



# SPORTON International Inc.

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## FCC RADIO TEST REPORT

Applicant's company	Raytrend Technology Corp
Applicant Address	Rm.5, 18F-1, No.700, Zhongzheng Rd., Zhonghe Dist., New Taipei City 235, Taiwan
FCC ID	OIL-COLLAGE
Manufacturer's company	1) VeriSonix Corp. 2) GWAN KUEN Technology Co., LTD.
Manufacturer Address	1) 4F, No. 176, Jian 1st Road, Zhonghe Dist., New Taipei City23553, Taiwan, R.O.C 2) No. 224-2, Liancheng Rd.,Zhonghe Dist., New Taipei 235, Taiwan

Product Name	Bluetooth Speaker
Brand Name	IN2UIT
Model Name	COLLAGE
Test Rule	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2402 ~ 2480 MHz
Received Date	Dec. 01, 2012
Final Test Date	Jan. 28, 2013
Submission Type	Original Equipment



### Statement

**Test result included is only for the Bluetooth 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 C63.10-2009, 47 CFR FCC Part 15 Subpart C**

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



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### History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR2D0113	Rev. 01	Initial issue of report	Jan. 31, 2013



## 1. CERTIFICATE OF COMPLIANCE

Product Name : Bluetooth Speaker  
Brand Name : IN2UIT  
Model Name : COLLAGE  
Applicant : Raytrend Technology Corp  
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 Dec. 01, 2012 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.

A handwritten signature in blue ink, appearing to read 'Sam Chen', is written over a horizontal line.

Sam Chen

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	10.30 dB
4.2	15.247(b)(1)	Maximum Conducted Output Power	Complies	26.99 dB
4.3	15.247(a)(1)	Hopping Channel Separation	Complies	-
4.4	15.247(b)(1)	Number of Hopping Frequency	Complies	-
4.5	15.247(a)(1)	Dwell Time	Complies	-
4.6	15.247(d)	Radiated Emissions	Complies	1.23 dB
4.7	15.247(d)	Band Edge Emissions	Complies	3.78 dB
4.8	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%
Hopping Channel Separation	±8.5×10 <sup>-8</sup>	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°C	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

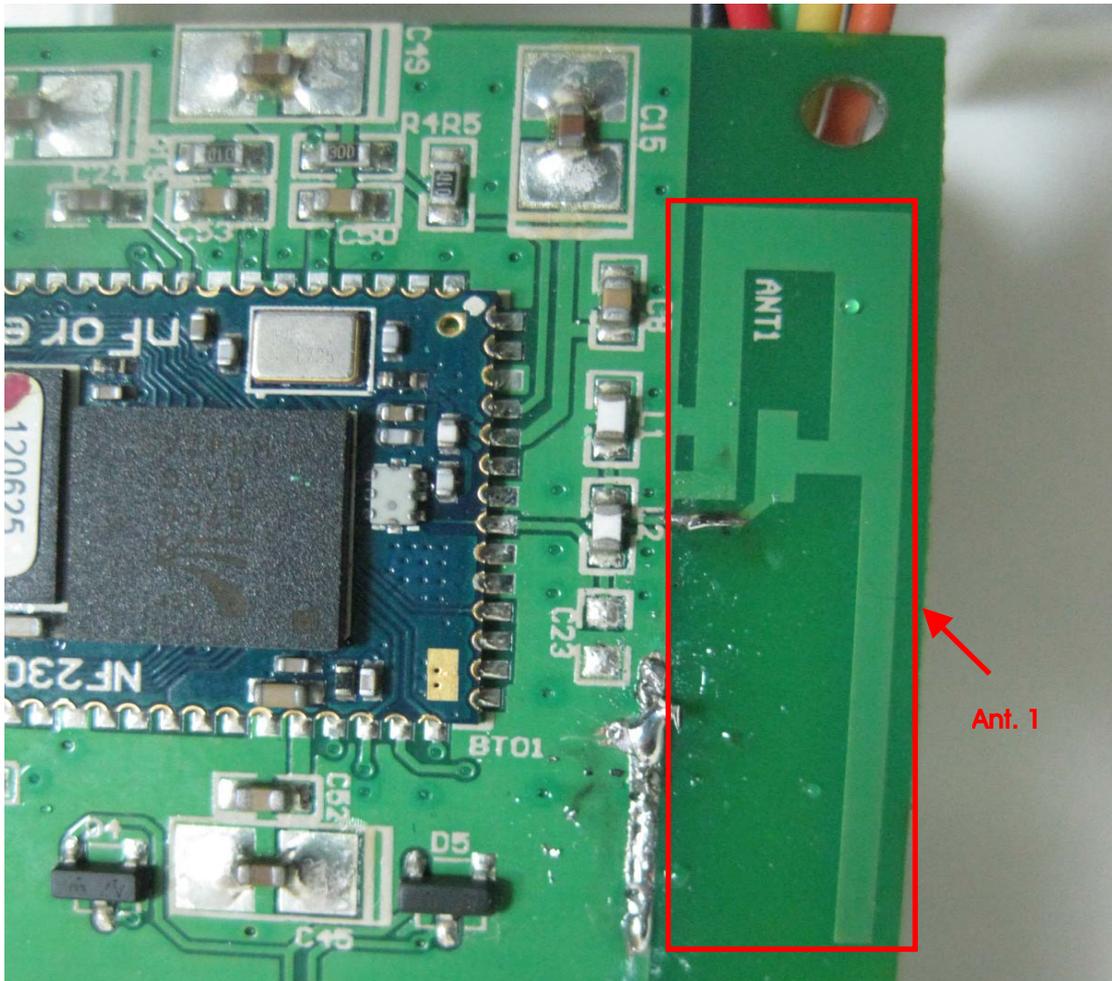
Items	Description
Power Type	From Power Adapter
Modulation	FHSS (GFSK / $\pi/4$ -DQPSK / 8DPSK)
Data Rate (Mbps)	GFSK: 1 ; $\pi/4$ -QPSK: 2 ; 8DPSK: 3
Frequency Range	2402 ~ 2480 MHz
Channel Number	79
Channel Band Width (99%)	For Bluetooth 1.0 : 0.8800 MHz For Bluetooth 2.1 + EDR : 1.1760 MHz
Conducted Output Power	For Bluetooth 1.0 : 3.01 dBm For Bluetooth 2.1 + EDR : 0.96 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

#### 3.2. Accessories

Power	Brand Holder	Model	Rating
Adapter	EDAC	EA10521C-150	Input: 100-240V~1.8A, 50-60Hz Output: 15V, 4.0A
<b>Others</b>			
Power Cable: Non-Shielded, 0.6m			

3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	-	-	Printed Antenna	NA	1.26



3.4. Table for Carrier Frequencies

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
2402 ~ 2480 MHz	0	2402 MHz	40	2442 MHz
	1	2403 MHz	:	:
	:	:	77	2479 MHz
	38	2440 MHz	78	2480 MHz
	39	2441 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.

#### For Bluetooth 1.0:

Test Items	Mode	Data Rate	Channel	Antenna
AC Power Conducted Emissions	CTX	-	-	-
Peak Output Power	GFSK	1 Mbps	0/39/78	1
Average Output Power	GFSK	1 Mbps	0/39/78	1
Hopping Channel Separation	GFSK	1 Mbps	0~1/39~40/77~78	1
Number of Hopping Frequency	GFSK	1 Mbps	0~78	1
Dwell Time	DH1/DH3/DH5	1 Mbps	0/39/78	1
Radiated Emissions Below 1GHz	CTX	-	-	-

#### For Bluetooth 2.1 + EDR:

Test Items	Mode	Data Rate	Channel	Antenna
AC Power Conducted Emissions	CTX	-	-	-
Peak Output Power	8DPSK	3 Mbps	0/39/78	1
Average Output Power	8DPSK	3 Mbps	0/39/78	1
Hopping Channel Separation	8DPSK	3 Mbps	0~1/39~40/77~78	1
Number of Hopping Frequency	8DPSK	3 Mbps	0~78	1
Dwell Time	3DH1/3DH3/3DH5	3 Mbps	0/39/78	1
Radiated Emissions Below 1GHz	CTX	-	-	-
Radiated Emissions Above 1GHz	8DPSK	3 Mbps	0/39/78	1
Band Edge Emissions	8DPSK	3 Mbps	0/39/78	1

### 3.6. Table for Testing Locations

Test Site No.	Site Category	Location	FCC Reg. No.	IC File No.	VCCI Reg. No
03CH01-CB	SAC	Hsin Chu	262045	IC 4086D	-
CO01-CB	Conduction	Hsin Chu	262045	IC 4086D	-
TH01-CB	OVEN Room	Hsin Chu	-	-	-

Open Area Test Site (OATS); Semi Anechoic Chamber (SAC); Please refer section 6 for Test Site Address.

### 3.7. Table for Supporting Units

Support Unit	Brand	Model	FCC ID
PC	Acer	N/A	N/A
LCD Monitor	HP	FW660AA	N/A
Keyboard	iCooky	SK068	DoC
Mouse	Logitech M90	M-U0026	DoC

### 3.8. 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.

For Bluetooth 1.0 :

Power Parameters of Bluetooth

Test Software Version	CSR BlueSuite 2.4.6		
Frequency	2402 MHz	2441 MHz	2480 MHz
Parameters 1DH5	63	63	63

For Bluetooth 2.1 + EDR :

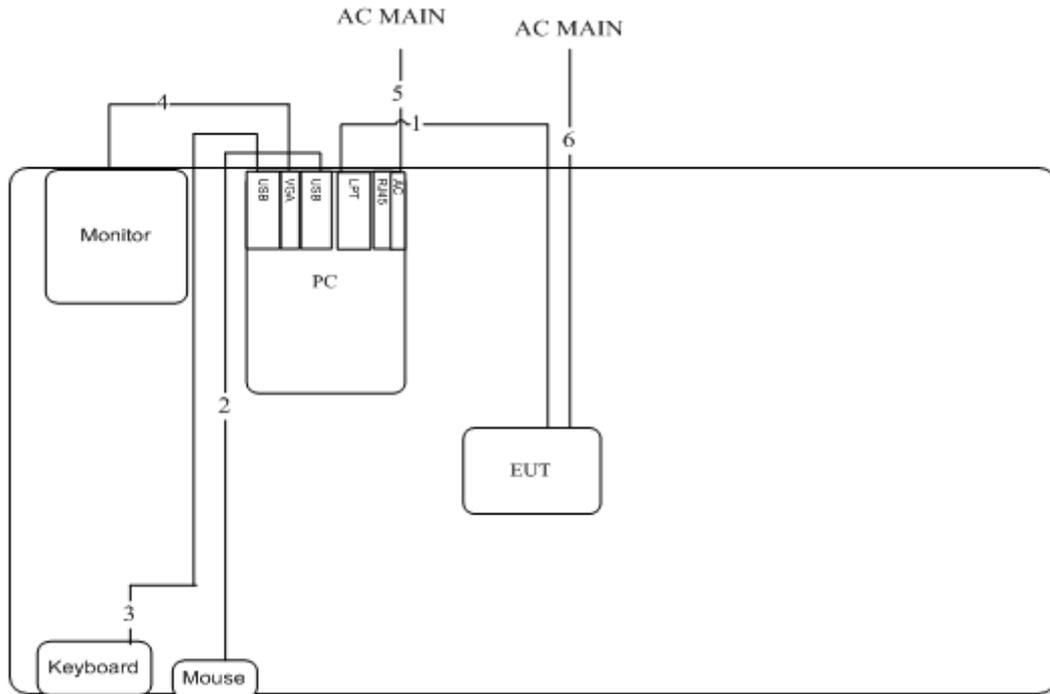
Power Parameters of Bluetooth

Test Software Version	CSR BlueSuite 2.4.6		
Frequency	2402 MHz	2441 MHz	2480 MHz
Parameters 3DH5	120	120	120

During the test, "CSR BlueSuite 2.4.6" under WIN XP was executed the test program to control the EUT continuously transmit RF signal.

### 3.9. Test Configurations

#### 3.9.1. AC Power Line Conduction Emissions and Radiation Emissions Test Configuration



Item	Connection	Shield	Length
1	LPT Cable	Yes	1m
2	USB Cable	No	1.8m
3	USB Cable	No	1.8m
4	VGA Cable	Yes	1.8m
5	Power Cable	No	1.8m
6	Power Cable	No	0.6m

## 4. TEST RESULT

### 4.1. AC Power Line Conducted Emissions Measurement

#### 4.1.1. Limit

For a Low-power Radio-frequency Device 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

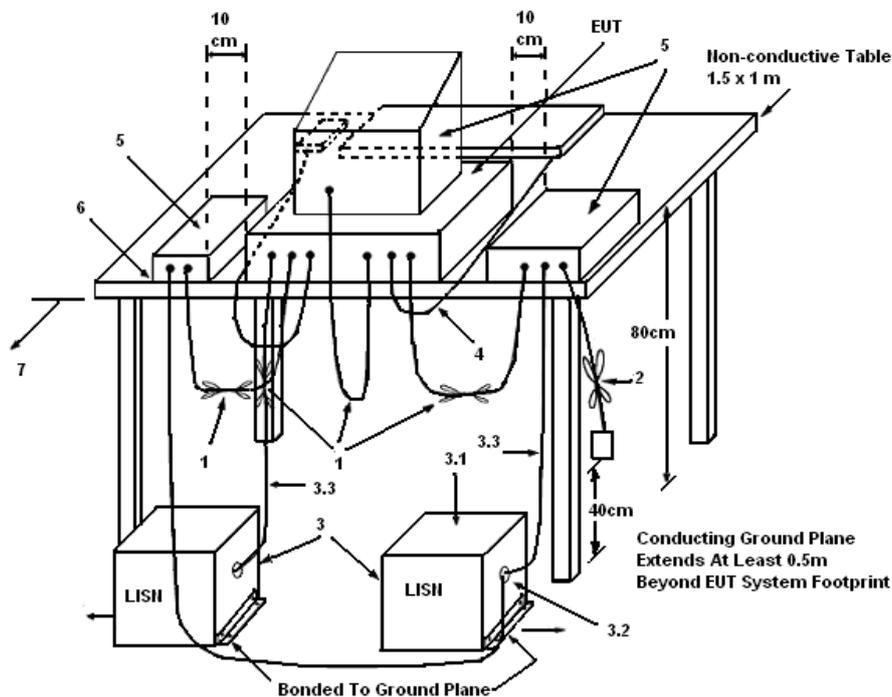
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

#### 4.1.3. Test Procedures

1. Configure the EUT according to ANSI C63.10. 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.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
4. The frequency range from 150 kHz to 30 MHz was searched.
5. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. 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  $\Omega$ . 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

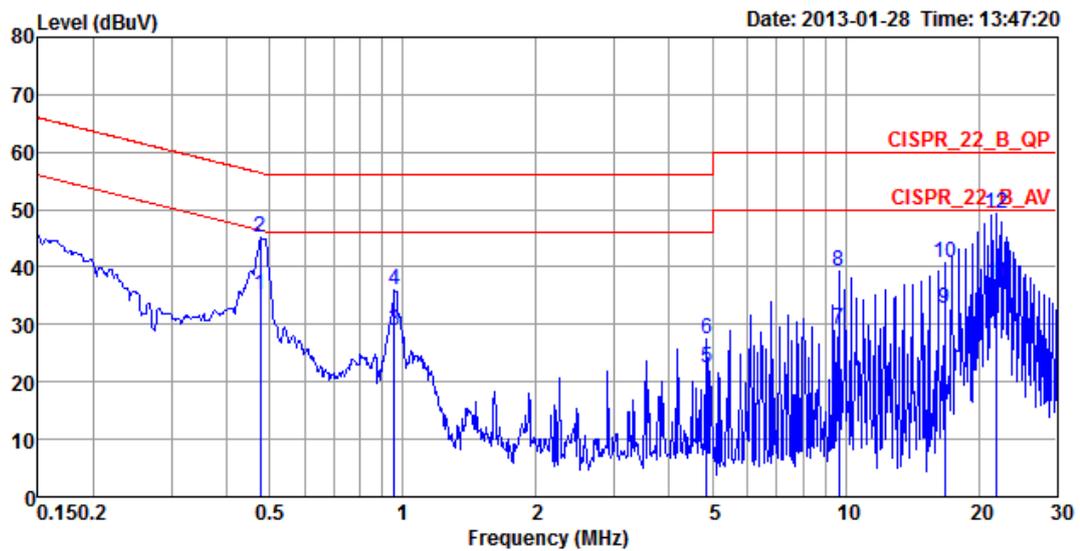
There is no deviation with the original standard.

