

RSOK-Z Series ◇ Regulated SIP8

1W ◇ Isolated Single Output ◇ 4:1 Input

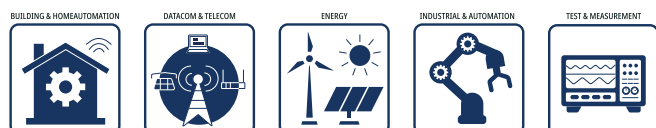
features

- 4:1 wide input voltage range
- SIP8 package
- Continuous short circuit protection
- No minimum load required
- 3kVDC/1 second isolation
- Adjustable output (3.3 - 17VDC)
- 3 year warranty



Dimensions (LxWxH): 21.8 x 9.2 x 11.1mm (0.86 x 0.36 x 0.44inch)
4.7g (0.01lbs)

APPLICATIONS



SAFETY & EMC



DESCRIPTION

The RSOK-Z series is a cutting-edge DC/DC converter series with a wide 4:1 input voltage range of 9-36 VDC. This converter features ON/OFF control for added convenience and precision. The RSOK-Z boasts high accuracy and tight line and load regulation, ensuring reliable performance even under challenging conditions. The device also includes continuous short circuit protection and undervoltage lockout (UVLO) for added safety and security. This product is certified to meet the rigorous safety requirements of IEC/EN/UL 62368-1, making it suitable for use in a variety of industrial applications. With a maximum output power of 1W and the ability to operate at 0% minimum load, the RSOK-Z is both versatile and efficient. Finally, the RSOK-Z offers functional grade isolation of 3kVDC/1sec and an operating range of -40°C to 95°C without derating, making it ideal for use in demanding industrial environments.

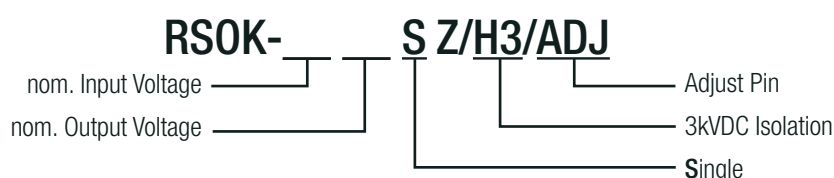
SELECTION GUIDE

Part Number	Input Voltage Range [VDC]	Output Voltage [VDC]	Output Current max. [mA]	Efficiency typ. ⁽¹⁾ [%]	max. Capacitive Load ⁽²⁾ [μF]
RSOK-2405SZ/H3	9-36	5	200	75	1500
RSOK-2412SZ/H3/ADJ	9-36	3.3-17	167	78	750

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

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

MODEL NUMBERING



RSOK-Z Series ◇ Regulated SIP8**1W ◇ Isolated Single Output ◇ 4:1 Input****BASIC CHARACTERISTICS** (measured @ $T_{AMB} = 25^{\circ}\text{C}$, nom. V_{IN} , full load and after warm-up unless otherwise stated)

