

FCC RF Test Report

APPLICANT : NEC CASIO Mobile Communications, Ltd.
EQUIPMENT : GSM/EGPRS/WCDMA/LTE Mobile Phone
BRAND NAME : NEC
MODEL NAME : NE-201A1A
MARKETING NAME : KMP7R4AE1-1AB
FCC ID : A98-RSZ3446
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DTS) Digital Transmission System

The product was received on Oct. 31, 2012 and completely tested on Dec. 03, 2012. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:



Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR2O3103C	Rev. 01	Initial issue of report	Dec. 25, 2012

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	A8.2(a)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
3.2	15.247(b)(1)	A8.1(b)	Peak Output Power	$\leq 30\text{dBm}$	Pass	-
3.5	15.247(e)	A8.2(b)	Power Spectral Density	$\leq 8\text{dBm}$	Pass	-
3.4	15.247(d)	A8.5	Conducted Band Edges and Spurious Emission	$\leq 20\text{dBc}$	Pass	-
3.5	15.247(d)	A8.5	Radiated Band Edges and Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 1.71 dB at 358.100 MHz for Quasi-Peak
3.6	15.207	Gen 7.2.2	AC Conducted Emission	15.207(a)	Pass	Under limit 7.20 dB at 13.558 MHz
3.7	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

NEC CASIO Mobile Communications, Ltd.

31Fl., Tamagawa Renaissance City Tower N, 1753 Shimonumabe, Nakahara-ku, Kawasaki, Kanagawa
211-8666 Japan 2

1.2 Manufacturer

Arima Communications Corp.

6F., No. 866, Jhongjheng Rd., Jhonghe Dist., New Taipei City 23586, Taiwan

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	GSM/EGPRS/WCDMA/LTE Mobile Phone
Brand Name	NEC
Model Name	NE-201A1A
Marketing Name	KMP7R4AE1-1AB
FCC ID	A98-RSZ3446
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA/LTE/ WLAN 11bgn / Bluetooth / NFC
HW Version	EP2
SW Version	3.0.8
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

Product Specification subjective to this standard	
Tx/Rx Frequency Range	2402 MHz ~ 2480 MHz
Number of Channels	40
Carrier Frequency of Each Channel	40 Channel(37 hopping + 3 advertising channel)
Maximum Output Power to Antenna	Bluetooth 4.0 - LE : 1.88 dBm (0.0015 W)
Antenna Type	Chip Antenna type with gain 1.40 dBi
Type of Modulation	Bluetooth 4.0 - LE : GFSK

1.4 Testing Site

Test Site	SPORTON INTERNATIONAL INC.			
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-3273456 / FAX: +886-3-3284978			
Test Site No.	Sporton Site No.			FCC/IC Registration No.
	TH02-HY	CO05-HY	03CH07-HY	722060/4086B-1

1.5 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC Part 15 Subpart C §15.247
- ♦ FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v02
- ♦ ANSI C63.4-2003 and ANSI C63.10-2009
- ♦ IC RSS-210 Issue 8
- ♦ IC RSS-Gen Issue 3

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

1.6 Ancillary Equipment List

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
3.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
4.	Notebook	DELL	Latitude E6320	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m

2 Test Configuration of Equipment Under Test

2.1 RF Output Power

The RF output power was recorded in the following table:

Channel	Frequency	Bluetooth 4.0 – LE RF Output Power
		Data Rate / Modulation
		GFSK
		1Mbps
Ch00	2402MHz	1.88 dBm
Ch19	2440MHz	1.63 dBm
Ch39	2480MHz	1.08 dBm

2.2 Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction (150 kHz to 30 MHz), radiation (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

Pre-scanned tests, X, Y, Z in three orthogonal panels, were conducted to determine the final configuration from all possible combinations.

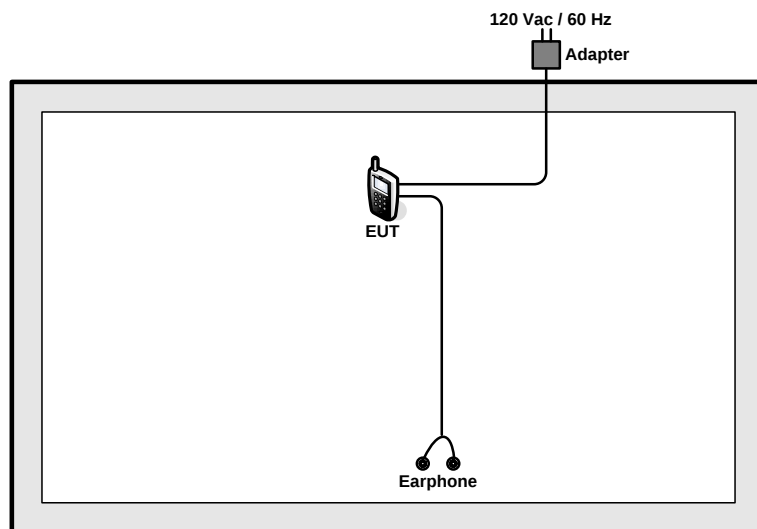
The following tables are showing the test modes as the worst cases (Z plane) and recorded in this report.

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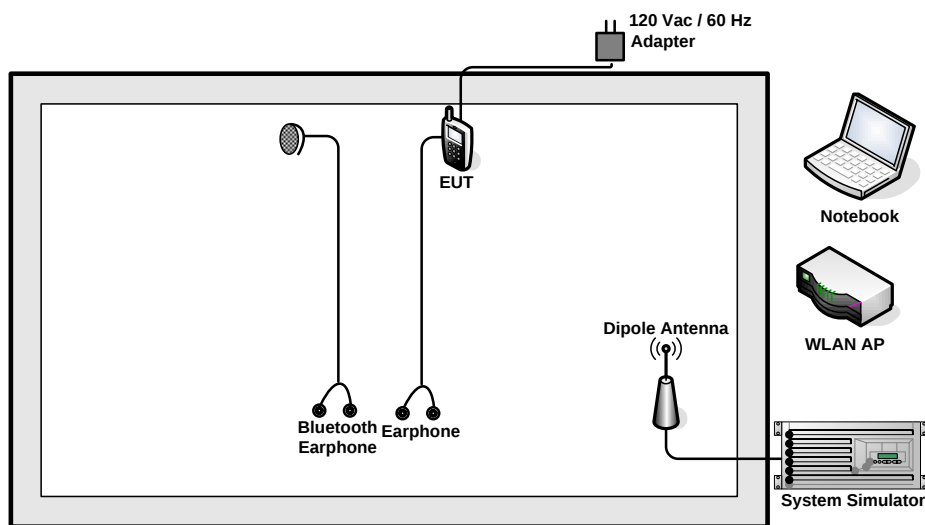
Test Cases	
Test Item	Data Rate / Modulation
	Bluetooth 4.0 – LE / GFSK
Conducted TCs	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps
	Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps
	Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps
Radiated TCs	Mode 1: Bluetooth Tx CH00_2402 MHz_1Mbps
	Mode 2: Bluetooth Tx CH19_2440 MHz_1Mbps
	Mode 3: Bluetooth Tx CH39_2480 MHz_1Mbps
AC Conducted Emission	Mode 1 :GSM1900 Idle + Bluetooth Link + WLAN Link + RFID On + Earphone + Battery + USB Cable (Charging from Adapter)

2.3 Connection Diagram of Test System

<Bluetooth 4.0 – LE Tx Mode>



<AC Conducted Emission Mode>



2.4 RF Utility

For Bluetooth function, the RF utility, "Command" was installed in the notebook which was programmed in order to make the EUT into the engineering modes to provide functions like channel selection and power level for continuous transmitting and receiving signals.

2.5 Measurement Results Explanation Example

For conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and 10dB attenuator between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and 10dB attenuator factor.

Offset = RF cable loss + attenuator factor.

Following table shows an offset computation example with cable loss 14.2 dB.

Example :

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

$$= 14.2 + 10 = 24.2 \text{ (dB)}$$

3 Test Result

3.1 6dB Bandwidth Measurement

3.1.1 Limit of 6dB Bandwidth

The minimum 6 dB bandwidth shall be at least 500 KHz.

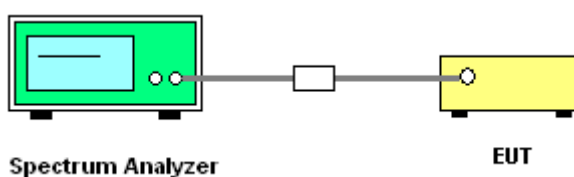
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v02.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 KHz.
5. Measure and record the results in the test report.

