FCC RF Test Report

APPLICANT	:	Motorola Solutions, Inc.
EQUIPMENT	:	Enterprise Digital Assistant (EDA)
BRAND NAME	:	MOTOROLA
MODEL NAME	:	MC67ND
FCC ID	:	UZ7MC67ND
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DSS) Spread Spectrum Transmitter

The product was received on Jan. 11, 2013 and completely tested on Mar. 01, 2013. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the compliance with the applicable technical standards.

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

Reviewed by:

Louis Wu

Louis Wu / Manager

Reviewed by:

Jones Tsai

Jones Tsai / Manager

Testing Laboratory 1190

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

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR320416A	Rev. 01	Initial issue of report	Mar. 22, 2013

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(1)	RSS-210 A8.4(2)	Number of Channels	≥ 15Chs	Pass	-
3.2	15.247(a)(1)	RSS-210 A8.1(b)	Hopping Channel Separation	≥ 2/3 of 20dB BW	Pass	-
3.3	15.247(a)(1)	RSS-210 A8.1(d)	Dwell Time of Each Channel	≤ 0.4sec in 31.6sec period	Pass	-
3.4	15.247(a)(1)	RSS-210 A8.1(a)	20dB Bandwidth	NA	Pass	-
3.4	-	RSS-Gen 4.6.1	99% Bandwidth	-	Pass	-
3.5	15.247(b)(1)	RSS-210 A8.1(b)	Peak Output Power	≤ 1 W for 1Mbps ≤ 125 mW for 2, 3Mbps	Pass	-
3.6	15.247(d)	RSS-210 A8.5	Conducted Band Edges	≤ 20dBc	Pass	-
3.7	15.247(d)	RSS-210 A8.5	Conducted Spurious Emission	≤ 20dBc	Pass	-
3.8	15.247(d)	RSS-210 A8.5	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 8.22 dB at 62.670 MHz
3.9	15.207	RSS-Gen 7.2.4	AC Conducted Emission	15.207(a)	Pass	Under limit 10.50 dB at 0.190 MHz
3.10	15.203 & 15.247(b)	RSS-210 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

Motorola Solutions, Inc.
One Motorola Plaza, Holtsville, NY 11742-1300 USA

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	Enterprise Digital Assistant (EDA)
Brand Name	MOTOROLA
Model Name	MC67ND
FCC ID	UZ7MC67ND
EUT supports Radios application	CDMA/EV-DO/GSM/EGPRS/WCDMA/HSPA/ WLAN 11abgn(HT20) / Bluetooth 2.1 EDR
HW Version	EV
SW Version	90.28.21 (RF Fusion Version : X_2.00.0.0.072R)
FW Version	2.47
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.

1.4 Product Specification of Equipment Under Test

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) : 2.67 dBm (0.0018 W) Bluetooth EDR (2Mbps) : 2.95 dBm (0.0020 W) Bluetooth EDR (3Mbps) : 3.52 dBm (0.0022 W)
99% Occupied Bandwidth	Bluetooth (1Mbps) : 0.856MHz Bluetooth EDR (2Mbps) : 1.200MHz Bluetooth EDR (3Mbps) : 1.172MHz
Antenna Type	Fixed Intenal Antenna type (PIFA Antenna) with gain 0.36 dBi
Type of Modulation	Bluetooth 2.1 BDR (1Mbps) : GFSK Bluetooth 2.1 EDR (2Mbps) : π/4-DQPSK Bluetooth 2.1 EDR (3Mbps) : 8-DPSK

1.5 Testing Site

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

The test site complies with ANSI C63.4 2003 requirement.

1.6 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 C63.10-2009
- IC RSS-210 Issue 8
- IC RSS-Gen Issue 3
- NOTICE 2012-DRS0126

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.
3. Per the section 2.2.3 of Notice of 2012-DRS0126, " Receivers Excluded from Industry Canada Requirements", only radiocommunication receivers operating in stand-alone mode within the band 30-960 MHz and scanner receivers are subject to Industry Canada requirements.

2 Test Configuration of Equipment Under Test

2.1 Descriptions of Test Mode

The EUT has been associated with peripherals pursuant to 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).

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

Channel	Frequency	Bluetooth RF Output Power		
		GFSK / 1Mbps		
		DH1	DH3	DH5
Ch00	2402MHz	2.38 dBm	2.40 dBm	2.40 dBm
Ch39	2441MHz	2.66 dBm	**2.67 dBm**	2.66 dBm
Ch78	2480MHz	2.65 dBm	2.64 dBm	2.64 dBm

Channel	Frequency	Bluetooth RF Output Power		
		π /4-DQPSK / 2Mbps		
		2DH1	2DH3	2DH5
Ch00	2402MHz	2.71 dBm	2.72 dBm	2.72 dBm
Ch39	2441MHz	2.94 dBm	2.94 dBm	**2.95 dBm**
Ch78	2480MHz	2.92 dBm	2.91 dBm	2.92 dBm

Channel	Frequency	Bluetooth RF Output Power		
		8-DPSK / 3Mbps		
		3DH1	3DH3	3DH5
Ch00	2402MHz	3.33 dBm	3.34 dBm	3.36 dBm
Ch39	2441MHz	**3.52 dBm**	3.50 dBm	3.51 dBm
Ch78	2480MHz	3.46 dBm	3.48 dBm	3.48 dBm

Remark:

1. The data rate was set in 3Mbps, and all the test items due to the highest RF output power.
2. The EUT is programmed to transmit signals continuously for all testing.

2.2 Test Mode

The following summary table is showing all test modes to demonstrate in compliance with the standard.

Definition of each configuration about keypad and Camera for EUT

Keypads	Cameras
(1) Qwerty (2) Numeric (3) PIM	(1) With camera (2) Without camera

Preliminary test for Radiated Spurious Emissions and AC Conducted Emission:
The preliminary test purpose is to find out the worst configuration among all components, and choose the worst configuration to perform final test demonstrated in compliance with FCC standard.

MC67ND HW/SW design is the same as FCC ID UZ7MC67NA granted on 2012/07/25, except the WWAN module replacement (PH8-P module in MC67NA, and PXS8 module in MC67ND). Due to the similarity, MC67NA RF performance is representative (Sporton RF Report of FCC ID: UZ7MC67NA, Report No: FR221518-01A Rev.01, Date of available on FCC website: 2012/07/25) and is referenced in this report.

Due to the similarity between MC67NA and MC67ND, the worst configuration is chosen according that found in MC67NA test report.

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 and the worst cases (Z plane) are recorded in this report.

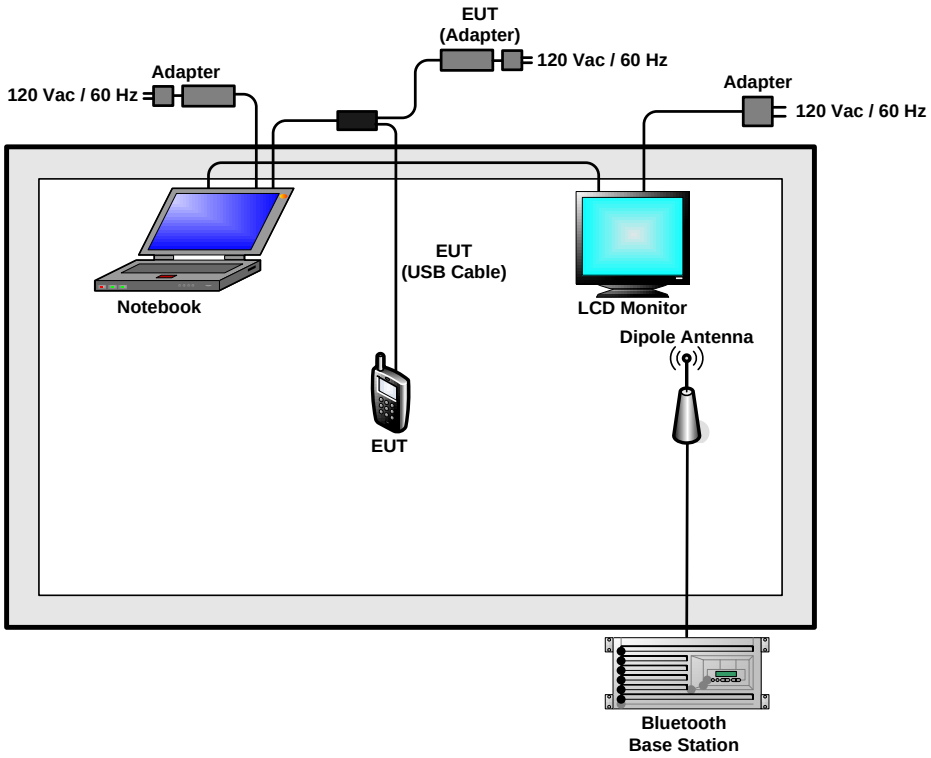
Test Modes					
Radiated TCs					
No.	**Data Rate**	**Modulation**	**Mode**	**Keypad**	**Camera**
1	Bluetooth EDR 3Mbps	8-DPSK	CH00_2402 MHz	1	1
2	Bluetooth EDR 3Mbps	8-DPSK	CH39_2441 MHz	1	1
3	Bluetooth EDR 3Mbps	8-DPSK	CH78_2480 MHz	1	1
Remark: For radiated TCs, test was performed together with USB charging cable with AC power.					

Test Modes			
Conducted TCs			
No.	Data Rate	Modulation	Mode
1	Bluetooth 1Mbps	GFSK	CH00_2402 MHz
2	Bluetooth 1Mbps	GFSK	CH39_2441 MHz
3	Bluetooth 1Mbps	GFSK	CH78_2480 MHz
4	Bluetooth EDR 2Mbps	π/4-DQPSK	CH00_2402 MHz
5	Bluetooth EDR 2Mbps	π/4-DQPSK	CH39_2441 MHz
6	Bluetooth EDR 2Mbps	π/4-DQPSK	CH78_2480 MHz
7	Bluetooth EDR 3Mbps	8-DPSK	CH00_2402 MHz
8	Bluetooth EDR 3Mbps	8-DPSK	CH39_2441 MHz
9	Bluetooth EDR 3Mbps	8-DPSK	CH78_2480 MHz

Test Cases
AC Conducted Emission
Mode 1 :GSM850 Idle + WLAN (2.4G) Link + Bluetooth Link + GPS Rx + Qwerty Keypad with Camera + USB Charging Cable with AC Power + USB Link
Remark: 1. For radiated test cases, the worst mode data rate 3Mbps was reported only, because this data rate has the highest RF output power at preliminary tests, and the conducted spurious emissions and conducted band edge measurement for each data rate are no worse than 3Mbps, and no other significantly frequencies found in conducted spurious emission . 2. ”BT Link” stands for EUT linked to Bluetooth Earphone by BT function. 3. ”WLAN Link” stands for EUT with AP at 2.4GHz band. 4. “USB Link” stands for data file transfer. 5. DSD keypad PCB is the same as Numeric keypad PCB, only difference is printed.

2.3 Connection Diagram of Test System

<Bluetooth Tx Mode>



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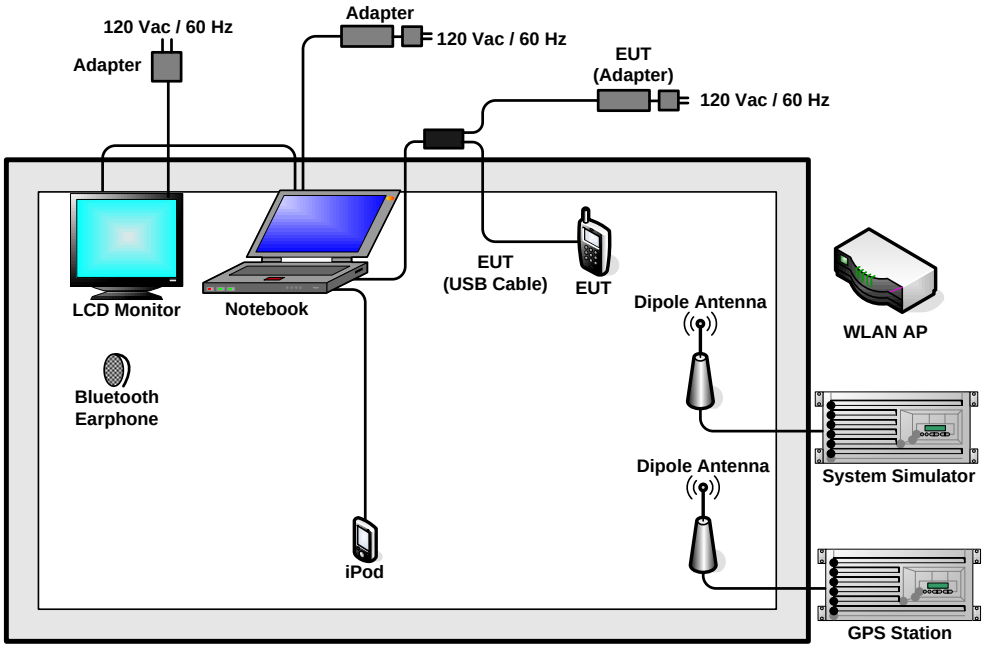


2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	Bluetooth Base Station	R&S	CBT32	N/A	N/A	Unshielded, 1.8 m
3.	GPS Station	T&E	GS-50	N/A	N/A	Unshielded, 1.8 m
4.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
5.	Notebook	DELL	Vostro 1510	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
6.	LCD Monitor	DELL	U2410	FCC DoC	Shielded, 1.6 m	Unshielded, 1.8 m
7.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
8.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
9.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A

2.5 Description of RF Function Operation Test Setup

For Bluetooth function, the RF utility, “FILE EXPLORER ➔ MPA3 WM BT Regulatory ➔ test ➔ Device Under test On” was installed in EUT which was programmed in order to make the EUT to contact with Bluetooth base station for transmitting and receiving signals continuously.

2.6 Measurement Results Explanation Example

For all conducted test items:

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

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

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

Example :

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

= 4.2 + 10 = 14.2 (dB)

For radiated band edges and spurious emission test :

Per part 15.35(c), the EUT Bluetooth average emission level could be determined by the peak emission level applying duty cycle correction factor, to represent averaging over the whole pulse train.

The average level is derived from the peak level corrected with “Duty cycle correction factor”.

Average Emission Level(dBμV/m) = Peak Emission Level(dBμV/m) + Duty cycle correction factor(dB)

*Duty cycle correction factor(dB) = 20 * log(Duty cycle).*
Duty cycle = On time / 100 milliseconds
On time = worst case dwell time * hopping number in 100 ms

For example : bluetooth with worst case dwell time 2.9ms and 2 hops in 100 ms, then
Duty cycle correction factor(dB) = 20 * log((2.9 * 2) / 100) = -24.73 dB

Following shows an average computation example with duty cycle correction factor = -24.73dB, and the peak emission level is 45.61 dBμV/m.

Example :
Average Emission Level(dBμV/m) = Peak Emission Level(dBμV/m) + duty cycle correction factor(dB)
= 45.61 + (-24.73) = 20.88 (dBμV/m)

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 RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings: Span = the frequency band of operation; RBW ≥ 1% of the span; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
6. The number of hopping frequency used is defined as the number of total channel.
7. Record the measurement data derived from spectrum analyzer.

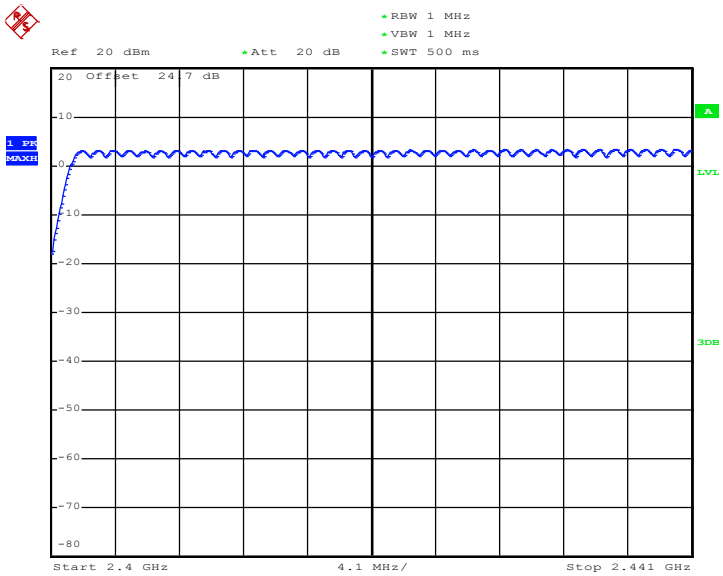
3.1.4 Test Setup

3.1.5 Test Result of Number of Hopping Frequency

Test Mode :	3Mbps	**Temperature :**	24~26℃
Test Engineer :	Coyote Lin	**Relative Humidity :**	50~53%

Number of Hopping (Channel)	Adaptive Frequency Hopping (Channel)	Limits (Channel)	Pass/Fail
79	20	> 15	Pass

Number of Hopping Channel Plot on Channel 00 - 78



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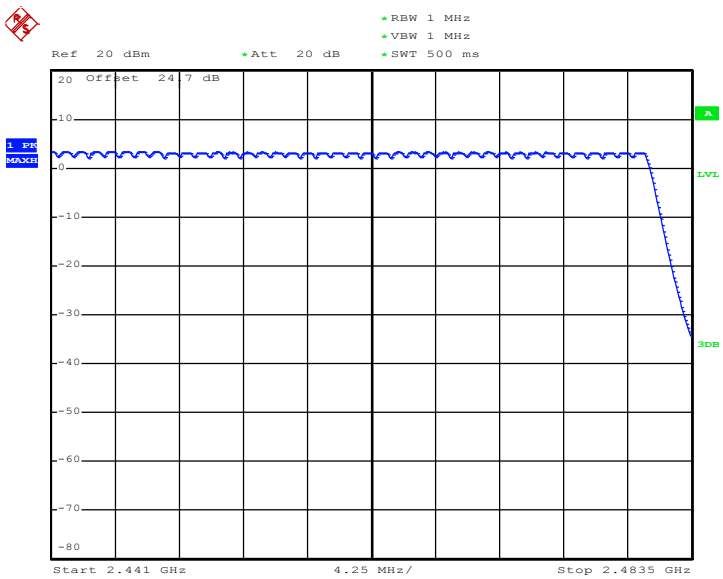

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3.2 Hopping Channel Separation Measurement

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. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels; RBW ≥ 1% of the span; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
6. Measure and record the results in the test report.

