COMMON PARTS/MATERIALS, SPACE USE, APPLICATION DATA SHEET FOR

Part Description	CAPACITORS, CHIP, FIXED, FINE CERAMIC DIELECTRIC
Part Number and Type	N2040/L104
Applicable Specification	JAXA-QTS-2040 JAXA-QTS-2040/L104

January 2026

Prepared and Established by Fukui Murata Manufacturing Co., Ltd.

Issued by Japan Aerospace Exploration Agen

This document is the English version of JAXA QTS/ADS which was originally written and authorized in Japanese and carefully translated into English for international users. If any question arises as to the context or detailed description, it is strongly recommended to verify against the latest official Japanese version.

The release date of the English version of this data sheet: 9 October 2026

Record of revisions

Rev.	Date	Description
NC	Dec. 2005	Original
A	25 Oct. 2007	Reflected the change of document by Fukui Murata Manufacturing Co., Ltd. Document No: JMCG0-0018-R (Rev. A)
B	28 Nov. 2019	Reflected the change of document by Fukui Murata Manufacturing Co., Ltd. Document No: JMCG0-0018-R (Rev. B)
C	27 Jun. 2022	Reflected the change of document by Fukui Murata Manufacturing Co., Ltd. Document No: JMCG0-0018-R (Rev. C)
D	10 Sept. 2025	Reflected the change of document by Fukui Murata Manufacturing Co., Ltd. Document No: JMCG0-0018-R (Rev. D)
E	30 Jan. 2026	Reflected the change of document by Fukui Murata Manufacturing Co., Ltd. Document No: JMCG0-0018-R (Rev. E)
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JMCG0-0018-R

Revision history

Rev.	Date	Description
A	25 Oct. 2007	• Added terminal finish " S" (solder coating) • Added note that the applied solder amount (fillet height) shall be 0.5T as a maximum. • Added that failure rate level satisfies the assurance level S. • Reviewed dimension tolerance with the addition of solder coating products.
B	28 Nov. 2019	Affected Section: Paragraph 2.1, Externals and Dimensions, (2) Dimensions Details: Changed the dimensions L, W, T, G and S to the proper values. Reason: To reduce the selection effort by correcting the dimensions. Affected Section: Paragraph 2.4 Details: Changed the description of terminal finish S from "Sn60Pb37Ag3 solder coating over Ni plating" to "Replacement solder coating for terminal finish "Y"". Reason: To align with the detail specification. Affected Section: Paragraph 8, Storage condition Details: Specified the lower limit of the storage temperature and of the humidity. Reason: To align with the detail specification. Affected Section: Contact Details: Updated the division from AS Capacitor Product Engineering Section II to Products Planning Section 1, Product Engineering Department, Capacitor Division, and telephone number from +81-778-21-8372 to +81-778-21-8371. Reason: To align with internal organizational changes.
C	27 Jun. 2022	Affected Section: All pages including cover page Details: Changed the part number from NASDA2040··· to N2040···. Reason: To align with JAXA-QTS-2040/L104 Affected Section: Page number in the contents Details: Changed the page number.

JMCG0-0018-R

Revision history

Rev.	Date	Description
		Reason: To add the result of the requalification of C0G base metal parts. Affected Section: Paragraph 2.3, Element construction Details: Added the C0G base metal for inner electrode. Reason: To add the result of the requalification of C0G base metal parts. Affected Section: Paragraph 4.1, Samples (for Terminal finish Y and S) Details: Added the part numbers N2040/L104N1608C0G1H332J and N2040/L104N2012C0G2A182J with C0G base metal. Reason: To add the result of the requalification of C0G base metal parts. Affected Section: Paragraph 4.2, Electrical characteristics through paragraph 7, Reliability Details Details: Added the data of for N2040/L104N1608C0G1H332J and N2040/L104N2012C0G2A182J with C0G base metal. Reason: To add the result of the requalification of C0G base metal parts. Affected Section: Paragraph 4.2, Electrical characteristics [Temperature characteristics] Details: Changed the title of Y-axis of the graphs 4 to 11 from "Temperature coefficient [ppm/°C]" to "Capacitance change [%]". Reason: To correct the errors. Affected Section: Paragraph 4.3 Mechanical and Thermal Characteristics Tables in [Mechanical characteristics] [Environmental characteristics] [Durability characteristic] Details: Added the result of the requalification of C0G base metal parts. Reason: To requalify the addition of the product lineup. Affected Section: Paragraph 4.3 Mechanical and Thermal Characteristics Tables in [Mechanical characteristics] [Environmental characteristics] [Durability characteristic]

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Revision history

Rev.	Date	Description
		Details: Added the referred paragraph numbers for requirements and test methods specified in Appendix L of JAXA-QTS-2040. Reason: To simplify the contents of the tables. Affected Section: Paragraph 4.3, Mechanical and Thermal Characteristics Tables in [Mechanical characteristics] Details: Deleted the row of terminal strength. Reason: Terminal strength was no longer the requalification requirement since JAXA-QTS-2040/L104 revision C. Affected Section: Paragraph 4.3, Mechanical and Thermal Characteristics Tables in [Mechanical characteristics] Details: Changed the test item from “shear” to “Shear (destructive)”. Reason: To align with the Appendix L of JAXA-QTS-2040. Affected Section: Paragraph 4.3, Mechanical and Thermal Characteristics Tables in [Mechanical characteristics] Details: For substrate bending, changed the sample size from 3 to 10. Reason: To align with the actually subjected sample size. Affected Section: [Drifts in environmental tests] to [Drifts in resistance to soldering heat] in paragraph 4.3 Details: Changed the tile for Y-axis of the graphs for the insulation resistance from "IR[Log IR]" to "Log IR[-]". Reason: To correct the title because the Y-axis in the tables is the logarithm of the insulation resistance IR, which is unitless. Affected Section: [Drifts in environmental tests] Details: Changed “Thermal shock“ to “Thermal shock (I)” Reason: To align with JAXA-QTS-2040.

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Revision history

Rev.	Date	Description
		Affected Section: [Drifts in environmental tests] Details: Corrected DF【%】to Log IR【-】in Thermal shock (I) graph. Reason: To correct error. Affected Section: Paragraph 6.1, Shear (Destructive) Details: Changed the name of the test item from "Shear" to "Shear (Destructive) and deleted the test method and sample size". Reason: To align with the name of the test item specified in Appendix L of JAXA-QTS-2040, and to move the test method and the sample size to paragraph 4.3 herein. Affected Section: Table in paragraph 6.2, Substrate Bending Details: Changed the significant figures in the table set to two decimal places. Reason: Measured value to three decimal places but to be a large margin in error in the three decimal places. Affected Section: Table in paragraph 6.2, Substrate Bending Details: Changed the value in destructive flexure point as "7.50<". Reason: It is impossible to accurately deflect the test board of 7.50 mm or more due to the structure of the test equipment. Affected Section: Table in paragraph 6.2 Substrate Bending Details: Deleted the average value. Reason: To indicate the value "7.50 <" because the comparison of averages is meaningless. Affected Section: Paragraph 6.2, Substrate Bending Details: Added the additional explanation with the associated table.

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Revision history

Rev.	Date	Description
		Reason: To measure the destructive bending with Cap-method specified in Appendix L of JAXA-QTS-2040, and to supplement that no significant difference in results between AE-method and Cap-method. Affected Section: The graph (3) in paragraph 6.3 Destructive DC Voltage Details: Repaired missing ruled lines on graphs. Reason: It was not proper condition as a graph. Affected Section: Paragraph 6.4, Barometric Pressure (Reduced) Details: Added the additional explanation. Reason: To show the omission of the barometric pressure (reduced) test in the requalification of C0G base metal parts. Affected Section: Tables (1) and (2) in Paragraph 7.1, failure rates for C0G precious parts and X7R base metal parts Details: Marked with "," for large number of digits. Reason: To make the table easier to read. Affected Section: Tables (1) and (2) in Paragraph 7.1, failure rates for C0G precious parts and X7R base metal parts Details: Deleted the words "rated condition" and "acceleration condition" in the column. Reason: To simplify the table by using the test condition with temperature and voltage.
D	10 Sept. 2025	Affected Section: Paragraph 4.2, Electrical Characteristics - AC Bias Characteristics Details: Changed the name from “AC Bias Characteristics” to “AC Voltage Characteristics.” Affected Section: Paragraph 4.2 Details: Added DC Bias Characteristics.

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Revision history

Rev.	Date	Description
		Reason: To inform that the capacitance of high-dielectric-constant MLCCs may vary from the nominal value when a DC voltage is applied. Affected Section: Paragraph 9 Notes Details: Added paragraphs 9.4 “DC Bias Characteristics” and 9.5 “AC Voltage Characteristics” Reason: To inform that the capacitance of high-dielectric-constant MLCCs may vary from the nominal value due to the application of DC or AC voltages. Affected Section: Paragraph 10, Others Details: Changed the contact from “Products Planning Section 1, Product Engineering Department, Capacitor Division” to “Product Planning Section 1, Product Engineering Department, Sales Promotion Department, Ceramic Capacitor Division” Reason: To align with internal organization changes.
E	30 Jan. 2026	Affected Section: Revision history, revision B through revision D. Details: Added a blank line after each revision record, introduced the headings "Affected Section," "Details," and "Reason" for each record, and applied left indentation to the affected section, revision details, and reason text. Reason: To improve readability. Affected Section: Paragraph 1.1, Scope. Details: Added a requirement to retain data for C0G precious metal parts even after their certification is discontinued.

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COMMON PARTS/MATERIALS, SPACE USE,
APPLICATION DATA SHEET FOR

1. GENERAL

1.1 Scope

This Application Data Sheet details additional general information necessary for parts selection and/or equipment design that is not contained in JAXA-QML. Users are encouraged to look into other information sources for specific applications, and responsible for their decisions on part selection and usage.
Data for C0G precious metal parts shall be retained even after their certification is discontinued.

1.2 Applicable Documents

(1) JAXA-QTS-2040	Capacitors, Fixed, High Reliability, Space Use, General Specification for
(2) JAXA-QTS-2040/L104	Capacitors, Fixed, Fine Ceramic Dielectric, (Temperature Stable and General Purpose), (N2040/L104), High Reliability, Space Use, Detail Specification for

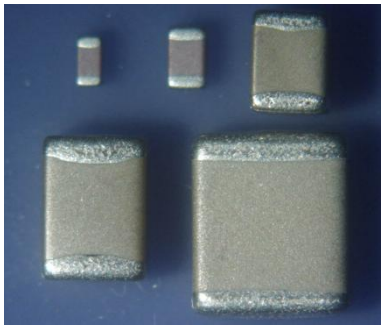
1.3 Reference Documents

(1) MIL-STD-202	Test Method Standard, Electronic and Electrical Component Parts
(2) JIS C 5101-1	Fixed Capacitors for Use in Electronic Equipment Part 1: Generic Specification

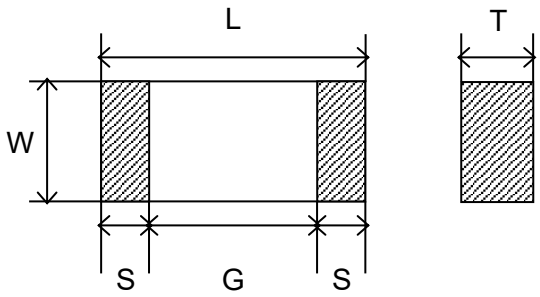
2. SUMMARY OF PRODUCTS

2.1 Externals and Dimensions

(1) Externals



(2) Dimensions



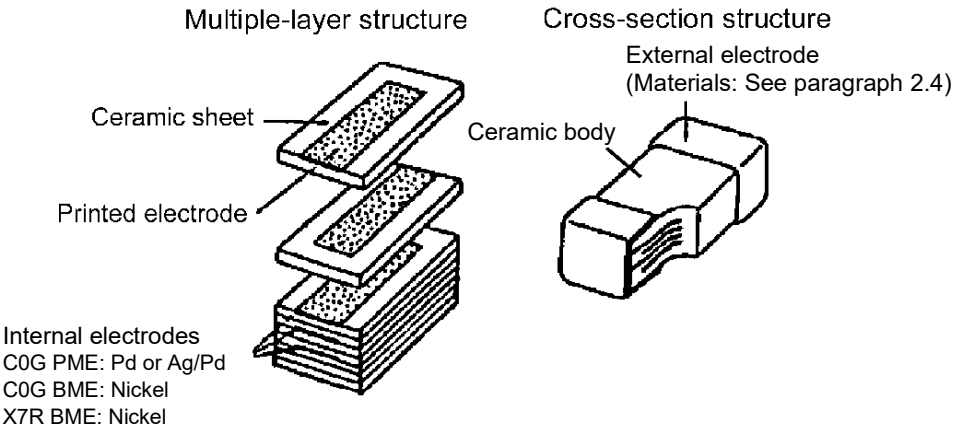
Unit: mm

Style	L	W	T	S	G
1608	$1.60^{+0.20}_{-0.10}$	$0.80^{+0.20}_{-0.10}$	0.70 to 1.00	0.2 to 0.6	0.5 min.
2012	$2.00^{+0.25}_{-0.15}$	$1.25^{+0.25}_{-0.15}$	0.50 to 1.50	0.20 to 0.8	0.7 min.
3216	$3.20^{+0.40}_{-0.15}$	$1.60^{+0.30}_{-0.15}$	0.75 to 1.90	0.3 min.	1.2 min.
3225	$3.20^{+0.40}_{-0.30}$	$2.50^{+0.30}_{-0.20}$	0.80 to 2.80	0.3 min.	1.0 min.
4532	$4.50^{+0.50}_{-0.40}$	$3.20^{+0.35}_{-0.30}$	1.00 to 2.80	0.3 min.	2.0 min.
5750	$5.70^{+0.50}_{-0.40}$	$5.00^{+0.45}_{-0.40}$	1.00 to 2.05	0.3 min.	2.0 min.

2.2 Mass

Style	Mass
1608	0.004g
2012	0.018g
3216	0.030g
3225	0.110g
4532	0.205g
5750	0.280g

2.3 Element Construction



2.4 Terminal Finish

Symbol	Terminal finish
Y	100 % Sn plated over Ni barrier base
S	Replacement solder coating for terminal finish “Y”

2.5 Failure Rate Level

It shall satisfy level S (0.001 %/1000HR). See the details for paragraph 7.1.

3. USAGE

3.1 Ratings

Item	Applicable paragraph of JAXA-QTS-2040	Description
Voltage–temperature characteristics	L.1.3.2	C0G, X7R
Nominal capacitance range	L.1.3.4	0.5 to 2,200,000 pF
Rated voltage	L.1.3.3	25, 50, 100, 200, 500 V
Operating temperature range	L.1.3.2	-55 to +125 °C
Capacitance tolerance	L.1.3.5	10 pF or less: C, D Over 10 pF: J, K, M

3.2 Recommended Operating Conditions

Ambient temperature: Between -55 and +75 °C

Applied voltage: Within 70 % of the rated voltage

3.3 Notes for Circuit Design

Capacitors with C0G characteristics are suitable for resonant circuits such as oscillators and tuners as their Q values are high and stable against fluctuations of the ambient temperature, operating frequency and voltage. Capacitors with X7R characteristics are suitable for use as bypass and coupling capacitors in high frequency circuits. Both capacitors shall be used under their rated voltages at temperatures within their ambient temperature ranges.

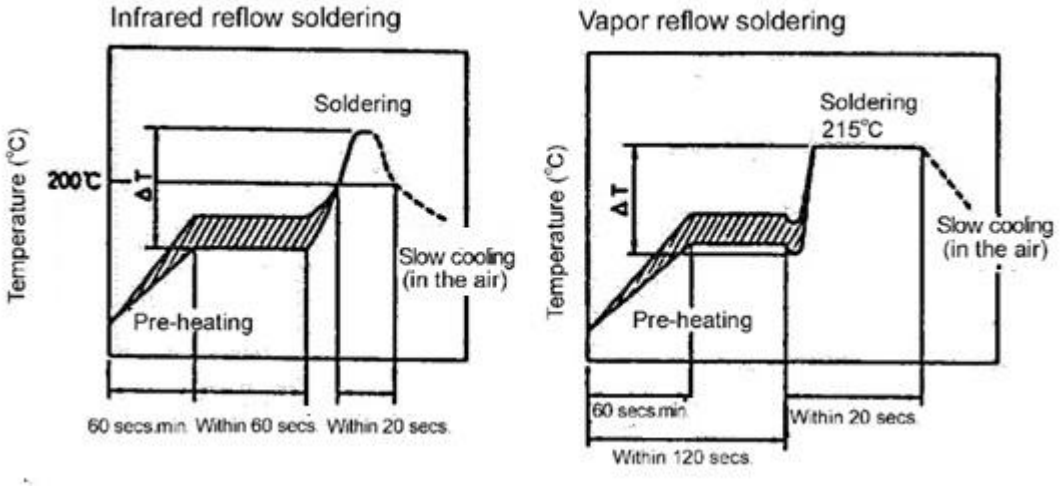
3.4 Recommended Mounting Methods

3.4.1 Notes on Soldering

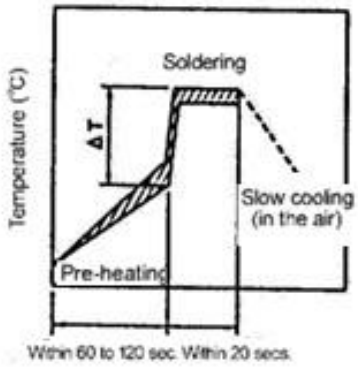
(1) Fluxes shall be selected from those of rosin types with chlorine concentration of 0.2 wt% as a maximum.
(2) Solders shall be selected from those of Sn-Pb types with Sn:Pb ratio 6:4 or 5:5.
(3) Preheating shall be performed prior to soldering to control the temperature differences as shown in the table below. If the temperature difference exceeds the limit, cracks could occur on the ceramic element and reduce the insulation resistance, which could lead to insulation failures and/or short-circuiting.

Chip size	Temperature difference (ΔT)
1608, 2012	Up to 190 °C
3216, 3225, 4532, 5750	Up to 130 °C

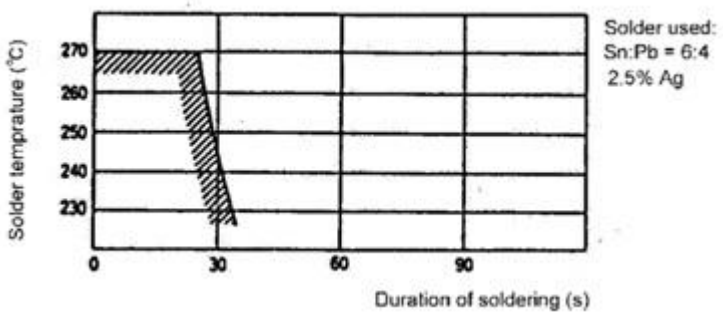
(4) Recommended Soldering Conditions
▪ Reflow soldering



▪ Iron soldering



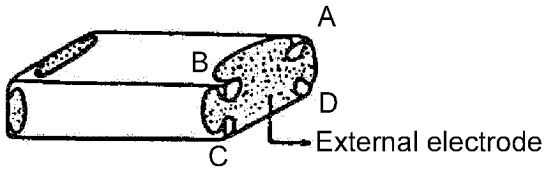
(5) Allowable soldering temperatures and durations



When soldering is repeated, note that the allowable duration is a total of soldering durations. When soldering is repeated in mixed conditions, the allowable duration is a total of normalized soldering durations which offset different soldering conditions.

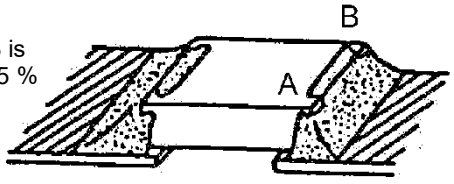
(6) If soldering time is long, verify with a magnifier that dissolution of the electrodes shall not exceed a maximum of 25 % of the perimeter of A-B-C-D face.

Single unit



As the edge of unit soldered on a PWB is partially invisible, 25 % shall be measured within visible area (side A-B).

Unit soldered on PWB



(7) Verify that the applied solder amount (fillet height) is 0.5T of the chip capacitor T dimension as a maximum and provides secure adhesion. The solder amount shall be minimized as much as possible.

(8) After soldering, the capacitors shall be left in room temperature for slow cooling.

4. CHARACTERISTICS UNDER NORMAL CONDITIONS

4.1 Samples (for Terminal finish Y and S)

C0G Precious metal parts

No	Part number	Size	Characteristics	Rated voltage (V)	Capacitance (pF)
1.	N2040/L104-3216C0G1H332J	3216	C0G	50	3,300
2.	N2040/L104-3216C0G2A182J	3216	C0G	100	1,800
3.	N2040/L104-3216C0G2D391J	3216	C0G	200	390

X7R Base metal parts

No	Part number	Size	Characteristics	Rated voltage (V)	Capacitance (pF)
4.	N2040/L104-3225X7R1E105K	3225	X7R	25	1,000,000
5.	N2040/L104-4532X7R1E225K	4532	X7R	25	2,200,000
6.	N2040/L104-5750X7R1H474K	5750	X7R	50	470,000
7.	N2040/L104-5750X7R1H105K	5750	X7R	50	1,000,000
8.	N2040/L104-5750X7R2A224K	5750	X7R	100	220,000
9.	N2040/L104-5750X7R2A474K	5750	X7R	100	470,000
10.	N2040/L104-5750X7R2D224K	5750	X7R	200	220,000
11.	N2040/L104-5750X7R2H104K	5750	X7R	500	100,000

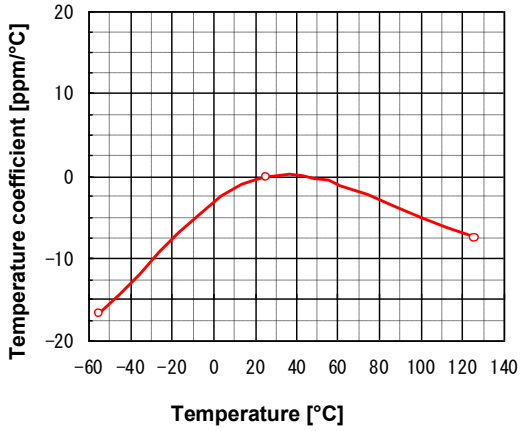
C0G Base metal parts

No	Part number	Size	Characteristics	Rated voltage (V)	Capacitance (pF)
A	N2040/L104N1608C0G1H332J	1608	C0G	50	3,300
B	N2040/L104N2012C0G2A182J	2012	C0G	100	1,800

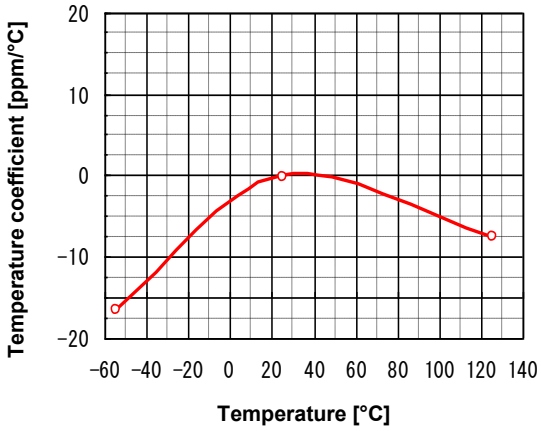
4.2 Electrical Characteristics

[Temperature characteristics]

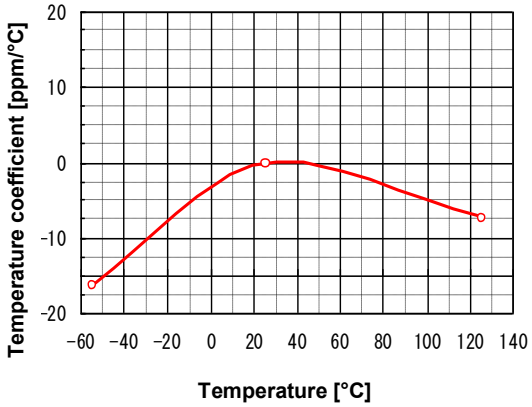
1. N2040/L104-3216C0G1H332J



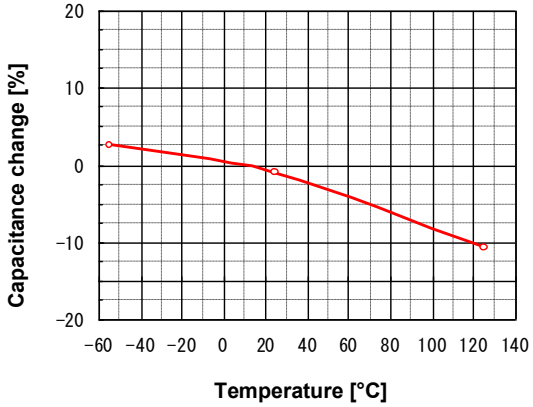
2. N2040/L104-3216C0G2A182J



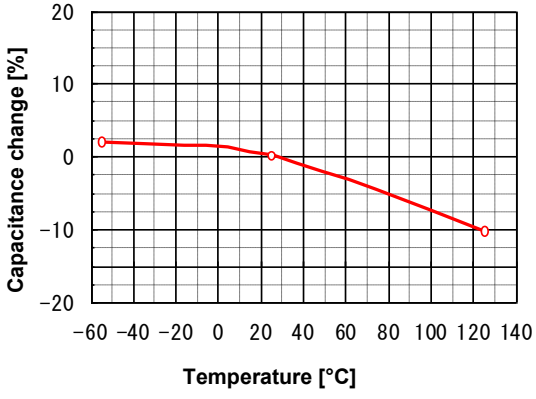
3. N2040/L104-3216C0G2D391J



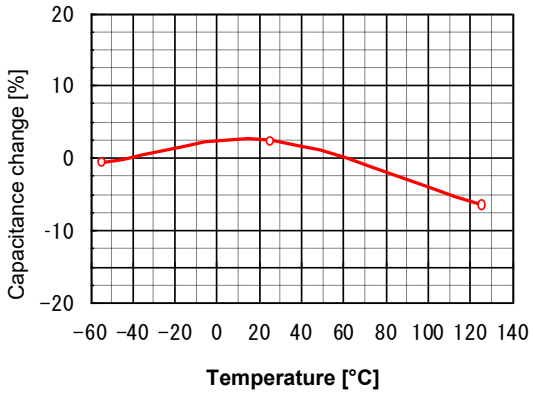
4. N2040/L104-3225X7R1E105K



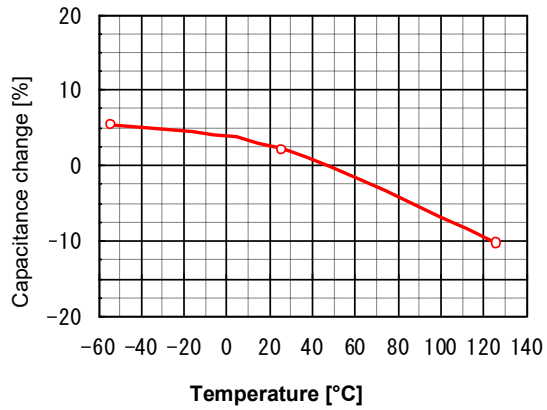
5. N2040/L104-4532X7R1E225K



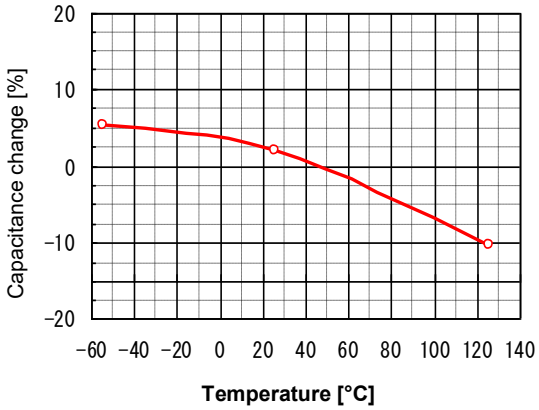
6. N2040/L104-5750X7R1H474K



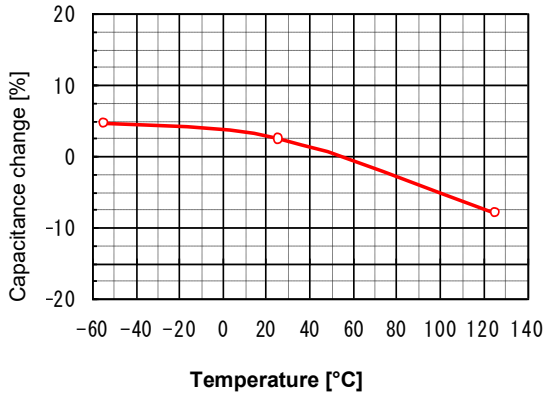
7. N2040/L104-5750X7R1H105K



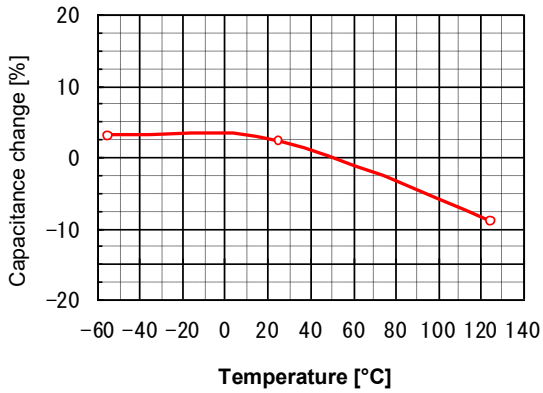
8. N2040/L104-5750X7R2A224K



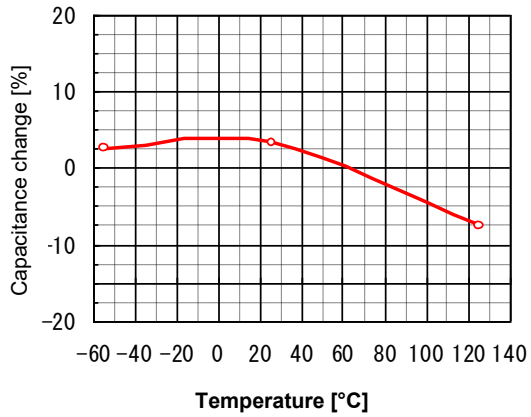
9. N2040/L104-5750X7R2A474K



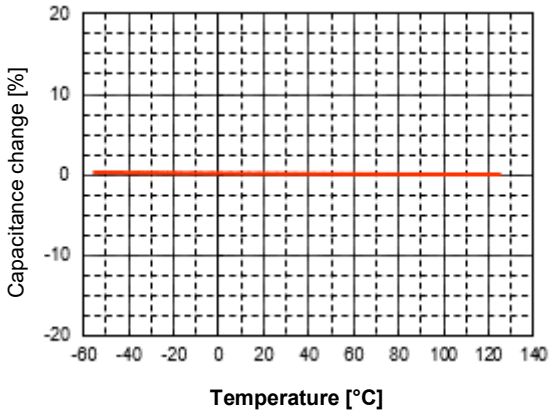
10. N2040/L104-5750X7R2D224K



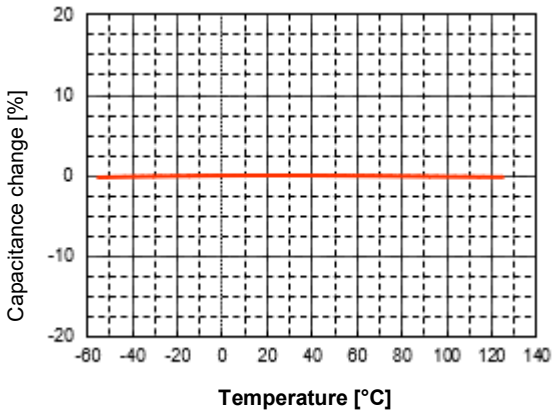
11. N2040/L104-5750X7R2H104K



A. N2040/L104N1608C0G1H332J

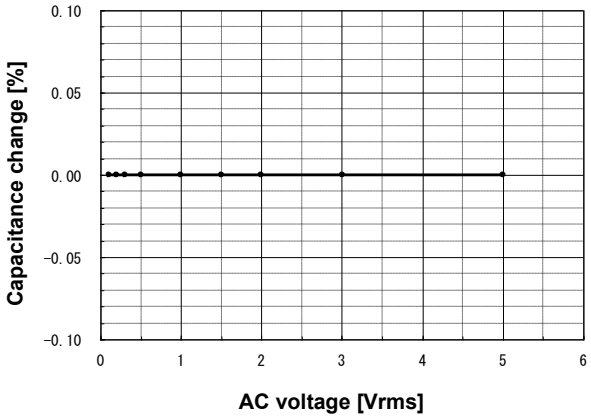


B. N2040/L104N2012C0G2A182J

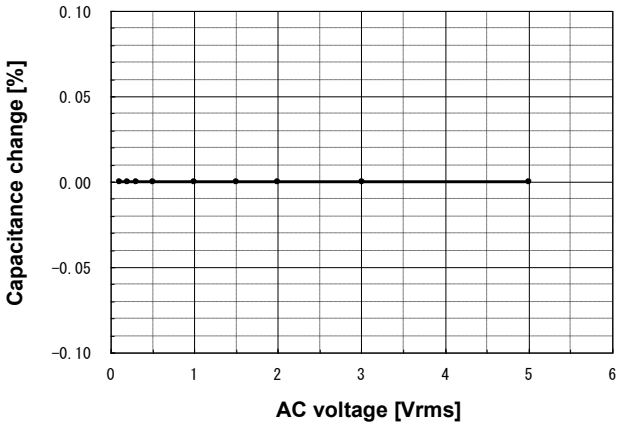


[AC Voltage characteristics]

