

FCC/IC RF Test Report

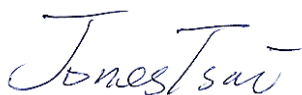
APPLICANT : Kilpatrick LLC
EQUIPMENT : Tablet PC
MODEL NAME : C9R6QM
FCC ID : S2F-8560
IC : 10888A-8560
STANDARD : FCC Part 15 Subpart C §15.247
IC RSS-210 issue 8
CLASSIFICATION : (DSS) Spread Spectrum Transmitter

The product was completely tested on Aug. 30, 2013. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown to be compliant 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: Joseph Lin / Supervisor



Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

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

TABLE OF CONTENTS

REVISION HISTORY.....	3
SUMMARY OF TEST RESULT	4
1 GENERAL DESCRIPTION.....	5
1.1 Applicant.....	5
1.2 Feature of Equipment Under Test	5
1.3 Product Specification of Equipment Under Test.....	5
1.4 Modification of EUT	5
1.5 Testing Site.....	6
1.6 Applied Standards	6
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST.....	7
2.1 Descriptions of Test Mode.....	7
2.2 Test Mode.....	8
2.3 Connection Diagram of Test System.....	8
2.4 Support Unit used in test configuration and system	9
2.5 Description of RF Function Operation Test Setup.....	9
2.6 Measurement Results Explanation Example.....	9
3 TEST RESULT	10
3.1 Number of Channel Measurement	10
3.2 Hopping Channel Separation Measurement	12
3.3 Dwell Time Measurement.....	19
3.4 20dB and 99% Bandwidth Measurement	22
3.5 Peak Output Power Measurement	35
3.6 Conducted Band Edges Measurement.....	37
3.7 Conducted Spurious Emission Measurement	44
3.8 AC Conducted Emission Measurement.....	54
3.9 Antenna Requirements.....	60
4 LIST OF MEASURING EQUIPMENT.....	61
5 UNCERTAINTY OF EVALUATION.....	62

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR332726-04A	Rev. 01	Initial issue of report	Aug. 14, 2013
FR332726-04A	Rev. 02	Update report for Conducted Band Edges Measurement in section 3.6.5 and description for test mode and AFH in section 2.1 and 3.5.5	Aug. 30, 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	$\geq 15\text{Chs}$	Pass	-
3.2	15.247(a)(1)	RSS-210 A8.1(b)	Hopping Channel Separation	$\geq 2/3$ of 20dB BW	Pass	-
3.3	15.247(a)(1)	RSS-210 A8.1(d)	Dwell Time of Each Channel	$\leq 0.4\text{sec}$ 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	$\leq 125\text{ mW}$	Pass	-
3.6	15.247(d)	RSS-210 A8.5	Conducted Band Edges	$\leq 20\text{dBc}$	Pass	-
3.7	15.247(d)	RSS-210 A8.5	Conducted Spurious Emission	$\leq 20\text{dBc}$	Pass	-
3.8	15.207	RSS-Gen 7.2.4	AC Conducted Emission	15.207(a)	Pass	Under limit 11.50 dB at 0.190 MHz
3.9	15.203 & 15.247(b)	RSS-210 A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Kilpatrick LLC
102 S. Tejon Street
Suite 1100
Colorado Springs, Colorado 80903

1.2 Feature of Equipment Under Test

Product Feature	
Equipment	Tablet PC
Model Name	C9R6QM
FCC ID	S2F-8560
IC	10888A-8560
EUT supports Radios application	WLAN 11a/b/g/n HT20/HT40 Bluetooth v3.0

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

1.3 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 BR(1Mbps) : 6.0 dBm (0.0040 W) Bluetooth EDR (2Mbps) : 7.2 dBm (0.0052 W) Bluetooth EDR (3Mbps) : 7.3 dBm (0.0054 W)
99% Occupied Bandwidth	Bluetooth BR(1Mbps) : 1.024MHz Bluetooth EDR (2Mbps) : 1.072MHz Bluetooth EDR (3Mbps) : 1.124MHz
Antenna Type	Fixed internal Antenna with gain 4.10 dBi
Type of Modulation	Bluetooth v3.0 BR (1Mbps) : GFSK Bluetooth v3.0 EDR (2Mbps) : $\pi/4$ -DQPSK Bluetooth v3.0 EDR (3Mbps) : 8-DPSK

1.4 Modification of EUT

No modifications are made to the EUT during all test items.

1.5 Testing Site

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

Note: 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 C63.4-2003
- 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

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

Channel	Frequency	Bluetooth RF Output Power		
		Data Rate / Modulation		
		GFSK	$\pi/4$ -DQPSK	8-DPSK
		1Mbps	2Mbps	3Mbps
Ch00	2402MHz	6.0 dBm	7.2 dBm	7.3 dBm
Ch39	2441MHz	6.0 dBm	7.0 dBm	7.2 dBm
Ch78	2480MHz	5.0 dBm	6.2 dBm	6.3 dBm

Remark:

1. All the test data for each data rate were verified, but only the worst case was reported.
 2. The worse data rate was 3Mbps for Radiated Spurious Emissions and all the data rate were tested for RF conducted items and reported.
 3. For AFH mode, the power and other characteristics remain the same as 1Mbps data rate.
- a. The EUT has been associated with peripherals 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). Pre-scanned tests, X, Y, Z in three orthogonal panels, and different data rates were conducted to determine the final configuration (Y plane as worst plane) from all possible combinations, and recorded in this report.
- b. AC power line Conducted Emission was tested under maximum output power.

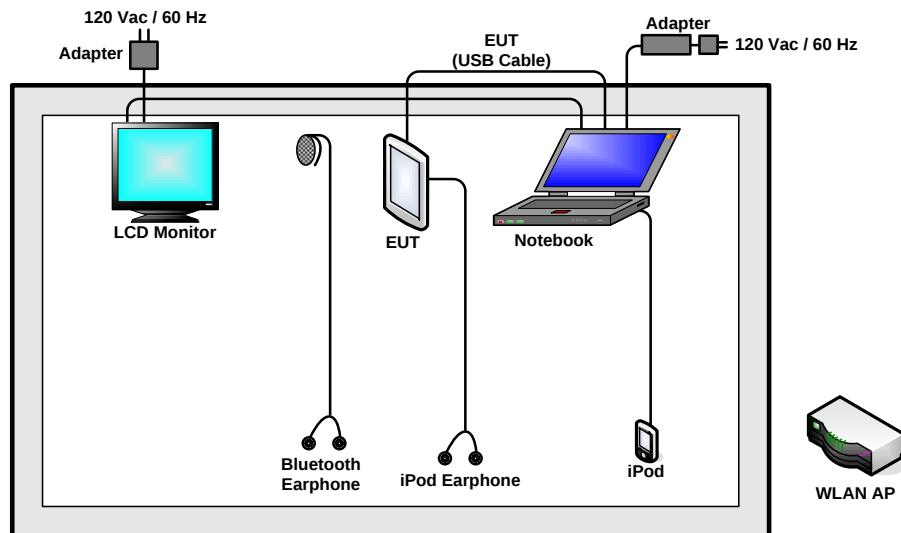
2.2 Test Mode

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

Summary table of Test Cases			
Test Item	Data Rate / Modulation		
	Bluetooth BR 1Mbps GFSK	Bluetooth EDR 2Mbps $\pi/4$ -DQPSK	Bluetooth EDR 3Mbps 8-DPSK
Conducted Test Cases	Mode 1: CH00_2402 MHz	Mode 4: CH00_2402 MHz	Mode 7: CH00_2402 MHz
	Mode 2: CH39_2441 MHz	Mode 5: CH39_2441 MHz	Mode 8: CH39_2441 MHz
	Mode 3: CH78_2480 MHz	Mode 6: CH78_2480 MHz	Mode 9: CH78_2480 MHz
AC Conducted Emission	Mode 1 :WLAN (2.4G) Link + Bluetooth Link + Earphone + USB Cable (Data Link with Notebook) + Camera		
	Mode 2 :WLAN (5G) Link + Bluetooth Link + Earphone + USB Cable (Data Link with Notebook) + Camera		
Remark: For 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 .			

2.3 Connection Diagram of Test System

<AC Conducted Emission Mode>



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
2.	Notebook	DELL	Latitude E6320	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
3.	LCD Monitor	DELL	U2410	FCC DoC	Shielded, 1.6 m	Unshielded, 1.8 m
4.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
5.	iPod Earphone	Apple	N/A	FCC DoC	Unshielded, 1.0 m	N/A
6.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
7.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A
8.	Adapter	Foxlink	PE98ED	Verification	N/A	N/A

2.5 Description of RF Function Operation Test Setup

For Bluetooth function, the RF utility, “ADB” was installed in EUT which was programmed in order to make the EUT get into the engineering modes for continuous transmitting and receiving signals.

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.

Example:

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.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 4.2 + 10 = 14.2 \text{ (dB)}\end{aligned}$$

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.

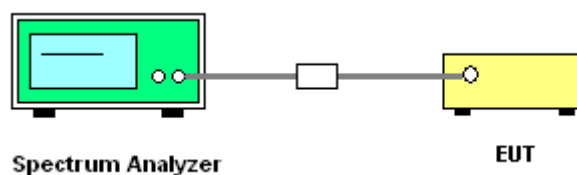
3.1.2 Measuring Instruments

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 $\geq$ 1% of the span; VBW $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
6. The number of hopping frequency used is defined as the 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°C
Test Engineer :	Coyote Lin	Relative Humidity :	48~51%
Number of Hopping (Channel)	Adaptive Frequency Hopping (Channel)	Limits (Channel)	Pass/Fail
79	20	> 15	Pass

Ref 20 dBm Att 20 dB RBW 1 MHz VSW 1 MHz SWT 500 ms

Offset 24.7 dB

1 Hz MAX

Start 2.4 GHz 4.1 MHz/Stop 2.441 GHz

Report NO.	FR332726-04A-CON
Report Version	: Rev. 02
Page Number	: 11 of 62

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.

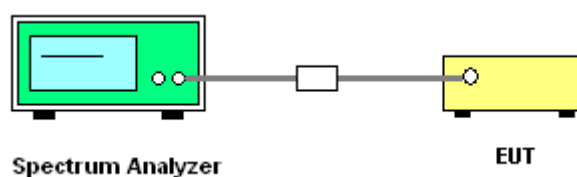
3.2.2 Measuring Instruments

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; $RBW \geq 1\%$ of the span;
 $VBW \geq RBW$; Sweep = auto; Detector function = peak; Trace = max hold.
6. Measure and record the results in the test report.

