SPORTON International Inc.
No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, TaoYuan Hsien, Taiwan, R.O.C.
Ph: 886-3-327-3456 / FAX: 886-3-327-0973 / www.sporton.com.tw

FCC RADIO TEST REPORT

Applicant's company	**Sinpro Enterprise Co.,Ltd.**
Applicant Address	6F,No.141, Duanhua N.Road., Taipei 10549 Taiwan
FCC ID	**XBJLM2455ER-EU-EC**
Manufacturer's company	**AboCom Systems, Inc**
Manufacturer Address	No.77, Yu-Yih Rd., Chu-Nan, Miao-Lih County 35059, Taiwan R.O.C.

Product Name	Sinpro Zigbee module
Brand Name	Sinpro logo
Model Name	LM2455-ER, LM2455-EU, LM2455-EC
Test Rule	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2405 ~ 2475MHz
Received Date	Apr. 16, 2009
Final Test Date	Jun. 02, 2009
Submission Type	Original Equipment
Multiple Listing	Please refer to section 3.7

Statement

Test result included is only for the IEEE 802.15.4 ZigBee part of the product.

The test result in this report refers exclusively to the presented test model / sample.

Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.

The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI C63.4-2003** and **47 CFR FCC Part 15 Subpart C**.

The test equipment used to perform the test is calibrated and traceable to NML/ROC.

Testing Laboratory
1190

Table of Contents

History of This Test Report

Original Issue Date: Jun. 10, 2009

Report No.: FR941605

■ No additional attachment.

□ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

Certificate No.: CB9806056

1. CERTIFICATE OF COMPLIANCE

Product Name	:	Sinpro Zigbee module
Brand Name	:	Sinpro logo
Model Name	:	LM2455-ER, LM2455-EU, LM2455-EC
Applicant	:	Sinpro Enterprise Co.,Ltd.
Test Rule Part(s)	:	47 CFR FCC Part 15 Subpart C § 15.247

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Apr. 16, 2009 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.

Jordan Hsiao 2009. 6.12

Jordan Hsiao

SPORTON INTERNATIONAL INC.

2. SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart C				
Part	**Rule Section**	**Description of Test**	**Result**	**Under Limit**
4.1	15.207	AC Power Line Conducted Emissions	Complies	4.45 dB
4.2	15.247(b)(3)	Maximum Conducted Output Power	Complies	21.62 dB
4.3	15.247(e)	Power Spectral Density	Complies	12.78 dB
4.4	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
4.5	15.247(d)	Radiated Emissions	Complies	0.85 dB
4.6	15.247(d)	Band Edge Emissions	Complies	8.76 dB
4.7	15.203	Antenna Requirements	Complies	-

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.3dB	Confidence levels of 95%
Maximum Conducted Output Power	±0.8dB	Confidence levels of 95%
Power Spectral Density	±0.5dB	Confidence levels of 95%
6dB Spectrum Bandwidth	$\pm 8.5\times10^{-8}$	Confidence levels of 95%
Radiated Emissions (9kHz~30MHz)	±0.8dB	Confidence levels of 95%
Radiated Emissions (30MHz~1000MHz)	±1.9dB	Confidence levels of 95%
Radiated / Band Edge Emissions (1GHz~18GHz)	±1.9dB	Confidence levels of 95%
Radiated Emissions (18GHz~40GHz)	±1.9dB	Confidence levels of 95%
Temperature	±0.7℃	Confidence levels of 95%
Humidity	±3.2%	Confidence levels of 95%
DC / AC Power Source	±1.4%	Confidence levels of 95%

3. GENERAL INFORMATION

3.1. Product Details

Items	Description
Power Type	From Host System
Modulation	DSSS (QPSK)
Data Rate (kbps)	DSSS (250kbps)
Frequency Range	2405 ~ 2475MHz
Channel Number	15
Channel Band Width (99%)	21.22 kHz
Conducted Output Power	8.38 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

3.2. Accessories

N/A

3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	WALSIN	RFANT8010080A3T	Chip Antenna	NA	2.0
2	JOYMAX	IWX152RSXXX-300	Dipole Antenna	Reversed-SMA	3.6
3	JOYMAX	IWX-2411RSXX	Dipole Antenna	Reversed-SMA	1.6
4	JOYMAX	IWF-152XMPAX-711	Dipole Antenna	UFL	3.2
5	JOYMAX	IWF-241XMPEX-711	Dipole Antenna	UFL	1.3

Note:

Five antennas are provided to this EUT, please refer to the table with combination of their antenna type and connector type.

Due to Ant. 2 ~ Ant. 3 is the same type antenna, only the higher gain antenna “Ant. 2” was tested and recorded in this report.

Due to Ant. 4 and Ant. 5 would be connected with EUT via an antenna cable, the antenna cable might influence the Radiated Emissions Measurement below 1GHz, and Ant. 4 and Ant. 5 is the same type antenna, only the higher gain antenna “Ant. 4” was tested and recorded for Radiated Emissions below 1GHz in this report.

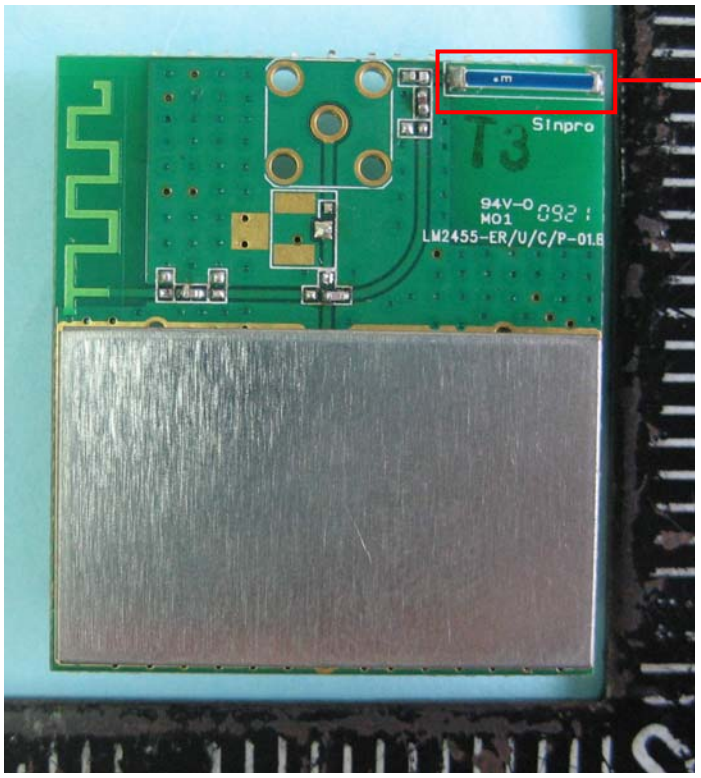
For Radiated Emissions Test Below 1GHz:

Ant. 1, Ant. 2 and Ant. 4 were tested and recorded in this report.

For Radiated Emissions Test Above 1GHz:

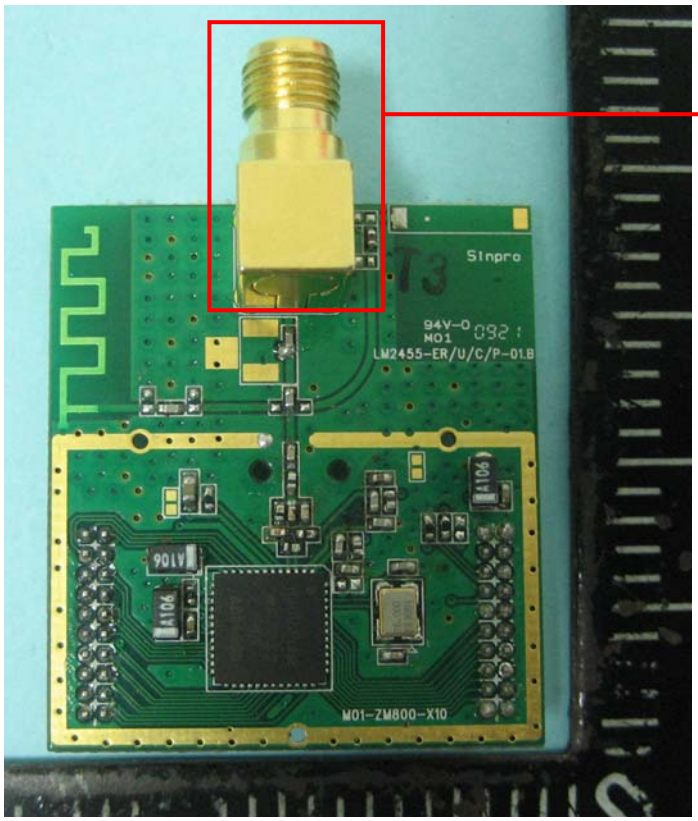
Ant. 1 and Ant. 2 were tested and recorded in this report.

For EUT 1 (Model No.: LM2455-EC)



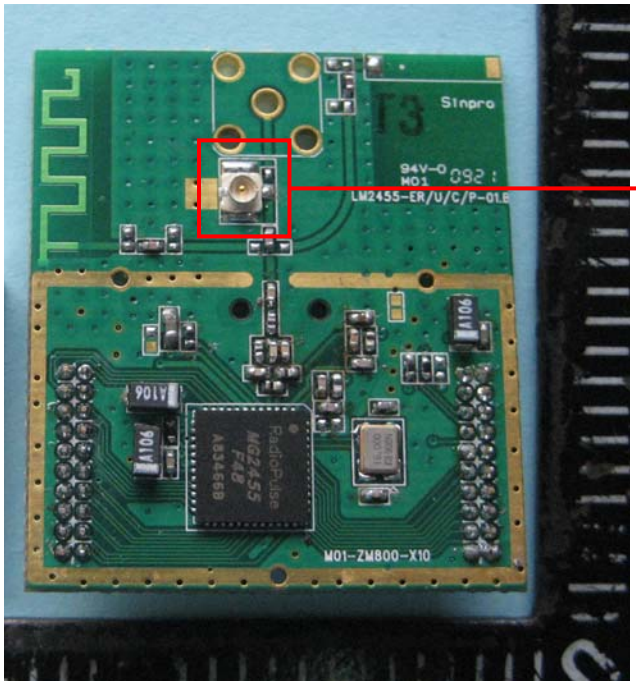
Ant. 1 (Chip Antenna)

For EUT 2 (Mode No.: LM2455-ER)



Ant. 2 (Dipole Antenna) /
Ant. 3 (Dipole Antenna)

For EUT 3 (Mode No.: LM2455-EU)



Ant. 4 (Dipole Antenna) /
Ant. 5 (Dipole Antenna)

3.4. Table for Carrier Frequencies

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
2405 ~ 2475MHz	11	2405 MHz	19	2445 MHz
	12	2410 MHz	20	2450 MHz
	13	2415 MHz	21	2455 MHz
	14	2420 MHz	22	2460 MHz
	15	2425 MHz	23	2465 MHz
	16	2430 MHz	24	2470 MHz
	17	2435 MHz	25	2475 MHz
	18	2440 MHz		

3.5. Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel	Antenna
AC Power Line Conducted Emissions	Normal Link	Auto	-	-
Maximum Peak Conducted Output Power	QPSK	250 kbps	11/18/25	-
Power Spectral Density 6dB Spectrum Bandwidth	QPSK	250 kbps	11/18/25	-
Radiated Emissions 9kHz~1GHz	Normal Link	Auto	-	-
Radiated Emissions 1GHz~10th Harmonic	QPSK	250 kbps	11/18/25	1/2
Band Edge Emissions	QPSK	250 kbps	11/25	1/2

Test Mode:

Mode 1. EUT 1 with chip antenna

Mode 2. EUT 2 with Ant. 2

Mode 3. EUT 3 with Ant. 4

For Conducted Emission test:

Due to Mode 1 generated the worst test result, so it was recorded in this report.

For Radiated Emission test (30MHz~1GHz):

Due to Ant. 2 and Ant. 4 is the same type antenna, and Ant. 4 generated the worst test result, so only Ant. 4 was tested and recorded in this report.

Due to Mode 1 and Mode 3 generated the worst test result, so it was recorded in this report.

For Radiated Emission test (Above 1GHz):

Mode 1. EUT 1 with chip antenna

Mode 2. EUT 2 with Ant. 2

Due to Ant. 2 and Ant. 4 is the same type antenna, only the higher gain antenna “Ant. 2” was tested and recorded in this report.

3.6. Table for Testing Locations

Test Site No.	Site Category	Location	FCC Reg. No.	IC File No.	VCCI Reg. No
03CH03-HY	SAC	Hwa Ya	480872	IC 4088	-
CO04-HY	Conduction	Hwa Ya	480872	IC 4088	-
TH01-HY	OVEN Room	Hwa Ya	-	-	-

Open Area Test Site (OATS); Semi Anechoic Chamber (SAC); Fully Anechoic Chamber (FAC).

Please refer section 6 for Test Site Address.

3.7. Table for Multiple Listing

The brand/model names in the following table are all refer to the identical product.

Brand Name	Model Name	Antenna Connector Type	Description
Sinpro logo	LM2455-ER	Reversed-SMA	All the models are identical except for the Antenna Connector Type.
	LM2455-EU	UFL	
	LM2455-EC	N/A	

3.8. Table for Supporting Units

Support Unit	Brand	Model	FCC ID
Mouse	I Cooby	AMS0706W	DoC
Notebook	DELL	PP25L	E2K4965AGNM
Notebook	DELL	PP25L	E2K4965AGNM
MODULE	ABOCOM	ZM800	N/A

3.9. Table for Parameters of Test Software Setting

During testing, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Power Parameters of IEEE 802.15.4 ZigBee

Test Software Version	Hyper Terminal		
Frequency	2405 MHz	2440 MHz	2475 MHz
802.15.4 ZigBee	0X03	0X03	0X03

Note: Only the lowest power setting was tested and recorded in this report.

An executive program, EMCTEST.EXE under WIN XP, which generates a complete line of continuously repeating " H " pattern was used as the test software.

The program was executed as follows:

a. Turn on the power of all equipment.

b. The NB sends " H" messages to the panel, and the panel displays " H " patterns on the screen.

c. Repeat the steps from b.

At the same time, the following programs were executed:

Executed "Device-Programmer 3.52" to enable the EUT work.

