Data Sheet

Customer:	
Product:	Green Anti-Sulfurated Thick Film Chip Resistor - ASG Series (Chip)
Size:	0402/0603/0805/1206/1210/2010/2512
Issued Date:	15-Jun-22
Edition:	REV.A

RoHS Compliant

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15-Jun-22	15-Jun-22	15-Jun-22		
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Green Anti-Sulfurated Thick Film Chip Resistor



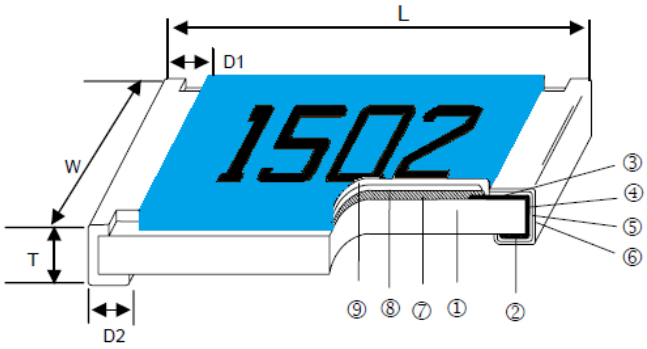
■Scope

－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
－Total Lead(Pb)-free without RoHS exemptions

■Construction



①	Alumina Substrate	④	Edge Electrode	⑦	Resistor Layer
②	Bottom Electrode	⑤	Barrier Layer	⑧	Primary Overcoat
③	Top Electrode	⑥	External Electrode	⑨	Secondary Overcoat

■Applications

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

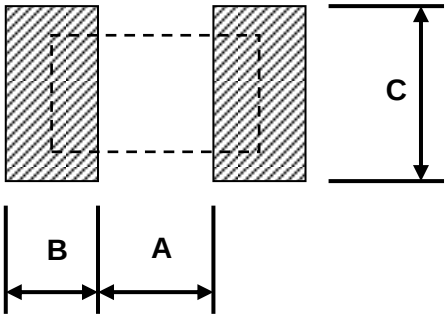
■Dimensions

Type	Size (Inch)	L (mm)	W (mm)	T (mm)	D1 (mm)	D2 (mm)	Weight (g) (1000pcs)
ASG02	0402	1.00±0.05	0.50±0.05	0.35±0.05	0.20±0.10	0.20±0.10	0.62
ASG03	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	2.04
ASG05	0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.40±0.20	4.36
ASG06	1206	3.10±0.10	1.55±0.10	0.55±0.10	0.50±0.25	0.50±0.20	8.9
ASG10	1210	3.10±0.10	2.60±0.15	0.55±0.10	0.50±0.25	0.50±0.20	15.9
ASG0A	2010	5.00±0.10	2.50±0.15	0.55±0.10	0.60±0.25	0.50±0.20	24.2
ASG12	2512	6.35±0.10	3.10±0.15	0.55±0.10	0.60±0.25	0.50±0.20	39.4

■Part Numbering

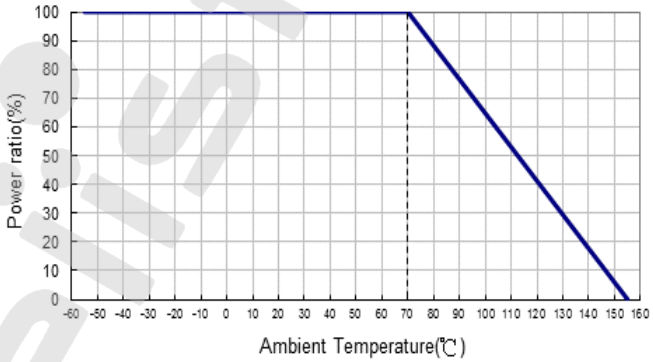
ASG	06	F	T	E	V	1002
Product Type	Dimensions	Resistance Tolerance	Packaging Code	TCR (PPM/°C)	Power Rating	Resistance
	02: 0402 03: 0603 05: 0805 06: 1206 10: 1210 0A: 2010 12: 2512	D: ±0.5% F: ±1% J: ±5%	T: 7”Taping Reel V:10”Taping Reel W:13”Taping Reel	E: ±100 F: ±200 - : No Specified	Y: 1/16W X: 1/10W W: 1/8W V: 1/4W O: 1/3W U: 1/2W Q: 3/4W T: 1W A: 1.5W	R0R0: 0Ω 0010: 1Ω 1000: 100Ω 1002: 10KΩ 2201: 2.2KΩ 1003: 100KΩ 1004: 1MΩ

