

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

Part Description	TRANSFORMERS AND INDUCTORS, POWER
Part Number and Type	NASDA 2110/A124-T000
Applicable Specification	JAXA-QTS-2110 JAXA-QTS-2110/A124

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	16 June 2006	Original				
A	20 June 2012	<p>(1) Page 8: Outgassing Data of Materials Added data for wire of Furukawa Magnet Wire and Hitachi Cable. Added data for adhesive (erroneously omitted).</p> <p>(2) Page 4: Changed the contact due to reorganization.</p> <table style="width: 100%; border: none;"> <tr> <td style="text-align: center;">Before</td> <td style="text-align: center;">After</td> </tr> <tr> <td>Avio & Industrial Devices Business Unit Quality Assurance Group</td> <td>Electronic Components Business Sector Components Quality Assurance Group</td> </tr> </table> <p>(3) Page 3: Added paragraph 6 RELIABILITY</p> <p>(4) Others: Page 6: Added table number in Table 1. Pages 6 and 7: Updated the test data. (the data of Group A and B tests of Quality Conformance test was updated) Page 7: Added the table title of Table 2 "Evaluation Test Results (Electrical Characteristics)".</p>	Before	After	Avio & Industrial Devices Business Unit Quality Assurance Group	Electronic Components Business Sector Components Quality Assurance Group
Before	After					
Avio & Industrial Devices Business Unit Quality Assurance Group	Electronic Components Business Sector Components Quality Assurance Group					
B	16 Feb. 2017	<p>(1) Page 5, Figure 1: Added manufacture line identification code to the serial number in (3) Markings Added a marking example; a symbol, "W" indicates that products are manufactured in Wakayanagi Tamura Corporation; no symbol indicates that the products are manufactured in Tamura Corporation.</p> <p>(2) Page 6, Table 1: Deleted Note⁽²⁾ (overlooked at the time of revising to A revision)</p> <p>(3) Page 7, Table 2: Added data of the samples manufactured in Wakayanagi Tamura Corporation in the range of measurement.</p>				
C	22 Aug. 2022	<p>(1) Page 4, Paragraph 8: Changed contact division and telephone number in association with organization change.</p> <ul style="list-style-type: none"> • AVIO Department → Magnetic Business Unit, AVIO Department • +81-49-284-3105 → +81-50-3664-0489 				

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
2.3	Characteristics of Amorphous Core.....	2
3.	USAGE.....	2
3.1	Rating	2
3.2	Installation Methods	2
4.	CHARACTERISTICS UNDER NORMAL OPERATING CONDITIONS	3
4.1	Electrical Characterisitcs	3
4.2	Environmental Resistance.....	3
4.3	Outgassing.....	3
5.	HANDLING AND STORAGE CONDITIONS	3
6.	RELIABILITY	3
6.1	Possible Failure Mode.....	3
7.	PRECAUTIONS.....	3
7.1	Instructions for Purchaser	3
7.2	Instructions for User	4
8.	OTHERS.....	4

**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

- | | |
|------------------------|--|
| (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/A124 | NASDA 2110/A124 Type, Transformers and Inductors, Power, High Reliability, Space Use, Detail Specification For |

2. SUMMARY OF PRODUCTS

The transformer described in this data sheet is an open type high reliability product for electrical equipment to be installed on satellites and/or launch vehicles.

2.1 Externals, Dimensions and Mass

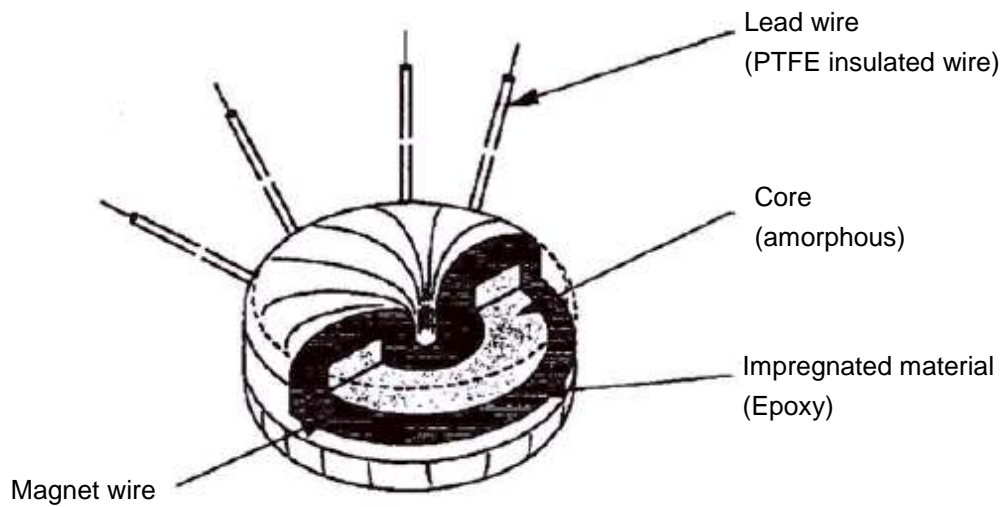
Externals, dimensions, mass and markings of the transformer are shown below.

