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Data Sheet

Customer:	
Product:	Anti-Sulfurated Thick Film Chip Resistor - AS Series
Size:	0201/0402/0603/0805/1206/1210/2010/2512
Issued Date:	28-Jan-11
Edition:	REV.A9

Produced by (QC)	Checked (QC)	Approved by (QC)	Prepared by (Sales)	Accepted by (Customer)
28-Jan-11	28-Jan-11	28-Jan-11	28-Jan-11	
Susan Huang	***J.C. Liu***	***J.C. Liu***		

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Anti-Sulfurated Thick Film Chip Resistor
(AS Series)

■Scope

－This specification applies to all sizes of rectangular-type fixed chip resistors with Ruthenium-base as material.

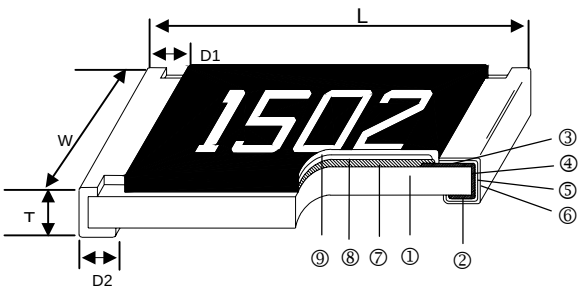
■Features

－Special construction to prevent sulfuration in a sulfur containing environment

■Applications

－Automotive
－High-end Computer
－Industrial Equipment
－Automatic Equipment Controller
－Medical Equipment
－High-end Multimedia Electronics
－Outdoor Electronic Applications

■Construction



①	Alumina Substrate	④	Edge Electrode (NiCr)	⑦	Resistor Layer (RuO_2/Ag)
②	Bottom Electrode (Ag)	⑤	Barrier Layer (Ni)	⑧	Primary Overcoat (Glass)
③	Top Electrode (Ag-Pd)	⑥	External Electrode (Sn)	⑨	Secondary Overcoat (Epoxy)

■Dimensions

Unit: mm

Type	Size (Inch)	L	W	T	D1	D2	Weight (g) (1000pcs)
AS01	0201	0.60±0.03	0.30±0.03	0.23±0.03	0.15±0.05	0.15±0.05	0.150
AS02	0402	1.00±0.05	0.50±0.05	0.35±0.05	0.20±0.10	0.20±0.10	0.620
AS03	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	2.042
AS05	0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.40±0.20	4.368
AS06	1206	3.10±0.10	1.55±0.10	0.55±0.10	0.50±0.25	0.50±0.20	8.947
AS10	1210	3.10±0.10	2.60±0.15	0.55±0.10	0.50±0.25	0.50±0.20	15.959
AS0A	2010	5.00±0.10	2.50±0.15	0.55±0.10	0.60±0.25	0.50±0.20	24.241
AS12	2512	6.35±0.10	3.10±0.15	0.55±0.10	0.60±0.25	0.50±0.20	39.448

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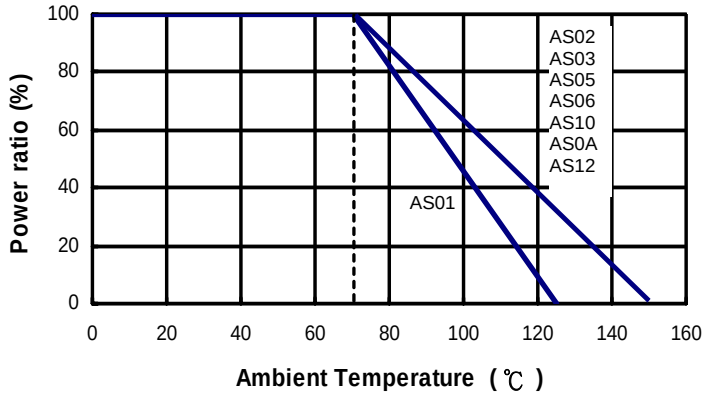
■Part Numbering

AS	03	F	T	E	1002
Product Type	Dimensions	Resistance Tolerance	Packaging Code	TCR (PPM/℃)	Resistance
	01: 0201 02: 0402 03: 0603 05: 0805 06: 1206 10: 1210 0A: 2010 12: 2512	D: ±0.5% F: ±1% J: ±5%	B: Bulk T: Taping Reel	E: ±100 F: ±200	R0R0: 0Ω 1000: 100Ω 1002: 10KΩ 2201: 2.2KΩ 1003: 100KΩ