#### 4.1.6. EUT Operation during Test

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

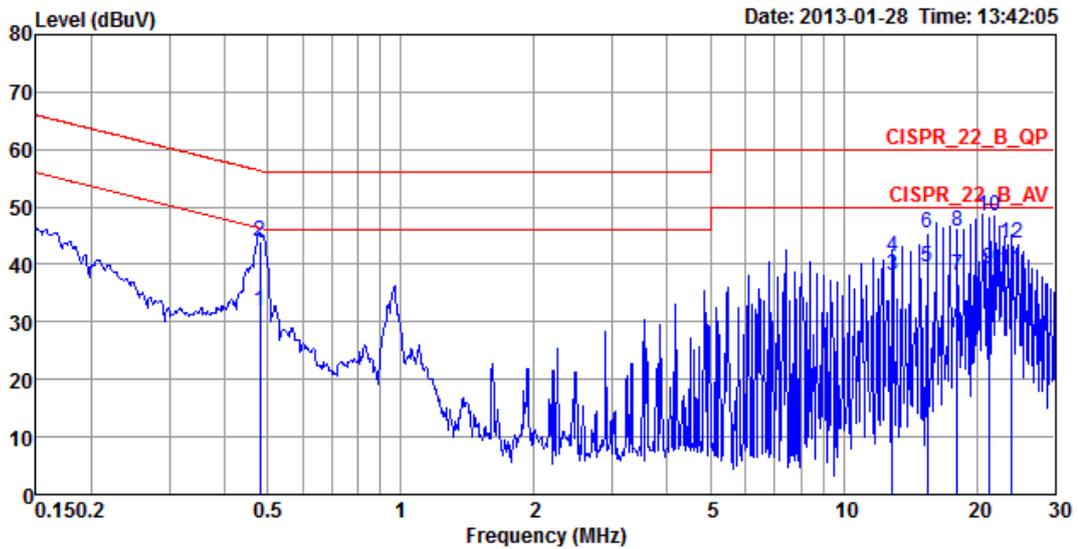
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	22°C	Humidity	58%
Test Engineer	Sollo Luo	Phase	Line
Configuration	CTX		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 av	0.48	35.08	-21.33	56.41	34.81	0.22	0.05	Average
2	0.48	45.08	-11.33	56.41	44.81	0.22	0.05	QP
3	0.96	28.95	-27.05	56.00	28.65	0.23	0.07	Average
4	0.96	35.95	-20.05	56.00	35.65	0.23	0.07	QP
5	4.85	22.36	-33.64	56.00	21.90	0.32	0.14	Average
6	4.85	27.36	-28.64	56.00	26.90	0.32	0.14	QP
7	9.65	29.31	-30.69	60.00	28.71	0.42	0.18	Average
8	9.65	39.31	-20.69	60.00	38.71	0.42	0.18	QP
9	16.75	32.68	-27.32	60.00	31.91	0.65	0.12	Average
10	16.75	40.68	-19.32	60.00	39.91	0.65	0.12	QP
11	21.95	37.33	-22.67	60.00	36.35	0.79	0.19	Average
12 pp	21.95	49.33	-10.67	60.00	48.35	0.79	0.19	QP

Temperature	22°C	Humidity	58%
Test Engineer	Sollo Luo	Phase	Neutral
Configuration	CTX		



	Freq	Level	Over	Limit	Read	LISN	Cable	Remark
	MHz	dBuV	Limit	Line	Level	Factor	Loss	
			dB	dBuV	dBuV	dB	dB	
1	0.48	31.84	-14.48	46.32	31.71	0.08	0.05	Average
2	0.48	44.03	-12.29	56.32	43.90	0.08	0.05	QP
3	12.88	38.12	-11.88	50.00	37.62	0.36	0.14	Average
4	12.88	41.18	-18.82	60.00	40.68	0.36	0.14	QP
5 pp	15.45	39.70	-10.30	50.00	39.17	0.42	0.11	Average
6	15.45	45.44	-14.56	60.00	44.91	0.42	0.11	QP
7	18.02	38.22	-11.78	50.00	37.63	0.46	0.13	Average
8	18.02	45.66	-14.34	60.00	45.07	0.46	0.13	QP
9	21.25	39.17	-10.83	50.00	38.47	0.53	0.17	Average
10 qp	21.25	48.27	-11.73	60.00	47.57	0.53	0.17	QP
11	23.84	38.85	-11.15	50.00	38.01	0.61	0.23	Average
12	23.84	43.81	-16.19	60.00	42.97	0.61	0.23	QP

Note:

Level = Read Level + LISN Factor + Cable Loss

## 4.2. Maximum Conducted Output Power Measurement

### 4.2.1. Limit

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, the limit for peak output power is 1Watt (30dBm). For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts (21dBm). 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

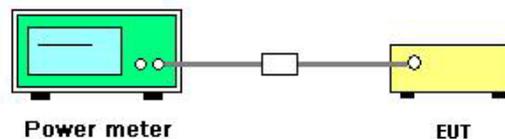
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Bandwidth	50MHz bandwidth is greater than the EUT emission bandwidth
Detector	Average

### 4.2.3. Test Procedures

This procedure provides an alternative for determining the RMS output power using a broadband RF average power meter with a thermocouple detector.

### 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	18°C	Humidity	65%
Test Engineer	Robert Chang	Configurations	GFSK / DH5
Test Date	Dec. 13, 2012		

## For Bluetooth 1.0

Frequency	Conducted Power (dBm)	Conducted Power (W)	Max. Limit(dBm)	Max. Limit(W)	Result
2402 MHz	2.54	0.0018	30.00	1.0000	Complies
2441 MHz	2.65	0.0018	30.00	1.0000	Complies
2480 MHz	3.01	0.0020	30.00	1.0000	Complies

Temperature	18°C	Humidity	65%
Test Engineer	Robert Chang	Configurations	8DPSK / 3DH5
Test Date	Dec. 13, 2012		

## For Bluetooth 2.1+EDR

Frequency	Conducted Power (dBm)	Conducted Power (W)	Max. Limit(dBm)	Max. Limit(W)	Result
2402 MHz	0.96	0.0012	30.00	1.0000	Complies
2441 MHz	0.85	0.0012	30.00	1.0000	Complies
2480 MHz	0.84	0.0012	30.00	1.0000	Complies

### 4.3. Hopping Channel Separation Measurement

#### 4.3.1. Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

#### 4.3.2. Measuring Instruments and Setting

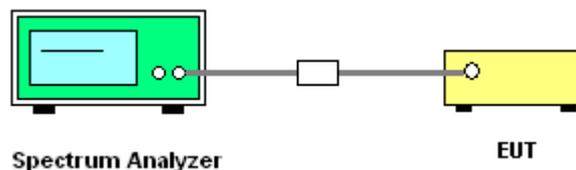
Please refer to section 5 of equipments list in this report. The following table is the setting of spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	30 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

#### 4.3.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilized for 20 dB bandwidth measurement.
3. The resolution bandwidth of 100 kHz and the video bandwidth of 100 kHz were utilized for channel separation measurement.

#### 4.3.4. Test Setup Layout



#### 4.3.5. Test Deviation

There is no deviation with the original standard.

## 4.3.6. Test Result of Hopping Channel Separation

Temperature	18°C	Humidity	65%
Test Engineer	Robert Chang	Configurations	GFSK / DH5

## For Bluetooth 1.0

Frequency	20dB Bandwidth (MHz)	99% Occupied BW (MHz)	Channel Separation (MHz)	Two-Thirds of 20dB Bandwidth (MHz)	Result
2402 MHz	0.9560	0.8800	1.00	0.637	Complies
2441 MHz	0.8640	0.8560	1.00	0.576	Complies
2480 MHz	0.8600	0.8520	1.00	0.573	Complies

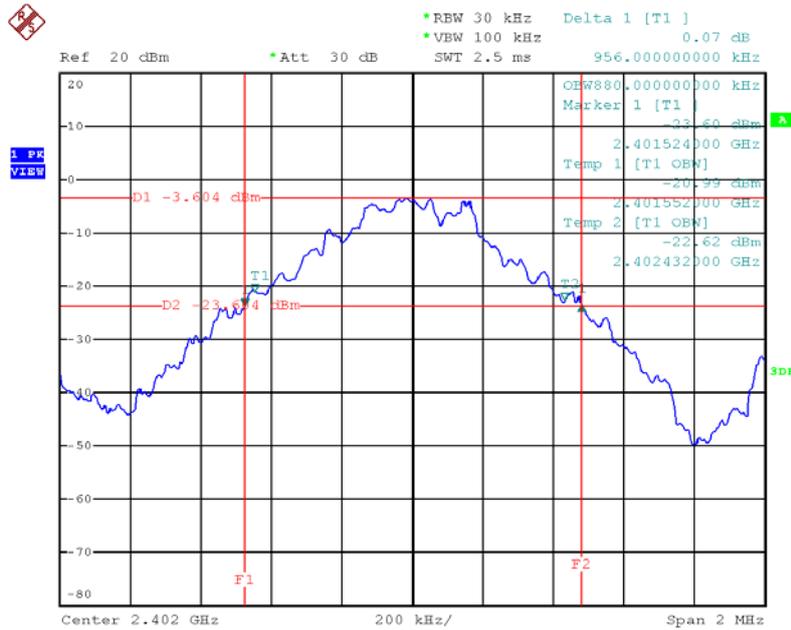
Temperature	18°C	Humidity	65%
Test Engineer	Robert Chang	Configurations	8DPSK / 3DH5

## For Bluetooth 2.1+EDR

Frequency	20dB Bandwidth (MHz)	99% Occupied BW (MHz)	Channel Separation (MHz)	Two-Thirds of 20dB Bandwidth (MHz)	Result
2402 MHz	1.2600	1.1760	1.00	0.840	Complies
2441 MHz	1.2840	1.1720	1.00	0.856	Complies
2480 MHz	1.2520	1.1760	1.00	0.835	Complies

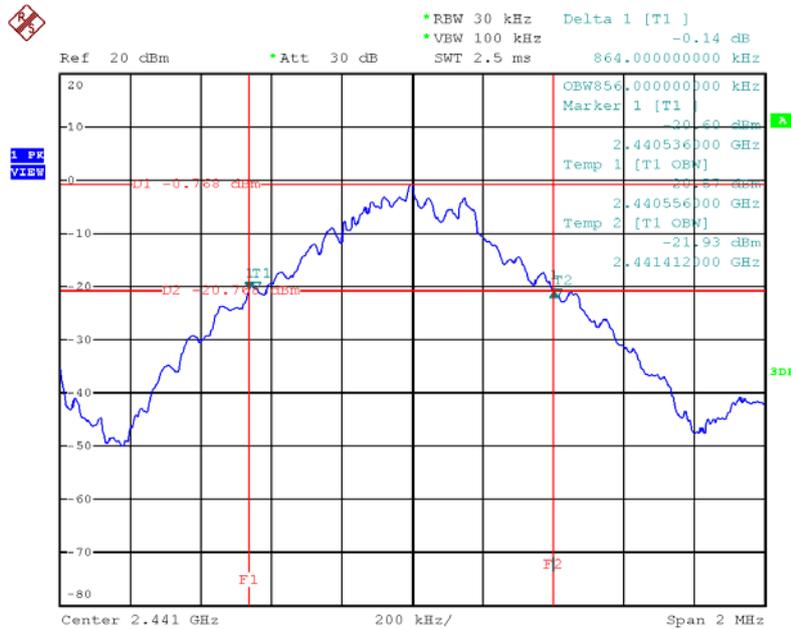
For Bluetooth 1.0

20 dB Bandwidth Plot on Channel 0 / 2402 MHz



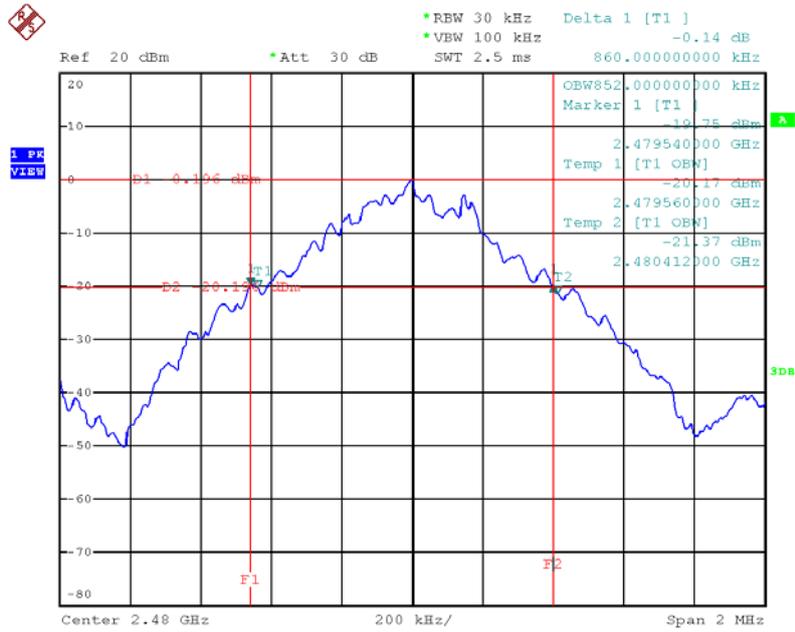
Date: 13.DEC.2012 07:33:24

20 dB Bandwidth Plot on Channel 39 / 2441 MHz



Date: 13.DEC.2012 07:32:50

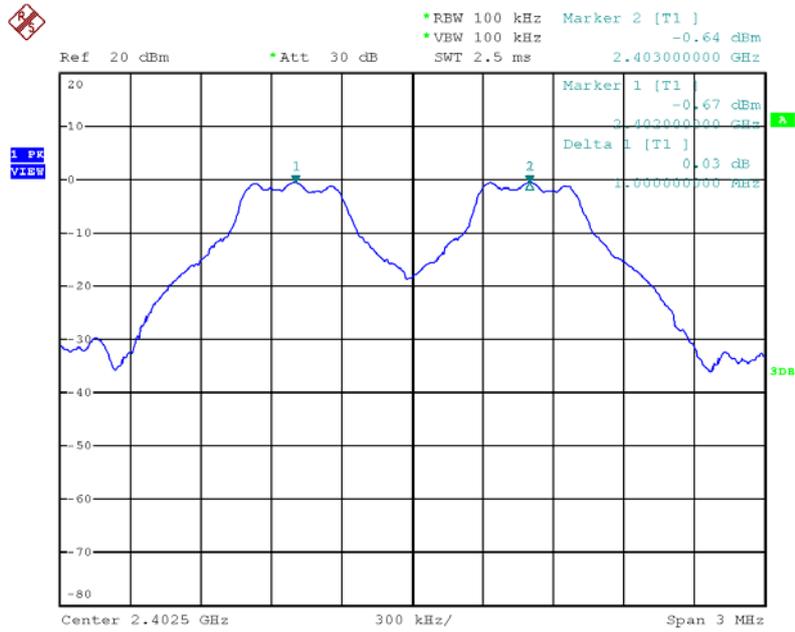
20 dB Bandwidth Plot on Channel 78 / 2480 MHz



