

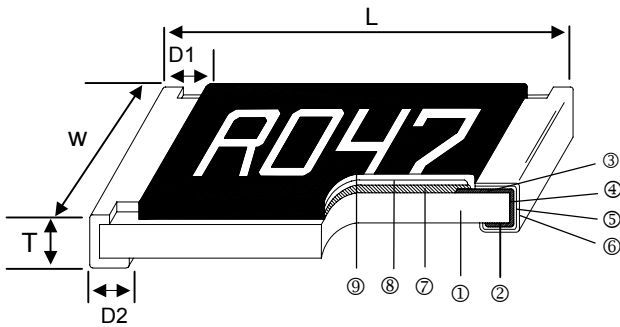
系列号	HoCS
修订日期	2020-03-06
版本号	Ho-A0



## Features

- 3 Watts power rating in 1 Watt size, 1225 package
- Low TCR of  $\pm 100$  PPM/ $^{\circ}$ C
- Resistance values from 1m to 1 ohm
- High purity alumina substrate for high power dissipation
- Long side terminations with higher power rating
- RoHS Compliance

## Construction



## Applications

- Power Management Applications
- Switching Power Supply
- Over Current Protection in Audio Applications
- Voltage Regulation Module (VRM)
- DC-DC Converter, Battery Pack, Charger, Adaptor
- Automotive Engine Control
- 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)	Weight (g) (1000pcs)
CS	0201	0.60 $\pm$ 0.03	0.30 $\pm$ 0.03	0.23 $\pm$ 0.05	0.12 $\pm$ 0.05	0.15 $\pm$ 0.05	0.18
CS	0402	1.00 $\pm$ 0.05	0.50 $\pm$ 0.05	0.32 $\pm$ 0.10	0.25 $\pm$ 0.10	0.20 $\pm$ 0.10	0.7
CS	0603	1.60 $\pm$ 0.10	0.80 $\pm$ 0.10	0.45 $\pm$ 0.10	0.30 $\pm$ 0.20	0.30 $\pm$ 0.20	1.99
CS	0805	2.00 $\pm$ 0.10	1.25 $\pm$ 0.10	0.55 $\pm$ 0.10	0.30 $\pm$ 0.20	0.40 $\pm$ 0.25	5.3
CS	1206	3.10 $\pm$ 0.10	1.55 $\pm$ 0.10	0.55 $\pm$ 0.10	0.50 $\pm$ 0.30	0.40 $\pm$ 0.25	8.82
CS	1210	3.10 $\pm$ 0.10	2.60 $\pm$ 0.15	0.55 $\pm$ 0.10	0.50 $\pm$ 0.30	0.50 $\pm$ 0.25	15.5
CS	2010	5.00 $\pm$ 0.10	2.50 $\pm$ 0.15	0.60 $\pm$ 0.15	0.60 $\pm$ 0.30	0.50 $\pm$ 0.25	27.03
CS	2512	6.35 $\pm$ 0.10	3.10 $\pm$ 0.15	0.60 $\pm$ 0.10	0.60 $\pm$ 0.30	0.55 $\pm$ 0.25	43.08
CS (2W)	2512 (10 - 99m $\Omega$ )	6.35 $\pm$ 0.20	3.15 $\pm$ 0.15	0.74 $\pm$ 0.10	0.60 $\pm$ 0.30	0.55 $\pm$ 0.25	53.08
CS (2W)	2512 (100 - 1000m $\Omega$ )	6.35 $\pm$ 0.20	3.15 $\pm$ 0.15	0.74 $\pm$ 0.10	0.60 $\pm$ 0.30	2.10 $\pm$ 0.10	53.08
CS	1225	3.10 $\pm$ 0.15	6.30 $\pm$ 0.15	0.90 $\pm$ 0.15	0.60 $\pm$ 0.30	0.80 $\pm$ 0.25	64.88
CS	3720	2.00 $\pm$ 0.20	3.75 $\pm$ 0.20	0.60 $\pm$ 0.10	0.40 $\pm$ 0.20	0.40 $\pm$ 0.20	19.96
CS	7520	2.00 $\pm$ 0.20	7.50 $\pm$ 0.30	0.60 $\pm$ 0.10	0.40 $\pm$ 0.20	0.40 $\pm$ 0.20	35.71
CS	0612	1.55 $\pm$ 0.10	3.10 $\pm$ 0.15	0.55 $\pm$ 0.10	0.30 $\pm$ 0.15	0.45 $\pm$ 0.15	10.19



