2500 HN series

www.martekpower.com

Single Output DC/DC Converter

Descriptions

The 2500HN, single output power modules are 16 to 25 watt DC/DC converters available in a single output configuration providing 3.3 VDC to 15 VDC outputs in a compact, industry standard 2.0" X 1.6" X 0.4" package. These 400kHz, switching converters are available in 12, 24 and 48 VDC inputs making them one of the most versatile product lines in the market with efficiencies up to 87%. Advanced surface mount construction allows these converters to achieve outstanding thermal performance eliminating the need for thermal potting compounds and thereby enhancing manufacturing efficiency to reduce costs.

Output Characteristics

	Min	Typ	Max	Unit/Comments
Output Voltage Set Point		±1		% Output voltage at nominal line & FL
Total Band Error	-2		+2	% Output voltage including line/load regulation setting
Line Regulation		±0.5		% Output voltage measured from min. input line to maximum
Load Regulation		±0.5		% Output voltage measured from FL to 10% load
Temperature Coefficient		±0.01		% per degree C
Ripple/Noise		60	100	mV p-p measured at 20 MHz bandwidth with ext. 1 µf cap.
Output Voltage and Current				Refer to model selection chart
Load Transient Response		±2		% Deviation of Vout voltage for a 25% load change for 200µS
Short Circuit Protection				Indefinite, Automatic Recovery
Output Voltage Trim Range		±10		% Output voltage. Place ext. resistor between pins 8 - 6 to trim down. Between pins 8 - 7 to trim up.
Overvoltage Protection		125		%; Clamp type (5VDC output set at 6.8VDC)

Features

- Up to 87% Efficiency
- Single Output, 25 watt converter
- Available in 12, 24 and 48 VDC Inputs
- Industry Standard 2" X 1.6" X 0.4" Package
- Output Over Voltage, Input Over Voltage & Short Circuit Protection

Input Characteristics

		Min	Typ	Max	Units/Comments
Input Voltage					
12 VDC Input Models		9	12	18	VDC
24 VDC Input Models		18	24	36	VDC
48 VDC Input Models		36	48	75	VDC
Under Voltage Shutdown					
12 VDC Input Models		8			VDC
24 VDC Input Models		17			VDC
48 VDC Input Models		33			VDC
Over Voltage Shutdown					
12 VDC Input Models				20	VDC
24 VDC Input Models				40	VDC
48 VDC Input Models				80	VDC
Minimum Input Current					
12 VDC Input Models		0			mA
24 VDC Input Models		0			mA
48 VDC Input Models		0			mA
Full Load Input Current					
12 VDC Input Models				2.1	A
24 VDC Input Models				1.26	A
48 VDC Input Models				0.62	A
Input Fuse Requirements					
12 VDC Input Models				7	Amps; Slow blow type
24 VDC Input Models				4	Amps; Slow blow type
48 VDC Input Models				2	Amps; Slow blow type
Efficiency by Model					
2503S12HN			78		%; FL Nominal Line
2505S12HN			80		%; FL Nominal Line
2512S12HN			82		%; FL Nominal Line
2515S12HN			84		%; FL Nominal Line
2503S24HN			79		%; FL Nominal Line
2505S24HN			83		%; FL Nominal Line
2512S24HN			86		%; FL Nominal Line
2515S24HN			87		%; FL Nominal Line
2503S48HN			80		%; FL Nominal Line
2505S48HN			84		%; FL Nominal Line
2512S48HN			86		%; FL Nominal Line
2515S48HN			87		%; FL Nominal Line
Switching Frequency		360	400	440	kHz; Factory set
Remote Shut Down	Off	0		0.80	VDC;Referenced to input
	On	3.5			VDC or open;Referenced to input
Input - Output Capacitance			1000		pF
Input Filter					LC type
Isolation Voltage			1500		VDC
Isolation Resistance		100			MOhms

Martek Power reserves the right to change specifications without notice.

