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CERTIFICATION OF COMPLIANCE

Wise & Blue Co., Ltd

804, 1112-7 Namchon-ri, Oksan-myeon, Cheongwon-gun,
Chungcheongbuk-do, Korea

Dates of Tests: September 22 ~ October 5, 2009
Test Report S/N: DR50110909Q-r1
Test Site : DIGITAL EMC CO., LTD.

FCC ID

U5L-WB130

APPLICANT

Wise & Blue Co., Ltd

Purpose	:	Original Grant
FCC Equipment Class	:	Part 15 Spread Spectrum Transmitter(DSS)
Device name	:	Bluetooth Headset
Manufacturer	:	ALT SEMICON CO., LTD.
FCC ID	:	U5L-WB130
Model name	:	WB130
Test Device Serial number	:	Identical prototype
FCC Rule Part(s)	:	FCC Part 15.247 Subpart C ANSI C63.4-2003
Frequency Range	:	2402 ~ 2480 MHz
Max. Output power	:	-14.24 dBm Conducted
Data of issue	:	October 30, 2009

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1. General information

This report contains the result of tests performed by:

DIGITAL EMC CO., LTD.

Address: 683-3, Yubang-Dong, Yongin-Si, Kyunggi-Do, Korea. 449-080

<http://www.digitalemc.com> E-mail: Harveysung@digitalemc.com

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Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the "General requirements for the competent of calibration and testing laboratory".

Tested by: Engineer

October 30, 2009

D.C. Cha



Data

Name

Signature

Reviewed by: Manager

October 30, 2009

W.J. Lee



Data

Name

Signature

Applicant:

Company name : Wise & Blue Co., Ltd.

Address : 804, 1112-7 Namchon-ri, Oksan-myeon, Cheongwon-gun, Chungcheongbuk-do, Korea

Date of order : March 20, 2009

2. Equipment information

U5L-WB130

2.1 Equipment description

Equipment model no.	WB130
Equipment serial no.	Identical prototype
Type of equipment	Bluetooth Headset
Frequency band	2402 ~ 2480 MHz
Type of Modulation	<input checked="" type="checkbox"/> GFSK for 1Mbps(BDR mode) <input type="checkbox"/> $\pi/4$ -DQPSK for 2Mbps(EDR mode) <input type="checkbox"/> 8DPSK for 3Mbps(EDR mode)
Spread Spectrum	Frequency Hopping
Channel Spacing	1.0 MHz
Power	DC 3.7V (Lithium Battery)
Type of antenna	<input checked="" type="checkbox"/> Internal Type: PCB Antenna <input type="checkbox"/> External Type:



2.2 Ancillary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
-	-	-	-	-
-	-	-	-	-

3. Information about test items

U5L-WB130

3.1 Tested frequency

- Hopping Function: Enable

Frequency	TX	RX
Frequency band of operation	2402MHz ~ 2480MHz	2402MHz ~ 2480MHz

- Hopping Function: Disable

Frequency	TX	RX
Lowest frequency	2402MHz	2402MHz
Middle frequency	2441MHz	2441MHz
Highest frequency	2480MHz	2480MHz

3.2 Tested environment

Temperature	:	15 ~ 35 (°C)
Relative humidity content	:	20 ~ 75 %
Air pressure	:	86 ~ 103 kPa
Details of power supply	:	3.7 V DC

3.3 Test mode

Test Case 1	-
Test Case 2	-

3.4 Auxiliary equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
-	-	-	-	-
-	-	-	-	-

3.5 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing

→ None

4. Test Report

4.1 Summary of tests

FCC Part Section(s)	Parameter	Limit (Using in 2400 ~ 2483.5MHz)	Test Condition	Status Note 1
I. Test Items				
15.247(a)	Carrier Frequency Separation	$\geq 20\text{dB BW}$ or \geq Two-Thirds of the 20dB BW	Conducted	C
	Number of Hopping Frequencies	≥ 15 hops		C
	20 dB Bandwidth	None		C
	Dwell Time	≤ 0.4 seconds		C
15.247(b)	Transmitter Output Power	$\leq 1\text{Watt}$, if CHs ≥ 75 Others $\leq 0.125\text{W}$		C
15.247(c)	Band-edge /Conducted	The radiated emission to any 100 kHz of out-band shall be at least 20dB below the highest in-band spectral density.		C
	Conducted Spurious Emissions			C
15.205 15.209	Radiated Spurious Emissions	FCC 15.209 Limits	Radiated	C
15.207	AC Conducted Emissions	EN 55022	AC Line Conducted	NA Note 2
15.203	Antenna Requirements	FCC 15.203	-	C
Note 1: C=Comply NC=Not Comply NT=Not Tested NA=Not Applicable Note 2: When this device is in the charging mode, the Bluetooth function is disabled.				

The sample was tested according to the following specification:

FCC Parts 15.247; ANSI C-63.4-2003, DA00-705

4.2 Transmitter requirements

4.2.1 Carrier Frequency Separation

- Procedure:

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

After the trace being stable, the reading value between the peaks of the adjacent channels using the marker-delta function was recorded as the measurement results.

The spectrum analyzer is set to:

Span = wide enough to capture the peaks of two adjacent channels

RBW = 1% of the span

Sweep = auto

VBW = \geq RBW

Detector function = peak

Trace = max hold

- Measurement Data: **Comply**

Hopping Mode	Data rate	Peak of center channel (MHz)	Peak of adjacent Channel (MHz)	Test Result (MHz)
Enable	1Mbps	2441.028846	2440.014423	1.014423

See next page for actual measured spectrum plot.

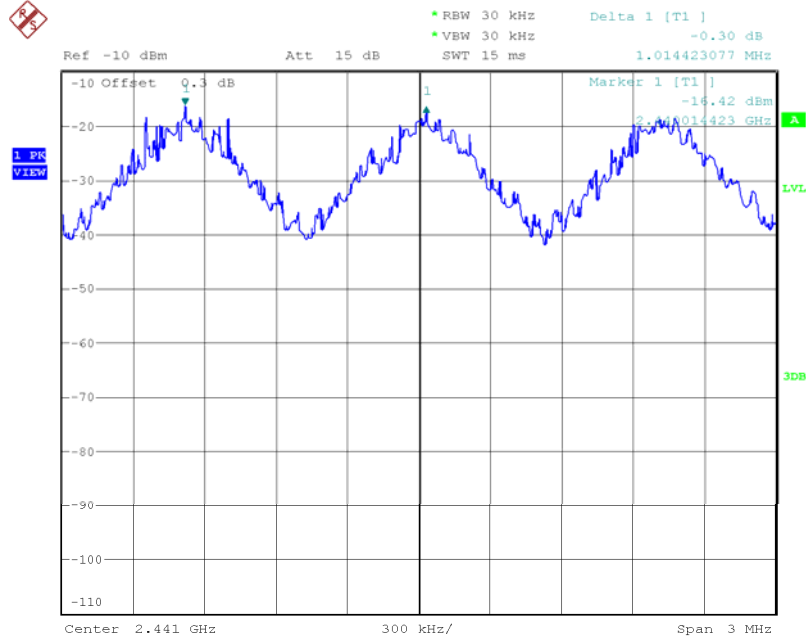
- Minimum Standard:

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Alternatively, 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

Carrier Frequency Separation

Hopping mode: Enable & Data rate: 1Mbps



Date: 1.OCT.2009 08:18:23

4.2.2 Number of Hopping Frequencies

- Procedure:

The number of hopping frequencies was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

To get higher resolution, four frequency ranges within the 2400 ~ 2483.5 MHz FH band were examined.

The spectrum analyzer is set to:

Span = 25MHz Plot 1: Start Frequency = 2389.5MHz, Stop Frequency = 2414.5 MHz

Plot 2: Start Frequency = 2414.5MHz, Stop Frequency = 2439.5 MHz

Plot 3: Start Frequency = 2439.5MHz, Stop Frequency = 2464.5 MHz

Plot 4: Start Frequency = 2464.5MHz, Stop Frequency = 2489.5 MHz

RBW = 1% of the span or more

Sweep = auto

VBW = \geq RBW

Detector function = peak

Trace = max hold

- Measurement Data: **Comply**

Hopping mode	Data rate	Test Result (Total Hops)
Enable	1Mbps	79

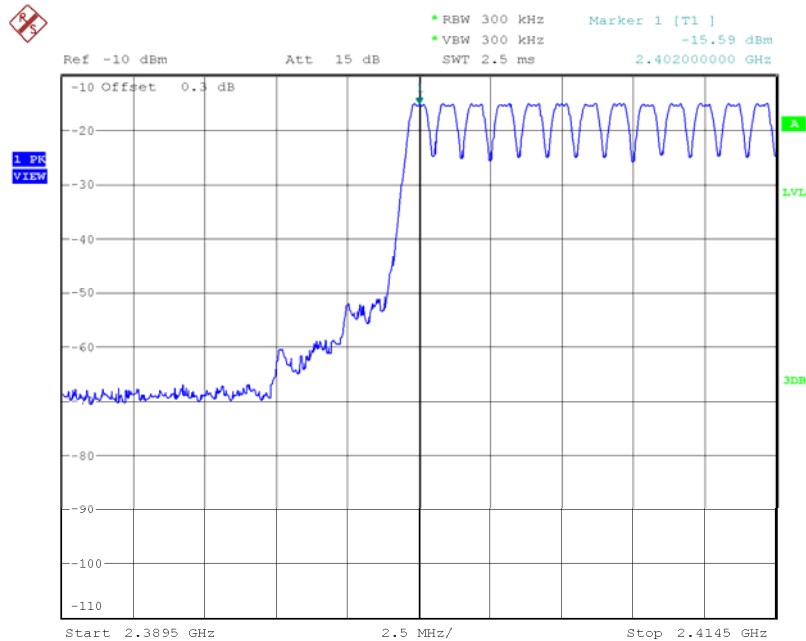
Note 1: See next pages for actual measured spectrum plots.

- Minimum Standard:

