

Features

Regulated Converters

- 30W in a 1"x1" case
- 4:1 wide input voltage range
- 2kVDC/1min isolation
- IEC/EN62638-1 certified
- Efficiency over 90%
- OVP, OLP, OTP, UVLO
- +110°C max. case temperature

REC30E-Z

30 Watt
1" x 1"
Single & Dual Output



Description

The REC30E-Z series are high power density, wide input voltage range 30W DC/DC converters in an industry standard 1"x1" case size. Despite their small size, the REC30E-Z converters are fully specified devices with output currents up to 7 amps, over 90% efficiency, no minimum load, 2000VDC/1min isolation, tight regulation, and low ripple/noise figures. The outputs are also fully protected against over-temperature, short circuits, overcurrent, and overvoltage, and the single output version offers a ±10% trim range. These converters will find industrial applications where board space is at a premium.

Selection Guide

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current [mA]	Efficiency typ. ⁽¹⁾ [%]	max. Capacitive Load ⁽²⁾ [µF]
REC30E-243.3SZ	9 - 36	3.3	7000	88.5	10000
REC30E-2405SZ	9 - 36	5	6000	89	7200
REC30E-2412SZ	9 - 36	12	2500	90	1200
REC30E-2415SZ	9 - 36	15	2000	90.5	1000
REC30E-2424SZ	9 - 36	24	1250	90.5	380
REC30E-2412DZ	9 - 36	±12	±1250	89	±750
REC30E-2415DZ	9 - 36	±15	±1000	90	±500
REC30E-483.3SZ	18 - 75	3.3	7000	88	10000
REC30E-4805SZ	18 - 75	5	6000	90	7200
REC30E-4812SZ	18 - 75	12	2500	90.5	1200
REC30E-4815SZ	18 - 75	15	2000	90.5	1000
REC30E-4824SZ	18 - 75	24	1250	91	380
REC30E-4812DZ	18 - 75	±12	±1250	90.5	±750
REC30E-4815DZ	18 - 75	±15	±1000	91	±500

Notes:

Note1: Efficiency is tested at nominal input and full load at +25°C ambient

Note2: Max Cap Load is tested at nominal input and full resistive load

Model Numbering



IEC/EN62368-1 3rd Edition pending
EN55032 compliant

Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

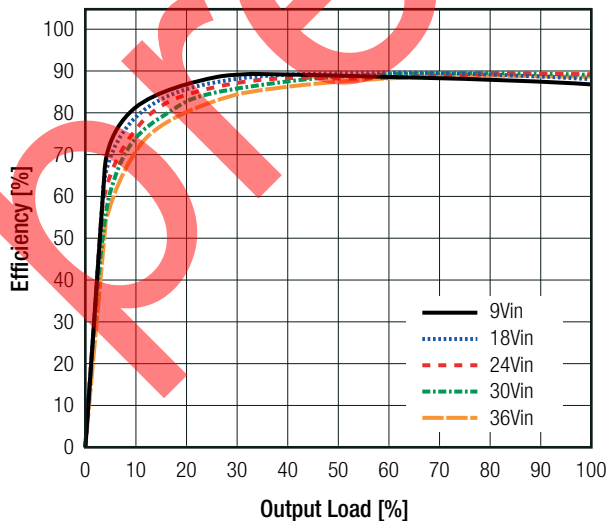
BASIC CHARACTERISTICS				
Parameter	Condition	Min.	Typ.	Max.
Internal Input Filter				Pi type
Input Voltage Range	nom. Vin= 24VDC	9VDC	24VDC	36VDC
	nom. Vin= 48VDC	18VDC	48VDC	75VDC
Input Surge Voltage	nom. Vin= 24VDC		50VDC	
	nom. Vin= 48VDC		100VDC	
Under Voltage Lockout (UVLO)	nom. Vin= 24VDC	DC-DC ON	7.5VDC	
		DC-DC OFF	16VDC	
	nom. Vin= 48VDC	DC-DC ON	9VDC	
		DC-DC OFF	18VDC	
Input Current	nom. Vin= 24VDC		1500mA	
	nom. Vin= 48VDC		690mA	
Quiescent Current				10mA
Output Voltage Trimming	single output		±10%	
Minimum Load			0%	
Start-up time			30ms	
ON/OFF CTRL	DC-DC ON		Open or 3.5VDC < V _{CTRL} < 15VDC	
	DC-DC OFF		Short or 0VDC < V _{CTRL} < 1.2VDC	
Input Current of CTRL Pin	DC-DC OFF		2mA	
Internal Operating Frequency	REC30E-243.3SZ, REC30E-483.3SZ		300kHz	
	REC30E-24xxS(D)Z		400kHz	
	REC30E-48xxS(D)Z		370kHz	
	REC30E-4815SZ, REC30E-2415DZ		430kHz	
Output Ripple and Noise ⁽³⁾	20MHz BW		75mVp-p	