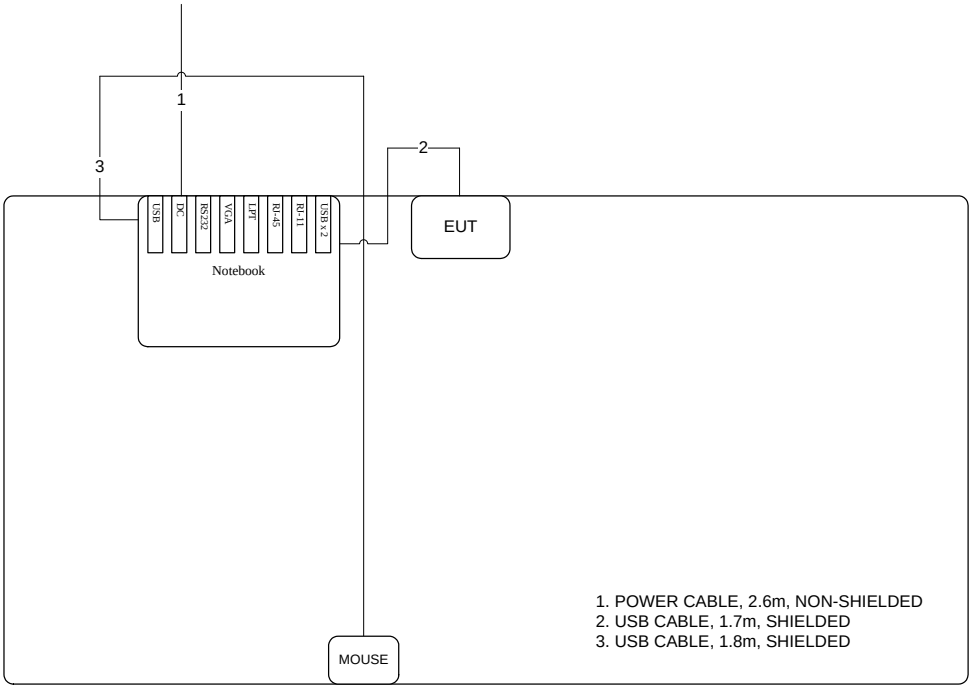
Executed "Hyper Terminal" to control the EUT to transmit data.

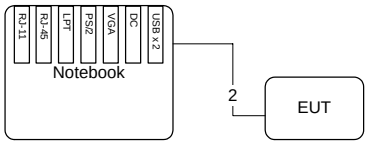
3.10. Test Configurations

3.10.1. Radiation Emissions Test Configuration

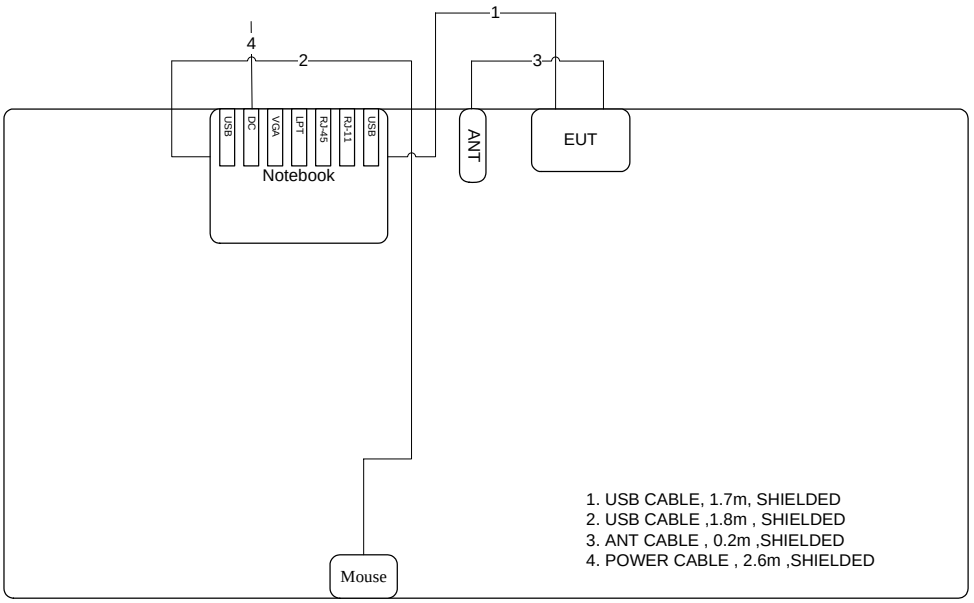
Test Configuration: 30MHz~1GHz

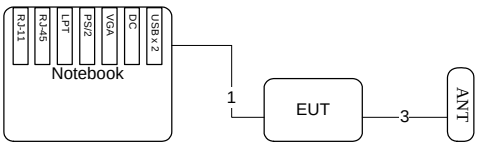
Test Mode: Mode 1





Test Mode: Mode 3

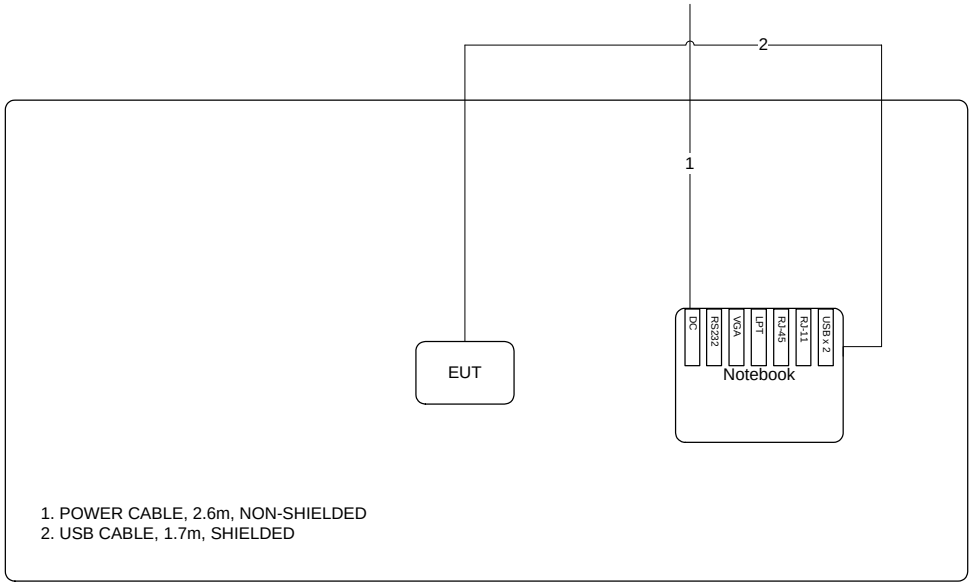




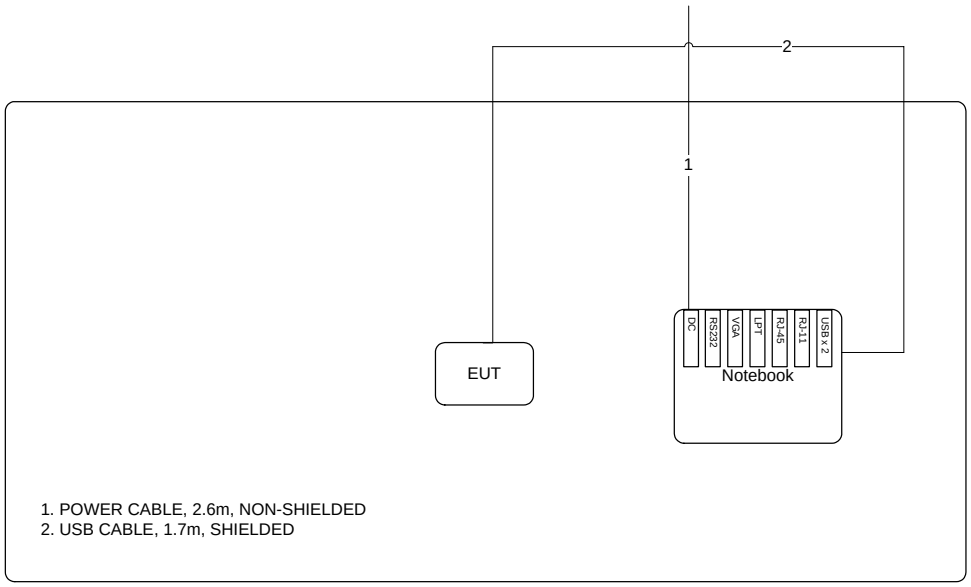
Z

Test Configuration: Above 1GHz

Test Mode: Mode 1

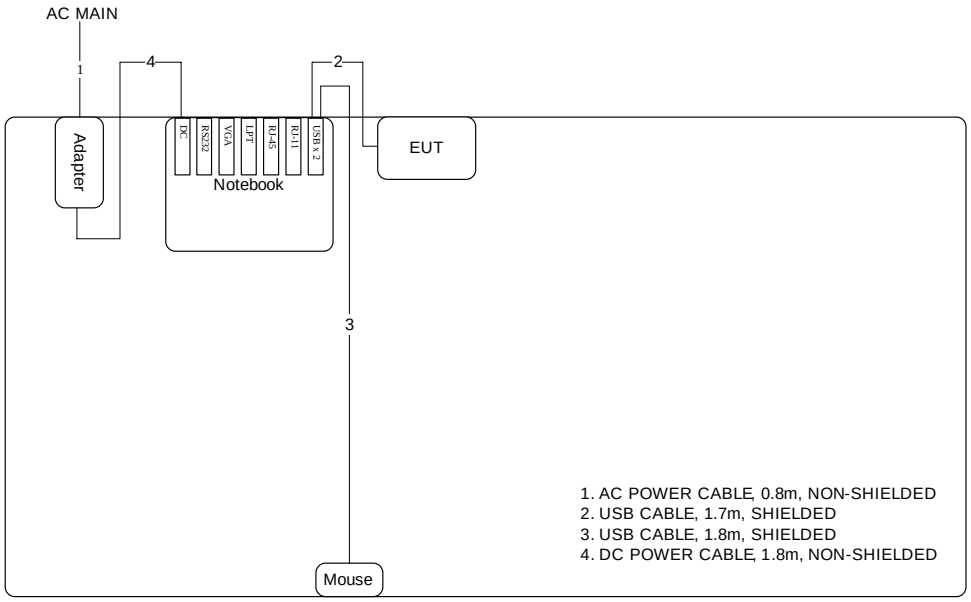


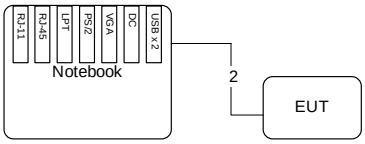
Test Mode: Mode 2



3.10.2. AC Power Line Conduction Emissions Test Configuration

Test Mode: Mode 1





4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

For this product which is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

Frequency (MHz)	QP Limit (dBuV)	AV Limit (dBuV)
0.15~0.5	66~56	56~46
0.5~5	56	46
5~30	60	50

4.1.2. Measuring Instruments and Setting

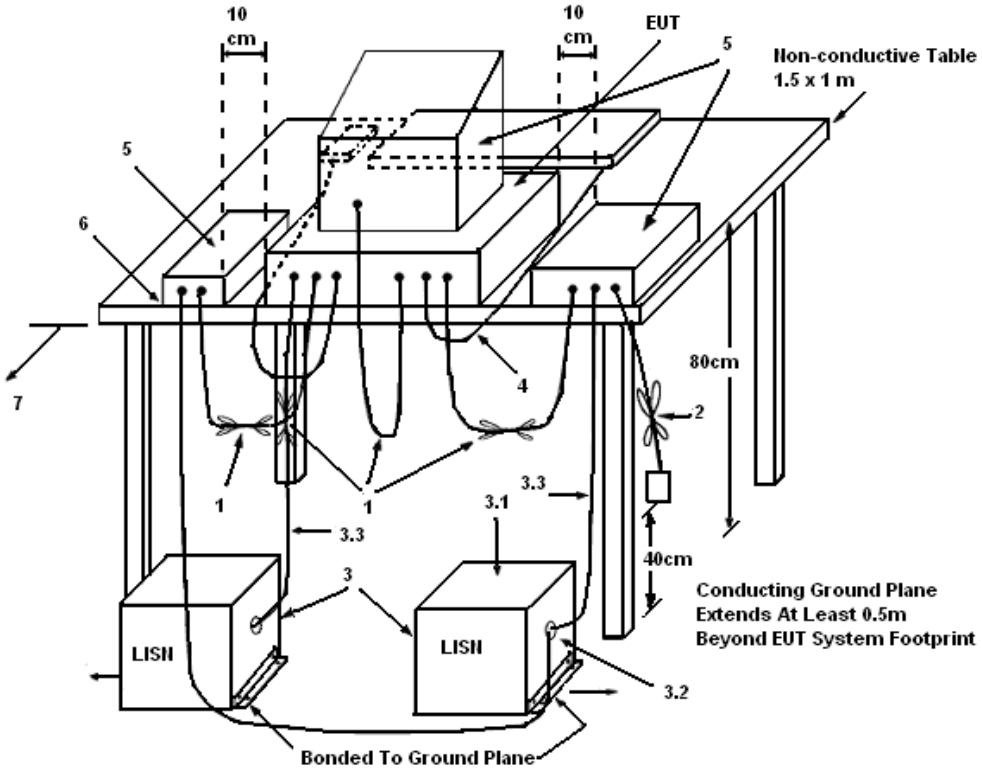
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 KHz

4.1.3. Test Procedures

Configure the EUT according to ANSI C63.4. The EUT or host of EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
The frequency range from 150 KHz to 30 MHz was searched.
Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
The measurement has to be done between each power line and ground at the power terminal.

4.1.4. Test Setup Layout



LEGEND:

(1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

(2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

(3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω. LISN can be placed on top of, or immediately beneath, reference ground plane.

(3.1) All other equipment powered from additional LISN(s).

(3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.

(3.3) LISN at least 80 cm from nearest part of EUT chassis.

(4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.

(5) Non-EUT components of EUT system being tested.

(6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.