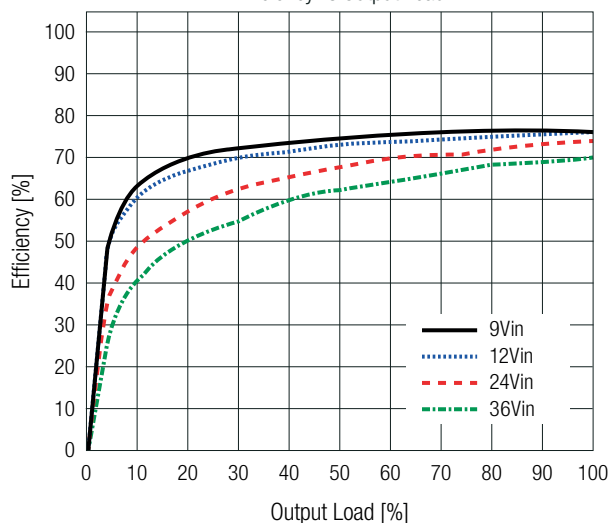
Parameter	Conditions	Min.	Typ.	Max.
Internal Input Filter		capacitors		
Input Voltage Range	nom. $V_{IN} = 24\text{VDC}$	9VDC		36VDC
Under Voltage Lockout	DC-DC ON	8.1VDC		8.7VDC
	DC-DC OFF	6VDC		6.66VDC
Input Current			160mA	
Quiescent Current			3mA	10mA
Output Voltage Trimming	RSOK-2412SZ/H3/ADJ only; refer to „Output Voltage Trimming“	3.3VDC		17VDC
Minimum Load		0%		
ON/OFF CTRL	DC-DC ON	open or $V_{CTRL} > 1.5\text{VDC}$		
	DC-DC OFF	short to $-V_{IN}$ or $V_{CTRL} < 1.5\text{VDC}$		
Input Current of CTRL pin	DC-DC ON			1mA
Standby Current	DC-DC OFF		3mA	6mA
Internal Operating Frequency		100kHz		800kHz
Output Ripple and Noise ⁽³⁾	20MHz BW; nom. $V_{IN} = 24\text{VDC}$			80mVp-p

Note3: Measurements are made with a 0.1μF MLCC & 10μF E-cap in parallel across output. (low ESR)

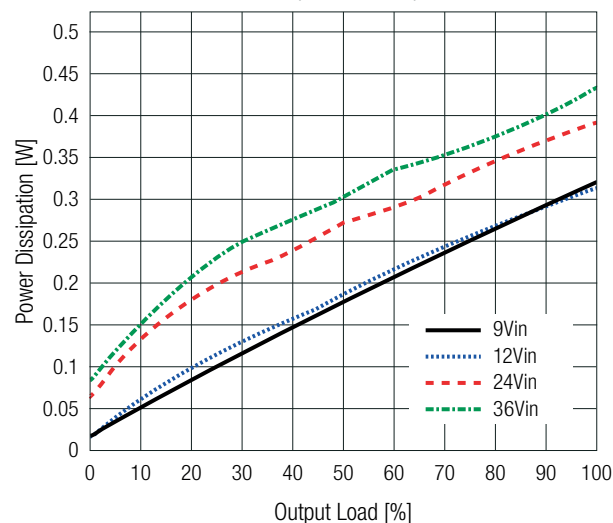
The test setup can have an impact on ripple noise values (placement of scope probe, capacitors, it's specifications, wires, PCB tracks, distances, etc.)