At least 15 hops

Number of Hopping Frequencies 1

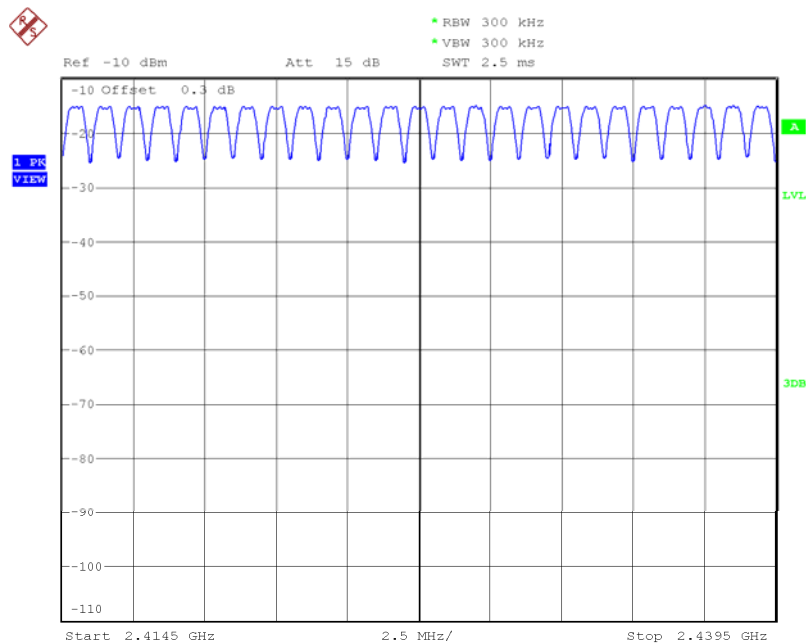
Hopping mode: Enable & Data rate: 1Mbps



Date: 1.OCT.2009 07:58:09

Number of Hopping Frequencies 2

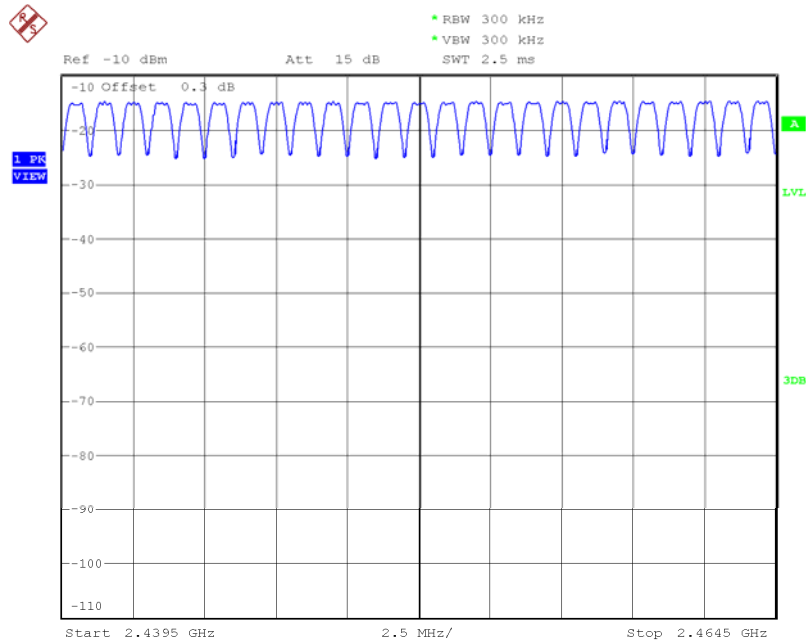
Hopping mode: Enable & Data rate: 1Mbps



Date: 1.OCT.2009 08:00:09

Number of Hopping Frequencies 3

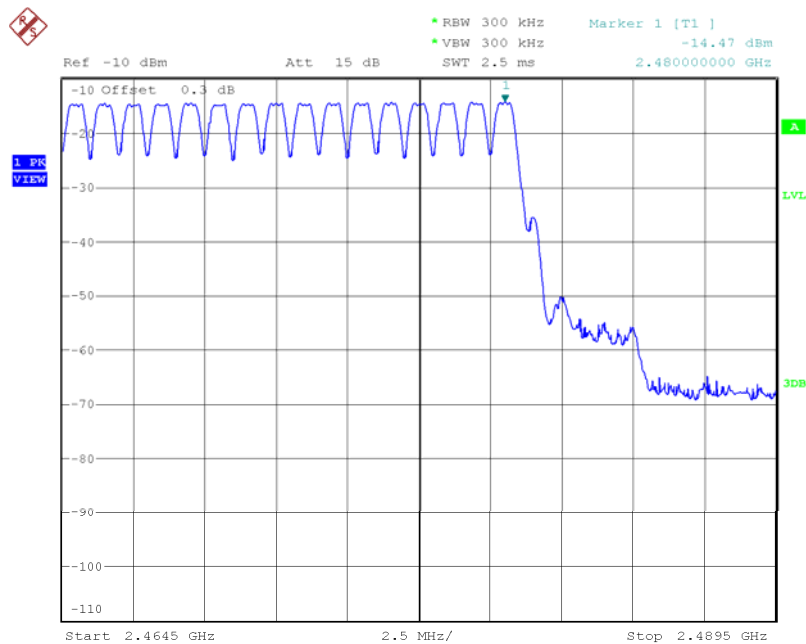
Hopping mode: Enable & Data rate: 1Mbps



Date: 1.OCT.2009 08:02:44

Number of Hopping Frequencies 4

Hopping mode: Enable & Data rate: 1Mbps



Date: 1.OCT.2009 08:05:03

4.2.3 20 dB Bandwidth

- Procedure:

The bandwidth at 20 dB below the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels.

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest Frequencies

Span = approximately 2 or 3 times of the 20 dB bandwidth

RBW = 1% of the 20dB bandwidth or more

Sweep = auto

VBW = \geq RBW

Detector function = peak

Trace = max hold

- Measurement Data: **Comply**

Hopping mode	Date rate	Tested Frequency	Test Results (MHz)
Disable	1Mbps	Lowest	1.466346
		Middle	1.466346
		Highest	1.474358

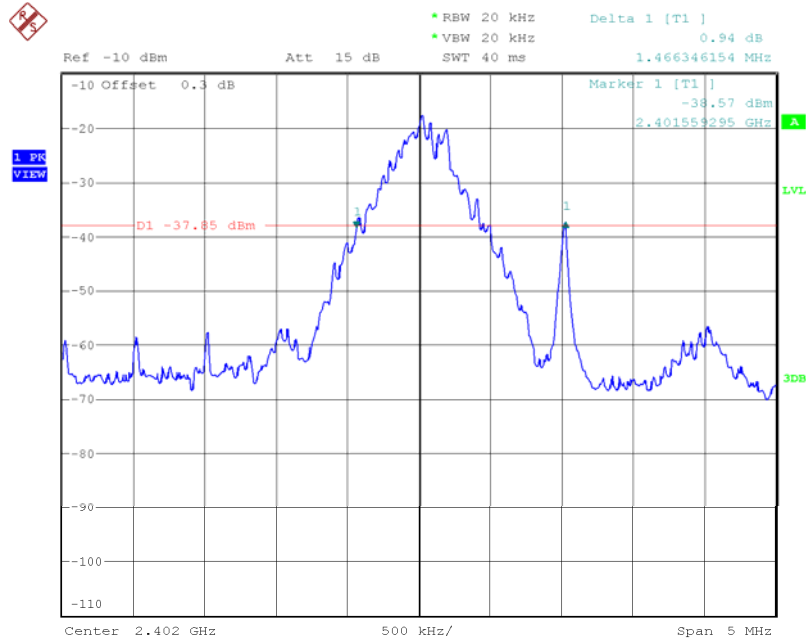
Note 1: See next pages for actual measured spectrum plots.

- Minimum Standard:

None

20dB Bandwidth

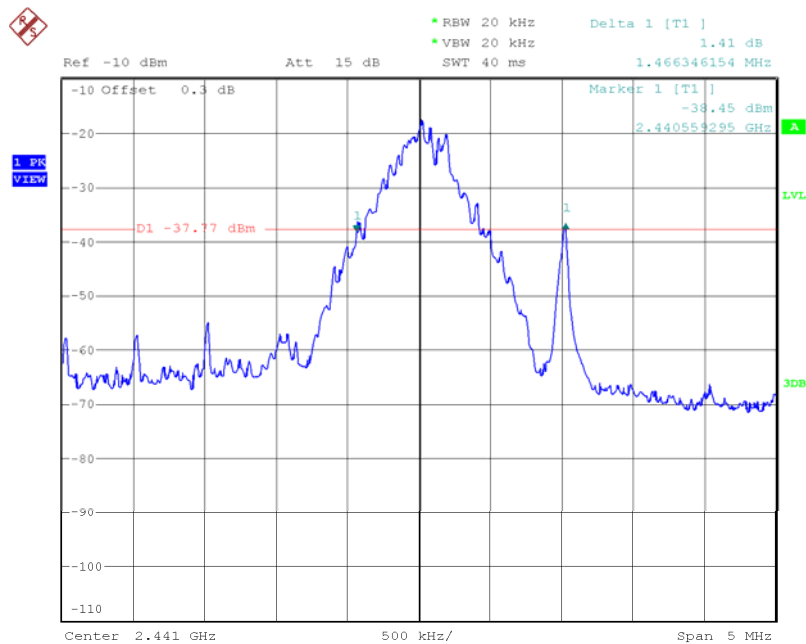
Lowest Frequency & Data rate: 1Mbps



Date: 1.OCT.2009 07:47:01

20dB Bandwidth

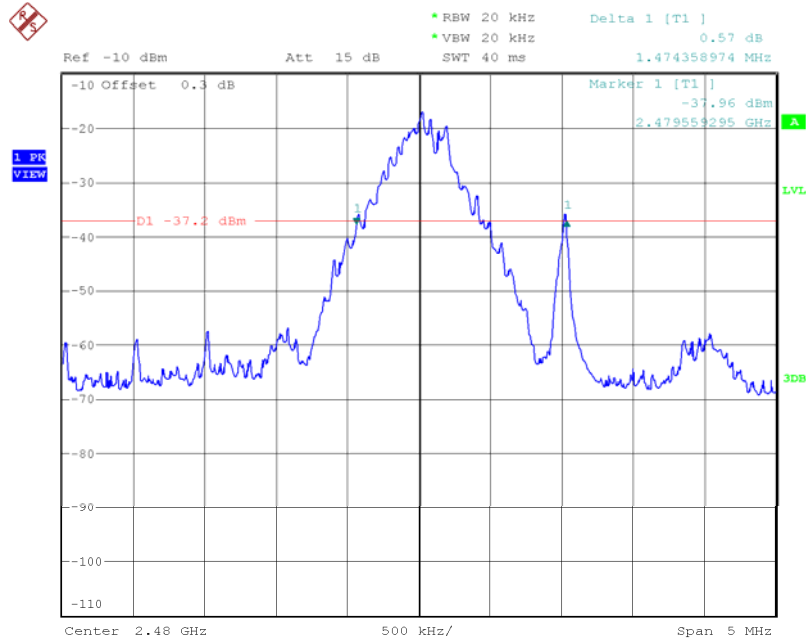
Middle Frequency & Data rate: 1Mbps



Date: 1.OCT.2009 07:48:39

20dB Bandwidth

Highest Frequency & Data rate: 1Mbps



Date: 1.OCT.2009 07:49:56

4.2.4 Time of Occupancy (Dwell Time)

- Procedure:

The dwell time was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

The spectrum analyzer is set to:

Center frequency = 2441 MHz

Span = zero

RBW = 1 MHz

VBW = \geq RBW

Trace = max hold

Detector function = peak

- Measurement Data: **Comply**

Hopping mode	Data Rate	Packet Type	Burst On Time (ms)	Period (ms)	Number of hopping Channels	Test Result (s)
Enable	1Mbps	DH 5	2.91	3.75	79	0.3104

Note 1: Each new transmission event begins on the next channel in the hopping sequence after the final channel used in the previous transmission event.

DWELL TIME=(0.4 x Number of hopping Channels) x Burst On time / (period x Number of hopping Channels)

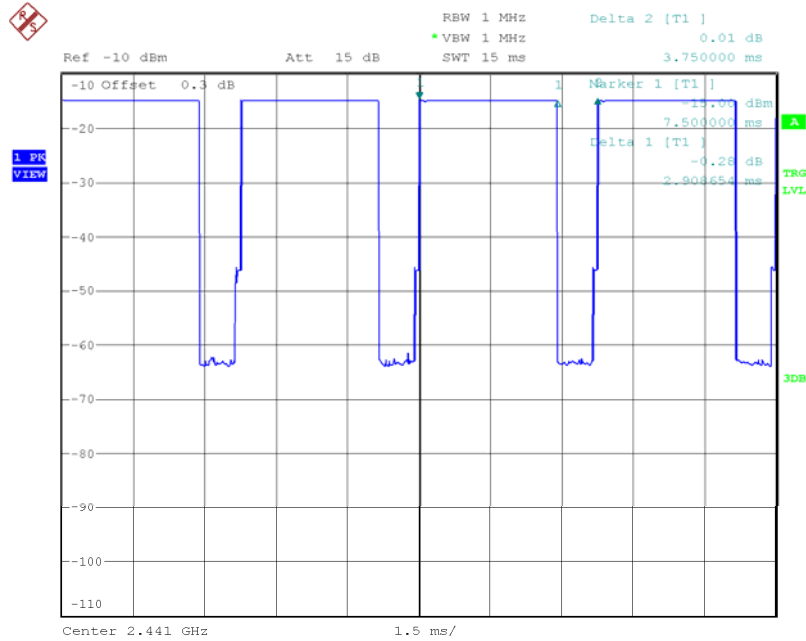
Note 2: See next pages for actual measured spectrum plots.

- Minimum Standard:

No greater than 0.4 seconds

Time of Occupancy

Hopping mode: Enable & Data rate: 1Mbps



Date: 1.OCT.2009 07:55:15

4.2.5 Peak Output Power

- Procedure:

The peak output power was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels.

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest Frequencies

Span = approximately 5 times of the 20 dB bandwidth

RBW = greater than the 20dB bandwidth of the emission being measured

VBW = \geq RBW

Detector function = peak

Trace = max hold

Sweep = auto

- Measurement Data: **Comply**

Hopping mode	Data rate	Tested Frequency	Test Results	
			dBm	mW
Disable	1Mbps	Lowest	-14.99	0.032
		Middle	-14.88	0.033
		Highest	-14.24	0.038

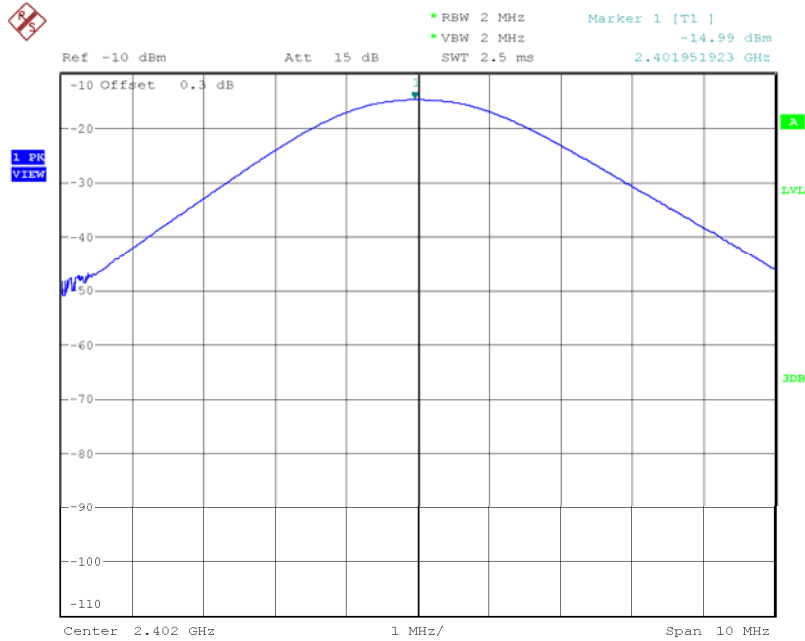
Note 1: See next pages for actual measured spectrum plots.

