



# HITANO ENTERPRISE CORP.

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## Data Sheet

Customer: \_\_\_\_\_

Product: Metal Strip Type Halogen Free Current Sensing Resistors

Size : 1206/2512

Issued Date: 30-March-2023

Edition: Ver. 1

### Record of change

Date	Ver.	Description	Page

#### VENDOR :

**HITANO ENTERPRISE CORP.**

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#### MAKER :

**Prosperity Dielectric Co., Ltd.**

No.220-1, Sec. 2, Nanshan Rd., Lujhu, Taoyuan  
33860, Taiwan, R.O.C



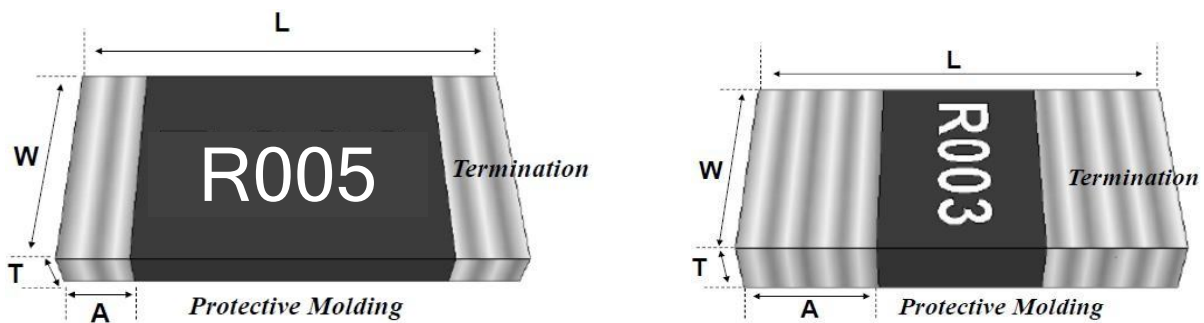
### 1. Features

- High power rating and low TCR.
- Low resistance and high precision (1%). Low HEMF type  $\cong 3\mu V/^{\circ}C$ .
- Low inductance design, less than 1.0nH available.
- Excellent reliability and suitable cost.
- Suitable for lead free soldering.
- High precision trimming implement.
- RoHS compliant & Halogen Free.

### 2.Applications

- Switching model power supply.
- Battery pack.
- Notebook, Tablet PC
- Test Instrument.
- Power Amplifier.

### 3.Dimension and Construction



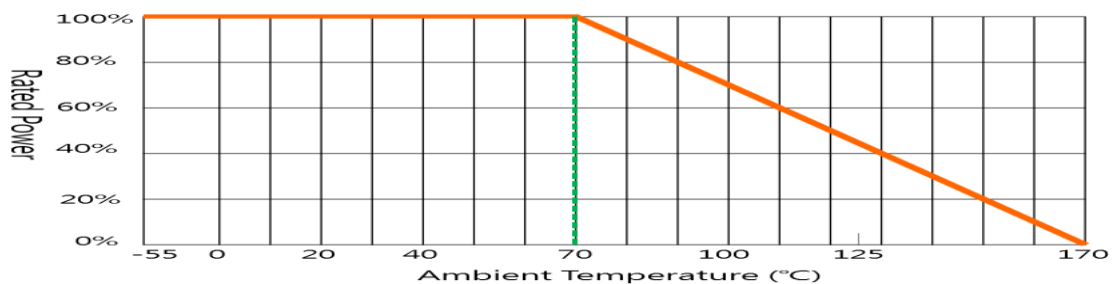
Item	Protective Molding	Resistive Element	Internal Terminal	External Terminal
Material	Resin	Alloy Metal	Copper	Solder

