FEATURE

- AEC-Q200 qualified.
- Excellent Antistatic property
- Higher Max. Working Voltage
- High reliability and stability
- RoHS complaint.
- Superior Anti-Sulfur performance
- Compatible with Reflow and Wave soldering
- MSL class: MSL 1
- Applications:
  - Adapters
  - Industrial control system
  - Outdoor equipment
  - Medical devices
  - etc.

MANUFACTURER PART NO.

For example: AE1206J100KT5G00-AE1206 ±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
AE	1206	J	100K	T	5	G	00
Automotive Grade Anti-ESD Thick Film Chip Resistors	0201 0402 0603 0805 1206 1210	F=±1% J=±5%	1R①=1Ω 4R7=4.7Ω 4K7②=4.7KΩ 100K=100KΩ 4M7③=4.7MΩ	T=T/R④	4=4K 5=5K A=10K	G=Std. S=P.C.⑤	00=Refer to table as below.

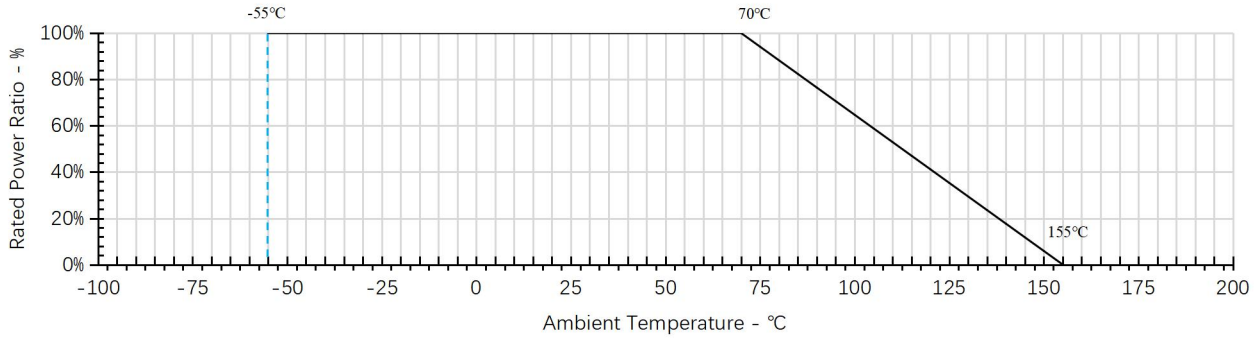
Note: ① R=Radix, 10^0, Ω ② K=Kilo, 10^3, KΩ ③ M=Mega, 10^6, MΩ
④ T/R=Taping in Reel packing type ⑤ P.C.=Personal and Customized.

CHARACTERISTICS

Type	Rated Power	Max. Working Voltage	Max. Overload Voltage	Tolerance	Value Range
AE0201	1/20W	25V	50V	±1%, ±5%	1Ω~10M
AE0402	1/16W	50V	100V	±1%, ±5%	1Ω~10M
AE0603	1/4W	150V	200V	±1%, ±5%	1Ω~10M
AE0805	2/5W	200V	400V	±1%, ±5%	1Ω~10M
AE1206	2/3W	500V	1000V	±1%, ±5%	1Ω~10M
AE1210	1/2W	800V	1500V	±1%, ±5%	1Ω~10M

This document is subject to change without notice. The products described herein, and this document are subject to specific disclaimers, set forth at GiantOhm official website, http://www.giantohm.com/download/cid/22.html

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.

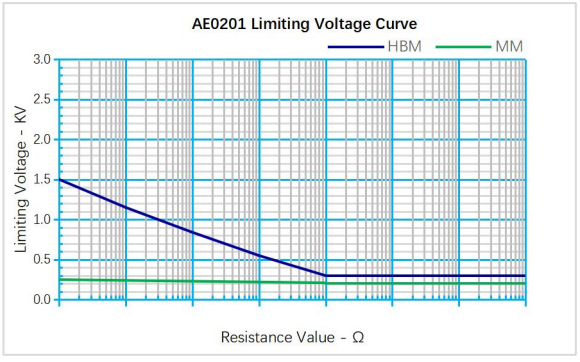
The Rated Voltage of certain resistance value should be the calculated result or Max. Working Voltage of product series whichever less.