- Minimum Standard:

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: **1 Watt**. For all other frequency hopping systems in the 2400-2483.5 MHz band: **0.125 Watts**

Peak Output Power

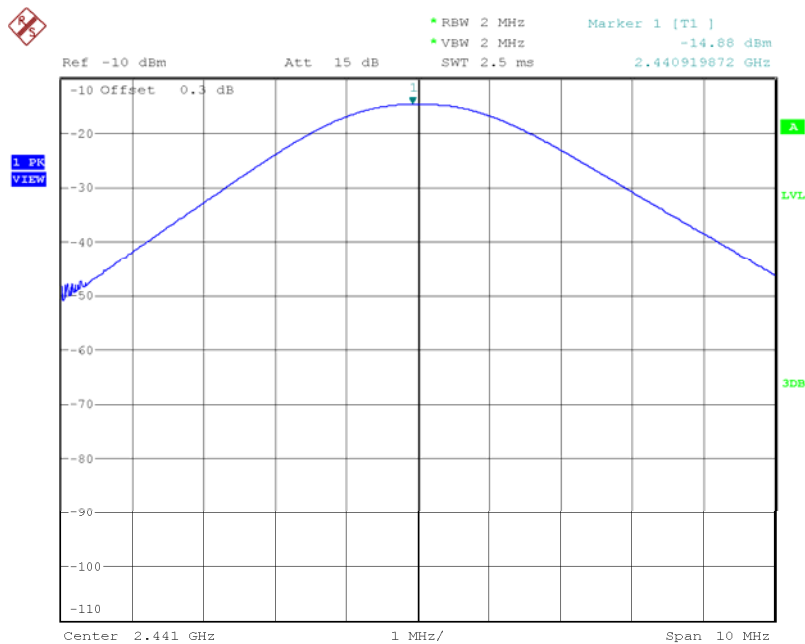
Lowest Frequency & Data rate: 1Mbps



Date: 1.OCT.2009 07:53:16

Peak Output Power

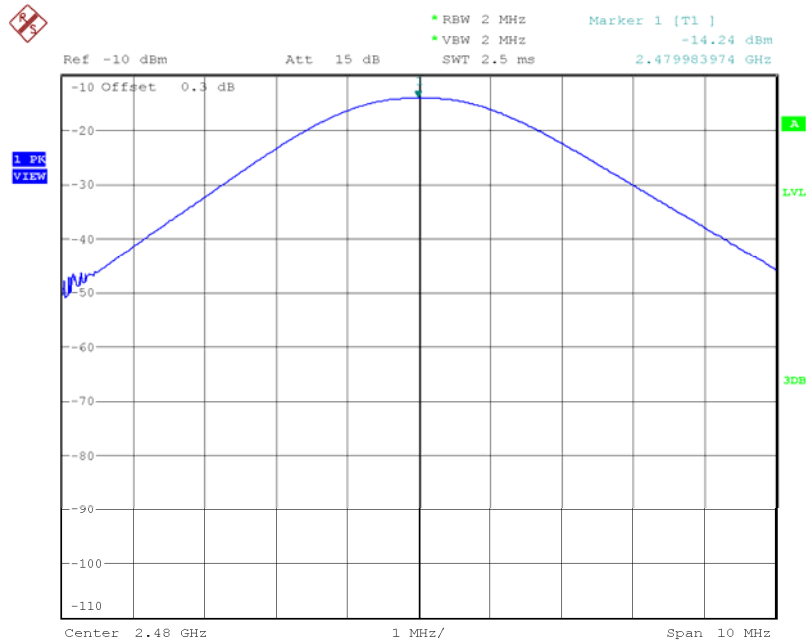
Middle Frequency & Data rate: 1Mbps



Date: 1.OCT.2009 07:52:07

Peak Output Power

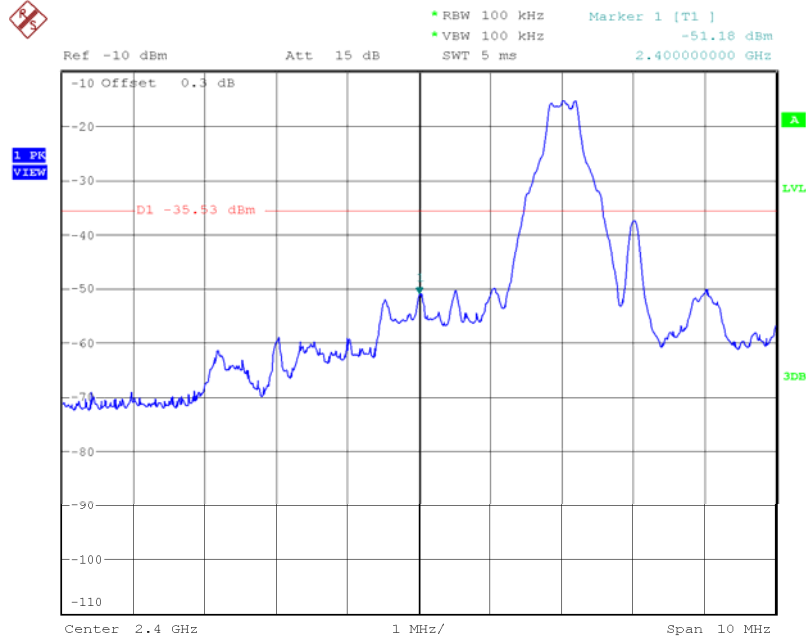
Highest Frequency & Data rate: 1Mbps



Date: 1.OCT.2009 07:51:08

Low Band-edge

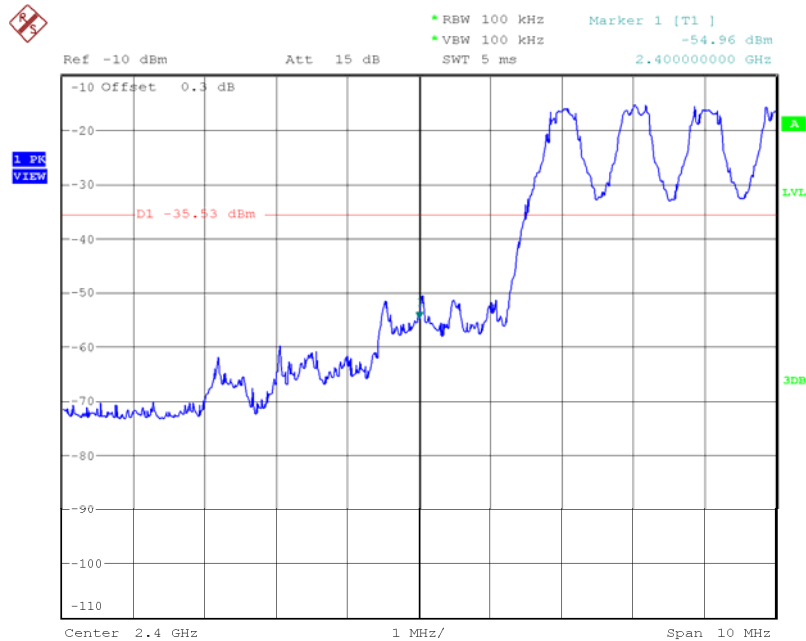
Hopping mode: Disable & Data rate: 1Mbps



Date: 1.OCT.2009 08:21:56

Low Band-edge

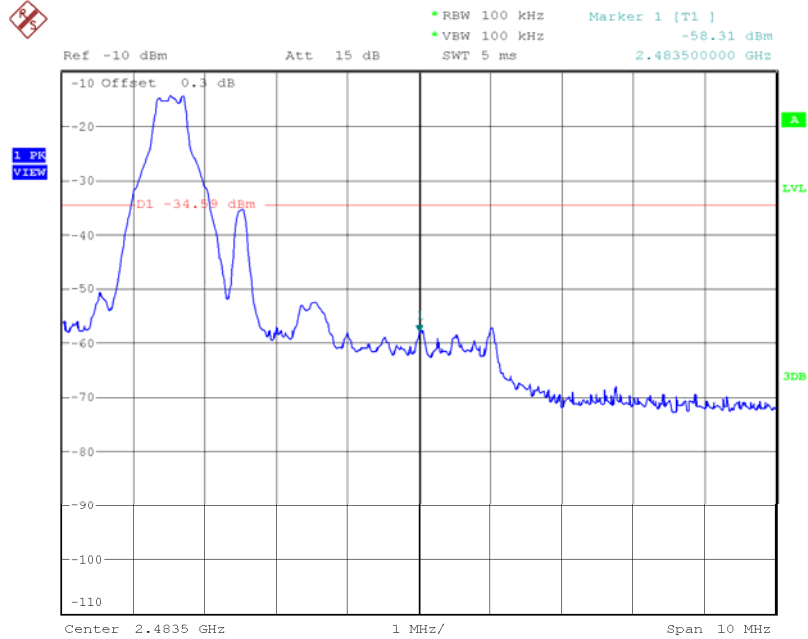
Hopping mode: Enable & Data rate: 1Mbps



Date: 1.OCT.2009 08:24:22

High Band-edge

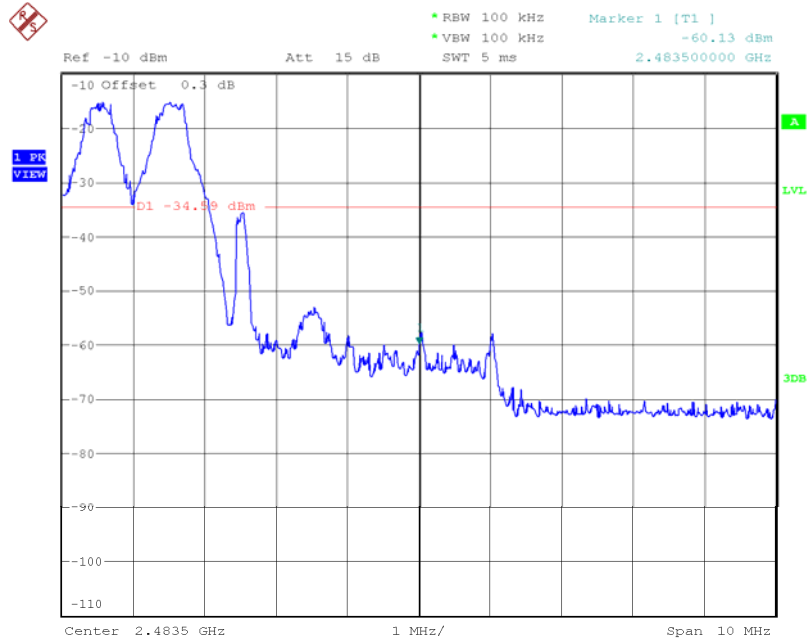
Hopping mode: Disable & Data rate: 1Mbps



