

# REC5K-RW Series $\diamond$ Regulated DIP24

## 5W $\diamond$ Isolated Single Output $\diamond$ 4:1 Input

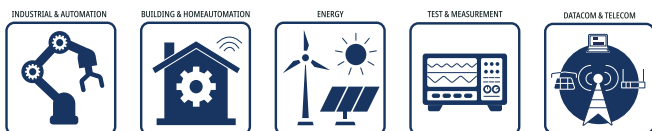
### FEATURES

- 4kVDC/1sec isolation
- Industry standard 5W DIP24 package
- Low ripple and noise
- Derates to 110°C ambient temperature
- Wide 4:1 input
- ON/OFF control pin, UVLO, SCP
- 0% minimum load
- Adjustable output (3.3 - 15VDC)
- 3 year warranty



Dimensions (LxWxH): 32.1 x 20.6 x 10.2mm (1.26 x 0.81 x 0.40inch)  
12.0g (0.03 lbs)

### APPLICATIONS



### SAFETY & EMC



### DESCRIPTION

This series offers 4kVDC/1sec isolation and internal filtering to reduce noise, making it ideal for both industrial and other sophisticated highend applications. The compact DIP24 non-conductive plastic package ensures high power density without compromising performance, operating with derating up to 110°C. Short circuit protection, undervoltage lockout, and remote on/off control is standard, and the converter are certified according to UL/IEC/EN62368-1.

### SELECTION GUIDE

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current max. [mA]	Efficiency typ. <sup>(1)</sup> [%]	max. Capacitive Load <sup>(2)</sup> [ $\mu$ F]
REC5K-2405SRW/H4/A	9-36	5	1000	78	3000
REC5K-2412SRW/H4/A/ADJ	9-36	3.3-15	1212	84	3000

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



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## 5W $\diamond$ Isolated Single Output $\diamond$ 4:1 Input

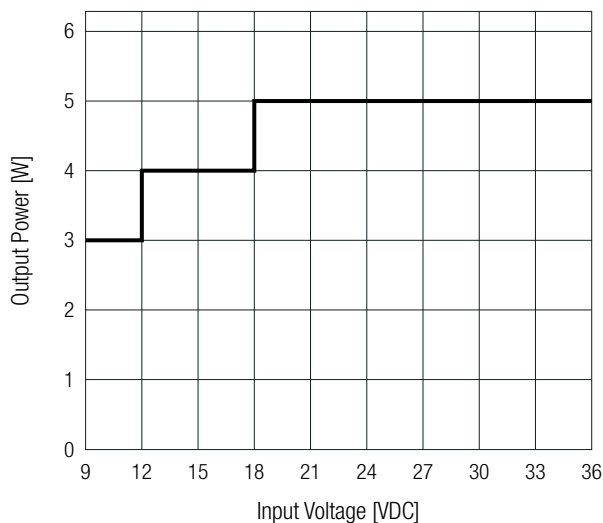
**BASIC CHARACTERISTICS** (measured @  $T_{AMB} = 25^{\circ}C$ , nom.  $V_{IN}$ , full load and after warm-up unless otherwise stated)

Parameter	Condition	Min.	Typ.	Max.
Input Voltage Range	nom. $V_{IN} = 24VDC$	9VDC		36VDC
Under Voltage Lockout	DC-DC ON	8.2VDC		8.8VDC
	DC-DC OFF	5.4VDC		6.0VDC
Input Current		240mA		270mA
Quiescent Current				20mA
Output Voltage Trimming	REC5K-2412SRW/H4/A/ADJ only, refer to „Output Voltage Trimming“	3.3VDC		15VDC
Minimum Load		0%		
Startup time				50ms
ON/OFF CTRL	DC-DC ON		Open or $V_{CTRL} > 1.5VDC$	
	DC-DC OFF		Short to $-V_{IN}$ or $< 1.5VDC$	
Input Current on CTRL Pin	DC-DC ON			1mA
Standby Current	DC-DC OFF		3mA	6mA
Internal Operating Frequency				400kHz
Output Ripple and Noise <sup>(3)</sup>	20MHz BW, nom. $V_{IN} = 24VDC$			80mVp-p
	REC5K-2412SRW/H4/A/ADJ			200mVp-p

Note3: Measurements are made with a 0.1 $\mu$ F MLCC & 10 $\mu$ F E-cap in parallel across output. (low ESR)  
 The test setup can have an impact on ripple noise values (placement of scope probe, capacitors, it's specifications, wires, PCB tracks, distances, etc.)