RSOK-2405SZ/H3

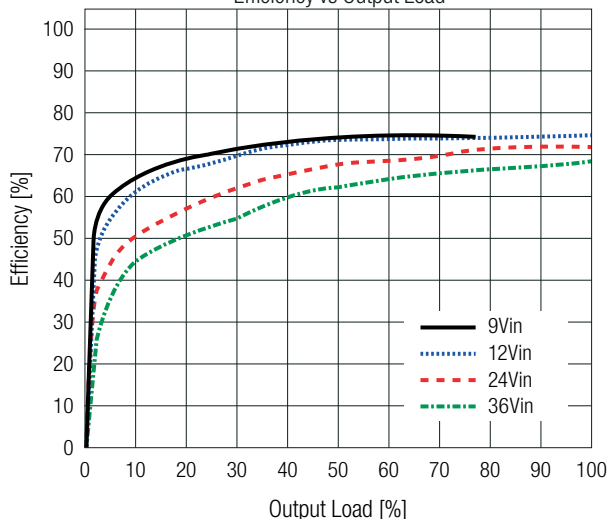
Efficiency vs Output Load



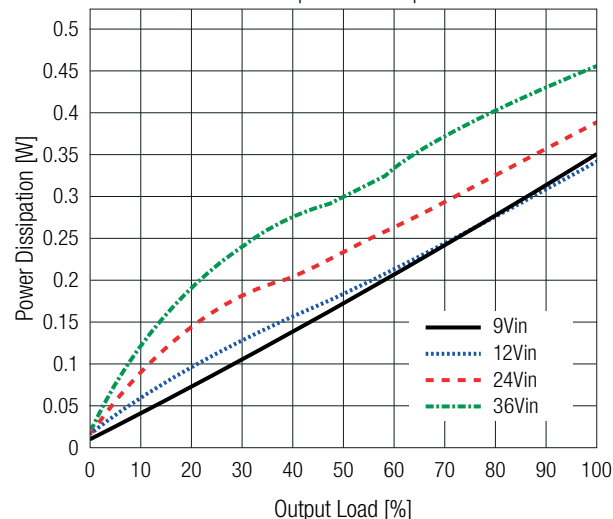
Power Dissipation vs. Output Load

**RSOK-2412SZ/H3/ADJ****3.3Vout**

Efficiency vs Output Load



Power Dissipation vs. Output Load



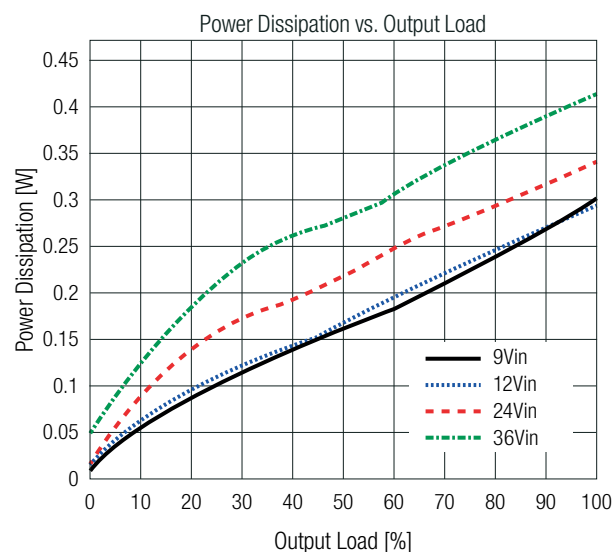
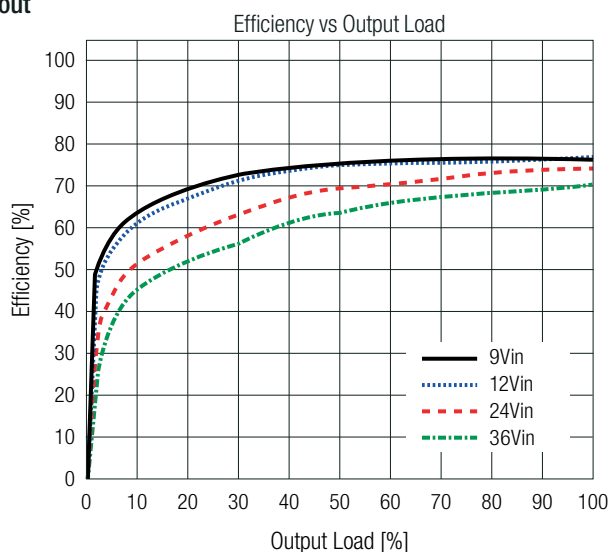
RSOK-Z Series ◇ Regulated SIP8