(7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

4.1.5. Test Deviation

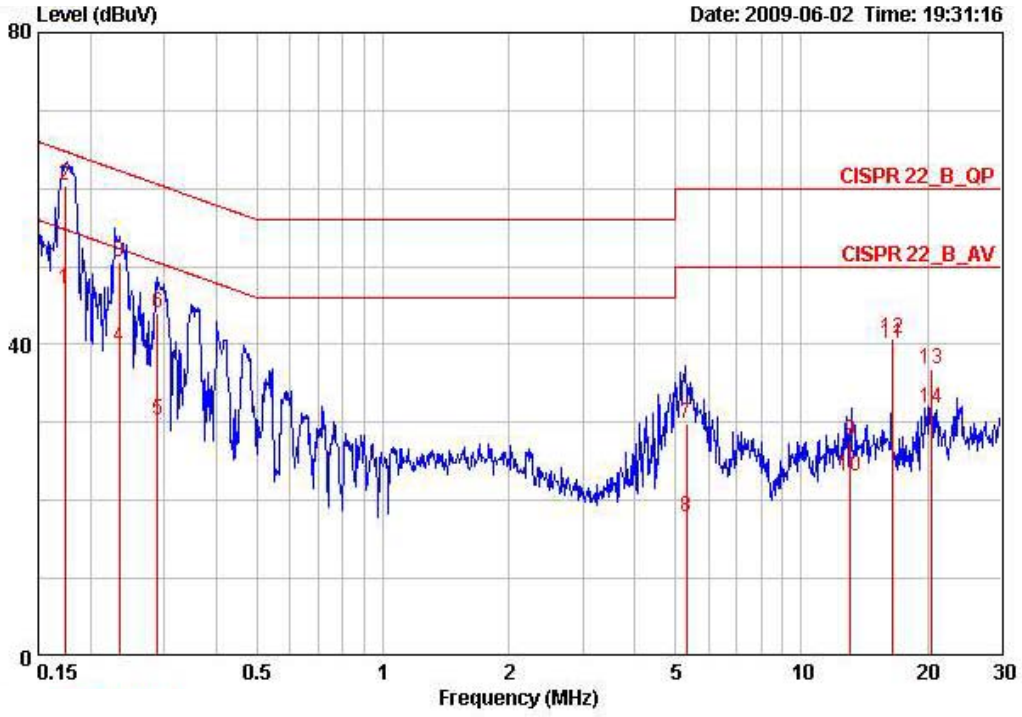
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

The EUT was placed on the test table and programmed in normal function.

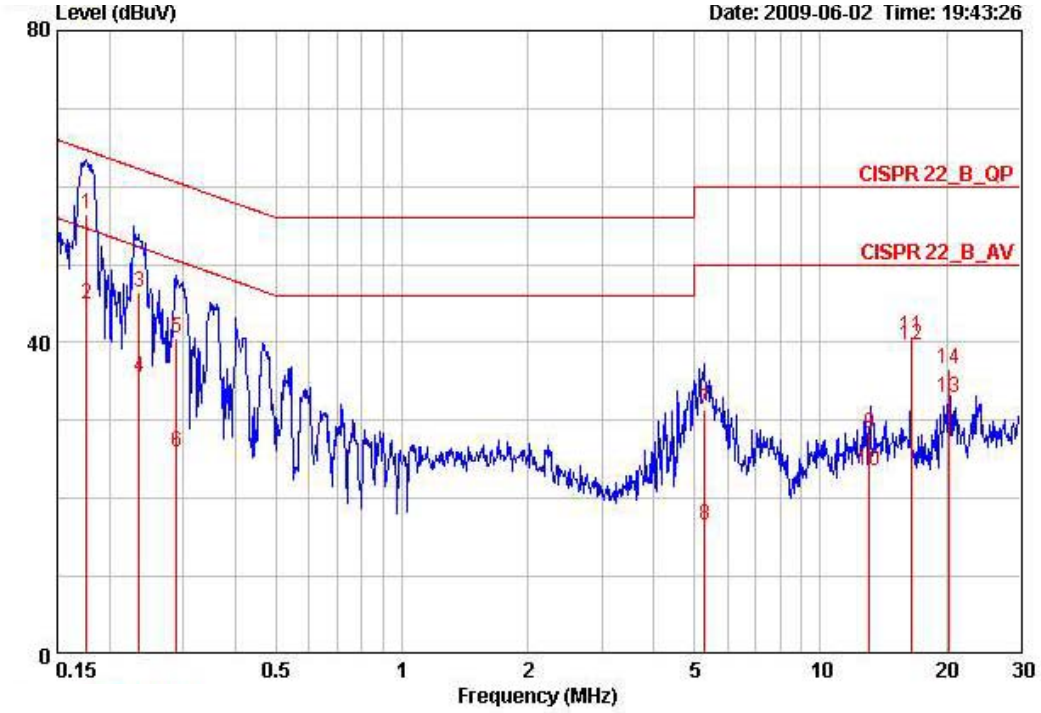
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	24°C	Humidity	59%
Test Engineer	Howar Sung	Phase	Line
Configuration	Normal Link / Mode 1		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 @	0.17384	47.01	-7.76	54.77	46.75	0.06	0.20	AVERAGE
2 @	0.17384	60.32	-4.45	64.77	60.06	0.06	0.20	QP
3	0.23409	50.67	-11.64	62.30	50.42	0.05	0.20	QP
4	0.23409	39.66	-12.65	52.30	39.41	0.05	0.20	AVERAGE
5	0.28935	30.39	-20.15	50.54	30.15	0.04	0.20	AVERAGE
6	0.28935	44.14	-16.40	60.54	43.90	0.04	0.20	QP
7	5.311	29.78	-30.22	60.00	29.30	0.18	0.30	QP
8	5.311	17.81	-32.19	50.00	17.33	0.18	0.30	AVERAGE
9	13.115	27.58	-32.42	60.00	26.69	0.49	0.40	QP
10	13.115	23.14	-26.86	50.00	22.25	0.49	0.40	AVERAGE
11 @	16.464	40.04	-9.96	50.00	39.00	0.64	0.40	AVERAGE
12	16.464	40.84	-19.16	60.00	39.80	0.64	0.40	QP
13	20.411	36.75	-23.25	60.00	35.40	0.85	0.50	QP
14	20.411	31.73	-18.27	50.00	30.38	0.85	0.50	AVERAGE

Temperature	24°C	Humidity	59%
Test Engineer	Howar Sung	Phase	Neutral
Configuration	Normal Link / Mode 1		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 @	0.17584	56.55	-8.13	64.68	56.26	0.09	0.20	QP
2 @	0.17584	44.97	-9.71	54.68	44.68	0.09	0.20	AVERAGE
3	0.23558	46.47	-15.78	62.25	46.19	0.08	0.20	QP
4	0.23558	35.52	-16.73	52.25	35.24	0.08	0.20	AVERAGE
5	0.28935	40.51	-20.03	60.54	40.24	0.07	0.20	QP
6	0.28935	25.93	-24.61	50.54	25.66	0.07	0.20	AVERAGE
7	5.277	31.43	-28.57	60.00	30.91	0.22	0.30	QP
8	5.277	16.47	-33.53	50.00	15.95	0.22	0.30	AVERAGE
9	13.114	28.35	-31.65	60.00	27.44	0.51	0.40	QP
10	13.114	23.64	-26.36	50.00	22.73	0.51	0.40	AVERAGE
11	16.465	40.87	-19.13	60.00	39.82	0.65	0.40	QP
12	16.465	39.71	-10.29	50.00	38.66	0.65	0.40	AVERAGE
13	20.346	32.90	-17.10	50.00	31.57	0.83	0.50	AVERAGE
14	20.346	36.59	-23.41	60.00	35.26	0.83	0.50	QP

Note:

Level = Read Level + LISN Factor + Cable Loss.

4.2. Maximum Conducted Output Power Measurement

4.2.1. Limit

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. The limited has to be reduced by the amount in dB that the gain of the antenna exceed 6dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

4.2.2. Measuring Instruments and Setting

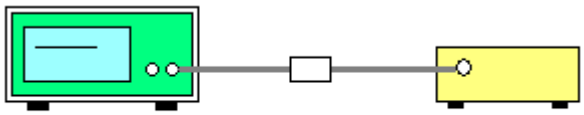
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RB	1MHz
VB	3MHz
Detector	RMS
Trace	Max Hold
Sweep Time	Auto

4.2.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Test was performed in accordance with Measurement of Digital Transmission Systems Operating under Section 15.247 March 23, 2005.

4.2.4. Test Setup Layout



4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

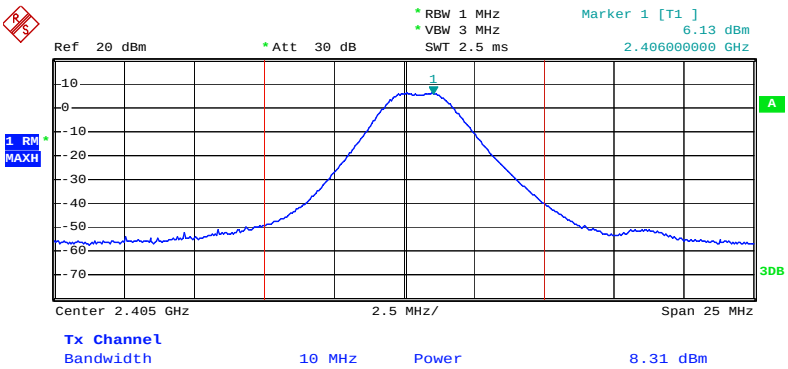
4.2.7. Test Result of Maximum Conducted Output Power

Temperature	23°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	IEEE 802.15.4 ZigBee

Configuration IEEE 802.15.4 ZigBee

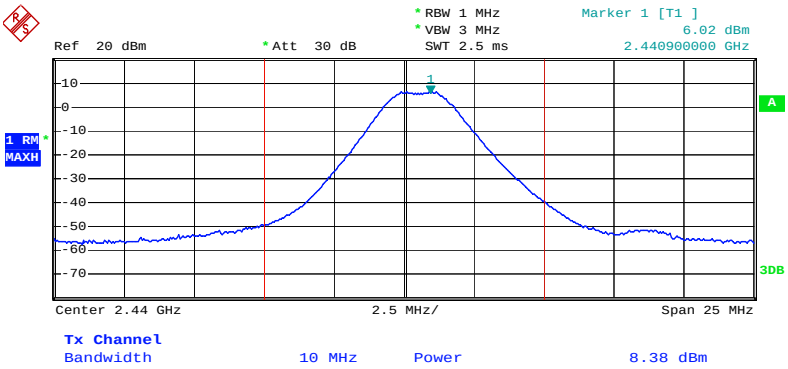
Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
11	2405 MHz	8.31	30.00	Complies
18	2440 MHz	8.38	30.00	Complies
25	2475 MHz	8.37	30.00	Complies

Conducted Output Power Plot on Configuration IEEE 802.15.4 ZigBee / 2405 MHz



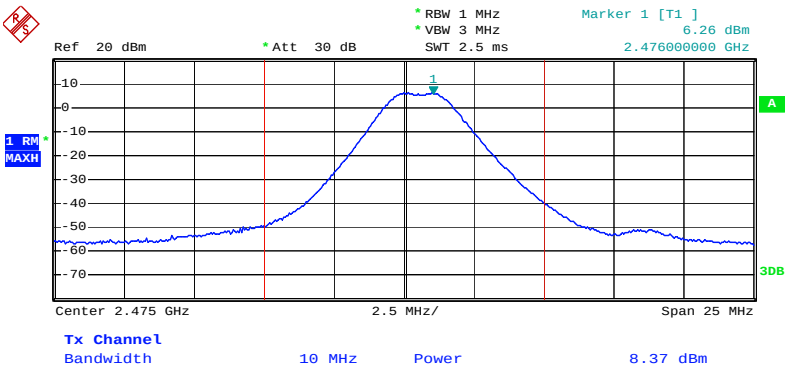
Date: 26.MAY.2009 18:07:40

Conducted Output Power Plot on Configuration IEEE 802.15.4 ZigBee / 2440 MHz



Date: 26.MAY.2009 18:09:14

Conducted Output Power Plot on Configuration IEEE 802.15.4 ZigBee / 2475 MHz



Date: 26.MAY.2009 18:10:55

4.3. Power Spectral Density Measurement

4.3.1. Limit

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.

4.3.2. Measuring Instruments and Setting

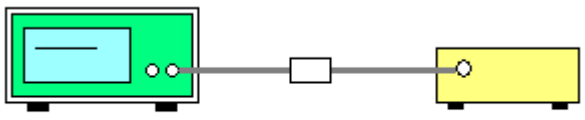
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	30kHz
RB	3 kHz
VB	30 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	10s

4.3.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyser.
2. Set RBW of spectrum analyzer to 3kHz and VBW to 30kHz. Set Detector to Peak, Trace to Max Hold.
3. Mark the frequency with maximum peak power as the center of the display of the spectrum.
4. Set the span to 30kHz and the sweep time to 10s and record the maximum peak value.

4.3.4. Test Setup Layout



4.3.5. Test Deviation

There is no deviation with the original standard.

4.3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

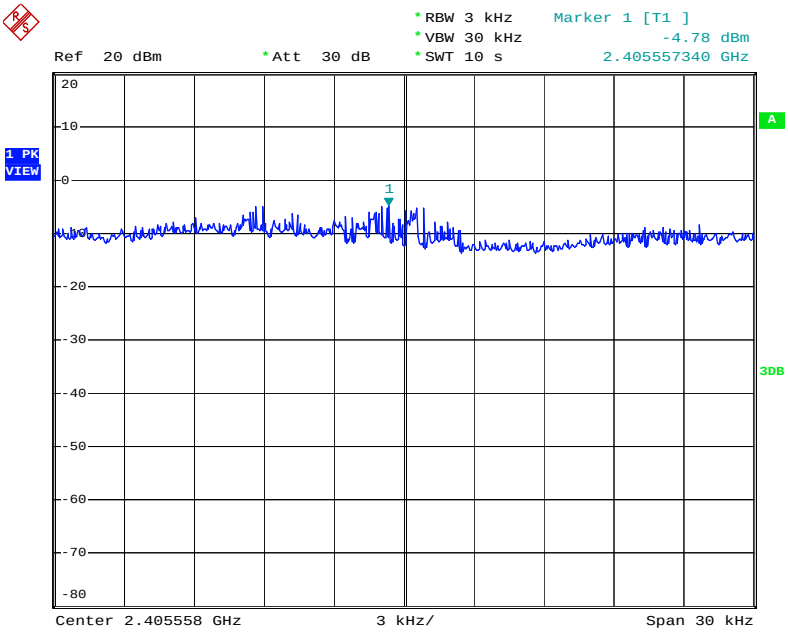
4.3.7. Test Result of Power Spectral Density

Temperature	23°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	IEEE 802.15.4 ZigBee

