Technical Data Sheet

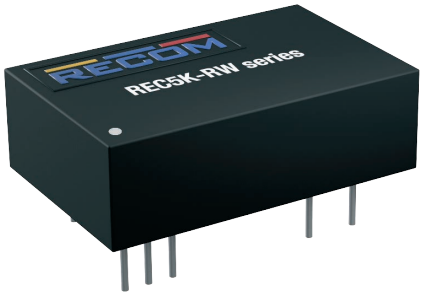
REC5K-RW Series ◊ Regulated DIP24

5W ◊ Isolated Single Output ◊ 4:1 Input

RECOM DC/DC Converter

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

RoHS² compliant 10 from 10 | Reach compliant | IECEE CB SCHEME | c UL us E224736

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. (1) [%]	max. Capacitive Load (2) [µF]
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

REC5K-___ ___ S RW/H4/A/ADJ

- nom. Input Voltage
- nom. Output Voltage
- Single
- Wide Input Range
- 4kVDC Isolation
- Adjust Pin

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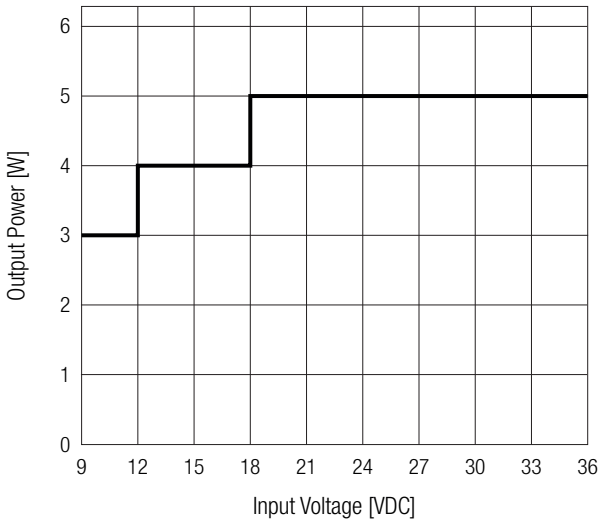
BASIC CHARACTERISTICS (measured @ T_{AMB}= 25°C, nom. V_{IN}, full load and after warm-up unless otherwise stated)

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 (3)	20MHz BW, nom. V_{IN}= 24VDC			80mVp-p
	REC5K-2412SRW/H4/A/ADJ			200mVp-p

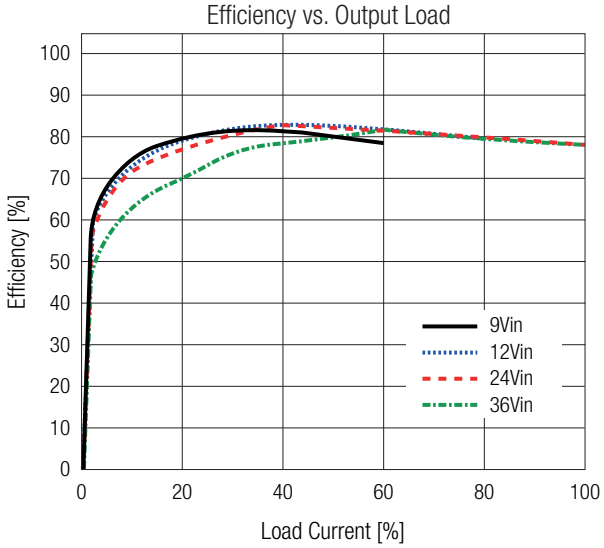
Note3: Measurements are made with a 0.1µF MLCC & 10µF E-cap in parallel across output. (low ESR)
The test setup can have an impact on ripple noise values (placement of scope probe, capacitors, it's specifications, wires, PCB tracks, distances, etc.)

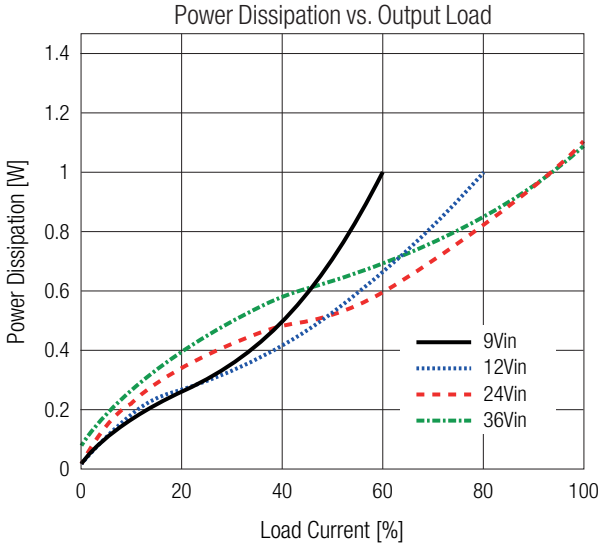
Line Derating

(@ Chamber and natural convection 0.1m/s)