1W ◇ Isolated Single Output ◇ 4:1 Input

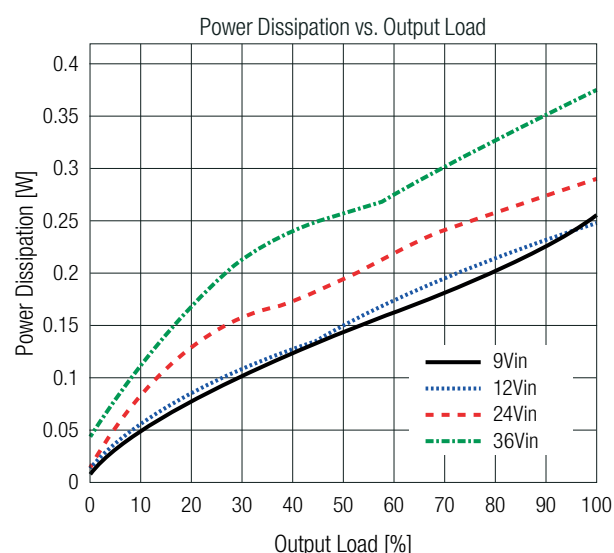
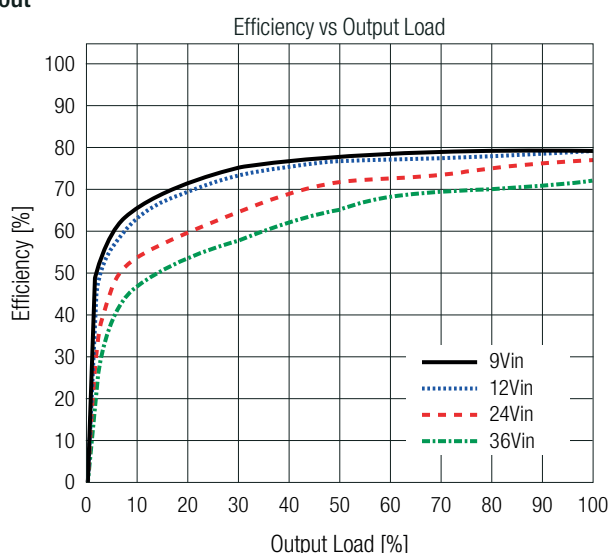
BASIC CHARACTERISTICS (measured @ $T_{AMB} = 25^{\circ}\text{C}$, nom. V_{IN} , full load and after warm-up unless otherwise stated)

RSOK-2412SZ/H3/ADJ

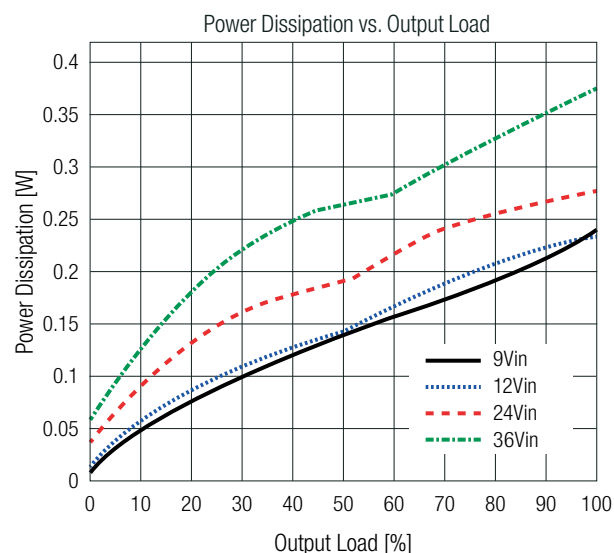
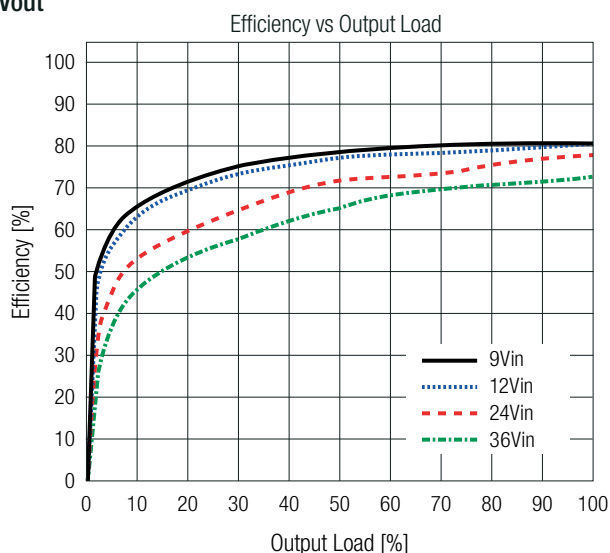
5Vout



