Features

Regulated Converters

- 4:1 Wide Input Voltage Range
- 1.6kVDC Isolation
- UL Certified
- Efficiency up to 89%
- Six-Sided Continuous Shield

RECOM
DC/DC Converter

RP20-FW

20 Watt 2“ x 1“ Single & Dual Output

3 YEAR Warranty

Description

The RP20-FW series wide range input DC/DC converters are certified to UL 60950-1 and to cUL 60950-1. This makes them ideal for all telecom and industrial applications where approved safety standards are required. The industry standard 2” x 1” package meets military standards for thermal shock and vibration tolerance.

Selection Guide

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [mA]	Input[1] Current [mA]	Efficiency[1] typ. [%]	Max. Capacitive Load[2] [µF]
RP20-243.3SFW[3,4]	9-36	3.3	5500	890	85	18000
RP20-2405SFW[3,4]	9-36	5	4000	947	88	9600
RP20-2412SFW[3,4]	9-36	12	1670	971	86	1650
RP20-2415SFW[3,4]	9-36	15	1330	967	86	1050
RP20-483.3SFW[3,4]	18-75	3.3	5500	445	85	18000
RP20-4805SFW[3,4]	18-75	5	4000	473	88	9600
RP20-4812SFW[3,4]	18-75	12	1670	480	87	1650
RP20-4815SFW[3,4]	18-75	15	1330	478	87	1050
RP20-2405DFW[3,4]	9-36	±5	±2000	947	88	±4800
RP20-2412DFW[3,4]	9-36	±12	±833	957	87	±825
RP20-2415DFW[3,4]	9-36	±15	±667	958	87	±525
RP20-4805DFW[3,4]	18-75	±5	±2000	468	89	±4800
RP20-4812DFW[3,4]	18-75	±12	±833	473	88	±825
RP20-4815DFW[3,4]	18-75	±15	±667	474	88	±525

Notes:

Note1: Maximum value at nominal input voltage and full load.
Note2: Test by minimum Vin and constant resistor load.

RoHS 6 from 6 compliant
REACH compliant
c UL us E196683

UL60950-1 Certified

Model Numbering

RP20-___ ___FW/___ ___

- Input Voltage
- Output Voltage
- **S**ingle or **D**ual
- Package[4]
- Control Logic[3]

Ordering Examples

RP20-2405SFW = 24V 4:1 Input, 5V Output, Positive Logic CTRL pin fitted
RP20-4812DFW/N-HC = 48V 4:1 Input, ±12V Output, Negative Logic CTRL pin fitted, Heat-sink fitted

Notes:

Note3: no suffix for CTRL function with Positive Logic (1=ON, 0=OFF), and trim pin
add “N” for CTRL function with Negative Logic (0=ON, 1=OFF), and trim pin
Note4: add suffix -HC for premounted Heat-sink and clips

Specifications measured at Ta = 25°C, nominal input voltage, full load otherwise noted

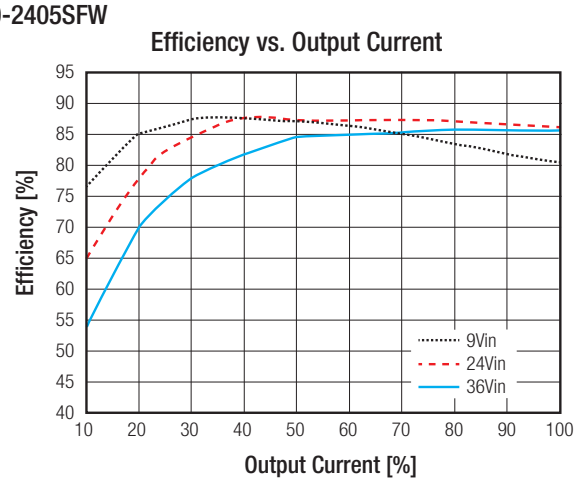
BASIC CHARACTERISTICS					
Parameter	**Condition**		**Min.**	**Typ.**	**Max.**
Input Voltage Range	nom. Vin = 24V nom. Vin = 48V		9VDC 18VDc	24VDC 48VDC	36VDC 75VDC
Under Voltage Lockout (UVLO)	Vin = 24V	DC-DC ON DC-DC OFF		 7.5VDC	9VDC
	Vin = 48V	DC-DC ON DC-DC OFF		 15VDC	18VDC
Input Filter					Pi-Type
Input Reflected Ripple Current	nominal Vin and full load			20mAp-p	
Input Surge Voltage	Vin = 24V, 100ms max. Vin = 48V, 100ms max.				50VDC 100VDC
Start-up time	Power up Remote ON/OFF			20ms 20ms	
Operating Frequency Range			360kHz	400kHz	440kHz
Minimum Load[5]			0%		
Optional Output Trim					±10%
Ripple and Noise	measured by 20MHz bandwidth with a 0.1µF/50V MLCC	3.3V 5.0V, 12V, 15V		60mVp-p 75mVp-p	
		Dual		100mVp-p	
Remote ON/OFF[6]	Positive Logic	DC-DC ON DC-DC OFF			Open or 3.0V < Vr < 12V Short or 0V < Vr < 1.2V
	Negative Logic	DC-DC ON DC-DC OFF			Short or 0V < Vr < 1.2V Open or 3.0V < Vr < 12V
Input current of Remote pin (CTRL)		DC-DC OFF		2mA	
		DC-DC ON	-0.5mA		0.5mA

