



### FEATURES

- RoHS compliant
- Operating temperature range: -40°C to +100°C
- Industry standard pinout
- Input and output filtering
- Low profile shell
- Single and dual outputs
- Output trim function

### DESCRIPTION

The WPN20RC series is available in three input voltage ranges of 9-18V, 18-36V and 33-75V. The unit is housed in a space saving aluminum shell. The 300KHz switching frequency and forward converter topology provide excellent performance across all line and load conditions. Other features include: under voltage lock-out, internal temperature shutdown, soft start and over current protection.

An output trim feature is provided, allowing the user to compensate for long line lengths.

Applications include: Telecommunications, Battery Powered Systems, Process Control Equipment, Transportation Equipment and Distributed Power Systems.

The product range has been recognised by Underwriters Laboratory (UL) to UL 1950 for operational insulation, file number E179522 applies.



### SELECTION GUIDE

Order Code	Input Voltage	Output Voltage	Output Current		Input Current Nom. Load	Efficiency
	Nom.		Min.	Nom.		
	V	V	A	A	A	%
WPN20R48S05C	48	5.0	0.0	4.00	0.50	85
WPN20R12S05C	Obsolete, recommended alternative: (click to view data sheets)				UWR-5/4000-D12A-C	
WPN20R12S12C					UWR-12/1650-D12A-C	
WPN20R12D12C					BWR-12/830-D12A-C	
WPN20R24S03C					UWR-3.3/4850-D12A-C	
WPN20R24S05C					UWR-5/4000-D12A-C	
WPN20R24S12C					UWR-12/1650-D12A-C	
WPN20R24D12C					BWR-12/830-D12A-C	
WPN20R24D15C					BWR-15/670-D12A-C	
WPN20R48S12C					UWR-12/1650-D48A-C	
WPN20R48D12C					BWR-12/830-D48A-C	
WPN20R48D15C					BWR-15/670-D48A-C	

### INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Voltage range	All WPN20R12 types	9	12	18	V
	All WPN20R24 types	18	24	36	
	All WPN20R48 types	33	48	75	
Reflected ripple current				50	mA p-p
Undervoltage lockout threshold	All WPN20R12 types	7		8.8	V
	All WPN20R24 types	15.5		17	
	All WPN20R48 types	30		33	

### OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units		
Rated power				20	W		
Voltage setpoint accuracy				±1.5	%		
Temperature coefficient				±0.005	%/°C		
Line regulation	High line to low line			Singles	±0.1	%	
				Duals	±0.5	%	
Load regulation	Min load to Nom. load			Singles	±0.5	%	
				Duals	±2.0	%	
Ripple & Noise	Single outputs, BW = 5Hz to 20MHz				60	100	mVp-p
				Dual outputs, BW = 5Hz to 20MHz		50	100
Output voltage adjust range	See attached plots						
Short circuit & overcurrent protection	Continuous						

### GENERAL CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency			300		kHz
Max capacitive load			550		mF/A
MTTF per ML-HDBK-217 Ground benign	Circuit stress method TA = +25° unmodified database		1.4		MHr

All specifications typical at T<sub>A</sub>=25°C, nominal input voltage and rated output current unless otherwise specified.

**ISOLATION CHARACTERISTICS**

Parameter	Conditions	Min.	Typ.	Max.	Units
Rated voltage		1500			Vpk
Test voltage	60Hz, 10 seconds	1500			Vpk
Resistance		10			GΩ
Capacitance		2400			pF

**TEMPERATURE CHARACTERISTICS**

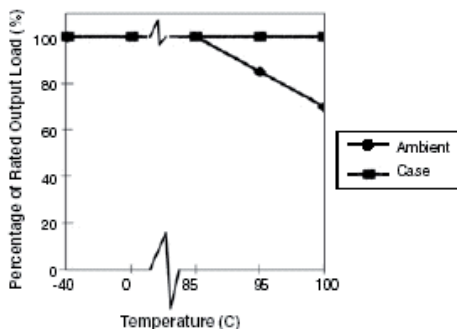
Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	Ambient (with no derating)	-40		+85	°C
Operation	Case (with no derating)	-40		+100	°C
Storage		-55		+125	°C
Thermal shutdown	Case	105		115	°C

**RoHS COMPLIANCE INFORMATION**



This series is compatible with RoHS soldering systems with a peak wave solder temperature of 260°C for 10 seconds. The pin termination finish on this product series is matte tin (100 microns min.) over nickel (40-80 microinches min.). The series is backward compatible with Sn/Pb soldering systems. For further information, please visit [www.murata-ps.com/rohs](http://www.murata-ps.com/rohs)

**THERMAL DERATING CURVE**



**TECHNICAL NOTES**

**ISOLATION VOLTAGE**

‘Hi Pot Test’, ‘Flash Tested’, ‘Withstand Voltage’, ‘Proof Voltage’, ‘Dielectric Withstand Voltage’ & ‘Isolation Test Voltage’ are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

Murata Power Solutions WPN20 series of dc/dc converters are all 100% production tested at their stated isolation voltage. This is 1500 Vpk for 10 seconds.