3.1.4 Test Setup

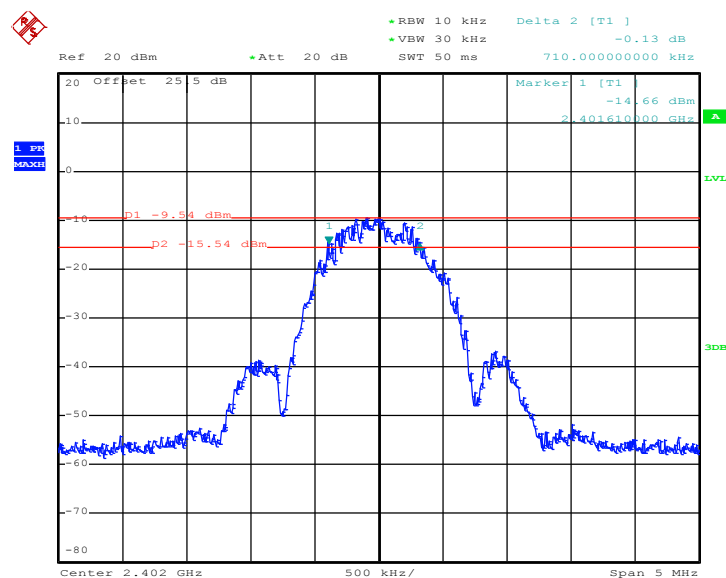


3.1.5 Test Result of 6dB Bandwidth

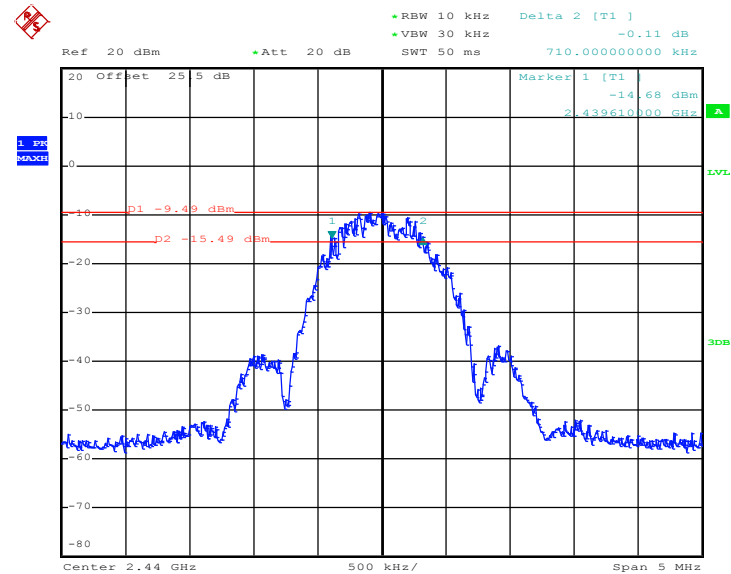
Test Mode :	Bluetooth 4.0 - LE	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	58~61%

Channel	Frequency (MHz)	6dB Bandwidth (MHz)
00	2402	0.71
19	2440	0.71
39	2480	0.71

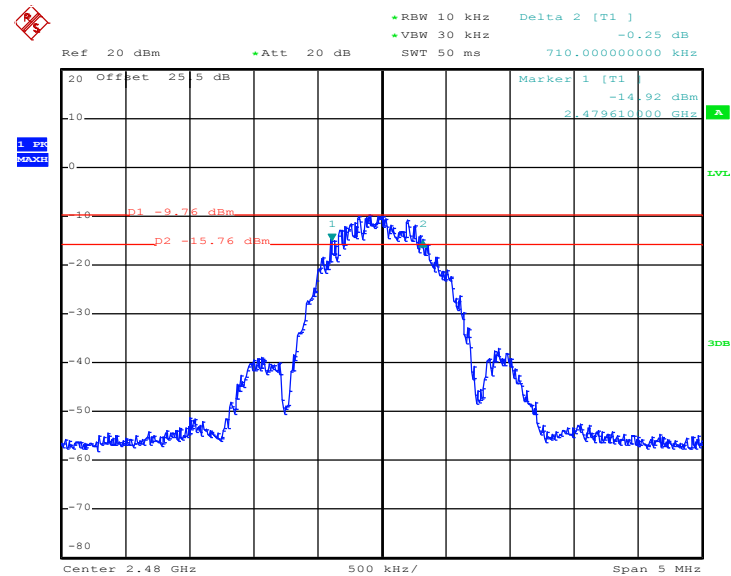
6 dB Bandwidth Plot on Channel 00



Date: 27.NOV.2012 15:51:01

6 dB Bandwidth Plot on Channel 19


Date: 27.NOV.2012 15:55:55

6 dB Bandwidth Plot on Channel 39


Date: 27.NOV.2012 15:59:28

3.2 Peak Output Power Measurement

3.2.1 Limit of Peak Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna of directional gain greater than 6dBi are used the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. 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.

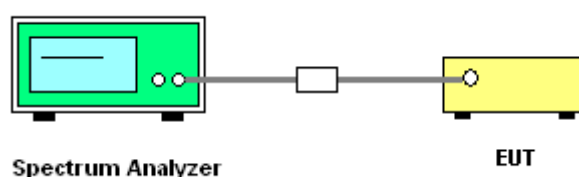
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v02.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

3.2.4 Test Setup

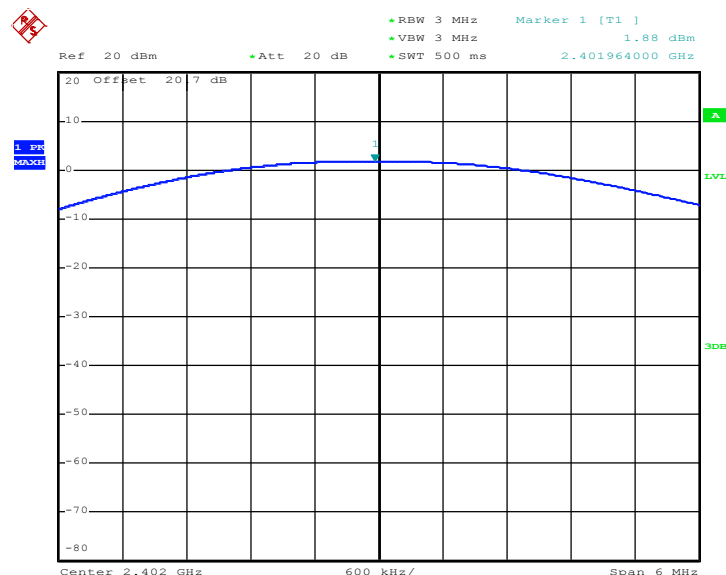


3.2.5 Test Result of Peak Output Power

Test Mode :	Bluetooth 4.0 - LE	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	58~61%

Channel	Frequency (MHz)	RF Power (dBm)		
		GFSK	Max. Limits (dBm)	Pass/Fail
		1 Mbps		
00	2402	1.88	30.00	Pass
19	2440	1.63	30.00	Pass
39	2480	1.08	30.00	Pass

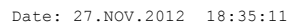
Peak Output Power Plot on Channel 00



Date: 27.NOV.2012 18:27:07



Peak Output Power Plot on Channel 39



3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3KHz band at any time interval of continuous transmission.

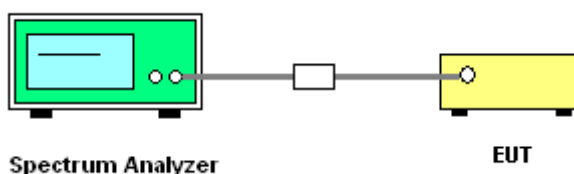
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. The testing follows Measurement Procedure 9.1 Option 1 of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v02
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Record the measurement data derived from spectrum analyzer.

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Test Mode :	Bluetooth 4.0 - LE	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	58~61%

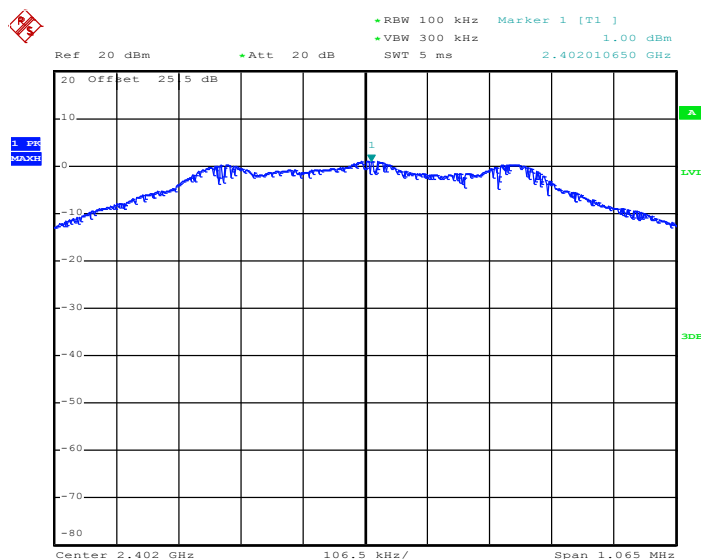
Channel	Frequency (MHz)	Power Density		Max. Limits (dBm/3KHz)	Pass/Fail
		PSD/100KHz (dBm)	PSD/3KHz (dBm)		
00	2402	1.00	-14.08	8	Pass
19	2440	1.01	-14.13	8	Pass
39	2480	0.70	-14.40	8	Pass

Note:

1. Measured power density (dBm) has offset with cable loss.
2. The Measured power density (dBm)/ 100KHz is reference level and used as 20dBc down for Conducted Band Edges and Conducted Spurious Emission limit line.