3.2.4 Test Setup

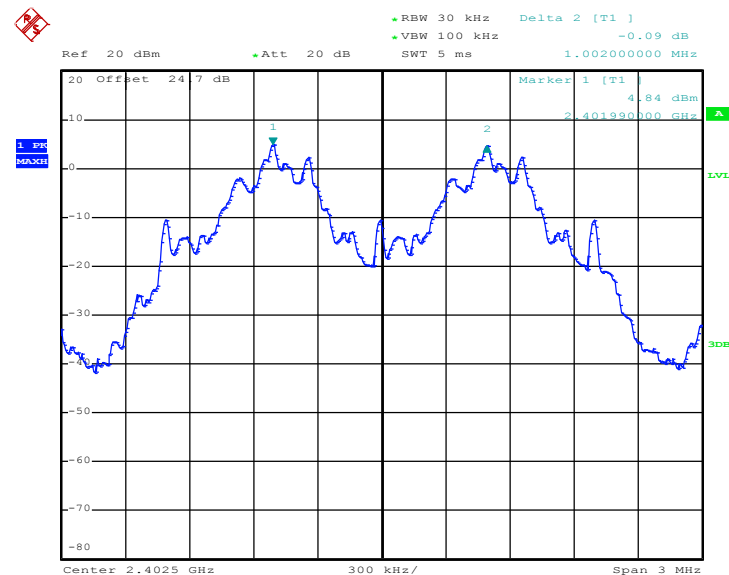


3.2.5 Test Result of Hopping Channel Separation

Test Mode :	1Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	48~51%

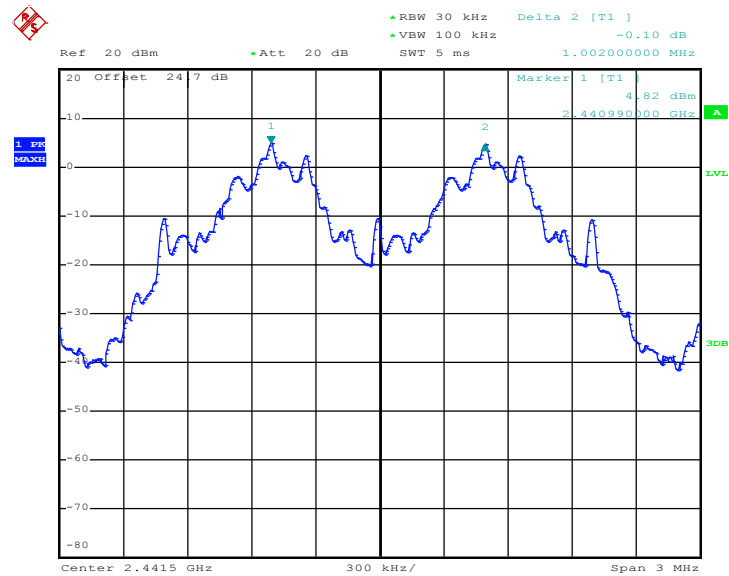
Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.002	0.4027	Pass
39	2441	1.002	0.4107	Pass
78	2480	1.002	0.4027	Pass

Channel Separation Plot on Channel 00 - 01



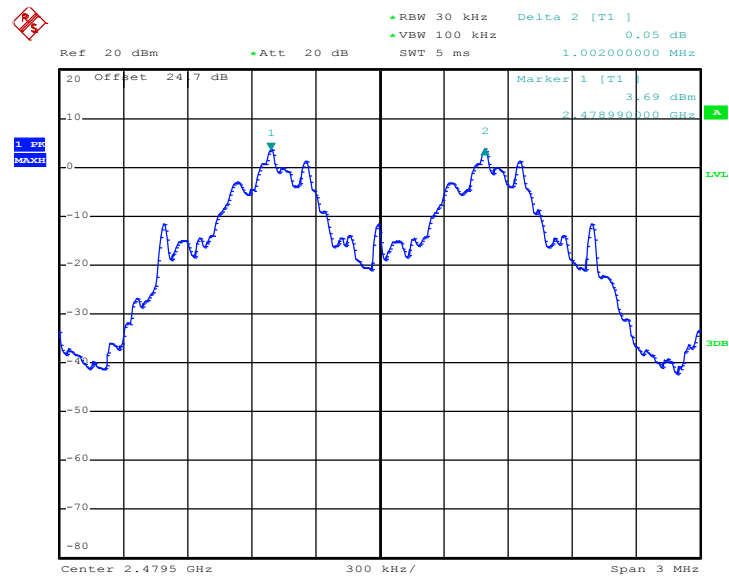
Date: 8.AUG.2013 17:55:23

Channel Separation Plot on Channel 39 - 40



Date: 8.AUG.2013 18:04:07

Channel Separation Plot on Channel 77 - 78

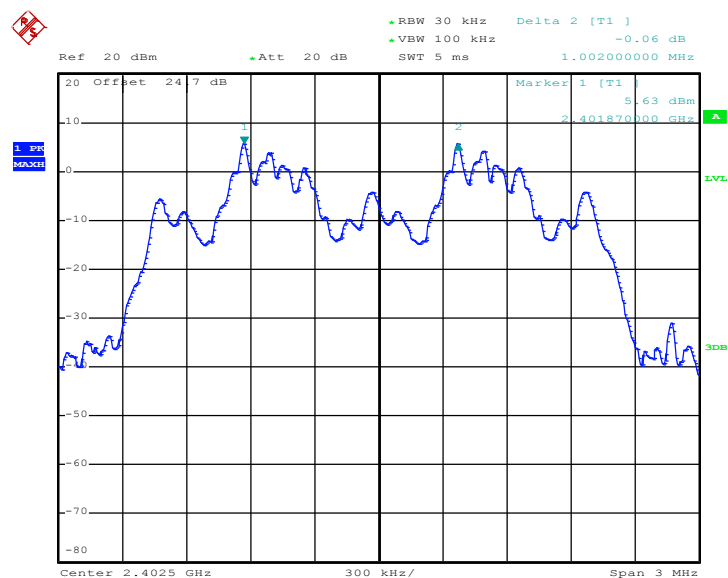


Date: 8.AUG.2013 18:10:33

Test Mode :	2Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	48~51%

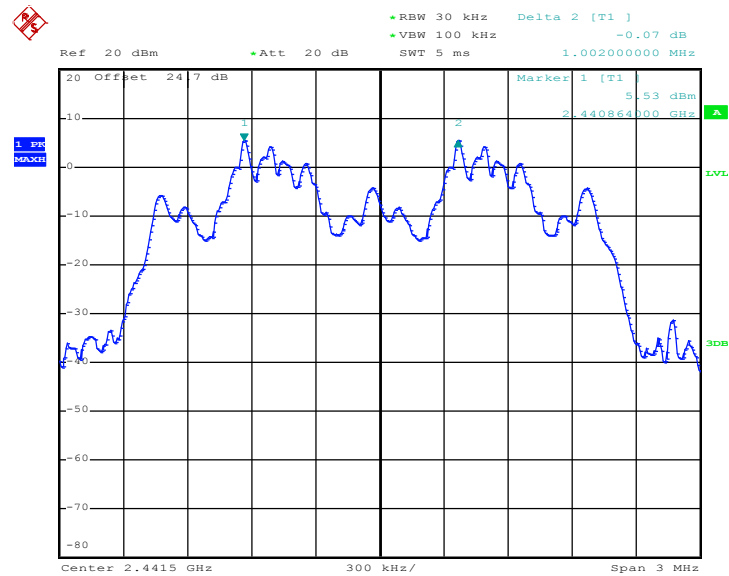
Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.002	0.5520	Pass
39	2441	1.002	0.5480	Pass
78	2480	1.002	0.5560	Pass

Channel Separation Plot on Channel 00 - 01



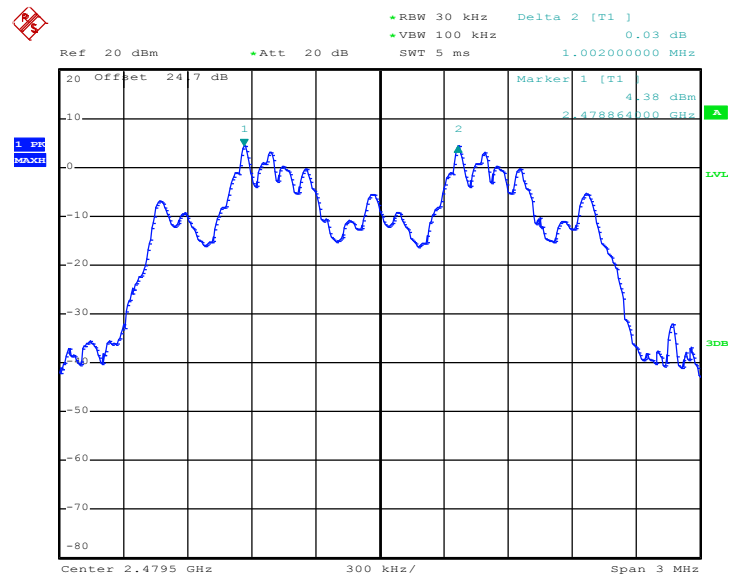
Date: 8.AUG.2013 18:39:37

Channel Separation Plot on Channel 39 - 40



Date: 8.AUG.2013 18:45:05

Channel Separation Plot on Channel 77 - 78

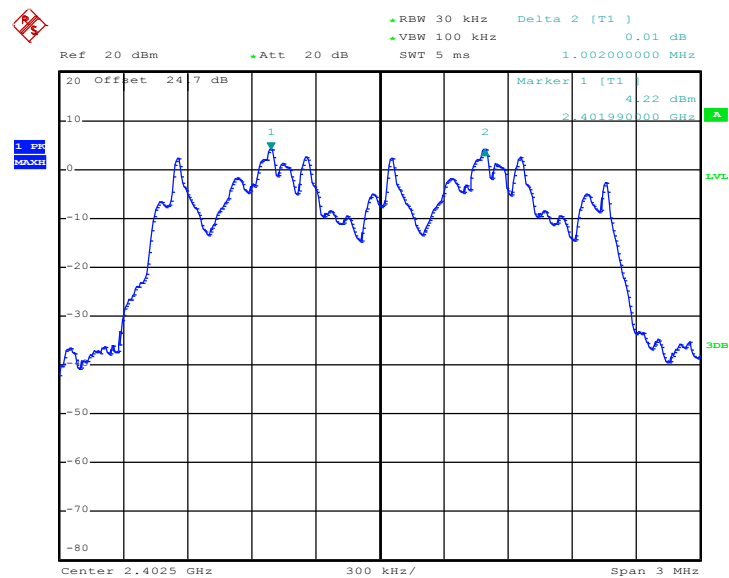


Date: 8.AUG.2013 18:50:45

Test Mode :	3Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	48~51%

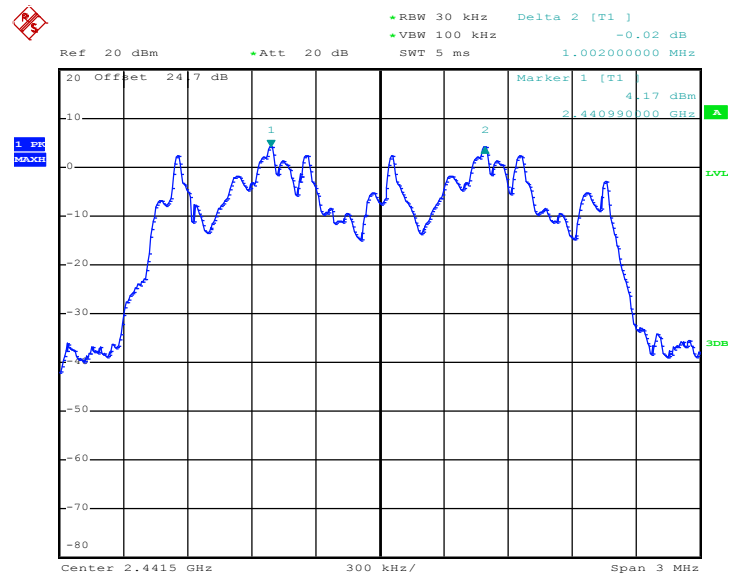
Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.002	0.7920	Pass
39	2441	1.002	0.7920	Pass
78	2480	1.002	0.7920	Pass

Channel Separation Plot on Channel 00 - 01



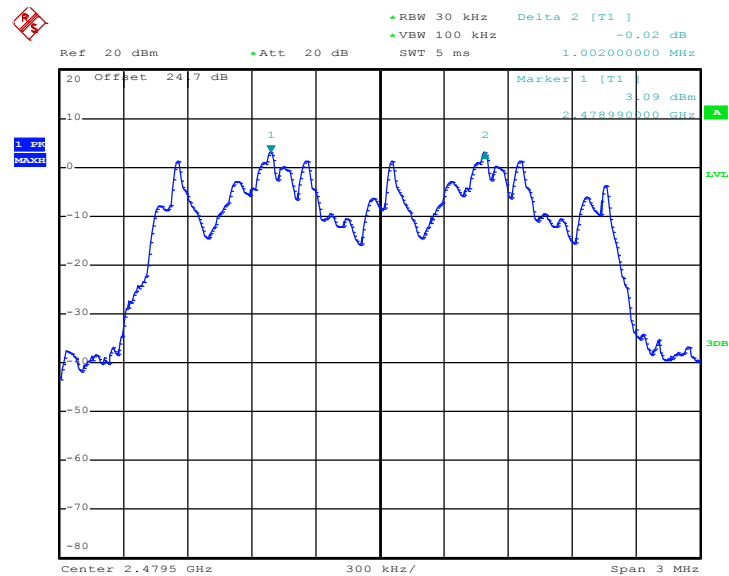
Date: 8.AUG.2013 19:07:03

Channel Separation Plot on Channel 39 - 40



Date: 8.AUG.2013 19:02:27

Channel Separation Plot on Channel 77 - 78



Date: 8.AUG.2013 18:57:28

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.