Unit: mm

HFMF	L	W	T	a
1206 1~2mΩ	3.20±0.20	1.70±0.20	0.70±0.20	1.10±0.25
1206 3~30mΩ	3.10±0.20	1.65±0.20	0.60±0.20	0.60±0.20
2512 4~100mΩ	6.20±0.20	3.25±0.20	0.60±0.20	0.80±0.20
2512 1~3 mΩ	6.40±0.20	3.25±0.20	0.75±0.20	2.00±0.20
2512 3W 4~100mΩ	6.20±0.20	3.25±0.20	0.65±0.20	0.80±0.20
2512 3W 2~3 mΩ	6.40±0.20	3.25±0.20	0.75±0.20	2.00±0.20
2512 3W 0.5~1mΩ	6.40±0.20	3.25±0.20	0.80±0.20	2.00±0.20

### 4.Power Derating Curve

Operating Temperature Range: -55 to +170°C



## 5.Rating

Table A.

Rating Type	Tolerance (%)	Rating 70°C	Max. Working Current (Voltage)*	Max. Overload Current (Voltage)*	Alloy Type	Temperature coefficient of Resistance (ppm/°C)**	Resistance (mΩ)
<b>HFMF06 (1206)</b>	<b>±1%(F) ±2%(G) ±5%(J)</b>	<b>0.5W</b>	22.4A (111mV)	50.0A (250mV)	Low EMF	<b>±75</b>	<b>1,2</b>
						<b>±70</b>	<b>3,4,5,6,7,8,9, 10,15,20,25</b>
		<b>1W</b>	10.0A (111mV)	22.4A (250mV)	Standard	<b>±50</b>	<b>5,10,15,18 20,25,30</b>
						31.6A (158mV)	70.7A (354mV)
			<b>±70</b>	<b>3,4,5,6,7,8,9, 10,15,20,25</b>			
			14.1A (173mV)	31.6A (387mV)	Standard	<b>±50</b>	<b>5,10,15 18,20,25,30</b>
<b>HFMF25 (2512)</b>	<b>±0.5% (D)***</b>	<b>1W</b>				31.6A (158mV)	70.7A (354mV)
			18.3A (469mV)	40.8A (1049mV)	Standard		
<b>2W</b>		44.7A (224mV)				100A (500mV)	Low EMF
			25.8A (548mV)	57.7A (1225mV)	Standard		

Note:

- (i)  $E = \sqrt{P * R}$  or Max. Working Voltage whichever is lower.
- (ii) E: Working Voltage(V), P: Rated Power (W), R: Resistance Value(Ω)
- (iii) Please keep the surface temperature do not exceed 105°C when operating.
- (iv) \* : Related number are depend on specific items only.
- (v) \*\* : TCR Hot (+25~+155°C). \*\*\* : ±0.5% available resistance with underline. Ex. 10
- (vi) R-value might be variance depend on soldering conditions and please consider this influence before use milli-ohm resistors, and strongly suggest use the recommend solder pad to design your circuits.
- (vii) Max. working & Max. overload current details please refer Annex. 1.

Table B.

Rating Type	Tolerance (%)	Rating 70°C	Max. Working Current (Voltage)*	Max. Overload Current (Voltage)*	Alloy Type	Temperature coefficient of Resistance (ppm/°C)**	Resistance (mΩ)		
HFMF25 (2512)	±1%(F) ±2%(G) ±5%(J)	3W	77.5A (47mV)	173.2A (106mV)	Low EMF	±70	0.5,0.75		
			54.8A (245mV)	122.5A (548mV)		±70	1,2,2.5,3,4,5 6,7,8,9,10		
						±50	20		
		3W			24.5A (812mV)	54.8A (1817mV)	Standard	±70	5,6,8,10
								±50	12,14,15,16,18,20 25,30,33,35,40,50 60,75,80,100

Note:

- (i)  $E = \sqrt{P * R}$  or Max. Working Voltage whichever is lower.
- (ii) E: Working Voltage(V), P: Rated Power (W), R: Resistance Value(Ω)
- (iii) Please keep the surface temperature do not exceed 105°C when operating.
- (iv) \* : Related number are depend on specific items only.
- (v) \*\* : TCR Hot (+25~+155°C). \*\*\* : ±0.5% available items with underline. Ex. 10
- (vi) R-value might be variance depend on soldering conditions and please consider this influence before use milli-ohm resistors, and strongly suggest use the recommend solder pad to design your circuits.
- (vii) Max. working &. Max. overload current details please refer Annex. 1.

