KANSAI ELECTRONIC INDUSTRY DEVELOPMENT CENTER

HEAD OFFICE
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KITA-KU OSAKA 530-0047 JAPAN

IKOMA TESTING LABORATORY
12128 TAKAYAMA-CHO
IKOMA-CITY NARA 630-0101 JAPAN

Corporate Juridical Person

TEST REPORT

Report No.K-003-04-C, K-016-04-B Date: 31 December 2004

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.
Low Power License - Exempt Radio communication Devices (RSS-210 issue5:2001, Amendment: 2002).

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 : Intelligent Systems Co., Ltd.

Mailing Address : 60 Kamitakamatsu-cho, Fukuine, Higashiyama-ku, Kyoto-shi, Kyoto-fu, 605-0983 Japan

2. Identification of Tested Device

Type of Device : Direct Sequence Spread Spectrum Transmitter
Type of Modulation : ☐: FHSS ☒: DSSS ☐: Other method
FCC ID : SRX-ISNWIRE
IC : 5567A-ISNWIRE
Device Name : Module for the three DS Development Support Tool
Trade Name : —
Model Number : NTR EMU WIRELESS ADP
Serial Number : 04090309 version F1 ☐: Prototype ☒: Pre-production ☐: Production
Date of Manufacture : November 2004

3. Test Items and Procedure

☒: 6 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 – 2003
☒: without deviation, ☐: with deviation(details are found inside of this report)

4. Date of Test

Receipt of Test Sample : 25 November 2004
Condition of Test Sample : ☒: Damage is not found on the set.
☐: Damage is found on the set. (Details are described in this report)
Test Completed on : 20 December 2004

S. Izumi

Seiichi Izumi
General Manager/ Ikoma Testing Laboratory

Table of Contents

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 +/- 3×10^{-9} for 6dB Bandwidth 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.

This test report is to certify that the tested device properly complies with the requirements of RSS-210.

The measured result is below the specification limit by a margin less than the measurement uncertainty; it is not therefore possible to determine compliance at a level of confidence of 95%. However, the measured result indicates higher probability that the product tested complies with the specification limit.

2. GENERAL INFORMATION

2.1. Product Description

The Model No. : NTR EMU WIRELESS ADP (referred to as the EUT in this report) is a the module which performs DS wireless communication by radio, and only IS-NITRO-EMULATOR, IS-NITRO-CAPTURE, and IS-NITRO-VIDEO carry out.

(1) Technical Specifications

・Access type	: Direct Sequence Spread Spectrum Method
・Tx Frequency range	: 2412 MHz – 2462 MHz
・Rx Frequency range	: 2412 MHz – 2462 MHz
・SS Intermediated Frequency	: 315 MHz
・Output power	: 0.001W (typical)
・Antenna	: Built in antenna, Antenna Gain –1.3dBi Impedance 50Ω (Unbalanced)

(2) Used Oscillating Frequency

・FCX-04	: 22 MHz

(3) Provided Terminals

・ANT IN	: for wireless antenna
・AXN440430S	: for NTR EMU NITRO CPU

(4) Rated Power Supply : DC 2.8V(Internal Power)
The rated power is supplied from the host device.

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	:	2412 – 2462 MHz
(6) Upper Frequency of Radiated Emission Measurement Range	:	☐ 1000 MHz ☐ 2000 MHz ☐ 5000 MHz ☒ Tenth harmonics of the highest fundamental frequency

(1) Type of device	:	☒ Intentional Raidators
(2) Reference Rule and Specification	:	Industry Canada Radio Standards Specification – 210 Issue 5, Amendment:2002
(3) Kind of Equipment Category	:	☒ Category I ☐ Category II
(4) Procedure of Application	:	☒ Original Equipment ☐ Modification
(5) Highest Frequency used in the Device	:	2412 – 2462 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

Open Area Test Site	☐	No.1	☐	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 C63.4-2003. The KEC has been accredited by the NVLAP (Lab. Code: 200207-0) based on ISO/IEC 17025.
Also the laboratory has been authorized by TUV Product Service (GER) and TUV Rheinland (GER) based on their criteria for testing laboratory (ISO/IEC 17025).
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 compliance tests were preformed under test modes.

Op-mode 1 : Transmitting continuous data at 2412 MHz with modulation (1 M or 2 Mbps)
Op-mode 2 : Transmitting continuous data at 2437 MHz with modulation (1 M or 2 Mbps)
Op-mode 3 : Transmitting continuous data at 2462 MHz with modulation (1 M or 2 Mbps)
Op-mode 4 : Receiving (Tx standby)
Op-mode 5 : Wireless Communication mode

The EUT is designed both of a horizontally placed and vertically place. In radiated emission measurement, each condition was conducted.
As a result, the emission that produce the maximum operation modes were reported.

[Note]
(1) The worst case of 1 or 2 Mbps modes were tested and reported on the each tested Items.
(2) TUV Rheinland EMC Test Plan Ref. : 12601394A.

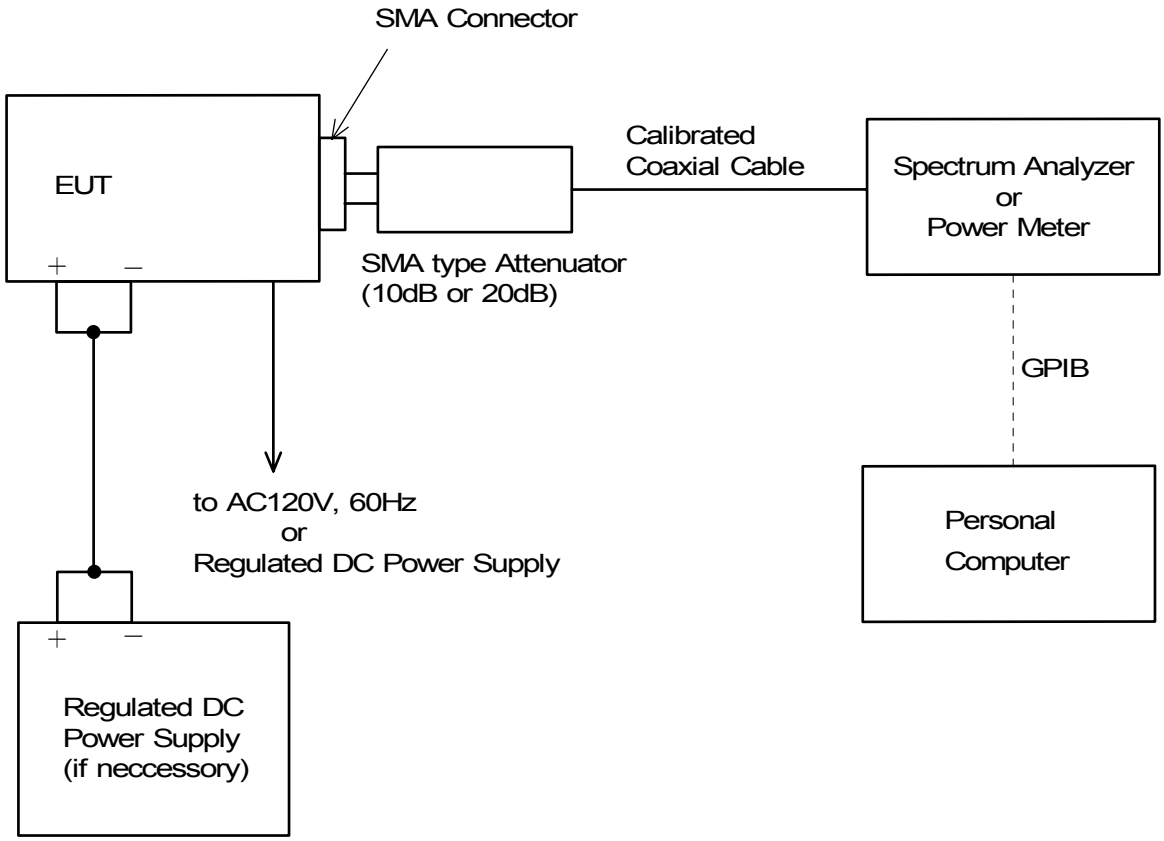
a) 20dB Bandwidth measurement	: Op-mode 1, Op-mode 2 and Op-mode 3
b) Peak Output Power measurement	: Op-mode 1 ,Op-mode 2 and Op-mode 3
c) Band Edge RF Conducted measurement	: Op-mode 1 and Op-mode 3
d) Spurious RF Conducted emission measurement	: Op-mode 1 ,Op-mode 2 and Op-mode 3
e) Power Density measurement	: Op-mode 1 ,Op-mode 2 and Op-mode 3
f) Radiated Emission measurement	: Op-mode 1 ,Op-mode 2, Op-mode 3 and Op-mode 4
g) AC Power Line Conducted Emission measurement	: Op-mode 4 and Op-mode 5

3.2. Characterization and condition of EUT System

☒ : normal, ☐ : not normal (that is)

3.3. Test Setup Diagram

- 6dB Bandwidth
- Peak Output Power
- Band Edge RF Conducted Emission
- Spurious RF Conducted Emission
- Peak Power Density



[Note]
Regulated DC Power Supply is not used in this report.

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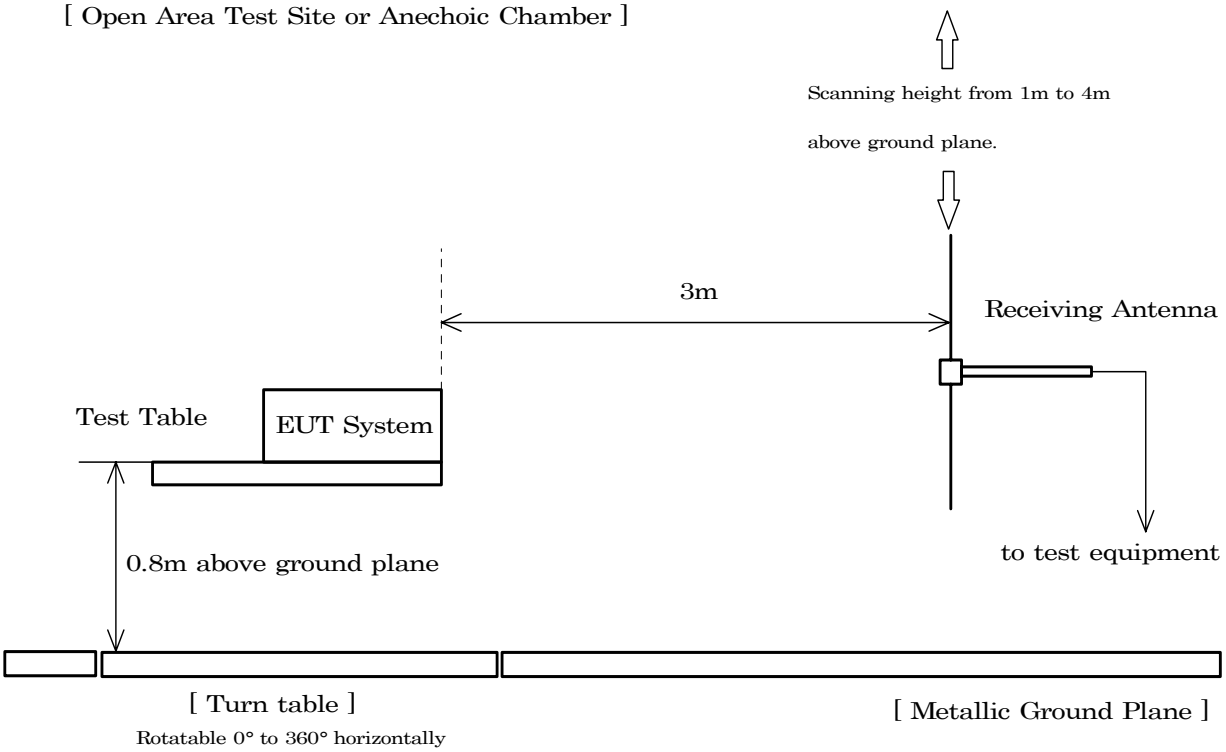
・Radiated Emission Measurement



[Note]