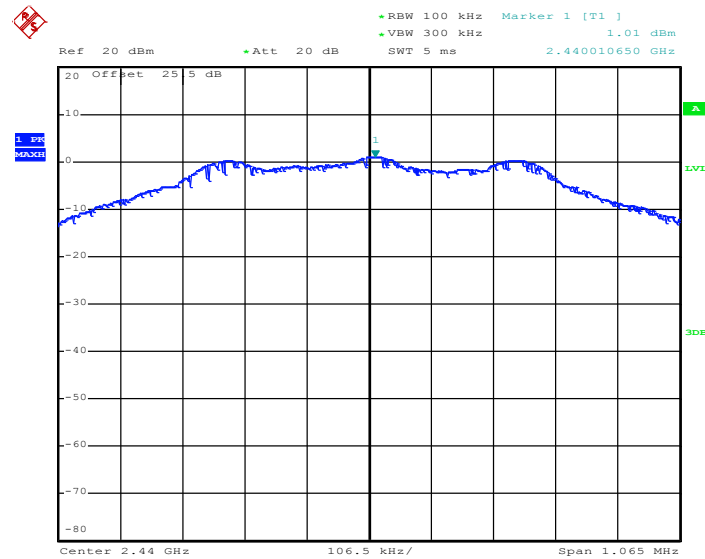
3.3.6 Test Result of Power Spectral Density Plots (100kHz)

PSD 100kHz Plot on Channel 00



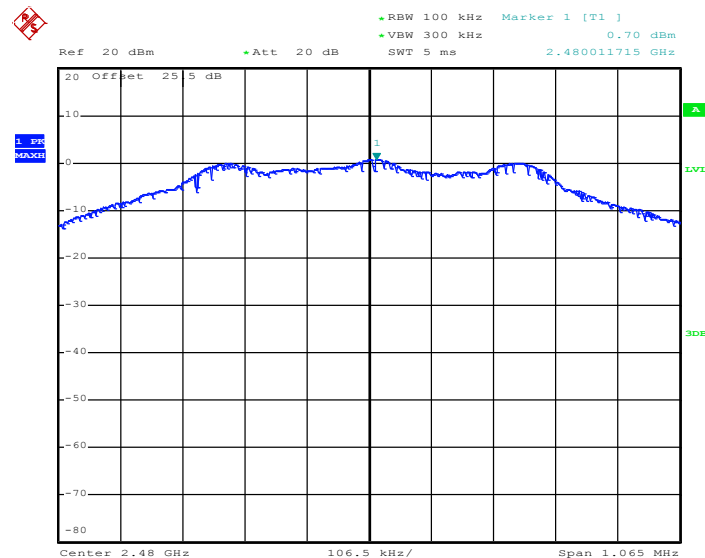
Date: 27.NOV.2012 15:52:54

PSD 100kHz Plot on Channel 19



Date: 27.NOV.2012 15:56:33

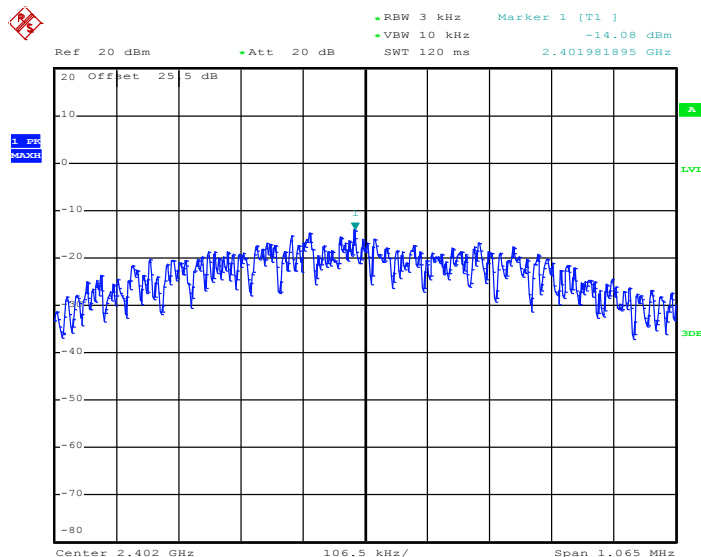
PSD 100kHz Plot on Channel 39



Date: 27.NOV.2012 15:59:58

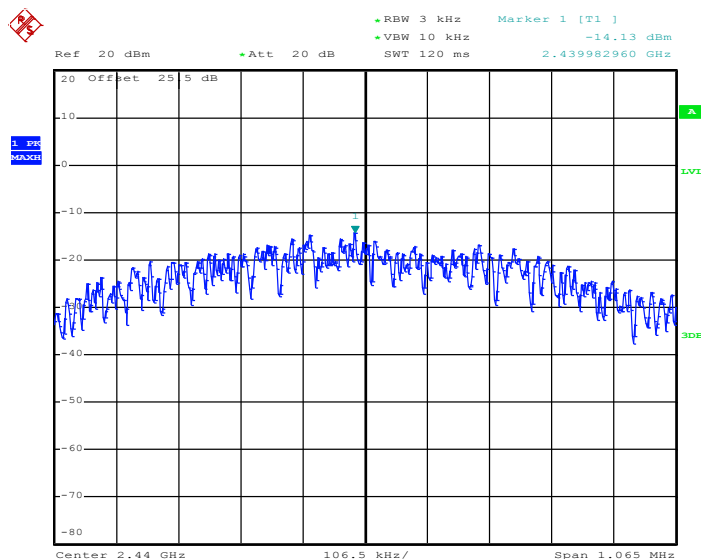
3.3.7 Test Result of Power Spectral Density Plots (3kHz)

PSD 3kHz Plot on Channel 00



Date: 27.NOV.2012 15:52:32

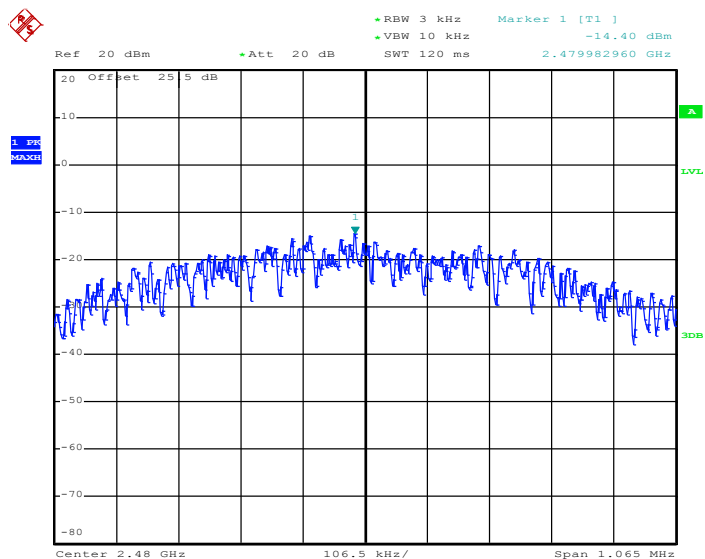
PSD 3kHz Plot on Channel 19



Date: 27.NOV.2012 15:56:26



PSD 3kHz Plot on Channel 39



Date: 27.NOV.2012 15:59:52

3.4 Conducted Band Edges and Spurious Emission Measurement

3.4.1 Limit of Conducted Band Edges and Spurious Emission

All harmonics/spurious must be at least 20 dB down from the highest emission level within the authorized band.

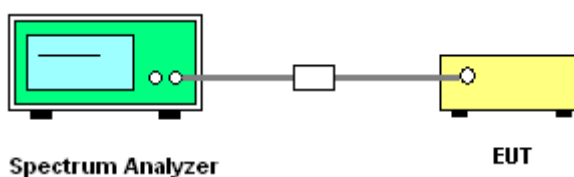
3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 Test Procedure

1. The testing follows the guidelines in ANSI C63.4-2003 and the Measurement Procedure of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v02.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 KHz, Video bandwidth (VBW) $\geq$ RBW. Out of the authorized frequency band emissions must be at least 20 dB lower than the highest emission level within the authorized band as measured with a 100 KHz RBW. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
5. Measure and record the results in the test report.

3.4.4 Test Setup

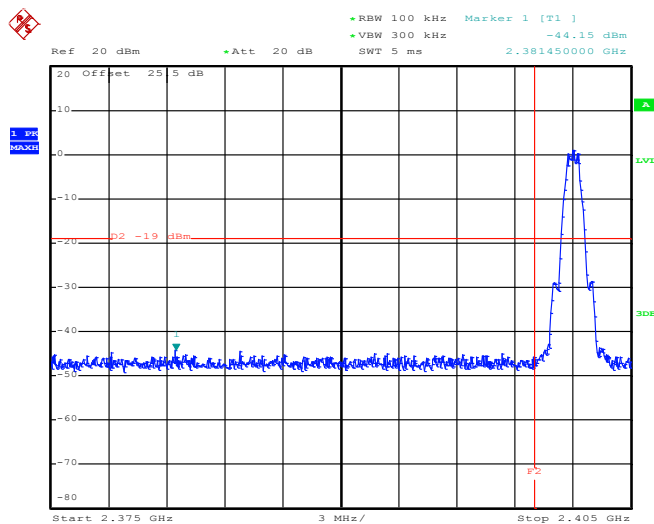




3.4.5 Test Result of Conducted Band Edges

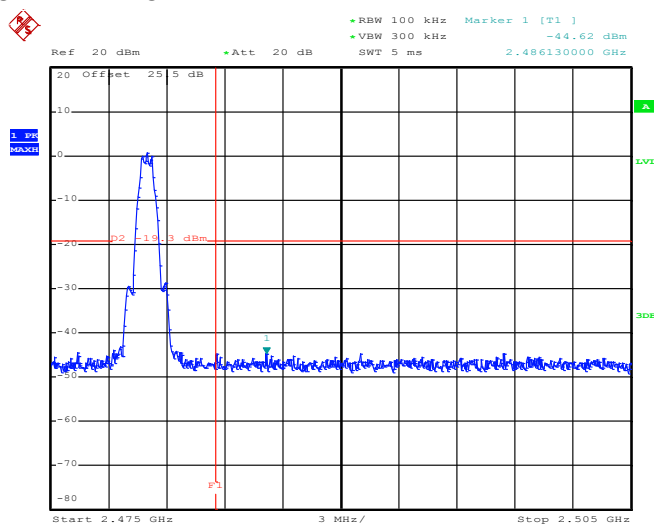
Test Mode :	Bluetooth 4.0 - LE	Temperature :	24~26℃
Test Channel :	00 and 39	Relative Humidity :	58~61%
		Test Engineer :	Coyote Lin