### 6.Part Number

Type	Size	Tolerance	Packing	Watt	Value	TCR	Special Code
<b>HFMF</b>	<b>06</b> :1206 <b>25</b> :2512	<b>D</b> :±0.5% <b>E</b> :±1% <b>G</b> :±2% <b>J</b> :±5%	<b>T</b> :Paper Tape 4Kpcs (For 1206) <b>P</b> :Plastic Tape 4Kpcs (For 2512)	<b>E</b> : 1/2W <b>H</b> : 1W <b>J</b> : 2W <b>K</b> : 3W	<b>XXXX</b> 4 digits Jumper 000_ _ means blank	<b>∓</b> : As Rating table <b>X</b> : Use for 2512 ≅ 3m	AEC-Q200 & Anti-Sulfur Standard <b>LHM</b> Low EMF <b>BHM</b>

※ Anti-sulfur criteria:  $\Delta R \leq 1\%$ .

ASTM B-809, 90°C, 1000H & EIA-977, 105°C, 750H Compliant.

Example:

#### **HFMF25FPKR010-BHM**

→Metal strip, 2512 size, ±1%, plastic tape, 3W, 10mΩ, low emf, AEC-Q200

#### **HFMF25FPKR2L5XBHM**

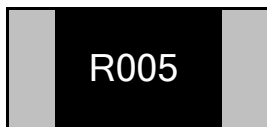
→Metal strip, 2512 size, ±1%, plastic tape, 3W, 2.5mΩ, low emf, AEC-Q200

### 7.Marking/Soldering Reference

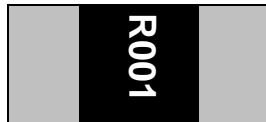
HFMF 1206/2512

TOP: Marking. (4 Digits marking to identify the resistance value.)

“R005”=5mΩ



2512 “R001”=1mΩ



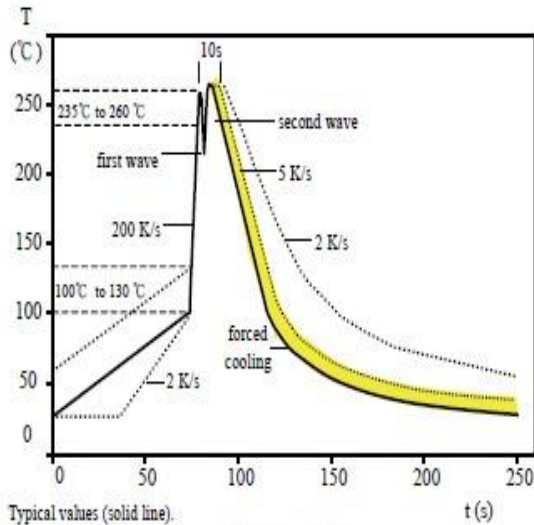
1206 “1”=1mΩ



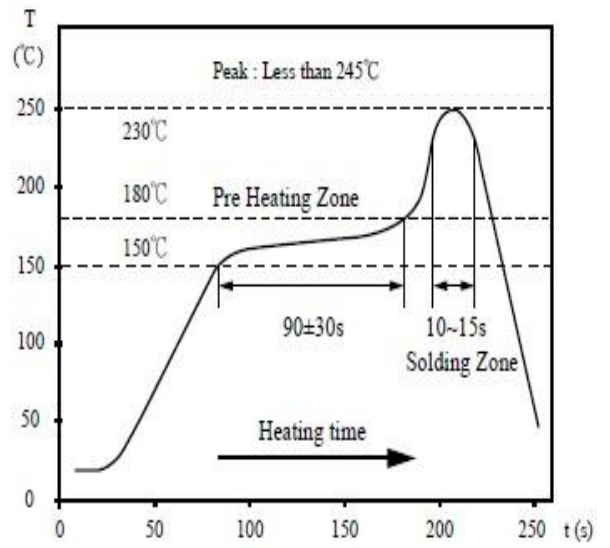
Remarks.

