

# Features

# Regulated Converters

- 4:1 Wide Input Voltage Range
- 1.6kVDC Isolation
- UL Certified
- Efficiency up to 88%
- Over Current and Over Voltage Protection
- No Minimum Load Required



## RP12-AW

**12 Watt**  
**DIP24/SMD**  
**Single & Dual**  
**Output**

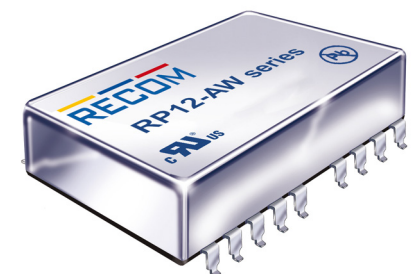
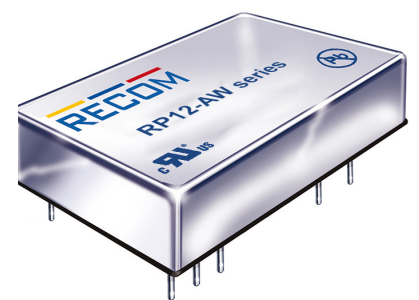


### Description

The RP12-AW wide range input DC/DC converters are certified to UL 60950-1 and cUL 60950-1. This makes them ideal for all telecom and industrial applications where approved safety standards are required. The DIP24 package is available in both pinned and SMD case styles and meets military standards for thermal shock and vibration tolerance.

### Selection Guide

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [mA]	Input <sup>(1)</sup> Current [mA]	Efficiency <sup>(1)</sup> typ. [%]	Max. Capacitive Load <sup>(2)</sup> [µF]
RP12-243.3SAW <sup>(3)</sup>	9-36	3.3	3500	573	84	2000
RP12-2405SAW <sup>(3)</sup>	9-36	5.1	2400	575	87	2000
RP12-2412SAW <sup>(3)</sup>	9-36	12	1000	575	87	430
RP12-2415SAW <sup>(3)</sup>	9-36	15	800	575	87	300
RP12-483.3SAW <sup>(3)</sup>	18-75	3.3	3500	286	84	2000
RP12-4805SAW <sup>(3)</sup>	18-75	5.1	2400	293	87	2000
RP12-4812SAW <sup>(3)</sup>	18-75	12	1000	287	87	430
RP12-4815SAW <sup>(3)</sup>	18-75	15	800	284	88	300
RP12-2405DAW <sup>(3)</sup>	9-36	±5	±1200	595	84	±1250
RP12-2412DAW <sup>(3)</sup>	9-36	±12	±500	575	87	±200
RP12-2415DAW <sup>(3)</sup>	9-36	±15	±400	575	87	±120
RP12-4805DAW <sup>(3)</sup>	18-75	±5	±1200	294	85	±1250
RP12-4812DAW <sup>(3)</sup>	18-75	±12	±500	287	87	±200
RP12-4815DAW <sup>(3)</sup>	18-75	±15	±400	287	87	±120

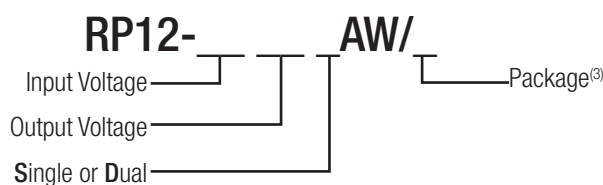


### Notes:

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



### Model Numbering



### Ordering Examples:

RP12-2412SAW/SMD = 24V Input, 12V Output, Single, SMD Package.

