

VKP60xT

SERIES DC/DC CONVERTER

POWER: 60 Watt

OUTPUT: Dual/Triple Output

SIZE: Half Brick

CDTECHNOLOGIES

Power Solutions
POWER ELECTRONICS DIVISION

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PRODUCT DATA SHEET

FEATURES

- 18 - 40 & 33 - 75V INPUT RANGE
- 2.3" X 2.4" X 0.5"
- USER CONFIGURABLE AS A SINGLE, DUAL OR TRIPLE OUTPUT
- EACH CHANNEL INDEPENDENTLY CURRENT LIMITED
- EXCELLENT CROSS REGULATION
- 1500Vdc ISOLATION BETWEEN INPUT AND OUTPUT
- 500Vdc CHANNEL TO CHANNEL ISOLATION
- HIGH EFFICIENCY: 87% TYPICAL
- FIXED-FREQUENCY OPERATION
- OPERATION TO +100°C BASEPLATE TEMPERATURE
- 50μS TRANSIENT RECOVERY, 0-90% LOAD STEP
- PRIMARY & SECONDARY REMOTE ON/OFF
- ADJUSTABLE OUTPUT VOLTAGE
- EXTERNAL SYNCHRONIZATION
- VKP60MT SERIES ARE APPROVED TO UL/CUL1950, EN 60950

DESCRIPTION

The VKP60LT and VKP60MT Series are members of the VK high density DC/DC converter family. They are multiple output DC/DC converters offered in both a 18-40 and 33-75 input voltage range. Their versatile architecture featuring fully isolated channels enables the system designer to utilize the converter in either a single, dual or triple output scheme without excessive minimum load requirements or cross regulation degradation.

The VKP60xT's architecture results in an economical and practical solution for use in distributed power schemes for today's demanding telecommunication and electronic data processing applications requiring ground separation between noise sensitive digital logic and bipolar analog components. The VKP60xT's proprietary control circuitry

responds to 50-100% load steps in 35μSeconds to within 1% of nominal Vout. The peak deviation will not exceed 7% of Vout for pulsed load slew rates in excess of 75 Amps per microsecond. The VKP60xT is ideal for electronic data processing applications utilizing modern disk drives and low voltage microprocessors that require dynamic load current response while maintaining tight output voltage tolerances.

AGENCY APPROVALS



PRODUCT SELECTION CHART

MODEL	INPUT VOLTAGE (Vdc)	Vout			Iout		
		RATED OUTPUT VOLTAGE (VDC)			RATED MAXIMUM OUTPUT CURRENT (A)		
		Output 1 (±)	Output 2 (±)	Output 3 (±)	Output 1	Output 2	Output 3
VKP60LT312	24 (18-40)	3.3	12	12	18	2.5	2.5
VKP60LT315		3.3	15	15	18	2	2
VKP60LT512		5.1	12	12	12	2.5	2.5
VKP60LT515		5	15	15	12	2	2
VKP60MT312	48 (33-75)	3.3	12	12	18	2.5	2.5
VKP60MT315		3.3	15	15	18	2	2
VKP60MT512		5.1	12	12	12	2.5	2.5
VKP60MT515		5	15	15	12	2	2

INPUT SPECIFICATIONS, ALL MODELS

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

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Voltage Range					
VKP60LT Series		18	24	40	V_{DC}
VKP60MT Series		33	48	75	V_{DC}
Reflected Ripple Current	Peak - Peak			220	mA
Input Ripple Rejection	DC to 1KHz	50	60		dB
Maximum Input Current	Output Power = 60W				
VKP60LT Series	$V_{IN} = 16\text{V}$			6	A
VKP60MT Series	$V_{IN} = 30\text{V}$			3	A
No Load Power Dissipation	$P_{OUT} = 0, V_{IN, Min} < V_{IN} < V_{IN, Max}$			6	W
Inrush Charge					
VKP60LT Series				0.29	mC
VKP60MT Series				0.165	mC
Quiescent Operating Current					
Primary On/Off Disabled			7.5	10	mA
Secondary On/Off Disabled			15	25	mA

