



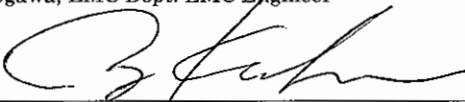
MEASUREMENT/TECHNICAL REPORT

FCC Part 15 Subpart C

Issued: September 8, 2010

Name and Address of the Applicant:	SATO Corporation 1-7-1, Shimomeguro, Meguro-ku, Tokyo 153-0064 Japan
Test Item:	WLAN Module
Identification:	WLAN2USB
Serial No.:	01
FCC ID:	MMFTH208-W1
Sample Receipt Date:	December 10, 2008
Test Specification:	FCC Part 15 Subpart C, 15.247
Date of Testing:	December 11, 12, 2008 June 9, 2009 July 5, 12 and 13, 2010
Test Result:	PASS

Report Prepared by:	Cosmos Corporation 2-3571 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:	 O. Itogawa, EMC Dept. EMC Engineer	September 8, 2010 Date
Reviewed by:	 Y. Kawahara, EMC Dept. EMC Manager	September 8, 2010 Date

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. This Test Report is based on the tests made for sample provided, and it is not applicable to individual product identical to the sample.

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1. Description of Equipment Under Test

1.1 Product Description

Manufacturer : SATO Corporation
 Model (referred to as the EUT) : WLAN2USB
 Nominal Voltage : DC 5V to 19V
 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 : 2.4GHz Wireless LAN
 The bandwidth of the IF filters : N/A
 Method of Communication Link : Software to make maximum speed transmitting
 The operating frequency band : 2412MHz to 2462MHz
 The thermal limitation : 0 to 40

1.2 Antenna Description

No.	Type Name	Gain	Antenna Type	Remarks
1	AH104F2450	1.7dBi	Inverted-F	Integral

1.3 Accompanied Peripherals Description

No.	Equipment Name	Manufacturer	Type Name	Serial Number	Remarks
1	Barcode Printer	---	TH208-W1	---	---
2	Jig	---	---	---	---
3	PC	DELL	Latitude D510	26870125245	DC19.5V, 1.5A
4	AC Adapter	DELL	PA-1650-05D2	0F7970-71615- 59D-4335	AC100-240V, 50/60Hz, 1.5A

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

(2-3571 Ohnoki, 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.

2.4 Test Sample

During the testing period, there was no change for the design of test sample.
The same test sample was used in all test items.

I, SATO Corporation, declare as shown in the above mentioned.

Seiichiro Nagata

Printed name
Title: Supervisor
Department: R&D Division Product Design Dept.

Seiichiro Nagata

Signature

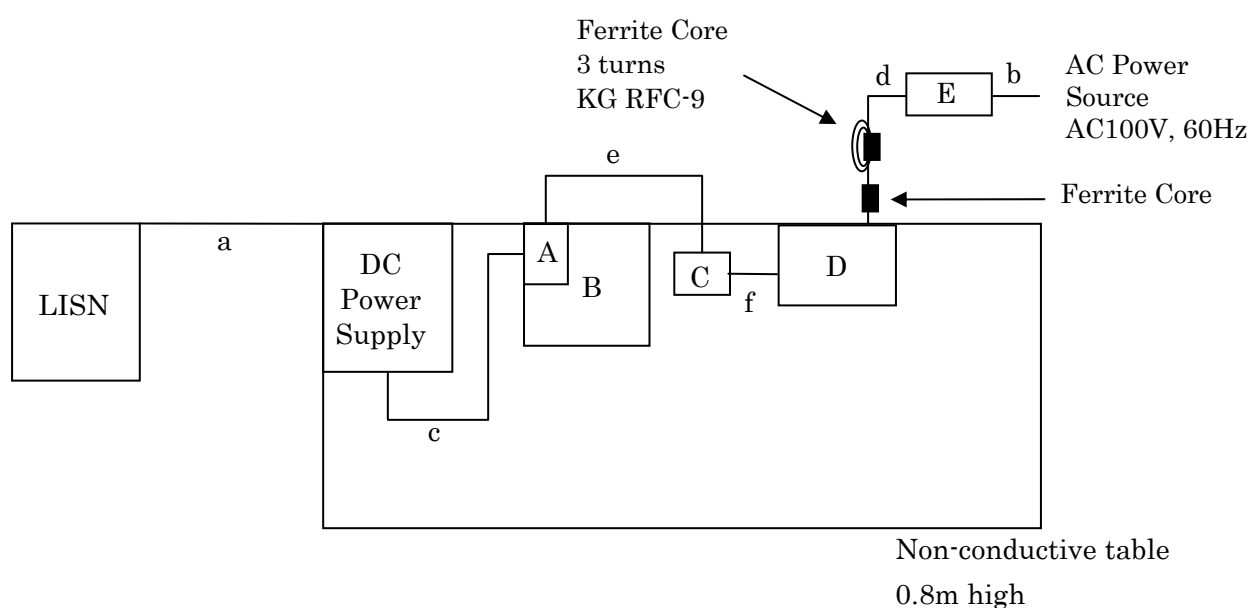
3. Summary of Test Results

Section	Test Item	Limit	Result
15. 207	AC Power Conducted Emission	See 5.1.2	Pass
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

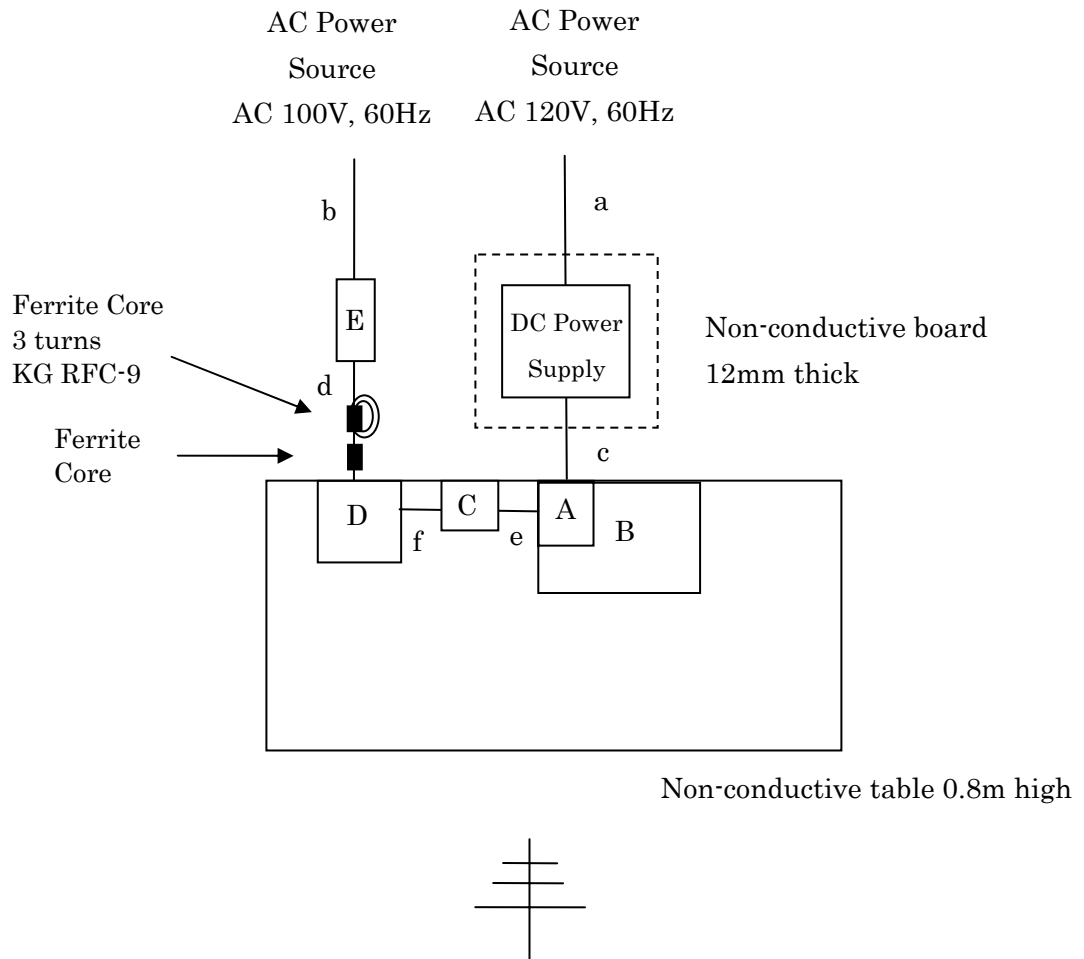
	Instrument	Model		Cable	Length	Shield
A	EUT (WLAN Module)	WLAN2USB	a	AC Power Cable	1.8 m	×
B	Barcode Printer	TH208-W1	b	AC Power Cable	0.6 m	×
C	Jig	---	c	DC Power Cable	2.0 m	×
D	PC	Latitude D510	d	DC Power Cable	1.6 m	×
E	AC Adapter	PA-1650-05D2	e	Signal Cable	0.1 m	×
			f	Signal Cable	0.2 m	×

4.1 15. 207 AC Power Conducted Emission in Shield Room



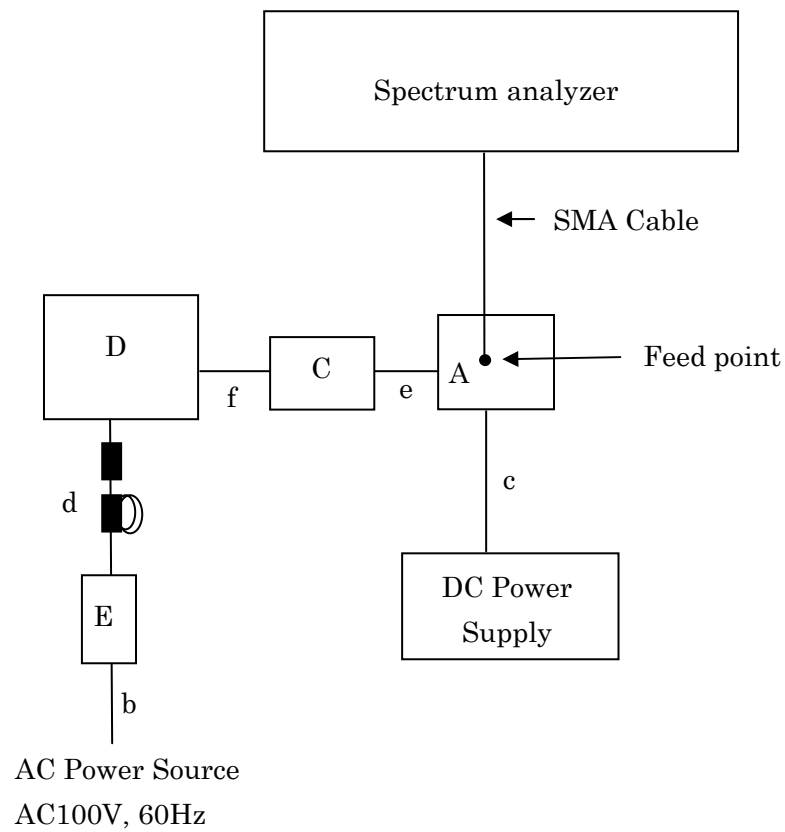
D, E, b and d were connected only during the operation and these were removed during the test.

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

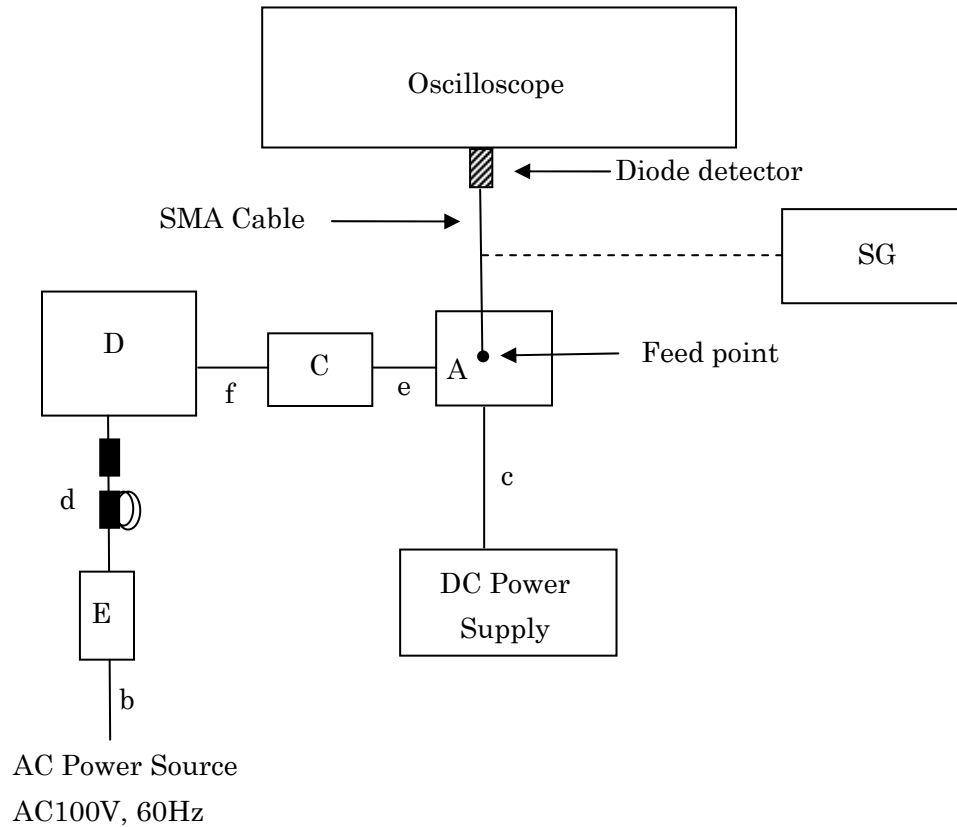


D, E, b and d were connected only during the operation and these were removed during the test.

- 4.3 15.247(a)(2) Spectrum Bandwidth of Direct Sequence Spread Spectrum System, 15. 247(d) Transmitter Suprious Emissions (Conducted) and 15.247(e) Power Spectrum Density



4.4 15.247(b) Maximum Peak Output Power



4.5 Test Mode

In all test configurations above, EUT makes continuous RF transmitting with manufacturer's specified 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.
- Non-conductive board (12mm thick) for EUT and non-conductive table (0.8m 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

<<Conducted Emission>>

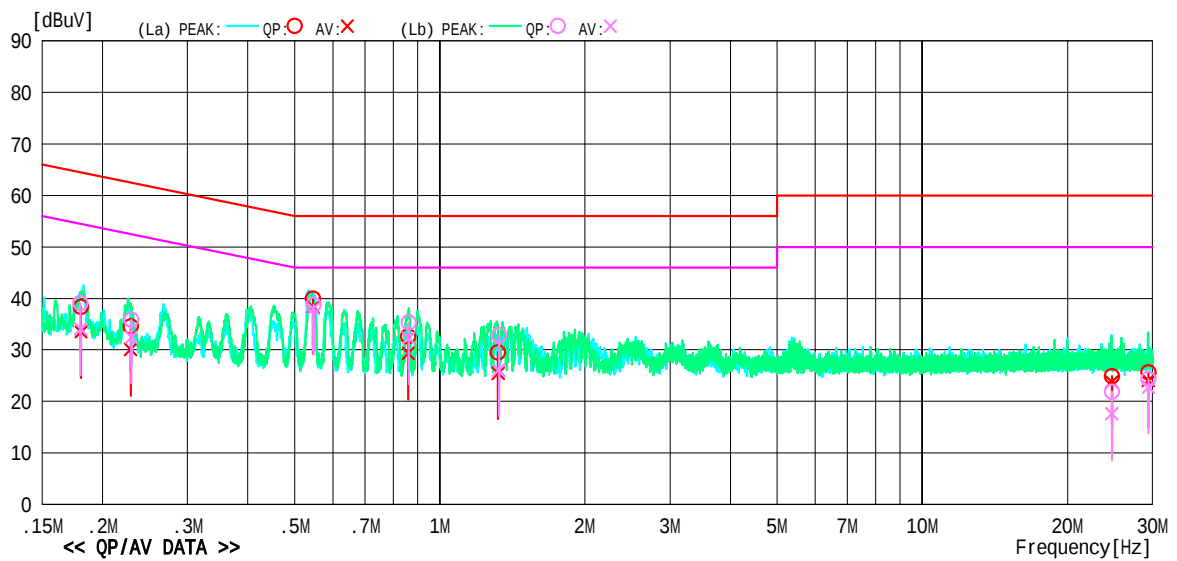
Cosmos Corporation Onoki Lab.