■Recommend Land Pattern

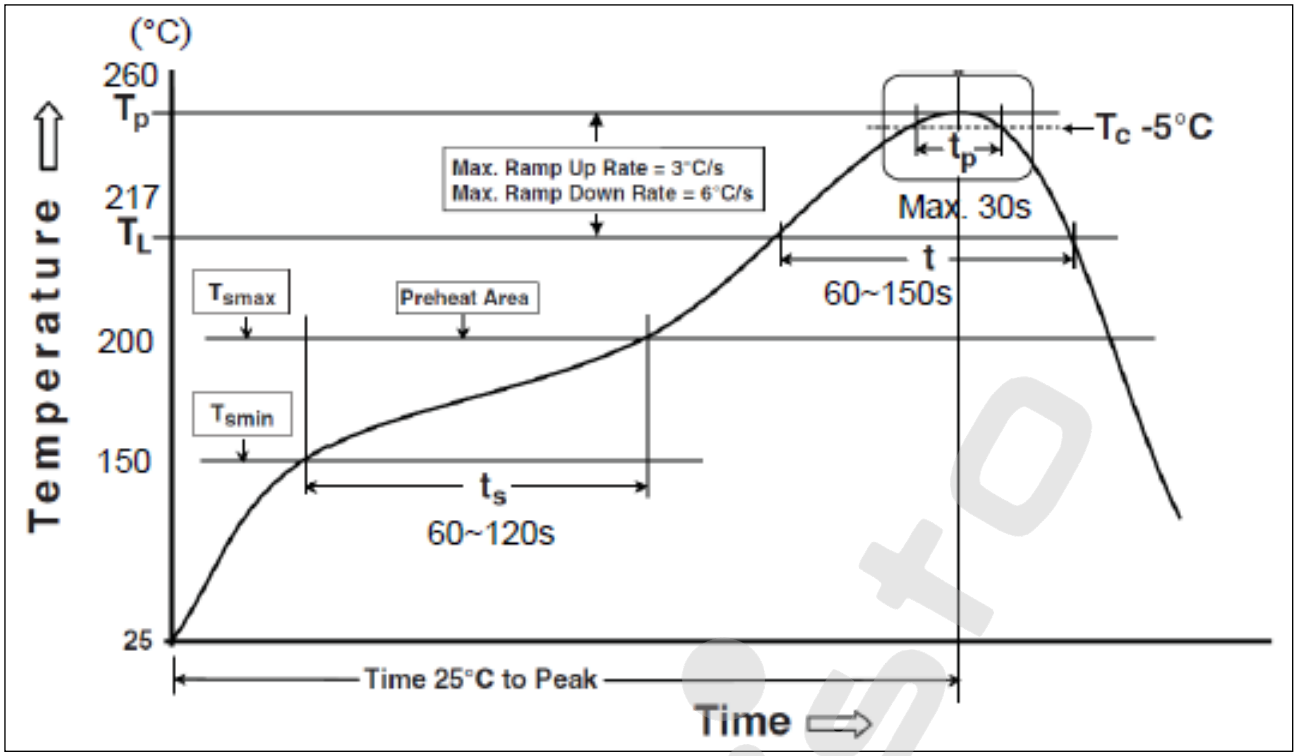


Type	A (mm)	B (mm)	C (mm)
ASG02	0.50	0.45	0.60
ASG03	0.90	0.60	0.90
ASG05	1.20	0.70	1.30
ASG06	2.00	0.90	1.60
ASG10	2.00	0.90	2.80
ASG0A	3.80	0.90	2.80
ASG12	4.90	1.60	3.50

■Derating Curve



■Soldering Condition (Ref. IPC/JEDEC J-STD-020 & J-STD-002)



Reflow Profiles	
Profile Feature	**Pb-Free Assembly**
Preheat Min. Temperature (Tsmin) Max Temperature (Tsmax) Preheating time (ts) from (Tsmin to Tsmax)	 150 °C 200 °C 60-120 seconds
Ramp-up rate (T_L to Tp)	3 °C/second max.
Liquidous temperature (T_L) Time (t_L) maintained above T_L	217 °C 60-150 seconds
Min. Peak temperature (Tp min)	235°C
Max. Peak temperature (Tp max)	260°C
Time (tp) within 5 °C of the specified classification temperature (Tc)	30 seconds max.
Ramp-down rate (Tp to T_L)	6 °C/second max.
Time 25 °C to peak temperature	8 minutes max.

