

V. Environmental tests



Environmental test conditions

- **Test:**

- High temperature test: (125 ± 2) °C, 500 hr
- Low temperature test: (-40 ± 2) °C, 500 hr
- High temperature and high humidity operation test:
 (85 ± 2) °C, (85 ± 3) % R.H., 1000 Hr, rated current
- Vibration test: min. 10 Hz, max. 55 Hz, 1.52 mm, 1 octave,
2 hr/axis, X, Y, Z 3 axes

A社 1608**High temp. test**

MAXECHO

A社 No.	Impedance (Ω)			DC resistance (m Ω)		
	(High temp.) before	(High temp.) after	Change rate (%)	(High temp.) before	(High temp.) after	Change rate (%)
1	100.45	102.39	1.93%	180.55	229.68	27.6%
2	109.01	109.63	0.57%	175.65	222.19	26.5%
3	99.32	99.88	0.56%	185.32	219.62	18.5%
4	104.69	104.54	-0.14%	182.55	178.89	-1.98%
5	105.64	106.80	1.10%	188.43	185.42	-1.33%
6	110.65	111.58	0.84%	186.76	183.96	-1.26%
7	97.35	97.64	0.30%	187.32	183.57	-2.03%
8	108.95	108.75	-0.18%	182.78	179.12	-2.07%
9	98.22	99.83	1.64%	187.88	184.06	-1.99%
10	98.84	99.73	0.90%	177.45	175.66	-1.05%
11	101.78	100.93	-0.84%	178.76	176.26	-1.23%
12	99.85	101.94	2.09%	185.65	182.86	-1.46%
13	96.54	96.69	0.16%	187.83	185.01	-1.57%
14	97.92	98.67	0.77%	179.77	177.07	-1.67%
15	98.88	98.37	-0.52%	183.65	169.87	-7.51%
16	108.69	109.77	0.99%	185.87	182.99	-1.57%
17	99.39	100.54	1.15%	182.34	179.78	-1.72%
18	99.65	101.08	1.44%	185.87	182.89	-1.64%
19	99.23	100.53	1.31%	175.58	172.59	-1.68%
20	103.83	105.20	1.32%	179.43	174.40	-2.19%
Avg.	101.9442	102.7245	0.97%	182.97	186.29	1.81%

A社 2125**High temp. test**

MAXECHO

A社 No.	Impedance (Ω)			DC resistance (m Ω)		
	(High temp.) before	(High temp.) after	Change rate (%)	(High temp.) before	(High temp.) after	Change rate (%)
1	198.67	189.47	-4.63%	33.35	24.92	-25.28%
2	218.02	205.99	-5.52%	20.3	26.21	29.11%
3	196.26	186.35	-5.05%	27.28	23.98	-12.10%
4	207.9	194.34	-6.52%	27.42	25.47	-7.11%
5	196.39	184.82	-5.89%	44.66	26.09	-41.55%
6	198.39	193.15	-2.64%	30.21	25.09	-16.95%
7	208.52	193.51	-7.20%	27.56	24.48	-11.17%
8	187.87	181.28	-3.51%	28.65	26.69	-6.84%
9	202.68	193.96	-4.30%	26.75	24.78	-7.36%
10	187.12	180.29	-3.65%	46.24	26.82	-42.56%
11	191.35	182.13	-4.82%	27.63	24.86	-10.03%
12	192.67	182.81	-5.12%	27.25	25.31	-7.12%
13	200.59	192.71	-3.93%	27.38	25.47	-6.98%
14	193.57	185.69	-4.07%	26.63	24.57	-7.74%
15	194.76	188.08	-3.43%	26.91	24.18	-10.14%
16	194.44	186.66	-4.00%	28.23	24.63	-12.75%
17	198.23	186.63	-5.85%	32.16	26.1	-18.84%
18	186.83	179.66	-3.84%	27.88	29.84	7.03%
19	201.43	193.41	-3.98%	30.39	25.88	-14.84%
20	212.34	198.01	-6.75%	27.53	28.3	2.80%
Avg.	198.4015	188.9475	-4.77%	29.72	25.68	-13.62%

B社 1608**High temp. test****MURATA**

B社 No.	Impedance (Ω)			DC resistance (m Ω)		
	(High temp.) before	(High temp.) after	Change rate (%)	(High temp.) before	(High temp.) after	Change rate (%)
1	119.61	118.07	-1.29%	377.48	374.48	-0.79%
2	125.02	122.54	-1.98%	353.39	348.86	-1.28%
3	125.31	123.93	-1.10%	386.86	364.56	-5.76%
4	125.19	111.57	-10.88%	357.7	353.32	-1.22%
5	126.09	122.58	-2.78%	373.09	364.45	-2.32%
6	122.23	120.17	-1.69%	348.73	344.6	-1.18%
7	124.35	121.38	-2.39%	362.13	357.81	-1.19%
8	119.39	116.33	-2.56%	364.7	361.88	-0.77%
9	120.88	118.04	-2.35%	358.45	354.27	-1.17%
10	116.52	113.5	-2.59%	394.42	355.86	-9.78%
11	114.64	111.95	-2.35%	344.65	340.22	-1.29%
12	118.75	115.8	-2.48%	371.18	366.29	-1.32%
13	115.73	112.51	-2.78%	359.36	354.95	-1.23%
14	120.38	117.2	-2.64%	352.25	347.64	-1.31%
15	121.99	118.45	-2.90%	360.38	355.71	-1.30%
16	118.04	114.67	-2.85%	357.52	352.7	-1.35%
17	121.27	119.02	-1.86%	384.45	379.74	-1.23%
18	124.78	121.8	-2.39%	362.79	358.39	-1.21%
19	111.36	108.25	-2.79%	368.35	363.58	-1.29%
20	122.93	120.65	-1.85%	366.19	361.64	-1.24%
Avg.	120.723	117.4205	-2.73%	365.2035	358.0475	-1.91%

