

规格书

SPECIFICATION

丽智电子（南通）有限公司

地址：江苏省南通市通州区康富路 789 号

Address: No. 789, Kang Fu Road Tongzhou District Nantong city Jiangsu province

Tel: 0086-0513-68856666

Fax: 0086-0513-68383688

车规超高功率厚膜贴片电阻规格书- AU 系列

Approval Specification for Automotive Ultra-High Power Thick Film Chip Resistors-Type AU

1. 范围 (scope) :

1.1 适用于本公司所生产的无铅、车规超高功率厚膜贴片电阻 AU 系列

This specification applies to **Automotive Ultra-High Power Thick Film Chip Resistors** which meet requirements of Pb free.

1.2 本公司的无铅产品指的贴片电阻端电极无铅，而存在于电阻层的玻璃中的符合 RoHS 豁免条款。 There no lead exists in terminal of resistor, and lead which exist in glass of resistor layer meets RoHS exemption.

1.3 符合 AEC-Q200 條款

The relevant provisions of the AEC-Q200

2. 产品料号 (part number) :

0603 1/3W 5% 100Ω

AU0603JN0101G

<u>AU</u>	<u>0603</u>	<u>J</u>	<u>N</u>	<u>0101</u>	<u>G</u>	<u> </u>
↓	↓	↓	↓	↓	↓	↓
类型(Type)	尺寸(Size)	公差	额定功率	阻值	包装代码	区别码
AU: 车规超	0402	Toleranc	Rated Power	Resistance value	Packing Code	Distinction Code
高功率厚膜	0603	e	5=1/5W	±0.5%、±1%	G=成品, 7 inch reel	空码 = 无指定
贴片电阻	0805	D=0.5%	N=1/3W	49R9=49.9Ω	常规包装量	- “X “= 特别指
(Automotiv	1206	F=±1%	3=1/2W	1002=10KΩ	H=成品, 10 inch	定, 不同字母代表
e	1210	G=±2%	2=3/4W	±2%、±5%	reel两倍包装量	不同指定
Ultra-High	2010	J=±5%	1=1W	06R8=6.8Ω	Z=成品, 15K包装量	
Power thick	2512		D=1.5W	0564=560KΩ	S=成品, 20K包装量	
film chip			C=3W		U=成品, 50K包装	
resistors)					V=bulk (散料)	

车规超高功率厚膜贴片电阻规格书- AU 系列

Approval Specification for Automotive Ultra-High Power Thick Film Chip Resistors-Type AU

3. 电阻本体字码标示 (Marking on the Resistor's Body):

※ 0402 因本体太小，本体上无字码标示 For 0402 size, no marking on the body due to the small size of the resistor. ※ 公差$\geq \pm 2\%$的产品，以三字码标示，前两位表示阻值的有效数字，最后一位表示 10 的乘幂 $\geq \pm 2\%$ Tolerance product: the marking is 3 digits, the first 2 digits are significant figures of resistance value and the 3rd one denotes the power number of 10, (10X). ※ $\pm 1\%$的产品，以四字码标示，前三位表示阻值的有效数字，最后一位表示 10 的乘幂 $\pm 1\%$ tolerance product: the marking is 4 digits, the first 3 digits are significant figures of resistance value and the 4th one denotes the power number of 10, (10X). ※ 0603 $\pm 1\%$ E96 系列的标准阻值，因电阻本体太小，采用三位代码标示。 Standard E96 series values of 0603 $\pm 1\%$: due to the small size of the resistor's body, use 3digits code to indicate the resistance value.		No Marking
		$472 = 47 \times 10^2 = 4.7K \Omega$
		10 Ω 以下标示：5R6=5.6 Ω Below 10 Ω : 5R6=5.6 Ω
		$4992 = 499 \times 10^2 = 49.9K \Omega$
		100 Ω 以下标示：6R81=6.81 Ω Below 100 Ω : 6R81=6.81 Ω
		0603 $\pm 1\%$ E96 系列 $38Y = 243 \times 10^{-2} = 2.43 \Omega$

车规超高功率厚膜贴片电阻规格书- AU 系列

Approval Specification for Automotive Ultra-High Power Thick Film Chip Resistors-Type AU

0603 $\pm 1\%$ E96 系列的标准阻值代码(Standard E96 Series Resistance Value Code for 0603 $\pm 1\%$ Marking)

代码 Code	阻值 Value	代码 Code	阻值 Value	代码 Code	阻值 Value	代码 Code	阻值 Value	代码 Code	阻值 Value	代码 Code	阻值 Value
01	100	17	147	33	215	49	316	65	464	81	681
02	102	18	150	34	221	50	324	66	475	82	698
03	105	19	154	35	226	51	332	67	487	83	715
04	107	20	158	36	232	52	340	68	499	84	732
05	110	21	162	37	237	53	348	69	511	85	750
06	113	22	165	38	243	54	357	70	523	86	768
07	115	23	169	39	249	55	365	71	536	87	787
08	118	24	174	40	255	56	374	72	549	88	806
09	121	25	178	41	261	57	383	73	562	89	825
10	124	26	182	42	267	58	392	74	576	90	845
11	127	27	187	43	274	59	402	75	590	91	866
12	130	28	191	44	280	60	412	76	604	92	887
13	133	29	196	45	287	61	422	77	619	93	909
14	137	30	200	46	294	62	432	78	634	94	931
15	140	31	205	47	301	63	442	79	649	95	953
16	143	32	210	48	309	64	453	80	665	96	976

0603 $\pm 1\%$ E96 系列的指数代码(Multiplier Code for 0603 $\pm 1\%$ Marking)

代码 Code	Y	X	A	B	C	D	E	F
指数 Multiplier	10^{-2}	10^{-1}	10^0	10^1	10^2	10^3	10^4	10^5

阻值标示如下(So the resistance value are marked as the following examples)



$$10D = 124 \times 10^3 = 124K \Omega$$



$$38Y = 243 \times 10^{-2} = 2.43 \Omega$$

0603 $\pm 1\%$ 的产品，在标准 E24 系列中，但不属于 E96 系列，标示与 5%的字码相同，但是在字码下加一条线
 Standard E24 and not belong to E96 series values of 0603 $\pm 1\%$, the marking is the same as 5% tolerance but marking as underline



$$\underline{331} = 33 \times 10^1 = 330 \Omega$$

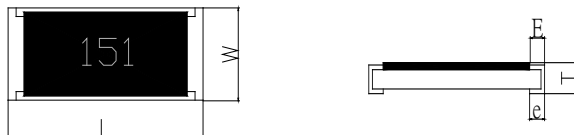


$$\underline{560} = 56 \times 10^0 = 56 \Omega$$

车规超高功率厚膜贴片电阻规格书- AU 系列

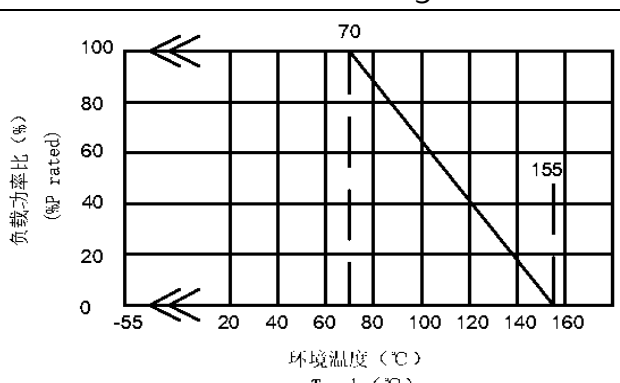
Approval Specification for Automotive Ultra-High Power Thick Film Chip Resistors-Type AU

4. 尺寸 (dimension) :

