



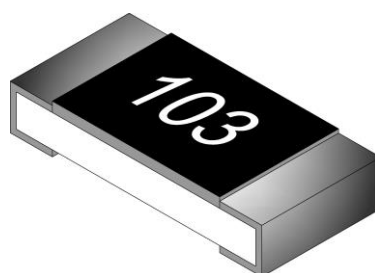
QRH Series Automotive High Power Chip Resistor Product Specifications

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■ Automotive High Power Chip Resistor — QRH Series



■ Application

- Automotive electronics
- Navigation equipment, TPMS
- Heating, Ventilating and Air conditioning
- Indoor lighting, Central door locking, Wiper module

■ Features

- Small size and light weight
- Reliability, high quality
- CCD visual quality inspection
- AEC-Q200 Compliant

■ Parts Number Explanation

Example :

QRH	2512	J	100R	E	04	Z
Product Type	Size (Inch)	Resistor Tolerance	Resistor Value	Package	Quantity	Optional
QRH	0402 0603 0805 1206 1210 1812 2010 2512	F : $\pm 1\%$ J : $\pm 5\%$	0R=0R00 10mR=R010 100mR=R100 1R=1R00 10R=10R0 100R=100R 1K=1K00 1M=1M00	P : Paper Taping (0603~1210) Q : Paper Taping (0402) E : Embossed Taping	04 : 4000PCS 05 : 5000PCS 10 : 10000PCS 40 : 40000PCS 50 : 50000PCS	Z : Default



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■ High Power Electrical Specifications

Item Type	Rated Power at 70℃	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/℃)	Resistance Range	
					F (±1%)	J (±5%)
QRH0402	0.1W	50V	100V	±400	1Ω≤R<10Ω	
				±100	10Ω≤R≤10MΩ	
QRH0603	0.125 W	75V	150V	±400	1Ω≤R<10Ω	
				±100	10Ω≤R≤10MΩ	
QRH0805	0.25 W	150V	300V	±400	1Ω≤R<10Ω	
				±100	10Ω≤R≤10MΩ	
QRH1206	0.5 W	200V	400V	±400	1Ω≤R<10Ω	
				±100	10Ω≤R≤10MΩ	
QRH1210	0.66 W			±400	1Ω≤R<10Ω	
				±100	10Ω≤R≤10MΩ	
QRH1812	1 W			±400	1Ω≤R<10Ω	
				±100	10Ω≤R≤10MΩ	
QRH2010	1 W			±400	1Ω≤R<10Ω	
				±100	10Ω≤R≤10MΩ	
QRH2512	2 W			±400	1Ω≤R<10Ω	
				±100	10Ω≤R≤10MΩ	

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55℃ ~ +155℃.

Type	0402	0603	0805	1206	1210	1812	2010	2512
Jumper Resistance Value	20mΩMax							
Jumper Rated Current	2A	2.5A	3.5A	5A	6A	7A	7A	10A
Max. Over Load Current <1 second and 1 times	6A	9A	13A	16A	19A	22A	22A	30A



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● Automotive High Power Low Ohm Chip Resistor

■ Automotive High Power Electrical Specifications

Type \ Item	Rated Power at 70℃	Rated Voltage Range	Max Overload Voltage	T.C.R. (PPM/℃)	Resistance Range (mΩ)
					F(±1%)、J±(5%)
QRH0402	0.1W	0.15~0.31V	0.786V	±1000	220≤R≤450
				±800	450<R<1000
QRH0603	0.125W	0.1~0.35V	0.879V	±1000	75≤R<100
				±800	100≤R≤330
				±600	330<R<1000
QRH0805	0.25W	0.05~0.5V	1.244V	±1800	10≤R<50
				±800	50≤R<100
				±600	100≤R<1000
QRH1206	0.5W	0.07~0.7V	1.759V	±1800	10≤R<50
				±800	50≤R<100
				±600	100≤R<1000
QRH1210	0.66W	0.08~0.81V	2.021V	±1800	10≤R<50
				±800	50≤R<100
				±600	100≤R<1000
QRH1812	1W	0.1~0.99V	2.487V	±1800	10≤R<50
				±800	50≤R<100
				±600	100≤R<1000
QRH2010	1W	0.1~0.99V	2.487V	±1800	10≤R<50
				±800	50≤R<100
				±600	100≤R<1000
QRH2512	2W	0.14~1.41V	3.518V	±1800	10≤R<50
				±800	50≤R<100
				±600	100≤R<1000

