

HoRS 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

- ① RoHS Compliance
- ② Low inductance Highly reliable multilayer electrode construction
- ③ Higher component and equipment reliability
- ④ Reduced size of final equipment reliability



■ Applications

- ① Power Management Applications
- ② Switching Power Supply
- ③ Over Current Protection in Audio Application
- ④ Voltage Regulation Module (VRM)
- ⑤ DC-DC Converter, Battery Pack, Charger, Adaptor , Disk Driver

■ Standard Electrical Specifications

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

Operating Voltage= $\sqrt{P \cdot R}$; Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$



■ 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%	
0402	1/10W	-55 ~ +155°C	1.40A	50~91 100~976		±800 ±500
0603	1/8W		2.50A	20~47 50~91 100~976		±1200 ±800 ±500
0805	1/4W		5.00A	10~18 20~47 50~91 100~976		±1500 ±1200 ±800 ±500
1206	1/2W		7.07A			
1210	1/2W		7.07A			
2010	1W		10.0A	10~18 20~91 100~976		±1500 ±800 ±500
2512	2W		14.1A			

Operating Voltage= $\sqrt{P \cdot R}$

Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$

Operating Current= $\sqrt{P/R}$

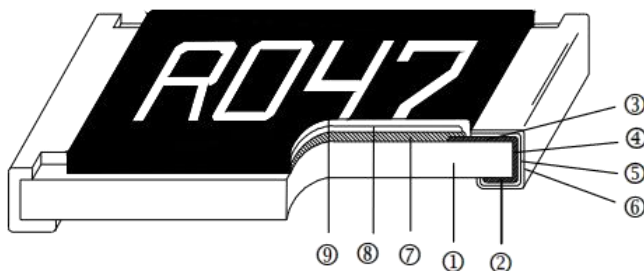
■ Part Numbering

Selection Example: HoRS2512-1W-100mR-1%

H o R S 2 5 1 2 1 W 1 0 0 m R 1 %
 ↓ ↓ ↓ ↓ ↓ ↓

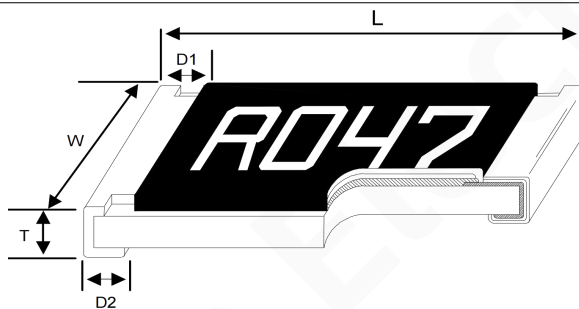
makers	Product Type	Dimensions (L×D)	Power Rating	Resistance	Resistance Tolerance
Ho	RS	0402 0603 0805 1206 1210 2010 2512	1/16W 1/10W 1/8W 1/4W 1/3W 3/4W 1W 2W	10mR=0.01Ω 100mR=0.1Ω 1R=1Ω	±1% ±5%

■ Construction



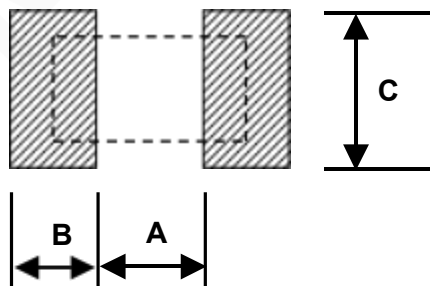
1	2	3	4	5
Alumina Substrate	Bottom Electrode	Top Electrode	Edge Electrode	Barrier Layer
6	7	8	9	
External Electrode	Resistor Layer	Primary Overcoat	Secondary Overcoat	

