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香港柴湾安业街十二号长益工业大厦**10**字楼**A**座

HONG KONG RESISTORS MANUFACTORY

(wholly owned by Hong Kong Resistors Manufactory International Ltd.)

AN ISO 9001:2015 CERTIFIED MANUFACTURER

AN ISO 45001: 2018 MANUFACTURER

AN ISO 14001: 2015 MANUFACTURER

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DATASHEET

Name of Product: Current Sensing Thick Film Chip Resistors – RS Series

Sales Executive:_____ Date: _____

制造 Prepared by	品质 Quality by	业务 Sales by	核准 Authorized by
客户 customer approval	客户 customer approval	客户 customer approval	客户 customer approval

Spec. No. RS 2023

Rev. No.: 2023 Dec

Current Sensing Thick Film Chip Resistor



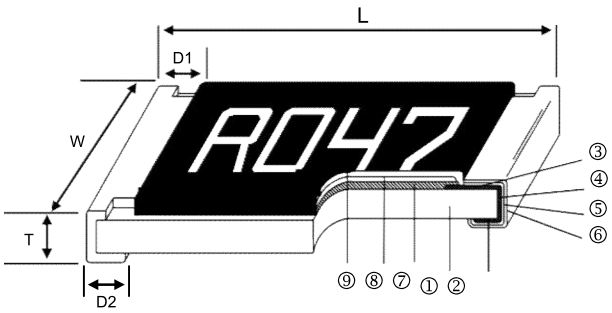
■Scope

—This specification applies to all sizes of rectangular-type fixed chip resistors with Ruthenium-base as material.

■Features

—Low inductance
—Highly reliable multilayer electrode construction
—Higher component and equipment reliability
—Reduced size of final equipment reliability
—RoHS Compliance

■ Construction



■Applications

—Power Management Applications
—Switching Power Supply
—Over Current Protection in Audio Application
—Voltage Regulation Module (VRM)
—DC-DC Converter, Battery Pack, Charger, Adaptor
—Disk Driver

①	Alumina Substrate	④	Edge Electrode	⑦	Resistor Layer
②	Bottom Electrode	⑤	Barrier Layer	⑧	Primary Overcoat
③	Top Electrode	⑥	External Electrode	⑨	Secondary Overcoat

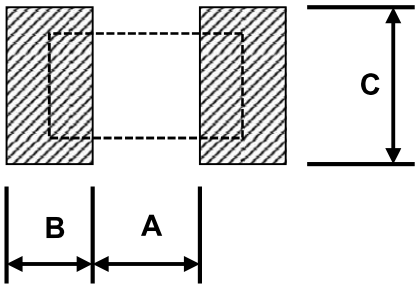
■Dimensions

Type	Size (Inch)	L (mm)	W (mm)	T (mm)	D1 (mm)	D2 (mm)
RS02	0402	1.00±0.05	0.50±0.05	0.35±0.05	0.20±0.10	0.20±0.10
RS03	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20
RS05	0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.40±0.20
RS06	1206	3.10±0.10	1.55±0.10	0.55±0.10	0.50±0.25	0.50±0.20
RS10	1210	3.10±0.10	2.60±0.15	0.55±0.10	0.50±0.25	0.50±0.20
RS18	1812	4.50±0.20	3.10±0.20	0.55±0.15	0.50±0.25	0.60±0.25
RS20	2010	5.00±0.10	2.50±0.15	0.55±0.10	0.60±0.25	0.50±0.20
RS25	2512	6.35±0.10	3.10±0.15	0.55±0.10	0.60±0.25	0.50±0.20

