



EMI TEST REPORT

JQA APPLICATION NO. : 400-20404

Model No. : G8D 360M

Type of Equipment : TPMS Receiver

Regulations Applied : CFR 47 FCC Rules and Regulations Part 15

FCC ID : OUCG8D-360M

Applicant : OMRON Corporation

Address : 6368 Nenjo zaka, Okusa Komaki-city,
Aichi 485-0802, Japan.

Manufacture : OMRON Corporation

Address : 6368 Nenjo-zaka, Okusa Komaki-city,
Aichi 485-0802, Japan

Received date of EUT : August 22, 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 B (June 23, 1989) All other receivers subject to part 15

Test procedure :

AC power line conducted emission, radiated emission and antenna conducted power 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 | : TPMS Receiver |
| 2) Product Type | : Pre-production |
| 3) Category | : All other receivers subject to part 15 |
| 4) EUT Authorization | : Certification |
| 5) FCC ID | : OJCG8D-360M |
| 6) Trade Name | : OMRON |
| 7) Model No. | : GBD 360M |
| 8) Tuning Frequency Range | : 433.92 MHz |
| 9) Highest Frequency Used in the EUT | : 423.22 MHz |
| 10) Serial No. | : None |
| 11) Date of Manufacture | : None |
| 12) Power Rating | : 12 VDC |
| 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
<input type="checkbox"/> - Test Receiver	ESH-2	Rohde & Schwarz	880370/016	May 2002	1 Year
<input type="checkbox"/> - Test Receiver	ESH-3	Rohde & Schwarz	881460/030	May 2002	1 Year
<input type="checkbox"/> - Test Receiver	ESH510	Rohde & Schwarz	935871/004	May 2002	1 Year
<input type="checkbox"/> - LISN(for Peripheral)	KNW-407	Kyoritsu Electrical	0-833-6	Apr. 2002	1 Year
<input type="checkbox"/> - LISN(for EUT)	KNW-407	Kyoritsu Electrical	8-855-2	Apr. 2002	1 Year
<input type="checkbox"/> - LISN	KNW-407	Kyoritsu Electrical	8-757-1	Apr. 2002	1 Year
<input type="checkbox"/> - RF Cable	3D-2W	Fujikura	155-21-006E0	Apr. 2002	1 Year
<input type="checkbox"/> - RF Cable	3D-2W	Fujikura	155-21-007E0	Apr. 2002	1 Year
<input type="checkbox"/> - 50ohm Termination	-	SUHRER	154-06-501E0	Jan. 2002	1 Year
<input type="checkbox"/> - 50ohm Termination	-	SUHRER	154-06-502E0	Jan. 2002	1 Year

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

- 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

- 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
<input type="checkbox"/> - Spectrum Analyzer	8560E	Hewlett Packard	3245A00189	Nov. 2001	1 Year
<input type="checkbox"/> - Spectrum Analyzer	8566B	Hewlett Packard	2140A01091	Mar. 2002	1 Year
<input type="checkbox"/> - RF Pre selector	85685A	Hewlett Packard	2646A00522	Oct. 2001	1 Year
<input type="checkbox"/> - Spectrum Analyzer	8566R	Hewlett Packard	2747A05655	Apr. 2002	1 Year
<input type="checkbox"/> - RF Pre-selector	85685A	Hewlett Packard	2091AD0933	Apr. 2002	1 Year
<input type="checkbox"/> - Test Receiver	ESV	Rohde & Schwarz	872148/039	May 2002	1 Year
<input checked="" type="checkbox"/> - Test Receiver	ESVS10	Rohde & Schwarz	826148/002	May 2002	1 Year
<input type="checkbox"/> - Test Receiver	ESVS10	Rohde & Schwarz	832699/001	May 2002	1 Year
<input type="checkbox"/> - Antenna	KBA-511	Kyoritsu Electrical	0-170-1	Nov. 2001	1 Year
<input type="checkbox"/> - Antenna	KBA-511A	Kyoritsu Electrical	0-201-13	Nov. 2001	1 Year
<input type="checkbox"/> - Antenna	KBA-611	Kyoritsu Electrical	0-147-14	Nov. 2001	1 Year
<input type="checkbox"/> - Antenna	KBA-611	Kyoritsu Electrical	0-210-5	Nov. 2001	1 Year
<input checked="" type="checkbox"/> - Biconical Antenna	BBA9106	Schwarzbeck	VIA91031150	Nov. 2001	1 Year
<input type="checkbox"/> - Biconical Antenna	BBA9106	Schwarzbeck	11905076E0	Nov. 2001	1 Year
<input checked="" type="checkbox"/> - Log-Periodic Antenna	UHALP9107	Schwarzbeck	11905079E0	Nov. 2001	1 Year
<input type="checkbox"/> - Log-Periodic Antenna	UHALP9107	Schwarzbeck	11905110	Nov. 2001	1 Year
<input checked="" type="checkbox"/> - RF Cable	SD-2W	Fujikura	155-21-001E0	Feb. 2002	1 Year
<input type="checkbox"/> - RF Cable	SD-2W	Fujikura	155-21-002E0	Feb. 2002	1 Year