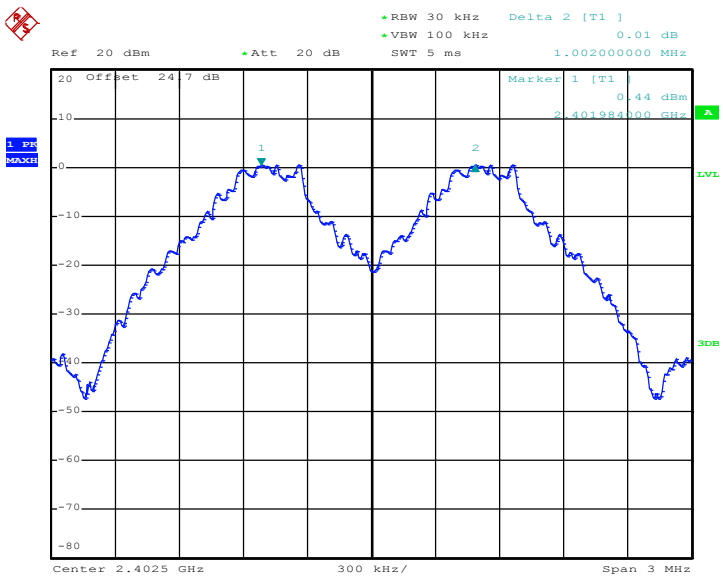
3.2.4 Test Setup

3.2.5 Test Result of Hopping Channel Separation

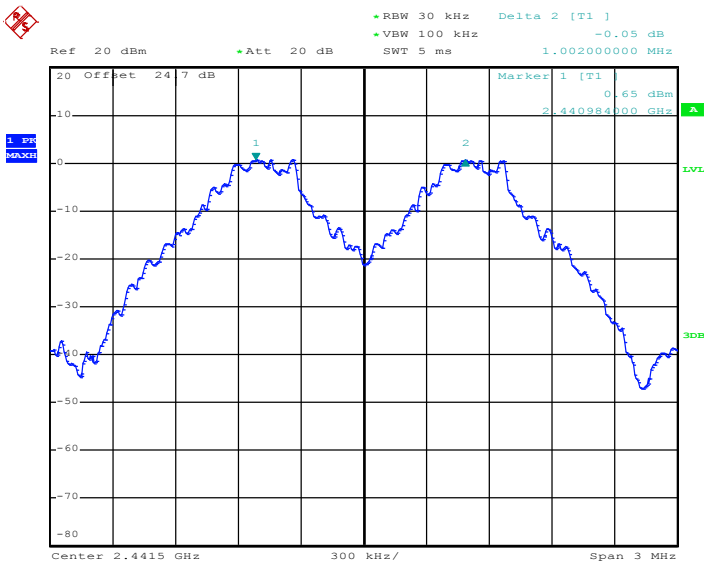
Test Mode :	1Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.002	0.6373	Pass
39	2441	1.002	0.6373	Pass
78	2480	1.002	0.6347	Pass

Channel Separation Plot on Channel 00 - 01



Channel Separation Plot on Channel 39 - 40



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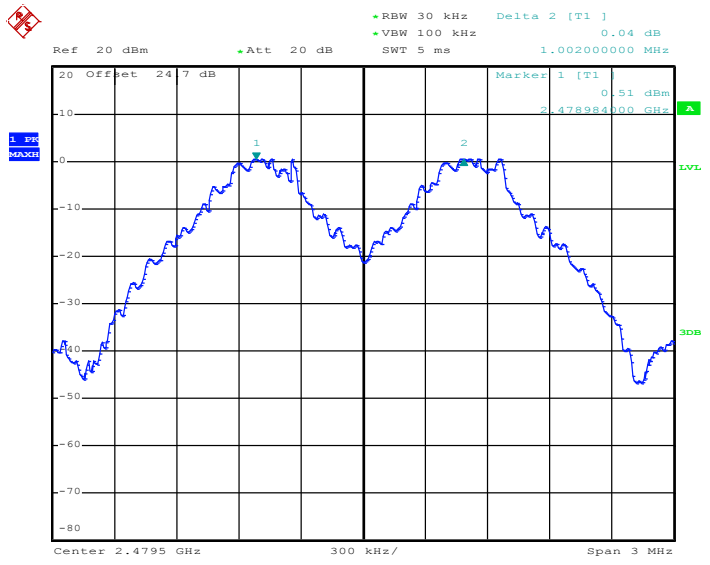
Channel Separation Plot on Channel 77 - 78



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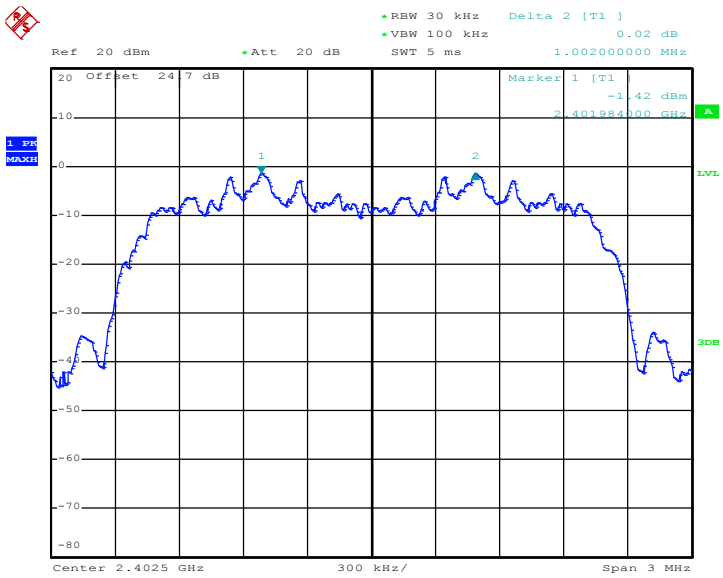
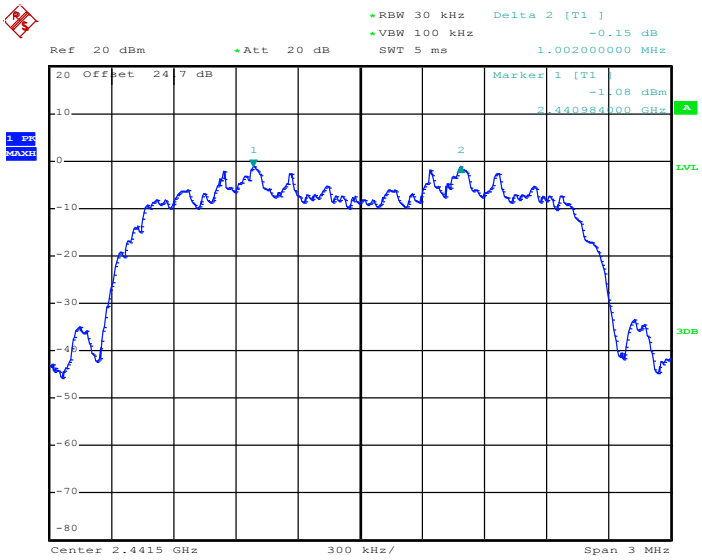
Test Mode :	2Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.002	0.8960	Pass
39	2441	1.002	0.9000	Pass
78	2480	1.002	0.8920	Pass

Channel Separation Plot on Channel 00 - 01



Channel Separation Plot on Channel 39 - 40



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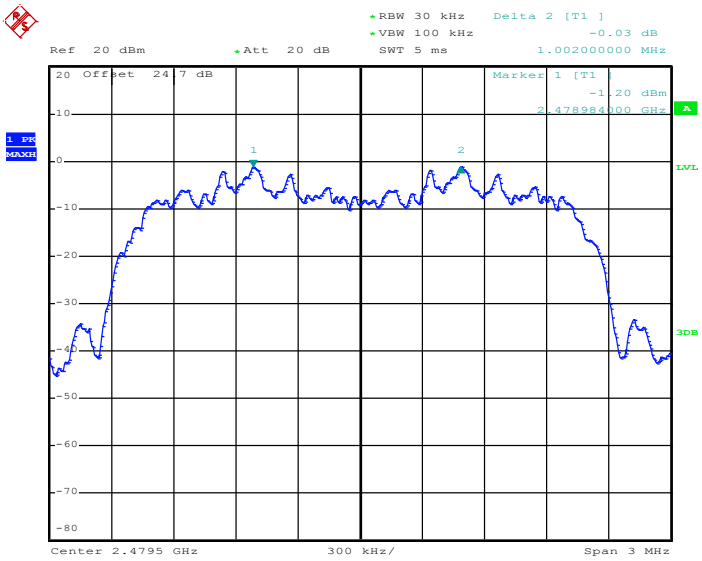
Channel Separation Plot on Channel 77 - 78



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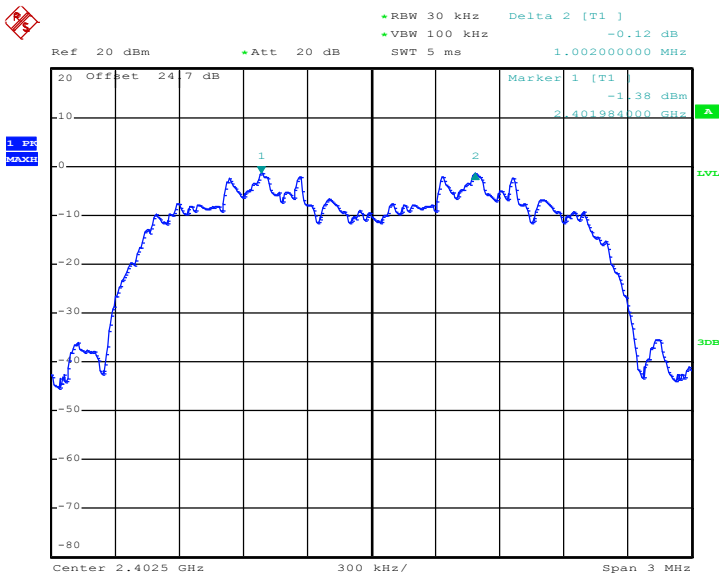
Test Mode :	3Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.002	0.8560	Pass
39	2441	1.002	0.8560	Pass
78	2480	1.002	0.8560	Pass

Channel Separation Plot on Channel 00 - 01



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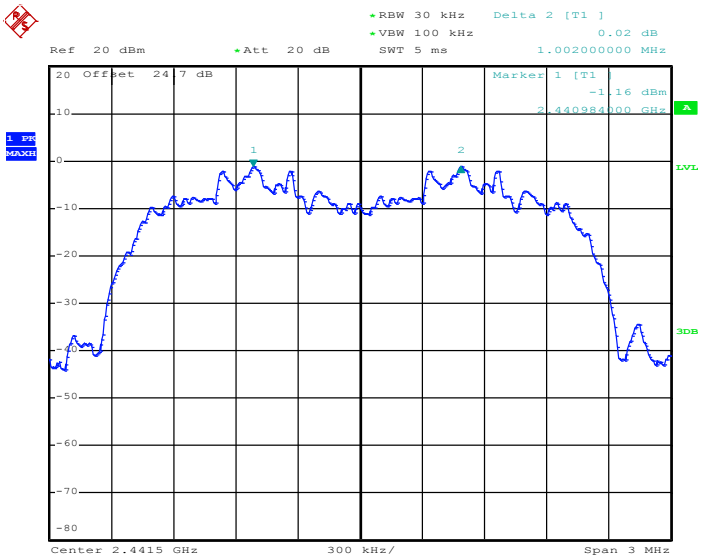
Channel Separation Plot on Channel 39 - 40



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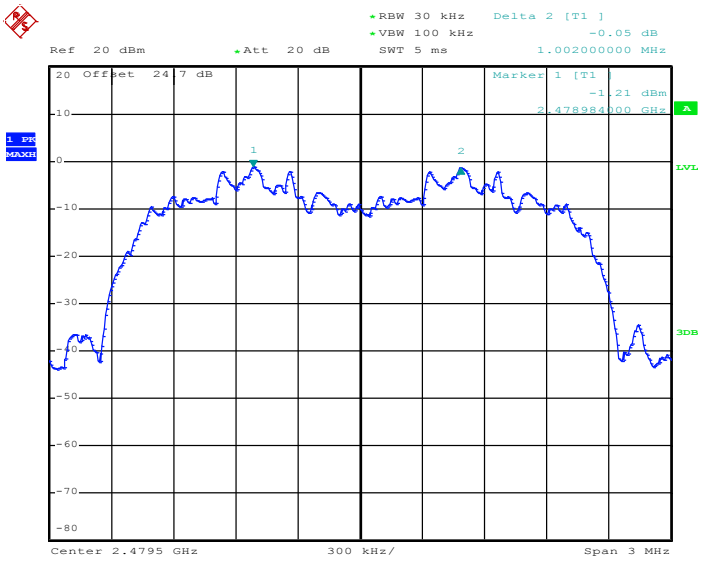
Channel Separation Plot on Channel 77 - 78



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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.

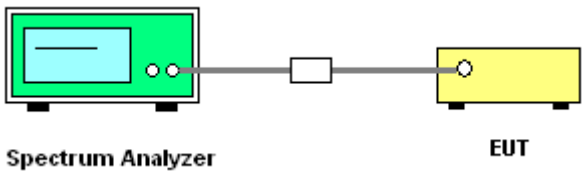
3.3.2 Measuring Instruments

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 RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. 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.
6. Measure and record the results in the test report.

3.3.4 Test Setup



3.3.5 Test Result of Dwell Time

Test Mode :	DH5	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

Mode	Hopping Channel Number	Hops Over Occupancy Time(hops)	Package Transfer Time (msec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
Normal	79	106.67	2.98	0.32	0.4	Pass
AFH	20	53.33	2.98	0.16	0.4	Pass

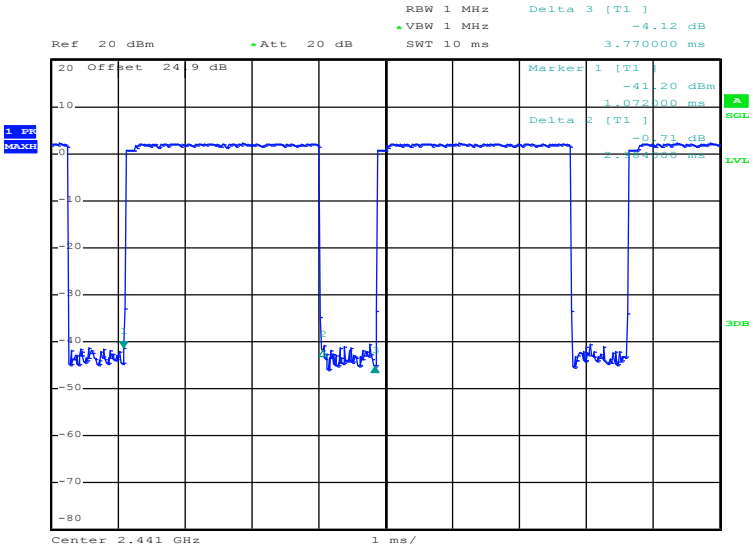
Remark:

1. In normal mode, hopping rate is 1600hops/s with 6 slots in 79 hopping channels.
With channel hopping rate (1600 / 6 / 79) in Occupancy Time Limit (0.4 x 79) (s),
Hops Over Occupancy Time comes to (1600 / 6 / 79) x (0.4 x 79) = 106.67 hops.

2. In AFH mode, hopping rate is 800hops/s with 6 slots in 20 hopping channels.
With channel hopping rate (800 / 6 / 20) in Occupancy Time Limit (0.4 x 20) (s),
Hops Over Occupancy Time comes to (800 / 6 / 20) x (0.4 x 20) = 53.33 hops.

3. Dwell Time(s) = Hops Over Occupancy Time (hops) x Package Transfer Time

Package Transfer Time Plot



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3.4 20dB and 99% Bandwidth Measurement

3.4.1 Limit of 20dB and 99% Bandwidth

Reporting only

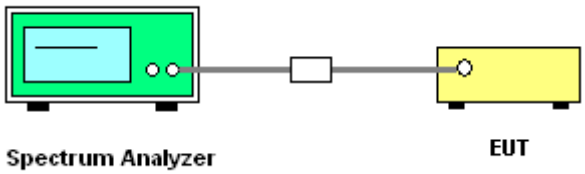
3.4.2 Measuring Instruments

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 RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Use the following spectrum analyzer settings for 20dB Bandwidth measurement.
   Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel;
   RBW ≥ 1% of the 20 dB bandwidth; VBW ≥ RBW; Sweep = auto; Detector function = peak;
   Trace = max hold.
5. Use the following spectrum analyzer settings for 99 % Bandwidth measurement.
   For 99% Bandwidth measurement, the RBW=30kHz, and VBW = 100kHz. Sweep = auto ;
   Detector function = sample. Trace = max hold.
6. Measure and record the results in the test report.

