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

Part Description	TRANSFORMERS
Part Number and Type	JAXA2110/A200-T000
Applicable Specification	JAXA-QTS-2110 JAXA-QTS-2110/A200

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Prepared and Established by IRIICHI Technologies Inc.

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.

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Record of revisions

Rev.	Date	Description
NC	20 Nov. 2024	Original Issued a document by IRIICHI Technologies Inc. Document number: GR6-02004 (Rev. 3)

GR6-02004 (Rev. 3)

Revision history

Rev.	Date	Description	Reasons for revision
1	27 May 2024	Original	
2	13 Aug. 2024	▪ All page top left The document number "JAXA-ADS-2110/A200" has added. The release date "27 May, 2024" has added. ▪ All page top right The document number "GR6-02004" has added. ▪ Contents 8 Others The section number 8.1 titled "Inquiries" has added. ▪ Contents The marginal test result of the shock has deleted. The marginal test result of the thermal shock has deleted. ▪ Page 7. Table 2 bottom part The information that the marginal test of the shock is under evaluation has deleted. The information that the marginal test of the thermal shock is under evaluation has deleted.	To review the description. To add the document number. To add the information missed. To delete since the marginal test of the shock and the marginal test of the thermal shock are under evaluation. To delete the evaluation items in the contents.
3	7 Oct. 2024	▪ All page top left The document number “JAXA-ADS-2110/A200” has deleted. The release date "May 27, 2024" has deleted. ▪ Cover page top right The column titled document number has changed to the column titled registration number. The document number "GR6-02004" has changed to blank. (Applicable only in Japanese version.) ▪ Contents (title in paragraph 2.1) The title in paragraph 2.1 has changed from "Externals and dimension" to “Externals, dimensions, marking and wiring."	To review the description. To review the description. To correct error

		▪ Contents The title "Table 3 Outgassing data" has added.	To add the outgassing data.
		▪ Revision history, contents, pages 1 to 7 The document number has changed from "GR6-02004" to "GR6-02004 (Rev. 3)."	To add the revision information with the document number.
		▪ Paragraph 4.2.1. The paragraph number has changed from 4.2 to 4.2.1. The title in the paragraph has changed from "Mechanical and thermal characteristics" to "Mechanical and thermal characteristics (except temperature rise)."	To correct to the true title and the paragraph number.
		▪ Paragraph 4.2.2 Temperature rise The main body has added “Qualification Test Group IV to guarantee the temperature rise value at the maximum ambient temperature (105°C). Evaluation results are shown in Table 2.	To clarify that the temperature rise results measured at the room temperature applied and the reasons.
		▪ Table 1. paragraph 3, Group II, Electrical characteristics The test result has changed from blank to acceptable.	To reflect the test result.
		▪Table 1, paragraph 11, Group III, Electrical characteristics The test results has changed from blank to acceptable.	To reflect the test result.
		▪ Table 1 Group IV, paragraphs 14 Temperature rise The description has changed from “25°C maximum” to "in accordance with paragraph 4.2.2." The description has changed from "Δt = 17.6°C to 18.5°C" to "acceptable."	To review the description.
		▪ Table 1, paragraph 19, Group IV, Electrical characteristics The test result: has changed from blank to acceptable.	To reflect the test result.
		▪ Table 2. Evaluation test results (Electrical characteristics) The description has changed from blank to "Temperature rise."	To add the detail explanation data related to paragraph 4.2.2.
		▪ Added Outgassing data The outgassing data has added to as Table 3.	To add the evaluation data.

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Contents

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

1. GENERAL

1.1 Scope

This Application Data Sheet provides additional detailed information necessary for designing or selecting products not contained in JAXA QML. Relevant information not covered in this document shall also be considered. Users are responsible for all aspects pertaining to selection and use of the product(s) specified in this document.

