Features

Regulated Converters

- 4:1 Wide Input Voltage Range
- 1.6kVDC Isolation
- UL Certified
- Efficiency up to 89%
- Six-Sided Continuous Shield
- Available as Power Module (RPM40-GW)

RECOM
DC/DC Converter

RP40-GW

40 Watt 2" x 2" Single, Dual Output

3 YEAR Warranty

Description

The RP40-GW 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 2" package meets military standards for thermal shock and vibration tolerance.

RoHS 6 from 6 compliant
REACH compliant
c UL us E196683

UL60950-1 Certified

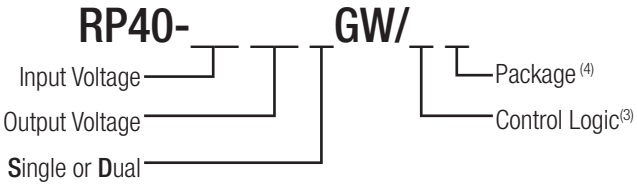
Selection Guide

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [mA]	Input[1] Current [mA]	Efficiency[1] typ. [%]	Max. Capacitive Load[2] [µF]
RP40-243.3SGW[3,4]	9-36	3.3	10000	1580	87	25750
RP40-2405SGW[3,4]	9-36	5	8000	1894	88	13600
RP40-2412SGW[3,4]	9-36	12	3333	1916	87	2360
RP40-2415SGW[3,4]	9-36	15	2666	1915	87	1510
RP40-483.3SGW[3,4]	18-75	3.3	10000	790	87	25750
RP40-4805SGW[3,4]	18-75	5	8000	936	89	13600
RP40-4812SGW[3,4]	18-75	12	3333	958	87	2360
RP40-4815SGW[3,4]	18-75	15	2666	947	88	1510
RP40-2412DGW[3,4]	9-36	±12	±1667	1938	86	±1200
RP40-2415DGW[3,4]	9-36	±15	±1333	1938	86	±750
RP40-4812DGW[3,4]	18-75	±12	±1667	958	87	±1200
RP40-4815DGW[3,4]	18-75	±15	±1333	969	86	±750

Notes:

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

Model Numbering



Ordering Examples

RP40-2405SGW = 24V 4:1 Input, 5V Output, Positive Logic CTRL pin.
RP40-4812DGW/N-HC = 48V 4:1 Input, ±12V Output, Negative Logic CTRL pin, Heat-sink fitted

Notes:

Note3: no suffix for CTRL function with Positive Logic (1=ON, 0=OFF) and trim pin
add suffix "N" for CTRL function with Negative Logic (0=ON, 1=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= 24V nom. Vin= 48V		9VDC 18VDC	24VDC 48VDC	36VDC 75VDC
Under Voltage Lockout (UVLO)	Vin = 24V	DC-DC ON DC-DC OFF		 8VDC	9VDC
	Vin = 48V	DC-DC ON DC-DC OFF		 16VDC	18VDC
Input Filter[5]					Pi-Type
Input Reflected Ripple Current[6]	nominal Vin and full load			20mAp-p	
Input Surge Voltage	Vin= 24V, 100ms max. Vin= 48V, 100ms max.				50VDC 100VDC
Start-up time	Power up Remote ON/OFF			20ms 20ms	
Operating Frequency Range[7]			270kHz	300kHz	330kHz
Minimum Load	Single Dual		0% 10%		
Ripple and Noise	measured by 20MHz bandwidth	Single 3.3V, 5V Single 12V, 15V		50mVp-p 75mVp-p	
		Dual 12Vout Dual 15Vout		120mVp-p 150mVp-p	
Remote ON/OFF[8]	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)	24Vin 48Vin	DC-DC OFF DC-DC OFF		10mA 5mA	
		DC-DC ON	-0.5mA		0.5mA

Notes:

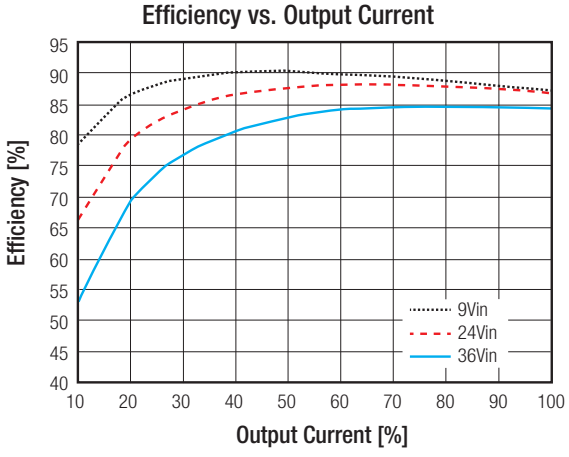
Note5: An external filter capacitor is required for normal operation. The capacitor should be capable of handing 1A ripple current for 48V/24V models.
RECOM suggest: Nippon chemi-con KY series, 220µF/100V, ESR 90m Ω.

