

Designated by Ministry of international Trade and industry

KANSAI ELECTRONIC INDUSTRY DEVELOPMENT CENTER

HEAD OFFICE

6-8-7 NISHITENMA

KITA-KU OSAKA 530-0047 JAPAN



Corporate Juridical Person

IKOMA TESTING LABORATORY

12128 TAKAYAMA-CHO

IKOMA-CITY NARA 630-0101 JAPAN

TEST REPORT**Report No.A-006-02-C****Date: 4 March 2002**

This test report is to certify that the tested device properly complies with the requirements of:

FCC Rules and Regulations Part 15 Subpart C Intentional Radiators.

All the tests necessary to show compliance to the requirements were performed and these results met the specifications of requirement. The results of this report should not be construed to imply compliance of equipment other than that, which was tested. Unless the laboratory permission, this report should not be copied in part.

1. Applicant

Company Name : Sony Corporation.

Mailing Address : 6-7-35, Kitashinagawa, Shinagawa-ku, Tokyo, 141-0001 Japan

2. Identification of Tested Device

Type of Device : Bluetooth Transmitter

Type of Modulation : ☒: FHSS ☐: DSSS ☐: Other methodKind of Equipment Authorization : ☐: DoC ☒: Certification ☐: Verification

FCC ID : AK8DCRIP55

Device Name : Digital Video Camera Recorder

Trade Name : SONY

Model Number : DCR-IP55

Serial Number : 14 (for Radiated Emission and AC Power Line Conducted Emission test),
15 (for Other test)☒: Prototype ☐: Pre-production ☐: Production

Date of Manufacture : January 2002

3. Test Items and Procedure

- ☒: Carrier Frequency Separation Measurement
- ☒: Number of Hopping Frequencies Measurement
- ☒: Time of Occupancy (Dwell Time) Measurement
- ☒: 20 dB Bandwidth Measurement
- ☒: Peak Output Power Measurement
- ☒: Band Edge RF Conducted Emission Measurement
- ☒: Spurious RF Conducted Emission Measurement
- ☒: Power Density Measurement
- ☒: Radiated Spurious Emission Measurement
- ☒: AC Power Line Conducted Emission Measurement

Above all tests were performed under: FCC Public Notice DA00-705(March 30,2000)
and ANSI C63.4 – 1992

☒: without deviation, ☐: with deviation(details are found inside of this report)

4. Date of Test

Receipt of Test Sample : 5 February 2002

Test Completed on : 13 February 2002

Eizo Hariya
General Manager/ Ikoma Testing Laboratory

Table of Contents

0. LABORATORY ACCREDITATION AND MEASUREMENT UNCERTAINTY	3
0.1. Laboratory Accreditation.....	3
0.2. Measurement Uncertainty	3
1. CERTIFICATION OF THE COMPLIANCE	3
2. GENERAL INFORMATION	4
2.1. Product Description	4
2.2. Description for Equipment Authorization.....	5
2.3. Test Facility.....	5
3. TESTED SYSTEM	6
3.1. Test Mode	6
3.2. Operation of EUT System	6
3.3. Characterization and condition of EUT System	7
3.4. Block Diagram of EUT System	8
3.5. List of EUT System	9
3.6. List of Cables.....	9
3.7. Test Setup Diagram	10
4. CARRIER FREQUENCY SEPARATION MEASUREMENT (§ 15.247 (a) (1))	13
4.1. Test Procedure.....	13
4.2. Test Results	13
5. NUMBER OF HOPPING FREQUENCIES MEASUREMENT (§ 15.247 (a) (1) (ii))	15
5.1. Test Procedure.....	15
5.2. Test Results	15
6. TIME OF OCCUPANCY (DWELL TIME) MEASUREMENT (§ 15.247 (a) (1) (ii))	17
6.1. Test Procedure.....	17
6.2. Test Results	18
7. 20 dB BANDWIDTH MEASUREMENT (§ 15.247 (a) (1) (ii))	25
7.1. Test Procedure.....	25
7.2. Test Results	25
8. PEAK OUTPUT POWER MEASUREMENT (§ 15.247 (b) (1))	28
8.1. Test Procedure.....	28
8.2. Test Results	29
9. BAND EDGE RF CONDUCTED EMISSION MEASUREMENT (§ 15.247 (c)).....	32
9.1. Test Procedure.....	32
9.2. Test Results	33
10. SPURIOUS RF CONDUCTED EMISSION MEASUREMENT (§ 15.247 (c))	35
10.1. Test Procedure.....	35
10.2. Test Results	36
11. PEAK POWER DENSITY MEASUREMENT (§ 15.247 (d))	39
11.1. Test procedure	39
11.2. Test Results	40
12. RADIATED EMISSION MEASUREMENT (§ 15.247 (c)), (§ 15.209 (a))	43
12.1. Test Procedure.....	43
12.2. Test Results	44
13. AC POWER LINE CONDUCTED EMISSION MEASUREMENT (§ 15.207)	56
13.1. Test Procedure.....	56
13.2. Test Results	57
14. USED TEST EQUIPMENTS AND CALIBRATION STATUS	58

0. LABORATORY ACCREDITATION AND MEASUREMENT UNCERTAINTY

0.1. Laboratory Accreditation

KEC is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) for the specific scope of accreditation under Lab Code: 200207-0.

When the test report concerns with the NVLAP accreditation test, the first page of the test report is signed by NVLAP Approved Signatory accompanied by the NVLAP logo.

The report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

0.2. Measurement Uncertainty

The result of a measurement is only an approximation or estimate of the value of a specific quantity. And thus the measurand is complete only when a statement of uncertainty is given.

KEC quotes Measurement Uncertainty (U)

- of $\pm 3 \times 10^{-9}$ for Carrier Frequency Separation Measurement
- of $\pm 3 \times 10^{-9}$ for Number of Hopping Frequencies Measurement
- of $\pm 3 \times 10^{-9}$ for 20dB Bandwidth Measurement
- of $\pm 3 \times 10^{-9}$ for Time of Occupancy (Dwell time) Measurement
- of ± 0.7 dB for Peak Output Power Measurement
- of ± 0.7 dB for Band Edge RF Conducted Measurement
- of ± 0.7 dB for Spurious RF Conducted Emission Measurement
- of ± 0.7 dB for Power Density
- of ± 4.9 dB for Radiated Emissions
- of ± 2.2 dB for Conducted Emissions

1. CERTIFICATION OF THE COMPLIANCE

This test report is to certify that the tested device properly complies with the requirements of FCC Rules and Regulations Part 15 Subpart C Intentional Radiators.

KEC evaluation criteria for compliance:

The Product complies, if

the measured results are below the specification limit by a margin more than or equal to

- U 3×10^{-9} for Carrier Frequency Separation Measurement
- U 3×10^{-9} for Number of Hopping Frequencies Measurement
- U 3×10^{-9} for Time of Occupancy (Dwell time) Measurement
- U 3×10^{-9} for 20dB Bandwidth Measurement
- U (0.7 dB) for Peak Output Power Measurement
- U (0.7 dB) for Band Edge RF Conducted Measurement
- U (0.7 dB) for Spurious RF Conducted Emission Measurement
- U (0.7 dB) for Power Density
- 1/2 U (2.5 dB) for Radiated Emissions
- U (2.2 dB) for Conducted Emissions

2. GENERAL INFORMATION

2.1. Product Description

The SONY Model No. DCR-IP55 (referred as EUT in this report) is a digital video camera recorder built in bluetooth module.

(1) Technical Specifications

• Modulation type	: FHSS (F1D)
• Tx Frequency range	: 2402 – 2480 MHz
• Rx Frequency range	: 2401 – 2479 MHz
• Antenna	: Built in antenna (Gain 1 dBi (typ.), Impedance 50Ω)
• CCD	: 107×10^4 pixels
• EVF LCD	: 18×10^4 pixels
• PANEL LCD	: 21.1×10^4 pixels
• Flash Memory	: 64 Mbyte
• SDRAM	: 64 Mbyte
• Recording Media	: Micro MV Cassette

(2) Used Oscillating Frequency

• Bluetooth RF	: 1.2 GHz
• CCD clock	: 33.0 / 27 MHz
• USB clock	: 48 MHz
• Micro computer clock	: 20 / 27 MHz
• Bluetooth base band	: 13.0 MHz
• Timer clock	: 32.768 kHz

(3) Provided Terminals

• IEEE 1394	: DV Input / Output port
• AV I/O	: AV Input / Output port
• Stereo mini mini jack	: for Camera and Video remote controller
• USB (Mini-B)	: USB Input port
• DC IN	: DC Power supply
• 10 pin connector	: for Memory Stick

(4) Rated Power Supply

: AC 100~240V, 50/60Hz (with AC Adapter)
or DC 7.2V (with Battery)

2.2. Description for Equipment Authorization

(1) Type of device	: ☒ Intentional Radiators
(2) Reference Rule and Specification	: FCC Rule Part 15 Subpart C, Section 15.247 Operation with in the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz
(3) Kind of Equipment Authorization	: ☐ DoC ☒ Certification ☐ Verification
(4) Procedure of Application	: ☒ Original Equipment ☐ Modification
(5) Highest Frequency used in the Device	: 2402 – 2480 MHz
(6) Upper Frequency of Radiated Emission Measurement Range	: ☐ 1000 MHz ☐ 2000 MHz ☐ 5000 MHz ☒ Tenth harmonics of the highest fundamental frequency

2.3. Test Facility

All tests described in this report were performed by:	
Name:	KANSAI ELECTRONIC INDUSTRY DEVELOPMENT CENTER (KEC) IKOMA TESTING LABORATORY
OpenArea Test Site	☐ No.1 ☐ No.3 ☐ No.4
Anechoic Chamber	☐ No.1 ☒ No.3
Shielded Room	☐ No.1 ☐ No.2 ☒ No.4 ☐ No.5 ☒ No.6
Address:	12128, Takayama-cho Ikoma-city, Nara, 630-0101 Japan
These test facilities have been filed with the FCC under the criteria of ANSI C63.4-1992. The KEC has been accredited by the NVLAP (Lab. Code: 200207-0) based on ISO17025. Also the laboratory has been authorized by TUV Product Service (GER) and TUV Rheinland (GER) based on their criteria for testing laboratory (EN45001). EMC M.C. Anechoic Chamber No.3 has been filed with the Industry Canada under the criteria of RSS212, issue 1. (File number : IC4149-3)	

3. TESTED SYSTEM

3.1. Test Mode

The following operation modes were used under the test.

- Op-mode 1 : Transmitting PRBS9 pattern at 2402 MHz without hopping
- Op-mode 2 : Transmitting PRBS9 pattern at 2441 MHz without hopping
- Op-mode 3 : Transmitting PRBS9 pattern at 2480 MHz without hopping
- Op-mode 4 : Transmitting PRBS9 PN pattern with hopping
- Op-mode 5 : Receiving with out hopping (Tx standby)
- Op-mode 6 : Transmitting "Paging mode"
- Op-mode 7 : Transmitting "Inquiry mode"

- a) Carrier Frequency Separation measurement : Op-mode 4
- b) Number of Hopping Frequencies measurement : Op-mode 4
- c) Time of Occupancy measurement : Op-mode 4, Op-mode 6, Op-mode 7
- d) 20dB Bandwidth measurement : Op-mode 4
- e) Peak Output Power measurement : Op-mode 1 ,Op-mode 2 and Op-mode 3
- f) Band Edge RF Conducted measurement : Op-mode 4
- g) Spurious RF Conducted emission measurement : Op-mode 1 ,Op-mode 2 and Op-mode 3
- h) Power Density measurement : Op-mode 4
- i) Radiated Emission measurement : Op-mode 1 ,Op-mode 2, Op-mode 3 and Op-mode 5
- j) AC Power Line Conducted Emission measurement : Op-mode 1 ,Op-mode 2, Op-mode 3 and Op-mode 5

3.2. Operation of EUT System

Transmitting (Op-mode 1~4)

1. Turn on all devices.
2. The EUT was set to the network mode.
3. Connect the EUT to the host PC via jig by using the RS 232C.
4. Execute the test program
5. Choice the test mode
 - a. Tx / Rx mode : Transmitting mode
 - b. Hopping ON/OFF : Hopping OFF or ON
 - c. Packet : DH1, DH3 or DH5
 - d. PAYLOAD : PRBS9
 - e. Send frequency : 2402, 2441 or 2480 MHz
6. Execute the Test command and remove the host PC.

Then, the EUT was set in the continuous transmitting operation.

Receiving mode(Op-mode 5)

1. Turn on all devices.
2. The EUT was set to the network mode.
3. Connect the EUT to the host PC via jig by using the RS 232C.
4. Execute the test program
5. Choice the test mode
 - a. Tx / Rx mode : Receiving mode
 - b. Hopping ON/OFF : Hopping OFF
 - c. Send frequency : 2402, 2441 or 2480 MHz
5. Execute the Test command and remove the host PC.

Then, the EUT was set in the continuous receiving operation.

Paging mode (Op-6, Time of Occupancy measurement only)

1. Turn on all devices.
2. Connect the EUT to the host PC via jig by using the RS 232C.
3. Execute the test program (Program Name : Bluetest)
4. Select the serial port and set the bound rate 115200.
5. Select the tree.
[HCI] – [HCI Command – Link Control] – [Create_Connection].
6. Click the connection icon.

Then, the EUT was set in the “Paging operation”.

Paging mode :

Transmitting Inquiry mode (Op-7, Time of Occupancy measurement only)

1. Turn on all devices.
2. Connect the EUT to the host PC via jig by using the RS 232C.
3. Execute the test program (Program Name : Project 1)
4. Click OPEN with mouse.

Then, the EUT was set in the “Inquiry operation”.

Inquiry mode :

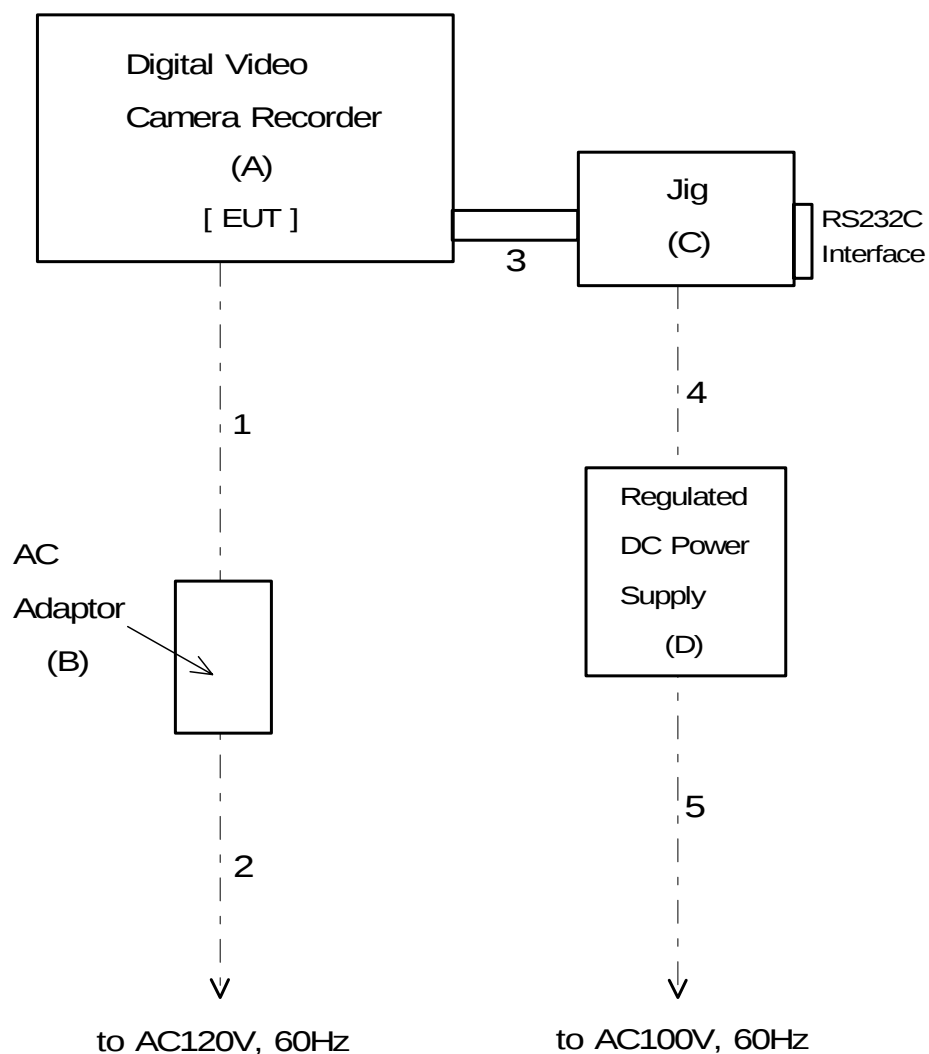
[Note]

The test program is prepared by manufacture. (Blue Bench 6752, Bluetest and Project 1)

3.3. Characterization and condition of EUT System

☒ : normal, ☐ : not normal (that is)

3.4. Block Diagram of EUT System



————— : Signal Line

- - - - - : Power Line

[Note]

- (1) DC power supply was set to DC +5.0V in measurement.
- (2) Excluding the radiated emission and AC power line conducted emission test, the EUT was modified to connect the spectrum analyzer by using the 3.5 Ø short coaxial cable and 10 dB attenuator.
- (3) See 3.5 List of EUT System and 3.6 List of Cables.

