

Features

Regulated Converter

- 2:1 input voltage range
- 1.6kVDC isolation
- UL certified
- Efficiency up to 90%
- Six-sided continuous shield
- Available as power module (RPM30-E)

RECOM
DC/DC Converter

RP30-E

30 Watt
2" x 1.6"
Single and Dual Output



UL
E196683



UL60950-1 certified
EN55032 compliant

Description

The RP30-E 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 industry standard 2" x 1.6" package meets military standards for thermal shock and vibration tolerance

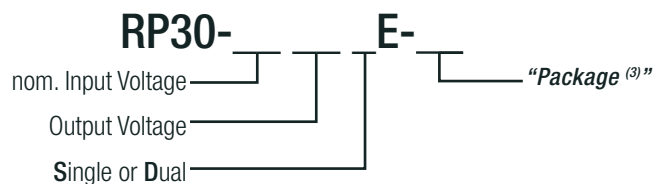
Selection Guide

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [mA]	Input ⁽¹⁾ Current [mA]	Efficiency ⁽¹⁾ typ. [%]	Max. Capacitive Load ⁽²⁾ [μF]
RP30-123.3SE ⁽³⁾	9-18	3.3	6000	1941	85	19500
RP30-1205SE ⁽³⁾	9-18	5	6000	2874	87	10200
RP30-1212SE ⁽³⁾	9-18	12	2500	2841	88	3240
RP30-1215SE ⁽³⁾	9-18	15	2000	2841	88	1100
RP30-243.3SE ⁽³⁾	18-36	3.3	6000	959	86	19500
RP30-2405SE ⁽³⁾	18-36	5	6000	1420	88	10200
RP30-2412SE ⁽³⁾	18-36	12	2500	1404	89	3240
RP30-2415SE ⁽³⁾	18-36	15	2000	1404	89	1100
RP30-483.3SE ⁽³⁾	36-75	3.3	6000	474	87	19500
RP30-4805SE ⁽³⁾	36-75	5	6000	702	89	10200
RP30-4812SE ⁽³⁾	36-75	12	2500	694	90	3240
RP30-4815SE ⁽³⁾	36-75	15	2000	694	90	1100
RP30-1212DE ⁽³⁾	9-18	±12	±1250	2874	87	±1020
RP30-1215DE ⁽³⁾	9-18	±15	±1000	2874	87	±675
RP30-2412DE ⁽³⁾	18-36	±12	±1250	1420	88	±1020
RP30-2415DE ⁽³⁾	18-36	±15	±1000	1420	88	±675
RP30-4812DE ⁽³⁾	36-75	±12	±1250	710	88	±1020
RP30-4815DE ⁽³⁾	36-75	±15	±1000	710	88	±675

Notes:

- Note1: Maximum values at nominal input voltage and full load
Note2: Max. Cap load is tested at minimum input and constant resistive load

Model Numbering



Notes:

- Note3: add suffix "-HC" for premounted Heat-sink with clips

Ordering Examples

RP30-2405SE = 24V Input, 5V Output, Single
RP30-4812DE-HC = 48V Input, ±12V Output, Dual, Heat-sink premounted

Specifications (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

BASIC CHARACTERISTICS

Parameter	Condition		Min.	Typ.	Max.
Internal Input Filter ⁽⁴⁾			LC Type		
Input Voltage Range	nom. Vin = 12VDC nom. Vin = 24VDC nom. Vin = 48VDC		9VDC 18VDC 36VDC	12VDC 24VDC 48VDC	18VDC 36VDC 75VDC
Input Surge Voltage	100ms max.	nom. Vin = 12VDC nom. Vin = 24VDC nom. Vin = 48VDC			36VDC 50VDC 100VDC
Under Voltage Lockout (UVLO)	nom. Vin = 12VDC	DC-DC ON DC-DC OFF		8VDC	9VDC
	nom. Vin = 24VDC	DC-DC ON DC-DC OFF		16VDC	17.8VDC
	nom. Vin = 48VDC	DC-DC ON DC-DC OFF		33VDC	36VDC
Output Voltage Trimming	refer to „ OUTPUT VOLTAGE TRIMMING “		-10%		+10%
Minimum Load			0%		
Start-up Time	Power up ON/OFF CTRL			25ms 25ms	
ON/OFF CTRL ⁽⁵⁾ refer to „ ON/OFF CTRL “	Positive Logic	DC-DC ON DC-DC OFF	Open or 3.0VDC < V _{CTRL} < 12VDC Short or 0VDC < V _{CTRL} < 1.2VDC		
Input Current of CTRL pin	drive current	I _{CTRL}	-0.5mA		+0.5mA
Standby Current	DC-DC OFF	I _{in}		2.5mA	
Internal Operating Frequency			270kHz	300kHz	330kHz
Output Ripple and Noise	measured at 20MHz BW with a 0.1µF/50V MLCC	3.3Vout, 5Vout 12Vout, 15Vout		50mVp-p 75mVp-p	
		±12Vout, ±15Vout		100mVp-p	
Input Reflected Ripple Current ⁽⁶⁾				30mA _{p-p}	

