

Features

- 4:1 wide input voltage range
- 1.6kVDC isolation
- UL60950-1 certified
- Efficiency up to 91%
- Six-sided continuous shield
- No minimum load required

Regulated Converters



RP10-AW

10 Watt
1"x1"
Single & Dual
Output



Description

The RP10-AW series are wide input voltage range 1"x1" power DC/DC converters. Despite their small size, the RP10-AW converters are fully specified devices with built-in Class A EMC filters, no minimum load, 1600VDC isolation, under-voltage lockout and low ripple/noise figures. The outputs are fully protected against short circuits, overcurrent and overvoltage and can be trimmed over a +/-10% range. The RP10-AW series will find many uses in applications where board space is at a premium as no external components are required.

Selection Guide

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [mA]	Input (1) Current [mA]	Efficiency (1) typ. [%]	Max. Capacitive Load [µF]
RP10-243.3SAW (2,3)	9-36	3.3	3000	485	85	3500
RP10-2405SAW (2,3)	9-36	5	2000	479	87	2500
RP10-2412SAW (2,3)	9-36	12	830	461	90	430
RP10-2415SAW (2,3)	9-36	15	670	460	91	350
RP10-2424SAW (2,3)	9-36	24	416	462	90	125
RP10-483.3SAW (2,3)	18-75	3.3	3000	243	85	3500
RP10-4805SAW (2,3)	18-75	5	2000	239	87	2500
RP10-4812SAW (2,3)	18-75	12	830	231	90	430
RP10-4815SAW (2,3)	18-75	15	670	233	90	350
RP10-4824SAW (2,3)	18-75	24	416	231	90	125
RP10-2405DAW (2,3)	9-36	±5	±1000	479	87	±1440
RP10-2412DAW (2,3)	9-36	±12	±416	467	89	±250
RP10-2415DAW (2,3)	9-36	±15	±333	468	89	±180
RP10-4805DAW (2,3)	18-75	±5	±1000	239	87	±1440
RP10-4812DAW (2,3)	18-75	±12	±416	234	89	±250
RP10-4815DAW (2,3)	18-75	±15	±333	234	89	±180



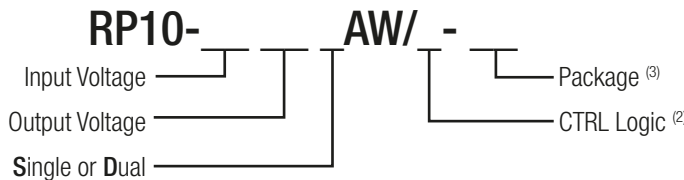
Notes:

Note1: Measured at nominal input voltage and full load



UL60950-1 Certified

Model Numbering



Ordering Examples

RP10-2405SAW/P = 24V Input, 5V Output, Positive Logic CTRL pin and Trim pin fitted
 RP10-4805DAW/XC-HC = 48V Input, ±5V Output, without CTRL pin, with fitted Heat-sink
 RP10-2415SAW/N = 24V Input, 5V Output, Negative Logic CTRL pin and Trim pin fitted

Notes:

- Note2: standard part is with suffix "P" for positive logic (1=ON, 0=OFF) and trim pin add suffix "N" instead for negative logic (0=ON, 1=OFF) and trim pin or add suffix "XC" instead for no CTRL pin
 Note3: add suffix "-HC" for premounted Heat-sink with clamps

