VSX75MD35

75 Watt Dual Output Quarter Brick DC/DC Converter

VSX75

VSX75-U

- 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%
- Fixed Frequency Operation
- -40C° to +100C° Baseplate Temp.
- Output Current Limit, Self-Start
- 1,500 Vdc Isolation, Input to Output

- UL/CUL 1950, EN60 950
- 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

The VSX75 Series are 75 Watt, compact, high-efficiency, high-density dual output converters with a 36-75V input and with 3.3Vdc and 5.0Vdc outputs. The industry quarter-pack size of 2.3" x 1.5" x 0.5" coupled with 90% 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 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 VSX75 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 VSX75 Series.

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNIT
Input Voltage: VSX75MD35	Vi		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	℃

SPECIFICATIONS, ALL MODELS

Specifications are at T_{CASE} = +40°C nominal input voltage unless otherwise specified.

<table>
<tr><th>PARAMETER</th><th>SYMBOL</th><th>MIN</th><th>TYP</th><th>MAX</th><th>UNITS</th></tr>
<tr><td colspan="6">INPUT</td></tr>
<tr><td>Voltage Range</td><td></td><td>36</td><td>48</td><td>75</td><td>VDC</td></tr>
<tr><td>Input Reflected Ripple Current</td><td>Peak - Peak</td><td></td><td></td><td>500</td><td>mA</td></tr>
<tr><td>Maximum Input Current</td><td>Vin = 30V, Pout 75W</td><td></td><td></td><td>3</td><td>A</td></tr>
<tr><td>No Load Input Current</td><td></td><td></td><td></td><td>60</td><td>mA</td></tr>
<tr><td>On/Off Activated Input Current</td><td></td><td></td><td></td><td>25</td><td>mA</td></tr>
<tr><td>Input Undervoltage Lockout</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Turn On</td><td></td><td>30</td><td>33</td><td>36</td><td>VDC</td></tr>
<tr><td>Turn Off</td><td></td><td>27</td><td>30</td><td>33</td><td>VDC</td></tr>
<tr><td>Input Overvoltage Lockout</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Turn Off</td><td></td><td>76</td><td>80</td><td>84</td><td>VDC</td></tr>
<tr><td>Turn On</td><td></td><td>74.5</td><td>78.5</td><td>82.5</td><td>VDC</td></tr>
</table>

INPUT

OUTPUT — Under any conditions, the voltage of V1 will always be greater or equal to that of V2.

