MEASUREMENT/TECHNICAL REPORT
FCC Part 15 Subpart C

Issued: August 3, 2010

Name and Address of the Applicant:	PATLITE CORPORATION 8-8 Matsuyamachi, Chuo-ku, Osaka 542-0067 Japan
Test Item:	USB dongle
Identification:	WDR-U
Serial No.:	01
FCC ID:	XQ3WRU
Sample Receipt Date:	December 14, 2009
Test Specification:	FCC Part 15 Subpart C, 15.247
Date of Testing:	January 12, 2010 to January 20, 2010
Test Result:	PASS

Report Prepared by: Cosmos Corporation
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Tested by: O. Itogawa — August 3, 2010
O. Itogawa, Engineer — Date

Reviewed by: — August 3, 2010
Y. Kawahara, Deputy General Manager — Date

Notes:
1. This report should not be reproduced except in full, without the written approval of Cosmos Corporation.
2. All measurement data contained in this report may have uncertainty. A judgment for the limitation should be taken into the count.
3. The report in this report apply only to the sample tested.

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1. Description of Equipment Under Test

1.1 Product Description

Manufacturer	: PATLITE CORPORATION
Model (referred to as the EUT)	: WDR-U
Nominal Voltage	: DC 5V (±10%)
Type of Modulation	: DSSS
Mode of Operation	: ☐ duplex ☐ 1/2 duplex ☒ simplex ☐ other
The type of the equipment	: ☐ Stand-alone ☒ Combined Equipment ☐ Plug –In Card ☐ Other (Module Unit)
The type of the antenna	: ☒ Integral ☐ External ☐ Other
The type of power source	: ☐ AC mains ☐ Dedicated AC adapter (V) ☒ DC Voltage ☐ Battery
The type of battery (if applicable)	: N/A
Type of Operation	: ☐ Continuous ☐ Burst ☒ Intermittent
Stand by Mode	: ☐ Available ☒ N/A
Intended functions	:
The bandwidth of the IF filters	: N/A
Method of Communication Link	:
The operating frequency band	: 2400MHz to 2483.5MHz
The thermal limitation	: from 5℃ to 40℃

1.2 Antenna Description

No.	Type Name	Gain	Antenna Type	Remarks
1	AHD1403-244ST01	1.64dBi (-0.5dBd)	Dielectric chip antenna	Integral

1.3 Accompanied Peripherals Description

No.	Equipment Name	Manufacturer	Type Name	Serial Number	Remarks
1	Personal Computer	Acer Inc.	ZG5	---	DC19V, 1.58A
2	AC Adapter	HIPRO	HD-A0301R3	F3-080744089001	AC100V-240V, 50/60Hz, 1A

2. General Information

2.1 Test Methodology

All measurement subject to the present report was carried out according to the procedures in ANSI C63.4: 2003.

2.2 Test Facility

All measurement was performed in the following facility;

Cosmos Corporation EMC Lab. Ohnogi

(2-3571 Ohaza-iwatachi, Ohnogi, Watarai-cho, Watarai-gun, Mie-ken 516-2102, Japan) The test firm has been filed since March 7, 2008 under CFR 47 Part.2.948.

2.3 Traceability

The calibration of measurement equipment used in the test subject to the present report is designed and operated to ensure that the measurement is traceable to national standards of measurement or equivalent abroad.

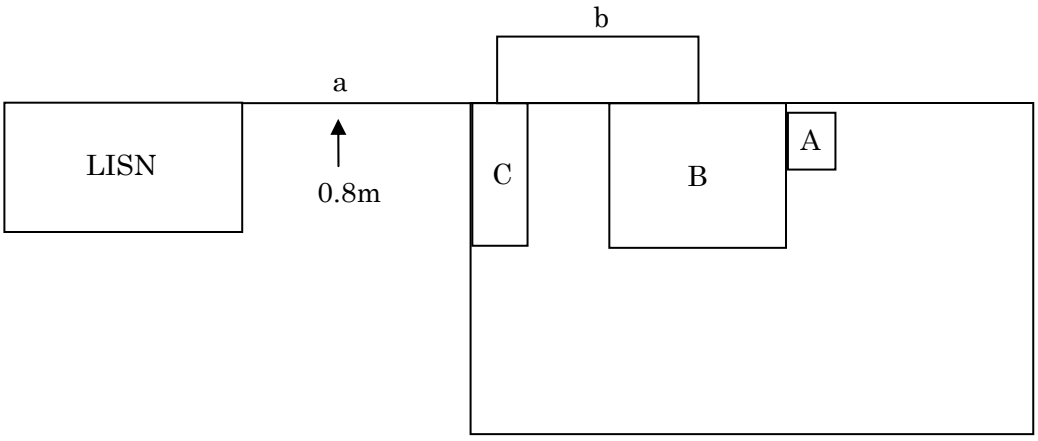
3. Summary of Test Results

Section	Test Item	Limit	Result
15. 207	AC Power Conducted Emission	See 5.1.2	Pass
15. 247(a)(1)	Spectrum Bandwidth of Frequency Hopping Spread Spectrum System	< 1MHz if using less than 15 non-overlapping channels	N/A
15. 247(a)(1)	Channel Separation	> 2/3 of 20dB BW for systems with output power < 125mW	N/A
15. 247(a)(1)	Number of Channels	> 15 channels	N/A
15. 247(a)(1)	Time of Occupancy	< 0.4 sec in 30 sec period	N/A
15. 247(a)(2)	Spectrum Bandwidth of Direct Sequence Spread Spectrum System	Min. 500kHz	Pass
15. 247(b)	Maximum Peak Output Power	Max. 1W (30dBm)	Pass
15. 247(d) 15. 209	Transmitter Radiated Emissions	See 5.4.2 See 5.5.2	Pass
15. 247(e)	Power Spectrum Density	Max. 8dBm	Pass
15. 247(d)	Band Edge Measurement	See 5.7.2	Pass
15.215(c)	20dB Bandwidth	---	Pass

4. Test Configuration

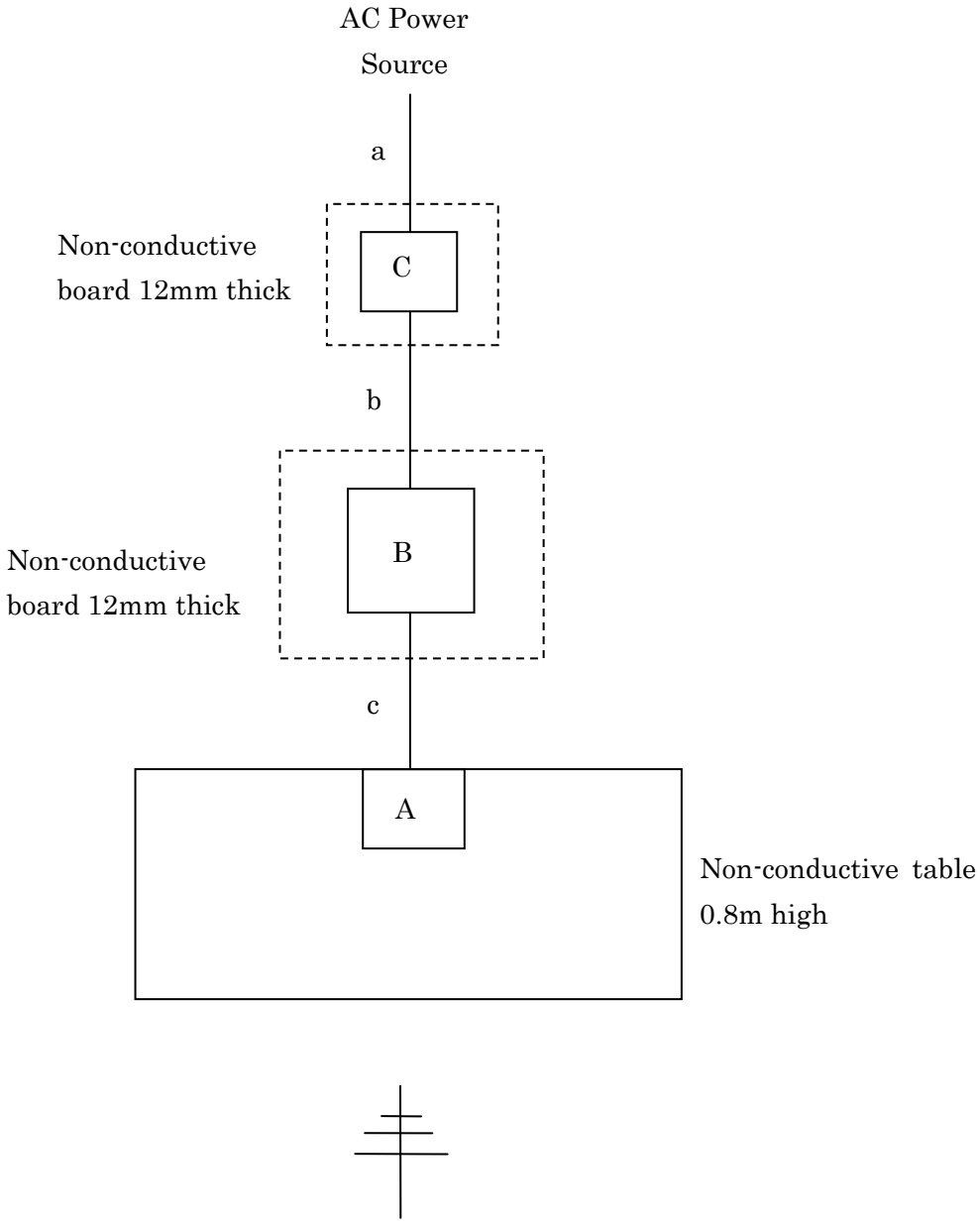
	Instrument	Model		Cable	Length	Shield
A	USB dongle	WDR-U	a	AC Power Cord	1.7 m	×
B	Personal Computer	ZG5	b	DC Power Cord	1.5 m	×
C	AC Adapter	HD-A0301R3	c	USB cable	1.0 m	○

4.1 15. 207 AC Power Conducted Emission in Shield Room

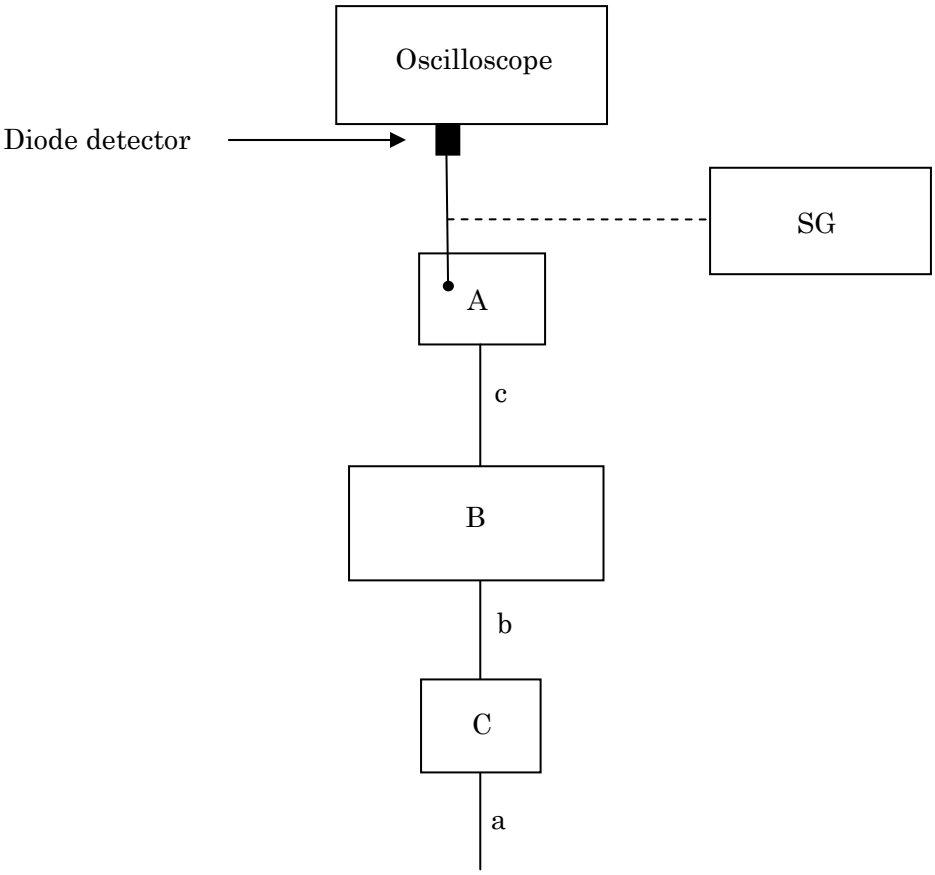


Non-conducted table,
0.8 m high

4.2 15. 247(d), 15.209 Transmitter Radiated Emissions, 15.209 Band Edge (Radiated), and 15.215 (c) 20 dB Bandwidth in 3m Anechoic Chamber



4.3 Maximum Peak Output Power



4.4 Test Mode

In all test configurations above, EUT makes continuous RF transmitting with manufacturer's specified power.