Notes:

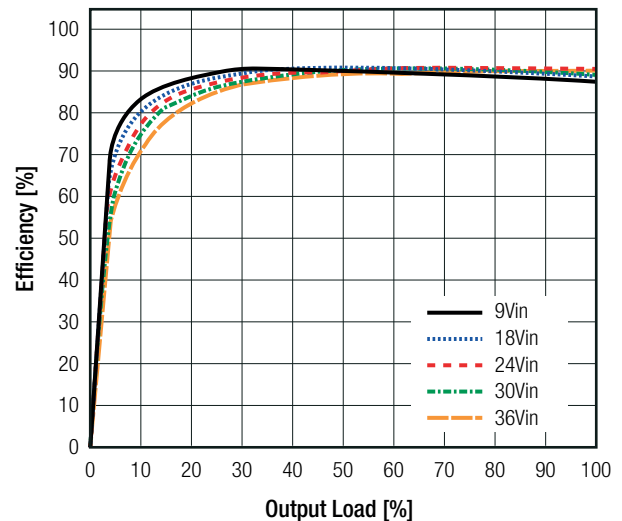
Note3: Measurements are made with a 0.1µF MLCC across output (low ESR)

Efficiency vs. Load

REC30E-243.3SZ



REC30E-2405SZ

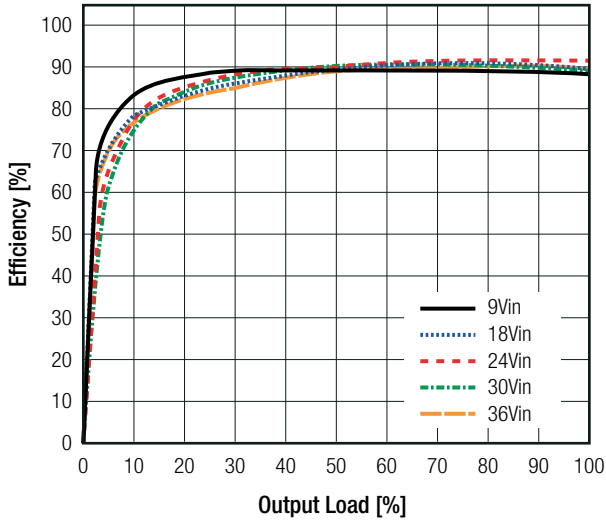


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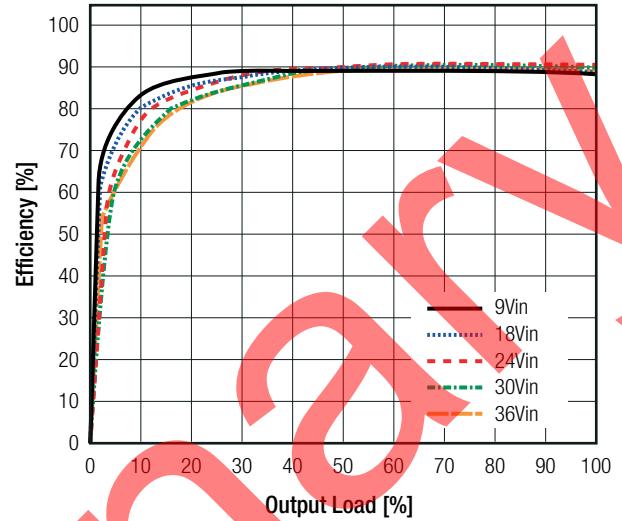
Specifications (measured @ $T_a = 25^\circ\text{C}$, nom. Vin, full load and after warm-up unless otherwise stated)

