


FCC RF Test Report

APPLICANT : Unimax Communications
EQUIPMENT : CDMA EVDO REV A 800/1900MHZ
BRAND NAME : UMX
MODEL NAME : U670C
FCC ID : P46-U670C
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : (DSS) Spread Spectrum Transmitter

The product was received on Mar. 16, 2012 and completely tested on Aug. 01, 2012. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the compliance with the applicable technical standards.

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

Reviewed by:



Jones Tsai / Manager



SPORTON INTERNATIONAL (KUNSHAN) INC.
No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C.



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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR231609A	Rev. 01	Initial issue of report	Aug. 06, 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	≥ 15Chs	Pass	-
3.2	15.247(a)(1)	A8.1(b)	Hopping Channel Separation	≥ 2/3 of 20dB BW	Pass	-
3.3	15.247(a)(1)	A8.1(d)	Dwell Time of Each Channel	≤ 0.4sec in 31.6sec period	Pass	-
3.4	15.247(a)(1)	A8.1(a)	20dB Bandwidth	NA	Pass	-
3.5	15.247(b)(1)	A8.1(b)	Peak Output Power	≤ 125 mW	Pass	-
3.6	15.247(d)	A8.5	Conducted Band Edges	≤ 20dBc	Pass	-
3.7	15.247(d)	A8.5	Conducted Spurious Emission	≤ 20dBc	Pass	-
3.8	15.247(d)	A8.5	Radiated Band Edges	15.209(a) & 15.247(d)	Pass	-
3.9	15.247(d)	A8.5	Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 7.74 dB at 37.810 MHz
3.10	15.207	Gen 7.2.4	AC Conducted Emission	15.207(a)	Pass	Under limit 5.82 dB at 1.500 MHz
3.11	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-



1 General Description

1.1 Applicant

Unimax Communications
18201 McDermott St. West Suite E, Irvine, CA 92614

1.2 Manufacturer

Unimax Communications
18201 McDermott St. West Suite E, Irvine, CA 92614

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	CDMA EVDO REV A 800/1900MHZ
Brand Name	UMX
Model Name	U670C
FCC ID	P46-U670C
EUT supports Radios application	CDMA / EV-DO / WLAN 11bgn / Bluetooth
HW Version	F3610_BOARD_V1.2
SW Version	U670C.GB.12260689
EUT Stage	Identical Prototype

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

Product Specification subjective to this standard	
Tx/Rx Frequency Range	2402 MHz ~ 2480 MHz
Number of Channels	79
Carrier Frequency of Each Channel	2402+n*1 MHz; n=0~78
Maximum Output Power to Antenna	Bluetooth (1Mbps) : 3.29 dBm (0.0021 W) Bluetooth EDR (2Mbps) : 2.85 dBm (0.0019 W) Bluetooth EDR (3Mbps) : 2.45 dBm (0.0018 W)
Antenna Type	PIFA Antenna with gain 1.28 dBi
Type of Modulation	Bluetooth (1Mbps) : GFSK Bluetooth 2.1 EDR (2Mbps) : $\pi/4$ -DQPSK Bluetooth 2.1 EDR (3Mbps) : 8-DPSK

1.4 Testing Site

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.			
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C. TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958			
Test Site No.	Sporton Site No.			FCC/IC Registration No.
	TH01-KS	CO01-KS	03CH01-KS	149928/4086E-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 and ANSI C63.10-2009
- ♦ IC RSS-210 Issue 8
- ♦ IC RSS-Gen Issue 3

Remark:

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



1.6 Ancillary Equipment List

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	Bluetooth Base Station	R&S	CBT	N/A	N/A	Unshielded, 1.8 m
3.	DC Power Supply	GWINSTEK	GPS-3030D	N/A	N/A	Unshielded, 1.8 m
4.	WLAN AP	D-Link	DIR-855	KA2DIR855A2	N/A	Unshielded, 1.8 m
5.	Notebook	DELL	P08S	QDS-BRCM1030	N/A	AC I/P: Unshielded, 0.9 m DC O/P: Shielded, 1.8 m
6.	Bluetooth Earphone	Nokia	BH-106	QTLBH-106	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:

Band	Bluetooth RF Output Power		
Channel	00	39	78
Frequency	2402	2441	2480
Peak Power	3.03	3.29	3.29

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 1Mbps 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 ANSI C63.10-2009 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).

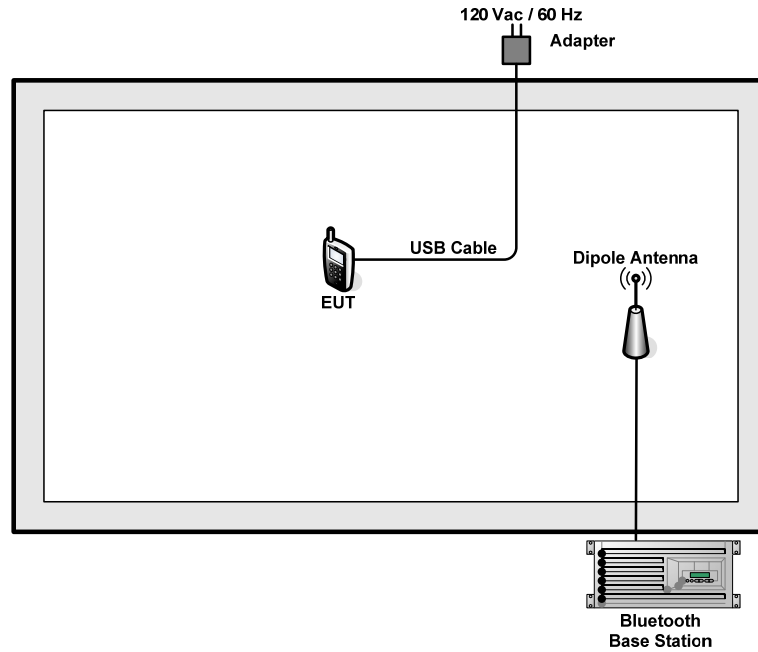
Pre-scanned tests, X, Y, Z in three orthogonal panels, were conducted to determine the final configuration from all possible combinations.

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

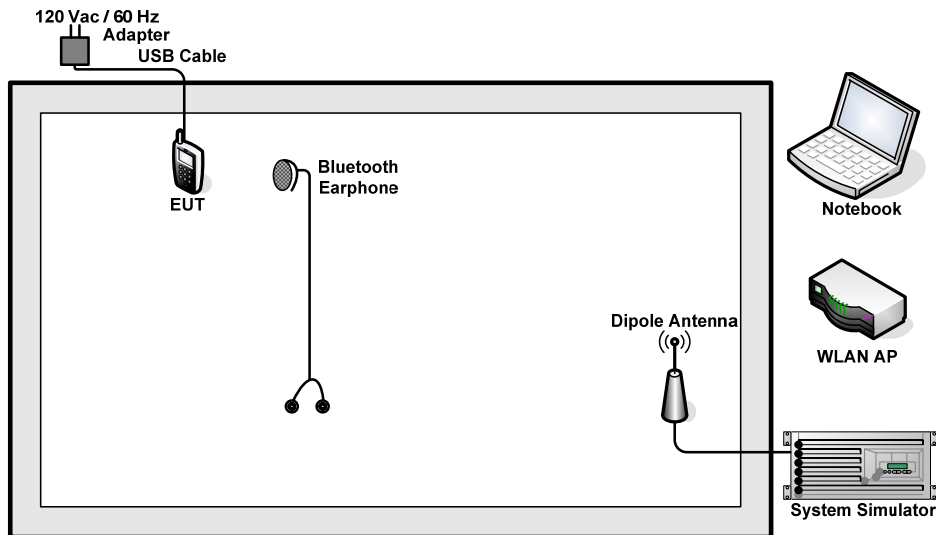
Test Cases			
Test Item	Data Rate / Modulation		
	Bluetooth 1Mbps GFSK	Bluetooth EDR 2Mbps $\pi/4$ -DQPSK	Bluetooth EDR 3Mbps 8-DPSK
Conducted TCs	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz	Mode 4: CH00_2402 MHz Mode 5: CH39_2441 MHz Mode 6: CH78_2480 MHz	Mode 7: CH00_2402 MHz Mode 8: CH39_2441 MHz Mode 9: CH78_2480 MHz
Radiated TCs	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz	N/A	N/A
AC Conducted Emission	Mode 1 :CDMA2000 BC0 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter) + Camera		
Remark: For radiated TCs, the data rate was set in 1Mbps 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>



<AC Conducted Emission Mode>



2.4 RF Utility

For Bluetooth function, execute "ADB" to make the EUT get into the engineering modes, and key in "# *7678#", then key in "000000" 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.

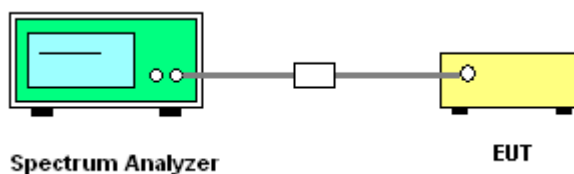
3.1.2 Measuring Instruments

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.
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.
4. The number of hopping frequency used is defined as the device has the numbers of total channel.

3.1.4 Test Setup

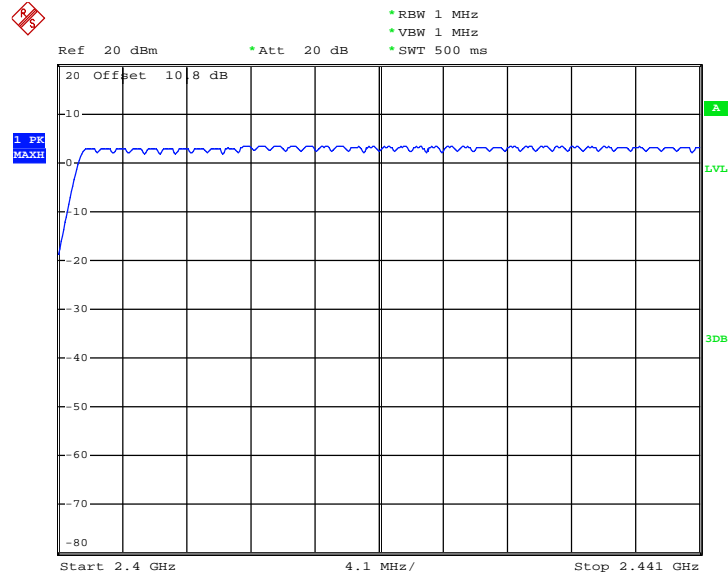


3.1.5 Test Result of Number of Hopping Frequency

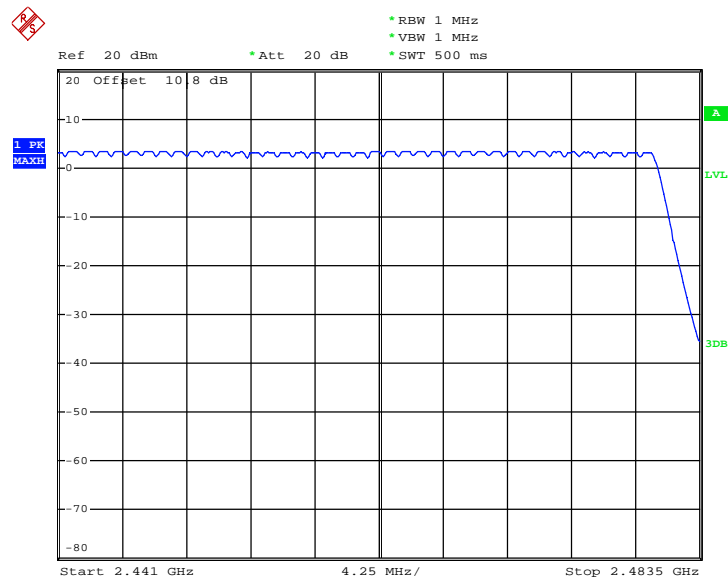
Test Mode :	1Mbps	Temperature :	23~24°C
Test Engineer :	King Liu	Relative Humidity :	47~48%
Number of Hopping Channels (Channel)		Limits (Channel)	Pass/Fail
79		> 15	Pass



Number of Hopping Channel Plot on Channel 00 - 78



Date: 27.JUL.2012 14:54:35



Date: 27.JUL.2012 14:50:27

3.2 Hopping Channel Separation Measurement

3.2.1 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.

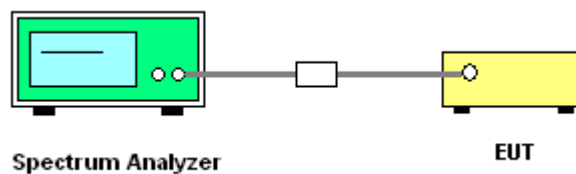
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 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.

3.2.4 Test Setup



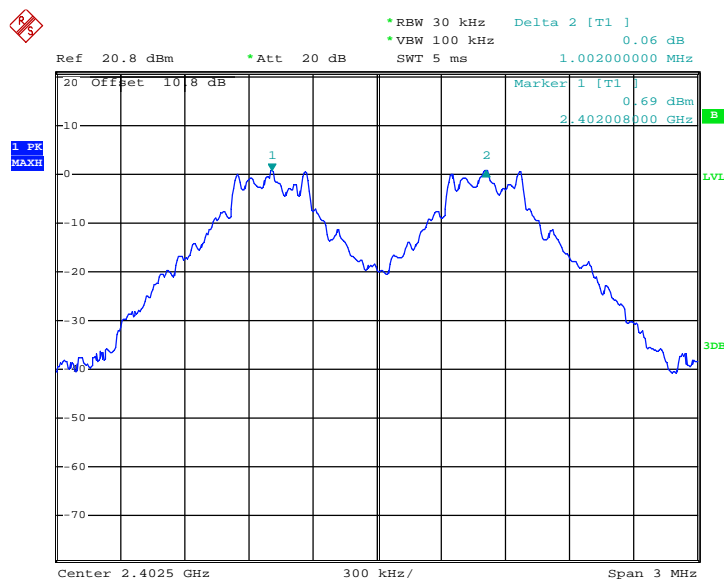


3.2.5 Test Result of Hopping Channel Separation

Test Mode :	1Mbps	Temperature :	23~24°C
Test Engineer :	King Liu	Relative Humidity :	47~48%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.002	0.596	Pass
39	2441	1.002	0.596	Pass
78	2480	1.002	0.596	Pass

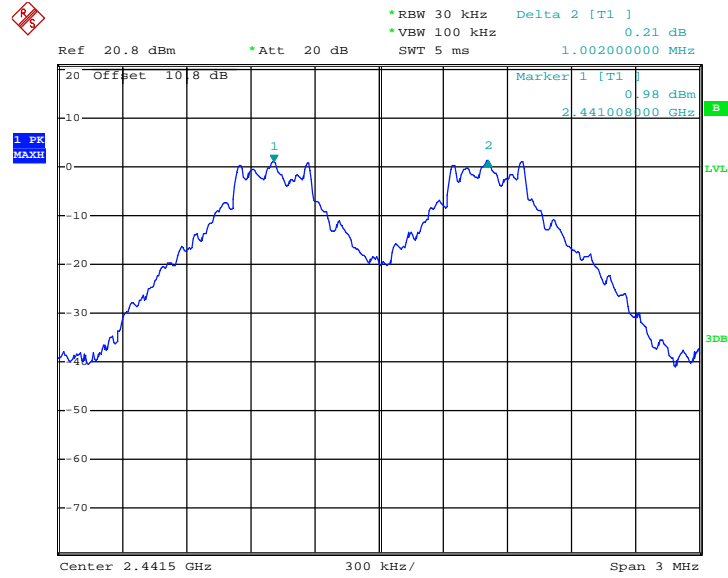
Channel Separation Plot on Channel 00 - 01