Test Table size	: 1.0m × 1.0m, Height 0.8m, Material : Expanded Polystyrene
Receiving Antenna	: Tuned dipole antenna, Biconical(30-300MHz) antenna or Logperiodic antenna (30-1000MHz) or Standard gain horn antenna (Above 1GHz) Scan from 1.0m to 4.0m above ground plane expect for vertical polarization the minimum height of center of antenna is increased so that the lowest point of the bottom of the antenna clears the ground surface by at least 25cm.
Interconnecting cables	: Excess part of the interconnecting cables longer than 1meter are bundled in the center. Cables that hang closer than 40cm to the ground plane is folded back and forth forming bundled 30 to 40 cm long, hanging approx, in the middle between the ground plane and table.
AC Power Cables	: All AC Power cord drape to the floor and are routed over the receptacle. In case of floor-Standing Equipment, Excess power cords are bundled in the center or shortened to appropriate length.
Floor-Standing Equipment	: EUT and all cables are insulated from the ground plane by 3mm to 12mm of insulating material

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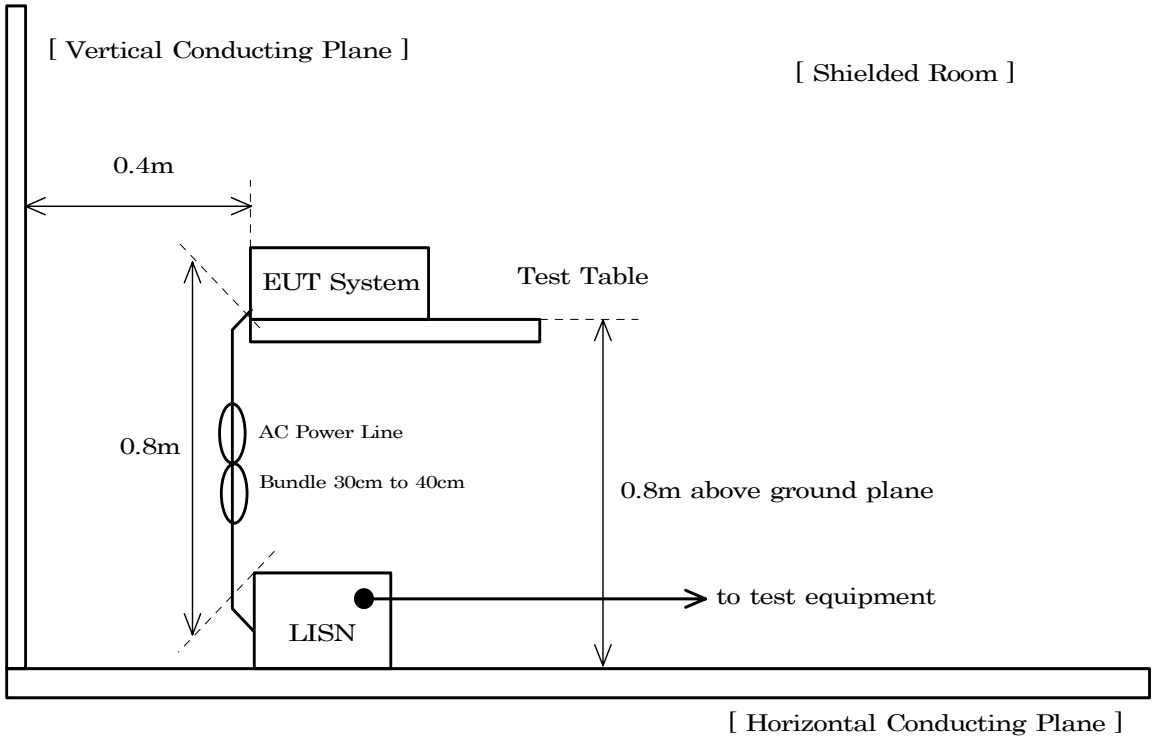
・Conducted Emission Measurement

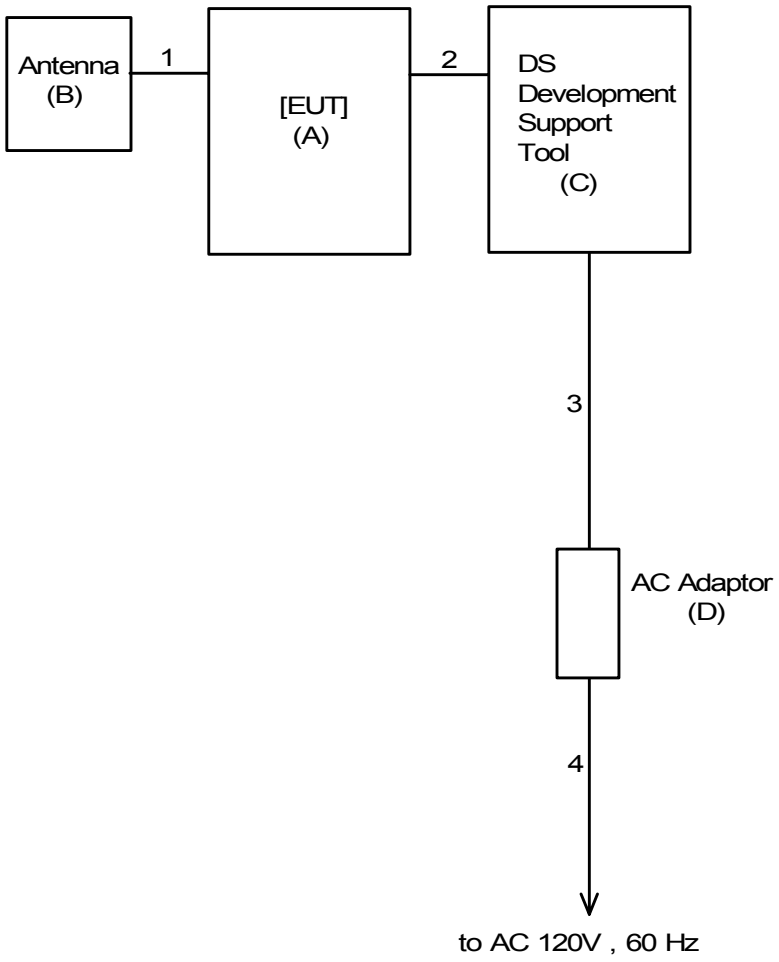


[Note]

Test Table size	: 2.0m × 1.0m, Height 0.8m, Material : Wooden
LISN	: All LISN are bounded on the conducting plane by using the screw. 2nd LISN RF connector is terminated in 50Ω load.
Interconnecting cables	: Excess part of the interconnecting cables longer than 1meter are bundled in the center. Cables that hang closer than 40cm to the ground plane is folded back and forth forming bundled 30 to 40 cm long, hanging approx, in the middle between the ground plane and table.
AC Power Cables	: AC Power cord of EUT is connected to one LISN which is placed on the ground plane. The LISN place in 80cm from the nearest part of EUT chassis. The excess power cord is bundled in the center, or shortened to appropriate length. AC power cord except from the EUT are connected second LISN.
Floor-Standing Equipment	: EUT and all cables are insulated from the ground plane by 3mm to 12mm of insulating material

Horizontal and vertical conducting plane (minimum 2.0m×2.0m) extends at least 0.5m beyond the EUT system footprint.

3.4. Block Diagram of EUT System



[Note]

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	Module for the three DS Development Support Tool	NTR EMU WIRELESS ADP (04090309 version F1)	SRX-ISNWIRE (－)	EUT	
B	Antenna	－ (－)	N/A (－)	EUT	
C	DS Development Suppor Tool	IS-NITRO-CAPTURE (04090309)	N/A (－)		
D	AC Adaptor	DOL-001 (USA) (－)	N/A (Nintendo)		

[Attention]
N/A : Not Applicable

3.6. List of Cables

No	Cable Name	Shielded (Y/N)	Length (m)	Note	Remark
1	Antenna Cable	Y	0.1		
2	Relay Cord	N	0.1		
3	DC Output Cord of AC Adaptor (B)	N	2.0		
4	AC Input Cord of AC Adaptor (B)	N	2.0	2-wires type	

4. 6 dB BANDWIDTH MEASUREMENT (§ 15.247 (a) (2)), (RSS210 6.2.2 (O) (iv))

4.1. 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 6dB 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 : 50 MHz
	Resolution bandwidth : 100 kHz
	Video bandwidth : ≧ RBW
	Sweep : Auto
	Detector function : Peak
	Trace Mode : Max Hold

4.2. Test Results

Measured Frequency [MHz]	Measured Bandwidth [MHz]	Limit [kHz]
2412	9.75	>500
2437	10.17	>500
2462	10.17	>500

[Note]
(1) See next page figure 1 to 3.
(2) The worst case of data rate : 2 Mbps.

[Test Condition]
EUT operation : Data transmission
EUT channel : 1, 6, 11 (2412, 2437, 2462 MHz)

