Features

Regulated Converters

- 2:1 Wide Input Voltage Range
- 1.6kVDC Isolation
- UL Certified
- Efficiency up to 90%
- Six-Sided Continuous Shield
- Available as Power Module (RPM40-G)

RECOM

DC/DC Converter

RP40-G

40 Watt Single, Dual & Triple Output

3 YEAR warranty

Description

The RP40-G series 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 2" 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]
RP40-123.3SG[3,4]	9-18	3.3	8000	2558	86	21000
RP40-1205SG[3,4]	9-18	5	8000	3876	86	13600
RP40-1212SG[3,4]	9-18	12	3333	3876	86	2360
RP40-1215SG[3,4]	9-18	15	2666	3830	87	1510
RP40-243.3SG[3,4]	18-36	3.3	8000	1264	87	21000
RP40-2405SG[3,4]	18-36	5	8000	1873	89	13600
RP40-2412SG[3,4]	18-36	12	3333	1894	88	2360
RP40-2415SG[3,4]	18-36	15	2666	1872	89	1510
RP40-483.3SG[3,4]	36-75	3.3	8000	625	88	21000
RP40-4805SG[3,4]	36-75	5	8000	926	90	13600
RP40-4812SG[3,4]	36-75	12	3333	936	89	2360
RP40-4815SG[3,4]	36-75	15	2666	936	89	1510
RP40-1212DG[3,4]	9-18	±12	±1800	4235	85	±1200
RP40-1215DG[3,4]	9-18	±15	±1400	4118	85	±750
RP40-2412DG[3,4]	18-36	±12	±1800	2069	87	±1200
RP40-2415DG[3,4]	18-36	±15	±1400	2011	87	±750
RP40-4812DG[3,4]	36-75	±12	±1800	1034	87	±1200
RP40-4815DG[3,4]	36-75	±15	±1400	1006	87	±750
RP40-120512TG[3,4]	9-18	5 / ±12	6000 /±400	3837	86	6800µF/±330µF
RP40-120515TG[3,4]	9-18	5 / ±15	6000 / ±300	3779	86	6800µF/±110µF
RP40-240512TG[3,4]	18-36	5 / ±12	6000 / ±400	1897	87	6800µF/±330µF
RP40-240515TG[3,4]	18-36	5 / ±15	6000 / ±300	1868	87	6800µF/±110µF
RP40-480512TG[3,4]	36-75	5 / ±12	6000 / ±400	938	88	6800µF/±330µF
RP40-480515TG[3,4]	36-75	5 / ±15	6000 / ±300	923	88	6800µF/±110µF

Notes:

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

Note2: Test by minimum Vin and constant resistor load.

RoHS 2 compliant 6 from 6

REACH compliant

c UL us E196683

UL60950-1 Certified

Model Numbering

RP40-___ ___ G/ ___ ___

- Input Voltage
- Output Voltage
- Single or Dual or Triple
- Package[4]
- Control Logic[3]

Ordering Examples

RP40-2405SG = 24V Input, 5V Output, Positive Logic CTRL pin.

RP40-4812DG-HC = 48V Input, ±12V Output, Positive Logic CTRL pin, Heat-sink fitted

Notes:

Note3: no suffix for CTRL function with Positive Logic (1=ON, 0=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

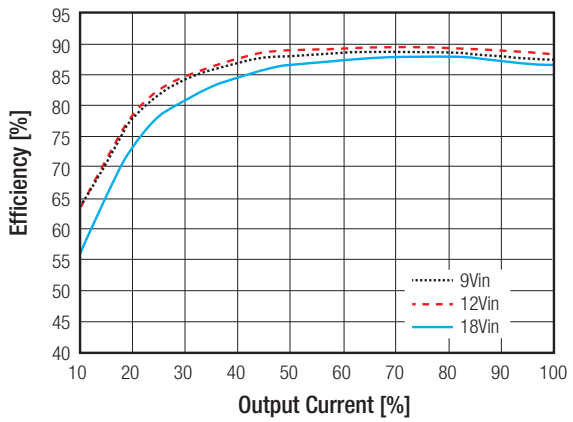
Parameter	Condition			Min.	Typ.	Max.
Input Voltage Range	nom. Vin= 12V nom. Vin= 24V nom. Vin= 48V			9VDC 18VDC 36VDC	12VDC 24VDC 48VDC	18VDC 36VDC 75VDC
Under Voltage Lockout (UVLO)	Vin = 12V	DC-DC ON DC-DC OFF			 8VDC	9VDC
	Vin = 24V	DC-DC ON DC-DC OFF			 16VDC	17.8VDC
	Vin = 48V	DC-DC ON DC-DC OFF			 34VDC	36VDC
Input Filter						L-C Type
Input Reflected Ripple Current[5]	nominal Vin and full load				40mAp-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				25ms 25ms	
				270kHz	300kHz	330kHz
Minimum Load	of full load	Single Dual and Triple		0% 10%		
Ripple and Noise	measured by 20MHz bandwidth with a 0.1µF/50V MLCC	Single	3.3Vout, 5 Vout 12Vout, 15Vout		50mVp-p 75mVp-p	
		Dual	12Vout 15Vout		120mVp-p 150mVp-p	
		Triple	3.3Vout, 5 Vout 12Vout, 15Vout		50mVp-p 75mVp-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		
Input current of Remote pin (CTRL)		DC-DC OFF			2.5mA	
		DC-DC ON		-0.5mA		0.5mA