5. Measurement Result

5.1 15. 207 AC Power Conducted Emission

5.1.1 Setting Remarks

- Configure the EUT System in accordance with ANSI C63.4-2003.
- Non-conductive board (10mm thick) for EUT and non-conductive table (80cm high) for personal computer were used.
- Other power cord of support equipment is connected to another LISN to isolate its emission from the measured emission of EUT.
- The measuring port of LISN for support equipment was terminated by the 50Ω
- Activate the EUT System and run the software prepared for the test, if necessary.
- Refer to test configuration figure 4.1.

5.1.2 Minimum Standard

15. 207 (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

5.1.3 Result

EUT complies with the requirement.

Uncertainty of measurement : ± 2.26 dB
Temperature, Humidity : 24 ˚C, 40 %

5.1.4 Measured Data

Measured Value Table

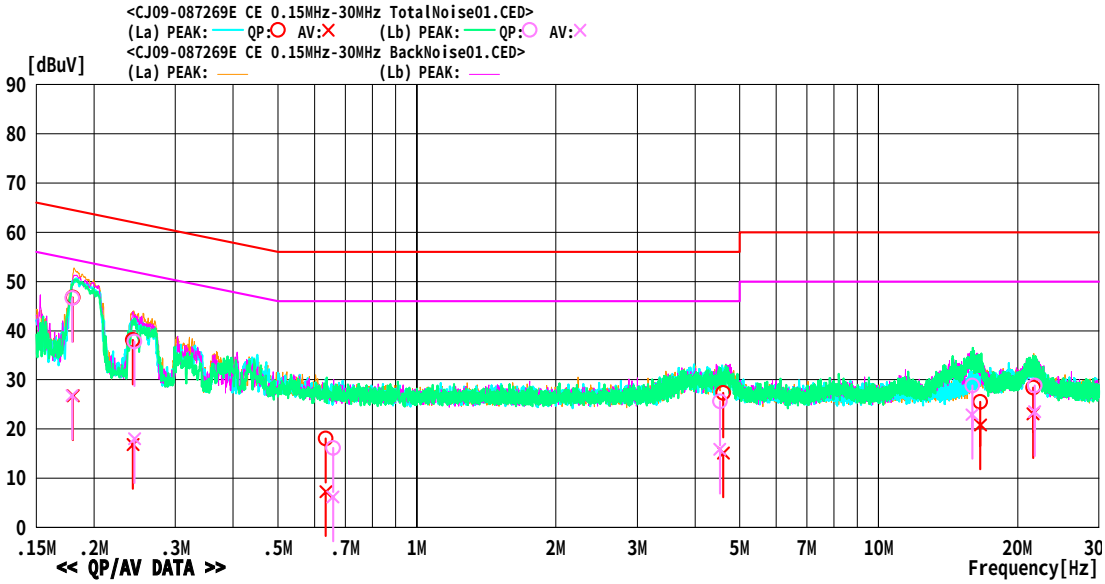
Cosmos Corporation Onoki Lab.
Date : 2010/01/06

Model Name : WDR-U
Serial No. : 01
Operator : O.Itogawa
Power Supply : AC 120V,60Hz/DC5V

Job No : CJ09-087269E
Temp/Humi : 24°C/40%
Condition : Operated
Remark :

Memo : RBW:9kHz(150k-30MHz)

LIMIT : FCC 15.207(QP)
FCC 15.207(AV)



No	Freq.	Reading Level		C.Fac	Results		Limit		Margin		Phase	Comment
		QP	AV		QP	AV	QP	AV	QP	AV		
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.18009	36.6	16.6	10.1	46.7	26.7	64.5	54.5	17.8	27.8	La	
2	0.24288	28.0	6.7	10.1	38.1	16.8	62.0	52.0	23.9	35.2	La	
3	0.63517	8.0	-2.8	10.1	18.1	7.3	56.0	46.0	37.9	38.7	La	
4	4.61068	16.9	4.7	10.4	27.3	15.1	56.0	46.0	28.7	30.9	La	
5	16.61731	14.5	9.8	11.0	25.5	20.8	60.0	50.0	34.5	29.2	La	
6	21.59546	17.3	12.0	11.1	28.4	23.1	60.0	50.0	31.6	27.0	La	
7	0.17939	36.6	16.7	10.1	46.7	26.8	64.5	54.5	17.9	27.7	Lb	
8	0.24472	27.7	7.9	10.1	37.8	18.0	61.9	51.9	24.2	33.9	Lb	
9	0.65849	6.1	-3.9	10.1	16.2	6.2	56.0	46.0	39.9	39.8	Lb	
10	4.53064	15.2	5.5	10.4	25.6	15.9	56.0	46.0	30.4	30.1	Lb	
11	15.93342	18.0	12.0	10.9	28.9	22.9	60.0	50.0	31.1	27.1	Lb	
12	21.77963	17.7	12.4	11.1	28.8	23.5	60.0	50.0	31.2	26.5	Lb	

-TEPTO-DV/CE Ver1.50.0128

5.2 15. 247(a)(2) Spectrum Bandwidth of Direct Sequence Spread Spectrum System

5.2.1 Setting Remarks

- The both side of 6dB down value from peak power are measured by using delta-maker function of the spectrum analyzer.
- The spectrum analyzer is set-up as following;

✓	Frequency Span	: 10 MHz
✓	Resolution bandwidth	: 100 kHz
✓	Video bandwidth	: 300 kHz
✓	Sweep	: 10 ms
✓	Detector function	: Peak
✓	Trace Mode	: Max Hold

5.2.2 Minimum Standard

15.247 (a) (2) Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

5.2.3 Result

EUT complies with the requirement.

Uncertainty of measurement result: ± 0.8 dB
Temperature, Humidity : 23˚C, 45 %

5.2.4 Measured Data

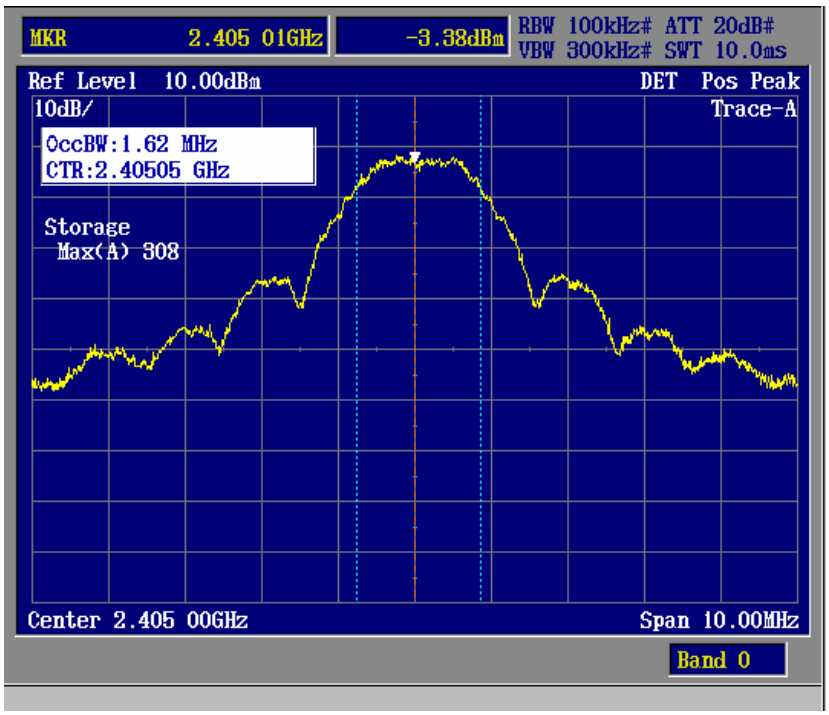
Frequency (MHz)	Frequency Bandwidth (MHz)	Limit (MHz)	Margin (dB)
2405(11ch)	1.62	0.5	1.1

Frequency (MHz)	Frequency Bandwidth (MHz)	Limit (MHz)	Margin (dB)
2440(18ch)	1.62	0.5	1.1

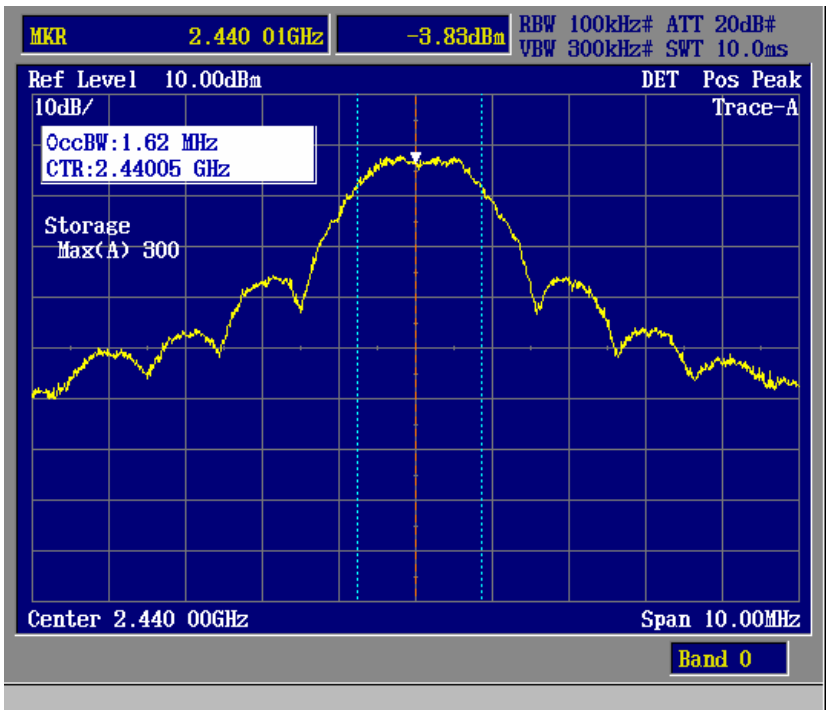
Frequency (MHz)	Frequency Bandwidth (MHz)	Limit (MHz)	Margin (dB)
2480(26ch)	1.65	0.5	1.2

Measured Data (Continued)

Low



Middle



5.2.4 Measured Data (Continued)

High

5.3 15. 247(b) Maximum Peak Output Power

5.3.1 Setting Remarks

- See test configuration figure 4.3.
- The maximum peak output power is measured as following;

1. The diode detector is inserted between EUT and the oscilloscope.
2. The oscilloscope is used to read the peak response of the detector.
3. Replaced EUT by the signal generator (SG).
4. Adjusted the frequency of SG to the fundamental frequency.
5. Adjusted the amplitude of SG to be the same peak recorded in 2.

- The oscilloscope is set-up as following;

✓	Voltage level range	: 10 mV / Div
✓	Sampling time	: 1.00GS / s
✓	Function	: Peak search

5.3.2 Minimum Standard

The maximum peak output power shall not exceed 1 watt. If transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

5.3.3 Result

EUT complies with the requirement.

Uncertainty of measurement result: ± 0.5 dB
Temperature, Humidity : 23˚C, 45%

5.3.4 Measured Data

Frequency (MHz)	Power Supply Voltage [V]	Peak Power (dBm)	Limit (dBm)	Margin (dB)
2405(11ch)	5.00	1.58	30	28.42
	4.25		30	30
	5.75		30	30

Frequency (MHz)	Power Supply Voltage [V]	Peak Power (dBm)	Limit (dBm)	Margin (dB)
2440(18ch)	5.00	0.65	30	29.35
	4.25		30	30
	5.75		30	30

Frequency (MHz)	Power Supply Voltage [V]	Peak Power (dBm)	Limit (dBm)	Margin (dB)
2480(26ch)	5.00	0.31	30	29.69
	4.25		30	30
	5.75		30	30

Note:
Since this device is digital modulation equipment, Maximum peak output power was measured.
EUT was not operated normally at measurement of conducted or radiated in voltage change ±15%, because the rated voltage of EUT is DC4.5V to DC5.5V.

5.4 15. 247(d) Transmitter Spurious Emissions (Conducted)

5.4.1 Setting Remarks

- EUT directly connects to the spectrum analyzer via calibrated coaxial cable and 10 dB attenuator.
- The Spectrums are scanned from the lowest generated frequency of EUT up to the 10th harmonics by using the spectrum analyzer.
- The spectrum analyzer is set-up as following;

✓	Resolution bandwidth	: 100 kHz
✓	Video bandwidth	: 100 kHz
✓	Sweep	: Auto
✓	Detector function	: Peak
✓	Trace Mode	: Max Hold

5.4.2 Minimum Standard

15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required.