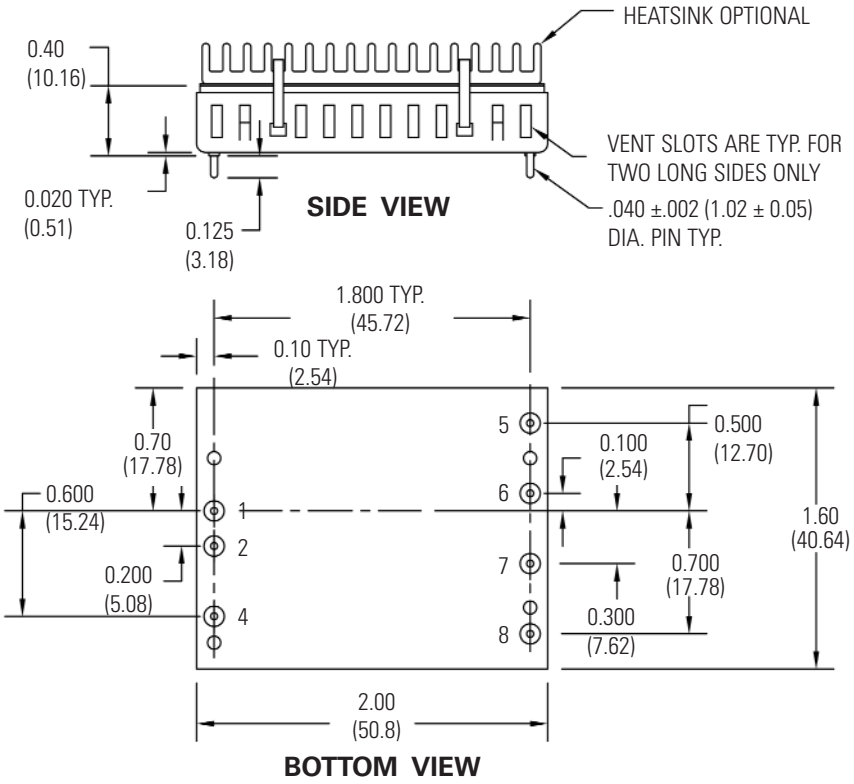
Model Selection Chart

	Input Voltage (VDC)	Output Voltage (VDC)	Full Load Output Current (A)
2503S12HN	12	3.3	5.0
2505S12HN	12	5.0	4.0
2512S12HN	12	12.0	1.7
2515S12HN	12	15.0	1.33
2503S24HN	24	3.3	6.0
2505S24HN	24	5.0	5.0
2512S24HN	24	12.0	2.0
2515S24HN	24	15.0	1.66
2503S48HN	48	3.3	6.0
2505S48HN	48	5.0	5.0
2512S48HN	48	12.0	2.0
2515S48HN	48	15.0	1.66

General Characteristics

	Min	Typ	Max	Unit/Comments
Operating Temp. Range	-40		+105	°C; measured at baseplate
Storage Temp. Range	-55		+125	°C; measured at baseplate
Material Flammability				UL94V-0
Altitude: Operating			10,000	Feet
Non-Operating			40,000	Feet
Relative Humidity	5		95	% Humidity, non-condensing
Weight			22	Grams
Size				2" X 1.6" X 0.4"
Case Material				Black coated aluminum
Agency Approvals				UL/CUL1950, TUV, EN60950

Outline Drawing



Pin Out Chart

Pins	FUNCTION
1	+ INPUT
2	- INPUT
4	CONTROL
5	NO PIN
6	+ OUTPUT
7	- OUTPUT
8	TRIM

Notes:
1. Unless otherwise specified dimensions are in inches (mm).
2. Controlling dimension in inch.
3. Tolerances: X.XX = ±0.02 (0.5)
X.XXX = ±0.010 (0.25)

All specifications are typical at nominal input, nominal load and 25° C unless otherwise specified.
External, low ESR, 33 microfarad (minimum) capacitor across input is recommended for operation.