■Standard Electrical Specifications

Item / Type	Power Rating at 70℃ Jumper Rated Current	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range ±0.5% (E24,E96)	Resistance Range ±1% (E24,E96)	Resistance Range ±5% (E24)	TCR (PPM/℃)
ASG02 (0402)	1/16W	-55 ~ +155°C	50V	100V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ			±200 ±100 ±200
	Jumper: 1A				-		0Ω (<50mΩ)	-
ASG03 (0603)	1/10W		75V	150V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ			±200 ±100 ±200
	Jumper: 1A				-		0Ω (<50mΩ)	-
ASG05 (0805)	1/8W		150V	300V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ			±200 ±100 ±200
	Jumper: 2A				-		0Ω (<50mΩ)	-
ASG06 (1206)	1/4W		200V	400V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ			±200 ±100 ±200
	Jumper: 2A				-		0Ω (<50mΩ)	-
ASG10 (1210)	1/3W		200V	400V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ			±200 ±100 ±200
	Jumper: 2.5A				-		0Ω (<50mΩ)	-
ASG0A (2010)	3/4W		200V	400V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ			±200 ±100 ±200
	Jumper: 3.5A				-		0Ω (<50mΩ)	-
ASG12 (2512)	1W		250V	500V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ			±200 ±100 ±200
	Jumper: 4A				-		0Ω (<50mΩ)	-

■High Power Rating Electrical Specifications

Item / Type	Power Rating at 70℃	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range ±0.5% (E24、E96)	Resistance Range ±1% (E24、E96)	Resistance Range ±5% (E24)	TCR (PPM/℃)
ASG02 (0402)	1/10W	-55 ~ +155°C	50V	100V	-	1Ω - 9.76Ω		±200
					10Ω - 1MΩ			±100
ASG03 (0603)	1/4W		75V	150V	-	1Ω - 9.76Ω		±200
					10Ω - 1MΩ			±100
ASG05 (0805)	1/3W		150V	300V	-	1Ω - 9.76Ω		±200
					10Ω - 1MΩ			±100
ASG06 (1206)	1/2W		200V	400V	-	1Ω - 9.76Ω		±200
					10Ω - 1MΩ			±100
ASG10 (1210)	3/4W		200V	400V	-	1Ω - 9.76Ω		±200
					10Ω - 1MΩ			±100
ASG0A (2010)	1W		200V	400V	-	1Ω - 9.76Ω		±200
					10Ω - 1MΩ			±100
ASG12 (2512)	1.5W		250V	500V		1Ω - 9.76Ω		±200
					10Ω - 1MΩ			±100

Operating Voltage=$\sqrt{(P*R)}$ or Max. Operating Voltage listed above, whichever is lower.

Overload Voltage=2.5*$\sqrt{(P*R)}$ or Max. Overload Voltage listed above, whichever is lower.

The power rating depends on the maximum temperature of the resistive element. Due to the power dissipation of the resistor, the temperature of the resistive element will rise depending on the condition of heat dissipation from PCB. The maximum power rating in application only applies if the temperature of the resistive element is not exceed 125 ℃.

■ Viking is capable of manufacturing the optional spec based on customer's requirement.

■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** At 25°C/-55°C and 25°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 whichever is lower for 5 seconds, 2 seconds for high power series
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, RCWV for 1000 hrs with 1.5 hrs “ON” and 0.5 hr “OFF”
Damp Heat with Load	±(2.0%+0.10Ω)	±(3.0%+0.10Ω)	<100mΩ	**JIS-C-5201-1 4.24** **IEC-60115-1 4.24** 40±2°C, 90~95% R.H., RCWV for 1000 hrs with 1.5 hrs “ON” and 0.5 hr “OFF”
Dry Heat	±(1.0%+0.05Ω)	±(1.5%+0.10Ω)	<50mΩ	**JIS-C-5201-1 4.23** **IEC-60115-1 4.23.2** at +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 60 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 Max. Operating Voltage 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 +155°C, 5 cycles
Sulfur Test	±(0.5%+0.05Ω)	±(0.5%+0.05Ω)	<50mΩ	**ASTM-B-809-95** H2S, 50±2°C, 91~93% R.H., no power rating for 1000 hrs

RCWV(Rated Continuous Working Voltage)=√(P*R) or Max. Operating Voltage whichever is lower.

