

MEASUREMENT/TECHNICAL REPORT
FCC Part 15 Subpart CIssued: March 23rd, 2007

Name and Address of the Applicant: Brother Industries, Ltd.
1-1-1, Kawagishi, Mizuho-ku, Nagoya, Japan 467-8562

Test Item: Mobile Printer Integrating Bluetooth Module

Identification: MW-260

Serial No.: 5V6201000000009 (Sample No. 9)
5V6201000000013 (Sample No. 13)

Sample No.: 2

FCC ID: B3Q5V6201

Sample Receipt Date: January 26th, 2007

Test Specification: CFR 47 Part.15 Subpart C 15.247

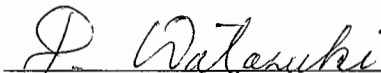
Date of Testing: March 4th to March 10th, 2007

Test Result: PASS

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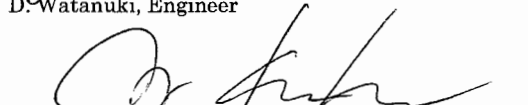
Tested by:


D. Watanuki, Engineer

Date

March 23rd, 2007

Reviewed by:


Y. Kawahara, Deputy General Manager

Date

March 23rd, 2007

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	: Brother Industries, Ltd.
Model (referred to as the EUT)	: MW-260
Nominal Voltage	: DC 7.4V
Type of Modulation	: ☐ DSSS ☒ FHSS ☐ Other
FCC ID	: B3Q5V6201
The type of the equipment	: ☒ Stand-alone ☐ Combined Equipment ☐ Plug –In Card ☐ Other
The type of the antenna	: ☒ Integral ☐ external ☐ Other
The type of power source	: ☐ AC mains ☒ Dedicated AC adapter (100-240 VAC) ☐ DC Voltage ☒ Battery
The type of battery (if applicable)	: Rechargeable Lithimu-ion
Type of Operation	: ☐ Continuous ☒ Burst ☐ Intermittent
Intended functions	: Printer with wireless data transmission
The type of modulation	: GFSK
The bandwidth of the IF filters	: N/A
Method of Communication Link	: Software to make high speed packet transmitting
The operating frequency band	: 2,402 to 2,480 MHz
The thermal limitation	: 0 to 40 degree
Other	:

1.2 Antenna Description

The following antenna is provided to EUT as the integrated original antenna.

No.	Type Name	Gain	Antenna Type	Remarks
1	LB2313-000	9.8 dBi	On board chip antenna	Originally Integrated.

1.3 Accompanied Peripherals Description

The following equipment is accompanied with EUT as its peripheral.

No.	Equipment Name	Manufacturer	Type Name	Serial Number	Remarks
1	AC Adapter	Brother Industries, Ltd.	AD-200JP	MU18-2105140-A1	AC 100-240V, 0.6A

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 November 2, 2004 under CFR 47 Part.2.948.

Cosmos Corporation EMC Lab. No.1

(519 Shimesasu, Watarai-cho, Watarai-gun, Mie-ken, 516-2119, Japan) The test firm has been filed since July 14, 1999 under CFR 47 Part.2.948.

2.3 Traceability

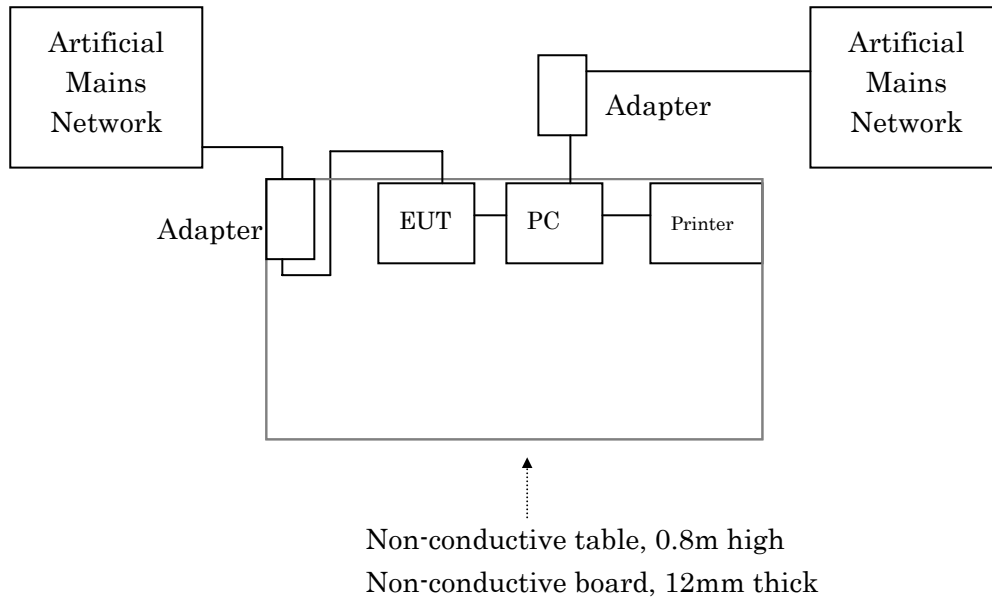
The calibration of measurement equipment used in the test subject to the present report is designed and operated to ensure that the measurement is traceable to national standards of measurement or equivalent abroad.

3. Summary of Test Results

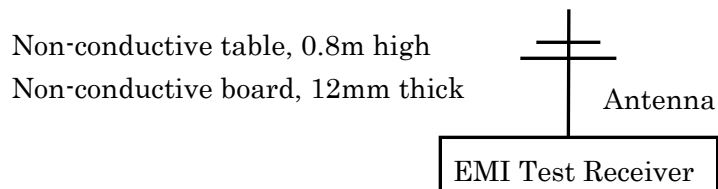
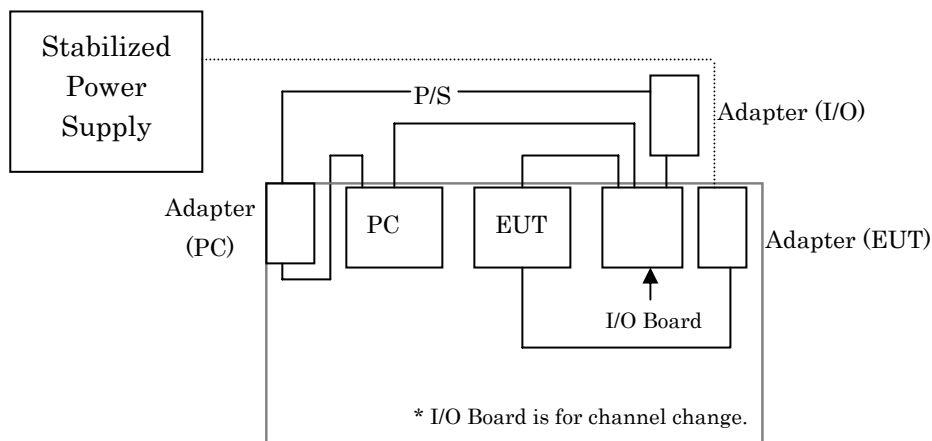
Section	Test Item	Limit	Result
15. 207	AC Power Conducted Emission	See 5.1.2	Pass
15. 247(a)(1)	Spectrum Bandwidth of Frequency Hopping Spread Spectrum System	< 1MHz if using less than 15 non-overlapping channels	Pass
15. 247(a)(1)	Channel Separation	> 2/3 of 20dB BW for systems with output power < 125mW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

4. Test Configuration

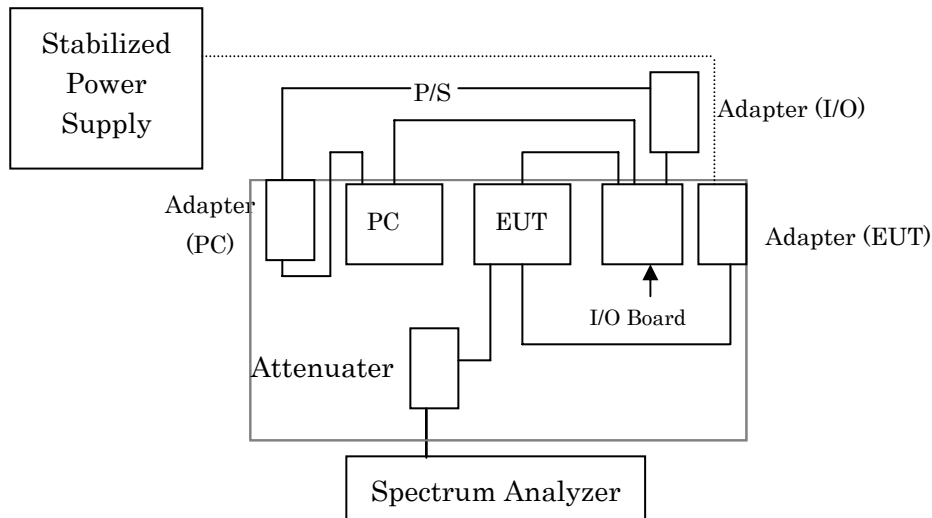
4.1 15. 207 AC Power Conducted Emission in Shield Room