A question commonly asked is, “What is the continuous voltage that can be applied across the part in normal operation?”

The WPN20 series has been recognized by Underwriters Laboratory, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC.

The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

**REPEATED HIGH-VOLTAGE ISOLATION TESTING**

It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. While manufactured parts can withstand several times the stated test voltage, the isolation capability does depend on the wire insulation. Any material, including this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

**APPLICATION NOTES**

**OUTPUT VOLTAGE ADJUSTMENT**

The trim resistor equations are:

$$R_{DOWN} = \left[ \frac{G - (V_{OUT} \times H)}{V_{OUT} - V_{NOM}^*} \right]$$

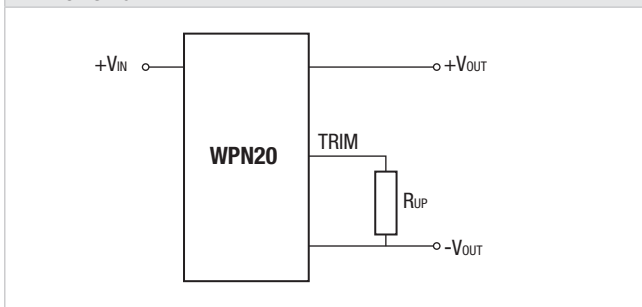
$$R_{UP} = \left[ \frac{G - (V_{OUT} \times K)}{V_{OUT} - V_{NOM}^*} \right]$$

Where:

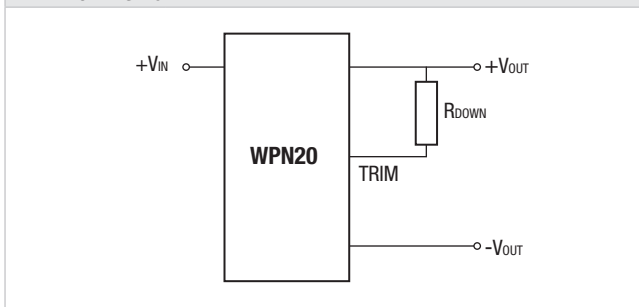
V <sub>NOM</sub>	3.3V	5V	12V	15V
G	27604	8250	235050	362450
H	7500	1100	17800	2200
K	9280	2200	21700	26990

\*Note: For 3.3V outputs, V<sub>NOM</sub> is 3.327V and for 15V outputs V<sub>NOM</sub> is 14.967V.

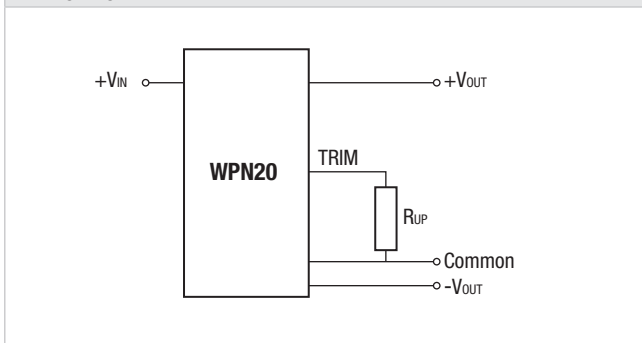
**TRIM UP SINGLE**



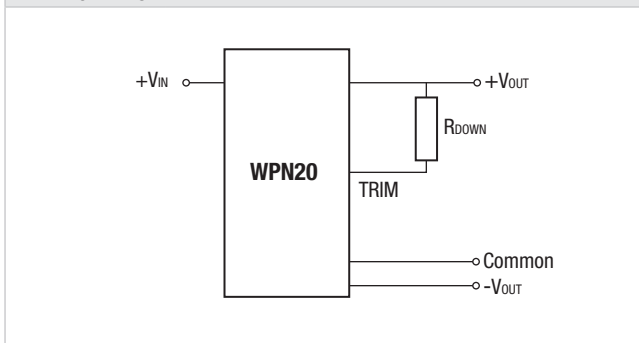
**TRIM DOWN SINGLE**



**TRIM UP DUAL**



**TRIM DOWN DUAL**



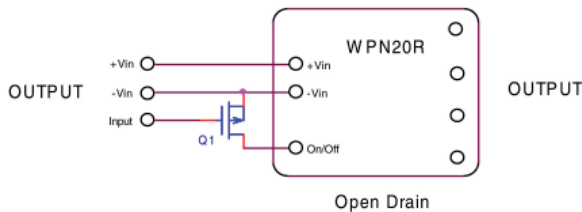
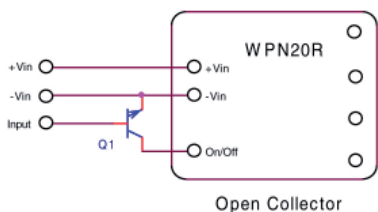
When the output voltage is trimmed up, output current must be derated so that the maximum output power (shown in the selection table) is not exceeded.

