



JAPAN QUALITY ASSURANCE ORGANIZATION

21-25, KINUTA 1-CHOME, SETAGAYA-KU, TOKYO 157-8573 JAPAN

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JQA APPLICATION NO.: 400-20683

Issue Date : January 29, 2003

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EMI TEST REPORT

JQA APPLICATION NO. : 400-20683

Model No. : BS-E

Type of Equipment : Wireless Information System
(Transmitter)

Regulations Applied : CFR 47 FCC Rules and Regulations Part 15

FCC ID : QULBSE3

Applicant : Mitsui & Co., Ltd. Nagoya Office Machinery Division

Address : 16-21, Meieki Minami 1-chome, Nakamura-ku, Nagoya-city,
Aichi-prefecture 450-8677, Japan

Manufacture : Harmony Co., Ltd.

Address : 3-62 Sameganji, Jushiyama-mura, Ama-gun,
Aichi-prefecture, Japan

Received date of EUT : December 26, 2002

Final Judgment : Passed

Test results in this report are obtained in use of equipment that is traceable to National Institute of Advanced Industrial Science and Technology (AIST) of Japan and Communication Research Laboratory (CRL) of Japan.

The test results only respond to the tested sample. This report should not be reproduced except in full, without the written approval of JQA EMC Engineering Dept. Testing Div.

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1 DOCUMENTATION**1.1 TEST REGULATION**

FCC Rules and Regulations Part 15 Subpart A and C (June 23, 1989) Intentional Radiators

Test procedure :

AC power line conducted emission, radiated emission, frequency stability and occupied bandwidth tests were performed according to the procedures in ANSI C63.4-1992.

1.2 GENERAL INFORMATION**1.2.1 Test facility :**

1) Test Facility located at EMC Engineering Dept. Testing Div. :

- No.2 and 3 Anechoic Chambers(3 meters Site).
- Shielded Enclosure.

Expiration date of FCC test facility filing : May 27, 2005

2) EMC Engineering Dept. Testing Div. is recognized under the National Voluntary Laboratory accreditation Program for satisfactory compliance established in title 15, Part 285 Code of Federal Regulations.

NVLAP Lab Code : 200189-0 (Effective through : June 30, 2003)

1.2.2 Description of the Equipment Under Test (EUT) :

- | | |
|--------------------------------------|--|
| 1) Type of Equipment | : Wireless Information System
(Transmitter) |
| 2) Product Type | : Production |
| 3) Category | : Security/Remote Control Transmitter |
| 4) EUT Authorization | : Certification |
| 5) FCC ID | : QULBSE3 |
| 6) Trade Name | : BELSTAR |
| 7) Model No. | : BS-E |
| 8) Operating Frequency Range | : 298.8 MHz |
| 9) Highest Frequency Used in the EUT | : 298.8 MHz |
| 10) Serial No. | : 02120065 |
| 11) Date of Manufacture | : None |
| 12) Power Rating | : DC 4.5V(Battery) |
| 13) EUT Grounding | : None |

1.2.3 Definitions for symbols used in this test report :

- x - indicates that the listed condition, standard or equipment is applicable for this report.
- indicates that the listed condition, standard or equipment is not applicable for this report.

1.3 TEST CONDITION

1.3.1 The measurement of the AC Power Line Conducted Emission

☐ - was performed in the following test site.

☒ - was not applicable.

Test location :

Safety & EMC Center EMC Engineering Dept. Testing Div.
21-25, Kinuta 1-chome, Setagaya-ku, Tokyo 157-8573, Japan

☐ - Shielded Enclosure

☐ - Anechoic Chamber No. 2 (portable Type)

Used test instruments :

Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
☐ - Test Receiver	ESH-2	Rohde & Schwarz	880370/016	May 2002	1 Year
☐ - Test Receiver	ESH-3	Rohde & Schwarz	881460/030	May 2002	1 Year
☐ - Test Receiver	ESHS10	Rohde & Schwarz	835871/004	May 2002	1 Year
☐ - LISN(for Peripheral)	KNW-407	Kyoritsu Electrical	8-833-6	Apr. 2002	1 Year
☐ - LISN(for EUT)	KNW-407	Kyoritsu Electrical	8-855-2	Apr. 2002	1 Year
☐ - LISN	KNW-407	Kyoritsu Electrical	8-757-1	Apr. 2002	1 Year
☐ - RF Cable	3D-2W	Fujikura	155-21-006E0	Apr. 2002	1 Year
☐ - RF Cable	3D-2W	Fujikura	155-21-007E0	Apr. 2002	1 Year
☐ - 50ohm Termination	-	SUHNER	154-06-501E0	Jan. 2003	1 Year
☐ - 50ohm Termination	-	SUHNER	154-06-502E0	Jan. 2003	1 Year

1.3.2 The measurement of the Radiated Emission(9 kHz - 30 MHz)

___ - was performed in the following test site.

x - was not applicable.

Test location :

Safety & EMC Center EMC Engineering Dept. Testing Div.

21-25, Kinuta 1-chome, Setagaya-ku, Tokyo 157-8573, Japan

___ - Anechoic Chamber No. 2 (3 meters)

___ - Anechoic Chamber No. 3 (3 meters)

Validation of Site Attenuation :

1) Last Confirmed Date : N/A

2) Interval : N/A

Used test instruments :

Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
___ - Test Receiver	ESH-2	Rohde & Schwarz	880370/016	May 2002	1 Year
___ - Test Receiver	ESH-3	Rohde & Schwarz	881460/030	May 2002	1 Year
___ - Test Receiver	ESHS10	Rohde & Schwarz	835871/004	May 2002	1 Year
___ - Test Receiver	ESVS10	Rohde & Schwarz	826148/002	May 2002	1 Year
___ - Antenna	HFH2-Z2	Rohde & Schwarz	881058/62	Nov 2002	1 Year
___ - RF Cable	RG-213/U	F & G	155-21-010E0	Apr. 2002	1 Year

1.3.3 The measurement of the Radiated Emission(30 MHz - 1000 MHz)

 x - was performed in the following test site.