[Environment]
Temperature 24°C Humidity 38%

[Tested Date / Tester]
20 December 2004 Signature

Ikuya Minematsu

Spectrum Chart

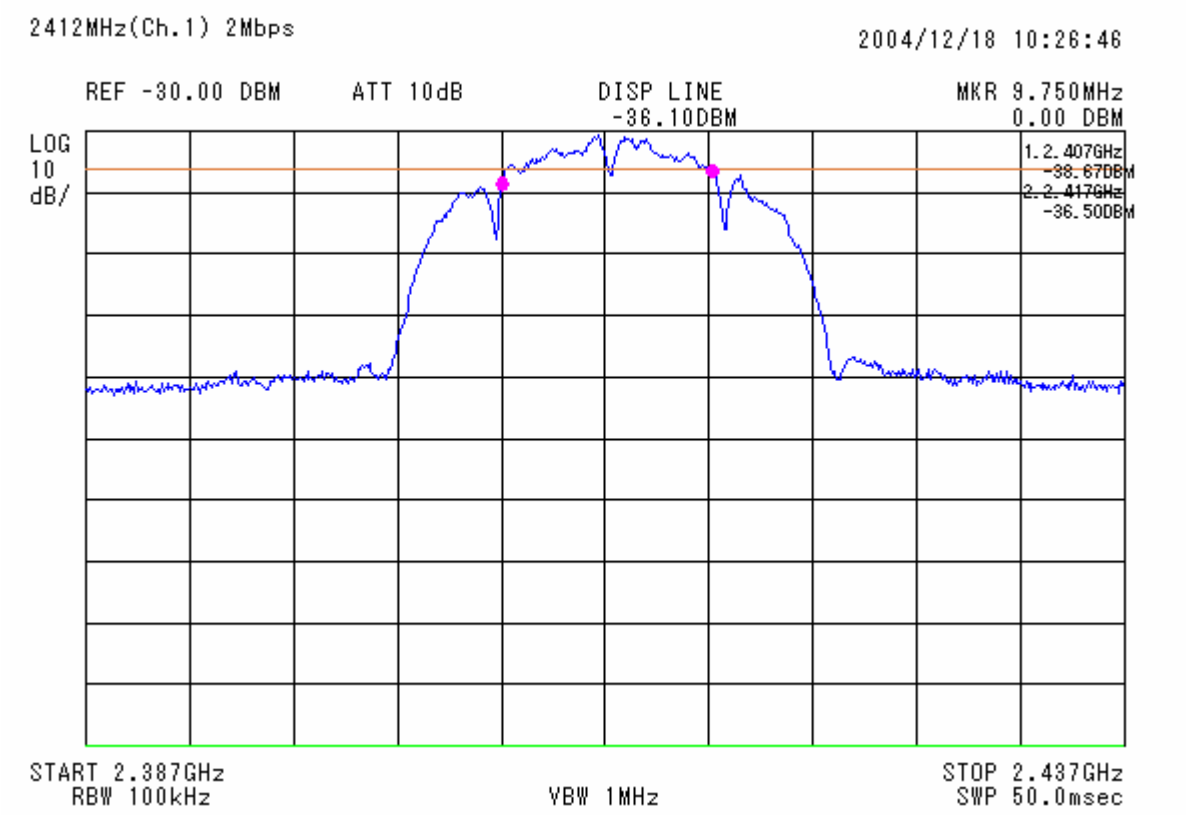


figure 1 6dB Bandwidth fc = 2412 MHz

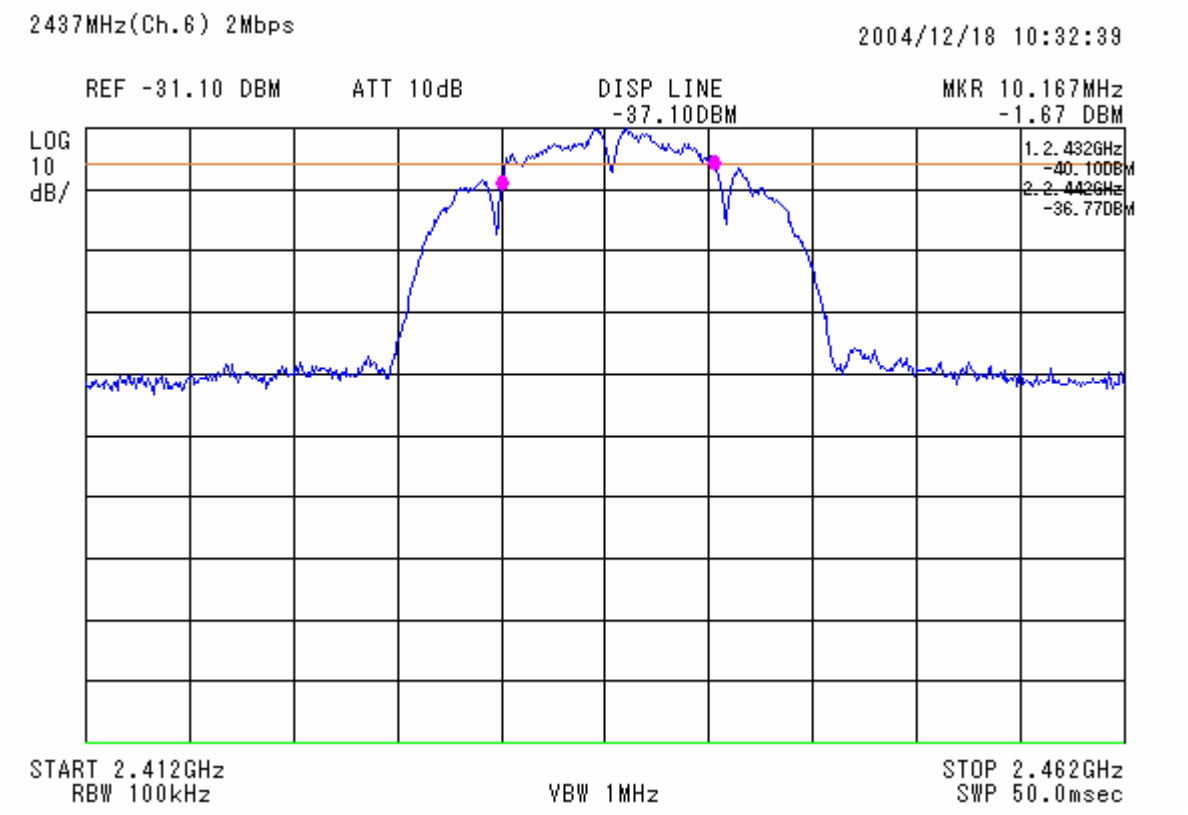


figure 2 6dB Bandwidth fc = 2437 MHz

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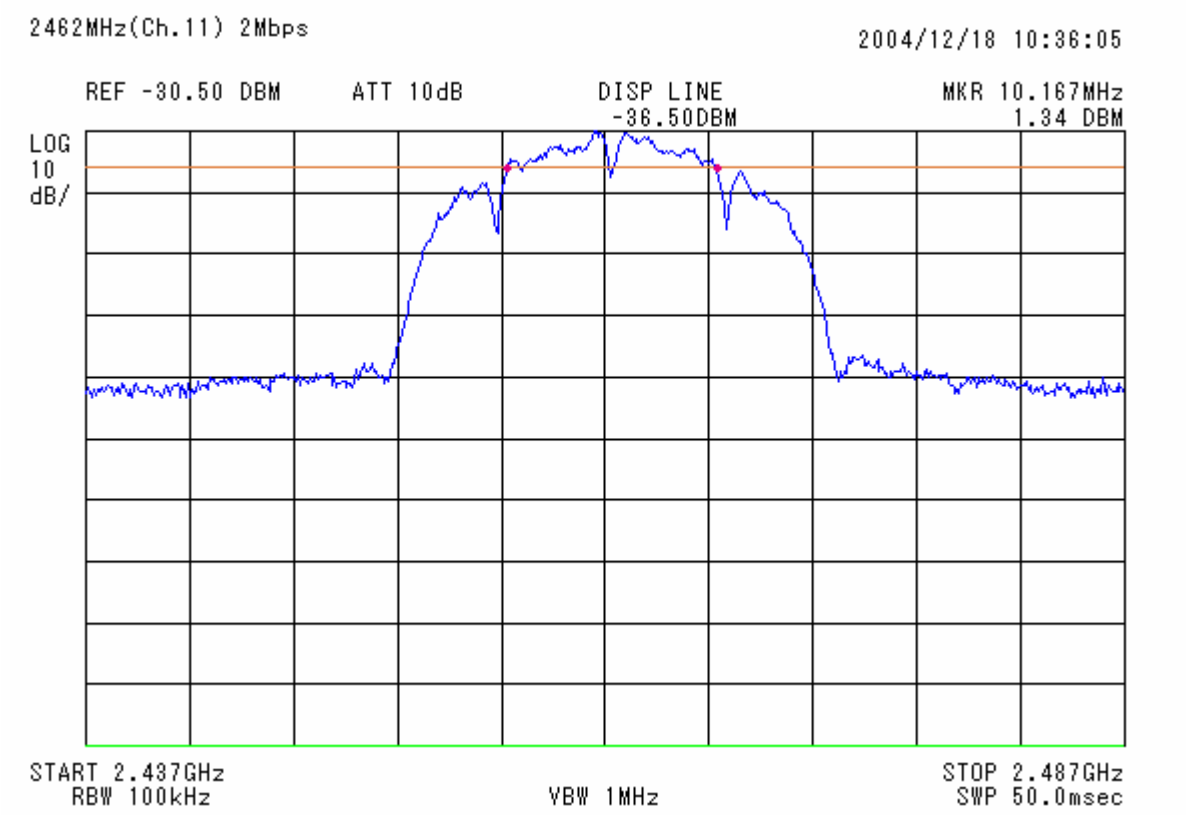

figure 3 6dB Bandwidth fc = 2462 MHz

5. PEAK OUTPUT POWER MEASUREMENT (§ 15.247 (b) (3)), (RSS210 6.2.2 (O) (b))

5.1. 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) or peak type power meter.
	[Note]
(*1)	Spectrum Analyzer Set Up Conditions
	Frequency Span : 20 dB bandwidth of the emission being measured
	Resolution bandwidth : ≧ 5 MHz
	Video bandwidth : ≧ RBW
	Sweep : Auto
	Detector function : Peak
	Trace Mode : Max Hold

5.2. Test Results

Measured Frequency [MHz]	Correction Factor [dB]	Meter Reading [dBm]	Output Power [dBm]	Limit [dBm]	Margin for Limit [dB]
2412	20.1	-20.3	-0.2	30.0	30.2
2437	20.1	-20.2	-0.1	30.0	30.1
2462	20.0	-20.1	-0.1	30.0	30.1

[Note]
(1) Correction Factor includes the both loss of attenuator and cable used in the measurement.
(2) The measurement was performed by peak type power meter.
(3) The worst case of data rate : 2 Mbps.

[Calculation method]
Peak Output Power (dBm) = Meter Reading (dBm) + Correction Factor (dB)

[Test Condition]
EUT operation : Data transmission
EUT channel : 1, 6, 11 (2412, 2437, 2462 MHz)

[Environment]
Temperature 24°C Humidity 38%

[Tested Date / Tester]
20 December 2004 Signature

Ikuya Minematsu

6. BAND EDGE RF CONDUCTED EMISSION MEASUREMENT (§ 15.247 (c)), (RSS210 6.2.2 (O) (e1))

6.1. 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	: ≧ RBW
Sweep	: Auto
Detector function	: Peak
Trace Mode	: Max Hold

6.2. Test Results

Measured Frequency [MHz]	Measured Separation From Carrier [dBc]	Limit [dBc]	Margin For Limit [dB]
2390.00	41.8	20.0	21.8
2483.50	42.0	20.0	22.0

[Note]
See next page figure 4 to 5.

[Test Condition]
EUT operation : Data transmission
EUT channel : 1, 11 (2412, 2462 MHz)