Date: 25.JUL.2012 21:09:58

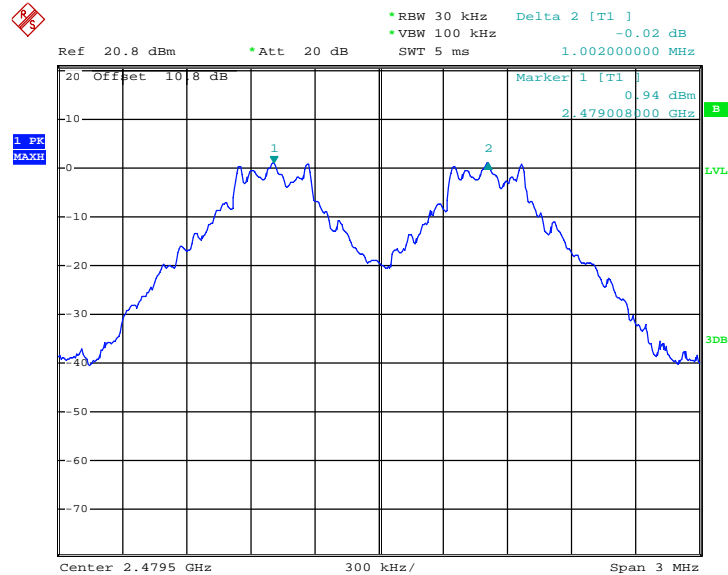


Channel Separation Plot on Channel 39 - 40



Date: 25.JUL.2012 21:10:56

Channel Separation Plot on Channel 77 - 78



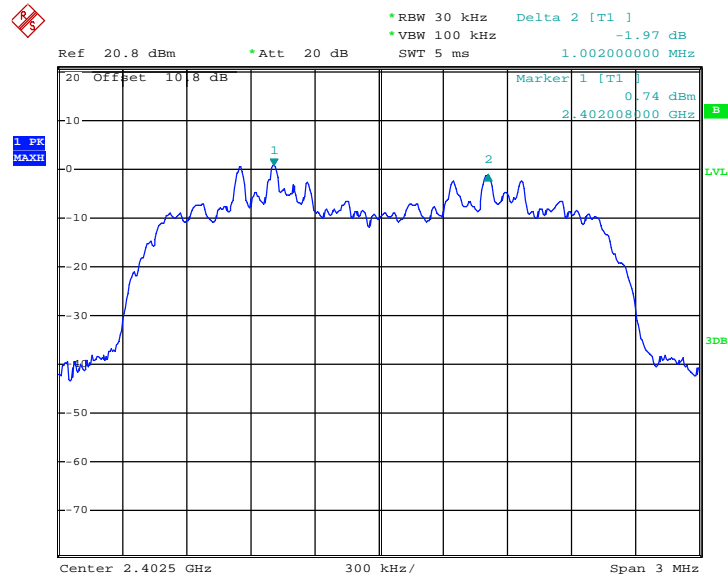
Date: 25.JUL.2012 21:12:28



Test Mode :	2Mbps	Temperature :	23~24°C
Test Engineer :	King Liu	Relative Humidity :	47~48%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.002	0.860	Pass
39	2441	1.008	0.860	Pass
78	2480	1.002	0.860	Pass

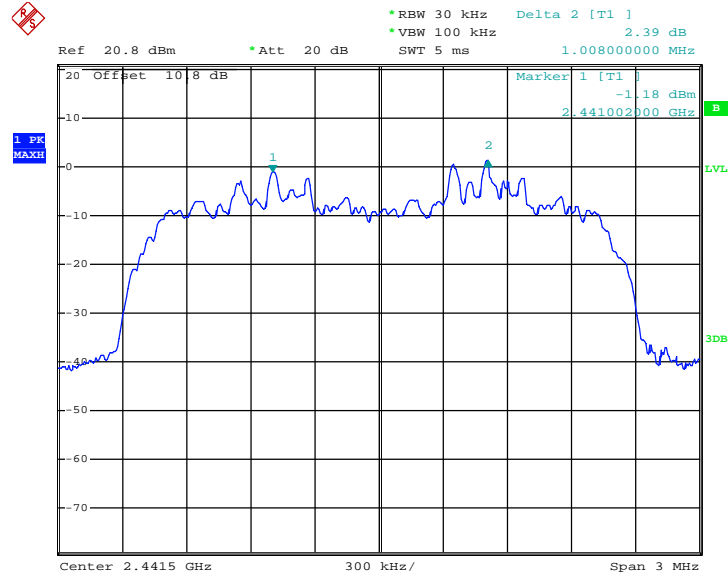
Channel Separation Plot on Channel 00 - 01



Date: 25.JUL.2012 21:08:35

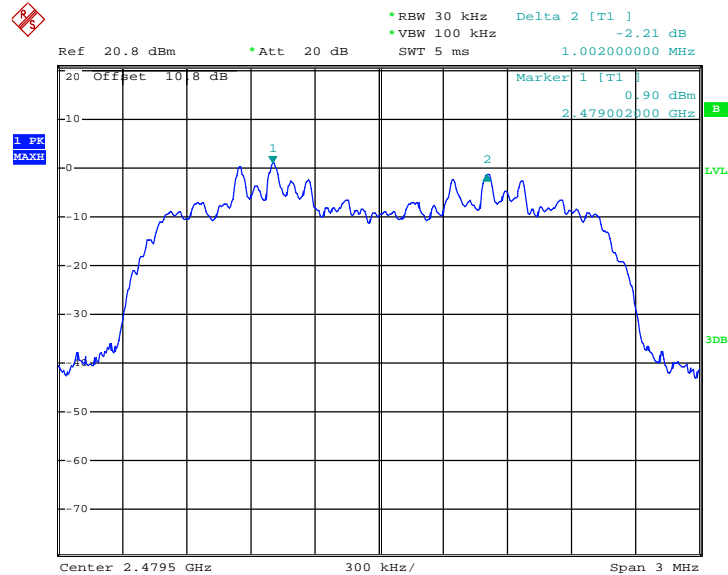


Channel Separation Plot on Channel 39 - 40



Date: 25.JUL.2012 21:05:15

Channel Separation Plot on Channel 77 - 78



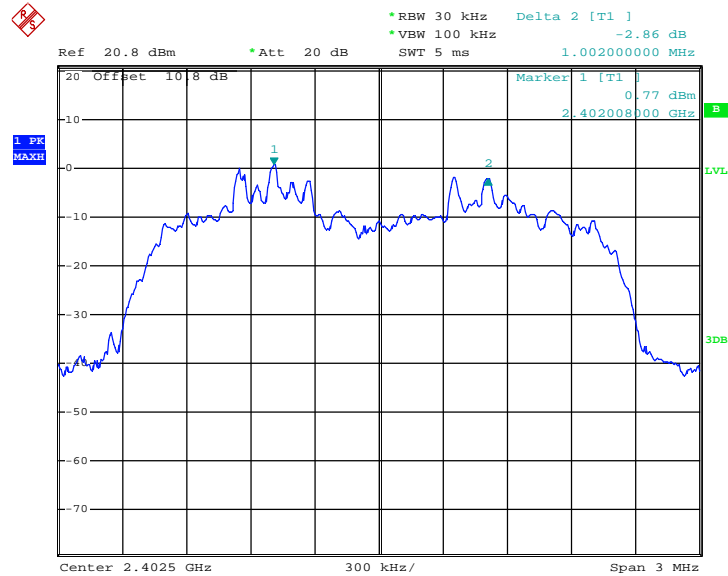
Date: 25.JUL.2012 21:04:08



Test Mode :	3Mbps	Temperature :	23~24°C
Test Engineer :	King Liu	Relative Humidity :	47~48%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.002	0.824	Pass
39	2441	1.002	0.824	Pass
78	2480	1.164	0.824	Pass

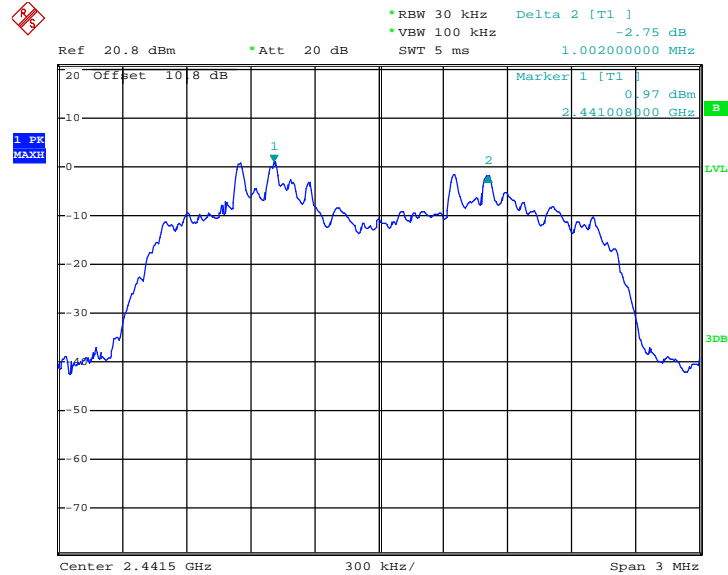
Channel Separation Plot on Channel 00 - 01



Date: 25.JUL.2012 20:59:55

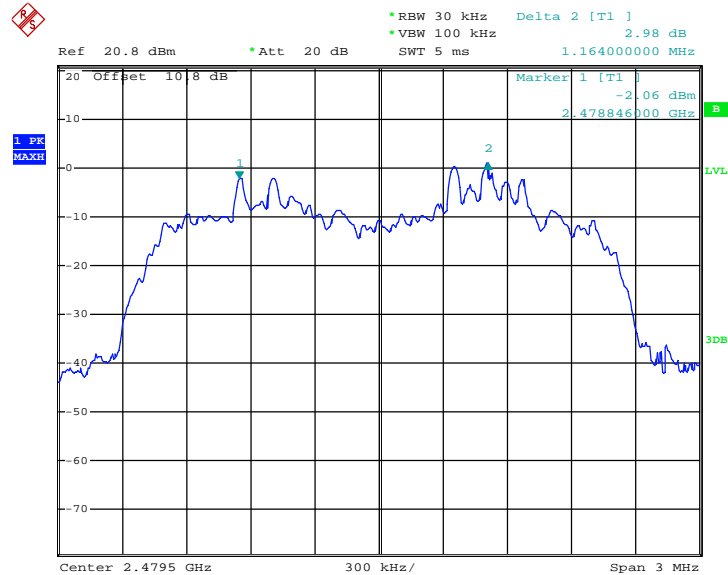


Channel Separation Plot on Channel 39 - 40



Date: 25.JUL.2012 21:01:50

Channel Separation Plot on Channel 77 - 78



Date: 25.JUL.2012 21:02:52

3.3 Dwell Time Measurement

3.3.1 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.

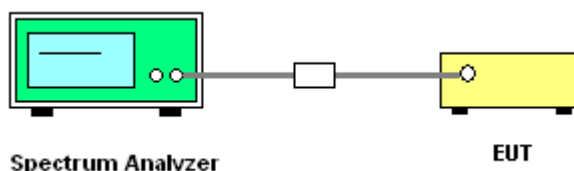
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 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 ≥ 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.

3.3.4 Test Setup



3.3.5 Test Result of Dwell Time

Test Mode :	DH5	Temperature :	23~24°C
Test Engineer :	King Liu	Relative Humidity :	47~48%

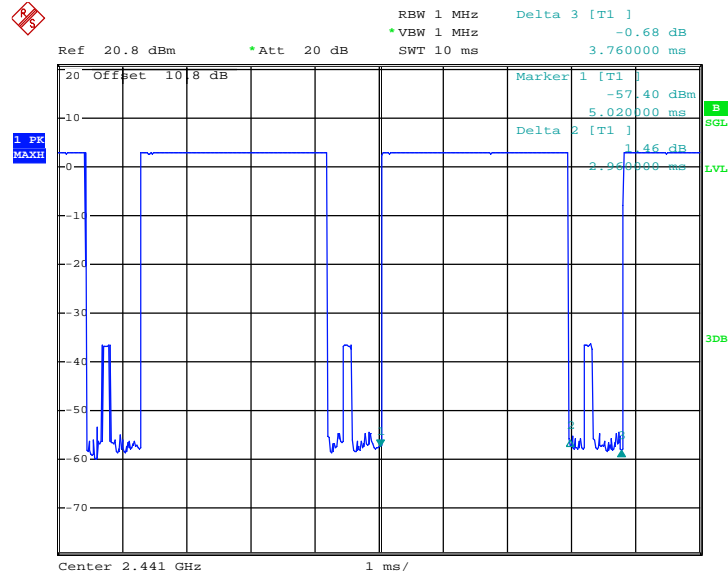
Package Mode	Average Hopping Channel	Package Transfer Time (usec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
DH5	3.30	2960.00	0.31	0.4	Pass

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)

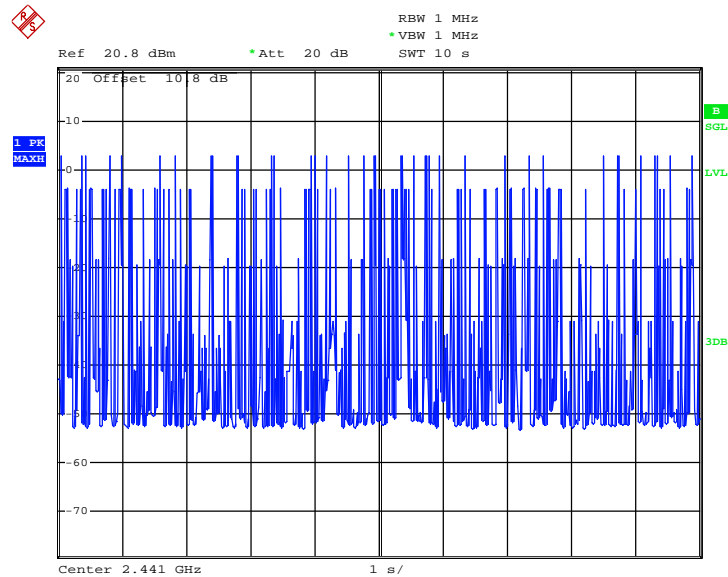


DH5 Dwell Time (One Pulse) Plot on Channel 39



Date: 25.JUL.2012 20:15:06

DH5 Dwell Time (Count Pulses) Plot on Channel 39



Date: 25.JUL.2012 20:22:28

3.4 20dB Bandwidth Measurement

3.4.1 Limit of 20dB Bandwidth

N/A

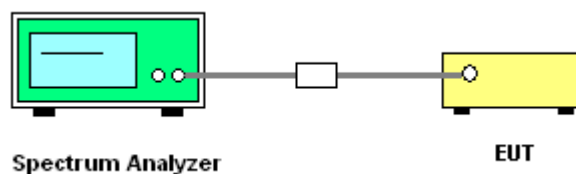
3.4.2 Measuring Instruments

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. 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.

