

Features

Regulated Converters

- 2:1 wide input voltage range
- 1.6kVDC isolation
- UL60950-1 certified
- Efficiency up to 89%
- Six-sided continuous shield
- No minimum load required

RECOM
DC/DC Converter

RP15-A

15 Watt

1"x1"

Single & Dual Output



Description

The RP15-A series are ultraminiature power DC/DC converters in a case half the size of industry standard 15W converters. Despite their small size, the RP15-A converters are fully specified devices with output currents up to 4 Amps, no minimum load, 1600VDC isolation and low ripple/noise figures. The outputs are also fully protected against short circuits, overcurrent and overvoltage. The RP15-A series will find many uses in applications where board space and/or board height is at a premium.

Selection Guide

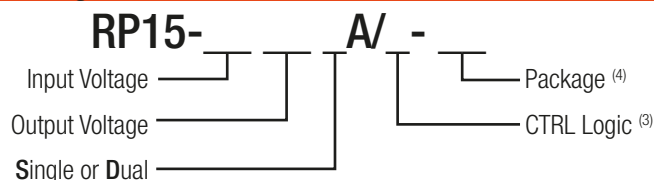
Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [mA]	Input Current (1) [mA]	Efficiency typ. (1) [%]	Max. Capacitive Load (2) [μF]
RP15-123.3SA (3,4)	9-18	3.3	4000	1310	84	12000
RP15-1205SA (3,4)	9-18	5	3000	1420	88	6000
RP15-1212SA (3,4)	9-18	12	1300	1512	86	1000
RP15-1215SA (3,4)	9-18	15	1000	1420	88	660
RP15-243.3SA (3,4)	18-36	3.3	4000	640	86	12000
RP15-2405SA (3,4)	18-36	5	3000	710	88	6000
RP15-2412SA (3,4)	18-36	12	1300	747	87	1000
RP15-2415SA (3,4)	18-36	15	1000	710	88	660
RP15-483.3SA (3,4)	36-75	3.3	4000	320	86	12000
RP15-4805SA (3,4)	36-75	5	3000	355	88	6000
RP15-4812SA (3,4)	36-75	12	1300	369	88	1000
RP15-4815SA (3,4)	36-75	15	1000	355	88	660
RP15-1205DA (3,4)	9-18	±5	±1500	1471	85	±3000
RP15-1212DA (3,4)	9-18	±12	±625	1437	87	±520
RP15-1215DA (3,4)	9-18	±15	±500	1420	88	±330
RP15-2405DA (3,4)	18-36	±5	±1500	735	85	±3000
RP15-2412DA (3,4)	18-36	±12	±625	710	88	±520
RP15-2415DA (3,4)	18-36	±15	±500	710	88	±330
RP15-4805DA (3,4)	36-75	±5	±1500	368	85	±3000
RP15-4812DA (3,4)	36-75	±12	±625	351	89	±520
RP15-4815DA (3,4)	36-75	±15	±500	355	88	±330

Notes:

Note1: Measured at nominal input voltage and full load

Note2: Measured at minimum input voltage and constant resistive load

Model Numbering



Ordering Examples

RP15-2405SA/P = 24V Input, 5V Output, Positive Logic CTRL pin and Trim pin fitted

RP15-4805DA-HC = 48V Input, ±5V Output, Heat-sink fitted.

Notes:

Note3: standard part is without suffix "P" or "N" = without CTRL & Trim function

Trim function is only available for single output with /P or /N suffix

add suffix "P" for CTRL function with positive logic (1=ON, 0=OFF) and trim pin for single output

add suffix "N" for CTRL function with negative logic (0=ON, 1=OFF) and trim pin for single output