■ Dimensions



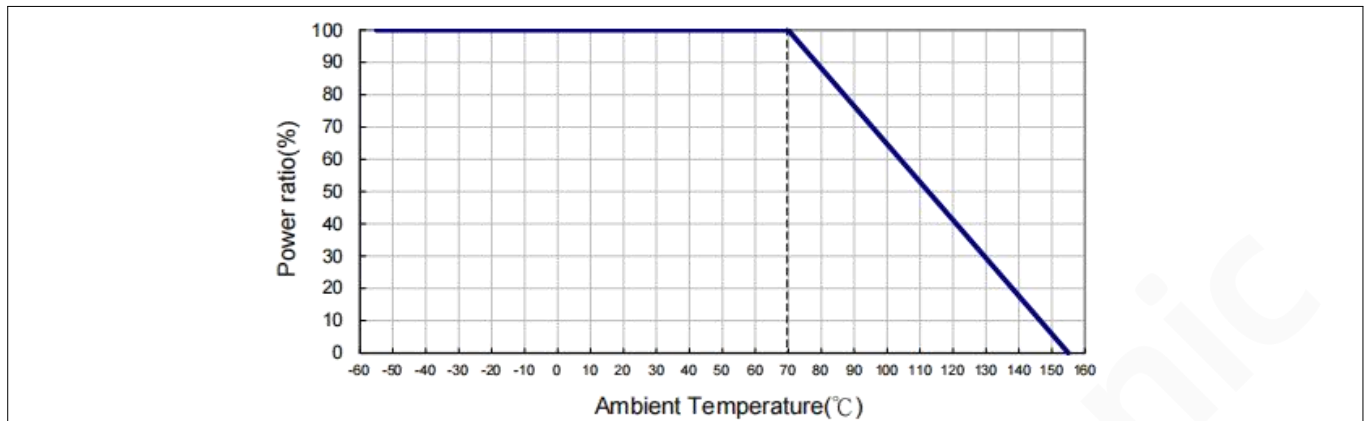
Type	L (mm)	W (mm)	T (mm)	D1 (mm)	D2 (mm)	Weight(g) (1000pcs)
0402	1.00±0.05	0.50±0.05	0.35±0.05	0.20±0.10	0.20±0.10	0.620
0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	2.042
0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.40±0.20	4.368
1206	3.10±0.10	1.55±0.10	0.55±0.10	0.50±0.25	0.50±0.20	8.947
1210	3.10±0.10	2.60±0.15	0.55±0.10	0.50±0.25	0.50±0.20	15.959
2010	5.00±0.10	2.50±0.15	0.55±0.10	0.60±0.25	0.50±0.20	24.241
2512	6.35±0.10	3.10±0.15	0.55±0.10	0.60±0.25	0.50±0.20	39.448