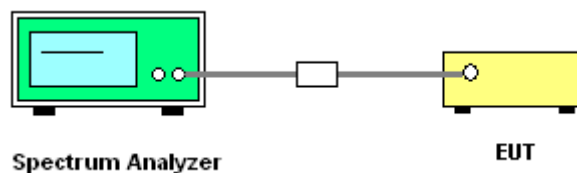
3.3.2 Measuring Instruments

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 $\geq$ 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

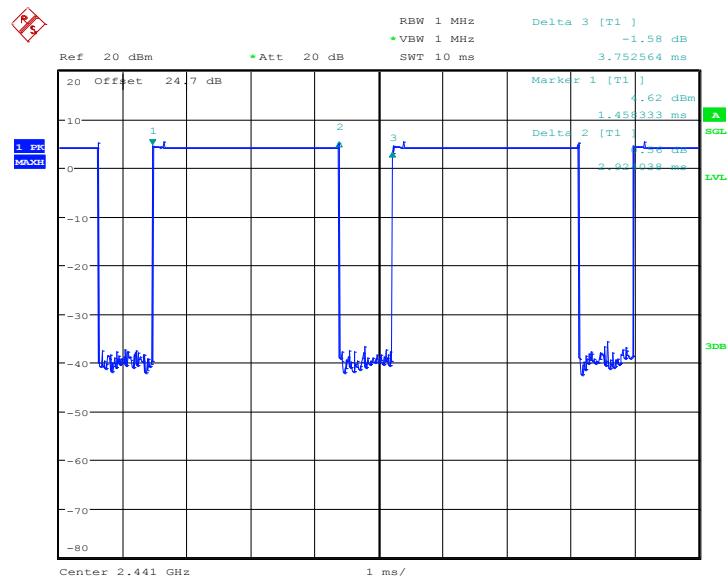
Test Mode :	DH5	Temperature :	24~26°C
Test Engineer :	Coyote Lin	Relative Humidity :	48~51%

Mode	Hopping Channel Number	Hops Over Occupancy Time(hops)	Package Transfer Time (msec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
Normal	79	106.67	2.92	0.31	0.4	Pass
AFH	20	53.33	2.92	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 (0.4×79) (s),
Hops Over Occupancy Time comes to $(1600 / 6 / 79) \times (0.4 \times 79) = 106.67$ 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 (0.4×20) (s),
Hops Over Occupancy Time comes to $(800 / 6 / 20) \times (0.4 \times 20) = 53.33$ hops.
3. Dwell Time(s) = Hops Over Occupancy Time (hops) x Package Transfer Time

Package Transfer Time Plot



Date: 5.AUG.2013 13:41:37

3.4 20dB and 99% Bandwidth Measurement

3.4.1 Limit of 20dB and 99% Bandwidth

Reporting only

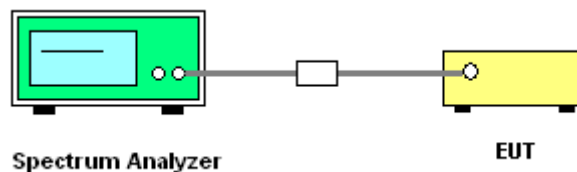
3.4.2 Measuring Instruments

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 $\geq$ 1% of the 20 dB bandwidth; VBW $\geq$ 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

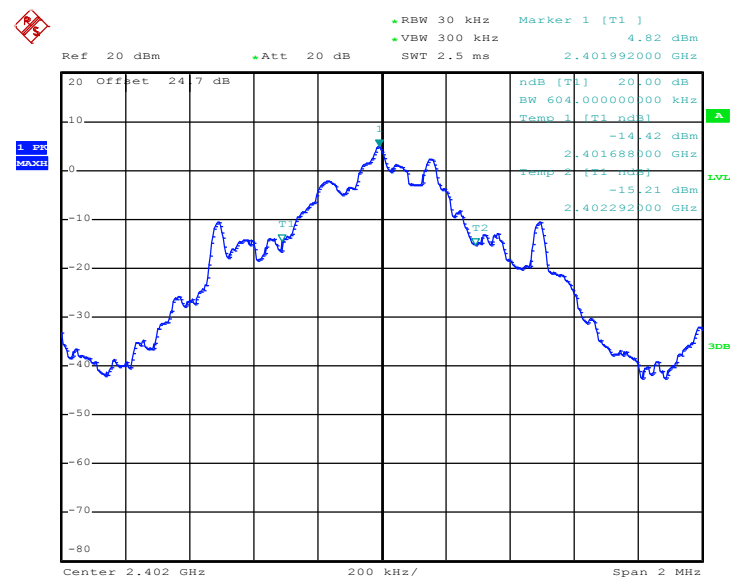


3.4.5 Test Result of 20dB Bandwidth

Test Mode :	1Mbps	Temperature :	24~26°C
Test Engineer :	Coyote Lin	Relative Humidity :	48~51%

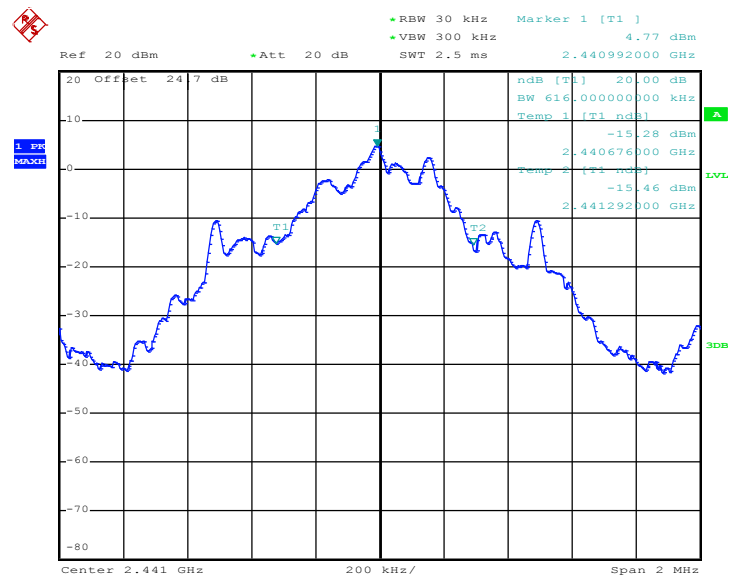
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	0.604
39	2441	0.616
78	2480	0.604

20 dB Bandwidth Plot on Channel 00



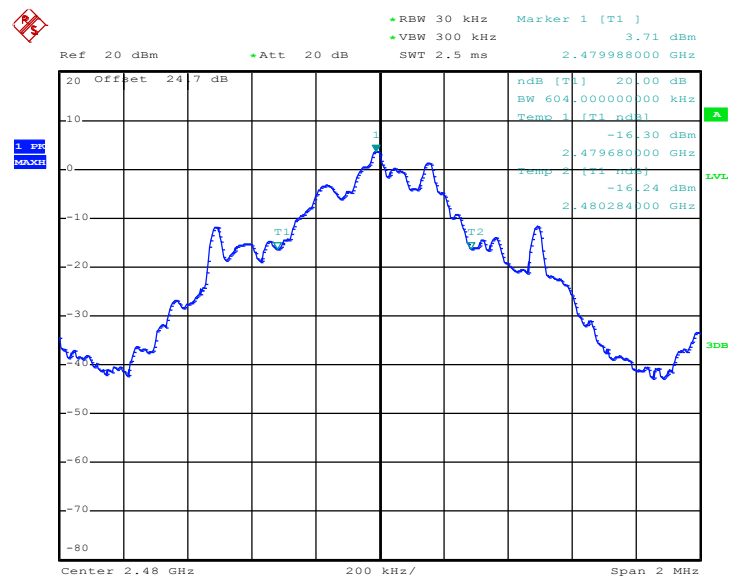
Date: 8.AUG.2013 17:55:49

20 dB Bandwidth Plot on Channel 39



Date: 8.AUG.2013 18:04:32

20 dB Bandwidth Plot on Channel 78

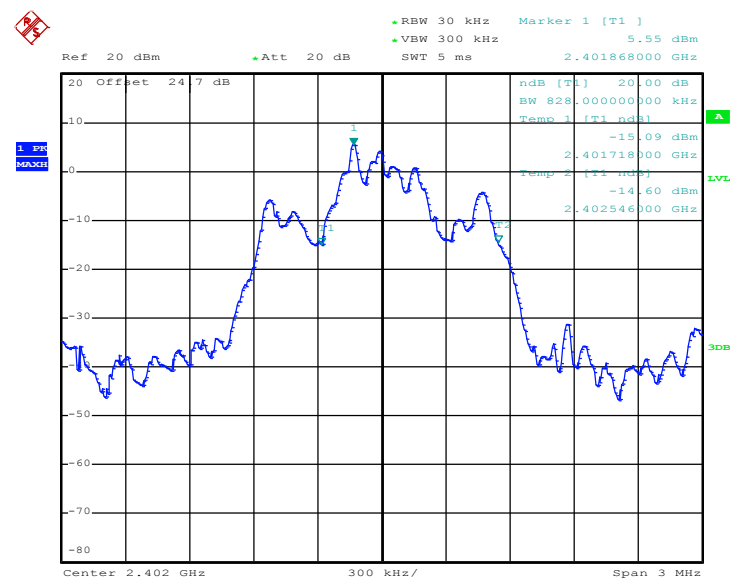


Date: 8.AUG.2013 18:11:44

Test Mode :	2Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	48~51%

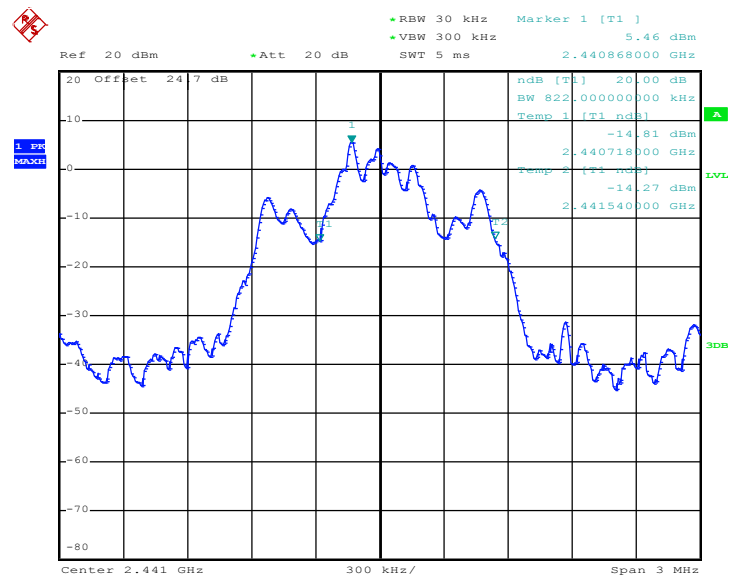
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	0.828
39	2441	0.822
78	2480	0.834