1.3.3 The measurement of the Radiated Emission(Above 1000 MHz)

- 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

- No. 2 site (3 meters)
- No. 3 site (3 meters)

Validation of Site Attenuation :

- 1) Last Confirmed Date :N/A
- 2) Interval :K/A

Used test instruments :

Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
<input type="checkbox"/> - Spectrum Analyzer	8560E	Hewlett Packard	3240A00189	Nov. 2001	1 Year
<input type="checkbox"/> - Spectrum Analyzer	8566B	Hewlett Packard	2140A01091	Mar. 2002	1 Year
<input type="checkbox"/> RF Pre selector	85685A	Hewlett Packard	2648A00522	Oct. 2001	1 Year
<input checked="" type="checkbox"/> - Spectrum Analyzer	8566B	Hewlett Packard	2747A05855	Apr. 2002	1 Year
<input checked="" type="checkbox"/> - RF Pre-selector	85685A	Hewlett Packard	2091A00933	Apr. 2002	1 Year
<input checked="" type="checkbox"/> - Log-Periodic Antenna	HL 025	Rohde & Schwarz	340182/015	Jan. 2002	1 Year
<input type="checkbox"/> - RF Amplifier	DBP-0102N5334272B	DBS Microwave Inc.	012	June 2002	1 Year
<input type="checkbox"/> - RF Amplifier	WJ-6882-814	Watkins-Johnson	0414	June 2002	1 Year
<input type="checkbox"/> - RF Amplifier	WJ-5335-556	Watkins-Johnson	106	June 2002	1 Year
<input type="checkbox"/> - RF Amplifier	WJ 5320 307	Watkins-Johnson	645	June 2002	1 Year
<input checked="" type="checkbox"/> - RF Cable(10m)	S 04272B	Suhner	155-21-011E0	May 2002	1 Year
<input type="checkbox"/> - RF Cable(2m)	SUCCOFLEX 104	Suhner	155-21-012E0	May 2002	1 Year
<input type="checkbox"/> - RF Cable(1m)	SUCCOFLEX 104	Suhner	155 21 013E0	May 2002	1 Year
<input type="checkbox"/> - RF Cable(1m)	S 04272B	Suhner	155 21 015E0	June 2002	1 Year
<input type="checkbox"/> Test Receiver	ES126	Rohde & Schwarz	100043	Aug. 2001	1 Year
<input type="checkbox"/> - RF Amplifier	JS4 00102600 28 5A	MITEQ	669167	Apr. 2002	1 Year
<input type="checkbox"/> - RF Cable(4m)	SUCCOFLEX 104	Suhner	190630	Dec. 2001	1 Year
<input type="checkbox"/> - RF Cable(1m)	SUCCOFLEX 104	Suhner	182811/4	Dec. 2001	1 Year
<input type="checkbox"/> - RF Cable(10m)	F130-S1S1-394	MEGA PHASE	10510	Dec. 2001	1 Year

1.3.4 The measurement of the Antenna Conducted Power

- 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	ESV	Rohde & Schwarz	872148/039	May 2002	1 Year
<input checked="" type="checkbox"/> - Test Receiver	ESVS10	Rohde & Schwarz	826148/002	May 2002	1 Year
<input type="checkbox"/> - Test Receiver	ESVS10	Rohde & Schwarz	832699/001	May 2002	1 Year
- Spectrum Analyzer	8560E	Hewlett Packard	3240A00189	Nov. 2001	1 Year
- Spectrum Analyzer	8566B	Hewlett Packard	2140A01091	Mar. 2002	1 Year
<input checked="" type="checkbox"/> - RF Pre-selector	85685A	Hewlett Packard	2648A00522	Oct. 2001	1 Year
<input checked="" type="checkbox"/> - Spectrum Analyzer	8566B	Hewlett Packard	2747A05855	Apr. 2002	1 Year
<input type="checkbox"/> - RF Pre-selector	85685A	Hewlett Packard	2091A00933	Apr. 2002	1 Year
<input type="checkbox"/> - RF Cable(2m)	SUCOFLEX 104	Suhner	155-21-012E0	May 2002	1 Year
<input type="checkbox"/> - RF Cable(1m)	SUCOFLEX 104	Suhner	155-21-013E0	May 2002	1 Year