Low Band Edge Plot on Channel 00



Date: 27.NOV.2012 15:53:14

High Band Edge Plot on Channel 39



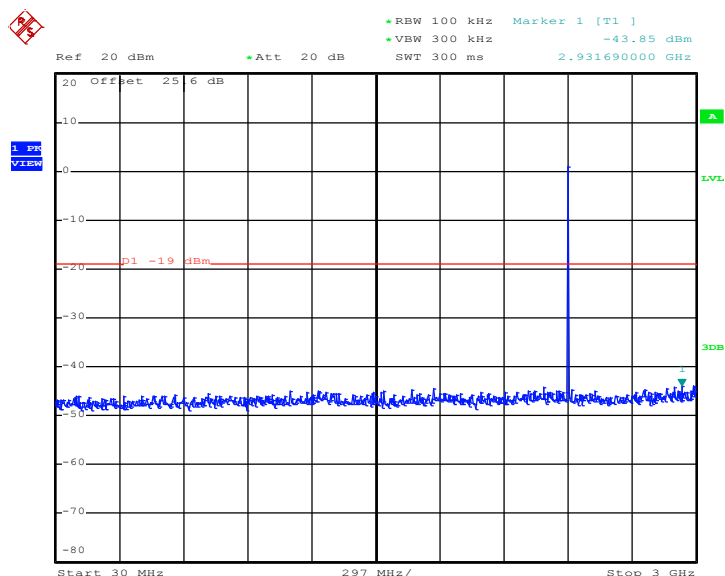
Date: 27.NOV.2012 16:00:27



3.4.6 Test Result of Conducted Spurious Emission

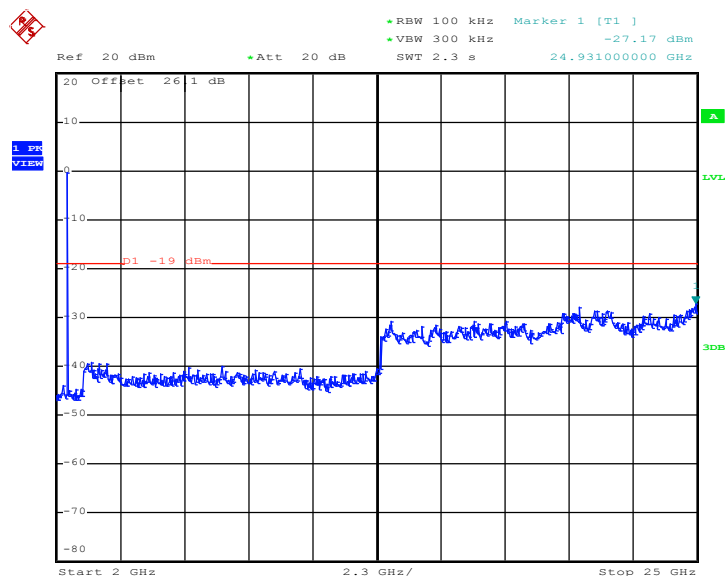
Test Mode :	Bluetooth 4.0 - LE	Temperature :	24~26℃
Test Channel :	00	Relative Humidity :	58~61%
		Test Engineer :	Coyote Lin

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps
GFSK Channel 00



Date: 27.NOV.2012 15:53:35

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 00

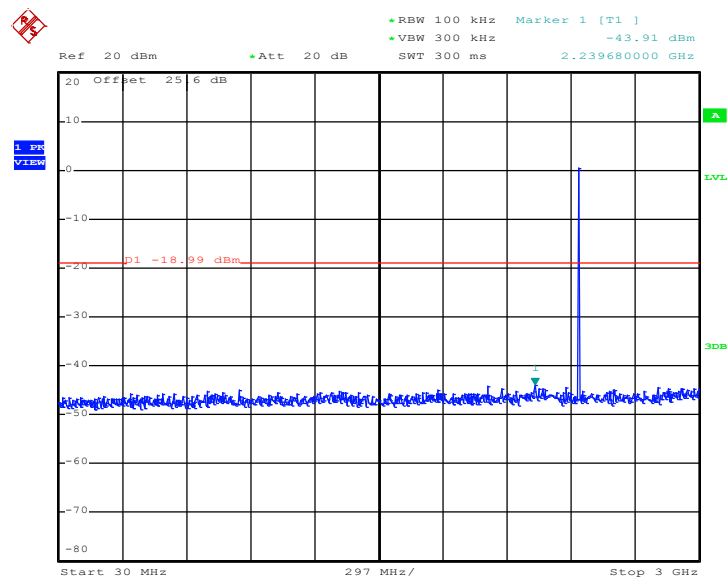


Date: 27.NOV.2012 15:53:53

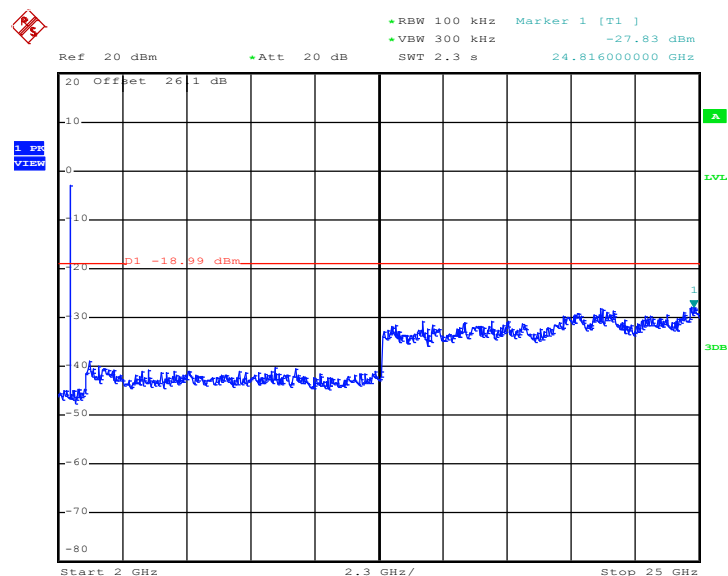


Test Mode :	Bluetooth 4.0 - LE	Temperature :	24~26℃
Test Channel :	19	Relative Humidity :	58~61%
		Test Engineer :	Coyote Lin

Conducted Spurious Emission Plot on Bluetooth LE 1Mbps
GFSK Channel 19



Date: 27.NOV.2012 15:57:05

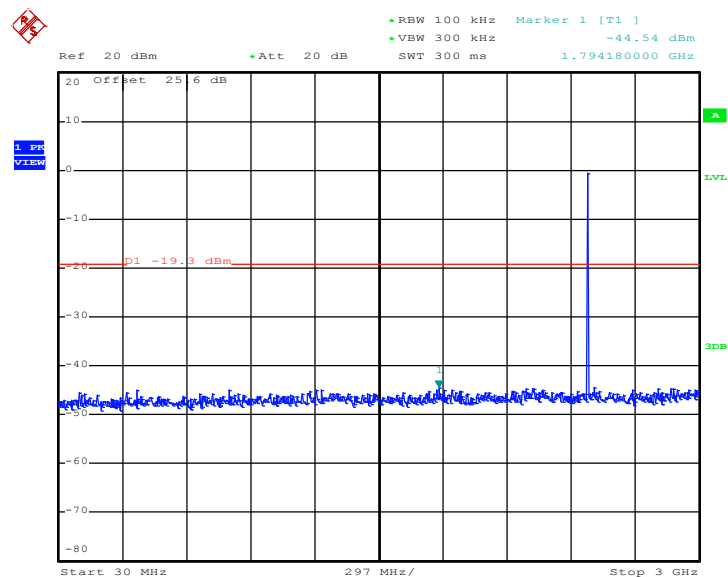


Date: 27.NOV.2012 15:57:23



Test Mode :	Bluetooth 4.0 - LE	Temperature :	24~26°C
Test Channel :	39	Relative Humidity :	58~61%
		Test Engineer :	Coyote Lin

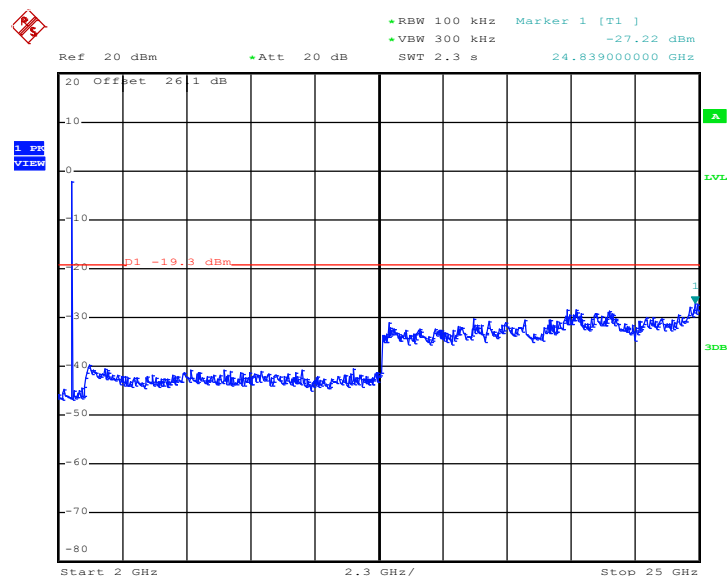
**Conducted Spurious Emission Plot on Bluetooth LE 1Mbps
GFSK Channel 39**



Date: 27.NOV.2012 16:01:01



Conducted Spurious Emission Plot on Bluetooth LE 1Mbps
GFSK Channel 39



Date: 27.NOV.2012 16:01:19

3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

3.5.3 Test Procedures

1. The testing follows the guidelines in ANSI C63.10-2009 and ANSI C63.4-2003 test site requirement.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;

(2) Set RBW=100 KHz for $f < 1$ GHz; VBW $\geq$ RBW; Sweep = auto; Detector function = peak;
Trace = max hold;

(3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement.

