

FCC RF Test Report

APPLICANT : Motorola Solutions, Inc.
EQUIPMENT : Enterprise Digital Assistant (EDA)
BRAND NAME : Motorola
MODEL NAME : MC4597
FCC ID : UZ7MC4597
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DSS) Spread Spectrum Transmitter

The product was received on Apr. 20, 2012 and completely tested on May 20, 2012. 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:



Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

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FCC ID : UZ7MC4597

Page Number : 1 of 72

Report Issued Date : Dec. 05, 2012

Report Version : Rev. 01

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR250901A	Rev. 01	Initial issue of report	Dec. 05, 2012

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	-
3.2	-	Gen 4.6.1	99% Bandwidth	-	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	$\leq 125\text{ mW}$	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 7.2.4	AC Conducted Emission	15.207(a)	Pass	Under limit 18.30 dB at 0.342 MHz and 1.470 MHz
3.9	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 9.97 dB at 2483.500 MHz
3.10	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Motorola Solutions, Inc.

One Motorola Plaza, Holtsville, NY 11742-1300 USA

1.2 Manufacturer

Inventec Appliances Corp.

37, Wugong 5th Road, New Taipei industrial Park, Wugu District, New Taipei City, Taiwan 24890

1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	Enterprise Digital Assistant (EDA)
Brand Name	Motorola
Model Name	MC4597
FCC ID	UZ7MC4597
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) : 0.51 dBm (0.0011 W) Bluetooth EDR (2Mbps) : 2.70 dBm (0.0019 W) Bluetooth EDR (3Mbps) : 3.02 dBm (0.0020 W)
Antenna Type	PIFA Antenna with gain 2.85 dBi
HW Version	DVT2.3
SW Version	BSP9.351
Type of Modulation	Bluetooth (1Mbps) : GFSK Bluetooth EDR (2Mbps) : $\pi/4$ -DQPSK Bluetooth EDR (3Mbps) : 8-DPSK
EUT Stage	Identical Prototype

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

1.	Mobile Computing Terminal	OS Version	BSP9.351
2.	-	OEM Name	MC45
3.	-	OEM Version	DVT2.3
4.	Wireless (Fusion)	Part Number	WM-AG-AT-02-C
5.	-	Version	3.40.0.0.56

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 8
- IC RSS-Gen Issue 3

Remark:

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

1.6 Ancillary Equipment List

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	GPS Station	T&E	GS-50	N/A	N/A	Unshielded, 1.8 m
3.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
4.	Bluetooth Base Station	R&S	CBT32	N/A	N/A	Unshielded, 1.8 m
5.	Notebook	DELL	P20G	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
6.	Bluetooth Earphone	Sony Ericsson	MW600	PY70DA2029	N/A	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	$\pi/4$ -DQPSK	8-DPSK
		1Mbps	2Mbps	3Mbps
Ch00	2402MHz	-0.61 dBm	1.49 dBm	1.68 dBm
Ch39	2441MHz	0.51 dBm	2.70 dBm	3.02 dBm
Ch78	2480MHz	-0.58 dBm	1.56 dBm	1.87 dBm

Remark:

1. All the test data for each data rate were verified, but only the worst case was reported.
2. The data rate was set in 3Mbps for all the test items due to the highest RF output power.
3. 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).

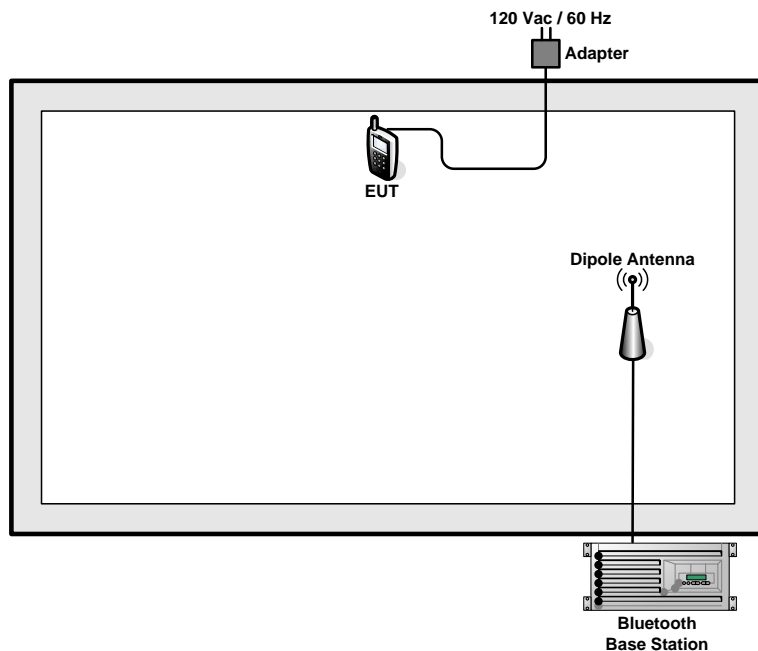
Pre-scanned tests, X, Y, Z in three orthogonal panels, were conducted to determine the final configuration from all possible combinations.

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

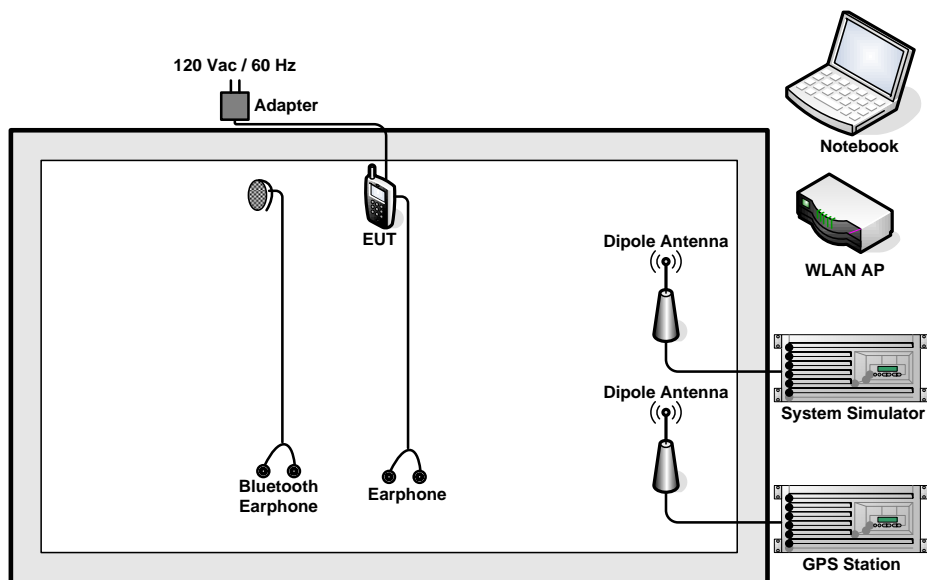
Test Cases			
Test Item	Data Rate / Modulation		
	Bluetooth 1Mbps GFSK	Bluetooth EDR 2Mbps $\pi/4$ -DQPSK	Bluetooth EDR 3Mbps 8-DPSK
Conducted TCs	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz	Mode 4: CH00_2402 MHz Mode 5: CH39_2441 MHz Mode 6: CH78_2480 MHz	Mode 7: CH00_2402 MHz 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 :GSM850 Idle + Bluetooth Link + WLAN (2.4G) Link + GPS Rx + MP3 + USB Cable (Chaging from Adapter) Mode 2 :WCDMA Band V Idle + Bluetooth Link + WLAN (5G) Link + GPS Rx + MP3 + USB Cable (Chaging from Adapter)		
Remark:			
1. 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. For conducted emission, the worst case is mode 2; all the test data were reported.			
3. “Bluetooth Link” stands for terminal linked to headset by Bluetooth function.			
4. “WLAN Link” stands for terminal associated with AP at 2.4GHz or 5GHz band.			
5. “GPS Rx” stands for receive signals from GPS station continuously.			
6. “MP3” stands for playing MP3 file.			
7. The battery (03 Rev A) and battery (01 Rev C) spec are the same, only difference is label.			

2.3 Connection Diagram of Test System

<Bluetooth Tx Mode>



<AC Conducted Emission Mode>





2.4 RF Utility

For Bluetooth function, the RF utility, “Regedit” was installed in EUT which was programmed then set “DUT Mode=1” and turn on Bluetooth in order to make the EUT into the engineering modes to contact with Bluetooth base station for continuous transmitting and receiving signals.

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.

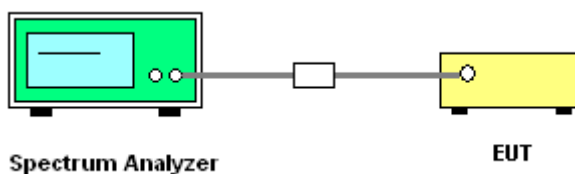
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedure

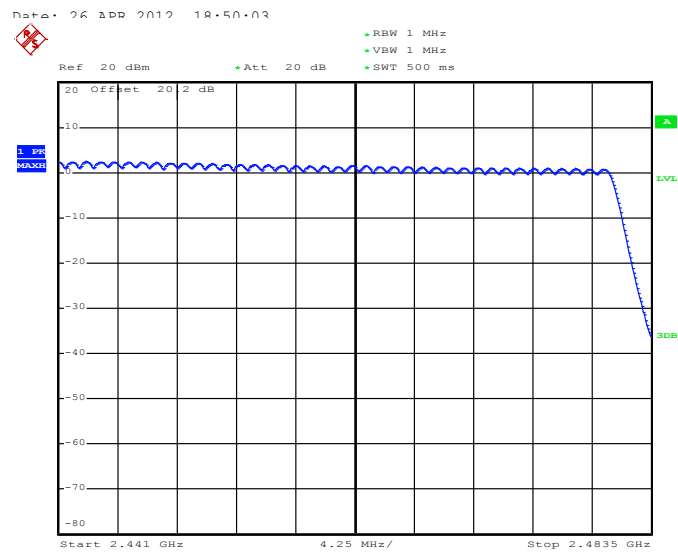
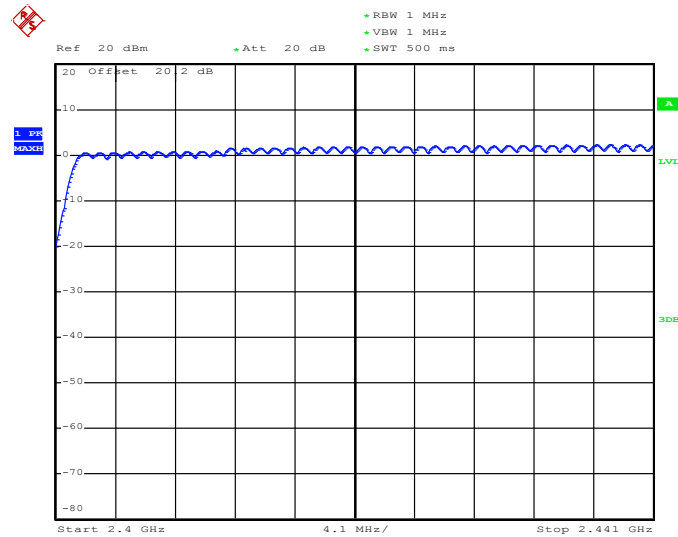
1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. The modulation types of EUT are irrelevant to number of hopping channels deviation.
4. The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:
5. Span = the frequency band of operation; $RBW \geq 1\%$ of the span; $VBW \geq RBW$; Sweep = auto; Detector function = peak; Trace = max hold.
6. 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°C
Test Engineer :	Kenny Chen	Relative Humidity :	50~53%
Number of Hopping Channels (Channel)		Limits (Channel)	Pass/Fail
79		> 15	Pass

Number of Hopping Channel Plot on Channel 00 - 78


Date: 26.APR.2012 18:59:19

3.2 20dB and 99% Bandwidth Measurement

3.2.1 Limit of 20dB Bandwidth

N/A

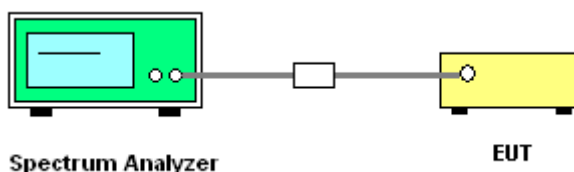
3.2.2 Measuring Instruments

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

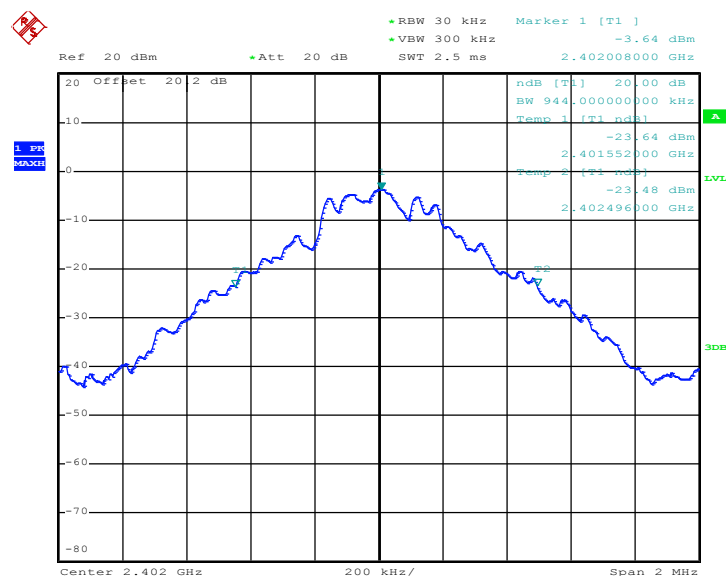


3.2.5 Test Result of 20dB Bandwidth

Test Mode :	Mode 1, 2, 3	Temperature :	24~26℃
Test Engineer :	Kenny Chen	Relative Humidity :	50~53%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	0.944
39	2441	0.944
78	2480	0.940