20 dB Bandwidth Plot on Channel 00



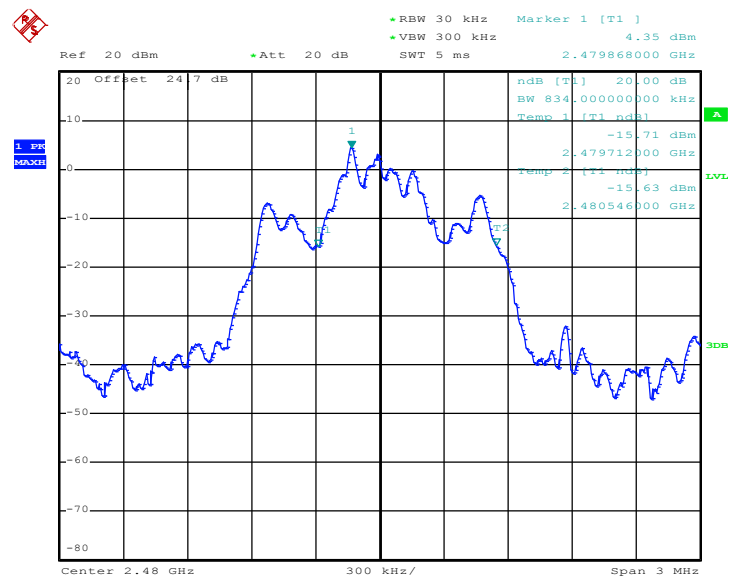
Date: 8.AUG.2013 18:40:01

20 dB Bandwidth Plot on Channel 39



Date: 8.AUG.2013 18:45:46

20 dB Bandwidth Plot on Channel 78

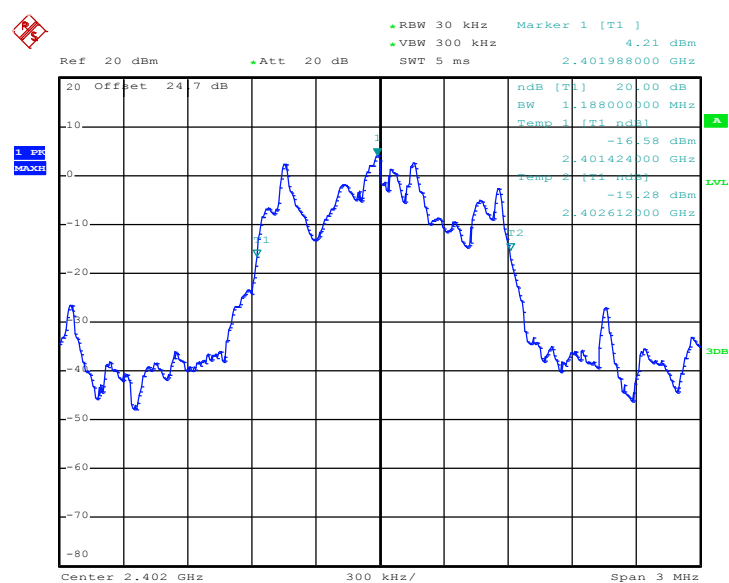


Date: 8.AUG.2013 18:51:11

Test Mode :	3Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	48~51%

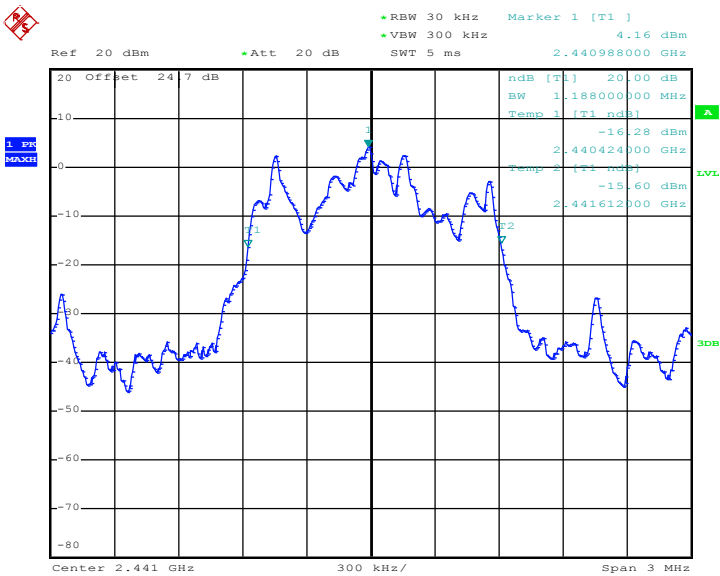
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.188
39	2441	1.188
78	2480	1.188

20 dB Bandwidth Plot on Channel 00



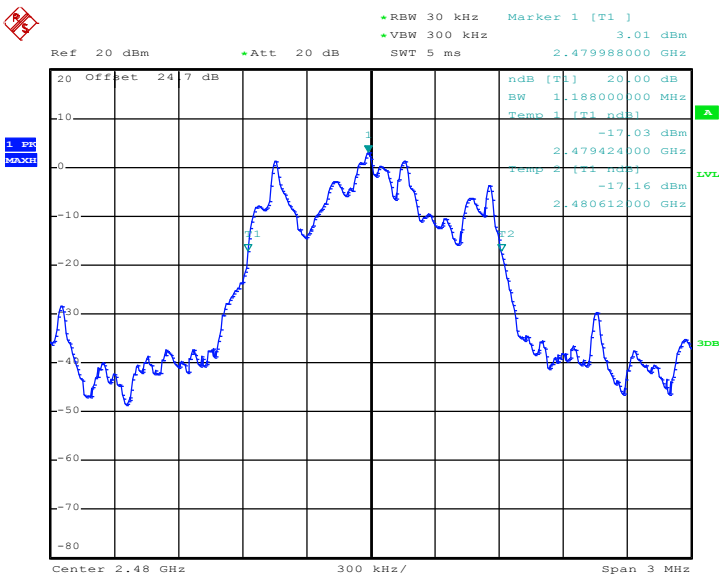
Date: 8.AUG.2013 19:07:30

20 dB Bandwidth Plot on Channel 39



Date: 8.AUG.2013 19:02:51

20 dB Bandwidth Plot on Channel 78



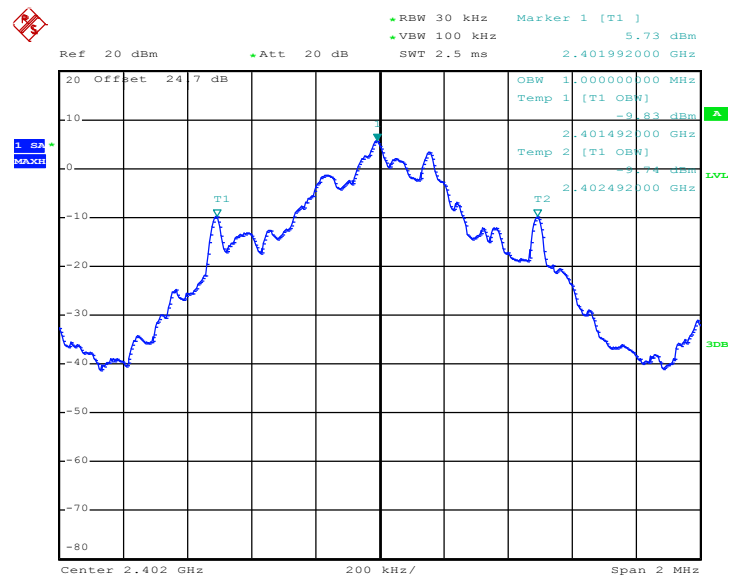
Date: 8.AUG.2013 18:57:56

3.4.6 Test Result of 99% Occupied Bandwidth

Test Mode :	1Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	48~51%

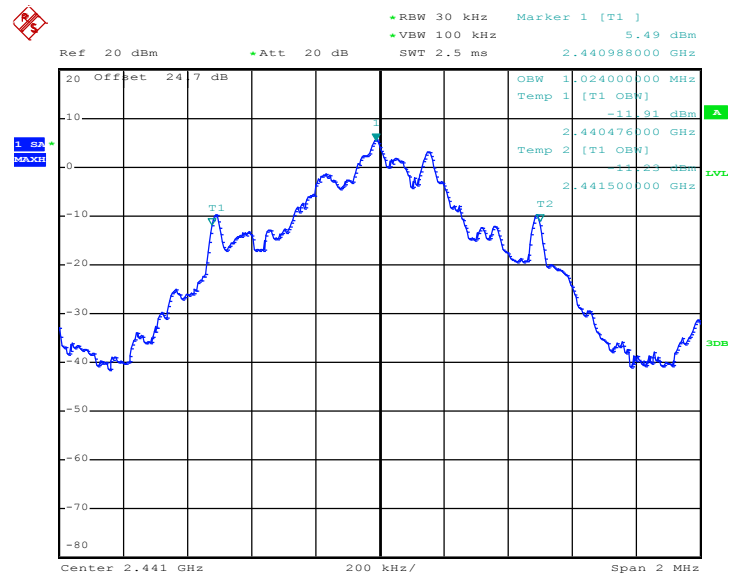
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	1.000
39	2441	1.024
78	2480	1.000