B社 2125**High temp. test****MURATA**

B社 No.	Impedance (Ω)			DC resistance (m Ω)		
	(High temp.) before	(High temp.) after	Change rate (%)	(High temp.) before	(High temp.) after	Change rate (%)
1	221.68	208.89	-5.77%	33.61	30.39	-9.58%
2	224.05	205.15	-8.44%	31.59	29.32	-7.19%
3	224.35	215.85	-3.79%	33.37	31.25	-6.35%
4	221.71	207.94	-6.21%	33.1	31.67	-4.32%
5	225.14	211.58	-6.02%	34.63	32.67	-5.66%
6	229.9	218.59	-4.92%	32.86	30.77	-6.36%
7	220.7	210.59	-4.58%	33.28	30.19	-9.28%
8	206.05	202.6	-1.67%	33.83	30.85	-8.81%
9	225.5	206.1	-8.60%	32.65	30.57	-6.37%
10	227.04	215.66	-5.01%	32.76	30.71	-6.26%
11	224.78	211.62	-5.85%	31.96	29.85	-6.60%
12	221.9	204.15	-8.00%	32.8	30.84	-5.98%
13	209.35	197.16	-5.82%	30.55	28.44	-6.91%
14	255.55	207.75	-18.70%	32.08	30.07	-6.27%
15	217.76	208.97	-4.04%	31.36	29.46	-6.06%
16	221.97	204.14	-8.03%	32.8	30.57	-6.80%
17	226.15	203.28	-10.11%	31.89	30.09	-5.64%
18	218.83	209.05	-4.47%	32.48	30.34	-6.59%
19	226.63	216.76	-4.36%	35.7	30.26	-15.24%
20	231.57	212.97	-8.03%	33.69	31.32	-7.03%
Avg.	224.0305	208.94	-6.62%	32.8495	30.4815	-7.16%

C社 1608**High temp. test**

Samwha

C社	Impedance (Ω)			DC resistance ($m\Omega$)		
	(High temp.) before	(High temp.) after	Change rate (%)	(High temp.) before	(High temp.) after	Change rate (%)
1	121.23	115.07	-5.08%	55.18	54.13	-1.90%
2	113.66	110.92	-2.41%	58.59	55.94	-4.52%
3	117.13	108.58	-7.30%	55.89	53.41	-4.44%
4	124.17	115.02	-7.37%	56.68	55.64	-1.83%
5	113.84	111.69	-1.89%	56.18	52.95	-5.75%
6	125.96	122.37	-2.85%	57.13	55.62	-2.64%
7	130.7	123.34	-5.63%	59.34	56.88	-4.15%
8	119.06	116.8	-1.90%	56.68	55.2	-2.61%
9	110.27	109.02	-1.13%	55.87	54.05	-3.26%
10	125.91	118.5	-5.89%	59.82	57.12	-4.51%
11	105.43	104.12	-1.24%	61.81	54.12	-12.44%
12	116.72	111.96	-4.08%	55.29	56.52	2.22%
13	107.48	103.79	-3.43%	56.37	56.78	0.73%
14	105.49	104.42	-1.01%	57.93	55.24	-4.64%
15	104.85	101.84	-2.87%	59.71	54.41	-8.88%
16	102.32	99.89	-2.37%	61.22	56.96	-6.96%
17	113.38	110.74	-2.33%	57.49	59.95	4.28%
18	125.89	119.31	-5.23%	53.69	54.93	2.31%
19	110.78	107.07	-3.35%	55.17	53.46	-3.10%
20	116.5	110.93	-4.78%	58.56	57.61	-1.62%
Avg.	115.5385	111.269	-3.61%	57.43	55.546	-3.19%

C社 2125**High temp. test**

Samwha

C社 No.	Impedance (Ω)			DC resistance (m Ω)		
	(High temp.) before	(High temp.) after	Change rate (%)	(High temp.) before	(High temp.) after	Change rate (%)
1	206.27	190.04	-7.87%	33.57	32.32	-3.72%
2	187.63	183.46	-2.22%	30.54	33.68	10.28%
3	212.49	203.73	-4.12%	32.47	32.23	-0.74%
4	202.39	197.84	-2.25%	32.25	32.13	-0.37%
5	225.27	205.17	-8.92%	32.66	34.22	4.78%
6	188.78	183.28	-2.91%	31.2	31.7	1.60%
7	223.96	214.42	-4.26%	30.74	30.83	0.29%
8	205.78	197.8	-3.88%	31.53	31.25	-0.89%
9	225.56	218.66	-3.06%	32.35	33.38	3.18%
10	213.64	206.75	-3.23%	34.06	33.18	-2.58%
11	205.12	199.83	-2.58%	31.36	31.18	-0.57%
12	220.31	212.91	-3.36%	34.7	32.86	-5.30%
13	224.57	218.02	-2.92%	35.27	32.31	-8.39%
14	204.87	198.28	-3.22%	31.47	31.57	0.32%
15	214.31	205.88	-3.93%	32.84	31.75	-3.32%
16	226.26	218.49	-3.43%	32.59	33.01	1.29%
17	208.03	192.15	-7.63%	33.18	32.77	-1.24%
18	209.18	200.4	-4.20%	32.76	31.59	-3.57%
19	233.96	225.15	-3.77%	32.47	32.31	-0.49%
20	222.64	214.37	-3.71%	32.7	32.42	-0.86%
Avg.	213.051	204.3315	-4.07%	32.5355	32.3345	-0.52%

Summary and J-chip judgement

High temp. test

Sample		Test result: Impedance(Ω)			Test result: DCR(Ω)		
		Min. value	Max. Value	Avg.value	Min. value	Max. Value	Avg.value
1608	A	-0.14%	2.09%	0.97%	-1.05%	27.60%	1.81%
		Judg○	Judg○	Judg○	Judg○	Judg○	Judg○
	B	-1.1%	-10.88%	-2.73%	-0.79%	-9.78%	-1.91%
		Judg○	Judg○	Judg○	Judg○	Judg○	Judg○
	C	-1.01%	-7.37%	-3.61%	0.73%	-12.44%	-3.19%
		Judg○	Judg○	Judg○	Judg○	Judg○	Judg○
2125	A	-2.64%	-7.2%	-4.77%	2.80%	-42.56%	-13.62%
		Judg○	Judg○	Judg○	Judg○	Judg○※	Judg○
	B	-1.67%	-18.7%	-6.62%	-4.32%	-15.24%	-7.16%
		Judg○	Judg○	Judg○	Judg○	Judg○	Judg○
	C	-2.22%	-8.92%	-4.07%	0.29%	10.28%	-0.52%
		Judg○	Judg○	Judg○	Judg○	Judg○	Judg○

<Total Judgement>

All of test results are no problem except ※A2125 (MAXECHO) value.