COMMON SPECIFICATIONS, ALL MODELS

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

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
ISOLATION					
Input to Each Output	Peak Test	1500			V_{DC}
Input to Baseplate		1500			V_{DC}
Channel to Channel	Any Channel to Any Channel	500			V_{DC}
Resistance, Input - Output		10			M Ω
Capacitance, Input - Output			2000		pF
Leakage Current	$V_{ISO} = 240\text{VAC}, 60\text{Hz}$		180		$\mu\text{A}, \text{rms}$
GENERAL					
Set Point Accuracy	$V_{IN} = \text{Nominal}, 50\% \text{ Load}$			1	%
Turn-on Time	Within 1% of Nominal V_{OUT}		3.5	5	mSec
Remote On/Off Control Inputs					
Primary	Open Collector/Drain				
Sink Current-Logic Low	$V_{IN} = V_{MAX}$			7	mA
Vlow				0.8	V
Vhigh				Open Collector	
Secondary	Open Collector/Drain				
Sink Current-Logic Low				100	μA
Vlow				0.4	V
Vhigh				Open Collector	
External Synchronization Input					
Frequency		440		520	KHz
Pulse Width	See Application Notes	150		320	nSec
Source Impedance				47	Ω
Input High Voltage		4		5	V
Input Low Voltage		0		1	V
Input Impedance			470		Ω
Switching Frequency		470	480	490	KHz
Weight				3 (85)	oz (g)
TEMPERATURE					
Operation/Specification	Case Temperature	-40		+100	$^{\circ}\text{C}$
Storage		-55		+125	$^{\circ}\text{C}$
Shutdown		+100		+115	$^{\circ}\text{C}$
Thermal Impedance	Case to Ambient		8.2		$^{\circ}\text{C/W}$

VKP60xT312 OUTPUT SPECIFICATIONS

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

PARAMETER	CONDITIONS	OUTPUT 1			OUTPUT 2			OUTPUT 3			UNITS
		Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	
Output Power	Total Combined O/P Power = 60 Watts Max.		30	60		15	30		15	30	W
Set Point Voltage			3.3			12.2			12.2		V
Output Current, I_{OUT}	I_{ONom}	0.5	9	18	0	1.25	2.5	0	1.25	2.5	A
Output Ripple, p-p	DC to 20MHz*		100	200		150	250		150	250	mV
Output Adjust Range	*	3.15		3.80			Dependent on V1				V
Output Temperature Drift			.02	.05		.02	.05		.02	.05	$\%/^{\circ}\text{C}$
Line Regulation	$V_{IN, Min} \leq V_{IN} \leq V_{IN, Max}$ $I_O = I_{O, Nom}$		0.05	1.0		1.0	.2.0		1.0	2.0	%
Load Regulation	Min Load to Rated Load		0.50	1.0		See Regulation Curves			See Regulation Curves		%
Current Limit Inception	Other Outputs Min Load		23			5.0			5.0		A
Short-Circuit Current			19	25		4.0	5.0		4.0	5.0	A
Transient Response	50 to 100% Load Step										
Peak Deviation			150	250							mV
Settling Time	V_{OUT1} 1% of $V_{OUT1, Nom}$		35	50							μSec
Overvoltage Limit		4.2		5.0							V
Efficiency	$I_{OUT1} = 9\text{A}, (I_{OUT2} + I_{OUT3}) = 2.5\text{A}$ F.L. $V_{IN} = \text{Nominal}$	85	86								%

*See Application Notes available at www.cdpowerelectronics.com

VKP60xT315 OUTPUT SPECIFICATIONS Specifications are at T_{CASE} = +40°C nominal input voltage unless otherwise specified.

