Features

Regulated Converter

- 2:1 input voltage range
- 1.6kVDC isolation
- UL60950-1 certified
- Efficiency up to 87%
- Fixed operation frequency
- Six-sided continuous shield

RECOM
DC/DC Converter

RP10-E

10 Watt 2“ x 1“ Single and Dual Output

3 YEAR warranty

Description

The RP10-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” package meets military standards for thermal shock and vibration tolerance and is available with an optional remote on/off control pin. This series is also available with the /M1 and /M2 option which is particularly suitable for extended temperature range applications.

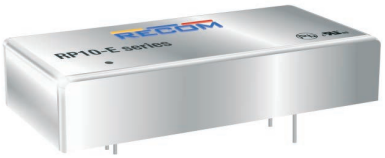
Selection Guide

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [mA]	Input (1) Current [mA]	Efficiency (1) typ. [%]	Max. Capacitive Load (2) [µF]
RP10-123.3SE (3,4)	9-18	3.3	2000	688	80	6800
RP10-1205SE (3,4)	9-18	5	2000	1029	81	4700
RP10-1212SE (3,4)	9-18	12	830	988	84	690
RP10-1215SE (3,4)	9-18	15	670	997	84	470
RP10-243.3SE (3,4)	18-36	3.3	2000	344	80	6800
RP10-2405SE (3,4)	18-36	5	2000	508	82	4700
RP10-2412SE (3,4)	18-36	12	830	494	84	690
RP10-2415SE (3,4)	18-36	15	670	499	84	470
RP10-483.3SE (3,4)	36-75	3.3	2000	172	80	6800
RP10-4805SE (3,4)	36-75	5	2000	248	84	4700
RP10-4812SE (3,4)	36-75	12	830	241	86	690
RP10-4815SE (3,4)	36-75	15	670	241	87	470
RP10-1205DE (3,4)	9-18	±5	±1000	992	84	±680
RP10-1212DE (3,4)	9-18	±12	±416	1002	83	±330
RP10-1215DE (3,4)	9-18	±15	±333	991	84	±110
RP10-2405DE (3,4)	18-36	±5	±1000	502	83	±680
RP10-2412DE (3,4)	18-36	±12	±416	489	85	±330
RP10-2415DE (3,4)	18-36	±15	±333	496	84	±110
RP10-4805DE (3,4)	36-75	±5	±1000	248	84	±680
RP10-4812DE (3,4)	36-75	±12	±416	242	86	±330
RP10-4815DE (3,4)	36-75	±15	±333	245	85	±110

Notes:

Note1: Maximum values at nominal input voltage and full load

Note2: Max. Cap load is tested at minimum input and constant resistive load



RoHS 2+ compliant 10 from 10 · REACH compliant · c UL us E196683 · EAC

UL60950-1 certified
EN55032 compliant

Model Numbering

RP10-___ ___ E/ _ /M1-

- nom. Input Voltage
- nom. Output Voltage
- Single or Dual
- *“Package (5)”*
- *“Extended Version (4)”*
- *“CTRL Logic (3)”*

Notes:

Note3: no suffix for standard part without CTRL pin
add suffix “P” for CTRL function with positive logic (1=ON, 0=OFF)
add suffix “N” for CTRL function with negative logic (0=ON, 1=OFF)

Note4: add suffix “/M1” for higher efficiencies and extended temperature range

Note5: add suffix “-HC” for premounted Heat-sink with clips

Ordering Examples

RP10-1205SE/P = 12V input, 5V output, single, positive logic CTRL pin

RP10-4805DE/M1-HC = 48V input, ±5V output, dual, extended temp. range, 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					Pi-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
Minimum Load (6)			10%		
Start-up Time	Power up			20ms	
ON/OFF CTRL (7) refer to ***"ON/OFF CTRL"***	Positive Logic	DC-DC ON DC-DC OFF			Open or 3.5VDC < V_{CTRL}< 12VDC Short or 0VDC < V_{CTRL}< 1.2VDC
	Negative Logic	DC-DC ON DC-DC OFF			Short or 0VDC < V_{CTRL}< 1.2VDC Open or 3.5VDC < V_{CTRL}< 12VDC
Input Current of CTRL pin	drive current	I_{CTRL}	-0.5mA		+1.0mA
Standby Current	DC-DC OFF	I_{in}		20mA	
Internal Operating Frequency			270kHz	300kHz	330kHz
Output Ripple and Noise	20MHz BW	Single Dual		50mVp-p 75mVp-p	
Input Reflected Ripple Current (8)				30mAp-p	