Model Name : WLAN2USB
Serial No. : 01
Operator : O. Itogawa
Power Supply : AC120V, 60Hz

Job No : CJ10-095339E
Temp/Humi : 24 /40%
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	AV		QP	AV	QP	AV	QP	AV		
		[dBuV]	[dBuV]		[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.18050	28.2	23.4	10.1	38.3	33.5	64.5	54.5	26.2	21.0	La	
2	0.22885	24.5	20.0	10.1	34.6	30.1	62.5	52.5	27.9	22.4	La	
3	0.54625	29.8	28.2	10.1	39.9	38.3	56.0	46.0	16.1	7.7	La	
4	0.86050	22.5	19.2	10.1	32.6	29.3	56.0	46.0	23.4	16.7	La	
5	1.32030	19.4	15.4	10.1	29.5	25.5	56.0	46.0	26.5	20.5	La	
6	24.72200	13.9	12.8	11.0	24.9	23.8	60.0	50.0	35.1	26.2	La	
7	29.43010	14.7	13.2	10.9	25.6	24.1	60.0	50.0	34.4	25.9	La	
8	0.18010	29.0	24.0	10.1	39.1	34.1	64.5	54.5	25.4	20.4	Lb	
9	0.22955	25.8	22.4	10.1	35.9	32.5	62.5	52.5	26.6	20.0	Lb	
10	0.54705	28.7	27.9	10.1	38.8	38.0	56.0	46.0	17.2	8.0	Lb	
11	0.86195	25.2	22.2	10.1	35.3	32.3	56.0	46.0	20.7	13.7	Lb	
12	1.32570	22.7	16.0	10.1	32.8	26.1	56.0	46.0	23.2	19.9	Lb	
13	24.71670	10.9	6.6	11.0	21.9	17.6	60.0	50.0	38.1	32.4	Lb	
14	29.43720	13.3	11.8	11.0	24.3	22.8	60.0	50.0	35.7	27.2	Lb	

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	: 30 MHz to 40 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

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 : 24°C, 42 %

5.2.4 Measured Data

Frequency (MHz)	Measured Bandwidth (MHz)	Limit (MHz)
CCK (1Mbps)		
2412 (1ch)	10.29	> 0.5
2437 (6ch)	9.42	> 0.5
2462 (11ch)	9.3	> 0.5
OFDM (6Mbps)		
2412 (1ch)	16.56	> 0.5
2437 (6ch)	16.60	> 0.5
2462 (11ch)	16.60	> 0.5

Frequency (MHz)	Measured Bandwidth (MHz)	Limit (MHz)
CCK (11Mbps)		
2412 (1ch)	10.36	> 0.5
2437 (6ch)	9.96	> 0.5
2462 (11ch)	10.24	> 0.5
OFDM (54Mbps)		
2412 (1ch)	16.68	> 0.5
2437 (6ch)	16.72	> 0.5
2462 (11ch)	16.68	> 0.5

5.2.4 Measured Data (Continued)

1CH 1Mbps

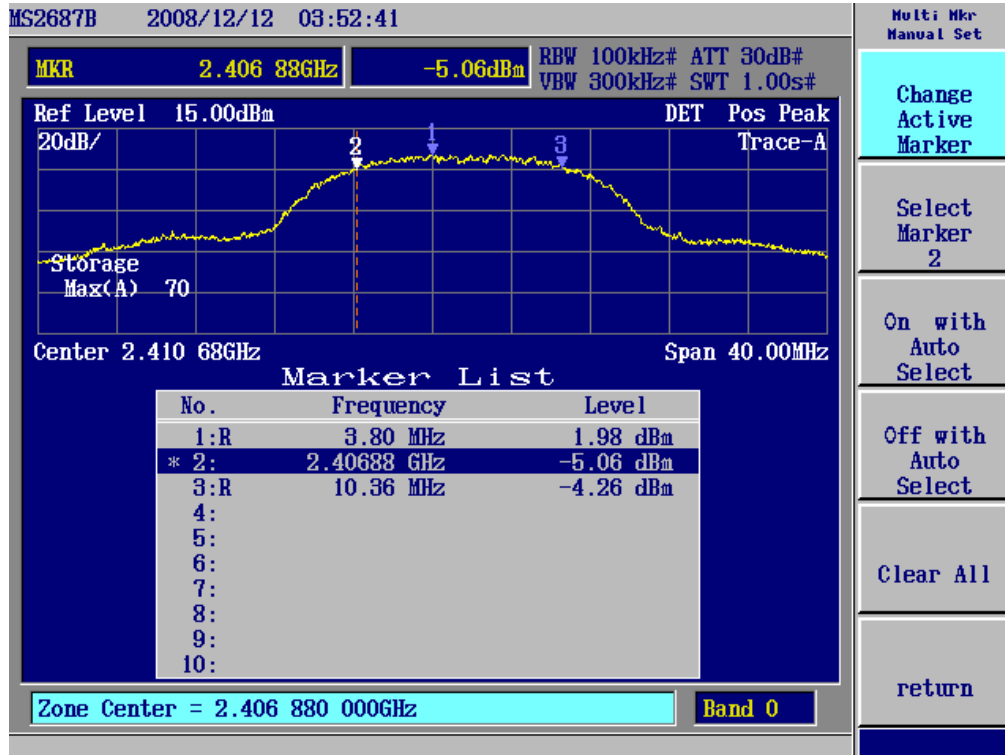


1CH 6Mbps



5.2.4 Measured Data (Continued)

1CH 11Mbps

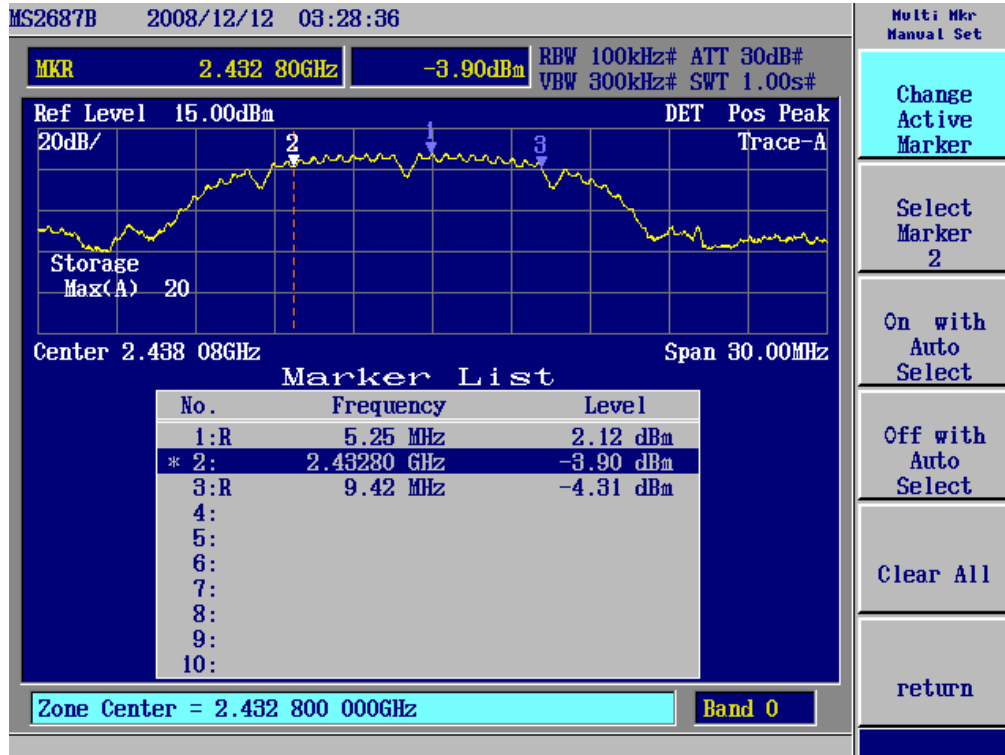


1CH 54Mbps



5.2.4 Measured Data (Continued)

6CH 1Mbps

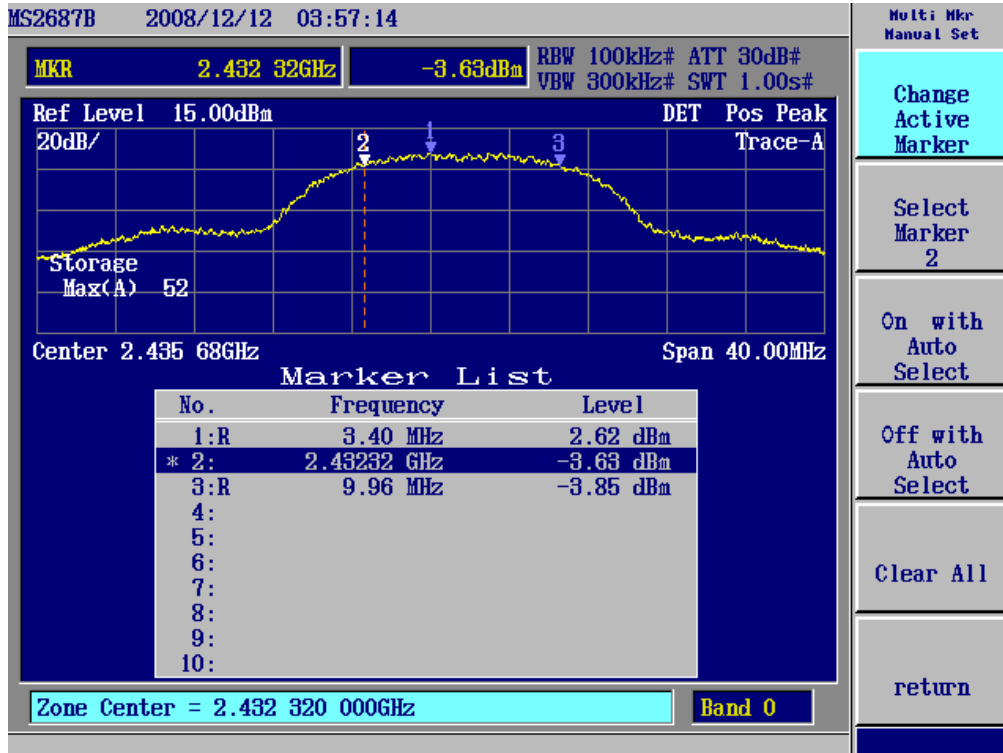


6CH 6Mbps



5.2.4 Measured Data (Continued)

6CH 11Mbps



6CH 54Mbps

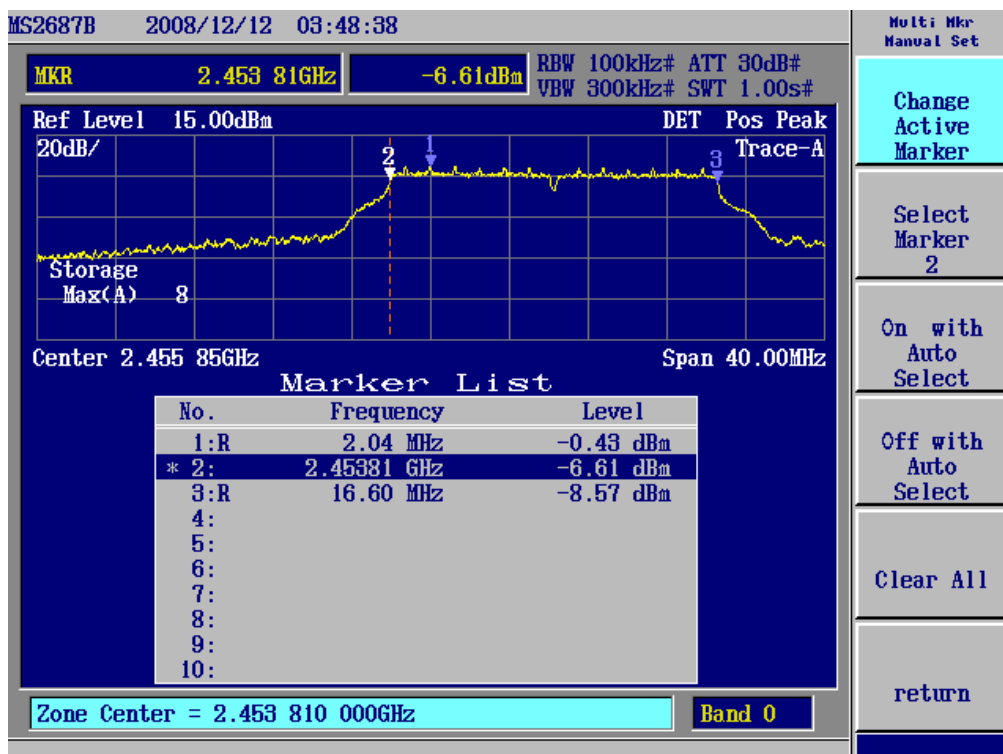


5.2.4 Measured Data (Continued)

11CH 1Mbps

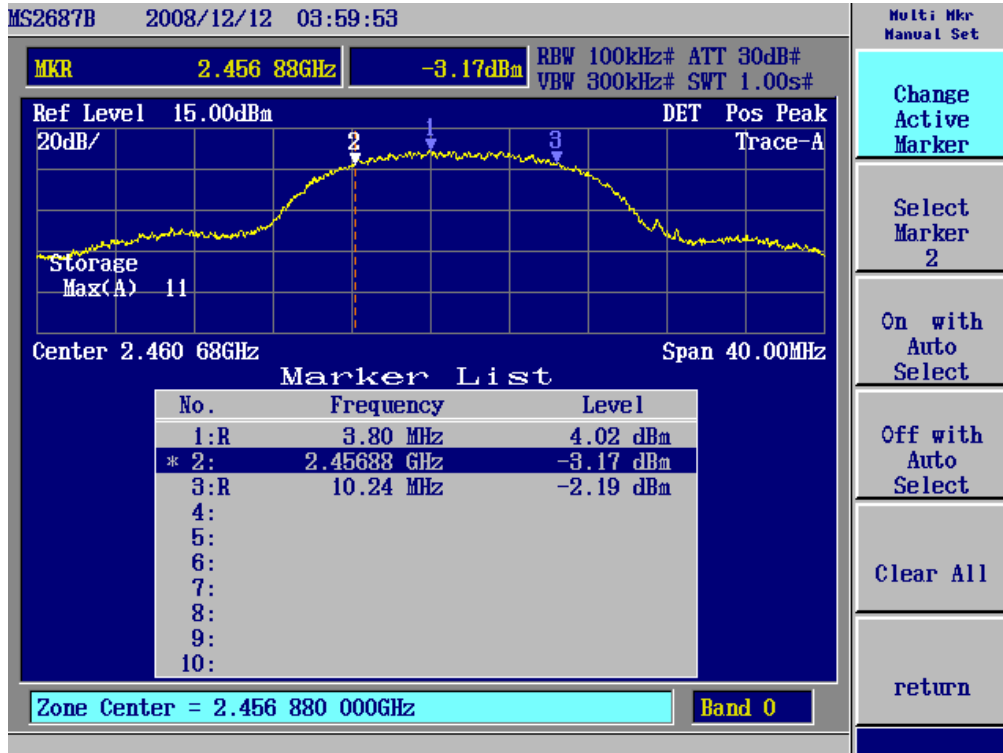


11CH 6Mbps



5.2.4 Measured Data (Continued)

11CH 11Mbps



11CH 54Mbps



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 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 : 24°C, 42%

5.3.4 Measured Data

[Voltage -15%]

Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
CCK (1 Mbps)			
2412 (1ch)	13.03	30	16.97
2437 (6ch)	13.66	30	16.34
2462 (11ch)	14.66	30	15.34
OFDM (6 Mbps)			
2412 (1ch)	10.65	30	19.35
2437 (6ch)	11.66	30	18.34
2462 (11ch)	12.37	30	17.63

Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
CCK (11 Mbps)			
2412 (1ch)	12.91	30	17.09
2437 (6ch)	13.48	30	16.52
2462 (11ch)	14.47	30	15.53
OFDM (54 Mbps)			
2412 (1ch)	10.62	30	19.38
2437 (6ch)	11.36	30	18.64
2462 (11ch)	12.21	30	17.79

[Normal Voltage]

Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
CCK (1 Mbps)			
2412 (1ch)	13.02	30	16.98
2437 (6ch)	13.56	30	16.44
2462 (11ch)	14.65	30	15.35
OFDM (6 Mbps)			
2412 (1ch)	10.58	30	19.42
2437 (6ch)	11.66	30	18.34
2462 (11ch)	12.31	30	17.69

Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
CCK (11 Mbps)			
2412 (1ch)	12.88	30	17.12
2437 (6ch)	13.34	30	16.66
2462 (11ch)	14.53	30	15.47
OFDM (54 Mbps)			
2412 (1ch)	10.50	30	19.50
2437 (6ch)	11.51	30	18.49
2462 (11ch)	11.84	30	18.16

[Voltage +15%]

Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
CCK (1 Mbps)			
2412 (1ch)	13.00	30	17.00
2437 (6ch)	13.55	30	16.45
2462 (11ch)	14.77	30	15.23
OFDM (6 Mbps)			
2412 (1ch)	10.59	30	19.41
2437 (6ch)	11.71	30	18.29
2462 (11ch)	12.27	30	17.73

Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
CCK (11 Mbps)			
2412 (1ch)	12.93	30	17.07
2437 (6ch)	13.35	30	16.65
2462 (11ch)	14.57	30	15.43
OFDM (54 Mbps)			
2412 (1ch)	12.62	30	17.38
2437 (6ch)	11.58	30	18.42
2462 (11ch)	12.11	30	17.89

5.4 15. 247(d) Transmitter Suprious 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

- See test configuration figure 4.3.

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

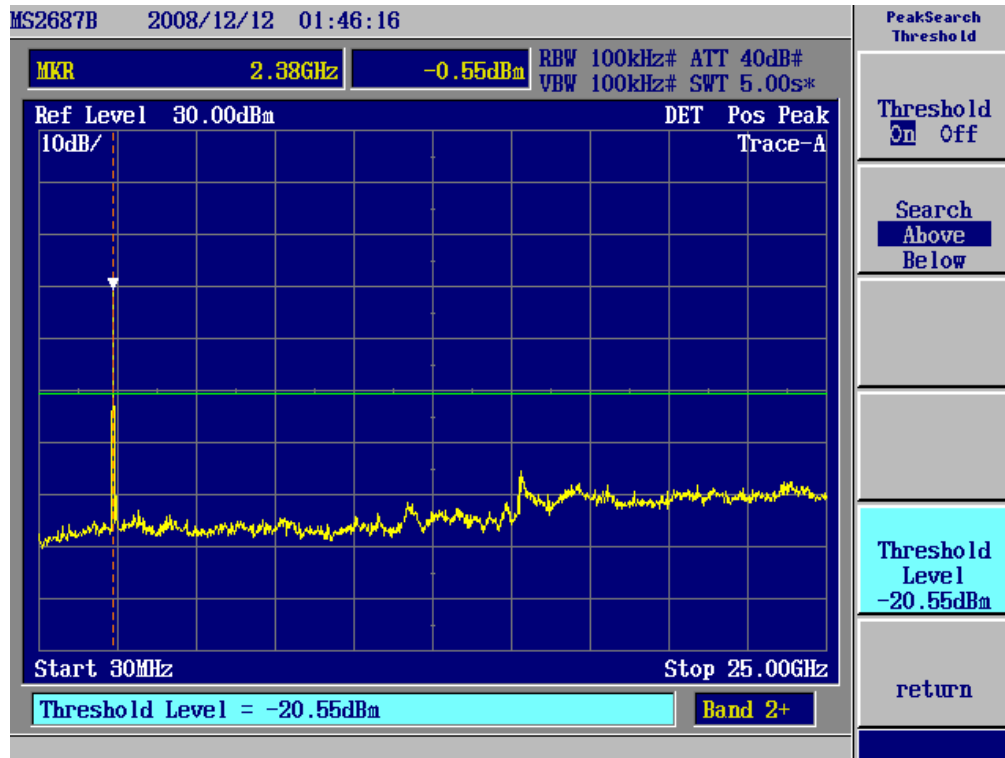
EUT complies with the requirement.