Date: 13.DEC.2012 07:30:56

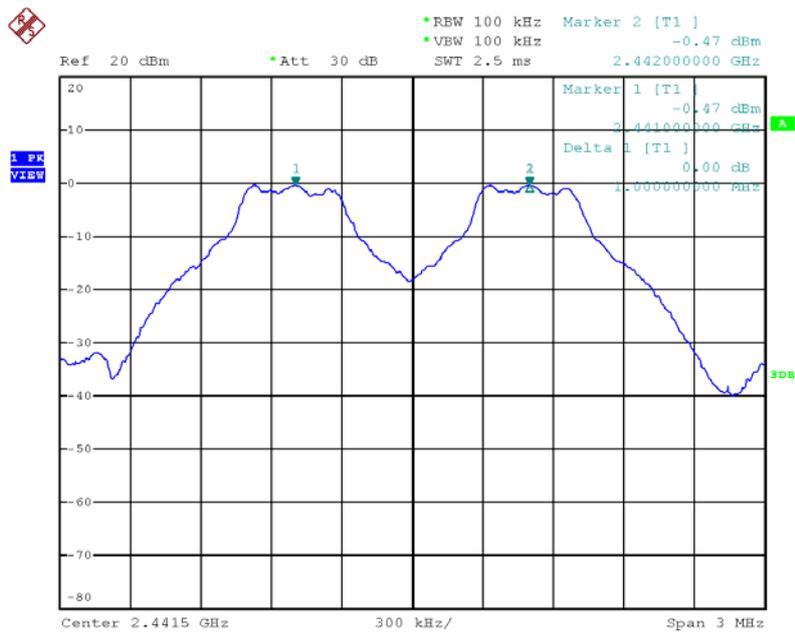
For Bluetooth 1.0

Channel Separation Plot on Channel 0~1 / 2402 MHz ~ 2403 MHz



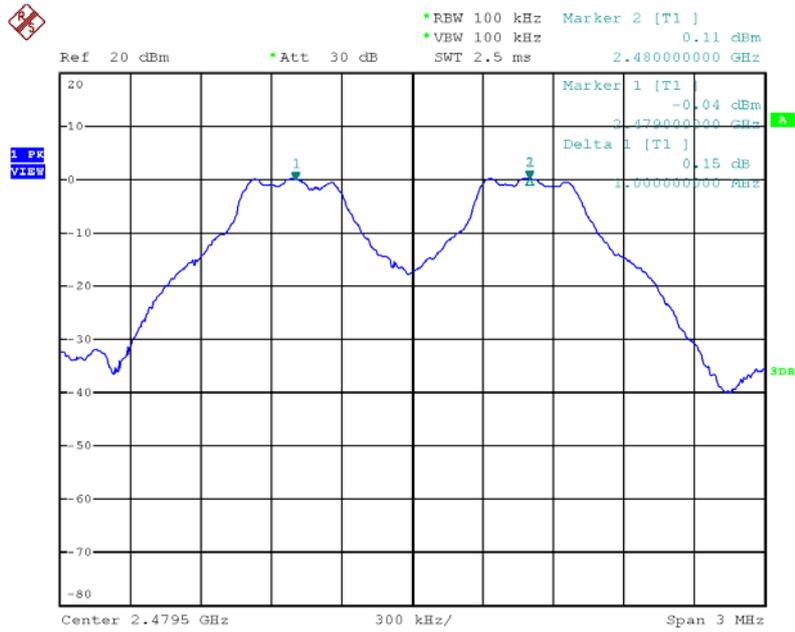
Date: 13.DEC.2012 07:57:30

Channel Separation Plot on Channel 39~40 / 2441 MHz ~ 2442 MHz



Date: 13.DEC.2012 07:58:19

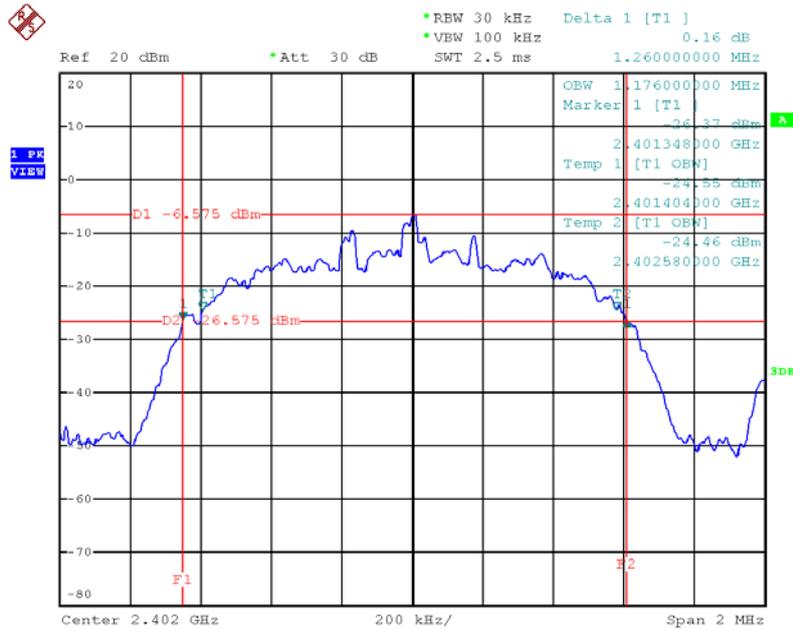
Channel Separation Plot on Channel 77~78 / 2479 MHz ~ 2480 MHz



Date: 13.DEC.2012 07:59:13

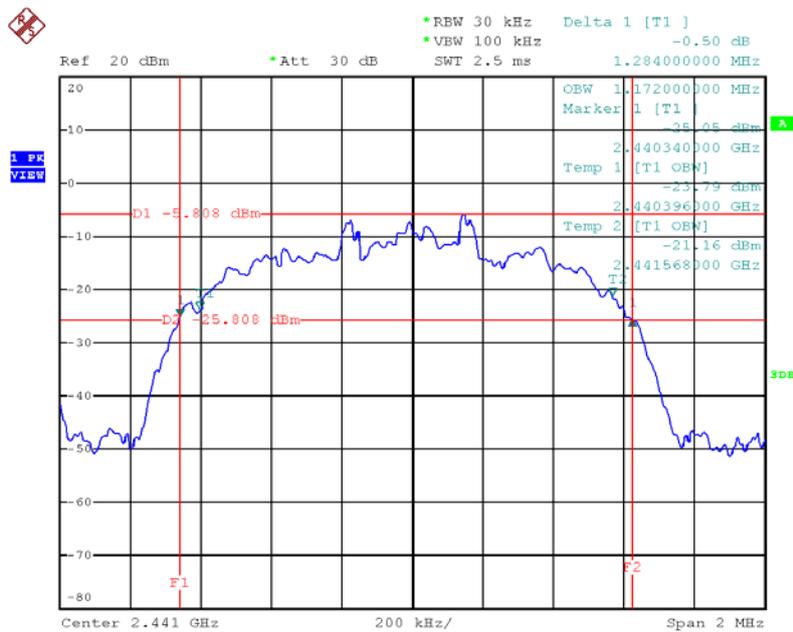
For Bluetooth 2.1+EDR

20 dB Bandwidth Plot on Channel 0 / 2402 MHz



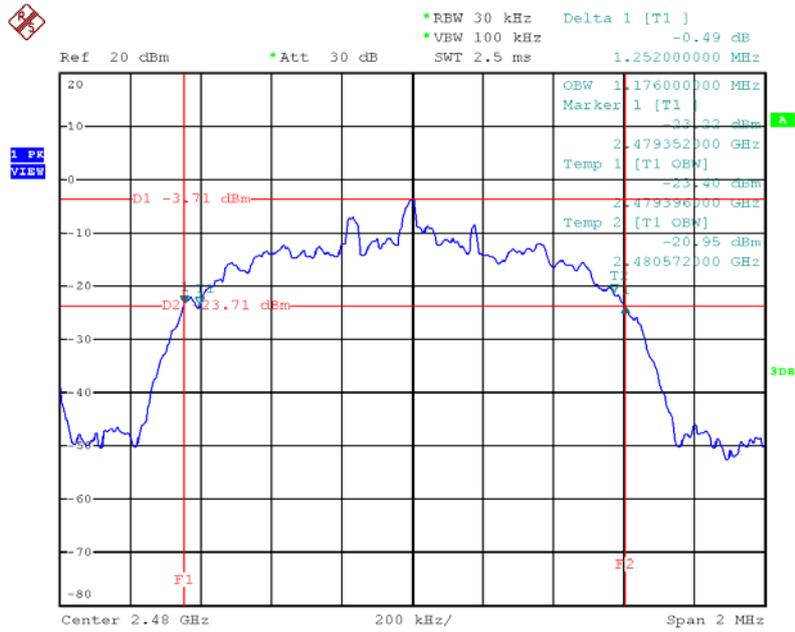
Date: 13.DEC.2012 07:06:58

20 dB Bandwidth Plot on Channel 39 / 2441 MHz



Date: 13.DEC.2012 07:25:43

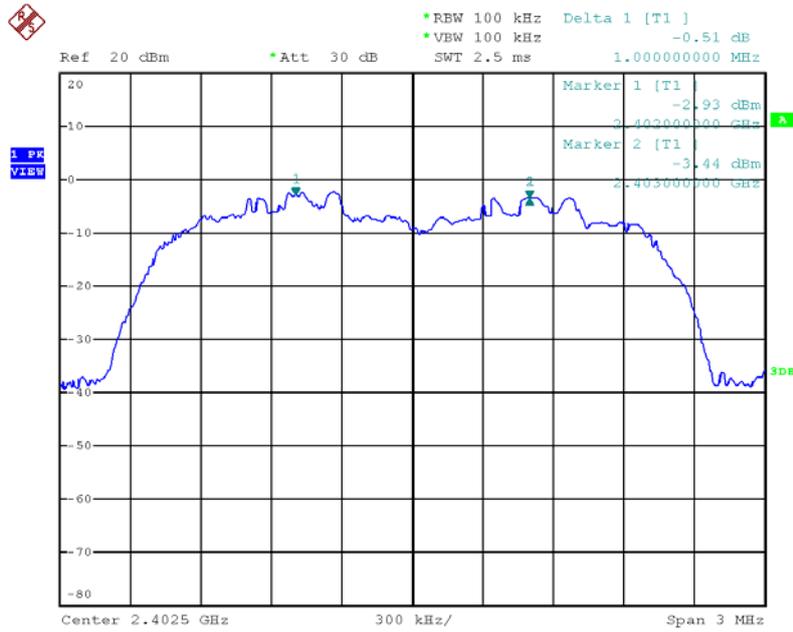
20 dB Bandwidth Plot on Channel 78 / 2480 MHz



Date: 13.DEC.2012 07:27:18

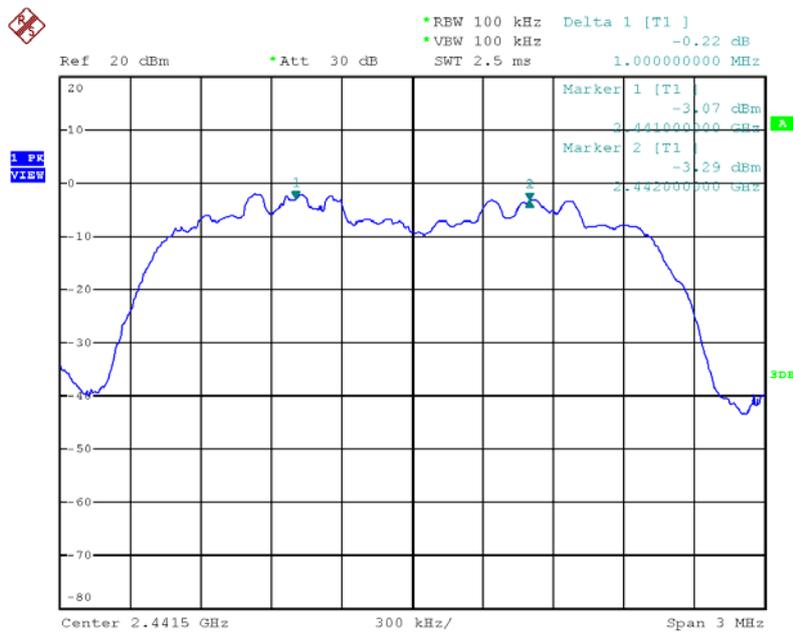
For Bluetooth 2.1+EDR

Channel Separation Plot on Channel 0~1 / 2402 MHz ~ 2403 MHz



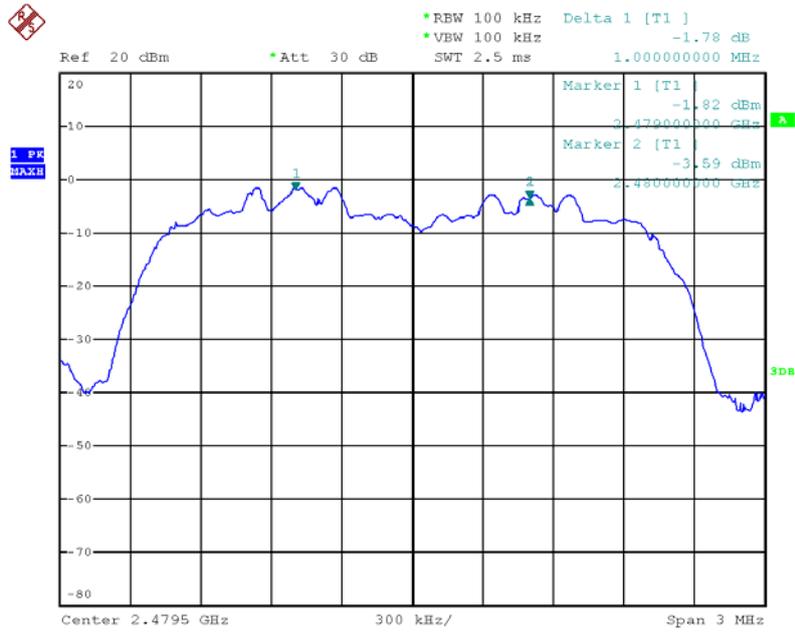
Date: 12.DEC.2012 13:44:16

Channel Separation Plot on Channel 39~40 / 2441 MHz ~ 2442 MHz



Date: 12.DEC.2012 13:48:56

Channel Separation Plot on Channel 77~78 / 2479 MHz ~ 2480 MHz



Date: 12.DEC.2012 13:52:02

#### 4.4. Number of Hopping Frequency Measurement

##### 4.4.1. Limit

At least 15 hopping frequencies, and should be equally spaced.

