

可靠性测试报告

Reliability Test Report

AECR

车规厚膜电阻

Automotive Thick Film Resistor

**丰全球电子产业羽翼
解客户设计制造难题**

Better Solution for
Sustainable High End Manufacturing

可靠性测试报告

Reliability Test Report

测试型号

Tested Parts

AECR0603J100RK9

AECR2010F15K0K9

报告编号

Report Number

RESI202007011

生产日期

Date of Manufacture

2020.1

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温度系数测试记录

TCR Test Record

1、样品信息/Sample

物料编号	样品数量	样品编号
Part Number	Sampling Size	Sample Code
AECR0603J100RK9	8	A1-A8

2、试验标准/Test Standards

IEC 60115-1 4.8

3、试验要求/Test Requirements

测量点+25°C和+155°C/Measure at the temperature +25°C and +155°C.

4、测试设备/Test Equipment

恒温恒湿试验箱/Constant Temperature & Humidity Chamber
精密电阻测试仪/Precision Ohmmeter

5、测试日期/Test Date

2020/5/13

6、测试合格标准/Test Qualified Standards

温度系数/TCR $\leq \pm 100\text{PPM}/^{\circ}\text{C}$

7、测试数据及结果/Test Data & Results

编号/Code	初始值 Initial Value 25°C R_0	测试后 Value After Test 155°C R_t	$\Delta R/\Delta T$ ppm/ $^{\circ}\text{C}$	测试结果 Test Result 155°C
A1	99.93	99.82	-8.47	Pass
A2	100.02	99.81	-16.15	Pass
A3	99.73	99.84	8.48	Pass
A4	99.96	99.82	-10.77	Pass
A5	99.55	99.75	15.45	Pass
A6	99.52	99.68	12.37	Pass
A7	99.54	100.02	37.09	Pass
A8	99.85	99.77	-6.16	Pass

短时过载测试记录

Short Time Overload Test Record

1、样品信息/Sample

物料编号	样品数量	样品编号
Part Number	Sampling Size	Sample Code
AECR0603J100RK9	10	A1-A10

2、试验标准/Test Standards

IEC 60115-1 4.13

3、试验要求/Test Requirements

2.5倍额定电压或最大过载电压(取较小值), 5 秒

2.5 times RCWV or Max. Overload voltage whichever is less for 5 seconds.

4、测试设备/Test Equipment

可编程直流电源/Programmable DC Power Supply

精密电阻测试仪/Precision Ohmmeter

5、测试日期/Test Date

2020/4/6

6、测试合格标准/Test Qualified Standards

$$\Delta R \leq \pm (2.0\% + 0.1\Omega)$$

7、测试数据及结果/Test Data & Results

编号/Code	初始值 Initial Value	测试后 Value After Test	$\Delta R/R$ %	测试结果 Test Result
	R_0	R_t		
A1	100.35	100.37	0.02	Pass
A2	100.25	100.26	0.01	Pass
A3	99.85	99.86	0.01	Pass
A4	100.26	100.27	0.01	Pass
A5	100.25	100.26	0.01	Pass
A6	100.15	100.16	0.01	Pass
A7	100.32	100.34	0.02	Pass
A8	100.25	100.26	0.01	Pass
A9	100.15	100.14	-0.01	Pass
A10	99.90	99.92	0.02	Pass

耐焊接热测试记录

Resistance to Solder Heat Test Record

1、样品信息/Sample

物料编号	样品数量	样品编号
Part Number	Sampling Size	Sample Code
AECR0603J100RK9	10	A1-A10

2、试验标准/Test Standards

MIL-STD-202 Method 210

3、试验要求/Test Requirements

+260°C ± 5°C 锡槽, 保持10秒 / +260°C ± 5°C tin bath for 10s

4、测试设备/Test Equipment

工业高清数码电子显微镜 / Industrial HD Electron Microscope
精密电阻测试仪 / Precision Ohmmeter
锡炉 / Solder Pot