1.2 Applicable Documents

The latest version of the followings are applicable to the product in this data 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/A200	Transformers, High Reliability, Space Use, (JAXA2110/A200 Type) Detail Specification For

2. SUMMARY OF PRODUCT

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, Marking and Wiring

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

Part number	Externals, dimensions, marking and wiring
JAXA2110/A200-T000	See Figures 1 and 2

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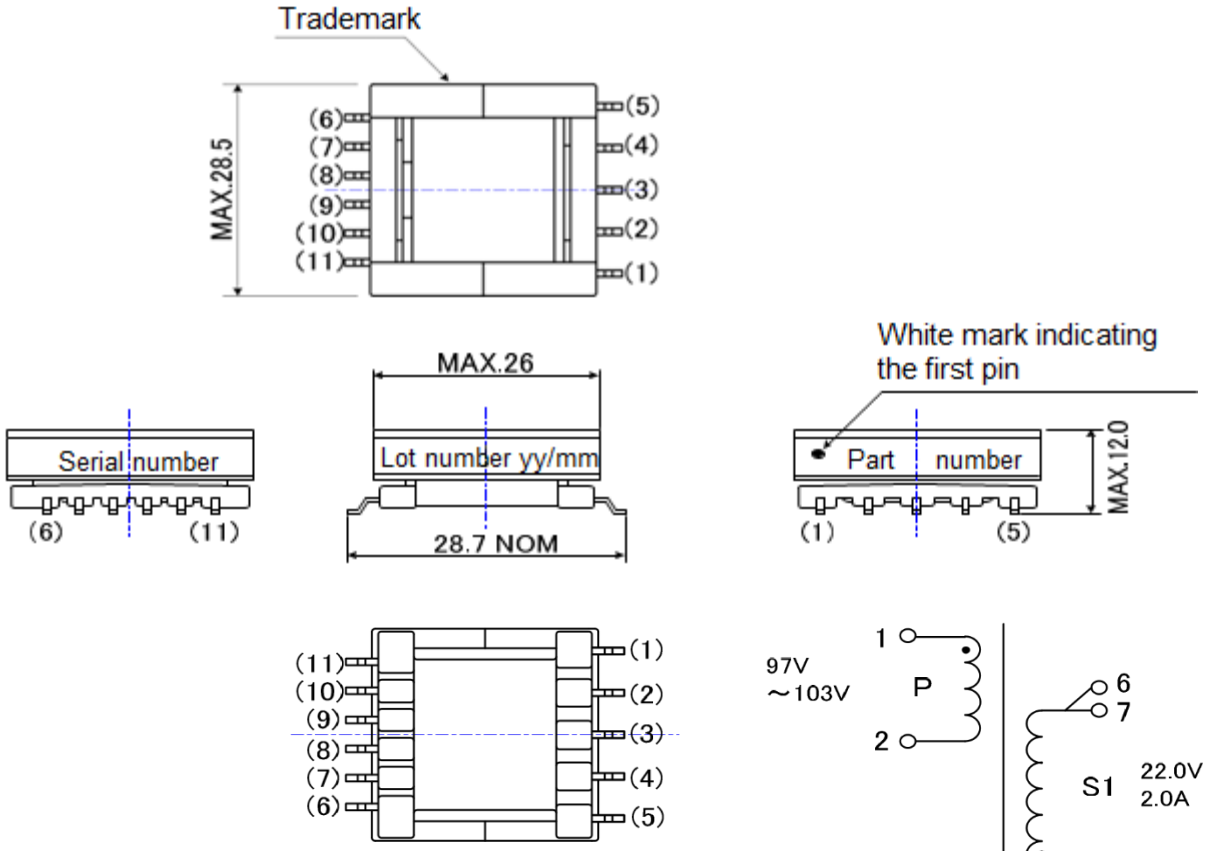
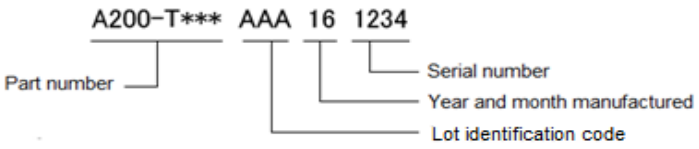


