AA Series

Automotive Grade Anti-Sulfur Wide Terminal Thick Film Chip Resistors

Version. C

FEATURE

- AEC-Q200 Compliant
- High stability and reliability
- RoHS complaint
- Superior Anti-Sulfur performance
- MSL class: MSL 1
- Applications:
  - Automotive electronics, such as multimedia entertainment, Vehicle navigation, Audio control unit
  - Electric door and window, electric seat control unit
  - Reversing radar
  - Automotive lighting and control unit
  - Consumer electronics
  - etc.

MANUFACTURER PART NO.

For example: AA0612J100KT5G00-AA0612 ±5% 100KΩ T/R-5000

Series	Size	Tol.	Nominal Resistance Value	PKG	SPQ	Feature	TCR
2 codes	4 codes	1 code	2~5 codes	1 code	1 code	1 code	2 codes
AA	0612	J	100K	T	5	G	00
Automotive Grade Anti-Sulfur Wide Terminal Thick Film Chip Resistors	0508 0612 1020 1225	F=±1% J=±5%	0R=Jumper(<50mΩ) 1R①=1Ω 4R7=4.7Ω 4K7②=4.7KΩ 100K=100KΩ 4M7③=4.7MΩ	T=T/R④	4=4K 5=5K	G=Std. S=P.C.⑤	00=Refer to table as below.

Note: ① R=Radix, 10^0, Ω ② K=Kilo, 10^3, KΩ ③ M=Mega, 10^6, MΩ

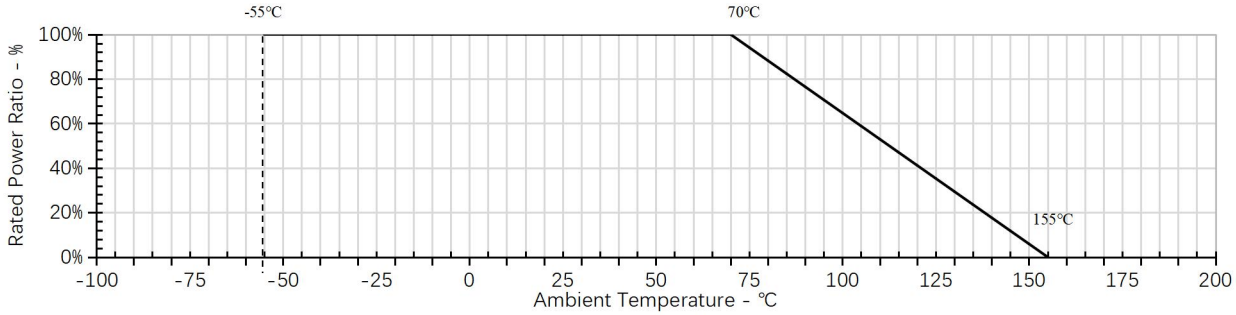
④ T/R=Taping in Reel packing type ⑤ P.C.=Personal and Customized.

CHARACTERISTICS

Type	Rated Power	MWV①	MOV②	Tolerance	TCR PPM/℃	Resistance Range	Jumper(0Ω)		
							Rated Current	MOC③	Range
AA0508	1/3W	150V	300V	±1%, ±5%	±400 PPM/℃	10Ω	4A	8A	50mΩ Max.
					±200 PPM/℃	10Ω<R≦100Ω			
					±100 PPM/℃	100Ω<R≦1MΩ			
	2/3W				±800 PPM/℃	10mΩ≦R<30mΩ			
					±400 PPM/℃	30mΩ≦R < 10Ω			
AA0612	1/2W	200V	400V	±1%, ±5%	±200 PPM/℃	10Ω<R≦100Ω	5A	10A	50mΩ Max.
					±100 PPM/℃	100Ω<R≦1MΩ			
	1W				0~+300 PPM/℃	10mΩ≦R<100mΩ			
					±200 PPM/℃	100mΩ≦R≦10Ω			
AA1020	1W	200V	400V	±1%, ±5%	±200 PPM/℃	10Ω<R≦100Ω	6A	12A	50mΩ Max.
					±100 PPM/℃	100Ω<R≦1MΩ			
				±5%	±400 PPM/℃	1Ω<R≦10Ω			
				±1%, ±5%	±800 PPM/℃	10mΩ≦R < 30mΩ			
					±400 PPM/℃	30mΩ≦R≦1Ω			
AA1225	2W	200V	400V	±1%, ±5%	±400 PPM/℃	1Ω<R≦10Ω	6A	15A	50mΩ Max.
					±200 PPM/℃	10Ω<R≦100Ω			
					±100 PPM/℃	100Ω<R≦1MΩ			
	3W				±800 PPM/℃	10mΩ≦R < 30mΩ			
					±400 PPM/℃	30mΩ≦R≦1Ω			

