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Data Sheet

Customer: _____

Product: Thick Film Anti-Surge Chip Resistor _____

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

Issued Date: 30-March-2023 _____

Edition: Ver. 1 _____

Record of change

Date	Ver.	Description	Page

VENDOR :

HITANO ENTERPRISE CORP.

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MAKER :

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33860, Taiwan, R.O.C



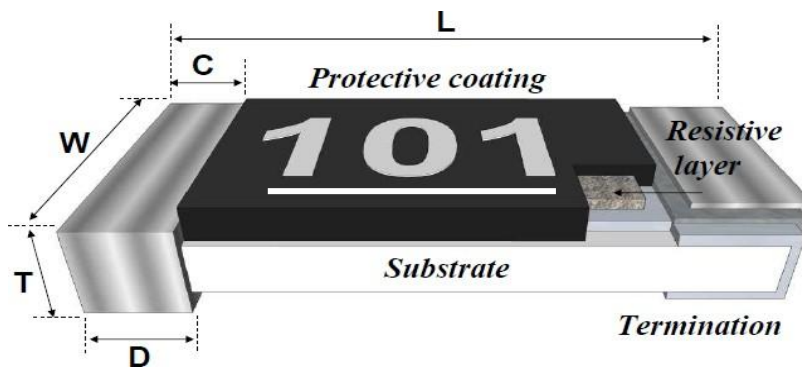
1. Features

- High reliability and compact size.
- Suitable for withstanding surge voltage.
- Suitable for lead free soldering.
- RoHS compliant & Halogen Free.
- Meet AEC-Q200

2. Applications

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

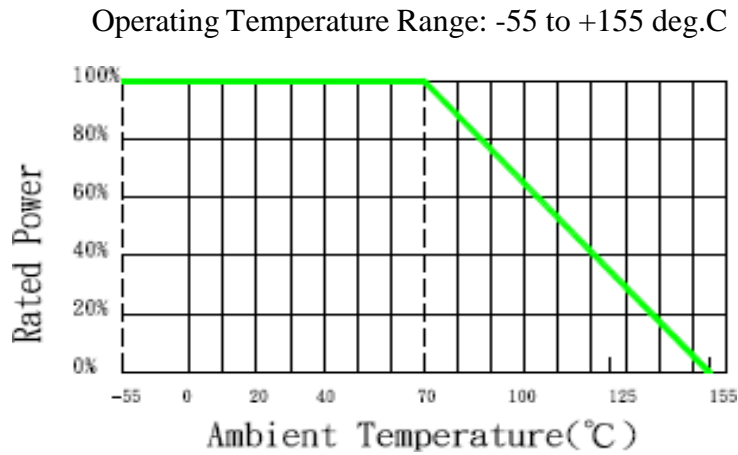
3. Dimension and Construction



Unit: mm

Type	L	W	C	D	T
HFNF03	1.60±0.10	0.80±0.10	0.30±0.20	0.30±0.20	0.45±0.10
HFNF05	2.00±0.10	1.25±0.10	0.40±0.20	0.40±0.20	0.50±0.10
HFNF06	3.10±0.10	1.60±0.10	0.50±0.25	0.50±0.25	0.55±0.10
HFNF12	3.10±0.10	2.60±0.10	0.50±0.25	0.50±0.25	0.55±0.10
HFNF20	5.00±0.20	2.50±0.20	0.60±0.25	0.60±0.25	0.60±0.10
HFNF25	6.40±0.20	3.20±0.20	0.60±0.25	0.90±0.25	0.60±0.15

4. Power Derating Curve



5. Rating

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.	
HFNF03	0603	1/10W	50V	100V	±5%(J) ±10%(K) ±15%(L) ±20%(M)	±100	1Ω	1MΩ	E24
HFNF05	0805	1/8W	150V	300V					
HFNF06	1206	1/4W	200V	400V					
HFNF12	1210	1/3W	200V	400V					
HFNF20	2010	3/4W	200V	400V					
HFNF25	2512	1W	200V	400V					

Note: $RCWV = (P \times R)^{1/2}$ or Max. RCWV listed above, whichever is lower. RCWV:

