

Features

Regulated Converters

- 2:1 Wide Input Voltage Range
- 1.6kVDC Isolation
- UL Certified
- Efficiency up to 88%
- Over Current Protection
- No Minimum Load Required

RECOM
DC/DC Converter

RP12-A

12 Watt
DIP24/SMD
Single & Dual
Output



Description

The RP12-A series 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.

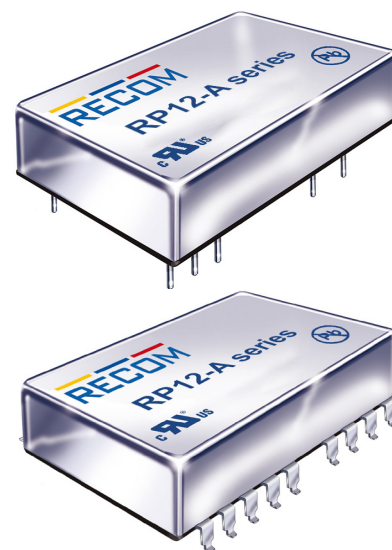
Selection Guide

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [mA]	Input ⁽¹⁾ Current [mA]	Efficiency ⁽¹⁾ typ. [%]	Max. Capacitive Load ⁽²⁾ [μF]
RP12-123.3SA ⁽³⁾	9-18	3.3	3500	1146	84	2000
RP12-1205SA ⁽³⁾	9-18	5.1	2400	1163	86	2000
RP12-1212SA ⁽³⁾	9-18	12	1000	1163	86	430
RP12-1215SA ⁽³⁾	9-18	15	800	1163	86	300
RP12-243.3SA ⁽³⁾	18-36	3.3	3500	566	85	2000
RP12-2405SA ⁽³⁾	18-36	5.1	2400	586	87	2000
RP12-2412SA ⁽³⁾	18-36	12	1000	575	87	430
RP12-2415SA ⁽³⁾	18-36	15	800	575	87	300
RP12-483.3SA ⁽³⁾	36-75	3.3	3500	283	85	2000
RP12-4805SA ⁽³⁾	36-75	5.1	2400	293	87	2000
RP12-4812SA ⁽³⁾	36-75	12	1000	287	87	430
RP12-4815SA ⁽³⁾	36-75	15	800	287	87	300
RP12-1205DA ⁽³⁾	9-18	±5	±1200	1220	82	±1250
RP12-1212DA ⁽³⁾	9-18	±12	±500	1149	87	±200
RP12-1215DA ⁽³⁾	9-18	±15	±400	1149	87	±120
RP12-2405DA ⁽³⁾	18-36	±5	±1200	602	83	±1250
RP12-2412DA ⁽³⁾	18-36	±12	±500	568	88	±200
RP12-2415DA ⁽³⁾	18-36	±15	±400	568	88	±120
RP12-4805DA ⁽³⁾	36-75	±5	±1200	301	83	±1250
RP12-4812DA ⁽³⁾	36-75	±12	±500	284	88	±200
RP12-4815DA ⁽³⁾	36-75	±15	±400	284	88	±120

Notes:

Note1: Maximum value at nominal input voltage and full load.

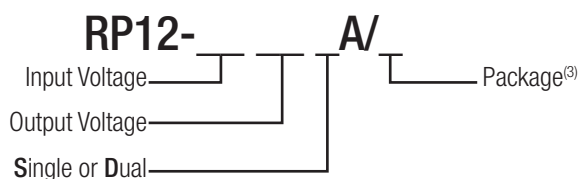
Note2: Test by minimum Vin and constant resistor load.



cUL US
E196683

UL60950-1 Certified

Model Numbering



Ordering Examples:

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

Notes:

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

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 = 12V nom. Vin = 24V nom. Vin = 48V	9VDC 18VDC 36VDC	12VDC 24VDC 48VDC	18VDC 36VDC 75VDC
Under Voltage Lockout (UVLO)	Vin = 12V DC-DC ON DC-DC OFF		8VDC	9VDC
	Vin = 24V DC-DC ON DC-DC OFF		16VDC	18VDC
	Vin = 48V DC-DC ON DC-DC OFF		33VDC	36VDC
Input Filter	Pi-Type			
Input Reflected Ripple Current ⁽⁴⁾	nominal Vin and full load		20mA _{p-p}	
Input Surge Voltage	Vin = 12V, 100ms max. Vin = 24V, 100ms max. Vin = 48V, 100ms max.			36VDC 50VDC 100VDC
Start-up time	Power up Remote ON/OFF		450ms 5ms	
Operating Frequency		360kHz	400kHz	440kHz
Minimum Load ⁽⁵⁾	of full load	10%		
Ripple and Noise	20MHz bandwidth, with 1μF MLCC on output		85mV _{p-p}	
Remote ON/OFF ⁽⁶⁾	Positive Logic DC-DC ON DC-DC OFF	Open or 3V < Vr < 12V Short or 0V < Vr < 1.2V		
Input current of Remote pin (CTRL)	DC-DC OFF		2.5mA	
	DC-DC ON	-0.5mA		+0.5mA

Notes:

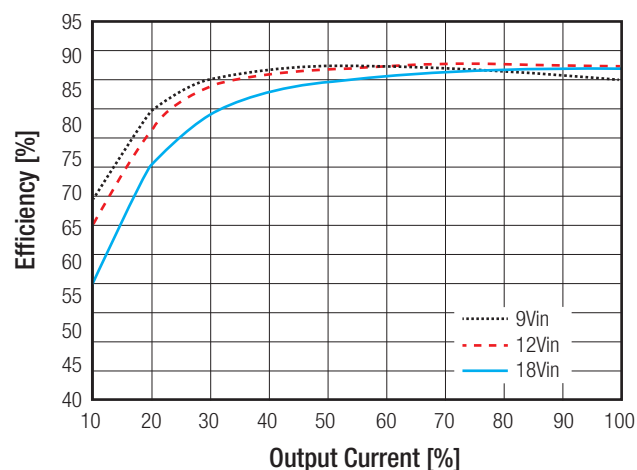
Note4: Simulated source impedance of 12μH. 12μH inductor in series with +Vin.

Note5: The RP12 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.

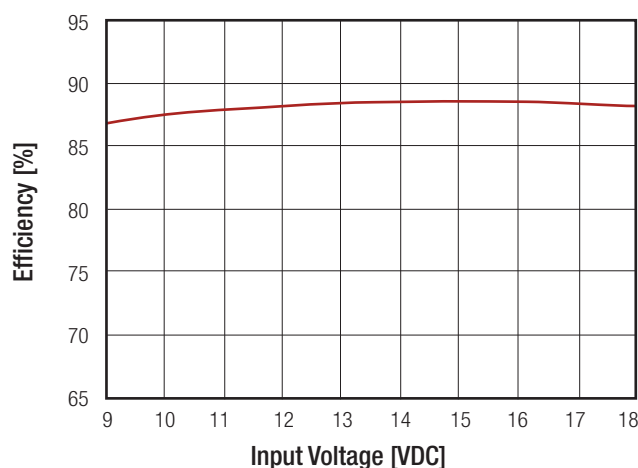
Note6: The ON/OFF control pin voltage is referenced to -Vin pin.

