



CHM150 SERIES 150 WATT 2:1 INPUT MEDICAL 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)
- 5000V_{ac} I/O Isolation for 250V_{ac} Working Voltage
- Operating Case Temperature -40 to +100°C
- EN 60601-1-2, EN 55032, EN 55035 Approval
- IEC/UL 60601-1 3rd 2 MOPP Approval
- Design Meets CF Rated Medical Applications
- 5000m Operating Altitude
- Half-Brick Size Meet Industrial Standard



MODEL NUMBER	INPUT VOLTAGE	OUTPUT VOLTAGE	OUTPUT CURRENT		INPUT CURRENT		% EFF.	CAPACITOR LOAD MAX.
			MIN.	MAX.	NO LOAD	FULL LOAD		
CHM150-24S12	18-36 VDC	12 VDC	0 mA	12.5 A	10 mA	6831 mA	91.5	20000 µF
CHM150-24S15	18-36 VDC	15 VDC	0 mA	10.0 A	10 mA	6831 mA	91.5	15400 µF
CHM150-24S24	18-36 VDC	24 VDC	0 mA	6.25 A	10 mA	6868 mA	91	6250 µF

NOTE:

1. Measured at nominal input voltage 24VDC.

PART NUMBER

Series	Nominal Input Voltage	Number of Outputs	Nominal Output Voltage	Remote On/Off Logic
CHM150-	II	O	XX	
CHM150	24: 24VDC	S : Single	12 : 12VDC 15 : 15VDC 24 : 24VDC	None : Positive N : Negative

Part Number Example:

CHM150-24S12N: Half-Brick, 150W, 2:1 18-36V_{dc} Input, Single 12V_{dc} Output, Negative Logic



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		36	V _{dc}
Input Surge Voltage	100ms max.	All			50	V _{dc}
Operating Case Temperature	At the center part of base plate (with derating)	All	-40		100	°C
Storage Temperature		All	-55		125	°C

INPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Operating Input Voltage		All	18	24	36	V _{dc}
Input Under Voltage Lockout						
Turn-On Voltage Threshold	Full Load	All	15.6	16.5	17.5	V _{dc}
Turn-Off Voltage Threshold	Full Load	All	14.6	15.5	16.5	V _{dc}
Lockout Hysteresis Voltage	Full Load	All		1		V _{dc}
Maximum Input Current	V _{in} =22V, Full load V _{in} =18V, 80% Load	All		8		A
No-Load Input Current	V _{in} =24V, I _o =0A	See Model Number Table				mA
Input Filter	Pi filter	All				
Inrush Current (I ² t)	As per ETS300 132-2	All			0.1	A ² s
Input Reflected Ripple Current	P-P thru 12uH inductor, 5Hz to 20MHz	All		30		mA

OUTPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Voltage Set Point Accuracy	V _{in} =24V, Full load, T _c =25°C	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°C to 100°C	All			±0.02	%/°C
Output Voltage Ripple and Noise (5Hz to 20MHz bandwidth)						
Peak-to-Peak	Full load, 10uF and 1uF ceramic capacitors	12&15Vo			150	mV
		24Vo			240	
RMS		12&15Vo			60	mV
		24Vo			100	
Output Current Range	V _{in} =18 to 22V V _{in} =22 to 36V	See Power Derating Curve See Model Number Table				A
Over Current Protection	Hiccup mode. Auto recovery	All	110	140	160	%
Short Circuit Protection		All	Continuous, Auto Recovery			
External Load Capacitance	Full load (resistive)	See Model Number Table				uF
Output Voltage Trim Range	P _o ≤ max. rated power, I _o ≤ I _{o_max} .	All	-20		+10	%
Output Voltage Remote Sense Range	P _o ≤ max. rated power, I _o ≤ I _{o_max} . % of nominal V _o	All			+10	%
Over Voltage Protection	Limited voltage, % of nominal V _o	All	115	125	140	%