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

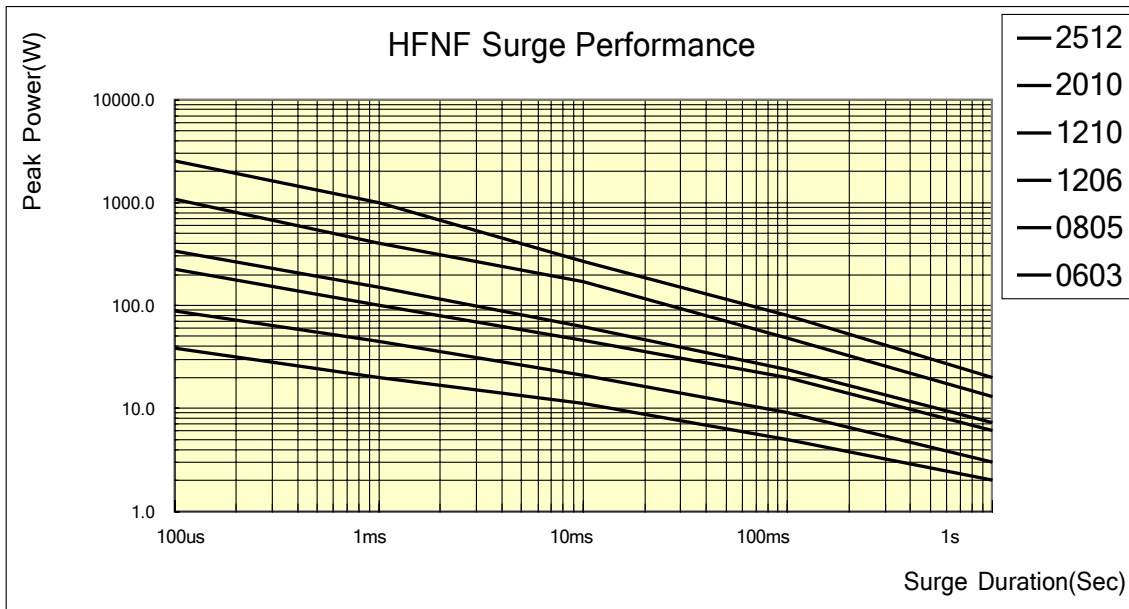
6.Part Number

Type	Size	Tolerance	Packing	Watt	R Value (GM)	Special Code
HFNE	03 :0603	J :±5%	Paper Tape : 0603.0805 1206.1210 I : 5Kpcs V : 10Kpcs W : 20Kpcs Plastic Tape : 2010.2512 P : 4Kpcs X : 8Kpcs Y : 16Kpcs	: As Rating Info	XXX 3 digit	-M : Meet AEC-Q200
	05 :0805	K :±10%				
	06 :1206	L :±15%				
	12 :1210	M :±20%				
	20 :2010					
	25 :2512					

Example:

HFNF25JP-104-M

→2512 size, tolerance 5%, plastic tape, 1W, 1 MΩ, Aec-Q200.

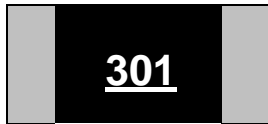


7. Marking/Soldering

Resistance value identify :

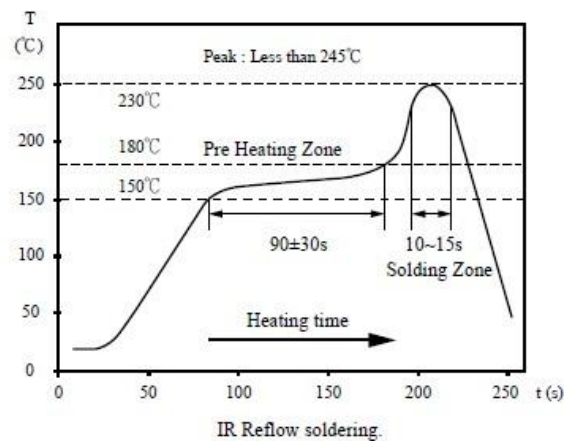
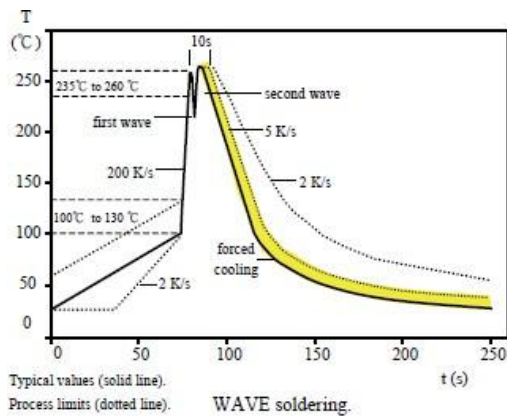
E24 ±5%: 3 Digits marking with underline to identify the resistance value

0603/0805/1206/1210/2010/2512

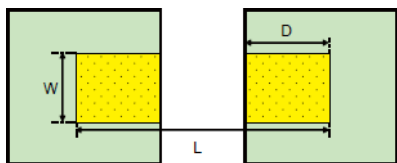


301 → $30 \times 10^1 = 300 \Omega$

Soldering Reference :



Recommend Solder Pad Dimensions :



