

FCC RF Test Report

APPLICANT : Getac Technology Corporation
EQUIPMENT : Smartphone
BRAND NAME : Getac
MODEL NAME : MH132
FCC ID : QYLMH132
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : Digital Spread Spectrum (DSS)

The product was received on Nov. 25, 2010 and completely tested on Nov. 29, 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.

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR0N2304-01A	Rev. 01	Initial issue of report	Dec. 16, 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	-
3.7	15.247(d)	A8.5	Spurious Emission	$< 20\text{ dBc}$	Pass	-
3.8	15.207	Gen 7.2.2	AC Conducted Emission	15.207(a)	Pass	Under limit 15.4 dB at 0.206 MHz
3.9	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 6.76 dB at 48.63 MHz
3.10	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-



1 General Description

1.1 Applicant

Getac Technology Corporation

5F., Building A, No. 209, Sec.1, Nangang Rd., Nangang Dist., Taipei City 11568, Taiwan, R.O.C.

1.2 Manufacturer

GeTAC Technology(Kunshan) LTD.

No. 269, 2nd Road, Export Processing Zone, Changjiang South Road, Kunshan, Jiangsu, P.R.C.

1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	Smartphone
Brand Name	Getac
Model Name	MH132
FCC ID	QYLMH132
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) : 7.38 dBm (0.006 W) Bluetooth EDR (2Mbps) : 9.29 dBm (0.009 W) Bluetooth EDR (3Mbps) : 9.73 dBm (0.009 W)
Antenna Type	PIFA Antenna with gain -4.0 dBi
HW Version	1.0
SW Version	0.07
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	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 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.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
4.	Bluetooth Earphone	Nokia	BH-102	PYAHS-107W	N/A	N/A
5.	Notebook	DELL	Vostro 1510	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
6.	LCD Monitor	Lenovo	6135-AB1	FCC DoC	Shielded, 1.6 m	Unshielded, 1.8 m
7.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A

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	7.38 dBm	9.29 dBm	9.71 dBm
Ch39	2441MHz	7.31 dBm	9.25 dBm	9.73 dBm
Ch78	2480MHz	7.23 dBm	9.16 dBm	9.67 dBm

Remark:

1. The data rate was set in 3Mbps 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).

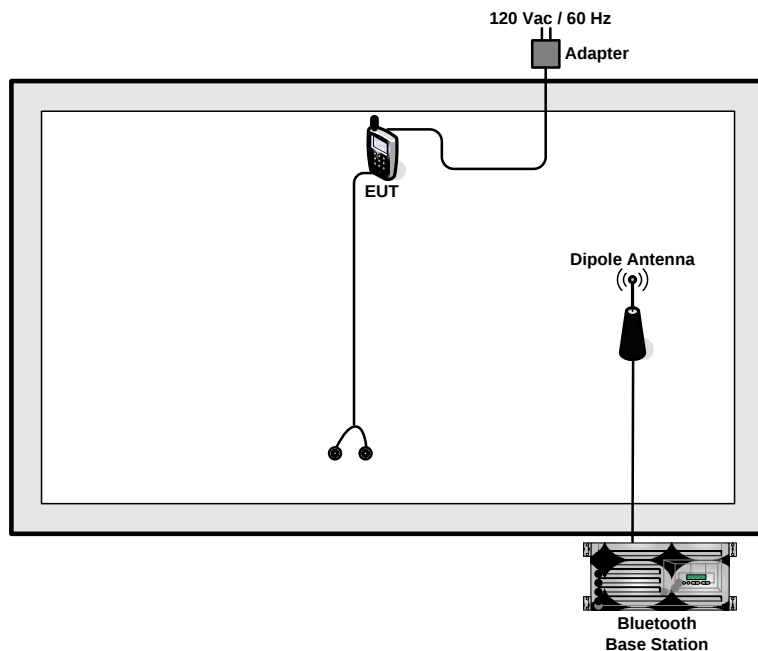
Pre-scanned tests were conducted to determine the final configuration from all possible combinations.

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

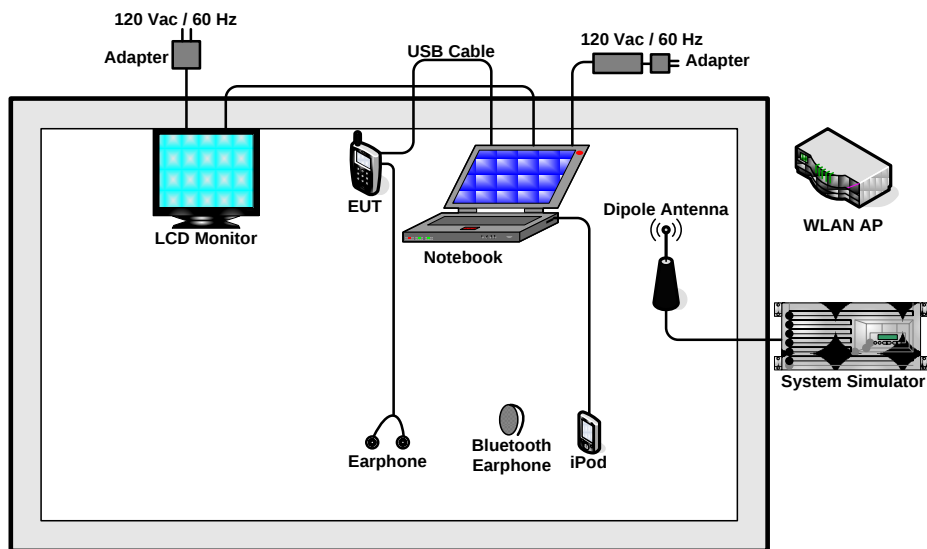
Test Cases			
Test Item	Data Rate / Modulation		
	Bluetooth 1Mbps GFSK	Bluetooth EDR 2Mbps $\pi/4$ -DQPSK	Bluetooth EDR 3Mbps 8-DPSK
Conducted TCs	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz	Mode 4: CH00_2402 MHz Mode 5: CH39_2441 MHz Mode 6: CH78_2480 MHz	Mode 7: CH00_2402 MHz Mode 8: CH39_2441 MHz Mode 9: CH78_2480 MHz
Radiated TCs	N/A	N/A	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz
AC Conducted Emission	Mode 1: WCDMA Band II Idle + Bluetooth Link + WLAN Link + MP3 Play + Earphone + USB Cable (Link with Notebook)		
Remark: For radiated TCs, the data rate was set in 3Mbps due to the highest RF output power; only the data of these modes was reported.			

2.3 Connection Diagram of Test System

<Bluetooth Tx Mode>



<EUT with USB Cable (Link with Notebook) Mode>



2.4 RF Utility

For Bluetooth function, the RF utility, "BT Tool" was installed in EUT which was programmed in order to make the EUT into the engineering modes to 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.

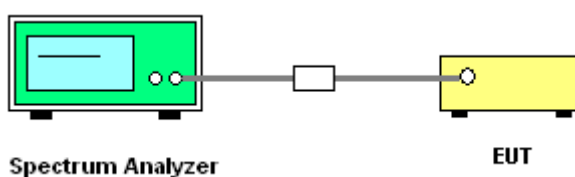
3.1.2 Measuring Instruments

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.

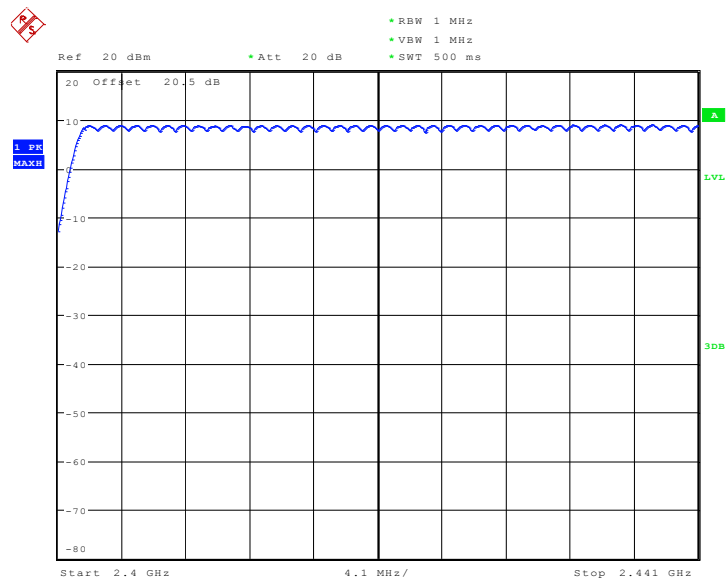
3.1.4 Test Setup



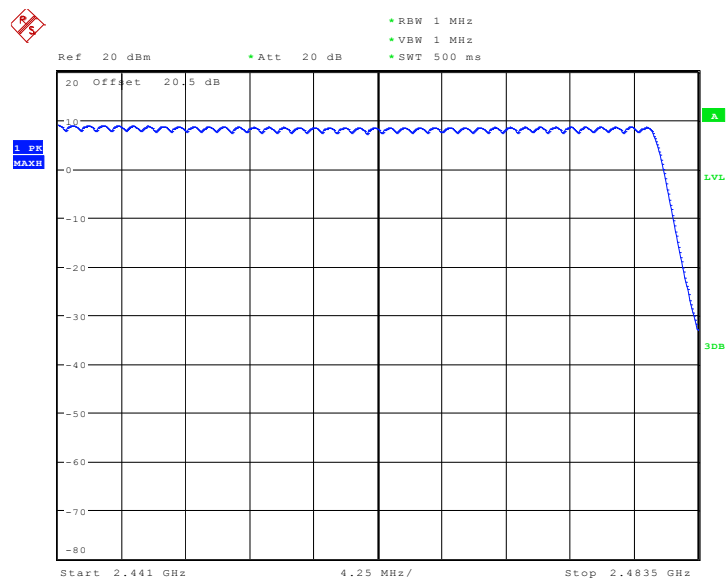
3.1.5 Test Result of Number of Hopping Frequency

Test Mode :	Mode 7~9	Temperature :	24~26℃
Test Engineer :	Alan Liu	Relative Humidity :	45~48%
Number of Hopping Channels (Channel)		Limits (Channel)	Pass/Fail
79		> 15	Pass

Number of Hopping Channel Plot on Channel 00 - 78



Date: 27.NOV.2010 01:00:57



Date: 27.NOV.2010 01:07:53

3.2 20dB Bandwidth Measurement

3.2.1 Limit of 20dB Bandwidth

N/A

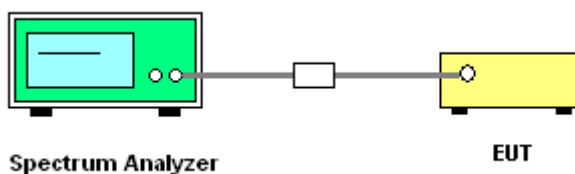
3.2.2 Measuring Instruments

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

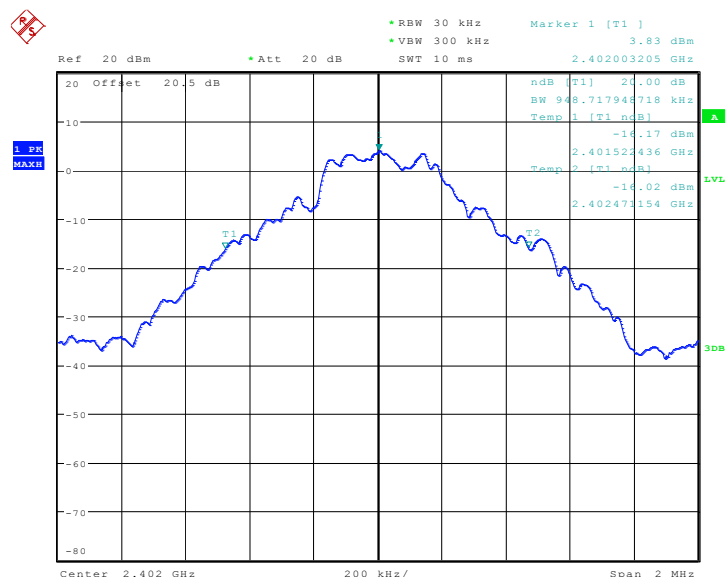


3.2.5 Test Result of 20dB Bandwidth

Test Mode :	Mode 1, 2, 3	Temperature :	24~26℃
Test Engineer :	Alan Liu	Relative Humidity :	45~48%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	0.949
39	2441	0.949
78	2480	1.016