● For non-standard parts, please contact our sales dept.

● Operating Temperature Range : -55°C ~ +155°C.



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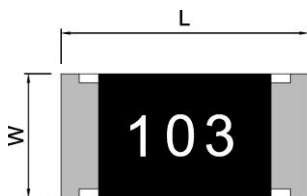
● Automotive High Power High Ohm Chip Resistor

■ Automotive High Power Electrical Specifications

Item Type	Rated Power at 70℃	Max Working Voltage	Max Overload Voltage	T.C.R. (PPM/℃)	Resistance Range	
					F(±1%)	J(±5%)
QRH0402	0.1W	50V	100V	±200	10.1 MΩ	10.1 MΩ
QRH0603	0.125 W	75V	150V			
QRH0805	0.25 W	150V	300V			
QRH1206	0.5 W	200V	400V		~	~
QRH1210	0.66 W				30 MΩ	30 MΩ
QRH2010	1 W					
QRH2512	2 W					

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55°C ~ +155°C.

■ Type Dimension



QRH0402 / QRH0603 / QRH0805 / QRH1206 / QRH1210 / QRH1812 / QRH2010 / QRH2512

■ Dimension

Unit: mm

Type	L	W	H	l ₁	l ₂
QRH0402	1.00 ± 0.05	0.50 ± 0.05	0.30 ± 0.05	0.15 ± 0.10	0.20 ± 0.10
QRH0603	1.60 ± 0.10	0.80 ± 0.10	0.40 ± 0.10	0.30 ± 0.20	0.30 ± 0.10
QRH0805	2.00 ± 0.10	1.25 ± 0.10	0.50 ± 0.15	0.30 ± 0.15	0.40 ± 0.15
QRH1206	3.05 ± 0.10	1.60 ± 0.10	0.55 ± 0.15	0.40 ± 0.20	0.50 ± 0.20
QRH1210	3.05 ± 0.10	2.50 ± 0.15	0.55 ± 0.15	0.50 ± 0.20	0.50 ± 0.20
QRH1812	4.50 ± 0.10	3.10 ± 0.15	0.55 ± 0.05	0.55 ± 0.20	0.70 ± 0.20
QRH2010	5.00 ± 0.20	2.50 ± 0.15	0.55 ± 0.10	0.60 ± 0.20	0.60 ± 0.20
QRH2512	6.30 ± 0.20	3.20 ± 0.15	0.65 ± 0.15	0.60 ± 0.20	0.60 ± 0.20



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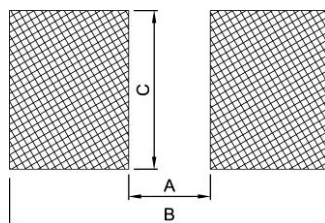
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● General Information

■ Recommend Land Pattern Design



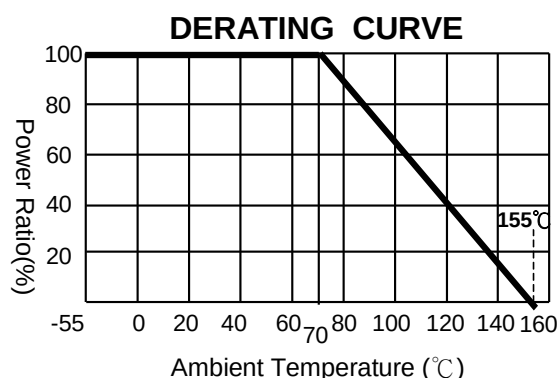
■ Dimension

Unit: mm

Item \ Type	0402	0603	0805	1206	1210	1812	2010	2512
A	0.60	0.80	1.30	2.20	2.00	3.11	3.80	4.90
B	1.60	2.40	2.90	4.20	4.40	5.91	6.60	8.10
C	0.70	1.00	1.40	1.70	2.70	3.00	2.70	3.40

