

Data Sheet

Customer: _____

Product: Thick Film Anti-Surge Chip Resistor - HSR Series _____

Size : 0603/0805/1206/1210/2010/2512 _____

Issued Date: 06-Oct.-2023 _____

Edition: Ver. 6 _____

Record of change

Date	Ver.	Description	Page
1-Apr.-2015	1	Revised available tolerance	2
15-Jul.-2016	2	Add surge duration curve	2
15-Mar.-2019	3	Revised power rating and available tolerance	
17-Sep.-2020	4	Revised power rating and available tolerance	
31-Mar.-2023	5	Revised subject	
06-Oct.-2023	6	Revised rating	2

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06-Oct.-2023	06-Oct.-2023	06-Oct.-2023	
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Thick Film Anti-Surge Chip Resistor

HSR Series

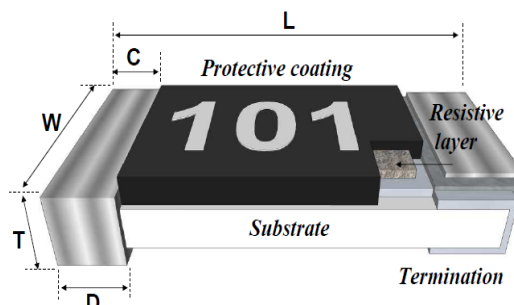
1. Features

- High reliability and compact size.
- Suitable for withstanding surge voltage.
- Suitable for lead free soldering.
- RoHS compliant & Halogen Free.

2. Applications

- Power supply.
- Automotive industry.
- Digital meter, Consumer electronics, M/B.
- LED Lighting.
- Industry control board.

3. Dimension and Construction



Size	L	W	C	D	T
0603	1.60±0.10	0.80±0.10	0.30±0.20	0.30±0.20	0.45±0.10
0805	2.00±0.10	1.25±0.10	0.40±0.20	0.40±0.20	0.50±0.10
1206	3.10±0.10	1.60±0.10	0.50±0.25	0.50±0.25	0.55±0.10
1210	3.10±0.10	2.60±0.10	0.50±0.25	0.50±0.25	0.55±0.10
2010	5.00±0.20	2.50±0.20	0.60±0.25	0.60±0.25	0.60±0.10
2512	6.40±0.20	3.20±0.20	0.60±0.25	0.90±0.25	0.60±0.15

Unit : mm

■ Part Numbering

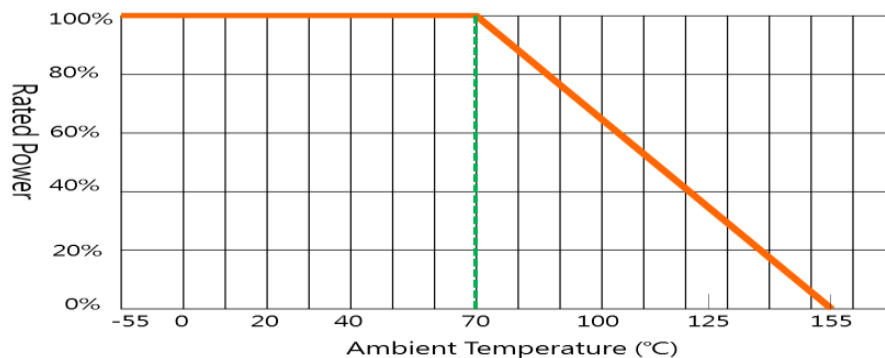
<u>HSR</u>	<u>0805</u>	<u>J</u>	<u>R</u>	<u>H</u>	<u>47KR</u>
Type	Size	Tolerance	Packing	-	Resistance(Ω) Resistance Value
	0603	J : ± 5%	R : Paper tape-5Kpcs	Standard	
	0805	K : ±10%	K : Plastic tape-4Kpcs	H	For example
	1206	L : ±15%		High Power	100R, 1KR, 10KR
	1210				100KR, 1MR
	2010	M : ±20%			
	2512				

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4.Power Derating Curve

Operating Temperature Range: -55 to +155 deg.C



5.Rating

Standard

Type	Size	Power Rating at 70°C	Max. RCWV	Max. Overload Voltage	Resistance Tolerance	Temperature Coefficient (ppm/°C)	Resistance Range		Standard Resistance Values
							Min.	Max.	
HSR0603	0603	1/10W	50V	100V	±5%(J) ±10%(K) ±15%(L) ±20%(M)	±100	1Ω	1MΩ	E24
HSR0805	0805	1/8W	150V	300V					
HSR1206	1206	1/4W	200V	400V					
HSR1210	1210	1/3W	200V	400V					
HSR2010	2010	3/4W	200V	400V					
HSR2512	2512	1W	200V	400V					