Note: ① MWV=Max. Working Voltage ② MOV=Max. Overload Voltage ③ MOC=Max. Overload Current

POWER DERATING CURVE



Note: Operating Temperature Range: -55℃~+155℃

RATED VOLTAGE

Resistors should have a Rated Voltage DC or AC corresponding to Rated Power which can be calculated by formula as below.

The Rated Voltage of certain resistance value should be the calculated result or Max. Working Voltage of product series whichever less.

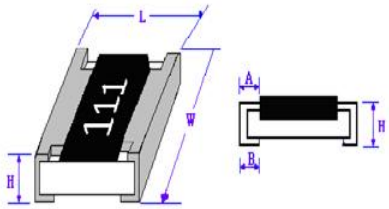
Formula:

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

E=Rated voltage(V)
P=Rated power(W)
R=Nominal resistance(Ω)

DIMENSIONS

Unit: mm

Figure	Type	L	W	H	A	B
	AA0508	1.20±0.10	2.0±0.10	0.55±0.10	0.20±0.10	0.30±0.20
	AA0612	1.60±0.15	3.20±0.15	0.55±0.10	0.30±0.20	0.45±0.20
	AA1020	2.50±0.15	5.00±0.15	0.55±0.10	0.40±0.20	0.60±0.20
	AA1225	3.10±0.15	6.25±0.15	0.55±0.10	0.45±0.20	0.65±0.20

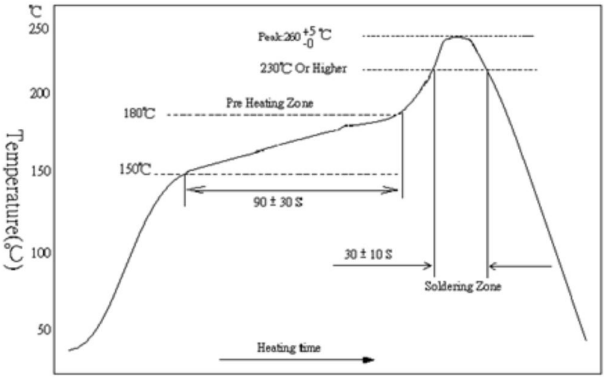
RELIABILITY

Item	Test Method	Acceptable Criterion
High Temperature Exposure	+155℃, 1000hrs., unpowered, measure the resistance change rate after test. **Reference: AEC-Q200 Test 3, MIL-STD-202 Method 108**	1% Series: △R/R=±(1.0%+0.05Ω) 5% Series: △R/R=±(2.0%+0.05Ω) Jumper: ＜50mΩ
Temperature Cycling	-55~+155℃, soak time 30min, Transition Time :1minute, 1000 cycles **Reference: AEC-Q200 Test 4, JESD22 Method JA-104**	△R/R=±(1.0%+0.05Ω) Jumper: ＜50mΩ
Humidity Bias	85℃, 85%, 10% rated power, 1000H, after the test and stand 24H to measure the change rate of resistance value for components with specified operating voltages higher or equal to500V, 10% of operating voltage. **Reference: AEC-Q200 TEST 7, MIL-STD-202 Method 103**	1% Series: △R/R=±(2.0%+0.05Ω) 5% Series: △R/R=±(3.0%+0.05Ω) Jumper: ＜100mΩ
High Temperature Operating Life	maximum specified operating temperature at 100% rated power without derating, 1000H, 90 min ON,30 min OFF **Reference: AEC-Q200 Test 8, MIL-STD -202 Method 108**	±1% Series: △R/R=±(2.0%+0.05Ω) ±5% Series: △R/R= ±(3.0%+0.05Ω) Jumper: ＜100mΩ
Resistance to Soldering Heat	Reflow test, time above 217 °C is 60s-150s, time above 250 ± 5°C is 30±5s **Reference: AEC-Q200 TEST 15, MIL-STD-202 Method 210**	△R/R=±(1.0%+0.05Ω) Jumper: ＜50mΩ