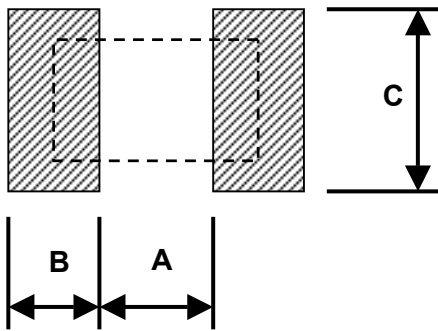
地址：深圳市龙华新区观澜大布头路南通邦高新产业园 A 栋 8 楼

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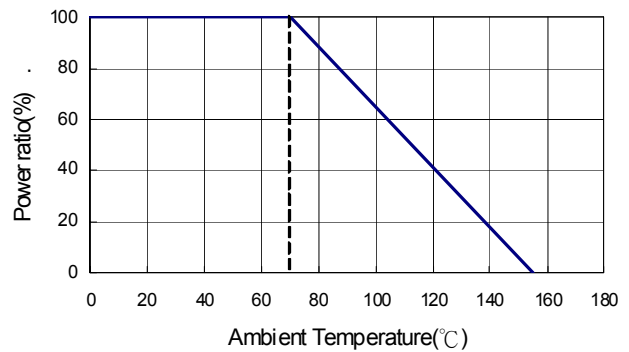
## Part Numbering

CS	0603	1/4W	R100	1%	±100
Product Type	Dimensions (L×W)	Power Rating	Resistance	Resistance Tolerance	TCR (PPM/°C)
	0201 0402 0603 0805 1206 1210 2010 2512 1225 3720 7520 0612	2W 1.5W 1W 3/4W 1/2W 1/4W 1/5W 1/8W	R010: 0.01Ω R100: 0.1Ω 1R00: 1Ω	±0.5% ±1% ±2% ±5%	±100 ±200 ±300 ±400 ±600 ±150 ±1000

## Recommend Land Pattern



## Derating Curve



Pad Layout (Except For CS12: Ultra High Power Rating Series)

Type	A (mm)	B (mm)	C (mm)
CS0201	0.25	0.30	0.40±0.2
CS0402	0.50	0.50	0.60±0.2
CS0603	0.80	1.00	0.90±0.2
CS0805	1.00	1.00	1.35±0.2
CS1206	2.00	1.15	1.70±0.2
CS1210	2.00	1.15	2.50±0.2
CS2110	3.60	1.40	2.50±0.2
CS2512	4.90	1.60	3.20±0.2
CS1225	1.20	2.00	7.00±0.2
CS3720	1.00	1.80	3.90±0.2
CS7520	1.00	1.80	7.60±0.2
CS0612	0.60	1.00	3.20±0.2

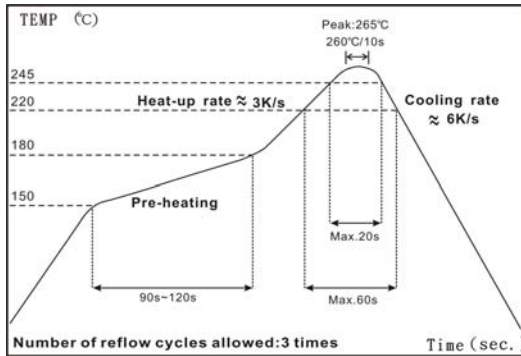
## Marking for 0603

Type	Code
1R0	1.000Ω
R10	0.100Ω
R01	0.010Ω
<u>102</u>	0.102Ω
<u>024</u>	0.024Ω

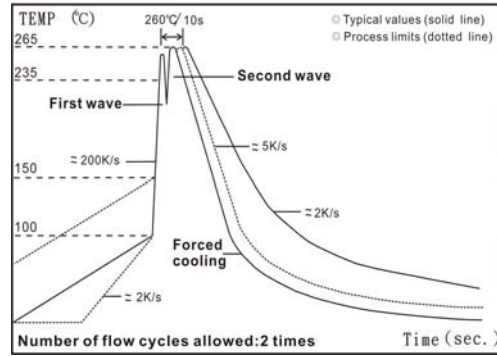
Pad Layout ( For CS12: Ultra High Power Rating Series)

Type	Resistance Range	A (mm)	B (mm)	C (mm)
CS2512	10~99 mΩ	4.9	1.6	3.2±0.2
CS2512	100~1000mΩ	1.0	3.55	3.2±0.2

### Soldering Condition



IR Reflow Soldering



Wave Soldering (Flow Soldering)

- (1) Time of IR reflow soldering at maximum temperature point 260°C : 10s
- (2) Time of wave soldering at maximum temperature point 260°C : 10s
- (3) Time of soldering iron at maximum temperature point 410°C : 5s