 - was not applicable.

Test location :

Safety & EMC Center EMC Engineering Dept. Testing Div.

21-25, Kinuta 1-chome, Setagaya-ku, Tokyo 157-8573, Japan

 x - Anechoic Chamber No. 2 (3 meters)

 - Anechoic Chamber No. 3 (3 meters)

Validation of Site Attenuation :

1) Last Confirmed Date :March, 2002

2) Interval :1 year

Used test instruments :

Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
<u> </u> - Spectrum Analyzer	8560E	Hewlett Packard	3240A00189	Oct. 2002	1 Year
<u> </u> - Spectrum Analyzer	8566B	Hewlett Packard	2140A01091	Oct. 2002	1 Year
<u> </u> - RF Pre-selector	85685A	Hewlett Packard	2648A00522	Oct. 2002	1 Year
<u> </u> - Spectrum Analyzer	8566B	Hewlett Packard	2747A05855	Apr. 2002	1 Year
<u> </u> - RF Pre-selector	85685A	Hewlett Packard	2091A00933	Apr. 2002	1 Year
<u> </u> - Test Receiver	ESV	Rohde & Schwarz	872148/039	May 2002	1 Year
<u> x </u> - Test Receiver	ESVS10	Rohde & Schwarz	826148/002	May 2002	1 Year
<u> </u> - Test Receiver	ESVS10	Rohde & Schwarz	832699/001	May 2002	1 Year
<u> </u> - Antenna	KBA-511	Kyoritsu Electrical	0-170-1	Nov. 2002	1 Year
<u> </u> - Antenna	KBA-511A	Kyoritsu Electrical	0-201-13	Nov. 2002	1 Year
<u> </u> - Antenna	KBA-611	Kyoritsu Electrical	0-147-14	Nov. 2002	1 Year
<u> </u> - Antenna	KBA-611	Kyoritsu Electrical	0-210-5	Nov. 2002	1 Year
<u> x </u> - Biconical Antenna	BBA9106	Schwarzbeck	VHA91031150	Nov. 2002	1 Year
<u> </u> - Biconical Antenna	BBA9106	Schwarzbeck	11905078E0	Nov. 2002	1 Year
<u> x </u> - Log-Periodic Antenna	UHALP9107	Schwarzbeck	11905079E0	Nov. 2002	1 Year
<u> </u> - Log-Periodic Antenna	UHALP9107	Schwarzbeck	11905110	Nov. 2002	1 Year
<u> x </u> - RF Cable	5D-2W	Fujikura	155-21-001E0	Feb. 2002	1 Year
<u> </u> - RF Cable	5D-2W	Fujikura	155-21-002E0	Feb. 2002	1 Year

1.3.4 The measurement of the Radiated Emission(Above 1000 MHz) x - was performed in the following test site. - was not applicable.**Test location :**

Safety & EMC Center EMC Engineering Dept. Testing Div.

21-25, Kinuta 1-chome, Setagaya-ku, Tokyo 157-8573, Japan

 x - No. 2 site (3 meters) - No. 3 site (3 meters)**Validation of Site Attenuation :**

1) Last Confirmed Date : N/A

2) Interval : N/A

Used test instruments :

Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
<u> </u> - Spectrum Analyzer	8560E	Hewlett Packard	3240A00189	Oct. 2002	1 Year
<u> x </u> - Spectrum Analyzer	8566B	Hewlett Packard	2140A01091	Oct. 2002	1 Year
<u> x </u> - RF Pre-selector	85685A	Hewlett Packard	2648A00522	Oct. 2002	1 Year
<u> </u> - Spectrum Analyzer	8566B	Hewlett Packard	2747A05855	Apr. 2002	1 Year
<u> </u> - RF Pre-selector	85685A	Hewlett Packard	2091A00933	Apr. 2002	1 Year
<u> x </u> - Log-Periodic Antenna	HL 025	Rohde & Schwarz	340182/015	Jan. 2003	1 Year
<u> </u> - RF Amplifier	DBP-0102N533427B	DBS Microwave Inc.	012	June 2002	1 Year
<u> x </u> - RF Amplifier	WJ-6882-814	Watkins-Johnson	0414	June 2002	1 Year
<u> </u> - RF Amplifier	WJ-5315-556	Watkins-Johnson	106	June 2002	1 Year
<u> </u> - RF Amplifier	WJ-5320-307	Watkins-Johnson	645	June 2002	1 Year
<u> x </u> - RF Cable(10m)	S 04272B	Suhner	155-21-011E0	May 2002	1 Year
<u> </u> - RF Cable(2m)	SUCOFLEX 104	Suhner	155-21-012E0	May 2002	1 Year
<u> x </u> - RF Cable(1m)	SUCOFLEX 104	Suhner	155-21-013E0	May 2002	1 Year
<u> </u> - RF Cable(1m)	S 04272B	Suhner	155-21-015E0	June 2002	1 Year
<u> </u> Test Receiver	ESI26	Rohde & Schwarz	100043	Aug. 2002	1 Year

1.3.5 The measurement of the Frequency Stability

☐ - was performed.

☒ - was not applicable.

Used test instruments :

Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
☐ - Frequency Counter	53131A	Hewlett Packard	3546A11807	May 2002	1 Year
☐ - Oven	-	Ohnishi Co. Ltd.	-	May 2002	1 Year
☐ - DC Power Supply	6628A	Hewlett Packard	3224A00284	June 2002	1 Year

1.3.6 The measurement of the Occupied Bandwidth

☒ - was performed.

☐ - was not applicable.