尺寸 dimension						单位 (unit) : mm
型别 (Type)	L	W	T	E	e	
AU0402	1.00±0.05	0.50±0.05	0.30±0.05	0.15±0.10	0.20±0.10	
AU0603	1.60±0.10	0.80±0.10	0.40±0.10	0.30±0.20	0.30±0.10	
AU0805	2.00±0.10	1.25±0.10	0.50±0.15	0.30±0.15	0.40±0.15	
AU1206	3.05±0.10	1.60±0.10	0.55±0.15	0.40±0.20	0.50±0.20	
AU1210	3.05±0.10	2.50±0.15	0.55±0.15	0.50±0.20	0.50±0.20	
AU2010	5.00±0.20	2.50±0.15	0.55±0.10	0.60±0.20	0.60±0.20	
AU2512	6.30±0.20	3.20±0.15	0.68±0.10	0.60±0.20	0.60±0.20	

5. 特性参数 (Performance Characteristics)

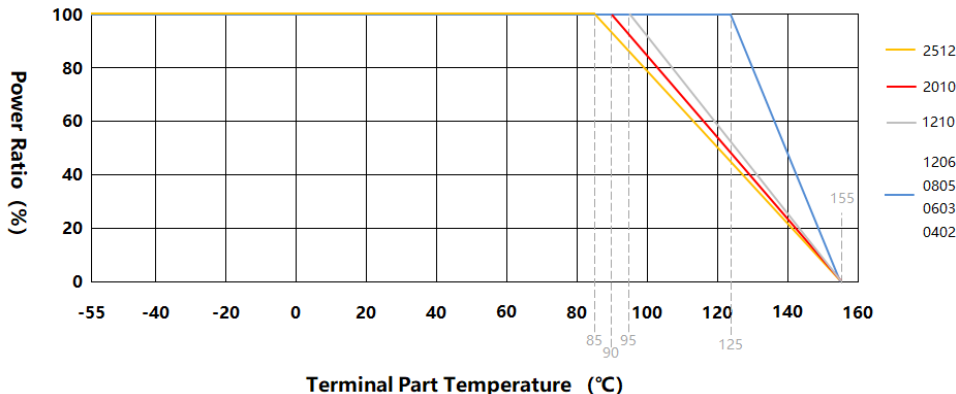
5.1 功率衰减曲线 (Derating Curve) :

使用温度范围	-55℃~+155℃
说明 Directions	电阻的额定功率基于-55℃至 70℃的环境温度下运行。当温度超过 70℃时，负载功率比例依照下图予以修订。 Resistors shall have a power rating based on continuous load operation at an ambient temperature from -55℃ to 70℃.For temperature in excess of 70℃ , the load shall be derated as shown in figure.
功率衰减曲线 Derating Curve	 负载功率比 (%P rated) 环境温度 (℃) T amb (℃)

车规超高功率厚膜贴片电阻规格书- AU 系列

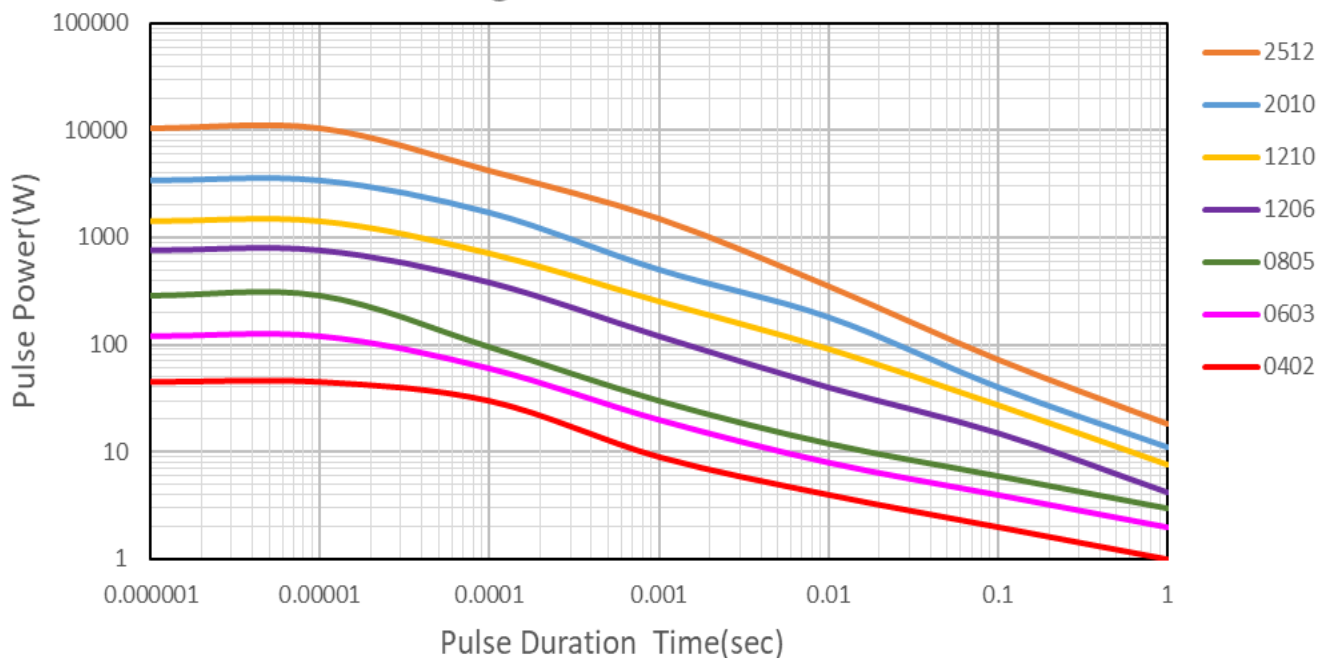
Approval Specification for Automotive Ultra-High Power Thick Film Chip Resistors-Type AU

5.2 端子温度曲线 (Terminal part Temperature Curve) :

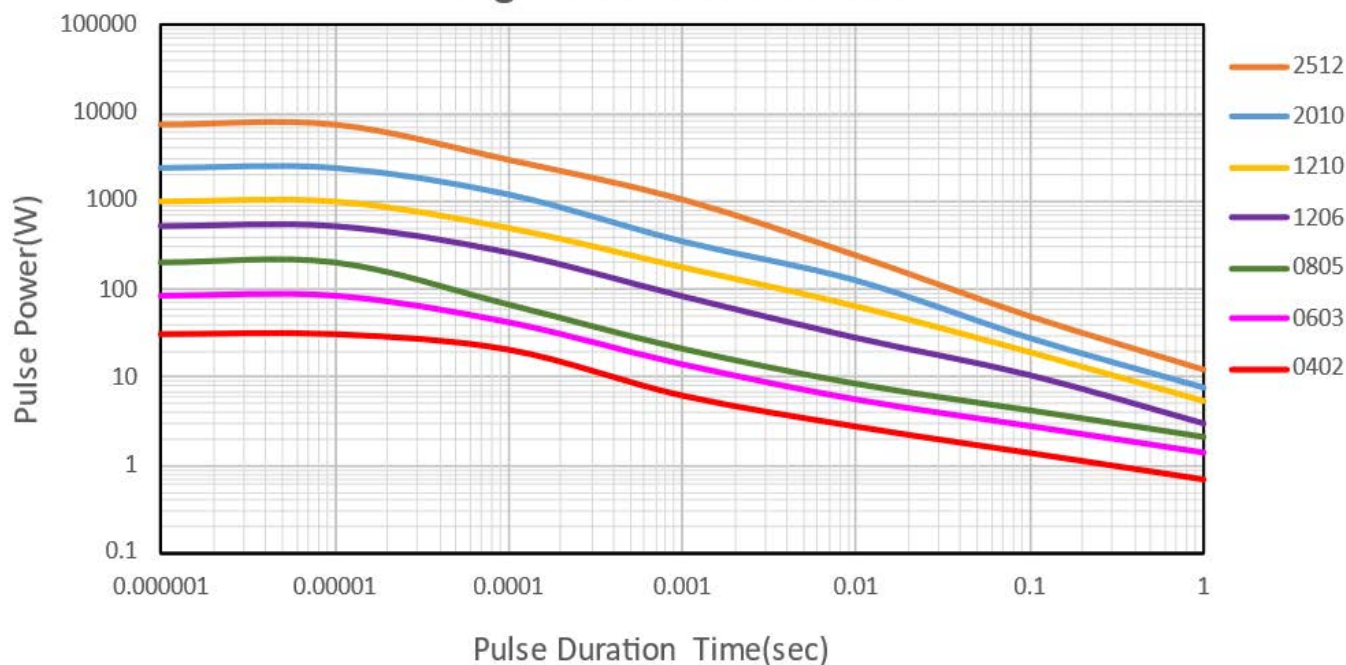
说明 Directions	电阻在使用时，端子温度达到对应尺寸的温度时，功率需按照图上降额曲线修正。 For resistors operated terminal part temperature of described for each size or above, a power rating shall be derated in accordance with derating curve.																								
端子温度曲线 Terminal part Temperature Curve	 The graph illustrates the power derating curves for different resistor sizes. The Y-axis represents the Power Ratio (%) from 0 to 100, and the X-axis represents the Terminal Part Temperature (°C) from -55 to 160. The curves show that power rating is constant at 100% until a specific temperature threshold, after which it decreases linearly to 0% at 155°C. <table><tr><th>Resistor Size</th><th>Start Temperature (°C)</th><th>End Temperature (°C)</th></tr><tr><td>2512</td><td>85</td><td>155</td></tr><tr><td>2010</td><td>90</td><td>155</td></tr><tr><td>1210</td><td>95</td><td>155</td></tr><tr><td>1206</td><td>100</td><td>155</td></tr><tr><td>0805</td><td>125</td><td>155</td></tr><tr><td>0603</td><td>155</td><td>155</td></tr><tr><td>0402</td><td>155</td><td>155</td></tr></table>	Resistor Size	Start Temperature (°C)	End Temperature (°C)	2512	85	155	2010	90	155	1210	95	155	1206	100	155	0805	125	155	0603	155	155	0402	155	155
Resistor Size	Start Temperature (°C)	End Temperature (°C)																							
2512	85	155																							
2010	90	155																							
1210	95	155																							
1206	100	155																							
0805	125	155																							
0603	155	155																							
0402	155	155																							