Part number	Externals, dimensions and marking	Mass (nominal value)
NASDA 2110/A124-T000	See Figure 1	14g

2.2 Construction

The transformer is of an epoxy resin impregnated open type. Magnet wires are wound around a toroidal core. Direct wires or PTFE insulated wires are pulled out to serve as the leads. The following figure shows a simplified internal construction.

E-A4-30340C



2.3 Characteristics of Amorphous Core

Amorphous has no crystal structure and better magnetic characteristics as follows compared to conventional magnetic materials such as ferrite, dust and permalloy.

- High saturation magnetic flux density
- High permeability
- Low retention
- Low iron loss at high-frequencies
- Excellent frequency characteristic of relative magnetic permeability
- Stable against changes in ambient temperature

Especially, cobalt base amorphous cores are frequently used for applications such as high impedance transformers and magnetic amplifiers which take advantage of a feature that the cores behave as inductors with magnetic saturation.

3. USAGE

3.1 Rating

The transformer is rated as follows.

Part number	Rated power	Operating frequency	Operating ambient temperature (1)	Temperature rise (1)	Input voltage
NASDA 2110/A124-T000	10.4VA	20kHz	-55°C to +85°C	20°C max.	20Vrms

Note (1) Operating ambient temperature + Temperature rise = Maximum operating temperature ;R (105°C) max.

3.2 Installation Methods

It is recommended to install the transformer as follows.

- (a) Use both a retainer plate and epoxy adhesive. The retainer plate shall be fastened with stainless-steel screws.

4. CHARACTERISTICS UNDER NORMAL OPERATING CONDITIONS

4.1 Electrical Characterisitcs

The transformer satisfies the electrical characteristics specified in the detail specification. Test results are shown in Tables 1 and 2.

4.2 Environmental Resistance

The transformer satisfies the environmental conditions specified in the detail specification. Test results are shown in Tables 1 and 2.

4.3 Outgassing

Outgassing data of organic materials used in the transformer is shown in Table 3.

5. HANDLING AND STORAGE CONDITIONS

- (1) Use caution not to expose the transformer to excessive stresses such as shock by drop.
- (2) It is recommended to store the transformer under the following conditions.

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

6. RELIABILITY

6.1 Possible Failure Mode

- Open circuit (breaking, bad connection)
- Short circuit (Insulation breakage, insulating film breakage)
- Low Inductance (iron core breakage, flexure, layer short)

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/A124, 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 Instructions for User