3.5. List of EUT System

No	Device Name (Interface)	Model Number (Serial Number)	FCC ID (Trade Name)	Note	Remark
A	Digital Video Camera Recorder	DCR-IP55 (14,15)	AK8DCRIP55 (SONY)	EUT	(1)
B	AC Adaptor	AC-L20A (15029058)	N/A (SONY)	Accessory of EUT	
C	BT-Jig	— (—)	— (—)	Made by SONY	
D	Regulated DC Power Supply	523A (C118807)	N/A (Metronix)		

[Remark]

(1) : Serial Number

14 : for radiated emission and AC power line conducted emission test

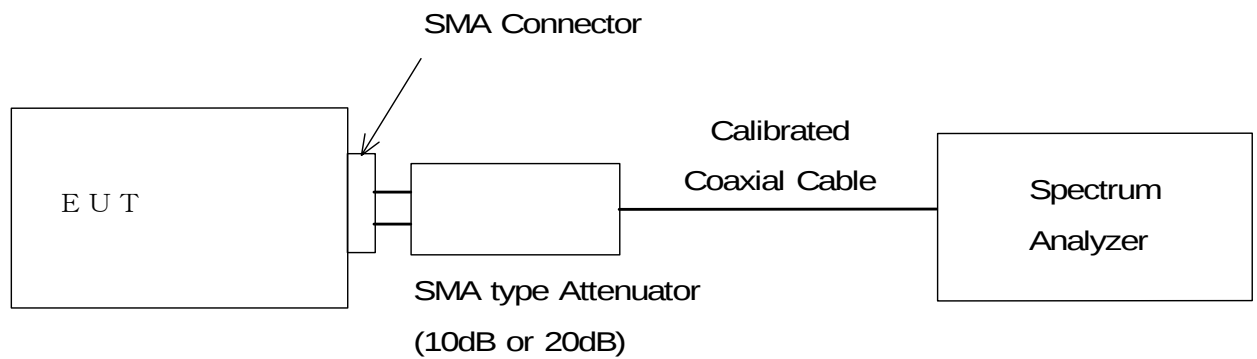
15 : for other test

3.6. List of Cables

No	Cable Name	Shielded (Y/N)	Length (m)	Note	Remark
1	AC Input Cord of AC Adaptor	N	2.0		
2	DC Output Cord of AC Adaptor	N	1.8		
3	BT - Jig Cable	N	0.1		
4	DC Input Cord of EUT	N	1.75	2-wires type	
5	AC power cord of Regulated DC Power Supply	N	2.4	2-wires type	

3.7. Test Setup Diagram

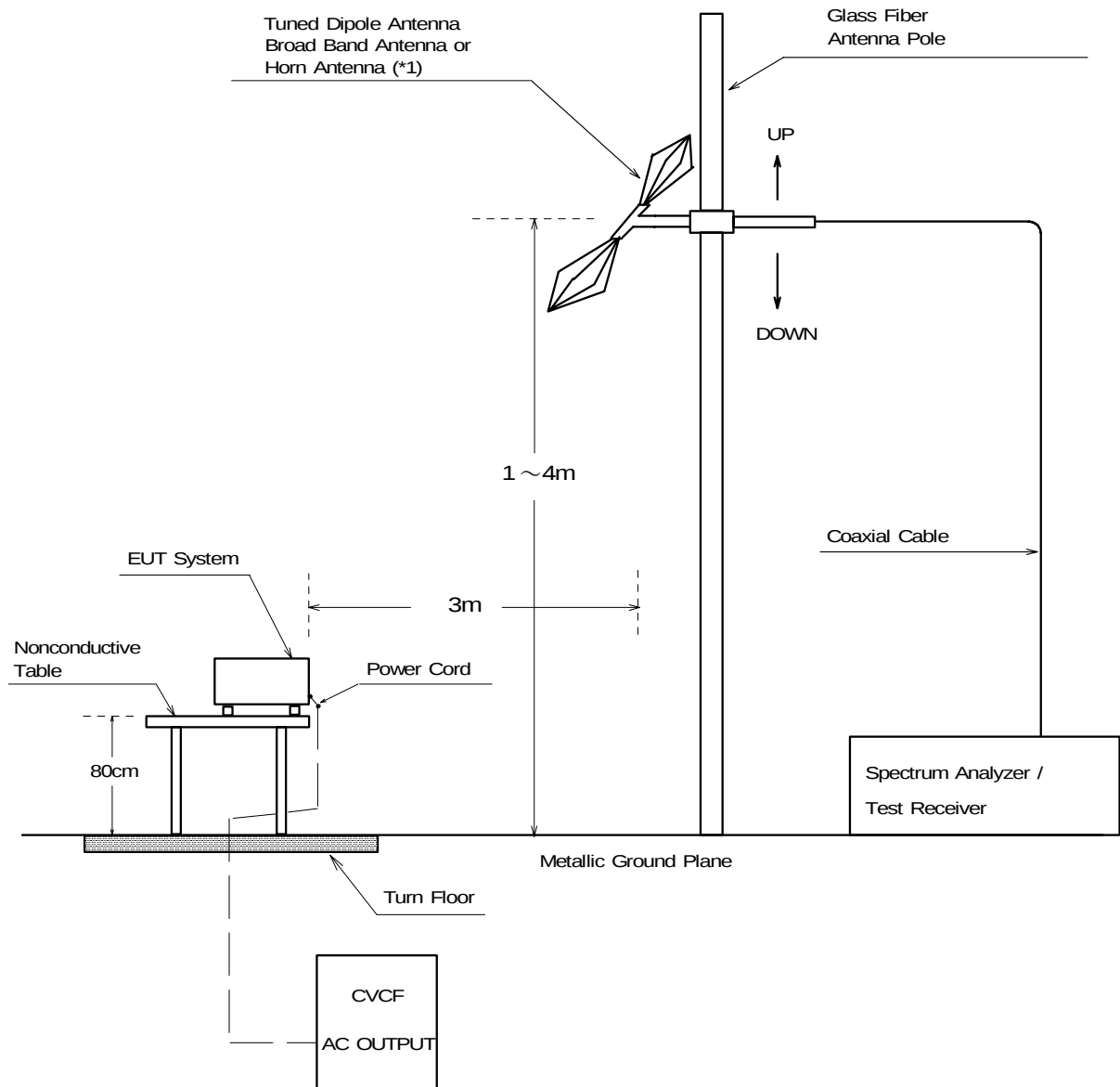
- Carrier Frequency Separation
- Number of Hopping Frequencies
- Time of Occupancy (Dwell Time)
- 20dB Bandwidth
- Peak Output Power
- Band Edge RF Conducted Emission
- Spurious RF Conducted Emission
- Peak Power Density



- Continued -

• Radiated Emission Measurement

[Open Site or Anechoic Chamber]

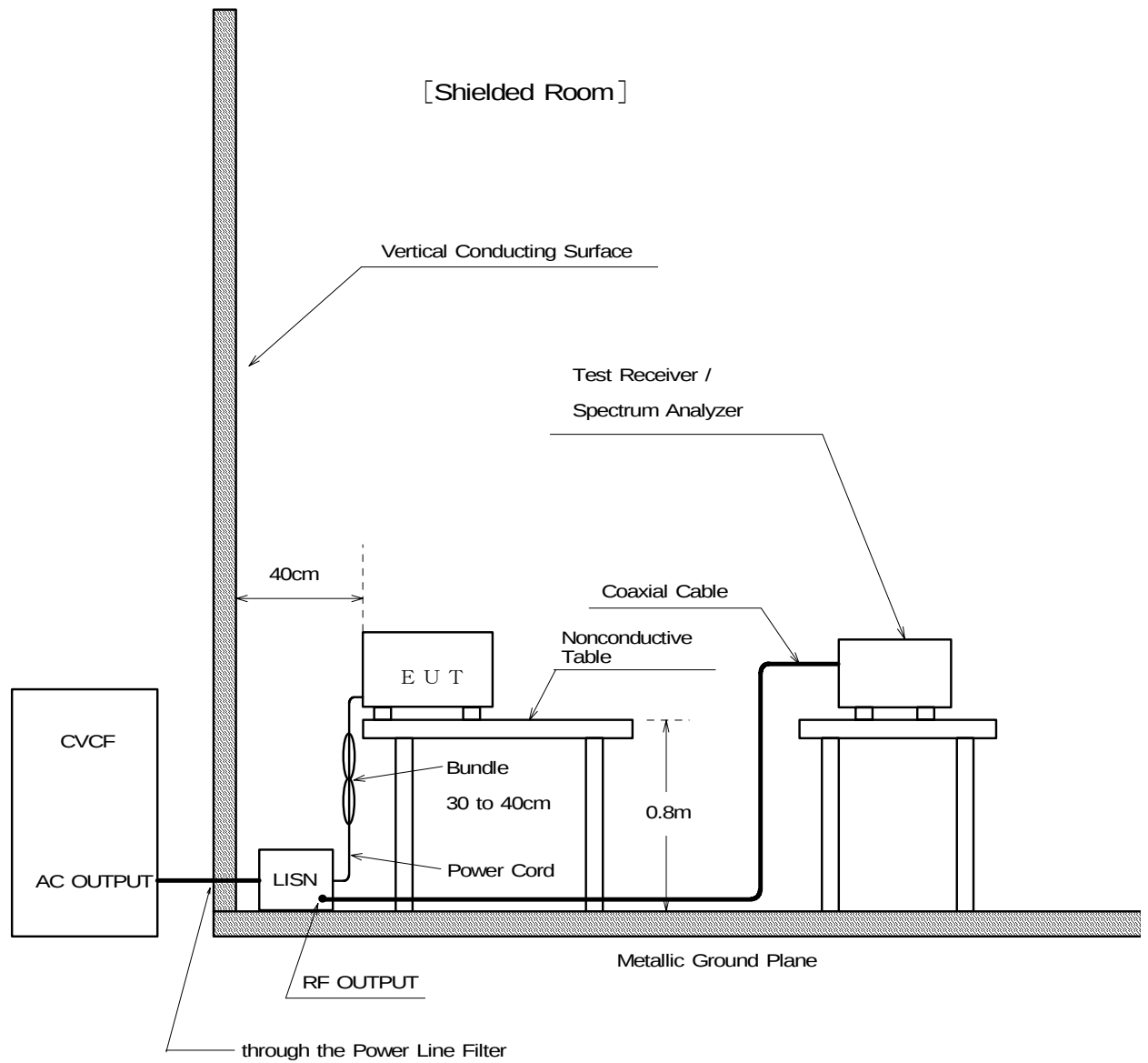


[Note]

(1*) : Above 1GHz

- Continued -

• Conducted Emission Measurement



4. CARRIER FREQUENCY SEPARATION MEASUREMENT (§ 15.247 (a) (1))

4.1. Test Procedure

(1)	Connect the EUT RF output port to the spectrum analyzer(*1) via calibrated coaxial cable and suitable attenuator (if necessary).
(2)	Activates the EUT System and executes the software prepared for test, if necessary.
(3)	To find out the worst case, the transmitting data rate of EUT is varied with the different modes of operation. The final test condition is recorded in this report.
(4)	The spectrums are scanned and allow the trace to stabilize.
(5)	The separation between the peaks of the adjacent channel was determined by using the maker – delta function of spectrum analyzer(*1).
[Note]	
(*1)	Spectrum Analyzer Set Up Conditions
	Frequency Span : 5 MHz
	Resolution bandwidth : 30 kHz
	Video bandwidth : $\geq$ RBW
	Detector function : Peak
	Trace Mode : Max Hold

4.2. Test Results

Measured Frequency [MHz]	Carrier Frequency Separation [MHz]	Limits [MHz]
2441.00	1.017	0.025

[Note] See next page figure 1.	
[Test Condition]	
EUT operation	: Data transmission, DH5 packet.
EUT channel	: Hopping

[Environment]

Temperature 22°C Humidity 42%

[Tested Date / Tester]

13 February 2002

Signature



Ikuya Minematsu

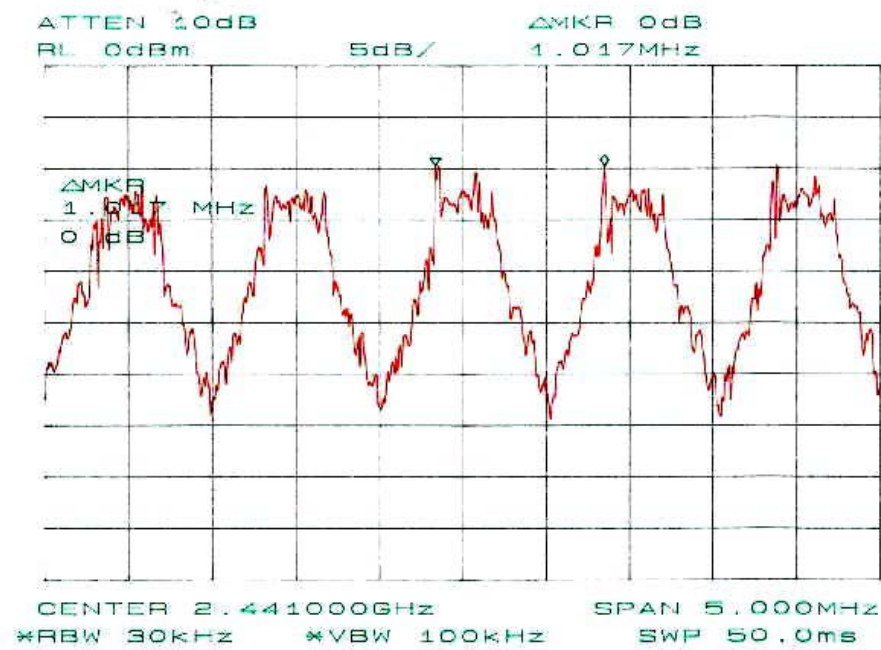


figure 1 Carrier frequency Separation $f_c = 2441$ MHz

5. NUMBER OF HOPPING FREQUENCIES MEASUREMENT (§ 15.247 (a) (1) (ii))

5.1. Test Procedure

(1)	Connect the EUT RF output port to spectrum analyzer (*1) via calibrated coaxial cable and suitable attenuator (if necessary).
(2)	Activates the EUT System and executes the software prepared for test, if necessary.
(3)	To find out the worst case, the transmitting data rate of EUT is varied with the different modes of operation. The final test condition is recorded in this report.
(4)	The spectrums are scanned and allow the trace to stabilize.
(5)	The number of hopping frequencies were counted on the spectrum analyzer and recorded.
[Note]	
(*1)	Spectrum Analyzer Set Up Conditions
	Frequency Span : 100 MHz, $f_c = 2441$ MHz
	Resolution bandwidth : 300 kHz
	Sweep : Auto
	Detector function : Peak detector
	Trace : Max Hold

5.2. Test Results

Measured Value	Number of Limit
79	>75

[Note] See next page figure 2.	
[Test Condition]	
EUT operation	: Data transmission, DH5 packet
EUT channel	: Hopping

[Environment]

Temperature: 22°C

Humidity: 42%

[Tested Date/ Tester]