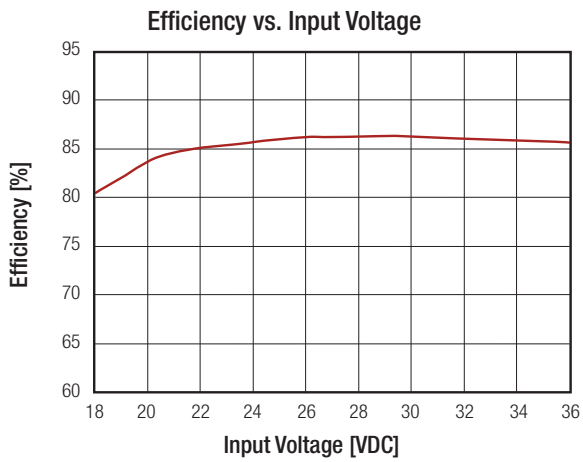
Notes:

Note5: The RP20-FW series requires a minimum of 10% loading on the output to maintain specified regulation. Operation under no-load condition will not damage these devices, however they may not meet all listed specification.

Note6: The ON/OFF control function can be positive or negative logic. The pin voltage is referenced to -Vin pin.

RP20-2405SFW





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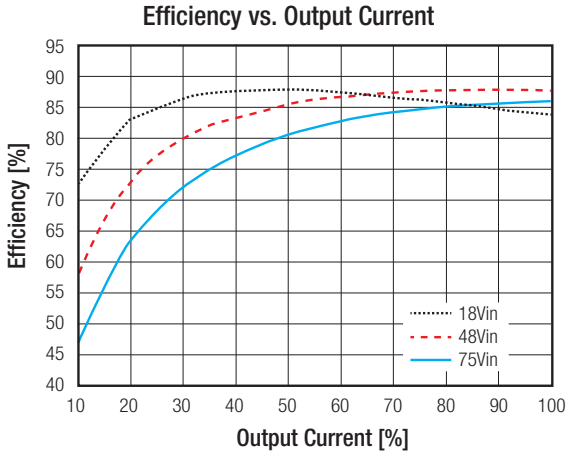
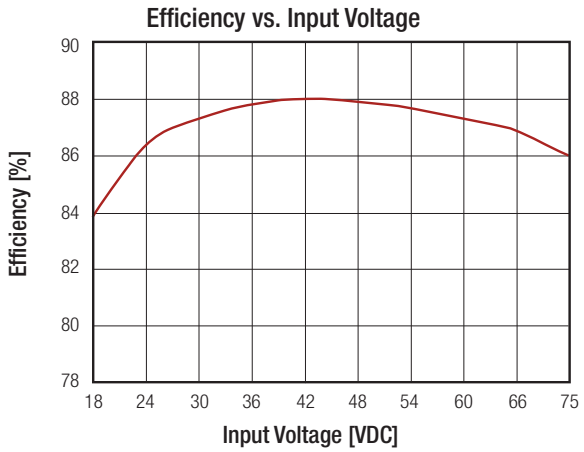
Specifications measured at Ta = 25°C, nominal input voltage, full load otherwise noted

RP20-4805SFW





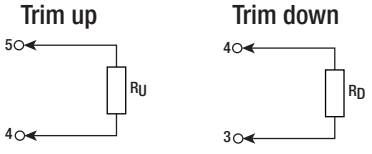
REGULATIONS

Parameter	Condition		Value
Output Voltage Accuracy			±1.0%
Voltage Adjustability	Single		±10%
Line Voltage Regulation	low line to high line at full load	Single Dual	±0.2% ±0.5%
Load Voltage Regulation	no load to full load	Single Dual	±0.5% ±1.0%
Cross Regulation	asymmetrical 25%<>100% load		±5%
Transient Response recovery time	25% load step change		250µs

External Output Trimming

Output Voltage Trimming

Single output Powerline converters offer the feature of trimming the output voltage over a certain range around the nominal value by using external trim resistors. No general equation can be given for calculating the trim resistors, but the following trimtables give typical values for chosing these trimming resistors. If voltages between the given trim points are required, extrapolate between the two nearest given values to work out the resis tor required or use a variable resistor to set the output voltage. Output can be externally trimmed by using the method shown below.



