

# RED20W SERIES

DC-DC CONVERTER

4 : 1 ULTRA WIDE INPUT RANGE  
 UP TO 20Watts



## FEATURES

- 1600VDC INPUT TO OUTPUT ISOLATION
- STANDARD 2.00 X 1.00 X 0.40 INCH
- SIX-SIDED CONTINUOUS SHIELD
- UL60950-1, EN60950-1, & IEC60950-1 SAFETY APPROVALS
- COMPLIANCE TO EN50155 AND EN45545-2 RAILWAY STANDARD
- CE MARKED
- COMPLIANT TO RoHS II & REACH

## APPLICATIONS

- RAILWAY SYSTEM
- WIRELESS NETWORK
- TELECOM/DATACOM
- INDUSTRY CONTROL SYSTEM
- DISTRIBUTED POWER ARCHITECTURES
- SEMICONDUCTOR EQUIPMENT

<b>1600VDC ISOLATION</b>	<b>REMOTE CONTROL</b>	<b>UVP</b>	<b>OCP</b>	<b>SCP</b>	<b>OVP</b>	<b>LOW STANDBY POWER</b>
--------------------------	-----------------------	------------	------------	------------	------------	--------------------------

## TECHNICAL SPECIFICATION

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

Model Number	Input Range	Output Voltage	Output Current @ Full Load	Input Current @ No Load	Efficiency	Maximum Capacitor Load (1)
	VDC	VDC	mA	mA		μF
RED20-24S3P3W	9 ~ 36	3.3	4500	6	85	7000
RED20-24S05W	9 ~ 36	5	4000	6	88	5000
RED20-24S12W	9 ~ 36	12	1670	6	89	850
RED20-24S15W	9 ~ 36	15	1330	6	88	700
RED20-24D12W	9 ~ 36	±12	±833	6	88	±500
RED20-24D15W	9 ~ 36	±15	±667	6	89	±350
RED20-48S3P3W	18 ~ 75	3.3	4500	4	85	7000
RED20-48S05W	18 ~ 75	5	4000	4	88	5000
RED20-48S12W	18 ~ 75	12	1670	4	89	850
RED20-48S15W	18 ~ 75	15	1330	4	89	700
RED20-48D12W	18 ~ 75	±12	±833	4	88	±500
RED20-48D15W	18 ~ 75	±15	±667	4	89	±350
RED20-110S3P3W	43 ~ 160	3.3	4500	3	85	7000
RED20-110S05W	43 ~ 160	5	4000	3	87	5000
RED20-110S12W	43 ~ 160	12	1670	3	88	850
RED20-110S15W	43 ~ 160	15	1330	3	88	700
RED20-110D12W	43 ~ 160	±12	±833	3	88	±500
RED20-110D15W	43 ~ 160	±15	±667	3	89	±350

## PART NUMBER STRUCTURE

<b>RED20</b>	<b>- 48</b>	<b>S</b>	<b>05</b>	<b>W</b>	<b>-</b>	<b>A</b>	<b>HS</b>
Series Name	Input Voltage (VDC)	Output Quantity	Output Voltage (VDC)	Input Range		Option	Assembly Option
	24: 9~36 48: 18~75 110: 43~160	S: Single  D: Dual	3P3: 3.3 05: 5 12: 12 15: 15	4:1		□: Negative logic remote ON/OFF(Standard) A: Positive logic remote ON/OFF B: Without Ctrl pin C: Negative logic remote ON/OFF without Trim pin D: Without Ctrl & Trim pin E: Positive logic remote ON/OFF without Trim pin	□: None HS: Heat-sink HC: Heat-sink with Clamp