Used test instruments :

Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
☐ - Spectrum Analyzer	8560E	Hewlett Packard	3240A00189	Oct. 2002	1 Year
☒ - Spectrum Analyzer	8566B	Hewlett Packard	2140A01091	Oct. 2002	1 Year
☐ - Spectrum Analyzer	8566B	Hewlett Packard	2747A05855	Apr. 2002	1 Year
☐ - Function Generator	3325B	Hewlett Packard	2847A03284	July 2002	1 Year
☐ - FM Linear Detector	MS61A	Anritsu Corp.	M77486	Oct. 2002	1 Year
☐ - Level Meter	ML422C	Anritsu Corp.	M87571	June 2002	1 Year
☐ - Measuring Amplifier	2636	B & K	1614851	June 2002	1 Year
☐ - AF Amplifier	P-500L	Accuphase	BOY806	Feb. 2002	1 Year
☐ - Microphone	4134	B & K	1269477	May 2002	1 Year
☐ - Preamplifier	2639	B & K	1268763	May 2002	1 Year
☐ - Pistonphone	4220	B & K	1165008	Mar. 2002	1 Year
☐ - Artificial Mouth	4227	B & K	1274869	N/A	N/A

1.4 EUT MODIFICATION / Deviation from Standard

1.4.1 EUT MODIFICATION

- ☒ - No modifications were conducted by JQA to achieve compliance to Class B levels.
☐ - To achieve compliance to Class B levels, the following changes were made by JQA during the compliance test.

The modifications will be implemented in all production models of this equipment.

Applicant :

Date :

Typed Name :

Position :

1.4.2 Deviation from Standard:

- ☒ - No deviations from the standard described in clause 1.1.
☐ - The following deviations were employed from the standard described in clause 1.1:

1.5 TEST RESULTS

AC Power Line Conducted Emission - Applicable x - NOT Applicable

The requirements are - PASSED - NOT PASSED

Remarks :

Radiated Emission [§15.231(b)] x - Applicable - NOT Applicable

The requirements are x - PASSED - NOT PASSED

Remarks:

Frequency Stability - Applicable x - NOT Applicable

The requirements are - PASSED - NOT PASSED

Remarks:

Occupied Bandwidth [§15.231(c)] x - Applicable - NOT Applicable

The requirements are x - PASSED - NOT PASSED

Remarks:

1.6 SUMMARY

General Remarks :

The EUT was tested according to the requirements of FCC Rules and Regulations Part 15 Subpart A and C (June 23, 1989) under the test configuration, as shown in clause 1.7 to 1.10.

The conclusion for the test items which are required by the applied regulation is indicated under the final judgment.

Final Judgment :

The "as received" sample;

- x - fulfill the test requirements of the regulation mentioned on clause 1.1.
- fulfill the test requirements of the regulation mentioned on clause 1.1, but with certain qualifications.
- doesn't fulfill the test regulation mentioned on clause 1.1.

Begin of testing : January 8, 2003

End of testing : January 10, 2003

- JAPAN QUALITY ASSURANCE ORGANIZATION -
Approved by:

Signatories:
Issued by:



Masaaki Takahashi
Senior Manager
JQA EMC Engineering Dept.



Shigeru Osawa
Assistant Manager
JQA EMC Engineering Dept.

1.7 TEST CONFIGURATION / OPERATION OF EUT

1.7.1 Test Configuration

The equipment under test (EUT) consists of :

Item	Manufacturer	Model No.	FCC ID	Serial No.
Wireless Information System (Transmitter)	Harmony Co., Ltd.	BS-E	QULBSE3	02120065

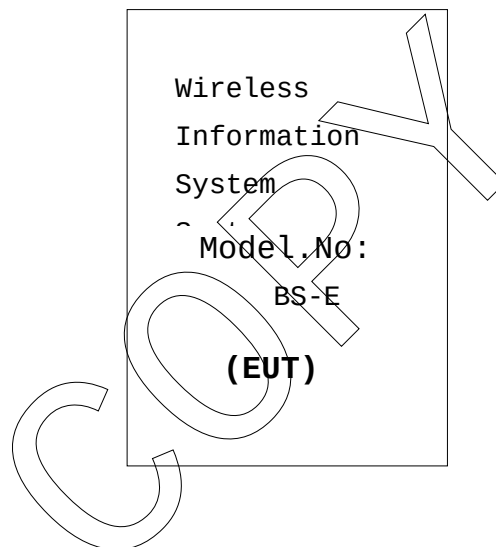
1.7.2 Operating condition

Power supply Voltage : 4.5 VDC(Battery)

The tests have been carried out under the transmitting condition.

COPY

1.8 EUT ARRANGEMENT (DRAWINGS)



1.9 PRELIMINARY TEST AND TEST-SETUP (DRAWINGS)

1.9.1 AC Power Line Conducted Emission (150 kHz - 30 MHz) :

According to description of ANSI C63.4-1992 sec.13.1.3.1, the AC power line preliminary conducted emissions measurements were carried out.

