Towards Excellence in *Quality, Service & Innovation*

A S J

DATA SHEET

Anti-Sulphur Thick Film Chip Resistor

ASAS(Automotive Grade) Series

0.5% TO 5.0%, TCR -200 TO +400

SIZE: 0201/0402/0603/0805/1206/1210/2010/2512

RoHs Compliant

Product Specification – October 14, 2020 V.5

1. SCOPE

1.1 This specification is applicable to lead-free and halogen-free ASAS series anti-sulfurated automotive thick film chip resistors.

1.2 Superior Sulfur resistant capability (Refer to ASTM-B-809-95&EIA977 sulfur vapor test).

1.3 Lead-free products refer to termination lead-free which meets RoHS requirement. However, Pb contained in glass material is exempted by RoHS directive.

1.4 This product is for automotive electronic application.

1.5 AEC-Q200 qualified, grade 1.

2. PART NUMBERING SYSTEM

Part Numbering is made in accordance with the following system:

ASAS	5	-	1002	-	F	L
Type	Size (Inch/mm)		Nominal Resistance		Resistance Tolerance	Packaging
Anti - Sulfurated Automotive Thick Film Chip Resistors	05(0201/0603) 10(0402/1005) 16(0603/1608) 21(0805/2012) 32(1206/3216) 40(1210/3225) 50(2010/5025) 63(2512/6432)		5% (3-Digit): EX. 10Ω = 100, 4.7Ω = 4R7, Jumper=000 1% (4-Digit): EX. 10.2Ω = 10R2, 10KΩ = 1002, Jumper=0000		D=±0.5% F = ±1% J = ±5%	E = 4,000 pcs Lead Free L = 5,000 pcs Lead Free K = 10,000 pcs Lead Free Y = 20,000 pcs Lead Free N = 50,000 pcs Lead Free

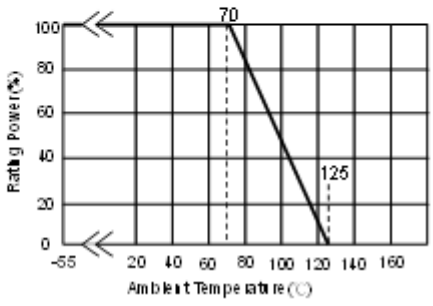
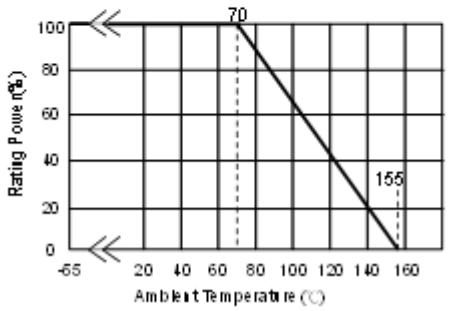
3. RATING

3.1 Rated Power

3.1.1 Resistor Rated Power

Type	Rated Power at 70℃	Max. Working Voltage	Max. Overload Voltage
ASAS05 (0201)	1/20 W	25V	50V
ASAS10 (0402)	1/16 W	50V	100V
ASAS16 (0603)	1/10 W	75V	150V
ASAS21 (0805)	1/8 W	150V	300V
ASAS32 (1206)	1/4 W	200V	400V
ASAS40 (1210)	1/2 W	200V	400V
ASAS50 (2010)	3/4 W	200V	400V
ASAS63 (2512)	1W	200V	400V

3.2 Power Derating Curve:

Type	ASAS05(0201/0603)	Other
Operating Temperature Range	-55°C to +125°C	-55°C to +155°C
Explain	If the ambient temperature exceeds 70 degrees centigrade to 125 degrees centigrade, the power can be modified by the curve as below.	If the ambient temperature exceeds 70 degrees centigrade to 155 degrees centigrade, the power can be modified by the curve as below.
Figure		

3.3 Standard Atmospheric Condition

Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests is as follows:

Ambient Temperature = + 5°C to +35°C

Relative Humidity = < 85% RH

Air Pressure = 86 kPa to 106kPa

If there may be any doubt about the results, measurement shall be made within the following limits:

Ambient Temperature = 20 ± 2°C

Relative Humidity = 60 to 70% RH

Air Pressure = 86 kPa to 106kPa

3.4 Operating Temperature Range -55°C to +155°C (ASAS05 -55°C to +125°C)

3.5 Storage Temperature Range -5°C to + 40°C / < 85% RH

3.6 Flammability Rating Tested in accordance to UL-94, V-0

3.7 Moisture Sensitivity Level Rating: Level 1

3.8 Product Assurance ASJ resistor shall warranty 24 months from the date of shipment.

3.9 ASJ resistors are RoHS compliance in accordance to RoHS Directive.

3.10 Resistance, Resistance Tolerance and Temperature Coefficient of Resistance.

Type	Rated Power at 70℃	Max. Working Voltage	Max. Overload Voltage	T.C.R (ppm / ℃)	Resistance Range		JUMPER (0Ω) Rated Current		JUMPER (0Ω) Resistance Value	
					D(±0.5%) E-24、E-96	J(±5%)、F(±1%) E-24、E-96	J(±5%)	F(±1%)	J(±5%)	F(±1%)
ASAS05 (0201)	1/20W	25V	50V	-200 +400	1Ω≦R＜10Ω	1Ω≦R＜10Ω	0.5A	0.5A	100mΩ MAX	50mΩ MAX
				±200	10Ω≦R≦10MΩ	10Ω≦R＜10MΩ				
ASAS10 (0402)	1/16W	50V	100V	±200	------	1Ω≦R＜10Ω	1A	1.5A	100mΩ MAX	50mΩ MAX
				±100	10Ω≦R≦1MΩ	10Ω≦R＜22MΩ				
ASAS16 (0603)	1/10W	75V	150V	±200	1Ω≦R＜10Ω	1Ω≦R＜10Ω	1A	2A	100mΩ MAX	50mΩ MAX
				±100	10Ω≦R≦1MΩ	10Ω≦R＜22MΩ				
ASAS21 (0805)	1/8W	150V	300V	±200	1Ω≦R＜10Ω	1Ω≦R＜10Ω	2A	2.5A	100mΩ MAX	50mΩ MAX
				±100	10Ω≦R≦1MΩ	10Ω≦R＜27MΩ				
ASAS32 (1206)	1/4W	200V	400V	±200	1Ω≦R＜10Ω	1Ω≦R＜10Ω	2A	3.5A	100mΩ MAX	50mΩ MAX
				±100	10Ω≦R≦1MΩ	10Ω≦R＜27MΩ				
ASAS40 (1210)	1/2W	200V	400V	±200	1Ω≦R＜10Ω	1Ω≦R＜10Ω	2A	4A	100mΩ MAX	50mΩ MAX
				±100	10Ω≦R≦1MΩ	10Ω≦R＜27MΩ				
ASAS50 (2010)	3/4W	200V	400V	±200	1Ω≦R＜10Ω	1Ω≦R＜10Ω	2A	5A	100mΩ MAX	50mΩ MAX
				±100	10Ω≦R≦1MΩ	10Ω≦R＜20MΩ				
ASAS63 (2512)	1W	200V	400V	±200	1Ω≦R＜10Ω	1Ω≦R＜10Ω	2A	7A	100mΩ MAX	50mΩ MAX
				±100	10Ω≦R≦1MΩ	10Ω≦R＜20MΩ				
Operating Temperature Range				-55℃ ~ +155℃(0201：－55℃ ~ ＋125℃)						

3.11 Rated Voltage

Rated Voltage: DC voltage or AC voltage (rms) based on the rated power.

The voltage can be calculated by the following formula. If the calculated value exceeds the Max. voltage specified in the Table 3.1.1, the Max. Voltage rating is set as the voltage rating.

$$E = \sqrt{R \times P}$$

E= Voltage rating (v)

P= Power rating (w)

R= Nominal resistance(Ω)

4. MARKING ON PRODUCT

The nominal resistance shall be marked on the surface of each resistor

Type	Resistance Range	Tolerance≦1%	Tolerance＞1%
ASAS05	All	No Marking	
ASAS10	Jumper = 0Ω		
ASAS16, ASAS21, ASAS32, ASAS40, ASAS50, ASAS63	All	Marked as a square	
ASAS21, ASAS32, ASAS40, ASAS50, ASAS63	＜1Ω	4-digits Marking	4-digits Marking
	≧1Ω	4-digits Marking	3-digits Marking
	Jumper=0Ω	3-digits Marking	1-digit Marking

4.1 Numeric Numbering

4.1.1 ≦1% Tolerance : ***Four Numerals Marking***

First 3 digits are significant figures; fourth digit is number of zeros.

Examples:

Nominal Resistance	***Marking***	***Remarks***
1 Ω	1R00	$1 \times 10^0 = 1$
10 Ω	10R0	$10 \times 10^0 = 10$
100 Ω	1000	$100 \times 10^0 = 100$
4.7K Ω	4701	$470 \times 10^1 = 470\ 0$
47K Ω	4702	$470 \times 10^2 = 470\ 00$
470K Ω	4703	$470 \times 10^3 = 470\ 000$
1M Ω	1004	$100 \times 10^4 = 100\ 0000$

4.1.2 5% Tolerance: ***Three Numerals Marking***

First 2 digits are significant figures, third digit is number of zeros. Letter R is decimal point.

Example:

Nominal Resistance	***Marking***	***Remarks***
1 Ω	1R0	$1 \times 10^0 = 1$
10 Ω	100	$10 \times 10^0 = 1\ 0$
100 Ω	101	$10 \times 10^1 = 1\ 00$
4.7K Ω	472	$47 \times 10^2 = 47\ 00$
47K Ω	473	$47 \times 10^3 = 47\ 000$
470K Ω	474	$47 \times 10^4 = 47\ 0000$
4.7M Ω	475	$47 \times 10^5 = 47\ 00000$

4.1.3 0603 1% Tolerance : ***Three Character E-96 Marking Standard.***

The first 2 digits for the 3 digits E-96 part marking standard.

The third character is a letter multiplier :

Nominal resistance	*Marking*	*Remark*
33.2 Ω	51 X	332 X 10^{-1} Ω
150 Ω	18 A	150 X 10^{0} Ω
4.99K Ω	68 B	499 X 10^{1} Ω
1 0.2K Ω	02 C	102 X 10^{2} Ω
100K Ω	01 D	100 X 10^{3} Ω

4.1.4 Marking Table

E24 Series

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

E96 Series

100	102	105	107	110	113	115	118	121	124	127	130
133	137	140	143	147	150	154	158	162	165	169	174
178	182	187	191	196	200	205	210	215	221	226	232
237	243	249	255	261	267	274	280	287	294	301	309
316	324	332	340	348	357	365	374	383	392	402	412
422	432	442	453	464	475	487	499	511	523	536	549
562	576	590	604	619	634	649	665	681	698	715	732
750	768	787	806	825	845	866	887	909	931	953	976