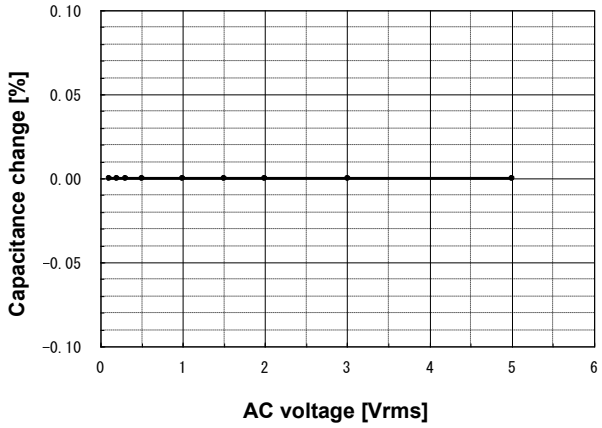
1. N2040/L104-3216C0G1H332J



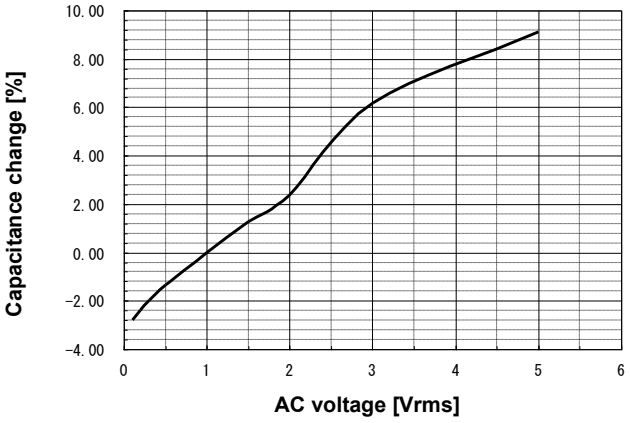
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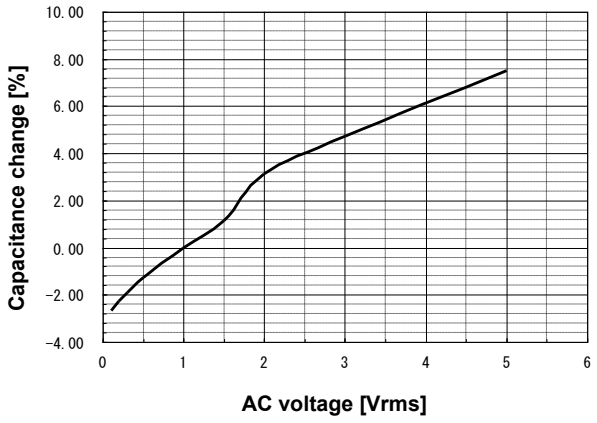
3. N2040/L104-3216C0G2D391J



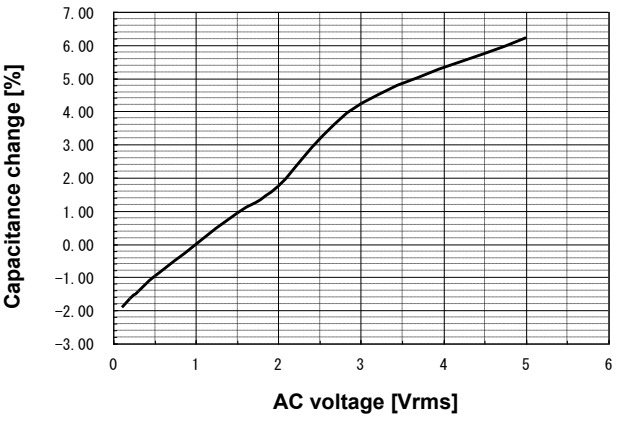
4. N2040/L104-3225X7R1E105K



5. N2040/L104-4532X7R1E225K

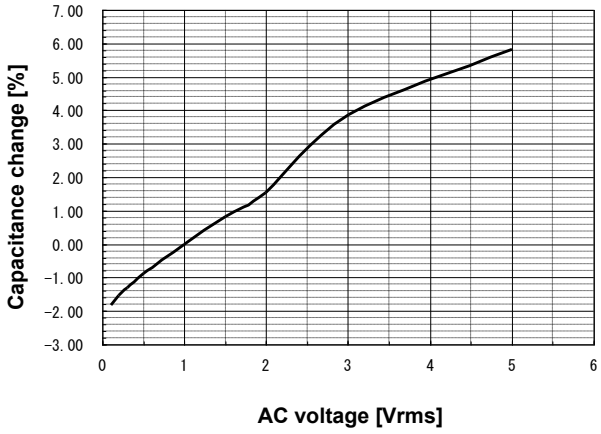


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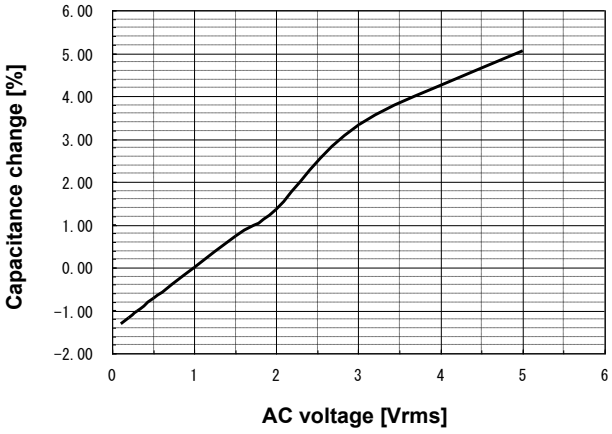


JMCG0-0018-R

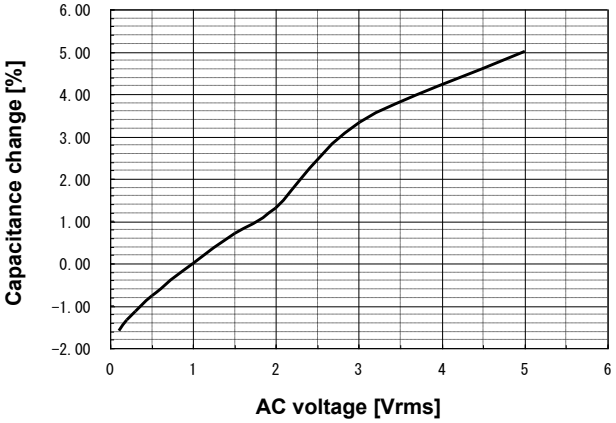
7. N2040/L104-5750X7R1H105K



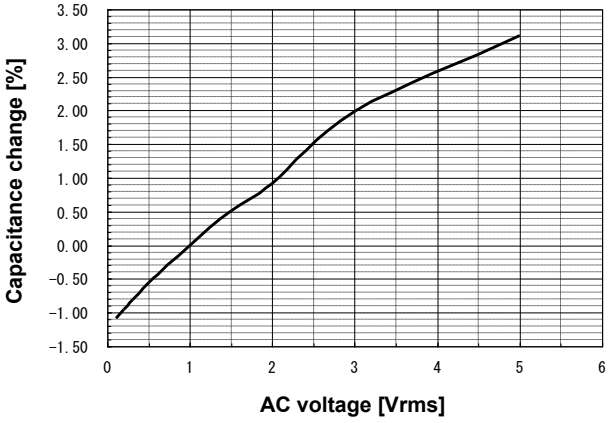
8. N2040/L104-5750X7R2A224K



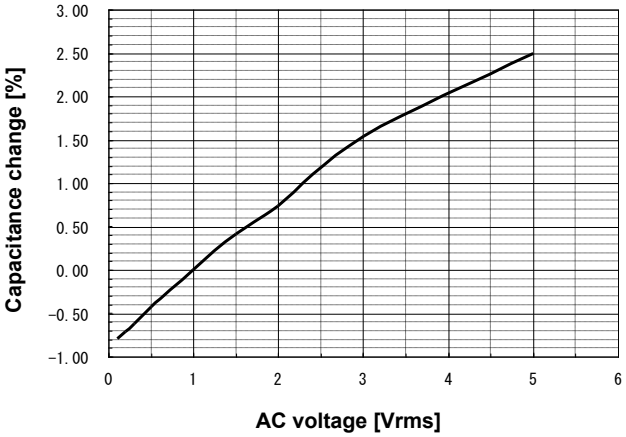
9. N2040/L104-5750X7R2A474K



10. N2040/L104-5750X7R2D224K

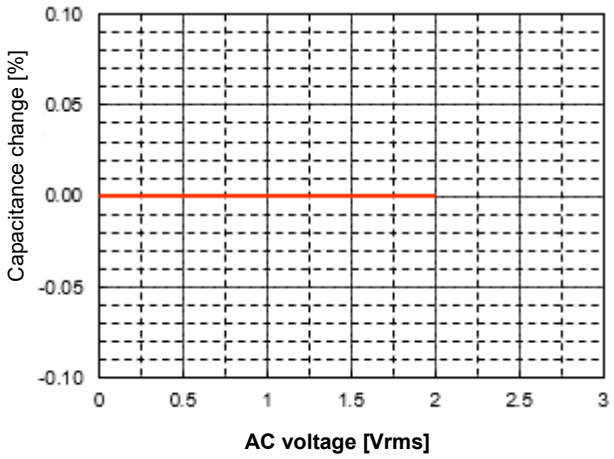


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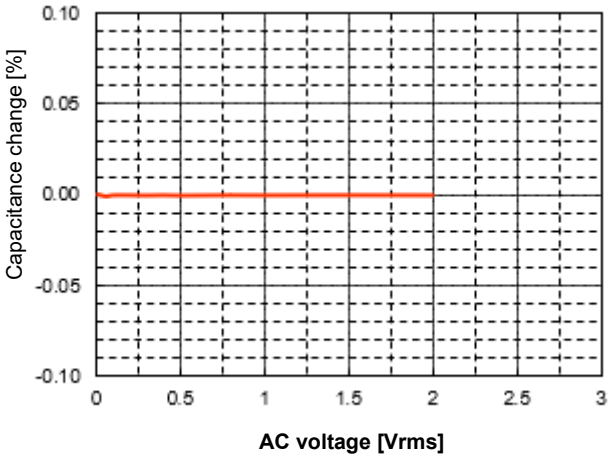


JMCG0-0018-R

A.N2040/L104N1608C0G1H332J

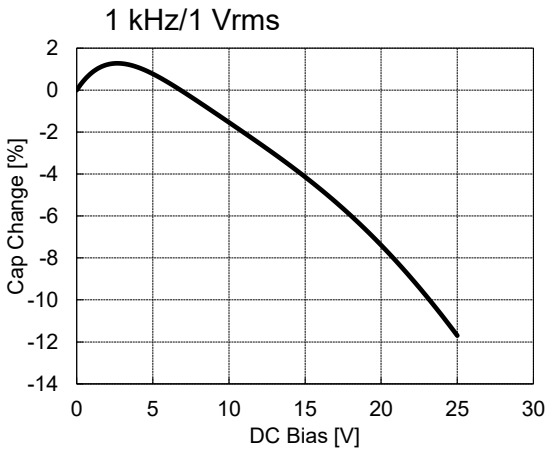


B.N2040/L104N2012C0G2A182J

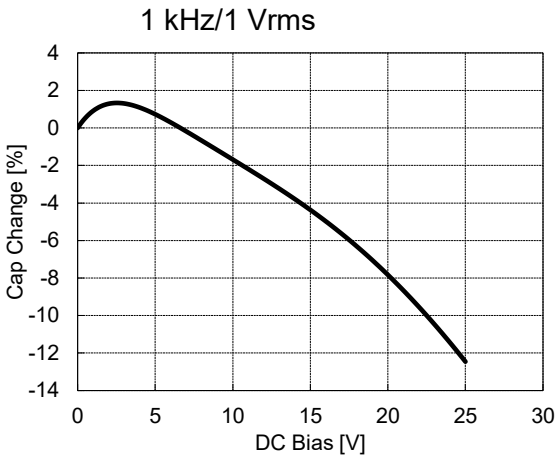


【DC Bias Characteristics】

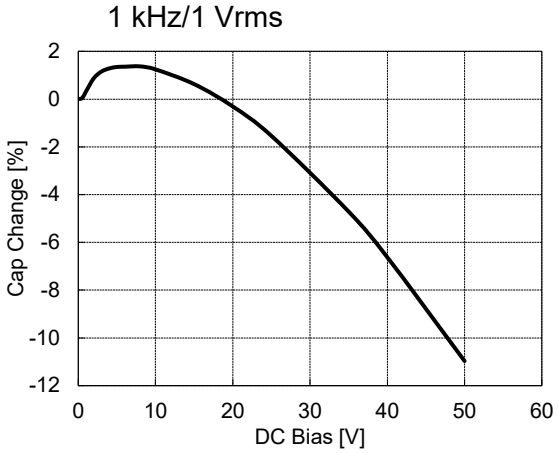
4. N2040/L104-3225X7R1E105K



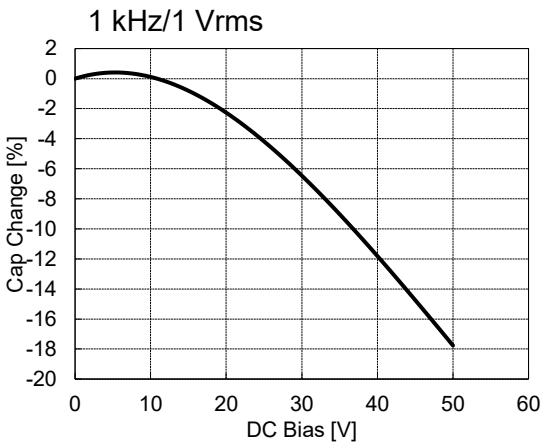
5. N2040/L104-4532X7R1E225K



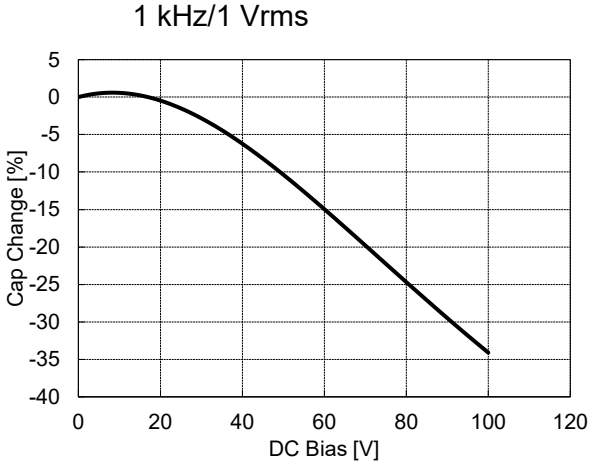
6. N2040/L104-5750X7R1H474K



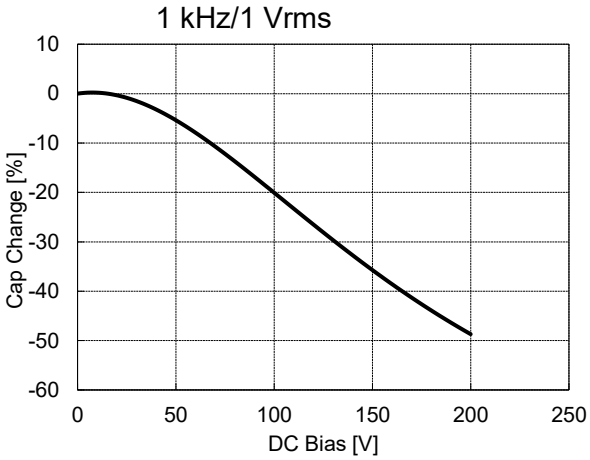
7. N2040/L104-5750X7R1H105K



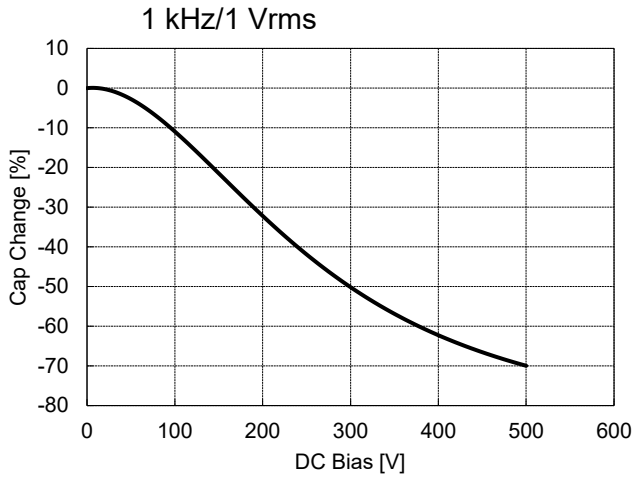
9. N2040/L104-5750X7R2A474K



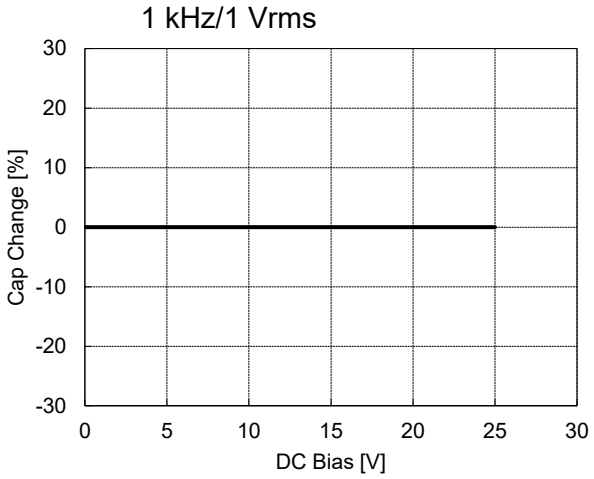
10. N2040/L104-5750X7R2D224K



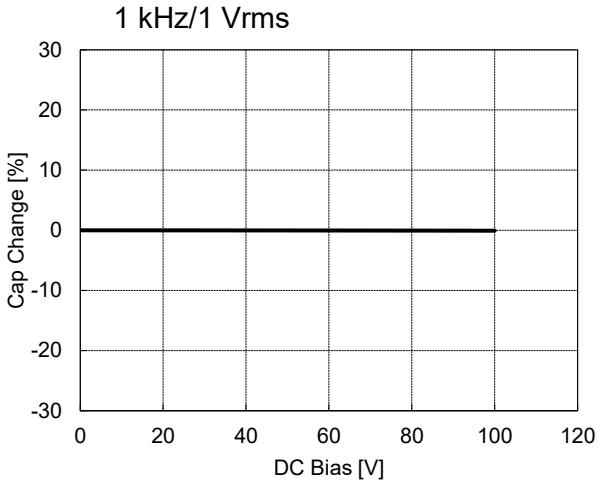
11. N2040/L104-5750X7R2H104K



A.N2040/L104N1608C0G1H332J



B.N2040/L104N2012C0G2A182J



4.3 Mechanical and Thermal Characteristics

[Mechanical characteristics]

Item	Requirement paragraph (1)	Test method paragraph (1)	No. of defectives/ sample size	
			X7R base metal C0G precious metal	C0G base metal
Shear (destructive)	L3.9.1	L4.4.8.1	0/5	0/6
Substrate bending	L3.9.3	L4.4.8.3	0/10	0/10
Solderability	L3.9.4	L4.4.8.4	0/6	0/4
Resistance to soldering heat	L3.9.5	L4.4.8.5	0/9	0/4

Note: (1) Indicates the paragraph number of Appendix L, JAXA-QTS-2040F.

[Environmental characteristics]

Item	Requirement paragraph (1)	Test method paragraph (1)	No. of defectives/ sample size	
			X7R base metal C0G precious metal	C0G base metal
Random vibration	L3.10.1	L4.4.9.1	0/10	0/10
Shock	L3.10.2	L4.4.9.2	0/10	0/10
Thermal shock (I)	L3.10.3	L4.4.9.3	0/18	0/18
Thermal shock and immersion cycling	L3.10.5	L4.4.9.5	0/18	0/18
Moisture resistance	L3.10.6	L4.4.9.6	0/9	0/12
Humidity, steady state, low voltage	L3.10.7	L4.4.9.7	0/12	0/12
Barometric pressure (reduced)	L3.10.8	L4.4.9.8	0/6	—

Note: (1) Indicates the paragraph number of Appendix L, JAXA-QTS-2040F.

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[Durability characteristic]

Item	Requirement paragraph (1)	Test method paragraph (1)	No. of defectives/ sample size	
			X7R base metal C0G precious metal	C0G base metal
Life	L.3.11.1	L4.4.10.1 (test condition) 125 °C, 1WV, 4000hrs	0/159	—
		L4.4.10.1 (test condition) 125 °C, 2WV, 4000hrs	0/175	0/246

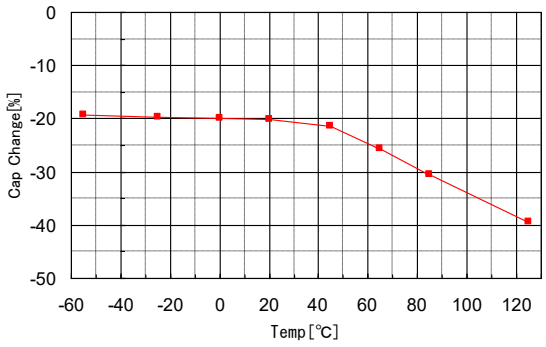
Note: (1) Indicates the paragraph number of Appendix L, JAXA-QTS-2040F.

5. CHARACTERISTICS UNDER VARIOUS OPERATING ENVIRONMENTAL CONDITIONS

[Voltage–temperature characteristics]

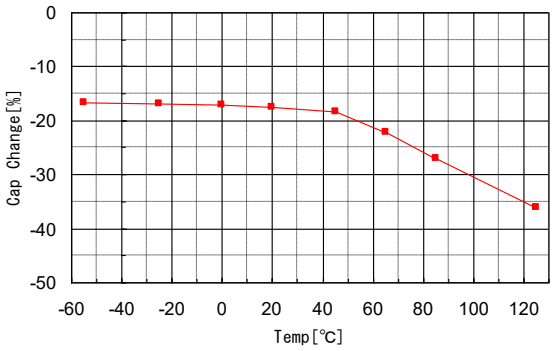
4. N2040/L104-3225X7R1E105K

Voltage applied: 25 V



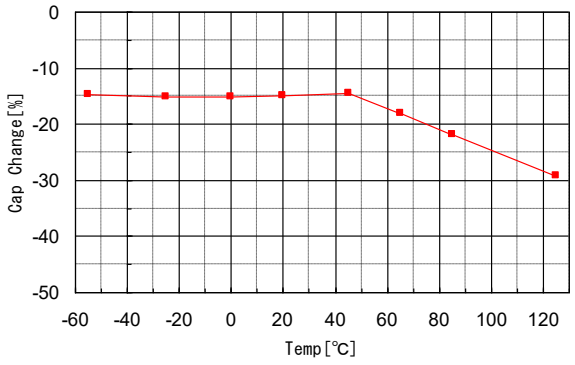
5. N2040/L104-4532X7R1E225K

Voltage applied: 25 V



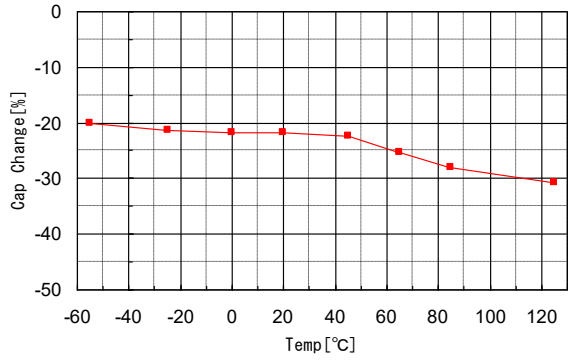
6. N2040/L104-5750X7R1H474K

Voltage applied: 50 V



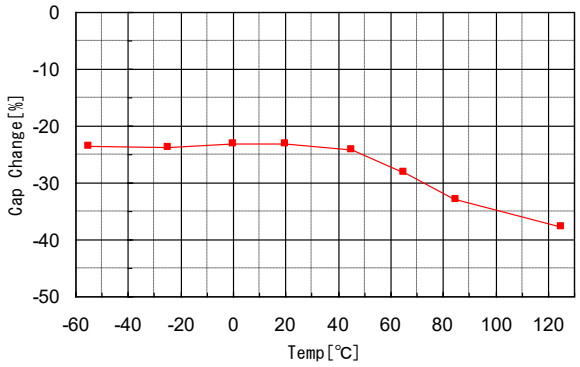
7. N2040/L104-5750X7R1H105K

Voltage applied: 50 V



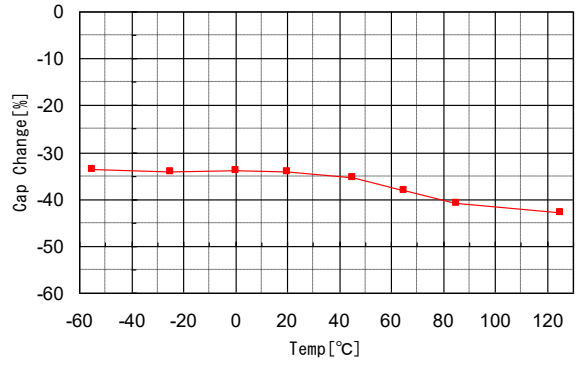
8. N2040/L104-5750X7R2A224K

Voltage applied: 100 V



9. N2040/L104-5750X7R2A474K

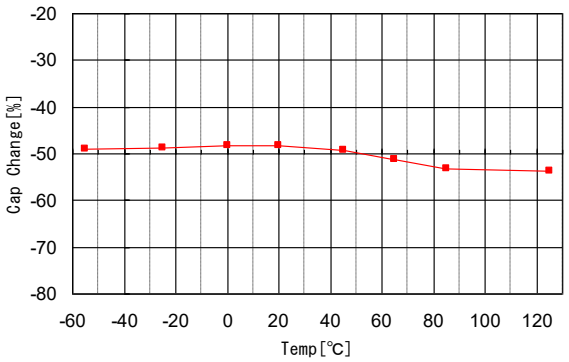
Voltage applied: 100 V



JMCG0-0018-R

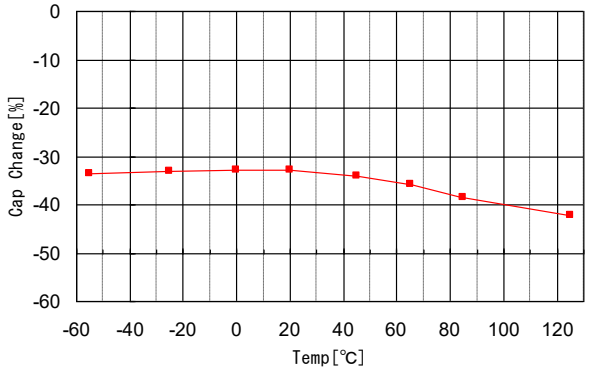
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Voltage applied: 200 V