Uncertainty of measurement result: ± 0.8 dB

Temperature, Humidity : 24°C, 42%

5.4.4 Measured Data

1CH 1Mbps

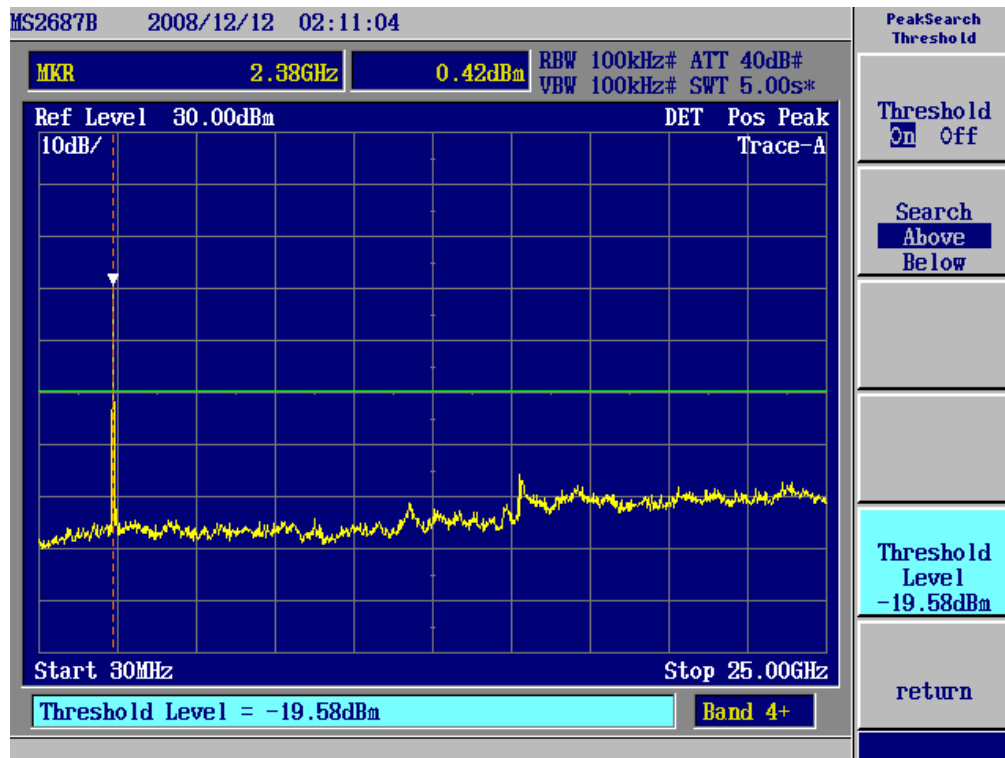


1CH 6Mbps

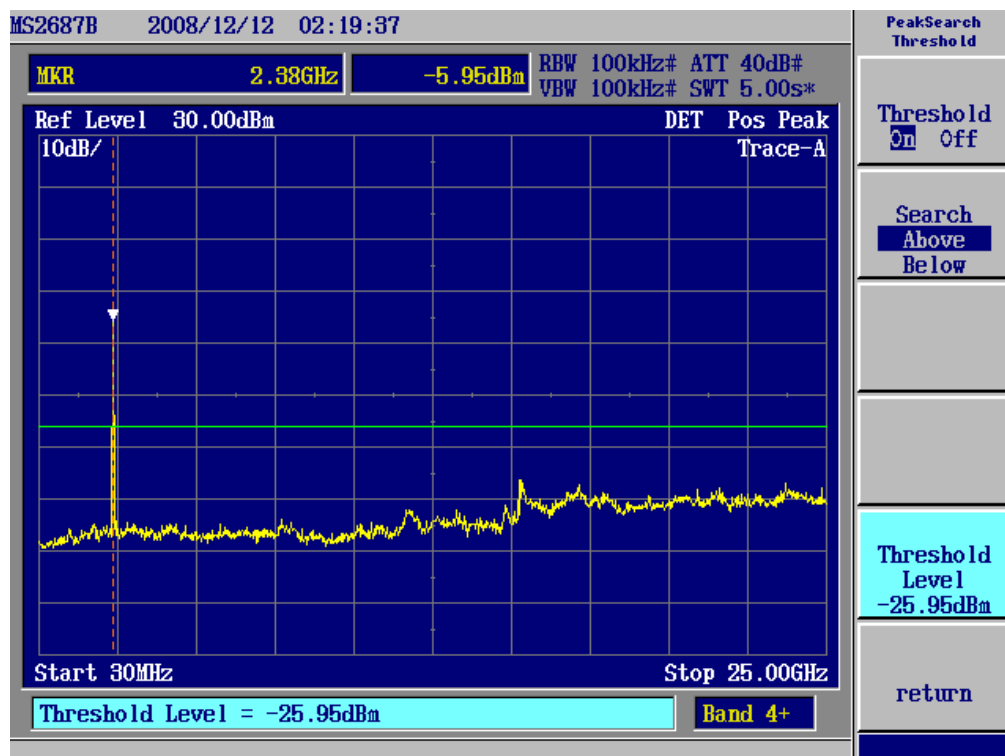


5.4.4 Measured Data (Continued)

1CH 11Mbps



1CH 54Mbps



5.4.4 Measured Data (Continued)

6CH 1Mbps



6CH 6Mbps

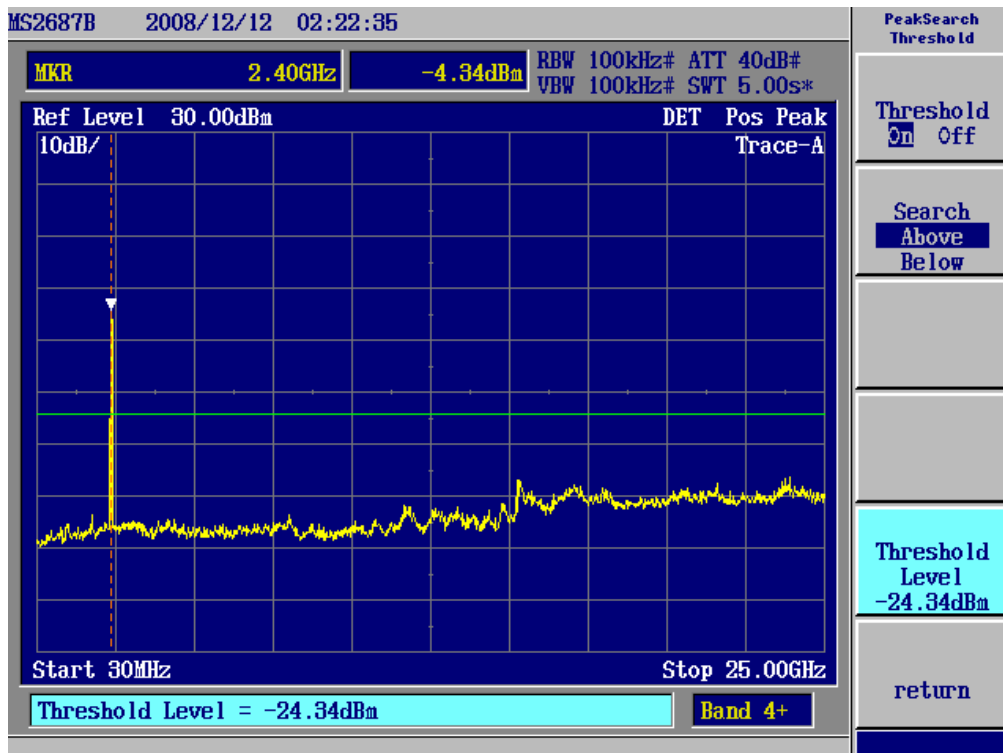


5.4.4 Measured Data (Continued)

6CH 11Mbps

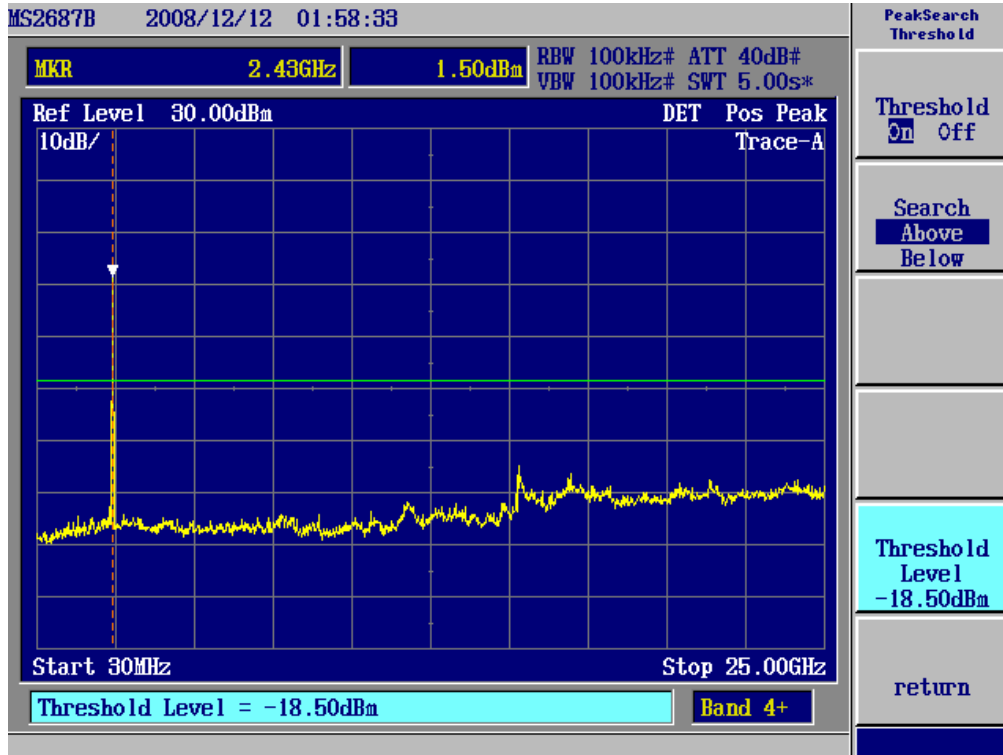


6CH 54Mbps

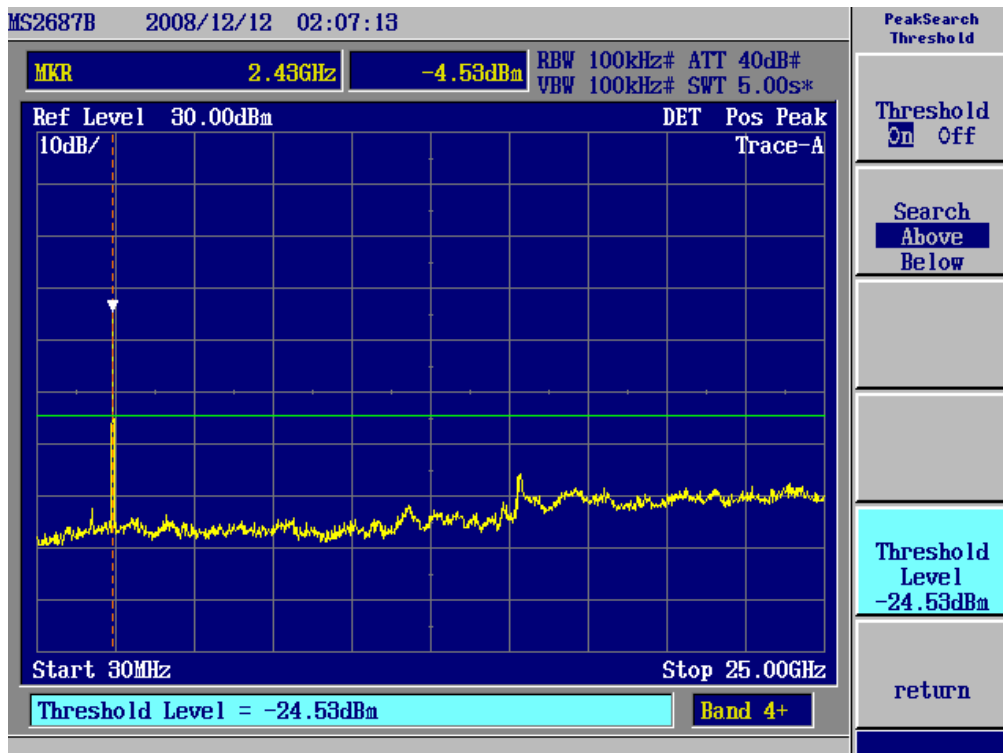


5.4.4 Measured Data (Continued)

11CH 1Mbps



11CH 6Mbps

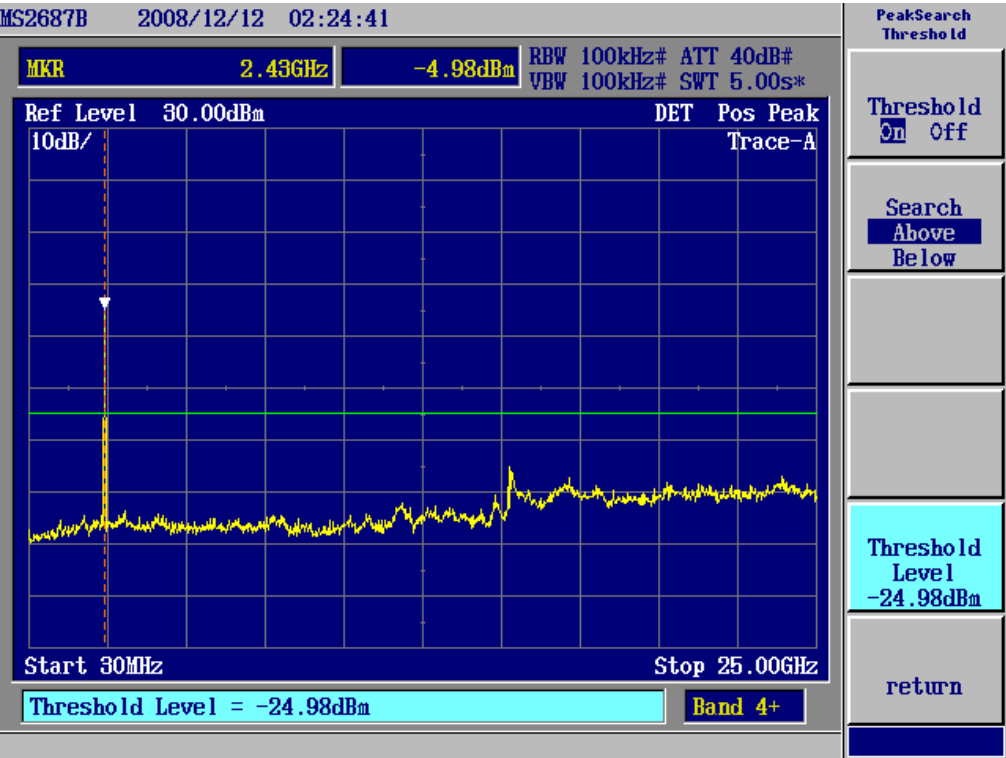


5.4.4 Measured Data (Continued)

11CH 11Mbps



11CH 54Mbps



5.5 15. 247(d), 15.209 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 or Quasi-Peak
- ✓ Trace Mode : Max Hold

(Frequency range : Above 1000 MHz)

- ✓ Resolution bandwidth : 1 MHz
- ✓ Video bandwidth : 1 MHz
- ✓ Detector function : Peak or Average
- ✓ 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

30MHz to 1GHz

No spurious emission for RF was found in 30MHz to 1GHz.