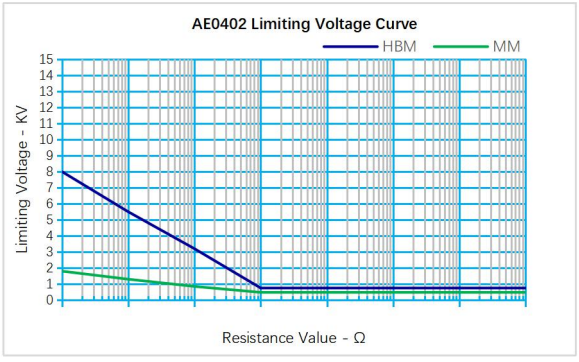
Formula:

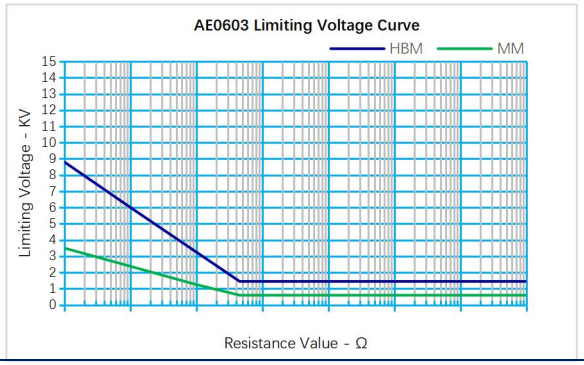
$$E = \sqrt{P \times R}$$

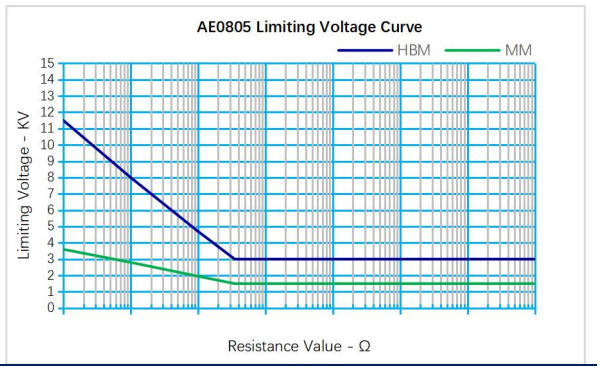
E=Rated voltage(V)
P=Rated power(W)
R=Nominal resistance(Ω)

ESD LIMITING VOLTAGE CURVE

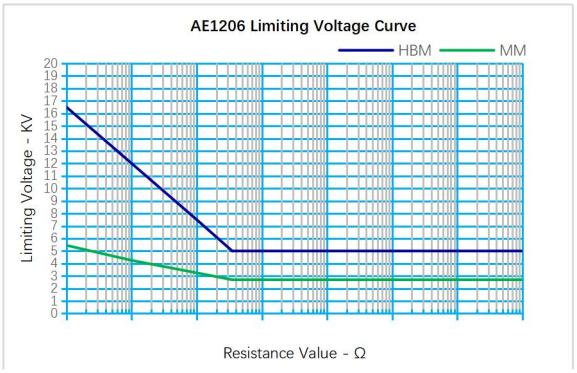


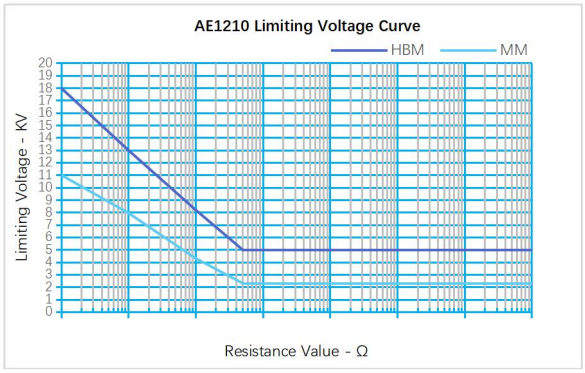






This document is subject to change without notice. The products described herein, and this document are subject to specific disclaimers, set forth at GiantOhm official website, http://www.giantohm.com/download/cid/22.html

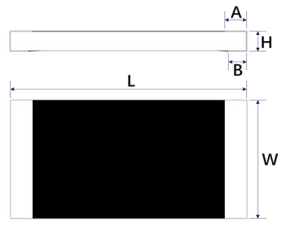




Note: HBM:100PF 1K5 1Cycle MM: 200PF 0E 1Cycle

DIMENSIONS

Unit: mm

Figure	Type	L	W	H	A	B
	AE0201	0.60±0.03	0.30±0.03	0.23±0.03	0.12±0.05	0.15±0.05
	AE0402	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10
	AE0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20
	AE0805	2.00±0.15	1.25±0.15	0.55±0.10	0.40±0.20	0.40±0.20
	AE1206	3.10±0.15	1.55±0.15	0.55±0.10	0.45±0.20	0.45±0.20
	AE1210	3.10±0.10	2.60±0.20	0.55±0.10	0.50±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**	±1% Series: △R/R= ±(1.0%+0.05Ω) ±5% Series: △R/R= ±(2.0%+0.05Ω)
Temperature Cycling	-55~+155℃, soak time 30min, Transition Time :1minute, 1000 cycles **Reference: AEC-Q200 Test 4, JESD22 Method JA-104**	△R/R=±(2.0%+0.05Ω)
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)
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)
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
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)
ESD	Human body mode, two discharges, positive and negative polarity once each Size: 0201 | 0402, 0603 | 0805 and above Test Voltage: 500V | 1000V | 2000V **Reference: AEC-Q200 Test 17, AEC-Q200-002**	△R/R=±(2.0%+0.05Ω)