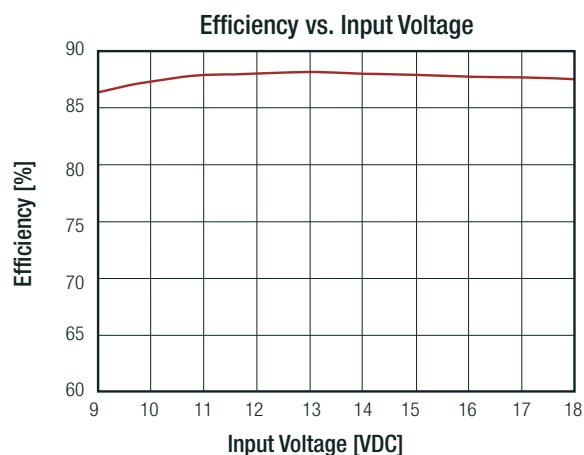
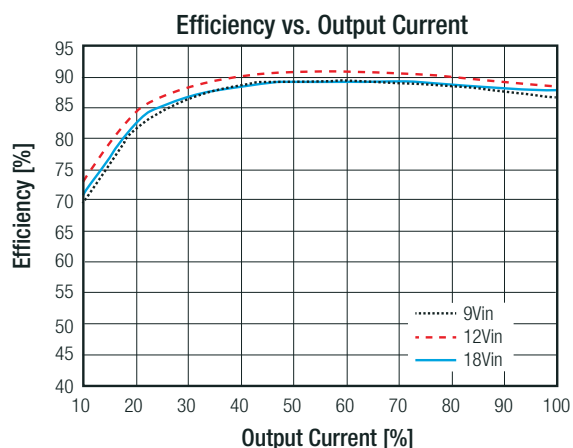
Notes:

Note4: An external filter capacitor is required for normal operation. The capacitor should be capable of handling 1A ripple current for 48V/24V models. RECOM suggest: Nippon chemi-con KY series, 220µF/100V, ESR 90mΩ

Note5: The pin voltage is referenced to -Vin pin

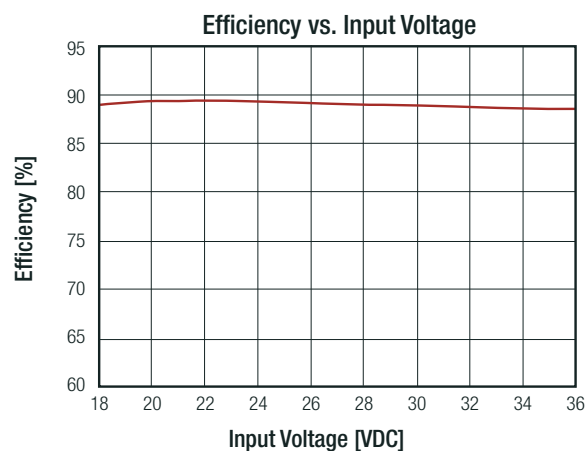
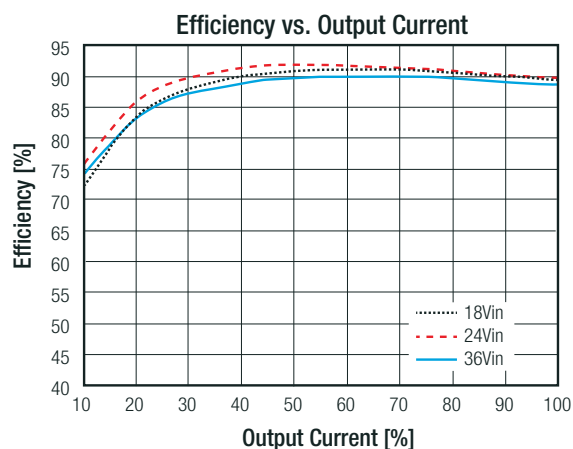
Note6: Simulated source impedance of 12µH. 12µH inductor in series with +Vin