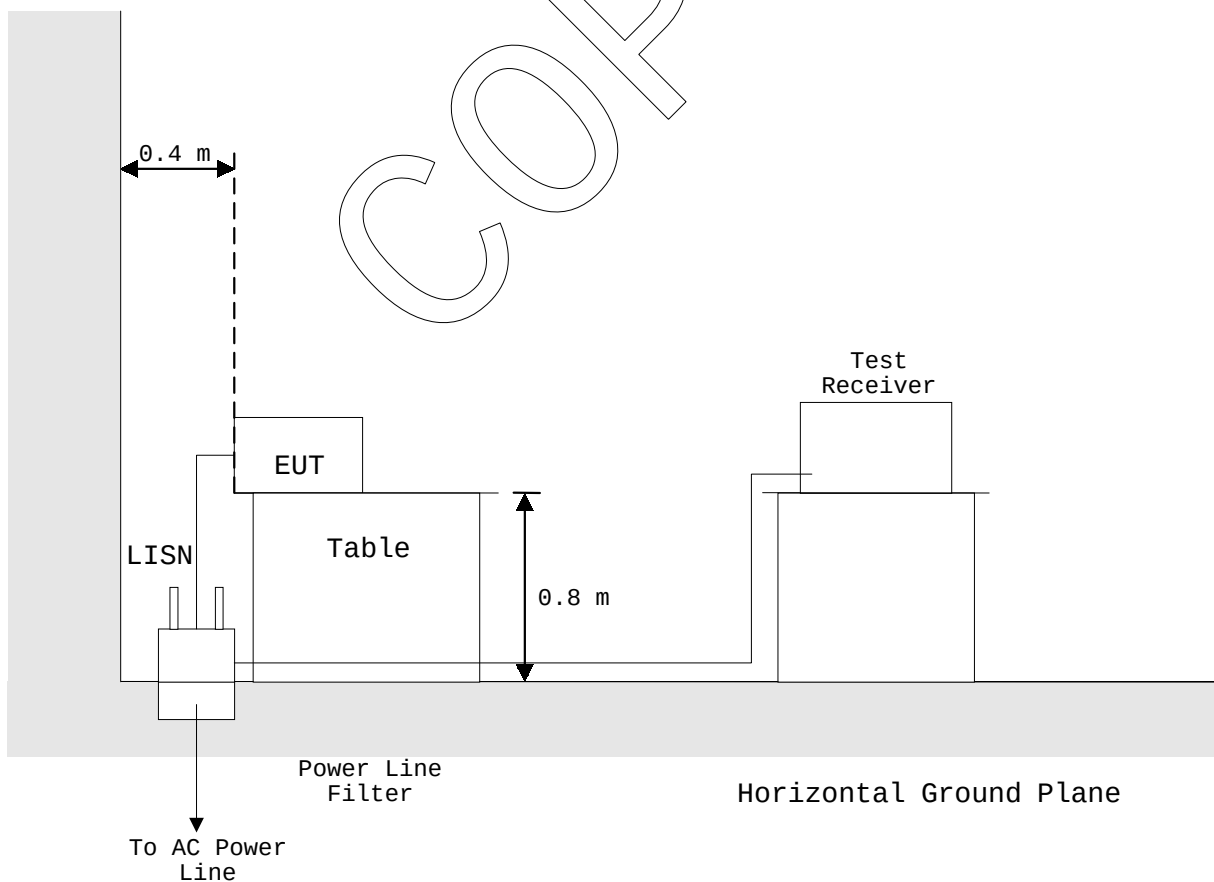
The preliminary conducted measurements were performed using the spectrum analyzer to observe the emission characteristics of the EUT.

The EUT configuration, cable configuration and mode of operation were determined for producing the maximum level of emissions. These configurations were used for final AC power line conducted emissions measurements.

Shielded Enclosure

- Side View -

Vertical
Ground
Plane

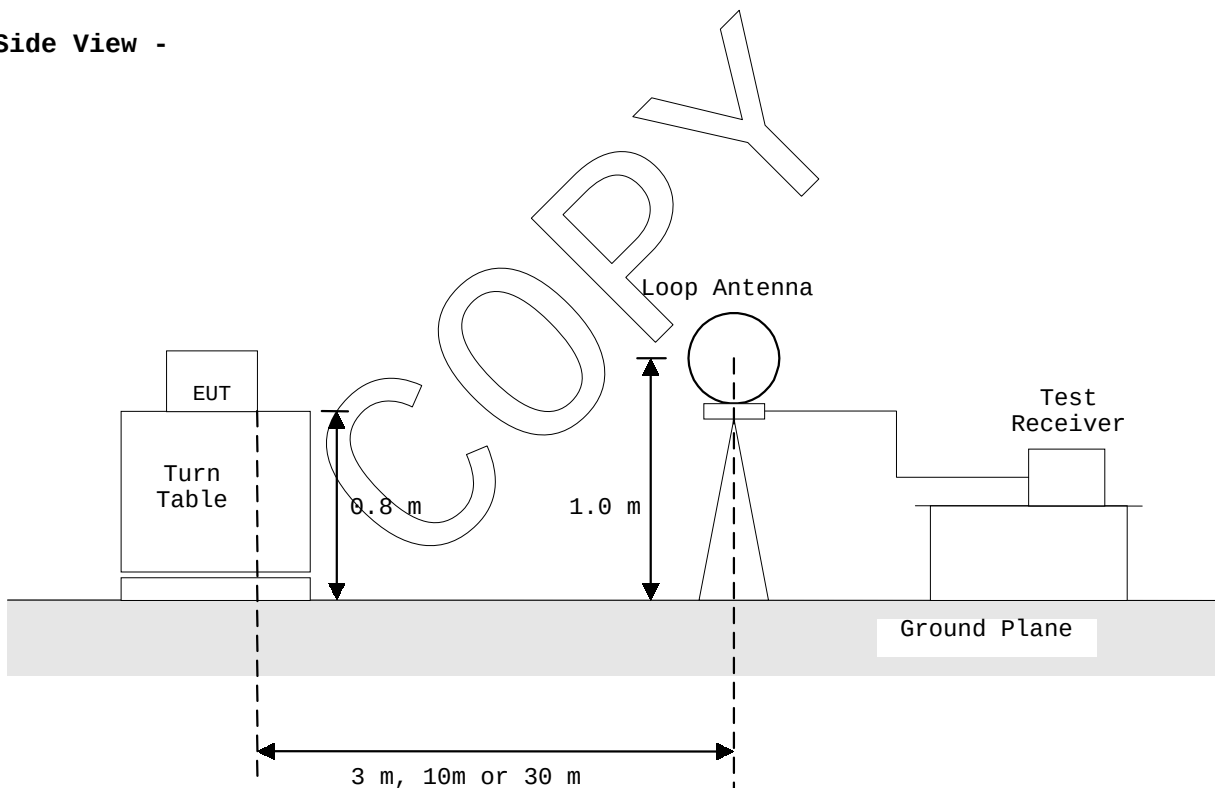


1.9.2 Radiated Emission (9 kHz - 30 MHz) :

According to description of ANSI C63.4-1992 sec.13.1.4.1, the preliminary radiated emissions measurement were carried out. The preliminary radiated measurements were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT.

The EUT configuration, cable configuration and mode of operation were determined for producing the maximum level of emissions. These configurations were used for the final radiated emissions measurements.