5、测试日期/Test Date

2020/3/18

6、测试合格标准/Test Qualified Standards

$$\Delta R \leq \pm (1.0\% + 0.05\Omega)$$

7、测试数据及结果/Test Data & Results

编号/Code	初始值 Initial Value	测试后 Value After Test	$\Delta R/R$ %	测试结果 Test Result
	R_0	R_t		
A1	99.76	99.72	-0.04	Pass
A2	99.87	99.83	-0.04	Pass
A3	100.11	100.08	-0.03	Pass
A4	99.77	99.74	-0.03	Pass
A5	100.00	99.99	-0.01	Pass
A6	100.43	100.40	-0.03	Pass
A7	100.11	100.08	-0.03	Pass
A8	100.09	100.08	-0.01	Pass
A9	99.66	99.66	0.00	Pass
A10	99.76	99.72	-0.04	Pass

温度循环测试记录

Temperature Cycling Test Record

1、样品信息/Sample

物料编号	样品数量	样品编号
Part Number	Sampling Size	Sample Code
AECR0603J100RK9	10	A1-A10

2、试验标准/Test Standards

JESD22 Method JA-104

3、试验要求/Test Requirements

Ts(min):- 55°C±3°C, Ts(max):+125°C±3°C

时间:各30分钟;循环次数:1000次/Duration:30mins;Cycle:1000cycles.

4、测试设备/Test Equipment

高低温冲击箱/Thermal Shock Chamber

精密电阻测试仪/Precision Ohmmeter

5、测试日期/Test Date

2020/4/27

6、测试合格标准/Test Qualified Standards

$$\Delta R \leq \pm (1.0\% + 0.1\Omega)$$

7、测试数据及结果/Test Data & Results

编号/Code	初始值 Initial Value	测试后 Value After Test	$\Delta R/R$ %	测试结果 Test Result
	R_0	R_t		
A1	100.14	100.10	-0.04	Pass
A2	99.84	99.92	0.08	Pass
A3	99.76	99.80	0.04	Pass
A4	100.20	100.15	-0.05	Pass
A5	99.42	99.46	0.04	Pass
A6	99.60	99.65	0.05	Pass
A7	100.10	100.16	0.06	Pass
A8	100.25	100.32	0.07	Pass
A9	99.71	99.79	0.08	Pass
A10	99.83	99.90	0.07	Pass

绝缘电阻测试记录

Insulation Resistance Test Record

1、样品信息/Sample

物料编号	样品数量	样品编号
Part Number	Sampling Size	Sample Code
AECR0603J100RK9	10	A1-A10

2、试验标准/Test Standards

IEC 60115-1 4.6

3、试验要求/Test Requirements

在电极和基片间施加100V的直流电压, 保持60秒, 然后测绝缘电阻值
Apply a DC voltage of 100V between the electrode and the substrate for 60s

4、测试设备/Test Equipment

可编程直流电源/Programmable DC Power Supply
精密电阻测试仪/Precision Ohmmeter

5、测试日期/Test Date

2020/4/27

6、测试合格标准/Test Qualified Standards

$\geq 10G\Omega$

7、测试数据及结果/Test Data & Results

编号/Code	绝缘电阻 Insulation Resistance	测试结果 Test Result
A1	$\geq 10G\Omega$	Pass
A2	$\geq 10G\Omega$	Pass
A3	$\geq 10G\Omega$	Pass
A4	$\geq 10G\Omega$	Pass
A5	$\geq 10G\Omega$	Pass
A6	$\geq 10G\Omega$	Pass
A7	$\geq 10G\Omega$	Pass
A8	$\geq 10G\Omega$	Pass
A9	$\geq 10G\Omega$	Pass
A10	$\geq 10G\Omega$	Pass

耐溶剂性测试记录

Resistance to Solvents Test Record

1、样品信息/Sample

物料编号	样品数量	样品编号
Part Number	Sampling Size	Sample Code
AECR0603J100RK9	10	A1-A10

2、试验标准/Test Standards

MIL-STD-202 Method 215

3、试验要求/Test Requirements

浸入20~25°C的IPA, 保持60s
Immerse into IPA of 20~25°C for 60sec.