RP30-1205SE

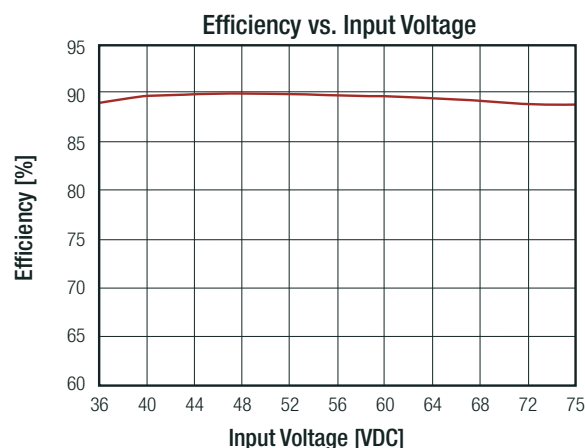
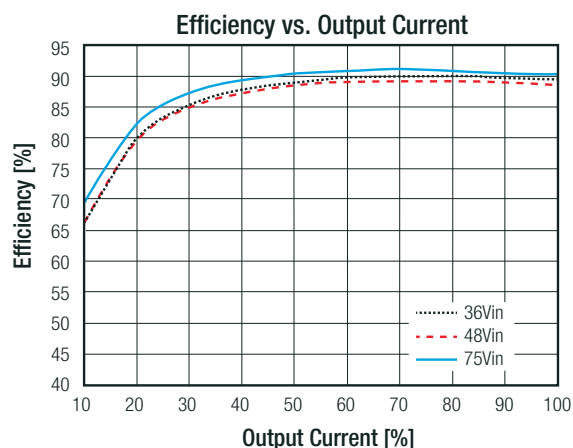


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RP30-2405SE



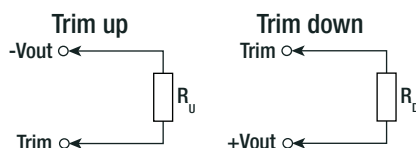
RP30-4805SE



OUTPUT VOLTAGE 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 choosing 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.



RP30-xx3.3SE

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	[VDC]
$R_u =$	57.93	26.16	15.58	10.28	7.11	4.99	3.48	2.34	1.46	0.75	[k Ω]
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	[VDC]
$R_d =$	69.47	31.23	18.49	12.12	8.29	5.74	3.92	2.56	1.50	0.65	[k Ω]

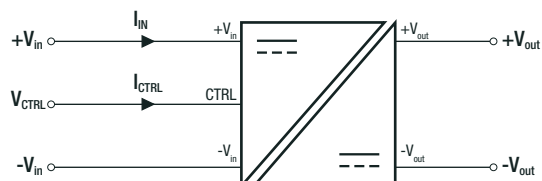
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Specifications (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

RP30-xx05SE											
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	[VDC]
R _u =	36.57	16.58	9.92	6.58	4.59	3.25	2.30	1.59	1.03	0.59	[kΩ]
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	[VDC]
R _d =	45.53	20.61	12.31	8.15	5.66	4.00	2.81	1.92	1.23	0.68	[kΩ]
RP30-xx12SE											
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	[VDC]
R _u =	367.91	165.95	98.64	64.98	44.78	31.32	21.70	14.49	8.88	4.39	[kΩ]
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	[VDC]
R _d =	460.99	207.95	123.60	81.42	56.12	39.25	27.20	18.16	11.13	5.51	[kΩ]
RP30-xx15SE											
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	[VDC]
R _u =	404.18	180.59	106.06	68.80	46.44	31.53	20.88	12.90	6.69	1.72	[kΩ]
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	[VDC]
R _d =	499.82	223.41	131.27	85.20	57.56	39.14	25.97	16.10	8.42	2.282	[kΩ]
RP30-xx12DE											
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	[VDC]
R _u =	218.21	98.10	58.07	38.05	26.04	18.03	12.32	8.03	4.69	2.02	[kΩ]
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	[VDC]
R _d =	273.44	123.02	72.87	47.80	32.76	22.73	15.57	10.20	6.02	2.67	[kΩ]
RP30-xx15DE											
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	[VDC]
R _u =	268.29	120.64	71.43	46.82	32.06	22.21	15.10	9.91	5.81	2.53	[kΩ]
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	[VDC]
R _d =	337.71	152.02	90.13	59.18	40.61	28.23	19.39	12.76	7.60	3.47	[kΩ]

Specifications (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

ON/OFF CTRL



Positive Logic

DC-DC ON
DC-DC OFF

Open or 3.0VDC < V_{CTRL} < 12VDC
Short or 0VDC < V_{CTRL} < 1.2VDC

REGULATIONS

Parameter	Condition		Value
Output Accuracy			±1.0%
Line Regulation	low line to high line, full load	Single Dual	±0.2% ±0.5%
Load Regulation	0% to 100% load	Single Dual	±0.5% ±1.0%
Cross Regulation	asymmetrical 25%<>100% load		±5.0%
Transient Response Recovery Time	25% load step change		300µs typ.