3.4.4 Test Setup



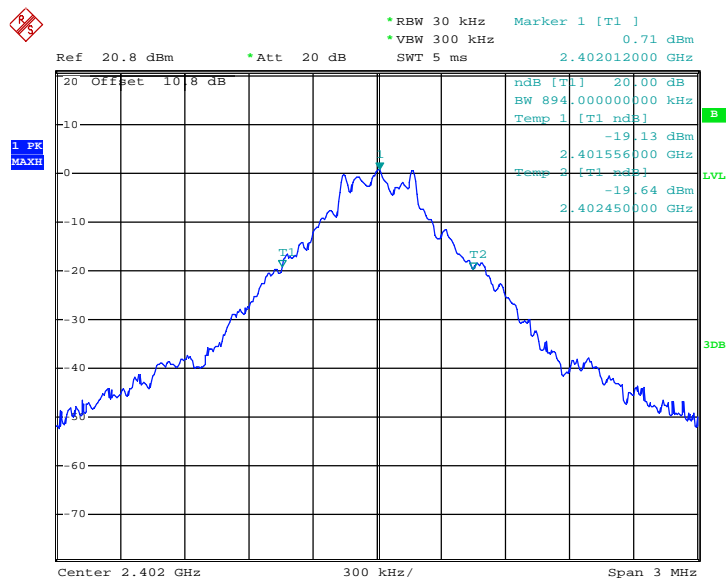


3.4.5 Test Result of 20dB Bandwidth

Test Mode :	1Mbps	Temperature :	23~24°C
Test Engineer :	King Liu	Relative Humidity :	47~48%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	0.894
39	2441	0.894
78	2480	0.894

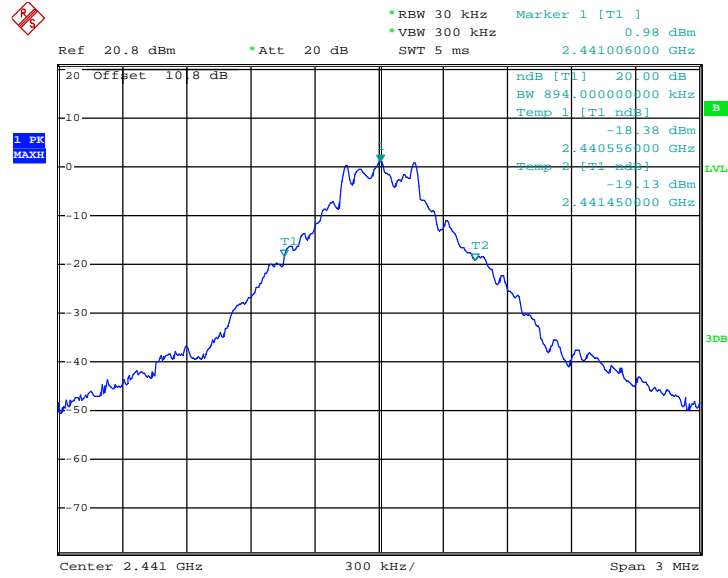
20 dB Bandwidth Plot on Channel 00



Date: 25.JUL.2012 20:51:19

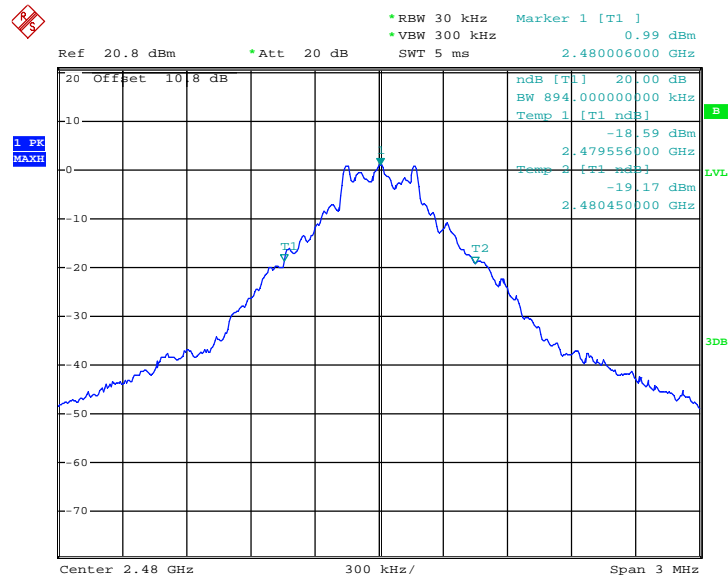


20 dB Bandwidth Plot on Channel 39



Date: 25.JUL.2012 20:50:50

20 dB Bandwidth Plot on Channel 78



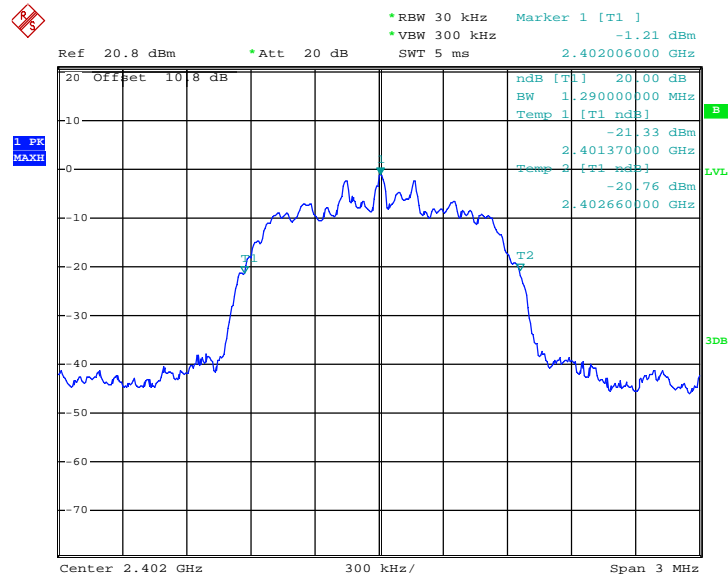
Date: 25.JUL.2012 20:50:00



Test Mode :	2Mbps	Temperature :	23~24°C
Test Engineer :	King Liu	Relative Humidity :	47~48%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.290
39	2441	1.290
78	2480	1.290

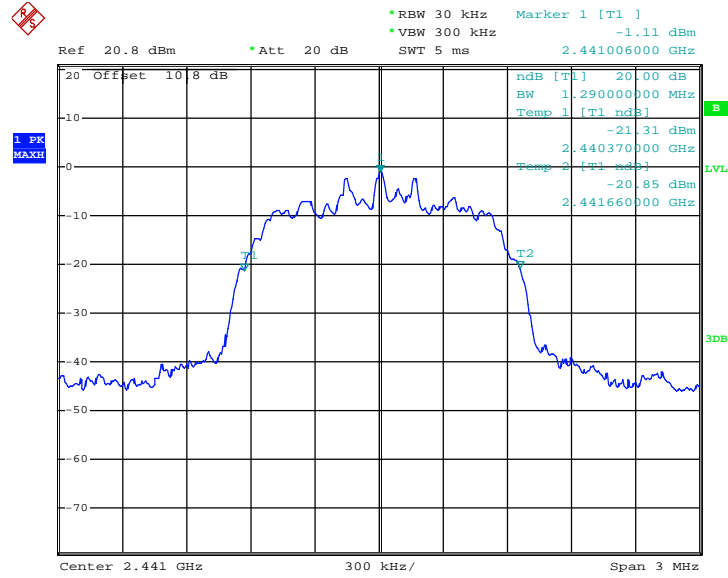
20 dB Bandwidth Plot on Channel 00



Date: 25.JUL.2012 20:52:29

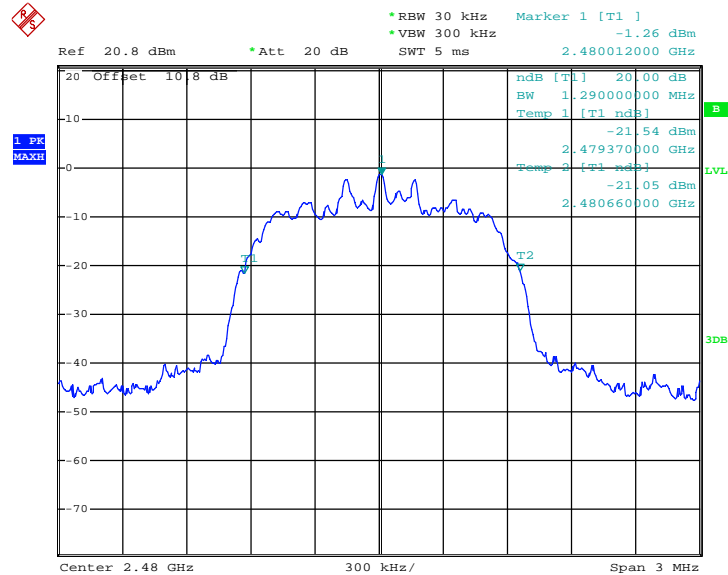


20 dB Bandwidth Plot on Channel 39



Date: 25.JUL.2012 20:53:03

20 dB Bandwidth Plot on Channel 78



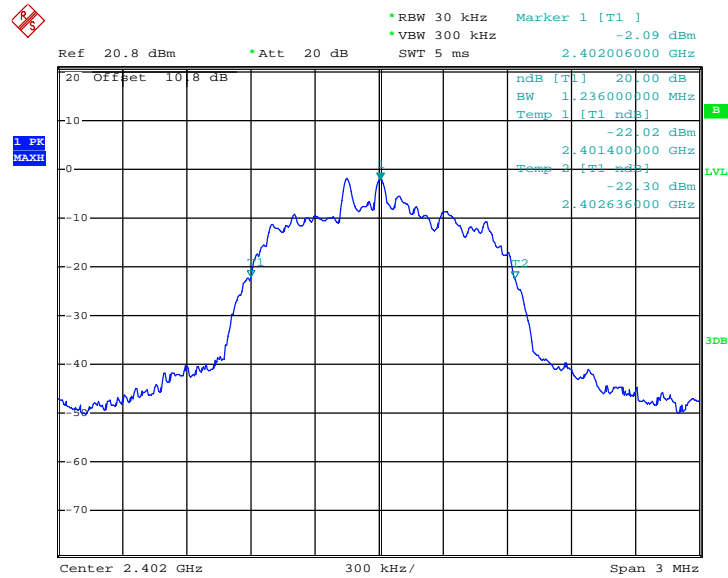
Date: 25.JUL.2012 20:53:45



Test Mode :	3Mbps	Temperature :	23~24°C
Test Engineer :	King Liu	Relative Humidity :	47~48%

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

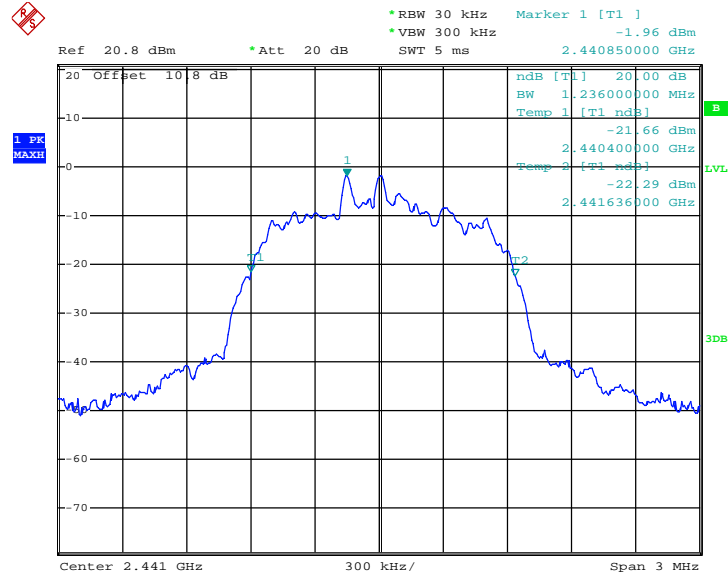
20 dB Bandwidth Plot on Channel 00



Date: 25.JUL.2012 20:56:08

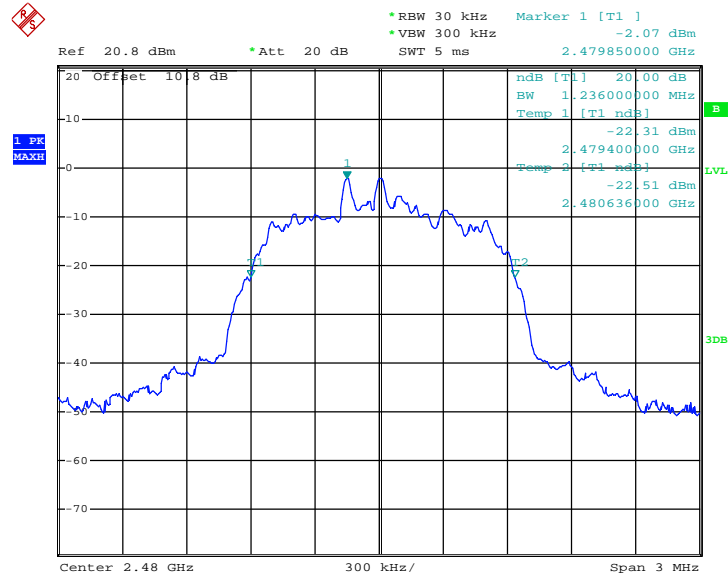


20 dB Bandwidth Plot on Channel 39



Date: 25.JUL.2012 20:55:28

20 dB Bandwidth Plot on Channel 78



Date: 25.JUL.2012 20:54:43

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.

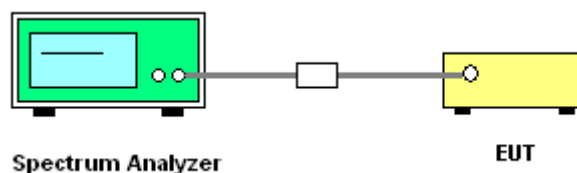
3.5.2 Measuring Instruments

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



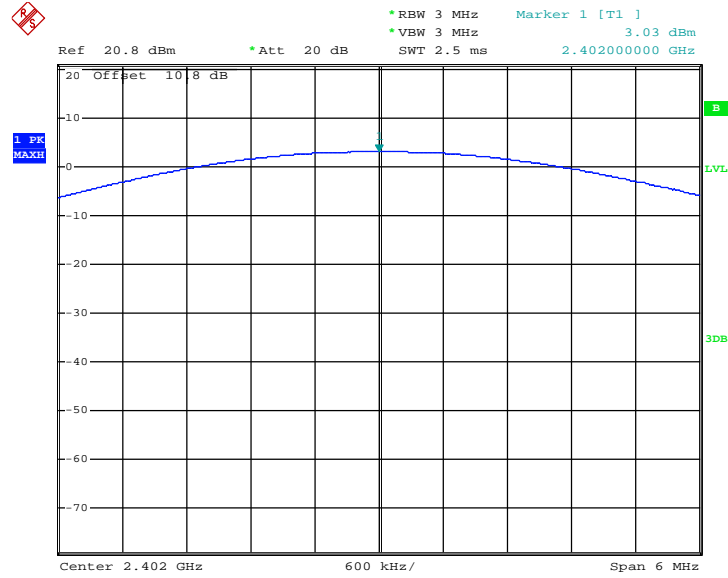
3.5.5 Test Result of Peak Output Power

Test Mode :	1Mbps	Temperature :	23~24°C
Test Engineer :	King Liu	Relative Humidity :	47~48%

Channel	Frequency (MHz)	RF Power (dBm)		
		GFSK	Max. Limits (dBm)	Pass/Fail
		1 Mbps		
00	2402	3.03	30.00	Pass
39	2441	3.29	30.00	Pass
78	2480	3.29	30.00	Pass

