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TRANSFORMERS AND INDUCTORS, POWER, HIGH RELIABILITY, SPACE USE, DETAIL SPECIFICATION FOR

(NASDA 2110/A122 TYPE)

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: June 25, 2021

Revision Log

Rev.	Date	Changes
NC	30 Sept. 2005	Original
A	20 June 2012	Changed the temperature at the 3rd step of Thermal shock from 115°C to 130°C in Table 3. (130°C to be the highest operating temperature)
B	3 July 2017	Paragraph 1.1: Scope: Added “The products per this specification are manufactured…or Wakayanagi Tamura Corporation (Kurihara city of Miyagi)” Paragraph 3.2: Externals, Construction, Dimensions, Marking and Mass: Added “Additionally, manufacture line identification letter “W” is added to…” and a marking example in (4).
C	1 Apr. 2019	Paragraph 1.1: Scope: Deleted the description about Tamura Corporation (Sakado city of Saitama) due to unification of the facility. Paragraph 3.2: Externals, Construction, Dimensions, Marking and Mass: ▪ Changed description due to unification of the facility. ▪ Changed manufacturer line identification letter to manufacturer line letter in the text and marking example.
D	13 Dec. 2019	Paragraph 1.1: Scope: Added “The transformers and inductors specified herein do not meet outgassing requirements.” Paragraph 3.2: Externals, Construction, Dimensions, Marking and Mass: (4) Added “and manufacture line letter”. (error corrected) Paragraph 4.5: Change to tests and inspections: Added the description about the shortening of applied time of the test voltage in insulation resistance test.

Contents

NASDA 2110/A122 TYPE,
TRANSFORMERS AND INDUCTORS, POWER,
HIGH RELIABILITY, SPACE USE,
DETAIL SPECIFICATION FOR

1. GENERAL

1.1 Scope

This specification establishes the detail requirements for transformers and inductors with an PQ ferrite core (NASDA 2110/A122 type) of space use, high reliability, transformers and inductors that satisfied JAXA-QTS-2110, Transformers and Inductors, High Reliability, Space use, General Specification for. The products per this specification are manufactured in Wakayanagi Tamura Corporation (Kurihara city of Miyagi).

The transformers and inductors specified herein do not meet outgassing requirements.

1.2 Part Number

The part number shall be indicated in accordance with paragraph A.1.2, Appendix A of JAXA-QTS-2110 as shown below. When there is a part number defined by purchaser, a part number defined in this specification shall also be provided in a product specification.

(Example)
NASDA([1]) 2110/A122 – T000
Identification number

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

1.3 Rating

The rating shall be as specified in Table 1.

Table 1. Rating

Item	Applicable paragraph of JAXA-QTS-2110	Identification number	
		T000	T001 or subsequent
Grade	A.3.3.8	6 (open type)	
Operating ambient temperature	–	-55 to +100°C	As specified in the product specification.
Class	A.3.6.1	S (130°C)	
Operating frequency	–	100kHz	
Input voltage	–	60Vrms	
Output power	–	81VA	

2. APPLICABLE DOCUMENTS

Applicable documents shall be as specified in paragraph A.2.1, Appendix A of JAXA-QTS-2110.

3. REQUIREMENTS

Requirements shall be as follows and as specified in Section A.3, Appendix A of JAXA-QTS-2110.

3.1 Qualification Coverage

The qualification coverage shall be as specified in Table 2.

Table 2. Qualification Coverage

No.	Item	Specification
1	Class (maximum operating temperature)	S (130°C) max.
2	External/internal mounting construction	Screwing
	External dimensions (mm)	42 x 54 x 45^{H} max.
	Total volume (cm^3)	102.06 max.
3	Operating voltage	175Vpeak max.
	Insulator	Polyester, equivalent or better
4	Magnet wire diameter (mm)	φ0.10 min.
	Coating material	Polyester, equivalent or better
5	Grade	6
	Insulation, impregnation, and filling material	Epoxy impregnation
6	Construction and material of terminal	PTFE lead wire (AWG30 to AWG18) Direct wiring wire (φ0.4mm to φ1.14mm)
	Terminal strength	MIL-STD-202, test method 211, test condition A PTFE lead wire: 13.7N max. (AWG 28 to 18) PTFE lead wire: 9.8N max. (AWG 30 to 28) Direct wiring wire: 9.8N max.
7	Shock	MIL-STD-202, test method 213 Test conditions: 840G, 0.6ms, half sine wave max.
	Vibration	MIL-STD-202, test method 204, test condition D max. MIL-STD-202, test method 214, test condition II-H max.
8	Core material	Ferrite
	Core shape	PQ type
9	Dielectric withstanding voltage	AC 500V max.