99% Occupied Bandwidth Plot on Channel 00



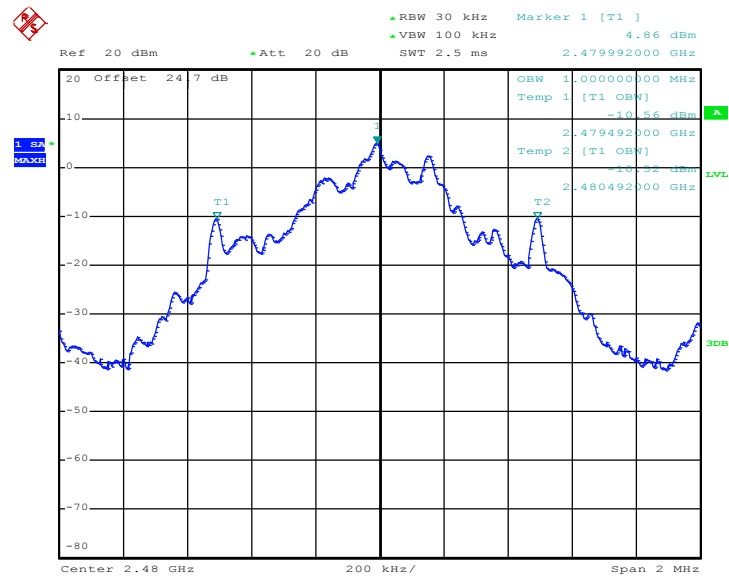
Date: 13.AUG.2013 19:34:12

99% Occupied Bandwidth Plot on Channel 39



Date: 13.AUG.2013 19:36:15

99% Occupied Bandwidth Plot on Channel 78

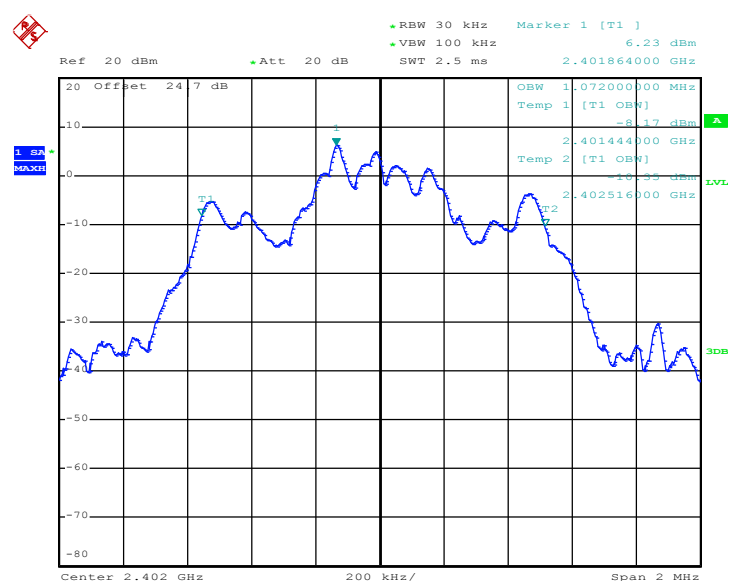


Date: 13.AUG.2013 19:39:09

Test Mode :	2Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	48~51%

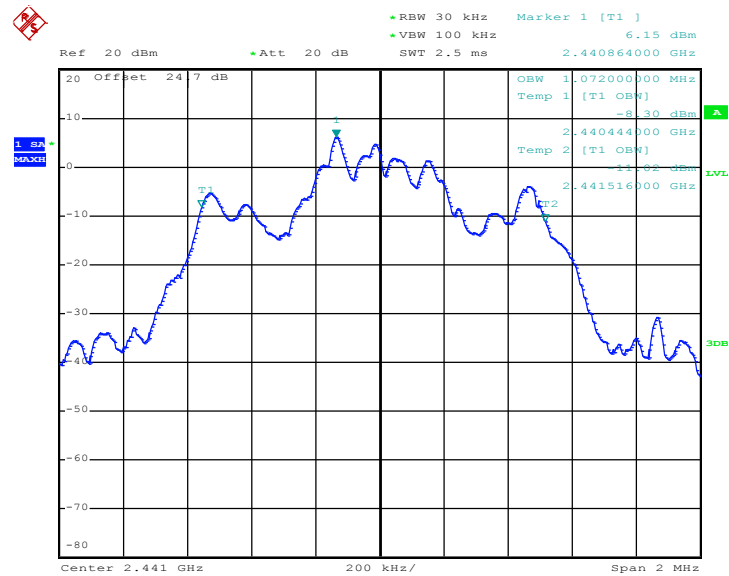
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	1.072
39	2441	1.072
78	2480	1.068

99% Occupied Bandwidth Plot on Channel 00



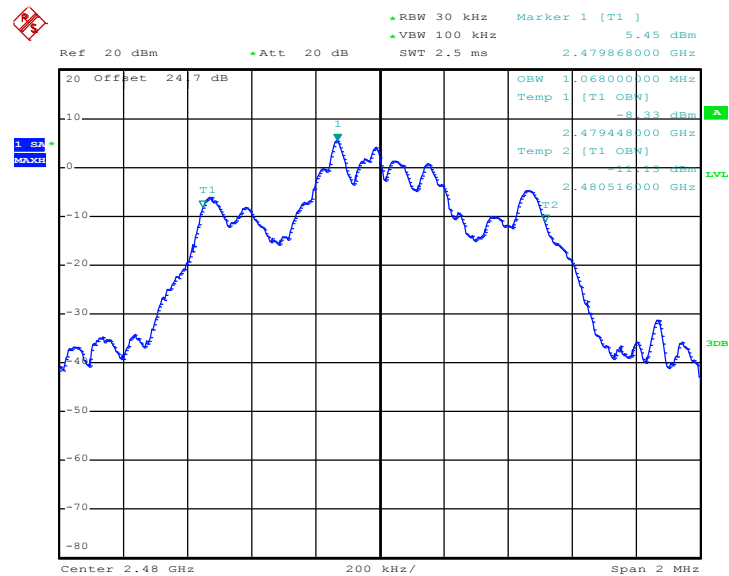
Date: 13.AUG.2013 19:48:37

99% Occupied Bandwidth Plot on Channel 39



Date: 13.AUG.2013 19:45:36

99% Occupied Bandwidth Plot on Channel 78

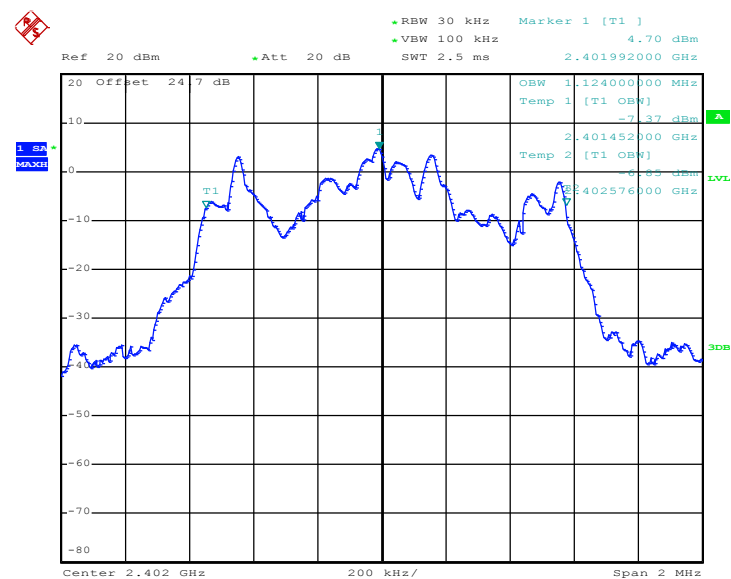


Date: 13.AUG.2013 19:42:34

Test Mode :	3Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	48~51%

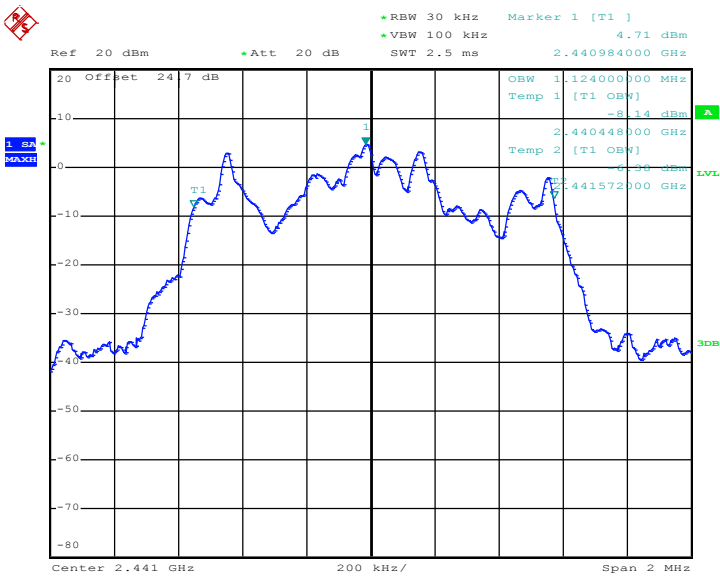
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	1.124
39	2441	1.124
78	2480	1.124

99% Occupied Bandwidth Plot on Channel 00



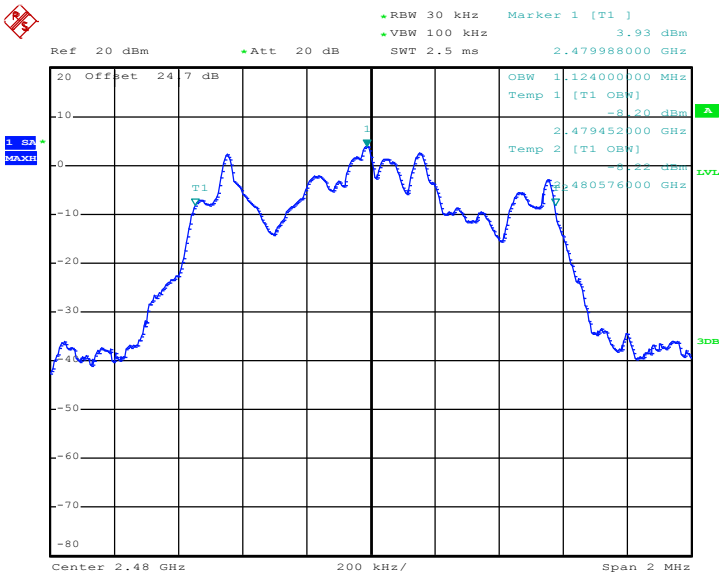
Date: 13.AUG.2013 19:50:58

99% Occupied Bandwidth Plot on Channel 39



Date: 13.AUG.2013 19:55:07

99% Occupied Bandwidth Plot on Channel 78



Date: 13.AUG.2013 19:58:30

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.

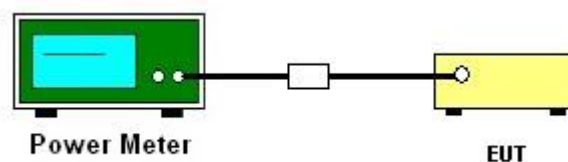
3.5.2 Measuring Instruments

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 power meter 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 :	48~51%

Channel	Frequency (MHz)	RF Power (dBm)		
		GFSK	Max. Limits (dBm)	Pass/Fail
		1 Mbps		
00	2402	6.0	20.97	Pass
39	2441	6.0	20.97	Pass
78	2480	5.0	20.97	Pass

Note:

1. For AFH mode using 20 hopping channels, the maximum output power limit is 20.97dBm.
2. For AFH mode, the power and other characteristics remain the same as 1Mbps data rate.

Test Mode :	2Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	48~51%

Channel	Frequency (MHz)	RF Power (dBm)		
		$\pi/4$ -DQPSK	Max. Limits (dBm)	Pass/Fail
		2 Mbps		
00	2402	7.2	20.97	Pass
39	2441	7.0	20.97	Pass
78	2480	6.2	20.97	Pass

Test Mode :	3Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	48~51%

Channel	Frequency (MHz)	RF Power (dBm)		
		8-DPSK	Max. Limits (dBm)	Pass/Fail
		3 Mbps		
00	2402	7.3	20.97	Pass
39	2441	7.2	20.97	Pass
78	2480	6.3	20.97	Pass

3.6 Conducted Band Edges Measurement

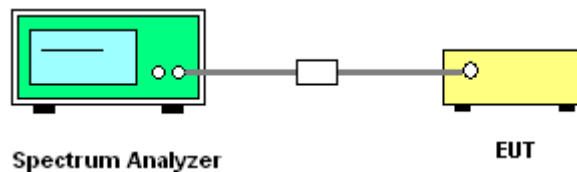
3.6.1 Measuring Instruments

See list of measuring instruments of this test report.

3.6.2 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 = 100kHz ($\geq 1\%$ span=10MHz), 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 100kHz 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.