Date: 5.OCT.2009 10:03:24

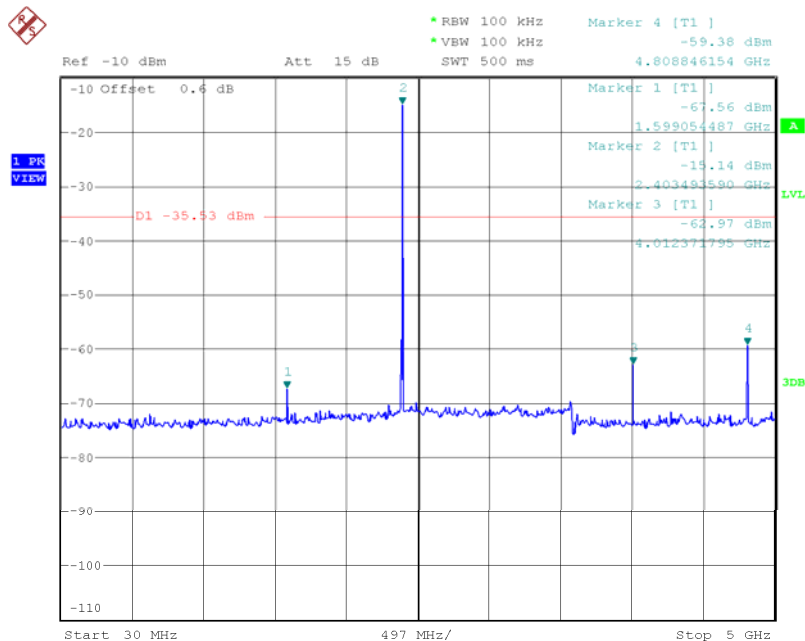
High Band-edge

Hopping mode: Enable & Data rate: 1Mbps



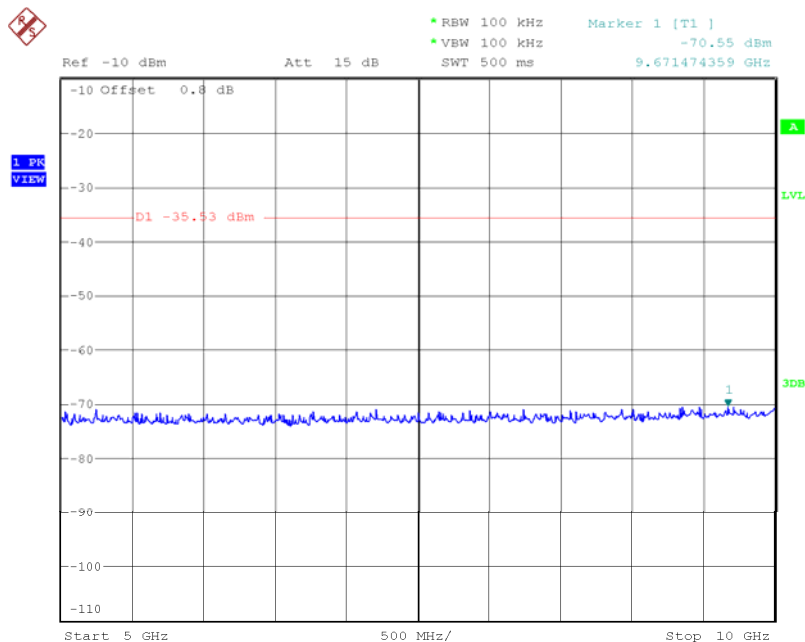
Date: 5.OCT.2009 10:04:31

30MHz ~ 5GHz Conducted Spurious Emissions Lowest Frequency & Data rate: 1Mbps



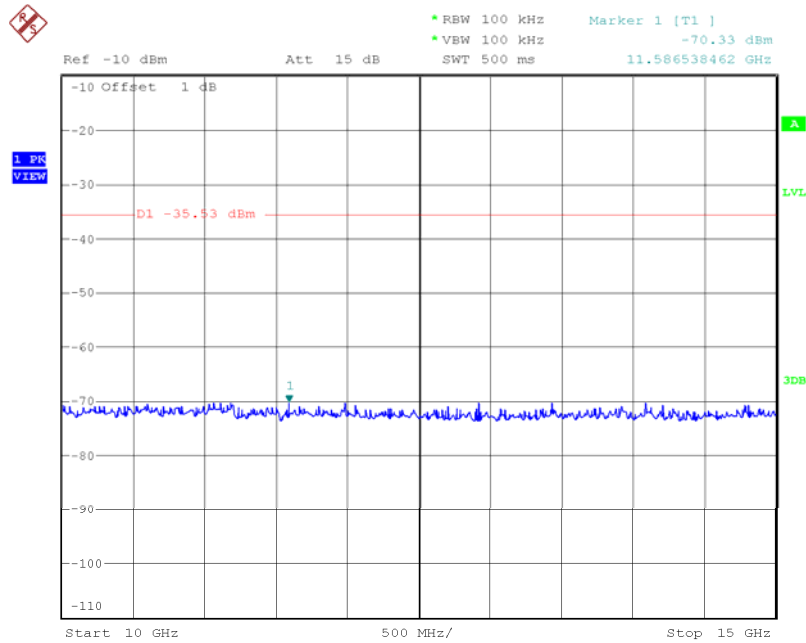
Date: 5.OCT.2009 09:45:19

5GHz ~ 10GHz Conducted Spurious Emissions Lowest Frequency & Data rate: 1Mbps



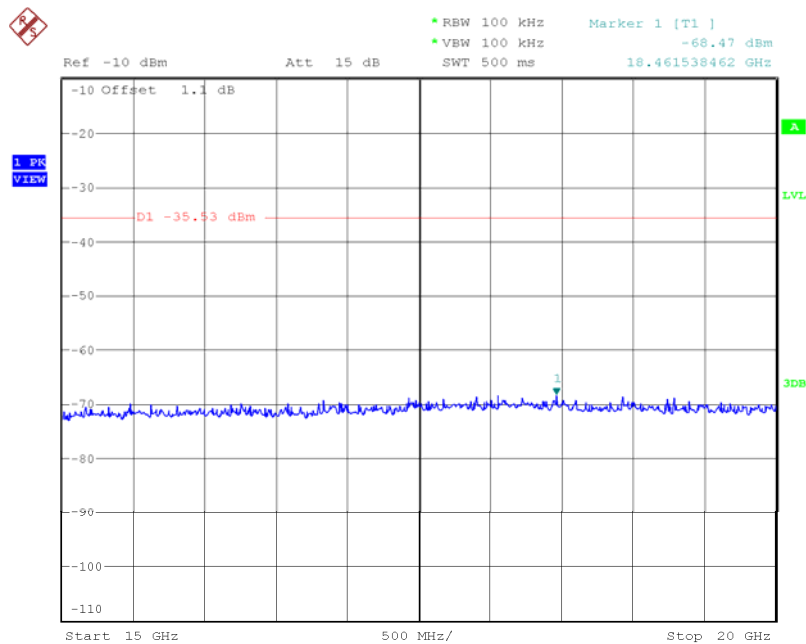
Date: 5.OCT.2009 09:46:48

10GHz ~ 15GHz Conducted Spurious Emissions Lowest Frequency & Data rate: 1Mbps



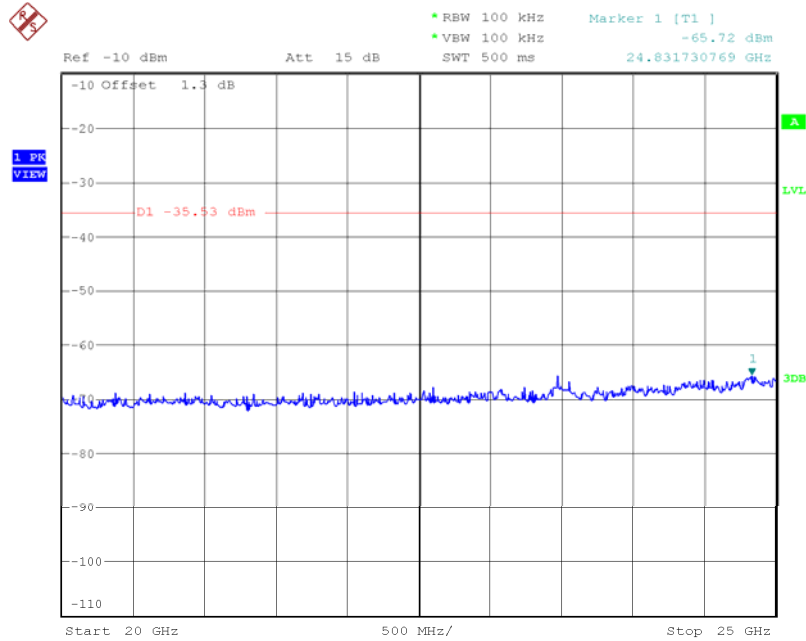
Date: 5.OCT.2009 09:48:03

15GHz ~ 20GHz Conducted Spurious Emissions Lowest Frequency & Data rate: 1Mbps



Date: 5.OCT.2009 09:49:32

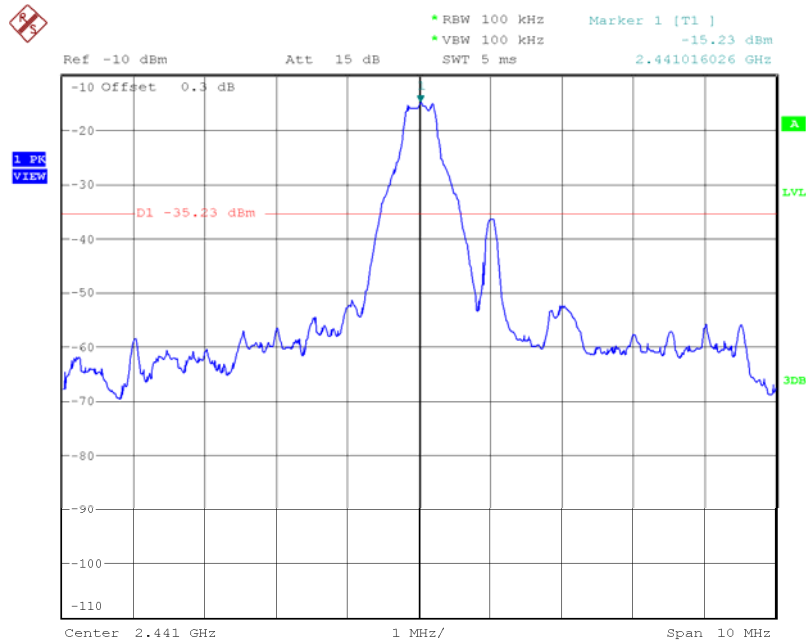
20GHz ~ 25GHz Conducted Spurious Emissions Lowest Frequency & Data rate: 1Mbps



Date: 5.OCT.2009 09:50:36

Reference for limit

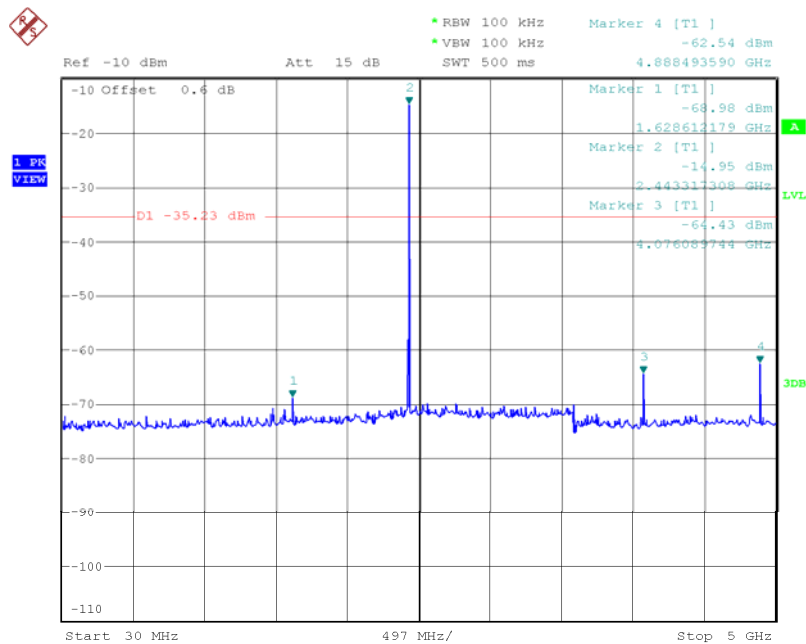
Middle Frequency & Data rate: 1Mbps



Date: 5.OCT.2009 09:53:08

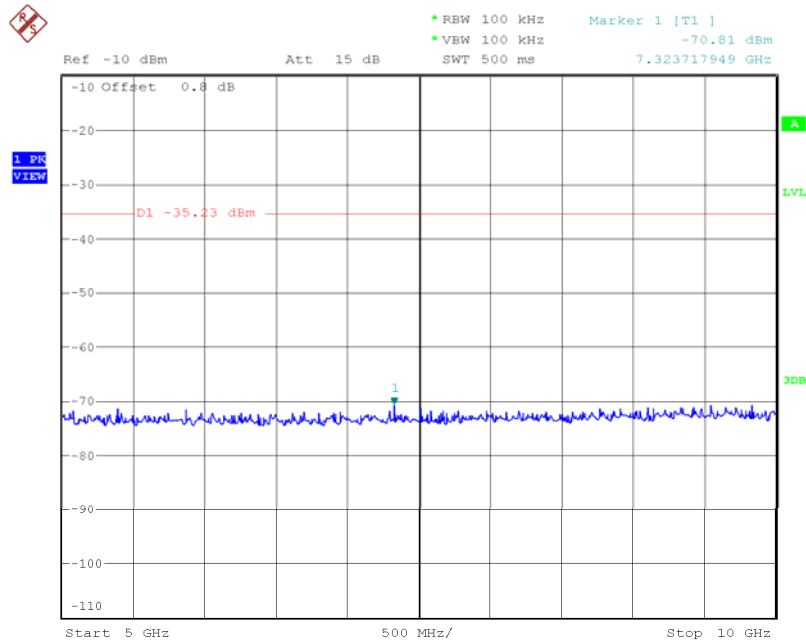
30MHz ~ 5GHz Conducted Spurious Emissions

