

FCC RF Test Report

APPLICANT : Acer Incorporated
EQUIPMENT : Smart HandHeld
BRAND NAME : Acer
MODEL NAME : S120
FCC ID : HLZJMS120EU
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : Digital Spread Spectrum (DSS)

The product was received on Aug. 19, 2010 and completely tested on Sep. 15, 2010. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.4-2003 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:



Anderson Chiu / Deputy Manager



SPORTON INTERNATIONAL INC.

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

TABLE OF CONTENTS

REVISION HISTORY	3
SUMMARY OF TEST RESULT	4
1 GENERAL DESCRIPTION	5
1.1 Applicant	5
1.2 Manufacturer	5
1.3 Feature of Equipment Under Test	5
1.4 Testing Site	6
1.5 Applied Standards	6
1.6 Ancillary Equipment List	6
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST	7
2.1 RF Output Power	7
2.2 Test Mode	8
2.3 Connection Diagram of Test System	9
2.4 RF Utility	9
3 TEST RESULT	10
3.1 Number of Channel Measurement	10
3.2 20dB Bandwidth Measurement	12
3.3 Hopping Channel Separation Measurement	19
3.4 Dwell Time Measurement	22
3.5 Peak Output Power Measurement	24
3.6 Band Edges Measurement	27
3.7 Spurious Emission Measurement	38
3.8 AC Conducted Emission Measurement	42
3.9 Radiated Emission Measurement	46
3.10 Antenna Requirements	55
4 LIST OF MEASURING EQUIPMENT	56
5 UNCERTAINTY OF EVALUATION	57
APPENDIX A. PHOTOGRAPHS OF EUT	
APPENDIX B. SETUP PHOTOGRAPHS	



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR081915-04A	Rev. 01	Initial issue of report	Oct. 20, 2010

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(1)	A8.4(2)	Number of Channels	$\geq 15\text{Chs}$	Pass	-
3.2	15.247(a)(1)	A8.1(a)	20dB Bandwidth	NA	Pass	-
3.3	15.247(a)(1)	A8.1(b)	Channel Separation	$\geq 2/3$ of 20dB BW	Pass	-
3.4	15.247(a)(1)	A8.1(d)	Dwell Time of Each Channel	$\leq 0.4\text{sec}$ in 31.6sec period	Pass	-
3.5	15.247(b)(1)	A8.1(b)	Peak Output Power	$\leq 1\text{W}$	Pass	-
3.6	15.247(d)	A8.5	Frequency Band Edges	$\leq 20\text{dBc}$	Pass	-
3.8	15.207	Gen 7.2.2	AC Conducted Emission	15.207(a)	Pass	Under limit 17.3 dB at 0.366 MHz
3.9	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 7.8 dB at 70.5 MHz
3.10	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Acer Incorporated

8F., No. 88, Sec. 1, Hsin Tai Wu Rd., Hsichih, Taipei Hsien 221, Taiwan

1.2 Manufacturer

Compal Communication (Nanjing)

Nanjing Jingning Export Processing Zone (South Area) No. 68-2 Suyuan Street

1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	Smart HandHeld
Brand Name	Acer
Model Name	S120
Sample 1	EUT with Memory 1
Sample 2	EUT with Memory 2
FCC ID	HLZJMS120EU
Tx/Rx Frequency Range	2400 MHz ~ 2483.5 MHz
Number of Channels	79
Carrier Frequency of Each Channel	2402+n*1 MHz; n=0~78
Channel Spacing	1 MHz
Maximum Output Power to Antenna	Bluetooth (1Mbps) : 4.38 dBm (0.003 W) Bluetooth EDR (2Mbps) : 4.70 dBm (0.003 W) Bluetooth EDR (3Mbps) : 4.39 dBm (0.003 W)
Antenna Type	PIFA Antenna with gain 2.0 dBi
HW Version	REV0E (DVT2)
SW Version	Android version: 2.2 Baseband version: A4-00.18.00 Build number:Acer_LiquidMetal_0.018.50
Type of Modulation	Bluetooth (1Mbps) : GFSK Bluetooth EDR (2Mbps) : π /4-DQPSK Bluetooth EDR (3Mbps) : 8-DPSK
EUT Stage	Identical Prototype

Remark:

1. For other wireless features of this EUT, test report will be issued separately.
2. This test report recorded only product characteristics and test results of Digital Spread Spectrum (DSS).
3. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

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.
	CO05-HY	03CH05-HY	TW1022/4086B-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 Public Notice DA 00-705
- ♦ ANSI C63.4-2003
- ♦ IC RSS-210 Issue 7

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 (DoC), 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.	Bluetooth Base Station	R&S	CBT32	N/A	N/A	Unshielded, 1.8 m
3.	Bluetooth Earphone	Nokia	BH-102	PYAHS-107W	N/A	N/A
4.	GPS Station	T&E	GS-50	N/A	N/A	Unshielded, 1.8 m
5.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
6.	Notebook	DELL	Vostro 1510	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

Preliminary tests were performed in different data rate and recorded the RF output power in the following table:

Channel	Frequency	Bluetooth RF Output Power		
		Data Rate / Modulation		
		GFSK	π /4-DQPSK	8-DPSK
		1Mbps	2Mbps	3Mbps
Ch00	2402MHz	4.38 dBm	4.70 dBm	4.39 dBm
Ch39	2441MHz	2.05 dBm	2.31 dBm	2.06 dBm
Ch78	2480MHz	3.41 dBm	3.93 dBm	3.65 dBm

Remark:

1. The data rate was set in 2Mbps for all the test items due to the highest RF output power.
2. The EUT is programmed to transmit signals continuously for all testing.

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).

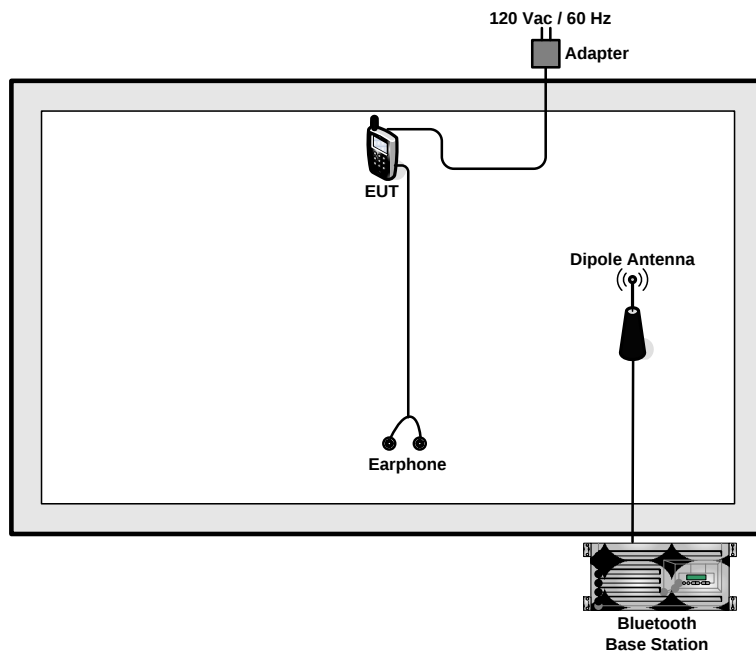
Pre-scanned tests were conducted to determine the final configuration from all possible combinations.

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

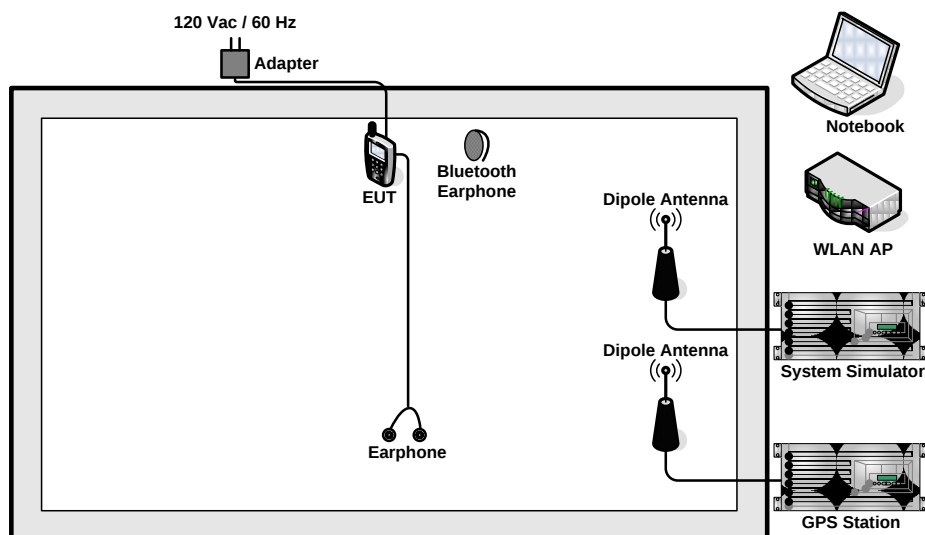
Test Cases			
Test Item	Data Rate / Modulation		
	Bluetooth 1Mbps GFSK	Bluetooth EDR 2Mbps π /4-DQPSK	Bluetooth EDR 3Mbps 8-DPSK
Conducted TCs	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz	Mode 4: CH00_2402 MHz Mode 5: CH39_2441 MHz Mode 6: CH78_2480 MHz	Mode 7: CH00_2402 MHz Mode 8: CH39_2441 MHz Mode 9: CH78_2480 MHz
Radiated TCs	N/A	Mode 1: CH00_2402 MHz + Battery 1 Mode 2: CH39_2441 MHz + Battery 1 Mode 3: CH78_2480 MHz + Battery 1	N/A
AC Conducted Emission	Mode 1 :GSM850 Idle + Bluetooth Link + WLAN Link + GPS Rx + Adapter + Earphone + Battery 1		
Remark:			
1. For radiated TCs, the data rate was set in 2Mbps due to the highest RF output power; only the data of these modes was reported.			
2. Sample 1 and Sample 2 are almost the same. The difference between these two samples is memory only. The difference is not related any RF effect, so only Sample 1 is used for all tests.			

2.3 Connection Diagram of Test System

<Bluetooth Tx Mode>



<EUT with Adapter Mode>



2.4 RF Utility

For Bluetooth function, the RF utility, "BT Enter DUT Mode" was installed in EUT which was programmed in order to make the EUT contact with Bluetooth base station for transmitting and receiving signals continuously.

3 Test Result

3.1 Number of Channel Measurement

3.1.1 Limits of Number of Hopping Frequency

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

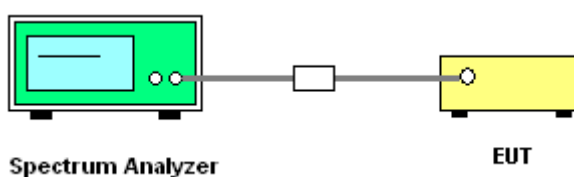
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedure

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. The modulation types of EUT are irrelevant to number of hopping channels deviation.
4. The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:
Span = the frequency band of operation; $RBW \geq 1\%$ of the span; $VBW \geq RBW$; Sweep = auto;
Detector function = peak; Trace = max hold.
5. The number of hopping frequency used is defined as the device has the numbers of total channel.

3.1.4 Test Setup

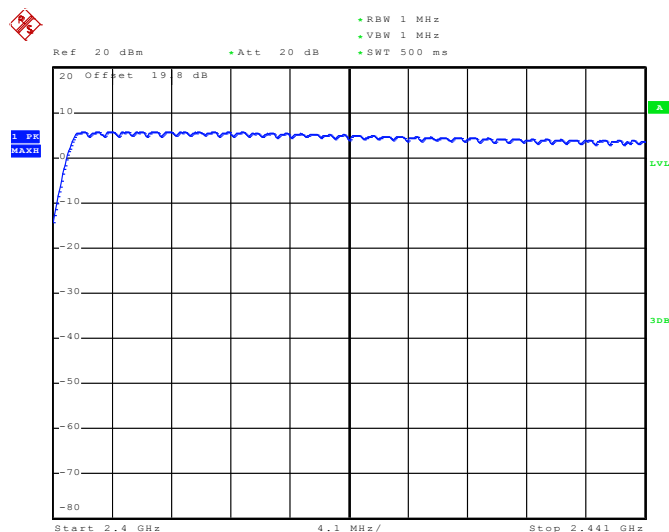


3.1.5 Test Result of Number of Hopping Frequency

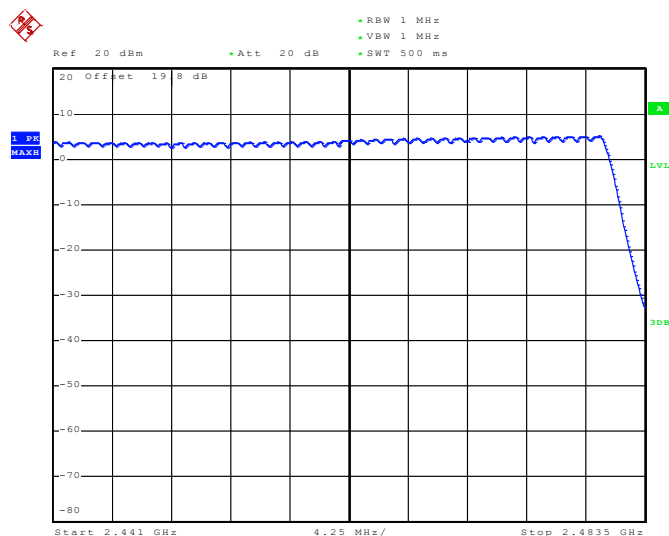
Test Mode :	Mode 4~6	Temperature :	25~27℃
Test Engineer :	Andy Yeh	Relative Humidity :	48~51%