5.3 单脉冲功率曲线 (Single Pulse Power Curve) :

Single Pulse 100 ohm 5%

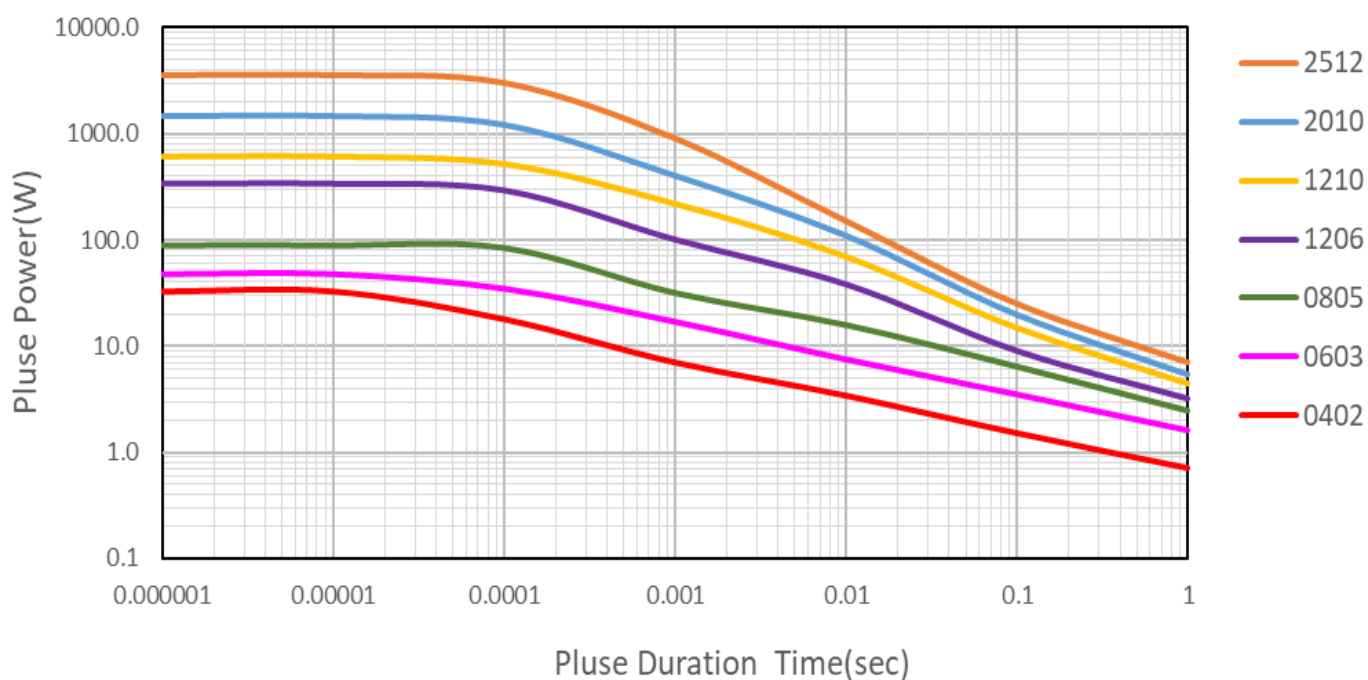


Single Pulse 100 ohm 1%

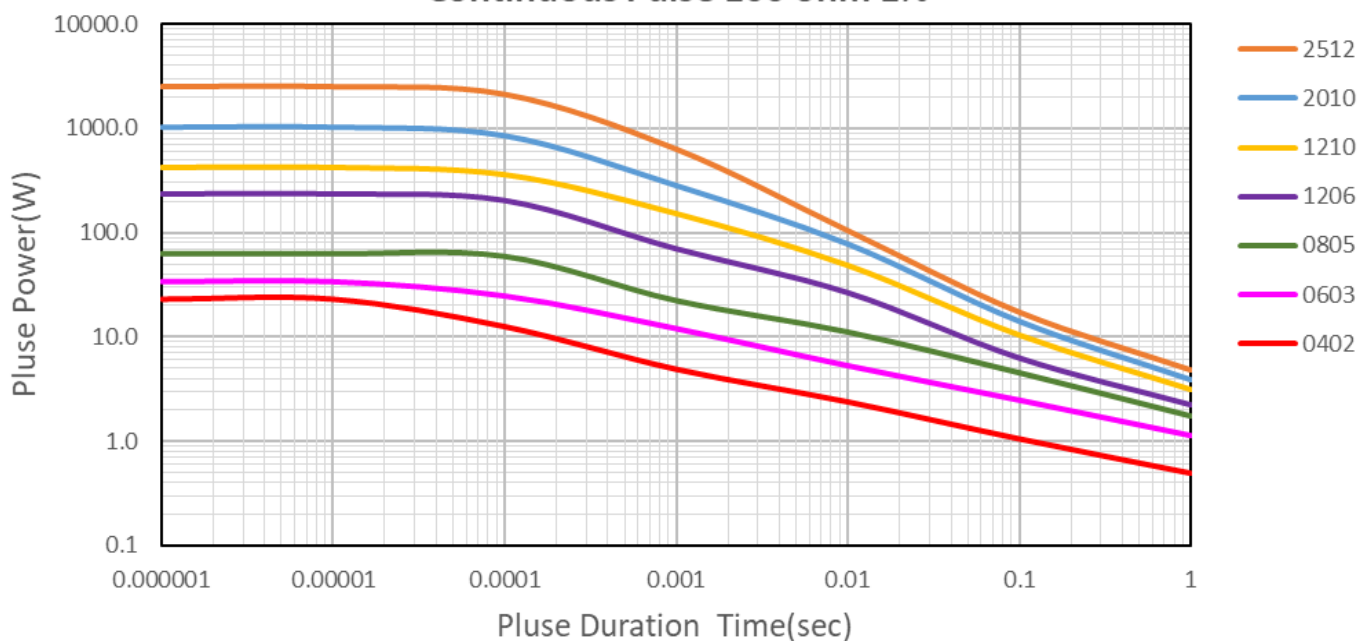


5.4连续脉冲功率曲线（Continuous Pulse Power Curve）：

Continuous Pulse 100 ohm 5%



Continuous Pulse 100 ohm 1%

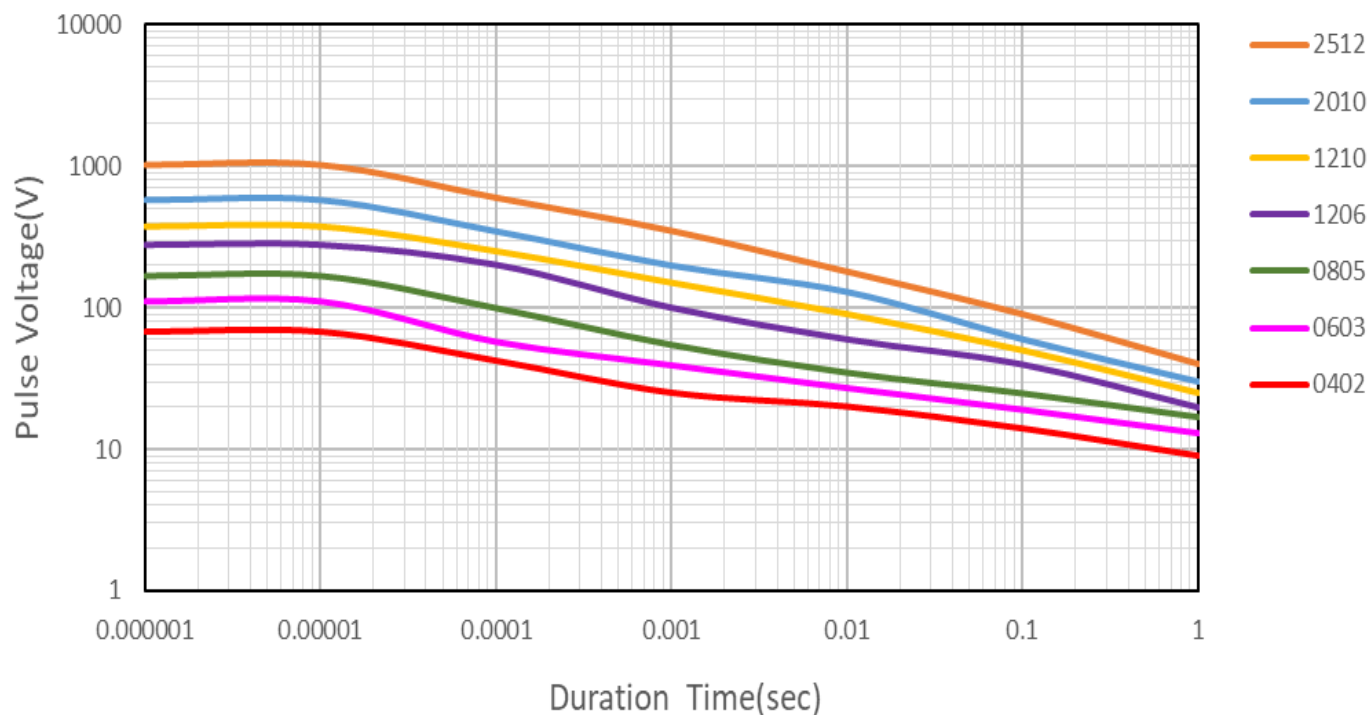


车规超高功率厚膜贴片电阻规格书- AU 系列

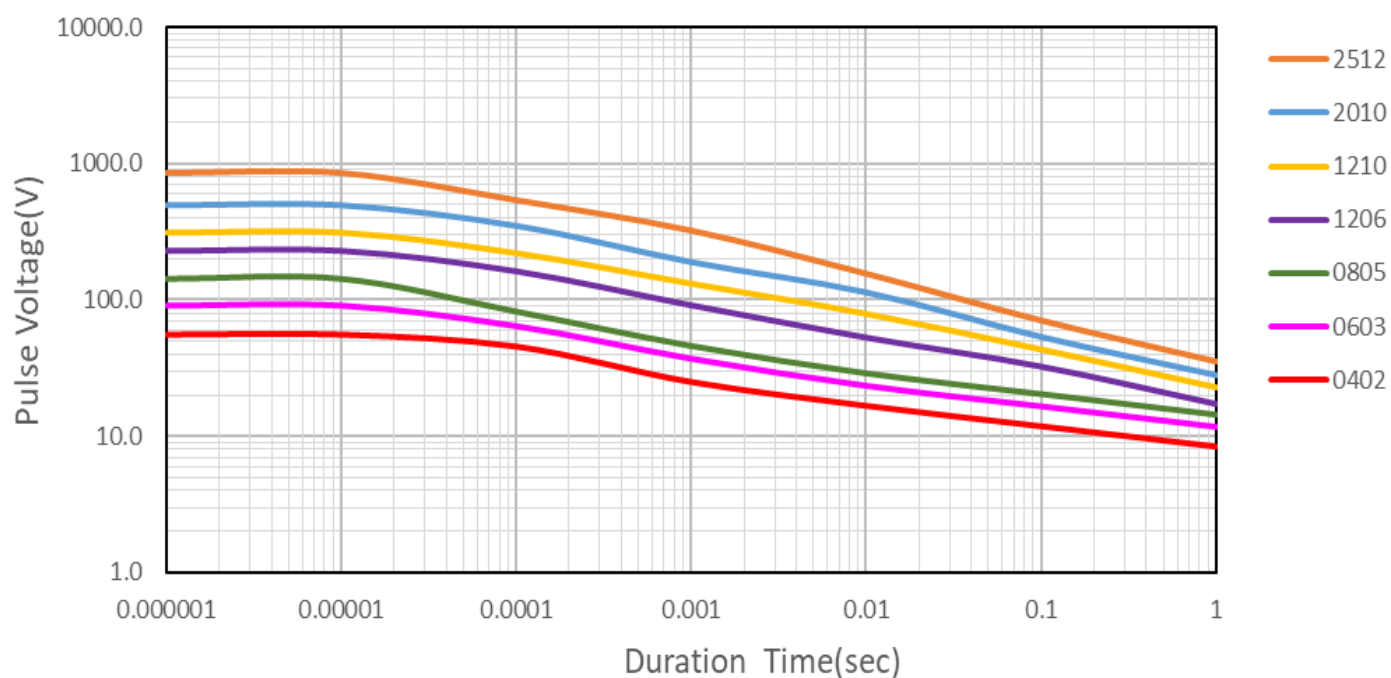
Approval Specification for Automotive Ultra-High Power Thick Film Chip Resistors-Type AU

5.5脉冲电压曲线 (Pulse Voltage Curve) :

Pulse Voltage 100 ohm 5%



Pulse Voltage 100 ohm 1%



车规超高功率厚膜贴片电阻规格书- AU 系列

Approval Specification for Automotive Ultra-High Power Thick Film Chip Resistors-Type AU

备注 (remark) :

※ 额定电压计算公式 (The rated voltage is calculated by the following formula) :

$R \geq 1\Omega$:

$$E = \sqrt{RP}$$

E : 额定电压 (Rated Voltage) (V)

P : 额定功率 (Rated Power) (W)

R : 电阻阻值 (Resistance) (ohm)