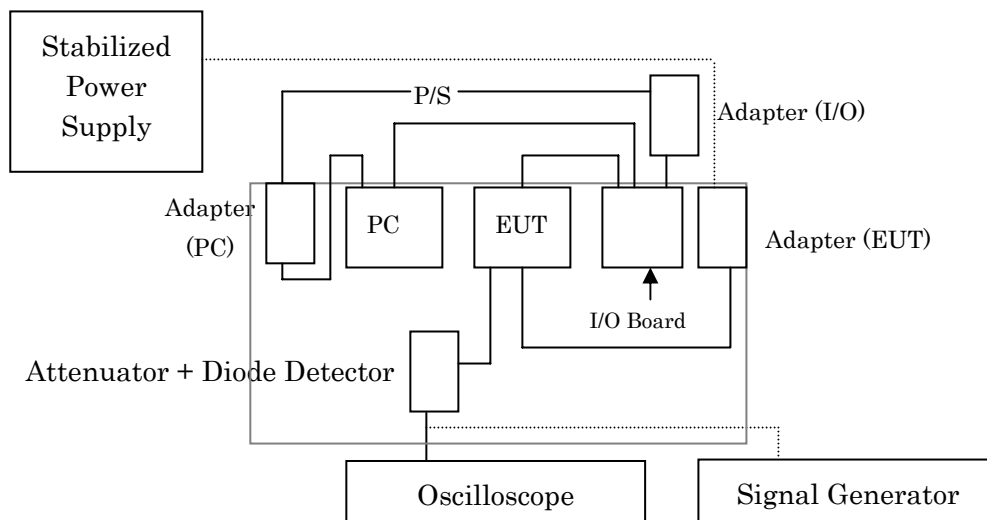
4.2 15. 247(c) Transmitter Radiated Emissions and Band Edge (Radiated) in 3m Anechoic Chamber



4.3 All Other Test Items (Except Maximum Peak Output Power)



4.4 Maximum Peak Output Power



4.5 Test Mode

In all test configurations above, EUT makes continuous RF transmitting with maximum power.

All conducted measurement is performed with an external stabilized power supply voltage varied between 85% and 115% of the nominal rated supply voltage in accordance with the section 15.31 (e) of the part.

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.
- A wooden test table (1.5m×1.0m, height 0.8m) is used.
- EUT's dedicated AC adapter connected to Artificial Mains Network (AMN).
- Other power cord of support equipment is connected to another AMN to isolate its emission from the measured emission of EUT.
- The measuring port of AMN for support equipment is terminated by the 50Ω
- Activate the EUT System and run the software prepared for the test, if necessary.
- See test configuration figure 4.1.

5.1.2 Minimum Standard

(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 : 19°C, 57%

5.1.4 Measured Data

Measured Value Table

Standard : FCC Part15 ClassB
 Model : MW-260 / AD-200
 Serial No. : E04711-M6A000032 / None
 Operator : J.Takashiba
 Power : DC10.5V / AC120V 60Hz
 Temp, Humid : 19 deg, 57 %
 Remark1 : Operated
 Remark2 : USB Mode
 Remark3 :
 Remark4 : RBW : 9KHz

 Final Result

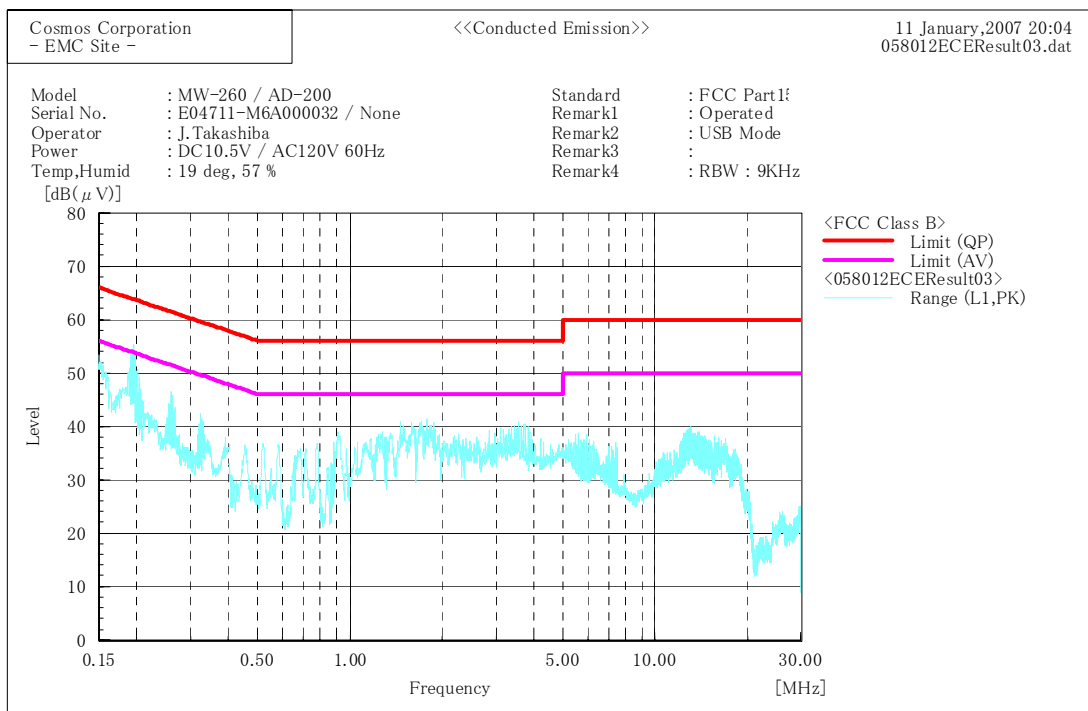
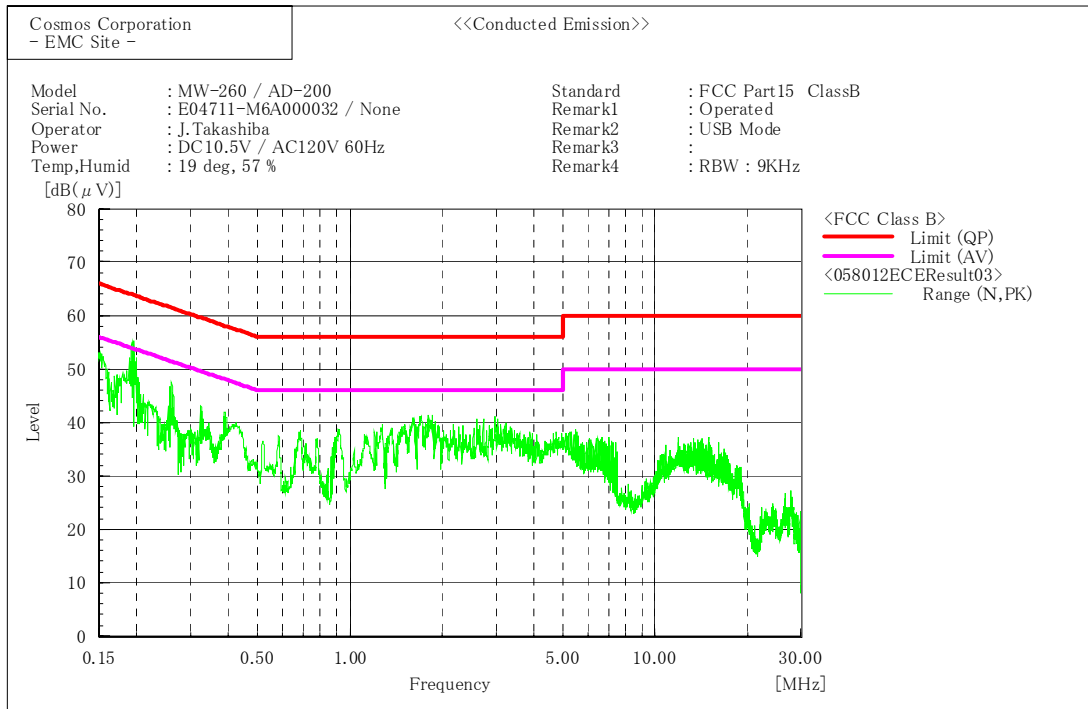
--- N Phase ---

No.	Frequency	Reading QP	Reading AV	c.f	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV
	[MHz]	[dB(μ V)]	[dB(μ V)]	[dB]	[dB(μ V)]	[dB(μ V)]	[dB(μ V)]	[dB(μ V)]	[dB]	[dB]
1	0.196	42.6	30.1	10.3	52.9	40.4	63.8	53.8	10.9	13.4
2	0.261	34.4	25.1	10.3	44.7	35.4	61.4	51.4	16.7	16.0
3	0.325	29.8	24.1	10.3	40.1	34.4	59.6	49.6	19.5	15.2
4	1.882	24.9	21.8	10.6	35.5	32.4	56.0	46.0	20.5	13.6
5	4.734	22.5	17.9	11.1	33.6	29.0	56.0	46.0	22.4	17.0
6	14.872	16.3	9.8	11.8	28.1	21.6	60.0	50.0	31.9	28.4

--- L1 Phase ---

No.	Frequency	Reading QP	Reading AV	c.f	Result QP	Result AV	Limit QP	Limit AV	Margin QP	Margin AV
	[MHz]	[dB(μ V)]	[dB(μ V)]	[dB]	[dB(μ V)]	[dB(μ V)]	[dB(μ V)]	[dB(μ V)]	[dB]	[dB]
1	0.193	44.2	31.3	10.3	54.5	41.6	63.9	53.9	9.4	12.3
2	0.259	38.8	34.6	10.3	49.1	44.9	61.5	51.5	12.4	6.6
3	0.327	28.9	19.5	10.3	39.2	29.8	59.5	49.5	20.3	19.7
4	1.800	21.9	16.4	10.6	32.5	27.0	56.0	46.0	23.5	19.0
5	3.571	28.1	24.3	10.8	38.9	35.1	56.0	46.0	17.1	10.9
6	13.046	21.3	14.6	11.6	32.9	26.2	60.0	50.0	27.1	23.8

Peak Hold Wave Form



5.2 15. 247(a)(1) Spectrum Bandwidth and Channel Separation of Frequency Hopping Spread Spectrum System

5.2.1 Setting Remarks

- The both side of 20dB 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 : 30 kHz
 - ✓ Video bandwidth : 30 kHz
 - ✓ Sweep : Auto
 - ✓ Detector function : Peak
 - ✓ Trace Mode : Max Hold
- See test configuration figure 4.3.

