

## **5 WATT REGULATED SMALL PACKAGE DC/DC CONVERTER**

### **WP05R**

#### **FEATURES**

- **SMALL PACKAGE SIZE: 1" X 2"**
- **INDUSTRY STANDARD PINOUT**
- **SURFACE MOUNT DEVICES (SMD)**
- **LOW-COST ALTERNATE SOURCE**
- **CONTINUOUS SHORT CIRCUIT PROTECTION**
- **UL1950 RECOGNITION  
(SOME MODELS PENDING)**
- **MEETS FCC CLASS B**

#### **APPLICATIONS**

- **TELECOMMUNICATION EQUIPMENT**
- **BATTERY POWERED SYSTEMS**
- **PORTABLE INSTRUMENTS**
- **PROCESS CONTROL EQUIPMENT**
- **TRANSPORTATION EQUIPMENT**
- **DISTRIBUTED POWER SYSTEMS**
- **SPACE-CRITICAL APPLICATIONS**

#### **DESCRIPTION**

The WP05R Series is a family of high performance DC/DC converters that offer high efficiency and regulated outputs over a 2:1 input voltage range of either 18-36VDC or 36-72 VDC.

Surface mount devices and manufacturing technology make it possible to offer performance equivalent to competition at a lower cost.

A self oscillating flyback topology coupled with a rugged MOSPOWER transistor are used to produce a highly reliable product with a minimum parts count. The internal body diodes of these FETS protect the unit against input voltage reversal. An external fuse is required to limit the body diode current to 2 amps.

The WP05R Series offers low noise (approximately 50 to

75mVp-p) without the addition of an external capacitor. The series is also 6-sided shielded, further reducing system noise. This shield is connected to -VIN.

No external heatsink is required for the WP05R Series to supply its rated 5 watts. With a minimum amount of airflow, the temperature range may be extended from 70°C to 85°C. (See derating curve.)

The package of the WP05R Series is plastic. This eliminates the layout precautions required by metal enclosed devices. The encapsulant material is rated UL94V-0 for flammability and offers excellent heat transfer characteristics.

Internal circuitry provides continuous short-circuit protection and automatic restart after the short is removed.

# ELECTRICAL SPECIFICATIONS

Specifications typical at  $T_A = +25^\circ\text{C}$ , nominal input voltage, rated output current unless otherwise specified.

MODEL	NOMINAL INPUT VOLTAGE (VDC)	RATED OUTPUT VOLTAGE (VDC)	OUTPUT CURRENT		INPUT CURRENT		EFFICIENCY (%)
			MIN LOAD (mA)	RATED LOAD (mA)	MIN LOAD (mA)	RATED LOAD (mA)	
WP05R24S03	24	3.3	25	1500	20	300	70
WP05R24S05	24	5	50	1000	20	265	78
WP05R24S12	24	12	21	417	20	255	82
WP05R24S15	24	15	17	333	20	250	83
WP05R24D05	24	$\pm 5$	$\pm 25$	$\pm 500$	20	265	78
WP05R24D12	24	$\pm 12$	$\pm 10$	$\pm 208$	20	255	82
WP05R24D15	24	$\pm 15$	$\pm 8$	$\pm 167$	20	250	83
WP05R48S03	48	3.3	25	1500	13	150	70
WP05R48S05	48	5	50	1000	13	135	78
WP05R48S12	48	12	21	417	13	127	82
WP05R48S15	48	15	17	333	13	125	83
WP05R48D05	48	$\pm 5$	$\pm 25$	$\pm 500$	13	135	78
WP05R48D12	48	$\pm 12$	$\pm 10$	$\pm 208$	13	127	82
WP05R48D15	48	$\pm 15$	$\pm 8$	$\pm 167$	13	125	83

NOTE: Other input and output voltages may be available. Please consult factory.

# COMMON SPECIFICATIONS

Specifications typical at  $T_A = +25^\circ\text{C}$ , nominal input voltage, rated output current unless otherwise specified.

