CHB500W SERIES
500 WATT 4:1 INPUT ISOLATED DC-DC CONVERTER

Features

- Efficiency Up to 91.5%
- 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 +105℃
- Half Brick Size Meet Industrial Standard 2.28"x2.4"x0.5"
- Safety Meets UL/IEC/EN 62368-1 2nd (Basic Insulation)
- Shock & Vibration MIL-STD-810F Compliant
- Fire & Smoke EN 45545-2 Compliant
- 5000m Operating Altitude
- Option Model with Single Wire Parallel Control (Suffix "-PC")



MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.		CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD	(3)	(2)	
CHB500W-24S12	9-40 VDC	12 VDC	0 mA	42.0 A	80 mA	22.4 A	91	90	42000μF
CHB500W-24S24	9.5-40 VDC	24 VDC	0 mA	21.0 A	80 mA	22.4 A	91.5	91	21000uF
CHB500W-24S28	9-40 VDC	28 VDC	0 mA	18.0 A	80 mA	22.4 A	90	90	18000uF
CHB500W-24S48	9-40 VDC	48 VDC	0 mA	10.4 A	100 mA	22.4 A	90	90	4000uF
CHB500W-24S54	9-40 VDC	54 VDC	0 mA	9.26 A	100 mA	22.4 A	90.5	90	4000uF

NOTE:
1. Nominal Input Voltage 24VDC.
2. Measured at Nominal Input Voltage.
3. Measured at 12VDC for 24Vin.

PART NUMBER

Series	Nominal Input Voltage	Number of Outputs	Nominal Output Voltage	Remote On/Off Logic	Mounting Inserts	Operating Case Temp. Range
CHB500W-	II	O	XX	L	-Y (Option)	-Z (Option)
CHB500W	24 : 24 VDC	S : Single	12 : 12VDC 24 : 24VDC 28 : 28VDC 48 : 48VDC 54 : 54VDC	None : Positive N : Negative	None : M3x0.5 Mounting Inserts -C : Clear Mounting Insert (3.2mm DIA.)	None : Blank -PC : with Parallel Control

Part Number Example:
CHB500W-24S12N-C-PC: Half Brick, 500W, 4:1 9-40Vdc Input, Single 12Vdc Output, Negative Logic, Clear Mounting Insert, with Parallel Control

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		40	V_{dc}
Input Surge Voltage	100ms max.	All			50	V_{dc}
Operating Ambient Temperature	At the center part of case plate (with derating)	All	-40		105	℃
Maximum Case Temperature		All			110	℃
Storage Temperature		All	-55		125	℃

INPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Operating Input Voltage		All	9	24	40	V_{dc}
Input Under Voltage Lockout						
Turn-On Voltage Threshold		All	8	8.5	8.8	V_{dc}
Turn-Off Voltage Threshold		All	7.7	8	8.3	V_{dc}
Lockout Hysteresis Voltage		All		0.6		V_{dc}
Maximum Input Current	V_{in}=9V, Full load	All		50		A
No-Load Input Current	V_{in}=24, 48V, I_o=0A	See Model Number Table				mA
Input Filter	C Type	All				
Inrush Current (I^2t)	As per ETS300 132-2	All		0.2	0.4	A^2s
Input Reflected Ripple Current	P-P thru 12uH inductor, 5Hz to 20MHz	All		100		mA

OUTPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Voltage Set Point Accuracy	V_{in}=24, 48V, 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 105℃	All			±0.02	%/℃
Output Voltage Ripple and Noise (5Hz to 20MHz bandwidth)						
Peak-to-Peak	Full load, 100uF tantalum and 1.0uF ceramic capacitors	12Vo			120	mV
	Full load, 10uF tantalum and 1.0uF ceramic capacitors	24Vo 28Vo			280	
	Full load, 10uF aluminum and 1.0uF ceramic capacitors	48Vo 54Vo			480	
RMS	Full load, 100uF tantalum and 1.0uF ceramic capacitors	12Vo			60	
	Full load, 10uF tantalum and 1.0uF ceramic capacitors	24Vo 28Vo			100	
	Full load, 10uF aluminum and 1.0uF ceramic capacitors	48Vo 54Vo			200	
Output Current Range	V_{in}= 9 to 40V	See Model Number Table				A
Over Current Protection	Hiccup mode. Auto recovery	All	110	125	140	%
Short Circuit Protection	Hiccup mode. Auto recovery	All	Continuous, Auto Recovery			
External Load Capacitance	Full load (resistive)	See Model Number Table				uF
Output Voltage Trim Range	$P_o \leqq$ max. rated power, $I_o \leqq I_{o_max.}$	Others 54Vo	-20 -20		+15 +10	%
Output Voltage Remote Sense Range	$P_o \leqq$ max. rated power, $I_o \leqq I_{o_max.}$ % of nominal V_o	Others 54Vo			+15 +10	%
Over Voltage Protection	Limited voltage, % of nominal V_o	All	120	130	140	%

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Load Share Accuracy (50%-100% load)	The condition is to use two modules. If you use more modules, please contact cincon	Others 54Vo	-10 -20		+10 +20	%

EFFICIENCY

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
100% Load	V_{in}=24V	See Model Number Table				%

DYNAMIC CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Output Voltage Current Transient						
Error Band	65% to 100% of $I_{o_max.}$ step load change d_i/d_t=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		40		ms
Turn-On Delay Time, From Input	$V_{in_min.}$ to 10%$V_{o_set,}$ Power up	All		40		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			1875 3000	V_{ac} V_{dc}
	1 Minute; input to case				1000 1600	V_{ac} V_{dc}
	1 Minute; output to case				1000 1600	V_{ac} V_{dc}
Isolation Resistance	Input to output	All	100			MΩ
Isolation Capacitance	Input to output Input to case Output to case	All		2000 NC 2000		pF

FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Switching Frequency	Pulse width modulation (PWM), fixed	All	180	200	220	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		65	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		65	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		10	15	mA
Over Temperature Shutdown	Temperature at the center part of case, non-latching	All		110		℃
Over Temperature Recovery		All		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℃	12Vo 24Vo 28Vo 48Vo 54Vo		422 500 455 596 572		K hours
Weight		All		114		grams
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					
Humidity	95% RH max. Non condensing					
Altitude	5000m Operating altitude, 12000m Transport altitude					
Thermal Shock	MIL-STD-810F					
Fire & Smoke	EN 45545-2 Compliant					

EMC SPECIFICATIONS (External components required, please refer to application note.)

EMI	Meets EN 55032 (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	Perf. Criteria A
Conducted immunity	EN 61000-4-6 Level 3: 0.15~80MHz, 10V	Perf. Criteria A
Application Note Link		CHB500W Series App Notes
Packaging Information Link		Packaging Information

Immunity to Environmental Conditions.

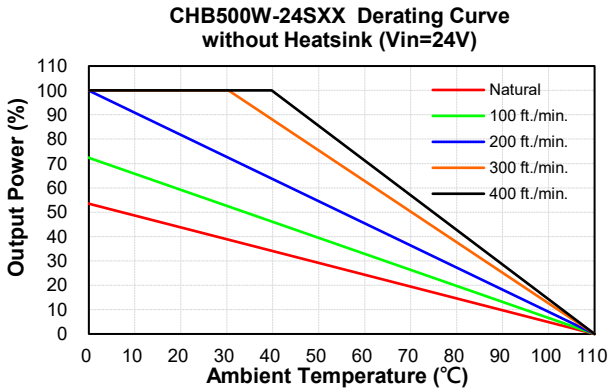
Phenomenon	Reference Clause	Reference Standard	Test Conditions	Result
Vibration Test	MIL-STD-810F Table 514.5C-VIII Figure 514.5C-6	MIL-STD-810F	Unit are non-operating Vibration Waveform：Random Vibration Frequency：15 ~ 2000 Hz Vibration axis：X、Y、Z axis Duration：1hr / axis	Pass
Shock Test	MIL-STD-810F 516.5 Table 516.5-I	MIL-STD-810F	Wave form：Sawtooth wave Test Category : Crash Hazard Test for Ground Equipment Duration：10 ms Peak Acceleration：75 G Cross-over Frequency：80 Hz No. of Shock：Each axis 3 times Shock Direction：±X , ±Y , ±Z axis	Pass
Thermal Shock Cycling Test	MIL-STD-810F 503.4 Figure 503.4-1	MIL-STD-810F	Temperature：-55℃ to 105℃ Humidity：95%RH Duration：8hrs/ 3 times cycling& 4hrs dwell time	Pass
Thermal Humidity Cycling Test	MIL-STD-810F Notice 3 Method 507.4	MIL-STD-810F	Temperature：60℃ to 30℃ Humidity：95%RH Duration：240 hrs	Pass

