Features

Regulated Converters

- Wide 4:1 input voltage range
- 1.6kVDC isolation
- UL certified
- Efficiency up to 90%
- Six-sided continuous shield
- No minimum load required

RECOM
DC/DC Converter

RP20-AW

20 Watt 1“ x 1“ Single & Dual Output

3 YEAR Warranty

Description

The RP20-AW series are ultraminiature wide input voltage range power DC/DC converters in a case half the size of industry standard 20W converters. Despite their small size, the RP20-AW converters are fully specified devices with output currents up to 4.5 Amps, up to 90% efficiency, no minimum load, 1600VDC isolation, a built-in Class A EMC filter and low ripple/noise figures. The outputs are also fully protected against short circuits, overcurrent and overvoltage. The no load input current is particularly low (only 4mA/6mA). The RP20-AW series will find many uses in applications where board space and/or board height is at a premium or in battery-powered systems where standby current is important.

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]
RP20-243.3SAW (3,4)	9-36	3.3	4500	695	89	7000
RP20-2405SAW (3,4)	9-36	5	4000	936	89	5000
RP20-2412SAW (3,4)	9-36	12	1670	938	89	850
RP20-2415SAW (3,4)	9-36	15	1330	934	89	700
RP20-483.3SAW (3,4)	18-75	3.3	4500	356	87	7000
RP20-4805SAW (3,4)	18-75	5	4000	468	89	5000
RP20-4812SAW (3,4)	18-75	12	1670	469	89	850
RP20-4815SAW (3,4)	18-75	15	1330	462	90	700
RP20-2412DAW (3,4)	9-36	±12	±833	936	89	±500
RP20-2415DAW (3,4)	9-36	±15	±667	926	90	±350
RP20-4812DAW (3,4)	18-75	±12	±833	468	89	±500
RP20-4815DAW (3,4)	18-75	±15	±667	463	90	±350

Notes:

Note1: Measured at nominal input voltage and full load
Note2: Measured at minimum input voltage and constant resistive load

E196683

UL60950-1 Certified

Model Numbering

RP20-____AW/_-__

- Input Voltage
- Output Voltage
- **S**ingle or **D**ual
- Package (4)
- Control Logic (3)

Ordering Examples

RP20-2405SAW/P = 24V 4:1 Input, 5V Output, Positive Logic CTRL pin and Trim pin fitted
RP20-483.3SAW-HC = 48V 4:1 Input, 3.3V Output, Premounted Heat-sink, no Trim or CTRL pins
RP20-4812DAW/N = 48V 4:1 input, ±12V Output, negative logic with CTRL pin and Com pin fitted

Notes:

Note3: standard part is without suffix “P” or “N” = without CTRL & Trim function
Trim function is only available for single output with /P or /N suffix
add suffix “P” for CTRL function with positive logic (1=ON, 0=OFF), including trim pin
add suffix “N” for CTRL function with negative logic (0=ON, 1=OFF), including 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.
Internal Input Filter					Pi-Type
Input Voltage Range	nom. Vin = 24V nom. Vin = 48V		9VDC 18VDC	24VDC 48VDC	36VDC 75VDC
Input Surge Voltage	Vin = 24V, 100ms max. Vin = 48V, 100ms max.				50VDC 100VDC
Under Voltage Lockout (UVLO)	Vin = 24V	DC-DC ON DC-DC OFF		8VDC	9VDC
	Vin = 48V	DC-DC ON DC-DC OFF		16VDC	18VDC
Input Reflected Ripple Current [5]				30mAp-p	
Output Voltage Trimming [6]	Single Output				±10.0%
Minimum Load			0%		
Start-up time	Power up ON/OFF CTRL				30ms 30ms
ON/OFF CTRL [7]	Positive Logic	DC-DC ON DC-DC OFF			Open or 3.0V < Vr < 15V 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 < 15V
Input Current of CTRL Pin	DC-DC ON		-0.5mA		1.0mA
Standby Current	DC-DC OFF			2mA	
Internal Operating Frequency	3.3Vout, 5Vout Others		248kHz 297kHz	275kHz 330kHz	303kHz 363kHz
Ripple and Noise	20Mhz BW, with 1µF M/C X7R and a 10µF T/C	Single		75mVp-p	
	20Mhz BW; with 1µF M/C X7R and 10µF T/C for each output	Dual		100mVp-p	

Notes:

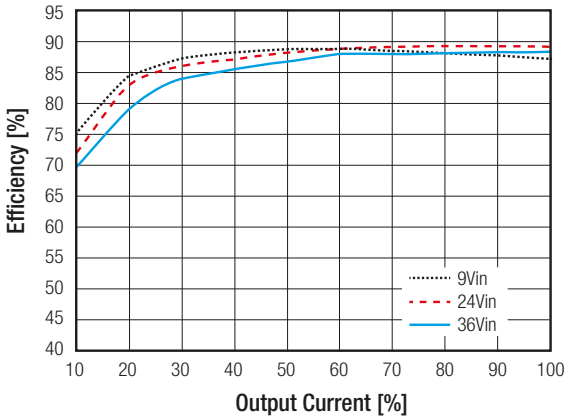
Note5: Simulated source impedance of 12µH. 12µH inductor in series with +Vin

Note6: 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 +Vout pin or -Vout pin. Please refer to next page

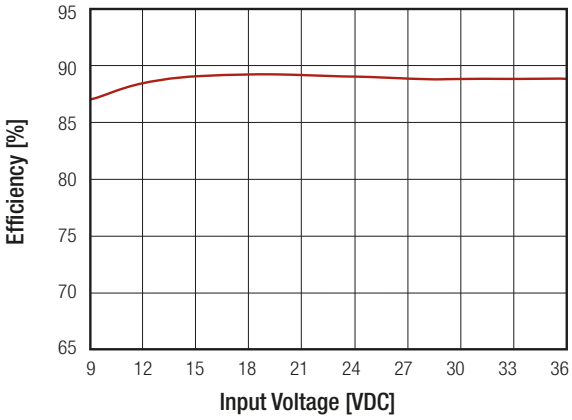
Note7: The ON/OFF control function can be positive or negative logic. The pin voltage is referenced to -Vin pin. If no suffix is specified, the control pin will be omitted

RP20-2405SAW

Efficiency vs. Output Current



Efficiency vs. Input Voltage



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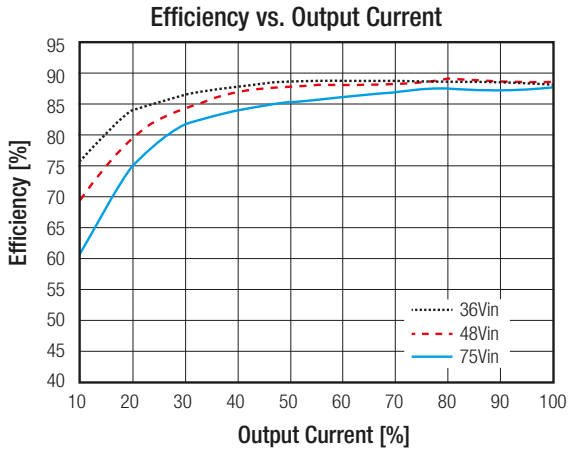
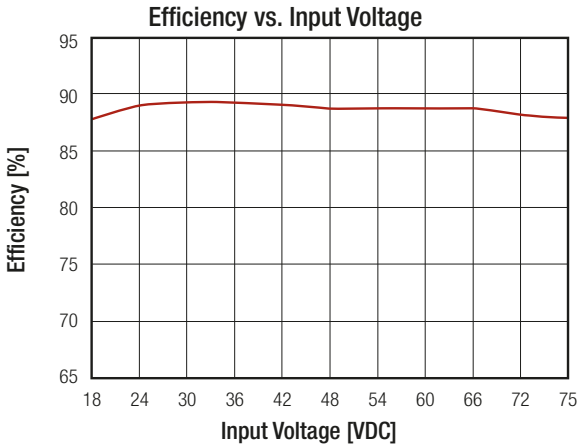
Specifications (measured at Ta = 25°C, nominal input voltage, full load otherwise noted)

RP20-4805SAW

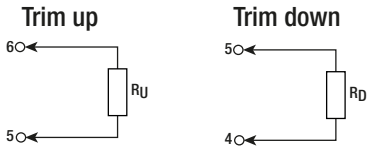




External Output Trimming

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 resistor required or use a variable resistor to set the output voltage. Output can be externally trimmed by using the method shown below.