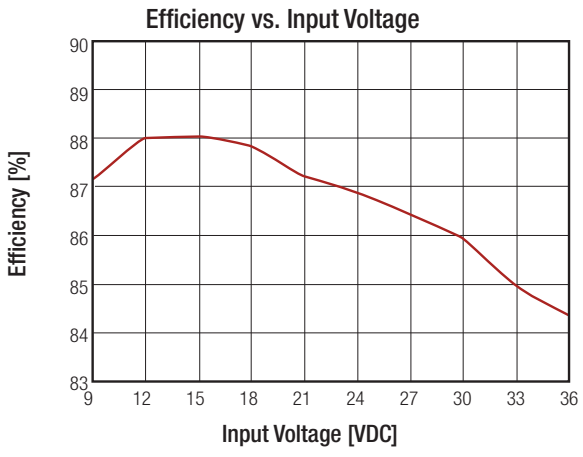
Note6: Simulated source impedance of 12µH. 12µH inductor in series with +Vin.

Note7: Operating frequency for dual output: master (5Vout) 300kHz slave (3.3Vout) 500kHz.

Note8: The ON/OFF control pin voltage is referenced to -Vin pin.

RP40-2405SGW





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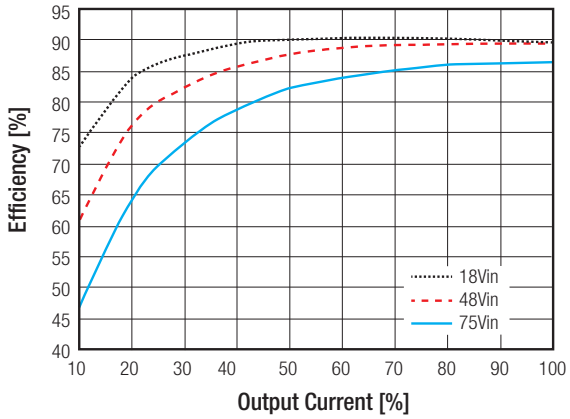
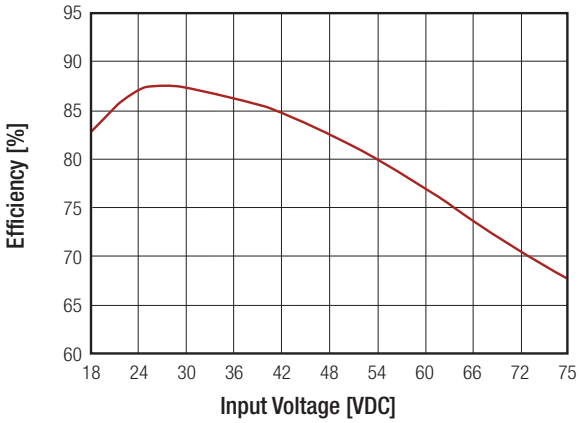
Specifications measured at Ta = 25°C, nominal input voltage, full load otherwise noted

RP40-4805SGW

Efficiency vs. Output Current



Efficiency vs. Input Voltage



REGULATIONS

Parameter	Condition		Value
Output Voltage Accuracy			±1.0% max.
Voltage Adjustability [9]			±10.0% max.
Line Voltage Regulation	low line to high line		±0.2% max.
Load Voltage Regulation[10,11]	min. load to full load	Single	±0.5% max.
		Dual	±1.0% max.
Cross Regulation	asymmetrical 25%/100% FL		±5.0% max.
Transient Response recovery time	25% load step change		250µs typ.

Notes:

Note9: 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.

Note10: The dual output required a minimum 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

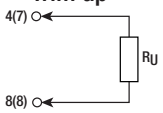
Note11: Load regulation for dual output: Min load to 100% load balanced on all outputs.

