

FCC Test Report

(TR-1307-061-01)

Applicant : GP Electronics (HK) Ltd.

Address : 6/F Gold Peak Building, 30 Kwai Wing Road, Kwai Chung,
N.T., HK

Manufacturer : GP Electronics (Huizhou) Co. Ltd.

Address : No.76, Hui Feng Si Road, Zhong Kai Hi-Tech Industrial
Development Zone, Huizhou, Guangdong, P.R.China 516006

Product Name : Active Speaker

Trademark : KEF

Model(s) : X300A Wireless

Standard(s) : FCC Part 15 Subpart C

Test Result : Pass

Date of Test : Jun 22, 2013 to Aug 12, 2013

Report issued Dated : Aug 15, 2013

The report shall not be reproduced except in full, without the written approval of the TDK EMC Center.

The results in this report apply only to the sample(s) tested. The production units are required to conform to the initial sample as received when the units are placed in the market.

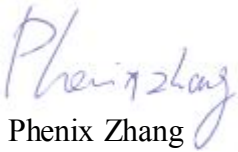

Responsible Engineer	:		Approved by	:	
		Phenix Zhang	Technical manager		CHAN king-chui
Date	:	2013.08.15	Date	:	2013.08.15

Table of Contents

Description	Page
1.Description of the Test Site.....	3
1.1 Test Site Location:.....	3
1.2 Site Registration.....	3
1.3 Test Scope.....	3
2.Description of the Tested Samples.....	4
2.1 Customer Information.....	4
2.2 Identification of EUT.....	4
2.3 Spec of EUT.....	4
2.4 Test Standards List.....	4
3. Test Specifications.....	5
3.1 Standard(s) Used.....	5
3.2 Test Mode.....	5
3.3 Deviations from the Test Specification.....	5
4. Test Result.....	6
4.1 Antenna Requirement.....	6
4.2 Conducted Emission (mains).....	7
4.3 Maximum Peak Output Power.....	10
4.4 Band Edges Emission.....	15
4.5 6dB BANDWIDTH.....	27
4.6 Power Spectral Density.....	32
4.7 Spurious Radiated Emission.....	37
5. Test Setup.....	65
5.1 Ancillary and Accessory Equipment Used.....	65
5.2 Photographs of the Test Configuration.....	66
5.3 Photographs of the EUT.....	68
6. Equipment List.....	70
7. Test Uncertainty.....	71
8. Appendix.....	71
8.1 Confirmation of Compliance within the Limits.....	71

1. Description of the Test Site

1.1 Test Site Location:

Laboratory : TDK South China EMC Center
SAE Technologies Development (Dongguan) Co.,
Ltd. Changan Branch
Address : Zhenan Hi-tech Industrial Park, Dongguan City,
Guangdong Province, China
Phone no. : (86)-769-8564-4678
Fax no. : (86)-769-8564-4499
Email : emc@cn.tdk.com

1.2 Site Registration

VCCI (November 2011) : Reg. No. R-4814, C-3733,
G-473, T-1212
FCC site registration (August 2011) : Reg. No. 732901
IC registration (January,2011) : Reg. No. 0993A
CNAS (August 2010) : Reg. No. L4677

1.3 Test Scope

EMC and RF testing according to national / international standards

2. Description of the Tested Samples

2.1 Customer Information

Customer : GP Electronics (HK) Ltd.
Address : 6/F Gold Peak Building, 30 Kwai Wing Road, Kwai Chung,
N.T., HK
Phone no. : None
Fax no. : None

2.2 Identification of EUT

Trademark : KEF
Model(s) No. : X300A Wireless
Serial No. : None

2.3 Spec of EUT

Description of Antenna : fixed, built-in antenna, 3.7dBi
Power Supply : 100-120V 50/60Hz
Operation Frequency : 2412 MHz ~ 2462 MHz
Number of Channels : 11
Modulation : DSSS(BPSK / QPSK / CCK) for IEEE 802.11b ;
OFDM(BPSK/QPSK/16QAM/64QAM) for IEEE 802.11g
Data Rate : IEEE 802.11b: 11Mbps Max.
IEEE 802.11g: 54Mbps Max.

2.4 Test Standards List

FCC Part 15 (2012)
RADIO FREQUENCY DEVICES
FCC KDB558074 D01 v03
Guidance for Performing Compliance Measurements on Digital Transmission Systems
(DTS) Operating Under §15.247

3. Test Specifications

3.1 Standard(s) Used

FCC Rules	Description Of Test	Result
15.203/15.247(b)	Antenna Requirement	Pass
15.207	Conducted Emission	Pass
15.247(b)(3)	Maximum Peak Output Power	Pass
15.247(d)	Band Edges Emission	Pass
15.247(a)(2)	6 dB Bandwidth	Pass
15.247(e)	Power Spectral Density	Pass
15.247(d)	Spurious Radiated Emission	Pass

3.2 Test Mode

The EUT has been tested under operating condition.

Software used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

IEEE 802.11b: Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 11Mbps data rate (worst case) are chosen for the final testing.

IEEE 802.11g: Channel 1(2412MHz), Channel 6(2437MHz) and Channel 11(2462MHz) with 54Mbps data rate (worst case) are chosen for the final testing.

EUT has two same antennas. They have the same configuration and gain. The chip will detect which signal of receiving is higher and then choose that one. The two antennas has same input power from the chip and cannot be operated at the same time. The CON1 has been chose for all tests.

3.3 Deviations from the Test Specification

N/A

4. Test Result

4.1 Antenna Requirement

4.1.1 Standard Applicable

Section 15.203:

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 of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna James or electrical connector is prohibited.

Section 15.247(b):

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.1.2 Antenna Connected Construction

The antenna connector is designed with permanent attachment and no consideration of replacement.

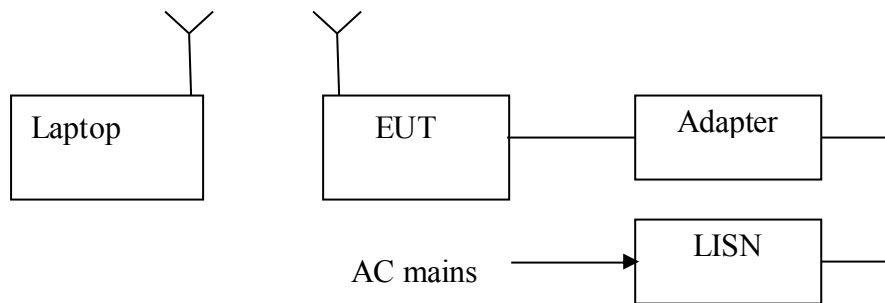
Transmitter antenna of directional gain is 3.7dBi.

4.2 Conducted Emission (mains)

4.2.1 Test Summary

Test Room	:	Shielded Room
Power Source	:	AC 120V / 60Hz
Standards:	:	FCC Part15 C : 2011
EUT Type	:	Table Top
EUT configuration	:	EUT's highest possible emission level

4.2.2 Block diagram of test setup



4.2.3 Measurement method

The EUT along with its peripherals were placed on a 1.0m (W) x 1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4m space from a vertical reference plane. The EUT was connected to power mains through a Artificial Mains Network(AMN), which provided 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room.

The excess power cable between the EUT and the AMN was bundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

4.2.4. Result

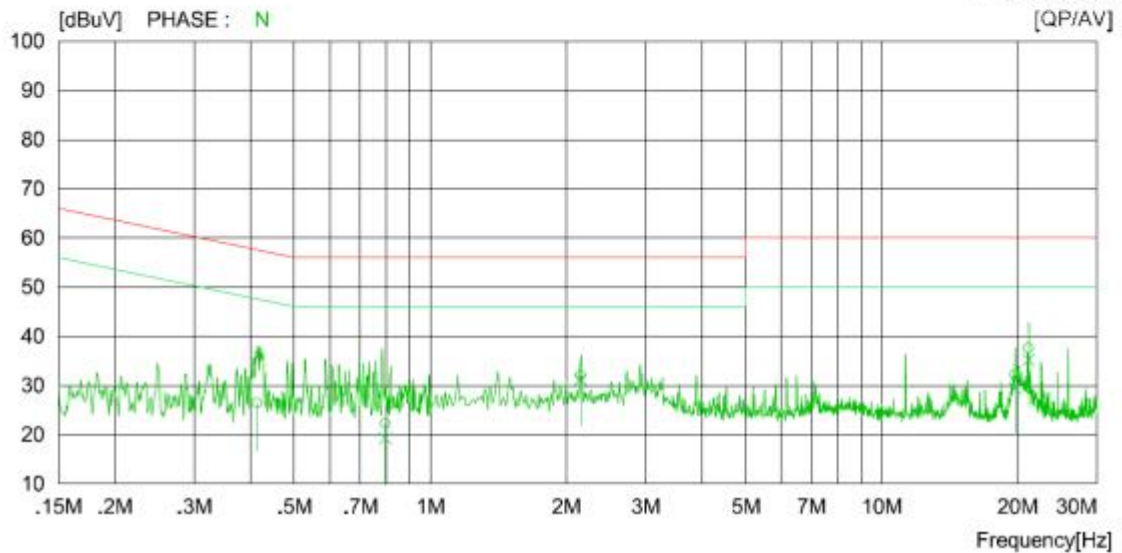
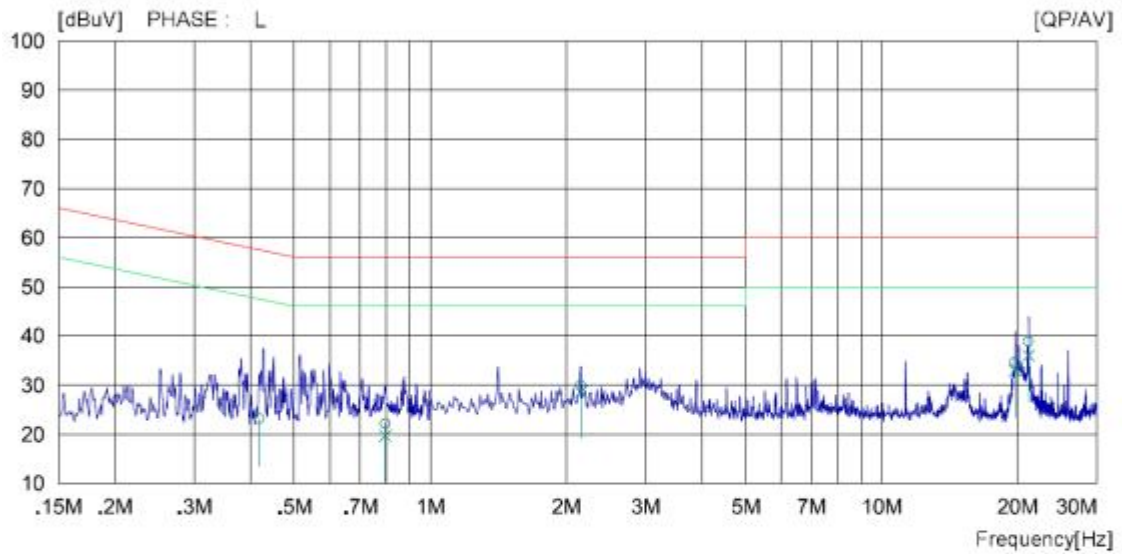
PASS

Conducted Emission

TDK South China EMC Centre
Date : 2013-06-22 12:04:44

Company Name : X300A Wireless	Document No. :
Model Name : X300A Wireless	Power Supply : AC 120V/60Hz
Product Name :	Temp/Humi : 25deg / 52%RH
Test condition : pink noise	Operator : CAO JIALIANG
Memo : LEFT SPEAKER	

LIMIT : FCC Part 15 B QP
FCC Part 15 B AV



Conducted Emission

TDK South China EMC Centre
Date : 2013-06-22 12:04:44

Company Name : X300A Wireless	Document No. : AC 120V/50Hz
Model Name : pink noise	Power Supply : 25deg / 52%RH
Product Name : pink noise	Temp/Humi : CAO JIALIANG
Test condition : pink noise	Operator : CAO JIALIANG

Memo : LEFT SPEAKER

LIMIT : FCC Part 15 B QP
FCC Part 15 B AV

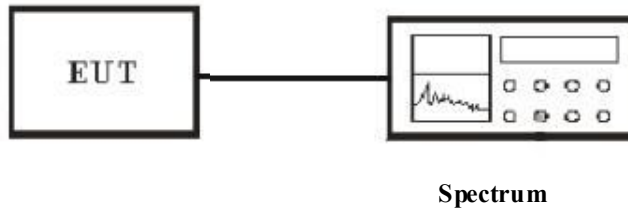
NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.41800	13.2	-2.8	9.9	23.1	7.1	57.5	47.5	34.4	40.4	L
2	0.79400	12.1	9.7	10.0	22.1	19.7	56.0	46.0	33.9	26.3	L
3	2.15600	20.0	18.8	9.9	29.9	28.7	56.0	46.0	26.1	17.3	L
4	19.75700	25.1	23.4	9.5	34.6	32.9	60.0	50.0	25.4	17.1	L
5	21.16800	29.3	26.5	9.5	38.8	36.0	60.0	50.0	21.2	14.0	L
6	0.41400	16.5	-2.0	9.9	26.4	7.9	57.6	47.6	31.2	39.7	N
7	0.79400	12.3	9.2	10.0	22.3	19.2	56.0	46.0	33.7	26.8	N
8	2.15300	22.1	21.3	9.9	32.0	31.2	56.0	46.0	24.0	14.8	N
9	19.75700	22.7	19.9	9.5	32.2	29.4	60.0	50.0	27.8	20.6	N
10	21.16800	28.1	25.7	9.5	37.6	35.2	60.0	50.0	22.4	14.8	N

4.3 Maximum Peak Output Power

4.3.1 Applicable Standard

According to Section 15.247(b)(3), for systems using digital modulation in 2400-2483.5MHz: 1 Watt.

4.3.2 Block diagram of test setup



Connection method: The shield cable was connected with EUT and Spectrum which have $50\Omega Z_c$. There have a combiner inserted between the spectrum and EUT. The connector of EUT side is original by manufacturer. The connector of Spectrum side is N type.

4.3.3 Measurement method

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in above figure without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. According to KDB558074 requirement, set spectrum analyzer as:
Measurement mode: Channel Power
Center Frequency = 2412MHz, 2437MHz or 2462MHz;
RBW=1MHz, VBW=3MHz,
Channel Power Span = 48MHz
Integ. Bandwidth = 30MHz ,
Sweep = auto
Detector function = peak
4. Hold on 30s, find out the max value on the screen of Spectrum.
5. Repeat above procedures until all frequencies measured were complete.

4.3.4. Result

Temperature (°C) : 22~23	EUT: Active Speaker
Humidity (%RH) : 50~54	M/N: X300A Wireless
Barometric Pressure (mbar) : 950~1000	Operation Condition: Tx Mode
Test date: Jul 30, 2013	Test engineer: Phenix

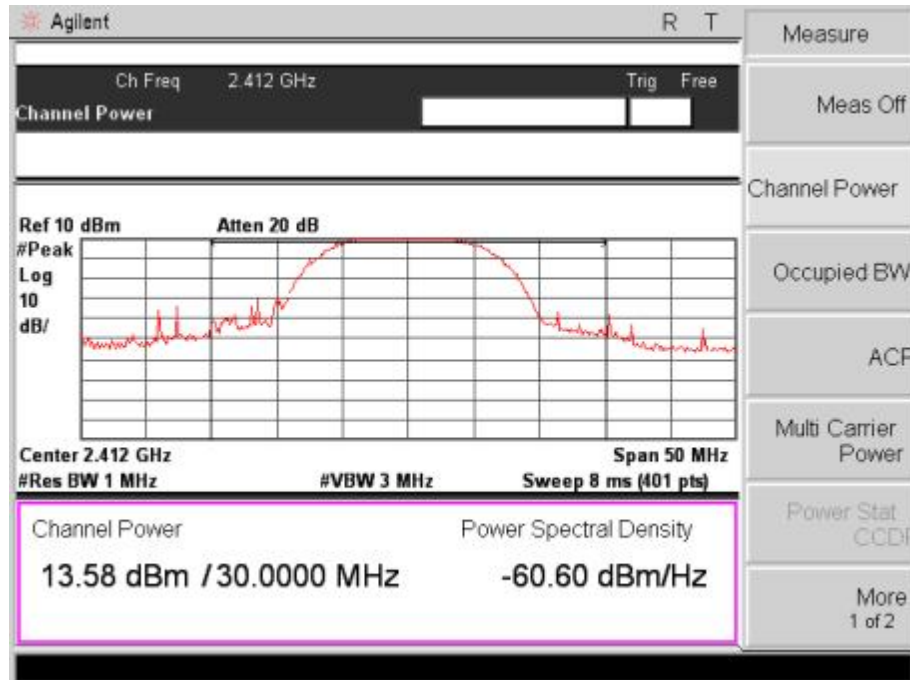
802.11b mode:

Channel No.	Frequency (MHz)	Output Power (dBm)	Limits (dBm)	Margin (dB)
LOW (CH 1)	2412	13.58	30	16.42
MID (CH 6)	2437	13.40	30	16.60
HIG (CH 11)	2462	12.01	30	17.99

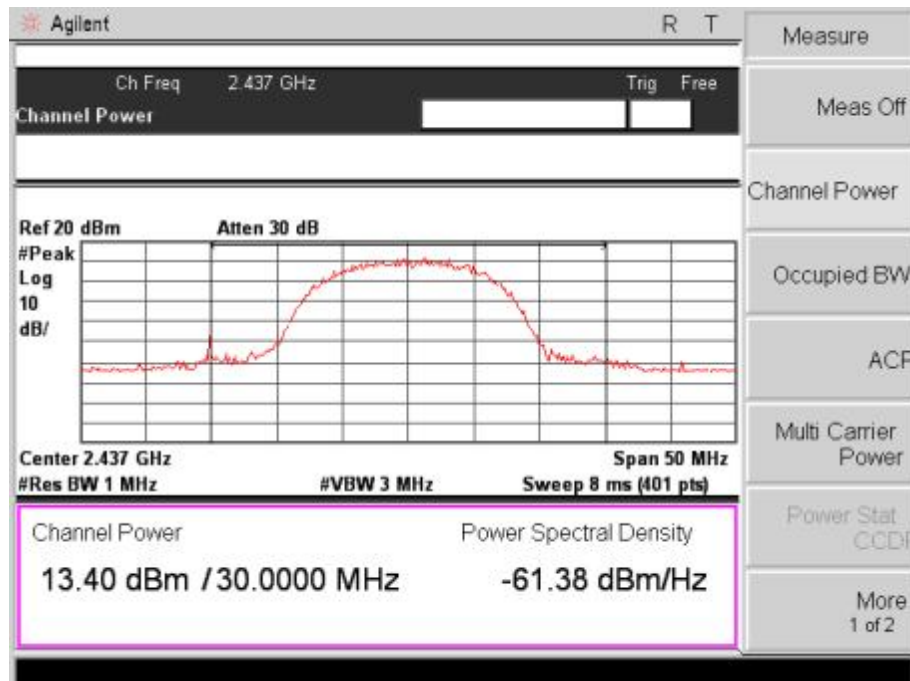
802.11g mode:

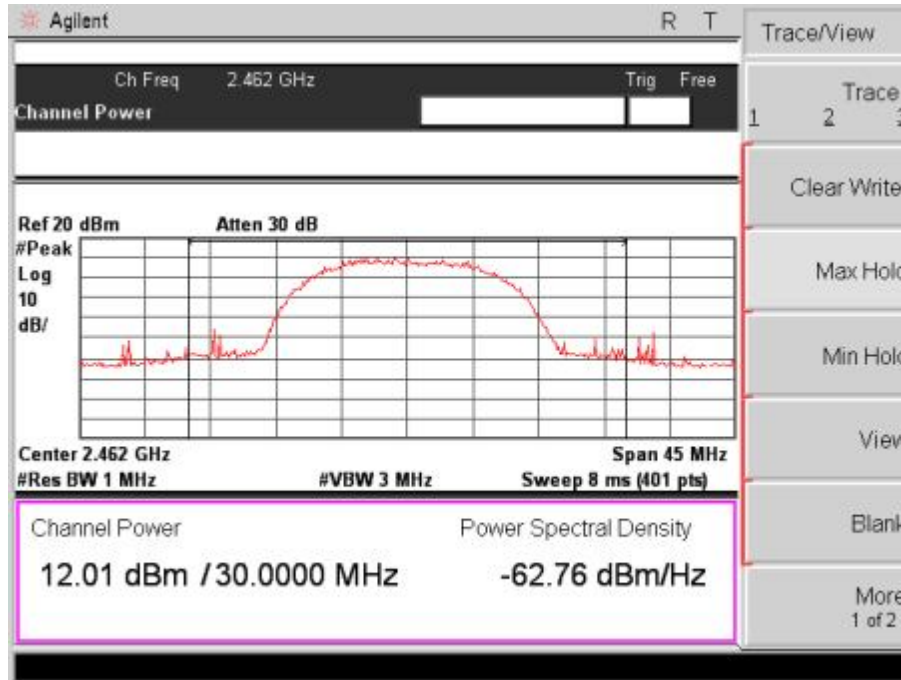
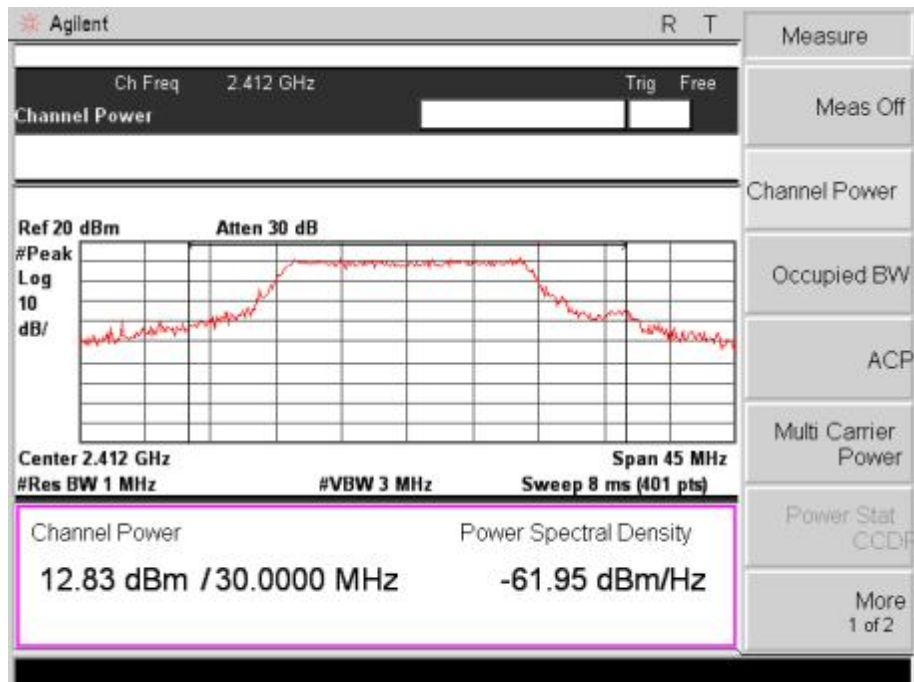
Channel No.	Frequency (MHz)	Output Power (dBm)	Limits (dBm)	Margin (dB)
LOW (CH 1)	2412	12.83	30	17.17
MID (CH 6)	2437	13.27	30	16.73
HIG (CH 11)	2462	13.51	30	16.49