RP20-xx3.3SAW

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 =	385.071	191.511	126.990	94.730	75.374	62.470	53.253	46.340	40.963	36.662	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 =	116.719	54.779	34.133	23.810	17.616	13.486	10.537	8.325	6.604	5.228	kOhms

RP20-xx05SAW

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 =	253.450	125.700	83.117	61.825	49.050	40.533	34.450	29.888	26.339	23.500	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 =	248.340	120.590	78.007	56.715	43.940	35.423	29.340	24.778	21.229	18.390	kOhms

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

RP20-xx12SAW

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 =	203.223	99.057	64.334	46.973	36.557	29.612	24.652	20.932	18.038	15.723	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 =	776.557	308.723	248.779	182.807	143.223	116.834	97.985	83.848	72.853	64.057	kOhms

RP20-xx15SAW

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 =	161.557	78.223	50.446	36.557	28.223	22.668	18.700	15.723	13.409	11.557	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 =	818.223	401.557	262.668	193.223	151.557	123.779	103.938	89.057	77.483	68.223	kOhms

REGULATIONS

Parameter	Condition		Value
Output Voltage Accuracy			±1.0%
Line Voltage Regulation	Single Dual		±0.2% ±0.5%
Load Voltage Regulation	0% load to 100% load	Single Dual	±0.2% ±1.0%
	10% load to 100% load	Single Dual	±0.1% ±0.8%
Cross Regulation	asymmetrical 25%<>100% load		±5.0%
Transient Response	25% load step change	recovery time	250µs typ.

PROTECTIONS

Parameter	Condition		Value
Short Circuit Protection (SCP)			continuous, automatic recovery
Over Voltage Protection (OVP)	Zener Diode Clamp	3.3Vout 5Vout 12Vout 15Vout	3.7 - 5.4VDC 5.6 - 7.0VDC 13.5 - 19.6VDC 16.8 - 20.5VDC
Over Load Protection (OLP)			Hiccup mode, 150% of rated Iout typ.
Isolation Voltage	tested for 1 minute	I/P to O/P I/P (O/P) to case	1.6kVDC 1.0kVDC
Isolation Resistance	tested with 500VDC		1GΩ min
Isolation Capacitance			1500pF max.

Notes:

Note8: This power module is not internally fused. An input line fuse must always be used. Recom suggests:
24Vin= T4A; 48Vin= T2A slow blow types

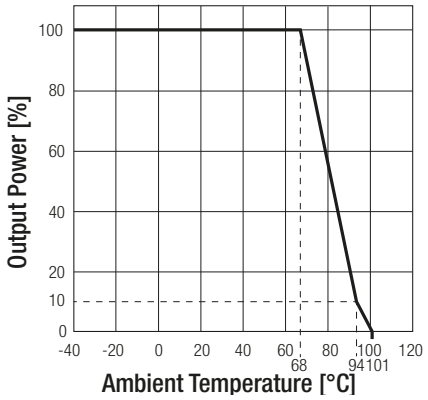
Specifications (measured at Ta = 25°C, nominal input voltage, full load otherwise noted)

ENVIRONMENTAL

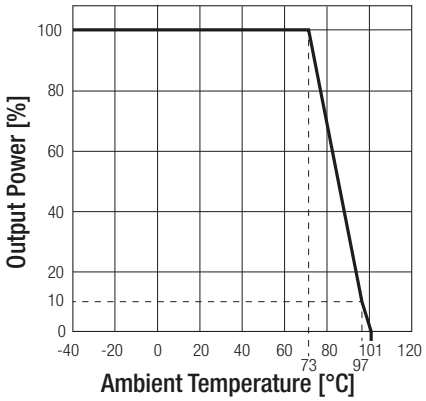
Parameter	Condition		Value
Operating Temperature Range	without derating with derating		-40°C to +68°C -40°C to +101°C
Maximum Case Temperature			+105°C
Temperature Coefficient			±0.02%/°C max.
Thermal Impedance	natural convection 0.1m/s (20LFM)	without Heat-sink with Heat-sink	17.6°C/Watt 14.8°C/Watt
Operating Humidity			5% - 95% RH
Thermal Shock			according to MIL-STD-810F
Vibration			according to MIL-STD-810F
MTBF	according to MIL-HDBK-217F, G.B. Bellcore TR-NWT-000332 (9)	+25°C	1469 x 10^3 hours 1766 x 10^3 hours

Derating Graph (10)

RP20-4815SAW



RP20-4815SAW with Heat-sink



Notes:

Note9: BELLCORE TR-NWT-000332. Case I: 50% Stress, Ta= 40°C. MIL-HDBK 217F Notice 2. Ta= 25°C, full load, (controlled environment)

Note10: Derating graphs are valid only for the shown part numbers. If you need detailed derating-information about a partpnumber not shown here please contact our technical support service at techsupportAT@recom-power.com.

SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Condition	Standard
Information Technology Equipment, General Requirements for Safety	E196683	UL60950-1 1st Ed.: 2003 C22.2 No. 60950 1st. Ed.: 2003

EMC Compliance	Condition	Standard / Criterion
Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	with external filter	EN55022, Class A or B
ESD Electrostatic discharge immunity test	Air ±8kV and Contact ±6kV	EN61000-4-2, Criteria A
Radiated, radio-frequency, electromagnetic field immunity test	10 V/m	EN61000-4-3, Criteria A
Fast Transient and Burst Immunity (11)	±2kV	EN61000-4-4, Criteria A
Surge Immunity (11)	±2kV	EN61000-4-5, Criteria A
Immunity to conducted disturbances, induced by radio-frequency fields	10 Vr.m.s	EN61000-4-6, Criteria A

Notes:

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.

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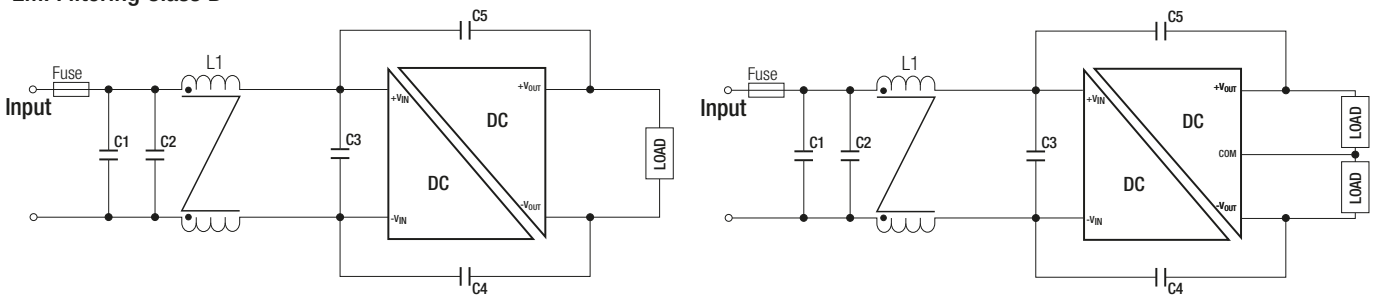
Specifications (measured at Ta = 25°C, nominal input voltage, full load otherwise noted)

EMI Filtering Class B

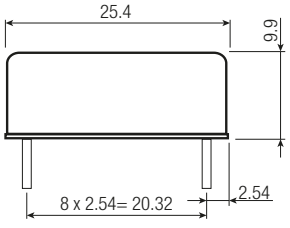


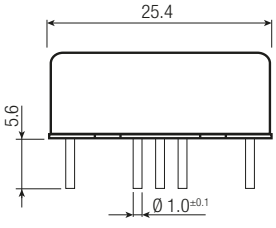
MODEL	C1	C2	C3	C4/C5	L1
RP20-24xxSAW RP20-24xxDAW	4.7µF/25V 1812 MLCC	N/A	N/A	470pF/2kV 1808 MLCC	CMC: 325µH ref.: WE 744290321 ref.: CMC-06
RP20-48xxSAW RP20-48xxDAW	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	470pF/2kV 1808 MLCC	CMC: 325µH ref.: WE 744290321 ref.: CMC-06

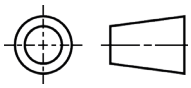
DIMENSIONS and PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	Case Base Potting	Nickel coated copper FR4 PCB Silicone (UL94-V0)
Package Dimensions (LxWxH)	without Heat-sink with Heat-sink	25.4 x 25.4 x 9.9mm 31.4 x 25.4x 16.5mm
Package Weight	without Heat-sink with Heat-sink	15g 21.44g

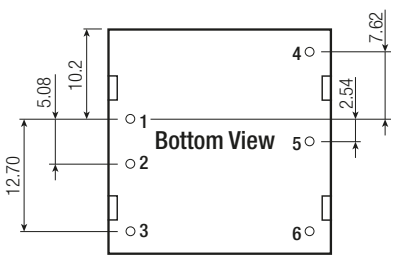
Dimension Drawing (mm)