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	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		1.5		ms
Turn-On Delay Time, From Input	$V_{in_min.}$ to 10% V_{o_set} , Power up	All		3		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			5000	V_{ac}
	1 Minute; input to case (base plate)				2500	
	1 Minute; output to case (base plate)				2500	
Isolation Resistance	Input to output	All	1000			MΩ
Isolation Capacitance	Input to output (100KHz, 0.25V)	All			80	pF
Leakage Current	Touch Current	All			10	uA
Creepage	Input to output	All	8			mm
Clearance	Input to output	All	8			mm

FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Switching Frequency	Output ripple frequency	All	185	200	215	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		36	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		36	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		0.4	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		1.5	3	mA
Over Temperature Shutdown	Temperature at the center part of case, non-latching	All		105		°C
Over Temperature Recovery		All		88		°C



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	12Vo 15Vo 24Vo		1346 1391 1725		k hours
Weight		All		128		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					
Safety	IEC 60601-1, ANSI/AAMI ES 60601-1					
Shock/Vibration	MIL-STD-810F					
Humidity	95% RH max. Non-condensing					
Altitude	5000m Operating altitude, 12000m Transport altitude					
Thermal Shock	MIL-STD-810F					

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

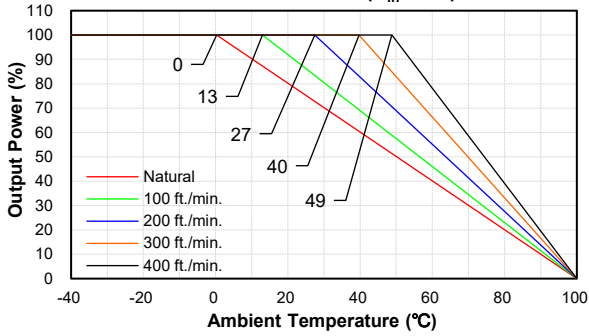
EMI	EN 60601-1-2, EN 55032, EN/IEC 61204-3, FCC Part 15B, EN/IEC 61000-6-4, ICES-003 Issue 7, with external filter		Class A
EMS	EN 55035, EN/IEC 61204-3, EN/IEC 61000-6-1, EN/IEC 61000-6-2		Ed 4.1
	EN 60601-1-2		
ESD	EN 61000-4-2	Level 4: Air $\pm 15kV$, Contact $\pm 8kV$	Perf. Criteria A
Radiated Immunity	EN 61000-4-3	Level 3: 80MHz~2.7GHz: 10V/m	Perf. Criteria A
Fast Transient	EN 61000-4-4	Level 3: On power input port, $\pm 2kV$, with external circuit	Perf. Criteria A
Surge	EN 61000-4-5	Level 4: Line to line, $\pm 2kV$, with external circuit	Perf. Criteria A
Conducted Immunity	EN 61000-4-6	Level 2: 0.15~80MHz, 3V (EN 60601-1-2), Level 3: 0.15~80MHz, 10V (EN/IEC 61204-3)	Perf. Criteria A
Power Frequency Magnetic Field	EN 61000-4-8	Level 4: 50Hz & 60Hz 30A/m	Perf. Criteria A
Proximity Magnetic Fields	EN 61000-4-39	30kHz, 8A/m ≥ 2 sec, Continuous wave 134.2kHz, 65A/m ≥ 2 sec, Plus modulation 2.1kHz 13.56MHz, 7.5A/m ≥ 2 sec, Plus modulation 50kHz	Perf. Criteria A
Application Note Link	CHM150 Series App Notes		
Packaging Information Link	Packaging Information		