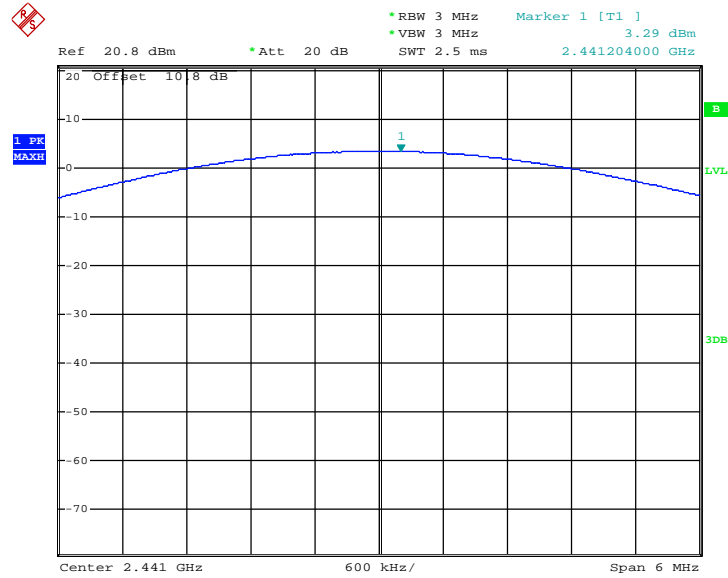


Peak Output Power Plot on Channel 00



Date: 25.JUL.2012 19:17:12

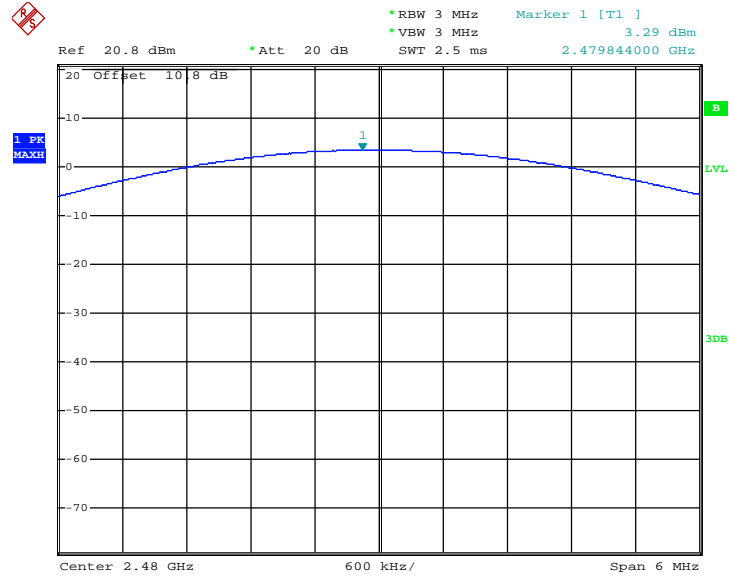
Peak Output Power Plot on Channel 39



Date: 25.JUL.2012 19:18:03



Peak Output Power Plot on Channel 78



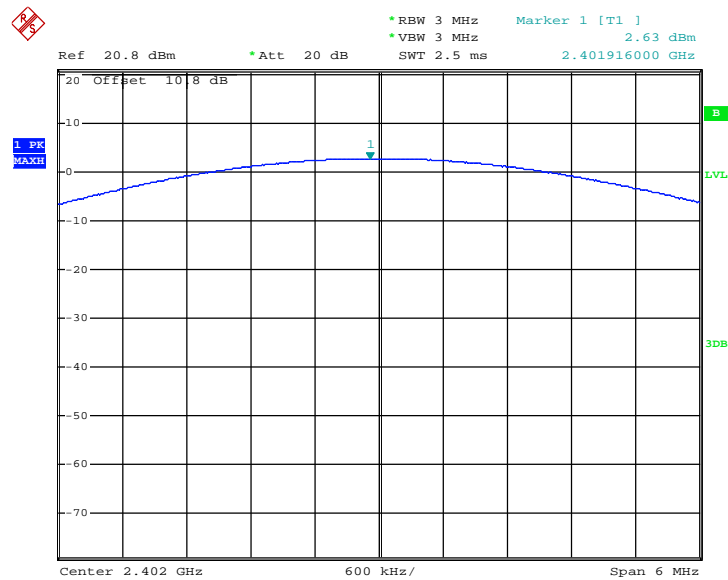
Date: 25.JUL.2012 19:18:36



Test Mode :	2Mbps	Temperature :	23~24°C
Test Engineer :	King Liu	Relative Humidity :	47~48%

Channel	Frequency (MHz)	RF Power (dBm)		
		$\pi/4$ -DQPSK	Max. Limits (dBm)	Pass/Fail
		2 Mbps		
00	2402	2.63	20.97	Pass
39	2441	2.85	20.97	Pass
78	2480	2.79	20.97	Pass

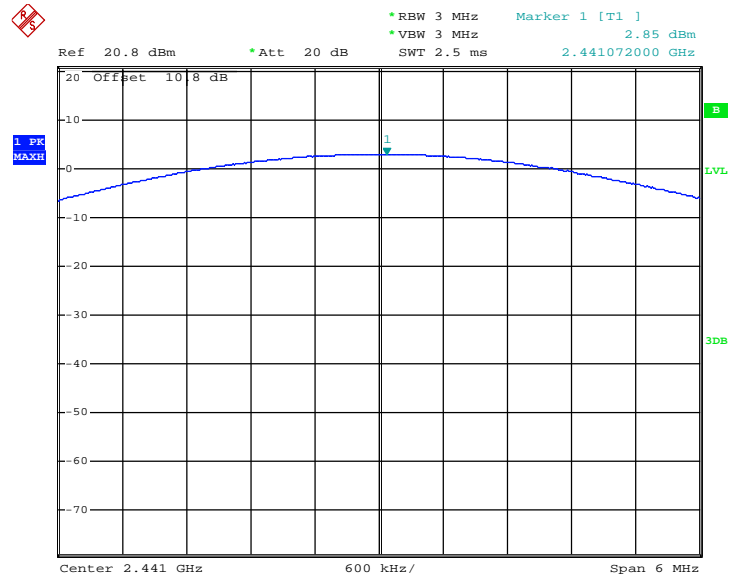
Peak Output Power Plot on Channel 00



Date: 25.JUL.2012 19:36:13

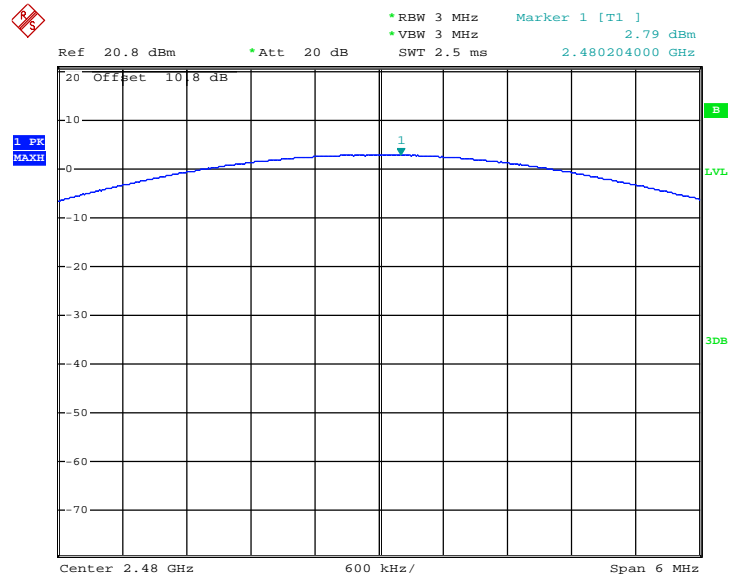


Peak Output Power Plot on Channel 39



Date: 25.JUL.2012 19:35:46

Peak Output Power Plot on Channel 78



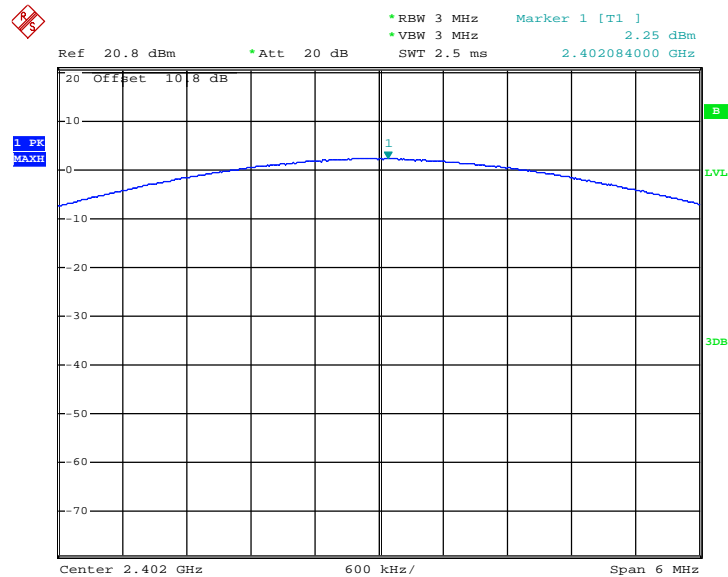
Date: 25.JUL.2012 19:35:15



Test Mode :	3Mbps	Temperature :	23~24°C
Test Engineer :	King Liu	Relative Humidity :	47~48%

Channel	Frequency (MHz)	RF Power (dBm)		
		8-DPSK	Max. Limits (dBm)	Pass/Fail
		3 Mbps		
00	2402	2.25	20.97	Pass
39	2441	2.45	20.97	Pass
78	2480	2.22	20.97	Pass

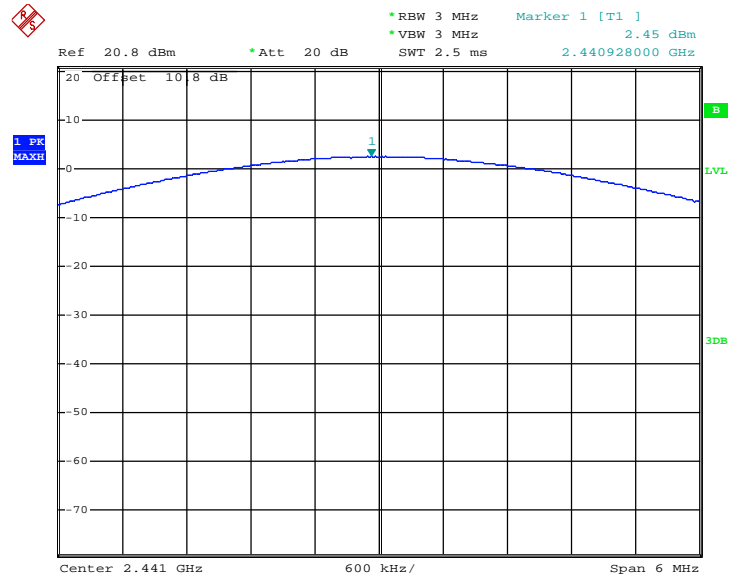
Peak Output Power Plot on Channel 00



Date: 25.JUL.2012 19:37:56

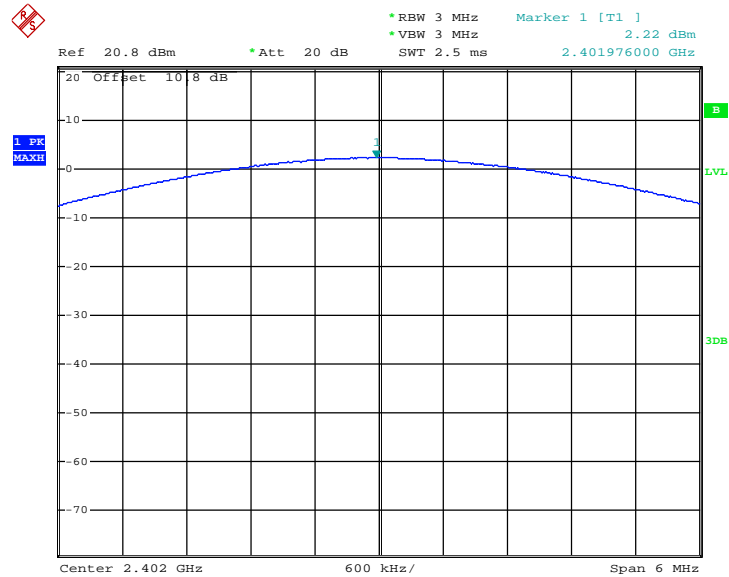


Peak Output Power Plot on Channel 39



Date: 25.JUL.2012 19:37:26

Peak Output Power Plot on Channel 78



Date: 25.JUL.2012 19:36:55

3.6 Conducted 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.

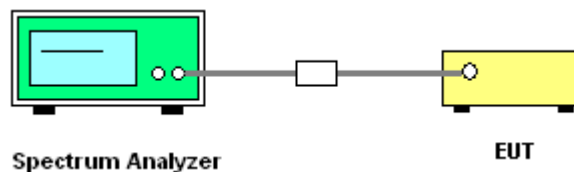
3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

3.6.3 Test Procedures

1. The testing follows the guidelines in Band-edge Compliance of RF Conducted Emissions of FCC Public Notice DA 00-705 Measurement Guidelines.
2. Set RBW = 300KHz ($\geq 1\%$ span=30MHz), VBW = 300KHz (\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. 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

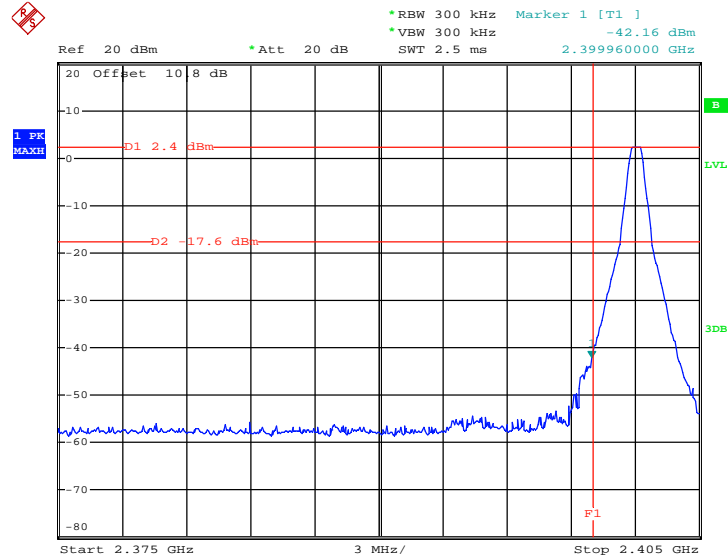




3.6.5 Test Result of Conducted Band Edges

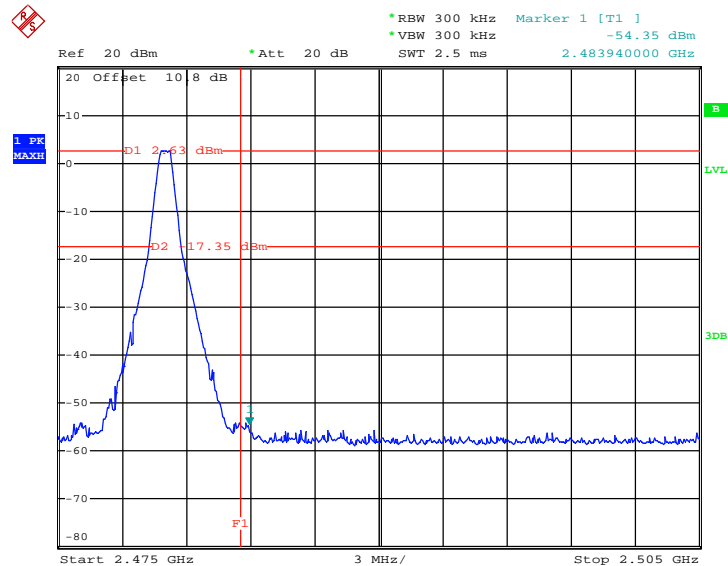
Test Mode :	1Mbps	Temperature :	23~24°C
Test Channel :	00 and 78	Relative Humidity :	47~48%
		Test Engineer :	King Liu