Power Enhance

Type	Size	Power Rating at 70°C	Max. RCWV	Max. Overload Voltage	Resistance Tolerance	Temperature Coefficient (ppm/°C)	Resistance Range		Standard Resistance Values
							Min.	Max.	
HSR0805	0805	1/4W	150V	300V	±5%(J)	±100	1Ω	1MΩ	E24
HSR1206	1206	1/3W	200V	400V	±10%(K)				
					±15%(L)				
					±20%(M)				

Application Note : $RCWV = \sqrt{P \times R}$ or Max. RCWV listed above, whichever is lower.

RCWV : Working Voltage (V) , P : Rated Power (W) , R : Resistance Value (Ω)

Solder-pad and trace size influences should be evaluated, and board surface temperature should keep not exceed 105°C when full rated power applied.

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6. Marking/Soldering/Surge

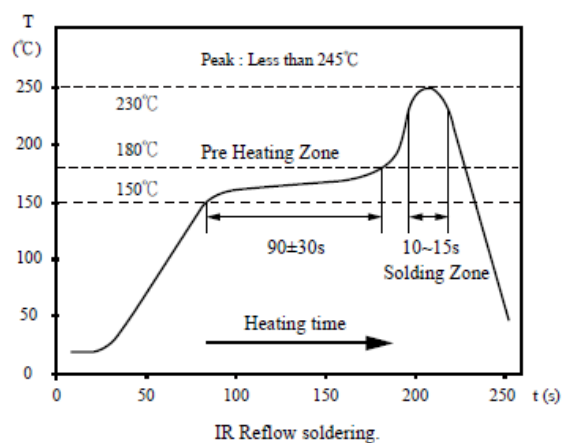
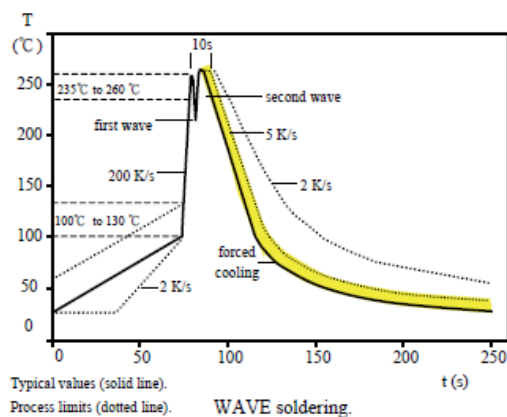
Resistance value identify :

E24 $\pm 5\%$: 3 Digits marking with underline to identify the resistance value 0603/0805/1206/1210/2010/2512



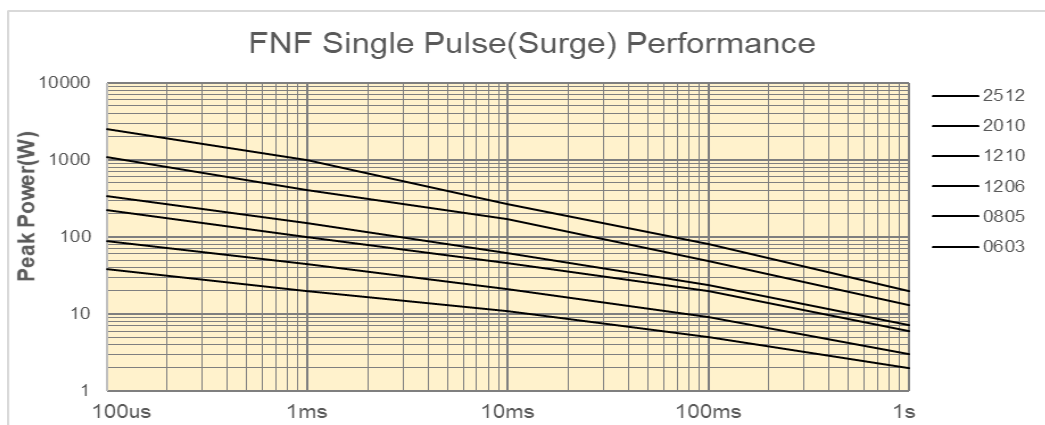
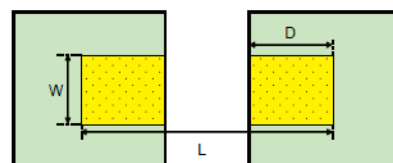
$$301 \rightarrow 30 \times 10^1 = 300 \Omega$$

