Data Sheet

Customer:	
Product:	Automotive Grade Anti-Sulfurated Chip Resistor – AS..A Series
Size:	0201/0402/0603/0805/1206/1210/2010/2512
Issued Date:	15-Jun-26
Edition:	REV.B6



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15-Jun-26	15-Jun-26	15-Jun-26		
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Automotive Grade Anti-Sulfurated Chip Resistor



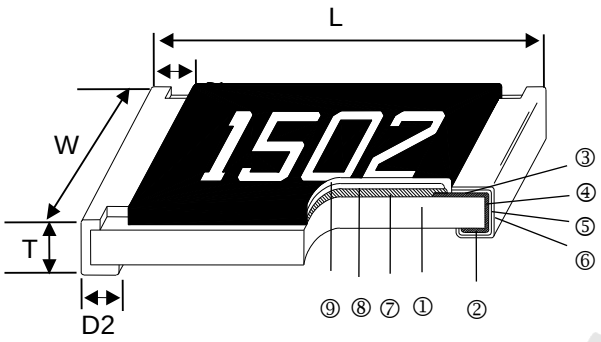
Scope

– 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
– AEC-Q200 Qualified
– 100% CCD inspection
– MSL: Level 1
– Products with lead-free terminations meet EU RoHS requirements. Pb-glass contained in electrodes, resistors element and glass are exempted by RoHS.

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

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

Dimensions

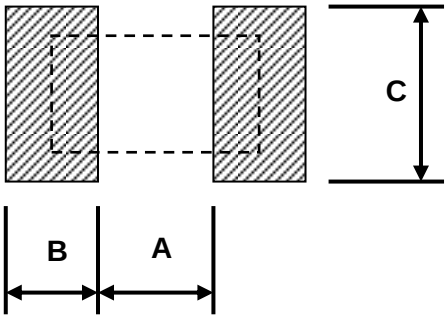
Type	Size (Inch)	L (mm)	W (mm)	T (mm)	D1 (mm)	D2 (mm)	Weight (g) (1000pcs)
AS01	0201	0.60±0.03	0.30±0.03	0.23±0.03	0.15±0.05	0.15±0.05	0.150
AS02	0402	1.00±0.05	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10	0.620
AS03	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	2.042
AS05	0805	2.00±0.10	1.25±0.10	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

Part Numbering

AS	06	F	T	E	U	1002	A
Product Type	Dimensions	Resistance Tolerance	Packaging Code	TCR (PPM/℃)	Power Rating	Resistance	Marking
	01: 0201 02: 0402 03: 0603 05: 0805 06: 1206 10: 1210 0A: 2010 12: 2512	D: ±0.5% F: ±1% J: ±5% or Jumper	T: 7"Taping Reel V:10"Taping Reel W:13"Taping Reel	E: ±100 F: ±200 - : No Specified (For Jumper)	: Standard* (See Remark) W: 1/8W V: 1/4W O: 1/3W U: 1/2W Q: 3/4W T: 1W K: 1.25W S: 2W	1000: 100Ω 1002: 10KΩ 2201: 2.2KΩ 1003: 100KΩ R0R0: 0Ω	A: Automotive Grade

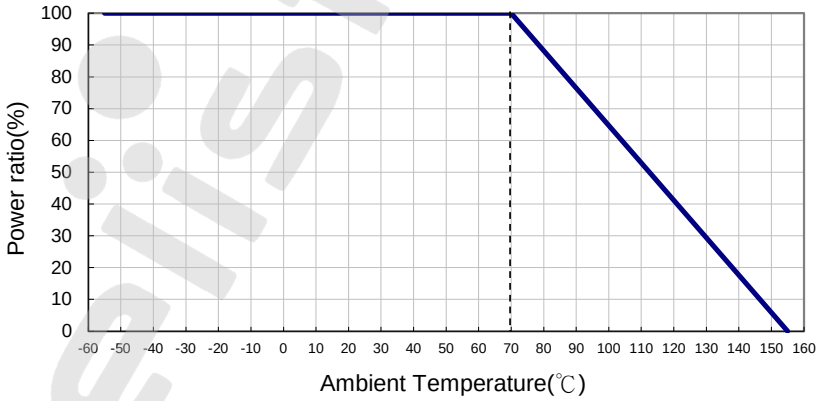
*Remark: Standard part no need for power rating code.