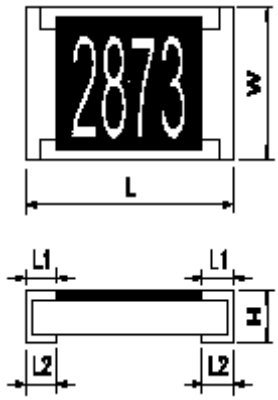
EIAJ-96

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

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

5. DIMENSIONS, CONSTRUCTIONS AND MATERIALS

5.1 Dimensions



Unit:mm

Type \ Dimension / Size Code	L	W	H	L1	L2
ASAS05	**0201**	0.60±0.03	0.30±0.03	0.23±0.03	0.10±0.05	0.15±0.05
ASAS10	**0402**	1.00±0.10	0.50±0.05	0.30±0.05	0.20±0.10	0.25±0.10
ASAS16	**0603**	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.15	0.30±0.15
ASAS21	**0805**	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.35±0.20
ASAS32	**1206**	3.05±0.10	1.55±0.10	0.50±0.10	0.45±0.20	0.35±0.20
ASAS40	**1210**	3.05±0.10	2.55±0.10	0.55±0.10	0.50±0.20	0.50±0.20
ASAS50	**2010**	5.00±0.20	2.50±0.20	0.60±0.10	0.65±0.20	0.65±0.20
ASAS63	**2512**	6.30±0.20	3.20±0.20	0.60±0.10	0.65±0.20	0.65±0.20

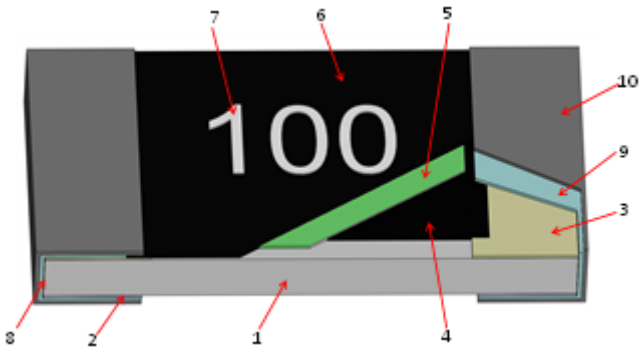
5.2 Plating Thickness

5.2.1 Ni: ≧2μm

5.2.2 Sn(Tin): ≧3μm

5.2.3 Sn(Tin): Matte Sn

5.3 Structure Graph



1	Ceramic substrate	6	2nd Protective coating
2	Bottom inner electrode	7	Marking
3	Top inner electrode	8	Terminal inner electrode
4	Resistive layer	9	Ni plating
5	1st Protective coating	10	Sn plating

6. Reliability Test

<table>
<tr><th rowspan="2">Item</th><th rowspan="2">Conditions</th><th colspan="2">Specifications</th></tr>
<tr><th>Resistors</th><th>Jumper</th></tr>
<tr><td rowspan="2">High Temperature Exposure (Storage)</td><td rowspan="2">Put the specimens in the chamber with temperature of 155±3℃ for 1000 hours. Then take them out to stabilize in room temperature for 24±4hr or more, and measure of its resistance variance rate.

Experiment evidence: AEC-Q200</td><td>0.5%, 1%：△R=±1.0%
5%：△R=±2.0%</td><td>Refer to item 3.10</td></tr>
<tr><td colspan="2">No mechanical damage.</td></tr>
<tr><td rowspan="2">Temperature Cycling</td><td rowspan="2">Put the specimens in the High & low temperature test chamber with temperature varies from -55℃ to 125℃ for 5 minutes and total 1000 cycles. Then take them out to stabilize in room temperature for 24±4hr or more, and measure of its resistance variance rate.

Experiment evidence: AEC-Q200</td><td>△R%=±2.0%</td><td>Refer to item 3.10</td></tr>
<tr><td colspan="2">No mechanical damage</td></tr>
<tr><td rowspan="2">Biased Humidity</td><td rowspan="2">Solder the specimens on the test PCB and put them into the constant temperature humidity chamber with 85±2℃ and 85±5%RH. Then apply the test voltage that calculates based on the 10% of rated power for 1000hrs. Then take them out to stabilize in room temperature for 24±4hr or more, and measure of its resistance variance rate.

Experiment evidence: AEC-Q200</td><td>0.5%, 1%：△R%=±2.0%
5%：△R%=±3.0%</td><td>Refer to item 3.10</td></tr>
<tr><td colspan="2">No mechanical damage, short or burning-out phenomenon.</td></tr>
<tr><td rowspan="2">Operational Life</td><td rowspan="2">Solder the specimens on the test PCB and Put them in the chamber with temperature of 125±3℃ and load the voltage for 1000 hours. Then take them out to stabilize in room temperature for 24±4hr or more, and measure of its resistance variance rate.
Note: The input voltage shall refer to the power derating curve (referring to Table.3.2)

Experiment evidence: AEC-Q200</td><td>0.5%, 1%：△R%=±2.0%
5%：△R%=±3.0%</td><td>Refer to item 3.10</td></tr>
<tr><td colspan="2">No mechanical damage, short or burning-out phenomenon.</td></tr>
<tr><td rowspan="2">Short Time Overload</td><td rowspan="2">Applied 2.5 times rated voltage for 5 seconds and release the load for about 30 minutes, then measure its resistance variance rate. (Rated voltage refer to item 3.10 general specifications) Jumper :
Applied Maximum overload current
<table>
<tr><th>Type / Jumper</th><th>ASAS05 (0201)</th><th>ASAS10 (0402)</th><th>ASAS16 (0603)</th><th>ASAS21 (0805)</th><th>ASAS32 (1206)</th><th>ASAS40 (1210)</th><th>ASAS50 (2010)</th><th>ASAS63 (2512)</th></tr>
<tr><td>±5%</td><td>1.25A</td><td>2.5A</td><td>2.5A</td><td>5A</td><td>5A</td><td>5A</td><td>5A</td><td>5A</td></tr>
<tr><td>±1%</td><td>1.25A</td><td>3.75A</td><td>5.0A</td><td>6.25A</td><td>8.75A</td><td>10.0A</td><td>12.5A</td><td>17.5A</td></tr>
</table>
Refer to JIS-C5201-1 4.13</td><td>0.5%, 1%：△R%=±1.0%
5%：△R%=±2.0%</td><td>Refer to item 3.10</td></tr>
<tr><td colspan="2">No mechanical damage, peel-off of side end or chip crack.</td></tr>
<tr><td rowspan="2">Resistance to Soldering Heat</td><td rowspan="2">The specimens are fully immersed into the Pb-free solder pot, then take them out to stabilize for 1 hour or more and measure of its resistance variance rate.
Temp of solder pot：260±5℃
Soldering duration：10±1sec.