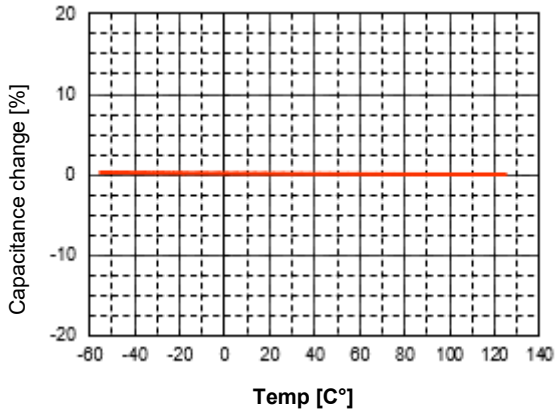
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Voltage applied: 500 V



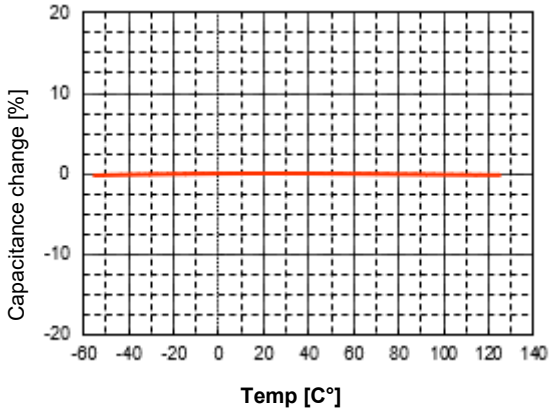
A.N2040/L104N1608C0G1H332J

Voltage applied: 50 V



B. N2040/L104N2012C0G2A182J

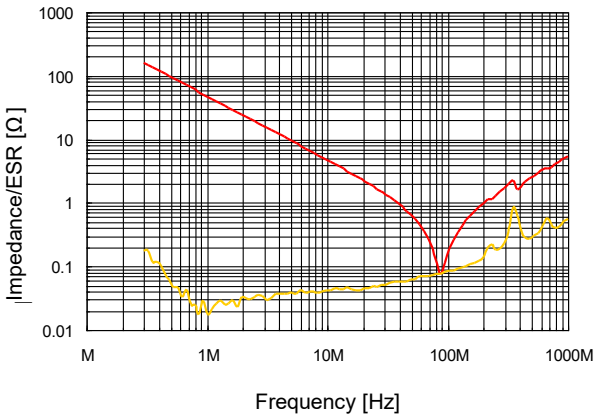
Voltage applied: 100 V



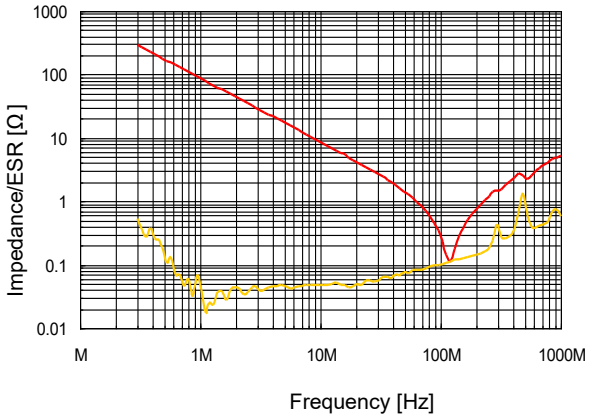
JMCG0-0018-R

[Input/output characteristics] Red line: Impedance-frequency characteristic
yellow line: ESR-frequency characteristic

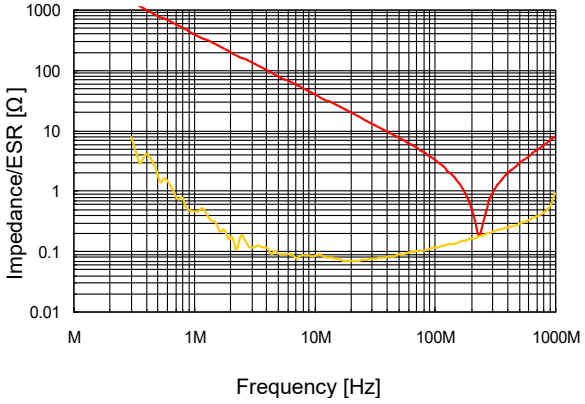
1. N2040/L104-3216C0G1H332J



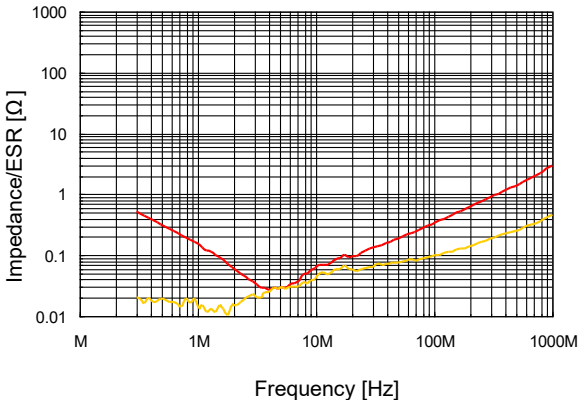
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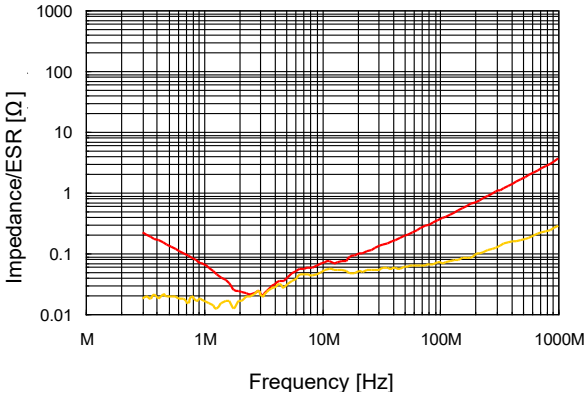
3. N2040/L104-3216C0G2D391J



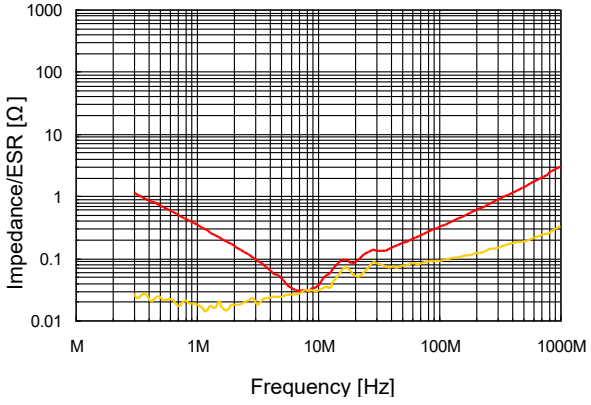
4. N2040/L104-3225X7R1E105K



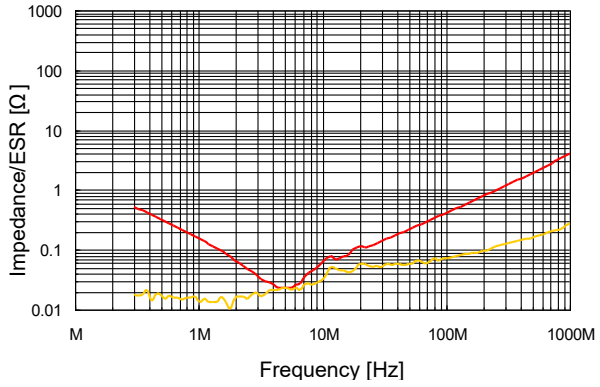
5. N2040/L104-4532X7R1E225K



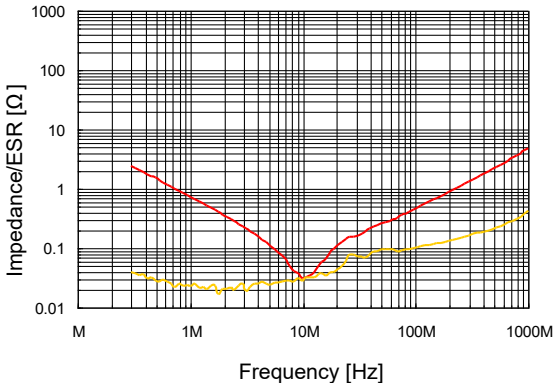
6. N2040/L104-5750X7R1H474K



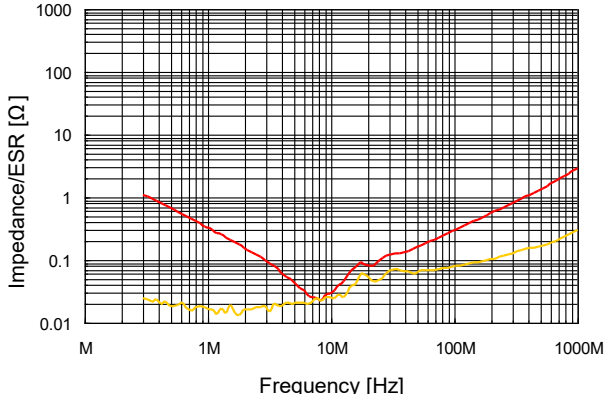
7. N2040/L104-5750X7R1H105K



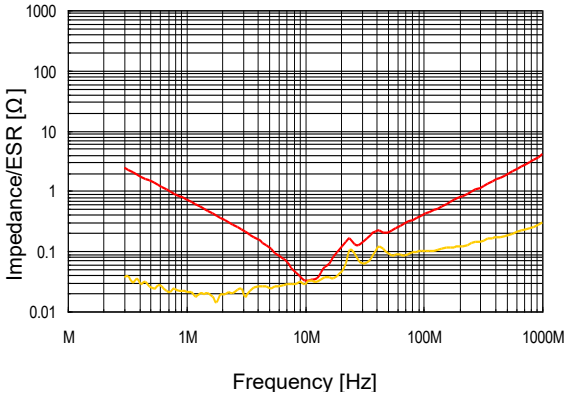
8. N2040/L104-5750X7R2A224K



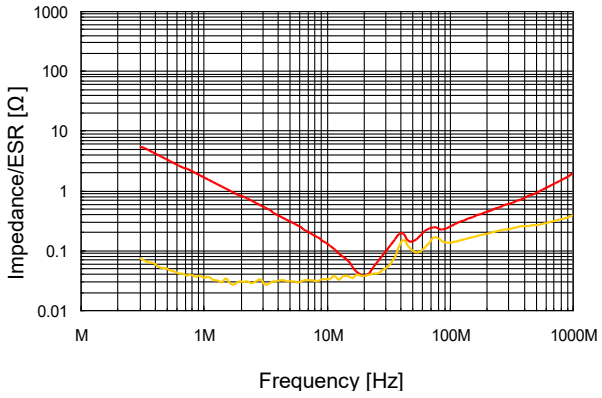
9. N2040/L104-5750X7R2A474K



10. N2040/L104-5750X7R2D224K

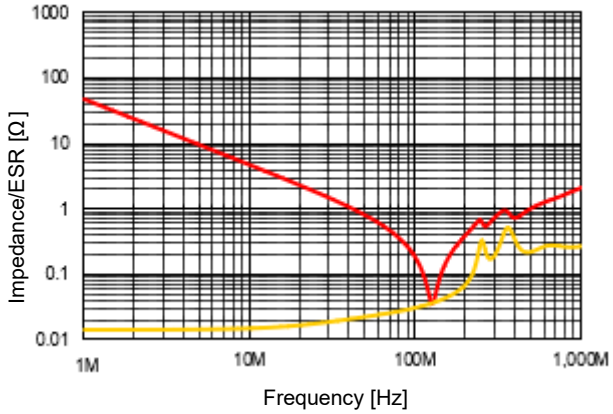


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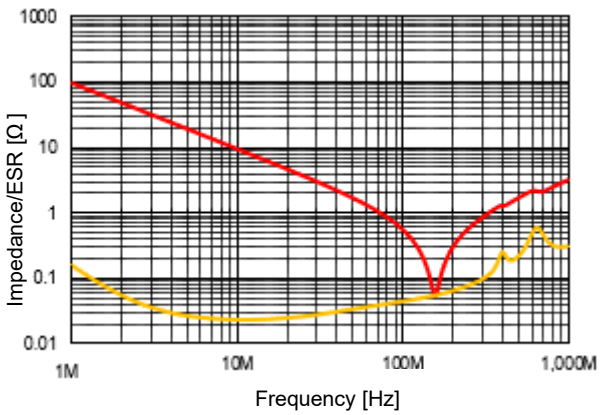


JMCG0-0018-R

A.N2040/L104N1608C0G1H332J



B. N2040/L104N2012C0G2A182J



Random vibration

No.	Part number	No. of defectives/sample size
1.	N2040/L104-3216C0G1H332J	0/10
2.	N2040/L104-3216C0G2A182J	0/10
3.	N2040/L104-3216C0G2D391J	0/10
4.	N2040/L104-3225X7R1E105K	0/10
5.	N2040/L104-4532X7R1E225K	0/10
6.	N2040/L104-5750X7R1H474K	0/10
7.	N2040/L104-5750X7R1H105K	0/10
8.	N2040/L104-5750X7R2A224K	0/10
9.	N2040/L104-5750X7R2A474K	0/10
10.	N2040/L104-5750X7R2D224K	0/10
11.	N2040/L104-5750X7R2H104K	0/10
A	N2040/L104N1608C0G1H332J	0/10
B	N2040/L104N2012C0G2A182J	0/10

*There is no intermittent contact, open, or short for the duration of 0.1 ms or longer.

Shock

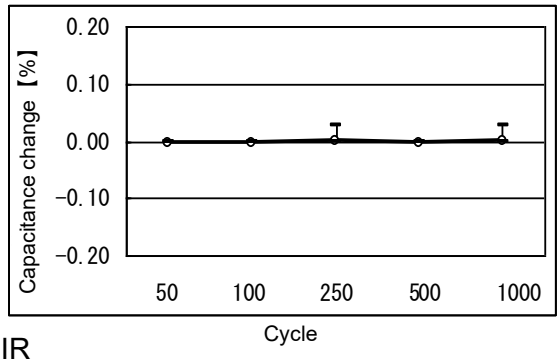
No.	Part number	No. of defectives/sample size
1.	N2040/L104-3216C0G1H332J	0/10
2.	N2040/L104-3216C0G2A182J	0/10
3.	N2040/L104-3216C0G2D391J	0/10
4.	N2040/L104-3225X7R1E105K	0/10
5.	N2040/L104-4532X7R1E225K	0/10
6.	N2040/L104-5750X7R1H474K	0/10
7.	N2040/L104-5750X7R1H105K	0/10
8.	N2040/L104-5750X7R2A224K	0/10
9.	N2040/L104-5750X7R2A474K	0/10
10.	N2040/L104-5750X7R2D224K	0/10
11.	N2040/L104-5750X7R2H104K	0/10
A	N2040/L104N1608C0G1H332J	0/10
B	N2040/L104N2012C0G2A182J	0/10

*There is no intermittent contact, open, or short for the duration of 0.1 ms or longer.

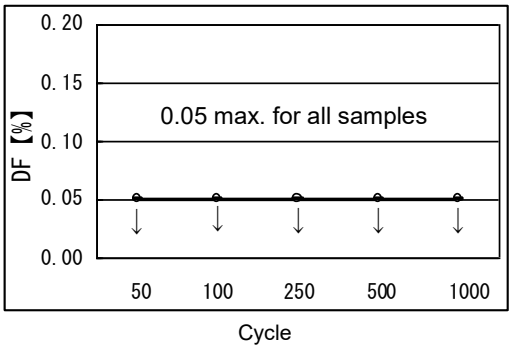
[Drifts in environmental tests] – Thermal shock test (I)

1. N2040/L104-3216C0G1H332J

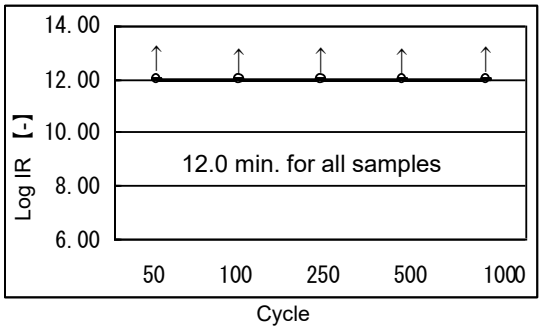
ΔC



DF

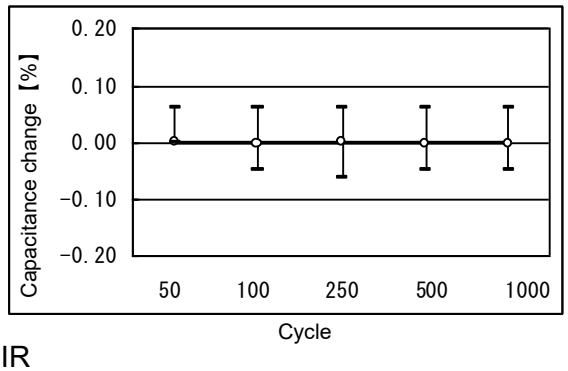


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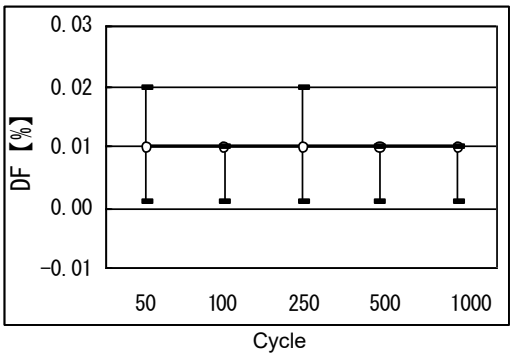


2. N2040/L104-3216C0G2A182J

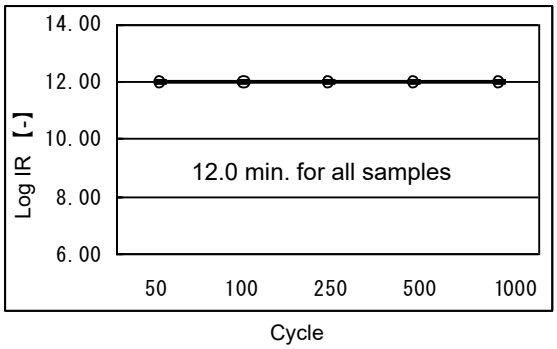
ΔC



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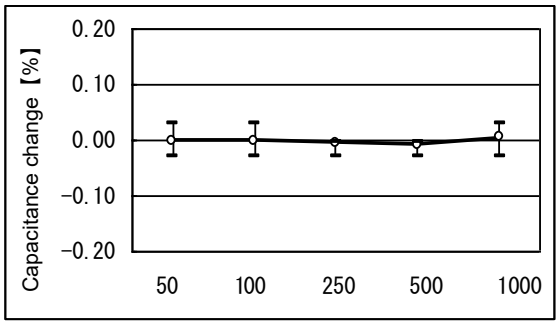


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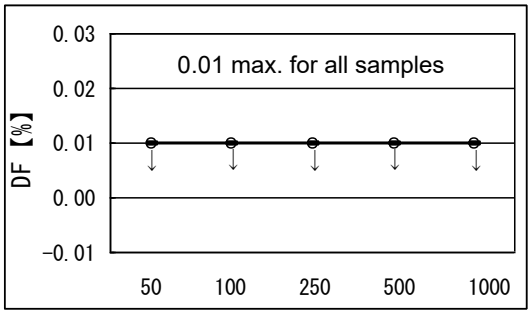


3. N2040/L104-3216C0G2D391J

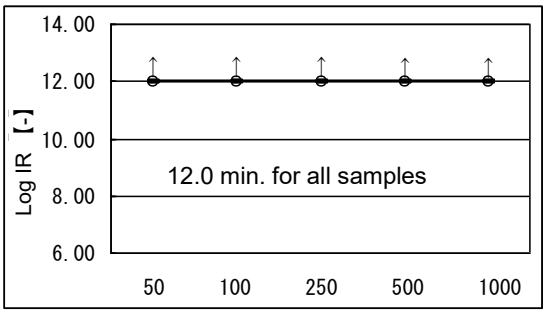
ΔC



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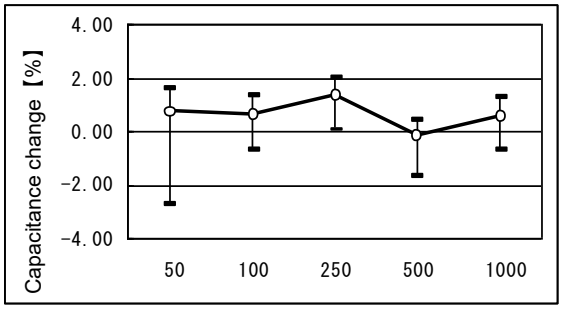


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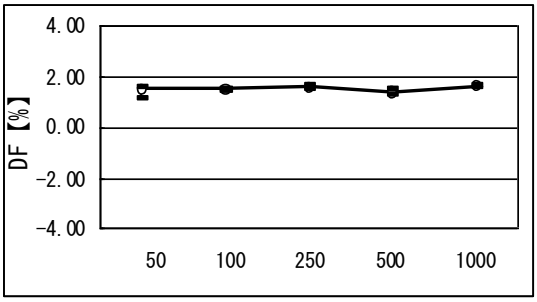


4. N2040/L104-3225X7R1E105K

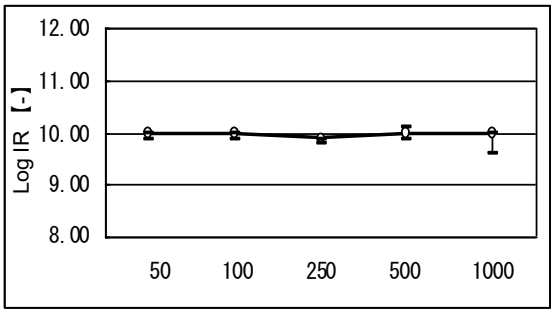
ΔC



DF

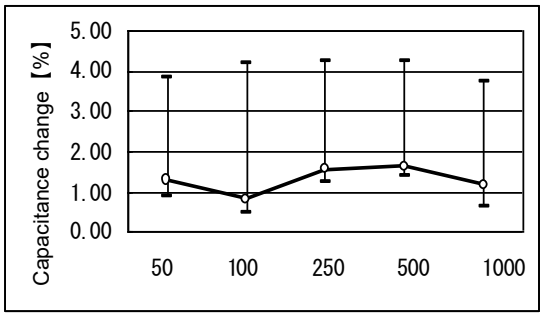


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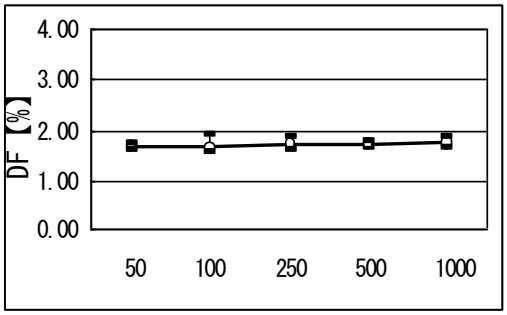


5. N2040/L104-4532X7R1E225K

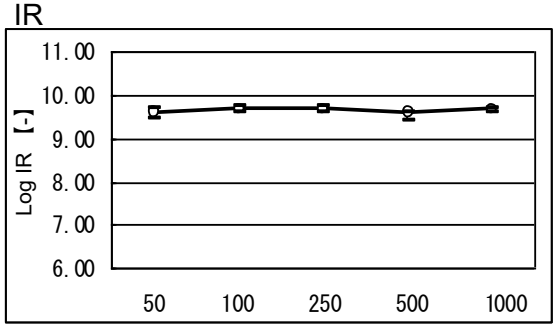
ΔC



DF

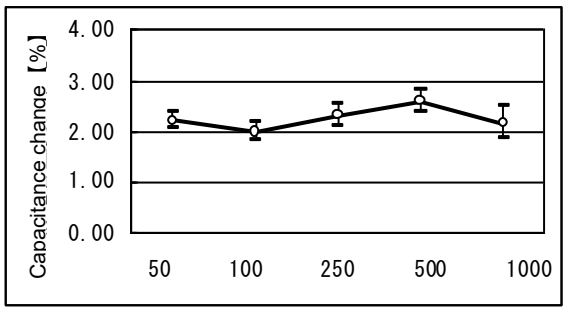


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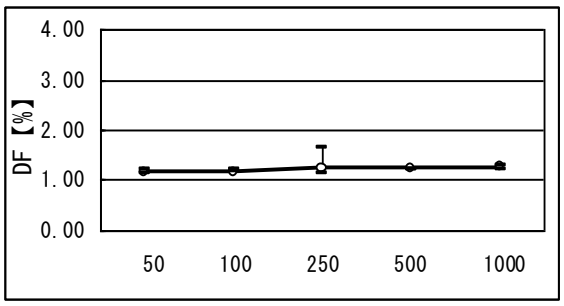


6. N2040/L104-5750X7R1H474K

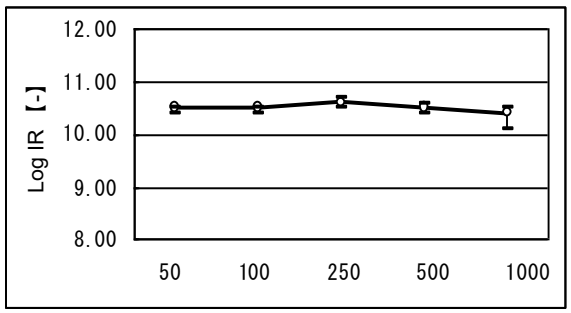
ΔC



DF

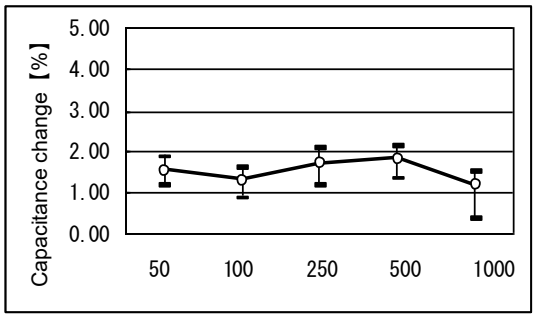


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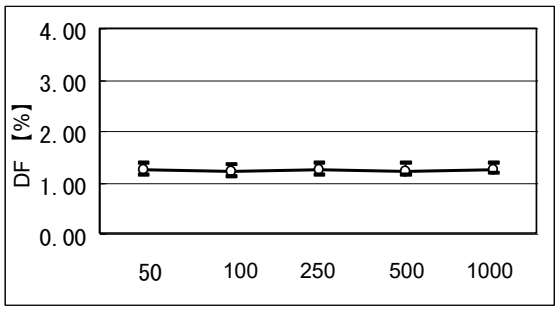


7. N2040/L104-5750X7R1H105K

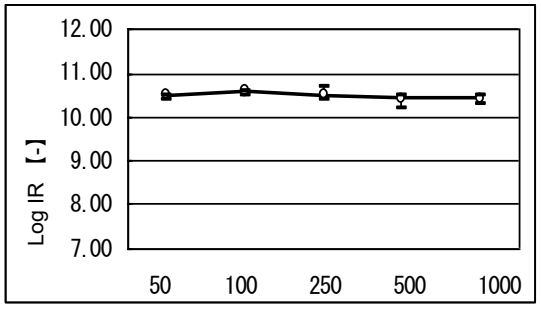
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DF

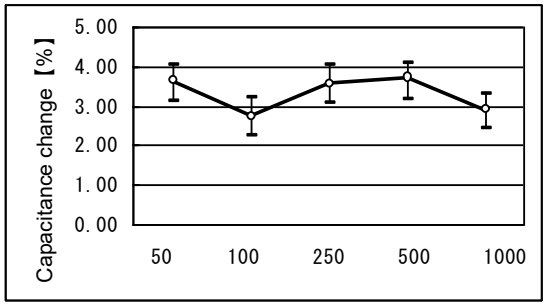


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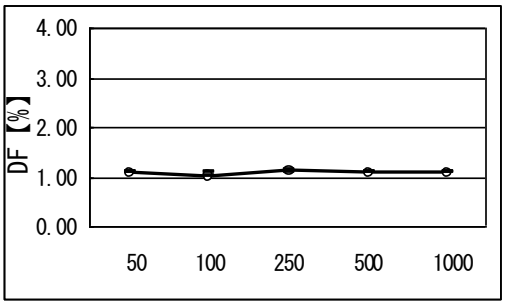