Notes:

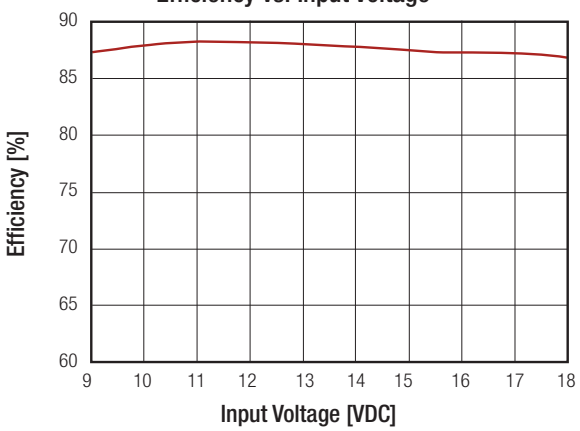
Note5: Simulated source impedance of 12µH. 12µH inductor in series with +Vin.
Note6: The ON/OFF control pin voltage is referenced to -Vin pin.

RP40-1205SG

Efficiency vs. Output Current



Efficiency vs. Input Voltage



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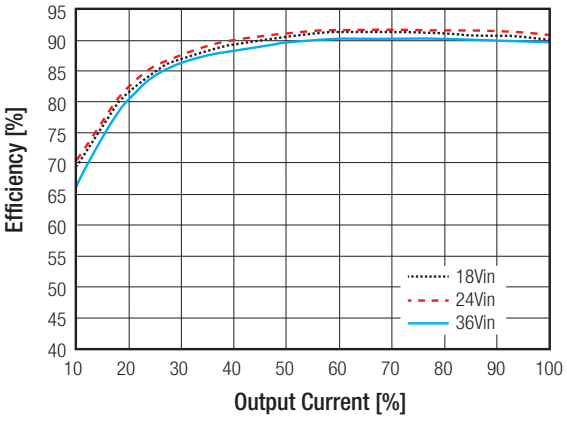
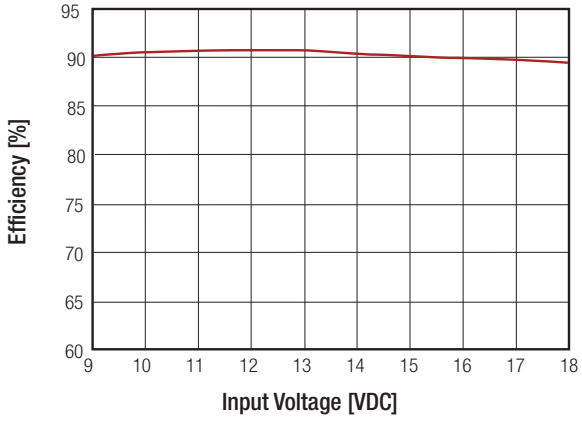
Specifications measured at Ta = 25°C, nominal input voltage, full load otherwise noted