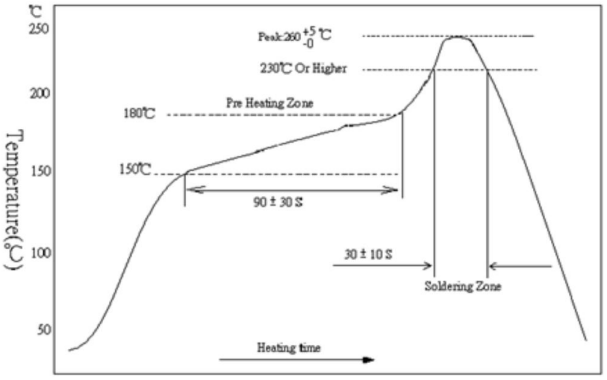
This document is subject to change without notice. The products described herein, and this document are subject to specific disclaimers, set forth at GiantOhm official website, http://www.giantohm.com/download/cid/22.html

Item	Test Method	Acceptable Criterion
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 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**	1Ω≤R≤10Ω: 0201: -100~+350 PPM/°C 0402~1210:±200 PPM/°C 10Ω<R≤10MΩ: 0201: ±200 PPM/°C 0402~1210: ±100 PPM/°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: 0402, 0603, 0805 | 0201, 1206, 1210 Depth: 5mm | 3mm **Reference: AEC-Q200 TEST 21, AEC-Q200-005**	△R/R=±(1.0%+0.05Ω)
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**	±1% Series: △R/R=±(1.0%+0.05Ω) ±5% Series: △R/R=±(2.0%+0.05Ω)
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)
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)
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
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%+0.05Ω)

This document is subject to change without notice. The products described herein, and this document are subject to specific disclaimers, set forth at GiantOhm official website, http://www.giantohm.com/download/cid/22.html

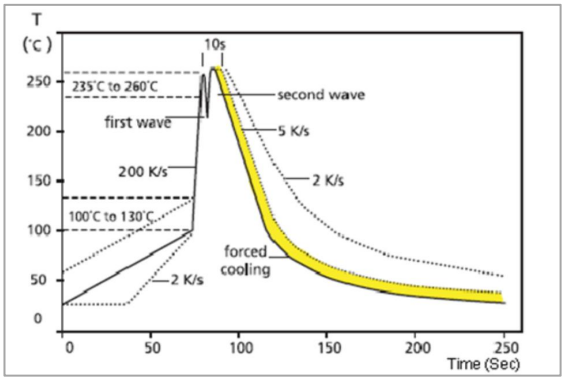
SOLDERING

Lead Free IR Reflow Soldering Profile



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

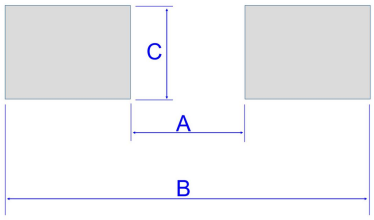
Lead Free Double-Wave Soldering Profile



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

SOLDERING PAD

Unit: mm



Type	A	B	C
AE0201	0.3	1.0	0.4
AE0402	0.5	1.5	0.6
AE0603	0.8	2.1	0.9
AE0805	1.2	3.0	1.3
AE1206	2.2	4.2	1.6
AE1210	2.2	4.2	2.8

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.

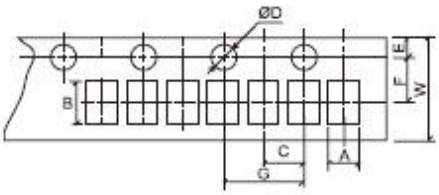
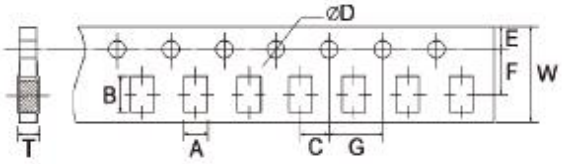
A. High temperature.
B. Near the sea, or corrosive gas, such as Cl_2、 H_2S、 NH_3、 SO_2 and NO_2, etc.
C. Unverified liquids, such as water, oil, chemical or organic solvent.
D. Unverified resin or paint to cover products.
E. Products should be washed with water soluble cleaner even if non cleaning flux.

STORAGE / CARRY CONDITIONS

A. Temperature: 25±5℃
B. Humidity: 60±15%RH
C. Storage life:
   - 0201 size: 1 year;
   - 0402 and above size: 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.