13 February 2002

Signature



Ikuya Minematsu

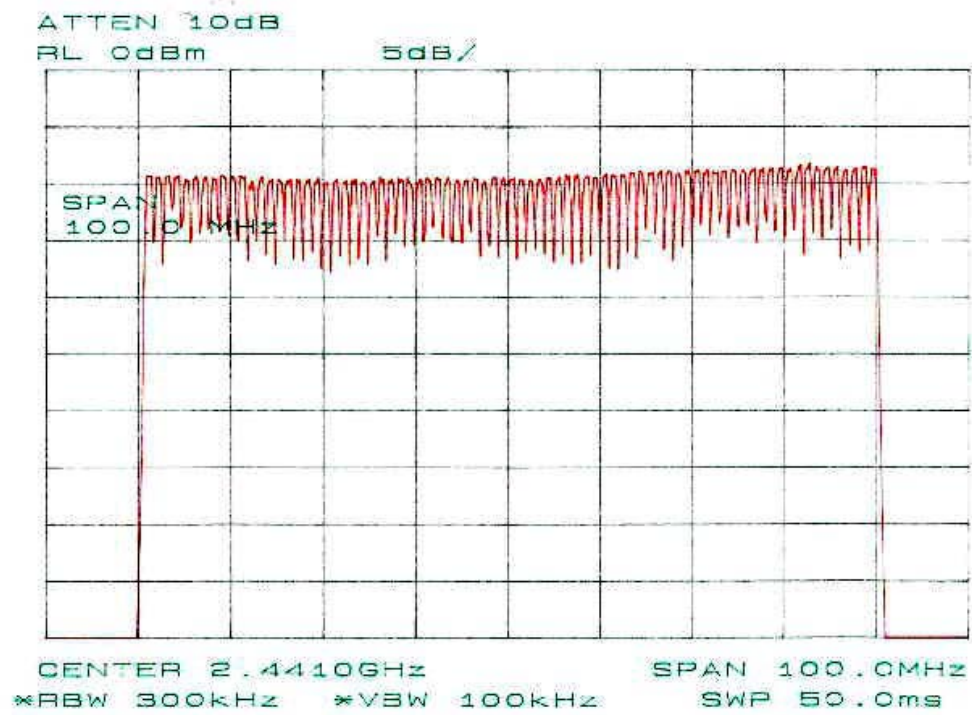


figure 2 Number of Hopping frequency

6. TIME OF OCCUPANCY (DWELL TIME) MEASUREMENT (§ 15.247 (a) (1) (ii))

6.1. Test Procedure

(1)	Connect the EUT RF output port to spectrum analyzer via calibrated coaxial cable and suitable attenuator (if necessary).
(2)	Activates the EUT System and execute the software prepared for test, if necessary.
(3)	To find out the worst case, the transmitting data rate of EUT is varied with the different modes of operation. The final test condition is recorded in this report.
(4)	The span of spectrum analyzer was set to zero (sweep time 10msec). The occupied time at center on a hopping frequency was observed and recorded as “Ton”.
(5)	The spectrums are scanned by using the spectrum analyzer (*1). And the numbers of occupied channel per 30sec were counted by using the delta-marker function of spectrum analyzer and recorded as “N30”.
(6)	The dwell time was calculated by $Ton \times N30$.
[Note]	
(*1)	Spectrum Analyzer Set Up Conditions
	Frequency Span : Zero span
	Resolution bandwidth : 100 kHz ~ 1 MHz
	Video bandwidth : $\geq$ RBW
	Sweep : as necessary to capture the entire dwell time per hopping channel
	Detector function : Peak
	Trace Mode : Max Hold

6.2. Test Results

(1) Hopping mode (See figure 3 and 4)

Measured Value(s) [sec]	Limit(s) [sec]
0.221692	0.4

In measurement time of 30s, total 76 transmissions occurred. The duration of one transmission was 2.917ms.
Time of occupancy at 30s is obtained : $76 \times 2.917\text{ms} = 221.692\text{ms}$

(2) Paging mode (See figure 5,6,7,8 and 9)

Measured Value(s) [sec]	Limit(s) [sec]
0.02604716	0.4

The paging cycles, lengths 5.1sec. During that the EUT transmitted with 70 ms intervals.
One transmission took 0.11917ms. And total 3 transmissions occurred in 70 msec intervals.
The total transmitter on time is obtained: $(5.1\text{sec} / 0.07\text{s}) \times 0.35751\text{ms} = 26.04716\text{ms}$

(3) Inquiry mode (See figure 10, 11 and 12)

Measured Value(s) [sec]	Limit(s) [sec]
0.1534314	0.4

The inquiry mode is 12.875sec.
And the EUT is transmitted with 10ms intervals. Therefore one transmission time becomes 0.11917ms
The final total time of "Tx ON" is calculated by : $(12.875\text{s} / 0.01\text{s}) \times 0.11917\text{ms} = 153.4314\text{ms}$

[Note] See next page figure 3 to 7.	
[Test Condition] EUT operation : Data transmission, DH5 packet, Paging mode, Inquiry mode. EUT channel : Hopping	

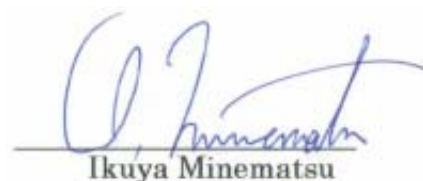
[Environment]

Temperature 22°C Humidity 42%

[Tested Date / Tester]