Figure 1. Externals

Figure 2. Wiring Diagram

1) Part number (abbreviation)
2) Terminal identification (see Figure 1)
3) Lot identification code
4) Year and month manufactured
5) Serial number
6) Trademark of manufacturer



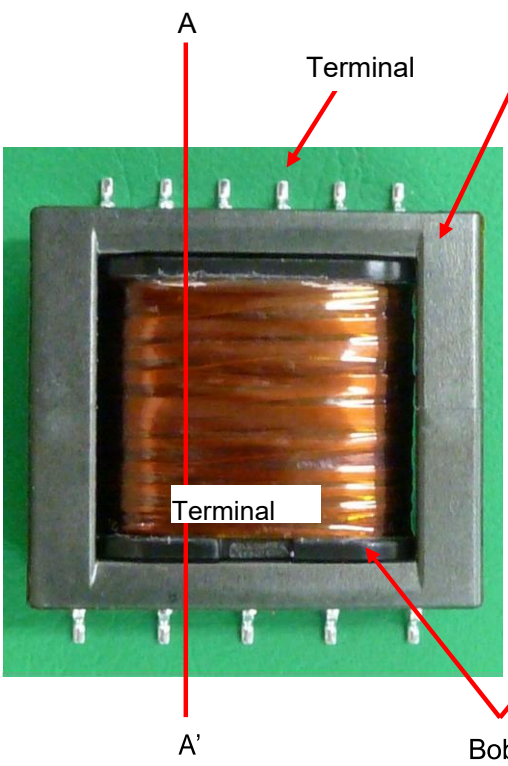
Trademark

2.2 Mass

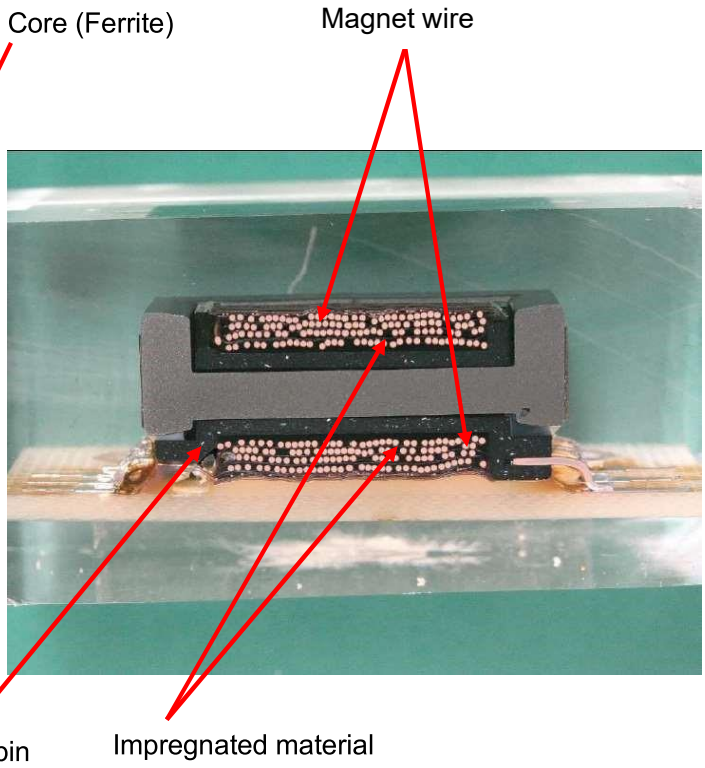
Part number	Mass (Standard value)
JAXA2110/A200-T000	30g

2.3 Construction

The product is of an open type transformer consisting the coils impregnated with epoxy resin and is composed with EPC type ferrite core. The coils are made of magnet wires which are wound around a bobbin with gull-wing shaped terminal. The internal structures are shown on Pictures 1 and 2.



Picture 1. (Top view from Transformer)



Picture 2.（Cross sectional view of A-A'）

3. USAGE

3.1 Ratings

The ratings of transformers are as follows.