■Derating Curve



■Electrical Specifications

Item / Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range ±0.5%	Resistance Range ±1%	Resistance Range ±5%	TCR (PPM/°C)
AS01 (0201)	1/20W	-55 ~ +125°C	25V	50V	—	1Ω - 10MΩ		±200
Jumper	1A				—	0Ω(<50mΩ)		—
AS02 (0402)	1/16W	-55 ~ +155°C	50V	100V	0Ω(<50mΩ) 1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ			— ±200 ±100 ±200
Jumper	1A							
AS03 (0603)	1/10W		50V	100V				
Jumper	1A							
AS05 (0805)	1/8W		150V	300V				
Jumper	1A							
AS06 (1206)	1/4W		200V	400V				
Jumper	2A							
AS10 (1210)	1/3W		200V	400V				
Jumper	2.5A							
AS0A (2010)	3/4W		200V	400V				
Jumper	3.5A							
AS12 (2512)	1W		250V	500V				
Jumper	4A							

Operating Voltage=√(P*R) or Max. operating voltage listed above, whichever is lower.

Overload Voltage=2.5*√(P*R) or Max. overload voltage listed above, whichever is lower.

■ SUPEROHM is capable of manufacturing the opt ional spec based on customer's requirement.

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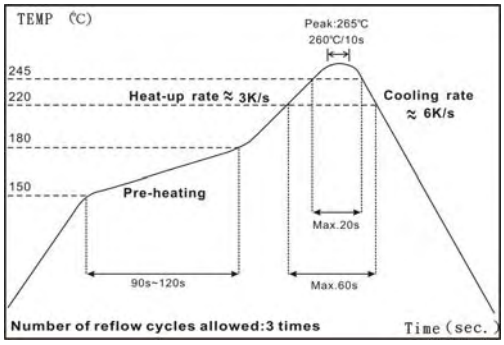
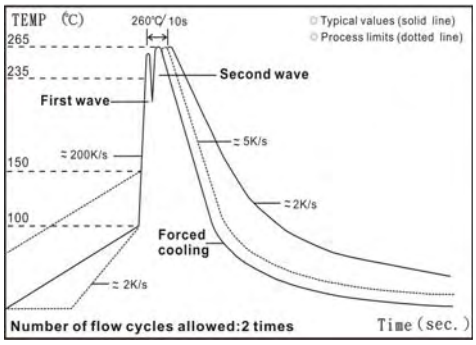
■Soldering Condition



IR Reflow Soldering



Wave Soldering (Flow Soldering)

(1) Time of IR reflow soldering at maximum temperature point 260°C：10s

(2) Time of wave soldering at maximum temperature point 260°C：10s

(3) Time of soldering iron at maximum temperature point 410°C：5s

■Environmental Characteristics

Item	Requirement			Test Method
	±1% and Below	±5%	Jumper	
Temperature Coefficient of Resistance (T.C.R.)	As Spec.			**JIS C 5201-1 4.8** **IEC 60115-1 4.8** -55°C~+125°C, 25°C is the reference temperature
Short Time Overload	±(1.0%+0.05Ω)	±(2.0%+0.05Ω)	<50mΩ	**JIS C 5201-1 4.13** **IEC 60115-1 4.13** RCWV*2.5 or Max. overload voltage for 5 seconds
Insulation Resistance	≧10G			**JIS C 5201-1 4.6** **IEC 60115-1 4.6** Max. overload voltage for 1 minute
Endurance	±(2.0%+0.10Ω)	±(3.0%+0.10Ω)	<100mΩ	**JIS C 5201-1 4.25** **IEC 60115-1 4.25.1** 70±2°C, Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load	±(2.0%+0.10Ω)	±(3.0%+0.10Ω)	<100mΩ	**JIS C 5201-1 4.24** 40±2°C, 90~95% R.H., Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Dry Heat	±(1.0%+0.05Ω)	±(1.5%+0.10Ω)	<50mΩ	**JIS C 5201-1 4.23.2** **IEC 60115-1 2.23.2** at +125/+155°C for 1000 hrs
Bending Strength	±(1.0%+0.05Ω)	±(1.0%+0.05Ω)	<50mΩ	**JIS C 5201-1 4.33** **IEC 60115-1 4.33** Bending once for 5 seconds 2010, 2512 sizes: 2mm Other sizes: 3mm
Solderability	95% min. coverage			**JIS C 5201-1 4.17** **IEC 60115-1 4.17** 245±5°C for 3 seconds
Resistance to Soldering Heat	±(0.5%+0.05Ω)	±(1.0%+0.05Ω)	<50mΩ	**JIS C 5201-1 4.18** **IEC 60115-1 4.18** 260±5°C for 10 seconds
Voltage Proof	No breakdown or flashover			**JIS C 5201-1 4.7** **IEC 60115-1 4.7** 1.42 times RCWV (RMS) for 1 minute
Leaching	Individual leaching area ≦5% Total leaching area ≦10%			**JIS C 5201-1 4.18** **IEC 60068-2-58 8.2.1** 260±5°C for 30 seconds
Rapid Change of Temperature	±(0.5%+0.05Ω)	±(1.0%+0.05Ω)	<50mΩ	**JIS C 5201-1 4.19** **IEC 60115-1 4.19** -55°C to +125/+155°C, 5 cycles
Sulfur Test	±(0.5%+0.05Ω)	±(0.5%+0.05Ω)	<50mΩ	**ASTM-B-809-95** 3~5ppm H2S, 50±2°C, 91~93% R.H., no power rating for 1000 hrs