This document is subject to change without notice. The products described herein, and this document are subject to specific disclaimers, set forth at GiantOhm official website, http://www.giantohm.com/download/cid/22.html

TAPING SPECIFICATIONS Taping drawing

Carrier Taping A	Carrier Taping B
	

B. Taping Dimensions unit: mm

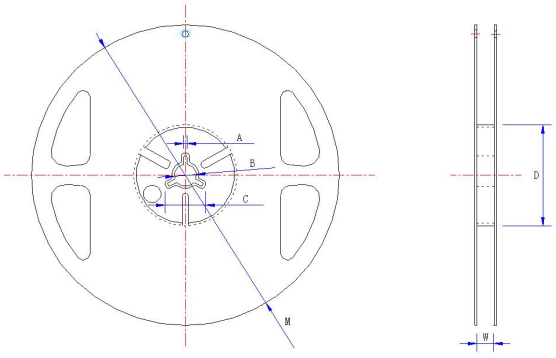
Type or Size		A±0.2	B±0.2	C±0.05	$\text{ØD}^{+0.1}_{-0}$	E±0.1	F±0.05	G±0.1	W±0.2	T±0.1
Carrier Taping A	0201	0.40±0.05	0.70±0.05	2.0	1.5	1.75	3.5	4.0	8.0	0.47
	0402	0.67±0.1	1.17±0.1	2.0	1.5	1.75	3.5	4.0	8.0	0.47
Carrier Taping B	0603	1.10	1.90	2.0	1.5	1.75	3.5	4.0	8.0	0.67
	0805	1.65	2.40	2.0	1.5	1.75	3.5	4.0	8.0	0.81
	1206	1.90	3.45	2.0	1.5	1.75	3.5	4.0	8.0	0.81
	1210	2.85	3.50	2.0	1.5	1.75	3.5	4.0	8.0	0.81

STANDARD PACKING

Series	0201	0402	0603	0805	1206	1210
SPQ, PCS/Reel	15,000	10,000	5,000	5,000	5,000	5,000
Taping material	Carrier	Carrier	Carrier	Carrier	Carrier	Carrier

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
0201	15,000	2.0	13.0	21.0	60.0	178.0	10.0
0402	10,000	2.0	13.0	21.0	60.0	178.0	10.0
0603	5,000	2.0	13.0	21.0	60.0	178.0	10.0
0805	5,000	2.0	13.0	21.0	60.0	178.0	10.0
1206	5,000	2.0	13.0	21.0	60.0	178.0	10.0
1210	5,000	2.0	13.0	21.0	60.0	178.0	10.0

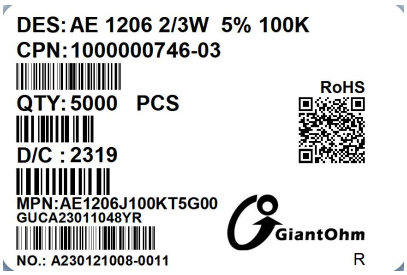
This document is subject to change without notice. The products described herein, and this document are subject to specific disclaimers, set forth at GiantOhm official website, http://www.giantohm.com/download/cid/22.html

LABEL SPECIFICATION

A. Produce Label



B. Customer Label



PACKING BOX

A. Packing Type

Taping in reel / Bulk in plastic bag.

B. Inner box

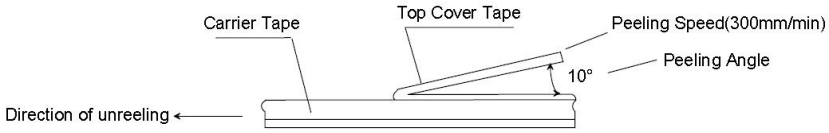
The inner box has several capacities hold 1 reel, 2 reels, 3 reels, 4 reels, 5 reels and 10 reels.

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	0201	0402	0603 and above
Adhesive force limit	6~30gf	10~40gf	10~70gf

This document is subject to change without notice. The products described herein, and this document are subject to specific disclaimers, set forth at GiantOhm official website, http://www.giantohm.com/download/cid/22.html

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.

This document is subject to change without notice. The products described herein, and this document are subject to specific disclaimers, set forth at GiantOhm official website, http://www.giantohm.com/download/cid/22.html

VERSION HISTORY

Version	Date	Change Item(s)	Description
A	2023/02/11	-	First version
B	2024/02/01	Full	Add Packing Specifications and update according to AEC-Q200 version E.
C	2024/07/16	Full	Updated test acceptable criterion. Add Moisture sensitivity level description.

This document is subject to change without notice. The products described herein, and this document are subject to specific disclaimers, set forth at GiantOhm official website, http://www.giantohm.com/download/cid/22.html