■Part Numbering

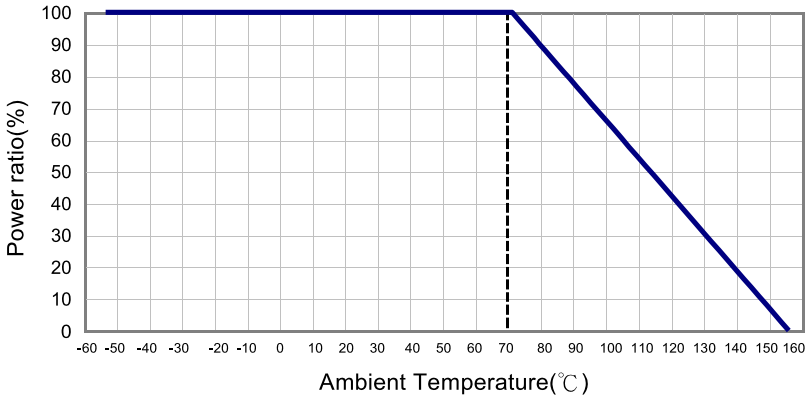
RS	06	0R1	F	1/2W
Type	Size	Value	Tolerance	Power
	02 : 0402		F : ±1%	1/16W
	03 : 0603		J : ±5%	1/10W
	05 : 0805			1/8W
	06 : 1206			1/4W
	10 : 1210			1/3W
	18 : 1812			1/2W
	20 : 2010			3/4W
	25 : 2512			1W
				2W

■Recommend Land Pattern

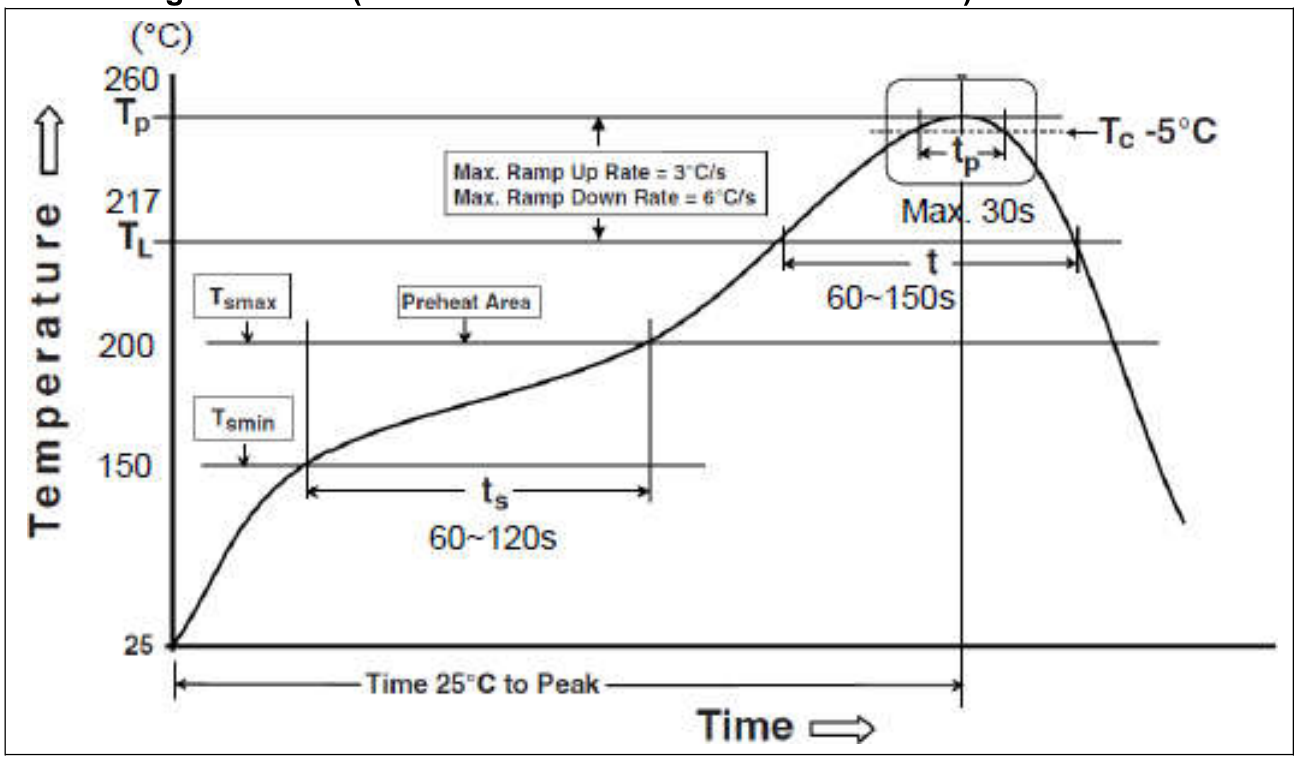


Type	A (mm)	B (mm)	C (mm)
RS02	0.50	0.45	0.60
RS03	0.90	0.60	0.90
RS05	1.20	0.70	1.30
RS06	2.00	0.90	1.60
RS10	2.00	0.90	2.80
RS20	3.80	0.90	2.80
RS25	3.80	1.60	3.50