Configuration IEEE 802.15.4 ZigBee

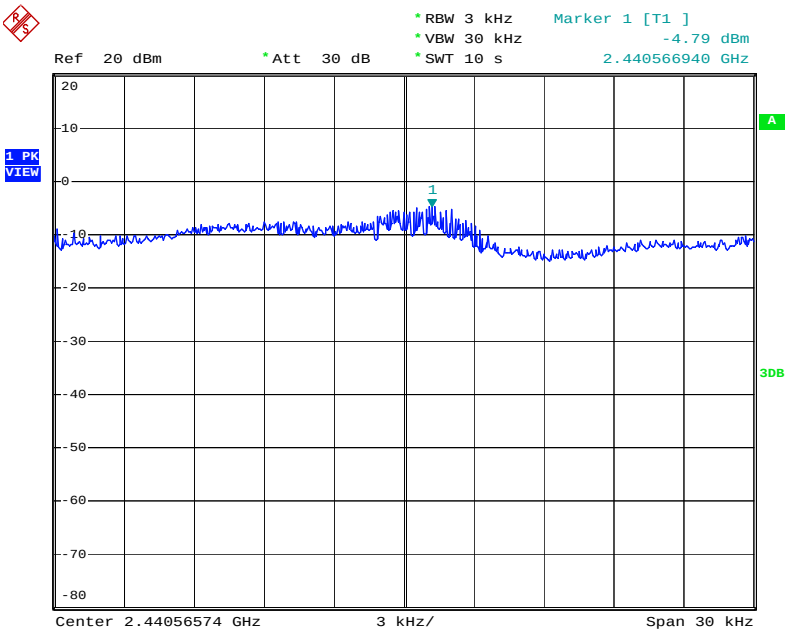
Channel	Frequency	Power Density (dBm/3kHz)	Max. Limit (dBm/3kHz)	Result
11	2405 MHz	-4.78	8.00	Complies
18	2440 MHz	-4.79	8.00	Complies
25	2475 MHz	-5.62	8.00	Complies

Power Density Plot on Configuration IEEE 802.15.4 ZigBee / 2405 MHz



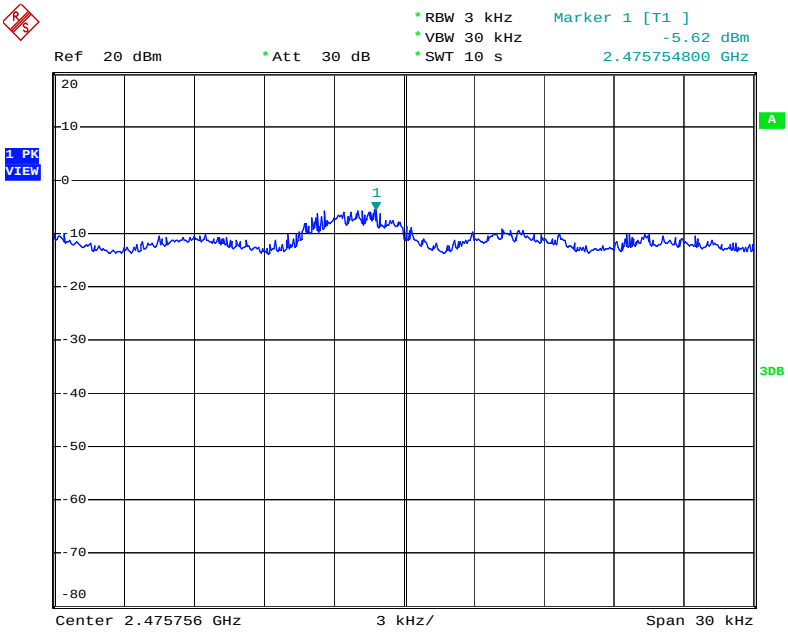
Date: 26.MAY.2009 18:43:47

Power Density Plot on Configuration IEEE 802.15.4 ZigBee / 2440 MHz



Date: 26.MAY.2009 18:36:23

Power Density Plot on Configuration IEEE 802.15.4 ZigBee / 2475 MHz



Date: 26.MAY.2009 18:33:37

4.4. 6dB Spectrum Bandwidth Measurement

4.4.1. Limit

For digital modulation systems, the minimum 6dB bandwidth shall be at least 500 kHz.

4.4.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 6dB Bandwidth
RB	100 kHz
VB	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.4.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
2. The resolution bandwidth of 100 kHz and the video bandwidth of 100 kHz were used.
3. Measured the spectrum width with power higher than 6dB below carrier.

4.4.4. Test Setup Layout

4.4.5. Test Deviation

There is no deviation with the original standard.

4.4.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

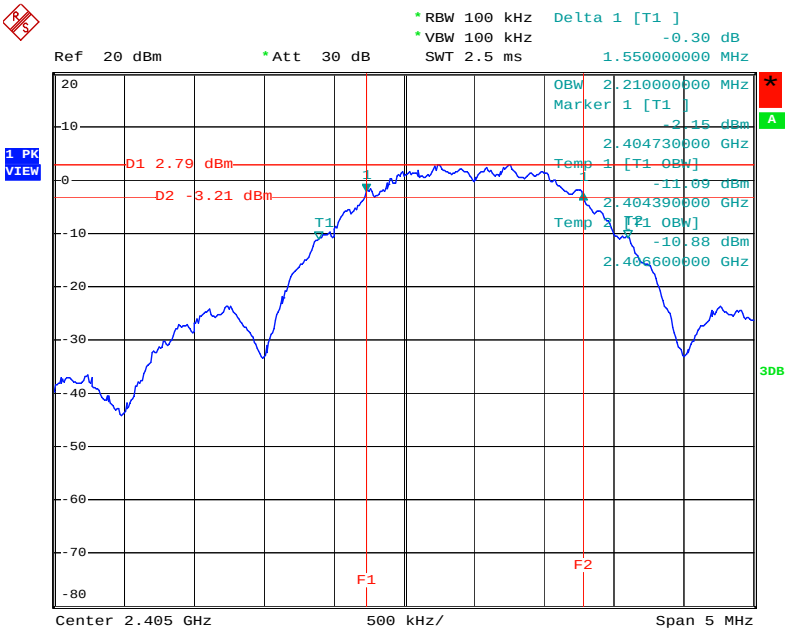
4.4.7. Test Result of 6dB Spectrum Bandwidth

Temperature	23°C	Humidity	56%
Test Engineer	Alan Huang	Configurations	IEEE 802.15.4 ZigBee

Configuration IEEE 802.15.4 ZigBee

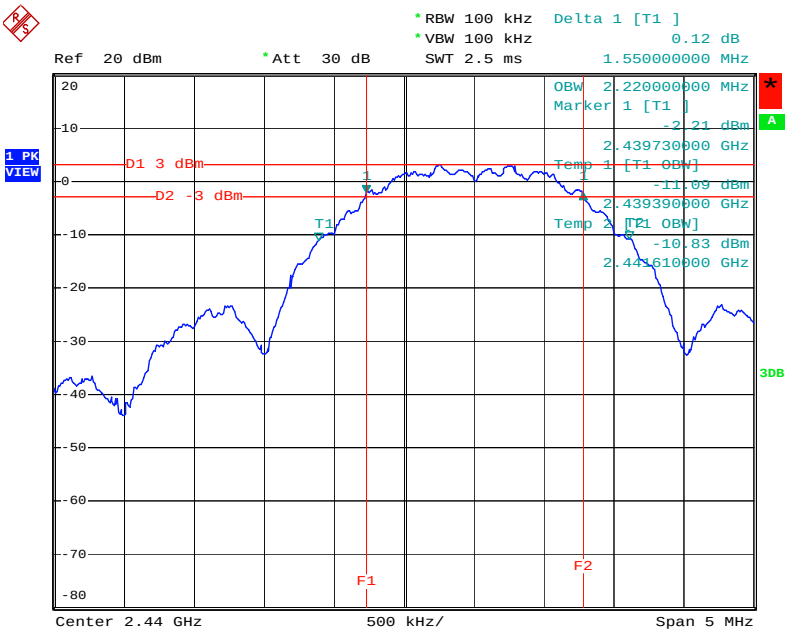
Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
11	2405 MHz	1.55	2.21	500	Complies
18	2440 MHz	1.55	2.22	500	Complies
25	2475 MHz	1.54	2.21	500	Complies

6 dB Bandwidth Plot on Configuration IEEE 802.15.4 ZigBee / 2405 MHz



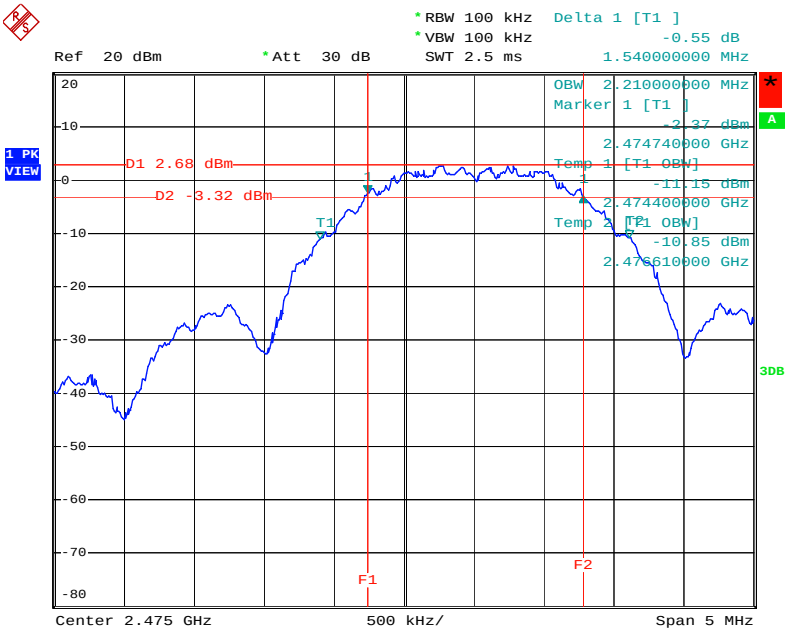
Date: 26.MAY.2009 18:42:15

6 dB Bandwidth Plot on Configuration IEEE 802.15.4 ZigBee / 2440 MHz



Date: 26.MAY.2009 18:39:00

6 dB Bandwidth Plot on Configuration IEEE 802.15.4 ZigBee / 2475 MHz



Date: 26.MAY.2009 18:22:05

4.5. Radiated Emissions Measurement

4.5.1. Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

4.5.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 3MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1MHz / 3MHz for peak

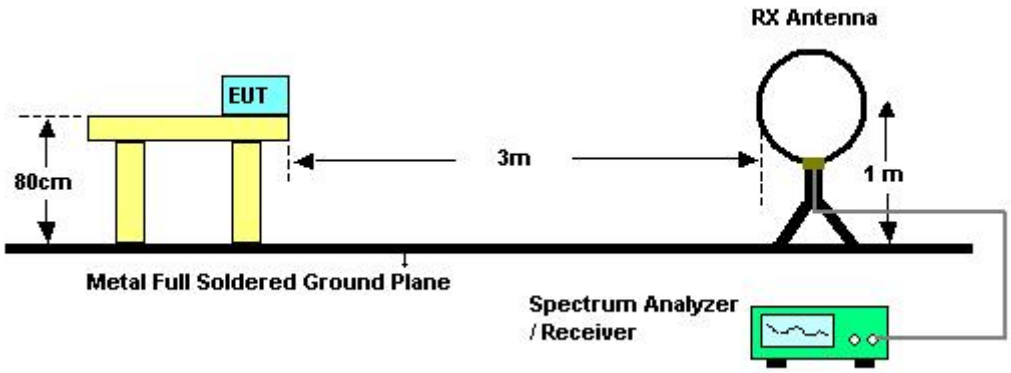
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.5.3. Test Procedures

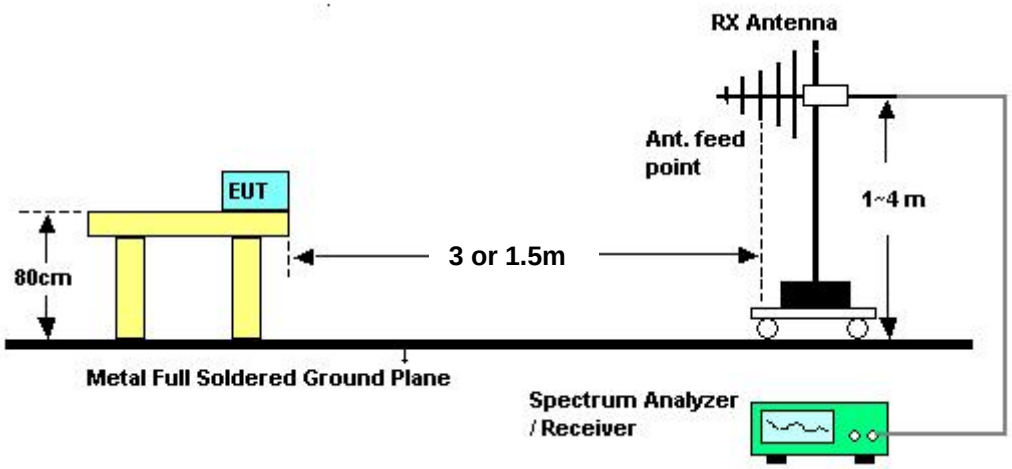
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

4.5.4. Test Setup Layout

For radiated emissions below 30MHz



For radiated emissions above 30MHz



Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1.5m.

Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1.5m]) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

4.5.5. Test Deviation

There is no deviation with the original standard.