Middle Frequency & Data rate: 1Mbps



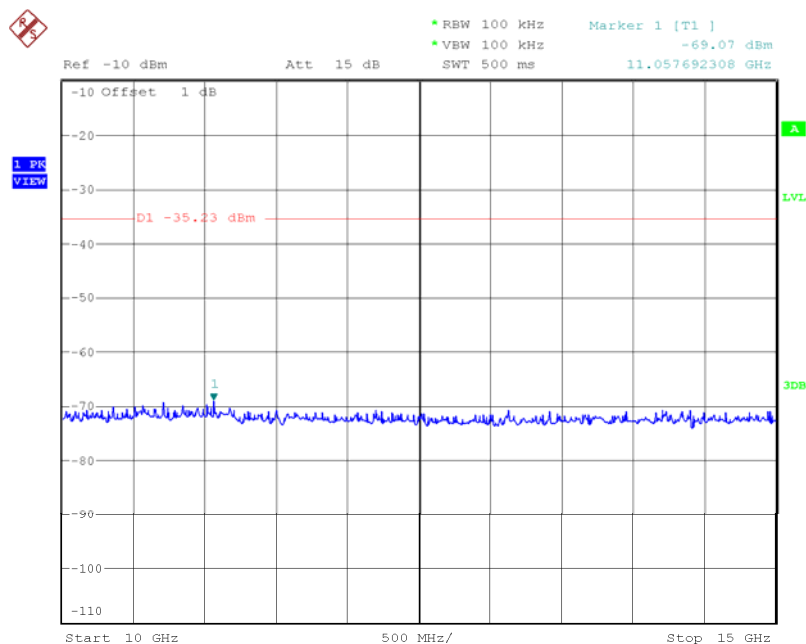
Date: 5.OCT.2009 09:54:32

5GHz ~ 10GHz Conducted Spurious Emissions Middle Frequency & Data rate: 1Mbps



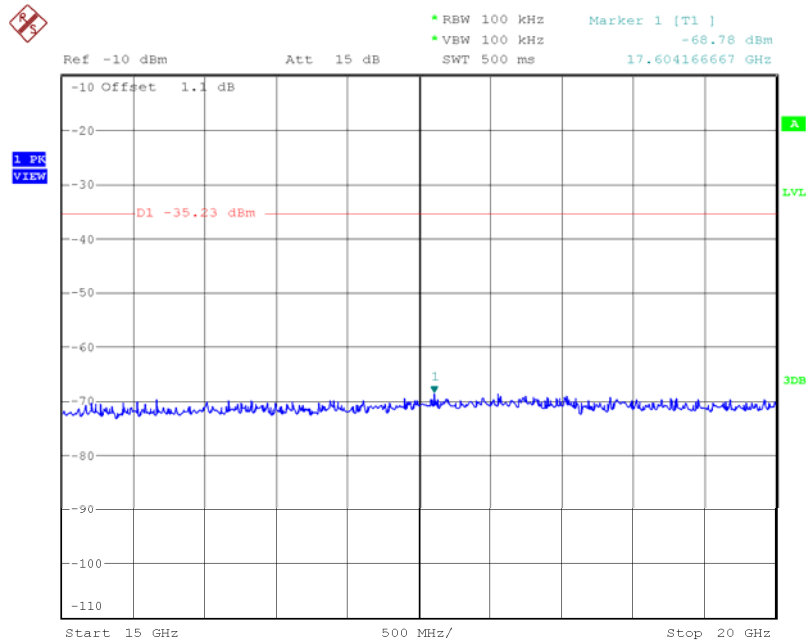
Date: 5.OCT.2009 09:56:07

10GHz ~ 15GHz Conducted Spurious Emissions Middle Frequency & Data rate: 1Mbps



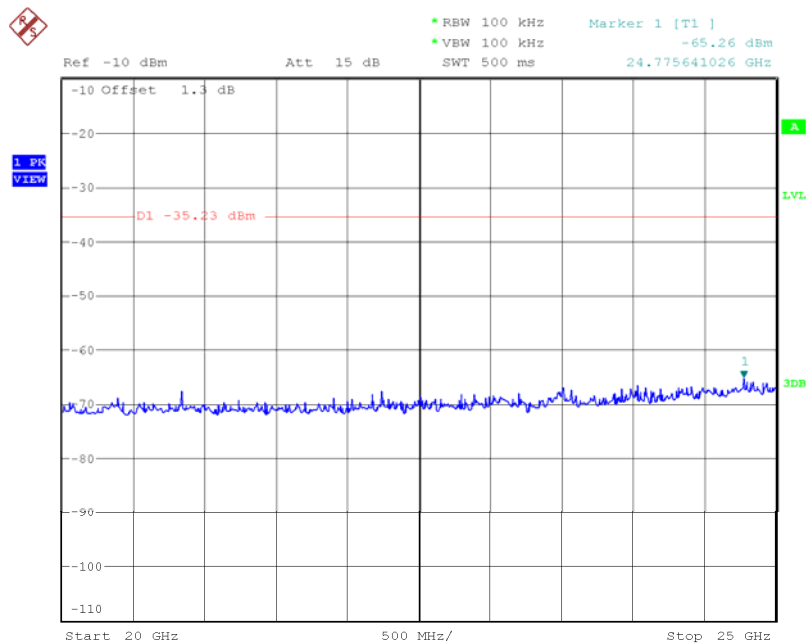
Date: 5.OCT.2009 09:59:07

15GHz ~ 20GHz Conducted Spurious Emissions Middle Frequency & Data rate: 1Mbps



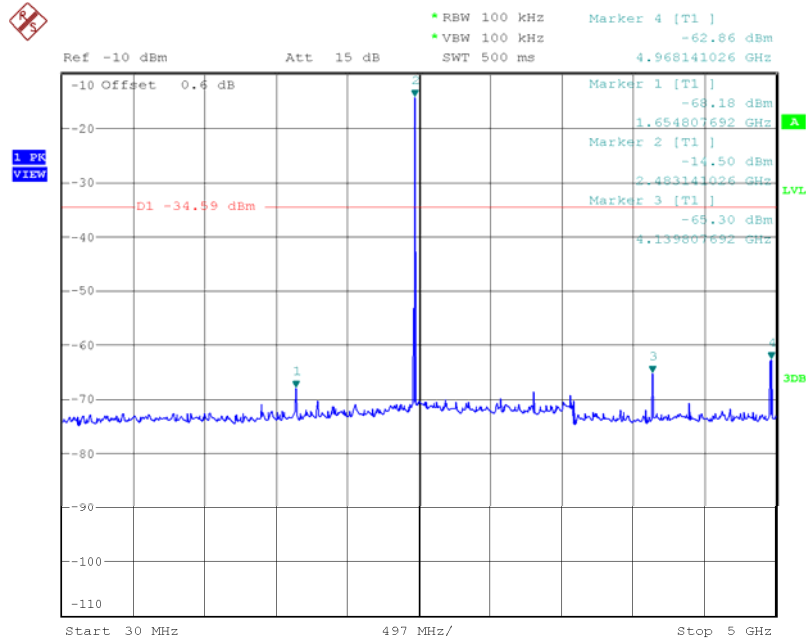
Date: 5.OCT.2009 10:00:12

20GHz ~ 25GHz Conducted Spurious Emissions Middle Frequency & Data rate: 1Mbps



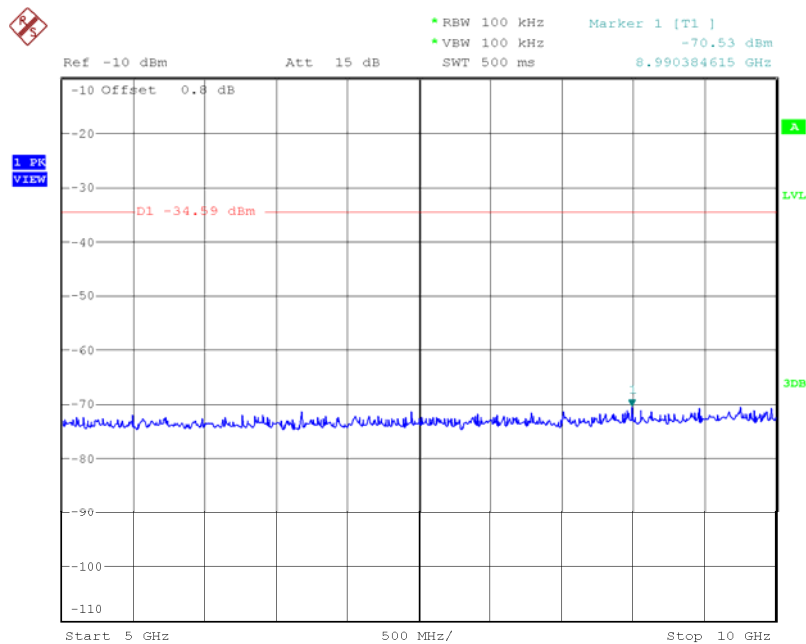
Date: 5.OCT.2009 10:01:13

30MHz ~ 5GHz Conducted Spurious Emissions Highest Frequency & Data rate: 1Mbps



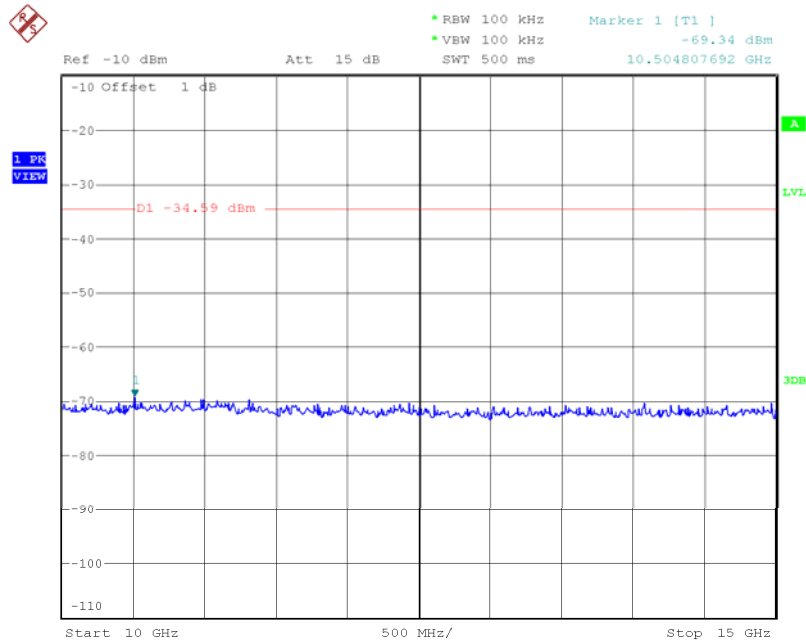
Date: 5.OCT.2009 10:07:05

5GHz ~ 10GHz Conducted Spurious Emissions Highest Frequency & Data rate: 1Mbps



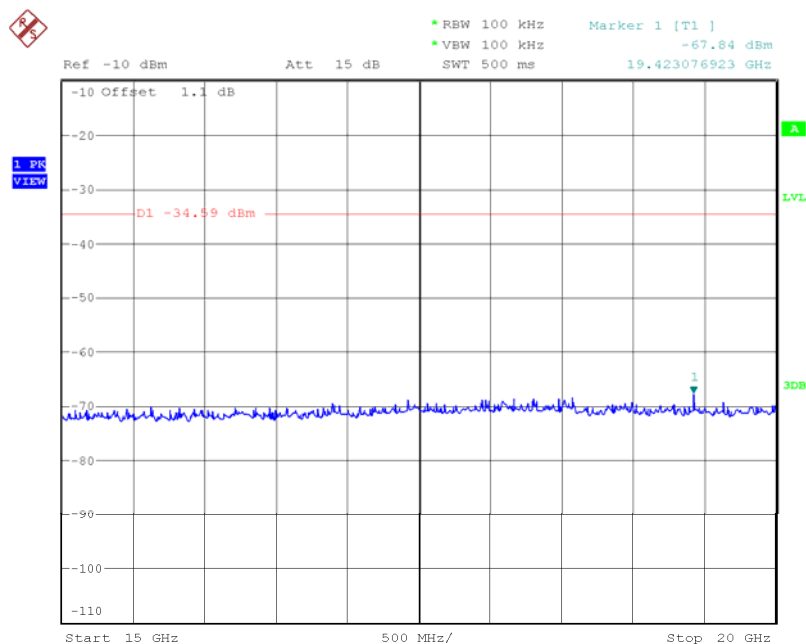
Date: 5.OCT.2009 10:10:05

10GHz ~ 15GHz Conducted Spurious Emissions Highest Frequency & Data rate: 1Mbps



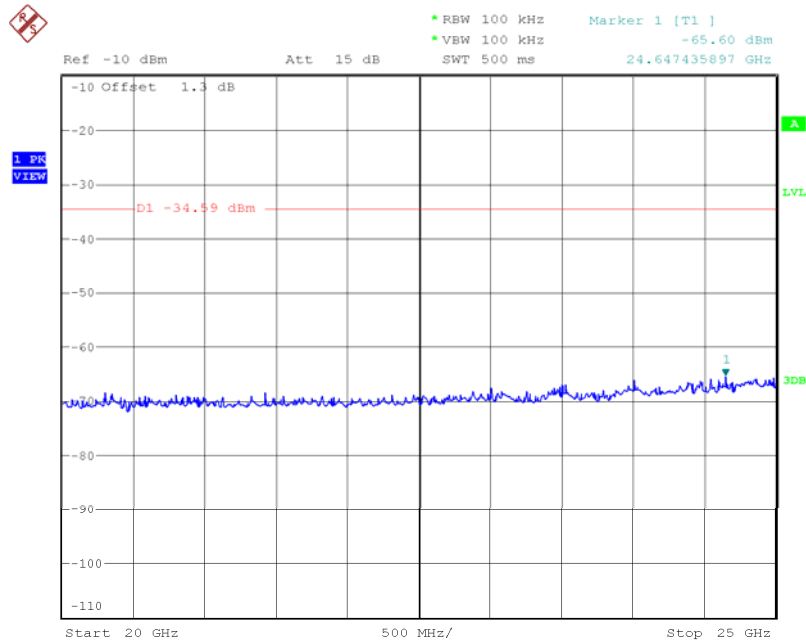
Date: 5.OCT.2009 10:11:41

15GHz ~ 20GHz Conducted Spurious Emissions Highest Frequency & Data rate: 1Mbps



Date: 5.OCT.2009 10:12:55

20GHz ~ 25GHz Conducted Spurious Emissions Highest Frequency & Data rate: 1Mbps



Date: 5.OCT.2009 10:14:10

4.2.7 Radiated Spurious Emissions

- Procedure:

The EUT was placed on a 0.8m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

The spectrum analyzer is set to:

Tested frequency = Low, Middle, High Frequencies

Frequency Range = 30 MHz ~ 10th harmonic.