Low Band Edge Plot on Channel 00



Date: 26.JUL.2012 15:30:31

High Band Edge Plot on Channel 78

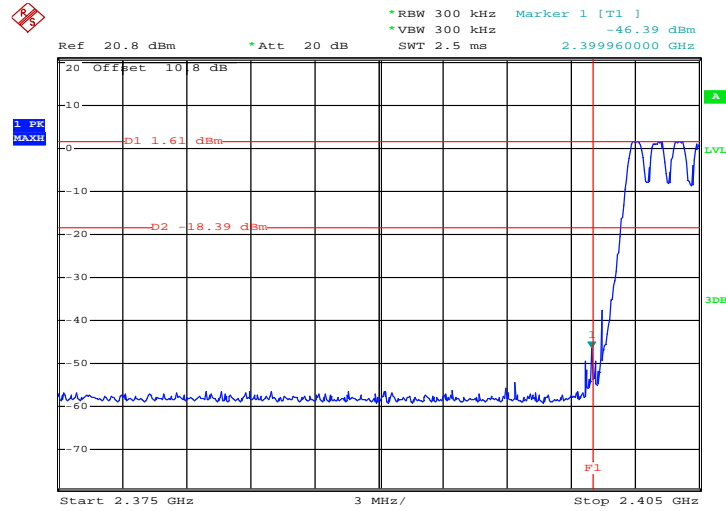


Date: 26.JUL.2012 15:33:56

3.6.6 Test Result of Conducted Hopping Mode Band Edges

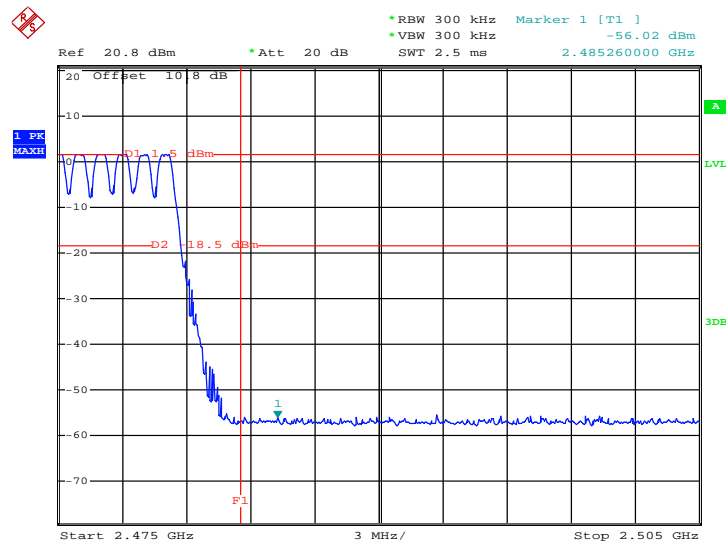
Test Mode :	1Mbps	Temperature :	23~24°C
Test Channel :	00 and 78	Relative Humidity :	47~48%
		Test Engineer :	King Liu

Hopping Mode Low Band Edge Plot Channel 00



Date: 1.AUG.2012 19:01:26

Hopping Mode High Band Edge Plot Channel 78



Date: 1.AUG.2012 18:59:16

3.7 Conducted Spurious Emission Measurement

3.7.1 Limit of Spurious Emission Measurement

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.

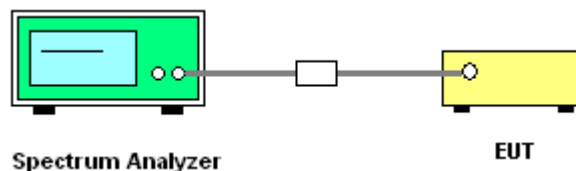
3.7.2 Measuring Instruments

See list of measuring instruments of this test report.

3.7.3 Test Procedure

1. The testing follows the guidelines in Spurious RF Conducted Emissions of FCC Public Notice DA 00-705 Measurement Guidelines
2. The transmitter output was connected to the spectrum analyzer via a low lose cable.
3. Set RBW = 100 KHz, VBW = 300KHz, 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

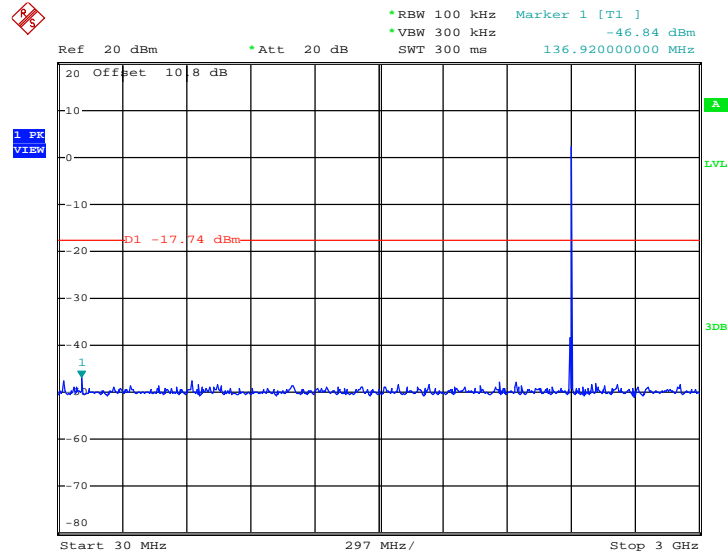




3.7.5 Test Result

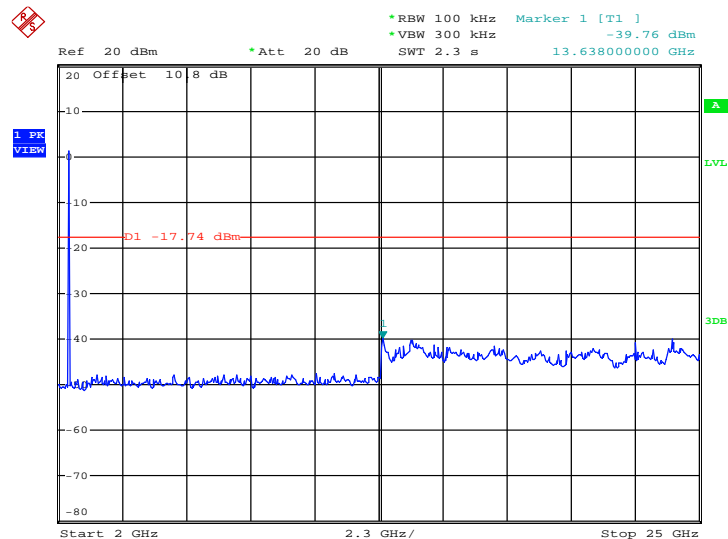
Test Mode :	1Mbps	Temperature :	23~24°C
Test Channel :	00	Relative Humidity :	47~48%
		Test Engineer :	King Liu

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 26.JUL.2012 15:08:35

Conducted Spurious Emission Plot between 2 GHz ~ 25 GHz

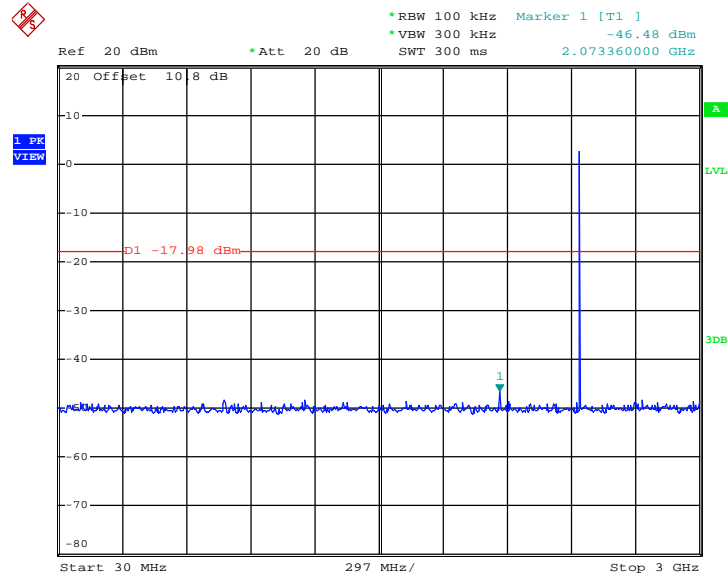


Date: 26.JUL.2012 15:09:55



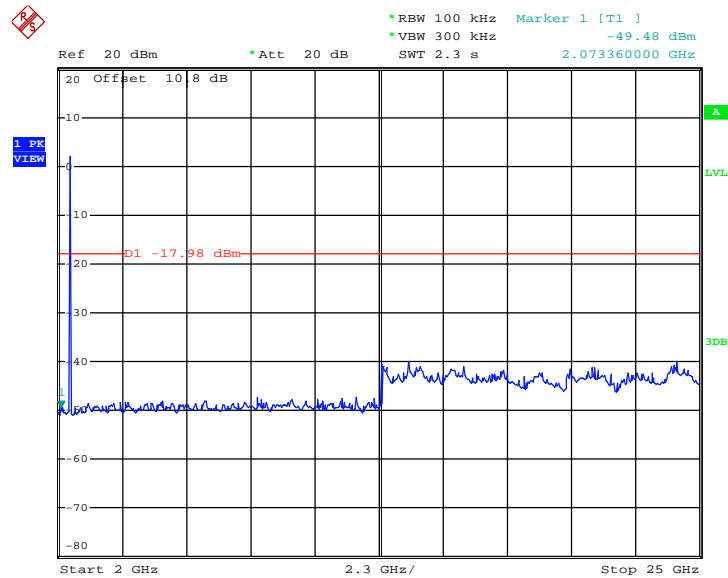
Test Mode :	1Mbps	Temperature :	23~24°C
Test Channel :	39	Relative Humidity :	47~48%
		Test Engineer :	King Liu

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 26.JUL.2012 15:11:42

Conducted Spurious Emission Plot between 2 GHz ~ 25 GHz

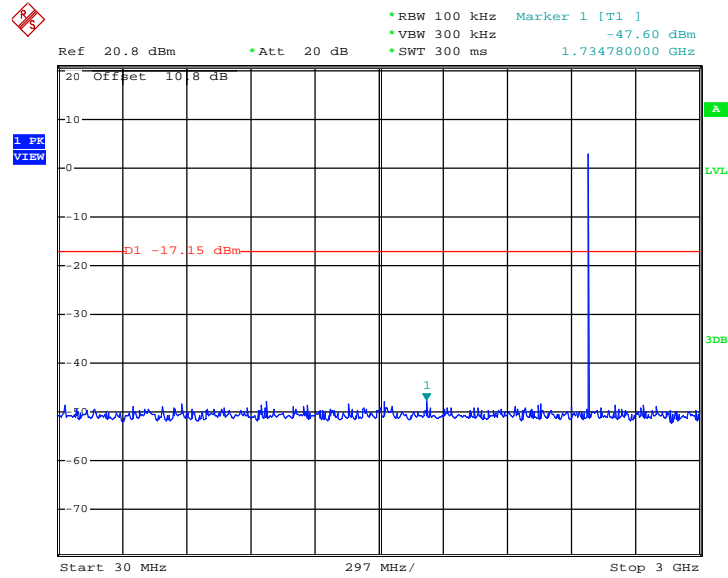


Date: 26.JUL.2012 15:12:23



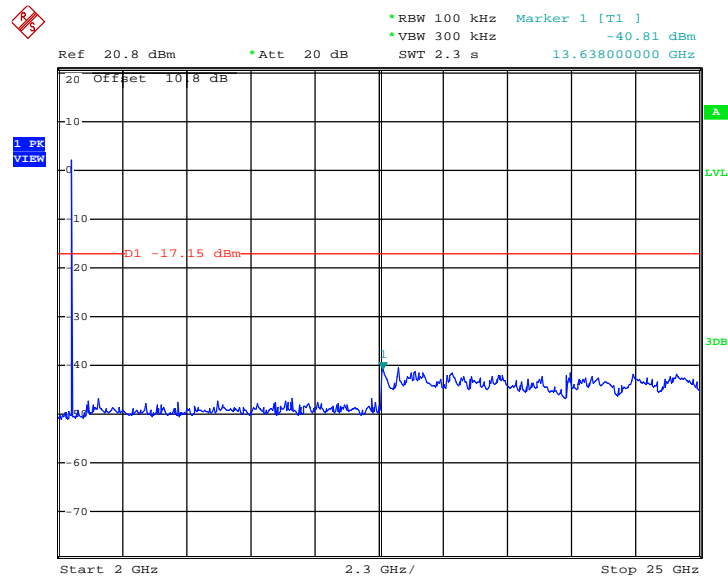
Test Mode :	1Mbps	Temperature :	23~24°C
Test Channel :	78	Relative Humidity :	47~48%
		Test Engineer :	King Liu

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 27.JUL.2012 14:59:31

Conducted Spurious Emission Plot between 2 GHz ~ 25 GHz



Date: 27.JUL.2012 15:00:39

3.8 Radiated Band Edges Measurement

3.8.1 Limit of Radiated Band Edges

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

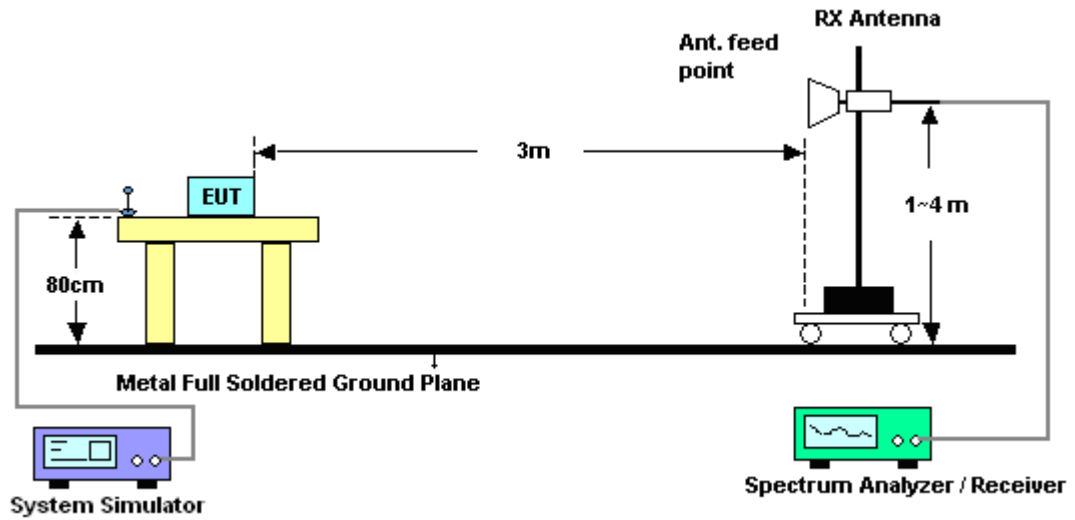
3.8.2 Measuring Instruments

See list of measuring instruments of this test report.