How To Order

How to Order

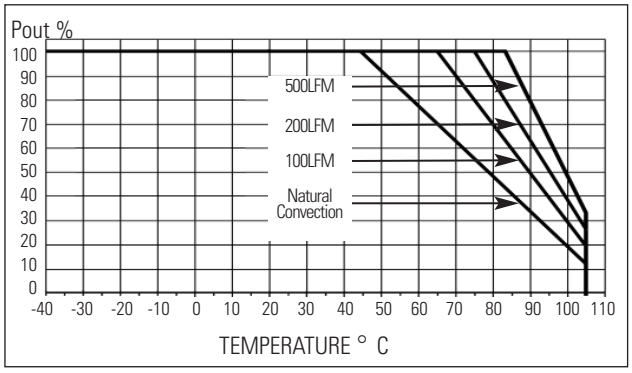
25 05 XX S XX HN

- 25 — Wattage
- 05 — Output Voltage
- XX = ± 12 / ±15
- S — Single Output
- XX — Input Voltage
- HN — Hi-Density, Non-Encap

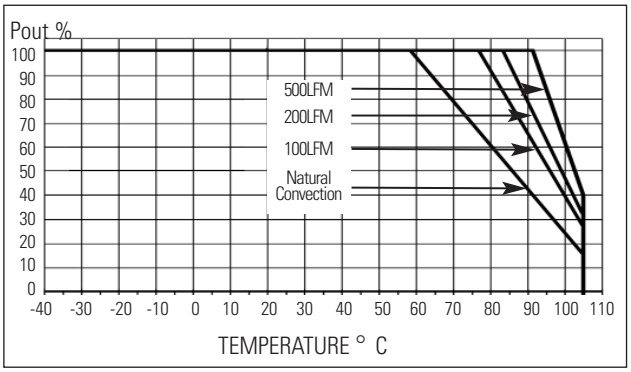
H Options: To add external heatsink mounted on the baseplate of the converter please add a "- H" at the end of the part number. Heatsink is provided to improve thermal performance (see derating curves).

Derating Curves

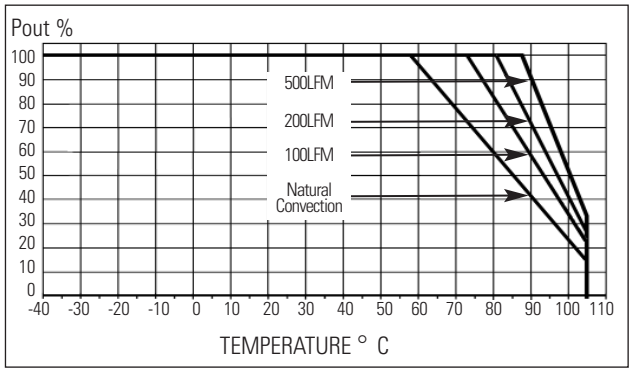
MODEL 2500HN Single 3.3V & 5V (Without heatsink)



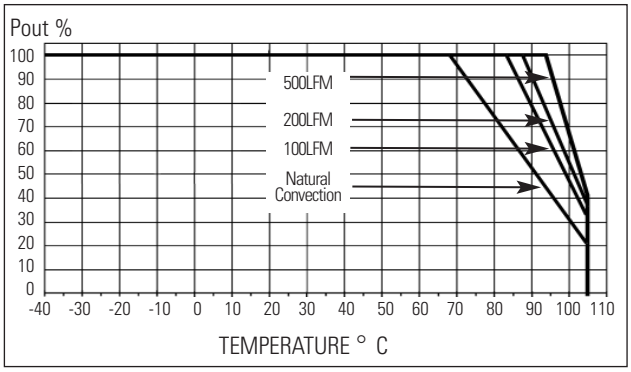
MODEL 2500HN Single 3.3V & 5V (With heatsink)



MODEL 2500HN Single 12V & 15V (Without heatsink)



MODEL 2500HN Single 12V & 15V (With heatsink)



2500 HN series

www.martekpower.com

Dual Output DC/DC Converter

Descriptions

The 2500HN, dual output power modules are 20 to 25 watt DC/DC converters available in a dual output configuration providing both digital and analog outputs in a compact, industry standard 2.0" X 1.6" X 0.4" package. These 400kHz, switching converters are available in 12, 24 and 48 VDC inputs making them one of the most versatile product lines in the market with efficiencies up to 87%. Advanced surface mount construction allows these converters to achieve outstanding thermal performance eliminating the need for thermal potting compounds and thereby enhancing manufacturing efficiency to reduce costs.