(※ Because there is no specification of High temperature test about DCR, it is impossible to judge.)

A社 1608**Low temp. test**

MAXECHO

A社 No.	Impedance (Ω)			DC resistance (m Ω)		
	(Low temp.) before	(Low temp.) after	Change rate (%)	(Low temp.) before	(Low temp.) after	Change rate (%)
1	105.9	104.4	-1.42%	180.55	178.20	-1.10%
2	107.08	105.95	-1.06%	175.65	173.84	-1.03%
3	94	93.16	-0.89%	185.32	183.76	-0.84%
4	96.97	95.85	-1.15%	182.55	180.96	-0.67%
5	95.14	94.13	-1.06%	188.43	186.64	-0.95%
6	100.12	99.19	-0.93%	186.76	184.84	-1.03%
7	96.56	95.28	-1.33%	187.32	185.18	-1.14%
8	110.12	109.7	-0.38%	182.78	180.50	-1.25%
9	94.66	93.82	-0.89%	187.88	185.78	-1.12%
10	97.11	96.34	-0.79%	177.45	175.39	-1.16%
11	98.45	95.95	-2.54%	178.76	171.32	-14.68%
12	97.32	96.35	-1.00%	185.65	183.22	-1.31%
13	97.36	97.07	-0.30%	187.83	185.03	-1.39%
14	96.33	95.04	-1.34%	179.77	177.49	-1.27%
15	102.15	101.04	-1.09%	183.65	180.75	-1.58%
16	96.24	95.73	-0.53%	185.87	181.80	-2.19%
17	106.15	105.22	-0.88%	182.34	181.20	-1.22%
18	109.36	108.95	-0.37%	185.87	183.04	-1.52%
19	97.97	96.95	-1.04%	175.58	173.72	-1.06%
20	95.11	94.7	-0.43%	179.43	177.15	-1.17%
Avg.	99.705	98.741	-0.97%	182.97	180.43	-1.88%

A社 No.	Impedance (Ω)			DC resistance (m Ω)		
	(Low temp.) before	(Low temp.) after	Change rate (%)	(Low temp.) before	(Low temp.) after	Change rate (%)
1	203.80	204.49	0.34%	33.35	30.75	-7.80%
2	196.41	209.02	6.42%	20.3	19.29	-5.01%
3	201.55	198.51	-1.51%	27.28	25.18	-7.70%
4	195.48	198.55	1.57%	27.42	25.58	-6.72%
5	206.15	210.99	2.35%	44.66	40.91	-8.39%
6	199.19	206.60	3.72%	30.21	27.37	-9.36%
7	195.13	193.94	-0.61%	27.56	25.16	-8.69%
8	175.94	181.85	3.36%	28.65	26.70	-8.56%
9	187.55	188.92	0.73%	26.75	24.20	-9.55%
10	192.63	202.55	5.15%	46.24	42.40	-8.27%
11	186.23	179.23	-3.76%	27.63	25.06	-9.21%
12	195.53	203.86	4.26%	27.25	24.61	-9.64%
13	199.12	200.63	0.76%	27.38	24.82	-9.34%
14	198.99	203.61	2.32%	26.63	23.79	-10.68%
15	182.28	193.51	6.16%	26.91	22.95	-14.10%
16	184.83	188.83	1.81%	28.23	26.00	-7.89%
17	202.38	204.83	1.21%	32.16	29.75	-7.49%
18	196.41	189.10	-3.72%	27.88	25.37	-8.96%
19	195.38	192.76	-1.34%	30.39	27.66	-8.98%
20	207.23	198.51	-4.21%	27.53	25.88	-5.96%
Avg.	195.1105	197.4815	1.21%	29.72	27.17	-8.62%

B社 No.	Impedance (Ω)			DC resistance (m Ω)		
	(Low temp.) before	(Low temp.) after	Change rate (%)	(Low temp.) before	(Low temp.) after	Change rate (%)
1	123.69	123.4	-0.23%	375.95	352.66	-6.19%
2	115.09	115.42	0.29%	343.76	339.85	-1.14%
3	115.69	114.75	-0.81%	352.88	348.98	-1.11%
4	118.04	117.77	-0.23%	351	347.41	-1.02%
5	114.23	113.91	-0.28%	370.44	367.3	-0.85%
6	121.71	120.48	-1.01%	363.54	358.74	-1.32%
7	126.32	126.02	-0.24%	365.36	349.73	-4.28%
8	110.4	111.11	0.64%	355.82	349.92	-1.66%
9	123.01	122.14	-0.71%	365.44	360.18	-1.44%
10	110.16	111.66	1.36%	357.77	353.55	-1.18%
11	116.04	116.22	0.16%	371.46	370.17	-0.35%
12	119.77	119.22	-0.46%	350.91	345.98	-1.40%
13	118.2	117.29	-0.77%	367.31	362.85	-1.21%
14	119.95	119.89	-0.05%	349.62	345.58	-1.16%
15	118.27	117.46	-0.68%	355.78	351.29	-1.26%
16	113.78	113.23	-0.48%	339.28	334.38	-1.44%
17	116.76	116.13	-0.54%	370.91	367.23	-0.99%
18	114.95	114.2	-0.65%	346.4	342.53	-1.12%
19	123.34	122.89	-0.36%	361.92	357.89	-1.11%
20	123.56	122.53	-0.83%	374.02	370.51	-0.94%
Avg.	118.148	117.786	-0.30%	359.4785	353.8365	-1.56%

B社 No.	Impedance (Ω)			DC resistance (m Ω)		
	(Low temp.) before	(Low temp.) after	Change rate (%)	(Low temp.) before	(Low temp.) after	Change rate (%)
1	217.98	215.06	-1.34%	32.76	30.72	-6.23%
2	224.15	223.24	-0.41%	33.21	31	-6.65%
3	206.75	207.1	0.17%	31.01	30.37	-2.06%
4	215.27	208.95	-2.94%	31.47	29.59	-5.97%
5	226.63	226.4	-0.10%	32.95	31.17	-5.40%
6	223.98	216.46	-3.36%	33.32	32.76	-1.68%
7	223.17	220.61	-1.15%	33.79	33.59	-0.59%
8	220.39	214.65	-2.60%	30.37	28.29	-6.85%
9	212.73	213.2	0.22%	32.97	31.06	-5.79%
10	227.89	222.33	-2.44%	33.4	31.6	-5.39%
11	226.73	225.83	-0.40%	33.3	30.81	-7.48%
12	226.77	219.96	-3.00%	33.34	31.33	-6.03%
13	229.62	227.14	-1.08%	34.62	31.39	-9.33%
14	219.45	216.52	-1.34%	29.82	28.62	-4.02%
15	224.69	222.19	-1.11%	33.25	30.96	-6.89%
16	229.77	222.88	-3.00%	33.3	31.41	-5.68%
17	222.56	221.31	-0.56%	32.34	30.3	-6.31%
18	216.15	212.2	-1.83%	33.08	32.25	-2.51%
19	231.11	225.15	-2.58%	33.39	31.48	-5.72%
20	212.83	209.26	-1.68%	33.92	30.43	-10.29%
Avg.	221.931	218.522	-1.53%	32.7805	30.9565	-5.54%

