

# Features

# Regulated Converters

- 4:1 Wide Input Voltage Range
- 1.6kVDC Isolation
- UL Certified
- Efficiency up to 88%
- Six-Sided Continuous Shield
- Available as Power Module (RPM30-EW)



## RP30-EW

# 30 Watt Single & Dual Output



### Description

The RP30-EW series wide input range 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 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 <sup>(1)</sup> Current [mA]	Efficiency <sup>(1)</sup> typ. [%]	Max. Capacitive Load <sup>(2)</sup> [μF]
RP30-243.3SEW <sup>(3,4)</sup>	10-40	3.3	6000	948	87	19500
RP30-2405SEW <sup>(3,4)</sup>	10-40	5	6000	1437	87	10200
RP30-2412SEW <sup>(3,4)</sup>	10-40	12	2500	1437	87	3300
RP30-2415SEW <sup>(3,4)</sup>	10-40	15	2000	1420	88	1100
RP30-483.3SEW <sup>(3,4)</sup>	18-75	3.3	6000	474	87	19500
RP30-4805SEW <sup>(3,4)</sup>	18-75	5	6000	710	88	10200
RP30-4812SEW <sup>(3,4)</sup>	18-75	12	2500	718	87	3300
RP30-4815SEW <sup>(3,4)</sup>	18-75	15	2000	710	88	1100
RP30-2412DEW <sup>(3,4)</sup>	10-40	±12	±1250	1488	84	±1000
RP30-2415DEW <sup>(3,4)</sup>	10-40	±15	±1000	1471	85	±680
RP30-4812DEW <sup>(3,4)</sup>	18-75	±12	±1250	735	85	±1000
RP30-4815DEW <sup>(3,4)</sup>	18-75	±15	±1000	726	86	±680

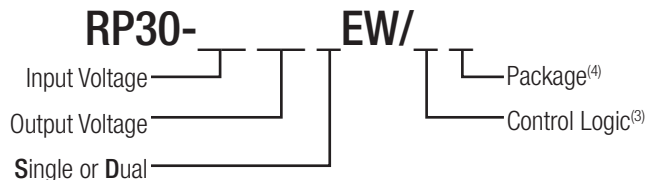


### Notes:

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



### Model Numbering



### Ordering Examples

- RP30-2405SEW = 24V Input, 5V Output, Positive Logic CTRL pin.  
 RP30-4812DEW/N-HC = 48V Input, ±12V Output, Negative Logic CTRL pin, Heat-sink fitted

### Notes:

- Note3: no suffix for CTRL function with Positive Logic (1=ON, 0=OFF)  
 add "N" for CTRL function with Negative Logic (0=ON, 1=OFF)  
 Note4: add suffix -HC for premounted Heat-sink and clips

UL60950-1 Certified

**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 = 24V nom. Vin = 48V		10VDC 18VDC	24VDC 48VDC	40VDC 75VDC
Under Voltage Lockout (UVLO)	Vin = 24V	DC-DC ON DC-DC OFF		8VDC	10VDC
	Vin = 48V	DC-DC ON DC-DC OFF		16VDC	18VDC
Input Filter <sup>(5)</sup>					L-C Type
Input Reflected Ripple Current <sup>(6)</sup>	nominal Vin and full load			20mA <sub>p-p</sub>	
Input Surge Voltage	Vin = 24V, 100ms max. Vin = 48V, 100ms max.				50VDC 100VDC
Start-up time	Power up Remote ON/OFF			10ms 10ms	
Operating Frequency Range			270kHz	300kHz	330kHz
Minimum Load	% of full load	Single Dual	0% 10%		
Ripple and Noise	measured by 20Mhz bandwidth with a 0.1µF/50V MLCC			60mV <sub>p-p</sub> 75mV <sub>p-p</sub> 100mV <sub>p-p</sub>	
Remote ON/OFF <sup>(7)</sup>	Positive Logic	DC-DC ON DC-DC OFF	Open or 3.0V < Vr < 12V 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 < 12V		
Input current of Remote pin (CTRL)	DC-DC OFF			3mA	
	DC-DC ON		-0.5mA		0.5mA

**Notes:**

Note5: An external filter capacitor is required for normal operation. The capacitor should be capable of handling 1A ripple current for 48V/24V models.

