FEATURE

- Higher max. working voltage than general purpose series products.
- AEC-Q200 qualified.
- High reliability and stability
- RoHS complaint.
- Superior anti-sulfur performance.
- Meet high requirements for high temperature and high humidity with 85℃ and 85%RH.
- Compatible with reflow and wave soldering.
- Applications:
  - Adapters
  - Back-light circuit
  - Camera
  - Automotive electronics
  - Industrial Equipment
  - etc.

MANUFACTURER PART NO.

For example: AV1206F1MT5G00-AV1206 ±1% 1MΩ 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
AV	1206	F	1M	T	5	G	00
Automotive Grade High Voltage Thick Film Chip Resistors	0603 0805 1206 1210 2010 2512	D=0.5% F=1% J=5%	36K①=36KΩ 49K9=49.9KΩ 4M7②=4.7MΩ	T=T/R③	4=4K 5=5K	G=Std. S=P.C.④	00=Refer to table RELIABILITY.

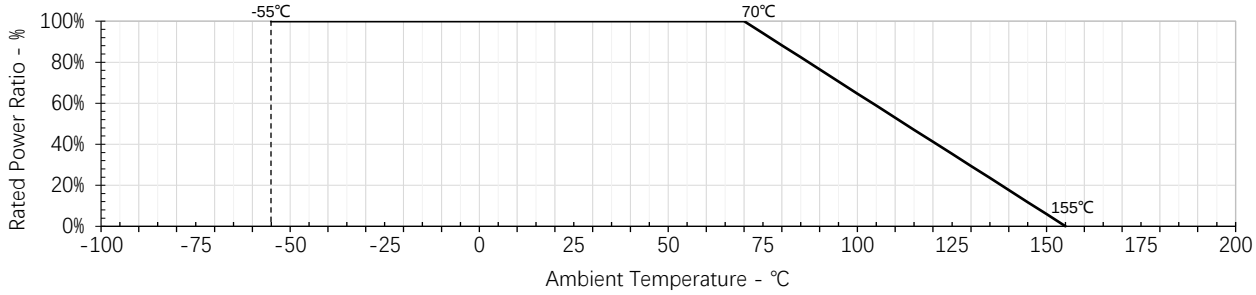
Note: ① K=Kilo, 10^3, KΩ ②M=Mega, 10^6, MΩ
③ T/R=Taping in Reel package type ④P.C.=Personal and Customized.

CHARACTERISTICS

Type	Rated Power	MWV①	MOV②	Tolerance	Value Range	Operating Temp.
AV0603	1/10W	350V	500V	±0.5%, ±1%, ±5%	36KΩ-10MΩ	-55~+155℃
AV0805	1/8W	400V	800V	±0.5%, ±1%, ±5%	100KΩ-10MΩ	
AV1206	1/4W	500V	1000V	±0.5%, ±1%, ±5%	100KΩ-10MΩ	
AV1210	1/2W	800V	1500V	±0.5%, ±1%, ±5%	50KΩ-10MΩ	
AV2010	3/4W	2000V	3000V	±1%, ±5%	50KΩ-10MΩ	
				±0.5%	50KΩ-1MΩ	
AV2512	1W	3000V	4000V	±1%, ±5%	39KΩ-10MΩ	
				±0.5%	39KΩ-1MΩ	

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

POWER DERATING CURVE



Note: Operating Temperature Range from -55℃ to +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.