<<Radiated Emission>>

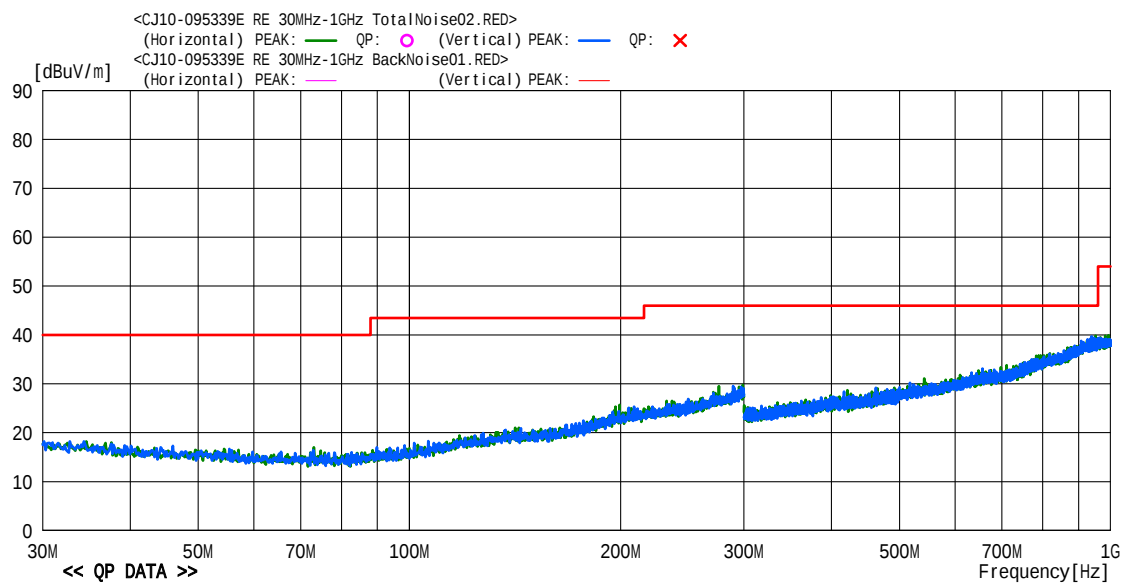
Cosmos Corporation Onoki Lab.
Date : 2010/07/12 21:47:29

Model Name : WLAN2USB
Serial No. : 01
Operator : O.Itogawa
Power Supply : AC 120V,60Hz

Job No : CJ10-095339E
Temp./Humi. : 25 /43%
Condition : CH01
Remark :

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	

5.5.4 Measured Data (Continued)

30MHz to 1GHz

<<Radiated Emission>>

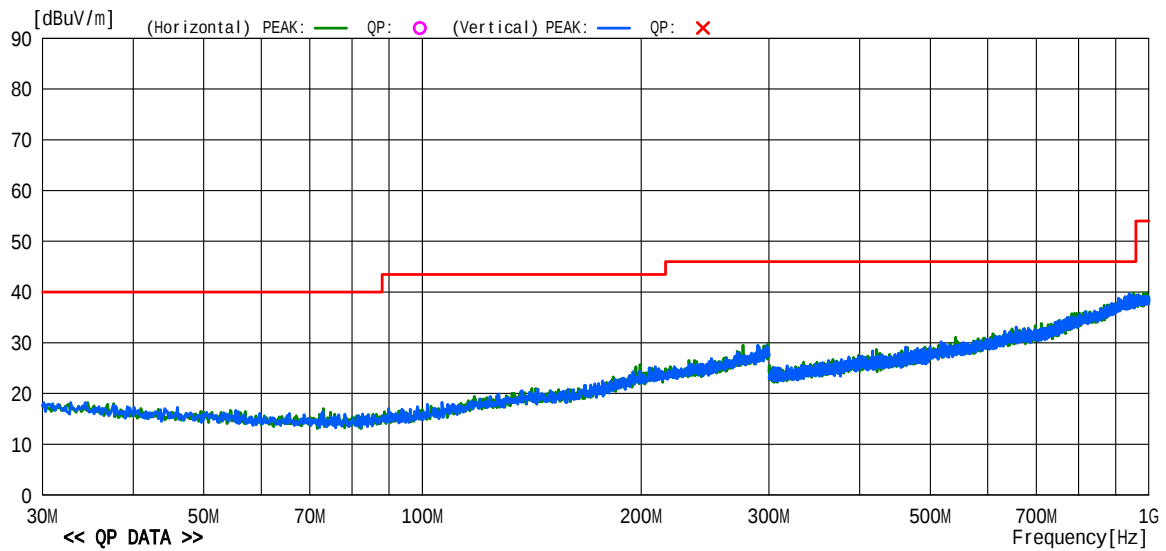
Cosmos Corporation Onoki Lab.

Model Name : WLAN2USB
Serial No. : 01
Operator : O.Itogawa
Power Supply : AC 120V,60Hz

Job No : CJ10-095339E
Temp./Humi. : 25 /43%
Condition : CH06
Remark :

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	

5.5.4 Measured Data (Continued)

30MHz to 1GHz

<<Radiated Emission>>

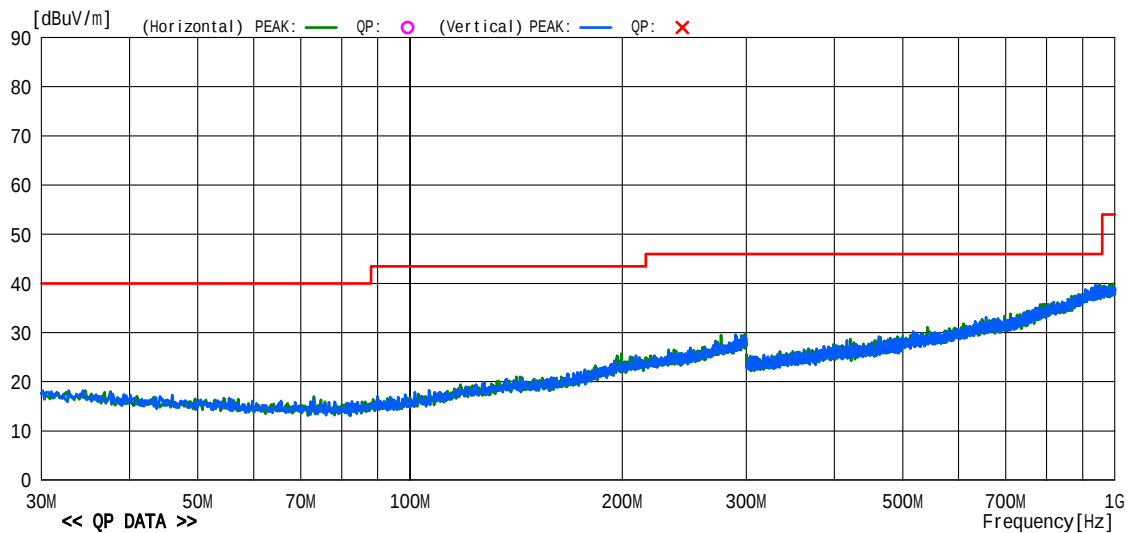
Cosmos Corporation Onoki Lab.

Model Name : WLAN2USB
Serial No. : 01
Operator : O. Itogawa
Power Supply : AC 120V, 60Hz

Job No : CJ10-095339E
Temp./Humi. : 25 / 43%
Condition : CH11
Remark :

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	

5.5.4 Measured Data (Continued)

1GHz to 18GHz

RADIATED EMISSION

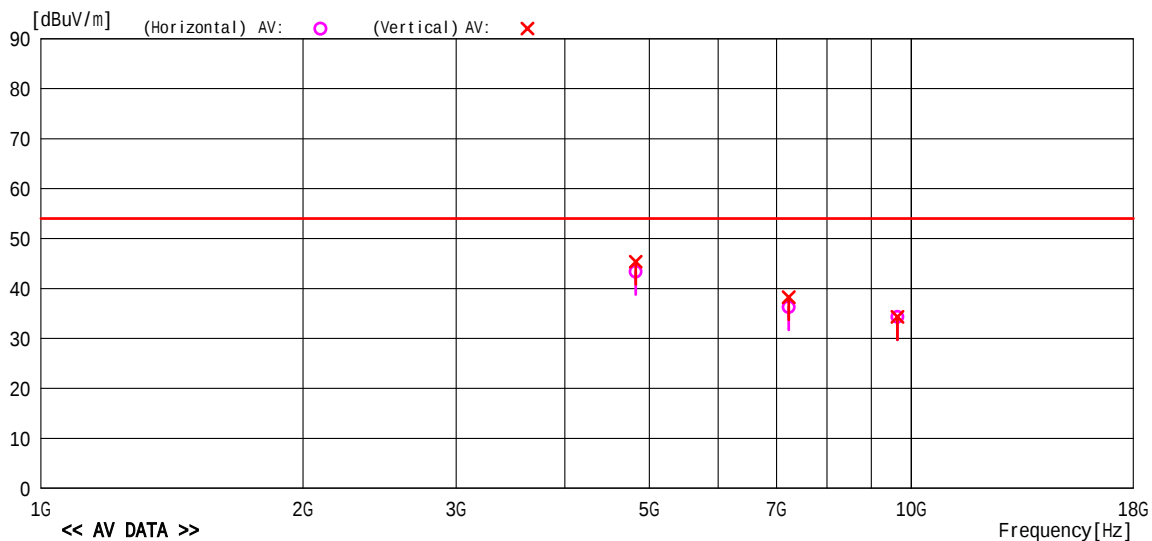
Cosmos Corporation Onoki Lab.
Date : 2010/07/12 20:17:18

Model Name : WLAN2USB
Serial No. : 01
Operator : O. Itogawa
Power Supply : AC 120V,60Hz

Job No. : CJ10-095339E
Temp/Humi : 25 /43%
Condition : CH01
Remark :

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	Pol.	Height	Angle	Ant	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	Type	
1	4824.161	41.2	32.1	6.3	36.2	43.4	54.0	10.7	Hori.	100	426	AV	
2	7231.492	25.7	36.7	7.6	33.7	36.3	54.0	17.7	Hori.	100	0	AV	
3	9642.317	20.0	38.5	9.1	33.3	34.3	54.0	19.7	Hori.	100	192	AV	
4	4824.076	43.2	32.1	6.3	36.2	45.4	54.0	8.6	Vert.	116	295	AV	
5	7231.512	27.7	36.7	7.6	33.7	38.3	54.0	15.7	Vert.	100	152	AV	
6	9644.421	20.0	38.5	9.1	33.3	34.3	54.0	19.7	Vert.	112	164	AV	

5.5.4 Measured Data (Continued)

1GHz to 18GHz

RADIATED EMISSION

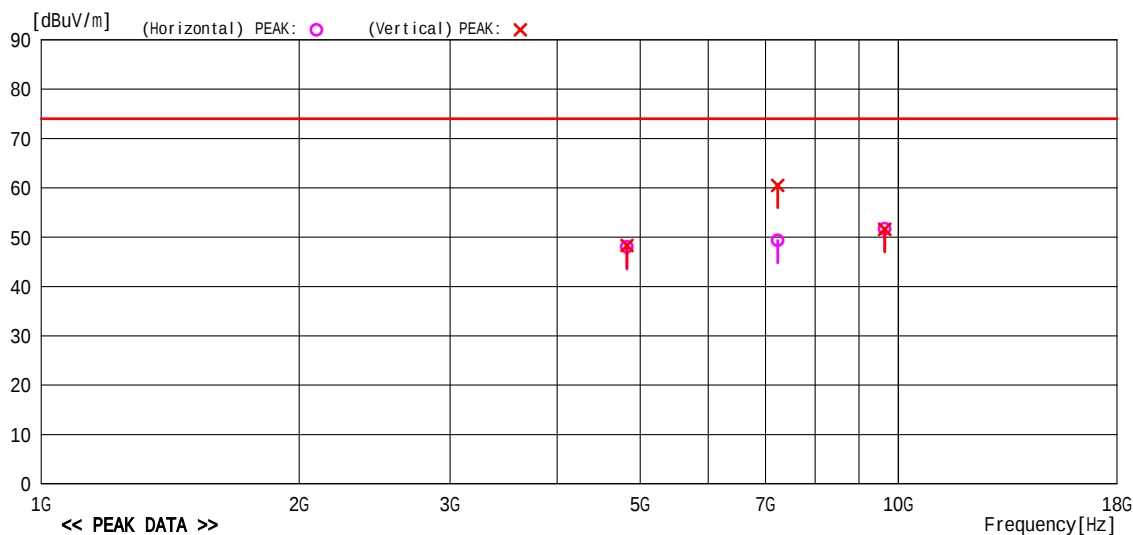
Cosmos Corporation Onoki Lab.
Date : 2010/07/12 20:17:18

Model Name : WLAN2USB
Serial No. : 01
Operator : O. Itogawa
Power Supply : AC 120V,60Hz

Job No. : CJ10-095339E
Temp/Humi : 25 /43%
Condition : CH01
Remark :

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	4824.161	45.9	32.1	6.3	36.2	48.1	74.0	25.9	Hori.	100	426	PK	
2	7231.492	38.8	36.7	7.6	33.7	49.4	74.0	24.7	Hori.	100	0	PK	
3	9642.317	37.4	38.5	9.1	33.3	51.7	74.0	22.3	Hori.	100	192	PK	
4	4824.076	46.1	32.1	6.3	36.2	48.3	74.0	25.7	Vert.	116	295	PK	
5	7231.512	49.9	36.7	7.6	33.7	60.5	74.0	13.5	Vert.	100	152	PK	
6	9644.421	37.3	38.5	9.1	33.3	51.6	74.0	22.4	Vert.	112	164	PK	

5.5.4 Measured Data (Continued)

1GHz to 18GHz

RADIATED EMISSION

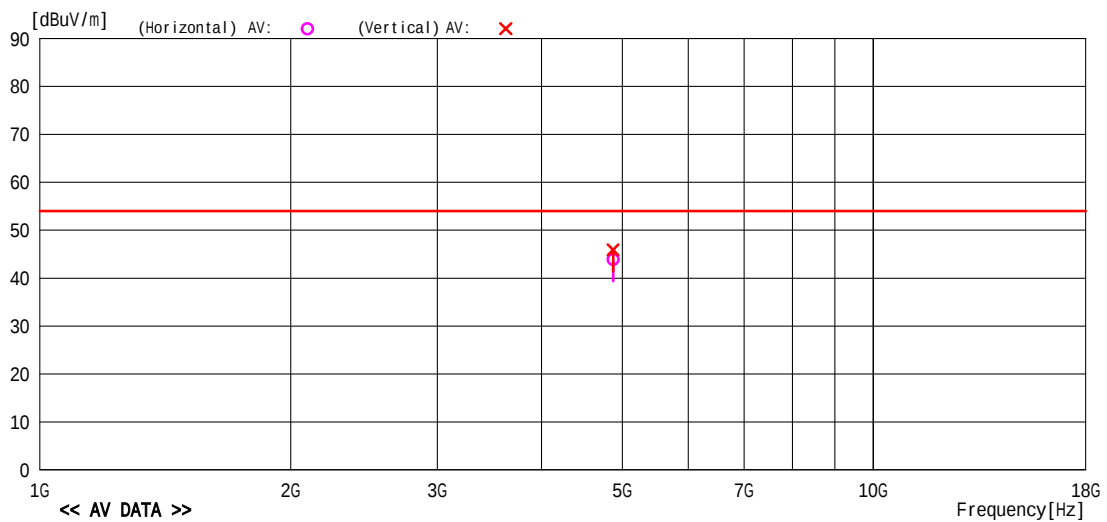
Cosmos Corporation Onoki Lab.
Date : 2010/07/12 20:48:34

Model Name : WLAN2USB
Serial No. : 01
Operator : O. Itogawa
Power Supply : AC 120V, 60Hz

Job No. : CJ10-095339E
Temp/Humi : 25 / 43%
Condition : CH06
Remark :

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	4874.096	41.5	32.2	6.3	36.1	43.9	54.0	10.1	Hori.	100	155	AV	
2	4874.091	43.5	32.2	6.3	36.1	45.9	54.0	8.1	Vert.	100	296	AV	

5.5.4 Measured Data (Continued)

1GHz to 18GHz

RADIATED EMISSION

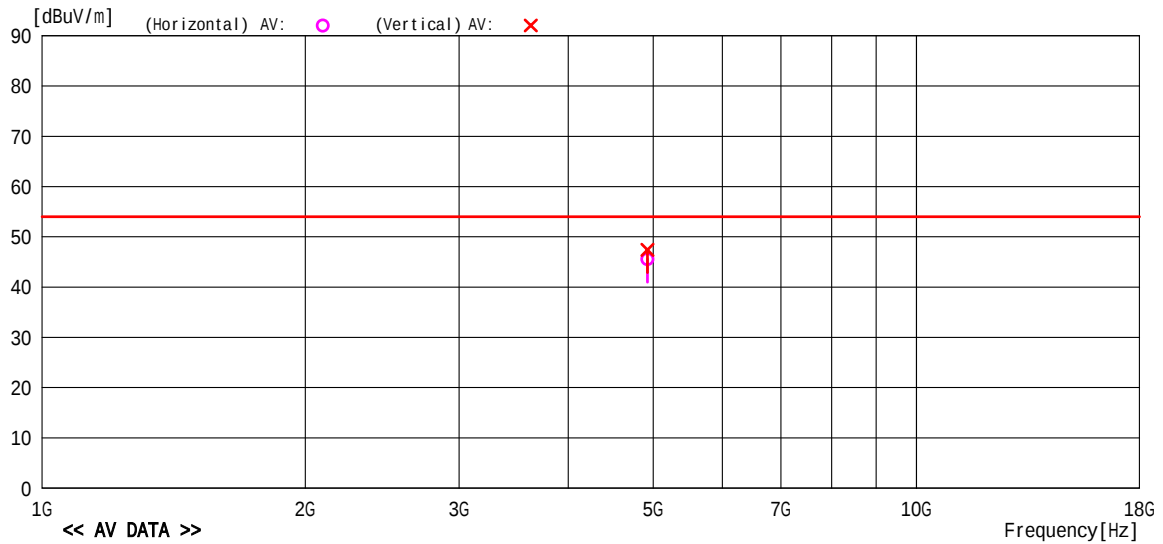
Cosmos Corporation Onoki Lab.
Date : 2010/07/12 21:15:21

Model Name : WLAN2USB
Serial No. : 01
Operator : O. Itogawa
Power Supply : AC 120V,60Hz

Job No. : CJ10-095339E
Temp/Humi : 25 /43%
Condition : CH11
Remark :

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	4924.125	42.9	32.2	6.3	35.9	45.5	54.0	8.5	Hori.	135	149	AV	
2	4924.125	44.8	32.2	6.3	35.9	47.4	54.0	6.6	Vert.	107	296	AV	

5.5.4 Measured Data (Continued)

1GHz to 18GHz

RADIATED EMISSION

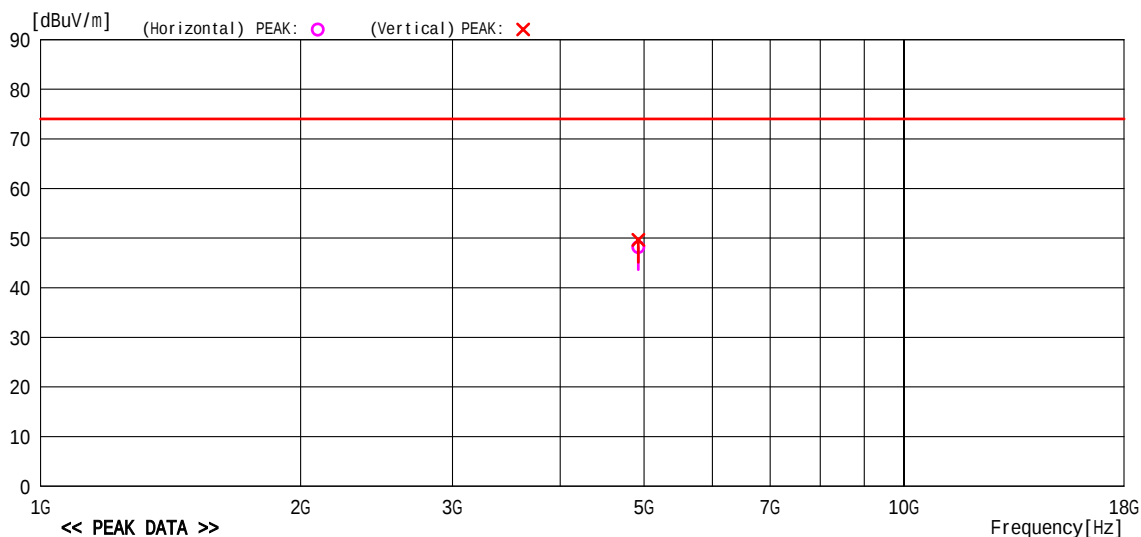
Cosmos Corporation Onoki Lab.
Date : 2010/07/12 21:15:21

Model Name : WLAN2USB
Serial No. : 01
Operator : O. Itogawa
Power Supply : AC 120V, 60Hz

Job No. : CJ10-095339E
Temp/Humi : 25 / 43%
Condition : CH11
Remark :

Memo : RBW:1GHz ~ (1MHz)

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



5.5.4 Measured Data (Continued)

18GHz to 26.5GHz

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

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
- See test configuration figure 4.3.