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 / UNCERTAINTY

AC Power Line Conducted Emission ___ - Applicable x - NOT Applicable

The requirements are ___ - PASSED ___ - NOT PASSED

Min. Limit Margin dB at MHz

Max. Limit Exceeding dB at MHz

Uncertainty of Measurement Results +/- 2.4 dB (level of confidence:95%)

Remarks :

Radiated Emission [§15.109(a)] x - Applicable - NOT Applicable

The requirements are x - PASSED ___ - NOT PASSED

Min. Limit Margin 11.2 dB at 64.0 MHz

Max. Limit Exceeding dB at MHz

Uncertainty of Measurement Results

Biconical Antenna +/- 3.8 dB (level of confidence:95%)

Log-Periodic Antenna +/- 4.7 dB (level of confidence:95%)

Half Wave Dipole Antenna +/- 3.4 dB (level of confidence:95%)

Remarks:

Antenna Conducted Power [§15.111] x - Applicable - NOT Applicable

The requirements are x - PASSED ___ - NOT PASSED

Min. Limit Margin Greater than 20.0 dB at MHz

Max. Limit Exceeding dB at MHz

Uncertainty of Measurement Results +/- 2.1 dB (level of confidence:95%)

Remarks:

1.6 SUMMARY**General Remarks :**

The RJT was tested according to the requirements of FCC Rules and Regulations Part 15 Subpart A and B (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;

- 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 : August 27, 2002

End of testing : August 27, 2002

- JAPAN QUALITY ASSURANCE ORGANIZATION -

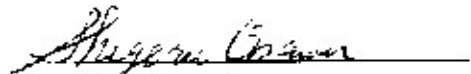
Approved by:



Masaaki Takahashi
Senior Manager
JQA EMC Engineering Dept.

Signatories:

Issued by:



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 :

Symbol	Item	Manufacturer	Model No.	FCC ID	Serial No.
A	TPMS Receiver	OMRON Corporation	G8D-360M	OUCG8D-360M	None

The measurement was carried out with the following support equipment connected :

Symbol	Item	Manufacturer	Model No.	Serial No.
B	Simulator	OMRON Corporation	None	None

Type of Cable :

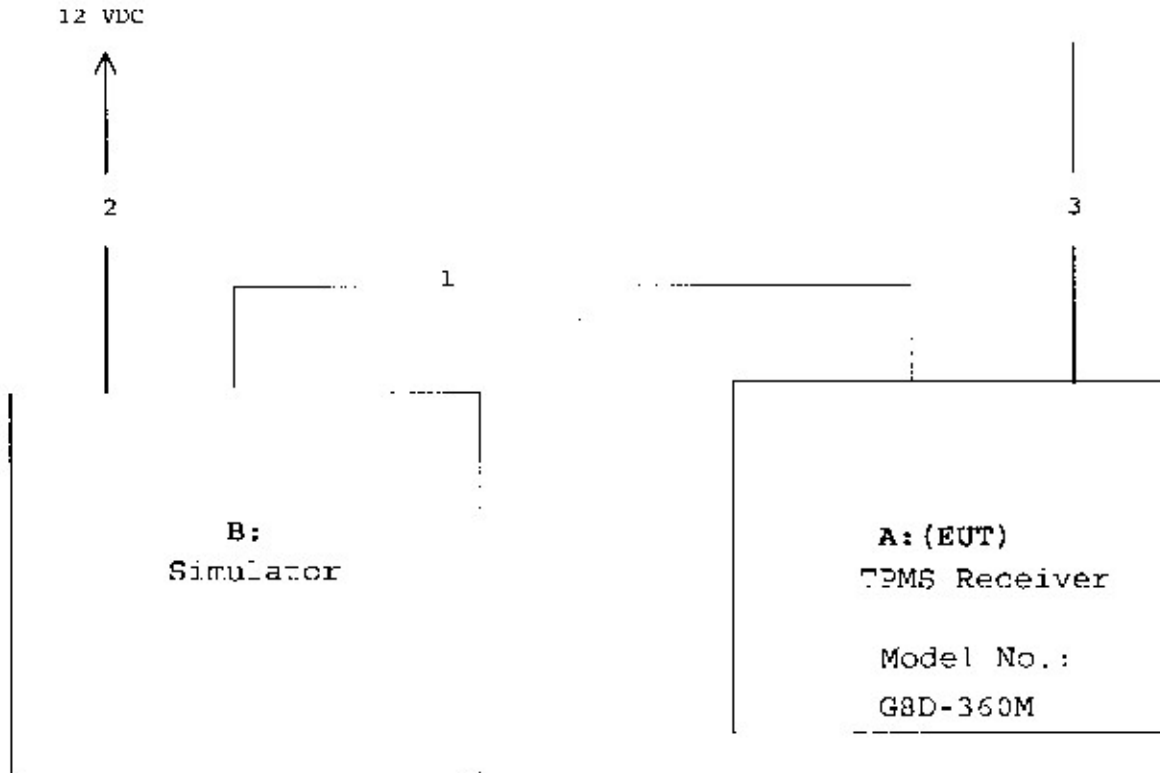
Symbol	Description	Identification (Manufacturer etc.)	Shielded YES / NO	Ferrite Core	Connector Type Shielded YES / NO	Length (m)
1	Cable	-	NO	NO	NO	0.3
2	Cable	-	NO	NO	NO	0.5
3	Antenna Cable	-	YES	NO	YES	0.3