■Derating Curve



■Soldering Condition (Ref. IPC/JEDEC J-STD-020 & J-STD-002)



Reflow Profiles	
Profile Feature	**Pb-Free Assembly**
Preheat Min. Temperature (Tsmin) Max Temperature (Tsmax) Preheating time (ts) from (Tsmin to Tsmax)	 150 °C 200 °C 60-120 seconds
Ramp-up rate (T_L to Tp)	3 °C/second max.
Liquidous temperature (T_L) Time (t_L) maintained above T_L	217 °C 60-150 seconds
Min. Peak temperature (Tp min)	235°C
Max. Peak temperature (Tp max)	260°C
Time (tp) within 5 °C of the specified classification temperature (Tc)	30 seconds max.
Ramp-down rate (Tp to T_L)	6 °C/second max.
Time 25 °C to peak temperature	8 minutes max.

■Standard Electrical Specifications

Item / Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Current	Resistance Range (mΩ)		TCR (PPM/°C)
				±1%	±5%	
RS02 (0402)	1/16W	-55 ~ +155°C	1.11A	50 - 91 100 - 976		±800 ±500
RS03 (0603)	1/10W	-55 ~ +155°C	2.23A	20 - 47 50 - 91 100 - 976		±1200 ±800 ±500
RS05 (0805)	1/8W	-55 ~ +155°C	3.53A	10 - 18 20 - 47 50 - 91 100 - 976		±1500 ±1200 ±800 ±500
RS06 (1206)	1/4W	-55 ~ +155°C	5.00A			
RS18(1812)	3/4W	-55 ~ +155°C	5.77A	10 - 47 100 - 976		±1800 ±800
RS10 (1210)	1/3W	-55 ~ +155°C	5.77A	10 - 18 20 - 91 100 - 976		±1500 ±800 ±500
RS20 (2010)	3/4W	-55 ~ +155°C	8.66A			
RS25 (2512)	1W	-55 ~ +155°C	10.0A			

Operating Voltage=$\sqrt{(P*R)}$; Overload Voltage=2.5*$\sqrt{(P*R)}$

■High Power Electrical Specifications

Item / Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Current	Resistance Range (mΩ)		TCR (PPM/°C)
				±1%	±5%	
RS02 (0402)	1/10W	-55 ~ +155°C	1.40A	50 - 91 100 - 976		±800 ±500
RS03 (0603)	1/8W	-55 ~ +155°C	2.50A	20 - 47 50 - 91 100 - 976		±1200 ±800 ±500
RS05 (0805)	1/4W	-55 ~ +155°C	5.00A	10 - 18 20 - 47 50 - 91 100 - 976		±1500 ±1200 ±800 ±500
RS06 (1206)	1/2W	-55 ~ +155°C	7.07A			
RS10 (1210)	1/2W	-55 ~ +155°C	7.07A	10 - 18 20 - 91 100 - 976		±1500 ±800 ±500
RS20 (2010)	1W	-55 ~ +155°C	10.0A			
RS25 (2512)	2W	-55 ~ +155°C	14.1A			

Operating Voltage=$\sqrt{(P*R)}$
Overload Voltage=2.5*$\sqrt{(P*R)}$
Operating Current=$\sqrt{(P/R)}$
■HKR is capable of manufacturing the optional spec based on customer's requirement.