RP20-xx3.3SF

Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout =	3.333	3.366	3.399	3.432	3.465	3.498	3.531	3.564	3.597	3.63	Volts
R_U =	57.93	26.16	15.58	10.28	7.11	4.99	3.48	2.34	1.46	0.75	KOhms
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout =	3.267	3.234	3.201	3.168	3.135	3.102	3.069	3.036	3.003	2.97	Volts
R_D =	69.47	31.23	18.49	12.12	8.29	5.74	3.92	2.56	1.50	0.65	KOhms

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Specifications measured at Ta = 25°C, nominal input voltage, full load otherwise noted

RP20-xx05SFW

Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout =	5.05	5.10	5.15	5.20	5.25	5.30	5.35	5.4	5.45	5.50	Volts
R_U =	36.57	16.58	9.92	6.58	4.59	3.25	2.30	1.59	1.03	0.59	KOhms
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout =	4.95	4.90	4.85	4.80	4.75	4.70	4.65	4.60	4.55	4.50	Volts
R_D =	45.53	20.61	12.31	8.15	5.66	4.00	2.81	1.92	1.23	0.68	KOhms

RP20-xx12SFW

Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout =	12.12	12.24	12.36	12.48	12.60	12.72	12.84	12.96	13.08	13.20	Volts
R_U =	367.91	165.95	98.64	64.98	44.78	31.32	21.70	14.49	8.88	4.39	KOhms
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout =	11.88	11.76	11.64	11.52	11.40	11.28	11.16	11.04	10.92	10.8	Volts
R_D =	460.99	207.95	123.60	81.42	56.12	39.25	27.20	18.16	11.13	5.51	KOhms

RP20-xx15SFW

Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout =	15.15	15.3	15.45	15.60	15.75	15.90	16.05	16.20	16.35	16.50	Volts
R_U =	404.18	180.59	106.06	68.80	46.44	31.53	20.88	12.90	6.69	1.72	KOhms
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout =	14.85	14.70	14.55	14.40	14.25	14.10	13.95	13.80	13.65	13.50	Volts
R_D =	499.82	223.41	131.27	85.20	57.56	39.14	25.97	16.10	8.42	2.282	KOhms

PROTECTIONS

Parameter	Condition		Value
Short Circuit Protection (SCP)			continuous, automatic recovery
Over Voltage Protection (OVP)	Zener Diode Clamp	3.3Vout 5Vout 12Vout 15Vout	3.9VDC typ. 6.2VDC typ. 15VDC typ. 18VDC typ.
Over Load Protection (OLP)	% of Iout rated		150% typ.
Isolation Voltage	I/P to O/P I/P to O/P to case		1.6kVDC/1 minute 1.6kVDC/1 minute
Isolation Resistance	500 VDC		1GΩ min.
Isolation Capacitance			1500pF max.

Notes:

Note7: This power module is not internally fused. An input line fuse must always be used.

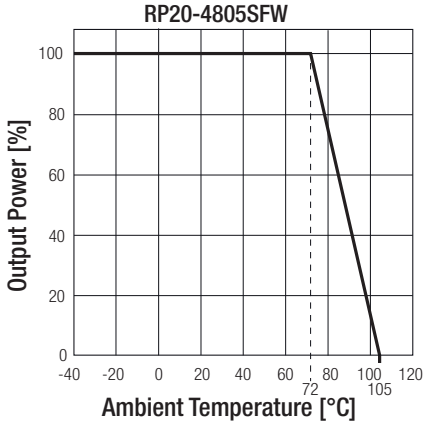
Specifications measured at Ta = 25°C, nominal input voltage, full load otherwise noted