1.7.2 Operating condition

Power supply Voltage : DC 12V

The tests have been carried out under the receiving condition.

1.8 EUT ARRANGEMENT (DRAWINGS)



1.9 PRELIMINARY TEST AND TEST-SETUP (DRAWINGS)

1.9.1 AC Power Line Conducted Emission (450 kHz - 30 MHz) :

According to description of ANSI C63.4-1992 sec.7.2.3, the AC power line preliminary conducted emissions measurements were carried out.

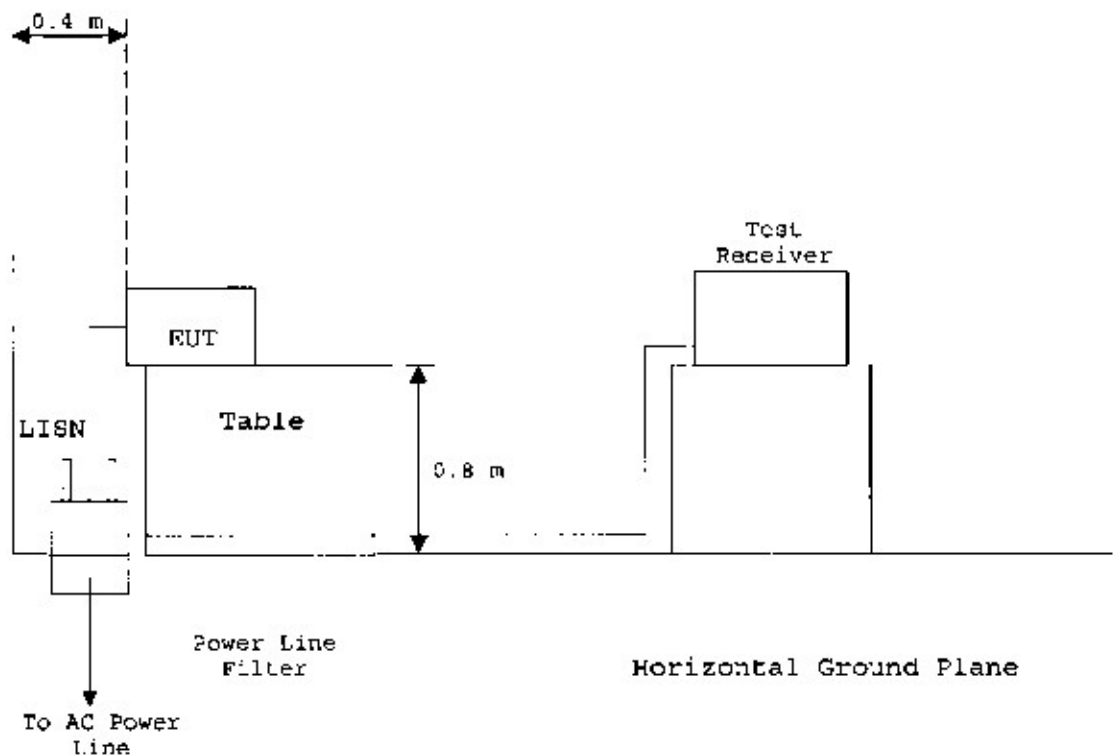
The preliminary conducted measurements were performed using the spectrum analyzer to observe the emission characteristics of the EUT.