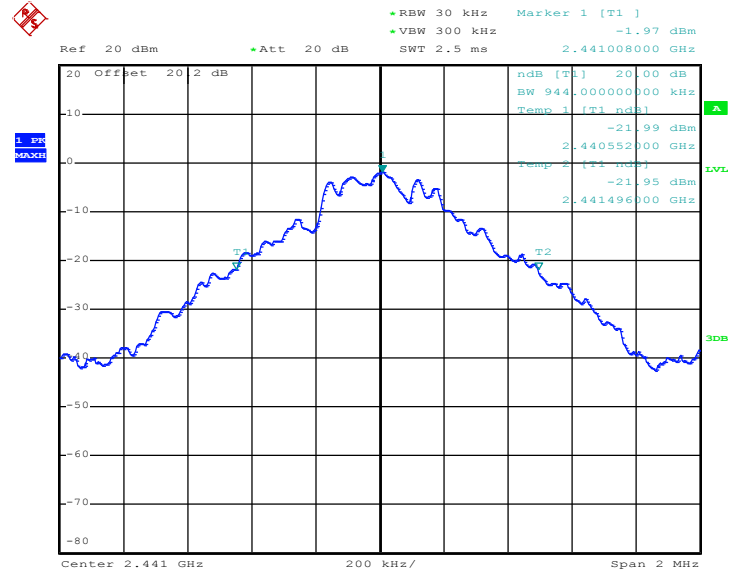
20 dB Bandwidth Plot on Channel 00



Date: 26.APR.2012 18:22:20

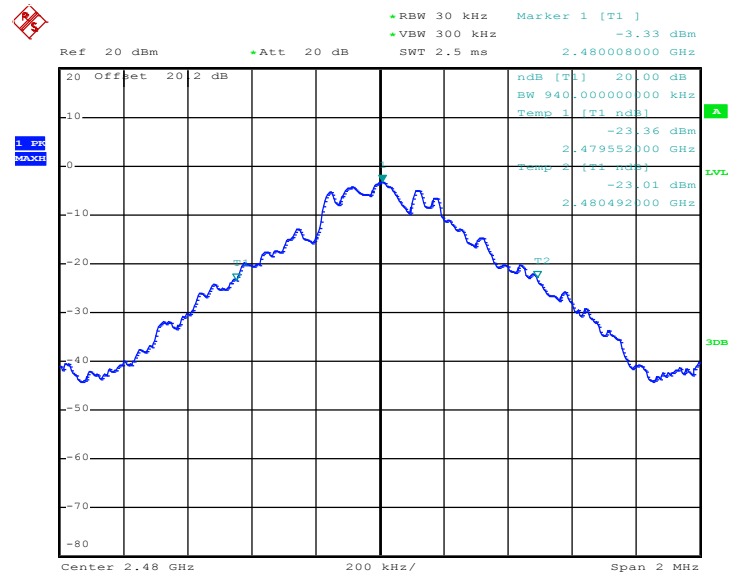


20 dB Bandwidth Plot on Channel 39



Date: 26.APR.2012 18:26:11

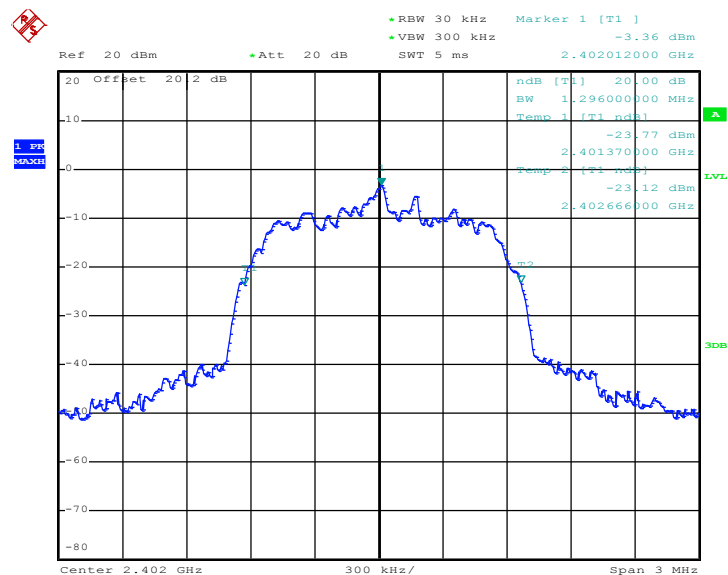
20 dB Bandwidth Plot on Channel 78



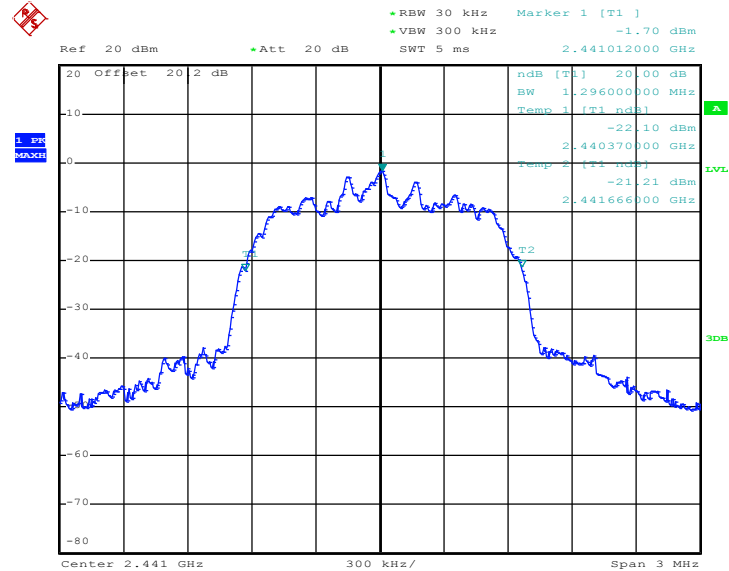
Date: 26.APR.2012 18:26:39

Test Mode :	Mode 4, 5, 6	Temperature :	24~26°C
Test Engineer :	Kenny Chen	Relative Humidity :	50~53%

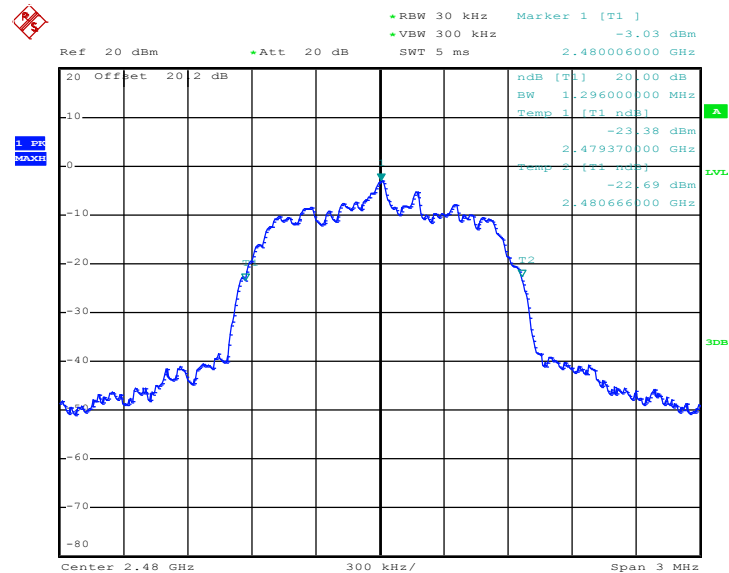
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.296
39	2441	1.296
78	2480	1.296

20 dB Bandwidth Plot on Channel 00


Date: 26.APR.2012 18:27:24

20 dB Bandwidth Plot on Channel 39


Date: 26.APR.2012 18:27:52

20 dB Bandwidth Plot on Channel 78


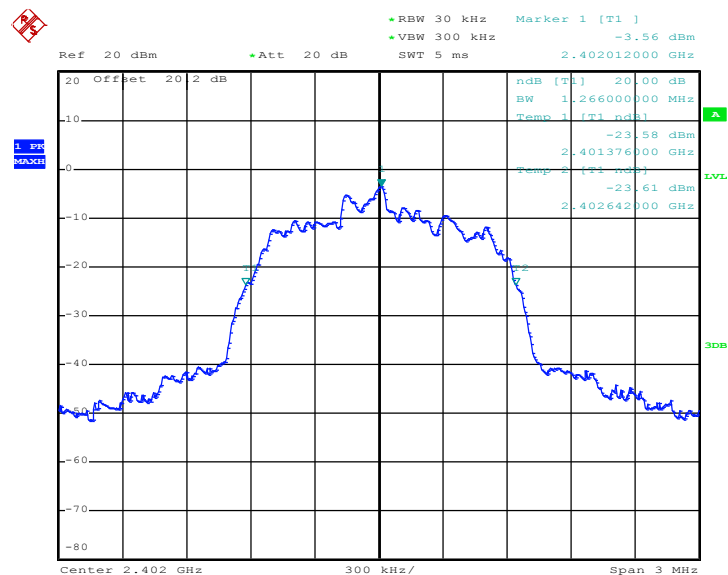
Date: 26.APR.2012 18:28:32



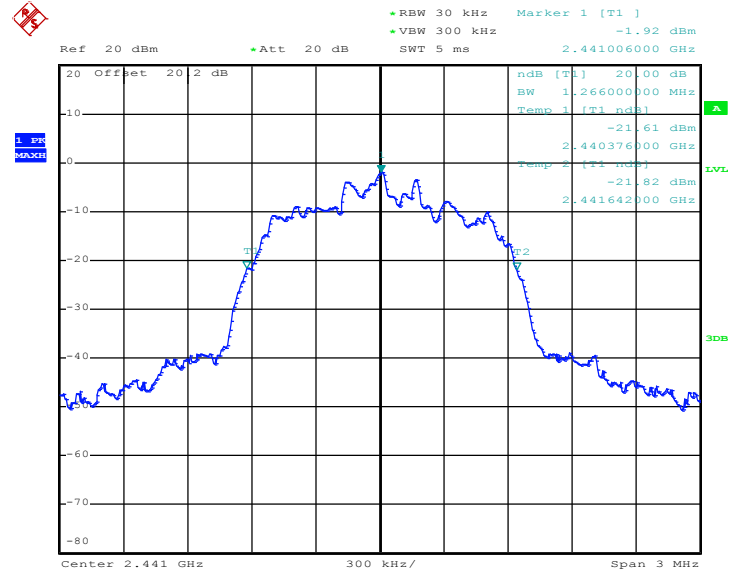
Test Mode :	Mode 7, 8, 9	Temperature :	24~26°C
Test Engineer :	Kenny Chen	Relative Humidity :	50~53%

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

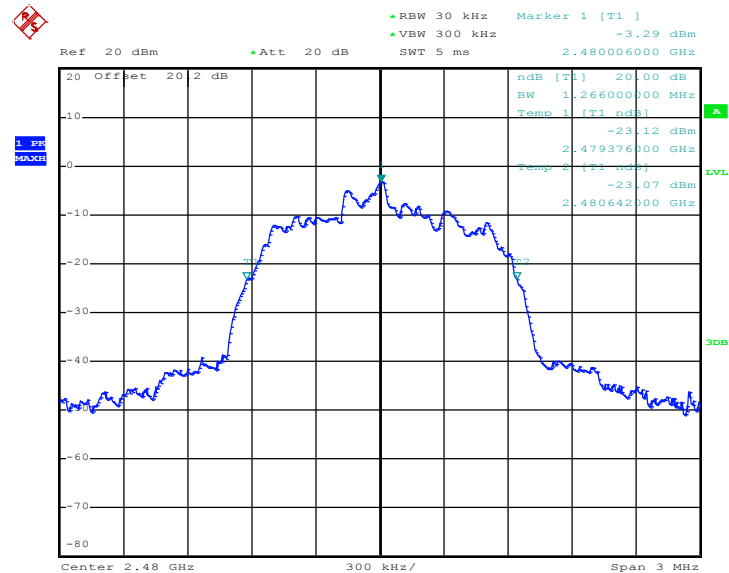
20 dB Bandwidth Plot on Channel 00



Date: 26.APR.2012 18:29:09

20 dB Bandwidth Plot on Channel 39


Date: 26.APR.2012 18:29:59

20 dB Bandwidth Plot on Channel 78


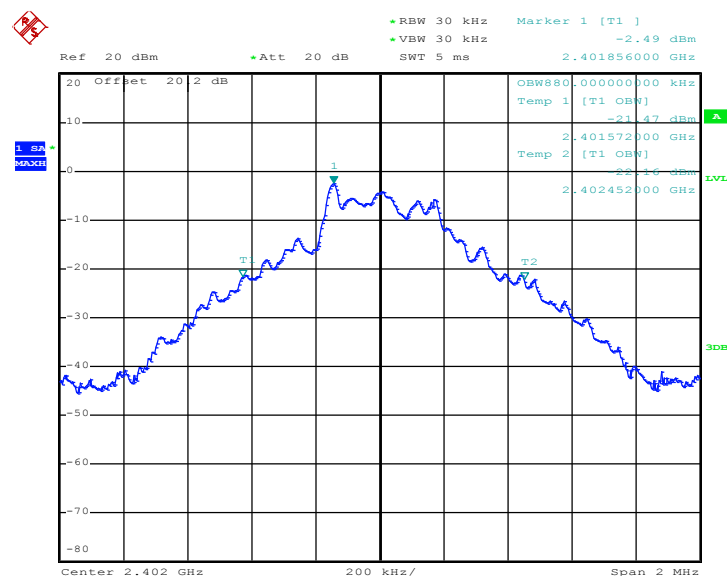
Date: 26.APR.2012 18:30:28

3.2.6 Test Result of 99% Occupied Bandwidth

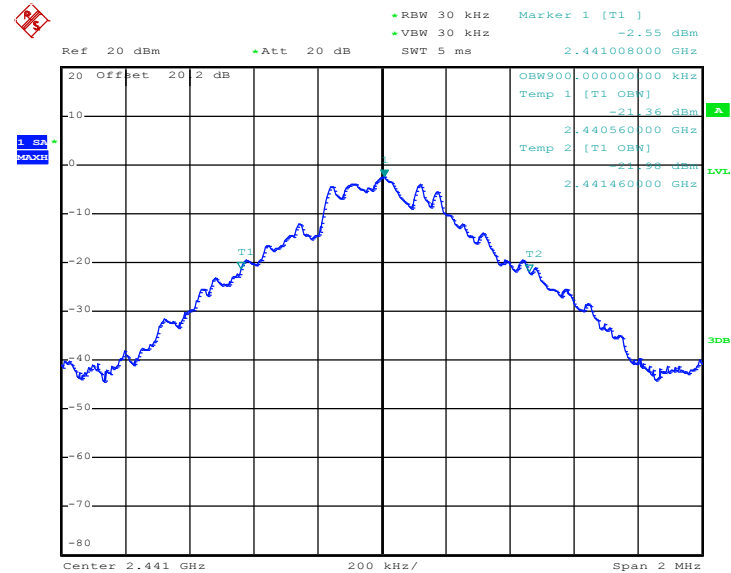
Test Mode :	Mode 1, 2, 3	Temperature :	24~26°C
Test Engineer :	Kenny Chen	Relative Humidity :	50~53%

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	0.880
39	2441	0.900
78	2480	0.904

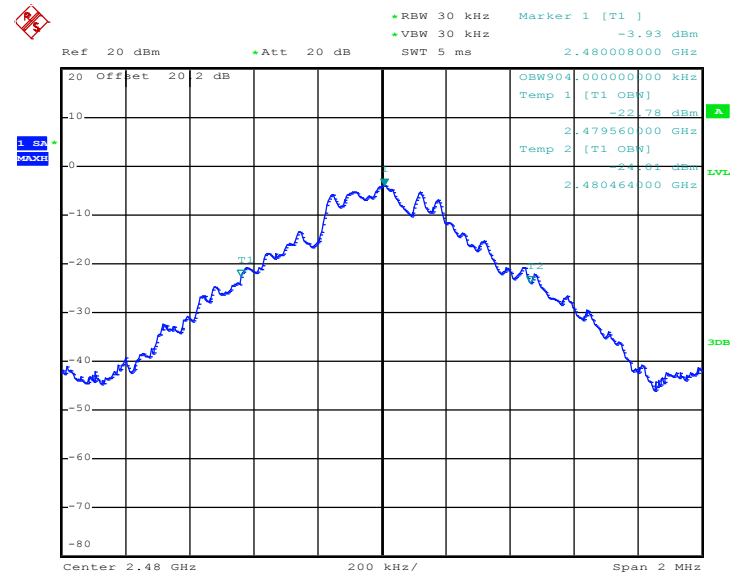
99% Bandwidth Plot on Channel 00



Date: 26.APR.2012 18:37:02

99% Occupied Bandwidth Plot on Channel 39


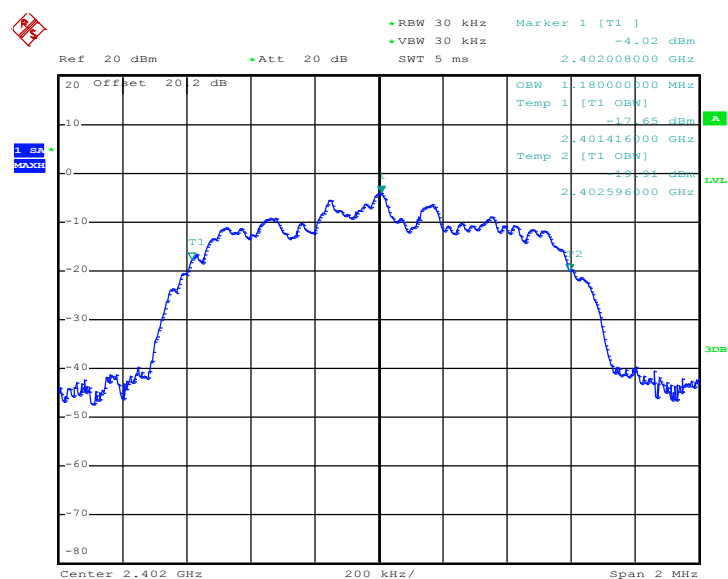
Date: 26.APR.2012 18:37:43

99% Occupied Bandwidth Plot on Channel 78


Date: 26.APR.2012 18:38:23

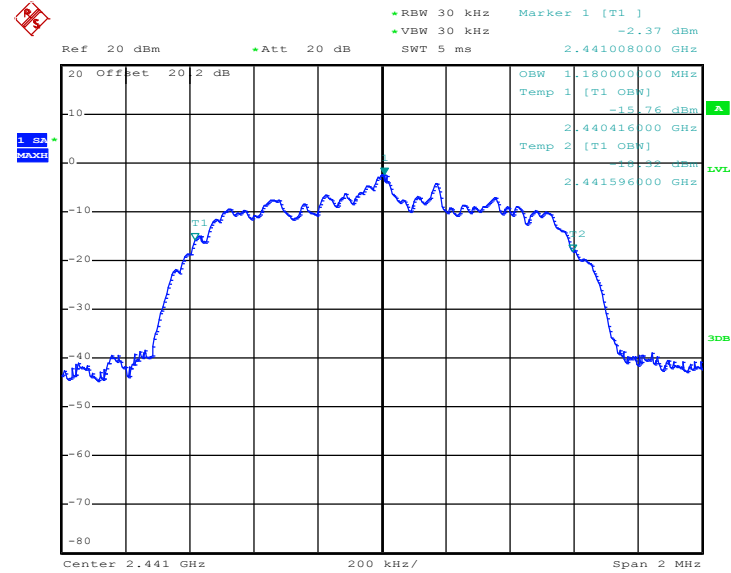
Test Mode :	Mode 4, 5, 6	Temperature :	24~26°C
Test Engineer :	Kenny Chen	Relative Humidity :	50~53%