3.8.3 Test Procedures

1. The testing follows the guidelines in Spurious Radiated Emissions of FCC Public Notice DA 00-705 Measurement Guidelines and fulfills ANSI C63.4-2003 and the guidelines in ANSI C63.10-2009 test site requirement.
2. 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).
3. 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.

3.8.4 Test Setup





3.8.5 Test Result of Radiated Band Edges

Test Mode :	1Mbps	Temperature :	21~22°C
Test Channel :	00	Relative Humidity :	46~47%
		Test Engineer :	Chenmy Cheng

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
2325.2	50.3	-23.7	74	48.17	32.76	3.27	33.9	110	340	Peak
2325.2	37.5	-16.5	54	35.37	32.76	3.27	33.9	110	340	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
2322.73	50.37	-23.63	74	48.24	32.76	3.27	33.9	110	321	Peak
2322.73	37.53	-16.47	54	35.4	32.76	3.27	33.9	110	321	Average



Test Mode :	1Mbps	Temperature :	21~22°C
Test Channel :	78	Relative Humidity :	46~47%
		Test Engineer :	Chenmy Cheng

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
2483.63	50.93	-23.07	74	48.44	33.01	3.68	34.2	112	201	Peak
2483.63	37.64	-16.36	54	35.15	33.01	3.68	34.2	112	201	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	92.47	54.83	37.64	54	-16.36	Pass
Hopping Mode	92.47	56.04	36.43	54	-17.57	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
2484.64	47.23	-26.77	74	44.74	33.01	3.68	34.2	115	346	Peak
2484.64	34.11	-19.89	54	31.62	33.01	3.68	34.2	115	346	Average

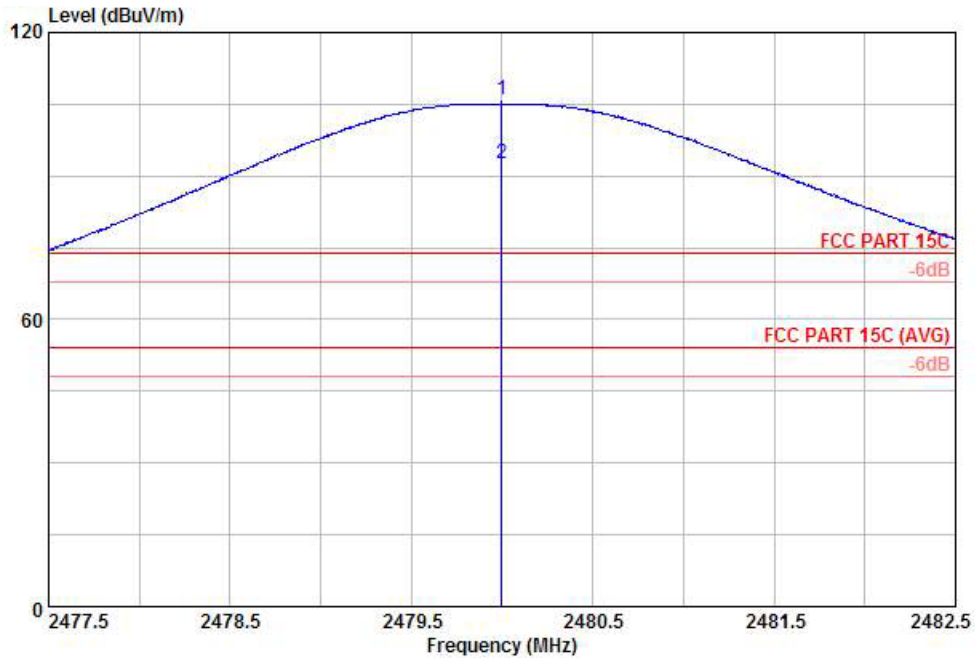
Summary results of marker-delta method:

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	88.25	54.14	34.11	54	-19.89	Pass
Hopping Mode	88.25	54.48	33.77	54	-20.23	Pass

Note: Average result = Maximum field strength – Delta result



Test Mode :	1Mbps	Temperature :	21~22°C
Test Channel :	78	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	Polarization :	Horizontal



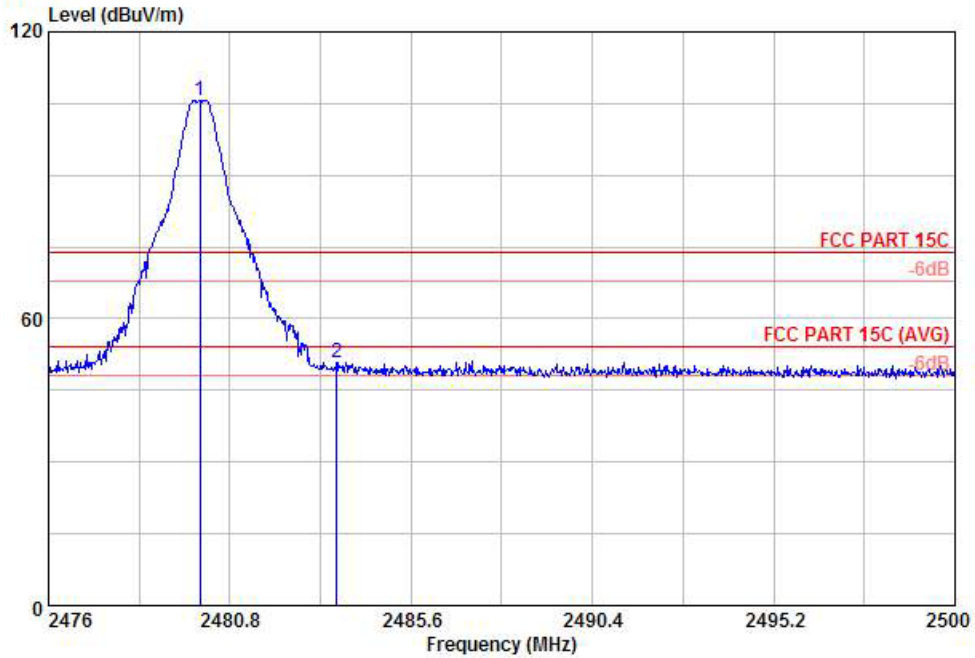
Site : 03CH01-KS
 Condition: FCC PART 15C 3m HF ANI-100803 HORIZONTAL

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 X	2480.00	105.84	31.84	74.00	97.54	33.01	4.29	29.00	115	259	Peak
2 X	2480.00	92.47	38.47	54.00	84.17	33.01	4.29	29.00	115	259	Average

* Maximum field strength of the fundamental emission



Test Mode :	1Mbps	Temperature :	21~22°C
Test Channel :	78	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	Polarization :	Horizontal



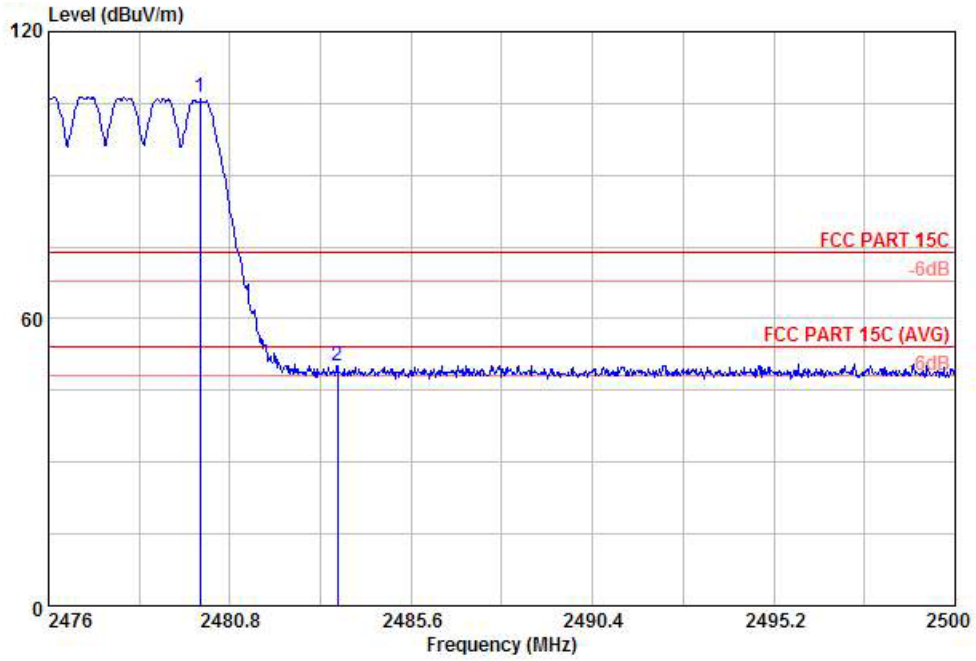
Site : 03CH01-KS
 Condition: FCC PART 15C 3m HF ANT-100803 HORIZONTAL

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	cm	deg	Remark
1 X	2480.00	105.76	31.76	74.00	97.46	33.01	4.29	29.00	112	260 Peak
2	2483.63	50.93	-23.07	74.00	42.63	33.01	4.29	29.00	112	201 Peak

* Marker-Delta Method (RBW/VBW=100KHz): 54.83 dB , single carrier Mode



Test Mode :	1Mbps	Temperature :	21~22°C
Test Channel :	78	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	Polarization :	Horizontal



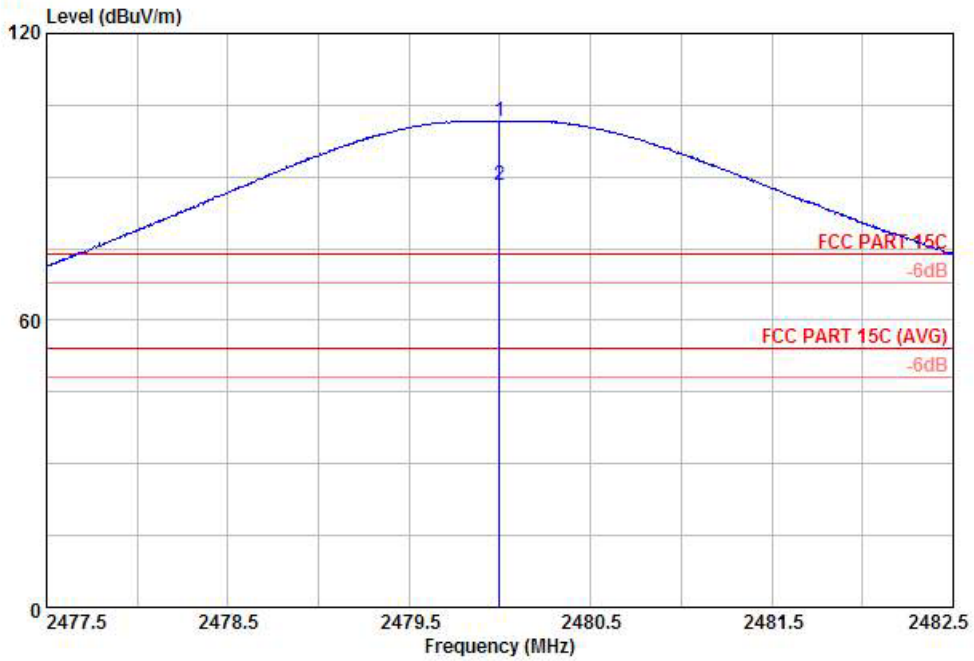
Site : 03CH01-KS
 Condition: FCC PART 15C 3m HF ANT-100803 HORIZONTAL

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	cm	deg	
1 X	2480.00	106.29	32.29	74.00	97.99	33.01	4.29	29.00	115	260 Peak
2	2483.66	50.25	-23.75	74.00	41.95	33.01	4.29	29.00	200	110 Peak

* Marker-Delta Method (RBW/VBW=100KHz): 56.04 dB , Hopping Mode



Test Mode :	1Mbps	Temperature :	21~22°C
Test Channel :	78	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	Polarization :	Vertical



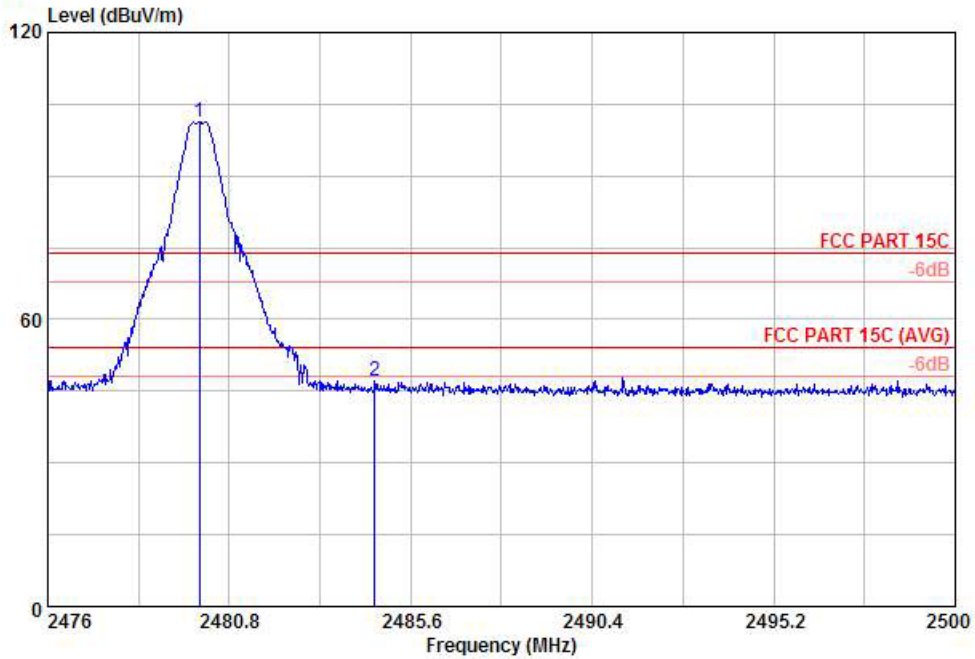
Site : 03CH01-KS
 Condition: FCC PART 15C 3m HF ANT-100803 VERTICAL

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	
	MHz	dBuV/m	dB	dBuV/m	Level	Loss	Factor	Pos	Pos	Remark
					dBuV	dB	dB	cm	deg	
1 X	2480.00	101.73	27.73	74.00	93.43	33.01	4.29	29.00	101	330 Peak
2 X	2480.00	88.25	34.25	54.00	79.95	33.01	4.29	29.00	101	330 Average

* Maximum field strength of the fundamental emission



Test Mode :	1Mbps	Temperature :	21~22°C
Test Channel :	78	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	Polarization :	Vertical



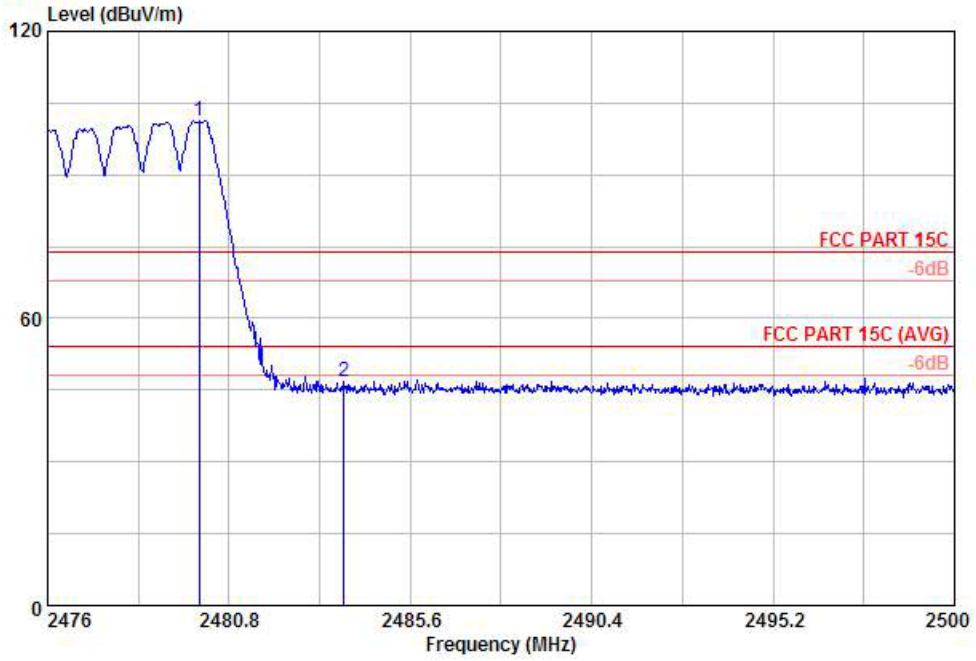
Site : 03CH01-KS
 Condition: FCC PART 15C 3m HF ANT-100803 VERTICAL

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	
	MHz	dBuV/m	dB	dBuV/m	dBuV	Loss	Factor	Pos	Pos	Remark
						dB	dB	cm	deg	
1 X	2480.00	101.37	27.37	74.00	93.07	33.01	4.29	29.00	100	332 Peak
2	2484.64	47.23	-26.77	74.00	38.93	33.01	4.29	29.00	115	346 Peak

* Marker-Delta Method (RBW/VBW=100KHz): 54.14 dB , single carrier Mode



Test Mode :	1Mbps	Temperature :	21~22°C
Test Channel :	78	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	Polarization :	Vertical



Site : 03CH01-KS
 Condition: FCC PART 15C 3m HF ANT-100803 VERTICAL

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Ant	Table	
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB	dB	cm	deg	Remark
1 X	2480.00	101.32	27.32	74.00	93.02	33.01	4.29	29.00	102	299 Peak
2	2483.85	46.84	-27.16	74.00	38.54	33.01	4.29	29.00	100	360 Peak

* Marker-Delta Method (RBW/VBW=100KHz): 54.48 dB , Hopping Mode

3.9 Radiated Spurious Emission Measurement

3.9.1 Limit of Radiated Emission

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

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

3.9.2 Measuring Instruments

See list of measuring instruments of this test report.