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

BASIC CHARACTERISTICS				
Parameter	Condition	Min.	Typ.	Max.
Internal Input Filter				Pi-Type
Input Voltage Range	nom. Vin = 24V nom. Vin = 48V	9VDC 18VDC	24VDC 48VDC	36VDC 75VDC
Input Surge Voltage	Vin = 24V, 1s max. Vin = 48V, 1s max.			50VDC 100VDC
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 Reflected Ripple Current			30mA _{p-p}	
Output Voltage Trimming ⁽⁴⁾	Single Output	3.3V _{out} , 12V _{out} Others		±10.0% -10.0% to +20.0%
Minimum Load		0%		
Start-up time	Power up ON/OFF CTRL			30ms 30ms
ON/OFF Control ⁽⁵⁾	Positive Logic	DC-DC ON DC-DC OFF	Open or 3.0 < Vr < 15VDC Short or 0 < Vr < 1.2VDC	
	Negative Logic	DC-DC ON DC-DC OFF	Short or 0 < Vr < 1.2VDC Open or 3.0 < Vr < 15VDC	
Input Current of CTRL Pin	DC-DC ON	-0.5 mA		1.0mA
Standby Current	DC-DC OFF		2.5mA	
Internal Operating Frequency		297kHz	330kHz	363kHz
Ripple and Noise	20MHz BW, with a 10µF/25V X7R 1206 MLCC	3.3V _{out} , 5V _{out} 12V _{out} , 15V _{out}	40mV _{p-p} 60mV _{p-p}	
	20MHz BW, with a 1µF/50V X7R 1206 MLCC	24V _{out}	60mV _{p-p}	

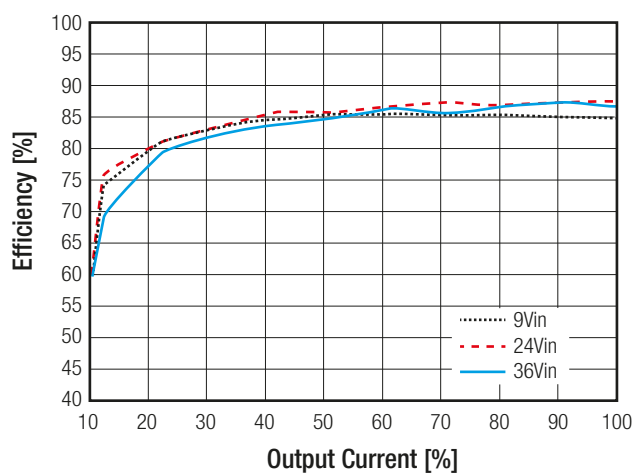
Notes:

Note4: Trimming allows the user to increase or decrease the output voltage set point of the module. This is accomplished by connecting an external resistor between the Trim pin and either +V_{out} pin or -V_{out} pin

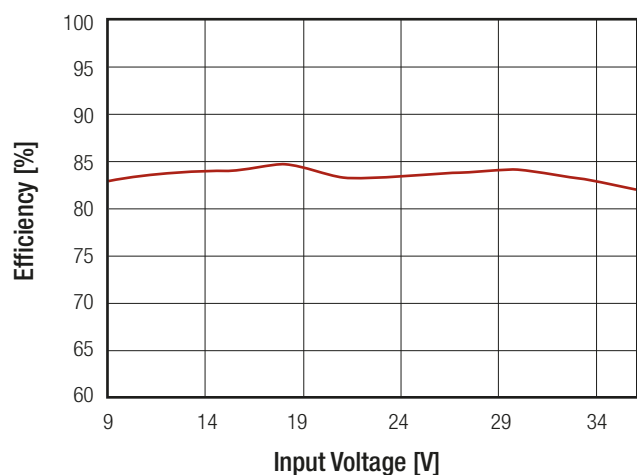
Note5: The ON/OFF control function can be positive or negative logic. The pin voltage is referenced to -Vin pin. If suffix "XC" is specified, the control pin will be omitted

RP10-2405SAW

Efficiency vs. Output Current



Efficiency vs. Input Voltage



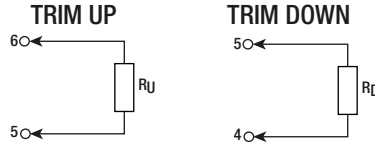
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Specifications (measured at Ta = 25°C, nominal input voltage, full load otherwise noted)

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.