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS	
<b>INPUT</b>						
Voltage Range		18	24	36	VDC	
Reflected Ripple Current		36	48	72	VDC	
			20	35	mAp-p	
<b>ISOLATION</b>						
Rated Voltage		500		VDC	GΩ	
Test Voltage	60 Hz, 10 Seconds	500		Vpk		
Resistance		10				
Capacitance			470			pF
Leakage Current	$V_{iso} = 240\text{VAC}, 60\text{Hz}$		50			$\mu\text{Arms}$
<b>OUTPUT</b>						
Rated Power			5.0		W	
Voltage Setpoint Accuracy						
Singles			$\pm 1$	$\pm 2$	%	
Duals			$\pm 2$	$\pm 4$	%	
Temperature Coefficient			$\pm 0.02$		%/ $^\circ\text{C}$	
Line Regulation	Low Line to High Line					
Singles				5	mV	
Duals				1	%	
Load Regulation	Min Load to Rated Load					
Singles				25	mV	
Duals				1	%	
Ripple and Noise						
24VIN Models	BW = 20Hz to 10MHz			100	mVp-p	
48VIN Models	BW = 20Hz to 10MHz			50	mVp-p	
5V Output Models	BW = 20Hz to 2MHz			5	mVrms	
Other Models	BW = 20Hz to 2MHz			10	mVrms	
Transient Response	Rated Load to Min Load		10		mS	
	Min Load to Rated Load		10		mS	
Overvoltage Protection Threshold	3.3V Output		3.9		VDC	
	5V Output		6.8		VDC	
	12V Output		15		VDC	
	15V Output		18		VDC	
<b>GENERAL</b>						
Switching Frequency			140		KHz	
Package Weight			30		g	
MTTF per MIL-HDBK-217	Ground Benign, Circuit Stress Method					
Revision F	$T_A = +25^\circ\text{C}$		636,843		Hr	
	$T_A = +70^\circ\text{C}$		199,000		Hr	
	$T_A = +85^\circ\text{C}$		122,009		Hr	
MTTF per Bellcore TR-NWT-000322	Environmental Stress = 1.0					
Issue 4, September, 1992	$T_A = +25^\circ\text{C}$		1,079,617		Hr	
	$T_A = +70^\circ\text{C}$		205,055		Hr	
	$T_A = +85^\circ\text{C}$		98,839		Hr	
<b>TEMPERATURE</b>						
Specification	No Power Derating	-40		+70	$^\circ\text{C}$	
Operation		-40		+100	$^\circ\text{C}$	
Storage		-55		+110	$^\circ\text{C}$	

## ABSOLUTE MAXIMUM RATINGS

Output Short-Circuit Duration.....	Continuous
Case Temperature .....	100°C
Lead Temperature (soldering, 10 seconds max).....	+300°C

## ORDERING INFORMATION

	<b>WP05R</b>	<b>xyzz</b>	<b>N</b>	<b>/H</b>
Device Family _____	Indicates Wide Input Power 5 Watt Regulated Unit			
Model Number _____	Selected From Table of Electrical Characteristics			
Where:	xx = Input Voltage y = Number of Outputs (Single "S", Dual "D") zz = Output Voltage			
Package Option _____				
Screening Option _____				

## MECHANICAL

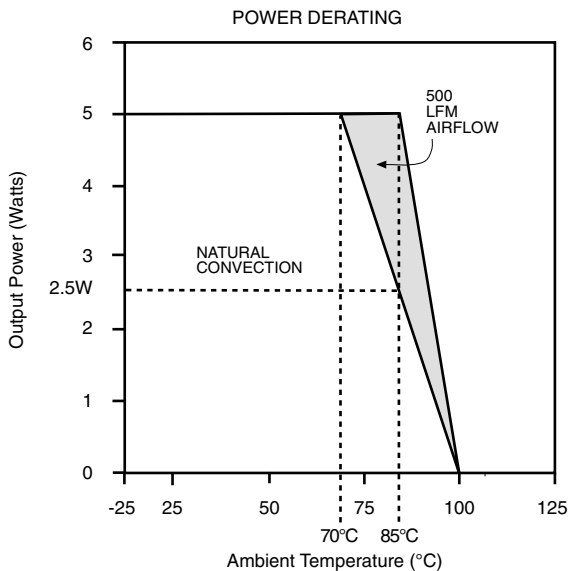
**TOP VIEW**

**SIDE VIEW**

**BOTTOM VIEW**

**NOTES:** All dimensions are in inches (millimeters).  
 GRID: 0.100 inches (2.54 millimeters)  
 \* Common pins are not present on single output models.  
 Product marked with specific model ordered, date code, job code.  
 PIN PLACEMENT TOLERANCE: ±0.015 inches.  
**MATERIAL:** Units are encapsulated in a low thermal resistance molding compound which has excellent chemical resistance, wide operating temperature range, and good electrical properties under high humidity environments. The encapsulant and the outer shell of the unit have UL94V-0 ratings. Lead material is brass with a solder plated surface to allow ease of solderability.

## APPLICATION NOTES



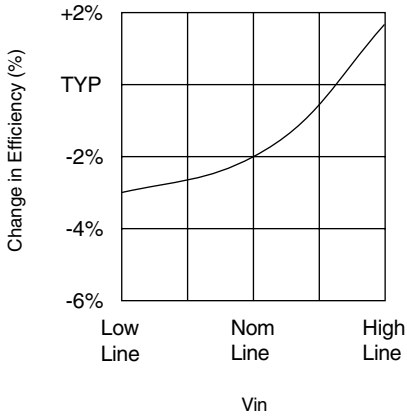
## FUSING

For maximum safety and system protection, a Buss PC-TRON, PCB 2A fuse or equivalent should be used in series with the input.

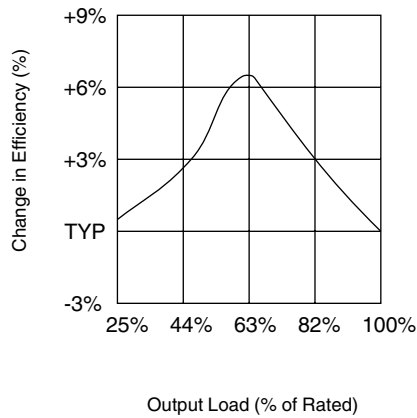
# TYPICAL PERFORMANCE CURVES

$T_A = +25^\circ\text{C}$ , nominal input voltage, rated load, recommended external components applied, unless otherwise specified.