8. N2040/L104-5750X7R2A224K

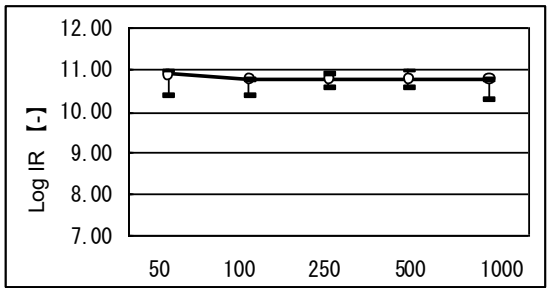
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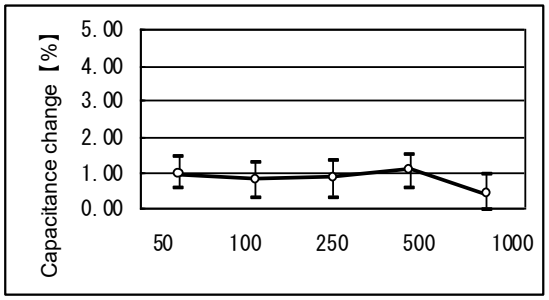


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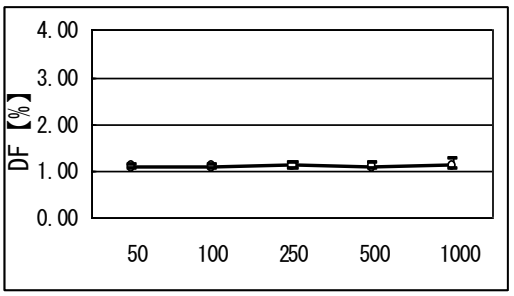


9. N2040/L104-5750X7R2A474K

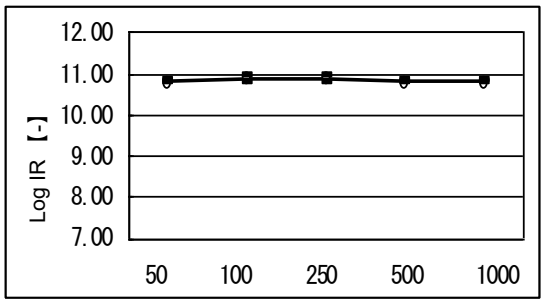
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DF

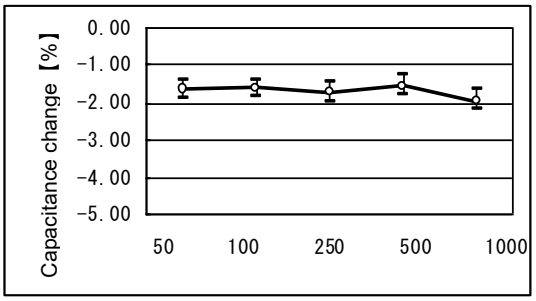


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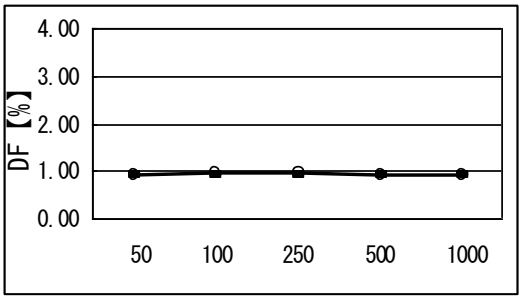


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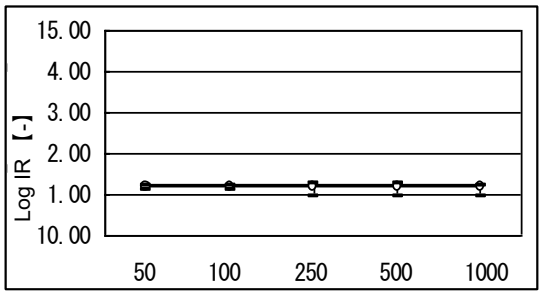
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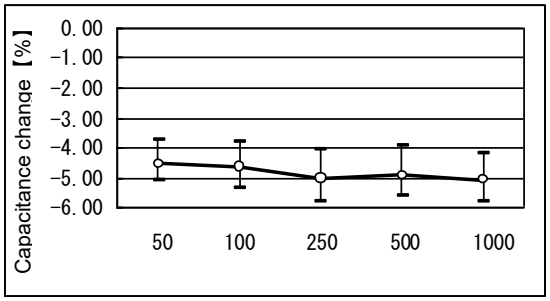


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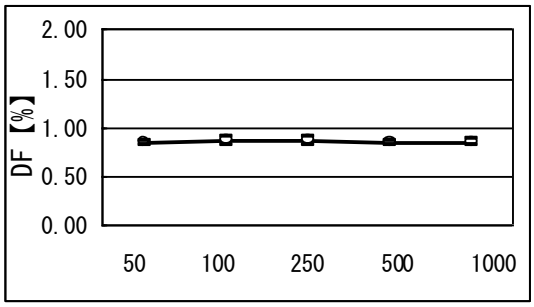


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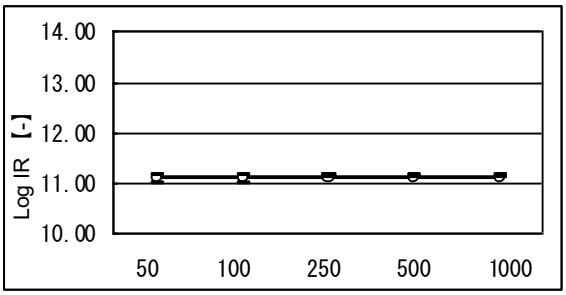
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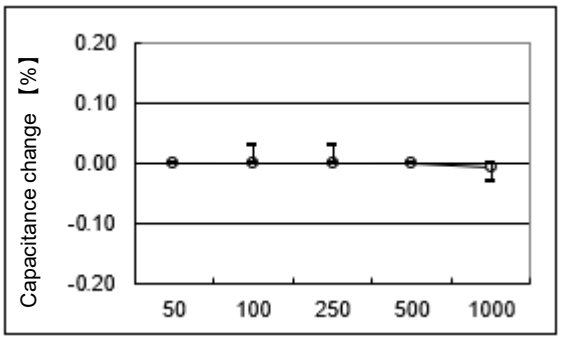


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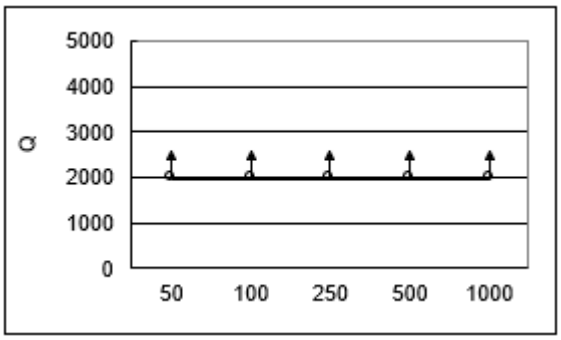


A.N2040/L104N1608C0G1H332J

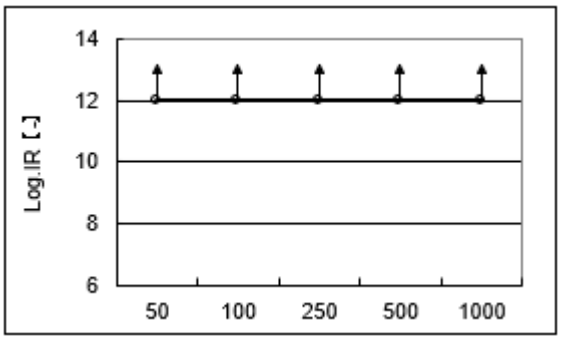
ΔC



Q

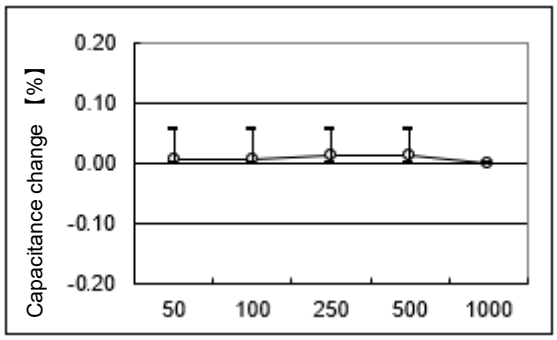


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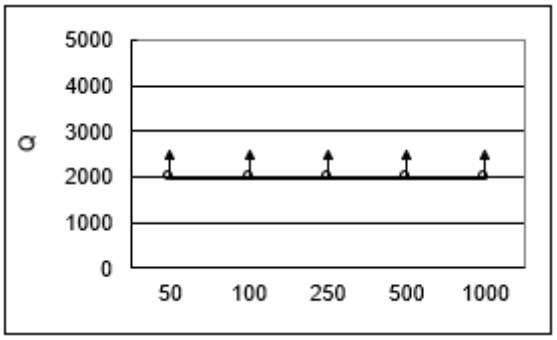


B. N2040/L104N2012C0G2A182J

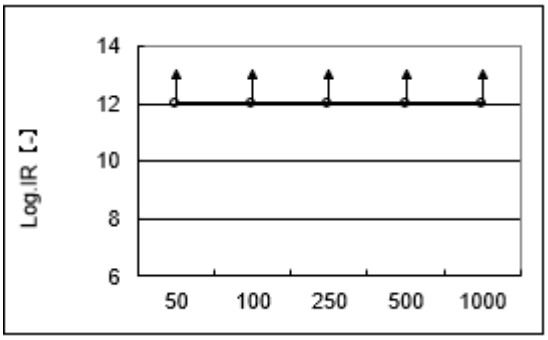
ΔC



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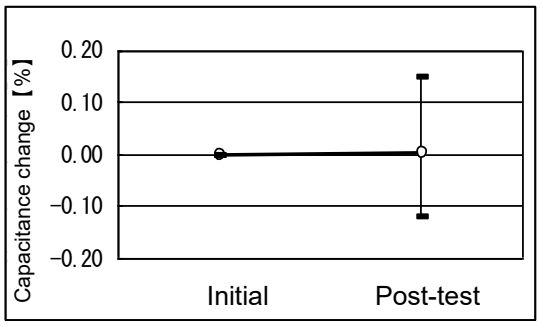
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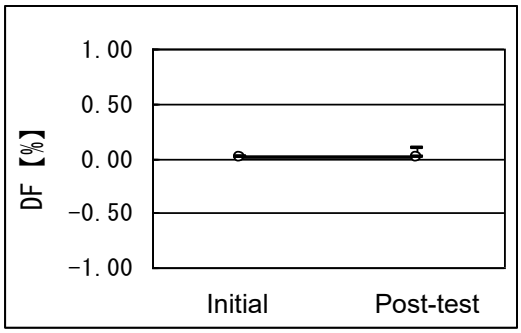
[Drifts in environmental tests] – Thermal shock and immersion cycling

1. N2040/L104-3216C0G1H332J

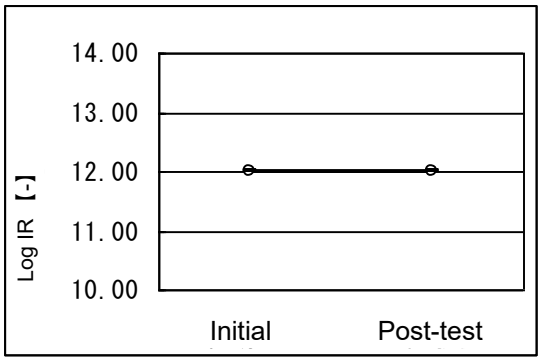
ΔC



DF

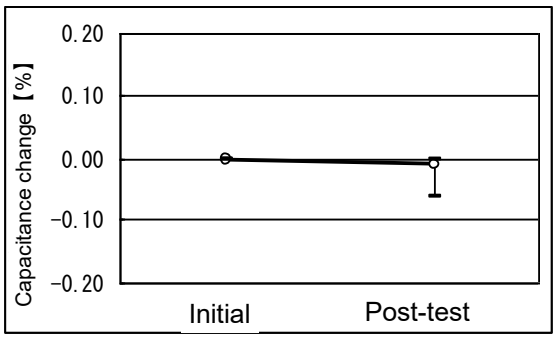


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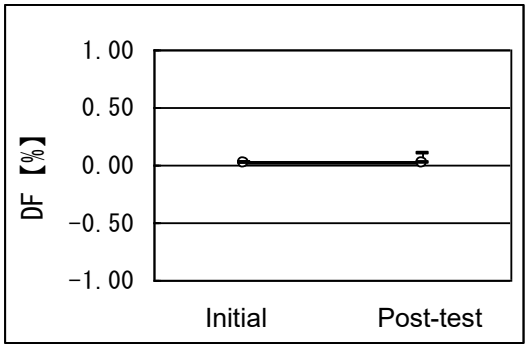


2. N2040/L104-3216C0G2A182J

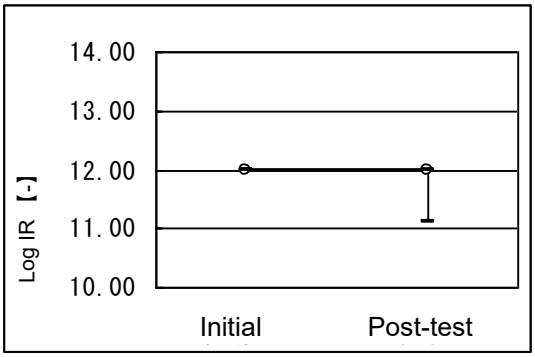
ΔC



DF

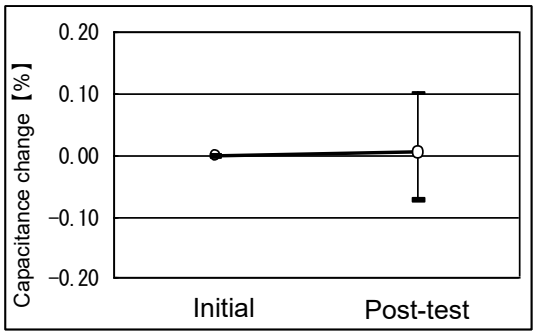


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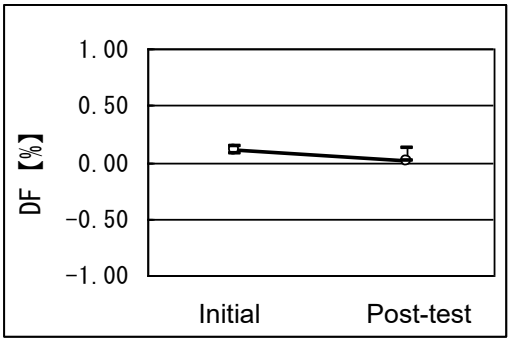


3. N2040/L104-3216C0G2D391J

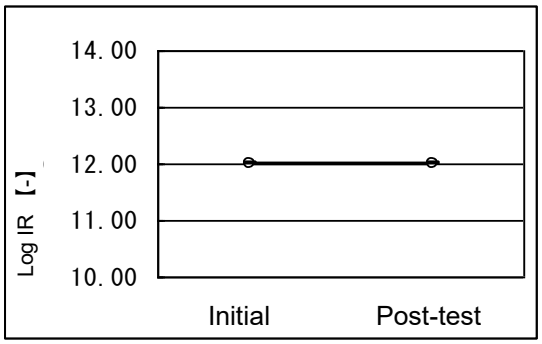
ΔC



DF

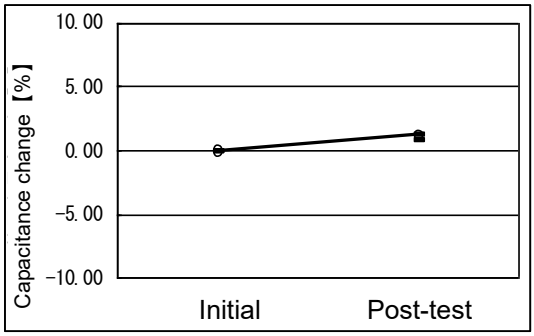


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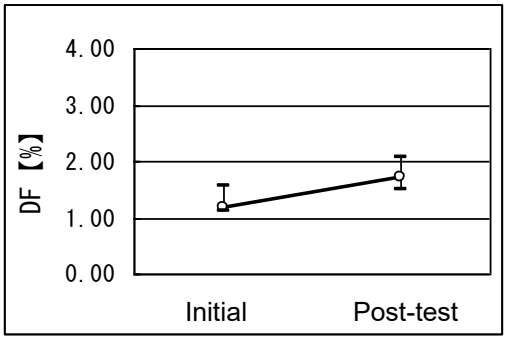


4. N2040/L104-3225X7R1E105K

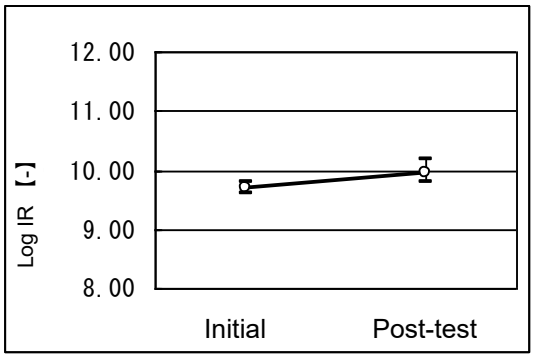
ΔC



DF

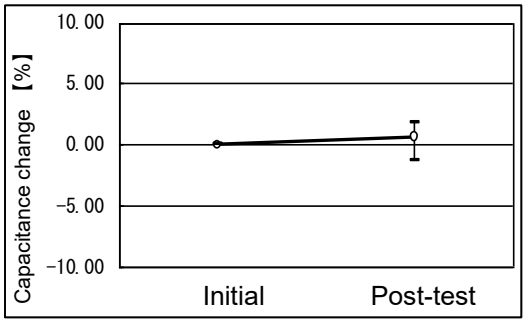


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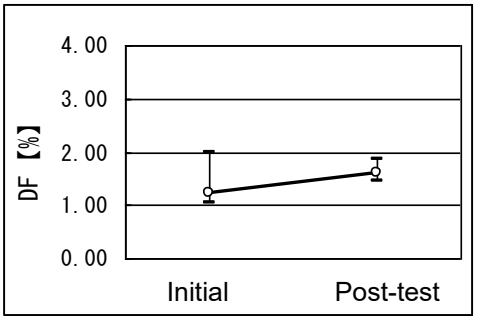


5. N2040/L104-4532X7R1E225K

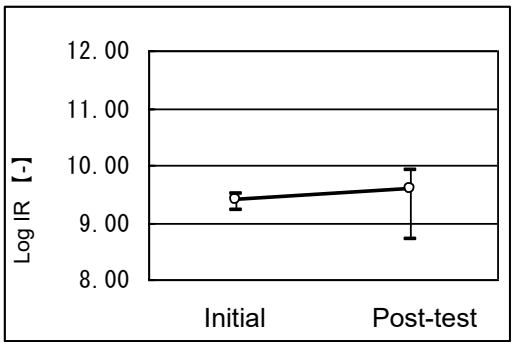
ΔC



DF

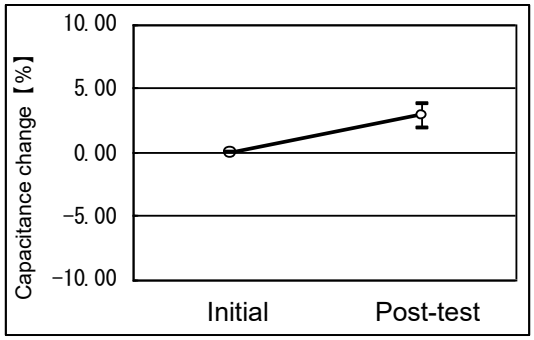


IR

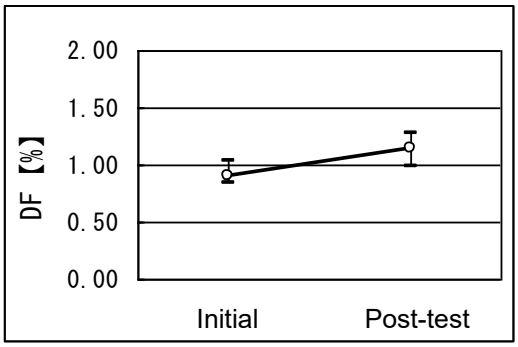


6. N2040/L104-5750X7R1H474K

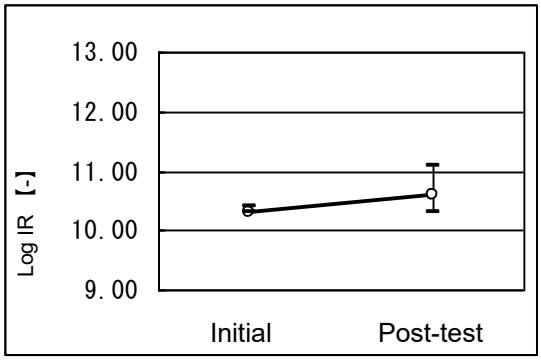
ΔC



DF

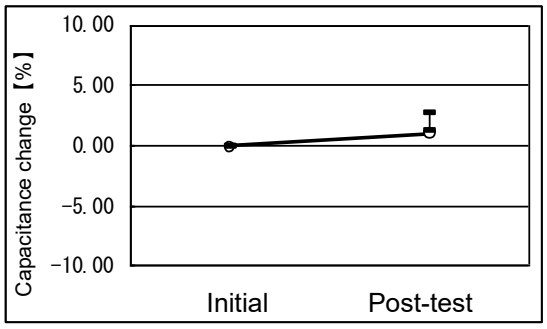


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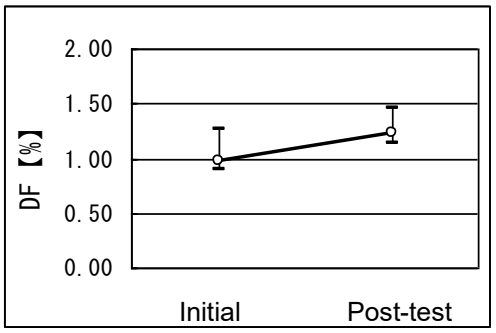


7. N2040/L104-5750X7R1H105K

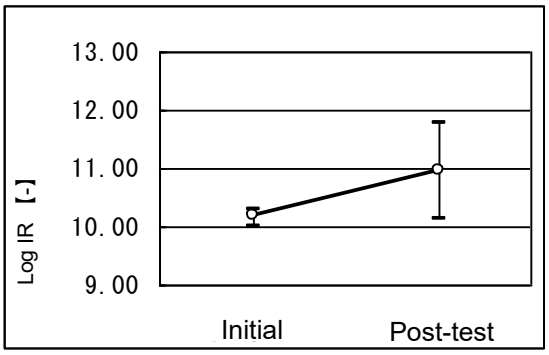
ΔC



DF

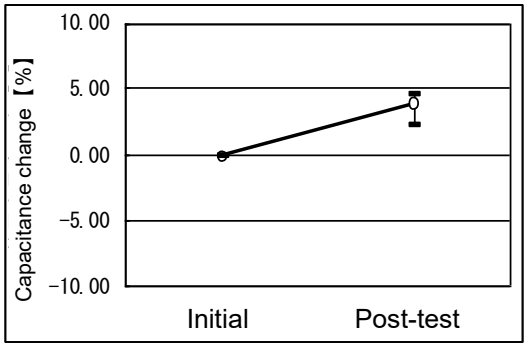


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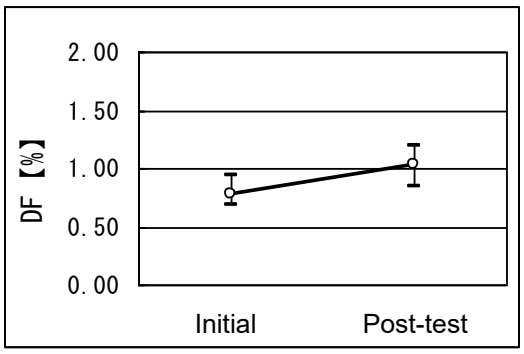


8. N2040/L104-5750X7R2A224K

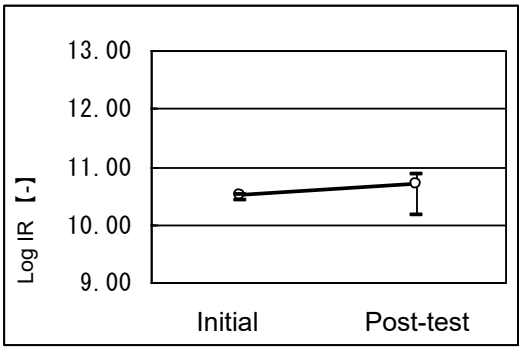
ΔC



DF

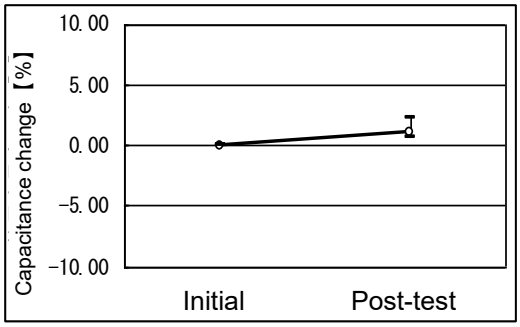


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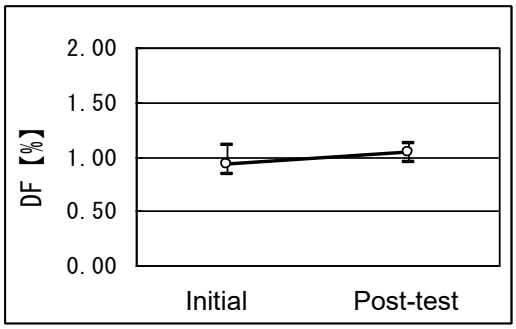


9. N2040/L104-5750X7R2A474K

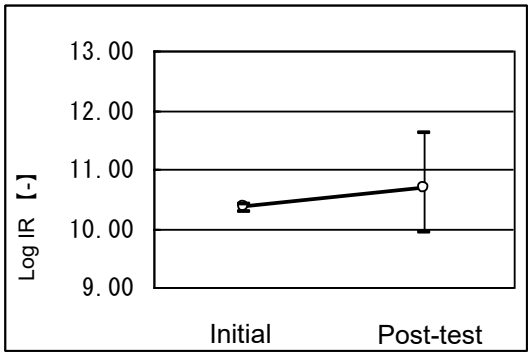
ΔC



DF

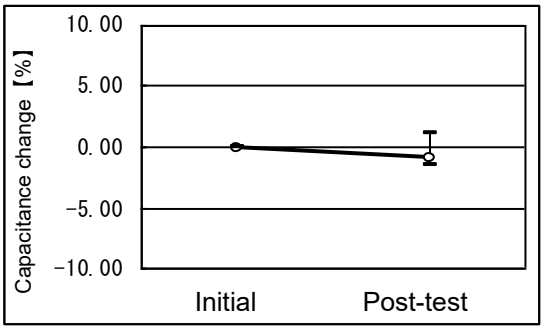


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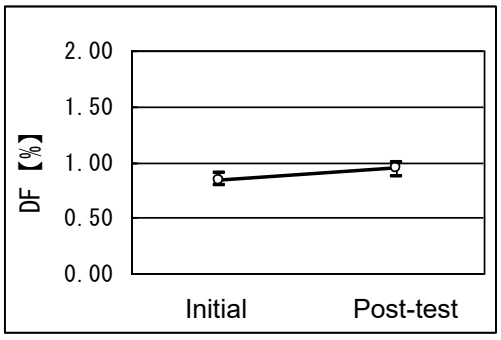


10. N2040/L104-5750X7R2D224K

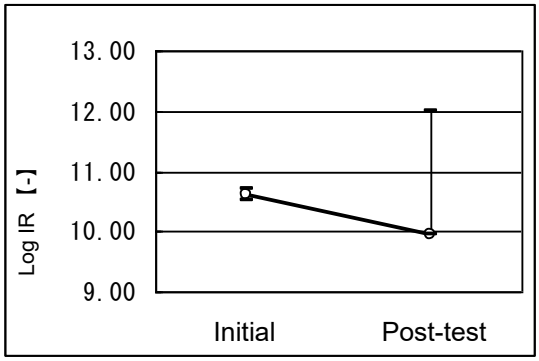
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DF

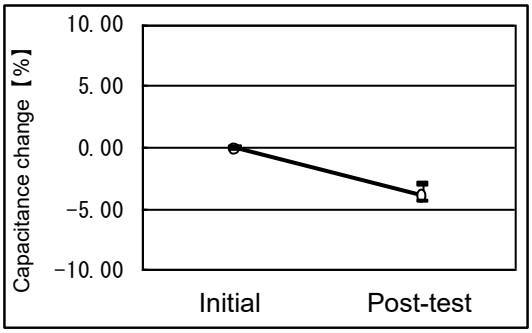


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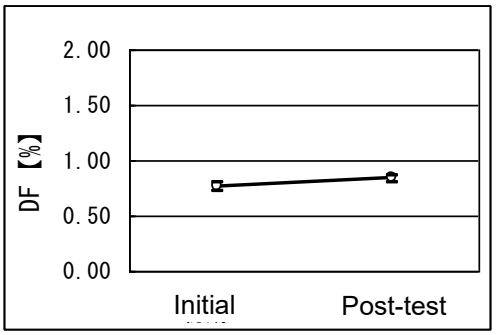