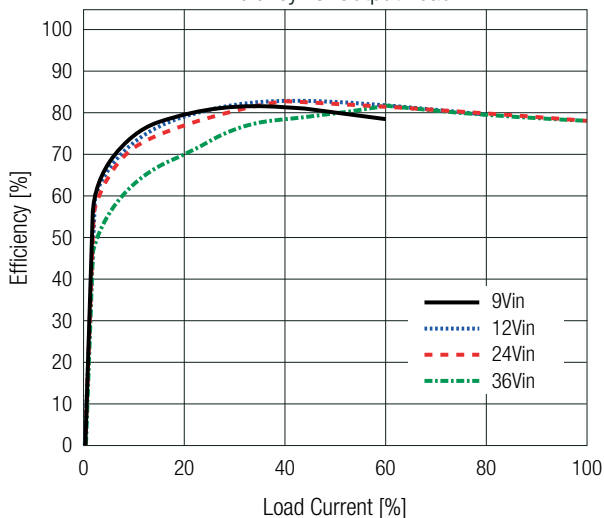
### Line Derating

(@ Chamber and natural convection 0.1m/s)

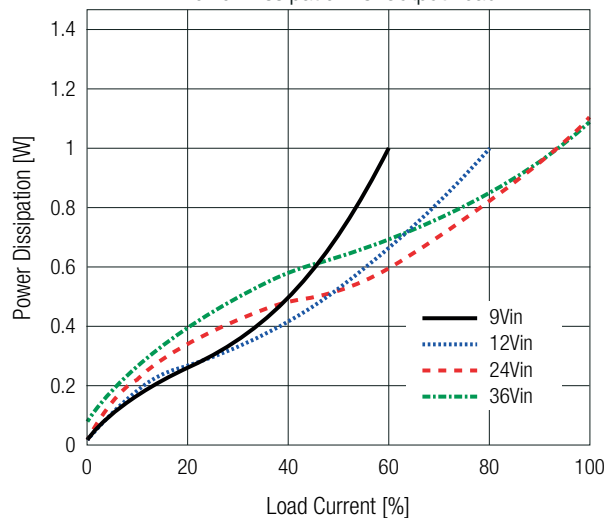


### REC5K-2405SRW/H4/A

Efficiency vs. Output Load



Power Dissipation vs. Output Load



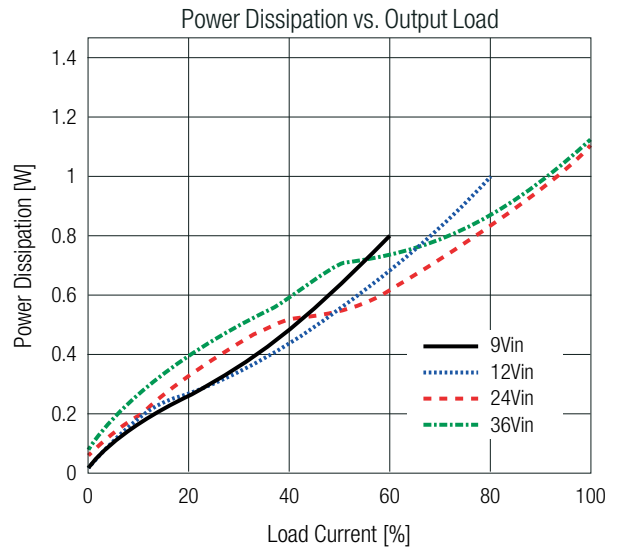
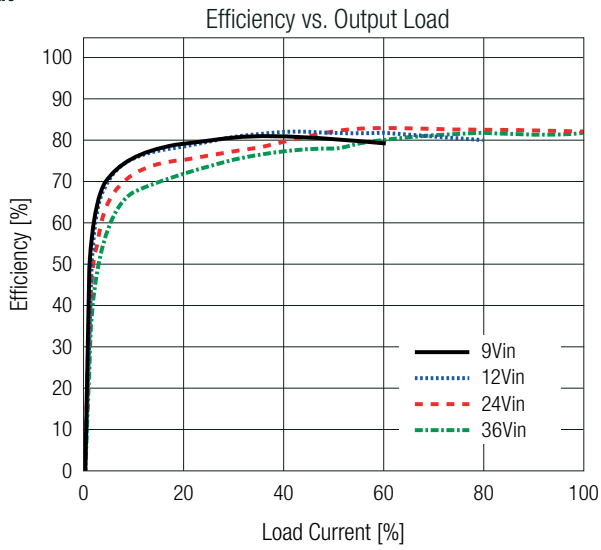
# REC5K-RW Series $\diamond$ Regulated DIP24