For average measurement:

- VBW = 10 Hz, when duty cycle is no less than 98 percent.
- VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

Band	Duty Cycle(%)	T(us)	1/T(KHz)	VBW Setting
Bluetooth 4.0 - LE	66.67	424	2.36	3KHz

Note: For average measurement with duty cycle $< 98\%$, use reduced VBW measurement method 4.2.3.2.3 in ANSI C63.10.

Marker-Delta method :

(1) Set RBW = 1 MHz, VBW = 3 MHz, peak detector.

Repeat the measurement with an average detector, use RBW = 1MHz

VBW = 10 Hz, when duty cycle is no less than 98 percent.

VBW $\geq 1/T$, when duty cycle is less than 98 percent

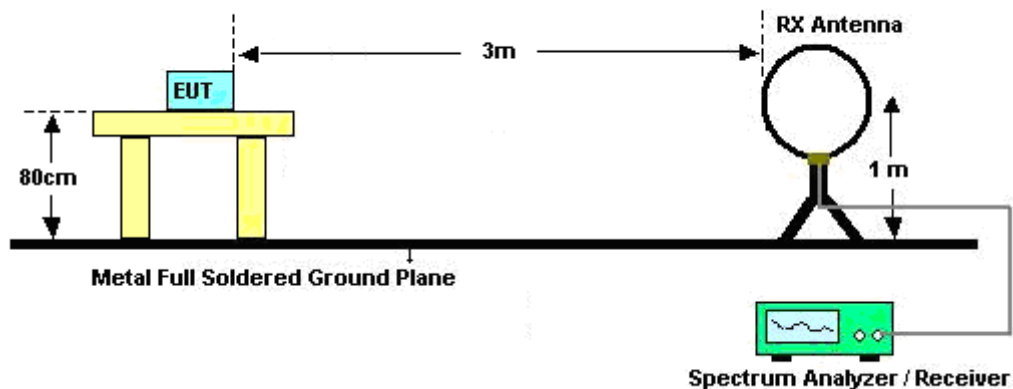
(2) Set span = 10MHz, that encompasses both the peak of the fundamental emission and the band-edge emission under investigation. Set RBW = 100KHz, 1% of the total span. Set VBW = 100KHz $\geq$ RBW.

(3) Subtract the delta measured in step (2) from the field strengths measured in step (1).

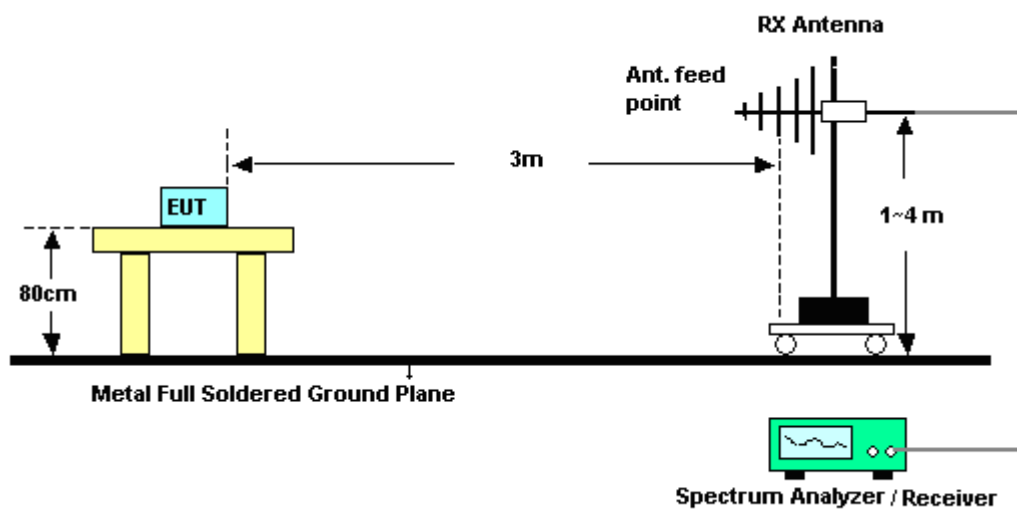
The resultant field strengths (peak/average) are then used to determine band-edge compliance as required by Section 15.205.

3.5.4 Test Setup

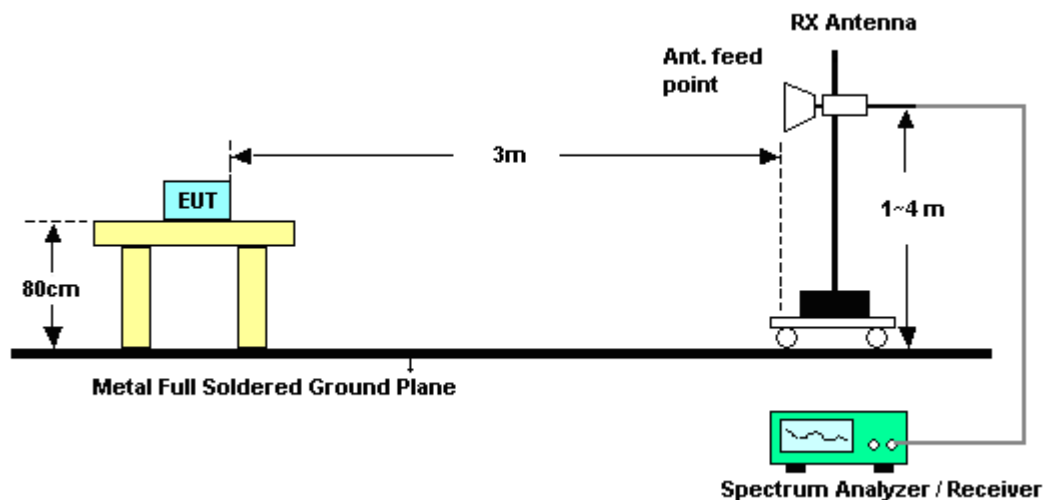
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.5.5 Test Results of Radiated Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

3.5.6 Test Result of Radiated Band Edges

Test Mode :	Mode 1	Temperature :	22~24°C
Test Channel :	00	Relative Humidity :	51~52%
		Test Engineer :	Marlboro Hsu

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2373.36	45.64	-28.36	74	41.32	32.28	5.99	33.95	108	34	Peak
2389.92	34.26	-19.74	54	29.89	32.3	6.03	33.96	108	34	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.02	45.95	-28.05	74	41.58	32.3	6.03	33.96	100	293	Peak
2383.53	33.81	-20.19	54	29.46	32.28	6.03	33.96	100	293	Average

Test Mode :	Mode 3	Temperature :	22~24°C
Test Channel :	39	Relative Humidity :	51~52%
		Test Engineer :	Marlboro Hsu

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.52	59.6	-14.4	74	55.04	32.38	6.18	34	129	36	Peak
2483.5	56.52	*2.52	54	51.96	32.38	6.18	34	129	36	Average
2483.52	42.45	-31.55	74	-	-	-	-	-	-	Peak
2483.5	41.56	-12.44	54	-	-	-	-	-	-	Average

Summary results of marker-delta method:

Test mode	Maximum field strength of the fundamental emission (dBμV/m)	Delta Result (dB)	Measurement Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
Peak	97.72	55.27	42.45	74	-31.55	Pass
Average	96.83	55.27	41.56	54	-12.44	Pass

Note : Measurement result = Maximum field strength – Delta result

*Delta-Marker Method is used for the 2483.5MHz average measurement as described in the test procedure of this report and the test result is under 12.44dB

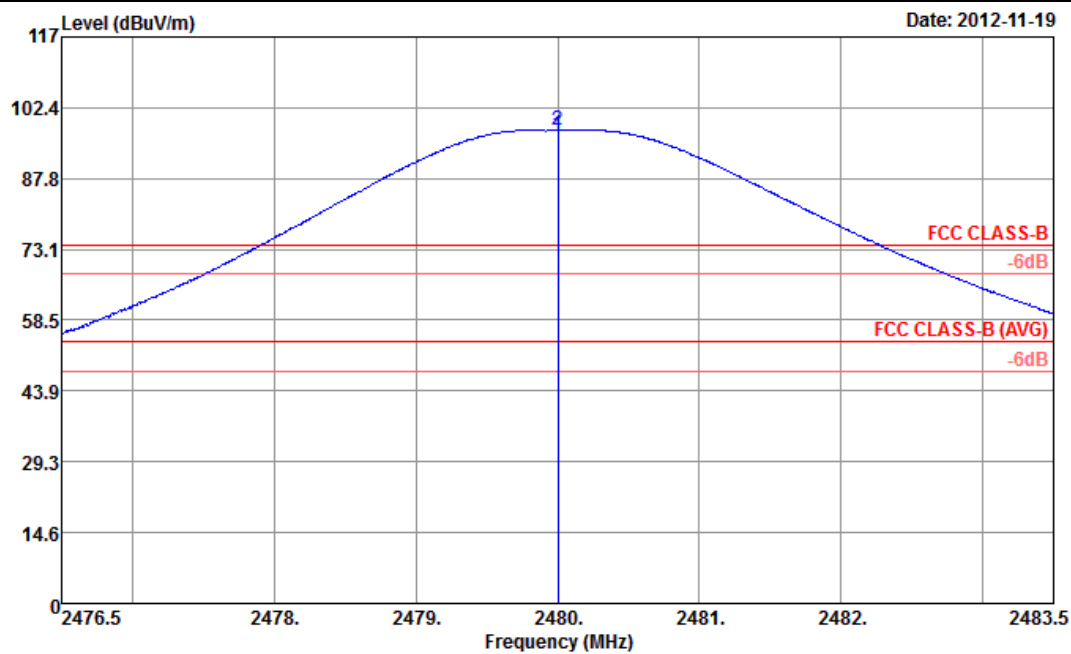
ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	52.75	-21.25	74	48.19	32.38	6.18	34	125	355	Peak
2483.5	48.57	-5.43	54	44.01	32.38	6.18	34	125	355	Average
2483.5	41.81	-32.19	74	-	-	-	-	-	-	Peak
2483.5	40.93	-13.07	54	-	-	-	-	-	-	Average