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	1.180
39	2441	1.180
78	2480	1.184

99% Bandwidth Plot on Channel 00


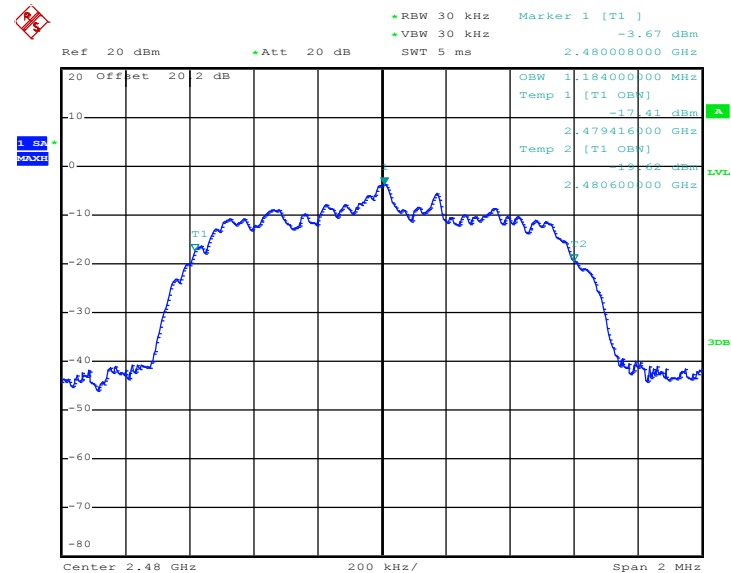
Date: 26.APR.2012 18:39:02

99% Occupied Bandwidth Plot on Channel 39



Date: 26.APR.2012 18:39:39

99% Occupied Bandwidth Plot on Channel 78



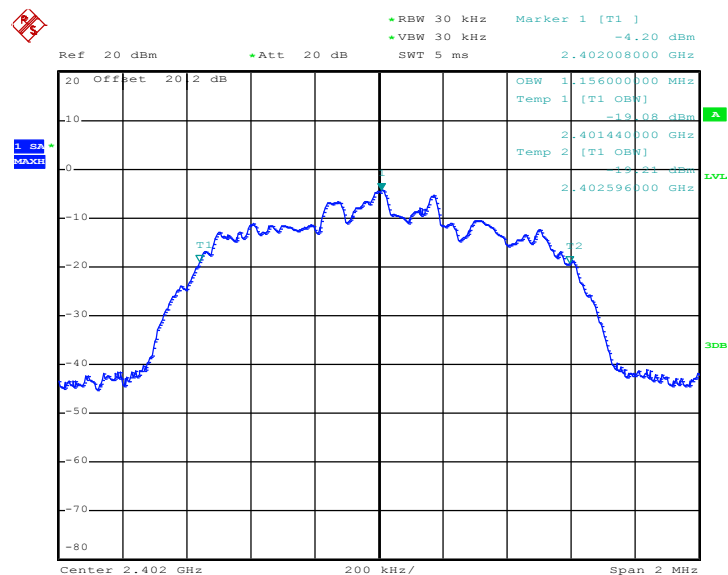
Date: 26.APR.2012 18:40:16



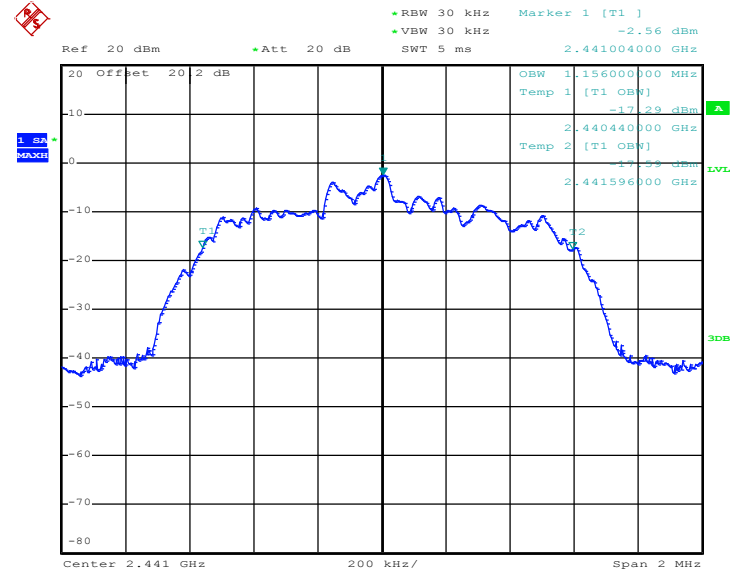
Test Mode :	Mode 7, 8, 9	Temperature :	24~26°C
Test Engineer :	Kenny Chen	Relative Humidity :	50~53%

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	1.156
39	2441	1.156
78	2480	1.160

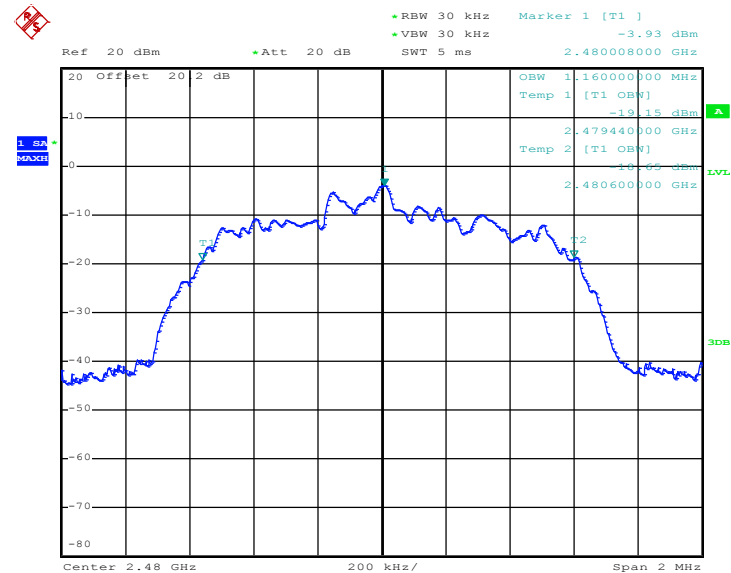
99% Bandwidth Plot on Channel 00



Date: 26.APR.2012 18:40:56

99% Occupied Bandwidth Plot on Channel 39


Date: 26.APR.2012 18:41:33

99% Occupied Bandwidth Plot on Channel 78


Date: 26.APR.2012 18:42:11

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.

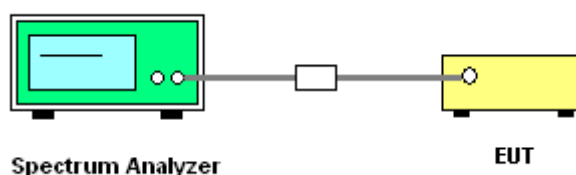
3.3.2 Measuring Instruments

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

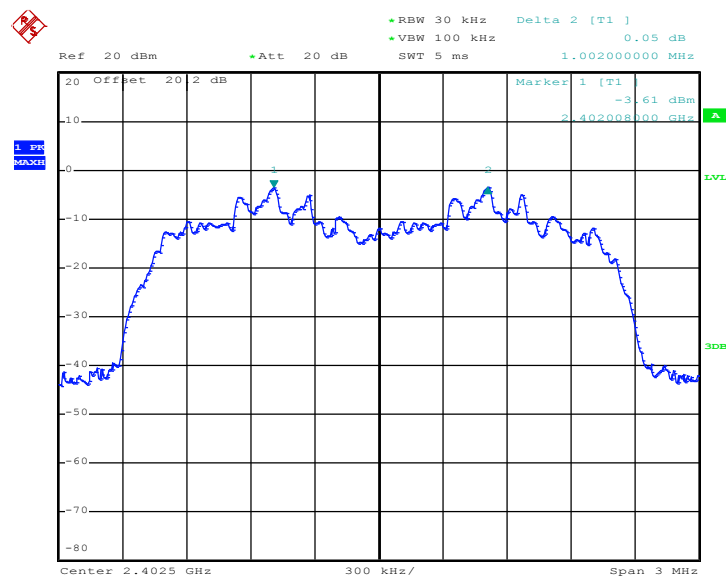


3.3.5 Test Result of Hopping Channel Separation

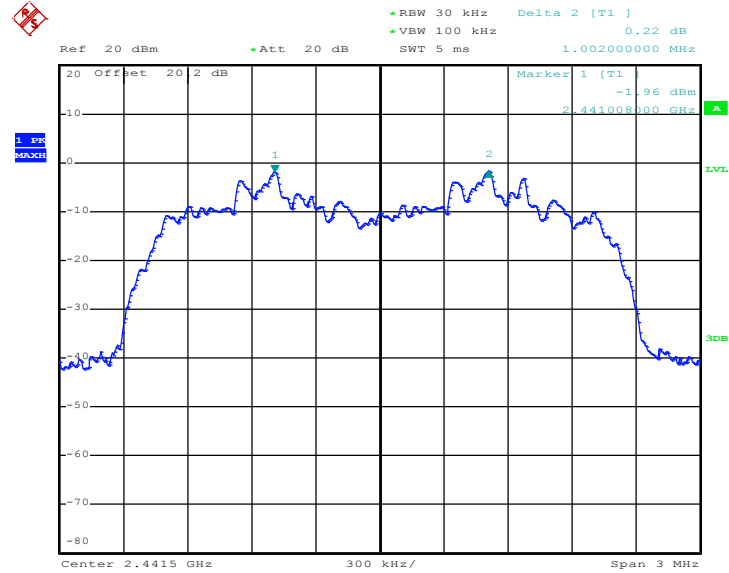
Test Mode :	Mode 7, 8, 9	Temperature :	24~26℃
Test Engineer :	Kenny Chen	Relative Humidity :	50~53%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.002	0.8440	Pass
39	2441	1.002	0.8440	Pass
78	2480	1.002	0.8480	Pass

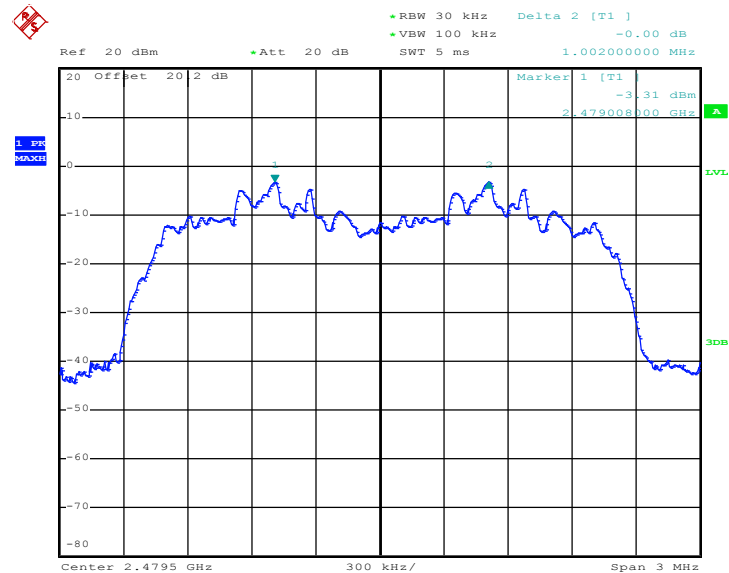
Channel Separation Plot on Channel 00 - 01



Date: 26.APR.2012 18:12:11

Channel Separation Plot on Channel 39 - 40


Date: 26.APR.2012 18:14:16

Channel Separation Plot on Channel 77 - 78


Date: 26.APR.2012 18:14:57

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.

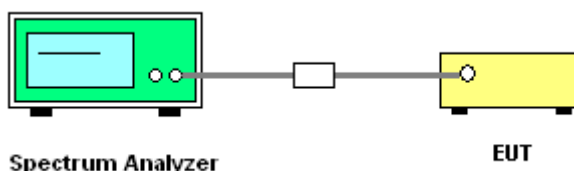
3.4.2 Measuring Instruments

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



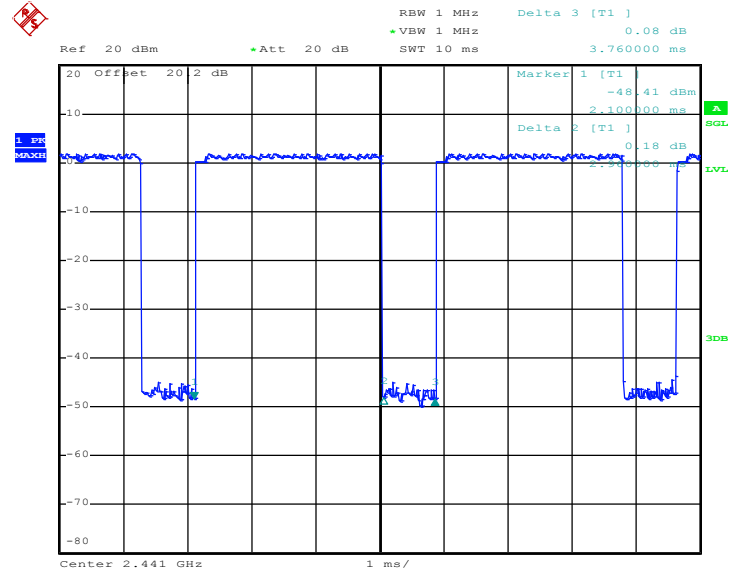
3.4.5 Test Result of Dwell Time

Test Mode :	Mode 8	Temperature :	24~26°C
Test Engineer :	Kenny Chen	Relative Humidity :	50~53%

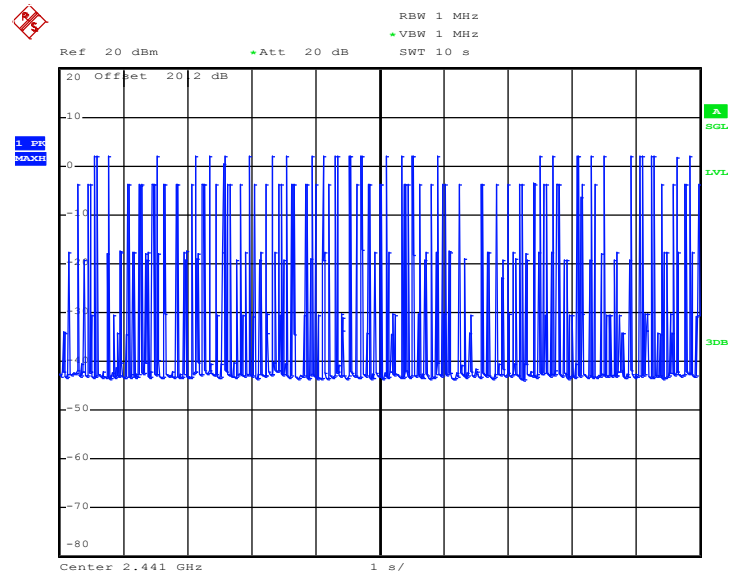
Package Mode	Average Hopping Channel	Package Transfer Time (usec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
3DH5	3.20	2960.00	0.30	0.4	Pass

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)

3DH5 Dwell Time (One Pulse) Plot on Channel 39


Date: 20.APR.2012 13:38:07

3DH5 Dwell Time (Count Pulses) Plot on Channel 39


Date: 26.APR.2012 19:41:18

3.5 Peak Output Power Measurement

3.5.1 Limit of Peak Output Power

Section 15.247 (b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band 0.125 watts. The power limit for 1Mbps is 1watt, and for 2Mbps, and 3Mbps are 0.125 watts.