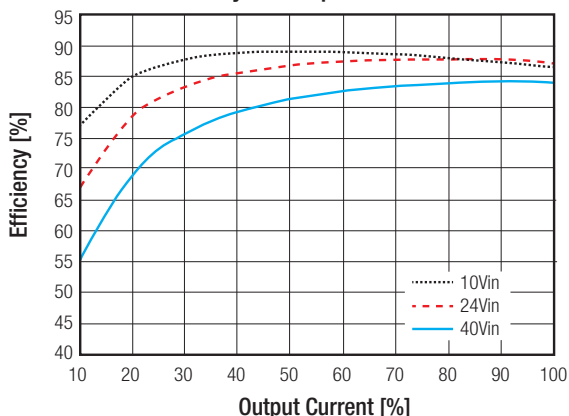
RECOM suggest: Nippon chemi-con KY series, 220µF/100V, ESR 90m Ω.

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

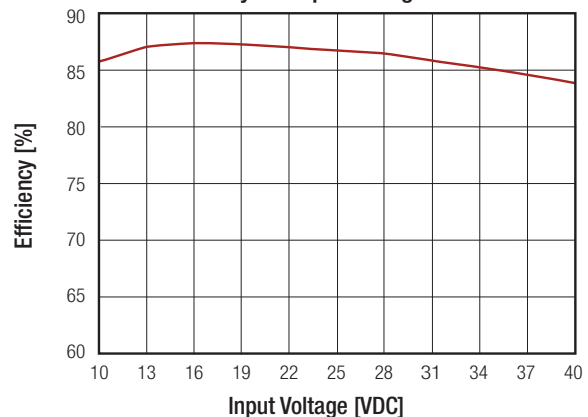
Note7: The ON/OFF control function can be positive or negative logic. The pin voltage is referenced to -Vin pin.

**RP30-2405SE**

**Efficiency vs. Output Current**



**Efficiency vs. Input Voltage**

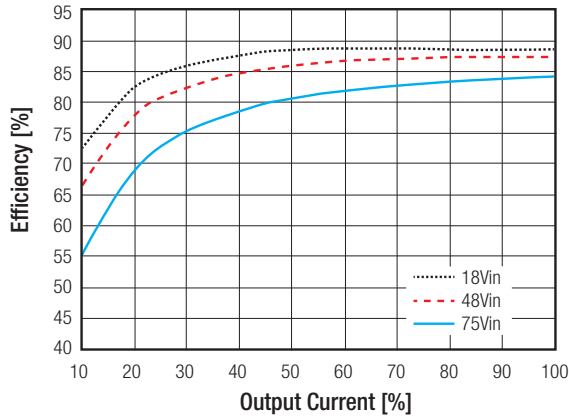


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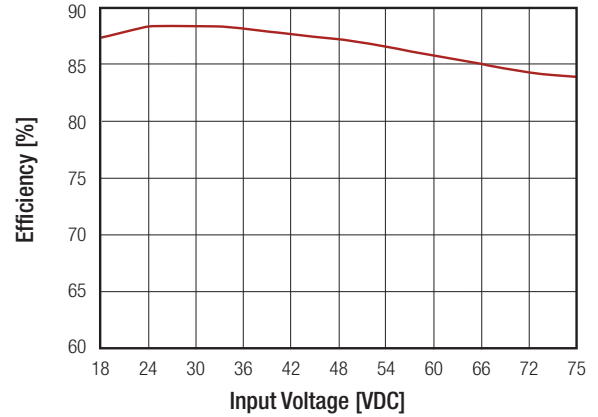
Specifications measured at Ta = 25°C, nominal input voltage, full load otherwise noted

RP30-4805SEW

Efficiency vs. Output Current



Efficiency vs. Input Voltage



REGULATIONS

Parameter	Condition	Value	
Output Voltage Accuracy		±1%	
Voltage Adjustability		±10%	
Line Voltage Regulation	low line to high line at full load	±0.5%	
Load Voltage Regulation <sup>(6)</sup>	no load to full load	Single Dual	±0.5% ±1.0%
Cross Regulation	asymmetrical 25%<->100% load	±5%	
Transient Response recovery time	25% load step change	250µs	

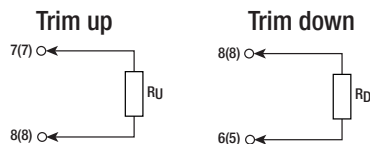
Notes:

Note8: The dual output required a minimum 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.