Number of Hopping Channels (Channel)	Limits (Channel)	Pass/Fail
79	> 15	Pass

Number of Hopping Channel Plot on Channel 00 - 78



Date: 14.SEP.2010 20:05:08



Date: 14.SEP.2010 20:00:00

3.2 20dB Bandwidth Measurement

3.2.1 Limit of 20dB Bandwidth

N/A

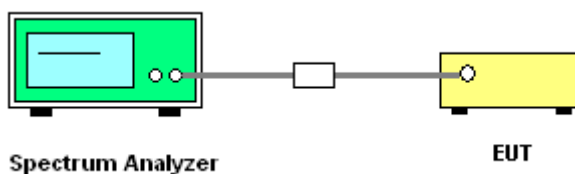
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. The EUT should be transmitting at its maximum data rate as the worst cases.
4. Use the following spectrum analyzer settings:
Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel;
RBW $\geq$ 1% of the 20 dB bandwidth; VBW $\geq$ RBW; Sweep = auto; Detector function = peak;
Trace = max hold.
5. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

3.2.4 Test Setup

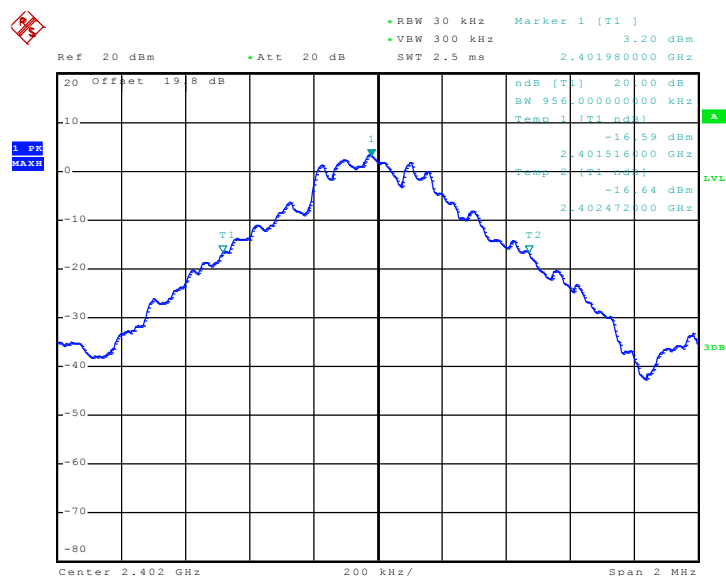


3.2.5 Test Result of 20dB Bandwidth

Test Mode :	Mode 1, 2, 3	Temperature :	25~27°C
Test Engineer :	Andy Yeh	Relative Humidity :	48~51%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	0.956
39	2441	0.960
78	2480	0.940

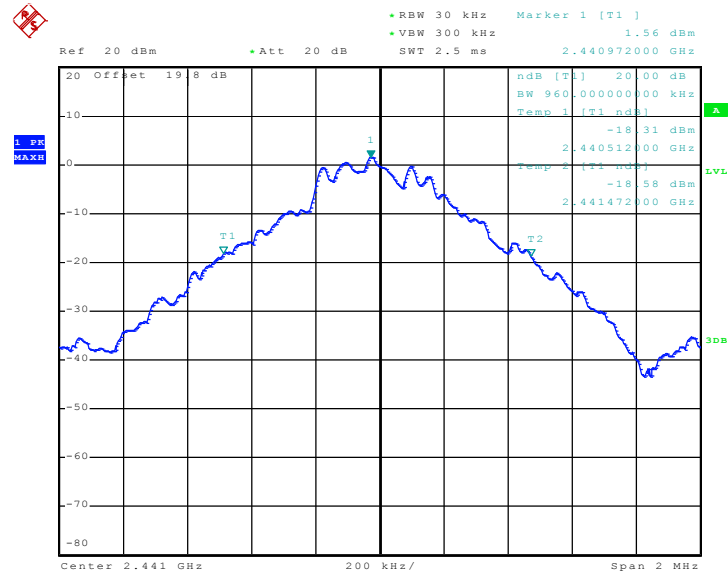
20 dB Bandwidth Plot on Channel 00



Date: 14.SEP.2010 18:25:55

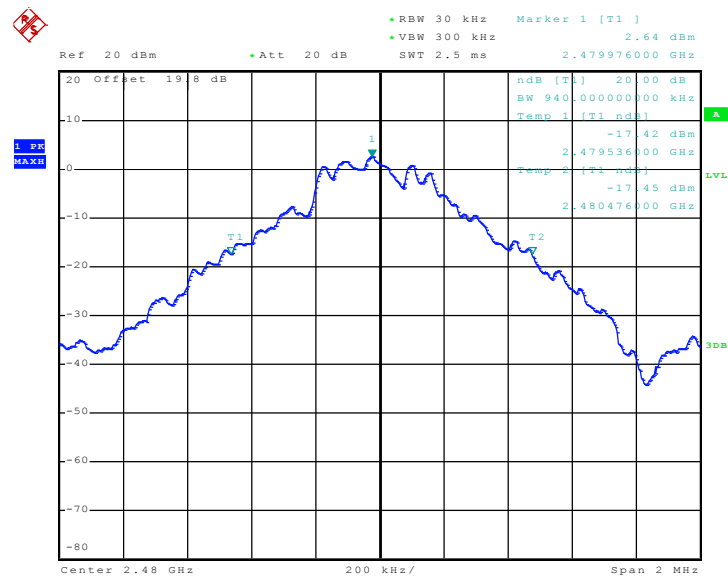


20 dB Bandwidth Plot on Channel 39



Date: 14.SEP.2010 18:26:25

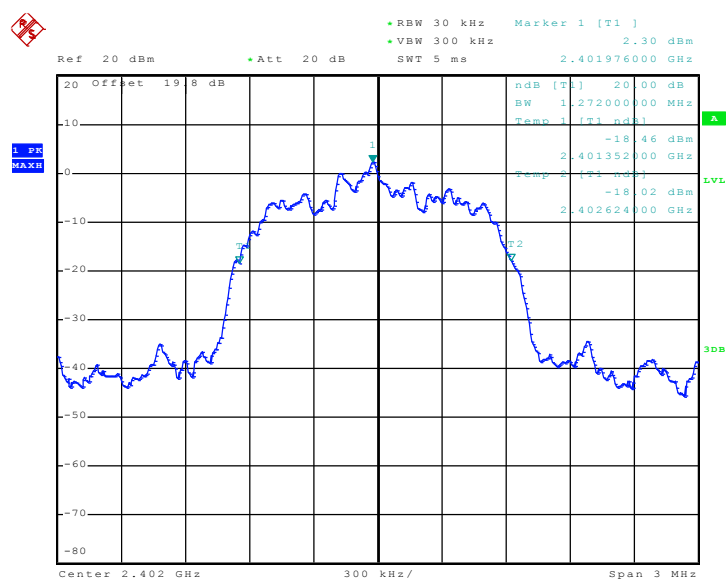
20 dB Bandwidth Plot on Channel 78



Date: 14.SEP.2010 18:26:59

Test Mode :	Mode 4, 5, 6	Temperature :	25~27°C
Test Engineer :	Andy Yeh	Relative Humidity :	48~51%

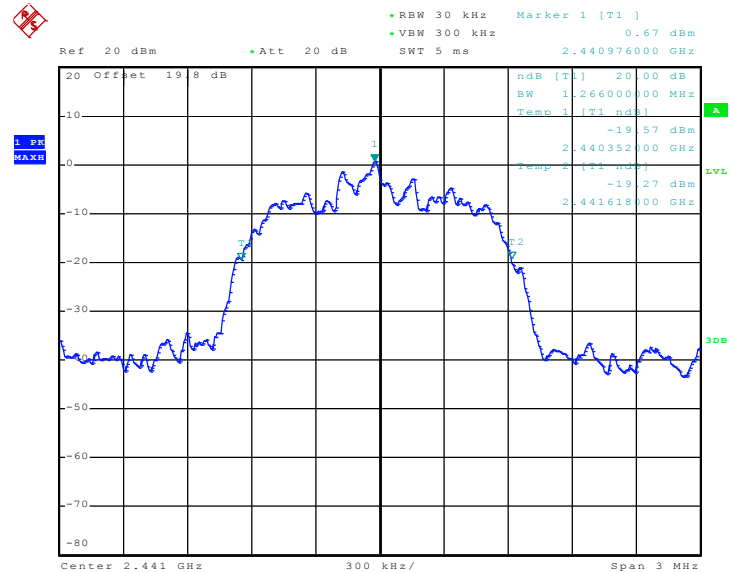
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.272
39	2441	1.266
78	2480	1.266

20 dB Bandwidth Plot on Channel 00


Date: 14.SEP.2010 18:27:53

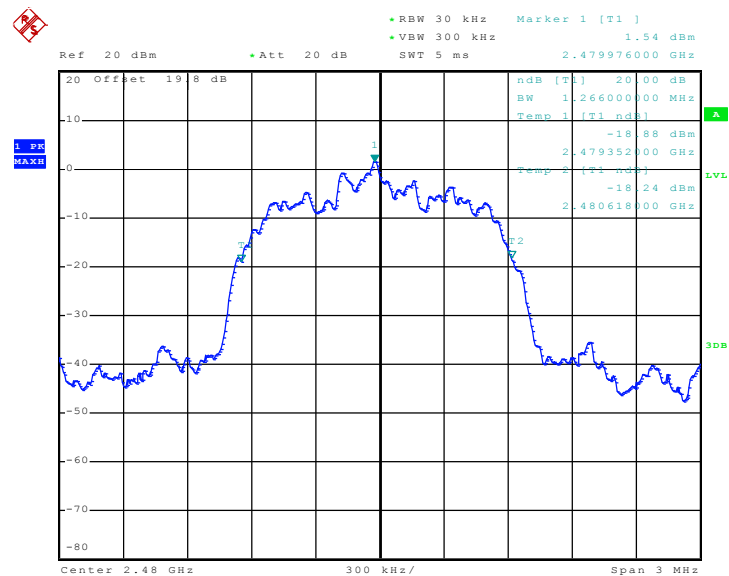


20 dB Bandwidth Plot on Channel 39



Date: 14.SEP.2010 18:28:24

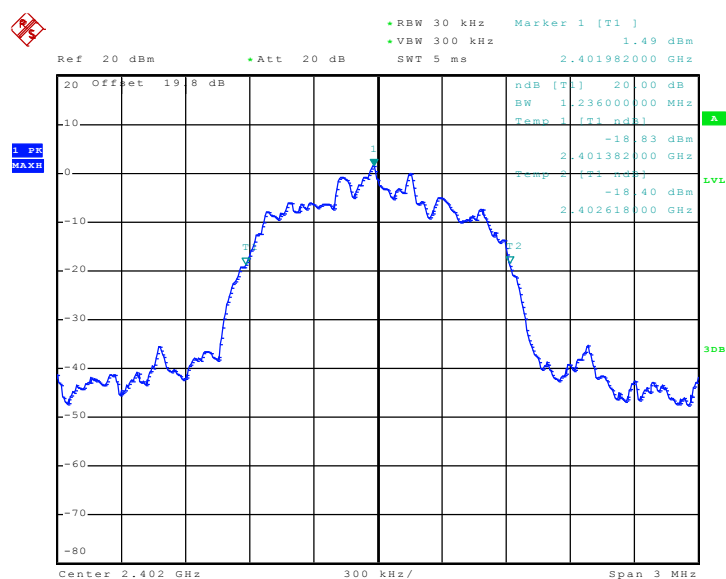
20 dB Bandwidth Plot on Channel 78



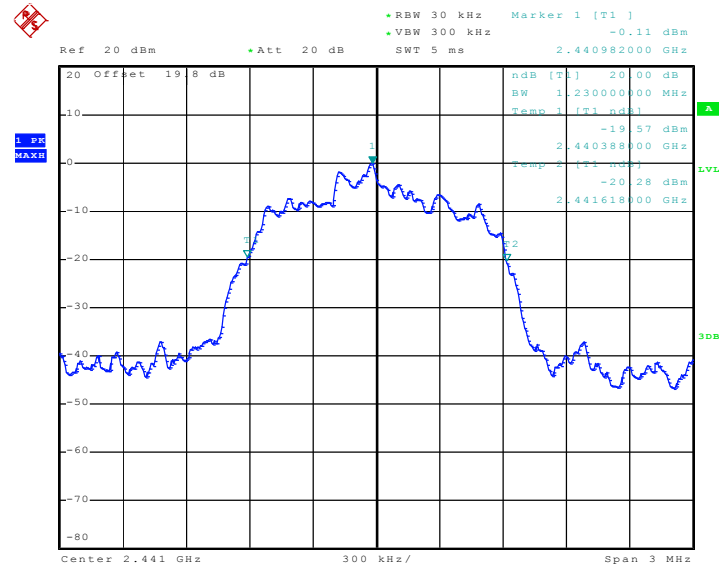
Date: 14.SEP.2010 18:28:52

Test Mode :	Mode 7, 8, 9	Temperature :	25~27°C
Test Engineer :	Andy Yeh	Relative Humidity :	48~51%

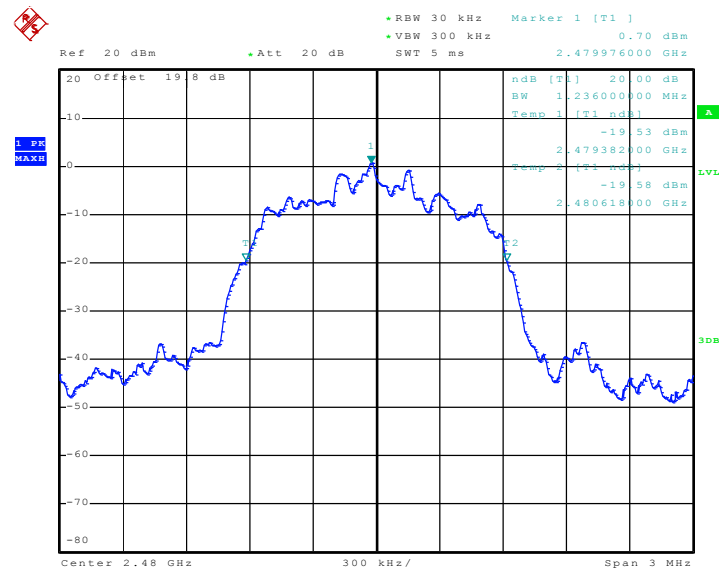
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.236
39	2441	1.230
78	2480	1.236

20 dB Bandwidth Plot on Channel 00


Date: 14.SEP.2010 18:29:48

20 dB Bandwidth Plot on Channel 39


Date: 14.SEP.2010 18:30:43

20 dB Bandwidth Plot on Channel 78


Date: 14.SEP.2010 18:31:11

3.3 Hopping Channel Separation Measurement

3.3.1 Limit of Hopping Channel Separation

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.