Recommend Land Pattern

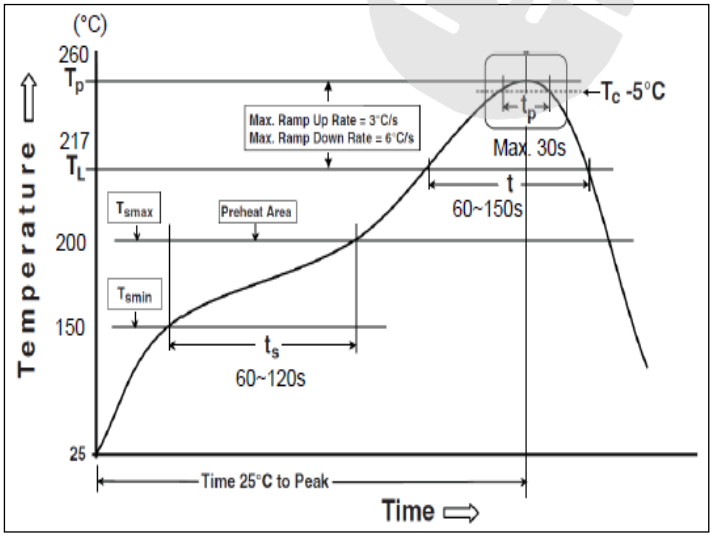


Type	A (mm)	B (mm)	C (mm)
AS01	0.30	0.25	0.30
AS02	0.50	0.45	0.60
AS03	0.90	0.60	0.90
AS05	1.20	0.70	1.30
AS06	2.00	0.90	1.60
AS10	2.00	0.90	2.80
AS0A	3.80	0.90	2.80
AS12	4.90	1.60	3.50

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			TCR (PPM/℃)
					±0.5% (E24,E96)	±1% (E24,E96)	±5% (E24)	
AS01 (0201)	1/20W	-55 ~ +155°C	25V	50V	-	1Ω - 10MΩ		±200
	Jumper: 1A				-		0Ω (<50mΩ)	-
AS02 (0402)	1/16W		75V	150V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ			±200 ±100 ±200
	Jumper: 1A				-		0Ω (<50mΩ)	-
AS03 (0603)	1/10W		75V	150V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ			±200 ±100 ±200
	Jumper: 1A				-		0Ω (<50mΩ)	-
AS05 (0805)	1/8W		150V	300V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ			±200 ±100 ±200
	Jumper: 2A				-		0Ω (<50mΩ)	-
AS06 (1206)	1/4W		200V	400V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ			±200 ±100 ±200
	Jumper: 2A				-		0Ω (<50mΩ)	-
AS10 (1210)	1/3W		200V	400V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ			±200 ±100 ±200
	Jumper: 2.5A				-		0Ω (<50mΩ)	-
AS0A (2010)	3/4W		200V	400V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ			±200 ±100 ±200
	Jumper: 3.5A				-		0Ω (<50mΩ)	-
AS12 (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 ±1% (E24、E96)	Resistance Range ±5% (E24)	TCR (PPM/℃)
AS02 (0402)	1/8W	-55 ~ +155°C	75V	100V	1Ω - 9.76Ω		±200
					10Ω - 1MΩ		±100
AS03 (0603)	1/4W		75V	150V	1Ω - 9.76Ω		±200
					10Ω - 1MΩ		±100
AS05 (0805)	1/3W		150V	300V	1Ω - 9.76Ω		±200
	1/2W				10Ω - 1MΩ		±100
AS06 (1206)	1/2W		200V	400V	1Ω - 9.76Ω		±200
					10Ω - 1MΩ		±100
AS10 (1210)	3/4W		200V	400V	1Ω - 9.76Ω		±200
	1W				10Ω - 1MΩ		±100
AS0A (2010)	1W		200V	400V	1Ω - 9.76Ω		±200
	1.25W				10Ω - 1MΩ		±100
AS12 (2512)	2W		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 ±1% and Below	Requirement ±5%	Requirement Jumper	Test Method
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** 2.5 times RCWV or Max. Overload Voltage whichever is lower for 5 seconds High Power: 2 times RCWV or Max. Overload Voltage whichever is lower for 5 seconds
Insulation Resistance	≧10G			**JIS C 5201-1 4.6** **IEC 60115-1 4.6** Max. Overload Voltage for 1 minute
Operational Life	±(1.0%+0.10Ω)	±(3.0%+0.10Ω)	<100mΩ	**MIL-STD-202 Method 108** Condition D Steady State TA=125°C at derated power. Measurement at 24±4 hours after test conclusion.
Biased Humidity	±(1.0%+0.10Ω)	±(3.0%+0.10Ω)	<100mΩ	**MIL-STD-202 Method 103** 1000 hrs 85°C/85%RH 10% of operating power. (≦100V)