## 5W $\diamond$ Isolated Single Output $\diamond$ 4:1 Input

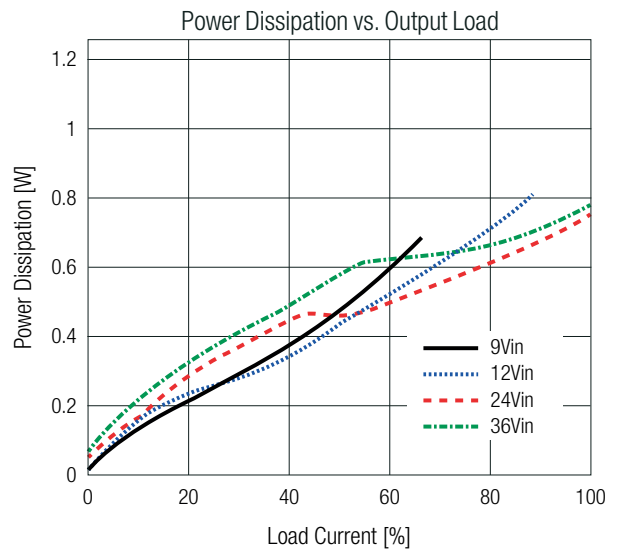
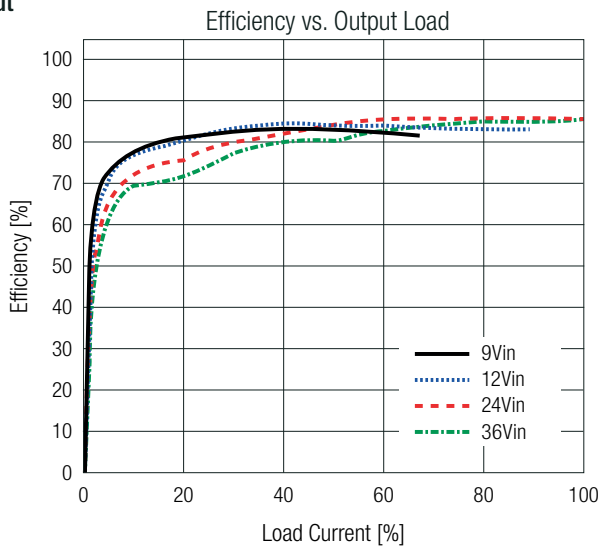
**Specifications** (measured @  $T_a = 25^\circ\text{C}$ , nom.  $V_{in}$ , full load and after warm-up unless otherwise stated)

REC5K-2412SRW/H4/A/ADJ

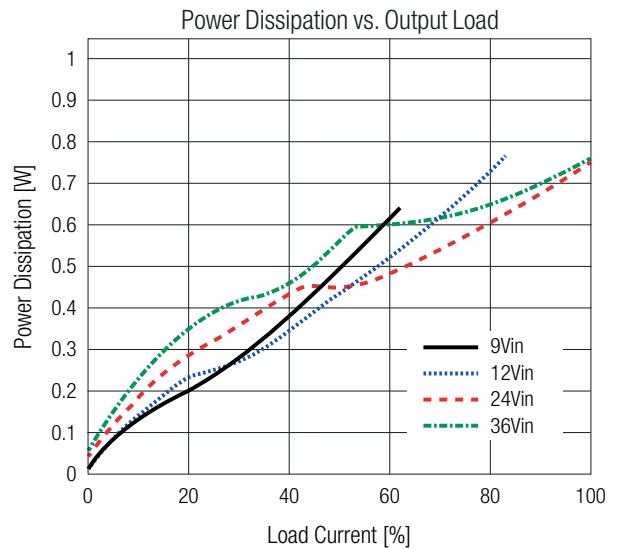
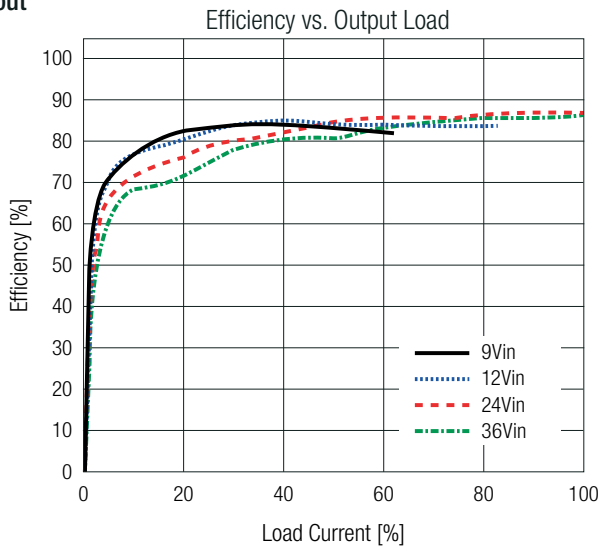
5Vout



