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Cancelled
1 October 2023

TRANSFORMERS AND INDUCTORS, POWER, HIGH RELIABILITY, SPACE USE, (NASDA 2110/A116 TYPE) DETAIL SPECIFICATION FOR

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: 1 July 2025

Record of revisions

Rev.	Date	Description
NC	30 Sep. 2005	Original
A	7 Feb. 2008	Reflected the change of document by TAMURA Corporation Document No: E-A4-30329 (Rev. A)
B	30 May 2012	Reflected the change of document by TAMURA Corporation Document No: E-A4-30329 (Rev. B)
C	3 July 2017	Reflected the change of document by TAMURA Corporation Document No: E-A4-30329 (Rev. C)
D	1 Apr. 2019	Reflected the change of document by TAMURA Corporation Document No: E-A4-30329 (Rev. D)
E	13 Dec 2019	Reflected the change of document by TAMURA Corporation Document No: E-A4-30329 (Rev. E)
F	1 Oct 2023	Reflected the change of document by TAMURA Corporation Document No: E-A4-30329 (Rev. F)
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Revision history

Rev.	Date	Description
NC	30 Sep. 2005	Original
A	7 Feb. 2008	(1) Extended the qualification coverage regarding terminal strength. (Tables 2 and 3) ・ PTFE lead wire larger than AWG 18 from 13.7N maximum to 19.6N maximum ・ Direct wiring wire larger than φ1.14mm: from 9.8N maximum to 19.6N maximum (2) Corrected marking items and abbreviation rule of markings in accordance with the actual markings. (paragraph 3.2) (3) Changed wiring ratio as follows to be consistent with the qualification coverage. (Table 4) ・ (9–10)/(1–2): from 2.525 ± 3% to 2.475± 3%
B	11 Dec. 2008	(1) Extended the qualification coverage regarding operating voltage and dielectric withstanding voltage as follows. ・ Operating voltage: from 175Vpeak maximum to 250Vpeak maximum ・ Dielectric withstanding voltage: from AC500V maximum to AC700V maximum (Table 1) ・ Output power: from 97VA to 100VA (Table 2) ・ Operating voltage: from "175Vpeak maximum" to "250Vpeak maximum (Except 175Vpeak maximum for coil)" ・ Added electric field intensity ・ Dielectric withstanding voltage: from AC500V maximum to AC700V maximum (Table 3) ・ Dielectric withstanding voltage: At sea level: from AC500V to AC700V At reduced pressure: from AC300V to AC320V ・ Insulation resistance: from DC100V to DC500V (Table 4) ・ Winding ratio: (3-4) / (1-2): from 1.500 ± 3% to 2.250± 3% (5-6) / (1-2): from 0.800 ± 3% to 1.000± 3% (7-8) / (1-2): from 1.300 ± 3% to 1.750± 3% (9-10) / (1-2): from 2.475 ± 3% to 3.540± 3% (11-12) / (1-2): from 1.300 ± 3% to 2.000± 3% (13-14) / (1-2): from 0.300 ± 4% to 0.500± 4% ・ Inductance: from 5.0mH to 2.3mH ・ DC resistance: (1-2): from 0.05Ω maximum to 0.03Ω maximum (7-8): from 0.30Ω maximum to 0.25Ω maximum (11-12): from 0.55Ω maximum to 0.50Ω maximum