3.4.4 Test Setup

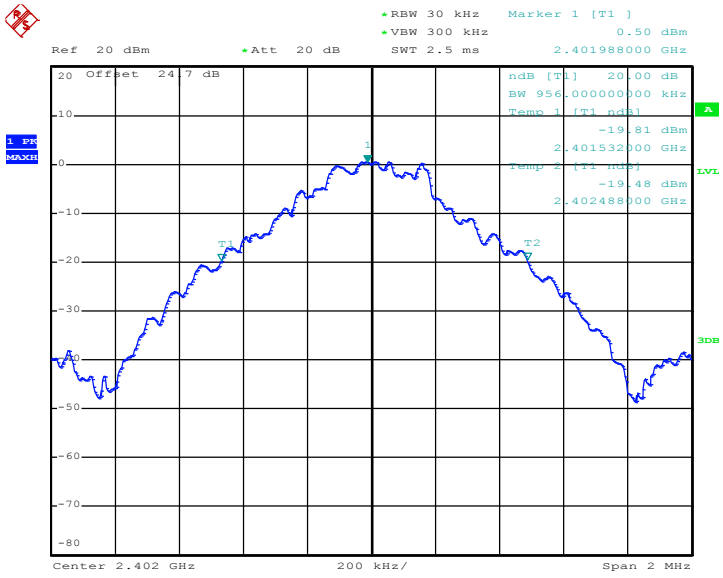


3.4.5 Test Result of 20dB Bandwidth

Test Mode :	1Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

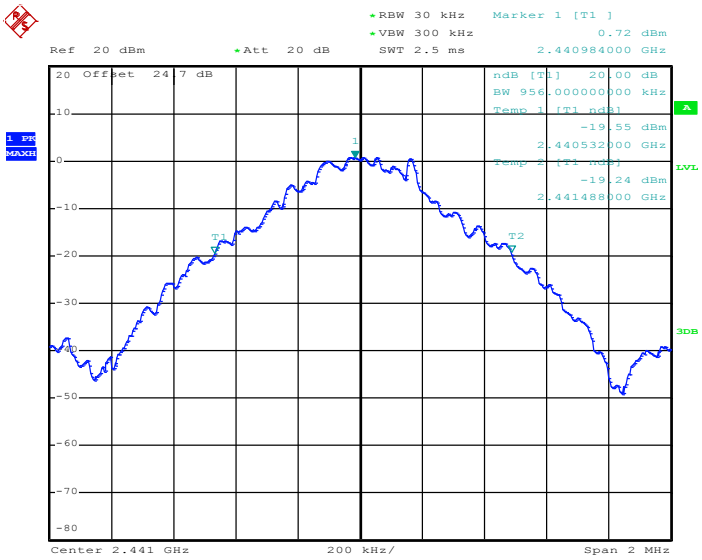
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	0.956
39	2441	0.956
78	2480	0.952

20 dB Bandwidth Plot on Channel 00



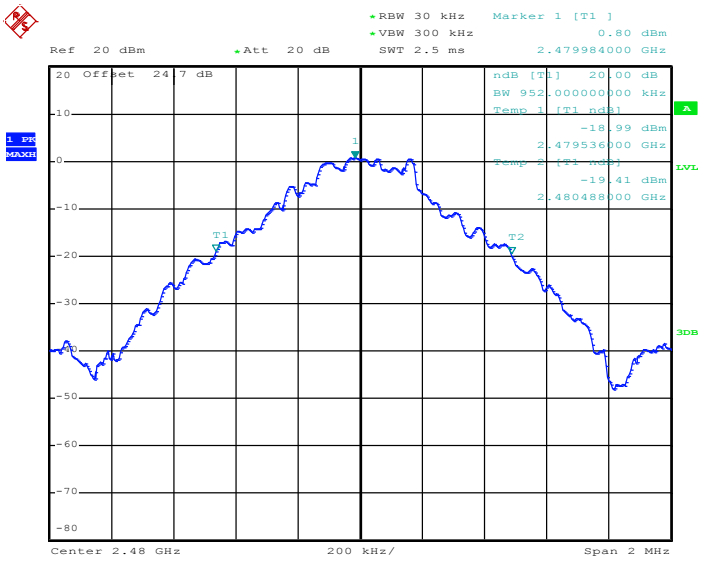
Date: 6.FEB.2013 11:57:12

20 dB Bandwidth Plot on Channel 39



Date: 6.FEB.2013 11:57:29

20 dB Bandwidth Plot on Channel 78

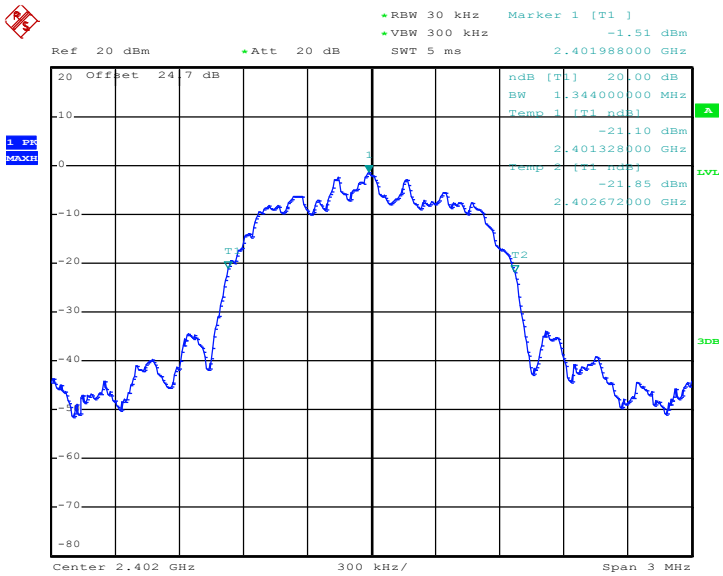


Date: 6.FEB.2013 11:57:46

Test Mode :	2Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

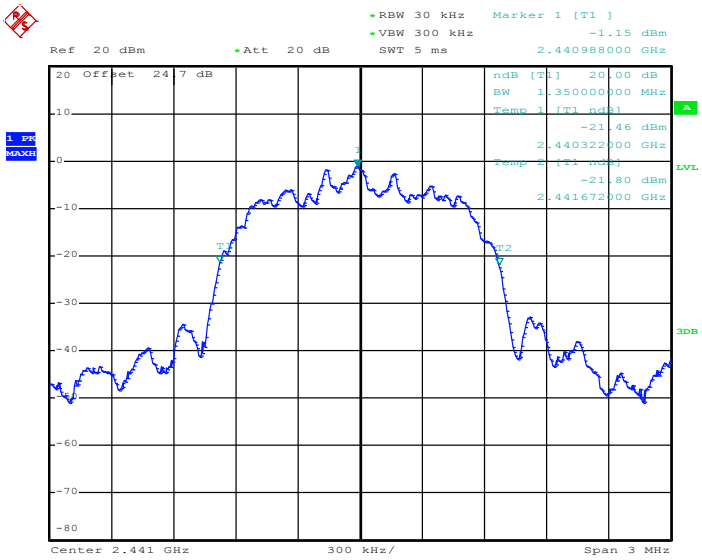
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.344
39	2441	1.350
78	2480	1.338

20 dB Bandwidth Plot on Channel 00



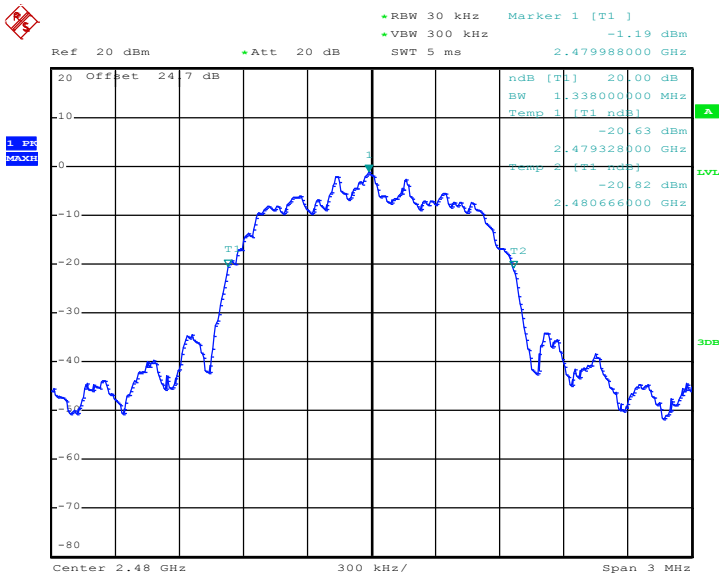
Date: 6.FEB.2013 11:58:23

20 dB Bandwidth Plot on Channel 39



Date: 6.FEB.2013 11:59:13

20 dB Bandwidth Plot on Channel 78

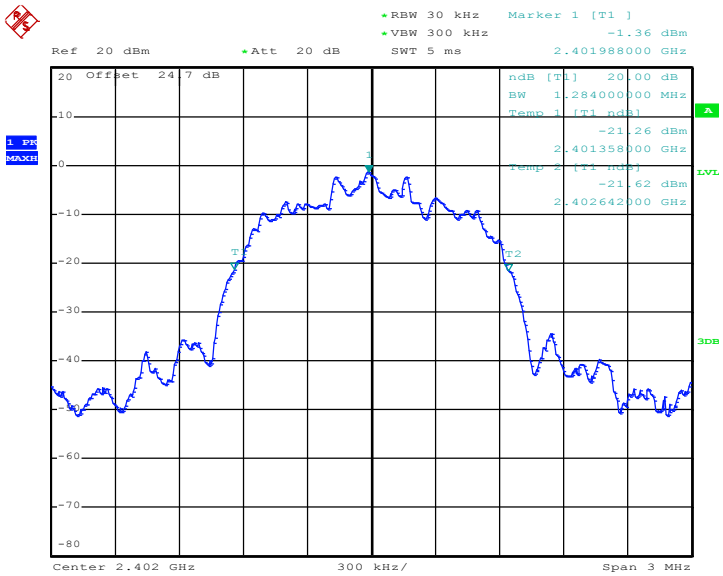


Date: 6.FEB.2013 11:59:35

Test Mode :	3Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

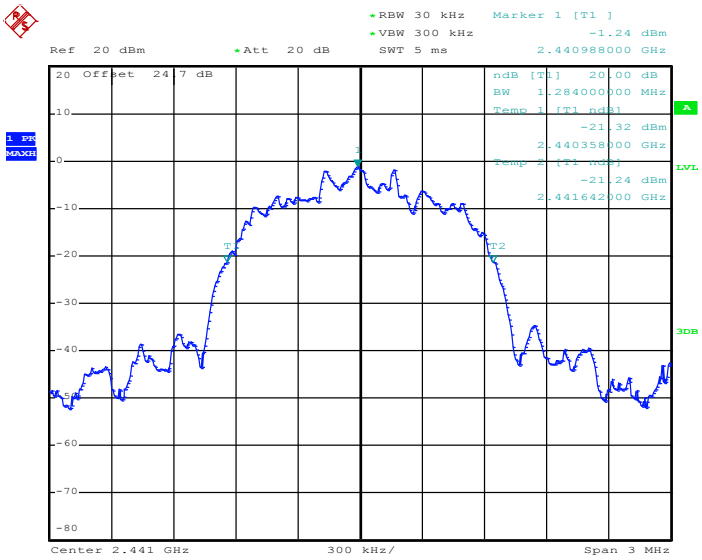
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.284
39	2441	1.284
78	2480	1.284

20 dB Bandwidth Plot on Channel 00



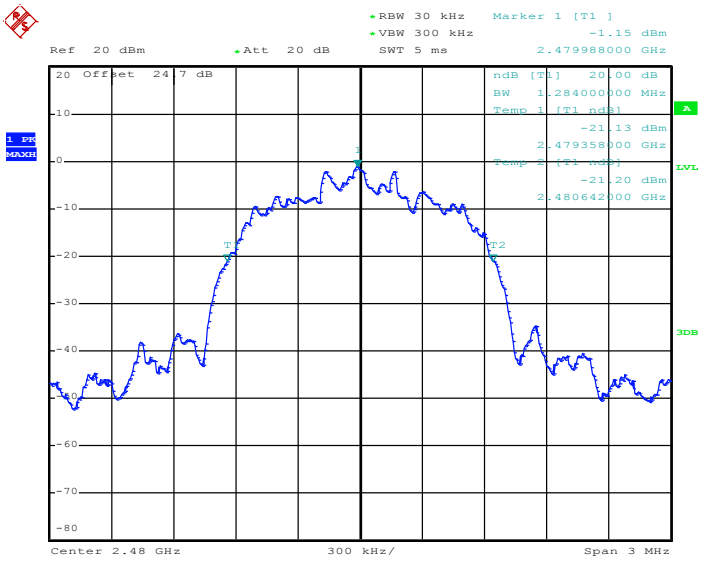
Date: 6.FEB.2013 12:00:13

20 dB Bandwidth Plot on Channel 39



Date: 6.FEB.2013 12:00:31

20 dB Bandwidth Plot on Channel 78



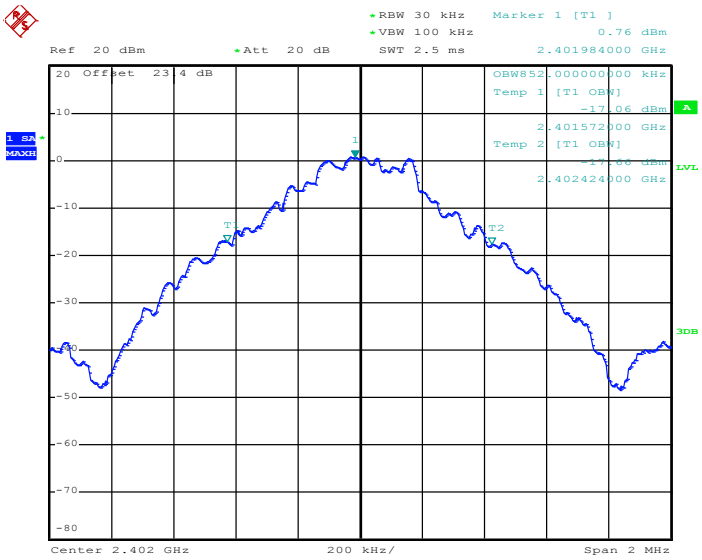
Date: 6.FEB.2013 12:00:50

3.4.6 Test Result of 99% Occupied Bandwidth

Test Mode :	1Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

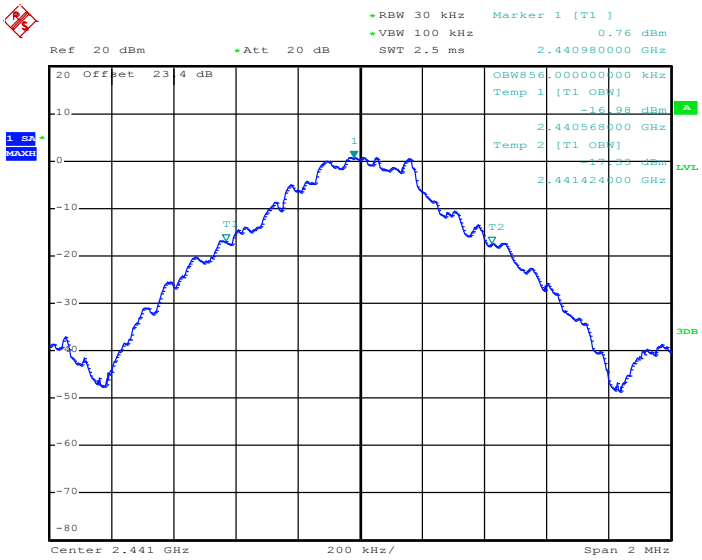
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	0.852
39	2441	0.856
78	2480	0.852

99% Bandwidth Plot on Channel 00



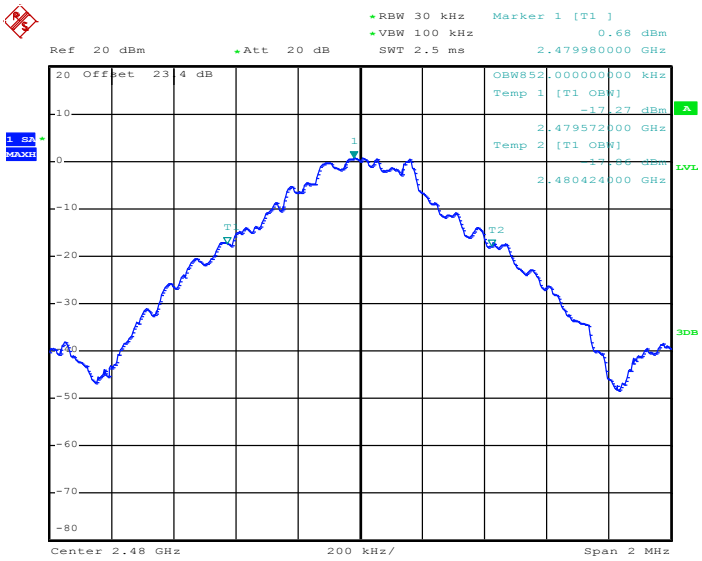
Date: 1.MAR.2013 17:37:55

99% Occupied Bandwidth Plot on Channel 39



Date: 1.MAR.2013 17:38:41

99% Occupied Bandwidth Plot on Channel 78

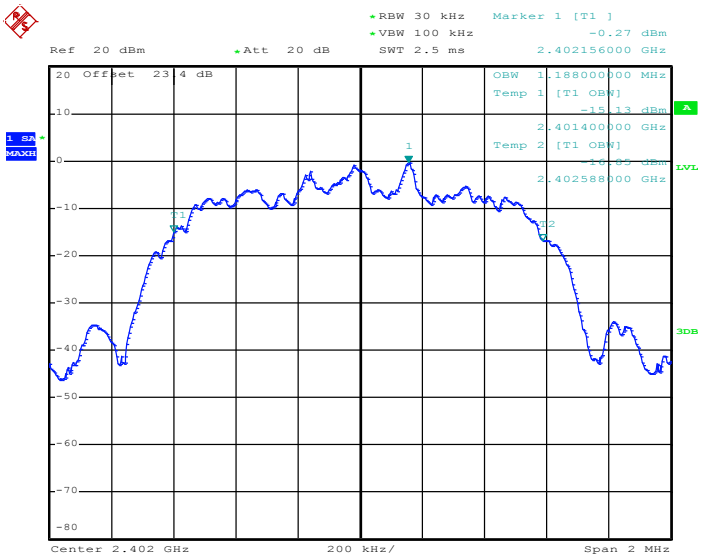


Date: 1.MAR.2013 17:37:16

Test Mode :	2Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

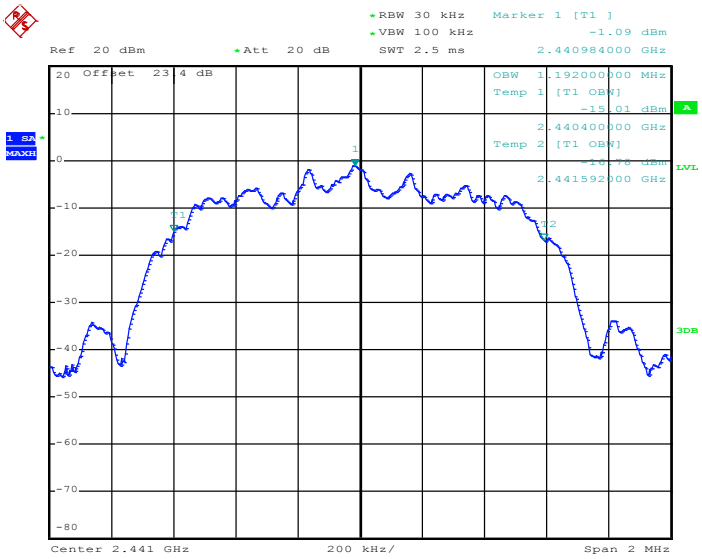
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	1.188
39	2441	1.192
78	2480	1.200

