



后芮驷(上海)电子有限公司

Horus International Electronics Co., LTD.

承认书

SPECIFICATION FOR APPROVAL

编号:

品名	DESCRIPTION:	厚膜抗突波电阻
规格	SPEC :	HRS-ASXXXXXXXXXXXXXZ
包装	PACKAGE:	卷装
客户	CUSTOMER:	
客户料号	CUSTOMER P/N:	

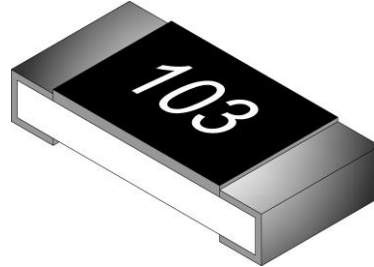
APPROVED BY	
CUSTOMER	 HORUS



AS Series Thick Film Anti-Surge Chip Resistor Product Specifications

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Thick Film Anti-Surge Chip Resistor — AS Series



Application

- Metering(Testing/Measurement)
- Medical Devices
- Automotive
- Power supply
- Charger
- Inverter
- LCD Video Monitors

Features

- High power rating
- Improved working voltage ratings
- Standard package sizes of 0402~2512
- excellent Anti-Pulse ability (Tolerance 1%&2%)
- excellent Anti-Surge ability (Tolerance 5%&10%&20%&30%)
- AEC-Q200 Compliant

Parts Number Explanation

Example:

AS	0603	J	10R0	P	05	Z
Product Type	Size (Inch)	Resistor Tolerance	Resistor Value	Package	Quantity	Optional
AS	0402 0603 0805 1206 1210 2010 2512	F : ±1% G : ±2% J : ±5% K : ±10% M : ±20% N : ±30%	1R=1R00 10R=10R0 100R=100R 1K=1K00 1M=1M00	P : Paper Taping (0603~1210) Q : Paper Taping (0402) E : Embossed Taping	04 : 4000PCS 05 : 5000PCS 10 : 10000PCS 40 : 40000PCS 50 : 50000PCS	Z : Type-1 Normal Type H : Type-2 High Power



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■ Standard Electrical Specifications Type-1

Item Type-1	Rated Power at 70°C	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/°C)	Resistance Range		
					F(±1%) G(±2%)	J(±5%) K(±10%)	M(±20%) N(±30%)
AS0402	0.1 W	50V	100V	±400	$1\Omega \leq R < 10\Omega$	$1\Omega \leq R < 10\Omega$	
				±300		$10\Omega \leq R < 1K\Omega$	
				±200	$10\Omega \leq R \leq 1M\Omega$	$1K\Omega \leq R \leq 10M\Omega$	
AS0603	0.125 W	150V	200V	±400	$1\Omega \leq R < 10\Omega$	$1\Omega \leq R < 10\Omega$	
				±200	-	-	$10\Omega \leq R \leq 10M\Omega$
				±100	$10\Omega \leq R \leq 1M\Omega$	$10\Omega \leq R \leq 10M\Omega$	-
AS0805	0.25 W	150V	300V	±400	$1\Omega \leq R < 10\Omega$	$1\Omega \leq R < 10\Omega$	
				±200	-	-	$10\Omega \leq R \leq 10M\Omega$
				±100	$10\Omega \leq R \leq 1M\Omega$	$10\Omega \leq R \leq 10M\Omega$	-
AS1206	0.33 W	200V	400V	±400	$1\Omega \leq R < 10\Omega$	$1\Omega \leq R < 10\Omega$	
				±200	-	-	$10\Omega \leq R \leq 10M\Omega$
				±100	$10\Omega \leq R \leq 1M\Omega$	$10\Omega \leq R \leq 10M\Omega$	-
AS1210	0.5 W	200V	400V	±400	$1\Omega \leq R < 10\Omega$	$1\Omega \leq R < 10\Omega$	
				±200	-	-	$10\Omega \leq R \leq 10M\Omega$
				±100	$10\Omega \leq R \leq 1M\Omega$	$10\Omega \leq R \leq 10M\Omega$	-
AS2010	0.75 W	400V	800V	±400	$1\Omega \leq R < 10\Omega$	$1\Omega \leq R < 10\Omega$	
				±200	-	-	$10\Omega \leq R \leq 10M\Omega$
				±150	$10\Omega \leq R \leq 1M\Omega$	$10\Omega \leq R \leq 10M\Omega$	-
AS2512	1.5 W	500V	1000V	±400	$1\Omega \leq R < 10\Omega$	$1\Omega \leq R < 10\Omega$	
				±200	-	-	$10\Omega \leq R \leq 10M\Omega$
				±150	$10\Omega \leq R \leq 1M\Omega$	$10\Omega \leq R \leq 10M\Omega$	-

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55°C ~ +155°C.



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■ High Power Rating Electrical Specifications Type-2