Item	Test Method	Acceptable Criterion
Resistance to Solvent	Immerse in isopropanol solvent at room temperature (23±5℃) for 5min, wipe 10 times with a hard toothbrush, repeat 3 times, take out and blow dry for Examination. **Reference: AEC-Q200 Test 12, MIL-STD-202 Method 215**	No visible damage
ESD	Human body mode, two discharges, positive and negative polarity once each. Size: 0508 and above Test Voltage: 2000V **Reference: AEC-Q200 Test 17, AEC-Q200-002**	△R/R=±(2.0%+0.05Ω) Jumper: ＜50mΩ
Solderability	Pretreatment: Dry heat 155℃, 4H, after take out, stand at room temperature for 2 hours. Test method B1: Dip the resistance in a tin furnace at 245±5℃ for 5 seconds, then take it out and observe the solder area under a microscope; Test method D: 260±5℃, T=30+5/-0s. **Reference: AEC-Q200 Test 18, J-STD-002 & IEC 60115-1 11.1.4.3**	Soldering coverage over 95% At the edge of terminal, the object underneath (e.g., white ceramic) shall not expose.
Electrical Characterization	$\mathrm{TCR(PPM/℃)} = \frac{(R_2 - R_1)}{R1 \times (T_2 - T_1)} \times 10^6$ R_1: Resistance value at room temperature (Ω) R_2: Resistance value at test temperature -55℃ or +125℃ T_1: Temperature at room temperature (℃) T_2: Temperature at -55℃ or +125℃ **Reference: AEC-Q200 Test 19,IEC 60115-1 6.2**	Details in table CHARACTERISTIC
Board Flex	The SMD resistance was welded to the test board and bent with the standard pressure block. After standing for 60s under the corresponding deformation condition, the change rate of resistance value of the part was tested Size: 0508, 0612 / 1225, 1020 Depth: 3mm / 2mm **Reference: AEC-Q200 TEST 21, AEC-Q200-005**	△R/R=±(1.0%+0.05Ω) Jumper: ＜50mΩ
Terminal Strength	Apply 1.8Kgf. external force on the side of the part to test the solder joint adhesion of the part. **Reference: AEC Q200-005**	No mechanical damage or peel-off of side end
Short Time Overload	Apply 2.5 times rated voltage or maximum overload voltage (whichever is the smallest) for 5 seconds. **Reference: IEC 60115-1 8.1.4.2**	1% Series: △R/R=±(1.0%+0.05Ω) 5% Series: △R/R=±(2.0%+0.05Ω) Jumper: ＜50mΩ
Mechanical shock	Half sine wave, acceleration 100g's, each three times in X, Y and Z directions, pulse width 6ms. **Reference: AEC-Q200 Test 13, MIL-STD -202 Method 213**	△R/R=±(1.0%+0.05Ω) Jumper: ＜50mΩ
Vibration	Frequency: 10Hz~2000Hz, acceleration: 5g's, X, Y, Z three directions, 12 cycles in each direction, a total of 36 cycles, a single cycle test for 20min. **Reference: AEC-Q200 Test 14, MIL-STD -202 Method 204**	△R/R=±(1.0%+0.05Ω) Jumper: ＜50mΩ
Flammability	Protective layer flammability report or component needle flame test report **Reference: AEC-Q200 Test 20, UL-94**	Do not burn and cotton below do not ignite
Sulfide test	Put the test sample resistor in sulfur vapor, at a temperature of 105±2℃ for 750hrs **Reference: ASTM-B-809-95&EIA977**	△R/R=±(4.0%+0.05Ω) Jumper: ＜100mΩ
Flame retardancy	$9V_{DC}$ to $32V_{DC}$ (clamp current 500A) in each increment $1V_{DC}$ for 1 hr. **Reference: AEC-Q200 Test 24, AEC-Q200-001**	1. Nonflammable 2. Do not explode 3. The temperature cannot be higher than 350℃ for 10 seconds