■ Storage Temperature: 25±3°C; Humidity < 80%RH

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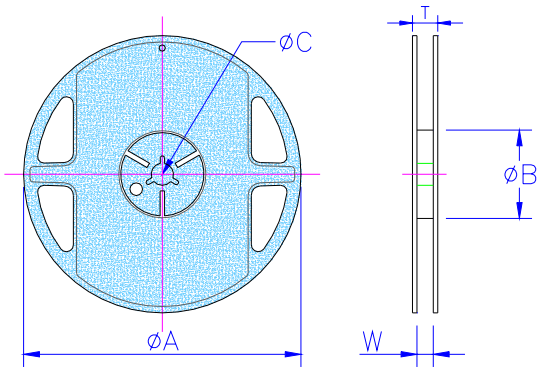
■Packaging

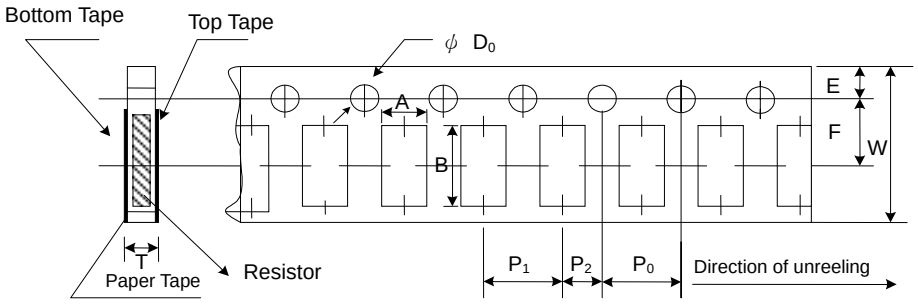
Reel Specifications & Packaging Quantity



Unit: mm

Type	Packaging Quantity		Tape Width	Reel Diameter	ΦA	ΦB	ΦC	W	T
AS01	Paper	15K	8mm	7 inch	178.5±1.5	$60^{+1/-0}$	13.0±0.2	9.0±0.5	12.5±0.5
AS01 AS02	Paper	10K 20K 40K	8mm	7 inch	178.5±1.5	$60^{+1/-0}$	13.0±0.2	9.0±0.5	12.5±0.5
				10 inch	254±1	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
AS03 AS05 AS06 AS10	Paper	5K 10K 20K		13 inch	330±1	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
AS0A AS12	Embossed	4K 8K	12mm	7 inch	178.5±1.5	$60^{+1/-0}$	13.0±0.5	13.0±0.5	15.5±0.5
				10 inch	250±1	62±0.5	13.0±0.5	12.5±0.5	16.5±0.5

Paper Tape Specifications



Unit: mm

Type	A	B	W	E	F	P_0	P_1	P_2	$ΦD_0$	T
AS01	0.38±0.05	0.68±0.05	8.0±0.2	1.75±0.1	3.50±0.05	4.00±0.1	2.00±0.05	2.00±0.05	1.50+0.1,-0	0.42±0.2
AS02	0.65±0.1	1.15±0.1	8.0±0.2	1.75±0.1	3.50±0.05	4.00±0.1	2.00±0.05	2.00±0.05	1.50+0.1,-0	0.45±0.1
AS03	1.10±0.1	1.90±0.1	8.0±0.2	1.75±0.1	3.50±0.05	4.00±0.1	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.70±0.1
AS05	1.60±0.1	2.40±0.2	8.0±0.2	1.75±0.1	3.50±0.05	4.00±0.1	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.1
AS06	1.90±0.1	3.50±0.2	8.0±0.2	1.75±0.1	3.50±0.05	4.00±0.1	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.1
AS10	2.90±0.1	3.50±0.2	8.0±0.2	1.75±0.1	3.50±0.05	4.00±0.1	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.1