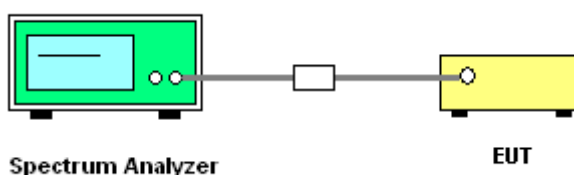
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. Please refer FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. The EUT should be transmitting at its maximum data rate as the worst cases.
4. Use the following spectrum analyzer settings:
Span = wide enough to capture the peaks of two adjacent channels; $RBW \geq 1\%$ of the span;
VBW $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
5. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

3.3.4 Test Setup

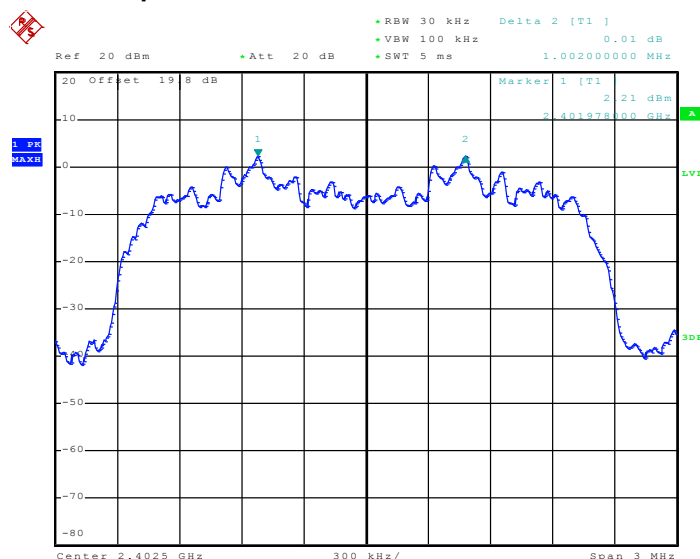


3.3.5 Test Result of Hopping Channel Separation

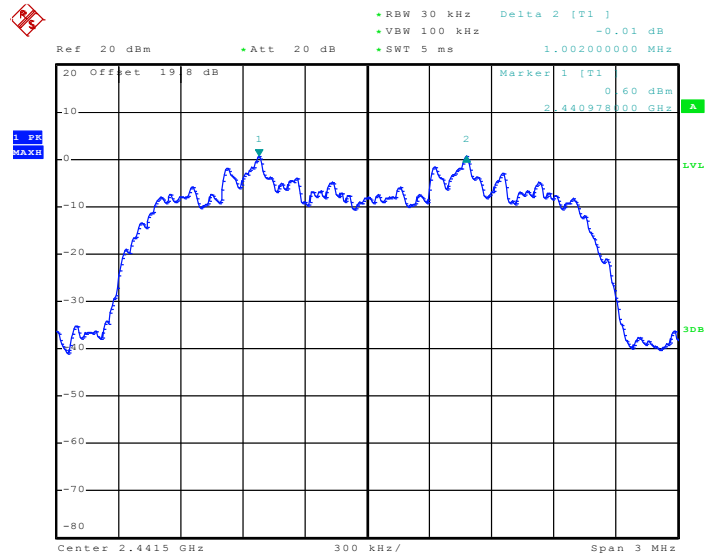
Test Mode :	Mode 4, 5, 6	Temperature :	25~27℃
Test Engineer :	Andy Yeh	Relative Humidity :	48~51%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.002	0.848	Pass
39	2441	1.002	0.844	Pass
78	2480	1.002	0.844	Pass

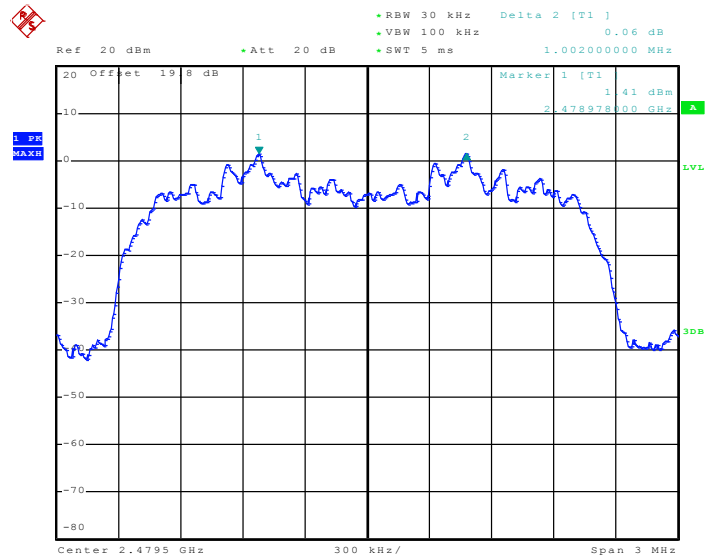
Channel Separation Plot on Channel 00 - 01



Date: 14.SEP.2010 18:59:02

Channel Separation Plot on Channel 39 - 40


Date: 14.SEP.2010 18:59:51

Channel Separation Plot on Channel 77 - 78


Date: 14.SEP.2010 19:00:26

3.4 Dwell Time Measurement

3.4.1 Limit of Dwell Time

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.

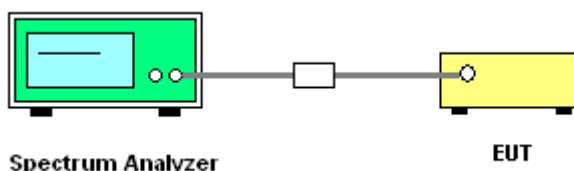
3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. The EUT should be transmitting at its maximum data rate as the worst cases.
4. The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:
Span = zero span, centered on a hopping channel; RBW = 1 MHz; VBW $\geq$ RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold.
5. Use the marker-delta function to calculate the dwell time.

3.4.4 Test Setup



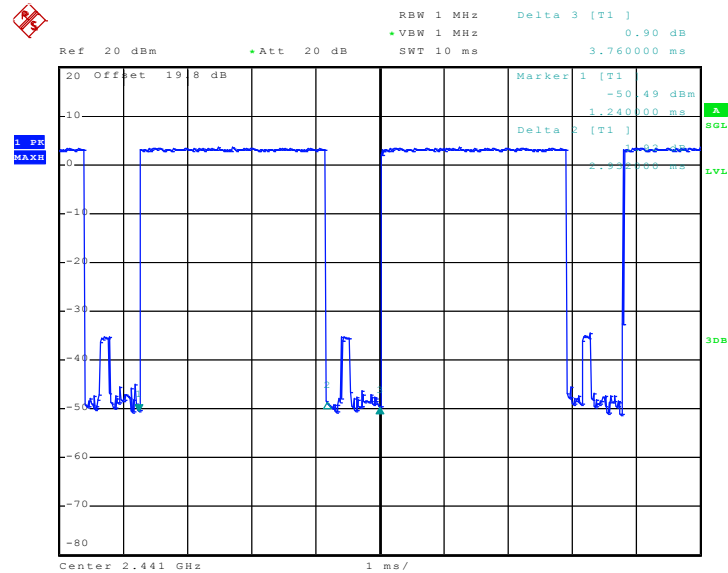
3.4.5 Test Result of Dwell Time

Test Mode :	Mode 5	Temperature :	25~27°C
Test Engineer :	Andy Yeh	Relative Humidity :	48~51%

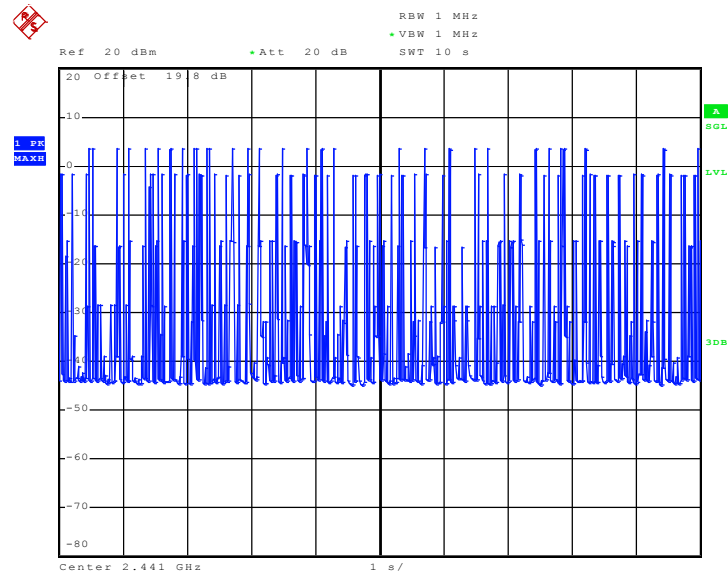
Package Mode	Average Hopping Channel	Package Transfer Time (usec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
2DH5	3.10	2932.00	0.29	0.4	Pass

Remark:

1. Dwell Time=79(channels) x 0.4(s) x average hopping channel x package transfer time
2. 79 channels come from the Hopping Channel number.
3. Average Hopping Channel = hops/sweep time
4. t: Package Transfer Time(us)

2DH5 Dwell Time (One Pulse) Plot on Channel 39


Date: 14.SEP.2010 19:26:54

2DH5 Dwell Time (Count Pulses) Plot on Channel 39


Date: 14.SEP.2010 19:37:03

3.5 Peak Output Power Measurement

3.5.1 Limit of Peak Output Power

Frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels: 1W (30 dBm).

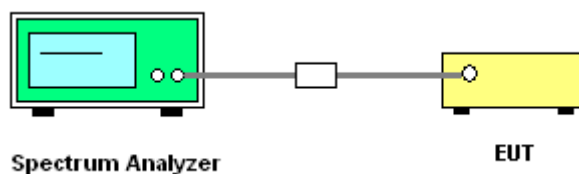
3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

3.5.3 Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.