5.4.3 Result

EUT complies with the requirement.

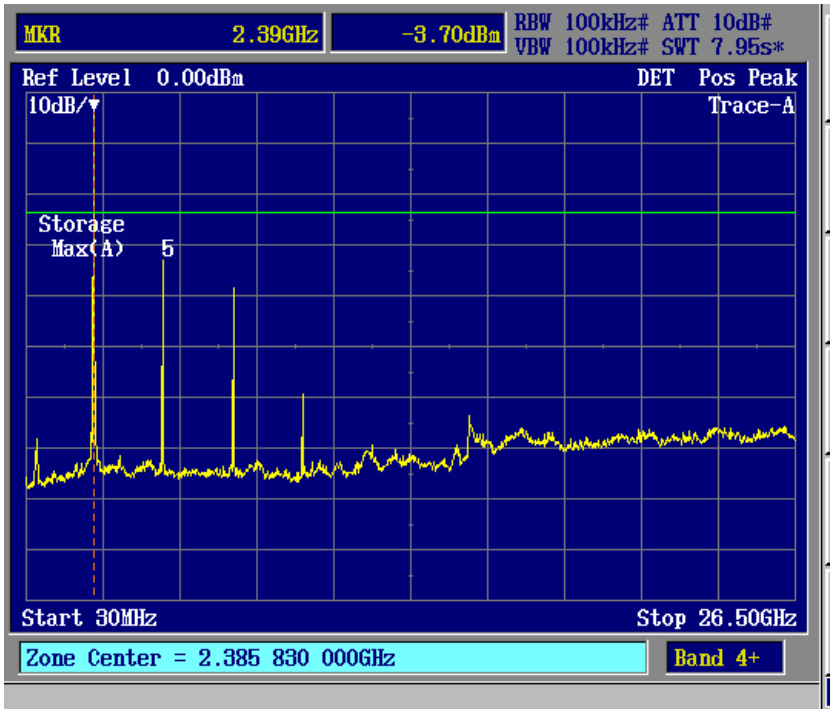
Uncertainty of measurement result: ± 0.8 dB
Temperature, Humidity : 23˚C, 45%

5.4.4 Measured Data

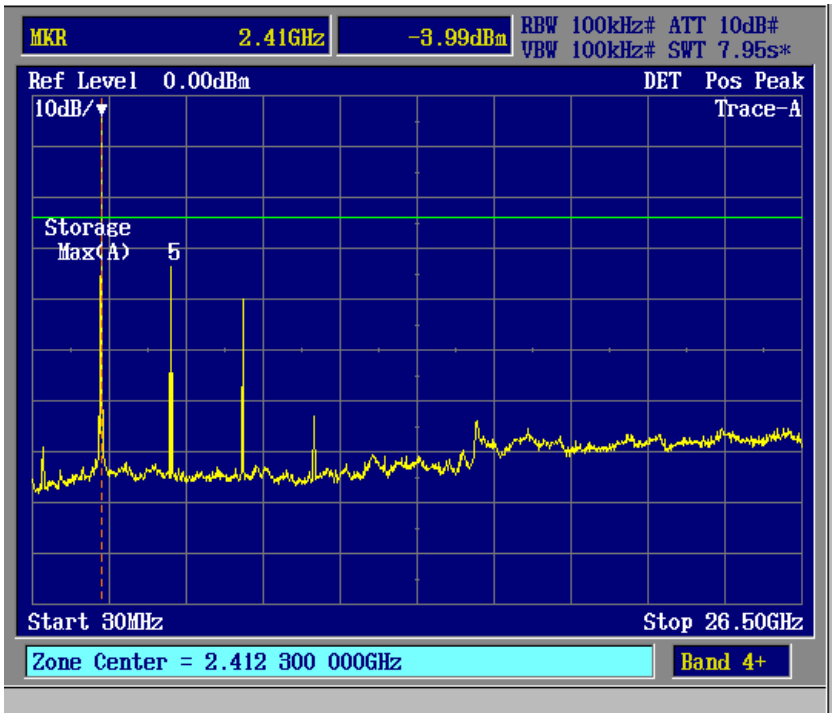
(No emission exceeding the 20dB limit was found)

30MHz - 26.5GHz

Low

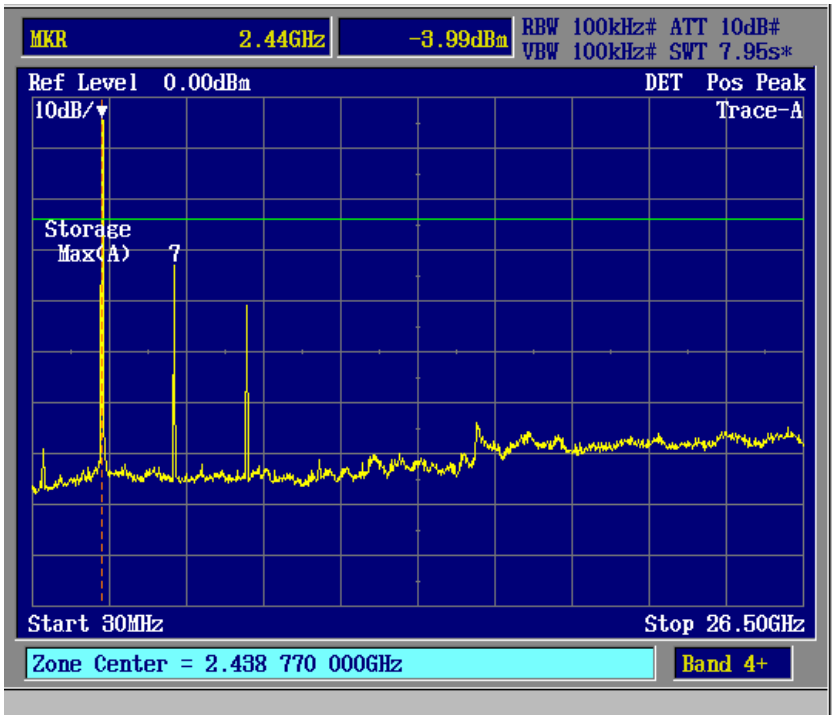


Middle



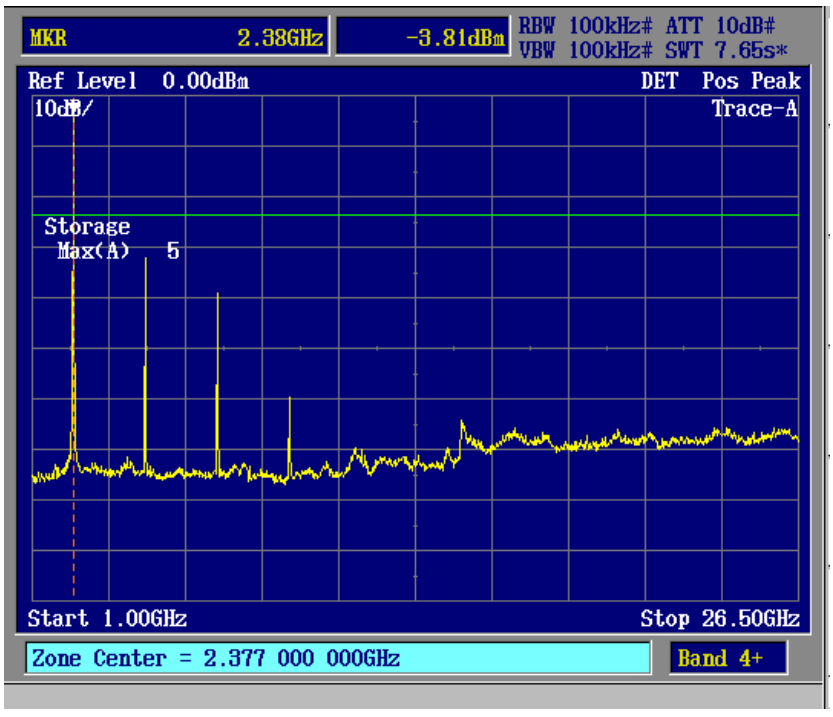
5.4.4 Measured Data (Continued)

High



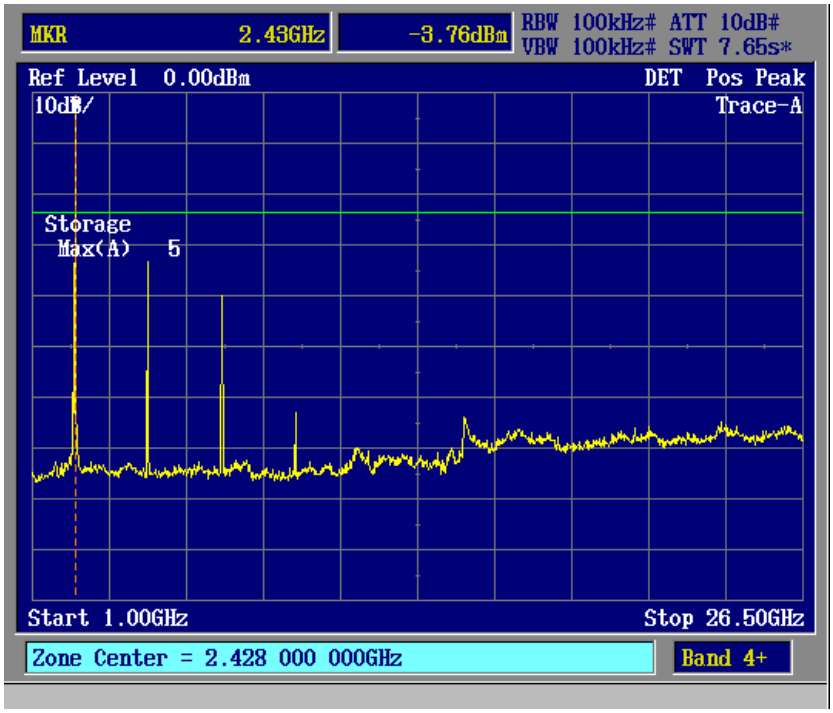
1GHz - 26.5GHz

Low

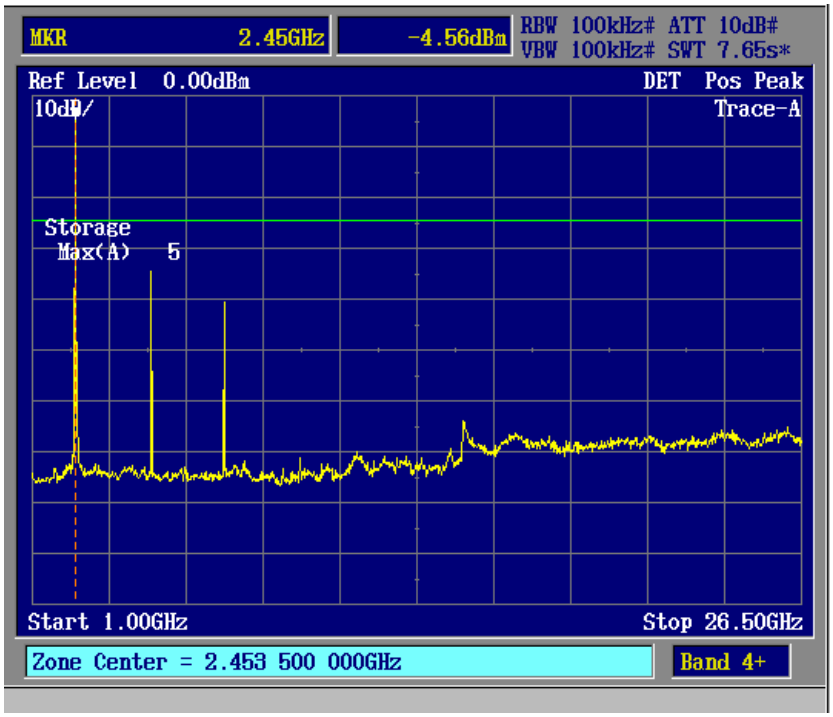


5.4.4 Measured Data (Continued)

Middle



High



5.5 15. 247(d) Transmitter Radiated Emissions (Radiated)

5.5.1 Setting Remarks

- The data lists in "5.5.4 Measured Data " list the significant emission frequencies, measured levels, correction factor (includes cable and antenna corrections), the corrected reading, plus the limit.
- In the frequency range between 30MHz to 25 GHz (as 10th harmonics), the Electric Field Strength is measured in accordance with ANSI C63.4: 2003 and CISPR22: 1997.
- The test setup is made in accordance with ANSI C63.4: 2003.
- The antenna is measured at 1-4m height.
- The EUT is placed on the non-conductive table in the center of turntable. The height of this table is 0.8m.
- The measurement is carried out with both horizontal and vertical antenna polarization.
- The highest radiation from the equipment is recorded.
- By varying the configuration of the test sample and the cable routing, it is attempted to maximize the emission.
- The test receiver with Quasi Peak and Average detector is in compliance with CISPR 16-1:1993.
- The spectrum analyzer is set-up as following;

(Frequency range : 30 - 1000 MHz)

·	Resolution bandwidth	: 100 kHz
·	Video bandwidth	: 300 kHz
·	Detector function	: Peak
·	Trace Mode	: Max Hold

(Frequency range : Above 1000 MHz)

✓	Resolution bandwidth	: 1 MHz
✓	Video bandwidth	: 1 MHz
✓	Detector function	: Peak
✓	Trace Mode	: Max Hold

- EMI Test Receiver analyzer is set-up as following;

✓	IF bandwidth	: 120 kHz (Quasi-Peak Detector)
✓	IF bandwidth	: 1 MHz (Average Detector)

- See test configuration figure 4.2.

