

# VSX50MD23

## 50 Watt Dual Output Quarter Brick DC/DC Converter



- 2.5V & 3.3V Dual Output
- 2.3" x 1.5" x 0.5"
- 89% Efficiency
- Low Output Noise
- Input Filtering
- Remote On/Off, Input Side
- Output Voltage Trim, +10%/ -8%
- Fixed Frequency Operation
- -40°C to +100°C Baseplate Temp.
- Output Current Limit, Self-Start
- 1,500 Vdc Isolation, Input to Output
- UL/CUL 1950, EN60 950
- 36 to 75 Vdc Input Models
- Continuous Short Circuit Protection
- Non-Latching Protection:
  - Input Undervoltage
  - Input Overvoltage
  - Output Overvoltage
  - Overtemperature
- Output Voltage Tracking at Turn-on and Turn-off
- No Minimum Load Current

### APPLICATIONS

- Distributed Power Architectures
- Workstations
- EDP Equipment
- Telecommunications

### OPTIONS

- Choice of Remote On/Off Logic Configuration
- Heatsink Available for Extended Operation

### ADDITIONAL INFORMATION

- See Application Note DCAN-41 at [www.cdpowerelectronics.com](http://www.cdpowerelectronics.com)

The VSX50 Series are 50 Watt, compact, high-efficiency, high-density dual output converters with a 36-75V input and 2.5Vdc and 3.3Vdc outputs. The industry quarter-pack size of 2.3" x 1.5" x 0.5" coupled with 89% efficiency is an industry high-density breakthrough.

These converters utilize V Series high density technology. This technology has been featured in our highly efficient VKP and VKA Series now successfully in use worldwide. The very high 89%

efficiency minimizes the requirement for heat-sinking and the low output ripple minimizes the need for additional filtering. For maximum flexibility, power can be traded between outputs as required. The VSX50 Series feature virtually all of the options required by design engineers but not at the competition's typical additional price for each option. This multitude of features are standard on the VSX50 Series.

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNIT
Input Voltage: VSX50MD23	$V_i$		100	Vdc
I/O Isolation Voltage			1500	Vdc
I/P to case			1500	Vdc
O/P to case			200	Vdc
Operating Case Temperature	T	-40	100	°C

# SPECIFICATIONS, ALL MODELS

Specifications are at  $T_{CASE} = +40^{\circ}C$  nominal input voltage unless otherwise specified.

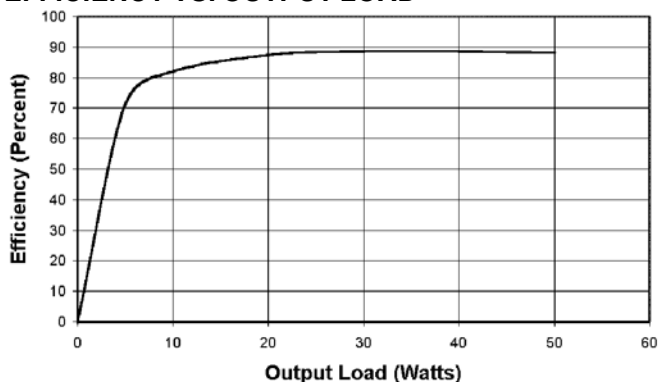
	PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS
<b>INPUT</b>	INPUT					
	Voltage Range		36	48	75	VDC
	Input Reflected Ripple Current	Peak - Peak			325	mA
	Maximum Input Current	$V_{in} = 30V, P_{out} 50W$			2	A
	No Load Input Current				60	mA
	On/Off Activated Input Current				25	mA
	Input Undervoltage Lockout					
	Turn On		30	33	36	VDC
	Turn Off		27	30	33	VDC
	Input Overvoltage Lockout					
	Turn Off		76	80	84	VDC
	Turn On		74.5	78.5	82.5	VDC