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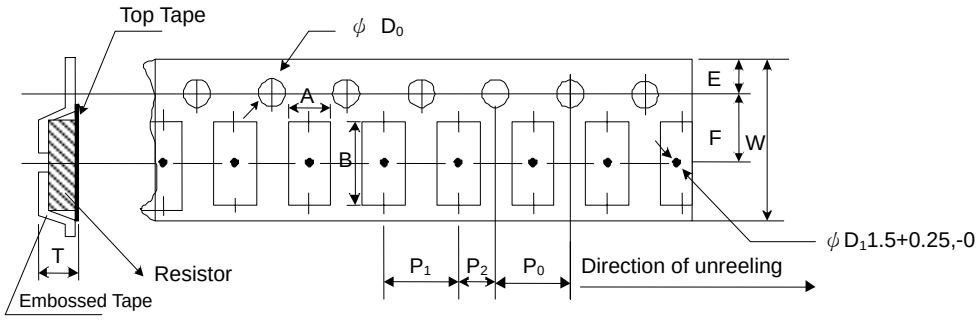
Embossed Plastic Tape Specifications



Unit: mm

Type	A	B	W	E	F	P_0	P_1	P_2	ΦD_0	T
AS0A	2.8±0.1	5.5±0.1	12.0±0.3	1.75±0.1	5.5±0.05	4.00±0.1	4.00±0.1	2.00±0.05	1.50+0.1, -0	1.2^{+0}
AS12	3.5±0.1	6.7±0.1	12.0±0.3	1.75±0.1	5.5±0.05	4.00±0.1	4.00±0.1	2.00±0.05	1.50+0.1, -0	1.2^{+0}

■Marking

No Marking for 0201 and 0402

1% for 0805/1206/1210/2010/2512: 4 digits marking

Example:

Resistance	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ
Marking	1000	2201	1002	4992	1003

5% for 0603/0805/1206/1210/2010/2512: 3 digits marking in E24

Example: 101=100Ω 102=1KΩ (1st and 2nd are E24 code and 3rd code is multiplier)

E24 code	10	11	12	13	15	16	18	20	22	24	27	30	33	36	39	43	47	51	56	62	68	75	82	91

1% for 0603: 3 digits marking in E96

3 digits marking for Example: 14C=13K7Ω 13C=13K3Ω

68B=4K99Ω 68X=49.9Ω

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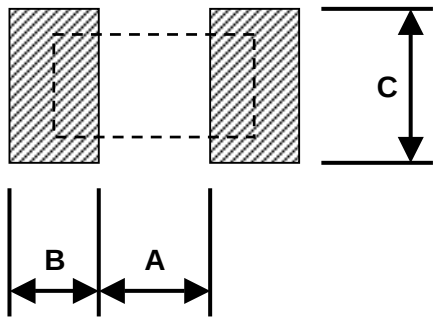
Marking Table

Code	E96	Code	E96	Code	E96	Code	E96
01	100	**25**	178	**49**	316	**73**	562
02	102	**26**	182	**50**	324	**74**	576
03	105	**27**	187	**51**	332	**75**	590
04	107	**28**	191	**52**	340	**76**	604
05	110	**29**	196	**53**	348	**77**	619
06	113	**30**	200	**54**	357	**78**	634
07	115	**31**	205	**55**	365	**79**	649
08	118	**32**	210	**56**	374	**80**	665
09	121	**33**	215	**57**	383	**81**	681
10	124	**34**	221	**58**	392	**82**	698
11	127	**35**	226	**59**	402	**83**	715
12	130	**36**	232	**60**	412	**84**	732
13	133	**37**	237	**61**	422	**85**	750
14	137	**38**	243	**62**	432	**86**	768
15	140	**39**	249	**63**	442	**87**	787
16	143	**40**	255	**64**	453	**88**	806
17	147	**41**	261	**65**	464	**89**	825
18	150	**42**	267	**66**	475	**90**	845
19	154	**43**	274	**67**	487	**91**	866
20	158	**44**	280	**68**	499	**92**	887
21	162	**45**	287	**69**	511	**93**	909
22	165	**46**	294	**70**	523	**94**	931
23	169	**47**	301	**71**	536	**95**	953
24	174	**48**	309	**72**	549	**96**	976

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

■Recommend Land Pattern

Unit: mm



Type	A	B	C
AS01	0.30	0.25	0.30
AS02	0.50	0.45	0.60
AS03	0.90	0.60	0.90
AS05	1.20	0.70	1.30
AS06	2.00	0.90	1.60
AS10	2.00	0.90	2.80
AS0A	3.80	0.90	2.80
AS12	3.80	1.60	3.50