20 WATT
Single & Dual Output

Regulated, 4:1 Wide Input Range

RAILWAY
DC/DC Converters

FEATURES

- **Railway Application**
- **4:1 Ultra Wide Input Voltage Range: 9-36 Vdc, 18-75 Vdc and 43-160 Vdc**
- **20 Watts Output Power**
- **Output Current up to 2.4A**
- **Standard 1.00″ X 2.00″ X 0.40″ Package**
- **High Efficiency (Up to 88%)**
- **CE Mark Meets 2006/95/EC, 93/68/EEC and 2004/108EC**
- **UL60950-1, EN60950-1, IEC60950-1 and EN50155 Licensed**
- **RoHS Compliant to EU Directive 2011/65/EU**

RWB20 Series

Specifications

INPUT

Voltage Range		24VDC nominal input.....18 -36VDC 48VDC nominal input.....36 -75VDC 110VDC nominal input.....43-160VDC
Input Filter	24VDC, 48VDC input	Common Choke
	110VDC input	Pi Filter
Input Surge Voltage		24VDC input.....50VDC 1sec, max. 48VDC input.....100VDC 1sec, max. 110VDC input.....170VDC 1 sec., max.
Input Reflected Ripple Current	Normal input and full load	30mAp-p
Start up Time	Normal input and constant resistive load	Power up.....30ms, max. Remote On/Off.....30ms, max.
Startup Voltage		24VDC input.....9VDC, max. 48VDC input.....18VDC, max. 110VDC input.....43VDC, max.
Shutdown Voltage		24VDC input .....8VDC 48VDC input .....16VDC 110VDC input 40VDC
Remote ON/OFF (Note 6)		
Positive Logic (Option)	DC-DC ON	.....Open or 3V < Vr < 15V
	DC-DC OFF	.....Short or 0V < Vr < 1.2V
Negative Logic (Standard)	DC-DC ON	.....Short or 0V < Vr < 1.2V
	DC-DC OFF	.....Open or 3V < Vr < 15V
Input Current of Remote Control Pin.	Nominal input.....	-0.5mA-1.0mA
Remote off state input current.....	.....Nominaal input	2.5mA

OUTPUT

Output Power.....		20 Watts
Voltage Accuracy.		±1%
Minimum Load....		0%
Voltage Adjustability (Note 5)	Single..	±10%
Line Regulation	LL to HL at Full Load.....	Single .....±0.2% Dual .....±0.5%
Load Regulation	No Load to Full Load.....	Single,,..... ±0.2% Dual..... ±1.0%
	10% Load to 90% Load.....	Single,,..... ±0.1% Dual..... ±0.8%
Cross Regulation	Asymmetrical Load 25% / 100% FL..	Dual..... ±5%
Ripple and Noise	20MHz band width....Measured with a 1u50F/50V X7R MLCC..See table	
Temperature Coefficient..		±0.2% / ◦C, max.
Transient Response recovery Time	25% load step change.....	250µS
Over voltage protection	3.3 VDC output..	3.7VDC-5.4VDC
	5VDC output.....	5.6VDC-7.0VDC
	12VDC output.....	13.5VDC-19.6VDC
	15VDC output.....	16.8VDC-20.5VDC
Overload Protection	% of FL at nominal input....	150%
Short Circuit Protection		Hiccup, automatic recovery

See next page for additional specifications.

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GENERAL

Efficiency.....See table
Isolation Voltage
Input to Output .....1600Vdc, min. 1 minute
Input (Output) to Case .....1000Vdc, min. 1 minute
Isolation Resistance .....10^9ohms, min.
Isolation Capacitance .....3000pF, max.
Switching Frequency .....330KHz±10%
Approvals and Standard.....IEC60950-1, UL60950-1, EN60950-1, EN50155
Case Material .....Nickel Coated Copper
Base Material .....FR4 PCB
Potting Material .....Silicon (UL94-V0)
Dimensions 1.00 x 2.00 x 0.40 inches (25.4 x 50.8 x 10.2 mm)
Weight .....30g (1.06 oz.)
MTBF (Note 1) .....BELLCORE TR-NWT-000332.....1.630 x 10^6 hrs
.....MIL-HDBK-217F.....4.950 x 10^5 hrs

ENVIRONMENTAL

Operating Ambient Temperature (Note 7) .....-40°C - +101°C (with derating)
Maximum Case Temperature.....+105°C
Storage Temperature Range.....-55°C - +125°C
Thermal Impedance (Note 8) .....Natural Convection.....12°C
..... Natural Convection with Heat Sink... .....10°C
Thermal Shock..... .....EN61373, MIL-STD-810F
Vibration..... .....EN61373,MIL-STD-810F
Relative Humidity..... .....5% to 95% RH