Note4: add suffix -HC for premounted Heat-sink and clips



C **UL** US
E196683

UL60950-1 Certified

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

BASIC CHARACTERISTICS								
Parameter	Condition					Min.	Typ.	Max.
Internal Input Filter	Pi-Type							
Input Voltage Range	nom. Vin = 12V nom. Vin = 24V nom. Vin = 48V					9VDC 18VDC 36VDC	12VDC 24VDC 48VDC	18VDC 36VDC 75VDC
Input Surge Voltage	Vin = 12V, 100ms max. Vin = 24V, 100ms max. Vin = 48V, 100ms max.							36VDC 50VDC 100VDC
Under Voltage Lockout (UVLO)	Vin = 12V		DC-DC ON DC-DC OFF				8VDC	9VDC
	Vin = 24V		DC-DC ON DC-DC OFF				14.5VDC	18VDC
	Vin = 48V		DC-DC ON DC-DC OFF				30.5VDC	36VDC
Input Reflected Ripple Current ⁽⁵⁾							30mA _{p-p}	
Output Voltage Trimming ⁽⁶⁾	Single Output					±10.0%		
Minimum Load						0%		
Start-up time	Power up ON/OFF CTRL							30ms 30ms
ON/OFF Control ⁽⁷⁾	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						360kHz	400kHz	440kHz
Ripple and Noise	measured by 20MHz bandwidth	with a 1μF M/C X7R and 10μF T/C with a 1μF M/C X7R and 10μF T/C	Single	3.3Vout, 5Vout 12Vout, 15Vout			75mVp-p 100mVp-p	
		with a 1μF M/C X7R and 10μF T/C	Dual	all models			100mVp-p	

Notes:

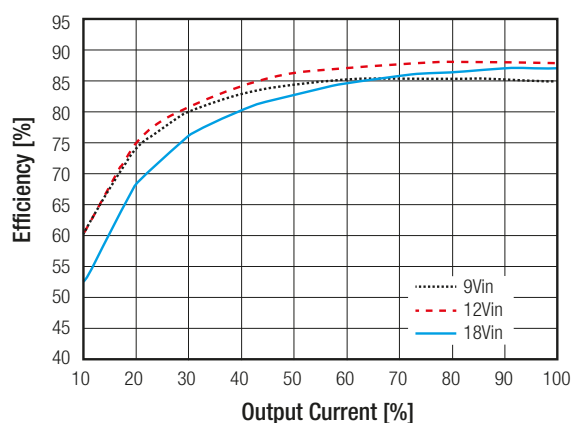
Note5: Simulated source impedance of 12 μH . 12 μH inductor in series with + V_{in}

Note6: 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

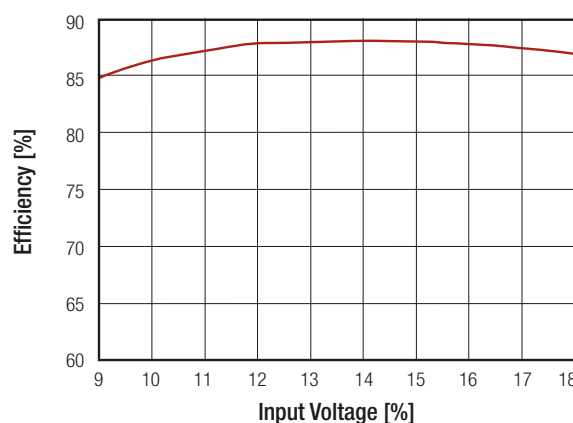
Note7: The ON/OFF control function can be positive or negative logic. The pin voltage is referenced to - V_{in} pin. If no suffix is specified, the control pin will be omitted

RP15-1205SA

Efficiency vs. Output Current



Efficiency vs. Input Voltage

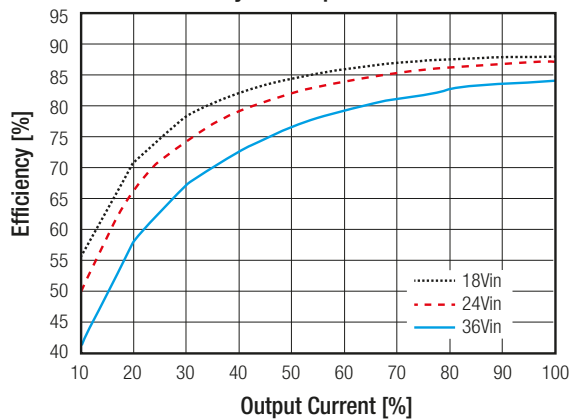


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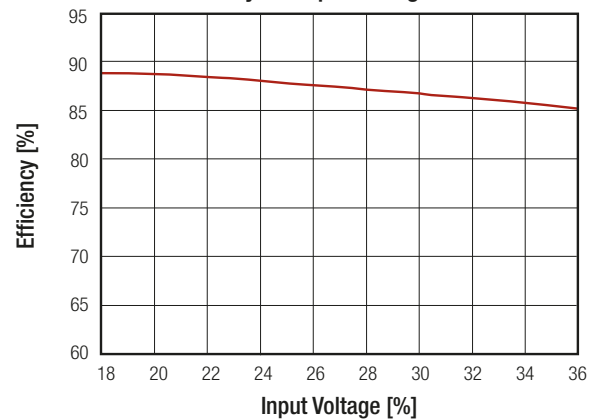
Specifications (measured at $T_a = 25^\circ\text{C}$, nominal input voltage, full load otherwise noted)