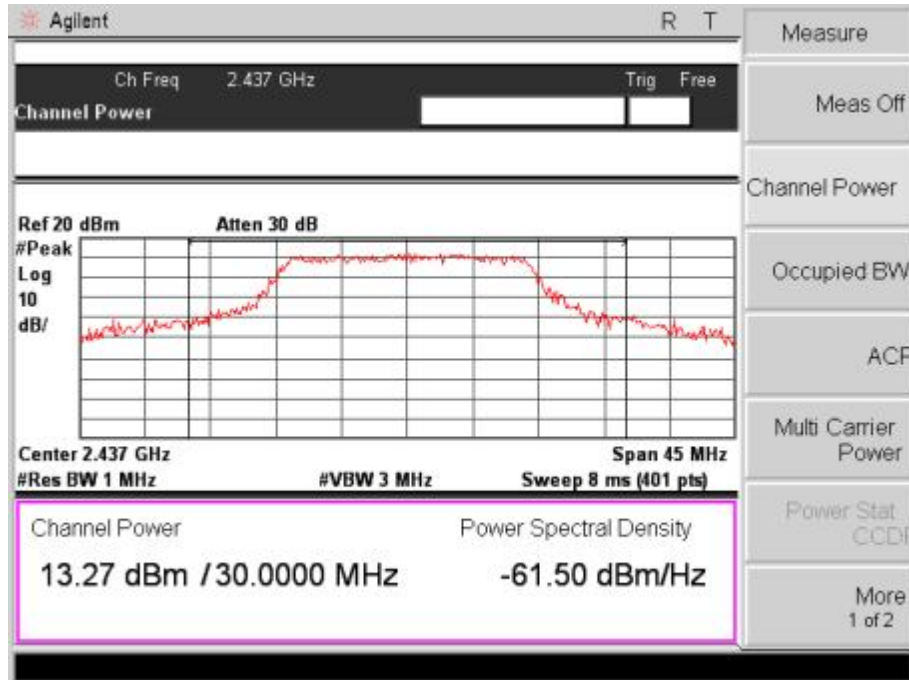
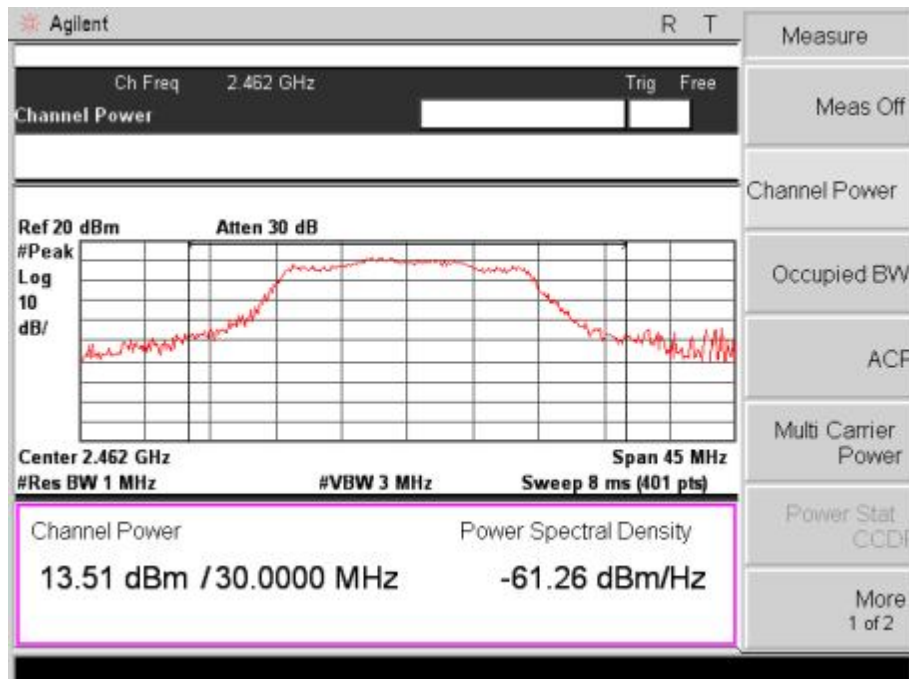
802.11b mode Plot:
Channel LOW :



Channel MID :



Channel HIG :

**802.11g mode Plot:
Channel LOW :**


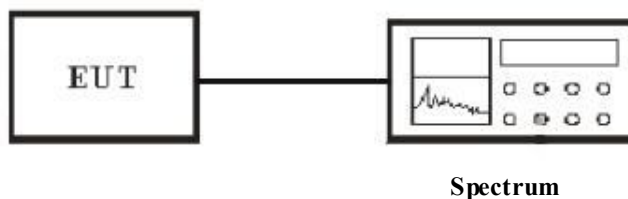
Channel MID :

Channel HIG :


4.4 Band Edges Emission

4.4.1 Applicable Standard

Section 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. In addition, radiated emissions that fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209.

4.4.2 Block diagram of test setup



Connection method: The shield cable was connected with EUT and Spectrum which have $50\Omega Z_c$. There is a combiner inserted between the spectrum and EUT. The connector of EUT side is original by manufacturer. The connector of Spectrum side is N type.

4.4.3 Measurement method

1. The transmitter is set to the lowest channel.
2. The transmitter output was connected to the spectrum analyzer via a cable and cable loss is used as the offset of the spectrum analyzer.
3. Set both RBW and VBW of spectrum analyzer to 100KHz with convenient frequency span including 20MHz bandwidth from lower band edge. Then detector set to peak and max hold this trace.
4. The lowest band edges emission was measured and recorded.
5. The transmitter set to the highest channel and repeated 2~4.

4.4.4. Result

Conducted:

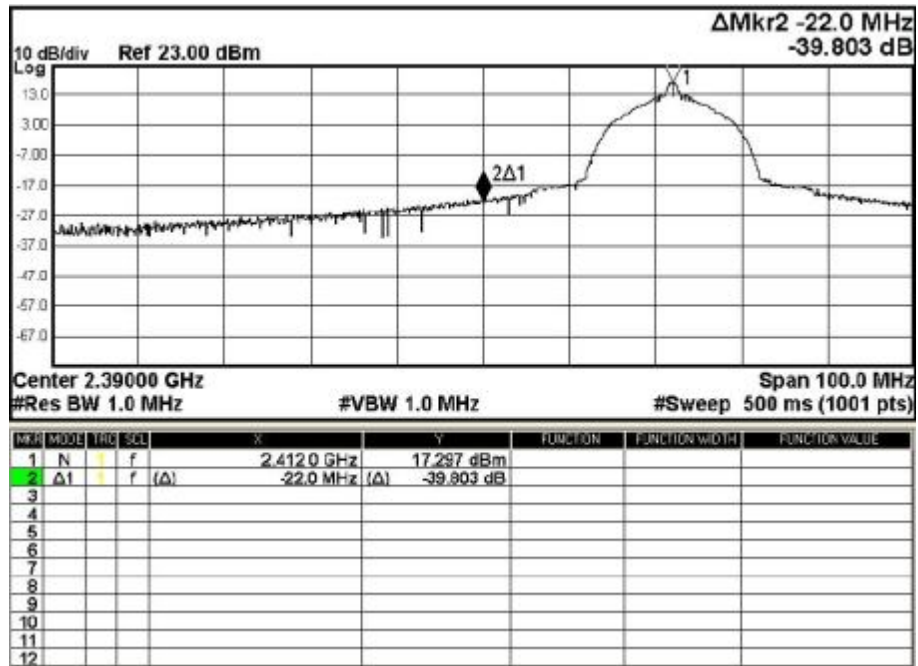
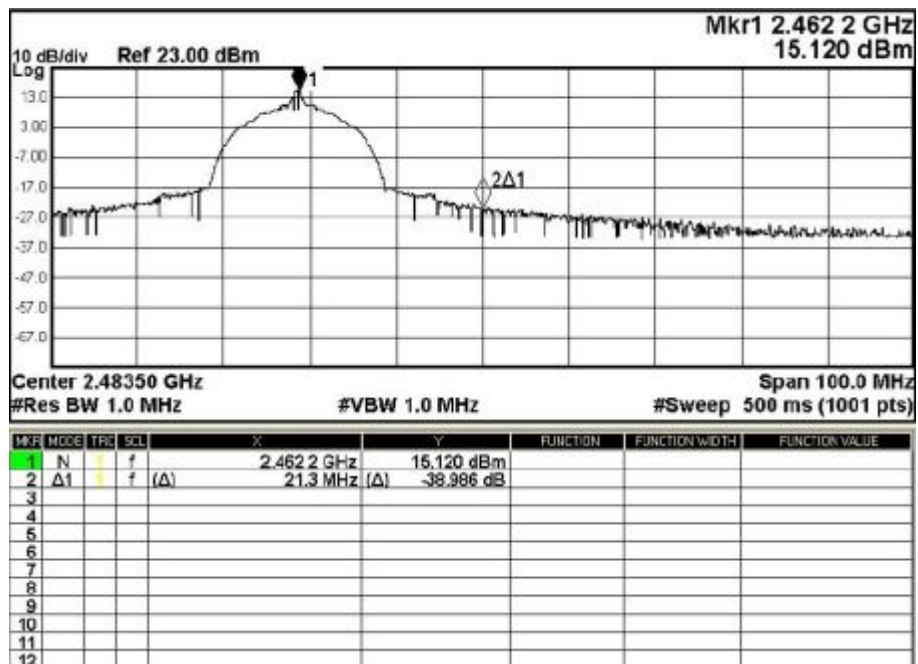
Temperature (°C) : 22~23	EUT: Active Speaker
Humidity (%RH) : 50~54	M/N: X300A Wireless
Barometric Pressure (mbar) : 950~1000	Operation Condition: Tx Mode
Test date: Jul 30, 2013	Test engineer: Phenix

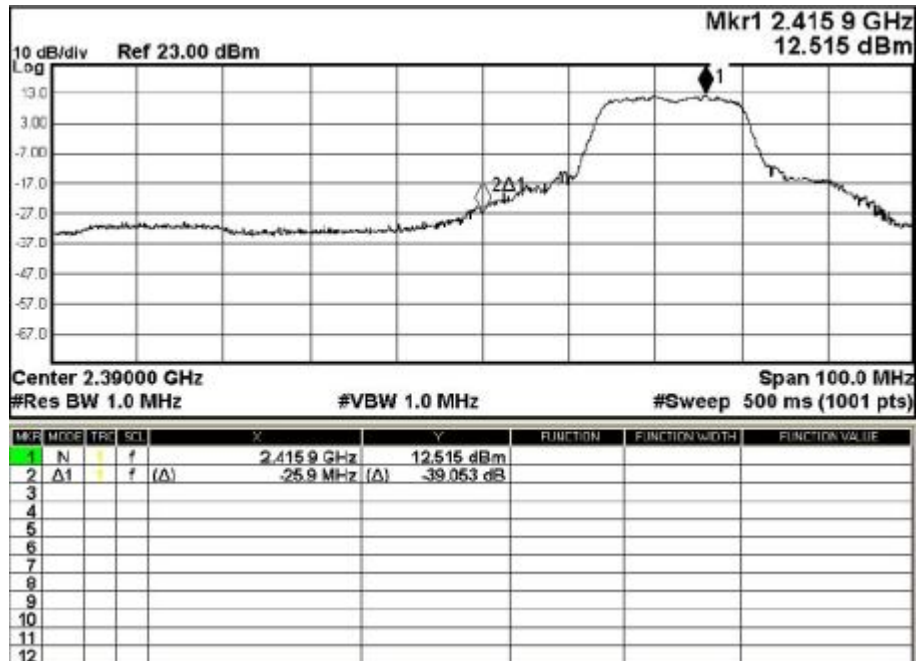
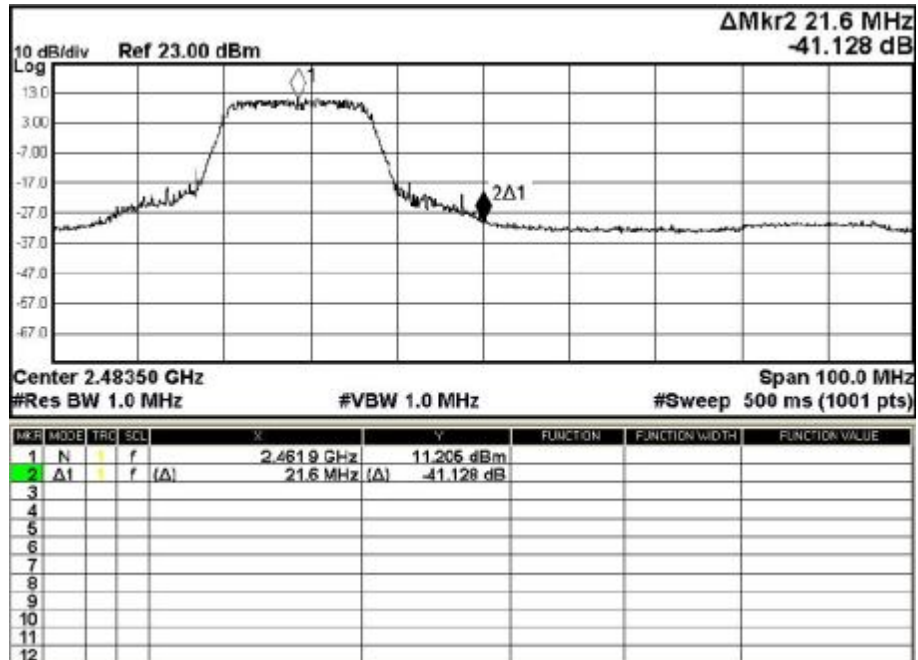
802.11b mode:

Frequency (MHz)	Read Delta (dB)	Limits (dB)	Margin (dB)
2390	-39.8	-20	19.8
2483.5	-39.0	-20	19.0

802.11g mode:

Frequency (MHz)	Read Delta (dB)	Limits (dB)	Margin (dB)
2390	-39.1	-20	19.1
2483.5	-41.1	-20	21.1

**802.11b mode Plot:
Channel LOW :**

Channel HIG :


**802.11g mode Plot:
Channel LOW :**

Channel HIG :


Radiated:
802.11b mode:

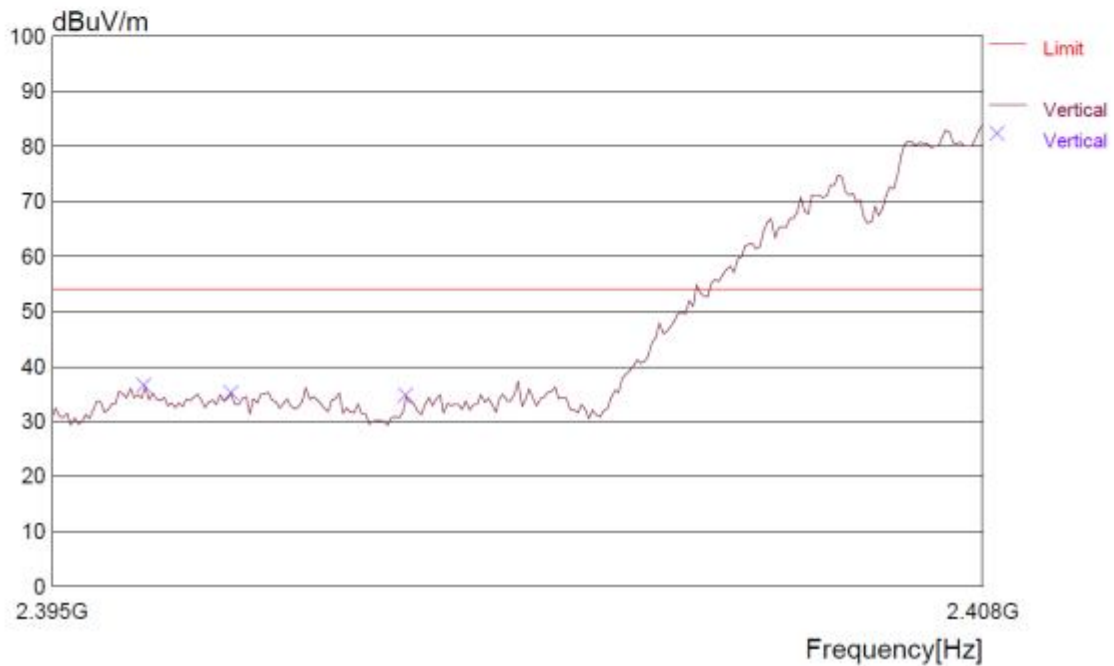
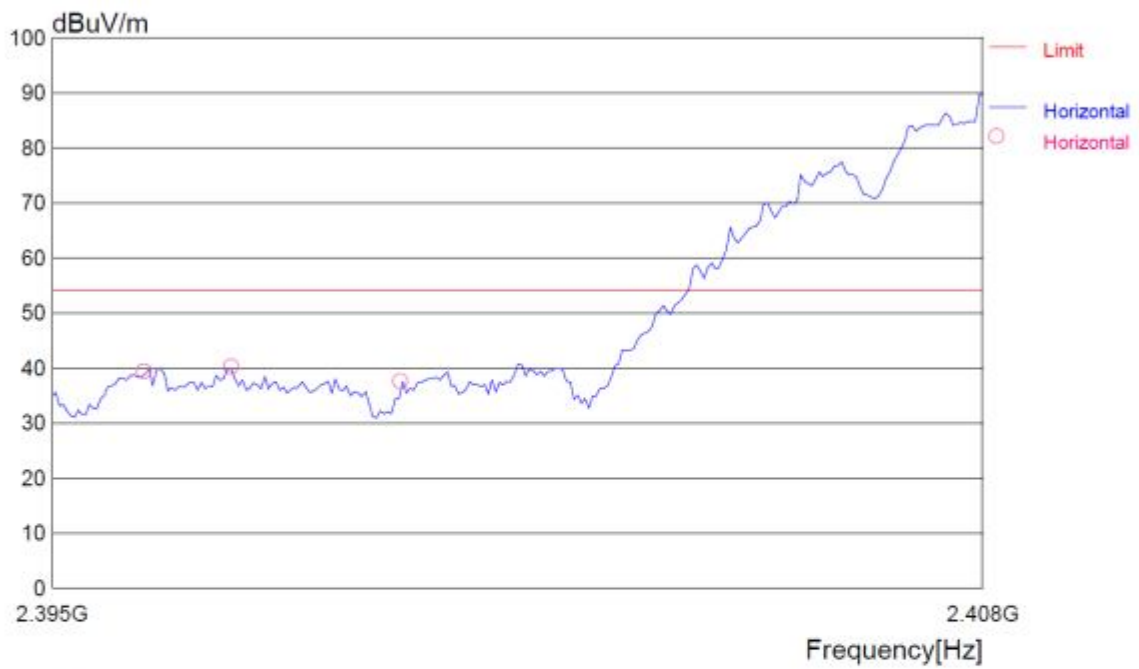
RADIATED EMISSION

Date : 2013/07/26 15:24:56

Trade Name	:	Document No.	:
Model Name	:	Power Supply	:
Product Name	:	Temp/Humi	:
Test Condition	:	Operator	:

Memo : 802.11b CH-L

LIMIT : FCC Part15 C transmitter spurious above1G(average)



RADIATED EMISSION

Date : 2013/07/26 15:24:56

 Trade Name :
 Model Name : X300A Wireless
 Product Name : Active Speaker
 Test Condition :

 Document No. :
 Power Supply : AC 120V/60Hz
 Temp/Humi : 27/55RH%
 Operator : Ely zhang

Memo : 802.11b CH-L

LIMIT : FCC Part15 C transmitter spurious above1G(average)

Frequency [MHz]	Meter (PK) [dBuV]	Ant. Type	Detector	Antenna Factor [dB/m]	Total Loss [dB]	Level (PK) [dBuV/m]	Angle [degree]	Height [m]	Pola.	Limit [dBuV/m]	Margin [dB]
2396.300	41.6	HRN	PK	31.4	-34.0	39.0	92	2.00	Hori.	54.0	15.0
2396.300	38.9	HRN	PK	31.4	-34.0	36.3	64	2.00	Vert.	54.0	17.7
2397.496	42.5	HRN	PK	31.4	-34.0	39.9	224	2.00	Hori.	54.0	14.1
2397.496	37.7	HRN	PK	31.4	-34.0	35.1	218	2.00	Vert.	54.0	18.9
2399.888	40.1	HRN	PK	31.4	-34.0	37.5	183	2.00	Hori.	54.0	16.5
2399.940	37.1	HRN	PK	31.4	-34.0	34.5	189	2.00	Vert.	54.0	19.5

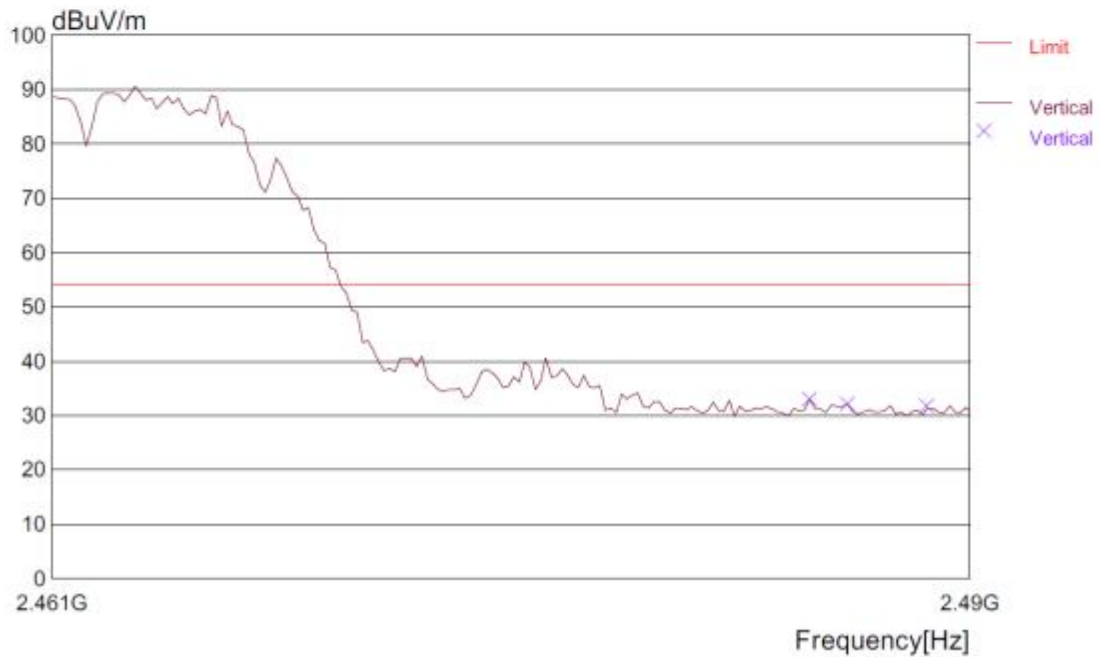
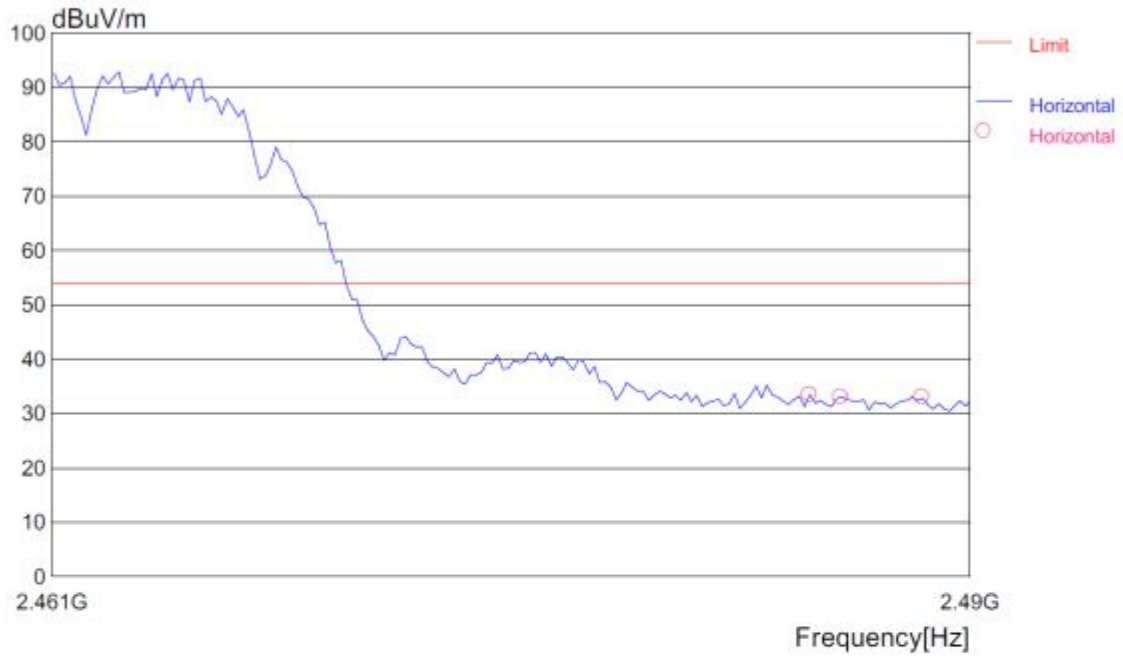
RADIATED EMISSION