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Rev.	Date	Description
		・ Output: from 97VA to 100VA ・ Change in test circuit: Load between 9 and 10: from 500Ω to 10kΩ Load between 11 and 12: from 300Ω to 4kΩ (2) Thermal shock: Changed temperature at 3rd step (Table 3) From 115°C to 130°C (The temperature of 130°C means the maximum operating temperature in this detail specification.)
C	3 July 2017	Paragraph 1.1: Scope Added the wording “The products per this specification are manufactured ...or Wakayanagi Tamura Corporation (Kurihara city of Miyagi)” in the text. Paragraph 3.2: Externals, Construction, Dimensions, Marking and Mass Added the wording “Additionally, manufacture line identification letter “W” is added to…” and a marking example in (4).
D	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 the description about TAMURA Corporation due to unification of the facility. ・ Changed the wording from "manufacturer line identification letter" to "manufacturer line letter" in the text and marking example.
E	13 Dec. 2019	Paragraph 1.1: Scope Added the wording “The transformers and inductors specified herein do not meet outgassing requirements.” in the text. Paragraph 3.2: Externals, Construction, Dimensions, Marking and Mass Added the wording “and manufacture line letter” in item (4). (error corrected) Paragraph 4.5: Change to tests and inspections Changed the description to add the shortening of applied time of the test voltage in insulation resistance test.
F	1 Oct. 2023	Paragraph 2: Applicable Documents Changed the wording from "Applicable documents shall be as specified in paragraph A.2.1, appendix A of JAXA-QTS-2110.” to "Applicable documents shall be in accordance with paragraph A.2.1, appendix A of JAXA-QTS-2110 and as follows." in the text. Added MIL-W-16878E as an applicable document in item a). Added the note "* As soon as the insulated electrical wires of the MIL-W-16878D are no longer available, those wires of the MIL-W-16878E shall be applied." in item a). (Due to change in the revision letter of the applicable document “MIL-W-16878” for PTFE wire.)

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**TRANSFORMERS AND INDUCTORS, POWER,
HIGH RELIABILITY, SPACE USE,
(NASDA 2110/A116 TYPE)
DETAIL SPECIFICATION FOR**

1. GENERAL

1.1 Scope

This specification establishes the detail requirements for toroidal transformers and inductors with a ferrite core (NASDA 2110/A116 type) specified in JAXA-QTS-2110. The products under this specification are manufactured in Wakayanagi Tamura Corporation (Kurihara city of Miyagi).

The transformers and inductors specified in this specification 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 a purchaser designates a specific part number, corresponding part number in this specification shall be stipulated in a product specification.

(Example)
NASDA (1) 2110/A116 – T000
Identification number

Note: (1) "NASDA" indicates the part is for space use and may be abbreviated “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	–	50kHz	
Input voltage	–	50Vrms	
Output power	–	100VA	

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2. APPLICABLE DOCUMENTS

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

a) MIL-W-16878E: Wire, Electrical, Insulated, General Specification for

* As soon as the insulated electrical wires of the MIL-W-16878D are no longer available, those wires of the MIL-W-16878E shall be applied.

3. REQUIREMENTS

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

3.1 Qualification Coverage

The qualification coverage shall be as specified in Table 2

Table 2. Qualification Coverage

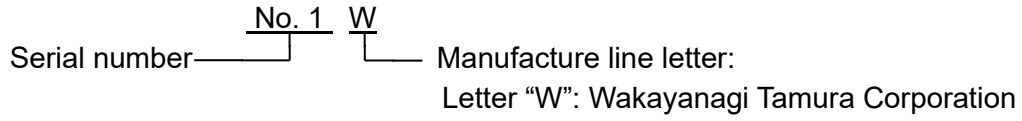
No.	Item	Specification to be covered
1	Class (maximum operating temperature)	S (130°C) maximum
2	External/internal mounting construction	Adhesion or combination of adhesion and screwing
	External dimension (mm)	φ65 x 43^{H} maximum
	Total volume (cm^3)	142.6 maximum
3	Operating voltage	250Vpeak maximum (Except 175Vpeak maximum for coil)
	Insulation	Polyester, equivalent or better
	Electric field intensity	63.5V/mil maximum (Not applicable for 175Vpeak and below)
4	Magnet wire diameter (mm)	φ0.1 minimum
	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 (AWG 30 minimum) Direct wiring wire (φ0.4mm minimum)
	Terminal strength	MIL-STD-202, test method 211, test condition A PTFE lead wire: 19.6N maximum (larger than AWG 18) : 13.7N maximum (AWG 28 to 18) : 9.8N maximum (AWG 30 to 28) Direct wiring wire:19.6N maximum (larger than φ1.14mm) : 9.8N maximum (φ 0.4mm to 1.14mm)
7	Shock	MIL-STD-202, test method 213 Test conditions: 1,000G, 0.4ms, semi sine wave maximum
	Vibration	MIL-STD-202, test method 204, test condition D maximum MIL-STD-202, test method 214, test condition II-H maximum
8	Core material	Ferrite
	Core shape	Toroidal type
9	Dielectric withstanding voltage	AC 700V maximum