### Standard Electrical Specifications

Type	Item	Power Rating at 70°C	Operating Temp. Range	Max. Operating Current	Resistance Range (mΩ)				TCR (PPM/°C)
					±0.5%	±1%	±2%	±5%	
CS0201		1/20W	-55 ~ +155°C	0.70A	100 - 147	150 - 500	510 - 1000	±1000 ±600 ±300	
CS0402		1/16W		1.11A	50 - 100	102 - 500	510 - 1000	±400 ±300 ±200	
CS0603		1/10W		2.23A	20 - 50	51 - 100	102 - 500	510 - 1000	±600 ±400 ±300 ±200
CS0805		1/8W		2.50A	20 - 50	51 - 100	102 - 196	200 - 1000	±600 ±400 ±300 ±200
CS1206		1/4W		5.00A	10 - 20	21 - 50	51 - 91	100 - 1000	±600
CS1210		1/2W		7.07A	10 - 20	21 - 50			±400
CS2010		3/4W		8.66A	10 - 20	21 - 50			±300
CS12512		1W		10.0A	10 - 20	21 - 50			±200
CS1225		3W		31.6A	3 - 5	6 - 20	21 - 30	33 - 8000	±300 ±200 ±150 ±100
CS3720		1W		10.0A	10 - 18	20 - 500			±300 ±150
CS7520		2W		44.7A	—	1 - 4			±300
CS0612		1W		10.0A	10 - 27	30 - 91	100 - 499	500 - 1000	±600 ±300 ±200 ±100

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### High Power & Ultra High Power Rating Electrical Specifications

Type \ Item	Power Rating at 70°C	Operating Temp. Range	Max. Operating Current	Resistance Range (mΩ)				TCR (PPM/°C)
				±0.5%	±1%	±2%	±5%	
CS0402	1/8W	-55 ~ +155°C	1.56A	51 - 100	102 - 500	510 - 1000	±400 ±300 ±200	
CS0603	1/8W		1.98A					
CS0805	1/5W		2.21A					
CS1206	1/4W		7.07A	10 - 20	21 - 50	51 - 91	±600 ±400 ±300 ±200	
CS1210	3/4W		8.66A					
CS2010	1W		10.0A					
CS2512	1.5W		12.2A					
CS2512	*2W		14.1A					

\*: Ultra High Power

### Low TCR Electrical Specifications

Type \ Item	Power Rating at 70°C	Operating Temp. Range	Max. Operating Current	Resistance Range (mΩ)				TCR (PPM/°C)
				±0.5%	±1%	±2%	±5%	
CS0805	1/8W	-55 ~ +155°C	1.11A	100 - 1000				±100
CS1206	1/4W		1.58A	100 - 1000				±100
CS1210	1/2W		2.58A	75 - 1000				±100
CS2010	3/4W		3.87A	50 - 1000				±100
CS2512	1W		7.07A	20 - 1000				±100
CS2512	*2W		6.32A	50 - 1000				±100
CS3720	1W		3.16A	100 - 500				±100
CS7520	2W		6.32A	50 - 350				±100

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

## Environmental Characteristics

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

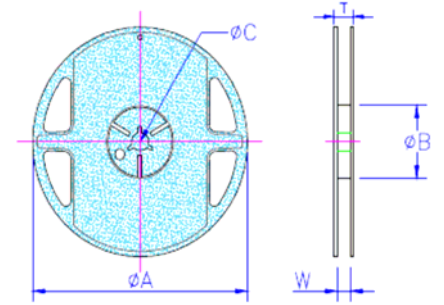
RCWV(Rated Continuous Working Voltage)= $\sqrt{P \cdot R}$  or Max. Operating Voltage whichever is lower.