Date : 2013/07/26 15:30:43

Trade Name	: X300A Wireless	Document No.	:
Model Name	: Active Speaker	Power Supply	: AC 120V/60Hz
Product Name	: Active Speaker	Temp/Humi	: 27/55RH%
Test Condition	:	Operator	: Eliy zhang

Memo : 802.11b CH-H

LIMIT : FCC Part15 C transmitter spurious above1G(average)



RADIATED EMISSION

Date : 2013/07/26 15:30:43

 Trade Name :
 Model Name : X300A Wireless
 Product Name : Active Speaker
 Test Condition :

 Document No. :
 Power Supply : AC 120V/60Hz
 Temp/Humi : 27/55RH%
 Operator : Eliy zhang

Memo : 802.11b CH-H

LIMIT : FCC Part15 C transmitter spurious above1G(average)

Frequency [MHz]	Meter (PK) [dBuV]	Ant. Type	Detector	Antenna Factor [dB/m]	Total Loss [dB]	Level (PK) [dBuV/m]	Angle [degree]	Height [m]	Pola.	Limit [dBuV/m]	Margin [dB]
2484.922	36.1	HRN	PK	31.2	-33.8	33.5	180	2.01	Hori.	54.0	20.5
2484.922	35.6	HRN	PK	31.2	-33.8	33.0	188	2.00	Vert.	54.0	21.0
2485.945	35.7	HRN	PK	31.2	-33.8	33.1	217	2.01	Hori.	54.0	20.9
2486.115	34.6	HRN	PK	31.2	-33.8	32.0	196	2.00	Vert.	54.0	22.0
2488.501	35.5	HRN	PK	31.2	-33.8	32.9	205	2.01	Hori.	54.0	21.1
2488.671	34.0	HRN	PK	31.2	-33.8	31.4	176	2.00	Vert.	54.0	22.6

802.11g mode:

RADIATED EMISSION

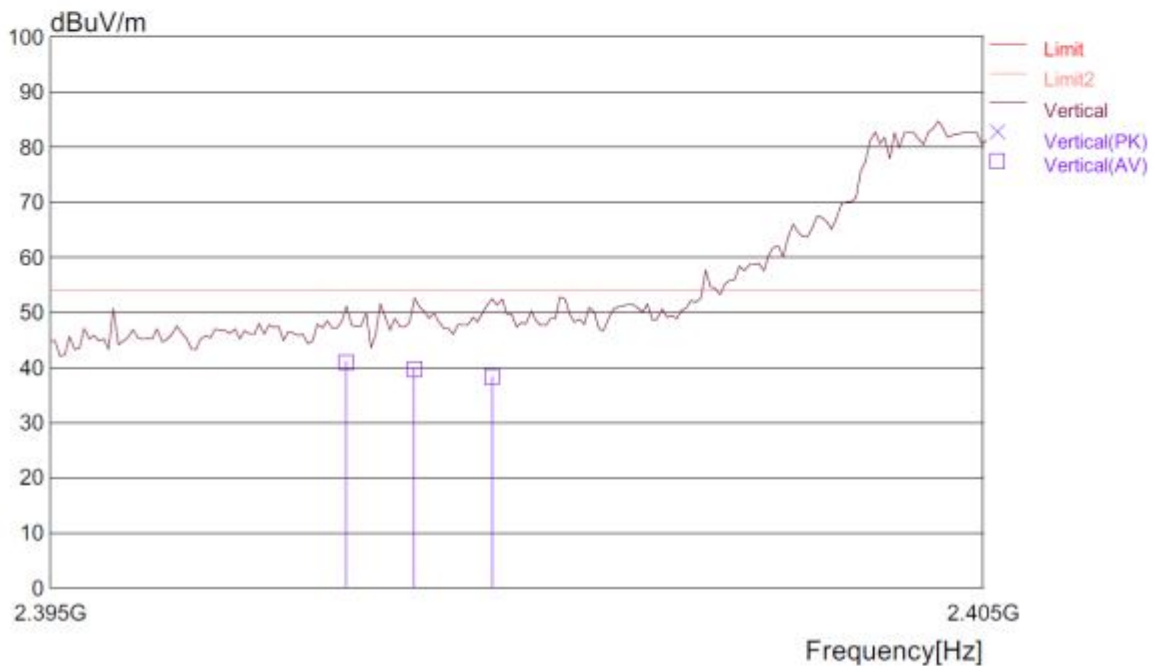
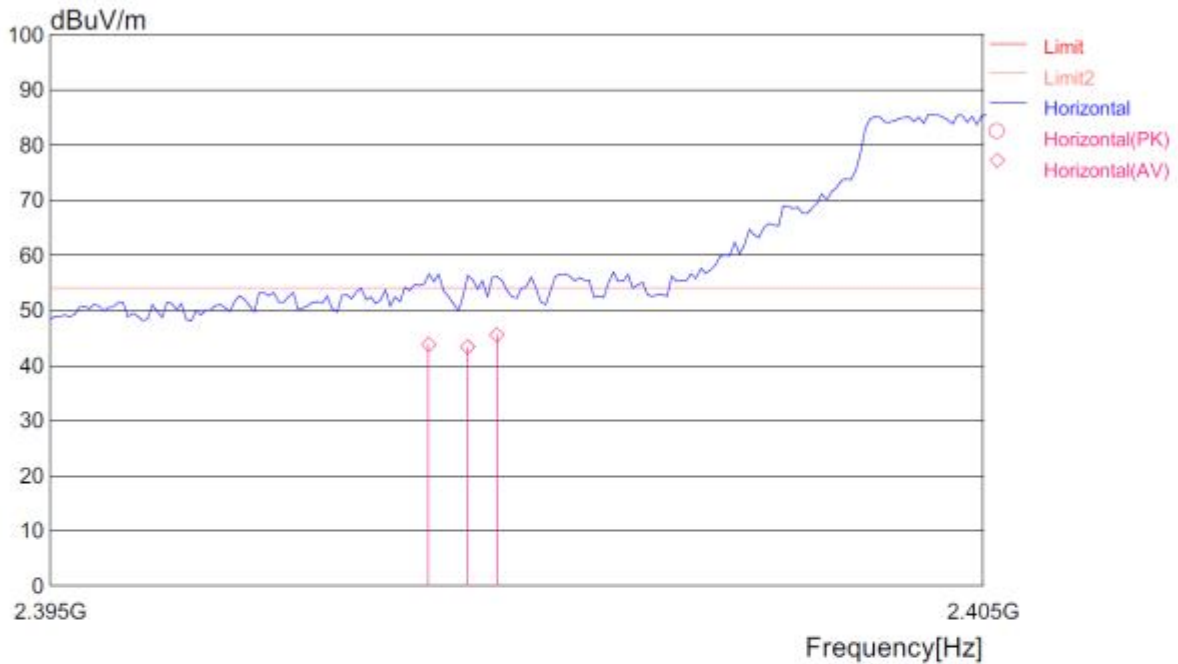
Date : 2013/07/26 15:07:33

Trade Name :
 Model Name : X300A Wireless
 Product Name : Active Speaker
 Test Condition :

Document No. :
 Power Supply : AC 120V/60Hz
 Temp/Humi : 27/55RH%
 Operator : Eliy zhang

Memo : 802.11g CH-L

LIMIT :
 FCC Part15 C transmitter spurious above1G(average)



RADIATED EMISSION

Date : 2013/07/26 15:07:33

 Trade Name :
 Model Name : X300A Wireless
 Product Name : Active Speaker
 Test Condition :

 Document No. :
 Power Supply : AC 120V/60Hz
 Temp/Humi : 27/55RH%
 Operator : Elij zhang

Memo : 802.11g CH-L

 LIMIT :
 FCC Part15 C transmitter spurious above1G(average)

Frequency [MHz]	Meter Reading [dBuV]		Ant. Type	Antenna Factor [dB/m]	Total Loss [dB]	Level [dBuV/m]		Angle [degree]	Height [cm]	Pola.	Limit [dBuV/m]		Margin [dB]	
	(PK)	(AV)				(PK)	(AV)				(PK)	(AV)	(PK)	(AV)
2399.056	59.3	46.0	HRN	31.4	-34.0	56.7	43.4	96	2.00	Hori	----	54.0	----	10.6
2399.472	59.0	45.8	HRN	31.4	-34.0	56.4	43.2	101	2.00	Hori	----	54.0	----	10.8
2399.784	58.7	47.9	HRN	31.4	-34.0	56.1	45.3	224	2.00	Hori	----	54.0	----	8.7
2398.172	53.8	43.2	HRN	31.4	-34.0	51.2	40.6	165	2.00	Vert	----	54.0	----	13.4
2398.900	55.2	42.1	HRN	31.4	-34.0	52.6	39.5	170	2.00	Vert	----	54.0	----	14.5
2399.732	55.1	40.8	HRN	31.4	-34.0	52.5	38.2	186	2.00	Vert	----	54.0	----	15.8

RADIATED EMISSION

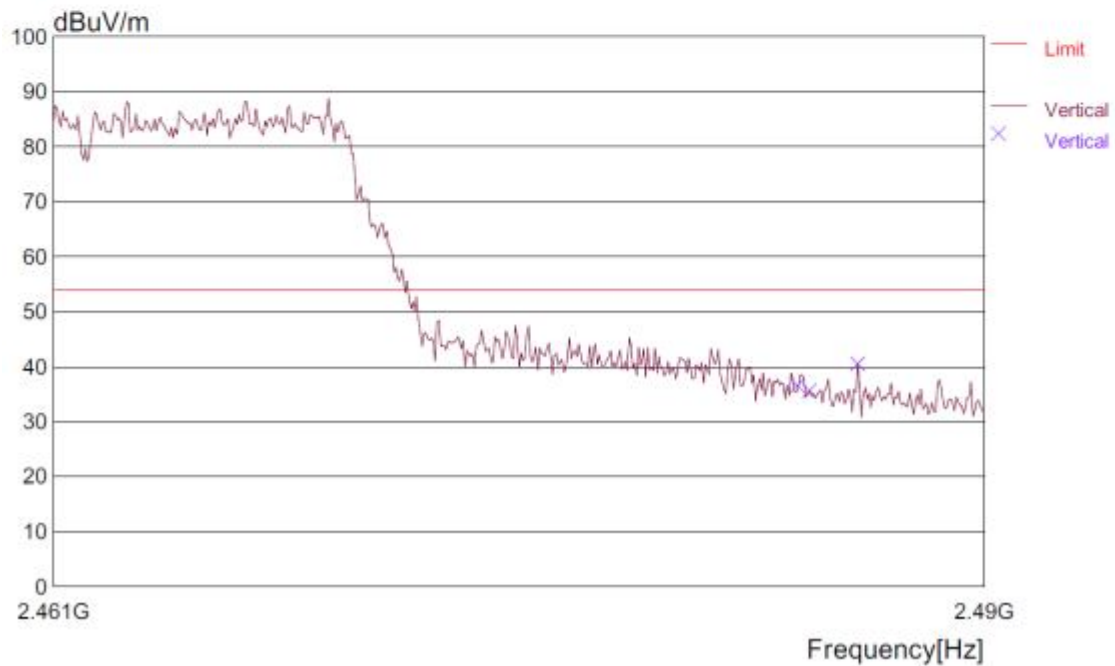
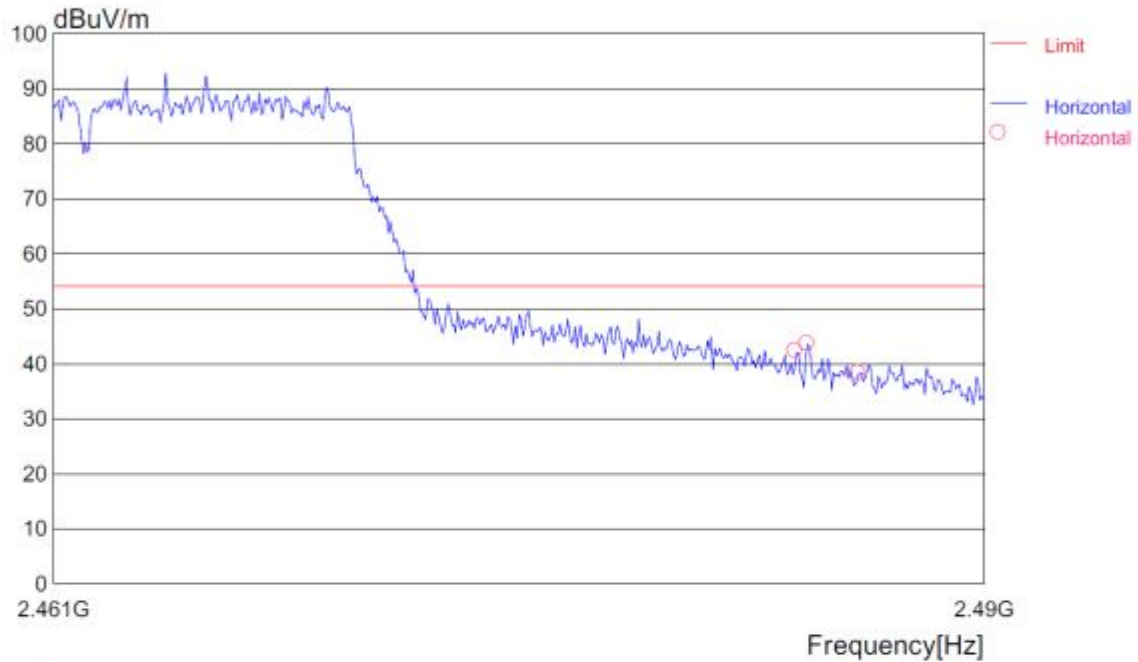
Date : 2013/07/26 15:35:09

Trade Name :
 Model Name : X300A Wireless
 Product Name : Active Speaker
 Test Condition :

Document No. :
 Power Supply : AC 120V/60Hz
 Temp/Humi : 27/55RH%
 Operator : Eliy zhang

Memo : 802.11g CH-H

LIMIT : FCC Part15 C transmitter spurious above1G(average)



RADIATED EMISSION

Date : 2013/07/26 15:35:09

 Trade Name :
 Model Name : X300A Wireless
 Product Name : Active Speaker
 Test Condition :

 Document No. :
 Power Supply : AC 120V/60Hz
 Temp/Humi : 27/55RH%
 Operator : Ely zhang

Memo : 802.11g CH-H

LIMIT : FCC Part15 C transmitter spurious above1G(average)

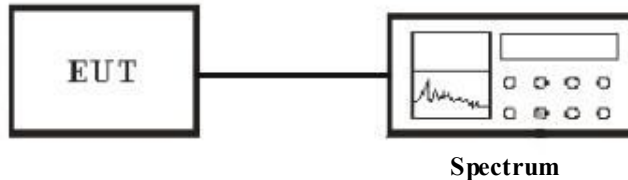
Frequency [MHz]	Meter (PK) [dBuV]	Ant. Type	Detector	Antenna Factor [dB/m]	Total Loss [dB]	Level (PK) [dBuV/m]	Angle [degree]	Height [m]	Pola.	Limit [dBuV/m]	Margin [dB]
2484.126	44.7	HRN	PK	31.2	-33.8	42.1	238	2.00	Hori.	54.0	11.9
2484.184	39.2	HRN	PK	31.2	-33.8	36.6	176	2.00	Vert.	54.0	17.4
2484.475	46.2	HRN	PK	31.2	-33.8	43.6	234	2.00	Hori.	54.0	10.4
2484.533	38.2	HRN	PK	31.2	-33.8	35.6	192	2.00	Vert.	54.0	18.4
2486.043	43.1	HRN	PK	31.2	-33.8	40.5	176	2.00	Vert.	54.0	13.5
2486.102	40.8	HRN	PK	31.2	-33.8	38.2	218	2.00	Hori.	54.0	15.8

4.5 6dB BANDWIDTH

4.5.1 Applicable Standard

According to section 15.247(a)(2), for digital modulation technique, the minimum 6dB bandwidth shall be at least 500kHz.

4.5.2 Block diagram of test setup



Connection method: The shield cable was connected with EUT and Spectrum which have $50\Omega Z_c$. There have a combiner inserted between the spectrum and EUT. The connector of EUT side is original by manufacturer. The connector of Spectrum side is N type.

4.5.3 Measurement method

1. The transmitter output was connected to the spectrum analyzer through a shielded cable.
2. Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz, Span=40MHz, Sweep=auto.
3. Set Detector to Peak, Trace to Max Hold and Sweep Time is auto.
4. Mark the peak frequency and -6dB(upper and lower) frequency.
5. Repeat above 1-4 points for the middle and highest channel of the EUT.

4.5.4. Result

Temperature (°C) : 22~23	EUT: Active Speaker
Humidity (%RH) : 50~54	M/N: X300A Wireless
Barometric Pressure (mbar) : 950~1000	Operation Condition: Tx Mode
Test date: Jul 30, 2013	Test engineer: Phenix

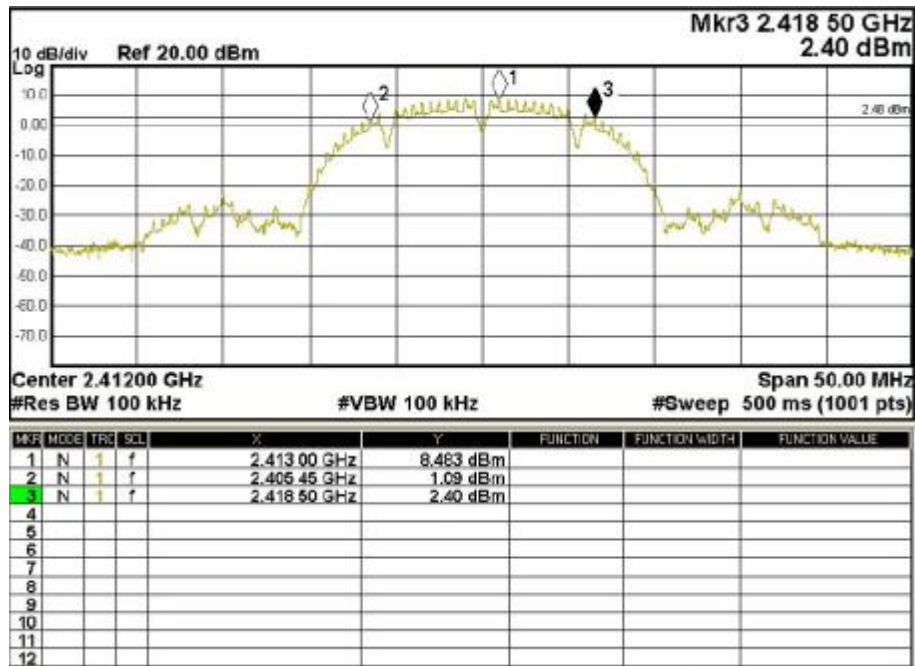
802.11b mode:

Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limits (MHz)
LOW (CH 1)	2412	13.05	>0.5
MID (CH 6)	2437	12.20	>0.5
HIG (CH 11)	2462	12.15	>0.5

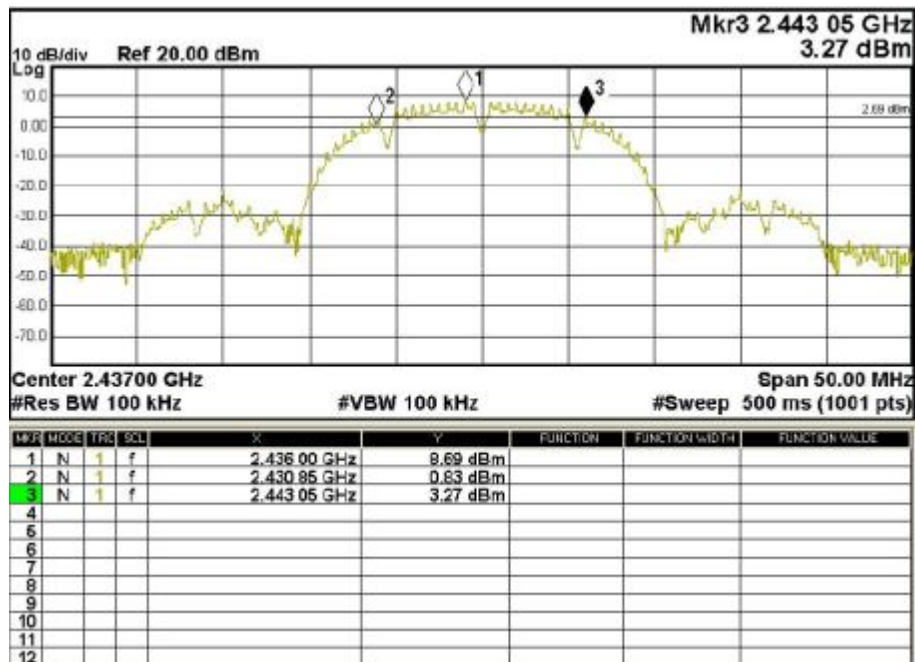
802.11g mode:

Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limits (MHz)
LOW (CH 1)	2412	16.50	>0.5
MID (CH 6)	2437	16.45	>0.5
HIG (CH 11)	2462	16.25	>0.5