3.5.4 Test Setup

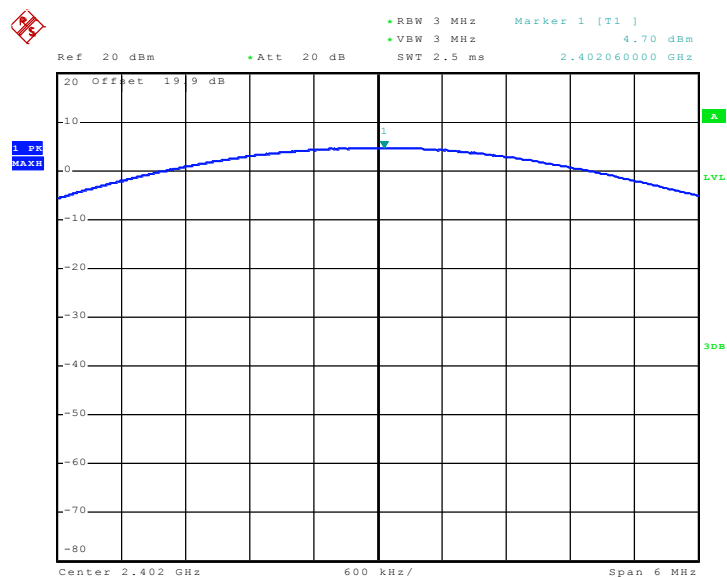


3.5.5 Test Result of Peak Output Power

Test Mode :	Mode 4, 5, 6	Temperature :	25~27°C
Test Engineer :	Andy Yeh	Relative Humidity :	48~51%

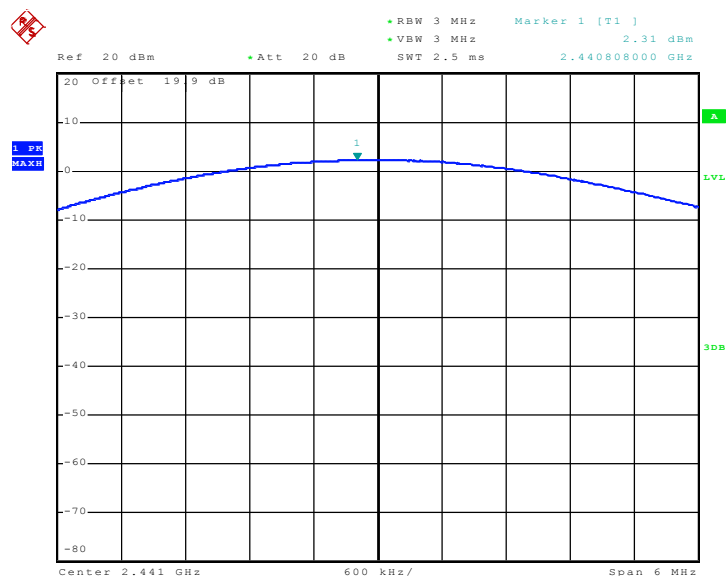
Channel	Frequency (MHz)	RF Power (dBm)		
		π /4-DQPSK	Max. Limits (dBm)	Pass/Fail
		2 Mbps		
00	2402	4.70	30	Pass
39	2441	2.31	30	Pass
78	2480	3.93	30	Pass

Peak Output Power Plot on Channel 00



Date: 6.SEP.2010 23:30:07

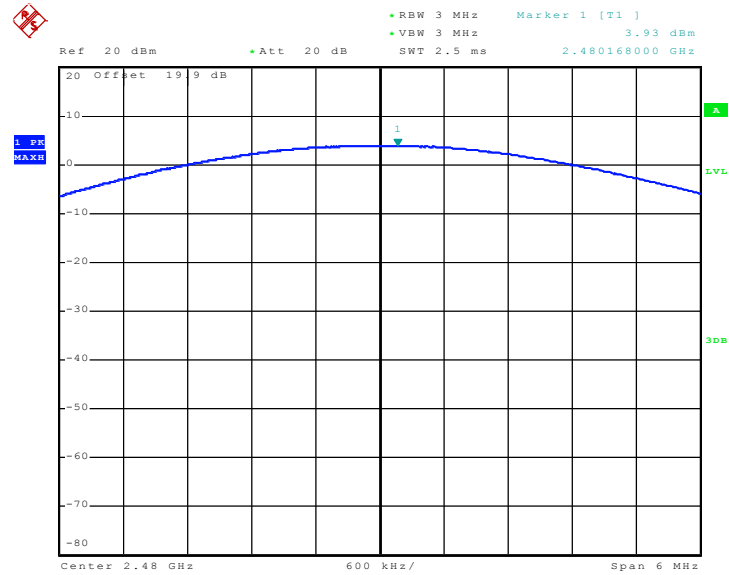
Peak Output Power Plot on Channel 39



Date: 6.SEP.2010 23:29:38



Peak Output Power Plot on Channel 78



Date: 6.SEP.2010 23:29:10

3.6 Band Edges Measurement

3.6.1 Limit of Band Edges

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

3.6.2 Measuring Instruments

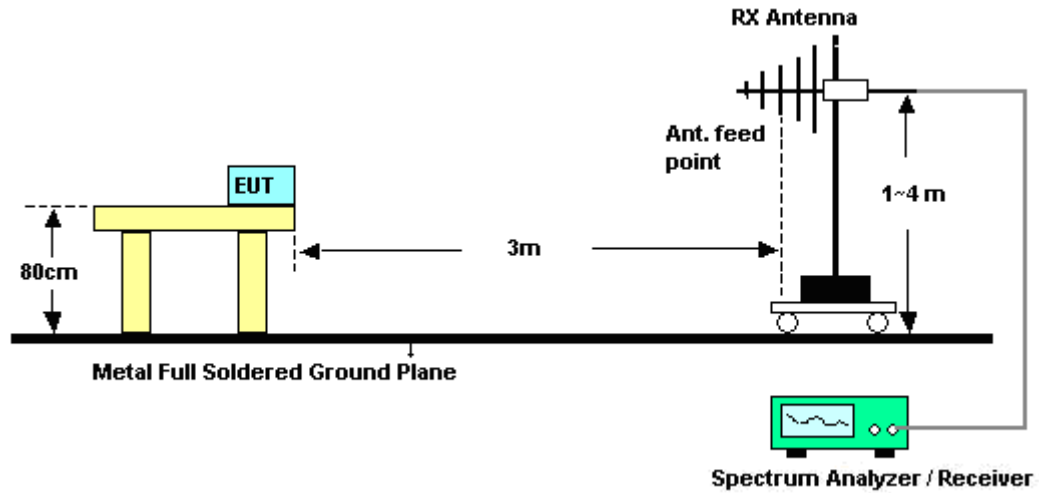
See list of measuring instruments of this test report.

3.6.3 Test Procedures

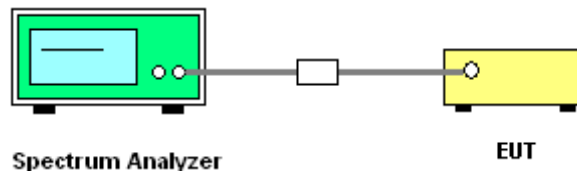
1. The testing follows the guidelines in ANSI C63.4-2003 and FCC Public Notice DA 00-705 Measurement Guidelines.
2. RF antenna conducted test: Set RBW = 300kHz, Video bandwidth (VBW) $\geq$ RBW. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 300k Hz RBW. Note: If the device complies with the use of power option 2 the attenuation under this paragraph shall be 30 dB instead of 20 dB.
3. Radiated emission test: Applies to band edge emissions that fall in the restricted bands listed in FCC Section 15.205. The maximum permitted average field strength is listed in FCC Section 15.209. A pre-amp is necessary for this measurement. For measurements above 1 GHz, set RBW = 1MHz, VBW = 1MHz, Sweep: Auto for Peak; set RBW = 1MHz, VBW = 10 Hz, Sweep: Auto for Average. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation. See FCC Section 15.35(b) and (c).
4. In case the emission is fail due to the used RBW / VBW is too wide, marker-delta method of FCC Public Notice DA 00-705 will be followed.

3.6.4 Test Setup

<Radiated Band Edges>



<Conducted Band Edges>



3.6.5 Test Result of Radiated Band Edges

Test Mode :	Mode 1	Temperature :	26.1~27.8°C
Test Channel :	00	Relative Humidity :	51~57%
		Test Engineer :	Jason Wang

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
2373.84	44.48	-29.52	74	42.41	31.68	4.47	34.08	174	210	Peak
2373.84	30.81	-23.19	54	28.74	31.68	4.47	34.08	174	210	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
2363.01	43.95	-30.05	74	41.93	31.66	4.44	34.08	126	29	Peak
2363.01	31.11	-22.89	54	29.09	31.66	4.44	34.08	126	29	Average

Test Mode :	Mode 3	Temperature :	26.1~27.8°C
Test Channel :	78	Relative Humidity :	51~57%
		Test Engineer :	Jason Wang

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
2483.5	64.64	-9.36	74	62.35	31.78	4.59	34.08	109	360	Peak
2483.5	25.7	-28.3	54	23.41	31.78	4.59	34.08	109	360	Average

Summary results of marker-delta method:

Test mode	Maximum field strength of the fundamental emission (dBμV/m)	Delta Result (dB)	Average Result (dBμV/m)	Average Limit (dBμV/m)	Margin (dB)	Result
Single Carrier Mode	83.69	58.38	25.31	54	-28.69	Pass
Hopping Mode	83.69	57.99	25.7	54	-28.3	Pass

Note : Average result = Maximum field strength – Delta result

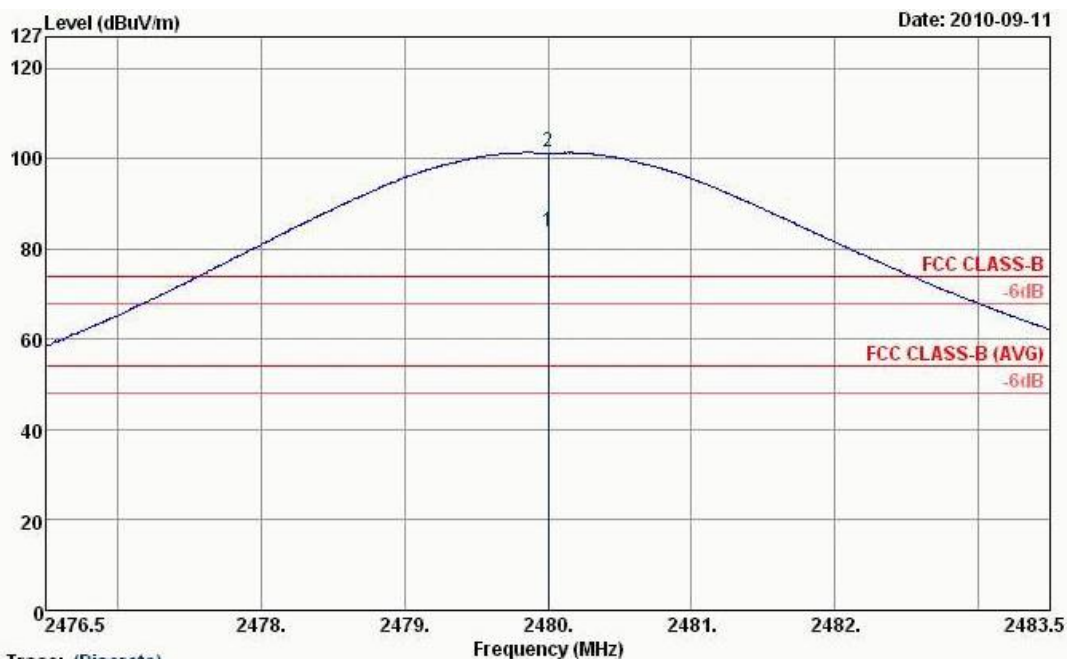
ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	61.41	-12.59	74	59.12	31.78	4.59	34.08	100	23	Peak
2483.5	24.53	-29.47	54	22.24	31.78	4.59	34.08	100	23	Average

Summary results of marker-delta method:

Test mode	Maximum field strength of the fundamental emission (dBμV/m)	Delta Result (dB)	Average Result (dBμV/m)	Average Limit (dBμV/m)	Margin (dB)	Result
Single Carrier Mode	81.06	56.53	24.53	54	-29.47	Pass
Hopping Mode	81.06	58.63	22.43	54	-31.57	Pass

Note : Average result = Maximum field strength – Delta result

Test Mode :	Mode 3	Temperature :	26.1~27.8°C
Test Channel :	78	Relative Humidity :	51~57%
Test Engineer :	Jason Wang	Polarization :	Horizontal



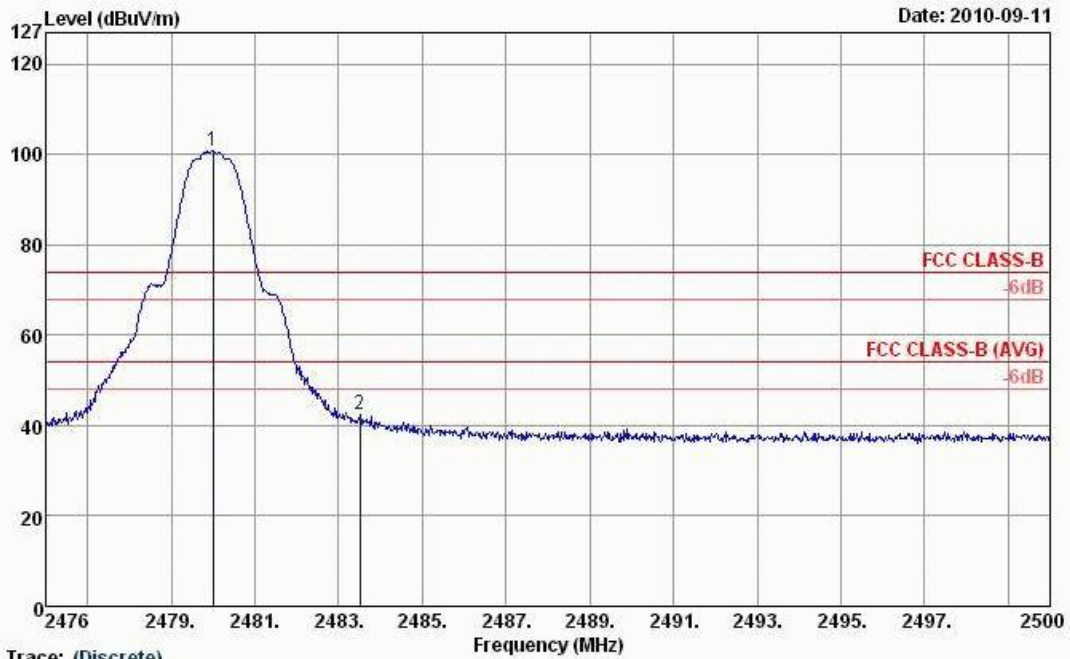
Trace: (Discrete)

Site : 03CH05-HY
 Condition : FCC CLASS-B HF_ANT_100824 HORIZONTAL
 Project : FR 081915-02
 Mode : Mode 3