Item Type-2	Rated Power at 70°C	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/°C)	Resistance Range		
					F(±1%) G(±2%)	J(±5%) K(±10%)	M(±20%) N(±30%)
AS0402	0.125W	50V	100V	±400	$1\Omega \leq R < 10\Omega$	$1\Omega \leq R < 10\Omega$	
				±300	-	$10\Omega \leq R < 1K\Omega$	
				±200	$10\Omega \leq R \leq 1M\Omega$	$1K\Omega \leq R \leq 10M\Omega$	
AS0603	0.25 W	150V	200V	±400	$1\Omega \leq R < 10\Omega$	$1\Omega \leq R < 10\Omega$	
				±200	-	-	$10\Omega \leq R \leq 10M\Omega$
				±100	$10\Omega \leq R \leq 1M\Omega$	$10\Omega \leq R \leq 10M\Omega$	-
AS0805	0.4 W	150V	300V	±400	$1\Omega \leq R < 10\Omega$	$1\Omega \leq R < 10\Omega$	
				±200	-	-	$10\Omega \leq R \leq 10M\Omega$
				±100	$10\Omega \leq R \leq 1M\Omega$	$10\Omega \leq R \leq 10M\Omega$	-
AS1206	0.5 W	200V	400V	±400	$1\Omega \leq R < 10\Omega$	$1\Omega \leq R < 10\Omega$	
				±200	-	-	$10\Omega \leq R \leq 10M\Omega$
				±100	$10\Omega \leq R \leq 1M\Omega$	$10\Omega \leq R \leq 10M\Omega$	-
AS1210	0.75 W	200V	400V	±400	$1\Omega \leq R < 10\Omega$	$1\Omega \leq R < 10\Omega$	
				±200	-	-	$10\Omega \leq R \leq 10M\Omega$
				±100	$10\Omega \leq R \leq 1M\Omega$	$10\Omega \leq R \leq 10M\Omega$	-
AS2010	1 W	400V	800V	±400	$1\Omega \leq R < 10\Omega$	$1\Omega \leq R < 10\Omega$	
				±200	-	-	$10\Omega \leq R \leq 10M\Omega$
				±150	$10\Omega \leq R \leq 1M\Omega$	$10\Omega \leq R \leq 10M\Omega$	-
AS2512	2 W	500V	1000V	±400	$1\Omega \leq R < 10\Omega$	$1\Omega \leq R < 10\Omega$	
				±200	-	-	$10\Omega \leq R \leq 10M\Omega$
				±150	$10\Omega \leq R \leq 1M\Omega$	$10\Omega \leq R \leq 10M\Omega$	-

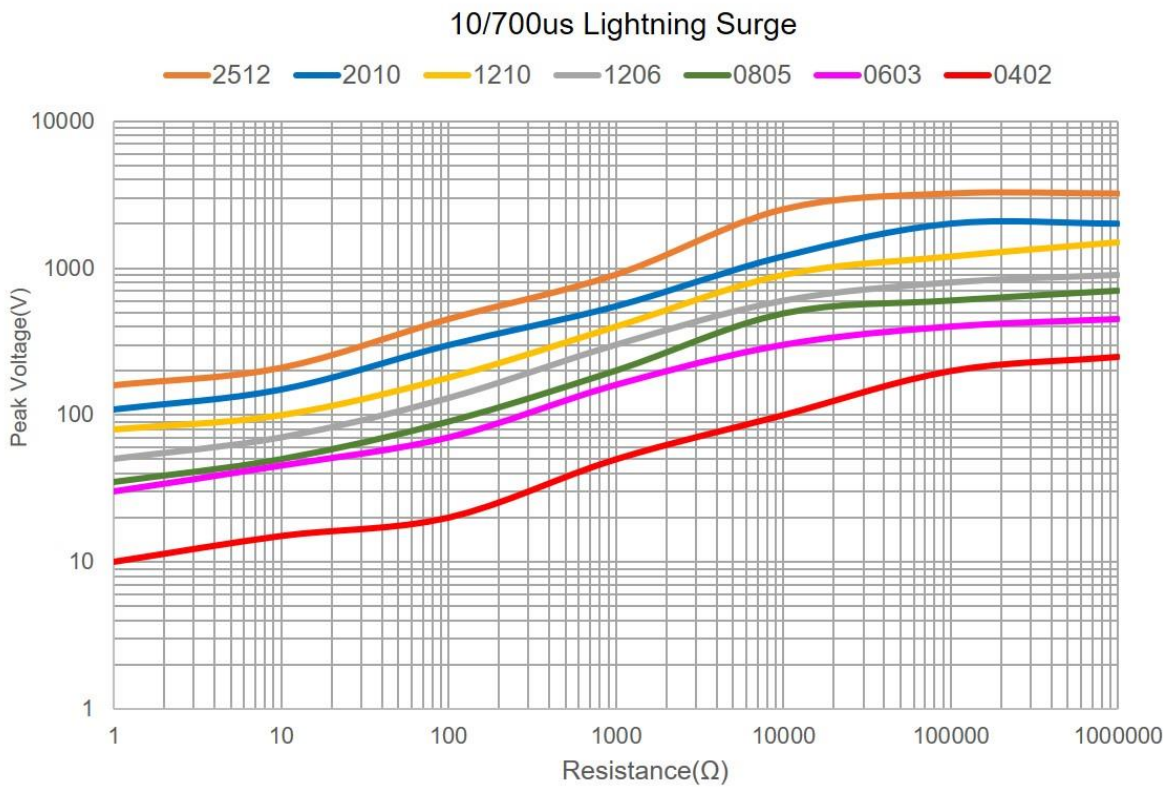
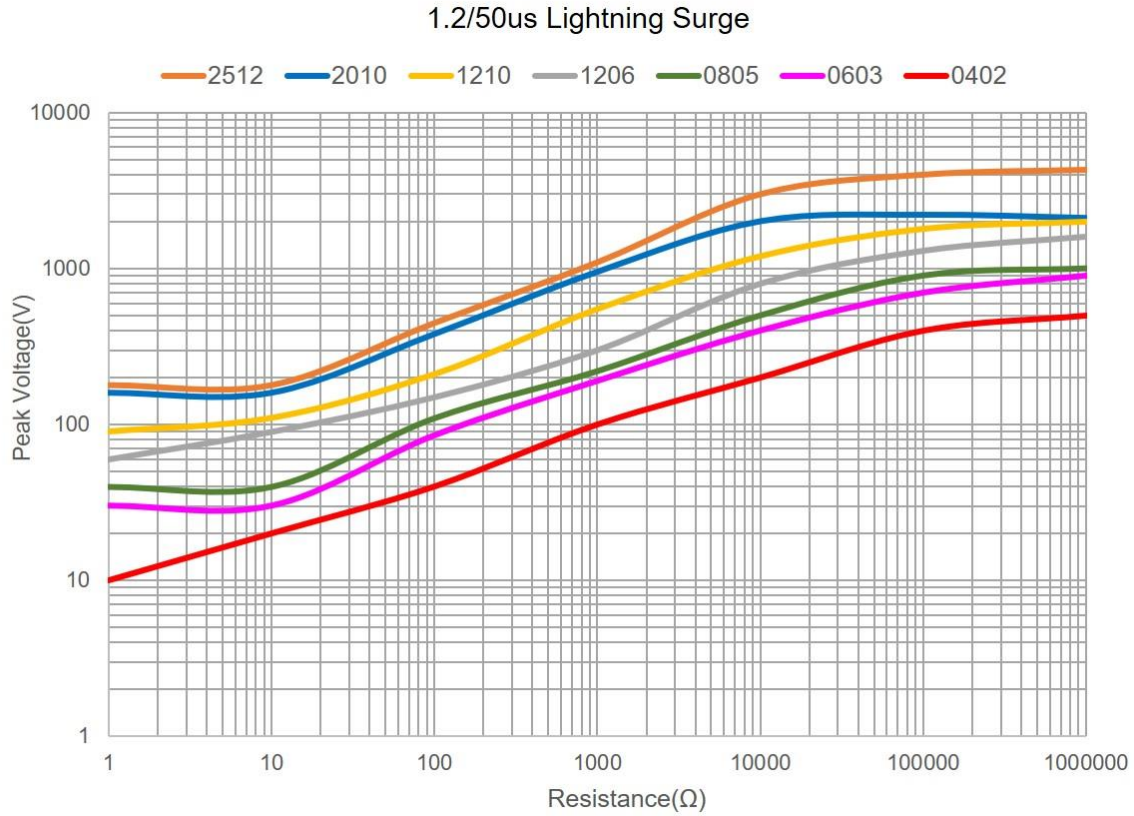
- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55°C ~ +155°C