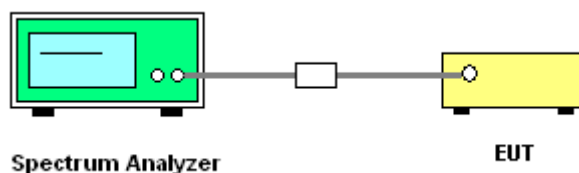
3.5.2 Measuring Instruments

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

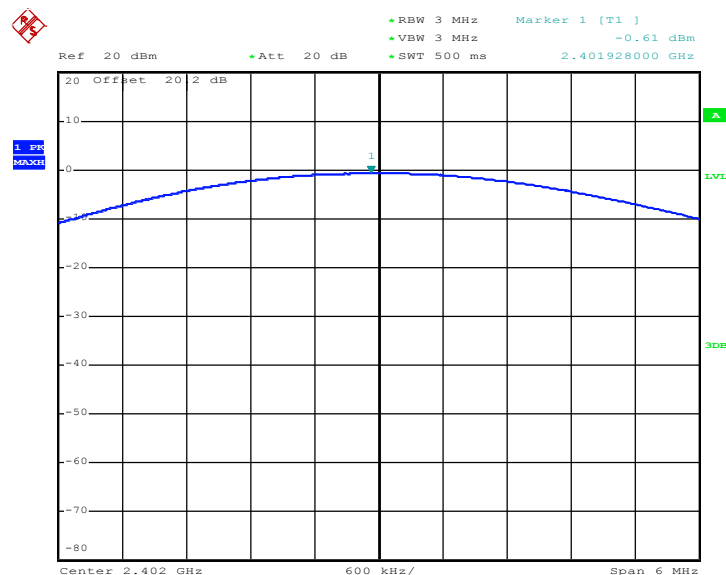


3.5.5 Test Result of Peak Output Power

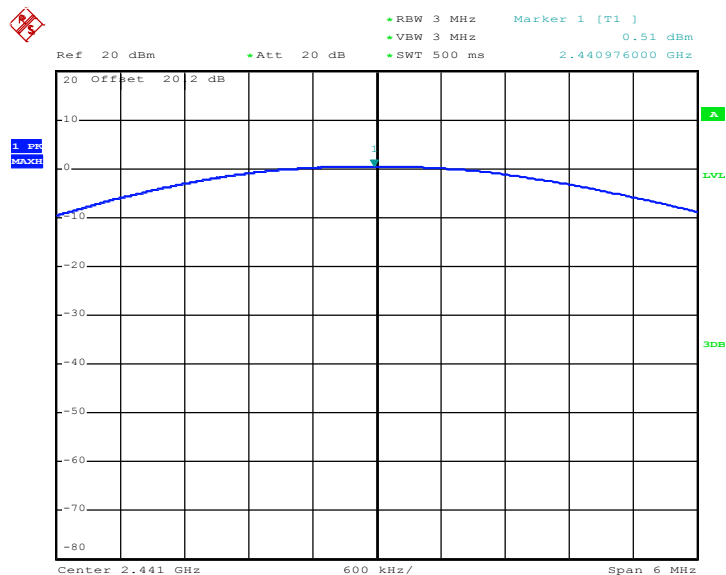
Test Mode :	Mode 1, 2, 3	Temperature :	24~26℃
Test Engineer :	Kenny Chen	Relative Humidity :	50~53%

Channel	Frequency (MHz)	RF Power (dBm)		
		GFSK	Max. Limits (dBm)	Pass/Fail
		1 Mbps		
00	2402	-0.61	30.00	Pass
39	2441	0.51	30.00	Pass
78	2480	-0.58	30.00	Pass

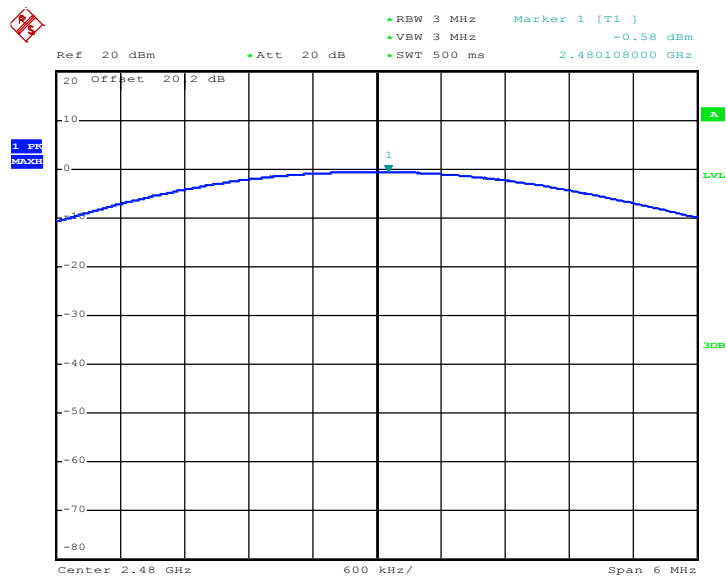
Peak Output Power Plot on Channel 00



Date: 20.APR.2012 13:52:59

Peak Output Power Plot on Channel 39


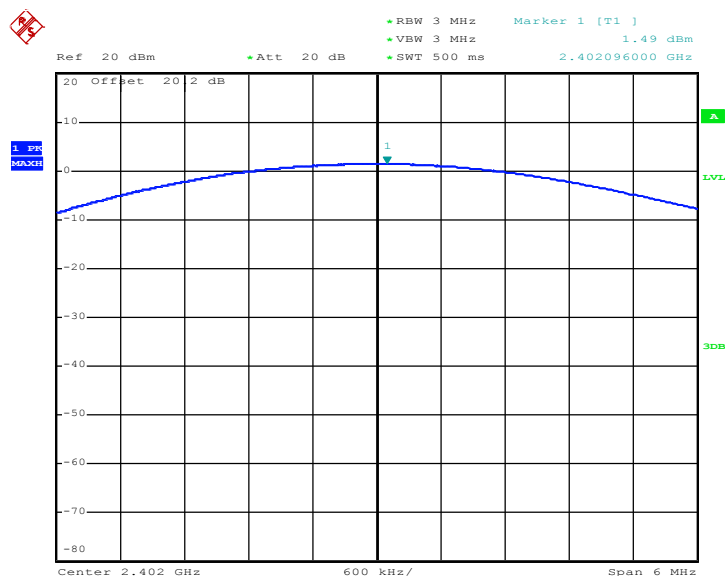
Date: 20.APR.2012 13:54:18

Peak Output Power Plot on Channel 78


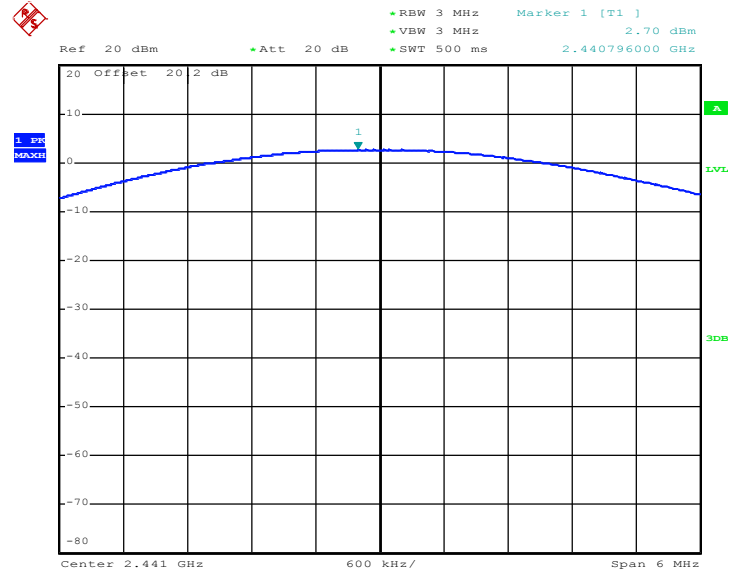
Date: 20.APR.2012 13:55:39

Test Mode :	Mode 4, 5, 6	Temperature :	24~26°C
Test Engineer :	Kenny Chen	Relative Humidity :	50~53%

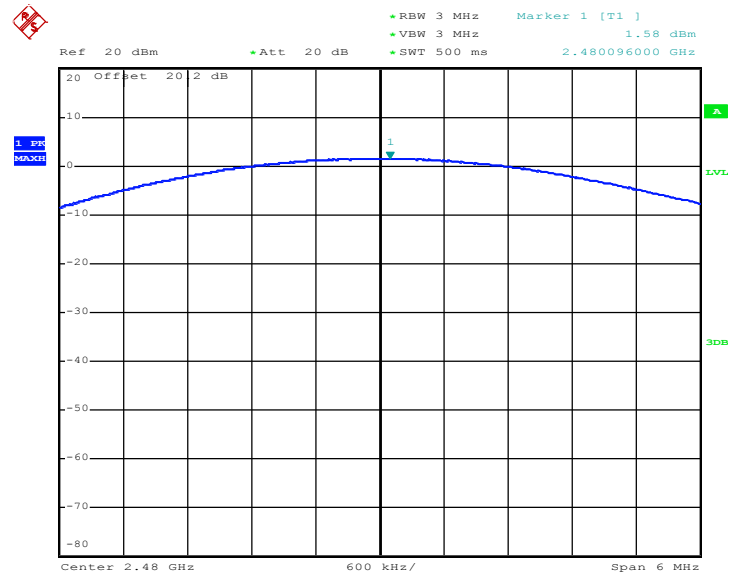
Channel	Frequency (MHz)	RF Power (dBm)		
		$\pi/4$ -DQPSK	Max. Limits (dBm)	Pass/Fail
		2 Mbps		
00	2402	1.49	20.97	Pass
39	2441	2.70	20.97	Pass
78	2480	1.58	20.97	Pass

Peak Output Power Plot on Channel 00


Date: 20.APR.2012 13:53:42

Peak Output Power Plot on Channel 39


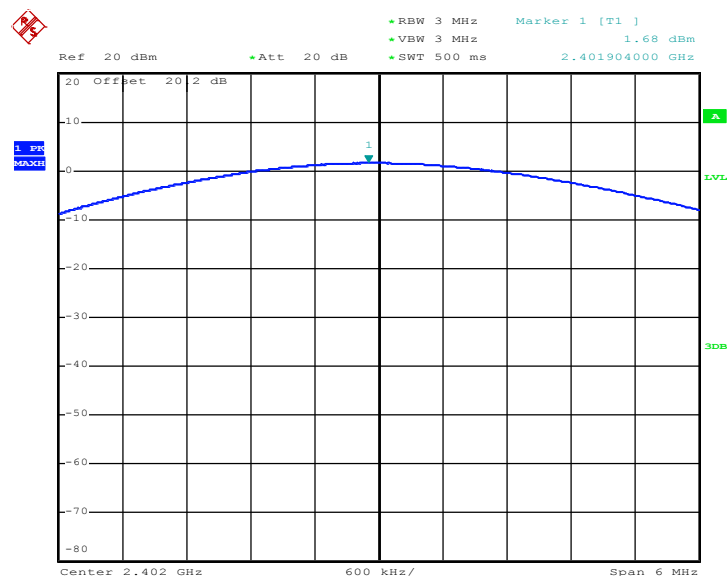
Date: 20.APR.2012 13:55:03

Peak Output Power Plot on Channel 78


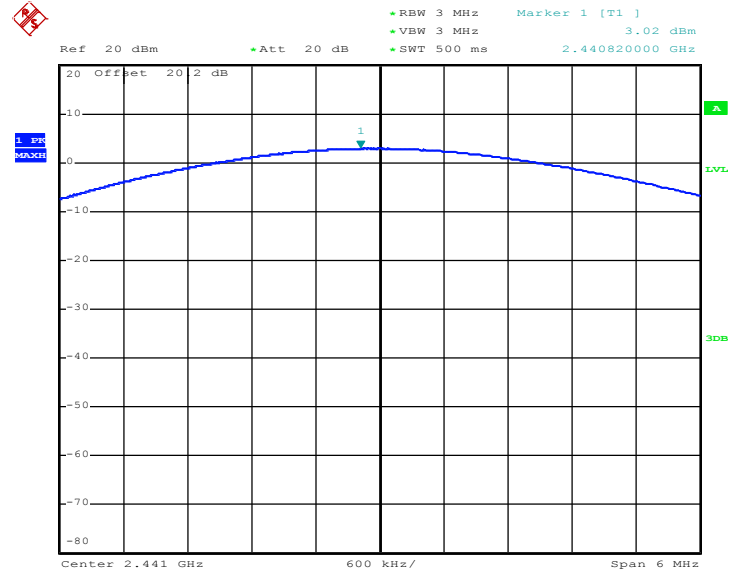
Date: 20.APR.2012 13:56:23

Test Mode :	Mode 7, 8, 9	Temperature :	24~26°C
Test Engineer :	Kenny Chen	Relative Humidity :	50~53%

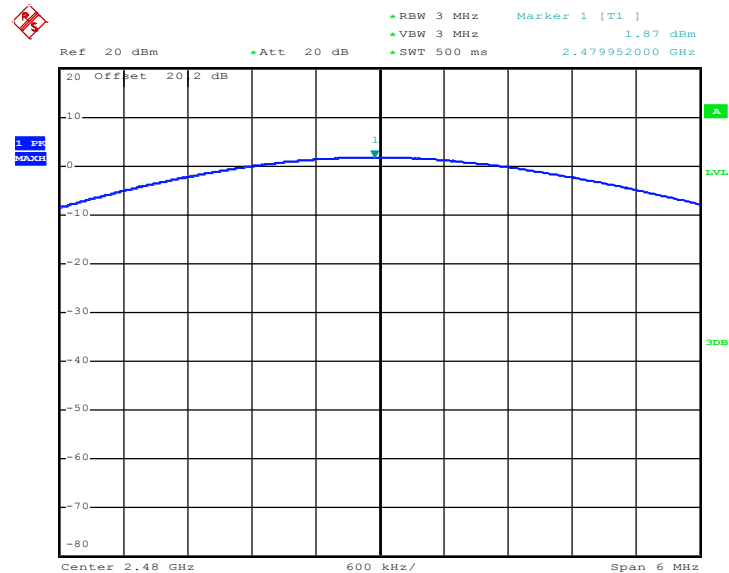
Channel	Frequency (MHz)	RF Power (dBm)		
		8-DPSK	Max. Limits (dBm)	Pass/Fail
		3 Mbps		
00	2402	1.68	20.97	Pass
39	2441	3.02	20.97	Pass
78	2480	1.87	20.97	Pass

Peak Output Power Plot on Channel 00


Date: 20.APR.2012 13:53:51

Peak Output Power Plot on Channel 39


Date: 20.APR.2012 13:55:13

Peak Output Power Plot on Channel 78


Date: 20.APR.2012 13:56:32

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

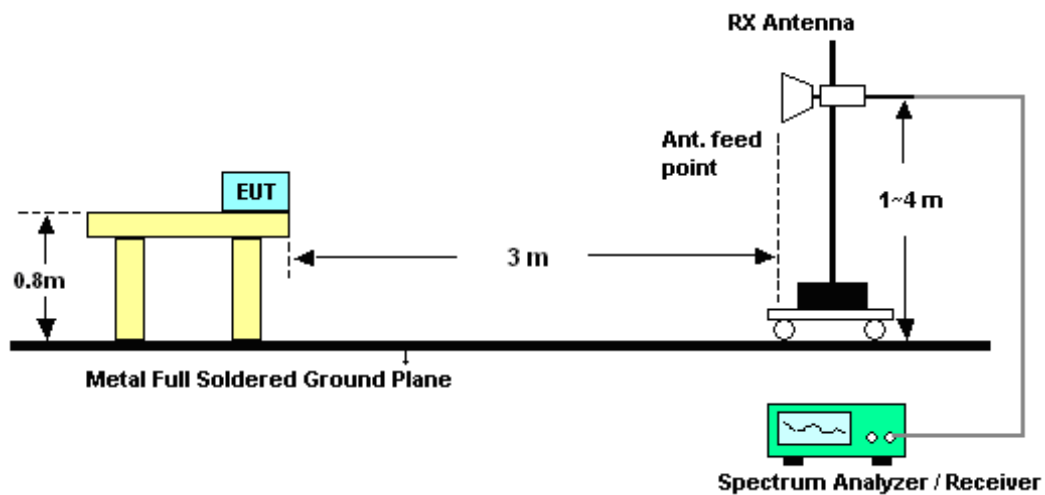
See list of measuring instruments of this test report.