※ 如果计算出的电压超过此型别的最大工作电压, 则此型别的最大工作电压为此电阻的额定电压。

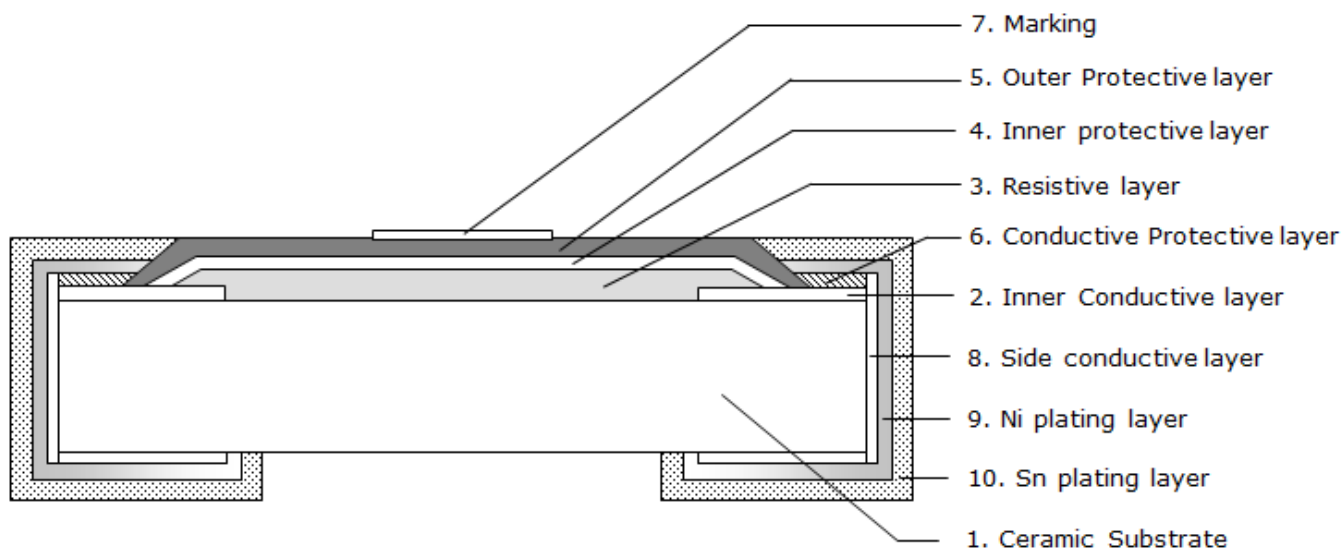
In case the value calculated by the formula exceed the maximum working voltage as above table 9, the maximum working voltage shall be regarded as rated voltage.

储存条件及期限 (storage condition or Data) : $25 \pm 5^\circ\text{C}$, $60 \pm 20\%\text{RH}$; 有效期 2 年。

车规超高功率厚膜贴片电阻规格书- AU 系列

Approval Specification for Automotive Ultra-High Power Thick Film Chip Resistors-Type AU

6.电阻结构（Construction）：



No.	结构 construction	主要材料 Major material
1	陶瓷基板 Ceramic substrate	三氧化二铝 Al ₂ O ₃
2	内电极 Inner Conductive layer	银 Ag-Pd
3	阻体层 Resistive layer	氧化钌+玻璃 RuO ₂ + glass
4	内保护层 Inner protective layer	玻璃 Glass
5	外保护层 Outer Protective layer	环氧树脂 Epoxy
6	电极保护层 Conductive Protective layer	银 Ag
7	文字 Marking	环氧树脂 Epoxy
8	侧电极 Side conductive layer	镍铬合金 Ni-Cr
9	镍电极 Ni plating layer	镍 Ni
10	锡电极 Sn plating layer	雾锡 Matte Tin

车规超高功率厚膜贴片电阻规格书- AU 系列

Approval Specification for Automotive Ultra-High Power Thick Film Chip Resistors-Type AU

7. 电气特性标准 (Standard Electrical Specifications) :

7.1. 规格 (Type)

型别 Type	额定功率 Rated power	最大工作电压 Max Working Voltage	最大过载电压 Max Overload Voltage	T.C.R. (PPM/°C)	阻值范围		
					D: $\pm 0.5\%$	F: $\pm 1.0\%$ G: $\pm 2.0\%$	J: $\pm 5.0\%$
AU0402	1/5W	50V	100V	± 400	-	$1\Omega \leq R < 10\Omega$	
				± 100	$10\Omega \leq R \leq 1M\Omega$	$10\Omega \leq R \leq 10M\Omega$	
AU0603	1/3W	150V	200V	± 400	-	$1\Omega \leq R < 10\Omega$	
				± 100	$10\Omega \leq R \leq 1M\Omega$	$10\Omega \leq R \leq 10M\Omega$	
AU0805	1/2W	400V	600V	± 400	-	$1\Omega \leq R < 10\Omega$	
				± 100	$10\Omega \leq R \leq 1M\Omega$	$10\Omega \leq R \leq 10M\Omega$	
AU1206	3/4W	200V	400V	± 400	-	$1\Omega \leq R < 10\Omega$	
				± 100	$10\Omega \leq R \leq 1M\Omega$	$10\Omega \leq R \leq 10M\Omega$	
AU1210	1W	200V	400V	± 400	-	$1\Omega \leq R < 10\Omega$	
				± 100	$10\Omega \leq R \leq 1M\Omega$	$10\Omega \leq R \leq 10M\Omega$	
AU2010	1.5W	200V	400V	± 400	-	$1\Omega \leq R < 10\Omega$	
				± 150	$10\Omega \leq R \leq 1M\Omega$	$10\Omega \leq R \leq 10M\Omega$	
AU2512	3W	250V	500V	± 400	-	$1\Omega \leq R < 10\Omega$	
				± 150	$10\Omega \leq R \leq 1M\Omega$	$10\Omega \leq R \leq 10M\Omega$	

车规超高功率厚膜贴片电阻规格书- AU 系列

Approval Specification for Automotive Ultra-High Power Thick Film Chip Resistors-Type AU

8.性能信赖性测试 (Performance Reliability Test Methods)

内容 Item	测试方法 Test Methods	测试条件 Test Conditions	规格 Specification
温度系数 Temperature Coefficient of Resistance (T.C.R.)□	JIS C 5201 4.8 IEC-60115-1 4.8	$TCR = (R - R_0) / (t - t_0) R_0 \times 10^6 \text{ (ppm)}$ R_0 电阻在室温下的阻值(resistance at room temperature) R 电阻在 155℃或-55℃下的阻值(resistance at 155℃ or -55℃) t_0 室温(room temperature) t 测试温度 (test temperature 155℃ or -55℃)	参照 7 项
绝缘电阻 Insulation resistance	JIS C 5201 4.6 IEC-60115-1 4.6	电阻本体上加载 100V (DC) 绝缘耐压 60±5 秒后, 测量绝缘阻抗 Applying 100V (DC) to the resistor body and withstanding 60±5 seconds of insulation voltage. Measure the insulation resistance	≥ 10GΩ
短时间过负荷 Short-time overload	JIS C 5201 4.13 IEC-60115-1 4.13	加载 5 倍的额定功率或最大过载电压 (两者取其小) 时间 5 秒后测量试验前后的阻值变化率。 Applied 5 times of rated Power or Max Overload Voltage whichever is less for 5 second. Measure the variation of resistance. $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{-----} (\%)$ R_1 = 试验前阻值(resistance before test) R_2 = 试验后阻值(resistance after test)	±1%: ±(1.00%+0.05Ω) ±5%: ±(2.00%+0.1Ω)
溶蚀 Leaching	JIS C 5201 4.18 IEC-60068-2-58 8.2.1	锡炉温度 260±5℃, 时间 30+1/-0 秒, 取出置于显 微镜下观察焊锡面积。 Dip the resistance in a tin furnace at 260±5℃ for 30+1/-0seconds, then take it out and observe the solder area under a microscope;	单边未吃锡面积≤ 5% Individual leaching area ≤ 5% 总未吃锡面积≤ 10% Total leaching area ≤ 10%

车规超高功率厚膜贴片电阻规格书- AU 系列

Approval Specification for Automotive Ultra-High Power Thick Film Chip Resistors-Type AU

