

# VSX60xD35

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



- 3.3V & 5.0V Dual Output
- 2.3" x 1.5" x 0.5"
- 90% Efficiency
- Low Output Noise
- Input Filtering
- Remote On/Off, Input Side
- Output Voltage Trim, +/-10%
- -40C° to +100C° Baseplate Temp.
- Output Current Limit, Self-Start
- 1,500 Vdc Isolation, Input to Output
- UL/CUL 1950, EN60 950
- 18-36 Vdc and 36-75 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-40 at [www.cdpowerelectronics.com](http://www.cdpowerelectronics.com)

The VSX60 Series are dual output converters with 18-36V and 36-75V input models with 3.3Vdc and 5Vdc outputs. The industry quarter-pak size of 2.3" x 1.5" x 0.5" coupled with 90% efficiency is an industry high-density breakthrough.

These converters utilize Vx high density technology. This technology has been featured in our highly efficient VKP and VKA series now successfully in use worldwide. The very high 90%

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 VSX60 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 VSX60 series.

### ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNIT
Input Voltage:				
VSX60LD35	$V_i$		100	Vdc
VSX60MD35	$V_i$	36	75	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  $T_{CASE} = +40^{\circ}\text{C}$  nominal input voltage unless otherwise specified.

INPUT	PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS
	Operating Input Voltage					
	VSX60LD	$V_i$	18	24	36	VDC
	VSX60MD	$V_i$	36	48	75	VDC
	Maximum Input Current ( $V_i=0\text{V}$ to $V_i$ max, $I_o=I_o$ max)					
	VSX60LD	$I_i$ max			5.0	A
	VSX60MD	$I_i$ max			2.25	A
	I/P Reflected Ripple Current				400	mA p-p
No Load Input Current	$I_{iNL}$		50		mA	
On/Off Activated Input Current	$I_{iQ}$		17		mA	

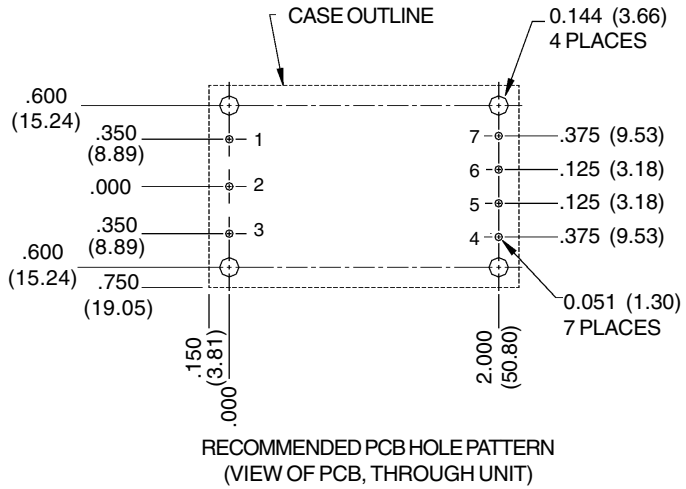
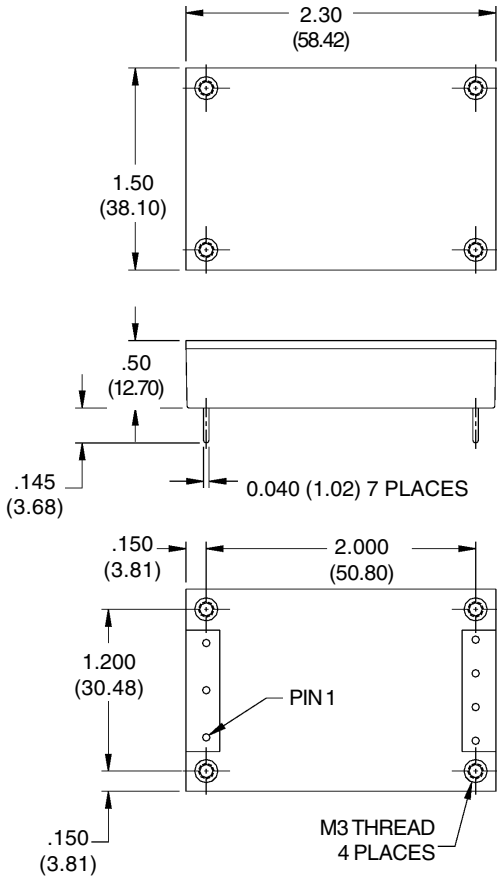
OUTPUT Under any conditions, the voltage of V1 will always be greater or equal to that of V2.	PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS
	Output voltage Over all conditions of I/P voltage, load and temperature)					
	3.3 Vout (V2)	3.3 $V_o$	3.2	–	3.4	Vdc
	5.0 Vout (V1)	5.0 $V_o$	4.8	–	5.2	Vdc
	Output Voltage Setpoint ( $V_i=48$ , $I_{o3}=9\text{A}$ , $I_{o5}=6\text{A}$ , $T_c=25^{\circ}\text{C}$ )					
	3.3 Vout (V2)	3.3 $V_{o,set}$	3.26	3.30	3.34	Vdc
	5.0 Vout (V1)	5.0 $V_{o,set}$	4.96	5.02	5.08	Vdc
	Output Ripple and Noise Voltage (peak-to-peak, 100 MHz BW)					
	3.3 Vout (V2)	–	–	–	60	mv p-p
	5.0 Vout (V1)	–	–	–	80	mv p-p
	Output Current (Total module O/P power should not exceed 60 Watts)					
	3.3 Vout (V2)	$I_{o3}$	–	–	15	A
	5.0 Vout (V1)	$I_{o5}$	–	–	12	A
	Output Current Limit Inception ( $V_o=95\%$ of $V_o$ nom)					
	3.3 Vout (V2)	$I_{o3,cli}$	19.0	21.0	23.0	A
	5.0 Vout (V1)	$I_{o5,cli}$	12.5	13.5	15.0	A
	Output Short Ckt Current (Max impedance across short circuit = 65m $\Omega$ )					
	3.3 $V_o$		16	19	22	A
	5.0 $V_o$		11	14	17	A
	Efficiency ( $V_i=48\text{V}$ , $I_{o3}=9\text{A}$ , $I_{o5}=6\text{A}$ , $T_c=70^{\circ}\text{C}$ )	$\eta$	89	90	–	%
Dynamic Response ( $\Delta I_o/\Delta t=0.2\text{A}/\mu\text{sec}$ . $V_i=48\text{V}$ , $T_c=25^{\circ}\text{C}$ , either O/P) Load change of 50% $I_o$ max; at any operating load up to $I_{o,max}$ or $P_{o,max}$ Peak Deviation outside settling point						
	–	–	2	–	% $V_o$ nom	