- Side View -



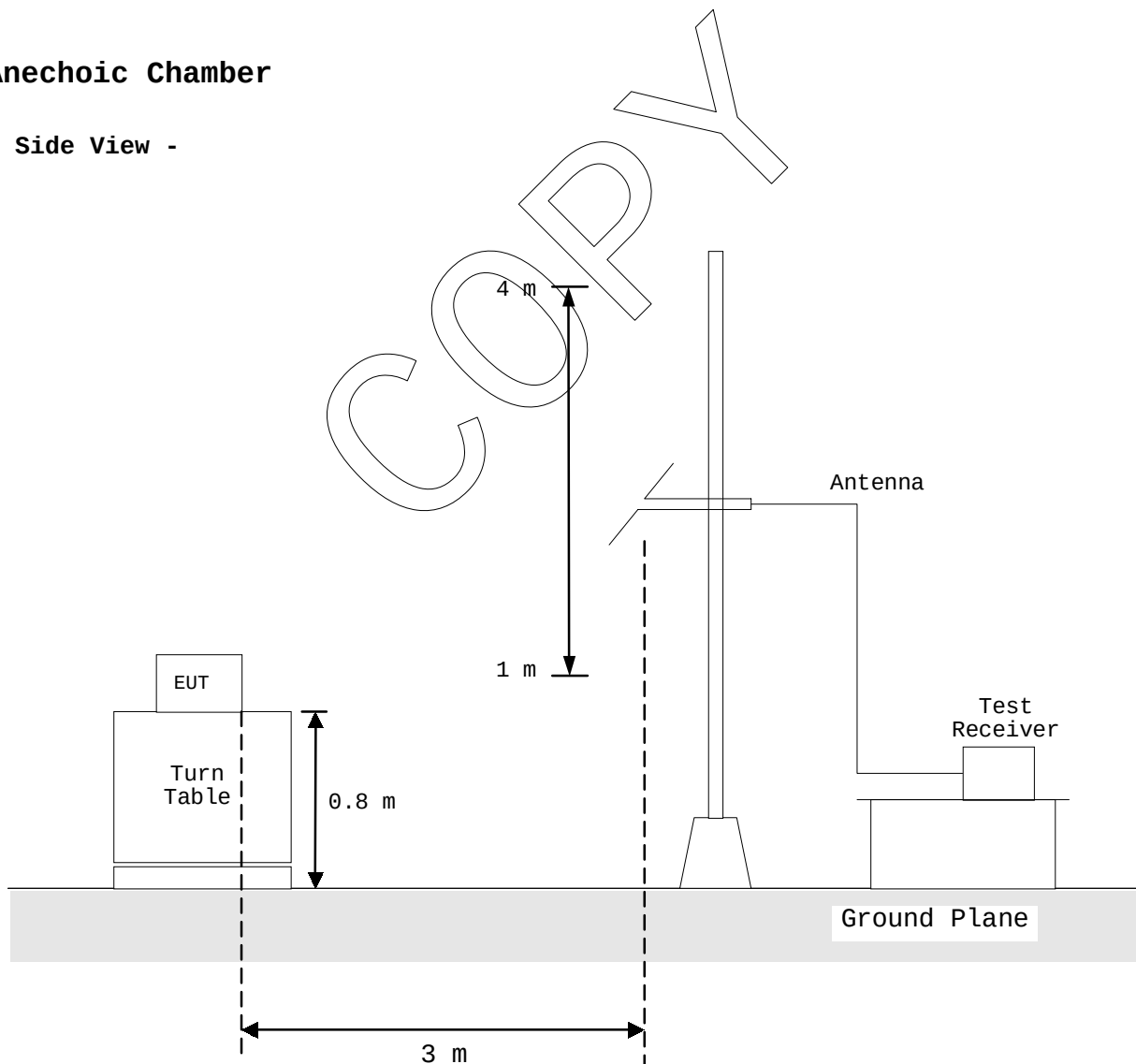
1.9.3 Radiated Emission (30 MHz - 1000 MHz) :

According to description of ANSI C63.4-1992 sec.13.1.4.1, the preliminary radiated emissions measurement were carried out. The preliminary radiated measurements were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT.

The EUT configuration, cable configuration and mode of operation were determined for producing the maximum level of emissions. These configurations were used for the final radiated emissions measurements.