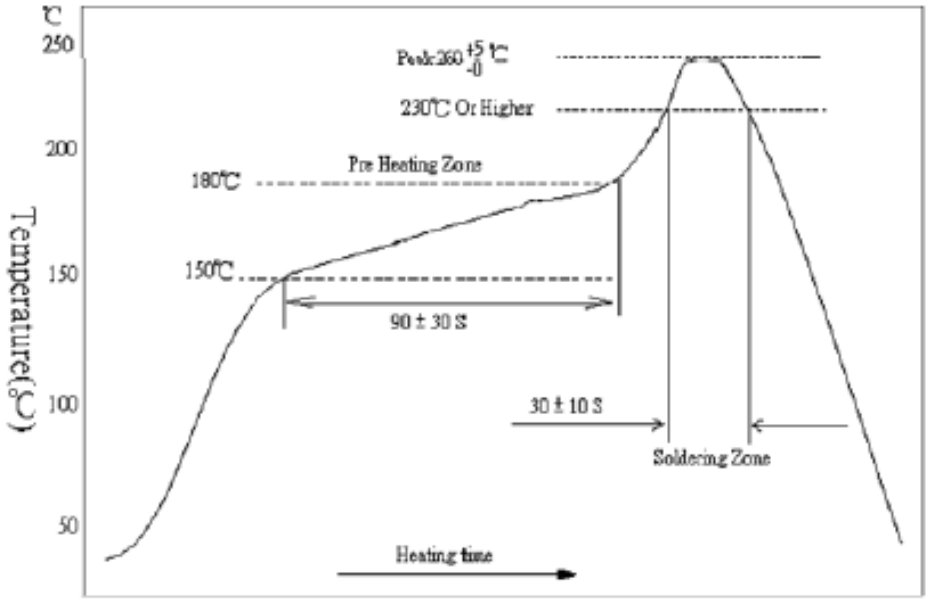
Experiment evidence AEC-Q200</td><td>△R=±1.0%</td><td>Refer to item 3.10</td></tr>
<tr><td colspan="2">No cosmetic defect on terminal or peel-off of side end</td></tr>
</table>

Item	Conditions	Specifications	
		Resistors	Jumper
ESD	Put the specimens on the test fixture and two (2)discharges (2KVDC) shall be applied to each PUT, one (1) with a positive polarity and one (1) with a negative polarity. Afterwards, the specimens stabilize for 30min or more and measure of its resistance variance rate. The test is performed with direct contact and regular discharge mode. The resistor and capacitor used on the spearhead is 2000Ωand 150pF respectively. Experiment evidence AEC-Q200	△R%=±3.0%	Refer to item 3.10
		No mechanical damage, short or burning-out phenomenon.	
Solderability	**Test method:** **Test item 1 (solder pot test): Method B** Precondition: The specimens are subjected to 155℃ dry bake for 4hrs±15min. The specimens are immersed into the flux first, then fully immersed into the solder pot, at a temperature of 235± 5℃ for $5^{+0}_{-0.5}$ sec. Then rinse with water and observe the soldering coverage under the microscope. **Test item 2 (Leaching test): Method D** The specimens are immersed into the flux first, then fully immersed into the solder pot, at a temperature of 260±5℃ for $30^{+0}_{-0.5}$ sec. Then rinse with water and observe the soldering coverage under the microscope. Experiment evidence AEC-Q200	1.Soldering coverage over 95% 2.At the edge of terminal, the object underneath (e.g. white ceramic) shall not expose.	
Electrical Characterization	$TCR(ppm/^{\circ}C) = \frac{(R2-R1)}{R1(T2-T1)} x10^6$ R1: Resistance at room temperature (Ω) R2: Resistance at -55℃or +125℃(Ω) T1: Room temperature (℃) T2: Temperature -55℃or +125℃	Refer to item 3. general specifications	NA
Board Flex (Bending Test)	Solder the specimens on the test PCB and put the PCBA onto the Bending Tester. Add force at the central part of PCB, and the duration of the applied forces shall be 60 (+ 5) Sec. Measure of its resistance variance rate in load. Bending depth (D)： 10、16、21=5mm 05、32、40=3mm 50、63=2mm Experiment evidence: AEC-Q200	△R=±1.0%	Refer to item 3.10
		No mechanical damage, peel-off of side end or chip crack.	
Sulfuration Test	Put the tested resistor in sulfur vapor, at a temperature of 105±2℃for 750hrs Refer to ASTM-B-809-95&EIA977	△R=±4.0%	Refer to item 3.10

6.1 Technical application notes: (This is for recommendation, customer are please to perform adjustment according to actual application)