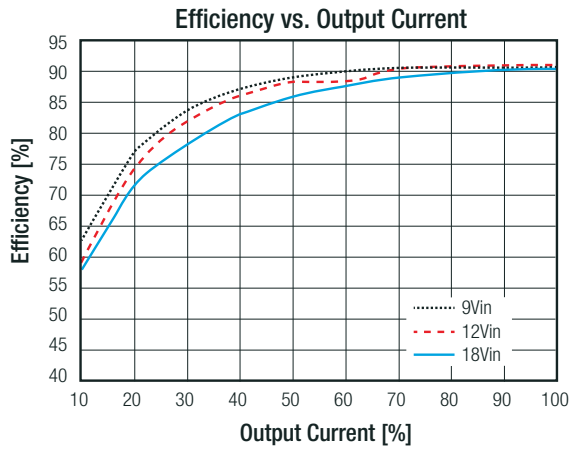
Notes:

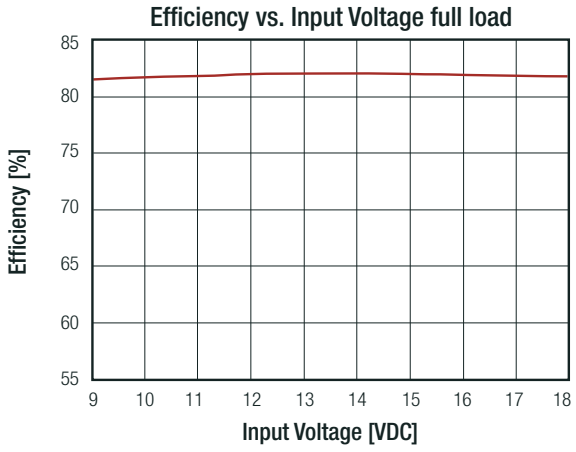
Note6: The RP10-E series requires a minimum of 10% loading on the output to maintain specified regulation. Operation under no-load condition will not damage these devices, however they may not meet all listed specification

Note7: If no suffix is specified, the control pin will be absent. If fitted, the ON/OFF control function can be positive or negative logic. The pin voltage is referenced to -Vin

Note8: Simulated source impedance of 12µH. 12µH inductor in series with +Vin

RP10-1205SE





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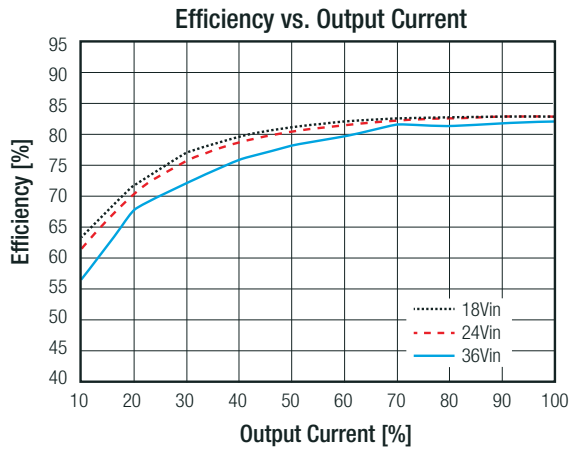
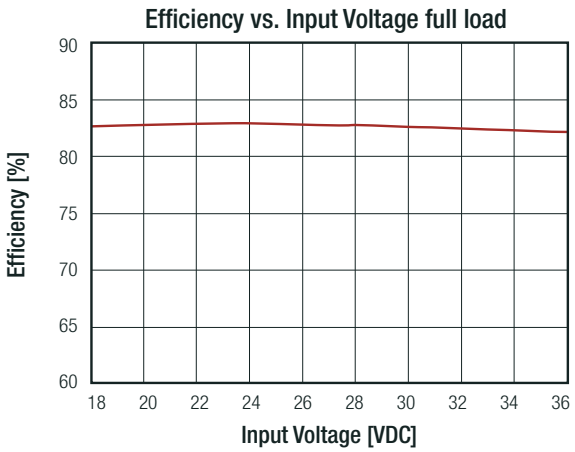
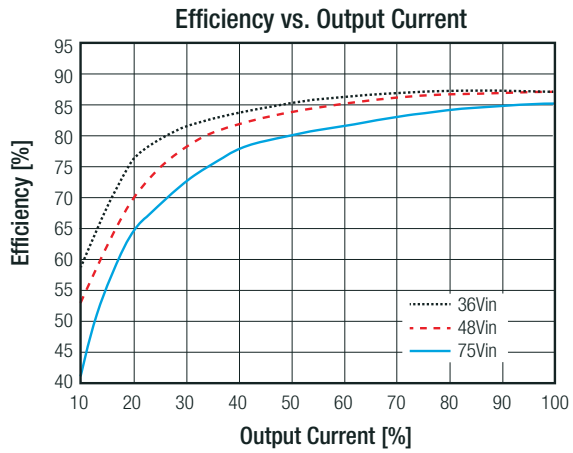
Specifications (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