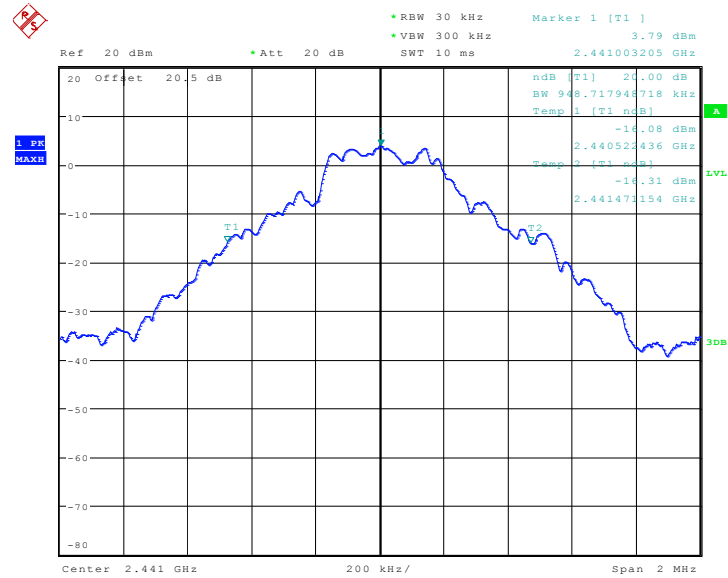
20 dB Bandwidth Plot on Channel 00



Date: 26.NOV.2010 23:54:12

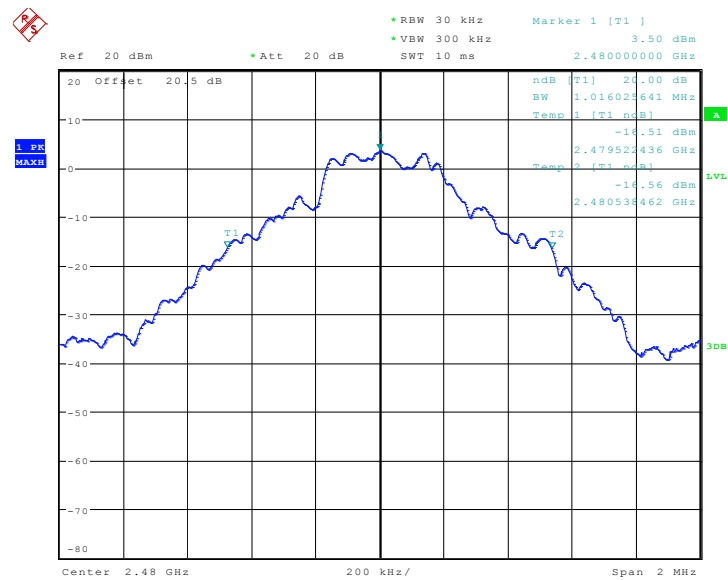


20 dB Bandwidth Plot on Channel 39



Date: 26.NOV.2010 23:54:47

20 dB Bandwidth Plot on Channel 78



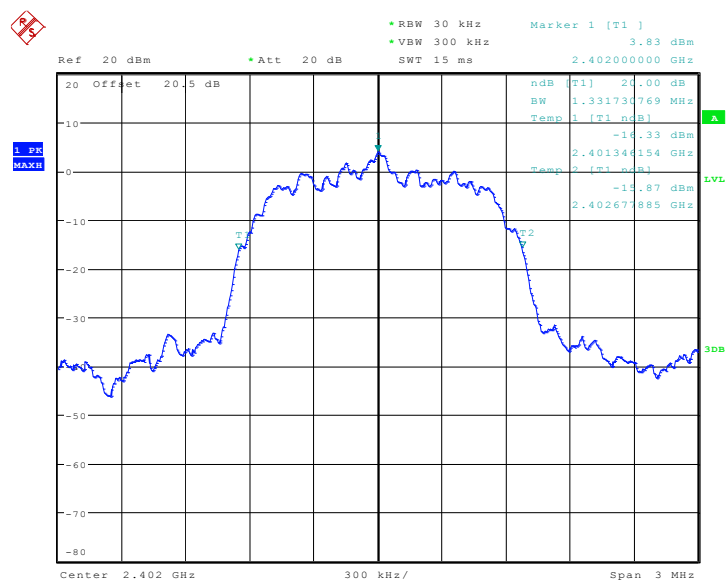
Date: 26.NOV.2010 23:55:19



Test Mode :	Mode 4, 5, 6	Temperature :	24~26°C
Test Engineer :	Alan Liu	Relative Humidity :	45~48%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.332
39	2441	1.332
78	2480	1.308

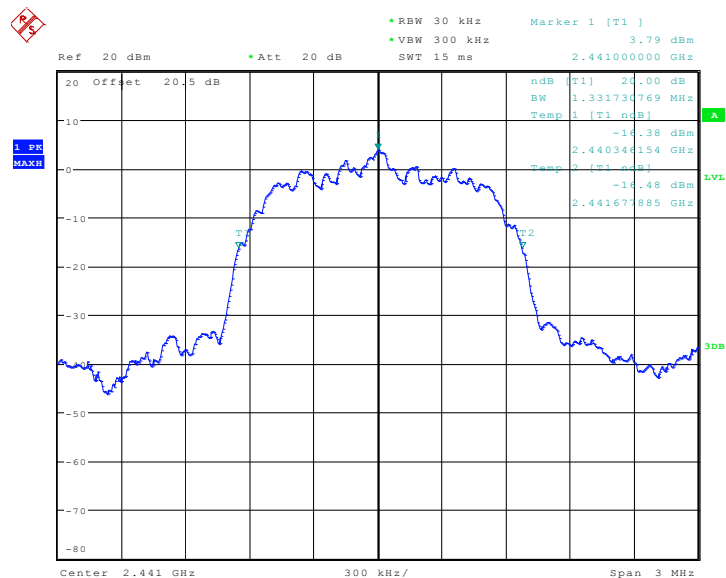
20 dB Bandwidth Plot on Channel 00



Date: 26.NOV.2010 23:57:40

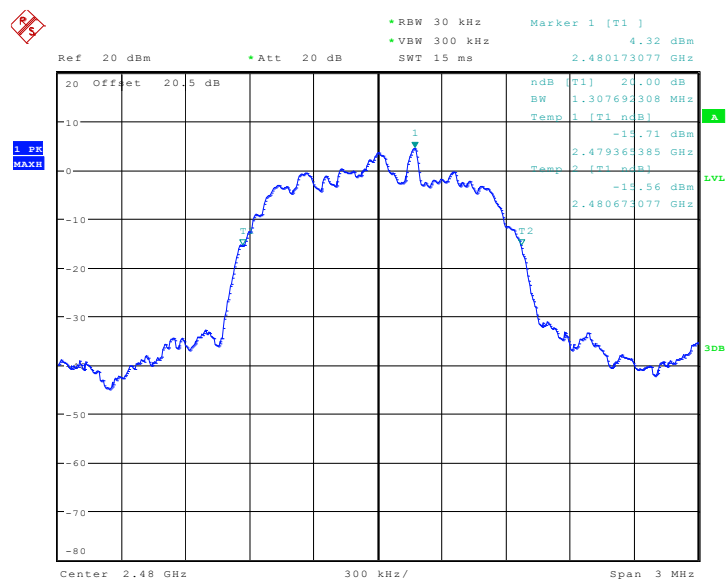


20 dB Bandwidth Plot on Channel 39



Date: 26.NOV.2010 23:56:46

20 dB Bandwidth Plot on Channel 78



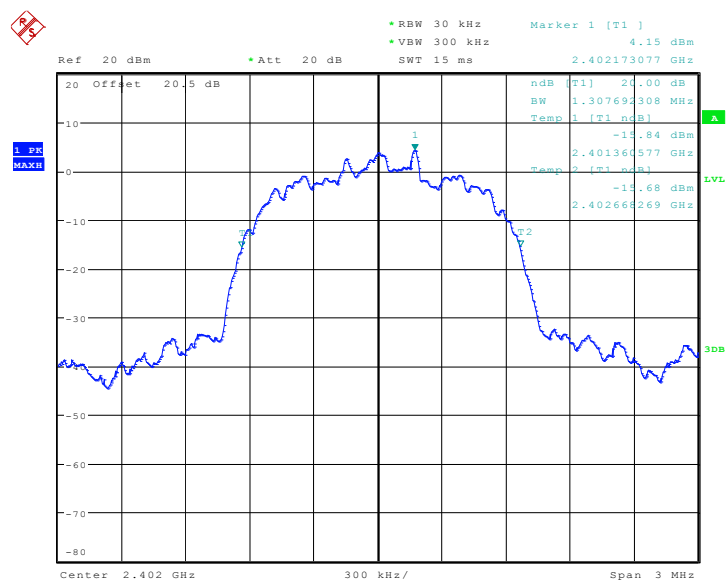
Date: 26.NOV.2010 23:56:07



Test Mode :	Mode 7, 8, 9	Temperature :	24~26°C
Test Engineer :	Alan Liu	Relative Humidity :	45~48%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.308
39	2441	1.308
78	2480	1.313

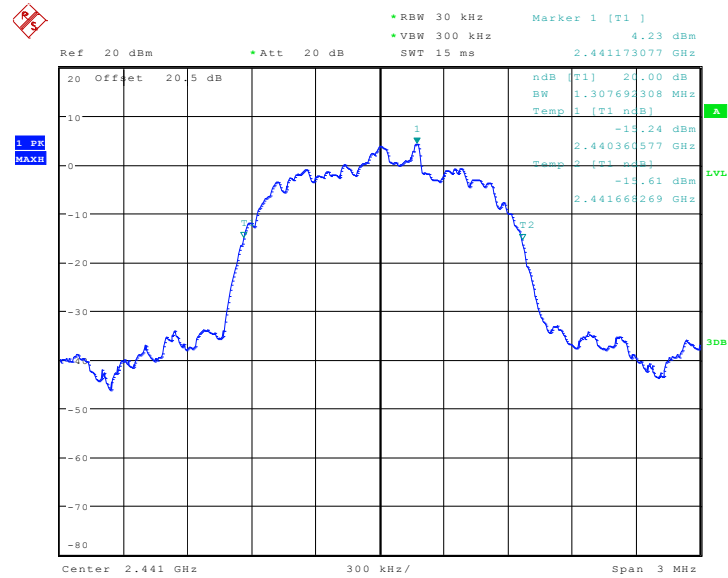
20 dB Bandwidth Plot on Channel 00



Date: 26.NOV.2010 23:58:35

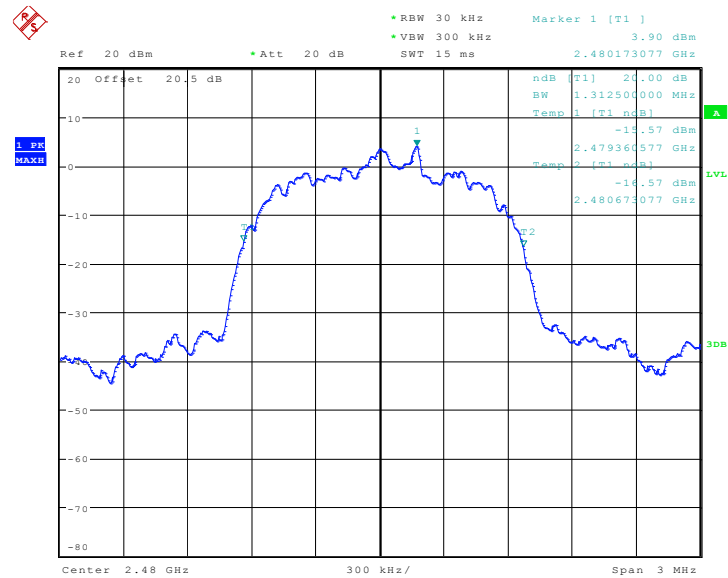


20 dB Bandwidth Plot on Channel 39



Date: 26.NOV.2010 23:59:11

20 dB Bandwidth Plot on Channel 78



Date: 26.NOV.2010 23:59:55

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.