Summary results of marker-delta method:

Test mode	Maximum field strength of the fundamental emission (dBμV/m)	Delta Result (dB)	Measurement Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
Peak	89.68	47.87	41.81	74	-32.19	Pass
Average	88.8	47.87	40.93	54	-13.07	Pass

Note : Measurement result = Maximum field strength – Delta result

Test Mode :	Mode 3	Temperature :	22~24°C
Test Channel :	78	Relative Humidity :	51~52%
Test Engineer :	Marlboro Hsu	Polarization :	Horizontal

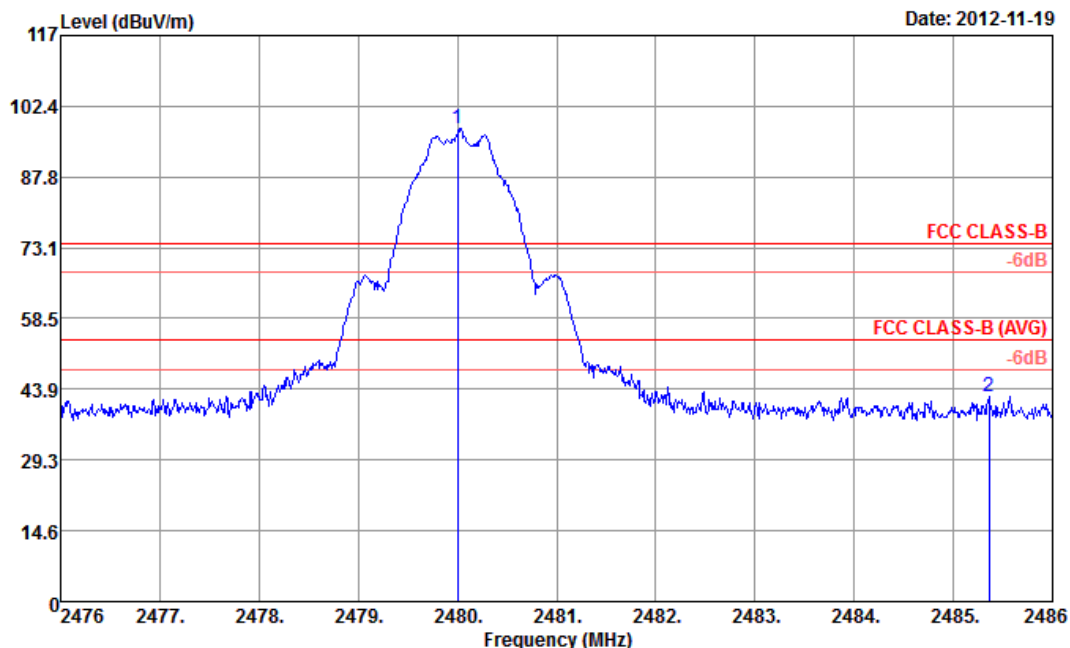


Site : 03CH07-HY
Condition : FCC CLASS-B 3m HF-ANT_120823 HORIZONTAL
: RBW:1000.000KHz VBW:3000.000KHz SWT:Auto

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Factor	Preamp Loss	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 *	2480.00	96.83	42.83	54.00	92.27	32.38	6.18	34.00	129	36 Average
2 *	2480.00	97.72	23.72	74.00	93.16	32.38	6.18	34.00	129	36 Peak

* Maximum field strength of the fundamental emission

Test Mode :	Mode 3	Temperature :	22~24°C
Test Channel :	78	Relative Humidity :	51~52%
Test Engineer :	Marlboro Hsu	Polarization :	Horizontal

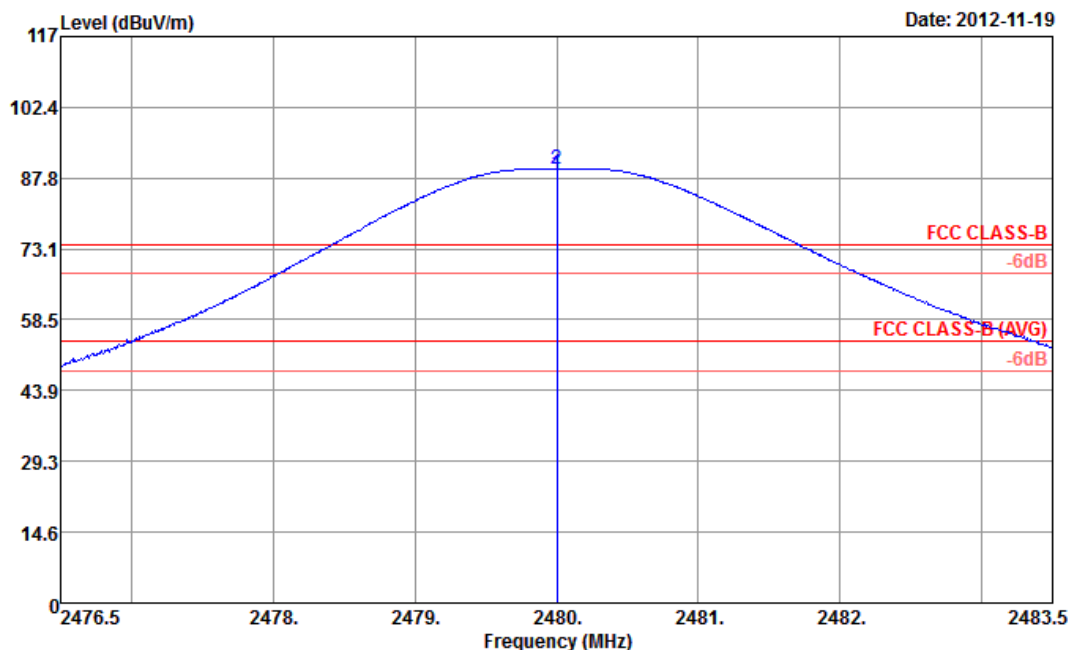


Site : 03CH07-HY
Condition : FCC CLASS-B 3m HF-ANT_120823 HORIZONTAL
: RBW:100.000KHz VBW:100.000KHz SWT:Auto

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	A/Pos	T/Pos	Remark
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	cm	deg
1 *	2480.00	97.68	23.68	74.00	93.12	32.38	6.18	34.00	129	36 Peak
2	2485.36	42.41	-31.59	74.00	37.85	32.38	6.18	34.00	129	36 Peak

* Marker-Delta Method (RBW/VBW=100KHz): 55.27 dB , single carrier Mode

Test Mode :	Mode 3	Temperature :	22~24°C
Test Channel :	78	Relative Humidity :	51~52%
Test Engineer :	Marlboro Hsu	Polarization :	Vertical

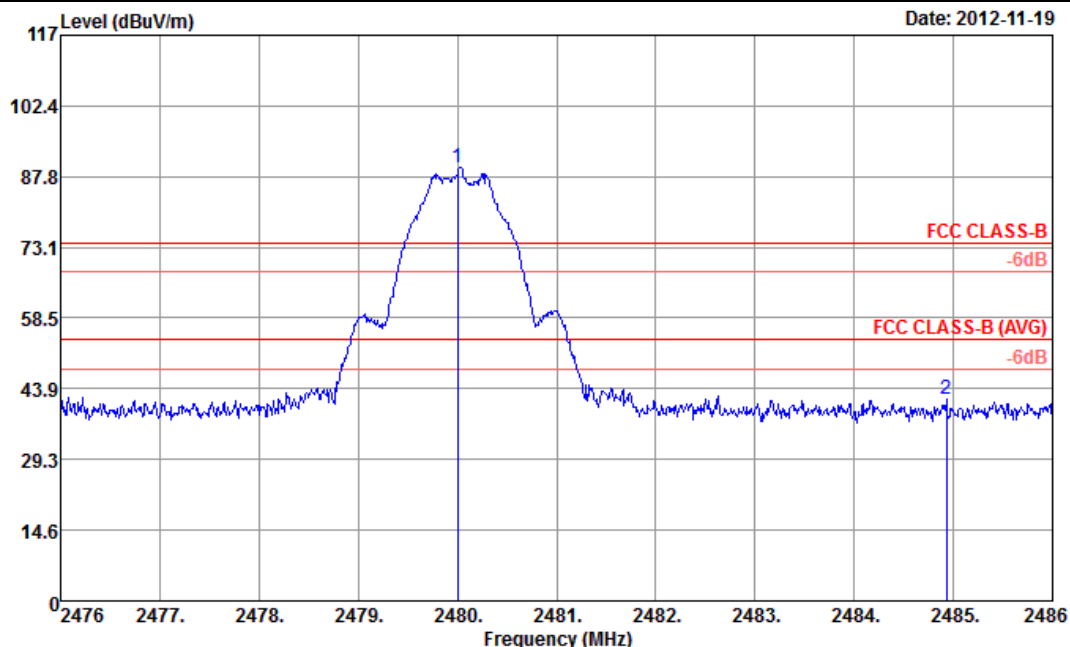


Site : 03CH07-HY
Condition : FCC CLASS-B 3m HF-ANT_120823 VERTICAL
: RBW:1000.000KHz VBW:3000.000KHz SWT:Auto

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 *	2480.00	88.80	34.80	54.00	84.24	32.38	6.18	34.00	125	355 Average
2 *	2480.00	89.68	15.68	74.00	85.12	32.38	6.18	34.00	125	355 Peak