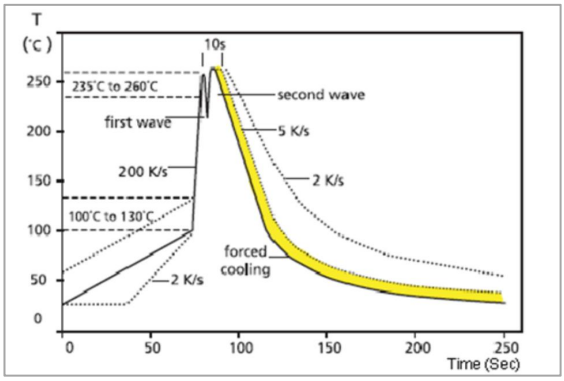
SOLDERING

Lead Free IR Reflow Soldering Profile



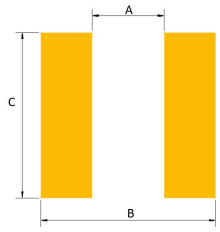
- Top temperature should be under 260^{+5}_{-0}℃ ,10Sec.
- Reference: J-STD-020D

Lead Free Double-Wave Soldering Profile



- 350±10℃ within 3 Sec. if soldering iron.

SOLDERING PAD



Unit: mm

Type	A	B	C
AA0508	0.6	2.2	2.3
AA0612	0.7	2.6	3.5
AA1020	0.5	3.5	5.3
AA1225	1.3	4.2	6.4

WORKING ENVIRONMENT

If user intends to use products in special environments or states (including but not limited to the following), it is necessary to approve special characteristics and reliability for the following or other application environments.

A. Hot temperature.
B. Near the sea, or corrosive gas, such as Cl_2, H_2S, NH_3, SO_2 and NO_2, etc.
C. Unverified liquids, such as water, oil, chemical or organic solvent.
D. Unverified resin or paint to cover products.
E. Products should be washed with water soluble cleaner even if non cleaning flux.

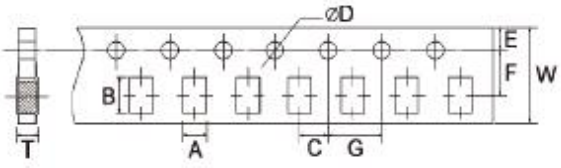
STORAGE / CARRY CONDITIONS

A. Temperature: 25±5℃
B. Humidity: 60±15%RH
C. Storage life: 2 years, FIFO
D. Please hold box correct orientation when storing and carrying. It is strictly prohibited to fall or squeeze the box, otherwise the product electrode or body may be damaged.

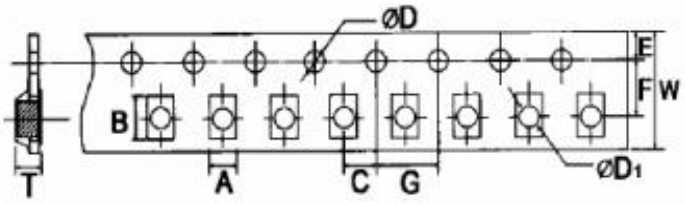
TAPING SPECIFICATIONS

A. Taping drawing

Carrier Taping A



Embossed Taping



B. Taping Dimensions unit: mm

Type or Size		A±0.2	B±0.2	C±0.05	$ØD^{+0.1}_{-0}$	E±0.1	F±0.05	G±0.1	W±0.2	T±0.1
Carrier Taping A	0508	1.65	2.40	2.0	1.5	1.75	3.5	4.0	8.0	0.81
	0612	1.90	3.45	2.0	1.5	1.75	3.5	4.0	8.0	0.81