99% Bandwidth Plot on Channel 00



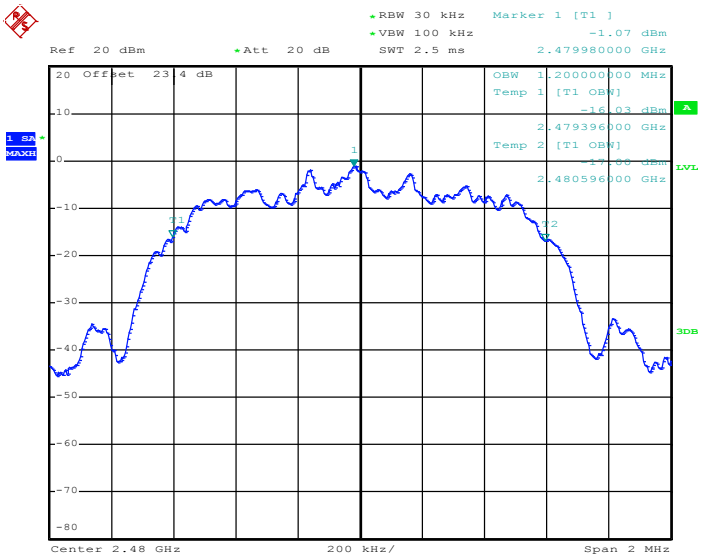
Date: 1.MAR.2013 17:39:36

99% Occupied Bandwidth Plot on Channel 39



Date: 1.MAR.2013 17:40:25

99% Occupied Bandwidth Plot on Channel 78

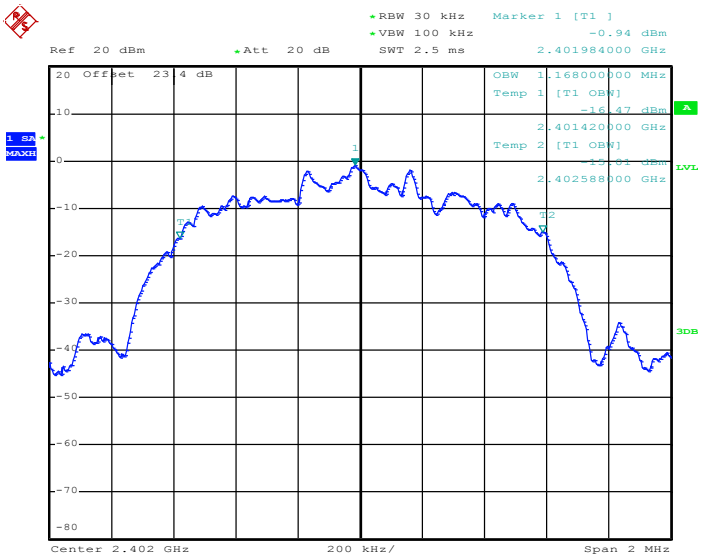


Date: 1.MAR.2013 17:41:42

Test Mode :	3Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

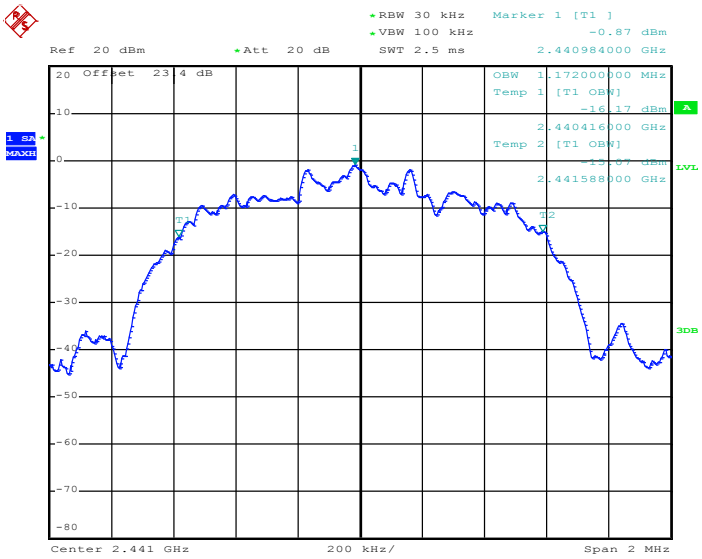
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	1.168
39	2441	1.172
78	2480	1.168

99% Bandwidth Plot on Channel 00



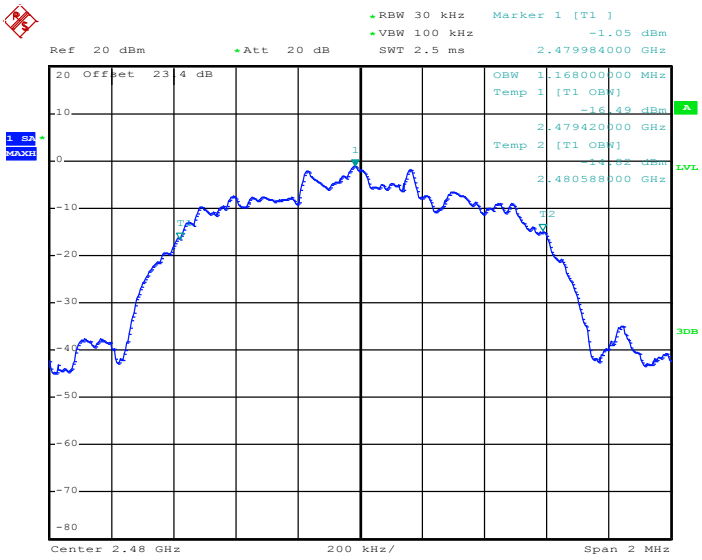
Date: 1.MAR.2013 17:48:24

99% Occupied Bandwidth Plot on Channel 39



Date: 1.MAR.2013 17:43:30

99% Occupied Bandwidth Plot on Channel 78



Date: 1.MAR.2013 17:42:44

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, 3Mbps and AFH are 0.125 watts.

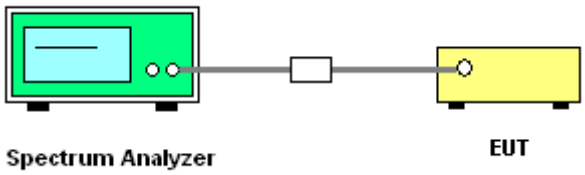
3.5.2 Measuring Instruments

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 RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power with cable loss and record the results in the test report.
5. Measure and record the results in the test report.

3.5.4 Test Setup



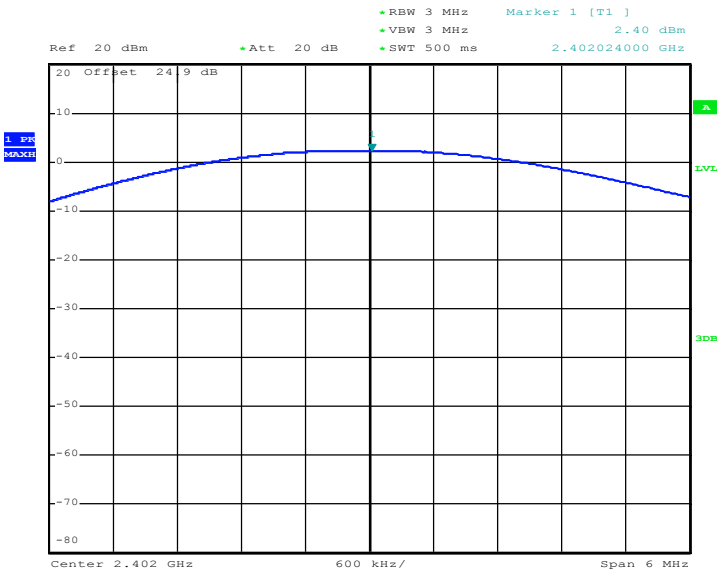
3.5.5 Test Result of Peak Output Power

Test Mode :	1Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

Channel	Frequency (MHz)	RF Power (dBm)		
		GFSK	Max. Limits (dBm)	Pass/Fail
		1 Mbps		
00	2402	2.40	20.97	Pass
39	2441	2.67	20.97	Pass
78	2480	2.64	20.97	Pass

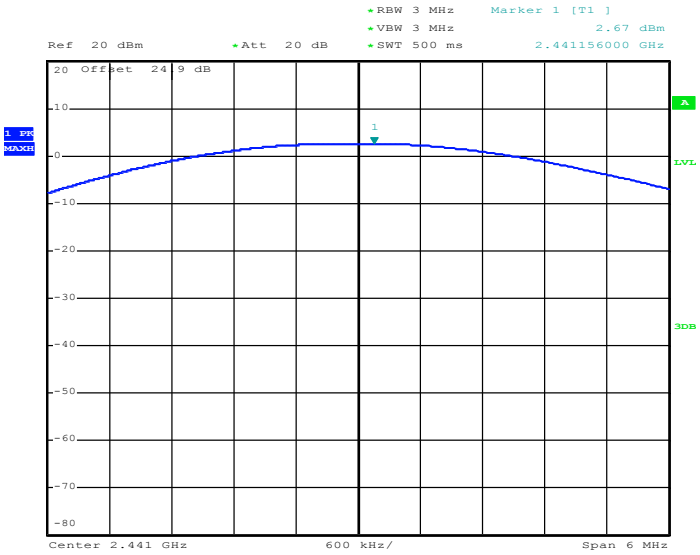
Note: For AFH mode using 20 hopping channels, the maximum output power limit is 20.97dBm.

Peak Output Power Plot on Channel 00



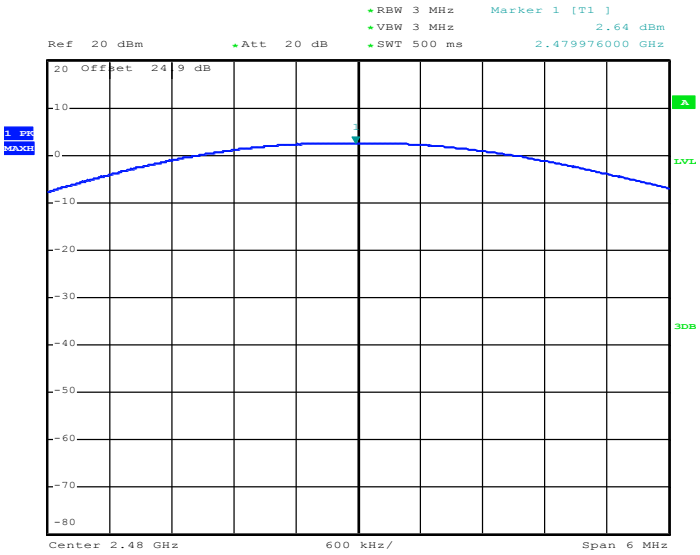
Date: 11.JAN.2013 15:48:53

Peak Output Power Plot on Channel 39



Date: 11.JAN.2013 15:50:08

Peak Output Power Plot on Channel 78

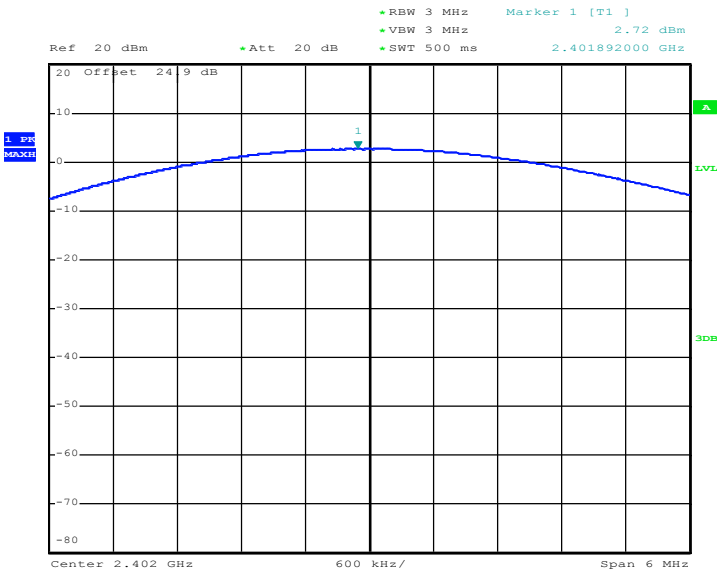


Date: 11.JAN.2013 15:51:23

Test Mode :	2Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

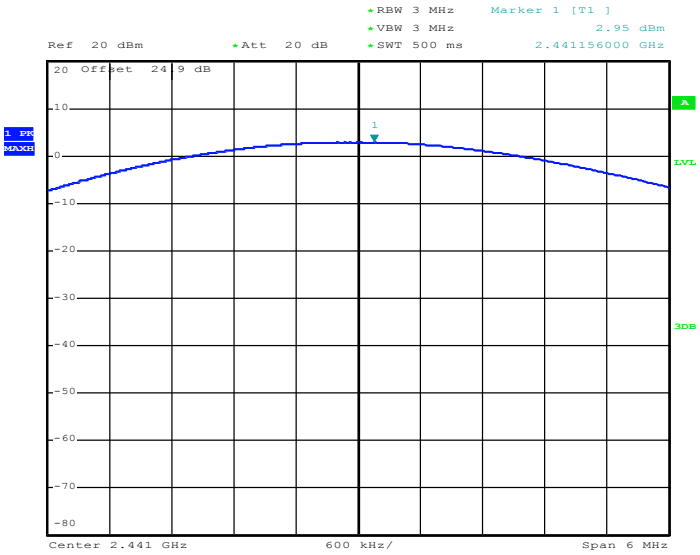
Channel	Frequency (MHz)	RF Power (dBm)		
		π /4-DQPSK	Max. Limits	Pass/Fail
		2 Mbps	(dBm)	
00	2402	2.72	20.97	Pass
39	2441	2.95	20.97	Pass
78	2480	2.92	20.97	Pass

Peak Output Power Plot on Channel 00



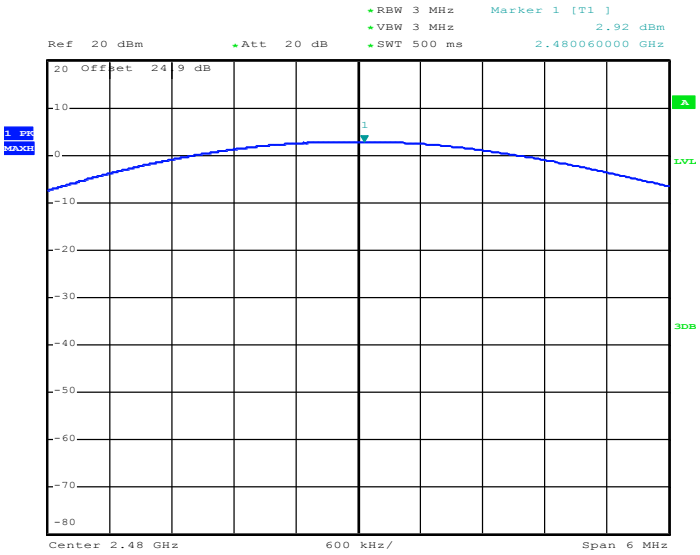
Date: 11.JAN.2013 15:49:26

Peak Output Power Plot on Channel 39



Date: 11.JAN.2013 15:50:41

Peak Output Power Plot on Channel 78

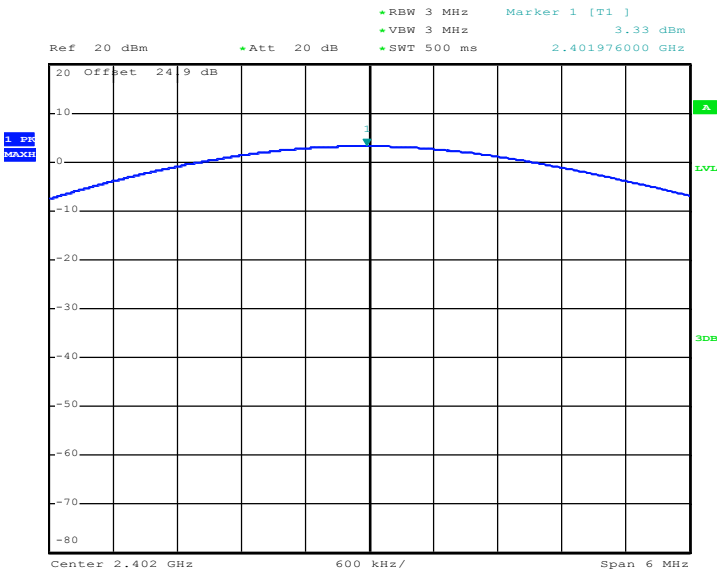


Date: 11.JAN.2013 15:51:56

Test Mode :	3Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

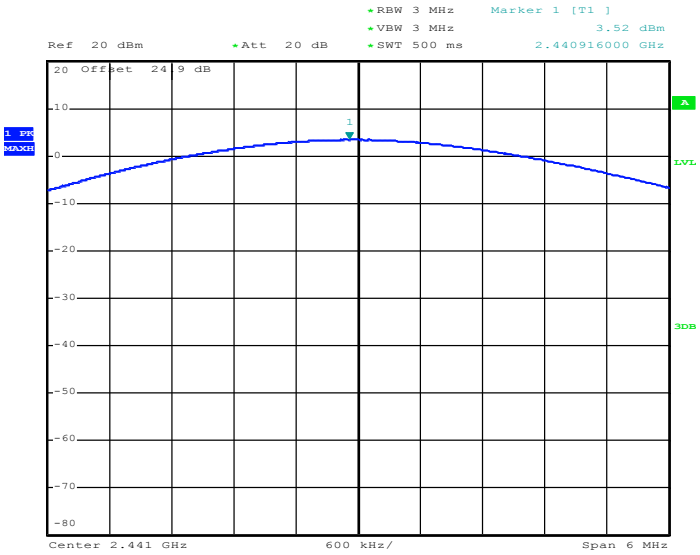
Channel	Frequency (MHz)	RF Power (dBm)		
		8-DPSK	Max. Limits	Pass/Fail
		3 Mbps	(dBm)	
00	2402	3.33	20.97	Pass
39	2441	3.52	20.97	Pass
78	2480	3.46	20.97	Pass

Peak Output Power Plot on Channel 00



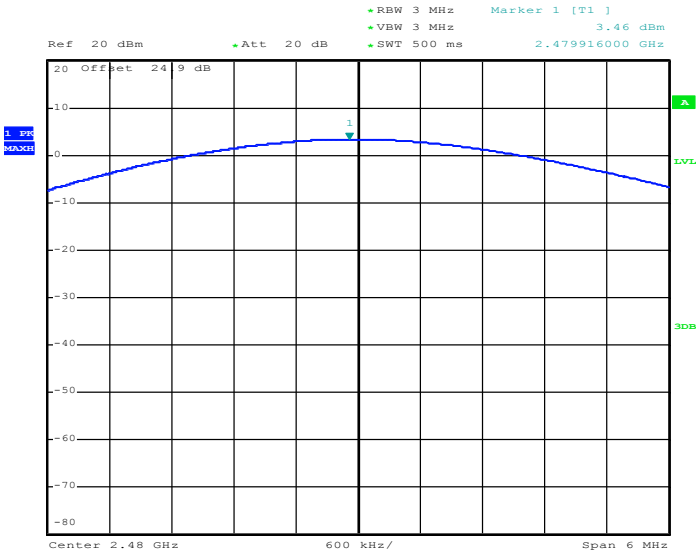
Date: 11.JAN.2013 15:49:35

Peak Output Power Plot on Channel 39



Date: 11.JAN.2013 15:50:50

Peak Output Power Plot on Channel 78



Date: 11.JAN.2013 15:52:04

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

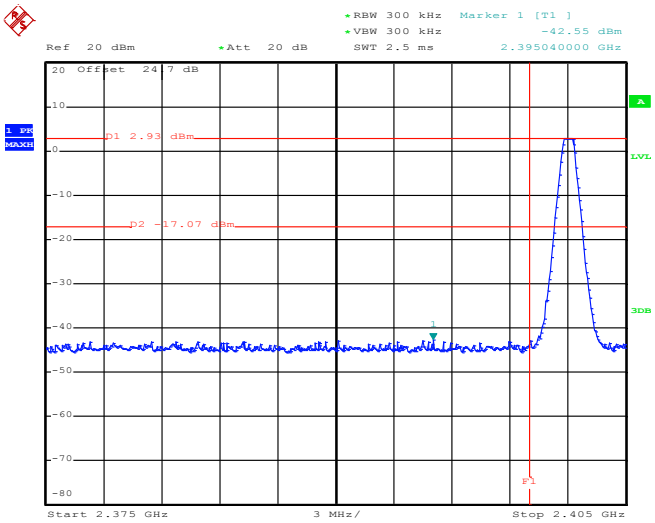
1. The testing follows the guidelines in Band-edge Compliance of RF Conducted Emissions of FCC Public Notice DA 00-705 Measurement Guidelines.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Set RBW = 300KHz (≥ 1% span=30MHz), VBW = 300KHz (≥ RBW). Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 300KHz RBW. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used.
4. Enable hopping function of the EUT and then repeat step 2. and 3.
5. Measure and record the results in the test report.