■ Performance Characteristics

■ Power Derating Curve



Power rating or current rating is in the case based on continuous full-load at ambient temperature of 70°C.

For operation at ambient temperature in excess of 70°C, the load should be derated in accordance with figure of derating Curve.

■ Voltage Rating or Current Rating

Resistance Range: $\geq 1\Omega$

Rated Voltage: The resistor shall have a DC continuous working voltage or a RMS AC continuous working voltage at commercial-line frequency and wave form corresponding to the power rating, as determined formula as following:

$$E(RCWV) = \sqrt{P \times R}$$

E=Rated voltage(V)

P=Power rating(W)

R=Nominal resistance(Ω)



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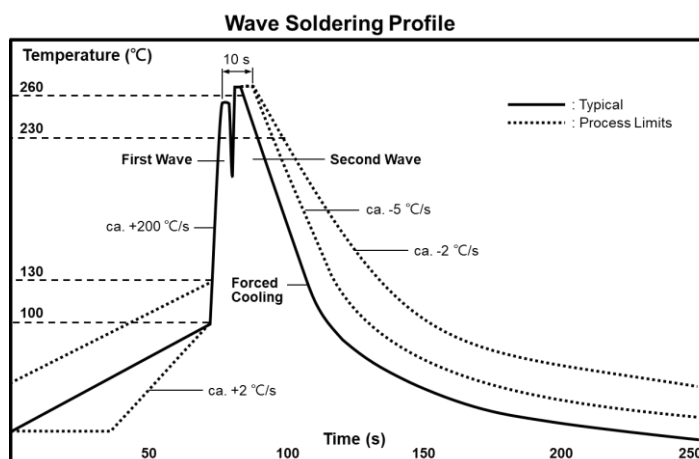
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● Reliability Test and Requirement