9Vout



12Vout



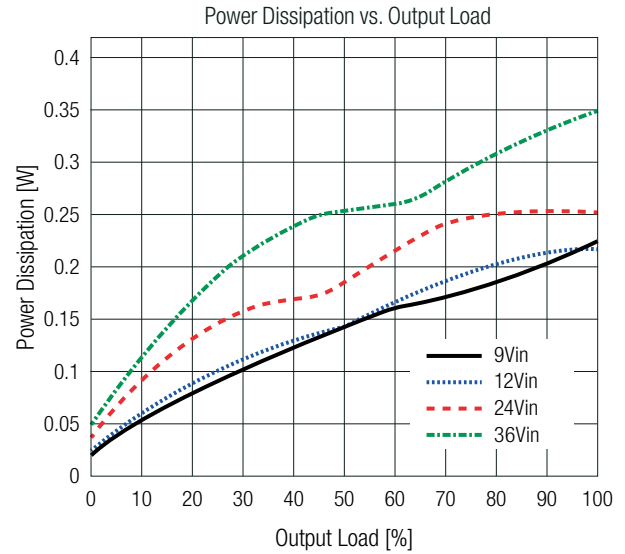
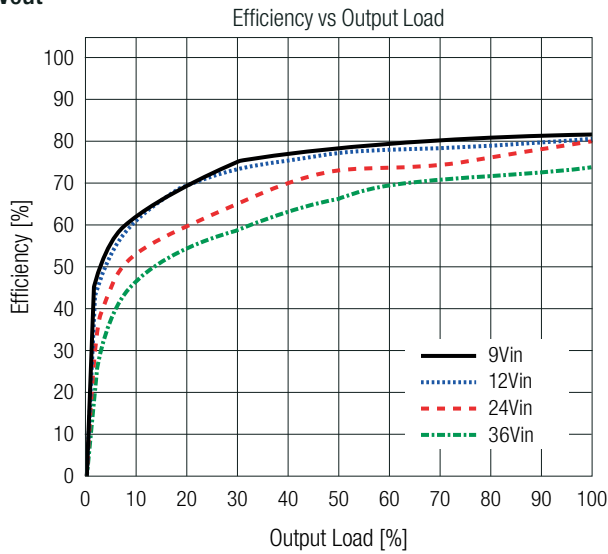
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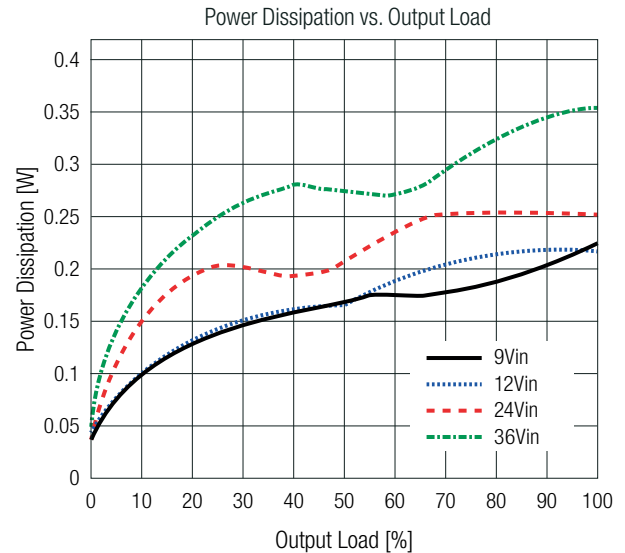
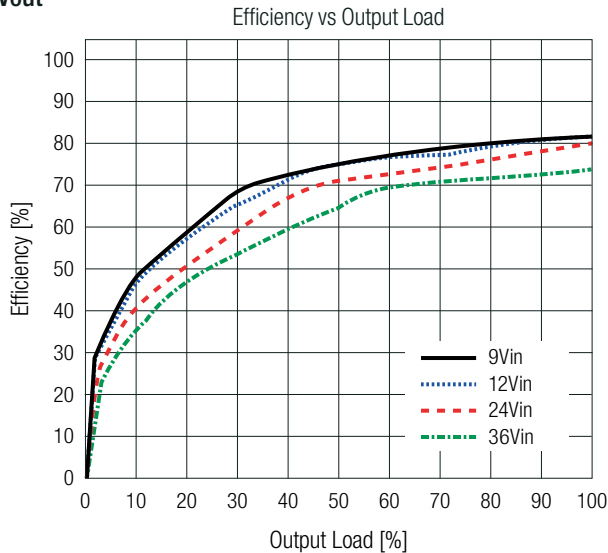
BASIC CHARACTERISTICS (measured @ $T_{AMB} = 25^{\circ}\text{C}$, nom. V_{IN} , full load and after warm-up unless otherwise stated)