RP15-2405SA

Efficiency vs. Output Current

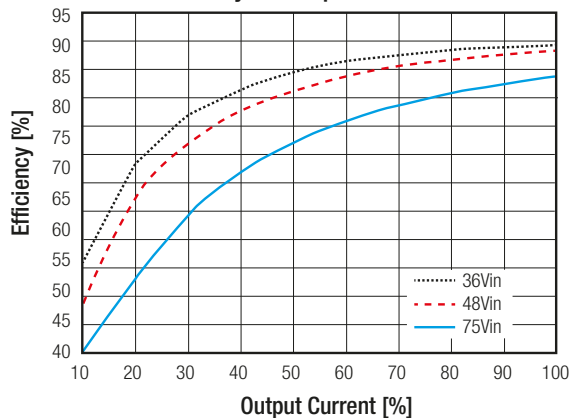


Efficiency vs. Input Voltage

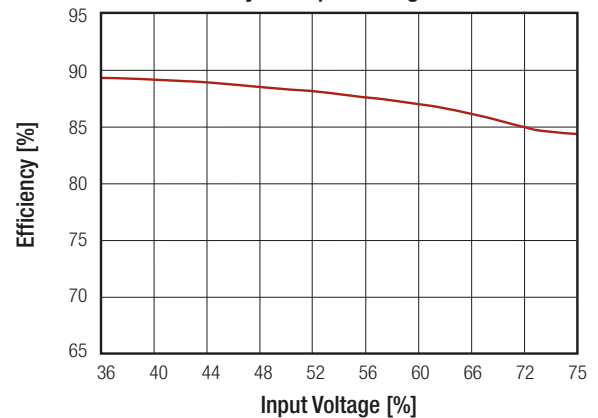


RP15-4805SA

Efficiency vs. Output Current



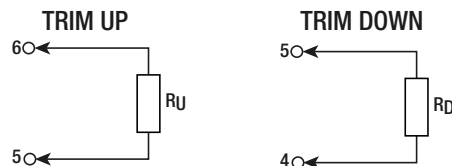
Efficiency vs. Input Voltage



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.



RP15-xx3.3A

Trim up	1	2	3	4	5	6	7	8	9	10	%
$V_{out} =$	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	%
$V_{out} =$	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

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

RP15-xx05A											
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 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
RP15-xx12A											
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	308.723	248.779	182.807	143.223	116.834	97.985	83.848	72.853	64.057	kOhms
RP15-xx15A											
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 =	161.557	78.223	50.446	36.557	28.223	22.668	18.700	15.723	13.409	11.557	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

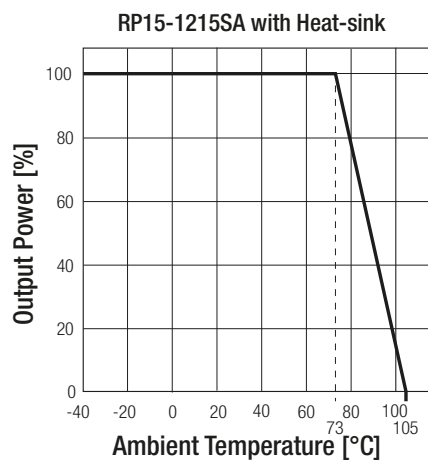
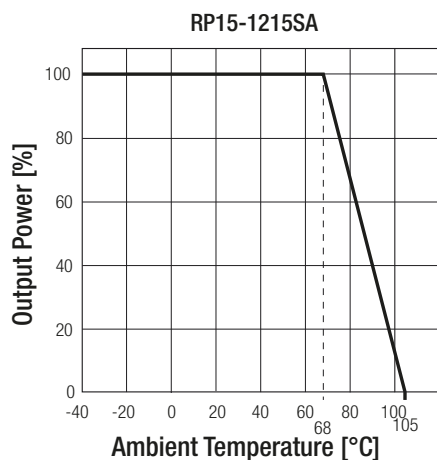
REGULATIONS			
Parameter	Condition		Value
Output Voltage Accuracy			±1.0%
Line Voltage Regulation	Single		±0.2%
	Dual		±0.5%
Load Voltage Regulation	0% to 100% load	Single	±0.2%
		Dual	±1.0%
Cross Regulation	asymmetrical 25%<>100% load		±5.0%
Transient Response	25% load step change	recovery time	250µs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