11. N2040/L104-5750X7R2H104K

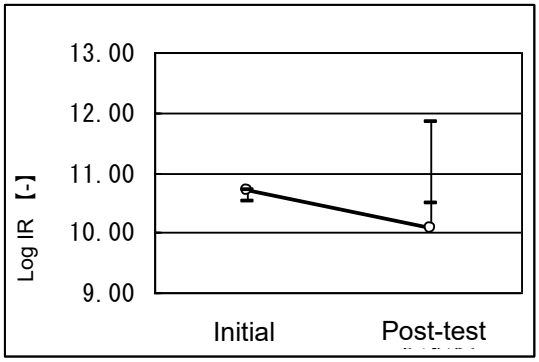
ΔC



DF

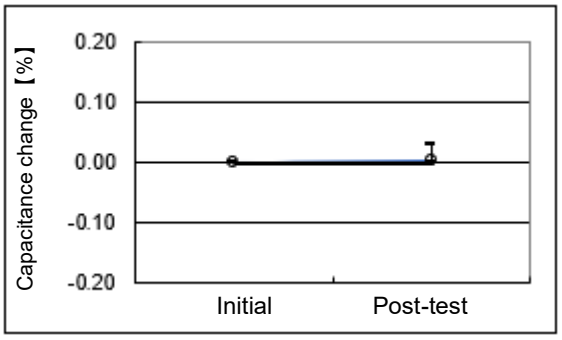


IR

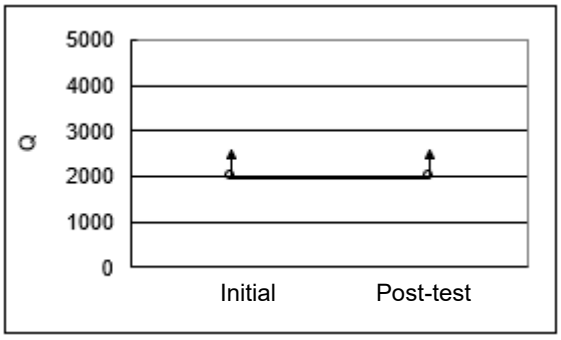


A.N2040/L104N1608C0G1H332J

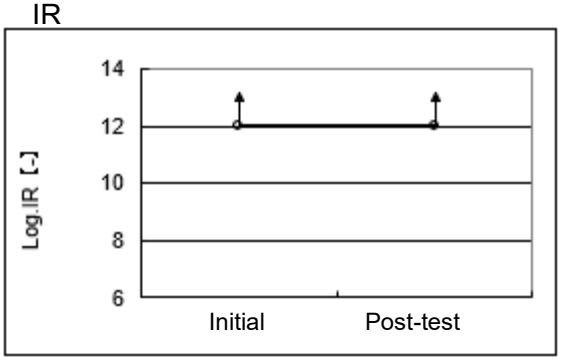
ΔC



Q

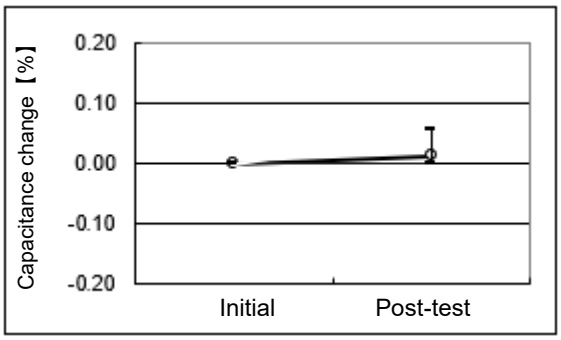


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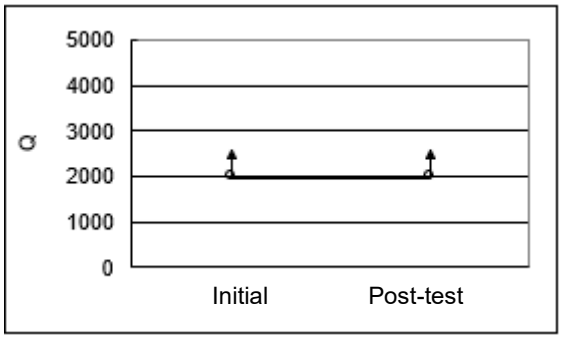


B. N2040/L104N2012C0G2A182J

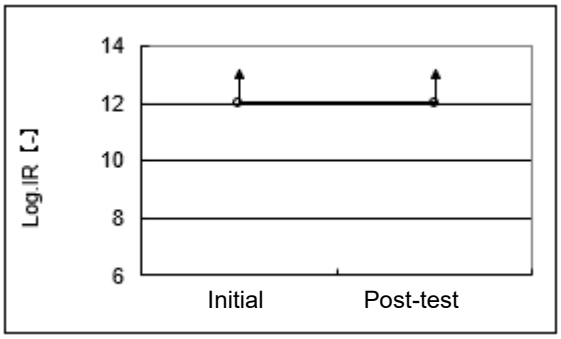
ΔC



Q



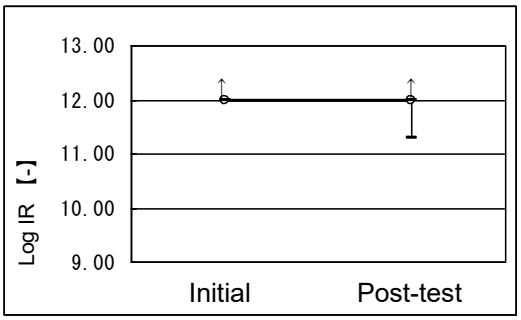
IR



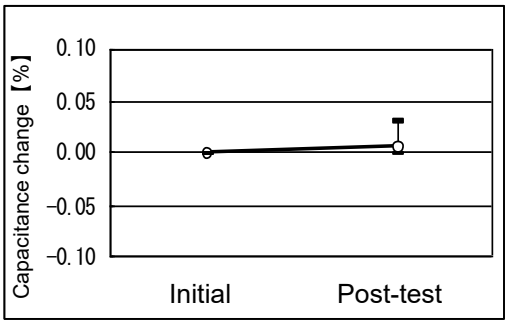
[Drifts in environmental tests] – Moisture resistance

1. N2040/L104-3216C0G1H332J

IR

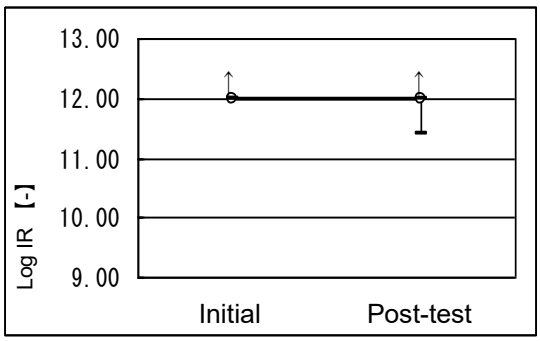


ΔC

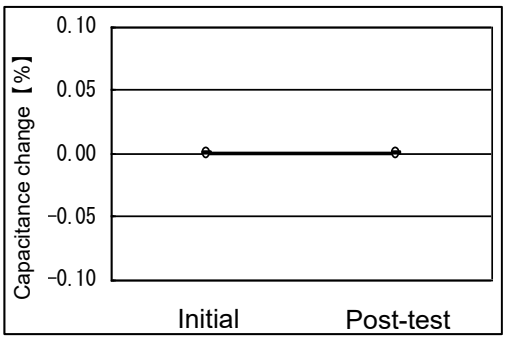


2. N2040/L104-3216C0G2A182J

IR

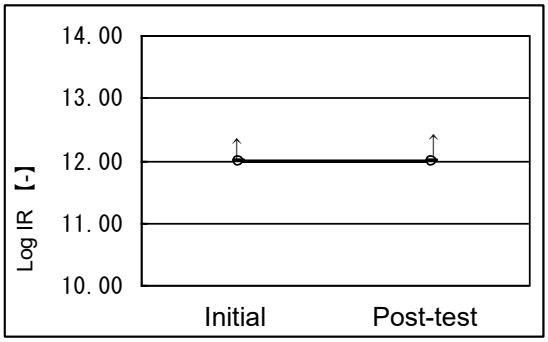


ΔC

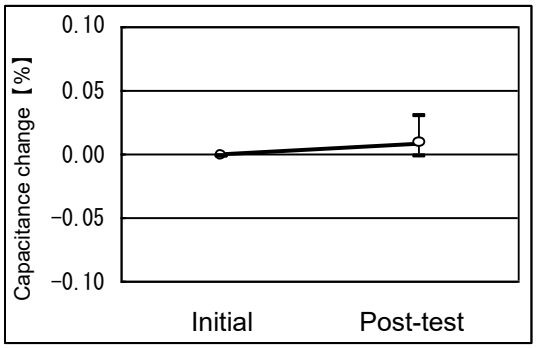


3. N2040/L104-3216C0G2D391J

IR

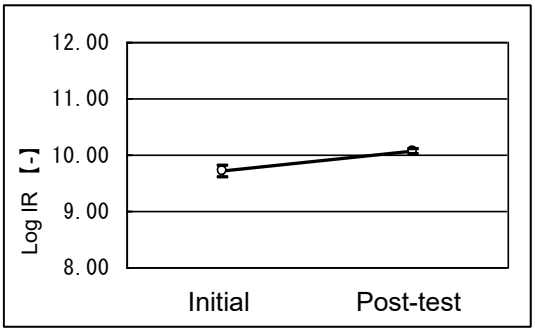


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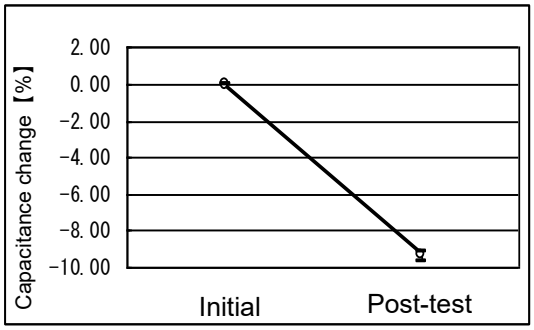


4. N2040/L104-3225X7R1E105K

IR

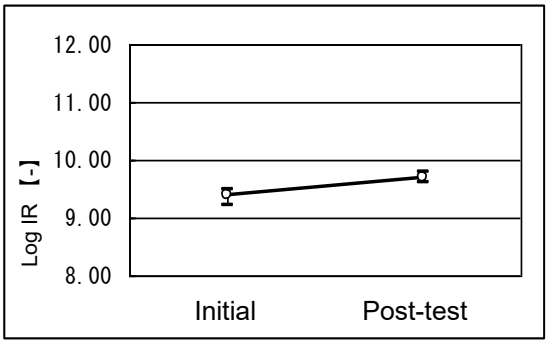


ΔC

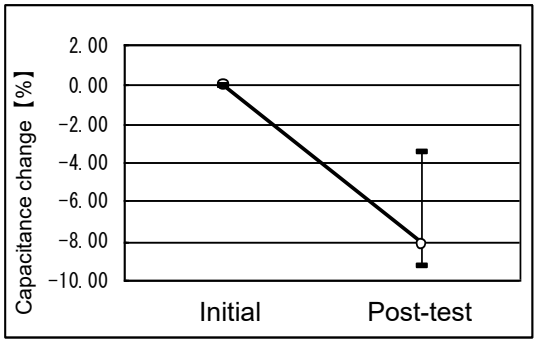


5. N2040/L104-4532X7R1E225K

IR

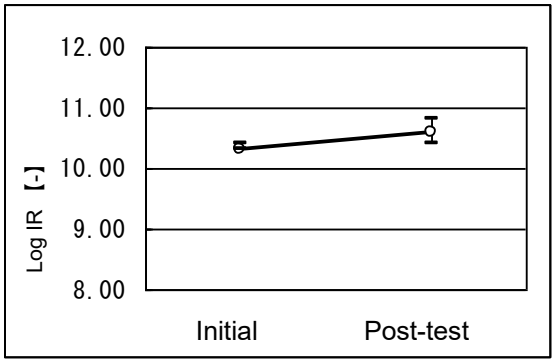


ΔC

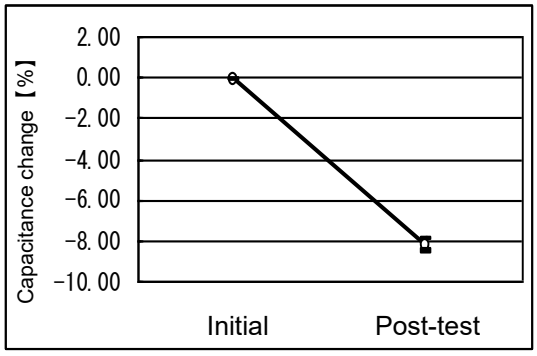


6. N2040/L104-5750X7R1H474K

IR

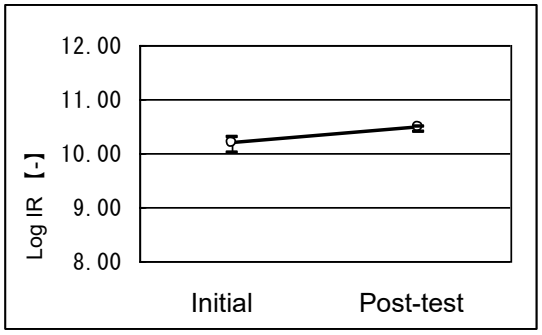


ΔC

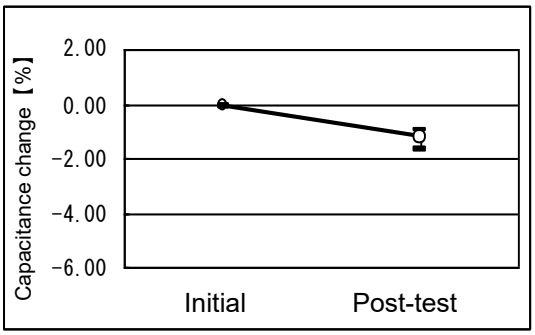


7.N2040/L104-5750X7R1H105K

IR

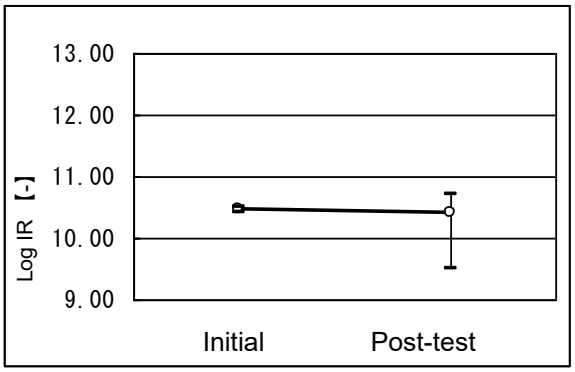


ΔC

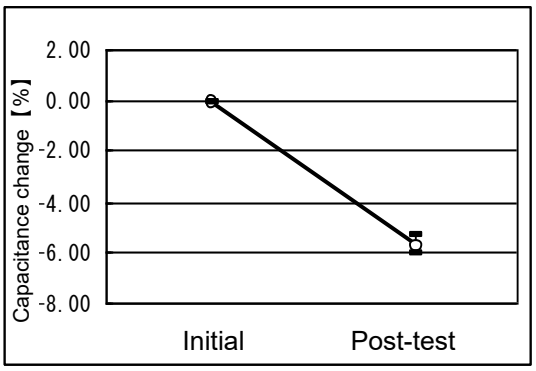


8. N2040/L104-5750X7R2A224K

IR

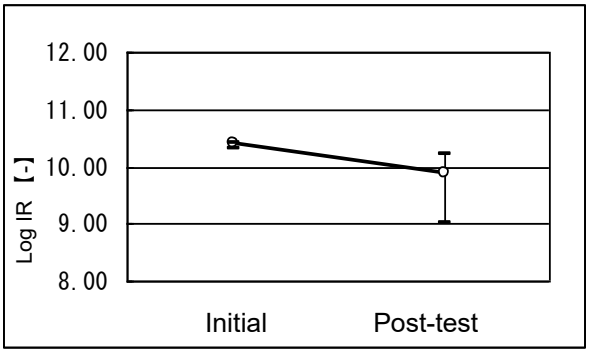


ΔC

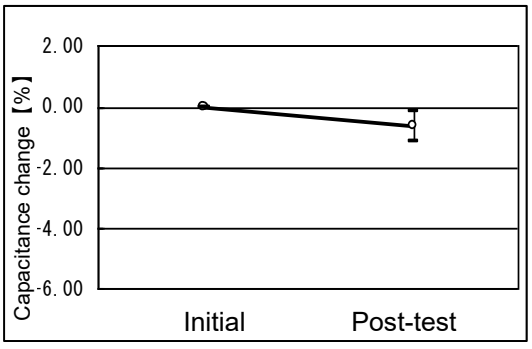


9. N2040/L104-5750X7R2A474K

IR

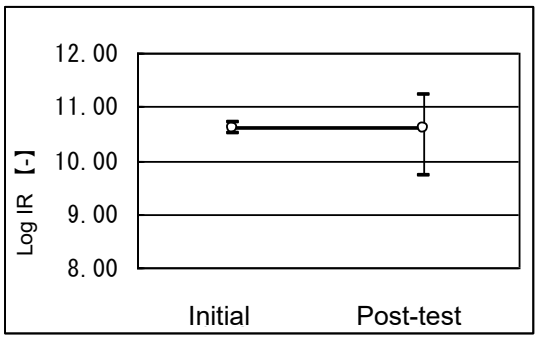


ΔC

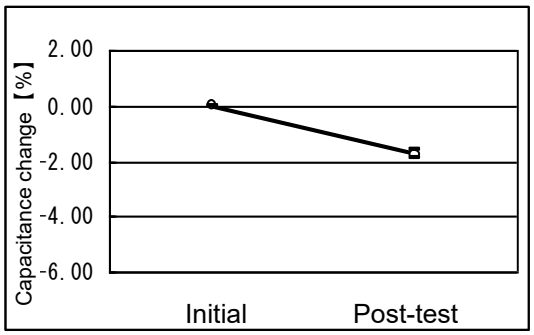


10. N2040/L104-5750X7R2D224K

IR

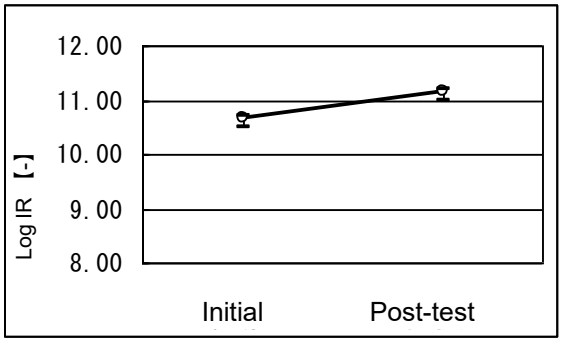


ΔC

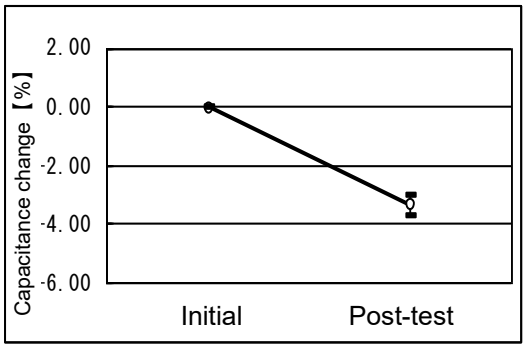


11. N2040/L104-5750X7R2H104K

IR

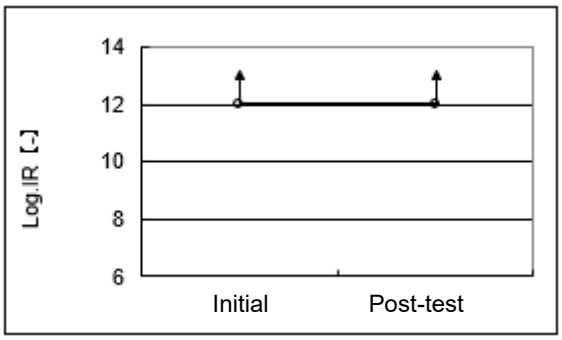


ΔC

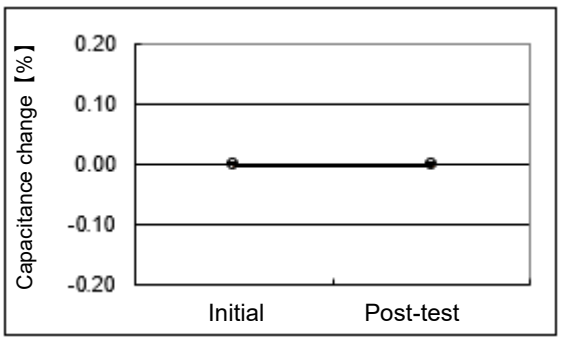


A.N2040/L104N1608C0G1H332J

IR

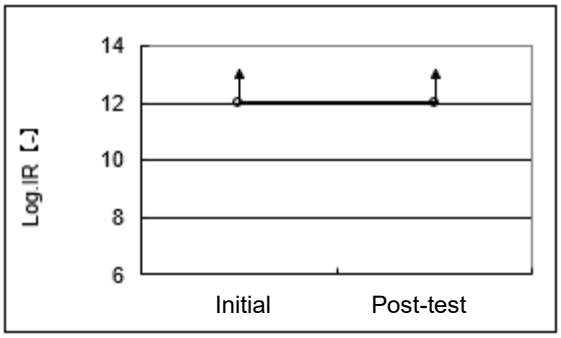


ΔC

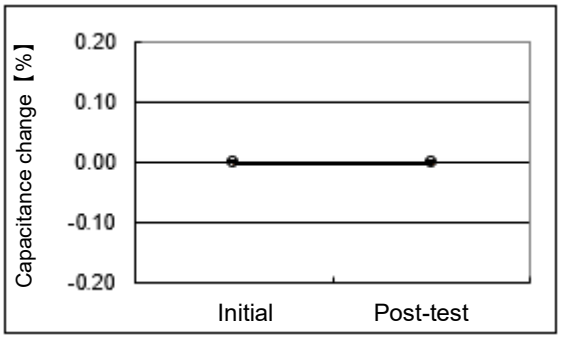


B. N2040/L104N2012C0G2A182J

IR



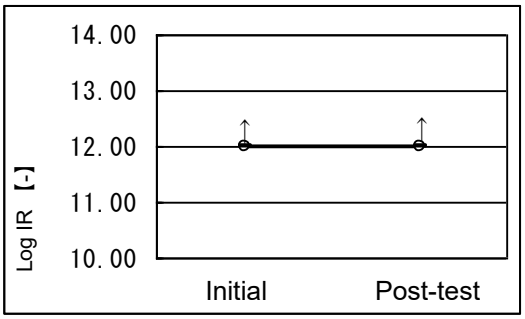
ΔC



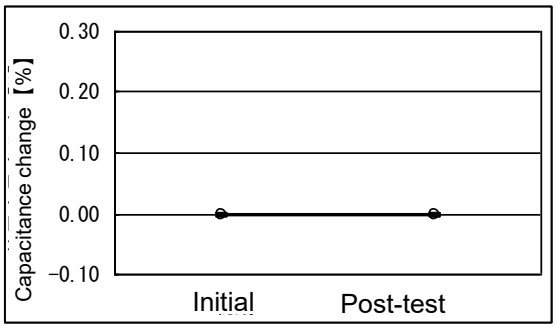
[Drifts in environmental tests] – Humidity, steady state, low voltage

1. N2040/L104-3216C0G1H332J

IR

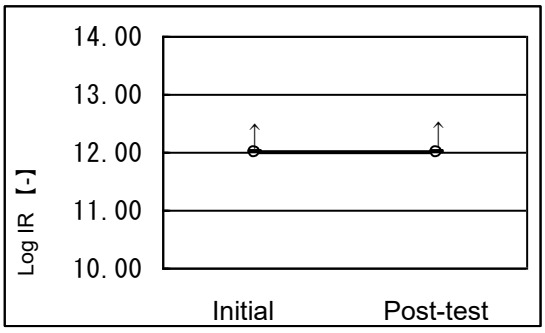


ΔC

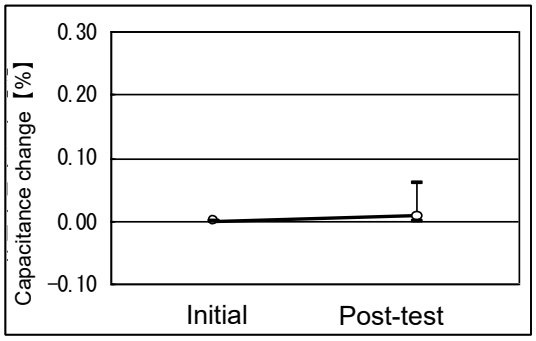


2. N2040/L104-3216C0G2A182J

IR

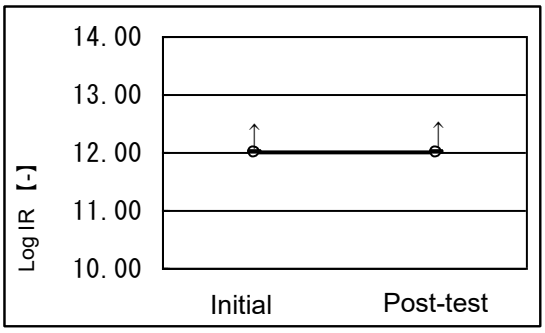


ΔC

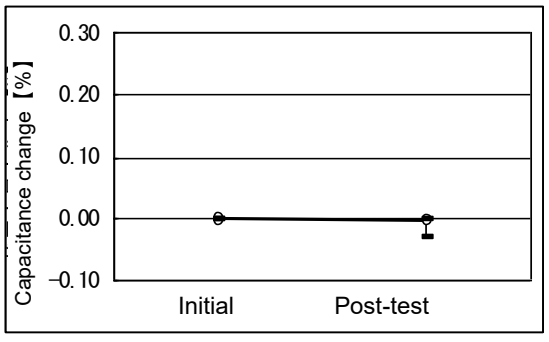


3. N2040/L104-3216C0G2D391J

IR

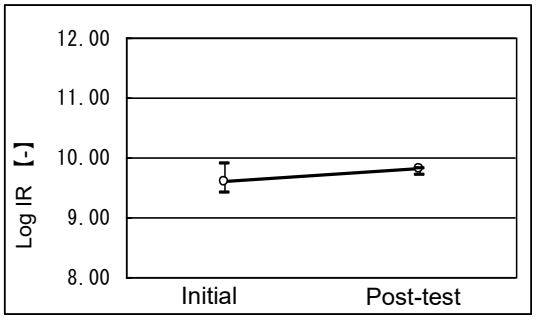


ΔC

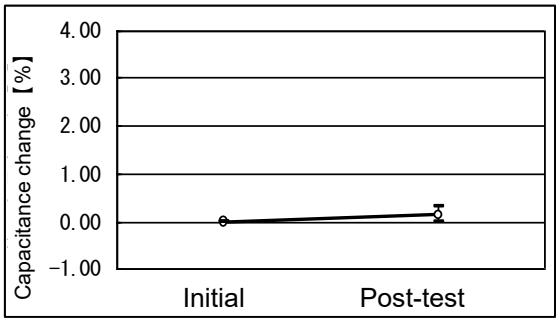


4. N2040/L104-3225X7R1E105K

IR

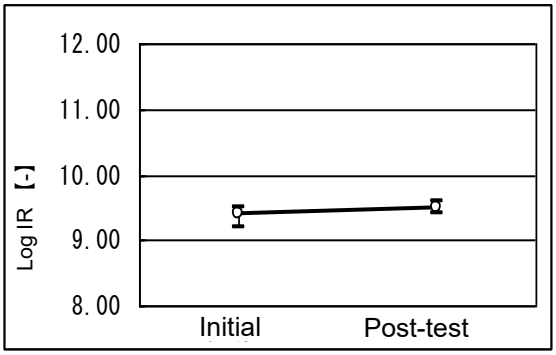


ΔC

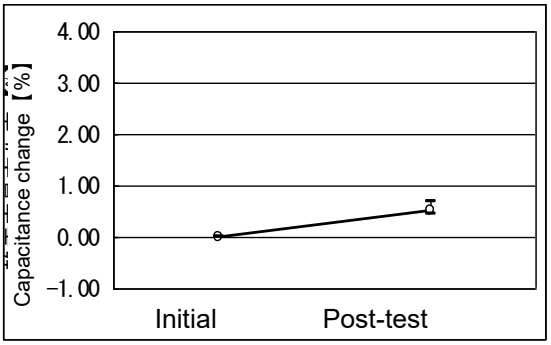


5. N2040/L104-4532X7R1E225K

IR

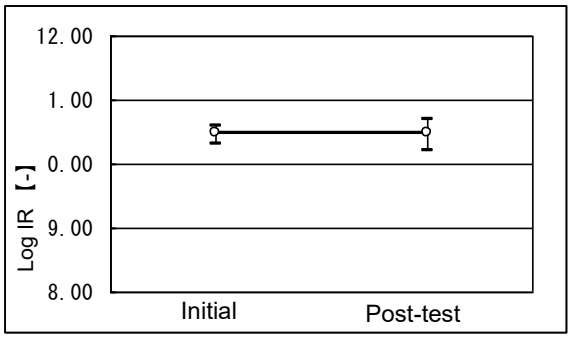


ΔC

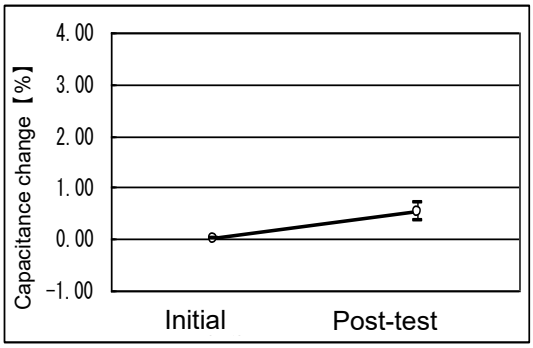


6. N2040/L104-5750X7R1H474K

IR

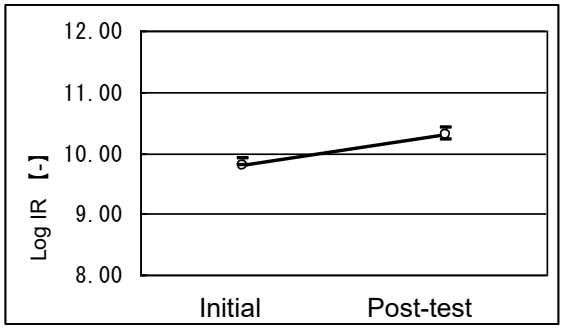


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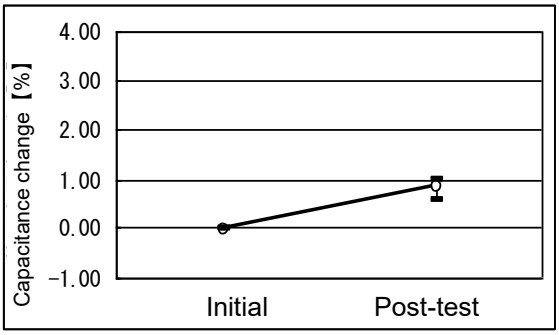


