

FEATURES

- RoHS Compliant
- 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



PRODUCT OVERVIEW

The VSX60xD35C 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 VSX60xD35C 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 VSX60xD35C series.

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.murata-ps.com

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNIT
Input Voltage:				
VSX60LD35C	Vi		100	Vdc
VSX60MD35C	Vi		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					
	VSX60LDC	Vi	18	24	36	VDC
	VSX60MDC	Vi	36	48	75	VDC
	Maximum Input Current (Vi=0V to Vi max, Io=Io max)					
	VSX60LDC	Ii max			5.0	A
	VSX60MDC	Ii max			2.25	A
	I/P Reflected Ripple Current				400	mA p-p
	No Load Input Current	IiNL		50		mA
	On/Off Activated Input Current	IiQ		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 (Note 1) Over all conditions of I/P voltage, load and temperature)					
3.3 Vout (V2)	3.3 Vo	3.2	—	3.4	Vdc
5.0 Vout (V1)	5.0 Vo	4.8	—	5.2	Vdc
Output Voltage Setpoint (Vi=48, Io ₂ =9A, Io ₃ =6A, Tc=25°C)					
3.3 Vout (V2)	3.3 Vo,set	3.26	3.30	3.34	Vdc
5.0 Vout (V1)	5.0 Vo,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)	Io ₃	—	—	15	A
5.0 Vout (V1)	Io ₅	—	—	12	A
Output Current Limit Inception (Vo=95% of Vo nom)					
3.3 Vout (V2)	Io _{3,cli}	19.0	21.0	23.0	A
5.0 Vout (V1)	Io _{5,cli}	12.5	13.5	15.0	A
Output Short Ckt Current (Max impedance across short circuit = 65mΩ)		16	19	22	A
3.3 Vo		16	19	22	A
5.0 Vo		11	14	17	A
Efficiency (Vi=48V, Io ₃ =9A,Io ₅ =6A, Tc=70°C)	η	89	90	—	%
Dynamic Response (ΔIo/Δt=0.2A/μsec.Vi=48V, Tc=25°C, either O/P) Load change of 50% Io max; at any operating load up to Iomax or Pomax Peak Deviation outside settling point	—	—	2	—	%Vo nom

NOTE: 1. Worst case voltage conditions occur with full load drawn from one output only, zero being drawn from the other.

For worst case voltages at less extreme loading conditions, consult the factory.

GENERAL	PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS
	Isolation Specifications					
	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	V on/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	VO5OV 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 ₃ td	—	-10	—	%
	5.0 Vo	VO ₅ td	—	-10	—	%
	Tie Trim to O/P RTN for trim up 3.3 Vo	VO ₃ td	—	10	—	%
	5.0 Vo	VO ₅ td	—	10	—	%

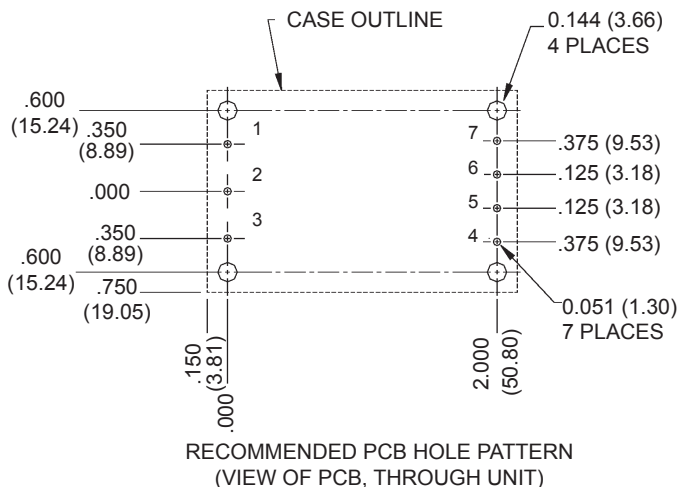
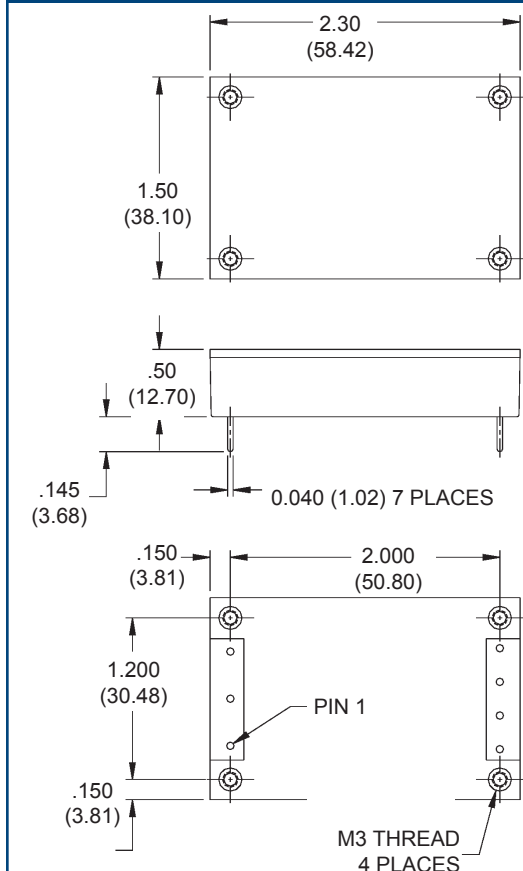
THROUGH-HOLE SOLDERING INFORMATION

These devices are intended for wave soldering or manual soldering.

They are not intended to be subject to surface mount processes under any circumstances.

The normal wave soldering process can be used with these devices where the device is subjected to a maximum wave temperature of 260°C for a period of no more than 10 seconds. Within this time and temperature range, the integrity of the device's plastic body will not be compromised and internal temperatures within the converter will not exceed 175°C. Care should be taken to control manual soldering limits identical to that of wave soldering.

MECHANICAL



Pinout Key	
1	+Vin
2	On/Off
3	-Vin
4	+3.3 Vout
5	O/P RTN
6	Trim
7	+5.0 Vout

Dimensions are in inches (millimeters).
 Tolerances: x.xx in. $\pm$ 0.02 in.
 x.xxx in. $\pm$ 0.01 in.

NOTES:

1. Marked with: specific model ordered, date code, job code.
2. 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 finish is matte tin 100 micro-inches maximum, over a nickel barrier layer 40-80 micro-inches.
3. 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.murata-ps.com.

ORDERING INFORMATION

To Find Model Number

Device Family VSX60 xD35 -1 U C
 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
 RoHS-compliant

Model Numbers*

VSX60LD35C
VSX60LD35-1C
VSX60MD35C
VSX60MD35-1C
VSX60MD35-1C
VSX60MD35-1UC

*Strikethrough denotes obsolete models.