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

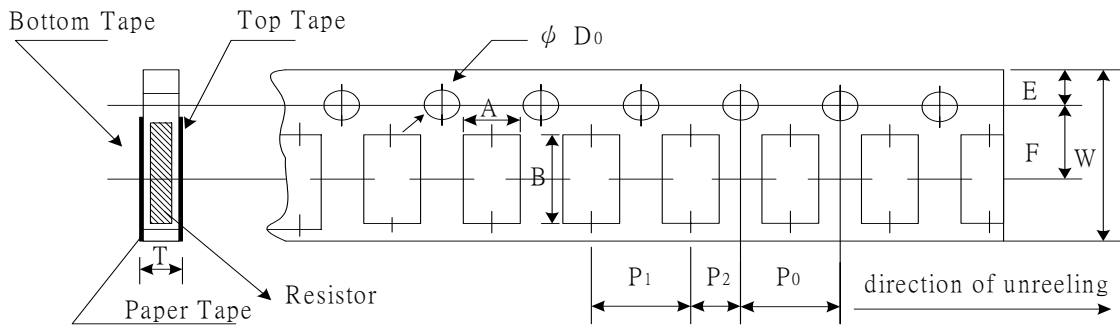
## ■Packaging

### Packaging Quantity & Reel Specifications

Type	ΦA (mm)	ΦB (mm)	ΦC (mm)	W (mm)	T (mm)	Paper Tape (EA)	Embossed Plastic Tape (EA)
CS0201	178.0±1.0	60.0+1.0	13.5±0.7	9.5±0.1	11.5±1.0	10,000	
CS0402	178.0±1.0	60.0+1.0	13.5±0.7	9.5±0.1	11.5±1.0	10,000	-
CS0603	178.0±1.0	60.0+1.0	13.5±0.7	9.5±0.1	11.5±1.0	5,000	-
CS0805	178.0±1.0	60.0+1.0	13.5±0.7	9.5±0.1	11.5±1.0	5,000	-
CS1206	178.0±1.0	60.0+1.0	13.5±0.7	9.5±0.1	11.5±1.0	5,000	-
CS1210	178.0±1.0	60.0+1.0	13.5±0.7	9.5±0.1	11.5±1.0	5,000	
CS2010	178.0±1.0	60.0+1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	4,000
CS2512	178.0±1.0	60.0+1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	4,000
CS2512 (2W)	178.0±1.0	60.0+1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	2,000
CS1225	178.0±1.0	60.0+1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	2,000
CS3720	178.0±1.0	60.0+1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	2,000
CS7520	178.0±1.0	60.0+1.0	13.5±0.7	17.5±1.0	19.5±1.0	-	2,000
CS0612	178.0±1.0	60.0+1.0	13.5±0.7	9.5±0.1	11.5±1.0	5,000	-

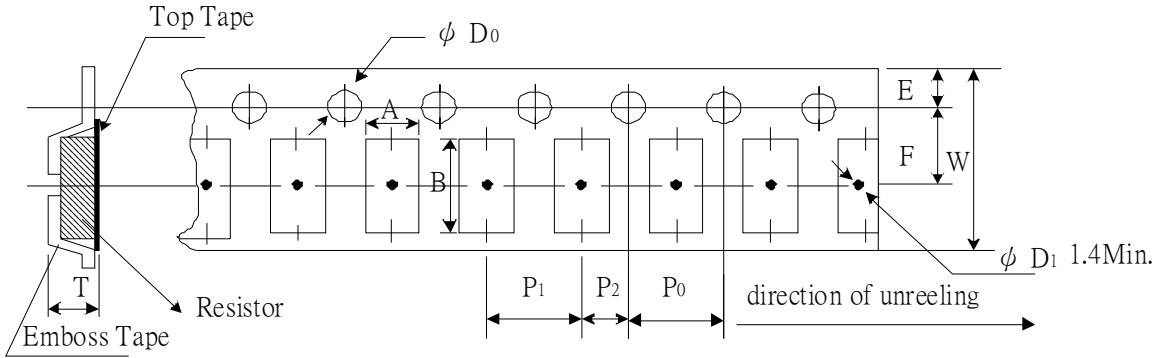


### Paper Tape Specifications



Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P0 (mm)	P1 (mm)	P2 (mm)	ΦD <sub>0</sub> (mm)	T (mm)
CS0201	0.38±0.05	0.68±0.05	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	0.42±0.20
CS0402	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
CS0603	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
CS0805	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
CS1206	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
CS1210	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
CS0612	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

Emboss Plastic Tape Specifications



Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P <sub>0</sub> (mm)	P <sub>1</sub> (mm)	P <sub>2</sub> (mm)	ΦD <sub>0</sub> (mm)	T (mm)
CS2010	2.80±0.10	5.50±0.10	12.0±0.30	1.75±0.10	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50+0.10	1.00±0.20
CS2512	3.50±0.10	6.70±0.10	12.0±0.30	1.75±0.10	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50+0.10	1.00±0.20
CS2512 (2W)	3.38±0.10	6.68±0.10	12.0±0.30	1.75±0.10	5.5±0.10	4.00±0.10	4.00±0.10	2.00±0.05	1.55+0.05	1.45±0.20
CS1225	3.38±0.10	6.68±0.10	12.0±0.30	1.75±0.10	5.5±0.10	4.00±0.10	4.00±0.10	2.00±0.05	1.55+0.05	1.45±0.20
CS3720	2.50±0.20	4.45±0.20	12.0±0.30	1.75±0.10	5.5±0.05	4.00 ±0.05	4.00±0.10	2.00±0.05	1.50+0.10	1.20 ±0.20
CS7520	2.50±0.20	8.30±0.20	16.0±0.30	1.75±0.10	7.8±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50+0.10	1.20 ±0.20