

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

Part Description	TRANSFORMERS AND INDUCTORS, POWER
Part Number and Type	JAXA 2110/A153-T000
Applicable Specification	JAXA-QTS-2110 JAXA-QTS-2110/A153

August 2022

Prepared and Established by Tamura Corporation

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: February 10, 2023

Revision Log

Rev.	Date	Revised Contents
NC	1 Mar. 2012	Original
A	21 Feb. 2018	<p>(1) Page 5: Changed contact in association with organization change Components Quality Assurance Group →Magnetic Business Unit, Production Management dept., Quality Assurance Group</p> <p>(2) Page 6: Added Manufacture line identification letter to the serial number in the marking; Added marking example; W: Wakayanagi Tamura Corporation, No letter added: Tamura corporation</p> <p>(3) Page 12, Table 8: Added the data for “sample made by Wakayanagi Tamura Corporation” to the parameter range.</p>
B	22 Aug. 2022	<p>(1) Page 5, Paragraph 8: Changed contact division and telephone number in association with organization change.</p> <ul style="list-style-type: none"> • Production Management department → AVIO Department • +81-49-284-9152 → +81-50-3664-0489 <p>(2) Page 13 Outgassing Data of Materials:</p> <p>① Changed TML(%) and CVCM(%) values of No.1 Bobbin. (Due to the change in the value of outgassing data for the finished product in association with revised bobbin value due to change in material.)</p> <p>② Added notes:</p> <ul style="list-style-type: none"> a. Added outgas data for two bobbins (E-B1-30317 and E-B1-30318) of the same material, differing only in size. b. Added that bobbin E-B1-30317 shows new and old data and bobbin E-B1-30318 shows new data. (because the application period due to the change of bobbin resin material is different for the two types of bobbins.) c. Added that use of the bobbin with the old data shall be prioritized for bobbin E-B1-30317.

Contents

1.	GENERAL	1
1.1	Scope.....	1
1.2	Applicable Documents.....	1
2.	SUMMARY OF PRODUCTS.....	1
2.1	Externals, Dimensions and Mass	1
2.2	Construction.....	1
3.	USAGE.....	2
3.1	Rating	2
3.2	Recommended Mounting Methods.....	2
4.	CHARACTERISTICS UNDER NORMAL OPERATING CONDITIONS	4
4.1	Electrical Characterisitcs	4
4.2	Environmental Resistance.....	4
4.3	Outgassing.....	4
5.	ENVIRONMENTAL LIMITS.....	4
6.	HANDLING AND STORAGE CONDITIONS	4
7.	PRECAUTIONS.....	5
7.1	Instructions for Purchaser	5
7.2	Instruction for User.....	5
8.	OTHERS.....	5

**COMMON PARTS AND 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.

1.2 Applicable Documents

The latest issues of the following documents are applicable to the products described in this sheet.

- | | |
|------------------------|---|
| (1) JAXA-QTS-2000 | Common Parts/Materials, Space Use, General Specification for |
| (2) JAXA-QTS-2110 | Transformers and Inductors, High Reliability, Space Use, General Specification For |
| (3) JAXA-QTS-2110/A153 | JAXA 2110/A153 Type, Transformers and Inductors, Power, (Outgassing-Qualified), High Reliability, Space Use, Detail Specification For |

2. SUMMARY OF PRODUCTS

Transformers described in this data sheet are outgassing-qualified open type high reliability parts for electric equipment to be installed on satellites and/or launch vehicles.

2.1 Externals, Dimensions and Mass

Externals, dimensions, mass and marking of the transformers are shown below.

Part number	Externals, dimensions and marking	Mass (standard value)
JAXA 2110/A153-T000	See page 6, Figure 3	34g

2.2 Construction

The transformer is of an epoxy resin impregnated open type and composed of coils and PQ type ferrite core. The coils are made of magnet wires which are wound around a bobbin with gull-wing shaped terminal. The following figure shows outline internal structure.