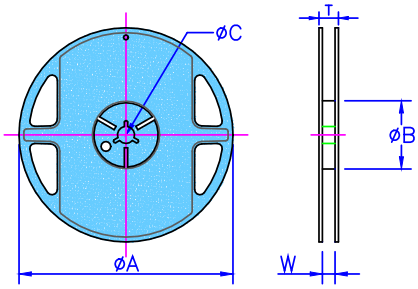
■ **Storage Temperature: 15~28°C; Humidity < 80%RH**

■ **Shelf Life: 2 years from production date.**

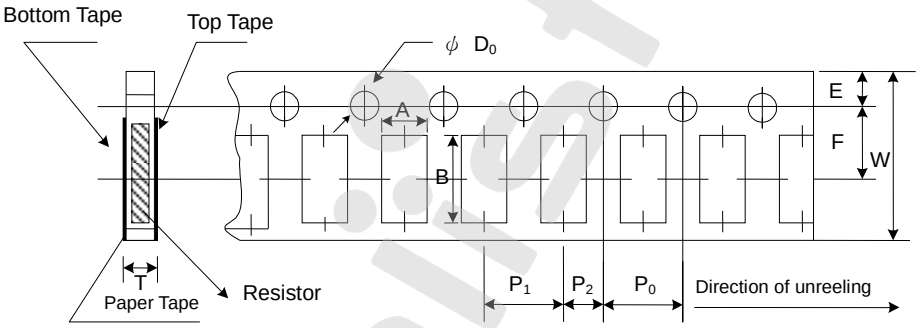
■Packaging

Reel Specifications & Packaging Quantity

Type	Packaging Quantity		Tape Width	Reel Diameter	ΦA (mm)	ΦB (mm)	ΦC (mm)	W (mm)	T (mm)
ASG02	Paper	10K	8mm	7 inch	178.5±1.5	$60^{+1/-0}$	13.0±0.2	9.0±0.5	12.5±0.5
		20K		10 inch	254±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
		40K		13 inch	330±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
ASG03 ASG05 ASG06 ASG10	Paper	5K	8mm	7 inch	178.5±1.5	$60^{+1/-0}$	13.0±0.2	9.0±0.5	12.5±0.5
		10K		10 inch	254±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
		20K		13 inch	330±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
ASG0A ASG12	Embossed	4K	12mm	7 inch	178.5±1.5	$60^{+1/-0}$	13.0±0.5	13.0±0.5	15.5±0.5
		8K		10 inch	250±1.0	62±0.5	13.0±0.5	12.5±0.5	16.5±0.5

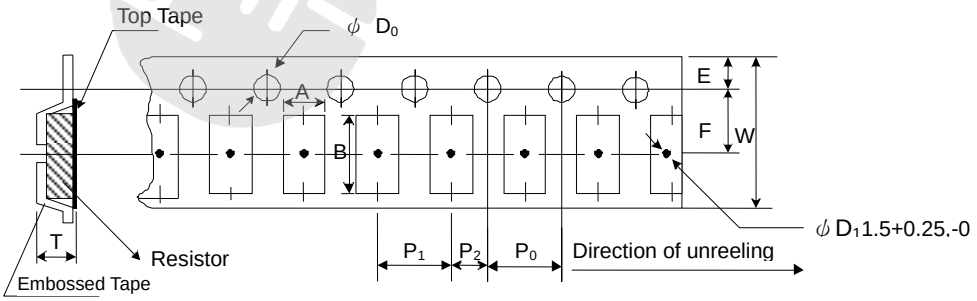


Paper Tape Specifications



Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P_0 (mm)	P_1 (mm)	P_2 (mm)	ΦD_0 (mm)	T (mm)
ASG02	0.65±0.10	1.15±0.10	8.00±0.20	1.75±0.10	3.50±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.50+0.1,-0	0.45±0.10
ASG03	1.10±0.10	1.90±0.10	8.00±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.70±0.10
ASG05	1.60±0.10	2.40±0.20	8.00±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10
ASG06	1.90±0.10	3.50±0.20	8.00±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10
ASG10	2.90±0.10	3.50±0.20	8.00±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10

Embossed Plastic Tape Specifications



Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P_0 (mm)	P_1 (mm)	P_2 (mm)	ΦD_0 (mm)	T (mm)
ASG0A	2.80±0.10	5.40±0.20	12.0±0.30	1.75±0.10	5.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.1, -0	1.2^{+0}
ASG12	3.50±0.10	6.70±0.10	12.0±0.30	1.75±0.10	5.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.1, -0	1.2^{+0}

■Marking

No Marking for 0402

Jumper for all: Letter “0”

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

Example:

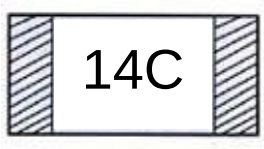
Resistance	5.6Ω	97.6Ω	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ
Marking	5R60	97R6	1000	2201	1002	4992	1003

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

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	G	X	Y		
Multiplier	10^0	10^1	10^2	10^3	10^4	10^5	10^6	10^{-1}	10^{-2}		

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version A	Jun 15, 2022	-	- New product release