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JAXA-QTS-2110/A151G
1 October 2023

Superseding
JAXA-QTS-2110/A151F
Cancelled
1 October 2023

TRANSFORMERS AND INDUCTORS, POWER, (OUTGASSING-QUALIFIED), HIGH RELIABILITY, SPACE USE, (JAXA 2110/A151 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-A4-30333 (Rev. A)
B	30 May 2012	Reflected the change of document by TAMURA Corporation Document No: E-A4-30333 (Rev. B)
C	3 July 2017	Reflected the change of document by TAMURA Corporation Document No: E-A4-30333 (Rev. C)
D	1 Apr. 2019	Reflected the change of document by TAMURA Corporation Document No: E-A4-30333 (Rev. D)
E	13 Dec. 2019	Reflected the change of document by TAMURA Corporation Document No: E-A4-30333 (Rev. E)
F	23 Mar. 2023	Reflected the change of document by TAMURA Corporation Document No: E-A4-30333 (Rev. F)
G	1 Oct. 2023	Reflected the change of document by TAMURA Corporation Document No: E-A4-30333 (Rev. G)
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Revision history

Rev.	Date	Description
NC	31 May 2006	Original
A	7 Feb. 2008	(1) Extended the qualification coverage regarding construction and material of terminal. (Table 2) • PTFE lead wire: from (AWG 28 to 18) to (AWG 28 minimum) • Direct wiring wire: from (φ0.4mm to φ1.14mm) to (φ0.4mm minimum) (2) 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
B	30 May 2012	(1) Changed the temperature at the 3rd step of Thermal shock from 115°C to 130°C in Table 3. (The temperature of 130°C means the maximum operating temperature in this detail specification.)
C	5 Feb. 2016	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 code “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 • Deleted 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 3.2: Externals, Construction, Dimensions, Marking and Mass Added the wording “and manufacture line letter” in item (4). (not listed) 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.

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Rev.	Date	Description
F	28 Mar. 2023	Extended the qualification coverage for the following items to the same scope of qualification as A114 type. Paragraph 3.1: Qualification coverage, Table 2 Qualification coverage “Shock” Test condition: from 840G, 0.6ms to 1000G, 0.4ms Paragraph 3.3: Performance, Table 3 Performance Requirements. “Shock” Test conditions: from 840G, 0.6ms to 1000G, 0.4ms
G	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.)

Contents

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JAXA 2110/A151 TYPE,
TRANSFORMERS AND INDUCTORS, POWER,
(OUTGASSING-QUALIFIED),
HIGH RELIABILITY, SPACE USE,
DETAIL SPECIFICATION FOR

1. GENERAL

1.1 Scope

This specification establishes the detail requirements for toroidal transformers and inductors with a molybdenum permalloy powder (MPP) core (JAXA 2110/A151 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 shall meet the requirements for outgassing.

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) JAXA(1) 2110/A151 – T000

Identification number

Note (1) "JAXA" indicates the part is for space use and may be abbreviated “J.”

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	–	20kHz	
Input voltage	–	50Vrms	
Output power	–	253VA	

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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 dimensions (mm)	φ80 x 48H maximum
	Total volume (cm3)	241.2 maximum
3	Operating voltage	175Vpeak maximum
	Insulation	Polyester, equivalent or better
4	Magnet wire diameter (mm)	φ0.14 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 28 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) Direct wiring wire: 19.6N maximum (larger than φ1.14mm) : 9.8N maximum (φ0.4mm to 1.14mm)
7	Shock	MIL-STD-202, test method 213 Test conditions: 1000G, 0.4ms, half 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	MPP
	Core shape	Toroidal type
9	Dielectric withstanding voltage	AC 500V maximum
10	Outgassing	TML: 1.0% maximum, CVCM: 0.1% maximum

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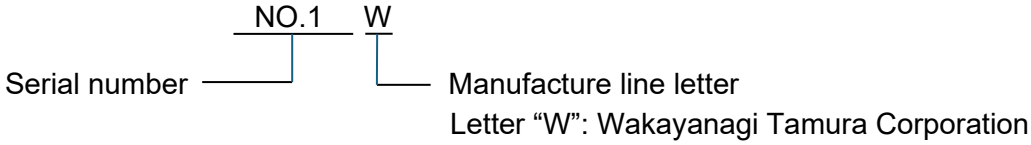
3.2 Externals, Construction, Dimensions, Marking and Mass

The externals, construction, 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, the marking shall be made as specified in the product specification. 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 numbers given 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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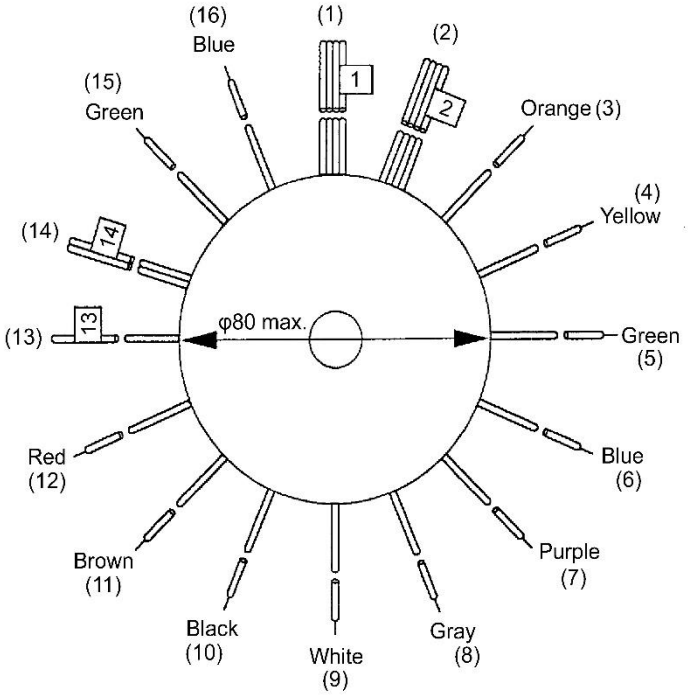