C社 No.	Impedance (Ω)			DC resistance (m Ω)		
	(Low temp.) before	(Low temp.) after	Change rate (%)	(Low temp.) before	(Low temp.) after	Change rate (%)
1	104.03	101.96	-1.99%	52	53.61	3.10%
2	123.55	119.28	-3.46%	54.72	57.39	4.88%
3	126.65	122.14	-3.56%	54.9	56.85	3.55%
4	119.24	115.25	-3.35%	56.32	55.85	-0.83%
5	128.06	124.57	-2.73%	55.48	54.49	-1.78%
6	122.09	118.57	-2.88%	54.22	57.68	6.38%
7	129.18	124.24	-3.82%	55.08	55.8	1.31%
8	124.09	119.8	-3.46%	55.72	58.89	5.69%
9	115.43	112.73	-2.34%	53.82	55.21	2.58%
10	119.55	116.32	-2.70%	58.33	53.1	-8.97%
11	131.03	127.83	-2.44%	55.07	55.28	0.38%
12	110.13	107.12	-2.73%	57.22	55.71	-2.64%
13	110.2	106.4	-3.45%	58.04	58.94	1.55%
14	106.34	102.69	-3.43%	53.38	57.55	7.81%
15	117.78	114.05	-3.17%	57.52	55.41	-3.67%
16	129.58	125.87	-2.86%	54.04	54.89	1.57%
17	120.43	116.4	-3.35%	56.65	57.71	1.87%
18	112.33	108.04	-3.82%	57.79	57.07	-1.25%
19	124.27	120.56	-2.99%	58.44	58.4	-0.07%
20	127.75	122.37	-4.21%	52.68	53.95	2.41%
Avg.	120.0855	116.3095	-3.14%	55.571	56.189	1.19%

C社 2125**Low temp. test**

Samwha

C社 No.	Impedance (Ω)			DC resistance (m Ω)		
	(Low temp.) before	(Low temp.) after	Change rate (%)	(Low temp.) before	(Low temp.) after	Change rate (%)
1	222.15	215.85	-2.84%	32.66	32.52	-0.43%
2	218.06	207.21	-4.98%	34.17	30.9	-9.57%
3	207.32	178.65	-13.83%	30.99	30.69	-0.97%
4	200.78	197.84	-1.46%	32.2	32.04	-0.50%
5	202.06	197.58	-2.22%	31.31	31.37	0.19%
6	217.35	214.21	-1.44%	32.99	33.59	1.82%
7	217.8	183.26	-15.86%	31.72	30.58	-3.59%
8	221.12	214.32	-3.08%	34.36	34.14	-0.64%
9	219.34	211.6	-3.53%	32.89	32.52	-1.12%
10	219.61	216.87	-1.25%	31.29	32.68	4.44%
11	215.83	212.07	-1.74%	33.97	31.52	-7.21%
12	207.46	202.64	-2.32%	35.48	33.14	-6.60%
13	240.45	236.2	-1.77%	35.65	33.28	-6.65%
14	213.34	209.19	-1.95%	34.33	31.75	-7.52%
15	204.18	173.67	-14.94%	32.25	32.16	-0.28%
16	237.08	225.36	-4.94%	36.23	31.88	-12.01%
17	211.54	204.54	-3.31%	34.22	32.68	-4.50%
18	208.51	178.76	-14.27%	34.9	32.4	-7.16%
19	230.07	218.22	-5.15%	30.23	33.65	11.31%
20	217.75	214.39	-1.54%	37.6	33.24	-11.60%
Avg.	216.59	205.6215	-5.12%	33.472	32.3365	-3.13%

Summary and J-chip judgement

Low temp. test

Sample		Test result: Impedance(Ω)			Test result: DCR(Ω)		
		Min. value	Max. Value	Avg. value	Min. value	Max. Value	Avg. value
1608	A	-0.3%	-2.54%	-0.97%	-0.67%	-14.68%	-1.88%
		Judg:○	Judg:○	Judg:○	Judg:○	Judg:○	Judg:○
	B	0.16%	1.36%	-0.3%	-1.56%	-0.35%	-6.19%
		Judg:○	Judg:○	Judg:○	Judg:○	Judg:○	Judg:○
	C	-1.99%	-1.99%	-3.14%	0.07%	-8.97%	1.19%
		Judg:○	Judg:○	Judg:○	Judg:○	Judg:○	Judg:○
2125	A	0.34%	6.42%	1.21%	-5.01%	-14.1%	-8.62%
		Judg:○	Judg:○	Judg:○	Judg:○	Judg:○※	Judg:○
	B	0.17%	-2.58%	-5.54%	-0.59%	-10.29%	-5.54%
		Judg:○	Judg:○	Judg:○	Judg:○	Judg:○	Judg:○
	C	-1.44%	-15.86%	-5.12%	0.19%	-11.6%	-3.13%
		Judg:○	Judg:○	Judg:○	Judg:○	Judg:○	Judg:○

<Total Judgement>

All of test results are no problem.