##### 4.4.2. Measuring Instruments and Setting

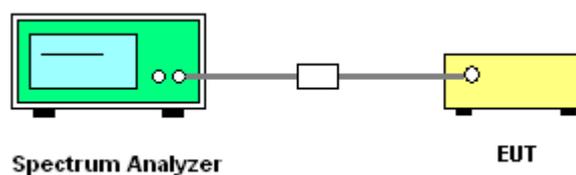
Please refer to section 5 of equipments list in this report. The following table is the setting of spectrum analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> Operating Frequency Range
RB	1MHz
VB	1MHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

##### 4.4.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. The resolution bandwidth of 100 kHz and the video bandwidth of 100 kHz were utilized.
3. Observe frequency hopping in 2400MHz~2483.5MHz, there are at least 75 non-overlapping channels.

##### 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 Number of Hopping Frequency

Temperature	18°C	Humidity	65%
Test Engineer	Robert Chang	Configurations	GFSK

#### For Bluetooth 1.0

Modulation Type	Channel No.	Frequency (MHz)	Hopping Ch. (Channels)	Min. Limit (Channels)	Test Result
GFSK	0 ~ 78	2402 ~ 2480	79	15	Complies

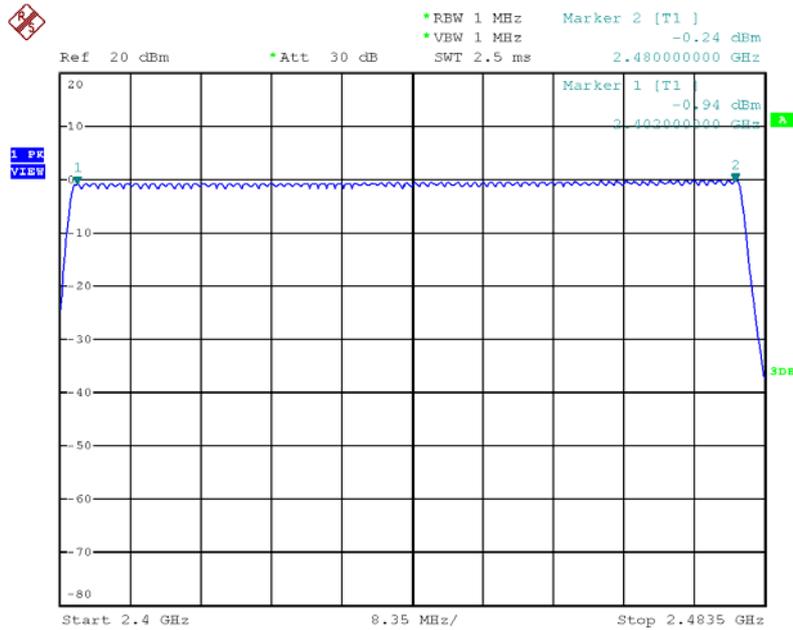
Temperature	18°C	Humidity	65%
Test Engineer	Robert Chang	Configurations	8DPSK

For Bluetooth 2.1+EDR

Modulation Type	Channel No.	Frequency (MHz)	Hopping Ch. (Channels)	Min. Limit (Channels)	Test Result
8DPSK	0 ~ 78	2402 ~ 2480	79	15	Complies

For Bluetooth 1.0

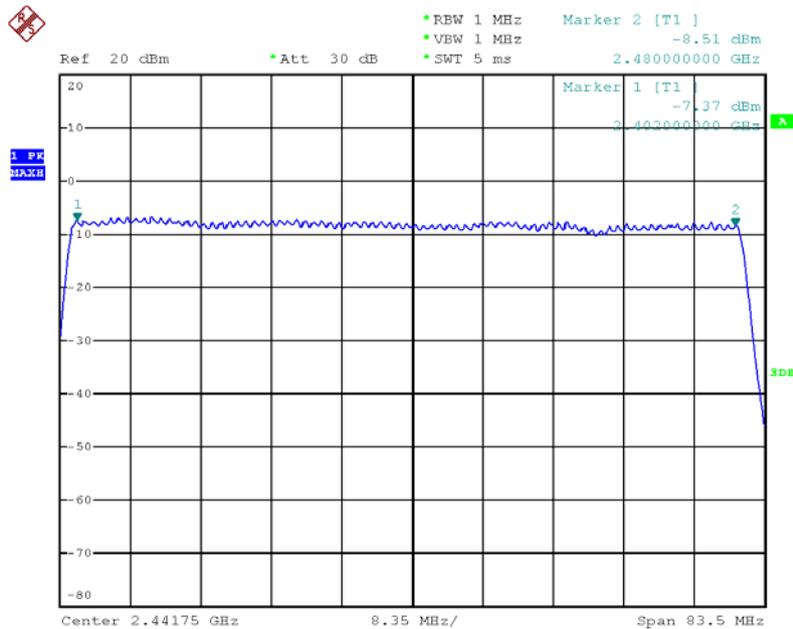
Number of Hopping Channel Plot on Channel 0~78 / 2402 MHz ~ 2480 MHz



Date: 13.DEC.2012 07:52:46

For Bluetooth 2.1+EDR

Number of Hopping Channel Plot on Channel 0~78 / 2402 MHz ~ 2480 MHz



Date: 12.DEC.2012 13:34:17

#### 4.5. Dwell Time Measurement

##### 4.5.1. Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

##### 4.5.2. Measuring Instruments and Setting

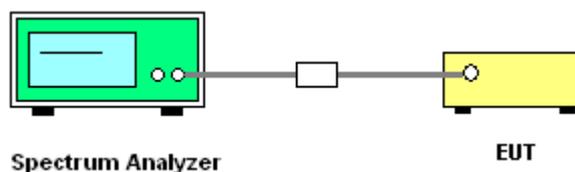
Please refer to section 5 of equipments list in this report. The following table is the setting of spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	0 MHz
RB	1000 kHz
VB	1000 kHz
Detector	Peak
Trace	Single Trigger

##### 4.5.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer
2. Set RBW of spectrum analyzer to 1000kHz and VBW to 1000kHz.
3. Use a video trigger with the trigger level set to enable triggering only on full pulses.
4. Sweep Time is more than once pulse time.
5. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
6. Measure the maximum time duration of one single pulse.
7. Set the EUT for 3DH5, 3DH3 and 3DH1 packet transmitting.
8. Measure the maximum time duration of one single pulse.

##### 4.5.4. Test Setup Layout



##### 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. Test Result of Dwell Time

Temperature	20°C	Humidity	65%
Test Engineer	Robert Chang	Configurations	GFSK / DH1 / DH3 / DH5

## For Bluetooth 1.0

Data Packet	Frequency	Pulse Duration	Dwell Time	Limits	Test Result
		(ms)	(s)	(s)	
DH1	2402 MHz	0.4050	0.1296	0.4000	Complies
DH1	2441 MHz	0.4050	0.1296	0.4000	Complies
DH1	2480 MHz	0.4050	0.1296	0.4000	Complies
DH3	2402 MHz	1.6450	0.2632	0.4000	Complies
DH3	2441 MHz	1.6250	0.2600	0.4000	Complies
DH3	2480 MHz	1.6650	0.2664	0.4000	Complies
DH5	2402 MHz	2.9050	0.3099	0.4000	Complies
DH5	2441 MHz	2.9050	0.3099	0.4000	Complies
DH5	2480 MHz	2.9050	0.3099	0.4000	Complies

## Remark:

Dwell Time = 79(channels) x 0.4(s) x average hopping channel x package transfer time (us)

79 channels come from the Hopping Channel number.

Average Hopping Channel = hops / sweep time

Temperature	20°C	Humidity	65%
Test Engineer	Robert Chang	Configurations	8DPSK / 3DH1 / 3DH3 / 3DH5

## For Bluetooth 2.1 +EDR

Data Packet	Frequency	Pulse Duration	Dwell Time	Limits	Test Result
		(ms)	(s)	(s)	
3DH1	2402 MHz	0.3950	0.1264	0.4000	Complies
3DH1	2441 MHz	0.3950	0.1264	0.4000	Complies
3DH1	2480 MHz	0.3950	0.1264	0.4000	Complies
3DH3	2402 MHz	1.6600	0.2656	0.4000	Complies
3DH3	2441 MHz	1.6600	0.2656	0.4000	Complies
3DH3	2480 MHz	1.6600	0.2656	0.4000	Complies
3DH5	2402 MHz	2.9000	0.3093	0.4000	Complies
3DH5	2441 MHz	2.9000	0.3093	0.4000	Complies
3DH5	2480 MHz	2.9100	0.3104	0.4000	Complies

## Remark:

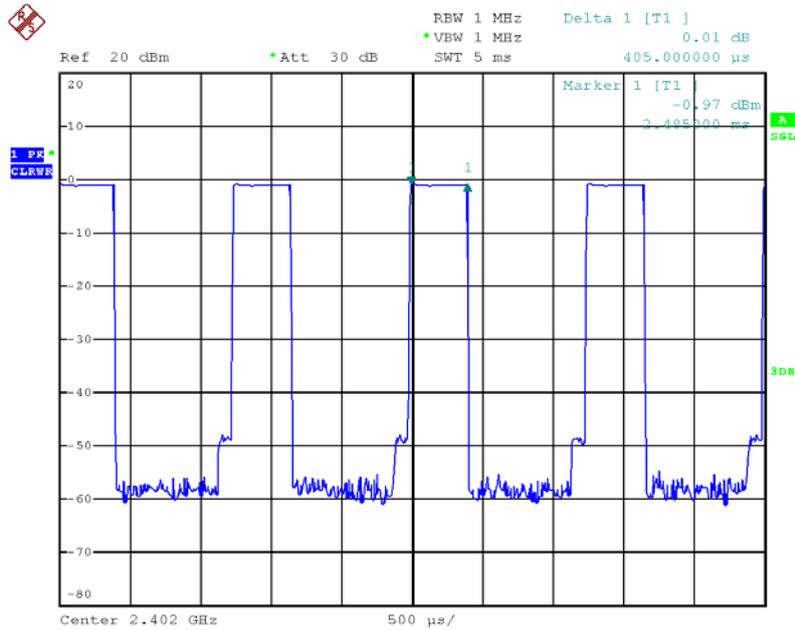
Dwell Time = 79(channels) x 0.4(s) x average hopping channel x package transfer time (us)

79 channels come from the Hopping Channel number.