2512 “L50”=0.5mΩ    2512“L75”=0.75 mΩ    2512“2L50”=2.5 mΩ

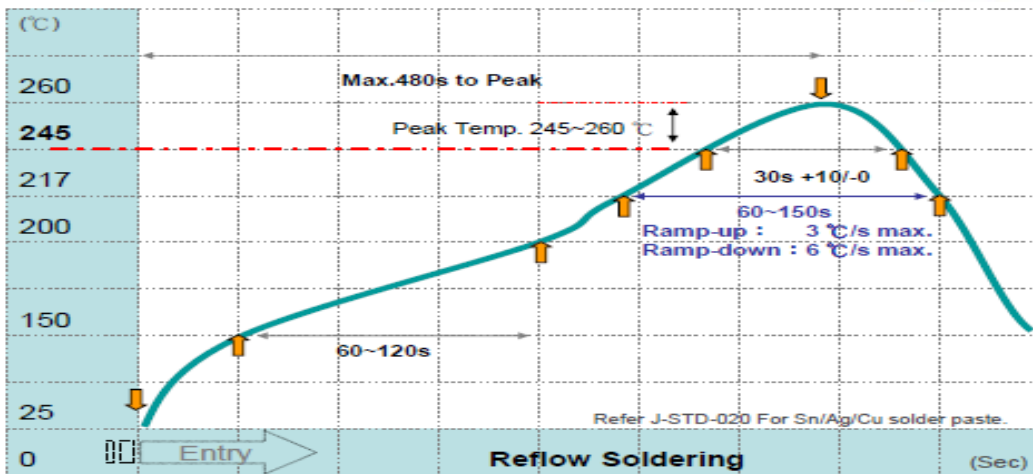
**Soldering Reference : Applicable for most industrial soldering request.**



Typical values (solid line).  
Process limits (dotted line). **WAVE soldering.**

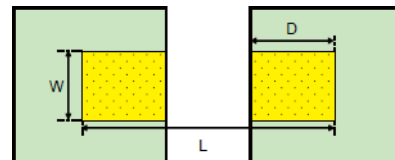


**IR Reflow soldering.**



**Recommend Solder Pad Dimensions :**

Type	W	D	L
<b>1206</b>	1.80	1.30	4.70
<b>1206 1~2 mR</b>	1.80	2.30	5.60
<b>2512</b>	3.70	1.60	7.60
<b>2512 0.5~3 mR</b>	4.00	3.00	7.30