RSOK-2412SZ/H3/ADJ

15Vout

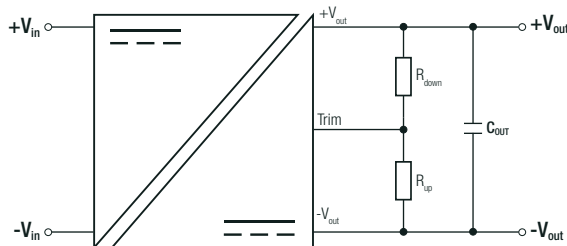


17Vout



OUTPUT VOLTAGE TRIMMING

The nominal output voltage of RSOK-2412SZ/H3/ADJ is 12V but can be trimmed between 3.3V and 17V 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]
V_{out_set}	= trimmed output voltage	[VDC]
R_{up}	= trim up resistor	[Ω]
R_{down}	= trim down resistor	[Ω]
R_1	= internal resistor	[200k Ω]
R_2	= internal resistor	[10k5 Ω]

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

$V_{out_set} =$	13	14	15	16	17	[VDC]
R_{up} (E96) $\approx$	113k	59k	39k2	29k4	23k7	[Ω]

Trim down

$V_{out_set} =$	3.3	5	9	[VDC]
R_{down} (E96) $\approx$	63k4	127k	39k2	[Ω]
$C_{out} =$	22	10	-	[μF]

RSOK-Z Series ◇ Regulated SIP8

1W ◇ Isolated Single Output ◇ 4:1 Input

OUTPUT VOLTAGE TRIMMING**Practical Example trim up to 17VDC:**

$$R_{UP} = \frac{0.596V \times 200k\Omega \times 10.5k\Omega}{17V \times 10.5k\Omega - 200k\Omega \times 0.596V - 10.5k\Omega \times 0.596V} = 23.596\Omega$$

R_{up} according to E96 $\approx$ **23k7Ω**

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 $\approx$ **63k4Ω**

REGULATIONS

Parameter	Conditions	Value
Output Accuracy		±2.0% typ.
Line Regulation	low line to high line, full load	±0.5% max.
Load Regulation ⁽⁴⁾	10%-100% load	1.0% max.

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

PROTECTIONS

Parameter	Type		Value
Short Circuit Protection (SCP)			continuous, auto recovery
Short Circuit Input Current	nom. V_{IN} = 24VDC		120mA max.
Isolation Voltage ⁽⁵⁾	I/P to O/P	1 second	3kVDC
		rated for 1 minute	1.5kVAC/50Hz
Isolation Resistance	I/P to O/P, V_{ISO} = 500VDC		1GΩ min.
Isolation Capacitance	I/P to O/P, 100kHz/0.1V		50pF 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 protection is also required. Recommended fuse: slow blow type

ENVIRONMENTAL

Parameter	Conditions		Value
Operating Temperature Range	with derating, refer to „Derating Graph“		-40°C to +105°C
Maximum Case Temperature			+115°C max.
Temperature Coefficient			0.02%/K
Thermal Impedance	natural convection 0.1m/s		49.17K/W
Operating Altitude			5000m
Operating Humidity	non-condensing		95% RH max.
Pollution Degree			PD2
MTBF	according to MIL-HDBK-217F, G.B.	RSOK-2405SZ/H3; V_{IN} = 5VDC	$T_{AMB} = +25^{\circ}\text{C}$ 2725 x 10 ³ hours
			$T_{AMB} = +80^{\circ}\text{C}$ 867 x 10 ³ hours
		RSOK-2412SZ/H3/ADJ; V_{IN} = 24VDC	$T_{AMB} = +25^{\circ}\text{C}$ 2678 x 10 ³ hours
			$T_{AMB} = +80^{\circ}\text{C}$ 1106 x 10 ³ hours