9Vout



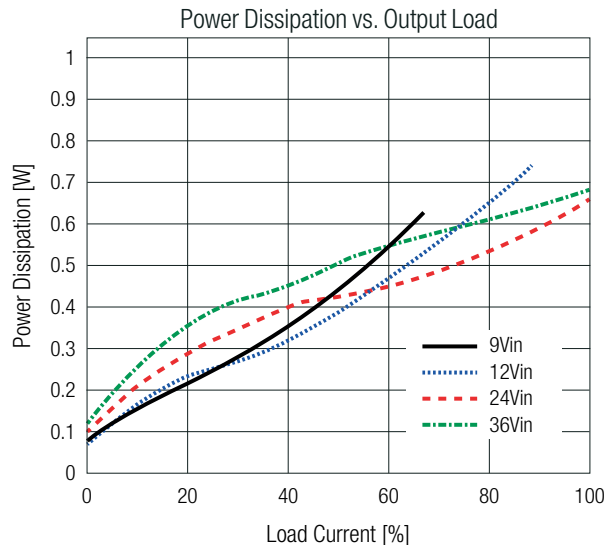
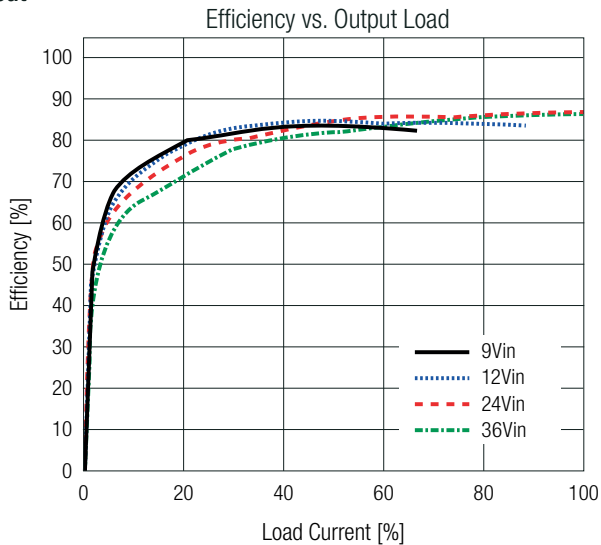
12Vout



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

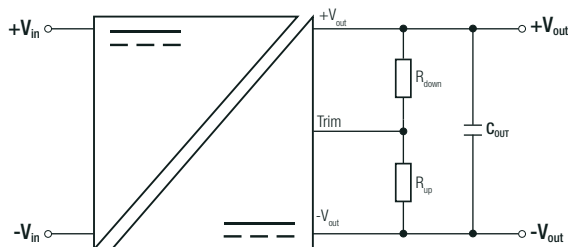
REC5K-2412SRW/H4/A/ADJ

15Vout



**OUTPUT VOLTAGE TRIMMING**

The nominal output voltage of REC5K-2412SRW/H4/A/ADJ is 12V but can be trimmed between 3.3V and 15V by using an external trim resistor. The values for the trim resistor are according to standard E96 values; therefore, the specified voltage may slightly vary. Resistor values may be calculated with the following equation:



- V<sub>ref</sub> = reference voltage [0.596VDC]
- V<sub>out<sub>set</sub></sub> = trimmed output voltage [VDC]
- R<sub>up</sub> = trim up resistor [Ω]
- R<sub>down</sub> = trim down resistor [Ω]
- R<sub>1</sub> = internal resistor [200kΩ]
- R<sub>2</sub> = internal resistor [10k5Ω]