<table>
<tr><th>PARAMETER</th><th>CONDITIONS</th><th>MIN</th><th>TYP</th><th>MAX</th><th>UNITS</th></tr>
<tr><td>Output Power</td><td></td><td></td><td></td><td>75</td><td>Watts</td></tr>
<tr><td>Output Efficiency</td><td>Io1=11.5A, Io2=7.5A</td><td>89</td><td></td><td></td><td>%</td></tr>
<tr><td>Set Point Voltage</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>V1 (3.3V)</td><td>Io1=11.5A</td><td>3.26</td><td>3.30</td><td>3.34</td><td>V_{DC}</td></tr>
<tr><td>V2 (5.0V)</td><td>Io2=7.5A</td><td>4.96</td><td>5.02</td><td>5.08</td><td>V_{DC}</td></tr>
<tr><td>Output Current</td><td>Total Module Output</td><td></td><td></td><td></td><td></td></tr>
<tr><td>V1 (3.3V)</td><td>Power Should Not</td><td>0</td><td></td><td>23</td><td>A</td></tr>
<tr><td>V2 (5.0V)</td><td>Exceed 75 Watts</td><td>0</td><td></td><td>15</td><td>A</td></tr>
<tr><td>Output Ripple And Noise Voltage</td><td>100 MHz BW</td><td></td><td></td><td></td><td></td></tr>
<tr><td>V1 (3.3V)</td><td></td><td></td><td></td><td>60</td><td>mV_{P-P}</td></tr>
<tr><td>V2 (5.30V)</td><td></td><td></td><td></td><td>80</td><td>mV_{P-P}</td></tr>
<tr><td>Output Adjust Range</td><td>Both Outputs Will Adjust at the Same Time and by the Same %</td><td>-8</td><td></td><td>+10</td><td>%</td></tr>
<tr><td>Output Temperature Drift</td><td>.</td><td></td><td>0.02</td><td>0.05</td><td>% /°C</td></tr>
<tr><td>Line Regulation</td><td>V_{IN} = 36 to 75 I_1=11.5A, I_2=7.5A</td><td></td><td>0.10</td><td>0.20</td><td>%</td></tr>
<tr><td>Load Regulation</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>V1 (3.3V)</td><td>I_1 = 0 to 23A, I_2=0A</td><td></td><td></td><td>3.0</td><td>% of Nom</td></tr>
<tr><td>V2 (5.0V)</td><td>I_1=0A, I_2=0 to 15A</td><td></td><td></td><td>2.5</td><td>% of Nom</td></tr>
<tr><td>Load Cross Regulation</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>V1 (3.3V)</td><td>I_1 = 0A, I_2=0 to 15A</td><td></td><td></td><td>1.0</td><td>% of Nom</td></tr>
<tr><td>V2 (5.0V)</td><td>I_1=0 to 23A, I_2=0A</td><td></td><td></td><td>5.0</td><td>% of Nom</td></tr>
<tr><td>Output Current Limit Inception</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>V1 (3.3V)</td><td></td><td>24</td><td>27</td><td>30</td><td>A</td></tr>
<tr><td>V2 (5.0V)</td><td></td><td>16</td><td>18</td><td>20</td><td>A</td></tr>
<tr><td>Short Circuit Current</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>V1 (3.0V)</td><td></td><td>22</td><td>25</td><td>30</td><td>A</td></tr>
<tr><td>V2 (5.0V)</td><td></td><td>15</td><td>18</td><td>20</td><td>A</td></tr>
<tr><td>Output Overvoltage Set Point (Non-latching independent control loop)</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>V1 (3.3V)</td><td></td><td>3.8</td><td>4.0</td><td>4.3</td><td>V_{DC}</td></tr>
<tr><td>V2 (5.0V)</td><td></td><td>5.85</td><td>6.1</td><td>6.35</td><td>V_{DC}</td></tr>
<tr><td>Transient Response</td><td>($\Delta Io/\Delta t$=0.2A/μsec either output) Load change of 40% of Io max at any operating load up to Io max and Po max</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Settling Time</td><td></td><td></td><td></td><td>100</td><td>μsec</td></tr>
<tr><td>Peak Deviation</td><td></td><td></td><td></td><td>4</td><td>%</td></tr>
<tr><td>Switching Frequency</td><td></td><td></td><td>330</td><td></td><td>KHz</td></tr>
</table>

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS
ISOLATION SPECIFICATIONS					
Input to Output		1500			V_{DC}
Input to Case		1500			V_{DC}
Output to Case		200			V_{DC}
Resistance Input to Output		10			$M\Omega$
Capacitance Input to Output			1000		pF
Leakage Current	V_{ISO} = 240V_{AC}, 60Hz		90		μA, rms
FEATURE SPECIFICATIONS					
Remote On/Off					
(open collector equivalent,					
signal referenced to $-V_{IN}$ terminal)					
VSX75MD35 Preferred Logic (negative)					
Logic Low – Module On					
Logic High – Module Off					
VSX75MD35-1 Optional Logic (Positive)					
Logic Low – Module Off					
Logic High – Module On					
	Von/off Low	0		0.4	V_{DC}
	Von/off High	2		Open Collector	V_{DC}
	Ion/off			200	μA
Turn On Time					
From Application of V_{IN}	(V_O within 1% of		7	10	mSecs
From Remote On/Off Activation	steady state)		3	4	mSecs
Weight					
VSX75MD35, VSX75MD35-1			67		Grams
VSX75MD35-U, VSX75MD35-1U			44		Grams
TEMPERATURE					
Operation /Specification	Case	-40		+100	°C
Storage	Case	-55		+125	°C
Shutdown	Case	+105	+115	+125	°C
Shutdown (Hysteresis)			10		°C
Thermal Impedance	Free Air		12.2		°C/Watt
(Case to Ambient)					