Efficiency vs. Load

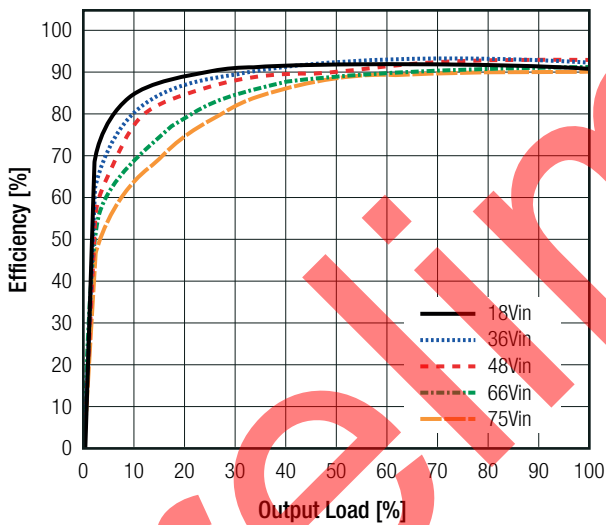
REC30E-2424SZ



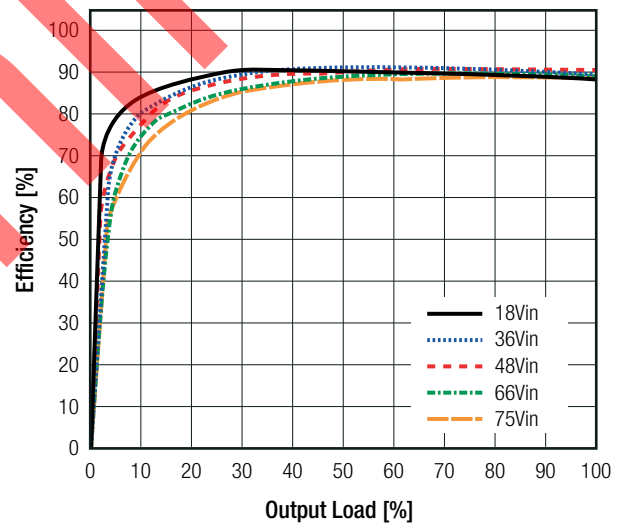
REC30E-2415DZ



REC30E-4812SZ

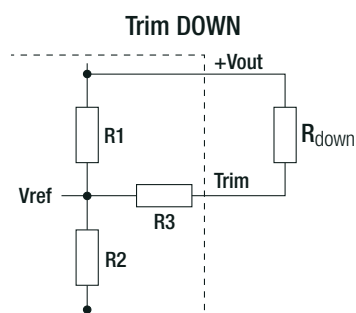
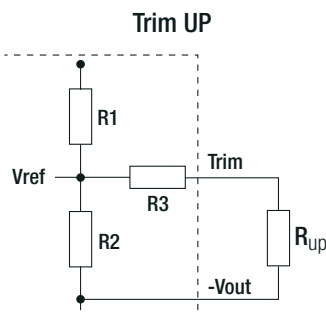


REC30E-4812DZ



OUTPUT VOLTAGE TRIMMING

The REC30E-Z converters offer the feature of trimming the output voltage over a certain range around the nominal value by using external trim resistors. The values for the external trim resistors shown in the below examples are according to standard E96 values; therefore, the specified voltage may slightly vary.



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Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

OUTPUT VOLTAGE TRIMMING

- Vout_{nom} = nominal output voltage [VDC]
- Vout_{set} = trimmed output voltage [VDC]
- ΔVout = output voltage change [%]
- V_{ref} = reference voltage [VDC]
- R_{up} = external trim up resistor [Ω]
- R_{down} = external trim down resistor [Ω]
- R₁, R₂, R₃ = internal resistors [Ω]
- k_u = trim up factor []
- k_d = trim down factor []