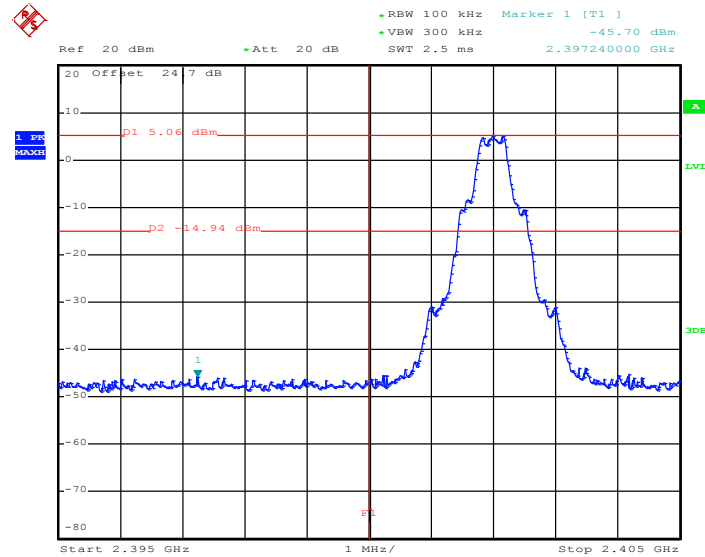
3.6.3 Test Setup



3.6.5 Test Result of Conducted Band Edges

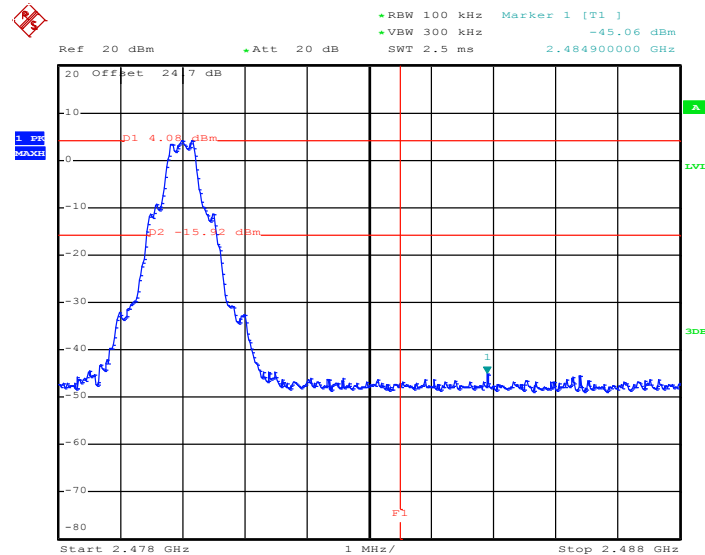
Test Mode :	1Mbps	Temperature :	24~26°C
Test Channel :	00 and 78	Relative Humidity :	48~51%
		Test Engineer :	Coyote Lin

Low Band Edge Plot on Channel 00



Date: 30.AUG.2013 16:49:44

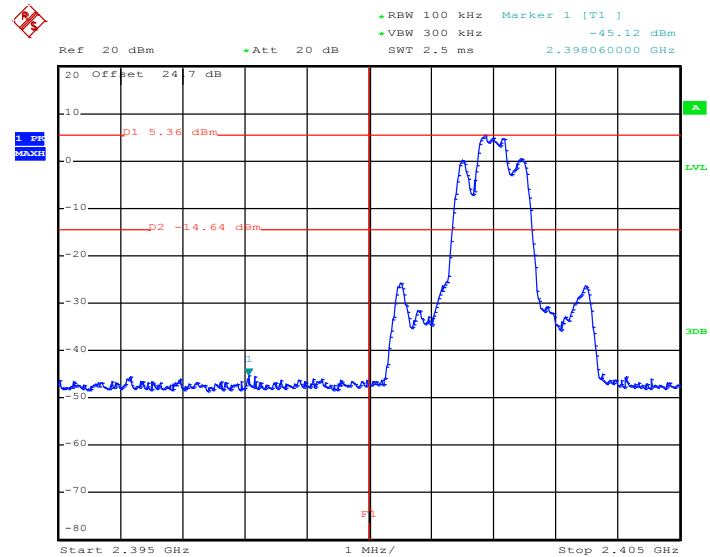
High Band Edge Plot on Channel 78



Date: 30.AUG.2013 16:52:31

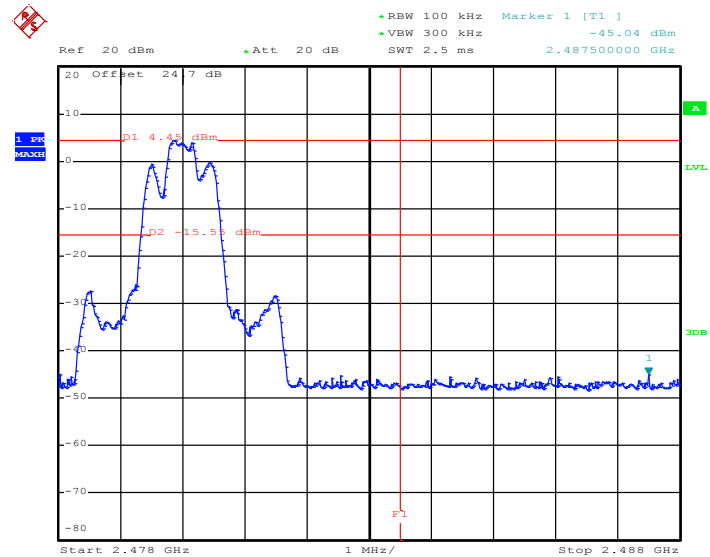
Test Mode :	2Mbps	Temperature :	24~26℃
Test Channel :	00 and 78	Relative Humidity :	48~51%
		Test Engineer :	Coyote Lin

Low Band Edge Plot on Channel 00



Date: 30.AUG.2013 18:26:30

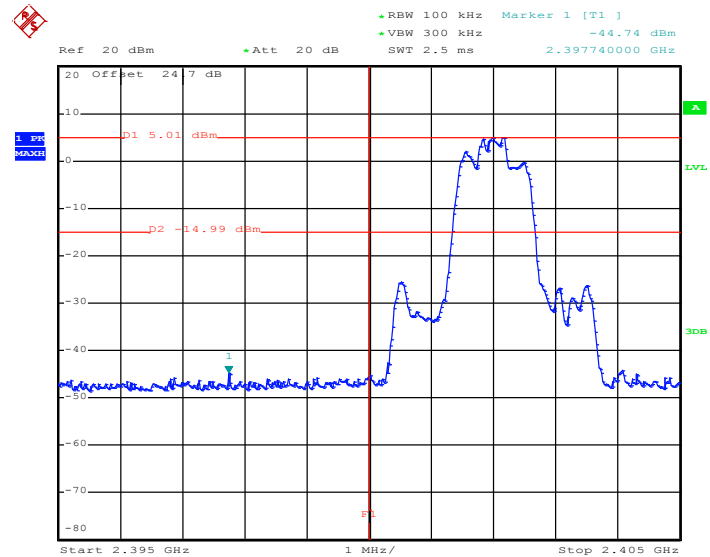
High Band Edge Plot on Channel 78



Date: 30.AUG.2013 16:55:19

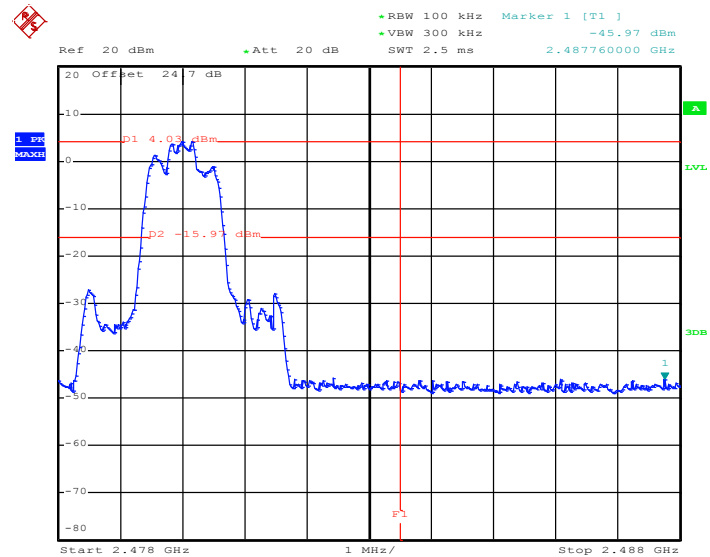
Test Mode :	3Mbps	Temperature :	24~26℃
Test Channel :	00 and 78	Relative Humidity :	48~51%
		Test Engineer :	Coyote Lin

Low Band Edge Plot on Channel 00



Date: 30.AUG.2013 17:03:07

High Band Edge Plot on Channel 78

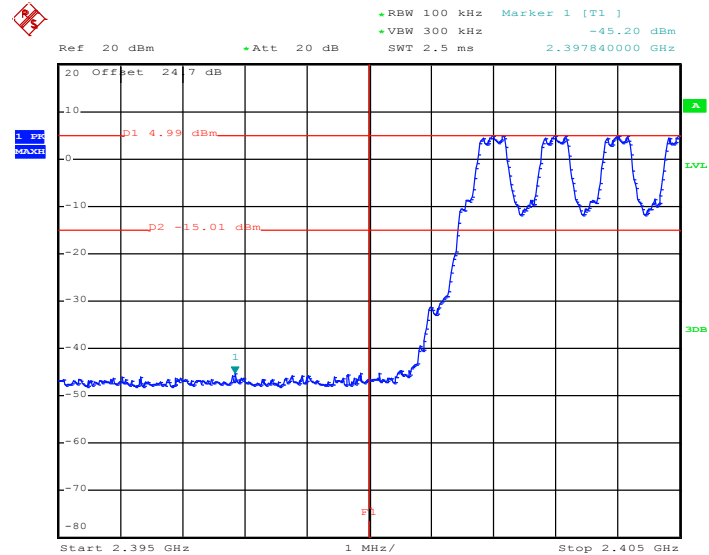


Date: 30.AUG.2013 17:06:10

3.6.6 Test Result of Conducted Hopping Mode Band Edges

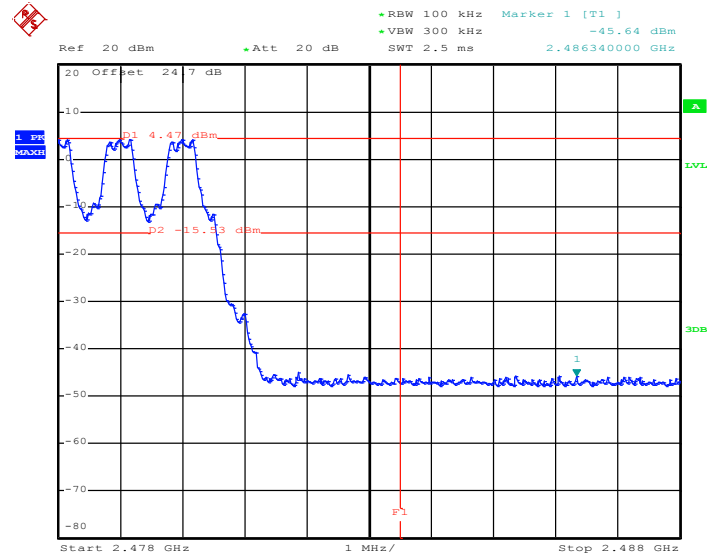
Test Mode :	1Mbps	Temperature :	24~26°C
Test Engineer :	Coyote Lin	Relative Humidity :	48~51%