External Output Trimming

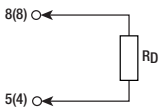
Output Voltage Trimming

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 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.

Trim up



Trim down



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

RP40-xx3.3SGW

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

RP40-xx05SGW

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-xx12SGW

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-xx15SGW

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-xx12DGW

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

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

RP40-xx15DGW											
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

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)			110°C typ.
Over Load Protection (OLP)	% of Iout rated		150% max.
Isolation Voltage	I/O to O/P I/O (O/P) to Case		1.6kVDC/ 1 minute 1.6kVDC/ 1 minute
Isolation Resistance	500VDC		1GΩ min.
Isolation Capacitance			2500pF max.

Notes:

Note12: 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 +57°C -40°C to +105°C
Maximum Case Temperature		+105°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[13]	6617 x 10^2 hours 1105 x 10^3 hours

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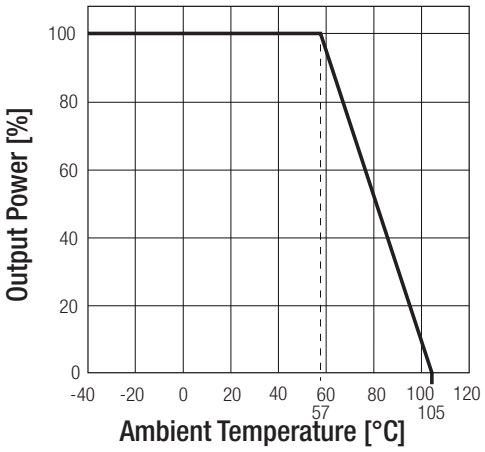
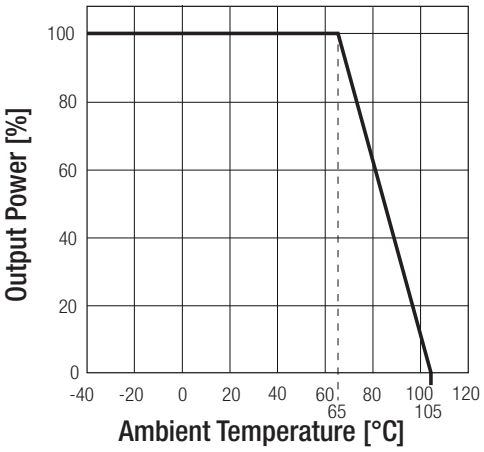
Specifications measured at Ta = 25°C, nominal input voltage, full load otherwise noted

Derating Graph(14)

RP40-483.3SGW



RP40-483.3SGW with Heat-sink



Notes:

Note13 BELLCORE TR-NWT-000332. Case I: 50% Stress, Temperature at 40°C (Ground fixed and controlled environment).

Note14: 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

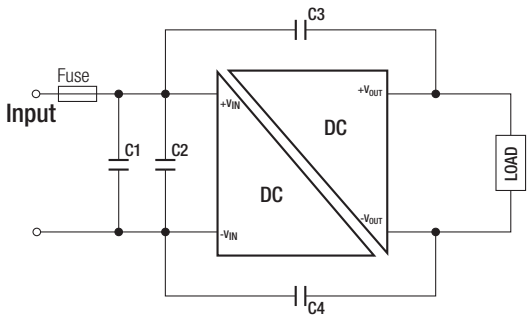
EMC Compliance	Condition	Standard / Criterion
EMI Standard(15)	with external filter	EN55022, Class A or B
ESD	Air ±8kV and Contact ±6kV	EN61000-4-2, Criteria A
Radiated Immunity	10 V/m	EN61000-4-3, Criteria A
Fast Transient(16)	±2kV	EN61000-4-4, Criteria B
Surge(16)	±1kV	EN61000-4-5, Criteria A
Conducted Immunity	10 Vr.m.s	EN61000-4-6, Criteria A

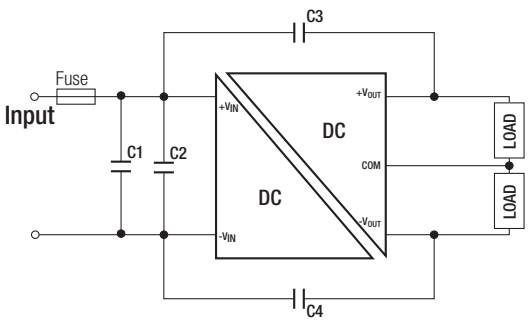
Notes:

Note15: The standard modules meet EMI Class A or Class B with external components, see filter suggestions below.