13 February 2002

Signature



Ikuya Minematsu

(1) Hopping mode

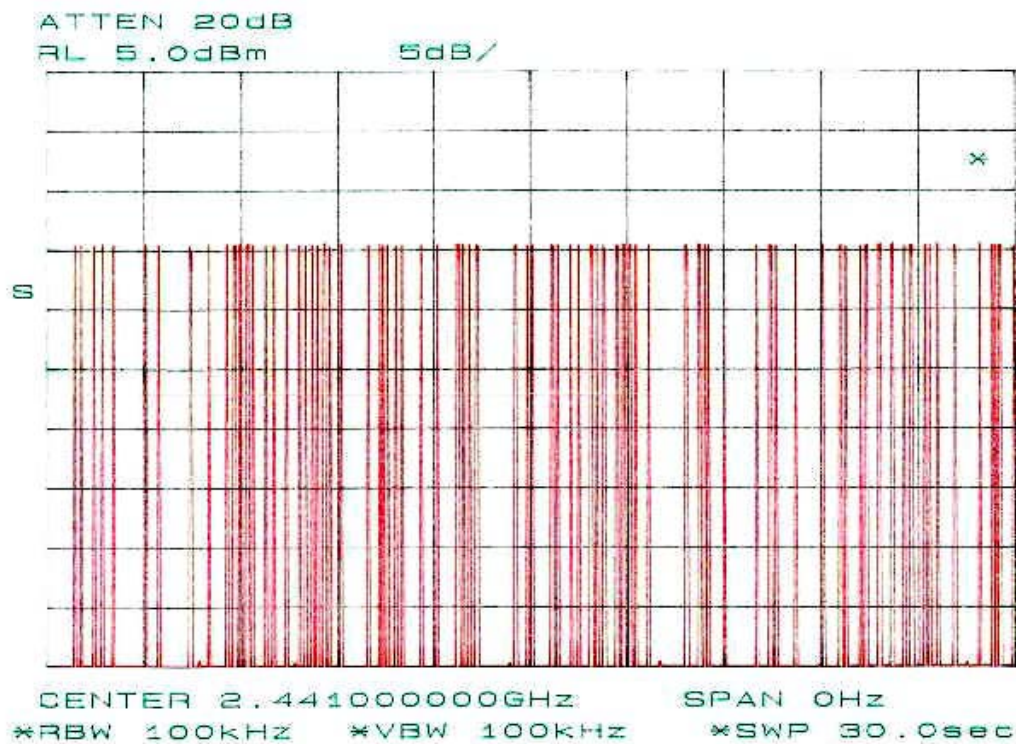


figure 3. Number of transmission at 30s

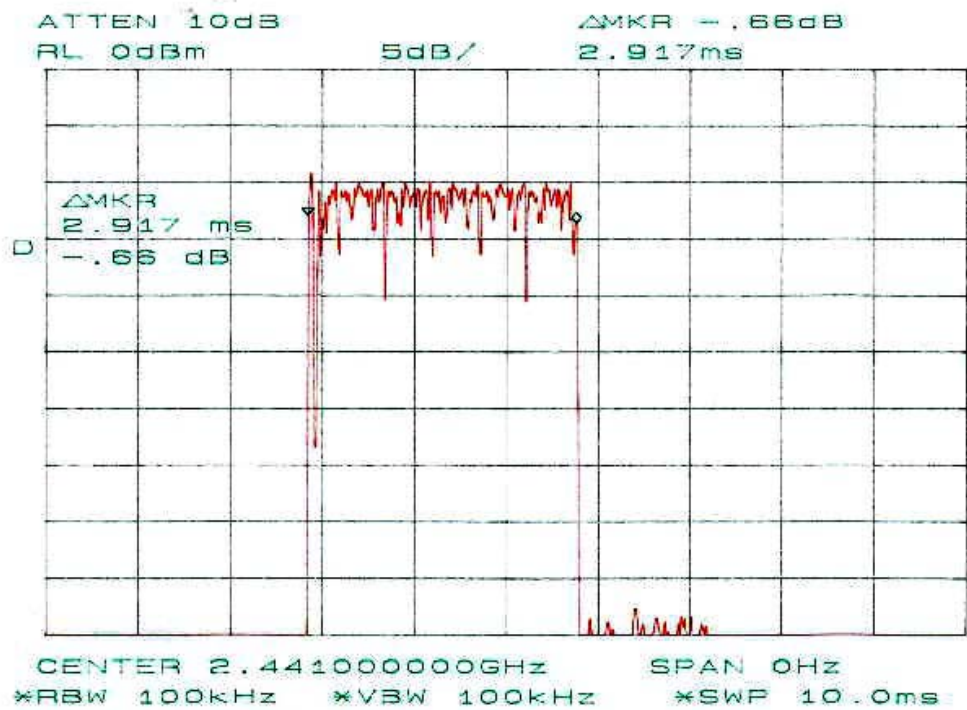


figure 4. Duration of one transmission

(2) Paging mode

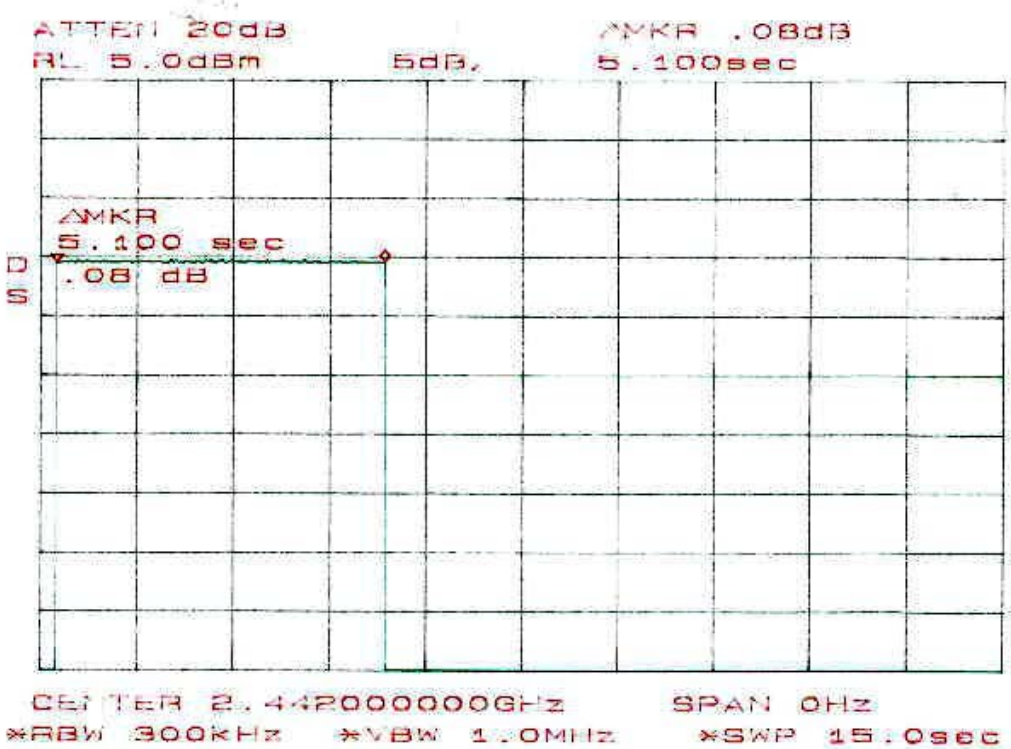


figure 5 Complete paging Cycle

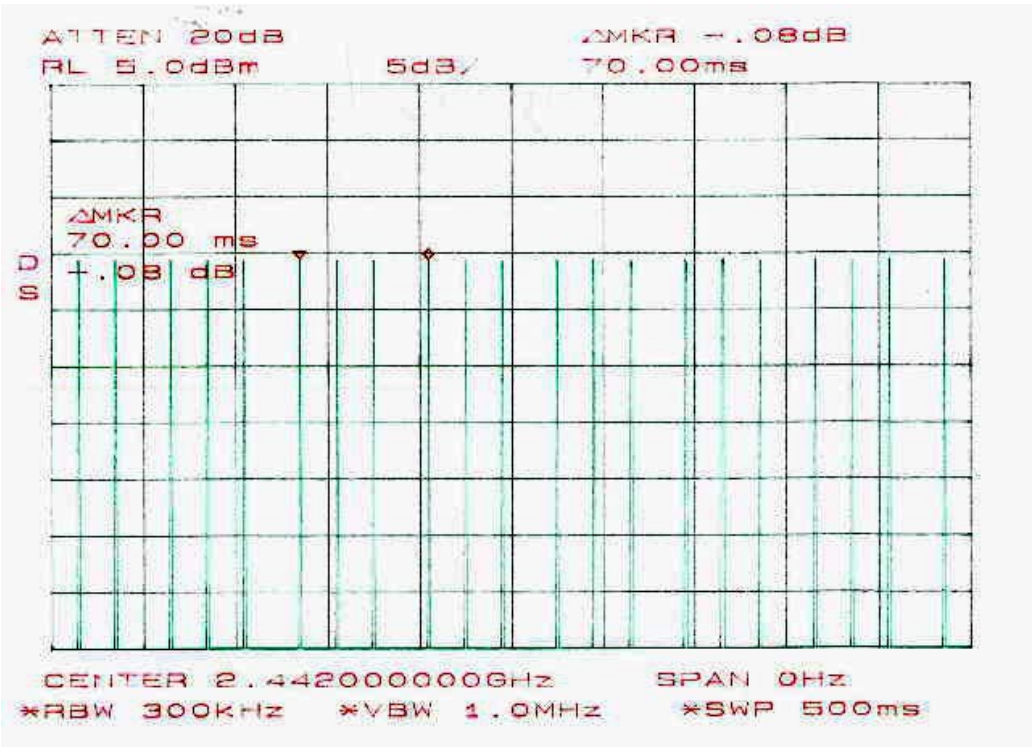


figure 6 Paging repetition frequency

- Continued -

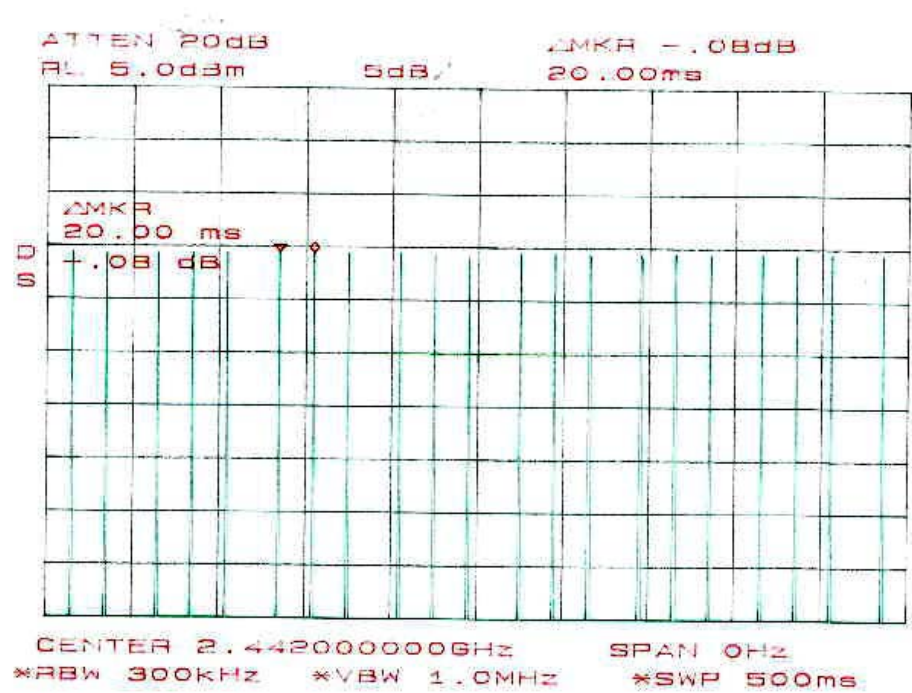


figure 7 Paging repetition frequency

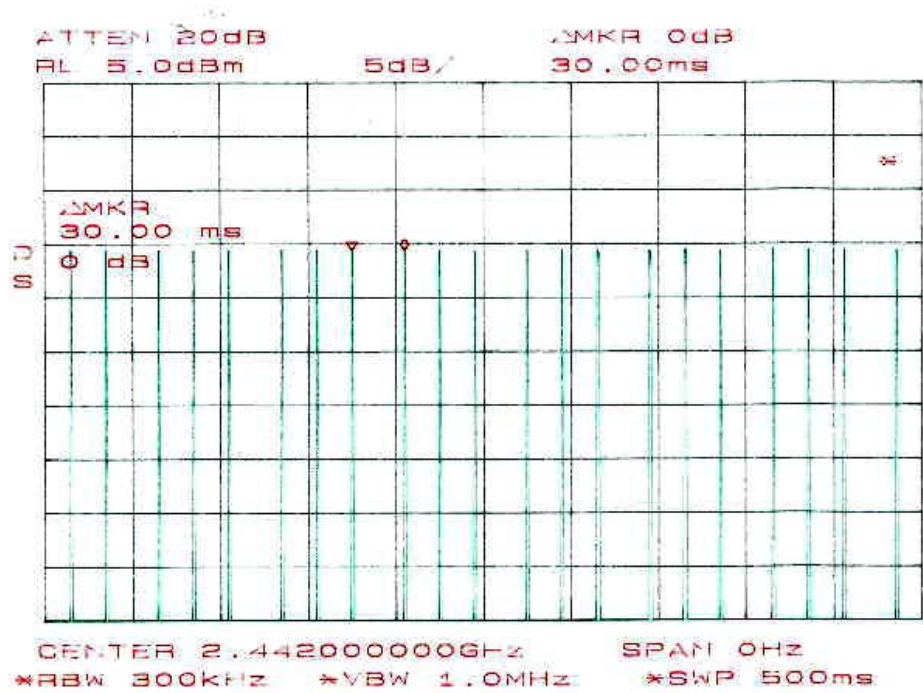


figure 8 Paging repetition frequency

- Continued -

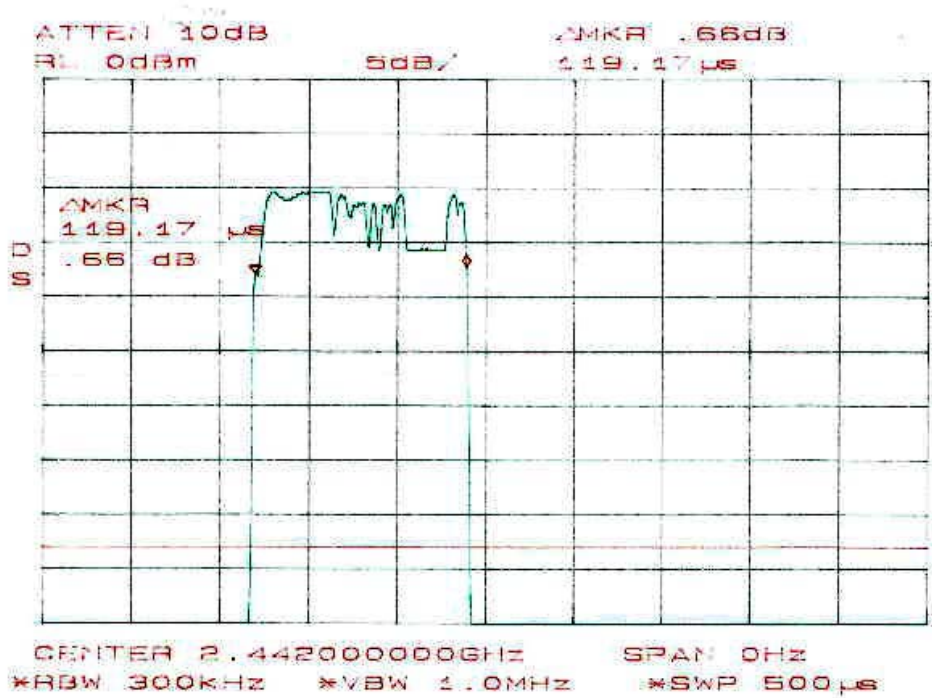


figure 9. Duration of one transmission

(3) Inquiry mode

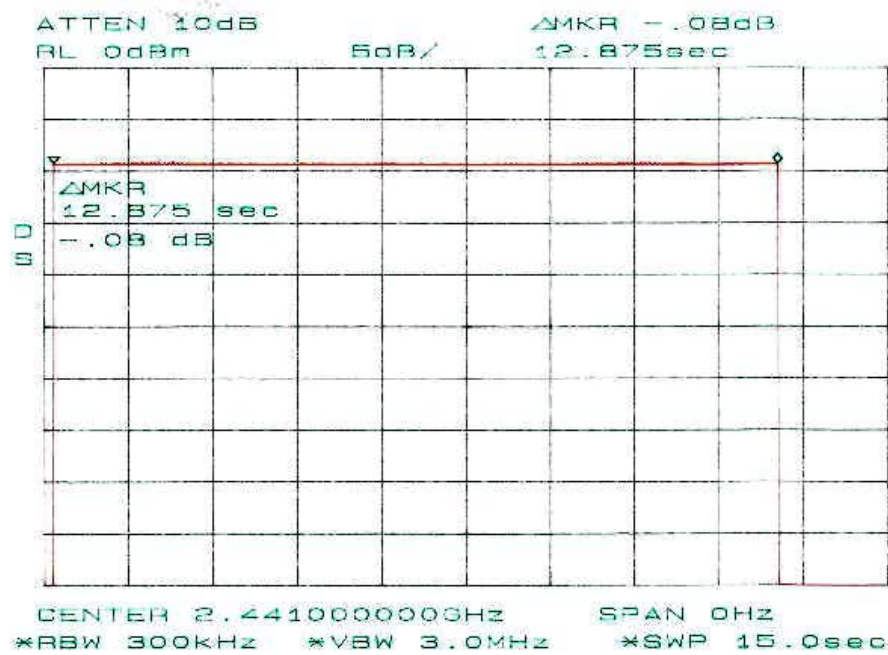


figure 10 Complete inquiry Cycle

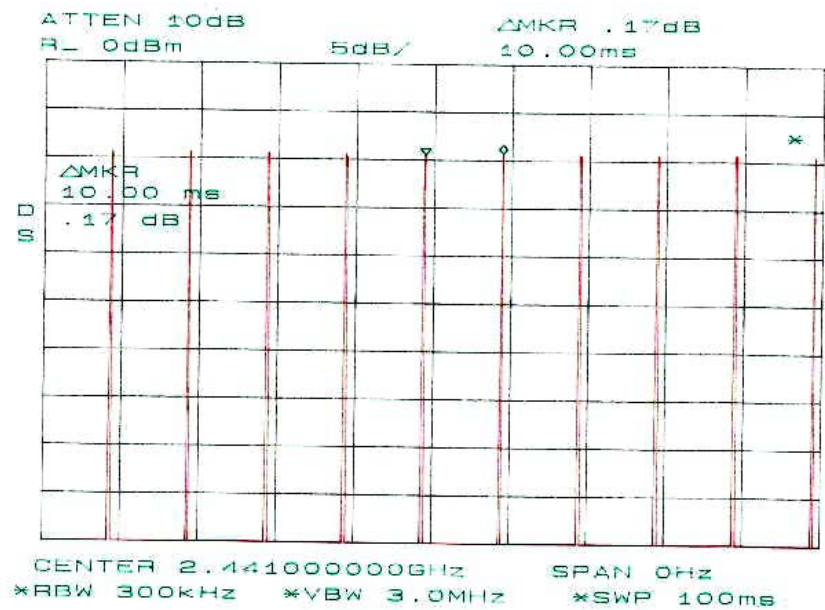


figure 11 Inquiry repetition frequency

- Continued -

(3) Inquiry mode (Continued)

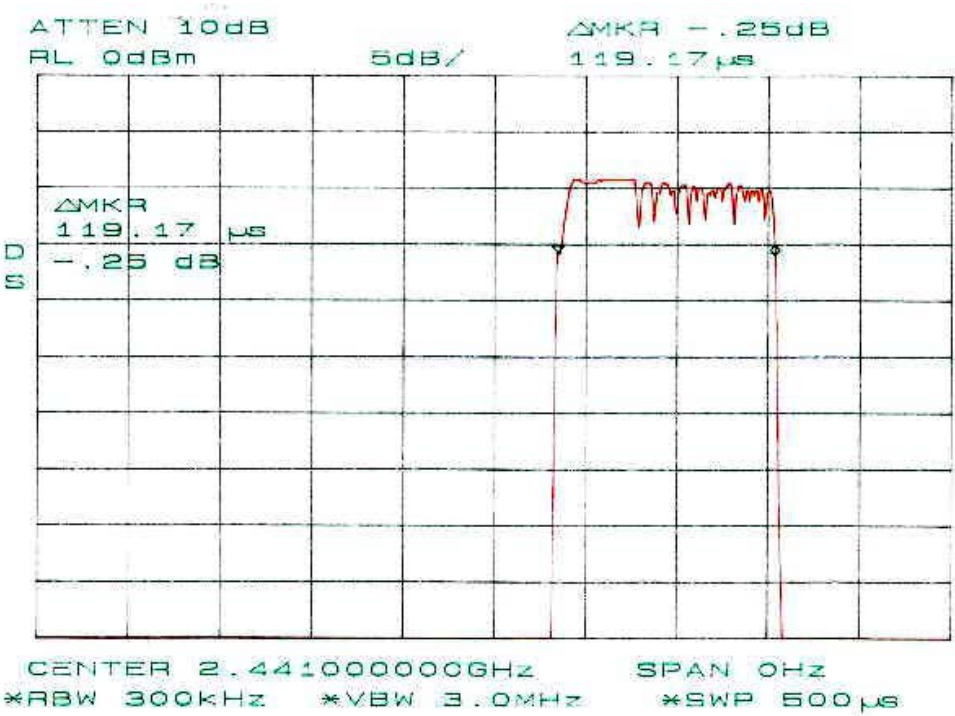


figure 12 Duration of one transmission

7. 20 dB BANDWIDTH MEASUREMENT (§ 15.247 (a) (1) (ii))

7.1. Test Procedure

(1)	Connect the EUT RF output port to spectrum analyzer via calibrated coaxial cable and suitable attenuator (if necessary).
(2)	Activates the EUT System and execute the software prepared for test, if necessary.
(3)	To find out the maximum emission condition, the transmitting data rate of EUT is set to maximum data rate.
(4)	The Spectrums are scanned and allow the trace stabilized.
(5)	The both side of 20dB down value from peak power were measured by using delta-maker function of the spectrum analyzer (*1).
(6)	Above measurement were performed under low-band hopping frequency, mid-band hopping frequency and high band hopping frequency.
[Note]	
(*1)	Spectrum Analyzer Set Up Conditions
	Frequency Span : 2 MHz
	Resolution bandwidth : 10 kHz
	Video bandwidth : $\geq$ RBW
	Sweep : Auto
	Detector function : Peak
	Trace Mode : Max Hold

7.2. Test Results

Measured Frequency [MHz]	20dB Band Width [MHz]	Limit [MHz]	Margin for Limit [MHz]
2402.00	0.800	1.000	0.200
2441.00	0.797	1.000	0.203
2480.00	0.803	1.000	0.197

[Note]	
See next page figure 13 to 15.	
[Test Condition]	
EUT operation	: Data transmission, DH5 packet
EUT channel	: 2, 40, 80 (2402, 2441, 2480 MHz)

[Environment]

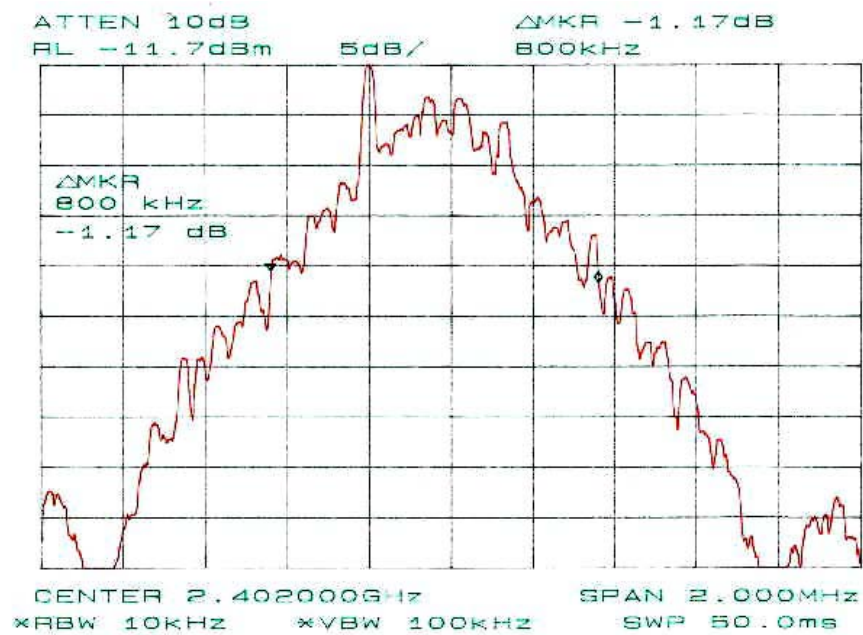
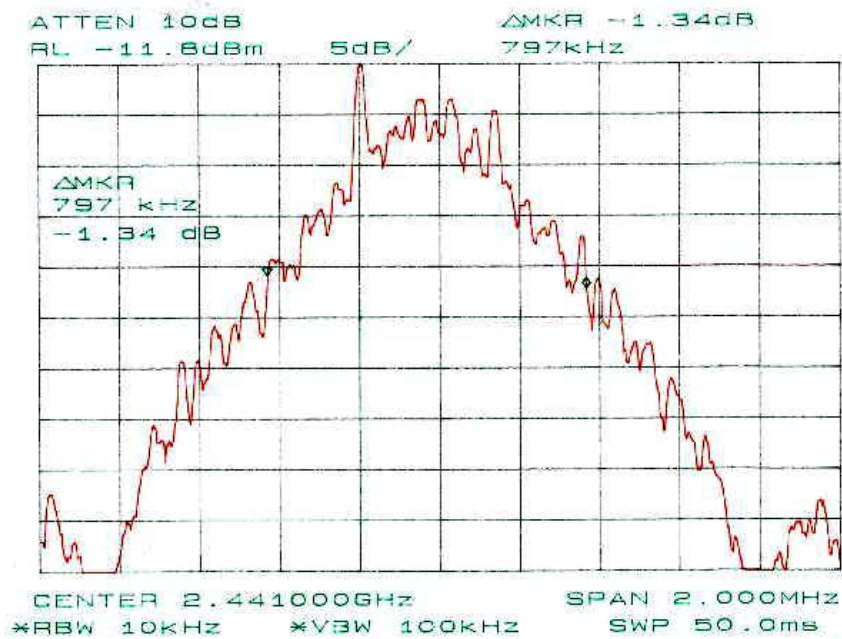
Temperature 22°C Humidity 42%

[Tested Date / Tester]

13 February 2002

Signature


Ikuya Minematsu

figure 13 20dB Bandwidth $f_c = 2402$ MHzfigure 14 20dB Bandwidth $f_c = 2441$ MHz

- Continued -



figure 15 20dB Bandwidth $f_c = 2480$ MHz

8. PEAK OUTPUT POWER MEASUREMENT (§ 15.247 (b) (1))

8.1. Test Procedure

- | | |
|-----|---|
| (1) | Connect the EUT RF output port to spectrum analyzer via calibrated coaxial cable and suitable attenuator (if necessary). |
| (2) | Activates the EUT System and executes the software prepared for test, if necessary. |
| (3) | To find out the worst case, the transmitting data rate of EUT is varied with the different modes of operation. The final test condition is recorded in this report. |
| (4) | The spectrums are scanned and allow the trace to stabilize. |
| (5) | The peak output power was determined by using the marker-data function of spectrum analyzer (*1). |

[Note]

(*1) Spectrum Analyzer Set Up Conditions

Frequency Span	: 20 dB bandwidth of the emission being measured
Resolution bandwidth	: 1 MHz
Video bandwidth	: $\geq$ RBW
Sweep	: Auto
Detector function	: Peak
Trace Mode	: Max Hold

8.2. Test Results

Measured Frequency	Correction Factor	Meter Reading	Peak Output Power	Limits	Margin for Limit
[MHz]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
2402.00	11.7	-9.1	2.6	30.0	27.4
2441.00	11.8	-9.4	2.4	30.0	27.6
2480.00	11.8	-8.2	3.6	30.0	26.4

[Note]

(1) Correction Factor includes the both loss of attenuator and cable used in the measurement.

(2) See next page figure 16, 17 and 18.