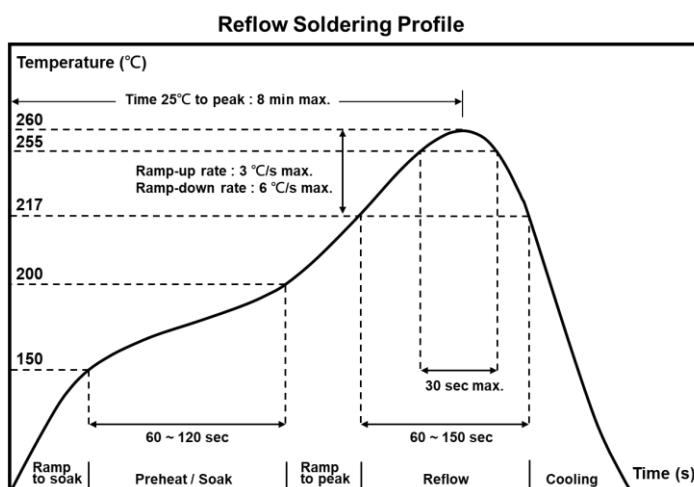
Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (T.C.R)	JIS-C-5201-1 4.8 IEC-60115-1 4.8	At 25°C / -55°C and 25°C / +155°C, 25°C is the reference temperature	As Spec
Short Time Overload	JIS-C-5201-1 4.13 IEC-60115-1 4.13	High Power : 2.5 times RCWV or Max. Overload voltage whichever is less for 2 seconds.	±1 : ±(1.0%+0.05Ω) ±5 : ±(2.0%+0.1Ω) Value <1Ω : ±(2.0%+0.1Ω)
Leaching	JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1	260±5°C for 30 seconds.	>95% Coverage
Resistance to Soldering Heat	JIS-C-5201-1 4.18 IEC-60115-1 4.18	260±5°C for 10 seconds.	±1 : ±(0.5%+0.05Ω) ±5 : ±(1.0%+0.05Ω) Value <1Ω : ±(1.0%+0.05Ω)
Insulation Resistance	JIS-C-5201-1 4.6 IEC-60115-1 4.6	Apply 100VDC for 1 minute.	≥ 10GΩ
Temperature Cycling	JESD22 Method JA-104	1000 Cycles (-55°C to +125°C) Measurement at 24±4 hours after test conclusion. 30min maximum dwell time at each temperature extreme.	1% : ±(0.5%+0.05Ω) 5% : ±(1.0%+0.10Ω)
Resistance to Solvent	MIL-STD-202 Method 215	Add Aqueous wash chemical - OKEM Clean or equivalent.	1% : ±(0.5%+0.05Ω) 5% : ±(0.5%+0.05Ω)
Biased Humidity	MIL-STD-202 Method 103	1,000 hours; 85°C / 85% RH, 10% of operating power. Measurement at 24±4 hours after test conclusion.	1% : ±(1.0%+0.05Ω) 5% : ±(3.0%+0.05Ω)
High Temperature Exposure (Storage)	MIL-STD-202 Method 108	1000 hrs. @ T=155°C. Unpowered. Measurement at 24±4 hours after test conclusion.	1% : ±(0.5%+0.05Ω) 5% : ±(2.0%+0.05Ω)
Operational Life	MIL-STD-202 Method 108	Condition D Steady State TA=125°C at derated power. Measurement at 24±4 hours after test conclusion.	1% : ±(1.0%+0.05Ω) 5% : ±(3.0%+0.10Ω)
External Visual	MIL-STD-883 Method 2009	Electrical test not required. Inspect device construction, marking and workmanship.	—
Mechanical Shock	MIL-STD-202 Method 213	Wave Form : Tolerance for half sine shock pulse. Peak value is 100g's. Normal duration(D) is 6(ms)	±1 : ±(1.0%+0.05Ω) ±5 : ±(2.0%+0.1Ω)
Vibration	MIL-STD-202 Method 204	5 g's for 20 min., 12 cycles each of 3 orientations. Note: Test from 10-2000 Hz	±1 : ±(1.0%+0.05Ω) ±5 : ±(2.0%+0.1Ω)
ESD	AEC-Q200- 002 or ISO/DIS 10605	Human body model 0402 / 0603 : 1KV 0805 and above : 2KV	±(3%+0.05Ω)
Solderability	J-STD-002	(1) 4 hrs 155°C dry heat (2) 245±5°C 3 sec.	±1 : ±(0.5%+0.05Ω) ±5 : ±(1.0%+0.05Ω)
Terminal Strength (SMD)	AEC Q200-006	Pressurizing force for 60 seconds 0402 / 0603 : 8N ; 0805 and above : 17.7N	No broken
Board Flex	AEC Q200-005	Bending once for 60 seconds 2010, 2512 sizes: 2mm Other sizes: 3mm	±1 : ±(1.0%+0.05Ω) ±5 : ±(1.0%+0.05Ω)

• Recommended Customer Soldering Parameters

• Wave solder Temperature condition



• Solder reflow Temperature condition



• Rework temperature (hot air equipment) : 350°C, 3~5seconds

• Recommended reflow methods

IR, vapor phase oven, hot air oven

If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.