**INPUT SPECIFICATIONS**

Parameter	Conditions		Min.	Typ.	Max.	Unit
Operating input voltage range	24Vin(nom)		9	24	36	VDC
	48Vin(nom)		18	48	75	
	110Vin(nom)		43	110	160	
Input reflected ripple current				30		mAp-p
Start up voltage	24Vin(nom)				9	VDC
	48Vin(nom)				18	
	110Vin(nom)				43	
Shutdown voltage	24Vin(nom)			8		VDC
	48Vin(nom)			16		
	110Vin(nom)			40		
Start up time	Constant resistive load	Power up			30	ms
		Remote ON/OFF			30	
Input surge voltage	100 ms, max.	24Vin(nom)			50	VDC
		48Vin(nom)			100	
		110Vin(nom)			170	
Input filter		24Vin(nom), 48 Vin(nom) 110Vin(nom)	Common Chock Pi type			
Remote ON/OFF	Referred to -Vin pin	Positive logic	DC-DC ON		Open or 3 ~ 15VDC	mA
		(Option)	DC-DC OFF		Short or 0 ~ 1.2VDC	
		Negative logic	DC-DC ON		Short or 0 ~ 1.2VDC	
		(Standard)	DC-DC OFF		Open or 3 ~ 15VDC	
		Input current of Ctrl pin	-0.5		+1.0	
		Remote off input current		2.5		

**OUTPUT SPECIFICATIONS**

Parameter	Conditions		Min.	Typ.	Max.	Unit
Voltage accuracy			-1.0		+1.0	%
Line regulation	Low Line to High Line at Full Load	Single	-0.2		+0.2	%
		Dual	-0.5		+0.5	
Load regulation	No Load to Full Load	Single	-0.2		+0.2	%
		Dual	-1.0		+1.0	
	10% Load to 90% Load	Single	-0.1		+0.1	
		Dual	-0.8		+0.8	
Cross regulation	Asymmetrical load 25%/100% FL	Dual	-5.0		+5.0	%
Voltage adjustability	Single output		-10		+10	%
Ripple and noise	20MHz bandwidth	3.3Vout, 5Vout		75		mVp-p
	With a 1 $\mu$ F/50V X7R MLCC	12Vout, 15Vout		100		
Temperature coefficient			-0.02		+0.02	%/°C
Transient response recovery time	25% load step change			250		$\mu$ s
Over voltage protection	3.3Vout		3.7		5.4	VDC
	5Vout		5.6		7.0	
	12Vout		13.5		19.6	
	15Vout		16.8		20.5	
Over load protection	% of Iout rated			150		%
Short circuit protection			Continuous, automatic recovery			

**GENERAL SPECIFICATIONS**

Parameter	Conditions		Min.	Typ.	Max.	Unit
Isolation voltage	1 minute	Input to Output	1600			VDC
		Input (Output) to Case	1600			
Isolation resistance	500VDC		1			G $\Omega$
Isolation capacitance					3000	pF
Switching frequency			297	330	363	kHz
Safety approvals			UL60950-1 EN60950-1 IEC60950-1			
Case material			Nickel-coated copper			
Base material			FR4 PCB			
Potting material			Silicone (UL94 V-0)			
Weight			30g (1.06oz)			
MTBF	MIL-HDBK-217F, Full load		1.523 x 10 <sup>6</sup> hrs			

**ENVIRONMENTAL SPECIFICATIONS**

Parameter	Conditions	Min.	Typ.	Max.	Unit
Operating ambient temperature	With derating	-40		+101	°C
Maximum case temperature				+105	°C
Storage temperature range		-55		+125	°C
Thermal impedance	Natural convection (20LFM) Without heat-sink With heat-sink		12 10		°C/W
Thermal shock					MIL-STD-810F
Shock					EN61373, MIL-STD-810F
Vibration					EN61373, MIL-STD-810F
Relative humidity					5% to 95% RH

**EMC SPECIFICATIONS**

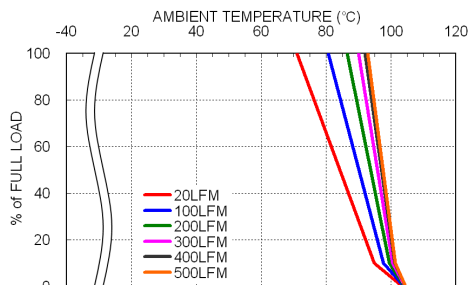
Parameter	Conditions	Level
EMI <sup>(2)</sup>	EN55022, EN55011	Class A, Class B
ESD	EN61000-4-2 Air ± 8kV and Contact ± 6kV	Perf. Criteria A
Radiated immunity	EN61000-4-3 10 V/m	Perf. Criteria A
Fast transient <sup>(3)</sup>	EN61000-4-4 ±2kV	Perf. Criteria A
Surge <sup>(3)</sup>	EN61000-4-5 ±2kV	Perf. Criteria A
Conducted immunity	EN61000-4-6 10 Vr.m.s	Perf. Criteria A
Power frequency magnetic field	EN61000-4-8 100A/m continuous; 1000A/m 1 second	Perf. Criteria A