ENVIRONMENTAL

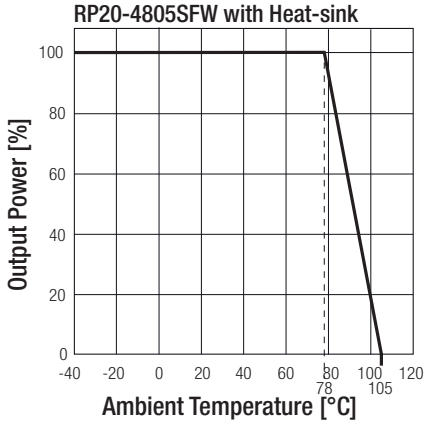
Parameter	Condition	Value
Operating Temperature Range	without derating with derating	-40°C to +72°C -40°C to +105°C
Maximum Case Temperature		+105°C
Temperature Coefficient		±0.02%/°C max.
Thermal Impedance	Natural convection (20LFM) Natural convection (20LFM) with Heat-sink	12°C/Watt 10°C/Watt
Operating Humidity		5% - 95% RH
Thermal Shock		MIL-STD-810F
Vibration		MIL-STD-810F
MTBF	MIL-HDBK-217F Bellcore TR-NWT-000332[8]	1851 x 10^3 hours 2350 x 10^3 hours

Derating Graph[9]

RP20-4805SFW



RP20-4805SFW with Heat-sink



Notes:

Note8: BELLCORE TR-NWT-000332. Case I: 50% Stress, Temperature at 40°C (Ground fixed and controlled environment).

Note9: Derating graphs are valid only for the shown part numbers. If you need detailed derating-information about a part-number not shown here please contact our technical support service at techsupportAT@recom-power.com

SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Report / File Number	Standard
UL General Safety	E196683	UL60950-1 1st. Ed.: 2003 C22.2 No. 60950 1st. Ed.: 2003

EMC Compliance	Condition	Standard / Criterion
EMI Standard[10]	with external filter	EN55022, Class A or B
ESD	Air ±8kV and Contact ±6kC	EN61000-4-2, Criteria B
Radiated Immunity	10 V/m	EN61000-4-3, Criteria A
Fast Transient[11]	±2kV	EN61000-4-4, Criteria B
Surge[11]	±1kV	EN61000-4-5, Criteria A
Conducted Immunity	10 Vr.m.s	EN61000-4-6, Criteria A

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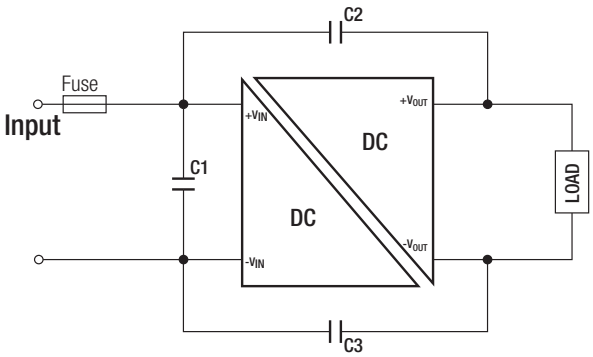
Specifications measured at Ta = 25°C, nominal input voltage, full load otherwise noted

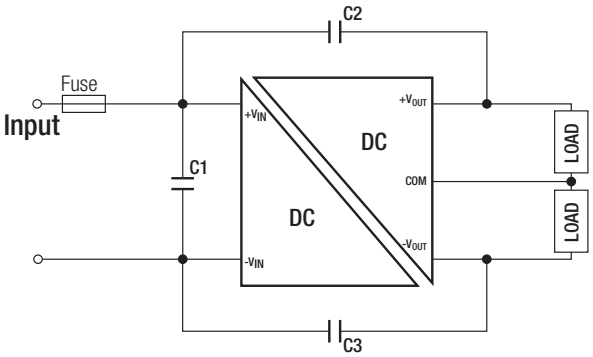
Notes:

Note10: The standard modues meet EMI Class A or Class B with external components, see filter suggestions below.

Note11: An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5. The filter capacitor Recom suggests: Nippon chemi-con KY series, 220µF/100V