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■ Lightning Surge:

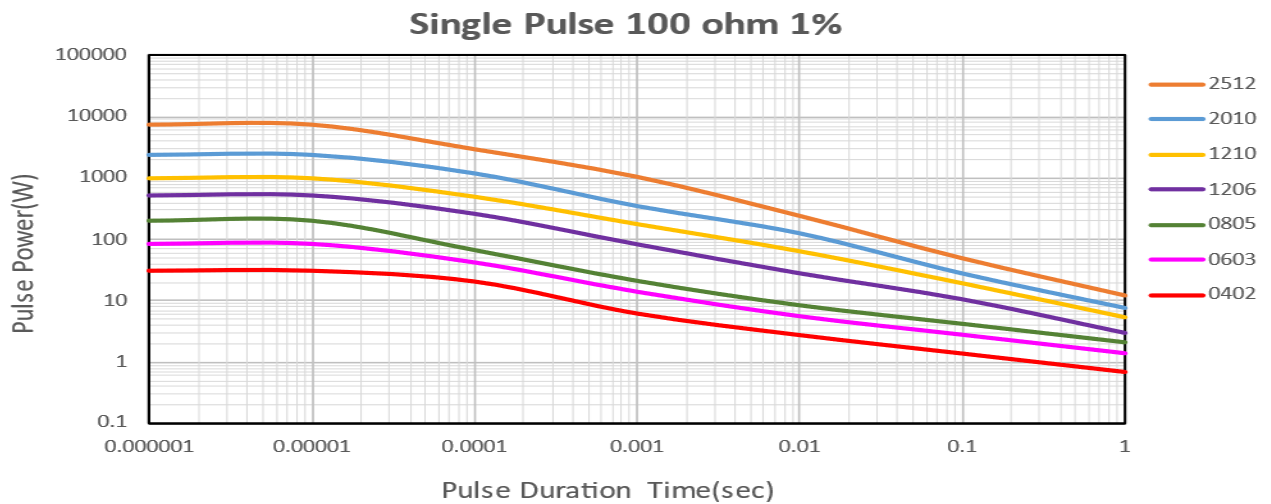
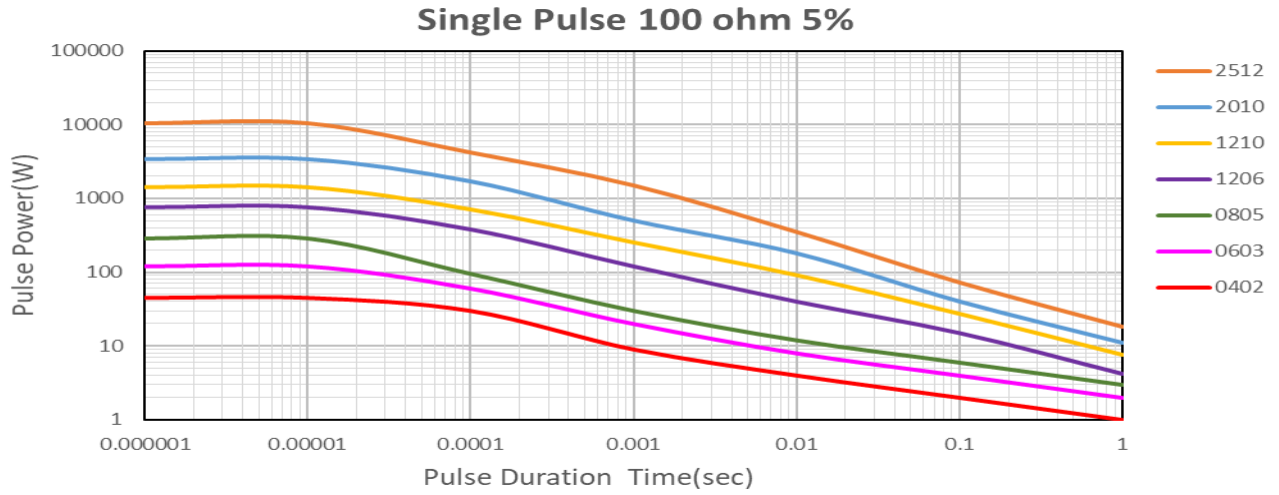