3.2 External Construction, Dimension, 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)



(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

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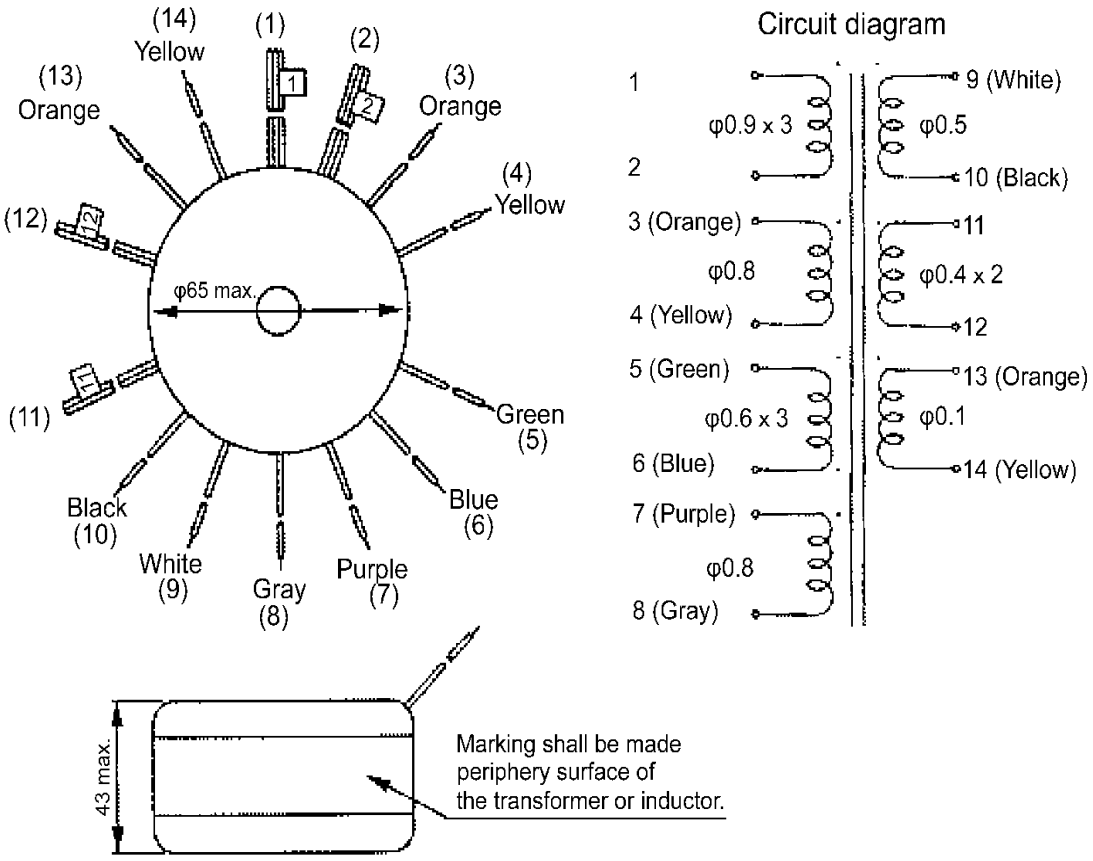

Unit: mm

1. Lead wire length: 100mm minimum
   AWG 18 for terminals 5, 6
   AWG 20 for terminals 3, 4, 7, 8
   AWG 24 for terminals 9, 10
   AWG 30 for terminals 13, 14
   Direct wiring wire of φ0.9mm x 3 for terminals 1, 2
   Direct wiring wire of φ0.4mm x 2 for terminals 11, 12
   Coating removed approx.10mm at the end
2. Mass: 350g maximum

Figure 1. External, 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.