Vout _{nom}	R ₁ [Ω]	R ₂ [Ω]	R ₃ [Ω]	V _{ref} [VDC]
3.3VDC	16k6	10k	52k3	1.25
5VDC	10k		35k7	2.5
12VDC	38k		48k7	
15VDC	50k1		64k9	
24VDC	86k		73k2	

$$k_u = \left[\frac{V_{ref}}{(V_{out} + \Delta V_{out}) - V_{ref}} \right] * R_1 = k\Omega$$

$$R_{up} = \left[\frac{k_u * R_2}{R_2 - k_u} \right] - R_3 = k\Omega$$

$$k_d = \left[\frac{(V_{out} + \Delta V_{out}) - V_{ref}}{V_{ref}} \right] * R_2 = k\Omega$$

$$R_{down} = \left[\frac{k_d * R_1}{R_1 - k_d} \right] - R_3 = k\Omega$$

Trim Up: Vout_{set} = 26.4VDC

Vout_{nom} = 24V, ΔVout = 2.4V (10%)

$$k_u = \left[\frac{2.5V}{(24V + 2.4V) - 2.5V} \right] * 86k\Omega = 8k995\Omega$$

$$R_{up} = \left[\frac{8.995k\Omega * 10k\Omega}{10k\Omega - 8.995k\Omega} \right] - 76.8k\Omega = 16k4\Omega$$

Trim down: Vout_{set} = 21.6VDC

Vout_{nom} = 24V, ΔVout = -2.4V (-10%)

$$k_d = \left[\frac{[24V + (-2.4V)] - 2.5V}{2.5V} \right] * 10k\Omega = 76k4\Omega$$

$$R_{down} = \left[\frac{76.4k\Omega * 86k\Omega}{86k\Omega - 76.4k\Omega} \right] - 76.8k\Omega = 611k2\Omega$$

REGULATIONS

Parameter	Condition		Value
Output Accuracy			±1.0% typ.
Line Regulation	low line to high line, full load	Single	±0.2% typ.
		Dual	±0.5% typ.
Load Regulation	0% to 100% load	Single	0.2% typ.
		Dual	1.0% typ.
Cross Regulation	asymmetrical load 25% / 100%		±0.5% typ.
Transient Response Recovery Time	25% load step change (75% - 100%)		250µs

PROTECTIONS

Parameter	Type		Value
Short Circuit Protection (SCP)			continuous, auto recovery
Over Load Protection (OLP)	hiccup mode	nom. Vin= 24VDC	170% of rated I _{OUT}
		nom. Vin= 48VDC	190% of rated I _{OUT}
Over Temperature Protection (OTP)	automatic restart after cool down		115°C

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Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

Parameter	Type		Value
Over Voltage Protection (OVP)	internal clamping	REC30E-xx3.3SZ	5.3VDC min.
		REC30E-xx05SZ	6.2VDC min.
		REC30E-xx12SZ	15VDC min.
		REC30E-xx15SZ	18VDC min.
		REC30E-xx24SZ	30VDC min.
		REC30E-xx12DZ	±15VDC min.
		REC30E-xx15DZ	±18VDC min.
Isolation Voltage ⁽⁴⁾	I/P to O/P	1 minute	2kVDC
Isolation Resistance	V _{ISO} = 500VDC		1GΩ min.
Isolation Capacitance			2400pF max.

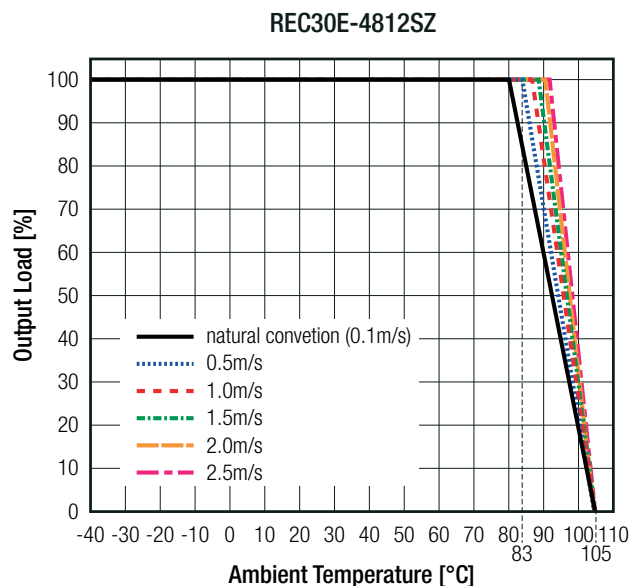
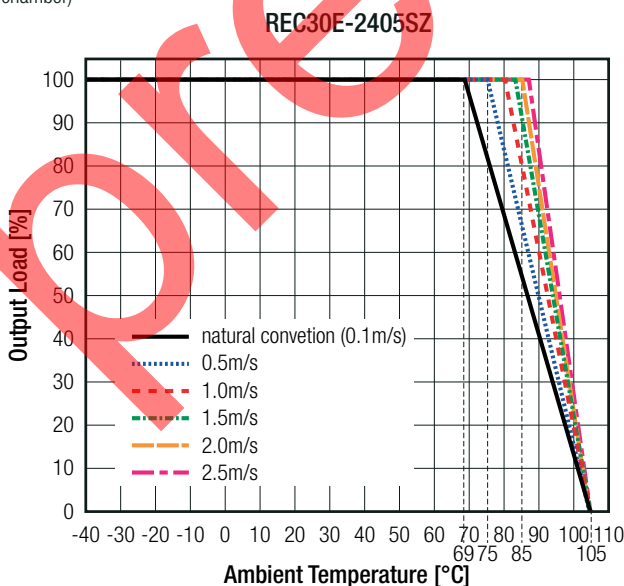
Notes:
Note4: For repeat Hi-Pot testing, reduce the time and/or the test voltage