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



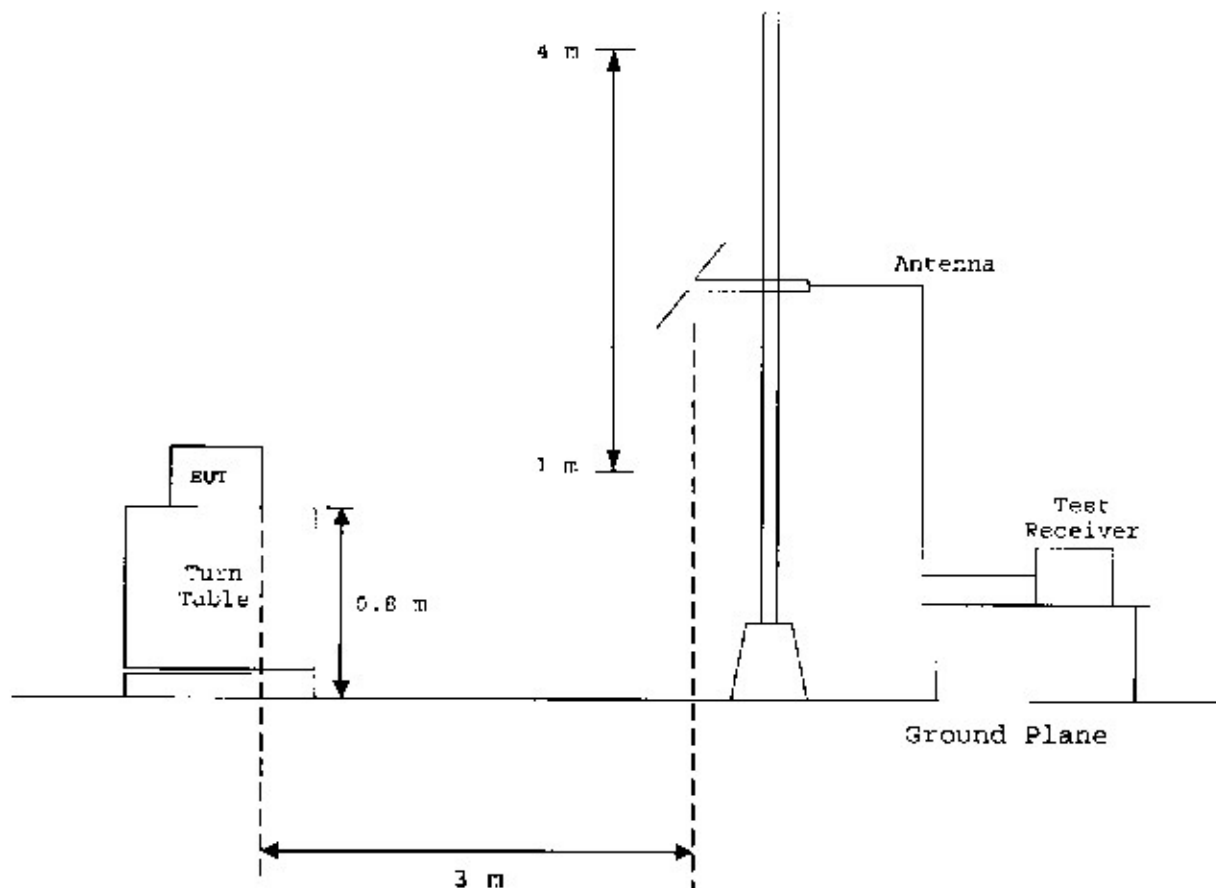
1.9.2 Radiated Emission (30 MHz - 1000 MHz) :

According to description of ANSI C63.4-1992 sec.8.3.1.1, 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 -