[Environment]
Temperature 24°C Humidity 38%

[Tested Date / Tester]
20 December 2004 Signature

Ikuya Minematsu

Spectrum Chart

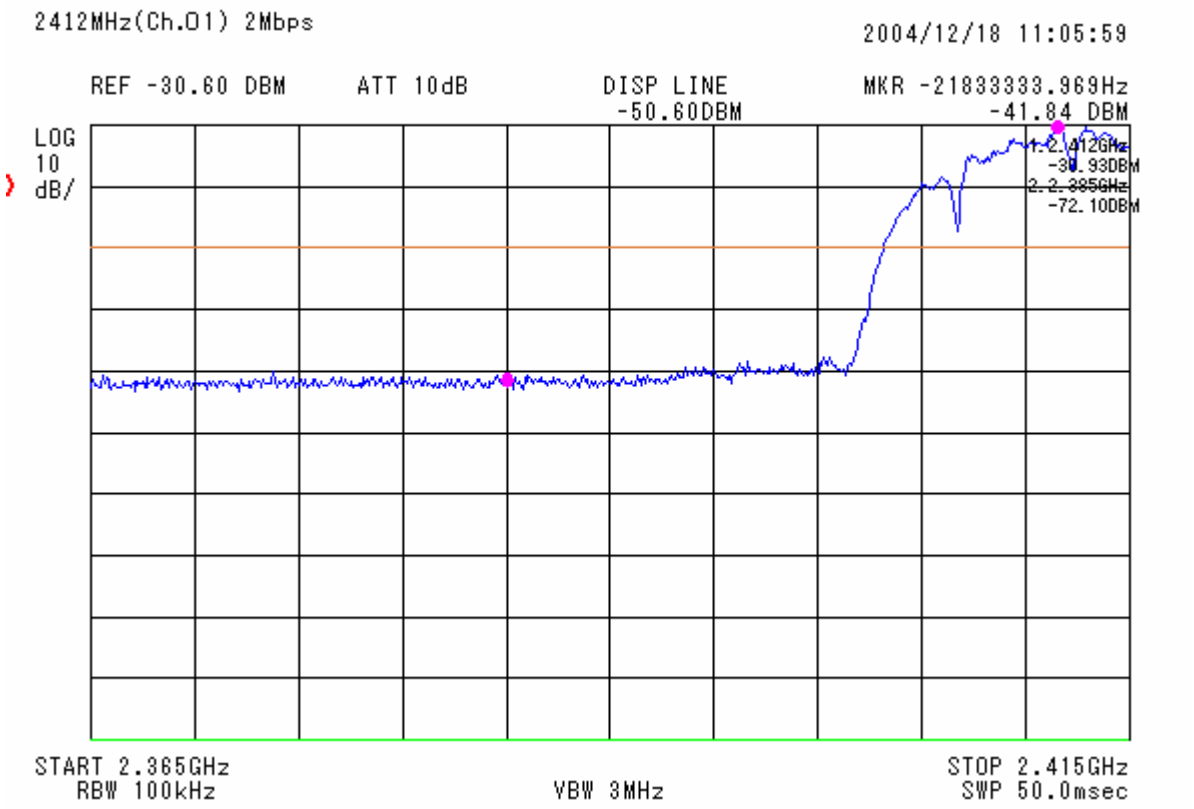

figure 4 Band Edge Low frequency side

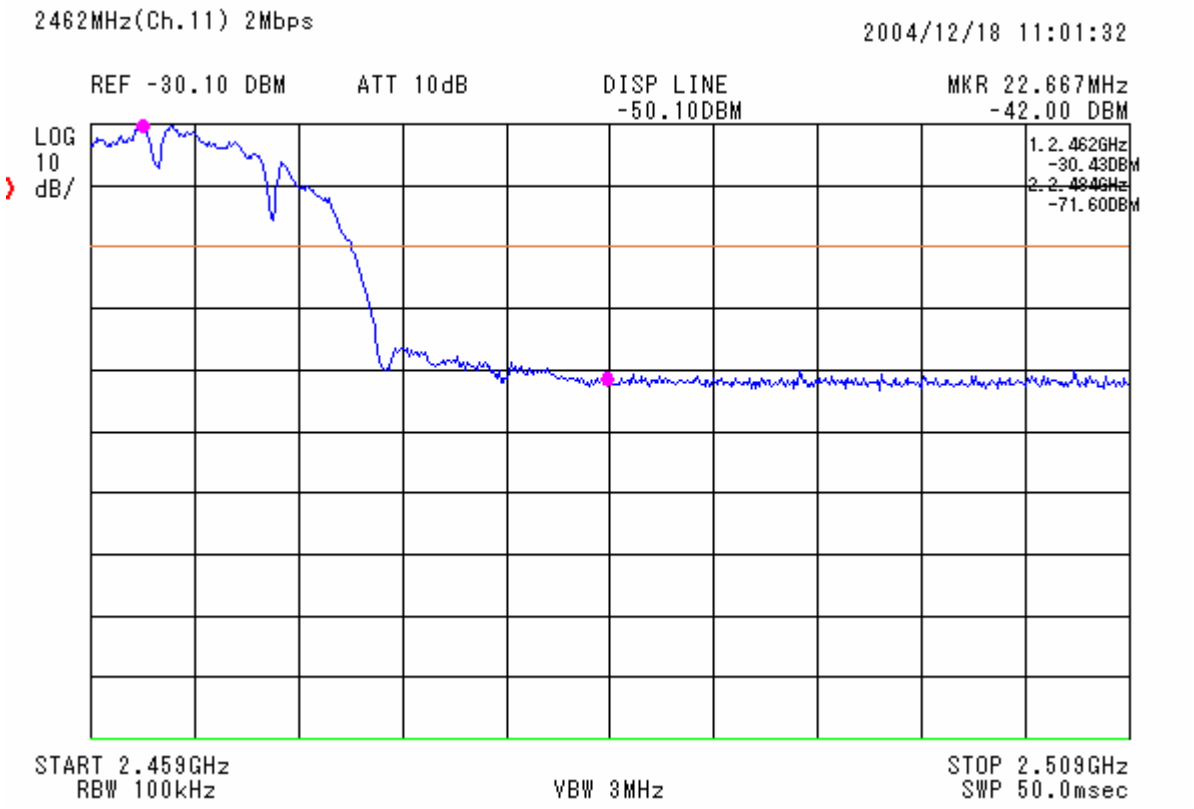

figure 5 Band Edge Upper frequency side

7. SPURIOUS RF CONDUCTED EMISSION MEASUREMENT (§ 15.247 (c)), (RS210 6.2.2 (O) (e1))

7.1. 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 : ≧RBW Sweep : Auto Detector function : Peak detector Trance : Max Hold

7.2. Test Results

Measured Frequency [MHz]	Correction Factor [dB]	Meter Reading [dBm]	Conducted Spurious [dBm]	Separation From Carrier [dBc]	Limit [dBc]
[Fc =2412MHz, Carrier Power : -9.3dBm]					
4824.00	22.0	< -75.0	> -53.0	> 43.7	> 20.0
[Fc =2437MHz, Carrier Power : -10.4dBm]					
4874.00	22.0	< -75.0	> -53.0	> 42.6	> 20.0
[Fc =2462MHz, Carrier Power : -10.1dBm]					
4912.00	22.0	< -75.0	> -53.0	> 42.9	> 20.0

[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 6 to 8.
(4) The worst case of data rate : 2 Mbps.

[Calculation method]
Spurious RF Emission (dBm) = Meter Reading (dBm) + Correction Factor (dB)
Separation From Carreier (dBc) = Spurious RF Emission (dBm) – Perk Output Power (dBm)

[EUT Condition]
EUT operation : Data transmission
EUT channel : 1, 6, 11 (2412, 2437, 2462 MHz)