3.6.4 Test Setup

3.6.6 Test Result of Conducted Band Edges

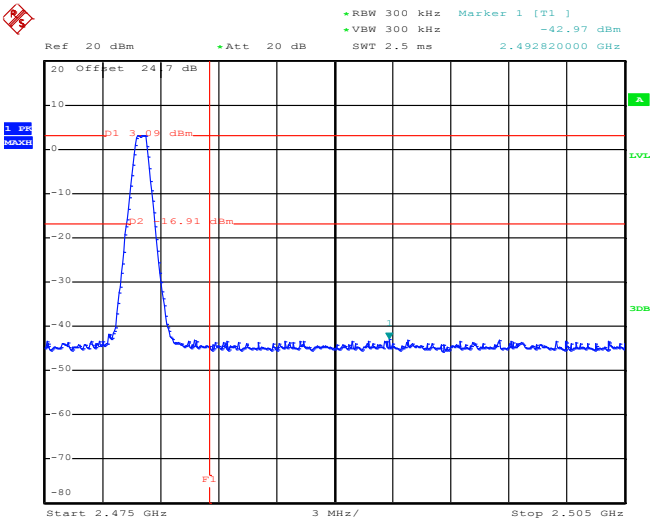
Test Mode :	1Mbps	Temperature :	24~26℃
Test Channel :	00 and 78	Relative Humidity :	50~53%
		Test Engineer :	Coyote Lin

Low Band Edge Plot on Channel 00



Date: 6.FEB.2013 12:01:43

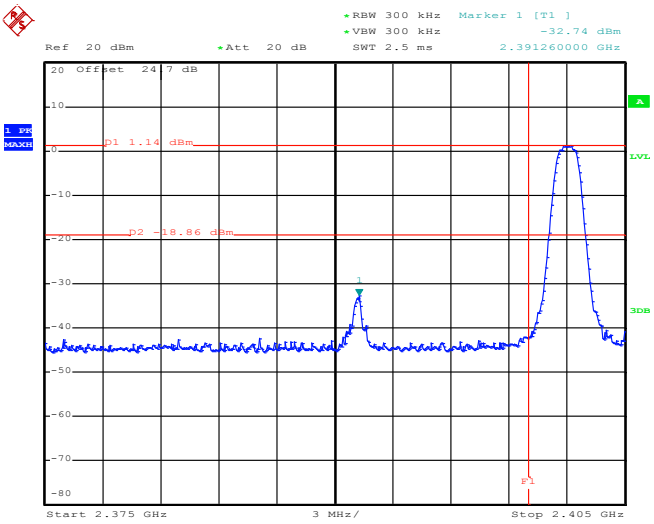
High Band Edge Plot on Channel 78



Date: 6.FEB.2013 12:02:46

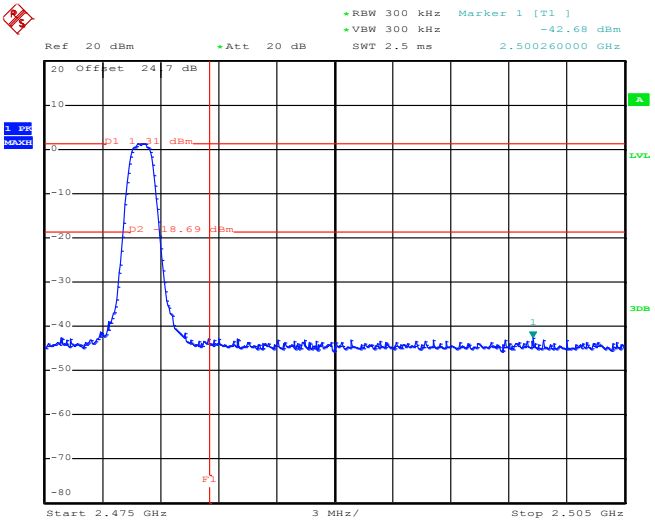
Test Mode :	2Mbps	**Temperature :**	24~26℃
Test Channel :	00 and 78	**Relative Humidity :**	50~53%
		Test Engineer :	Coyote Lin

Low Band Edge Plot on Channel 00



Date: 6.FEB.2013 12:03:38

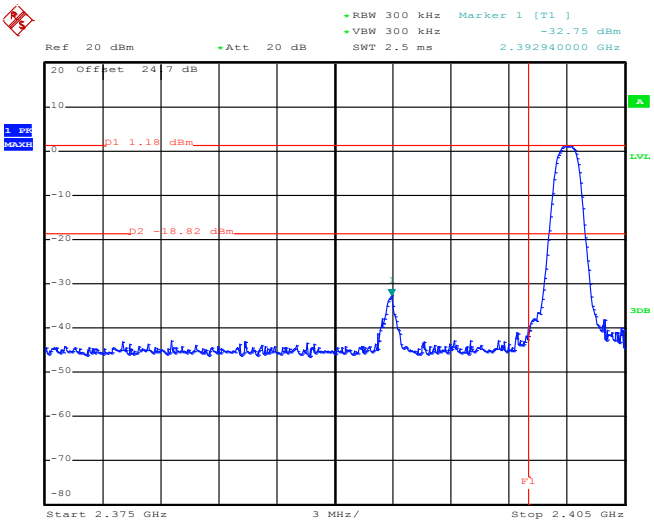
High Band Edge Plot on Channel 78



Date: 6.FEB.2013 12:04:41

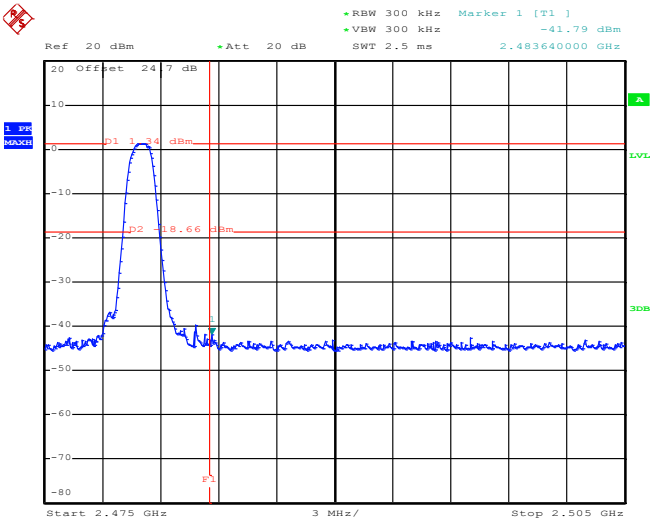
Test Mode :	3Mbps	**Temperature :**	24~26℃
Test Channel :	00 and 78	**Relative Humidity :**	50~53%
		Test Engineer :	Coyote Lin

Low Band Edge Plot on Channel 00



Date: 6.FEB.2013 13:33:05

High Band Edge Plot on Channel 78

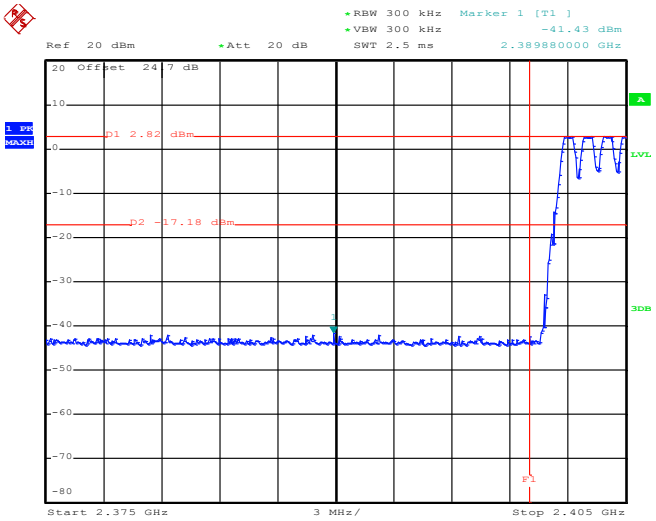


Date: 6.FEB.2013 12:06:36

3.6.7 Test Result of Conducted Hopping Mode Band Edges

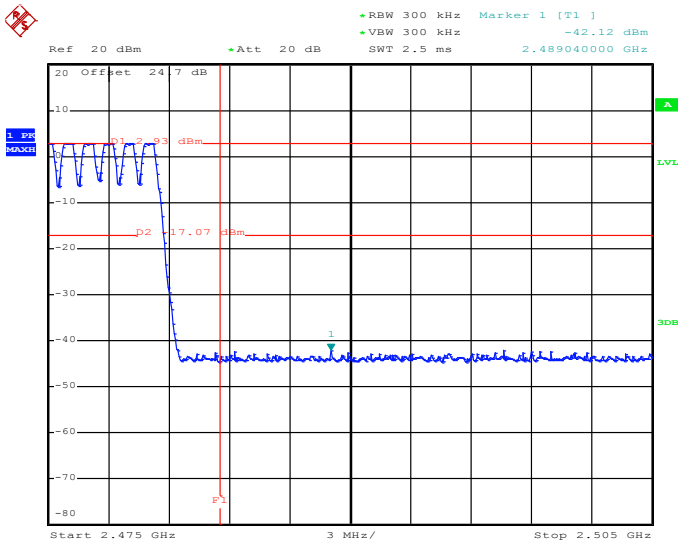
Test Mode :	1Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

1Mbps Hopping Mode Low Band Edge Plot



Date: 6.FEB.2013 15:45:20

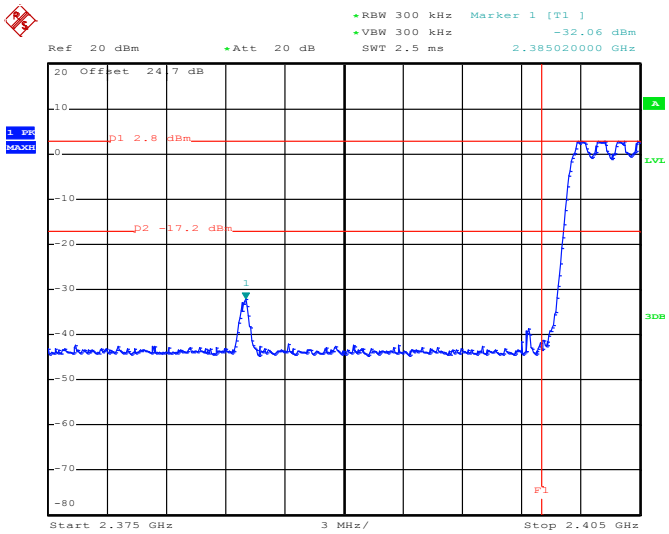
1Mbps Hopping Mode High Band Edge Plot



Date: 6.FEB.2013 15:57:04

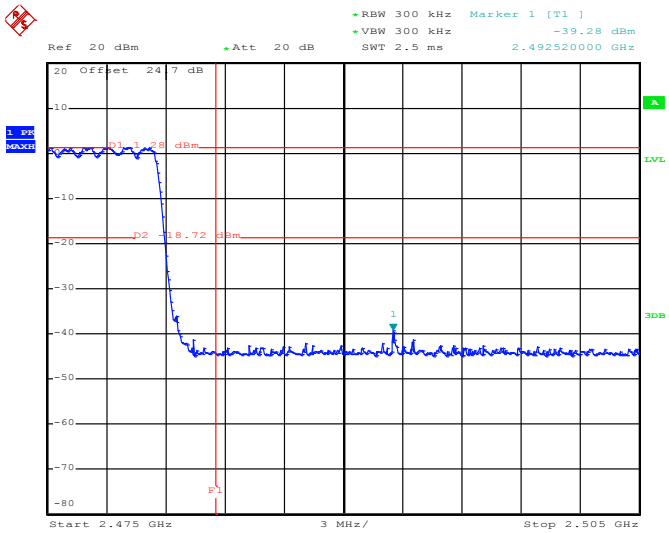
Test Mode :	2Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

2Mbps Hopping Mode Low Band Edge Plot



Date: 6.FEB.2013 15:37:09

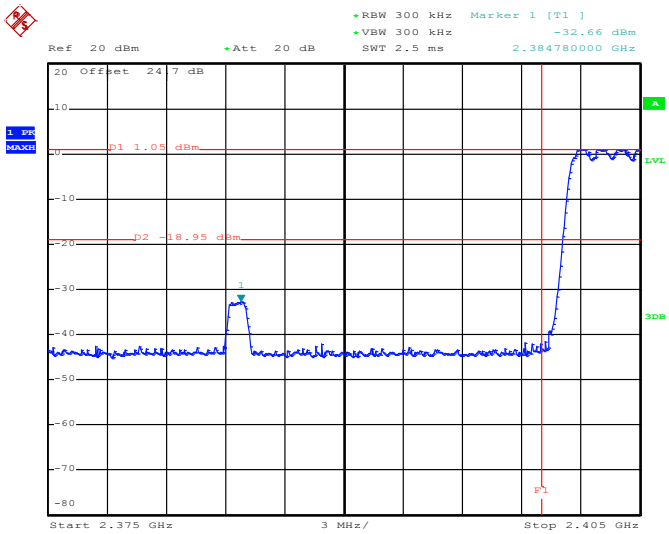
2Mbps Hopping Mode High Band Edge Plot



Date: 6.FEB.2013 15:31:07

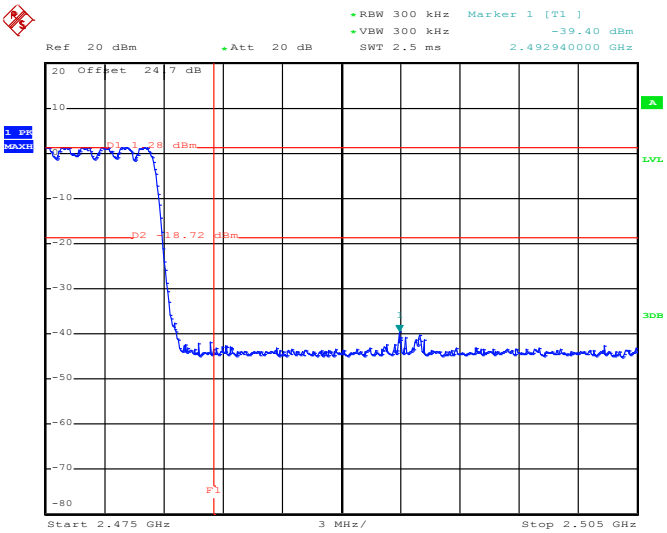
Test Mode :	3Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

3Mbps Hopping Mode Low Band Edge Plot



Date: 6.FEB.2013 15:24:18

3Mbps Hopping Mode High Band Edge Plot



Date: 6.FEB.2013 15:27:50

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

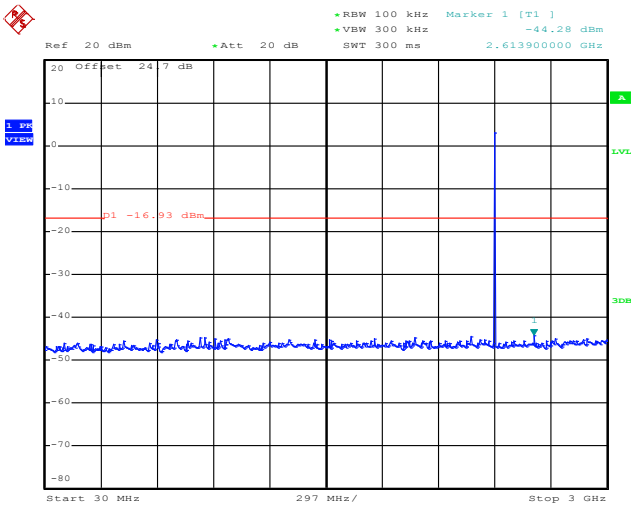
1. The testing follows the guidelines in Spurious RF Conducted Emissions of FCC Public Notice DA 00-705 Measurement Guidelines
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 KHz, 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.
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.7.4 Test Setup