3.2 Externals, Construction, Dimensions, Marking and Mass

The externals, constructions, dimensions and mass shall be as specified in Figure 1. Marking items shall be as follows in accordance with paragraph A.3.4.1, Appendix A of JAXA-QTS-2110. If the product specification has marking requirements, marking shall be made as specified in the product specification. Marking location shall be as shown in Figure 1. Additionally, manufacture line letter “W” is added to the end of the serial number or to the location specified in the product specification.

(1) Part number in this specification
(2) Terminal identification (See Figure 1)
(3) Lot identification code
(4) Serial number and manufacture line letter

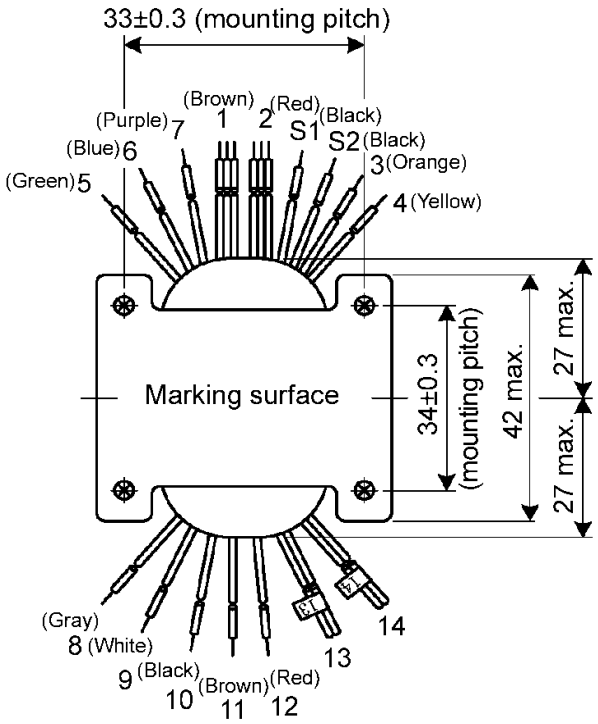
(Marking example)

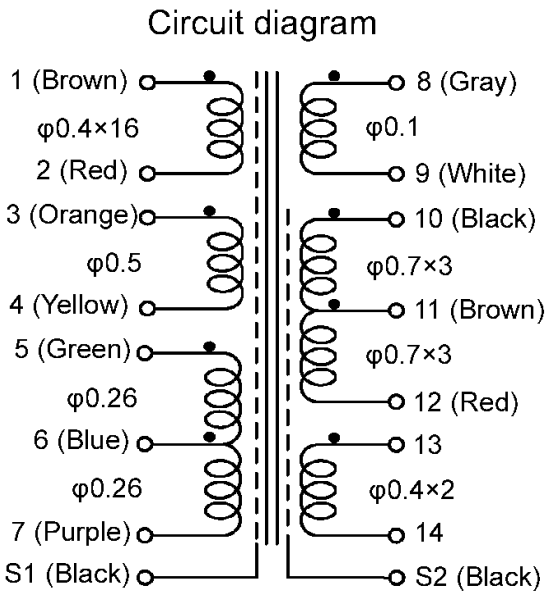
Serial number —— No. 1 W —— Manufacture line letter:
Letter “W”: Wakayanagi Tamura Corporation