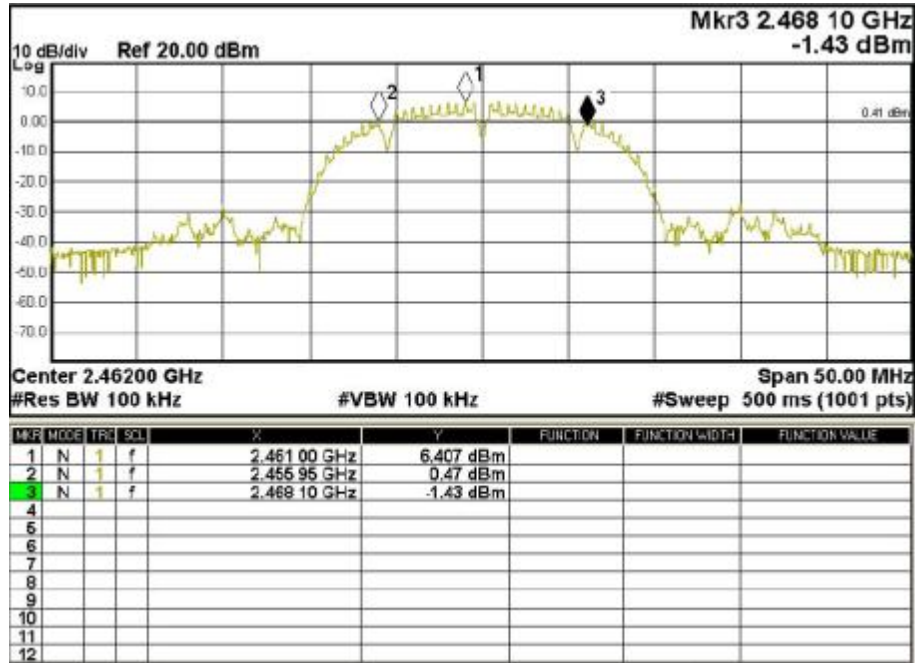
802.11b mode Plot:
Channel LOW :



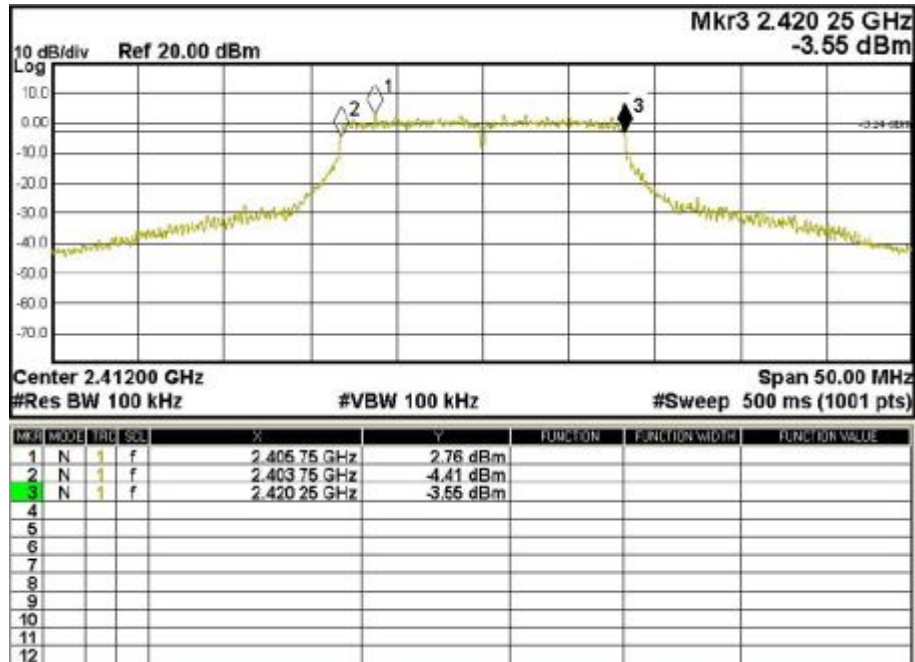
Channel MID :



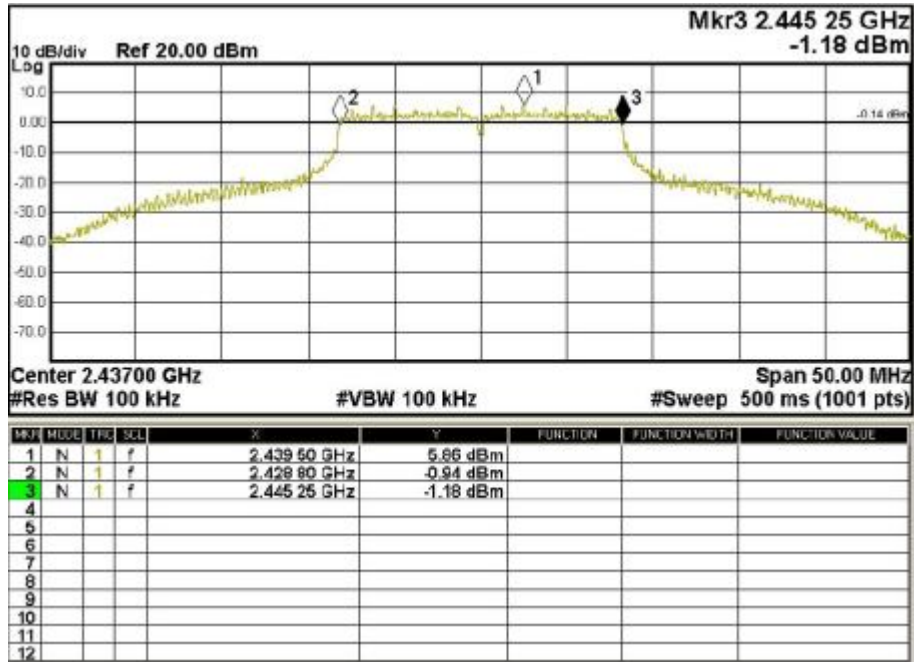
Channel HIG :



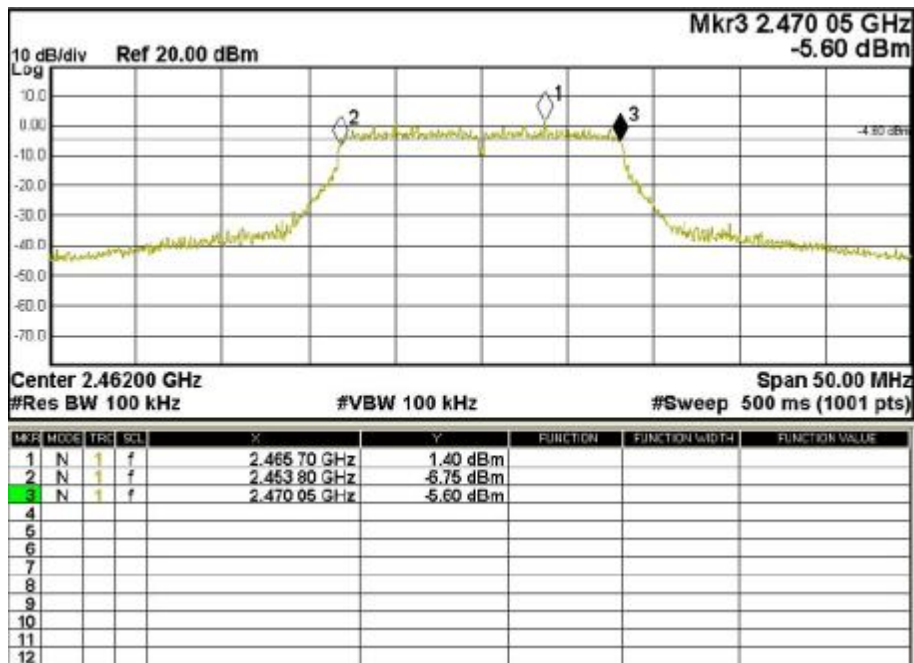
802.11g mode Plot:
Channel LOW :



Channel MID :



Channel HIG :

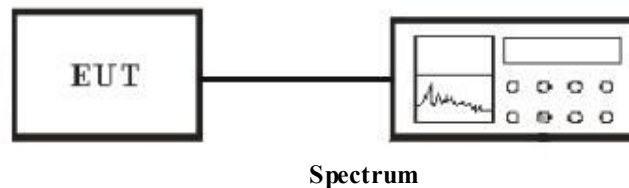


4.6 Power Spectral Density

4.6.1 Applicable Standard

According to section 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.

4.6.2 Block diagram of test setup



Connection method: The shield cable was connected with EUT and Spectrum which have $50\Omega Z_c$. There have a combiner inserted between the spectrum and EUT. The connector of EUT side is original by manufacturer. The connector of Spectrum side is N type.

4.6.3 Measurement method

According to the KDB 558074, the measurement procedure as below:

1. The transmitter output connected to the spectrum analyzer by a shielded cable.
2. Set the RBW = 3 kHz.
3. Set the VBW = 10 kHz.
4. Set the span to 1.5 times the DTS bandwidth
5. Detector = peak.
6. Sweep time = auto couple
7. Trace mode = max hold
8. Allow trace to fully stabilize
9. Use the peak marker function to determine the maximum power level

4.6.4. Result

Temperature (°C) : 22~23	EUT: Active Speaker
Humidity (%RH) : 50~54	M/N: X300A Wireless
Barometric Pressure (mbar) : 950~1000	Operation Condition: Tx Mode
Test date: Aug 12, 2013	Test engineer: Phenix

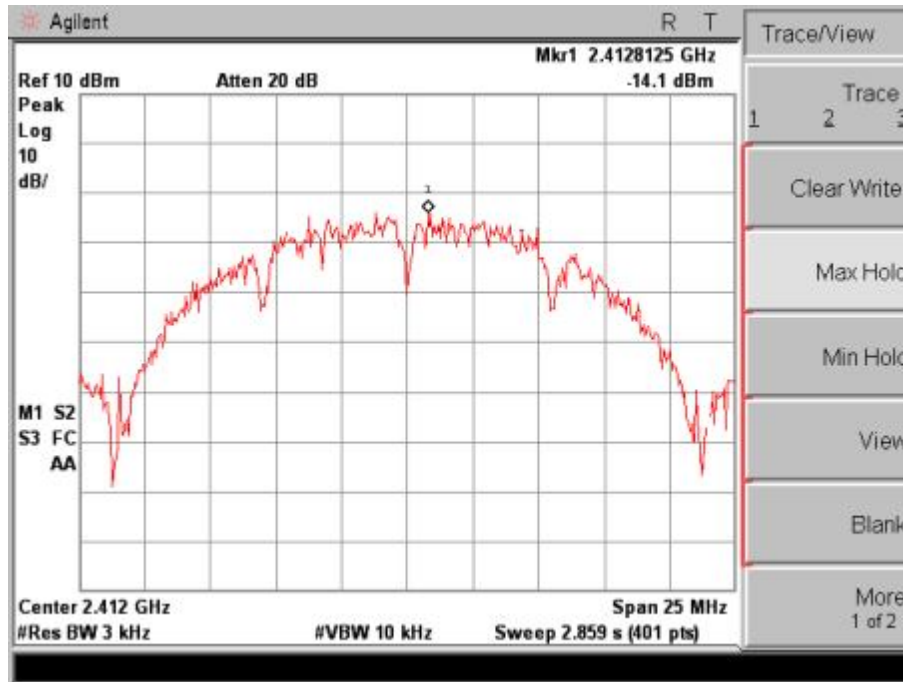
802.11b mode:

Channel No.	Frequency (MHz)	Power Spectral Density (dBm)	Limits (dBm)	Margin (dB)
LOW (CH 1)	2412	-14.1	8	22.1
MID (CH 6)	2437	-12.9	8	20.9
HIG (CH 11)	2462	-12.2	8	20.2

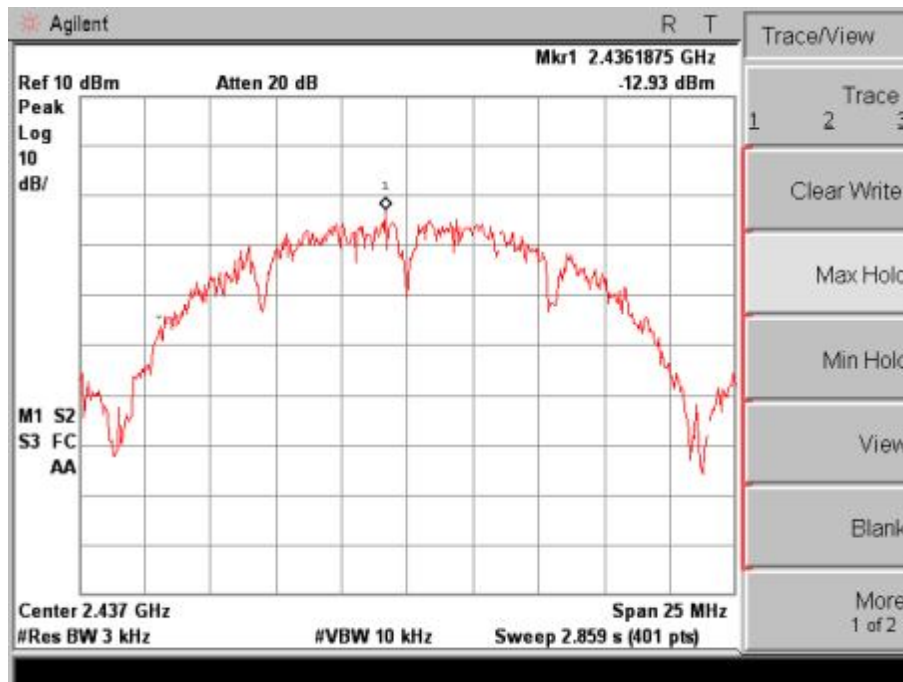
802.11g mode:

Channel No.	Frequency (MHz)	Power Spectral Density (dBm)	Limits (dBm)	Margin (dB)
LOW (CH 1)	2412	-14.3	8	22.3
MID (CH 6)	2437	-13.3	8	21.3
HIG (CH 11)	2462	-13.4	8	21.4

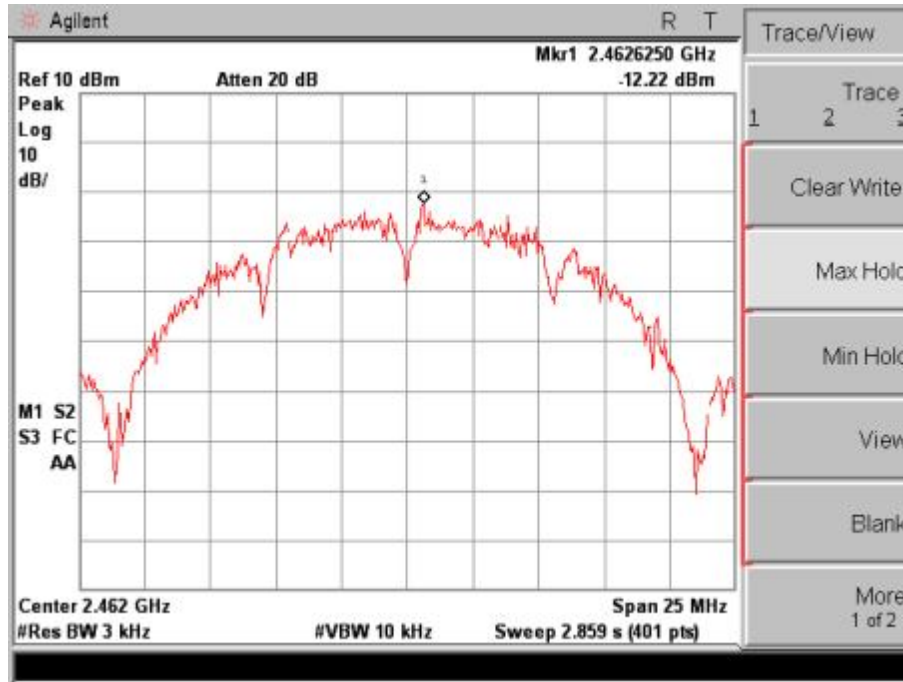
**802.11b mode Plot:
Channel LOW :**



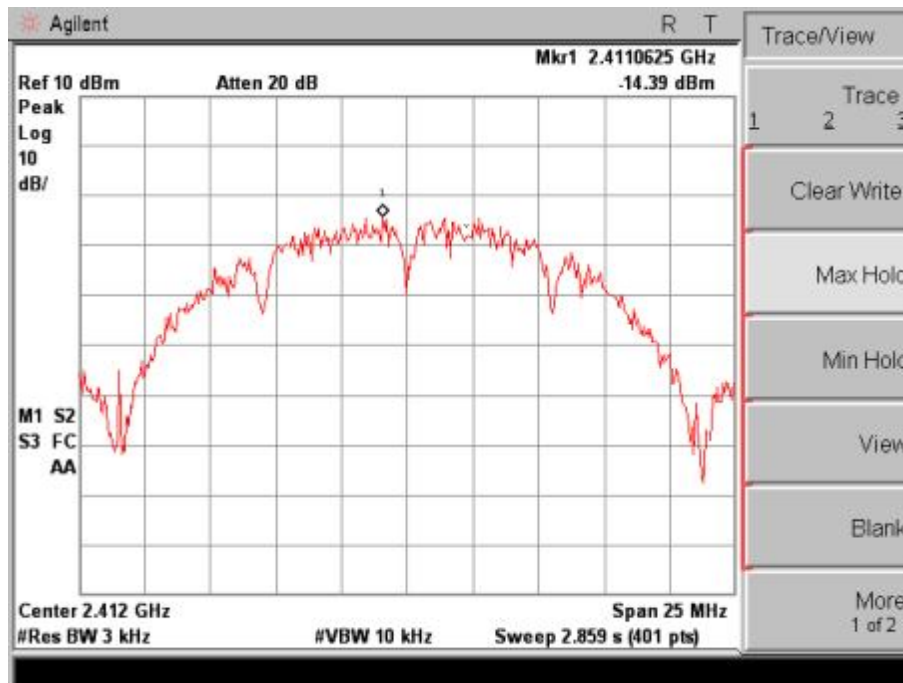
Channel MID :



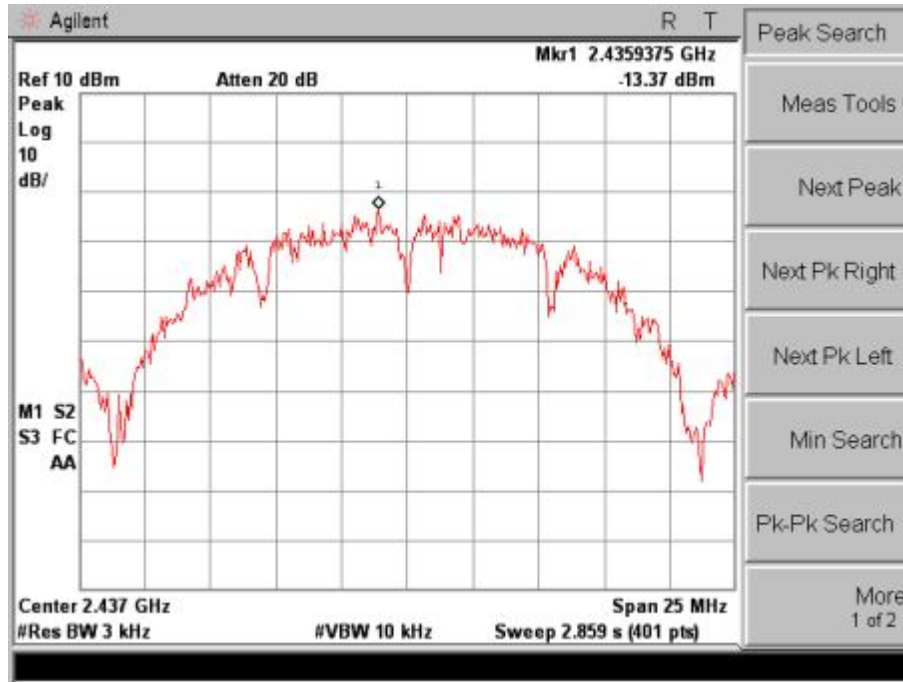
Channel HIG :



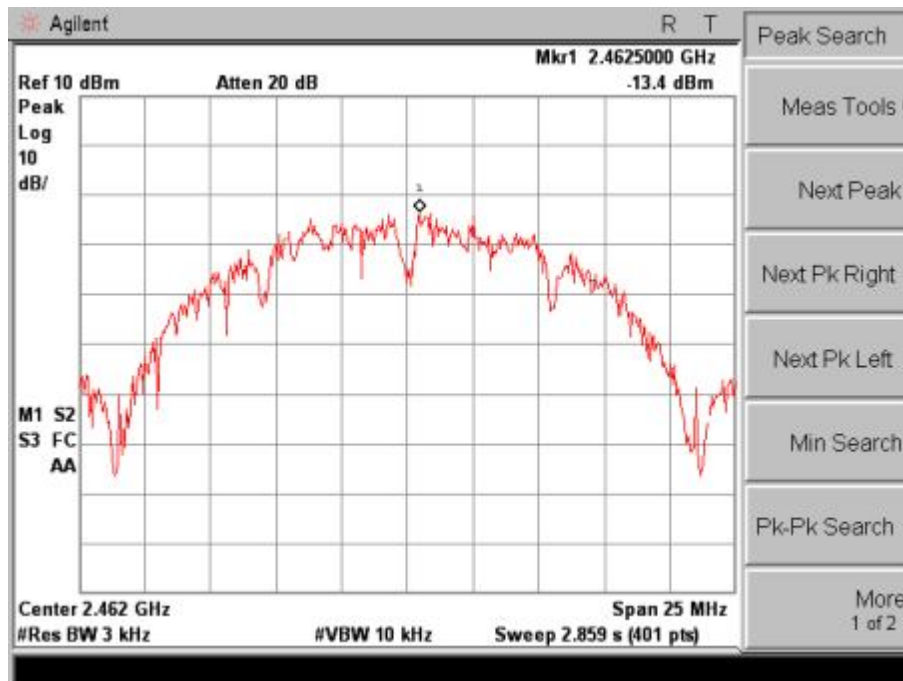
**802.11g mode Plot:
Channel LOW :**



Channel MID :



Channel HIG :



4.7 Spurious Radiated Emission

4.7.1 Applicable Standard

Section 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. In addition, radiated emissions that fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209.