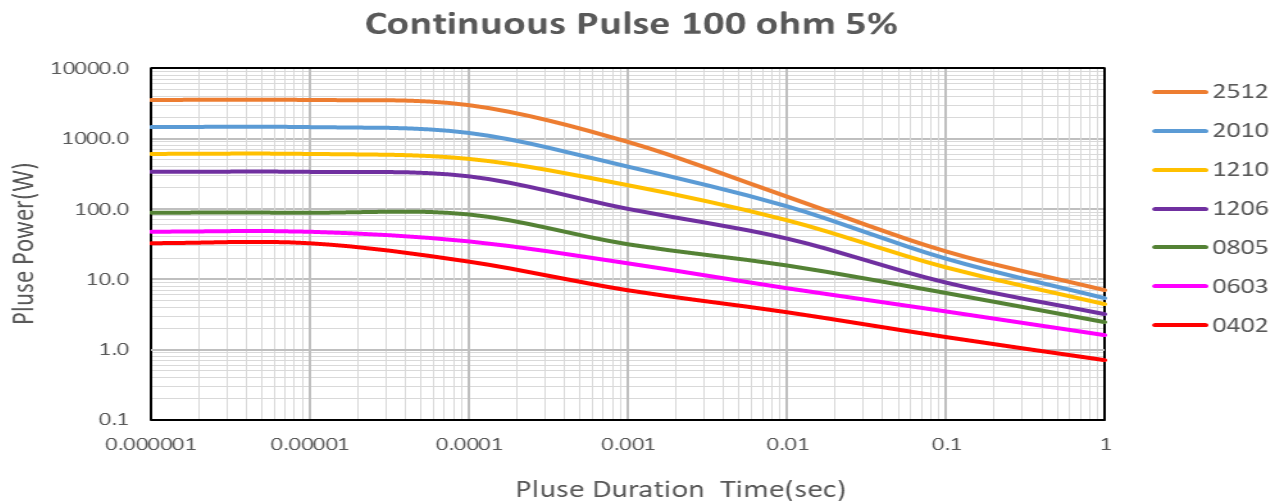
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Single Pulse Power:



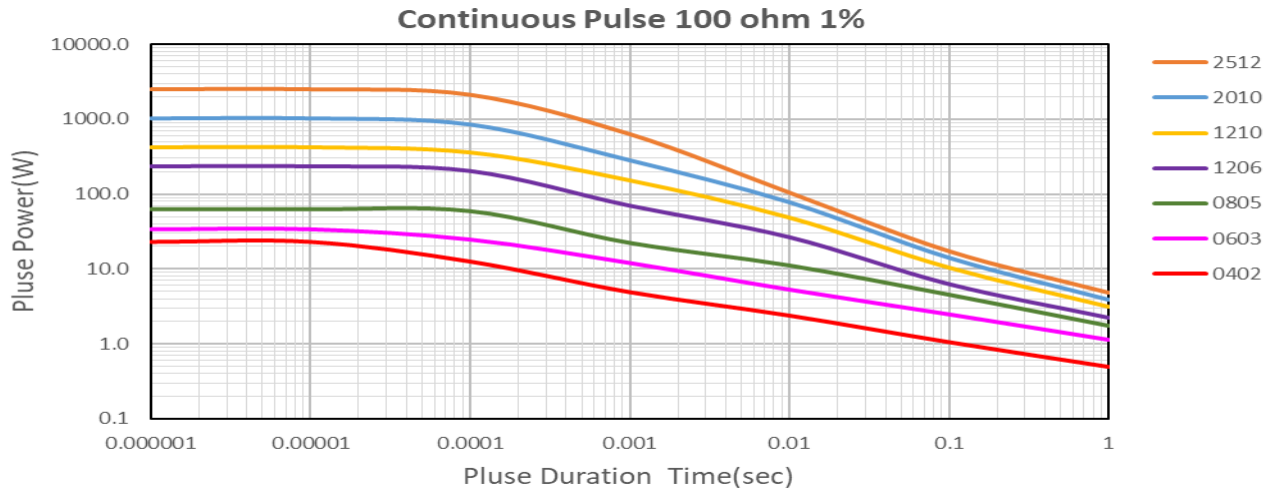
Continuous Pulse Power:



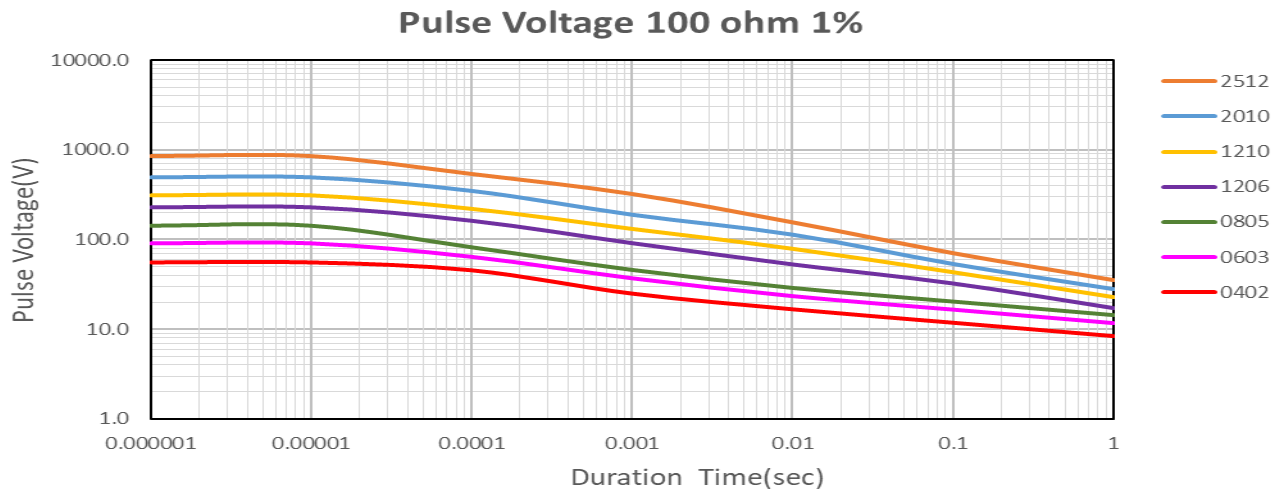
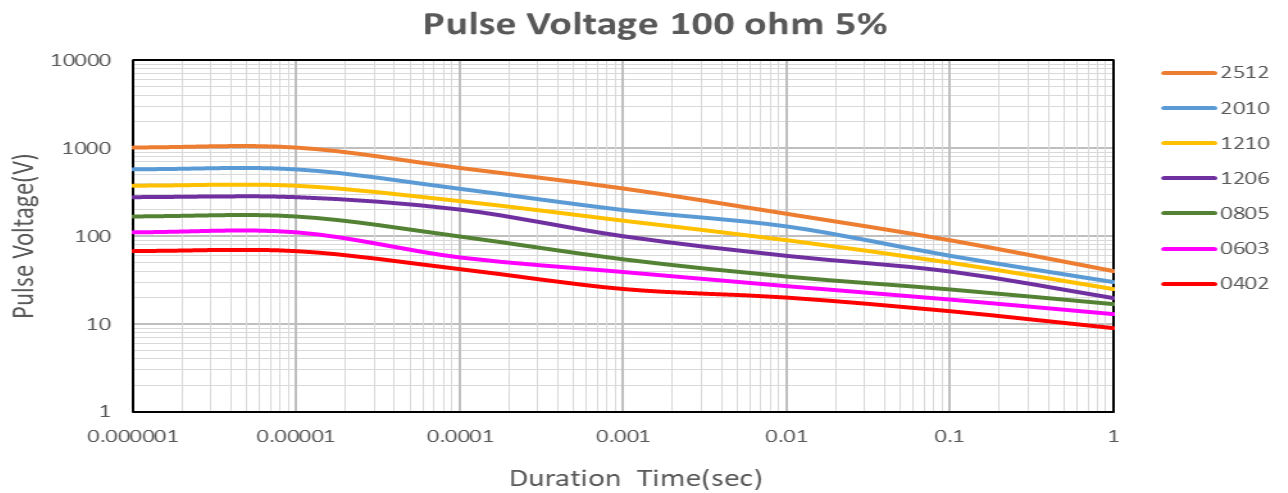


AS Series Thick Film Anti-Surge Chip Resistor Product Specifications

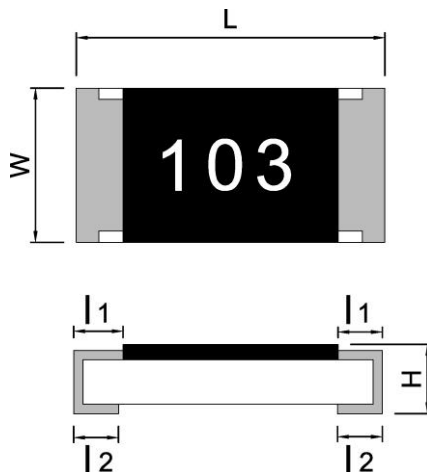
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■ Pulse Voltage:



■ Type Dimension



AS0402 / AS0603 / AS0805 / AS1206 / AS1210 / AS2010 / AS2512

TYPE-1	L	W	H	l ₁	l ₂
AS0402	1.00 ± 0.05	0.50 ± 0.05	0.30 ± 0.05	0.15 ± 0.10	0.20 ± 0.10
AS0603	1.60 ± 0.10	0.80 ± 0.10	0.40 ± 0.10	0.30 ± 0.20	0.30 ± 0.10
AS0805	2.00 ± 0.10	1.25 ± 0.10	0.50 ± 0.15	0.30 ± 0.15	0.40 ± 0.15
AS1206	3.05 ± 0.10	1.60 ± 0.10	0.55 ± 0.15	0.40 ± 0.20	0.50 ± 0.20
AS1210	3.05 ± 0.10	2.50 ± 0.15	0.55 ± 0.15	0.50 ± 0.20	0.50 ± 0.20
AS2010	5.00 ± 0.20	2.50 ± 0.15	0.55 ± 0.10	0.60 ± 0.20	0.60 ± 0.20
AS2512	6.30 ± 0.20	3.20 ± 0.15	0.68 ± 0.10	0.60 ± 0.20	0.60 ± 0.20

