

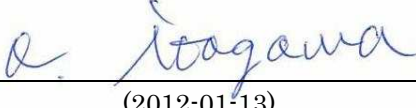
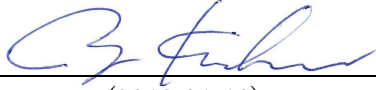


## MEASUREMENT / TECHNICAL REPORT FCC Part 15 Subpart C

Issued: January 13, 2012

Name and Address of the Applicant:	KONICA MINOLTA SENSING, INC. 3-91, Daisennishimachi, Sakai-ku, Sakai, Osaka 590-8551, Japan
Test Item:	Spectrophotometer
Identification:	CM-700d
Serial No.:	01
Sample No.:	1
FCC ID:	VTLCM700d
Sample Receipt Date:	November 22, 2011
Test Specification:	FCC Part 15 Subpart C, 15.247
Date of Testing:	November 24, 28 and 29, 2011 December 2, 3, 5 and 7, 2011
Test Result:	PASS

Report Prepared by:	Cosmos Corporation 3571-2 Ohnoki, Watarai-cho, Watarai-gun, Mie, Japan 516-2102 Phone: +81-596-63-0707 Fax: +81-596-63-0777
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Tested by:	 (2012-01-13)	(O. Itogawa, EMC Dept. EMC Engineer)
Reviewed by:	 (2012-01-13)	(Y. Kawahara, EMC Dept. EMC Manager) iNARTE : EMC-002846-NE

Notes:

1. This Test Report should not be reproduced except in full, without the written approval of Cosmos Corporation.
2. All measurement data contained in this Test Report may have uncertainty. A judgment for the limitation should be taken into the count.
3. The test result of this Test Report is based on the tests made for sample provided, and it is not applicable to individual product identical to the sample or similar product.

### Revision History

Revision	Issue Date	Description	Effect Page	Revised By
00	December 27, 2011	Initial Issue	-	-
01	January 13, 2012	<ul style="list-style-type: none"> <li>· Change of description for modulation method</li> <li>· Additional of calculation formula of Time of Occupancy</li> <li>· Deletion of Spectrum Bandwidth of Direct Sequence Spread Spectrum System</li> <li>· Change of limit of Maximum Peak Output Power</li> <li>· Deletion of Minimum Standard in Maximum Peak Output Power</li> <li>· Deletion of Power Spectrum Density</li> <li>· Additional of screen shot of Band Edge Measurement</li> </ul>	Page 5, 7, 14, 15, 18, 19, 20, 21, 23, 26, 41 and 42	Yoshida

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## 1. Description of Equipment under Test

### 1.1 Product Description

Manufacturer	KONICA MINOLTA SENSING, INC.
Model (referred to as the EUT)	CM-700d
Transmitter Type	<input type="checkbox"/> WLAN <input checked="" type="checkbox"/> Bluetooth <input type="checkbox"/> Zigbee <input type="checkbox"/> RFID <input type="checkbox"/> Other ( )
Nominal Voltage	DC5V
Type of Modulation	GFSK , $\pi/4$ DQPSK , 8DPSK (FHSS)
Mode of Operation	<input type="checkbox"/> duplex <input type="checkbox"/> 1/2 duplex <input checked="" type="checkbox"/> simplex <input type="checkbox"/> other
Type of Equipment	<input type="checkbox"/> Stand-alone <input type="checkbox"/> Combined Equipment <input type="checkbox"/> Plug -In Card <input checked="" type="checkbox"/> Other (Module Unit)
Type of Antenna	<input checked="" type="checkbox"/> Integral <input type="checkbox"/> external <input type="checkbox"/> Other
Type of Power source	<input type="checkbox"/> AC mains <input checked="" type="checkbox"/> Dedicated AC adaptor (AC 100V-AC 240V) <input checked="" type="checkbox"/> DC Voltage <input checked="" type="checkbox"/> Battery
Type of Battery (if applicable)	Nickel-metal-hydride battery or Alkaline battery
Type of Operation	<input type="checkbox"/> Continuous <input type="checkbox"/> Burst <input checked="" type="checkbox"/> Intermittent
Stand by Mode	<input type="checkbox"/> Available <input checked="" type="checkbox"/> N/A
Intended Functions	Bluetooth spectrophotometer
Bandwidth of the IF filters	N/A
Frequency Band Lower limit	2400MHz
Upper limit	2483.5MHz
Frequency of Operating	2402 to 2480MHz
Thermal Limitation	5 to 40°C

**Note:**

There is CM-600d as similar model of CM-700d.

The difference is only area which the light irradiates.

The enclosure, electronic circuit board, used component, component layout which relates to EMC and RF are same.

The tests were performed on CM-700d, and we confirmed to comply with the requirement.

## 1.2 Antenna Description

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT.

Therefore, the equipment complies with the antenna requirement of Section 15.203.

No.	Type Name	Gain	Antenna Type	Remarks
1	AHD1403-244ST01	+1.65dBi	On board chip antenna	Originally Integrated

## 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. Ohnoki**

3571-2 Ohnoki, Watarai-cho, Watarai-gun, Mie-ken 516-2102, Japan  
FCC registration number: 604492

### 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. 125mW	Pass
15. 247(d) 15. 209	Transmitter Radiated Emissions	See 5.5.2 See 5.6.2	Pass
15. 247(d)	Band Edge Measurement	See 5.7.2	Pass
15.215(c)	20 dB Bandwidth.	---	---

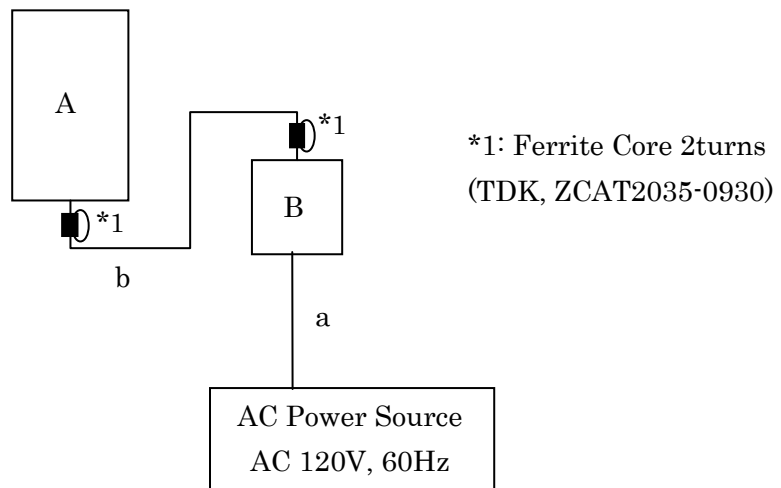
#### 4. Test Configuration

	Instrument	Model	Rating
<b>A</b>	Spectrophotometer (EUT 1)	CM-700d	DC 5V, 2.0A
<b>B</b>	AC Adaptor (EUT 2)	AC-A305	AC 100 – 240V, 50/60Hz, 0.24 – 0.16A

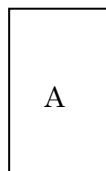
	Cable	Length	Shield	Ferrite Core
<b>a</b>	AC Power Cable	1.8 m	No	No
<b>b</b>	DC Power Cable	1.5 m	No	Yes

Setup diagram of tested system

AC Adaptor

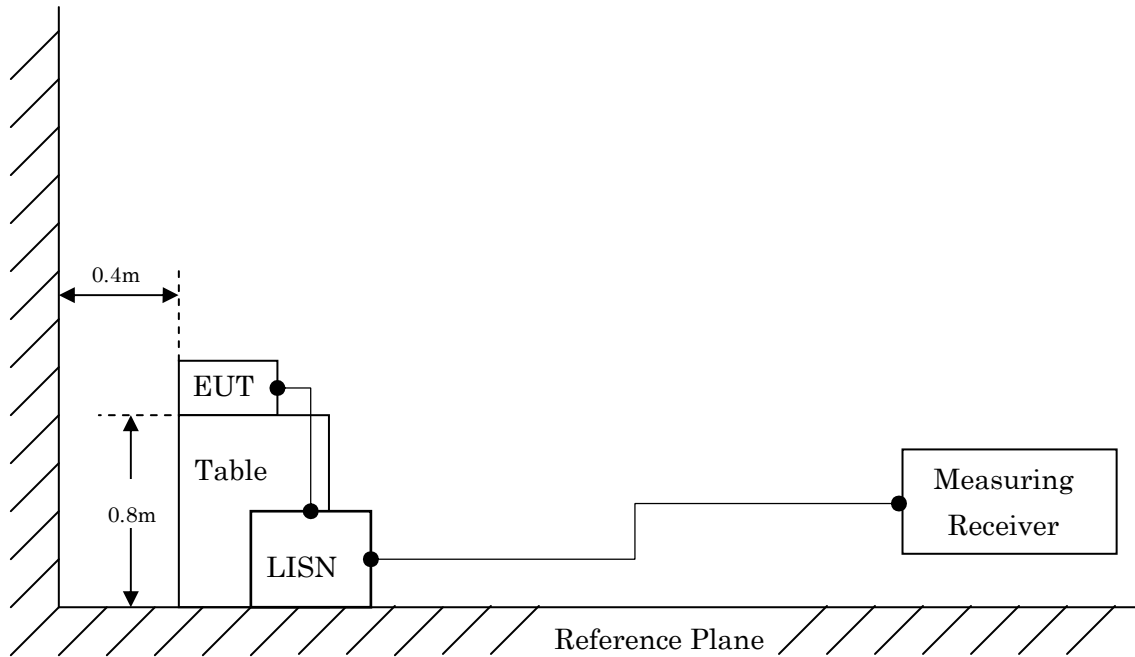


Battery

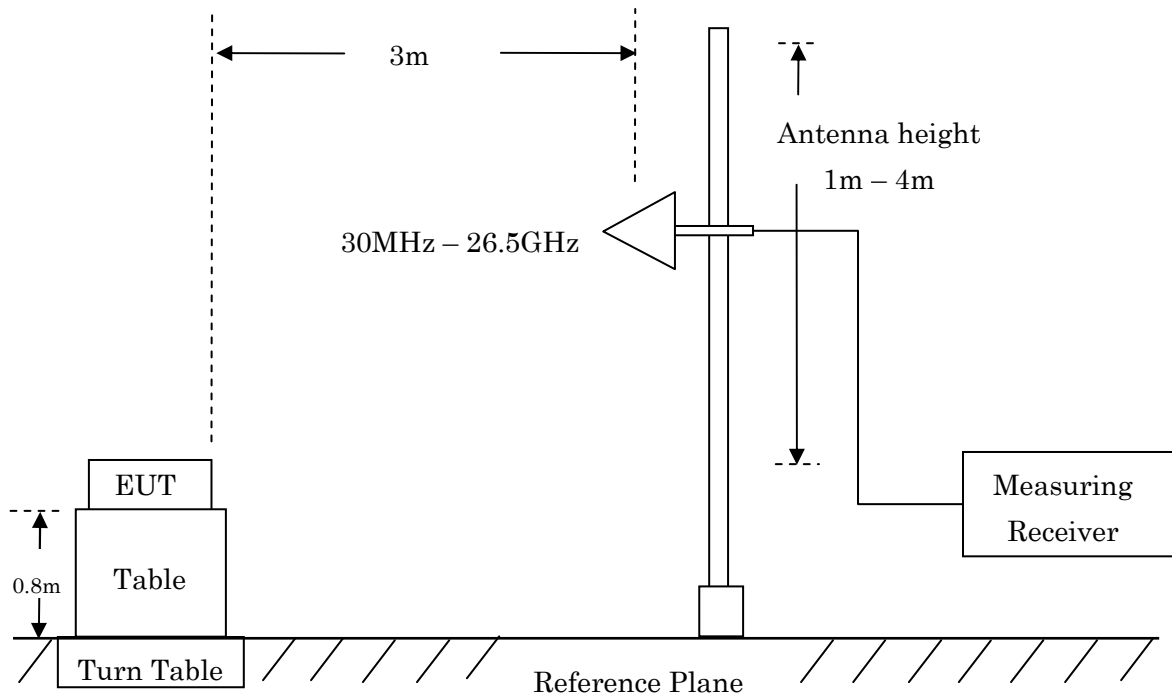




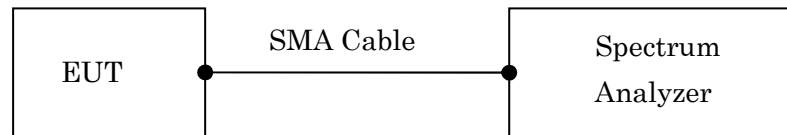
4.1 15. 207 AC Power Conducted Emission in Shield Room



4.2 15. 247(d), 15.209 Transmitter Radiated Emissions, 15.247(d) Band Edge (Radiated) in 3m Anechoic Chamber



#### 4.3 Conducted Emission



#### 4.4 Test Mode

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

15.247(b) Maximum Peak Output Power 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.