Output Characteristics

	Min	Typ	Max	Unit/Comments
Output Voltage Set Point		±1		% Output voltage at nominal line & FL
Total Band Error	-3		+3	% Output voltage including line/load regulation setting
Line Regulation		±0.5		% Output voltage measured from min. input line to maximum
Load Regulation		±1		% Output voltage measured from FL to 10% load
Temperature Coefficient		±0.01		% per degree C
Ripple/Noise		60	100	mV p-p measured at 20 MHz bandwidth with external 1 µf capacitor
Output Voltage and Current				Refer to model selection chart
Load Transient Response		±2		% deviation of Vout voltage for a 25% load change for 200µS
Short Circuit Protection				Indefinite, Automatic Recovery
Output Voltage Trim Range		±10		% Output voltage. Place ext. resistor between pins 8 - 6 to trim down. Between pins 8 - 7 to trim up
Overvoltage Protection		135		%; Clamp type

Features

- **Up to 87% Efficiency**
- **Dual Output, Up To 25 watt converter**
- **Available in 12, 24 and 48 VDC Inputs**
- **Industry Standard 2.0" X 1.6" X 0.4" Package**
- **Output Over Voltage, Input Over Voltage and Short Circuit Protection**

Input Characteristics

		Min	Typ	Max	Units/Comments
Input Voltage					
12 VDC Input Models		9	12	18	VDC
24 VDC Input Models		18	24	36	VDC
48 VDC Input Models		36	48	75	VDC
Under Voltage Shutdown					
12 VDC Input Models		8			VDC
24 VDC Input Models		17			VDC
48 VDC Input Models		33			VDC
Over Voltage Shutdown					
12 VDC Input Models				20	VDC
24 VDC Input Models				40	VDC
48 VDC Input Models				80	VDC
Minimum Input Current					
12 VDC Input Models		0			mA
24 VDC Input Models		0			mA
48 VDC Input Models		0			mA
Full Load Input Current					
12 VDC Input Models				2.10	A
24 VDC Input Models				1.26	A
48 VDC Input Models				0.62	A
Input Fuse Requirements					
12 VDC Input Models				7	Amps; Slow blow type
24 VDC Input Models				4	Amps; Slow blow type
48 VDC Input Models				2	Amps; Slow blow type
Efficiency by Model					
2505D12HN			80		%; FL Nominal Line
2512D12HN			82		%; FL Nominal Line
2515D12HN			84		%; FL Nominal Line
2505D24HN			83		%; FL Nominal Line
2512D24HN			86		%; FL Nominal Line
2515D24HN			87		%; FL Nominal Line
2505D48HN			84		%; FL Nominal Line
2512D48HN			86		%; FL Nominal Line
2515D48HN			87		%; FL Nominal Line
Switching Frequency		360	400	440	kHz; Factory set
Remote Shut Down	Off	0		0.80	VDC;Referenced to input
	On	3.5			VDC or open ; Referenced to input
Input - Output Capacitance			1000		pF
Input Filter					LC type
Isolation Voltage			1500		VDC
Isolation Resistance		100			MOhms

Martek Power reserves the right to change specifications without notice.