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 : 24°C, 42%

5.6.4 Measured Data

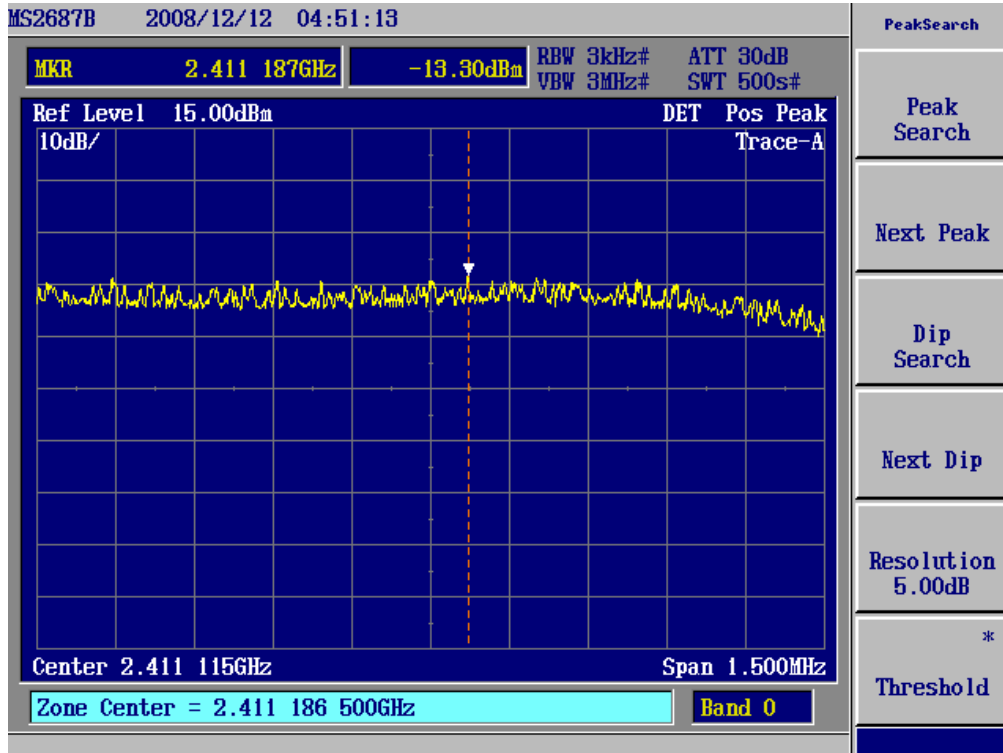
Frequency (MHz)	Correction Factor (dB)	Reading (dBm)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
CCK (1 Mbps)					
2412 (1ch)	0.70	-13.30	-12.6	8	20.60
2437 (6ch)	0.70	-12.50	-11.8	8	19.80
2462 (11ch)	0.70	-11.35	-10.65	8	18.65
OFDM (6 Mbps)					
2412 (1ch)	0.70	-15.45	-14.75	8	22.75
2437 (6ch)	0.70	-13.12	-12.42	8	20.42
2462 (11ch)	0.70	-13.37	-12.67	8	20.67

Frequency (MHz)	Correction Factor (dB)	Reading (dBm)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
CCK (11 Mbps)					
2412 (1ch)	0.70	-11.45	-10.75	8	18.75
2437 (6ch)	0.70	-11.18	-10.48	8	18.48
2462 (11ch)	0.70	-9.37	-8.67	8	16.67
OFDM (54 Mbps)					
2412 (1ch)	0.70	-14.33	-13.63	8	21.63
2437 (6ch)	0.70	-13.06	-12.36	8	20.36
2462 (11ch)	0.70	-12.52	-11.82	8	19.82

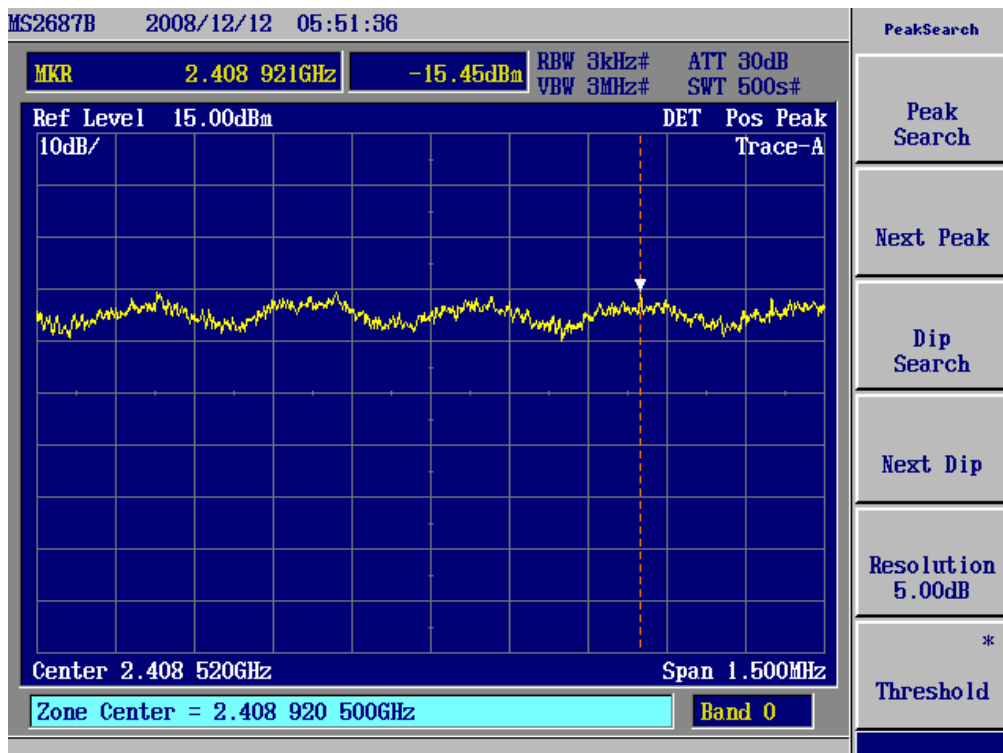
* Correction Factor = Cable Loss (dB) + External Attenuator (dB)