### Notes:

Note3: no suffix for standard package (DIP24), add suffix „SMD“ for SMD package

UL60950-1 Certified

**Specifications** measured at  $T_a = 25^\circ\text{C}$ , nominal input voltage, full load otherwise noted

**BASIC CHARACTERISTICS**

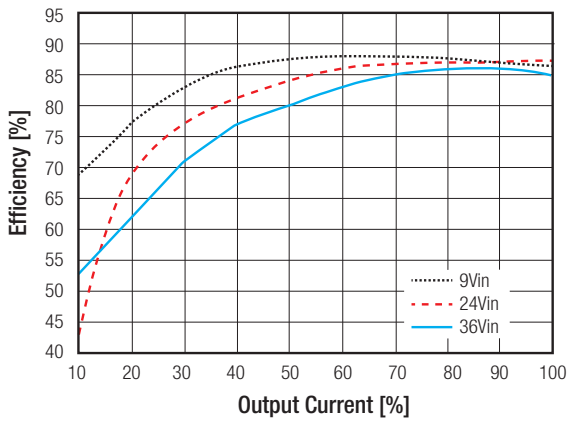
Parameter	Condition	Min.	Typ.	Max.
Input Voltage Range	nom. $V_{in} = 24\text{V}$ nom. $V_{in} = 48\text{V}$	9VDC 18VDC	24VDC 48VDC	36VDC 75VDC
Under Voltage Lockout (UVLO)	$V_{in} = 24\text{V}$ DC-DC ON DC-DC OFF		8VDC	9VDC
	$V_{in} = 48\text{V}$ DC-DC ON DC-DC OFF		16VDC	18VDC
Input Filter				Pi-Type
Input Reflected Ripple Current	nominal $V_{in}$ and full load		20mA <sub>p-p</sub>	
Input Surge Voltage	$V_{in} = 24\text{V}$ , 100ms max. $V_{in} = 48\text{V}$ , 100ms max.			50VDC 100VDC
Start-up time	Power up Remote ON/OFF		450ms 5ms	
Operating Frequency Range		360kHz	400kHz	440kHz
Minimum Load	of full load	0%		
Ripple and Noise	20MHz bandwidth		85mV <sub>p-p</sub>	
Remote ON/OFF <sup>(4)</sup>	Positive Logic	DC-DC ON DC-DC OFF		Open or $3.0\text{V} < V_r < 12\text{V}$ Short or $0\text{V} < V_r < 1.2\text{V}$
Input current of Remote pin (CTRL)		DC-DC OFF		2.5mA
		DC-DC ON	-0.5mA	+0.5mA

**Notes:**

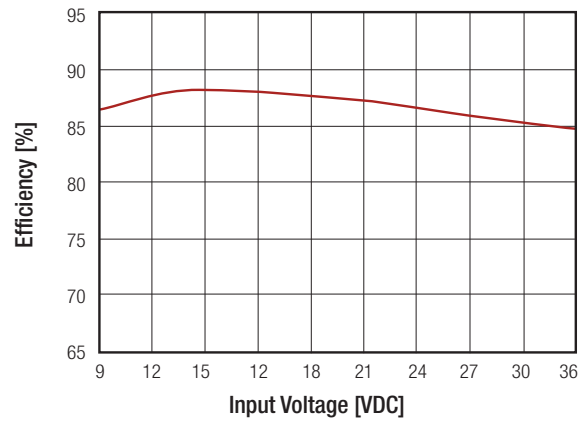
Note4: The ON/OFF control pin voltage is referenced to - $V_{in}$  pin.