4.5.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.5.7. Results of Radiated Emissions (9kHz~30MHz)

Temperature	25°C	Humidity	56%
Test Engineer	Johnson Chang		

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

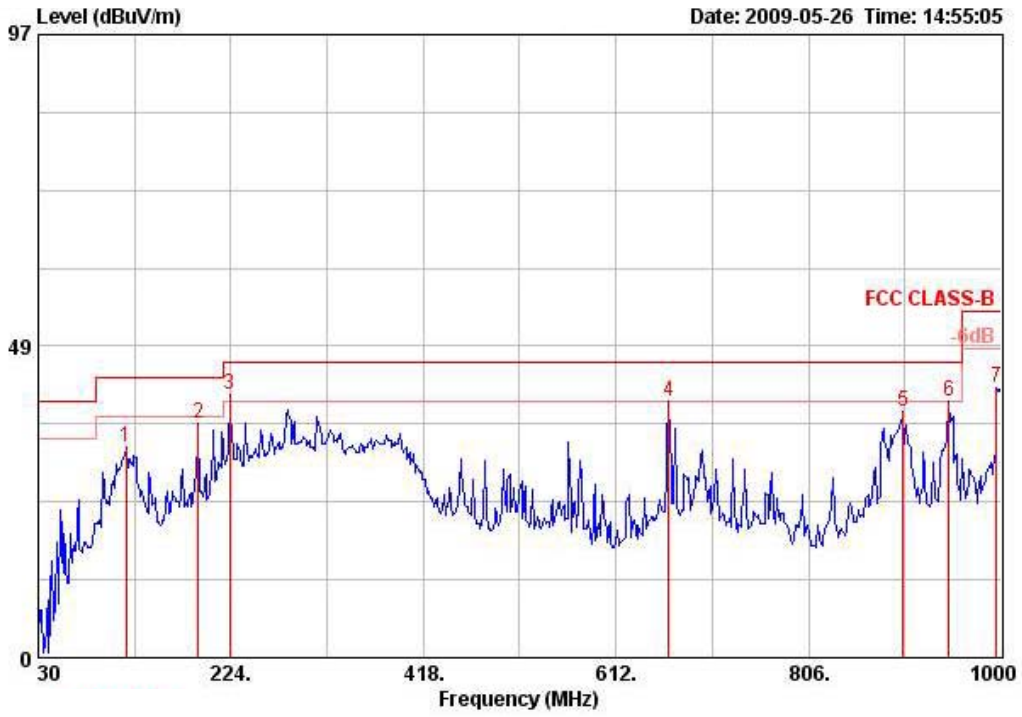
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

4.5.8. Results of Radiated Emissions (30MHz~1GHz)

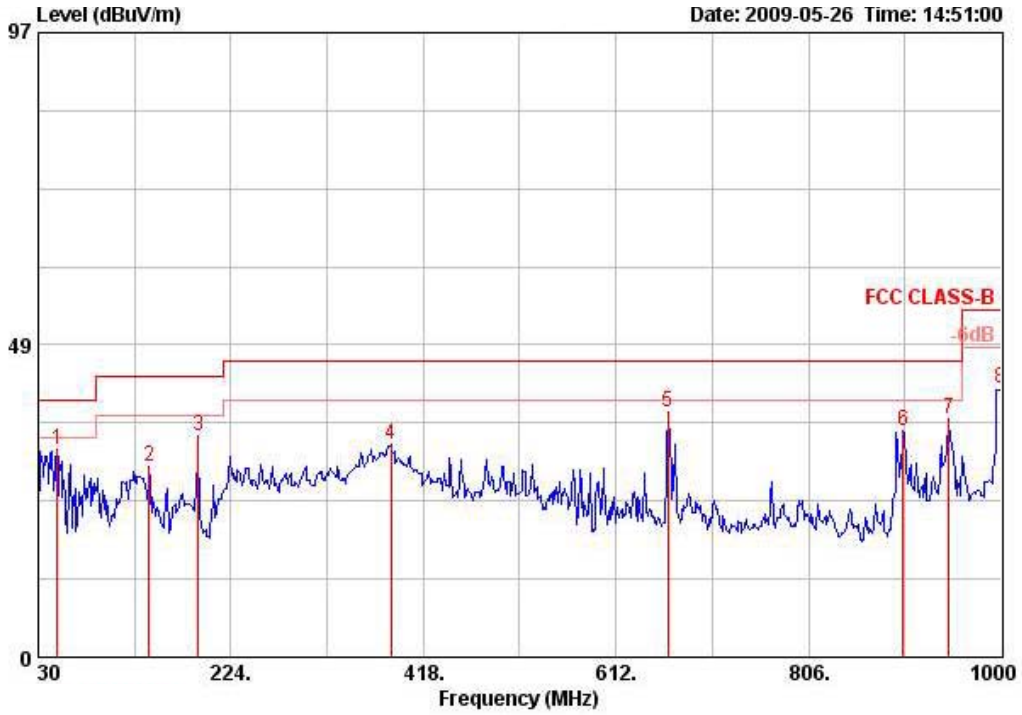
Temperature	25°C	Humidity	56%
Test Engineer	Johnson Chang	Configurations	Normal Link / Mode 1

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB			deg	cm
1	118.270	32.66	43.50	-10.84	50.89	-18.23	Peak	HORIZONTAL	-5	100
2 @	191.020	36.48	43.50	-7.02	57.63	-21.15	Peak	HORIZONTAL	-5	100
3 @	223.030	40.97	46.00	-5.03	60.88	-19.91	Peak	HORIZONTAL	236	100
4 @	665.350	39.80	46.00	-6.20	49.11	-9.31	Peak	HORIZONTAL	-5	100
5 @	901.060	38.33	46.00	-7.67	44.78	-6.45	Peak	HORIZONTAL	-5	100
6 @	947.620	39.87	46.00	-6.13	45.83	-5.95	Peak	HORIZONTAL	-5	100
7	995.150	41.93	54.00	-12.07	47.49	-5.56	Peak	HORIZONTAL	-5	100

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB			deg	cm
1	49.400	32.22	40.00	-7.78	54.10	-21.88	Peak	VERTICAL	-4	400
2	141.550	29.73	43.50	-13.77	48.98	-19.25	Peak	VERTICAL	-4	400
3	191.020	34.31	43.50	-9.19	55.46	-21.15	Peak	VERTICAL	-4	400
4	385.020	32.95	46.00	-13.05	46.72	-13.77	Peak	VERTICAL	-4	400
5	664.380	37.95	46.00	-8.05	47.26	-9.31	Peak	VERTICAL	-4	400
6	901.060	35.28	46.00	-10.72	41.72	-6.45	Peak	VERTICAL	-4	400
7	947.620	37.02	46.00	-8.98	42.97	-5.95	Peak	VERTICAL	-4	400
8	1000.000	41.63	54.00	-12.37	47.15	-5.52	Peak	VERTICAL	-4	400

Note:

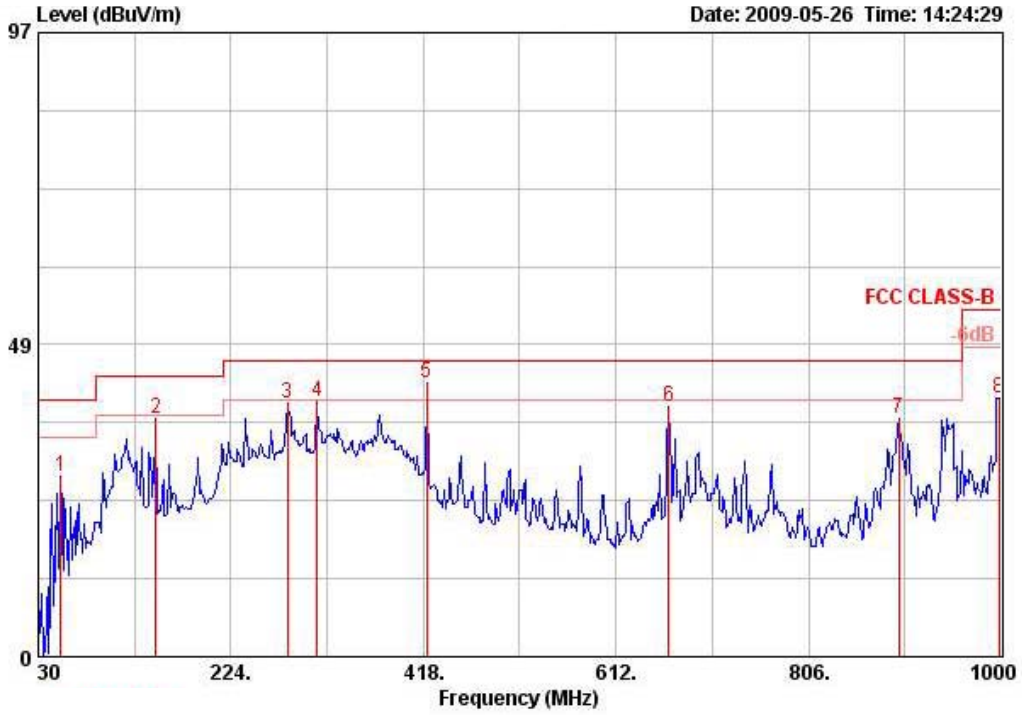
The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

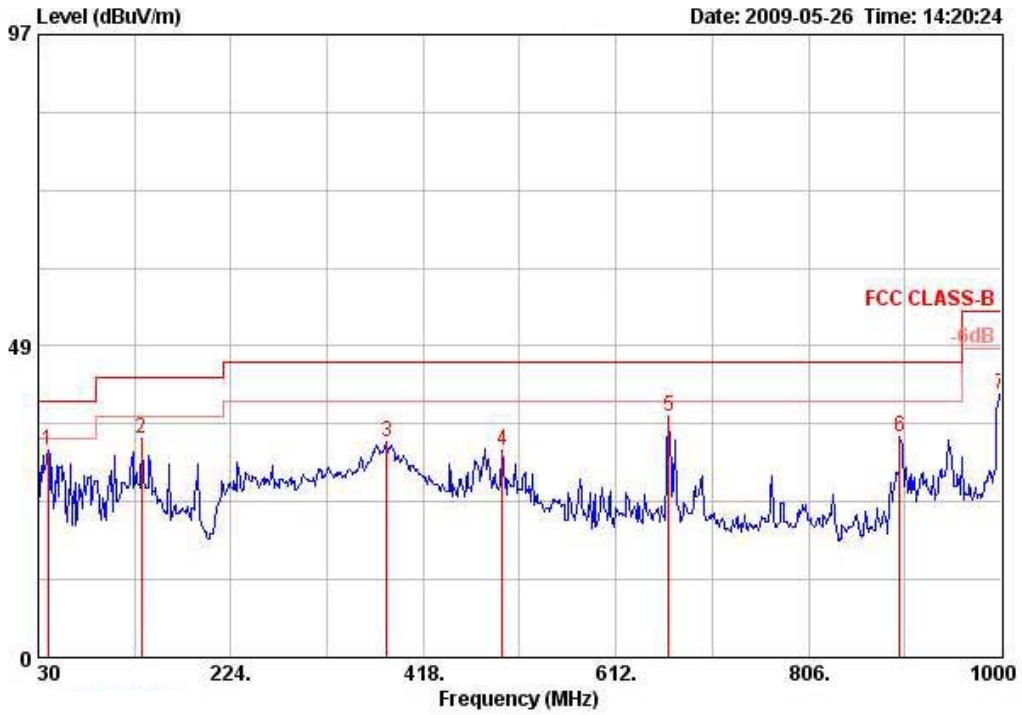
Temperature	25℃	Humidity	56%
Test Engineer	Johnson Chang	Configurations	Normal Link / Mode 3

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB			deg	cm
1	52.310	27.93	40.00	-12.07	50.61	-22.68	Peak	HORIZONTAL	-4	100
2 @	148.340	37.08	43.50	-6.42	56.68	-19.60	Peak	HORIZONTAL	-4	100
3 @	281.230	39.41	46.00	-6.59	56.27	-16.85	Peak	HORIZONTAL	-4	100
4 @	311.300	39.61	46.00	-6.39	55.67	-16.06	Peak	HORIZONTAL	-4	100
5 @	420.910	42.51	46.00	-3.49	55.53	-13.02	Peak	HORIZONTAL	233	100
6 @	665.350	38.75	46.00	-7.25	48.06	-9.31	Peak	HORIZONTAL	-4	100
7	897.180	37.06	46.00	-8.94	43.57	-6.50	Peak	HORIZONTAL	-4	100
8	998.060	40.26	54.00	-13.74	45.79	-5.54	Peak	HORIZONTAL	-4	100

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB			deg	cm
1 @	39.700	32.24	40.00	-7.76	49.76	-17.52	Peak	VERTICAL	-4	400
2	133.790	34.18	43.50	-9.32	52.96	-18.78	Peak	VERTICAL	-4	400
3	381.140	33.52	46.00	-12.48	47.41	-13.88	Peak	VERTICAL	-4	400
4	497.540	32.37	46.00	-13.63	44.24	-11.86	Peak	VERTICAL	-4	400
5	665.350	37.54	46.00	-8.46	46.85	-9.31	Peak	VERTICAL	-4	400
6	898.150	34.46	46.00	-11.54	40.95	-6.49	Peak	VERTICAL	-4	400
7	1000.000	41.07	54.00	-12.93	46.59	-5.52	Peak	VERTICAL	-4	400

Note:

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

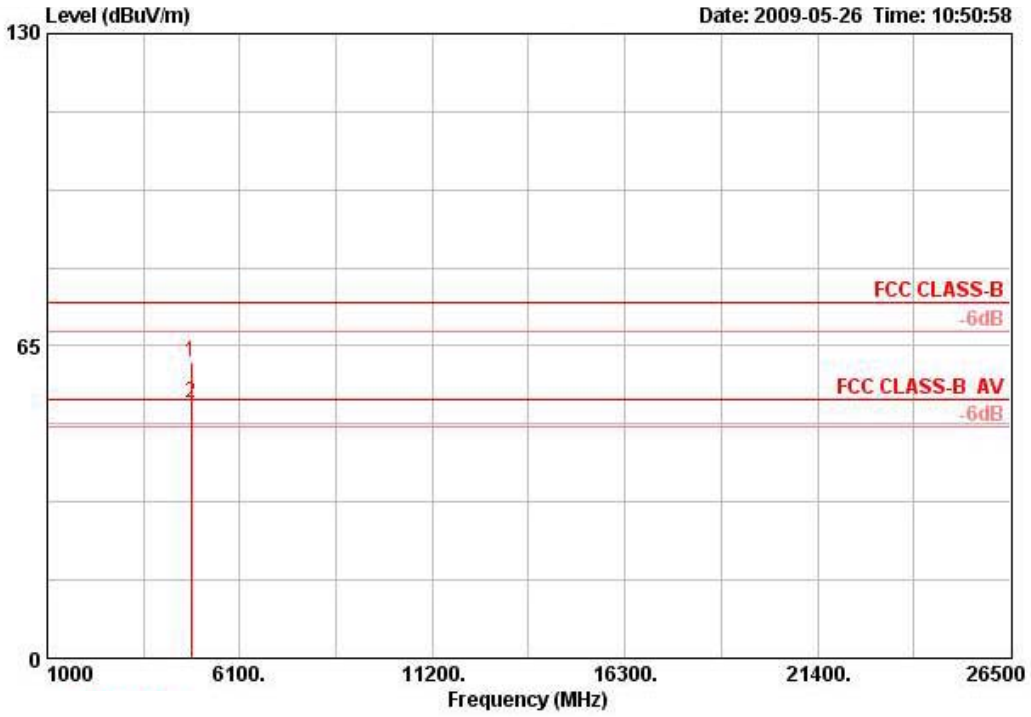
Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.5.9. Results for Radiated Emissions (1GHz~10th Harmonic)