ENVIRONMENTAL			
Parameter	Condition		Value
Operating Temperature Range ⁽⁵⁾	refer to "Derating Graph"		-40°C to +105°C
Maximum Case Temperature			110°C
Temperature Coefficient			0.02%/K max.
Thermal Impedance	0.1m/s, horizontal		15.9K/W
Operating Altitude			5000m
Operating Humidity	non-condensing		5% - 95% RH max.
Pollution Degree			PD2
Vibration			according to MIL-HDBK-202G
MTBF	according to MIL-HDBK-217F, G.B.	+25°C	560 x 10 ³ hours

Notes:

Note5: Test PCB: Eurocard 160x100mm 105µm copper, double layer horizontal

Derating Graph
(@chamber)

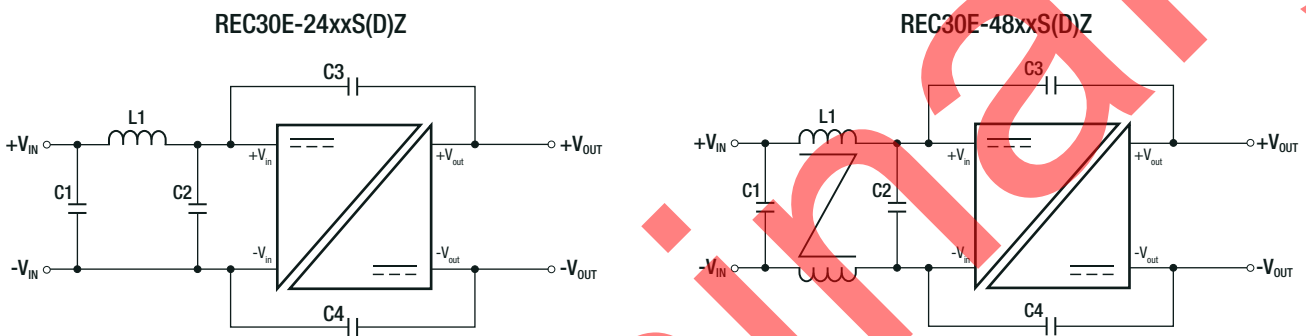


Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Report / File Number	Standard
Audio/Video, information and communication technology equipment - Part1: Safety requirements 3rd Edition	pending	IEC62368-1:2018 3rd Edition
		EN IEC 62368-1:2020+A11:2020
RoHS2		RoHS-2011/65/EU + AM-2015/863
EMC Compliance	Condition	Standard / Criterion
Electromagnetic compatibility of multimedia equipment – Emission Requirements	without external components	EN55032:2015+A11:2020, Class A
	see filter below	EN55032:2015+A11:2020, Class B