[Environment]
Temperature 24°C Humidity 38%

[Tested Date / Tester]
20 December 2004 Signature

Ikuya Minematsu

Spectrum

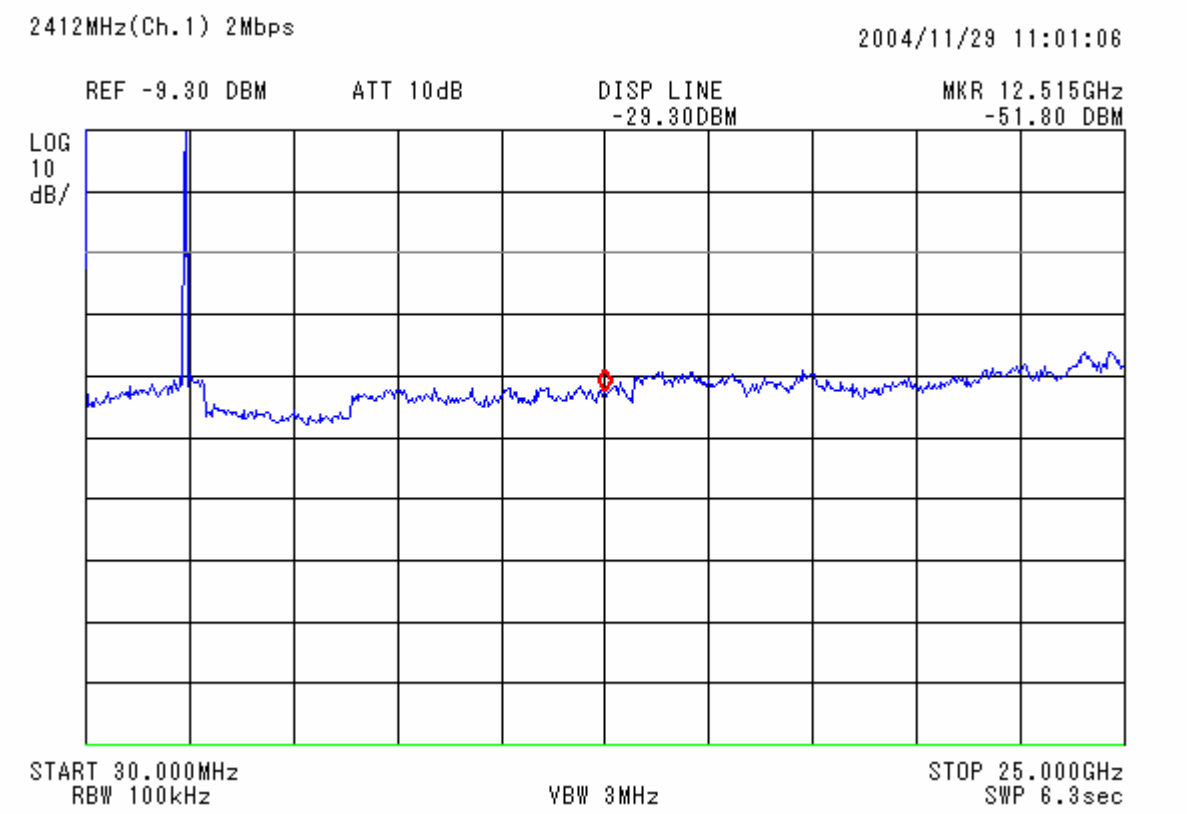

figure 6 Spurious RF conducted emission, Tx on 2412 MHz

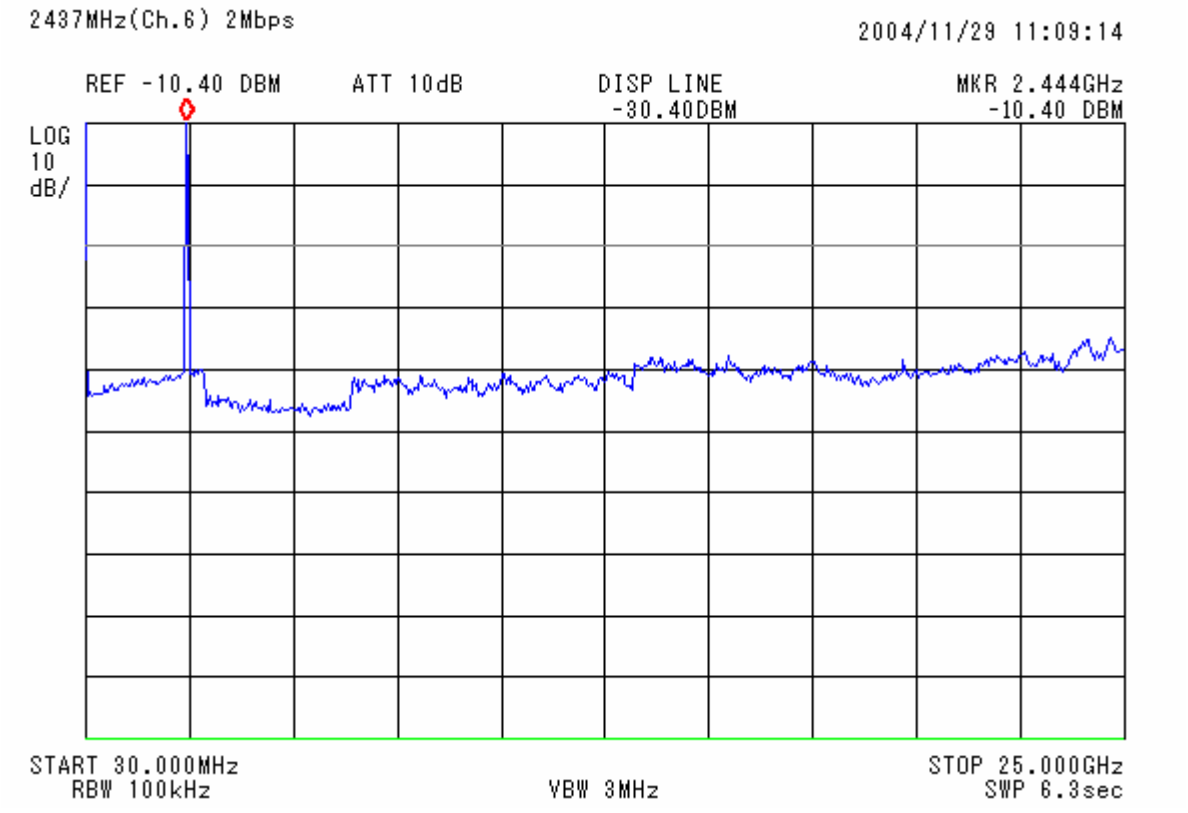

figure 7 Spurious RF conducted emission, Tx on 2437 MHz

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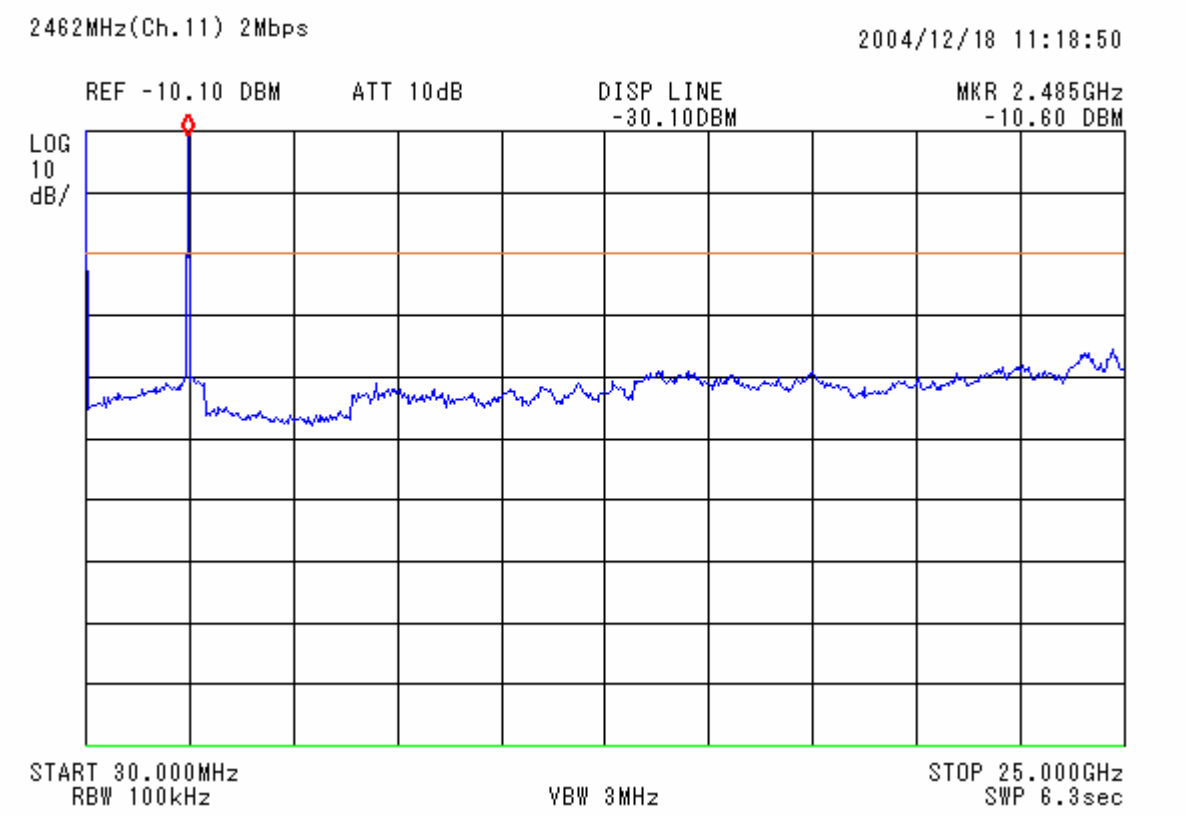


figure 8 Spurious RF conducted emission, Tx on 2462 MHz

8. PEAK POWER DENSITY MEASUREMENT (§ 15.247 (d)), (RSS210 6.2.2 (O) (b))

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 : 2 MHz
	Resolution bandwidth : 3 kHz
	Video bandwidth : ≧RBW
	Sweep time : Span / RBW = more than 666 sec
	Detector function : Peak
	Trace Mode : Max Hold

8.2. Test Results

Measured Frequency [MHz]	Correction Factor [dB]	Meter Reading [dBm/3kHz]	Peak Power Density [dBm]	Limit [dBm]	Margin for Limit [dB]
2412	21.2	-41.7	-20.5	8.0	28.5
2437	21.2	-41.9	-20.7	8.0	28.7
2462	21.2	-42.0	-20.8	8.0	28.8

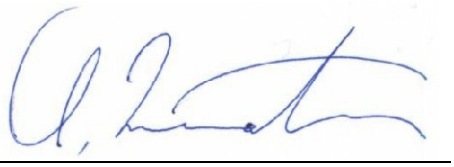
[Note]
(1) Correction factor includes both of a cable loss and attenuator loss.
(2) See next page figure 9 to 11.
(3) The worst case of data rate : 1 Mbps.

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

[EUT Condition]
EUT operation : Data transmission
EUT channel : 1, 6, 11 (2412, 2437, 2462 MHz)

[Environment]
Temperature 24°C Humidity 38%

[Tested Date / Tester]
20 December 2004 Signature



Ikuya Minematsu

Spectrum

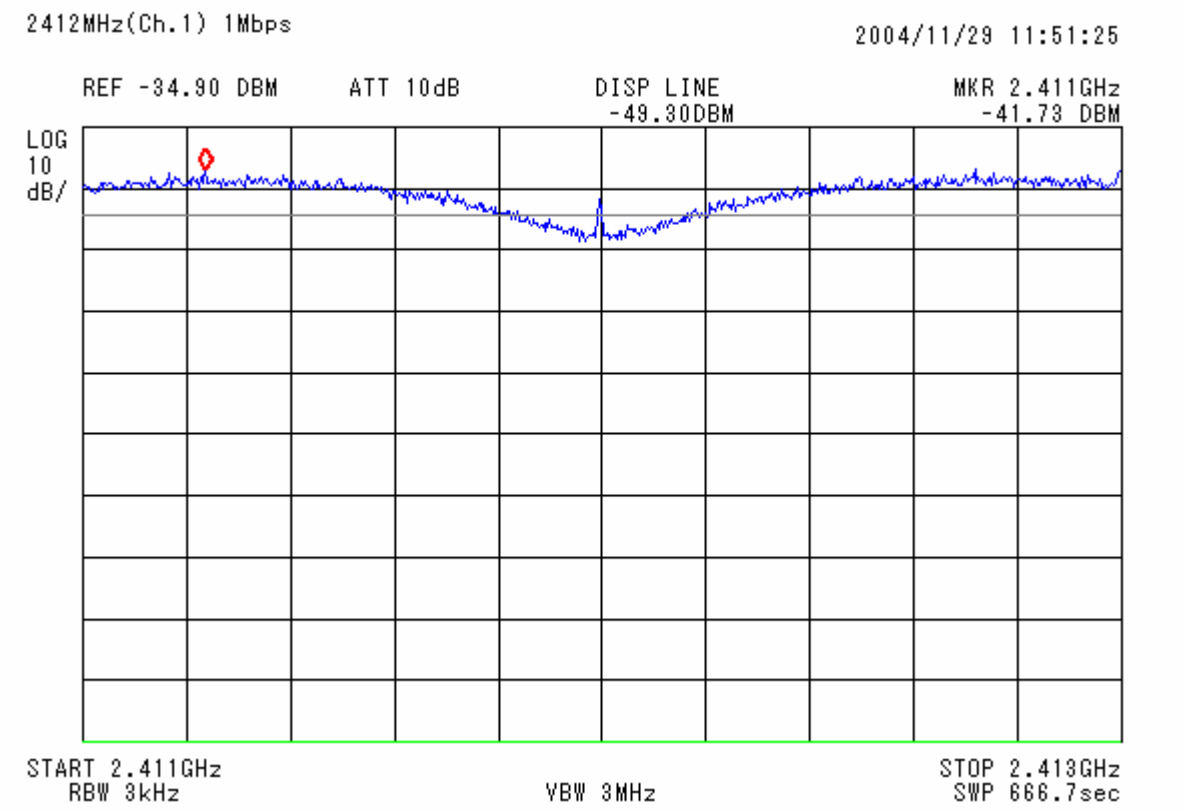


figure 9 Power Density, Tx on channel 1

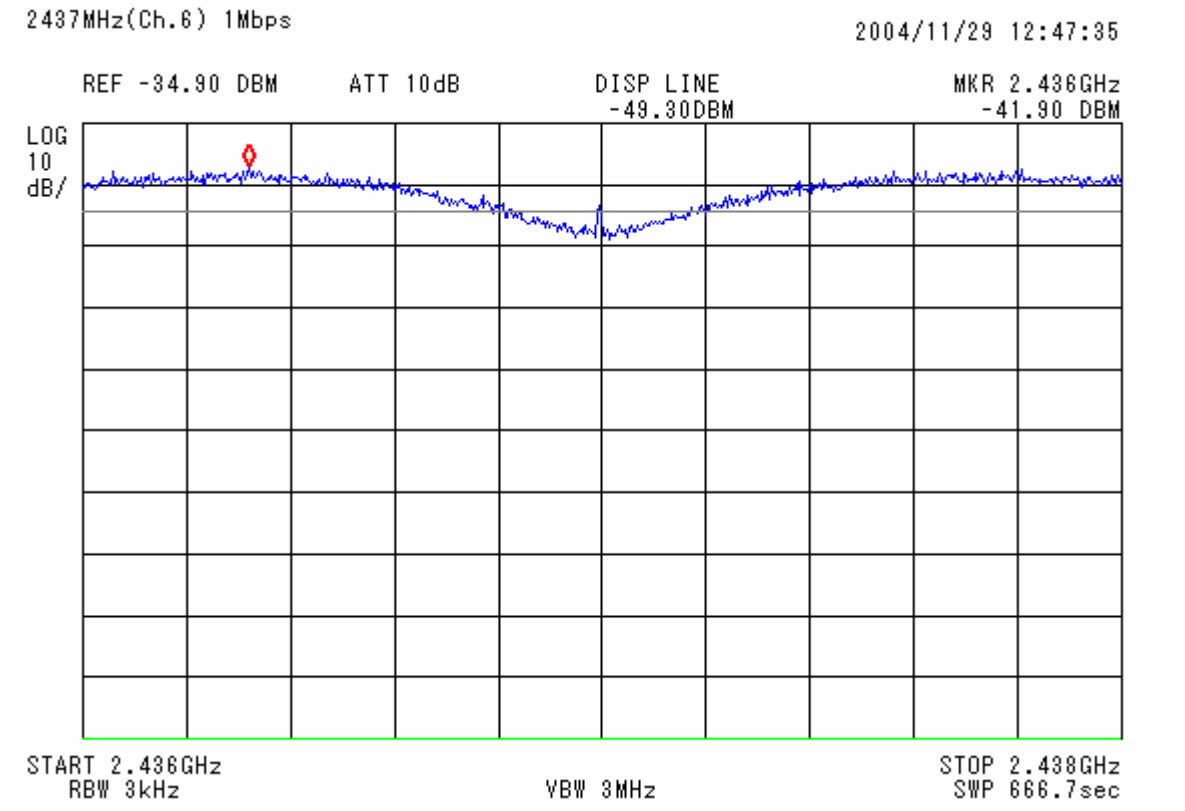


figure 10 Power Density, Tx on channel 6

- Continued –

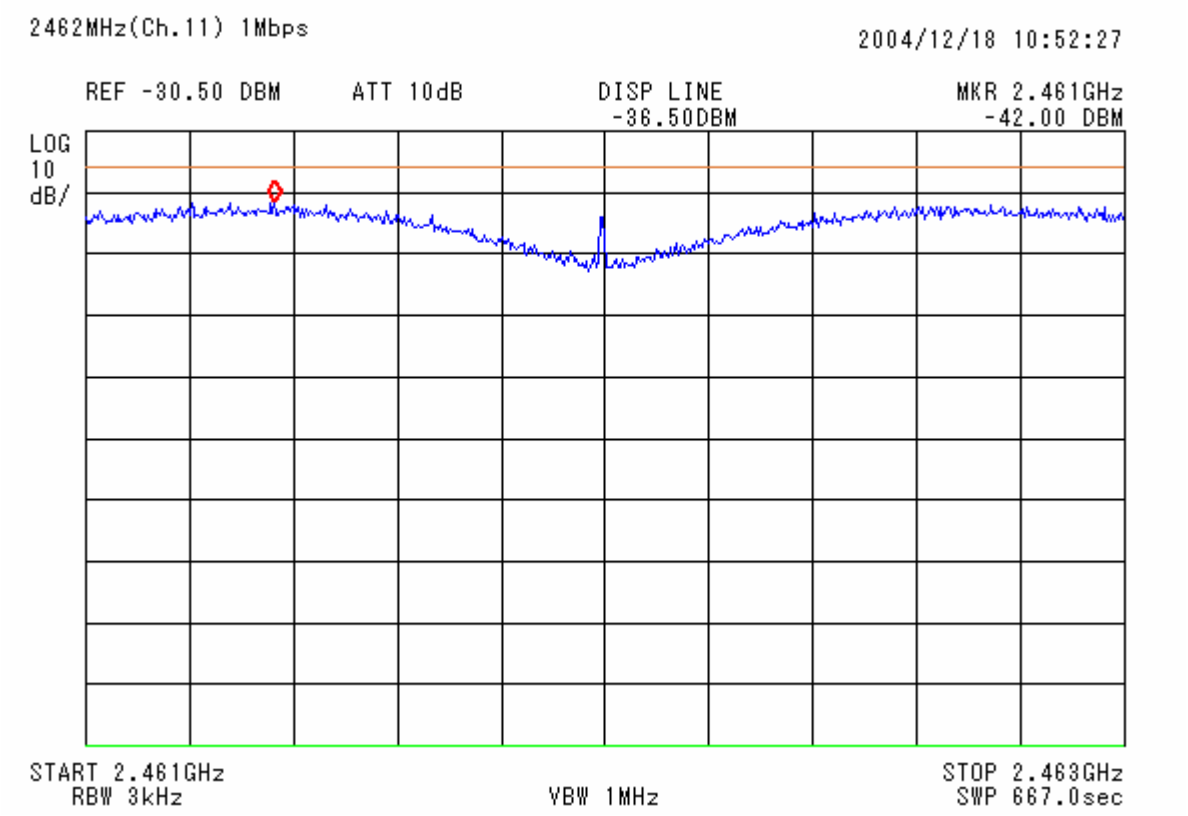


figure 11 Power Density, Tx on channel 11

9. RADIATED EMISSION MEASUREMENT (§ 15.247 (c)), (§ 15.209 (a)), (RSS210 6.2.2 (t1) (2) (ii) (a), RSS210 6.3)

9.1. Test Procedure

(1) Configure the EUT System in accordance with ANSI C63.4-2003 section 8.
☒: 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) Preliminary Measurement.
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) with pre-amplifier 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 with rotated the turn table from 0 to 360 degree, and collect the six highest emissions minimum on the spectrum analyzer relative to the limits in the whole range.