[Calculation method]

Peak Output Power (dBm) = Meter Reading (dBm) + Correction Factor (dB)

[Test Condition]

EUT operation : Data transmission, DH5 packet

EUT channel : 2, 40, 80 (2402, 2441, 2480 MHz)

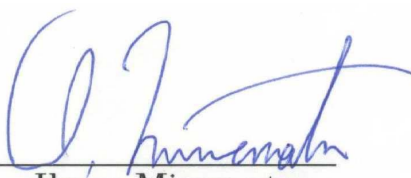
[Environment]

Temperature 22°C Humidity 42%

[Tested Date / Tester]

13 February 2002

Signature


Ikuya Minematsu

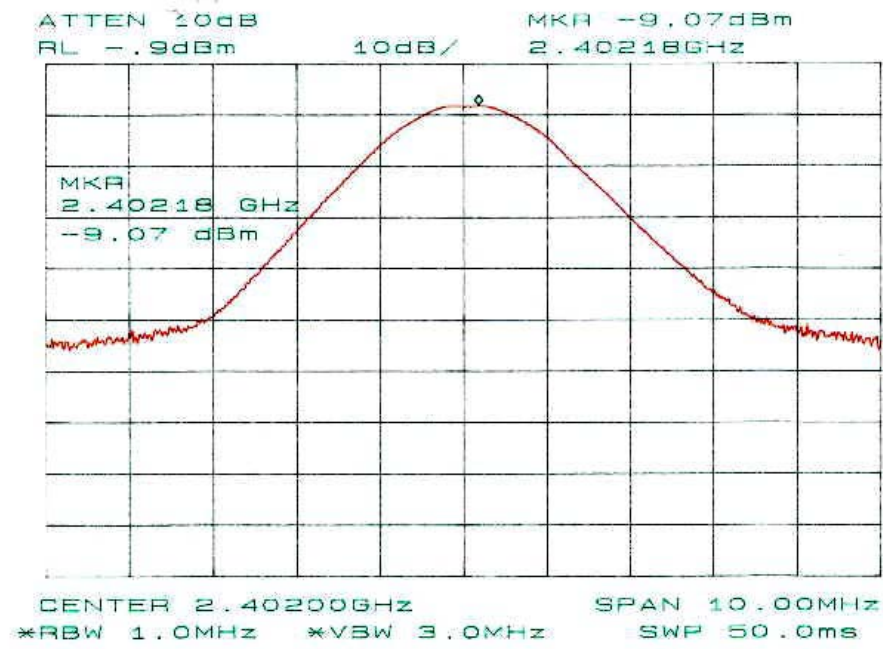


figure 16 2402 MHz (channel 2)

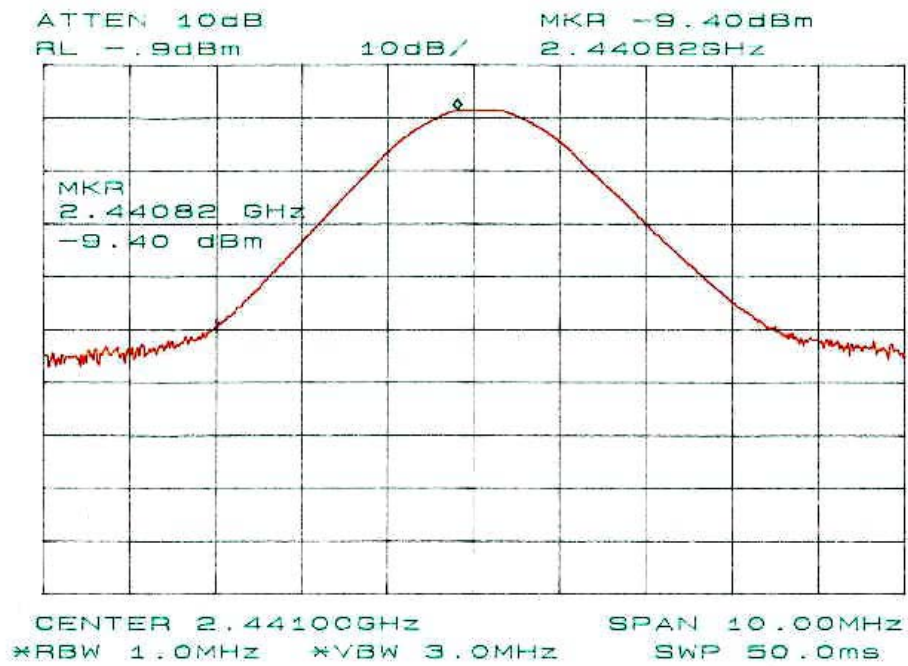


figure 17 2441 MHz (channel 40)

- Continued -

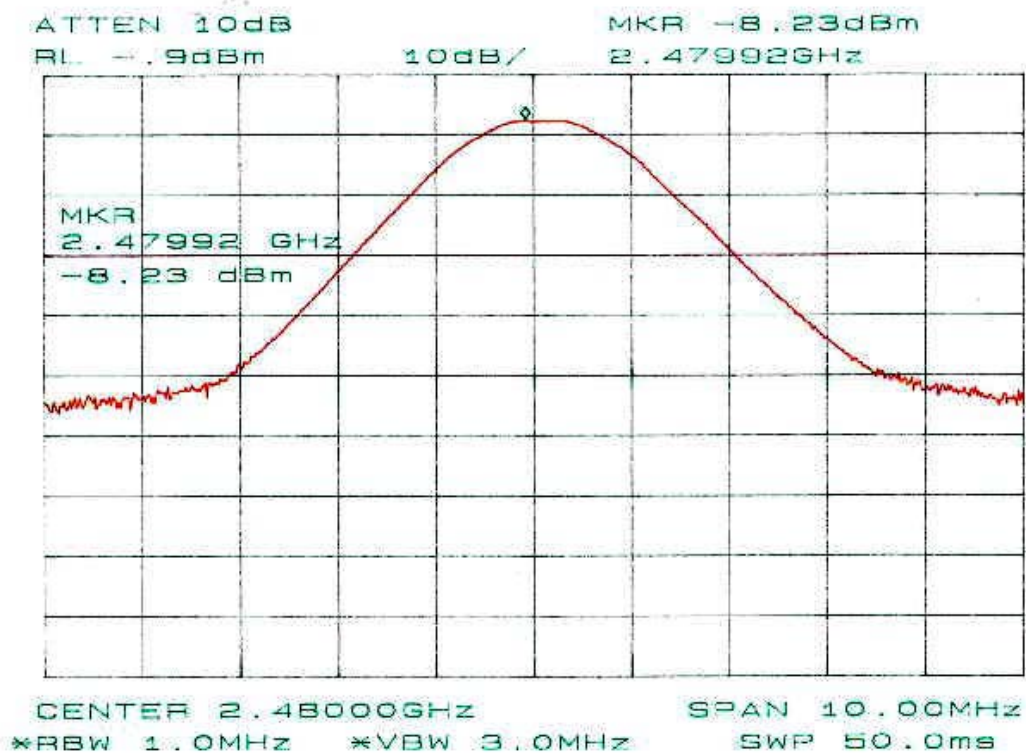


figure 18 2480 MHz (channel 80)

9. BAND EDGE RF CONDUCTED EMISSION MEASUREMENT (§ 15.247 (c))

9.1. Test Procedure

- | | |
|-----|---|
| (1) | Connect the EUT RF output port to the spectrum analyzer via calibrated coaxial cable and suitable attenuator (if necessary). |
| (2) | Activates the EUT System and executes the software prepared for test, if necessary. |
| (3) | To find out the maximum emission condition, the transmitting data rate of EUT is set to maximum data rate. |
| (4) | The spectrum are scanned. |
| (5) | The emission at the band edge or the highest modulation product outside of band were measured by using the marker function of spectrum analyzer (*1). |
| (6) | The peak of the in-band emission were measured by using the marker to peak function of spectrum analyzer. |
| (7) | Above measurement were repeated at other side band edge. |

[Note]

(*1) Spectrum Analyzer Set Up Conditions

Frequency Span	: Wide enough to capture the peak level of emission on the closest to the band edge
Resolution bandwidth	: 100 kHz
Video bandwidth	: $\geq$ RBW
Sweep	: Auto
Detector function	: Peak
Trace Mode	: Max Hold

9.2. Test Results

Measured Frequency	Limits	Results
[MHz]	[dBc]	[dBc]
2402	-20	<-30
2480	-20	<-30

[Note] See next page figure 19, 20.	
[Calculation method] Deviation From Carrier (dBc) = Spurious RF Emission (dBm) – Peak Output Power (dBm)	
[Test Condition] EUT operation : Data transmission, DH5 packet EUT channel : Hopping	

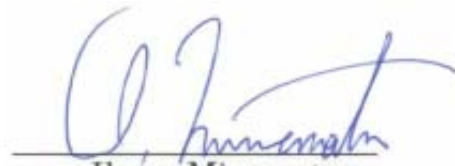
[Environment]

Temperature 22°C Humidity 42%

[Tested Date / Tester]

13 February 2002

Signature



Ikuya Minematsu

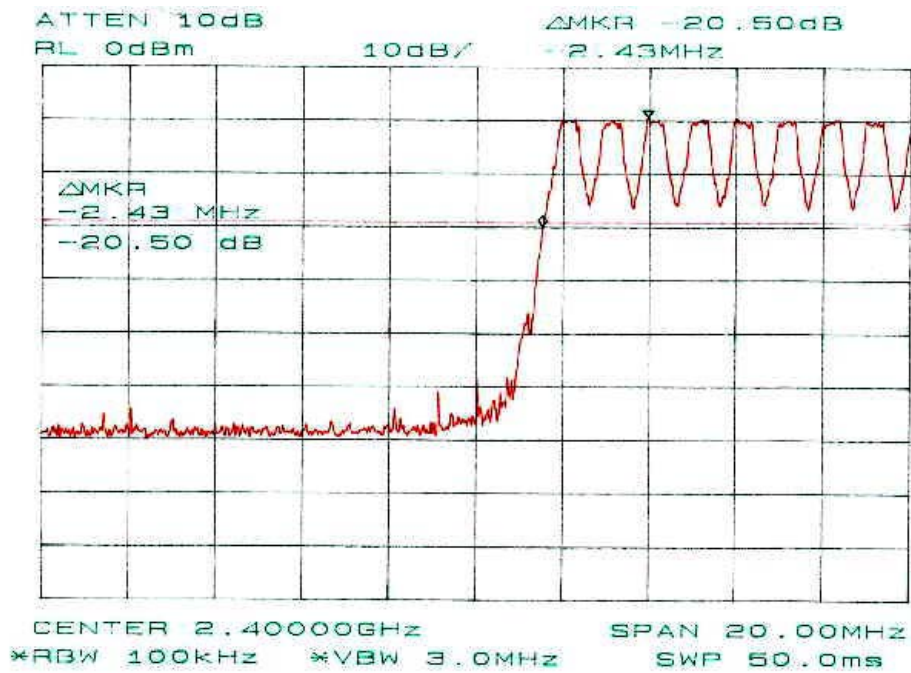


figure 19 Band Edge Low frequency side

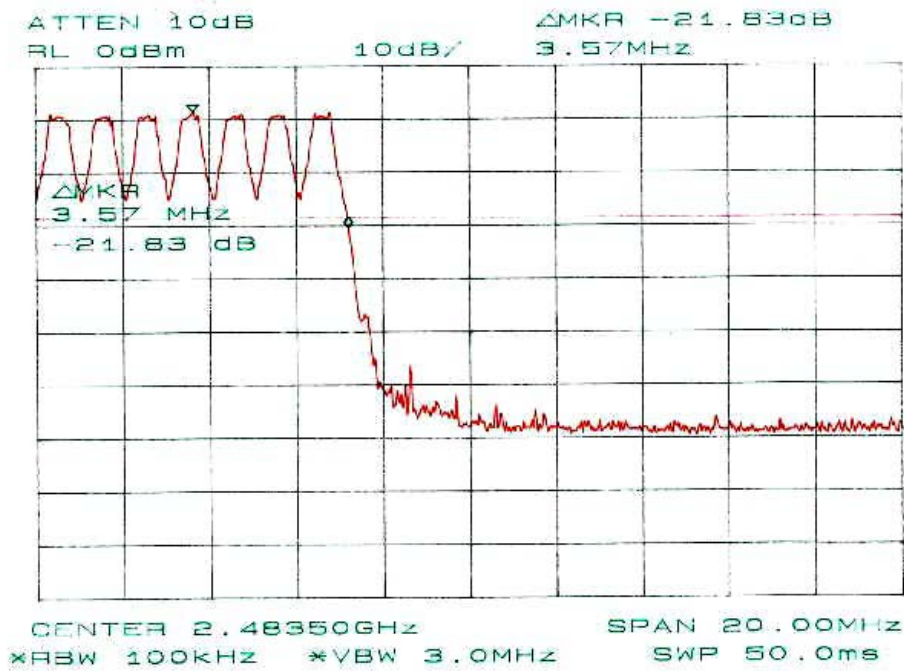


figure 20 Band Edge High frequency side

10. SPURIOUS RF CONDUCTED EMISSION MEASUREMENT (§ 15.247 (c))

10.1. Test Procedure

- | | |
|-----|--|
| (1) | Connect the EUT RF output port to the spectrum analyzer via calibrated coaxial cable and suitable attenuator (if necessary). |
| (2) | Activates the EUT System and executes the software prepared for test, if necessary. |
| (3) | The Spectrums are scanned from the lowest generated frequency of EUT up to the 10th harmonics by using the spectrum analyzer (*1). |

[Note]

- | | | |
|------|-------------------------------------|-----------------|
| (*1) | Spectrum Analyzer Set Up Conditions | |
| | Resolution bandwidth | : 100 kHz |
| | Video bandwidth | : $\geq$ RBW |
| | Sweep | : Auto |
| | Detector function | : Peak detector |
| | Trance | : Max Hold |

10.2. Test Results

Measured Frequency [MHz]	Correction Factor (*) [dB]	Meter Reading [dBm]	Spurious RF Emission [dBm]	Peak Output Power [dBm]	Deviation From Carrier [dBc]	Limits [dBc]	Margin for Limit [dB]
[fc = 2402MHz Harmonics]							
3603.00	12.4	-60.4	-48.0	2.6	-50.6	-20.0	30.6
4804.00	14.3	-70.3	-56.0	2.6	-58.6	-20.0	38.6
[fc = 2441MHz Harmonics]							
3661.50	12.4	-61.6	-49.2	2.4	-51.6	-20.0	31.6
4882.00	14.4	-68.2	-53.8	2.4	-56.2	-20.0	36.2
[fc = 2480MHz Harmonics]							
3720.00	12.5	-62.9	-50.4	3.6	-54.0	-20.0	34.0
4960.00	14.4	-66.6	-52.2	3.6	-55.8	-20.0	35.8

[Note]

- (1) No other spurious emission found above noise level.
 (2) Correction factor includes both of a cable loss and attenuator loss.
 (3) See next page figure 21 to 23.

[Calculation method]

Spurious RF Emission (dBm) = Meter Reading (dBm) + Correction Factor (dB)

Deviation From Carrier (dBc) = Spurious RF Emission (dBm) – Peak Output Power (dBm)

[EUT Condition]

EUT operation : Data transmission, DH5 packet

EUT channel : 2, 40, 80 (2402, 2441, 2480 MHz)

[Environment]

Temperature 22°C

Humidity 42%

[Tested Date / Tester]