RP40-2405SG

Efficiency vs. Output Current

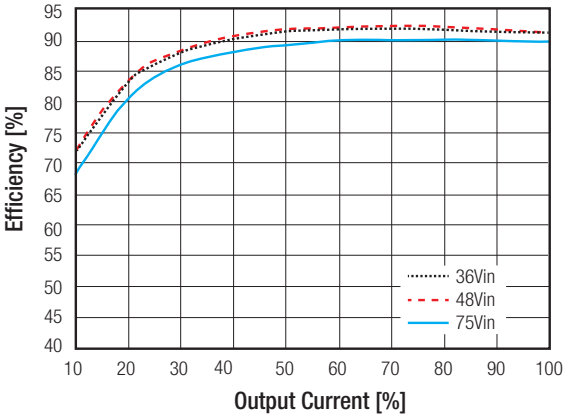


Efficiency vs. Input Voltage

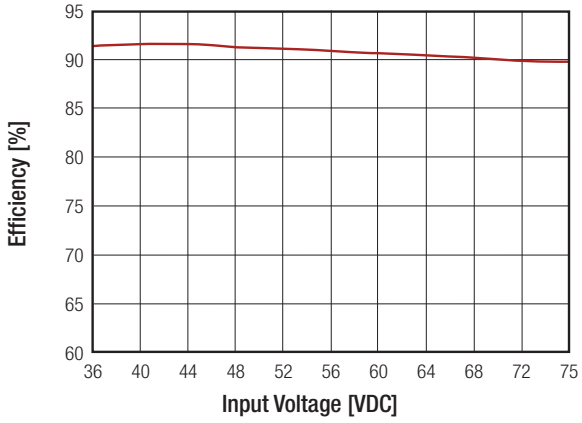


RP40-4805SG

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	Single & Dual Triple Main Triple Auxiliary		±1.0% max. ±1.0% max. ±5.0% max.
Voltage Adjustability (7)			±10% max.
Line Voltage Regulation	low line, high line at full load	Single & Dual Triple Main Triple Auxiliary	±0.5% max. ±1.0% max. ±5.0% max.
Load Voltage Regulation	Single/Dual min. load to full load	Single Dual	±0.5% max. ±1.0% max.
	Triple: main output (3.3, 5 Vout) 10% to 100% with 10% to 100% balanced on auxiliaries.	Triple Main	±2.0% max.
	Auxiliary outputs 10% to 100% balanced on all outputs	Auxiliary	±5.0% max.
Cross Regulation	asymmetrical 25%/100% FL	Dual	±5.0% max.
	Triple: main otput (3.3, 5Vout) 100%load, auxiliary 100%, other auxiliary 25% to 100% load or main output (3.3, 5Vout) 25%, auxiliary 25%, other auxiliary 25% to 100%	Triple 3.3Vout, 5Vout Triple 12Vout, 15Vout	±1.0% max. ±5.0% max.
Transient Response recovery time	25% load step change		250µs typ.

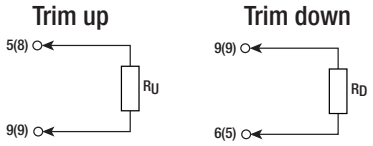
Notes:

Note7: For the single output: Maximum output deviation is 10% inclusive of remote sense and trim. If remote sense is not being use, the +Sense should be connected to its corresponding +Vout and likewise the -Sense should be conneted to its corresponding -Vout.

External Output Trimming

Output Voltage Trimming

Some single/dual 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.



RP40-xx3.3S

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

RP40-xx05SG

Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout =	5.05	5.01	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

RP40-xx12SF

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

RP40-xx15SG

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

Dual Output Voltage Trim Tables

RP40-xx12DG

Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout =	24.24	24.48	24.72	24.96	25.20	25.44	25.68	25.92	26.16	26.40	Volts
R_U =	218.21	98.10	58.07	38.05	26.04	18.03	12.32	8.03	4.69	2.02	kOhms
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout =	23.76	23.52	23.28	23.04	22.80	22.56	22.32	22.08	21.84	21.6	Volts
R_D =	273.44	123.02	72.87	47.80	32.76	22.73	15.57	10.20	6.02	2.67	kOhms

RP40-xx15DG

Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout =	30.30	30.60	30.90	31.20	31.50	31.80	32.10	32.40	32.70	33.00	Volts
R_U =	268.29	120.64	71.43	46.82	32.06	22.21	15.10	9.91	5.81	2.53	kOhms
Trim down	1	2	3	4	5	6	7	8	9	10	%
Vout =	29.70	29.40	29.10	28.80	28.50	28.20	27.90	27.60	27.30	27.00	Volts
R_D =	337.71	152.02	90.13	59.18	40.61	28.23	19.39	12.76	7.60	3.47	kOhms

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 5Vout 12Vout 15Vout	3.9VDC 6.2VDC 15VDC 18VDC
Over Temperature Protection (OTP)			115°C 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	500VDC		1GΩ min.
Isolation Capacitance			1000pF max.