4、测试材料/Test Materials

异丙醇/IPA

5、测试日期/Test Date

2020/3/24

6、测试合格标准/Test Qualified Standards

$$\Delta R \leq \pm (0.5\% + 0.05\Omega)$$

7、测试数据及结果/Test Data & Results

编号/Code	初始值 Initial Value	测试后 Value After Test	$\Delta R/R$ %	测试结果 Test Result
	R_0	R_t		
A1	99.78	99.78	0.00	Pass
A2	100.66	100.60	-0.06	Pass
A3	99.39	99.39	0.00	Pass
A4	99.36	99.36	0.00	Pass
A5	99.77	99.74	-0.03	Pass
A6	99.48	99.48	0.00	Pass
A7	100.38	100.36	-0.02	Pass
A8	99.21	99.19	-0.02	Pass
A9	100.23	100.23	0.00	Pass
A10	99.93	99.93	0.00	Pass

高温高湿测试记录

Bias Humidity Test Record

1、样品信息/Sample

物料编号	样品数量	样品编号
Part Number	Sampling Size	Sample Code
AECR0603J100RK9	10	A1-A10

2、试验标准/Test Standards

MIL-STD-202 Method 103

3、试验要求/Test Requirements

+85°C±2°C, 85%RH, 负载10%额定功率, 1000小时(+48小时), 通90分钟, 断30分钟
+85°C±2°C, 85%RH, load no less than 10% rated power for 1000hrs(+48hrs),
1.5hrs on, 0.5hr off

4、测试设备/Test Equipment

可编程恒温恒湿箱/Programmable Constant Temperature & Humidity Chamber
可编程直流电源/Programmable DC Power Supply
精密电阻测试仪/Precision Ohmmeter

5、测试日期/Test Date

2020/4/27

6、测试合格标准/Test Qualified Standards

$$\Delta R \leq \pm (3.0\% + 0.05\Omega)$$

7、测试数据及结果/Test Data & Results

编号/Code	初始值 Initial Value	测试后 Value After Test	$\Delta R/R$ %	测试结果 Test Result
	R_0	R_t		
A1	100.17	100.25	0.08	Pass
A2	99.74	99.81	0.07	Pass
A3	99.98	100.05	0.07	Pass
A4	100.15	100.24	0.09	Pass
A5	99.95	100.04	0.09	Pass
A6	100.28	100.35	0.07	Pass
A7	99.69	99.78	0.09	Pass
A8	99.48	99.52	0.04	Pass
A9	99.81	99.92	0.11	Pass
A10	99.88	99.96	0.08	Pass

高温存储测试记录

High Temperature Storage Test Record

1、样品信息/Sample

物料编号	样品数量	样品编号
Part Number	Sampling Size	Sample Code
AECR0603J100RK9	10	A1-A10

2、试验标准/Test Standards

MIL-STD-202 Method 108

3、试验要求/Test Requirements

1000h@+155°C, 不负载/1000h@+155°C, unpowered

4、测试设备/Test Equipment

高温存储试验箱/High Temperature Storage Test Chamber
精密电阻表/Precision Ohmmeter

5、测试日期/Test Date

2019/4/10

6、测试合格标准/Test Qualified Standards

$$\Delta R \leq \pm (2.0\% + 0.05\Omega)$$

7、测试数据及结果/Test Data & Results

编号/Code	初始值 Initial Value	测试后 Value After Test	$\Delta R/R$ %	测试结果 Test Result
	R_0	R_t		
A1	100.06	100.13	0.07	Pass
A2	99.86	99.92	0.06	Pass
A3	99.76	99.81	0.05	Pass
A4	100.00	100.03	0.03	Pass
A5	100.11	100.17	0.06	Pass
A6	100.03	100.07	0.04	Pass
A7	99.53	99.57	0.04	Pass
A8	100.12	100.18	0.06	Pass
A9	99.59	99.67	0.08	Pass
A10	99.72	99.76	0.04	Pass

负载寿命测试记录

Load Life Test Record

1、样品信息/Sample

物料编号	样品数量	样品编号
Part Number	Sampling Size	Sample Code
AECR0603J100RK9	10	A1-A10

2、试验标准/Test Standards

MIL-STD-202 Method 108

3、试验要求/Test Requirements

1000小时(+48小时)@+125°C±2°C, 额定电压, 通90分钟, 断30分钟
1000h(+48h)@+125°C±2°C, rated voltage, 1.5h on and 0.5h off