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Table 3. Performance Requirements (1)

Item	Requirement paragraph of JAXA-QTS-2110	Performance
Electrical characteristics	A.3.7.1	As specified in Table 4.
Dielectric withstanding voltage	A.3.7.2	At sea level: AC700V for 1 minute At reduced pressure: 1.1kPa, AC320V for 1 minute
Interlayer withstanding voltage	A.3.7.3	100kHz, sine wave of 100Vrms applied between (1-2) for 5±0.5s
Insulation resistance	A.3.7.4	DC500V, a) 10,000MΩ minimum
Corona discharge	A.3.7.5	N/A
Temperature rise	A.3.7.6	30°C maximum (ambient temperature: 100°C)
Overload	A.3.7.7	Ambient temperature: 130°C – measured temperature rise
Electrical continuity	A.3.7.8	As specified in appendix A of JAXA-QTS-2110.
Terminal strength (pull)	A.3.8.1	PTFE lead wire: 19.6N maximum (larger than AWG 18) : 13.7N maximum (AWG 28 to 18) : 9.8N maximum (AWG 30 to 28) Direct wiring wire: 19.6N maximum (larger than φ1.14mm) : 9.8N maximum (φ 0.4mm to 1.14mm)
Solderability	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: 1,000G, 0.4ms, semi sine wave
Thermal shock	A.3.9.3	Test condition A-1 (temperature at 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 solvents	A.3.9.7	N/A
Life	A.3.10.1	Ambient temperature: 130°C – measured temperature rise

Note: (1)This table is 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 Characteristics

The electrical characteristics shall be as shown in Table 4.

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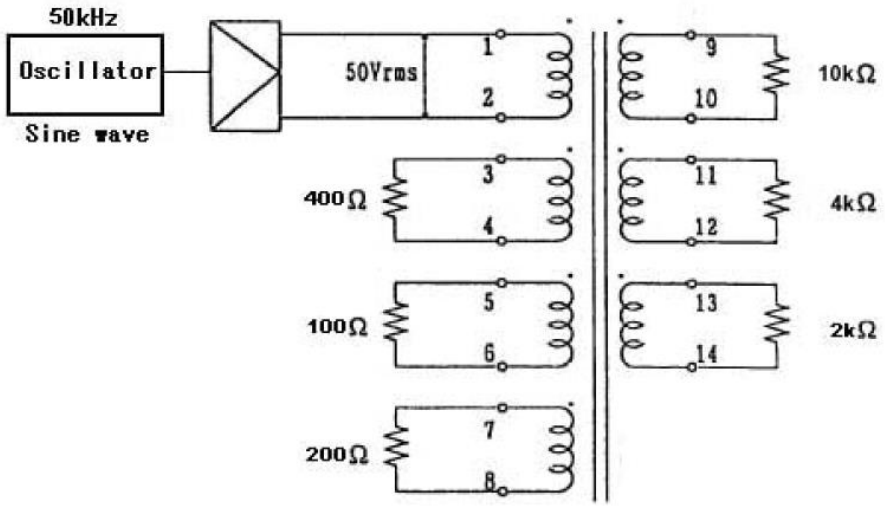
Table 4. Electrical Characteristics (1)

Item	Rating
Operating frequency	50kHz±10%
Power supply voltage	50Vrms
Winding ratio	(3– 4) / (1–2) = 2.250 ± 3% (5– 6) / (1–2) = 1.000 ± 3% (7– 8) / (1–2) = 1.750 ± 3% (9–10) / (1–2) = 3.540 ± 3% (11–12) / (1–2) = 2.000 ± 3% (13–14) / (1–2) = 0.500 ± 4%
Inductance	(1–2) = 2.3mH minimum at 10kHz, 1.0V
DC resistance (at 20°C)	(1–2) = 0.03Ω maximum, (9– 10) = 1.20Ω maximum (3–4) = 0.30Ω maximum, (11–12) = 0.50Ω maximum (5–6) = 0.08Ω maximum, (13–14) = 4.00Ω maximum (7–8) = 0.25Ω maximum
Output	100VA
Polarity	Test points 1, 3, 5, 7, 9, 11, and 13 shall have the same polarity.
Test circuit	

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

4. QUALITY ASSURANCE PROVISIONS

Quality assurance provisions shall be as specified in paragraph 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 minimum), and is steady or increasing, the test may be terminated before the end of the specified period (2 minimum) “

(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 paragraph A.5, appendix A of JAXA-QTS-2110.

6. NOTE

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