A社 No.	Impedance (Ω)			DC resistance (m Ω)		
	(High temp. & humidity op. test) before	(High temp. & humidity op. test) after	Change rate (%)	(High temp. & humidity op. test) before	(High temp. & humidity op. test) after	Change rate (%)
1	92.87	99.15	6.76%	180.55	152.35	-15.62%
2	94.27	100.44	6.55%	175.65	174.40	-0.71%
3	103.95	109.56	5.40%	185.66	184.25	-0.76%
4	96.96	101.23	4.40%	182.55	181.24	-0.72%
5	98.54	103.60	5.13%	188.43	185.86	-1.36%
6	102.54	108.00	5.32%	186.76	173.09	-7.32%
7	104.65	110.72	5.80%	187.32	185.19	-1.14%
8	111.67	117.02	4.79%	182.78	180.02	-1.51%
9	110.05	115.52	4.97%	187.88	185.97	-1.02%
10	104.93	108.83	3.72%	178.45	176.20	-1.26%
11	109.94	114.95	4.56%	178.76	175.86	-1.62%
12	102.55	107.25	4.58%	185.65	181.66	-2.15%
13	96.86	102.55	5.87%	187.83	185.50	-1.24%
14	97.69	105.82	8.32%	184.56	182.18	-1.29%
15	111.03	116.83	5.22%	183.65	180.97	-1.46%
16	102.33	107.25	4.81%	185.87	183.73	-1.15%
17	97.83	103.92	6.23%	182.34	179.84	-1.37%
18	106.66	112.95	5.90%	185.87	183.60	-1.22%
19	109.19	115.68	5.94%	177.78	175.52	-1.27%
20	107.65	115.40	7.20%	179.43	176.77	-1.48%
Avg.	103.1080	108.8333	5.55%	183.39	179.21	-2.28%

A社 No.	Impedance (Ω)			DC resistance (m Ω)		
	(High temp. & humidity op. test) before	(High temp. & humidity op. test) after	Change rate (%)	(High temp. & humidity op. test) before	(High temp. & humidity op. test) after	Change rate (%)
1	195.76	182.37	-6.84%	27.26	25.75	-5.53%
2	183.06	165.32	-9.69%	27.47	25.29	-7.95%
3	201.67	183.94	-8.79%	28.82	26.86	-6.80%
4	200.05	186.21	-6.92%	27.67	25.75	-6.94%
5	197.72	177.47	-10.24%	26.55	24.54	-7.57%
6	193.66	173.17	-10.58%	27.55	25.72	-6.66%
7	192.43	183.25	-4.77%	27.09	25.12	-7.27%
8	199.04	172.29	-13.44%	27.56	25.78	-6.46%
9	202.54	185.26	-8.53%	28.82	26.62	-7.62%
10	204.55	180.09	-11.96%	29.35	26.86	-8.47%
11	201.18	178.49	-11.28%	28.83	26.68	-7.46%
12	199.87	184.42	-7.73%	32.66	30.49	-6.63%
13	183.73	171.22	-6.81%	27.62	25.32	-8.32%
14	188.27	174.07	-7.54%	26.76	41.58	55.39%
15	197.36	180.64	-8.47%	29.58	28.02	-5.27%
16	204.87	187.74	-8.36%	32.82	30.30	-7.67%
17	206.07	196.65	-4.57%	29.33	31.56	7.60%
18	198.67	178.29	-10.26%	26.87	24.68	-8.16%
19	200.48	174.12	-13.15%	26.87	25.03	-6.86%
20	198.94	172.58	-4.85%	27.89	25.56	-8.34%
Avg.	197.4960	179.380	-9.17%	28.368	27.376	-3.50%

B社 No.	Impedance (Ω)			DC resistance ($m\Omega$)		
	(High temp. & humidity op. test) before	(High temp. & humidity op. test) after	Change rate (%)	(High temp. & humidity op. test) before	(High temp. & humidity op. test) after	Change rate (%)
1	119.45	92.01	-22.97%	365.9	360.57	-1.46%
2	109.93	86.79	-21.05%	363.01	360.29	-0.75%
3	119.7	90.92	-24.04%	341.03	338.4	-0.77%
4	121.42	94.11	-22.49%	364	361.37	-0.72%
5	116.41	91.53	-21.37%	363.7	360.58	-0.86%
6	117.84	92.95	-21.12%	371.23	368.44	-0.75%
7	118.83	94.74	-20.27%	364.33	360.59	-1.03%
8	120.38	93.18	-22.60%	380.41	377.81	-0.68%
9	122.68	98.32	-19.86%	364.26	360.23	-1.11%
10	118.95	91.03	-23.47%	364.12	361.55	-0.71%
11	117.01	95.55	-18.34%	353.65	350.23	-0.97%
12	122.53	96.38	-21.34%	365.26	362.09	-0.87%
13	123.69	96.85	-21.70%	358.46	355.45	-0.84%
14	120.38	94.18	-21.76%	349.52	347.45	-0.59%
15	118.81	96.01	-19.19%	362.05	355.87	-1.71%
16	119.34	92.05	-22.87%	364.7	361.38	-0.91%
17	118.99	95.45	-19.78%	364.79	362.97	-0.50%
18	118.16	93.16	-21.16%	371.54	368.31	-0.87%
19	119.08	91.93	-22.80%	326.79	352.76	7.95%
20	114.23	89.53	-21.62%	352.09	349.16	-0.83%
Avg.	118.8905	93.3335	-21.49%	360.542	358.775	-0.45%

B社	Impedance (Ω)			DC resistance (m Ω)		
No.	(High temp. & humidity op. test) before	(High temp. & humidity op. test) after	Change rate (%)	(High temp. & humidity op. test) before	(High temp. & humidity op. test) after	Change rate (%)
1	224.98	194.35	-13.61%	31.93	29.54	-7.49%
2	224.95	206.4	-8.25%	34.19	32.09	-6.14%
3	229.08	208.7	-8.90%	33.95	32.68	-3.74%
4	225.54	191.75	-14.98%	33.42	31.22	-6.58%
5	226.9	208.16	-8.26%	33.18	31.07	-6.36%
6	224.21	195.54	-12.79%	34.5	32.27	-6.46%
7	226.82	204.76	-9.73%	33.18	31.74	-4.34%
8	218.54	194.68	-10.92%	32.83	30.19	-8.04%
9	206.34	176.24	-14.59%	32.87	30.7	-6.60%
10	224.49	203.36	-9.41%	35.49	35.43	-0.17%
11	223.31	190.26	-14.80%	33.04	35.6	7.75%
12	219.01	193.07	-11.84%	31.96	32.84	2.75%
13	219.82	191.51	-12.88%	32.99	32.6	-1.18%
14	225.96	199.76	-11.59%	32.5	30.66	-5.66%
15	231.61	208.89	-9.81%	34.24	32.07	-6.34%
16	221.59	338.5	52.76%	32.09	32.22	0.41%
17	217.18	197.01	-9.29%	32.11	30.69	-4.42%
18	223.49	209.54	-6.24%	33.44	31.11	-6.97%
19	227.1	203.37	-10.45%	33.44	32.49	-2.84%
20	225.34	211.2	-6.27%	32.67	30.31	-7.22%
Avg.	223.313	206.3525	-7.59%	33.201	31.876	-3.98%