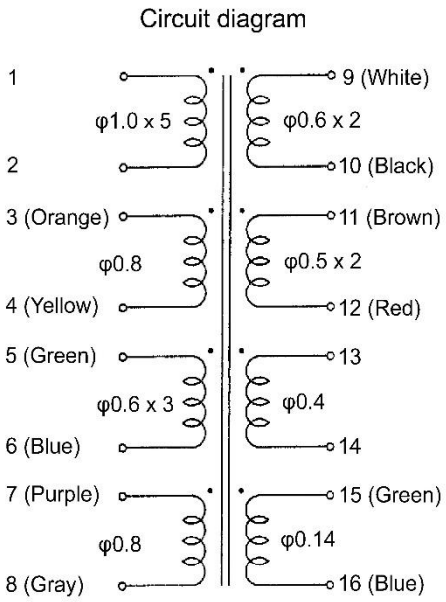

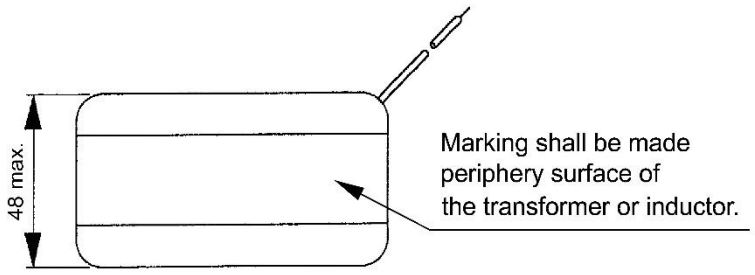

Unit: mm

1. Lead wire length: 100mm minimum
   AWG 18 for terminals 5, 6
   AWG 20 for terminals 3, 4, 7, 8, 9, 10, 11, 12
   AWG 28 for terminals 15, 16
   Direct wiring wires of φ1.0mm x 5 for terminals 1, 2
   Direct wiring wires of φ0.4mm for terminals 13, 14
   Coating removed approx.10mm at the end

2. Mass: 900g maximum

Figure 1. Externals, Construction, Dimensions, 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.

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3.3 Performance

Performance requirements shall be as specified in Table 3.

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: AC500V for 1 minute At reduced pressure: 1.1kPa, AC300V 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	DC100V, 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: 19.6 maximum (larger than AWG 18) : 13.7N maximum (AWG 28 to 18) Direct wiring wire: 19.6N maximum (larger than φ1.14mm) : 9.8N maximum (φ0.4mm 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:1000G, 0.4ms, half 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 shall be applicable to all certified products. Performance of individual product included in the qualification coverage shall be as specified in the product specification.

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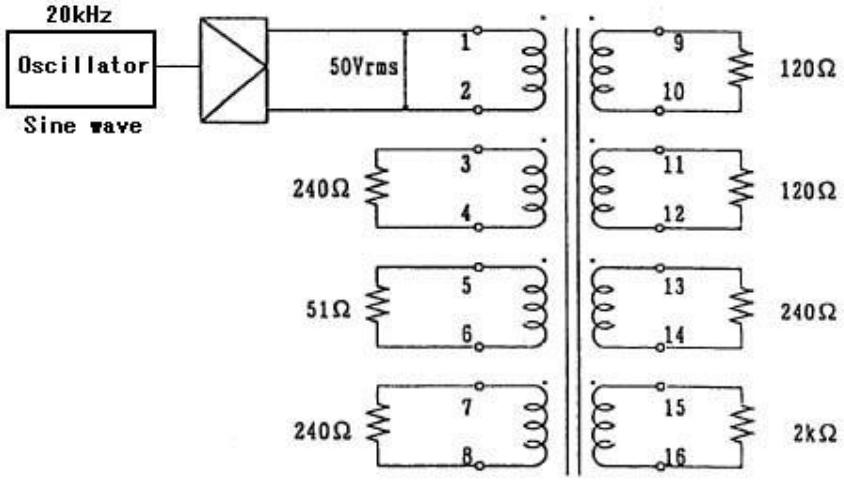
3.4 Electrical Characteristics

The electrical characteristics shall be as shown in Table 4.

Table 4. Electrical Characteristics (1)

Item	Rating
Operating frequency	20kHz±10% (sine wave)
Input voltage	50Vrms
Winding ratio	(3– 4) / (1–2) = 2.467 ± 3% (5–6) / (1–2) = 1.000 ± 3% (7– 8) / (1–2) = 2.467 ± 3% (9–10) / (1–2) = 1.200 ± 3% (11–12) / (1–2) = 1.200 ± 3% (13–14) / (1–2) = 1.000 ± 3% (15–16) / (1–2) = 0.800 ± 4%
Inductance	(1–2) = 90μH minimum at 10kHz, 0.1V, DC10A
DC resistance (at 20°C)	(1–2) = 0.03Ω maximum (9– 10) = 0.30Ω max (3–4) = 0.40Ω maximum (11–12) = 0.35Ω max (5–6) = 0.20Ω maximum (13–14) = 0.90Ω max (7–8) = 0.45Ω maximum (15–16) = 5.00Ω max
Output	253VA
Polarity	Test points 1, 3, 5, 7, 9, 11, 13, and 15 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.

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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 JAXAQTS-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.