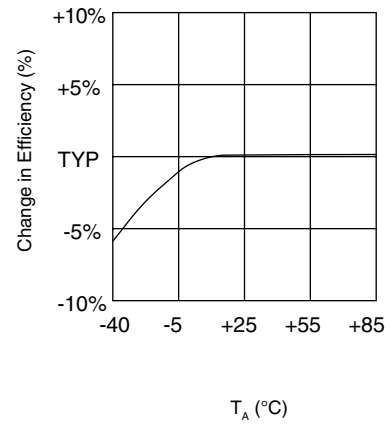
EFFICIENCY vs INPUT VOLTAGE



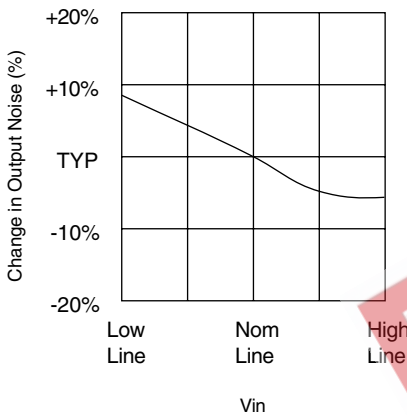
EFFICIENCY vs OUTPUT LOAD



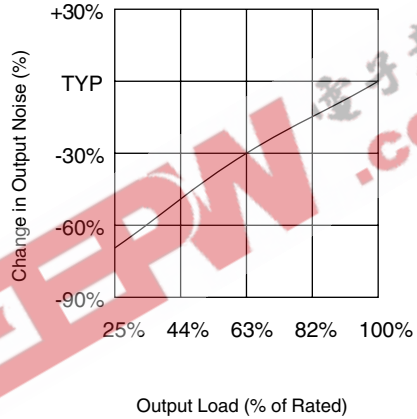
EFFICIENCY vs TEMPERATURE



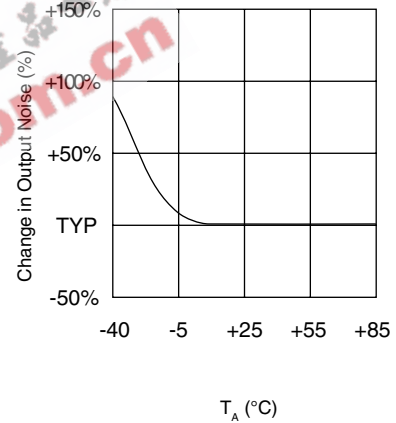
OUTPUT NOISE vs INPUT VOLTAGE



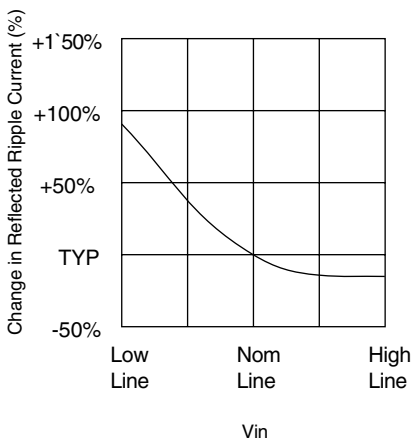
OUTPUT NOISE vs OUTPUT LOAD



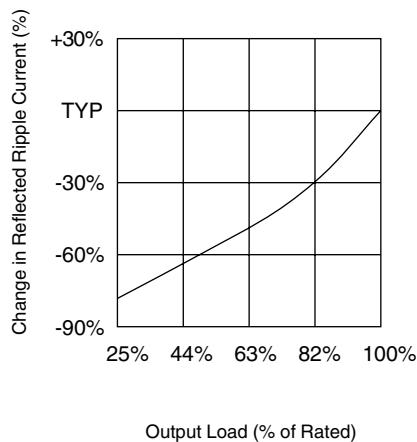
OUTPUT NOISE vs TEMPERATURE



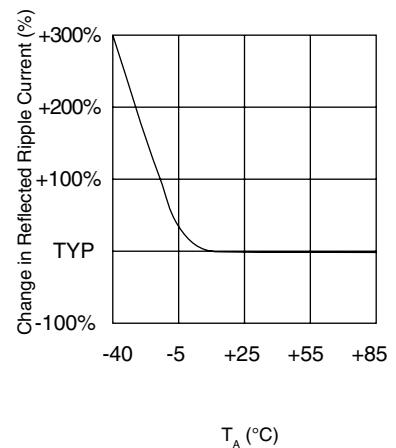
REFLECTED RIPPLE CURRENT vs INPUT VOLTAGE



REFLECTED RIPPLE CURRENT vs OUTPUT LOAD



REFLECTED RIPPLE CURRENT vs TEMPERATURE



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