3.6.3 Test Procedures

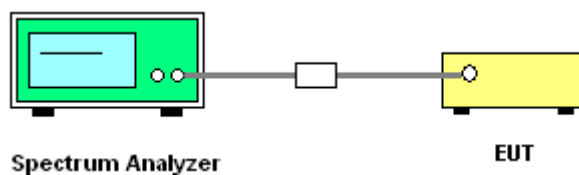
1. The testing follows the guidelines in ANSI C63.4-2003 and FCC Public Notice DA 00-705 Measurement Guidelines.
2. RF antenna conducted test: Set RBW = 300KHz, Video bandwidth (VBW) \geq RBW. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as 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 :	23~24°C
Test Channel :	00	Relative Humidity :	46~47%
		Test Engineer :	David Ke and Kai Wang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2337.12	46.96	-27.04	74	42.97	31.98	5.95	33.94	108	17	Peak
2337.12	33.53	-20.47	54	29.54	31.98	5.95	33.94	108	17	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2357.92	47.39	-26.61	74	43.34	32.01	5.99	33.95	162	335	Peak
2357.92	37.21	-16.79	54	33.16	32.01	5.99	33.95	162	335	Average

Test Mode :	Mode 3	Temperature :	23~24°C
Test Channel :	78	Relative Humidity :	46~47%
		Test Engineer :	David Ke and Kai Wang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	64.03	-9.97	74	59.67	32.18	6.18	34	127	13	Peak
2483.5	26.47	-27.53	54	22.11	32.18	6.18	34	127	13	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	83.09	56.62	26.47	54	-27.53	Pass
Hopping Mode	83.09	57.52	25.57	54	-28.43	Pass

Note: Average result = Maximum field strength – Delta result

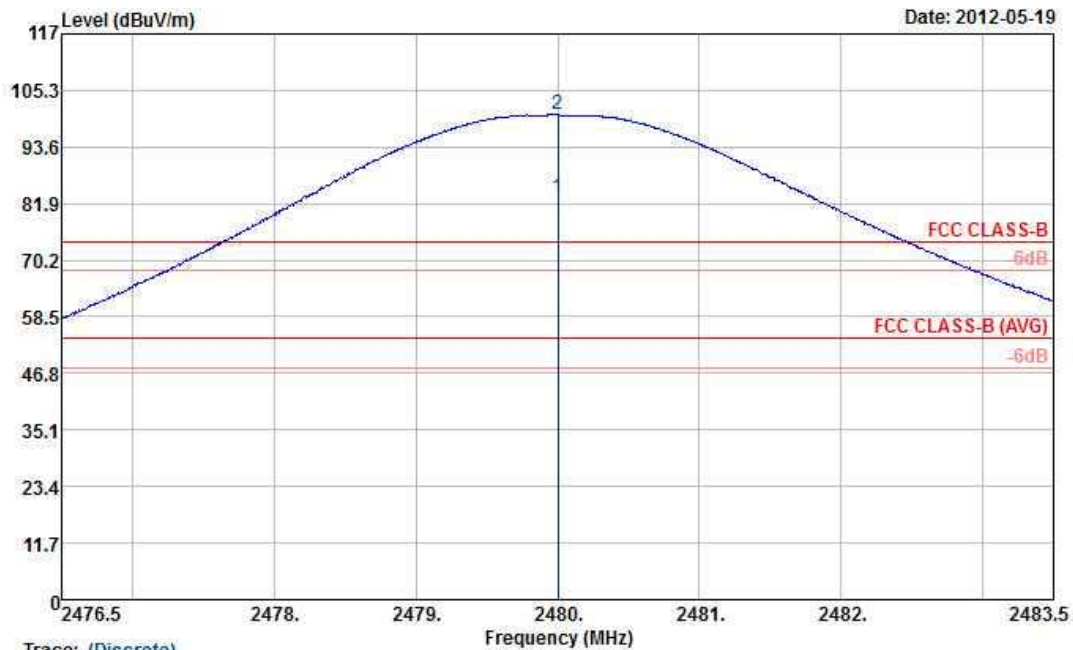
ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	62.18	-11.82	74	57.82	32.18	6.18	34	155	346	Peak
2483.5	26.09	-27.91	54	21.73	32.18	6.18	34	155	346	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	81.49	55.67	25.82	54	-28.18	Pass
Hopping Mode	81.49	55.4	26.09	54	-27.91	Pass

Note: Average result = Maximum field strength – Delta result

Test Mode :	Mode 3	Temperature :	23~24°C
Test Channel :	78	Relative Humidity :	46~47%
Test Engineer :	David Ke and Kai Wang	Polarization :	Horizontal



Trace: (Discrete)

Site : 03CH07-HY

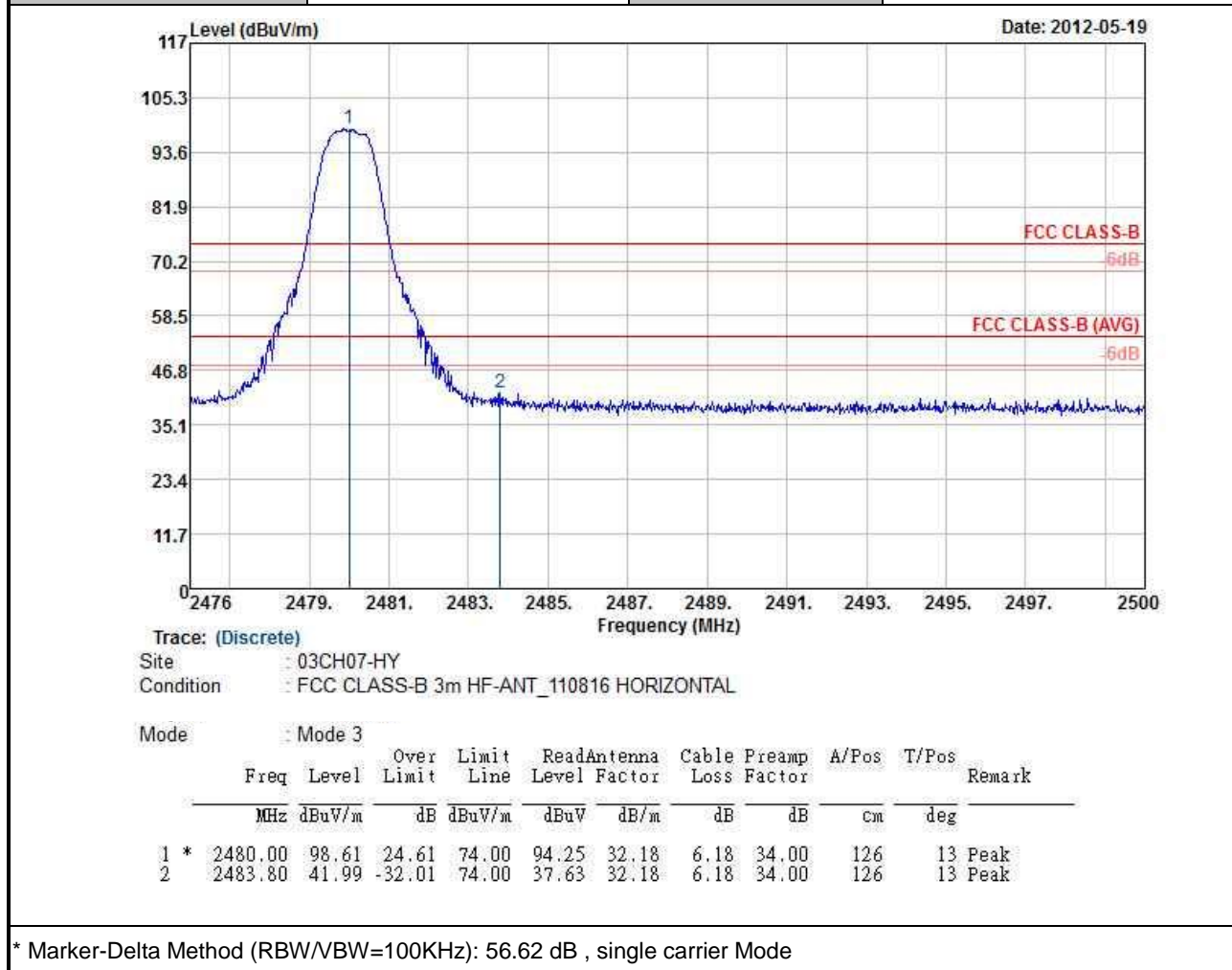
Condition : FCC CLASS-B 3m HF-ANT_110816 HORIZONTAL

Mode : Mode 3

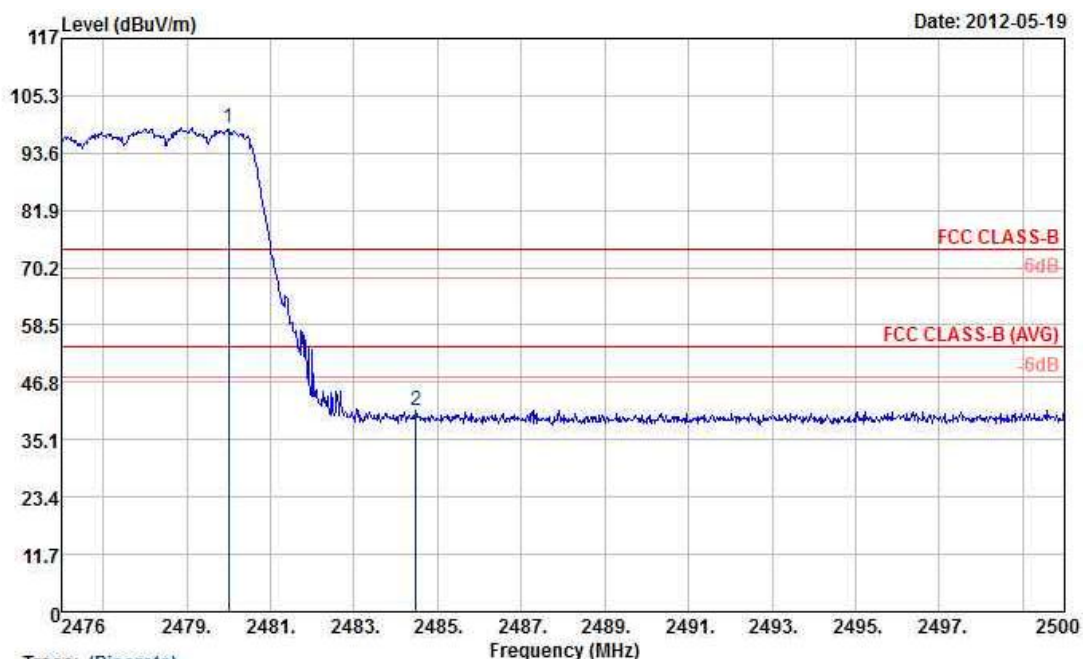
	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 *	2480.00	83.09	29.09	54.00	78.73	32.18	6.18	34.00	126	13 Average
2 *	2480.00	100.24	26.24	74.00	95.88	32.18	6.18	34.00	126	13 Peak

* Maximum field strength of the fundamental emission

Test Mode :	Mode 3	Temperature :	23~24°C
Test Channel :	78	Relative Humidity :	46~47%
Test Engineer :	David Ke and Kai Wang	Polarization :	Horizontal



Test Mode :	Mode 3	Temperature :	23~24°C
Test Channel :	78	Relative Humidity :	46~47%
Test Engineer :	David Ke and Kai Wang	Polarization :	Horizontal



Trace: (Discrete)

Site : 03CH07-HY

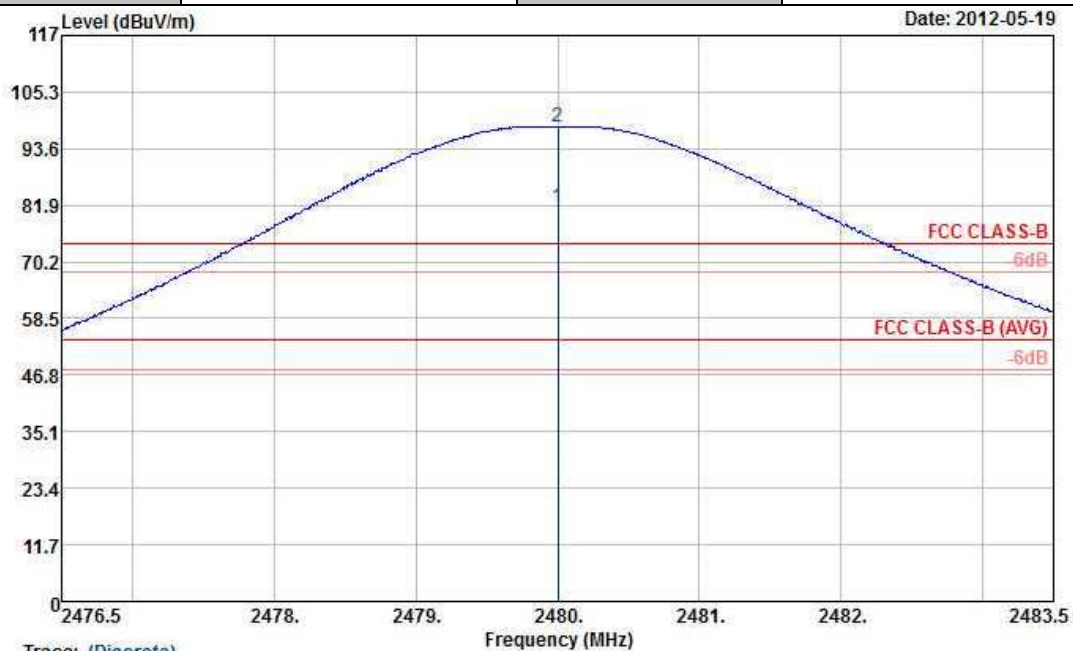
Condition : FCC CLASS-B 3m HF-ANT_110816 HORIZONTAL

Mode : Mode 3

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level Factor	Cable Loss Factor	Preamp Loss Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 *	2480.00	98.64	24.64	74.00	94.28	32.18	6.18	34.00	126	13 Peak
2	2484.47	41.12	-32.88	74.00	36.76	32.18	6.18	34.00	126	13 Peak

* Marker-Delta Method (RBW/VBW=100KHz): 57.52 dB , Hopping Mode

Test Mode :	Mode 3	Temperature :	23~24°C
Test Channel :	78	Relative Humidity :	46~47%
Test Engineer :	David Ke and Kai Wang	Polarization :	Vertical



Trace: (Discrete)

Site : 03CH07-HY

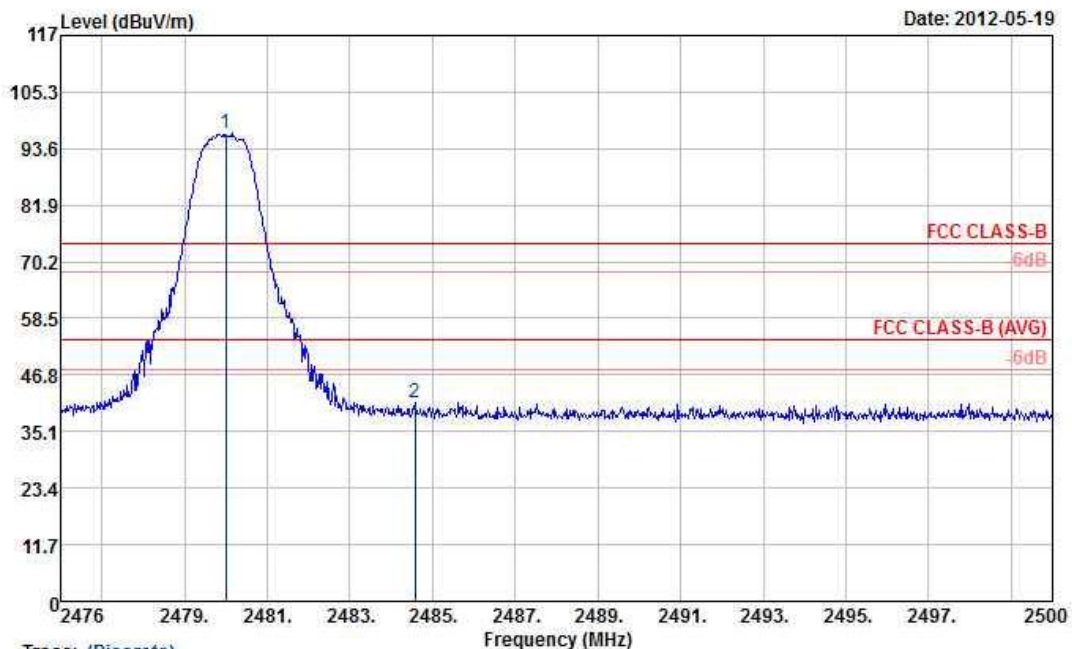
Condition : FCC CLASS-B 3m HF-ANT_110816 VERTICAL