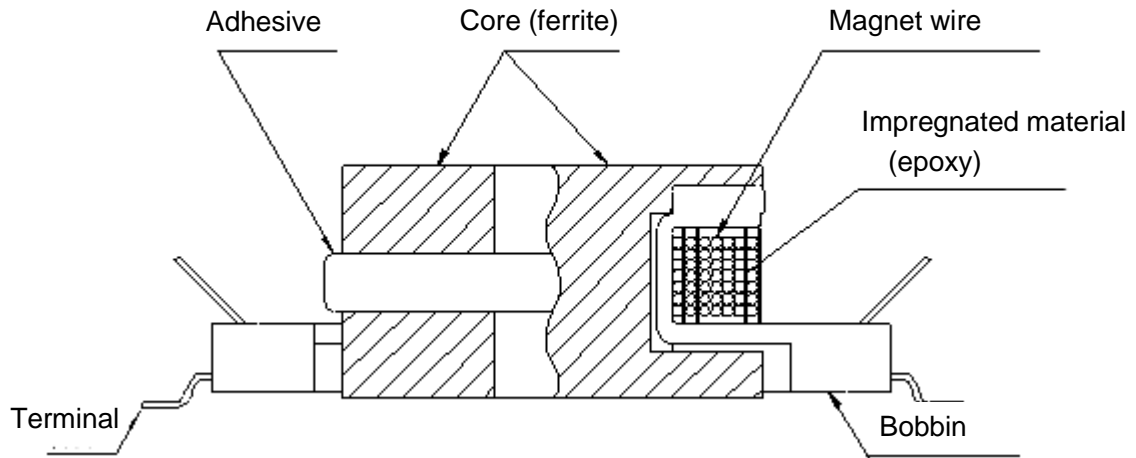


Figure 1. Outline of Inner Structure

3. USAGE

3.1 Rating

Ratings of transformers are as follows.

Part number	Rated power	Operating frequency	Operating ambient temperature (¹)	Temperature rise (¹)	Input voltage
JAXA2110/A153-T000	66.36VA	200kHz	-55°C to 100°C	30°C max.	40Vrms

Note: (¹) Operating ambient temperature + Temperature rise = Maximum operating temperature
: Class S (130°C) as a maximum

3.2 Recommended Mounting Methods

The transformer shall be surface mounted on printed circuit board by combining gull-wing terminal soldering, coil side face adhesion with epoxy adhesive and core side face adhesion with silicone adhesive. Outline drawing of mounting structure is shown in Figure 2.