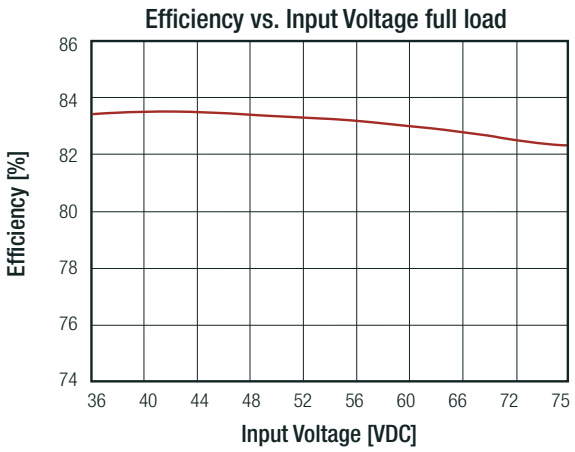
RP10-2405SE



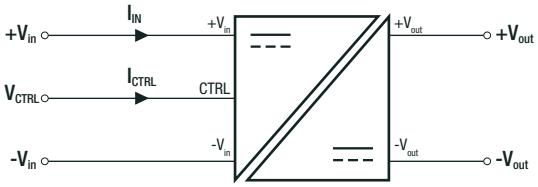


RP10-4805SE





ON/OFF CTRL



Positve Logic	DC-DC ON	Open or 3.5VDC < V_{CTRL} < 15VDC
	DC-DC OFF	Short or 0VDC < V_{CTRL} < 1.2VDC
Negativ Logic	DC-DC ON	Short or 0VDC < V_{CTRL} < 1.2VDC
	DC-DC OFF	Open or 3.5VDC < V_{CTRL} < 15VDC

REGULATIONS

Parameter	Condition		Value
Output Accuracy			±1.0%
Line Regulation	low line to high line, full load		±0.2%
Load Regulation	0% to 100% load	Single	±0.5%
		Dual	±1.0%
Cross Regulation	asymmetrical 25%<>100% load		±5.0%
Transient Response Recovery Time	25% load step change		250µs typ.

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

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 typ. 6.2VDC typ. 15VDC typ. 18VDC typ.
Over Load Protection (OLP)	% of Iout rated		150% typ.

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PROTECTIONS		
Parameter	**Condition**	**Value**
Isolation Voltage [9]	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		300pF max.

Notes:

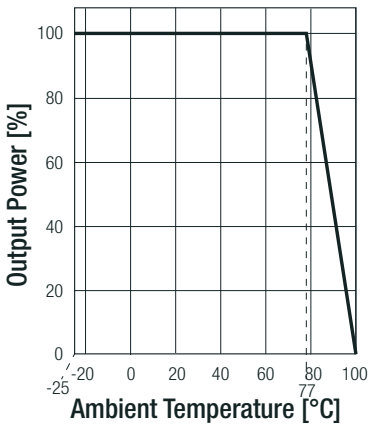
Note9: For repeat Hi-Pot testing, reduce the time and/or the test voltage

Note10: This power module is not internally fused. An input line fuse must always be used

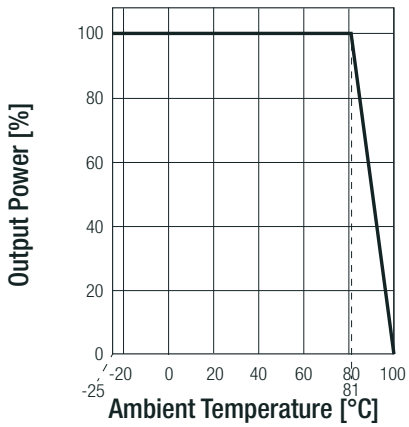
ENVIRONMENTAL			
Parameter	**Condition**		**Value**
Operating Temperature Range	with derating	Standard with suffix "M1"	-25°C to +100°C -40°C to +100°C
Maximum Case Temperature			+105°C
Temperature Coefficient			±0.02%/K max.
Thermal Impedance	@ natural convection 0.1m/s, vertical direction	without heat-sink with heat-sink	12K/W 10K/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.		3342 x 10^3 hours

Derating Graph [11]