GRAPHS

EFFICIENCY VS. OUTPUT LOAD
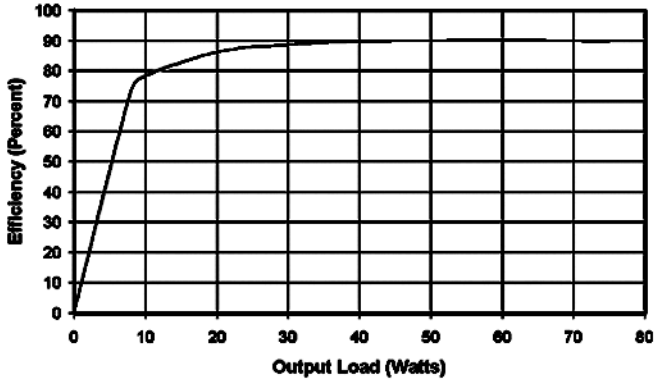
LOAD REGULATION VS. LOAD DISTRIBUTION
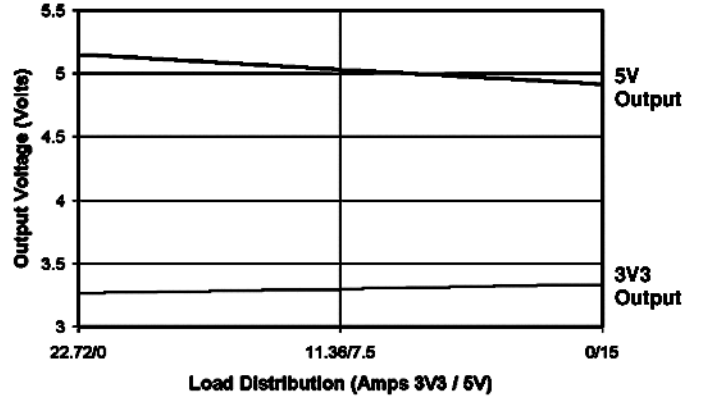
EFFICIENCY VS. INPUT VOLTAGE
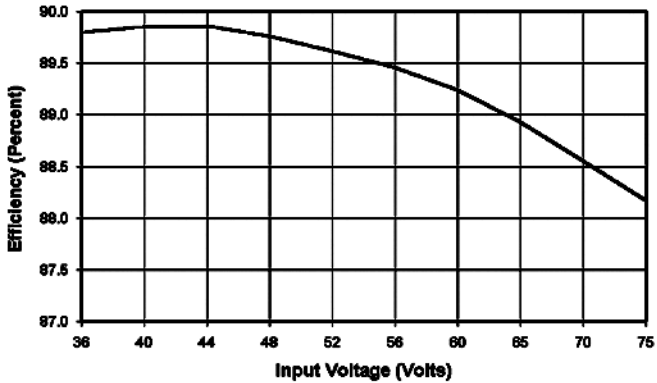
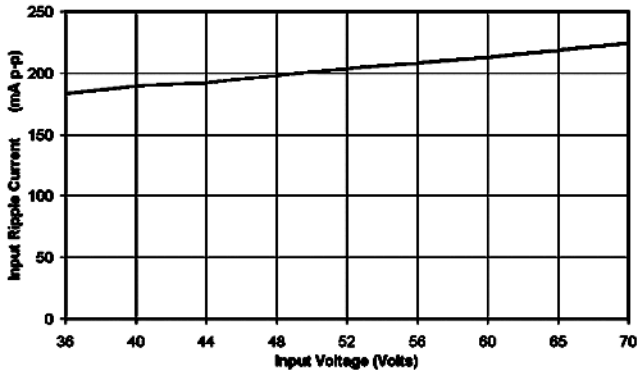## EFFICIENCY VS. BASEPLATE TEMPERATURE
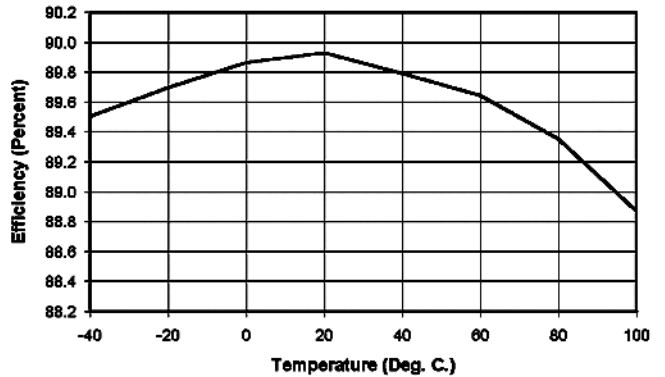