Anechoic Chamber

- Side View -



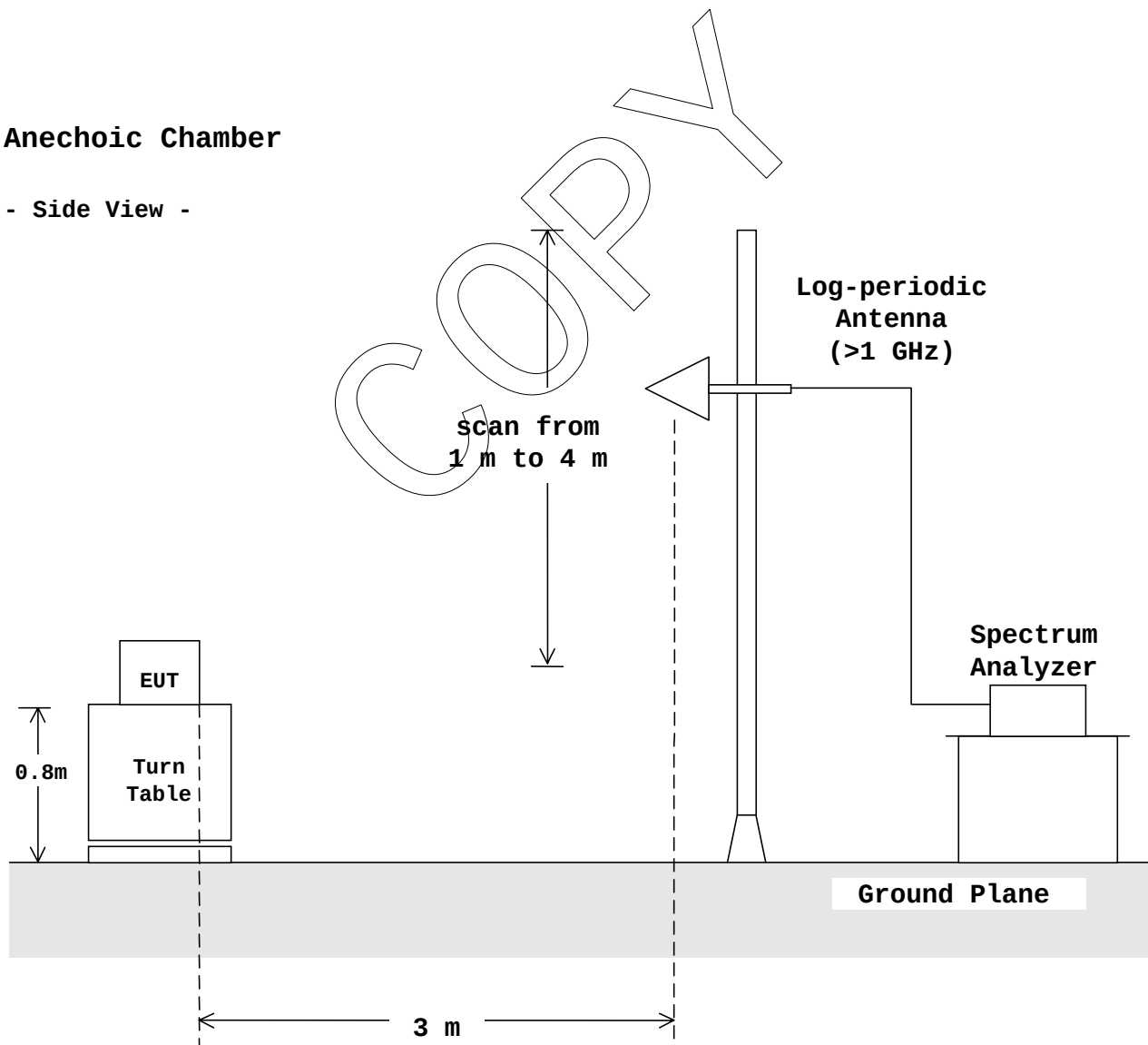
1.9.4 Radiated Emission (Above 1 GHz) :

According to description of ANSI C63.4-1992 sec.13.1.4.1, the preliminary radiated emissions measurements were carried out. The preliminary radiated measurements were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT.

The EUT configuration, cable configuration and mode of operation were determined for producing the maximum level of emissions. These configurations were used for the final radiated emissions measurements.

Anechoic Chamber

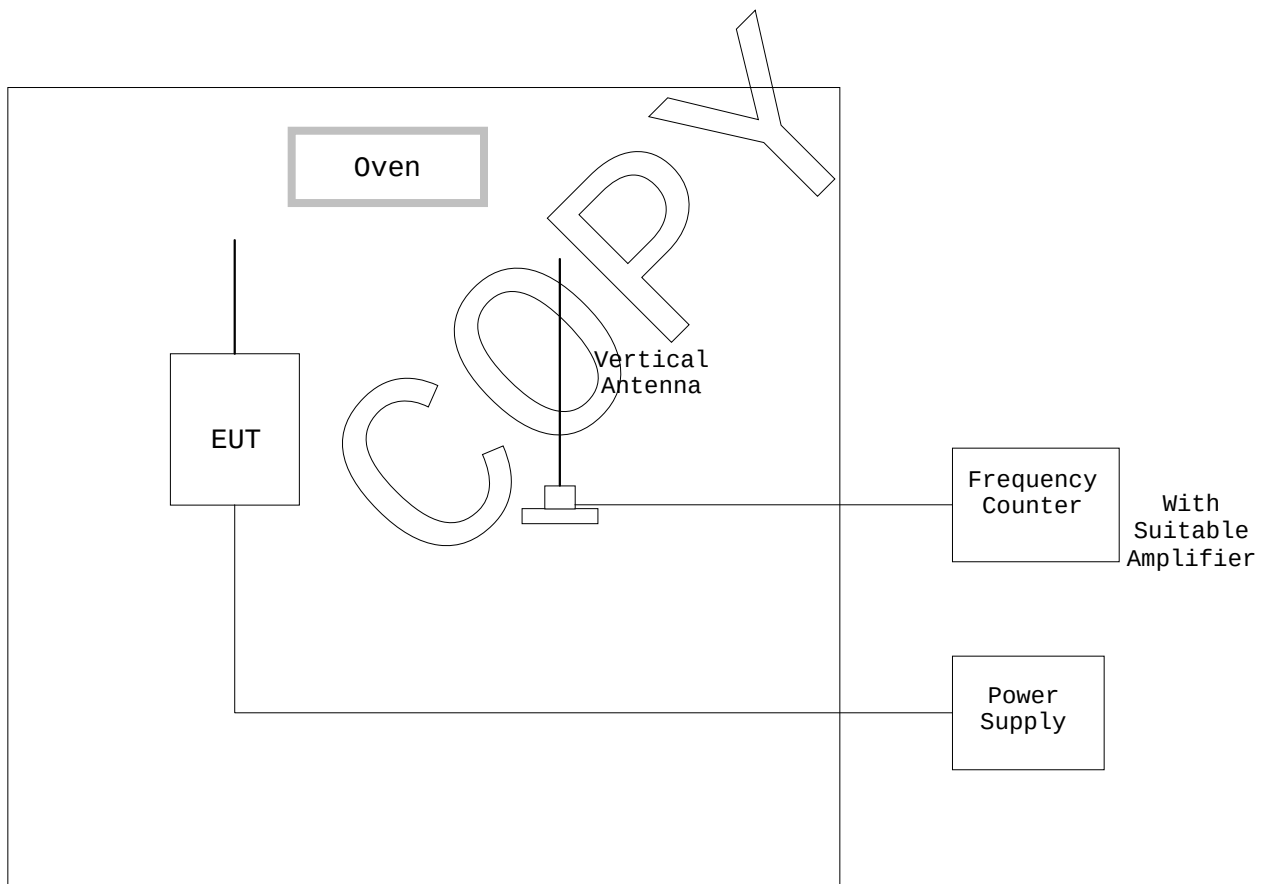
- Side View -



1.9.5 Frequency Stability :

According to description of ANSI C63.4-1992 sec.13.1.5 and sec.13.1.6, the frequency stability measurements were carried out. By using frequency counter with suitable RF amplifier, the carrier frequency of the transmitter under test was measured with a temperature variation of -20°C to $+50^{\circ}\text{C}$ at the normal supply voltage, and if required, with a variation in the primary voltage from 85 % to 115 % the rated supply voltage at the temperature of $+20^{\circ}\text{C}$.