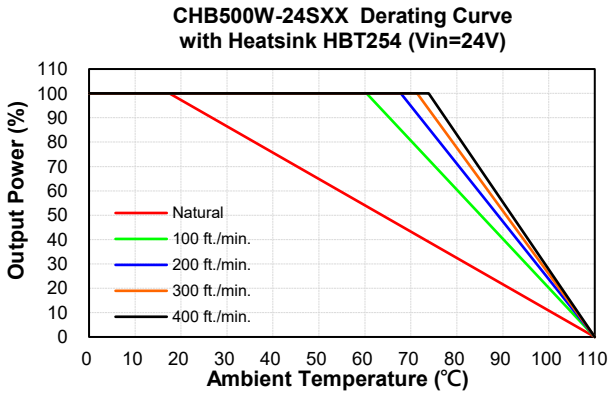
EN 45545-2 Fire & Smoke Test Conditions.

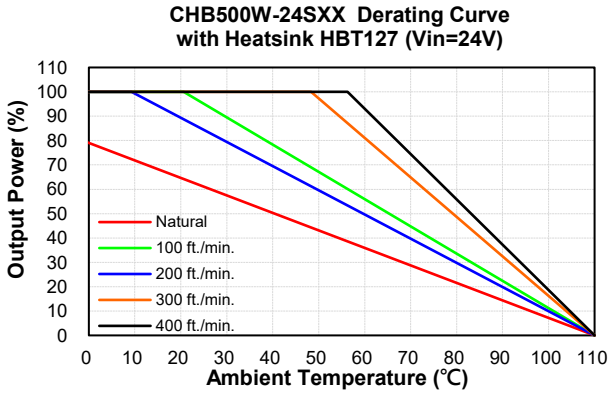
Item		Standard	Hazard Level
R22	Oxygen Index Test	EN 45545-2: 2013+A1:2015 EN ISO 4589-2: 2017	HL1, HL2, HL3
	Smoke Density Test	EN 45545-2: 2013+A1:2015 EN ISO 5659-2: 2017	HL1, HL2, HL3
	Smoke Toxicity Test	EN 45545-2: 2013+A1:2015 NF X70-100-1&2: 2006	HL1, HL2, HL3
R23	Oxygen Index Test	EN 45545-2: 2013+A1:2015 EN ISO 4589-2: 2017	HL1, HL2, HL3
	Smoke Density Test	EN 45545-2: 2013+A1:2015 EN ISO 5659-2: 2017	HL1, HL2, HL3
	Smoke Toxicity Test	EN 45545-2: 2013+A1:2015 NF X70-100-1&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: 2020+A1:2023 EN 60695-2-11:2014	HL1, HL2, HL3
R26	Vertical Flame Test	EN 45545-2: 2013+A1:2015 EN 60695-11-10: 2013	HL1, HL2, HL3