4、测试设备/Test Equipment

精密鼓风干燥箱/Precision Blast Drying Oven
可编程直流电源/Programmable DC Power Supply
精密电阻测试仪/Precision Ohmmeter

5、测试日期/Test Date

2020/4/27

6、测试合格标准/Test Qualified Standards

$$\Delta R \leq \pm (3.0\% + 0.10\Omega)$$

7、测试数据及结果/Test Data & Results

编号/Code	初始值 Initial Value	测试后 Value After Test	$\Delta R/R$ %	测试结果 Test Result
	R_0	R_t		
A1	100.06	100.12	0.06	Pass
A2	99.55	99.64	0.09	Pass
A3	99.97	100.03	0.06	Pass
A4	99.59	99.70	0.11	Pass
A5	99.63	99.72	0.09	Pass
A6	100.22	100.30	0.08	Pass
A7	99.58	99.64	0.06	Pass
A8	99.46	99.58	0.12	Pass
A9	100.26	100.34	0.08	Pass
A10	100.09	100.18	0.09	Pass

机械冲击测试记录

Mechanical Shock Test Record

1、样品信息/Sample

物料编号	样品数量	样品编号
Part Number	Sampling Size	Sample Code
AECR0603J100RK9	30	A1-A30

2、试验标准/Test Standards

MIL-STD-202 Method 213

3、试验要求/Test Requirements

正半弦波, 峰值加速度100g's, 脉冲持续6ms, 三轴六向各3次
Half Sine Pulse, Peak value 100g's, pulse duration 6ms,
3 times in each of six directions, on three different axes.

4、测试设备/Test Equipment

冲击碰撞台/Mechanical Shock Test Machine
精密电阻测试仪/Precision Ohmmeter

5、测试日期/Test Date

2020/4/6

6、测试合格标准/Test Qualified Standards

± (2.0%+ 0.1Ω)

7、测试数据及结果/Test Data & Results

编号/Code	初始值 Initial Value	测试后 Value After Test	$\Delta R/R$ %	测试结果 Test Result
	R_0	R_t		
A1	99.75	99.76	0.01	Pass
A2	99.91	99.59	-0.32	Pass
A3	99.62	99.93	0.31	Pass
A4	99.51	99.93	0.42	Pass
A5	99.66	99.80	0.14	Pass
A6	100.00	99.69	-0.31	Pass
A7	99.76	99.71	0.05	Pass
A8	99.73	99.54	0.19	Pass
A9	100.01	99.70	-0.31	Pass
A10	99.52	99.60	0.08	Pass
A11	99.74	99.79	0.05	Pass
A12	99.58	99.91	0.33	Pass
A13	99.85	99.87	0.02	Pass
A14	99.69	99.77	0.08	Pass
A15	99.67	99.81	0.14	Pass
A16	99.99	99.67	-0.32	Pass
A17	100.02	99.77	-0.25	Pass
A18	99.55	99.93	0.38	Pass
A19	99.66	99.53	-0.13	Pass
A20	99.58	99.95	0.37	Pass
A21	99.84	99.86	0.02	Pass
A22	99.75	99.78	0.03	Pass
A23	99.57	99.96	0.39	Pass
A24	99.74	99.98	0.24	Pass
A25	99.71	99.78	0.07	Pass
A26	99.73	99.74	0.01	Pass
A27	99.89	99.93	0.04	Pass
A28	99.58	99.97	0.39	Pass
A29	100.00	99.88	-0.12	Pass
A30	99.63	99.57	-0.06	Pass

振动测试记录

Vibration Test Record

1、样品信息/Sample

物料编号	样品数量	样品编号
Part Number	Sampling Size	Sample Code
AECR0603J100RK9	30	A1-A30

2、试验标准/Test Standards

MIL-STD-202 Method 204

3、试验要求/Test Requirements

10-2000Hz, 5g's, 20分钟一个循环, XYZ三个方向各12个循环
10-2000Hz, 5g's for 20min/cycle, 12 cycles each of 3 orientations.