4.7.2 Block diagram of test setup

Radiated Measurement Setup:

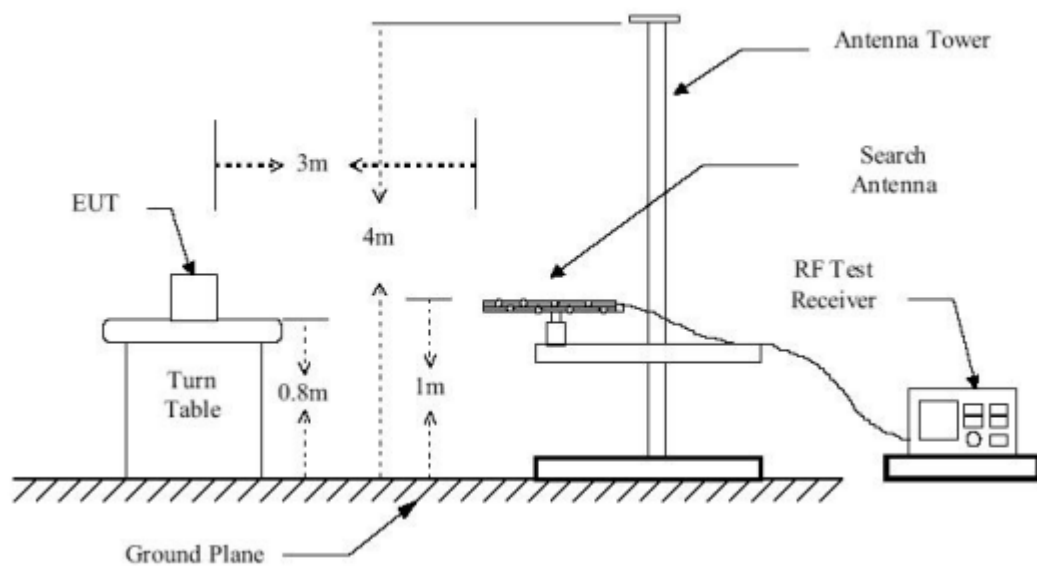


Figure 1 : Frequencies measured below 1 GHz configuration

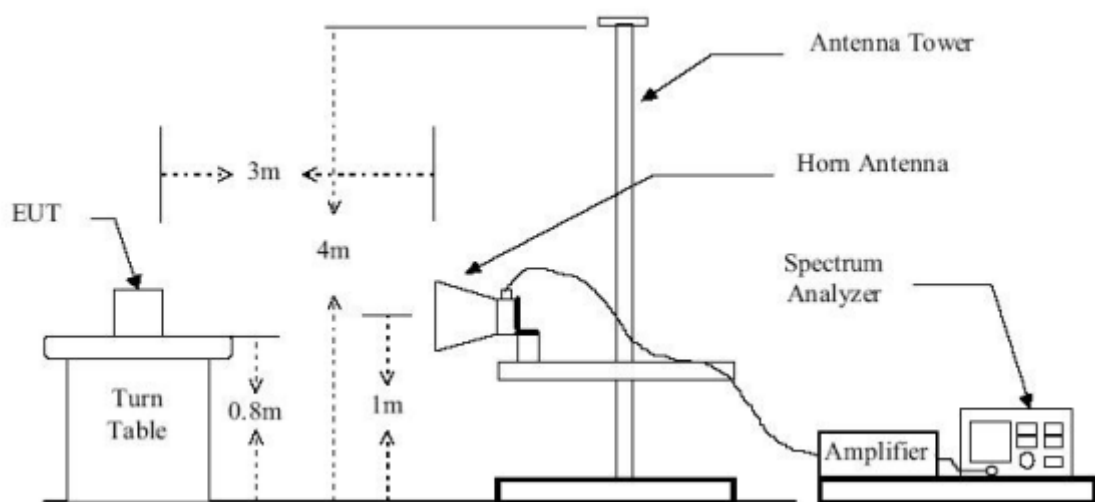
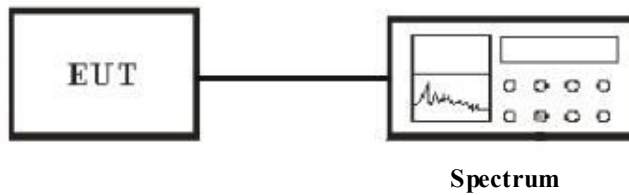


Figure 2 : Frequencies measured above 1 GHz configuration

Conducted Measurement Setup:



Connection method: The shield cable was connected with EUT and Spectrum which have $50\Omega Z_C$. There have a combiner inserted between the spectrum and EUT. The connector of EUT side is original by manufacturer. The connector of Spectrum side is N type.

4.7.3 Measurement method

Radiated Measurement

1. Configure the EUT according to ANSI C63.4 (2003).
2. The EUT was placed on the top of the turntable 0.8 meter above ground.
3. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
4. Power on the EUT and all the supporting units.
5. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
6. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization.
7. For each suspected emission, the antenna tower was scanned (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
8. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.

Conducted Measurement

1. For emission above 1GHz, conducted measurement method is used.
2. The transmitter is set to the lowest channel.
3. The transmitter output was connected to the spectrum analyzer via a cable and cable loss is used as the offset of the spectrum analyzer.
4. Set RBW to 100 KHz and VBW to 300 KHz, Then detector set to peak and max hold this trace.
5. The lowest band edges emission was measured and recorded.
6. The transmitter set to the highest channel and repeated 2~4.

4.7.4. Result

PASS

Radiated:

Below 30MHz:

No further spurious emissions has been found between 9kHz and 30 MHz.

30M- 1GHz:

802.11b mode:

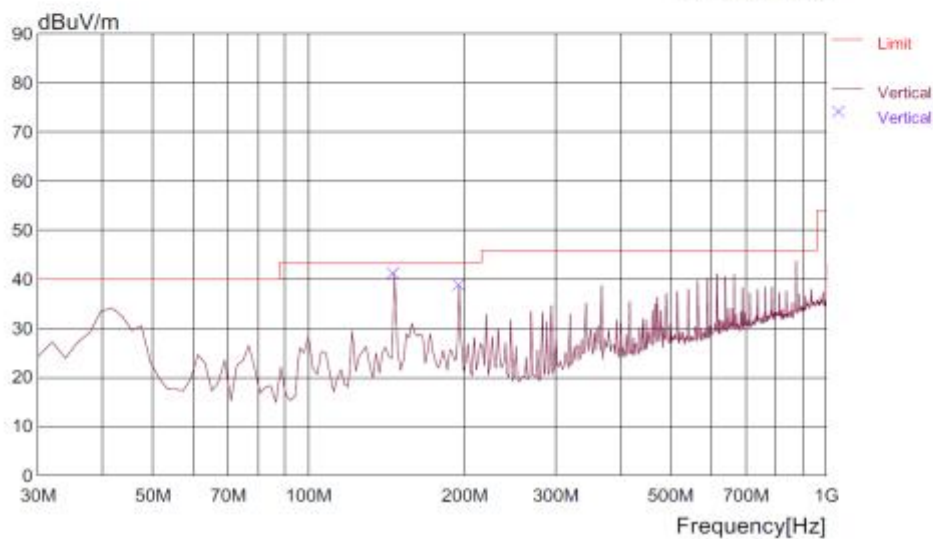
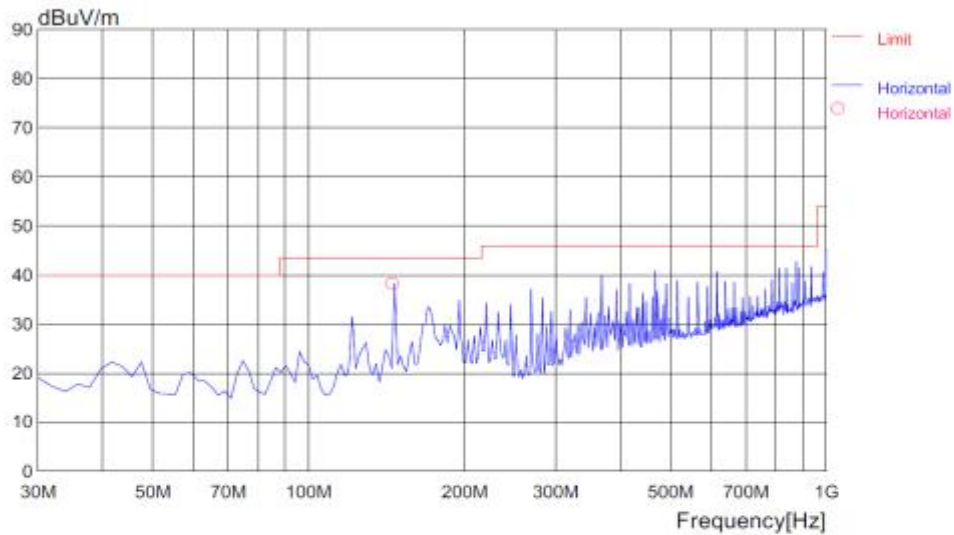
RADIATED EMISSION

Date : 2013/07/20 14:32:46

Trade Name	:		Document No.	:	
Model Name	:	X300A Wireless	Power Supply	:	AC 120V60Hz
Product Name	:	Active Speaker	Temp/Humi	:	27/55RH%
Test Condition	:	Tx, 11b mode	Operator	:	pang

Memo :

LIMIT : FCC Part15 Class B(3m)/USA



RADIATED EMISSION

Date : 2013/07/20 14:32:46

Trade Name : Model Name : X300A Wireless Product Name : Active Speaker Test Condition : Tx, 11b mode	Document No. : Power Supply : AC 120V60Hz Temp/Humi : 27/55RH% Operator : pang
---	---

Memo :

LIMIT : FCC Part15 Class B(3m)/USA

No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]	COMMENT
----- Horizontal -----											
1	146.633	50.5	11.5	7.8	31.6	38.2	43.5	5.3	200	98	
----- Vertical -----											
2	146.633	53.2	11.5	7.8	31.6	40.9	43.5	2.6	100	1	
3	195.231	49.0	13.2	8.0	31.6	38.6	43.5	4.9	100	224	

802.11g mode:

RADIATED EMISSION

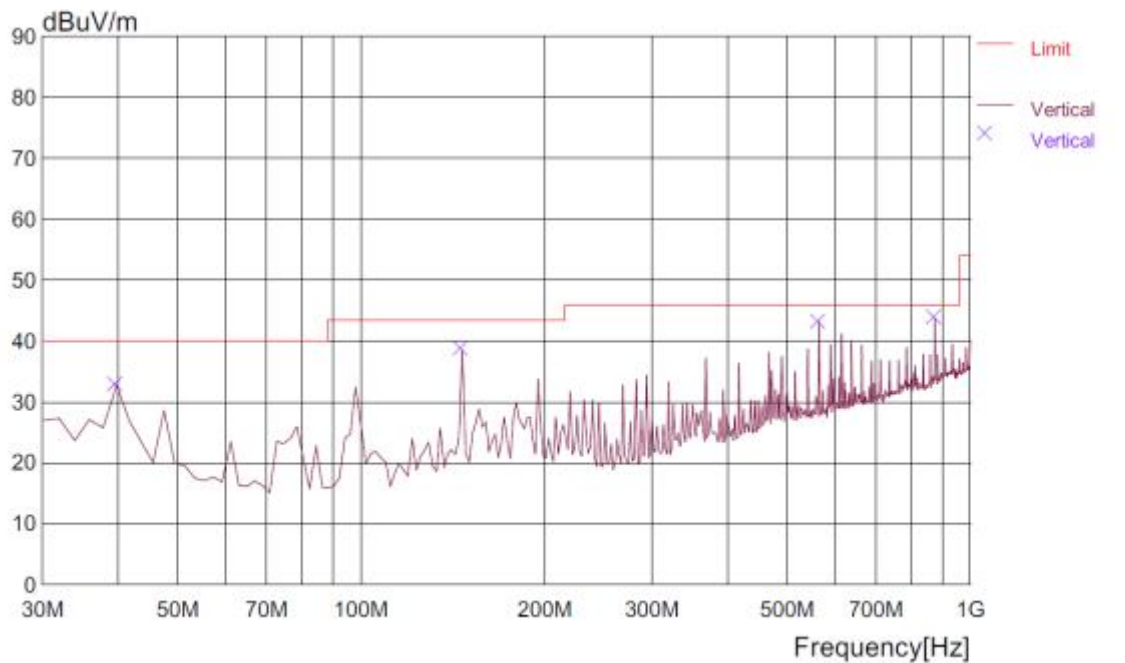
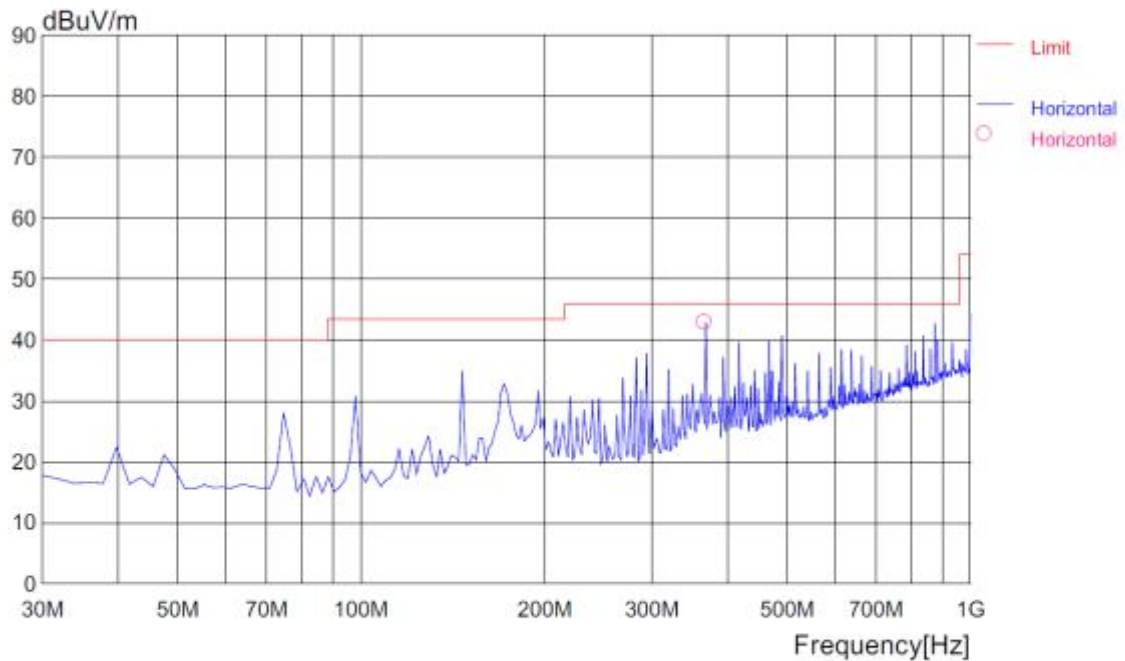
Date : 2013/07/20 16:17:23

Trade Name :
 Model Name : X300A Wireless
 Product Name : Active Speaker
 Test Condition : Tx, 11g mode

Document No. :
 Power Supply : AC 120V60Hz
 Temp/Humi : 27/55RH%
 Operator : pang

Memo :

LIMIT : FCC Part15 Class B(3m)/USA



RADIATED EMISSION

Date : 2013/07/20 16:17:23

Trade Name :	Document No. :
Model Name : X300A Wireless	Power Supply : AC 120V60Hz
Product Name : Active Speaker	Temp/Humi : 27/55RH%
Test Condition : Tx, 11g mode	Operator : pang

Memo :

LIMIT : FCC Part15 Class B(3m)/USA

No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA TABLE [cm]	COMMENT [DEG]
---- Horizontal ----										
1	368.236	49.5	15.9	9.0	31.5	42.9	46	3.1	100	67
---- Vertical ----										
2	39.719	46.1	11.3	6.9	31.6	32.7	40	7.3	100	253
3	146.633	50.8	11.5	7.8	31.6	38.5	43.5	5.0	100	359
4	564.569	45.5	19.3	9.7	31.3	43.2	46	2.8	100	7
5	875.594	41.3	22.9	10.7	31.1	43.8	46	2.2	199	22

Above 1GHz:

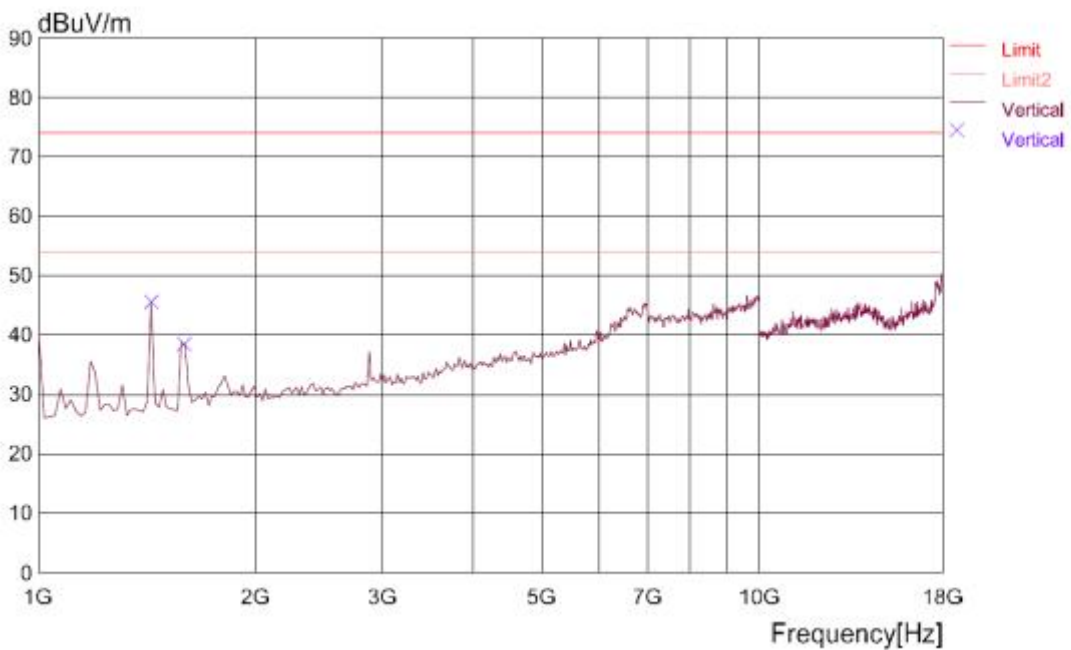
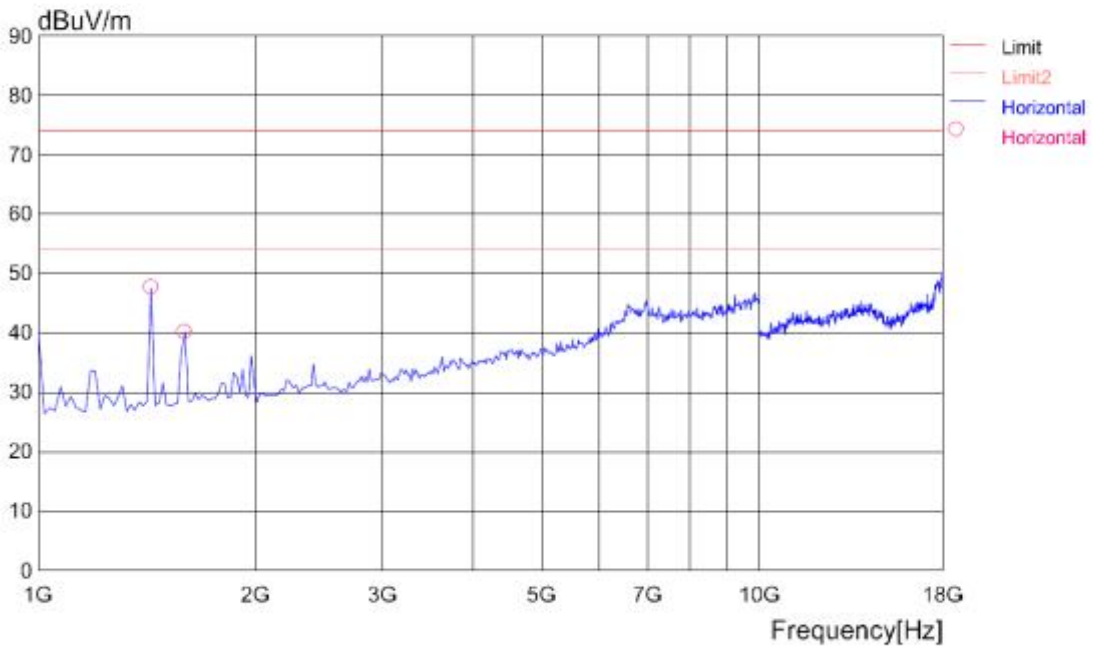
802.11b mode Channel Low:

RADIATED EMISSION

Date : 2013/07/02 15:31:54

Trade Name	:		Document No.	:	
Model Name	:	X300A Wireless	Power Supply	:	AC 120V/60Hz
Serial No.	:		Temp/Humi	:	27/55RH%
Test Condition	:	802.11b (CH-L) TX	Operator	:	pang
Memo	:				

LIMIT : FCC Part15 C transmitter spurious above1G(peak)
 FCC Part15 C transmitter spurious above1G(average)



No further spurious emissions found between 18GHz and 25GHz.

RADIATED EMISSION

Date : 2013/07/02 15:31:54

Trade Name	Document No.
Model Name : X300A Wireless	Power Supply : AC 120V/60Hz
Serial No. :	Temp/Humi : 27/55RH%
Test Condition : 802.11b (CH-L) TX	Operator : pang

Memo :

 LIMIT : FCC Part15 C transmitter spurious above1G(peak)
 FCC Part15 C transmitter spurious above1G(average)

Frequency [MHz]	Meter (PK) [dBuV]	Ant. Type	Detector	Antenna Factor [dB/m]	Total Loss [dB]	Level (PK) [dBuV/m]	Angle [degree]	Height [m]	Pola.	Limit [dBuV/m]	Margin [dB]
1432.867	54.6	HRN	PK	28.9	-36.0	47.5	203	2.00	Hori.	74.0	26.5
1432.867	52.5	HRN	PK	28.9	-36.0	45.4	200	2.00	Vert.	74.0	28.6
1595.192	46.9	HRN	PK	29.0	-35.7	40.2	257	1.00	Hori.	74.0	33.8
1595.192	45.0	HRN	PK	29.0	-35.7	38.3	256	1.00	Vert.	74.0	35.7

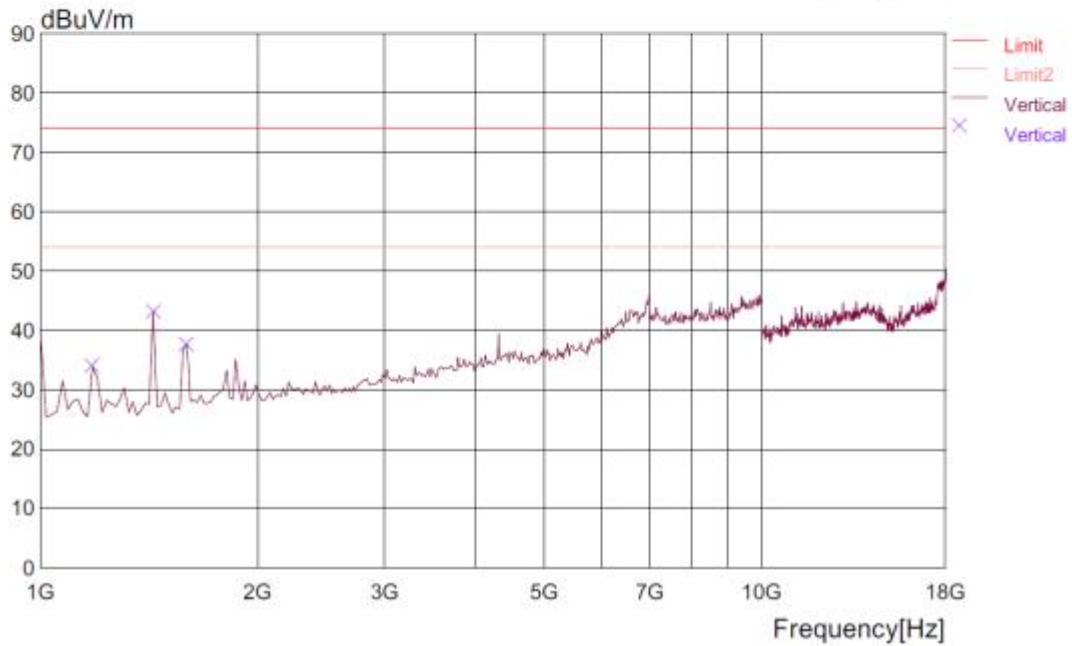
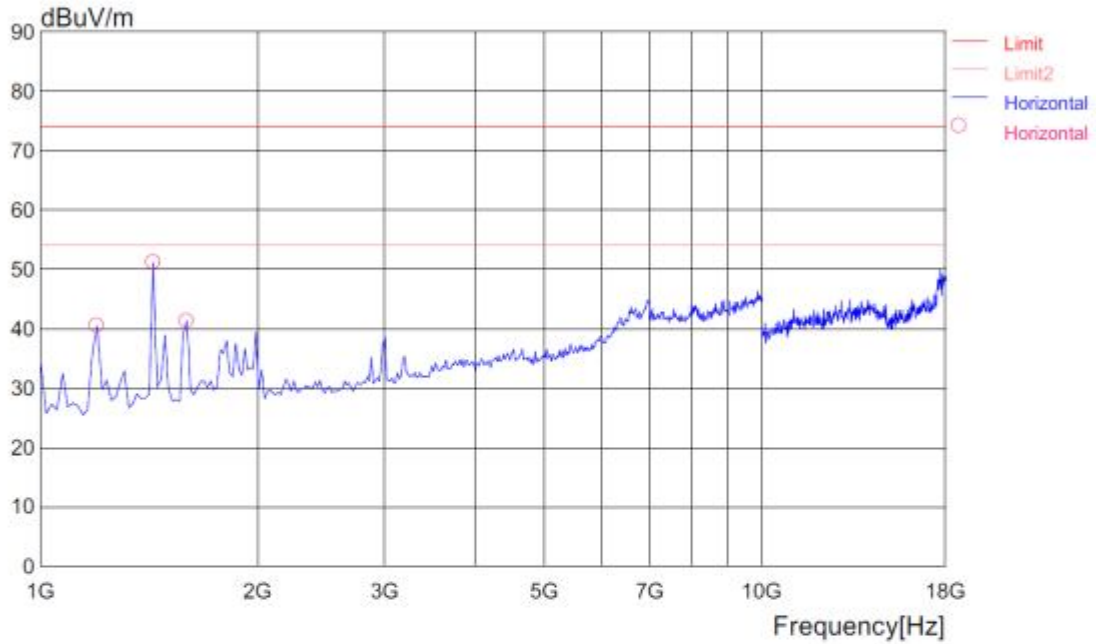
802.11b mode Channel Mid:

RADIATED EMISSION

Date : 2013/07/02 15:51

Trade Name : X300A Wireless	Document No. : AC 120V/60Hz
Model Name : X300A Wireless	Power Supply : 27/55RH%
Serial No. : TX mode	Temp/Humi : pang
Test Condition : TX mode	Operator : pang
Memo : 802.11b (CH-M)	

LIMIT : FCC Part15 C transmitter spurious above1G(peak)
 FCC Part15 C transmitter spurious above1G(average)



No further spurious emissions found between 18GHz and 25GHz.

