POWER MATE TECHNOLOGY CO., LTD.

RED20W SERIES

20 WATTS DC-DC CONVERTER

FEATURES

- **RAILWAY APPLICATION**
- **20 WATTS MAXIMUM OUTPUT POWER**
- **ULTRA LOW QUIESCENT CURRENT**
- **SINGLE OUTPUT UP TO 4.5A**
- **STANDARD 2.00 X 1.00 X 0.40 INCH**
- **HIGH EFFICIENCY UP TO 89%**
- **4:1 ULTRA WIDE INPUT VOLTAGE RANGE**
- **SIX-SIDED CONTINUOUS SHIELD**
- **FIXED SWITCHING FREQUENCY**
- **CE MARK MEETS 2006/95/EC, 2011/95/EC AND 2004/108/EC**
- **SAFETY MEETS UL60950-1, EN60950-1, IEC60950-1 AND EN50155**
- **COMPLIANT TO RoHS EU DIRECTIVE 2011/65/EU**

OPTIONS

Positive logic Remote On/Off, Without trim pin, Without On/Off control pin

APPLICATIONS

Wireless Network
Telecom/Datacom
Industry Control System
Measurement Equipment
Semiconductor Equipment
Railway System

DESCRIPTION

RED20W DC/DC converters provide up to 20 watts of output power in an industry standard package and footprint. RED20W series have 4:1 ultra wide input voltage of 9~36, 18~75 and 43~160VDC. The RED20W have features 1600VDC of isolation, short circuit protection, over-current protection, over-voltage protection and six sided shielding.

TECHNICAL SPECIFICATION

All specifications are typical at nominal input, full load and 25ºC otherwise noted

OUTPUT SPECIFICATIONS

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 Dual	± 0.2% ± 0.5%
Load regulation	No Load to Full Load	Single Dual	± 0.2% ± 1.0%
	10% Load to 90% Load	Single Dual	± 0.1% ± 0.8%
Cross regulation	Asymmetrical load 25% / 100% FL	Dual	± 5%
Ripple and noise	20MHz bandwidth (Measured with a 1µF/50V X7R MLCC)		See table
Temperature coefficient			±0.02% / ºC, max.
Transient response recovery time 25% load step change			250µs
Over voltage protection	3.3VDC output 5VDC output 12VDC output 15VDC output		3.7VDC~5.4VDC 5.6VDC~7.0VDC 13.5VDC~19.6VDC 16.8VDC~20.5VDC
Over load protection	% of FL at nominal input		150%
Short circuit protection			Continuous, automatics recovery

GENERAL SPECIFICATIONS

Efficiency		See table
Isolation voltage	Input to Output Input(Output) to Case	1600VDC, min. 1minute 1000VDC, min. 1minute
Isolation resistance	500VDC	10^9 ohms, min.
Isolation capacitance		3000pF, max.
Switching frequency		330kHz±10%
Design meet safety standard		IEC60950-1, UL60950-1, EN60950-1, EN50155
Case material		Nickel-coated copper
Base material		FR4 PCB
Potting material		Silicone (UL94-V0)
Dimensions		2.00 X 1.00 X 0.40 Inch (50.8X 25.4 X 10.2 mm)
Weight		30g(1.06oz)
MTBF (Note 1)	MIL-HDBK-217F	$1.523x10^6$hrs

INPUT SPECIFICATIONS

Input voltage range	24VDC nominal input 48VDC nominal input 110VDC nominal input	9 ~ 36VDC 18 ~ 75VDC 43 ~ 160VDC
Input filter	24VDC, 48VDC input 110VDC input	Common Chock Pi Filter
Input surge voltage	24VDC input 48VDC input 110VDC input	50VDC 1sec, max. 100VDC 1sec, max. 170VDC 1sec, max.
Input reflected ripple current	Nominal input and full load	30mAp-p
Start up time	Nominal input and constant resistive load	Power up 30ms, max. Remote ON/OFF 30ms, max.
Start-up voltage	24VDC input 48VDC input 110VDC input	9VDC, max. 18VDC, max. 43VDC, max.
Shutdown voltage	24VDC input 48VDC input 110VDC input	8VDC 16VDC 40VDC
Remote ON/OFF (Note 6)		
Positive logic(Option)	DC-DC ON DC-DC OFF	Open or 3 V < Vr < 15V Short or 0V < Vr < 1.2V
Negative logic(Standard)	DC-DC ON DC-DC OFF	Short or 0V < Vr < 1.2V Open or 3V < Vr < 15V
Input current of Remote control pin	Nominal input	-0.5mA~1.0mA
Remote off state input current	Nominal input	2.5mA