	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 X	2480.00	83.69	29.69	54.00	81.40	31.78	4.59	34.08	109	360 Average
2 X	2480.00	101.40	27.40	74.00	99.11	31.78	4.59	34.08	109	360 Peak

* Maximum field strength of the fundamental emission

Test Mode :	Mode 3	Temperature :	26.1~27.8°C
Test Channel :	78	Relative Humidity :	51~57%
Test Engineer :	Jason Wang	Polarization :	Horizontal



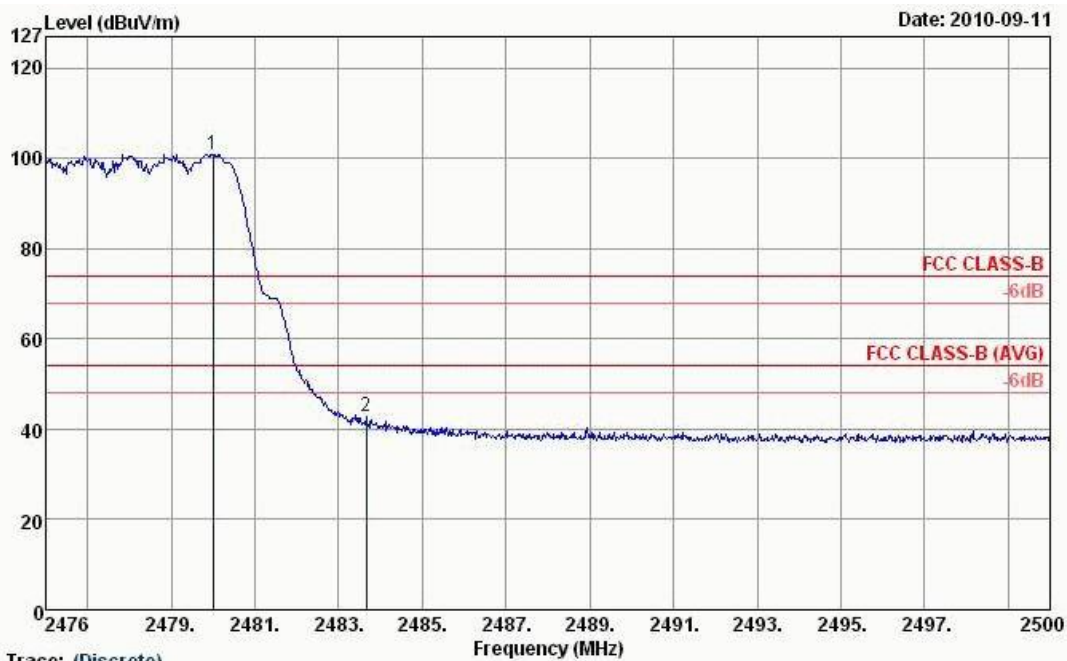
Trace: (Discrete)

Site : 03CH05-HY
Condition : FCC CLASS-B HF_ANT_100824 HORIZONTAL
Project : FR 081915-02
Mode : Mode 3

	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 X	2480.00	100.80	26.80	74.00	98.51	31.78	4.59	34.08	109	360 Peak
2	2483.51	42.42	-31.58	74.00	40.13	31.78	4.59	34.08	109	360 Peak

* Marker-Delta Method (RBW/VBW=100KHz): 58.38 dB , single carrier Mode

Test Mode :	Mode 3	Temperature :	26.1~27.8°C
Test Channel :	78	Relative Humidity :	51~57%
Test Engineer :	Jason Wang	Polarization :	Horizontal

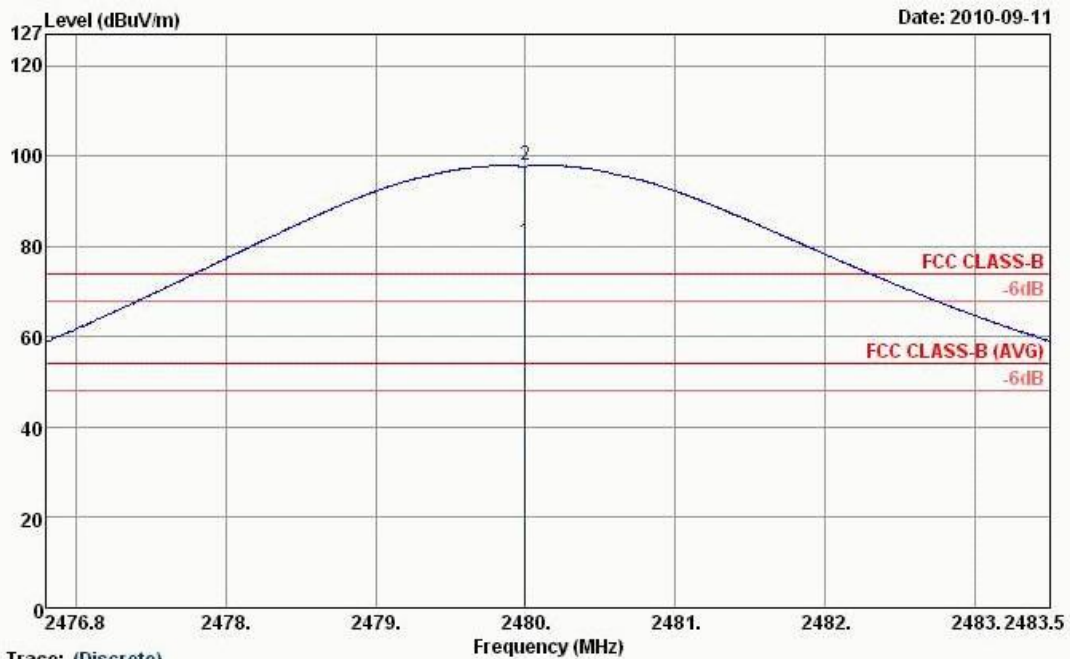

Trace: (Discrete)

Site : 03CH05-HY
 Condition : FCC CLASS-B HF_ANT_100824 HORIZONTAL
 Project : FR 081915-02
 Mode : Mode 3

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Loss	Preamplifier	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 X	2480.00	100.89	26.89	74.00	98.60	31.78	4.59	34.08	109	360 Peak
2	2483.66	42.90	-31.10	74.00	40.61	31.78	4.59	34.08	109	360 Peak

* Marker-Delta Method (RBW/VBW=100KHz): 57.99 dB , Hopping Mode

Test Mode :	Mode 3	Temperature :	26.1~27.8°C
Test Channel :	78	Relative Humidity :	51~57%
Test Engineer :	Jason Wang	Polarization :	Vertical

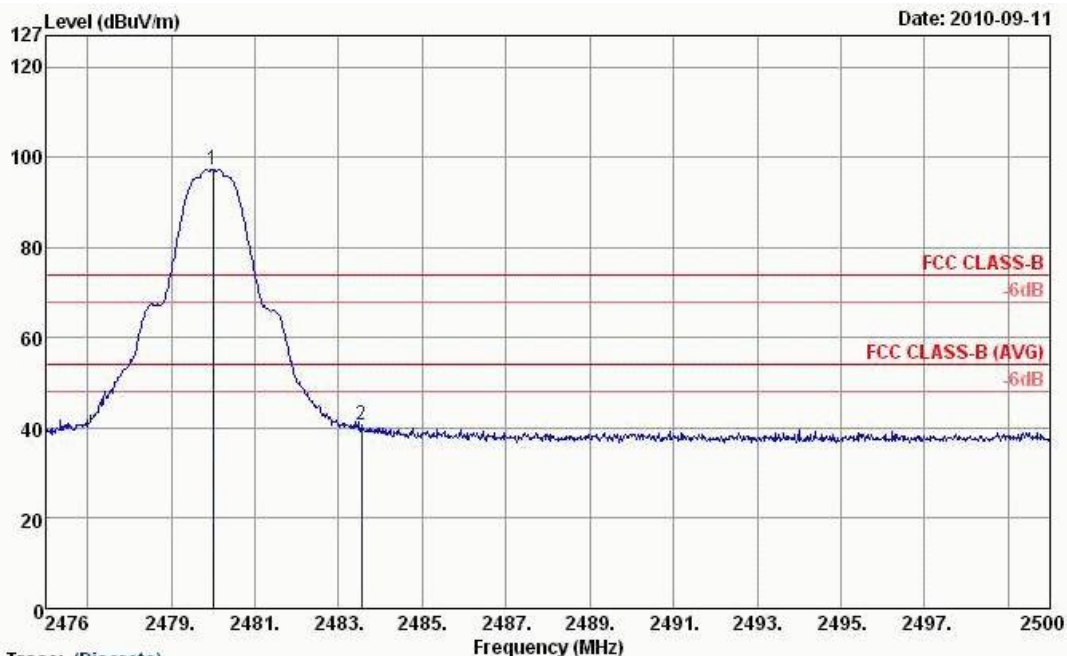

Trace: (Discrete)

Site : 03CH05-HY
Condition : FCC CLASS-B HF_ANT_100824 VERTICAL
Project : FR 081915-02
Mode : Mode 3

	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 X	2480.00	81.06	27.06	54.00	78.77	31.78	4.59	34.08	100	23 Average
2 X	2480.00	98.01	24.01	74.00	95.72	31.78	4.59	34.08	100	23 Peak

* Maximum field strength of the fundamental emission

Test Mode :	Mode 3	Temperature :	26.1~27.8°C
Test Channel :	78	Relative Humidity :	51~57%
Test Engineer :	Jason Wang	Polarization :	Vertical

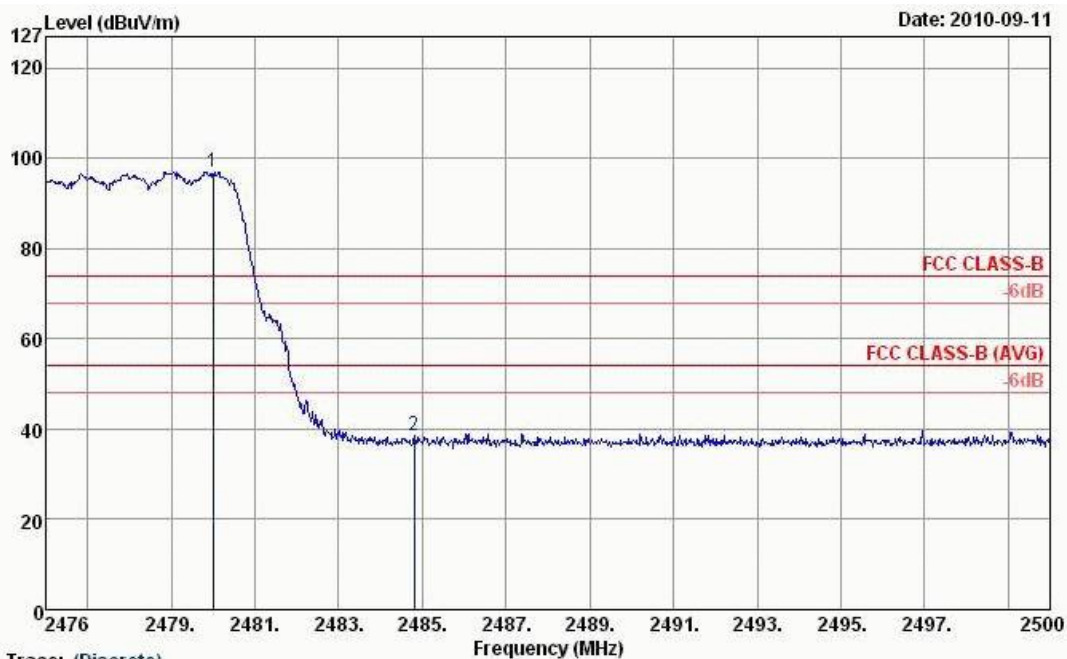


Site : 03CH05-HY
Condition : FCC CLASS-B HF_ANT_100824 VERTICAL
Project : FR 081915-02
Mode : Mode 3

	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 X	2480.00	97.38	23.38	74.00	95.09	31.78	4.59	34.08	100	23 Peak
2	2483.54	40.85	-33.15	74.00	38.56	31.78	4.59	34.08	100	23 Peak

* Marker-Delta Method (RBW/VBW=100KHz): 56.53 dB , single carrier Mode

Test Mode :	Mode 3	Temperature :	26.1~27.8°C
Test Channel :	78	Relative Humidity :	51~57%
Test Engineer :	Jason Wang	Polarization :	Vertical



Trace: (Discrete)

Site : 03CH05-HY
 Condition : FCC CLASS-B HF_ANT_100824 VERTICAL
 Project : FR 081915-02
 Mode : Mode 3

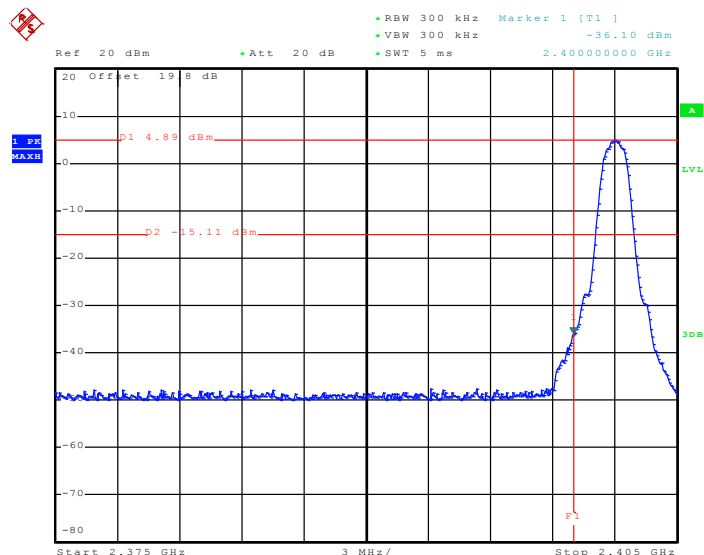
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 X	2480.00	97.10	23.10	74.00	94.81	31.78	4.59	34.08	100	23	Peak
2	2484.81	38.47	-35.53	74.00	36.18	31.78	4.59	34.08	100	23	Peak