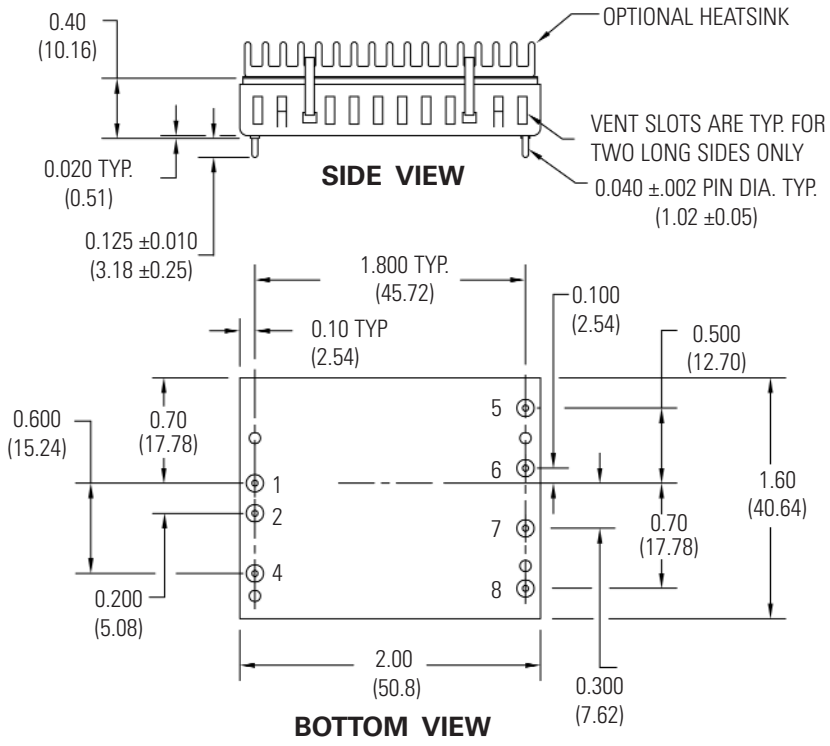
Model Selection Chart

	Input Voltage (VDC)	Output Voltage (VDC)	Full Load Output Current (A)
2505D12HN	12	±5	±2.00
2512D12HN	12	±12	±0.85
2515D12HN	12	±15	±0.67
2505D24HN	24	±5	±2.50
2512D24HN	24	±12	±1.00
2515D24HN	24	±15	±0.83
2505D48HN	48	±5	±2.50
2512D48HN	48	±12	±1.00
2515D48HN	48	±15	±0.83

General Characteristics

	Min	Typ	Max	Unit/Comments
Operating Temp. Range	-40		+110	°C; measured at baseplate
Storage Temp. Range	-55		+125	°C; measured at baseplate
Material Flammability				UL94V-0
Altitude: Operating			10,000	Feet
Non-Operating			40,000	Feet
Relative Humidity	5		95	% Humidity, non-condensing
Weight			22	Grams
Size				2" X1.6" X0.4"
Case Material				Black coated aluminum
Agency Approvals				UL/CUL1950, TUV, EN60950

Outline Drawing



Pin Out Chart

Pins	FUNCTION
1	+ INPUT
2	- INPUT
4	CONTROL
5	+ OUTPUT
6	COMMON
7	- OUTPUT
8	TRIM

Notes:

1. Unless otherwise specified dimensions are in inches (mm).
2. Controlling dimension in inch.
3. Tolerances

Inches	mm
X.XX = ±0.02	X.X = ±0.5
X.XXX= ±0.010	X.XX = ±0.25

All specifications are typical at nominal input, nominal load and 25° C unless otherwise specified.
External, low ESR, 33 microfarad (minimum) capacitor across input is recommended for operation.

How To Order

How to Order

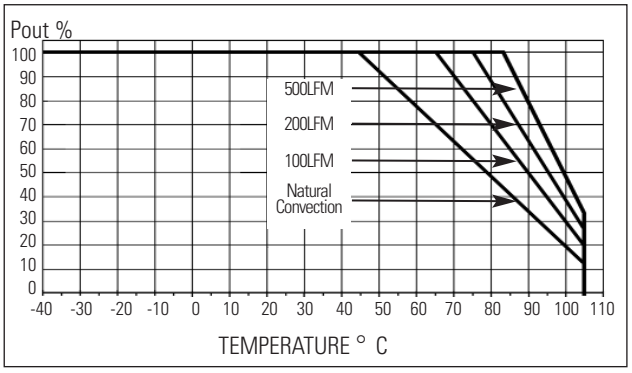
25 05 XX D XX HN

- 25 — Wattage
- 05 — Output Voltage
- XX = ± 12 / ±15
- D — Dual Output
- XX — Input Voltage
- HN — Hi-Density, Non-Encap

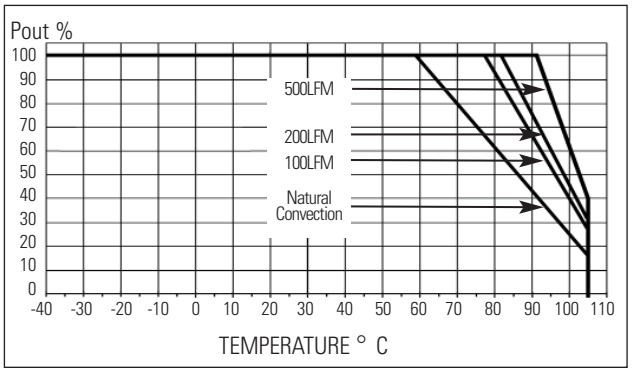
H Options: To add external heatsink mounted on the baseplate of the converter please add a "- H" at the end of the part number. Heatsink is provided to improve thermal performance (see derating curves).