PARAMETER	CONDITIONS	OUTPUT1			OUTPUT2			OUTPUT3			UNITS
		Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	
Output Power	Total Combined O/P Power = 60 Watts Max.		30	60		15	30		15	30	W
Set Point Voltage	I _{O,Nom}		3.3			15.85			15.85		V
Output Current, I _{OUT}		0.5	9	18	0	1	2	0	1	2	A
Output Ripple, p-p	DC to 20MHz*		100	200		125	250		125	250	mV
Output Adjust Range	See Application Notes*	3.15		3.80	Dependent on V1						V
Output Temperature Drift			.02	.05		.02	.05		.02	.05	%/°C
Line Regulation	V _{IN, Min} ≤ V _{IN} ≤ V _{IN, Max} I _O = I _{O, Nom}		0.05	1.0		1.0	2.0		1.0	2.0	%
Load Regulation	Min Load to Rated Load		0.50	1.0	See Regulation Curves			See Regulation Curves			%
Current Limit Inception	Other Outputs Min Load		23			4.0			4.0		A
Short-Circuit Current			19	25		3.2	4.0		3.2	4.0	A
Transient Response	50 to 100% Load Step										
Peak Deviation			150	250							mV
Settling Time	V _{OUT} * 1% of V _{OUT, Nom}		35	50							μSec
Overvoltage Limit		4.2		5.0							V
Efficiency	I _{OUT1} =9A, (I _{OUT2} +I _{OUT3})=2A F.L. V _{IN} =Nominal	85	86								%

VKP60xT512 OUTPUT SPECIFICATIONS Specifications are at T_{CASE} = +40°C nominal input voltage unless otherwise specified.

PARAMETER	CONDITIONS	OUTPUT1			OUTPUT2			OUTPUT3			UNITS
		Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	
Output Power	Total Combind O/P Power = 60 Watts Max		30	60		15	30		15	30	W
Set Point Voltage	I _{O,Nom}		5.1			12			12		V
Output Current, I _{OUT}		0.5	6.0	12	0	1.25	2.5	0	1.25	2.5	A
Output Ripple, p-p	DC to 20MHz*		125	200		150	250		150	250	mV
Output Adjust Range	*	4.75		5.50	Dependent on V1						V
Output Temperature Drift			.02	.05		.02	.05		.02	.05	%/°C
Line Regulation	V _{IN, Min} ≤ V _{IN} ≤ V _{IN, Max} I _O = I _{O, Nom}		0.05	0.10		1.0	2.0		1.0	2.0	%
Load Regulation	Min Load to Rated Load		0.50	1.0	See Regulation Curves			See Regulation Curves			%
Current Limit Inception	Other Outputs Min Load		16			5.0			5.0		A
Short-Circuit Current			12.6	16		4.0	5.0		4.0	5.0	A
Transient Response	50 to 100% Load Step										
Peak Deviation			200	300							mV
Settling Time	V _{OUT} * 1% of V _{OUT, Nom}		35	50							μSec
Overvoltage Limit		6.0		6.8							V
Efficiency	I _{OUT1} =6A, (I _{OUT2} +I _{OUT3})=2.5A F.L. V _{IN} =Nominal	86	87								%