■ Recommend Land Pattern

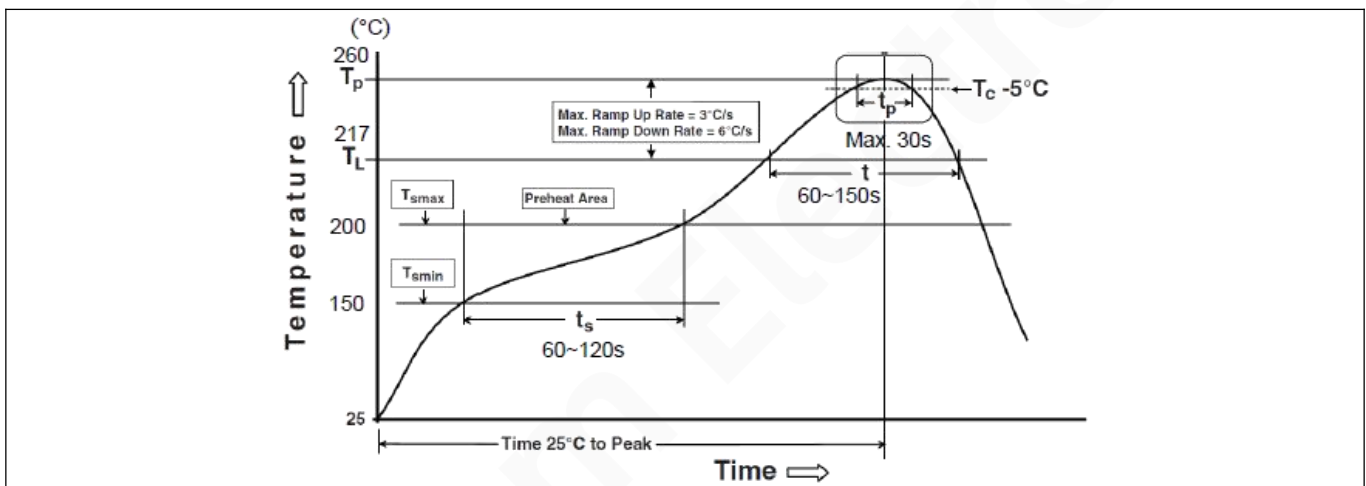


Type	A (mm)	B (mm)	C (mm)
0402	0.50	0.45	0.60
0603	0.90	0.60	0.90
0805	1.20	0.70	1.30
1206	2.00	0.90	1.60
1210	2.00	0.90	2.80
2010	3.80	0.90	2.80
2512	3.80	1.60	3.50

■ Derating Curve



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



Reflow Profiles	
Profile Feature	Pb-Free Assembly
Preheat	
Min. Temperature (T_{smin})	150 °C
Max Temperature (T_{smax})	200 °C
Preheating time (t_s) from (T_{smin} to T_{smax})	60-120 seconds
Ramp-up rate (T_L to T_p)	3 °C/second max.
Liquidous temperature (T_L)	217 °C
Time (t_L) maintained above T_L	60-150 seconds
Min. Peak temperature (T_p min)	235°C
Max. Peak temperature (T_p max)	260°C
Time (t_p) within 5 °C of the specified classification temperature (T_c)	30 seconds max.
Ramp-down rate (T_p to T_L)	6 °C/second max.
Time 25 °C to peak temperature	8 minutes max.

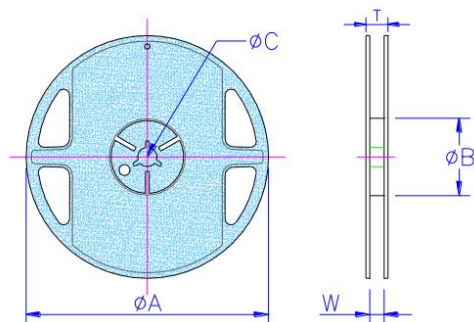
■ Environmental Characteristics

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 -55°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 5 seconds 2010, 2512 sizes: 2mm Other sizes: 3mm
Solderability	95% min. coverage		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
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)= $\sqrt{P \cdot R}$ or Max. Operating Voltage whichever is lower.