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 *	2480.00	81.49	27.49	54.00	77.13	32.18	6.18	34.00	155	346 Average
2 *	2480.00	98.24	24.24	74.00	93.88	32.18	6.18	34.00	155	346 Peak

* Maximum field strength of the fundamental emission

Test Mode :	Mode 3	Temperature :	23~24°C
Test Channel :	78	Relative Humidity :	46~47%
Test Engineer :	David Ke and Kai Wang	Polarization :	Vertical

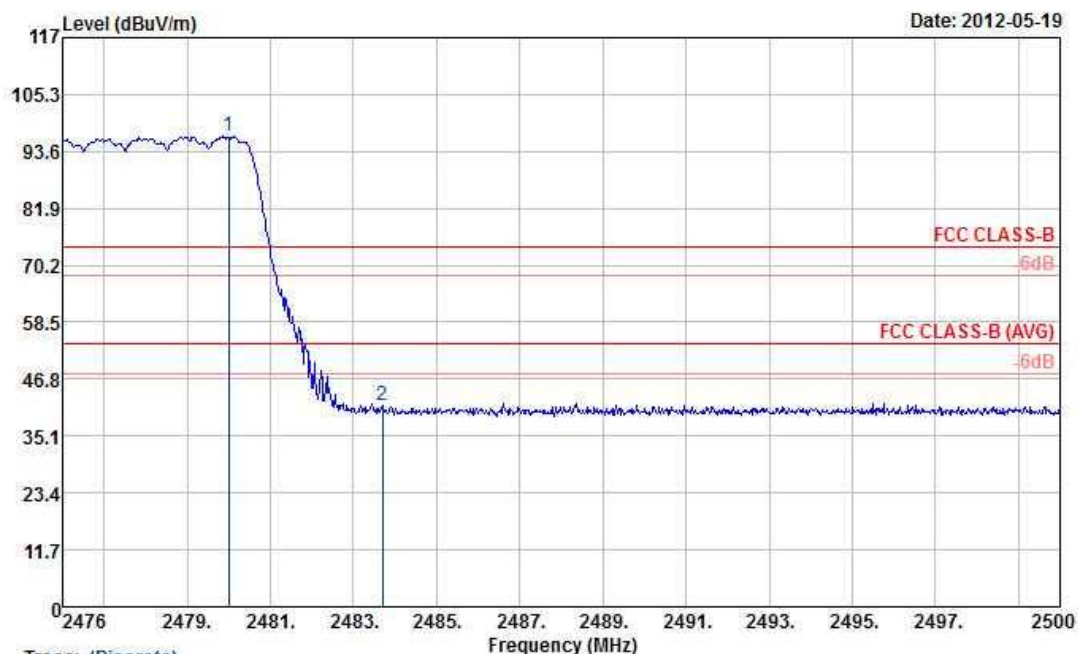


Mode : Mode 3

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	A/Pos	T/Pos	Remark
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	cm	deg
1 *	2480.00	96.64	22.64	74.00	92.28	32.18	6.18	34.00	155	346 Peak
2	2484.57	40.97	-33.03	74.00	36.61	32.18	6.18	34.00	155	346 Peak

* Marker-Delta Method (RBW/VBW=100KHz): 55.67 dB , single carrier Mode

Test Mode :	Mode 3	Temperature :	23~24°C
Test Channel :	78	Relative Humidity :	46~47%
Test Engineer :	David Ke and Kai Wang	Polarization :	Vertical



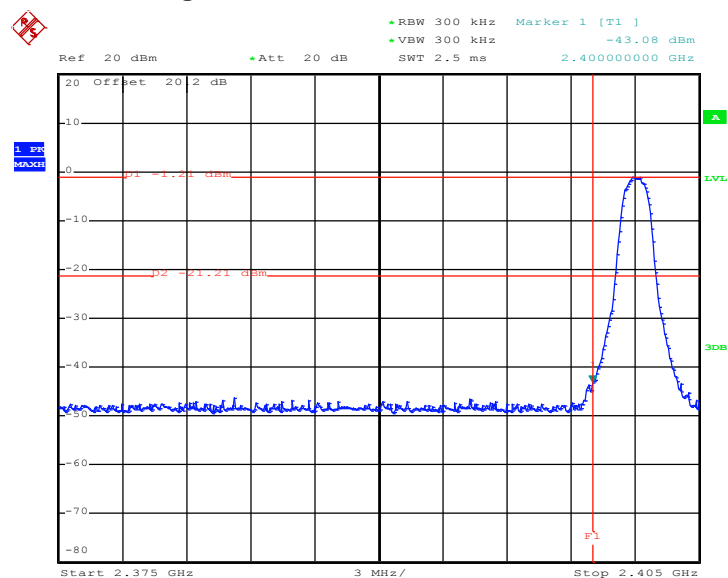
Mode	Mode 3		Over	Limit	ReadAntenna		Cable	Preamp	A/Pos	T/Pos	Remark
	Freq	Level	Limit	Line	Level	Factor	Loss	Factor			
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 *	2480.00	96.65	22.65	74.00	92.29	32.18	6.18	34.00	155	346	Peak
2	2483.70	41.25	-32.75	74.00	36.89	32.18	6.18	34.00	155	346	Peak

* Marker-Delta Method (RBW/VBW=100KHz): 55.40 dB , Hopping Mode

3.6.6 Test Result of Conducted Band Edges

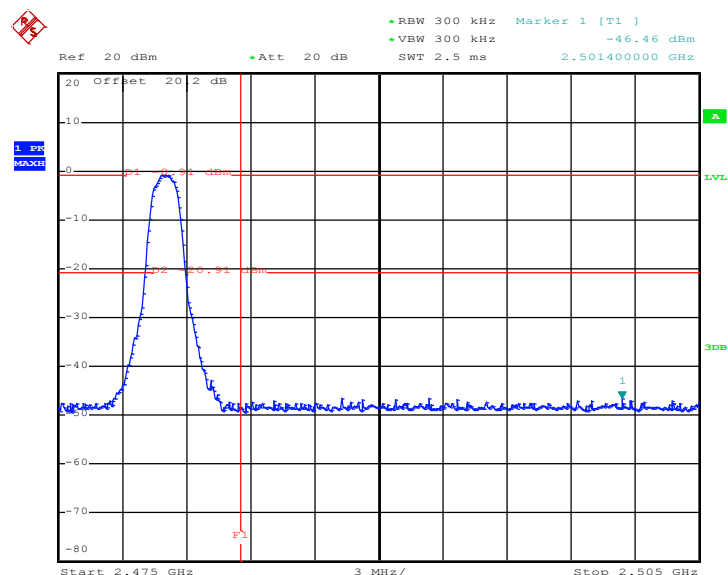
Test Mode :	Mode 7 and 9	Temperature :	24~26℃
Test Channel :	00 and 78	Relative Humidity :	50~53%
		Test Engineer :	Kenny Chen

Low Band Edge Plot on Channel 00



Date: 26.APR.2012 18:35:15

High Band Edge Plot on Channel 78



Date: 26.APR.2012 18:36:24

3.7 Spurious Emission Measurement

3.7.1 Limit of Spurious Emission Measurement

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

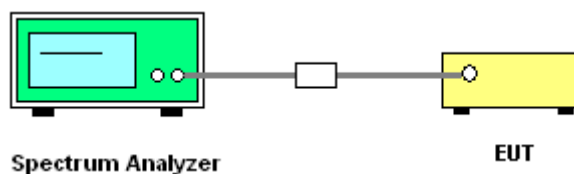
3.7.2 Measuring Instruments

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.

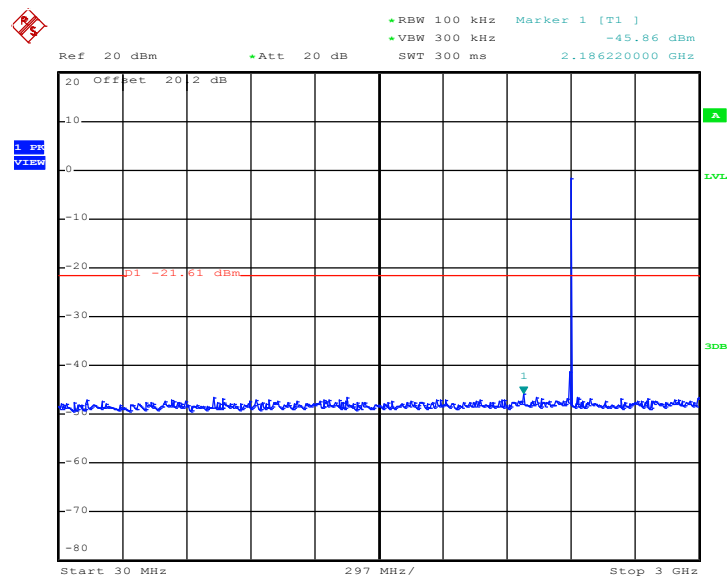
3.7.4 Test Setup



3.7.5 Test Result

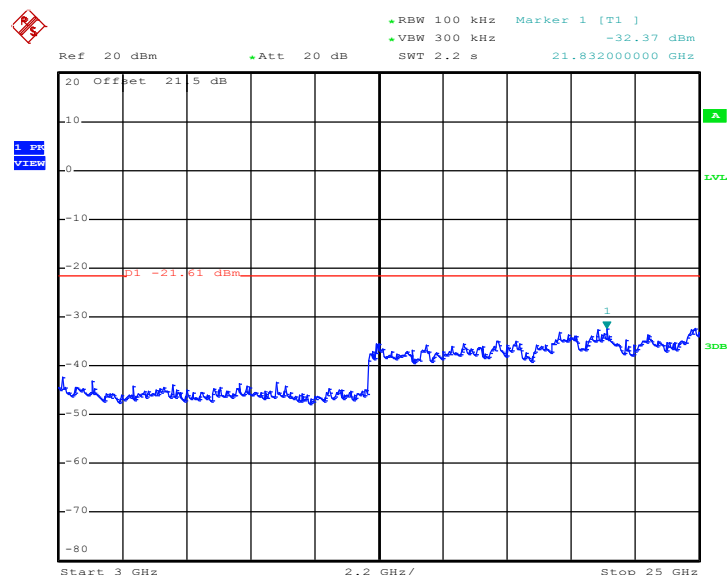
Test Mode :	Mode 7	Temperature :	24~26℃
Test Channel :	00	Relative Humidity :	50~53%
		Test Engineer :	Kenny Chen

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



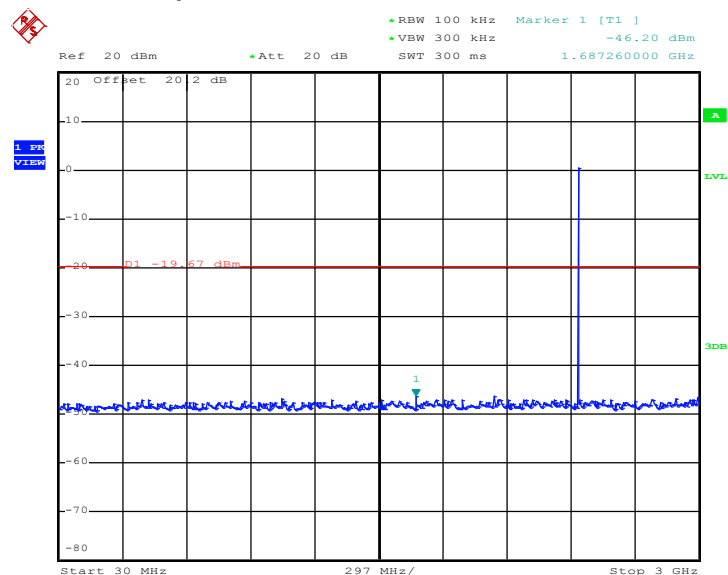
Date: 26.APR.2012 18:43:07

Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz

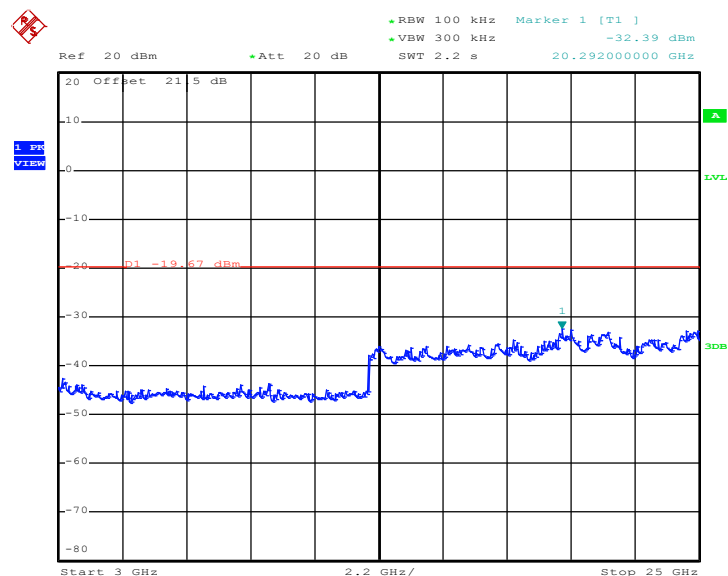


Date: 26 APR 2012 18:43:21

Test Mode :	Mode 8	Temperature :	24~26°C
Test Channel :	39	Relative Humidity :	50~53%
		Test Engineer :	Kenny Chen

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz


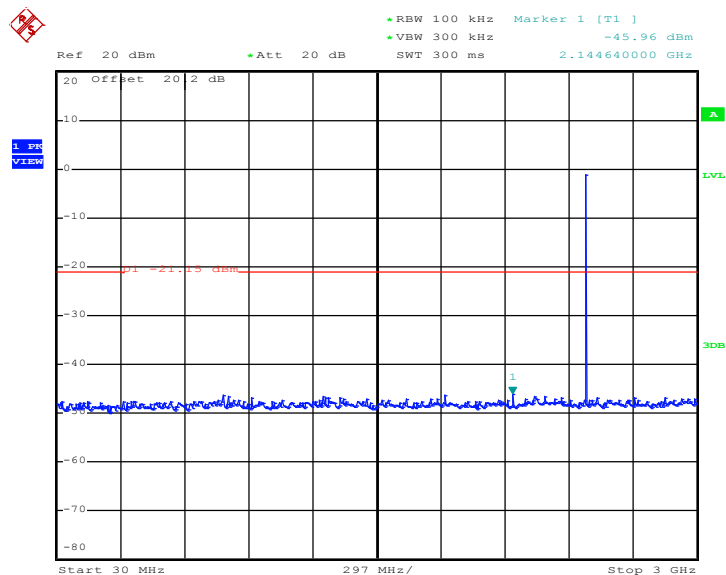
Date: 26.APR.2012 18:44:15

Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz


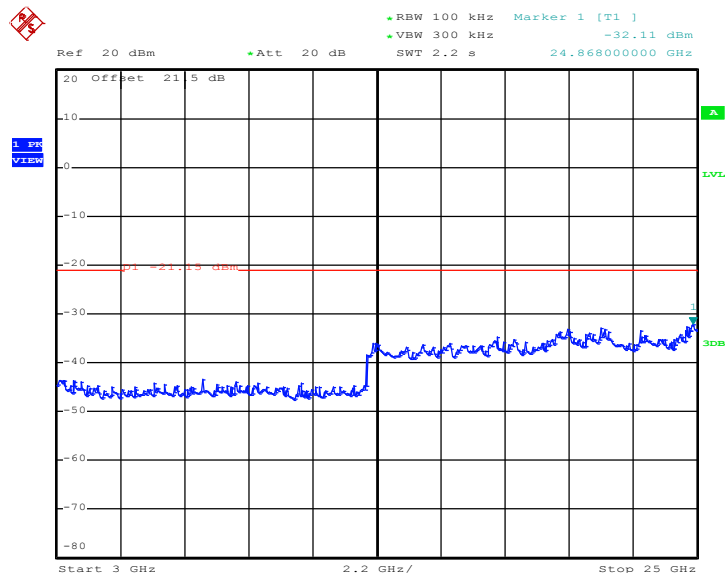
Date: 26.APR.2012 18:44:30



Test Mode :	Mode 9	Temperature :	24~26°C
Test Channel :	78	Relative Humidity :	50~53%
		Test Engineer :	Kenny Chen

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz

Date: 26.APR.2012 18:45:24

Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz

Date: 26.APR.2012 18:45:37

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.