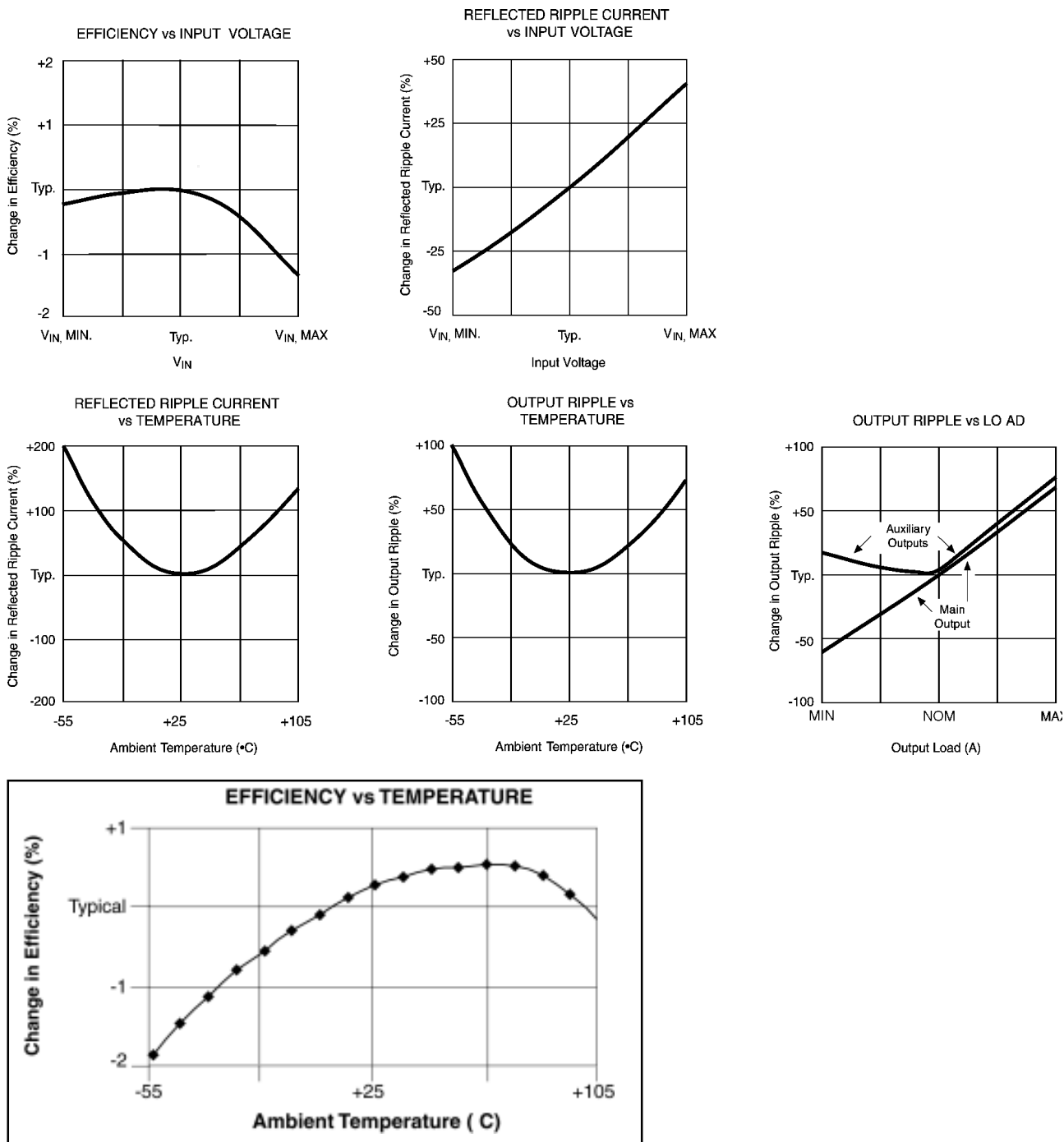
VKP60xT515 OUTPUT SPECIFICATIONS Specifications are at T_{CASE} = +40°C nominal input voltage unless otherwise specified.

PARAMETER	CONDITIONS	OUTPUT1			OUTPUT2			OUTPUT3			UNITS
		Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	
Output Power	Total Combined O/P Power = 60 Watts Max		30	60		15	30		15	30	W
Set Point Voltage	I _{O,Nom}		5.0			15.3			15.3		V
Output Current, I _{OUT}		0.5	6	12	0	1	2	0	1	2	A
Output Ripple, p-p	DC to 20MHz*		100	200		125	250		125	250	mV
Output Adjust Range	*	4.60		5.50	Dependent on V1						V
Output Temperature Drift			.02	.05		.02	.05		.02	.05	%/°C
Line Regulation	V _{IN, Min} ≤ V _{IN} ≤ V _{IN, Max} I _O = I _{O, Nom}		0.05	0.10		1.0	2.0		1.0	2.0	%
Load Regulation	Min Load to Rated Load		0.50	1.0	See Regulation Curves			See Regulation Curves			%
Current Limit Inception	Other Outputs Min Load		16			4.0			4.0		A
Short-Circuit Current			12.6	16		3.2	4.0		3.2	4.0	A
Transient Response	50 to 100% Load Step										
Peak Deviation			200	300							mV
Settling Time	V _{OUT} * 1% of V _{OUT, Nom}		35	50							μSec
Overvoltage Limit		6.0		6.8							V
Efficiency	I _{OUT1} =6A, (I _{OUT2} +I _{OUT3})=2A F.L. V _{IN} =Nominal	86	87								%