Soldering Reference :



Recommend Solder Pad Dimensions : (Unit:mm)

Type	W	D	L
HSR0603	0.90	1.00	3.00
HSR0805	1.30	1.15	3.50
HSR1206	1.80	1.30	4.70
HSR1210	3.00	1.30	4.70
HSR2010	3.00	1.50	6.80
HSR2512	3.70	1.60	7.60



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7. Reliability Performance

Test Item	Specification	Test Method
DC Resistance	J : $\pm 5\%$ K : $\pm 10\%$ L : $\pm 15\%$ M : $\pm 20\%$	IEC 60115-1 / JIS C 5201-1 , Clause 4.5 Measure the resistance Value.
Resistance to Solder Heat	$\Delta R \leq \pm(1\% + 0.1\Omega)$ No mechanical damage.	IEC 60115-1, Clause 4.18 Solder dipping @ $260^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for 10sec. ± 1 sec.
Solder Ability	Over 95% of termination must be covered with solder.	IEC 60115-1, Clause 4.17 After immersing flux, dip in the $245 \pm 2^{\circ}\text{C}$ molten solder bath for 3 ± 0.5 sec.
Board Flex	$\Delta R \leq \pm(1\% + 0.1\Omega)$ No mechanical damage.	IEC 60115-1, Clause 4.33 Resistance change after bended on the 90mm PCB. Bending 2mm
Short Time Overload	$\Delta R \leq \pm(2\% + 0.1\Omega)$	IEC 60115-1, Clause 4.13 $2.5 \times$ Rated voltage for 5 seconds
Temperature Cycle	$\Delta R \leq \pm(1\% + 0.05\Omega)$ No mechanical damage.	IEC 60115-1, Clause 4.19 Repeat 5 cycles as follow. $-55^{\circ}\text{C}(30\text{min}) \rightarrow 25^{\circ}\text{C}(2 \sim 3\text{min}) \rightarrow 155^{\circ}\text{C}(30\text{min}) \rightarrow 25^{\circ}\text{C}(2 \sim 3\text{min})$
Load Life Humidity	$\Delta R \leq \pm(3\% + 0.1\Omega)$	IEC 60115-1, Clause 4.24 $40 \pm 2^{\circ}\text{C}$ with relative humidity 90% ~ 95%, rated voltage for 1.5 hours ON 30 minutes OFF. Cycle repeated 1000 hours.
Temperature Coefficient of Resistance (TCR)	Within the spec.	IEC 60115-1, Clause 4.8 $\text{TCR}(\text{ppm}/^{\circ}\text{C}) = \frac{(R_2 - R_1)/R_1 \times 1}{(T_2 - T_1)} \times 10^6$ Test temperature : $25^{\circ}\text{C} \sim +155^{\circ}\text{C}$
Load Life	$\Delta R \leq \pm(3\% + 0.1\Omega)$	IEC 60115-1, Clause 4.25 Rated voltage for 1.5 hours for followed by a pause 0.5 hour at $70 \pm 2^{\circ}\text{C}$. Cycle repeated 1000 hours.
Insulation Resistance	Between termination and coating must over 1000M Ω	IEC 60115-1, Clause 4.6 Test voltage : $100 \pm 15\text{V}$

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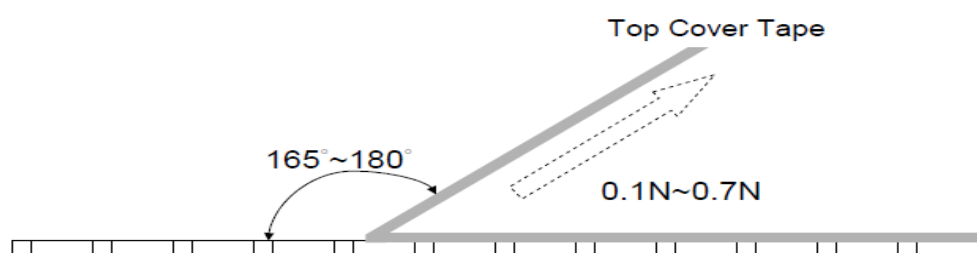
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8. PACKAGING