TYPE-2	L	W	H	l ₁	l ₂
AS0402	1.00 ± 0.05	0.50 ± 0.05	0.30 ± 0.05	0.15 ± 0.10	0.20 ± 0.10
AS0603	1.60 ± 0.10	0.80 ± 0.10	0.40 ± 0.10	0.30 ± 0.20	0.30 ± 0.10
AS0805	2.00 ± 0.10	1.25 ± 0.10	0.50 ± 0.15	0.30 ± 0.15	0.40 ± 0.15
AS1206	3.05 ± 0.10	1.60 ± 0.10	0.55 ± 0.15	0.40 ± 0.20	0.50 ± 0.20
AS1210	3.05 ± 0.10	2.50 ± 0.15	0.55 ± 0.15	0.50 ± 0.20	0.50 ± 0.20
AS2010	5.00 ± 0.20	2.50 ± 0.15	0.55 ± 0.10	0.60 ± 0.20	0.60 ± 0.20
AS2512	6.30 ± 0.20	3.20 ± 0.15	0.68 ± 0.10	0.60 ± 0.20	0.60 ± 0.20

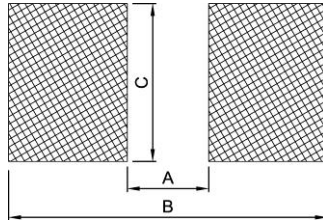


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● General Information

■ Recommend Land Pattern Design



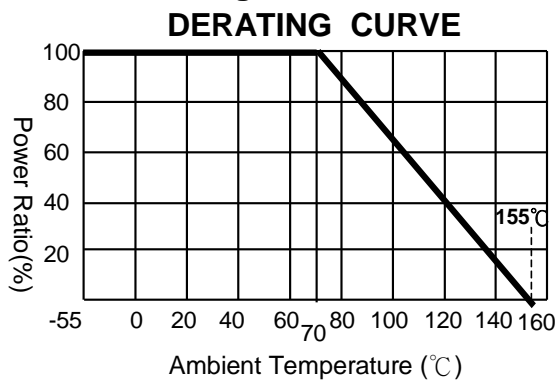
■ Dimension

Unit:mm

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

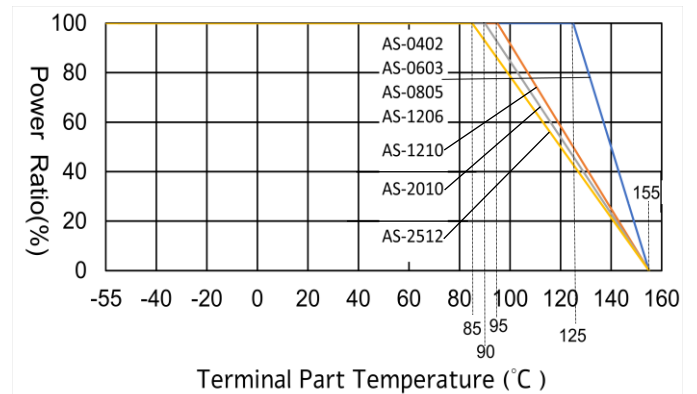
■ Performance Characteristics

■ Power Derating Curve



Power rating or current rating is in the case based on continuous full-load at ambient temperature of 70°C. For operation at ambient temperature in excess of 70°C, the load should be derated in accordance with figure of derating Curve.

■ Terminal part temperature



For resistors operated terminal part temperature of described for each size or above, a power rating shall be derated in accordance with derating curve.

■ Voltage Rating or Current Rating

Resistance Range: $\geq 1\Omega$

Rated Voltage: The resistor shall have a DC continuous working voltage or a RMS AC continuous working voltage at commercial-line frequency and wave form corresponding to the power rating, as determined formula as following:

$$E(RCWV) = \sqrt{P \times R}$$

E=Rated voltage(V)

P=Power rating(W)

R=Nominal resistance(Ω)



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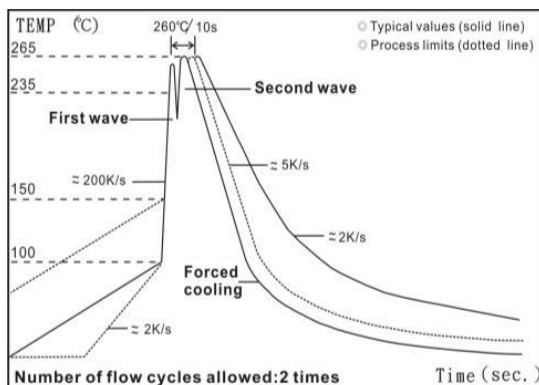
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● Reliability Test and Requirement