RP10-xx3.3SAW

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 =	385.071	191.511	126.990	94.730	75.374	62.470	53.253	46.340	40.963	36.662	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 =	116.719	54.779	34.133	23.810	17.616	13.486	10.537	8.325	6.604	5.228	kOhms

RP10-xx05SAW

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 _u =	253.450	125.700	83.117	61.825	49.050	40.533	34.450	29.888	26.339	23.500	kOhms
Trim up	11	12	13	14	15	16	17	18	19	20	%
Vout =	5.55	5.60	5.65	5.70	5.75	5.80	5.85	5.90	5.95	6.00	Volts
R _u =	21.177	19.242	17.604	16.200	14.983	13.919	12.979	12.144	11.397	10.725	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 =	248.340	120.590	78.007	56.715	43.940	35.423	29.340	24.778	21.229	18.390	kOhms

RP10-xx12SAW

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 =	203.223	99.057	64.334	46.973	36.557	29.612	24.652	20.932	18.038	15.723	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 =	776.557	380.723	248.779	182.807	143.223	116.834	97.985	83.848	72.853	64.057	kOhms

RP10-xx15SAW

Trim up	1	2	3	4	5	6	7	8	9	10	%
Vout =	15.15	15.30	15.45	15.60	15.75	15.90	16.05	16.20	16.35	16.50	Volts
R _u =	161.557	78.223	50.446	36.557	28.223	22.668	18.700	15.723	13.409	11.557	kOhms
Trim up	11	12	13	14	15	16	17	18	19	20	%
Vout =	16.65	16.80	16.95	17.10	17.25	17.40	17.55	17.70	17.85	18.00	Volts
R _u =	10.042	8.779	7.711	6.795	6.001	5.307	4.694	4.149	3.662	3.223	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 =	818.223	401.557	262.668	193.223	151.557	123.779	103.938	89.057	77.483	68.223	kOhms

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

RP10-xx24SAW											
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 _v =	570.333	278.667	181.444	132.833	13.667	84.222	70.333	59.917	51.815	45.333	kOhms
Trim up	11	12	13	14	15	16	17	18	19	20	%
Vout =	26.64	26.88	27.12	27.36	27.60	27.84	28.08	28.32	28.56	28.80	Volts
R _v =	40.030	35.611	31.872	28.667	25.889	23.458	21.314	19.407	17.702	16.167	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	21.60	Volts
R _d =	4947.667	2439.333	1603.222	1185.167	934.333	767.111	647.667	558.083	488.407	432.667	kOhms

REGULATION			
Parameter	Condition		Value
Output Voltage Accuracy			±1.0%
Line Voltage Regulation	low line to high line	Single	±0.2%
		Dual	±0.5%
Load Voltage Regulation	0% to 100% load	Single	±0.2%
		Dual	±1.0%
		10% to 90% load	±0.1%
		Dual	±0.8%
Cross Regulation	asymmetrical 25% <> 100% load		±5.0%
Transient Response	25% load step change	recovery time	250µs typ.

PROTECTION			
Parameter	Condition		Value
Short Circuit Protection (SCP)			continuous, automatic recovery
Over Voltage Protection (OVP)	Zener Diode Clamp	3.3Vout	3.7 - 5.4VDC
		5Vout	6.3 - 7.4VDC
		12Vout	13.5 - 19.6VDC
		15Vout	18.3 - 22.0VDC
		24Vout	29.1 - 32.5VDC
Over Load Protection (OLP)			Hiccup mode, 150% of rated Iout typ.
Isolation Voltage	tested for 1 minute	I/P to O/P I/P (O/P) to case	1.6kVDC 1.0kVDC
Isolation Resistance	tested with 500VDC		1GΩ min.
Isolation Capacitance			1500pF max.