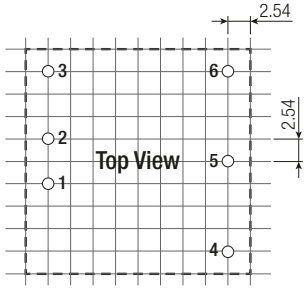






Recommended Footprint Details





Pin Connections

Pin #	Single	Single /P or /N	Dual	Dual /P or /N
1	+Vin	+Vin	+Vin	+Vin
2	-Vin	-Vin	-Vin	-Vin
3	no pin	CTRL	no pin	CTRL
4	+Vout	+Vout	+Vout	+Vout
5	no pin	Trim	Com	Com
6	-Vout	-Vout	-Vout	-Vout

Pin Pitch Tolerance ±0.25mm
Pin dimension tolerance ±0.1mm
XX.X ± 0.5mm
XX.XX ± 0.25mm

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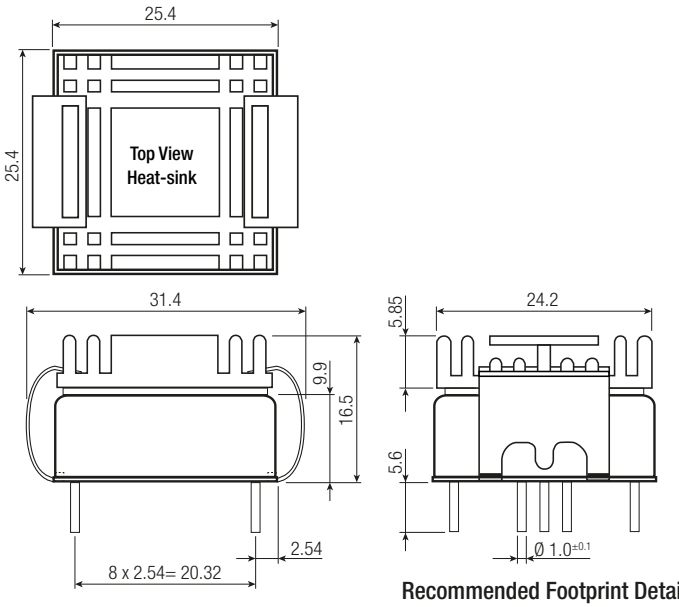
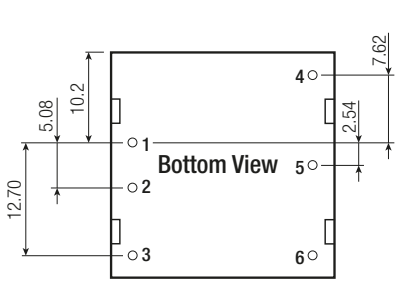
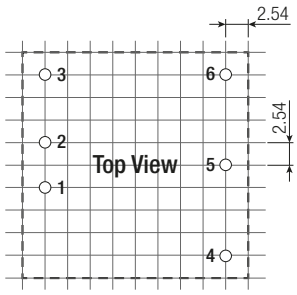
Specifications (measured at Ta = 25°C, nominal input voltage, full load otherwise noted)

Dimension Drawing (mm) with Heat-sink





Recommended Footprint Details



Pin Connections

Pin #	Single	Single /P or /N	Dual	Dual /P or /N
1	+Vin	+Vin	+Vin	+Vin
2	-Vin	-Vin	-Vin	-Vin
3	no pin	CTRL	no pin	CTRL
4	+Vout	+Vout	+Vout	+Vout
5	no pin	Trim	Com	Com
6	-Vout	-Vout	-Vout	-Vout

Pin Pitch Tolerance ±0.25mm
Pin dimension tolerance ±0.1mm
XX.X ± 0.5mm
XX.XX ± 0.25mm

PACKAGING INFORMATION

Parameter	Type		Value
Packaging Dimensions (LxWxH)	without Heat-sink	Tube	230.0 x 180.0 x 28.0mm
	with Heat-sink	Tray	230.0 x 180.0 x 28.0mm
Packaging Quantity	without Heat-sink	Tube	8pcs
	with Heat-sink	Tray	20pcs
Storage Temperature Range			-55°C to +125°C
Storage Humidity			5% - 95% RH