Average Hopping Channel = hops / sweep time

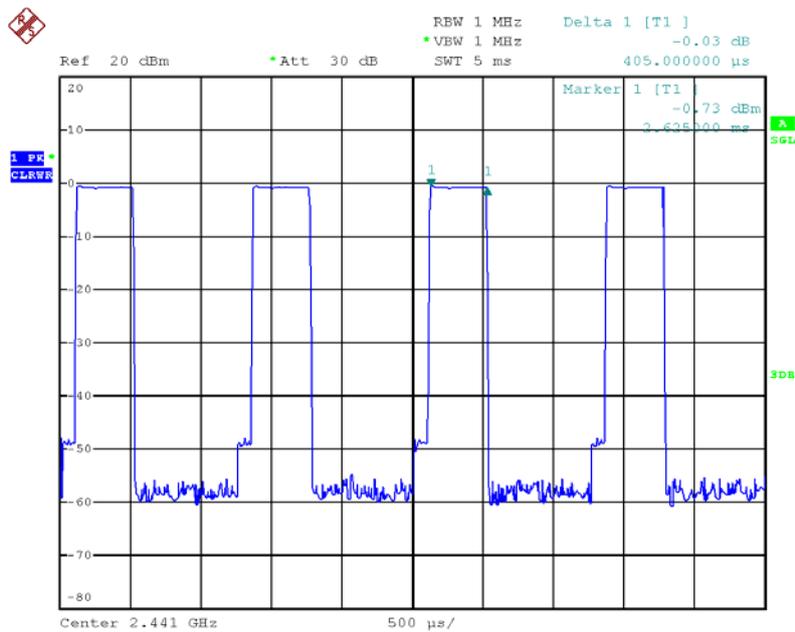
For Bluetooth 1.0

Dwell Time Plot on Channel 0 / DH1 / 2402 MHz



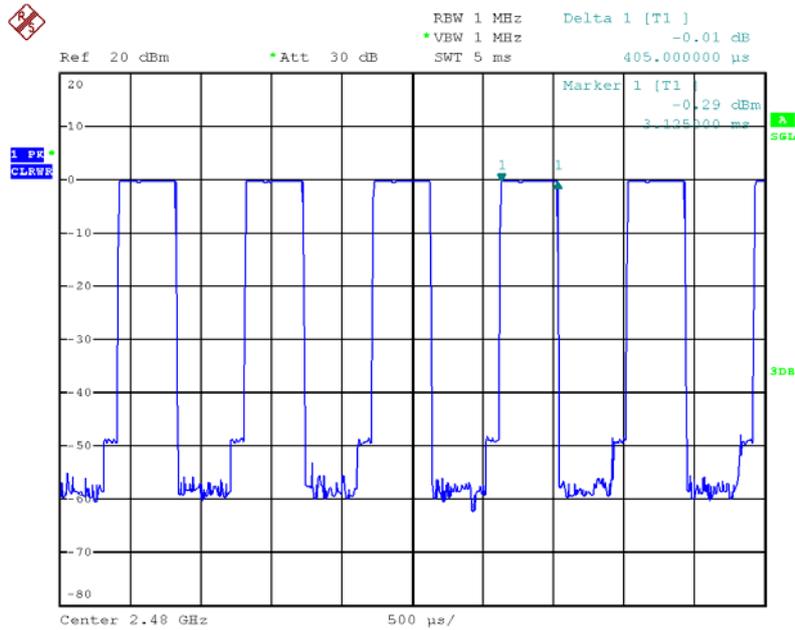
Date: 13.DEC.2012 07:49:55

Dwell Time Plot on Channel 39 / DH1 / 2441 MHz



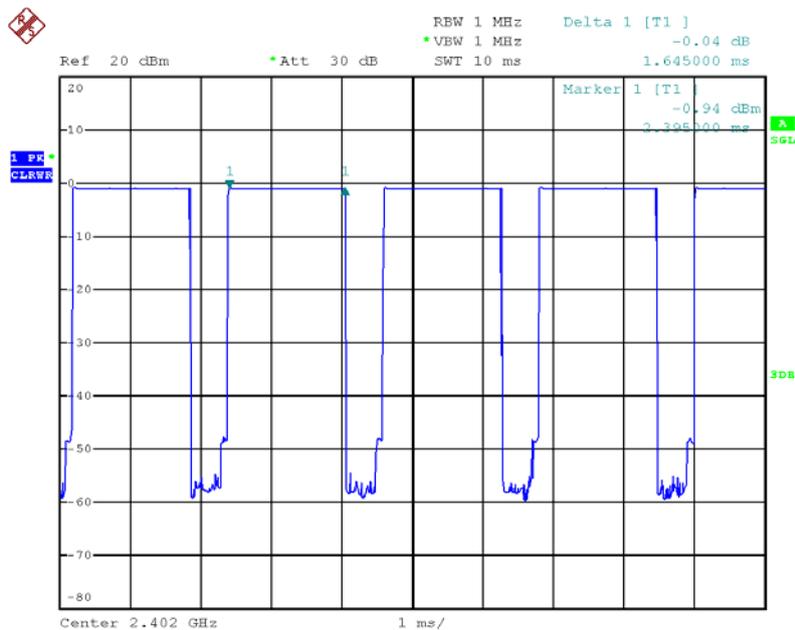
Date: 13.DEC.2012 07:49:26

Dwell Time Plot on Channel 78 / DH1 / 2480 MHz



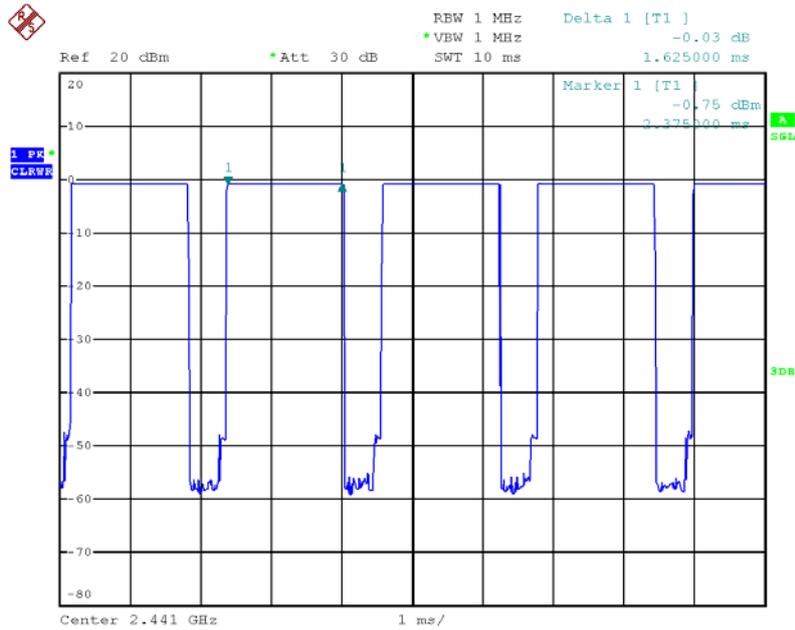
Date: 13.DEC.2012 07:48:51

Dwell Time Plot on Channel 0 / DH3 / 2402 MHz



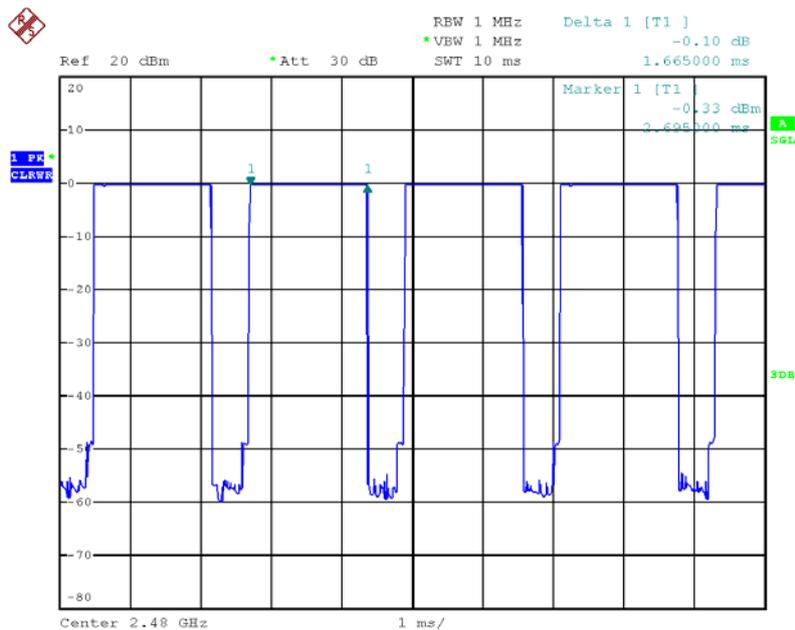
Date: 13.DEC.2012 07:46:17

Dwell Time Plot on Channel 39 / DH3 / 2441 MHz



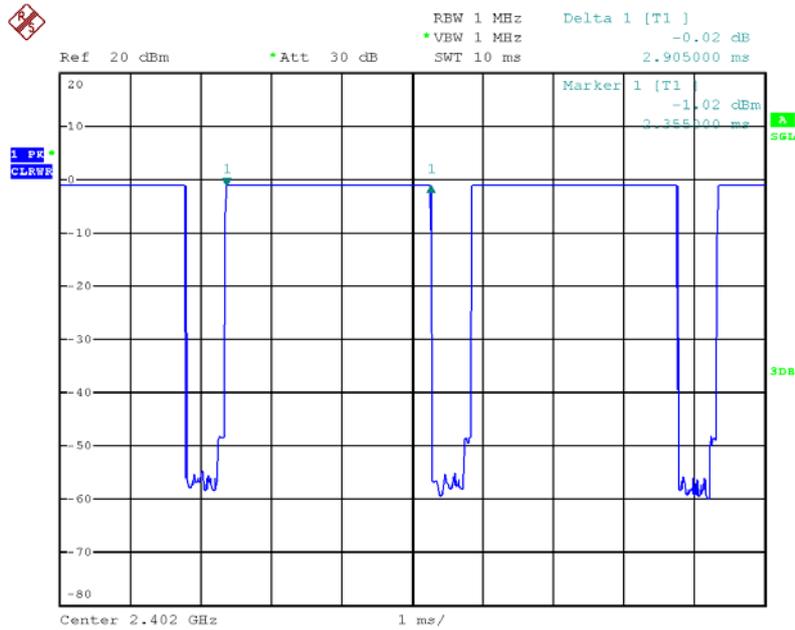
Date: 13.DEC.2012 07:47:22

Dwell Time Plot on Channel 78 / DH3 / 2480 MHz



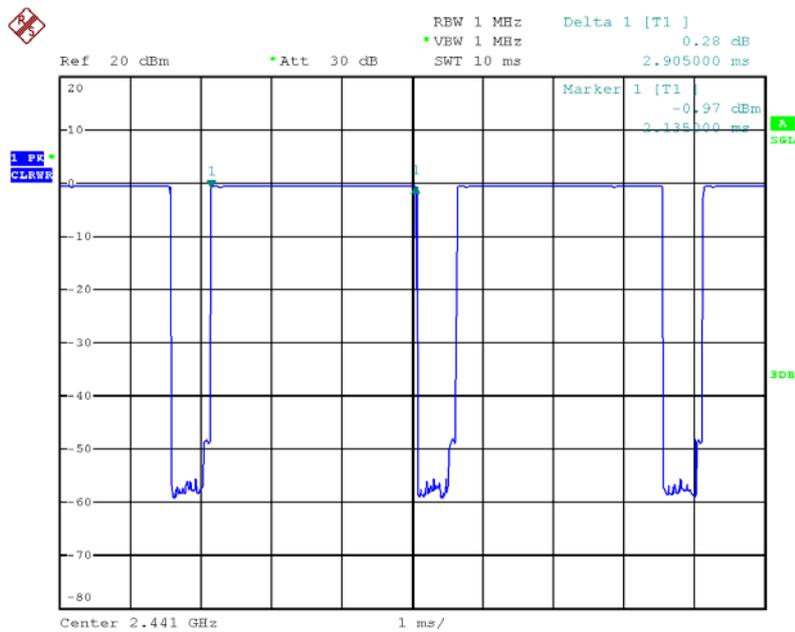
Date: 13.DEC.2012 07:48:02

Dwell Time Plot on Channel 0 / DH5 / 2402 MHz



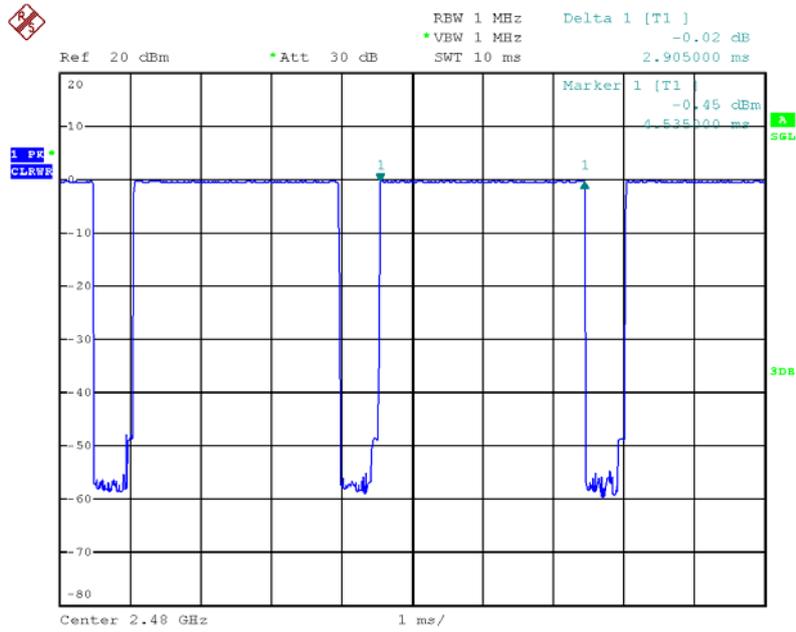
Date: 13.DEC.2012 07:44:38

Dwell Time Plot on Channel 39 / DH5 / 2441 MHz



Date: 13.DEC.2012 07:43:34

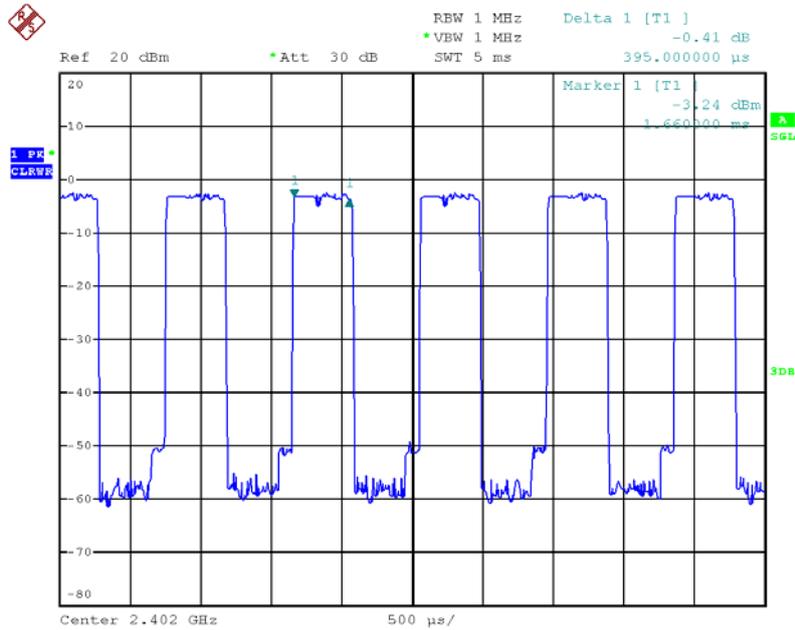
Dwell Time Plot on Channel 78 / DH5 / 2480 MHz