Derating Curves

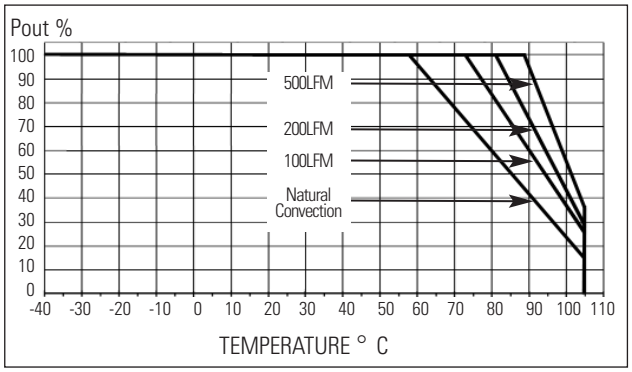
MODEL 2500HN Dual 3.3V & 5V (Without heatsink)



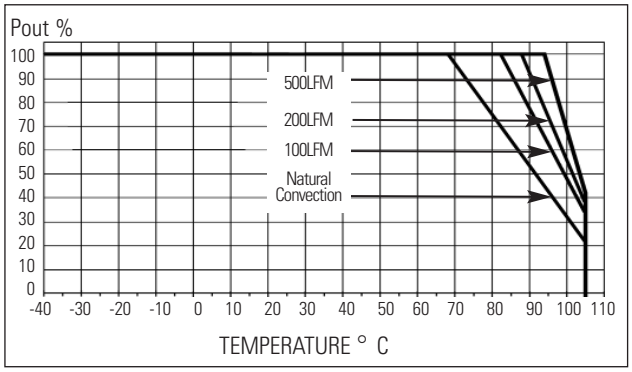
MODEL 2500HN Dual 3.3V & 5V (With heatsink)



MODEL 2500HN Single 12V & 15V (Without heatsink)



MODEL 2500HN Dual 12V & 15V (With heatsink)



Output Voltage Adjustment (25W HN Dual Series)

Output voltage trim allows the user to increase or decrease the output voltage set point of a module. This is accomplished by connecting an external resistor between the TRIM pin and either the Vo(+) or Vo(-) pins. With an external resistor between the TRIM and Vo(+) pins (Radj-down), the output voltage set point (Vo, adj) decreases. With an external resistor between the TRIM pin and Vo(-) pin (Radj-up), Vo, adj increases.

The following equations determine the required external resistor value to obtain an output voltage change of Δ %:

$$\text{Radj-down} = \left[\frac{A - C}{\Delta\%} - (A + B) \right] K\Omega$$

$$\text{Radj-up} = \left[\frac{C}{\Delta\%} - B \right] K\Omega$$

Example

Device	A	B	C	-5% Vo Radji - down	+5% Vo Radji - up
±5Vo	6.00	16.00	1.50	68.0KΩ	14.0KΩ
±12Vo	17.20	16.00	1.79	275.0KΩ	19.8KΩ
±15Vo	22.00	16.00	1.83	365.4KΩ	20.6KΩ

Note:

The adjusted output voltage cannot exceed ±10% of the nominal output voltage.
Both outputs will be proportionately adjusted up/down.

2500 HN series

Triple Output DC/DC Converter

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The 2500HN, triple output power modules are 25 watt DC/DC converters available in a triple output configuration providing both digital and analog outputs in a compact, industry standard 2" X 2" X 0.4" package. These 400kHz, switching converters are available in 12, 24 and 48 VDC inputs making them one of the most versatile product lines in the market with efficiencies up to 85%. Advanced surface mount construction allows these converters to achieve outstanding thermal performance eliminating the need for thermal potting compounds and thereby enhancing manufacturing efficiency to reduce costs.