(8) Final Measurement.
The EUT is operated in the worst case condition where maximum emission is detected by the preliminary 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 (*2) or (*5) with pre-amplifier.

(9) So that maximum field strength, the turntable azimuth and receiving antenna are adjusted the position.

[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 (Peak detector Measurement)
- Frequency range : 1 GHz - Upper frequency of measurement range
- Resolution bandwidth : 2 MHz (Impulse Bandwidth ≒ 1 MHz)
- Video bandwidth : 1 MHz
- Attenuator : 10 dB
- Detector function : Peak mode

(*3) Test Receiver Set Up Conditions
- Detector function : Quasi-Peak
- IF bandwidth : 120 kHz

The test receiver is complied with the specification of CISPR Publication 16.

(*4) Test Receiver Set Up Conditions
- Detector function : Average
- IF bandwidth : 1 MHz

(*5) Spectrum Analyzer Set Up Conditions (Average detector Measurement)
- Frequency range : 1 GHz - Upper frequency of measurement range
- Resolution bandwidth : 2 MHz (Impulse Bandwidth ≒ 1 MHz)
- Video bandwidth : 10 Hz or 30 Hz
- Attenuator : 10 dB
- Y axis : Liner

9.2. Test Results

(1) In the frequency range : above 1 GHz

Measurement Distance ☒: 3m ☐: 10m

Fc = 2412 MHz (Ch.01) 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]						
2412.00	24.7	66.6	66.8	91.5	-	-
4824.00	-3.0	46.2	44.7	43.2	74.0	30.8
7236.00	-1.7	<42.0	<42.0	<40.3	74.0	>33.7
9648.00	1.3	<44.0	<44.0	<45.3	74.0	>28.7
12060.00	5.1	<44.0	<44.0	<49.1	74.0	>24.9
14472.00	7.1	<43.0	<43.0	<50.1	74.0	>23.9
16884.00	8.9	<42.0	<42.0	<50.9	74.0	>23.1
19296.00	4.1	<48.0	<48.0	<52.1	74.0	>21.9
21708.00	5.2	<50.0	<50.0	<55.2	74.0	>18.8
24120.00	5.4	<52.0	<52.0	<57.4	74.0	>16.6
[Average Detector Measurement] (*1)						
4824.00	-3.0	38.2	36.7	35.2	54.0	18.8
7236.00	-1.7	<32.0	<32.0	<30.3	55.0	>24.7
9648.00	1.3	<33.0	<33.0	<34.3	54.0	>19.7
12060.00	5.1	<32.0	<32.0	<37.1	54.0	>16.9
14472.00	7.1	<33.0	<33.0	<40.1	54.0	>13.9
16884.00	8.9	<32.0	<32.0	<40.9	54.0	>13.1
19296.00	4.1	<36.0	<36.0	<40.1	54.0	>13.9
21708.00	5.2	<39.0	<39.0	<44.2	54.0	>9.8
24120.00	5.4	<40.0	<40.0	<45.4	54.0	>8.6

- Continued -

Measurement Distance ☒: 3m ☐: 10m

Fc = 2437 MHz (Ch.06) 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]						
2437.00	24.6	67.6	67.2	92.2	-	-
4874.00	-3.0	47.2	47.4	44.4	74.0	29.6
7311.00	-1.8	<42.0	<42.0	<40.2	74.0	>33.8
9748.00	1.3	<44.0	<44.0	<45.3	74.0	>28.7
12185.00	5.5	<44.0	<44.0	<49.5	74.0	>24.5
14622.00	7.2	<43.0	<43.0	<50.2	74.0	>23.8
17059.00	9.1	<42.0	<42.0	<51.1	74.0	>22.9
19496.00	4.2	<48.0	<48.0	<52.2	74.0	>21.8
21933.00	5.4	<50.0	<50.0	<55.4	74.0	>18.6
24370.00	5.6	<52.0	<52.0	<57.6	74.0	>16.4
[Average Detector Measurement] (*1)						
4874.00	-3.0	37.2	36.4	34.2	54.0	19.8
7311.00	-1.8	<32.0	<32.0	<30.2	55.0	>24.8
9748.00	1.3	<33.0	<33.0	<34.3	54.0	>19.7
12185.00	5.5	<32.0	<32.0	<37.5	54.0	>16.5
14622.00	7.2	<33.0	<33.0	<40.2	54.0	>13.8
17059.00	9.1	<32.0	<32.0	<41.1	54.0	>12.9
19496.00	4.2	<36.0	<36.0	<40.2	54.0	>13.8
21933.00	5.4	<39.0	<39.0	<44.4	54.0	>9.6
24370.00	5.6	<40.0	<40.0	<45.6	54.0	>8.4

- Continued -

Measurement Distance ☒: 3m ☐: 10m

Fc = 2462 MHz (ch.11) 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]						
2462.00	24.6	71.0	69.8	95.6	-	-
4924.00	-3.0	47.2	44.8	44.2	74.0	29.8
7386.00	-1.8	<42.0	<42.0	<40.2	74.0	>33.8
9848.00	1.3	<44.0	<44.0	<45.3	74.0	>28.7
12310.00	5.5	<44.0	<44.0	<49.5	74.0	>24.5
14772.00	7.2	<43.0	<43.0	<50.2	74.0	>23.8
17234.00	9.1	<42.0	<42.0	<51.1	74.0	>22.9
19696.00	4.2	<48.0	<48.0	<52.2	74.0	>21.8
22158.00	5.4	<50.0	<50.0	<55.4	74.0	>18.6
24620.00	5.6	<52.0	<52.0	<57.6	74.0	>16.4
[Average Detector Measurement] (*1)						
4924.00	-3.0	37.0	35.1	34.0	54.0	20.0
7386.00	-1.8	<32.0	<32.0	<30.2	54.0	>23.8
9848.00	1.3	<33.0	<33.0	<34.3	54.0	>19.7
12310.00	5.5	<32.0	<32.0	<37.5	54.0	>16.5
14772.00	7.2	<33.0	<33.0	<40.2	54.0	>13.8
17234.00	9.1	<32.0	<32.0	<41.1	54.0	>12.9
19696.00	4.2	<36.0	<36.0	<40.2	54.0	>13.8
22158.00	5.4	<39.0	<39.0	<44.4	54.0	>9.6
24620.00	5.6	<40.0	<40.0	<45.6	55.0	>9.4

2) Local Frequency

Measurement Distance ☒: 3m ☐: 10m

Fc = 2412 MHz (Ch.01) Receiving operation Local Frequency

Measured Frequency [MHz]	Antenna Factor [dB/m]	Meter Reading Horizontal Polarization [dBuV]	Meter Reading Vertical Polarization [dBuV]	Maximum Field Strength [dBuV/m]	Limit [dBuV/m]	Margin for Limits [dB]
[Peak Detector Measurement]						
2038.00	-11.5	50.3	50.4	38.9	74.0	35.1
4076.00	-3.7	<40.0	<40.0	<36.3	74.0	>37.7
6114.00	-3.1	<40.0	<40.0	<36.9	74.0	>37.1
8152.00	-0.7	<42.0	<42.0	<41.3	74.0	>32.7
10190.00	2.1	<43.0	<43.0	<45.1	74.0	>28.9
[Average Detector Measurement] (*1)						
2038.00	-11.1	41.8	41.9	30.8	54.0	23.2
4076.00	-3.7	<30.0	<30.0	<26.3	54.0	>27.7
6114.00	-3.1	<30.0	<30.0	<26.9	54.0	>27.1
8152.00	-0.7	<32.0	<32.0	<31.3	54.0	>22.7
10190.00	2.1	<33.0	<33.0	<35.1	54.0	>18.9

- Continued -

Measurement Distance ☒: 3m ☐: 10m

Fc = 2437 MHz (Ch.06) Receiving operation Local Frequency

Measured Frequency [MHz]	Antenna Factor [dB/m]	Meter Reading Horizontal Polarization [dBuV]	Meter Reading Vertical Polarization [dBuV]	Maximum Field Strength [dBuV/m]	Limit [dBuV/m]	Margin for Limits [dB]
[Peak Detector Measurement]						
2063.00	-11.4	49.6	50.6	39.2	74.0	34.8
4126.00	-3.7	<40.0	<40.0	<36.3	74.0	>37.7
6189.00	-3.1	<40.0	<40.0	<36.9	74.0	>37.1
8252.00	-0.7	<42.0	<42.0	<41.3	74.0	>32.7
10315.00	2.1	<43.0	<43.0	<45.1	74.0	>28.9
[Average Detector Measurement] (*1)						
2063.00	-11.1	40.6	42.2	31.1	54.0	22.9
4126.00	-3.7	<30.0	<30.0	<26.3	54.0	>27.7
6189.00	-3.1	<30.0	<30.0	<26.9	54.0	>27.1
8252.00	-0.7	<32.0	<32.0	<31.3	54.0	>22.7
10315.00	2.1	<33.0	<33.0	<35.1	54.0	>18.9

- Continued -

Measurement Distance ☒: 3m ☐: 10m

Fc = 2462 MHz (Ch.11) Receiving operation Local Frequency

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]						
2088.00	-11.3	52.0	51.4	40.7	74.0	33.3
4176.00	-3.7	<40.0	<40.0	<36.3	74.0	>37.7
6264.00	-3.2	<40.0	<40.0	<36.8	74.0	>37.2
8352.00	0.3	<42.0	<42.0	<42.3	74.0	>31.7
10440.00	2.2	<43.0	<43.0	<45.2	74.0	>28.8
[Average Detector Measurement] (*1)						
2088.00	-11.0	43.0	42.4	32.0	54.0	22.0
4176.00	-3.7	<30.0	<30.0	<26.3	54.0	>27.7
6264.00	-3.2	<30.0	<30.0	<26.8	54.0	>27.2
8352.00	0.3	<32.0	<32.0	<32.3	54.0	>21.7
10440.00	2.2	<33.0	<33.0	<35.2	54.0	>18.8

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

Measurement Distance ☒: 3m ☐: 10m

Transmitting Operation (Maximum Power output mode)

Measured Frequency [MHz]	Antenna Factor [dB/m]	Meter Reading Horizontal Polarization [dBuV]	Meter Reading Vertical Polarization [dBuV]	Maximum Field Strength [dBuV/m]	Limit [dBuV/m]	Margin for Limits [dB]
[Average Detector (Band Edge) Measurement]						
(*1) 2390.00	9.9	38.3	38.3	48.2	54.0	5.8
(*1) 2483.50	9.9	38.9	38.3	48.8	54.0	5.2
[Peak Detector (Band Edge) Measurement]						
2390.00	9.9	50.0	50.0	59.9	74.0	14.1
2483.50	9.9	51.9	49.5	61.8	74.0	12.2

[Remark]
(*1) : Spectrum analyzer setup condition.
Detector : Peak
RBW : 2MHz
VBW : 10Hz

[Note]
(1) The measurement were performed both of transmitting operation and receiving operation.
(2) Antenna Factor includes both of the cable loss, Pre-amplifier gain and BEF loss.
(3) See next page figure 12 to 15.
(4) Above 1GHz, antenna factor includes both of the cable loss and pre-amplifier gain.
(5) In frequency range 1to 2GHz and 3 to 4GHz, the band eliminate filter (Cut off frequency 2.4GHz) was used.
(6) The worst case of data rate : 2 Mbps.