C社 No.	Impedance (Ω)			DC resistance ($m\Omega$)		
	(High temp. & humidity op. test) before	(High temp. & humidity op. test) after	Change rate (%)	(High temp. & humidity op. test) before	(High temp. & humidity op. test) after	Change rate (%)
1	121.52	116.29	-4.30%	58.17	59.65	2.54%
2	123.22	111.7	-9.35%	53.77	55.65	3.50%
3	124.2	114.66	-7.68%	56.43	55.67	-1.35%
4	110.71	106.28	-4.00%	53.82	53.43	-0.72%
5	117.42	107.66	-8.31%	55.34	55.73	0.70%
6	121.63	114.95	-5.49%	52.51	59.8	13.88%
7	109.28	106.58	-2.47%	53.27	56.6	6.25%
8	118.2	110.54	-6.48%	53.69	54.15	0.86%
9	113.03	105.55	-6.62%	54.51	59.19	8.59%
10	113.69	105.93	-6.83%	54.53	53.78	-1.38%
11	123.74	114.69	-7.31%	54.49	59.62	9.41%
12	110.02	102.31	-7.01%	57.61	56.1	-2.62%
13	112.28	106.04	-5.56%	53.35	54.1	1.41%
14	114.87	107.76	-6.19%	55.8	54.05	-3.14%
15	108.31	104.91	-3.14%	55.66	57.41	3.14%
16	120.21	113.43	-5.64%	54.47	58.29	7.01%
17	119.11	109.64	-7.95%	54.65	58.87	7.72%
18	102.31	94.89	-7.25%	57.38	55.23	-3.75%
19	102.57	96.57	-5.85%	54.7	55.84	2.08%
20	114.43	106.09	-7.29%	55.79	57.87	3.73%
Avg.	115.0375	107.8235	-6.24%	54.997	56.5515	2.89%

C社 No.	Impedance (Ω)			DC resistance ($m\Omega$)		
	(High temp. & humidity op. test) before	(High temp. & humidity op. test) after	Change rate (%)	(High temp. & humidity op. test) before	(High temp. & humidity op. test) after	Change rate (%)
1	220.91	32.12	-85.46%	32.13	32.32	0.59%
2	197.6	163.29	-17.36%	31.21	33.68	7.91%
3	203.97	167.73	-17.77%	35.8	30.93	-13.60%
4	215.73	190.64	-11.63%	34.56	32.64	-5.56%
5	208.53	171.98	-17.53%	33.62	30.77	-8.48%
6	191.44	17.46	-90.88%	35.53	30.59	-13.90%
7	201.86	180.41	-10.63%	35.55	33.28	-6.39%
8	212.26	44.63	-78.97%	34.84	31.8	-8.73%
9	234.32	191.8	-18.15%	34.12	32.19	-5.66%
10	211.68	173.63	-17.98%	37.76	31.2	-17.37%
11	225.96	180.94	-19.92%	33.68	32.69	-2.94%
12	215.96	40.99	-81.02%	34.93	31.86	-8.79%
13	216.52	167.82	-22.49%	31.56	31.08	-1.52%
14	218.5	182.87	-16.31%	37.38	32.66	-12.63%
15	204.23	164.3	-19.55%	35.42	30.85	-12.90%
16	225.87	184.96	-18.11%	35.54	32.06	-9.79%
17	218.02	176.36	-19.11%	37.25	31.68	-14.95%
18	219.84	176.99	-19.49%	32.14	31.8	-1.06%
19	202.57	168.23	-16.95%	34.78	32.25	-7.27%
20	221.12	180.99	-18.15%	36.76	31.59	-14.06%
Avg.	213.3445	147.907	-30.87%	34.728	31.896	-7.85%

Summary and J-chip judgement

High temp. & humidity op. test result

Sample		Test result: Impedance(Ω)			Test result: DCR(Ω)		
		Min. value	Max. Value	Avg.value	Min. value	Max. Value	Avg.value
1608	A	3.72%	8.32	5.55%	-0.71%	-15.62%	-2.28%
		Judg○	Judg○	Judg○	Judg○	Judg○	Judg○
	B	-18.34%	-24.04%	-21.49%	-0.5%	7.95%	-0.45%
		Judg○	Judg△	Judg○	Judg○	Judg○	Judg○
	C	-2.47%	-9.35%	-6.24%	0.70%	13.88%	2.89%
		Judg○	Judg○	Judg○	Judg○	Judg○	Judg○
2125	A	-4.57%	-13.15%	-3.5%	-5.27%	55.39%	-3.5%
		Judg○	Judg○	Judg○	Judg○	Judg○※	Judg○
	B	-6.24%	52.76%	-7.59%	-0.17%	-8.04%	-3.98%
		Judg○	Judg×	Judg○	Judg○	Judg○	Judg○
	C	-10.63%	-90.88%	-30.87%	0.59%	-14.95%	-7.85%
		Judg○	Judg×	Judg×	Judg○	Judg○	Judg○

<Total Judgement>

- Company A (MAXECHO): All of results are satisfied with spec except※A2125.
- Company B (MURATA): B1608 results is close to the limit value ($\pm 25\%$). B2125 is over the limit value ($\pm 25\%$).
- Company C (Samwha): C2125 results is over the limit value ($\pm 25\%$). Average value is also over the limit value.