Item	Requirement			Test Method
	±1% and Below	±5%	Jumper	
High Temperature Exposure	±(1.0%+0.05Ω)	±(1.5%+0.10Ω)	<50mΩ	**MIL-STD-202 Method 108** at +155°C for 1000 hrs
Board Flex	±(1.0%+0.05Ω)	±(1.0%+0.05Ω)	<50mΩ	**AEC-Q200-005** Bending once for 60 seconds 2010, 2512 sizes: 2mm Other sizes: 3mm
Solderability	>95% coverage			**JIS C 5201-1 4.17** **IEC 60115-1 4.17** **J-STD-002** 245±5°C for 3 seconds
Resistance to Soldering Heat	±(0.5%+0.05Ω)	±(1.0%+0.05Ω)	<50mΩ	**MIL-STD-202 Method 210** 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
Temperature Cycling	±(0.5%+0.05Ω)	±(1.5%+0.05Ω)	<50mΩ	**JESD22 Method JA-104** -55°C to +125°C, 1000 cycles
Mechanical Shock	±(0.25%+0.05Ω)	±(1.0%+0.05Ω)	<50mΩ	**MIL-STD-202 Method 213** Wave Form: Tolerance for half sine shock pulse. Peak value is 100g's. Normal duration (D) is 6.
Vibration	±(0.5%+0.05Ω)	±(1.0%+0.05Ω)	<50mΩ	**MIL-STD-202 Method 204** 5 g's for 20 min., 12 cycles each of 3 orientations, 10-2000 Hz
ESD	±(3%+0.05Ω)			**AEC-Q200-002** Human body model 0201: 0.5KV 0402/0603: 1KV 0805 and above: 2KV
Resistance to Solvents	No visible damage on appearance and marking.			**MIL-STD-202 Method 215** Add Aqueous wash chemical - OKEM Clean or equivalent. Do not use banned solvents.
Terminal Strength	No broken			**AEC-Q200-006** Force of 1.8kg for 60 seconds.
Flammability	No ignition of the tissue paper or scorching or the pinewood board			**UL-94** V-0 or V-1 are acceptable. Electrical test not required.
Sulfur Test	△R±1%		<50mΩ	**EIA-977 (Condition B)** 105±2°C, no power rating for 750 hrs.

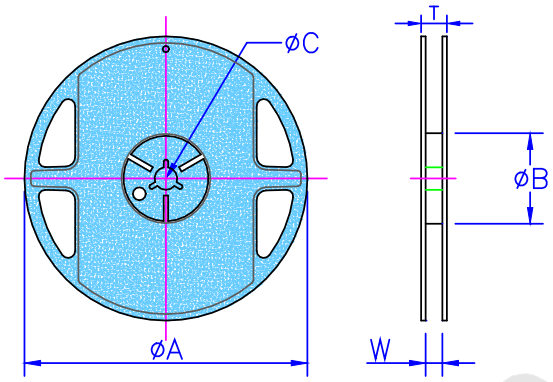
RCWV(Rated Continuous Working Voltage)=√(P*R) or Max. Operating Voltage whichever is lower.