ENVIRONMENTAL SPECIFICATIONS

Operating ambient temperature (Note 7)		-40ºC ~ +101ºC (with derating)
Maximum case temperature		+105ºC
Storage temperature range		-55ºC ~ +125ºC
Thermal impedance (Note 8)	Natural convection Natural convection with heat-sink	12ºC/Watt 10ºC/Watt
Thermal shock		EN61373, MIL-STD-810F
Vibration		EN61373, MIL-STD-810F
Relative humidity		5% to 95% RH

EMC CHARACTERISTICS

EMI (Note 9)	EN55022, EN55011		Class A, Class B
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	10 Vr.m.s	Perf. Criteria A

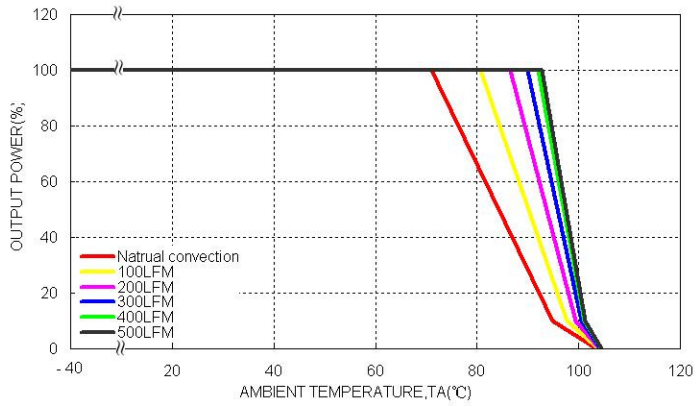
Model Number	Input Range	Output Voltage	Output Current		Output [3] Ripple & Noise	No Load[2] Input Current	Eff [3] (%)	Capacitor [4] Load max
			Min. Load	Full Load				
RED20-24S3P3W	9 ~ 36 VDC	3.3 VDC	0mA	4500mA	75mVp-p	6mA	85	7000μF
RED20-24S05W	9 ~ 36 VDC	5 VDC	0mA	4000mA	75mVp-p	6mA	88	5000μF
RED20-24S12W	9 ~ 36 VDC	12 VDC	0mA	1670mA	100mVp-p	6mA	89	850μF
RED20-24S15W	9 ~ 36 VDC	15 VDC	0mA	1330mA	100mVp-p	6mA	88	700μF
RED20-24D12W	9 ~ 36 VDC	± 12 VDC	0mA	± 833mA	100mVp-p	6mA	88	± 500μF
RED20-24D15W	9 ~ 36 VDC	± 15 VDC	0mA	± 667mA	100mVp-p	6mA	89	± 350μF
RED20-48S3P3W	18 ~ 75 VDC	3.3 VDC	0mA	4500mA	75mVp-p	4mA	85	7000μF
RED20-48S05W	18 ~ 75 VDC	5 VDC	0mA	4000mA	75mVp-p	4mA	88	5000μF
RED20-48S12W	18 ~ 75 VDC	12 VDC	0mA	1670mA	100mVp-p	4mA	89	850μF
RED20-48S15W	18 ~ 75 VDC	15 VDC	0mA	1330mA	100mVp-p	4mA	89	700μF
RED20-48D12W	18 ~ 75 VDC	± 12 VDC	0mA	± 833mA	100mVp-p	4mA	88	± 500μF
RED20-48D15W	18 ~ 75 VDC	± 15 VDC	0mA	± 667mA	100mVp-p	4mA	89	± 350μF
RED20-110S3P3W	43 ~ 160 VDC	3.3 VDC	0mA	4500mA	75mVp-p	3mA	85	7000μF
RED20-110S05W	43 ~ 160 VDC	5 VDC	0mA	4000mA	75mVp-p	3mA	87	5000μF
RED20-110S12W	43 ~ 160 VDC	12 VDC	0mA	1670mA	100mVp-p	3mA	88	850μF
RED20-110S15W	43 ~ 160 VDC	15 VDC	0mA	1330mA	100mVp-p	3mA	88	700μF
RED20-110D12W	43 ~ 160 VDC	± 12 VDC	0mA	± 833mA	100mVp-p	3mA	88	± 500μF
RED20-110D15W	43 ~ 160 VDC	± 15 VDC	0mA	± 667mA	100mVp-p	3mA	89	± 350μF