5.2.2 Minimum Standard

The maximum permissible 20dB bandwidth is 1MHz, unless more than 15 non-overlapping channels are employed.

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

5.2.3 Result

EUT complies with the requirement.

Uncertainty of measurement	: ± 1.2 dB
Temperature, Humidity	: 25 °C, 35%

5.2.4 Measured Data

Frequency (MHz)	Measured Bandwidth (kHz)	Limit (MHz)
20 dB band width		
2402 (1ch)	840	< 1
2441 (39ch)	840	< 1
2480 (78ch)	820	< 1
Channel separation		
Hopping channel	1,250	

2402 MHz (1ch)



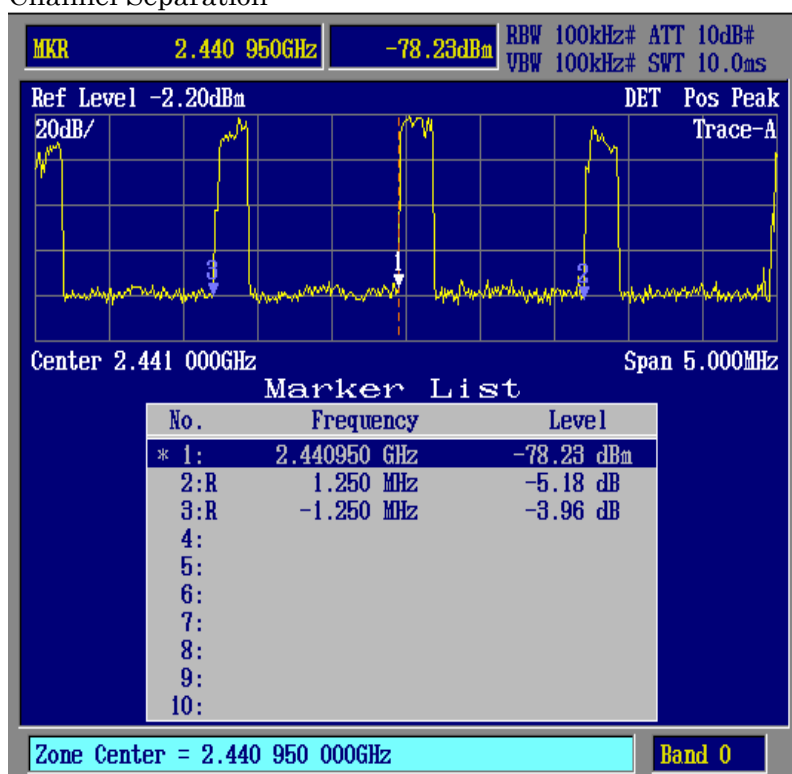
2441 MHz (39ch)



2480 MHz (78ch)



Channel Separation



5.3 15. 247(b) Maximum Peak Output Power

5.3.1 Setting Remarks

- See test configuration figure 4.4.
- 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 spectrum analyzer 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 : 24 °C, 35%

5.3.4 Measured Data

(Normal Rated Voltage, 7.4 VDC)

Frequency (MHz)	Peak Power (dBm)	Limit (dB)	Margin (dB)
2402 (1ch)	-0.2	30	30.2
2441 (39ch)	-1.33	30	31.33
2480 (78ch)	-1.06	30	31.06

(High-varied voltage, 8.51 VDC)

Frequency (MHz)	Peak Power (dBm)	Limit (dB)	Margin (dB)
2402 (1ch)	-0.08	30	30.08
2441 (39ch)	-1.3	30	31.3
2480 (78ch)	-0.92	30	30.92

(Low-varied voltage, 6.29 VDC)

Frequency (MHz)	Peak Power (dBm)	Limit (dB)	Margin (dB)
2402 (1ch)	-0.15	30	30.15
2441 (39ch)	-1.28	30	31.28
2480 (78ch)	-0.99	30	30.99

5.4 15. 247(c) Transmitter Radiated Emissions (Conducted)

5.4.1 Setting Remarks

- EUT directly connects to the spectrum analyzer via calibrated coaxial cable and a suitable 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	: 1 MHz
✓ Sweep	: Auto
✓ Detector function	: Peak
✓ Trace Mode	: Max Hold

- See test configuration figure 4.3.

5.4.2 Minimum Standard

(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, 39%

5.4.4 Measured Data (No emission exceeding the 20dB limit was found)

2402 MHz (1ch)



2441 MHz (39ch)



2480 MHz (78ch)



5.5 15. 247(c) 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)).

5.5.3 Result

EUT complies with the requirement.

Uncertainty of measurement result: ± 3.28 dB

Temperature, Humidity : See each data table

5.4.4 Measured Data

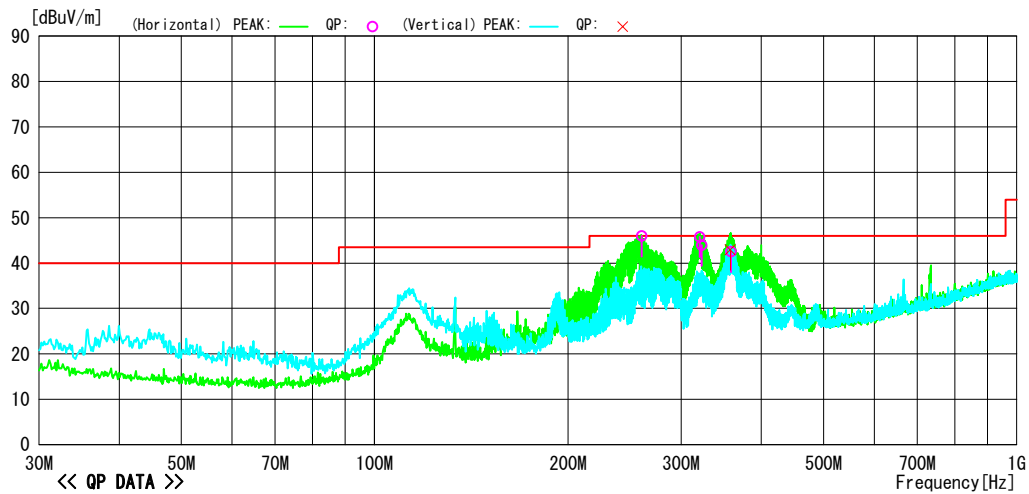
30MHz to 1GHz, Channel 1

Model Name : NW-260
 Serial No. :
 Operator : D. Watanuki
 Power Supply : AC120V, 60Hz

Job No : CJ06-058013E
 Temp./Humi. : 22°C/39%
 Condition : Operated
 Remark : 2402MHz (Low. Ch)

Memo : Cable Locations Adjusted

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



No	Freq. [MHz]	Reading [dBuV]	C. Fac [dB/m]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant Type	Comment
1	260.382	49.7	-3.8	45.9	46.0	0.1	Hori.	128	314	BC	
2	321.004	52.7	-6.9	45.8	46.0	0.2	Hori.	111	307	LP	
3	323.337	50.8	-6.9	43.9	46.0	2.1	Hori.	113	301	LP	
4	358.655	48.7	-6.2	42.5	46.0	3.5	Hori.	108	48	LP	
5	358.086	49.1	-6.2	42.9	46.0	3.1	Vert.	113	136	LP	

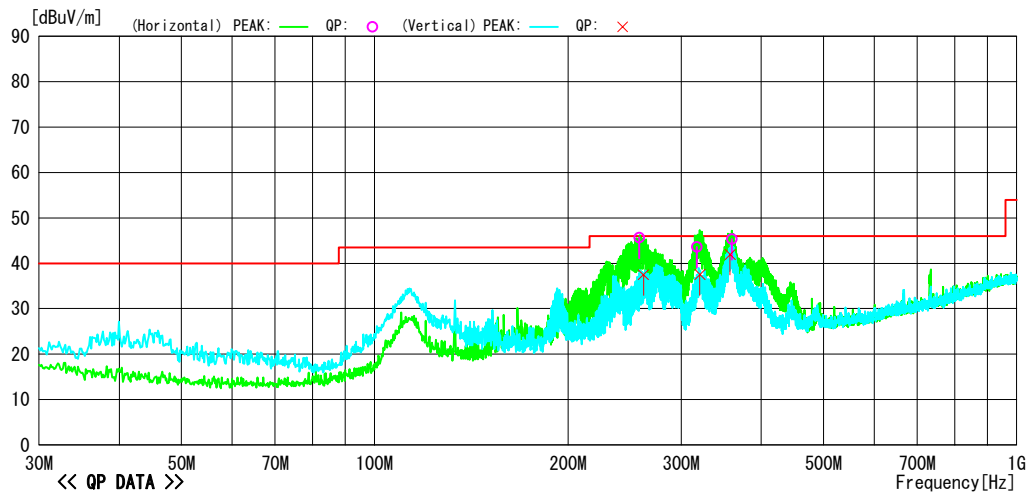
30MHz to 1GHz, Channel 39

Model Name : NW-260
Serial No. :
Operator : D. Watanuki
Power Supply : AC120V, 60Hz

Job No : GJ06-058013E
Temp./Humi. : 25°C/40%
Condition : Operated
Remark : 2441MHz (Mid. Ch)