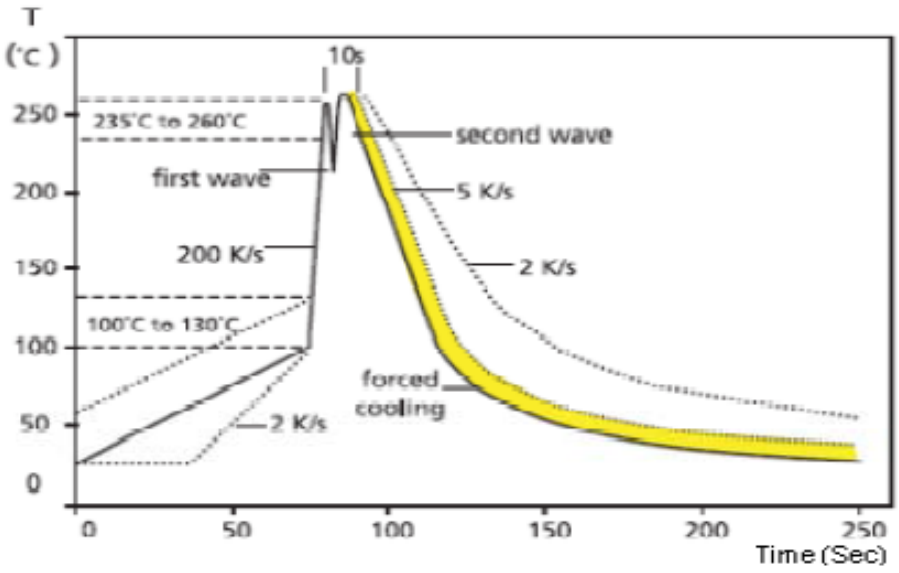
Soldering Profile

6.1.1 Lead Free IR Reflow Soldering Profile



Remark: The peak temperature of soldering heat is 260^{+5}_{-0} °C for 10 seconds.