Non-conductive board (12mm 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, 46 %

5.1.4 Measured Data

Measured Value Table

<<Conducted Emission>>

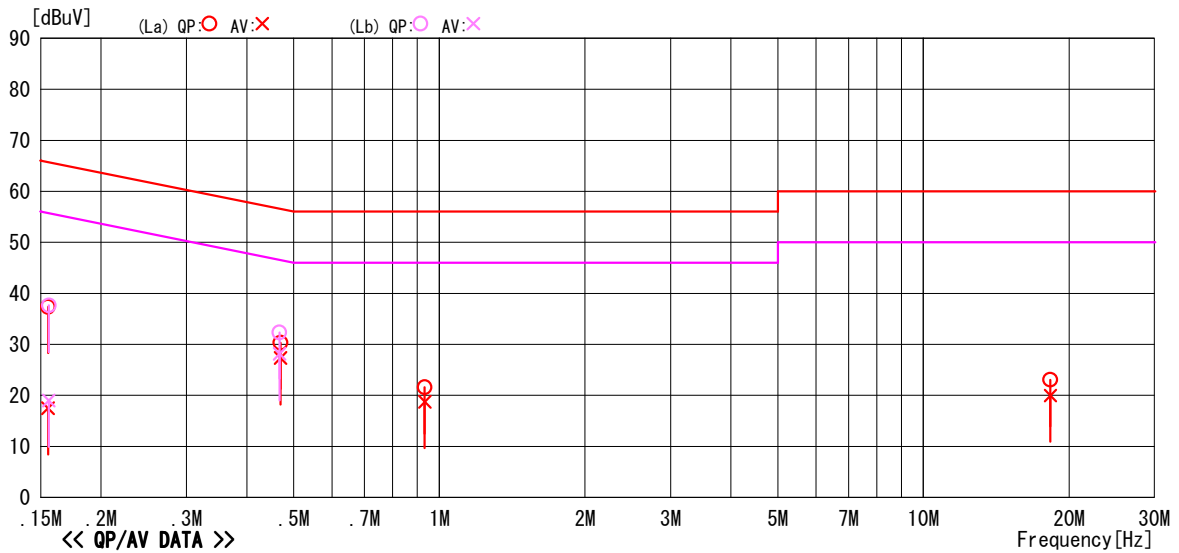
Cosmos Corporation Onoki Lab.  
 Date : 2011/12/07

Model Name : CM-700d / AC-A305  
 Serial No. : 01  
 Operator : O. Itogawa  
 Power Supply : AC120V, 60Hz / DC5V

Job No : CJ11-105994E  
 Temp/Humi : 24°C/46%  
 Condition : Operated  
 Remark :

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

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



No	Freq. [MHz]	Reading Level		C. Fac [dB]	Results		Limit		Margin		Phase	Comment
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]				
1	0.15547	27.2	7.3	10.2	37.4	17.5	65.7	55.7	28.3	38.2	La	
2	0.46957	20.4	17.3	10.0	30.4	27.3	56.5	46.5	26.2	19.2	La	
3	0.93315	11.5	8.7	10.1	21.6	18.8	56.0	46.0	34.4	27.2	La	
4	18.29138	11.8	8.7	11.3	23.1	20.0	60.0	50.0	36.9	30.0	La	
5	0.15596	27.4	8.8	10.2	37.6	19.0	65.7	55.7	28.1	36.7	Lb	
6	0.46754	22.3	18.0	10.1	32.4	28.1	56.6	46.6	24.2	18.5	Lb	

-TEPT0-DV/CE Ver1.50.0128

## 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 as following;

✓ Frequency Span	: 10 MHz
✓ Resolution bandwidth	: 100 kHz
✓ Video bandwidth	: 300 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.**

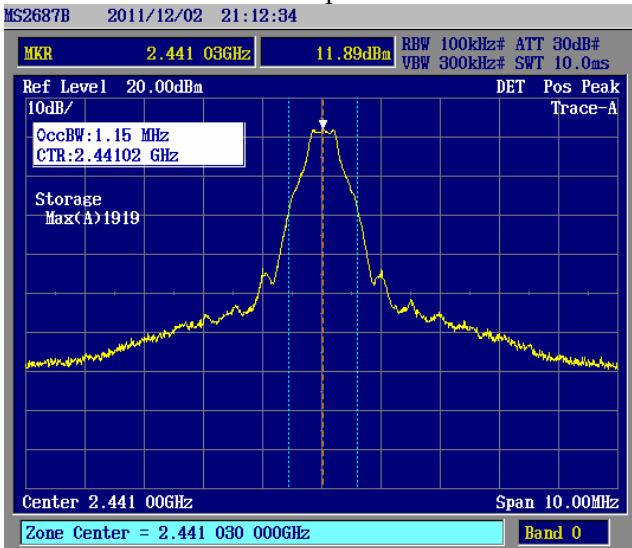
Uncertainty of measurement	: ± 0.8 dB
Temperature, Humidity	: 23 °C, 42%

5.2.4 Measured Data  
 20dB Bandwidth

Frequency (MHz)	Measured Bandwidth (kHz)	Limit (MHz)
<b>20 dB Bandwidth</b>		
<b>GFSK F1D 1Mbps BASIC DH-5</b>		
2402 (CH00)	1150	---
2441 (CH38)	1150	---
2480 (CH78)	1150	---
<b><math>\pi/4</math>DQPSK G1D 2Mbps EDR 2-DH5</b>		
2402 (CH00)	1460	---
2441 (CH38)	1460	---
2480 (CH78)	1450	---
<b>8DPSK G1D 3Mbps EDR 3-DH5</b>		
2402 (CH00)	1440	---
2441 (CH38)	1450	---
2480 (CH78)	1430	---
<b>Channel Separation</b>		
Hopping Channel	1010	>20dB Bandwidth and 25(kHz)

5.2.4 Measured Data (Continued)

20 dB Bandwidth 2441MHz  
 GFSK F1D 1Mbps BASIC DH-5



20 dB Bandwidth 2441MHz  
 $\pi$ /4DQPSK G1D 2Mbps EDR 2-DH5



20 dB Bandwidth 2441MHz  
 8DPSK G1D 3Mbps EDR 3-DH5



Channel Separation



### 5.3 15. 247(a)(1) Number of Channels and Time of Occupancy

#### 5.3.1 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 as following to measure Number of Channels;

✓	Frequency Span	: 79 MHz
✓	Resolution bandwidth	: 300 kHz
✓	Video bandwidth	: 300 kHz
✓	Sweep Time	: Auto
✓	Detector function	: Peak
✓	Trace Mode	: Max Hold

- The spectrum analyzer is set 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.

#### 5.3.2 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.

#### 5.3.3 Result

**EUT complies with the requirement.**

Number of Channels

Uncertainty of measurement result: 1 usec

Temperature, Humidity : 22 °C, 47%

Time of Occupancy

Uncertainty of measurement result: 1 usec

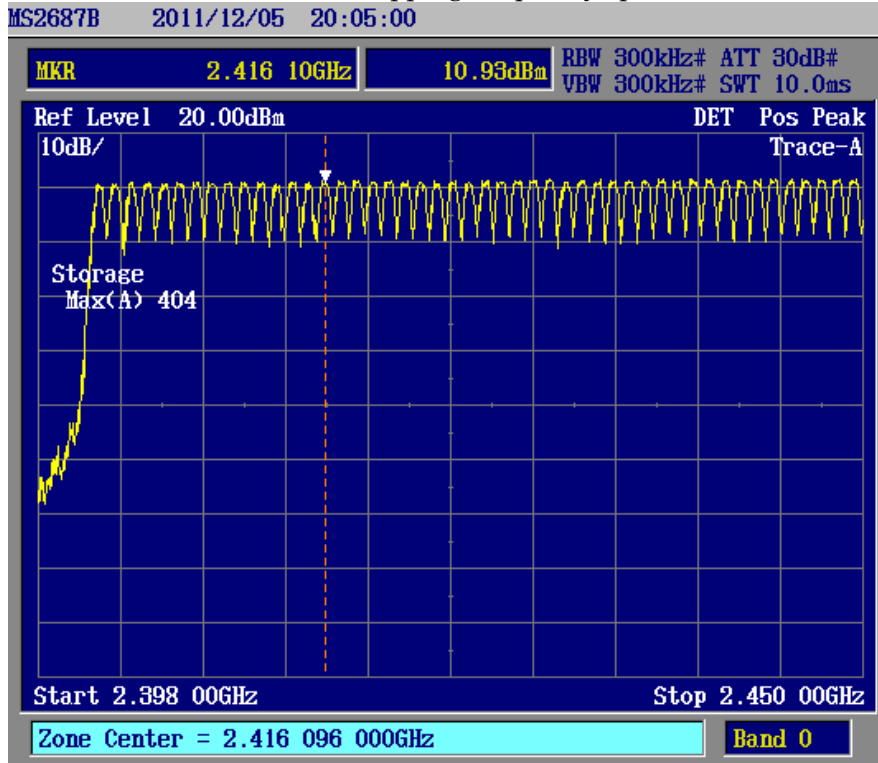
Temperature, Humidity : 23 °C, 42%



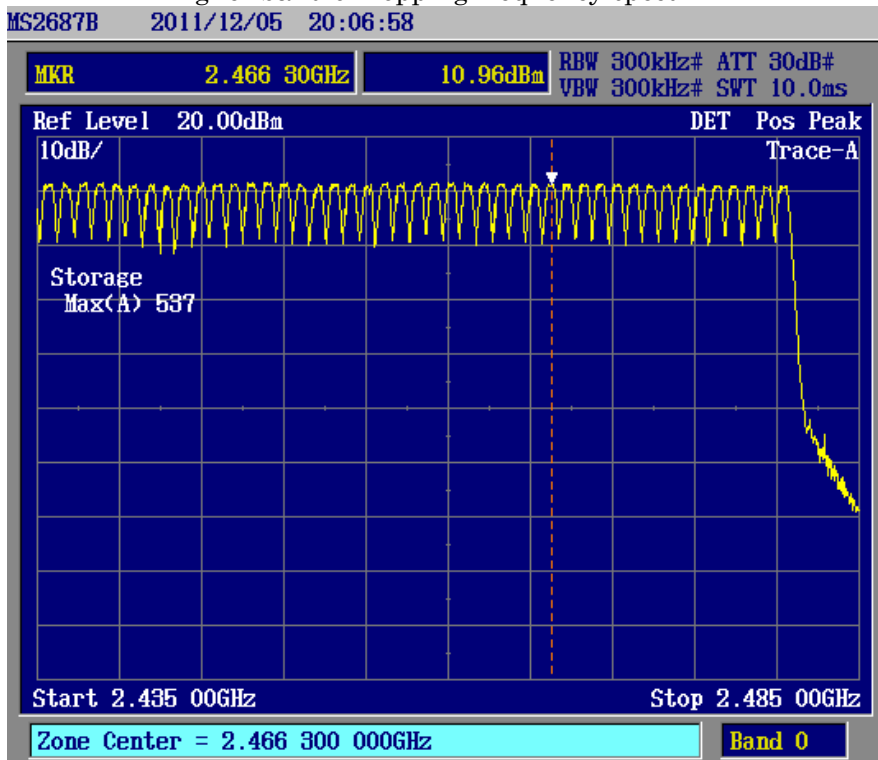
### 5.3.4 Measured Data

#### Number of Channels

Lower band of hopping frequency spectrum



Higher band of hopping frequency spectrum



5.3.4 Measured Data (Continued)

Time of Occupancy

**GFSK F1D 1Mbps BASIC DH-5**

Frequency [MHz]	Power Supply Voltage [V]	Cycle [ms]	ON Time [ms]	Duty cycle	Dwell Time [s]	Limit [s]	Margin [s]
2441(39CH)	5.00	3.75	3.11	0.83	0.33	0.40	0.07