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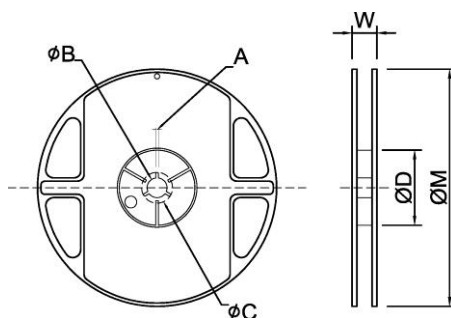
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■ Appendix For SMD Chip Resistor

● Packaging Information

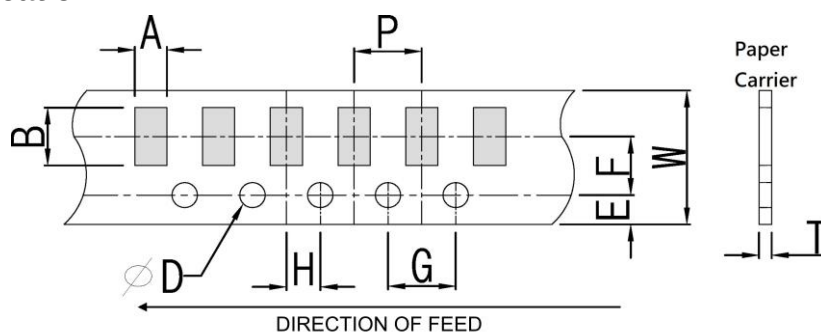


■ Dimension

Unit: mm

Type	Size		A	ΦB	ΦC	ΦD	W	ΦM
0402	7"	10K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	11.5±2.0	178±2.0
	13"	40K/50K Reel	2.0±0.5	13.5±1.0	21±1.0	100±1.0	11.5±2.0	330±2.0
0603/0805/1206/1210	7"	5K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	11.5±2.0	178±2.0
0603/0805/1206	10"	10K/Reel	2.0±0.5	13.5±1.0	21±1.0	100±1.0	11.5±2.0	254±2.0
	13"	20K/Reel	2.0±0.5	13.5±1.0	21±1.0	100±1.0	11.5±2.0	330±2.0
2010/2512/1812	7"	4K/Reel	2.0±0.5	13.5±1.0	21±1.0	60±1.0	16.0±2.0	178±2.0

■ Tapping Specification



■ Dimension

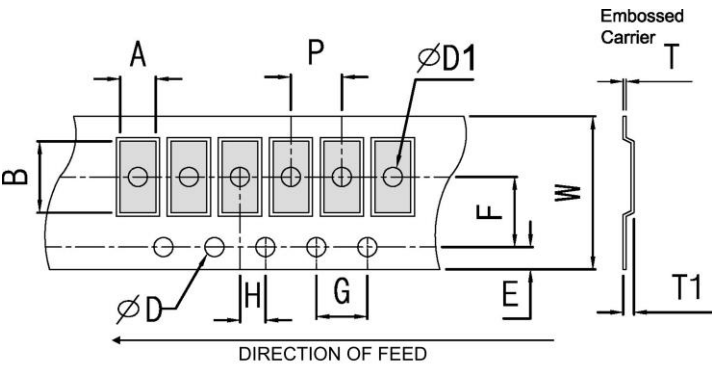
Unit: mm

Packaging	Type	A	B	W	E	F	G	H	T	ΦD	P
Paper Type	0402	0.70±0.1	1.20±0.1	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.05	0.45±0.1	1.50 ^{+0.10} ₋₀	2.0±0.1
	0603	1.05±0.2	1.80±0.2	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.05	0.60±0.1		4.0±0.1
	0805	1.55±0.2	2.30±0.2	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.05	0.75±0.1		
	1206	1.90±0.2	3.50±0.2	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.05	0.75±0.1		
	1210	2.85±0.2	3.50±0.2	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	2.0±0.05	0.75±0.1		