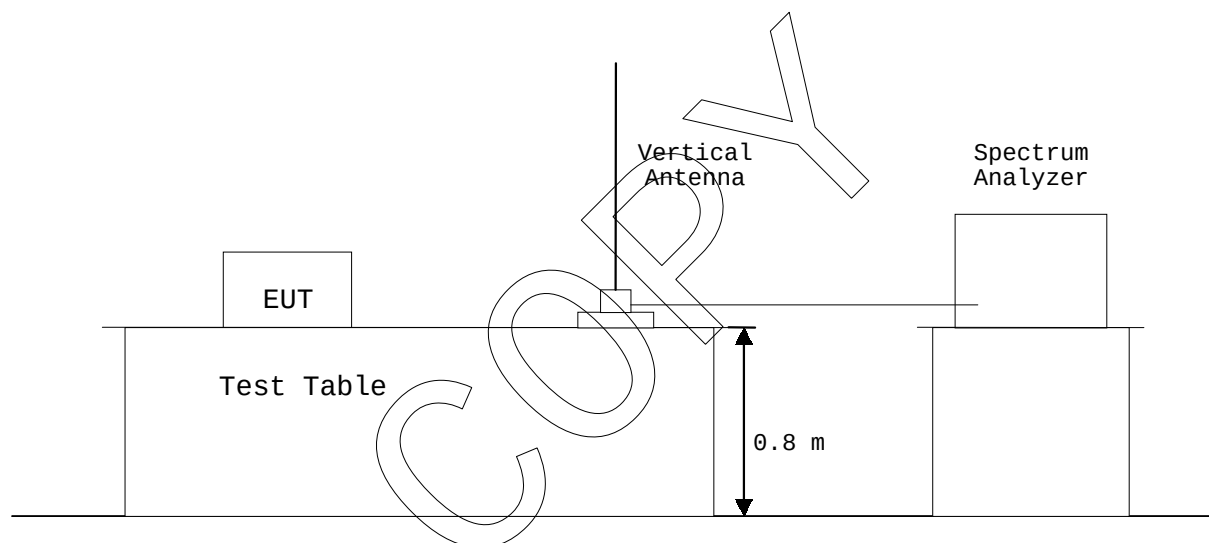
These measurements were carried out after allow sufficient time (approximately 1 hour) for the temperature of the chamber to stabilize.



1.9.6 Occupied Bandwidth :

According to description of ANSI C63.4-1992 sec.13.1.7, the occupied bandwidth measurements were carried out. By using a spectrum analyzer with a vertical antenna for picking up the signal, the measurements of the emission were made under the transmitting modes of the EUT.

The resolution bandwidth of spectrum analyzer was set to the value specified in sec.13.1.7.



1.10 TEST ARRANGEMENT (PHOTOGRAPHS)**PHOTOGRAPHS OF EUT CONFIGURATION FOR RADIATED EMISSIONS MEASUREMENT**

Photograph present configuration with maximum emission





TEST DATA

2.2 Radiated Emissions Measurement

Operating Frequency : 298.8 MHz

Distance of Measurement : 3.0 meters

Date : January 8, 2003

Temp. : 21 °C Humi. : 42 %

Frequency (MHz)	P-A Factor (dB)	Antenna Factor (dB)	Polarization	Meter Reading (dBuV)			Limits (dBuV/m)		Emission Levels (dBuV/m)		Margins (dB)	
				QP	AV	Peak	QP/AV	Peak	QP/AV	Peak	QP/AV	Peak
298.8	0.0	21.7	H	37.2	-	-	74.6	94.6	58.9	-	15.7	-
49.8	0.0	11.6	V	1.6	-	-	54.6	74.6	13.2	-	41.4	-
99.6	0.0	11.0	H	6.0	-	-	54.6	74.6	17.0	-	37.6	-
149.4	0.0	15.8	H	6.2	-	-	54.6	74.6	22.0	-	32.6	-
199.2	0.0	17.9	H	6.2	-	-	54.6	74.6	24.1	-	30.5	-
249.0	0.0	19.6	H	2.8	-	-	46.0	74.6	22.4	-	23.6	-
348.6	0.0	18.2	H	11.3	-	-	54.6	74.6	29.5	-	25.1	-
398.4	0.0	19.0	H	1.1	-	-	54.6	74.6	20.1	-	34.5	-

Notes :

- The spectrum was checked from 30 MHz to 1000 MHz.
- The cable loss is included in the antenna factor.
- The symbol of "<" means "or less".
- The symbol of ">" means "or greater".
- A sample calculation(QP/AV) was made at 298.8 (MHz).

$$PA + Af + Mr = 0 + 21.7 + 37.2 = 58.9 \text{ (dBuV/m)}$$

$$PA = \text{Peak to Average Factor(P-A Factor)}$$

$$Af = \text{Antenna Factor}$$

$$Mr = \text{Meter Reading}$$

6) Measuring Instrument Setting :

Detector function	Resolution Bandwidth	Video Bandwidth
Quasi-peak(QP)	120 kHz	-
Average(AV)	1 MHz	10 Hz
Peak	1 MHz	1 MHz