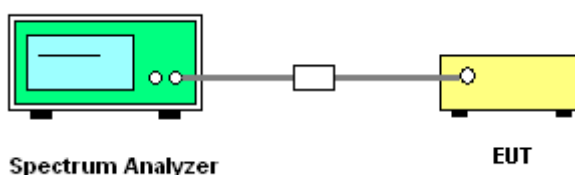
3.3.2 Measuring Instruments

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



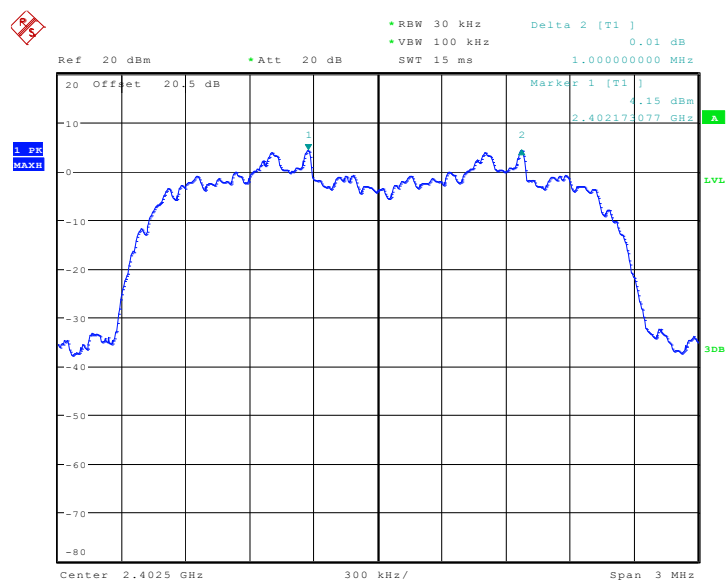


3.3.5 Test Result of Hopping Channel Separation

Test Mode :	Mode 7, 8, 9	Temperature :	24~26℃
Test Engineer :	Alan Liu	Relative Humidity :	45~48%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.000	0.872	Pass
39	2441	1.000	0.872	Pass
78	2480	1.005	0.875	Pass

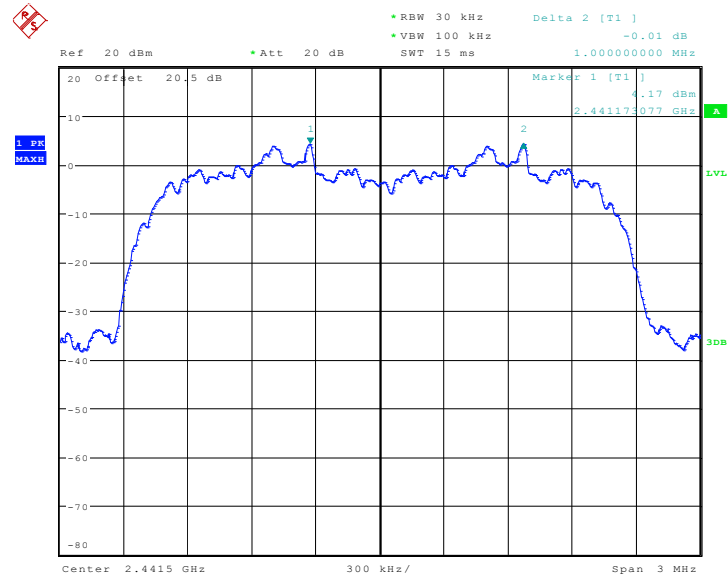
Channel Separation Plot on Channel 00 - 01



Date: 27.NOV.2010 00:39:26

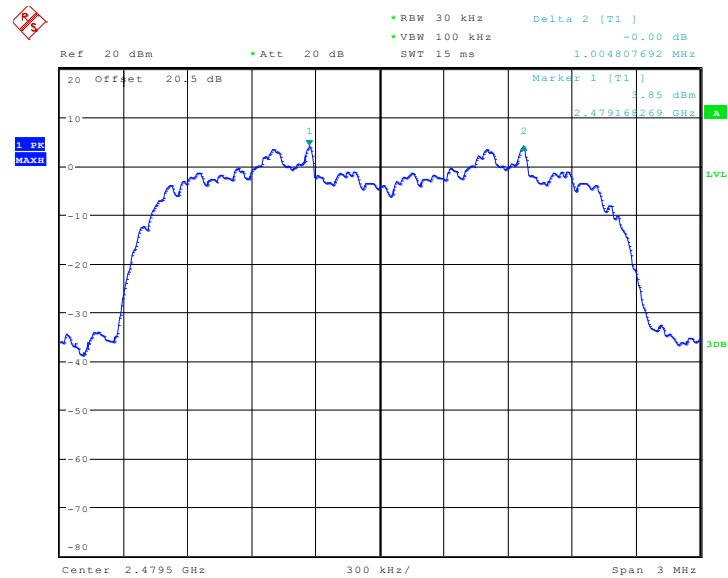


Channel Separation Plot on Channel 39 - 40



Date: 27.NOV.2010 00:40:10

Channel Separation Plot on Channel 77 - 78



Date: 27.NOV.2010 00:41:12

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.

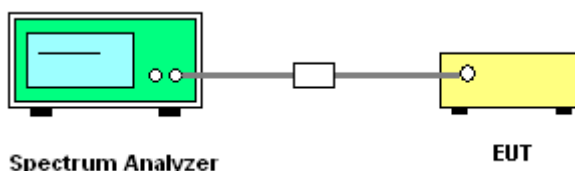
3.4.2 Measuring Instruments

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 8	Temperature :	24~26°C
Test Engineer :	Alan Liu	Relative Humidity :	45~48%

Package Mode	Average Hopping Channel	Package Transfer Time (usec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
3DH5	3.30	3060.90	0.32	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)



RBW 1 MHz Delta 3 [T1]
 0.53 dB
 * VBW 1 MHz
 SWT 10 ms 3.750000 ms

Ref 20 dBm * Att 20 dB

20 Offset 20.5 dB

Marker 1 [T1]
 -4.87 dBm
 657.05282 us
 Delta 2 [T2]
 -0.14 dB
 3.064897 ms

1. PR
 MAXH

Center 2.441 GHz 1 ms/

Date: 27.NOV.2010 00:23:03

RBW 1 MHz
VBW 1 MHz
SWT 10 s

Ref 20 dBm
Att 20 dB
Offset 20.5 dB

1. VPP
MAXH

Center 2.441 GHz
1 s /

Date: 27.NOV.2010 00:27:55

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).

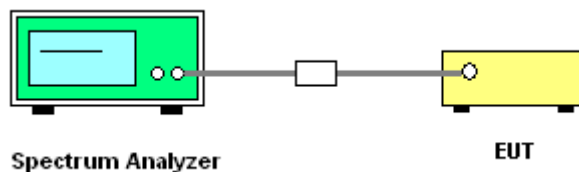
3.5.2 Measuring Instruments

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.

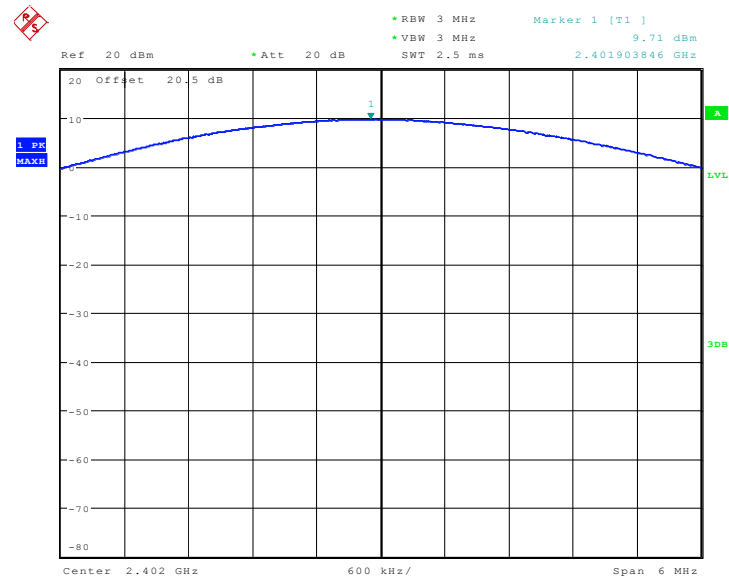
3.5.4 Test Setup



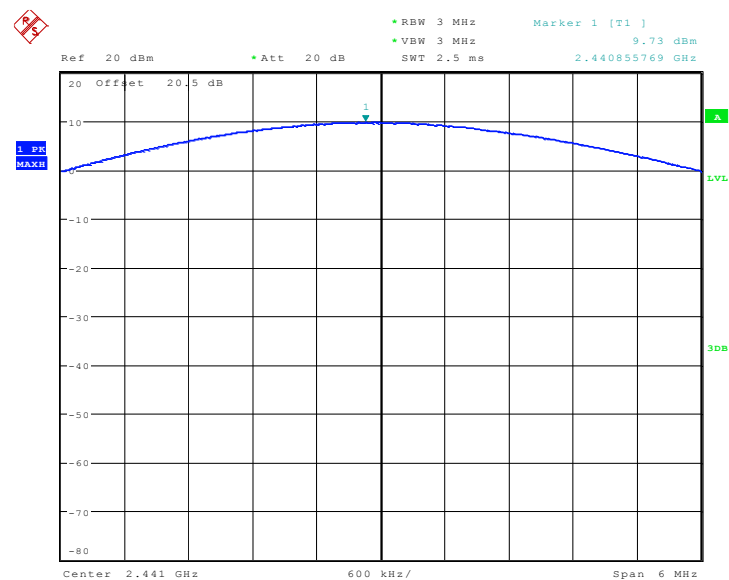
3.5.5 Test Result of Peak Output Power

Test Mode :	Mode 7, 8, 9	Temperature :	24~26°C
Test Engineer :	Alan Liu	Relative Humidity :	45~48%