* Maximum field strength of the fundamental emission

Test Mode :	Mode 3	Temperature :	22~24°C
Test Channel :	78	Relative Humidity :	51~52%
Test Engineer :	Marlboro Hsu	Polarization :	Vertical



Site : 03CH07-HY
Condition : FCC CLASS-B 3m HF-ANT_120823 VERTICAL
: RBW:100.000KHz VBW:100.000KHz SWT:Auto

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	A/Pos	T/Pos	Remark
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	cm	deg
			dB	dBuV/m	dBuV	dB/m	dB	dB		
1 *	2480.00	89.51	15.51	74.00	84.95	32.38	6.18	34.00	125	355 Peak
2	2484.93	41.64	-32.36	74.00	37.08	32.38	6.18	34.00	125	355 Peak

* Marker-Delta Method (RBW/VBW=100KHz): 47.87 dB , single carrier Mode

3.5.7 Test Result of Radiated Emission (30 MHz ~ 10th Harmonic)

Test Mode :	Mode 1	Temperature :	22~24°C
Test Channel :	00	Relative Humidity :	51~52%
Test Engineer :	Marlboro Hsu	Polarization :	Horizontal
Remark :	1. 2402 MHz is fundamental signal which can be ignored. 2. 7206 MHz and 9606 MHz are not within a restricted band, and its limit line is 20dB below the highest emission level. For example, 100.13 dBuV/m - 20dB = 80.13 dBuV/m. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2402	99.14	-	-	94.77	32.3	6.03	33.96	108	34	Average
2402	100.13	-	-	95.76	32.3	6.03	33.96	108	34	Peak
4803	45.51	-28.49	74	59.89	33.98	9.11	57.47	100	0	Peak
7206	42.29	-37.84	80.13	54.67	35.56	10.02	57.96	100	0	Peak
9606	46.38	-33.75	80.13	56.16	36.44	12.01	58.23	100	0	Peak

Test Mode :	Mode 1	Temperature :	22~24°C
Test Channel :	00	Relative Humidity :	51~52%
Test Engineer :	Marlboro Hsu	Polarization :	Vertical
Remark :	1. 2402 MHz is fundamental signal which can be ignored. 2. 7206 MHz and 9609 MHz are not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2402	88.52	-	-	84.15	32.3	6.03	33.96	100	293	Average
2402	93.52	-	-	89.15	32.3	6.03	33.96	100	293	Peak
4803	43.14	-30.86	74	57.52	33.98	9.11	57.47	100	0	Peak
7206	43.71	-29.81	73.52	56.09	35.56	10.02	57.96	100	0	Peak
9609	43.82	-29.7	73.52	53.6	36.44	12.01	58.23	100	0	Peak

Test Mode :	Mode 2	Temperature :	22~24°C
Test Channel :	19	Relative Humidity :	51~52%
Test Engineer :	Marlboro Hsu	Polarization :	Horizontal
Remark :	1. 2440 MHz is fundamental signal which can be ignored. 2. 9759 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2440	95.72	-	-	91.24	32.35	6.11	33.98	105	15	Average
2440	96.66	-	-	92.18	32.35	6.11	33.98	105	15	Peak
4881	42.53	-31.47	74	56.92	33.95	9.14	57.48	100	0	Peak
7320	43.73	-30.27	74	56.18	35.53	10.06	58.04	100	0	Peak
9759	46.09	-30.57	76.66	55.74	36.66	11.93	58.24	100	0	Peak

Test Mode :	Mode 2	Temperature :	22~24°C
Test Channel :	19	Relative Humidity :	51~52%
Test Engineer :	Marlboro Hsu	Polarization :	Vertical
Remark :	1. 2440 MHz is fundamental signal which can be ignored. 2. 9759 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2440	88.98	-	-	84.5	32.35	6.11	33.98	100	308	Average
2440	89.92	-	-	85.44	32.35	6.11	33.98	100	308	Peak
4881	42.25	-31.75	74	56.64	33.95	9.14	57.48	100	0	Peak
7320	42.58	-31.42	74	55.03	35.53	10.06	58.04	100	0	Peak
9759	46.06	-23.86	69.92	55.71	36.66	11.93	58.24	100	0	Peak

Test Mode :	Mode 3	Temperature :	22~24°C
Test Channel :	39	Relative Humidity :	51~52%
Test Engineer :	Marlboro Hsu	Polarization :	Horizontal
Remark :	1. 2480 MHz is fundamental signal which can be ignored. 2. 9921 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
137.46	28.25	-15.25	43.5	47.11	11.44	1.19	31.49			Peak
208.2	31.87	-11.63	43.5	52.21	9.71	1.35	31.4			Peak
284.88	42.82	-3.18	46	59.49	13.09	1.66	31.42			Peak
358.1	44.71	-1.29	46	59.21	14.87	2.04	31.41	117	305	Peak
358.1	44.29	-1.71	46	58.79	14.87	2.04	31.41	117	305	QP
415.5	40.78	-5.22	46	53.59	16.32	2.19	31.32			Peak
496	35.99	-10.01	46	46.46	18	2.43	30.9			Peak
2480	96.79	-	-	92.23	32.38	6.18	34	129	36	Average
2480	97.56	-	-	93	32.38	6.18	34	129	36	Peak
4962	47.31	-26.69	74	61.73	33.91	9.16	57.49	100	0	Peak
7440	43.91	-30.09	74	56.4	35.51	10.12	58.12	100	0	Peak
9921	46.85	-30.71	77.56	56.36	36.9	11.84	58.25	100	0	Peak

Test Mode :	Mode 3	Temperature :	22~24°C
Test Channel :	39	Relative Humidity :	51~52%
Test Engineer :	Marlboro Hsu	Polarization :	Vertical
Remark :	1. 2480 MHz is fundamental signal which can be ignored. 2. 9921 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. 3. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
39.45	34.56	-5.44	40	52.25	13.5	0.62	31.81	100	228	Peak
68.61	29.28	-10.72	40	53.96	6.28	0.83	31.79			Peak
281.64	32.01	-13.99	46	48.74	13.04	1.64	31.41			Peak
351.8	37.09	-8.91	46	51.79	14.72	1.99	31.41			Peak
428.8	35.95	-10.05	46	48.3	16.61	2.24	31.2			Peak
502.3	34.89	-11.11	46	45.21	18.13	2.45	30.9			Peak
2480	88.74	-	-	84.18	32.38	6.18	34	125	355	Average
2480	89.48	-	-	84.92	32.38	6.18	34	125	355	Peak
4959	42.85	-31.15	74	57.27	33.91	9.16	57.49	100	0	Peak
7440	42.59	-31.41	74	55.08	35.51	10.12	58.12	100	0	Peak
9921	46.36	-23.12	69.48	55.87	36.9	11.84	58.25	100	0	Peak

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

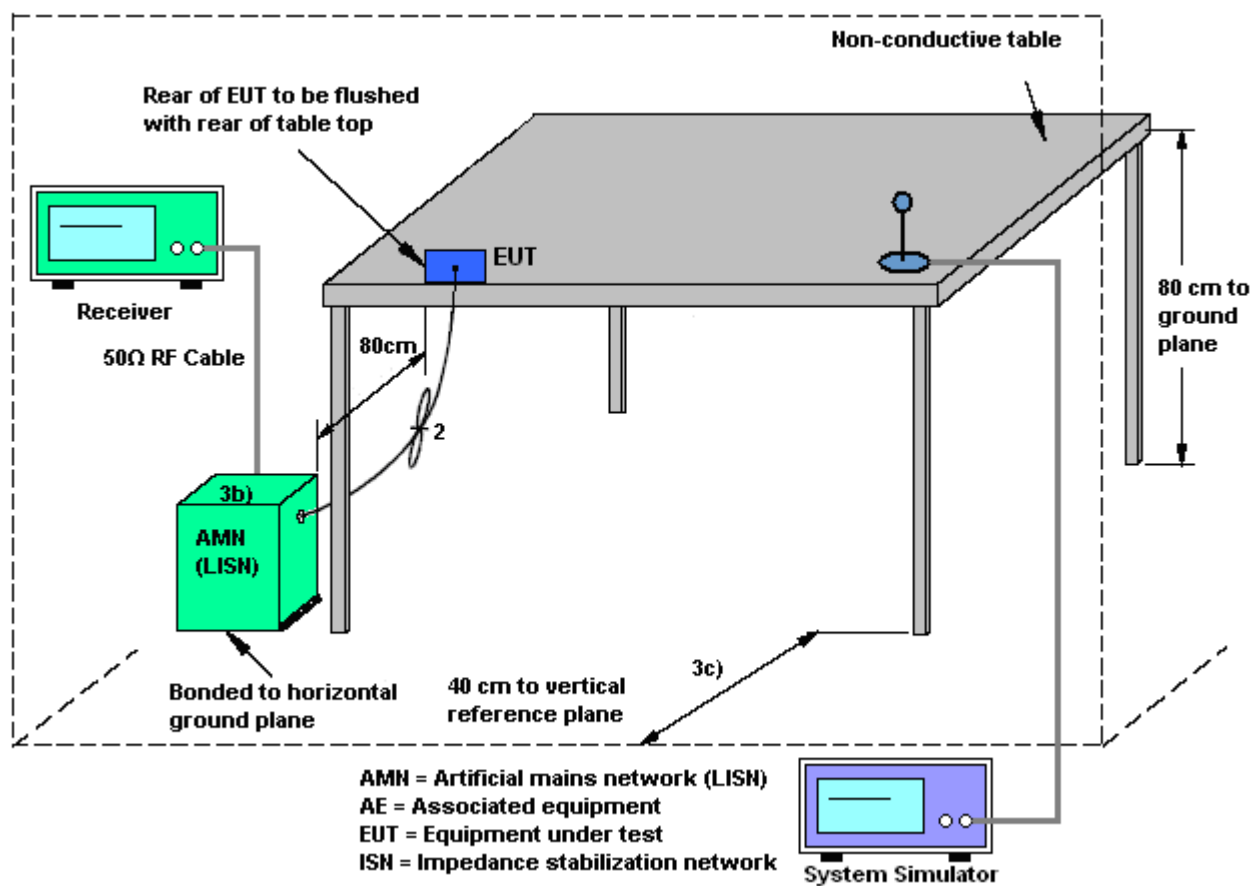
3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