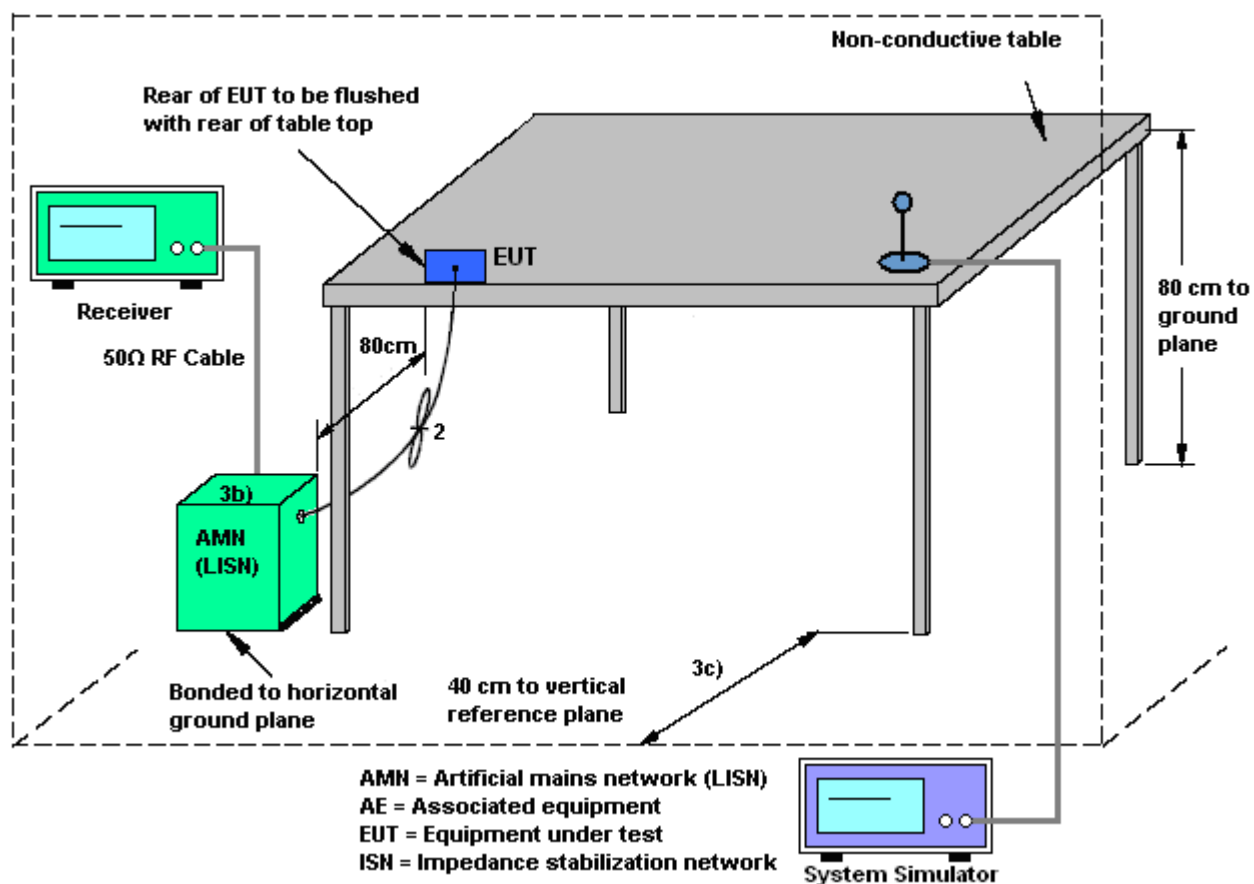
3.8.2 Measuring Instruments

See list of measuring instruments of this test report.

3.8.3 Test Procedures

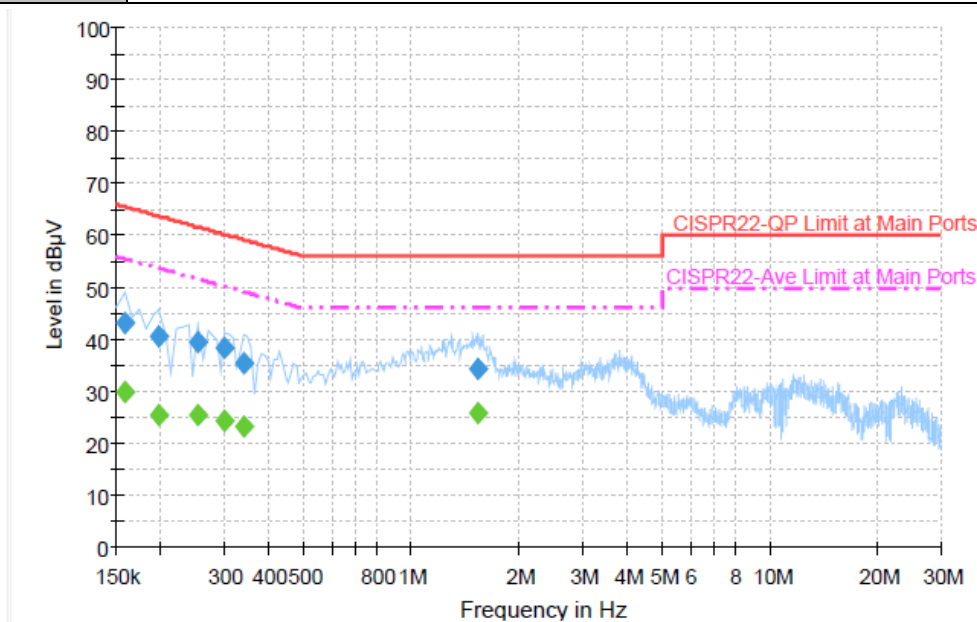
1. Please follow the guidelines in ANSI C63.4-2003.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All 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 :	Slash Huang	Relative Humidity :	57~59%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM850 Idle + Bluetooth Link + WLAN (2.4G) Link + GPS Rx + MP3 + USB Cable (Chaging from Adapter)		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



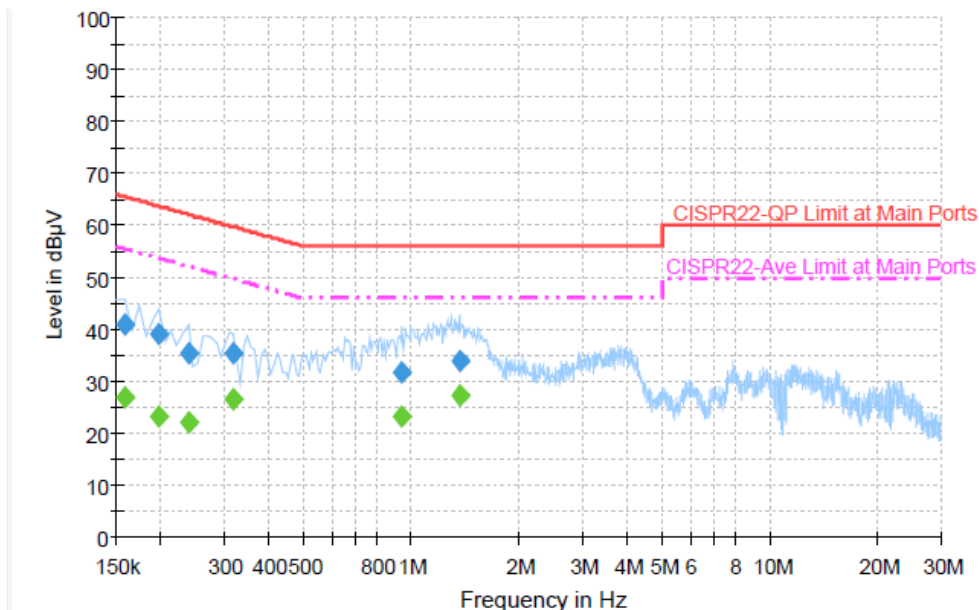
Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.158000	43.2	Off	L1	19.4	22.4	65.6
0.198000	40.6	Off	L1	19.4	23.1	63.7
0.254000	39.5	Off	L1	19.4	22.1	61.6
0.302000	38.3	Off	L1	19.4	21.9	60.2
0.342000	35.3	Off	L1	19.4	23.9	59.2
1.526000	34.5	Off	L1	19.4	21.5	56.0

Final Result : Average

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.158000	30.0	Off	L1	19.4	25.6	55.6
0.198000	25.5	Off	L1	19.4	28.2	53.7
0.254000	25.3	Off	L1	19.4	26.3	51.6
0.302000	24.3	Off	L1	19.4	25.9	50.2
0.342000	23.4	Off	L1	19.4	25.8	49.2
1.526000	25.9	Off	L1	19.4	20.1	46.0

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Slash Huang	Relative Humidity :	57~59%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + Bluetooth Link + WLAN (2.4G) Link + GPS Rx + MP3 + USB Cable (Charging from Adapter)		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		

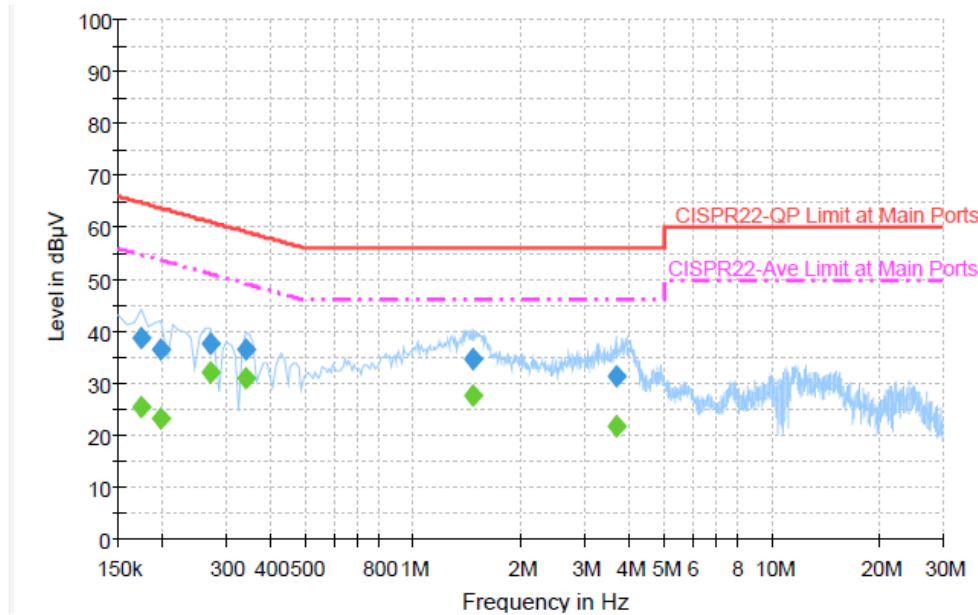

Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.158000	41.0	Off	N	19.4	24.6	65.6
0.198000	39.3	Off	N	19.4	24.4	63.7
0.238000	35.3	Off	N	19.4	26.9	62.2
0.318000	35.6	Off	N	19.4	24.2	59.8
0.942000	31.7	Off	N	19.4	24.3	56.0
1.366000	34.0	Off	N	19.5	22.0	56.0

Final Result : Average

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.158000	26.9	Off	N	19.4	28.7	55.6
0.198000	23.4	Off	N	19.4	30.3	53.7
0.238000	22.2	Off	N	19.4	30.0	52.2
0.318000	26.5	Off	N	19.4	23.3	49.8
0.942000	23.4	Off	N	19.4	22.6	46.0
1.366000	27.3	Off	N	19.5	18.7	46.0

Test Mode :	Mode 2	Temperature :	20~22°C
Test Engineer :	Slash Huang	Relative Humidity :	57~59%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WCDMA Band V Idle + Bluetooth Link + WLAN (5G) Link + GPS Rx + MP3 + USB Cable (Chaging from Adapter)		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		

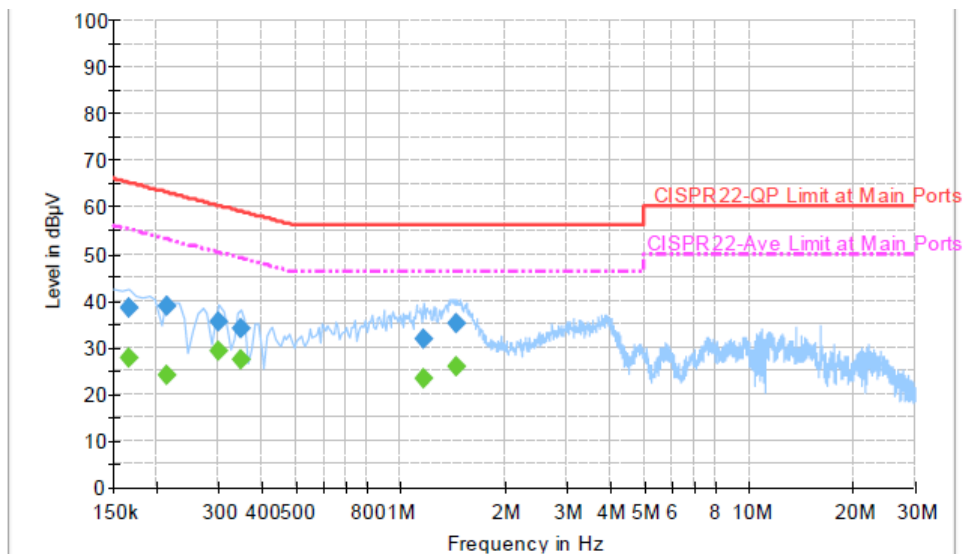

Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.174000	38.6	Off	L1	19.4	26.2	64.8
0.198000	36.4	Off	L1	19.4	27.3	63.7
0.270000	37.5	Off	L1	19.4	23.6	61.1
0.342000	36.6	Off	L1	19.4	22.6	59.2
1.470000	34.8	Off	L1	19.4	21.2	56.0
3.670000	31.2	Off	L1	19.5	24.8	56.0

Final Result : Average

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.174000	25.6	Off	L1	19.4	29.2	54.8
0.198000	23.2	Off	L1	19.4	30.5	53.7
0.270000	32.2	Off	L1	19.4	18.9	51.1
0.342000	30.9	Off	L1	19.4	18.3	49.2
1.470000	27.7	Off	L1	19.4	18.3	46.0
3.670000	21.8	Off	L1	19.5	24.2	46.0

Test Mode :	Mode 2	Temperature :	20~22°C
Test Engineer :	Slash Huang	Relative Humidity :	57~59%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WCDMA Band V Idle + Bluetooth Link + WLAN (5G) Link + GPS Rx + MP3 + USB Cable (Chaging from Adapter)		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		


Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.166000	38.2	Off	N	19.4	27.0	65.2
0.214000	38.6	Off	N	19.4	24.4	63.0
0.302000	35.5	Off	N	19.4	24.7	60.2
0.350000	33.9	Off	N	19.4	25.1	59.0
1.166000	31.9	Off	N	19.5	24.1	56.0
1.454000	35.2	Off	N	19.5	20.8	56.0

Final Result : Average

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.166000	27.8	Off	N	19.4	27.4	55.2
0.214000	24.1	Off	N	19.4	28.9	53.0
0.302000	29.2	Off	N	19.4	21.0	50.2
0.350000	27.3	Off	N	19.4	21.7	49.0
1.166000	23.3	Off	N	19.5	22.7	46.0
1.454000	25.8	Off	N	19.5	20.2	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

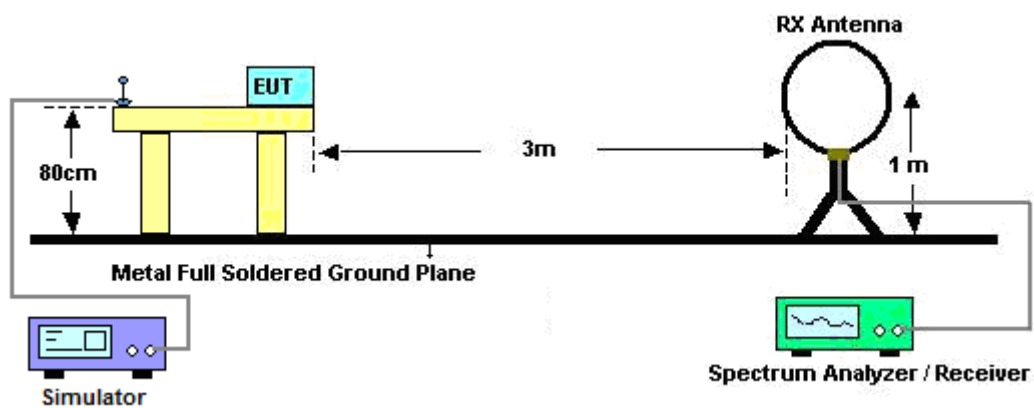
See list of measuring instruments of this test report.