RBW and VBW = 1. Frequency range: 30MHz ~ 1GHz

RBW = 120KHz / VBW = \geq RBW

2. Frequency range: 1GHz ~ 10th harmonics

Peak mode: RBW = 1MHz / VBW = \geq RBW

Average mode: RBW = 1MHz / VBW = 10Hz

Detector function = Peak

Sweep = auto

Trace = max hold

- Measurement Data: **Comply**

Note 1: See next pages for actual measured spectrum plots and data.

- Minimum Standard:

▪ FCC Part 15.209(a) and (b)

Frequency (MHz)	Limit (uV/m) @ 3m
30 ~ 88	100 **
88 ~ 216	150 **
216 ~ 960	200 **
Above 960	500

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

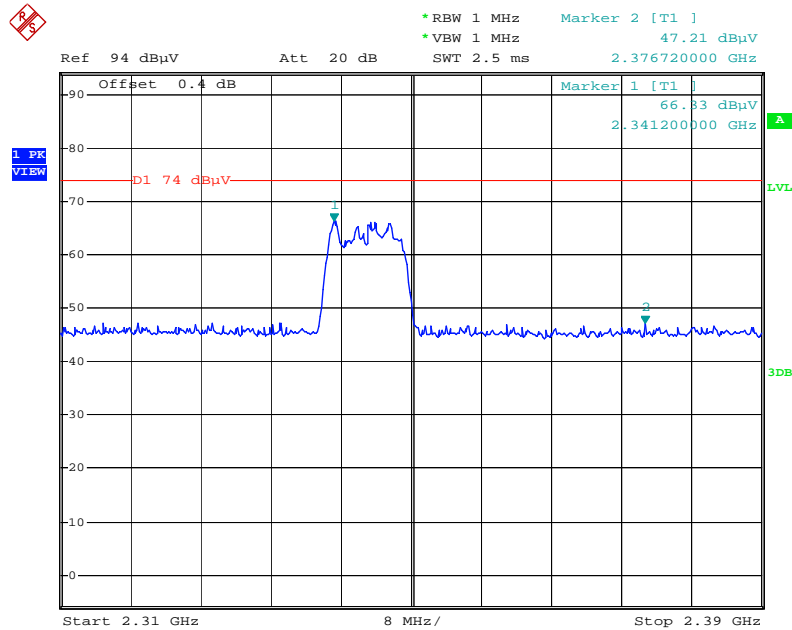
▪ FCC Part 15.205 (a): Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	3600 ~ 4400	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	4.5 ~ 5.15	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~ 12.52025	149.9 ~ 150.05	1645.5 ~ 1646.5	5.35 ~ 5.46	17.7 ~ 21.4
4.125 ~ 4.128	12.57675 ~ 12.57725	156.52475 ~ 156.52525	1660 ~ 1710	7.25 ~ 7.75	22.01 ~ 23.12
4.17725 ~ 4.17775	13.36 ~ 13.41	156.7 ~ 156.9	1718.8 ~ 1722.2	8.025 ~ 8.5	23.6 ~ 24.0
4.20725 ~ 4.20775	16.42 ~ 16.423	162.0125 ~ 167.17	2200 ~ 2300	9.0 ~ 9.2	31.2 ~ 31.8
6.215 ~ 6.218	16.69475 ~ 16.69525	167.72 ~ 173.2	2310 ~ 2390	9.3 ~ 9.5	36.43 ~ 36.5
6.26775 ~ 6.26825	16.80425 ~ 16.80475	240 ~ 285	2483.5 ~ 2500	10.6 ~ 12.7	Above 38.6
6.31175 ~ 6.31225	25.5 ~ 25.67	322 ~ 335.4	2655 ~ 2900	13.25 ~ 13.4	
8.291 ~ 8.294	37.5 ~ 38.25	399.90 ~ 410	3260 ~ 3267		
8.362 ~ 8.366	73 ~ 74.6	608 ~ 614	3332 ~ 3339		
8.37625 ~ 8.38675	74.8 ~ 75.2	960 ~ 1240	3345.8 ~ 3358		

▪ **FCC Part 15.205(b):** The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

Restricted Band Edge Lowest Frequency & Data rate: 1Mbps

Peak mode / Horizontal polarization

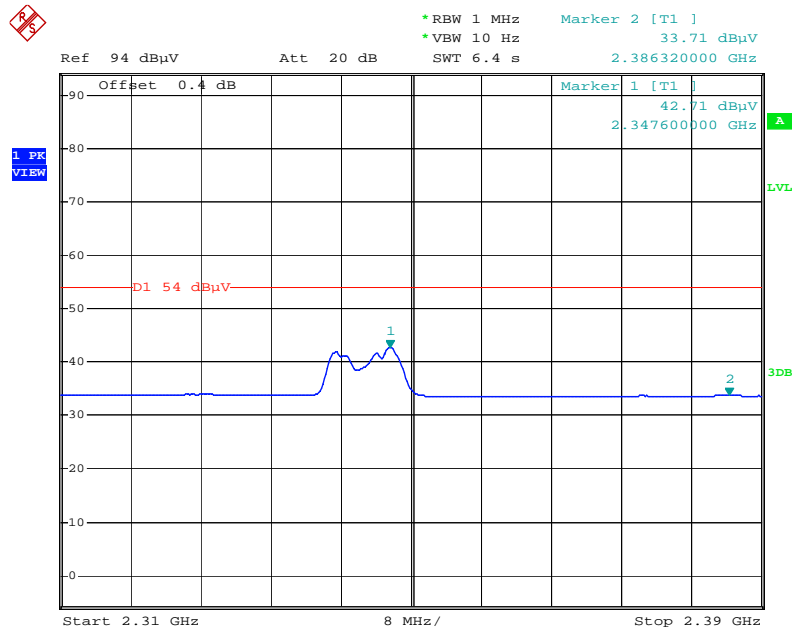


Date: 22.SEP.2009 04:28:33

Marker 1's emissions of the low band edge test plots are emissions from WIMAX downlink signal in Korea.

Restricted Band Edge Lowest Frequency & Data rate: 1Mbps

Average mode / Horizontal polarization

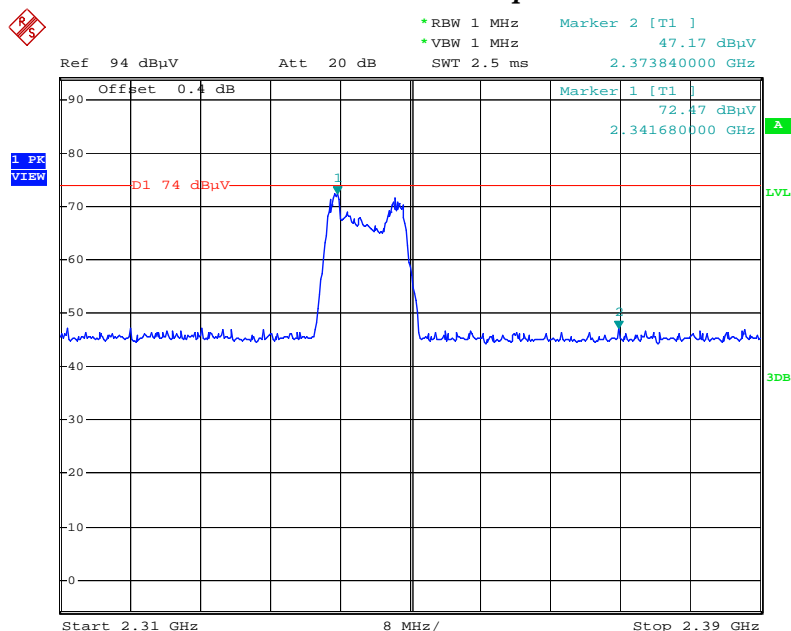


Date: 22.SEP.2009 04:30:06

Marker 1's emissions of the low band edge test plots are emissions from WIMAX downlink signal in Korea.

Restricted Band Edge Lowest Frequency & Data rate: 1Mbps

Peak mode / Vertical polarization

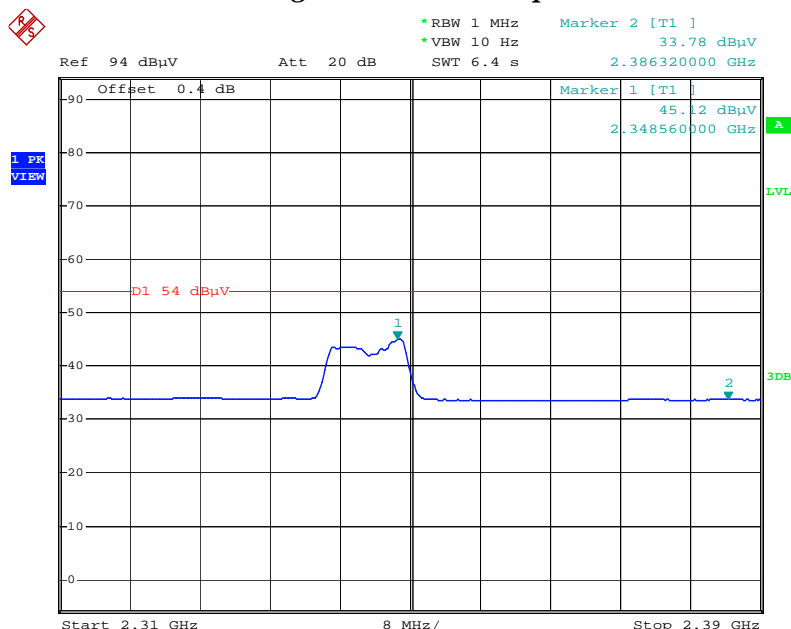


Date: 22.SEP.2009 04:20:27

Marker 1's emissions of the low band edge test plots are emissions from WIMAX downlink signal in Korea.

Restricted Band Edge Lowest Frequency & Data rate: 1Mbps

Average mode / Vertical polarization

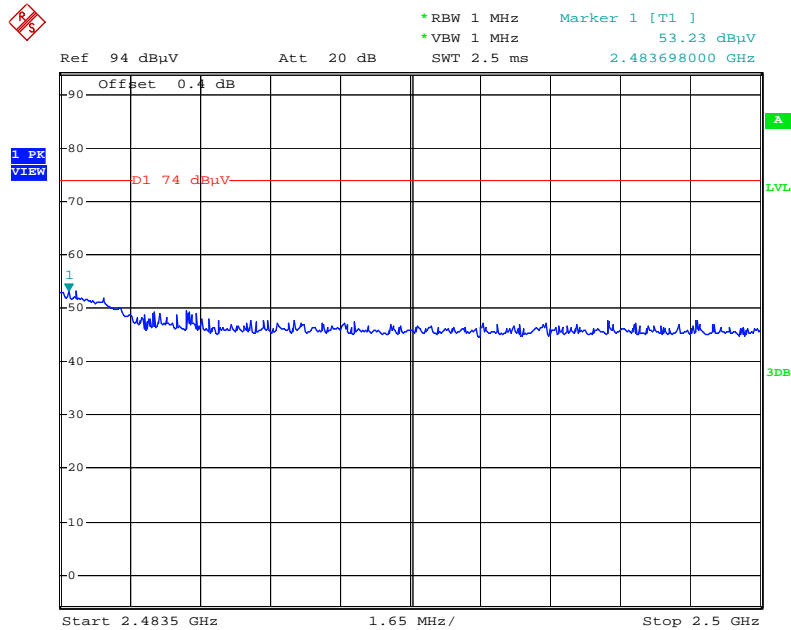


Date: 22.SEP.2009 04:22:07

Marker 1's emissions of the low band edge test plots are emissions from WIMAX downlink signal in Korea.