**$\pi/4$  QPSK G1D 2Mbps EDR 2-DH5**

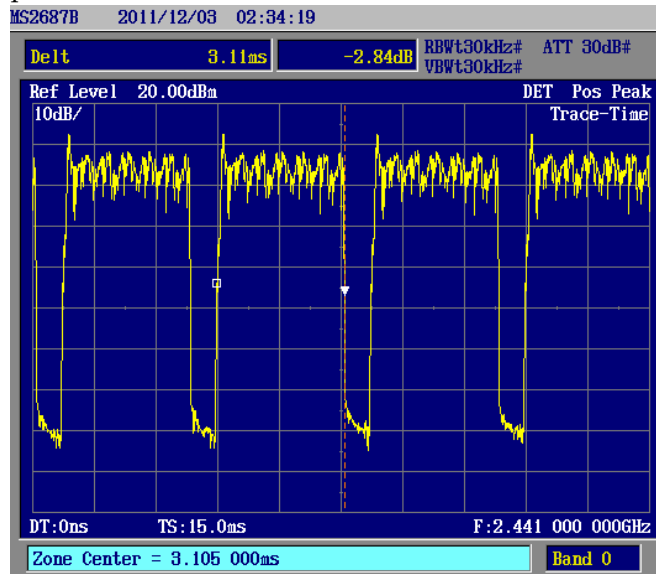
Frequency [MHz]	Power Supply Voltage [V]	Cycle [ms]	ON Time [ms]	Duty cycle	Dwell Time [s]	Limit [s]	Margin [s]
2441(39CH)	5.00	2.50	1.85	0.74	0.30	0.40	0.10

**8DPSK G1D 3Mbps EDR 3-DH5**

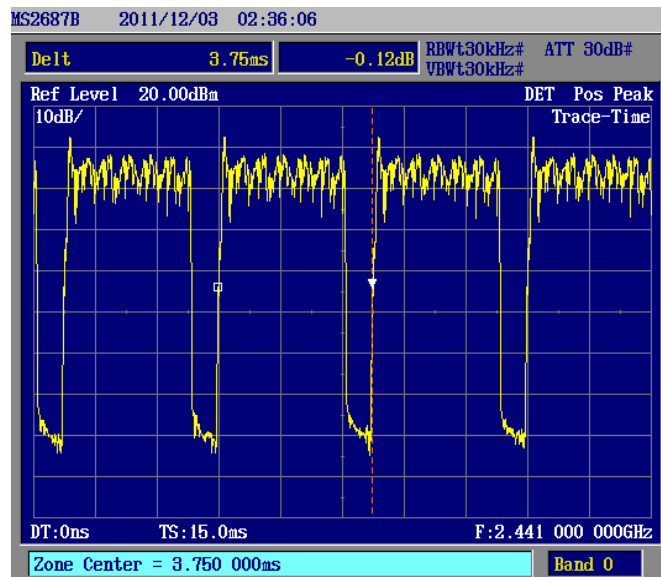
Frequency [MHz]	Power Supply Voltage [V]	Cycle [ms]	ON Time [ms]	Duty cycle	Dwell Time [s]	Limit [s]	Margin [s]
2441(39CH)	5.00	2.50	1.86	0.74	0.30	0.40	0.10

Sample calculation:  $(0.4 \times 79) \div (79 \times 3.75) \times 3.11 = 0.33\text{sec}$

ON Time



(ON+OFF Time)



#### 5.4 15. 247(b) Maximum Peak Output Power

##### 5.4.1 Setting Remarks

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

EUT directly connects to the spectrum analyzer via calibrated coaxial cable and a suitable attenuator.

The spectrum analyzer is set as following;

- ✓ Frequency span : 3 MHz
- ✓ Resolution bandwidth : 3 MHz
- ✓ Video bandwidth : 3 MHz
- ✓ Sweep : Auto
- ✓ Detector function : Peak
- ✓ Trace Mode : Max Hold

##### 5.4.2 Result

**EUT complies with the requirement.**

Uncertainty of measurement result:  $\pm 0.5$  dB  
Temperature, Humidity : 23°C, 42%

5.4.3 Measured Data

【Voltage -15%】

Frequency (MHz)	Peak Power (dBm)	Peak Power (W)	Limit (W)	Margin (W)
<b>GFSK F1D 1Mbps BASIC DH-5</b>				
2402 (CH00)	11.33	0.014	0.125	0.111
2441 (CH39)	11.95	0.016	0.125	0.109
2480 (CH78)	11.50	0.014	0.125	0.111
<b><math>\pi/4</math> QPSK G1D 2Mbps EDR 2-DH5</b>				
2402 (CH00)	9.05	0.008	0.125	0.117
2441 (CH39)	9.78	0.010	0.125	0.115
2480 (CH78)	9.14	0.008	0.125	0.117
<b>8DPSK G1D 3Mbps EDR 3-DH5</b>				
2402 (CH00)	9.52	0.009	0.125	0.116
2441 (CH39)	10.08	0.010	0.125	0.115
2480 (CH78)	9.63	0.009	0.125	0.116

【Normal Voltage】

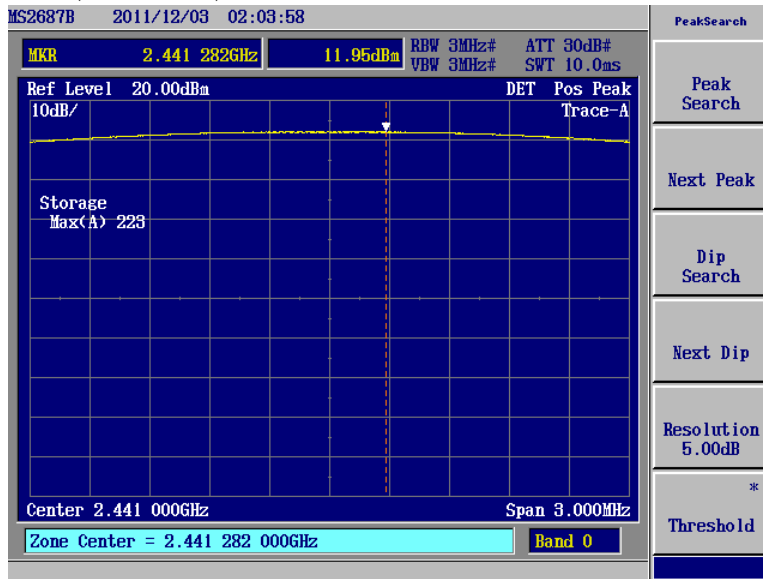
Frequency (MHz)	Peak Power (dBm)	Peak Power (W)	Limit (W)	Margin (W)
<b>GFSK F1D 1Mbps BASIC DH-5</b>				
2402 (CH00)	11.48	0.014	0.125	0.111
2441 (CH39)	11.93	0.016	0.125	0.109
2480 (CH78)	11.49	0.014	0.125	0.111
<b><math>\pi/4</math> QPSK G1D 2Mbps EDR 2-DH5</b>				
2402 (CH00)	9.06	0.008	0.125	0.117
2441 (CH39)	9.77	0.009	0.125	0.116
2480 (CH78)	9.21	0.008	0.125	0.117
<b>8DPSK G1D 3Mbps EDR 3-DH5</b>				
2402 (CH00)	9.47	0.009	0.125	0.116
2441 (CH39)	10.13	0.010	0.125	0.115
2480 (CH78)	9.59	0.009	0.125	0.116

【Voltage +15%】

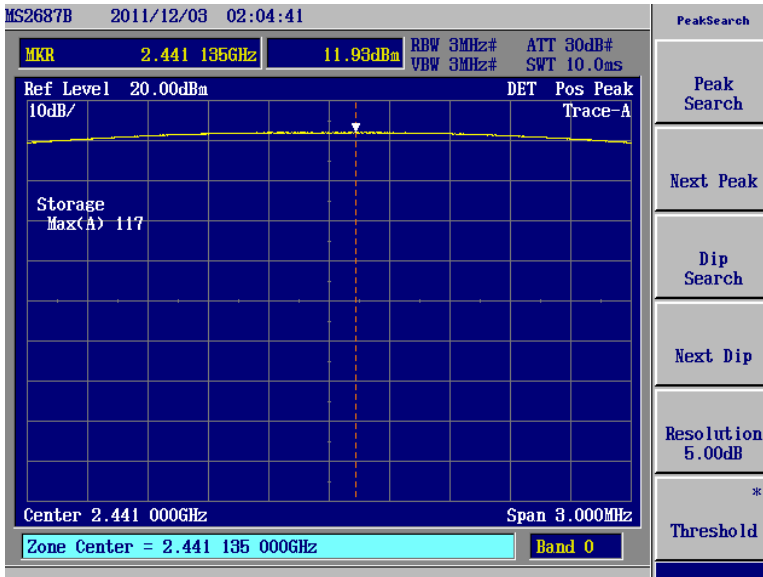
Frequency (MHz)	Peak Power (dBm)	Peak Power (W)	Limit (W)	Margin (W)
<b>GFSK F1D 1Mbps BASIC DH-5</b>				
2402 (CH00)	11.34	0.014	0.125	0.111
2441 (CH39)	11.96	0.016	0.125	0.109
2480 (CH78)	11.50	0.014	0.125	0.111
<b><math>\pi/4</math> QPSK G1D 2Mbps EDR 2-DH5</b>				
2402 (CH00)	9.11	0.008	0.125	0.117
2441 (CH39)	9.75	0.009	0.125	0.116
2480 (CH78)	9.29	0.008	0.125	0.117
<b>8DPSK G1D 3Mbps EDR 3-DH5</b>				
2402 (CH00)	9.43	0.009	0.125	0.116
2441 (CH39)	10.17	0.010	0.125	0.115
2480 (CH78)	9.61	0.009	0.125	0.116

5.4.3 Measured Data (Continued)

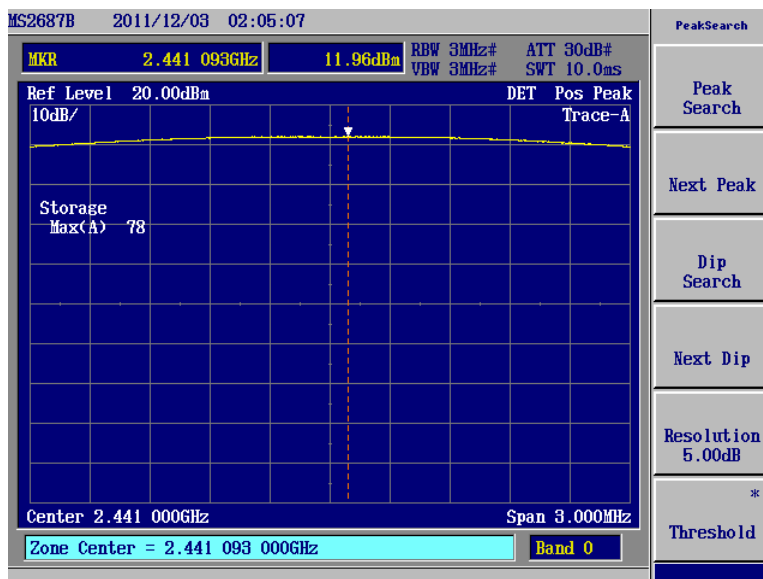
DC4.25V CH39  
 2441MHz  
 GFSK F1D 1Mbps  
 BASIC DH-5



DC5.0V CH39  
 2441MHz  
 GFSK F1D 1Mbps  
 BASIC DH-5



DC5.75V CH39  
 2441MHz  
 GFSK F1D 1Mbps  
 BASIC DH-5



## 5.5 15. 247(d) Transmitter Spurious Emissions (Conducted)

### 5.5.1 Setting Remarks

- EUT directly connects to the spectrum analyzer via calibrated coaxial cable.
- 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 as following;

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

- See test configuration figure 4.3.