A社 No.	Impedance (Ω)			DC resistance ($m\Omega$)		
	(Vib. test) before	(Vib. test) after	Change rate (%)	(Vib. test) before	(Vib. test) after	Change rate (%)
1	110.67	109.62	-0.95%	180.55	159.70	-11.55%
2	96.08	93.39	-0.72%	175.78	167.57	-4.67%
3	105.63	105.28	-0.333%	185.32	182.37	-1.59%
4	98.16	97.36	-0.82%	182.55	179.94	-1.43%
5	94.97	93.76	-1.27%	188.43	170.59	-9.47%
6	94.84	94.00	-0.89%	186.76	185.25	-0.81%
7	109.34	108.60	-0.68%	187.32	185.05	-1.21%
8	102.26	101.29	-0.95%	182.78	182.01	-0.42%
9	98.56	96.94	-1.64%	187.88	185.61	-1.21%
10	110.87	110.38	-0.44%	178.88	177.63	-0.70%
11	97.26	96.30	-0.99%	178.76	177.33	-0.80%
12	105.75	104.06	-1.60%	185.65	183.52	-1.15%
13	106.65	106.03	-0.58%	187.83	185.99	-0.98%
14	97.33	99.11	1.83%	179.77	178.28	-0.83%
15	98.85	93.13	-5.79%	185.67	183.01	-1.43%
16	94.38	97.83	3.66%	185.87	198.53	6.81%
17	97.85	96.48	-1.40%	182.34	176.63	-3.13%
18	98.58	97.44	-1.16%	185.87	184.59	-0.69%
19	101.47	102.01	0.53%	176.58	174.85	-0.98%
20	98.85	97.26	-1.61%	179.78	178.22	-0.87%
Avg.	100.9175	100.1262	-0.78%	183.22	179.83	-1.85%

A社 No.	Impedance (Ω)			DC resistance (m Ω)		
	(Vib. test) before	(Vib. test) after	Change rate (%)	(Vib. test) before	(Vib. test) after	Change rate (%)
1	196.51	187.47	-4.60%	30.55	28.55	-6.55%
2	205.47	192.61	-6.26%	27.90	25.03	-10.30%
3	198.75	192.17	-3.31%	27.28	26.49	-2.88%
4	220.11	208.82	-5.13%	27.42	25.82	-5.84%
5	157.68	148.50	-5.82%	29.56	27.54	-6.84%
6	198.76	196.08	-1.35%	30.25	27.67	-8.53%
7	200.66	200.14	-0.26%	27.88	21.36	-23.37%
8	197.86	185.22	-6.39%	28.65	26.87	-6.20%
9	211.58	212.21	0.30%	26.75	25.08	-6.24%
10	194.34	179.69	-7.54%	28.67	27.05	-5.66%
11	191.12	184.66	-3.38%	27.63	25.79	-6.67%
12	195.07	187.58	-3.84%	27.25	25.58	-6.13%
13	207.56	200.19	-3.55%	27.38	25.81	-5.74%
14	202.32	194.29	-3.97%	26.78	25.1	-6.27%
15	197.19	196.03	-0.59%	26.91	25.75	-4.32%
16	199.67	188.21	-5.74%	28.23	24.50	-13.20%
17	211.85	197.53	-6.76%	32.16	29.78	-7.41%
18	197.12	197.81	0.35%	27.90	26.32	-5.68%
19	208.05	194.46	-6.53%	30.23	28.19	-6.75%
20	202.56	201.65	-0.45%	27.87	25.81	-7.38%
Avg.	199.7115	192.2655	-3.73%	28.36	26.20	-7.61%

B社 No.	Impedance (Ω)			DC resistance ($m\Omega$)		
	(Vib. test) before	(Vib. test) after	Change rate (%)	(Vib. test) before	(Vib. test) after	Change rate (%)
1	129.01	129.62	0.47%	365.86	362.84	-0.83%
2	118.61	120.28	1.41%	351.5	348.77	-0.78%
3	115.8	118.95	2.72%	344.24	327.34	-4.91%
4	121.87	122.55	0.56%	360.82	357.72	-0.86%
5	121.38	123.68	1.89%	337.68	333.87	-1.13%
6	121.12	122.03	0.75%	356.99	351.81	-1.45%
7	117.25	116.87	-0.32%	371.31	366.12	-1.40%
8	119.75	120.76	0.84%	372.35	368.14	-1.13%
9	115.03	114.84	-0.17%	361.6	356.84	-1.32%
10	116.83	117.11	0.24%	370.3	355.9	-3.89%
11	125.35	123.98	-1.09%	384.71	364.3	-5.31%
12	119.46	119.6	0.12%	356.57	352.64	-1.10%
13	115.35	114.25	-0.95%	349.04	345.91	-0.90%
14	120.5	120.99	0.41%	357.55	354.4	-0.88%
15	108.31	108.94	0.58%	357.65	368.47	3.03%
16	117.61	116.8	-0.69%	359.81	363.18	0.94%
17	128.09	127.35	-0.58%	352.71	374.41	6.15%
18	124.22	124.34	0.10%	380.39	350.12	-7.96%
19	120.94	121.23	0.24%	362.02	356.56	-1.51%
20	119.2	118.77	-0.36%	379.87	375.75	-1.08%
Avg.	119.784	120.147	0.31%	361.6485	356.7545	-1.32%

B社 No.	Impedance (Ω)			DC resistance ($m\Omega$)		
	(Vib. test) before	(Vib. test) after	Change rate (%)	(Vib. test) before	(Vib. test) after	Change rate (%)
1	216.04	207.48	-3.96%	30.91	28.79	-6.86%
2	211.02	198.2	-6.08%	32.56	32.07	-1.50%
3	226.64	213.58	-5.76%	33.84	31.86	-5.85%
4	226.32	215.02	-4.99%	32.74	31.07	-5.10%
5	220.54	207.01	-6.13%	31.21	37.48	20.09%
6	210.86	204.99	-2.78%	31.39	30.78	-1.94%
7	216.8	209.13	-3.54%	30.4	28.49	-6.28%
8	207.14	192.25	-7.19%	34.11	32.37	-5.10%
9	234.85	220.75	-6.00%	33.77	32.28	-4.41%
10	224.15	211.82	-5.50%	33.95	31.94	-5.92%
11	214.07	207.19	-3.21%	31.61	29.69	-6.07%
12	235.97	221.11	-6.30%	33.76	33.67	-0.27%
13	218.55	207.88	-4.88%	32.78	30.82	-5.98%
14	224.42	213.97	-4.66%	33.8	31.57	-6.60%
15	225.68	216.95	-3.87%	30.75	31.43	2.21%
16	220.22	212.5	-3.51%	33.05	32.64	-1.24%
17	223.78	213.16	-4.75%	31.75	29.81	-6.11%
18	227.58	218.26	-4.10%	34.43	32.93	-4.36%
19	220.32	208.55	-5.34%	32.6	30.67	-5.92%
20	221.13	213.34	-3.52%	33.5	31.44	-6.15%
Avg.	221.304	210.657	-4.80%	32.6455	31.59	-3.17%