Type	W	D	L
HFNF03	0.90	1.00	3.00
HFNF05	1.30	1.15	3.50
HFNF06	1.80	1.30	4.70
HFNF12	3.00	1.30	4.70
HFNF20	3.00	1.50	6.80
HFNF25	3.70	1.60	7.60

Unit:mm

8. Reliability Performance (AEC-Q200)

Test Item	Specification	Test Method (AEC-Q200. IEC 60115)
DC Resistance	J: $\pm 5\%$ K: $\pm 10\%$ L: $\pm 15\%$ M: $\pm 20\%$	AEC-Q200 TABLE 7.1 IEC 60115-1 / JIS C 5201-1 , Clause 4.5 Measure the resistance Value.
High Temperature Exposure (Storage)	$\Delta R \leq \pm(3\%+0.1\Omega)$	AEC-Q200 TABLE 7.3 1000 hrs. @ T=125°C. Unpowered. Measurement at 24 ± 2 hours after test conclusion.
Temperature Cycling	$\Delta R \leq \pm(1\%+0.1\Omega)$ No mechanical damage.	AEC-Q200 TABLE 7.4 1000 Cycles (-55°C to +125°C). Measurement at 24 ± 2 hours after test conclusion.
Moisture Resistance	$\Delta R \leq \pm(1\%+0.1\Omega)$	AEC-Q200 TABLE 7.6 Test 65°C/80~100%RH/10Cycles. Measurement at 24 ± 2 hours after test conclusion. (t=24hrs/cycle).
Biased Humidity	$\Delta R \leq \pm(5\%+0.1\Omega)$	AEC-Q200 TABLE 7.7 1000 hours 85°C/85%RH. 10% of operating power. Measurement at 24 ± 2 hours after test conclusion.
Operational Life	$\Delta R \leq \pm(5\%+0.1\Omega)$	AEC-Q200 TABLE 7.8 Test 1000hr @ TA=125°C at specified rated power. Measurement at 24 ± 2 hours after test conclusion.
External Visual	No visual damage and refer PDC marking code.	AEC-Q200 TABLE 7.9 Inspect device construction, marking and workmanship.
Physical Dimension	Within the spec.	AEC-Q200 TABLE 7.10 Verify physical dimensions to the applicable device detail specification.
Mechanical Shock	Within product specification tolerance and no visible damage.	AEC-Q200 TABLE 7.13 Test Peak value:100g's,Wave:Hail-sine, Duration:6ms,Velocity:12.3ft/sec.

Test Item	Specification	Test Method (AEC-Q200. IEC 60115)
Vibration	No mechanical damage.	AEC-Q200 TABLE 7.14 5 g's for 20 min., 12 cycles each of 3 orientations. Test from 10-2000 Hz.
Resistance to Solder Heat	$\Delta R \leq \pm(1\% + 0.1\Omega)$ No mechanical damage.	AEC-Q200 TABLE 7.15 Solder dipping @ 270°C ±5°C for 10sec. ±1sec.
Thermal Shock	$\Delta R \leq \pm(1\% + 0.1\Omega)$ No mechanical damage.	AEC-Q200 TABLE 7.16 -55 to 155°C / dwell time 15min/ Max transfer time 20sec/ 300cycles.
ESD	$\Delta R \leq \pm(3\% + 0.1\Omega)$	AEC-Q200-002 Test contact min. 1KV.
Solder Ability	Over 95% of termination must be covered with solder.	AEC-Q200 TABLE 7.18 a) Baking 155°C 4H, dipping 235°C 5s b) Steam 1H, dipping 215°C 5s c) Steam 1H, dipping 260°C 7s
Flammability	Refer UL-94.	AEC-Q200 TABLE 7.20 UL-94 V-0 or V-1 are acceptable
Board Flex	$\Delta R \leq \pm(1\% + 0.1\Omega)$ No mechanical damage.	AEC-Q200 TABLE 7.21 Bending 2mm 2512.2010.1210.1206, 3mm 0805.0603.
Terminal Strength	No mechanical damage	AEC-Q200 TABLE 7.22 Force 1 Kg for 60 seconds.
Short Time Overload	$\Delta R \leq \pm(2\% + 0.1\Omega)$	IEC 60115-1, Clause 4.13 5 × Rated power for 5 seconds
Load Life Humidity	$\Delta R \leq \pm(3\% + 0.1\Omega)$	IEC 60115-1, Clause 4.24 40±2°C with relative humidity 90% ~ 95% D.C. rated voltage for 1.5 hours ON 30 minutes OFF. Cycle repeated 1000 hours.
Test Item	Specification	Test Method (AEC-Q200. IEC 60115)