3.9.3 Test Procedures

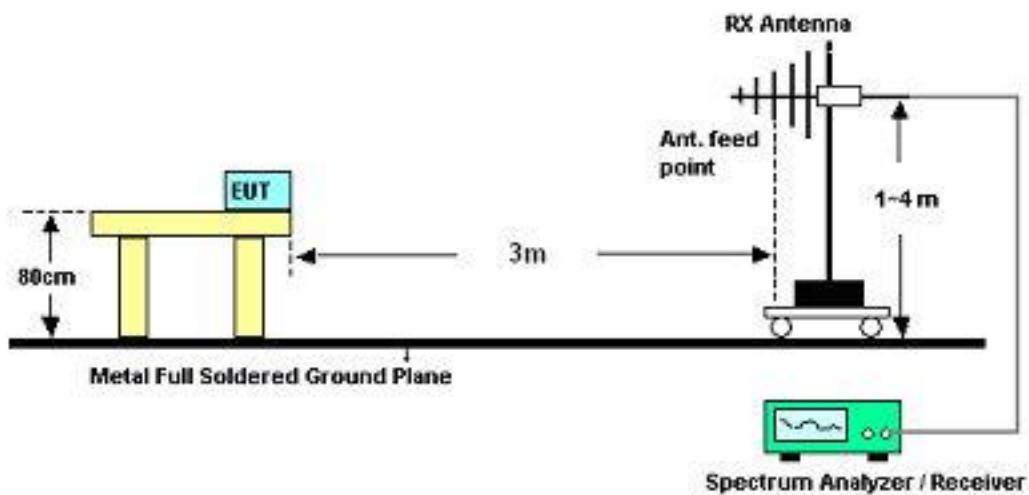
- The testing follows the guidelines in FCC Public Notice DA 00-705 Measurement Guidelines.
- Use the following spectrum analyzer settings:
 - Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for $f \geq 1$ GHz, 100 KHz for $f < 1$ GHz; VBW \geq RBW; Sweep = auto; Detector 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.
- Measured average value for the peak value is greater than 54 dBuV/m

3.9.4 Test Setup

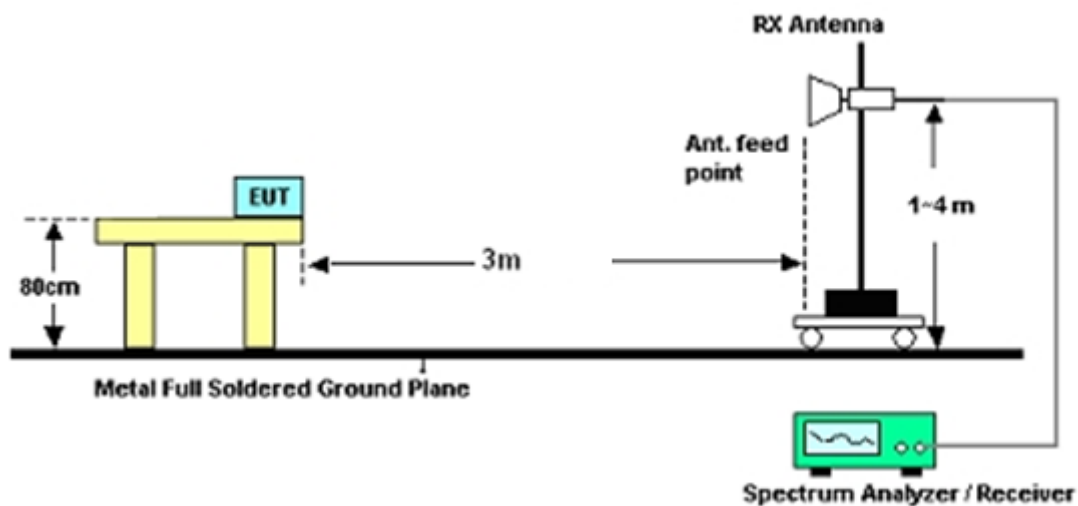
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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

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

Test Mode :	Mode 1	Temperature :	23~24°C
Test Channel :	00	Relative Humidity :	46~47%
Test Engineer :	David Ke and Kai Wang	Polarization :	Horizontal
Remark :	2402 MHz is fundamental signals which can be ignored.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
65.91	27.33	-12.67	40	52.07	6.22	0.81	31.77	100	248	Peak
118.29	30.32	-13.18	43.5	49.36	11.52	1.09	31.65	-	-	Peak
187.68	30.5	-13	43.5	51.54	8.98	1.27	31.29	-	-	Peak
447.7	17.71	-28.29	46	29.55	17.01	2.3	31.15	-	-	Peak
745.9	23.67	-22.33	46	29.87	21.28	3.05	30.53	-	-	Peak
923.7	25.79	-20.21	46	29.77	23.45	3.4	30.83	-	-	Peak
2337.12	33.53	-20.47	54	29.54	31.98	5.95	33.94	108	17	Average
2337.12	46.96	-27.04	74	42.97	31.98	5.95	33.94	108	17	Peak
2402	81.59	-	-	77.46	32.06	6.03	33.96	108	17	Average
2402	98.98	-	-	94.85	32.06	6.03	33.96	108	17	Peak
2500	33.29	-20.71	54	28.91	32.2	6.18	34	108	17	Average
2500	45.61	-28.39	74	41.23	32.2	6.18	34	108	17	Peak

Test Mode :	Mode 1	Temperature :	23~24°C
Test Channel :	00	Relative Humidity :	46~47%
Test Engineer :	David Ke and Kai Wang	Polarization :	Vertical
Remark :	2402 MHz is fundamental signals which can be ignored.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30.27	25.93	-14.07	40	37.27	20	0.53	31.87	100	129	Peak
64.29	23.7	-16.3	40	48.5	6.18	0.79	31.77	-	-	Peak
153.66	27.84	-15.66	43.5	47.03	10.99	1.21	31.39	-	-	Peak
304.2	22.36	-23.64	46	38.39	13.43	1.78	31.24	-	-	Peak
552.7	22.83	-23.17	46	32.5	18.99	2.56	31.22	-	-	Peak
957.3	25.93	-20.07	46	29.28	23.96	3.47	30.78	-	-	Peak
2357.92	37.21	-16.79	54	33.16	32.01	5.99	33.95	162	335	Average
2357.92	47.39	-26.61	74	43.34	32.01	5.99	33.95	162	335	Peak
2402	78.42	-	-	74.29	32.06	6.03	33.96	162	335	Average
2402	94.26	-	-	90.13	32.06	6.03	33.96	162	335	Peak
2490	33.11	-20.89	54	28.73	32.2	6.18	34	162	335	Average
2490	45.73	-28.27	74	41.35	32.2	6.18	34	162	335	Peak
4804	44.65	-29.35	74	61.5	34.1	9.11	60.06	100	0	Peak

Test Mode :	Mode 2	Temperature :	23~24°C
Test Channel :	39	Relative Humidity :	46~47%
Test Engineer :	David Ke and Kai Wang	Polarization :	Horizontal
Remark :	2441 MHz is fundamental signals which can be ignored.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30	22.31	-17.69	40	33.65	20	0.53	31.87	100	15	Peak
146.37	20.05	-23.45	43.5	38.99	11.27	1.21	31.42	-	-	Peak
168.51	22.08	-21.42	43.5	42.48	9.66	1.23	31.29	-	-	Peak
308.4	17.56	-28.44	46	33.44	13.54	1.79	31.21	-	-	Peak
624.1	21.86	-24.14	46	29.56	19.99	2.76	30.45	-	-	Peak
915.3	24.5	-21.5	46	28.62	23.33	3.38	30.83	-	-	Peak
2362	32.42	-21.58	54	28.37	32.01	5.99	33.95	133	20	Average
2362	45.64	-28.36	74	41.59	32.01	5.99	33.95	133	20	Peak
2441	82.83	-	-	78.57	32.13	6.11	33.98	133	20	Average
2441	100.28	-	-	96.02	32.13	6.11	33.98	133	20	Peak
2494	33.06	-20.94	54	28.68	32.2	6.18	34	133	20	Average
2494	45.46	-28.54	74	41.08	32.2	6.18	34	133	20	Peak

Test Mode :	Mode 2	Temperature :	23~24°C
Test Channel :	39	Relative Humidity :	46~47%
Test Engineer :	David Ke and Kai Wang	Polarization :	Vertical
Remark :	2441 MHz is fundamental signals which can be ignored.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30	26.42	-13.58	40	37.76	20	0.53	31.87	100	49	Peak
153.66	29.15	-14.35	43.5	48.34	10.99	1.21	31.39	-	-	Peak
207.66	23.16	-20.34	43.5	43.57	9.64	1.35	31.4	-	-	Peak
451.2	18.58	-27.42	46	30.36	17.07	2.3	31.15	-	-	Peak
652.8	22.14	-23.86	46	29.43	20.22	2.85	30.36	-	-	Peak
853	25.21	-20.79	46	29.88	22.62	3.27	30.56	-	-	Peak
2376	33.45	-20.55	54	29.38	32.03	5.99	33.95	127	344	Average
2376	45.7	-28.3	74	41.63	32.03	5.99	33.95	127	344	Peak
2441	81.03	-	-	76.77	32.13	6.11	33.98	127	344	Average
2441	97.03	-	-	92.77	32.13	6.11	33.98	127	344	Peak
2498	33.06	-20.94	54	28.68	32.2	6.18	34	127	344	Average
2498	45.34	-28.66	74	40.96	32.2	6.18	34	127	344	Peak
4882	43.07	-30.93	74	59.61	34.1	9.14	59.78	100	0	Peak

Test Mode :	Mode 3	Temperature :	23~24°C
Test Channel :	78	Relative Humidity :	46~47%
Test Engineer :	David Ke and Kai Wang	Polarization :	Horizontal
Remark :	2480 MHz is fundamental signals which can be ignored.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30	21.69	-18.31	40	33.03	20	0.53	31.87	100	49	Peak
109.92	23.1	-20.4	43.5	43.1	10.7	1.05	31.75	-	-	Peak
166.89	22.38	-21.12	43.5	42.61	9.85	1.23	31.31	-	-	Peak
393.8	16.1	-29.9	46	29.58	15.84	2.13	31.45	-	-	Peak
675.9	22.28	-23.72	46	29.4	20.41	2.89	30.42	-	-	Peak
913.9	24.98	-21.02	46	29.14	23.3	3.37	30.83	-	-	Peak
2338	33.31	-20.69	54	29.32	31.98	5.95	33.94	127	13	Average
2338	45.06	-28.94	74	41.07	31.98	5.95	33.94	127	13	Peak
2480	83.09	-	-	78.73	32.18	6.18	34	127	13	Average
2480	100.21	-	-	95.85	32.18	6.18	34	127	13	Peak
2483.5	26.47	-27.53	54	22.11	32.18	6.18	34	127	13	Average
2483.5	64.03	-9.97	74	59.67	32.18	6.18	34	127	13	Peak

Test Mode :	Mode 3	Temperature :	23~24°C
Test Channel :	78	Relative Humidity :	46~47%
Test Engineer :	David Ke and Kai Wang	Polarization :	Vertical
Remark :	2480 MHz is fundamental signal which can be ignored.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30	26.48	-13.52	40	37.82	20	0.53	31.87	100	18	Peak
65.1	21.3	-18.7	40	46.07	6.2	0.8	31.77	-	-	Peak
153.66	28.32	-15.18	43.5	47.51	10.99	1.21	31.39	-	-	Peak
307.7	20.39	-25.61	46	36.3	13.51	1.79	31.21	-	-	Peak
552.7	23.38	-22.62	46	33.05	18.99	2.56	31.22	-	-	Peak
948.2	25.18	-20.82	46	28.73	23.83	3.46	30.84	-	-	Peak
2318	33.18	-20.82	54	29.23	31.96	5.92	33.93	155	346	Average
2318	45.19	-28.81	74	41.24	31.96	5.92	33.93	155	346	Peak
2480	81.53	-	-	77.17	32.18	6.18	34	155	346	Average
2480	98.07	-	-	93.71	32.18	6.18	34	155	346	Peak
2483.5	26.09	-27.91	54	21.73	32.18	6.18	34	155	346	Average
2483.5	62.18	-11.82	74	57.82	32.18	6.18	34	155	346	Peak
4960	44.16	-29.84	74	60.34	34.1	9.16	59.44	100	0	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

Non-standard connector used.

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	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100055	9kHz~40GHz	Jun. 13, 2011	Apr. 20, 2012 ~ Apr. 26, 2012	Jun. 12, 2012	Conducted (TH02-HY)
Power Meter	Agilent	E4416A	GB41292344	300MHz~40GHz	Feb. 21, 2012	Apr. 20, 2012 ~ Apr. 26, 2012	Feb. 20, 2013	Conducted (TH02-HY)
Power Sensor	Agilent	E9327A	US40441548	300MHz~40GHz	Feb. 21, 2012	Apr. 20, 2012 ~ Apr. 26, 2012	Feb. 20, 2013	Conducted (TH02-HY)
Bluetooth Base Station	R&S	CBT32	100519	N/A	Jun. 01, 2011	Apr. 20, 2012 ~ Apr. 26, 2012	May 31, 2012	Conducted (TH02-HY)
EMI Test Receive	R&S	ESCS 30	100356	9KHz ~ 2.75GHz	Oct. 27, 2011	May 10, 2012	Oct. 26, 2012	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100081	9KHz ~ 30MHz	Dec. 09, 2011	May 10, 2012	Dec. 08, 2012	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100080	9KHz ~ 30MHz	Dec. 06, 2011	May 10, 2012	Dec. 05, 2012	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	May 10, 2012	N/A	Conduction (CO05-HY)
System Simulator	R&S	CMU200	112403	N/A	Feb. 22, 2011	May 10, 2012	Feb. 21, 2013	Conduction (CO05-HY)
GPS Station	T&E	GS-50	N/A	N/A	N/A	May 10, 2012	N/A	Conduction (CO05-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2726	30MHz ~ 1GHz	Oct. 22, 2011	May 19, 2012 ~ May 20, 2012	Oct. 21, 2012	Radiation (03CH07-HY)
Spectrum Analyzer	R&S	FSP30	101067	9KHz ~ 30GHz	Dec. 06, 2011	May 19, 2012 ~ May 20, 2012	Dec. 05, 2012	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 10, 2011	May 19, 2012 ~ May 20, 2012	Aug. 09, 2012	Radiation (03CH07-HY)
Pre Amplifier	Agilent	8449B	3008A02362	1GHz ~ 26.5GHz	Dec. 05, 2011	May 19, 2012 ~ May 20, 2012	Dec. 04, 2012	Radiation (03CH07-HY)
Pre Amplifier	COM-POWER	PA-103A	161241	10-1000MHz.32 dB.GAIN	Feb. 27, 2012	May 19, 2012 ~ May 20, 2012	Feb. 26, 2013	Radiation (03CH07-HY)
EMI TEST RECEIVER	R&S	ESCI 7	100724	9kHz ~ 7GHz	Aug. 22, 2011	May 19, 2012 ~ May 20, 2012	Aug. 21, 2012	Radiation (03CH07-HY)
Pre Amplifier	MITEQ	AMF-7D-00 101800-30-10P	159088	1GHz ~ 18GHz	Mar. 10, 2012	May 19, 2012 ~ May 20, 2012	Mar. 09, 2013	Radiation (03CH07-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz~30 MHz	Jul. 29, 2010	May 19, 2012 ~ May 20, 2012	Jul. 28, 2012	Radiation (03CH07-HY)
Bluetooth Base Station	R&S	CBT32	100519	N/A	Jun. 01, 2011	May 19, 2012 ~ May 20, 2012	May 31, 2012	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 EP250901 as below.