### 5.5.2 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.

### 5.5.3 Result

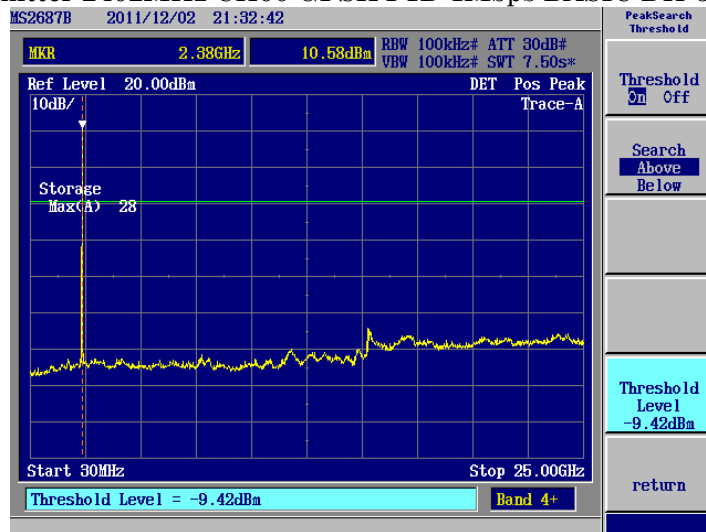
**EUT complies with the requirement.**

Uncertainty of measurement result:  $\pm 0.8$  dB

Temperature, Humidity : 23°C, 42%

5.5.4 Measured Data

Transmitter 2402MHz CH00 GFSK F1D 1Mbps BASIC DH-5



Transmitter 2441MHz CH39 GFSK F1D 1Mbps BASIC DH-5



Transmitter 2480MHz CH78 GFSK F1D 1Mbps BASIC DH-5



## 5.6 15. 247(d) Transmitter Radiated Emissions (Radiated)

### 5.6.1 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 25GHz (as 10<sup>th</sup> 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 as following;
- The carrier level (or,noise levels) was (or were) measured at each position of all three axes X,Y and Z,and the position that has the maximum noise was determined.
- With the position,the noise levels of all the frequencies was measured.

(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 as following;

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

- See test configuration figure 4.2.



5.6.2 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.

5.6.3 Result

**EUT complies with the requirement.**

Uncertainty of measurement result: ± 3.28 dB

Temperature, Humidity : Refer to each data table

5.6.4 Measured Data  
 30MHz to 1GHz

<<Radiated Emission>>

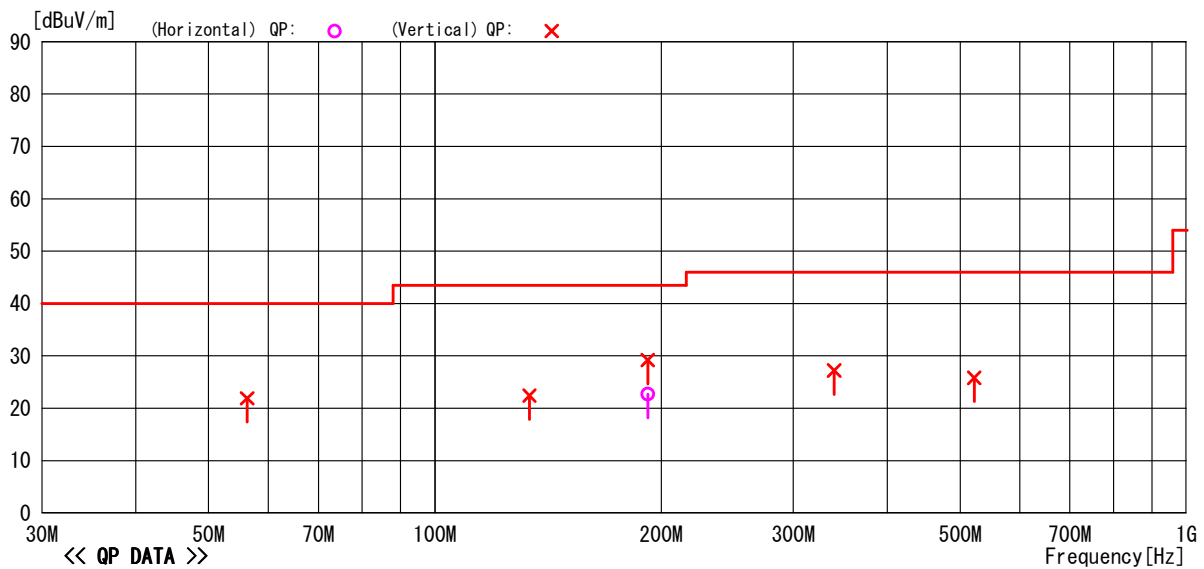
Cosmos Corporation Onoki Lab.  
 Date : 2011/11/28 23:15:51

Model Name : CM-700d / AC-A305  
 Serial No. : 01  
 Operator : O. Itogawa  
 Power Supply : AC120V, 60Hz / DC5V

Job No : CJ11-105994E  
 Temp./Humi. : 20°C/43%  
 Condition : CH00 2402MHz  
 Remark : Angle1 BDR 1Mbps

Memo : RBW: 30M~1GHz (120kHz)

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



No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	191.999	31.0	13.9	5.6	27.8	22.7	43.5	20.8	Hori.	240	0	BC	
2	56.246	35.1	10.6	4.6	28.4	21.9	40.0	18.1	Vert.	100	123	BC	
3	133.607	33.7	11.5	5.3	28.1	22.4	43.5	21.1	Vert.	100	33	BC	
4	191.979	37.5	13.9	5.6	27.8	29.2	43.5	14.3	Vert.	100	72	BC	
5	340.045	32.8	15.1	7.1	27.8	27.2	46.0	18.8	Vert.	149	134	LP	
6	522.269	28.4	18.0	8.2	28.8	25.8	46.0	20.2	Vert.	100	0	LP	

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5.6.4 Measured Data (Continued)

<<Radiated Emission>>

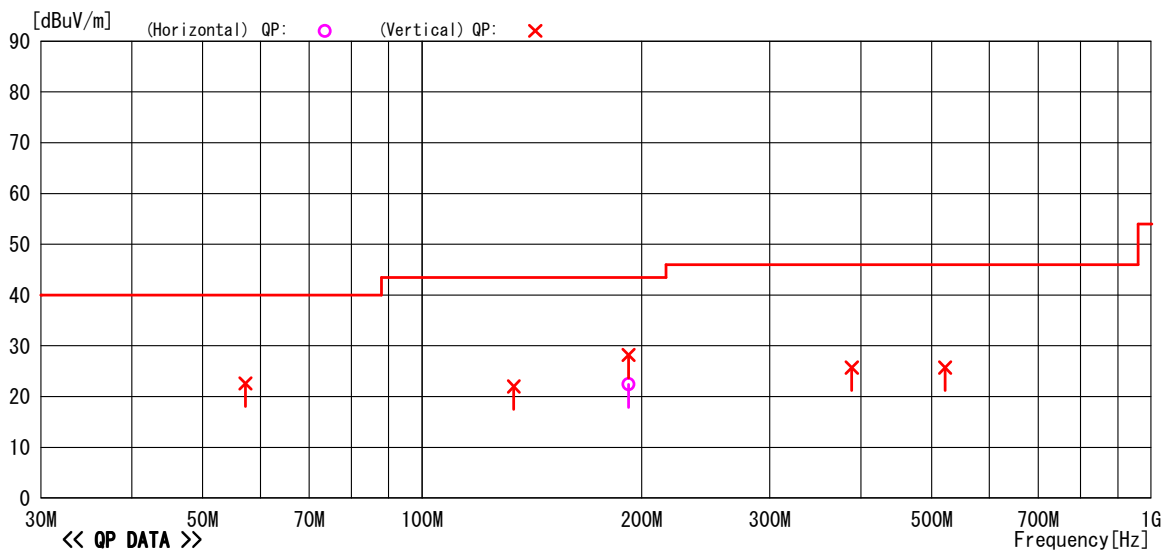
Cosmos Corporation Onoki Lab.  
Date : 2011/11/29 00:09:05

Model Name : CM-700d / AC-A305  
Serial No. : 01  
Operator : O. Itogawa  
Power Supply : AC120V, 60Hz / DC5V

Job No : CJ11-105994E  
Temp./Humi. : 20°C/43%  
Condition : CH39 2441MHz  
Remark : Angle1 BDR 1Mbps

Memo : RBW:30M~1GHz (120kHz)

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



No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	192.019	30.7	13.9	5.6	27.8	22.4	43.5	21.1	Hori.	338	20	BC	
2	57.239	35.8	10.6	4.6	28.4	22.6	40.0	17.4	Vert.	100	177	BC	
3	133.647	33.3	11.5	5.3	28.1	22.0	43.5	21.5	Vert.	100	12	BC	
4	192.009	36.5	13.9	5.6	27.8	28.2	43.5	15.3	Vert.	100	70	BC	
5	388.572	30.5	15.9	7.4	28.1	25.7	46.0	20.3	Vert.	128	309	LP	
6	521.838	28.3	18.0	8.2	28.8	25.7	46.0	20.3	Vert.	100	0	LP	

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5.6.4 Measured Data (Continued)

<<Radiated Emission>>

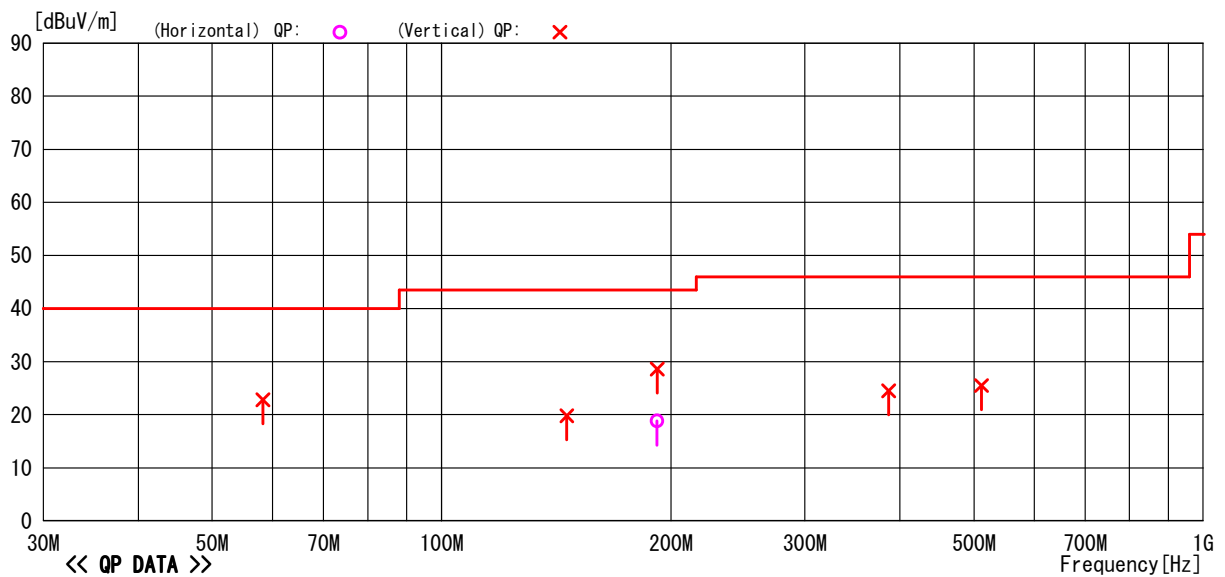
Cosmos Corporation Onoki Lab.  
Date : 2011/11/29 00:54:21