**Calculation:**

$$R_{up} = \frac{V_{REF} \times R_1 \times R_2}{V_{OUT} \times R_2 - R_1 \times V_{REF} - R_2 \times V_{REF}} = \Omega$$

$$R_{down} = \frac{R_1 \times R_2 \times (V_{OUT} - V_{REF})}{R_1 \times V_{REF} - R_2 \times (V_{OUT} - V_{REF})} = \Omega$$

**Trim up**

V <sub>out<sub>set</sub></sub> =	13	14	15	[VDC]
R <sub>up</sub> (E96) ≈	113k	59k	39k2	[Ω]

**Trim down**

V <sub>out<sub>set</sub></sub> =	3.3	5	9	[VDC]
R <sub>down</sub> (E96) ≈	63k4	127k	39k2	[Ω]
C <sub>out</sub> =	22	10	-	[μF]

**Practical Example trim up to 15VDC:**

$$R_{up} = \frac{0.596V \times 200k\Omega \times 10.5k\Omega}{15V \times 10.5k\Omega - 200k\Omega \times 0.596V - 10.5k\Omega \times 0.596V} = 39.061\Omega$$

R<sub>up</sub> according to E96 ≈ **39k2Ω**

**Practical Example trim down to 3.3VDC:**

$$R_{down} = \frac{200k\Omega \times 10.5k\Omega \times (3.3V - 0.596V)}{200k\Omega \times 0.596V - 10.5k\Omega \times (3.3V - 0.596V)} = 62.532\Omega$$

R<sub>down</sub> according to E96 ≈ **61k9Ω**

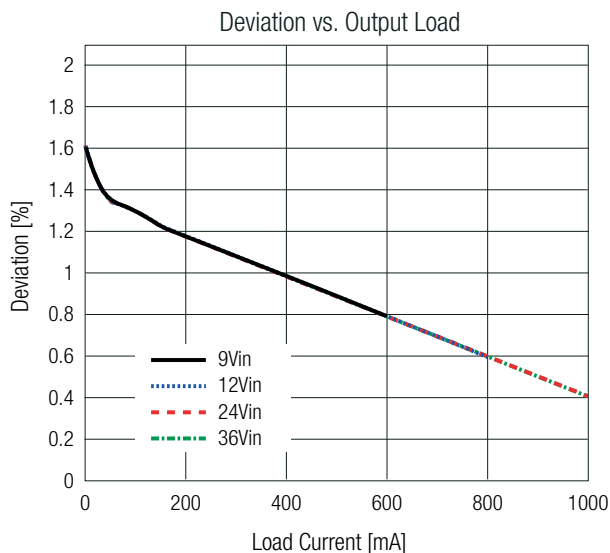
# REC5K-RW Series ◊ Regulated DIP24

## 5W ◊ Isolated Single Output ◊ 4:1 Input

### REGULATIONS

Parameter	Condition	Value
Output Accuracy		±2.5% typ.
Line Regulation	low line to high line, full load	±2.0% max.
Load Regulation <sup>(4)</sup>	10% to 100% load	2.0% max.

Note4: Operation below 10% load will not harm the converter, but specifications may not be met



### PROTECTIONS

Parameter	Condition	Value	
Short Circuit Protection (SCP)		hiccup mode, auto recovery	
Short Circuit Input Current	nom. $V_{IN}$ = 24VDC	120mA max.	
Isolation Voltage <sup>(5)</sup>	I/P to O/P	1 second	4kVDC
		rated for 1 minute	2kVAC/50Hz
Isolation Resistance	I/P to O/P, $V_{ISO}$ = 500VDC	1GΩ min.	
Isolation Capacitance	I/P to O/P, 100kHz/0.1V	REC5K-2405SRW/H4/A	50pF max.
		REC5K-2412SRW/H4/A/ADJ	800pF max.
Insulation Grade	according to 62368-1	functional	

Note5: For repeat Hi-Pot testing, reduce the time and/or the test voltage

Note6: Refer to local safety regulations if input over-current protections is also required. Recommended fuse: slow blow type