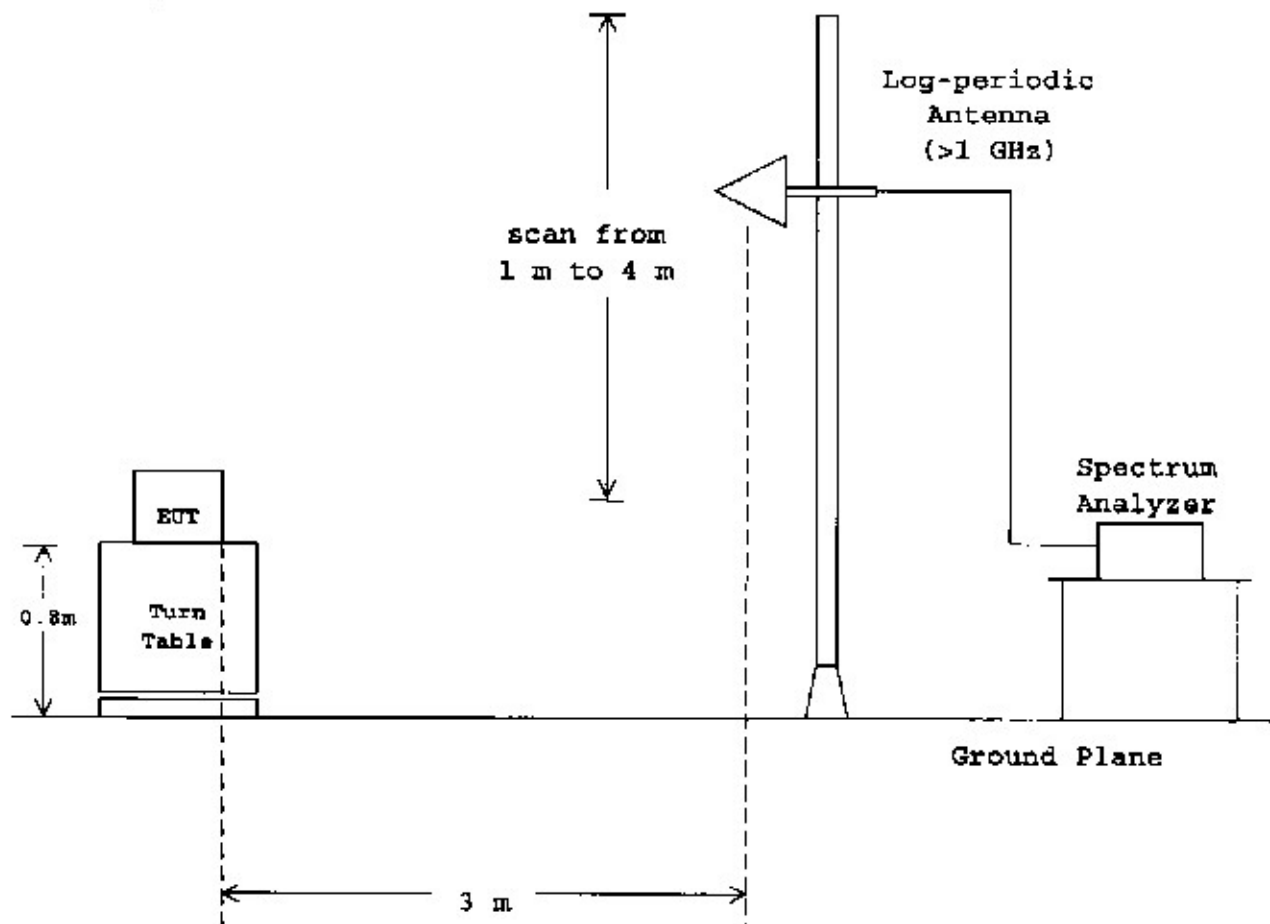
1.9.3 Radiated Emission (Above 1 GHz) :

According to description of ANSI C63.4-1992 sec.8.3.1.1, 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 -



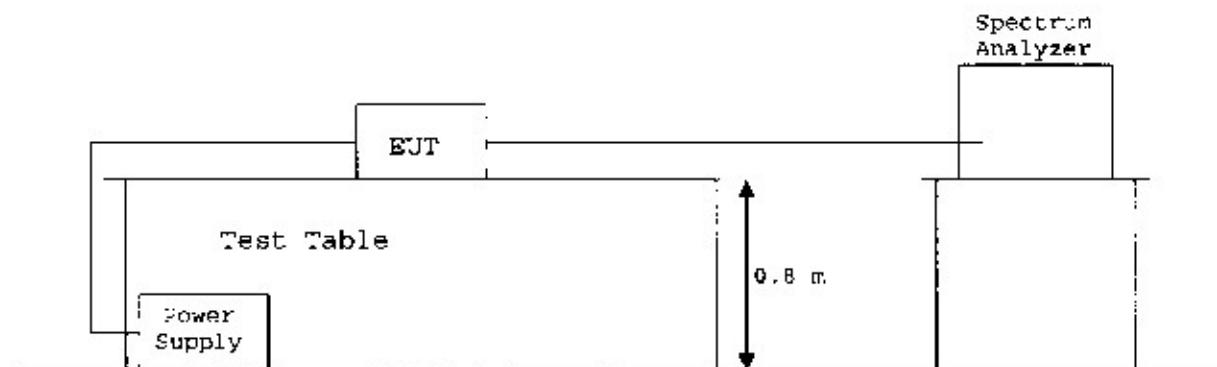
1.9.4 Antenna Conducted Power :

According to description of ANSI C63.4-1992 sec.12.1.5, the antenna conducted power measurements were carried out.

Antenna-conducted power measurements shall be performed with the EUT antenna terminals connected directly to either a spectrum analyzer or another measuring instrument, if the antenna impedance matches the impedance of the measuring instrument. Otherwise, use a balun or impedance-matching network to connect the measuring instrument to antenna terminals of the EUT. Losses in decibels in any balun or impedance-matching network used shall be added to the measured value in dB μ V.