REC5K-2405SRW/H4/A



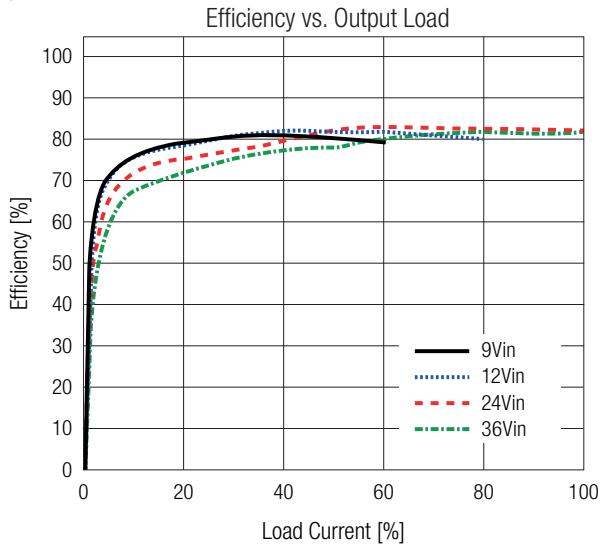


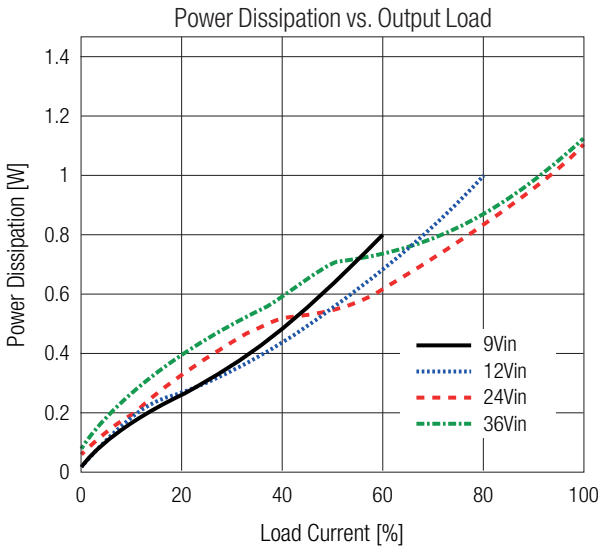
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Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