* Marker-Delta Method (RBW/VBW=100KHz): 58.63 dB , Hopping Mode

3.6.6 Test Result of Conducted Band Edges

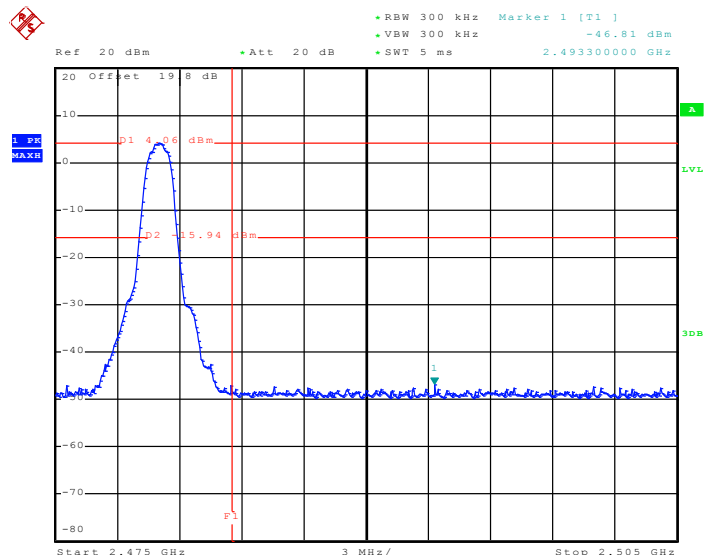
Test Mode :	Mode 4 and 6	Temperature :	25~27℃
Test Channel :	00 and 78	Relative Humidity :	48~51%
		Test Engineer :	Andy Yeh

Low Band Edge Plot on Channel 00



Date: 14.SEP.2010 19:08:09

High Band Edge Plot on Channel 78



Date: 14.SEP.2010 19:15:44

3.7 Spurious Emission Measurement

3.7.1 Limit of Spurious Emission Measurement

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

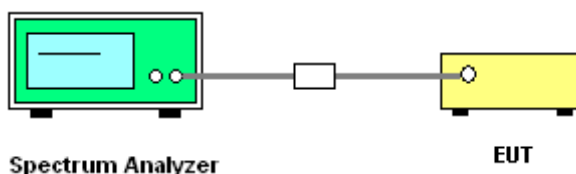
3.7.2 Measuring Instruments

See list of measuring instruments of this test report.

3.7.3 Test Procedure

1. The transmitter output was connected to the spectrum analyzer via a low lose cable.
2. Set RBW = 100 kHz, Video bandwidth (VBW) $\geq$ RBW, scan up through 10th harmonic. All harmonics / spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

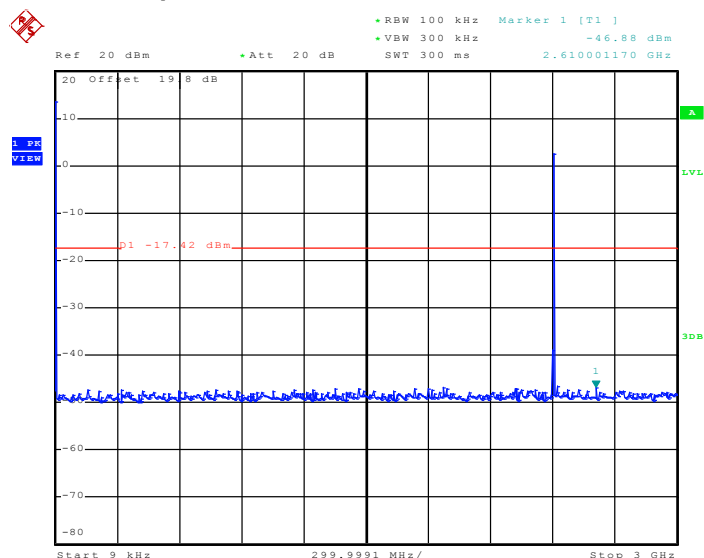
3.7.4 Test Setup



3.7.5 Test Result

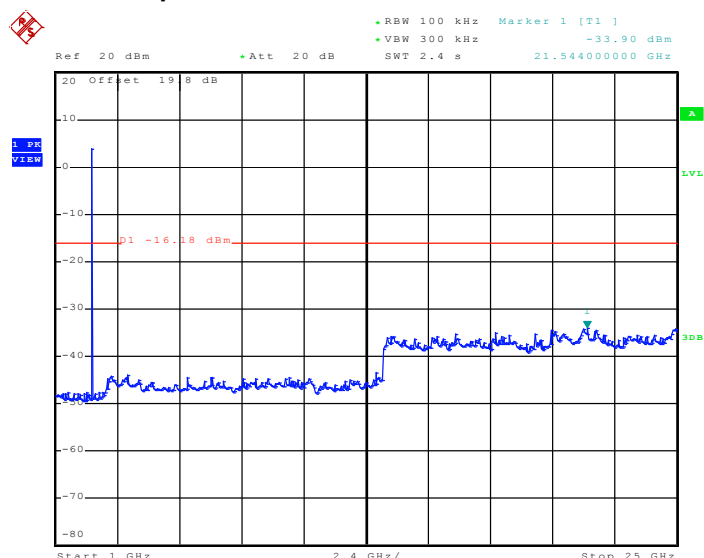
Test Mode :	Mode 4	Temperature :	25~27°C
Test Channel :	00	Relative Humidity :	48~51%
		Test Engineer :	Andy Yeh

Conducted Spurious Emission Plot between 9 kHz ~ 3 GHz



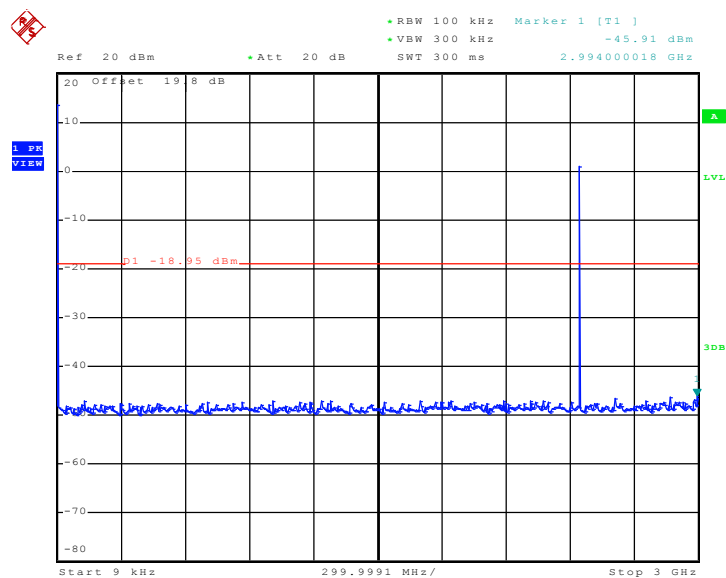
Date: 14.SEP.2010 20:14:21

Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz

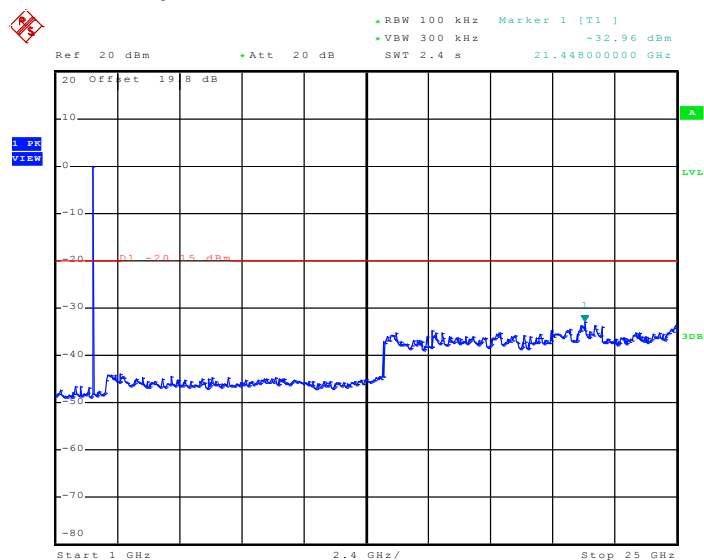


Date: 14.SEP.2010 20:14:44

Test Mode :	Mode 5	Temperature :	25~27°C
Test Channel :	39	Relative Humidity :	48~51%
		Test Engineer :	Andy Yeh

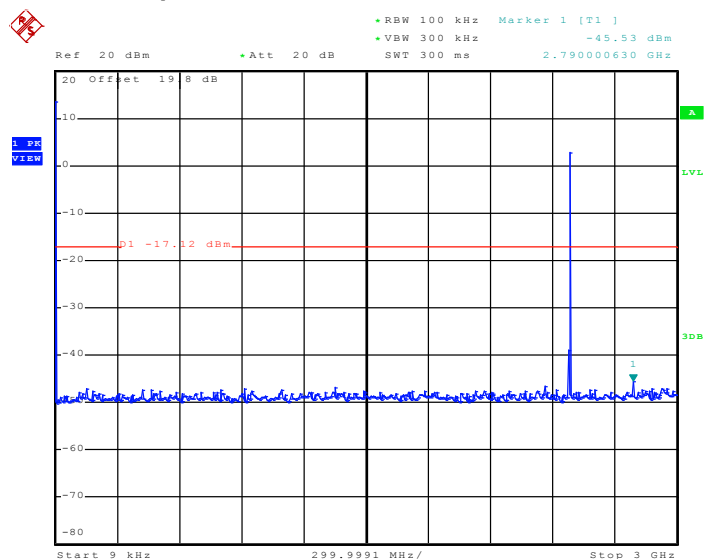
Conducted Spurious Emission Plot between 9 kHz ~ 3 GHz


Date: 14.SEP.2010 20:15:14

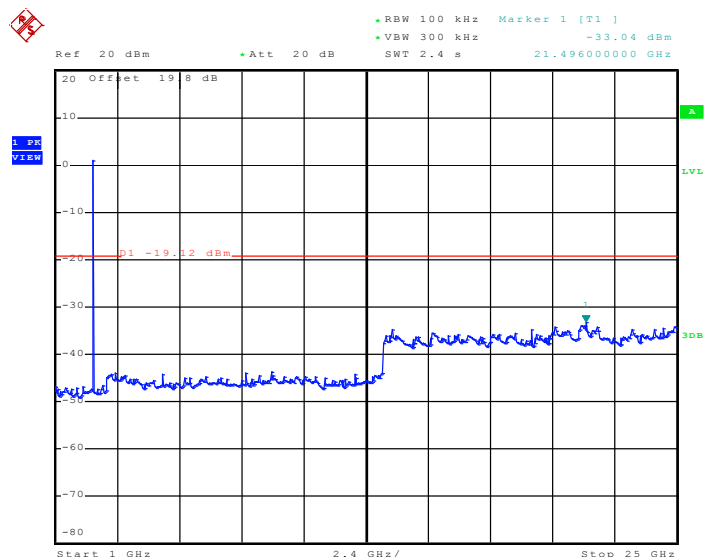
Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz


Date: 14.SEP.2010 20:15:58

Test Mode :	Mode 6	Temperature :	25~27°C
Test Channel :	78	Relative Humidity :	48~51%
		Test Engineer :	Andy Yeh

Conducted Spurious Emission Plot between 9 kHz ~ 3 GHz


Date: 14.SEP.2010 20:16:22

Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz


Date: 14.SEP.2010 20:17:04

3.8 AC Conducted Emission Measurement

3.8.1 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.