C社 No.	Impedance (Ω)			DC resistance ($m\Omega$)		
	(Vib. test) before	(Vib. test) after	Change rate (%)	(Vib. test) before	(Vib. test) after	Change rate (%)
1	124.75	121.08	-2.94%	56.37	55.64	-1.30%
2	113.77	111.96	-1.59%	56.82	55.78	-1.83%
3	117.01	113.83	-2.72%	59.57	56.1	-5.83%
4	116.85	114.81	-1.75%	55.59	54.1	-2.68%
5	108.3	106.94	-1.26%	58.09	55.93	-3.72%
6	111.74	108.82	-2.61%	56.56	56.67	0.19%
7	129.5	125.16	-3.35%	56.23	59.24	5.35%
8	111.38	108.56	-2.53%	57.41	54.35	-5.33%
9	120.96	118.85	-1.74%	56.89	54.84	-3.60%
10	125.26	122.55	-2.16%	54.56	53.42	-2.09%
11	113.37	111.23	-1.89%	53.93	55.94	3.73%
12	120.92	118.17	-2.27%	55.92	54.71	-2.16%
13	123.44	120.58	-2.32%	54	54.2	0.37%
14	118.08	114.72	-2.85%	55.01	57.75	4.98%
15	111.97	108.91	-2.73%	54.44	56.24	3.31%
16	113.88	111.02	-2.51%	59.5	57.21	-3.85%
17	116.51	113.57	-2.52%	56.26	56.41	0.27%
18	121.86	117.94	-3.22%	59.6	59.36	-0.40%
19	111.58	108.55	-2.72%	57.34	55.51	-3.19%
20	128.62	123.39	-4.07%	55.18	56.13	1.72%
Avg.	117.9875	115.032	-2.49%	56.4635	55.9765	-0.80%

C社 No.	Impedance (Ω)			DC resistance ($m\Omega$)		
	(Vib. test) before	(Vib. test) after	Change rate (%)	(Vib. test) before	(Vib. test) after	Change rate (%)
1	220.41	204	-7.45%	34.84	36.89	5.88%
2	207.83	197.31	-5.06%	33.3	31.65	-4.95%
3	203.05	212.75	4.78%	29.57	31.53	6.63%
4	218.44	194.03	-11.17%	31.96	32.24	0.88%
5	197.07	199.84	1.41%	31.79	33.25	4.59%
6	203.11	191.3	-5.81%	32.91	31.93	-2.98%
7	199.92	204.39	2.24%	30.04	33.92	12.92%
8	208.97	189.82	-9.16%	32.42	33.12	2.16%
9	218.8	211.75	-3.22%	33.18	32.14	-3.13%
10	201.82	196.91	-2.43%	31.07	32.26	3.83%
11	209.95	203.95	-2.86%	36.58	33.44	-8.58%
12	215.7	210.04	-2.62%	31.01	34.18	10.22%
13	199.17	197.12	-1.03%	33.64	31.02	-7.79%
14	216.96	212.78	-1.93%	37.63	36.45	-3.14%
15	203.95	196.56	-3.62%	31.41	32.92	4.81%
16	204.43	201.28	-1.54%	32.7	32.72	0.06%
17	218.36	212.56	-2.66%	34.79	32.76	-5.84%
18	204.11	197.17	-3.40%	35.96	32.58	-9.40%
19	208.02	201.28	-3.24%	29.55	34.26	15.94%
20	211.71	203.69	-3.79%	32.73	32.65	-0.24%
Avg.	208.589	201.9265	-3.13%	32.854	33.0955	1.09%

Summary and J-chip judgement

Vibration test

Sample		Test result: Impedance(Ω)			Test result: DCR(Ω)		
		Min. value	Max. Value	Avg.value	Min. value	Max. Value	Avg.value
1608	A	0.53%	3.66%	-0.78%	-0.26%	-11.55%	-1.85%
		Judg:○	Judg:○	Judg:○	Judg:○	Judg:○	Judg:○
	B	0.10%	2.72%	0.31%	-0.78%	-7.96%	-1.32%
		Judg:○	Judg:○	Judg:○	Judg:○	Judg:○	Judg:○
	C	-1.26%	-4.07%	-2.49%	0.19%	5.35%	-0.8%
		Judg:○	Judg:○	Judg:○	Judg:○	Judg:○	Judg:○
2125	A	-0.26%	-7.54%	-3.73%	-2.88%	-23.37%	-7.61%
		Judg:○	Judg:○	Judg:○	Judg:○	Judg:○※	Judg:○
	B	-2.78%	-7.19%	-4.8%	-0.27%	20.09%	-3.17%
		Judg:○	Judg:○	Judg:○	Judg:○	Judg:○	Judg:○
	C	-1.08%	-11.17%	-3.13%	0.06%	15.94%	1.09%
		Judg:○	Judg:○	Judg:○	Judg:○	Judg:○	Judg:○

<Total Judgement>

All of test results are no problem.

KETI試験結果の考察: 仮報告

■フェライトビーズ部品発掘:部品評価結果まとめ

3月22日時点、KETIの測定装置故障のため素子強度試験が完了していません。それを除く試験は完了しましたので下記の通り結果を比較して見ました。最終報告は素子強度試験完了後に行います。

メーカー 試験項目	A:MAXECHO		B:村田製作所		C:Samwha	
	1608	2125	1608	2125	1608	2125
素子強度	未	未	未	未	未	未
高温ランニング	◎ 合格	○ 準合格	◎ 合格	◎ 合格	◎ 合格	◎ 合格
低温ランニング	◎ 合格	◎ 合格	◎ 合格	◎ 合格	◎ 合格	◎ 合格
高温高湿	◎ 合格	○ 準合格	○ 準合格	× 不合格	◎ 合格	× 不合格
振動	◎ 合格	◎ 合格	◎ 合格	◎ 合格	◎ 合格	◎ 合格

(※ 準合格: 規格値に対して余裕がない結果/規格値が無いが疑義がある結果)

<SUMMARY>

①高温高湿試験:村田製作所/Samwha製品では断線が発生した。特に、Samwha製品はサンプル20に対して**4件発生(20%)**。フェライト基材組成に問題があると見える。