5.5.2 Minimum Standard

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F (kHz)	300
0.490-1.705	24000/F (kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., § § 15.231 and 15.241.

5.5.3 Result

EUT complies with the requirement.

Uncertainty of measurement result: ± 3.28 dB
Temperature, Humidity : Refer to each data table

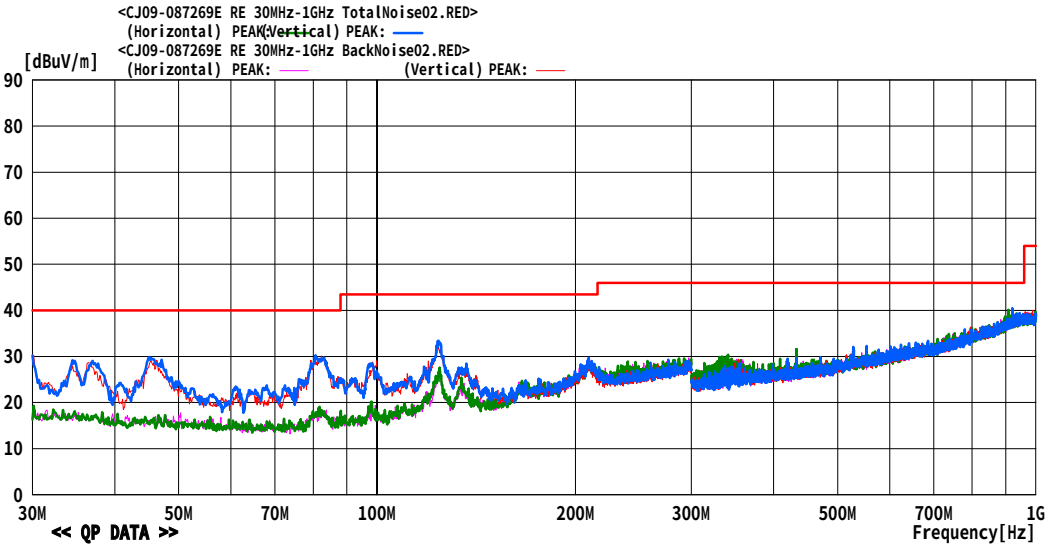
5.5.4 Measured Data

30M to 1GHz (11CH)

Model Name	: WDR-U	Job No	: CJ09-087269E
Serial No.	: 01	Temp./Humi.	: 24°C/40%
Operator	: O.Itogawa	Condition	: CH11
Power Supply	: DC5V	Remark	:

Memo : RBW:30M～1GHz(120kHz)

LIMIT : Fcc15C 15_209 (3m) 30MHz-1000MHz



No	Freq. [MHz]	Reading [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant Type	Comment
1	168.136	23.7	12.7	5.7	27.9	14.2	43.5	29.3	Hori.	100	169	BC	QP
2	404.409	22.3	16.6	7.5	28.3	18.1	46.0	27.9	Hori.	100	330	LP	QP
3	908.216	24.6	22.4	10.0	27.8	29.2	46.0	16.8	Hori.	100	358	LP	QP
4	168.136	23.7	12.7	5.7	27.9	14.2	43.5	29.3	Vert.	100	358	BC	QP
5	404.409	22.2	16.6	7.5	28.3	18.0	46.0	28.0	Vert.	100	358	LP	QP
6	921.442	24.5	22.5	10.0	27.7	29.3	46.0	16.7	Vert.	100	1	LP	QP

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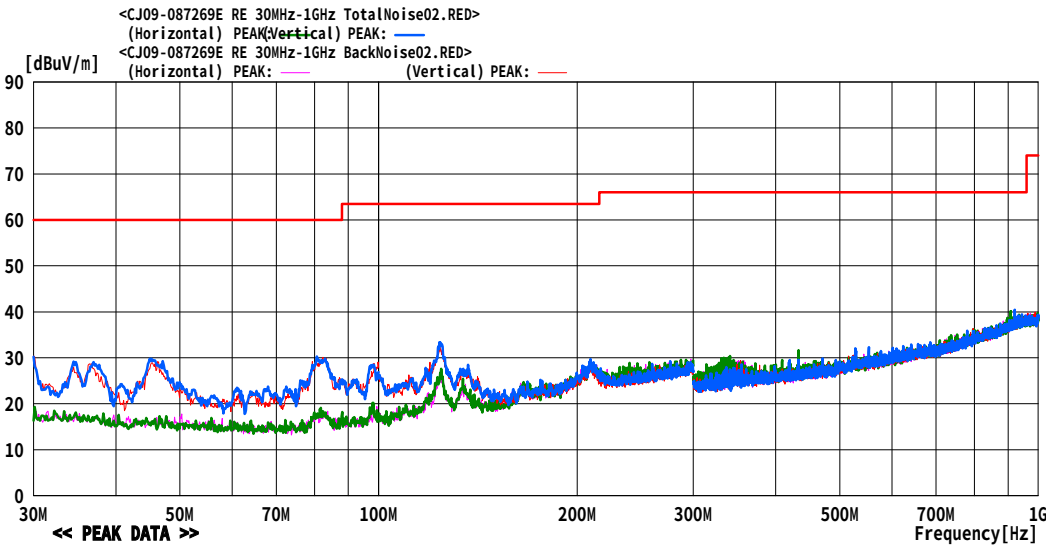
5.5.4 Measured Data (Continued)

30M to 1GHz (11CH)

Model Name	: WDR-U	Job No	: CJ09-087269E
Serial No.	: 01	Temp./Humi.	: 24℃/40%
Operator	: O.Itogawa	Condition	: CH11
Power Supply	: DC5V	Remark	:

Memo : RBW:30M～1GHz(120kHz)

LIMIT : Fcc15C 15_209 (3m)PK 30MHz-1000MHz



No	Freq. [MHz]	Reading [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant Type	Comment
1	168.136	29.6	12.7	5.7	27.9	20.1	63.5	43.4	Hori.	100	169	BC	PK
2	404.409	28.0	16.6	7.5	28.3	23.8	66.0	42.2	Hori.	100	330	LP	PK
3	908.216	30.3	22.4	10.0	27.8	34.9	66.0	31.1	Hori.	100	358	LP	PK
4	168.136	30.7	12.7	5.7	27.9	21.2	63.5	42.3	Vert.	100	358	BC	PK
5	404.409	28.4	16.6	7.5	28.3	24.2	66.0	41.8	Vert.	100	358	LP	PK
6	921.442	31.1	22.5	10.0	27.7	35.9	66.0	30.1	Vert.	100	1	LP	PK

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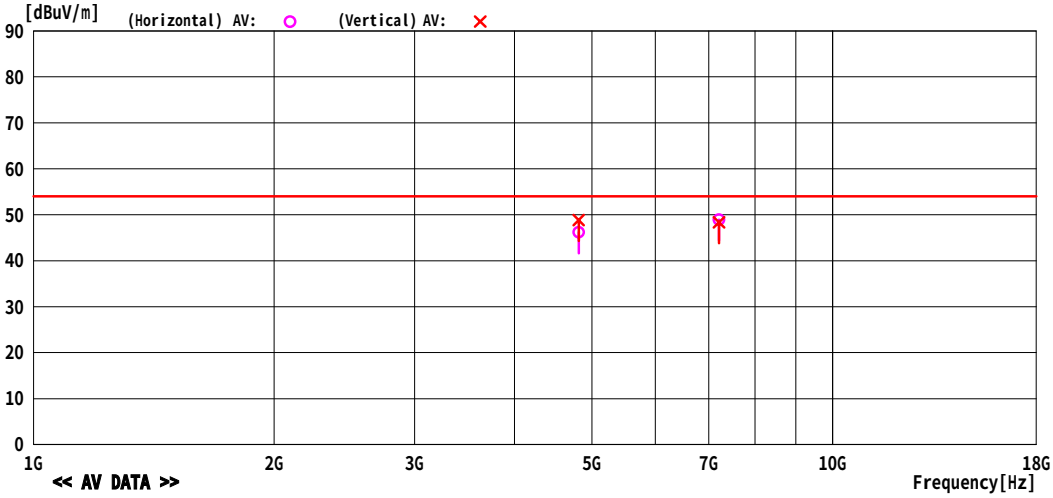
5.5.4 Measured Data (Continued)

1GHz to 18GHz (11CH)

Model Name	: WDR-U	Job No.	: CJ09-087269E
Serial No.	: 01	Temp/Humi	: 24°C/40%
Operator	: O.Itogawa	Condition	: CH11
Power Supply	: DC5V	Remark	:

Memo : RBW:1GHz～(1MHz)

LIMIT : FCC Subpart C 15.209 (3m) 1G-26.5GHz(AV)



No	Freq. [MHz]	Reading [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant Type	Comment
1	4811.033	41.4	32.1	-27.3	0.0	46.2	54.0	7.8	Hori.	159	294	HRN	AV
2	7213.400	37.5	36.7	-25.2	0.0	49.0	54.0	5.0	Hori.	181	136	HRN	AV
3	4810.922	44.1	32.1	-27.3	0.0	48.9	54.0	5.2	Vert.	132	168	HRN	AV
4	7213.568	36.9	36.7	-25.2	0.0	48.4	54.0	5.6	Vert.	178	54	HRN	AV

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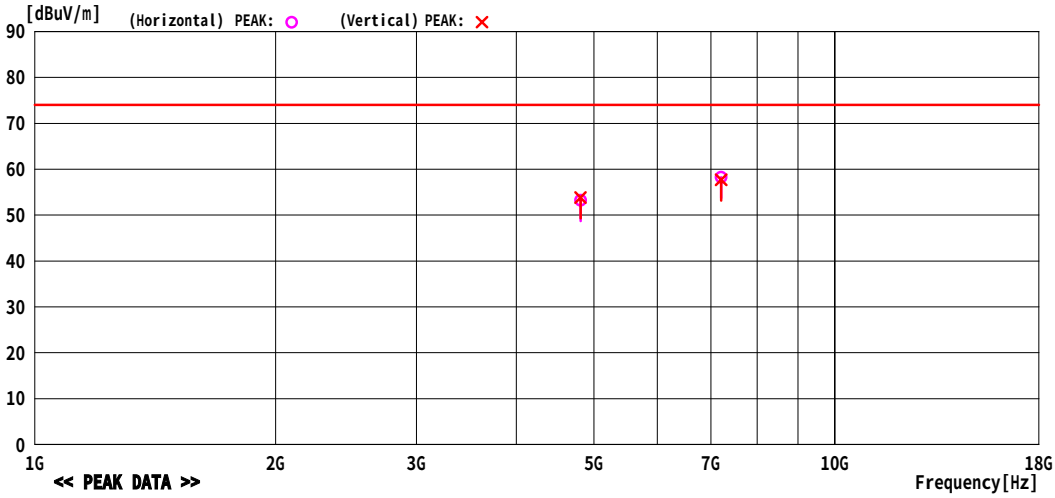
5.5.4 Measured Data (Continued)

1GHz to 18GHz (11CH)

Model Name	: WDR-U	Job No.	: CJ09-087269E
Serial No.	: 01	Temp/Humi	: 24°C/40%
Operator	: O.Itogawa	Condition	: CH11
Power Supply	: DC5V	Remark	:

Memo : RBW:1GHz～(1MHz)

LIMIT : FCC Subpart C 15.209 (3m) 1G-26.5GHz(PK)



No	Freq. [MHz]	Reading [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant Type	Comment
1	4811.033	48.5	32.1	-27.3	0.0	53.3	74.0	20.8	Hori.	159	294	HRN	PK
2	7213.400	46.8	36.7	-25.2	0.0	58.3	74.0	15.7	Hori.	181	136	HRN	PK
3	4810.922	49.0	32.1	-27.3	0.0	53.8	74.0	20.2	Vert.	132	168	HRN	PK
4	7213.568	46.2	36.7	-25.2	0.0	57.7	74.0	16.3	Vert.	178	54	HRN	PK

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5.5.4 Measured Data (Continued)

