

Registration No. 1262

JAXA-QTS-2040/L104G

15 November 2022

Superseding

JAXA-QTS-2040/L104F

Cancelled

15 November 2022

CAPACITORS, CHIP, FIXED, FINE CERAMIC DIELECTRIC,
(TEMPERATURE STABLE AND GENERAL PURPOSE)
(N2040/L104), HIGH RELIABILITY, SPACE USE,

DETAIL SPECIFICATION FOR

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

Issued by Japan Aerospace Exploration Agency

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 specification: June 14, 2023

JAXA-QTS-2040/L104G 15 November 2022		J A X A Parts Specification		Page	– L-i –																																																		
No. JMCG0-0017-R																																																							
Revision log																																																							
Rev.	Date	Revised Contents																																																					
NC	6 Oct. 2005	Original																																																					
A	12 Nov. 2007	Added the contents about terminal finish “S” products. The major changes are as follows: 1. Table L-1 Part number 2. Table L-3 Dimensions 3. Table L-4 Part list Note ⁽¹⁾ 4. Table L-5 Performance: Added solder coating in external electrode materials. Table L-2 Specification: Added Terminal finish (S, Y)																																																					
B	25 Jan. 2010	Corrected the errors of capacitance tolerance in Table L-4 Parts List. <table><tr><th rowspan="2">Part number</th><th>Capacitance tolerance</th><th>Capacitance tolerance</th></tr><tr><th>Error</th><th>Correction</th></tr><tr><td>N2040/L104-2012X7R1H391**</td><td>K, M</td><td>K</td></tr><tr><td>N2040/L104-2012X7R1H471**</td><td>K</td><td>K, M</td></tr><tr><td>N2040/L104-2012X7R1H561**</td><td>K, M</td><td>K</td></tr><tr><td>N2040/L104-2012X7R1H122**</td><td>K, M</td><td>K</td></tr><tr><td>N2040/L104-2012X7R1H152**</td><td>K</td><td>K, M</td></tr><tr><td>N2040/L104-2012X7R1H182**</td><td>K, M</td><td>K</td></tr><tr><td>N2040/L104-3216C0G1H182**</td><td>J</td><td>J, K</td></tr><tr><td>N2040/L104-3216C0G1H202**</td><td>J, K</td><td>J</td></tr><tr><td>N2040/L104-3216C0G1H222**</td><td>J</td><td>J, K</td></tr></table> Added the omitted parts numbers to Table L-4 Parts List <table><tr><th>Part number⁽¹⁾</th><th>Rated voltage (VDC)</th><th>Characteristic</th><th>Nominal capacitance</th><th>Capacitance tolerance</th><th>Mass (mg) (reference)</th></tr><tr><td>N2040/L104-3216C0G1H162**</td><td>50</td><td>C0G</td><td>1,600</td><td>J</td><td>30</td></tr><tr><td>N2040/L104-3216C0G1H242**</td><td>50</td><td>C0G</td><td>2,400</td><td>J</td><td>30</td></tr></table>				Part number	Capacitance tolerance	Capacitance tolerance	Error	Correction	N2040/L104-2012X7R1H391**	K, M	K	N2040/L104-2012X7R1H471**	K	K, M	N2040/L104-2012X7R1H561**	K, M	K	N2040/L104-2012X7R1H122**	K, M	K	N2040/L104-2012X7R1H152**	K	K, M	N2040/L104-2012X7R1H182**	K, M	K	N2040/L104-3216C0G1H182**	J	J, K	N2040/L104-3216C0G1H202**	J, K	J	N2040/L104-3216C0G1H222**	J	J, K	Part number ⁽¹⁾	Rated voltage (VDC)	Characteristic	Nominal capacitance	Capacitance tolerance	Mass (mg) (reference)	N2040/L104-3216C0G1H162**	50	C0G	1,600	J	30	N2040/L104-3216C0G1H242**	50	C0G	2,400	J	30
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C	27 Oct. 2014	Table L-7: Qualification Test and Table L-8: Quality Conformance Inspection (Group A): Changed the order of the test items “Insulation resistance (+125°C)” and “Dielectric withstanding voltage” for improving the operational efficiency as it was confirmed that changing the test order did not affect the characteristics. Table L-7: Qualification Test and Table L-9: Quality Conformance Inspection (Group B): Replaced “Terminal strength” with “Shear (Destructive)” test because measurement accuracy is low in the current terminal strength test and the evaluation jig is becoming hard to obtain. Therefore, the test is replaced with shear (destructive) test since it has the good past record in J2040/M105.																																																					

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No. JMCG0-0017-R				
Rev.	Date	Revised Contents		
D	30 Nov. 2016	Table L-5 Performance Requirements: Added voltage aging conditions to environmental performances, and voltage aging test method to paragraph 4.5.3. Table L-7 Qualification Test and Table L-8 Quality Conformance Inspection (Group A): Changed test method paragraph number of “Thermal shock and voltage aging” to paragraph 4.5.3 of this specification as it was confirmed that changing the voltage aging conditions for the purpose of shortening the manufacturing period did not affect the quality of the products except for some part type.		
E	28 Nov. 2019	· Table L-2 Rating: Note ⁽¹⁾ Changed the reference table number from Table L-4 to Supplementary Table 1 and left Table L-4 unassigned as the table of parts list is placed at the end of document. · Table L-3: Changed the dimensions L, W, T, G, and S to the proper values in order to reduce the selection effort by correcting the dimensions. · Paragraph 4.5.1 Shear (Destructive): Corrected error from “L Table L-12” to “Table L-12”. · Changed the wording to “Detachment of solder (from part or board surface)” in line with D of Table L-12. · Paragraph 4.5.2 Shear (Destructive) test methods: Changed a) Mounting method: “As specified in paragraph L.4.4.3” to As specified in paragraph L.4.4.3, Appendix L of JAXA-QTS-2040 for clarification. · Changed the table number from Table L-4 to Supplementary Table 1 in line with the expression in JAXA-QTS-2040/M105 (detail specification). · Tables L-7, L-8, L-9, L-10: Changed the wording of the title to “sample size/accept number” and combined the columns for clarification.		
F	27 June 2022	· Paragraph 1.2 Part number: Added part numbering system for C0G characteristics/internal electrode material base-metal parts (hereinafter referred to as C0G base metal parts) Reason: To distinguish the part numbers between the current C0G characteristics/internal electrode materials precious metal (hereinafter referred to as C0G precious metal) and the additional base metal to the product lineup. · Table L-2 Changed the nominal capacitance range for size 2012. Reason: To add C0G base metal parts to the product lineup. · Paragraph 1.4.2 Dielectric Thickness: Added dielectric thickness of C0G base metal parts. Reason: To add the product with the thickness not listed in Paragraph L.3.5.2.1 Dielectric of Appendix L · Table L-5: Added contents of dielectric, internal electrode material, and external electrode material for C0G base metal parts and clarified the difference from C0G precious metal parts, X7R characteristics, and internal electrode material base metal. Reason: To add the C0G base metal to the product lineup.		

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No. JMCG0-0017-R				
Rev.	Date	Revised Contents		
F	27 June 2022	Table L-5: Added the composition of silver. Reason: To align with detail specification. · Table L-7: Moved “Shear (destructive)” to XI-1 and deleted “Shear”. Reason: To align with Appendix L. · Table L-7 and Table L-9: Changed requirement paragraph and test method paragraph and sample size. Reason: To align with Appendix L. · Table L-7 and Table L-8: Changed the test method paragraph for thermal shock and voltage aging to paragraph 4.5.1. Reason: The number was moved up due to deletion of paragraph 4.5.1 Shear (destructive) and paragraph 4.5.2 Shear (destructive) test method. · Table L-8: Quality Conformance Inspection (Group A), A4-1 DPA: Changed the referred table for sample size from Table L-13 to Table L-14. Reason: To align with Appendix L. · Table L-9 Quality Conformance Inspection (Group B): Moved “Voltage-temperature characteristics” to Table L-10 Quality Conformance Inspection (Group C), and changed the group number in Table L-10. Reason: To align with Appendix L. · Table L-10 Quality Conformance Inspection (Group C): Deleted Shear. Reason: Should have deleted it in the previous revision. · Paragraph 4.5 Change to tests and inspections: Deleted paragraph 4.5.1 Shear (destructive) and paragraph 4.5.2 Shear (destructive) test method. Reason: No need to state Shear (destructive) as a change since the requirements (L.3.9.1) and test conditions (L.4.4.8.1) of JAXA-QTS-2040 Appendix L are applied. · Paragraph 4.5 Change to tests and inspections: Changed the paragraph of voltage aging test method to paragraph 4.5.3. Reason: the number was moved up due to deletion of paragraph 4.5.1 Shear (destructive) and paragraph 4.5.2 Shear (destructive) test method. · Paragraph 4.5.2 Quality Conformance Inspection (Groups B and C): Added classification table. Reason: To review the family of the products in Quality Conformance Inspection (Group C). · Supplementary Table 1 Parts List: Deleted capacitance tolerance designator "D" of N2040/L104-1608C0G1H0R5**. Reason: Capacitance tolerance designator "D" was deleted because the lower limit of capacitance value of 0pF is also a good product. · Supplementary Table 1 Parts List: C0G base metal parts were added to the product lineup. Reason: To add the C0G base metal pars to the product lineup.		

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G	15 Nov. 2022	· Paragraph 4.5 Change to tests and inspections: Added paragraph 4.5.3 Random vibration and shock to state that random vibration and shock are deleted and the group/order numbers of the tests are unassigned and the sample size of group I in Table L-7 is changed because (1) these tests are applicable to lead type, not surface mount type in accordance with MIL-PRF-123, MIL-PRF-32535, and MIL-PRF-55681 and (2) the structure and mounting form of the surface mount type are less susceptible to stress concentration than the lead type. · Paragraph 4.5 Change to tests and inspections: Added paragraph 4.5.4 Solder to state that silver content of tin/lead/silver solder shall be 3wt% or less because 3wt% silver containing solder is difficult to obtain. · Supplementary table 1 Parts list: Added footnote ⁽³⁾ to specify the part number of products which are scheduled to be discontinued.		

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**CAPACITORS, CHIP, FIXED, FINE CERAMIC DIELECTRIC,
(N2040/L104) HIGH RELIABILITY, SPACE USE,
DETAIL SPECIFICATION FOR**

1. GENERAL

1.1 Scope

This specification establishes the detail requirements for types 1608, 2012, 3216, 3225, 4532 and 5750 of space use, high reliability, general purpose, temperature stable, fine ceramic dielectric, fixed chip capacitors that satisfied JAXA-2040, Capacitors, Fixed, High Reliability, Space use, General Specification for (Appendix L).

1.2 Part Number

The part number of X7R characteristics / internal electrode base metal parts (hereinafter referred to as X7R base metal parts) shall consist of "NASDA2040/L104-", followed by style, characteristic, rated voltage, nominal capacitance, capacitance tolerance and terminal finish as given below (Example 1).

(Example 1)

NASDA ⁽¹⁾ 2040/L104	–	<u>1608</u>	<u>X7R</u>	<u>1E</u>	<u>102</u>	<u>K</u>	<u>Y</u>
		Style	Characteristic	Rated voltage	Nominal Capacitance	Capacitance tolerance	Terminal finish
		(L.1.3.1)	(L.1.3.2)	(L.1.3.3)	(L.1.3.4)	(L.1.3.5)	(L.1.3.6)

The part number of C0G characteristics / internal electrode precious metal parts (hereinafter referred to as C0G precious metal parts) and C0G characteristics / internal electrode base metal parts (hereinafter referred to as C0G base metal parts) shall consist of "NASDA2040/L104-", or "NASDA2040/L104N-", followed by style, characteristic, rated voltage, nominal capacitance, capacitance tolerance and terminal finish as given below (Example 2).