Memo : Cable Locations Adjusted

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



No	Freq.	Reading	C. Fac	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	258.125	49.5	-3.9	45.6	46.0	0.4	Hori.	130	333	BC	
2	317.742	50.5	-6.9	43.6	46.0	2.4	Hori.	112	325	LP	
3	359.988	51.6	-6.3	45.3	46.0	0.7	Hori.	103	182	LP	
4	262.215	41.1	-3.7	37.4	46.0	8.6	Vert.	100	198	BC	
5	321.112	44.4	-6.9	37.5	46.0	8.5	Vert.	102	255	LP	
6	357.625	48.1	-6.2	41.9	46.0	4.1	Vert.	139	132	LP	

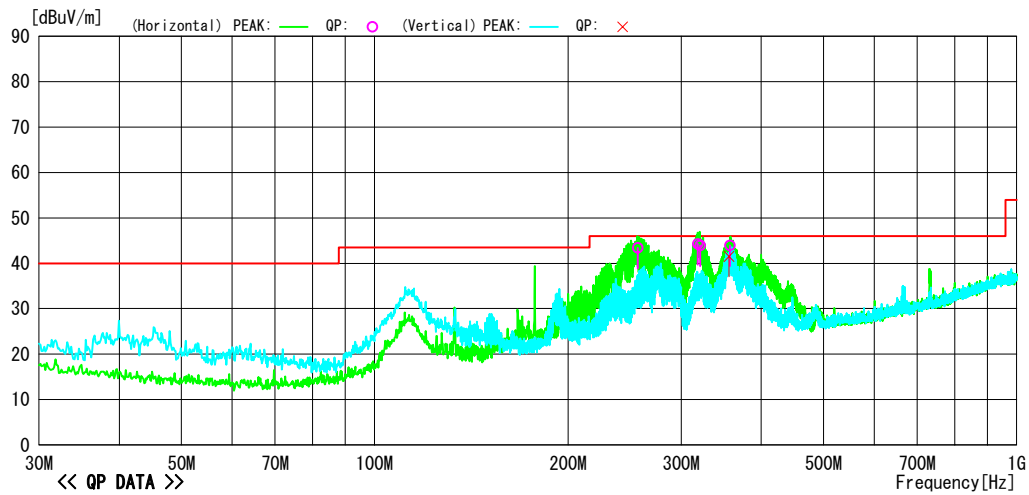
30MHz to 1GHz, Channel 79

Model Name : NW-260
 Serial No. :
 Operator : D. Watanuki
 Power Supply : AC120V, 60Hz

Job No : GJ06-058013E
 Temp./Humi. : 23°C/39%
 Condition : Operated
 Remark : 2480MHz (High. Ch)

Memo : Cable Locations Adjusted

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



No	Freq.	Reading	C. Fac	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	256.793	47.3	-3.9	43.4	46.0	2.6	Hori.	130	333	BC	
2	318.745	51.1	-6.9	44.2	46.0	1.8	Hori.	105	303	LP	
3	321.656	50.8	-6.9	43.9	46.0	2.1	Hori.	101	313	LP	
4	357.586	50.1	-6.2	43.9	46.0	2.1	Hori.	102	178	LP	
5	356.382	47.9	-6.4	41.5	46.0	4.5	Vert.	114	143	LP	

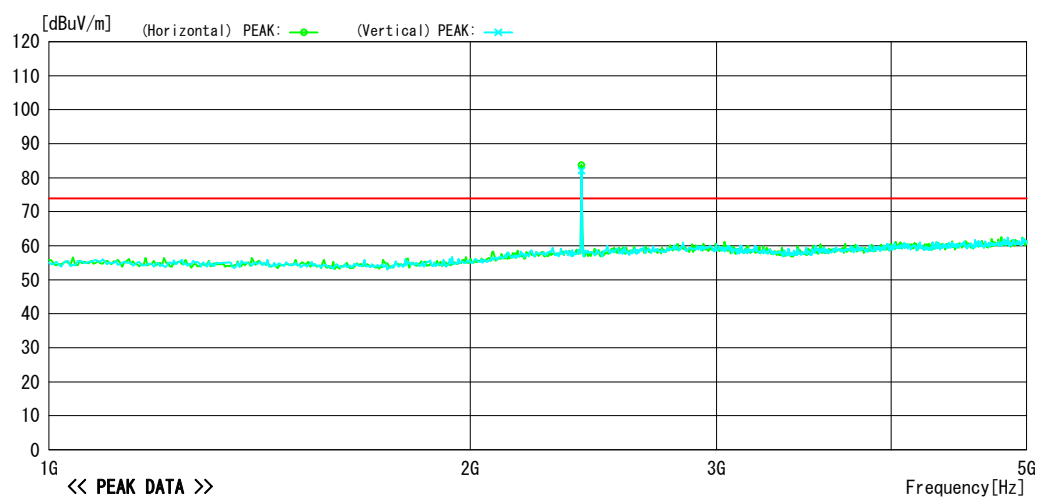
1GHz to 5GHz, Channel 1

Model Name : NW-260
 Serial No. : N/A
 Operator : D. Watanuki
 Power Supply : AC120V, 60Hz

Job No. : CJO6-058013E
 Temp/Humi : 19°C/38%
 Condition : Operated
 Remark : Operated 2402MHz

Memo :

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



No	Freq.	Reading	C. Fac	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	2402.800	55.7	28.0	83.7	74.0	-9.7	Hori.	100	193	HRN	
2	2402.800	54.1	28.0	82.1	74.0	-8.1	Vert.	100	129	HRN	

* Only fundamental emissions were found.

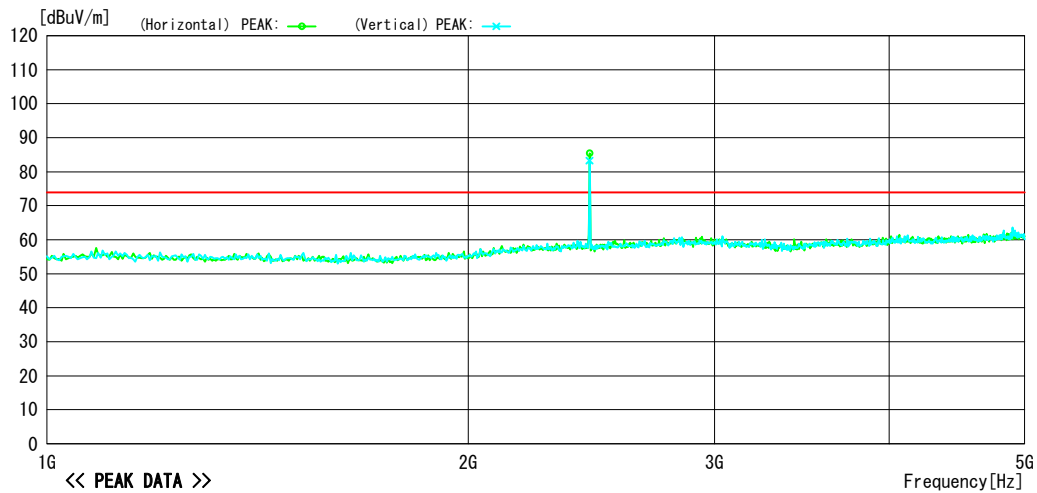
1GHz to 5GHz, Channel 39

Model Name : NW-260
 Serial No. : N/A
 Operator : D. Watanuki
 Power Supply : AC120V, 60Hz

Job No. : CJO6-058013E
 Temp/Humi : 19°C/38%
 Condition : Operated
 Remark : Operated 2441MHz

Memo :

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



No	Freq.	Reading	C. Fac	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	2442.880	57.3	28.1	85.4	74.0	-11.4	Hori.	100	206	HRN	
2	2442.880	55.2	28.1	83.3	74.0	-9.3	Vert.	100	132	HRN	

* Only fundamental emissions were found.

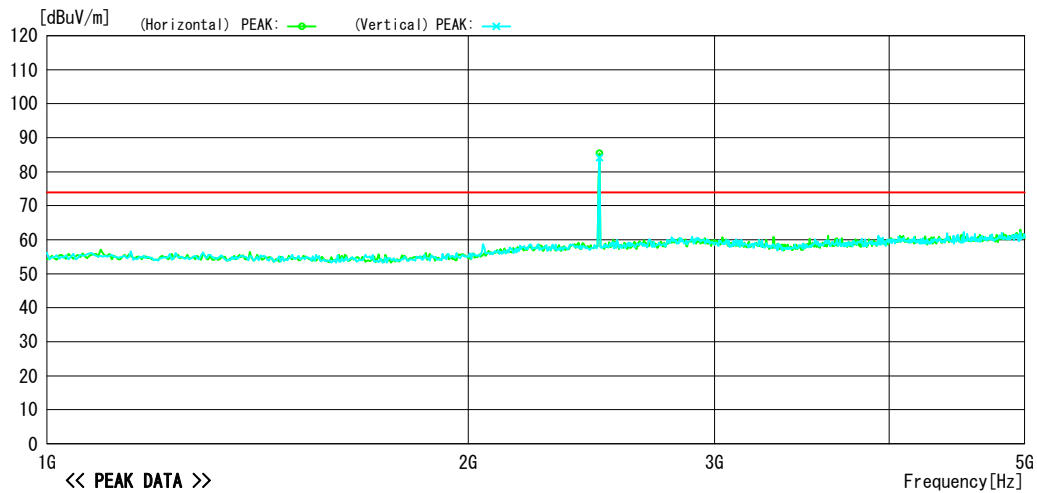
1GHz to 5GHz, Channel 78

Model Name : NW-260
 Serial No. : N/A
 Operator : D. Watanuki
 Power Supply : AC120V, 60Hz

Job No. : CJO6-058013E
 Temp/Humi : 19°C/38%
 Condition : Operated
 Remark : Operated 2480MHz

Memo :