Output Characteristics

	Min	Typ	Max	Unit/Comments
Output Voltage Set Point:				
Main		±1		% Output voltage
Auxiliary		±3		
Total Band Error:				%measured at min.
Main	-2		+2	line and full load
Auxiliary	-5		+5	and, max. line and min. load
Line Regulation:		±0.5		% Output voltage measured from min. input line to max.
Load Regulation:				% Output voltage
V1		±1		measured from FL
V2 and V3		±5		to min load
Ripple/Noise				
Main		100		mV; p-p measured
Auxiliary		1%		@ 20 MHz bandwidth
Output Voltage and Current				Refer to model selection chart
Temperature Coefficient		±0.02		% Output Voltage
Short Circuit Protection				Continuous
Overvoltage Protection		130		% Output Voltage; Clamp Type

Features

- **Up to 85% Efficiency**
- **Triple Output, 25 watt converter**
- **Available in 12, 24 and 48 VDC Inputs**
- **Industry Standard 2" X 2" X 0.4" Package**
- **Over Voltage, Over Temperature and Short Circuit Protection**

Input Characteristics

	Min	Typ	Max	Unit/Comments
Input Voltage				
12 VDC Input Models	9	12	18	VDC
24 VDC Input Models	18	24	36	VDC
48 VDC Input Models	36	48	75	VDC
Over Voltage Shutdown				
12 VDC Input Models			105	% Input Voltage
24 VDC Input Models			105	% Input Voltage
48 VDC Input Models			105	% Input Voltage
Minimum Input Current				
12 VDC Input Models	350			mA
24 VDC Input Models	330			mA
48 VDC Input Models	350			mA
Full Load Input Current				
12 VDC Input Models			2660	mA
24 VDC Input Models			1310	mA
48 VDC Input Models			650	mA
Efficiency by Model				
2505/12T12HN		83		%; FL Nominal Line
2505/15T12HN		83		%; FL Nominal Line
2505/12T24HN		84		%; FL Nominal Line
2505/15T24HN		84		%; FL Nominal Line
2505/12T48HN		85		%; FL Nominal Line
2505/15T48HN		85		%; FL Nominal Line
Switching Frequency	360	400	440	kHz; Factory set
Remote Shut Down				
Off	0		0.80	VDC;Referenced to input
On	3.5			VDC;Referenced to input
Input - Output Capacitance		2000		pF
Isolation Voltage		1500		VDC
Isolation Resistance	100			MOhms