(Example 2)

NASDA ⁽¹⁾ 2040/L104	<u>N</u>	<u>1608</u>	<u>C0G</u>	<u>1H</u>	<u>332</u>	<u>J</u>	<u>Y</u>
		Style	Characteristic	Rated voltage	Nominal Capacitance	Capacitance tolerance	Terminal finish
		(L.1.3.1)	(L.1.3.2)	(L.1.3.3)	(L.1.3.4)	(L.1.3.5)	(L.1.3.6)

- : C0G precious metal parts

N : C0G base metal parts

Note ⁽¹⁾ "NASDA" indicates the common part for space use and may be abbreviated to "N".

Table L-1. Part Number

Item	Applicable paragraph of JAXA-QTS-2040	Description
Style ⁽¹⁾	L.1.3.1	1608, 2012, 3216, 3225, 4532, 5750
Characteristic	L.1.3.2	C0G, X7R
Rated voltage	L.1.3.3	1E (25V), 1H(50V), 2A(100V), 2D(200V), 2H (500V)
Nominal capacitance	L.1.3.4	e.g. 102 (1,000pF)
Capacitance tolerance	L.1.3.5	C (±0.25pF), D (±0.5pF), J (±5%), K (±10%), M (±20%)
Terminal finish	L.1.3.6	Y (100% Sn plating over Ni base barrier) S (Replacement solder coating for terminal finish “Y”)

Note⁽¹⁾ Indicates “rectangular, electrode in both directions” (see Figure L-1)

1.3 Rating

Ratings shall be as specified in Table L-2.

Table L-2. Rating

Item	Description					
	1608	2012	3216	3225	4532	5750
Characteristic	C0G, X7R	C0G, X7R	C0G, X7R	X7R	X7R	X7R
Rated voltage (V)	25, 50, 100, 200	25, 50, 100, 200	25, 50, 100, 200, 500	25, 50, 100, 200, 500	25, 50, 100, 200, 500	50, 100, 200, 500
Nominal capacitance (pF)	0.5 to 22,000	36 to 100,000	180 to 220,000	4,700 to 1,000,000	10,000 to 2,200,000	22,000 to 1,000,000
Capacitance tolerance	C, D, J, K, M	J, K, M	J, K, M	K, M	K, M	K, M
Terminal Finish	S, Y	S, Y	S, Y	S, Y	S, Y	S, Y

Note: See Supplementary table 1 for details.

1.4 Other Requirements

1.4.1 Externals and Dimensions

Externals and dimensions are shown in Figure L-1 and Table L-3, respectively.

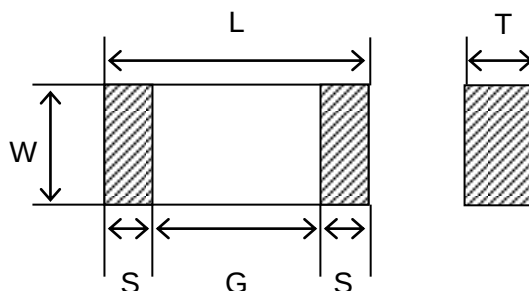


Figure L-1. Externals

Table L-3. Dimensions

(Unit: mm)

Style \ Symbol	L		W		T		G	S
	Max.	Min.	Max.	Min.	Max.	Min.		
1608	1.80	1.50	1.00	0.70	1.00	0.70	0.5 min.	0.2 to 0.6
2012	2.25	1.85	1.50	1.10	1.50	0.50	0.7 min.	0.2 to 0.8
3216	3.60	3.05	1.90	1.45	1.90	0.75	1.2 min.	0.3 min.
3225	3.60	2.90	2.80	2.30	2.80	0.80	1.0 min.	0.3 min.
4532	5.00	4.10	3.55	2.90	2.80	1.00	2.0 min.	0.3 min.
5750	6.20	5.30	5.45	4.60	2.05	1.00	2.0 min.	0.3 min.

1.4.2 Dielectric Thickness

The dielectric thickness (distance between opposing electrodes) of capacitors specified in Paragraph L.3.5.2.1, Appendix L of JAXA-QTS-2040 shall be as follows for C0G base metal parts 10 pF or more.

Table L-4. Dielectric Thickness of C0G Base Metal Parts

Rated voltage	Dielectric thickness
50V or less	2 μ m min.
More than 50V	5 μ m min.

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No. JMCG0-0017-R 2. APPLICABLE DOCUMENTS 2.1 Applicable Documents Refer to paragraph L.2.1, Appendix L of JAXA-QTS-2040 for applicable documents. 2.2 Reference Documents Refer to paragraph L.2.2, Appendix L of JAXA-QTS-2040 for reference documents. 3. REQUIREMENTS Requirements for capacitors shall be as specified in paragraph L.3, Appendix L of JAXA-QTS-2040 and as follows. 3.1 Performance Performance requirements shall be as specified in Table L-5.			

Table L-5. Performance Requirements

Item		Requirement paragraph of JAXA-QTS-2040	Performance
Materials	Dielectric	L.3.2 a)	C0G precious metal: Titanium oxide, C0G base metal: calcium zirconate, X7R base metal: barium titanate, based materials fired at a high-temperature. Dielectric constant shall be 30 to 5,000.
	Internal electrode	L.3.2	C0G precious metal: Palladium or silver-palladium C0G base metal: Nickel, X7R base metal: Nickel
	External electrode	L.3.2 b)	C0G precious metal: Silver or silver-palladium, C0G base metal: Copper, X7R base metal: Copper, and Tin plating finish. For terminal finish “S”, tin plating is replaced with silver Sn60Pb (containing 3wt% silver) by hot solder dip.
Design and construction		L.3.3	As specified in Figure L-1.
Non-destructive internal inspection		L.3.4	As specified in Appendix L of JAXA-QTS-2040. Ultrasonic test equipment shall be used.
Externals		L.3.5.1	As specified in Appendix L of JAXA-QTS-2040.
Dimension		L.3.5.2	As specified in Appendix L of JAXA-QTS-2040. Detailed dimensions shall be as given in Figure L-1 and Table L-3.
DPA		L.3.6.1	The following items shall be examined. Requirements specified in paragraph L.3.6, Appendix L of JAXA-QTS-2040 shall be satisfied. (1) Internal major dimensions (2) Craze or hole on the capacitor element (3) Separation of the Internal electrode and ceramic element (4) Voids or peeling of external electrodes
Electrical performance		L.3.8	As specified in Appendix L of JAXA-QTS-2040. Test voltage applied at the dielectric withstanding voltage test shall be 250% of DC rated voltage.
Mechanical performance		L.3.9	As specified in Appendix L of JAXA-QTS-2040.
Environmental performance		L.3.10	As specified in Appendix L of JAXA-QTS-2040. (However, random vibration and shock are not applied.) The conditions of voltage aging are as follows: Temperature: 125°C Voltage applied: Product with rated voltage of 200V max.: 400% of rated voltage Product with rated voltage of 500V: 200% of rated voltage Duration of application: Product with rated voltage of 200V max.: 21h Product with rated voltage of 500V: 168h
Durability performance		L.3.11	As specified in Appendix L of JAXA-QTS-2040.

3.2 Burn-In

When tested in accordance with paragraph 4.1.1, capacitors shall satisfy the following requirements.

- (a) Dielectric withstanding voltage: There shall be no damage or dielectric breakdown.
- (b) Insulation resistance (+25°C): 100,000MΩ or 1,000MΩ·μF, whichever is smaller as a minimum.
- (c) Capacitance: Within the tolerance specified in this specification
- (d) Dissipation factor:
 - (1) C0G characteristic
 - When the nominal capacitance is 30pF or over: $Q \geq 1,000$
 - When the nominal capacitance is less than 30pF: $Q \geq 400+20C$
(C: nominal capacitance (pF))
 - (2) X7R characteristic
 - $\tan \delta \leq 2.5\%$

4. QUALITY ASSURANCE PROVISIONS

Quality assurance provisions shall be as specified in paragraph L.4 of JAXA-QTS-2040, Appendix L and as follows.

4.1 In-Process Inspection

The in-process inspection shall be as specified in paragraph L.4.1 of JAXA-QTS-2040, Appendix L and Table L-6 of this specification.

Table L-6. In-Process Inspection

Inspection item	Requirement paragraph ⁽¹⁾	Test method paragraph ⁽¹⁾	Sample size
Non-destructive internal inspection	L.3.4	L.4.4.4	100%
Burn-in	3.2	4.1.1	100%
External	L.3.5.1	L.4.4.5	100%

Note ⁽¹⁾: This indicates paragraph number of JAXA-QTS-2040 except for Burn-in test for which the number indicates paragraph number of this specification.

4.1.1 Burn-In

Capacitors shall be tested as follows.

- (a) Test temperature: +85°C
- (b) Applied voltage: 200% of the rated voltage
- (c) Duration of application: 4 hours
- (d) Post-test measurements
 - The dielectric withstanding voltage, insulation resistance, capacitance, and dissipation factor shall be measured as specified in paragraphs L.4.4.7.3, L.4.4.7.4, L.4.4.7.1 and L.4.4.7.2, Appendix L of JAXA-QTS-2040.

4.2 Qualification Test

The qualification test shall be as specified in paragraph L.4.2, Appendix L of JAXA-QTS-2040 and Table L-7 of this specification.

Table L-7. Qualification Test

Group	Test order	Test item	Requirement paragraph	Test method paragraph	Pass/fail criteria
					Sample size / Accept number
I	1	Thermal shock and voltage aging	L.3.10.4	4.5.1 ⁽²⁾	221(0)
	2	Dielectric withstanding voltage	L.3.8.3	L.4.4.7.3	
	3	Insulation resistance (+125°C)	L.3.8.4	L.4.4.7.4	
	4	Insulation resistance (+25°C)	L.3.8.4	L.4.4.7.4	
	5	Capacitance	L.3.8.1	L.4.4.7.1	
	6	Dissipation factor	L.3.8.2	L.4.4.7.2	
II	1	Externals, dimensions, mass and marking	L.3.5	L.4.4.5	15(0)
	2	DPA	L.3.6.1	L.4.4.6.1	
III	1	Solderability	L.3.9.4	L.4.4.8.4	4(0)
	2	Resistance to soldering heat	L.3.9.5	L.4.4.8.5	4(0)
IV	1	Voltage-temperature characteristics	L.3.8.5	L.4.4.7.5	12(0)
	2	Moisture resistance	L.3.10.6	L.4.4.9.6	
V	1	Humidity, steady state, low voltage	L.3.10.7	L.4.4.9.7	12(0)
VI	1	Life	L.3.11.1	L.4.4.10.1	123(0)
VII	1	Barometric pressure (reduced)	L.3.10.8	L.4.4.9.8	6(0)
VIII	1	Thermal shock and immersion cycling	L.3.10.5	L.4.4.9.5	18(0)
IX	1	(Deleted)	–	–	–
	2	(Deleted)	–	–	–
X	1	Thermal shock (I)	L.3.10.3	L.4.4.9.3	18(0)
XI	1	Shear (Destructive)	L.3.9.1	L.4.4.8.1	6(0)
	2	Substrate bending	L.3.9.3	L.4.4.8.3	3(0)
–	–	Material	L.3.2	–	⁽¹⁾

Notes ⁽¹⁾ Documents shall be submitted to prove that the samples satisfy the design specification.

⁽²⁾ Indicates the paragraph number of this specification.