Date: 13.DEC.2012 07:42:23

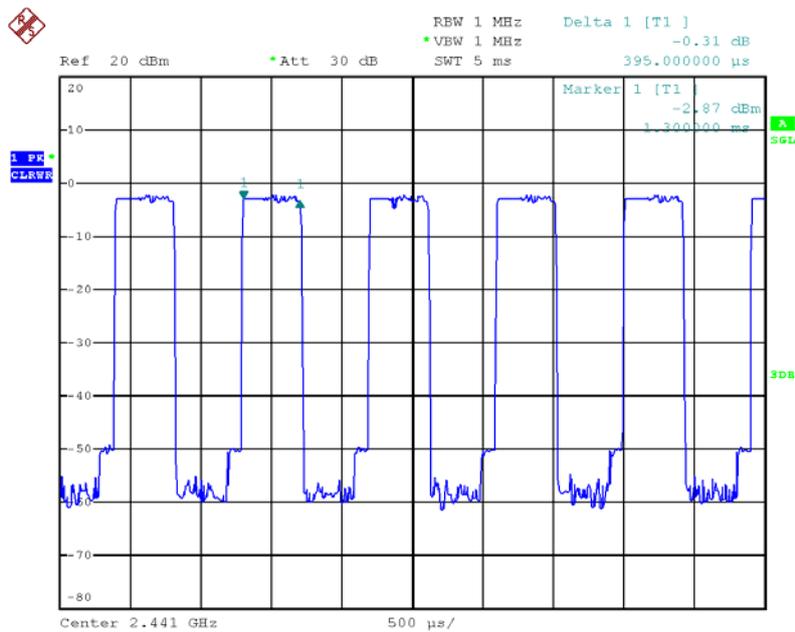
For Bluetooth 2.1 + EDR

Dwell Time Plot on Channel 0 / 3DH1 / 2402 MHz



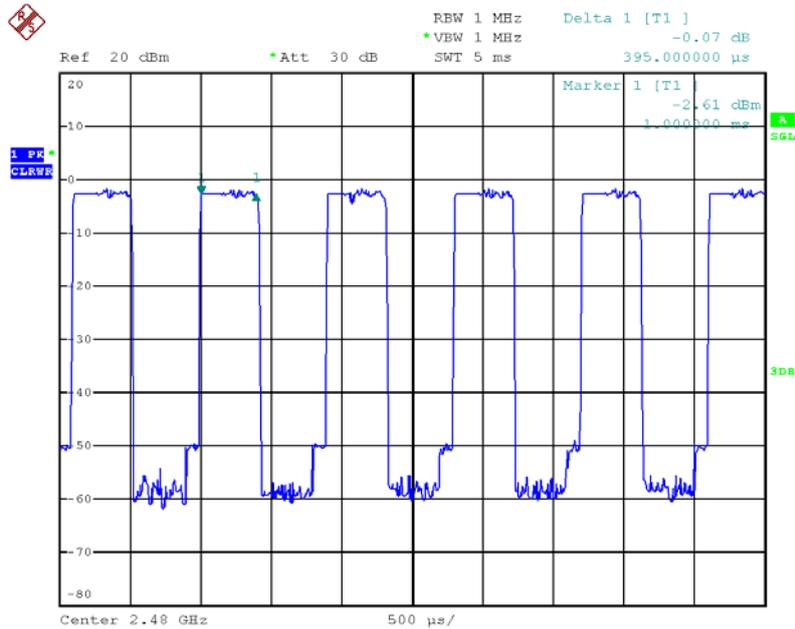
Date: 12.DEC.2012 13:26:30

Dwell Time Plot on Channel 39 / 3DH1 / 2441 MHz



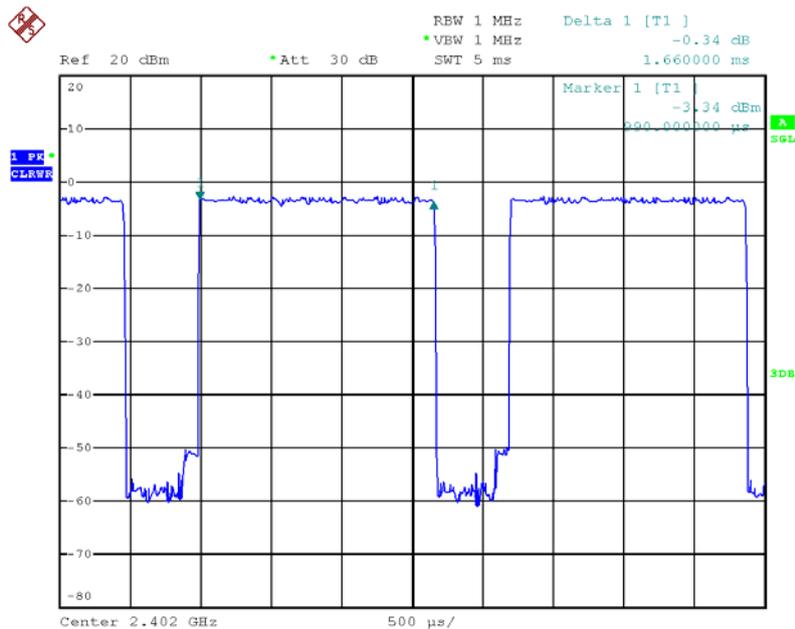
Date: 12.DEC.2012 13:25:47

Dwell Time Plot on Channel 78 / 3DH1 / 2480 MHz



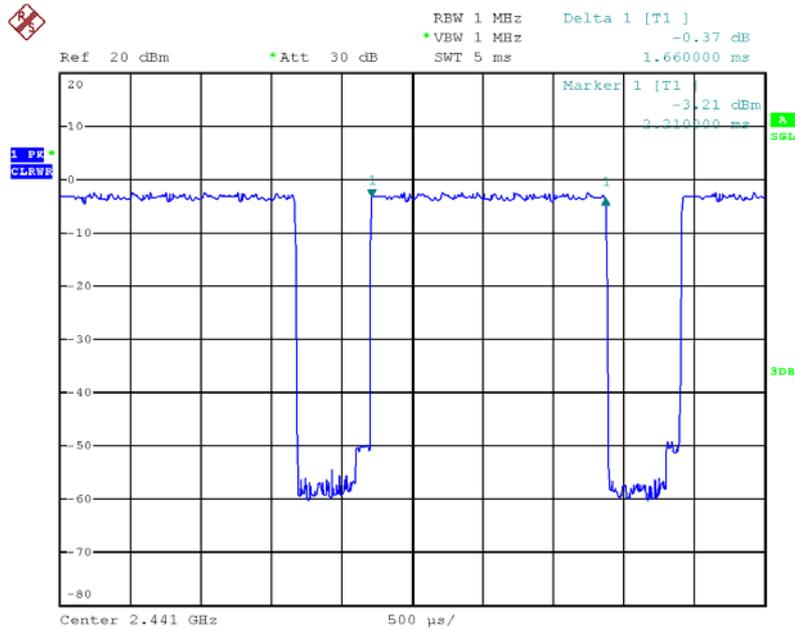
Date: 12.DEC.2012 13:25:05

Dwell Time Plot on Channel 0 / 3DH3 / 2402 MHz



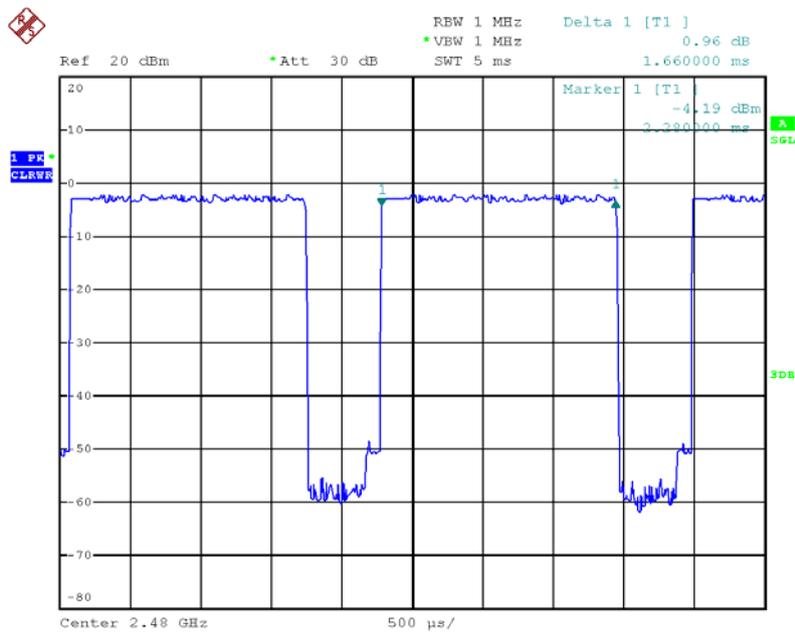
Date: 12.DEC.2012 13:19:16

Dwell Time Plot on Channel 39 / 3DH3 / 2441 MHz



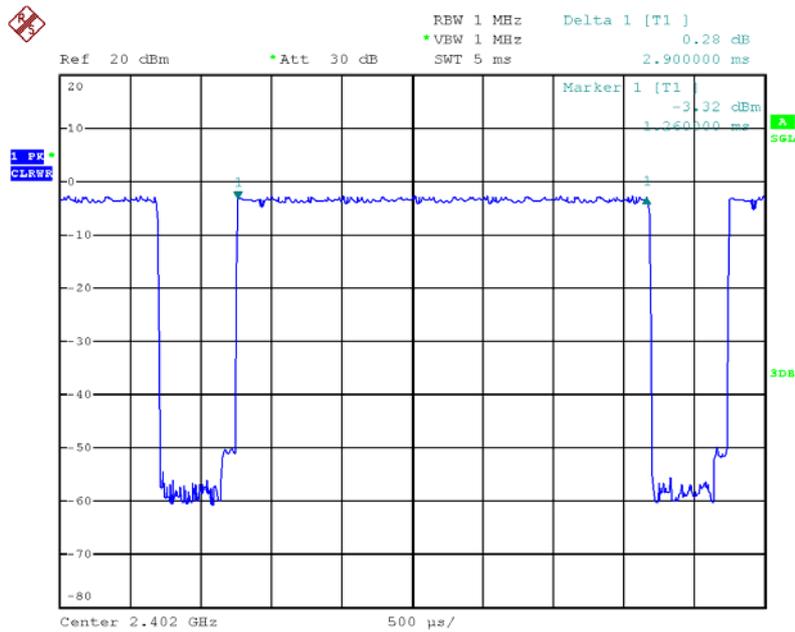
Date: 12.DEC.2012 13:20:58

Dwell Time Plot on Channel 78 / 3DH3 / 2480 MHz



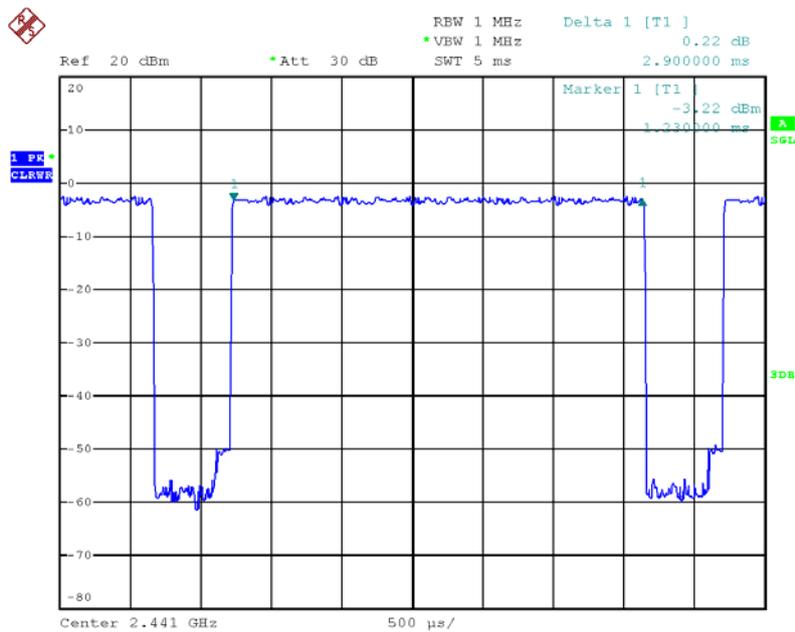
Date: 12.DEC.2012 13:21:38

Dwell Time Plot on Channel 0 / 3DH5 / 2402 MHz



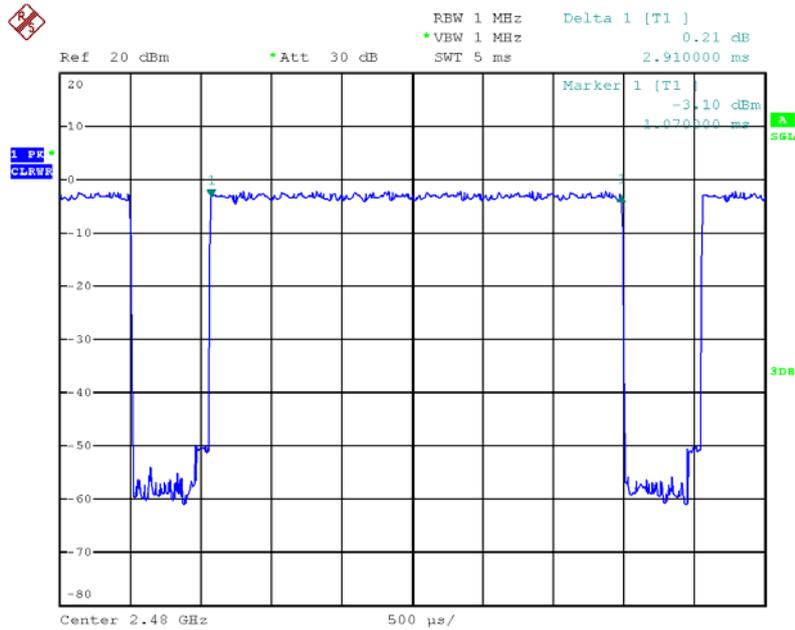
Date: 12.DEC.2012 13:17:55

Dwell Time Plot on Channel 39 / 3DH5 / 2441 MHz



Date: 12.DEC.2012 13:16:38

Dwell Time Plot on Channel 78 / 3DH5 / 2480 MHz



Date: 12.DEC.2012 13:15:10

## 4.6. Radiated 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 spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1 MHz / 3MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	100kHz / 300kHz for peak

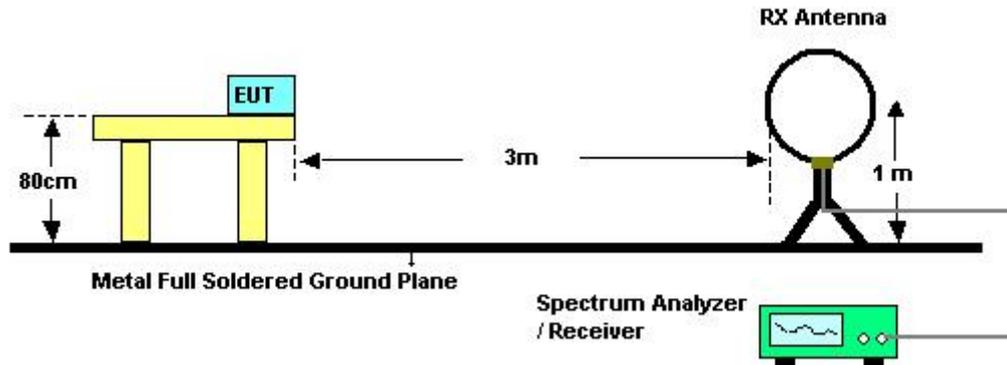
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

#### 4.6.3. Test Procedures

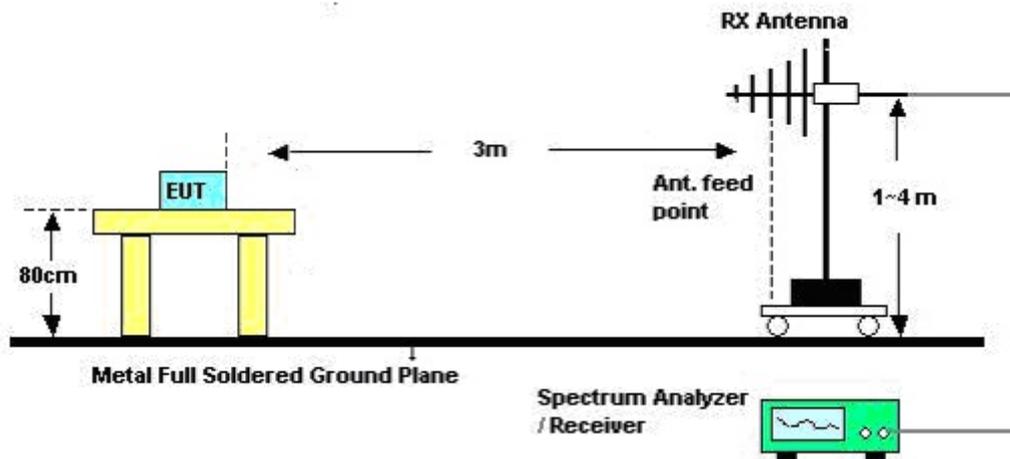
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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 3MHz 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.