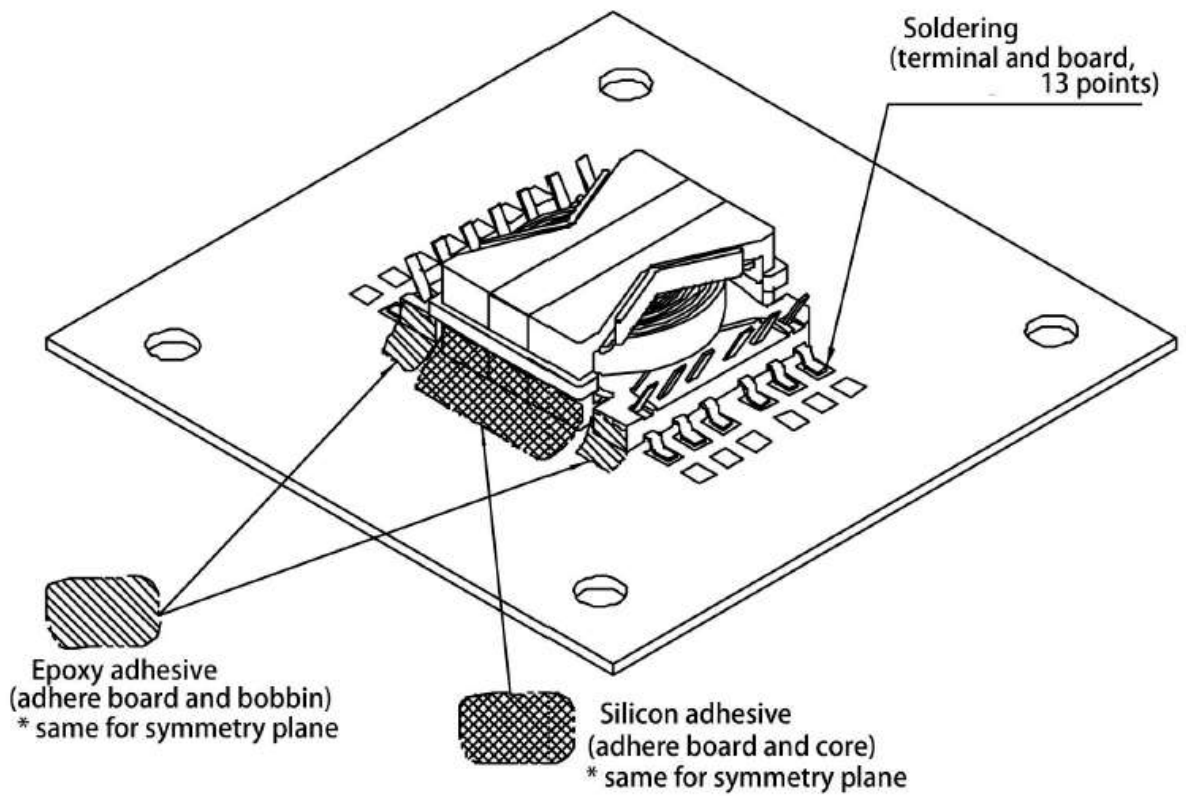
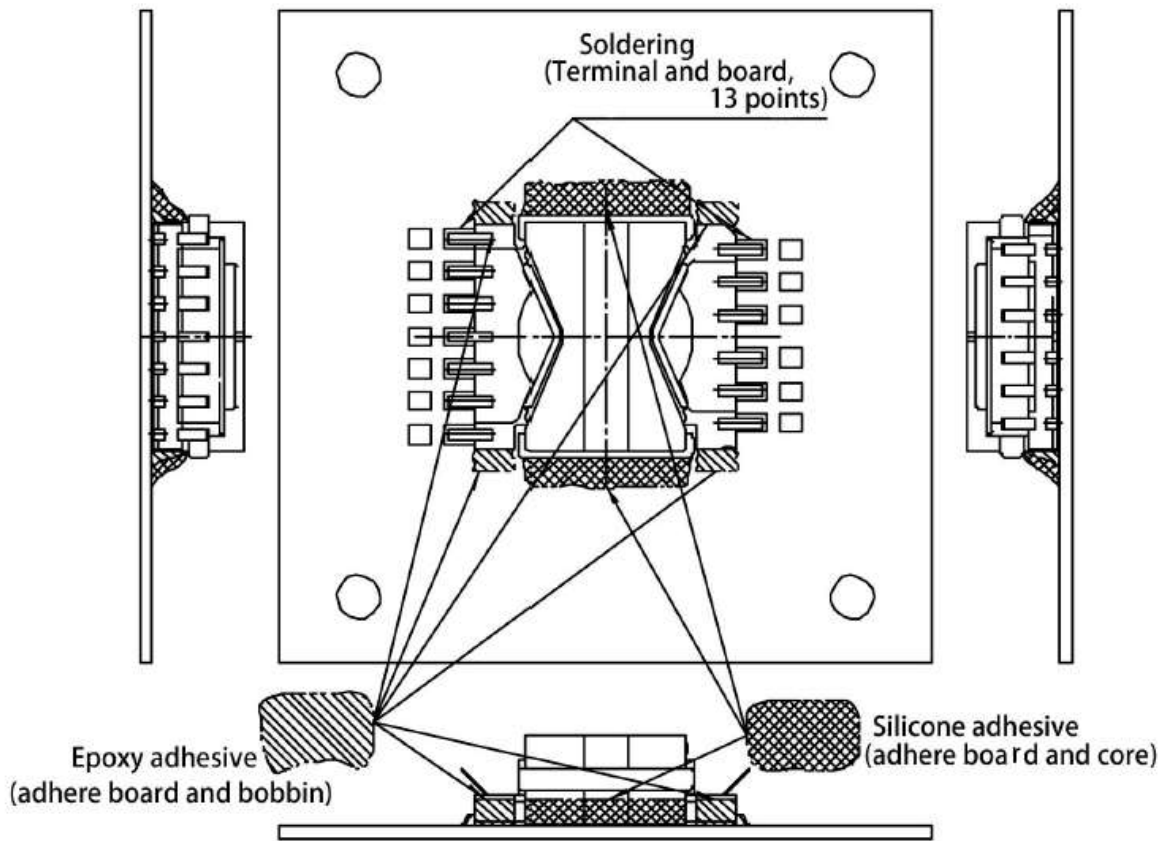


Figure 2. Mounting Structure

4. CHARACTERISTICS UNDER NORMAL OPERATING CONDITIONS

4.1 Electrical Characterisitcs

The transformers satisfied the electrical characteristics specified in the detail specification. Test results are shown in Table 8.

4.2 Environmental Resistance

The transformers satisfied the environmental conditions specified in the detail specification. Test results are shown in Table 7.

4.3 Outgassing

The transformers satisfied the outgassing requirements specified in the detail specification. Outgassing data of organic materials used in the transformers are shown on page 13.

5. ENVIRONMENTAL LIMITS

Vibration test and shock test were performed to evaluate the mechanical strength, and thermal shock test was performed to evaluate the thermal strength of the transformers. The evaluation results are shown below.