	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
<b>OUTPUT</b>	Output Power				50	Watts
	Output Efficiency	$I_{o1}=10A, I_{o2}=7.5A$	88			%
	Set Point Voltage					
	V1 (2.5V)	$I_{o1}=10A$	2.460	2.5	2.530	V <sub>DC</sub>
	V2 (3.3V)	$I_{o2}=7.5A$	3.290	3.3	3.360	V <sub>DC</sub>
	Output Current	Total Module Output				
	V1 (2.5V)	Power Should Not	0		20	A
	V2 (3.3V)	Exceed 50 Watts	0		15	A
	Output Ripple And Noise Voltage	100 MHz BW				
	V1 (2.5V)				60	mV <sub>P-P</sub>
	V2 (3.3V)				80	mV <sub>P-P</sub>
	Output Adjust Range	Both Outputs Will Adjust at the Same Time and by the Same %	-8		+10	%
	Output Temperature Drift			0.02	0.05	% / °C
	Line Regulation	$V_{IN} = 36$ to $75$ $I_1=10A, I_2=7.5A$		0.10	0.20	%
	Load Regulation					
	V1 (2.5V)	$I_1 = 0$ to $20A, I_2=0A$			4	% of Nom
	V2 (3.3V)	$I_1=0A, I_2=0$ to $15.15A$			2.5	% of Nom
	Load Cross Regulation					
	V1 (2.5V)	$I_1 = 0A, I_2=0$ to $15.15A$			1.5	% of Nom
	V2 (3.3V)	$I_1=0$ to $20A, I_2=0A$			3.5	% of Nom
	Output Current Limit Inception					
	V1 (2.5V)		21.0	24.0	28.0	A
	V2 (3.3V)		16.0	17.5	22.0	A
	Short Circuit Current					
	V1 (2.5V)		19.0	23.0	28.0	A
	V2 (3.3V)		14.0	18.0	22.0	A
	Output Overvoltage Set Point (Non-latching independent control loop)					
	V1 (2.5V)		2.70	2.90	3.25	V <sub>DC</sub>
V2 (3.3V)		3.60	3.90	4.30	V <sub>DC</sub>	
Transient Response						
Settling Time	( $\Delta I_o/\Delta t=0.2A/\mu sec$ either output) Load change of 40% of $I_o$ max at any operating load up to $I_o$ max and $P_o$ max			100	$\mu sec$	
Peak Deviation				4	%	
Switching Frequency				330	KHz	

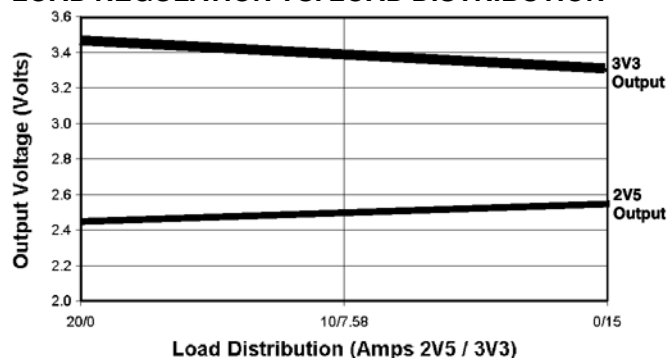
PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS
<b>ISOLATION SPECIFICATIONS</b>					
Input to Output		1500			V <sub>DC</sub>
Input to Case		1500			V <sub>DC</sub>
Output to Case		200			V <sub>DC</sub>
Resistance Input to Output		10			MΩ
Capacitance Input to Output			1000		pF
Leakage Current	V <sub>ISO</sub> = 240V <sub>AC</sub> , 60Hz		90		μA, rms
<b>FEATURE SPECIFICATIONS</b>					
Remote On/Off (open collector equivalent, signal referenced to -V <sub>IN</sub> terminal) VSX50MD23 Preferred Logic (negative) Logic Low – Module On Logic High – Module Off VSX50MD23-1 Optional Logic (Positive) Logic Low – Module Off Logic High – Module On					
	Von/off Low	0		0.4	V <sub>DC</sub>
	Von/off High	2		Open Collector	V <sub>DC</sub>
	Ion/off			200	μA
Turn On Time					
From Application of V <sub>IN</sub>	(V <sub>O</sub> within 1% of		7	10	mSecs
From Remote On/Off Activation	steady state)		3	4	mSecs
Weight					
VSX50MD23, VSX50MD23-1			67		Grams
VSX50MD23-U, VSX50MD23-1U			44		Grams
<b>TEMPERATURE</b>					
Operation /Specification	Case	-40		+100	°C
Storage	Case	-55		+125	°C
Shutdown	Case	+105	+115	+125	°C
Shutdown (Hysteresis)			10		°C
Thermal Impedance (Case to Ambient)	Free Air		12.2		°C/Watt