Channel	Frequency (MHz)	RF Power (dBm)		
		8-DPSK	Max. Limits (dBm)	Pass/Fail
		3 Mbps		
00	2402	9.71	30	Pass
39	2441	9.73	30	Pass
78	2480	9.67	30	Pass

Peak Output Power Plot on Channel 00


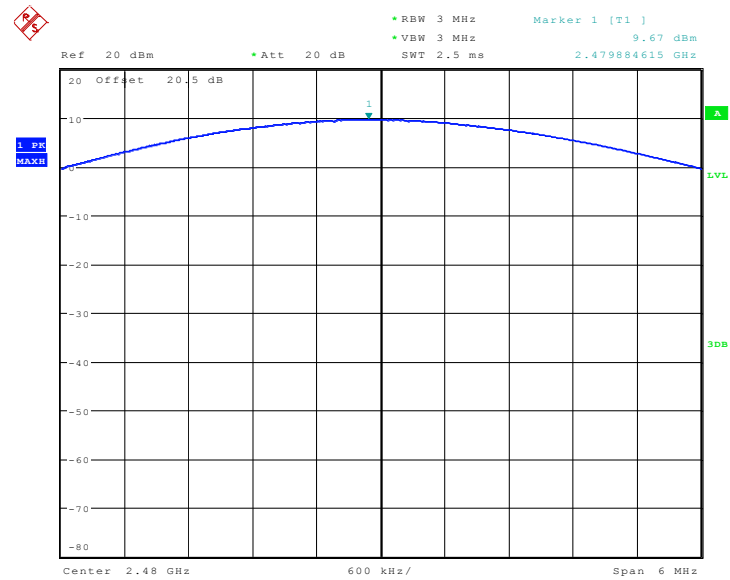
Date: 26.NOV.2010 20:43:00

Peak Output Power Plot on Channel 39


Date: 26.NOV.2010 20:45:47



Peak Output Power Plot on Channel 78



Date: 26.NOV.2010 20:56:30

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

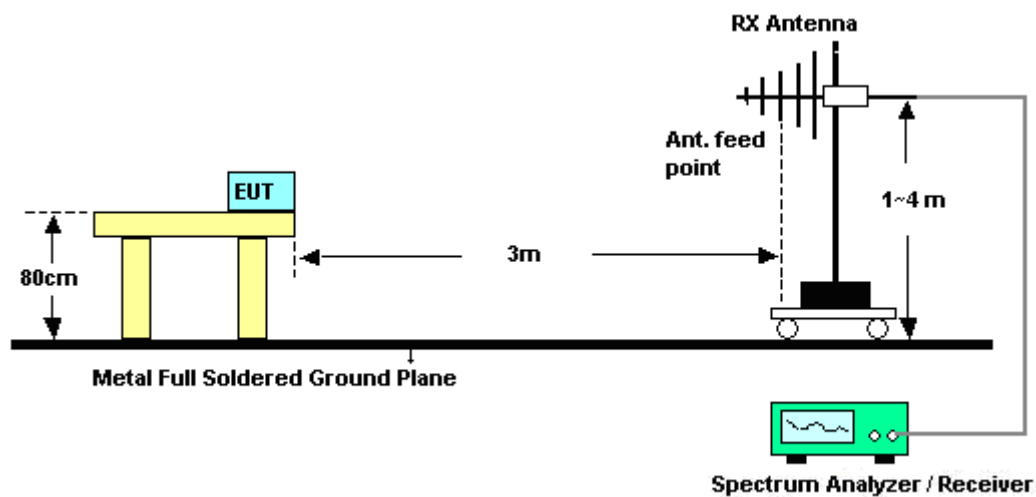
See list of measuring instruments of this test report.

3.6.3 Test Procedures

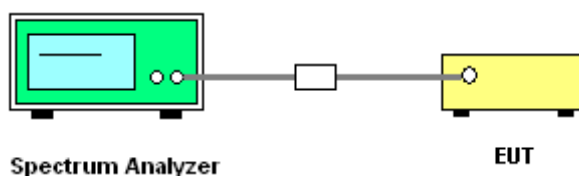
1. The testing follows the guidelines in ANSI C63.4-2003 and FCC Public Notice DA 00-705 Measurement Guidelines.
2. RF antenna conducted test: Set RBW = 300kHz, Video bandwidth (VBW) $\geq$ RBW. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band 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 :	24~25°C
Test Channel :	00	Relative Humidity :	45~46%
		Test Engineer :	David Yang

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
2372.70	49.97	-24.03	74.00	45.35	32.16	5.99	33.53	167	0	Peak
2372.70	34.27	-19.73	54.00	29.65	32.16	5.99	33.53	167	0	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
2362.06	50.21	-23.79	74.00	45.61	32.13	5.99	33.52	103	295	Peak
2362.06	35.69	-18.31	54.00	31.09	32.13	5.99	33.52	103	295	Average



Test Mode :	Mode 3	Temperature :	24~25°C
Test Channel :	78	Relative Humidity :	45~46%
		Test Engineer :	David Yang

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
2483.50	50.21	-23.79	74.00	45.31	32.28	6.18	33.56	104	9	Peak
2483.50	31.76	-22.24	54.00	26.86	32.28	6.18	33.56	104	9	Average

Summary results of marker-delta method for Peak:

Test mode	Maximum field strength of the fundamental emission (dB μ V/m)	Delta Result (dB)	Peak Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
Single Carrier Mode	107.77	57.56	50.21	74.00	-23.79	Pass
Hopping Mode	107.77	57.89	49.88	74.00	-24.12	Pass

Note : Peak result = Maximum field strength – Delta result

Summary results of marker-delta method for Average:

Test mode	Maximum field strength of the fundamental emission (dB μ V/m)	Delta Result (dB)	Average Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
Single Carrier Mode	89.32	57.56	31.76	54.00	-22.24	Pass
Hopping Mode	89.32	57.89	31.43	54.00	-22.57	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
2483.50	48.54	-25.46	74.00	43.64	32.28	6.18	33.56	100	307	Peak
2483.50	30.23	-23.77	54.00	25.33	32.28	6.18	33.56	100	307	Average

Summary results of marker-delta method for Peak:

Test mode	Maximum field strength of the fundamental emission (dBμV/m)	Delta Result (dB)	Peak Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
Single Carrier Mode	104.90	56.36	48.54	74.00	-25.46	Pass
Hopping Mode	104.90	56.94	47.96	74.00	-26.04	Pass

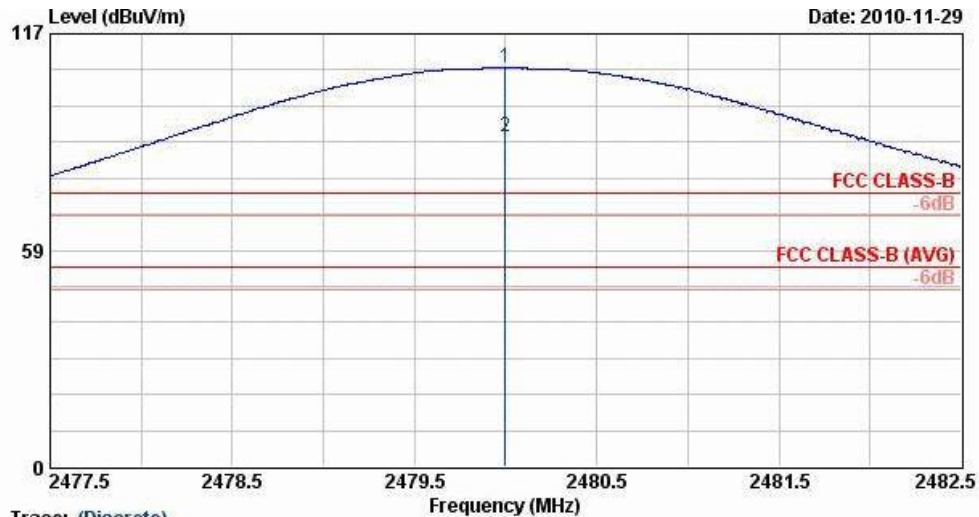
Note : Peak result = Maximum field strength – Delta result

Summary results of marker-delta method for Average:

Test mode	Maximum field strength of the fundamental emission (dBμV/m)	Delta Result (dB)	Average Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
Single Carrier Mode	86.59	56.36	30.23	54.00	-23.77	Pass
Hopping Mode	86.59	56.94	29.65	54.00	-24.35	Pass

Note : Average result = Maximum field strength – Delta result

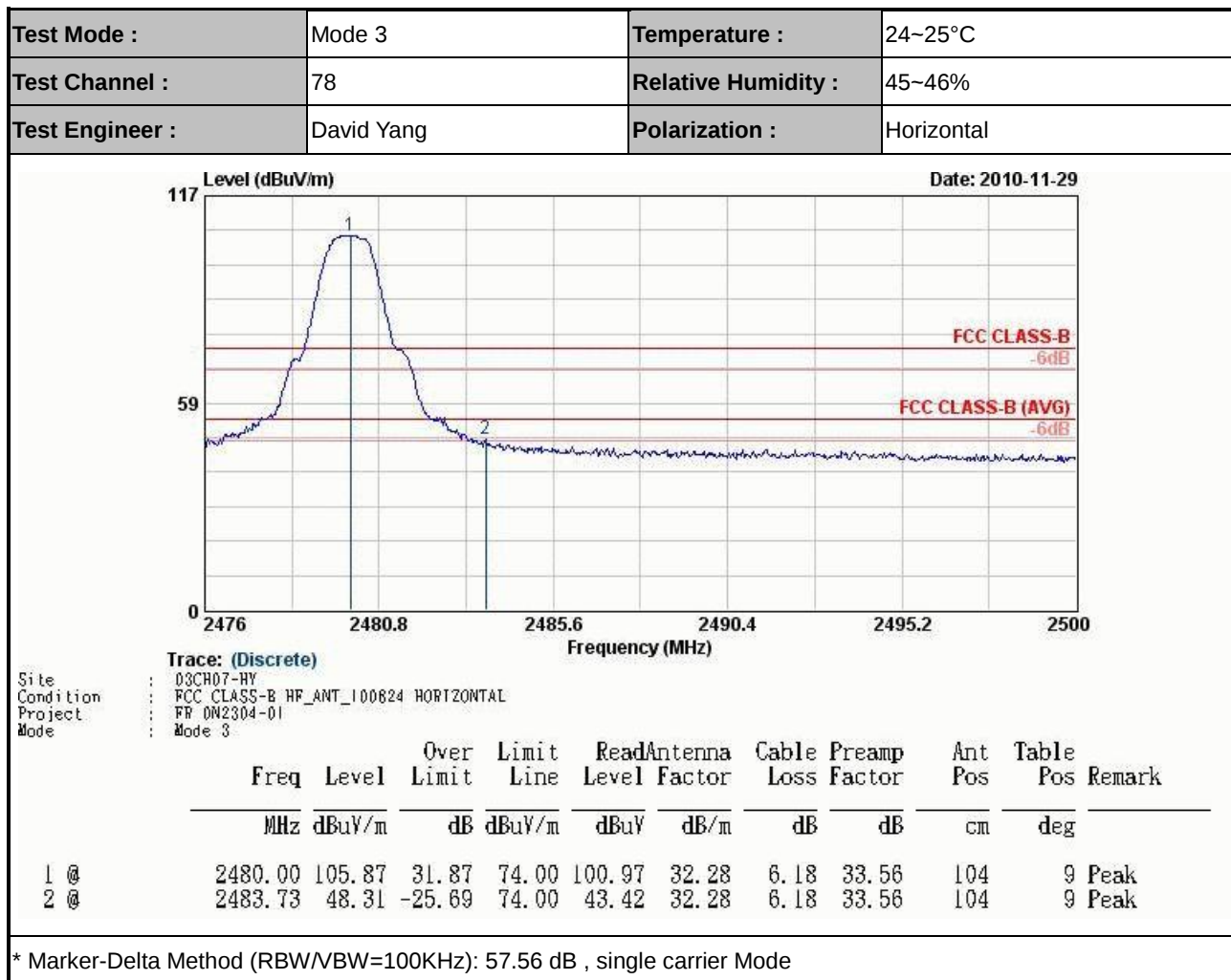
Test Mode :	Mode 3	Temperature :	24~25°C
Test Channel :	78	Relative Humidity :	45~46%
Test Engineer :	David Yang	Polarization :	Horizontal