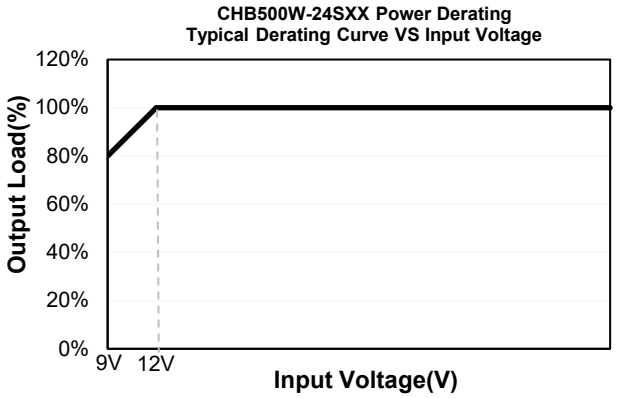
CHARACTERISTIC CURVE

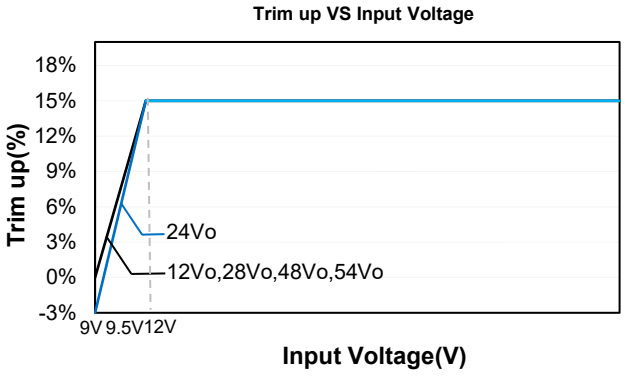
Power Derating Curve



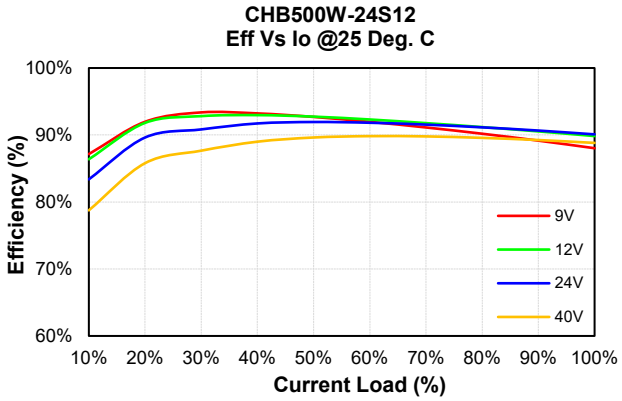


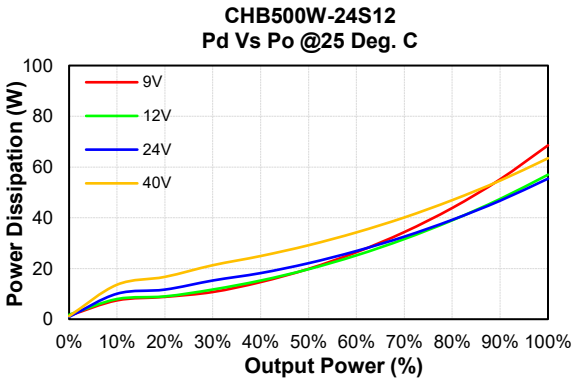


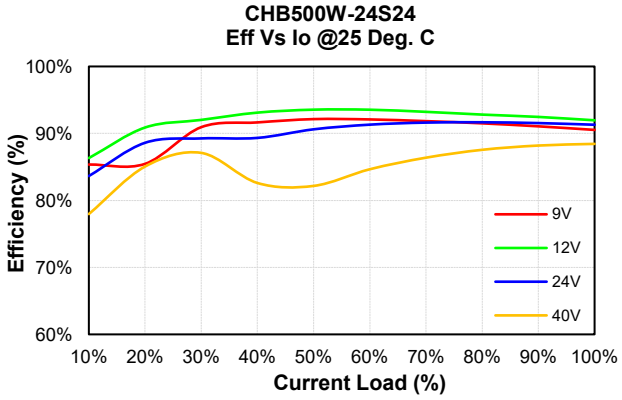


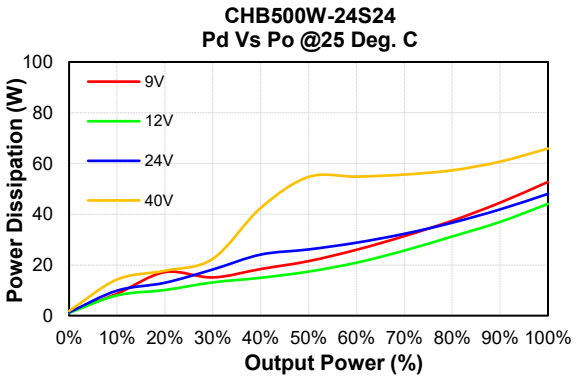


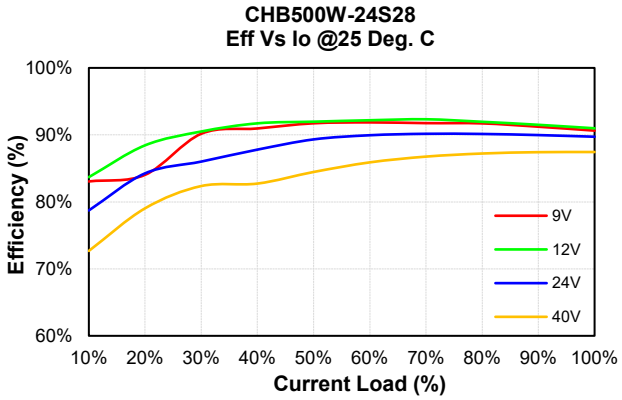
Performance Data

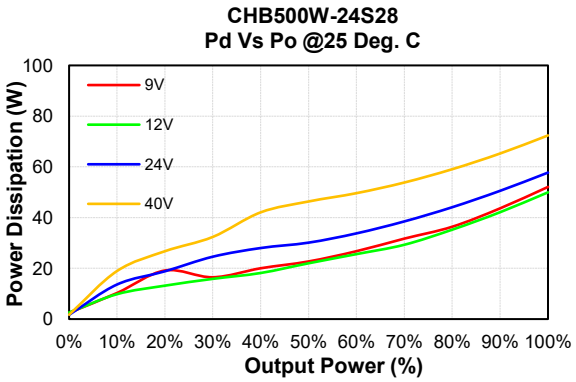