Model Name : CM-700d / AC-A305  
Serial No. : 01  
Operator : O. Itogawa  
Power Supply : AC120V, 60Hz / DC5V

Job No : CJ11-105994E  
Temp./Humi. : 20°C/43%  
Condition : CH78 2480MHz  
Remark : Angle1 BDR 1Mbps

Memo : RBW:30M~1GHz (120kHz)

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



No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	191.788	27.1	13.9	5.6	27.8	18.8	43.5	24.7	Hori.	254	220	BC	
2	58.240	36.1	10.5	4.6	28.4	22.8	40.0	17.2	Vert.	100	157	BC	
3	146.127	30.8	11.7	5.4	28.1	19.8	43.5	23.7	Vert.	100	303	BC	
4	191.999	36.9	13.9	5.6	27.8	28.6	43.5	14.9	Vert.	100	79	BC	
5	386.543	29.3	15.9	7.4	28.1	24.5	46.0	21.5	Vert.	139	307	LP	
6	511.944	28.2	17.9	8.2	28.8	25.5	46.0	20.5	Vert.	100	0	LP	

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5.6.4 Measured Data (Continued)

<<Radiated Emission>>

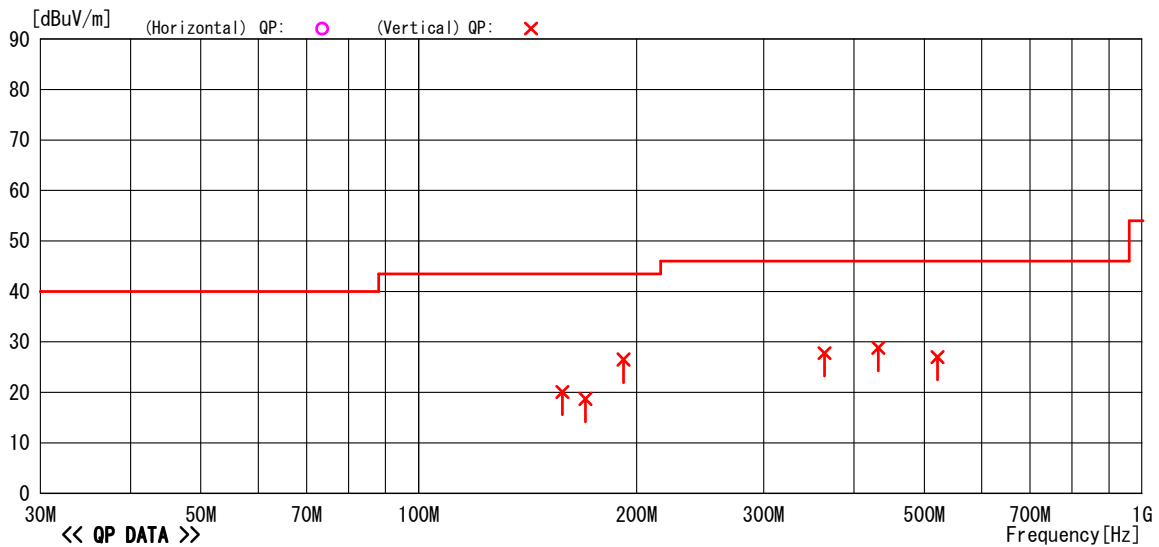
Cosmos Corporation Onoki Lab.  
 Date : 2011/11/29 01:47:14

Model Name : CM-700d / AC-A305  
 Serial No. : 01  
 Operator : O. Itogawa  
 Power Supply : Battery DC6V

Job No : CJ11-105994E  
 Temp./Humi. : 20°C/43%  
 Condition : CH00 2402MHz  
 Remark : Angle1 BDR 1Mbps

Memo : RBW:30M~1GHz (120kHz)

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



No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	158.001	30.7	12.0	5.5	28.1	20.1	43.5	23.4	Vert.	100	47	BC	
2	170.095	28.5	12.6	5.6	28.0	18.7	43.5	24.8	Vert.	100	0	BC	
3	191.989	34.8	13.9	5.6	27.8	26.5	43.5	17.0	Vert.	100	168	BC	
4	363.922	33.1	15.5	7.2	28.0	27.8	46.0	18.2	Vert.	151	295	LP	
5	432.009	32.9	16.6	7.7	28.4	28.8	46.0	17.2	Vert.	127	265	LP	
6	521.838	29.6	18.0	8.2	28.8	27.0	46.0	19.0	Vert.	100	0	LP	

5.6.4 Measured Data (Continued)

1GHz to 18GHz

**RADIATED EMISSION**

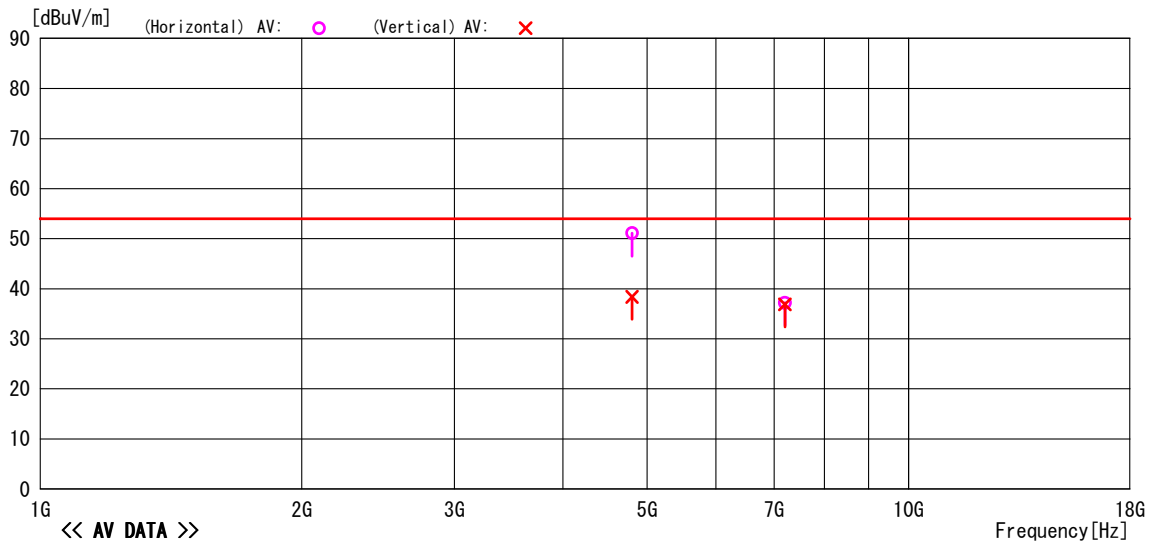
Cosmos Corporation Onoki Lab.  
 Date : 2011/11/24 11:51:58

Model Name : CM-700d / AC-A305  
 Serial No. : 01  
 Operator : O. Itogawa  
 Power Supply : AC120V, 60Hz / DC5V

Job No. : CJ11-105994E  
 Temp/Humi : 20°C/43%  
 Condition : CH00 2402MHz  
 Remark : Angle1 BDR 1Mbps

Memo : RBW:1GHz~(1MHz)

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



<< AV DATA >>

No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	4803.920	50.1	31.0	6.3	36.3	51.1	54.0	2.9	Hori.	100	169	AV	
2	7205.460	28.3	35.1	7.5	33.7	37.2	54.0	16.8	Hori.	100	223	AV	
3	4804.279	37.3	31.0	6.3	36.2	38.4	54.0	15.6	Vert.	121	86	AV	
4	7205.420	28.0	35.1	7.5	33.7	36.9	54.0	17.1	Vert.	102	202	AV	

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5.6.4 Measured Data (Continued)

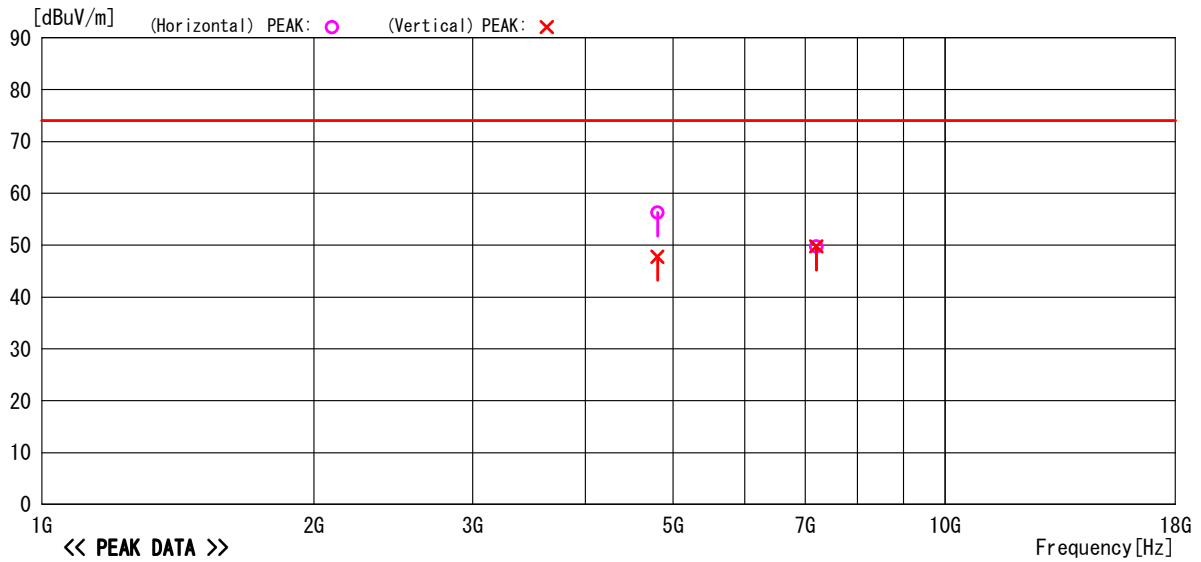
**RADIATED EMISSION**

Cosmos Corporation Onoki Lab.  
 Date : 2011/11/24 11:51:58

Model Name : CM-700d / AC-A305  
 Serial No. : 01  
 Operator : O. Itogawa  
 Power Supply : AC120V, 60Hz / DC5V  
 Memo : RBW:1GHz~(1MHz)

Job No. : CJ11-105994E  
 Temp/Humi : 20°C/43%  
 Condition : CH00 2402MHz  
 Remark : Angle1 BDR 1Mbps

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



No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pol.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	4803.920	55.3	31.0	6.3	36.3	56.3	74.0	17.7	Hori.	100	169		PK
2	7205.460	40.9	35.1	7.5	33.7	49.8	74.0	24.2	Hori.	100	223		PK
3	4804.279	46.7	31.0	6.3	36.2	47.8	74.0	26.2	Vert.	121	86		PK
4	7205.420	40.9	35.1	7.5	33.7	49.8	74.0	24.2	Vert.	102	202		PK

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5.6.4 Measured Data (Continued)