3.7.5 Test Result of Conducted Spurious Emission

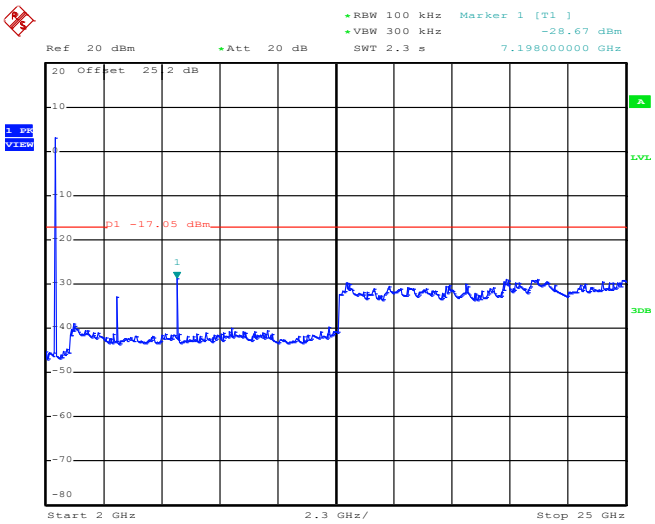
Test Mode :	1Mbps	Temperature :	24~26℃
Test Channel :	00	Relative Humidity :	50~53%
		Test Engineer :	Coyote Lin

1Mbps CSE Plot on Ch 00 between 30MHz ~ 3 GHz



Date: 6.FEB.2013 13:50:44

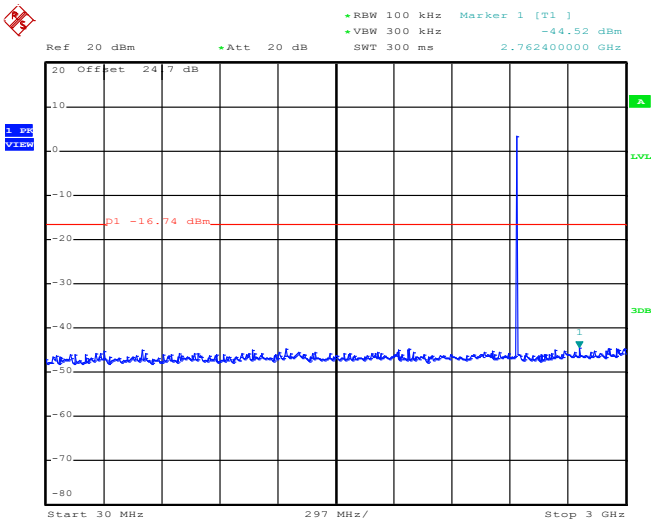
1Mbps CSE Plot on Ch 00 between 2 GHz ~ 25 GHz



Date: 6.FEB.2013 13:51:36

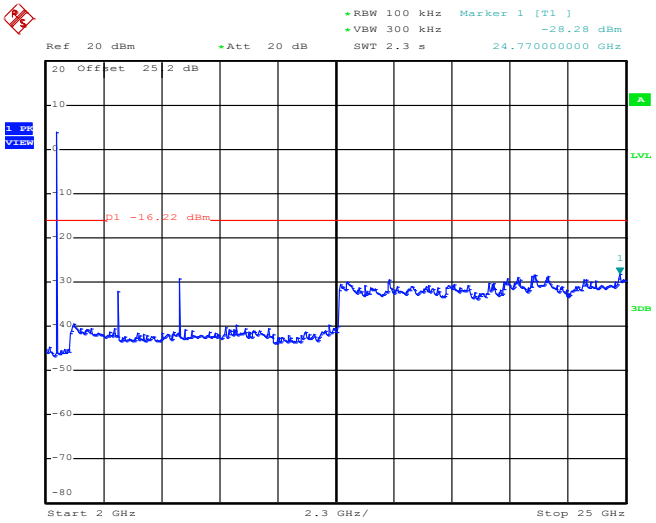
Test Mode :	1Mbps	Temperature :	24~26℃
Test Channel :	39	Relative Humidity :	50~53%
		Test Engineer :	Coyote Lin

1Mbps CSE Plot on Ch 39 between 30MHz ~ 3 GHz



Date: 6.FEB.2013 13:52:28

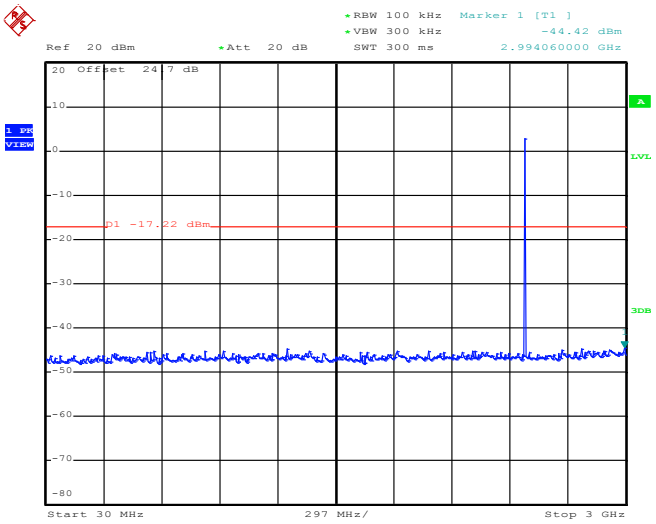
1Mbps CSE Plot on Ch 39 between 2 GHz ~ 25 GHz



Date: 6.FEB.2013 13:53:20

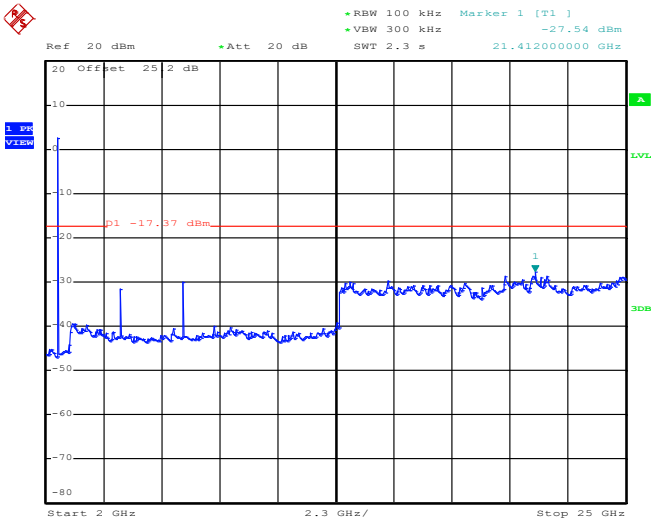
Test Mode :	1Mbps	Temperature :	24~26℃
Test Channel :	78	Relative Humidity :	50~53%
		Test Engineer :	Coyote Lin

1Mbps CSE Plot on Ch 78 between 30MHz ~ 3 GHz



Date: 6.FEB.2013 13:54:12

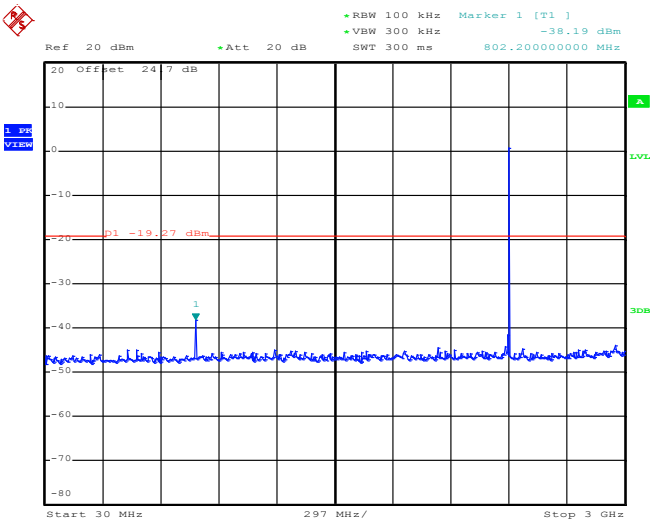
1Mbps CSE Plot on Ch 78 between 2 GHz ~ 25 GHz



Date: 6.FEB.2013 13:55:04

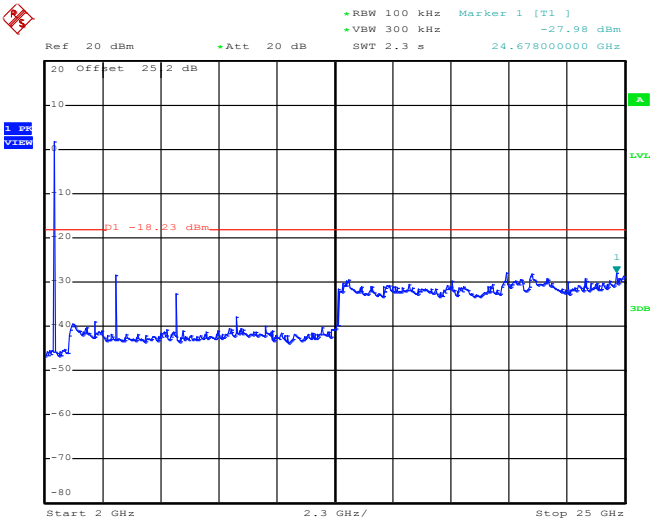
Test Mode :	2Mbps	**Temperature :**	24~26℃
Test Channel :	00	**Relative Humidity :**	50~53%
		Test Engineer :	Coyote Lin

2Mbps CSE Plot on Ch 00 between 30MHz ~ 3 GHz



Date: 6.FEB.2013 13:57:08

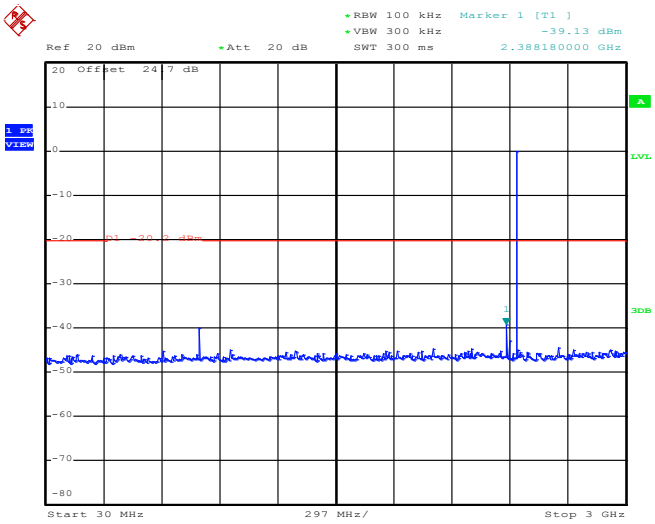
2Mbps CSE Plot on Ch 00 between 2 GHz ~ 25 GHz



Date: 6.FEB.2013 13:58:00

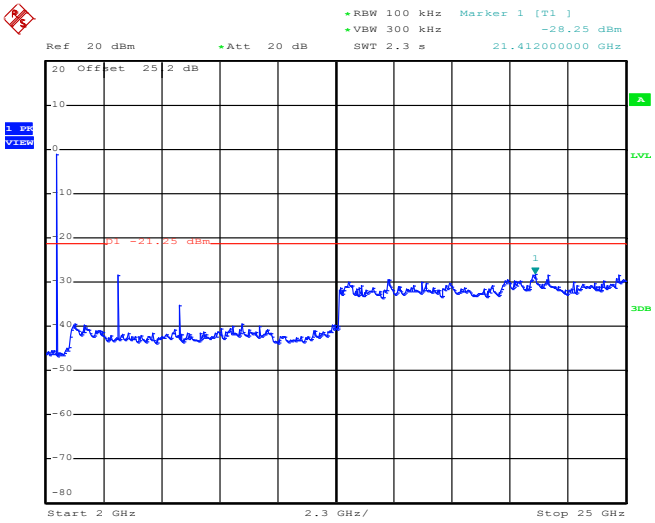
Test Mode :	2Mbps	Temperature :	24~26℃
Test Channel :	39	Relative Humidity :	50~53%
		Test Engineer :	Coyote Lin

2Mbps CSE Plot on Ch 39 between 30MHz ~ 3 GHz



Date: 6.FEB.2013 13:58:52

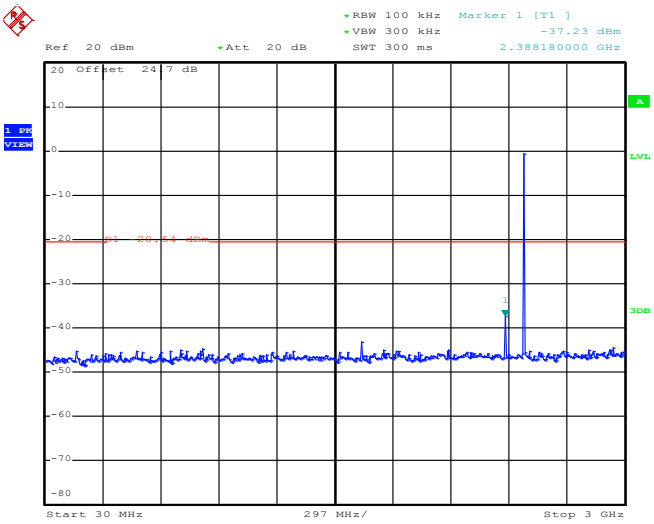
2Mbps CSE Plot on Ch 39 between 2 GHz ~ 25 GHz



Date: 6.FEB.2013 13:59:44

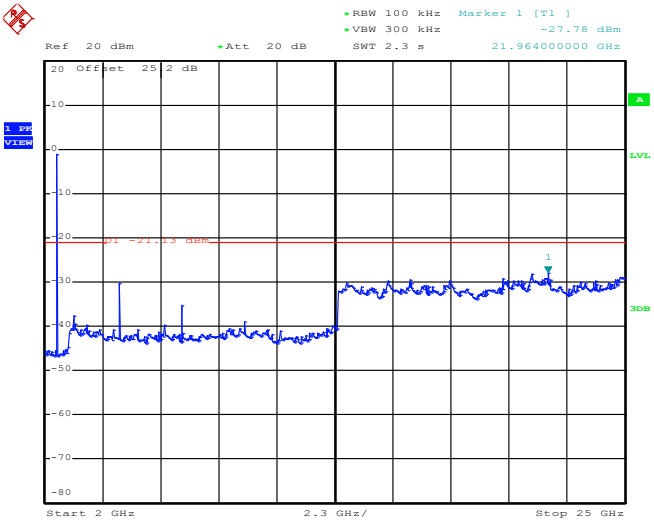
Test Mode :	2Mbps	**Temperature :**	24~26℃
Test Channel :	78	**Relative Humidity :**	50~53%
		Test Engineer :	Coyote Lin

2Mbps CSE Plot on Ch 78 between 30MHz ~ 3 GHz



Date: 6.FEB.2013 14:00:37

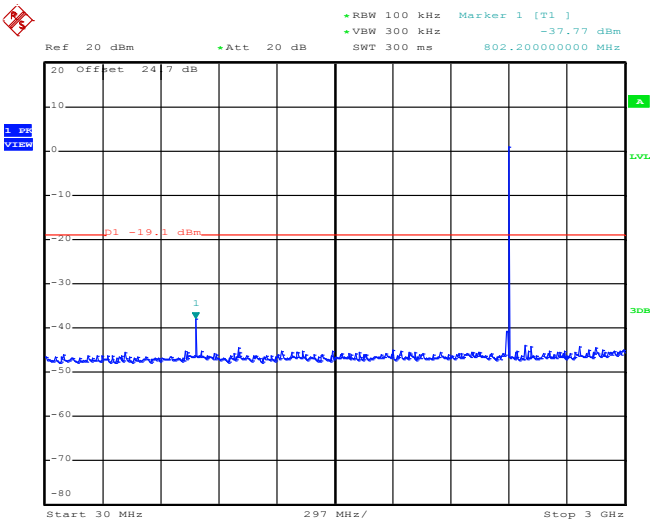
2Mbps CSE Plot on Ch 78 between 2 GHz ~ 25 GHz



Date: 6.FEB.2013 14:01:29

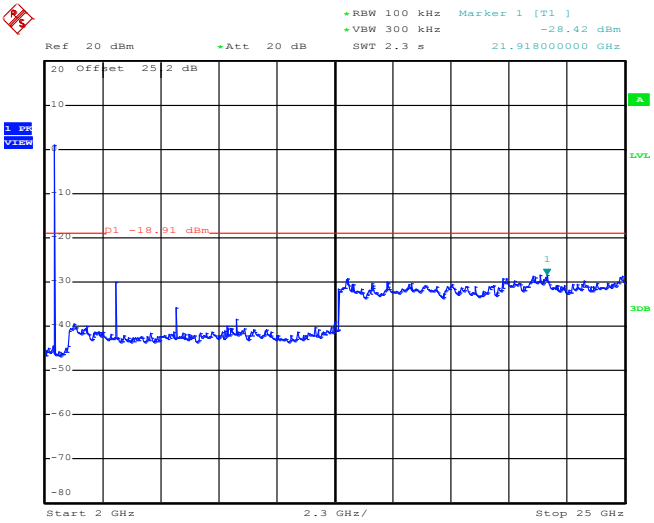
Test Mode :	3Mbps	Temperature :	24~26℃
Test Channel :	00	Relative Humidity :	50~53%
		Test Engineer :	Coyote Lin

3Mbps CSE Plot on Ch 00 between 30MHz ~ 3 GHz



Date: 6.FEB.2013 13:40:22

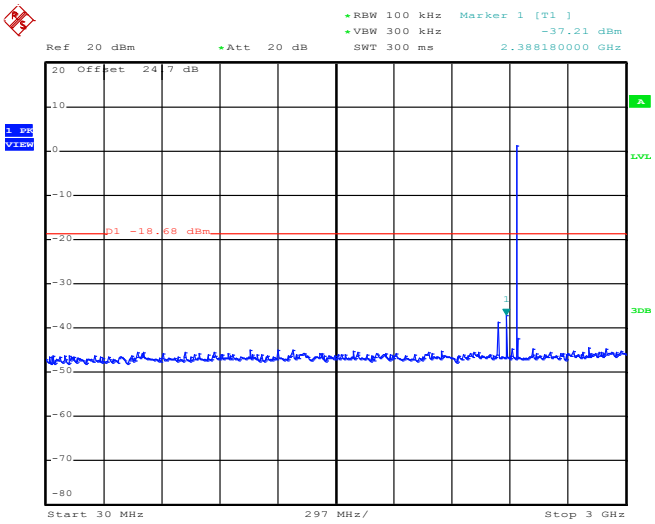
3Mbps CSE Plot on Ch 00 between 2 GHz ~ 25 GHz