Trace: (Discrete)
 Site : 03CH07-HY
 Condition : FCC CLASS-B HF_ANT_100824 HORIZONTAL
 Project : FR DN2304-01
 Mode : Mode 3

	Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Remark
			dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	107.77	33.77	74.00	102.87	32.28	6.18	33.56	104	9	Peak
2 @	2480.00	89.32	35.32	54.00	84.42	32.28	6.18	33.56	104	9	Average

* Maximum field strength of the fundamental emission



Test Mode :	Mode 3	Temperature :	24~25°C
Test Channel :	78	Relative Humidity :	45~46%
Test Engineer :	David Yang	Polarization :	Horizontal

Level (dBuV/m)

117

59

0

2476

2480.8

2485.6

2490.4

2495.2

2500

Date: 2010-11-29

FCC CLASS-B -6dB

FCC CLASS-B (AVG) -6dB

Trace: (Discrete)

Site : 03CH07-HY

Condition : FCC CLASS-B HF_ANT_100824 HORIZONTAL

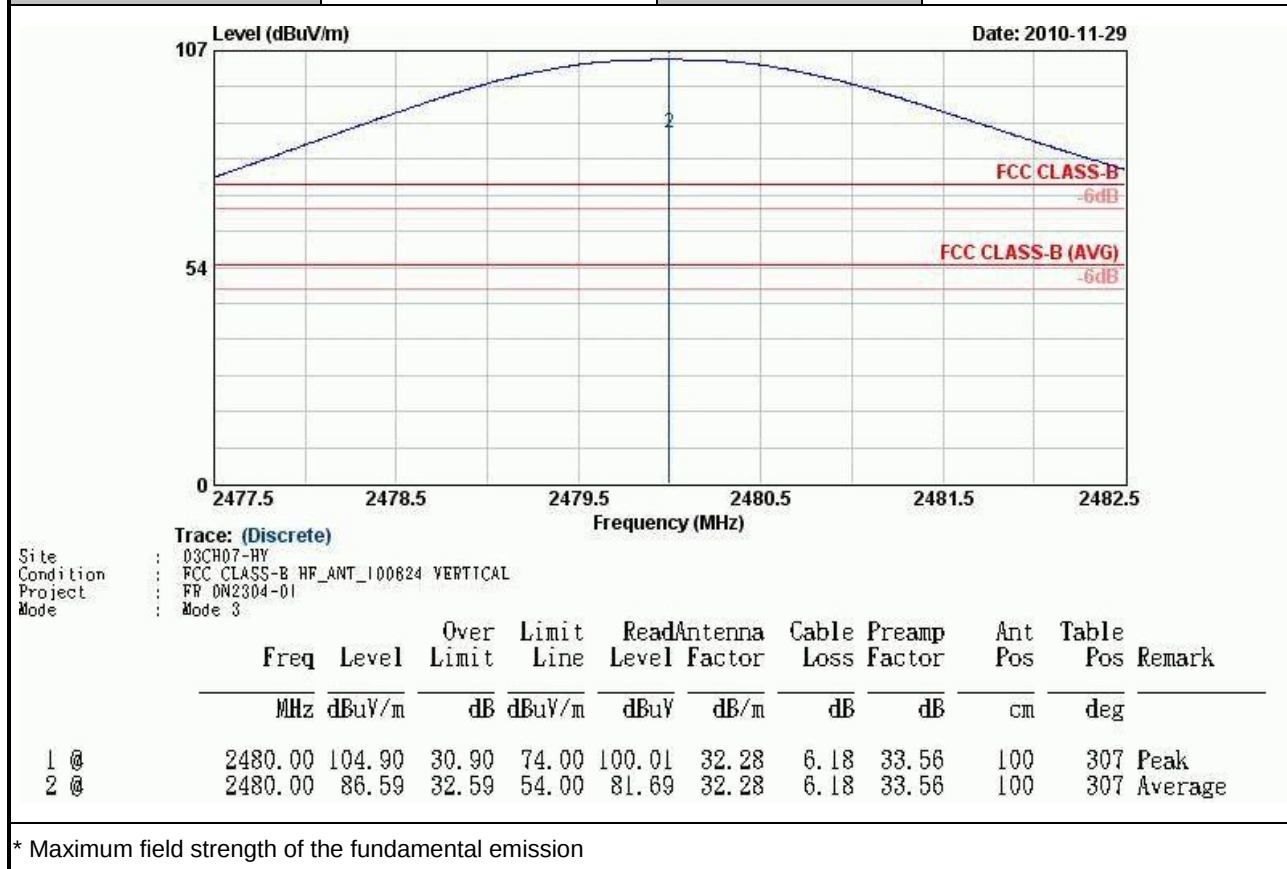
Project : FR 0N2304-01

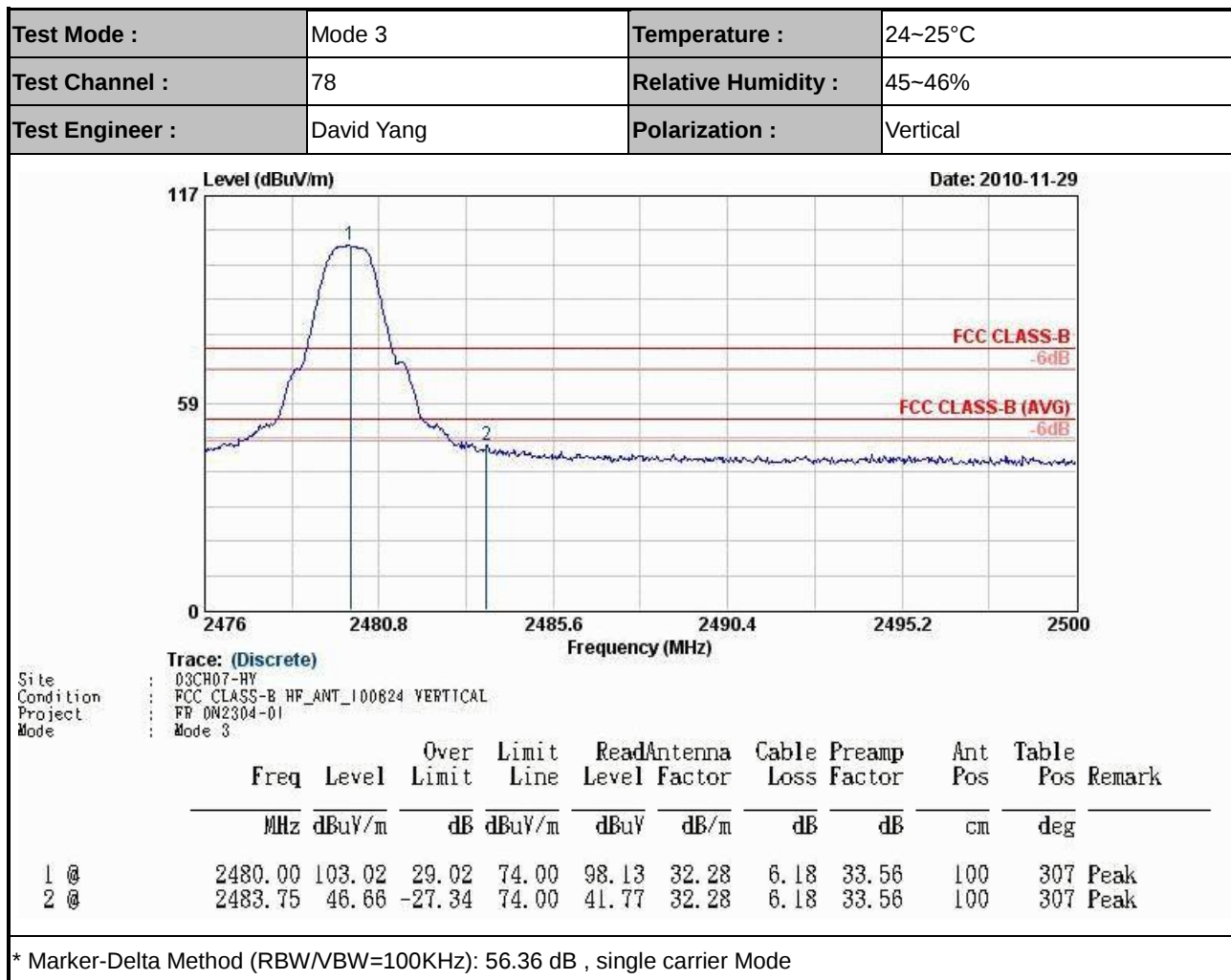
Mode : Mode 3

	Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Remark
			dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 @	2480.00	105.88	31.88	74.00	100.99	32.28	6.18	33.56	104	9	Peak
2 @	2483.63	47.99	-26.01	74.00	43.09	32.28	6.18	33.56	104	9	Peak

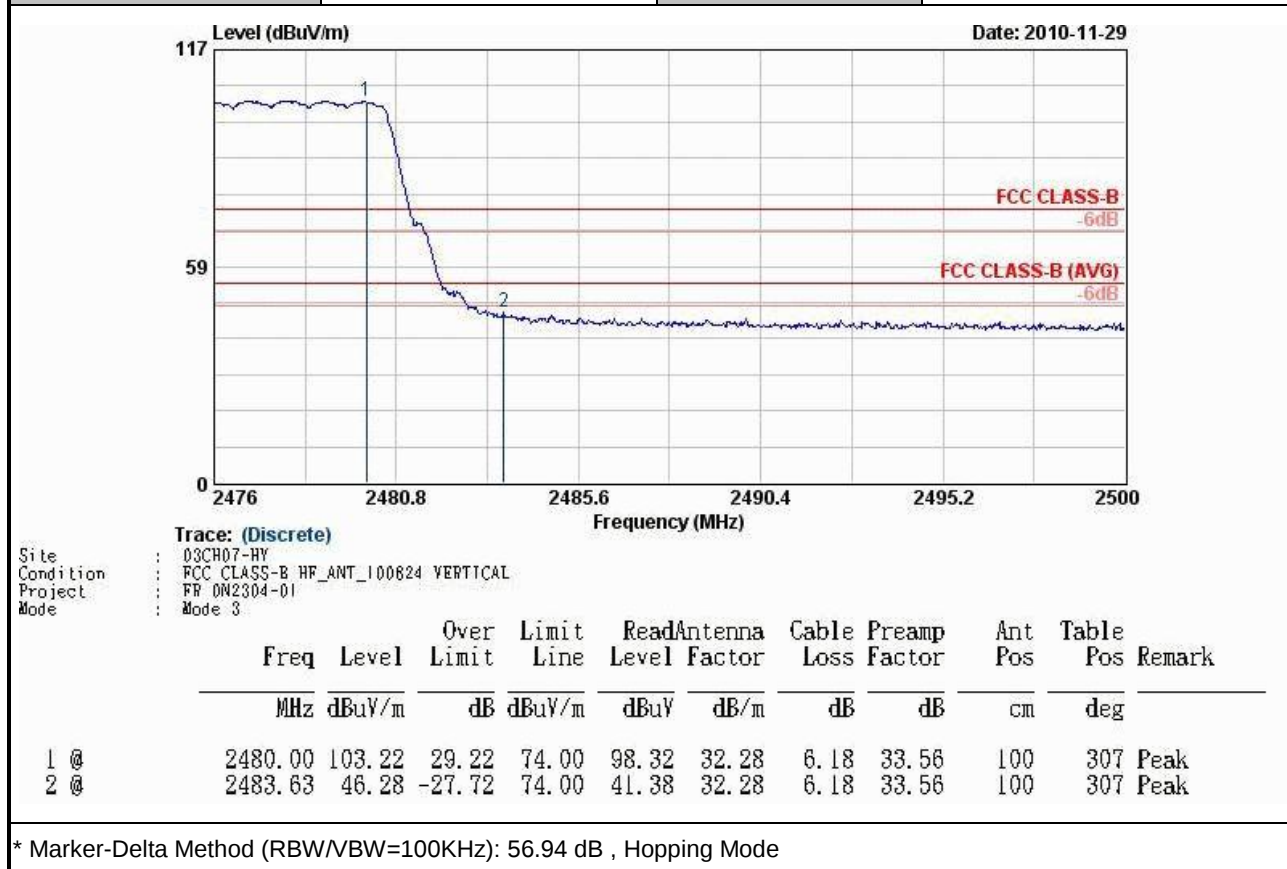
* Marker-Delta Method (RBW/VBW=100KHz): 57.89 dB , Hopping Mode