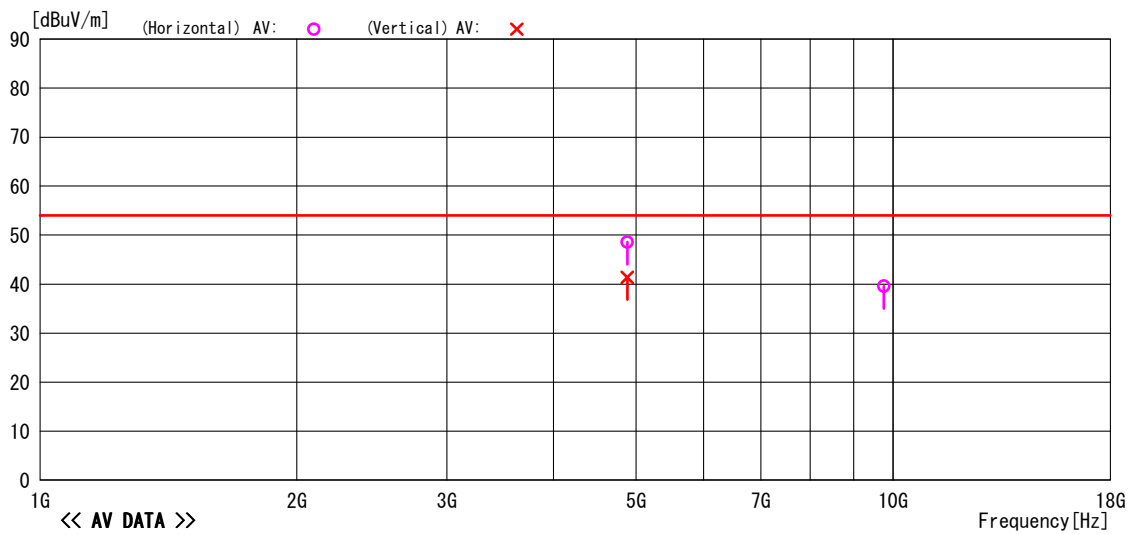
**RADIATED EMISSION**

Cosmos Corporation Onoki Lab.  
 Date : 2011/11/28 21:05:04

Model Name : CM-700d / AC-A305  
 Serial No. : 01  
 Operator : O. Itogawa  
 Power Supply : AC120V, 60Hz / DC5V  
 Memo : RBW:1GHz~(1MHz)

Job No. : CJ11-105994E  
 Temp/Humi : 22°C/42%  
 Condition : CH39 2441MHz  
 Remark : Angle1 BDR 1Mbps

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



No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	4882.277	47.3	31.1	6.3	36.1	48.6	54.0	5.4	Hori.	100	159	AV	
2	9763.263	26.5	37.4	9.2	33.5	39.6	54.0	14.4	Hori.	100	120	AV	
3	4882.257	40.1	31.1	6.3	36.1	41.4	54.0	12.6	Vert.	103	130	AV	

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5.6.4 Measured Data (Continued)

**RADIATED EMISSION**

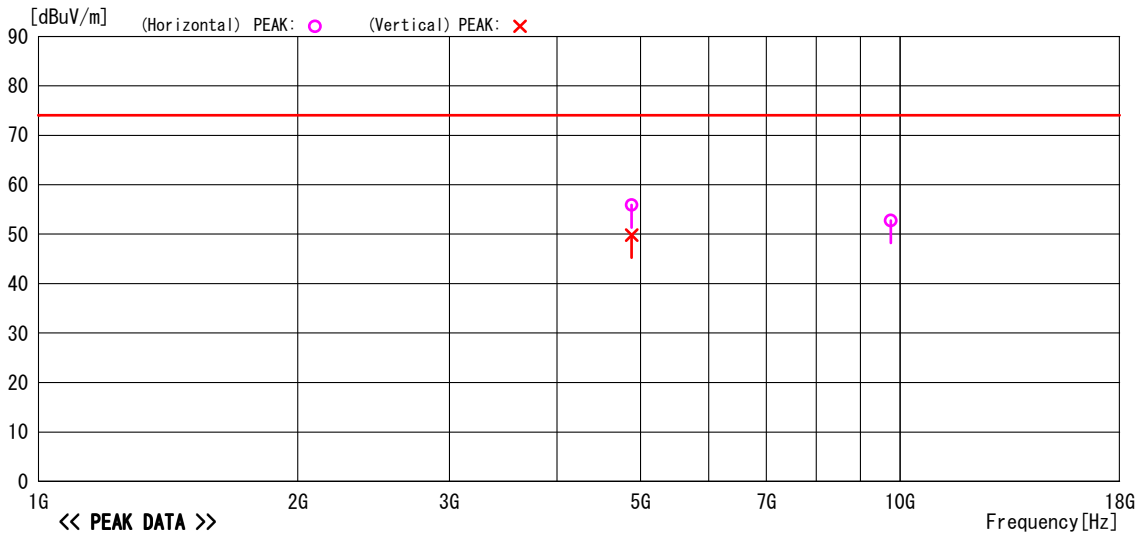
Cosmos Corporation Onoki Lab.  
 Date : 2011/11/28 21:05:04

Model Name : CM-700d / AC-A305  
 Serial No. : 01  
 Operator : O. Itogawa  
 Power Supply : AC120V, 60Hz / DC5V

Job No. : CJ11-105994E  
 Temp/Humi : 22°C/42%  
 Condition : CH39 2441MHz  
 Remark : Angle1 BDR 1Mbps

Memo : RBW:1GHz~(1MHz)

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



No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pol.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	4882.277	54.6	31.1	6.3	36.1	55.9	74.0	18.1	Hori.	100	159		PK
2	9763.263	39.6	37.4	9.2	33.5	52.7	74.0	21.3	Hori.	100	120		PK
3	4882.257	48.5	31.1	6.3	36.1	49.8	74.0	24.2	Vert.	103	130		PK

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5.6.4 Measured Data (Continued)

**RADIATED EMISSION**

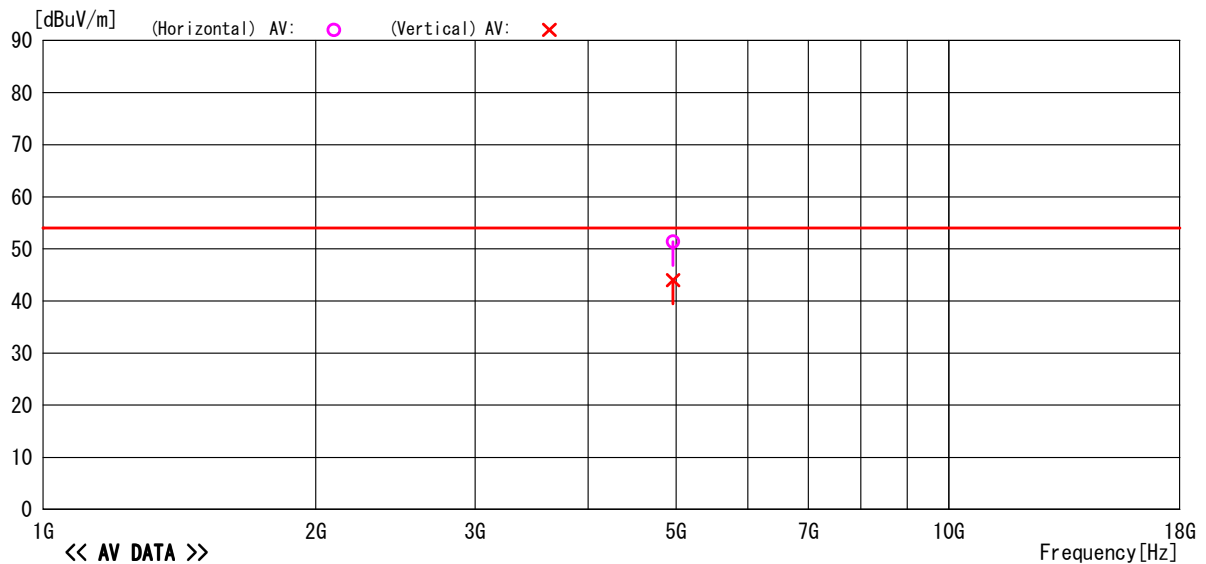
Cosmos Corporation Onoki Lab.  
 Date : 2011/11/28 21:37:35

Model Name : CM-700d / AC-A305  
 Serial No. : 01  
 Operator : O. Itogawa  
 Power Supply : AC120V, 60Hz / DC5V

Job No. : CJ11-105994E  
 Temp/Humi : 22°C/42%  
 Condition : CH78 2480MHz  
 Remark : Angle1 BDR 1Mbps

Memo : RBW:1GHz~(1MHz)

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



No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	4959.937	49.8	31.2	6.3	35.9	51.4	54.0	2.6	Hori.	109	153	AV	
2	4959.626	42.4	31.2	6.3	35.9	44.0	54.0	10.0	Vert.	101	136	AV	

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5.6.4 Measured Data (Continued)

**RADIATED EMISSION**

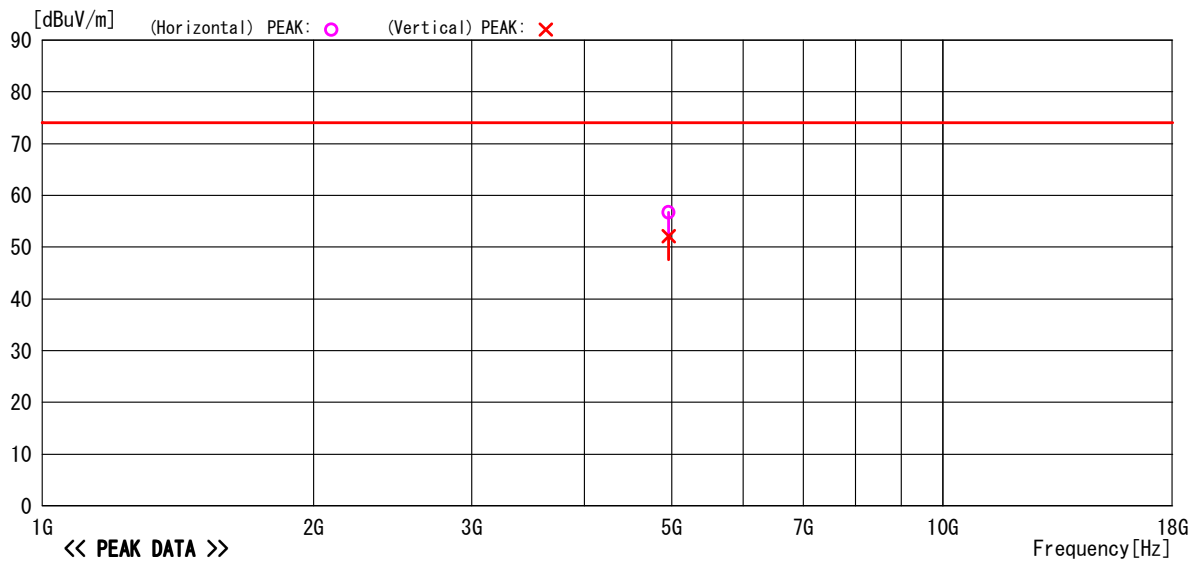
Cosmos Corporation Onoki Lab.  
Date : 2011/11/28 21:37:35

Model Name : CM-700d / AC-A305  
Serial No. : 01  
Operator : O. Itogawa  
Power Supply : AC120V, 60Hz / DC5V

Job No. : CJ11-105994E  
Temp/Humi : 22°C/42%  
Condition : CH78 2480MHz  
Remark : Angle1 BDR 1Mbps

Memo : RBW:1GHz~(1MHz)

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



No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	4959.937	55.1	31.2	6.3	35.9	56.7	74.0	17.3	Hori.	109	153	PK	
2	4959.626	50.5	31.2	6.3	35.9	52.1	74.0	21.9	Vert.	101	136	PK	

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5.6.4 Measured Data (Continued)