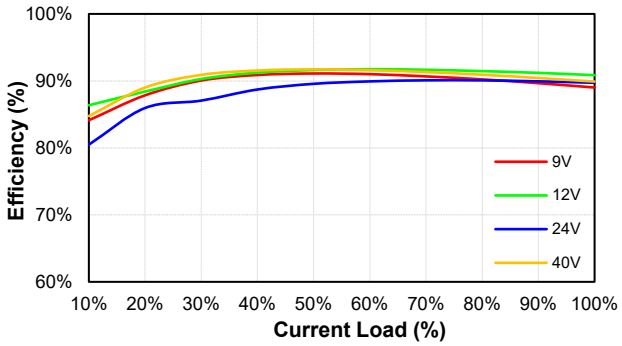




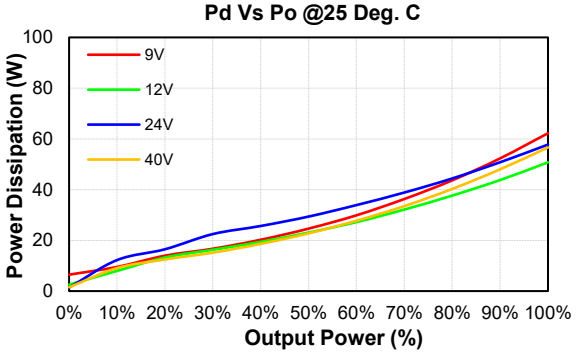




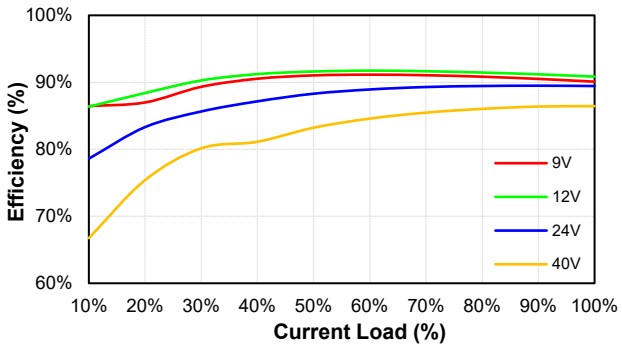
CHB500W-24S48
Eff Vs Io @25 Deg. C



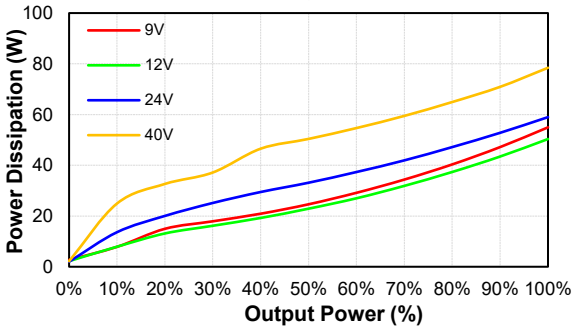
CHB500W-24S48
Pd Vs Po @25 Deg. C



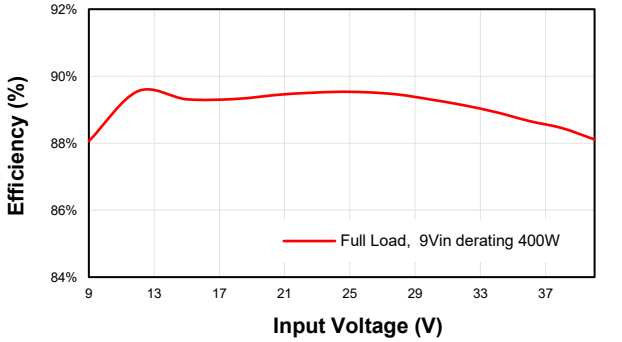
CHB500W-24S54
Eff Vs Io @25 Deg. C



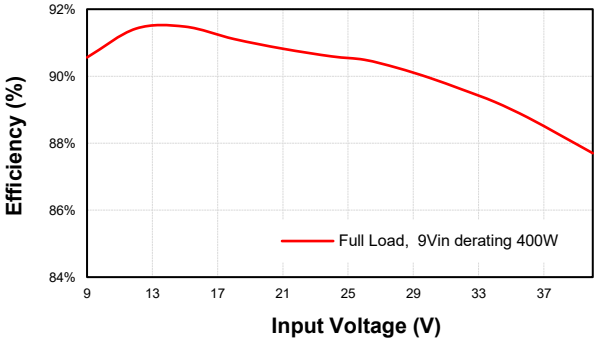
CHB500W-24S54
Pd Vs Po @25 Deg. C



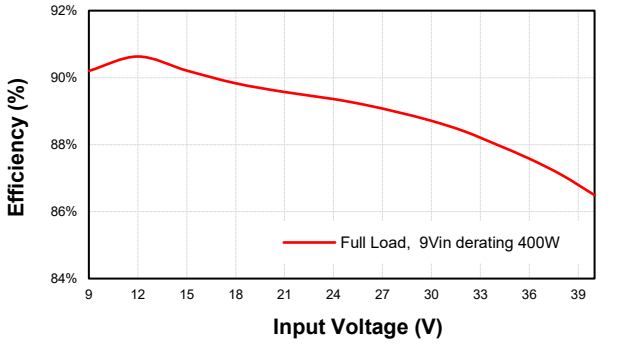