4.3 Quality Conformance Inspection

The quality conformance inspections shall be as specified in paragraph L.4.3, Appendix L of JAXA-QTS-2040 and Tables L-8 through L-10 of this specification.

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Table L-8. Quality Conformance Inspection (Group A)

Subgroup	Test order	Inspection item	Requirement paragraph	Test method paragraph	Pass/fail criteria
					Sample size / Accept number
A1	1	Thermal shock and voltage aging	L.3.10.4	4.5.1 ⁽¹⁾	100%(0)
	2	Dielectric withstanding voltage	L.3.8.3	L.4.4.7.3	
	3	Insulation resistance (+125°C)	L.3.8.4	L.4.4.7.4	
	4	Insulation resistance (+25°C)	L.3.8.4	L.4.4.7.4	
	5	Capacitance	L.3.8.1	L.4.4.7.1	
	6	Dissipation factor	L.3.8.2	L.4.4.7.2	
A2	1	Externals, dimensions, mass and marking	L.3.5	L.4.4.5	20(0)
A3	1	Humidity, steady state, low voltage	L.3.10.7	L.4.4.9.7	12(0)
A4	1	DPA	L.3.6.1	L.4.4.6.1	Table L-14 in Appendix L of JAXA-QTS-2040

Note⁽¹⁾ Indicates the paragraph number of this specification.**Table L-9. Quality Conformance Inspection (Group B)**

Subgroup	Test order	Inspection item	Requirement paragraph	Test method paragraph	Pass/fail criteria
					Sample size / Accept number
B1	1	Thermal shock	L.3.11.1	L.4.4.9.4.1	25(0)
	2	Life		L.4.4.10.1	
B2	1	Moisture resistance	L.3.10.6	L.4.4.9.6	12(0)
B3	1	Shear (Destructive)	L.3.9.1	L.4.4.8.1	6(0)
	2	Solderability	L.3.9.4	L.4.4.8.4	6(0)
	3	Resistance to soldering heat	L.3.9.5	L.4.4.8.5	6(0)

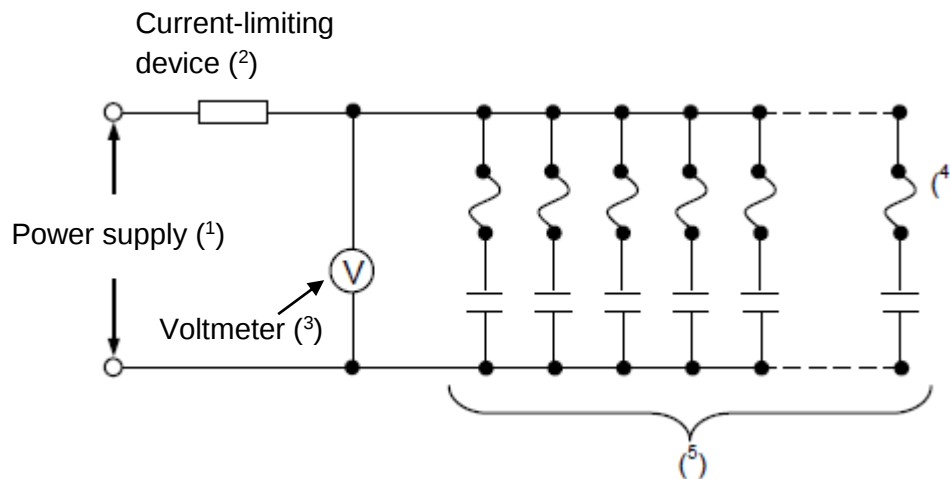
Table L-10. Quality Conformance Inspection (Group C)

Subgroup	Test order	Inspection item	Requirement paragraph	Test method paragraph	Pass/fail criteria
					Sample size / Accept number
C1	1	Barometric pressure (reduced)	L.3.10.8	L.4.4.9.8	6(0)
C2	1	Thermal shock and immersion cycling	L.3.10.5	L.4.4.9.5	18(0)
C3	1	Voltage-temperature characteristics	L.3.8.5	L.4.4.7.5	12(0)
C4	1	(Deleted)	—	—	—
	2	(Deleted)	—	—	—
C5	1	Thermal shock (I)	L.3.10.3	L.4.4.9.3	6(0)
C6	1	Substrate bending	L.3.9.3	L.4.4.8.3	3(0)

4.4 Long-Term Storage

Long-term storage shall be as follows and in accordance with paragraphs L.4.5, Appendix L of JAXA-QTS-2040.

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No. JMCG0-0017-R 4.4.1 Storage by Purchasers Capacitors shall not be stored at a high temperature and humidity or in an atmosphere polluted by such as sulfur or chlorine gas. Storage environment shall be an ambient temperature between 5 and 40°C and humidity between 20 and 70%RH. The individual package shall be only opened just prior to use. Opened capacitors shall be stored under the specified conditions after being appropriately packaged to avoid being adversely affected. 4.5 Change to Tests and Inspections There are changes to the test or inspection from the quality conformance inspection specified in Appendix L of JAXA-QTS-2040. 4.5.1 Test Method of Voltage Aging After the completion of thermal shock test specified in paragraph L.4.4.9.4.1, Appendix L of JAXA-QTS-2040, voltage aging test shall be conducted under the following conditions. During the test, the circuit shown in Figure L-2 shall be used to maintain a minimum of 95% of specified test voltage was maintained. Blown fuses or the voltage drop below 95% of the specified voltage shall constitute failure of the test. a) Temperature: $+125_{-0}^{+4}$ °C b) Applied voltage: - Product with rated voltage of 200V max.: 400% of rated voltage - Product with rated voltage of 500V: 200% of rated voltage c) Duration of application - Product with rated voltage of 200V max.: 21 hours min. - Product with rated voltage of 500V: 168 hours min. The time allowed to reach the specified voltage from 0V shall be within 2 minutes. The test shall be conducted in accordance with JIS Z 3198-7. d) Post-test inspection and measurement At the completion of the test while the capacitor is still maintained at the test temperature, insulation resistance shall be measured as specified in paragraph L.4.4.7.4, Appendix L of JAXA-QTS-2040. The test capacitor may be transferred to another chamber maintained at the same test temperature to measure the insulation resistance. The transfer time shall not exceed 15 minutes. The measurement shall be made after the test capacitor is stabilized at the test temperature. Then, the capacitor shall be restored back to its standard condition as specified in paragraph L.4.4.1 and the externals shall be examined using 10x magnification for any evidence of mechanical damages. Also, dielectric withstanding voltage, insulation resistance, capacitance, and dissipation factor shall be measured as specified in paragraphs L.4.4.7.3, L.4.4.7.4, L.4.4.7.1, and L.4.4.7.2, respectively.			



Notes:

- (¹) The power supply shall be capable of providing at least twice the rated voltage of the capacitor at a leakage current of 30mA as a minimum.
- (²) The current-limiting device shall be a resistor and/or a fuse which current is limited to the range from 30mA to 10A.
- (³) The voltmeter shall have the function that triggers an alarm and terminates the test if the applied voltage falls below 95% of the specified voltage.
- (⁴) A fuse or a resistor may be used if desired by a customer. Regardless of the use of a fuse/resistor, the specified test voltage shall still be applied to the capacitor.
- (⁵) The number of capacitors to be tested per circuit shall be 10 or more.

Figure L-2. Test Circuit for Voltage Aging

4.5.2 Quality Conformance Inspection (Group B and Group C)

Group B and Group C of the quality conformance inspection shall be conducted for each combination of characteristics and dielectric materials, and the composition of the inspection lot shall be in accordance with JAXA-QTS-2040 paragraph 4.5.2.1. If there is more than one lot in a combination submitted to the Group A inspection at the same time, the sample shall be taken from the lot with the highest electric field strength.

Table L-13. Classification of Quality Conformance Inspection (Group B and Group C)

No.	Characteristics	No. of classification	Dielectric materials
1	C0G	3	A,B,C
2	X7R	2	D, E

4.5.3 Random Vibration and Shock

Random vibration and shock are deleted from environmental performance of Table L-5 Performance requirements, Table L-7 Qualification test and Table L-10 Quality

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No. JMCG0-0017-R conformance inspection (Group C). Due to the deletion, the group/order numbers of the tests are unassigned and the sample size of group I of Table L-7 is changed. 4.5.4 Solder The silver content of tin/lead/silver solder specified in paragraph L.4.4.3 (Mounting of Test Samples), Appendix L of JAXA-QTS-2040 shall be 3wt% or less. 5. PREPARATION FOR DELIVERY Preparation for delivery shall be as follows and as specified in Section 5 of JAXA-QTS-2040. 6. NOTES Notes shall be as specified in paragraph 6 of JAXA-QTS-2040. In addition to the information specified in paragraph 6.2.1 of JAXA-QTS-2040, packaging style shall be designated when purchasing the products.			

Supplementary Table 1. Parts List

Part number ⁽¹⁾	Rated voltage (VDC)	Characteristic	Nominal capacitance (pF)	Capacitance tolerance ⁽²⁾	Mass (mg) (reference)
N2040/L104-1608C0G1H0R5** ⁽³⁾	50	C0G	0.5	C	4
N2040/L104-1608C0G1HR75** ⁽³⁾	50	C0G	0.75	C,D	4
N2040/L104-1608C0G1H010** ⁽³⁾	50	C0G	1.0	C,D	4
N2040/L104-1608C0G1H1R5** ⁽³⁾	50	C0G	1.5	C,D	4
N2040/L104-1608C0G1H020** ⁽³⁾	50	C0G	2.0	C,D	4
N2040/L104-1608C0G1H2R5** ⁽³⁾	50	C0G	2.5	C,D	4
N2040/L104-1608C0G1H030** ⁽³⁾	50	C0G	3.0	C,D	4
N2040/L104-1608C0G1H3R5** ⁽³⁾	50	C0G	3.5	C,D	4
N2040/L104-1608C0G1H040** ⁽³⁾	50	C0G	4.0	C,D	4
N2040/L104-1608C0G1H4R5** ⁽³⁾	50	C0G	4.5	C,D	4
N2040/L104-1608C0G1H050** ⁽³⁾	50	C0G	5.0	C,D	4
N2040/L104-1608C0G1H5R5** ⁽³⁾	50	C0G	5.5	C,D	4
N2040/L104-1608C0G1H060** ⁽³⁾	50	C0G	6.0	C,D	4
N2040/L104-1608C0G1H6R5** ⁽³⁾	50	C0G	6.5	C,D	4
N2040/L104-1608C0G1H070** ⁽³⁾	50	C0G	7.0	C,D	4
N2040/L104-1608C0G1H7R5** ⁽³⁾	50	C0G	7.5	C,D	4
N2040/L104-1608C0G1H080** ⁽³⁾	50	C0G	8.0	C,D	4
N2040/L104-1608C0G1H8R5** ⁽³⁾	50	C0G	8.5	C,D	4
N2040/L104-1608C0G1H090** ⁽³⁾	50	C0G	9.0	C,D	4
N2040/L104-1608C0G1H9R5** ⁽³⁾	50	C0G	9.5	C,D	4
N2040/L104-1608C0G1H100** ⁽³⁾	50	C0G	10	C,D	4
N2040/L104-1608C0G1H110** ⁽³⁾	50	C0G	11	J	4
N2040/L104-1608C0G1H120** ⁽³⁾	50	C0G	12	J,K	4
N2040/L104-1608C0G1H130** ⁽³⁾	50	C0G	13	J	4
N2040/L104-1608C0G1H150** ⁽³⁾	50	C0G	15	J,K	4
N2040/L104-1608C0G1H160** ⁽³⁾	50	C0G	16	J	4
N2040/L104-1608C0G1H180** ⁽³⁾	50	C0G	18	J,K	4
N2040/L104-1608C0G1H200** ⁽³⁾	50	C0G	20	J	4
N2040/L104-1608C0G1H220** ⁽³⁾	50	C0G	22	J,K	4
N2040/L104-1608C0G1H240** ⁽³⁾	50	C0G	24	J	4
N2040/L104-1608C0G1H270** ⁽³⁾	50	C0G	27	J,K	4
N2040/L104-1608C0G1H300** ⁽³⁾	50	C0G	30	J	4
N2040/L104-1608C0G1H330** ⁽³⁾	50	C0G	33	J,K	4
N2040/L104-1608C0G1H360** ⁽³⁾	50	C0G	36	J	4
N2040/L104-1608C0G1H390** ⁽³⁾	50	C0G	39	J,K	4
N2040/L104-1608C0G1H430** ⁽³⁾	50	C0G	43	J	4
N2040/L104-1608C0G1H470** ⁽³⁾	50	C0G	47	J,K	4
N2040/L104-1608C0G1H510** ⁽³⁾	50	C0G	51	J	4
N2040/L104-1608C0G1H560** ⁽³⁾	50	C0G	56	J,K	4