- The tests were performed on the transformer mounted on the board by the mounting method shown in paragraph 3.2.
- Board material: FR-4 (t1.6), mounting pitch: 68mm x 72mm
- Adhesive application area: coil side face (5.5±1.5mm wide, 3.5±1.5mm tall)
core side face: (28±1mm wide, 4±1mm tall)
- Vibration and shock tests were performed from step 1 to step 3 using the same samples.

Part number	Vibration limit test		Shock limit test		Thermal shock limit test	
	Test condition, Results	Evaluation data	Test condition, Results	Evaluation data	Test condition, Results	Evaluation data
JAXA2110 /A153-T000	Page.7 Table 1	Page 9 Tables 4-1, 4-2	Page.7 Table 2	Pages 9, 10 Tables 5-1, 5-2	Page 8 Table 3	Page 10 Tables 6-1, 6-2

6. HANDLING AND STORAGE CONDITIONS

- (1) Caution shall be used not to give excess stress such as drop impact.
- (2) It is advisable to store the transformer under the following conditions.

Items	Conditions
(1) Temperature	+0°C to +35°C
(2) Relative humidity	75%RH as a maximum
(3) Pressure	86kPa to 106kPa
(4) Others	It is advisable to store where vibrations and shocks are minimal.

7. PRECAUTIONS

7.1 Instructions for Purchaser

If purchaser's specification is included in the "qualification coverage" specified in the detail specification, JAXA-QTS-2110/A153 (paragraph 3.1), or if "qualification by similarity" specified in JAXA-QTS-2110, Appendix A (Paragraph A.3.1.1.1), is applicable, products can be provided as JAXA certified parts. In this case, the purchaser can specify requirements for specific applications in product specification (refer to JAXA-QTS-2110, Paragraph 6.3) for each procurement.

7.2 Instruction for User

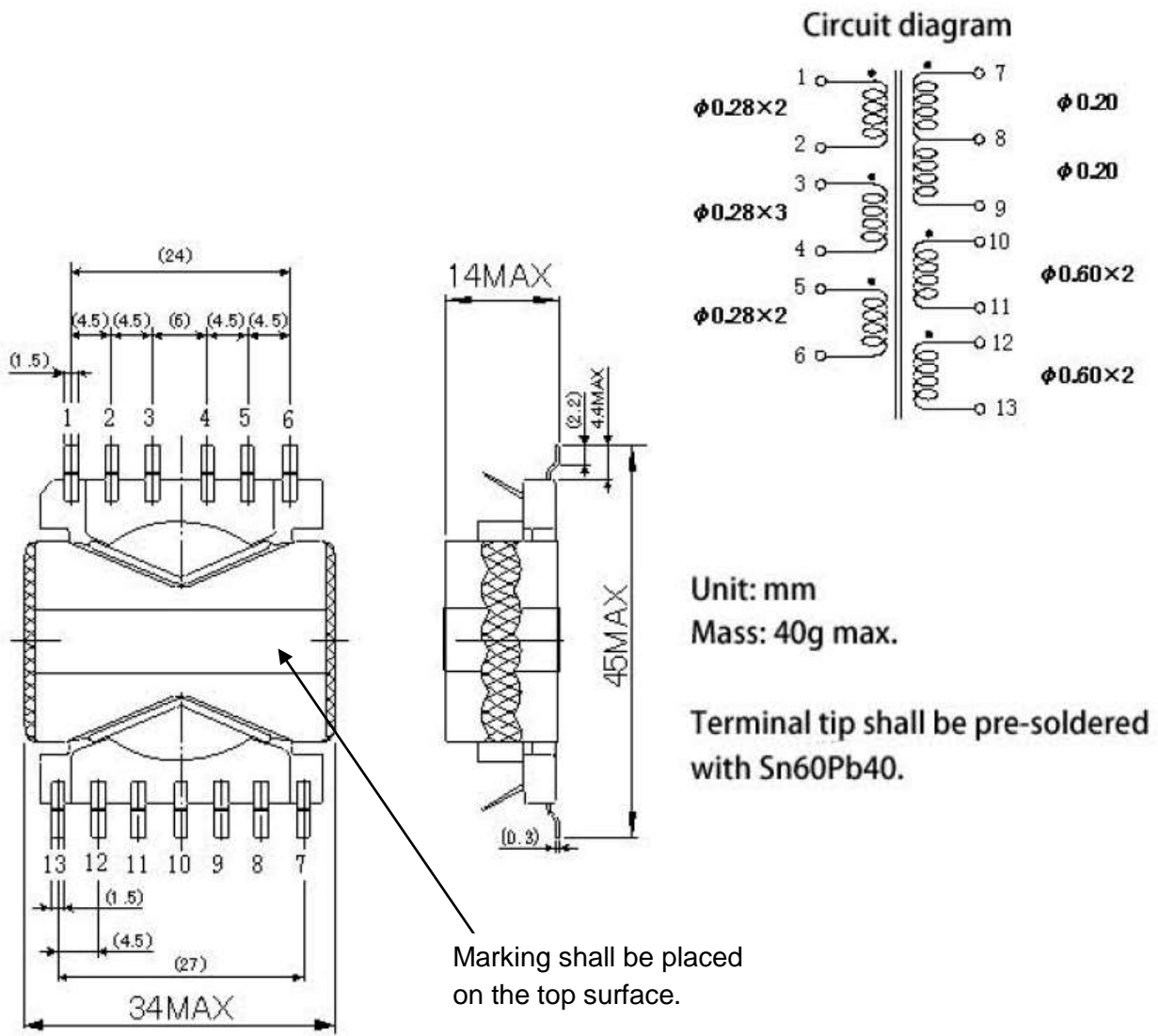
- Apply sufficient amount of adhesive to the bonding surface.
- It is advisable to keep the operating frequency deviation within $\pm 5\%$ of the rated operating frequency.
- It is advisable to operate the transformer within the rated output power and direct current.
- Operate the transformer in the temperature class S (130°C) as a maximum.
- Terminals shall be insulated when used under reduced-pressure environment.