内容 Item	测试方法 Test Methods	测试条件 Test Conditions	规格 Specification
抗焊锡热 Resistance to soldering heat	JIS C 5201 4.18 IEC-60115-1 4.18	锡炉温度 260±5℃, 时间 10±0.5 秒, 测量试验前后的阻值变化率。 Dip the resistance in a tin furnace at 260±5℃ for 10±0.5sec. Measure the variation of resistance. $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{-----} (\%)$ R1 = 试验前阻值(resistance before test) R2 = 试验后阻值(resistance after test)	±1%: ±(0.50%+0.05Ω) ±5%: ±(1.00%+0.05Ω)
焊锡性 Solderability	J-STD-002	干热 155 度 4 小时后浸入 245±5℃锡炉 3 秒 4 hrs 155℃ dry heat, 245±5℃ 3 sec. $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{-----} (\%)$ R1 = 试验前阻值(resistance before test) R2 = 试验后阻值(resistance after test)	±1%: ±(0.50%+0.05Ω) ±5%: ±(1.00%+0.05Ω)
耐溶剂 Resistance to Solvent	MIL-STD-202 Method 215	浸于洁净的 OKEM 化学水溶液中或同等水溶液中。 Add Aqueous wash chemical-OKEM clean or equivalent $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{-----} (\%)$ R1 = 试验前阻值(resistance before test) R2 = 试验后阻值(resistance after test)	±(0.50%+0.05Ω)
静电 ESD	AEC-Q200- 002 or ISO/DIS 10605	加载规定静电电压2次, 间隔1秒, 0402/0603: 1KV; 0805(含)以上: 2KV Human body model 0402/0603: 1KV; 0805 and above: 2KV $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{-----} (\%)$ R1 = 试验前阻值(resistance before test) R2 = 试验后阻值(resistance after test)	±(3.0%+0.05Ω)

车规超高功率厚膜贴片电阻规格书- AU 系列

Approval Specification for Automotive Ultra-High Power Thick Film Chip Resistors-Type AU

内容 Item	测试方法 Test Methods	测试条件 Test Conditions	规格 Specification
负荷寿命 Operational Life	MIL-STD-202 Method 108	恒定温度 125°C加载额定电压, 通电 1.5H, 断电 0.5H, 共持续 1000+24/-0 小时。静置 24±4 后量测阻值。 Put the specimen in a chamber at 125°C temperature, ON TIME:1.5H, OFF TIME:0.5H, rated voltage 1000 +24/-0 hours. Measurement at 24±4 hours after test conclusion. $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{-----} (\%)$ R1 = 试验前阻值(resistance before test) R2 = 试验后阻值(resistance after test)	±1%: ±(1.00%+0.05Ω) ±5%: ±(3.00%+0.10Ω)
耐湿特性 Biased Humidity	MIL-STD-202 Method 103	电阻放入恒温恒湿箱, 温度 85±2°C, 湿度 85±2%RH; 通 10%的电额定电压 1000 +48/-0 小时。静置 24±4 后量测阻值。 Put the specimen in a chamber at 85±2°C temperature and 85±2% relative humidity, 10% of operating power is 1000 +48/-0 hours. Measurement at 24±4 hours after test conclusion. $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{-----} (\%)$ R1 = 试验前阻值(resistance before test) R2 = 试验后阻值(resistance after test)	±1%: ±(1.00%+0.05Ω) ±5%: ±(3.00%+0.05Ω)
高温储存 High Temperature Exposure(Storage)	MIL-STD-202 Method 108	155°C下放置 1000h, 不加载功率, 试验结束 24±4 小时后进行测试。 1000 hrs. @ T=155°C. Unpowered. Measurement at 24±4 hours after test conclusion. $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{-----} (\%)$ R1 = 试验前阻值(resistance before test) R2 = 试验后阻值(resistance after test)	±1%: ±(0.50%+0.05Ω) ±5%: ±(2.00%+0.05Ω)

车规超高功率厚膜贴片电阻规格书- AU 系列

Approval Specification for Automotive Ultra-High Power Thick Film Chip Resistors-Type AU

内容 Item	测试方法 Test Methods	测试条件 Test Conditions	规格 Specification
温度循环 Temperature cycling	JESD22 Method JA-104	电阻放入温度循环机中, 温度 125°C至-55°C, 每个温度停滞不超过 30 分钟, 共 1000 个循环。静置 24±4 后量测阻值。 Put the resistor into the temperature cycling machine. Temperature of 125°C to -55°C. Each temperature remains stagnant for no more than 30 minutes. Repeated 1000 cycles. Measurement at 24±4 hours after test conclusion. $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{-----} (\%)$ R1 = 试验前阻值(resistance before test) R2 = 试验后阻值(resistance after test)	±1%: ±(0.50%+0.05Ω) ±5%: ±(1.00%+0.10Ω)
机械冲击 Mechanical Shock	MIL-STD-202 Method 213	波形: 半正弦冲击脉冲波, 峰值 100 克, 持续时间为 6ms Wave Form : Tolerance for half sine shock pulse. Peak value is 100g' s. Normal duration(D) is 6(ms) $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{-----} (\%)$ R1 = 试验前阻值(resistance before test) R2 = 试验后阻值(resistance after test)	±1%: ±(1.00%+0.05Ω) ±5%: ±(2.00%+0.10Ω)
振动 Vibration	MIL-STD-202 Method 204	5 克 20 分钟, 12 个循环, 每个循环 3 个方向。测试频率为 10-2000 H 5 g's for 20 min., 12 cycles each of 3 orientations. Note: Test from 10-2000 Hz $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{-----} (\%)$ R1 = 试验前阻值(resistance before test) R2 = 试验后阻值(resistance after test)	±1%: ±(1.00%+0.05Ω) ±5%: ±(2.00%+0.10Ω)
外观检 External Visual	MIL-STD-883 Method 2009	无需焊锡, 检查本体外观字码和电极尺寸。 Electrical test not required. Inspect device construction, marking and workmanship.	/

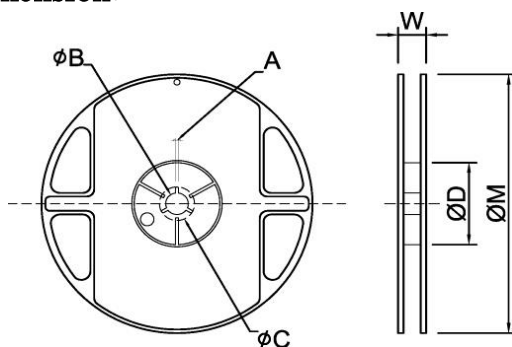
车规超高功率厚膜贴片电阻规格书- AU 系列

Approval Specification for Automotive Ultra-High Power Thick Film Chip Resistors-Type AU

内容 Item	测试方法 Test Methods	测试条件 Test Conditions	规格 Specification
端子强度 Terminal Strength (SMD)	AEC Q200-006	施加压力保持 60 秒。 压力 0402/0603: 8N; 0805(含)以上: 17.7N Pressurizing force for 60 seconds 0402/0603: 8N; 0805 and above: 17.7N	无破损 No broken
弯折 Board Flex	AEC Q200-005	弯曲一次保持 60 秒 弯曲度 2010/2512: 2mm; 其它尺寸: 3mm Bending once for 60 seconds 2010/2512 sizes: 2mm; Other sizes: 3mm $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{----- } (\%)$ R1 = 试验前阻值(resistance before test) R2 = 试验后阻值(resistance after test)	$\pm(1.00\%+0.05\Omega)$
单脉冲高压过载 Single pulse high voltage overload	IEC-60115	严重等级 4 级 加载电压为 $U=10*\sqrt{P_{70}*R}$ 或 $U=2*U_{MAX}$ 中两者选其小为准。每分钟一个脉冲, 10 个脉冲 Severity No. 4: $U=10*\sqrt{P_{70}*R}$ or $U=2*U_{MAX}$ Whichever is the less severe. One pulse per minute, 10 pulses 10 / 700μ s. $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{----- } (\%)$ R1 = 试验前阻值(resistance before test) R2 = 试验后阻值(resistance after test)	$\pm(1.00\%+0.05\Omega)$
硫化试验 Sulfur test (For Optional "A")	ASTM-B-809-95 EIA-977	在玻璃容器底部的培养皿上铺满10mm厚的硫 粉, 放置在105±3℃的恒温箱中1000H, cover the tray or base of the chamber with a bed of sulfur to 10mm depth minimum, temperature 105± 3℃;1000H $\Delta R\% = \frac{R_2 - R_1}{R_1} * 100 \text{----- } (\%)$ R1 = 试验前阻值(resistance before test) R2 = 试验后阻值(resistance after test)	$\pm(2.00\%+0.05\Omega)$