3.6.3 Test Procedures

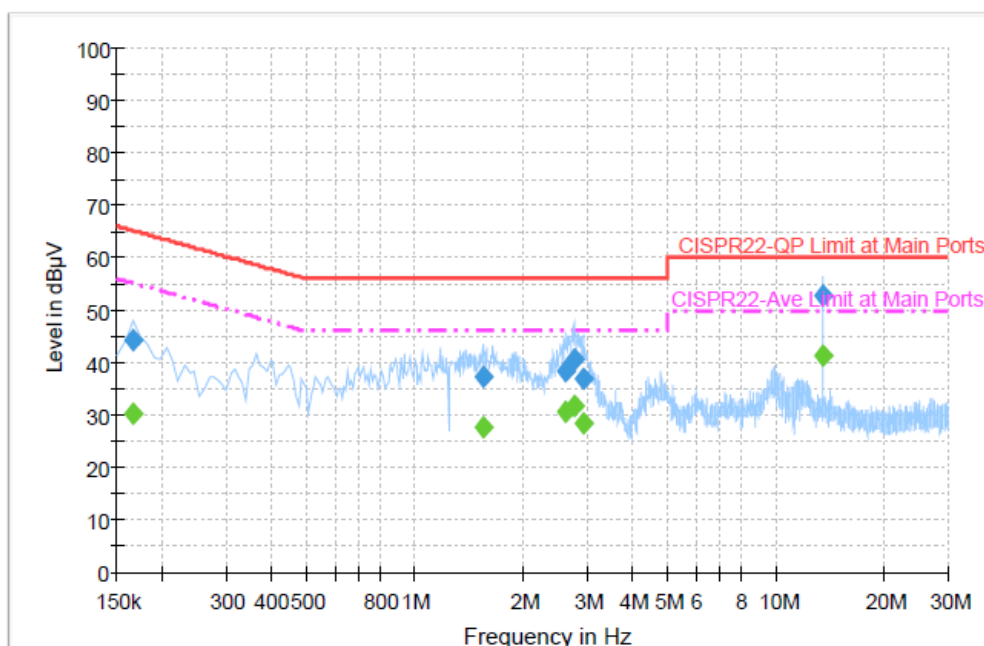
1. The testing follows the guidelines in ANSI C63.10-2009 and ANSI C63.4-2003 test site requirement.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connecting to the other LISN.
5. The LISN provides 50 ohm coupling impedance for the measuring instrument.
6. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
7. Both sides of AC line were checked for maximum conducted interference.
8. The frequency range from 150 kHz to 30 MHz was searched.
9. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

3.6.4 Test Setup



3.6.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	20~22℃
Test Engineer :	Slash Huang	Relative Humidity :	50~52%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM1900 Idle + Bluetooth Link + WLAN Link + RFID On + Earphone + Battery + USB Cable (Charging from Adapter)		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



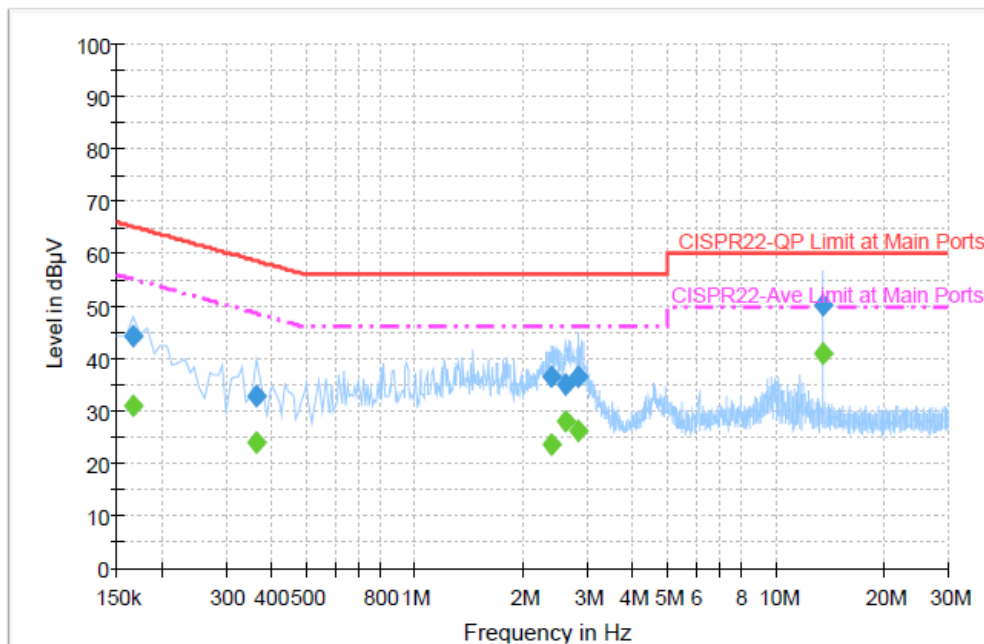
Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.166000	44.1	Off	L1	19.3	21.1	65.2
1.542000	37.3	Off	L1	19.4	18.7	56.0
2.622000	38.5	Off	L1	19.6	17.5	56.0
2.758000	40.8	Off	L1	19.6	15.2	56.0
2.934000	37.1	Off	L1	19.7	18.9	56.0
13.558000	52.8	Off	L1	19.9	7.2	60.0

Final Result : Average

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.166000	30.4	Off	L1	19.3	24.8	55.2
1.542000	27.6	Off	L1	19.4	18.4	46.0
2.622000	30.6	Off	L1	19.6	15.4	46.0
2.758000	31.6	Off	L1	19.6	14.4	46.0
2.934000	28.5	Off	L1	19.7	17.5	46.0
13.558000	41.2	Off	L1	19.9	8.8	50.0

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Slash Huang	Relative Humidity :	50~52%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM1900 Idle + Bluetooth Link + WLAN Link + RFID On + Earphone + Battery + USB Cable (Charging from Adapter)		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		


Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.166000	44.2	Off	N	19.3	21.0	65.2
0.366000	32.9	Off	N	19.3	25.7	58.6
2.398000	36.7	Off	N	19.6	19.3	56.0
2.606000	35.1	Off	N	19.6	20.9	56.0
2.838000	36.4	Off	N	19.7	19.6	56.0
13.558000	50.2	Off	N	19.9	9.8	60.0

Final Result : Average

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.166000	30.9	Off	N	19.3	24.3	55.2
0.366000	24.1	Off	N	19.3	24.5	48.6
2.398000	23.5	Off	N	19.6	22.5	46.0
2.606000	28.1	Off	N	19.6	17.9	46.0
2.838000	26.1	Off	N	19.7	19.9	46.0
13.558000	41.1	Off	N	19.9	8.9	50.0

3.7 Antenna Requirements

3.7.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. 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 FCC rule.

3.7.2 Antenna Connected Construction

Non-standard connector used.

3.7.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100055	9kHz~40GHz	Jun. 06, 2012	Nov. 27, 2012	Jun. 05, 2013	Conducted (TH02-HY)
EMI Test Receiver	R&S	ESCI 7	100724	9kHz~7GHz	Sep. 03, 2012	Dec. 03, 2012	Sep. 02, 2013	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100081	9KHz ~ 30MHz	Dec. 09, 2011	Dec. 03, 2012	Dec. 08, 2012	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100080	9KHz ~ 30MHz	Dec. 06, 2011	Dec. 03, 2012	Dec. 05, 2012	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	Dec. 03, 2012	N/A	Conduction (CO05-HY)
System Simulator	R&S	CMU200	117995	N/A	Jul. 28, 2011	Dec. 03, 2012	Jul. 27, 2013	Conduction (CO05-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30MHz ~ 1GHz	Oct. 06, 2012	Nov. 19, 2012	Oct. 05, 2013	Radiation (03CH07-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101067	9KHz ~ 30GHz	Dec. 06, 2011	Nov. 19, 2012	Dec. 05, 2012	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 22, 2012	Nov. 19, 2012	Aug. 21, 2013	Radiation (03CH07-HY)
Pre Amplifier	Agilent	8449B	3008A02362	1GHz ~ 26.5GHz	Dec. 05, 2011	Nov. 19, 2012	Dec. 04, 2012	Radiation (03CH07-HY)
Pre Amplifier	MITEQ	AMF-7D-0010 1800-30-10P	159088	1GHz ~ 18GHz	Mar. 10, 2012	Nov. 19, 2012	Mar. 09, 2013	Radiation (03CH07-HY)
Pre Amplifier	COM-POWER	PA-103A	161241	10-1000MHz.32 dB.GAIN	Feb. 27, 2012	Nov. 19, 2012	Feb. 26, 2013	Radiation (03CH07-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Sep. 03, 2012	Nov. 19, 2012	Sep. 02, 2013	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz ~ 40GHz	Sep. 28, 2012	Nov. 19, 2012	Sep. 27, 2013	Radiation (03CH07-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9KHz ~ 30MHz	Jul. 03, 2012	Nov. 19, 2012	Jul. 02, 2014	Radiation (03CH07-HY)



5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.26
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.54
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Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.72
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Appendix A. Photographs of EUT

Please refer to Sporton report number EP2O3103 as below.