Notes:

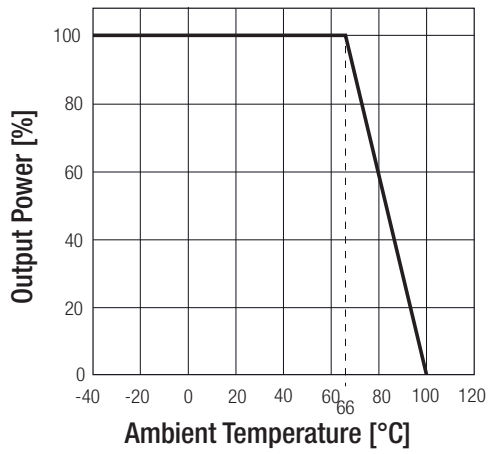
Note8: This power module is not internally fused. An input line fuse must always be used.

ENVIRONMENTAL

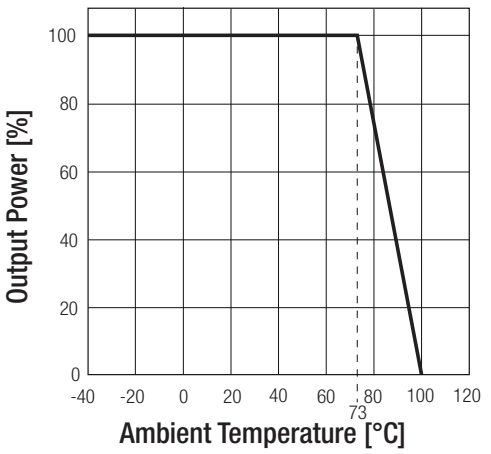
Parameter	Condition	Value
Operating Temperature Range	without derating with derating	-40°C to +66°C -40°C o +100°C
Maximum Case Temperature		+100°C max.
Temperature Coefficient		±0.02%/°C max.
Thermal Impedance	natural convection (20LFM) without Heat-sink natural convection (20LFM) with Heat-sink	9.2°C/Watt 7.6°C/Watt
Operating Humidity		5% - 95% RH
Thermal Shock		MIL-STD-810F
Vibration		MIL-STD-810F
MTBF	MIL-HDBK-217F BELLCORE TR-NWT-000332[9]	9224 x 10^2 hours 1398 x 10^3 hours

Derating Graph[10]

RP40-483.3SG



RP40-483.3SG with Heat-sink



Notes:

Note9: BELLCORE TR-NWT-000332. Case I: 50% Stress, Temperature at 40°C (Ground fixed and controlled environment).

Note10: 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 Ta = 25°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

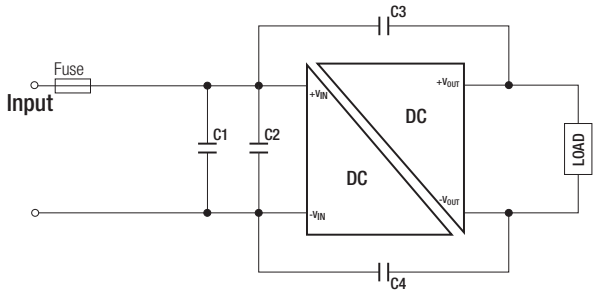
EMC Compliance	**Condition**	**Standard / Criterion**
EMI Standard[11]	with external filter	EN55022, Class A or B
ESD	Air ±8kV and Contact ±6kC	EN61000-4-2, Criteria B
Radiated Immunity	10 V/m	EN61000-4-3, Criteria A
Fast Transient[12]	±2kV	EN61000-4-4, Criteria B
Surge[12]	±1kV	EN61000-4-5, Criteria B
Conducted Immunity	10 Vr.m.s	EN61000-4-6, Criteria A

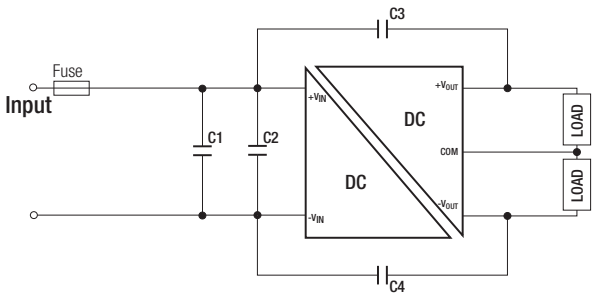
Notes:

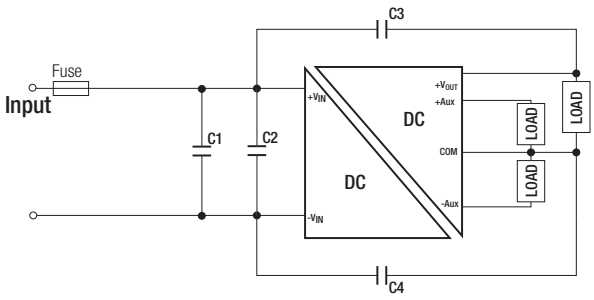
Note11: The standard modues meet EMI Class A or Class B with external components, see filter suggestions below.

Note12: 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/C4
RP40-12xxSG RP40-12xxDG RP40-12xxTG	6.8µF/50V 1812 MLCC	N/A	1000pF/2kV 1808 MLCC
RP40-24xxSG RP40-24xxDG RP40-24xxTG	6.8µF/50V 1812 MLCC	N/A	1000pF/2kV 1808 MLCC
RP40-48xxSG RP40-48xxDG RP40-48xxTG	2.2µF/100V 1812 MLCC	N/A	1000pF/2kV 1808 MLCC

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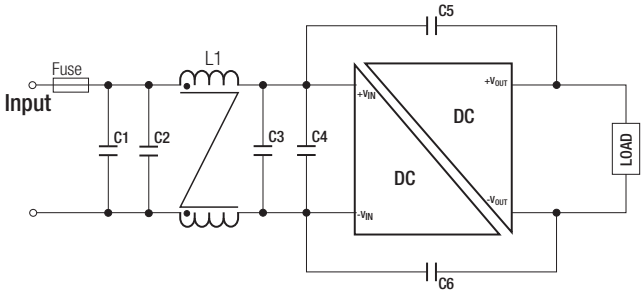
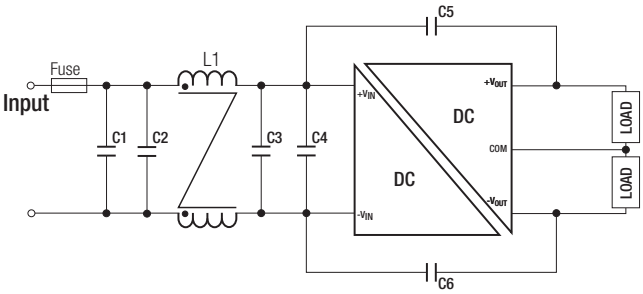
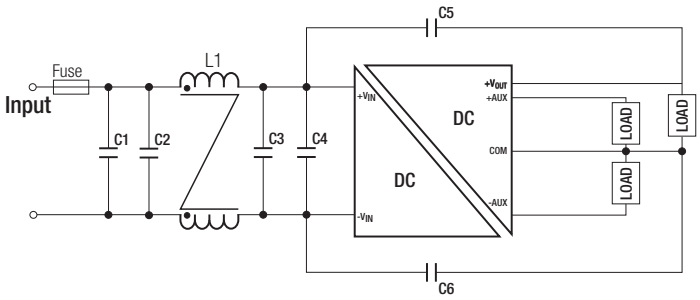
Specifications measured at Ta = 25°C, nominal input voltage, full load otherwise noted

EMI Filtering Class B







MODEL	C1	C2	C3	C4	C5/C6	L1
RP40-12xxSG RP40-12xxDG RP40-12xxTG	4.7µF/50V 1812 MLCC	N/A	4.7F/50V 1812 MLCC	N/A	1000pF/2kV 1808 MLCC	CMC: 450µH ref.: WE 7448227005 ref.: CMC-05
RP40-24xxSG RP40-24xxDG RP40-24xxTG	6.8µF/50V 1812 MLCC	N/A	6.8µF/50V 1812 MLCC	N/A	1000pF/2kV 1808 MLCC	CMC: 450µH ref.: WE 7448227005 ref.: CMC-05
RP40-48xxSG RP40-48xxDG RP40-48xxTG	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	6.8µF/50V 1812 MLCC	2.2µF/100V 1812 MLCC	1000pF/2kV 1808 MLCC	CMC: 830µH ref.: WE 744822301 ref.: CMC-08