9. 包装规格 (Tapping Specification)

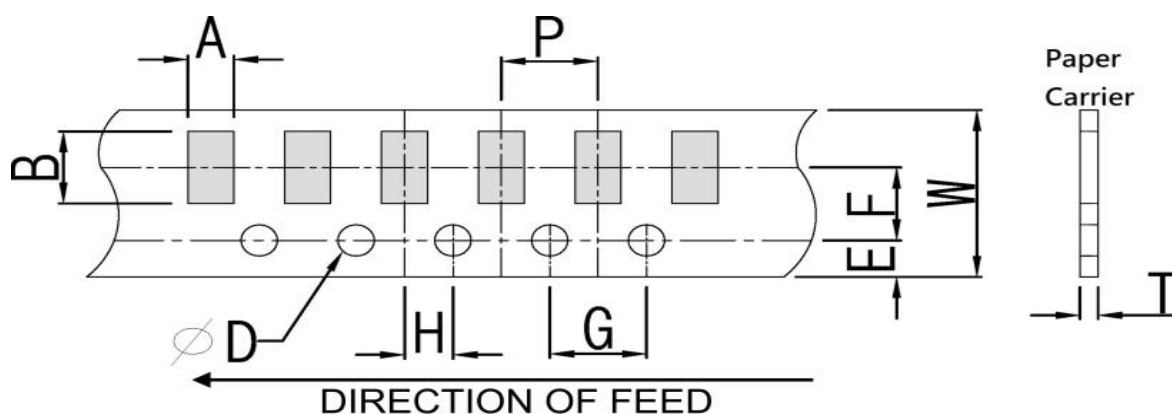
9.1 卷盘尺寸 (reel dimension)



Unit: mm

Type	Size		A	φ B	φ C	φ D	W	φ M
0402	7"	10K Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	11.5±2.0	178±2.0
	13"	40K/50K Reel	2.0±0.5	13.5±1.0	21±1.0	100±1.0	11.5±2.0	330±2.0
0603 0805 1206 1210	7"	5K Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	11.5±2.0	178±2.0
0603 0805 1206	10"	10K Reel	2.0±0.5	13.5±1.0	21±1.0	100±1.0	11.5±2.0	254±2.0
	13"	20K Reel	2.0±0.5	13.5±1.0	21±1.0	100±1.0	11.5±2.0	330±2.0
2010 2512	7"	4K Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	16.0±2.0	178±2.0

9.2 包装尺寸 (packing dimension)



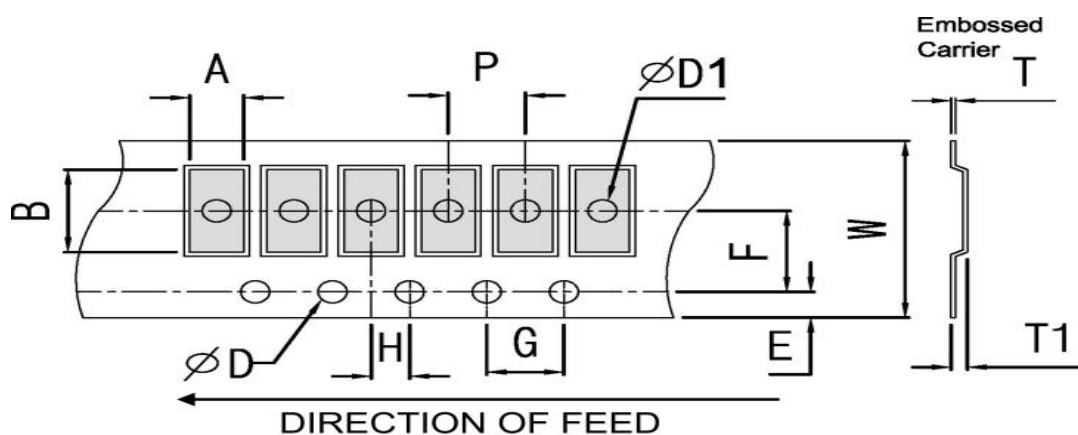
车规超高功率厚膜贴片电阻规格书- AU 系列

Approval Specification for Automotive Ultra-High Power Thick Film Chip Resistors-Type AU

Unit: mm

Paper Type

Type	A	B	W	E	F	G	H	T	ΦD	P
0402	0.70±0.1	1.20±0.1	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.05	0.45±0.1	1.50± ^{0.1} _{0.0}	2.0±0.1
0603	1.05±0.2	1.80±0.2	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.05	0.60±0.1		4.0±0.1
0805	1.55±0.2	2.30±0.2	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.05	0.75±0.1		4.0±0.1
1206	1.90±0.2	3.50±0.2	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.05	0.75±0.1		4.0±0.1
1210	2.85±0.2	3.50±0.2	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.05	0.75±0.1		4.0±0.1



Unit: mm

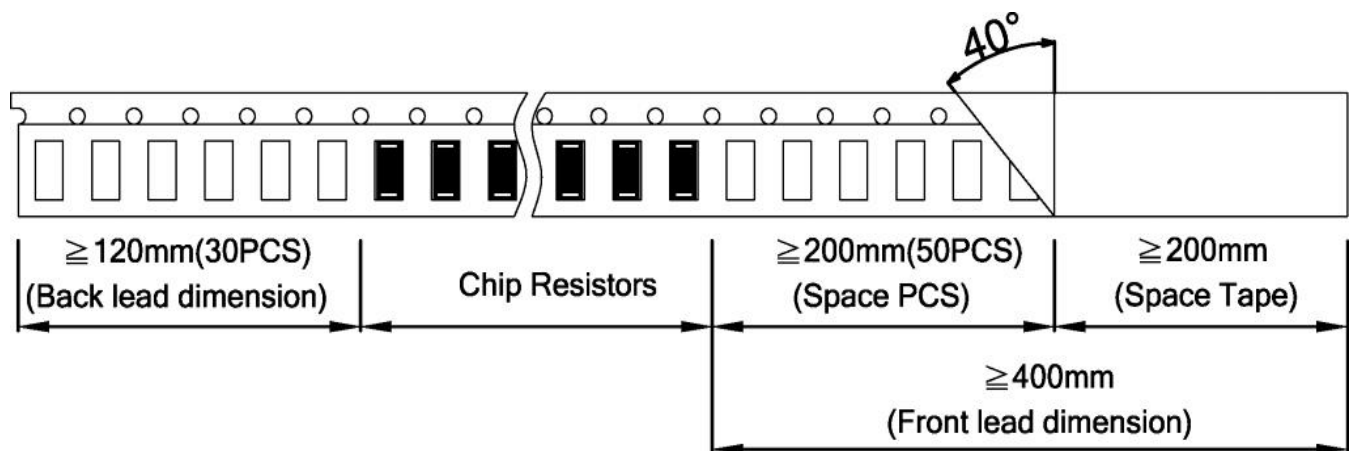
Embossed Type

Type	A	B	W	E	F	G	H	T	ΦD	ΦD1	T1	P
2010	2.80±0.2	5.60±0.2	12±0.1	1.75±0.1	5.5±0.05	4.0±0.1	2.0±0.05	0.23±0.1	1.50± ^{0.1} _{0.0}	1.5±0.1	0.85±0.15	4.0±0.1
2512	3.40±0.2	6.70±0.2	12±0.1	1.75±0.1	5.5±0.05	4.0±0.1	2.0±0.05	0.23±0.1		1.5±0.1	0.95±0.15	4.0±0.1

车规超高功率厚膜贴片电阻规格书- AU 系列

Approval Specification for Automotive Ultra-High Power Thick Film Chip Resistors-Type AU