Date : January 8, 2003

Temp. : 21 °C Humi. : 42 %

Frequency (GHz)	P-A Factor (dB)	Correction Factor (dB)	Polariza- tion	Meter Reading (dBuV)		Limits (dBuV/m)		Emission Levels (dBuV/m)		Margins (dB)	
				AV	Peak	AV	Peak	AV	Peak	AV	Peak
1.4940	0.0	28.6	0.0	-	< 6.0	54.0	74.0	< 34.6	< 34.6	> 19.4	> 39.4
2.9880	0.0	-9.1	0.0	-	< 47.0	54.6	74.6	< 37.9	< 37.9	> 16.7	> 36.7

- Notes :
- 1) The spectrum was checked from 1.0 GHz to tenth harmonics.
 - 2) The cable loss, amp. gain and antenna factor are included in the correction factor.
 - 3) The symbol of "<" means "or less".
 - 4) The symbol of ">" means "or greater".
 - 5) A sample calculation(AV) was made at 1.494 (GHz).
 $PA + Cf + Mr = 0 + 28.6 + 6(\text{Peak}) = 34.6 \text{ (dBuV/m)}$
 PA = Peak to Average Factor(P-A Factor)
 Cf = Correction Factor
 Mr = Meter Reading

6) Measuring Instrument Setting :

Detector function	Resolution Bandwidth	Video Bandwidth
Average(AV)	1 MHz	10 Hz
Peak	1 MHz	1 MHz

Holdover time after manual release[§15.231(a)(1)]

Max 5.00 s

(Manufacturer designed)

Tested by :



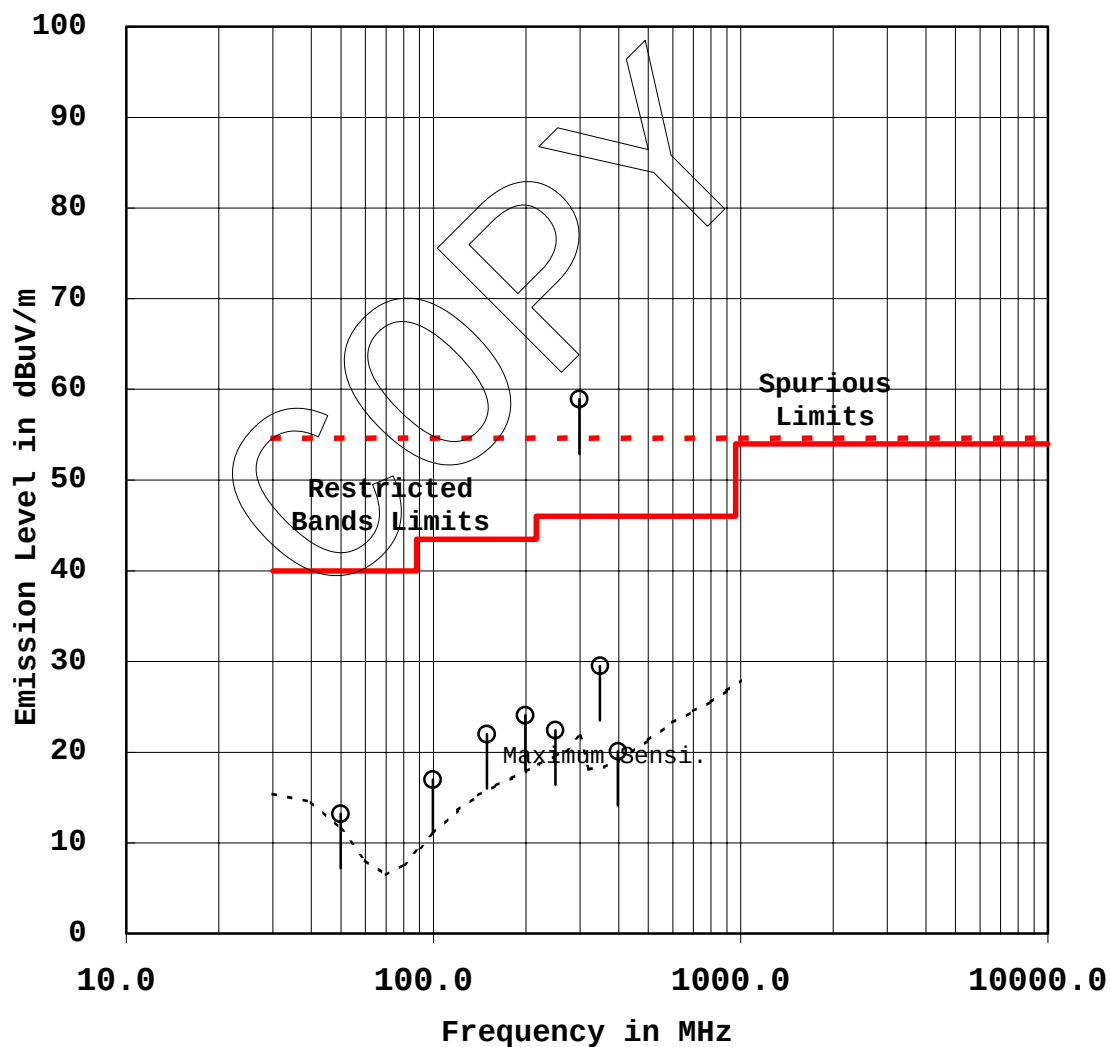
Yoichi Nakajima

Testing Engineer

RADIATED EMISSION MEASUREMENT

Model No. : BS-E

Standard : CFR 47 FCC Rules Part 15 QP/AV
 Operating Frequency(MHz) : 298.8



2.4 Occupied Bandwidth Measurement

Date : January 10, 2003Temp.: 24 °C Humi.: 30 %

Measurements Results :

Specified Limits : 0.25 % of the fundamental frequency
 $298.8 \text{ MHz} \times 0.0025 = 747 \text{ kHz}$

Refer to the attached graphs.

Tested by :



Shigeru Osawa
Testing Engineer

COPY

Emission Limitation

FCC ID : QULBSE3

Model : BS-E

Mode of EUT : Transmit