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 50.8 x 10.2mm 56.8 x 50.8 x 17.0mm
Package Weight	without Heat-sink with Heat-sink	60g 81.06g

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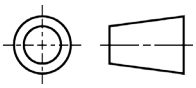
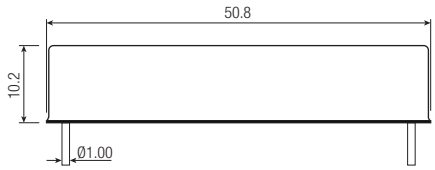
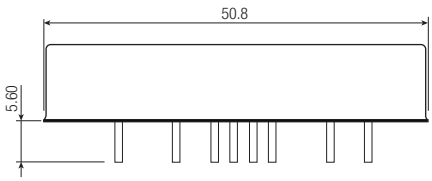
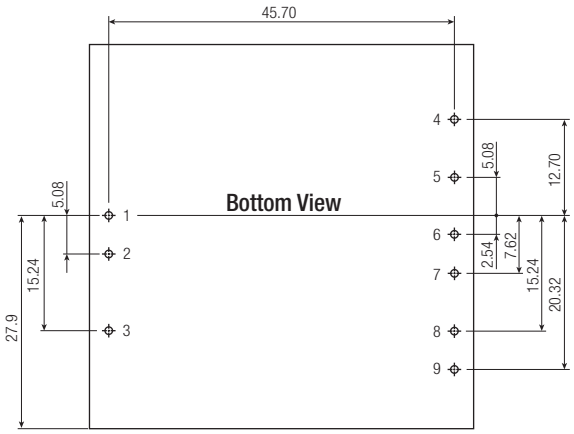
Specifications measured at Ta = 25°C, nominal input voltage, full load otherwise noted

Dimension Drawing (mm)







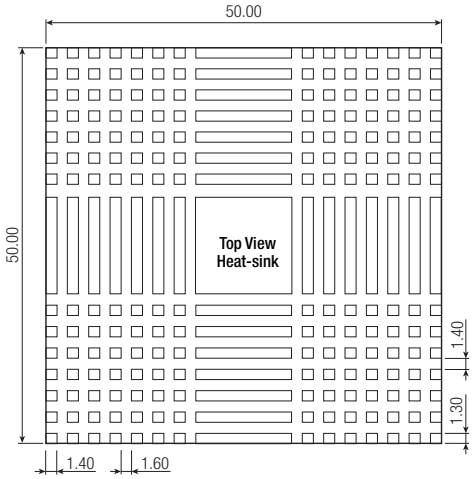


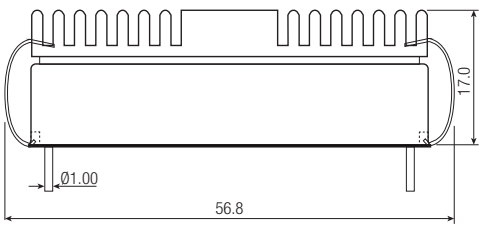
Pin Connections

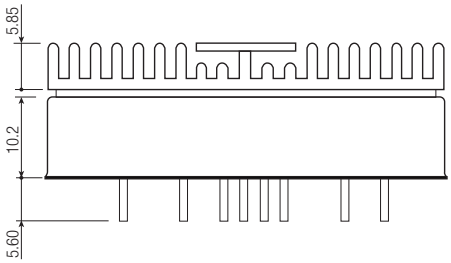
Pin #	Single	Dual	Triple
1	+Vin	+Vin	+Vin
2	-Vin	-Vin	-Vin
3	CTRL	CTRL	CTRL
4	NC	No Pin	+Aux
5	-Sense[7]	+Vout	Com
6	+Sense[7]	Com	-Aux
7	+Vout	Com	+Vout
8	-Vout	-Vout	Com
9	Trim	Trim	NC

NC: No Connection
Pin Pitch Tolerance ±0.25mm
Pin dimension tolerance ±0.1mm
Tolerance: X.X ±0.5mm
X.XX ±0.25mm

Dimension Drawing (mm) with Heat-sink







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

PACKAGING INFORMATION			
Parameter	**Type**		**Value**
Packaging Quantity	without Heat-sink with Heat-sink	Tube Tray	4pcs. 12pcs.
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.