RP12-1205SA

Efficiency vs. Output Current



Efficiency vs. Input Voltage

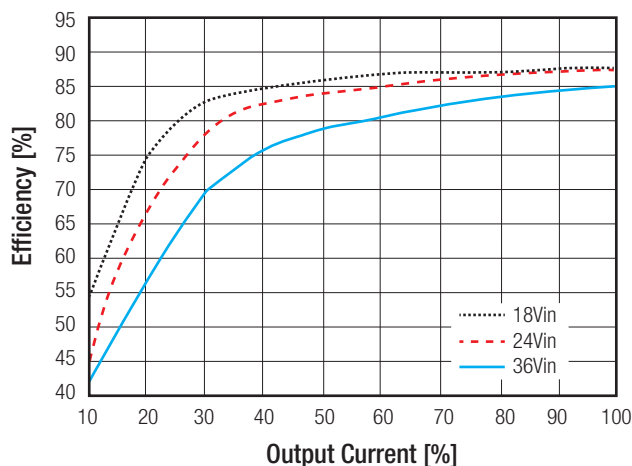


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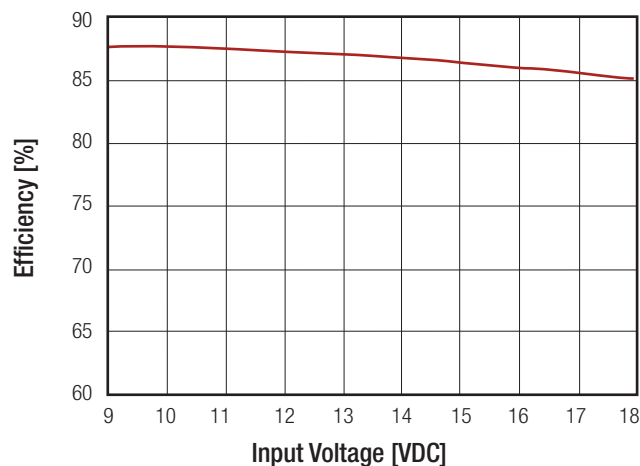
Specifications measured at $T_a = 25^\circ\text{C}$, nominal input voltage, full load otherwise noted

RP12-2405SA

Efficiency vs. Output Current

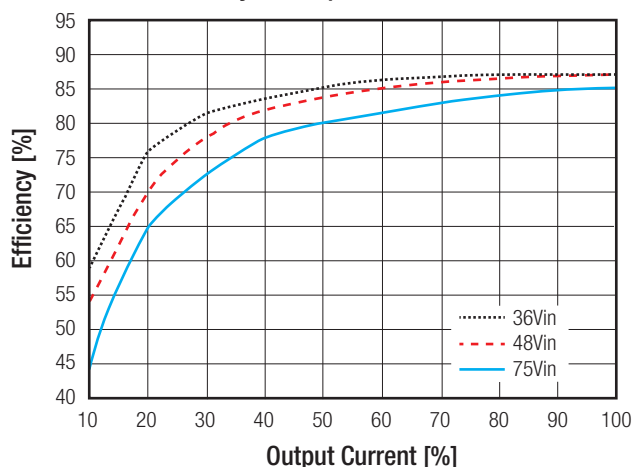


Efficiency vs. Input Voltage

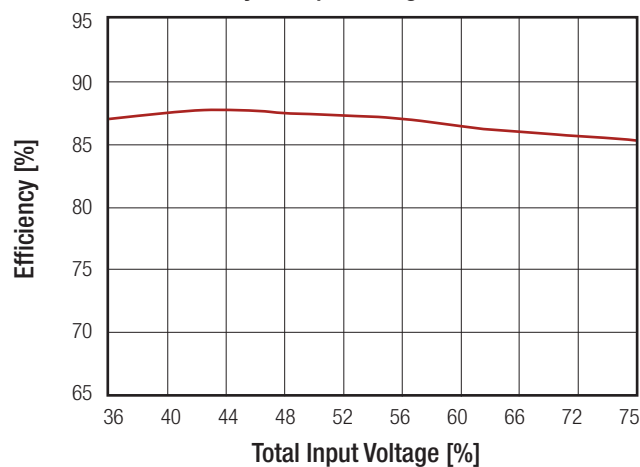


RP12-4805SA

Efficiency vs. Output Current



Efficiency vs. Input Voltage



REGULATIONS

Parameter	Condition		Value
Output Voltage Accuracy			$\pm 1.2\%$
Line Voltage Regulation	Single		$\pm 0.2\%$
	Dual		$\pm 0.5\%$
Load Voltage Regulation	no load to full load DIP type	Single	$\pm 0.5\%$
		Dual	$\pm 1.0\%$
	no load to full load SMD type	All	$\pm 1.0\%$
Cross Regulation	asymmetrical 25%<>100% load		$\pm 5\%$
Transient Response recovery time	25% load step change		250 μs