RADIATED EMISSION

Date : 2013/07/02 15:55:19

Trade Name : X300A Wireless	Document No. :
Model Name : X300A Wireless	Power Supply : AC 120V/60Hz
Serial No. :	Temp/Humi : 27/55RH%
Test Condition : TX mode	Operator : pang
Memo : 802.11b (CH-M)	

LIMIT : FCC Part15 C transmitter spurious above1G(peak)
 FCC Part15 C transmitter spurious above1G(average)

Frequency [MHz]	Meter (PK) [dBuV]	Ant. Type	Detector	Antenna Factor [dB/m]	Total Loss [dB]	Level (PK) [dBuV/m]	Angle [degree]	Height [m]	Pola.	Limit [dBuV/m]	Margin [dB]
1180.361	42.3	HRN	PK	28.2	-36.7	33.8	286	1.00	Vert.	74.0	40.2
1198.397	48.8	HRN	PK	28.3	-36.7	40.4	286	1.00	Hori.	74.0	33.6
1432.867	50.1	HRN	PK	28.9	-36.0	43.0	315	1.00	Vert.	74.0	31.0
1432.867	58.2	HRN	PK	28.9	-36.0	51.1	224	1.00	Hori.	74.0	22.9
1595.192	48.0	HRN	PK	29.0	-35.7	41.3	315	1.00	Hori.	74.0	32.7
1595.192	44.4	HRN	PK	29.0	-35.7	37.7	38	1.00	Vert.	74.0	36.3

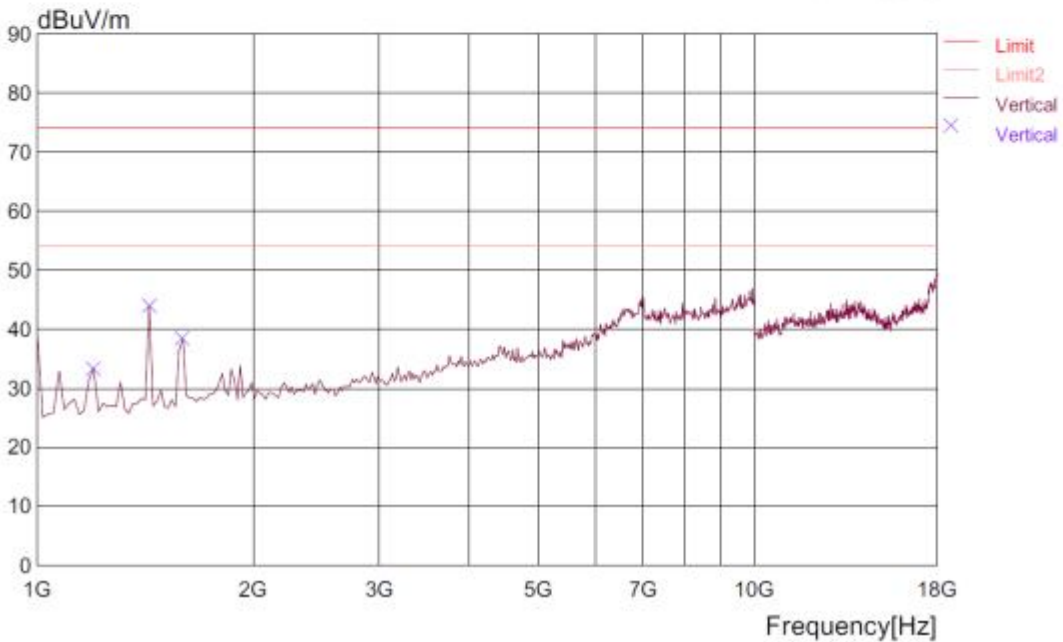
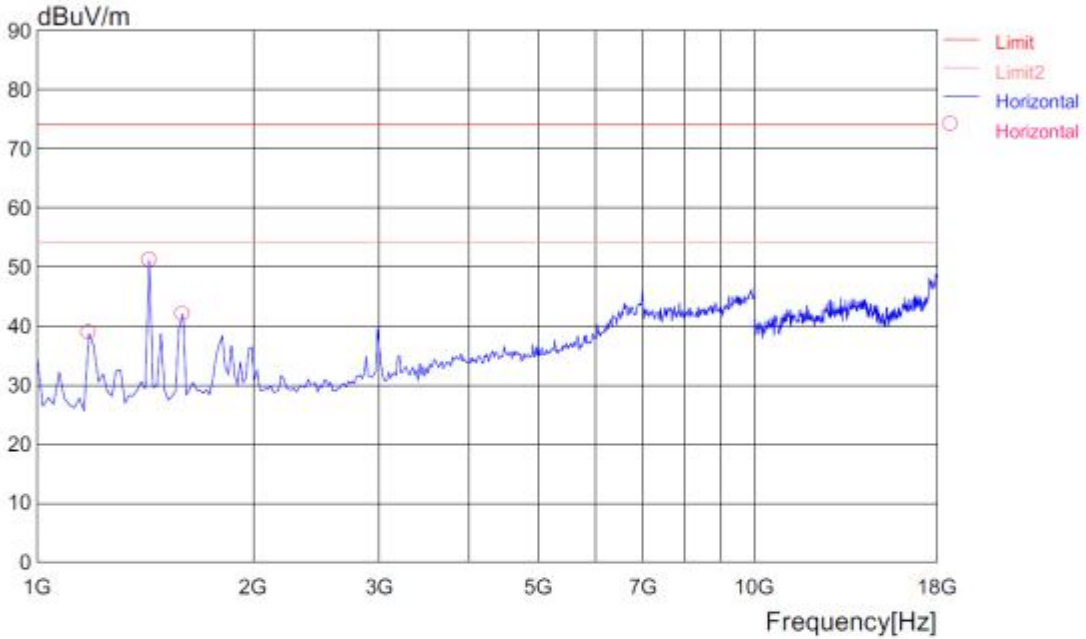
802.11b mode Channel High:

RADIATED EMISSION

Date : 2013/07/02 16:02:03

Trade Name	:	Document No.	:
Model Name	:	Power Supply	:
Serial No.	:	Temp/Humi	:
Test Condition	:	Operator	:
Memo		: 802.11b (CH-H)	

LIMIT : FCC Part15 C transmitter spurious above1G(peak)
 FCC Part15 C transmitter spurious above1G(average)



No further spurious emissions found between 18GHz and 25GHz.

RADIATED EMISSION

Date : 2013/07/02 16:02:03

Trade Name : X300A Wireless	Document No. : AC 120V/60Hz
Model Name : X300A Wireless	Power Supply : 27/55RH%
Serial No. : TX mode	Temp/Humi : pang
Test Condition : TX mode	Operator : pang
Memo : 802.11b (CH-H)	

LIMIT : FCC Part15 C transmitter spurious above1G(peak)
 FCC Part15 C transmitter spurious above1G(average)

Frequency [MHz]	Meter (PK) [dBuV]	Ant. Type	Detector	Antenna Factor [dB/m]	Total Loss [dB]	Level (PK) [dBuV/m]	Angle [degree]	Height [m]	Pola.	Limit [dBuV/m]	Margin [dB]
1180.361	47.2	HRN	PK	28.2	-36.7	38.7	262	1.00	Hori.	74.0	35.3
1198.397	41.7	HRN	PK	28.3	-36.7	33.3	154	1.00	Vert.	74.0	40.7
1432.867	58.2	HRN	PK	28.9	-36.0	51.1	233	1.00	Hori.	74.0	22.9
1432.867	51.1	HRN	PK	28.9	-36.0	44.0	315	1.00	Vert.	74.0	30.0
1595.192	48.8	HRN	PK	29.0	-35.7	42.1	315	1.00	Hori.	74.0	31.9
1595.192	45.0	HRN	PK	29.0	-35.7	38.3	261	1.00	Vert.	74.0	35.7

802.11g mode Channel Low:

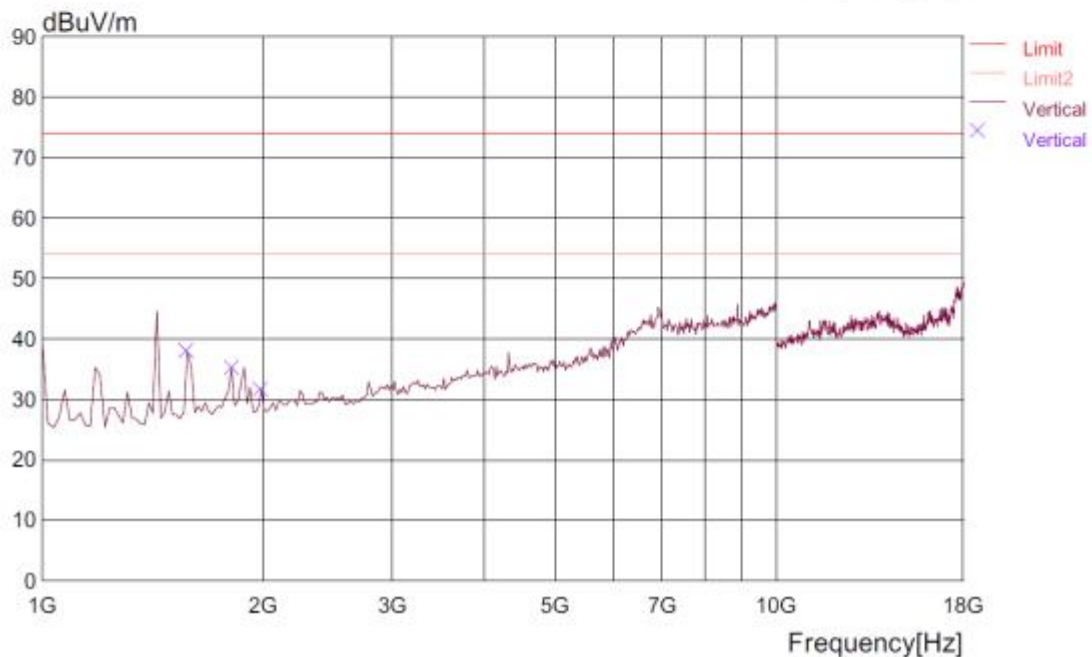
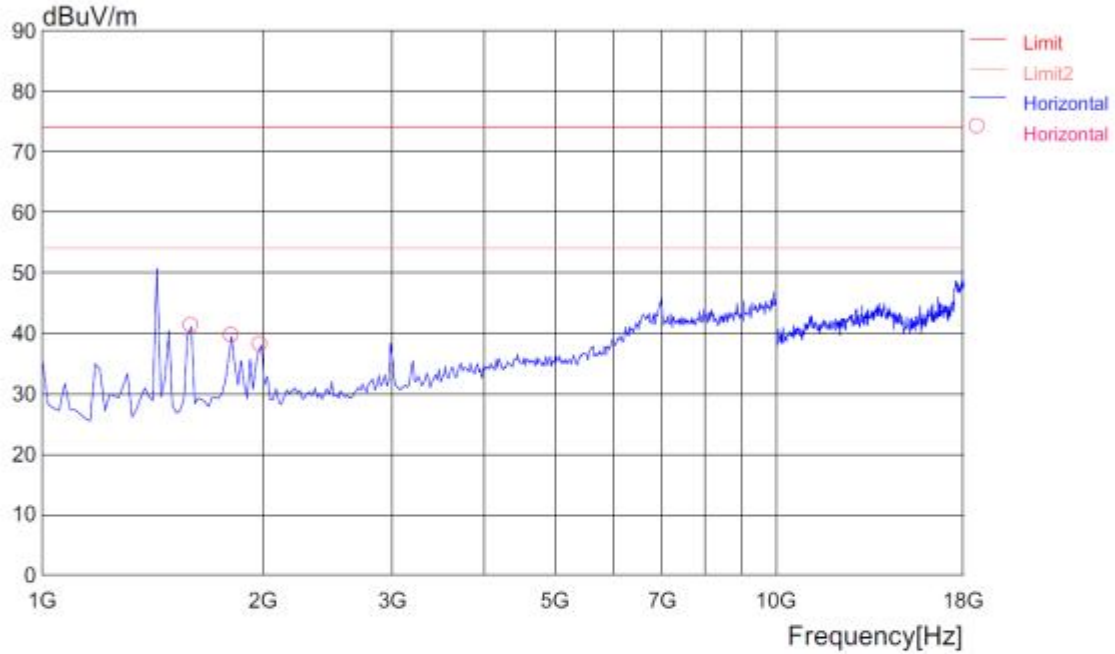
RADIATED EMISSION

Date : 2013/07/02 16:26:49

Trade Name : X300A Wireless	Document No. : AC 120V/60Hz
Model Name : X300A Wireless	Power Supply : 27/55RH%
Serial No. : TX mode	Temp/Humi : pang
Test Condition : TX mode	Operator : pang

Memo : 802.11g (CH-L)

LIMIT : FCC Part15 C transmitter spurious above1G(peak)
 FCC Part15 C transmitter spurious above1G(average)



No further spurious emissions found between 18GHz and 25GHz.

RADIATED EMISSION

Date : 2013/07/02 16:26:49

Trade Name	:		Document No.	:	
Model Name	:	X300A Wireless	Power Supply	:	AC 120V/60Hz
Serial No.	:		Temp/Humi	:	27/55RH%
Test Condition	:	TX mode	Operator	:	pang
Memo	:	802.11g (CH-L)			

LIMIT : FCC Part15 C transmitter spurious above1G(peak)
 FCC Part15 C transmitter spurious above1G(average)

Frequency [MHz]	Meter (PK) [dBuV]	Ant. Type	Detector	Antenna Factor [dB/m]	Total Loss [dB]	Level (PK) [dBuV/m]	Angle [degree]	Height [m]	Pola.	Limit [dBuV/m]	Margin [dB]
1577.156	44.6	HRN	PK	29.0	-35.7	37.9	63	1.00	Vert.	74.0	36.1
1595.192	47.8	HRN	PK	29.0	-35.7	41.1	323	1.00	Hori.	74.0	32.9
1811.626	44.7	HRN	PK	29.8	-35.0	39.5	302	1.00	Hori.	74.0	34.5
1811.626	40.3	HRN	PK	29.8	-35.0	35.1	270	1.00	Vert.	74.0	38.9
1991.987	42.6	HRN	PK	30.0	-34.6	38.0	319	1.00	Hori.	74.0	36.0
1991.987	36.1	HRN	PK	30.0	-34.6	31.5	356	1.00	Vert.	74.0	42.5

802.11g mode Channel Mid:

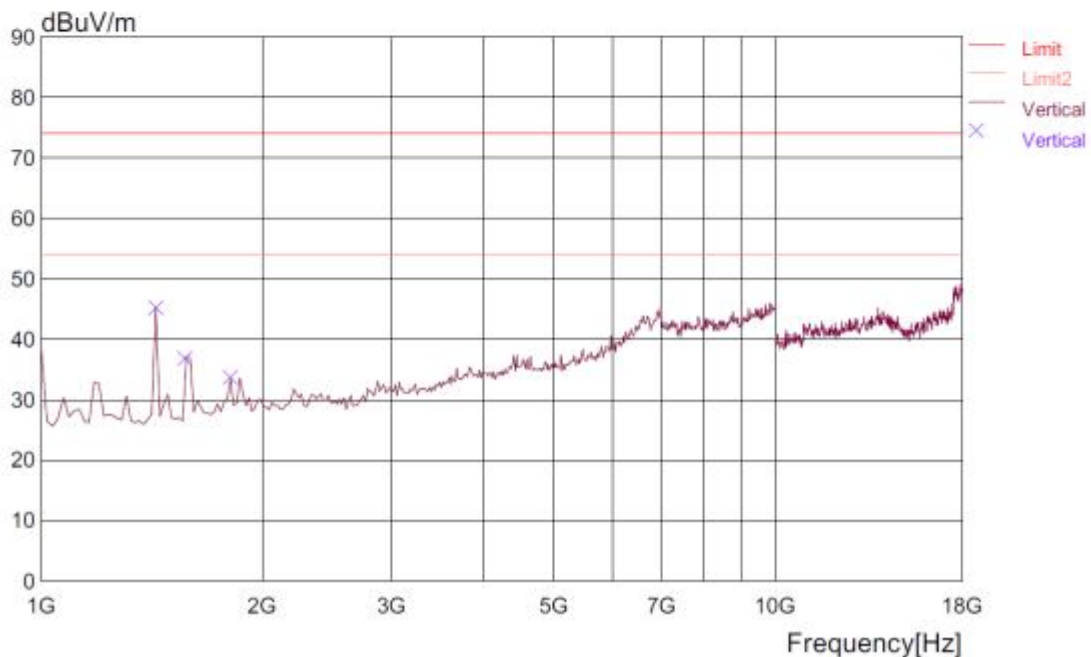
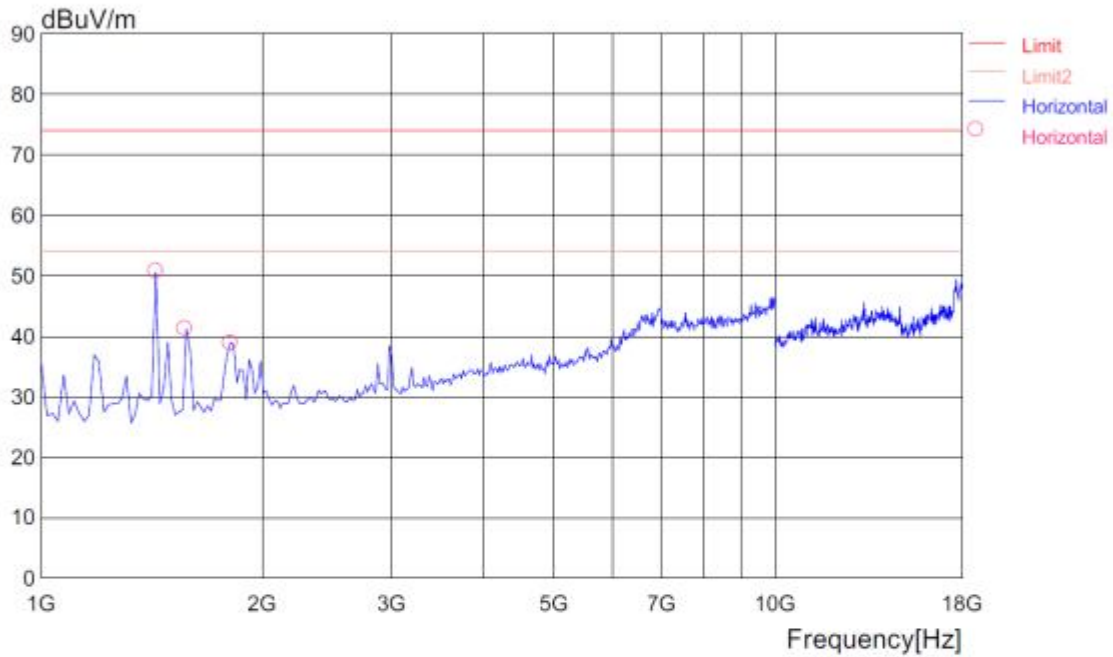
RADIATED EMISSION

Date : 2013/07/02 16:42:15

Trade Name : X300A Wireless	Document No. : AC 120V/60Hz
Model Name : X300A Wireless	Power Supply : 27/55RH%
Serial No. : TX mode	Temp/Humi : pang
Test Condition : TX mode	Operator : pang

Memo : 802.11g(CH-M)

LIMIT : FCC Part15 C transmitter spurious above1G(peak)
 FCC Part15 C transmitter spurious above1G(average)



No further spurious emissions found between 18GHz and 25GHz.