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IR

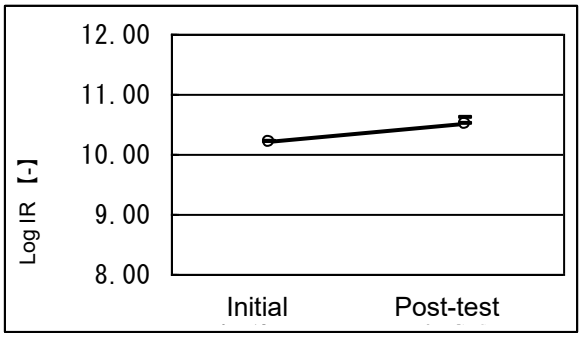


ΔC

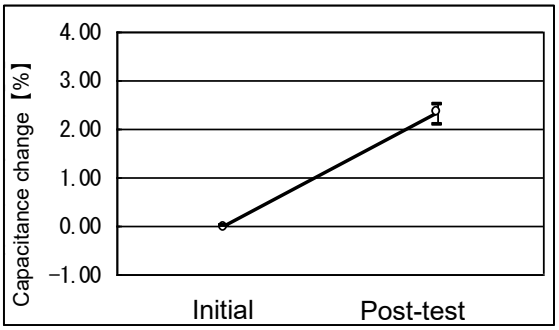


8. N2040/L104-5750X7R2A224K

IR

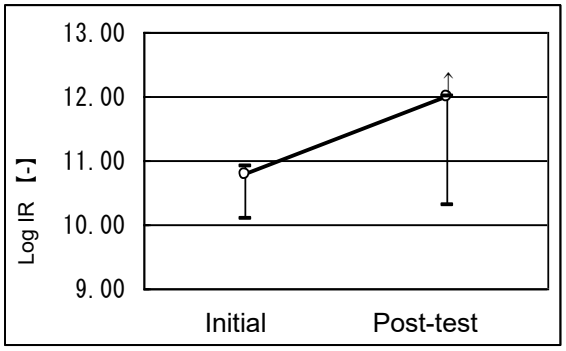


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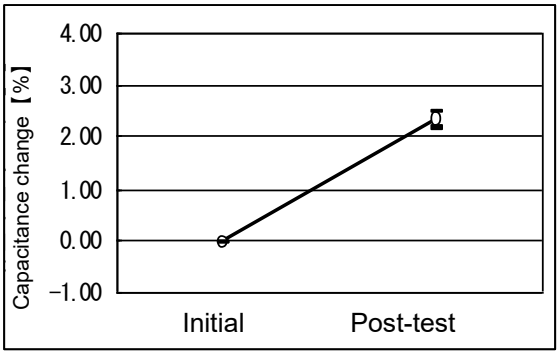


9. N2040/L104-5750X7R2A474K

IR

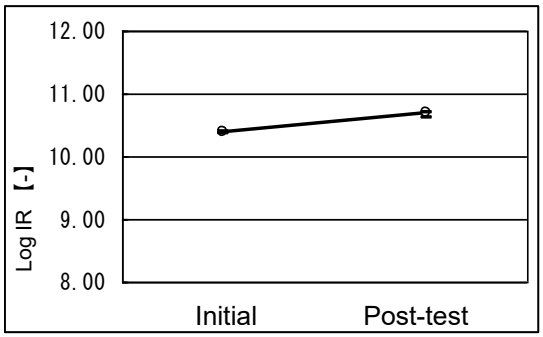


ΔC

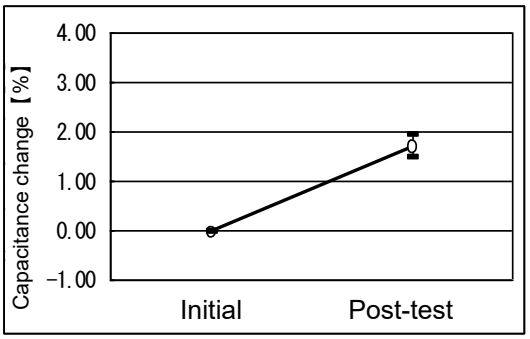


10. N2040/L104-5750X7R2D224K

IR

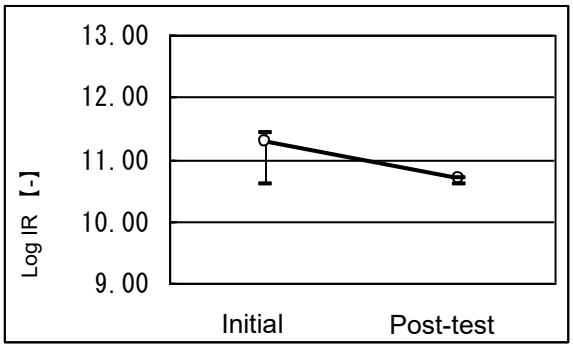


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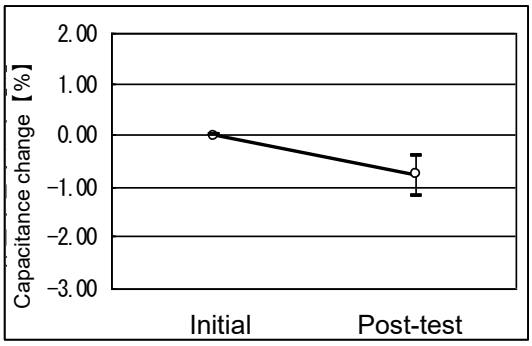


11. N2040/L104-5750X7R2H104K

IR

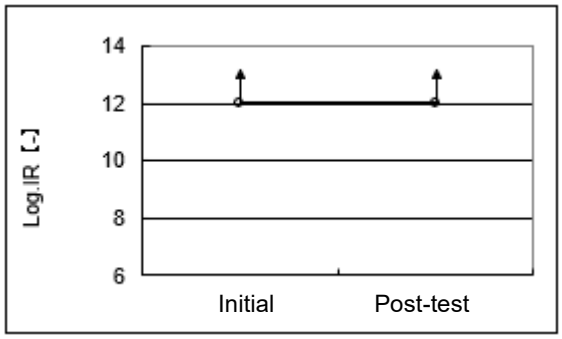


ΔC

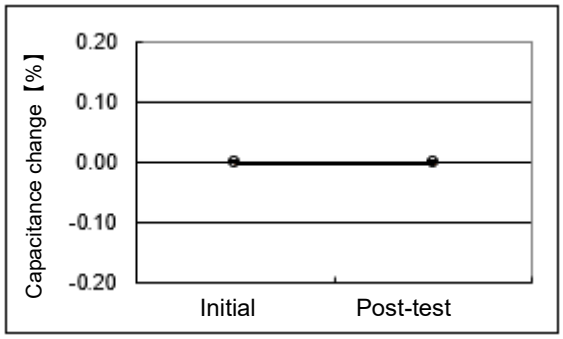


A.N2040/L104N1608C0G1H332J

IR



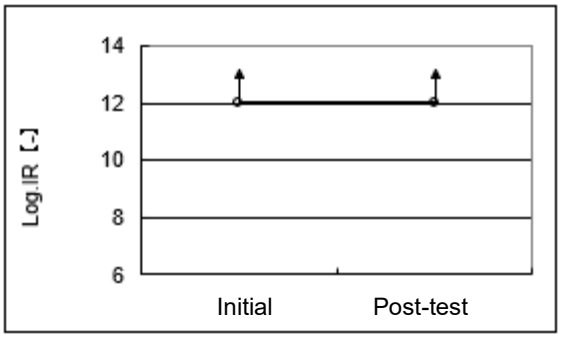
ΔC



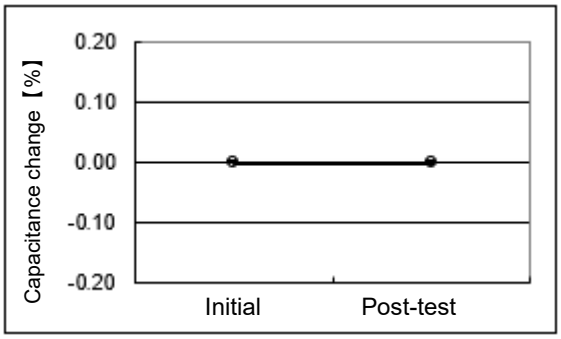
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B. N2040/L104N2012C0G2A182J

IR



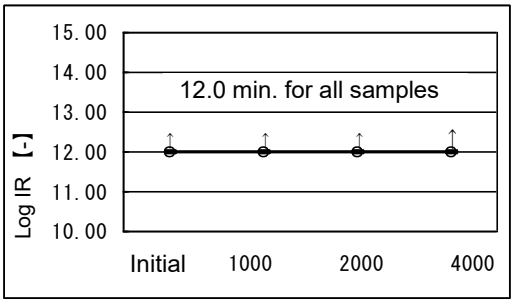
ΔC



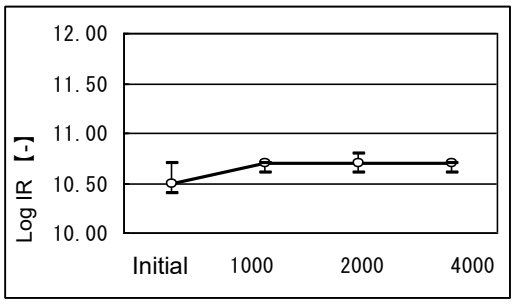
[Drifts in life tests]

1. N2040/L104-3216C0G1H332J

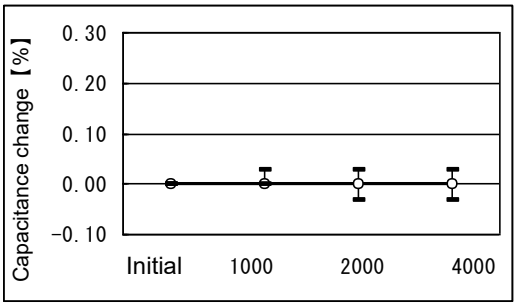
IR at room temperature (25 °C)



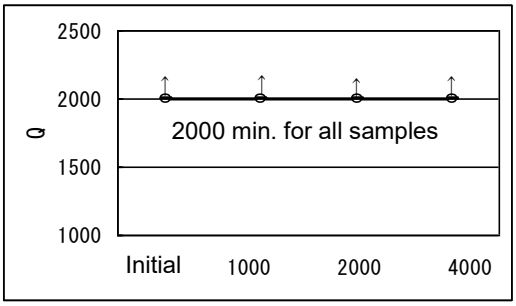
IR at elevated temperature (125 °C)



ΔC

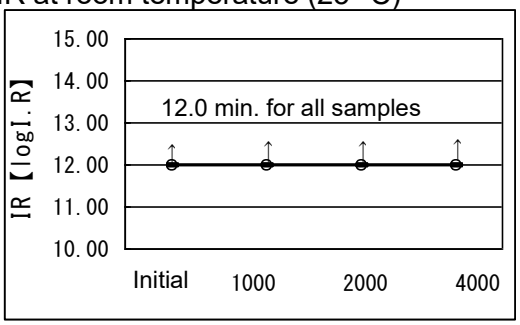


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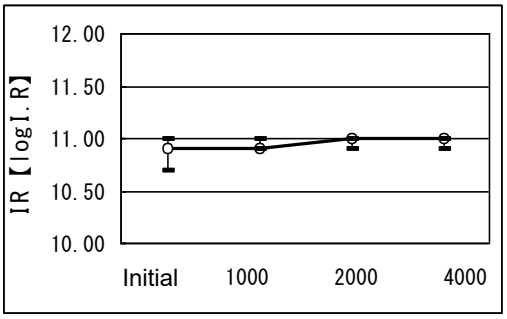


2. N2040/L104-3216C0G2A182J

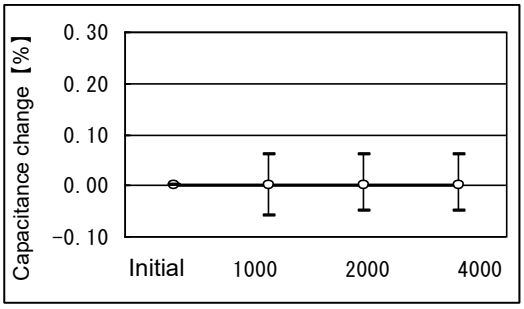
IR at room temperature (25 °C)



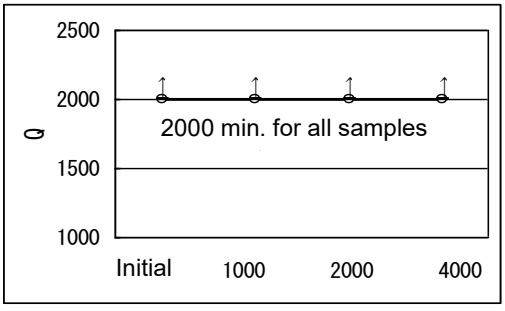
IR at elevated temperature (125 °C)



ΔC

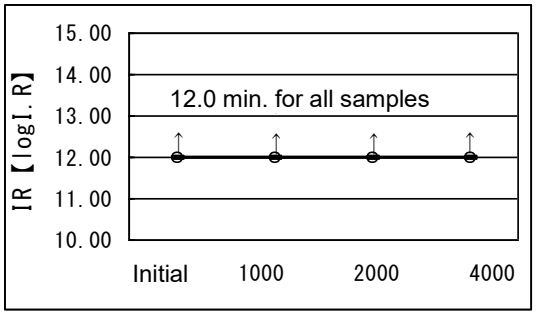


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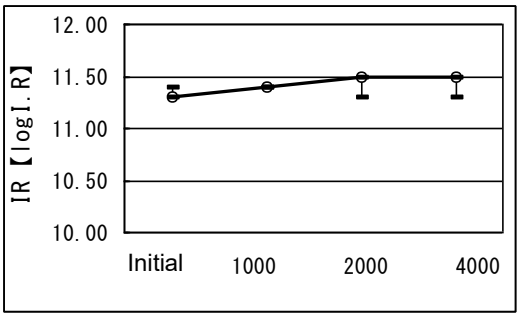


3. N2040/L104-3216C0G2D391J

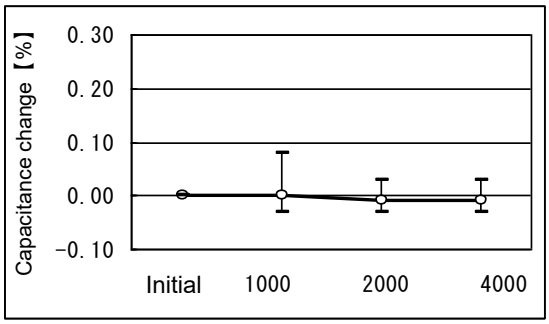
IR at room temperature (25 °C)



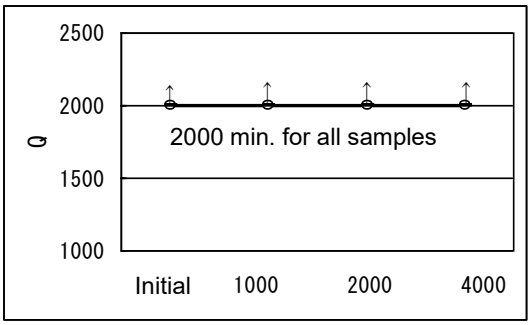
IR at elevated temperature (125 °C)



ΔC

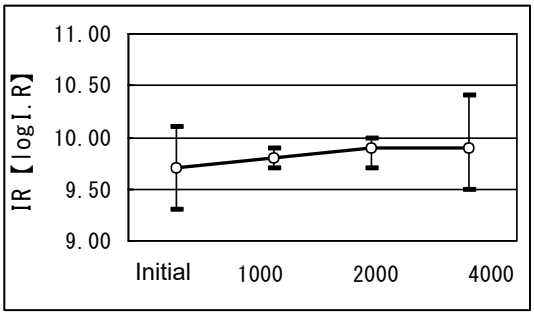


Q

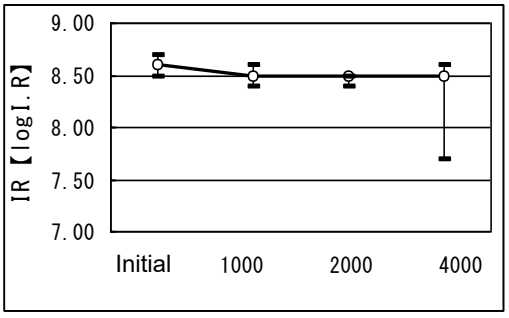


4. N2040/L104-3225X7R1E105K

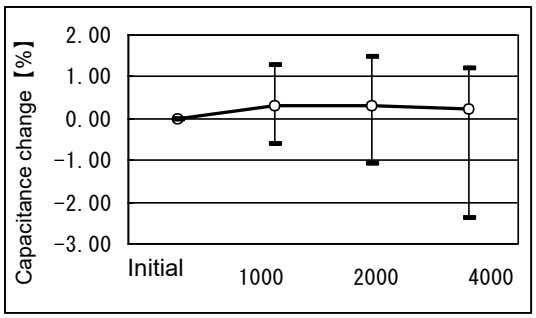
IR at room temperature (25 °C)



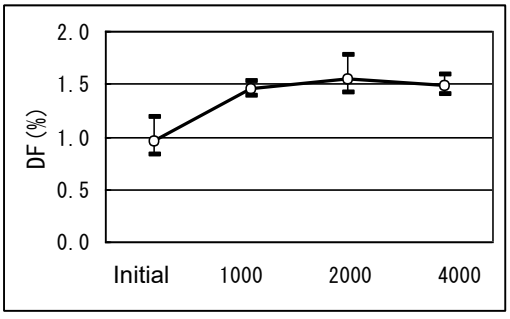
IR at elevated temperature (125 °C)



ΔC

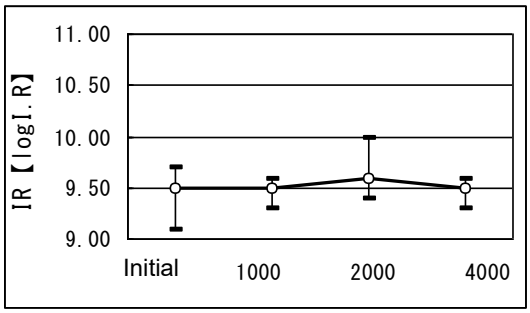


DF

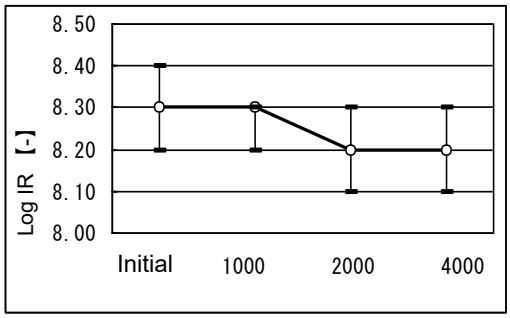


5. N2040/L104-4532X7R1E225K

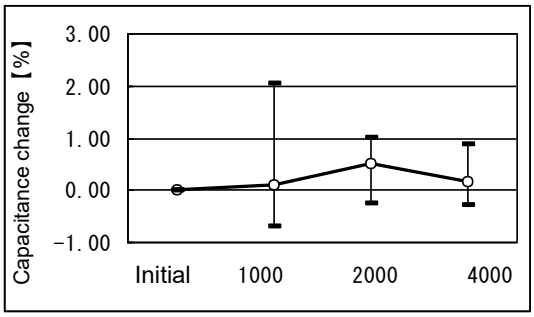
IR at room temperature (25 °C)



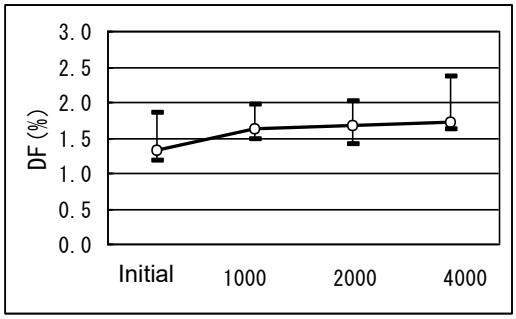
IR at elevated temperature (125 °C)



ΔC

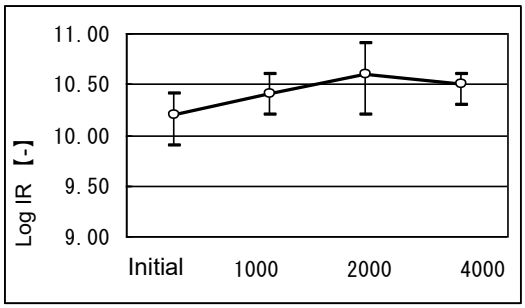


DF

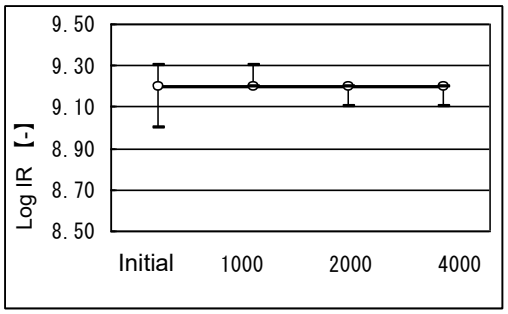


6. N2040/L104-5750X7R1H474K

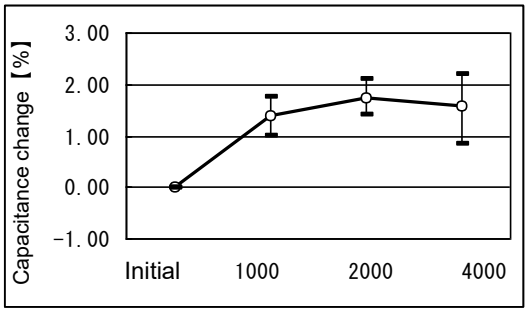
IR at room temperature (25 °C)



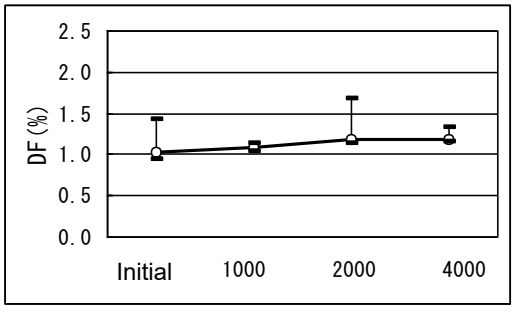
IR at elevated temperature (125 °C)



ΔC

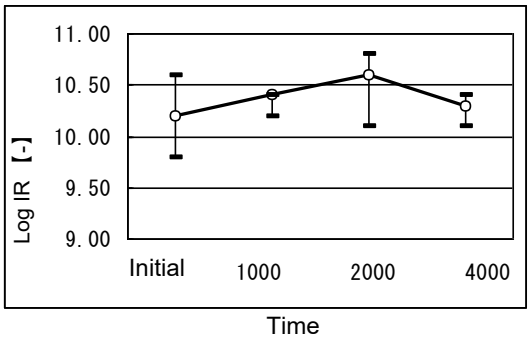


DF

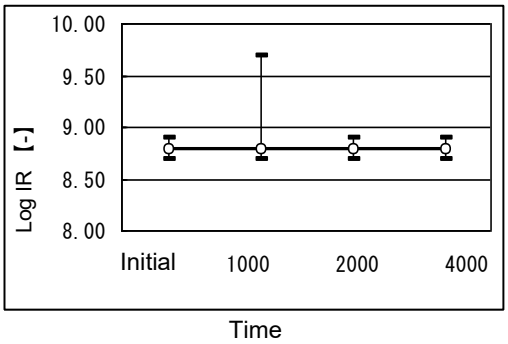


7. N2040/L104-5750X7R1H105K

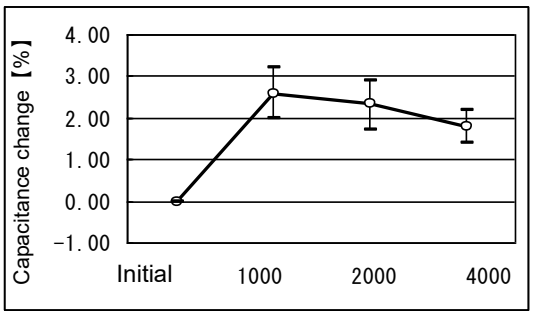
IR at room temperature (25 °C)



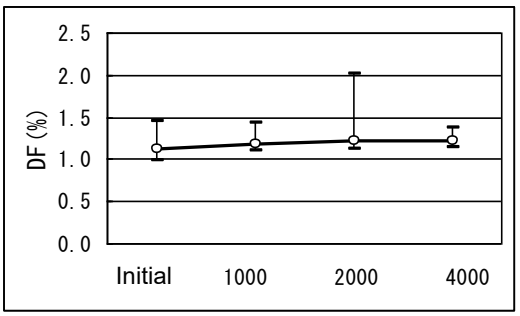
IR at elevated temperature (125 °C)



ΔC

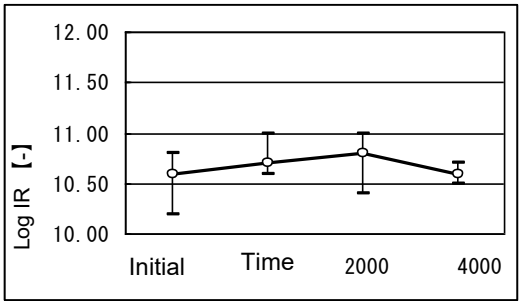


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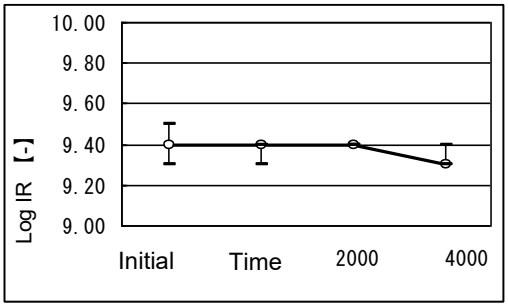


8. N2040/L104-5750X7R2A224K

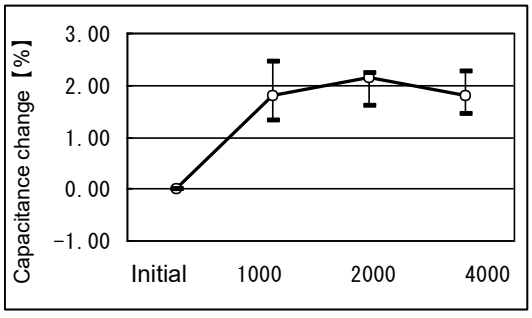
IR at room temperature (25 °C)



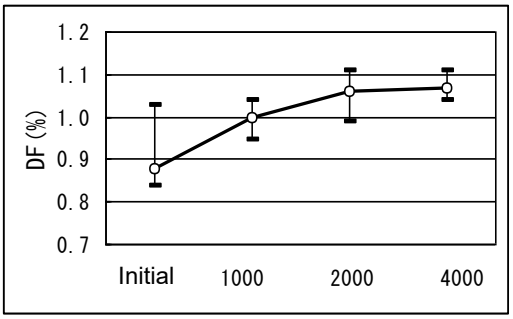
IR at elevated temperature (125 °C)



ΔC

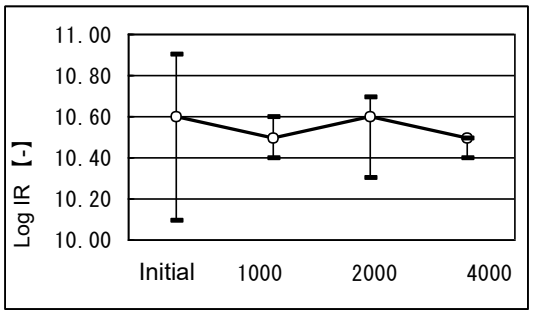


DF

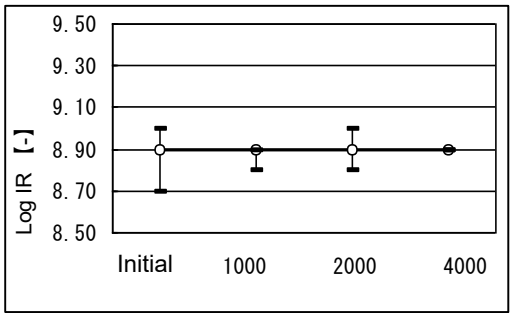


9. N2040/L104-5750X7R2A474K

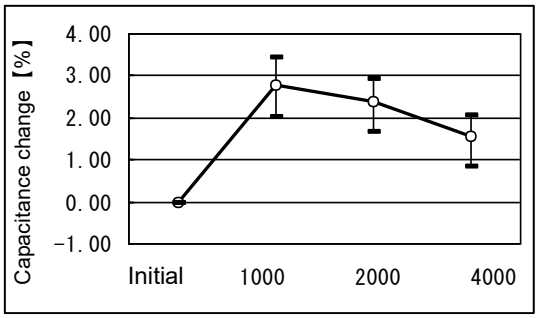
IR at room temperature (25 °C)



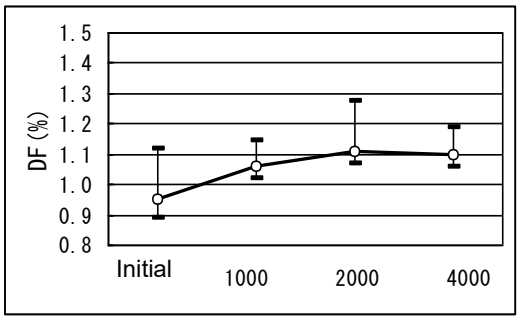
IR at elevated temperature (125 °C)