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

PROTECTIONS		
Parameter	Condition	Value
Short Circuit Protection (SCP)		continuous, automatic recovery
Over Voltage Protection (OVP)	Zener Diode Clamp	3.3Vout
		5.1Vout
		12Vout
		15Vout
Over Load Protection (OLP)	% of Iout rated	150% typ.
Isolation Voltage	DIP24	I/P to O/P
		I/P (O/P) to case
	SMD	I/P to O/P
		I/P (O/P) to case
Isolation Resistance	500VDC	1GΩ min.
Isolation Capacitance		1200pF max.
Notes:		
Note7: This power module is not internally fused. An input line fuse must always be used.		

ENVIRONMENTAL		
Parameter	Condition	Value
Operating Temperature Range	3.3Vout, ±5Vout	without derating
		with derating
	all others	without derating
		withderating
Maximum Case Temperature		+100°C
Temperature Coefficient		±0.02%/°C max.
Thermal Impedance	Natural convection (20LFM)	20°C/Watt typ.
Operating Humidity		5% - 95% RH
Thermal Shock		MIL-STD-810F
Vibration		MIL-STD-810F
MTBF	MIL-HDBK-217F	2064 x 10³ hours
	Bellco TR-NWT-000332 ⁽⁸⁾	2750 x 10³ hours

Derating Graph⁽⁹⁾

RP12-4815SA

Ambient Temperature [°C]	Output Power [%]
-40	100
-20	100
0	100
20	100
40	100
60	100
72	100
80	80
90	40
100	0

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.

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

SAFETY AND CERTIFICATIONS

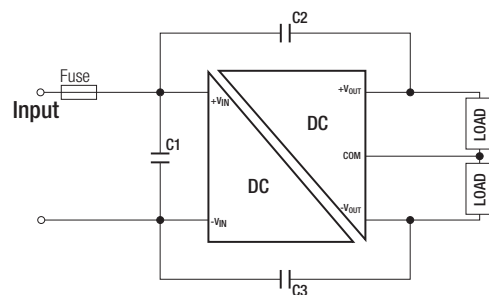
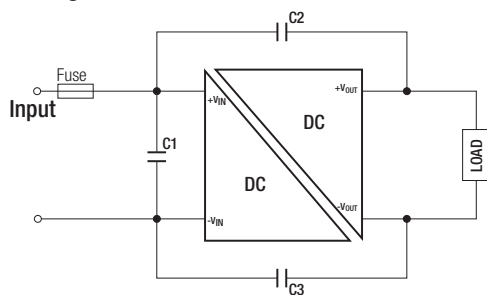
Certificate Type (Safety)	Report / File Number	Standard
UL General Safety	E196683	UL60950-1 1st Ed.: 2003 C22.2 No. 60950 1st. Ed.: 2003
EMC Compliance	Condition	Standard / Criterion
EMI Standard ⁽¹⁰⁾	with external filter	EN55022, Class A or B
ESD	Air $\pm 8\text{kV}$ and Contact $\pm 6\text{kV}$	EN61000-4-2, Criteria A
Radiated Immunity	10 V/m	EN61000-4-3, Criteria A
Fast Transient ⁽¹¹⁾	$\pm 2\text{kV}$	EN61000-4-4, Criteria A
Surge ⁽¹¹⁾	$\pm 1\text{kV}$	EN61000-4-5, Criteria A
Conducted Immunity	10 Vr.m.s	EN61000-4-6, Criteria A

Notes:

Note10: 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, 220 $\mu\text{F}/100\text{V}$