Supplementary Table 1. Parts List (Continued)

Part number ⁽¹⁾	Rated voltage (VDC)	Characteristic	Nominal capacitance (pF)	Capacitance tolerance ⁽²⁾	Mass (mg) (reference)
N2040/L104-1608C0G1H620** ⁽³⁾	50	C0G	62	J	4
N2040/L104-1608C0G1H680** ⁽³⁾	50	C0G	68	J,K	4
N2040/L104-1608C0G1H750** ⁽³⁾	50	C0G	75	J	4
N2040/L104-1608C0G1H820** ⁽³⁾	50	C0G	82	J,K	4
N2040/L104-1608C0G1H910** ⁽³⁾	50	C0G	91	J	4
N2040/L104-1608C0G1H101** ⁽³⁾	50	C0G	100	J,K	4
N2040/L104-1608C0G1H111** ⁽³⁾	50	C0G	110	J	4
N2040/L104-1608C0G1H121** ⁽³⁾	50	C0G	120	J,K	4
N2040/L104-1608C0G1H131** ⁽³⁾	50	C0G	130	J	4
N2040/L104-1608C0G1H151** ⁽³⁾	50	C0G	150	J,K	4
N2040/L104-1608C0G1H161** ⁽³⁾	50	C0G	160	J	4
N2040/L104-1608C0G1H181** ⁽³⁾	50	C0G	180	J,K	4
N2040/L104-1608C0G1H201** ⁽³⁾	50	C0G	200	J	4
N2040/L104-1608C0G1H221** ⁽³⁾	50	C0G	220	J,K	4
N2040/L104-1608C0G1H241** ⁽³⁾	50	C0G	240	J	4
N2040/L104-1608C0G1H271** ⁽³⁾	50	C0G	270	J,K	4
N2040/L104-1608C0G1H301** ⁽³⁾	50	C0G	300	J	4
N2040/L104-1608C0G1H331** ⁽³⁾	50	C0G	330	J,K	4
N2040/L104-1608C0G2A390** ⁽³⁾	100	C0G	39	J,K	4
N2040/L104-1608C0G2A430** ⁽³⁾	100	C0G	43	J	4
N2040/L104-1608C0G2A470** ⁽³⁾	100	C0G	47	J,K	4
N2040/L104-1608C0G2A510** ⁽³⁾	100	C0G	51	J	4
N2040/L104-1608C0G2A560** ⁽³⁾	100	C0G	56	J,K	4
N2040/L104-1608C0G2A620** ⁽³⁾	100	C0G	62	J	4
N2040/L104-1608C0G2A680** ⁽³⁾	100	C0G	68	J,K	4
N2040/L104-1608C0G2A750** ⁽³⁾	100	C0G	75	J	4
N2040/L104-1608C0G2A820** ⁽³⁾	100	C0G	82	J,K	4
N2040/L104-1608C0G2A910** ⁽³⁾	100	C0G	91	J	4
N2040/L104-1608C0G2A101** ⁽³⁾	100	C0G	100	J,K	4
N2040/L104-1608C0G2A111** ⁽³⁾	100	C0G	110	J	4
N2040/L104-1608C0G2A121** ⁽³⁾	100	C0G	120	J,K	4
N2040/L104-1608C0G2A131** ⁽³⁾	100	C0G	130	J	4
N2040/L104-1608C0G2A151** ⁽³⁾	100	C0G	150	J,K	4
N2040/L104-1608C0G2D030** ⁽³⁾	200	C0G	3.0	C,D	4
N2040/L104-1608C0G2D3R5** ⁽³⁾	200	C0G	3.5	C,D	4
N2040/L104-1608C0G2D040** ⁽³⁾	200	C0G	4.0	C,D	4
N2040/L104-1608C0G2D4R5** ⁽³⁾	200	C0G	4.5	C,D	4
N2040/L104-1608C0G2D050** ⁽³⁾	200	C0G	5.0	C,D	4
N2040/L104-1608C0G2D5R5** ⁽³⁾	200	C0G	5.5	C,D	4

Supplementary Table 1. Parts List (Continued)

Part number ⁽¹⁾	Rated voltage (VDC)	Characteristic	Nominal capacitance (pF)	Capacitance tolerance ⁽²⁾	Mass (mg) (reference)
N2040/L104-1608C0G2D060** ⁽³⁾	200	C0G	6.0	C,D	4
N2040/L104-1608C0G2D6R5** ⁽³⁾	200	C0G	6.5	C,D	4
N2040/L104-1608C0G2D070** ⁽³⁾	200	C0G	7.0	C,D	4
N2040/L104-1608C0G2D7R5** ⁽³⁾	200	C0G	7.5	C,D	4
N2040/L104-1608C0G2D080** ⁽³⁾	200	C0G	8.0	C,D	4
N2040/L104-1608C0G2D8R5** ⁽³⁾	200	C0G	8.5	C,D	4
N2040/L104-1608C0G2D090** ⁽³⁾	200	C0G	9.0	C,D	4
N2040/L104-1608C0G2D9R5** ⁽³⁾	200	C0G	9.5	C,D	4
N2040/L104-1608C0G2D100** ⁽³⁾	200	C0G	10	C,D	4
N2040/L104-1608C0G2D110** ⁽³⁾	200	C0G	11	J	4
N2040/L104-1608C0G2D120** ⁽³⁾	200	C0G	12	J,K	4
N2040/L104-1608C0G2D130** ⁽³⁾	200	C0G	13	J	4
N2040/L104-1608C0G2D150** ⁽³⁾	200	C0G	15	J,K	4
N2040/L104-1608C0G2D160** ⁽³⁾	200	C0G	16	J	4
N2040/L104-1608C0G2D180** ⁽³⁾	200	C0G	18	J,K	4
N2040/L104-1608C0G2D200** ⁽³⁾	200	C0G	20	J	4
N2040/L104-1608C0G2D220** ⁽³⁾	200	C0G	22	J,K	4
N2040/L104-1608C0G2D240** ⁽³⁾	200	C0G	24	J	4
N2040/L104-1608C0G2D270** ⁽³⁾	200	C0G	27	J,K	4
N2040/L104-1608C0G2D300** ⁽³⁾	200	C0G	30	J	4
N2040/L104-1608C0G2D330** ⁽³⁾	200	C0G	33	J,K	4
N2040/L104-1608X7R1E221**	25	X7R	220	K,M	4
N2040/L104-1608X7R1E271**	25	X7R	270	K	4
N2040/L104-1608X7R1E331**	25	X7R	330	K,M	4
N2040/L104-1608X7R1E391**	25	X7R	390	K	4
N2040/L104-1608X7R1E471**	25	X7R	470	K,M	4
N2040/L104-1608X7R1E561**	25	X7R	560	K	4
N2040/L104-1608X7R1E681**	25	X7R	680	K,M	4
N2040/L104-1608X7R1E821**	25	X7R	820	K	4
N2040/L104-1608X7R1E102**	25	X7R	1,000	K,M	4
N2040/L104-1608X7R1E122**	25	X7R	1,200	K	4
N2040/L104-1608X7R1E152**	25	X7R	1,500	K,M	4
N2040/L104-1608X7R1E182**	25	X7R	1,800	K	4
N2040/L104-1608X7R1E222**	25	X7R	2,200	K,M	4
N2040/L104-1608X7R1E272**	25	X7R	2,700	K	4
N2040/L104-1608X7R1E332**	25	X7R	3,300	K,M	4
N2040/L104-1608X7R1E392**	25	X7R	3,900	K	4
N2040/L104-1608X7R1E472**	25	X7R	4,700	K,M	4
N2040/L104-1608X7R1E562**	25	X7R	5,600	K	4

Supplementary Table 1. Parts List (Continued)

Part number ⁽¹⁾	Rated voltage (VDC)	Characteristic	Nominal capacitance (pF)	Capacitance tolerance ⁽²⁾	Mass (mg) (reference)
N2040/L104-1608X7R1E682**	25	X7R	6,800	K,M	4
N2040/L104-1608X7R1E822**	25	X7R	8,200	K	4
N2040/L104-1608X7R1E103**	25	X7R	10,000	K,M	4
N2040/L104-1608X7R1E123**	25	X7R	12,000	K	4
N2040/L104-1608X7R1E153**	25	X7R	15,000	K,M	4
N2040/L104-1608X7R1E183**	25	X7R	18,000	K	4
N2040/L104-1608X7R1E223**	25	X7R	22,000	K,M	4
N2040/L104-1608X7R1H221**	50	X7R	220	K,M	4
N2040/L104-1608X7R1H271**	50	X7R	270	K	4
N2040/L104-1608X7R1H331**	50	X7R	330	K,M	4
N2040/L104-1608X7R1H391**	50	X7R	390	K	4
N2040/L104-1608X7R1H471**	50	X7R	470	K,M	4
N2040/L104-1608X7R1H561**	50	X7R	560	K	4
N2040/L104-1608X7R1H681**	50	X7R	680	K,M	4
N2040/L104-1608X7R1H821**	50	X7R	820	K	4
N2040/L104-1608X7R1H102**	50	X7R	1,000	K,M	4
N2040/L104-1608X7R1H122**	50	X7R	1,200	K	4
N2040/L104-1608X7R1H152**	50	X7R	1,500	K,M	4
N2040/L104-1608X7R1H182**	50	X7R	1,800	K	4
N2040/L104-1608X7R1H222**	50	X7R	2,200	K,M	4
N2040/L104-1608X7R1H272**	50	X7R	2,700	K	4
N2040/L104-1608X7R1H332**	50	X7R	3,300	K,M	4
N2040/L104-2012C0G1H391** ⁽³⁾	50	C0G	390	J,K	18
N2040/L104-2012C0G1H431** ⁽³⁾	50	C0G	430	J	18
N2040/L104-2012C0G1H471** ⁽³⁾	50	C0G	470	J,K	18
N2040/L104-2012C0G1H511** ⁽³⁾	50	C0G	510	J	18
N2040/L104-2012C0G1H561** ⁽³⁾	50	C0G	560	J,K	18
N2040/L104-2012C0G1H621** ⁽³⁾	50	C0G	620	J	18
N2040/L104-2012C0G1H681** ⁽³⁾	50	C0G	680	J,K	18
N2040/L104-2012C0G1H751** ⁽³⁾	50	C0G	750	J	18
N2040/L104-2012C0G1H821** ⁽³⁾	50	C0G	820	J,K	18
N2040/L104-2012C0G1H911** ⁽³⁾	50	C0G	910	J	18
N2040/L104-2012C0G1H102** ⁽³⁾	50	C0G	1,000	J,K	18
N2040/L104-2012C0G1H112** ⁽³⁾	50	C0G	1,100	J	18
N2040/L104-2012C0G1H122** ⁽³⁾	50	C0G	1,200	J,K	18
N2040/L104-2012C0G2A680** ⁽³⁾	100	C0G	68	J,K	18
N2040/L104-2012C0G2A750** ⁽³⁾	100	C0G	75	J	18
N2040/L104-2012C0G2A820** ⁽³⁾	100	C0G	82	J,K	18
N2040/L104-2012C0G2A910** ⁽³⁾	100	C0G	91	J	18