Technical Data Sheet

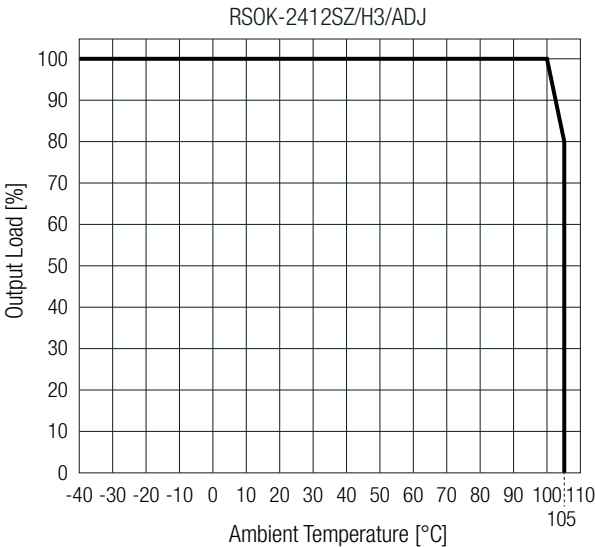
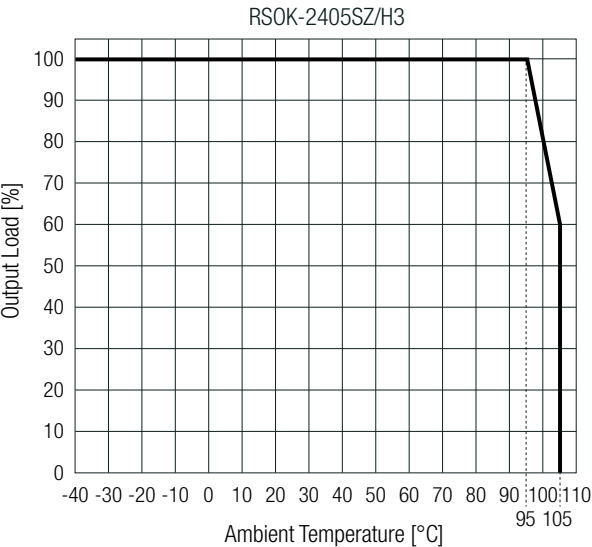
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ENVIRONMENTAL

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



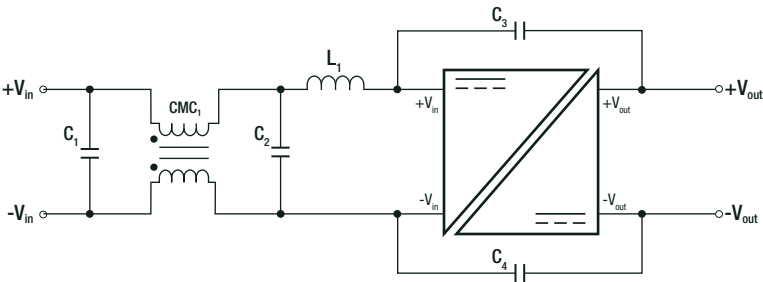
SAFETY & CERTIFICATIONS

Certificate Type (Safety)	Report Number	Standard
Audio/Video, information and communication technology equipment - Part1: Safety requirements 3rd Edition	E491408-A6025-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)	231227040	IEC62368-1:2018 3rd Edition
Audio/Video, information and communication technology equipment - Part1: Safety requirements 3rd Edition		EN IEC 62368-1:2020+A11:2020
RoHS2		RoHS 2011/65/EU + AM2015/863

EMC Compliance	Conditions	Standard / Criterion
Electromagnetic Compatibility of Multimedia Equipment - Emission Requirements	with external filter	EN55032, Class B