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



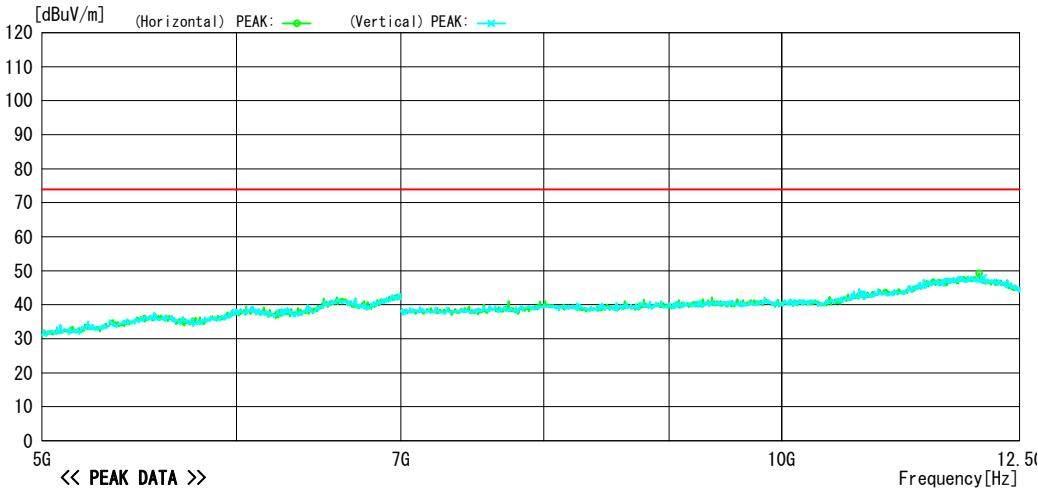
No	Freq.	Reading	C. Fac	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	2482.960	57.3	28.1	85.4	74.0	-11.4	Hori.	100	217	HRN	
2	2482.960	56.0	28.1	84.1	74.0	-10.1	Vert.	100	358	HRN	

* Only fundamental emissions were found.

5GHz to 12.5GHz, Channel 1

Model Name	: NW-260	Job No.	: CJ06-058013E
Model No.	:	Power Supply	: AC120V, 60Hz
Serial No.	:	Temp/Humi	: 19°C/39%
Test Condition	: Operated	Operator	: D. Watanuki
Memo	: 2402MHz		

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



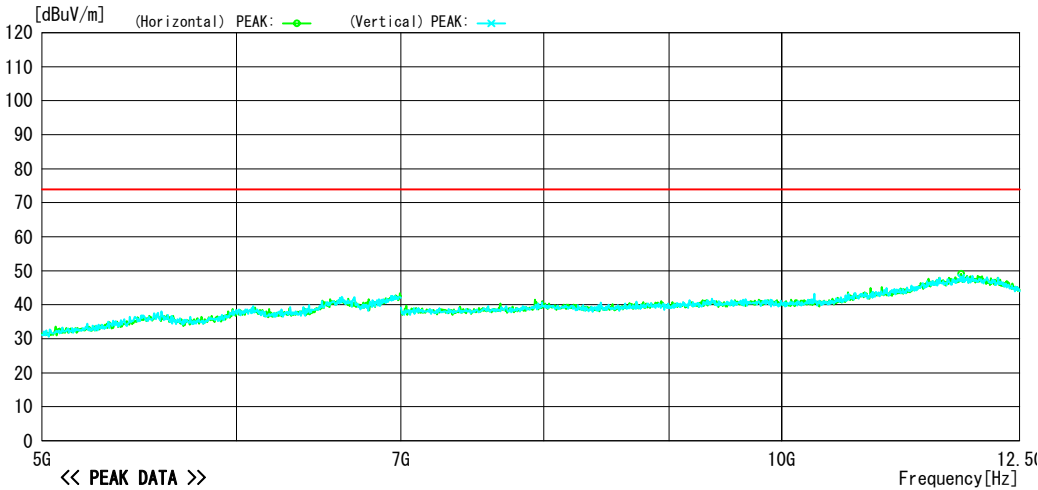
No	Freq.	Reading	C.Fac	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	2036.370	31.3	17.9	49.2	74.0	24.8	Hori.	100	275	HRN	
2	2078.440	30.2	17.7	47.9	74.0	26.1	Vert.	100	1	HRN	

* First digit of Freq. disappears due to software's specification.

5GHz to 12.5GHz, Channel 39

Model Name	: NW-260	Job No.	: CJ06-058013E
Model No.	:	Power Supply	: AC120V, 60Hz
Serial No.	:	Temp/Humi	: 19°C/39%
Test Condition	: Operated	Operator	: D. Watanuki
Memo	: 2441MHz		

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



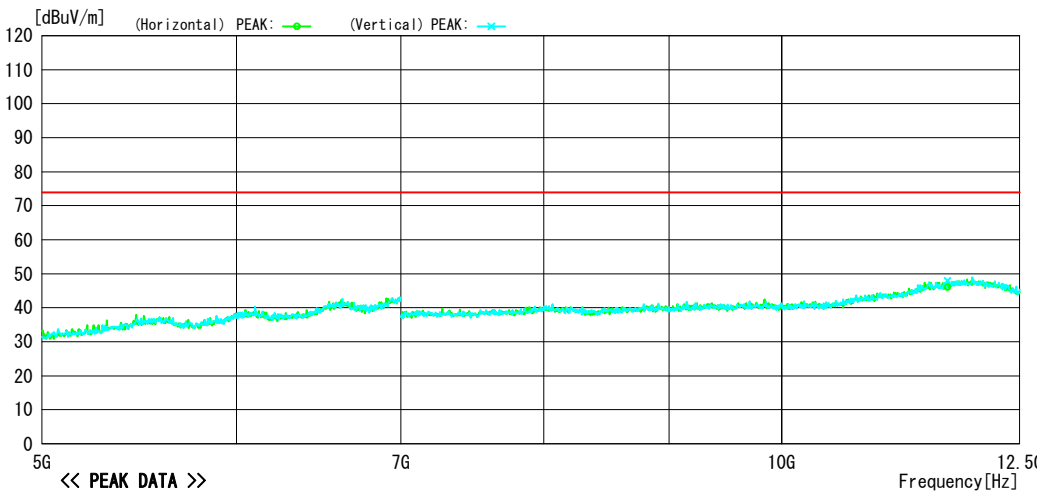
No	Freq.	Reading	C. Fac	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	1832.030	31.7	17.4	49.1	74.0	24.9	Hori.	100	359	HRN	
2	1832.030	30.5	17.4	47.9	74.0	26.1	Vert.	100	1	HRN	

* First digit of Freq. disappears due to software's specification.

5GHz to 12.5GHz, Channel 78

Model Name	: NW-260	Job No.	: CJ06-058013E
Model No.	:	Power Supply	: AC120V, 60Hz
Serial No.	:	Temp/Humi	: 19°C/39%
Test Condition	: Operated	Operator	: D. Watanuki
Memo	: 2480MHz		

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



No	Freq.	Reading	C. Fac	Result	Limit	Margin	Pola.	Height	Angle	Ant.	Comment
	[MHz]	[dBuV]	[dB/m]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	1681.780	29.0	17.1	46.1	74.0	27.9	Hori.	100	329	HRN	
2	1681.780	30.8	17.1	47.9	74.0	26.1	Vert.	100	359	HRN	

* First digit of Freq. disappears due to software's specification.

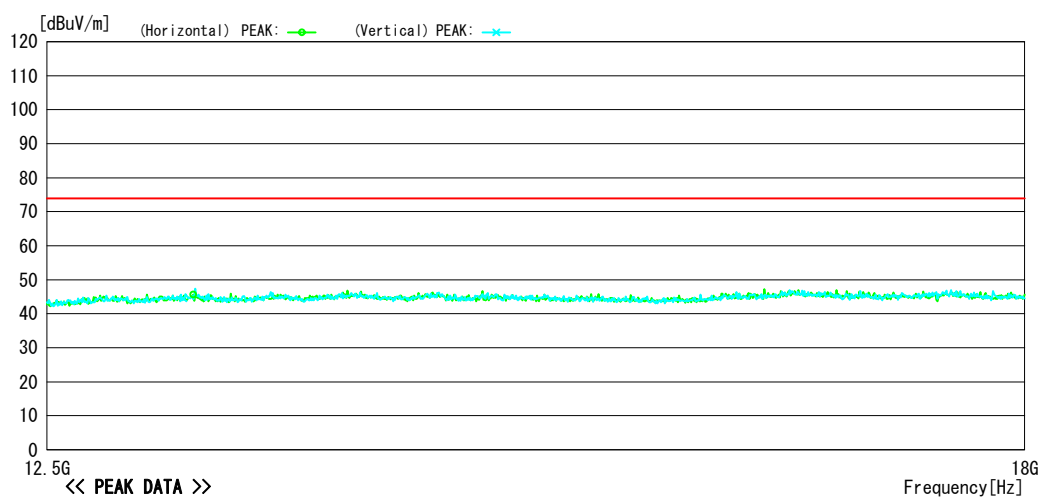
12.5GHz to 18GHz, Channel 1

Model Name : NW-260
 Model No. :
 Serial No. :
 Test Condition : Operated

Job No. : CJ06-058013E
 Power Supply : AC120V, 60Hz
 Temp/Humi : 19°C/39%
 Operator : D. Watanuki

Memo : 2402MHz

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



No	Freq.	Reading	C.Fac	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	3201.400	30.5	15.2	45.7	74.0	28.3	Hori.	100	358	HRN	
2	3151.300	29.3	15.2	44.5	74.0	29.5	Vert.	100	358	HRN	

* First digit of Freq. disappears due to software's specification.