**FUSING**

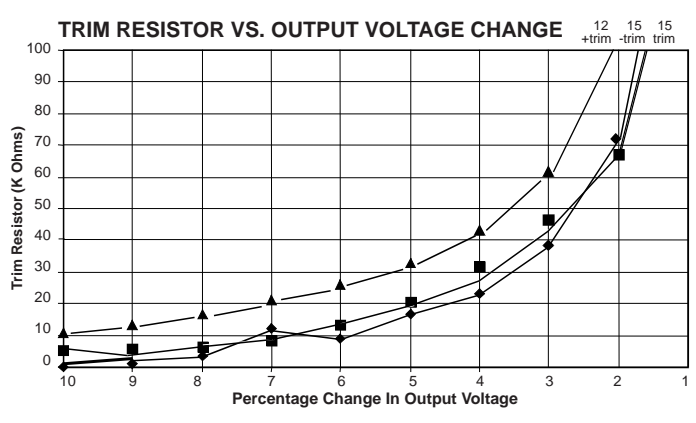
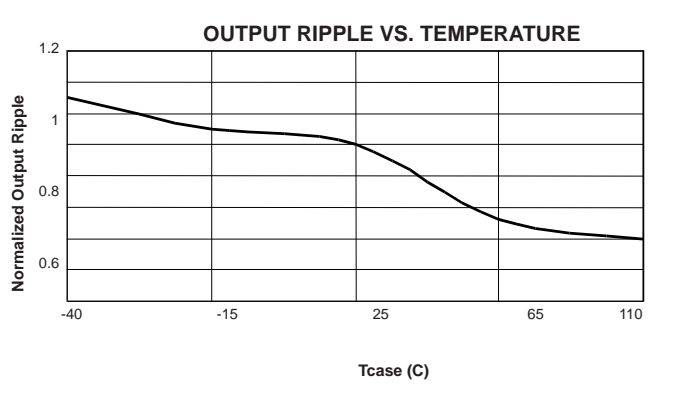
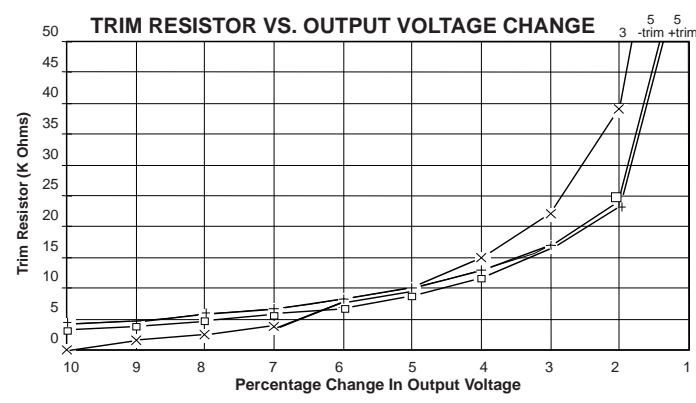
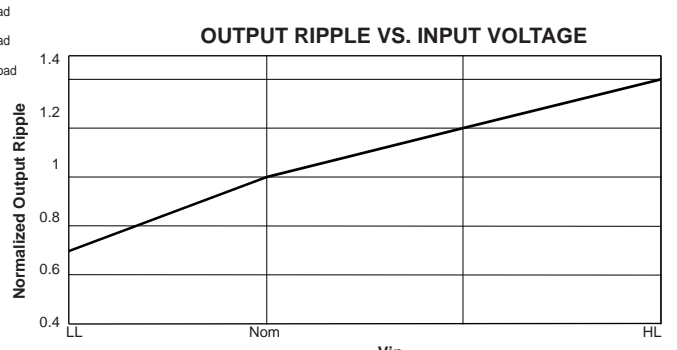
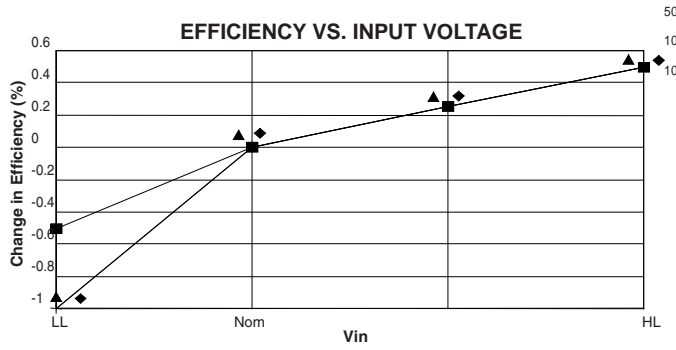
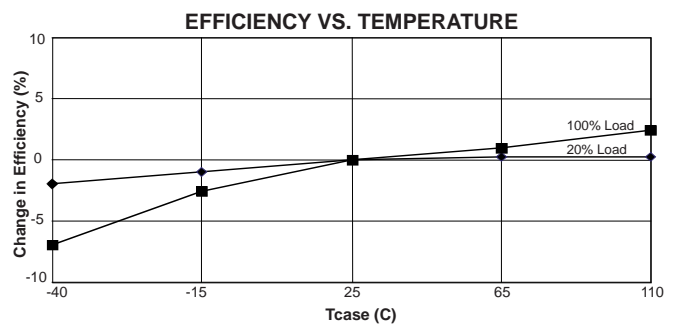
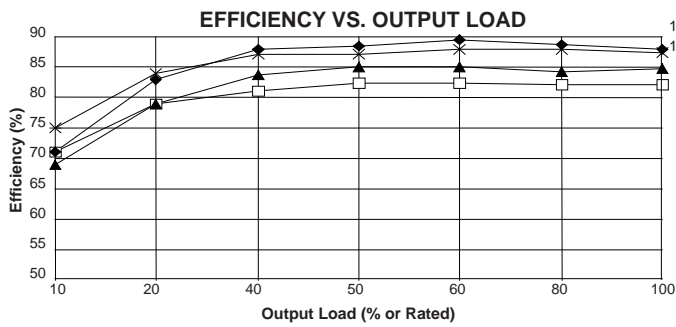
The WPN20R Series of converters are not internally fused. In order to maintain maximum safety an input line fuse should always be included. A slow blow, UL listed, 8A fuse is recommended for all models.