Supplementary Table 1. Parts List (Continued)

Part number ⁽¹⁾	Rated voltage (VDC)	Characteristic	Nominal capacitance (pF)	Capacitance tolerance ⁽²⁾	Mass (mg) (reference)
N2040/L104-2012C0G2A101** ⁽³⁾	100	C0G	100	J,K	18
N2040/L104-2012C0G2A111** ⁽³⁾	100	C0G	110	J	18
N2040/L104-2012C0G2A121** ⁽³⁾	100	C0G	120	J,K	18
N2040/L104-2012C0G2A131** ⁽³⁾	100	C0G	130	J	18
N2040/L104-2012C0G2A151** ⁽³⁾	100	C0G	150	J,K	18
N2040/L104-2012C0G2A161** ⁽³⁾	100	C0G	160	J	18
N2040/L104-2012C0G2A181** ⁽³⁾	100	C0G	180	J,K	18
N2040/L104-2012C0G2A201** ⁽³⁾	100	C0G	200	J	18
N2040/L104-2012C0G2A221** ⁽³⁾	100	C0G	220	J,K	18
N2040/L104-2012C0G2A241** ⁽³⁾	100	C0G	240	J	18
N2040/L104-2012C0G2A271** ⁽³⁾	100	C0G	270	J,K	18
N2040/L104-2012C0G2A301** ⁽³⁾	100	C0G	300	J	18
N2040/L104-2012C0G2A331** ⁽³⁾	100	C0G	330	J,K	18
N2040/L104-2012C0G2A361** ⁽³⁾	100	C0G	360	J	18
N2040/L104-2012C0G2A391** ⁽³⁾	100	C0G	390	J,K	18
N2040/L104-2012C0G2A431** ⁽³⁾	100	C0G	430	J	18
N2040/L104-2012C0G2A471** ⁽³⁾	100	C0G	470	J,K	18
N2040/L104-2012C0G2A511** ⁽³⁾	100	C0G	510	J	18
N2040/L104-2012C0G2A561** ⁽³⁾	100	C0G	560	J,K	18
N2040/L104-2012C0G2A621** ⁽³⁾	100	C0G	620	J	18
N2040/L104-2012C0G2A681** ⁽³⁾	100	C0G	680	J,K	18
N2040/L104-2012C0G2D390** ⁽³⁾	200	C0G	39	J,K	18
N2040/L104-2012C0G2D430** ⁽³⁾	200	C0G	43	J	18
N2040/L104-2012C0G2D470** ⁽³⁾	200	C0G	47	J,K	18
N2040/L104-2012C0G2D510** ⁽³⁾	200	C0G	51	J	18
N2040/L104-2012C0G2D560** ⁽³⁾	200	C0G	56	J,K	18
N2040/L104-2012C0G2D620** ⁽³⁾	200	C0G	62	J	18
N2040/L104-2012C0G2D680** ⁽³⁾	200	C0G	68	J,K	18
N2040/L104-2012C0G2D750** ⁽³⁾	200	C0G	75	J	18
N2040/L104-2012C0G2D820** ⁽³⁾	200	C0G	82	J,K	18
N2040/L104-2012C0G2D910** ⁽³⁾	200	C0G	91	J	18
N2040/L104-2012C0G2D101** ⁽³⁾	200	C0G	100	J,K	18
N2040/L104-2012C0G2D111** ⁽³⁾	200	C0G	110	J	18
N2040/L104-2012C0G2D121** ⁽³⁾	200	C0G	120	J,K	18
N2040/L104-2012C0G2D131** ⁽³⁾	200	C0G	130	J	18
N2040/L104-2012C0G2D151** ⁽³⁾	200	C0G	150	J,K	18
N2040/L104-2012X7R1E331**	25	X7R	330	K, M	18
N2040/L104-2012X7R1E391**	25	X7R	390	K	18
N2040/L104-2012X7R1E471**	25	X7R	470	K, M	18

Supplementary Table 1. Parts List (Continued)

Part number ⁽¹⁾	Rated voltage (VDC)	Characteristic	Nominal capacitance (pF)	Capacitance tolerance ⁽²⁾	Mass (mg) (reference)
N2040/L104-2012X7R1E561**	25	X7R	560	K	18
N2040/L104-2012X7R1E681**	25	X7R	680	K、M	18
N2040/L104-2012X7R1E821**	25	X7R	820	K	18
N2040/L104-2012X7R1E102**	25	X7R	1,000	K、M	18
N2040/L104-2012X7R1E122**	25	X7R	1,200	K	18
N2040/L104-2012X7R1E152**	25	X7R	1,500	K、M	18
N2040/L104-2012X7R1E182**	25	X7R	1,800	K	18
N2040/L104-2012X7R1E222**	25	X7R	2,200	K、M	18
N2040/L104-2012X7R1E272**	25	X7R	2,700	K	18
N2040/L104-2012X7R1E332**	25	X7R	3,300	K、M	18
N2040/L104-2012X7R1E392**	25	X7R	3,900	K	18
N2040/L104-2012X7R1E472**	25	X7R	4,700	K、M	18
N2040/L104-2012X7R1E562**	25	X7R	5,600	K	18
N2040/L104-2012X7R1E682**	25	X7R	6,800	K、M	18
N2040/L104-2012X7R1E822**	25	X7R	8,200	K	18
N2040/L104-2012X7R1E103**	25	X7R	10,000	K、M	18
N2040/L104-2012X7R1E123**	25	X7R	12,000	K	18
N2040/L104-2012X7R1E153**	25	X7R	15,000	K、M	18
N2040/L104-2012X7R1E183**	25	X7R	18,000	K	18
N2040/L104-2012X7R1E223**	25	X7R	22,000	K、M	18
N2040/L104-2012X7R1E273**	25	X7R	27,000	K	18
N2040/L104-2012X7R1E333**	25	X7R	33,000	K、M	18
N2040/L104-2012X7R1E393**	25	X7R	39,000	K	18
N2040/L104-2012X7R1E473**	25	X7R	47,000	K、M	18
N2040/L104-2012X7R1E563**	25	X7R	56,000	K	18
N2040/L104-2012X7R1E683**	25	X7R	68,000	K、M	18
N2040/L104-2012X7R1E823**	25	X7R	82,000	K	18
N2040/L104-2012X7R1E104**	25	X7R	100,000	K、M	18
N2040/L104-2012X7R1H221**	50	X7R	220	K、M	18
N2040/L104-2012X7R1H271**	50	X7R	270	K	18
N2040/L104-2012X7R1H331**	50	X7R	330	K、M	18
N2040/L104-2012X7R1H391**	50	X7R	390	K	18
N2040/L104-2012X7R1H471**	50	X7R	470	K、M	18
N2040/L104-2012X7R1H561**	50	X7R	560	K	18
N2040/L104-2012X7R1H681**	50	X7R	680	K、M	18
N2040/L104-2012X7R1H821**	50	X7R	820	K	18
N2040/L104-2012X7R1H102**	50	X7R	1,000	K、M	18
N2040/L104-2012X7R1H122**	50	X7R	1,200	K	18
N2040/L104-2012X7R1H152**	50	X7R	1,500	K、M	18

Supplementary Table 1. Parts List (Continued)

Part number ⁽¹⁾	Rated voltage (VDC)	Characteristic	Nominal capacitance (pF)	Capacitance tolerance ⁽²⁾	Mass (mg) (reference)
N2040/L104-2012X7R1H182**	50	X7R	1,800	K	18
N2040/L104-2012X7R1H222**	50	X7R	2,200	K,M	18
N2040/L104-2012X7R1H272**	50	X7R	2,700	K	18
N2040/L104-2012X7R1H332**	50	X7R	3,300	K,M	18
N2040/L104-2012X7R1H392**	50	X7R	3,900	K	18
N2040/L104-2012X7R1H472**	50	X7R	4,700	K,M	18
N2040/L104-2012X7R1H562**	50	X7R	5,600	K	18
N2040/L104-2012X7R1H682**	50	X7R	6,800	K,M	18
N2040/L104-2012X7R1H822**	50	X7R	8,200	K	18
N2040/L104-2012X7R1H103**	50	X7R	10,000	K,M	18
N2040/L104-2012X7R1H123**	50	X7R	12,000	K	18
N2040/L104-2012X7R1H153**	50	X7R	15,000	K,M	18
N2040/L104-2012X7R1H183**	50	X7R	18,000	K	18
N2040/L104-2012X7R1H223**	50	X7R	22,000	K,M	18
N2040/L104-2012X7R2A102**	100	X7R	1,000	K,M	18
N2040/L104-2012X7R2A122**	100	X7R	1,200	K	18
N2040/L104-2012X7R2A152**	100	X7R	1,500	K,M	18
N2040/L104-2012X7R2A182**	100	X7R	1,800	K	18
N2040/L104-2012X7R2A222**	100	X7R	2,200	K,M	18
N2040/L104-2012X7R2A272**	100	X7R	2,700	K	18
N2040/L104-2012X7R2A332**	100	X7R	3,300	K,M	18
N2040/L104-2012X7R2A392**	100	X7R	3,900	K	18
N2040/L104-2012X7R2A472**	100	X7R	4,700	K,M	18
N2040/L104-2012X7R2A562**	100	X7R	5,600	K	18
N2040/L104-2012X7R2A682**	100	X7R	6,800	K,M	18
N2040/L104-2012X7R2A822**	100	X7R	8,200	K	18
N2040/L104-2012X7R2A103**	100	X7R	10,000	K,M	18
N2040/L104-3216C0G1H152** ⁽³⁾	50	C0G	1,500	J,K	30
N2040/L104-3216C0G1H162** ⁽³⁾	50	C0G	1,600	J	30
N2040/L104-3216C0G1H182** ⁽³⁾	50	C0G	1,800	J,K	30
N2040/L104-3216C0G1H202** ⁽³⁾	50	C0G	2,000	J	30
N2040/L104-3216C0G1H222** ⁽³⁾	50	C0G	2,200	J,K	30
N2040/L104-3216C0G1H242** ⁽³⁾	50	C0G	2,400	J	30
N2040/L104-3216C0G1H272** ⁽³⁾	50	C0G	2,700	J,K	30
N2040/L104-3216C0G1H302** ⁽³⁾	50	C0G	3,000	J	30
N2040/L104-3216C0G1H332** ⁽³⁾	50	C0G	3,300	J,K	30
N2040/L104-3216C0G2A821** ⁽³⁾	100	C0G	820	J,K	30
N2040/L104-3216C0G2A911** ⁽³⁾	100	C0G	910	J	30
N2040/L104-3216C0G2A102** ⁽³⁾	100	C0G	1,000	J,K	30
N2040/L104-3216C0G2A112** ⁽³⁾	100	C0G	1,100	J	30
N2040/L104-3216C0G2A122** ⁽³⁾	100	C0G	1,200	J,K	30

Supplementary Table 1. Parts List (Continued)