Part number	Grade	Operating ambient temperature (1)	Operating frequency	Input voltage	Rated power
JAXA2110/A200-T000	6 (Open type)	-55°C to +105°C	100kHz	100Vrms	18.1VA

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

3.2 Mounting Methods

It is recommended that the transformer should be mounted on the surface of the printed wiring board by both soldering the gull-wing terminals on the solder pad and using epoxy adhesives on the coil body. However, it is not recommended to use reflow soldering.

4. CHARACTERISTICS UNDER NORMAL OPERATING CONDITIONS

4.1 Electrical Characterisitcs

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

4.2 Deleted

4.2.1 Mechanical and Thermal Characteristics (except temperature rise)

The transformer meets the electrical characteristic specified in the detail specification. The evaluation results are shown in Tables 1 and 2.

4.2.2 Temperature Rise

Qualification Test Group IV 14 Temperature Rise

The temperature rise of the products is measured at room temperature in an air-flow free location.

The method at the maximum ambient temperature (105°C) specified in appendix A of JAXA QTS-2110 is that the sample is placed in a chamber keeping 105°C and the measurement system is placed outside the chamber in a room temperature. In this case, the winding resistance value calculated to resistance method conversion varies, then more accurate value is acquired by placing the sample in a room temperature.

The temperature rise value in a room temperature is more than the temperature rise value at the maximum ambient temperature, therefore the measurement results in a room temperature guarantee the temperature rise value at the maximum ambient temperature (105°C).

The evaluation results are shown in Table 2.

4.3 Characteristics in Various Operating Environments

The transformer meets the electrical characteristic specified in the detail specification.The evaluation results are shown in Tables 1 and 2.

4.4 Environmental Limits

The shock as the marginal limit for mechanical strength is under evaluation.
The thermal shock as the marginal limit for thermal strength is under evaluation.

5. RELIABILITY

5.1 Possible Failure Modes

- Open circuit (breaking, bad connection)
- Short circuit (Insulation breakage, insulating film damage)

- Decrease of inductance and leakage inductance (core crack, flexure, layer short)
- Increase of inductance and leakage inductance (core crack when the construction has the center gap)

6. STORAGE CONDITIONS

It is recommended to store the transformer under the following conditions.

Item	Conditions
(1) Temperature	+0°C to +35°C
(2) Relative humidity	75%RH maximum

7. PRECAUTIONS

7.1 Instructions for Purchaser

If purchaser's specification is included in the "qualification coverage" specified in the detail specification (refer to paragraph 3.1 of JAXA-QTS-2110/A200), or if "qualification by similarity" specified in paragraph A.3.1.1.1, appendix A of JAXA-QTS-2110 is applicable, products can be provided as JAXA qualified parts. In this case, the purchaser can purchase requirements for specific applications in product specification (refer to paragraph 6.3 of JAXA-QTS-2110) for each procurement.

7.2 Instructions for User

- Use immediately after opening the dry pack (no baking required).
- The rigid epoxy adhesive is recommended. (example: EW2030, 3M)
- It is recommended to keep the operating frequency deviation within ±5% of the rated operating frequency.
- The transformer shall be operated within the rated output power and direct current.
- The transformer shall be operated in the temperature class S (130°C) as a maximum.
- The transformer shall be considered of its outgassing characteristics.

8. OTHERS

8.1 Inquiries

Direct all inquiries about this data sheet to the company below.

Manufacturer	IRIICHI Technologies Inc. Quality Assurance Department
Address	3140-1 Shimo Suwa-cho, Suwa-gun, Nagano 393-8555
Telephone	+81-266-27-2111

8.2 Outgassing

The outgassing data for organic materials used for the transformer are shown in Table 3.