Specifications (measured at $T_a = 25^\circ\text{C}$, 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	3.7 - 5.4VDC 5.6 - 7.0VDC 13.5 - 19.6VDC 16.8 - 20.5VDC
Over Load Protection (OLP)			Hiccup mode, 150% of rated lout 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			1000pF max.
Notes:			
Note8: This power module is not internally fused. An input line fuse must always be used. Recom suggests: 12Vin= T3.15A; 24Vin= T1.6A; 48Vin= T1.25A slow blow types			

ENVIRONMENTAL			
Parameter	Condition		Value
Operating Temperature Range	without derating with derating		-40°C to +68°C -40°C to +105°C
Maximum Case Temperature			+105°C
Temperature Coefficient			$\pm 0.02\%/^\circ\text{C}$ max.
Thermal Impedance	natural convection 0.1m/s (20LFM)	without Heat-sink with Heat-sink	18.2°C/Watt 15.8°C/Watt
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. Bellcore TR-NWT-000332 ⁽⁸⁾	+25°C	1600 x 10 ³ hours 1330 x 10 ³ hours

Derating Graph ⁽¹⁰⁾



Notes:

Note9: BELLCORE TR-NWT-000332. Case I: 50% Stress, $T_a = 40^\circ\text{C}$. MIL-HDBK 217F Notice 2. $T_a = 25^\circ\text{C}$, full load, (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 our technical support service at techsupportAT@recom-power.com

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

SAFETY AND CERTIFICATIONS

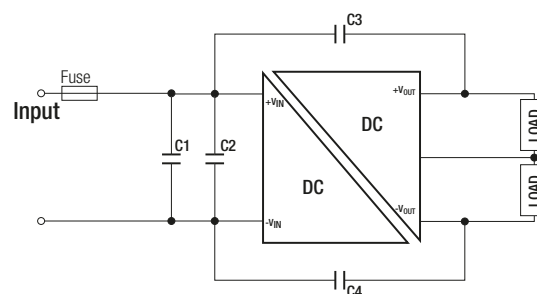
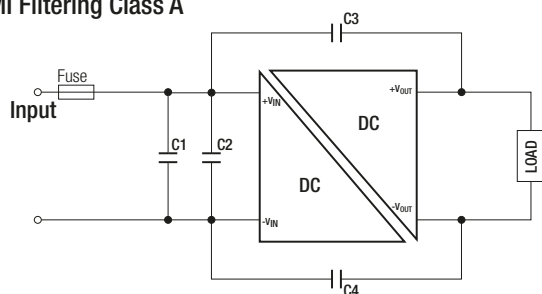
Certificate Type (Safety)	Report / File Number	Standard
Information Technology Equipment, General Requirements for Safety	E196683	UL60950-1 1st. Ed.: 2003 C22.2 No. 60950 1st. Ed.: 2003

EMC Compliance	Condition	Standard / Criterion
Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	with external filter	EN55022, Class A or 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 ⁽¹¹⁾	$\pm 2\text{kV}$	EN61000-4-4, Criteria A
Surge Immunity ⁽¹¹⁾	$\pm 1\text{kV}$	EN61000-4-5, Criteria A
Immunity to conducted disturbances, induced by radio-frequency fields	10Vr.m.s	EN61000-4-6, Criteria A

Notes:

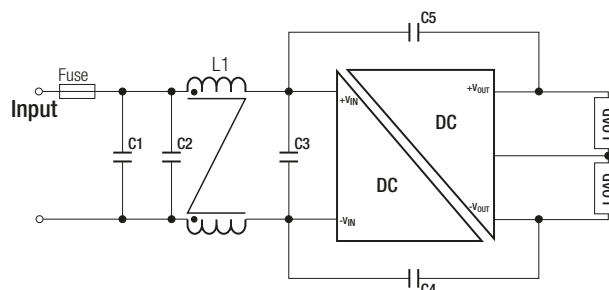
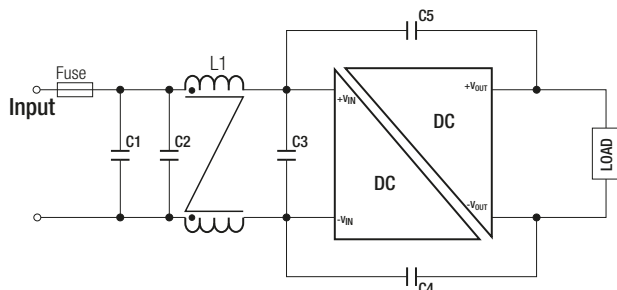
Note11: An external input filter capacitor is required if the module has to meet EN61000-4-4, EN61000-4-5. The filter capacitor Recom suggests: Nippon chemi-con KY series, 220 μF /100V

EMI Filtering Class A



MODEL	C1	C2	C3/C4
RP15-12xxS_DA	10 μF /25V 1812 MLCC	N/A	470pF/2kV 1808 MLCC
RP15-24xxS_DA	6.8 μF /50V 1812 MLCC	6.8 μF /50V 1812 MLCC	470pF/2kV 1808 MLCC
RP15-48xxS_DA	2.2 μF /100V 1812 MLCC	2.2 μF /100V 1812 MLCC	470pF/2kV 1808 MLCC

EMI Filtering Class B



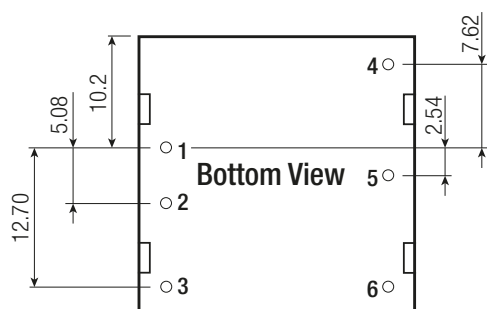
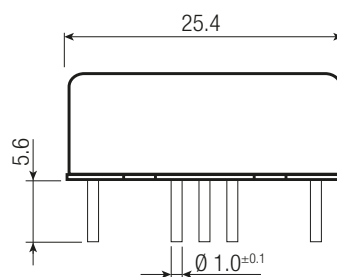
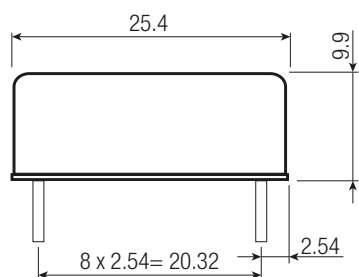
MODEL	C1	C2	C3	C4/C5	L1
RP15-12xxS_DA	10 μF /25V 1812 MLCC	N/A	10 μF /25V 1812 MLCC	470pF/2kV 1808 MLCC	CMC: 145 μH ref: WE 482210002 ref: CMC-07
RP15-24xxS_DA	6.8 μF /50V 1812 MLCC	N/A	6.8 μF /50V 1812 MLCC	470pF/2kV 1808 MLCC	CMC: 325 μH ref: WE 744290321 ref: CMC-06
RP15-48xxS_DA	2.2 μF /100V 1812 MLCC	2.2 μF /100V 1812 MLCC	2.2 μF /100V 1812 MLCC	470pF/2kV 1808 MLCC	CMC: 325 μH ref: WE 744290321 ref: CMC-06

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

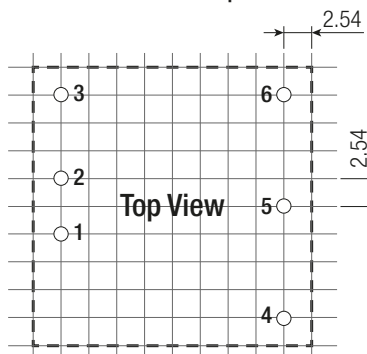
DIMENSIONS and PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	Case	Nickel coated copper
	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	15g
	with Heat-sink	21.5g

Dimension Drawing (mm)