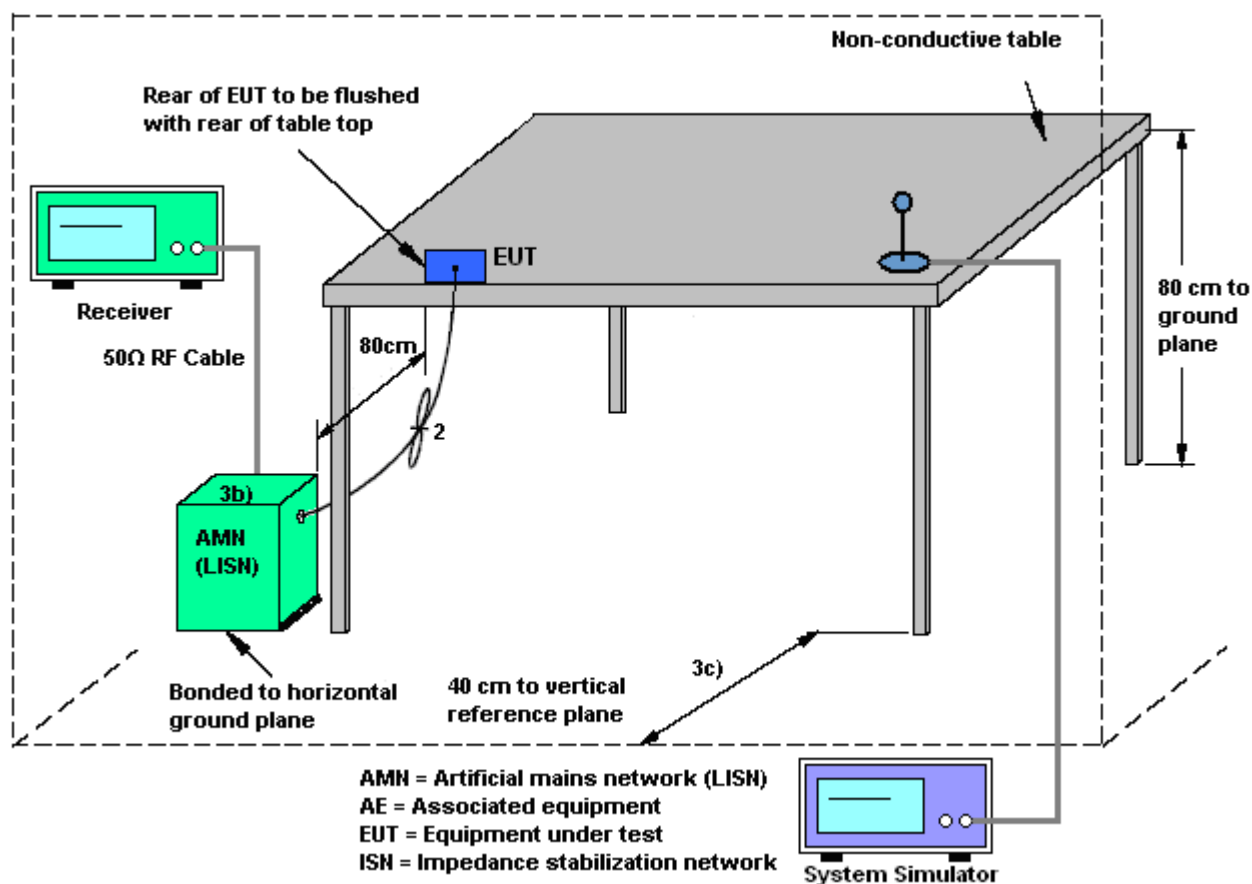
3.8.2 Measuring Instruments

See list of measuring instruments of this test report.

3.8.3 Test Procedures

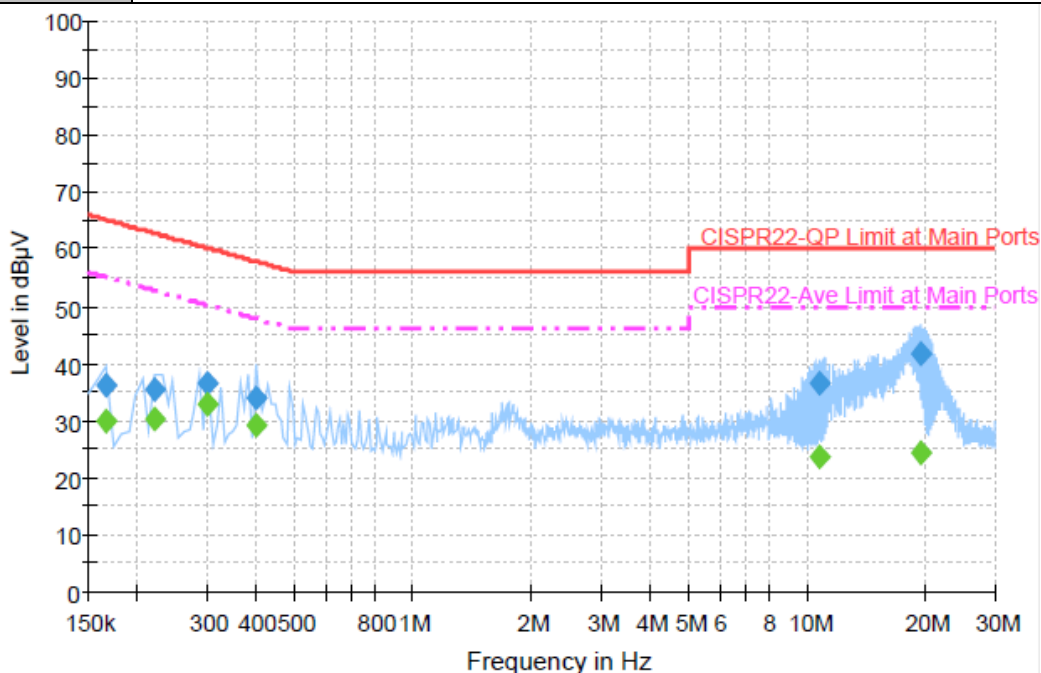
1. Please follow the guidelines in ANSI C63.4-2003.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All 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.

3.8.4 Test Setup



3.8.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Novic Jiang	Relative Humidity :	33~35%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + GPS Rx + Adapter + Earphone + Battery 1		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



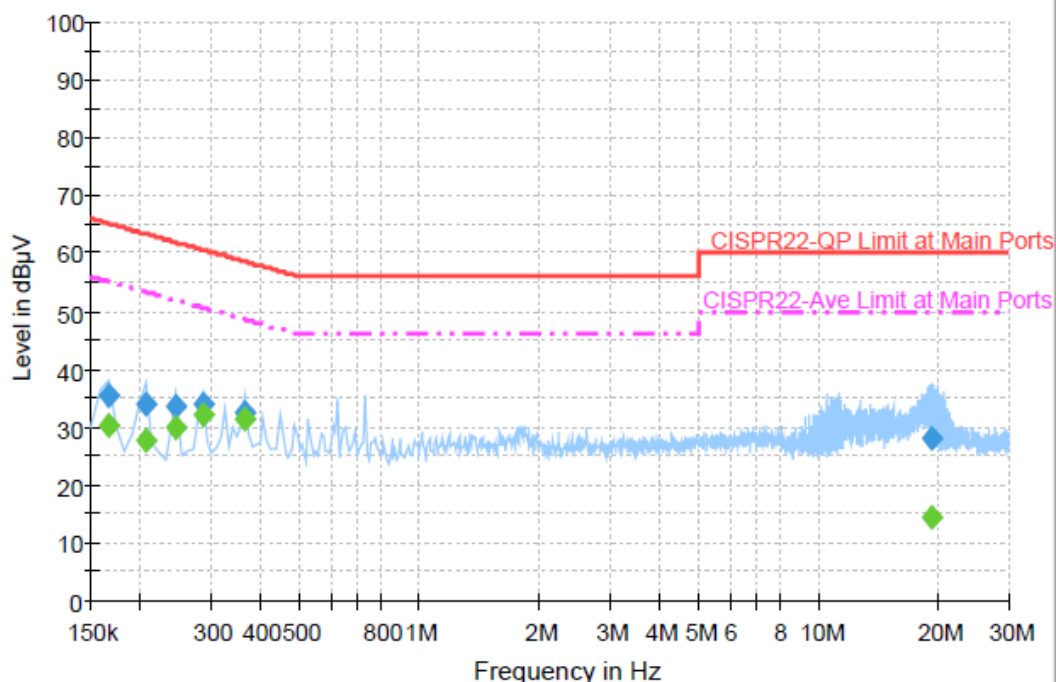
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.166000	36.0	Off	L1	19.3	29.2	65.2
0.222000	35.4	Off	L1	19.3	27.3	62.7
0.302000	36.6	Off	L1	19.3	23.6	60.2
0.398000	33.9	Off	L1	19.4	24.0	57.9
10.702000	36.7	Off	L1	19.6	23.3	60.0
19.454000	41.6	Off	L1	19.7	18.4	60.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.166000	29.9	Off	L1	19.3	25.3	55.2
0.222000	30.2	Off	L1	19.3	22.5	52.7
0.302000	32.7	Off	L1	19.3	17.5	50.2
0.398000	29.0	Off	L1	19.4	18.9	47.9
10.702000	23.7	Off	L1	19.6	26.3	50.0
19.454000	24.3	Off	L1	19.7	25.7	50.0

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Novic Jiang	Relative Humidity :	33~35%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + Bluetooth Link + WLAN Link + GPS Rx + Adapter + Earphone + Battery 1		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		


Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.166000	35.3	Off	N	19.3	29.9	65.2
0.206000	34.0	Off	N	19.3	29.4	63.4
0.246000	33.8	Off	N	19.4	28.1	61.9
0.286000	34.0	Off	N	19.3	26.6	60.6
0.366000	32.5	Off	N	19.3	26.1	58.6
19.214000	28.0	Off	N	19.8	32.0	60.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.166000	30.3	Off	N	19.3	24.9	55.2
0.206000	27.5	Off	N	19.3	25.9	53.4
0.246000	29.7	Off	N	19.4	22.2	51.9
0.286000	32.2	Off	N	19.3	18.4	50.6
0.366000	31.3	Off	N	19.3	17.3	48.6
19.214000	14.4	Off	N	19.8	35.6	50.0

3.9 Radiated Emission Measurement

3.9.1 Limit of Radiated 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

3.9.2 Measuring Instruments

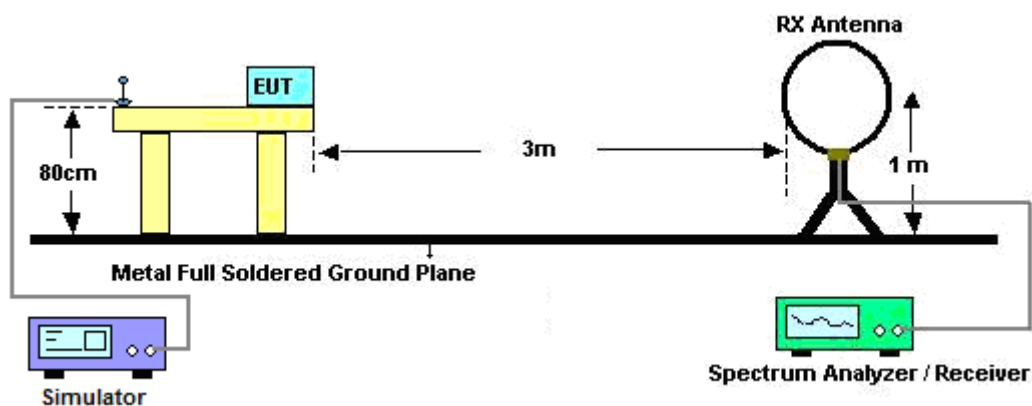
See list of measuring instruments of this test report.

3.9.3 Test Procedures

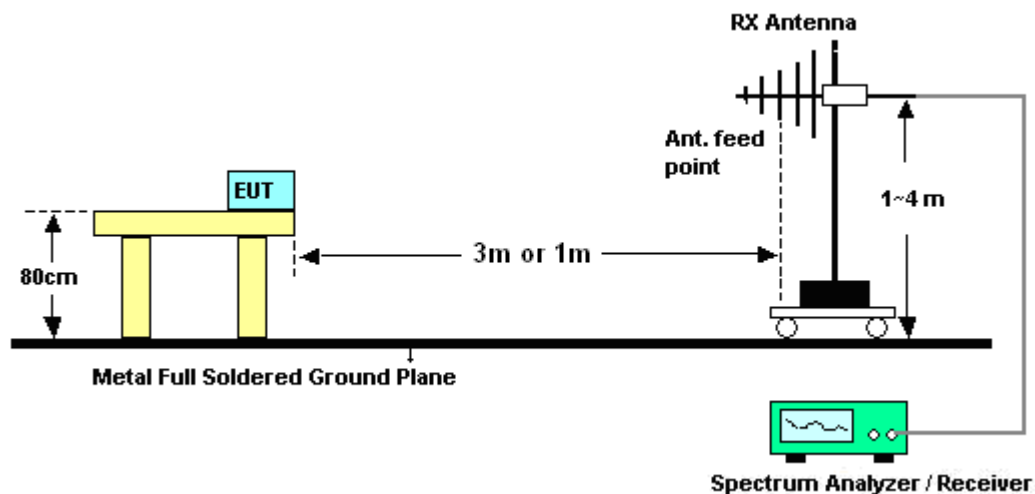
1. The testing follows the guidelines in FCC Public Notice DA 00-705 Measurement Guidelines.
2. Use the following spectrum analyzer settings:
 - (1) Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz; VBW $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
 - (2) Above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.
Distance extrapolation factor = $20 \log (\text{specific distance [3m]} / \text{test distance [1m]})$ (dB)
3. Follow the guidelines in ANSI C63.4-2003 with respect to maximizing the emission by rotating the EUT, measuring the emission for three EUT orthogonal planes, and adjusting the measurement antenna height and polarization. A pre-amp and a high pass filter are used for this test in order to get the good signal level.

3.9.4 Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



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

Test Engineer :	Jason Wang	Temperature :	26.1~27.8℃	
		Relative Humidity :	51~57%	

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

Note:

The amplitude of spurious emissions that 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.

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

Test Mode :	Mode 1	Temperature :	26.1~27.8°C
Test Channel :	00	Relative Humidity :	51~57%
Test Engineer :	Jason Wang	Polarization :	Horizontal
Remark :	2402 MHz is Fundamental Signals which can be ignored.		