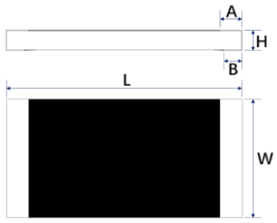
Formula:

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

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

DIMENSIONS

Unit: mm

Figure	Type	L	W	H	A	B
	AV0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20
	AV0805	2.00±0.15	1.25±0.15	0.55±0.10	0.40±0.20	0.40±0.20
	AV1206	3.10±0.15	1.55±0.15	0.55±0.10	0.45±0.20	0.45±0.20
	AV1210	3.10±0.10	2.60±0.20	0.55±0.10	0.50±0.25	0.50±0.20
	AV2010	5.00±0.10	2.50±0.20	0.55±0.10	0.60±0.25	0.50±0.20
	AV2512	6.35±0.10	3.20±0.20	0.55±0.10	0.60±0.25	0.50±0.20

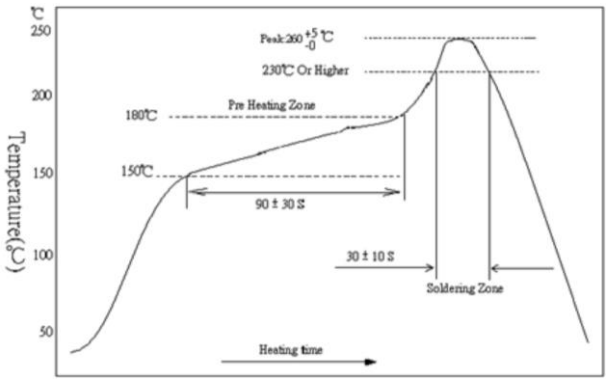
RELIABILITY

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**	0.5%, 1% Series: △R/R=±1.0% 5% Series: △R/R=±2.0%
Temperature Cycling	-55~+125℃, slope 10~20℃/min, dwell time 15min, 1000 cycles **Reference: AEC-Q200 Test 4, JESD22 Method JA-104**	△R/R=±2.0%
Biased Humidity	85℃, 85%RH, load 10% rated power, 1000hrs., take it out and stabilized 24 hrs. then measure the change rate of resistance value **Reference: AEC-Q200 TEST 7, MIL-STD-202 Method 103**	0.5%, 1% Series: △R/R=±2.0% 5% Series: △R/R=±3.0%
Operational Life	125℃, rated voltage (calculated according to derating curve), 1000 hrs., with cycle 90 min ON, 30 min OFF **Reference: AEC-Q200 Test 8, MIL-STD -202 Method 108**	0.5%, 1% Series: △R/R=±2.0% 5% Series: △R/R= ±3.0%
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

Item	Test Method	Acceptable Criterion
Resistance to Soldering Heat	Soak in a tin furnace at 260^{+5}_{0}℃ for 10^{+1}_{0} seconds, take out and stand for more than 60 minutes, then measure the change rate of resistance value. **Reference: AEC-Q200 TEST 15, MIL-STD-202 Method 210**	△R/R=±1.0%
ESD	Human body mode, two discharges, positive and negative polarity once each Size: 0603 | 0805 and above Test Voltage: 1000V | 2000V **Reference: AEC-Q200 Test 17, AEC-Q200-002**	△R/R=±2.0%
Solderability	Pretreatment: dry heat 155℃, 4 hrs. or PCT aging for 4 hrs. (equivalent), after take out, stand at room temperature for 2 hrs. Test method: 1. Dip the resistance in a tin furnace at 245±3℃ for 3 seconds, then take it out and observe the solder area under a microscope; 2. Reflow soldering test, Peak Temperature: 235℃, T=40± 5 seconds. **Reference: AEC-Q200 Test 18, J-STD-002 & IEC 60115-1 11.1.4.3**	Soldering coverage must be 95% minimum. At the edge of terminal, the object underneath (e.g., white ceramic) shall not expose.
Electrical Characterization	$\mathrm{TCR(PPM/℃)} = \frac{(R_2 - R_1)}{R_1 \times (T_2 - T_1)} \times 10^6$ R_1: Resistance value tested at room temperature (Ω) R_2: Resistance value tested at-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**	±100PPM/°C
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: 0603, 0805 | 1206, 1210 | 2010, 2512 Depth: 5mm | 3mm | 2mm **Reference: AEC-Q200 TEST 21, AEC-Q200-005**	△R/R=±1.0%
Terminal Strength	Apply 1.8Kgf. external force (0402,1 Kgf.) 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**	0.5%, 1% Series: △R/R=±1.0% 5% Series: △R/R=±2.0%
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%
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%
Flammability	V-0 **Reference: AEC-Q200 Test 20, UL-94**	Do not burn and cotton below do not ignite
Flame retardancy	9VDC to 32VDC (clamp current 500A) in each increment 1VDC 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
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%