6.1.2 Lead Free Double-Wave Soldering Profile(This applies to 0603 size inclusive above products)

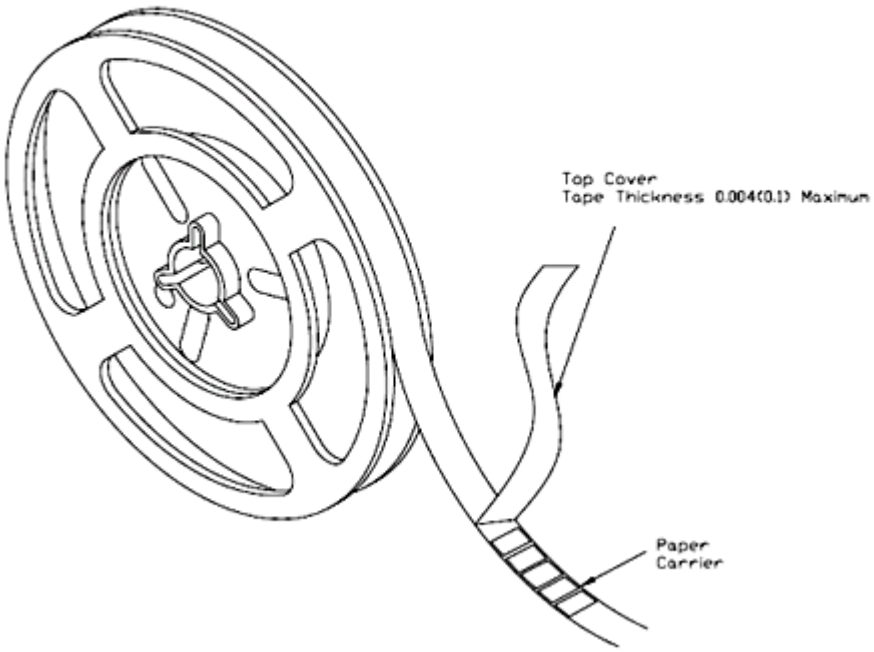


6.1.3 Soldering Iron : Temperature 350ºC±10ºC, dwell time shall be less than 3 sec.

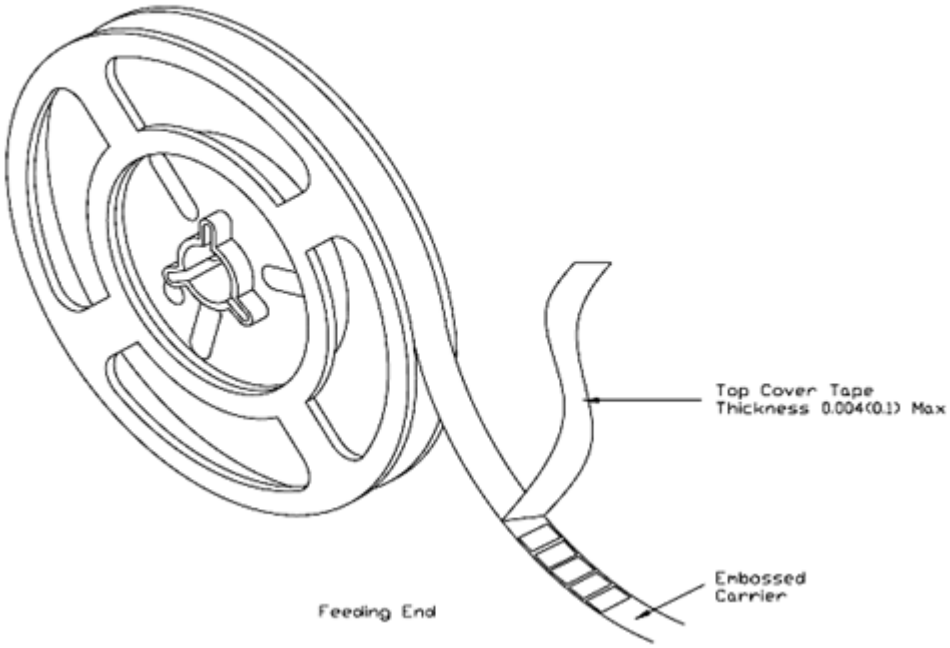
7. TAPING

7.1 Structure of Taping

Paper Carrier

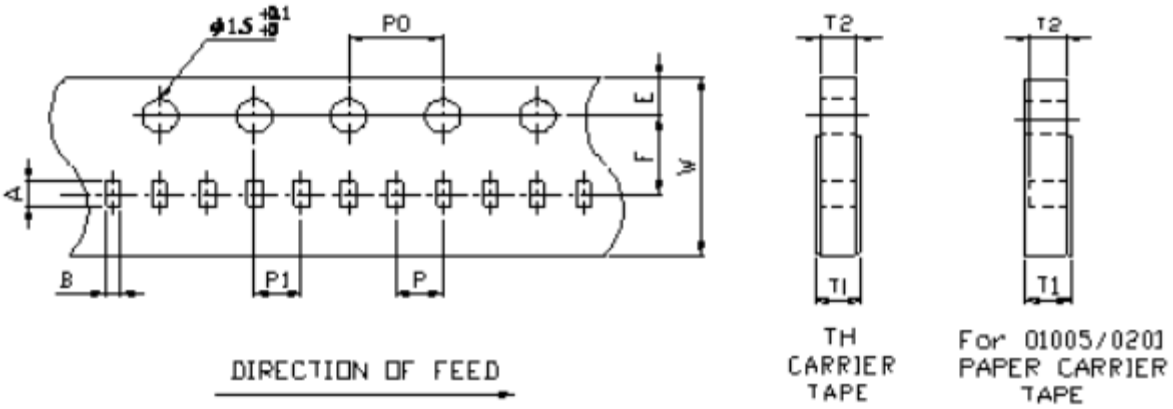


Embossed Plastic Carrier



7.2 Dimension

7.2.1 Dimension of Punched Paper Tape Carrier System (ASAS05,ASAS10)



Remark: Pitch tolerance over any 10 pitches of Po is ± 0.2 mm

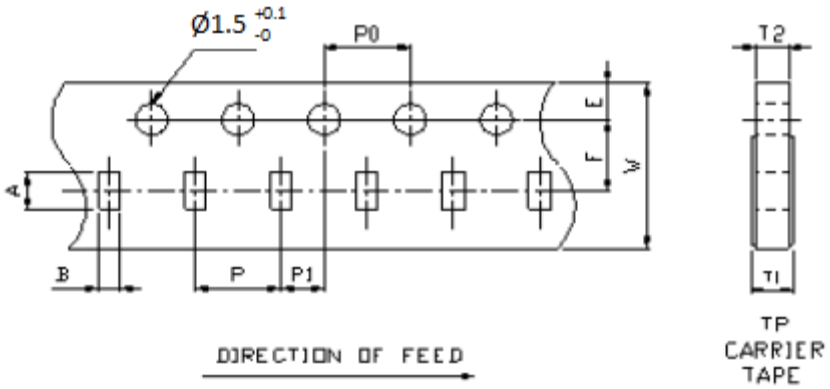
Dimension of Punched Paper Tape Carrier System (ASAS05, 10)

(unit : mm)

Code	A	B	W	E	F	T_1
ASAS05	0.68±0.05	0.38±0.03	8.00±0.10	1.75±0.10	3.50±0.05	$0.42^{+0.1}_{-0}$
ASAS10	1.15±0.05	0.65±0.05	8.00±0.20	1.75±0.10	3.50±0.05	$0.42^{+0.2}_{-0}$

Code	T_2	P	P0	10 x P0	P1
ASAS05	0.28±0.02	2.00±0.05	4.00±0.05	40.0±0.20	2.00±0.05
ASAS10	0.40±0.05	2.00±0.10	4.00±0.05	40.0±0.20	2.00±0.05

7.2.2 Dimension of Punched Paper Tape Carrier System /Plastic Embossed Carrier System (ASAS16, 21, 32, 40)

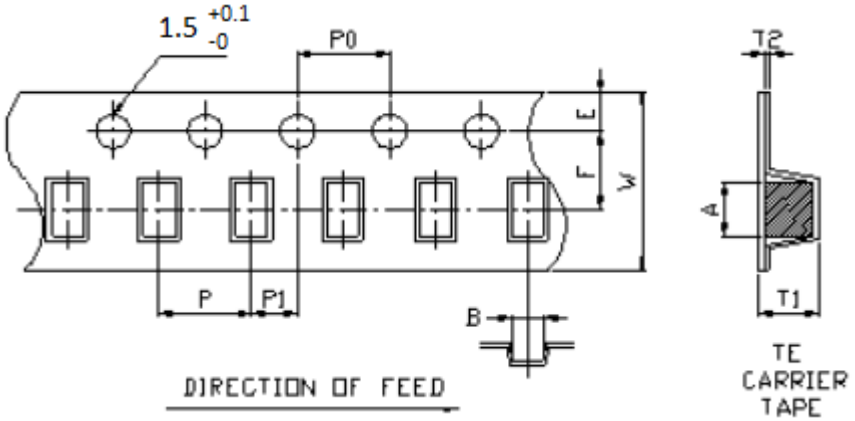


Remark: Pitch tolerance over any 10 pitches of Po is ± 0.2 mm

Dimension of Punched Paper Tape Carrier System (ASAS - 16, 21, 32, 40)

Code	A	B	W	E	F	T1	T2	P	P0	P1
ASAS16	1.8±0.10	1.0±0.10	8.0±0.20	1.75±0.10	3.50±0.05	$0.60^{+0.2}_{-0}$	0.60±0.10	4.0±0.10	4.0±0.05	2.0±0.05
ASAS21	2.3±0.10	1.55±0.1	8.0±0.20	1.75±0.10	3.50±0.05	$0.75^{+0.2}_{-0}$	0.75±0.10	4.0±0.10	4.0±0.05	2.0±0.05
ASAS32	3.5±0.20	1.9±0.20	8.0±0.20	1.75±0.10	3.50±0.05	$0.75^{+0.2}_{-0}$	0.75±0.10	4.0±0.10	4.0±0.05	2.0±0.05
ASAS40	3.5±0.20	2.8±0.20	8.0±0.20	1.75±0.10	3.50±0.05	$0.75^{+0.2}_{-0}$	0.75±0.10	4.0±0.10	4.0±0.05	2.0±0.05