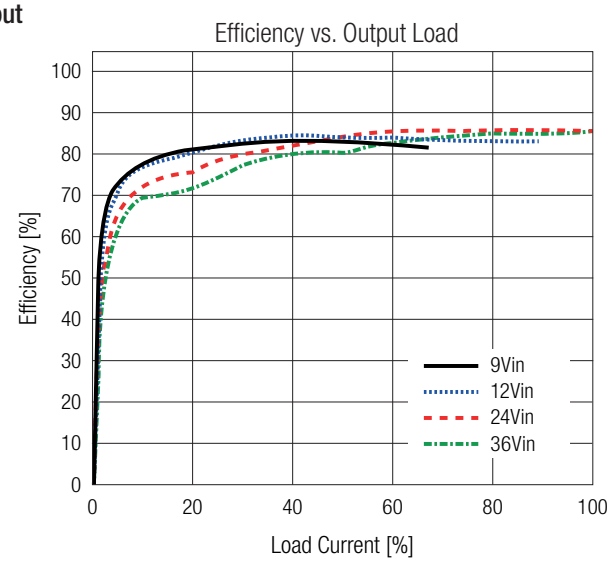
REC5K-2412SRW/H4/A/ADJ

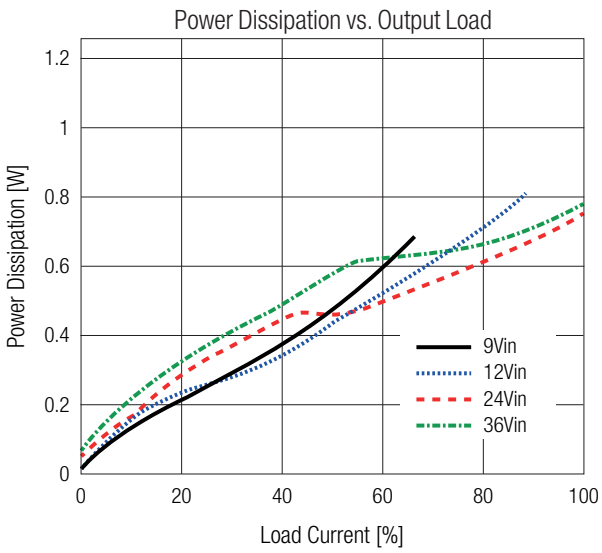
5Vout



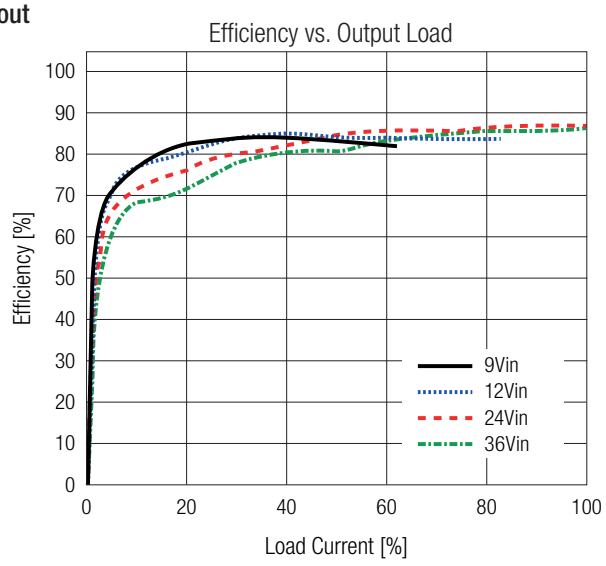


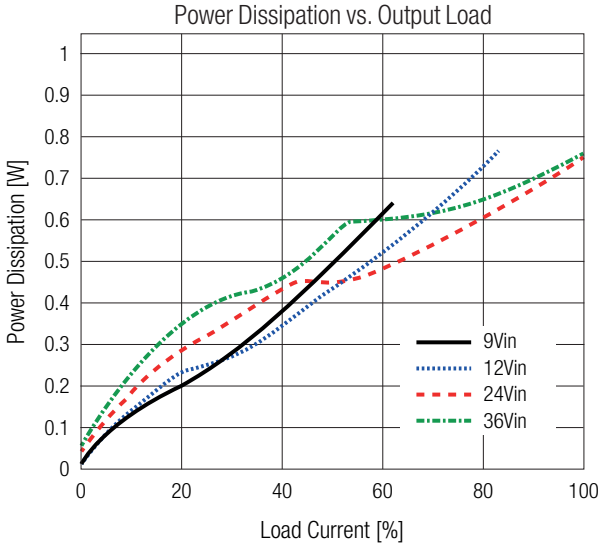
9Vout





12Vout



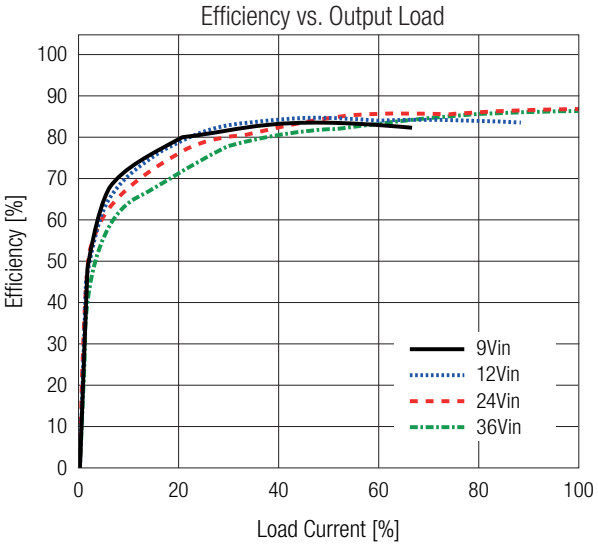


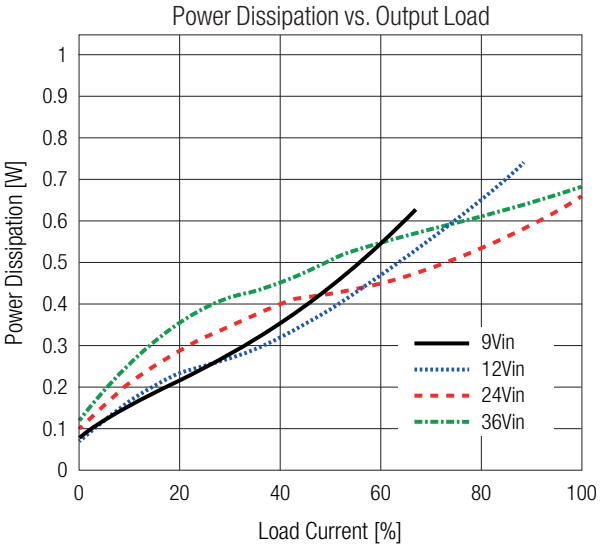
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Specifications (measured @ Ta= 25°C, nom. Vin, full load and after warm-up unless otherwise stated)