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

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

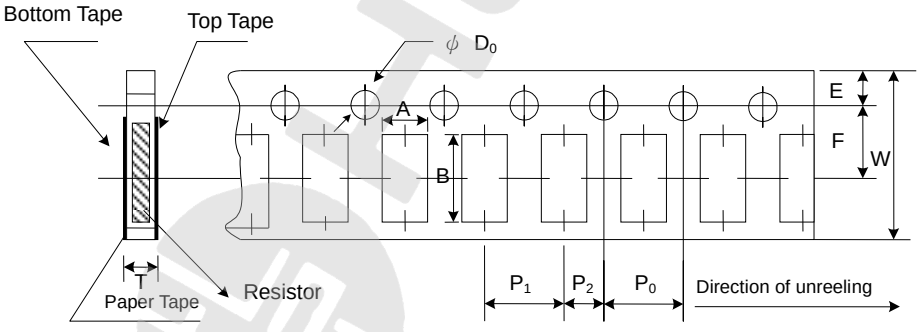
■Packaging

Reel Specifications & Packaging Quantity



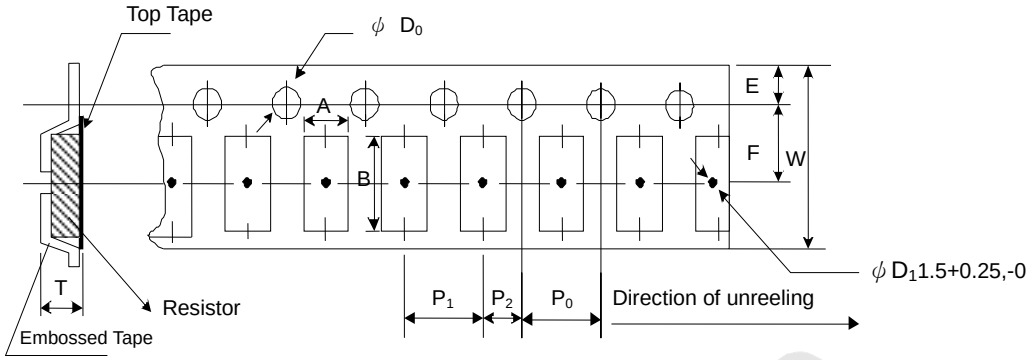
Type	Packaging Quantity		Tape Width	Reel Diameter	ΦA (mm)	ΦB (mm)	ΦC (mm)	W (mm)	T (mm)
AS01 AS02	Paper	10K	8mm	7 inch	178.5±1.5	$60^{+1/-0}$	13.0±0.2	9.0±0.5	12.5±0.5
		20K		10 inch	254±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
		40K		13 inch	330±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
AS03 AS05 AS06 AS10	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
AS0A AS12	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)
AS01	0.38±0.05	0.68±0.05	8.0±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	0.42±0.20
AS02	0.65±0.10	1.15±0.10	8.0±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
AS03	1.10±0.10	1.90±0.10	8.0±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
AS05	1.60±0.10	2.40±0.20	8.0±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
AS06	1.90±0.10	3.50±0.20	8.0±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
AS10	2.90±0.10	3.50±0.20	8.0±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)
AS0A	2.8±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}
AS12	3.5±0.10	6.7±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 0201/ 0402

Jumper for all: Letter “0”

0.5%,1% for 0805/1206/1210/2010/2512: 4 digits marking

Example:

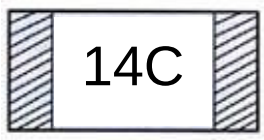
Resistance	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ
Marking	1000	2201	1002	4992	1003

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

0.5%,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 A3	Jun 03, 2014	-	- Environmental Characteristics updated
Version A4	Apr 30, 2015	-	- Environmental Characteristics updated
Version A5	Jul 15, 2016	-	- Remove Material Description - Modify Storage Temperature - Increase Product Size 0201
Version A6	Jan 12, 2018	-	- Modify Sulfur Test for EIA-977 - Electrical Specifications updated
Version A7	May 20, 2019	-	- Modify TCR Test description - Features added 100% CCD inspection
Version A8	Jun 1, 2019	-	- Modify ESD Test description & Spec.
Version A9	Mar 10, 2021	-	- Modify Soldering Condition
Version B	Nov 15, 2021	-	- Increase the shelf life description
Version B1	Feb 15, 2022	-	- Derating Curve changes the temperature range -0201 Operating temperature rises to 155℃
Version B2	Jun 15, 2022	-	- Modify Soldering Condition - 0603 Max. Operating & Max. overload voltage updated
Version B3	Sep 22, 2022	-	- Modify Operational Life and Biased Humidity Spec.
Version B4	Jul 08, 2024	-	- Modify the descriptions in the Features - Add high power production range
Version B5	Aug 22, 2025	-	- Modify the descriptions in the Features - Modify 0402 Dimensions
Version B6	Jun 15, 2026	-	- Modify the descriptions in the Features - Environmental Characteristics updated - Upgrade 0402 Specifications - Add high power production range