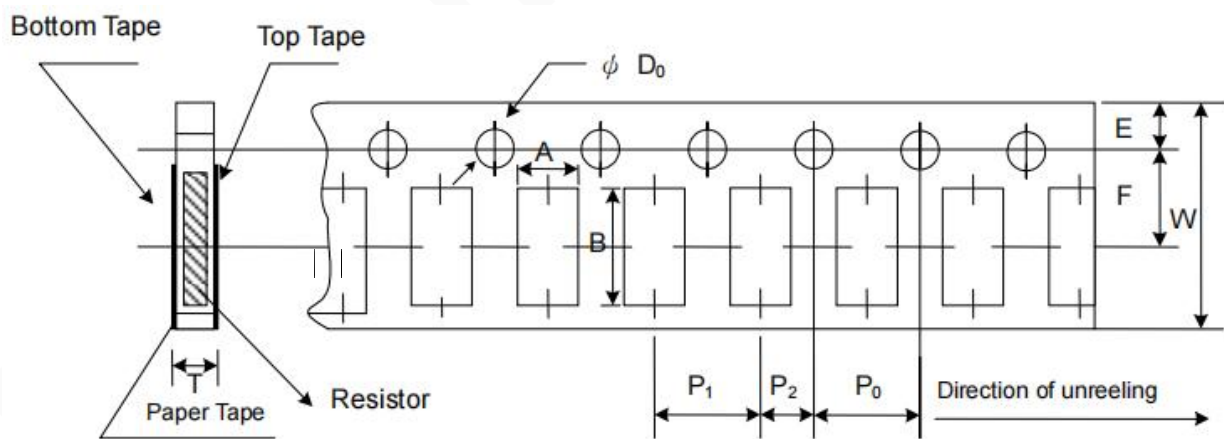
■ Packaging

Reel Specifications & Packaging Quantity

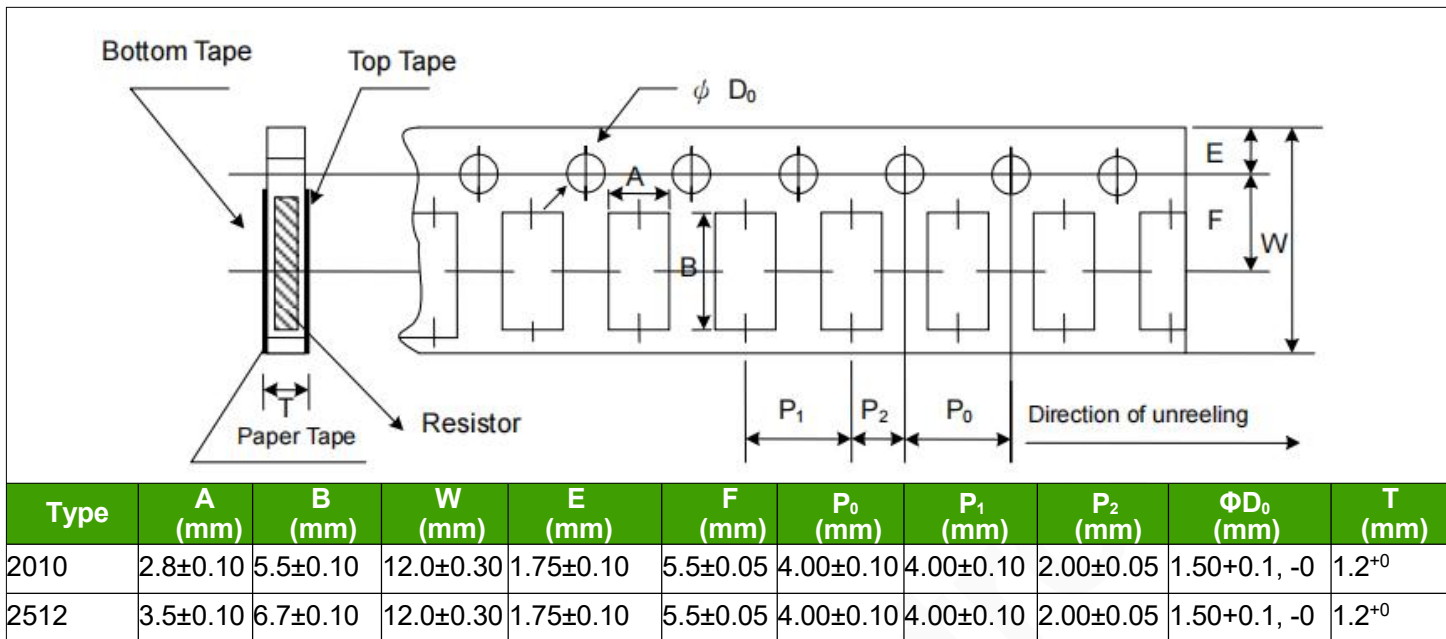


Type	Packaging Quantity		Tape Width	Reel Diameter	ΦA (mm)	ΦB (mm)	ΦC (mm)	W (mm)	T (mm)
0402	Paper	10K	8mm	7 inch	178.5±1.5	60+1/-0	13.0±0.2	9.0±0.5	12.5±0.5
		20K	8mm	10 inch	254±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
		40K	8mm	13 inch	330±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
0603 0805 1206 1210	Paper	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
2010 2512	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)
0402	0.65±0.10	1.15±0.10	8.0±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
0603	1.10±0.10	1.90±0.10	8.0±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
0805	1.60±0.10	2.40±0.20	8.0±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
1206	1.90±0.10	3.50±0.20	8.0±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
1210	2.90±0.10	3.50±0.20	8.0±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



■ 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



3 digits marking for E96:

■ Revision of curriculum vitae:

serial number	Contents of the modification	Modification Date	Reason for modification	releases	reviewer	auditor
1	Detailed update of specification content and layout	2024-07-29	Harmonization of formats	A0 to A1	YongKang Huang	YiWenLeng
2	Updated specification template	2025-05-25	standardised format	A1 to A2	YongKang Huang	YiWenLeng
3						