**RP12-2405SAW**

**Efficiency vs. Output Current**

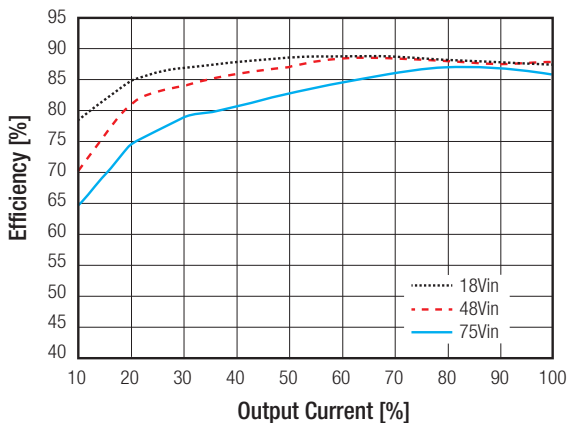


**Efficiency vs. Input Voltage**

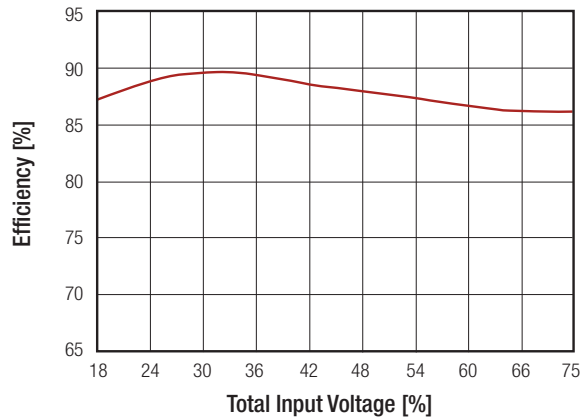


**RP12-4805SAW**

**Efficiency vs. Output Current**



**Efficiency vs. Input Voltage**



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

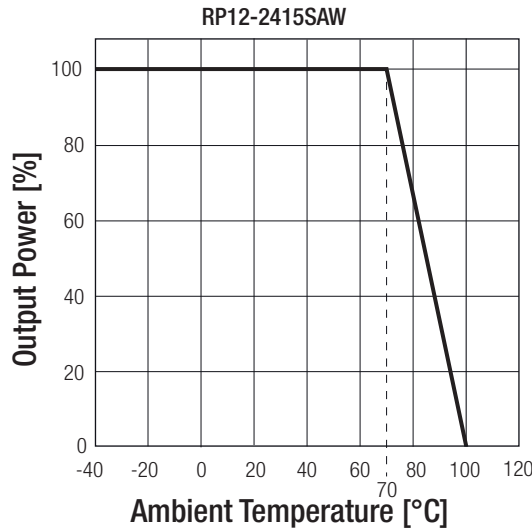
REGULATIONS			
Parameter	Condition	Value	
Output Voltage Accuracy		±1.2%	
Line Voltage Regulation	low line to high line at full load	±0.2%	
Load Voltage Regulation	0% load to 100% load DIP typ	Single	±0.5%
		Dual	±1.0%
	0% load to 100% load SMD	Single	±1.0%
		Dual	±1.0%
Cross Regulation	asymmetrical 25%<->100% load	±5%	
Transient Response recovery time	25% load step change	250µs typ.	

PROTECTIONS			
Parameter	Condition	Value	
Short Circuit Protection (SCP)		continuous, automatic recovery	
Over Voltage Protection (OVP)	Zener Diode Clamp	3.3Vout	3.9VDC
		5.1Vout	6.2VDC
		12Vout	15VDC
		15Vout	18VDC
Over Load Protection (OLP)	% of Iout rated	150% typ.	
Isolation Voltage	DIP24	I/P to O/P I/P (O/P) to case	1.6kVDC/1 minute 1.6kVDC/1 minute
	SMD	I/P to O/P I/P (O/P) to case	1.6kVDC/1 minute 1.0kVDC/1 minute
Isolation Resistance	500VDC	1GΩ min.	
Isolation Capacitance		1500pF max.	
<p><b>Notes:</b></p> <p>Note5: This power module is not internally fused. An input line fuse must always be used.</p>			

ENVIRONMENTAL			
Parameter	Condition	Value	
Operating Temperature Range	3.3Vout, ±5Vout	without derating	-40°C to +64°C
		with derating	-40°C to +105°C
	Others	without derating	-40°C to +70°C
		with derating	-40°C to +100°C
Maximum Case Temperature		+105°C	
Temperature Coefficient		±0.02%/°C max.	
Thermal Impedance	Natural convection (20LFM)	20°C/Watt	
Operating Humidity		5% - 95% RH	
Thermal Shock		MIL-STD-810F	
Vibration		MIL-STD-810F	
MTBF	MIL-HDBK-217F	2087 x 10 <sup>3</sup> hours	
	Bellcore TR-NWT-000332 <sup>(6)</sup>	2350 x 10 <sup>3</sup> hours	
continued on next page			

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

Derating Graph<sup>(7)</sup>



**Notes:**

Note6: BELLCORE TR-NWT-000332. Case I: 50% Stress, Temperature at 40°C (Ground fixed and controlled environment).