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 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-xx3.3SEW

Trim up	1	2	3	4	5	6	7	8	9	10	%
V <sub>out</sub> =	3.333	3.366	3.399	3.432	3.465	3.498	3.531	3.564	3.597	3.63	Volts
R <sub>U</sub> =	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	%
V <sub>out</sub> =	3.267	3.234	3.201	3.168	3.135	3.102	3.069	3.036	3.003	2.97	Volts
R <sub>D</sub> =	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  $T_a = 25^\circ\text{C}$ , nominal input voltage, full load otherwise noted

RP30-xx05SEW											
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
$R_{\text{v}}$ =	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
$R_{\text{d}}$ =	45.53	20.61	12.31	8.15	5.66	4.00	2.81	1.92	1.23	0.68	kOhms

RP30-xx12SEW											
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
$R_{\text{v}}$ =	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
$R_{\text{d}}$ =	460.99	207.95	123.60	81.42	56.12	39.25	27.20	18.16	11.13	5.51	kOhms

RP30-xx15SEW											
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
$R_{\text{v}}$ =	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
$R_{\text{d}}$ =	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

#### RP30-xx12DEW

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
$R_{\text{v}}$ =	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
$R_{\text{d}}$ =	273.44	123.02	72.87	47.80	32.76	22.73	15.57	10.20	6.02	2.67	kOhms

#### RP30-xx15DEW

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
$R_{\text{v}}$ =	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
$R_{\text{d}}$ =	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
Over Load Protection (OLP)	% of lout rated	150% max.
Over Temperature Protection (OTP)		115°C typ.
Isolation Voltage	I/P to O/P	1.6kVDC/1minute
	I/P to O/P to case	1.6kVDC/1minute
Isolation Resistance	500VDC	1GΩ min.
Isolation Capacitance		1000pF max.

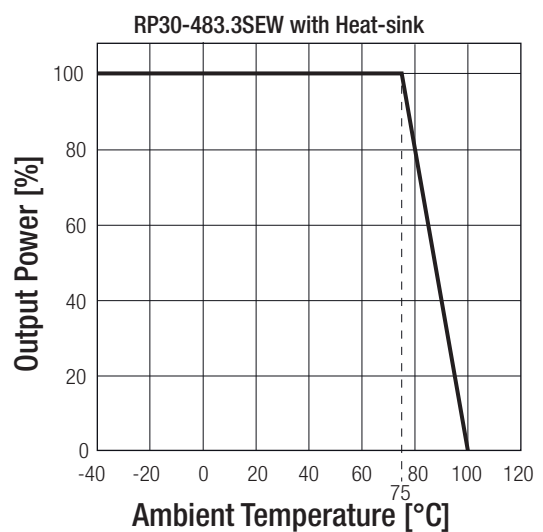
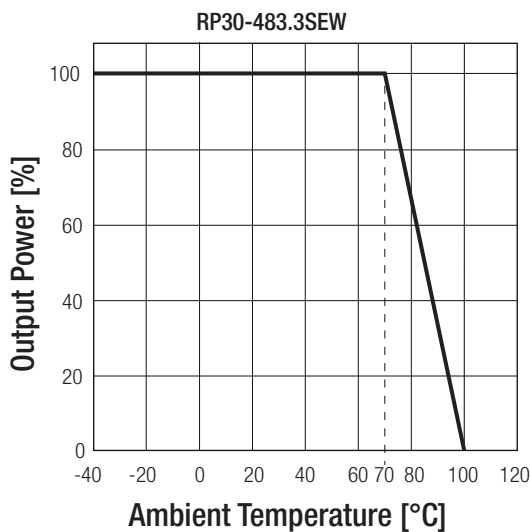
**Notes:**

Note9: This power module is not internally fused. An input line fuse must always be used.