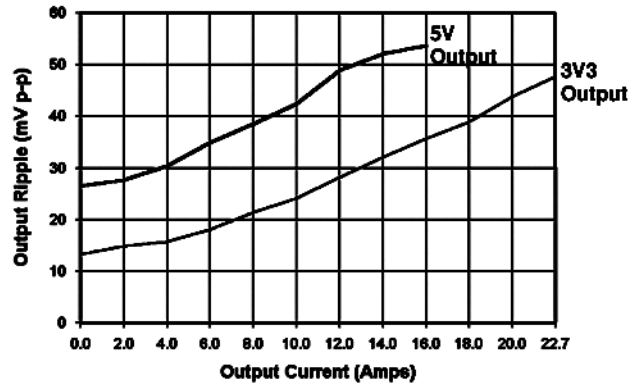## OUTPUT VOLTAGE RIPPLE VS. TEMPERATURE AT FULL LOAD
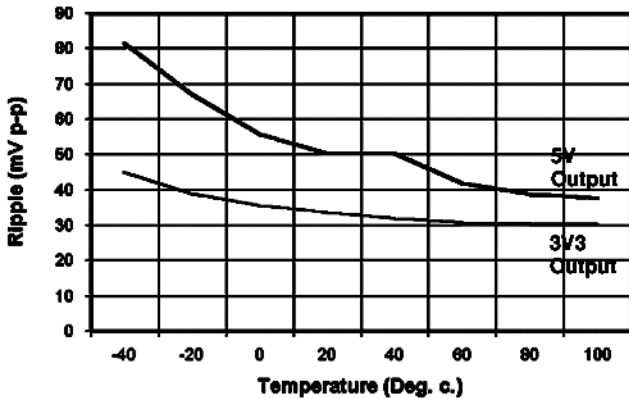
FULL LOAD EFFICIENCY VS. LOAD DISTRIBUTION
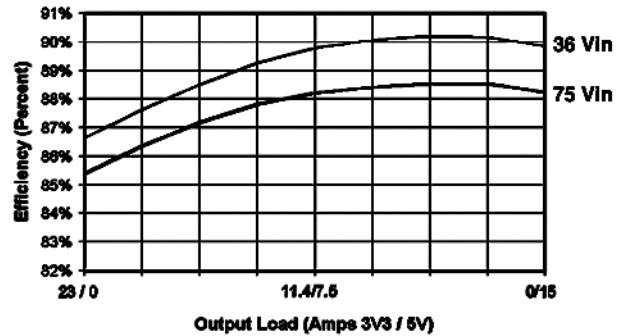
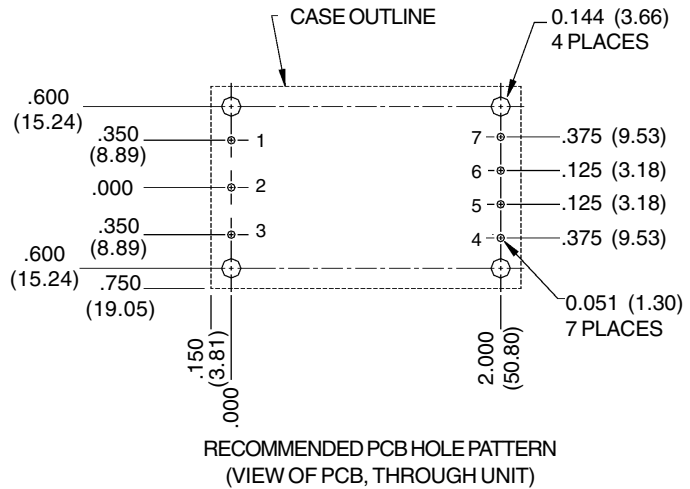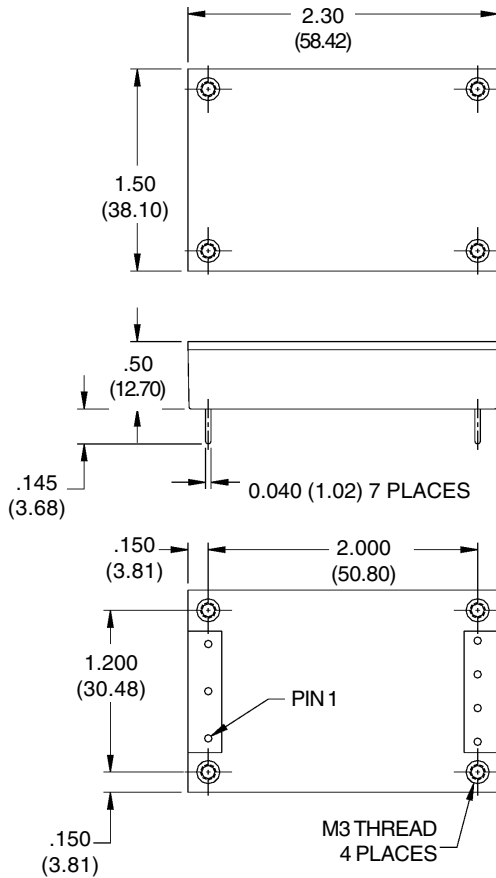## REFLECTED RIPPLE VS. INPUT VOLTAGE