Note

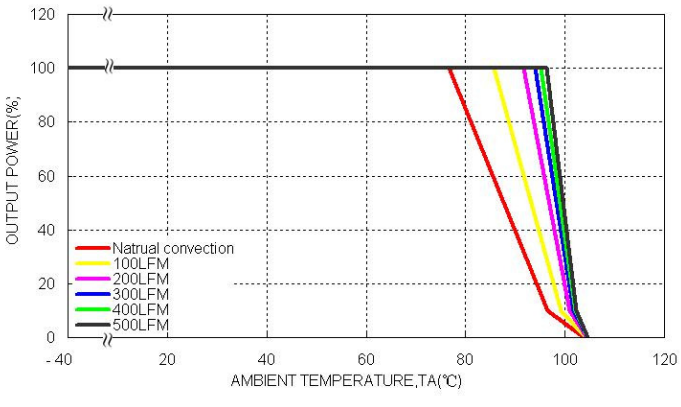
1. MIL-HDBK-217F @Ta=25 ºC, Full load.
2. Typical value at nominal input and no load.
3. Typical value at nominal input and full load.
4. Test by minimum input and constant resistive load.
5. Trimming allows the user to increase or decrease the output voltage set point of the module. This is accomplished by connecting an external resistor between the TRIM pin and either the +OUTPUT pin or the -OUTPUT pin.
6. The CTRL pin voltage is reference to -INPUT.
   The order number please see product standard table.
7. Operating ambient temperature:
   Converter can meet the railway T2 and TX temperature requirement.
   T2: -40℃ ~ +70℃ as all models , TX: -40℃ ~ +85℃ 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. The RED20W series 24VDC & 48VDC input standard module meet EN55022 & EN55011 Class B without external components, 110VDC input meet EN55022 Class A without external components and meet Class B with external components. For more detail information, please contact with P-DUKE.
10. An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5.
    The filter capacitor Power Mate suggest: 24VDC & 48VDC input: Nippon chemi-con KY series, 220μF/100V.
    110VDC input: Rubycon BXF series, 100μF/250V.

CAUTION: This power module is not internally fused. An input line fuse must always be used.

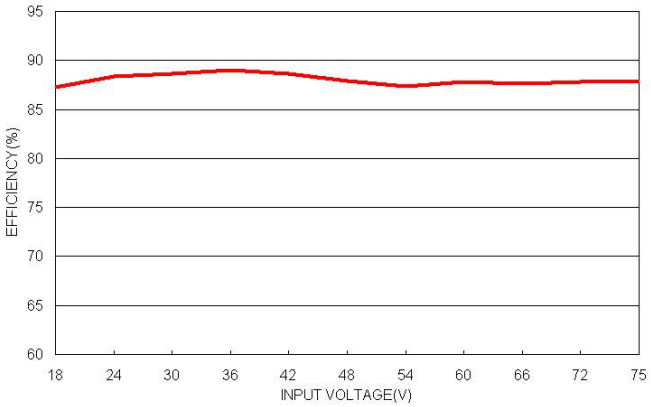
RED20-48S05W Derating Curve



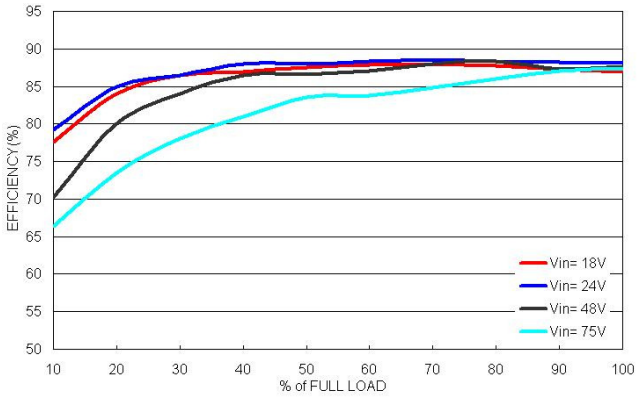
RED20-48S05W Derating Curve With Heat-sink（Note 8）



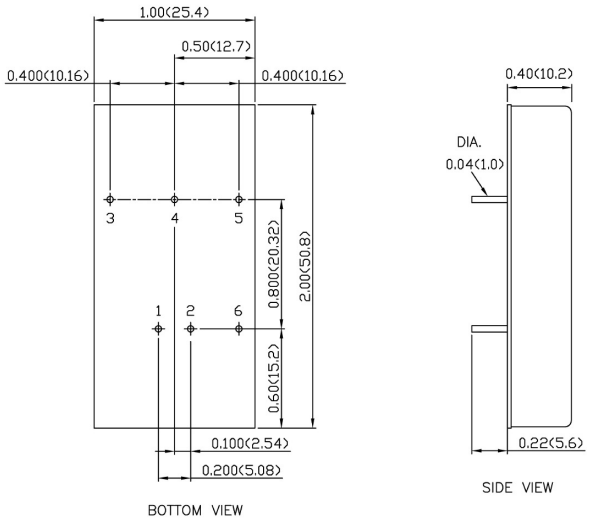
RED20-48S05W Efficiency VS Input Voltage



RED20-48S05W Efficiency VS Output Load



MECHANICAL DRAWING :



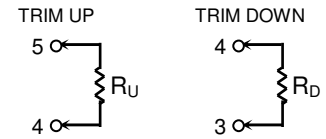
1. All dimensions in Inch (mm)

   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.



PRODUCT STANDARD TABLE	
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