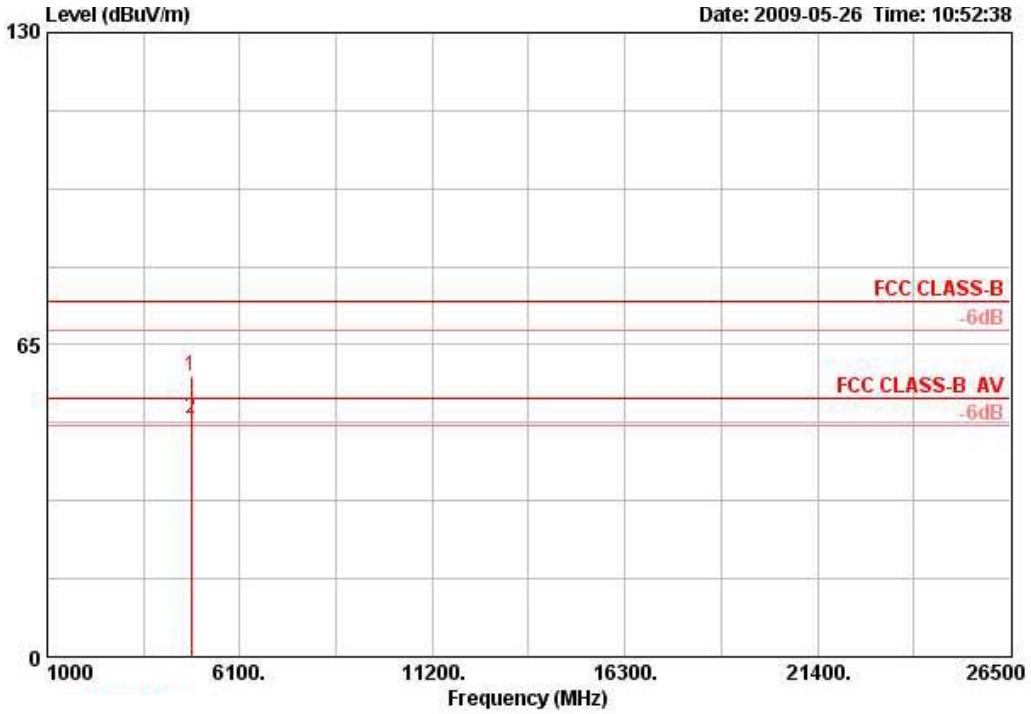
Temperature	25°C	Humidity	56%
Test Engineer	Johnson Chang	Configurations	802.15.4 ZigBee CH 11 / Mode 1

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB			deg	cm
1	4808.870	61.80	74.00	-12.20	59.86	1.94	PEAK	HORIZONTAL	203	157
2 @	4809.990	53.15	54.00	-0.85	51.21	1.94	AVERAGE	HORIZONTAL	203	157

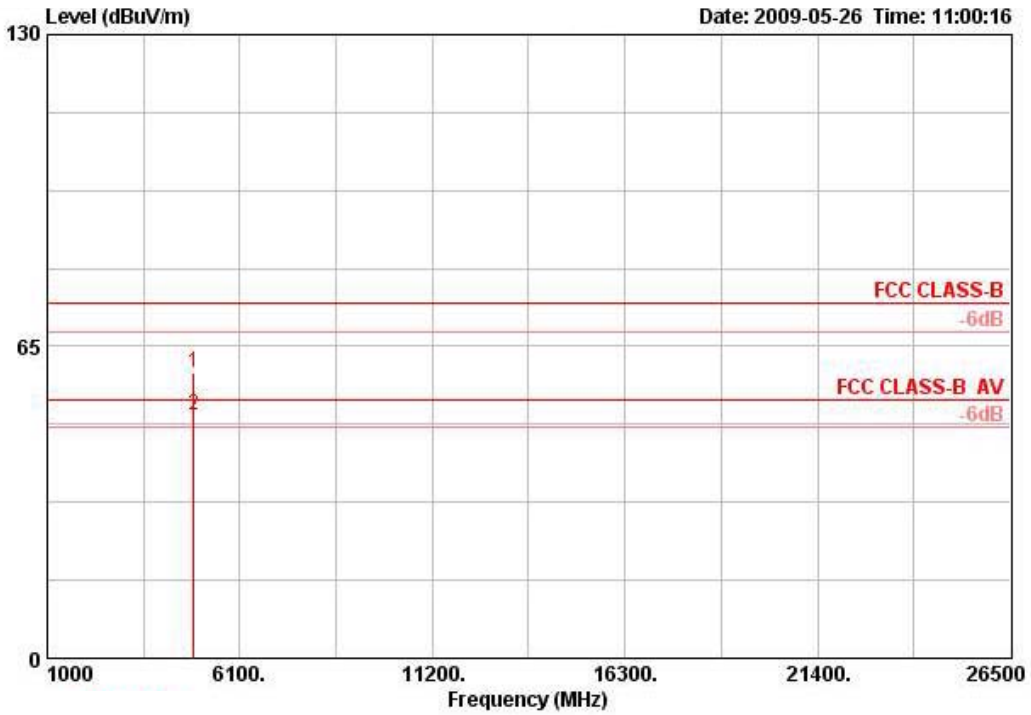
Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB			deg	cm
1	4808.890	58.34	74.00	-15.66	56.40	1.94	PEAK	VERTICAL	326	157
2 @	4809.990	49.49	54.00	-4.51	47.55	1.94	AVERAGE	VERTICAL	326	157

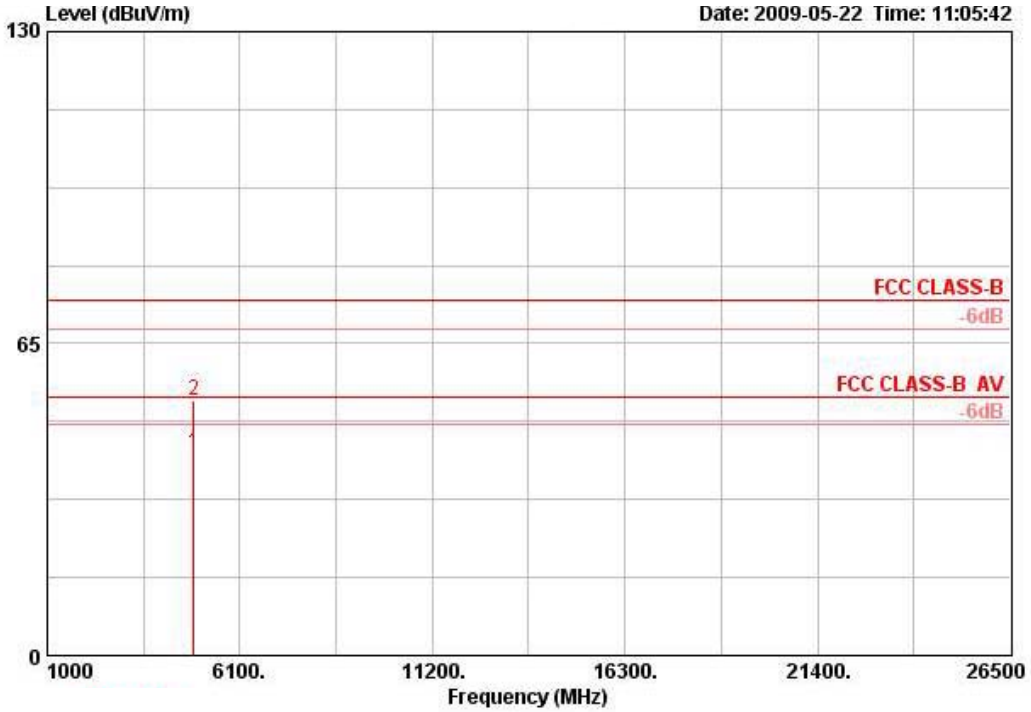
Temperature	25℃	Humidity	56%
Test Engineer	Johnson Chang	Configurations	802.15.4 ZigBee CH 18 / Mode 1

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB			deg	cm
1	4878.770	59.64	74.00	-14.36	57.54	2.10	PEAK	HORIZONTAL	202	183
2 @	4879.990	50.80	54.00	-3.20	48.70	2.10	AVERAGE	HORIZONTAL	202	183

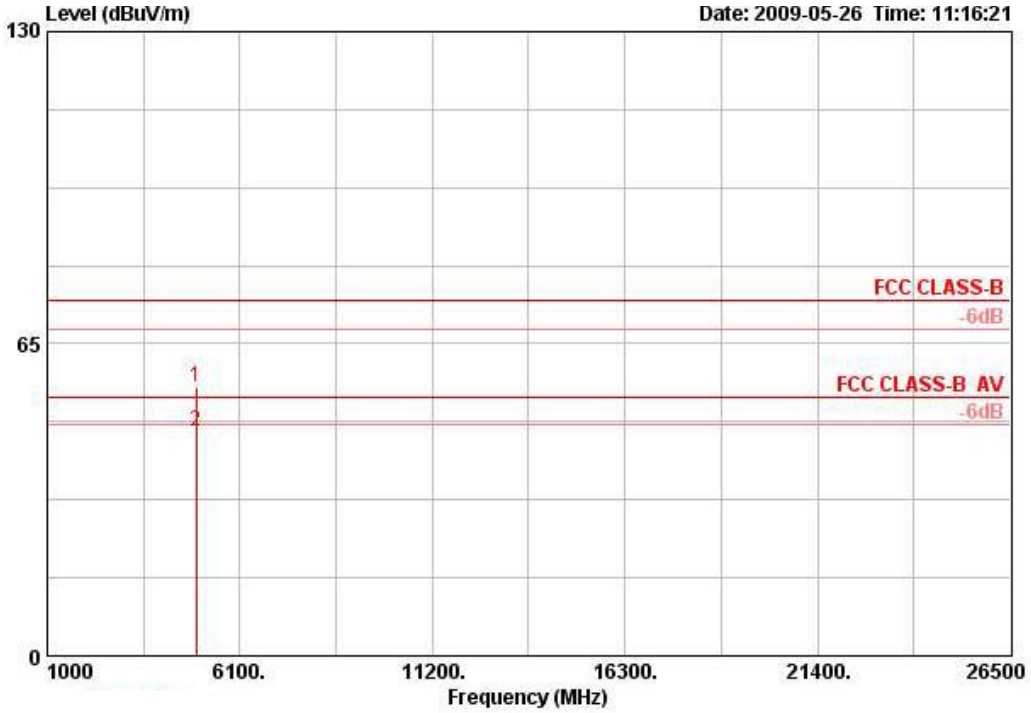
Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB			deg	cm
1	4880.050	42.25	54.00	-11.75	40.15	2.10	AVERAGE	VERTICAL	244	150
2	4880.800	53.25	74.00	-20.75	51.15	2.10	PEAK	VERTICAL	244	150

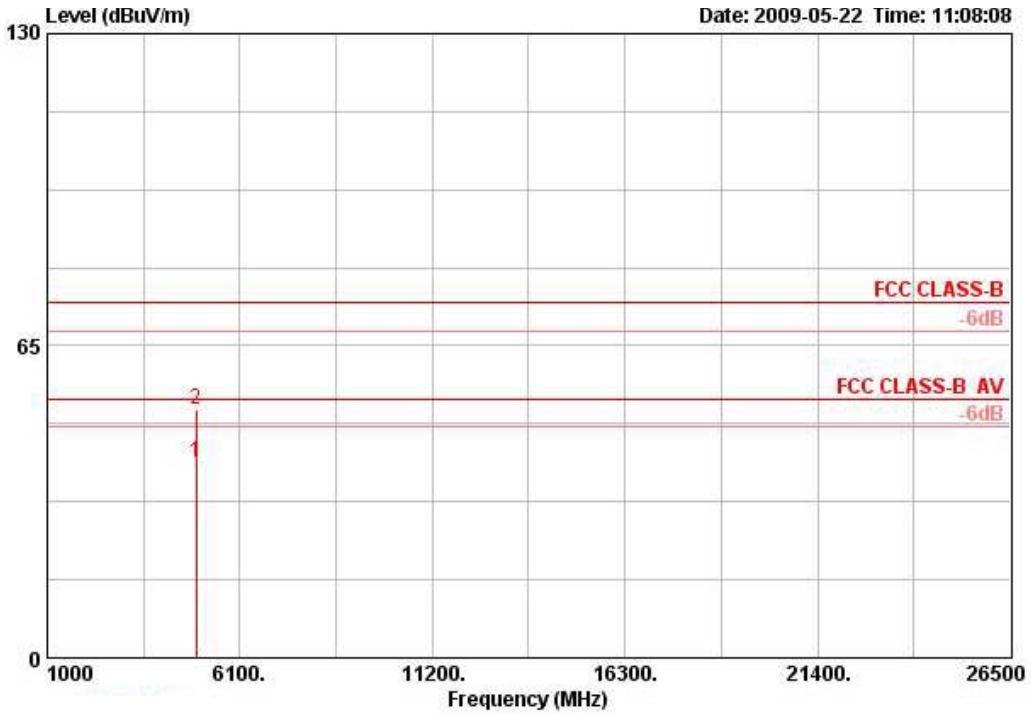
Temperature	25°C	Humidity	56%
Test Engineer	Johnson Chang	Configurations	802.15.4 ZigBee CH 25 / Mode 1

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB			deg	cm
1	4948.940	56.05	74.00	-17.95	53.79	2.26	PEAK	HORIZONTAL	13	176
2 @	4950.030	46.70	54.00	-7.30	44.44	2.26	AVERAGE	HORIZONTAL	13	176

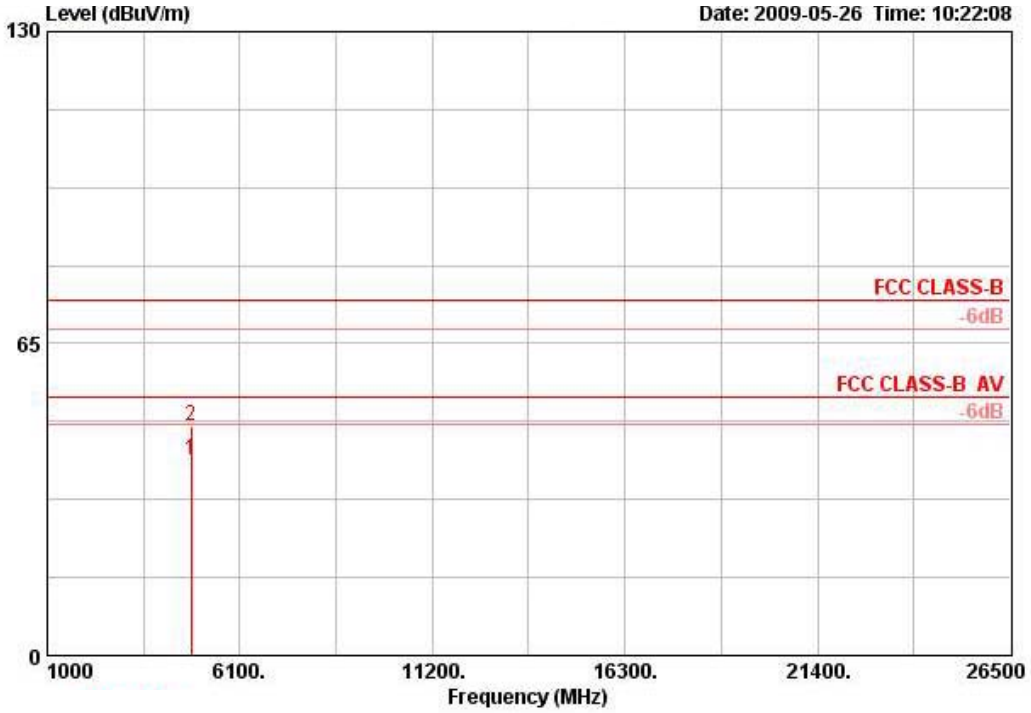
Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB			deg	cm
1	4950.140	40.91	54.00	-13.09	38.65	2.26	AVERAGE	VERTICAL	244	195
2	4951.070	51.58	74.00	-22.42	49.32	2.26	PEAK	VERTICAL	244	195