PROTECTIONS

Parameter	Condition		Value
Short Circuit Protection (SCP)			continuous, automatic recovery
Over Voltage Protection (OVP)	zener diode clamp	3.3Vout 5Vout 12Vout 15Vout	3.9VDC 6.2VDC 15VDC 18VDC
Over Load Protection (OLP)	% of lout rated		150% typ.
Over Temperature Protection (OTP)			115°C typ.
Isolation Voltage ⁽⁷⁾	I/P to O/P I/P to O/P to case		1.6kVDC/ 1 minute 1.6kVDC/ 1 minute
Isolation Resistance	Viso= 500VDC		1GΩ min.
Isolation Capacitance			1000pF max.

Notes:

Note7: For repeat Hi-Pot testing, reduce the time and/or the test voltage

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

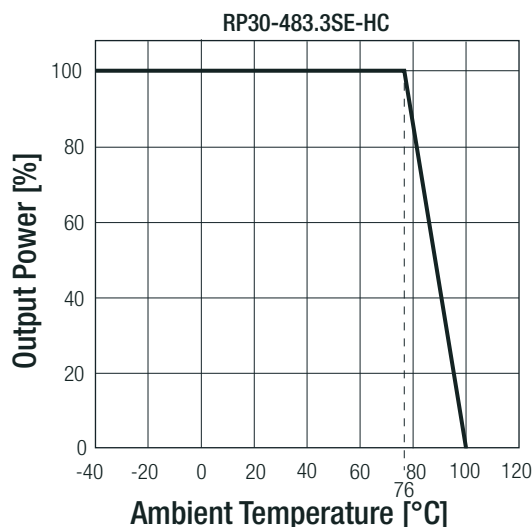
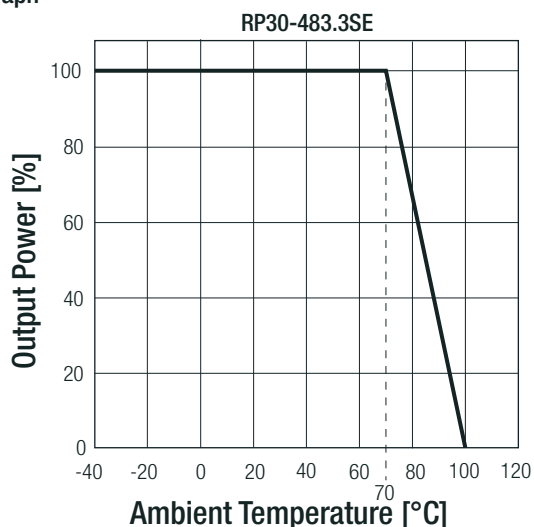
ENVIRONMENTAL

Parameter	Condition		Value
Operating Temperature Range	without derating with derating		-40°C to +70°C -40°C to +100°C
Maximum Case Temperature			+100°C
Temperature Coefficient			±0.02%/K max.
Thermal Impedance	@ natural convection 0.1m/s	without heat-sink with heat-sink	10K/W 8.24K/W
Operating Humidity	non-condensing		5% - 95% RH
Thermal Shock			according to MIL-STD-810F
Vibration			according to MIL-STD-810F
MTBF	MIL-HDBK-217F, G.B Bellcore TR-NWT-000332 ⁽⁹⁾		1283 x 10 ³ hours 1535 x 10 ³ hours

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Specifications (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

Derating Graph ⁽¹⁰⁾



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 RECOM Techsupport for detailed information

SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Condition	Standard
Information Technology Equipment, General Requirements for Safety	E196683	UL60950-1, 1st Edition CAN/CSA-C22.2 No. 60950-1, 1st Edition
EAC	RU-AT.49.09571	TP TC 004/2011
RoHS2		RoHS-2011/65/EU + AM-2015/863
EMC Compliance	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment - Emission requirements	with external filter (see filter suggestion below)	EN55032, Class A and B
ESD Electrostatic discharge immunity test	Air ±8kV and Contact ±6kV	EN61000-4-2, Criteria B
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 B
Surge Immunity ⁽¹¹⁾	±1kV	EN61000-4-5, Criteria B
Immunity to conducted disturbances, induced by radio-frequency fields	10 Vr.m.s	EN61000-4-6, Criteria A
Power Magnetic Field Immunity	100A/m continuous; 1000A/m 1s	EN61000-4-8, Criteria A

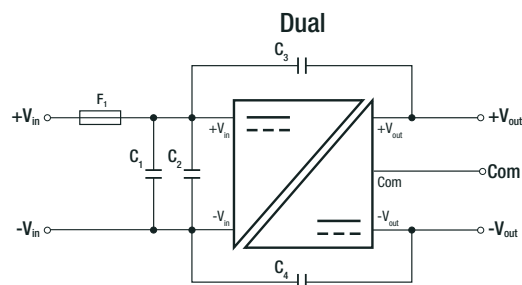
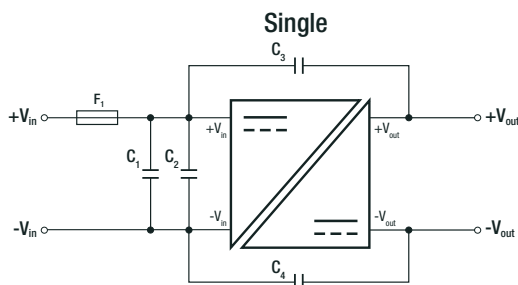
Notes:

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

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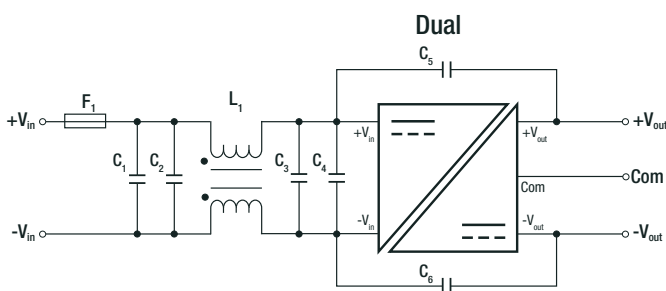
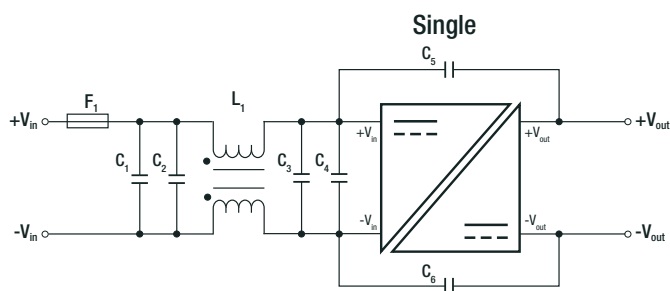
Specifications (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

EMC Filtering Suggestions according to EN55032



Component List Class A

MODEL	C1	C2	C3/C4
RP30-12xxSE RP30-12xxDE	6.8µF/50V, 1812 MLCC	N/A	1000pF/2kV, 1808 MLCC
RP30-24xxSE RP30-24xxDE	6.8µF/50V, 1812 MLCC	N/A	1000pF/2kV, 1808 MLCC
RP30-48xxSE RP30-48xxDE	2.2µF/100V, 1812 MLCC	N/A	1000pF/2kV, 1808 MLCC



Component List Class B

MODEL	C1	C2	C3	C4	C5/C6	L1
RP30-12xxSE RP30-12xxDE	4.7µF/50V 1812 MLCC	N/A	4.7µF/50V 1812 MLCC	N/A	1000pF/2kV 1808 MLCC	CMC: 450µH ref.: WE 7448227005 or ref.: CMC-05
RP30-24xxSE RP30-24xxDE	6.8µF/50V 1812 MLCC	N/A	6.8µF/50V 1812 MLCC	N/A	1000pF/2kV 1808 MLCC	CMC: 450µH ref.: WE 7448227005 or ref.: CMC-05
RP30-48xxSE RP30-48xxDE	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	1000pF/2kV 1808 MLCC	CMC: 450µH ref.: WE 7448227005 or ref.: CMC-05