Dimension of Plastic Embossed Carrier System (ASAS - 50, 63)



Code	A	B	W	E	F	T1	T2	P	P0	P1
ASAS50	5.5±0.20	2.8±0.20	12.0±0.20	1.75±0.10	5.50±0.05	1.10±0.15	0.23±0.15	4.0±0.10	4.0±0.05	2.0±0.05
ASAS63	6.7±0.20	3.4±0.20	12.0±0.20	1.75±0.10	5.50±0.05	1.10±0.15	0.23±0.15	4.0±0.10	4.0±0.05	2.0±0.05

7.3 Packaging

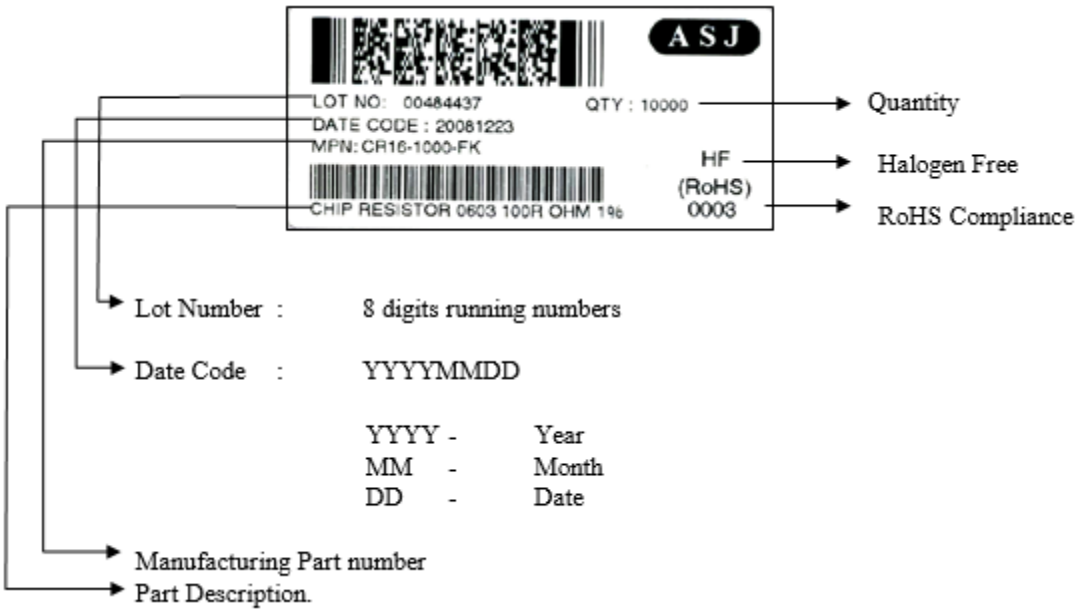
7.3.1 Taping

7.3.2 Quantity – Tape and Reels

Code	Quantity	Model	Remarks
ASAS05 ASAS10	10,000 pcs	7" Reel	2mm pitch (Paper Carrier)
	20,000 pcs	7" Reel	2mm pitch (Paper Carrier)
	50,000 pcs	13" Reel	2mm pitch (Paper Carrier)
ASAS16 ASAS21 ASAS32 ASAS40	5,000 pcs	7" Reel	4mm pitch (Paper Carrier)
	10,000 pcs	10" Reel	4mm pitch (Paper Carrier)
	20,000 pcs	13" Reel	4mm pitch (Paper Carrier)
ASAS50	4,000 pcs	7" Reel	4mm pitch (Embossed Carrier)
ASAS63	4,000 pcs	7" Reel	4mm pitch (Embossed Carrier)