8. OTHERS

Contact information is as follows.

Manufacturer	Tamura Corporation Electronic Components Business Sector, Magnetic Business Unit, AVIO department, Quality Assurance Group
Address	5-30, Chiyoda 5-chome, Sakado-city, Saitama 350-0214, Japan
Tel	+81-50-3664-0489

E-A4-30343B



1. Mass: 40g max.
2. Marking
J153-T000
Serial number and manufacture line identification letter

(Marking example)

Serial number No. 1 W Manufacture line identification letter:
Letter "W": Wakayanagi Tamura Corporation
No letter added: Tamura Corporation

Terminal identification

Figure 3. Externals, Dimensions and Marking

Table 1. Evaluation Results of Vibration Limit Test

Test item	Test conditions	Evaluation results (No. of failure)
Random vibration	<p>Step 1 MIL-STD-202 Test method: 214 Test condition: II-H (34.02Grms) 30 minutes each for three axis</p> <p>Step 2 MIL-STD-202 Test method: 214 Test condition: II-J (43.92Grms) 15 minutes each for three axis</p> <p>Step 3 MIL-STD-202 Test method: 214 Test condition: II-K (53.79Grms) 15 minutes each for three axis</p>	<p>0 out of 5</p> <p>There was no evidence of defects in appearance, withstanding voltage, insulation resistance, inductance and DC resistance.</p> <p>See Tables 4-1 and 4-2 for the evaluation data.</p>

Table 2. Evaluation Results of Shock Limit Test

Test item	Test conditions	Evaluation results (No. of failure)
Random vibration	<p>Step 1 MIL-STD-202 Test method: 213 Test condition: E (half sine wave) 1000G, 0.5ms 3 times each for 6 directions</p> <p>Step 2 MIL-STD-202 Test method: 213 Test condition: - (half sine wave) 1200G, 0.5ms 3 times each for 6 directions</p>	<p>0 out of 5</p> <p>There was no evidence of defects in appearance, withstanding voltage, insulation resistance, inductance and DC resistance.</p> <p>See Tables 5-1 and 5-2 for the evaluation data.</p>
	<p>Step 3 MIL-STD-202 Test method: 213 Test condition: F (half sine wave) 1500G, 0.5ms 3 times each for 6 directions</p>	<p>4 out of 5</p> <p>Step 3 of four rejected samples was discontinued as the core breaking was observed.</p> <p>See Tables 5-1 and 5-2 for the evaluation data of the accepted sample.</p>