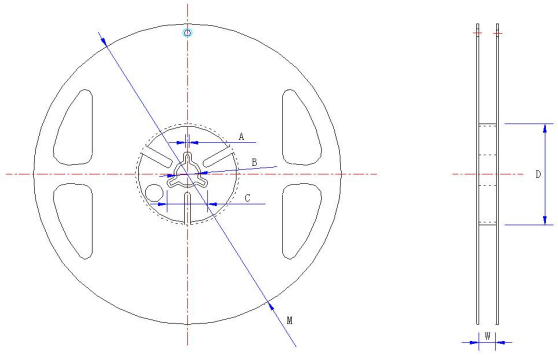
Type or Size		A±0.2	B±0.2	C±0.05	$ØD^{+0.1}_{-0}$	$ØD^{+0.25}_{-0}$	E±0.1	F±0.05	G±0.1	W±0.2	T±0.1
Embossed Taping	1020	2.90	5.60	2.00	1.50	1.50	1.75	5.50	4.00	12.00	1.00
	1225	3.50	6.70	2.00	1.50	1.50	1.75	5.50	4.00	12.00	1.00

STANDARD PACKING

Series	0508	0612	1020	1225
SPQ, PCS/Reel	5,000	5,000	4,000	4,000
Taping material	Carrier	Carrier	Embossed	Embossed

REEL SPECIFICATION

A. Reel drawing



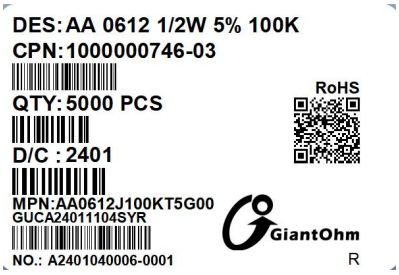
B. Reel dimension unit: mm

Type	SPQ PCS/Rl.	A±0.5	B±0.5	C±0.5	D±1	M±2	W±1
0508	5,000	2.0	13.0	21.0	60.0	178.0	10.0
0612	5,000	2.0	13.0	21.0	60.0	178.0	10.0
1020	4,000	2.0	13.0	21.0	60.0	178.0	13.8
1225	4,000	2.0	13.0	21.0	60.0	178.0	13.8

LABEL SPECIFICATION

A. Produce Label

B. Customer Label



PACKING BOX

A. Packing Type

Taping in reel / Bulk in plastic bag.

B. Inner box

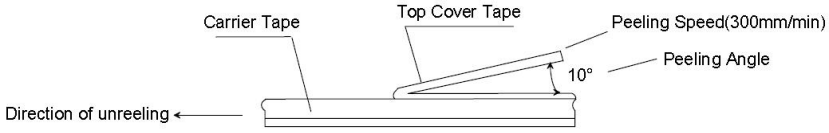
The inner box has several capacities hold 1 reel, 2 reels, 3 reels, 4 reels, 5 reels and 10 reels.

C. Out box

The out box has two capacities hold 6- or 8-pieces inner box.

NOTE OF COVER TAPE PEEL OFF

A. Figure of cover tape peel off.



B. Please keep peeling speed under 300mm per minute.

C. Please keep the angle between cover tape and direction of unreeling narrower than 10 degree.

D. There is limit of adhesive force between cover tape and carrier tape or embossed tape shown as following table.

Size of chip resistors	0508 and above
Adhesive force limit	10~70gf

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VERSION HISTORY

Version	Date	Change Item(s)	Description
A	2022/11/29	-	First version
B	2024/02/01	Full	Add Packing Specifications.
C	2024/07/16	Full	Add Packing Specifications Add Jumper Description in MPN Add Jumper test acceptable criterion. Add Moisture sensitivity level description.