Test Mode :	Mode 3	Temperature :	24~25°C
Test Channel :	78	Relative Humidity :	45~46%
Test Engineer :	David Yang	Polarization :	Vertical





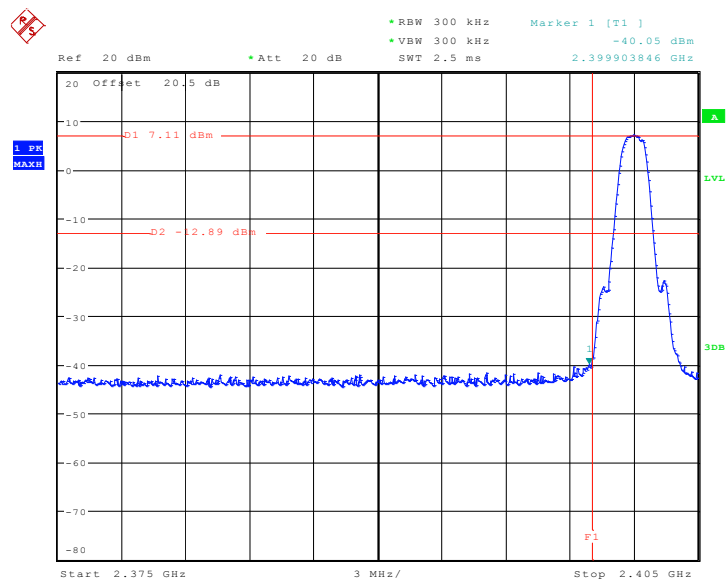
Test Mode :	Mode 3	Temperature :	24~25°C
Test Channel :	78	Relative Humidity :	45~46%
Test Engineer :	David Yang	Polarization :	Vertical



3.6.6 Test Result of Conducted Band Edges

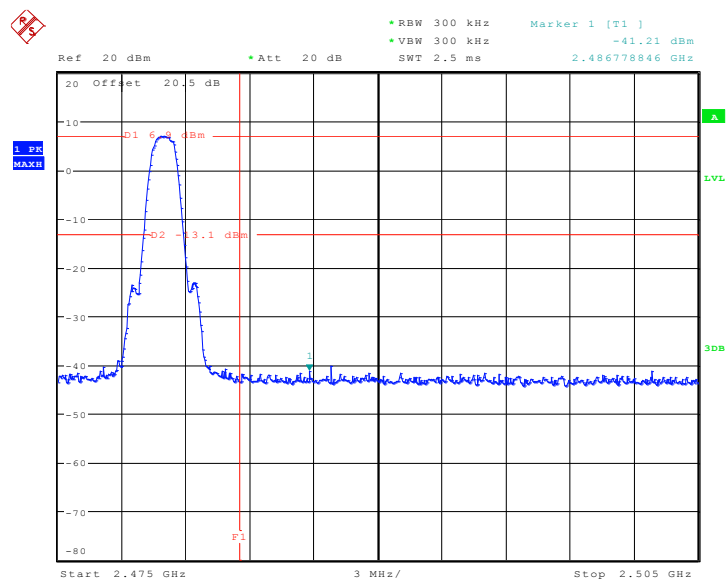
Test Mode :	Mode 7 and 9	Temperature :	24~26℃
Test Channel :	00 and 78	Relative Humidity :	45~48%
		Test Engineer :	Alan Liu

Low Band Edge Plot on Channel 00



Date: 26.NOV.2010 22:15:52

High Band Edge Plot on Channel 78



Date: 26.NOV.2010 22:06:36

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.

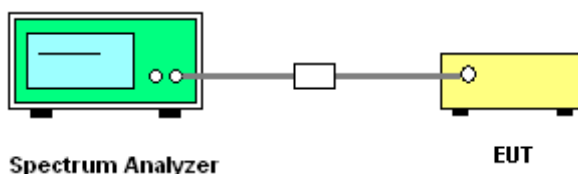
3.7.2 Measuring Instruments

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.

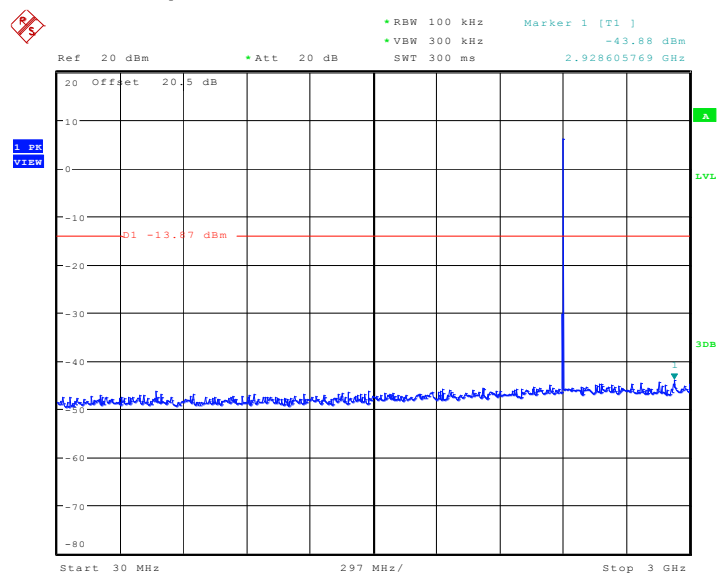
3.7.4 Test Setup



3.7.5 Test Result

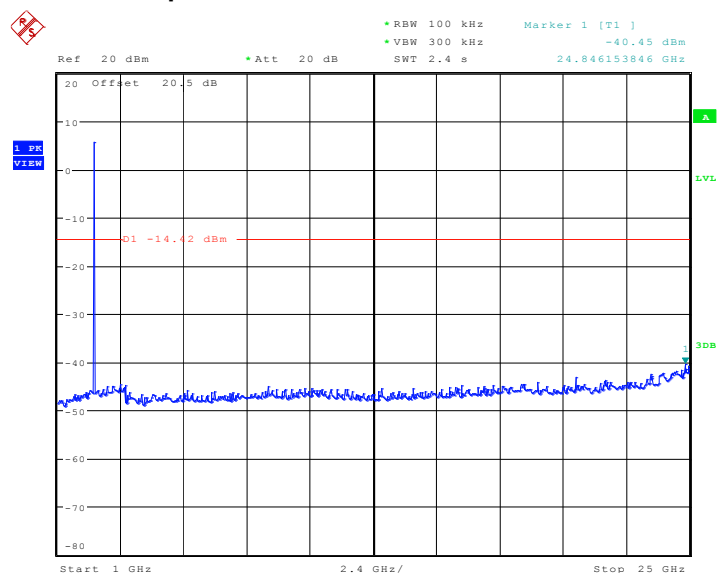
Test Mode :	Mode 7	Temperature :	24~26℃
Test Channel :	00	Relative Humidity :	45~48%
		Test Engineer :	Alan Liu

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 26.NOV.2010 22:41:42

Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz

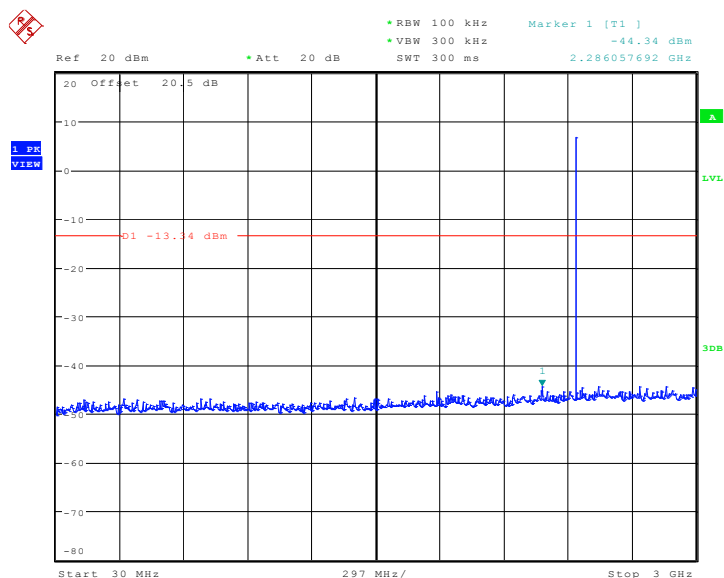


Date: 26.NOV.2010 22:58:38



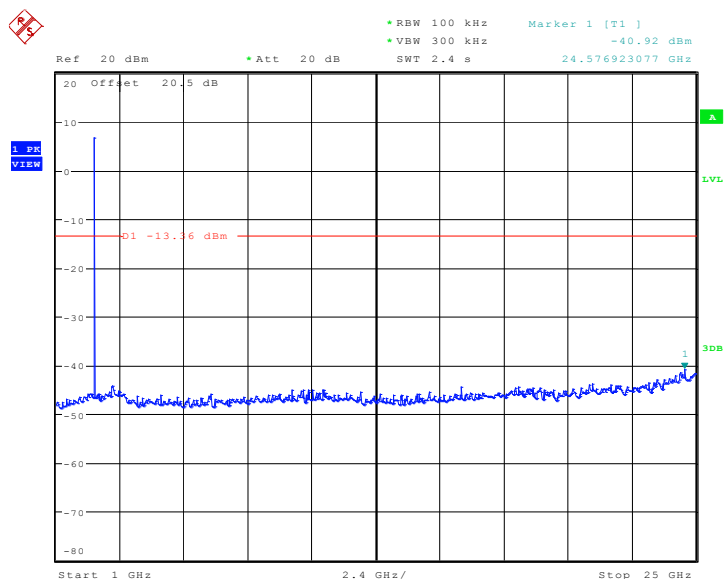
Test Mode :	Mode 8	Temperature :	24~26°C
Test Channel :	39	Relative Humidity :	45~48%
		Test Engineer :	Alan Liu

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 26.NOV.2010 22:42:21

Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz



Date: 26.NOV.2010 22:45:58



Report No. : FR0N2304-01A

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 26.NOV.2010 22:44:50

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.