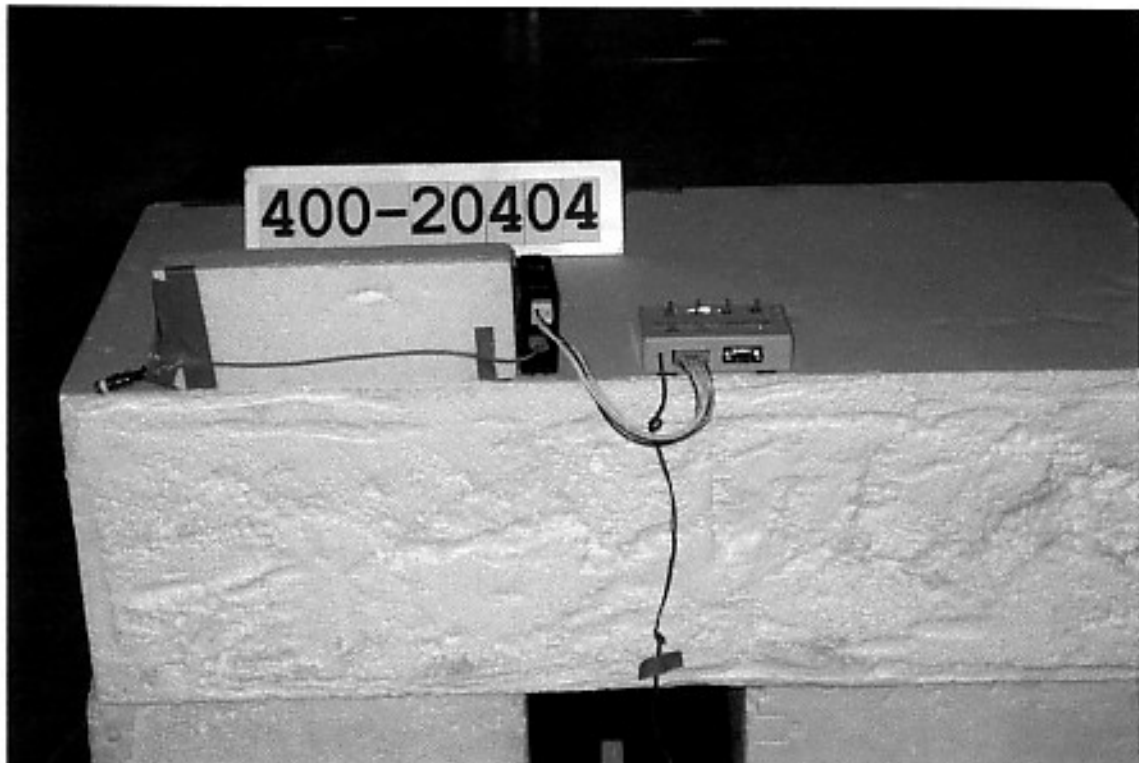
Shielded Enclosure

- Side View -



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

Tuning Frequency : 433.92 MHz
 Distance of Measurement : 3.0 meters

Date : August 27, 2002
 Temp. : 22 °C Humid. 68 %

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
48.0	0.0	12.3	V	3.5	-	-	40.0	-	15.8	-	24.2	-
56.0	0.0	9.3	V	13.9	-	-	40.0	-	23.2	-	16.8	-
64.0	0.0	7.1	V	21.7	-	-	40.0	-	28.6	-	11.2	-
72.0	0.0	6.0	V	14.5	-	-	40.0	-	21.1	-	18.9	-
80.0	0.0	7.6	V	10.4	-	-	40.0	-	18.0	-	22.0	-
192.0	0.0	17.6	H	0.2	-	-	43.5	-	17.8	-	25.7	-

Notes :

- 1; The spectrum was checked from 30 MHz to 2000 MHz.
- 2; The cable loss is included in the antenna factor.
- 3; The symbol of "<" means "or less".
- 4; The symbol of ">" means "or greater".
- 5; A sample calculation(QP/AV) was made at 48 (MHz):
 $PA + Af + Mr = 0 + 12.3 - 3.5 = 15.8 \text{ (dBuV/m)}$
 PA = Peak to Average Factor(P-A Factor);
 Af = Antenna Factor
 Mr = Meter Reading

6; Measuring Instrument Setting :