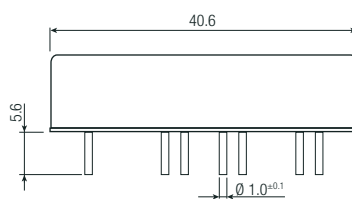
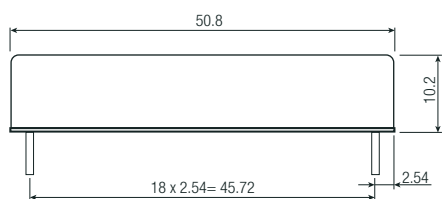
DIMENSIONS AND PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	case	nickel coated copper
	base	FR4 PCB
	potting	epoxy (UL94-V0)
Dimensions (LxWxH)	without Heat-sink	50.8 x 40.6 x 10.2mm
	with Heat-sink	56.8 x 40.6 x 17.0mm
Weight	without Heat-sink	48.0g
	with Heat-sink	65.78g

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Specifications (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

Dimension Drawing (mm)



Pinning Information

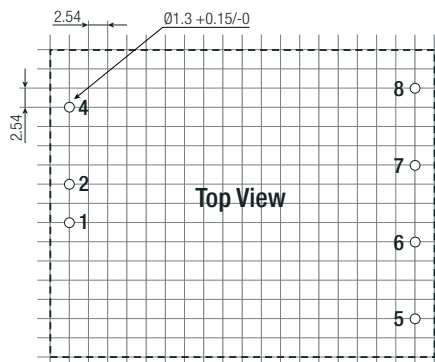
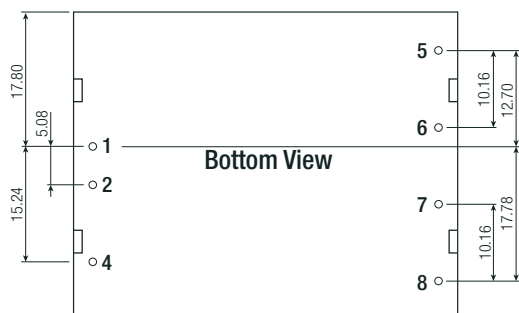
Pin #	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
4	CTRL	CTRL
5	no Pin	+Vout
6	+Vout	Com
7	-Vout	-Vout
8	Trim	Trim

Pin Pitch Tolerance $\pm 0.25\text{mm}$

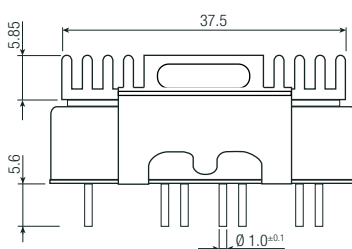
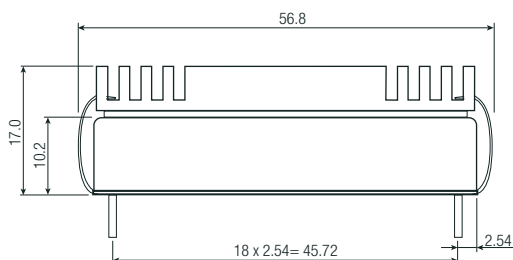
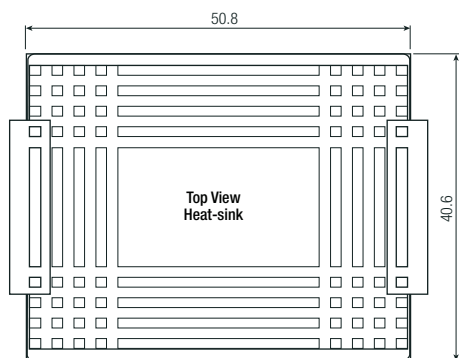
xx.x = $\pm 0.5\text{mm}$

xx.xx = $\pm 0.25\text{mm}$

Recommended Footprint Details



Dimension Drawing (mm) with Heat-sink



Specifications (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

PACKAGING INFORMATION

Parameter	Type		Value
Packaging Dimension (LxWxH)	tube	without heat-sink	255.0 x 54.0 x 22.0mm
	tray	with heat-sink	302.5 x 222.0 x 20.0mm
Packaging Quantity	tube	without heat-sink	5pcs
	tray	with heat-sink	15pcs
Storage Temperature Range			-55°C to +125°C
Storage Humidity	non-condensing		5% - 95% RH

The product information and specifications may be subject to changes even without prior written notice. The product has been designed for various applications; its suitability lies in the responsibility of each customer. The products are not authorized for use in safety-critical applications without RECOM's explicit written consent. A safety-critical application is an application where a failure may reasonably be expected to endanger or cause loss of life, inflict bodily harm or damage property. The applicant 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.

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