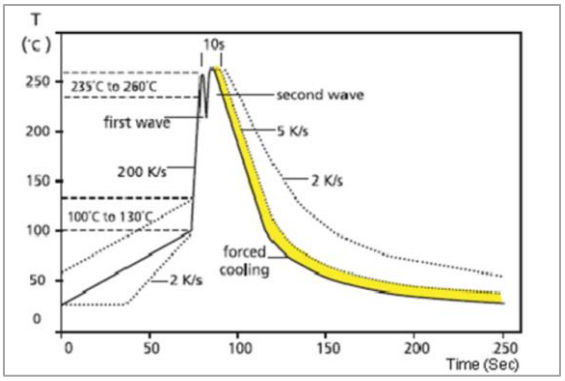
SOLDERING

Lead Free IR Reflow Soldering Profile



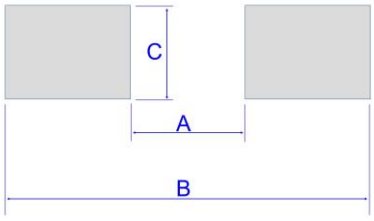
- Top temperature should be under 260^{+5}_{-0} ℃ ,10 Sec.
- Reference: J-STD-020D

Lead Free Double-Wave Soldering Profile



- Suitable for 0603 above size products
- 350±10℃ within 3 Sec. if soldering iron.

SOLDERING PAD



Type	A	B	C
AV0603	0.8	2.1	0.9
AV0805	1.2	3.0	1.3
AV1206	2.2	4.2	1.6
AV1210	2.2	4.2	2.8
AV2010	3.5	6.1	2.8
AV2512	3.8	8.0	3.5

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. High 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 package may be damaged.

LEGAL DISCLAIMER

GiantOhm and its distributors or agents (hereinafter referred to as GiantOhm) shall not bear any responsibility for any error, inaccuracy or incompleteness contained in any product related information (including but not limited to product specifications, data, pictures, and charts). GiantOhm may change, revise, or improve product related information at any time without prior notice.

GiantOhm makes no commitment, guarantee for the suitability of its products for special purposes or the continuous production of any of its products. To the maximum extent permitted by law, GiantOhm does not assume any of the following responsibilities:

A. All liabilities arising from the application or use of any GiantOhm's products.
B. All liabilities, including but not limited to the loss of profits or direct damage, indirect damage, special damage, punitive damage, derivative damage, or incidental damage caused by or related to GiantOhm's products.
C. All implied warranties, including fitness for a particular purpose, non-infringement, and merchantability.

GiantOhm defines this product as a general consumer electronic purpose, which is not applicable to any medical lifesaving or life-sustaining equipment, nor to any application that may cause casualties in case of failure of GiantOhm's products.

All technical suggestions on product application provided by GiantOhm are provided free of charge. GiantOhm assumes no obligation and responsibility for adopting such technical suggestions and available results, and all risks of adopting such suggestions shall be borne by the buyer. All risks and responsibilities arising from the buyer's use of GiantOhm's products in combination with other materials or raw materials, or in any combination in its manufacturing process, shall be borne by the buyer, regardless of any oral or written technical instructions, suggestions or other requirements given by GiantOhm for the use of the products.

The information provided above is only to explain the product specifications. If the product is not changed, GiantOhm has all the rights to modify the above contents without prior notice, and the product change will be notified to the customer by ECN.

VERSION HISTORY

Version	Date	Change Item(s)	Description
A	2022/06/22	-	First version
B	2022/11/03	Reliabilities	Updated test and requirements
C	2022/11/26	Reliabilities, Characteristics	Add tolerance ±0.5%.