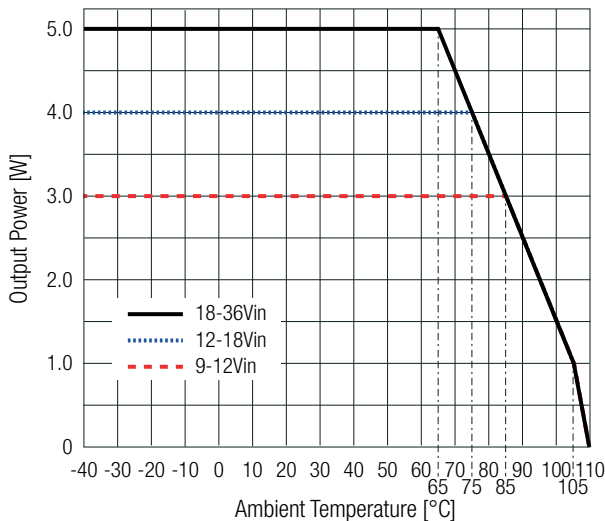
### ENVIRONMENTAL

Parameter	Condition	Value		
Operating Temperature Range	@natural convection 0.1m/s refer to „Derating Graph“	-40°C to +105°C		
Maximum Case Temperature		+125°C		
Operating Altitude		5000m		
Operating Humidity	non-condensing	95% RH max.		
Polution Degree		PD2		
MTBF	according to MIL-HDBK-217F, G.B.	REC5K-2405SRW/H4/A	$T_{AMB}$ = +25°C	1741 x 10 <sup>3</sup> hours
			$T_{AMB}$ = +65°C	661 x 10 <sup>3</sup> hours
		REC5K-2412SRW/H4/A/ADJ	$T_{AMB}$ = +25°C	1229 x 10 <sup>3</sup> hours
			$T_{AMB}$ = +85°C	460 x 10 <sup>3</sup> hours

### ENVIRONMENTAL

#### Derating Graph

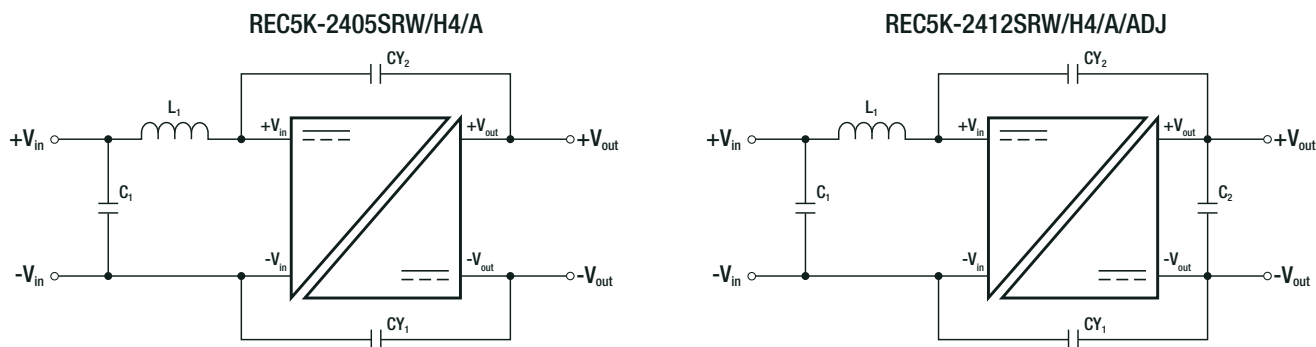
(@ Chamber and natural convection 0.1m/s)



### SAFETY AND CERTIFICATIONS

Certificate Type (Safety)	Report Number	Standard
Audio/Video, information and communication technology equipment - Part1: Safety requirements 3rd Edition	E491408-A6026-UL	UL62368-1:2019 3rd Edition
		CAN/CSA-C22.2 No. 62368-1-19 3rd Edition
Audio/Video, information and communication technology equipment - Part1: Safety requirements 3rd Edition (CB Scheme)	231227039	IEC62368-1:2018 3rd Edition
		EN IEC 62368-1:2020+A11:2020
RoHS2		RoHS 2011/65/EU + AM2015/863
EMC Compliance	Condition	Standard /Criterion
Electromagnetic Compatibility of Multimedia Equipment - Emission Requirements	with external filter	EN55032, Class B

#### EMC Filtering Suggestions according to EN55032



#### Component List Class B

Part Number	L <sub>1</sub>	C <sub>1</sub>	C <sub>2</sub>	CY <sub>1</sub> /CY <sub>2</sub>
REC5K-2405SRW/H4/A	22µH; <a href="#">RLS-226</a>	22µF	N/A	1nF/5kVDC
REC5K-2412SRW/H4/A/ADJ	5.6µH; <a href="#">RLS-567</a>	10µF	10µF	