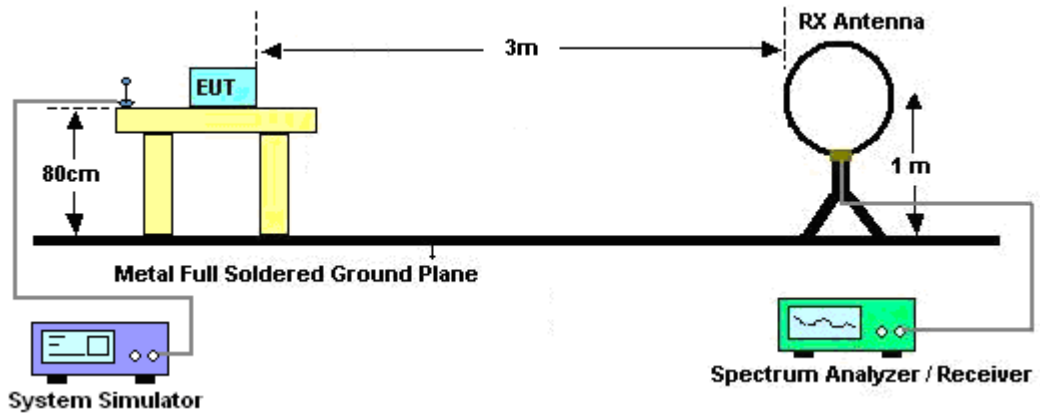


3.9.3 Test Procedures

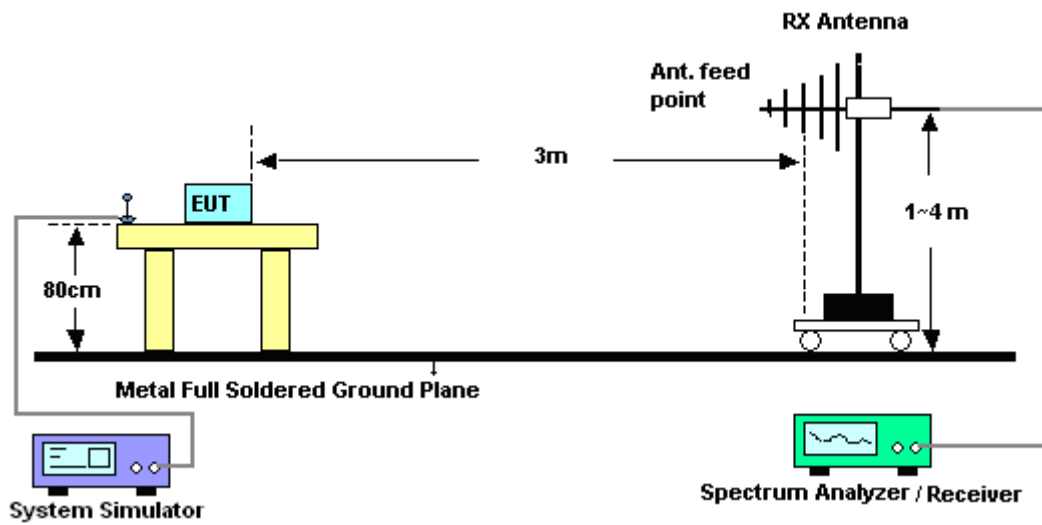
1. The testing follows the guidelines in Spurious Radiated Emissions of FCC Public Notice DA 00-705 Measurement Guidelines and fulfills ANSI C63.4-2003 and the guidelines in ANSI C63.10-2009 test site requirement.
2. Applies to band edge emissions that fall in the restricted bands listed in FCC Section 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).
3. Follow the guidelines in ANSI C63.4-2003 and ANSI C63.10-2009 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.
4. Measured average value if the peak value is greater than 54 dBu/m

3.9.4 Test Setup

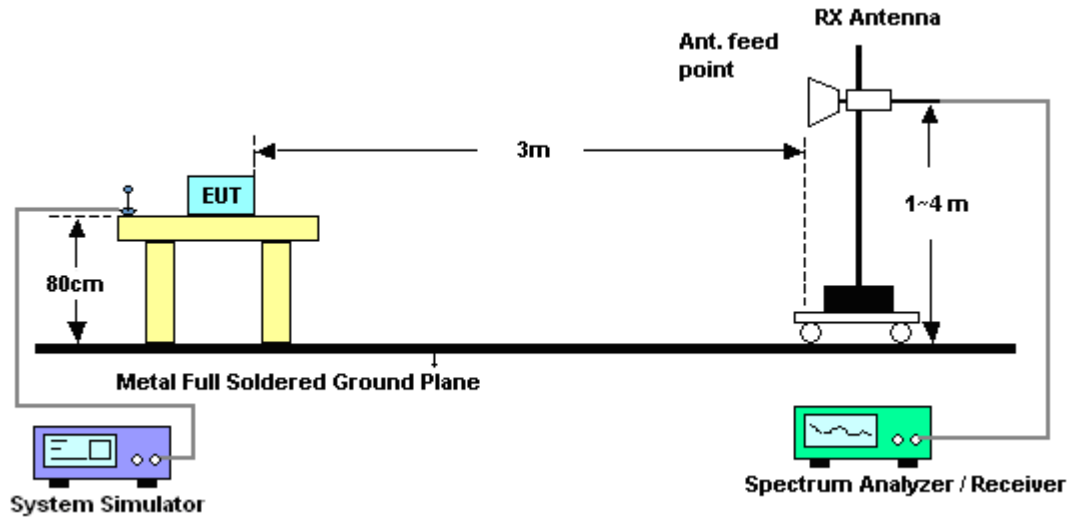
For radiated emissions below 30MHz



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 :	1Mbps	Temperature :	21~22°C
Test Channel :	00	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	Polarization :	Horizontal
Remark :	2402 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
37.81	31.86	-8.14	40	47.98	13.7	0.24	30.06	140	250	Peak
189.74	20.57	-22.93	43.5	41.43	8.5	0.58	29.94			Peak
319.94	32.53	-13.47	46	48.17	13.55	0.76	29.95			Peak
691.99	30.82	-15.18	46	40.17	19.25	1.12	29.72			Peak
787.24	32.98	-13.02	46	41.46	19.86	1.24	29.58			Peak
836.24	32.68	-13.32	46	40.69	20.36	1.27	29.64			Peak
2072	59.54	-14.46	74	57.98	32.46	2.51	33.41			Peak
2325.2	37.5	-16.5	54	35.37	32.76	3.27	33.9	110	340	Average
2325.2	50.3	-23.7	74	48.17	32.76	3.27	33.9	110	340	Peak
2402	88.29	-	-	86.01	32.86	3.47	34.05	100	261	Average
2402	104.02	-	-	101.74	32.86	3.47	34.05	100	261	Peak
2488.41	37.99	-16.01	54	35.45	33.05	3.72	34.23	110	320	Average
2488.41	50.12	-23.88	74	47.58	33.05	3.72	34.23	110	320	Peak
4804	45.71	-8.29	54	37.84	35.17	4.97	32.27	100	248	Average
4804	54.92	-19.08	74	47.05	35.17	4.97	32.27	100	248	Peak



Test Mode :	1Mbps	Temperature :	21~22°C
Test Channel :	00	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	Polarization :	Vertical
Remark :	2402 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
37.81	32.26	-7.74	40	48.38	13.7	0.24	30.06	100	360	Peak
134.56	20.59	-22.91	43.5	38.8	11.3	0.48	29.99	-	-	Peak
319.94	22.97	-23.03	46	38.61	13.55	0.76	29.95	-	-	Peak
537.59	29.36	-16.64	46	39.82	18.24	0.99	29.69	-	-	Peak
614.21	29.82	-16.18	46	39.71	18.67	1.07	29.63	-	-	Peak
721.73	29.32	-16.68	46	38.27	19.55	1.15	29.65	-	-	Peak
2072	53.55	-20.45	74	51.99	32.46	2.51	33.41	-	-	Peak
2322.73	37.53	-16.47	54	35.4	32.76	3.27	33.9	110	321	Average
2322.73	50.37	-23.63	74	48.24	32.76	3.27	33.9	110	321	Peak
2402	86.77	-	-	84.49	32.86	3.47	34.05	116	284	Average
2402	99.14	-	-	96.86	32.86	3.47	34.05	116	284	Peak
2484.42	37.86	-16.14	54	35.37	33.01	3.68	34.2	108	340	Average
2484.42	50.25	-23.75	74	47.76	33.01	3.68	34.2	108	340	Peak
4804	41.88	-12.12	54	34.01	35.17	4.97	32.27	106	360	Average
4804	54.38	-19.62	74	46.51	35.17	4.97	32.27	106	360	Peak



Test Mode :	1Mbps	Temperature :	21~22°C
Test Channel :	39	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	Polarization :	Horizontal
Remark :	2441 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
39.7	28.08	-11.92	40	45.55	12.3	0.25	30.02	125	89	Peak
320.03	30.26	-15.74	46	45.9	13.55	0.76	29.95	-	-	Peak
460.68	26.71	-19.29	46	39.13	16.45	0.91	29.78	-	-	Peak
787.57	33.27	-12.73	46	41.75	19.86	1.24	29.58	-	-	Peak
903	31.36	-14.64	46	39.08	20.46	1.3	29.48	-	-	Peak
979.63	29.15	-24.85	54	36.33	20.96	1.39	29.53	-	-	Peak
2084	53.61	-20.39	74	52.01	32.48	2.55	33.43	-	-	Peak
2335.65	37.41	-16.59	54	35.24	32.78	3.33	33.94	110	225	Average
2335.65	50.5	-23.5	74	48.33	32.78	3.33	33.94	110	225	Peak
2441	88.73	-	-	86.33	32.95	3.6	34.15	103	247	Average
2441	103	-	-	100.6	32.95	3.6	34.15	103	247	Peak
2491.26	37.99	-16.01	54	35.45	33.05	3.72	34.23	100	260	Average
2491.26	50	-24	74	47.46	33.05	3.72	34.23	100	260	Peak
4884	45.51	-8.49	54	37.62	35.18	4.98	32.27	100	360	Average
4884	55.41	-18.59	74	47.52	35.18	4.98	32.27	100	360	Peak



Test Mode :	1Mbps	Temperature :	21~22°C
Test Channel :	39	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	Polarization :	Vertical
Remark :	2441 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
35.25	31.19	-8.81	40	45.95	15.1	0.23	30.09	120	320	Peak
107.51	17.01	-26.49	43.5	34.98	11.56	0.43	29.96	-	-	Peak
319.94	22.72	-23.28	46	38.36	13.55	0.76	29.95	-	-	Peak
460.73	25.23	-20.77	46	37.65	16.45	0.91	29.78	-	-	Peak
537.59	29.61	-16.39	46	40.07	18.24	0.99	29.69	-	-	Peak
721.73	29.12	-16.88	46	38.07	19.55	1.15	29.65	-	-	Peak
2362.44	37.29	-16.71	54	35.08	32.81	3.38	33.98	160	320	Average
2362.44	49.97	-24.03	74	47.76	32.81	3.38	33.98	160	320	Peak
2441	84.6	-	-	82.2	32.95	3.6	34.15	173	116	Average
2441	95.82	-	-	93.42	32.95	3.6	34.15	173	116	Peak
2486.89	37.85	-16.15	54	35.36	33.01	3.68	34.2	146	156	Average
2486.89	50.66	-23.34	74	48.17	33.01	3.68	34.2	146	156	Peak
4884	44.7	-9.3	54	36.81	35.18	4.98	32.27	101	241	Average
4884	53.81	-20.19	74	45.92	35.18	4.98	32.27	101	241	Peak



Test Mode :	1Mbps	Temperature :	21~22°C
Test Channel :	78	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	Polarization :	Horizontal
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
37.81	31.83	-8.17	40	47.95	13.7	0.24	30.06	120	260	Peak
189.07	19.32	-24.18	43.5	40.2	8.49	0.57	29.94	-	-	Peak
319.94	29.12	-16.88	46	44.76	13.55	0.76	29.95	-	-	Peak
460.73	27.59	-18.41	46	40.01	16.45	0.91	29.78	-	-	Peak
691.99	32.52	-13.48	46	41.87	19.25	1.12	29.72	-	-	Peak
787.85	32.83	-13.17	46	41.31	19.86	1.24	29.58	-	-	Peak
2068	53.74	-20.26	74	52.18	32.46	2.51	33.41	-	-	Peak
2312	37.55	-16.45	54	35.46	32.73	3.22	33.86	105	34	Average
2312	49.03	-24.97	74	46.94	32.73	3.22	33.86	105	34	Peak
2480	105.84	-	-	103.35	33.01	3.68	34.2	115	259	Peak
2480	92.47	-	-	89.98	33.01	3.68	34.2	115	259	Average
2483.632	50.93	-23.07	74	48.44	33.01	3.68	34.2	112	201	Peak
2483.632	37.64	-16.36	54	35.15	33.01	3.68	34.2	112	201	Average
4962	44.6	-9.4	54	36.66	35.2	5	32.26	118	247	Average
4962	54.64	-19.36	74	46.7	35.2	5	32.26	118	247	Peak



Test Mode :	1Mbps	Temperature :	21~22°C
Test Channel :	78	Relative Humidity :	46~47%
Test Engineer :	Chenmy Cheng	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
33.8	31.77	-8.23	40	46.07	15.56	0.23	30.09	100	210	Peak
169.6	23.82	-19.68	43.5	43.99	9.2	0.54	29.91	-	-	Peak
319.94	23.71	-22.29	46	39.35	13.55	0.76	29.95	-	-	Peak
537.59	30.59	-15.41	46	41.05	18.24	0.99	29.69	-	-	Peak
719.2	31.06	-14.94	46	40.05	19.52	1.15	29.66	-	-	Peak
986.07	29.08	-24.92	54	36.18	21.02	1.4	29.52	-	-	Peak
2070	56.84	-17.16	74	55.28	32.46	2.51	33.41	-	-	Peak
2310	37.53	-16.47	54	35.44	32.73	3.22	33.86	120	340	Average
2310	49.64	-24.36	74	47.55	32.73	3.22	33.86	120	340	Peak
2480	101.73	-	-	99.24	33.01	3.68	34.2	101	330	Peak
2480	88.25	-	-	85.76	33.01	3.68	34.2	101	330	Average
2484.64	47.23	-26.77	74	44.74	33.01	3.68	34.2	115	346	Peak
2484.64	34.11	-19.89	54	31.62	33.01	3.68	34.2	115	346	Average
4962	43.09	-10.91	54	35.15	35.2	5	32.26	115	256	Average
4962	51.5	-22.5	74	43.56	35.2	5	32.26	115	256	Peak

3.10 AC Conducted Emission Measurement

3.10.1 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.