■Environmental Characteristics

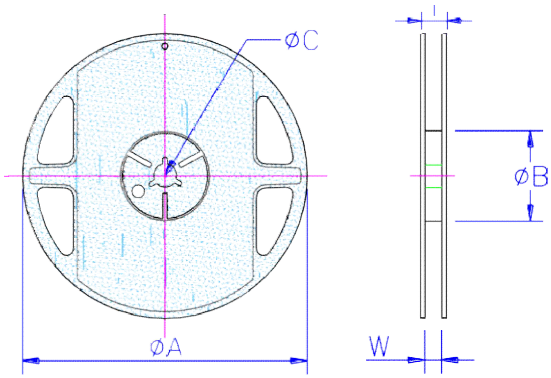
Item	Requirement		Test Method
	±1%	±5%	
Temperature Coefficient of Resistance (T.C.R.)	As Spec.		**JIS-C-5201-1 4.8** **IEC-60115-1 4.8** At 25°C/-55°C and 25°C/+125°C, 25°C is the reference temperature
Short Time Overload	±(1.0%+0.05Ω)	±(2.0%+0.05Ω)	**JIS-C-5201-1 4.13** **IEC-60115-1 4.13** RCWV*2.5 or Max. Overload Voltage whichever is lower for 5 seconds, 2 seconds for High Power Series
Insulation Resistance	≥10G		**JIS-C-5201-1 4.6** **IEC-60115-1 4.6** Max. Overload Voltage for 1 minute
Endurance	±(1.0%+0.10Ω)	±(2.0%+0.10Ω)	**JIS-C-5201-1 4.25** **IEC-60115-1 4.25.1** 70±2°C, RCWV for 1000 hrs with 1.5 hrs “ON” and 0.5 hr “OFF”
Damp Heat with Load	±(1.0%+0.10Ω)	±(2.0%+0.10Ω)	**JIS-C-5201-1 4.24** **IEC-60115-1 4.24** 40±2°C, 90~95% R.H., RCWV for 1000 hrs with 1.5 hrs “ON” and 0.5 hr “OFF”
Dry Heat	±(1.0%+0.05Ω)	±(1.5%+0.10Ω)	**JIS-C-5201-1 4.23** **IEC-60115-1 4.23.2** at +155°C for 1000 hrs
Bending Strength	±(1.0%+0.05Ω)	±(1.0%+0.05Ω)	**JIS-C-5201-1 4.33** **IEC-60115-1 4.33** Bending once for 60 seconds 2010, 2512 sizes: 2mm Other sizes: 3mm
Solderability	95% min. coverage		**JIS-C-5201-1 4.17** **IEC-60115-1 4.17** 245±5°C for 3 seconds
Resistance to Soldering Heat	±(0.5%+0.05Ω)	±(1.0%+0.05Ω)	**JIS-C-5201-1 4.18** **IEC-60115-1 4.18** 260±5°C for 10 seconds
Voltage Proof	No breakdown or flashover		**JIS-C-5201-1 4.7** **IEC-60115-1 4.7** 1.42 times Max. Operating Voltage for 1 minute RS02:100V; RS03:150V; RS05:300V RS06/10/20:400V; RS25:500V
Leaching	Individual leaching area ≦5% Total leaching area ≦ 10%		**JIS-C-5201-1 4.18** **IEC-60068-2-58 8.2.1** 260±5°C for 30 seconds
Rapid Change of Temperature	±(0.5%+0.05Ω)	±(1.0%+0.05Ω)	**JIS-C-5201-1 4.19** **IEC-60115-1 4.19** -55°C to +155°C, 5 cycles

RCWV(Rated Continuous Working Voltage)=$\sqrt{}$(P*R) or Max. Operating Voltage whichever is lower.