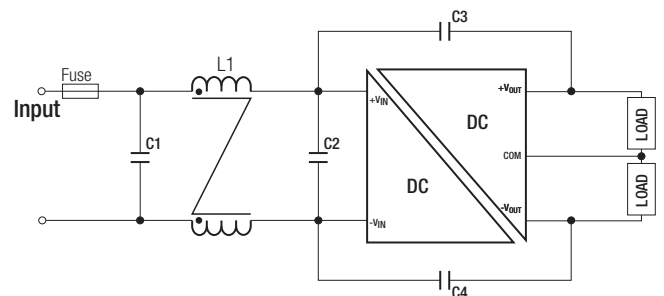
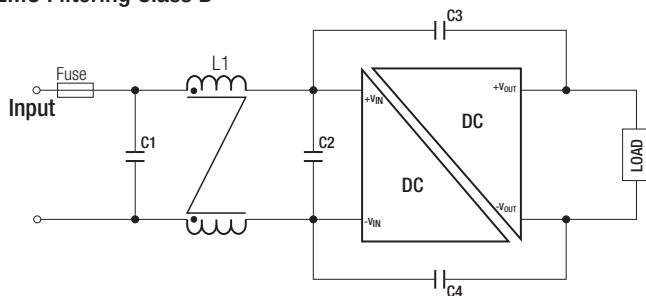
Note11: The standard modules meet EMI Class A or Class B with external components, see filter suggestions below.

EMC Filtering Class A



MODEL	C1	C2/C3
RP12-12xxS_DA	6.8 $\mu\text{F}/50\text{V}$ 1210 MLCC	1000pF/2kV 1206 MLCC
RP12-24xxS_DA	4.7 $\mu\text{F}/50\text{V}$ 1210 MLCC	1000pF/2kV 1206 MLCC
RP12-48xxS_DA	2.2 $\mu\text{F}/100\text{V}$ 1812 MLCC	1000pF/2kV 1206 MLCC

EMC Filtering Class B



MODEL	C1	C2	C3/C4	L1
RP12-12xxS_DA	3.3 $\mu\text{F}/50\text{V}$ 1812 MLCC	N/A	1000pF/2kV 1206 MLCC	CMC: 325 μH ref: WE 744290321 ref.: CMC-06
RP12-24xxS_DA	4.7 $\mu\text{F}/50\text{V}$ 1812 MLCC	N/A	1000pF/2kV 1206 MLCC	CMC: 325 μH ref: WE 744290321 ref.: CMC-06
RP12-48xxS_DA	2.2 $\mu\text{F}/100\text{V}$ 1812 MLCC	2.2 $\mu\text{F}/100\text{V}$ 1812 MLCC	1000pF/2kV 1206 MLCC	CMC: 325 μH ref: WE 744290321 ref.: CMC-06

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

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)

Top View: 31.8mm width, 20.3mm height, 10.2mm thickness. Pin spacing: 2.0mm, 0.5mm, 5.08mm. Pin 1 offset: 3.8mm. Pin 15 offset: 15.24mm.

Side View: 20.3mm width, 10.2mm height, 3.8mm thickness.

Bottom View: 20.32mm width, 2.54mm pin pitch. Pin numbers: 1, 2, 3, 9, 11, 23, 22, 16, 14.

Recommended Footprint Details: 2.54mm pitch, 0.8mm +0.15/-0mm pin diameter.

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

SMD Dimension Drawing (mm)

Top View: 32.0mm width, 20.3mm height, 11.2mm thickness. Pin spacing: 2.54mm, 10.16mm.

Side View: 20.3mm width, 11.2mm height, 10.9mm thickness. Pin offset: 25.4mm.

Bottom View: 20.3mm width, 27.94mm length. Pin area: 0.1 x 0.50mm. Pin offset: 0.50mm. Pin numbers: 1, 2, 3, 4, 5, 9, 10, 11, 12, 24, 23, 22, 21, 20, 16, 15, 14, 13.

Top View: 25.4mm width, 10.9mm height. Pin offset: 2.54mm, 1.6mm, 2.4mm.

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

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

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

The product information and specifications are subject to change without prior notice. RECOM products are not authorized for use in safety-critical applications (such as life support) without RECOM's explicit written consent. A safety-critical application is defined as an application where a failure of a RECOM product may reasonably be expected to endanger or cause loss of life, inflict bodily harm or damage property. The buyer shall indemnify and hold harmless RECOM, its affiliated companies and its representatives against any damage claims in connection with the unauthorized use of RECOM products in such safety-critical applications.