*See Application Notes available on the web at www.cdpowerelectronics.com

TYPICAL PERFORMANCE CURVE

$T_{Case} = +40^{\circ}\text{C}$, nominal input voltage, nominal load,
recommended external components applied, unless otherwise specified.
(Refer to Application Note DCAN-9 at www.cdpowerelectronics.com)



ABSOLUTE MAXIMUM RATINGS

Output Short-Circuit Duration	Continuous
Baseplate Temperature	+100°C
Lead Temperature (soldering, 10 seconds max)	+300°C
Storage Temperature	+125°C
Input to Output Isolation	1500 V_{DC}

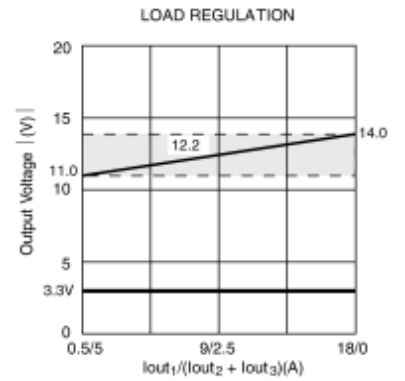
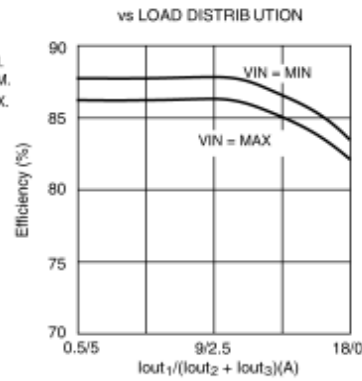
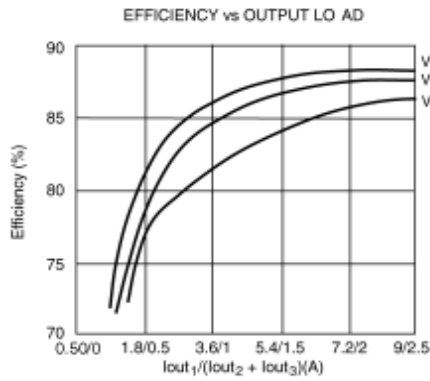
ORDERING INFORMATION

Device Family	VKP60	XTYZ	- L
Indicates 60 Watt Regulated Unit			
Model Number			
Selected from Table of Electrical Characteristics			
Where:			
X = Input Voltage (L = 24VDC, M = 48VDC)			
T = Number of Outputs (Triple "T")			
Y = 3 for 3.3V, 5 for 5V			
Z = 12 for 12V, 15 for 15V			
Lead Length			
0.200" - No Number			
0.145" - (6)			
0.110" - (8)			