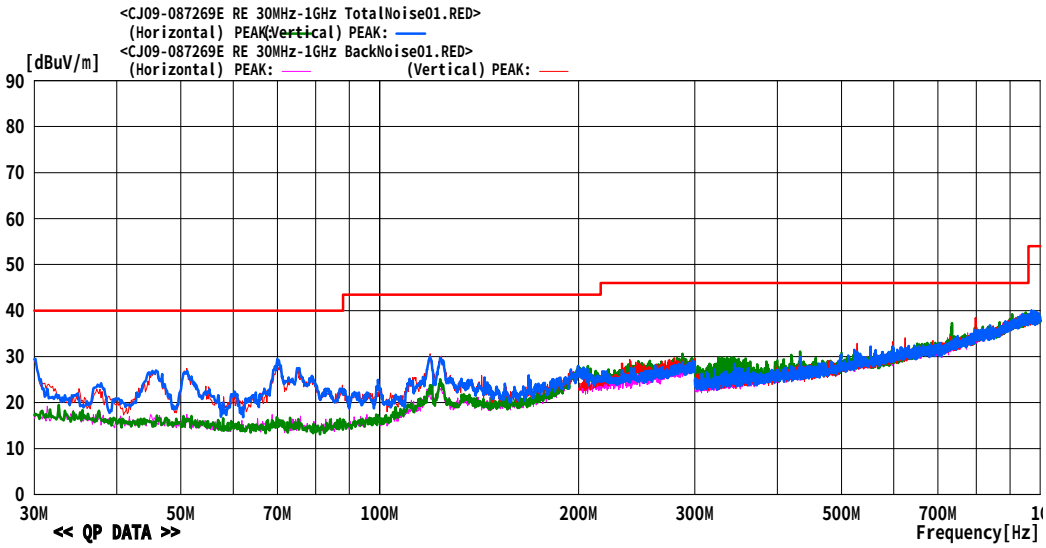
30M to 1GHz (18CH)

Model Name : WDR-U
Serial No. : 01
Operator : O.Itogawa
Power Supply : DC5V

Job No : CJ09-087269E
Temp./Humi. : 24°C/40%
Condition : CH18
Remark :

Memo : RBW:30M～1GHz(120kHz)

LIMIT : Fcc15C 15_209 (3m) 30MHz-1000MHz



No	Freq. [MHz]	Reading [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant Type	Comment
1	192.219	26.9	14.3	5.9	27.7	19.4	43.5	24.1	Hori.	100	0	BC	QP
2	341.533	26.8	15.2	7.1	27.8	21.3	46.0	24.7	Hori.	100	72	LP	QP
3	733.368	29.4	20.3	9.2	28.4	30.5	46.0	15.5	Hori.	109	267	LP	QP
4	191.327	27.9	14.2	5.9	27.7	20.3	43.5	23.2	Vert.	100	0	BC	QP

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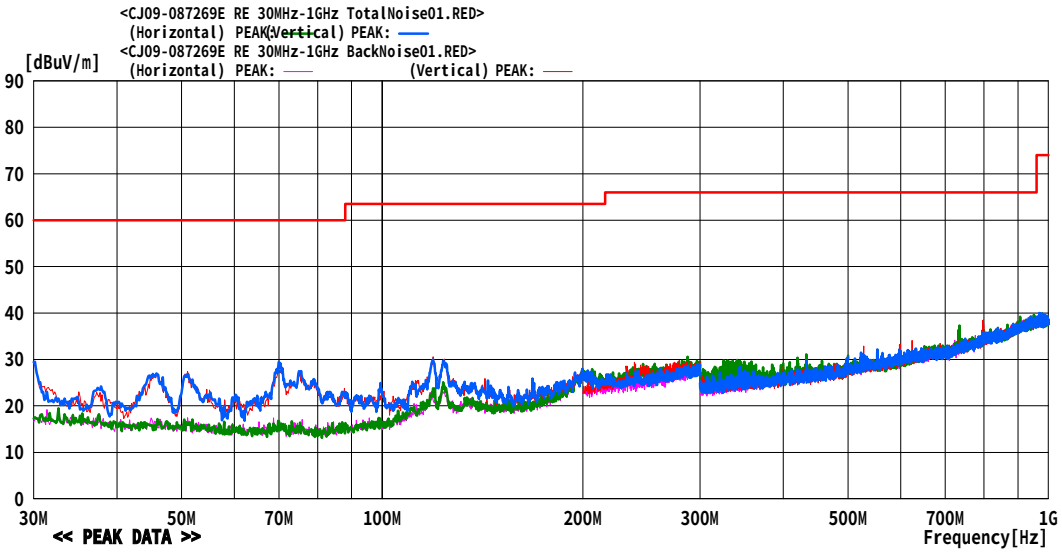
5.5.4 Measured Data (Continued)

30M to 1GHz (18CH)

Model Name	: WDR-U	Job No	: CJ09-087269E
Serial No.	: 01	Temp./Humi.	: 24℃/40%
Operator	: O.Itogawa	Condition	: CH18
Power Supply	: DC5V	Remark	:

Memo : RBW:30M～1GHz(120kHz)

LIMIT : Fcc15C 15_209 (3m)PK 30MHz-1000MHz



No	Freq. [MHz]	Reading [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant Type	Comment
1	192.219	32.2	14.3	5.9	27.7	24.7	63.5	38.8	Hori.	100	0	BC	PK
2	341.533	32.6	15.2	7.1	27.8	27.1	66.0	38.9	Hori.	100	72	LP	PK
3	733.368	35.2	20.3	9.2	28.4	36.3	66.0	29.7	Hori.	109	267	LP	PK
4	191.327	33.2	14.2	5.9	27.7	25.6	63.5	37.9	Vert.	100	0	BC	PK

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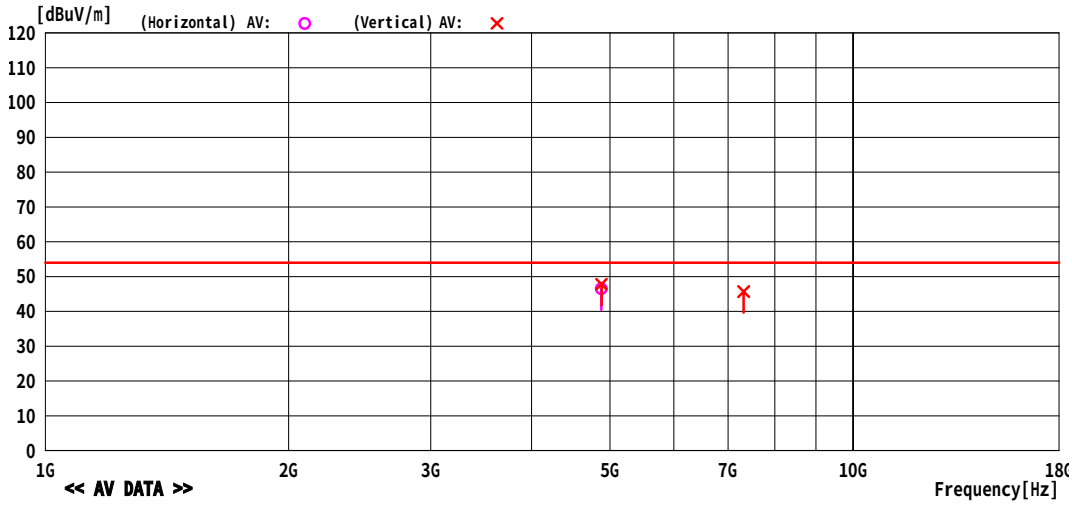
5.5.4 Measured Data (Continued)

1GHz to 18GHz (18CH)

Model Name	: WDR-U	Job No.	: CJ09-087269E
Serial No.	: 01	Temp/Humi	: 24℃/40%
Operator	: O.Itogawa	Condition	: CH18
Power Supply	: DC5V	Remark	:

Memo : RBW:1GHz～(1MHz)

LIMIT : FCC Subpart C 15.209 (3m) 1G-26.5GHz(AV)



No	Freq. [MHz]	Reading [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant Type	Comment
1	4879.028	41.2	32.2	-26.9	0.0	46.5	54.0	7.5	Hori.	123	162	HRN	AV
2	4881.012	42.5	32.2	-26.9	0.0	47.8	54.0	6.2	Vert.	100	195	HRN	AV
3	7321.527	34.0	36.8	-25.1	0.0	45.7	54.0	8.3	Vert.	217	198	HRN	AV

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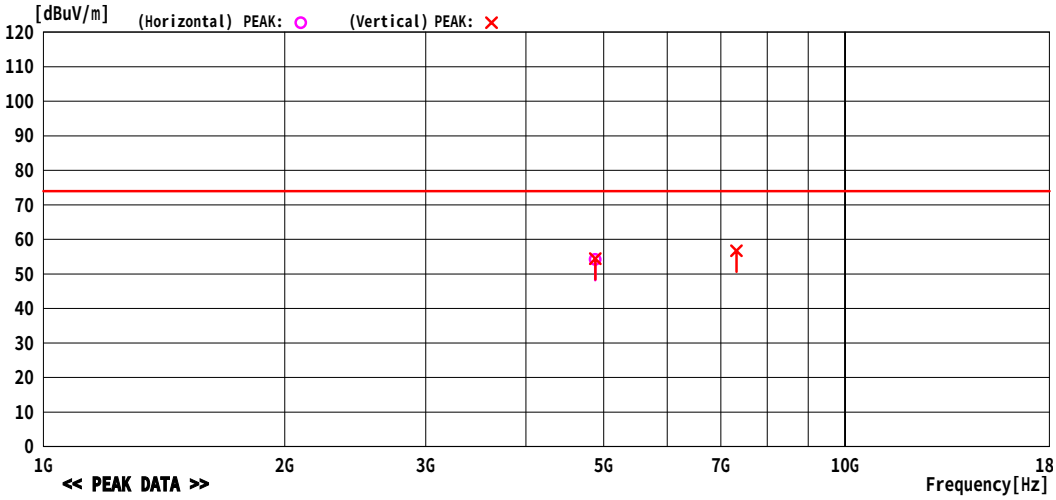
5.5.4 Measured Data (Continued)

1GHz to 18GHz (18CH)

Model Name	: WDR-U	Job No.	: CJ09-087269E
Serial No.	: 01	Temp/Humi	: 24°C/40%
Operator	: O.Itogawa	Condition	: CH18
Power Supply	: DC5V	Remark	:

Memo : RBW:1GHz～(1MHz)

LIMIT : FCC Subpart C 15.209 (3m) 1G-26.5GHz(PK)



No	Freq. [MHz]	Reading [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant Type	Comment
1	4879.028	48.9	32.2	-26.9	0.0	54.2	74.0	19.8	Hori.	123	162	HRN	PK
2	4881.012	49.1	32.2	-26.9	0.0	54.4	74.0	19.6	Vert.	100	195	HRN	PK
3	7321.527	45.0	36.8	-25.1	0.0	56.7	74.0	17.3	Vert.	217	198	HRN	PK

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5.5.4 Measured Data (Continued)

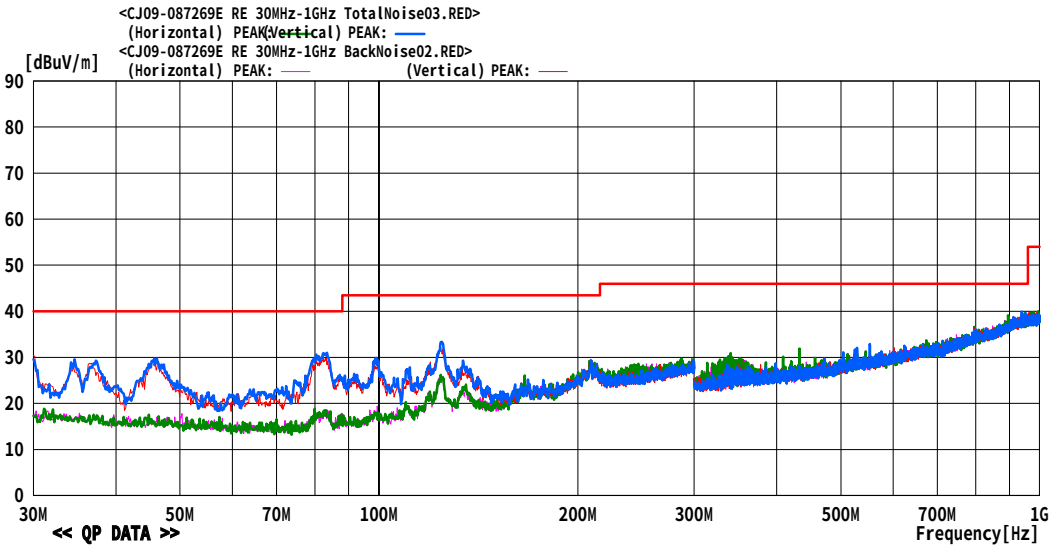
30M to 1GHz (26CH)