REC5K-2412SRW/H4/A/ADJ

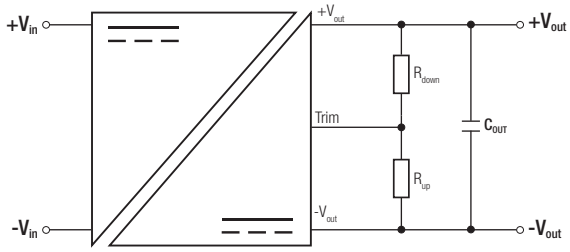
15Vout





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_{ref}	= reference voltage	[0.596VDC]
$Vout_{set}$	= trimmed output voltage	[VDC]
R_{up}	= trim up resistor	[Ω]
R_{down}	= trim down resistor	[Ω]
R_1	= internal resistor	[200kΩ]
R_2	= 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

$Vout_{set}$ =	13	14	15	[VDC]
R_{up} (E96) ≈	113k	59k	39k2	[Ω]

Trim down

$Vout_{set}$ =	3.3	5	9	[VDC]
R_{down} (E96) ≈	63k4	127k	570k	[Ω]
C_{out} =	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_{up} according to E96 ≈ **39k2Ω**

Practical Example trim down to 3.3VDC:

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

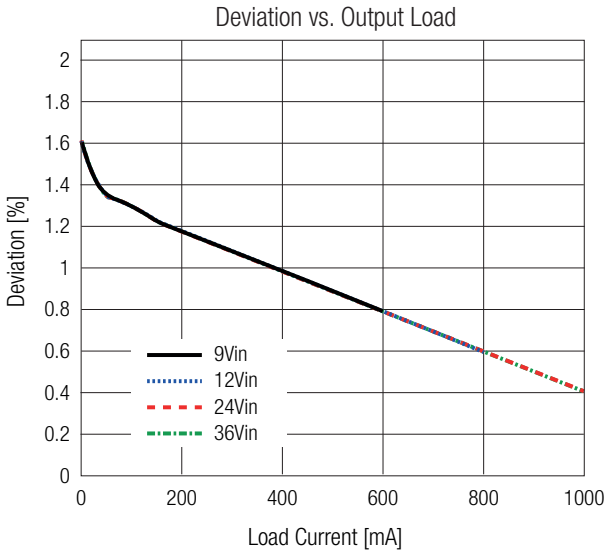
R_{down} according to E96 ≈ **61k9Ω**

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REGULATIONS

Parameter	Condition	Value
Output Accuracy		±2.5% typ.
Line Regulation	low line to high line, full load	±2.0% max.
Load Regulation [4]	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 [5]	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

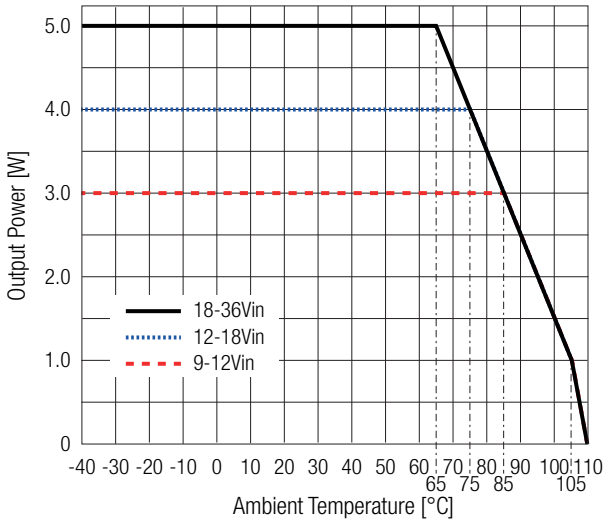
ENVIRONMENTAL

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 10^3 hours
			T_{AMB}= +65°C	661 x 10^3 hours
		REC5K-2412SRW/H4/A/ADJ	T_{AMB}= +25°C	1229 x 10^3 hours
			T_{AMB}= +85°C	460 x 10^3 hours

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ENVIRONMENTAL

Derating Graph
(@ Chamber and natural convection 0.1m/s)