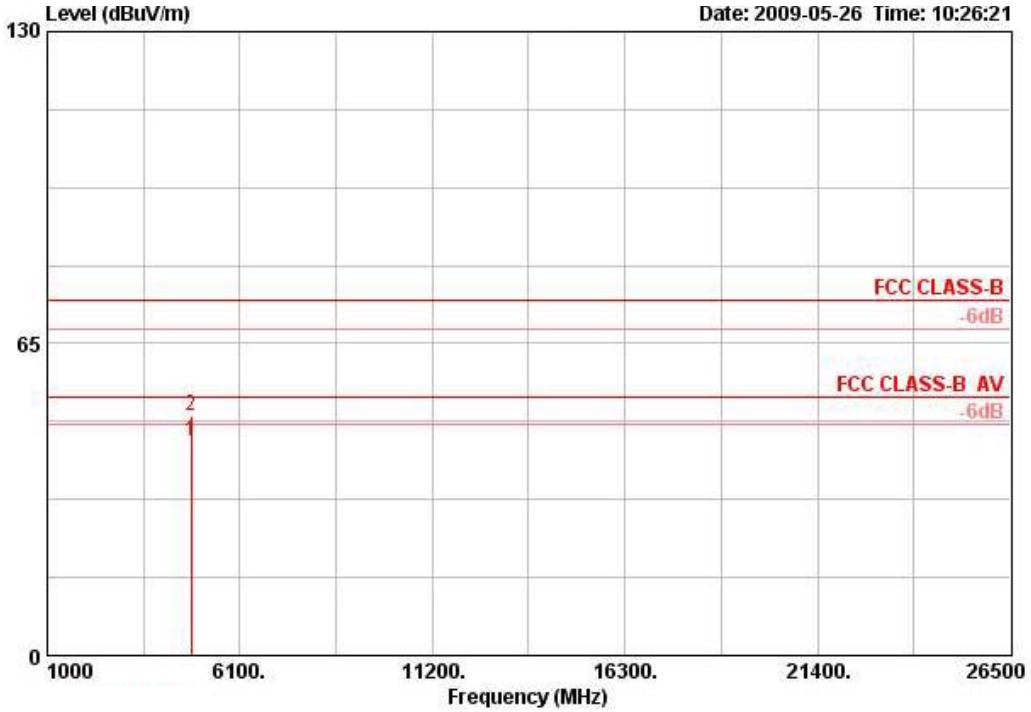
Temperature	25℃	Humidity	56%
Test Engineer	Johnson Chang	Configurations	802.15.4 ZigBee CH 11 / Mode 2

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB			deg	cm
1	4810.220	40.62	54.00	-13.38	38.68	1.94	AVERAGE	HORIZONTAL	218	146
2	4810.330	47.97	74.00	-26.03	46.03	1.94	PEAK	HORIZONTAL	218	146

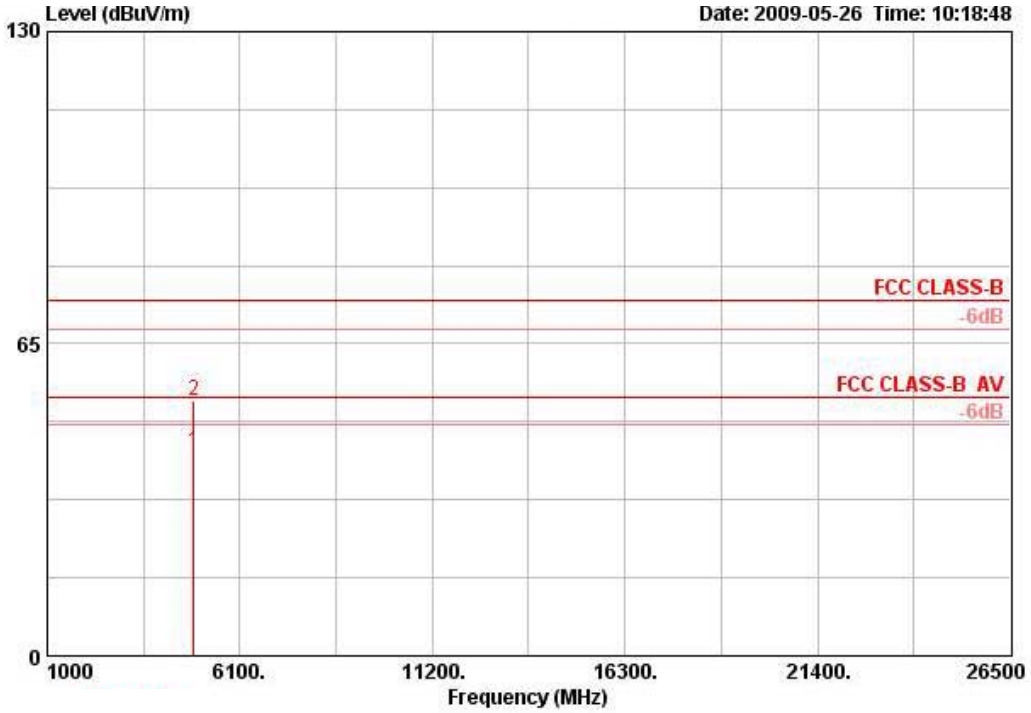
Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB			deg	cm
1 @	4810.230	44.59	54.00	-9.41	42.65	1.94	AVERAGE	VERTICAL	228	116
2	4810.240	50.05	74.00	-23.95	48.11	1.94	PEAK	VERTICAL	228	116

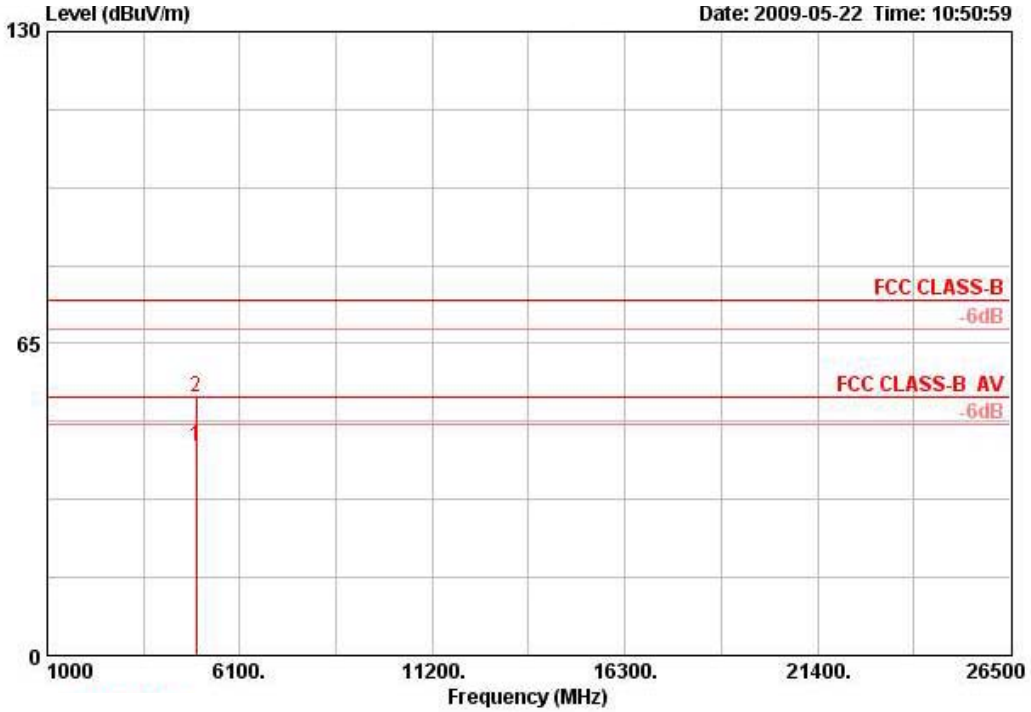
Temperature	25℃	Humidity	56%
Test Engineer	Johnson Chang	Configurations	802.15.4 ZigBee CH 18 / Mode 2

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB			deg	cm
1	4881.030	42.40	54.00	-11.60	40.29	2.10	AVERAGE	HORIZONTAL	10	183
2	4882.110	52.97	74.00	-21.03	50.87	2.10	PEAK	HORIZONTAL	10	183

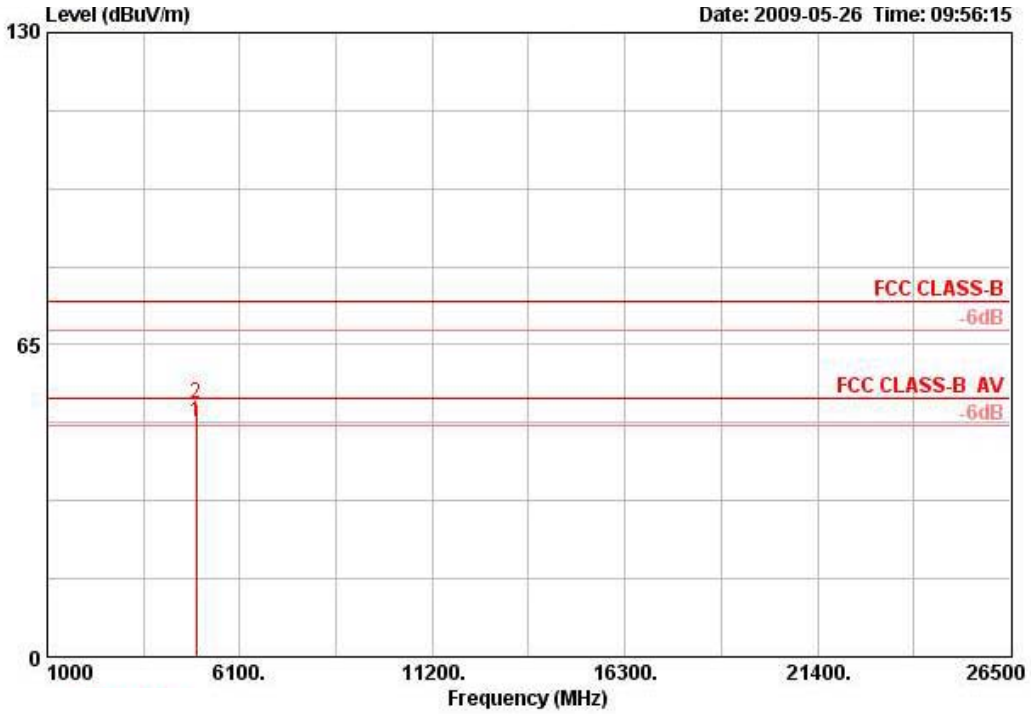
Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB			deg	cm
1 @	4950.070	43.42	54.00	-10.58	41.16	2.26	AVERAGE	VERTICAL	246	99
2	4950.940	53.77	74.00	-20.23	51.50	2.26	PEAK	VERTICAL	246	99

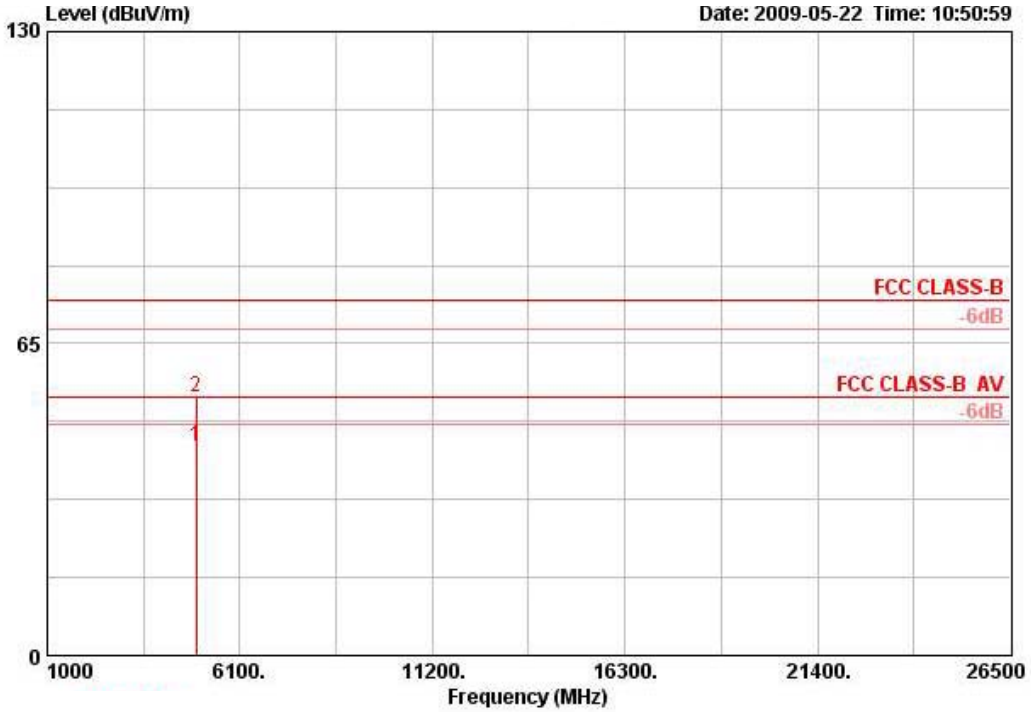
Temperature	25℃	Humidity	56%
Test Engineer	Johnson Chang	Configurations	802.15.4 ZigBee CH 25 / Mode 2

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB			deg	cm
1 @	4950.960	48.98	54.00	-5.02	46.72	2.26	AVERAGE	HORIZONTAL	18	171
2	4950.960	52.73	74.00	-21.27	50.47	2.26	PEAK	HORIZONTAL	18	171

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB			deg	cm
1 @	4950.070	43.42	54.00	-10.58	41.16	2.26	AVERAGE	VERTICAL	246	99
2	4950.940	53.77	74.00	-20.23	51.50	2.26	PEAK	VERTICAL	246	99

Note:

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.6. Band Edge Emissions Measurement

4.6.1. Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

4.6.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	100 KHz /100 KHz for Peak

4.6.3. Test Procedures

1. The test procedure is the same as section 4.5.3, only the frequency range investigated is limited to 100MHz around bandedges.
2. In case the emission is fail due to the used RB/VB is too wide, marker-delta method of FCC Public Notice DA00-705 will be followed.