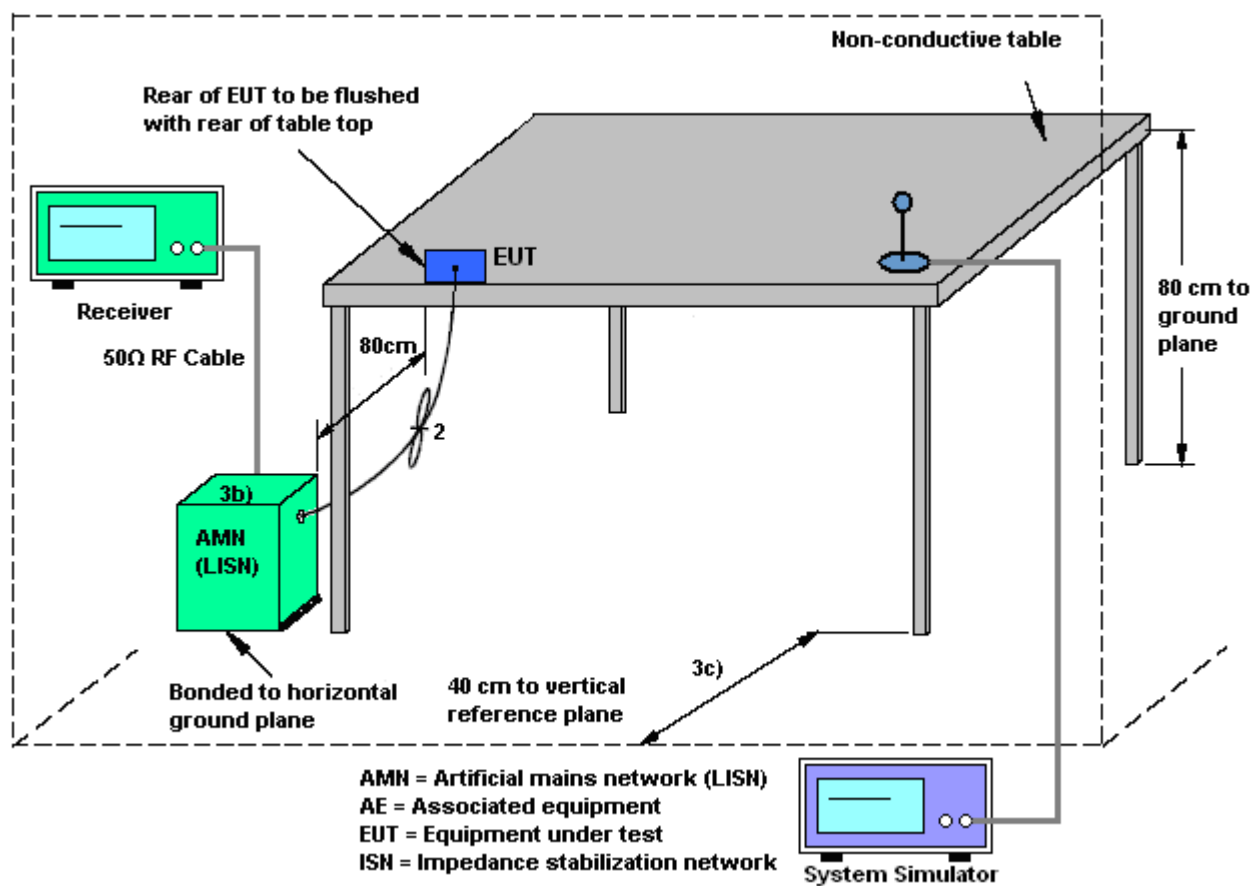
3.8.2 Measuring Instruments

See list of measuring instruments of this test report.

3.8.3 Test Procedures

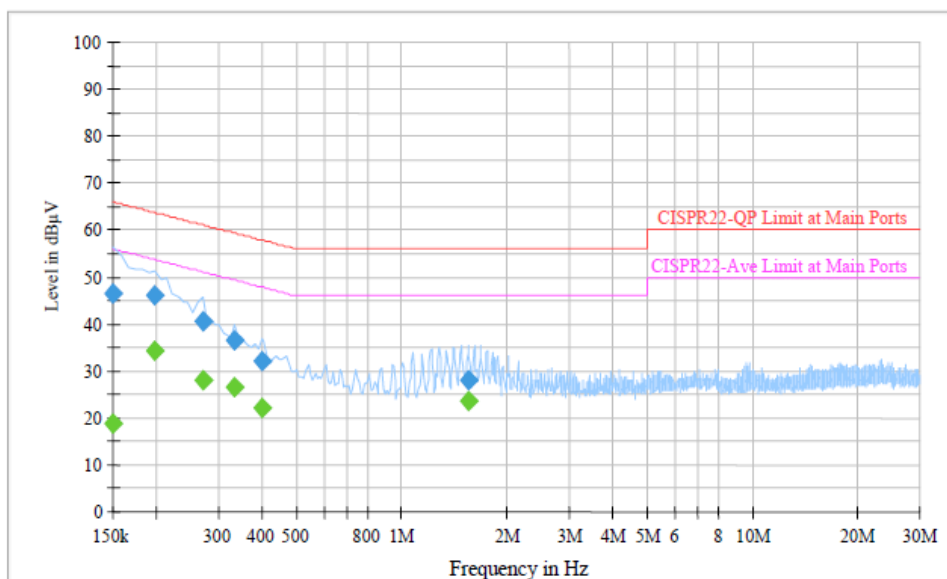
1. Please follow the guidelines in ANSI C63.4-2003.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All 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 :	21~23°C
Test Engineer :	Hayden Wu	Relative Humidity :	52~54%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WCDMA Band II Idle + Bluetooth Link + WLAN Link + MP3 Play + Earphone + USB Cable (Link with Notebook)		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



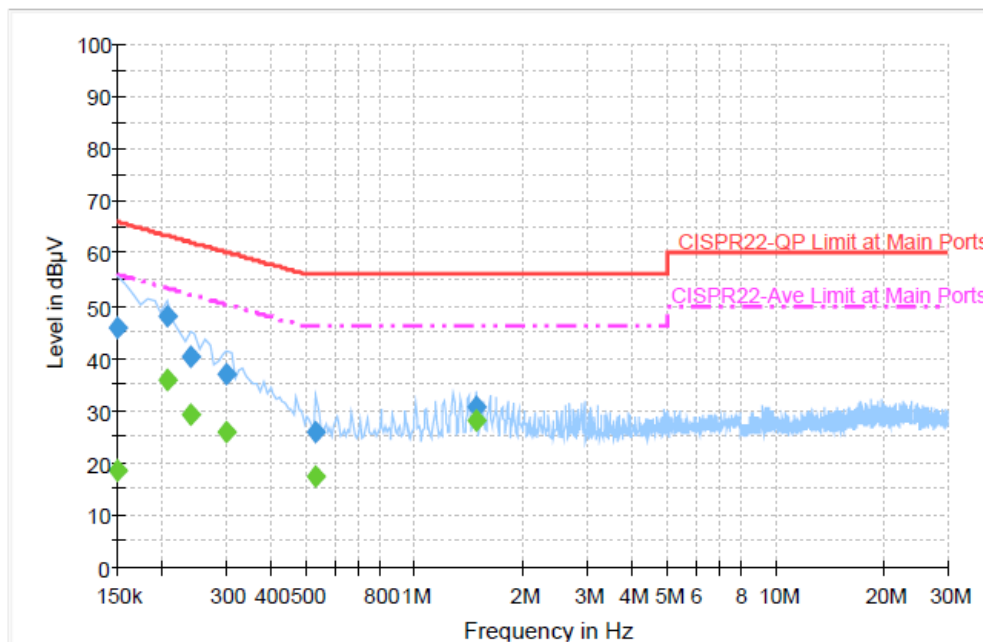
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	46.4	Off	L1	19.4	19.6	66.0
0.198000	46.0	Off	L1	19.3	17.7	63.7
0.270000	40.6	Off	L1	19.3	20.5	61.1
0.334000	36.5	Off	L1	19.3	22.9	59.4
0.398000	32.0	Off	L1	19.4	25.9	57.9
1.550000	28.0	Off	L1	19.4	28.0	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	18.9	Off	L1	19.4	37.1	56.0
0.198000	34.3	Off	L1	19.3	19.4	53.7
0.270000	27.9	Off	L1	19.3	23.2	51.1
0.334000	26.7	Off	L1	19.3	22.7	49.4
0.398000	22.3	Off	L1	19.4	25.6	47.9
1.550000	23.6	Off	L1	19.4	22.4	46.0

Test Mode :	Mode 1	Temperature :	21~23°C
Test Engineer :	Hayden Wu	Relative Humidity :	52~54%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WCDMA Band II Idle + Bluetooth Link + WLAN Link + MP3 Play + Earphone + USB Cable (Link with Notebook)		
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)
0.150000	45.7	Off	N	19.4	20.3	66.0
0.206000	48.0	Off	N	19.3	15.4	63.4
0.238000	40.2	Off	N	19.4	22.0	62.2
0.302000	36.9	Off	N	19.3	23.3	60.2
0.534000	25.9	Off	N	19.3	30.1	56.0
1.478000	30.8	Off	N	19.4	25.2	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	18.6	Off	N	19.4	37.4	56.0
0.206000	35.9	Off	N	19.3	18.5	53.4
0.238000	29.0	Off	N	19.4	23.2	52.2
0.302000	26.0	Off	N	19.3	23.8	50.2
0.534000	17.4	Off	N	19.3	28.6	46.0
1.478000	28.1	Off	N	19.4	17.9	46.0

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

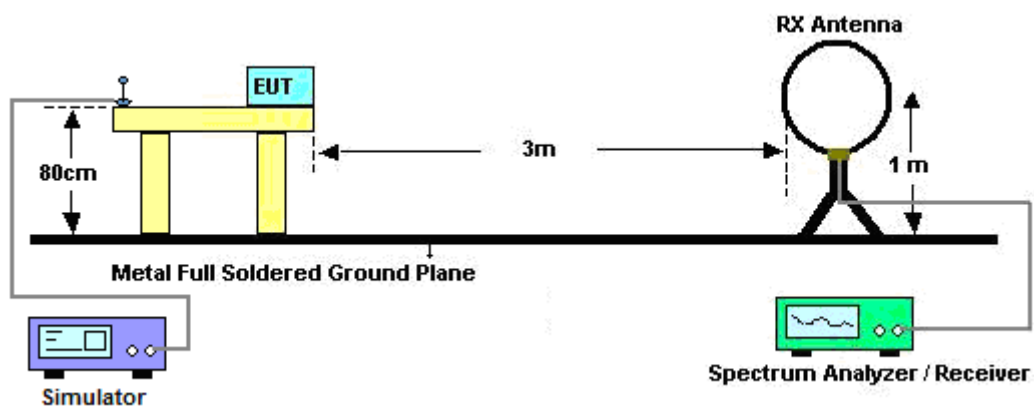
See list of measuring instruments of this test report.