ΔC

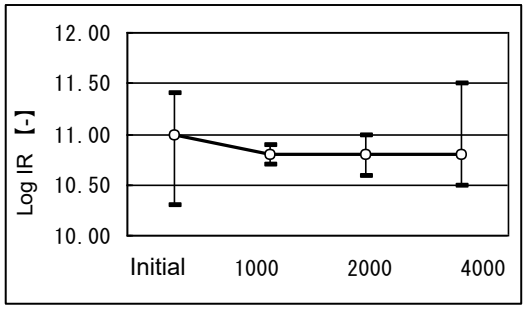


DF

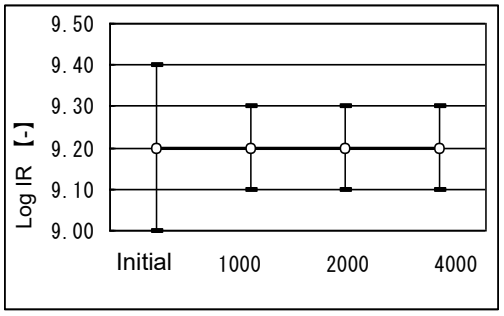


10. N2040/L104-5750X7R2D224K

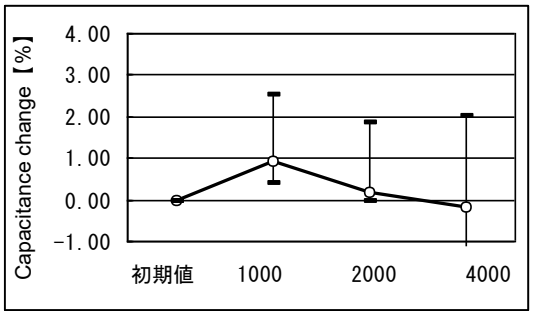
IR at room temperature (25 °C)



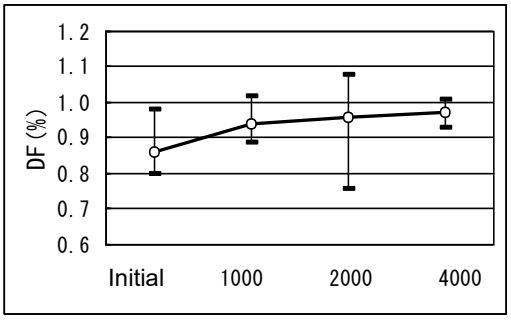
IR at elevated temperature (125 °C)



ΔC



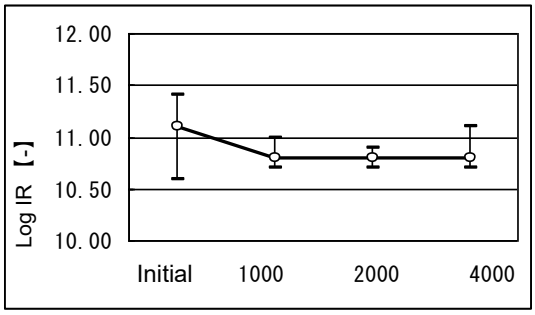
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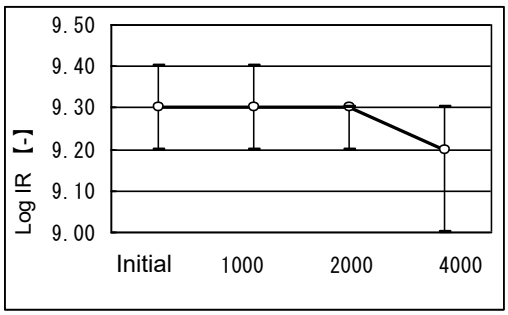
JMCG0-0018-R

11. N2040/L104-5750X7R2H104K

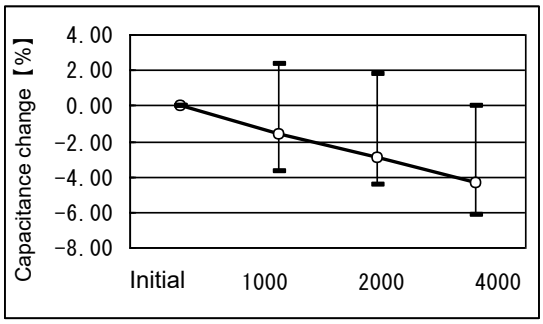
IR at room temperature (25 °C)



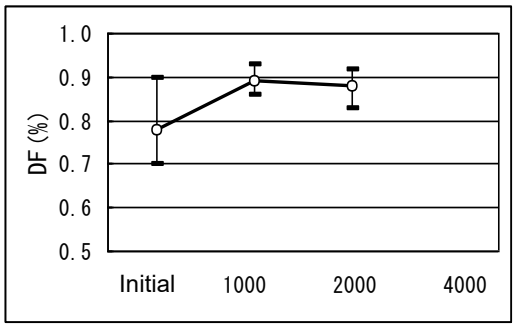
IR at elevated temperature (125 °C)



ΔC

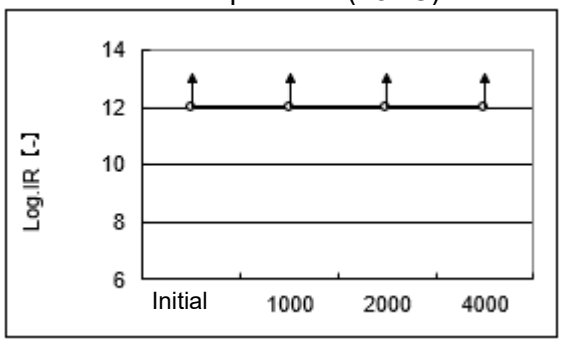


DF

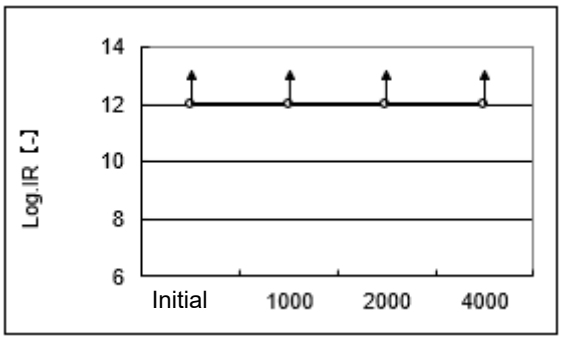


A.N2040/L104N1608C0G1H332J

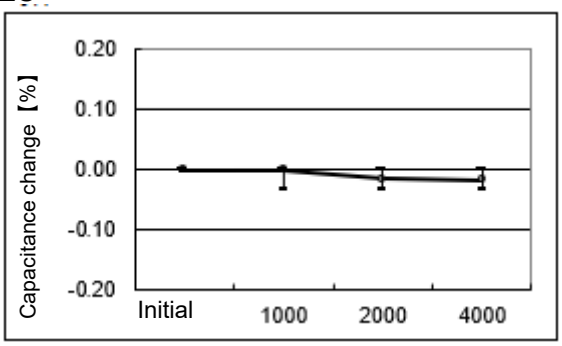
IR at room temperature (25 °C)



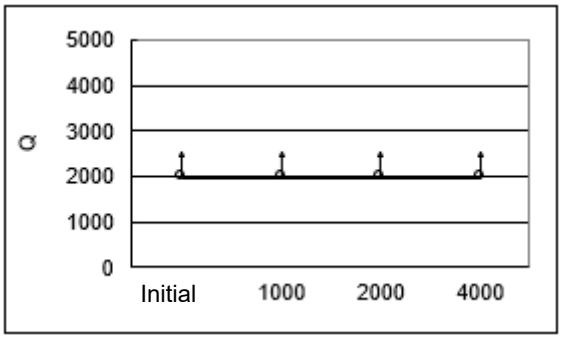
IR at elevated temperature (125 °C)



ΔC

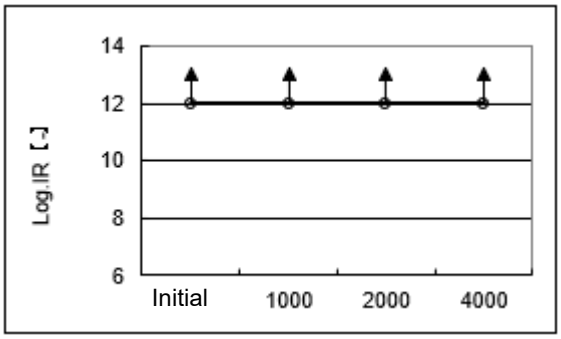


Q

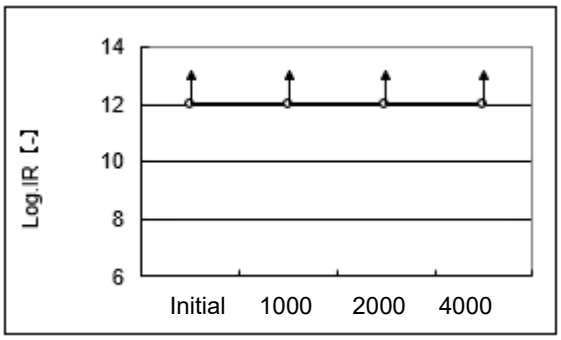


B. N2040/L104N2012C0G2A182J

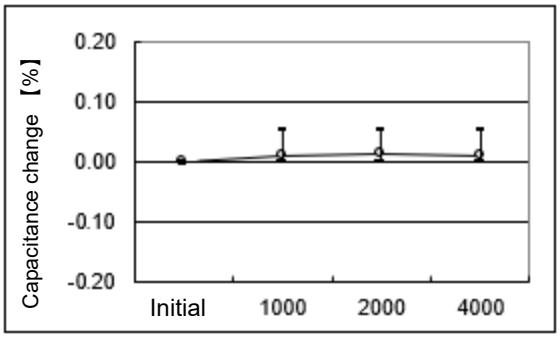
IR at room temperature (25 °C)



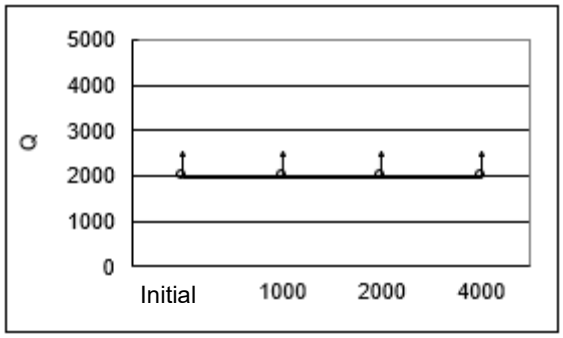
IR at elevated temperature (125 °C)



ΔC



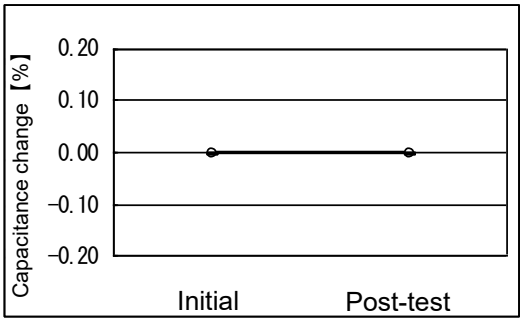
Q



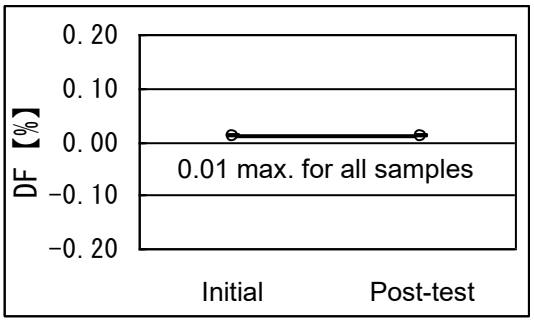
[Drifts in resistance to soldering heat]

1. N2040/L104-3216C0G1H332J

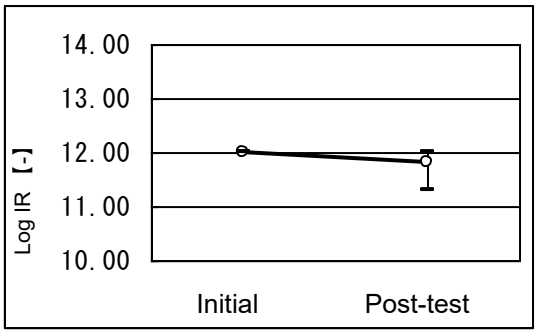
ΔC



DF

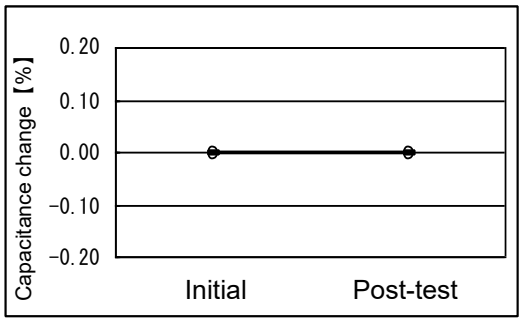


IR

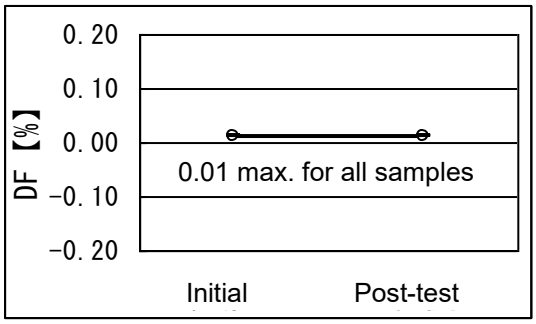


2. N2040/L104-3216C0G2A182J

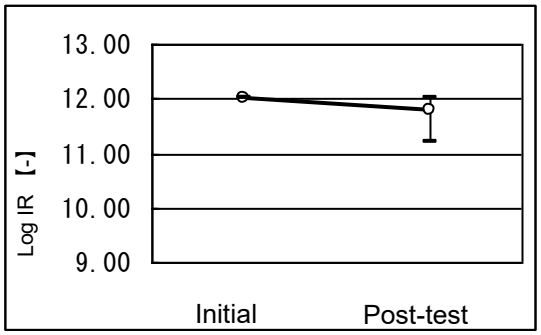
ΔC



DF

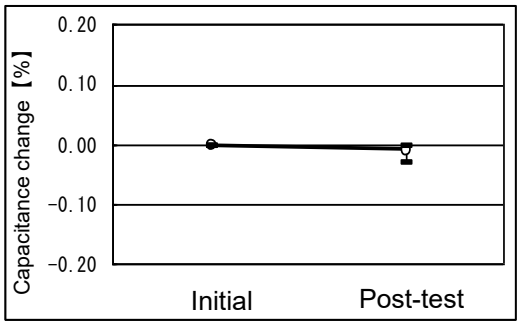


IR

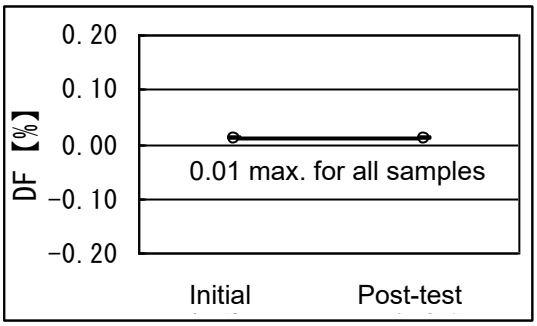


3. N2040/L104-3216C0G2D391J

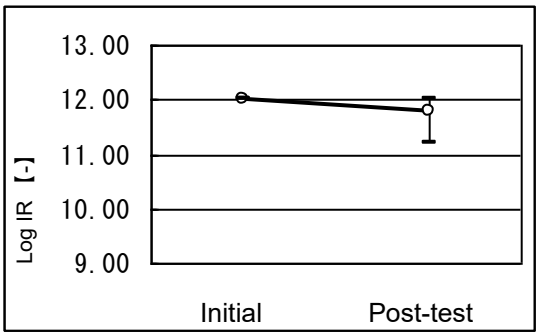
ΔC



DF

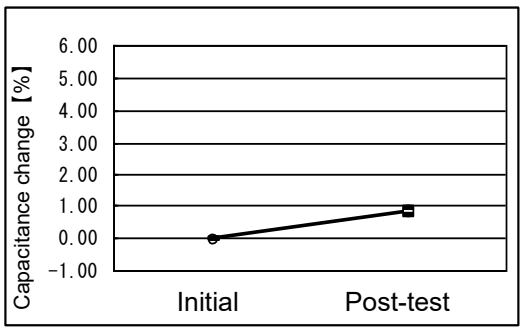


IR

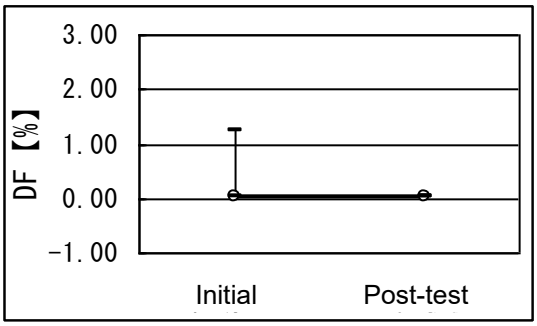


4. N2040/L104-3225X7R1E105K

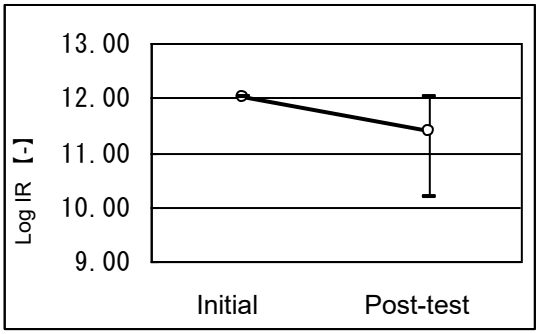
ΔC



DF

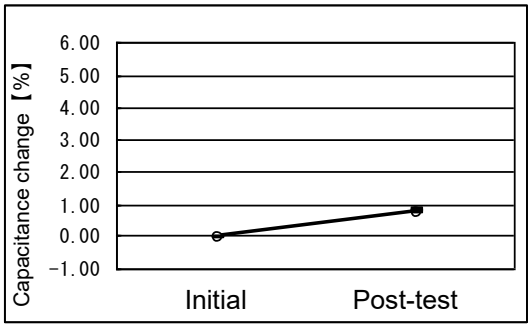


IR

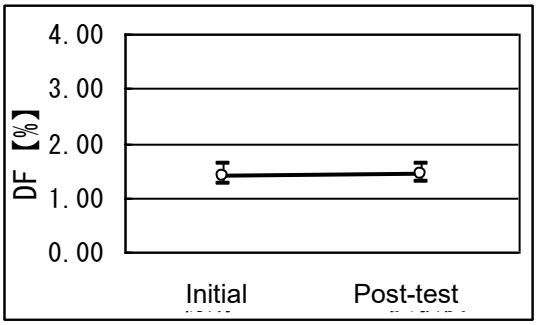


5. N2040/L104-4532X7R1E225K

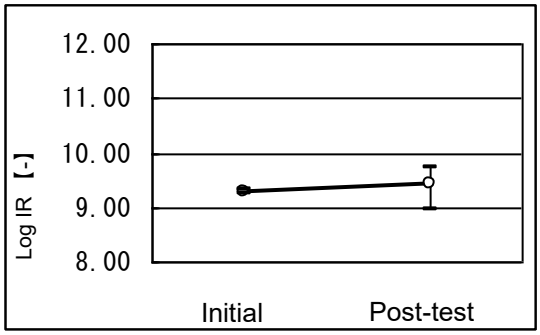
ΔC



DF

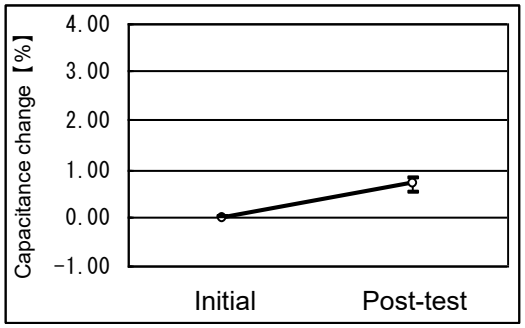


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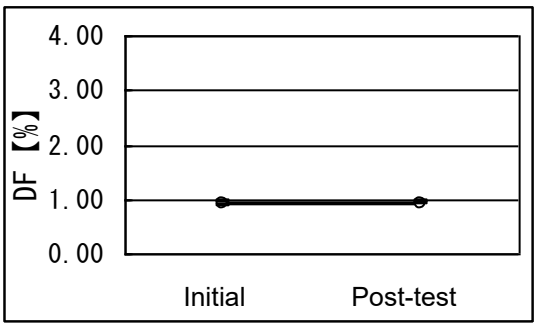


6. NASDA2040/L104-5750X7R1H474K

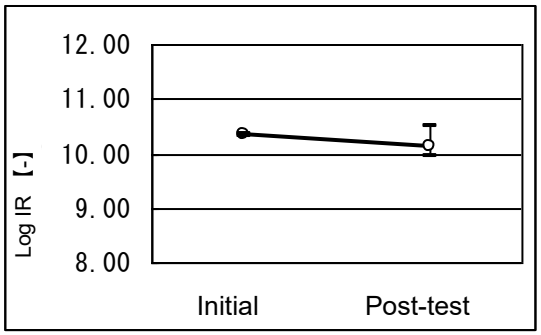
ΔC



DF

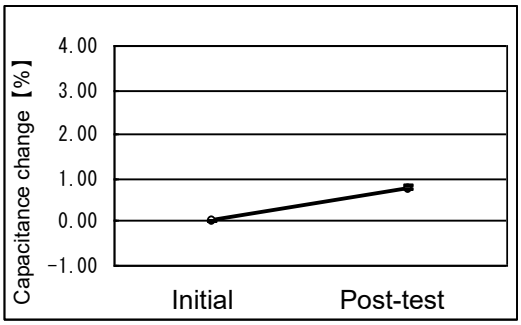


IR

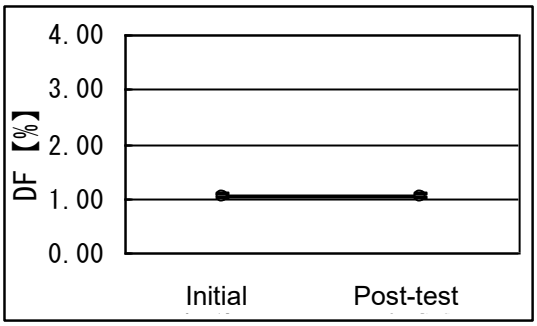


7. N2040/L104-5750X7R1H105K

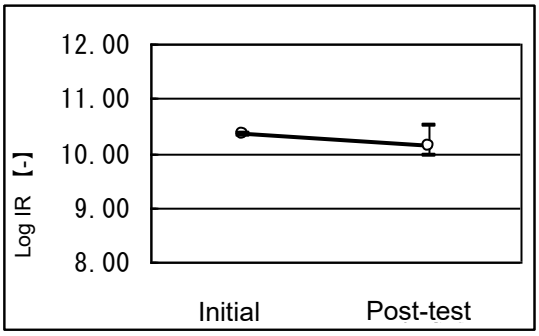
ΔC



DF

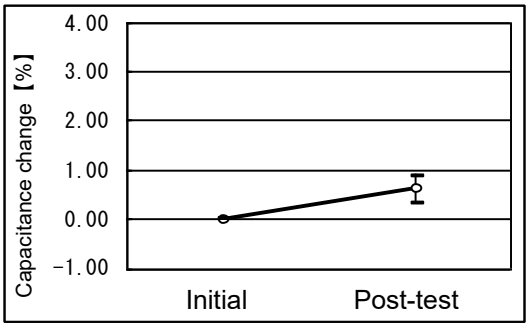


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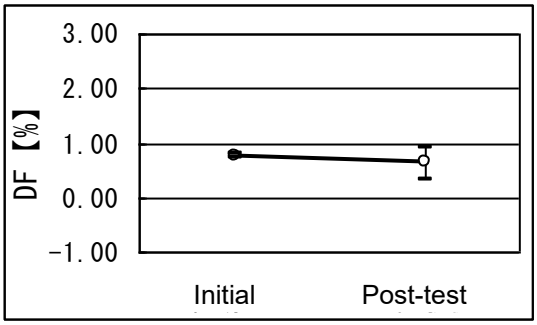


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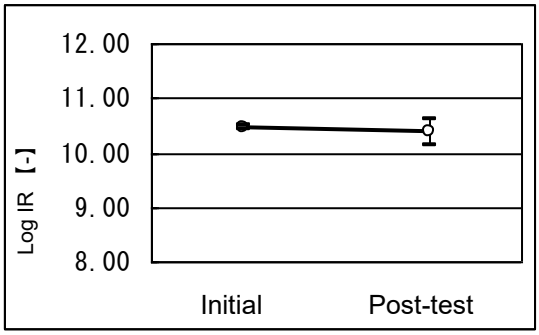
ΔC



DF

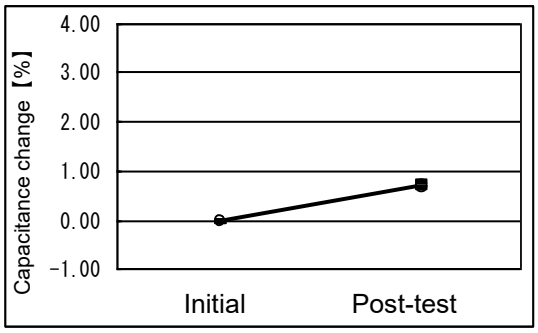


IR

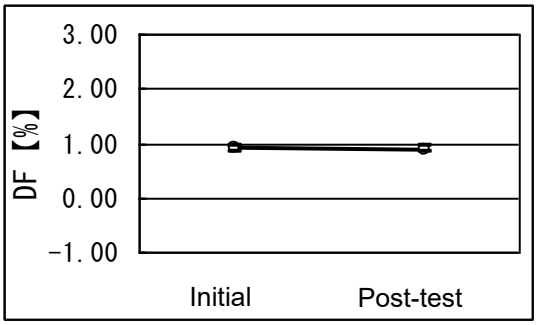


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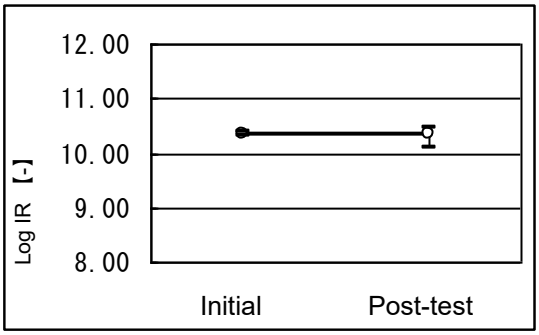
ΔC