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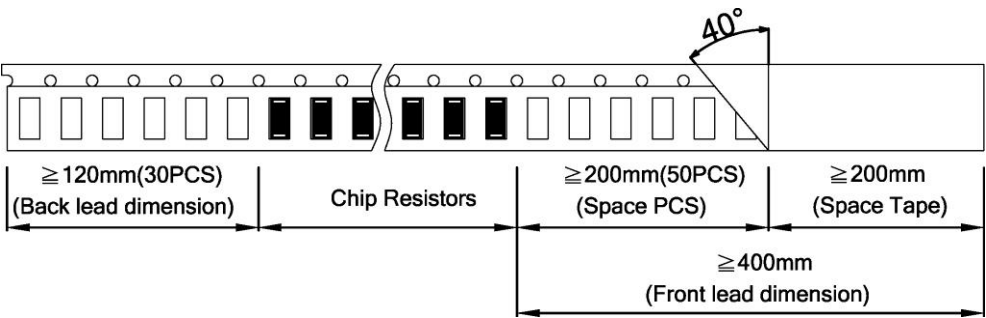
■ Dimension

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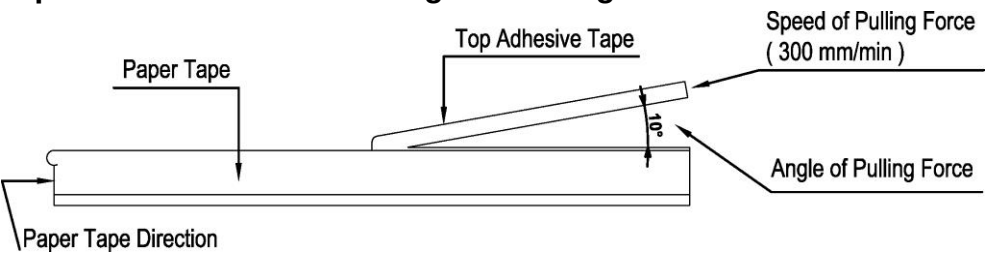
Packaging	Type	A	B	W	E	F	G	H	T	ØD	ØD1	T1	P
Embossed Type	2010	2.80±0.2	5.60±0.2	12±0.1	1.75±0.1	5.5±0.05	4.0±0.1	2.0±0.05	0.23±0.1	1.50 ^{+0.10} ₋₀	1.50±0.1	0.85±0.15	4.0±0.1
	2512	3.40±0.2	6.70±0.2	12±0.1	1.75±0.1	5.5±0.05	4.0±0.1	2.0±0.05	0.23±0.1		1.50±0.1	0.95±0.15	
	1812	3.30±0.2	4.60±0.2	12±0.1	1.75±0.1	5.5±0.05	4.0±0.1	2.0±0.05	0.23±0.1		1.50±0.1	0.85±0.15	

■ Packing Material Data/Storage Data

■ Front & Back Lead Dimension



■ Top Adhesive Peel Off Strength : 10~70g





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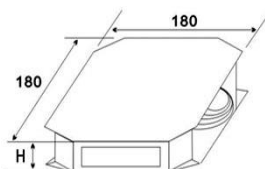
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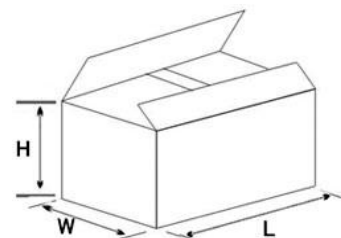
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■ Package

Inner Box Size	
Reel	Size H(mm)
1	13
2	24
3	36
5	60
10	113



External Box Size			
Contain (Kpcs)	Length (mm)	Width (mm)	Height (mm)
25K	180	180	60
50K	180	180	110
150K	430	200	200
300K	400	400	200



■ Storage Data :

Storage time at the environment temp: $25\pm 5^{\circ}\text{C}$ & humidity: $60\pm 20\%$ is valid for two years.

■ Product Testing Method:

Our products are tested with our company's tapping & testing equipments by using four-feet probe to touch at the back of both electrodes. Supposed different testing points or methods are requested, please advise beforehand and customized-made production is available.