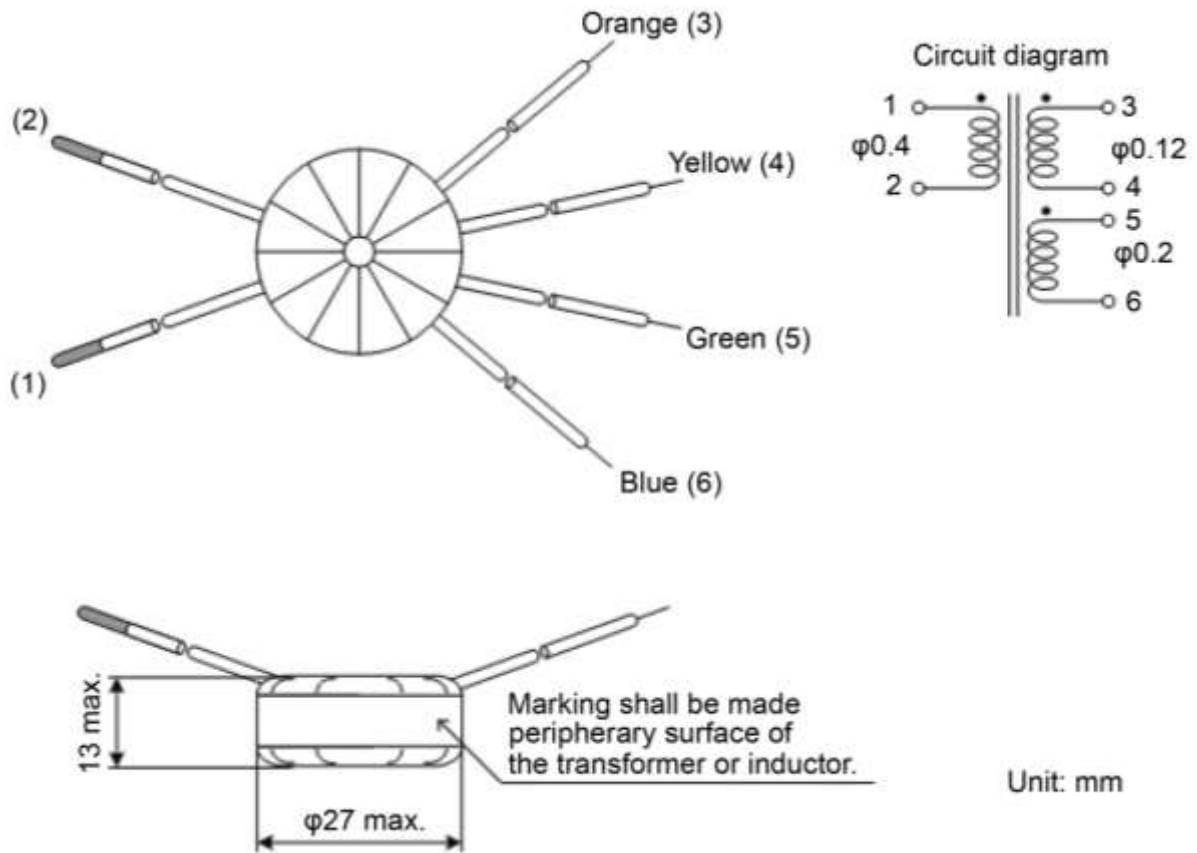
- Apply sufficient adhesive to the bonding surface.
- The acceptable adhesive is rigid epoxy adhesive.
- It is recommended to maintain the operating frequency deviation within $\pm 5\%$ of the rated operating frequency.
- It is recommended to operate the transformer within the rated output power and direct current.
- Operate the transformer in the temperature class R (105°C) as a maximum.
- Use the transformer in consideration of its outgassing characteristics.

8. OTHERS

Direct all inquiries about this data sheet to Tamura Corporation.

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

E-A4-30340C



- (1) Lead wire length: 100mm min.
Direct wire leads of $\phi 0.4\text{mm}$ for terminals 1, 2
No. 28 AWG for terminals 3, 4, 5, 6
Insulator removed approx. 10mm at the end
- (2) Mass: 17g max.
- (3) Markings:
N2110/A124-T000
Lot identification code
Serial number and manufacture line identification code

(Marking example)

Serial number NO.1 W Manufacture line identification code
W: Wakayanagi Tamura Corporation
No symbol: Tamura Corporation