**RADIATED EMISSION**

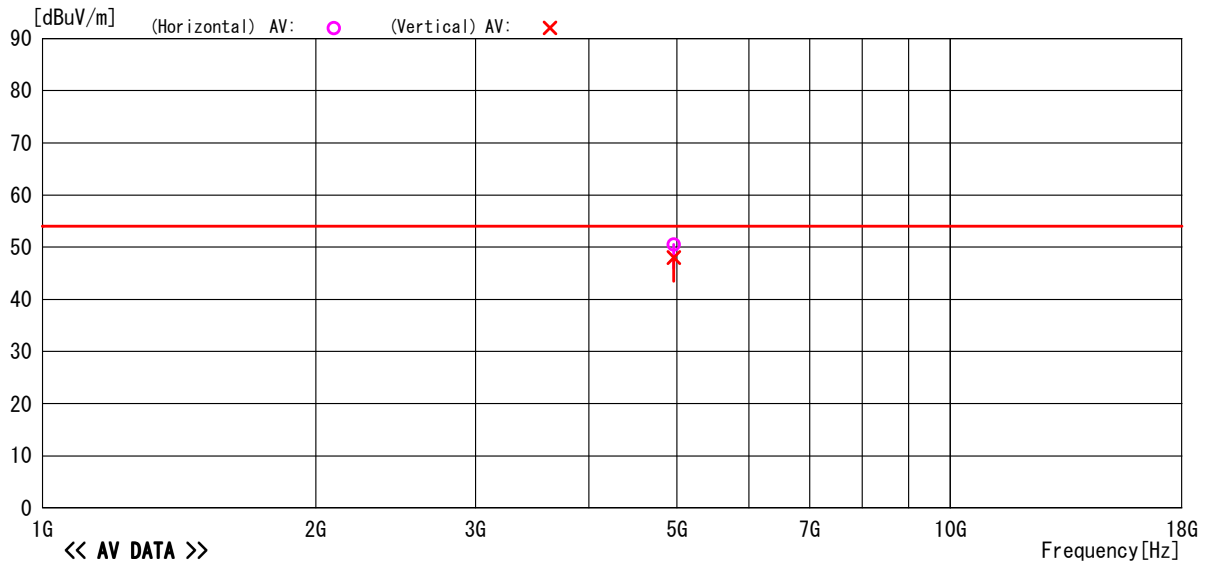
Cosmos Corporation Onoki Lab.  
 Date : 2011/11/29 22:05:00

Model Name : CM-700d / AC-A305  
 Serial No. : 01  
 Operator : O. Itogawa  
 Power Supply : Battery DC6V

Job No. : CJ11-105994E  
 Temp/Humi : 24°C/42%  
 Condition : CH78 2480MHz  
 Remark : Angle1 BDR 1Mbps

Memo : RBW:1GHz~(1MHz)

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



No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	4960.308	48.9	31.2	6.3	35.9	50.5	54.0	3.5	Hori.	109	153	AV	
2	4959.972	46.4	31.2	6.3	35.9	48.0	54.0	6.0	Vert.	103	157	AV	

5.6.4 Measured Data (Continued)

**RADIATED EMISSION**

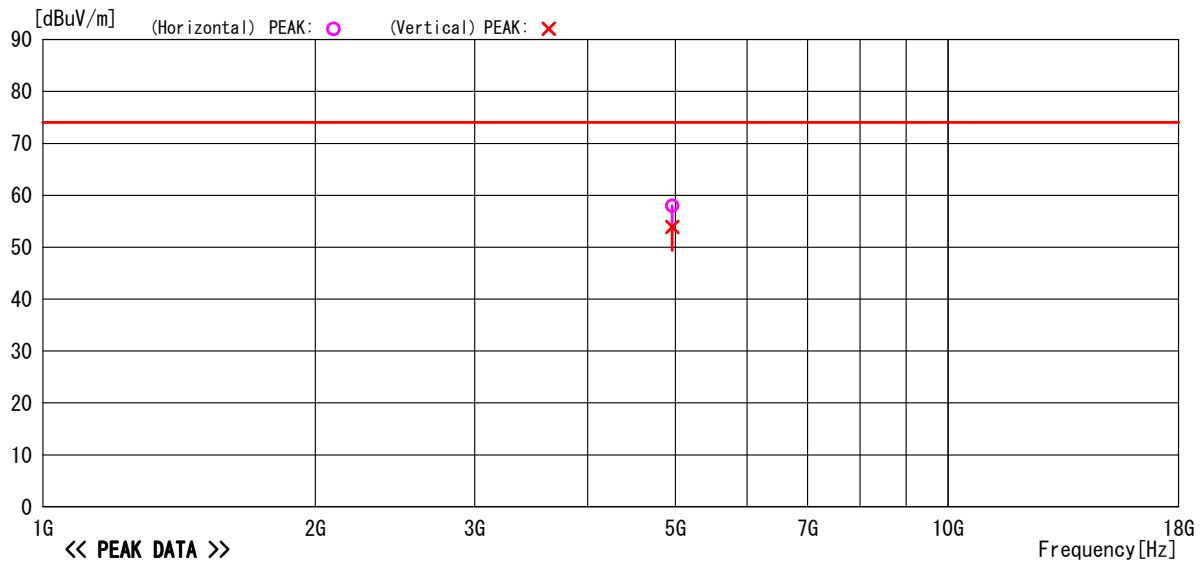
Cosmos Corporation Onoki Lab.  
 Date : 2011/11/29 22:05:00

Model Name : CM-700d / AC-A305  
 Serial No. : 01  
 Operator : O. Itogawa  
 Power Supply : Battery DC6V

Job No. : CJ11-105994E  
 Temp/Humi : 24°C/42%  
 Condition : CH78 2480MHz  
 Remark : Angle1 BDR 1Mbps

Memo : RBW:1GHz~(1MHz)

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



No	Freq.	Reading	Ant. Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	4960.308	56.4	31.2	6.3	35.9	58.0	74.0	16.0	Hori.	109	153		PK
2	4959.972	52.3	31.2	6.3	35.9	53.9	74.0	20.1	Vert.	103	157		PK

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#### 5.6.4 Measured Data (Continued)

18GHz to 26.5GHz

No spurious emission for RF was found in 18GHz to 26.5GHz.

※Note: The all data of 5.6.4 are the data of GFSK F1D 1Mbps BASIC DH-5 which is the worst modulation mode.

## 5.7 15. 247(d) Band Edge Measurement

## 5.7.1 Setting Remarks

- EUT directly connects to the spectrum analyzer via calibrated coaxial cable.
- 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 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.
- See test configuration figure 4.2.

## 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 $\mu$ V)	
	Peak	Average
Below 2,400	74	54
Above 2,483.5		

## 5.7.3 Result

**EUT complies with the requirement.**

Uncertainty of measurement result:  $\pm 2.6$  dB

Temperature, Humidity : 20°C, 43%

#### 5.7.4 Measured Data

The band edge emissions are calculated as following;

CH	Horizontal		Vertical	
	CH00 (2402MHz)	CH78 (2480MHz)	CH00 (2402MHz)	CH78 (2480MHz)
P <sub>max</sub>	108.27	108.65	108.32	108.33
P <sub>av</sub>	94.53	94.92	94.58	94.62
P <sub>dev</sub>	45.99	56.45	47.98	54.94
P <sub>dav</sub>	37.83	50.42	37.80	50.13
c.f	-3.70	-3.70	-3.70	-3.70
E <sub>be</sub>	58.58	48.50	56.64	49.69
E <sub>av</sub>	53.00	40.80	53.08	40.79
Limit(E <sub>be</sub> )	74.00	74.00	74.00	74.00
Limit(E <sub>av</sub> )	54.00	54.00	54.00	54.00
Margin(E <sub>be</sub> )	15.42	25.50	17.36	24.31
Margin(E <sub>av</sub> )	1.00	13.20	0.92	13.21

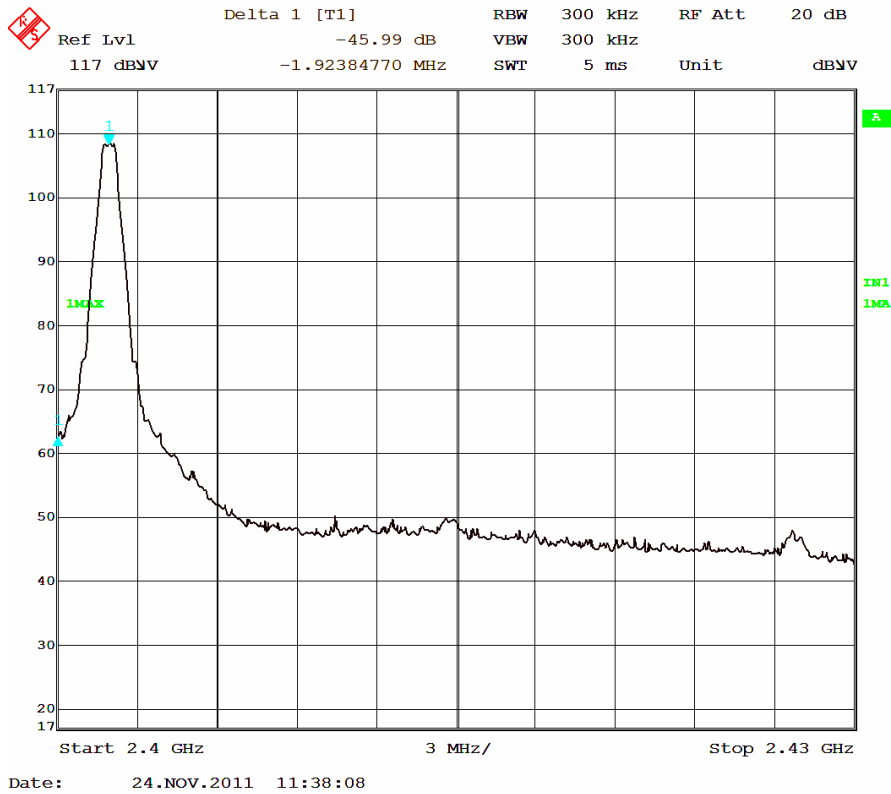
- P<sub>max</sub> : Maximum peak power of the fundamental.
- P<sub>av</sub> : Average of the fundamental.
- P<sub>dev</sub> : The amplitude delta between the peak power and the band edge emission.
- P<sub>dav</sub> : The amplitude delta between the average power and the band edge emission.
- E<sub>be</sub> : Band edge emission.
- E<sub>av</sub> : Average of the band edge emission.



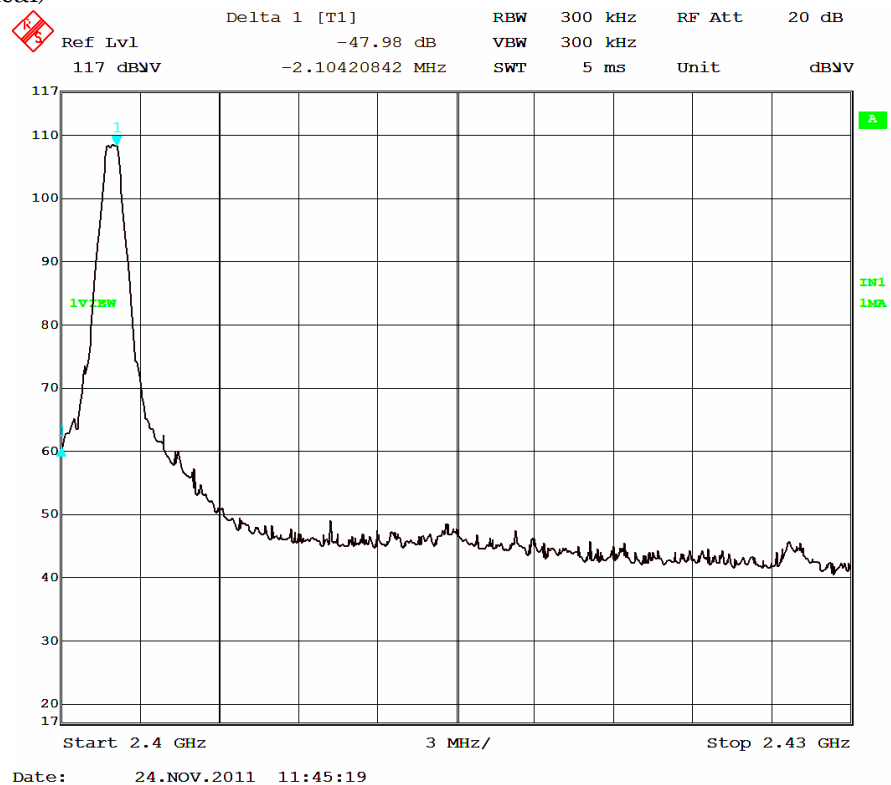
### 5.7.4 Measured Data (Continued)