5.6.4 Measured Data (Continued)

1CH 1Mbps

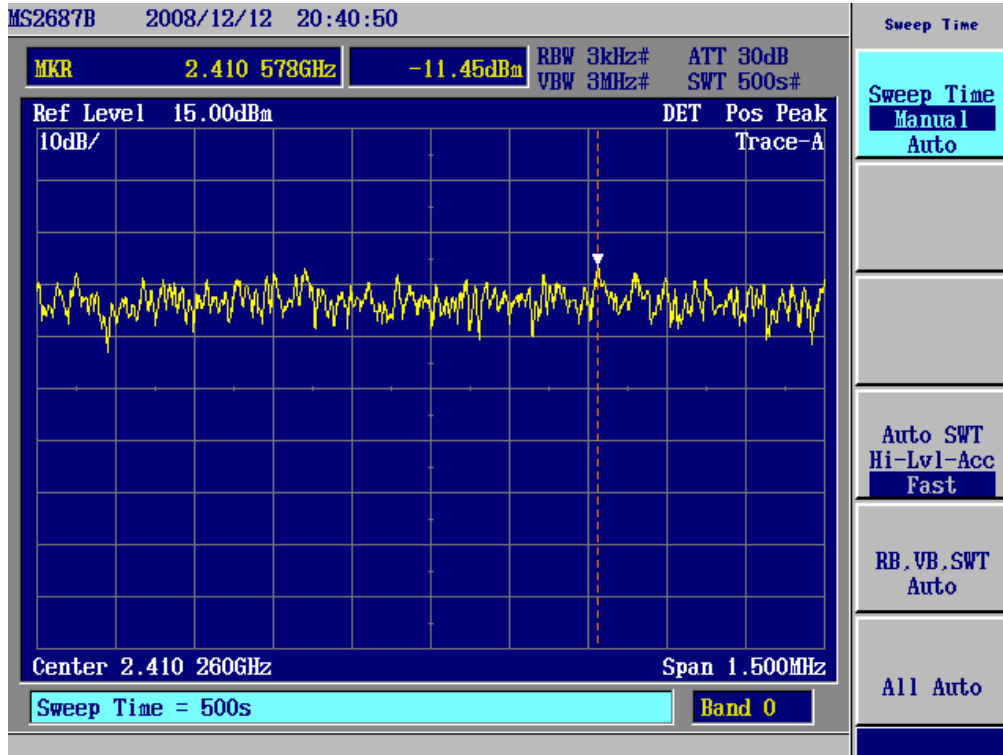


1CH 6Mbps



5.6.4 Measured Data (Continued)

1CH 11Mbps

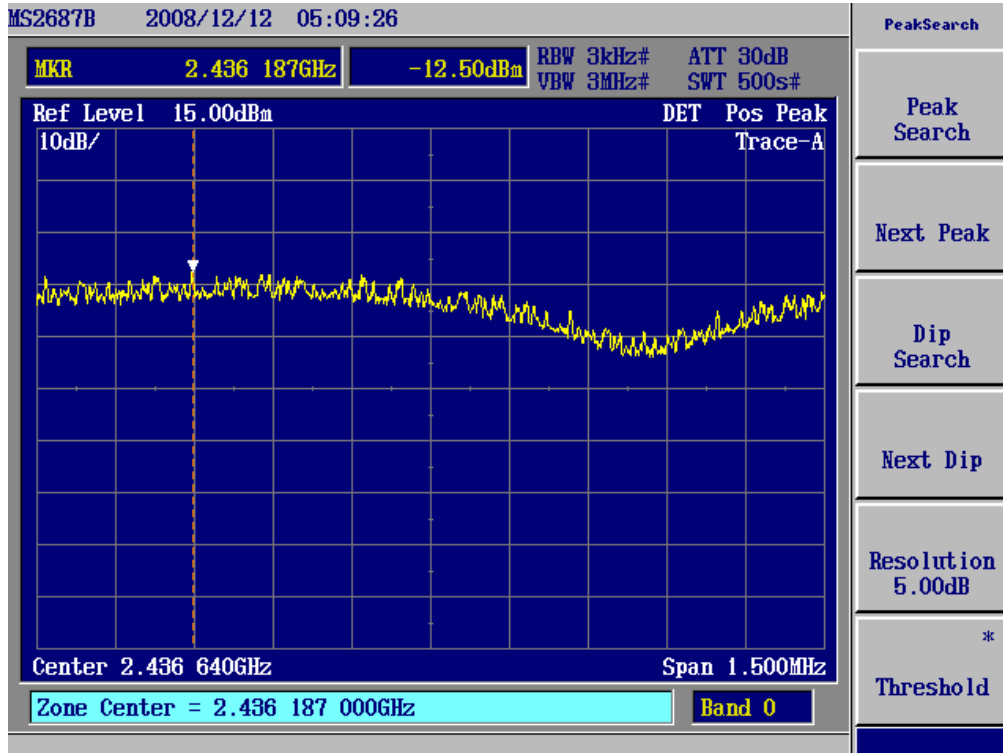


1CH 54Mbps



5.6.4 Measured Data (Continued)

6CH 1Mbps

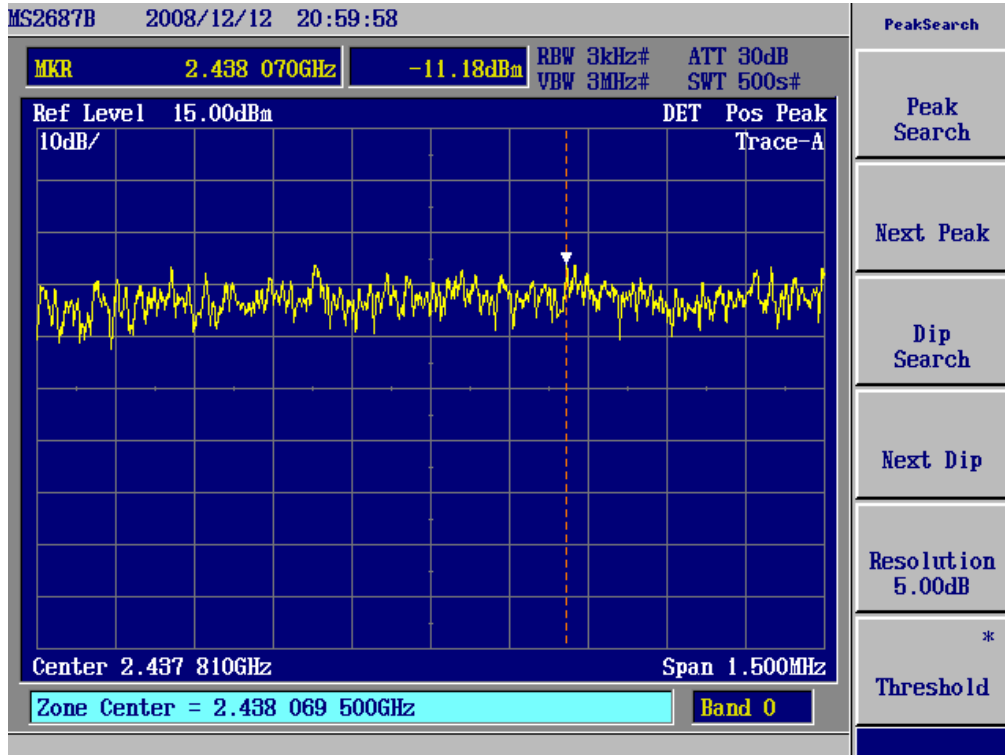


6CH 6Mbps

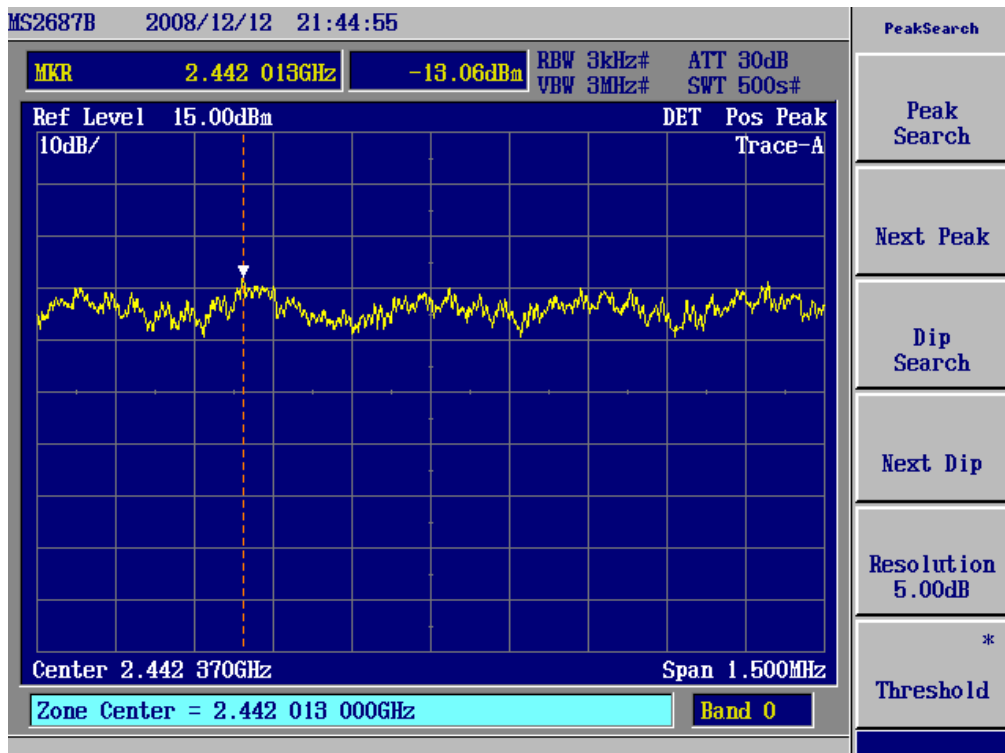


5.6.4 Measured Data (Continued)

6CH 11Mbps

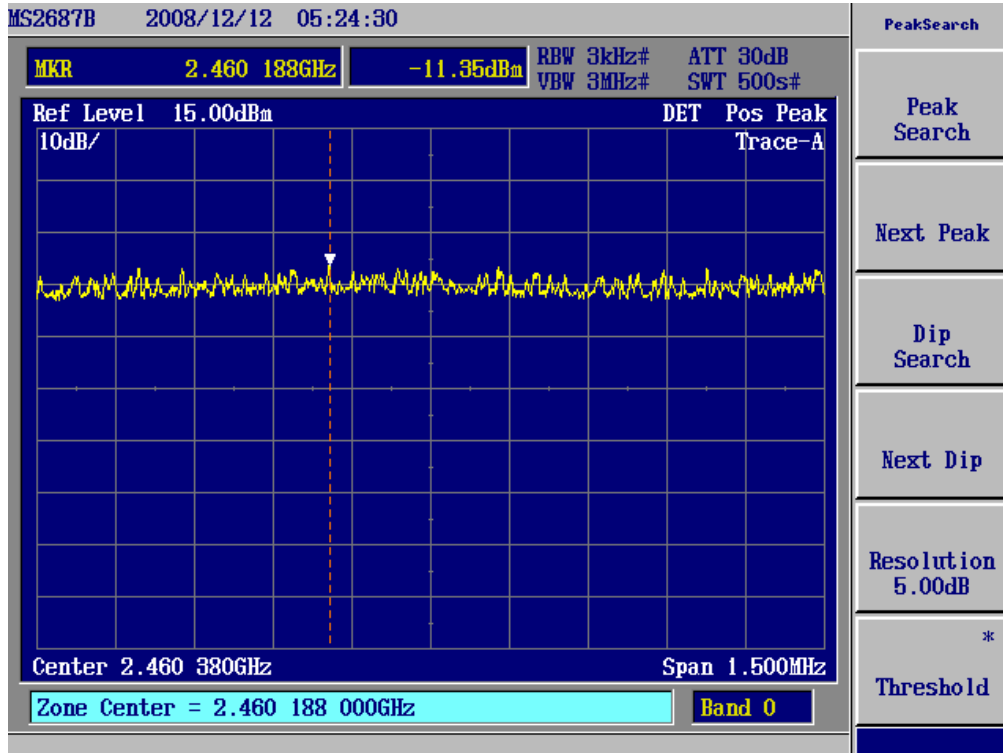


6CH 54Mbps



5.6.4 Measured Data (Continued)

11CH 1Mbps

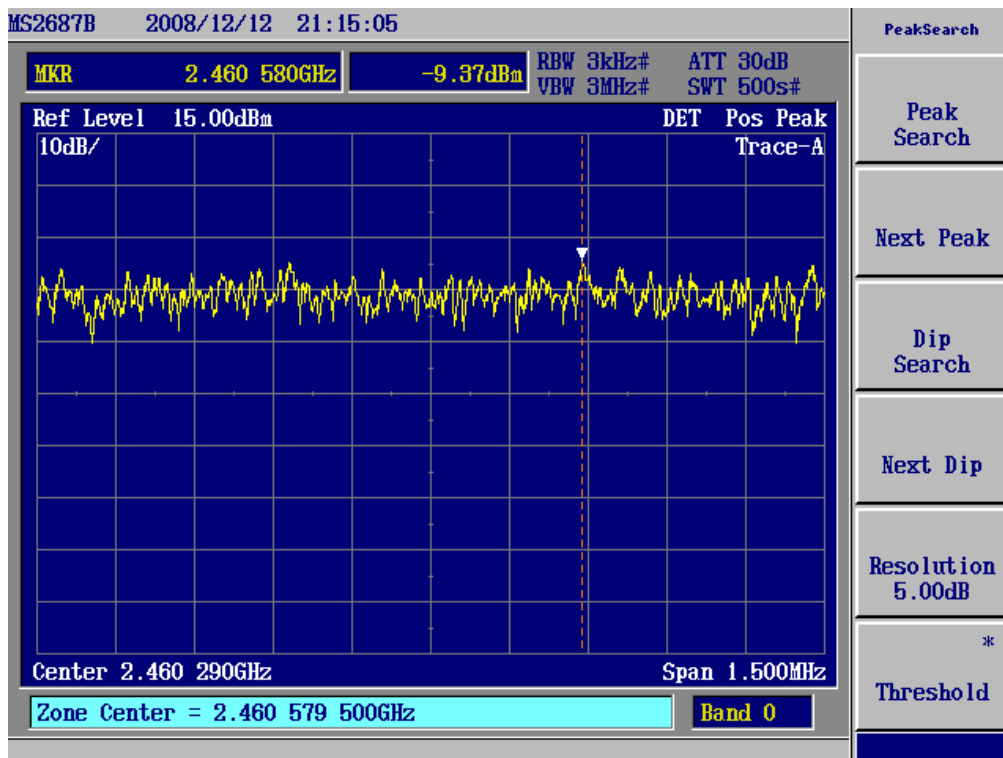


11CH 6Mbps



5.6.4 Measured Data (Continued)

11CH 11Mbps



11CH 54Mbps



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 : 3MHz
 - ✓ 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 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, 40%

5.7.4 Measured Data

The band edge emissions are calculated as following;

(Vertical)

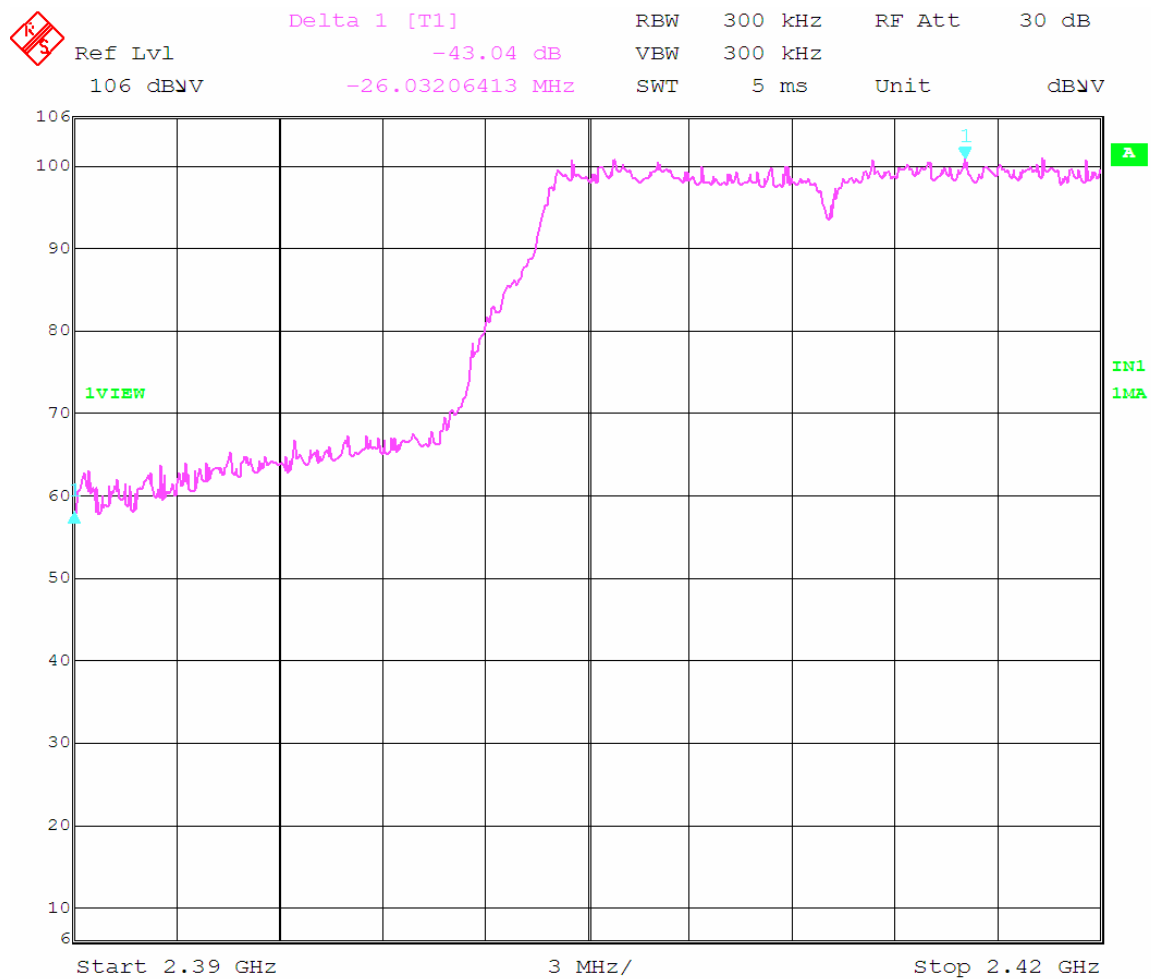
CH	P _{max}	P _{av}	P _{dev}	c.f.	E _{be}	E _{av}	Limit(E _{be})	Limit(E _{av})	Margin(E _{be})	Margin(E _{av})
01	104.80	96.52	43.04	-1.7	60.1	51.8	74.0	54.0	13.9	2.2
11	103.29	94.22	44.57	-1.7	57.0	48.0	74.0	54.0	17.0	6.1

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)

Lower frequency of the band edge (Vertical)

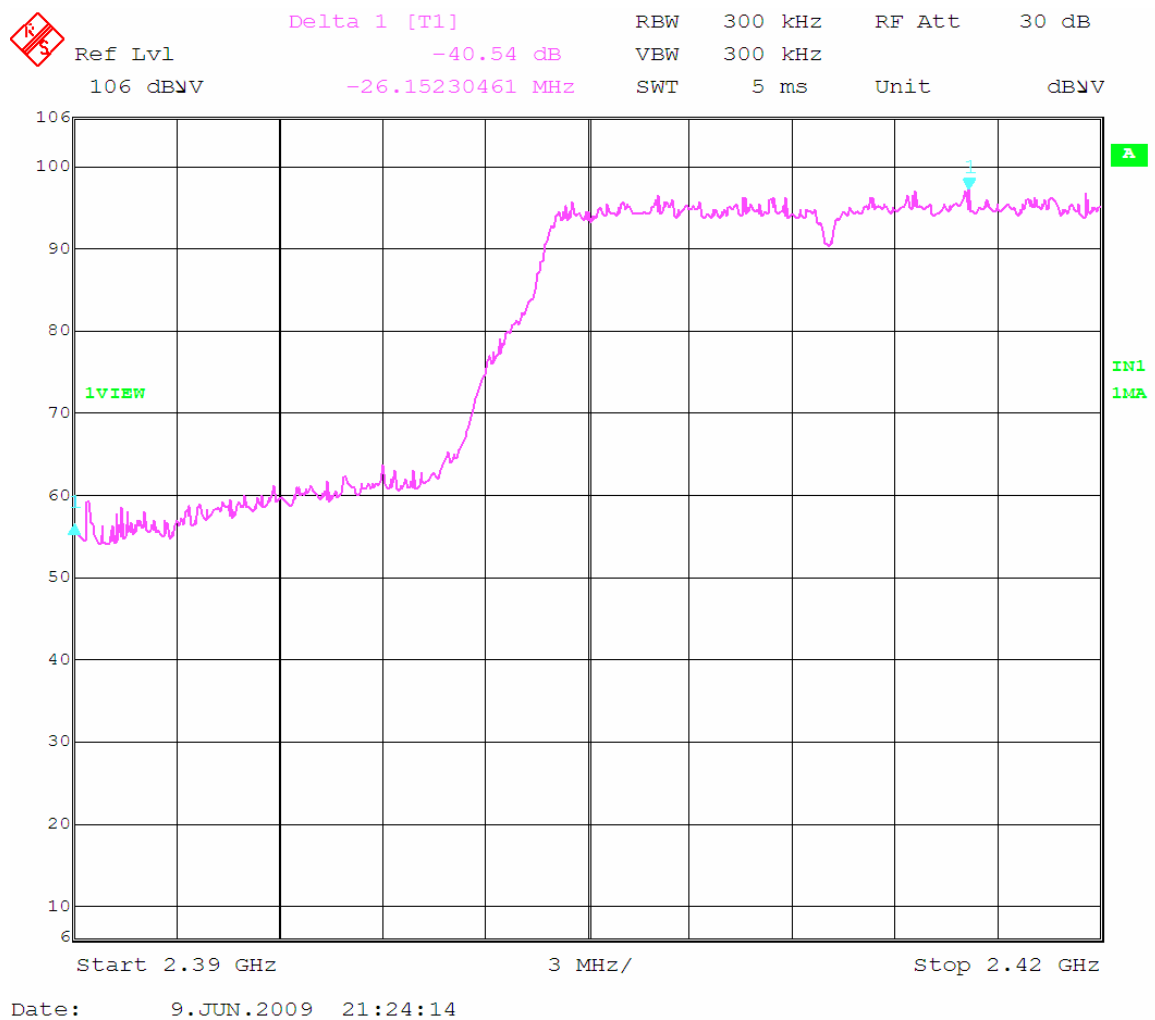


Date: 9.JUN.2009 21:31:34

Delta 1 [T1]
-43.04dB
-26.03206413MHz

5.7.4 Measured Data (Continued)

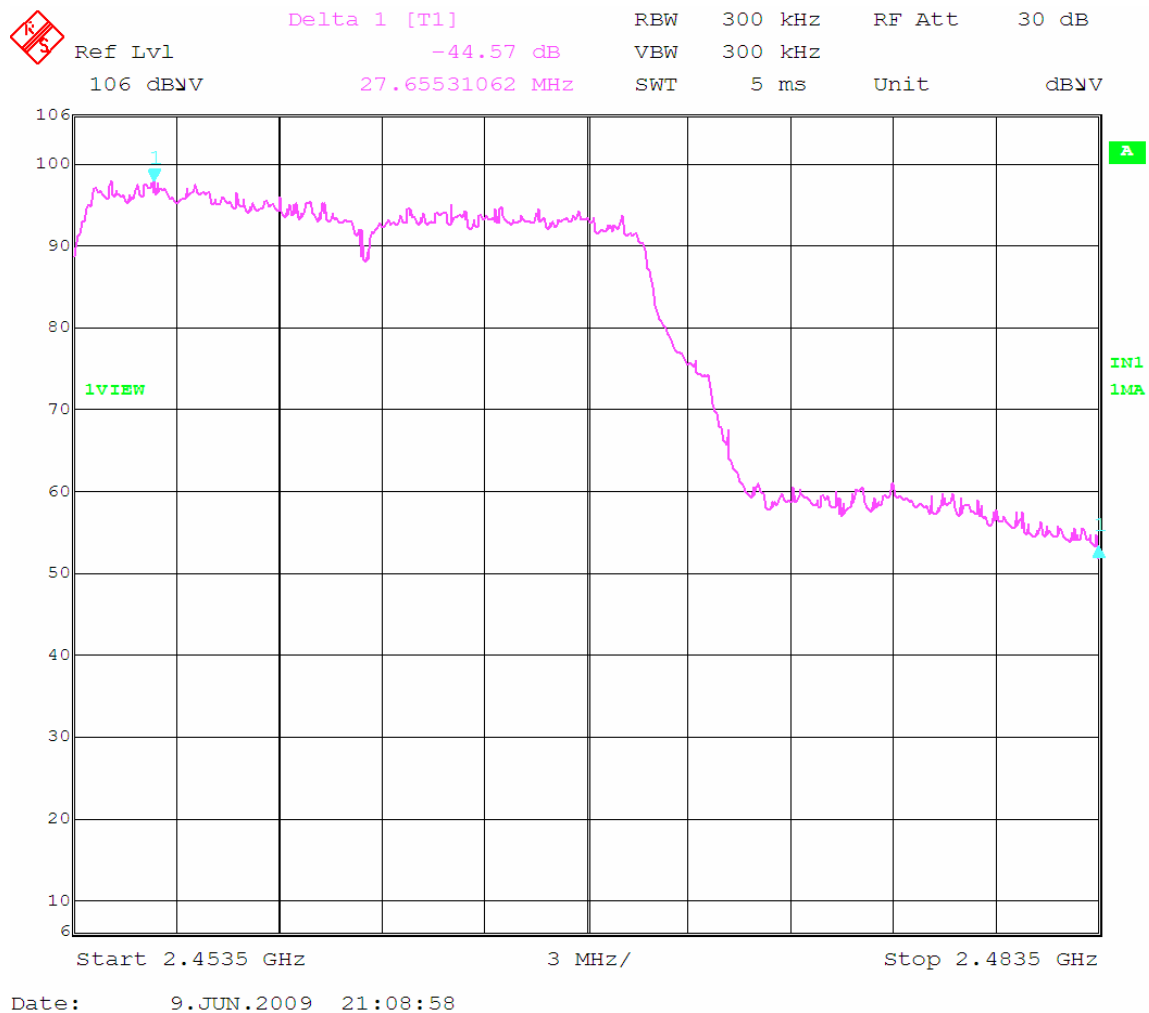
Lower frequency of the band edge (Horizontal)



Delta 1 [T1]
-40.54dB
-26.15230461MHz

5.7.4 Measured Data (Continued)

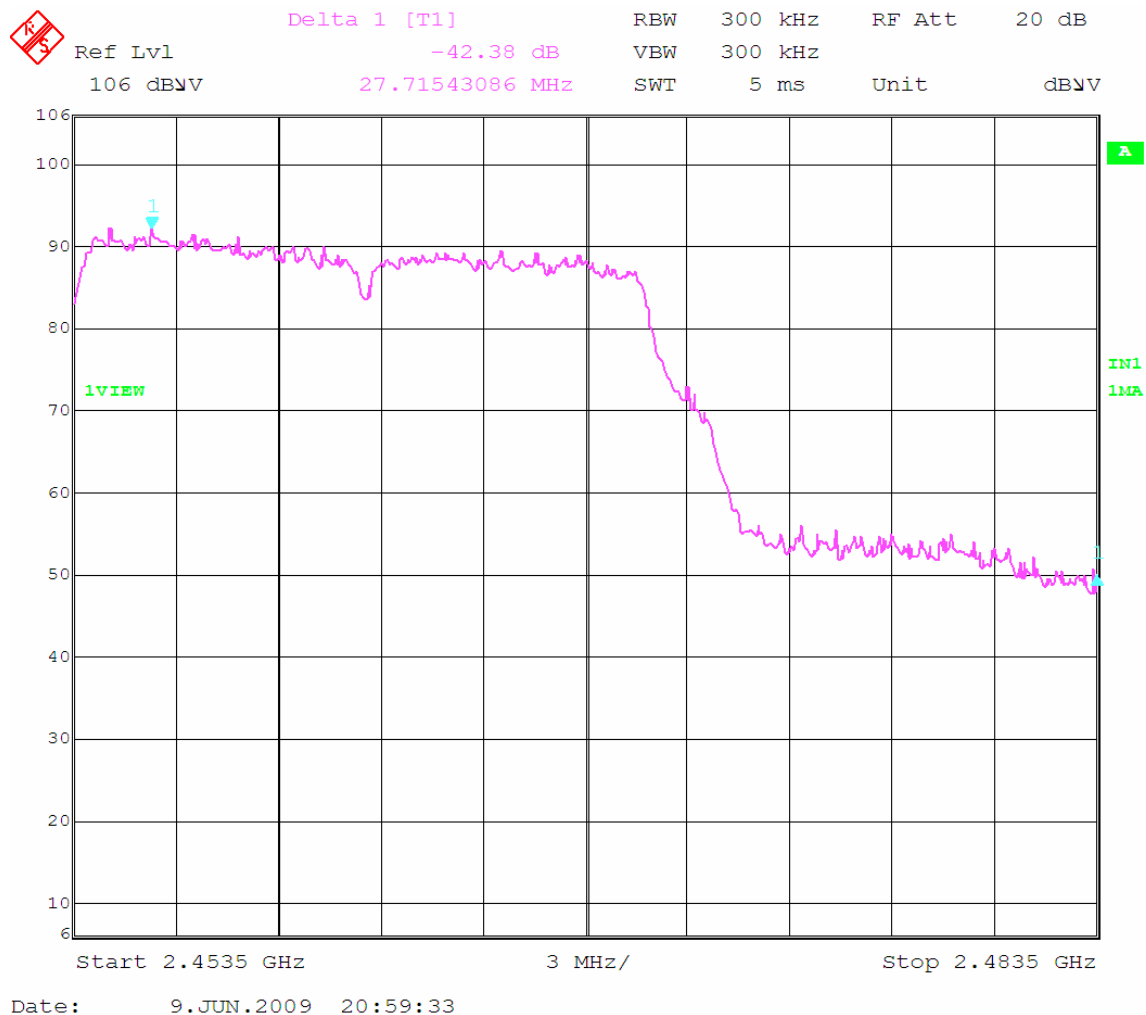
Higher frequency of the band edge (Vertical)