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Table 1. Evaluation Test Results (Environmental Durability and Electrical Characteristics)(Part 1)

Item no. Group		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	10	0
II	2	Material, design, construction, 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	10	0
	3	Electrical characteristics	A.4.4.4.1	As specified in Table 2.	Acceptable	10	0
	4	Withstanding voltage (at barometric pressure)	A.4.4.4.2.1	No dielectric breakdown	Acceptable	10	0
	5	Withstanding voltage (at reduced pressure)	A.4.4.4.2.2	No dielectric breakdown	Acceptable	10	0
	6	Interlayer withstanding voltage	A.4.4.4.3	No dielectric breakdown	Acceptable	10	0
	7	Insulation resistance	A.4.4.4.4	10,000MΩ (DC500V) minimum	100,000MΩ min.	10	0
	8	Fungus	—	External materials shall be processed to prevent bacterial infestation.	All materials used are antibacterial.	10	0
III	9	Solderability	A.4.4.5.2	Surface must be covered with 95% minimum of new solder.	Acceptable	2	0
	10	Life	A.4.4.7.1	No mechanical or electrical damages	Acceptable	2	0
	11	Visual and mechanical inspection (post-test)	A.4.4.2.1	Markings, dimension, mass and construction shall be as specified in the detail specification	Acceptable	2	0
	12	Electrical characteristics	A.4.4.4.1	As specified in Table 2.	Acceptable	2	0
IV	13	Terminal strength	A.4.4.5.1	No loosening, breakage or other mechanical damages to the terminals	Acceptable	6	0
	14	Temperature rise	A.4.4.4.6	The maximum temperature rise shall be as specified in the detail specification, and no mechanical damage are occurred.	Acceptable	2	0
	15	Vibration	A.4.4.6.1	No mechanical damages	Acceptable	6	0
	16	Shock	A.4.4.6.2	No mechanical damages	Acceptable	6	0
	17	Moisture resistance	A.4.4.6.5	No corrosions affecting electrical performance nor mechanical damages	Acceptable	6	0
	18	Overload	A.4.4.4.1.21	No corrosions affecting electrical performance nor mechanical damages	Acceptable	6	0
	19	Electrical characteristics	A.4.4.4.1	Shown in Table 2.	Acceptable	6	0
	20	Visual and mechanical inspection (post-test)	A.4.4.2.1	Markings, dimension, mass and construction shall be as specified in the detail specification	Acceptable	6	0
	21	DPA	A.4.4.3.1	Internal construction shall be as specified in the detail specification	Acceptable	3	0

Note ([2]) Indicates paragraph number of JAXA-QTS-2110.

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Table 2. Evaluation Test Results (Electrical Characteristics)

Item	Pass/Fail criteria		Performance characteristics or performance range
Primary inductance	Between (1-2) 6.45mH ±35% (at 10kHz, 1V).		6.67 to 7.28mH
Leakage inductance	Between (1-2) 10μH maximum (S1 to S2 short, at 100kHz, 1V)		3.14 to 4.32μH
Denaturation ratio (at 20kHz)	P:S1 (1-2):(11-6)=1:0.227 ± 3% P:S1 (1-2):(10-7)=1:0.227 ± 3% P:S2 (1-2):(9-8)=1:0.227 ± 3%		0.227 0.227 0.227
DC resistance (at 20℃)	P (1-2) S1 (11-6) S1 (10-7) S2 (9-8)	750mΩ maximum 82mΩ maximum 88mΩ maximum 2000mΩ maximum	577 to 584mΩ 64.9 to 66.8mΩ 64.3 to 77.0mΩ 1590 to 1619mΩ
Dimensions	A (Length)	28.5mm maximum	25.4 to 25.6mm
	B (Width)	26.0mm maximum	23.2 to 23.4mm
	C (Height)	12.0mm maximum	9.78 to 10.10mm
Mass	30g maximum		16.70 to 16.70g
Temperature rise	25℃ maximum		Measured value at room temperature: S/N841 Δt 15.4℃ S/N842 Δt 16.6℃ Resistance measured value at room temperature: S/N841 Δt 17.6℃ S/N842 Δt 18.5℃ Measured temperature rise value at life test: S/N838 Δt 2.5℃ S/N839 Δt 3.0℃