4、测试设备/Test Equipment

高频振动试验机/Vibration Test Shakers
精密电阻测试仪/Precision Ohmmeter

5、测试日期/Test Date

2020/4/6

6、测试合格标准/Test Qualified Standards

± (2.0%+ 0.1Ω)

7、测试数据及结果/Test Data & Results

编号/Code	初始值 Initial Value	测试后 Value After Test	$\Delta R/R$ %	测试结果 Test Result
	R_0	R_t		
A1	99.56	99.94	0.38	Pass
A2	99.82	99.96	-0.13	Pass
A3	99.59	99.87	0.28	Pass
A4	99.65	99.59	-0.06	Pass
A5	99.65	99.72	0.07	Pass
A6	99.95	99.87	-0.08	Pass
A7	100.02	99.78	-0.24	Pass
A8	99.79	99.99	0.20	Pass
A9	99.63	99.65	0.02	Pass
A10	99.87	99.91	0.04	Pass
A11	99.56	99.98	0.42	Pass
A12	99.99	99.88	-0.11	Pass
A13	99.51	99.72	0.21	Pass
A14	99.99	99.52	-0.47	Pass
A15	99.55	99.89	0.34	Pass
A16	99.67	99.96	0.29	Pass
A17	99.79	99.54	-0.25	Pass
A18	99.74	99.91	0.17	Pass
A19	99.79	99.52	-0.27	Pass
A20	99.93	99.80	-0.13	Pass
A21	99.93	99.65	-0.28	Pass
A22	99.80	99.85	0.05	Pass
A23	99.70	99.82	0.12	Pass
A24	99.87	99.58	-0.29	Pass
A25	99.96	99.80	-0.16	Pass
A26	100.00	99.91	-0.09	Pass
A27	99.70	100.02	0.32	Pass
A28	99.91	99.92	0.01	Pass
A29	99.75	99.86	0.11	Pass
A30	99.93	99.84	-0.09	Pass

ESD测试记录

ESD Test Record

1、样品信息/Sample

物料编号	样品数量	样品编号
Part Number	Sampling Size	Sample Code
AECR0603J100RK9	10	A1-A10
AECR2010F15K0K9	15	B1-B15

2、试验标准/Test Standards

IEC60115-1 4.38

3、试验要求/Test Requirements

人体放电模式, 0603 1KV脉冲电压, 2010 2KV脉冲电压
Human body model. 0603 loads 1KV pulse voltage.
2010 loads 2KV pulse voltage.

4、测试设备/Test Equipment

ESD 测试仪/ESD Generator
精密电阻测试仪/Precision Ohmmeter

5、测试日期/Test Date

2020/2/6

6、测试合格标准/Test Qualified Standards

 $\Delta R \leq \pm (3.0\% + 0.05\Omega)$

7、测试数据及结果/Test Data & Results

AECR0603J100RK9

编号/Code	初始值 Initial Value	测试后 Value After Test	ΔR	测试结果 Test Result
	R_0	R_t		
A1	99.63	99.69	0.06	Pass
A2	100.09	100.16	0.07	Pass
A3	99.74	99.81	0.07	Pass
A4	99.69	99.61	-0.08	Pass
A5	99.95	99.88	-0.07	Pass
A6	100.45	100.52	0.07	Pass
A7	100.03	100.12	0.09	Pass
A8	99.87	99.98	0.11	Pass
A9	100.07	100.16	0.09	Pass
A10	100.01	99.94	-0.07	Pass

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B1	14999.79	14999.72	-0.07	Pass
B2	14999.80	14999.66	-0.14	Pass
B3	14999.85	14999.77	-0.08	Pass
B4	14999.81	14999.78	-0.03	Pass
B5	14999.78	14999.70	-0.08	Pass
B6	14999.87	14999.83	-0.04	Pass
B7	14999.74	15000.32	0.58	Pass
B8	14999.79	14999.79	0.00	Pass
B9	14999.87	14999.82	-0.05	Pass
B10	14999.77	14999.78	0.01	Pass
B11	14999.77	14999.72	-0.05	Pass
B12	14999.68	14999.57	-0.11	Pass
B13	14999.73	14999.69	-0.04	Pass
B14	14999.77	14999.72	-0.05	Pass
B15	14999.79	14999.63	-0.16	Pass

可焊性测试记录

Solderability Test Record

1、样品信息/Sample

物料编号	样品数量	样品编号
Part Number	Sampling Size	Sample Code
AECR0603J100RK9	10	A1-A10

2、试验标准/Test Standards

IEC 60115-1 4.17

3、试验要求/Test Requirements

+245°C±5°C锡槽, 保持3秒/+245°C±5°C tin bath for 3 s.