Delta 1 [T1]
-44.57dB
27.65531062MHz

5.7.4 Measured Data (Continued)

Higher frequency of the band edge (Horizontal)

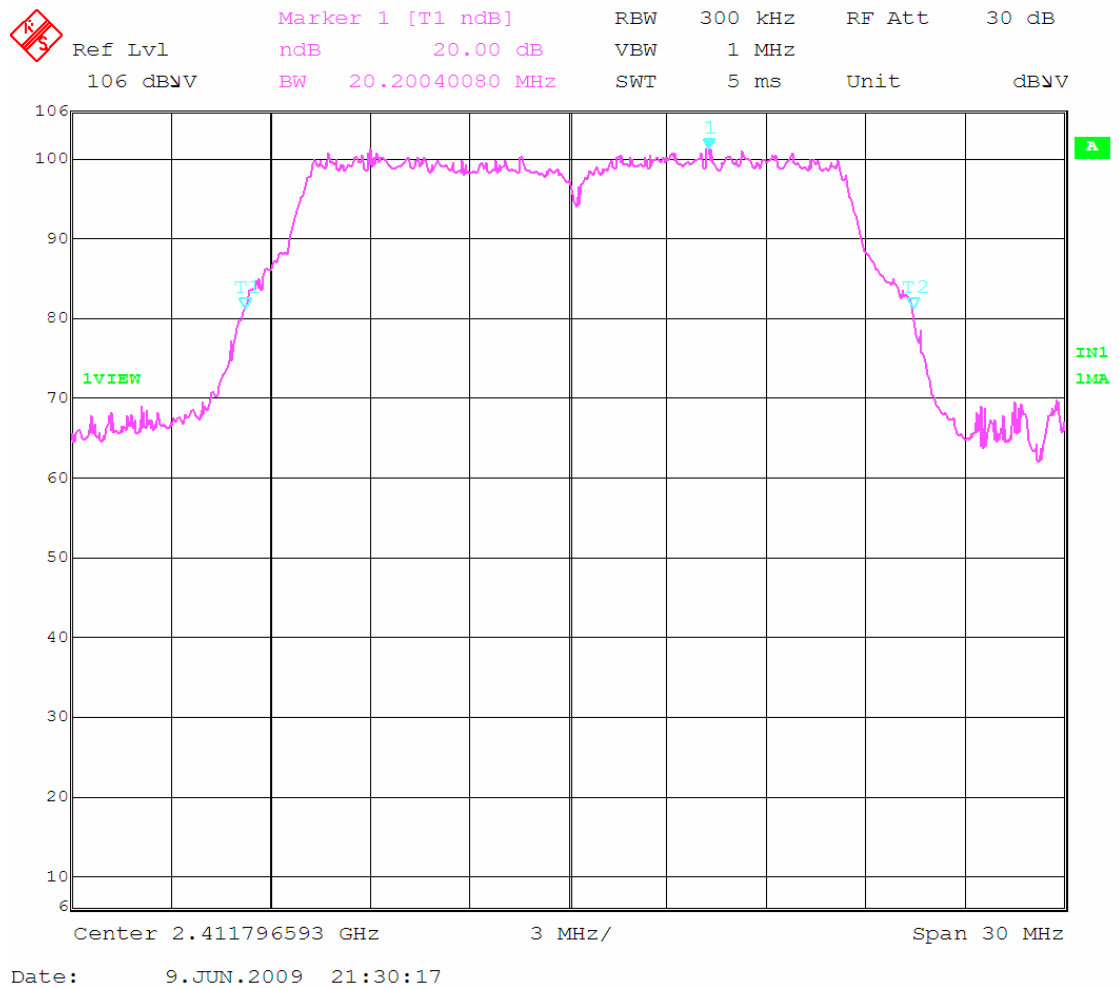


Delta 1 [T1]
 -42.38dB
 27.71543086MHz

5.8 15.215(c) 20dB Bandwidth

5.8.1 Measured Data

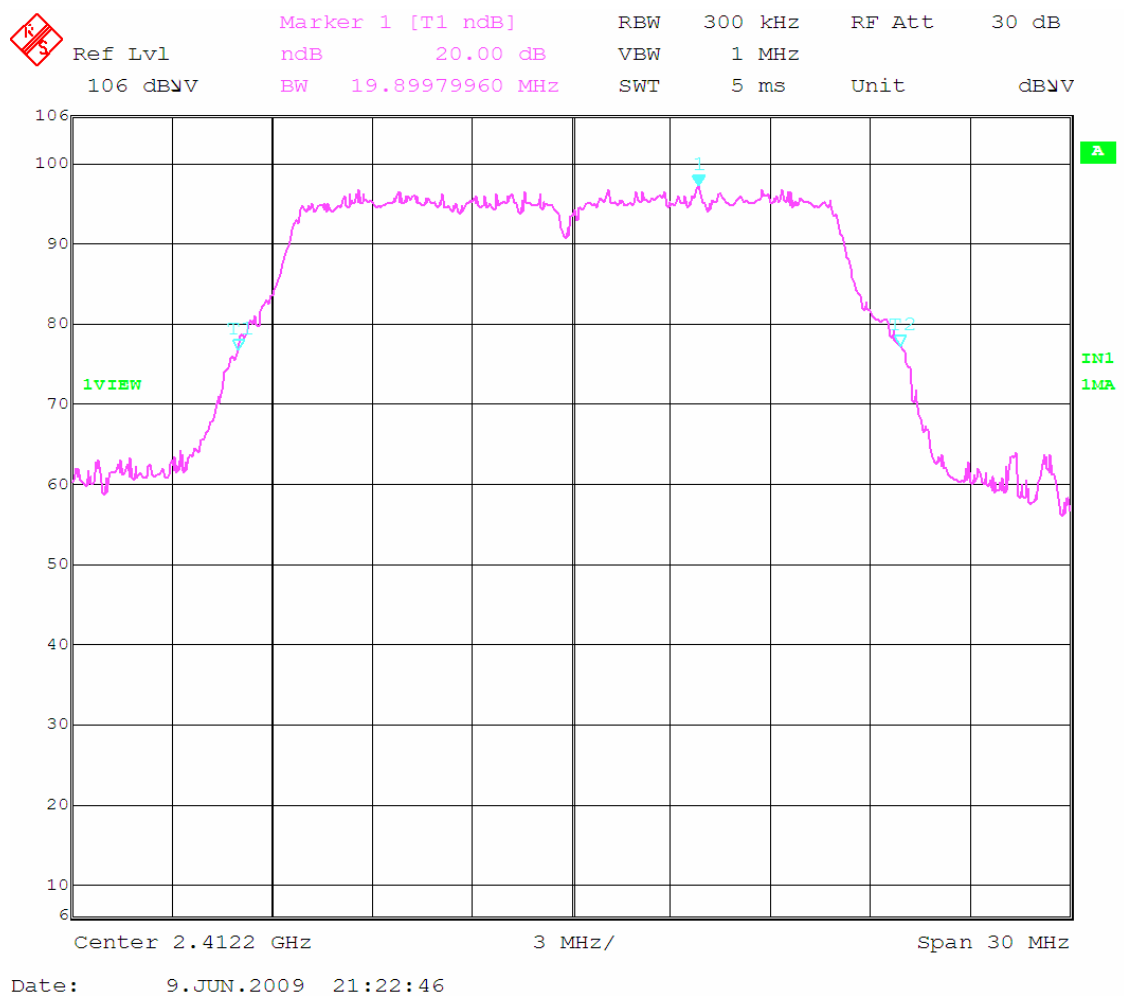
CH01 Vertical



Marker 1 [T1 ndB]
ndB 20.00 dB
BW 20.20040080 MHz

5.8.1 Measured Data (Continued)

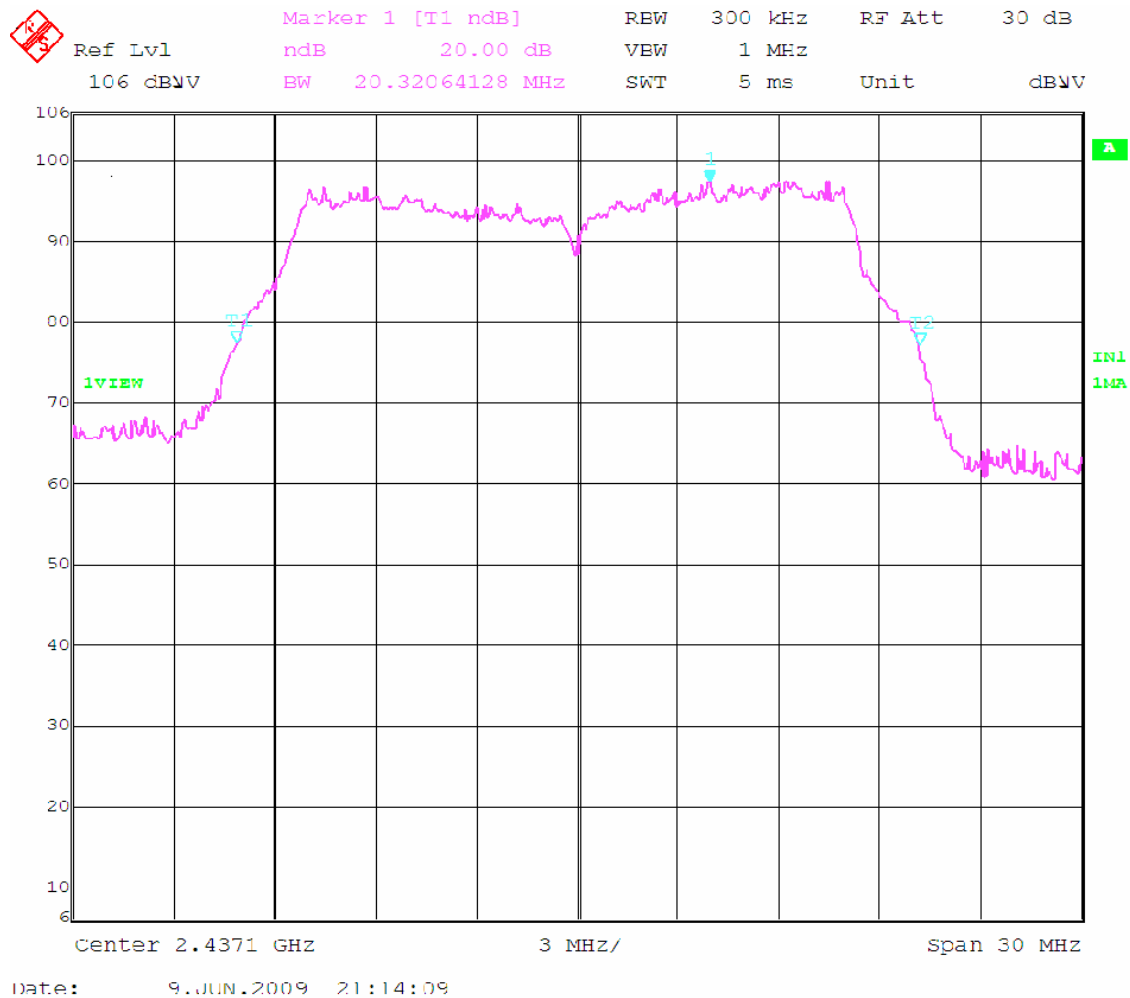
CH01 Horizontal



Marker 1 [T1 ndB]
ndB 20.00 dB
BW 19.89979960 MHz

5.8.1 Measured Data (Continued)

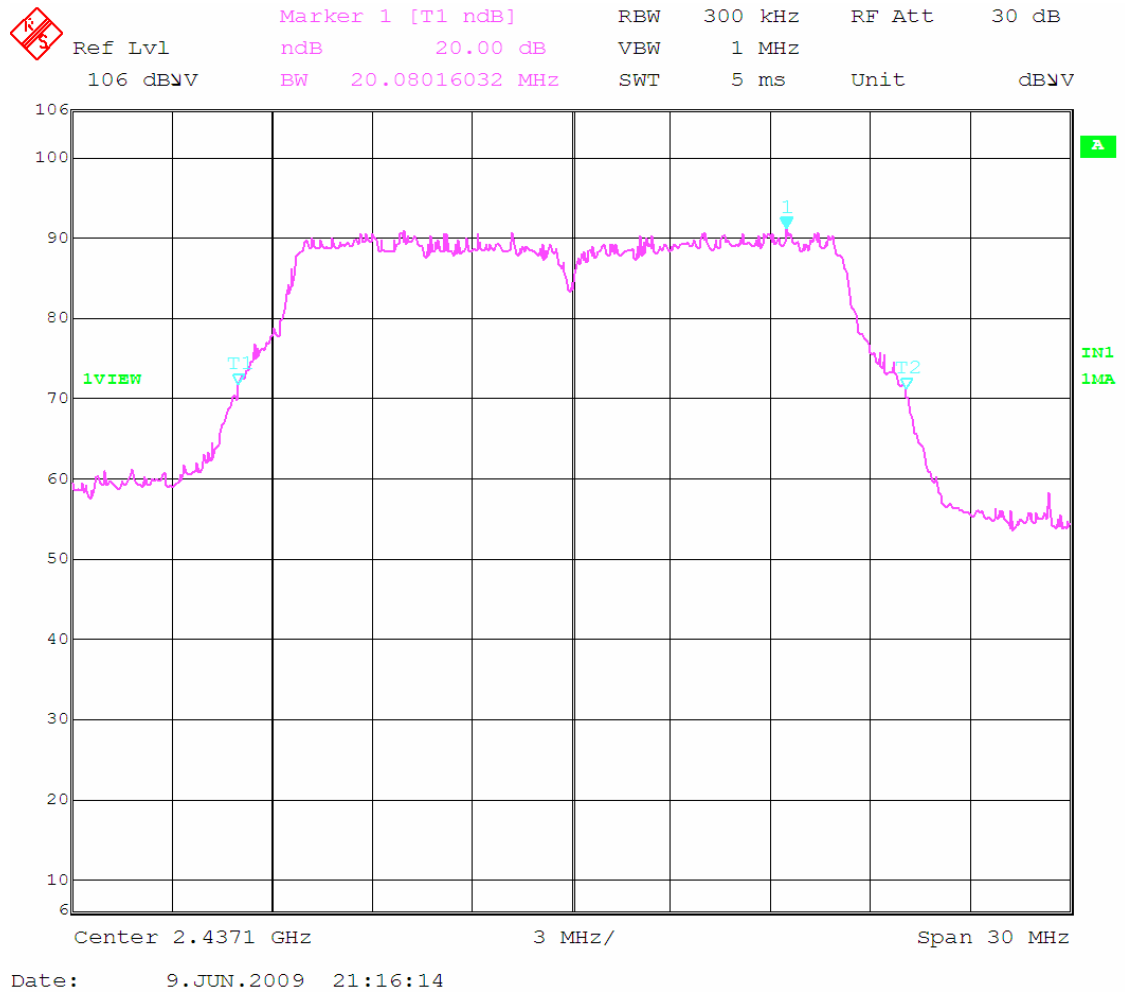
CH06 Vertical



Marker 1 [T1 ndB]
 ndB 20.00dB
 BW 20.32064128 MHz

5.8.1 Measured Data (Continued)

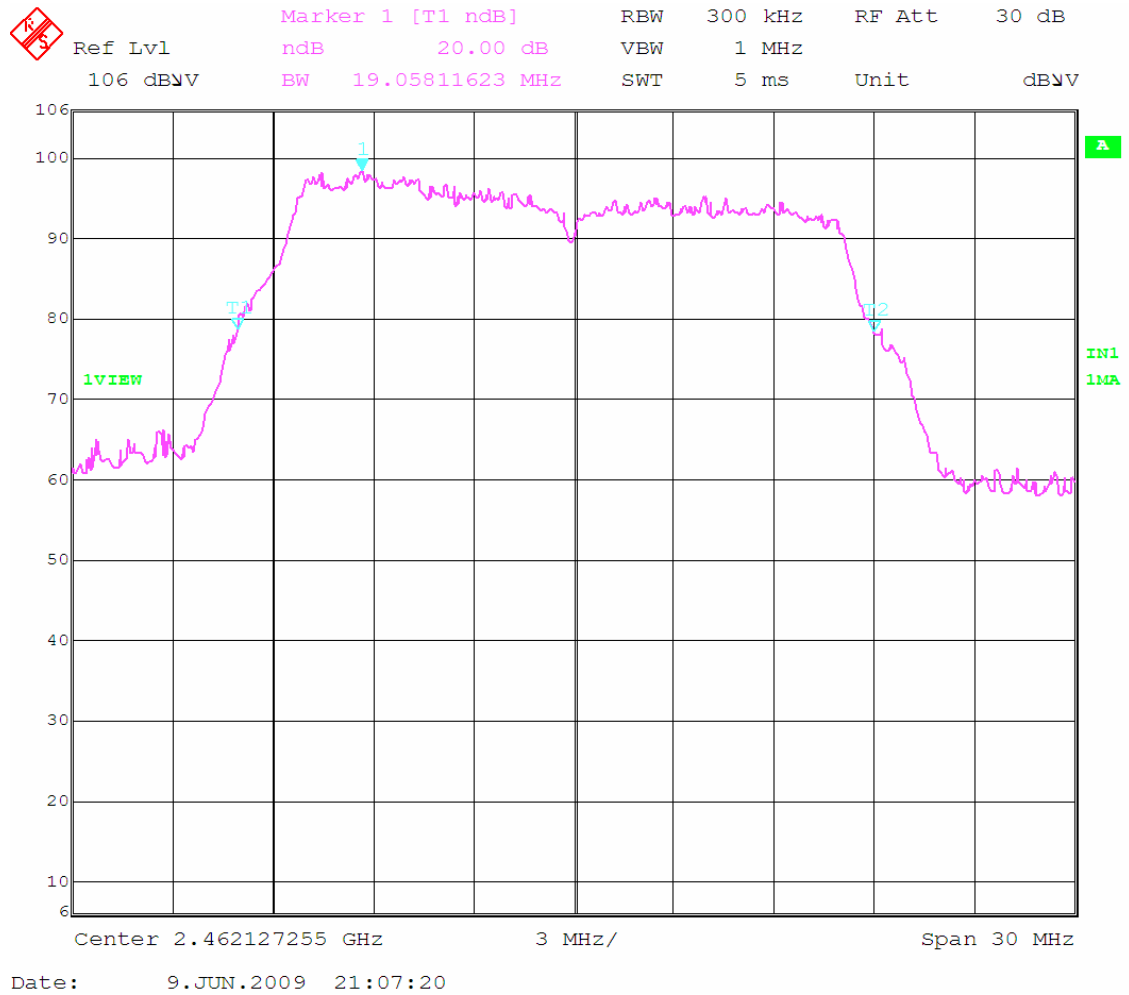
CH06 Horizontal



Marker 1 [T1 ndB]
ndB 20.00 dB
BW 20.08016032 MHz

5.8.1 Measured Data (Continued)

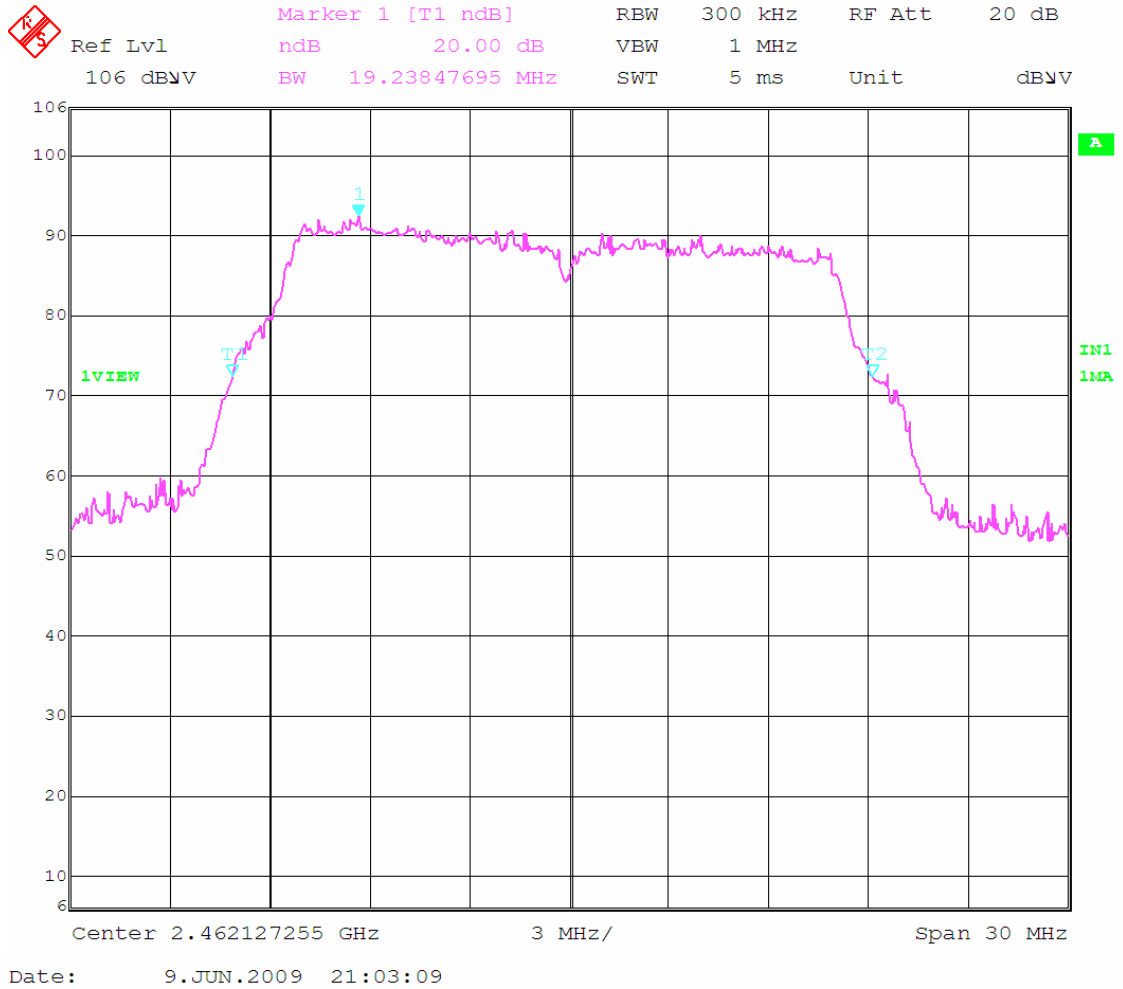
CH11 Vertical



Marker 1 [T1 ndB]
ndB 20.00 dB
BW 19.05811623 MHz

5.8.1 Measured Data (Continued)

CH11 Horizontal



Marker 1 [T1 ndB]
ndB 20.00 dB
BW 19.23847695 MHz

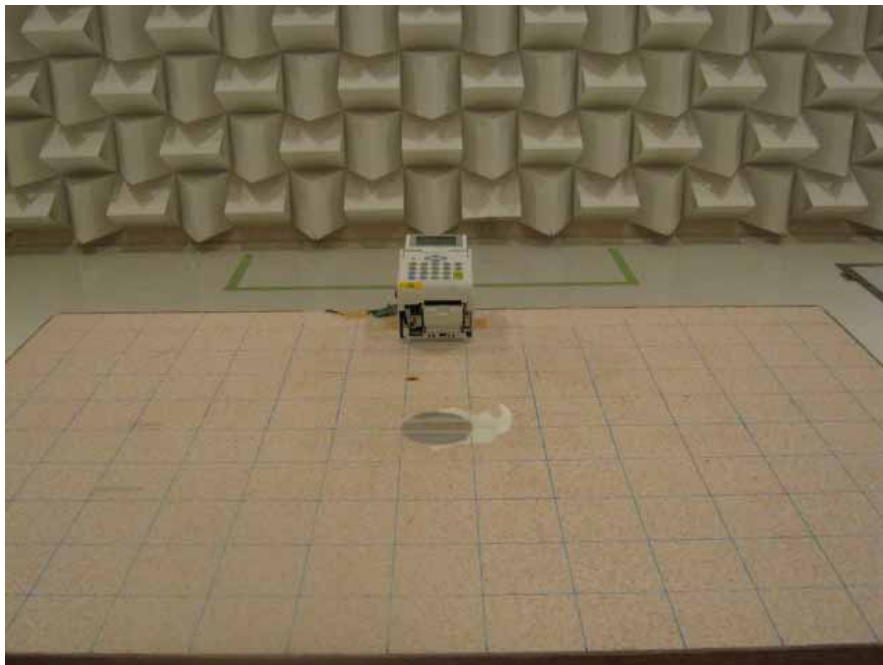
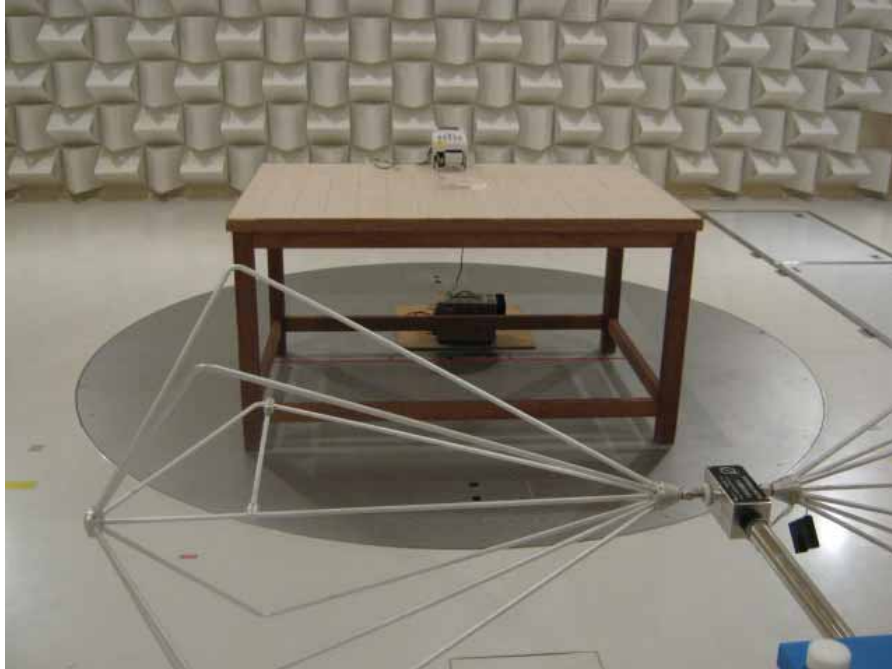
6. Photos

6.1 Setup Photo (AC Power Conducted Emission)



6.2 Setup Photo (Radiated Emission)

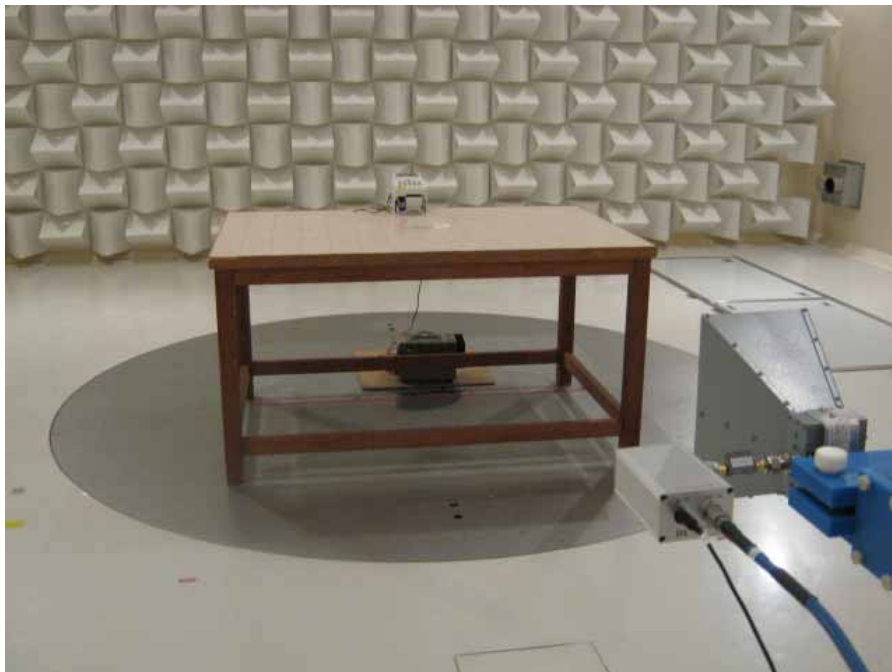
30MHz to 1GHz



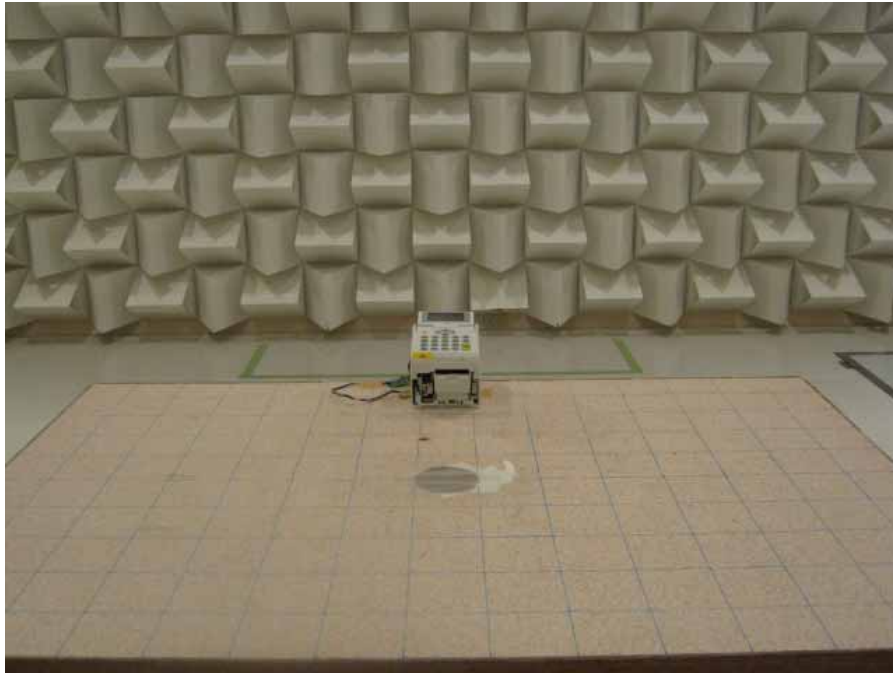
6.2 Setup Photo (Radiated Emission) (Continued)



1GHz to 18GHz

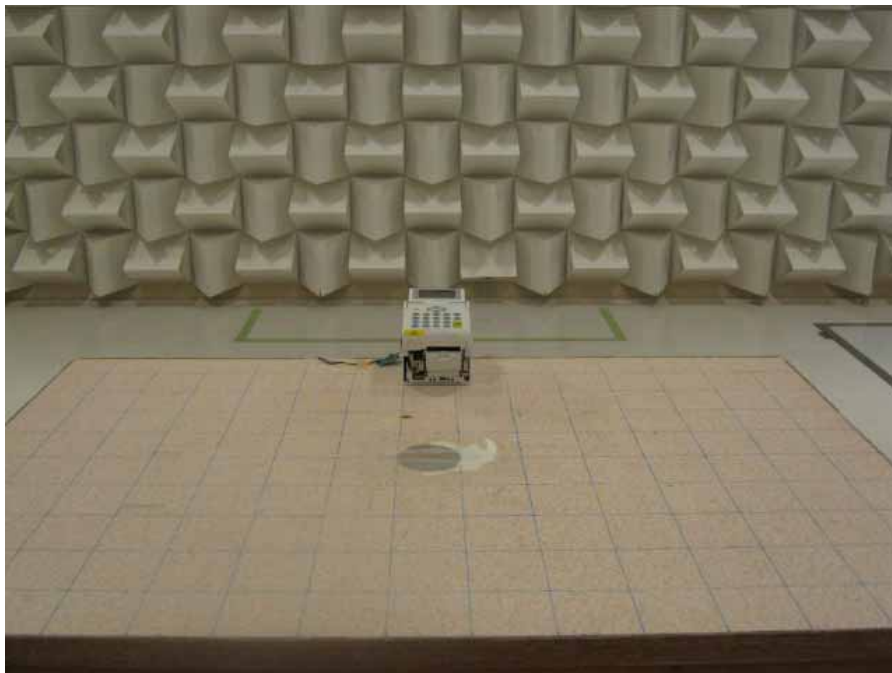


6.2 Setup Photo (Radiated Emission) (Continued)