13 February 2002

Signature


 Ikuya Minematsu

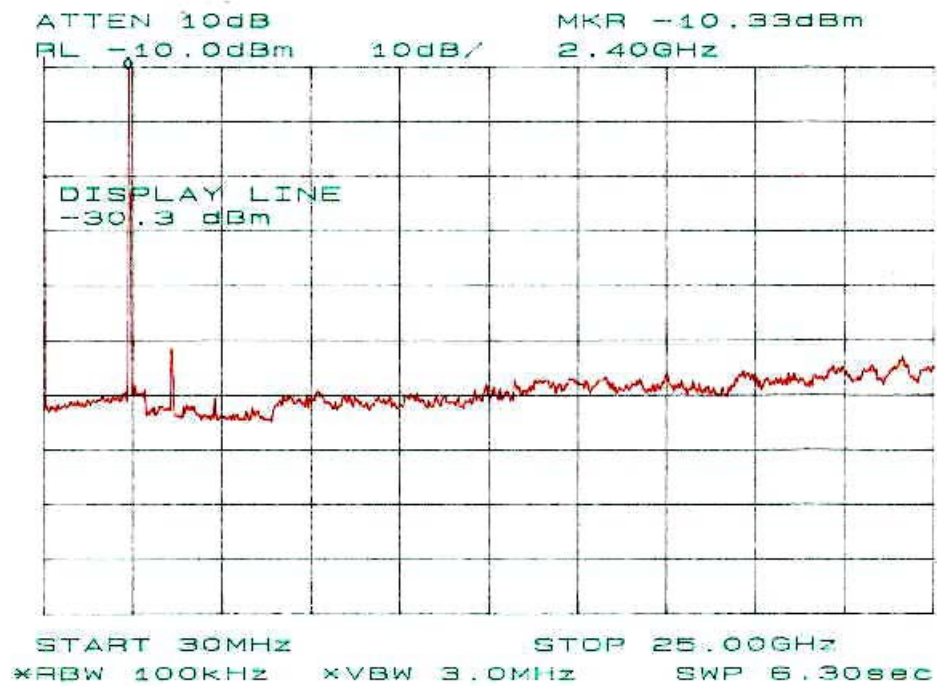


figure 21 Spurious RF conducted emission, Tx on 2402 MHz

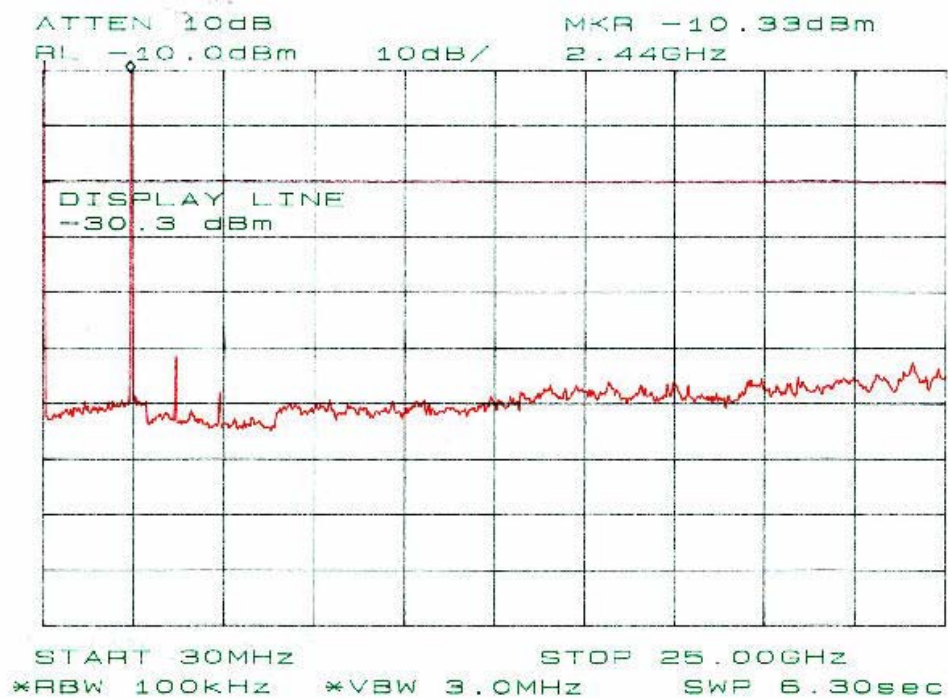


figure 22 Spurious RF conducted emission, Tx on 2441 MHz

- Continued -

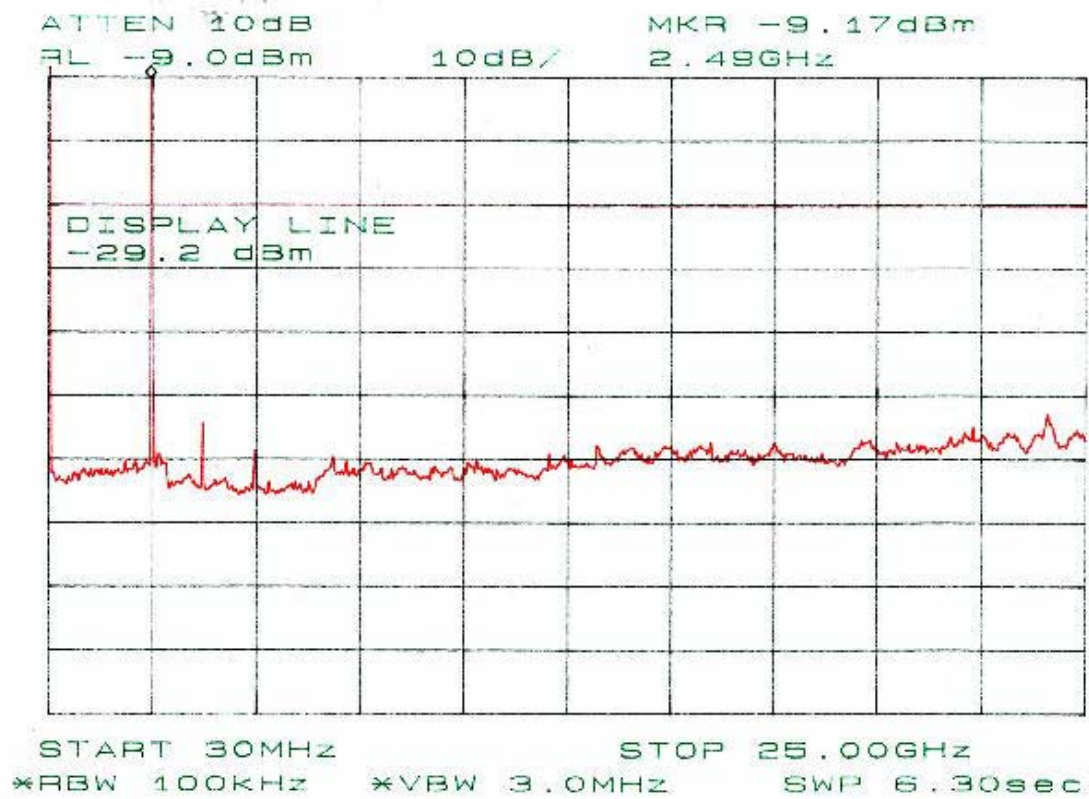


figure 23 Spurious RF conducted emission, Tx on 2480 MHz

11. PEAK POWER DENSITY MEASUREMENT (§ 15.247 (d))

11.1. Test procedure

(1)	Connect the EUT RF output port to spectrum analyzer via calibrated coaxial cable and suitable attenuator (if necessary).
(2)	Activates the EUT System and executes the software prepared for test, if necessary.
(3)	To find out the worst case, the transmitting data rate of EUT is varied with the different modes of operation. The final test condition is recorded in this report.
(4)	The spectrums are scanned and allow the trace to stabilize.
(5)	The peak output power was determined by using the marker-data function of spectrum analyzer (*1).
[Note]	
(*1)	Spectrum Analyzer Set Up Conditions
	Frequency Span : 2 MHz
	Resolution bandwidth : 3 kHz
	Video bandwidth : $\geq$ RBW
	Detector function : Peak
	Trace Mode : Max Hold

11.2. Test Results

Measured Frequency [MHz]	Correction Factor [dB]	Meter Reading [dBm]	Power Density [dBm]	Limits [dBm / RBW 3kHz]	Margin for Limit [dB]
2402.00	11.7	-19.1	-7.4	8.0	15.4
2441.00	11.8	-18.9	-7.1	8.0	15.1
2480.00	11.8	-17.9	-6.1	8.0	14.1

[Note]

- (1) Correction factor includes both of a cable loss and attenuator loss.
 (2) See next page figure 24 to 26.

[Calculation method]

Power Density [dBm/3kHz] = Meter Reading (dBm) + Correction Factor (dB)

[EUT Condition]

EUT operation : Data transmission, DH5 packet
 EUT channel : 2, 40, 80 (2402, 2441, 2480 MHz)

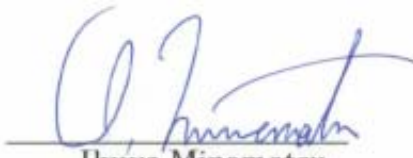
[Environment]

Temperature 22°C Humidity 42%

[Tested Date / Tester]

13 February 2002

Signature


 Ikuya Minematsu

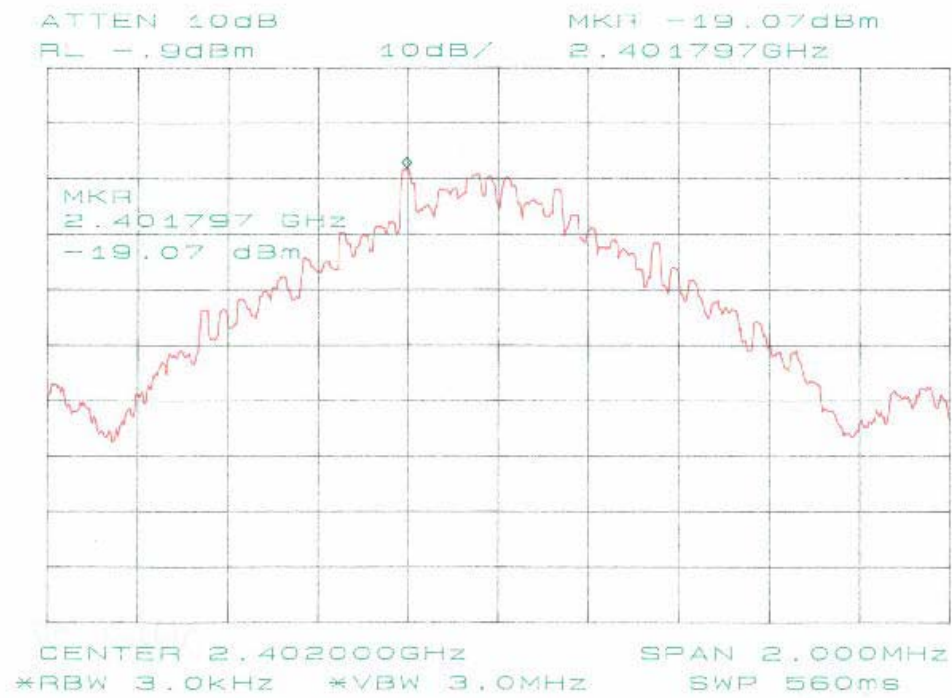


figure 24 Power Density, Tx on channel 2

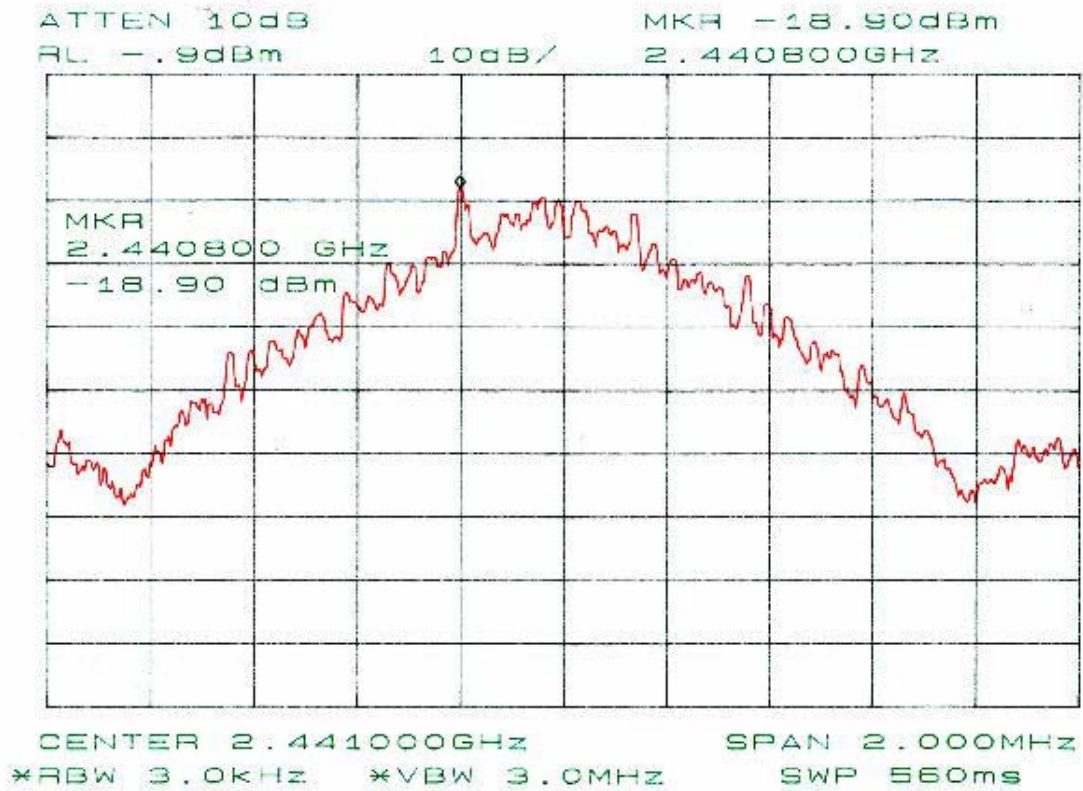


figure 25 Power Density, Tx on channel 20

- Continued -

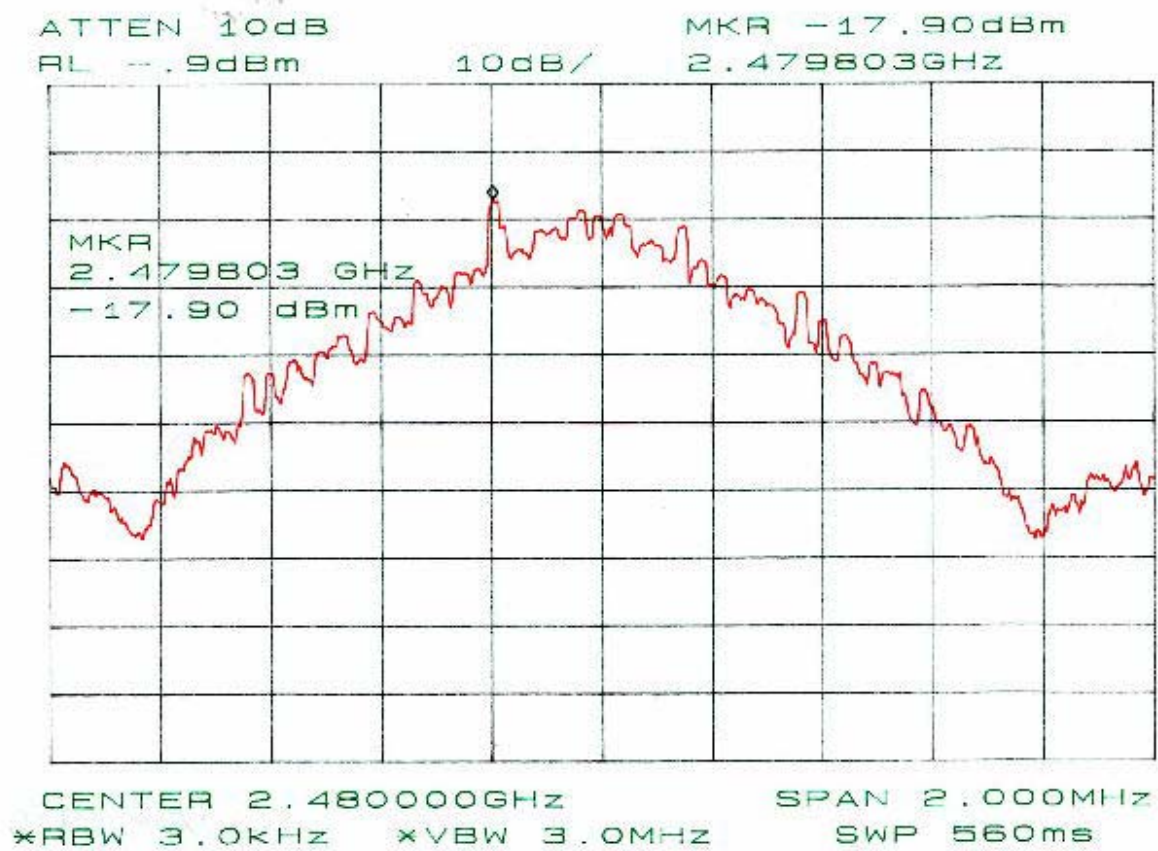


figure 26 Power Density, Tx on channel 80

12. RADIATED EMISSION MEASUREMENT (§ 15.247 (c)), (§ 15.209 (a))

12.1. Test Procedure

(1)	Configure the EUT System in accordance with ANSI C63.4-1992 section 8 and 13. ☒ : without deviation, ☐ : with deviation(details are found below) See also the block diagram and the photographs of EUT System configuration in this report.
(2)	If the EUT system is connected to a public power network, all power cords for the EUT System are connected the receptacle on the turntable.
(3)	Warm up the EUT System.
(4)	Activate the EUT System and run the prepared software for the test, if necessary.
(5)	To find out the emissions of the EUT System, preliminary radiated measurement are performed at a closer distance than that specified for final radiated measurement using the spectrum analyzer (*1) and the broad band antenna. In the frequency above 1 GHz, it is performed using the spectrum analyzer (*2) and the horn antenna.
(6)	To find out an EUT System condition, which produces the maximum emission, the configuration of EUT System, the position of the cables, and the operation mode, are changed under normal usage of the EUT.
(7)	The spectrums are scanned from 30 MHz to the upper frequency of measurement range, and collect the six highest emissions minimum on the spectrum analyzer relative to the limits in the whole range.
(8)	In final compliance test, the six highest emissions minimum, recorded above, are measured at the specified distance using the broad band antenna or the tuned dipole antenna and the test receiver (*3). In the frequency above 1 GHz, the measurements are performed by the horn antenna and ☐ the test receiver (*4). ☒ the spectrum analyzer(*5) with pre-amplifier.
[Note]	
(*1)	Spectrum Analyzer Set Up Conditions Frequency range : 30 - 1000 MHz Resolution bandwidth : 100 kHz Detector function : Peak mode
(*2)	Spectrum Analyzer Set Up Conditions Frequency range : 1 GHz - Upper frequency of measurement range Resolution bandwidth : 1 MHz Video bandwidth : 1 MHz Attenuator : 10 dB Detector function : Peak mode
(*3)	Test Receiver Set Up Conditions Detector function : Quasi-Peak or Peak IF bandwidth : 120 kHz
(*4)	Test Receiver Set Up Conditions Detector function : Average IF bandwidth : 1 MHz
(*5)	Spectrum Analyzer Set Up Conditions Frequency range : 1 GHz - Upper frequency of measurement range Resolution bandwidth : 1 MHz Video bandwidth : 1 MHz (peak detector), 10Hz (Average detector) Attenuator : 10 dB Detector function : Peak mode