Note7: 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**

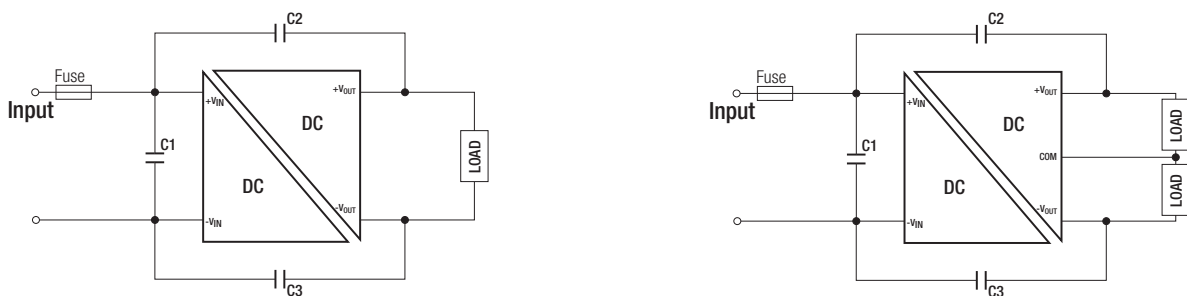
Certificate Type (Safety)	Report / File Number	Standard
UL General Safety	E196683	UL60950-1 1st Ed.: 2003 C22.2 No. 60950 1st. Ed.: 2003
EMC Compliance	Condition	Standard / Criterion
EMI Standard <sup>(8)</sup>	with external filter	EN55022, Class A or B
ESD	Air ±8kV and Contact ± 6kV	EN61000-4-2, Criteria A
Radiated Immunity	10 V/m	EN61000-4-3, Criteria A
Fast Transient <sup>(9)</sup>	±2kV	EN61000-4-4, Criteria A
Surge <sup>(9)</sup>	±1kV	EN61000-4-5, Criteria A
Conducted Immunity	10 Vr.m.s	EN61000-4-6, Criteria A

**Notes:**

Note8: The standard modules meet EMI Class A or Class B with external components, see filter suggestions below.

Note9: 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.

**EMC Filtering Class A**



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

MODEL	C1	C2/C3
RP12-24xxS_DA	3.3µF/50V 1210 MLCC	1000pF/2kV 1206 MLCC
RP12-48xxS_DA	1.5µF/100V 1812 MLCC	1000pF/2kV 1206 MLCC

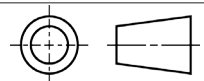
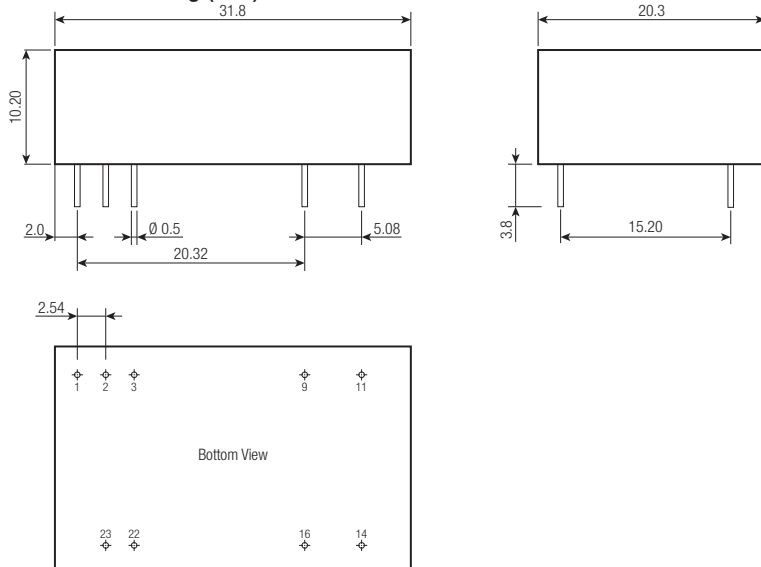
**EMC Filtering Class B**

MODEL	C1	C2	C3/C4	L1
RP12-24xxS_DA	3.3µF/50V 1812 MLCC	N/A	1000pF/2kV 1206 MLCC	CMC: 325µH ref: WE 744290321 ref.: CMC-06
RP12-48xxS_DA	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	1000pF/2kV 1206 MLCC	CMC: 145µH ref: WE 74482210002 ref.: CMC-07