6.2 Setup Photo (Radiated Emission) (Continued)

18GHz to 26.5GHz



6.2 Setup Photo (Radiated Emission) (Continued)



6.3 Setup Photo (All Other Test Items)



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	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
RF Selector	Techno Science Japan Corp.	RFM-E221	3148	Confirmed before Test

7.2 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, 2008 April, 2009
Signal Generator	Agilent Technology	E8254A	US41140186	May, 2008 May, 2009
Oscilloscope	Tektronix	TDS794D	B031832	October, 2008 October, 2009
Diode Detector	Agilent Technology	423B	MY42241836	March, 2008 March, 2009

7.3 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 (20Hz to 40GHz)	ROHDE& SCHWARZ	ESIB40	100211	October, 2009 October, 2010
Biconical Antenna (30to 300MHz)	SCHWARZBECK	VHBB9124 BBA9106	9124-311	September, 2009 September, 2010
Log.-Periodic Antenna (300MHz to1GHz)	SCHWARZBECK	UHALP9108A	645	September, 2009 September, 2010
Horn Antenna (1~12.5GHz)	SCHWARZBECK	BBHA9120D	443	January, 2009 January, 2010 and January, 2010 January, 2011
Horn Antenna (12.5~18GHz)	ETS LINDGREN	3160-08	00033782	September, 2009 September, 2010
Horn Antenna (18~26.5GHz)	ETS LINDGREN	3160-09	00034723	September, 2009 September, 2010
Pre Amp (30MHz-1GHz)	HEWLETT PACKARD	8447D	2944A07891	October, 2009 September, 2010
Pre Amp (1GHz-12.75GHz)	TSJ	MLA-0120AML-34	---	January, 2009 January, 2010 and January, 2010 January, 2011