Restricted Band Edge Highest Frequency & Data rate: 1Mbps

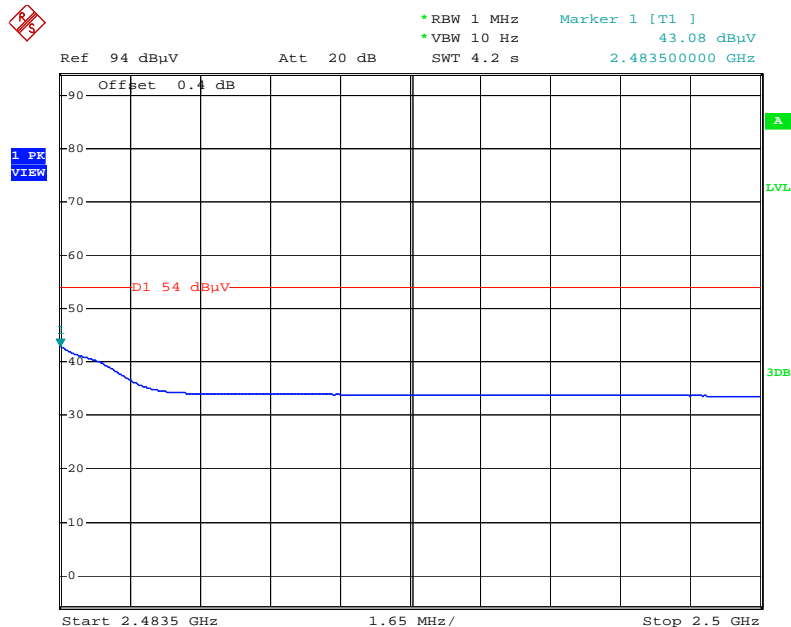
Peak mode / Horizontal polarization



Date: 22.SEP.2009 02:00:34

Restricted Band Edge Highest Frequency & Data rate: 1Mbps

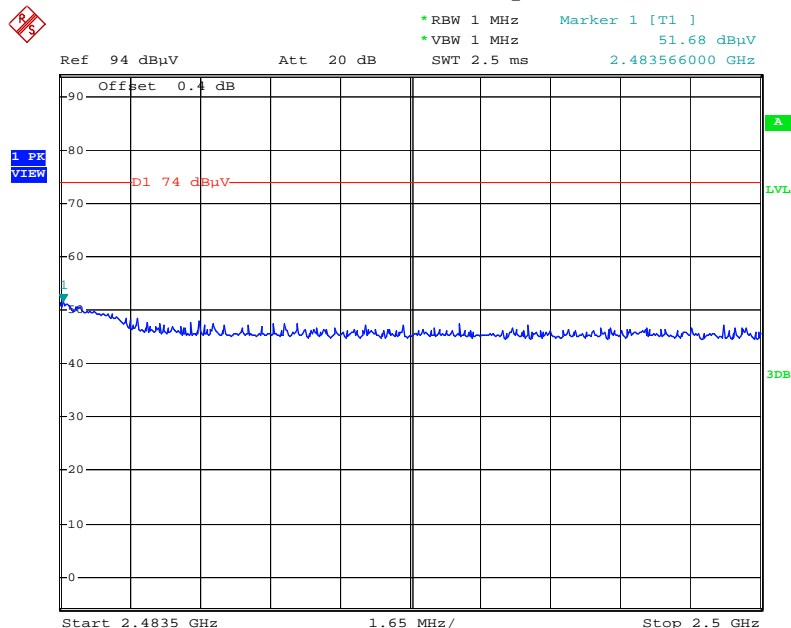
Average mode / Horizontal polarization



Date: 22.SEP.2009 02:01:27

Restricted Band Edge Highest Frequency & Data rate: 1Mbps

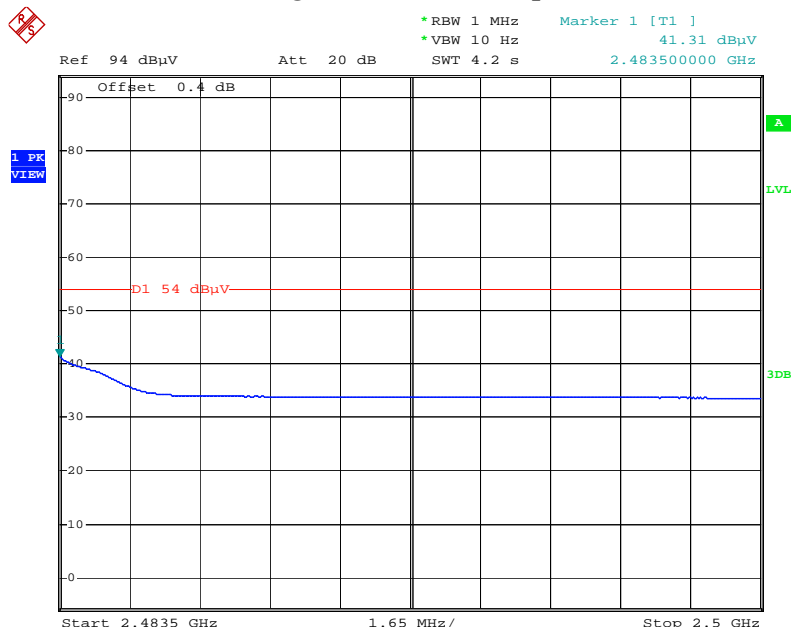
Peak mode / Vertical polarization



Date: 22.SEP.2009 01:55:41

Restricted Band Edge Highest Frequency & Data rate: 1Mbps

Average mode / Vertical polarization



Date: 22.SEP.2009 01:56:27

30MHz ~ 1GHz Radiated Spurious Emissions

Lowest Frequency & Data rate: 1Mbps



RADIATED EMISSION

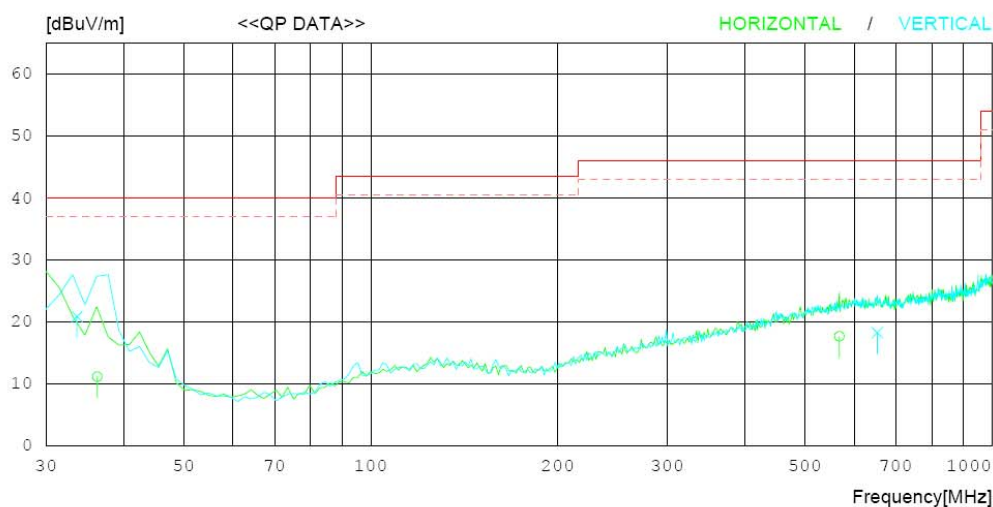
Date : 2009-09-24

Model Name : WB130
Model No. :
Serial No. : Identical prototype
Test Condition : TX: 2402MHz

Reference No. :
Power Supply : 3.7V
Temp/Humi : 24'C 39%
Operator : D.C.CHA

Memo :

LIMIT : FCC Part15 Subpart.B Class B (3m)
MARGIN: 3 dB



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	36.296	17.7	15.0	0.9	22.4	11.2	40.0	28.8	201	2
2	567.841	19.3	18.8	3.9	24.3	17.7	46.0	28.3	201	169
----- Vertical -----										
3	33.660	26.3	16.1	0.9	22.4	20.9	40.0	19.1	100	1
4	653.480	19.3	19.0	4.1	24.1	18.3	46.0	27.7	400	102

30MHz ~ 1GHz Radiated Spurious Emissions

Middle Frequency & Data rate: 1Mbps



RADIATED EMISSION

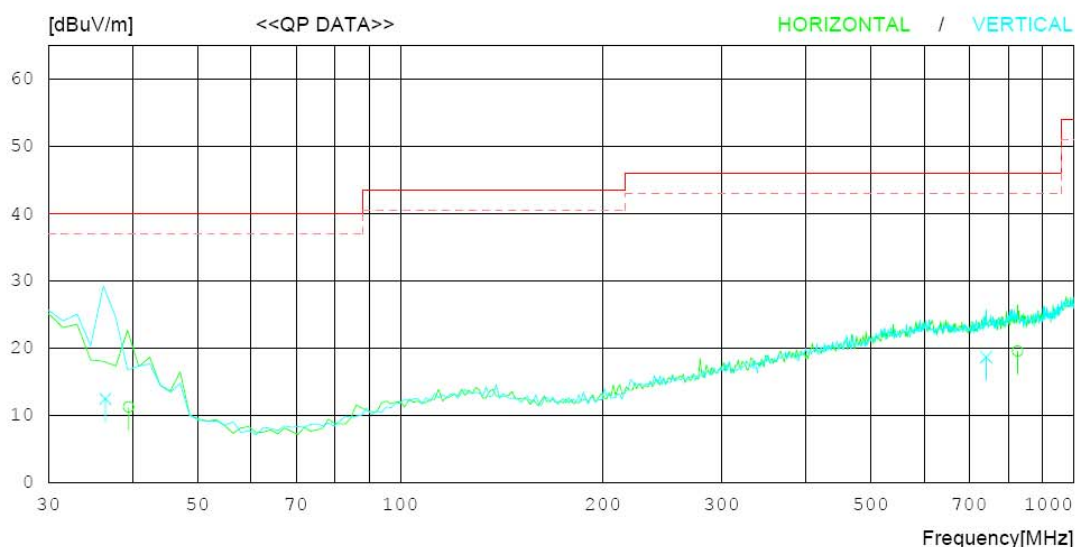
Date : 2009-09-24

Model Name : WB130
Model No. :
Serial No. : Identical prototype
Test Condition : TX: 2441MHz

Reference No. :
Power Supply : 3.7V
Temp/Humi : 24°C 39%
Operator : D.C.CHA

Memo :

LIMIT : FCC Part15 Subpart.B Class B (3m)
MARGIN: 3 dB



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	39.472	18.8	14.0	0.9	22.4	11.3	40.0	28.7	400	1
2	825.983	18.5	19.7	4.7	23.3	19.6	46.0	26.4	301	284
----- Vertical -----										
3	36.459	19.0	15.0	0.9	22.4	12.5	40.0	27.5	100	1
4	741.694	18.9	19.1	4.4	23.7	18.7	46.0	27.3	199	240

30MHz ~ 1GHz Radiated Spurious Emissions

Highest Frequency & Data rate: 1Mbps



RADIATED EMISSION

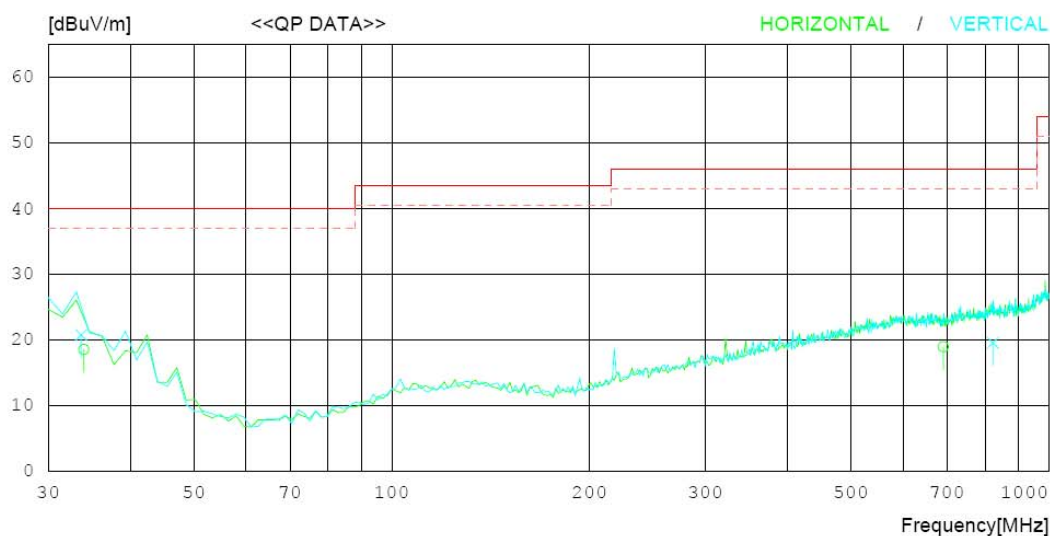
Date : 2009-09-24

Model Name : WB130
Model No. :
Serial No. : Identical prototype
Test Condition : TX: 2480MHz

Reference No. :
Power Supply : 3.7V
Temp/Humi : 24'C 39%
Operator : D.C.CHA

Memo :

LIMIT : FCC Part15 Subpart.B Class B (3m)
MARGIN: 3 dB



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	33.987	24.1	16.0	0.9	22.4	18.6	40.0	21.4	100	26
2	691.258	20.0	18.8	4.2	24.0	19.0	46.0	27.0	199	0
----- Vertical -----										
3	33.682	26.2	16.1	0.9	22.4	20.8	40.0	19.2	100	358
4	822.148	18.5	19.7	4.7	23.3	19.6	46.0	26.4	400	1

1GHz ~ 25GHz Radiated Spurious Emissions

▪ Lowest Frequency & Data rate: 1Mbps

Frequency (MHz)	ANT Pol	Reading(dBuV)		T.F (dB)	Result(dBuV/m)		Limit(dBuV/m)		Margin(dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
4804	H	50.43	38.69	7.27	57.70	45.96	74.00	54.00	16.30	8.04
4804	V	50.26	38.10	7.27	57.53	45.37	74.00	54.00	16.47	8.63
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ Middle Frequency & Data rate: 1Mbps

Frequency (MHz)	ANT Pol	Reading(dBuV)		T.F (dB)	Result(dBuV/m)		Limit(dBuV/m)		Margin(dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
4882	H	50.52	42.01	7.65	58.17	49.66	74.00	54.00	15.83	4.34
4882	V	50.10	40.75	7.65	57.75	48.40	74.00	54.00	16.25	5.60
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

▪ Highest Frequency & Data rate: 1Mbps

Frequency (MHz)	ANT Pol	Reading(dBuV)		T.F (dB)	Result(dBuV/m)		Limit(dBuV/m)		Margin(dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
4960	H	52.09	43.92	7.96	60.05	51.88	74.00	54.00	13.95	2.12
4960	V	49.65	40.85	7.96	57.61	48.81	74.00	54.00	16.39	5.19
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-

Note.