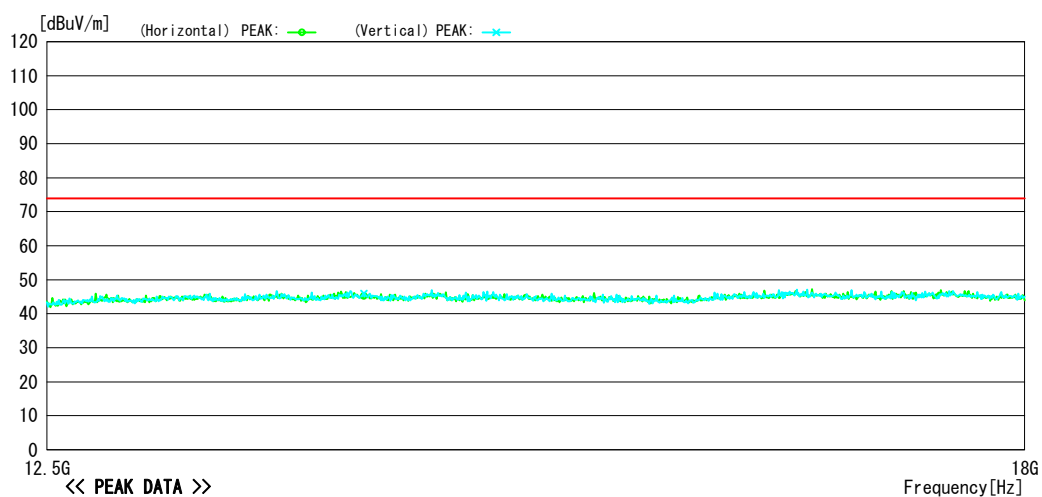
12.5GHz to 18GHz, Channel 39

Model Name : NW-260
 Model No. :
 Serial No. :
 Test Condition : Operated

Job No. : CJ06-058013E
 Power Supply : AC120V, 60Hz
 Temp/Humi : 19°C/39%
 Operator : D. Watanuki

Memo : 2441MHz

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



No	Freq.	Reading	C.Fac	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	4068.130	28.6	16.6	45.2	74.0	28.8	Hori.	100	358	HRN	
2	4068.130	29.3	16.6	45.9	74.0	28.1	Vert.	100	358	HRN	

* First digit of Freq. disappears due to software's specification.

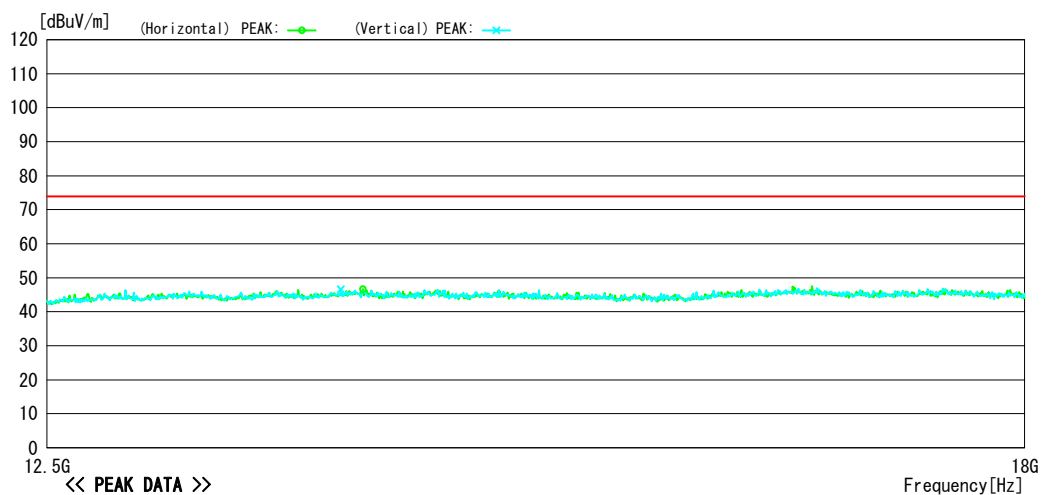
12.5GHz to 18GHz, Channel 78

```
Model Name      : NW-260
Model No.       :
Serial No.      :
Test Condition  : Operated
```

Job No. : CJ06-058013E
Power Supply : AC120V, 60Hz
Temp/Humi : 19°C/39%
Operator : D. Watanuki

Memo : 2480MHz

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



No	Freq.	Reading	C. Fac	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	4063.120	30.0	16.6	46.6	74.0	27.4	Hori.	100	358	HRN	
2	3947.890	30.2	16.4	46.6	74.0	27.4	Vert.	100	358	HRN	

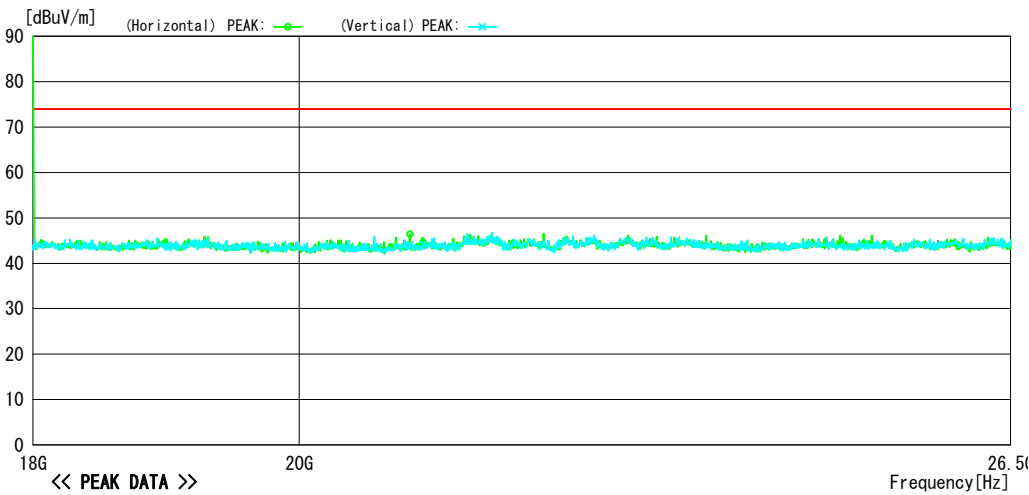
* First digit of Freq. disappears due to software's specification.

18GHz to 26.5GHz, Channel 1

Model Name	: NW-260	Job No.	: GJ06-058013E
Model No.	: NW-260	Power Supply	: AC120V, 60Hz
Serial No.	:	Temp/Humi	: 23deg, 27%
Test Condition	: 2402MHz (Low. Ch)	Operator	: D. Watanuki

Memo :

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



No	Freq.	Reading	C. Fac	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	0894.230	39.1	7.3	46.4	74.0	27.6	Hori.	100	358	HRN	
2	1002.500	37.4	7.2	44.6	74.0	29.4	Hori.	100	235	HRN	
3	0894.230	36.7	7.3	44.0	74.0	30.0	Vert.	100	358	HRN	
4	1002.500	36.9	7.2	44.1	74.0	29.9	Vert.	100	169	HRN	

* First digit of Freq. disappears due to software's specification.

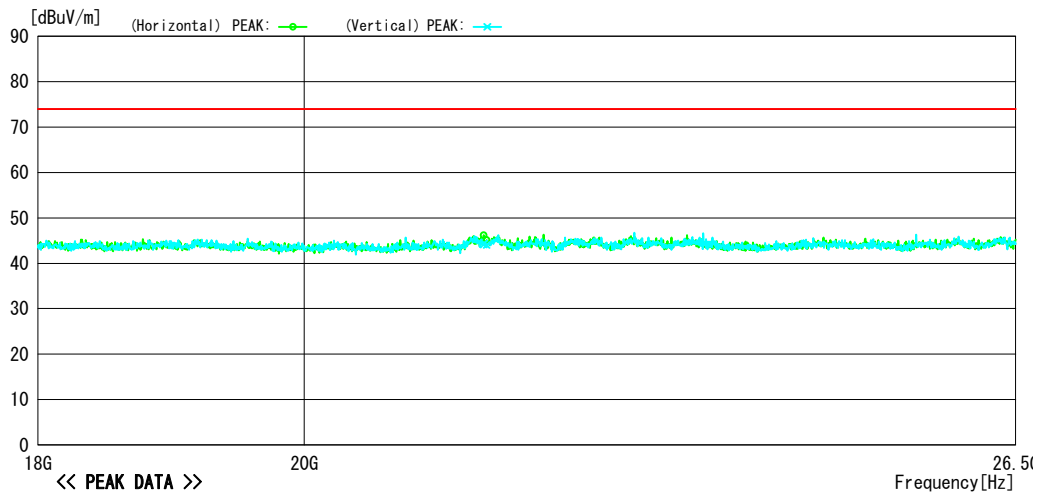
18GHz to 26.5GHz, Channel 39

Model Name : NW-260
 Model No. : NW-260
 Serial No. :
 Test Condition : 2441MHz (Mid. Ch)

Job No. : GJ06-058013E
 Power Supply : AC120V, 60Hz
 Temp/Humi : 23deg, 27%
 Operator : D. Watanuki

Memo :

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



No	Freq.	Reading	C. Fac	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	1471.670	37.9	8.3	46.2	74.0	27.8	Hori.	100	358	HRN	
2	1495.730	36.8	8.3	45.1	74.0	28.9	Hori.	100	320	HRN	
3	1471.670	35.9	8.3	44.2	74.0	29.8	Vert.	100	12	HRN	
4	1495.730	35.7	8.3	44.0	74.0	30.0	Vert.	100	247	HRN	

* First digit of Freq. disappears due to software's specification.