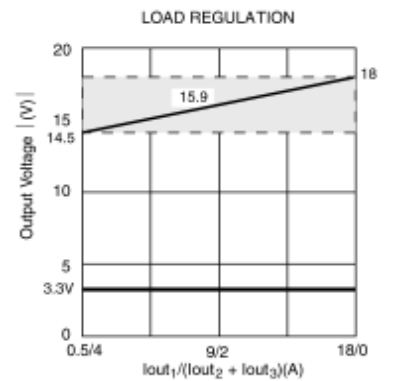
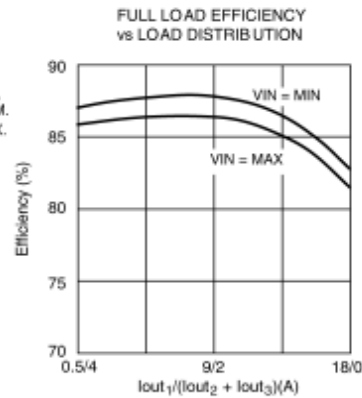
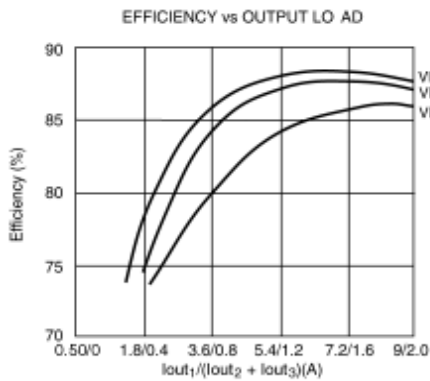
TYPICAL PERFORMANCE CURVE

$T_{case} = +40^{\circ}C$, nominal input voltage, nominal load,
recommended external components applied, unless otherwise specified.
(Refer to Application Note DCAN-9 at www.cdpowerelectronics.com)

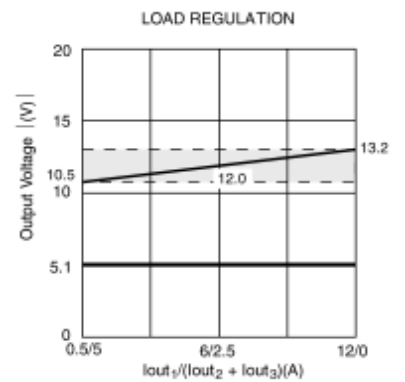
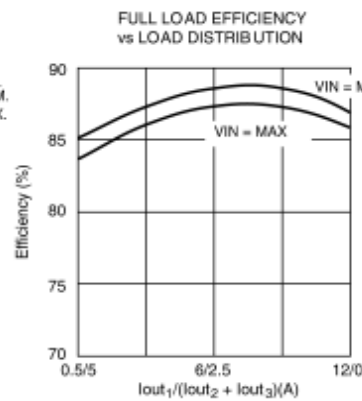
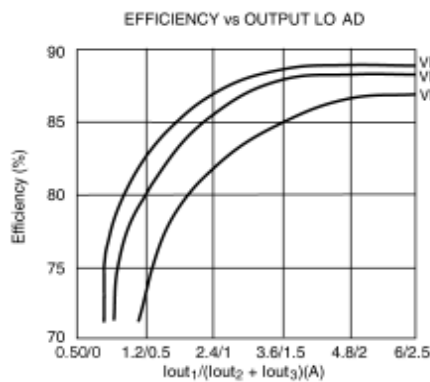
VKP60xT312