3.9.3 Test Procedures

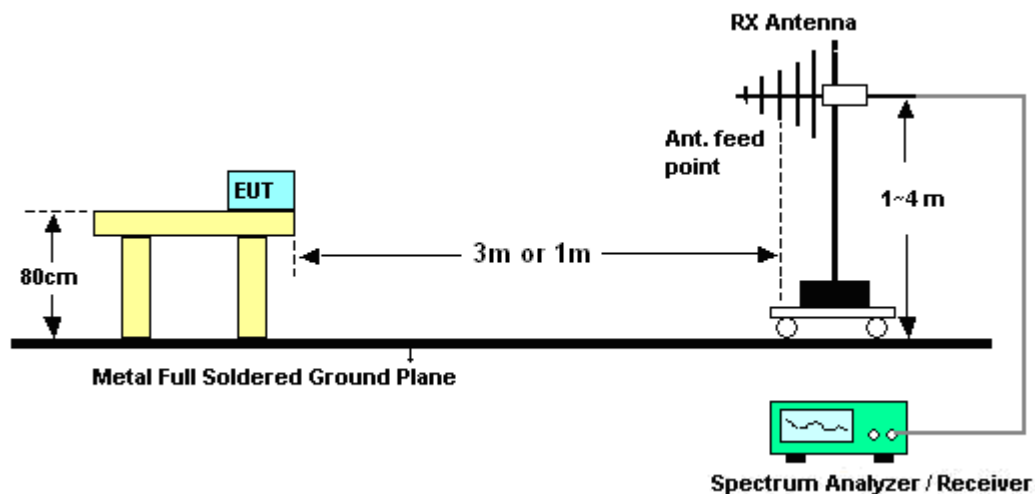
- The testing follows the guidelines in FCC Public Notice DA 00-705 Measurement Guidelines.
- Use the following spectrum analyzer settings:
 - Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz; VBW $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
 - 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)
- 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 :	David Yang	Temperature :	24~25℃	
		Relative Humidity :	45~46%	

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 :	24~25°C
Test Channel :	00	Relative Humidity :	45~46%
Test Engineer :	David Yang	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
30.00	28.43	-11.57	40.00	42.85	16.51	0.53	31.46	-	-	Peak
48.63	33.24	-6.76	40.00	55.01	9.08	0.68	31.53	106	178	Peak
159.33	25.86	-17.64	43.50	45.71	10.45	1.22	31.52	-	-	Peak
598.20	21.40	-24.60	46.00	29.90	19.74	2.68	30.92	-	-	Peak
690.60	21.54	-24.46	46.00	28.67	20.78	2.92	30.83	-	-	Peak
909.00	26.29	-19.71	46.00	29.87	23.74	3.36	30.68	-	-	Peak
2372.70	49.97	-24.03	74.00	45.35	32.16	5.99	33.53	167	0	Peak
2372.70	34.27	-19.73	54.00	29.65	32.16	5.99	33.53	167	0	Average
2402.00	104.01	-	-	99.33	32.18	6.03	33.53	167	0	Peak
2402.00	86.54	-	-	81.86	32.18	6.03	33.53	167	0	Average
2492.00	33.57	-20.43	54.00	28.66	32.30	6.18	33.57	167	0	Average
2492.00	47.62	-26.38	74.00	42.71	32.30	6.18	33.57	167	0	Peak



Test Mode :	Mode 1	Temperature :	24~25°C
Test Channel :	00	Relative Humidity :	45~46%
Test Engineer :	David Yang	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
30.00	31.87	-8.13	40.00	46.29	16.51	0.53	31.46	100	227	Peak
48.36	28.29	-11.71	40.00	50.06	9.08	0.68	31.53	-	-	Peak
159.33	28.67	-14.83	43.50	48.52	10.45	1.22	31.52	-	-	Peak
617.80	20.67	-25.33	46.00	28.86	19.97	2.74	30.90	-	-	Peak
764.10	23.42	-22.58	46.00	29.13	21.90	3.08	30.69	-	-	Peak
878.20	24.92	-21.08	46.00	28.95	23.37	3.31	30.71	-	-	Peak
2362.06	50.21	-23.79	74.00	45.61	32.13	5.99	33.52	103	295	Peak
2362.06	35.69	-18.31	54.00	31.09	32.13	5.99	33.52	103	295	Average
2402.00	105.39	-	-	100.71	32.18	6.03	33.53	103	295	Peak
2402.00	87.60	-	-	82.92	32.18	6.03	33.53	103	295	Average
2484.00	33.73	-20.27	54.00	28.83	32.28	6.18	33.56	103	295	Average
2484.00	45.92	-28.08	74.00	41.02	32.28	6.18	33.56	103	295	Peak

Test Mode :	Mode 2	Temperature :	24~25°C
Test Channel :	39	Relative Humidity :	45~46%
Test Engineer :	David Yang	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
30.00	28.96	-11.04	40.00	43.38	16.51	0.53	31.46	-	-	Peak
48.90	31.90	-8.10	40.00	53.67	9.08	0.68	31.53	100	313	Peak
145.29	26.00	-17.50	43.50	45.02	11.33	1.21	31.56	-	-	Peak
399.40	20.57	-25.43	46.00	33.05	16.56	2.14	31.18	-	-	Peak
618.50	21.50	-24.50	46.00	29.67	19.98	2.75	30.90	-	-	Peak
820.10	24.94	-21.06	46.00	29.74	22.71	3.19	30.70	-	-	Peak
2318.00	47.90	-26.10	74.00	43.40	32.09	5.92	33.51	109	2	Peak
2318.00	33.73	-20.27	54.00	29.23	32.09	5.92	33.51	109	2	Average
2441.00	106.00	-	-	101.20	32.24	6.11	33.55	109	2	Peak
2441.00	88.51	-	-	83.71	32.24	6.11	33.55	109	2	Average
2494.00	48.53	-25.47	74.00	43.62	32.30	6.18	33.57	109	2	Peak
2494.00	33.70	-20.30	54.00	28.79	32.30	6.18	33.57	109	2	Average



Test Mode :	Mode 2	Temperature :	24~25°C
Test Channel :	39	Relative Humidity :	45~46%
Test Engineer :	David Yang	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
30.00	31.75	-8.25	40.00	46.17	16.51	0.53	31.46	-	-	Peak
48.63	32.34	-7.66	40.00	54.11	9.08	0.68	31.53	122	194	Peak
159.06	28.77	-14.73	43.50	48.62	10.45	1.22	31.52	-	-	Peak
497.40	19.30	-26.70	46.00	29.75	18.18	2.44	31.07	-	-	Peak
629.00	22.35	-23.65	46.00	30.36	20.10	2.78	30.89	-	-	Peak
803.30	24.39	-21.61	46.00	29.42	22.50	3.15	30.68	-	-	Peak
2374.00	48.02	-25.98	74.00	43.40	32.16	5.99	33.53	100	315	Peak
2374.00	33.41	-20.59	54.00	28.79	32.16	5.99	33.53	100	315	Average
2441.00	104.71	-	-	99.91	32.24	6.11	33.55	100	315	Peak
2441.00	87.04	-	-	82.24	32.24	6.11	33.55	100	315	Average
2494.00	49.29	-24.71	74.00	44.38	32.30	6.18	33.57	100	315	Peak
2494.00	33.68	-20.32	54.00	28.77	32.30	6.18	33.57	100	315	Average

Test Mode :	Mode 3	Temperature :	24~25°C
Test Channel :	78	Relative Humidity :	45~46%
Test Engineer :	David Yang	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
30.54	30.12	-9.88	40.00	44.77	16.27	0.54	31.46	110	236	Peak
47.82	27.31	-12.69	40.00	48.68	9.48	0.67	31.52	-	-	Peak
160.41	25.50	-18.00	43.50	45.42	10.38	1.22	31.52	-	-	Peak
399.40	21.86	-24.14	46.00	34.34	16.56	2.14	31.18	-	-	Peak
715.80	22.77	-23.23	46.00	29.43	21.14	2.98	30.78	-	-	Peak
825.70	24.73	-21.27	46.00	29.47	22.76	3.21	30.71	-	-	Peak
2356.00	45.87	-28.13	74.00	41.31	32.13	5.95	33.52	104	9	Peak
2356.00	33.73	-20.27	54.00	29.17	32.13	5.95	33.52	104	9	Average
2480.00	107.56	-	-	102.66	32.28	6.18	33.56	104	9	Peak
2480.00	89.51	-	-	84.61	32.28	6.18	33.56	104	9	Average
2483.50	50.21	-23.79	74.00	45.31	32.28	6.18	33.56	104	9	Peak
2483.50	31.76	-22.24	54.00	26.86	32.28	6.18	33.56	104	9	Average



Test Mode :	Mode 3	Temperature :	24~25°C
Test Channel :	78	Relative Humidity :	45~46%
Test Engineer :	David Yang	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
30.00	29.96	-10.04	40.00	44.38	16.51	0.53	31.46	100	94	Peak
46.74	29.62	-10.38	40.00	50.59	9.87	0.67	31.51	-	-	Peak
125.85	28.28	-15.22	43.50	47.16	11.56	1.13	31.57	-	-	Peak
579.30	20.67	-25.33	46.00	29.55	19.44	2.63	30.95	-	-	Peak
775.30	24.07	-21.93	46.00	29.59	22.07	3.10	30.69	-	-	Peak
926.50	25.81	-20.19	46.00	29.08	23.96	3.40	30.63	-	-	Peak
2340.00	46.88	-27.12	74.00	42.34	32.11	5.95	33.52	100	307	Peak
2340.00	33.82	-20.18	54.00	29.28	32.11	5.95	33.52	100	307	Average
2480.00	104.87	-	-	99.97	32.28	6.18	33.56	100	307	Peak
2480.00	87.10	-	-	82.20	32.28	6.18	33.56	100	307	Average
2483.50	48.54	-25.46	74.00	43.64	32.28	6.18	33.56	100	307	Peak
2483.50	30.23	-23.77	54.00	25.33	32.28	6.18	33.56	100	307	Average

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	Anritsu	ML2495A	0932001	N/A	Sep. 13, 2010	Sep. 12, 2011	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	0846202	N/A	Sep. 14, 2010	Sep. 13, 2011	Conducted (TH02-HY)
EMI Test Receive	R&S	ESCS 30	100356	9KHz – 2.75GHz	Aug. 16, 2010	Aug. 15, 2011	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100081	9KHz ~ 30MHz	Dec. 03, 2010	Dec. 02, 2011	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100080	9KHz ~ 30MHz	Dec. 01, 2010	Nov. 30, 2011	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	117997	N/A	May 14, 2009	May 13, 2011	Conduction (CO05-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2726	30MHz ~ 1GHz	Oct. 31, 2010	Oct. 30, 2011	Radiation (03CH07-HY)
Spectrum Analyzer	R&S	FSP	101067	9KHz ~ 30GHz	Dec. 03, 2010	Dec. 02, 2011	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 19, 2010	Aug. 18, 2011	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170 251	15GHz- 40GHz	Oct. 18, 2010	Oct. 17, 2011	Radiation (03CH07-HY)
Pre Amplifier	Agilent	8449B	3008A023 62	1GHz~ 26.5GHz	Dec.06,2010	Dec. 05, 2011	Radiation (03CH07-HY)
Pre Amplifier	COM-POWER	PA-103A	161241	10-1000MHz.32 dB.GAIN	Mar. 27, 2010	Mar. 26, 2011	Radiation (03CH07-HY)
Loop Antenna	R&S	HFH2-Z2	860004/00 1	9 kHz~30 MHz	Jul. 29, 2010	Jul. 28, 2011	Radiation (03CH07-HY)
Bluetooth Base Station	R&S	CBT32	100519	N/A	May 12, 2009	May 11, 2011	Radiation (03CH07-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 EP0N2304-01 as below.