4.6.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.5.4.

4.6.5. Test Deviation

There is no deviation with the original standard.

4.6.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.6.7. Test Result of Band Edge and Fundamental Emissions

Temperature	25°C	Humidity	56%
Test Engineer	Johnson Chang	Configurations	802.15.4 ZigBee CH 11, 18, 25 / Mode 1
Test Date	May 26, 2009		

Channel 11

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB			deg	cm
1	2386.800	55.79	74.00	-18.21	24.86	30.93	PEAK	VERTICAL	137	100
2 @	2390.000	44.54	54.00	-9.46	13.61	30.93	AVERAGE	VERTICAL	137	100
3 @	2405.000	69.79	54.00			30.98	AVERAGE	VERTICAL	137	100
4 @	2405.600	72.62	74.00			30.98	PEAK	VERTICAL	137	100

Item 3, 4 are the fundamental frequency at 2405 MHz.

Channel 18

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB			deg	cm
1	2388.000	55.56	74.00	-18.44	24.63	30.93	PEAK	VERTICAL	300	100
2 @	2390.000	44.56	54.00	-9.44	13.63	30.93	AVERAGE	VERTICAL	300	100
3 @	2439.640	72.80	74.00			31.07	PEAK	VERTICAL	300	100
4 @	2440.040	70.06	54.00			31.07	AVERAGE	VERTICAL	300	100
5 @	2483.500	44.70	54.00	-9.30	13.52	31.18	AVERAGE	VERTICAL	300	100
6	2484.700	55.70	74.00	-18.30	24.52	31.18	PEAK	VERTICAL	300	100

Item 3, 4 are the fundamental frequency at 2444 MHz.

Channel 25

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB			deg	cm
1 @	2474.400	71.24	74.00			31.17	PEAK	VERTICAL	133	100
2 @	2474.990	68.36	54.00			31.17	AVERAGE	VERTICAL	133	100
3 @	2483.500	44.64	54.00	-9.36	13.46	31.18	AVERAGE	VERTICAL	133	100
4	2484.500	54.48	74.00	-19.52	23.30	31.18	PEAK	VERTICAL	133	100

Item 1, 2 are the fundamental frequency at 2475 MHz.

Temperature	25℃	Humidity	56%
Test Engineer	Johnson Chang	Configurations	802.15.4 ZigBee CH 11, 18, 25 / Mode 2
Test Date	May 26, 2009		

Channel 11

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB			deg	cm
1	2367.600	56.32	74.00	-17.68	25.44	30.88	PEAK	VERTICAL	35	100
2 @	2373.200	45.00	54.00	-9.00	14.12	30.88	AVERAGE	VERTICAL	35	100
3 @	2405.200	105.47	54.00			30.98	AVERAGE	VERTICAL	35	100
4 @	2405.200	105.63	74.00			30.98	PEAK	VERTICAL	35	100

Item 3, 4 are the fundamental frequency at 2405 MHz.

Channel 18

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB			deg	cm
1	2387.200	55.05	74.00	-18.95	24.12	30.93	PEAK	VERTICAL	217	107
2 @	2390.000	44.61	54.00	-9.39	13.68	30.93	AVERAGE	VERTICAL	217	107
3 @	2440.100	103.70	74.00			31.07	PEAK	VERTICAL	217	107
4 @	2440.500	101.54	54.00			31.07	AVERAGE	VERTICAL	217	107
5 @	2483.500	44.76	54.00	-9.24	13.58	31.18	AVERAGE	VERTICAL	217	107
6	2484.300	56.19	74.00	-17.81	25.01	31.18	PEAK	VERTICAL	217	107

Item 3, 4 are the fundamental frequency at 2444 MHz.

Channel 25

	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Remark	Pol/Phase	Table Pos	Ant Pos
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB			deg	cm
1 @	2475.490	103.82	54.00			31.17	AVERAGE	VERTICAL	200	144
2 @	2475.500	103.95	74.00			31.17	PEAK	VERTICAL	200	144
3	2484.100	55.88	74.00	-18.12	24.70	31.18	PEAK	VERTICAL	200	144
4 @	2491.700	45.24	54.00	-8.76	14.02	31.22	AVERAGE	VERTICAL	200	144

Item 1, 2 are the fundamental frequency at 2475 MHz.

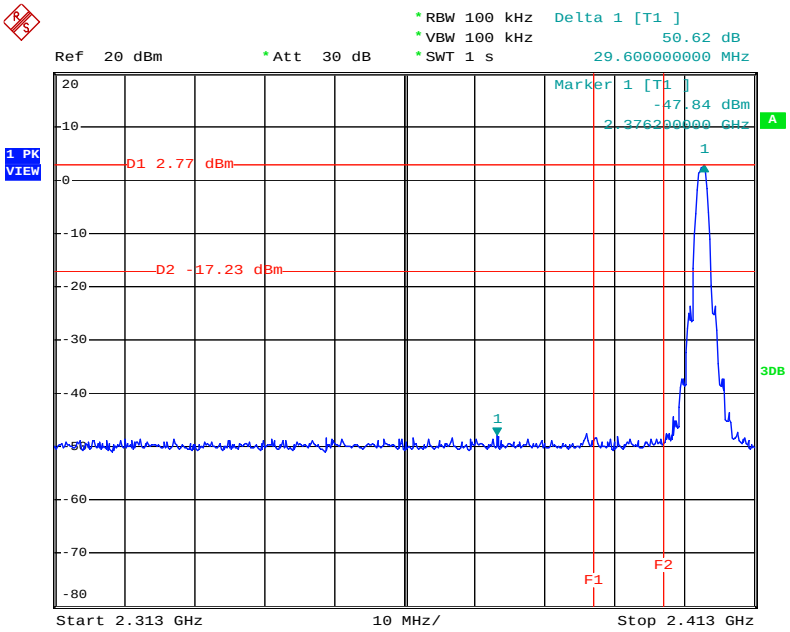
Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

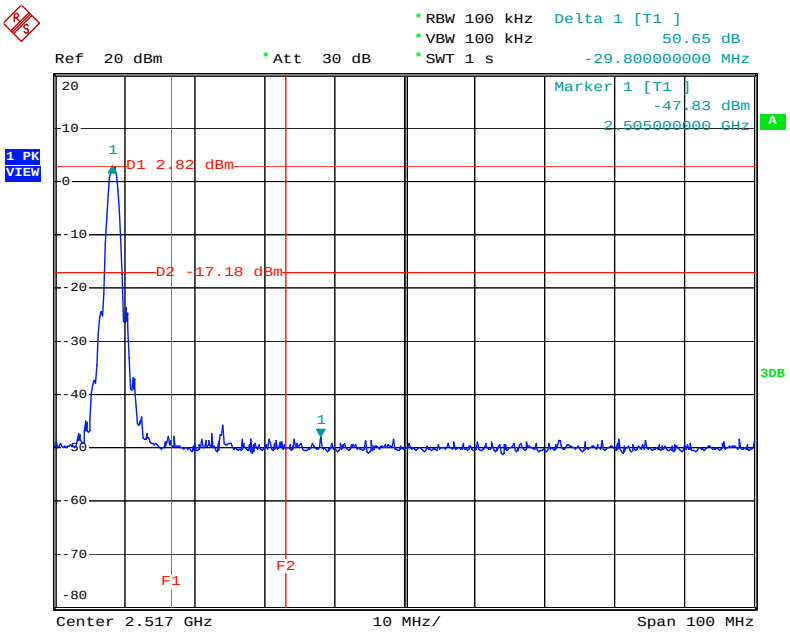
For Emission not in Restricted Band

Low Band Edge Plot on Configuration IEEE 802.15.4 ZigBee / 2405 MHz



Date: 26.MAY.2009 18:46:46

High Band Edge Plot on Configuration IEEE 802.15.4 ZigBee / 2475 MHz



Date: 26.MAY.2009 18:48:15

4.7. Antenna Requirements

4.7.1. Limit

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. 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 the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

4.7.2. Antenna Connector Construction

Please refer to section 3.3 in this test report; antenna connector complied with the requirements.

5. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100174	9kHz – 2.75GHz	Apr. 15, 2009	Conduction (CO04-HY)
LISN	MessTec	NNB-2/16Z	99079	9kHz – 30MHz	Mar. 23, 2009	Conduction (CO04-HY)
LISN (Support Unit)	EMCO	3810/2NM	9703-1839	9kHz – 30MHz	Mar. 22, 2009	Conduction (CO04-HY)
RF Cable-CON	UTIFLEX	3102-26886-4	CB049	9kHz – 30MHz	Apr. 20, 2009	Conduction (CO04-HY)
ISN	SCHAFFNER	ISN T400	21653	9kHz –30MHz	Jun. 13, 2008	Conduction (CO04-HY)
EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	N/A	Conduction (CO04-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30 MHz - 1 GHz 3m	Jun. 14, 2008	Radiation (03CH03-HY)
Amplifier	SCHAFFNER	COA9231A	18667	9 kHz - 2 GHz	Jan. 23, 2009	Radiation (03CH03-HY)
Amplifier	Agilent	8449B	3008A02120	1 GHz - 26.5 GHz	Jul. 21, 2008	Radiation (03CH03-HY)
Amplifier	MITEQ	AMF-6F-260400	9121372	26.5 GHz - 40 GHz	Apr. 06, 2009*	Radiation (03CH03-HY)
Spectrum Analyzer	R&S	FSP30	100023	9 kHz - 30 GHz	Feb. 02, 2009	Radiation (03CH03-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz - 30 MHz	Jul 28, 2008*	Radiation (03CH03-HY)
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30 MHz – 1 GHz	Jul. 12, 2008	Radiation (03CH03-HY)
Horn Antenna	EMCO	3115	6741	1GHz ~ 18GHz	Apr. 29, 2009	Radiation (03CH03-HY)
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15 GHz - 40 GHz	Jan.16, 2009	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	30 MHz - 1 GHz	Jan. 05, 2009	Radiation (03CH03-HY)
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	1 GHz - 40 GHz	Jan. 05, 2009	Radiation (03CH03-HY)
Turn Table	HD	DS 420	420/650/00	0 – 360 degree	N/A	Radiation (03CH03-HY)
Antenna Mast	HD	MA 240	240/560/00	1 m - 4 m	N/A	Radiation (03CH03-HY)
Spectrum Analyzer	R&S	FSU26.5	100015	20Hz ~ 26.5GHz	Oct. 29, 2008	Conducted (TH01-HY)
Power Meter	R&S	NRVS	100444	DC ~ 40GHz	Jul. 11, 2008	Conducted (TH01-HY)
Power Sensor	R&S	NRV-Z51	100458	DC ~ 30GHz	Jul. 11, 2008	Conducted (TH01-HY)
Power Sensor	R&S	NRV-Z32	100057	30MHz ~ 6GHz	Jul. 11, 2008	Conducted (TH01-HY)
AC Power Source	HPC	HPA-500W	HPA-9100024	AC 0 ~ 300V	May 30, 2009*	Conducted (TH01-HY)
DC Power Source	G.W.	GPC-6030D	C671845	DC 1V ~ 60V	Mar. 13, 2009	Conducted (TH01-HY)
Temp. and Humidity Chamber	Giant Force	GTH-225-20-S	MAB0103-001	N/A	Jul. 18, 2008	Conducted (TH01-HY)
RF CABLE-1m	Jye Bao	RG142	CB034-1m	20MHz ~ 7GHz	Dec. 01, 2008	Conducted (TH01-HY)
RF CABLE-2m	Jye Bao	RG142	CB035-2m	20MHz ~ 1GHz	Dec. 01, 2008	Conducted (TH01-HY)
Vector Signal Generator	R&S	SMU200A	102098	100kHz ~ 6GHz	Dec. 14, 2008	Conducted (TH01-HY)
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Mar. 25, 2009	Conducted (TH01-HY)
Oscilloscope	Tektonix	TDS380	B016197	400MHz/ 2GS/s	Jun. 27, 2008	Conducted (TH01-HY)

Note: Calibration Interval of instruments listed above is one year.

Note: *Calibration Interval of instruments listed above is two year.

6. TEST LOCATION

SHIJR	ADD	:	6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C.
	TEL	:	886-2-2696-2468
	FAX	:	886-2-2696-2255
HWA YA	ADD	:	No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.
	TEL	:	886-3-327-3456
	FAX	:	886-3-318-0055
LINKOU	ADD	:	No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C
	TEL	:	886-2-2601-1640
	FAX	:	886-2-2601-1695
DUNGHU	ADD	:	No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C.
	TEL	:	886-2-2631-4739
	FAX	:	886-2-2631-9740
JUNGHE	ADD	:	7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C.
	TEL	:	886-2-8227-2020
	FAX	:	886-2-8227-2626
NEIHU	ADD	:	4Fl., No. 339, Hsin Hu 2nd Rd., Taipei 114, Taiwan, R.O.C.
	TEL	:	886-2-2794-8886
	FAX	:	886-2-2794-9777
JHUBEI	ADD	:	No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C.
	TEL	:	886-3-656-9065
	FAX	:	886-3-656-9085

7. TAF CERTIFICATE OF ACCREDITATION

Certificate No. : L1190-070110

財團法人全國認證基金會
Taiwan Accreditation Foundation

Certificate of Accreditation

This is to certify that

Sporton International Inc.
EMC & Wireless Communications Laboratory
No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

is accredited in respect of laboratory

Accreditation Criteria	:	ISO/IEC 17025:2005
Accreditation Number	:	1190
Originally Accredited	:	December 15, 2003
Effective Period	:	January 10, 2007 to January 09, 2010
Accredited Scope	:	Testing Field, see described in the Appendix
Specific Accreditation Program	:	Accreditation Program for Designated Testing Laboratory for Commodities Inspection Accreditation Program for Telecommunication Equipment Testing Laboratory

Jay-San Chen
President, Taiwan Accreditation Foundation
Date : January 10, 2007

P1, total 9 pages

The Appendix forms an integral part of this Certificate, which shall be invalid when used without the Appendix.