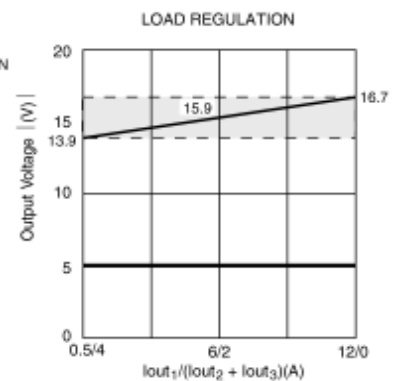
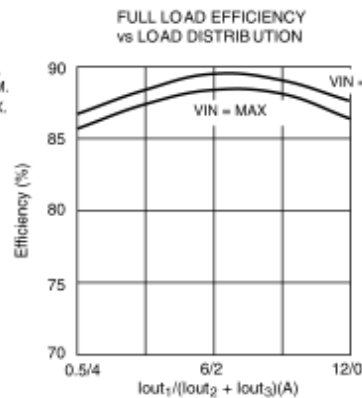
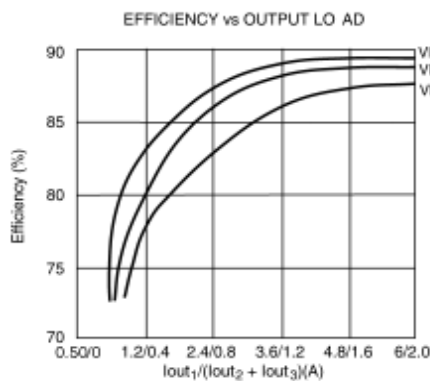
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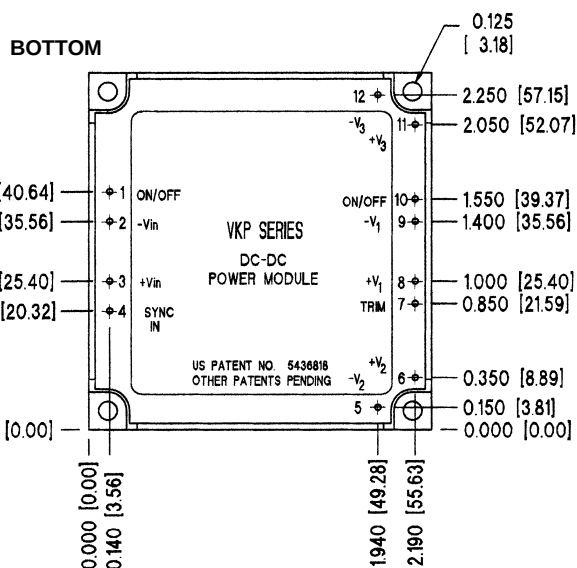
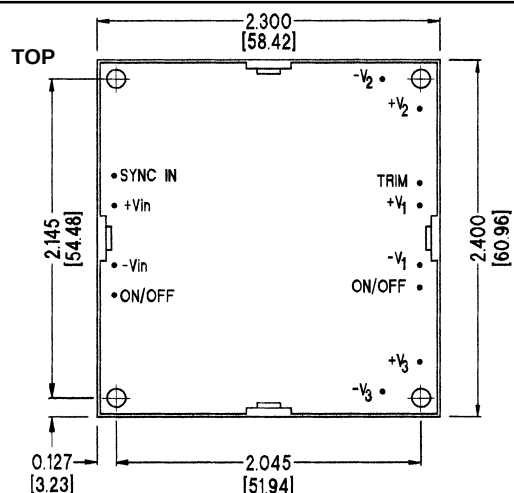
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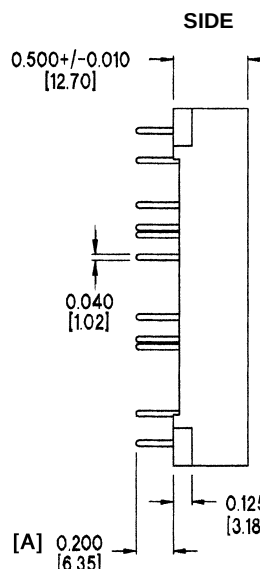
VKP60xT515



MECHANICAL



NOTES:
 All dimensions are in inches (millimeters).
 PIN PLACEMENT TOLERANCE: ± 0.005 "
 MECHANICAL TOLERANCE: ± 0.015 "
 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.



PIN CONNECTIONS	
1	PRIMARY ON/OFF
2	-VIN
3	+VIN
4	SYNC IN
5	-V2
6	+V2
7	TRIM
8	+V1
9	-V1
10	SECONDARY ON/OFF
11	+V3
12	-V3

[A] See Ordering Information on page 4 for available lead lengths.

Power Electronics Division, United States
 3400 E Britannia Drive, Tucson, Arizona 85706
 Phone: 800.547.2537
 Fax: 520.770.9369

C&D Technologies, (NCL)
 Tanners Drive Blakelands North
 Milton Keynes MK14 5BU UK
 Tel: +44 (0)1908 615232 Fax: +44 (0)1908 617545

Power Electronics Division, Europe
 C&D Technologies (Power Electronics) Ltd.
 132 Shannon Industrial Estate, Shannon, Co. Clare, Ireland
 Tel: +353.61.474.133 Fax: +353.61.474.141

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