Table 3. Evaluation Results of Thermal Shock Limit Test

Test item	Test conditions	Evaluation result (No. of failure)															
Thermal shock	<p>MIL-STD-202 Test method: 107 Test conditions:</p> <table border="1" data-bbox="483 524 959 770"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Time (minutes)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-30</td> <td>30 MIN</td> </tr> <tr> <td>2</td> <td>+25</td> <td>5 MAX</td> </tr> <tr> <td>3</td> <td>+100</td> <td>30 MIN</td> </tr> <tr> <td>4</td> <td>+25</td> <td>5 MAX</td> </tr> </tbody> </table> <p>No. of cycles: 1,000 max.</p>	Step	Temperature (°C)	Time (minutes)	1	-30	30 MIN	2	+25	5 MAX	3	+100	30 MIN	4	+25	5 MAX	<p>0 out of 5</p> <p>There is no evidence of defects in appearance, withstanding voltage, insulation resistance, inductance and DC resistance.</p> <p>See Tables 6-1 and 6-2 for the evaluation data.</p>
Step	Temperature (°C)	Time (minutes)															
1	-30	30 MIN															
2	+25	5 MAX															
3	+100	30 MIN															
4	+25	5 MAX															

Table 4-1. Vibration Limit Test Data

Sample No.	Inductance between (5 – 6) (μH)						
	Initial value	Step 1		Step 2		Step 3 (final)	
		Measured value	Change rate	Measured value	Change rate	Measured value	Change rate
9	64.68	64.64	-0.1%	64.74	0.1%	64.70	0.0%
10	65.09	65.13	0.1%	65.16	0.1%	65.17	0.1%
11	63.74	63.76	0.0%	63.87	0.2%	63.80	0.1%
12	64.72	64.75	0.0%	64.97	0.4%	64.98	0.4%
13	64.76	64.75	0.0%	64.90	0.2%	64.86	0.2%

Note: Inductance: ±10% or less of initial value (at 10kHz, 0.05V)

Table 4-2. Vibration Limit Test Data

Sample No.	DC resistance between (5 – 6) (mΩ)						
	Initial value	Step 1		Step 2		Step 3 (final)	
		Measured value	Change rate	Measured value	Change rate	Measured value	Change rate
9	77.0	76.8	-0.3%	77.1	0.1%	77.1	0.1%
10	76.4	76.3	-0.1%	76.2	-0.3%	77.0	0.8%
11	76.1	76.1	0.0%	75.9	-0.3%	75.5	-0.8%
12	76.1	75.8	-0.4%	75.8	-0.4%	75.7	-0.5%
13	76.6	76.2	-0.5%	76.3	-0.4%	76.0	-0.8%

Note: DC resistance: ±5% or less of initial value (at 20±5°C)

Table 5-1. Shock Limit Test Data

Sample No.	Inductance between (5 – 6) (μH)						
	Initial value	Step 1		Step 2		Step 3 (final)	
		Measured value	Change rate	Measured value	Change rate	Measured value	Change rate
14	62.75	62.73	0.0%	63.17	0.7%	/	
15	65.05	64.98	-0.1%	65.03	0.0%	/	
16	64.52	64.50	0.0%	64.60	0.1%	/	
17	64.92	64.85	-0.1%	64.92	0.0%	64.98	0.1%
18	64.15	64.40	0.4%	64.50	0.5%	/	

Note: Inductance: ±10% or less of initial value (at 10kHz, 0.05V)

E-A4-30343B

Table 5-2. Shock Limit Test Data

Sample No.	DC resistance between (5 – 6) (mΩ)						
	Initial value	Step 1		Step 2		Step 3 (final)	
		Measured value	Change rate	Measured value	Change rate	Measured value	Change rate
14	76.3	76.6	0.4%	76.5	0.3%		
15	76.1	75.5	-0.7%	76.1	0.0%		
16	76.0	75.5	-0.7%	75.6	-0.5%		
17	76.6	76.6	0.0%	76.1	-0.7%	76.4	-0.3%
18	76.0	76.0	0.0%	76.0	0.0%		

Note: DC resistance: $\pm 5\%$ or less of initial value (at $20\pm 5^\circ\text{C}$)

Table 6-1. Thermal Shock Limit Test Data

Sample No.	Inductance between (5 – 6) (μH)										
	Initial value	200 cycle		400 cycle		600 cycle		800 cycle		1000 cycle	
		Measured value	Change rate	Measured value	Change rate	Measured value	Change rate	Measured value	Change rate	Measured value	Change rate
19	64.91	64.95	0.1%	64.79	-0.2%	64.80	-0.2%	64.91	0.0%	64.80	-0.2%
20	65.21	65.19	0.0%	65.07	-0.2%	65.09	-0.2%	65.19	0.0%	65.07	-0.2%
21	65.03	65.09	0.1%	64.96	-0.1%	65.03	0.0%	65.07	0.1%	64.96	-0.1%
22	64.85	64.90	0.1%	64.73	-0.2%	64.70	-0.2%	64.83	0.0%	64.70	-0.2%
23	64.67	64.70	0.0%	64.60	-0.1%	64.55	-0.2%	64.72	0.1%	64.60	-0.1%