Date: 6.FEB.2013 15:09:13

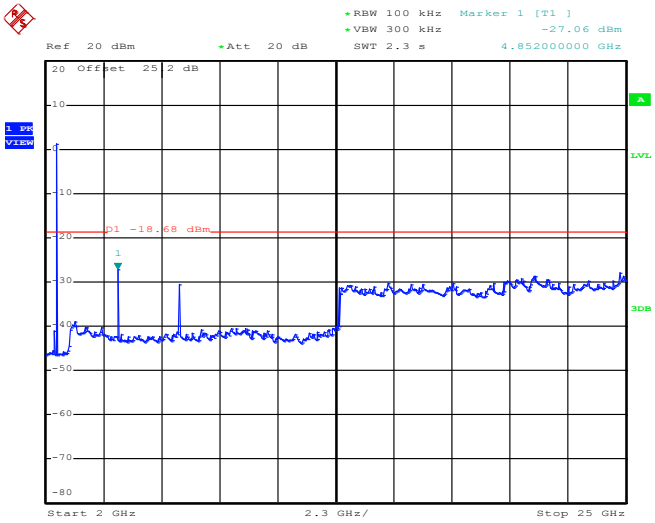
Test Mode :	3Mbps	Temperature :	24~26℃
Test Channel :	39	Relative Humidity :	50~53%
		Test Engineer :	Coyote Lin

3Mbps CSE Plot on Ch 39 between 30MHz ~ 3 GHz



Date: 6.FEB.2013 15:10:05

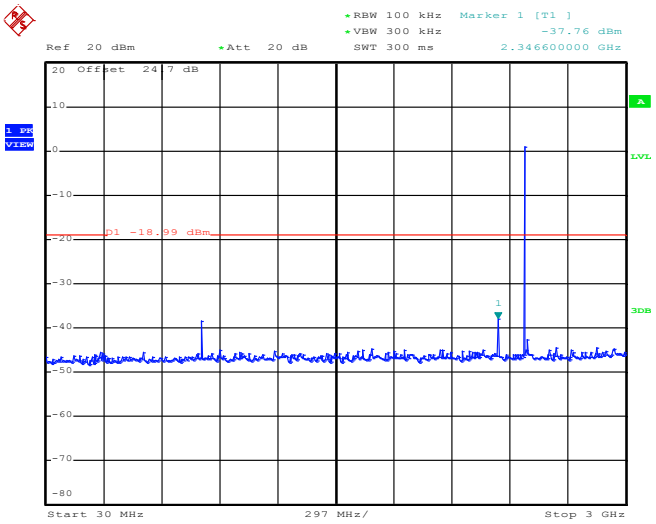
3Mbps CSE Plot on Ch 39 between 2 GHz ~ 25 GHz



Date: 6.FEB.2013 15:10:57

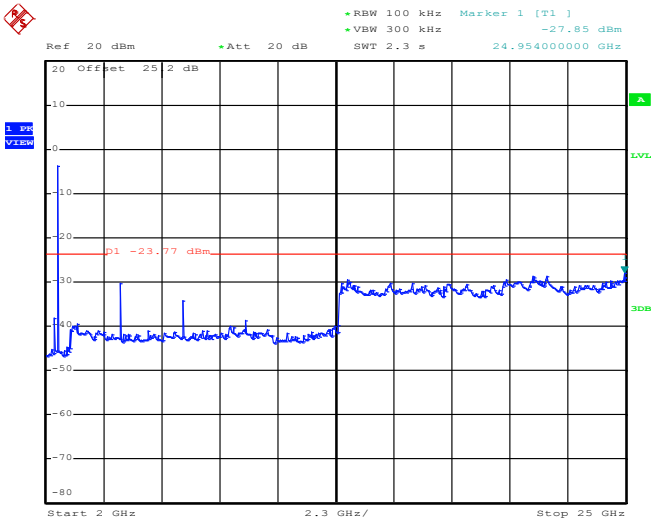
Test Mode :	3Mbps	Temperature :	24~26℃
Test Channel :	78	Relative Humidity :	50~53%
		Test Engineer :	Coyote Lin

3Mbps CSE Plot on Ch 78 between 30MHz ~ 3 GHz



Date: 6.FEB.2013 15:11:49

3Mbps CSE Plot on Ch 78 between 2 GHz ~ 25 GHz



Date: 6.FEB.2013 15:12:41

3.8 Radiated Band Edges and Spurious Emission Measurement

3.8.1 Limit of Radiated Band Edges and Spurious Emission

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

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

3.8.2 Measuring Instruments

See list of measuring instruments of this test report.

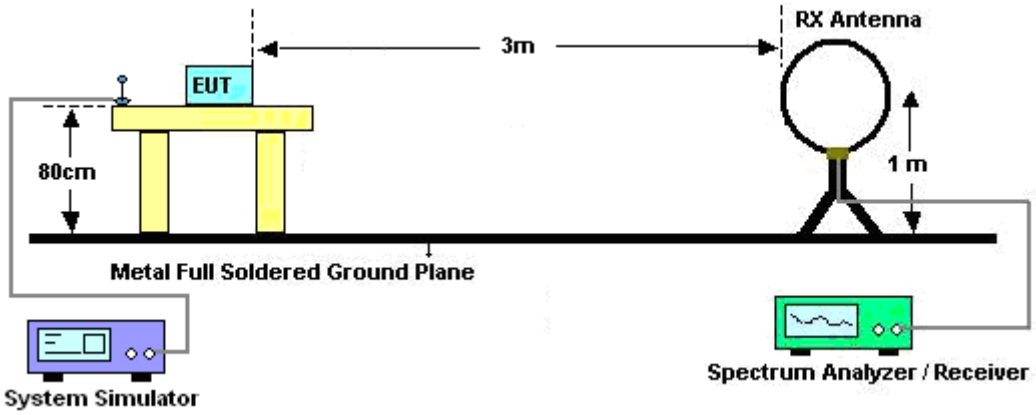
3.8.3 Test Procedures

1. The testing follows the guidelines in Spurious Radiated Emissions of FCC Public Notice DA 00-705 Measurement Guidelines and the guidelines in ANSI C63.10-2009.
2. The EUT was placed on a turntable with 0.8 meter above ground.
3. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 KHz for f < 1 GHz, RBW=1MHz for f>1GHz ; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
   (3) For average measurement: use duty cycle correction factor method per 15.35(c).
   Duty cycle = On time/100 milliseconds
   On time = $N_1*L_1+N_2*L_2+...+N_{n-1}*LN_{n-1}+N_n*L_n$
   Where N_1 is number of type 1 pulses, L_1 is length of type 1 pulses, etc.
   Average Emission Level = Peak Emission Level + 20*log(Duty cycle)
7. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

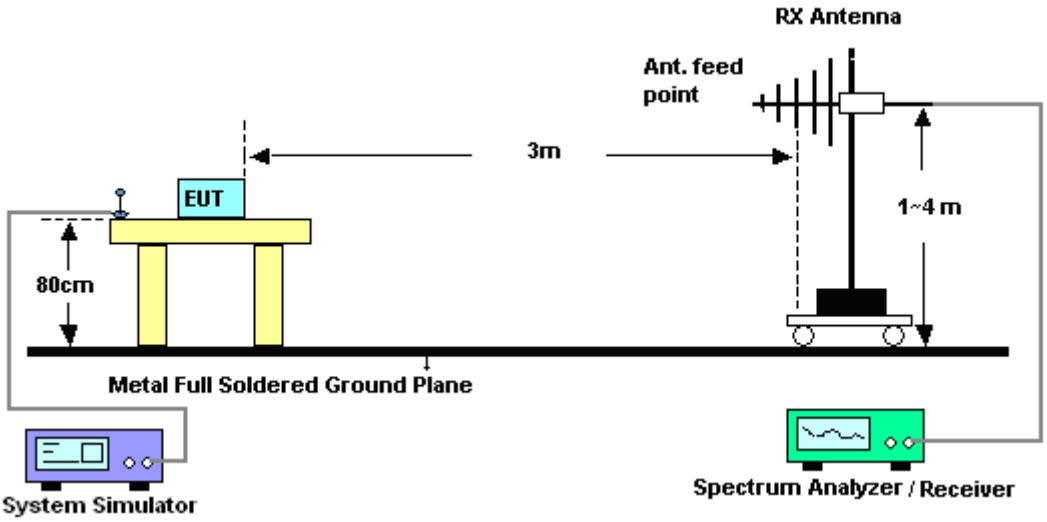
Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (24.79dB) derived from 20log (dwell time/100ms).

3.8.4 Test Setup

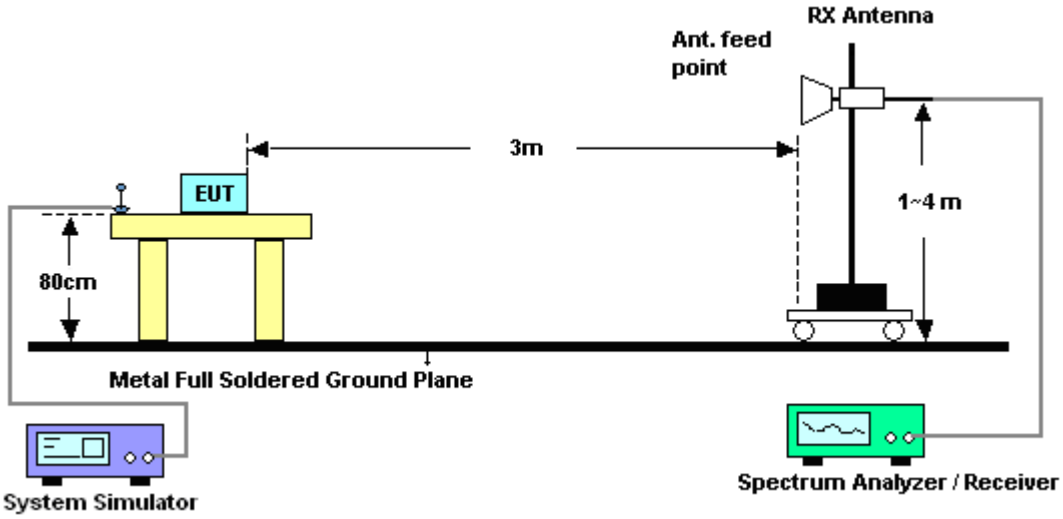
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz

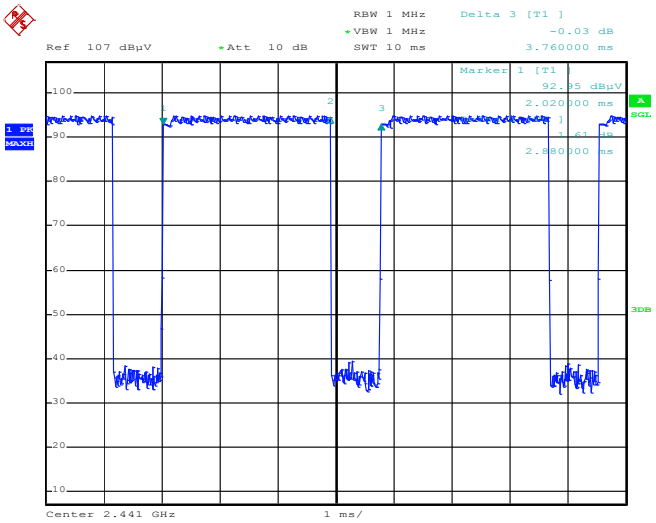


3.8.5 Test Results of Radiated Emissions (9 KHz ~ 30 MHz)

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.

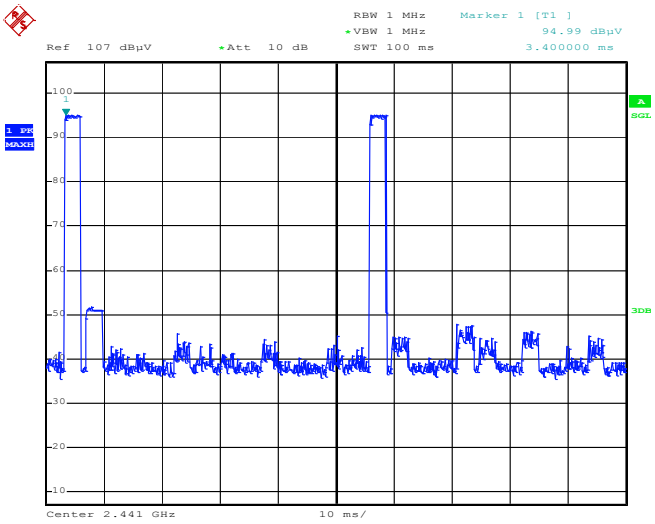
3.8.6 Duty cycle correction factor for average measurement

3DH5 on time/100ms (One Pulse) Plot on Channel 39



Date: 9.FEB.2013 07:04:02

3DH5 on time/100ms (Count Pulses) Plot on Channel 39



Date: 9.FEB.2013 07:11:39

Note:

1. Worst case Duty cycle = on time/100 milliseconds = 2 * 2.88 / 100 = 5.76 %
2. Worst case Duty cycle correction factor = 20*log(Duty cycle) = -24.79 dB
3. 3DH5 has the highest duty cycle worst case and is reported.

Duty Cycle Correction Factor Consideration for AFH mode:

Bluetooth normal hopping rate is 1600Hz and reduced to 800Hz in AFH mode; due to the reduced number of hopping frequencies, with the same packet configuration the dwell time in each channel frequency within 100msec period is longer in AFH mode than normal mode.

In AFH mode, the minimum hopping frequencies are 20, to get the longest dwell time DH5 packet is observed; the period to have DH5 packet completing one hopping sequence is

2.88ms x 20 channels = 57.6ms

There cannot be 2 complete hopping sequences within 100ms period, considering the random hopping behavior, maximum 2 hops can be possibly observed within the period. [100ms / 57.6ms] = 2 hops

Thus, the maximum possible ON time:

2.88ms x 2 = 5.76ms

Worst case Duty Cycle Correction factor, which is derived from the maximum possible ON time,

20 x log(5.76ms/100ms) = -24.79 dB

3.8.7 Test Result of Radiated Band Edges

Test Mode :	3Mbps	**Temperature :**	21~22°C
Test Channel :	00	**Relative Humidity :**	51~53%
		Test Engineer :	Marlboro Hsu

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	**Level (dBµV/m)**	**Over Limit (dB)**	**Limit Line (dBµV/m)**	**Read Level (dBµV)**	**Antenna Factor (dB)**	**Cable Loss (dB)**	**Preamp Factor (dB)**	**Ant Pos (cm)**	**Table Pos (deg)**	**Remark**
2389.2	64.56	-9.44	74	59.62	32.3	6.91	34.27	105	337	Peak
2389.2	39.77	-14.23	54	-	-	-	-	-	-	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**
2357.97	58.72	-15.28	74	53.83	32.26	6.88	34.25	141	56	Peak
2357.97	33.93	-20.07	54	-	-	-	-	-	-	Average

Test Mode :	3Mbps	**Temperature :**	21~22°C
Test Channel :	78	**Relative Humidity :**	51~53%
		Test Engineer :	Marlboro Hsu

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	**Level (dBµV/m)**	**Over Limit (dB)**	**Limit Line (dBµV/m)**	**Read Level (dBµV)**	**Antenna Factor (dB)**	**Cable Loss (dB)**	**Preamp Factor (dB)**	**Ant Pos (cm)**	**Table Pos (deg)**	**Remark**
2357.61	61.5	-12.5	74	56.61	32.26	6.88	34.25	100	348	Peak
2357.61	36.71	-17.29	54	-	-	-	-	-	-	Average
2389.02	63.17	-10.83	74	58.23	32.3	6.91	34.27	100	348	Peak
2389.02	38.38	-15.62	54	-	-	-	-	-	-	Average
2483.5	61.26	-12.74	74	56.25	32.38	7.06	34.43	100	348	Peak
2483.5	36.47	-17.53	54	-	-	-	-	-	-	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**
2389.56	54.52	-19.48	74	49.58	32.3	6.91	34.27	128	254	Peak
2389.56	29.73	-24.27	54	-	-	-	-	-	-	Average
2483.5	56.08	-17.92	74	51.07	32.38	7.06	34.43	128	254	Peak
2483.5	31.29	-22.71	54	-	-	-	-	-	-	Average

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

Test Mode :	3Mbps	**Temperature :**	21~22°C
Test Channel :	00	**Relative Humidity :**	51~53%
Test Engineer :	Marlboro Hsu	**Polarization :**	Horizontal
Remark :	1. 2403MHz is fundamental signal which can be ignored. 2. 7206 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. For example, 101.45 dBμV/m - 20dB = 81.45 dBμV/m.		

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
49.17	25.57	-14.43	40	48.01	8.5	0.69	31.63	-	-	Peak
112.08	29.32	-14.18	43.5	49	10.98	1.06	31.72	100	98	Peak
204.42	23.71	-19.79	43.5	44.28	9.44	1.34	31.35	-	-	Peak
314.7	21.99	-24.01	46	37.63	13.72	1.8	31.16	-	-	Peak
577.9	20.88	-25.12	46	29.69	19.42	2.63	30.86	-	-	Peak
806.8	24.79	-21.21	46	29.67	22.17	3.16	30.21	-	-	Peak
2403	101.45	-	-	96.53	32.31	6.91	34.3	105	337	Peak
2403	76.66	-	-	-	-	-	-	-	-	Average
4803	41.49	-32.51	74	56.23	33.98	8.75	57.47	100	0	Peak
4803	16.7	-37.3	54	-	-	-	-	-	-	Average
7206	42	-39.45	81.45	53.59	35.56	10.81	57.96	100	0	Peak

Note: Other harmonics are lower than background noise.

Test Mode :	3Mbps	**Temperature :**	21~22°C
Test Channel :	00	**Relative Humidity :**	51~53%
Test Engineer :	Marlboro Hsu	**Polarization :**	Vertical
Remark :	1. 2403 MHz is fundamental signal which can be ignored. 2. 7206 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level		

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
63.21	30.18	-9.82	40	55.01	6.16	0.78	31.77	100	35	Peak
165.81	23.49	-20.01	43.5	43.64	9.94	1.23	31.32	-	-	Peak
238.71	20.9	-25.1	46	38.79	11.79	1.52	31.2	-	-	Peak
449.1	17.66	-28.34	46	29.48	17.03	2.3	31.15	-	-	Peak
676.6	22.24	-23.76	46	29.37	20.41	2.89	30.43	-	-	Peak
846.7	24.5	-21.5	46	29.19	22.57	3.26	30.52	-	-	Peak
2403	95.48	-	-	90.56	32.31	6.91	34.3	141	56	Peak
2403	70.69	-	-	-	-	-	-	-	-	Average
4803	41.93	-32.07	74	56.67	33.98	8.75	57.47	100	0	Peak
4803	17.14	-36.86	54	-	-	-	-	-	-	Average
7206	42.62	-32.86	75.48	54.21	35.56	10.81	57.96	100	0	Peak

Note: Other harmonics are lower than background noise.