Part number ⁽¹⁾	Rated voltage (VDC)	Characteristic	Nominal capacitance (pF)	Capacitance tolerance ⁽²⁾	Mass (mg) (reference)
N2040/L104-3216C0G2A132** ⁽³⁾	100	C0G	1,300	J	30
N2040/L104-3216C0G2A152** ⁽³⁾	100	C0G	1,500	J,K	30
N2040/L104-3216C0G2A162** ⁽³⁾	100	C0G	1,600	J	30
N2040/L104-3216C0G2A182** ⁽³⁾	100	C0G	1,800	J,K	30
N2040/L104-3216C0G2D181** ⁽³⁾	200	C0G	180	J,K	30
N2040/L104-3216C0G2D201** ⁽³⁾	200	C0G	200	J	30
N2040/L104-3216C0G2D221** ⁽³⁾	200	C0G	220	J,K	30
N2040/L104-3216C0G2D241** ⁽³⁾	200	C0G	240	J	30
N2040/L104-3216C0G2D271** ⁽³⁾	200	C0G	270	J,K	30
N2040/L104-3216C0G2D301** ⁽³⁾	200	C0G	300	J	30
N2040/L104-3216C0G2D331** ⁽³⁾	200	C0G	330	J,K	30
N2040/L104-3216C0G2D361** ⁽³⁾	200	C0G	360	J	30
N2040/L104-3216C0G2D391** ⁽³⁾	200	C0G	390	J,K	30
N2040/L104-3216X7R1E221**	25	X7R	220	K,M	30
N2040/L104-3216X7R1E271**	25	X7R	270	K	30
N2040/L104-3216X7R1E331**	25	X7R	330	K,M	30
N2040/L104-3216X7R1E391**	25	X7R	390	K	30
N2040/L104-3216X7R1E471**	25	X7R	470	K,M	30
N2040/L104-3216X7R1E561**	25	X7R	560	K	30
N2040/L104-3216X7R1E681**	25	X7R	680	K,M	30
N2040/L104-3216X7R1E821**	25	X7R	820	K	30
N2040/L104-3216X7R1E102**	25	X7R	1,000	K,M	30
N2040/L104-3216X7R1E122**	25	X7R	1,200	K	30
N2040/L104-3216X7R1E152**	25	X7R	1,500	K,M	30
N2040/L104-3216X7R1E182**	25	X7R	1,800	K	30
N2040/L104-3216X7R1E222**	25	X7R	2,200	K,M	30
N2040/L104-3216X7R1E272**	25	X7R	2,700	K	30
N2040/L104-3216X7R1E332**	25	X7R	3,300	K,M	30
N2040/L104-3216X7R1E392**	25	X7R	3,900	K	30
N2040/L104-3216X7R1E472**	25	X7R	4,700	K,M	30
N2040/L104-3216X7R1E562**	25	X7R	5,600	K	30
N2040/L104-3216X7R1E682**	25	X7R	6,800	K,M	30
N2040/L104-3216X7R1E822**	25	X7R	8,200	K	30
N2040/L104-3216X7R1E103**	25	X7R	10,000	K,M	30
N2040/L104-3216X7R1E123**	25	X7R	12,000	K	30
N2040/L104-3216X7R1E153**	25	X7R	15,000	K,M	30
N2040/L104-3216X7R1E183**	25	X7R	18,000	K	30
N2040/L104-3216X7R1E223**	25	X7R	22,000	K,M	30
N2040/L104-3216X7R1E273**	25	X7R	27,000	K	30

Supplementary Table 1. Parts List (Continued)

Part number ⁽¹⁾	Rated voltage (VDC)	Characteristic	Nominal capacitance (pF)	Capacitance tolerance ⁽²⁾	Mass (mg) (reference)
N2040/L104-3216X7R1E333**	25	X7R	33,000	K,M	30
N2040/L104-3216X7R1E393**	25	X7R	39,000	K	30
N2040/L104-3216X7R1E473**	25	X7R	47,000	K,M	30
N2040/L104-3216X7R1E563**	25	X7R	56,000	K	30
N2040/L104-3216X7R1E683**	25	X7R	68,000	K,M	30
N2040/L104-3216X7R1E823**	25	X7R	82,000	K	30
N2040/L104-3216X7R1E104**	25	X7R	100,000	K,M	30
N2040/L104-3216X7R1E124**	25	X7R	120,000	K	30
N2040/L104-3216X7R1E154**	25	X7R	150,000	K,M	30
N2040/L104-3216X7R1E184**	25	X7R	180,000	K	30
N2040/L104-3216X7R1E224**	25	X7R	220,000	K,M	30
N2040/L104-3216X7R1H221**	50	X7R	220	K,M	30
N2040/L104-3216X7R1H271**	50	X7R	270	K	30
N2040/L104-3216X7R1H331**	50	X7R	330	K,M	30
N2040/L104-3216X7R1H391**	50	X7R	390	K	30
N2040/L104-3216X7R1H471**	50	X7R	470	K,M	30
N2040/L104-3216X7R1H561**	50	X7R	560	K	30
N2040/L104-3216X7R1H681**	50	X7R	680	K,M	30
N2040/L104-3216X7R1H821**	50	X7R	820	K	30
N2040/L104-3216X7R1H102**	50	X7R	1,000	K,M	30
N2040/L104-3216X7R1H122**	50	X7R	1,200	K	30
N2040/L104-3216X7R1H152**	50	X7R	1,500	K,M	30
N2040/L104-3216X7R1H182**	50	X7R	1,800	K	30
N2040/L104-3216X7R1H222**	50	X7R	2,200	K,M	30
N2040/L104-3216X7R1H272**	50	X7R	2,700	K	30
N2040/L104-3216X7R1H332**	50	X7R	3,300	K,M	30
N2040/L104-3216X7R1H392**	50	X7R	3,900	K	30
N2040/L104-3216X7R1H472**	50	X7R	4,700	K,M	30
N2040/L104-3216X7R1H562**	50	X7R	5,600	K	30
N2040/L104-3216X7R1H682**	50	X7R	6,800	K,M	30
N2040/L104-3216X7R1H822**	50	X7R	8,200	K	30
N2040/L104-3216X7R1H103**	50	X7R	10,000	K,M	30
N2040/L104-3216X7R1H123**	50	X7R	12,000	K	30
N2040/L104-3216X7R1H153**	50	X7R	15,000	K,M	30
N2040/L104-3216X7R1H183**	50	X7R	18,000	K	30
N2040/L104-3216X7R1H223**	50	X7R	22,000	K,M	30
N2040/L104-3216X7R1H273**	50	X7R	27,000	K	30
N2040/L104-3216X7R1H333**	50	X7R	33,000	K,M	30
N2040/L104-3216X7R1H393**	50	X7R	39,000	K	30
N2040/L104-3216X7R1H473**	50	X7R	47,000	K,M	30

Supplementary Table 1. Parts List (Continued)

Part number ⁽¹⁾	Rated voltage (VDC)	Characteristic	Nominal capacitance (pF)	Capacitance tolerance ⁽²⁾	Mass (mg) (reference)
N2040/L104-3216X7R1H104**	50	X7R	100,000	K,M	30
N2040/L104-3216X7R1H154**	50	X7R	150,000	K,M	30
N2040/L104-3216X7R1H184**	50	X7R	180,000	K	30
N2040/L104-3216X7R1H224**	50	X7R	220,000	K,M	30
N2040/L104-3216X7R2A103**	100	X7R	10,000	K,M	30
N2040/L104-3216X7R2A123**	100	X7R	12,000	K	30
N2040/L104-3216X7R2A153**	100	X7R	15,000	K,M	30
N2040/L104-3216X7R2A183**	100	X7R	18,000	K	30
N2040/L104-3216X7R2A223**	100	X7R	22,000	K ,M	30
N2040/L104-3216X7R2D152**	200	X7R	1,500	K,M	30
N2040/L104-3216X7R2D182**	200	X7R	1,800	K	30
N2040/L104-3216X7R2D222**	200	X7R	2,200	K,M	30
N2040/L104-3216X7R2D272**	200	X7R	2,700	K	30
N2040/L104-3216X7R2D332**	200	X7R	3,300	K,M	30
N2040/L104-3216X7R2D392**	200	X7R	3,900	K	30
N2040/L104-3216X7R2D472**	200	X7R	4,700	K,M	30
N2040/L104-3216X7R2D562**	200	X7R	5,600	K	30
N2040/L104-3216X7R2D682**	200	X7R	6,800	K,M	30
N2040/L104-3216X7R2D822**	200	X7R	8,200	K	30
N2040/L104-3216X7R2D103**	200	X7R	10,000	K,M	30
N2040/L104-3216X7R2D153**	200	X7R	15,000	K,M	30
N2040/L104-3216X7R2H102**	500	X7R	1,000	K,M	30
N2040/L104-3216X7R2H122**	500	X7R	1,200	K	30
N2040/L104-3216X7R2H152**	500	X7R	1,500	K,M	30
N2040/L104-3216X7R2H182**	500	X7R	1,800	K	30
N2040/L104-3216X7R2H222**	500	X7R	2,200	K,M	30
N2040/L104-3216X7R2H272**	500	X7R	2,700	K	30
N2040/L104-3216X7R2H332**	500	X7R	3,300	K,M	30
N2040/L104-3216X7R2H392**	500	X7R	3,900	K	30
N2040/L104-3216X7R2H472**	500	X7R	4,700	K,M	30
N2040/L104-3225X7R1E103**	25	X7R	10,000	K,M	110
N2040/L104-3225X7R1E123**	25	X7R	12,000	K	110
N2040/L104-3225X7R1E153**	25	X7R	15,000	K,M	110
N2040/L104-3225X7R1E183**	25	X7R	18,000	K	110
N2040/L104-3225X7R1E223**	25	X7R	22,000	K,M	110
N2040/L104-3225X7R1E273**	25	X7R	27,000	K	110
N2040/L104-3225X7R1E333**	25	X7R	33,000	K,M	110
N2040/L104-3225X7R1E393**	25	X7R	39,000	K	110
N2040/L104-3225X7R1E473**	25	X7R	47,000	K,M	110

Supplementary Table 1. Parts List (Continued)

Part number ⁽¹⁾	Rated voltage (VDC)	Characteristic	Nominal capacitance (pF)	Capacitance tolerance ⁽²⁾	Mass (mg) (reference)
N2040/L104-3225X7R1E563**	25	X7R	56,000	K	110
N2040/L104-3225X7R1E683**	25	X7R	68,000	K,M	110
N2040/L104-3225X7R1E823**	25	X7R	82,000	K	110
N2040/L104-3225X7R1E104**	25	X7R	100,000	K,M	110
N2040/L104-3225X7R1E124**	25	X7R	120,000	K	110
N2040/L104-3225X7R1E154**	25	X7R	150,000	K,M	110
N2040/L104-3225X7R1E184**	25	X7R	180,000	K	110
N2040/L104-3225X7R1E224**	25	X7R	220,000	K,M	110
N2040/L104-3225X7R1E105**	25	X7R	1,000,000	K,M	110
N2040/L104-3225X7R1H103**	50	X7R	10,000	K,M	110
N2040/L104-3225X7R1H123**	50	X7R	12,000	K	110
N2040/L104-3225X7R1H153**	50	X7R	15,000	K,M	110
N2040/L104-3225X7R1H183**	50	X7R	18,000	K	110
N2040/L104-3225X7R1H223**	50	X7R	22,000	K,M	110
N2040/L104-3225X7R1H273**	50	X7R	27,000	K	110
N2040/L104-3225X7R1H333**	50	X7R	33,000	K,M	110
N2040/L104-3225X7R1H393**	50	X7R	39,000	K	110
N2040/L104-3225X7R1H473**	50	X7R	47,000	K,M	110
N2040/L104-3225X7R1H563**	50	X7R	56,000	K	110
N2040/L104-3225X7R1H683**	50	X7R	68,000	K,M	110
N2040/L104-3225X7R1H823**	50	X7R	82,000	K	110
N2040/L104-3225X7R1H104**	50	X7R	100,000	K,M	110
N2040/L104-3225X7R2A472**	100	X7R	4,700	K,M	110
N2040/L104-3225X7R2A562**	100	X7R	5,600	K	110
N2040/L104-3225X7R2A682**	100	X7R	6,800	K,M	110
N2040/L104-3225X7R2A822**	100	X7R	8,200	K	110
N2040/L104-3225X7R2A103**	100	X7R	10,000	K,M	110
N2040/L104-3225X7R2A123**	100	X7R	12,000	K	110
N2040/L104-3225X7R2A153**	100	X7R	15,000	K,M	110
N2040/L104-3225X7R2A183**	100	X7R	18,000	K	110
N2040/L104-3225X7R2A223**	100	X7R	22,000	K,M	110
N2040/L104-3225X7R2A273**	100	X7R	27,000	K	110
N2040/L104-3225X7R2A333**	100	X7R	33,000	K,M	110
N2040/L104-3225X7R2A393**	100	X7R	39,000	K	110
N2040/L104-3225X7R2A473**	100	X7R	47,000	K,M	110
N2040/L104-3225X7R2D223**	200	X7R	22,000	K,M	110
N2040/L104-3225X7R2D333**	200	X7R	33,000	K,M	110
N2040/L104-3225X7R2D473**	200	X7R	47,000	K,M	110