7.3.3 Identification

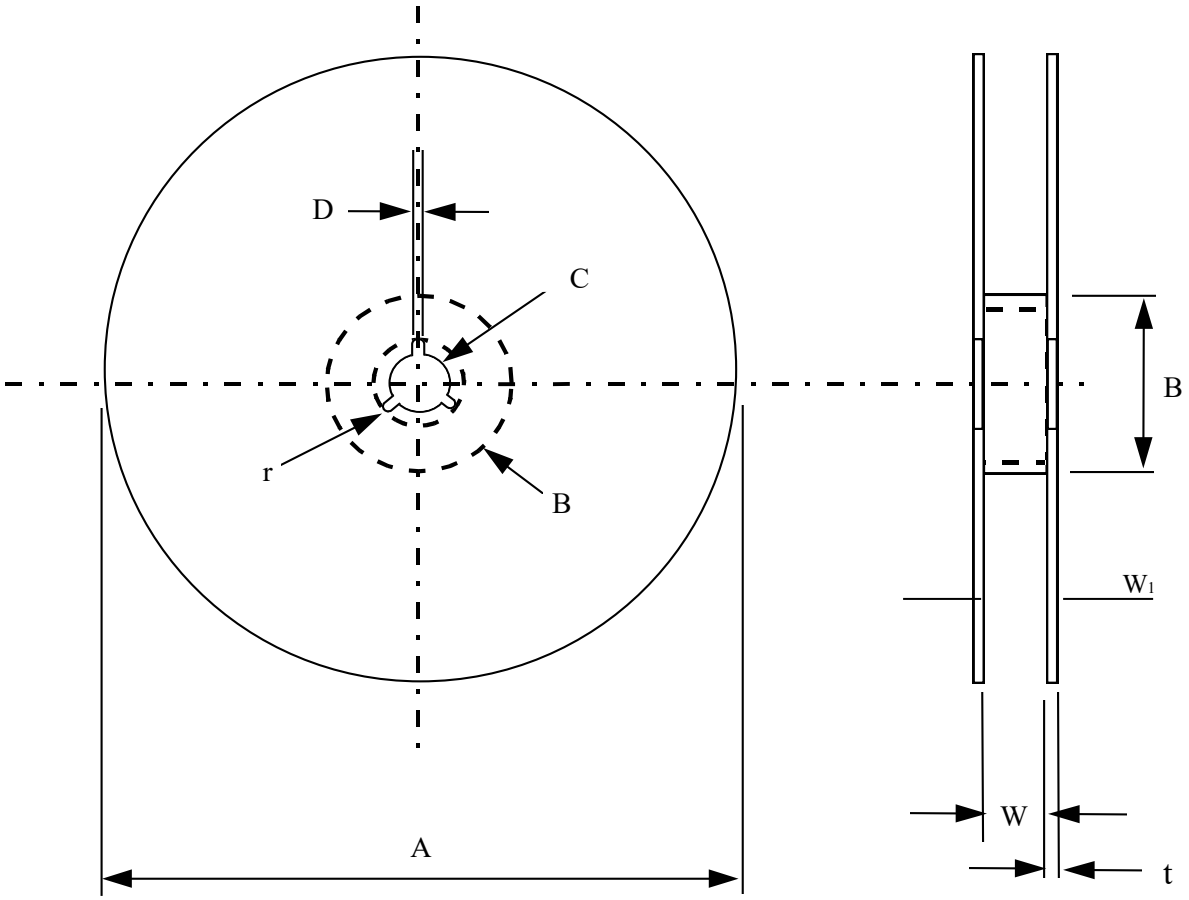
Production label that indicates the 8 digits lot number, product type, resistance value and tolerance shall be pasted on the surface of each reel.



7.3.4 Packaging Reel Box

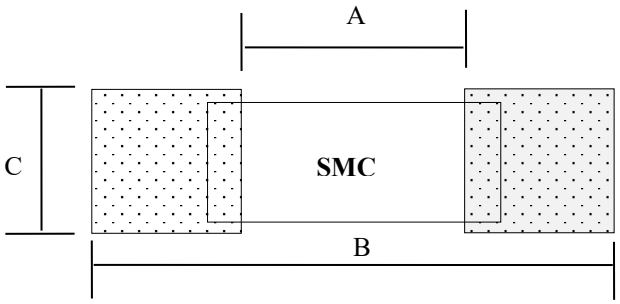
Dimension	Reel Box	Number of Reels
185 × 60 × 186 mm	25K Box	5
185 × 120 × 186 mm	50K Box	10

7.3.5 Reel Dimensions



Model	A	B	C	D	W	W_1	t	r
7”Reel (5K) (except 0402 10K)	ϕ178±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	11± 0.1	14.4 max	1.0± 0.1	1.0
7”Reel (4K)	ϕ178±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	13±1.0	14.4 max	1.2± 0.1	1.0
7’’Reel (10K)	ϕ178±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	11± 0.1	14.4 max	1.0± 0.1	1.0
10”Reel (10K)	ϕ254±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	11± 1.0	14.4 max	1.5± 0.1	1.0
13”Reel (20K)	ϕ330±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	11± 1.0	14.4 max	2.1± 0.1	-
13”Reel (20K)	ϕ330±1.0	ϕ100±1	13.5±0.5	2~3±0.5	10±0.5	-	-	-

8. SURFACE MOUNT LAND PATTERNS

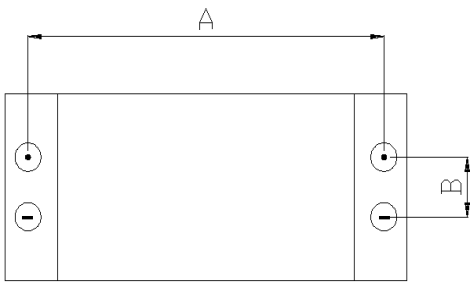


Unit: mm

Product (Type)	Land Dimension		
	A	B	C
ASAS05	0.3	1.0	0.4
ASAS10	0.5	1.5	0.6
ASAS16	0.8	2.1	0.9
ASAS21	1.2	3.0	1.3
ASAS32	2.2	4.2	1.6
ASAS40	2.2	4.2	2.8
ASAS50	3.5	6.1	2.8
ASAS63	3.8	8.0	3.5

9. Measurement Point

Bottom electrode



⊙ Current Terminal

⊖ Voltage Terminal

Unit : mm

TYPE \ DIM	A	B
ASAS05	0.44±0.05	0.22±0.05
ASAS10	0.80±0.05	0.24±0.05
ASAS16	1.35±0.05	0.35±0.05
ASAS21	1.80±0.05	0.35±0.05
ASAS32	2.90±0.05	0.35±0.05
ASAS40	2.90±0.05	0.35±0.05
ASAS50	4.50±0.05	1.15±0.05
ASAS63	5.90±0.05	1.60±0.05

10. REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version.1	18.12.2018		Initial Release
Version.2	27.12.2018		Add in 0 ohm information to related clause
Version.3	20.03.2019		1、Update clause 2 Part Numbering System 2、Update clause 3.10 table 3、Update clause 6 reliability test specification
Version.4	13.11.2019		Revise clause 1.2 Revise clause 3.1.1 resistor rated power Revise clause 3.9 Revise clause 6 sulfuration test
Version.5	14.10.2020		Revise clause 3.5 Storage temp. range