## 8. Reliability Performance

### 8.1 AEC-Q200 type.

Test Item	Specification	Test Method (AEC-Q200. IEC 60115)
<b>DC Resistance</b>	J: $\pm 5\%$ G: $\pm 2\%$ F: $\pm 1\%$ D: $\pm 0.5\%$	<b>AEC-Q200 TABLE 7.1</b> <b>IEC 60115-1 / JIS C 5201-1 , Clause 4.5</b> Measure the resistance Value.
<b>High Temperature Exposure (Storage)</b>	J、G: $\Delta R \cong \pm 3\%$ F、D: $\Delta R \cong \pm 1\%$	<b>AEC-Q200 TABLE 7.3</b> 1000 hrs. @ T=170°C. Unpowered. Measurement at 24 $\pm 2$ hours after test conclusion.
<b>Temperature Cycling</b>	J、G: $\Delta R \cong \pm 1\%$ F、D: $\Delta R \cong \pm 0.5\%$ No mechanical damage.	<b>AEC-Q200 TABLE 7.4</b> 1000 Cycles (-55°C to +125°C). Measurement at 24 $\pm 2$ hours after test conclusion. <b>IEC 60115-1 Clause 4.19 for General Type</b> Repeat 5 cycles as follows -55°C(30min.)→25°C(2~3min.)→155°C(30min.)→25°C(2~3min.)
<b>Moisture Resistance</b>	J、G: $\Delta R \cong \pm 1\%$ F、D: $\Delta R \cong \pm 0.5\%$	<b>AEC-Q200 TABLE 7.6</b> Test 65°C/80~100%RH/10Cycles. Measurement at 24 $\pm 2$ hours after test conclusion. (t=24hrs/cycle).
<b>Biased Humidity</b>	J、G: $\circ R \cong \pm 3\%$ F、D: $\circ R \cong \pm 1\%$	<b>AEC-Q200 TABLE 7.7</b> 1000 hours 85°C/85%RH. 10% of operating power. Measurement at 24 $\pm 2$ hours after test conclusion.
<b>Operational Life</b>	J、G: $\circ R \cong \pm 3\%$ F、D: $\circ R \cong \pm 1\%$	<b>AEC-Q200 TABLE 7.8</b> Test 1000hr @ T=125°C at specified rated power. Measurement at 24 $\pm 2$ hours after test conclusion.
<b>External Visual</b>	No visual damage and refer PDC marking code.	<b>AEC-Q200 TABLE 7.9</b> Inspect device construction, marking and workmanship.
<b>Physical Dimension</b>	Within the spec.	<b>AEC-Q200 TABLE 7.10</b> Verify physical dimensions to the applicable device detail specification.

<b>Mechanical Shock</b>	Within product specification tolerance and no visible damage.	<b>AEC-Q200 TABLE 7.13</b> Test Peak value:100g's,Wave:Hail-sine, Duration:6ms,Velocity:12.3ft/sec.
<b>Vibration</b>	No mechanical damage.	<b>AEC-Q200 TABLE 7.14</b> 5 g's for 20 min., 12 cycles each of 3 orientations. Test from 10-2000 Hz.
<b>Resistance to Solder Heat</b>	J、G: $\Delta R \cong \pm 1\%$ F、D: $\Delta R \cong \pm 0.5\%$ No mechanical damage.	<b>AEC-Q200 TABLE 7.15</b> Solder dipping @ 270°C±5°C for 10sec.±1sec.
<b>Thermal Shock</b>	J、G: $\Delta R \cong \pm 1\%$ F、D: $\Delta R \cong \pm 0.5\%$ No mechanical damage.	<b>AEC-Q200 TABLE 7.16</b> -55 to 155°C/ dwell time 15min/ Max transfer time 20sec/ 300cycles.
<b>ESD</b>	$\Delta R \cong \pm 1\%$ No mechanical damage.	<b>AEC-Q200-002</b> Test contact min. 1KV.
<b>Solder Ability</b>	Over 95% of termination must be covered with solder.	<b>AEC-Q200 TABLE 7.18</b> a) Baking 155°C 4H, dipping 235°C 5s b) Steam 1H, dipping 215°C 5s c) Steam 1H, dipping 260°C 7s
<b>Flammability</b>	Refer UL-94.	<b>AEC-Q200 TABLE 7.20</b> UL-94 V-0 or V-1 are acceptable
<b>Board Flex</b>	J、G: $\Delta R \cong \pm 1\%$ F、D: $\Delta R \cong \pm 0.5\%$ No mechanical damage.	<b>AEC-Q200 TABLE 7.21</b> Bending 2mm 2512.1206
<b>Terminal Strength</b>	No mechanical damage	<b>AEC-Q200 TABLE 7.22</b> Force 1 Kg for 60 seconds.
<b>Anti-Sulfur</b>	$\Delta R \cong \pm 1\%$	<b>ASTM-B-809-95(Modified)</b> Sulfur 1000 hours, 90±2°C <b>EIA-977(Test B)</b> Sulfur 750 hours, 105±2°C

Remarks. AEC-Q200 type compliable standard type reliability items.