12.2. Test Results

(1) In the frequency range : above 1 GHz

Measurement Distance ☒: 3m ☐: 10m

Fc = 2402 MHz Transmitting operation

Measured Frequency	Antenna Factor	Meter Reading		Maximum Field Strength	Limit	Margin for Limits
		Horizontal Polarization	Vertical Polarization			
[MHz]	[dB/m]	[dBuV]	[dBuV]	[dBuV/m]	[dBuV/m]	[dB]
[Peak Detector Measurement]						
2402	20.2	67.0	68.5	88.7	-	-
4804	-2.1	47.1	44.0	45.0	74.0	29.0
7206	-1.1	42.9	<38.0	41.8	74.0	32.2
9608	2.2	42.4	42.7	44.9	74.0	29.1
12010	6.5	<39.0	<39.0	<45.5	74.0	>28.5
14412	8.1	<40.0	<40.0	<48.1	74.0	>25.9
16814	9.6	<40.0	<40.0	<49.6	74.0	>24.4
19216	9.1	<40.0	<40.0	<49.1	74.0	>24.9
21618	10.6	<41.0	<41.0	<51.6	74.0	>22.4
24020	11.1	<42.0	<42.0	<53.1	74.0	>20.9
[Average Detector Measurement] (*1)						
4804	-2.1	39.8	35.0	37.7	54.0	16.3
7206	-1.1	30.9	<28.0	29.8	54.0	24.2
9608	2.2	29.8	30.9	33.1	54.0	20.9
12010	6.5	<28.0	<28.0	34.5	54.0	19.5
14412	8.1	<30.0	<30.0	<38.1	54.0	>15.9
16814	9.6	<30.0	<30.0	<39.6	54.0	>14.4
19216	9.1	<30.0	<30.0	<39.1	54.0	>14.9
21618	10.6	<31.0	<31.0	<41.6	54.0	>12.4
24020	11.1	<33.0	<33.0	<44.1	54.0	>9.9

[Remark]

(*1) : Spectrum analyzer setup condition.

Detector : Peak
RBW : 1MHz
VBW : 10Hz

- Continued -

Measurement Distance ☒: 3m ☐: 10m

Fc = 2441 MHz Transmitting operation

Measured Frequency	Antenna Factor	Meter Reading		Maximum Field Strength	Limit	Margin For Limits
		Horizontal Polarization	Vertical Polarization			
[MHz]	[dB/m]	[dBuV]	[dBuV]	[dBuV/m]	[dBuV/m]	[dB]
[Peak Detector Measurement]						
2441	20.2	66.8	68.5	88.7	-	-
4882	-2.1	47.1	44.2	45.0	74.0	29.0
7323	-0.9	42.3	<38.0	41.4	74.0	32.6
9764	2.4	<40.0	<40.0	<42.4	74.0	>31.6
12205	6.8	<40.0	<40.0	<46.8	74.0	>27.2
14646	8.3	<40.0	<40.0	<48.3	74.0	>25.7
17087	10.0	<40.0	<40.0	<50.0	74.0	>24.0
19528	8.1	<40.0	<40.0	<48.1	74.0	>25.9
21969	10.6	<41.0	<41.0	<51.6	74.0	>22.4
24410	11.0	<42.0	<42.0	<53.0	74.0	>21.0
[Average Detector Measurement] (*1)						
4882	-2.1	39.9	35.1	37.8	54.0	16.2
7323	-0.9	30.6	<28.0	29.7	54.0	24.3
9764	2.4	<29.0	<29.0	<31.4	54.0	>22.6
12205	6.8	<30.0	<30.0	<36.8	54.0	>17.2
14646	8.3	<30.0	<30.0	<38.3	54.0	>15.7
17087	10.0	<30.0	<30.0	<40.0	54.0	>14.0
19528	8.1	<30.0	<30.0	<38.1	54.0	>15.9
21969	10.6	<31.0	<31.0	<41.6	54.0	>12.4
24410	11.0	<33.0	<33.0	<44.0	54.0	>10.0

[Remark]

(*1) : Spectrum analyzer setup condition.

Detector : Peak
 RBW : 1MHz
 VBW : 10Hz

- Continued -

Measurement Distance ☒: 3m ☐: 10m

Fc = 2480 MHz Transmitting operation

Measured Frequency	Antenna Factor	Meter Reading		Maximum Field Strength	Limit	Margin for Limits
		Horizontal Polarization	Vertical Polarization			
[MHz]	[dB/m]	[dBuV]	[dBuV]	[dBuV/m]	[dBuV/m]	[dB]
[Peak Detector Measurement]						
2480	20.3	67.9	68.6	88.2	-	-
4960	-2.1	48.4	45.0	46.3	74.0	27.7
7440	-0.8	42.8	41.0	42.0	74.0	32.0
9920	2.6	<40.0	<40.0	42.6	74.0	>31.4
12400	7.0	<39.0	<39.0	<46.0	74.0	>28.0
14880	8.3	<41.0	<41.0	<49.3	74.0	>24.7
17360	10.1	<42.0	<42.0	<52.1	74.0	>21.9
19840	9.2	<40.0	<40.0	<49.2	74.0	>24.8
22320	10.2	<41.0	<41.0	<51.2	74.0	>22.8
24800	11.0	<42.0	<42.0	<53.0	74.0	>21.0
[Average Detector Measurement] (*1)						
4960	-2.1	41.3	36.1	39.2	54.0	14.8
7440	-0.8	32.1	30.1	31.3	54.0	22.7
9920	2.6	<29.0	<29.0	<31.6	54.0	>22.4
12400	7.0	<29.0	<29.0	<36.0	54.0	>18.0
14880	8.3	<30.0	<30.0	<38.3	54.0	>15.7
17360	10.1	<30.0	<30.0	<40.1	54.0	>13.9
19840	9.2	<30.0	<30.0	<39.2	54.0	>14.8
22320	10.2	<31.0	<31.0	<41.2	54.0	>12.8
24800	11.0	<32.0	<32.0	<43.0	54.0	>11.0

[Remark]

(*1) : Spectrum analyzer setup condition.

Detector : Peak
 RBW : 1MHz
 VBW : 10Hz

- Continued -

(1) In the frequency range : 30 MHz to 1000 MHz (Quasi-peak measurement)

Transmitting and Receiving operation

Measurement Distance ☒: 3m ☐: 10m

Measured Frequency	Antenna Factor	Meter Reading		Maximum Field Strength	Limits	Margin for Limits
		Horizontal Polarization	Vertical Polarization			
(MHz)	(dB/m)	(dBuV)	(dBuV)	(dBuV/m)	(dBuV/m)	(dB)
162.01	18.4	11.5	14.2	32.6	43.5	10.9
243.03	21.4	20.0	14.2	41.4	46.0	4.6
270.02	22.6	17.1	15.8	39.7	46.0	6.3
386.97	21.7	18.2	11.5	39.9	46.0	6.1
393.27	21.9	19.2	13.1	41.1	46.0	4.9
413.98	22.5	16.2	11.0	38.7	46.0	7.3
477.07	23.8	11.0	3.6	34.8	46.0	11.2

[Note]

In the restricted band emission of 30MHz to 1000MHz, the spurious emission were compliance with FCC rule. See 15, 16 page test data in graph.

- Continued -

Measurement Distance ☒: 3m ☐: 10m

Other Emission Above 1GHz

Transmitting Operation

Measured Frequency	Antenna Factor	Meter Reading		Maximum Field Strength	Limit	Margin for Limits
		Horizontal Polarization	Vertical Polarization			
[MHz]	[dB/m]	[dBuV]	[dBuV]	[dBuV/m]	[dBuV/m]	[dB]
[Peak Detector Measurement]						
1201.00	-12.7	52.0	47.8	39.3	74.0	34.7
1220.50	-12.5	52.8	50.2	40.3	74.0	33.7
1240.00	-12.4	54.3	51.3	41.9	74.0	32.1
3603.00	-7.4	46.2	44.8	38.8	74.0	35.2
3661.50	-7.1	45.8	<40.0	38.7	74.0	35.3
3720.00	-6.9	47.2	45.3	40.3	74.0	33.7
[Average Detector Measurement]						
1201.00	-12.7	45.2	40.0	32.5	54.0	21.5
1220.50	-12.5	48.7	41.0	36.2	54.0	17.8
1240.00	-12.4	47.9	41.9	35.5	54.0	18.5
3603.00	-7.4	37.8	36.1	30.4	54.0	23.6
3661.50	-7.1	37.4	<31.0	30.3	54.0	23.7
3720.00	-6.9	38.1	36.3	31.2	54.0	22.8

- Continued -

Measurement Distance ☒: 3m ☐: 10m

Other Emission Above 1GHz

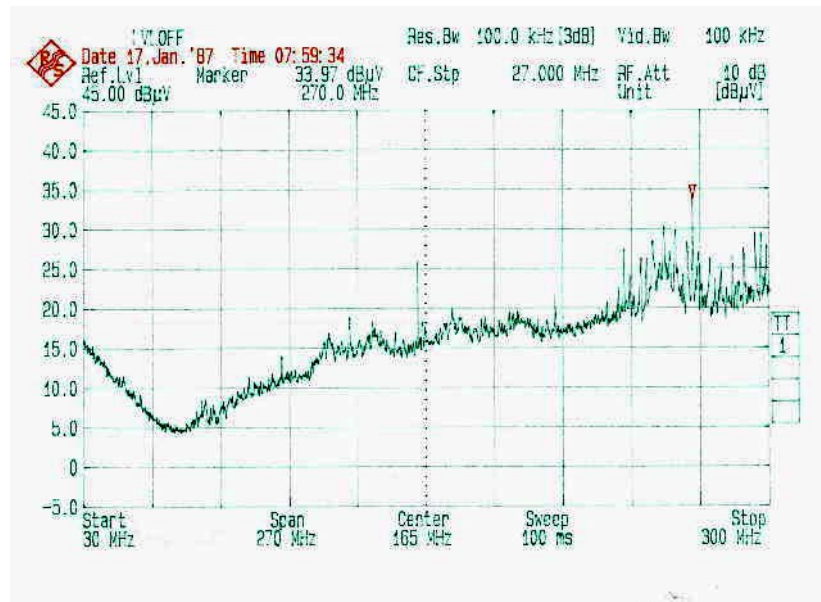
Receiving Operation

Measured Frequency	Antenna Factor	Meter Reading		Maximum Field Strength	Limit	Margin for Limits
		Horizontal Polarization	Vertical Polarization			
[MHz]	[dB/m]	[dBuV]	[dBuV]	[dBuV/m]	[dBuV/m]	[dB]
[Peak Detector Measurement]						
[Fundamental]						
2401.00	-9.5	44.8	43.1	35.3	74.0	38.7
2440.00	-9.6	44.3	45.5	35.9	74.0	38.1
2479.00	-9.5	45.0	45.9	36.4	74.0	37.6
[Harmonics]						
4802.00	-2.1	41.6	40.5	39.5	74.0	34.5
4880.00	-2.1	44.2	41.0	42.1	74.0	31.9
4958.00	-2.1	44.5	41.0	42.4	74.0	31.6
[Other Emission]						
1201.50	-12.7	51.3	47.0	38.6	74.0	35.4
1220.00	-12.5	52.4	49.3	39.9	74.0	34.1
1239.50	-12.4	52.8	48.3	40.4	74.0	33.6
[Average Detector Measurement]						
[Fundamental]						
2401.00	-9.5	33.2	32.0	23.7	54.0	30.3
2440.00	-9.6	32.8	33.8	24.2	54.0	29.8
2479.00	-9.5	33.0	34.0	24.5	54.0	29.5
[Harmonics]						
4802.00	-2.1	33.8	29.0	31.7	54.0	22.3
4880.00	-2.1	35.2	31.0	33.1	54.0	20.9
4958.00	-2.1	36.0	31.0	33.9	54.0	20.1
[Other Emission]						
1201.50	-12.7	47.2	39.5	34.5	54.0	19.5
1220.00	-12.5	47.6	40.0	35.1	54.0	18.9
1239.50	-12.4	48.8	39.8	36.4	54.0	17.6

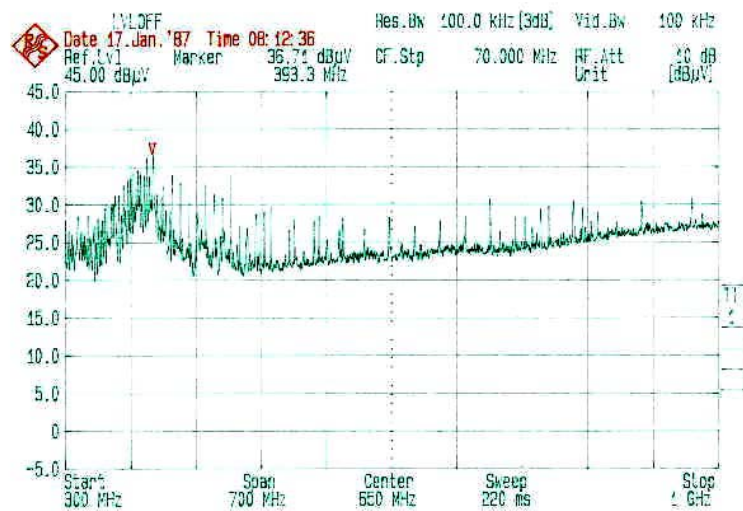
[Note]

The spurious above 2nd harmonics of receiving operation mode, were undetectable.

- (2) In frequency range : 30 MHz to 1000 MHz
 Test data in graph (Horizontal polarization)

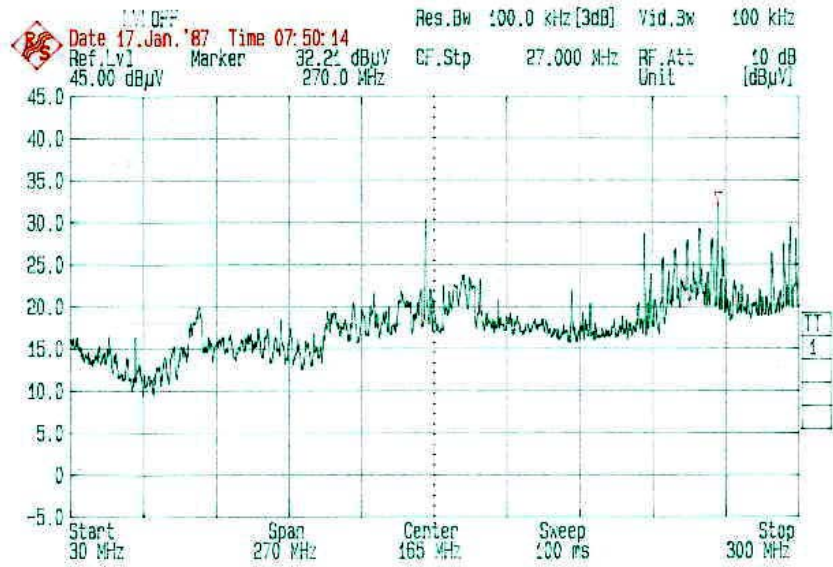


30 MHz to 300 MHz

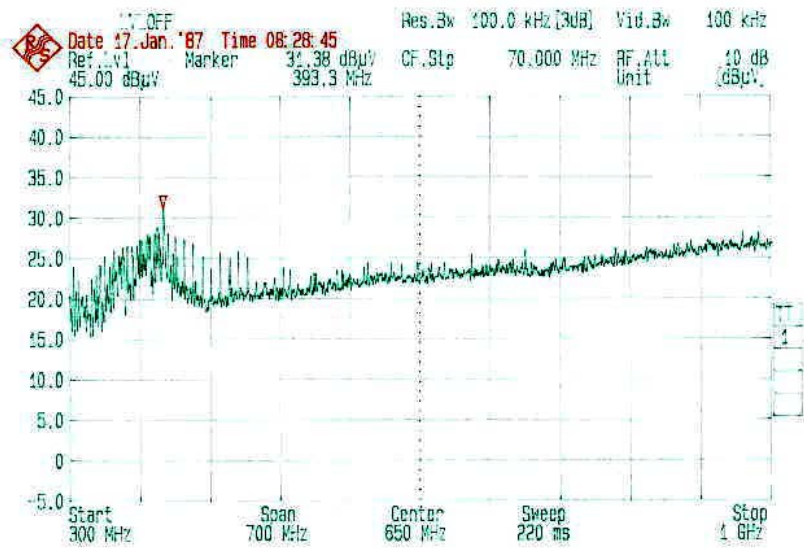


300 MHz to 1000 MHz

(2) In frequency range : 30 MHz to 1000 MHz
Test data in graph (Vertical polarization)