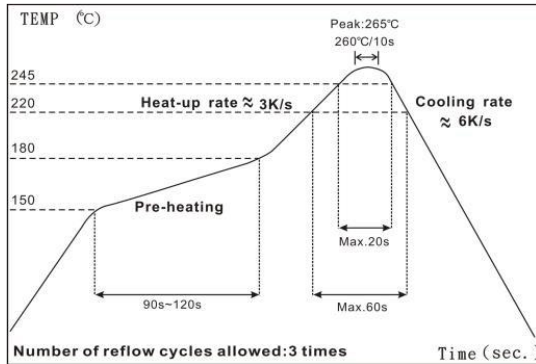
Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (T.C.R)	JIS-C-5201-1 4.8 IEC-60115-1 4.8	At 25°C / -55°C and 25°C / +155°C, 25°C is the reference temperature	Refer to Ratings
Short Time Overload	JIS-C-5201-1 4.13 IEC-60115-1 4.13	2.5 times RCWV or Max. Overload voltage whichever is less for 5 seconds.	±(1.0%+0.05Ω)
Single pulse high voltage overload	IEC-60115	Severity No. 4: $U = 10 \times \sqrt{P_{70} \times R}$ or $U = 2 \times U_{MAX}$; whichever is the less severe. One pulse per minute, 10 pulses 10 / 700 μs.	±(1.0%+0.05Ω)
Leaching	JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1	260±5°C for 30 seconds.	Individual leaching area ≤ 5% Total leaching area ≤ 10%
Resistance to Soldering Heat	JIS-C-5201-1 4.18 IEC-60115-1 4.18	260±5°C for 10 seconds.	±(1.0%+0.05Ω)
Rapid Change of Temperature	JIS-C-5201-1 4.19 IEC-60115-1 4.19	-55°C to +155°C, 5 cycles	±(1.0%+0.10Ω)
Resistance to Solvent	JIS-C-5201-1 4.29	The tested resistor be immersed into isopropyl alcohol of 20~25°C for 60 secs. Then the resistor is left in the room for 48 hrs.	±(0.5%+0.05Ω)
Damp Heat with Load	JIS-C-5201-1 4.24 IEC-60115-1 4.24	40±2°C, 90~95% R.H. RCWV or Max. working voltage whichever is less for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF" .	±(2.0%+0.05Ω)
Load Life (Endurance)	JIS-C-5201-1 4.25 IEC-60115-1 4.25.1	70±2°C, RCWV or Max. working voltage whichever is less for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF" .	±(3.0%+0.10Ω)
Insulation Resistance	JIS-C-5201-1 4.6 IEC-60115-1 4.6	Apply 100VDC for 1 minute.	≥10GΩ
Bending Strength	JIS-C-5201-1 4.33 IEC-60115-1 4.33	Bending once for 5 seconds D : 0402 · 0603 · 0805=5mm 1206 · 1210 · 1812=3mm 2010 · 2512=2mm	±(1.0%+0.05Ω)

■ Recommended Customer Soldering Parameters

■ Wave solder Temperature condition



■ Solder reflow Temperature condition



■ Rework temperature (hot air equipment) : 350°C, 3~5seconds

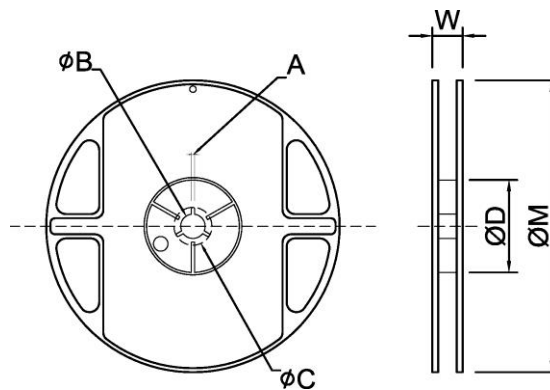
■ Recommended reflow methods

IR, vapor phase oven, hot air oven

If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

■ Appendix For SMD Chip Resistor

● Packaging Information

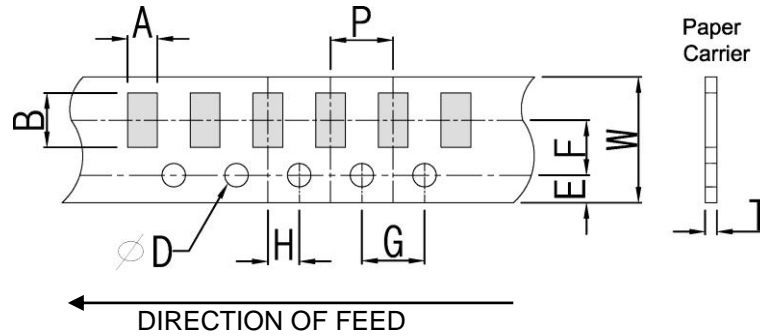


■ Dimension

Unit:mm

TYPE	SIZE	A	φB	φC	φD	W	φM
0402	7"	10K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	178±2.0
	13"	40K/50K Reel	2.0±0.5	13.5±1.0	21±1.0	100±1.0	330±2.0
0603/0805/1206/1210	7"	5K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	178±2.0
0603/0805 /1206	10"	10K/Reel	2.0±0.5	13.5±1.0	21±1.0	100±1.0	254±2.0
	13"	20K/Reel	2.0±0.5	13.5±1.0	21±1.0	100±1.0	330±2.0
2010/2512	7"	4K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	178±2.0

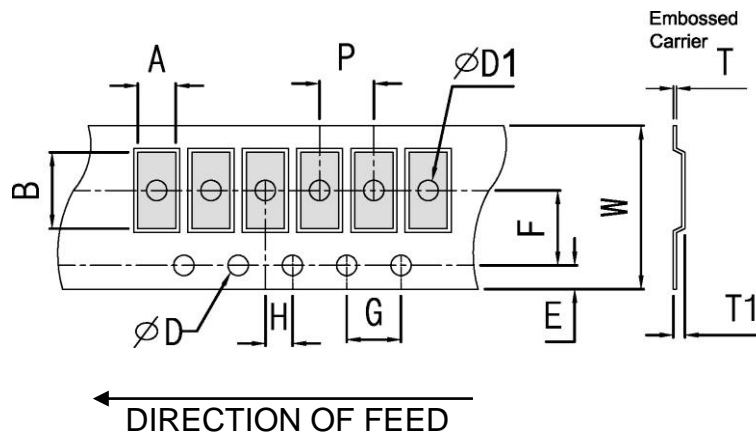
■ Tapping Specification



■ Dimension

Unit:mm

Packaging	Type	A	B	W	E	F	G	H	T	ϕD	P
Paper Type	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 +0.10 -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