Lower frequency of the band edge

(Horizontal)

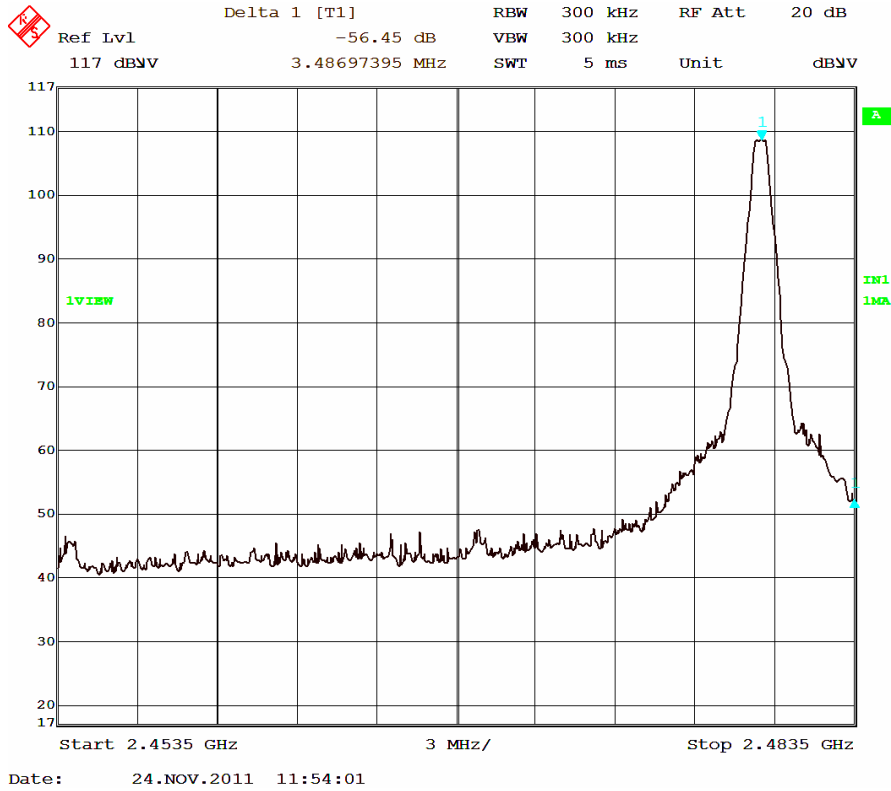


(Vertical)

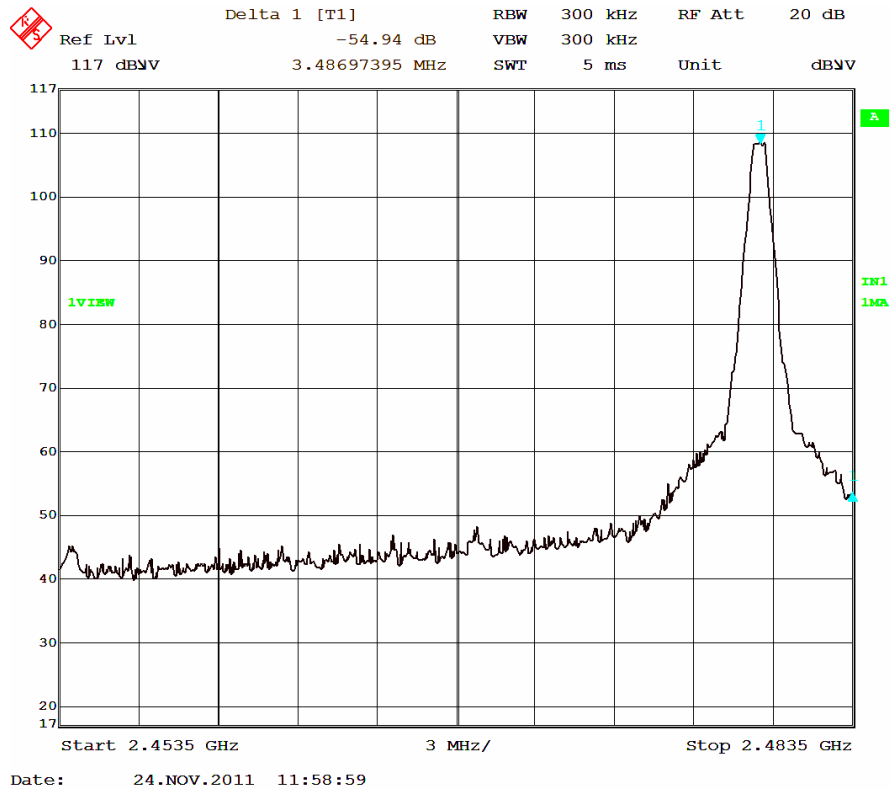


5.7.4 Measured Data (Continued)

Higher frequency of the band edge  
 (Horizontal)



(Vertical)



Note: The test results of hopping ON and OFF are the same.

## 6. Photos

### 6.1 Photo of the EUT



6.1 Photo of the EUT (Continued)



6.2 Setup Photo (AC Power Conducted Emission)



### 6.3 Setup Photo (Radiated Emission)

30MHz - 1GHz (AC Adaptor)



### 6.3 Setup Photo (Radiated Emission) (Continued)

30MHz - 1GHz (Battery)



### 6.3 Setup Photo (Radiated Emission) (Continued)

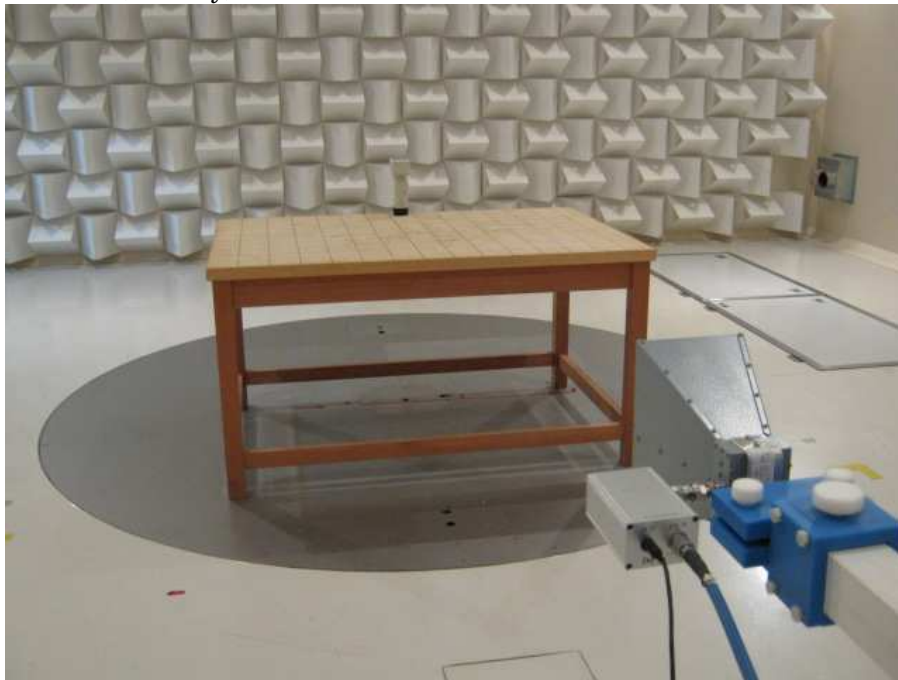
1GHz - 18GHz (AC Adaptor)





6.3 Setup Photo (Radiated Emission) (Continued)

1GHz - 18GHz (Battery)



6.3 Setup Photo (Radiated Emission) (Continued)

18GHz - 26.5GHz (AC Adaptor)

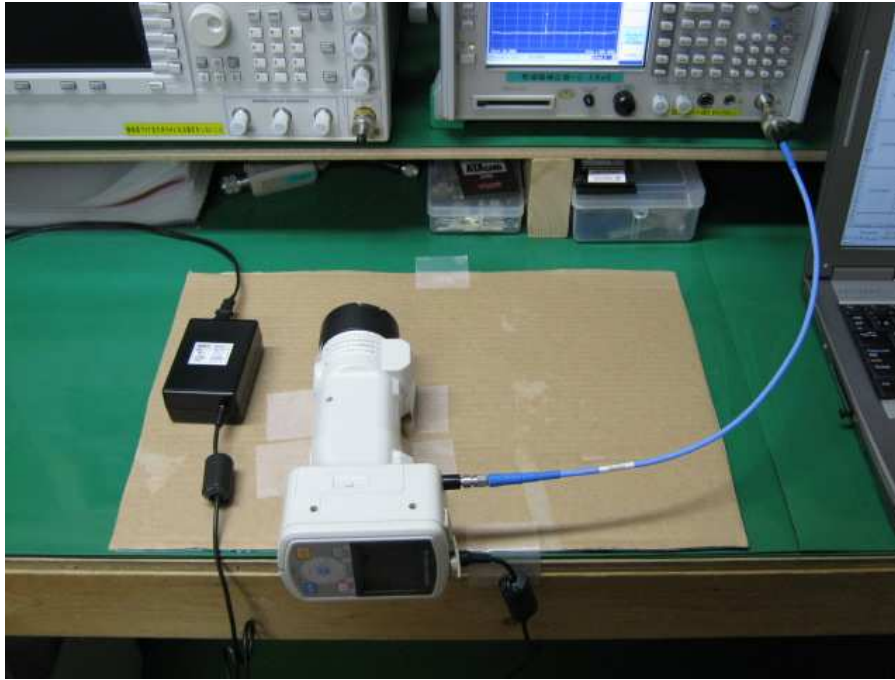


6.3 Setup Photo (Radiated Emission) (Continued)

18GHz - 26.5GHz (Battery)



6.4 Setup Photo (Conducted Emission)



## 7. List of Test Measurement Instruments

### 7.1 AC Power Conducted Emission

Instruments	Manufacturer	Model / Type	Serial No.	Calibration Date Next Calibration
Spectrum Analyzer	ADVANTEST CORPORATION	R3132	110401625	November, 2011 November, 2012
EMI Test Receiver	ROHDE&SCHWARZ	ESCS30	100335	November, 2011 November, 2012
Artificial-Mains Network	KYORITSU CORPORATION	KNW-341F	8S-2996-1	November, 2011 November, 2012
RF Selector	TSJ	RFM-E221	3148	October, 2011 October, 2012

### 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	TSJ	RFM-E121	03149	October, 2011 October, 2012
EMI Test Receiver (20Hz to 40GHz)	ROHDE&SCHWARZ	ESIB40	100211	January, 2011 January, 2012
Biconical Antenna (30MHz to 300MHz)	SCHWARZBECK	VHBB9124 BBA9106	9124-311	October, 2011 October, 2012
Log-Periodic Antenna (300MHz to 1GHz)	SCHWARZBECK	UHALP9108A	645	October, 2011 October, 2012
Horn Antenna (1GHz to 12.5GHz)	SCHWARZBECK	BBHA9120D	443	October, 2011 October, 2012
Horn Antenna (12.5GHz to 18GHz)	ETS LINDGREN	3160-08	00033782	September, 2011 September, 2012
Horn Antenna (18GHz to 26.5GHz)	ETS LINDGREN	3160-09	00034723	September, 2011 September, 2012
Pre Amp (30MHz to 1GHz)	HEWLETT PACKARD	8447D	2944A07891	October, 2011 October, 2012
Pre Amp (1GHz to 12.75GHz)	TSJ	MLA-0120AM L-34	---	June, 2011 June, 2012

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	November, 2011 November, 2012