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS
<b>Isolation Specifications</b>					
Isolation Capacitance	–	–	1000	–	pF
Isolation Resistance	–	10	–	–	MΩ
Remote On/Off (open collector equivalent, signal referenced to -Vin terminal) VSx60xD35 Preferred Logic (negative) Logic Low - Module On Logic High - Module Off VSX60xD35-1 - Optional Logic (positive) Logic Low - Module Off Logic High - Module On Logic Low: At Von/off = 0V	Von/off Ion/off	0 –	– –	70 200	Vdc μA
Turn On Time (Vo within 1% of steady state) From Application of Vin	–	–	7	10	mSecs
From Remote On/Off Activation)	–	–	3	4	mSecs
Input Undervoltage Lockout (Turn Off & Turn On Voltages Track)					
Turn On (VSX60LD35)		15	16.5	18	Vdc
Turn On (VSX60MD35)	–	30	33	36	Vdc
Turn Off (VSX60LD35)		13.5	15	16.5	Vdc
Turn Off (VSX60MD35)	–	27	30	33	Vdc
Input Overvoltage Lockout (Turn Off & Turn On Voltages Track)					
Turn On (VSX60LD35)		37	38.5	40	Vdc
Turn Off (VSX60MD35)	–	76	80	84	Vdc
Turn On (VSX60LD35)		36	38.5	41	Vdc
Turn On (VSX60MD35)	–	74.5	78.5	82.5	Vdc
Output Overvoltage Set Point (Non-latching independent control loop)					
3.3 Vo	VO3OV clamp	3.8	4.0	4.3	Vdc
5.0 Vo	VO3OV clamp	5.85	6.1	6.35	Vdc
Overtemperature Limiting	Tc	105	115	125	°C
Weight					
VSX60xD35, VSX60xD35-1			67		Grams
VSX60xD35-U, VSX60xD35-1U			44		Grams
Output Trim					
Tie Trim to +3.3 Vo for trim down 3.3 Vo	VO <sub>3</sub> td	–	-10	–	%
5.0 Vo	VO <sub>5</sub> td	–	-10	–	%
Tie Trim to O/P RTN for trim up 3.3 Vo	VO <sub>3</sub> td	–	10	–	%
5.0 Vo	VO <sub>5</sub> td	–	10	–	%

# 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	+3.3 Vout
5	O/P RTN
6	Trim
7	+5.0 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-40 available on the web at [www.cdpowerelectronics.com](http://www.cdpowerelectronics.com).

# ORDERING INFORMATION

## To Find Model Number

Device Family \_\_\_\_\_ VSX60 xD35 - 1 U  
 VSX60MD23 (Quarter Brick, 60 Watt DC/DC)  
 Where X is Input Range \_\_\_\_\_  
 L = 18-36Vdc; M = 36-75 Vdc  
 Logic: No Number = Preferred Logic (Negative); \_\_\_\_\_  
 1 = Optional Logic (Positive)  
 Package \_\_\_\_\_  
 No Letter = Encapsulated; U = Unencapsulated

## Model Numbers

VSX60LD35
VSX60LD35-1
VSX60MD35
VSX60MD35-U
VSX60MD35-1
VSX60MD35-1U

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