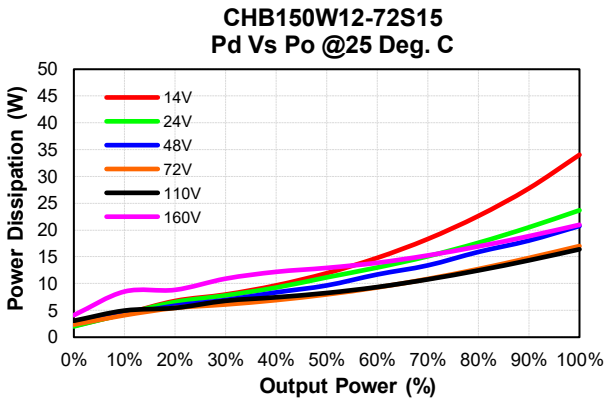




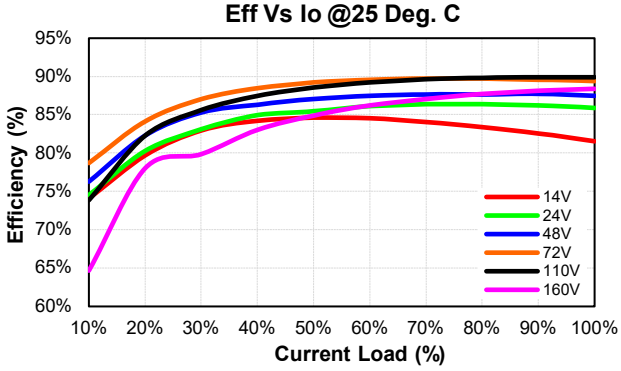




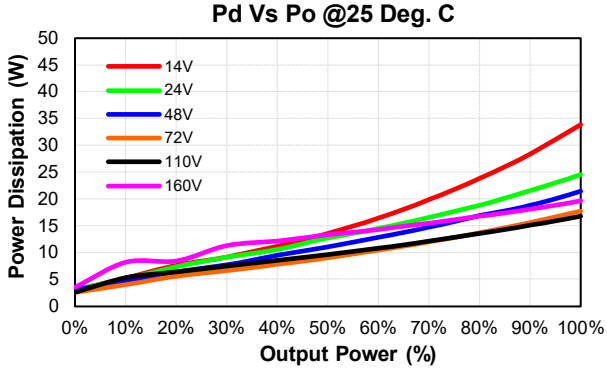




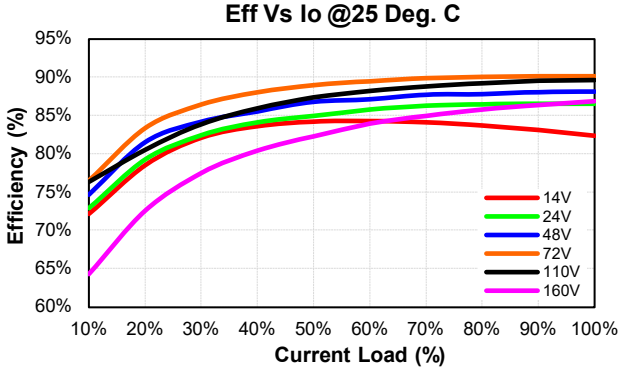
CHB150W12-72S24
Eff Vs Io @25 Deg. C



CHB150W12-72S24
Pd Vs Po @25 Deg. C



CHB150W12-72S48
Eff Vs Io @25 Deg. C



CHB150W12-72S48
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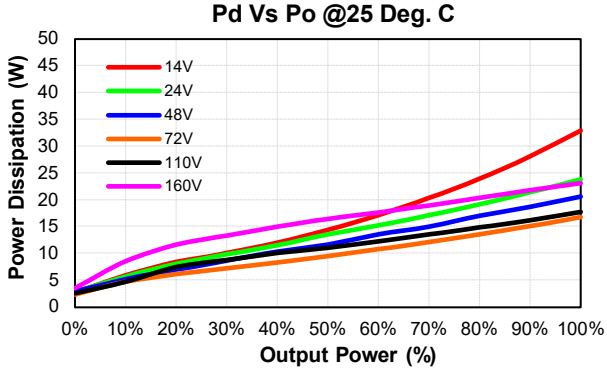
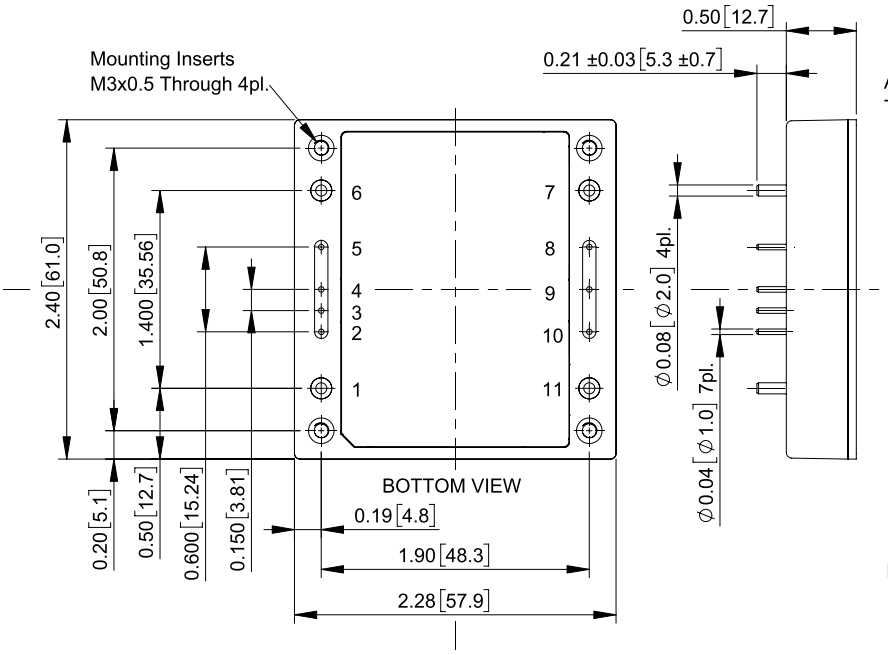


MECHANICAL SPECIFICATION



All Dimensions in Inches[mm]
Tolerance Inches: x.xx=±0.02, x.xxx=±0.010
Millimeters: x.x=±0.5, x.xx=±0.25

Pin Connection

Pin	Function
1	+V Input
2	UVLO
3	Sync
4	On/Off
5	BUS
6	-V Input
7	-V Output
8	-Sense
9	Trim
10	+Sense
11	+V Output

Note:Pin Size is Ø0.04±0.004 Inch [Ø1.0±0.1 mm]
Pin Size is Ø0.08±0.004 Inch [Ø2.0±0.1 mm]

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