# GRAPHS

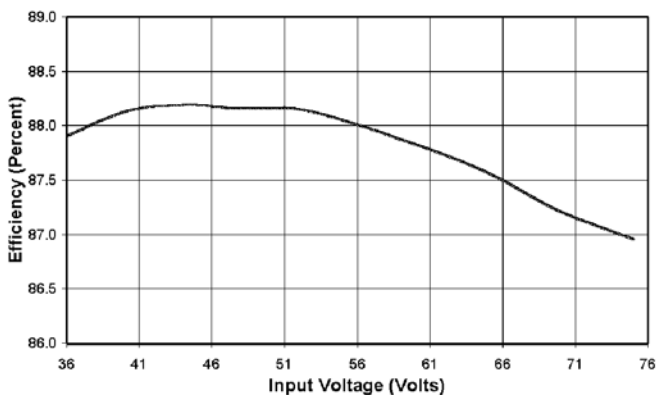
## EFFICIENCY VS. OUTPUT LOAD



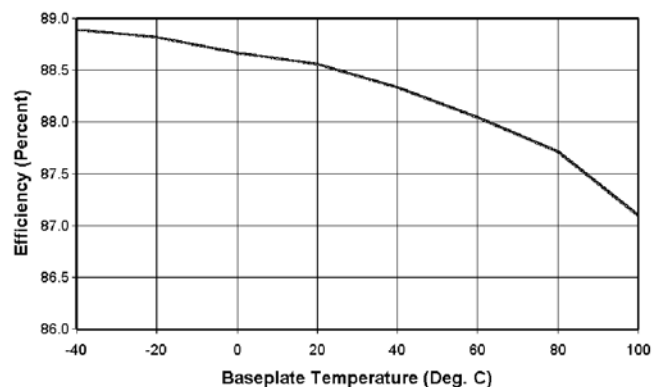
## LOAD REGULATION VS. LOAD DISTRIBUTION



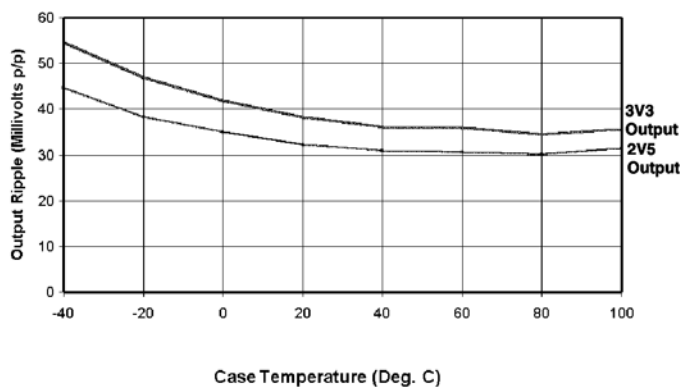
## EFFICIENCY VS. INPUT VOLTAGE



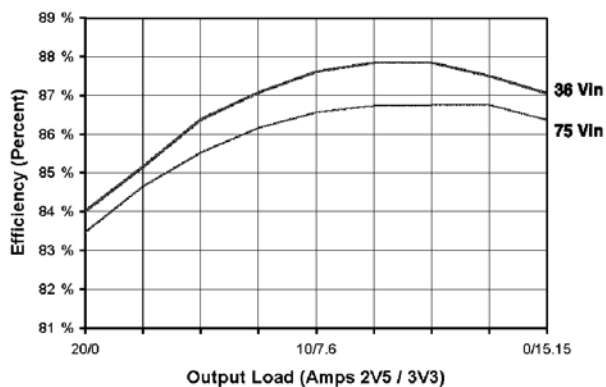
## EFFICIENCY VS. BASEPLATE TEMPERATURE



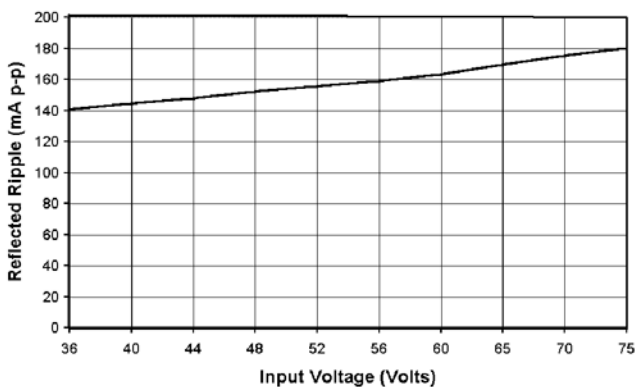
## OUTPUT VOLTAGE RIPPLE VS. TEMPERATURE AT FULL LOAD



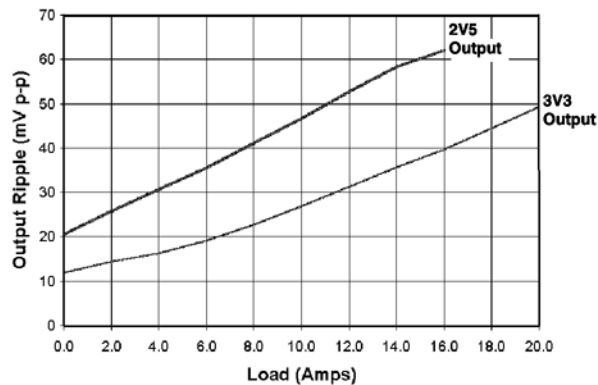
## FULL LOAD EFFICIENCY VS. LOAD DISTRIBUTION