Notes:

Note6: This power module is not internally fused. An input line fuse must always be used. Recom suggests: 24Vin= T2A; 48Vin= T1A, slow blow types

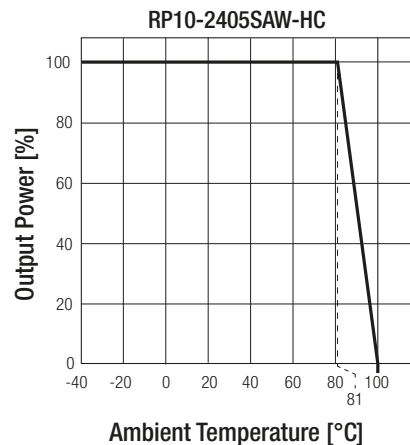
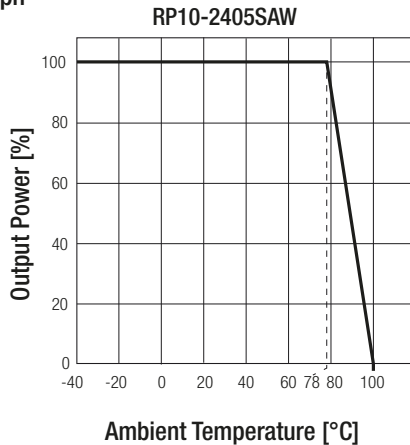
ENVIRONMENTAL		
Parameter	Condition	Value
Operating Temperature Range	without derating	-40°C to +78°C
	with derating	-40°C to +100°C
Maximum Case Temperature		+105°C
Temperature Coefficient		±0.02%/°C max.

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Specifications (measured at $T_a = 25^\circ\text{C}$, nominal input voltage, full load otherwise noted)

Parameter	Condition		Value
Thermal Impedance	natural convection 0.1m/s (20LFM)	without Heat-sink	18.2°C/W
		with Heat-sink	15.8°C/W
Operating Humidity			5% - 95% RH
Thermal Shock			according to MIL-STD-810F
Vibration			according to MIL-STD-810F
MTBF	according to MIL-HDBK-217F, G.B.	+25°C	3376 x 10 ³ hours

Derating Graph ⁽⁷⁾



Notes:

Note7: 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
Information Technology Equipment, General Requirements for Safety	E196683	UL60950-1 1st. Ed.: 2003 C22.2 No. 60950 1st. Ed.: 2003

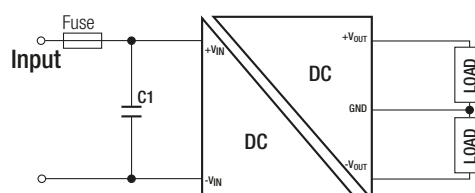
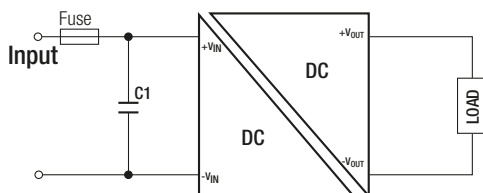
EMC Compliance	Condition	Standard / Criterion
Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement ⁽⁸⁾	without external filter	EN55022, Class A
	with external filter	EN55022, Class B
ESD Electrostatic discharge immunity test	Air $\pm 8\text{kV}$ and Contact $\pm 6\text{kV}$	EN61000-4-2, Criteria A
Radiated, radio-frequency, electromagnetic field immunity test	10V/m	EN61000-4-3, Criteria A
Fast Transient and Burst Immunity ⁽⁹⁾	$\pm 2\text{kV}$	EN61000-4-4, Criteria A
Surge Immunity ⁽⁹⁾	$\pm 1\text{kV}$	EN61000-4-5, Criteria A
Immunity to conducted disturbances, induced by radio-frequency fields	3Vr.m.s	EN61000-4-6, Criteria A
Power Magnetic Field Immunity	100A/m continuous, 1000A/m 1s	EN61000-4-8, Criteria A

Notes:

Note8: See filter suggestions below. RP10-2405SAW meets EMI Class B without external components

Note9: 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, 220 $\mu\text{F}/100\text{V}$