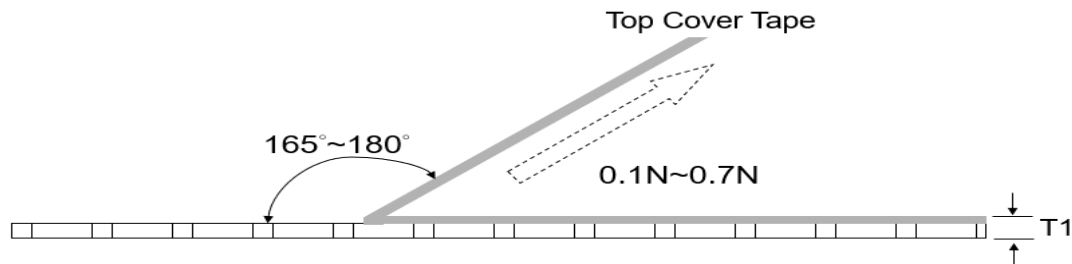


## 9. PACKAGING

### 9.1 Peel Strength of Top Cover Tape

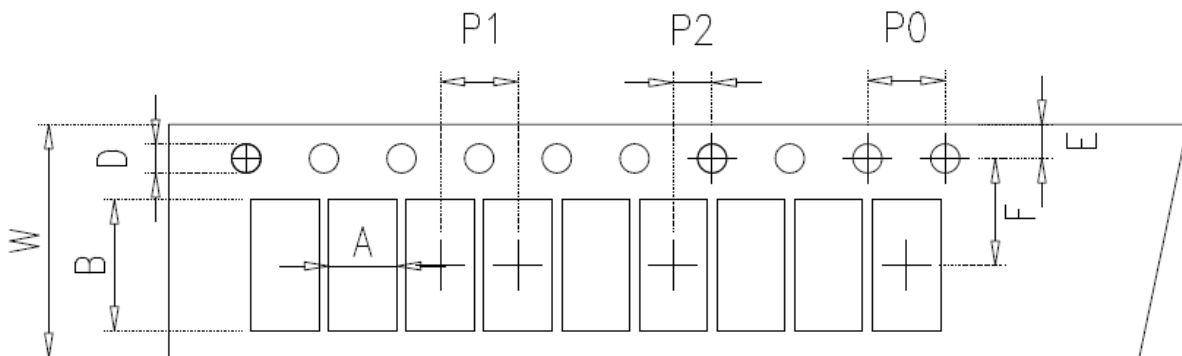
The peel speed shall be about 300 mm/min

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



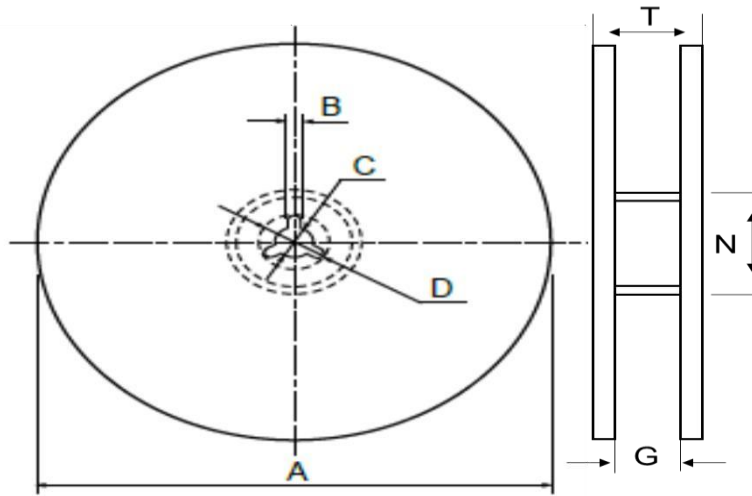
### 9.2 Tape Packaging Dimensions

unit.mm



Size	A	B	W	F	E	P1	P2	P0	D	T1
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	1.00±0.10
2512	3.50±0.20	6.75±0.20	12.0±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	1.15±0.10

### 9.3 Reel Dimensions



Size	Packaging Q'ty	A	N	C	D	B	G	T
1206	4kpcs/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.
2512	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.