4、测试设备/Test Equipment

显微镜/Microscope
蒸汽老化试验箱/Steam Aging Test Chamber
小型回流焊炉/Reflow Welder

5、测试日期/Test Date

2020/3/24

6、测试合格标准/Test Qualified Standards

$$\Delta R \leq \pm (1.0\% + 0.05\Omega)$$

7、测试数据及结果/Test Data & Results

编号/Code	初始值 Initial Value	测试后 Value After Test	$\Delta R/R$ %	测试结果 Test Result
	R_0	R_t		
A1	99.68	99.66	-0.02	Pass
A2	100.17	100.16	-0.01	Pass
A3	100.20	100.19	-0.01	Pass
A4	99.89	99.88	-0.01	Pass
A5	99.74	99.73	-0.01	Pass
A6	99.51	99.49	-0.02	Pass
A7	100.19	100.17	-0.02	Pass
A8	99.82	99.82	0.00	Pass
A9	100.07	100.07	0.00	Pass
A10	99.86	99.83	-0.03	Pass

端子强度测试记录

Terminal Strength Test Record

1、样品信息/Sample

物料编号	样品数量	样品编号
Part Number	Sampling Size	Sample Code
AECR0603J100RK9	10	A1-A10

2、试验标准/Test Standards

AEC Q200 TEST 6

3、试验要求/Test Requirements

0603: 8N, 60s

4、测试设备/Test Equipment

精密电阻测试仪/Precision Ohmmeter

5、测试日期/Test Date

2020/4/13

6、测试合格标准/Test Qualified Standards

$$\Delta R \leq \pm(1.0\% + 0.05\Omega)$$

7、测试数据及结果/Test Data & Results

编号/Code	初始值 Initial Value	测试后 Value After Test	$\Delta R/R$ %	测试结果 Test Result
	R_0	R_t		
A1	99.90	99.87	-0.03	Pass
A2	99.72	99.68	-0.04	Pass
A3	100.08	100.06	-0.02	Pass
A4	100.20	100.18	-0.02	Pass
A5	99.93	99.91	-0.02	Pass
A6	100.11	100.09	-0.02	Pass
A7	99.93	99.93	0.00	Pass
A8	99.97	99.96	-0.01	Pass
A9	100.31	100.30	-0.01	Pass
A10	100.22	100.19	-0.03	Pass

基板弯曲测试记录

Substrate Bending Test Record

1、样品信息/Sample

物料编号	样品数量	样品编号
Part Number	Sampling Size	Sample Code
AECR0603J100RK9	10	A1-A10

2、试验标准/Test Standards

AEC Q200 TEST 5

3、试验要求/Test Requirements

5mm, 保持60s/5mm. Duration: 60s.

4、测试设备/Test Equipment

弯曲试验机/Bending Tester
精密电阻测试仪/Precision Ohmmeter

5、测试日期/Test Date

2020/3/30

6、测试合格标准/Test Qualified Standards

$$\Delta R \leq \pm (1.0\% + 0.05\Omega)$$

7、测试数据及结果/Test Data & Results

编号/Code	初始值 Initial Value	测试后 Value After Test	$\Delta R/R$ %	测试结果 Test Result
	R_0	R_t		
A1	99.58	99.54	-0.04	Pass
A2	99.72	99.68	-0.04	Pass
A3	99.70	99.67	-0.03	Pass
A4	99.95	99.91	-0.04	Pass
A5	99.73	99.69	-0.04	Pass
A6	99.85	100.12	-0.03	Pass
A7	99.77	100.21	-0.02	Pass
A8	99.88	99.85	-0.03	Pass
A9	99.56	99.53	-0.03	Pass
A10	99.86	100.12	-0.02	Pass



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WeChat official account



企业微信
WeCom



微信小程序
WeChat mini program