EMI Filtering Class B



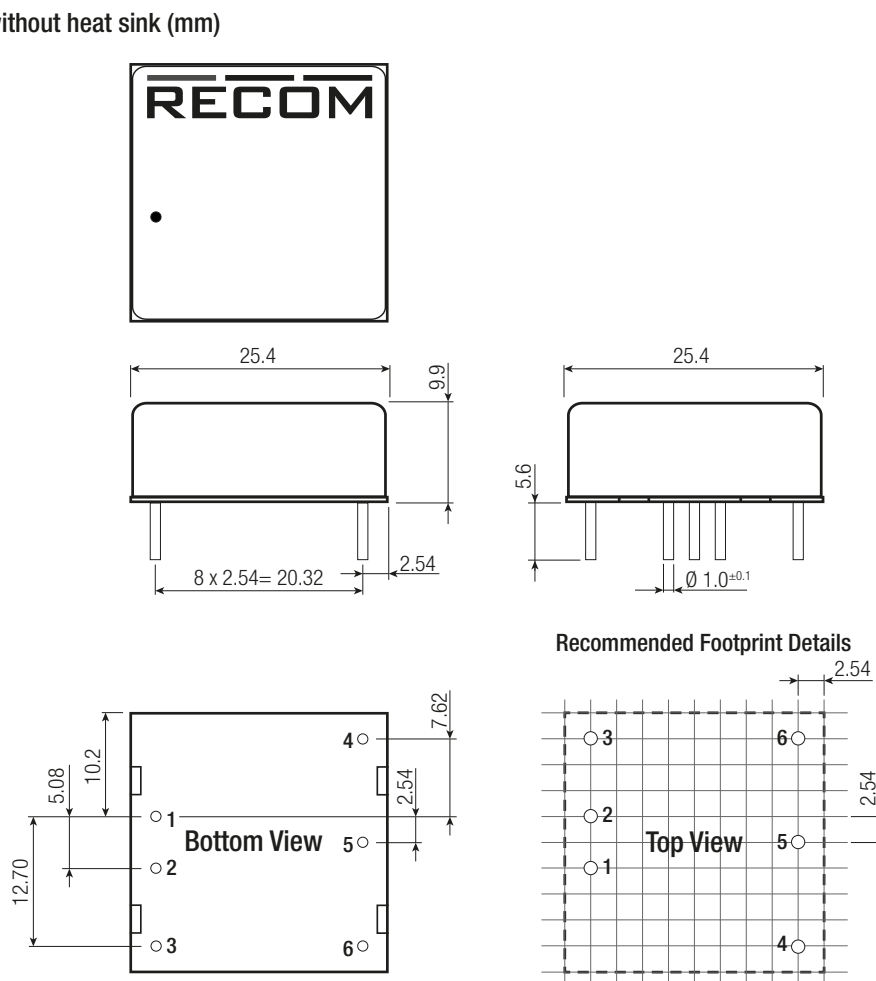
MODEL	C1
RP10-24xxS_DAW	6.8 $\mu\text{F}/50\text{V}$ 1812 MLCC
RP10-48xxS_DAW	4.7 $\mu\text{F}/100\text{V}$ 1812 MLCC

Specifications (measured at $T_a = 25^\circ\text{C}$, nominal input voltage, full load otherwise noted)

DIMENSIONS AND PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	Case	Copper Alloy C2680
	Base	FR4 PCB
	Potting	Epoxy (UL94-V0)
Package Dimensions (LxWxH)	without Heat-sink	25.4 x 25.4 x 9.9mm
	with Heat-sink	31.4 x 25.4 x 16.5mm
Package Weight	without Heat-sink	16.5g
	with Heat-sink	23g

Dimension Drawing without heat sink (mm)