### 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.

**Annex.1 Max. working & Max. overload current**

2512 Rating Power 1.0W			2512 Rating Power 2.0W		
R_Value (mΩ)	Max. Working (A)	Max. Overload (A)	R_Value (mΩ)	Max. Working (A)	Max. Overload (A)
1	31.6	70.7	1	44.7	100.0
2	22.4	50.0	2	31.6	70.7
2.5	20.0	44.7	2.5	28.3	63.2
3	18.3	40.8	3	25.8	57.7
4	15.8	35.4	4	22.4	50.0
5	14.1	31.6	5	20.0	44.7
6	12.9	28.9	6	18.3	40.8
7	12.0	26.7	7	16.9	37.8
8	11.2	25.0	8	15.8	35.4
9	10.5	23.6	9	14.9	33.3
10	10.0	22.4	10	14.1	31.6
12	9.1	20.4	12	12.9	28.9
15	8.2	18.3	15	11.5	25.8
18	7.5	16.7	18	10.5	23.6
20	7.1	15.8	20	10.0	22.4
22	6.7	15.1	22	9.5	21.3
25	6.3	14.1	25	8.9	20.0
30	5.8	12.9	30	8.2	18.3
33	5.5	12.3	33	7.8	17.4
35	5.3	12.0	35	7.6	16.9
40	5.0	11.2	40	7.1	15.8
50	4.5	10.0	50	6.3	14.1
60	4.1	9.1	60	5.8	12.9
70	3.8	8.5	70	5.3	12.0
75	3.7	8.2	75	5.2	11.5
80	3.5	7.9	80	5.0	11.2
100	3.2	7.1	100	4.5	10.0
			150	3.7	8.2

2512 Rating Power 3.0W		
R_Value (mΩ)	Max. Working (A)	Max. Overload (A)
0.5	77.5	173.2
0.75	63.2	141.4
1	54.8	122.5
2	38.7	86.6
2.5	34.6	77.5
3	31.6	70.7
4	27.4	61.2
5	24.5	54.8
6	22.4	50.0
7	20.7	46.3
8	19.4	43.3
9	18.3	40.8
10	17.3	38.7
12	15.8	35.4
14	14.6	32.7
15	14.1	31.6
16	13.7	30.6
18	12.9	28.9
20	12.2	27.4
25	11.0	24.5
30	10.0	22.4
33	9.5	21.3
35	9.3	20.7
40	8.7	19.4
50	7.7	17.3
60	7.1	15.8
75	6.3	14.1
80	6.1	13.7
100	5.5	12.2

1206 Rating Power 0.5W			1206 Rating Power 1.0W		
R_Value (mΩ)	Max. Working (A)	Max. Overload (A)	R_Value (mΩ)	Max. Working (A)	Max. Overload (A)
1	22.4	50.0	1	31.6	70.7
2	15.8	35.4	2	22.4	50.0
3	12.9	28.9	3	18.3	40.8
4	11.2	25.0	4	15.8	35.4
5	10.0	22.4	5	14.1	31.6
6	9.1	20.4	6	12.9	28.9
7	8.5	18.9	7	12.0	26.7
8	7.9	17.7	8	11.2	25.0
9	7.5	16.7	9	10.5	23.6
10	7.1	15.8	10	10.0	22.4
15	5.8	12.9	15	8.2	18.3
18	5.3	11.8	18	7.5	16.7
20	5.0	11.2	20	7.1	15.8
25	4.5	10.0	25	6.3	14.1
30	4.1	9.1	30	5.8	12.9

**\*\* 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.**