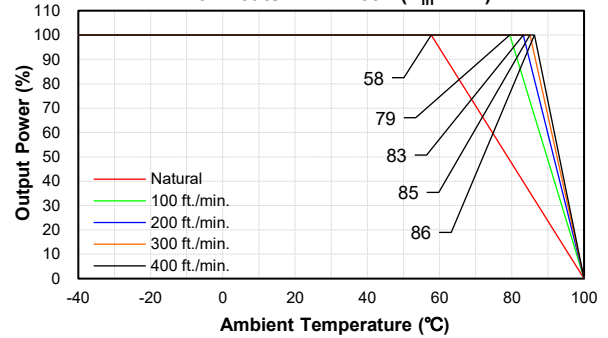
CHARACTERISTIC CURVE

Power Derating Curve

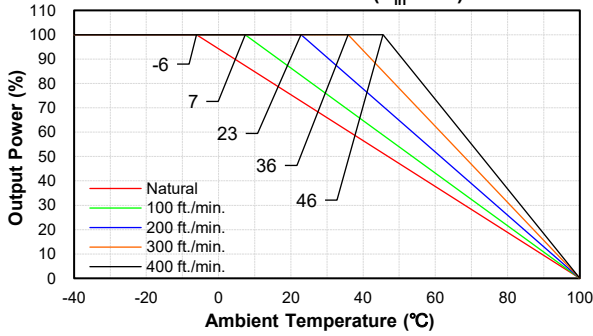
CHM150-24S12/15 Derating Curve without Heatsink ($V_{in}=24V$)



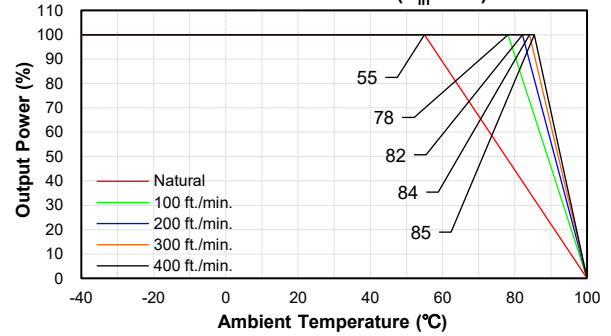
CHM150-24S12/15 Derating Curve with Heatsink M-C092 ($V_{in}=24V$)



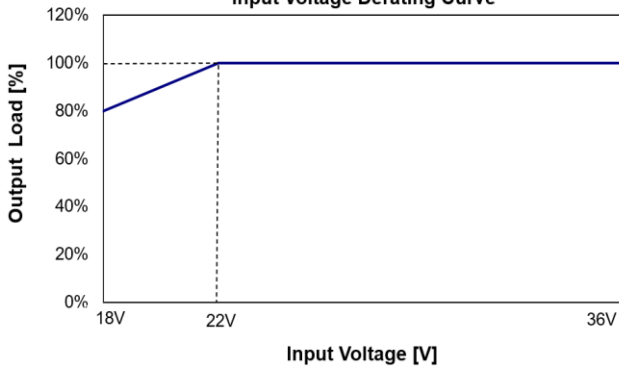
CHM150-24S24 Derating Curve without Heatsink ($V_{in}=24V$)



CHM150-24S24 Derating Curve with Heatsink M-C092 ($V_{in}=24V$)