Pin Connections

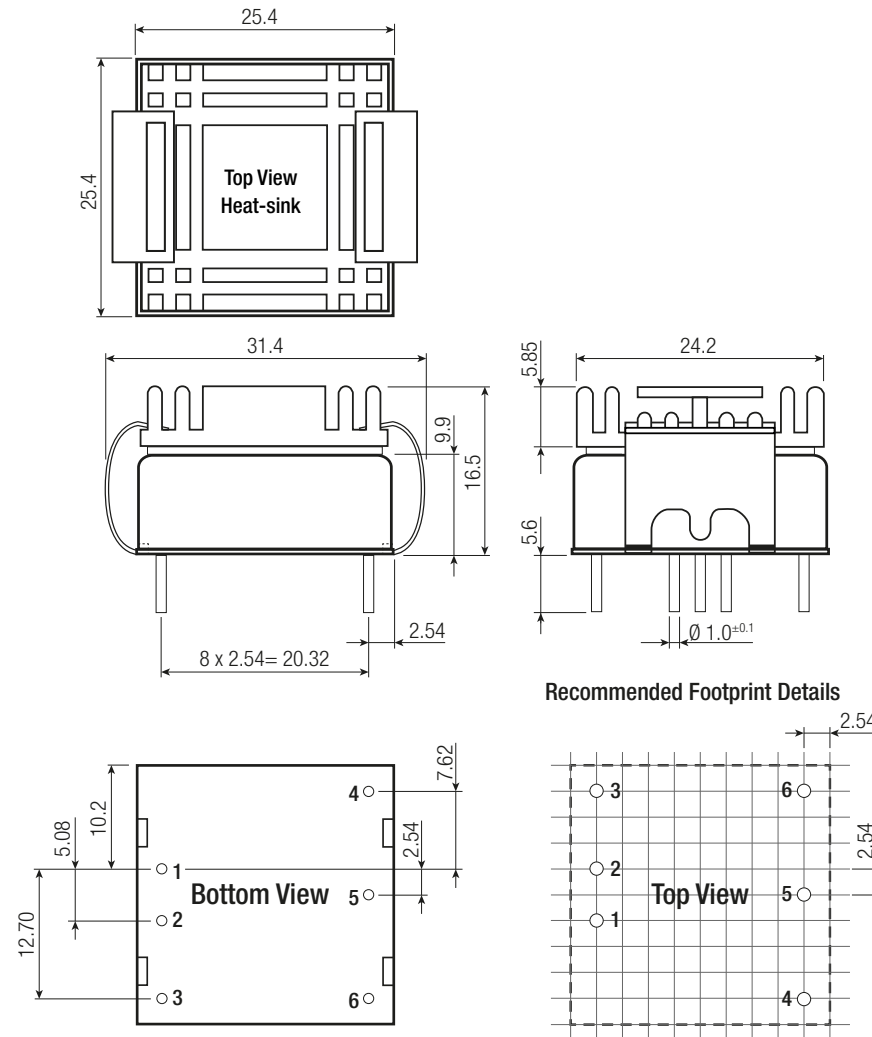
Pin #	Single	Dual	"XC"
1	+Vin	+Vin	+Vin
2	-Vin	-Vin	-Vin
3	CTRL ⁽²⁾	CTRL ⁽²⁾	no Pin
4	+Vout	+Vout	+Vout
5	Trim	Com	Com
6	-Vout	-Vout	-Vout

Pin Pitch Tolerance $\pm 0.25\text{mm}$
 Pin dimension tolerance $\pm 0.1\text{mm}$
 XX.X $\pm 0.5\text{mm}$
 XX.XX $\pm 0.25\text{mm}$

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

Dimension Drawing with heat sink (mm)



Pin Connections

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

Pin Pitch Tolerance ±0.25mm
 Pin dimension tolerance ±0.1mm
 XX.X ± 0.5mm
 XX.XX ± 0.25mm

PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimensions (LxWxH)	without Heat-sink	Tube 257.0 x 26.5 x 19.0mm
	with Heat-sink	Tray 230.0 x 180.0 x 28.0mm
Packaging Quantity	without Heat-sink	Tube 8pcs
	with Heat-sink	Tray 20pcs
Storage Temperature Range		-55°C to +125°C
Storage Humidity		5% - 95% RH

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