Supplementary Table 1. Parts List (Continued)

Part number ⁽¹⁾	Rated voltage (VDC)	Characteristic	Nominal capacitance (pF)	Capacitance tolerance ⁽²⁾	Mass (mg) (reference)
N2040/L104-3225X7R2H682**	500	X7R	6,800	K,M	110
N2040/L104-3225X7R2H103**	500	X7R	10,000	K,M	110
N2040/L104-3225X7R2H153**	500	X7R	15,000	K,M	110
N2040/L104-3225X7R2H223**	500	X7R	22,000	K,M	110
N2040/L104-4532X7R1E333**	25	X7R	33,000	K,M	205
N2040/L104-4532X7R1E393**	25	X7R	39,000	K	205
N2040/L104-4532X7R1E473**	25	X7R	47,000	K,M	205
N2040/L104-4532X7R1E563**	25	X7R	56,000	K	205
N2040/L104-4532X7R1E683**	25	X7R	68,000	K,M	205
N2040/L104-4532X7R1E823**	25	X7R	82,000	K	205
N2040/L104-4532X7R1E104**	25	X7R	100,000	K,M	205
N2040/L104-4532X7R1E124**	25	X7R	120,000	K	205
N2040/L104-4532X7R1E154**	25	X7R	150,000	K,M	205
N2040/L104-4532X7R1E184**	25	X7R	180,000	K	205
N2040/L104-4532X7R1E224**	25	X7R	220,000	K,M	205
N2040/L104-4532X7R1E274**	25	X7R	270,000	K,	205
N2040/L104-4532X7R1E334**	25	X7R	330,000	K,M	205
N2040/L104-4532X7R1E394**	25	X7R	390,000	K	205
N2040/L104-4532X7R1E474**	25	X7R	470,000	K,M	205
N2040/L104-4532X7R1E225**	25	X7R	2,200,000	K,M	205
N2040/L104-4532X7R1H333**	50	X7R	33,000	K,M	205
N2040/L104-4532X7R1H393**	50	X7R	39,000	K	205
N2040/L104-4532X7R1H473**	50	X7R	47,000	K,M	205
N2040/L104-4532X7R1H563**	50	X7R	56,000	K	205
N2040/L104-4532X7R1H683**	50	X7R	68,000	K,M	205
N2040/L104-4532X7R1H823**	50	X7R	82,000	K	205
N2040/L104-4532X7R1H104**	50	X7R	100,000	K,M	205
N2040/L104-4532X7R1H124**	50	X7R	120,000	K	205
N2040/L104-4532X7R1H154**	50	X7R	150,000	K,M	205
N2040/L104-4532X7R1H184**	50	X7R	180,000	K	205
N2040/L104-4532X7R1H224**	50	X7R	220,000	K,M	205
N2040/L104-4532X7R2A103**	100	X7R	10,000	K,M	205
N2040/L104-4532X7R2A123**	100	X7R	12,000	K	205
N2040/L104-4532X7R2A153**	100	X7R	15,000	K,M	205
N2040/L104-4532X7R2A183**	100	X7R	18,000	K	205
N2040/L104-4532X7R2A223**	100	X7R	22,000	K,M	205
N2040/L104-4532X7R2A273**	100	X7R	27,000	K	205
N2040/L104-4532X7R2A333**	100	X7R	33,000	K,M	205
N2040/L104-4532X7R2A393**	100	X7R	39,000	K	205
N2040/L104-4532X7R2A473**	100	X7R	47,000	K,M	205

Supplementary Table 1. Parts List (Continued)

Part number ⁽¹⁾	Rated voltage (VDC)	Characteristic	Nominal capacitance (pF)	Capacitance tolerance ⁽²⁾	Mass (mg) (reference)
N2040/L104-4532X7R2A563**	100	X7R	56,000	K	205
N2040/L104-4532X7R2A683**	100	X7R	68,000	K,M	205
N2040/L104-4532X7R2A823**	100	X7R	82,000	K	205
N2040/L104-4532X7R2A104**	100	X7R	100,000	K,M	205
N2040/L104-4532X7R2D683**	200	X7R	68,000	K,M	205
N2040/L104-4532X7R2D104**	200	X7R	100,000	K,M	205
N2040/L104-4532X7R2H333**	500	X7R	33,000	K,M	205
N2040/L104-4532X7R2H393**	500	X7R	39,000	K	205
N2040/L104-4532X7R2H473**	500	X7R	47,000	K,M	205
N2040/L104-5750X7R1H224**	50	X7R	220,000	K,M	275
N2040/L104-5750X7R1H274**	50	X7R	270,000	K	275
N2040/L104-5750X7R1H334**	50	X7R	330,000	K,M	275
N2040/L104-5750X7R1H394**	50	X7R	390,000	K	275
N2040/L104-5750X7R1H474**	50	X7R	470,000	K,M	275
N2040/L104-5750X7R1H564**	50	X7R	560,000	K	275
N2040/L104-5750X7R1H684**	50	X7R	680,000	K,M	275
N2040/L104-5750X7R1H824**	50	X7R	820,000	K	275
N2040/L104-5750X7R1H105**	50	X7R	1,000,000	K,M	275
N2040/L104-5750X7R2A223**	100	X7R	22,000	K,M	280
N2040/L104-5750X7R2A273**	100	X7R	27,000	K	280
N2040/L104-5750X7R2A333**	100	X7R	33,000	K,M	280
N2040/L104-5750X7R2A393**	100	X7R	39,000	K	280
N2040/L104-5750X7R2A473**	100	X7R	47,000	K,M	280
N2040/L104-5750X7R2A563**	100	X7R	56,000	K	280
N2040/L104-5750X7R2A683**	100	X7R	68,000	K,M	280
N2040/L104-5750X7R2A823**	100	X7R	82,000	K	280
N2040/L104-5750X7R2A104**	100	X7R	100,000	K,M	280
N2040/L104-5750X7R2A124**	100	X7R	120,000	K	280
N2040/L104-5750X7R2A154**	100	X7R	150,000	K,M	280
N2040/L104-5750X7R2A184**	100	X7R	180,000	K	280
N2040/L104-5750X7R2A224**	100	X7R	220,000	K,M	280
N2040/L104-5750X7R2A274**	100	X7R	270,000	K	280
N2040/L104-5750X7R2A334**	100	X7R	330,000	K,M	280
N2040/L104-5750X7R2A394**	100	X7R	390,000	K	280
N2040/L104-5750X7R2A474**	100	X7R	470,000	K,M	280
N2040/L104-5750X7R2D154**	200	X7R	150,000	K,M	280
N2040/L104-5750X7R2D184**	200	X7R	180,000	K	280
N2040/L104-5750X7R2D224**	200	X7R	220,000	K,M	280
N2040/L104-5750X7R2H104**	500	X7R	100,000	K,M	280

Supplementary Table 1. Parts List (Continued)

Part number ⁽¹⁾	Rated voltage (VDC)	Characteristic	Nominal capacitance (pF)	Capacitance tolerance ⁽²⁾	Mass (mg) (reference)
N2040/L104N1608C0G1H0R5**	50	C0G	0.5	C	4
N2040/L104N1608C0G1HR75**	50	C0G	0.75	C,D	4
N2040/L104N1608C0G1H010**	50	C0G	1.0	C,D	4
N2040/L104N1608C0G1H1R5**	50	C0G	1.5	C,D	4
N2040/L104N1608C0G1H020**	50	C0G	2.0	C,D	4
N2040/L104N1608C0G1H2R5**	50	C0G	2.5	C,D	4
N2040/L104N1608C0G1H030**	50	C0G	3.0	C,D	4
N2040/L104N1608C0G1H3R5**	50	C0G	3.5	C,D	4
N2040/L104N1608C0G1H040**	50	C0G	4.0	C,D	4
N2040/L104N1608C0G1H4R5**	50	C0G	4.5	C,D	4
N2040/L104N1608C0G1H050**	50	C0G	5.0	C,D	4
N2040/L104N1608C0G1H5R5**	50	C0G	5.5	C,D	4
N2040/L104N1608C0G1H060**	50	C0G	6.0	C,D	4
N2040/L104N1608C0G1H6R5**	50	C0G	6.5	C,D	4
N2040/L104N1608C0G1H070**	50	C0G	7.0	C,D	4
N2040/L104N1608C0G1H7R5**	50	C0G	7.5	C,D	4
N2040/L104N1608C0G1H080**	50	C0G	8.0	C,D	4
N2040/L104N1608C0G1H8R5**	50	C0G	8.5	C,D	4
N2040/L104N1608C0G1H090**	50	C0G	9.0	C,D	4
N2040/L104N1608C0G1H9R5**	50	C0G	9.5	C,D	4
N2040/L104N1608C0G1H100**	50	C0G	10	C,D	4
N2040/L104N1608C0G1H110**	50	C0G	11	J	4
N2040/L104N1608C0G1H120**	50	C0G	12	J,K	4
N2040/L104N1608C0G1H130**	50	C0G	13	J	4
N2040/L104N1608C0G1H150**	50	C0G	15	J,K	4
N2040/L104N1608C0G1H160**	50	C0G	16	J	4
N2040/L104N1608C0G1H180**	50	C0G	18	J,K	4
N2040/L104N1608C0G1H200**	50	C0G	20	J	4
N2040/L104N1608C0G1H220**	50	C0G	22	J,K	4
N2040/L104N1608C0G1H240**	50	C0G	24	J	4
N2040/L104N1608C0G1H270**	50	C0G	27	J,K	4
N2040/L104N1608C0G1H300**	50	C0G	30	J	4
N2040/L104N1608C0G1H330**	50	C0G	33	J,K	4
N2040/L104N1608C0G1H360**	50	C0G	36	J	4
N2040/L104N1608C0G1H390**	50	C0G	39	J,K	4
N2040/L104N1608C0G1H430**	50	C0G	43	J	4
N2040/L104N1608C0G1H470**	50	C0G	47	J,K	4
N2040/L104N1608C0G1H510**	50	C0G	51	J	4
N2040/L104N1608C0G1H560**	50	C0G	56	J,K	4