**Remote on/off**

The WPN20R Series of converters are equipped with a primary on/off control pin for increased system flexibility. The input is TTL open-collector and/or CMOS open-drain compatible. The primary on/off pin uses positive logic, which turns the unit off when a logic low signal is applied (<0.7V). The figure below illustrates the typical external connections to enable this function. If no connection is made to the primary on/off control pin, the module will operate normally.

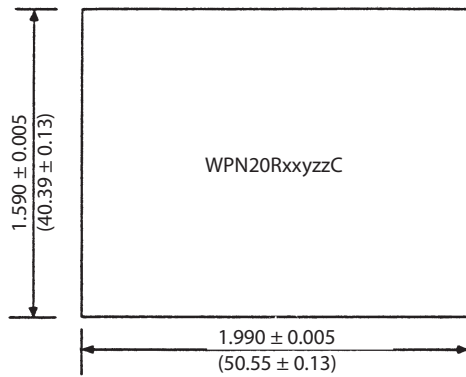


**PERFORMANCE GRAPHS**

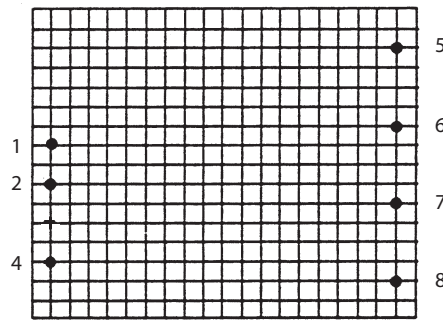
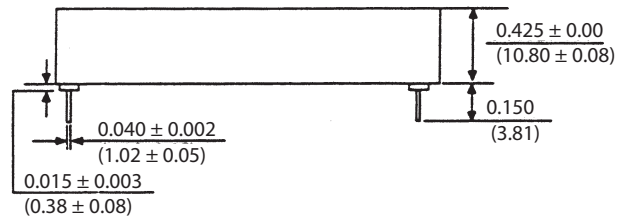


**MECHANICAL DIMENSIONS**

**PIN SIDE DOWN**



**SIDE VIEW**



**PIN SIDE UP**

**PIN CONNECTIONS**

Pin	Function	
	Singles	Duals
1	+V <sub>IN</sub>	+V <sub>IN</sub>
2	-V <sub>IN</sub>	-V <sub>IN</sub>
4	Remote on/off	Remote on/off
5	NO PIN	+V <sub>OUT</sub>
6	+V <sub>OUT</sub>	OV
7	-V <sub>OUT</sub>	-V <sub>OUT</sub>
8	TRIM	TRIM

Weight: 32g

All pins on a 0.1 (2.54) pitch and within ±0.01 (0.25) of true position.  
Unless otherwise stated all dimensions are in inches (mm) ±0.01 (0.25).