CHB500W-24S12
Eff Vs Io @25 Deg. C



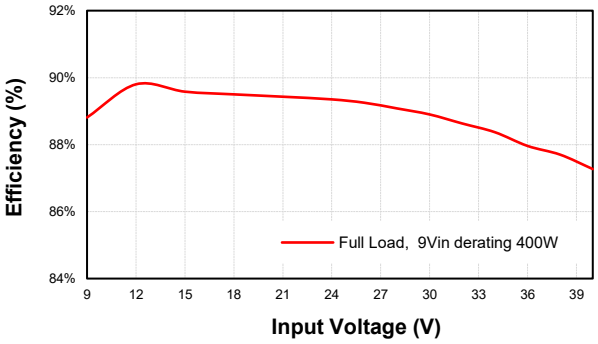
CHB500W-24S24
Eff Vs Io @25 Deg. C

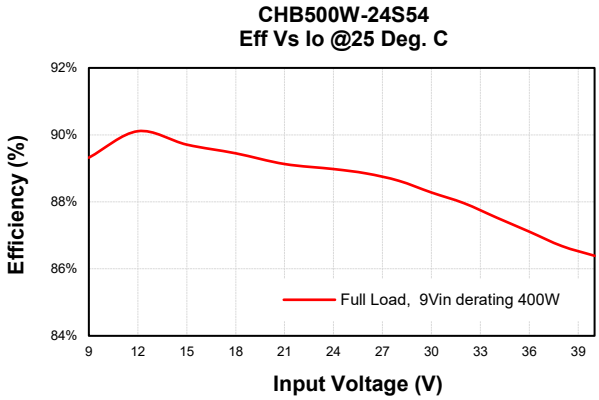


CHB500W-24S28
Eff Vs Io @25 Deg. C

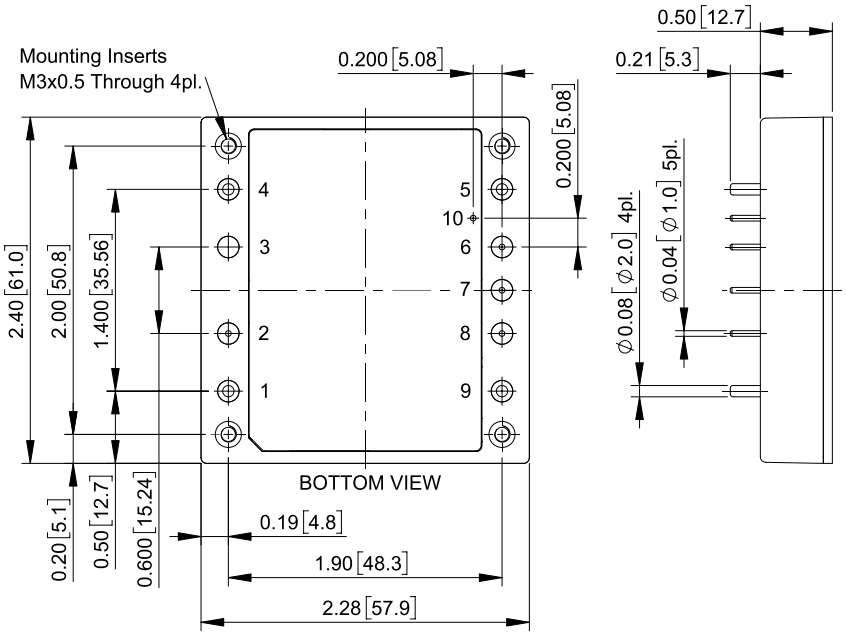


CHB500W-24S48
Eff Vs Io @25 Deg. C




CHB500W-24S54
Eff Vs Io @25 Deg. C
Efficiency (%)
92%
90%
88%
86%
84%
9
12
15
18
21
24
27
30
33
36
39
Full Load, 9Vin derating 400W
Input Voltage (V)

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

	Standard	Option-PC
Pin	Function	
1	+V Input	+V Input
2	On/Off	On/Off
3	NP	NP
4	-V Input	-V Input
5	-V Output	-V Output
6	-Sense	-Sense
7	Trim	Trim
8	+Sense	+Sense
9	+V Output	+V Output
10	NP	PC(Option)

Note:Pin Size is ∅0.04±0.004 Inch [∅1.0±0.1 mm]
Pin Size is ∅0.08±0.004 Inch [∅2.0±0.1 mm]
NP-No Pin

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