Recommended Footprint Details



Pin Connections

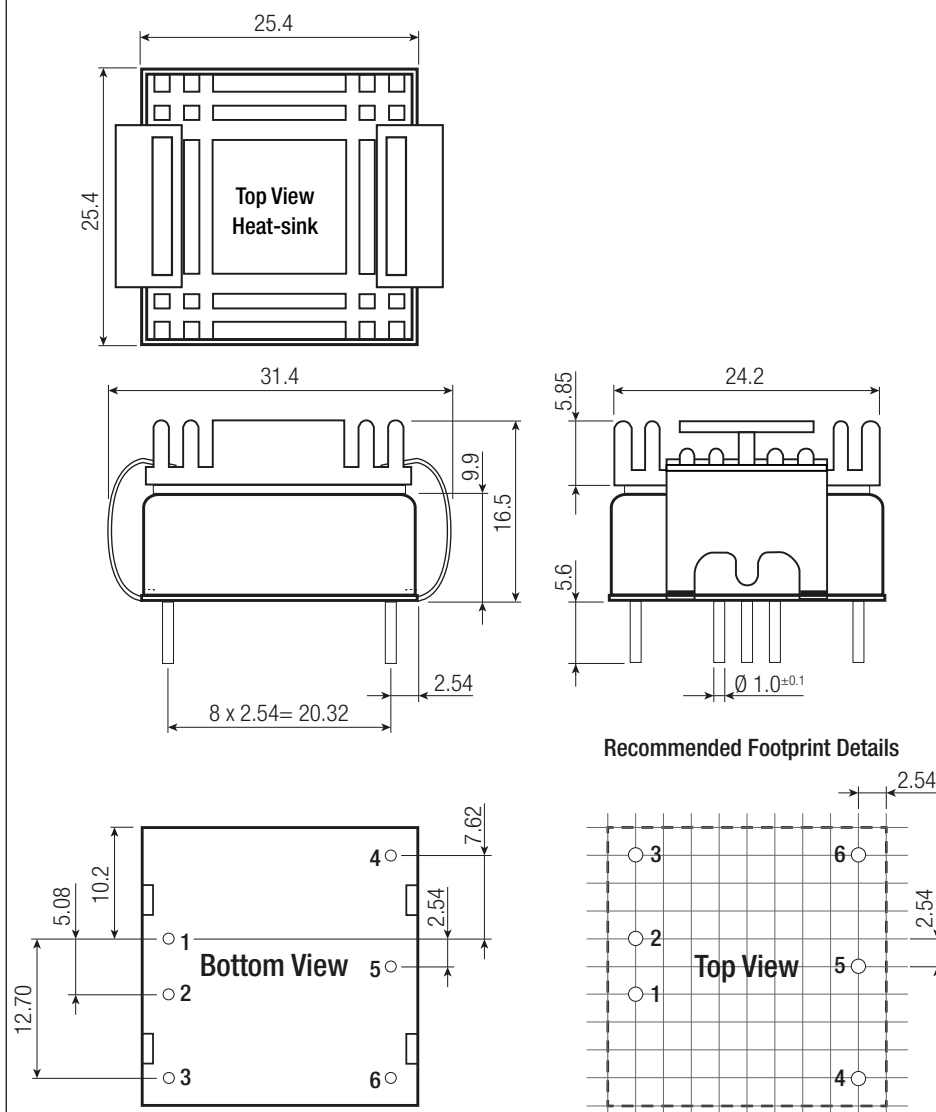
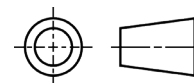
Pin #	Single	Single /P or /N	Dual	Dual /P or /N
1	+Vin	+Vin	+Vin	+Vin
2	-Vin	-Vin	-Vin	-Vin
3	no Pin	CTRL	no Pin	CTRL
4	+Vout	+Vout	+Vout	+Vout
5	no Pin	Trim	Com	Com
6	-Vout	-Vout	-Vout	-Vout

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

Dimension Drawing (mm) with Heat-sink



Pin Connections

Pin #	Single	Single /P or /N	Dual	Dual /P or /N
1	+Vin	+Vin	+Vin	+Vin
2	-Vin	-Vin	-Vin	-Vin
3	no Pin	CTRL	no Pin	CTRL
4	+Vout	+Vout	+Vout	+Vout
5	no Pin	Trim	Com	Com
6	-Vout	-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 $\pm 0.25\text{ mm}$

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 $+125^\circ\text{C}$
Storage Humidity		5% - 95% RH

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