**ENVIRONMENTAL**

Parameter	Condition	Value
Operating Temperature Range	without derating	-40°C to +70°C
	with derating	-40°C to +100°C
Maximum Case Temperature		+100°C
Temperature Coefficient		±0.02%/°C max.
Thermal Impedance <sup>(10)</sup>	Natural convection (20LFM)	10°C/Watt
	Natural convection (20LFM) with Heat-sink	8.24°C/Watt
Operating Humidity		5% - 95% RH
Thermal Shock		MIL-STD-810F
Vibration		MIL-STD-810F
MTBF	MIL-HDBK-217F	759.8 x 10 <sup>3</sup> hours
	Bellcore TR-NWT-000332 <sup>(10)</sup>	1315 x 10 <sup>3</sup> hours

**Derating Graph<sup>(11)</sup>**



**Notes:**

Note10: BELLCORE TR-NWT-000332. Case I: 50% Stress, Temperature at 40°C (Ground fixed and controlled environment).

Note11: 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

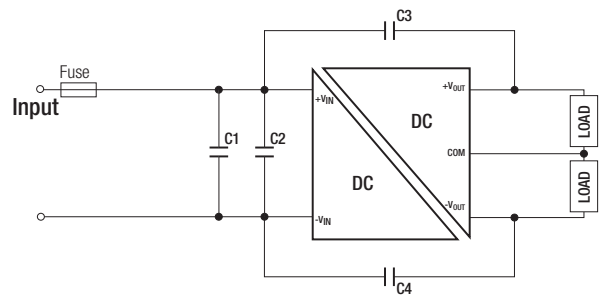
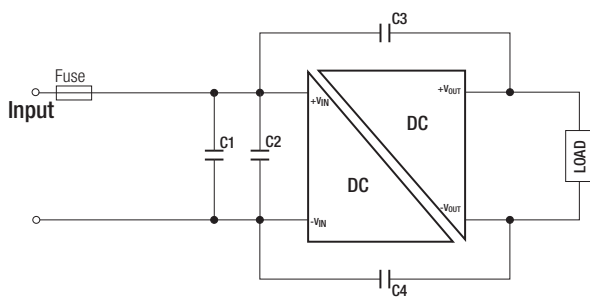
Certificate Type (Safety)	Report / File Number	Standard
UL General Safety	E196683	UL60950-1 1st. Ed.: 2003 C22.2 No. 60950 1st. Ed.: 2003
EMC Compliance	Condition	Standard / Criterion
EMI Standard <sup>(12)</sup>	with external filter	EN55022, Class A, Class B
ESD	Air ±8kV and Contact ±6kC	EN61000-4-2, Criteria B
Radiated Immunity	10 V/m	EN61000-4-3, Criteria A
Fast Transient <sup>(13)</sup>	±2kV	EN61000-4-4, Criteria A
Surge <sup>(13)</sup>	±1kV	EN61000-4-5, Criteria B
Conducted Immunity	10 Vr.m.s	EN61000-4-6, Criteria A

#### Notes:

Note12: The standard modules meet EMI Class A or Class B with external components, see filter suggestions below.

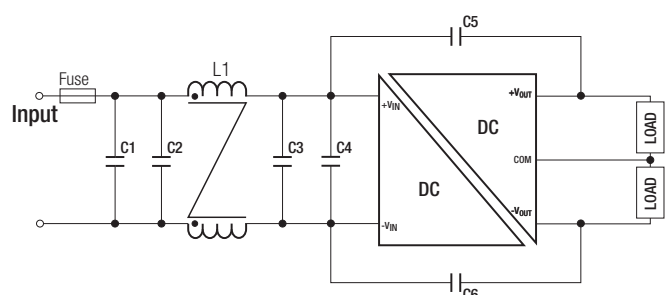
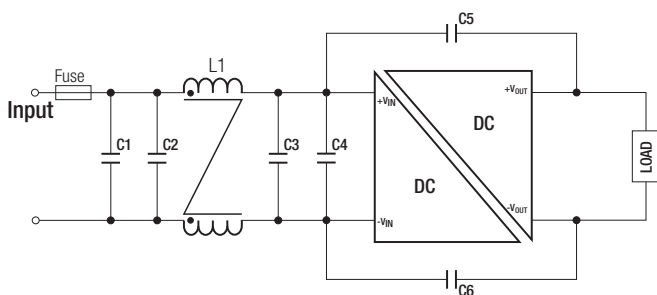
Note13: An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5. The filter capacitor Recom suggests: Nippon chemi-con KY series, 220µF/100V