**Note:**

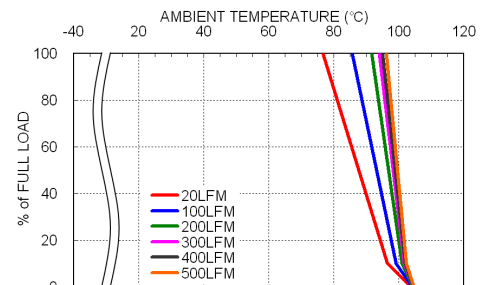
1. Test by minimum input and constant resistive load.
2. The 24VDC & 48VDC input standard modules meet EN55022 & EN55011 Class B without external components, 110VDC input meet EN55022 Class A without external components and meet Class B with external components. For further information, please contact with P-DUKE.
3. 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.  
The filter capacitor Power Mate suggest: 110VDC input: Rubycon BXF series, 100µF/250V.

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

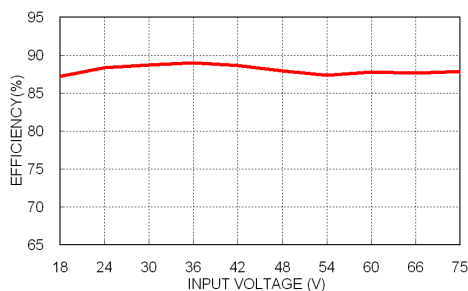
**CHARACTERISTIC CURVE**



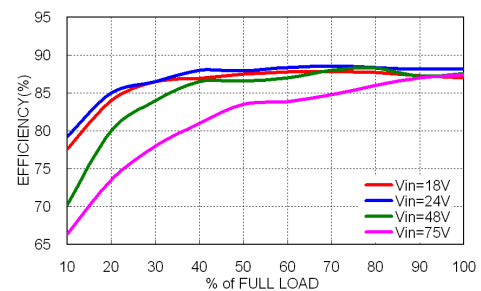
RED20-48S05W Derating Curve



RED20-48S05W Derating Curve With Heat-sink

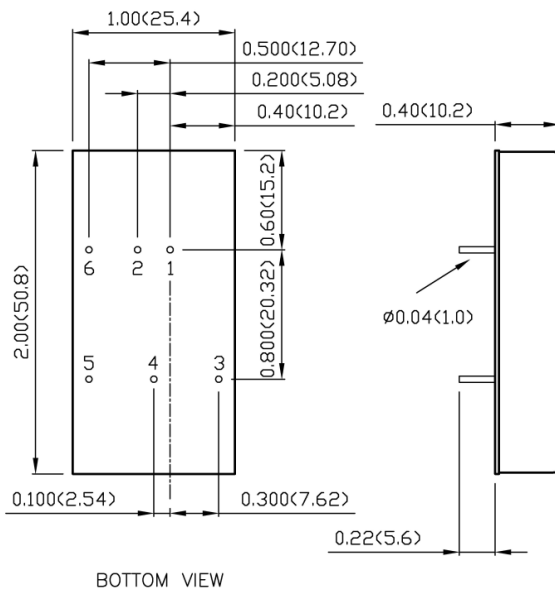


RED20-48S05W Efficiency vs. Input Voltage



RED20-48S05W Efficiency vs. Output Load

**MECHANICAL DRAWING**

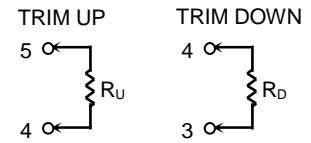


**PIN CONNECTION**

PIN	SINGLE	DUAL
1	+Vin	+Vin
2	-Vin	-Vin
3	+Vout	+Vout
4	Trim	Common
5	-Vout	-Vout
6	Ctrl	Ctrl

**EXTERNAL OUTPUT TRIMMING**

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



1. All dimensions in inch (mm)
2. Tolerance :x.xx±0.02 (x.x±0.5)  
x.xxx±0.01 (x.xx±0.25)
3. Pin pitch tolerance ±0.01 (0.25)
4. Pin dimension tolerance ±0.004(0.1)