Note: Inductance: $\pm 10\%$ or less of initial value (at 10kHz, 0.05V)

Table 6-2. Thermal Shock Limit Test Data

Sample No.	Inductance between (5 – 6) (mΩ)										
	Initial value	200 cycle		400 cycle		600 cycle		800 cycle		1000 cycle	
		Measured value	Change rate	Measured value	Change rate	Measured value	Change rate	Measured value	Change rate	Measured value	Change rate
19	76.4	76.3	-0.1%	76.1	-0.4%	75.4	-1.3%	76.3	-0.1%	75.4	-1.3%
20	76.0	76.1	0.1%	75.9	-0.1%	75.6	-0.5%	76.0	0.0%	75.6	-0.5%
21	76.0	76.0	0.0%	76.1	0.1%	76.2	0.3%	76.1	0.1%	75.6	-0.7%
22	76.0	76.0	0.0%	75.7	-0.4%	76.0	0.0%	76.0	0.0%	75.7	-0.4%
23	76.0	76.0	0.0%	75.5	-0.7%	76.0	0.0%	76.0	0.0%	76.0	0.0%

Note: DC resistance: $\pm 5\%$ or less of initial value (at $20\pm 5^\circ\text{C}$)

E-A4-30343B

Table 7. Evaluation Test Results (Environment Resistance and Electrical Characteristics)

Item no.	Test item	Test method ⁽¹⁾	Pass/Fail Criteria	Test result (range of characteristics)			
				Passed	Failed		
I	1	Thermal shock	A.4.4.6.3	No erosion affecting electrical characteristics or mechanical damage	Acceptable	8	0
II	2	Materials, draing, structure, external, dimension, marking, and workmanship	A.4.4.2 A.4.4.3	Marking, dimension, mass and structures are as specified in detail specification	Acceptable	8	0
	3	Electrical characteristics	A.4.4.4.1	As shown in Table 8 on page 12		8	0
	4	Withstanding voltage (normal pressure)	A.4.4.4.2.1	No dielectric breakdown	Acceptable	8	0
	5	Withstanding voltage (reduced pressure)	A.4.4.4.2.2	No dielectric breakdown	Acceptable	8	0
	6	Interlayer withstanding voltage	A.4.4.4.3	No dielectric breakdown	Acceptable	8	0
	7	Insulation resistance	A.4.4.4.4	10,000MΩ or more	100,000MΩ min.	8	0
	8	Bacteria resistance	–	External materials are processed to prevent bacterial infestation	Bacteria resistant material		
	III	9	Solderability	A.4.4.5.2	No mechanical or electrical damage	Acceptable	2
10		Life	A.4.4.7.1	Marking, dimension, mass and structures are as specified in detail specification	Acceptable	2	0
11		Externals and mechanical inspection (after test)	A.4.4.2.1	No mechanical or electrical damage	Acceptable	2	0
12		Electrical characteristics	A.4.4.4.1	As shown in Table 8 on page 12		2	0
IV	13	Resistance soldering heat	A.4.4.5.3	No softening of insulating material, no loosening of coil or terminals	Acceptable	6	0
	14	Terminal strength	A.4.4.5.1	No loosening, breakage or other mechanical damage to terminals	Acceptable	6	0
	15	Temperature rise	A.4.4.4.6	30°C or less	4.5 to 4.6°C	2	0
	16	Vibration	A.4.4.6.1	No mechanical damage	Acceptable	6	0
	17	Shock	A.4.4.6.2	No mechanical damage	Acceptable	6	0
	18	Moisture resistance	A.4.4.6.5	No erosion affecting electrical characteristics or mechanical damage	Acceptable	6	0
	19	Overload	A.4.4.4.1.21	No erosion affecting electrical characteristics or mechanical damage	Acceptable	6	0
	20	Electrical characteristics	A.4.4.4.1	As shown in Table 8 on page 12		6	0
	21	Externals and mechanical inspection (after test)	A.4.4.2.1	Marking, dimension, mass and structures are as specified in detail specification	Acceptable	6	0
	22	DPA	A.4.4.3.1	No gaps or cracks	Acceptable	3	0

Note⁽¹⁾: Indicates paragraph number of JAXA-QTS-2110, Appendix A.