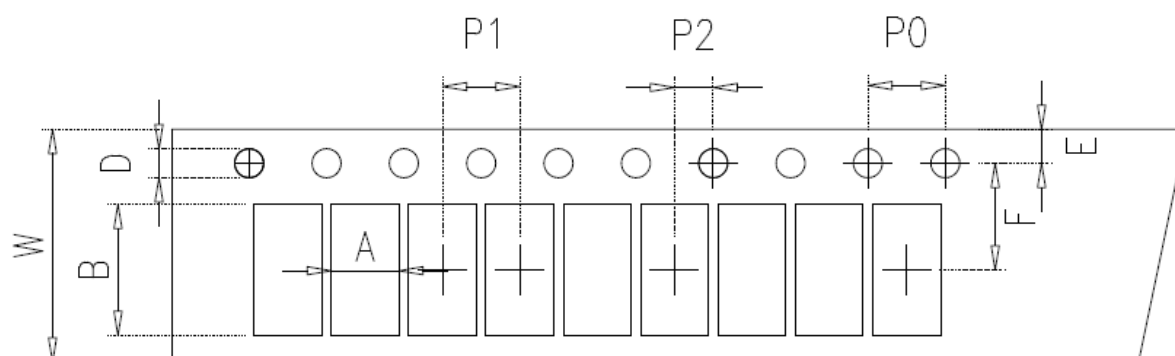
8.1 Peel Strength of Top Cover Tape

The peel speed shall be about 300 mm/min

The peel force of top cover tape shall between 0.1 to 0.7N



8.2 Tape Packaging Dimensions



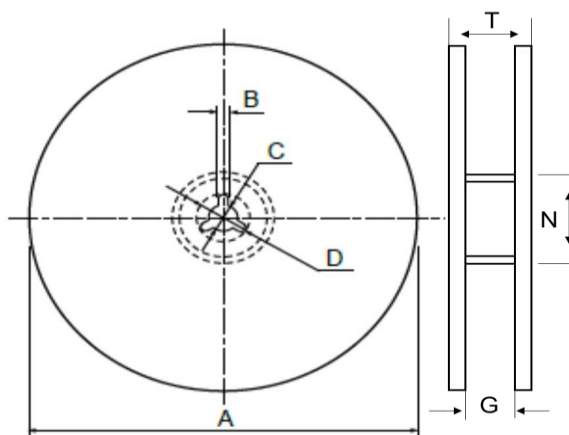
Size	A	B	W	F	E	P1	P2	P0	D
0603	1.10±0.20	1.90±0.20	8.00±0.30	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50+0.10/-0
0805	1.65±0.20	2.40±0.20	8.00±0.30	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50+0.10/-0
1206	2.00±0.20	3.60±0.20	8.00±0.30	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50+0.10/-0
1210	3.00±0.20	3.60±0.20	8.00±0.30	3.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50+0.10/-0
2010	2.80±0.20	5.50±0.20	12.00±0.30	5.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50+0.10/-0
2512	3.50±0.20	6.70±0.20	12.00±0.30	5.50±0.05	1.75±0.10	4.00±0.10	2.00±0.05	4.00±0.10	1.50+0.10/-0

unit:mm

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8.3 Reel Dimensions



Size	Packaging Q'ty	A	N	C	D	B	G	T
0603	5kpcs/Reel	178.0±2.0	60.0±0.5	13.0±0.5	20(Min.)	2.0±0.5	10.0±1.5	14.9max.
0805	10kpcs/Reel	254.0±2.0	100.0±1.0	13.5±0.5	20(Min.)	2.0±0.5	10.0±1.5	14.9max.
1206	20kpcs/Reel	330.0±2.0	100.0±1.0	13.5±0.5	20(Min.)	2.0±0.5	10.0±1.5	14.9max.
2010	4kpcs/Reel	178.0±2.0	60.0±0.5	13.0±0.5	20(Min.)	2.0±0.5	13.8±1.5	16.7max.
2512	8kpcs/Reel	254.0±2.0	100.0±0.5	13.5±0.5	20(Min.)	2.0±0.5	13.8±1.5	20.0max.
	16kpcs/Reel	330.0±2.0	100.0±1.0	13.5±0.5	20(Min.)	2.0±0.5	13.8±1.5	20.0max.

unit:mm

9. Storage & Handling

... Products are recommended to be used up within one year as ensured shelf life.

Check solder ability in case shelf life extension is needed.

... To store products with following condition:

Temperature:5 to 40℃ ; Humidity: 20 to 70% relative humidity.