OUTPUT RIPPLE VS. LOAD

MECHANICAL

Dimensions are in inches (millimeters).
Tolerances: x.xx in. ± 0.02 in.
               x.xxx in. ±0.01 in.

2.30 (58.42)

1.50 (38.10)

.50 (12.70)

.145 (3.68)

0.040 (1.02) 7 PLACES

.150 (3.81)

2.000 (50.80)

1.200 (30.48)

PIN 1

.150 (3.81)

M3 THREAD 4 PLACES

CASE OUTLINE

0.144 (3.66) 4 PLACES

.600 (15.24)
.350 (8.89)
.000
.350 (8.89)
.600 (15.24)
.750 (19.05)

1
2
3

7 .375 (9.53)
6 .125 (3.18)
5 .125 (3.18)
4 .375 (9.53)

0.051 (1.30) 7 PLACES

.150 (3.81)
.000

2.000 (50.80)

RECOMMENDED PCB HOLE PATTERN
(VIEW OF PCB, THROUGH UNIT)

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

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 material is solder plated to allow ease of solderability.

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.cdpowerelectronics.com.

ORDERING INFORMATION

To Find Model Number

VSX75MD35 - 1 U

Device Family
  VSX75MD35 (Quarter Brick, 75 Watt DC/DC)
Logic: No Number = Preferred Logic (Negative);
          1 = Optional Logic (Positive)
Package
No Letter = Encapsulated; U = Unencapsulated

Model Numbers
VSX75MD35
VSX75MD35-U
VSX75MD35-1
VSX75MD35-1U