Model Selection Chart

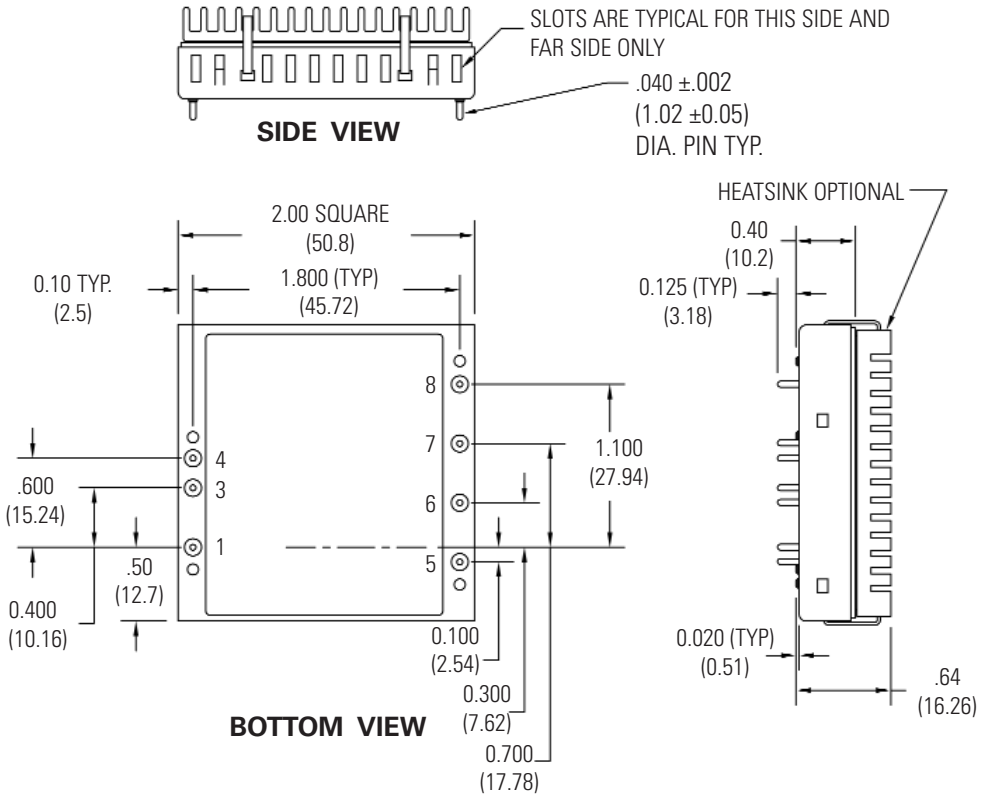
	Input Voltage (VDC)	Output Voltage (VDC)	Min. Output Current (mA)	Nominal Output Current (mA)	Max Output Current (mA)*
2505/12T12HN	12	5	300	3000	4000
		±12	±41	±412	±500
2505/15T12HN	12	5	300	3000	4000
		±15	±33	±333	±500
2505/12T24HN	24	5	300	3000	4000
		±12	±41	±412	±500
2505/15T24HN	24	5	300	3000	4000
		±15	±33	±333	±500
2505/12T48HN	48	5	300	3000	4000
		±12	±41	±412	±500
2505/15T48HN	48	5	300	3000	4000
		±15	±33	±333	±500

General Characteristics

	Min	Typ	Max	Unit/Comments
Operating Temperature Range	-40		+105	°C measured at baseplate
Storage Temperature Range	-55		+125	° C
Over Temperature Shutdown	+105	+115	+125	° C
Baseplate to Ambient Resistance		10		°C / watt
Weight			30	Grams
Size				2" X 2" X 0.4"
Case Material				Black coated aluminum
Agency Approvals				UL/CUL1950 TUV, EN60950

** Total output power may not exceed 25 watts.*

Outline Drawing



Pin Out Chart

Pins	FUNCTION
1	ON/OFF SYNC
3	- Vin
4	+ Vin
5	- V3out
6	COMMON
7	+ V1out
8	+V2out

Notes:
1. Unless otherwise specified dimensions are in inches (mm).
2. Controlling dimension in inch.
3. Tolerances: X.XX = ±0.02 (0.5)
   X.XXX = ±0.010 (0.25)

All specifications are typical at nominal input, nominal load and 25° C unless otherwise specified.
External, low ESR, 10 microfarad (minimum) capacitor across input is recommended for operation.

How To Order

How to Order

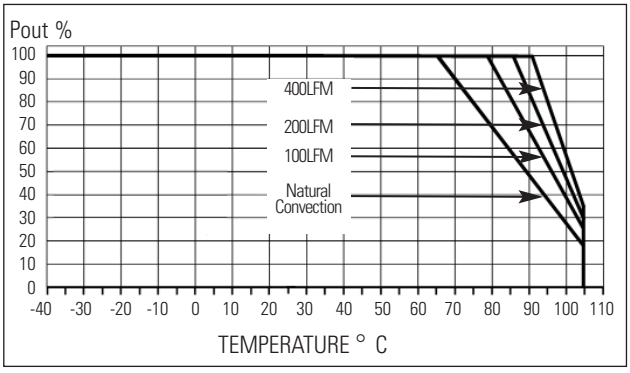
25 05 XX T XX HN

- 25 — Wattage
- 05 — Output Voltage
- XX — XX = ± 12 / ±15
- T — Triple Output
- XX — Input Voltage
- HN — Hi-Density, Non-Encap

H Options: To add external heatsink mounted on the baseplate of the converter please add a "- H" at the end of the part number. Heatsink is provided to improve thermal performance (see derating curves).

Derating Curves

MODEL 2500HN Triple 5V (Without heatsink)



MODEL 2500HN Triple 5V (With heatsink)