Note16: An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5.
The filter capacitor Recom suggest: Nippon chemi-con KY series, 220µF/100V

EMI Filtering Class A





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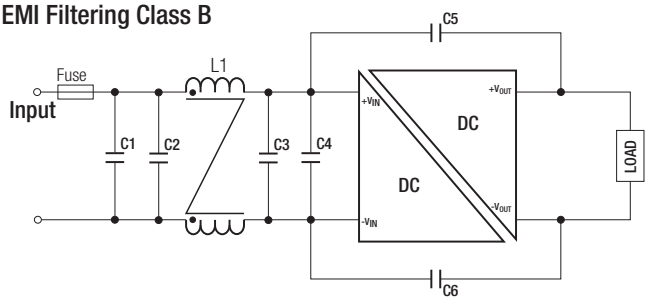
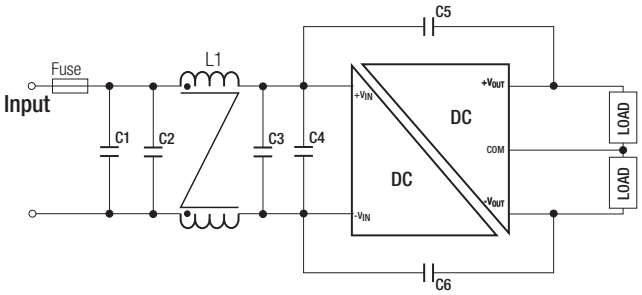
Specifications measured at Ta = 25°C, nominal input voltage, full load otherwise noted

MODEL	C1	C2	C3/C4
RP40-24xxSGW RP40-24xxDGW	N/A	N/A	1000pF/2kV 1206 MLCC
RP40-48xxSGW RP40-48xxDGW	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	1000pF/2kV 1206 MLCC

EMI Filtering Class B



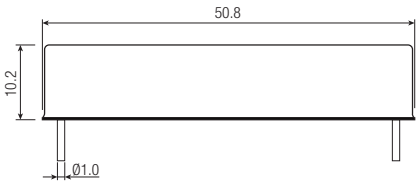


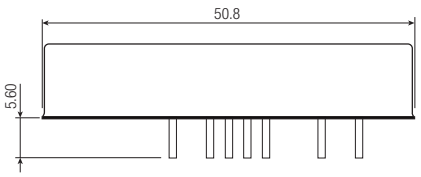
MODEL	C1	C2	C3	C4	C5/C6	L1
RP40-24xxSGW RP40-24xxDGW	4.7µF/50V 1812 MLCC	N/A	4.7µF/50V 1812 MLCC	N/A	1000pF/2kV 1206 MLCC	CMC: 450µH ref.: WE 7448227005 ref.: CMC-05
RP40-24xxSGW RP40-24xxDGW	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	1000pF/2kV 1206 MLCC	CMC: 830µH ref.: WE 744822301 ref.: CMC-08