CHM150 Series Input Voltage Derating Curve

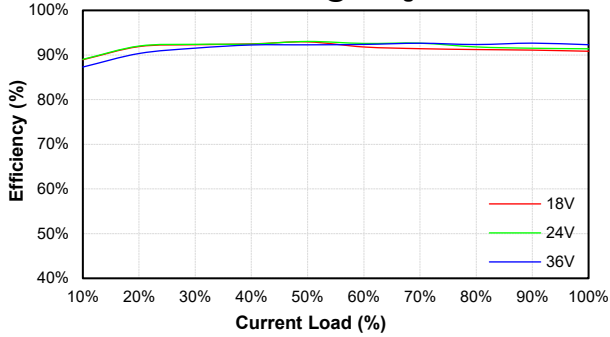




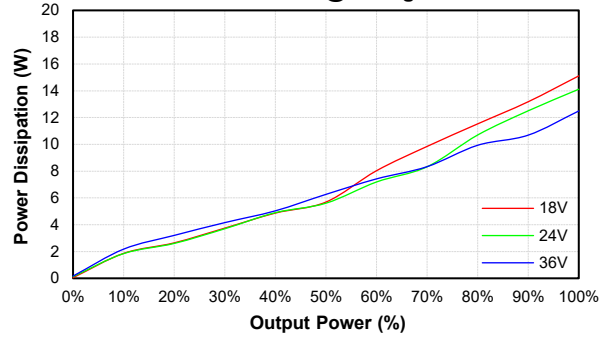
CHM150 Series

Performance Data

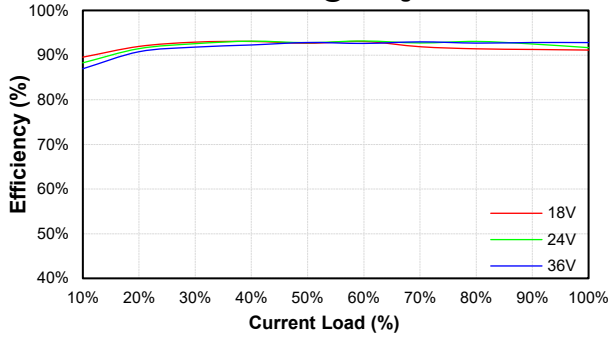
CHM150-24S12
Eff Vs Io @25 Deg. C



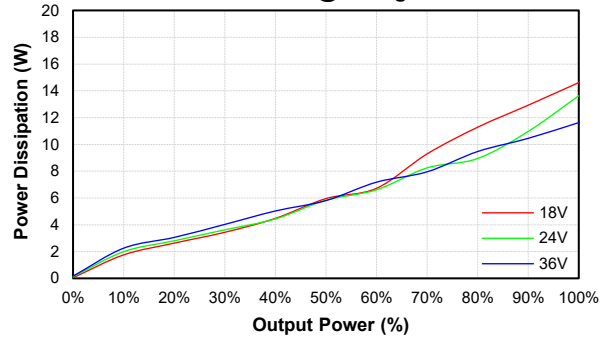
CHM150-24S12
Pd Vs Po @25 Deg. C



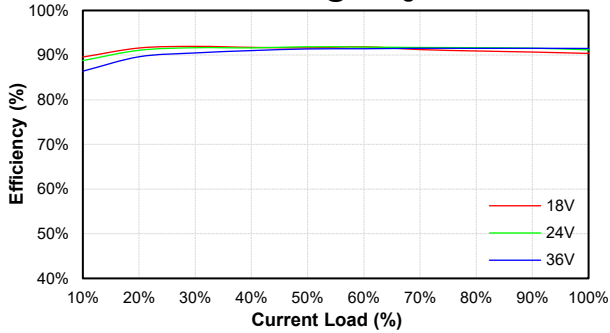
CHM150-24S15
Eff Vs Io @25 Deg. C



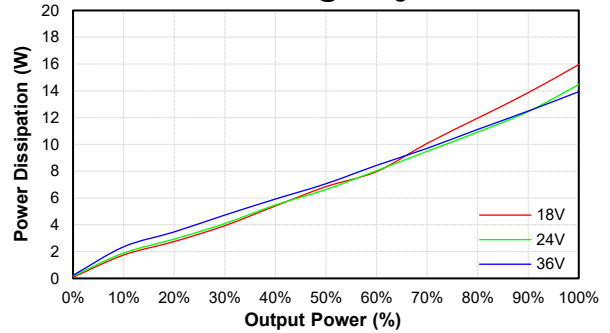
CHM150-24S15
Pd Vs Po @25 Deg. C



CHM150-24S24
Eff Vs Io @25 Deg. C



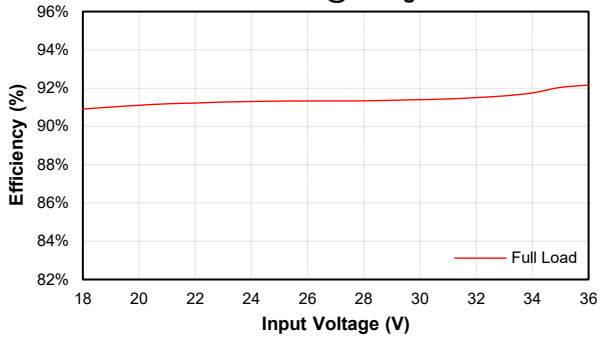