## REFLECTED RIPPLE VS. INPUT VOLTAGE



## OUTPUT RIPPLE VS. LOAD

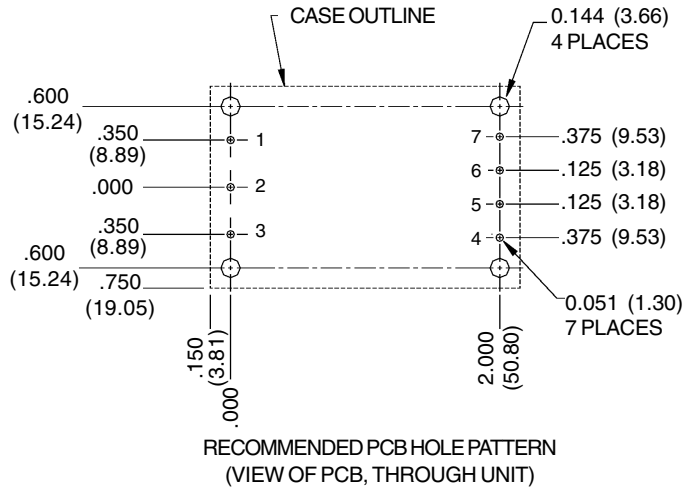
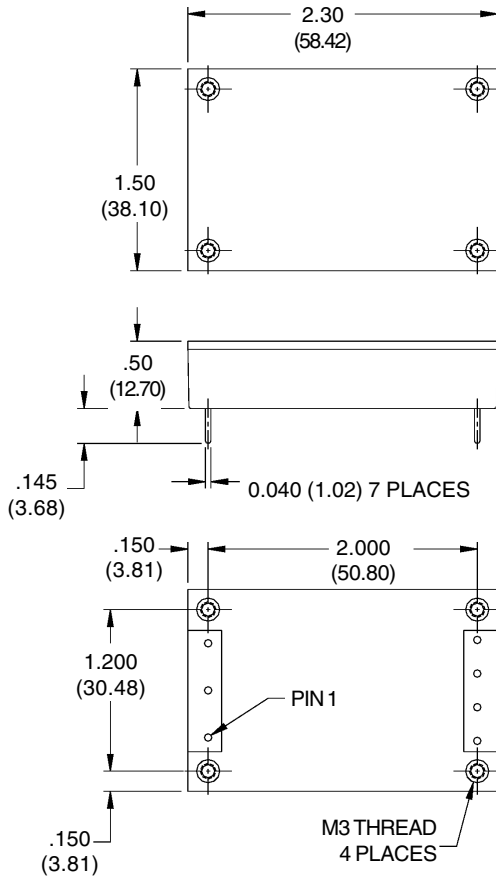


## MECHANICAL

Dimensions are in inches (millimeters).

Tolerances: x.xx in. ± 0.02 in.

x.xxx in. ± 0.01 in.



Pinout Key	
1	+Vin
2	On/Off
3	-Vin
4	+2.5 Vout
5	O/P RTN
6	Trim
7	+3.3 Vout

### NOTES:

- Marked with: specific model ordered, date code, job code.
- MATERIAL:** Units are encapsulated in a low thermal resistance molding compound which has excellent chemical resistance and electrical properties in high humidity environments and over a wide operating temperature range. The encapsulant and outer shell of the unit have UL94V-0 ratings. Lead material is solder plated to allow ease of solderability.
- IMPORTANT:** When utilizing the PEM nuts for board mounting, it is required to follow guidelines in application note DCAN-41 available on the web at [www.cdpowerelectronics.com](http://www.cdpowerelectronics.com).

## ORDERING INFORMATION

### To Find Model Number

Device Family \_\_\_\_\_ VSX50MD23 - 1 U  
 VSX50MD23 (Quarter Brick, 50 Watt DC/DC)  
 Logic: No Number = Preferred Logic (Negative); \_\_\_\_\_  
 1 = Optional Logic (Positive)  
 Package \_\_\_\_\_  
 No Letter = Encapsulated; U = Unencapsulated

### Model Numbers

VSX50MD23
VSX50MD23-U
VSX50MD23-1
VSX50MD23-1U

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