RP10-4805SE



RP10-4805SE-HC



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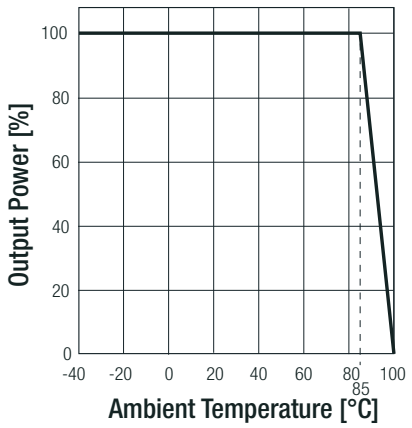
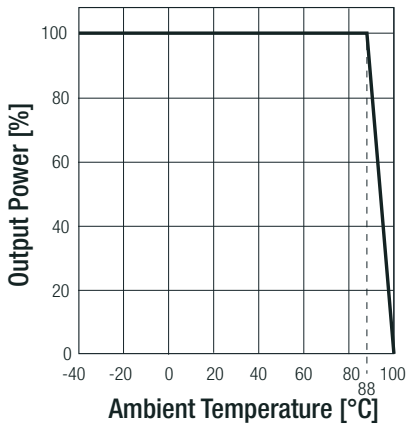
Specifications (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

RP10-4805SE/M1 (12)



RP10-4805SE/M1-HC (12)



Notes:

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 RECOM Techsupport for detailed information

Note12: "/M1" version is more efficient and can therefore operate in a more extensive temperature range than standard version

SAFETY AND CERTIFICATIONS		
Certificate Type (Safety)	**Condition**	**Standard**
Information Technology Equipment, General Requirements for Safety	E196683	UL60950-1, 2nd Edition, 2011 CAN/CSA-C22.2 No. 60950-1-07, 2nd Edition, 2011
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 (13)	±2kV	EN61000-4-4, Criteria B
Surge Immunity (13)	±2kV	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:

Note13: 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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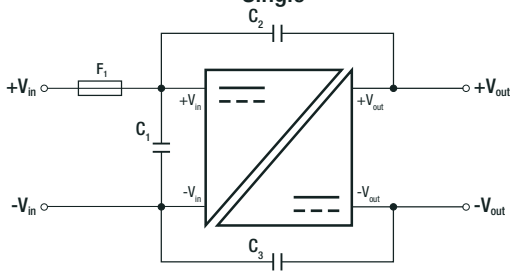
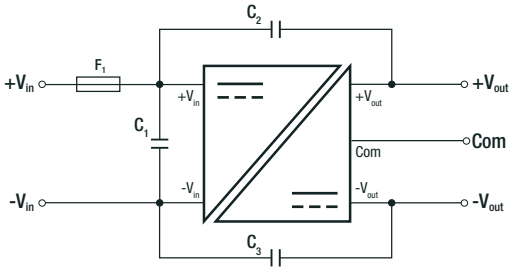
Specifications (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

EMC Filtering Suggestions according to EN55032

Single



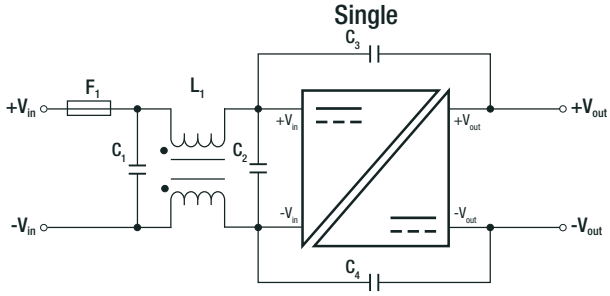
Dual



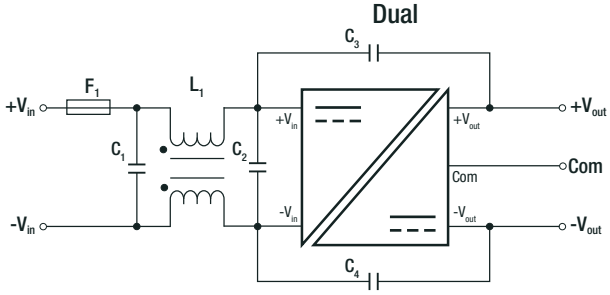
Component List Class A

MODEL	C1	C2	C3
RP10-12xxSE, RP10-12xxDE	2.2µF/25V, 1206 MLCC	1000pF/2kV, 1808 MLCC	1000pF/2kV, 1808 MLCC
RP10-24xxSE, RP10-24xxDE	N/A	1000pF/2kV, 1808 MLCC	1000pF/2kV, 1808 MLCC
RP10-48xxSE, RP10-48xxDE	N/A	1000pF/2kV, 1808 MLCC	1000pF/2kV, 1808 MLCC