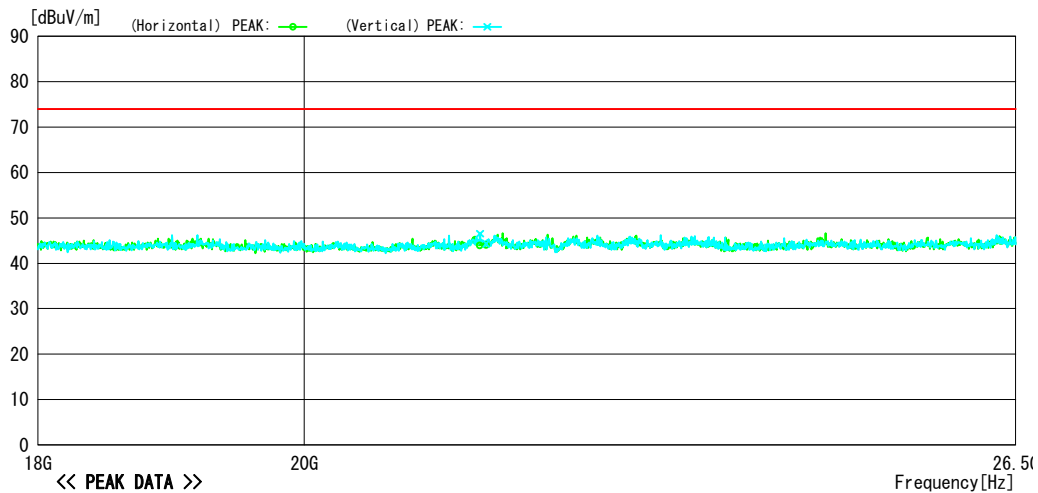
18GHz to 26.5GHz, Channel 78

Model Name : NW-260
 Model No. : NW-260
 Serial No. :
 Test Condition : 2480MHz (High. Ch)

Job No. : CJ06-058013E
 Power Supply : AC120V, 60Hz
 Temp/Humi : 23deg. 27%
 Operator : D. Watanuki

Memo :

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



No	Freq.	Reading	C. Fac	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	1439.590	35.8	8.1	43.9	74.0	30.1	Hori.	100	358	HRN	
2	1491.720	35.7	8.3	44.0	74.0	30.0	Hori.	100	358	HRN	
3	1439.590	38.4	8.1	46.5	74.0	27.5	Vert.	100	76	HRN	
4	1491.720	36.0	8.3	44.3	74.0	29.7	Vert.	100	51	HRN	

* First digit of Freq. disappears due to software's specification.

5.6 15. 247(a)(1) Number of Channels and Time of Occupancy

5.6.1 Setting Remarks

- EUT directly connects to the spectrum analyzer via calibrated coaxial cable and a suitable attenuator.
- The Number of Channels is determined by using Max-hold of the spectrum shape of spectrum analyzer.
- Time of Occupancy is determined by using the marker-data function of spectrum analyzer.
- The spectrum analyzer is set-up as following to measure Number of Channels;

✓	Frequency Span	: 79 MHz
✓	Resolution bandwidth	: 1 MHz
✓	Video bandwidth	: 3 MHz
✓	Sweep Time	: Auto
✓	Detector function	: Peak
✓	Trace Mode	: Max Hold

- The spectrum analyzer is set-up as following to measure Time of Occupancy;

✓	Frequency Span	: 0 Hz
✓	Resolution bandwidth	: 30 kHz
✓	Video bandwidth	: 30 kHz
✓	Detector function	: Peak
✓	Trace Mode	: Max Hold

- See test configuration figure 4.3.

5.6.2 Minimum Standard

This frequency hopping system must employ minimum of 15 hopping channels.

The maximum permissible time of occupancy is 400 ms within the minimum time period required to hop through all channels.

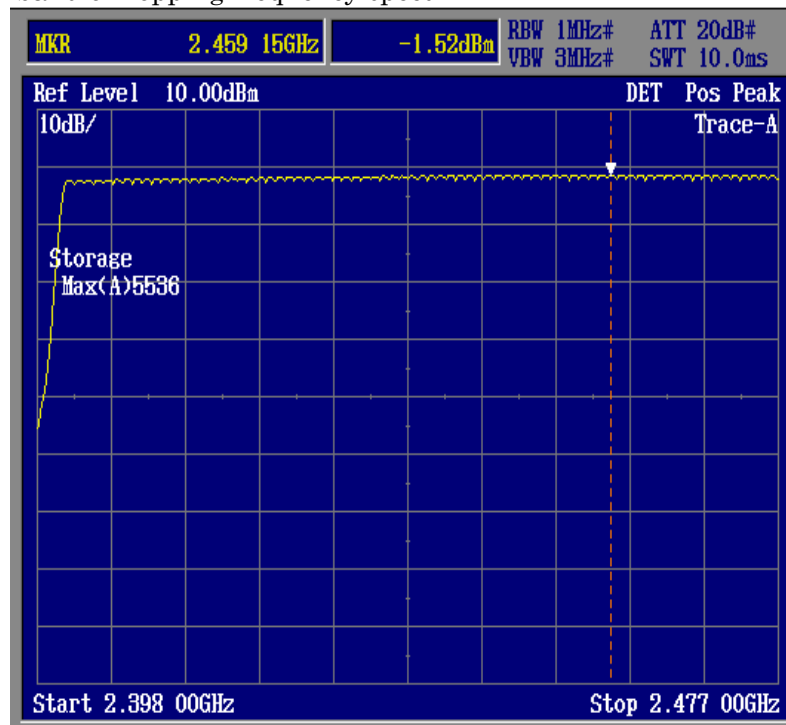
5.6.3 Result

EUT complies with the requirement.

Uncertainty of measurement result: 1 usec
Temperature, Humidity : 24 °C, 37%

5.6.4 Measured Data

Lower band of hopping frequency spectrum



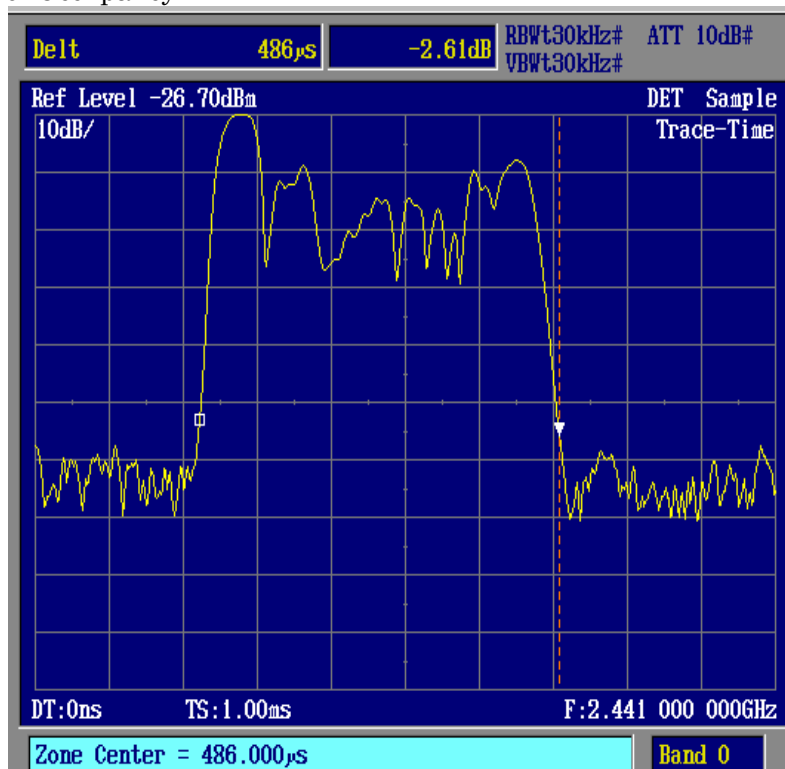
Higher band of hopping frequency spectrum



Number of observed channels

79

Time of Occupancy



Channel Hopping Rte: 1600 hops / sec
 Number of channels: 79
 Dwell time: 0.486 msec
 Time of occupancy: $(1600 / 79) * 79 * 0.4 * 0.486 * 10^{-3} = 0.31 \text{ sec}$

5.7 15. 247(c) Band Edge Measurement**5.7.1 Setting Remarks**

- EUT directly connects to the spectrum analyzer via calibrated coaxial cable and 10 dB attenuator.
- 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;
 - ✓ Resolution bandwidth : Equal or less than 1% of frequency span
 - ✓ Video bandwidth : > RBW
 - ✓ Sweep : Auto
 - ✓ Detector function : Peak
 - ✓ Trace Mode : Max Hold
- Where bandedge spectrum is too rough to find precise edge point, larger RBW i.e. 1MHz, 3MHz shall be applied as severer condition.
- See test configuration figure 4.3.