DF

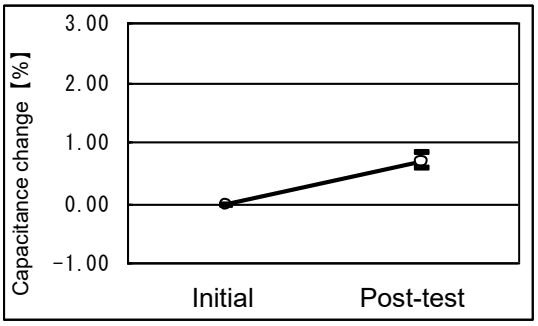


IR

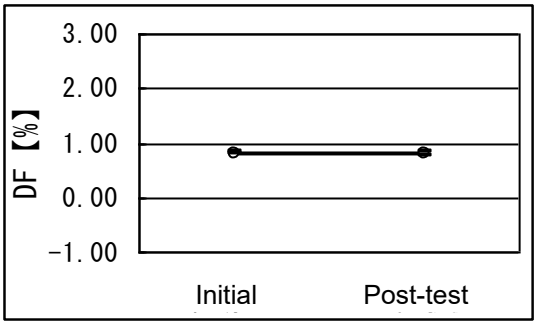


10. N2040/L104-5750X7R2D224K

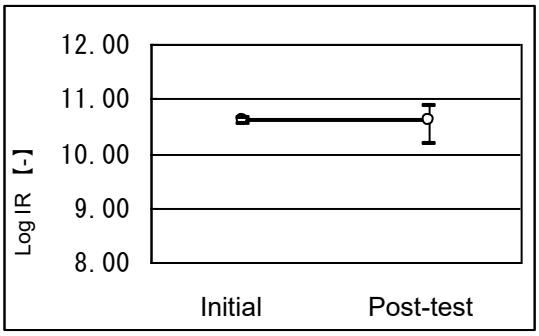
ΔC



DF



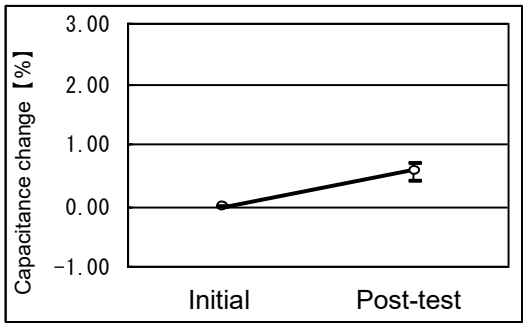
IR



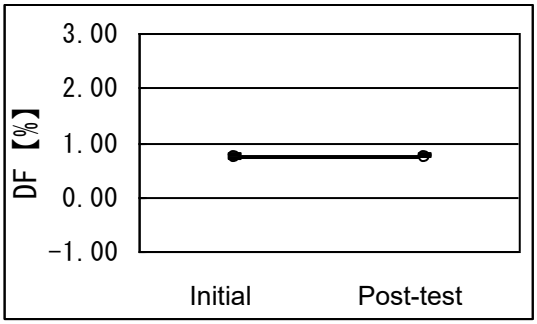
JMCG0-0018-R

11. N2040/L104-5750X7R2H104K

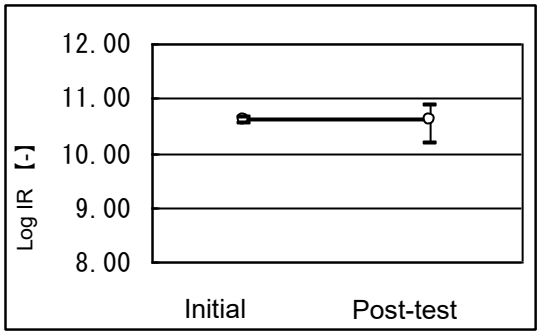
ΔC



DF

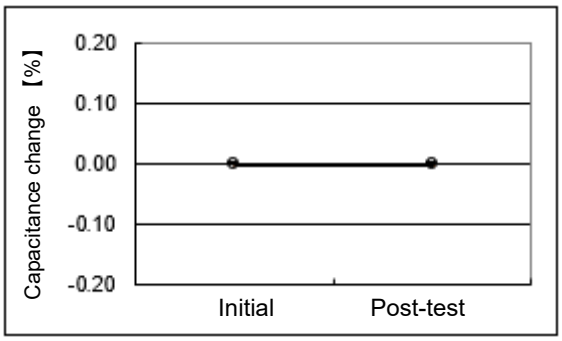


IR

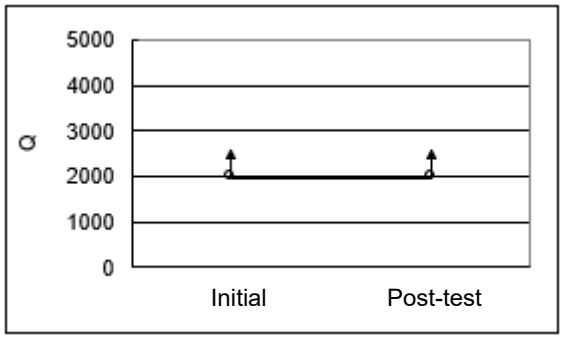


A.N2040/L104N1608C0G1H332J

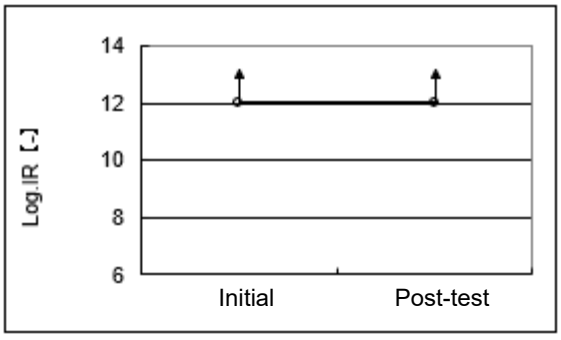
ΔC



Q

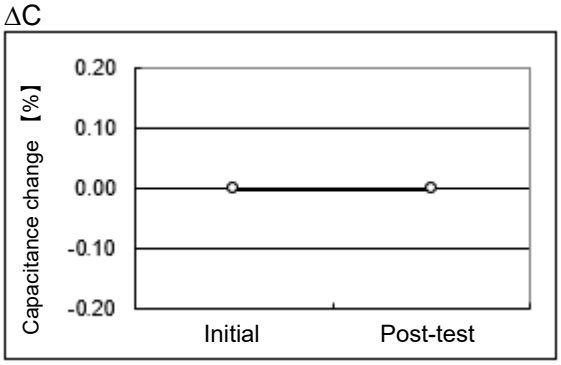


IR

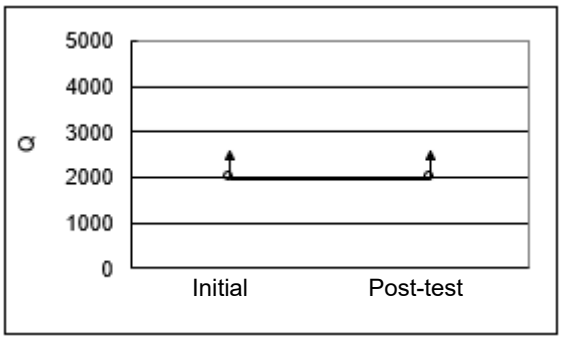


B. N2040/L104N2012C0G2A182J

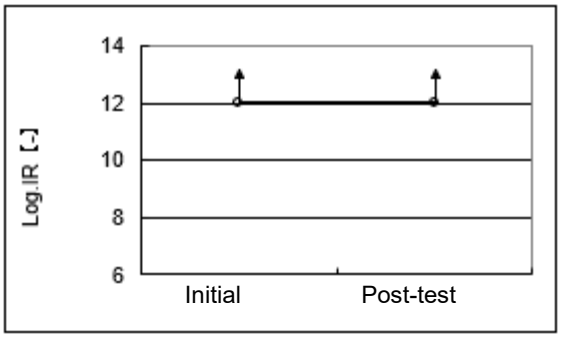
ΔC



Q



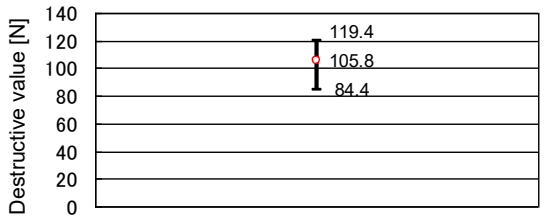
IR



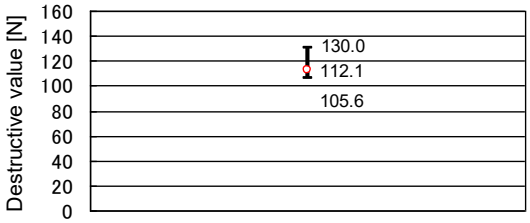
6. ENVIRONMENTAL LIMITS

6.1 Shear (Destructive)

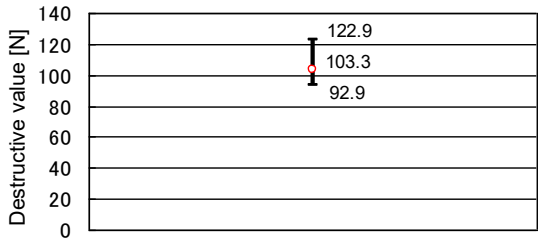
1. N2040/L104-3216C0G1H332J



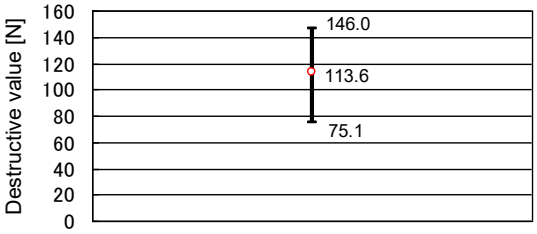
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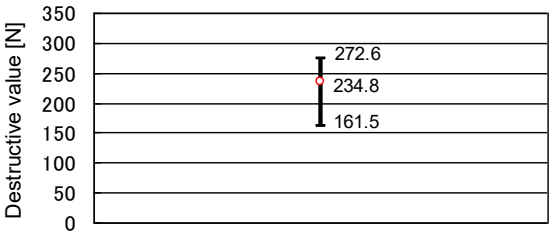
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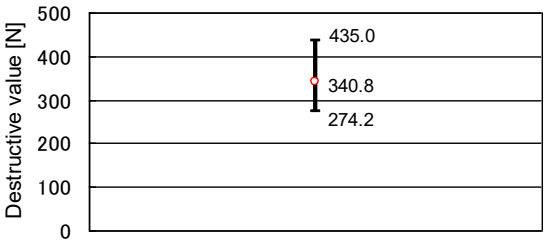
4. N2040/L104-3225X7R1E105K



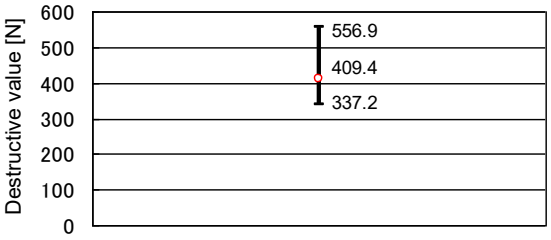
5. N2040/L104-4532X7R1E225K



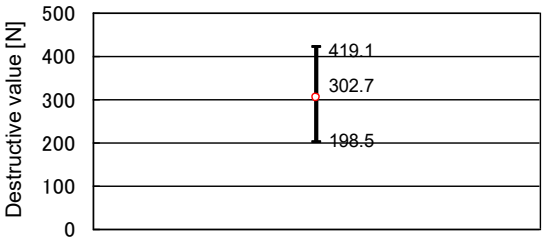
6. N2040/L104-5750X7R1H474K



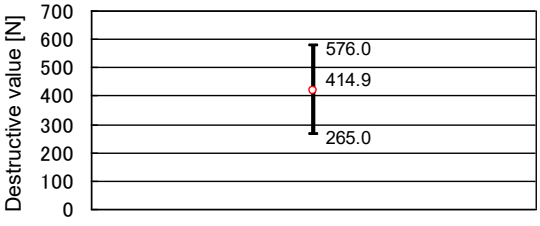
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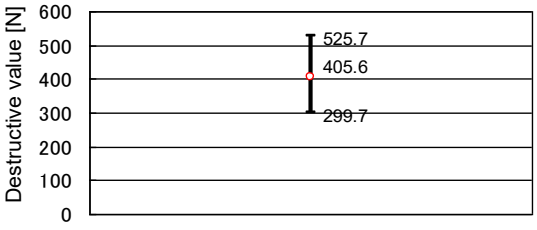
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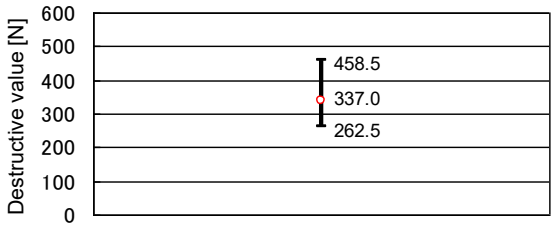
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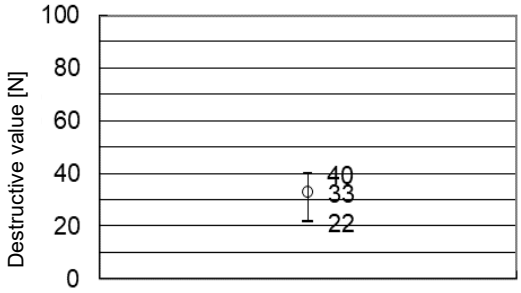
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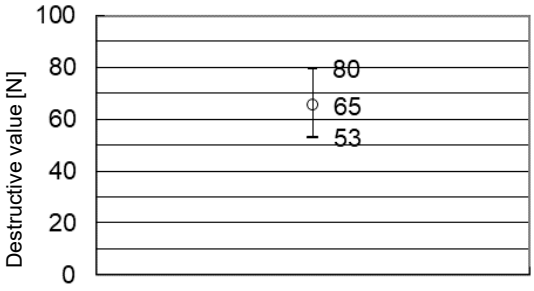
11. N2040/L104-5750X7R2H104K



A.N2040/L104N1608C0G1H332J



B. N2040/L104N2012C0G2A182J

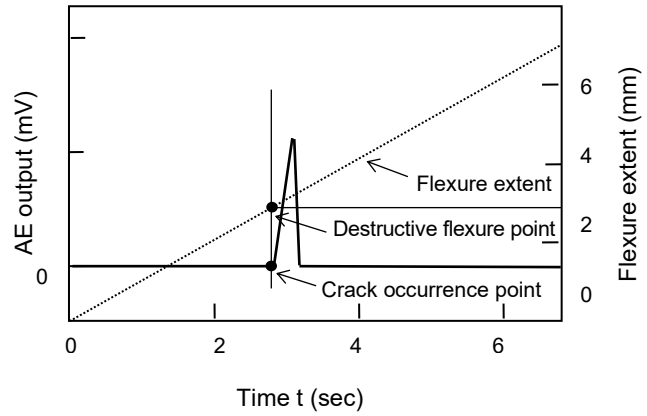


6.2 Substrate Bending

(1) Test method

This test shall be performed with Acoustic Emission (AE) method. A microphone shall be placed closely to a chip capacitor. A PWB (glass epoxy thickness: 1.6 mm) shall be bent to create internal cracks. Noises that will be generated when the cracks are created shall be picked up with the microphone and amplified to enable waveform observation. An example of waveform is shown below.
The flexure at the time when the AE output starts rising is defined as destructive flexure.

Example of determination by AE method



(2) The number of samples shall be 10 units per part number.

(3) Test results

Unit: mm

Sample	Sample No.												
	1	2	3	4	5	6	7	8	9	10	11	A	B
1	7.46	5.39	2.95	2.72	1.29	2.09	1.27	1.13	2.36	1.54	2.42	5.14	7.50<
2	4.33	6.08	3.96	2.02	2.13	1.37	1.31	1.61	2.15	2.06	2.24	4.13	7.50<
3	7.50<	4.53	7.50<	2.00	2.19	2.12	2.19	2.00	2.09	1.75	1.80	3.72	7.50<
4	7.50<	4.35	6.92	2.01	2.36	1.36	1.80	2.66	2.30	1.82	2.34	3.54	7.50<
5	4.94	2.57	6.49	1.34	2.25	1.43	1.96	1.28	2.04	1.47	7.50<	4.25	7.50<
6	6.13	1.77	6.18	1.89	2.58	1.56	2.39	2.46	2.36	1.72	1.68	3.52	7.50<
7	2.00	4.83	7.50<	2.27	2.09	1.34	2.11	1.59	1.90	2.33	2.02	4.75	7.50<
8	4.66	4.91	2.29	1.65	1.89	7.50<	2.18	1.82	1.92	2.29	1.99	4.69	7.50<
9	7.50<	2.29	5.01	1.32	3.19	1.52	1.54	7.50<	2.15	2.86	2.18	3.34	7.50<
10	2.64	4.02	2.45	1.79	2.21	1.52	1.77	1.20	1.86	1.68	1.06	3.41	7.50<
Max.	7.50<	6.08	7.50<	2.72	3.19	7.50<	2.39	7.50<	2.36	2.86	7.50<	5.14	7.50<
Min.	2.00	1.77	2.29	1.32	1.29	1.34	1.27	1.13	1.86	1.47	1.06	3.34	7.50<

Additional explanation

Since L.3.9.3, Appendix L of the JAXA-QTS-2040 specifies fracture deflection as the capacitance change (hereinafter referred to as the cap method), the results of the AE method and the cap method were compared for samples No. A and No. B. The results of the AE method in the table below are the same as the results of (3). There was no significant difference in the measurement results.

Unit: mm

Sample	Sample No. A		Sample No. B	
	AE method	Cap method	AE method	Cap method
1.	5.14	5.12	7.50<	7.50<
2.	4.13	4.11	7.50<	7.50<
3.	3.72	3.71	7.50<	7.50<
4.	3.54	4.26	7.50<	7.50<
5.	4.25	4.25	7.50<	7.50<
6.	3.52	3.51	7.50<	7.50<
7.	4.75	4.93	7.50<	7.50<
8.	4.69	4.69	7.50<	7.50<
9.	3.34	3.34	7.50<	7.50<
10.	3.41	3.42	7.50<	7.50<
Max.	5.14	5.12	7.50<	7.50<
Min.	3.34	3.34	7.50<	7.50<

Sample No.

C0G precious metal parts

No	Part number	Size	Characteristic	Rated voltage (V)	capacitance (pF)
1.	N2040/L104-3216C0G1H332J	3216	C0G	50	3,300
2.	N2040/L104-3216C0G2A182J	3216	C0G	100	1,800
3.	N2040/L104-3216C0G2D391J	3216	C0G	200	390

X7R base metal parts

No	Part number	Size	Characteristic	Rated voltage (V)	capacitance (pF)
4.	N2040/L104-3225X7R1E105K	3225	X7R	25	1,000,000
5.	N2040/L104-4532X7R1E225K	4532	X7R	25	2,200,000
6.	N2040/L104-5750X7R1H474K	5750	X7R	50	470,000
7.	N2040/L104-5750X7R1H105K	5750	X7R	50	1,000,000
8.	N2040/L104-5750X7R2A224K	5750	X7R	100	220,000
9.	N2040/L104-5750X7R2A474K	5750	X7R	100	470,000
10.	N2040/L104-5750X7R2D224K	5750	X7R	200	220,000
11.	N2040/L104-5750X7R2H104K	5750	X7R	500	100,000

C0G base metal parts

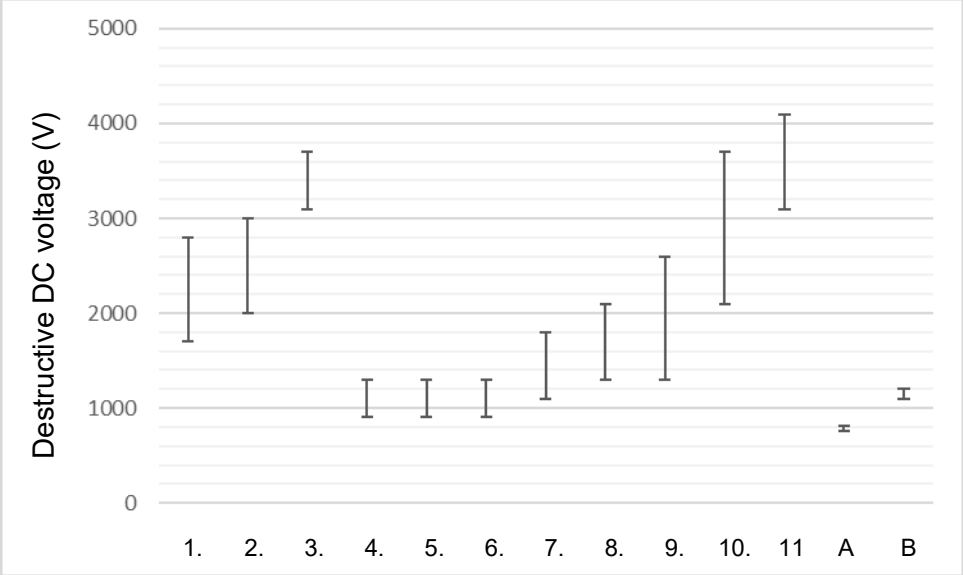
No	Part number	Size	Characteristic	Rated voltage (V)	capacitance (pF)
A	N2040/L104N1608C0G1H332J	1608	C0G	50	3,300
B	N2040/L104N2012C0G2A182J	2012	C0G	100	1,800

6.3 Destructive DC Voltage

(1) Test method
The test voltage shall be increased at the rate of 12.5 V/sec.

(2) The number of test samples shall be 10 units per part number.

(3) Test results



C0G precious metal parts

No	Part number	Size	Characteristic	Rated voltage (V)	capacitance (pF)
1.	N2040/L104-3216C0G1H332J	3216	C0G	50	3,300
2.	N2040/L104-3216C0G2A182J	3216	C0G	100	1,800
3.	N2040/L104-3216C0G2D391J	3216	C0G	200	390

X7R base metal parts

No	Part number	Size	Characteristic	Rated voltage (V)	capacitance (pF)
4.	N2040/L104-3225X7R1E105K	3225	X7R	25	1,000,000
5.	N2040/L104-4532X7R1E225K	4532	X7R	25	2,200,000
6.	N2040/L104-5750X7R1H474K	5750	X7R	50	470,000
7.	N2040/L104-5750X7R1H105K	5750	X7R	50	1,000,000
8.	N2040/L104-5750X7R2A224K	5750	X7R	100	220,000
9.	N2040/L104-5750X7R2A474K	5750	X7R	100	470,000
10.	N2040/L104-5750X7R2D224K	5750	X7R	200	220,000
11.	N2040/L104-5750X7R2H104K	5750	X7R	500	100,000

C0G base metal parts

No	Part number	Size	Characteristic	Rated voltage (V)	capacitance (pF)
A	N2040/L104N1608C0G1H332J	1608	C0G	50	3,300
B	N2040/L104N2012C0G2A182J	2012	C0G	100	1,800

6.4 Barometric Pressure (Reduced)

(1) Test method
This test shall be performed in accordance with test method 105 of MIL-STD-202 under the following conditions.
Mounting method: Lead wires shall be attached to the test capacitor.
Test condition: D (1.1kPa)
Rate of voltage application: Approximately 13 V/sec.
Charged and discharged currents: 50mA as a maximum

(2) The number of samples shall be 6 units per part number.

(3) Test results

Part no.		No.1	No.2	No.3	No.4	No.5	No.6	Max.	Min.	Avg.
N2040/L104-3216C0G1H332J	Discharge starting voltage (V)	520	540	545	530	510	570	570	510	535.8
	Dimension G (mm)	1.73	1.74	1.67	1.73	1.73	1.67	1.74	1.67	1.712
N2040/L104-3225X7R1E105K	Discharge starting voltage (V)	530	480	510	500	490	490	530	480	500.0
	Dimension G (mm)	1.78	1.80	1.84	1.79	1.83	1.82	1.84	1.78	1.810
N2040/L104-4532X7R1E225K	Discharge starting voltage (V)	460	450	455	460	430	460	460	430	452.5
	Dimension G (mm)	2.82	2.78	2.77	2.72	2.76	2.79	2.82	2.72	2.773
N2040/L104-5750X7R2H104K	Discharge starting voltage (V)	600	630	570	640	580	610	640	570	605.0
	Dimension G (mm)	3.90	3.88	3.94	3.94	3.95	3.93	3.95	3.88	3.923
N2040/L104-2012C0G2A150J	Discharge starting voltage (V)	580	500	560	590	500	500	590	500	538.3
	Dimension G (mm)	0.94	0.95	1.01	1.01	0.96	0.99	1.01	0.94	0.977
N2040/L104-1608C0G2D030C	Discharge starting voltage (V)	490	570	480	470	490	480	570	470	496.7
	Dimension G (mm)	0.86	0.87	0.85	0.91	0.91	0.86	0.91	0.85	0.877

Additional explanation

No new data was acquired for C0G base metal parts because it is not a new case size (dimension G) and the materials of the terminal electrode re-outer layer are the same.
The reference data are as follows.

- C0G base metal parts 1608 size is N2040/L104-1608C0G2D030C.
- C0G base metal parts 2012 size is N2040/L104-2012C0G2A150J.

7. RELIABILITY

7.1 Failure Rates

(1) Conditions and results of life test

C0G precious metal parts

Part number	Test condition (125 °C 1WV)			Test condition (125 °C 2WV)		
	Sample size	Test duration (hr.)	No. of defectives	Sample size	Test duration (hr.)	No. of defectives
N2040/L104-3216C0G1H332J	159	4000	0	175	4000	0
N2040/L104-3216C0G2A182J	159	4000	0	175	4000	0
N2040/L104-3216C0G2D391J	159	4000	0	175	4000	0

X7R base metal parts

Part number	Test condition (125 °C 1WV)			Test condition (125 °C 2WV)		
	Sample size	Test duration (hr.)	No. of defectives	Sample size	Test duration (hr.)	No. of defectives
N2040/L104-3225X7R1E105K	159	4000	0	175	4000	0
N2040/L104-4532X7R1E225K	159	4000	0	175	4000	0
N2040/L104-5750X7R1H474K	159	4000	0	175	4000	0
N2040/L104-5750X7R1H105K	159	4000	0	175	4000	0
N2040/L104-5750X7R2A224K	159	4000	0	175	4000	0
N2040/L104-5750X7R2A474K	159	4000	0	175	4000	0
N2040/L104-5750X7R2D224K	159	4000	0	175	4000	0
N2040/L104-5750X7R2H104K	159	4000	0	175	4000	0

C0G base metal parts

Part number	Test condition (125 °C 1WV)			Test condition (125 °C 2WV)		
	Sample size	Test duration (hr.)	No. of defectives	Sample size	Test duration (hr.)	No. of defectives
N2040/L104N1608C0G1H332J	-	-	-	246	4000	0
N2040/L104N2012C0G2A182J	-	-	-	246	4000	0

(2) Calculating failure rates

C0G precious metal parts

Part number	Component hour (hr.) (25 °C 1WV equivalent)			(Fit)
	Test condition (125 °C 1WV)	Test condition (125 °C 2WV)	Total	
N2040/L104-3216C0G1H332J	651,264,000	5,734,400,000	6,385,664,000	0.143
N2040/L104-3216C0G2A182J	651,264,000	5,734,400,000	6,385,664,000	0.143
N2040/L104-3216C0G2D391J	651,264,000	5,734,400,000	6,385,664,000	0.143

X7R base metal parts

Part number	Component hour (hr.) (25 °C 1WV equivalent)			(Fit)
	Test condition (125 °C 1WV)	Test condition (125 °C 2WV)	Total	
N2040/L104-3225X7R1E105K	651,264,000	5,734,400,000	6,385,664,000	0.143
N2040/L104-4532X7R1E225K	651,264,000	5,734,400,000	6,385,664,000	0.143
N2040/L104-5750X7R1H474K	651,264,000	5,734,400,000	6,385,664,000	0.143
N2040/L104-5750X7R1H105K	651,264,000	5,734,400,000	6,385,664,000	0.143
N2040/L104-5750X7R2A224K	651,264,000	5,734,400,000	6,385,664,000	0.143
N2040/L104-5750X7R2A474K	651,264,000	5,734,400,000	6,385,664,000	0.143
N2040/L104-5750X7R2D224K	651,264,000	5,734,400,000	6,385,664,000	0.143
N2040/L104-5750X7R2H104K	651,264,000	5,734,400,000	6,385,664,000	0.143

C0G base metal parts

Part number	Component hour (hr.) (25 °C 1WV equivalent)			(Fit)
	Test condition (125 °C 1WV)	Test condition (125 °C 2WV)	Total	
N2040/L104N1608C0G1H332J	-	8,060,928,000	8,060,928,000	0.113
N2040/L104N2012C0G2A182J	-	8,060,928,000	8,060,928,000	0.113

[Remarks]

1. Failure modes and specifications
   Insulation resistance, externals, capacitance change, dissipation factor
   (Specifications: As specified in JAXA-QTS-2040.)
2. Voltage is accelerated by three power rule and temperature is accelerated by 10 °C rule for converting to the application of rated voltage.
3. In the case of no failures, the failure rate is assured as follows (reliability level 60 %).
   $\lambda = 0.917/T$ (λ: failure rate, T: component hour)
   As a result from the calculation, the values in the table above satisfy S level
   (0.001 %/1000HR=10Fit as a maximum)

7.2 Possible Failure Mode

Insulation resistance degradation, high capacitance change rate, high dissipation factor change rate, decreased solderability strength and cracks can be possible.

8. STORAGE CONDITIONS

Observe the followings when the products are stored. Special cautions should be used about discoloration of terminal electrodes due to moisture and/or noxious fumes, which deteriorates solderability.

(1) Do not open the most internal package (heat sealed plastic bag). If opened, re-heat seal the package immediately or place the product in a desiccator with a drying agent.
(2) Keep the storage environments at ambient temperatures of between 5 and 40 °C and humidity of between 20 and 70 %RH.
(3) Keep the storage atmosphere free of noxious gases including sulfur and chlorine.
(4) Use high-dielectric products as soon as possible as their capacitance gradually decrease due to aging.

9. NOTES

9.1 Note for Cleaning

Ultrasonic cleaning shall be conducted with chamber output 20 W/l as a maximum for 5 minutes as a maximum.

9.2 Notes for Resin Coating

(1) Perform resin coating with a moisture-proof material for external insulation after the capacitor is mounted. Use a coating material of the minimum coefficient of thermal expansion.
(2) If an improper resin is used, capacitance reduction, degradation of insulation resistance or short-circuiting may be caused due to cracks in the ceramic element and/or detachment of terminal electrodes.
(3) If any problem is expected as a result of resin coating, change the coating material or perform buffer coating between the capacitor and the resin with a silicone resin.

9.3 Note for Tin Whisker

The products covered in this data sheet produce tin whiskers due to tin plated finish (terminal finish “Y”) on the external electrodes. Nodule whiskers around 30μm were observed as a result of the thermal shock test (at -30 to +100 °C for 1,000 cycles) in the development test. Consider the tin whisker issue in using the terminal finish “Y” products. Whiskers shall not grow on the terminal finish “S”.

9.4 DC Bias Characteristics

High-dielectric-constant capacitors exhibit capacitance variation when a DC voltage is applied.
Before use, select capacitors after considering this DC voltage characteristic.

Since the capacitors use dielectric ceramics that have voltage dependency, the capacitance may greatly vary when the applied DC voltage is high.
Therefore, to ensure the required capacitance, please confirm the following points:

(1) Check that the capacitance variation due to the applied voltage is within the allowable range, or that the application is not affected by such variation.
(2) The DC voltage characteristic shows that, even when the applied voltage is below the rated voltage, the capacitance change rate increases (decreases in value) as the applied voltage increases.
When using high-dielectric-constant capacitors in circuits such as time constant circuits, which require precise capacitance with a narrow tolerance, fully take into account the voltage characteristics, and carefully verify all characteristics under actual operating conditions and in the actual equipment.

9.5 AC Voltage Characteristics

High-dielectric-constant capacitors exhibit capacitance variation due to the applied AC voltage.
Before use, select capacitors after considering this AC voltage characteristic.

9.6 Others

To cut a PWB populated with capacitors, use a dedicated jig instead of manual cut to prevent breakage due to mechanical shocks.
For any questions with this data sheet, please contact:

10. OTHERS

For any questions with this data sheet, please contact:
Product Planning Section 1, Product Engineering Department, Sales Promotion Department, Ceramic Capacitor Division
Fukui Murata Manufacturing Co., Ltd.
Address: 13-1, Okamoto-cho, Echizen-shi, Fukui 915-8601 Japan
Telephone: +81-778-21-8371