CHM150-24S24
Pd Vs Po @25 Deg. C



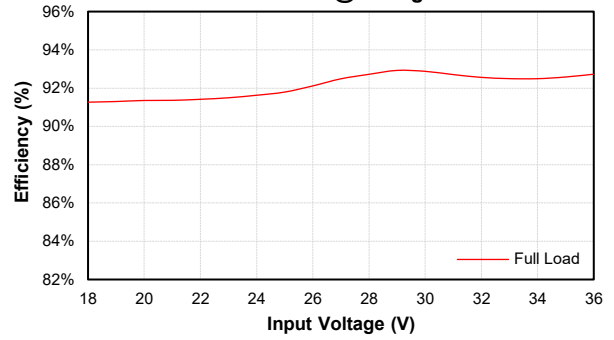


CHM150 Series

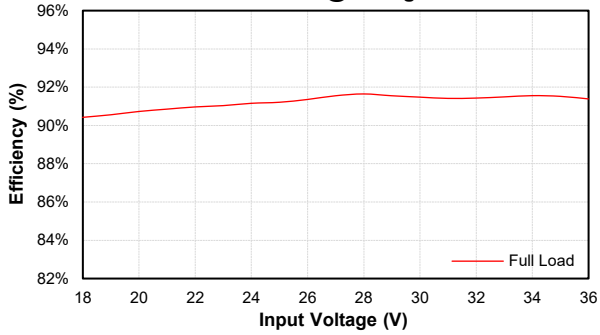
CHM150-24S12
Eff Vs Vin @25 Deg. C



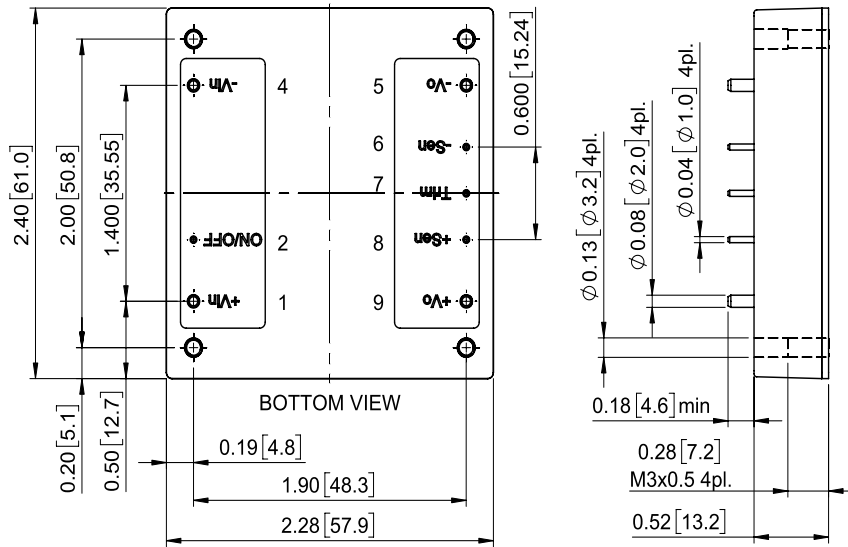
CHM150-24S15
Eff Vs Vin @25 Deg. C



CHM150-24S24
Eff Vs Vin @25 Deg. C



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	On/Off
4	-V Input
5	-V Output
6	-Sense
7	Trim
8	+Sense
9	+V Output

Note: Pin Size is $\phi 0.04 \pm 0.004$ Inch [$\phi 1.0 \pm 0.1$ mm]

Pin Size is $\phi 0.08 \pm 0.004$ Inch [$\phi 2.0 \pm 0.1$ mm]