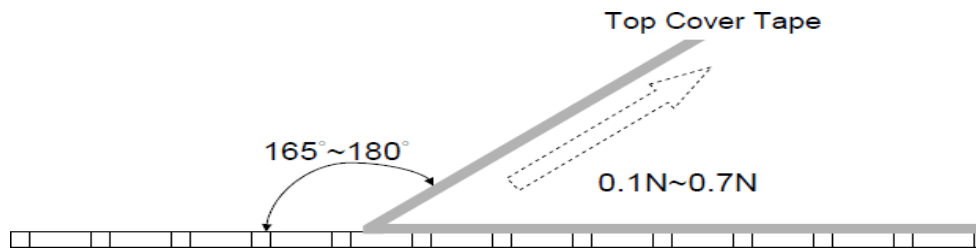
Temperature Coefficient of Resistance (TCR)	Within the spec.	IEC 60115-1, Clause 4.8 $T_1 \quad T_2$ Test temperature: $25^{\circ}\text{C} \sim -55^{\circ}\text{C}$ $25^{\circ}\text{C} \sim +155^{\circ}\text{C}$ $\text{TCR}(\text{ppm}/^{\circ}\text{C}) =$ $(R_2 - R_1) / R_1 \times 1 / (T_2 - T_1) \times 10^6$
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 $1000\text{M}\Omega$	IEC 60115-1, Clause 4.6 Test voltage: $100 \pm 15\text{V}$

9. PACKAGING

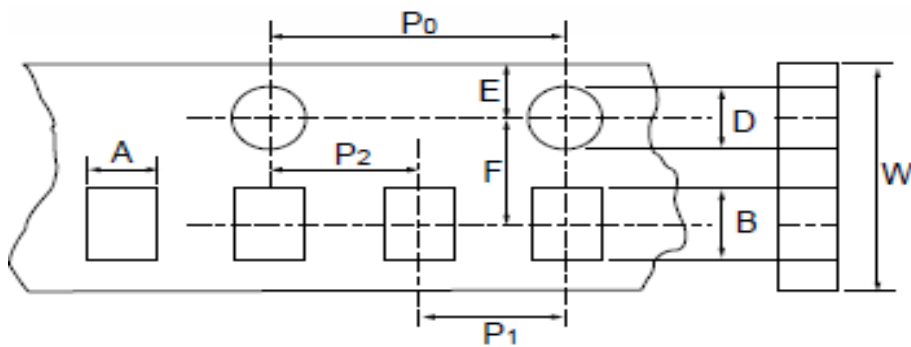
9.1 Peel Strength of Top Cover Tape

The peel speed shall be about 300 mm/min

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



9.2 Tape Packaging Dimensions

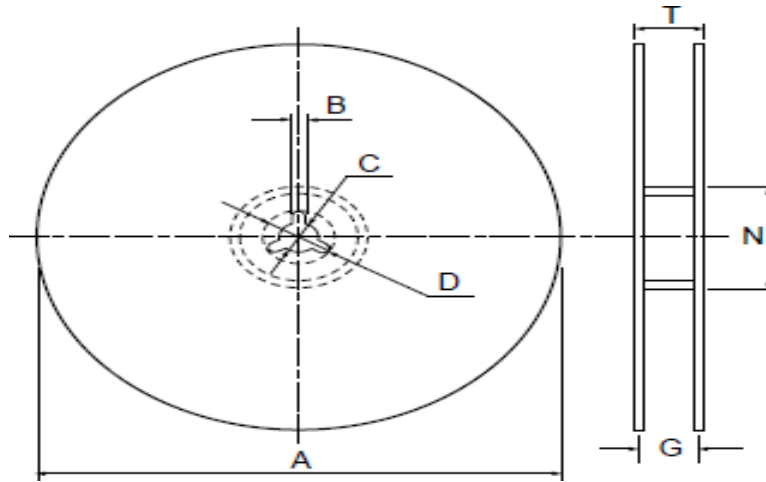


- Accumulated dimensional tolerance $40\pm 0.2\text{mm}$

unit:mm

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

9.3 Reel Dimensions



unit:mm

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.
1210	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.
2010	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.
2512	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.

10. 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°C; Humidity: 20 to 70% relative humidity.

Precaution for use :

The AEC-Q200 series resistors is mainly used on general automotive equipment without safety considerations.

Please contact our company in advanced if you intend to use resistor for designing the equipment which may damage itself and the safety of third party. If necessary, please consider to add the protect circuit in devising process and obtaining fully safety evaluation. The contents of the acknowledgment is only used for our parent company, marketing subsidiaries and official marketing agents who purchase our products. Not applicable for the other nonofficial channels.

**** If you have any request not find from above datas, please contact our sales for further information, we may do our best to meet your request.**