#### EMI Filtering Class A



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

#### EMI Filtering Class B



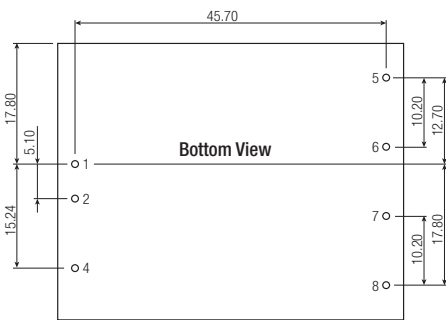
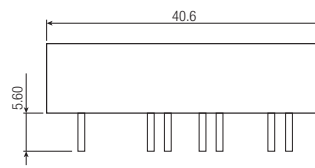
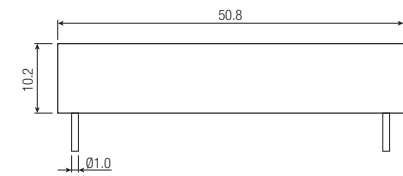
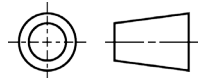
MODEL	C1	C2	C3	C4	C5/C6	L1
RP30-24xxSEW RP30-24xxDEW	6.8µF/50V 1812 MLCC	N/A	6.8µF/50V 1812 MLCC	N/A	1000pF/2kV 1808 MLCC	CMC: 450µH ref.: WE 7448227005 ref.: CMC-05
RP30-48xxSEW RP30-48xxDEW	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	1000pF/2kV 1808 MLCC	CMC: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

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

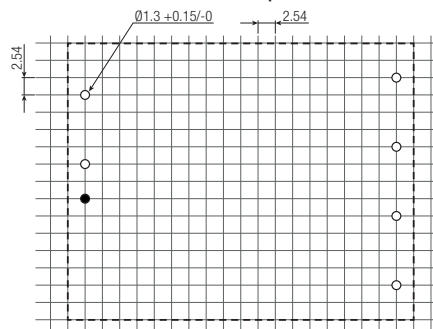
**DIMENSIONS and PHYSICAL CHARACTERISTICS**

Parameter	Type	Value
Material	Case	Nickel coated copper
	Base	FR4 PCB
	Potting	Epoxy (UL94-V0)
Package Dimensions (LxWxH)	without Heat-sink	50.8 x 40.6 x 10.2mm
	with Heat-sink	56.8 x 40.6 x 17.0mm
Package Weight	without Heat-sink	48g
	with Heat-sink	69.06g

**Dimension Drawing (mm)**



**Recommended Footprint Details**

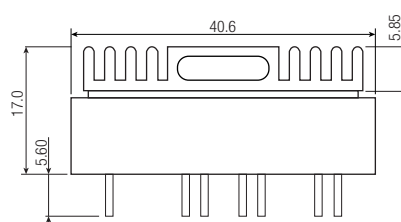
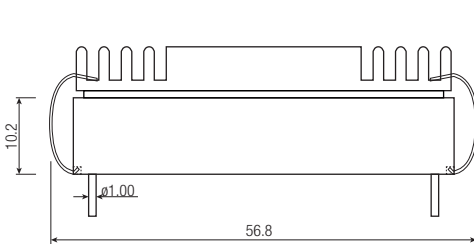
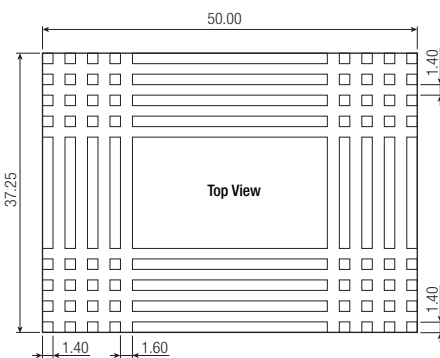


**Pin Connections**

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  $\pm 0.25\text{mm}$   
Pin Dimension Tolerance  $\pm 0.1\text{mm}$   
Tolerance: X.X  $\pm 0.5\text{mm}$   
X.XX  $\pm 0.25\text{mm}$

**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	Tube 5pcs.
	with Heat-sink	Tray 15pcs.
Storage Temperature Range		-55°C to +125°C
Storage Humidity		5% - 95% RH

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