Supplementary Table 1. Parts List (Continued)

Part number ⁽¹⁾	Rated voltage (VDC)	Characteristic	Nominal capacitance (pF)	Capacitance tolerance ⁽²⁾	Mass (mg) (reference)
N2040/L104N1608C0G1H620**	50	C0G	62	J	4
N2040/L104N1608C0G1H680**	50	C0G	68	J,K	4
N2040/L104N1608C0G1H750**	50	C0G	75	J	4
N2040/L104N1608C0G1H820**	50	C0G	82	J,K	4
N2040/L104N1608C0G1H910**	50	C0G	91	J	4
N2040/L104N1608C0G1H101**	50	C0G	100	J,K	4
N2040/L104N1608C0G1H111**	50	C0G	110	J	4
N2040/L104N1608C0G1H121**	50	C0G	120	J,K	4
N2040/L104N1608C0G1H131**	50	C0G	130	J	4
N2040/L104N1608C0G1H151**	50	C0G	150	J,K	4
N2040/L104N1608C0G1H161**	50	C0G	160	J	4
N2040/L104N1608C0G1H181**	50	C0G	180	J,K	4
N2040/L104N1608C0G1H201**	50	C0G	200	J	4
N2040/L104N1608C0G1H221**	50	C0G	220	J,K	4
N2040/L104N1608C0G1H241**	50	C0G	240	J	4
N2040/L104N1608C0G1H271**	50	C0G	270	J,K	4
N2040/L104N1608C0G1H301**	50	C0G	300	J	4
N2040/L104N1608C0G1H331**	50	C0G	330	J,K	4
N2040/L104N1608C0G1H361**	50	C0G	360	J	4
N2040/L104N1608C0G1H391**	50	C0G	390	J,K	4
N2040/L104N1608C0G1H431**	50	C0G	430	J	4
N2040/L104N1608C0G1H471**	50	C0G	470	J,K	4
N2040/L104N1608C0G1H511**	50	C0G	510	J	4
N2040/L104N1608C0G1H561**	50	C0G	560	J,K	4
N2040/L104N1608C0G1H621**	50	C0G	620	J	4
N2040/L104N1608C0G1H681**	50	C0G	680	J,K	4
N2040/L104N1608C0G1H751**	50	C0G	750	J	4
N2040/L104N1608C0G1H821**	50	C0G	820	J,K	4
N2040/L104N1608C0G1H911**	50	C0G	910	J	4
N2040/L104N1608C0G1H102**	50	C0G	1000	J,K	4
N2040/L104N1608C0G1H112**	50	C0G	1100	J	4
N2040/L104N1608C0G1H122**	50	C0G	1200	J,K	4
N2040/L104N1608C0G1H132**	50	C0G	1300	J	4
N2040/L104N1608C0G1H152**	50	C0G	1500	J,K	4
N2040/L104N1608C0G1H162**	50	C0G	1600	J	4
N2040/L104N1608C0G1H182**	50	C0G	1800	J,K	4
N2040/L104N1608C0G1H202**	50	C0G	2000	J	4
N2040/L104N1608C0G1H222**	50	C0G	2200	J,K	4
N2040/L104N1608C0G1H242**	50	C0G	2400	J	4
N2040/L104N1608C0G1H272**	50	C0G	2700	J,K	4
N2040/L104N1608C0G1H302**	50	C0G	3000	J	4
N2040/L104N1608C0G1H332**	50	C0G	3300	J,K	4

Supplementary Table 1. Parts List (Continued)

Part number ⁽¹⁾	Rated voltage (VDC)	Characteristic	Nominal capacitance (pF)	Capacitance tolerance ⁽²⁾	Mass (mg) (reference)
N2040/L104N1608C0G2A360**	100	C0G	36	J	4
N2040/L104N1608C0G2A390**	100	C0G	39	J,K	4
N2040/L104N1608C0G2A430**	100	C0G	43	J	4
N2040/L104N1608C0G2A470**	100	C0G	47	J,K	4
N2040/L104N1608C0G2A510**	100	C0G	51	J	4
N2040/L104N1608C0G2A560**	100	C0G	56	J,K	4
N2040/L104N1608C0G2A620**	100	C0G	62	J	4
N2040/L104N1608C0G2A680**	100	C0G	68	J,K	4
N2040/L104N1608C0G2A750**	100	C0G	75	J	4
N2040/L104N1608C0G2A820**	100	C0G	82	J,K	4
N2040/L104N1608C0G2A910**	100	C0G	91	J	4
N2040/L104N1608C0G2A101**	100	C0G	100	J,K	4
N2040/L104N1608C0G2A111**	100	C0G	110	J	4
N2040/L104N1608C0G2A121**	100	C0G	120	J,K	4
N2040/L104N1608C0G2A131**	100	C0G	130	J	4
N2040/L104N1608C0G2A151**	100	C0G	150	J,K	4
N2040/L104N1608C0G2D0R5**	200	C0G	0.5	C	4
N2040/L104N1608C0G2DR75**	200	C0G	0.75	C,D	4
N2040/L104N1608C0G2D010**	200	C0G	1.0	C,D	4
N2040/L104N1608C0G2D1R5**	200	C0G	1.5	C,D	4
N2040/L104N1608C0G2D020**	200	C0G	2.0	C,D	4
N2040/L104N1608C0G2D2R5**	200	C0G	2.5	C,D	4
N2040/L104N1608C0G2D030**	200	C0G	3.0	C,D	4
N2040/L104N1608C0G2D3R5**	200	C0G	3.5	C,D	4
N2040/L104N1608C0G2D040**	200	C0G	4.0	C,D	4
N2040/L104N1608C0G2D4R5**	200	C0G	4.5	C,D	4
N2040/L104N1608C0G2D050**	200	C0G	5.0	C,D	4
N2040/L104N1608C0G2D5R5**	200	C0G	5.5	C,D	4
N2040/L104N1608C0G2D060**	200	C0G	6.0	C,D	4
N2040/L104N1608C0G2D6R5**	200	C0G	6.5	C,D	4
N2040/L104N1608C0G2D070**	200	C0G	7.0	C,D	4
N2040/L104N1608C0G2D7R5**	200	C0G	7.5	C,D	4
N2040/L104N1608C0G2D080**	200	C0G	8.0	C,D	4
N2040/L104N1608C0G2D8R5**	200	C0G	8.5	C,D	4
N2040/L104N1608C0G2D090**	200	C0G	9.0	C,D	4
N2040/L104N1608C0G2D9R5**	200	C0G	9.5	C,D	4
N2040/L104N1608C0G2D100**	200	C0G	10	C,D	4
N2040/L104N1608C0G2D110**	200	C0G	11	J	4
N2040/L104N1608C0G2D120**	200	C0G	12	J,K	4
N2040/L104N1608C0G2D130**	200	C0G	13	J	4
N2040/L104N1608C0G2D150**	200	C0G	15	J,K	4

Supplementary Table 1. Parts List (Continued)

Part number ⁽¹⁾	Rated voltage (VDC)	Characteristic	Nominal capacitance (pF)	Capacitance tolerance ⁽²⁾	Mass (mg) (reference)
N2040/L104N1608C0G2D160**	200	C0G	16	J	4
N2040/L104N1608C0G2D180**	200	C0G	18	J,K	4
N2040/L104N1608C0G2D200**	200	C0G	20	J	4
N2040/L104N1608C0G2D220**	200	C0G	22	J,K	4
N2040/L104N1608C0G2D240**	200	C0G	24	J	4
N2040/L104N1608C0G2D270**	200	C0G	27	J,K	4
N2040/L104N1608C0G2D300**	200	C0G	30	J	4
N2040/L104N1608C0G2D330**	200	C0G	33	J,K	4
N2040/L104N2012C0G2A431**	100	C0G	430	J	18
N2040/L104N2012C0G2A471**	100	C0G	470	J,K	18
N2040/L104N2012C0G2A511**	100	C0G	510	J	18
N2040/L104N2012C0G2A561**	100	C0G	560	J,K	18
N2040/L104N2012C0G2A621**	100	C0G	620	J	18
N2040/L104N2012C0G2A681**	100	C0G	680	J,K	18
N2040/L104N2012C0G2A751**	100	C0G	750	J	18
N2040/L104N2012C0G2A821**	100	C0G	820	J,K	18
N2040/L104N2012C0G2A911**	100	C0G	910	J	18
N2040/L104N2012C0G2A102**	100	C0G	1000	J,K	18
N2040/L104N2012C0G2A112**	100	C0G	1100	J	18
N2040/L104N2012C0G2A122**	100	C0G	1200	J,K	18
N2040/L104N2012C0G2A132**	100	C0G	1300	J	18
N2040/L104N2012C0G2A152**	100	C0G	1500	J,K	18
N2040/L104N2012C0G2A162**	100	C0G	1600	J	18
N2040/L104N2012C0G2A182**	100	C0G	1800	J,K	18
N2040/L104N2012C0G2D360**	200	C0G	36	J	18
N2040/L104N2012C0G2D390**	200	C0G	39	J,K	18
N2040/L104N2012C0G2D430**	200	C0G	43	J	18
N2040/L104N2012C0G2D470**	200	C0G	47	J,K	18
N2040/L104N2012C0G2D510**	200	C0G	51	J	18
N2040/L104N2012C0G2D560**	200	C0G	56	J,K	18
N2040/L104N2012C0G2D620**	200	C0G	62	J	18
N2040/L104N2012C0G2D680**	200	C0G	68	J,K	18
N2040/L104N2012C0G2D750**	200	C0G	75	J	18
N2040/L104N2012C0G2D820**	200	C0G	82	J,K	18
N2040/L104N2012C0G2D910**	200	C0G	91	J	18
N2040/L104N2012C0G2D101**	200	C0G	100	J,K	18
N2040/L104N2012C0G2D111**	200	C0G	110	J	18
N2040/L104N2012C0G2D121**	200	C0G	120	J,K	18
N2040/L104N2012C0G2D131**	200	C0G	130	J	18
N2040/L104N2012C0G2D151**	200	C0G	150	J,K	18
N2040/L104N2012C0G2D161**	200	C0G	160	J	18
N2040/L104N2012C0G2D181**	200	C0G	180	J,K	18
N2040/L104N2012C0G2D201**	200	C0G	200	J	18

Supplementary Table 1. Parts List (Continued)

Part number ⁽¹⁾	Rated voltage (VDC)	Characteristic	Nominal capacitance (pF)	Capacitance tolerance ⁽²⁾	Mass (mg) (reference)
N2040/L104N2012C0G2D221**	200	C0G	220	J,K	18
N2040/L104N2012C0G2D241**	200	C0G	240	J	18
N2040/L104N2012C0G2D271**	200	C0G	270	J,K	18
N2040/L104N2012C0G2D301**	200	C0G	300	J	18
N2040/L104N2012C0G2D331**	200	C0G	330	J,K	18
N2040/L104N2012C0G2D361**	200	C0G	360	J	18
N2040/L104N2012C0G2D391**	200	C0G	390	J,K	18

Notes:

- ⁽¹⁾ Complete part number shall consist of capacitance tolerance and specified symbols (S, Y) for terminal finish replacing the asterisks.
- ⁽²⁾ Capacitance tolerance shall be as follows.
Capacitance tolerance up to 10pF: C: $\pm 0.25\text{pF}$, D: $\pm 0.5\text{pF}$
Capacitance tolerance more than 10pF: J: $\pm 5.0\%$, K: $\pm 10\%$, M: $\pm 20\%$
- ⁽³⁾ C0G precious metal products will be discontinued on October 31, 2024. Please consider terminating the adoption of this product to new designs or discontinuing your products.