30 MHz – 300 MHz



300 MHz to 1000 MHz

(3) In the frequency range : above 1 GHz (Restricted Bands)

Measurement Distance ☒: 3m ☐: 10m

Restricted Band Above 1GHz

Transmitting Operation (Maximum Power output mode) and Receiving Operation

Measured Frequency	Antenna Factor	Meter Reading		Maximum Field Strength	Limit	Margin for Limits
		Horizontal Polarization	Vertical Polarization			
[MHz]	[dB/m]	[dBuV]	[dBuV]	[dBuV/m]	[dBuV/m]	[dB]
[Average Detector Measurement]						
1000.00	-13.5	<35.0	<35.0	<21.5	54.0	>32.5
1201.00	-13.0	45.2	40.0	32.2	54.0	21.8
1220.50	-13.0	48.7	41.0	35.7	54.0	18.3
1240.00	-12.9	47.9	41.9	35.0	54.0	19.0
1300.00	-12.5	<37.0	<37.0	<24.5	54.0	>29.5
1427.00	-12.1	<37.0	<37.0	<24.9	54.0	>29.1
1435.00	-12.1	<37.0	<37.0	<24.9	54.0	>29.1
1626.50	-12.2	<37.0	<37.0	<24.8	54.0	>29.2
1645.50	-12.1	<37.0	<37.0	<24.9	54.0	>29.1
1646.50	-12.1	<37.0	<37.0	<24.9	54.0	>29.1
1660.00	-12.0	<37.0	<37.0	<25.0	54.0	>29.0
1710.00	-11.5	<37.0	<37.0	<25.5	54.0	>28.5
1718.80	-11.5	<37.0	<37.0	<25.5	54.0	>28.5
1722.20	-11.5	<37.0	<37.0	<25.5	54.0	>28.5
2200.00	-0.7	<36.0	<36.0	<35.3	54.0	>18.7
2300.00	-0.5	<36.0	<36.0	<35.5	54.0	>18.5
2310.00	-0.4	<32.0	<32.0	<31.6	54.0	>22.4
(*) 2390.00	-0.4	34.7	34.3	34.3	54.0	19.7
(*) 2483.50	-0.4	43.2	43.0	42.8	54.0	11.2
2500.00	-0.3	<33.0	<33.0	<32.7	54.0	>21.3
2655.00	0.1	<33.0	<33.0	<33.1	54.0	>20.9
2900.00	0.8	<33.0	<33.0	<33.8	54.0	>20.2
3260.00	-7.9	<35.0	<35.0	<27.1	54.0	>26.9
3267.00	-7.9	<35.0	<35.0	<27.1	54.0	>26.9

- Continued -

Measurement Distance ☒: 3m ☐: 10m

Restricted Band Above 1GHz

Measured Frequency	Antenna Factor	Meter Reading		Maximum Field Strength	Limit	Margin for Limits
		Horizontal Polarization	Vertical Polarization			
[MHz]	[dB/m]	[dBuV]	[dBuV]	[dBuV/m]	[dBuV/m]	[dB]
[Average Detector Measurement]						
3332.00	-7.6	<35.0	<35.0	<27.4	54.0	>26.6
3339.00	-7.6	<35.0	<35.0	<27.4	54.0	>26.6
3345.80	-7.6	<35.0	<35.0	<27.4	54.0	>26.6
3358.00	-7.6	<35.0	<35.0	<27.4	54.0	>26.6
3600.00	-7.5	<32.0	<32.0	<24.5	54.0	>29.5
3603.00	-7.4	37.8	36.1	30.4	54.0	23.6
3661.50	-7.1	37.4	<32.0	30.3	54.0	23.7
3720.00	-6.9	38.1	36.3	31.2	54.0	22.8
4400.00	-2.5	<32.0	<32.0	<29.5	54.0	>24.5
4500.00	-2.6	<32.0	<32.0	<29.4	54.0	>24.6
4804.00	-2.1	39.8	35.0	37.7	54.0	16.3
4882.00	-2.1	39.9	35.1	37.8	54.0	16.2
4960.00	-2.0	41.3	36.1	39.3	54.0	14.7
5150.00	-1.7	<32.0	<32.0	<30.3	54.0	>23.7
5350.00	-1.3	<32.0	<32.0	<30.7	54.0	>23.3
5460.00	-1.2	<32.0	<32.0	<30.8	54.0	>23.2
7250.00	-1.5	<28.0	<28.0	<26.5	54.0	>27.5
7323.00	-1.5	30.6	<28.0	29.1	54.0	24.9
7440.00	-1.5	32.1	30.1	30.6	54.0	23.4
7750.00	-1.2	<28.0	<28.0	<26.8	54.0	>27.2
8025.00	-1.0	<32.0	<32.0	<31.0	54.0	>23.0
8500.00	1.3	<32.0	<32.0	<33.3	54.0	>20.7
9000.00	1.8	<30.0	<30.0	<31.8	54.0	>22.2
9200.00	1.9	<30.0	<30.0	<31.9	54.0	>22.1
9300.00	1.9	<29.0	<29.0	<30.9	54.0	>23.1
9500.00	2.1	<29.0	<29.0	<31.1	54.0	>22.9
10600.00	3.4	<28.0	<28.0	<31.4	54.0	>22.6
12010.00	5.3	<28.0	<28.0	<33.3	54.0	>20.7
12205.00	6.1	<29.0	<29.0	<35.1	54.0	>18.9
12400.00	6.1	<29.0	<29.0	<35.1	54.0	>18.9
12700.00	6.4	<29.0	<29.0	<35.4	54.0	>18.6
13250.00	7.3	<31.0	<31.0	<38.3	54.0	>15.7
13400.00	7.3	<31.0	<31.0	<38.3	54.0	>15.7

-Continued -

Measurement Distance ☒: 3m ☐: 10m

Restricted Band Above 1GHz

Measured Frequency	Antenna Factor	Meter Reading		Maximum Field Strength	Limit	Margin for Limits
		Horizontal Polarization	Vertical Polarization			
[MHz]	[dB/m]	[dBuV]	[dBuV]	[dBuV/m]	[dBuV/m]	[dB]
[Average Detector Measurement]						
14470.00	8.3	<29.0	<29.0	<37.3	54.0	>16.7
14412.00	8.3	<29.0	<29.0	<37.3	54.0	>16.7
14500.00	8.3	<30.0	<30.0	<38.3	54.0	>15.7
15350.00	8.2	<30.0	<30.0	<38.2	54.0	>15.8
16200.00	8.7	<30.0	<30.0	<38.7	54.0	>15.3
17700.00	11.1	<30.0	<30.0	<41.1	54.0	>12.9
19216.00	4.7	<30.0	<30.0	<34.7	54.0	>19.3
19528.00	4.7	<30.0	<30.0	<34.7	54.0	>19.3
19840.00	4.8	<30.0	<30.0	<34.8	54.0	>19.2
21400.00	4.7	<30.0	<30.0	<34.7	54.0	>19.3
22010.00	4.9	<31.0	<31.0	<35.9	54.0	>18.1
23120.00	5.2	<31.0	<31.0	<36.2	54.0	>17.8
23600.00	5.4	<32.0	<32.0	<37.4	54.0	>16.6
24000.00	5.4	<32.0	<32.0	<37.4	54.0	>16.6
[Band Edge Measurement](*)						
2439.00	-0.4	48.1	48.1	47.7	74.0	26.3
2483.50	-0.4	50.6	49.3	50.2	74.0	23.8

[Remark]

(*) : Spectrum analyzer setup condition.

Detector : Peak
 RBW : 1MHz
 VBW : 1MHz

- Continued -

[Note]

- (1) The measurement were performed both of transmitting operation and receiving operation.
- (2) Antenna Factor includes the cable loss.
- (3) Above 1GHz, antenna factor includes both of the cable loss and pre-amplifier gain.
- (4) In frequency range 1to 2GHz and 3 to 4GHz, the band eliminate filter (Cut off frequency 2.45GHz) was used.

[Calculation method at Peak detector]

Maximum Field Strength (dB μ V/m)

= Meter Reading (at maximum level of Horizontal or Vertical) (dB μ V) + Antenna Factor (dB/m)

[Environment]

Temperature: 21°C

Humidity: 35%

[Tested Date/ Tester]

6 February 2002

Signature



Ikuya Minematsu

13. AC POWER LINE CONDUCTED EMISSION MEASUREMENT (§ 15.207)

13.1. Test Procedure

- (1) Configure the EUT System in accordance with ANSI C63.4-1992 section 7.
☒: without deviation, ☐: with deviation(details are found below)
See also the block diagram and the photographs of EUT System configuration in this report.
- (2) Connect the EUT's AC power cord to one Line Impedance Stabilization Network (LISN).
- (3) Any other power cord of other equipment is connected to a LISN different from the LISN used for the EUT.
- (4) Warm up the EUT System.
- (5) Activate the EUT System and run the software prepared for the test, if necessary.
- (6) Connect the spectrum analyzer (*1) to the measuring port of the LISN for the EUT, using a calibrated coaxial cable.
- (7) To find out an EUT System condition, which produces the maximum emission, the configuration of EUT System, the position of the cables, and the operation mode, are changed under normal usage of the EUT.
- (8) The spectrums are scanned from 450 kHz to 30 MHz and collect the six highest emissions minimum on the spectrum analyzer relative to the limits in the whole range.
- (9) The test receiver (*2) is connected to the LISN for the EUT, and the six highest emissions minimum recorded above are measured.

[Note]

- (*1) Spectrum Analyzer Set Up Conditions
- | | |
|----------------------|--------------------|
| Frequency range | : 450 kHz - 30 MHz |
| Resolution bandwidth | : 10 kHz |
| Video bandwidth | : 1 MHz |
| Detector function | : Peak mode |
- (*2) Test Receiver Set Up Conditions
- | | |
|-------------------|--------------------------------------|
| Detector function | : Quasi-Peak/ Average (if necessary) |
| IF bandwidth | : 10 kHz |

13.2. Test Results

Maximum Operation modes

Measured Frequency (MHz)	LISN Factor (dB)	Meter Reading		Maximum RF Voltage (dBuV)	Limits (dBuV)	Margin for Limits (dB)
		Va (dBuV)	Vb (dBuV)			
0.493	0.2	39.5	39.6	39.8	48.0	8.2
11.223	0.6	41.7	42.0	42.6	48.0	5.4
11.355	0.6	41.6	41.8	42.4	48.0	5.6
11.484	0.6	41.8	42.1	42.7	48.0	5.3
11.877	0.6	41.1	41.8	42.4	48.0	5.6
12.137	0.6	41.0	41.5	42.1	48.0	5.9
12.660	0.6	40.3	41.1	41.7	48.0	6.3

[Calculation method]

Maximum RF Voltage (dBuV)

= Meter Reading (at maximum level of Va or Vb) + LISN Factor (dB)

[Note]

(1) LISN Correction Factor includes the cable loss.

(2) If the measurement value with the quasi-peak detector meets the average limits, the measurement with the average detector is omitted.

[EUT Condition]

EUT operation : Data transmission, DH5 packet and Receiving

EUT channel : 2, 40, 80 (2402, 2441, 2480MHz)

[Environment]

Temperature: 21°C

Humidity: 35%

[Tested Date/ Tester]

7 February 2002

Signature



Ikuya Minematsu

14. USED TEST EQUIPMENTS AND CALIBRATION STATUS

Equipment	Manufacturer	Model No.	Specifications	KEC Control No.	Test Item (*)	Last Cal.	Next Cal.
Spectrum Analyzer	Agilent Technologies	8564E	Frequency Range 100Hz – 40GHz	SA-39	1,2,3,4,5, 6,7,8,9	2001/2	2002/2
	Rhode & Schwarz	FSA	Frequency Range 100Hz – 1.8GHz	SA-35	9	2001/3	2002/3
	Hewlett Packard	8568B	Frequency Range 100Hz – 1.5GHz	FS-46-3	10	2001/5	2002/5
Test Receiver	Rhode & Schwarz	ESHS10	Frequency Range 9kHz – 30 MHz	FS-83	10	2001/3	2002/3
		ESVS10	Frequency Range 20 MHz–1.0 GHz	FS-60	9	2001/6	2002/6
Pre-Amplifier	Hewlett Packard	8449B	Frequency Range 1GHz-26.5GHz Typ. Gain 30 dB	AM-52	9	2001/2	2002/2
	Anritsu	MH648A	Frequency Range 0.1MHz-1.3GHz Typ. Gain 30 dB	AM-41	9	2001/6	2002/6
Biconical Antenna	Schwarzbeck	VHA9103	Frequency Range 30MHz-300MHz	AN-180	9	2001/2	2002/2
Log Periodic Dipole Array Antenna	Schwarzbeck	UHAL9108A	Frequency Range 300MHz-1 GHz	AN-215	9	2001/2	2002/2
LISN	Kyoritsu	KNW407	Frequency Range 150kHz-30MHz	FL-106	10	2001/4	2002/4
		KNW242	Frequency Range 10kHz-30MHz	FL-110	N/A	2001/4	2002/4
Tuned Dipole Antenna	Kyoritsu	KBA-511AS	Frequency Range 25MHz-500MHz	AN-135	N/A	2001/3	2002/3
		KBA-611S	Frequency Range 500MHz-1GHz	AN-137	N/A	2001/3	2002/3
Standard Gain Horn Antenna	Raven	91888-2	Frequency Range 1GHz – 2GHz	AN-167	9	2001/4	2002/4
		91889-2	Frequency Range 2GHz – 5GHz	AN-168	9	2001/4	2002/4
	Scientific Atlanta	12-3.9	Frequency Range 3.95-5.85GHz	AN-231	9	2001/8	2002/8
		12-5.8	Frequency Range 5.85-8.2GHz	AN-143	9	2001/8	2002/8
		12-8.2	Frequency Range 8.2-12.4GHz	AN-144	9	2001/8	2002/8
		12-12.0	Frequency Range 12.4-18GHz	AN-105	9	2001/8	2002/8
		12-18.0	Frequency Range 18GHz – 26.5GHz	AN-107	9	2000/3	2002/3

- Continued -

Equipment	Manufacturer	Model No.	Specifications	KEC Control No.	Test Item (*)	Last Cal.	Next Cal.
Power Meter	Rhode & Schwarz	NRVD	Frequency Range DC – 18GHz	VV-38	N/A	2001/3	2002/3
Thermal Power Sensor	Rhode & Schwarz	NRV-Z51	Frequency Range 10MHz – 18GHz 1uW to 100mW	VV-38-1	N/A	2001/3	2002/3
Precision Attenuator	Hewlett Packard	HP33340C010	Frequency Range DC – 26.5GHz typ. 10dB	AT-40-3	1,2,3,4,5, 6,7,8,9	2002/1	2003/1
		HP33340C020	Frequency Range DC – 26.5GHz typ. 6dB	AT-40-2	N/A	2002/1	2003/1
Band Eliminate Filter	MICRO-TRONICS	BRM12294	Fc=2440MHz Typ. 70dB reduce	FL-174	9	2002/2	2003/2
Low Temperature Chamber	TABAI	MC-710	Temperature -75°C - 100°C	CH-31	N/A	2001/8	2002/8
Coaxial Cable	SUHNER	SUCOFLEX	Length : 10m (SMA type)	CL-45	9	2001/2	2002/2
			Length : 1m (SMA type)	CL-42	9	2001/2	2002/2
			Length : 10m (SMA type)	CL-46	N/A	2001/2	2002/2
			Length : 1.5m (3.5mm type)	CL-620	N/A	2001/8	2002/8
			Length : 2.5m (3.5mm type)	CL-621	9	2001/6	2002/6
			Length : 0.3m (3.5mm type)	CL-619	1,2,3,4,5, 6,7,8,9	2001/6	2002/6

[Note]

Test Item (*):

- 1 : Carrier Frequency Separation Measurement
- 2 : Number of Hopping Frequencies Measurement
- 3 : Time of Occupancy Measurement
- 4 : 20 dB Bandwidth Measurement
- 5 : Peak Output Power Measurement
- 6 : Band Edge Measurement
- 7 : Spurious RF Conducted Emission Measurement
- 8 : Power Density Measurement
- 9 : Radiated Emission Measurement
- 10 : AC Power Line Conducted Emission Measurement
- N/A : Not Applicable.

The overall program of calibration and verification of equipment is designed and operated so as to ensure that measurements made by KEC are traceable to national standards of measurement or equivalent abroad.