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 (dB μ V)	
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, 35%

5.7.4 Measured Data

The band edge emissions are calculated as following;

Lower frequency 2,390 MHz

	Level (dBuV/m)
$P_{\max}$	84.10
P_{av}	74.10
P_{dev}	29.85

Higher frequency 2,483.5 MHz

	Level (dBuV/m)
$P_{\max}$	86.82
P_{av}	76.88
P_{dev}	31.21

	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
E_{be}	54.25	74.00	19.75
E_{av}	44.25	54.00	9.75

	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
E_{be}	55.61	74.00	18.39
E_{av}	45.67	54.00	8.33

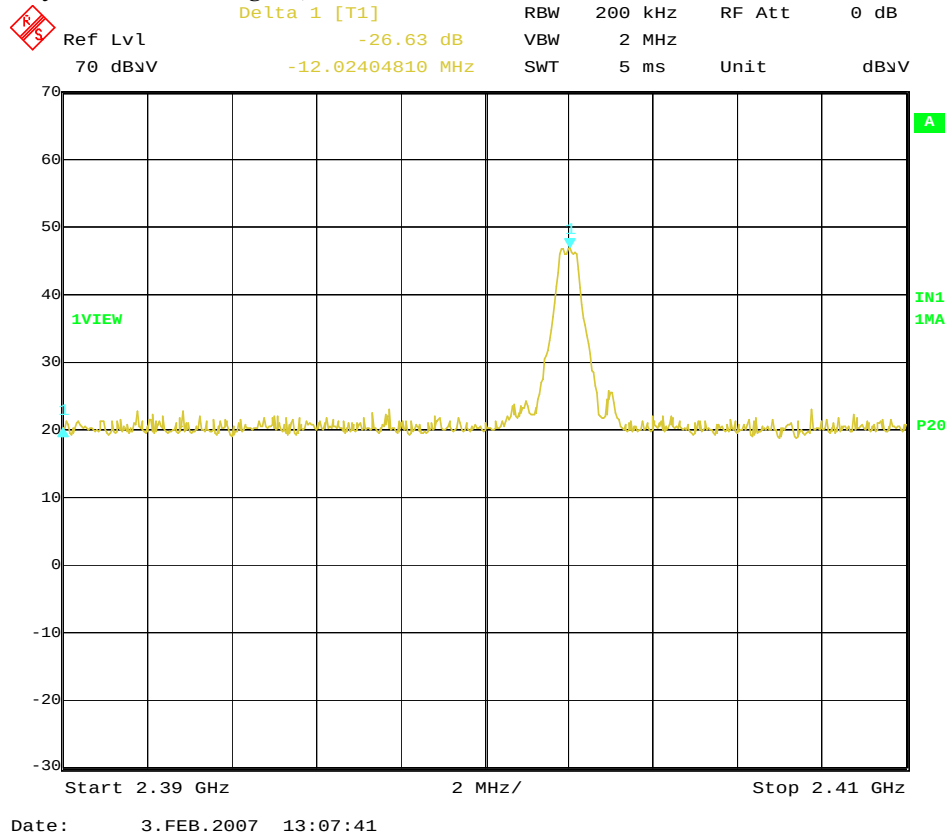
$P_{\max}$: Maximum peak power of the fundamental.

P_{dev} : The amplitude delta between the peak power and the band edge emission.

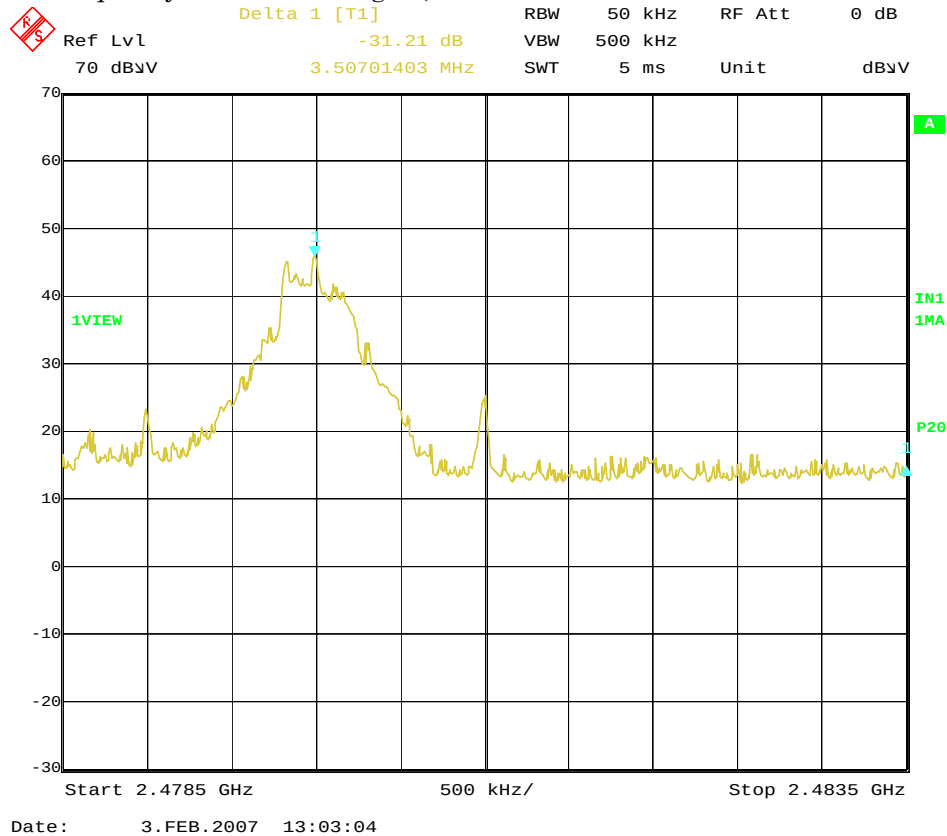
E_{be} : Band edge emission.

E_{av} : Average of the band edge emission.

Lower frequency of the band edge 2,390.0 MHz



Higher frequency of the band edge 2,483.5 MHz



6. Photos

6.1 Setup Photo (Conducted Emission)

Front View

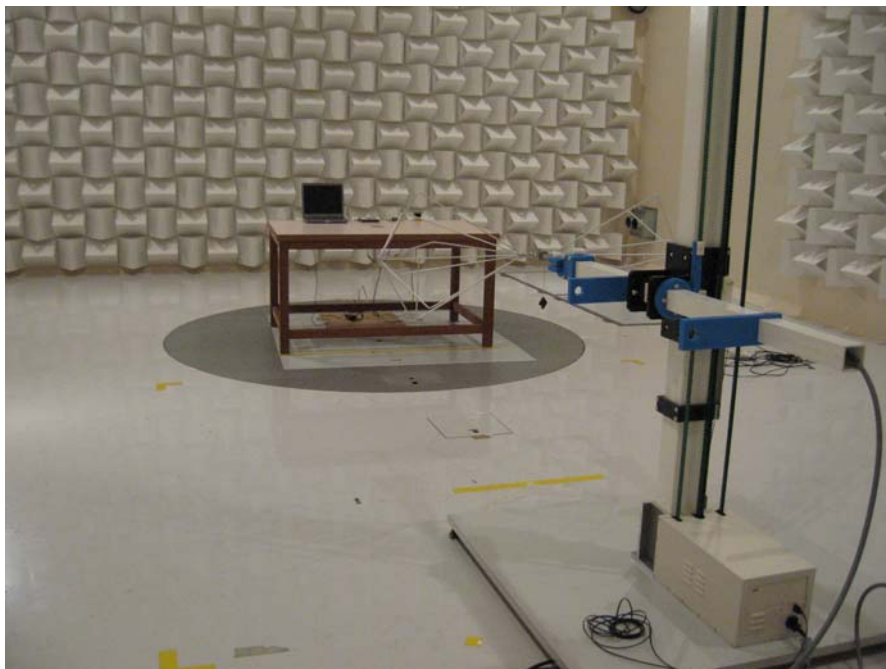


Side View



6.2 Setup Photo (Radiated Emission)

Front View



Rear View



7. List of Test Measurement Instruments**7.1 Conducted Emission**

Instruments	Manufacturer	Model / Type	Serial No.	Calibration Date Next Calibration
Spectrum Analyzer	ADVANTEST CORPORATION	R3132	140501174	July, 2006 July, 2007
EMI Test Receiver	ROHDE & SCHWARZ	ESCS30	100335	May, 2006 May, 2007
Artificial-Mains Network	KYORITSU CORPORATION	KNW-341C (for EUT)	8-1659-1	September, 2006 September, 2007
Artificial-Mains Network	KYORITSU CORPORATION	KNW-244C (for Peripheral)	8-1657-1	September, 2006 September, 2007
Transient Limiter	AGILENT TECHNOLOGIES	11947A	3107A03745	July, 2006 July, 2007
RF Selector	Techno Science Japan Corp.	RFM-E221	3148	---
Spectrum Analyzer	ADVANTEST CORPORATION	R3132	140501174	July, 2006 July, 2007

7.2 Radiated Emission Measurement

Instruments	Manufacturer	Model / Type	Serial No.	Calibration Date Next Calibration
Programmable AC/DC Power Source	NF Corporation	ES18000W	425779	---
EMI Test Receiver	ROHDE & SCHWARZ	ESIB40	100211	April, 2006 April, 2007
Biconical Antenna (30 to 300MHz)	SCHWARZBECK	VHBB9124(Balun) BBA9106(Elements)	311	September, 2006 September, 2007
Log.-Periodic Antenna (300 MHz to 1 GHz)	SCHWARZBECK	UHALP 9108 A	645	September, 2006 September, 2007
Horn Antenna	SCHWARZBECK	BBHA 9120 D	446	September, 2006 September, 2007
Horn Antenna	ETS LINDGREN	3160-08	00033778	September, 2006 September, 2007
Horn Antenna	ETS LINDGREN	3160-09	00034723	September, 2006 September, 2007

7.3 Conducted Radio Measurement

Instruments	Manufacturer	Model / Type	Serial No.	Calibration Date Next Calibration
DC Power Source	Diamond Antenna	GSV3000	01101481	---
Spectrum Analyzer	Anritsu	MS2687B	620016270 6	April, 2006 April, 2007
Signal Generator	Agilent Technology	E8254A	US411401 86	June, 2006 June, 2007
Oscilloscope	Tektronix	TDS794D	B031832	June, 2006 June, 2007
Diode Detector	Agilent Technology	423B	MY422418 36	March, 2006 March, 2007