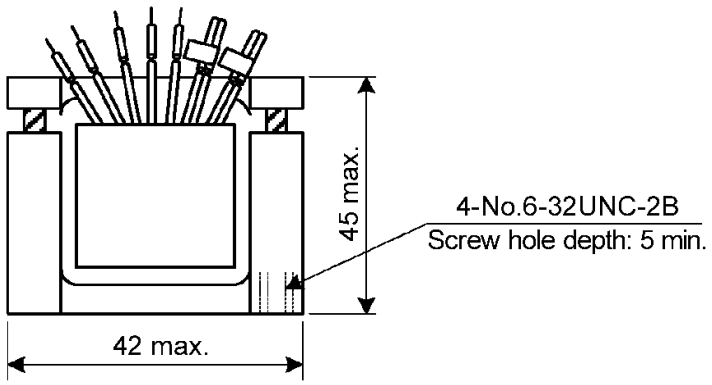
(5) Trademark

If the marking area on the transformer or inductor is limited, the items above may be abbreviated or omitted in the following order of precedence.

(1) ”2110/A” of the part number
(2) Trademark







Unit: mm

1. Lead wire length: 100mm min.
   AWG 18 x 3 for terminal no. 1, 2
   AWG 22 for terminal no. 5, 6, 7, 10, 11, 12
   AWG 24 for terminal no. 3, 4
   AWG 30 for terminal no. 8, 9
   Direct wiring wires of φ0.4mm x 2 for terminal no. 13, 14
   AWG 28 for terminal no. S1, S2
   Coating removed for length of approx.10mm at the end.
2. Mass: 220g max.

Figure 1. Externals, Construction, Dimension, Marking and Mass([1])

Note: ([1]) Figure 1 shall be applicable to all certified products. Externals, construction, dimensions, marking and mass of Individual product included in the qualification coverage shall be as specified in the product specification.

3.3 Performance

Performance requirements shall be as specified in Table 3.

Table 3. Performance Requirements([1])

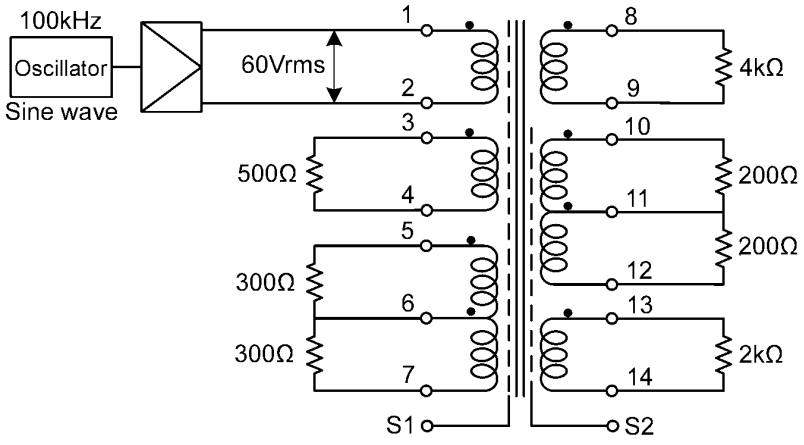
Item	Requirement paragraph of JAXA-QTS-2110	Requirement
Electrical characteristics	A.3.7.1	As specified in Table 4.
Dielectric withstanding voltage	A.3.7.2	At barometric pressure Between windings: AC500V for 1 minute Between windings and hardware: AC500V for 1 minute Between windings and shields: AC500V for 1 minute Between shields and hardware: AC500V for 1 minute At reduced pressure Between windings: AC300V, 1.1kPa for 1 minute Between windings and hardware: AC300V, 1.1kPa for 1 minute Between windings and shields: AC300V, 1.1kPa for 1 minute Between shield and hardware: AC300V, 1.1kPa for 1 minute
Interlayer withstanding voltage	A.3.7.3	200kHz, sine wave of 120Vrms applied between (1-2) for 5±0.5s
Insulation resistance	A.3.7.4	Between windings: DC100V, a) 10,000MΩ min. Between windings and hardware: DC100V, a) 10,000MΩ min. Between windings and shields: DC100V, a) 10,000MΩ min. Between shields and hardware: DC100V, a) 10,000MΩ min.
Corona discharge	A.3.7.5	N/A
Temperature rise	A.3.7.6	30°C max. (ambient temperature: 100°C)
Overload	A.3.7.7	Ambient temperature: 130°C – measured temperature rise
Conductivity	A.3.7.8	As specified in Appendix A of JAXA-QTS-2110.
Terminal strength (pull)	A.3.8.1	PTFE lead wire: 13.7N (AWG28 to 18) PTFE lead wire: 9.8N (AWG30 to 28) Direct wiring wire: 9.8N
Solderablity	A.3.8.2	N/A
Resistance to soldering heat	A.3.8.3	N/A
Seal	A.3.8.4	N/A
Vibration	A.3.9.1	High frequency: As specified in Appendix A of JAXA-QTS-2110. Random: As specified in Appendix A of JAXA-QTS-2110.
Shock	A.3.9.2	Test conditions: 840G, 0.6ms, semi sine wave
Thermal shock	A.3.9.3	Test condition A-1 (temperature at the 3rd step: 130°C)
Immersion	A.3.9.4	N/A
Moisture resistance	A.3.9.5	As specified in Appendix A of JAXA-QTS-2110.
Flammability	A.3.9.6	N/A
Resistance to solvent	A.3.9.7	N/A
Life	A.3.10.1	Ambient temperature: 130°C – measured temperature rise