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
99.12	21.67	-21.83	43.5	41.26	11.03	0.95	31.57	-	-	Peak
129.9	25.43	-18.07	43.5	43.5	12.38	1.07	31.52	-	-	Peak
207.66	28.13	-15.37	43.5	48.87	9.46	1.26	31.46	193	239	Peak
798.4	23.1	-22.9	46	30.32	20.75	2.57	30.54	-	-	Peak
929.3	23.51	-22.49	46	29.96	21.2	2.78	30.43	-	-	Peak
980.4	24.17	-29.83	54	30.08	21.06	3.31	30.28	-	-	Peak
2373.84	30.81	-23.19	54	28.74	31.68	4.47	34.08	174	210	Average
2373.84	44.48	-29.52	74	42.41	31.68	4.47	34.08	174	210	Peak
2402	81.3	-	-	79.18	31.7	4.5	34.08	174	210	Average
2402	98.32	-	-	96.2	31.7	4.5	34.08	174	210	Peak
2500	30.99	-23.01	54	28.65	31.8	4.62	34.08	174	210	Average
2500	42.51	-31.49	74	40.17	31.8	4.62	34.08	174	210	Peak

Test Mode :	Mode 1	Temperature :	26.1~27.8°C
Test Channel :	00	Relative Humidity :	51~57%
Test Engineer :	Jason Wang	Polarization :	Vertical
Remark :	2402 MHz is Fundamental Signals which can be ignored.		

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
49.17	29.8	-10.2	40	52.2	8.44	0.73	31.57	152	96	Peak
57.54	29.76	-10.24	40	53.72	6.85	0.73	31.54	-	-	Peak
154.2	28.87	-14.63	43.5	48.97	10.26	1.14	31.5	-	-	Peak
840.4	23.3	-22.7	46	30.38	20.82	2.61	30.51	-	-	Peak
942.6	23.44	-22.56	46	29.72	21.28	2.85	30.41	-	-	Peak
993.7	23.65	-30.35	54	29.17	20.93	3.77	30.22	-	-	Peak
2363.01	31.11	-22.89	54	29.09	31.66	4.44	34.08	126	29	Average
2363.01	43.95	-30.05	74	41.93	31.66	4.44	34.08	126	29	Peak
2402	80.4	-	-	78.28	31.7	4.5	34.08	126	29	Average
2402	97.15	-	-	95.03	31.7	4.5	34.08	126	29	Peak
2484	31.38	-22.62	54	29.09	31.78	4.59	34.08	126	29	Average
2484	43.22	-30.78	74	40.93	31.78	4.59	34.08	126	29	Peak

Test Mode :	Mode 2	Temperature :	26.1~27.8°C
Test Channel :	39	Relative Humidity :	51~57%
Test Engineer :	Jason Wang	Polarization :	Horizontal
Remark :	2441 MHz is Fundamental Signals which can be ignored.		

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
97.5	21.38	-22.12	43.5	41.3	10.69	0.95	31.56	-	-	Peak
126.39	25.44	-18.06	43.5	43.42	12.47	1.07	31.52	-	-	Peak
207.93	27.7	-15.8	43.5	48.46	9.44	1.26	31.46	225	136	Peak
729.8	23.29	-22.71	46	31.04	20.41	2.45	30.61	-	-	Peak
819.4	23.43	-22.57	46	30.55	20.79	2.61	30.52	-	-	Peak
979	24.34	-29.66	54	30.24	21.07	3.31	30.28	-	-	Peak
2352	31.24	-22.76	54	29.23	31.66	4.44	34.09	165	210	Average
2352	43.09	-30.91	74	41.08	31.66	4.44	34.09	165	210	Peak
2441	81.95	-	-	79.72	31.75	4.56	34.08	165	210	Average
2441	99.14	-	-	96.91	31.75	4.56	34.08	165	210	Peak
2500	30.88	-23.12	54	28.54	31.8	4.62	34.08	165	210	Average
2500	42.52	-31.48	74	40.18	31.8	4.62	34.08	165	210	Peak

Test Mode :	Mode 2	Temperature :	26.1~27.8°C
Test Channel :	39	Relative Humidity :	51~57%
Test Engineer :	Jason Wang	Polarization :	Vertical
Remark :	2441 MHz is Fundamental Signals which can be ignored.		

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
40.26	25.97	-14.03	40	44.74	12.17	0.58	31.52	-	-	Peak
58.35	28.25	-11.75	40	52.37	6.69	0.73	31.54	214	96	Peak
154.74	28.49	-15.01	43.5	48.59	10.26	1.14	31.5	-	-	Peak
750.8	23.28	-22.72	46	30.59	20.72	2.51	30.54	-	-	Peak
928.6	23.74	-22.26	46	30.19	21.2	2.78	30.43	-	-	Peak
980.4	24.41	-29.59	54	30.32	21.06	3.31	30.28	-	-	Peak
2374	31.2	-22.8	54	29.13	31.68	4.47	34.08	121	30	Average
2374	43.13	-30.87	74	41.06	31.68	4.47	34.08	121	30	Peak
2441	81.81	-	-	79.58	31.75	4.56	34.08	121	30	Average
2441	98.59	-	-	96.36	31.75	4.56	34.08	121	30	Peak
2500	30.9	-23.1	54	28.56	31.8	4.62	34.08	121	30	Average
2500	43.06	-30.94	74	40.72	31.8	4.62	34.08	121	30	Peak

Test Mode :	Mode 3	Temperature :	26.1~27.8°C
Test Channel :	78	Relative Humidity :	51~57%
Test Engineer :	Jason Wang	Polarization :	Horizontal
Remark :	2480 MHz is Fundamental Signals which can be ignored.		

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
96.42	28.91	-14.59	43.5	48.99	10.52	0.95	31.55	195	233	Peak
126.93	27.49	-16.01	43.5	45.49	12.45	1.07	31.52	-	-	Peak
207.93	28.42	-15.08	43.5	49.18	9.44	1.26	31.46	-	-	Peak
744.5	23.49	-22.51	46	30.91	20.63	2.51	30.56	-	-	Peak
896.4	23.85	-22.15	46	30.61	21.02	2.7	30.48	-	-	Peak
953.8	24.31	-21.69	46	30.55	21.29	2.85	30.38	-	-	Peak
2384	35.63	-18.37	54	33.56	31.68	4.47	34.08	109	360	Average
2384	45.57	-28.43	74	43.5	31.68	4.47	34.08	109	360	Peak
2480	84.07	-	-	81.78	31.78	4.59	34.08	109	360	Average
2480	101.51	-	-	99.22	31.78	4.59	34.08	109	360	Peak
2483.5	25.7	-28.3	54	23.41	31.78	4.59	34.08	109	360	Average
2483.5	64.64	-9.36	74	62.35	31.78	4.59	34.08	109	360	Peak

Test Mode :	Mode 3	Temperature :	26.1~27.8°C
Test Channel :	78	Relative Humidity :	51~57%
Test Engineer :	Jason Wang	Polarization :	Vertical
Remark :	2480 MHz is Fundamental Signals which can be ignored.		

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	26.67	-13.33	40	45.02	12.58	0.58	31.51	-	-	Peak
70.5	32.2	-7.8	40	56.77	6.1	0.84	31.51	228	77	Peak
154.2	28.59	-14.91	43.5	48.69	10.26	1.14	31.5	-	-	Peak
790	23.82	-22.18	46	31.08	20.74	2.54	30.54	-	-	Peak
898.5	23.46	-22.54	46	30.21	21.03	2.7	30.48	-	-	Peak
997.2	24.4	-29.6	54	29.93	20.91	3.77	30.21	-	-	Peak
2364	31	-23	54	28.98	31.66	4.44	34.08	100	23	Average
2364	43.49	-30.51	74	41.47	31.66	4.44	34.08	100	23	Peak
2480	81.28	-	-	78.99	31.78	4.59	34.08	100	23	Average
2480	97.79	-	-	95.5	31.78	4.59	34.08	100	23	Peak
2483.5	24.53	-29.47	54	22.24	31.78	4.59	34.08	100	23	Average
2483.5	61.41	-12.59	74	59.12	31.78	4.59	34.08	100	23	Peak

3.10 Antenna Requirements

3.10.1 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.

3.10.2 Antenna Connected Construction

The antennas type used in this product is PIFA Antenna without connector and it is considered to meet antenna requirement.

3.10.3 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	Due Date	Remark
Spectrum Analyzer	R&S	FSP30	101329	9kHz~30GHz	Apr. 26, 2010	Apr. 25, 2011	Conducted (TH02-HY)
Power Meter	Agilent	E4416A	GB412923 44	N/A	Feb. 25, 2010	Feb. 24, 2011	Conducted (TH02-HY)
Power Sensor	Agilent	E9327A	US404415 48	N/A	Feb. 25, 2010	Feb. 24, 2011	Conducted (TH02-HY)
EMI Test Receive	R&S	ESU	100211	9KHz – 2.75GHz	May 28, 2010	May 27, 2011	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100081	9kHz~30MHz	Nov. 30, 2009	Nov. 29, 2010	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100080	9kHz~30MHz	Nov. 23, 2009	Nov. 22, 2010	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	N/A	Conduction (CO05-HY)
System Simulator	R&S	CMU200	105934	N/A	Nov. 11, 2008	Nov. 10, 2010	Conduction (CO05-HY)
GPS Station	T&E	GS-50	N/A	N/A	N/A	N/A	Conduction (CO05-HY)
Spectrum Analyzer	R&S	FSP40	100057	9KHz-40GHz	Oct. 20, 2009	Oct. 19, 2010	Radiation (03CH05-HY)
Amplifier	COM-POWER	PA-103	161069	1KHz - 1GHz	Mar. 29, 2010	Mar. 28, 2011	Radiation (03CH05-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2726	30MHz ~ 1GHz	Oct. 31, 2009	Oct. 30, 2010	Radiation (03CH05-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170 251	15GHz- 40GHz	Oct. 14, 2009	Oct. 13, 2010	Radiation (03CH05-HY)
Pre Amplifier	Agilent	8449B	3008A019 17	1GHz- 26.5GHz	Nov. 11, 2009	Nov. 10, 2010	Radiation (03CH05-HY)
Turn Table	HD	Deis HD 2000	420/611	0 - 360 degree	N/A	N/A	Radiation (03CH05-HY)
Antenna Mast	HD	MA 240	240/666	1 m - 4 m	N/A	N/A	Radiation (03CH05-HY)
Horn Antenna	ESCO	3117	00066584	1GHz ~ 18GHz	Aug. 05, 2010	Aug. 04, 2011	Radiation (03CH05-HY)
Horn Antenna	Training Research	AH-0801	95119	8GHz~18GHz	Nov. 02, 2009	Nov. 01, 2010	Radiation (03CH05-HY)
Loop Antenna	R&S	HFH2-Z2	860004/00 1	9 kHz~30 MHz	Jul. 29, 2010	Jul. 28, 2011	Radiation (03CH05-HY)
Bluetooth Base Station	R&S	CBT32	100519	N/A	May 12, 2009	May 11, 2011	Radiation (03CH05-HY)

5 Uncertainty of Evaluation

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

Contribution	Uncertainty of X_i		$u(X_i)$
	dB	Probability Distribution	
Receiver Reading	0.10	Normal (k=2)	0.05
Cable Loss	0.10	Normal (k=2)	0.05
AMN Insertion Loss	2.50	Rectangular	0.63
Receiver Specification	1.50	Rectangular	0.43
Site Imperfection	1.39	Rectangular	0.80
Mismatch	+0.34 / -0.35	U-Shape	0.24
Combined Standard Uncertainty $U_c(y)$	1.13		
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	2.26		

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Contribution	Uncertainty of X_i		$u(X_i)$
	dB	Probability Distribution	
Receiver Reading	0.41	Normal (k=2)	0.21
Antenna Factor Calibration	0.83	Normal (k=2)	0.42
Cable Loss Calibration	0.25	Normal (k=2)	0.13
Pre-Amplifier Gain Calibration	0.27	Normal (k=2)	0.14
RCV/SPA Specification	2.50	Rectangular	0.72
Antenna Factor Interpolation for Frequency	1.00	Rectangular	0.29
Site Imperfection	1.43	Rectangular	0.83
Mismatch	+0.39 / -0.41	U-Shape	0.28
Combined Standard Uncertainty $U_c(y)$	1.27		
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	2.54		

Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

Contribution	Uncertainty of X_i		$u(X_i)$	C_i	$C_i * u(X_i)$
	dB	Probability Distribution			
Receiver Reading	± 0.10	Normal (k=2)	0.10	1	0.10
Antenna Factor Calibration	± 1.70	Normal (k=2)	0.85	1	0.85
Cable Loss Calibration	± 0.50	Normal (k=2)	0.25	1	0.25
Receiver Correction	± 2.00	Rectangular	1.15	1	1.15
Antenna Factor Directional	± 1.50	Rectangular	0.87	1	0.87
Site Imperfection	± 2.80	Triangular	1.14	1	1.14
Mismatch Receiver VSWR $\Gamma_1 = 0.197$ Antenna VSWR $\Gamma_2 = 0.194$ Uncertainty = $20\text{Log}(1-\Gamma_1*\Gamma_2)$	+0.34 / -0.35	U-Shape	0.244	1	0.244
Combined Standard Uncertainty $U_c(y)$	2.36				
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	4.72				



Appendix A. Photographs of EUT

Please refer to Sporton report number EP081915-02 as below.