1. No other spurious and harmonic emissions were detected at a level greater than 20dB below limit.
2. Sample Calculation.

$$\text{Margin} = \text{Limit} - \text{Result} \quad / \quad \text{Result} = \text{Reading} + \text{T.F} \quad / \quad \text{T.F} = \text{AF} + \text{CL} - \text{AG}$$

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

4.2.8 AC Line Conducted Emissions

- Procedure:

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its hopping function disabled at the middle channels in line with Section 15.31(m). Emissions closest to the limit are measured in the quasi-peak and average detector mode with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

- Measurement Data: **NA**

Note: When this device is in the charging mode, the Bluetooth function is disabled.

- Minimum Standard: FCC Part 15.207(a)/EN 55022

Frequency Range (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

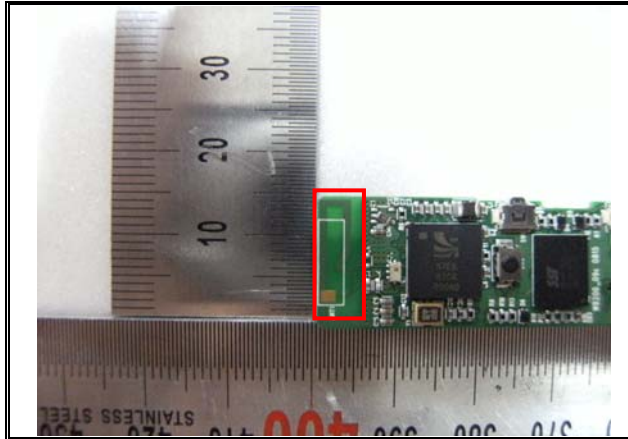
* Decreases with the logarithm of the frequency

4.2.9 Antenna Requirements

- Procedure:

Describe how the EUT complies with the requirement that either its antenna is permanently attached, or that it employs a unique antenna connector, for every antenna proposed for use with the EUT.

- Conclusion: **Comply**



- Minimum Standard:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions.

APPENDIX

TEST EQUIPMENT FOR TESTS

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment.

	Type	Manufacturer	Model	Cal.Due.Date (dd/mm/yy)	Next.Due.Date (dd/mm/yy)	S/N
<input type="checkbox"/>	Spectrum Analyzer	Agilent	E4440A	25/09/09	25/09/10	MY45304199
<input checked="" type="checkbox"/>	Spectrum Analyzer	Rohde Schwarz	FSQ26	05/06/09	05/06/10	200445
<input type="checkbox"/>	Spectrum Analyzer(RE)	H.P	8563E	13/10/09	13/10/10	3551A04634
<input type="checkbox"/>	Power Meter	H.P	EMP-442A	02/07/09	02/07/10	GB37170413
<input type="checkbox"/>	Power Sensor	H.P	8481A	02/07/09	02/07/10	3318A96332
<input type="checkbox"/>	Power Divider	Agilent	11636B	13/10/09	13/10/10	56471
<input type="checkbox"/>	Power Splitter	Anritsu	K241B	13/10/09	13/10/10	20611
<input type="checkbox"/>	Power Splitter	Anritsu	K241B	02/07/09	02/07/10	017060
<input type="checkbox"/>	Frequency Counter	H.P	5342A	13/07/09	13/07/10	2119A04450
<input type="checkbox"/>	TEMP & HUMIDITY Chamber	JISCO	KR-100/J-RHC2	10/10/09	10/10/10	30604493/021031
<input checked="" type="checkbox"/>	Digital Multimeter	H.P	34401A	13/03/09	13/03/10	3146A13475, US36122178
<input type="checkbox"/>	Multifunction Synthesizer	HP	8904A	06/10/09	06/10/10	3633A08404
<input checked="" type="checkbox"/>	Signal Generator	Rohde Schwarz	SMR20	13/03/09	13/03/10	101251
<input checked="" type="checkbox"/>	Signal Generator	H.P	ESG-3000A	02/07/09	02/07/10	US37230529
<input type="checkbox"/>	Vector Signal Generator	Rohde Schwarz	SMJ100A	02/02/09	02/02/10	100148
<input type="checkbox"/>	Audio Analyzer	H.P	8903B	02/07/09	02/07/10	3011A09448
<input type="checkbox"/>	Modulation Analyzer	H.P	8901B	02/07/09	02/07/10	3028A03029
<input type="checkbox"/>	8960 Series 10 Wireless Comms. Test Set	Agilent	E5515C	02/07/09	02/07/10	GB43461134
<input type="checkbox"/>	Universal Radio communication Tester	Rohde Schwarz	CMU 200	19/05/09	19/05/10	106760
<input type="checkbox"/>	Bluetooth Tester	TESCOM	TC-3000B	02/07/09	02/07/10	3000B000268
<input type="checkbox"/>	Thermo hygrometer	BODYCOM	BJ5478	06/02/09	06/02/10	090205-3
<input checked="" type="checkbox"/>	Thermo hygrometer	BODYCOM	BJ5478	06/02/09	06/02/10	090205-2
<input type="checkbox"/>	Thermo hygrometer	BODYCOM	BJ5478	06/02/09	06/02/10	090205-4
<input type="checkbox"/>	AC Power supply	DAEKWANG	5KVA	13/03/09	13/03/10	20060321-1
<input checked="" type="checkbox"/>	DC Power Supply	HP	6622A	13/03/09	13/03/10	3448A03760
<input type="checkbox"/>	DC Power Supply	HP	6633A	13/03/09	13/03/10	3524A06634
<input type="checkbox"/>	BAND Reject Filter	Microwave Circuits	N0308372	06/10/09	06/10/10	3125-01DC0352
<input type="checkbox"/>	BAND Reject Filter	Wainwright	WRCG1750	06/10/09	06/10/10	2
<input type="checkbox"/>	High-Pass Filter	ANRITSU	MP526D	06/10/09	06/10/10	M27756
<input type="checkbox"/>	High-pass filter	Wainwright	WHKX2.1	N/A	N/A	1
<input checked="" type="checkbox"/>	High-Pass Filter	Wainwright	WHKX3.0	N/A	N/A	9
<input type="checkbox"/>	Tunable Notch Filter	Wainwright	WRCT800.0 /960.0-0.2/40-8SSK	N/A	N/A	10
<input type="checkbox"/>	Tunable Notch Filter	Wainwright	WRCD1700.0 /2000.0-0.2/40-10SSK	N/A	N/A	27
<input type="checkbox"/>	Tunable Notch Filter	Wainwright	WRCT1900.0 /2200.0-5/40-10SSK	N/A	N/A	7
<input checked="" type="checkbox"/>	HORN ANT	ETS	3115	17/06/09	17/06/10	6419
<input type="checkbox"/>	HORN ANT	ETS	3115	23/09/09	23/09/10	21097
<input type="checkbox"/>	HORN ANT	A.H.Systems	SAS-574	10/06/09	10/06/10	154
<input type="checkbox"/>	HORN ANT	A.H.Systems	SAS-574	10/06/09	10/06/10	155

	Type	Manufacturer	Model	Cal.Due.Date (dd/mm/yy)	Next.Due.Date (dd/mm/yy)	S/N
<input type="checkbox"/>	Dipole Antenna	Schwarzbeck	VHA9103	06/10/09	06/10/10	2116
<input type="checkbox"/>	Dipole Antenna	Schwarzbeck	VHA9103	06/10/09	06/10/10	2117
<input type="checkbox"/>	Dipole Antenna	Schwarzbeck	UHA9105	05/10/09	05/10/10	2261
<input type="checkbox"/>	Dipole Antenna	Schwarzbeck	UHA9105	05/10/09	05/10/10	2262
<input type="checkbox"/>	LOOP Antenna	ETS	6502	14/09/09	14/09/10	3471
<input type="checkbox"/>	Coaxial Fixed Attenuators	Agilent	8491B	02/07/09	02/07/10	MY39260700
<input type="checkbox"/>	Coaxial Fixed Attenuators	Agilent	8491B	02/07/09	02/07/10	MY39260699
<input type="checkbox"/>	Attenuator (10dB)	WEINSCHTEL	23-10-34	01/10/09	01/10/10	BP4386
<input type="checkbox"/>	Attenuator (10dB)	WEINSCHTEL	23-10-34	19/01/09	19/01/10	BP4387
<input type="checkbox"/>	Attenuator (20dB)	WEINSCHTEL	86-20-11	06/10/09	06/10/10	432
<input type="checkbox"/>	Attenuator (10dB)	WEINSCHTEL	31696	06/10/09	06/10/10	446
<input type="checkbox"/>	Attenuator (10dB)	WEINSCHTEL	31696	06/10/09	06/10/10	408
<input type="checkbox"/>	Attenuator (40dB)	WEINSCHTEL	57-40-33	01/10/09	01/10/10	NN837
<input type="checkbox"/>	Attenuator (30dB)	JFW	50FH-030-300	13/03/09	13/03/10	060320-1
<input type="checkbox"/>	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0088CAN	02/07/09	02/07/10	788
<input type="checkbox"/>	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0185CAN	02/07/09	02/07/10	790
<input type="checkbox"/>	Type N Coaxial CIRCULATOR	NOVA MICROWAVE	0215CAN	02/07/09	02/07/10	112
<input checked="" type="checkbox"/>	Amplifier (30dB)	Agilent	8449B	10/10/09	10/10/10	3008A01590
<input type="checkbox"/>	Amplifier	EMPOWER	BBS3Q7ELU	02/02/09	02/02/10	1020
<input type="checkbox"/>	RF Power Amplifier	OPHIRRF	5069F	02/07/09	02/07/10	1006
<input checked="" type="checkbox"/>	EMI TEST RECEIVER	R&S	ESU	02/02/09	02/02/10	100014
<input checked="" type="checkbox"/>	BILOG ANTENNA	SCHAFFNER	CBL6112B	02/06/09	02/06/10	2737
<input checked="" type="checkbox"/>	Amplifier (22dB)	H.P	8447E	05/02/09	05/02/10	2945A02865
<input type="checkbox"/>	EMI TEST RECEIVER	R&S	ESCI	12/05/09	12/05/10	100364
<input type="checkbox"/>	LOG-PERIODIC ANT.	Schwarzbeck	UHALP9108A	30/05/09	30/05/10	590
<input type="checkbox"/>	BICONICAL ANT.	Schwarzbeck	VHA 9103	02/06/09	02/06/10	2233
<input type="checkbox"/>	LOG-PERIODIC ANT.	Schwarzbeck	UHALP9108A1	07/10/09	07/10/10	1098
<input type="checkbox"/>	BICONICAL ANT.	Schwarzbeck	VHA 9103	06/10/09	06/10/10	91031946
<input type="checkbox"/>	Low Noise Pre Amplifier	TSJ	MLA-100K01-B01-2	13/03/09	13/03/10	1252741
<input checked="" type="checkbox"/>	Amplifier (25dB)	Agilent	8447D	12/05/09	12/05/10	2944A10144
<input type="checkbox"/>	Amplifier (25dB)	Agilent	8447D	03/07/09	03/07/10	2648A04922
<input type="checkbox"/>	Spectrum Analyzer(CE)	H.P	8591E	26/04/09	26/04/10	3649A05889
<input type="checkbox"/>	LISN	Kyoritsu	KNW-407	03/07/09	03/07/10	8-317-8
<input type="checkbox"/>	LISN	Kyoritsu	KNW-242	13/10/09	13/10/10	8-654-15
<input type="checkbox"/>	CVCF	NF Electronic	4420	13/03/09	13/03/10	304935/337980
<input type="checkbox"/>	DC BLOCK	Hyuplip	KEL-007	N/A	N/A	7-1581-5
<input type="checkbox"/>	50 ohm Terminator	HME	CT-01	22/01/09	22/01/10	N/A
<input type="checkbox"/>	RFI/FIELD Intensity Meter	Kyoritsu	KNM-2402	03/07/09	03/07/10	4N-170-3