RADIATED EMISSION

Date : 2013/07/02 16:42:15

 Trade Name :
 Model Name : X300A Wireless
 Serial No. :
 Test Condition : TX mode

 Document No. :
 Power Supply : AC 120V/60Hz
 Temp/Humi : 27/55RH%
 Operator : pang

Memo : 802.11g(CH-M)

 LIMIT : FCC Part15 C transmitter spurious above1G(peak)
 FCC Part15 C transmitter spurious above1G(average)

Frequency [MHz]	Meter (PK) [dBuV]	Ant. Type	Detector	Antenna Factor [dB/m]	Total Loss [dB]	Level (PK) [dBuV/m]	Angle [degree]	Height [m]	Pola.	Limit [dBuV/m]	Margin [dB]
1432.867	57.7	HRN	PK	28.9	-36.0	50.6	232	1.00	Hori.	74.0	23.4
1432.867	52.2	HRN	PK	28.9	-36.0	45.1	200	1.00	Vert.	74.0	28.9
1577.156	47.9	HRN	PK	29.0	-35.7	41.2	195	1.00	Hori.	74.0	32.8
1577.156	43.6	HRN	PK	29.0	-35.7	36.9	179	1.00	Vert.	74.0	37.1
1811.626	44.2	HRN	PK	29.8	-35.0	39.0	302	1.00	Hori.	74.0	35.0
1811.626	38.6	HRN	PK	29.8	-35.0	33.4	274	1.00	Vert.	74.0	40.6

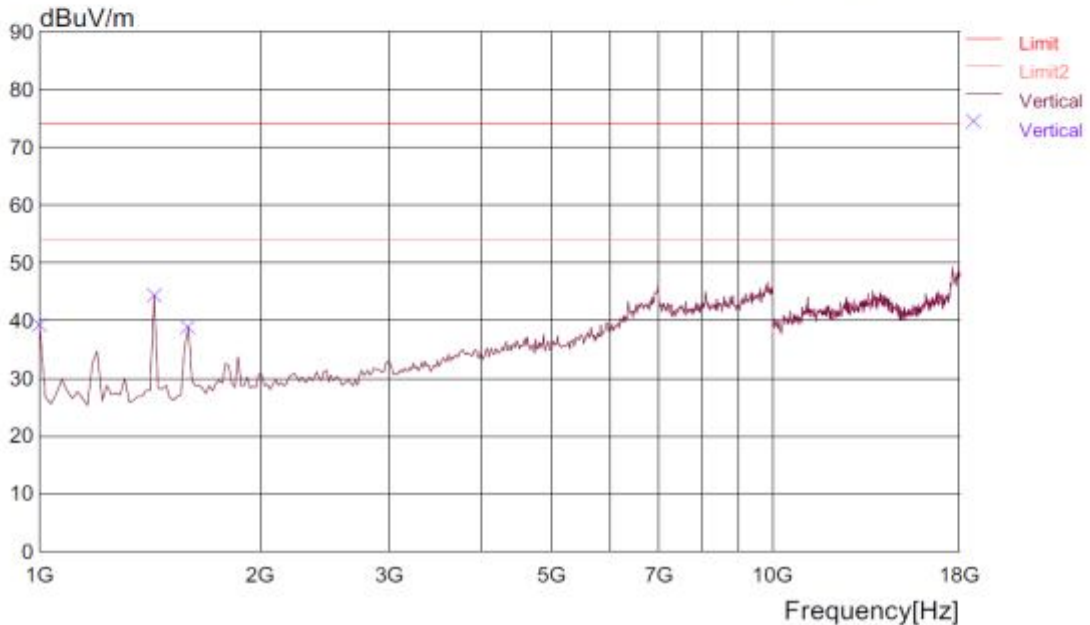
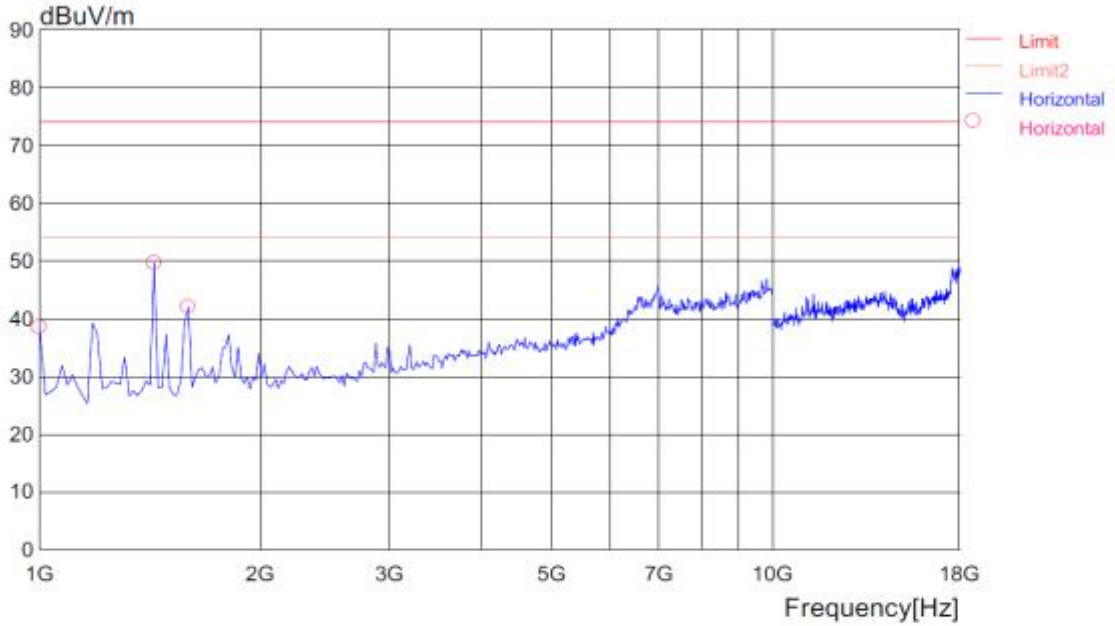
802.11g mode Channel High:

RADIATED EMISSION

Date : 2013/07/02 16:

Trade Name : X300A Wireless	Document No. : AC 120V/60Hz
Model Name : X300A Wireless	Power Supply : 27/55RH%
Serial No. : TX mode	Temp/Humi : pang
Test Condition : TX mode	Operator : pang
Memo : 802.11g(CH-H)	

LIMIT : FCC Part15 C transmitter spurious above1G(peak)
 FCC Part15 C transmitter spurious above1G(average)



No further spurious emissions found between 18GHz and 25GHz.

RADIATED EMISSION

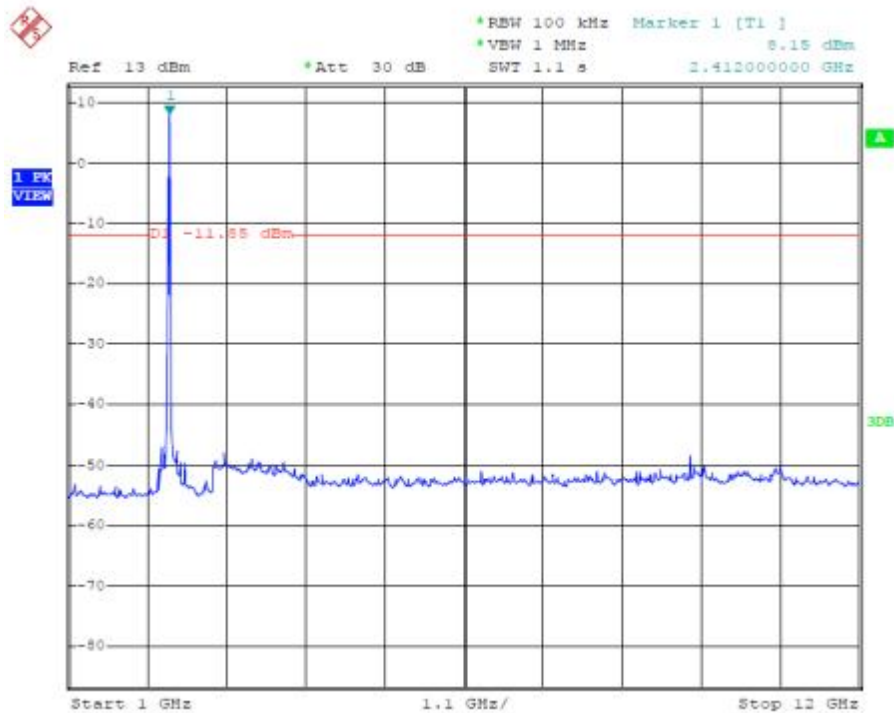
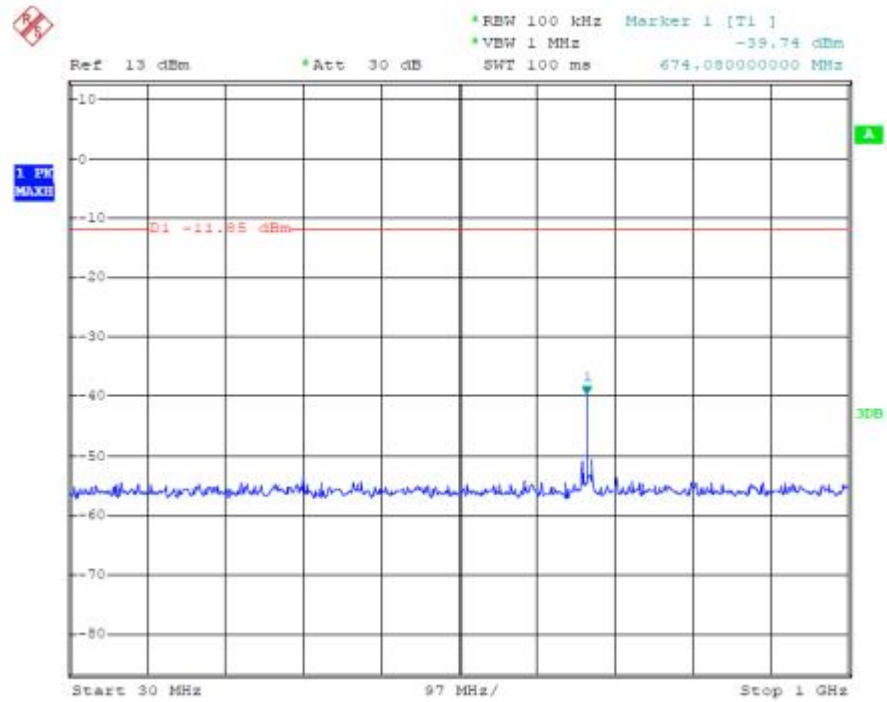
Date : 2013/07/02 16:46:03

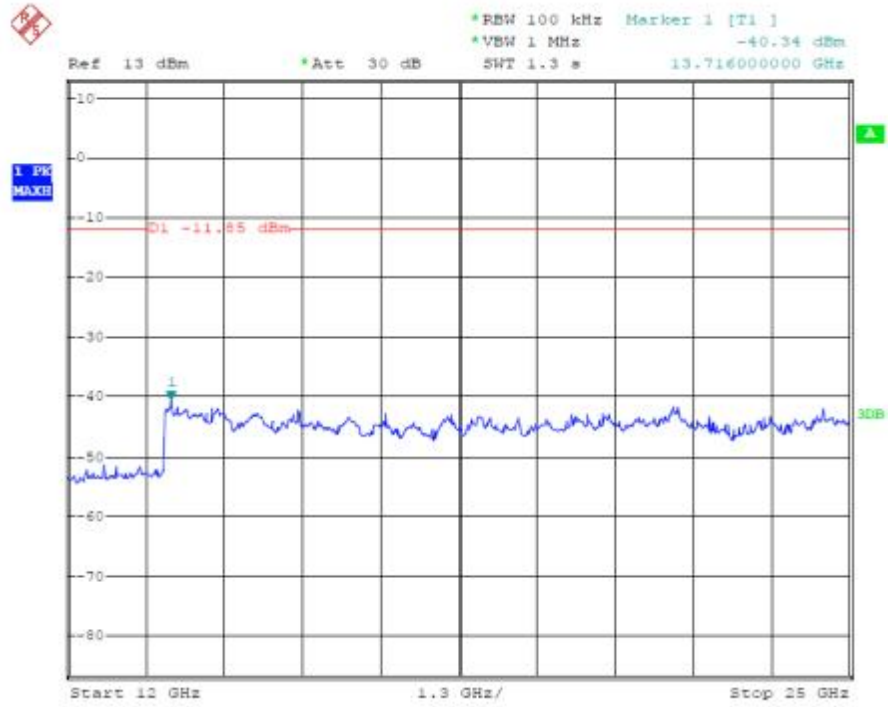
Trade Name : X300A Wireless	Document No. : AC 120V/60Hz
Model Name : X300A Wireless	Power Supply : 27/55RH%
Serial No. :	Temp/Humi : pang
Test Condition : TX mode	Operator :
Memo : 802.11g(CH-H)	

LIMIT : FCC Part15 C transmitter spurious above1G(peak)
 FCC Part15 C transmitter spurious above1G(average)

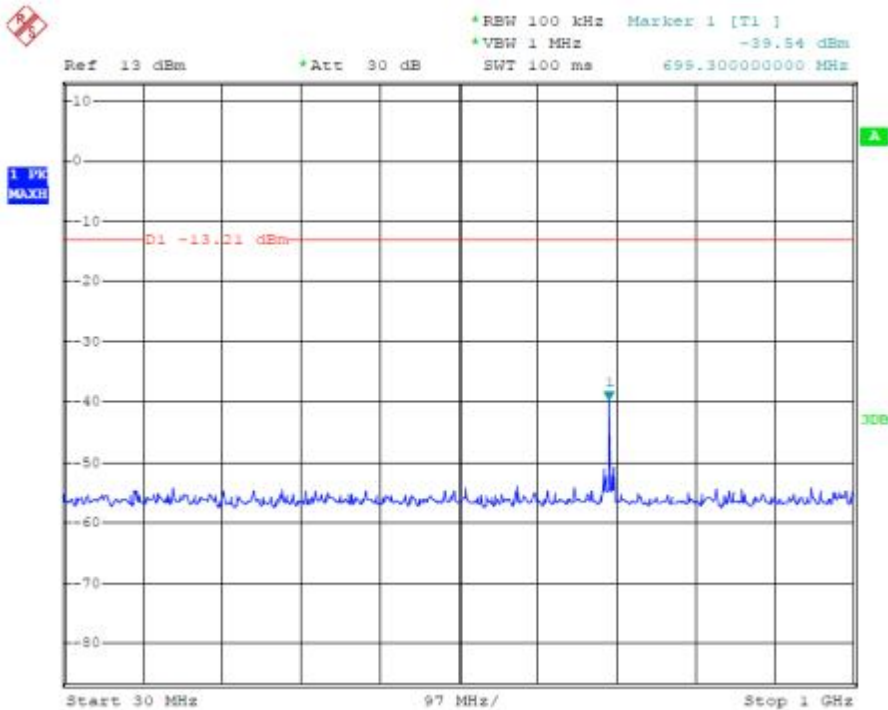
Frequency [MHz]	Meter (PK) [dBuV]	Ant. Type	Detector	Antenna Factor [dB/m]	Total Loss [dB]	Level (PK) [dBuV/m]	Angle [degree]	Height [m]	Pola.	Limit [dBuV/m]	Margin [dB]
1000.000	48.2	HRN	PK	27.3	-37.2	38.3	208	2.00	Hori.	74.0	35.7
1000.000	48.8	HRN	PK	27.3	-37.2	38.9	92	1.00	Vert.	74.0	35.1
1432.867	56.8	HRN	PK	28.9	-36.0	49.7	249	2.00	Hori.	74.0	24.3
1432.867	51.4	HRN	PK	28.9	-36.0	44.3	183	1.00	Vert.	74.0	29.7
1595.192	48.7	HRN	PK	29.0	-35.7	42.0	43	2.00	Hori.	74.0	32.0
1595.192	45.5	HRN	PK	29.0	-35.7	38.8	335	1.00	Vert.	74.0	35.2

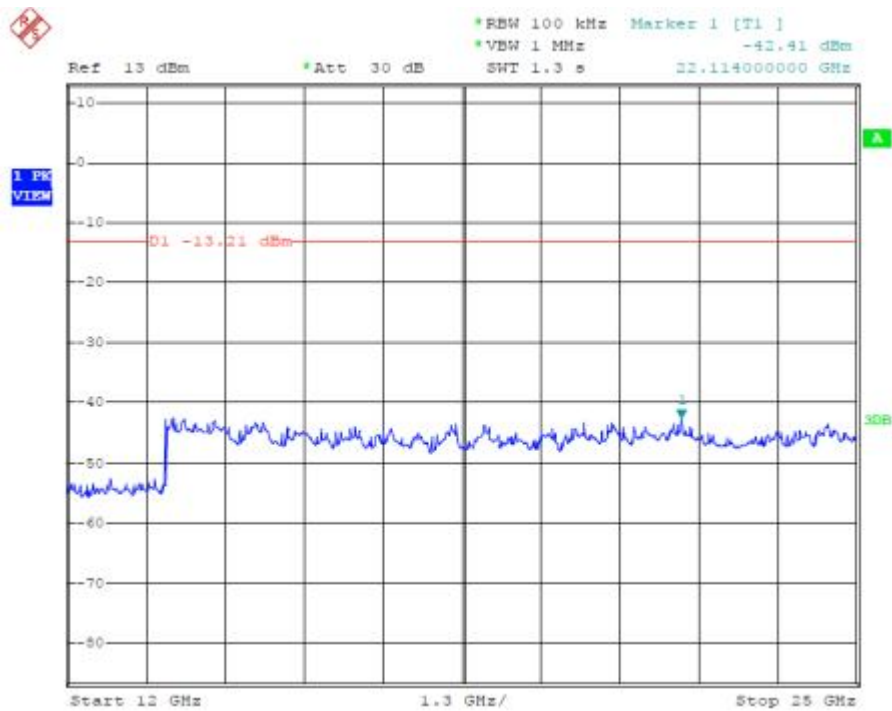
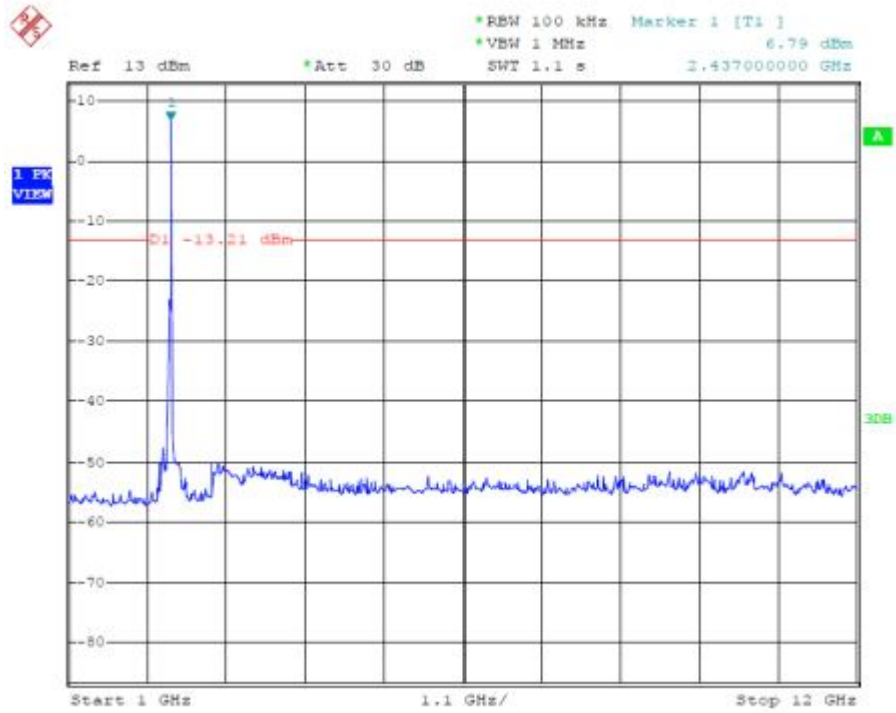
Conducted:
802.11b mode Channel LOW :



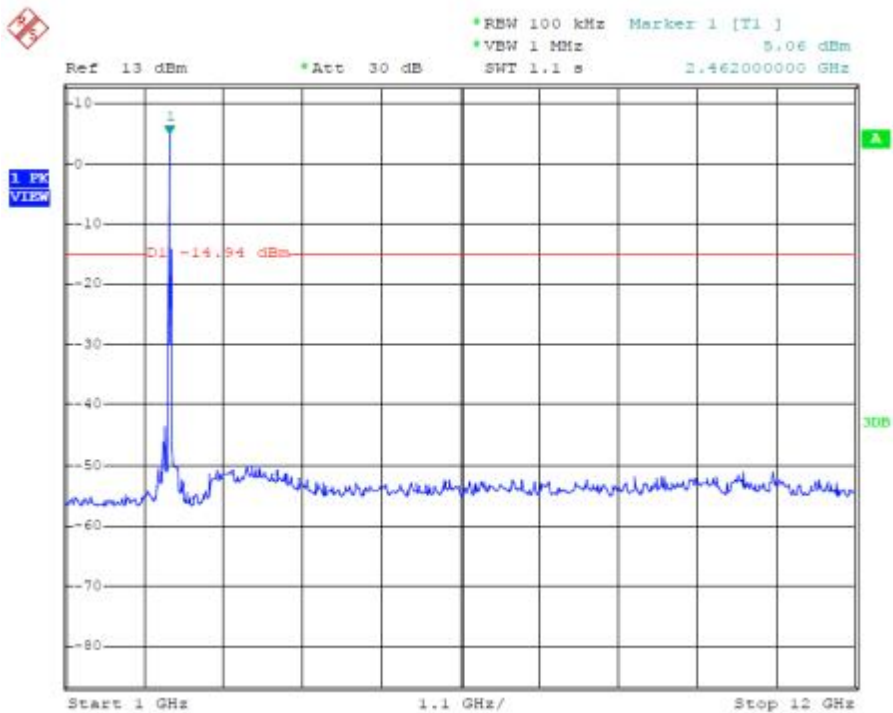
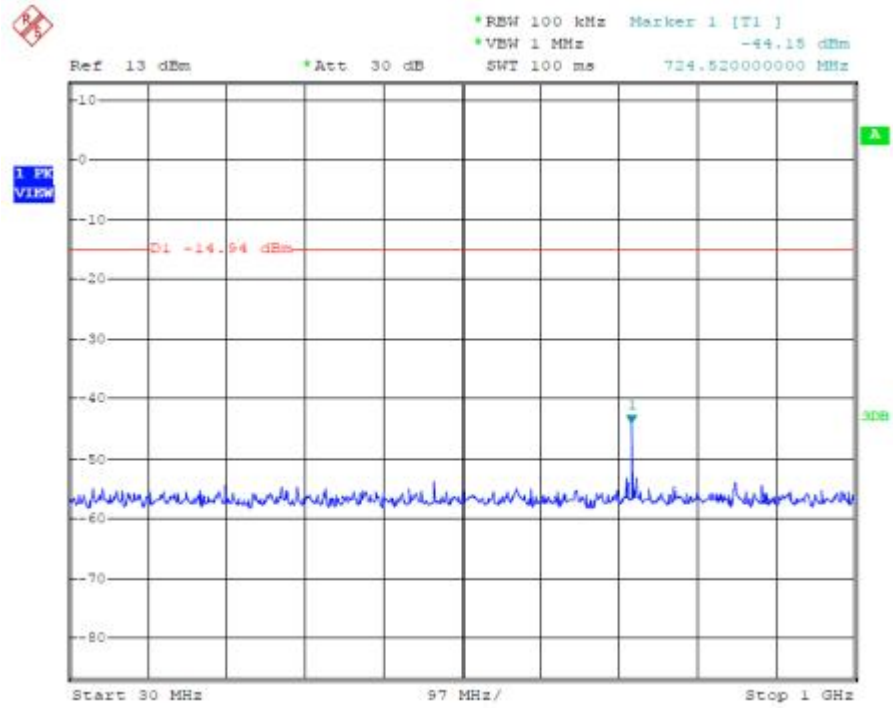


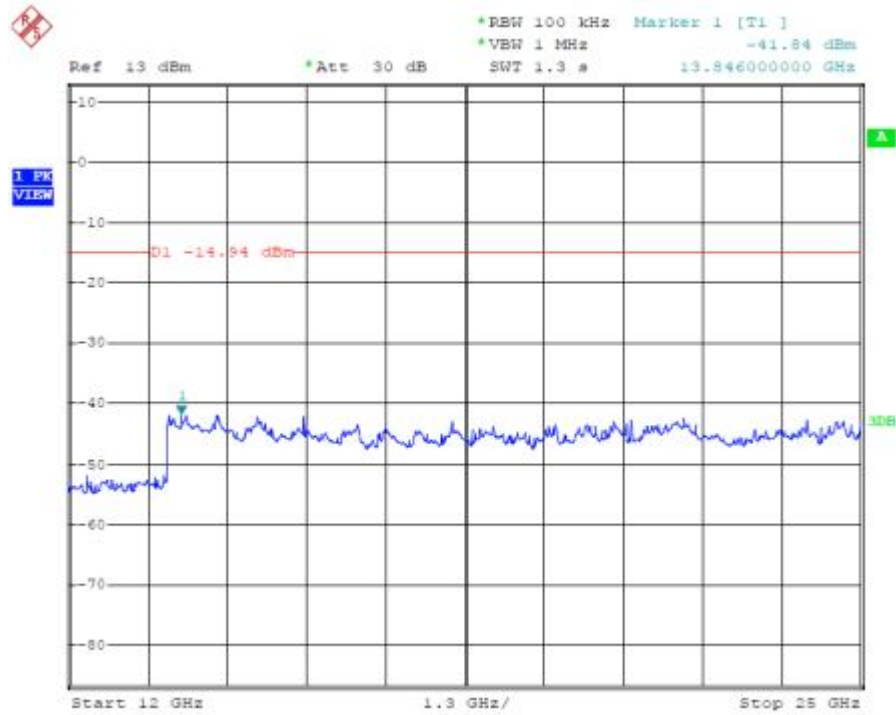
Channel MID :