Single



Dual



Component List Class B

MODEL	C1	C2	C3/C4	L1
RP10-12xxSE RP10-12xxDE	3.3µF/50V 1812 MLCC	N/A	1000pF/2kV 1808 MLCC	CMC: 325µH ref: WE 744290321 ref.: CMC-06
RP10-24xxSE RP10-24xxDE	2.2µF/50V 1812 MLCC	N/A	1000pF/2kV 1808 MLCC	CMC: 325µH ref: WE 744290321 ref.: CMC-06
RP10-48xxSE RP10-48xxDE	2.2µF/100V 1812 MLCC	2.2µF/100V 1812 MLCC	1000pF/2kV 1808 MLCC	CMC: 325µH ref: WE 744290321 ref.: CMC-06

DIMENSIONS AND PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	case base potting	nickel coated copper non-conductive black plastic epoxy (UL94 V-0)
Dimensions (LxWxH)	without Heat-sink with Heat-sink	50.8 x 25.4 x 10.2mm 56.8 x 25.4 x 16.8mm
Weight	without Heat-sink with Heat-sink	27g 37.89g

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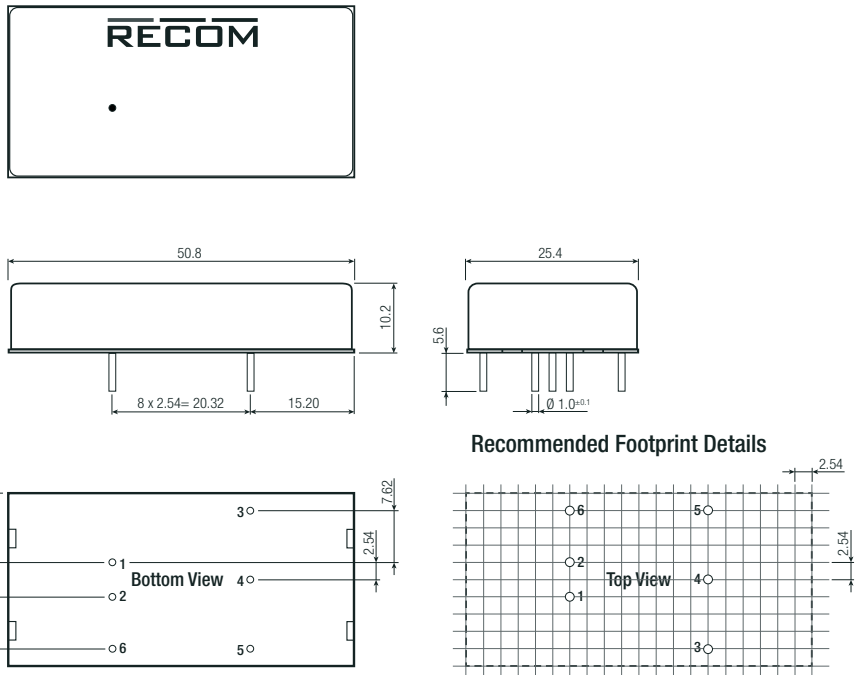
Specifications (measured @ Ta= 25°C, nom. Vin, full load unless otherwise stated)

Dimension Drawing (mm)

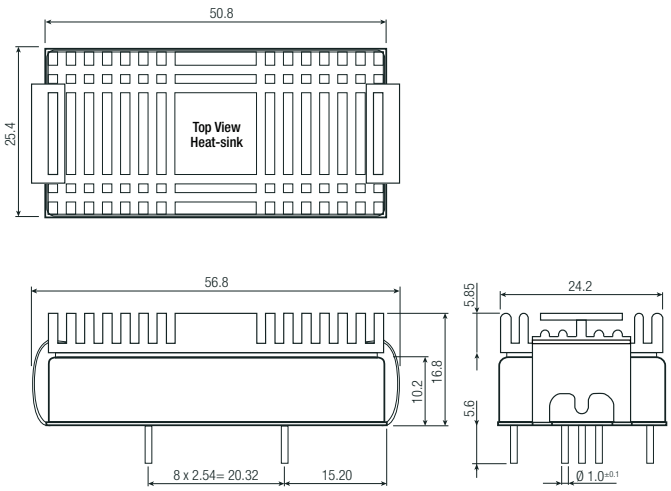


Pinning Information

Pin #	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	+Vout	+Vout
4	no Pin	Com
5	-Vout	-Vout
6	CTRL (3)	CTRL (3)

Tolerance: xx.x= ±0.5mm
xx.xx= ±0.25mm

Dimension Drawing with Heat-sink (mm)



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	9pcs
	tray	with heat-sink	20pcs
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.