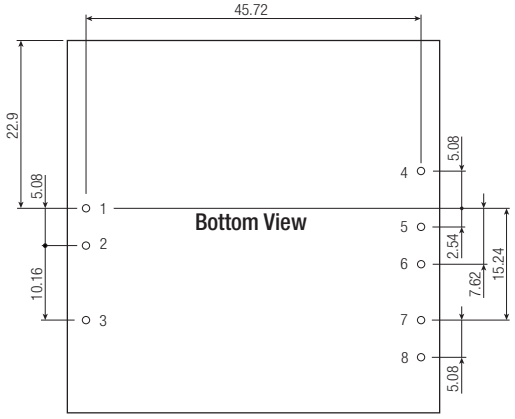
DIMENSIONS and PHYSICAL CHARACTERISTICS

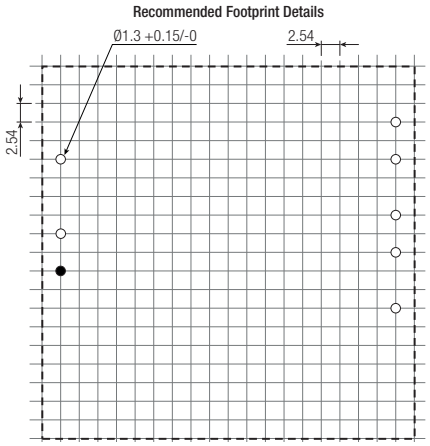
Parameter	Type	Value
Material	Case Base Potting	Nickel coated copper FR4 PCB Epoxy (UL94-V0)
Package Dimensions (LxWxH)	without Heat-sink with Heat-sink	50.8 x 50.8 x 10.2mm 56.8 x 50.8 x 17.0mm
Package Weight	without Heat-sink with Heat-sink	60g 81.06g

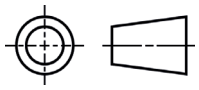
Dimension Drawing (mm)











Pin Connections

Pin #	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	CTRL	CTRL
4	-Sense[9]	+Vout
5	+Sense[9]	Com
6	+Vout	Com
7	-Vout	-Vout
8	Trim	Trim

Pin Pitch Tolerance ±0.25 mm
Pin Dimension Tolerance ±0.1mm
Tolerance: X.X ±0.5mm
X.XX ±0.25mm

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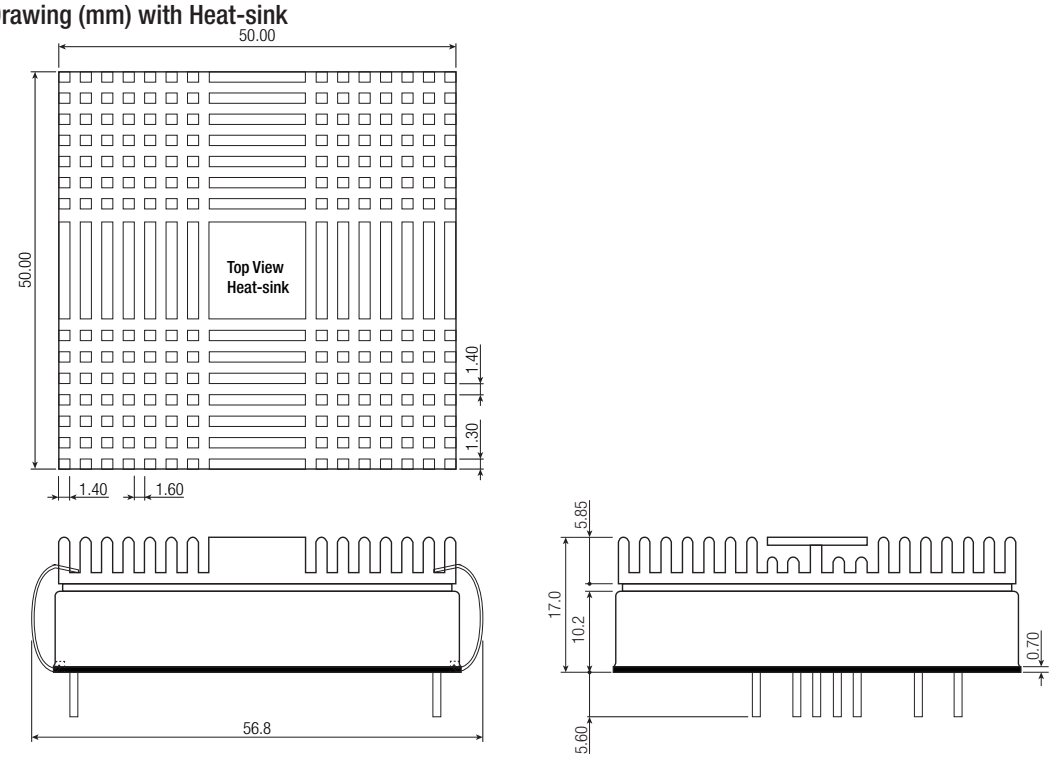
Specifications measured at Ta = 25°C, nominal input voltage, full load otherwise noted

Dimension Drawing (mm) with Heat-sink



PACKAGING INFORMATION			
Parameter	**Type**		**Value**
Packaging Quantity	without Heat-sink	Tube	4pcs.
	with Heat-sink	Tray	12pcs.
Storage Temperature Range			-55°C to +125°C
Storage Humidity			5% - 95% RH