1Mbps Hopping Mode Low Band Edge Plot



Date: 30.AUG.2013 17:48:18

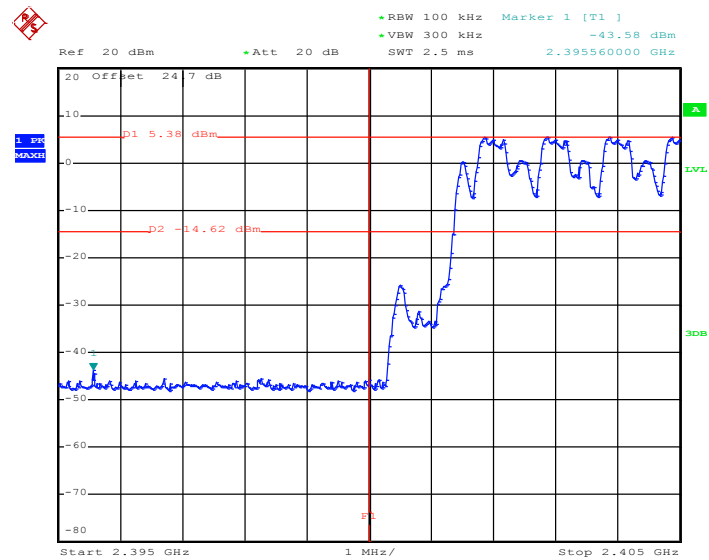
1Mbps Hopping Mode High Band Edge Plot



Date: 30.AUG.2013 17:44:37

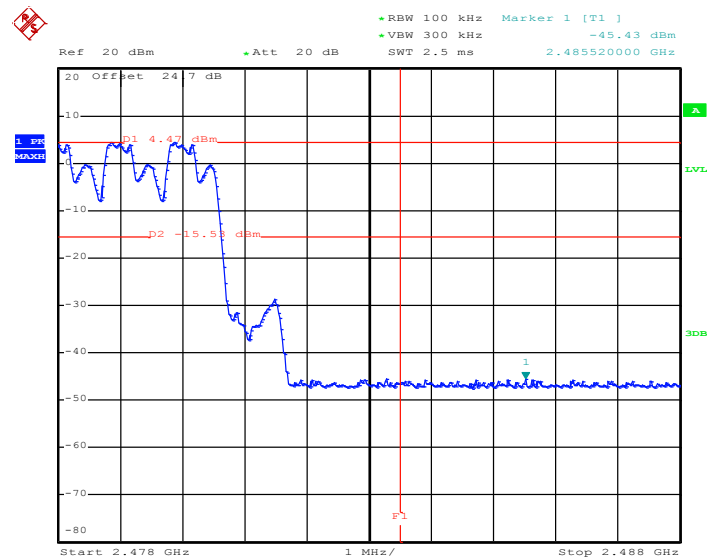
Test Mode :	2Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	48~51%

2Mbps Hopping Mode Low Band Edge Plot



Date: 30.AUG.2013 17:34:10

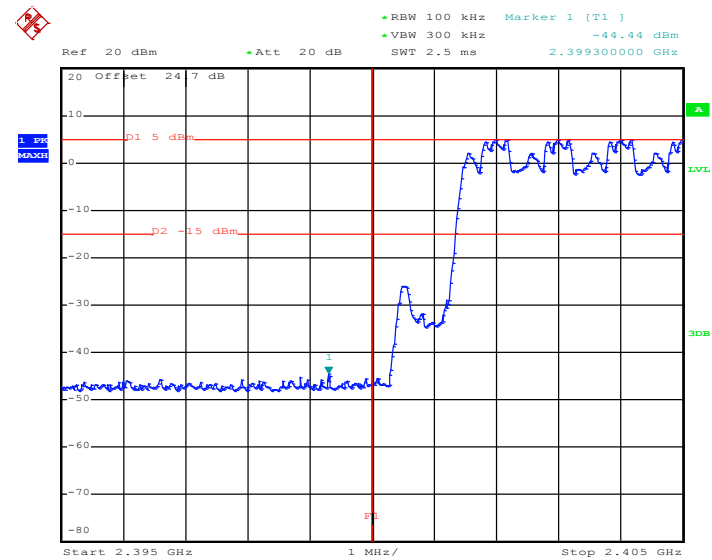
2Mbps Hopping Mode High Band Edge Plot



Date: 30.AUG.2013 17:41:02

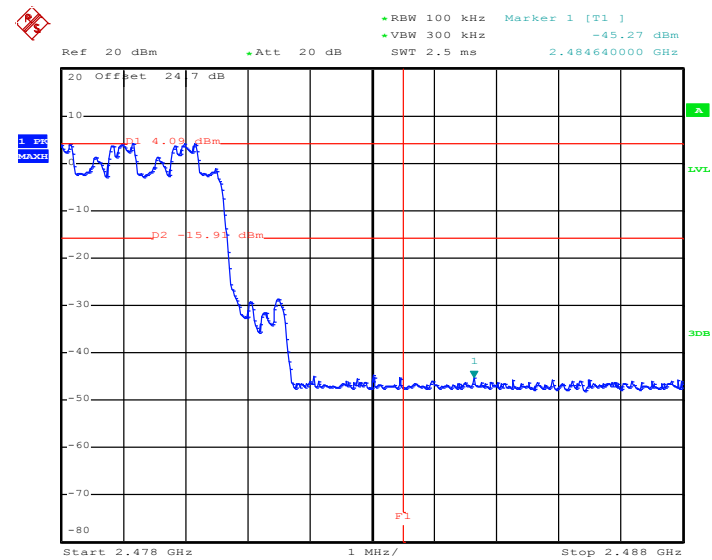
Test Mode :	3Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	48~51%

3Mbps Hopping Mode Low Band Edge Plot



Date: 30.AUG.2013 17:27:59

3Mbps Hopping Mode High Band Edge Plot



Date: 30.AUG.2013 17:24:49

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.

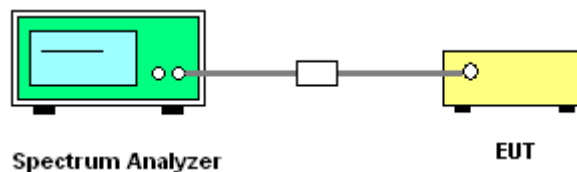
3.7.2 Measuring Instruments

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.

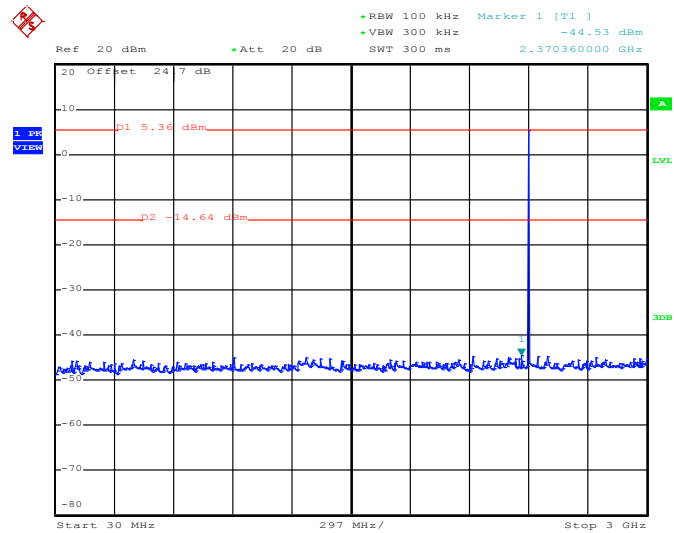
3.7.4 Test Setup



3.7.5 Test Result of Conducted Spurious Emission

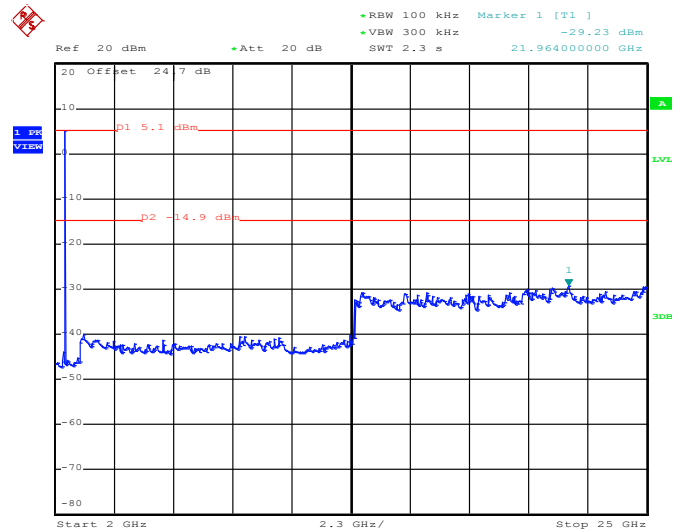
Test Mode :	1Mbps	Temperature :	24~26°C
Test Channel :	00	Relative Humidity :	48~51%
		Test Engineer :	Coyote Lin

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



Date: 9.AUG.2013 10:07:38

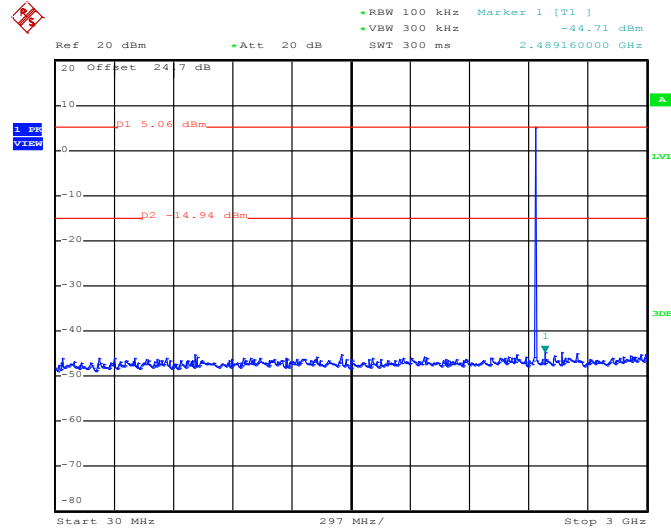
1Mbps CSE Plot on Ch 00 between 2 GHz ~ 25 GHz



Date: 9.AUG.2013 10:08:00

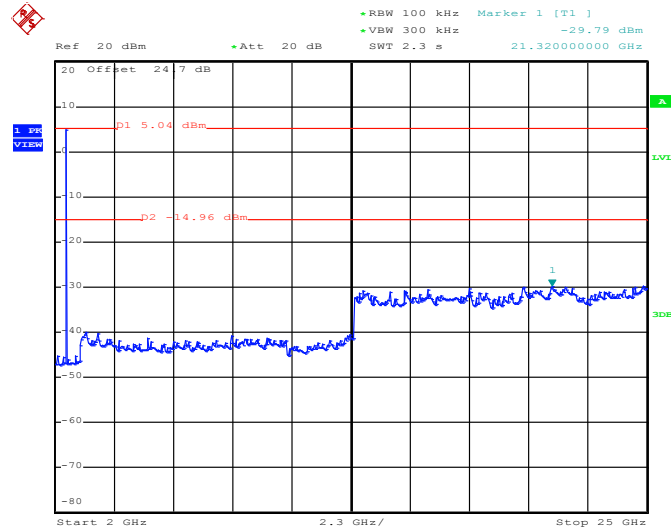
Test Mode :	1Mbps	Temperature :	24~26°C
Test Channel :	39	Relative Humidity :	48~51%
		Test Engineer :	Coyote Lin