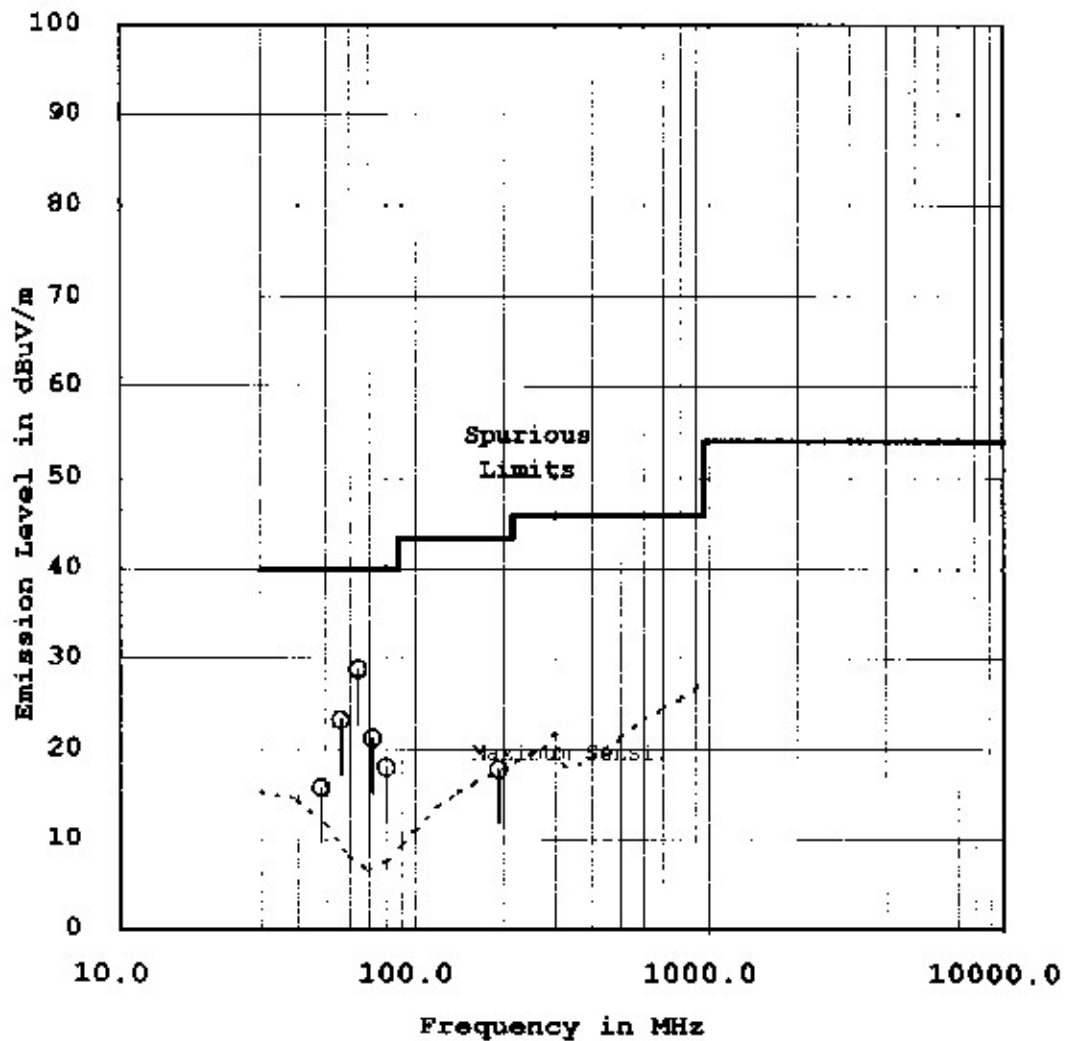
Detector function	Resolution Bandwidth	Video Bandwidth
Quasi-peak(QP)	120 kHz	-
Average(AV)	1 MHz	10 Hz
Peak	1 MHz	1 MHz

Tested by : Y. Nakajima
 Yoichi Nakajima
 Testing Engineer

RADIATED EMISSION MEASUREMENT

Model No. : G8D-360M

Standard : CFR 47 FCC Rules Part 15 QP/AV
Tuning Frequency(MHz) : 433.92



2.3 Antenna Conducted Power MeasurementDate : August 27, 2002
Temp. : 22 °C Humi. : 68 %Tuning Frequency : 433.92 MHz
Antenna Impedance : 50 ohms

No spurious emissions in the range 20 dB below the limit.

Note: 1. The spectrum was checked from 30 MHz to 2000 MHz.

2. Specified Limit:

$$10 \log(2 \text{ [nW] } / 1000000) + 107 = 50 \text{ dB}\mu\text{V}$$

3. Measuring Instrument Setting:

Below 1000 MHz

Detector function : CISPR Quasi-peak

IF Bandwidth : 120 kHz

Above 1000 MHz

Detector function : Peak

IF Bandwidth : 1 MHz

Video Bandwidth : 1 MHz

Tested by : Y. Nakajima
Yoichi Nakajima
Testing Engineer