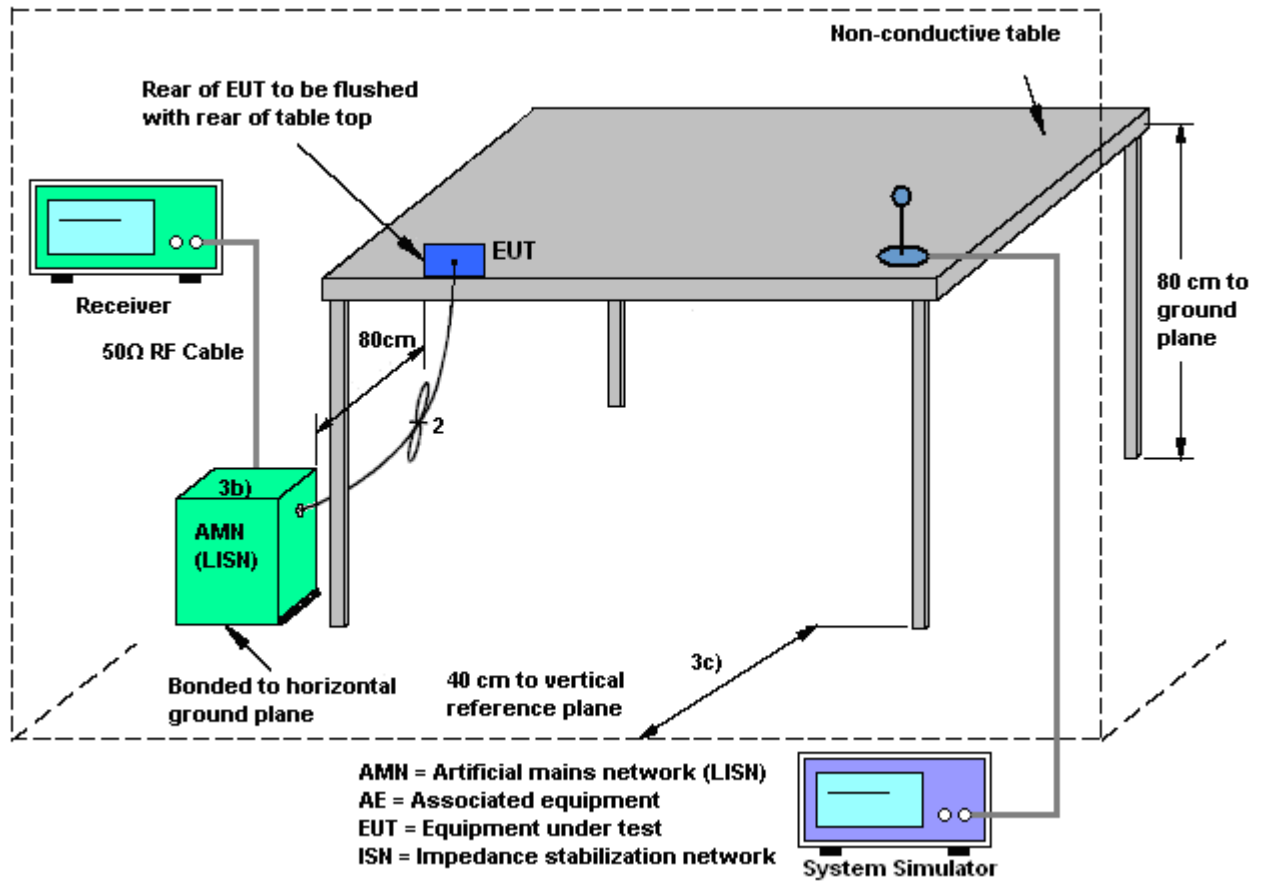
3.10.2 Measuring Instruments

See list of measuring instruments of this test report.

3.10.3 Test Procedures

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

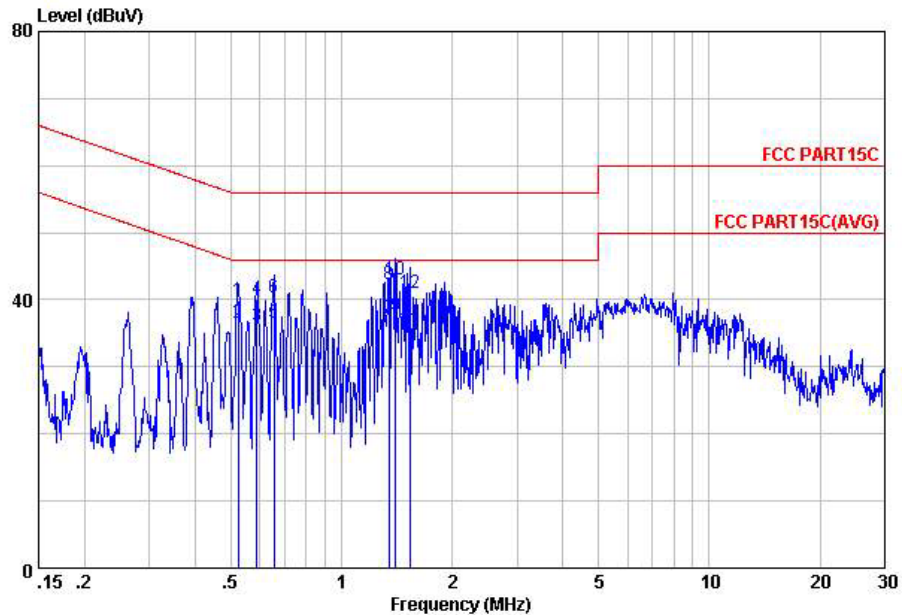
3.10.4 Test Setup





3.10.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	19~20°C
Test Engineer :	Tom Wang	Relative Humidity :	39~40%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	CDMA2000 BC0 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter) + Camera		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



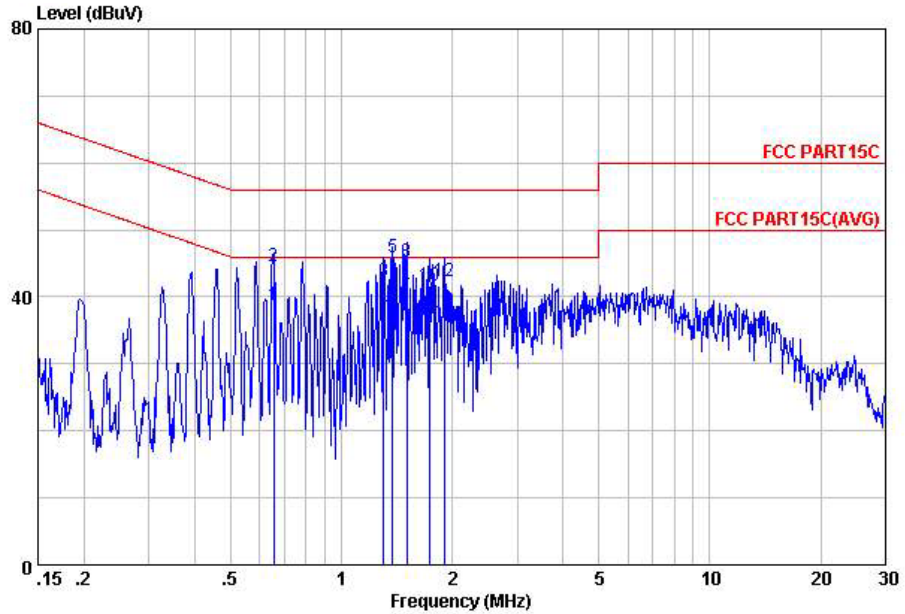
Site : C001-KS
 Condition: FCC PART15C LISN-111230 LINE

mode : Mode 1

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.52	39.84	-16.16	56.00	29.29	-0.08	10.63	QP
2	0.52	36.44	-9.56	46.00	25.89	-0.08	10.63	Average
3	0.59	36.05	-9.95	46.00	25.50	-0.08	10.63	Average
4	0.59	40.05	-15.95	56.00	29.50	-0.08	10.63	QP
5	0.65	36.65	-9.35	46.00	26.10	-0.09	10.64	Average
6	0.65	40.35	-15.65	56.00	29.80	-0.09	10.64	QP
7	1.34	37.16	-8.84	46.00	26.59	-0.10	10.67	Average
8	1.34	42.36	-13.64	56.00	31.79	-0.10	10.67	QP
9	1.40	37.57	-8.43	46.00	27.00	-0.10	10.67	Average
10	1.40	43.07	-12.93	56.00	32.50	-0.10	10.67	QP
11	1.54	35.58	-10.42	46.00	25.01	-0.11	10.68	Average
12	1.54	41.08	-14.92	56.00	30.51	-0.11	10.68	QP



Test Mode :	Mode 1	Temperature :	19~20°C
Test Engineer :	Tom Wang	Relative Humidity :	39~40%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	CDMA2000 BC0 Idle + Bluetooth Link + WLAN Link + USB Cable (Charging from Adapter) + Camera		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : C001-KS
 Condition: FCC PART15C LISN-111230 NEUTRAL

mode : Mode 1

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.65	38.76	-7.24	46.00	28.20	-0.08	10.64	Average
2	0.65	44.46	-11.54	56.00	33.90	-0.08	10.64	QP
3	1.30	42.27	-13.73	56.00	31.71	-0.10	10.66	QP
4	1.30	38.17	-7.83	46.00	27.61	-0.10	10.66	Average
5	1.37	45.97	-10.03	56.00	35.40	-0.10	10.67	QP
6	1.37	40.07	-5.93	46.00	29.50	-0.10	10.67	Average
7	1.50	40.18	-5.82	46.00	29.60	-0.10	10.68	Average
8	1.50	45.18	-10.82	56.00	34.60	-0.10	10.68	QP
9	1.73	35.99	-10.01	46.00	25.41	-0.11	10.69	Average
10	1.73	41.59	-14.41	56.00	31.01	-0.11	10.69	QP
11	1.90	36.09	-9.91	46.00	25.50	-0.11	10.70	Average
12	1.90	42.29	-13.71	56.00	31.70	-0.11	10.70	QP



3.11 Antenna Requirements

3.11.1 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.

3.11.2 Antenna Connected Construction

Non-standard connector used.

3.11.3 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	100319	9kHz~40GHz	Dec. 30, 2011	Jul. 25, 2012~ Aug. 01, 2012	Dec. 29, 2012	Conducted (TH01-KS)
Power Meter	Agilent	E4416A	MY45101555	N/A	Aug. 23, 2011	Jul. 25, 2012~ Aug. 01, 2012	Aug. 22, 2012	Conducted (TH01-KS)
Power Sensor	Agilent	E9327A	MY44421198	N/A	Aug. 23, 2011	Jul. 25, 2012~ Aug. 01, 2012	Aug. 22, 2012	Conducted (TH01-KS)
DC Power Supply	GWINSTEK	GPS-3030D	E1884515	N/A	Aug. 23, 2011	Jul. 25, 2012~ Aug. 01, 2012	Aug. 22, 2012	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	N/A	Dec. 30, 2011	Jul. 25, 2012~ Aug. 01, 2012	Dec. 29, 2012	Conducted (TH01-KS)
Bluetooth Base Station	R&S	CBT	100783	N/A	Aug. 18, 2011	Jul. 25, 2012~ Aug. 01, 2012	Aug. 17, 2012	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESCI	100534	9kHz~3GHz	Nov. 09, 2011	Jul. 19, 2012	Nov. 08, 2012	Radiation (03CH01-KS)
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Dec. 30, 2011	Jul. 19, 2012	Dec. 29, 2012	Radiation (03CH01-KS)
Bilog Antenna	SCHAFFNER	CBL6112D	23182	25MHz~2GHz	Dec. 08, 2011	Jul. 19, 2012	Dec. 07, 2012	Radiation (03CH01-KS)
Loop Antenna	R&S	HFH2-Z2	860004/00	9 kHz~30 MHz	Jul. 28, 2011	Jul. 19, 2012	Jul. 27, 2012	Radiation (03CH01-KS)
Double Ridge Horn Antenna	EMCO	3117	00075959	1GHz~18GHz	Jan. 06, 2012	Jul. 19, 2012	Jan. 05, 2013	Radiation (03CH01-KS)
Amplifier	Wireless	FPA-6592G	060004	30MHz~2GHz	Dec. 30, 2011	Jul. 19, 2012	Dec. 29, 2012	Radiation (03CH01-KS)
Amplifier	Agilent	8449B	3008A02370	1GHz~26.5GHz	Dec. 30, 2011	Jul. 19, 2012	Dec. 29, 2012	Radiation (03CH01-KS)
Active Horn Antenna	com-power	AHA-118	701023	1GHz~18GHz	Nov. 07, 2011	Jul. 19, 2012	Nov. 06, 2012	Radiation (03CH01-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz~40GHz	Oct. 11, 2011	Jul. 19, 2012	Oct. 10, 2012	Radiation (03CH01-KS)
Bluetooth Base Station	R&S	CBT	100783	N/A	Aug. 18, 2011	Jul. 19, 2012	Aug. 17, 2012	Radiation (03CH01-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz	Jun. 01, 2012	Jul. 14, 2012	May 31, 2013	Conduction (CO01-KS)
LISN	MessTec	AN3016	60103	9kHz~30MHz	Dec. 30, 2011	Jul. 14, 2012	Dec. 29, 2012	Conduction (CO01-KS)
LISN	MessTec	AN3016	60105	9kHz~30MHz	Dec. 30, 2011	Jul. 14, 2012	Dec. 29, 2012	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000811	N/A	Nov. 16, 2011	Jul. 14, 2012	Nov. 15, 2012	Conduction (CO01-KS)
System Simulator	R&S	CMU200	837587/066	2G Full-Band	Dec. 30, 2011	Jul. 14, 2012	Dec. 29, 2012	Conduction (CO01-KS)



5 Uncertainty of Evaluation

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

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.72
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Uncertainty of Conducted Emission Measurement (150 KHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.26
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Appendix A. Photographs of EUT

Please refer to Sporton report number EP231609 as below.