#### 4.6.4. Test Setup Layout

For radiated emissions below 1GHz



For radiated emissions above 1GHz



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

Temperature	24.5°C	Humidity	57%
Test Engineer	Andre Tak	Configurations	CTX

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

Note:

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

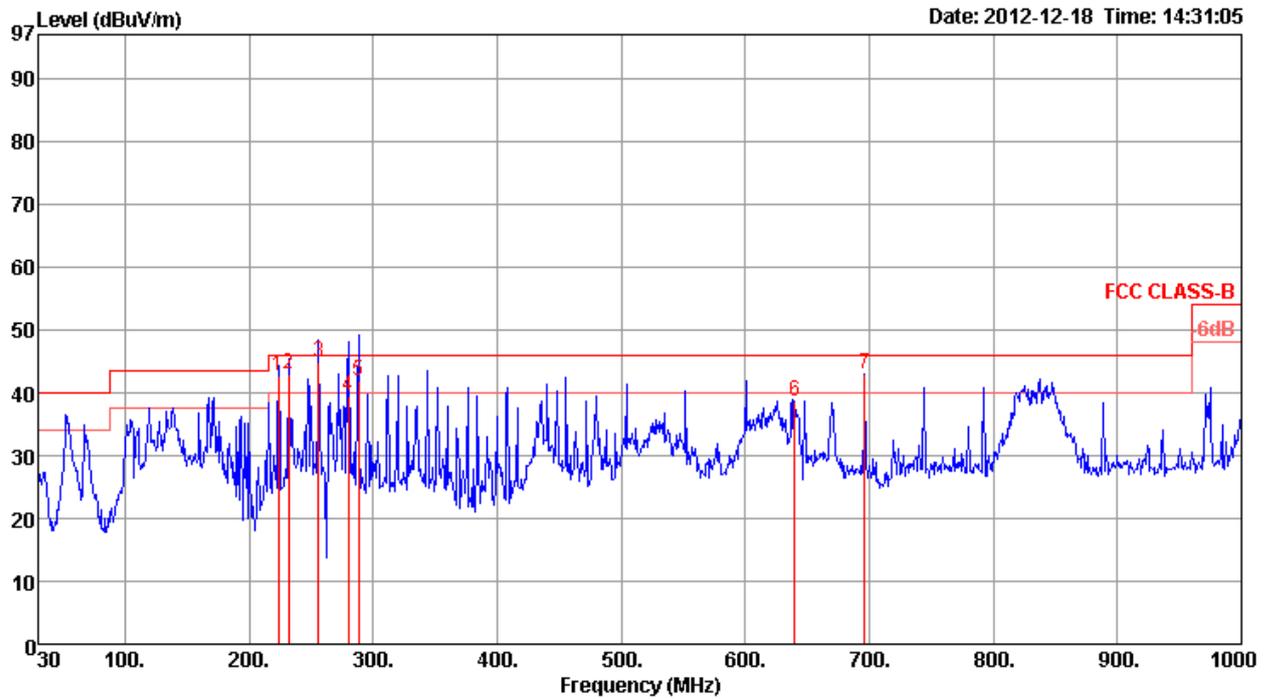
Distance extrapolation factor =  $40 \log(\text{specific distance} / \text{test distance})$  (dB);

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

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

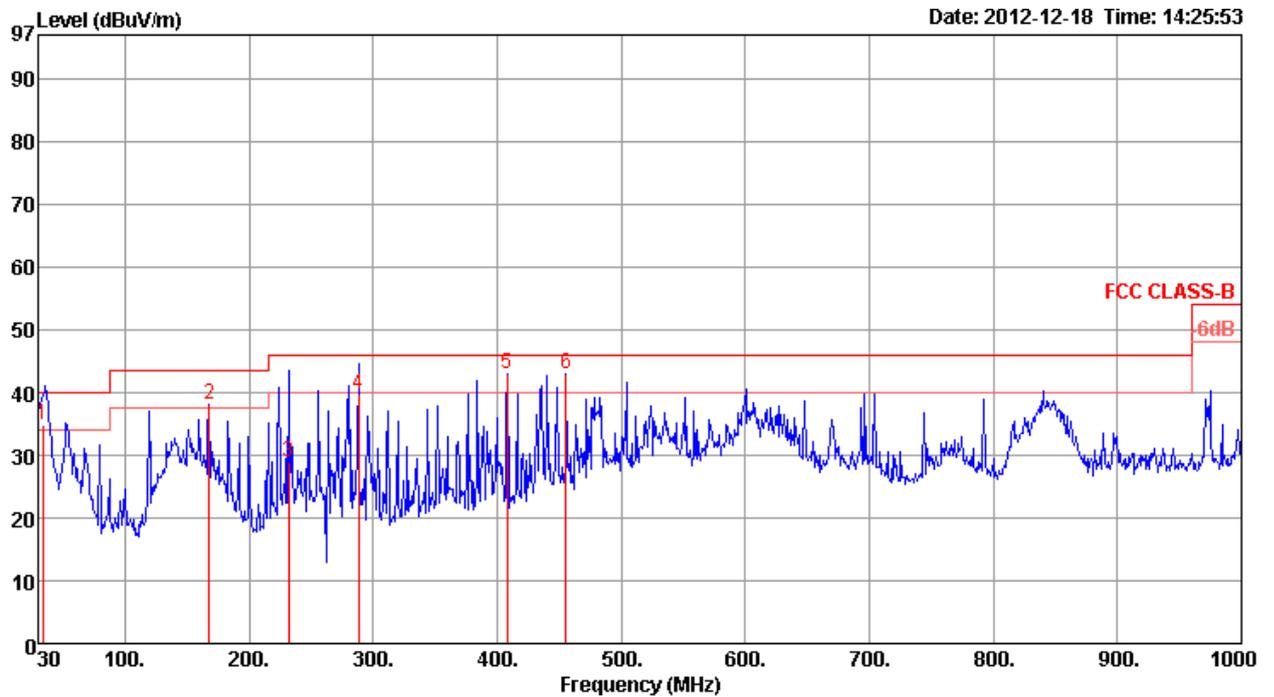
Temperature	24.5°C	Humidity	57%
Test Engineer	Andre Tak	Configurations	CTX

Horizontal



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	cm	deg	Pol/Phase
1	223.90	42.68	46.00	-3.32	57.09	1.80	10.84	27.05	139	360	HORIZONTAL
2	232.00	42.90	46.00	-3.10	56.70	1.83	11.41	27.04	145	25	HORIZONTAL
3	256.00	44.77	46.00	-1.23	57.00	1.92	12.84	26.99	107	179	HORIZONTAL
4	280.00	39.41	46.00	-6.59	51.20	2.02	13.13	26.94	100	143	HORIZONTAL
5	288.00	41.75	46.00	-4.25	53.41	2.05	13.22	26.93	100	145	HORIZONTAL
6	640.13	38.77	46.00	-7.23	44.79	3.14	18.90	28.06	100	0	HORIZONTAL
7	696.39	42.94	46.00	-3.06	48.54	3.32	19.08	28.00	100	0	HORIZONTAL

Vertical



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	33.47	34.92	40.00	-5.08	45.60	0.50	16.62	27.80	105	47	VERTICAL
2	167.74	38.19	43.50	-5.31	51.30	1.54	12.61	27.26	400	0	VERTICAL
3	231.97	28.90	46.00	-17.10	42.70	1.83	11.41	27.04	122	129	VERTICAL
4	288.00	39.65	46.00	-6.35	51.31	2.05	13.22	26.93	177	171	VERTICAL
5	408.30	43.01	46.00	-2.99	52.10	2.35	16.20	27.64	400	0	VERTICAL
6	455.83	42.84	46.00	-3.16	51.17	2.61	16.94	27.88	400	0	VERTICAL

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB 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.

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

Temperature	25.6°C	Humidity	56%
Test Engineer	Wen Chao	Configurations	Channel 0
Test Date	Dec. 12, 2012		

*Horizontal*

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	4803.97	43.44	54.00	-10.56	42.17	3.29	33.02	35.04	Average	133	262	HORIZONTAL
2	4804.01	57.94	74.00	-16.06	56.67	3.29	33.02	35.04	Peak	133	262	HORIZONTAL

*Vertical*

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	4803.88	52.27	74.00	-21.73	51.00	3.29	33.02	35.04	Peak	100	107	VERTICAL
2	4803.97	38.44	54.00	-15.56	37.17	3.29	33.02	35.04	Average	100	107	VERTICAL

Temperature	25.6°C	Humidity	56%
Test Engineer	Wen Chao	Configurations	Channel 39
Test Date	Dec. 12, 2012		

### Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	4881.92	58.03	74.00	-15.97	56.57	3.33	33.16	35.03	Peak	129	274	HORIZONTAL
2	4881.93	41.12	54.00	-12.88	39.66	3.33	33.16	35.03	Average	129	274	HORIZONTAL
3	7322.82	33.04	54.00	-20.96	28.42	4.06	35.96	35.40	Average	100	187	HORIZONTAL
4	7322.83	46.59	74.00	-27.41	41.97	4.06	35.96	35.40	Peak	100	187	HORIZONTAL

### Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	PoI/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	4881.93	52.39	74.00	-21.61	50.93	3.33	33.16	35.03	Peak	100	113	VERTICAL
2	4882.00	36.11	54.00	-17.89	34.65	3.33	33.16	35.03	Average	100	113	VERTICAL
3	7322.06	33.08	54.00	-20.92	28.46	4.06	35.96	35.40	Average	100	262	VERTICAL
4	7325.33	46.73	74.00	-27.27	42.08	4.06	35.99	35.40	Peak	100	262	VERTICAL



Temperature	25.6°C	Humidity	56%
Test Engineer	Wen Chao	Configurations	Channel 78
Test Date	Dec. 12, 2012		

*Horizontal*

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	4959.88	57.38	74.00	-16.62	55.69	3.37	33.33	35.01	Peak	130	278	HORIZONTAL
2	4960.00	39.47	54.00	-14.53	37.78	3.37	33.33	35.01	Average	130	278	HORIZONTAL
3	7439.35	46.65	74.00	-27.35	41.78	4.07	36.20	35.40	Peak	100	83	HORIZONTAL
4	7439.47	33.52	54.00	-20.48	28.65	4.07	36.20	35.40	Average	100	83	HORIZONTAL

*Vertical*

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	4959.92	33.07	54.00	-20.93	31.38	3.37	33.33	35.01	Average	100	134	VERTICAL
2	4959.97	49.96	74.00	-24.04	48.27	3.37	33.33	35.01	Peak	100	134	VERTICAL
3	7439.21	33.54	54.00	-20.46	28.67	4.07	36.20	35.40	Average	100	288	VERTICAL
4	7439.22	46.55	74.00	-27.45	41.68	4.07	36.20	35.40	Peak	100	288	VERTICAL

Note:

The amplitude of spurious emissions which 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.

## 4.7. Band Edge Emissions Measurement

### 4.7.1. 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

### 4.7.2. 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 / 3MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	100 kHz / 300 kHz for Peak

### 4.7.3. 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.

### 4.7.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.6.4.

### 4.7.5. Test Deviation

There is no deviation with the original standard.

### 4.7.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

## 4.7.7. Test Result of Band Edge and Fundamental Emissions

Temperature	25.6°C	Humidity	56%
Test Engineer	Wen Chao	Configurations	Channel 0, 39, 78
Test Date	Dec. 12, 2012		

## Channel 0

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2390.00	45.11	54.00	-8.89	14.72	2.22	28.17	0.00	Average	153	334	HORIZONTAL
2	2390.00	54.06	74.00	-19.94	23.67	2.22	28.17	0.00	Peak	153	334	HORIZONTAL
3	2402.16	89.80	54.00	35.80	59.37	2.22	28.21	0.00	Average	153	334	HORIZONTAL
4	2402.16	100.73	74.00	26.73	70.30	2.22	28.21	0.00	Peak	153	334	HORIZONTAL

## Channel 39

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2390.00	45.06	54.00	-8.94	14.67	2.22	28.17	0.00	Average	147	326	HORIZONTAL
2	2390.00	56.29	74.00	-17.71	25.90	2.22	28.17	0.00	Peak	147	326	HORIZONTAL
3	2441.00	89.43	54.00	35.43	58.90	2.24	28.29	0.00	Average	147	326	HORIZONTAL
4	2441.32	100.25	74.00	26.25	69.72	2.24	28.29	0.00	Peak	147	326	HORIZONTAL
5	2483.50	45.51	54.00	-8.49	14.87	2.26	28.38	0.00	Average	147	326	HORIZONTAL
6	2483.50	56.53	74.00	-17.47	25.89	2.26	28.38	0.00	Peak	147	326	HORIZONTAL

## Channel 78

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2480.16	89.25	54.00	35.25	58.61	2.26	28.38	0.00	Average	141	327	HORIZONTAL
2	2480.16	100.20	74.00	26.20	69.56	2.26	28.38	0.00	Peak	141	327	HORIZONTAL
3	2483.50	50.22	54.00	-3.78	19.58	2.26	28.38	0.00	Average	141	327	HORIZONTAL
4	2483.50	62.55	74.00	-11.45	31.91	2.26	28.38	0.00	Peak	141	327	HORIZONTAL

Note:

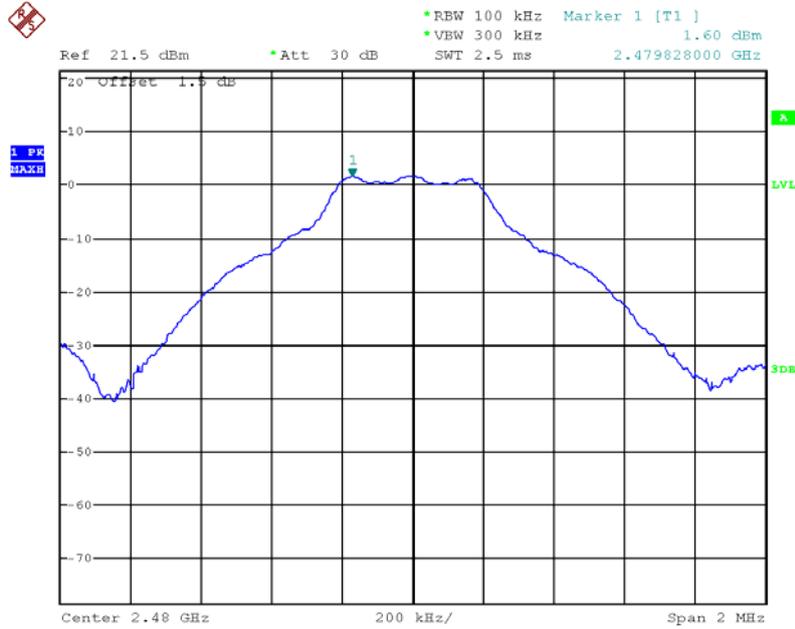
$$\text{Emission level (dBuV/m)} = 20 \log \text{Emission level (uV/m)}.$$

$$\text{Corrected Reading: Antenna Factor} + \text{Cable Loss} + \text{Read Level} - \text{Preamp Factor} = \text{Level}.$$