### DIMENSIONS and PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	Case	Nickel coated copper
	Base	Non-conductive black plastic
	Potting	Epoxy (UL94-V0)
Package Dimensions (LxWxH)	DIP	31.8 x 20.3 x 10.2mm
	SMD	32.0 x 20.3 x 11.2mm
Package Weight	DIP	18g
	SMD	20g

### DIP Dimension Drawing (mm)



### Pin Connections

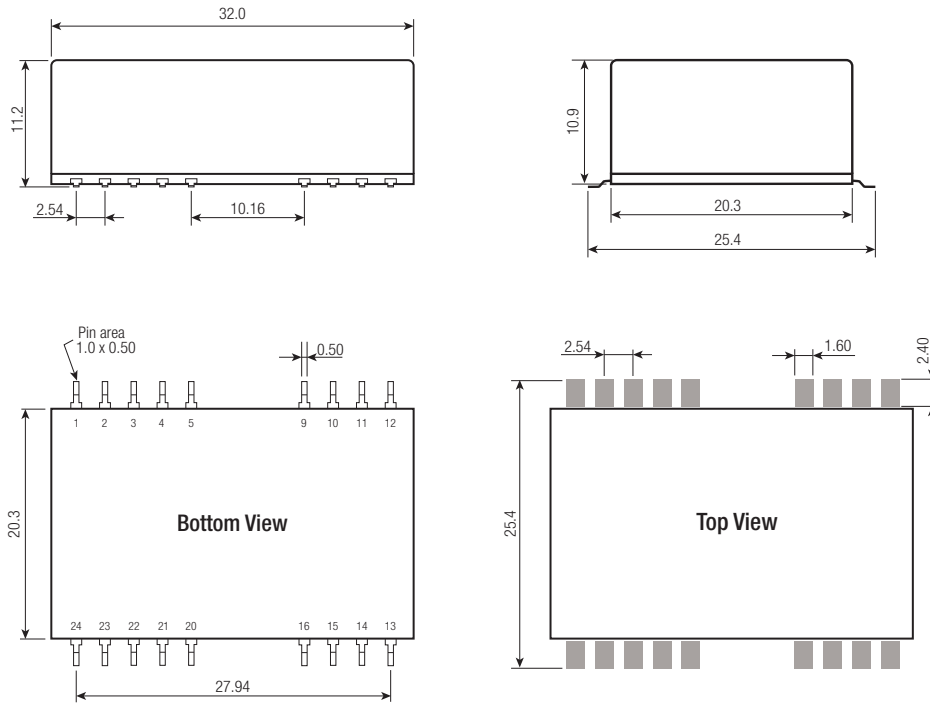
Pin #	Single	Dual
1	Ctrl	Ctrl
2	-Vin	-Vin
3	-Vin	-Vin
9	NC	Com
11	NC	-Vout
14	+Vout	+Vout
16	-Vout	Com
22	+Vin	+Vin
23	+Vin	+Vin

Pin Pitch Tolerance ±0.25mm  
 Pin Dimension Tolerance ±0.1mm  
 XX.X ± 0.5mm  
 XX.XX ± 0.25mm  
 NC = No Connection

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

### SMD Dimension Drawing (mm)



### Pin Connections

Pin #	Single	Dual
1	Ctrl	Ctrl
2	-Vin	-Vin
3	-Vin	-Vin
9	NC	Com
11	NC	-Vout
14	+Vout	+Vout
16	-Vout	Com
22	+Vin	+Vin
23	+Vin	+Vin
Others	NC	NC

Pin Pitch Tolerance  $\pm 0.25\text{mm}$   
 Pin Dimension Tolerance  $\pm 0.1\text{mm}$   
 XX.X  $\pm 0.5\text{mm}$   
 XX.XX  $\pm 0.25\text{mm}$   
 NC = No Connection

### PACKAGING INFORMATION

Parameter	Type	Value
Packaging Quantity	Tube	7pcs.
Storage Temperature Range		-55°C to +125°C
Storage Humidity		5% - 95% RH