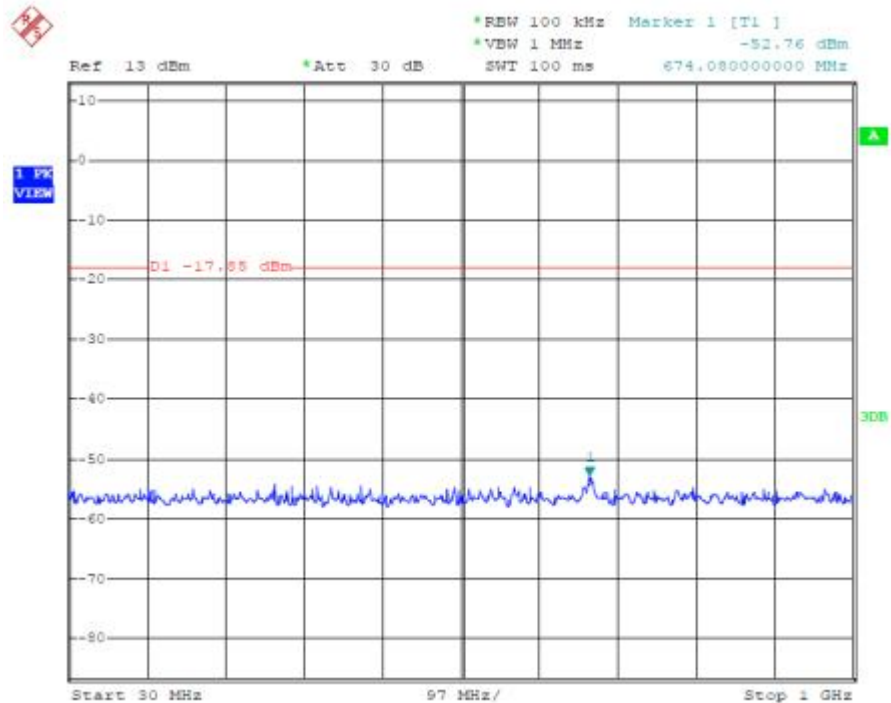


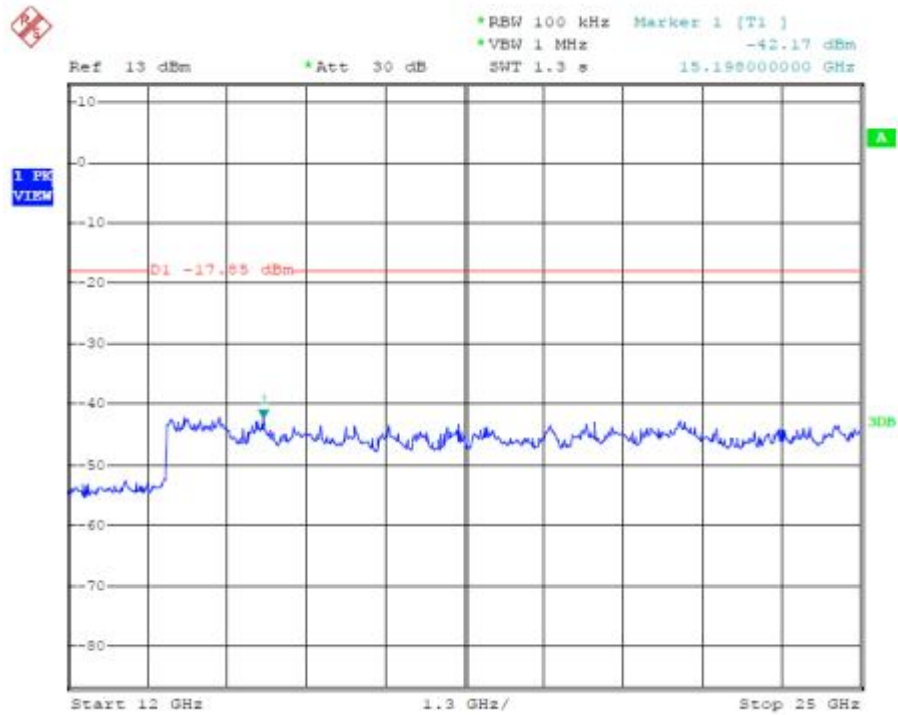
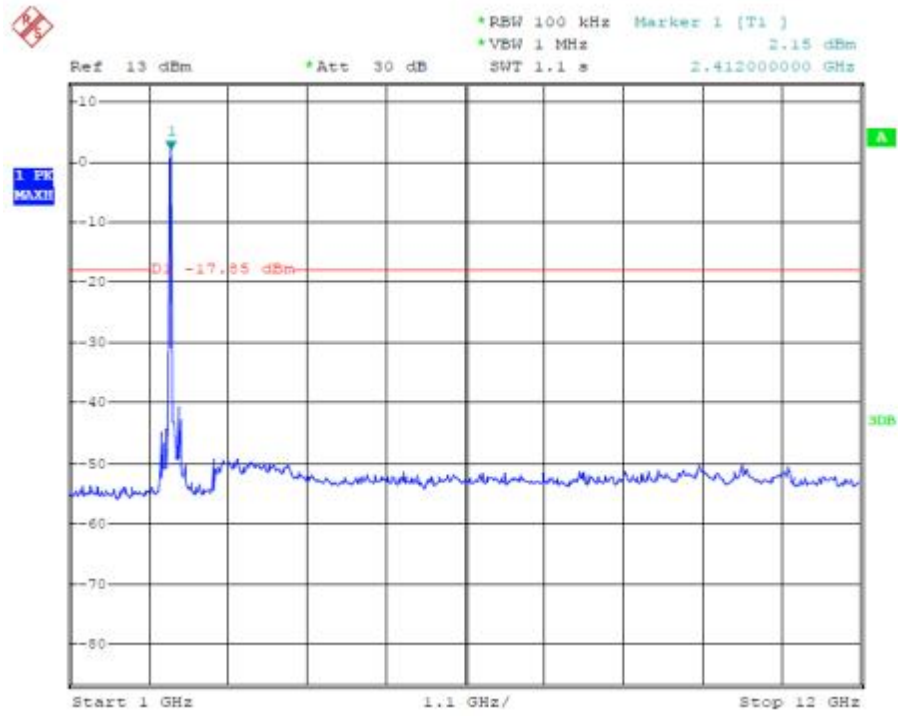
Channel HIG :



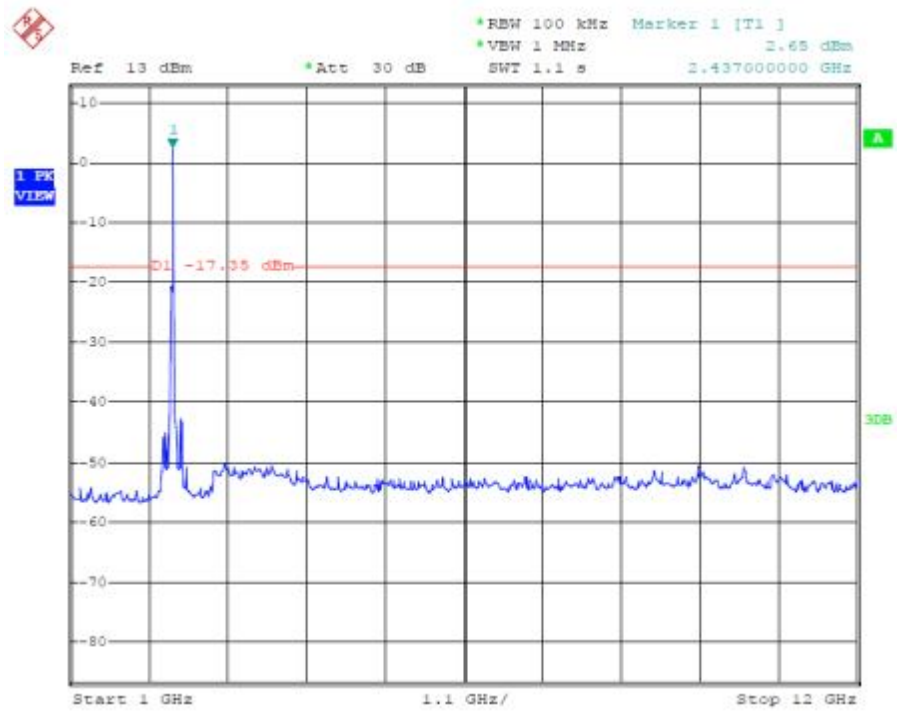
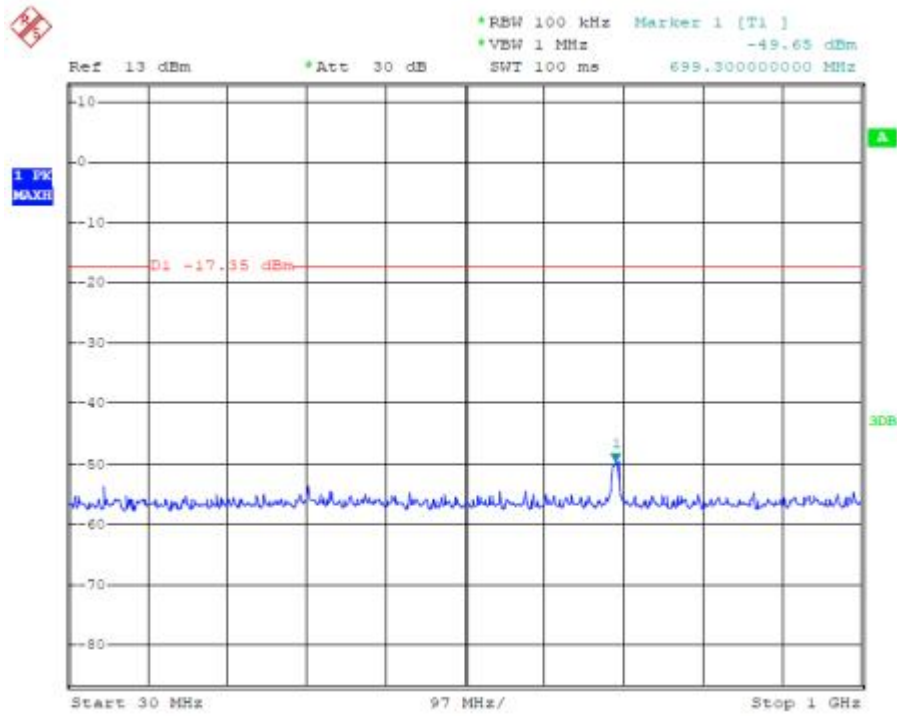


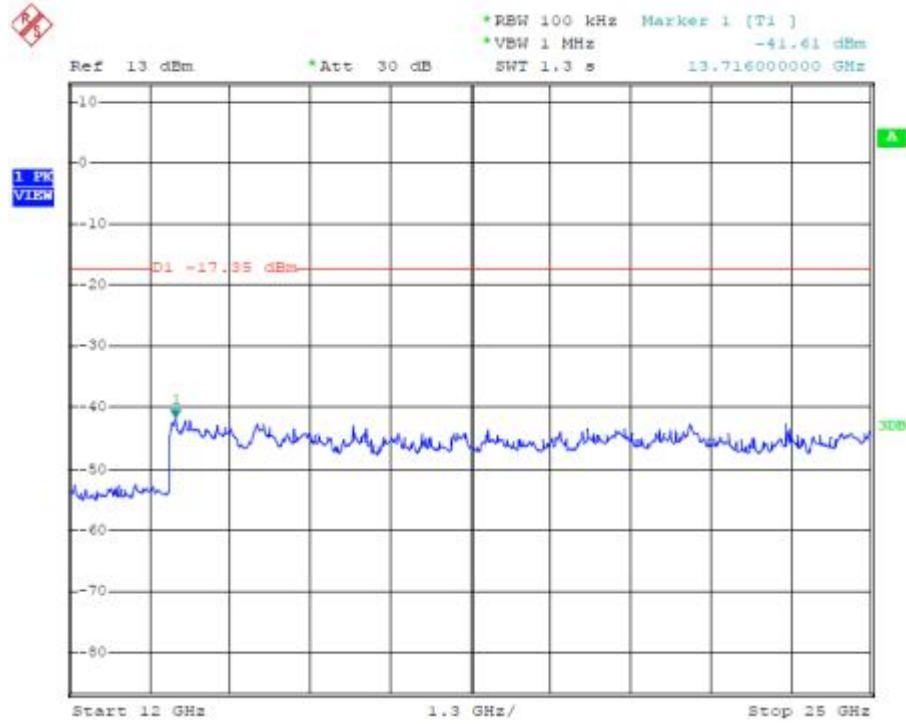
802.11g mode Channel LOW :



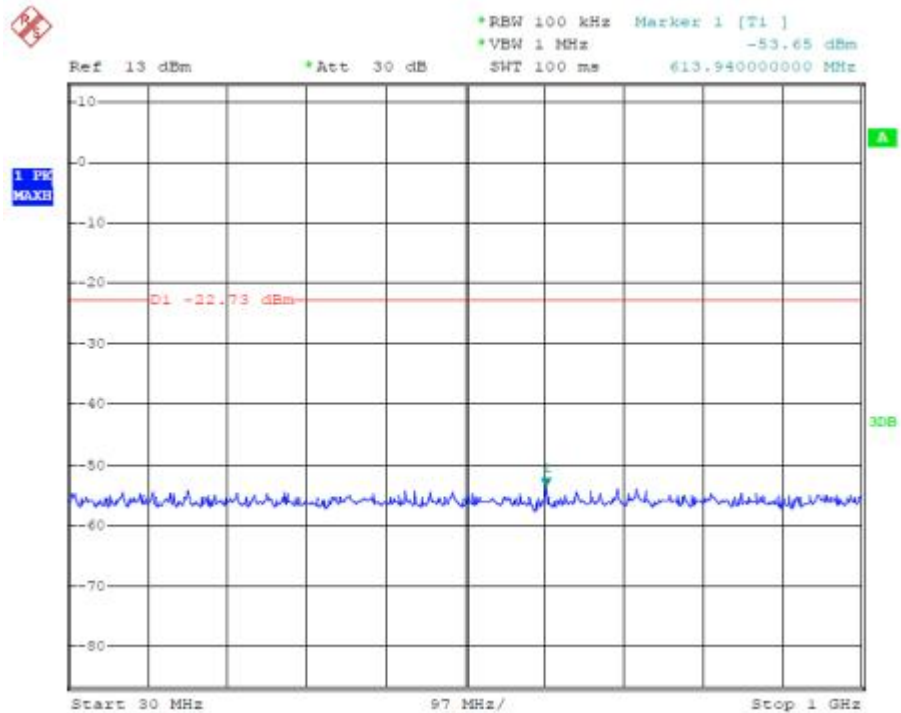


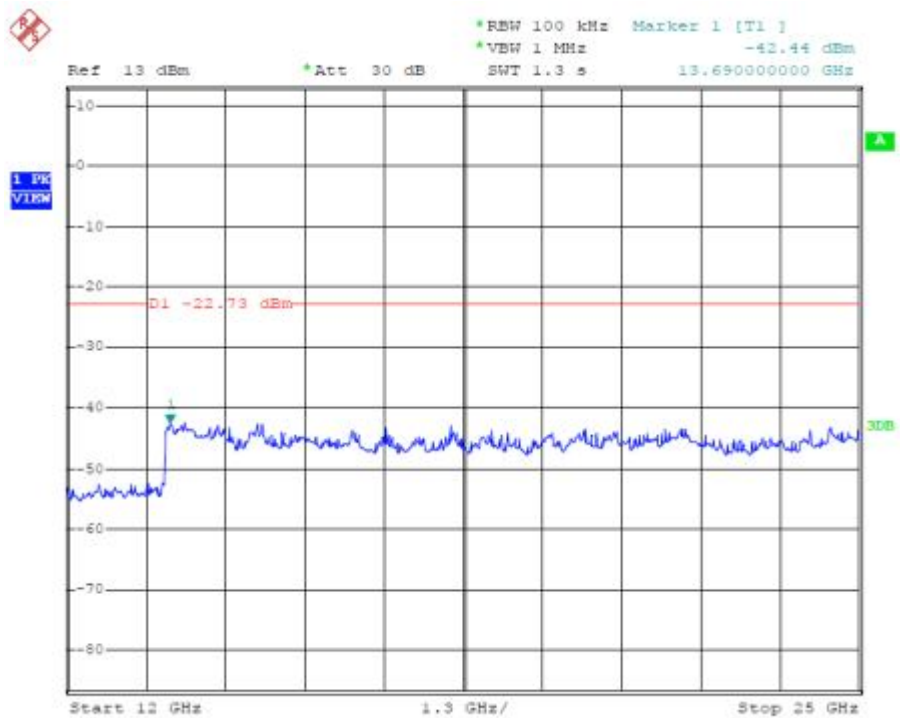
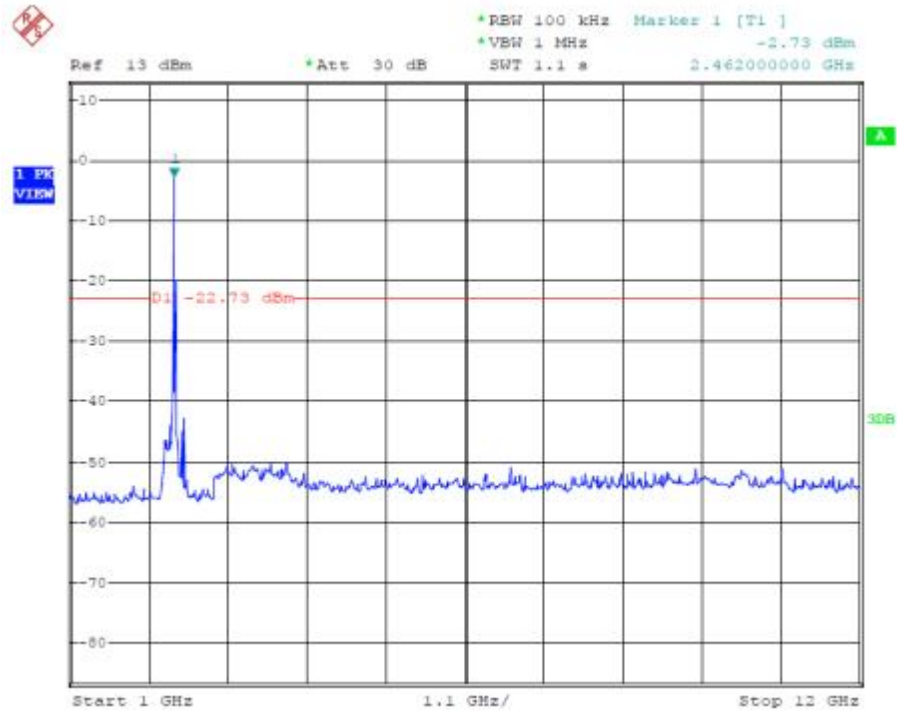
Channel MID :





Channel HIG :





5. Test Setup

5.1 Ancillary and Accessory Equipment Used

No.	Description	Specification	Quantity
1.	Laptop	DELL, M/N:Vostro 1400	1
2.	WLAN router	D-link, M/N:DIR-805	1

5.2 Photographs of the Test Configuration

5.2.1 Radiated emission

Below 1GHz:



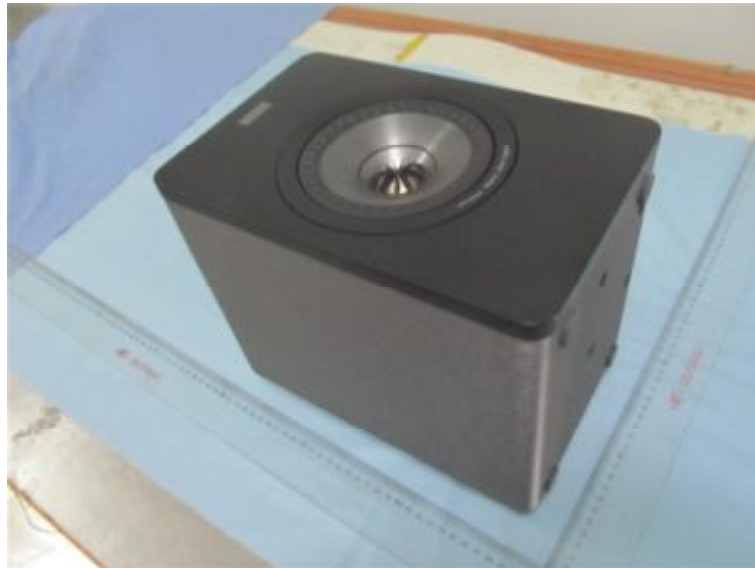
Above 1GHz:



5.2.2 Conducted emission



5.3 Photographs of the EUT



Enclosure of EUT



Enclosure of EUT



Cables

6. Equipment List

No.	Equipment	Manufacturer	Model	Serial No.	Last Cal. Date	Cal. Period
1	Precision Biconical Antenna	TDK Co.	PBA-2030	090500	2012-09-18	1Y
2	Precision Log Periodic Antenna	TDK Co.	PLP-3003	061001	2012-09-18	1Y
3	Hybrid Log Periodic Antenna	TDK	HLP-3003C	130174	2012-09-18	1Y
4	Horn antenna	TDK	HRN-0118	130174	2013-04-07	1Y
5	Horn antenna	TDK	HRN-0118	130186	2013-04-07	1Y
6	Attenuator 6 dB	Agilent	8491B	MY39260147	2012-09-18	1Y
7	Preamplifier	TDK Sonoma	310	242803	2013-04-07	1Y
8	Preamplifier	ELENA	EAU-3718 GXA	A070701	2013-04-07	1Y
9	EMI Receiver	Rohde & Schwarz	ESIB26	100234	2013-04-07	1Y
10	EMI Receiver	Rohde & Schwarz	ESCS30	100350	2013-04-07	1Y
11	Spectrum Analyzer	Agilent	E4403B	MY44210199	2013-04-07	1Y
12	Art. Mains Network	EMCO	3816/2	00044921	2013-04-07	1Y
13	Transient Limiter(10 dB)	Agilent	11947A	3107A03736	2013-04-07	1Y
14	Personal Computer	HP	DX2000MT	MXD4250 FZM	N/A	
15	Personal Computer	HP	DX2000MT	MXD4130 B2N	N/A	
16	Semi-Anechoic Chamber	TDK Co.	N/A	N/A	2013-04-07	1Y
17	Shielded Room	TDK Co.	N/A	N/A	N/A	
18	Loop Antenna	EMCO	6502	9107-2440	2013-04-07	1Y

7. Test Uncertainty

Test	Range	Confidence Level	Calculated Uncertainty
Radiated emission(3m)	9kHz-30MHz	95%	3.6dB
Radiated emission(3m)	30-1000MHz	95%	4.3dB
Radiated emission(3m)	1-25GHz	95%	5.4dB
Conducted emission	0.15-30MHz	95%	3.3dB
RF power, Spurious(conducted)	30M-25GHz	95%	3.0dB

8. Appendix

8.1 Confirmation of Compliance within the Limits

8.1.1 Method of calculating measurement result

Radiated Emission

	Reading	+	Antenna factor	+	Cable loss	-	Gain	=	Result
Example	45.9	+	11.3	+	6.9	-	31.6	=	32.5

Conducted Emission

	Reading	+	C. FACTOR	=	Result
Example	30.6	+	10.0	=	40.6