EMC CHARACTERISTICS

EMI (Note 9)..... EN55022, EN55011 .....24DC, 48VDC.....Class B
.....110VDC.....Class A
ESD..... ..EN61000-4-2 Air.....±8KV Contact.....±6KV .....Perf. Criteria A
Radiated Immunity..... EN61000-4-3 .....20 V/m .....Perf. Criteria A
Fast Transient (Note 10)..... EN61000-4-4 .....±2KV.....Perf. Criteria A
Surge (Note 10)..... EN61000-4-5 .....±2KV.....Perf. Criteria A
Conducted Immunity..... EN61000-4-6 .....10Vr.m.s.....Perf. Criteria A

SELECTION GUIDE

Input Voltage Range	Output Voltage	Output Current		Output[3] Ripple & Noise	Input Current	Efficiency[3] (%)	Model Number	Capacitor Load max.[4]
		Min. load	Full load		No load[4]			
9-36 Vdc	3.3 Vdc	0mA	4500mA	75mVp-p	6mA	85	RWB20-24S33	7000μF
9-36 Vdc	5 Vdc	0mA	4000mA	75mVp-p	6mA	88	RWB20-24S5	5000μF
9-36 Vdc	12 Vdc	0mA	1670mA	100mVp-p	6mA	89	RWB20-24S12	850μF
9-36 Vdc	15 Vdc	0mA	1330mA	100mVp-p	6mA	88	RWB20-24S15	700μF
18-75 Vdc	3.3 Vdc	0mA	4500mA	75mVp-p	4mA	85	RWB20-48S33	7000μF
18-75 Vdc	5 Vdc	0mA	4000mA	75mVp-p	4mA	88	RWB20-48S5	5000μF
18-75 Vdc	12 Vdc	0mA	1670mA	100mVp-p	4mA	89	RWB20-48S12	850μF
18-75 Vdc	15 Vdc	0mA	1330mA	100mVp-p	4mA	89	RWB20-48S15	700μF
43-160 Vdc	3.3 Vdc	0mA	4500mA	75mVp-p	3mA	85	RWB20-10S33	7000μF
43-160 Vdc	5 Vdc	0mA	4000mA	75mVp-p	3mA	87	RWB20-110S5	5000μF
43-160 Vdc	12 Vdc	0mA	1670mA	100mVp-p	3mA	88	RWB20-10S12	850μF
43-160 Vdc	15 Vdc	0mA	1330mA	100mVp-p	3mA	88	RWB20-25S15	700μF
9-36 Vdc	± 12 Vdc	0mA	± 833mA	100mVp-p	6mA	88	RWB20-24-12	± 500μF
9-36 Vdc	± 15 Vdc	0mA	± 667mA	100mVp-p	6mA	89	RWB20-24-15	± 350μF
18-75 Vdc	± 12 Vdc	0mA	± 833mA	100mVp-p	4mA	88	RWB20-48-12	± 500μF
18-75 Vdc	± 15 Vdc	0mA	± 667mA	100mVp-p	4mA	89	RWB20-48-15	± 350μF
43-160 Vdc	± 12 Vdc	0mA	± 833mA	100mVp-p	3mA	88	RWB20-110-12	± 500μF
43-160 Vdc	± 15 Vdc	0mA	± 667mA	100mVp-p	3mA	89	RWB20-110-15	± 350μF

Notes:

1. BELLCORE TR-NWT-000332. Case 1: 50% Stress, Temperature at 40°C.
   MIL-HDBK-217F Notice2 @Ta=25°C, Full load(Ground, Benign, controlled environment)
2. Typical value at nominal input and no load.
3. Typical value at nominal input and full load.
4. Test by minimum input and constant resistive load.
5. Trimming allows the user to increase or decrease the output voltage set point of the module. This is accomplished by connecting an external resistor between the trim pin and either the +OUTPUT pin or the -OUTPUT pin.
6. The CTRL pin is reference to -INPUT.
   Please see Remote On/Off table for model number designations.
7. Operating ambient temperature:
   Converter can meet the railway T2 and TX temperature requirement.
   T2: -40°C - +70°C as all models, TX: -40°C - +85°C as power derating to 55% output power (with Heat-sink as power derating to 70% output power.)
   Test condition with vertical direction by natural convection (20LFM).
8. Heat-sink is optional and P/N: 7G-0020C-F
9. EN55022 and EN55011
   24 Vdc & 48 Vdc input: To meet Class B without external filter.
   110 Vdc input: To meet Class A without external filter.
10. An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5.
    The filter capacitor Polytron suggests: 24 Vdc & 48 Vdc input: Nippon cheni-con KY series, 220 μF/100V, ESR 48mΩ.
    110 Vdc input: Rubycon BXF series, 100 μF/250V.
    Caution: This power module is not internally fused. An input line fuse must always be used.

See next page for mechanical specifications.