### DIMENSION & PHYSICAL CHARACTERISTICS

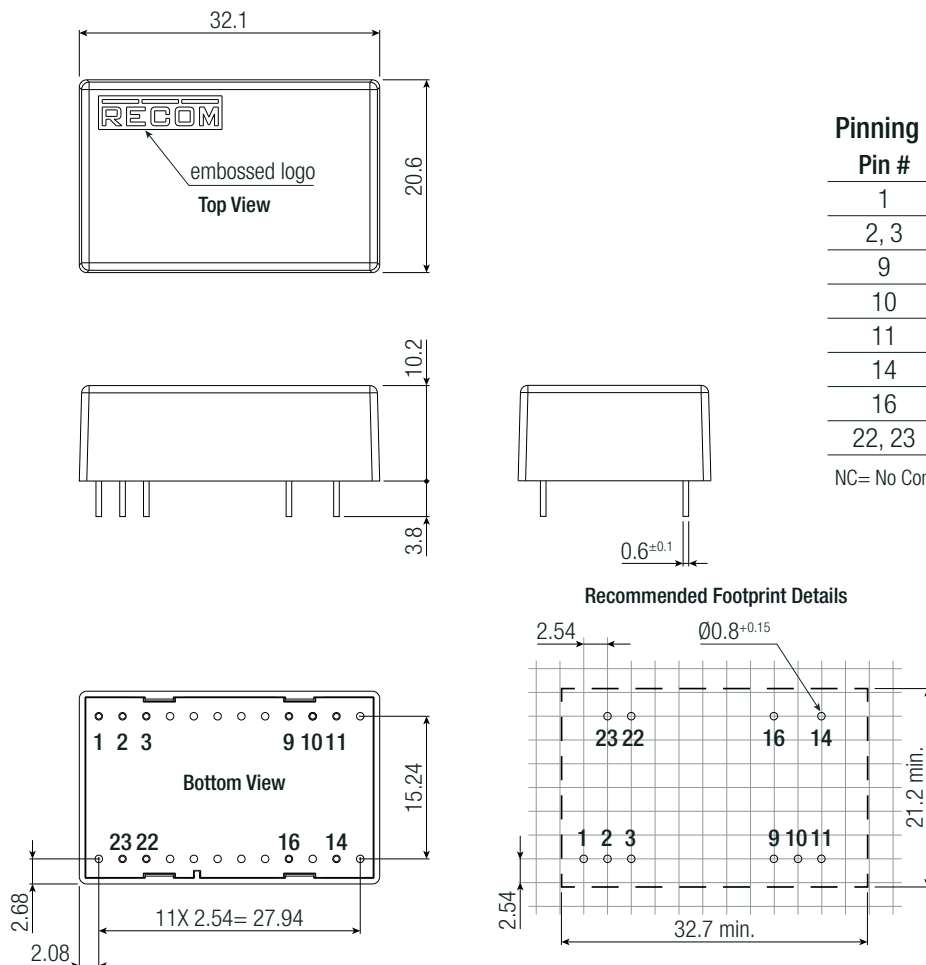
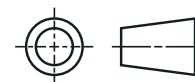
Parameter	Type	Value
Material	case	black plastic, (UL94 V-0)
	potting	PU, (UL94 V-0)
	PCB	FR4, (UL94 V-0)
Dimension (LxWxH)		32.1 x 20.6 x 10.2mm
		1.26 x 0.81 x 0.40 inch
Weight		12g typ.
		0.03 lbs

# REC5K-RW Series ◇ Regulated DIP24

5W ◇ Isolated Single Output ◇ 4:1 Input

## DIMENSION & PHYSICAL CHARACTERISTICS

Dimension Drawing (mm)



### Pinning Information

Pin #	Function	/ADJ
1	CTRL	CTRL
2, 3	-Vin	-Vin
9	NC	NC
10	No Pin	TRIM
11	NC	NC
14	+Vout	+Vout
16	-Vout	-Vout
22, 23	+Vin	+Vin

NC= No Connection

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

## PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	tube	512.9 x 22.2 x 20.9mm
Packaging Quantity		14pcs
Storage Temperature Range		-50°C to +125°C
Storage Humidity	non-condensing	95% RH max.

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