Model Name : WDR-U
Serial No. : 01
Operator : O.Itogawa
Power Supply : DC5V

Job No : CJ09-087269E
Temp./Humi. : 24°C/40%
Condition : CH26
Remark :

Memo : RBW:30M～1GHz(120kHz)

LIMIT : Fcc15C 15_209 (3m) 30MHz-1000MHz



No	Freq. [MHz]	Reading [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant Type	Comment
1	180.360	23.7	13.5	5.8	27.8	15.2	43.5	28.3	Hori.	100	0	BC	QP
2	448.497	24.0	17.1	7.8	28.4	20.5	46.0	25.5	Hori.	100	0	LP	QP
3	830.461	24.3	21.5	9.7	28.1	27.4	46.0	18.6	Hori.	100	0	LP	QP
4	180.360	23.5	13.5	5.8	27.8	15.0	43.5	28.5	Vert.	100	0	BC	QP
5	448.497	23.3	17.1	7.8	28.4	19.8	46.0	26.2	Vert.	100	0	LP	QP
6	830.461	24.5	21.5	9.7	28.1	27.6	46.0	18.4	Vert.	100	0	LP	QP

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5.5.4 Measured Data (Continued)

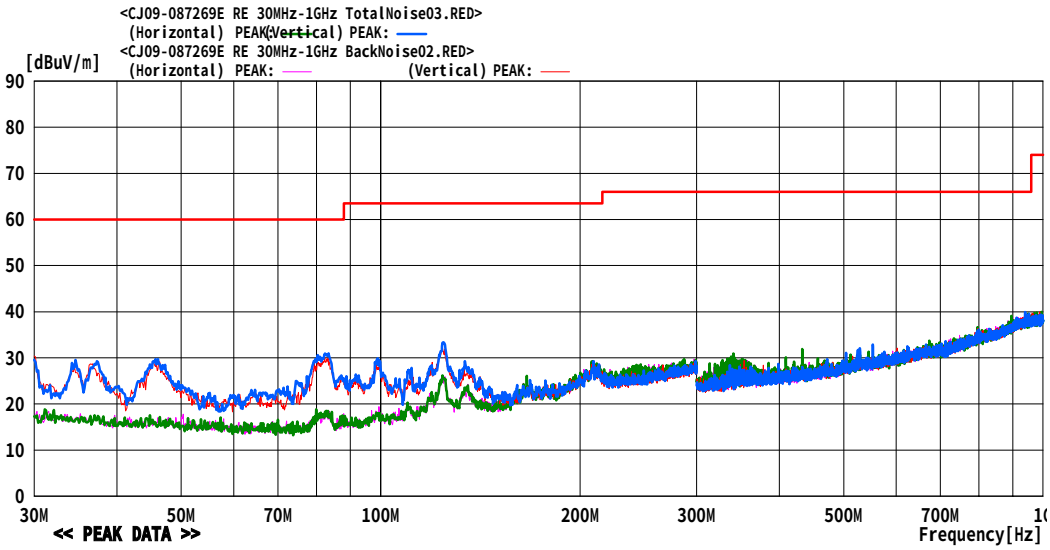
30M to 1GHz (26CH)

Model Name : WDR-U
Serial No. : 01
Operator : O.Itogawa
Power Supply : DC5V

Job No : CJ09-087269E
Temp./Humi. : 24°C/40%
Condition : CH26
Remark :

Memo : RBW:30M～1GHz(120kHz)

LIMIT : Fcc15C 15_209 (3m)PK 30MHz-1000MHz



No	Freq. [MHz]	Reading [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant Type	Comment
1	180.360	29.5	13.5	5.8	27.8	21.0	63.5	42.5	Hori.	100	0	BC	PK
2	448.497	29.4	17.1	7.8	28.4	25.9	66.0	40.1	Hori.	100	0	LP	PK
3	830.461	29.9	21.5	9.7	28.1	33.0	66.0	33.0	Hori.	100	0	LP	PK
4	180.360	29.4	13.5	5.8	27.8	20.9	63.5	42.6	Vert.	100	0	BC	PK
5	448.497	28.8	17.1	7.8	28.4	25.3	66.0	40.7	Vert.	100	0	LP	PK
6	830.461	30.9	21.5	9.7	28.1	34.0	66.0	32.0	Vert.	100	0	LP	PK

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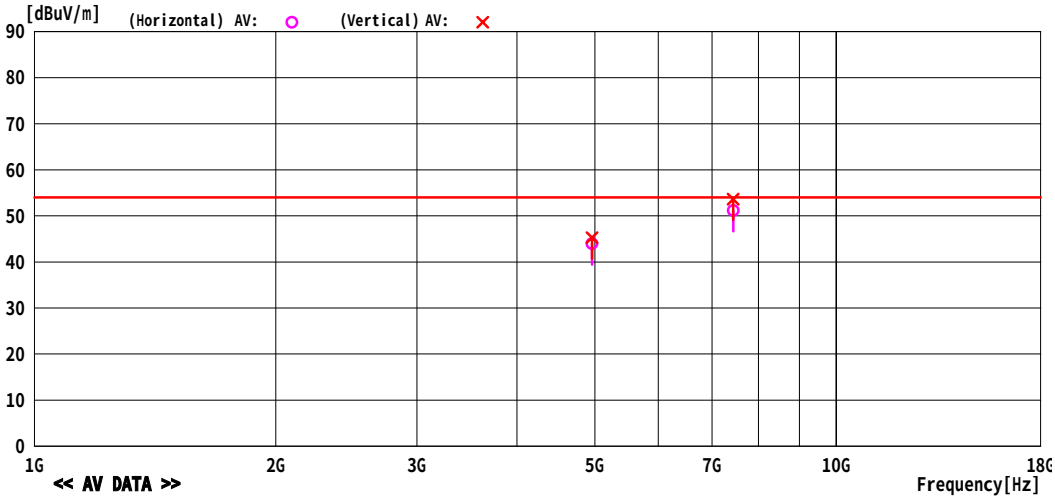
5.5.4 Measured Data (Continued)

1GHz to 18GHz (26CH)

Model Name	: WDR-U	Job No.	: CJ09-087269E
Serial No.	: 01	Temp/Humi	: 24℃/40%
Operator	: O.Itogawa	Condition	: CH26
Power Supply	: DC5V	Remark	:

Memo : RBW:1GHz～(1MHz)

LIMIT : FCC Subpart C 15.209 (3m) 1G-26.5GHz(AV)



No	Freq. [MHz]	Reading [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant Type	Comment
1	4961.119	38.2	32.3	-26.5	0.0	44.0	54.0	10.0	Hori.	100	140	HRN	AV
2	7441.399	39.4	36.8	-25.0	0.0	51.2	54.0	2.8	Hori.	181	132	HRN	AV
3	4961.069	39.5	32.3	-26.5	0.0	45.3	54.0	8.7	Vert.	100	168	HRN	AV
4	7438.645	41.8	36.8	-25.0	0.0	53.6	54.0	0.4	Vert.	149	288	HRN	AV

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5.5.4 Measured Data (Continued)

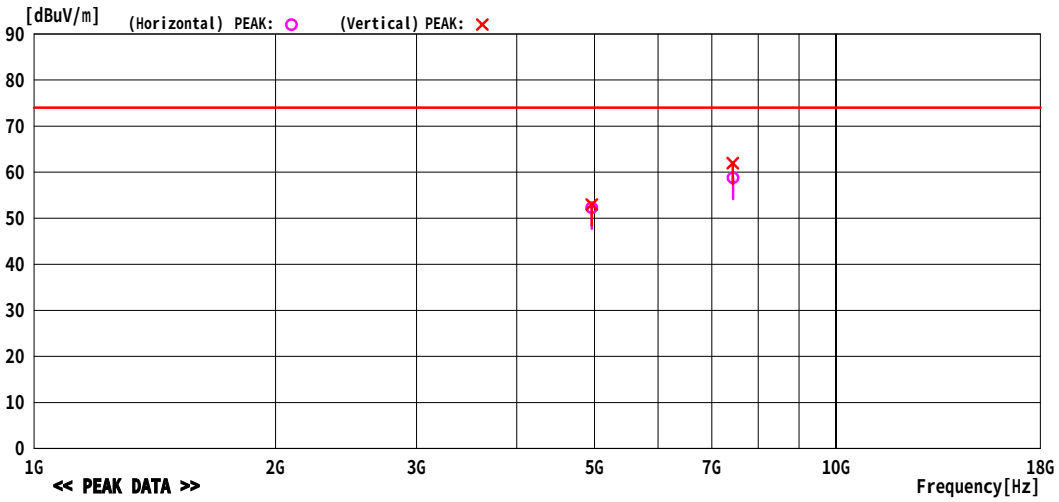
1GHz to 18GHz (26CH)

Model Name : WDR-U
Serial No. : 01
Operator : O.Itogawa
Power Supply : DC5V

Job No. : CJ09-087269E
Temp/Humi : 24℃/40%
Condition : CH26
Remark :

Memo : RBW:1GHz～(1MHz)

LIMIT : FCC Subpart C 15.209 (3m) 1G-26.5GHz(PK)



No	Freq. [MHz]	Reading [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant Type	Comment
1	4961.119	46.5	32.3	-26.5	0.0	52.3	74.0	21.7	Hori.	100	140	HRN	PK
2	7441.399	46.9	36.8	-25.0	0.0	58.7	74.0	15.3	Hori.	181	132	HRN	PK
3	4961.069	47.2	32.3	-26.5	0.0	53.0	74.0	21.0	Vert.	100	168	HRN	PK
4	7438.645	50.2	36.8	-25.0	0.0	62.0	74.0	12.0	Vert.	149	288	HRN	PK

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18GHz to 26.5GHz

11CH, 18CH, 26CH

No spurious emission was found.

5.6 15. 247(e) Power Spectrum Density

5.6.1 Setting Remarks

- EUT directly connects to the spectrum analyzer via calibrated coaxial cable and 10 dB attenuator.
- The loss of the coaxial cable is maximum 1 dB.
- The peak output power is determined by using the marker-data function of spectrum analyzer.
- The spectrum analyzer is set-up as following;

✓	Frequency Span	: 1.5 MHz
✓	Resolution bandwidth	: 3 kHz
✓	Video bandwidth	: 3 MHz
✓	Sweep	: 500sec
✓	Detector function	: Peak
✓	Trace Mode	: Max Hold

5.6.2 Minimum Standard

15.247 (e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

5.6.3 Result

EUT complies with the requirement.

Uncertainty of measurement result: ± 0.8 dB
Temperature, Humidity : 25˚C, 45%

5.6.4 Measured Data

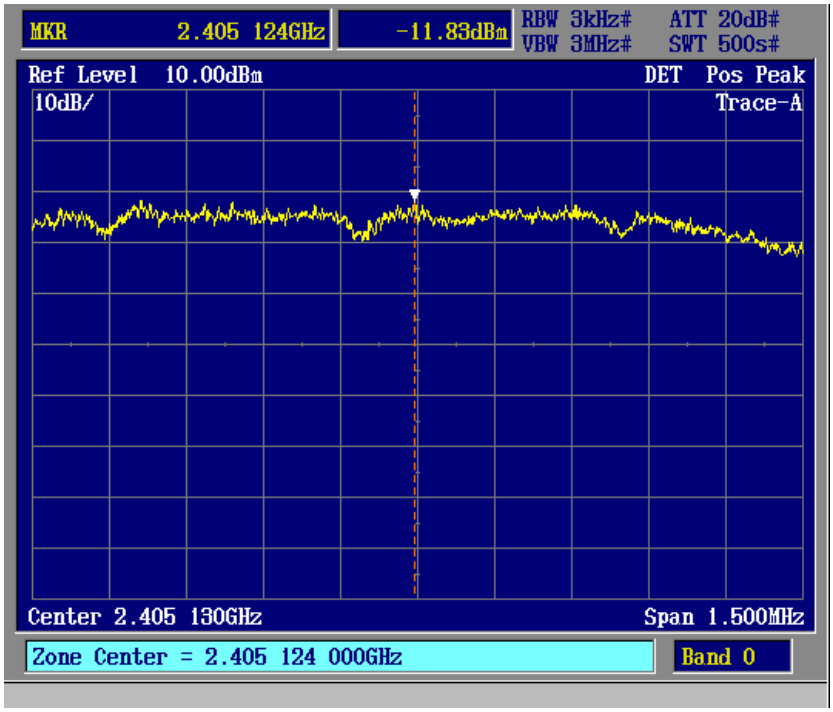
Frequency (MHz)	Correction Factor (dB)	Reading (dBm)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
2405(11ch)	0.70	-11.83	-11.13	8	19.13

Frequency (MHz)	Correction Factor (dB)	Reading (dBm)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
2440(18ch)	0.70	-12.43	-11.73	8	19.73

Frequency (MHz)	Correction Factor (dB)	Reading (dBm)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
2480(26ch)	0.70	-12.84	-12.14	8	20.14

* Correction Factor = Cable Loss (dB) + External Attenuator (dB)

11CH



5.6.4 Measured Data (Continued)

18CH

26CH

5.7 15. 247(d) Band Edge Measurement

5.7.1 Setting Remarks

- EUT directly connects to the spectrum analyzer via calibrated coaxial cable and 10 dB attenuator.
- The loss of the coaxial cable is maximum 1 dB.
- The emission at the band edge is measured by using the marker function of spectrum analyzer.
- The peak of the in-band emission is measured by using the marker to peak function of spectrum analyzer.
- This measurement is repeated in both side of the spectrum.
- The spectrum analyzer is set-up as following;

✓	Frequency Span	: 30MHz
✓	Resolution bandwidth	: 300kHz (1% of frequency span)
✓	Video bandwidth	: > RBW
✓	Sweep	: Auto
✓	Detector function	: Peak
✓	Trace Mode	: Max Hold

- Where band edge spectrum is too rough to find precise edge point, larger RBW i.e. 1MHz, 3MHz shall be applied as severer condition.