[Calculation method at Peak detector]
Maximum Field Strength (dBμV/m)
= Meter Reading (at maximum level of Horizontal or Vertical) (dBμV) + Antenna Factor (dB/m)

[Environment]
Temperature: 24°C Humidity: 38%

[Tested Date/ Tester]
20 December 2004 Signature

Ikuya Minematsu

Spectrum

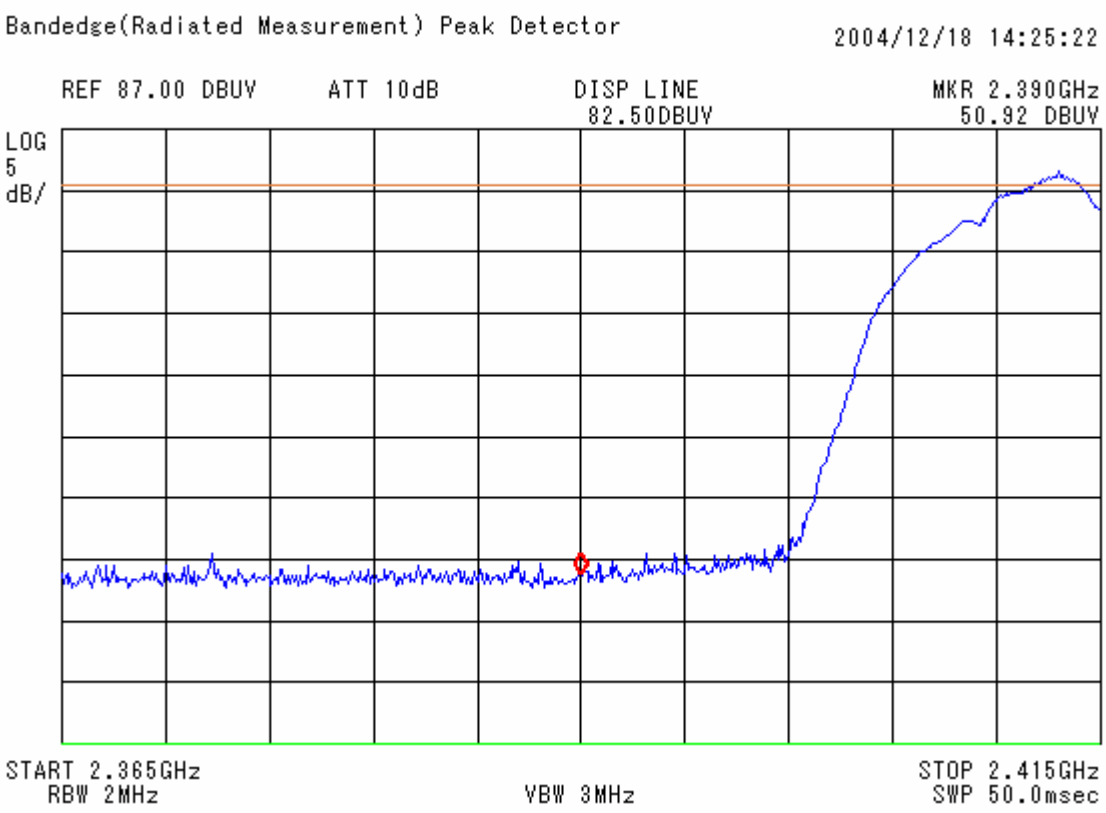


figure 12 Bandedge measurement (Lower side, Peak measurement)

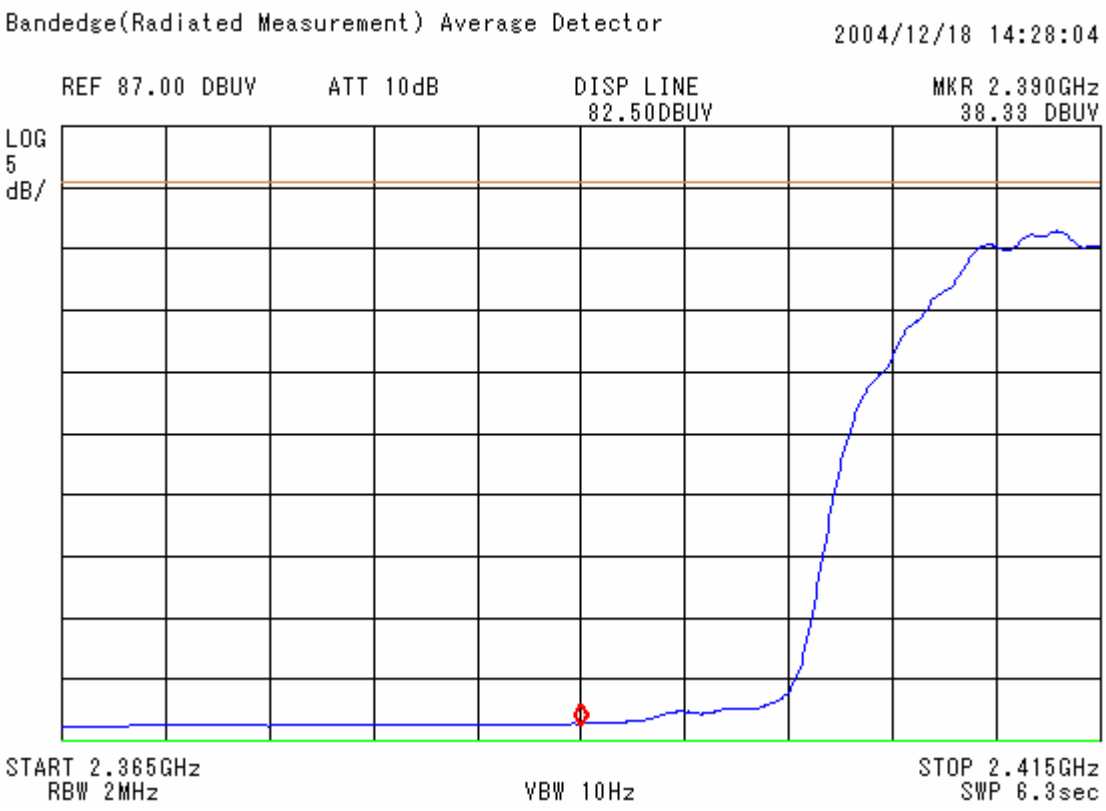


figure 13 Bandedge measurement (Lower side, Average measurement)

- Continued –

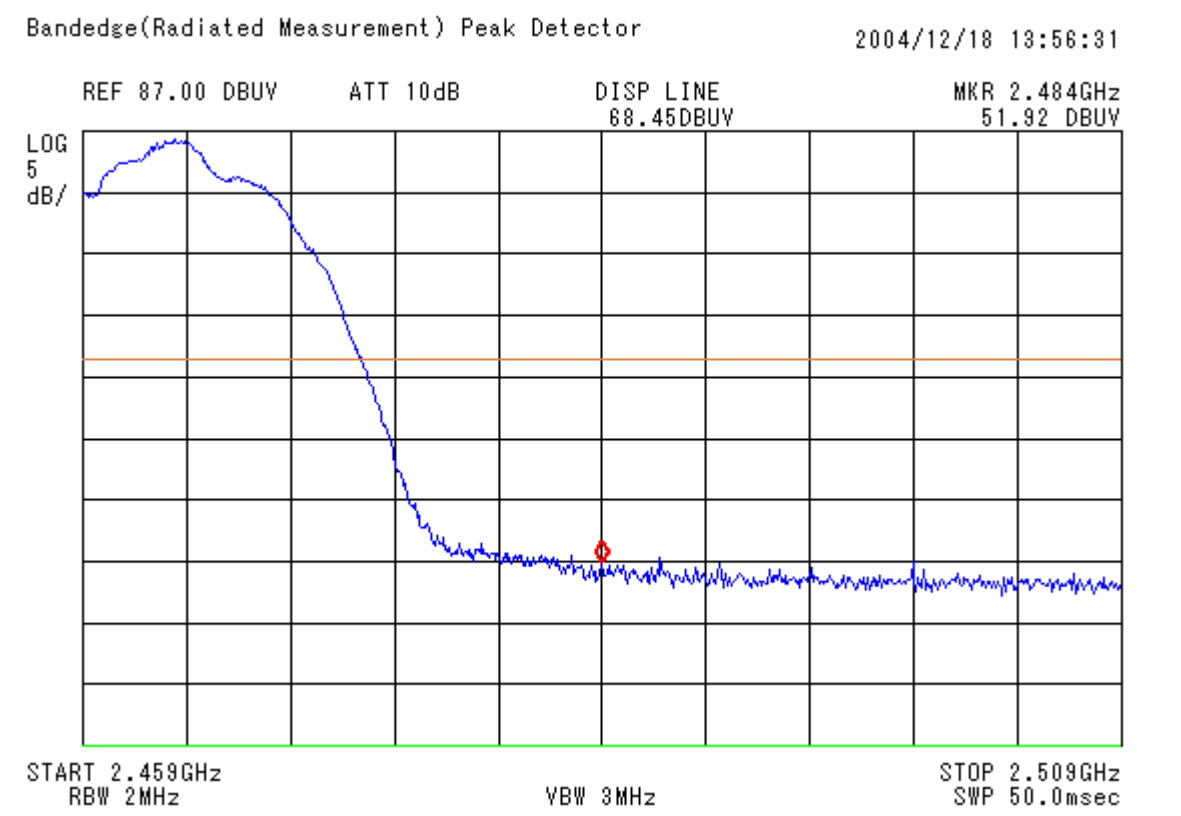


figure 14 Bandedge measurement (Upper side, Peak measurement)

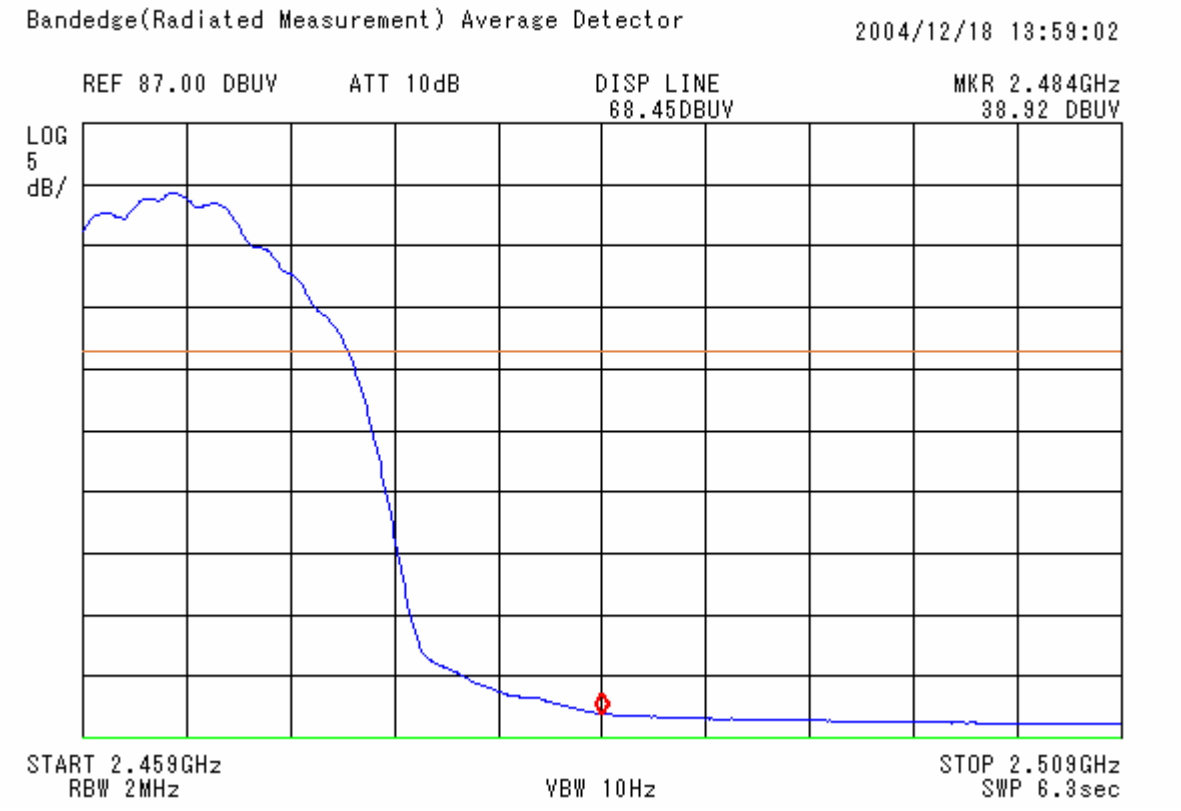


figure 15 Bandedge measurement (Upper side, Average measurement)

10. AC POWER LINE CONDUCTED EMISSION MEASUREMENT (§ 15.207 (a)), (RSS210 6.6)

10.1. Test Procedure

(1) Configure the EUT System in accordance with ANSI C63.4-2003 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.
☒: use the test table (2.0m × 1.0m, height 0.8m material : wooden), ☐: not use the test table

(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. The measuring port of 2nd LISN shall be terminated by the 50Ω terminator (resistor).