Table 8. Evaluation Test Result (Electrical Characteristics)

JAXA 2110/A153-T000

Item	Pass/Fail Criteria	Parameter range		
		Tamura Corporation Sakado factory sample	Wakayanagi Tamura sample	
Inductance	(5 - 6) = 40μH min	64.52 to 65.10μH	65.3 to 66.6μH	
Transforming ratio	(1 - 2) / (5 - 6) = 1.00±5%	0.5 to 0.6%	-0.6%	
	(3 - 4) / (5 - 6) = 1.00±5%	0.5 to 0.6%	-0.6 to -0.5%	
	(7 - 8) / (5 - 6) = 2.25±5%	0.5 to 0.7%	-0.6%	
	(8 - 9) / (5 - 6) = 2.25±5%	0.5 to 0.6%	-0.6%	
	(10 - 11) / (5 - 6) = 0.417±5%	0.5 to 0.7%	-0.6%	
DC resistance	(12 - 13) / (5 - 6) = 0.417±5%	0.5 to 0.6%	-0.6 to -0.5%	
	(1 - 2) = 190mΩ max.	115.2 to 117.7mΩ	115.1 to 115.6mΩ	
	(3 - 4) = 140mΩ max.	71.0 to 72.8mΩ	71.8 to 72.8mΩ	
	(5 - 6) = 130mΩ max.	75.7 to 77.2mΩ	76.0 to 77.4mΩ	
	(7 - 8) = 1.8Ω max.	1.099 to 1.131Ω	1.082 to 1.089Ω	
Polarity	(8 - 9) = 1.7Ω max.	1.033 to 1.066Ω	1.020 to 1.029Ω	
	(10 - 11) = 30mΩ max.	13.3 to 14.4mΩ	14.9 to 15.1mΩ	
Dimensions	(12 - 13) = 25mΩ max.	12.0 to 12.7mΩ	13.6 to 13.7mΩ	
	Test points 1, 3, 5, 7, 8, 10 and 12 shall have the same polarity.	Acceptable	Acceptable	
	A (Long)	45mm max.	43.3 to 43.6mm	43.3 to 43.4mm
Capacity	B (Wide)	34mm max.	32.7 to 33.5mm	32.5 to 32.7mm
	C (Tall)	14mm max.	13.0 to 13.4mm	12.9 to 13.1mm
Mass	17.23cm ³ max.	15.18 to 15.94cm ³	14.88 to 15.21cm ³	
	40g max.	34.0 to 34.1g	33.2 to 33.9g	

JAXA certified parts **Outgassing Data of Materials**
(JAXA2110/A153-T000)

No.	Name of materials	Part Number	Materials	TML (%)	CVCM (%)	Mass (g) (reference)
1	Bobbin	E-B1-30317	Diallyl phthalate	0.636	0.089	4.7
2	Wire	PEW (coating) Sumitomo Electric Wintec, INC.	Polyester	0.122	0.009	0.18
		PEW (coating) FURUKAWA MAGNET WIRE Co., LTD.	Polyester	0.008	0.000	0.06
		PEW (coating) Hitachi Cable, Ltd.	Polyester	0.009	0.001	0.06
3	Adhesive tape	NO. 1205	Polyimide/ acrylic pressure sensitive adhesive	0.859	0.065	0.01
4	Adhesive	Scotchweld 2216	Epoxy	0.77	0.04	0.5
5	Impregnated material	No. 280	Epoxy	0.581	0.047	1.5
6	Ink	M-9-N	Epoxy type	0.490	0.035	0.05
The outgassing data for the finished product				0.609	0.073	7.06

Notes:	Material part name and part number	TML (%)	CVCM (%)	Mass (g) (reference)
a. Due to material change in bobbin resin, the table on the right shows outgas data for two types of bobbins, E-B1-30317 (same size as QT product) and E-B1-30318, which differ only in size. (the two types are the same material and differ only in size) The data for No.1 bobbin (E-B1-30317) in the above table shows the new data.	Bobbin E-B1-30317 (old data)	0.395	0.004	4.7
	Bobbin E-B1-30317 (new data)	0.636	0.089	4.7
	Bobbin E-B1-30318 (new data)	0.636	0.089	3.6
b. For Bobbin E-B1-30318, no old data is shown since Bobbin E-B1-30318 will be replaced by a new bobbin with new data at the time this ADS (Revision B) is applied.				
c. For Bobbin E-B1-30317, use of the bobbin with the old data shall be prioritized.				