5.7.2 Minimum Standard

In any 100kHz bandwidth outside the frequency band in which the transmitter is operating, emissions shall be at least 20 dB below the fundamental emission or shall not exceed the following field strength limits. Emissions falling in the restricted bands of 15.205 shall not exceed the following field strength limits:

Frequency of Emission (MHz)	Limit of the band edge spurious emission (dBμV)	
Below 2,390.0	Peak	Average
Above 2,483.5	74	54

5.7.3 Result

EUT complies with the requirement.

Uncertainty of measurement result: ± 2.6 dB
Temperature, Humidity : 24˚C, 40%

5.7.4 Measured Data

The band edge emissions are calculated as following;

(Vertical)

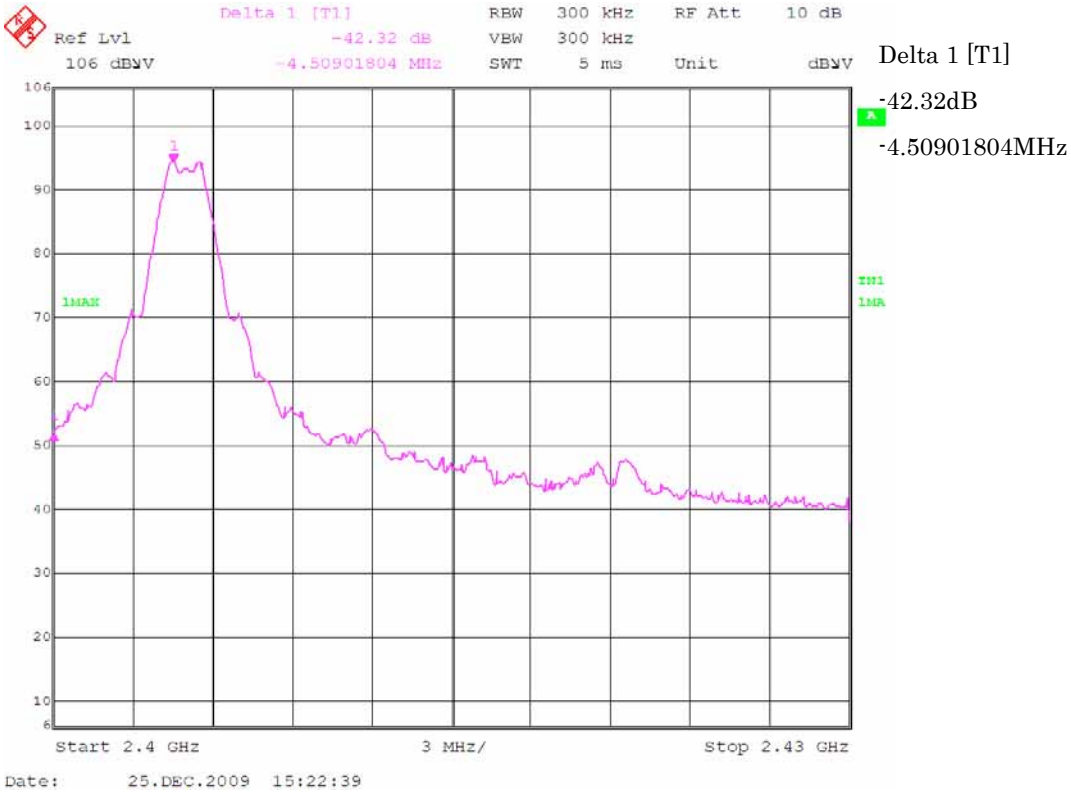
Frequency	Pmax	Pav	Pdev	Pdav	c.f.	Ebe	Eav	Limit (Ebe)	Limit (Eav)	Margin (Ebe)	Margin (Eav)
2400MHz	94.20	92.03	42.32	45.66	-1.7	50.2	44.7	74.0	54.0	23.8	9.3
2483.5MHz	92.54	90.47	36.08	37.20	-1.7	54.8	51.6	74.0	54.0	19.2	2.4

NOTE Vertical and Horizontal were measured and Vertical was confirmed as the worst.

P_{max} : Maximum peak power of the fundamental.
P_{av} : Average of the fundamental.
P_{dev} : The amplitude delta between the peak power and the band edge emission.
P_{dav} : The amplitude delta between the average power and the band edge emission.
E_{be} : Band edge emission.
E_{av} : Average of the band edge emission.

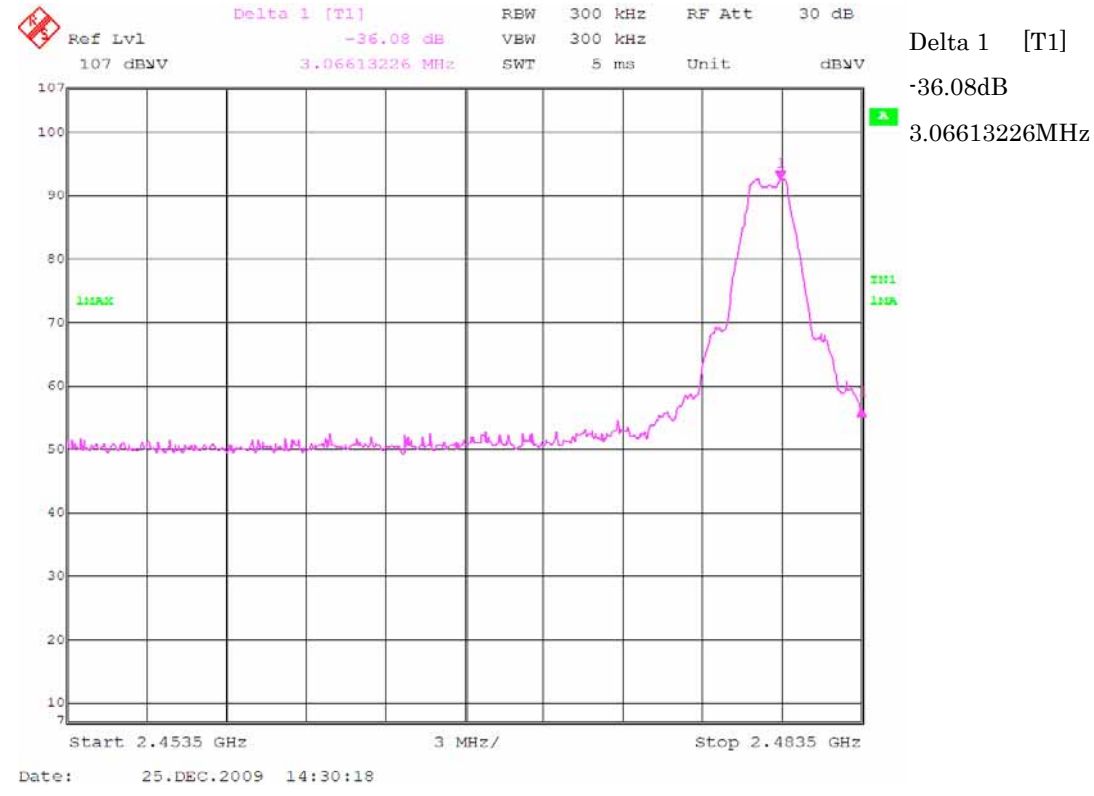
5.7.4 Measured Data (Continued)