For Emission not in Restricted Band

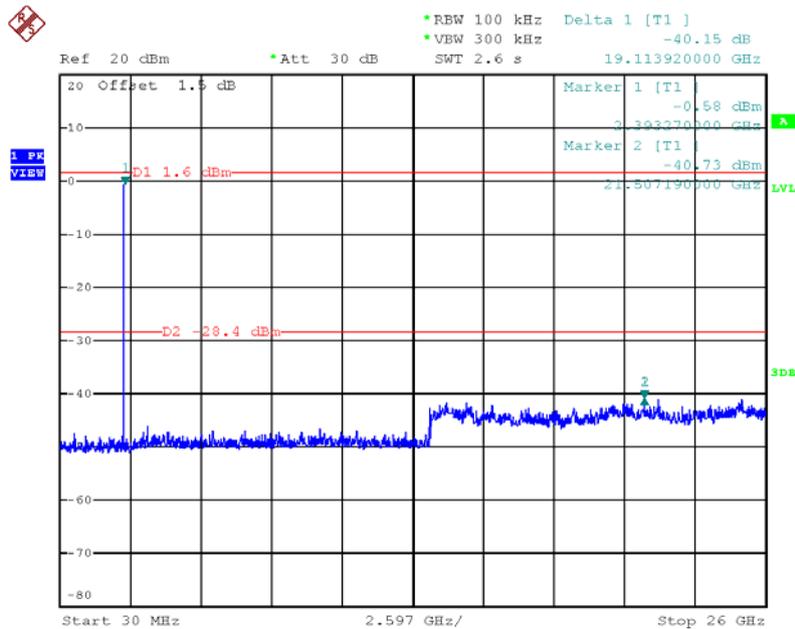
For Bluetooth 1.0

Plot on Configuration / (Reference Level)



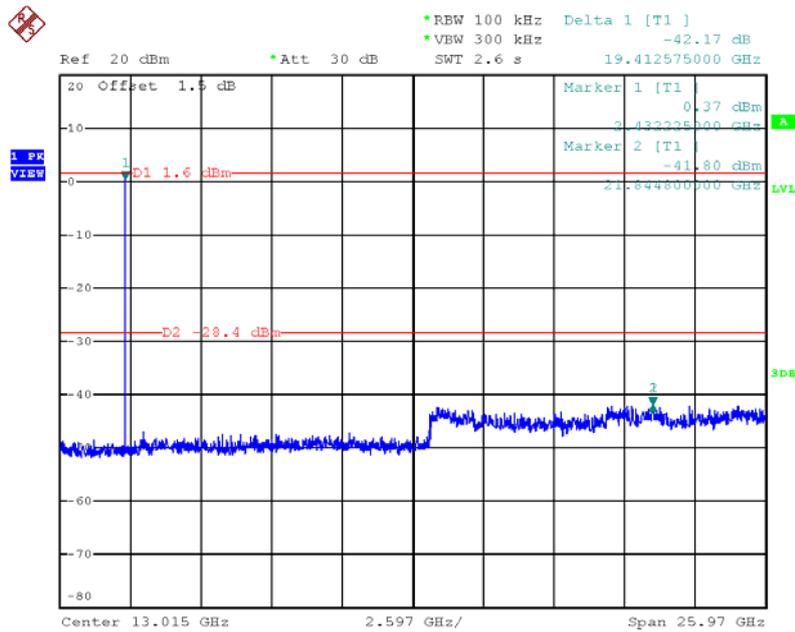
Date: 13.DEC.2012 08:03:15

Plot on Configuration / 2402 MHz (down 30dBc)



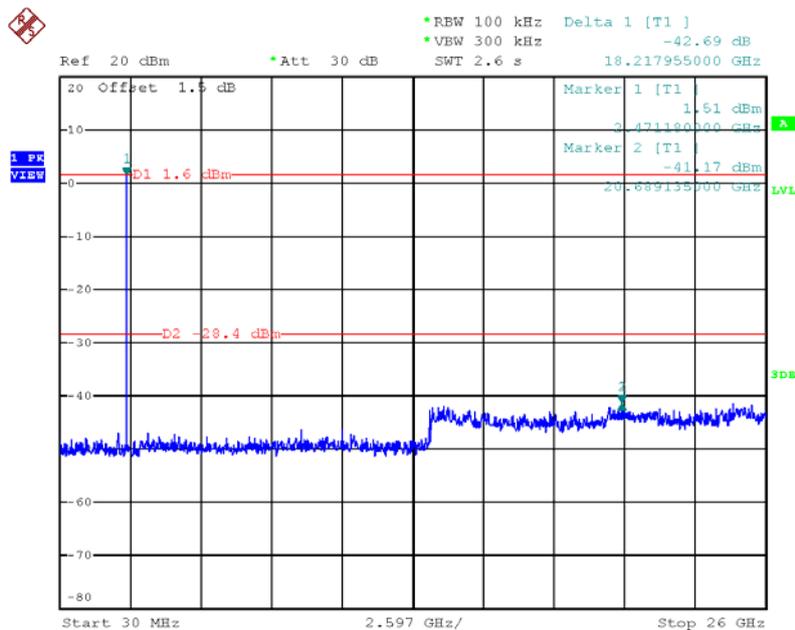
Date: 13.DEC.2012 08:17:59

Plot on Configuration / 2440 MHz (down 30dBc)



Date: 13.DEC.2012 08:16:53

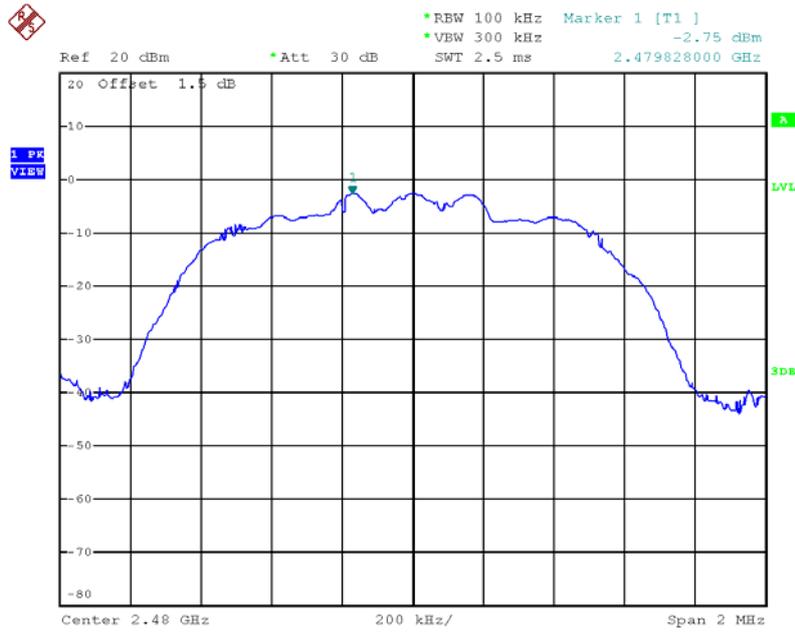
Plot on Configuration / 2480 MHz (down 30dBc)



Date: 13.DEC.2012 08:15:51

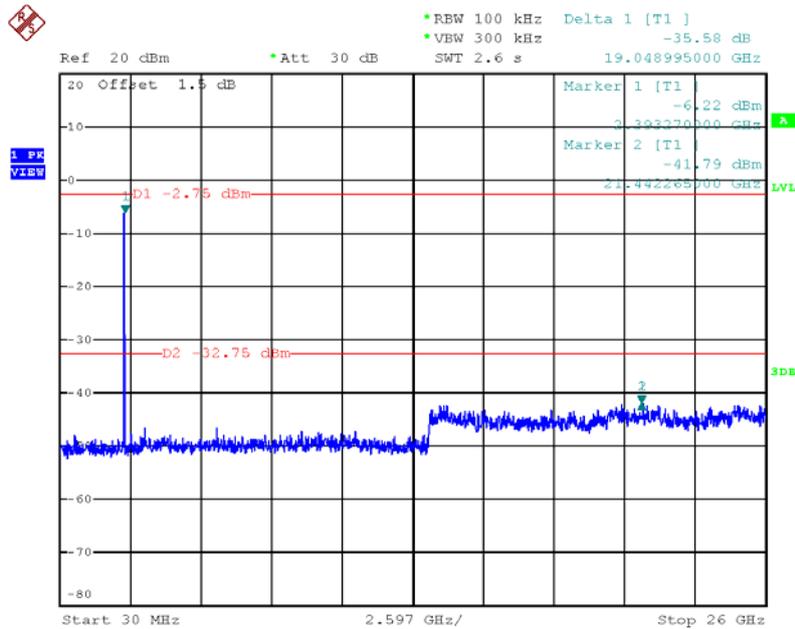
For Bluetooth 2.1+EDR

Plot on Configuration / (Reference Level)



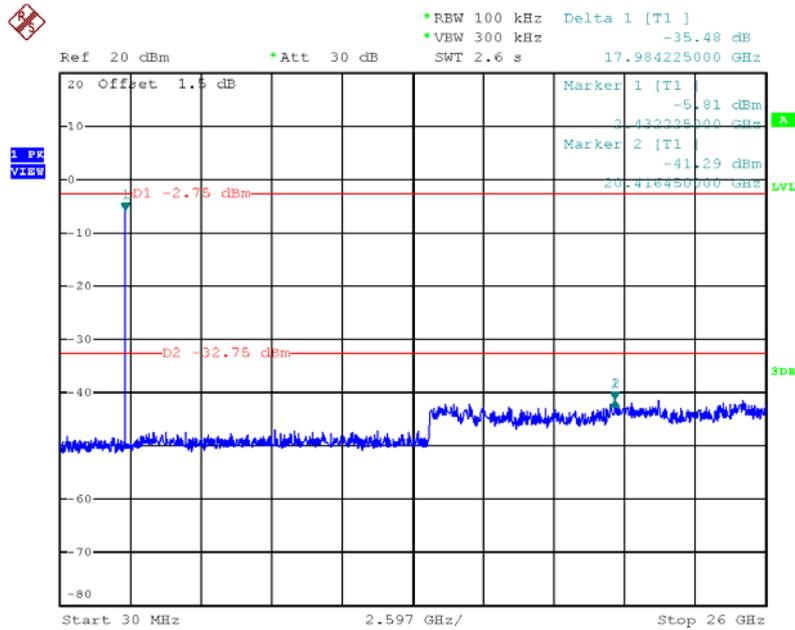
Date: 13.DEC.2012 08:22:10

Plot on Configuration / 2402 MHz (down 30dBc)



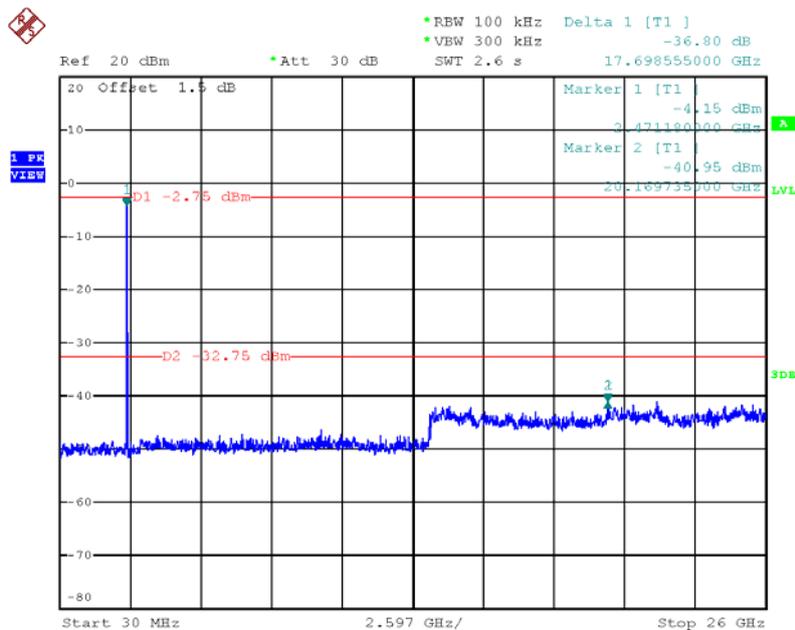
Date: 13.DEC.2012 08:25:47

Plot on Configuration / 2440 MHz (down 30dBc)



Date: 13.DEC.2012 08:24:56

Plot on Configuration / 2480 MHz (down 30dBc)



Date: 13.DEC.2012 08:23:23

## 4.8. Antenna Requirements

### 4.8.1. 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,

### 4.8.2. 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
EMI Test Receiver	R&S	ESCS 30	100377	9kHz ~ 2.75GHz	Oct. 23, 2012	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Nov. 26, 2012	Conduction (CO01-CB)
V- LISN	Schwarzbeck	NSLK 8127	8127-478	9kHz ~ 30MHz	Jun. 22, 2012	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	0.15MHz~30MHz	Dec. 04, 2012	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	Jan. 11, 2012	Radiation (O3CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz~18GHz	Nov. 27, 2012	Radiation (O3CH01-CB)
Horn Antenna	SCHWARZBEAK	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Nov. 23, 2012	Radiation (O3CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 27, 2012	Radiation (O3CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Nov. 23, 2012	Radiation (O3CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26.5GHz ~ 40GHz	Jul. 31, 2012	Radiation (O3CH01-CB)
Spectrum analyzer	R&S	FSP40	100056	9kHz~40GHz	Nov. 16, 2012	Radiation (O3CH01-CB)
EMI Test Receiver	R&S	ESCS 30	100355	9kHz ~ 2.75GHz	Mar. 20, 2012	Radiation (O3CH01-CB)
Turn Table	INN CO	CO 2000	N/A	0 ~ 360 degree	N.C.R	Radiation (O3CH01-CB)
Antenna Mast	INN CO	CO2000	N/A	1 m - 4 m	N.C.R	Radiation (O3CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz - 1 GHz	Nov. 18, 2012	Radiation (O3CH01-CB)
RF Cable-high	Woken	High Cable-1	N/A	1 GHz – 26.5 GHz	Nov. 18, 2012	Radiation (O3CH01-CB)
RF Cable-high	Woken	High Cable-2	N/A	1 GHz – 26.5 GHz	Nov. 18, 2012	Radiation (O3CH01-CB)
RF Cable-high	Woken	High Cable-3	N/A	1 GHz - 40 GHz	Nov. 18, 2012	Radiation (O3CH01-CB)
RF Cable-high	Woken	High Cable-4	N/A	1 GHz - 40 GHz	Nov. 18, 2012	Radiation (O3CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9 kHz - 30 MHz	Nov. 05, 2012*	Radiation (O3CH01-CB)
Signal analyzer	R&S	FSV40	100979	9kHz~40GHz	Oct. 08, 2012	Conducted (TH01-CB)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 05, 2012	Conducted (TH01-CB)
RF Power Divider	Woken	2 Way	0120A02056002D	2GHz ~ 18GHz	Nov. 18, 2012	Conducted (TH01-CB)
RF Power Divider	Woken	3 Way	MDC2366	2GHz ~ 18GHz	Nov. 18, 2012	Conducted (TH01-CB)
RF Power Divider	Woken	4 Way	0120A04056002D	2GHz ~ 18GHz	Nov. 18, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-7	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
RF Cable-high	Woken	High Cable-8	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-9	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-10	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-11	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
Power Sensor	Anritsu	MA2411B	0917223	300MHz~40GHz	Nov. 28, 2012	Conducted (TH01-CB)
Power Meter	Anritsu	ML2495A	1035008	300MHz~40GHz	Nov. 27, 2012	Conducted (TH01-CB)

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

" \* " Calibration Interval of instruments listed above is two year.

N.C.R. means Non-Calibration required.

## 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 2 <sup>nd</sup> 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