Note ([1]) This table shall be applicable to all certified products. Performance of individual product included in the qualification coverage shall be as specified in the product specification.

3.4 Electrical Characteristic

The electrical characteristics shall be as shown in Table 4.

Table 4. Electrical Characteristics([1])

Item	Rating
Operating frequency	100kHz±10% (sine wave)
Power supply voltage	60Vrms
Winding ratio	(3– 4) / (1–2) = 2.000 ± 3% (5– 6) / (1–2) = 1.00 ± 3% (6– 7) / (1–2) = 1.00 ± 3% (8–9) / (1–2) = 0.500 ± 4% (10–11) / (1–2) = 0.800 ± 3% (11–12) / (1–2) = 0.800 ± 3% (13–14) / (1–2) = 1.00 ± 3%
Inductance	(1–2) = 100μH min. at 100kHz, 0.5V
DC resistance (at 20°C)	(1–2) = 0.01Ω max., (8 – 9) = 1.6Ω max. (3–4) = 0.20Ω max., (10–11) = 0.03Ω max. (5–6) = 0.40Ω max., (11–12) = 0.03Ω max. (6–7) = 0.40Ω max., (13–14) = 0.08Ω max.
Output	81VA
Polarity	Test points 1, 3, 5, 6, 8, 10, 11, and 13 shall have the same polarity.
Test circuit	

Note([1]): This table shall be applicable to all certified products. Electrical characteristics of individual product included in the qualification coverage shall be as specified in the product specification.

4. QUALITY ASSURANCE PROVISIONS

Quality assurance provisions shall be as specified in Section A.4, Appendix A of JAXA-QTS-2110.

4.1 In-Process Inspection

The in-process inspection shall be as specified in paragraph A.4.1, Appendix A of JAXA-QTS-2110.

4.2 Qualification Test

The qualification test shall be as specified in paragraph A.4.2, Appendix A of JAXA-QTS-2110.

4.3 Quality Conformance Inspection

The quality conformance inspection shall be as specified in paragraph A.4.3, Appendix A of JAXA-QTS-2110.

4.4 Long-Term Storage

Long-term storage shall be as specified in paragraph A.4.5, Appendix A of JAXA-QTS-2110.

4.5 Change to Tests and Inspections

a) Insulation Resistance
(Standard) Insulation resistance in accordance with test method 302 of MIL-STD-202 is specified as follows. “If the instrument reading indicates that an insulation resistance meets the specified limit (2 min.), and is steady or increasing, the test may be terminated before the end of the specified period (2 min.)“

(Shortening of test time) From the test result and verification result, it was verified that the instrument reading increases or become stable within 2 minutes from the start of voltage application. Therefore, when the above condition is met and the measurement reaches the 10-times of 10 thousand MΩ as a minimum (which is more than 100 thousand MΩ), the test may be terminated before 2-minute passes.

5. PREPARATION FOR DELIVERY

Preparation for delivery shall be as specified in Section A.5, Appendix A of JAXA-QTS-2110.

6. NOTES

Details of notes shall be as specified in Section A.6, Appendix A of JAXA-QTS-2110.