11CH



Delta 1 [T1]
-42.32dB
-4.50901804MHz

26CH

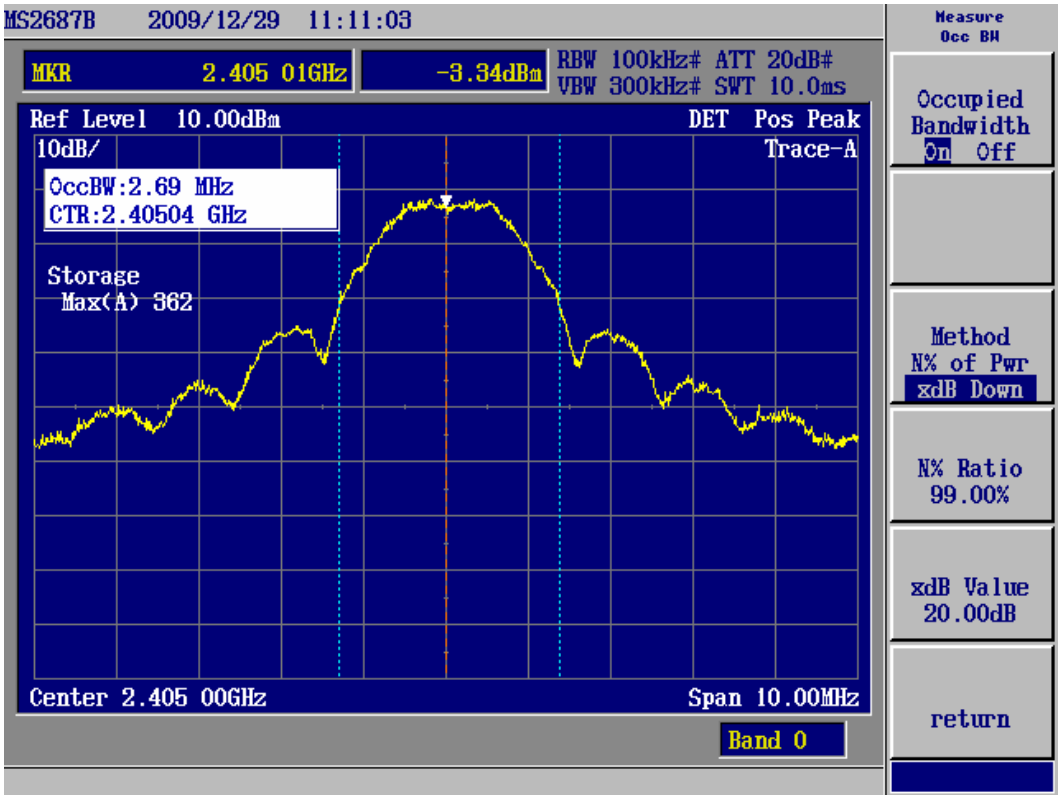


Delta 1 [T1]
-36.08dB
3.06613226MHz

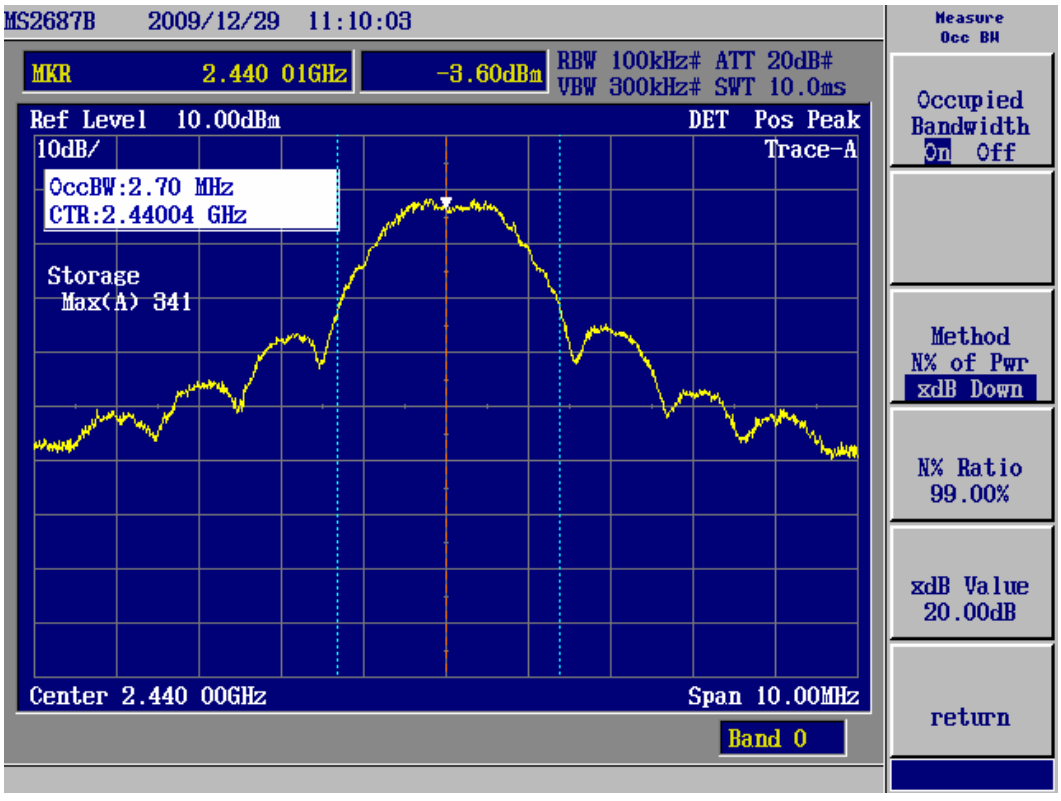
5.8 15.215(c) 20dB Bandwidth

5.8.1 Measured Data

11CH

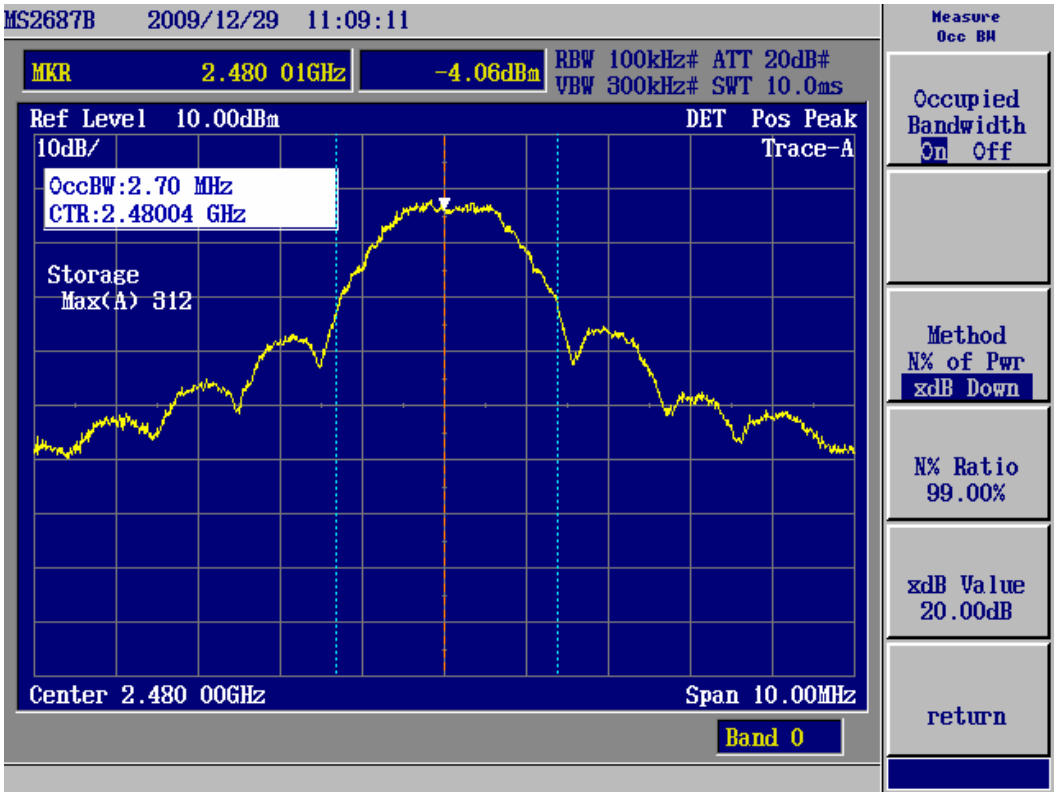


18CH



5.8.1 Measured Data (Continued)

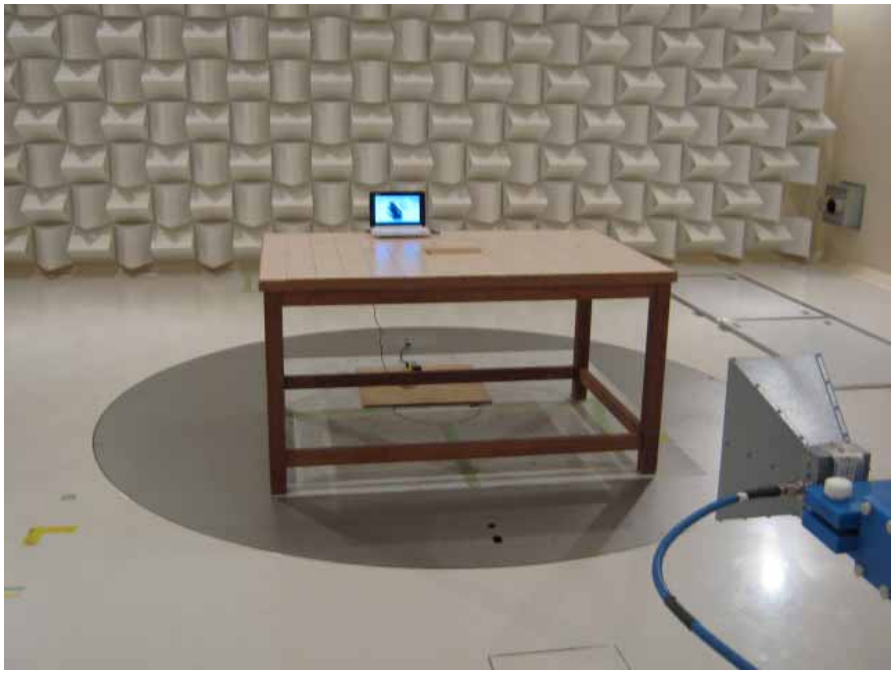
26CH

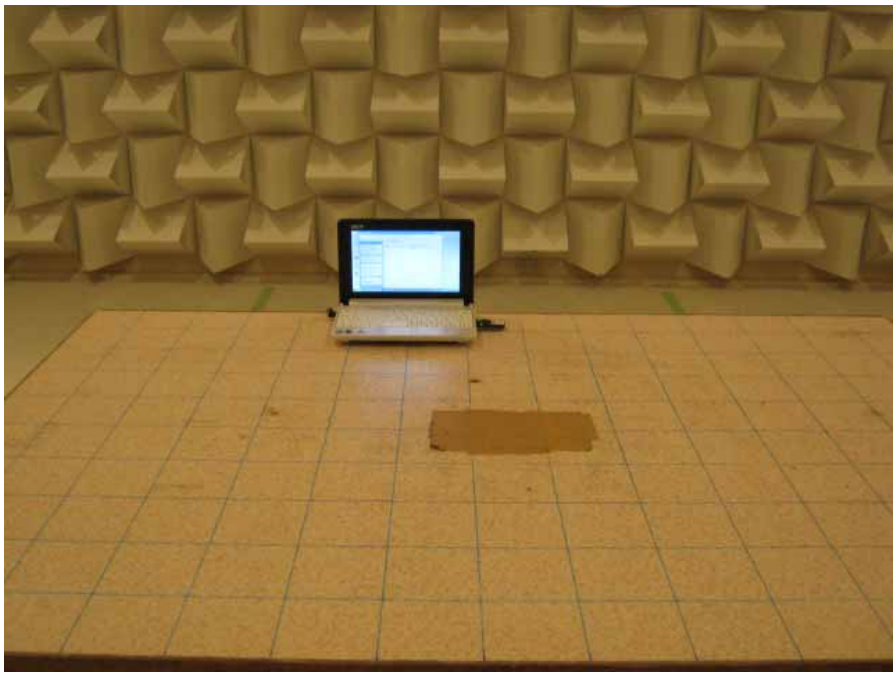


6. Photos

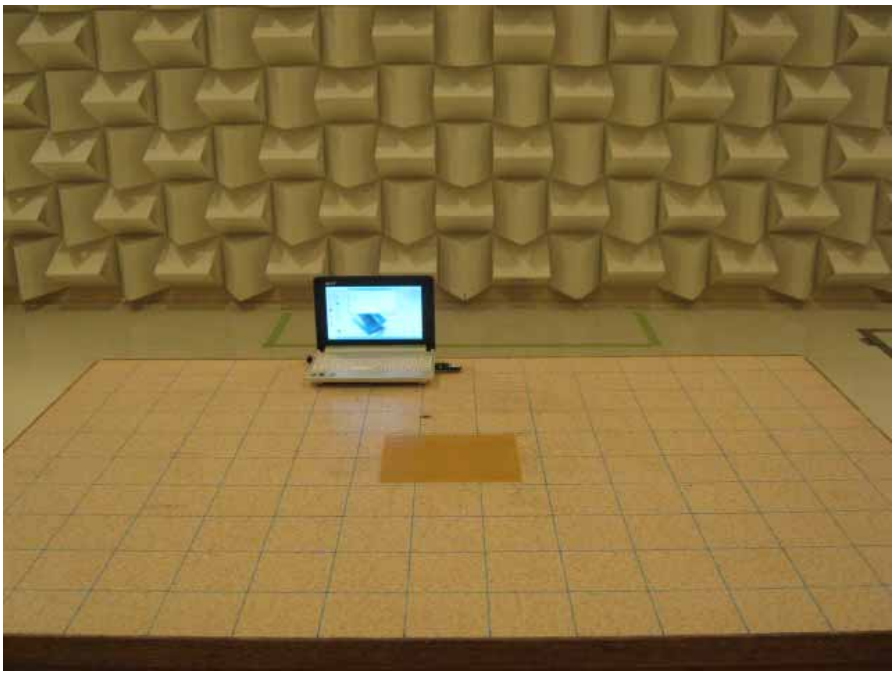
6.1 Setup Photo (AC Conducted Emission)

6.2 Setup Photo (Radiated Emission) (1 GHz to 18 GHz)





6.2 Setup Photo (Radiated Emission) (18 GHz to 26.5 GHz)



7. List of Test Measurement Instruments

7.1 AC Conducted Emission

Instruments	Manufacturer	Model / Type	Serial No.	Calibration Date Next Calibration
Spectrum Analyzer	ADVANTEST CORPORATION	R3132	100803390	November, 2009 November, 2010
EMI Test Receiver	ROHDE& SCHWARZ	ESCS30	100335	November, 2009 November, 2010
Artificial-Mains Network	KYORITSU CORPORATION	KNW-341F	8S-2996-1	July, 2009 July, 2010
Transient Limiter	AGILENT TECHNOLOGIES	11947A	3107A03745	September, 2009 September, 2010
RF Selector	Techno Science Japan Corp.	RFM-E221	3148	Confirmed Before Test

7.2 Radiated Emission Measurement

Instruments	Manufacturer	Model / Type	Serial No.	Calibration Date Next Calibration
Programmable AC/DC Power Source	NF Corporation	ES18000W	425779	Confirmed Before Test
RF Selector	Techno Science Japan Corp.	RFM-E221	3148	Confirmed Before Test
EMI Test Receiver	ROHDE& SCHWARZ	ESIB40	100211	October, 2009 October, 2010
Biconical Antenna (30 to 300MHz)	SCHWARZBECK	VHBB9124(Balun) BBA9106(Elements)	9124-311	September, 2009 September, 2010
Log.-Periodic Antenna (300 MHz to 1 GHz)	SCHWARZBECK	UHALP9108A	645	September, 2009 September, 2010
Horn Antenna (1 to 12.5GHz)	SCHWARZBECK	BBHA9120D	443	January, 2009 January, 2010
Horn Antenna (12.5 to 18GHz)	SCHWARZBECK	3160-08	00033782	September, 2009 September, 2010
Horn Antenna (18 to 26.5GHz)	SCHWARZBECK	3160-09	00034723	September, 2009 September, 2010
Pre Amp	HEWLETT PACKARD	8447D	2944A07891	October, 2009 September, 2010
Pre Amp	HEWLETT PACKARD	MLA-0120AKL-34	3008A01251	October, 2009 September, 2010

7.3 Conducted Radio Measurement

Instruments	Manufacturer	Model / Type	Serial No.	Calibration Date Next Calibration
DC Power Source	KIKUSUI	PAN60-6A	JK002503	---
Spectrum Analyzer	Anritsu	MS2687B	6200162706	April, 2009 April, 2010
Signal Generator	Agilent Techology	E8254A	US41140186	May, 2009 May, 2010
Oscilloscope	Tektronix	TDS794D	B031832	October, 2009 October, 2010
Diode Detector	Agilent Techology	423B	MY42241836	March, 2009 March, 2010