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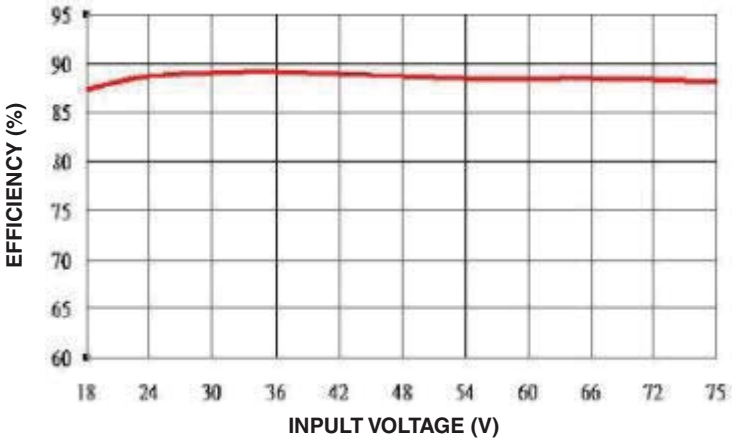
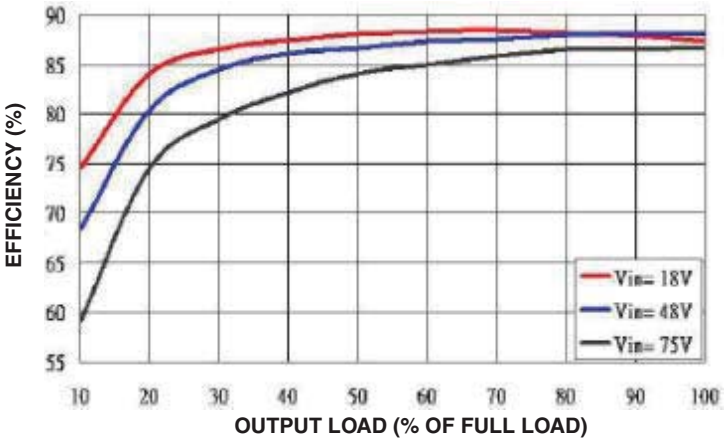
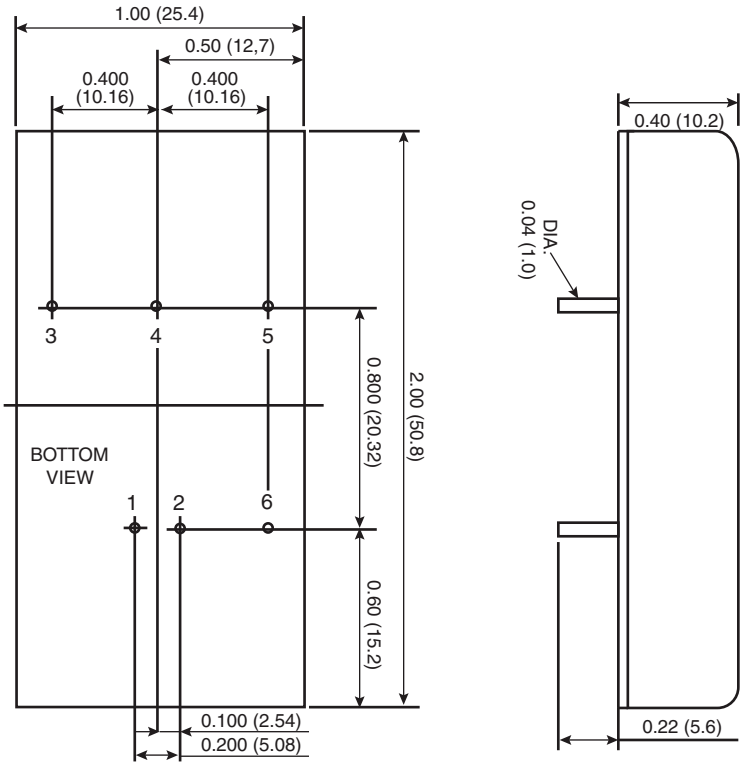
RWB20-48S5 EFFICIENCY INPUT VOLTAGE



RWB20-48S5 EFFICIENCY VS OUTPUT LOAD



Mechanical Drawing:

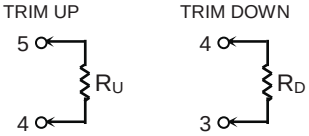


1. All dimensions in Inches (mm)
   Tolerance: X.XX±0.02 (X.X±0.5)
   X.XXX±0.01 (X.XX±0.25)
2. Pin pitch tolerance: ±0.01 (0.25)
3. Pin dimension tolerance: ±0.004 (0.1)

PIN CONNECTION		
PIN	SINGLE	DUAL
1	+ INPUT	+ INPUT
2	- INPUT	- INPUT
3	+ OUTPUT	+ OUTPUT
4	TRIM	COMMON
5	- OUTPUT	- OUTPUT
6	CTRL	CTRL

EXTERNAL OUTPUT TRIMMING

Output can be externally trimmed by using the method shown below.



REMOTE On/Off	
Option	Suffix
Negative logic remote ON/OFF (Standard)	
Positive logic remote ON/OFF	-A
Without ON/OFF logic pin	-B
Negative remote logic ON/OFF without TRIM pin	-C
Without ON/OFF logic & TRIM pin	-D
Positive remote logic ON/OFF without TRIM pin	-E

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