■ Dimension

Unit:mm

Packaging	Type	A	B	W	E	F	G	H	T	ϕD	$\phi D1$	T1	P
Embossed Type	2010	2.80±0.20	5.60±0.20	12±0.10	1.75±0.10	5.5±0.05	4.0±0.10	2.0±0.05	0.23±0.10	1.50 +0.10 -0	1.50±0.10	0.85±0.15	4.0±0.1
	2512	3.40±0.20	6.70±0.20	12±0.10	1.75±0.10	5.5±0.05	4.0±0.10	2.0±0.05	0.23±0.10		1.50±0.10	0.95±0.15	

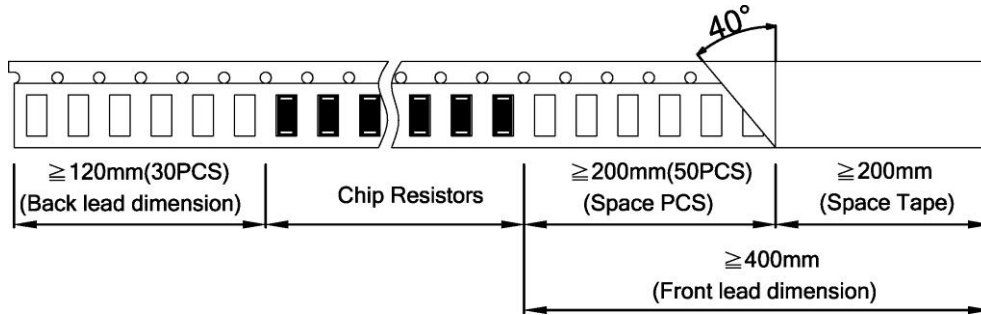


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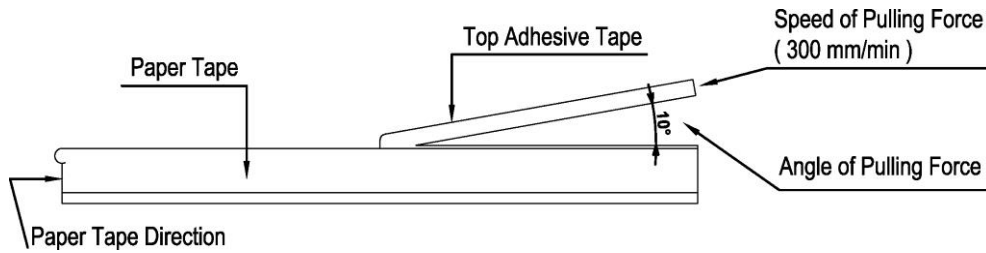
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■ Packing Material Data/Storage Data

■ Front & Back Lead Dimension

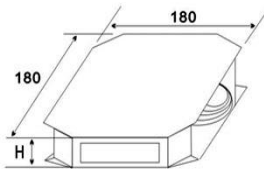


■ Top Adhesive Peel Off Strength : 10~70g

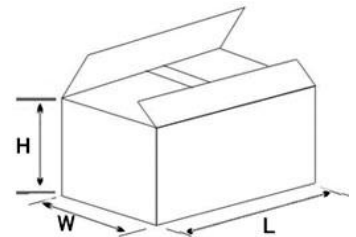


■ Package

Inner Box Size	
Reel	Size H(mm)
1	13
2	24
3	36
5	60
10	113



External Box Size			
Contain (Kpcs)	Length (mm)	Width (mm)	Height (mm)
25K	180	180	60
50K	180	180	110
150K	430	200	200
300K	400	400	200



■ Storage Data :

Storage time at the environment temp: $25\pm 5^\circ\text{C}$ & humidity: $60\pm 20\%$ is valid for one year from the date of delivery.



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■ Standard Resistance Values in a Decade

Marking code:

- 1%: marking code, please refer to E96 and E24 data form as below
 Ex: 120K, The marking code is 1203 in E24
 121K, The marking code is 1213 in E96
- 5%: marking code, please refer to E24 data form as below
 Ex: 120K, The marking code is 124 in E24
- Note: 0402 series resistor has no marking code.
- Type: 0603 1% marking code, please refer to E-96 multiplier code.
- Note: jumper zero ohm resistor marking code is one 「0」 (except type below 0402).

E96	E48	E96	E48	E96	E48	E96	E48	E96	E48						
100	100	169	169	287	287	487	487	825	825						
102		174		294		499		845							
105	105	178	178	301	301	511	511	866	866						
107		182		309		523		887							
110	110	187	187	316	316	536	536	909	909						
113		191		324		549		931							
115	115	196	196	332	332	562	562	953	953						
118		200		340		576		976							
121	121	205	205	348	348	590	590								
124		210		357		604		E24	E12	E6	E3				
127	127	215	215	365	365	619	619	10	10	10	10				
130		221		374		634		11							
133	133	226	226	383	383	649	649	12	12						
137		232		392		665		13							
140	140	237	237	402	402	681	681	15	15	15					
143		243		412		698		16							
147	147	249	249	422	422	715	715	18	18						
150		255		432		732		20							
154	154	261	261	442	442	750	750	22	22	22	22				
158		267		453		768		24							
162	162	274	274	464	464	787	787	27	27						
165		280		475		806		30							
								33	33	33					
								36							
								39	39						
								43							
								47	47	47	47				
								51							
								56	56						
								62							
								68	68	68					
								75							
								82	82						
								91							

According to IEC publication 63