■**Storage Temperature: 15~28°C; Humidity < 80%RH**

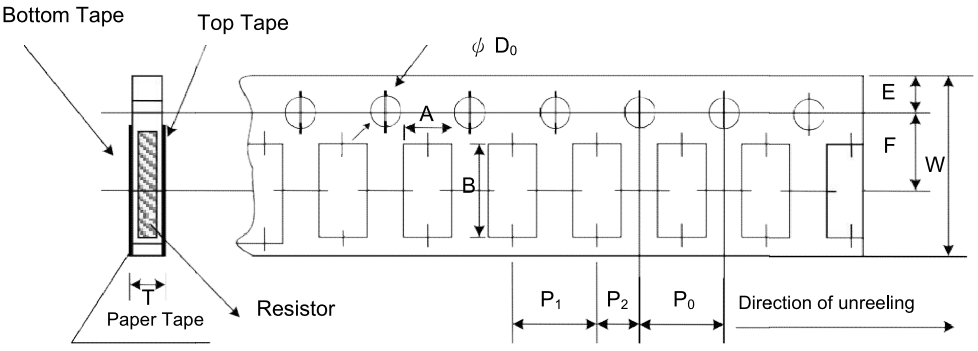
■Packaging

Reel Specifications & Packaging Quantity



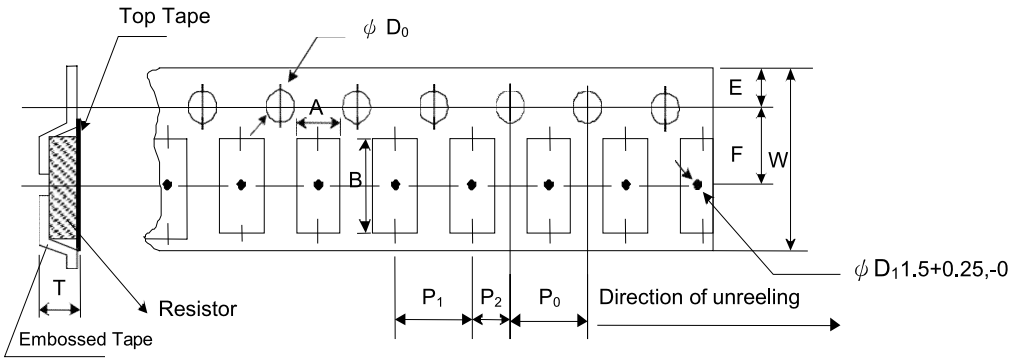
Type	Packaging Quantity		Tape Width	Reel Diameter	ΦA (mm)	ΦB (mm)	ΦC (mm)	W (mm)	T (mm)
RS02	Paper	10K	8mm	7 inch	178.5±1.5	$60^{+1/-0}$	13.0±0.2	9.0±0.5	12.5±0.5
		20K	8mm	10 inch	254±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
		40K	8mm	13 inch	330±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
RS03 RS05 RS06 RS10	Paper	5K	8mm	7 inch	178.5±1.5	$60^{+1/-0}$	13.0±0.2	9.0±0.5	12.5±0.5
		10K	8mm	10 inch	254±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
		20K	8mm	13 inch	330±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
RS18 RS20 RS25	Embossed	4K	12mm	7 inch	178.5±1.5	$60^{+1/-0}$	13.0±0.5	13.0±0.5	15.5±0.5
		8K	12mm	10 inch	250±1.0	62±0.5	13.0±0.5	12.5±0.5	16.5±0.5

Paper Tape Specifications



Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P_0 (mm)	P_1 (mm)	P_2 (mm)	ΦD_0 (mm)	T (mm)
RS02	0.65±0.10	1.15±0.10	8.00±0.20	1.75±0.10	3.50±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.50+0.1,-0	0.45±0.10
RS03	1.10±0.10	1.90±0.10	8.00±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.70±0.10
RS05	1.60±0.10	2.40±0.20	8.00±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10
RS06	1.90±0.10	3.50±0.20	8.00±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10
RS10	2.90±0.10	3.50±0.20	8.00±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10

Embossed Plastic Tape Specifications



Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P_0 (mm)	P_1 (mm)	P_2 (mm)	ΦD_0 (mm)	T (mm)
RS20	2.80±0.10	5.40±0.20	12.0±0.30	1.75±0.10	5.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.1, -0	1.2^{+0}
RS25	3.50±0.10	6.70±0.10	12.0±0.30	1.75±0.10	5.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.1, -0	1.2^{+0}

■Marking

No Marking for 0402

1%, 5% for 0805/1206/1210/2010/2512: 4 digits marking

Example:

Resistance	47mΩ	75mΩ	15mΩ	750mΩ	820mΩ
Marking	R047	R075	R015	R750	R820

5% for 0603: 3 digits marking in E24

1% for 0603: 3 digits marking with under-line in E96 (non-including E24 series)



3 digits marking for E24 or R value suffix is zero in E96: R10=100mΩ; R28=280mΩ