Test Mode :	3Mbps	Temperature :	21~22°C
Test Channel :	39	Relative Humidity :	51~53%
Test Engineer :	Marlboro Hsu	Polarization :	Horizontal
Remark :	2442 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
112.35	29.05	-14.45	43.5	48.73	10.98	1.06	31.72	100	59	Peak
195.78	23.75	-19.75	43.5	44.7	9.06	1.3	31.31	-	-	Peak
290.82	20.09	-25.91	46	36.62	13.18	1.7	31.41	-	-	Peak
421.1	18.2	-27.8	46	30.79	16.44	2.21	31.24	-	-	Peak
638.1	22.07	-23.93	46	29.57	20.1	2.8	30.4	-	-	Peak
799.1	24.71	-21.29	46	29.65	22.09	3.14	30.17	-	-	Peak
2442	100.43	-	-	95.48	32.35	6.99	34.39	100	348	Peak
2442	75.64	-	-	-	-	-	-	-	-	Average
4881	41.1	-32.9	74	55.78	33.95	8.85	57.48	100	0	Peak
4881	16.31	-37.69	54	-	-	-	-	-	-	Average
7323	41.46	-32.54	74	53.06	35.53	10.91	58.04	100	0	Peak
7323	16.67	-37.33	54	-	-	-	-	-	-	Average

Note: Other harmonics are lower than background noise.

Test Mode :	3Mbps	Temperature :	21~22°C
Test Channel :	39	Relative Humidity :	51~53%
Test Engineer :	Marlboro Hsu	Polarization :	Vertical
Remark :	2442 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
62.67	31.78	-8.22	40	56.61	6.16	0.78	31.77	100	97	Peak
117.48	25.33	-18.17	43.5	44.47	11.43	1.09	31.66	-	-	Peak
193.89	18.93	-24.57	43.5	39.91	9.04	1.3	31.32	-	-	Peak
428.8	18.04	-27.96	46	30.39	16.61	2.24	31.2	-	-	Peak
745.9	23.32	-22.68	46	29.52	21.28	3.05	30.53	-	-	Peak
923.7	25.39	-20.61	46	29.37	23.45	3.4	30.83	-	-	Peak
2442	93.54	-	-	88.59	32.35	6.99	34.39	100	233	Peak
2442	68.75	-	-	-	-	-	-	-	-	Average
4881	41.99	-32.01	74	56.67	33.95	8.85	57.48	100	0	Peak
4881	17.2	-36.8	54	-	-	-	-	-	-	Average
7323	41.18	-32.82	74	52.78	35.53	10.91	58.04	100	0	Peak
7323	16.39	-37.61	54	-	-	-	-	-	-	Average

Note: Other harmonics are lower than background noise.

Test Mode :	3Mbps	Temperature :	21~22°C
Test Channel :	78	Relative Humidity :	51~53%
Test Engineer :	Marlboro Hsu	Polarization :	Horizontal
Remark :	2481 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
59.97	21.64	-18.36	40	46.56	6.1	0.76	31.78	100	59	Peak
131.25	20.98	-22.52	43.5	39.81	11.58	1.15	31.56	-	-	Peak
205.5	23.65	-19.85	43.5	44.17	9.5	1.34	31.36	-	-	Peak
423.9	17.9	-28.1	46	30.41	16.5	2.22	31.23	-	-	Peak
633.9	22.13	-23.87	46	29.68	20.07	2.79	30.41	-	-	Peak
757.1	23.63	-22.37	46	29.58	21.46	3.07	30.48	-	-	Peak
2481	99.36	-	-	94.35	32.38	7.06	34.43	100	348	Peak
2481	74.57	-	-	-	-	-	-	-	-	Average
4959	44	-30	74	58.66	33.91	8.92	57.49	100	0	Peak
4959	19.21	-34.79	54	-	-	-	-	-	-	Average
7440	42.02	-31.98	74	53.59	35.51	11.04	58.12	100	0	Peak
7440	17.23	-36.77	54	-	-	-	-	-	-	Average

Note: Other harmonics are lower than background noise.

Test Mode :	3Mbps	Temperature :	21~22°C
Test Channel :	78	Relative Humidity :	51~53%
Test Engineer :	Marlboro Hsu	Polarization :	Vertical
Remark :	2481 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
63.21	31.22	-8.78	40	56.05	6.16	0.78	31.77	100	49	Peak
129.9	22.67	-20.83	43.5	41.49	11.6	1.15	31.57	-	-	Peak
204.96	18.64	-24.86	43.5	39.22	9.44	1.34	31.36	-	-	Peak
429.5	17.06	-28.94	46	29.39	16.63	2.24	31.2	-	-	Peak
759.9	23.24	-22.76	46	29.13	21.49	3.08	30.46	-	-	Peak
894.3	25.15	-20.85	46	29.58	23.04	3.33	30.8	-	-	Peak
2481	94.2	-	-	89.19	32.38	7.06	34.43	128	254	Peak
2481	69.41	-	-	-	-	-	-	-	-	Average
4959	41.83	-32.17	74	56.49	33.91	8.92	57.49	100	0	Peak
4959	17.04	-36.96	54	-	-	-	-	-	-	Average
7440	41.84	-32.16	74	53.41	35.51	11.04	58.12	100	0	Peak
7440	17.05	-36.95	54	-	-	-	-	-	-	Average

Note: Other harmonics are lower than background noise.

3.9 AC Conducted Emission Measurement

3.9.1 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 (dBμV)	
	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.

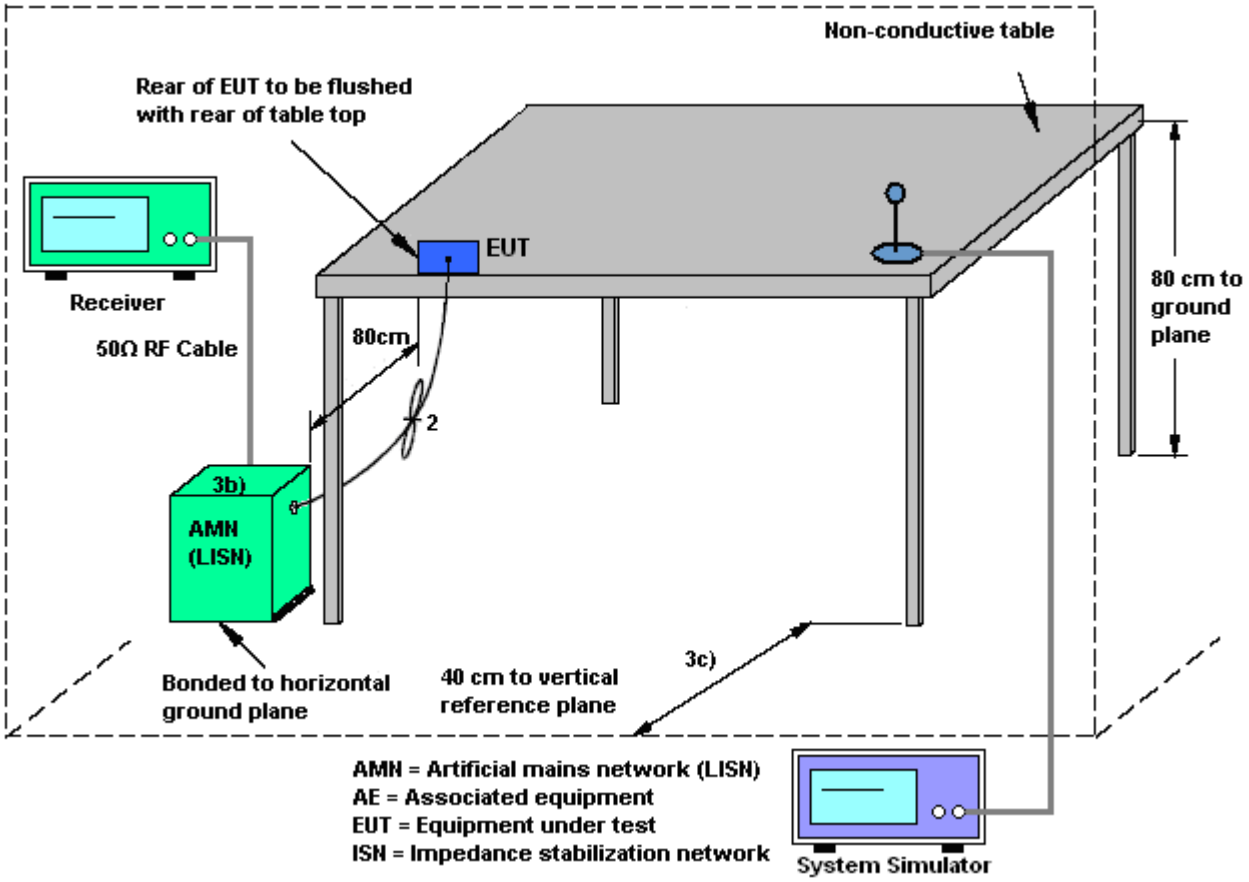
3.9.2 Measuring Instruments

See list of measuring instruments of this test report.

3.9.3 Test Procedures

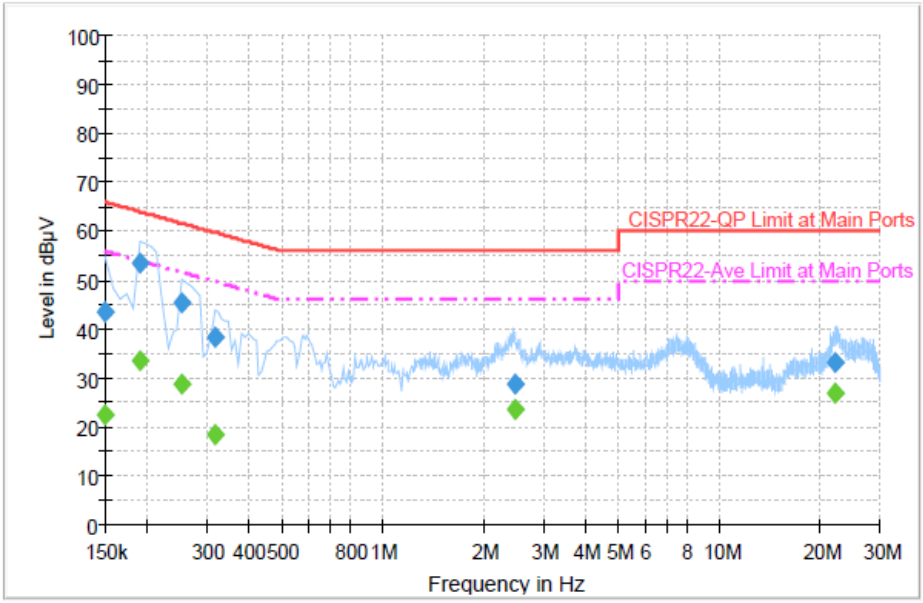
1. The test follows the guidelines in ANSI C63.10-2009 test site requirement.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization 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.

3.9.4 Test Setup



3.9.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	**Temperature :**	20~22℃
Test Engineer :	Slash Huang	**Relative Humidity :**	45~47%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	GSM850 Idle + WLAN (2.4G) Link + Bluetooth Link + GPS Rx + Qwerty Keypad with Camera + USB Charging Cable with AC Power + USB Link		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



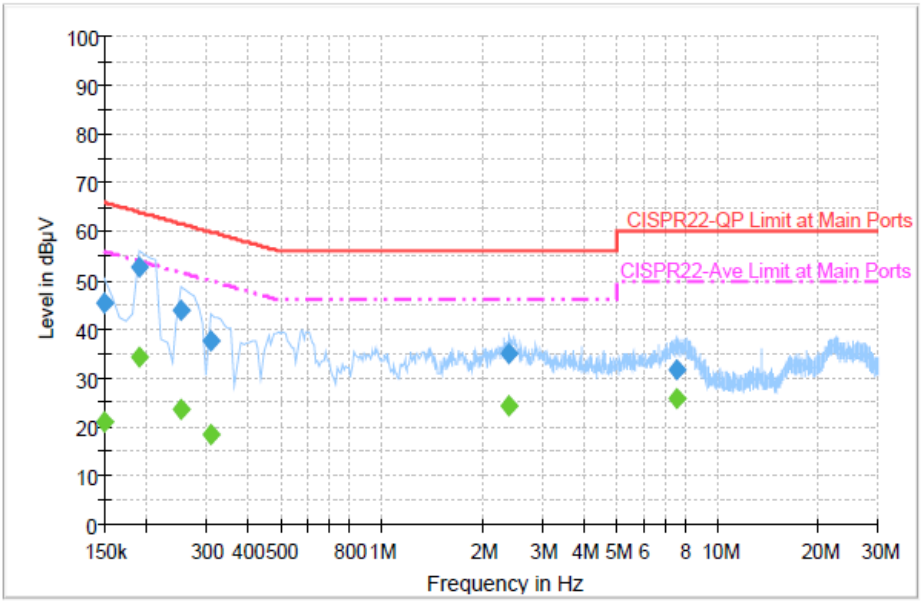
Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	43.5	Off	L1	19.4	22.5	66.0
0.190000	53.5	Off	L1	19.4	10.5	64.0
0.254000	45.4	Off	L1	19.4	16.2	61.6
0.318000	38.5	Off	L1	19.3	21.3	59.8
2.478000	28.8	Off	L1	19.6	27.2	56.0
22.134000	33.3	Off	L1	19.9	26.7	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	22.5	Off	L1	19.4	33.5	56.0
0.190000	33.5	Off	L1	19.4	20.5	54.0
0.254000	28.8	Off	L1	19.4	22.8	51.6
0.318000	18.3	Off	L1	19.3	31.5	49.8
2.478000	23.7	Off	L1	19.6	22.3	46.0
22.134000	26.8	Off	L1	19.9	23.2	50.0

Test Mode :	Mode 1	**Temperature :**	20~22℃
Test Engineer :	Slash Huang	**Relative Humidity :**	45~47%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral
Function Type :	GSM850 Idle + WLAN (2.4G) Link + Bluetooth Link + GPS Rx + Qwerty Keypad with Camera + USB Charging Cable with AC Power + USB Link		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	45.5	Off	N	19.4	20.5	66.0
0.190000	52.6	Off	N	19.4	11.4	64.0
0.254000	43.7	Off	N	19.4	17.9	61.6
0.310000	37.5	Off	N	19.4	22.5	60.0
2.398000	34.9	Off	N	19.7	21.1	56.0
7.550000	31.6	Off	N	19.7	28.4	60.0

Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	21.2	Off	N	19.4	34.8	56.0
0.190000	34.3	Off	N	19.4	19.7	54.0
0.254000	23.8	Off	N	19.4	27.8	51.6
0.310000	18.4	Off	N	19.4	31.6	50.0
2.398000	24.2	Off	N	19.7	21.8	46.0
7.550000	25.7	Off	N	19.7	24.3	50.0

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. 06, 2012	Jan. 11, 2013 ~ Mar. 01, 2013	Jun. 05, 2013	Conducted (TH02-HY)
Bluetooth Base Station	R&S	CBT32	100519	N/A	Jun. 05, 2012	Jan. 11, 2013 ~ Mar. 01, 2013	Jun. 04, 2013	Conducted (TH02-HY)
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100356	9KHz – 2.75GHz	Nov. 13, 2012	Feb. 20, 2013	Nov. 12, 2013	Conduction (CO05-HY)
Two-LISN	Rohde & Schwarz	ENV216	100081	9KHz ~ 30MHz	Dec. 12, 2012	Feb. 20, 2013	Dec. 11, 2013	Conduction (CO05-HY)
Two-LISN	Rohde & Schwarz	ENV216	100080	9KHz ~ 30MHz	Dec. 06, 2012	Feb. 20, 2013	Dec. 05, 2013	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	Feb. 20, 2013	N/A	Conduction (CO05-HY)
System Simulator	R&S	CMU200	117995	N/A	Jul. 28, 2011	Feb. 20, 2013	Jul. 27, 2013	Conduction (CO05-HY)
GPS Station	T&E	GS-50	N/A	N/A	N/A	Feb. 20, 2013	N/A	Conduction (CO05-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30MHz ~ 1GHz	Oct. 06, 2012	Feb. 05, 2013 ~ Feb. 09, 2013	Oct. 05, 2013	Radiation (03CH07-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101067	9KHz ~ 30GHz	Nov. 30, 2012	Feb. 05, 2013 ~ Feb. 09, 2013	Nov. 29, 2013	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 22, 2012	Feb. 05, 2013 ~ Feb. 09, 2013	Aug. 21, 2013	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A02362	1GHz~ 26.5GHz	Dec. 01, 2012	Feb. 05, 2013 ~ Feb. 09, 2013	Nov. 30, 2013	Radiation (03CH07-HY)
Pre Amplifier	MITEQ	AMF-7D-00101800-30-10P	159088	1GHz ~ 18GHz	Mar. 10, 2012	Feb. 05, 2013 ~ Feb. 09, 2013	Mar. 09, 2013	Radiation (03CH07-HY)
Pre Amplifier	COM-POWER	PA-103A	161241	10-1000MHz. 32dB.GAIN	Feb. 27, 2012	Feb. 05, 2013 ~ Feb. 09, 2013	Feb. 26, 2013	Radiation (03CH07-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Sep. 03, 2012	Feb. 05, 2013 ~ Feb. 09, 2013	Sep. 02, 2013	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz ~ 40GHz	Sep. 28, 2012	Feb. 05, 2013 ~ Feb. 09, 2013	Sep. 27, 2013	Radiation (03CH07-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9KHz ~ 30MHz	Jul. 03, 2012	Feb. 05, 2013 ~ Feb. 09, 2013	Jul. 02, 2013	Radiation (03CH07-HY)
Bluetooth Base Station	R&S	CBT32	100522	N/A	Feb. 09, 2012	Feb. 05, 2013 ~ Feb. 09, 2013	Feb. 08, 2014	Radiation (03CH07-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.26**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.54**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.72**

Appendix A. Photographs of EUT

Please refer to Sporton report number EP320416 as below.