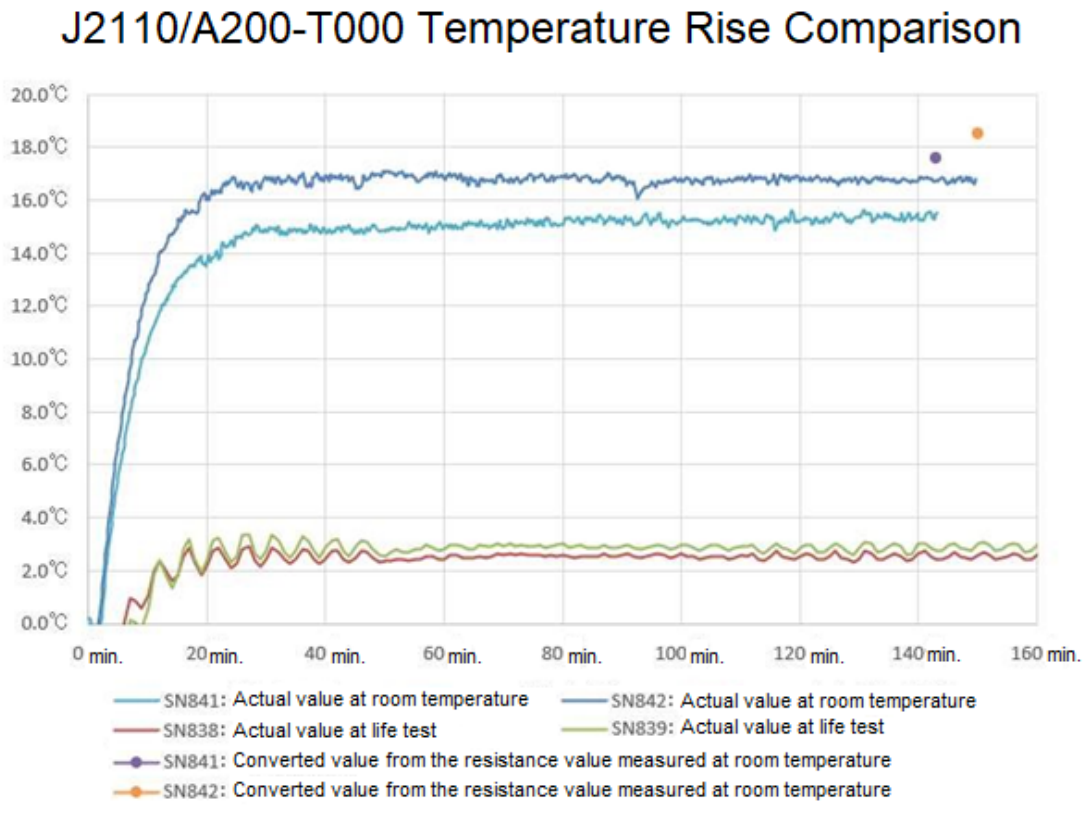

Table 3. Outgassing Data

	JAXA-ADS-2110/A200 **Outgassing Data of Materials Used**					
No.	Category	Part Number	Material	TML (%)	CVCM (%)	Mass (g) (Reference)
1	Spool	BEPC-25B-1111GAFR	FR phenol	2.130	0.002	1.68
2	Wire	1-PEW0.32	Polyester (Coating part)	0.015	0.0003	0.086
3	Wire	1-PEW0.10	Polyester (Coating part)	0.015	0.0003	0.002
4	Ink	Markem 7261 (White)	Polybutylene Terephthalate (PBT)	6.540	0.069	0.07
5	Kapton tape	No.653S #25	Polyimide	0.334	0.028	0.50
6	Impregnated material	5753 A-LV 5753 B-LV	Urethane	0.340	0.036	0.02
7	Adhesive	3140 RTV	Silicone	1.102	0.470	0.06
8	Adhesive	EW2030	Epoxy resin	0.526	0.025	0.03
9	Impregnation material	Scotch Cast resin No. 280	Epoxy resin	0.442	0.002	0.15
The outgassing data calculation results for the entire organic materials				1.678	0.020	2.60