EMC Filtering Suggestion according to EN55032

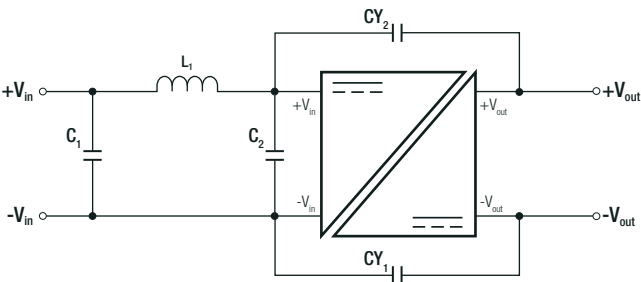
RSOK-2405SZ/H3



Component List Class B

C ₁ /C ₂	CMC ₁	L ₁	C ₃ /C ₄
10µF	11µH	22µH; RLS-226	2.2nF; 3kV

RSOK-2405SZ/H3/ADJ



Component List Class B

C ₁ /C ₂	CY ₁ /CY ₂	L ₁
10µF	470pF	5.6µH; RLS-567

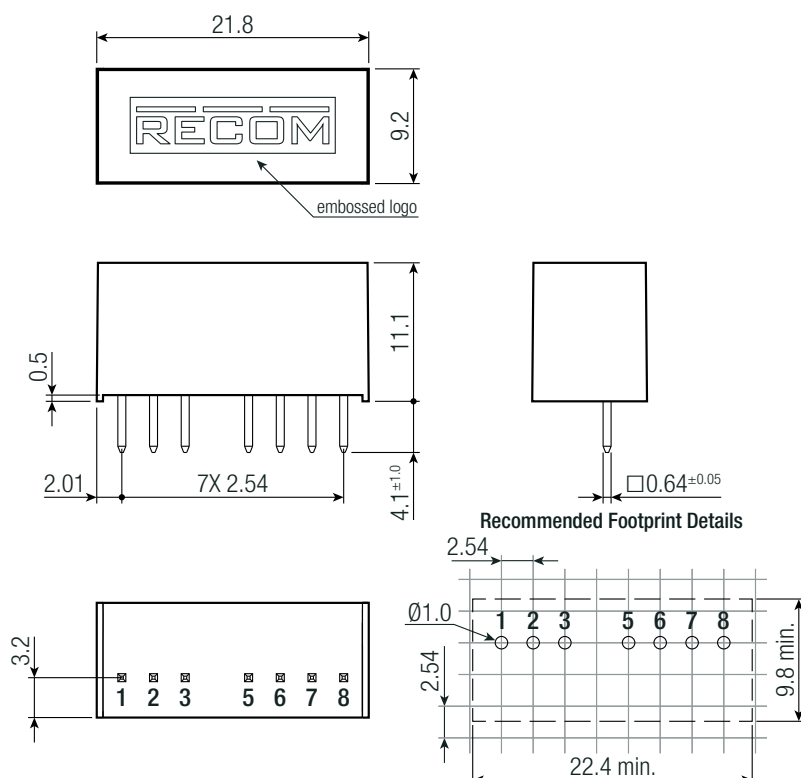
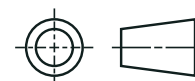
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DIMENSION & PHYSICAL CHARACTERISTICS

Parameter	Type	Value
Material	case	black plastic, (UL94 V-0)
	potting	PU, (UL94 V-0)
	PCB	FR4, (UL94 V-0)
Dimension (LxWxH)		21.8 x 9.2 x 11.1mm
		0.86 x 0.36 x 0.44 inch
Weight		4.7g typ.
		0.01 lbs

Dimension Drawing (mm)



Pinning Information

Pin #	Single	/ADJ
1	-Vin	-Vin
2	+Vin	+Vin
3	CTRL	CTRL
5	NC	TRIM
6	+Vout	+Vout
7	-Vout	-Vout
8	NC	NC

NC= no connection

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

PACKAGING INFORMATION

Parameter	Type	Value
Packaging Dimension (LxWxH)	tube	520.0 x 11.5 x 19.0mm
Packaging Quantity		22pcs
Storage Temperature Range		-50°C to +125°C
Storage Humidity	non-condensing	95% RH max.

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