EMC Filtering Suggestions according to EN55032



Component List Class B

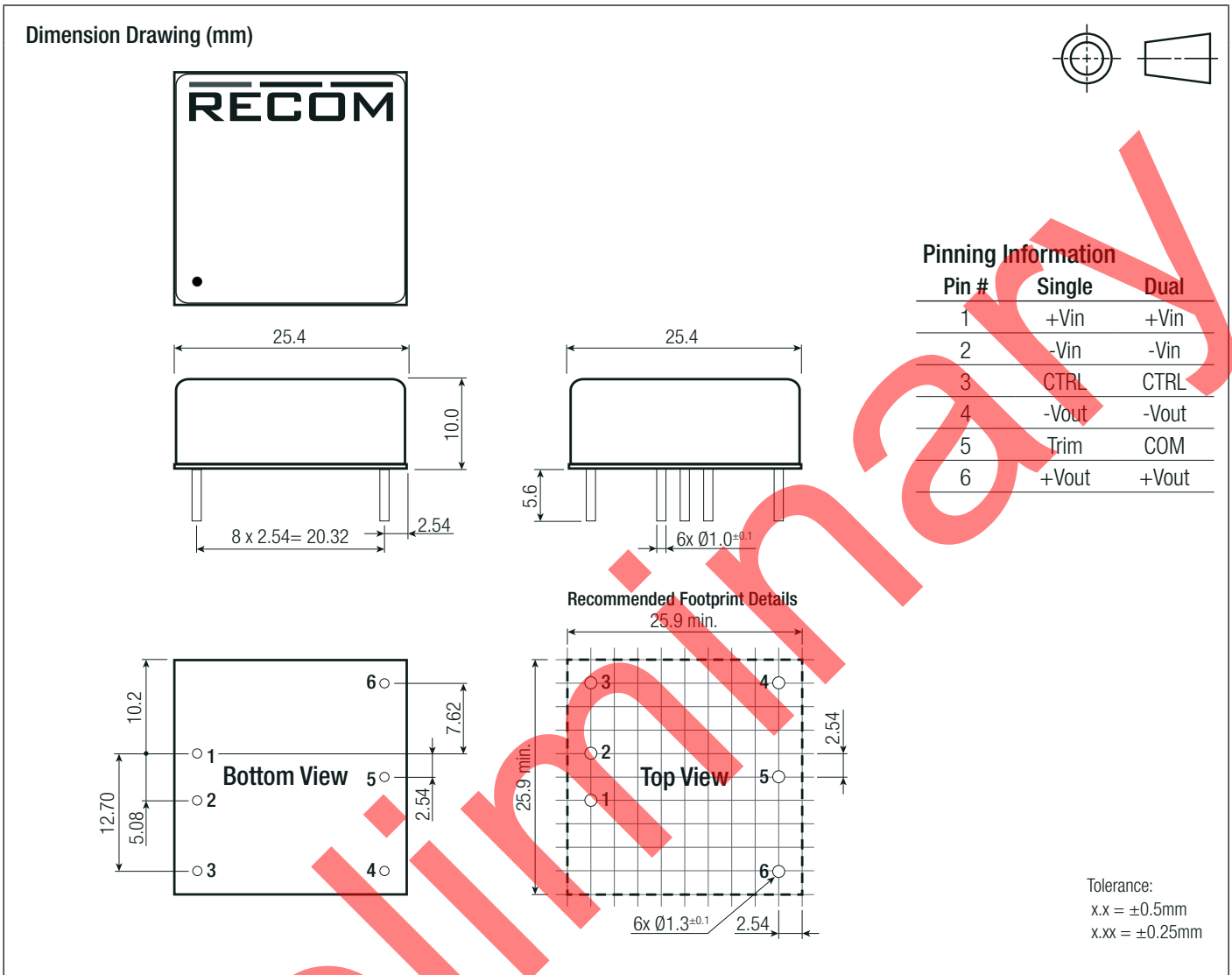
MODEL	C1	L1	C2	C3	C4
REC30E-24xxS(D)Z	4.7µF	10µF	4.7µF	2200pF	2200pF
REC30E-48xxS(D)Z		32µF			

DIMENSION AND PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	case	nickel plated metal
	potting	silicone, (UL94 V-0)
	PCB	FR4, (UL94 V-0)
Dimension (LxWxH)		25.4 x 25.4 x 10.0mm
Weight		17g typ.

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Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)



PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	tube	260.0 x 28.5 x 20.8mm
Packaging Quantity		8pcs
Storage Temperature Range		-55°C to +125°C
Storage Humidity	non-condensing	95% RH max.

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