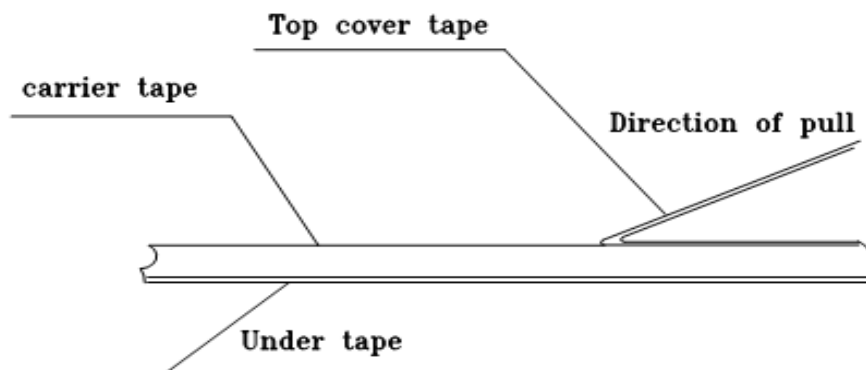
9.3 前后引线尺寸 (Front & Back Lead Dimension)



10. 上胶带剥离力测试 (Peel force of top cover tape)

上胶带以 300mm/分钟的速度，沿 165~180 度角的方向进行剥离，如下图所示。纸带的剥离力范围为 10g~70g；载带的剥离力范围为 15g~80g

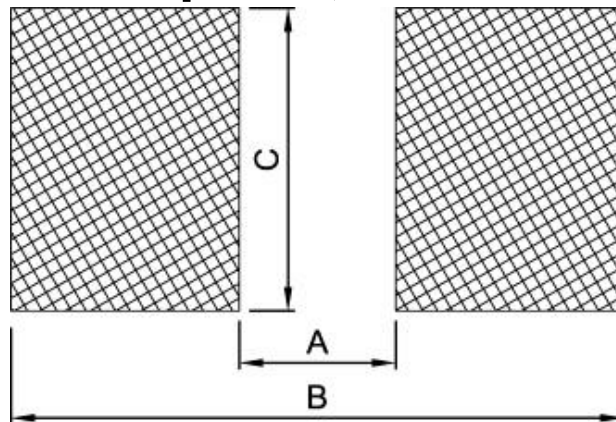
The top cover tape is pulled at a speed of 300 mm/min with the angle between the tape during peel and the direction of unreeling maintained at 165 to 180 degree as following picture. The peel force of paper carrier tape shall be 10 g to 70 g, the peel force of plastic carrier tape shall be 15 g to 80 g



车规超高功率厚膜贴片电阻规格书- AU 系列

Approval Specification for Automotive Ultra-High Power Thick Film Chip Resistors-Type AU

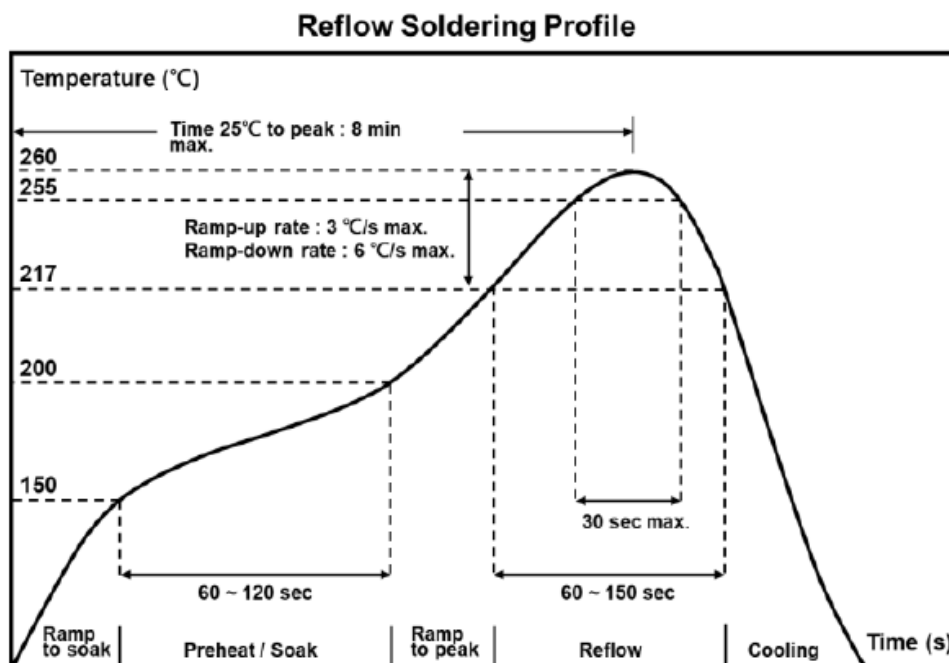
11. 焊盘尺寸 (Recommended land patterns):



Item \ Type	Dimensions (mm)						
	0402	0603	0805	1206	1210	2010	2512
A	0.60	0.80	1.30	2.20	2.00	3.80	4.90
B	1.60	2.40	2.90	4.20	4.40	6.60	8.10
C	0.70	1.00	1.40	1.70	2.70	2.70	3.40

12. 焊接 (soldering)

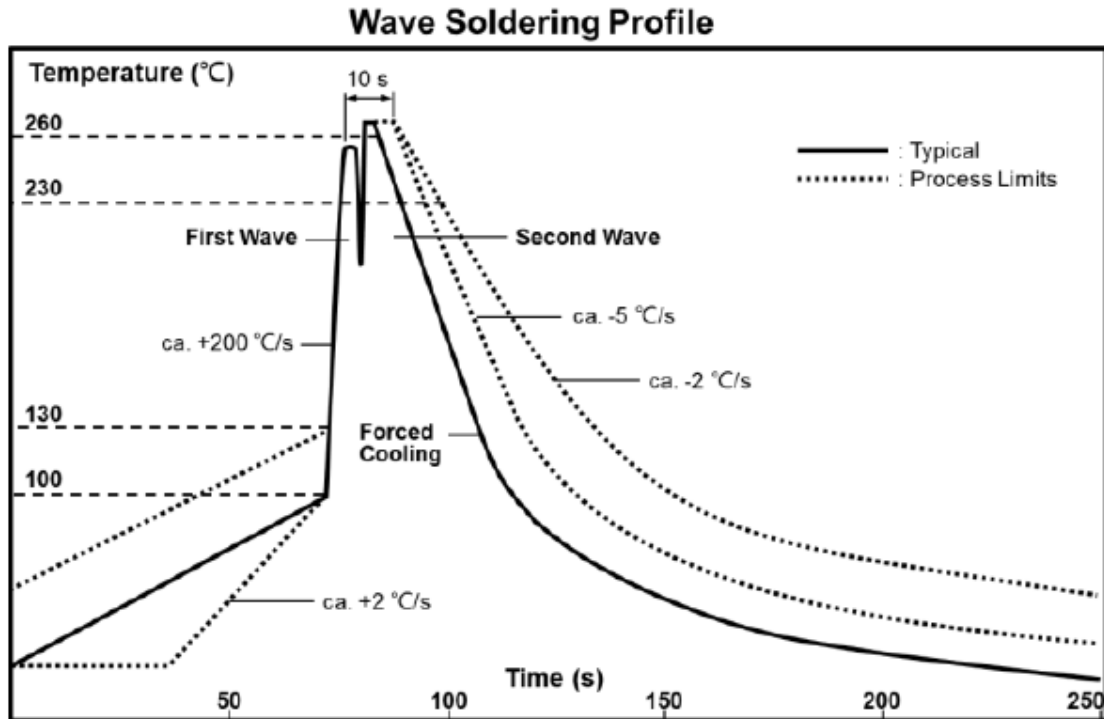
12.1 建议回流焊曲线 (Recommend reflow soldering profile)



车规超高功率厚膜贴片电阻规格书- AU 系列

Approval Specification for Automotive Ultra-High Power Thick Film Chip Resistors-Type AU

12.2 建议波峰焊曲线 (Recommend wave soldering profile)



12.3 手工焊温度 (hand soldering temperature)

烙鐵溫度 350°C 3~5 秒之內，避免烙鐵接觸電阻本體

The iron temperature is 350°C, hand soldering time less than 3~5S. Avoid solder iron tip direct touch the components body.

产品规格及资料如有更改，恕不另行通知。

All product specification and data are subject to change without notice.