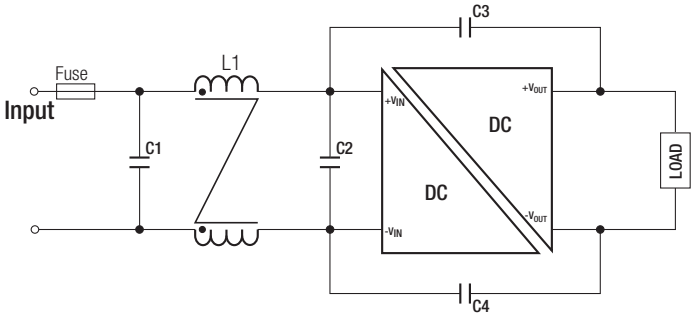
EMI Filtering Class A

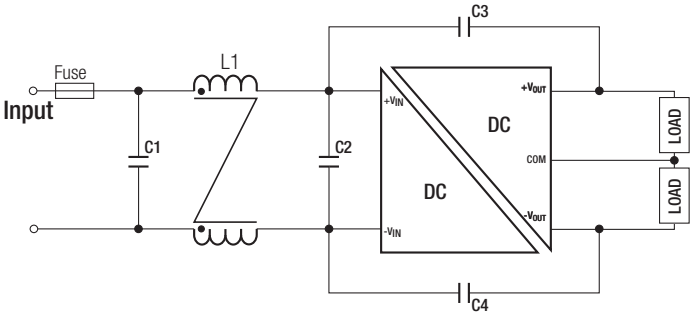




MODEL	C1	C2	C3
RP20-24xxSFW RP20-24xxDFW	N/A	1000pF/2kV 1808 MLCC	1000pF/2kV 1808 MLCC
RP20-48xxSFW RP20-48xxDFW	1µF/100V 1210 MLCC	1000pF/2kV 1808 MLCC	1000pF/2kV 1808 MLCC

EMI Filtering Class B





MODEL	C1	C2	C3/C4	L1
RP20-24xxSF RP20-24xxDF	4.7µF/50V 1812 MLCC	N/A	1000pF/2kV 1808 MLCC	CMC: 450µH ref.: WE 7448227005 ref.: CMC-05
RP20-48xxSF RP20-48xxDF	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	1000pF/2kV 1808 MLCC	CMC: 325µH ref: WE 744290321 ref.: CMC-06

DIMENSIONS and PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	Case Base Potting	Nickel coated copper FR4 PCB Epoxy (UL94-V0)
Package Dimensions (LxWxH)	without Heat-sink with Heat-sink	50.8 x 25.4 x 10.2mm 56.8 x 25.4 x 16.8mm
Package Weight	without Heat-sink with Heat-sink	27g 37.89g

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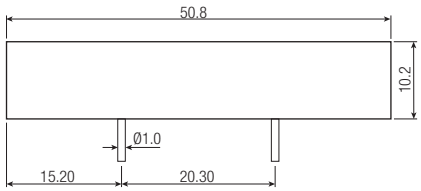
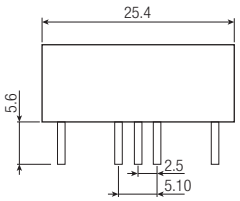
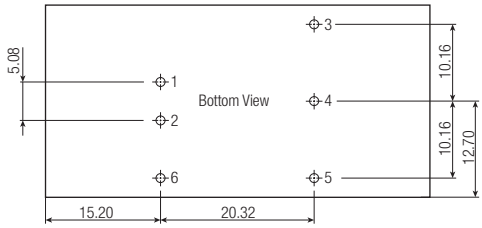
Specifications measured at Ta = 25°C, nominal input voltage, full load otherwise noted

Dimension Drawing (mm)





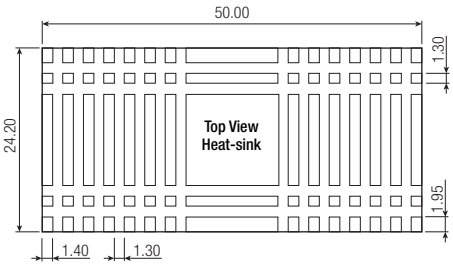


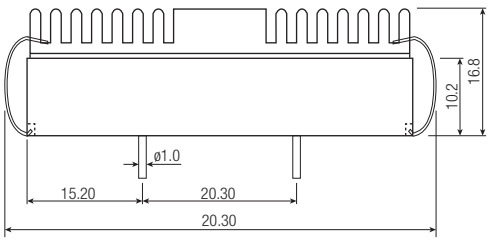
Pin Connections

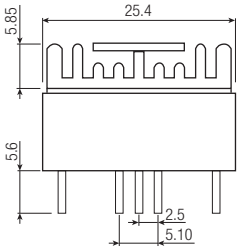
Pin #	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	+Vout	+Vout
4	Trim	Com
5	-Vout	-Vout
6	CTRL	CTRL

Pin Pitch Tolerance ±0.25 mm
Pin Dimension Tolerance ±0.1mm
Tolerance: X.X ±0.5mm
X.XX ±0.25mm

Dimension Drawing (mm) with Heat-sink







PACKAGING INFORMATION

Parameter	Type		Value
Packaging Quantity	without Heat-sink with Heat-sink	Tube Tray	9pcs. 20pcs.
Storage Temperature Range			-55°C to +125°C
Storage Humidity			5% - 95% RH