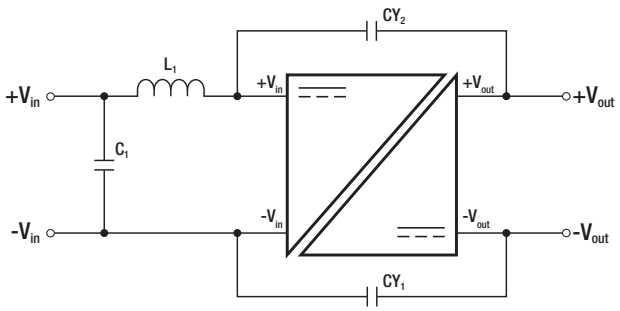


SAFETY AND CERTIFICATIONS

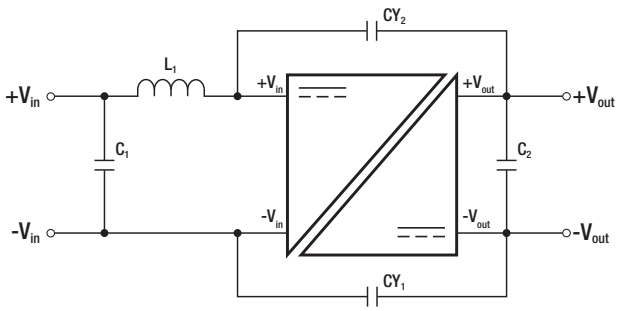
Certificate Type (Safety)	Report Number	Standard
Audio/Video, information and communication technology equipment - Part1: Safety requirements 3rd Edition	E491408-A6026-UL	UL62368-1:2019 3rd Edition
		CAN/CSA-C22.2 No. 62368-1-19 3rd Edition
Audio/Video, information and communication technology equipment - 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

REC5K-2405SRW/H4/A



REC5K-2412SRW/H4/A/ADJ



Component List Class B

Part Number	L_1	C_1	C_2	CY_1/CY_2
REC5K-2405SRW/H4/A	22µH; RLS-226	22µF	N/A	1nF/5kVDC
REC5K-2412SRW/H4/A/ADJ	5.6µH; RLS-567	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

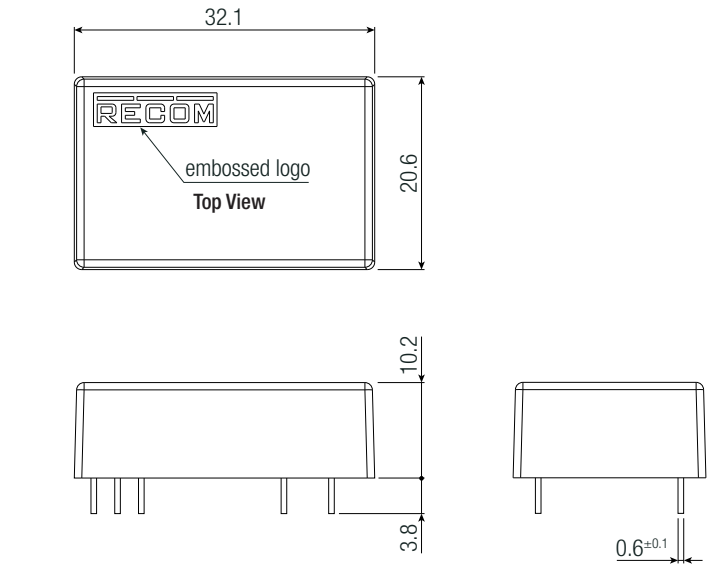
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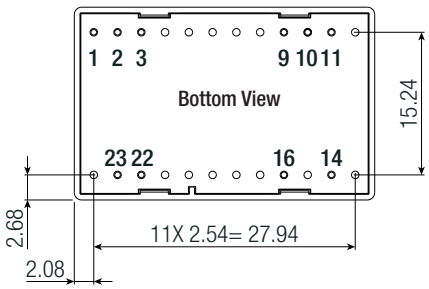
REC5K-RW Series ◊ Regulated DIP24

5W ◊ Isolated Single Output ◊ 4:1 Input

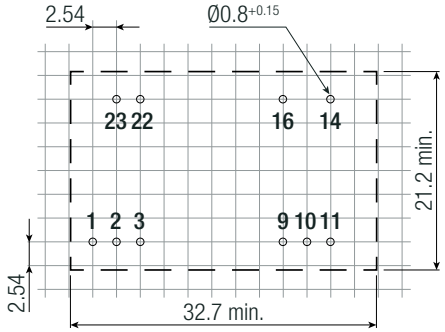
DIMENSION & PHYSICAL CHARACTERISTICS

Dimension Drawing (mm)





Recommended Footprint Details



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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