(4) Warm up the EUT System.

(5) Activate the EUT System and run the software prepared for the test, if necessary.

(6) Preliminary Measurement

a) Connect the spectrum analyzer (*1) to the measuring port of the LISN for the EUT, using a calibrated coaxial cable.

b) To find out the EUT System condition for the final test, which produces the maximum emission, the configuration of the EUT System, manipulated the position of the cables, and the operation mode, are changed under normal usage of the EUT.

c) The spectrums are scanned from 150 kHz to 30 MHz and collect the six highest emissions minimum on the spectrum analyzer relative to the limits in the whole range.

(7) Final Measurement
The EUT is operated in the worst-case condition where maximum emission is detected by the preliminary test. 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 : 150 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

The test receiver is complied with the specification of the CISPR Publication 16.

10.2. Test Results

Measured Frequency	AMN Factor	Meter Reading				Maximum RF Voltage		Limits		Margin for Limit	
		Q-Peak		Average		Q-Peak	Average	Q-Peak	Average	Q-Peak	Average
		Va	Vb	Va	Vb						
(MHz)	(dB)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dBuV)	(dB)	(dB)
0.166	10.2	47.1	47.2	43.8	44.2	57.4	54.4	65.2	55.2	7.8	0.8
0.251	10.1	41.3	41.6	40.2	40.4	51.7	50.5	61.7	51.7	10.0	1.2
0.418	10.1	28.5	31.2	28.5	29.0	41.3	39.1	57.5	47.5	16.2	8.4
2.519	10.1	30.0	28.9	-	-	40.1	-	56.0	46.0	15.9	-
2.604	10.1	30.8	30.2	-	-	40.9	-	56.0	46.0	15.1	-
5.587	10.2	33.6	33.9	27.8	27.9	44.1	38.1	60.0	50.0	15.9	11.9
16.756	10.9	33.0	32.5	-	-	43.9	-	60.0	50.0	16.1	-

[Attention]
The EUT is designed that rated power is supplied from the host device.
Therefore, the AC power line conducted emission measurement was estimated the AC power line of the host device.

[Note]
(1) LISN Correction Factor includes the cable loss.
(2) If the measurement value with the Q-peak detector meets the averate limits, the measurement with the average detector is omitted.

[Calculation method]
Maximum RF Voltage (dBuV)
= Meter Reading (at maximum level of Va or Vb) + LISN Factor (dB)

[Environment]
Temperature: 24℃ Humidity: 35%

[Tested Date / Tester]
3 December 2004 Signature

Ikuya Minematsu

Test Results in Graph

Conducted Disturbance at Mains port

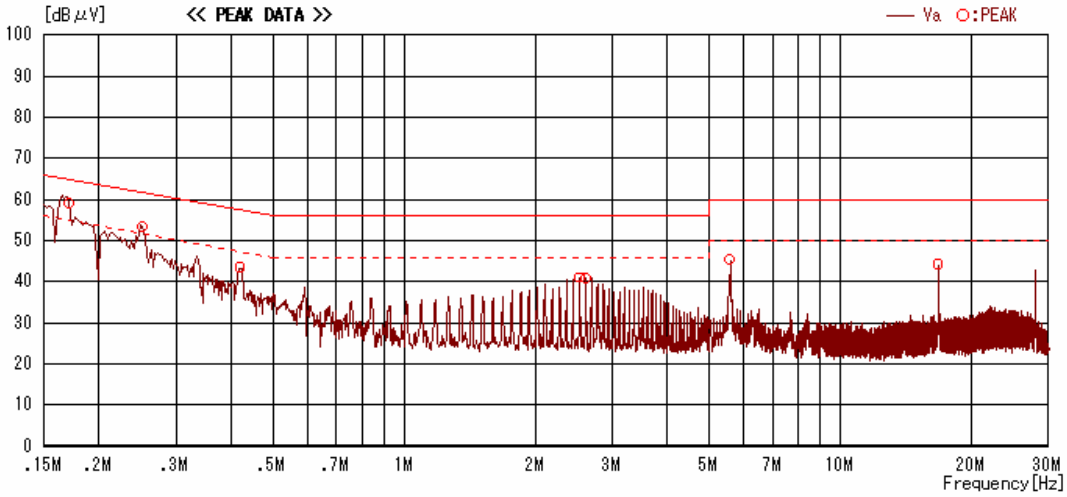
KEC 4th Shielded Room

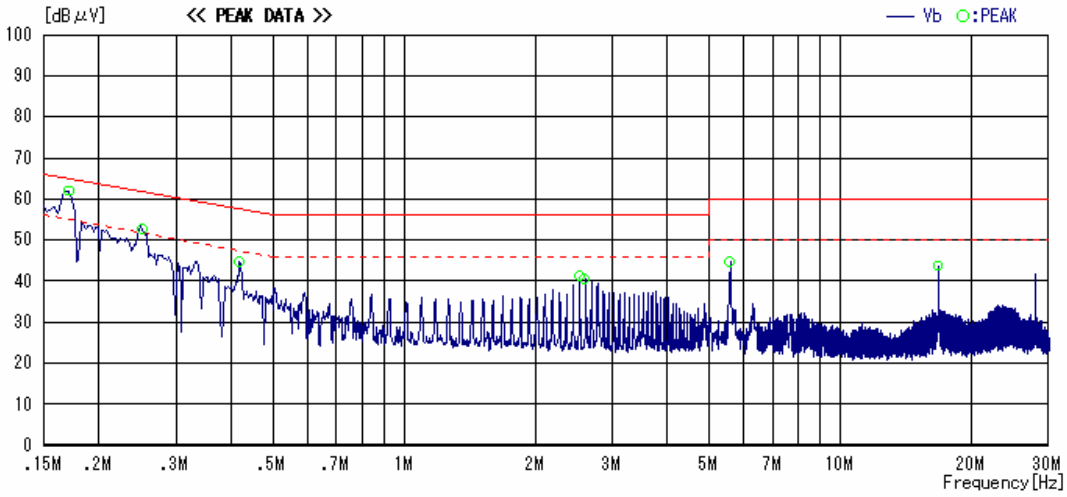
KEC No. : K-003-04-C
Model No. :
Serial No. :
Condition : Communication mode

Reference Rule : FCC Part 15C
Power Supply : AC120V, 60Hz
Temp/Humi : 24℃, 35%
Inspector : Ikuya Minematsu

Memo : K-016-04-B (RSS210 Issue 5)

LIMIT : CISPR Pub 22 Class B
CISPR Pub 22 Class B(AV)





11. 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	2004/4	2005/4
	Rhode & Schwarz	FSA	Frequency Range 9kHz – 1.5GHz	SA-35	6	2004/4	2005/4
	Agilent Technologies	E4403B	Frequency Range 9Hz – 3.0GHz	SA-48	7	2004/6	2005/6
Test Receiver	Rhode & Schwarz	ESHS10	Frequecy Range 9kHz – 30 MHz	FS-83	7	2004/2	2005/2
		ESVS10	Frequecy Range 20 MHz–1.0 GHz	FS-81	6	2004/3	2005/3
Pre-Amplifier	Hewlett Packard	8449B	Frequecy Range 1GHz-26.5GHz Typ. Gain 30 dB	AM-52	6	2004/2	2005/2
	Hewlett Packard	8447D	Frequecy Range 0.1MHz-1.3GHz Typ. Gain 26 dB	AM-44	6	2004/8	2005/8
Biconical Antenna	Schwarzbeck	VHA9103	Frequency Range 30MHz-300MHz	AN-219	6	2004/2	2005/2
Log Periodic Dipole Array Antenna	Schwarzbeck	UHAL9108A	Frequency Range 300MHz-1 GHz	AN-216	6	2004/2	2005/2
LISN	Kyoritsu	KNW407	Frequency Range 150kHz-30MHz	FL-106	7	2004/5	2005/5
		KNW242	Frequency Range 10kHz-30MHz	FL-110	N/A	2004/5	2005/5
Tuned Dipole Antenna	Kyoritsu	KBA-511AS	Frequency Range 25MHz-500MHz	AN-135	N/A	2003/2	2005/2
		KBA-611S	Frequency Range 500MHz-1GHz	AN-137	N/A	2003/2	2005/2
Standard Gain Horn Antenna	Raven	91888-2	Frequecy Range 1GHz – 2GHz	AN-211	6	2003/9	2005/9
		91889-2	Frequecy Range 2GHz – 5GHz	AN-212	6	2003/9	2005/9
	Scientific Atlanta	12-3.9	Frequecy Range 3.95-5.85GHz	AN-142	6	2003/9	2005/9
		12-5.8	Frequecy Range 5.85-8.2GHz	AN-104	6	2003/9	2005/9
		12-8.2	Frequecy Range 8.2-12.4GHz	AN-210	6	2003/9	2005/9
		12-12.0	Frequecy Range 12.4-18GHz	AN-145	6	2003/9	2005/9
		12-18.0	Frequecy Range 18GHz – 26.5GHz	AN-200	6	2004/8	2006/8

- Continued -

Equipment	Manufacturer	Model No.	Specifications	KEC Control No.	Test Item (*)	Last Cal.	Next Cal.
Power Meter	Rhode & Schwarz	E4419B	Frequency Range DC – 50GHz	VV-39	2	2003/9	2005/9
Power Sensor	Hewlett Packard	E4412A	Frequecy Range 10MHz – 18GHz Diod type	VV-39-1	2	2003/9	2005/9
Precision Attenuator	Hewlett Packard	HP33340C010	Frequency Range DC – 26.5GHz typ. 10dB	AT-40-3	6	2004/1	2005/1
		HP33340C020	Frequency Range DC – 26.5GHz typ. 20dB	AT-40-4	1,2,3,4, 5,6	2004/1	2005/1
Band Eliminate Filter	MICRO -TRONICS	BRM12294	Fc=2440MHz Typ. 70dB reduce	FL-174	6	2004/2	2005/2
Low Temperature Chamber	TABAI	MC-710	Temperature -75℃ - 100℃	CH-31	N/A	2004/7	2005/7
Coaxial Cable	SUHNER	SUCOFLEX	Length : 10m (SMA type)	CL-46	6	2004/2	2005/2
			Length : 1m (SMA type)	CL-42	6	2004/2	2005/2
			Length : 10m (SMA type)	CL-46	6	2004/2	2005/2
			Length : 2.5m (3.5mm type)	CL-621	6	2004/3	2005/3
			Length : 0.3m (3.5mm type)	CL-619	1,2,3,4, 5,6	2004/3	2005/3

[Note]

Test Item (*):
1 : 6 dB Bandwidth Measurement
2 : Peak Output Power Measurement
3 : Band Edge Measurement
4 : Spurious RF Conducted Emission Measurement
5 : Power Density Measurement
6 : Radiated Emission Measurement
7 : 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.