Terminal identification

Figure 1. Externals, Dimensions and Markings

**Table 1. Evaluation Test Results
(Environmental Resistance and Electrical Characteristics)**

Item no.	Test item	Test method ⁽¹⁾	Pass/Fail criteria	Test result (Parameter range)			
				Passed	Failed		
I	1	Thermal shock	A.4.4.6.3	No corrosions affecting electrical performance nor mechanical damages	Acceptable	3	0
II	2	Material, design, structure, externals, dimension, marking, workmanship	A.4.4.2 A.4.4.3	Markings, dimension, mass and structures shall be as specified in the detail specification.	Acceptable	3	0
	3	Electrical characteristics	A.4.4.4.1	Shown in Table 2.		3	0
	4	Withstanding voltage (ambient pressure)	A.4.4.4.2.1	No dielectric breakdown	Acceptable	3	0
	5	Withstanding voltage (reduced pressure)	A.4.4.4.2.2	No dielectric breakdown	Acceptable	3	0
	6	Interlayer withstanding voltage	A.4.4.4.3	No dielectric breakdown	Acceptable	3	0
	7	Insulation resistance	A.4.4.4.4	10,000MΩ min.	100,000MΩ min.	3	0
	8	Bacteria resistance	---	External materials shall be processed to prevent bacterial infestation.	bacteria resistant material used		
	III	9	Life	A.4.4.7.1	No mechanical or electrical damages	Acceptable	2
10		Visual and mechanical inspection (post-test)	A.4.4.2.1	Markings, dimension, mass and structures shall be as specified in the detail specification.	Acceptable	2	0
11		Electrical characteristics	A.4.4.4.1	Shown in Table 2.		2	0
IV	12	Terminal strength	A.4.4.5.1	No loosening, breakage or other mechanical damages to the terminals	Acceptable	3	0
	13	Temperature rise	A.4.4.4.6	20°C max.	5.9 to 7.4°C	3	0
	14	Vibration	A.4.4.6.1	No mechanical damages	Acceptable	3	0
	15	Shock	A.4.4.6.2	No mechanical damages	Acceptable	3	0
	16	Moisture resistance	A.4.4.6.5	No corrosions affecting electrical performance nor mechanical damages	Acceptable	3	0
	17	Overload	A.4.4.4.1.21	No corrosions affecting electrical performance nor mechanical damages	Acceptable	3	0
	18	Electrical characteristics	A.4.4.4.1	Shown in Table 2.		3	0
	19	Visual and mechanical inspection (post-test)	A.4.4.2.1	Markings, dimension, mass and structures shall be as specified in the detail specification.	Acceptable	3	0
	20	DPA	A.4.4.3.1	No gaps or cracks	Acceptable	3	0

Note (1) Indicates paragraph number of JAXA-QTS-2110.

Table 2. Evaluation Test Results (Electrical Characteristics)

NASDA 2110/A124-T000

Item	Pass/Fail criteria	Parameter range		
		Tamura Corporation Sakado factory sample	Wakayanagi Tamura sample	
Impedance	Between (1-2) 1kΩ min.	7.61 to 7.79kΩ	5.66 to 6.38kΩ	
Transformer turns ratio	(3 - 4) / (1-2) 6.19 ± 3%	0.1 to 0.2%	0.6 to 1.3%	
	(5 - 6) / (1-2) 1.27 ± 3%	-1.1 to -0.4%	-0.9 to 0.2%	
DC resistance	Between (1 - 2) 0.45Ω max.	0.340 to 0.346Ω	0.330 to 0.337Ω	
	Between (3 - 4) 23Ω max.	16.87 to 17.15Ω	16.82 to 17.01Ω	
	Between (5 - 6) 1.8Ω max.	1.458 to 1.470Ω	1.419 to 1.437Ω	
Polarity	Test points 1, 3, and 5 shall have the same polarity.	Acceptable	Acceptable	
Dimensions	A (Diameter)	Φ27mm max.	25.4 to 25.6mm	24.2 to 24.6mm
	B (Height)	13mm max.	11.3 to 11.5mm	10.7 to 10.9mm
	C (Lead length)	100mm min.	124mm	125mm
Volume	-	5.7 to 6.0cm ³	4.92 to 5.14cm ³	
Mass	17g max.	13.2 to 13.4g	12.3 to 12.5g	

Table 3. Outgassing Data

JAXA certified parts

(NASDA2110/A124-T0000)

Outgassing Data of Materials

No	Category	Part Number	Material name	TML (%)	CVCM (%)	Mass (g) (Reference)
1	Adhesive tape	No. 1205	Polyimide/ acrylic adhesive	0.859	0.065	0.05
2	Core case	FR-530 BLACK	Polyethylene terephthalate	0.522	0.121	-
3-1	Wire	PEW (insulator) (Sumitomo Electric Wintec Co., Ltd.)	Polyester	0.122	0.009	---
3-2	Wire	PEW (insulator) (Furukawa Magnet Wire Co., Ltd.)	Polyester	0.009	0.000	---
3-3	Wire	PEW (insulator) (Hitachi Cable Ltd.)	Polyester	0.008	0.001	---
4	Wire	UEW (insulator)	Polyurethane	0.584	0.013	-
5	Lead wire	TYPE E (insulator)	PTFE	0.005	0.008	-
6	Insulating film	Kapton H type	Polyimide	0.904	0.002	0.04
7	Adhesive	ECOBOND 104	Epoxy type	0.325	0.006	1
8	Insulating tape	Merubon Electrical insulating tape	Polyester	0.120	0.029	0.2
9	Adhesive	Aron alpha #201	α -Cyanoacrylate resin	14.310	0.120	0.001
10	Ink	M-9-N	Epoxy type	0.490	0.035	0.05
11	Impregnated material	No. 280	Epoxy	0.581	0.047	2
The outgassing data for the finished product				0.488	0.033	3.341