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



Date: 9.AUG.2013 10:09:09

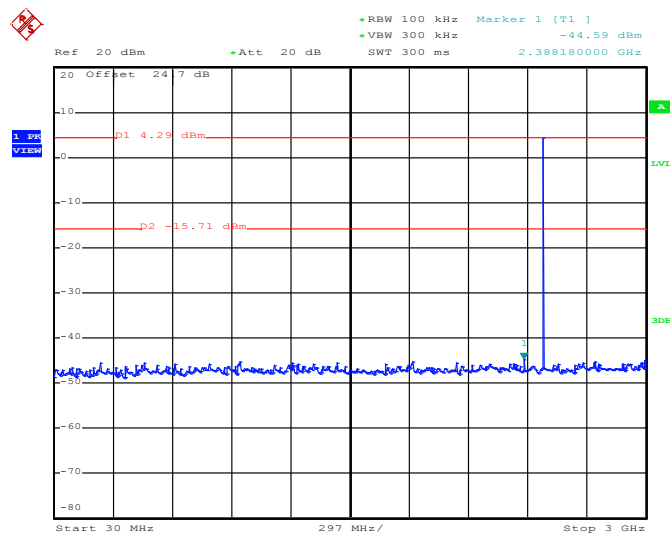
1Mbps CSE Plot on Ch 39 between 2 GHz ~ 25 GHz



Date: 9.AUG.2013 10:09:31

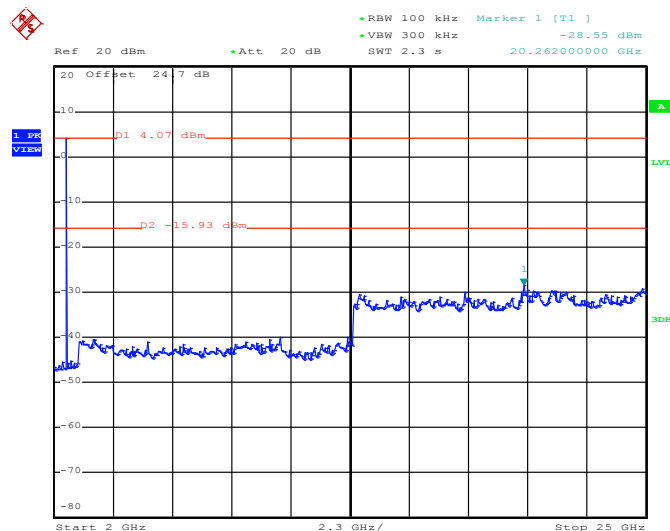
Test Mode :	1Mbps	Temperature :	24~26℃
Test Channel :	78	Relative Humidity :	48~51%
		Test Engineer :	Coyote Lin

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



Date: 9.AUG.2013 10:10:56

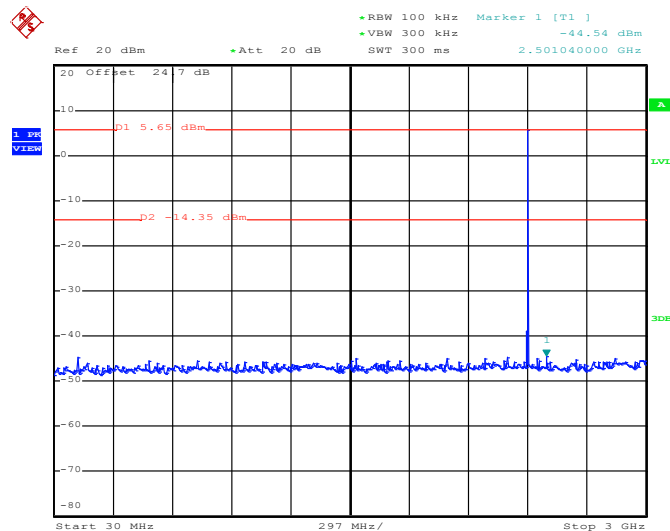
1Mbps CSE Plot on Ch 78 between 2 GHz ~ 25 GHz



Date: 9.AUG.2013 10:11:17

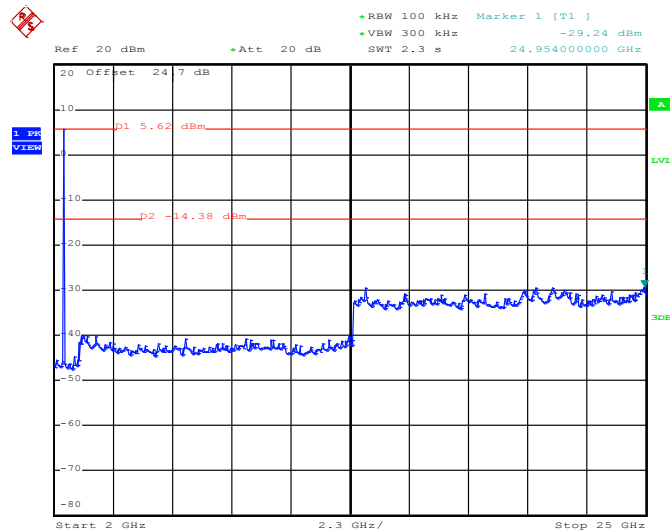
Test Mode :	2Mbps	Temperature :	24~26℃
Test Channel :	00	Relative Humidity :	48~51%
		Test Engineer :	Coyote Lin

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



Date: 9.AUG.2013 10:15:04

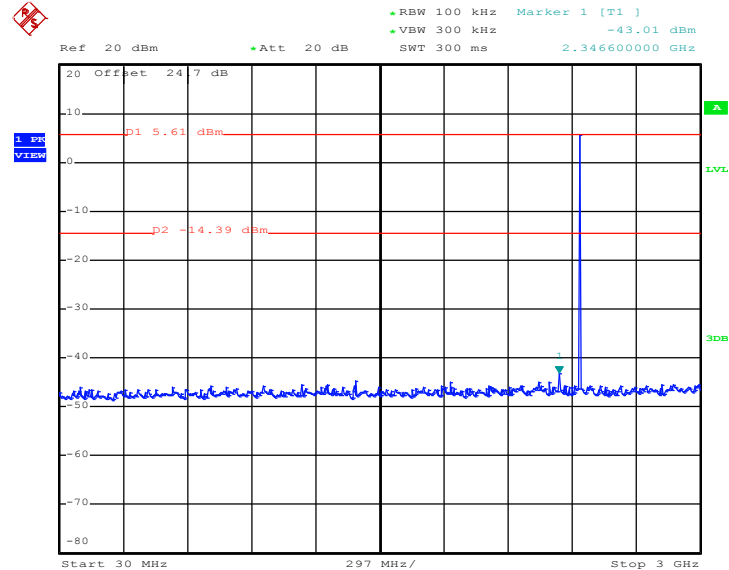
2Mbps CSE Plot on Ch 00 between 2 GHz ~ 25 GHz



Date: 9.AUG.2013 10:15:26

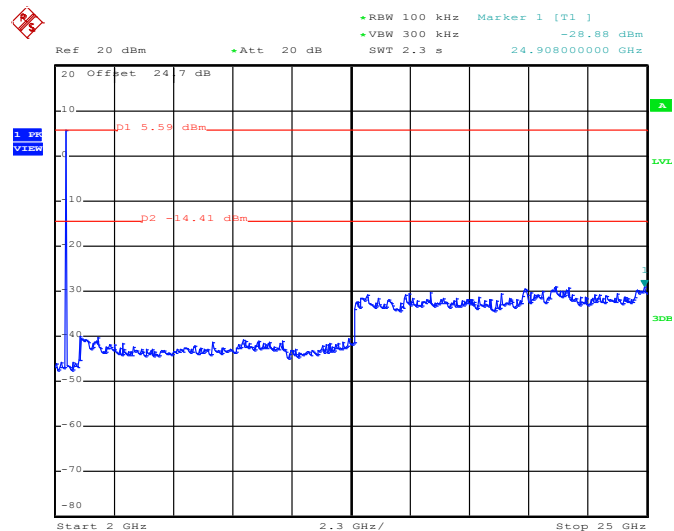
Test Mode :	2Mbps	Temperature :	24~26°C
Test Channel :	39	Relative Humidity :	48~51%
		Test Engineer :	Coyote Lin

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



Date: 9.AUG.2013 10:13:26

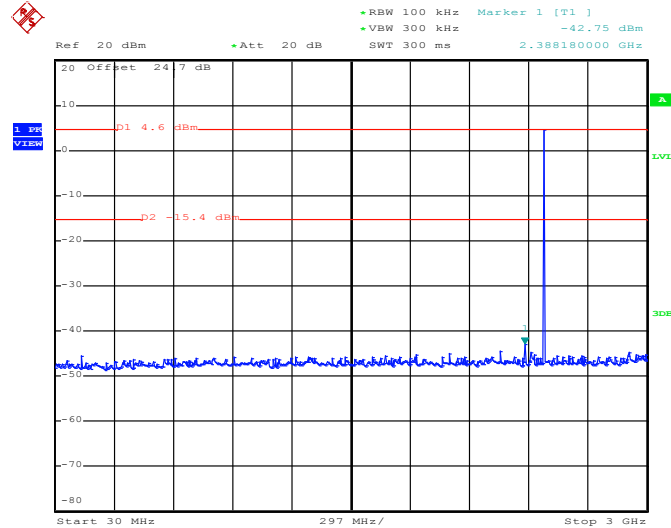
2Mbps CSE Plot on Ch 39 between 2 GHz ~ 25 GHz



Date: 9.AUG.2013 10:13:48

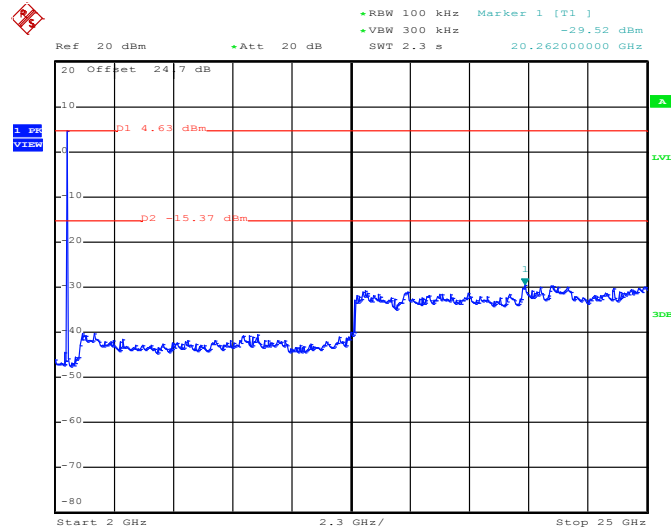
Test Mode :	2Mbps	Temperature :	24~26°C
Test Channel :	78	Relative Humidity :	48~51%
		Test Engineer :	Coyote Lin

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



Date: 9.AUG.2013 10:12:21

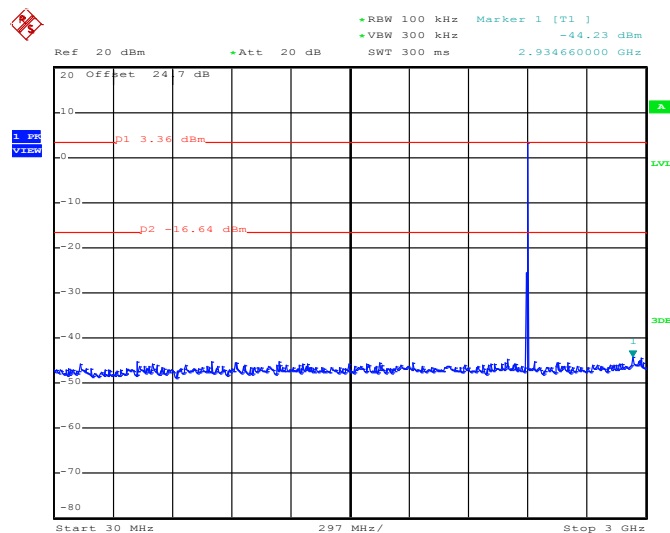
2Mbps CSE Plot on Ch 78 between 2 GHz ~ 25 GHz



Date: 9.AUG.2013 10:12:42

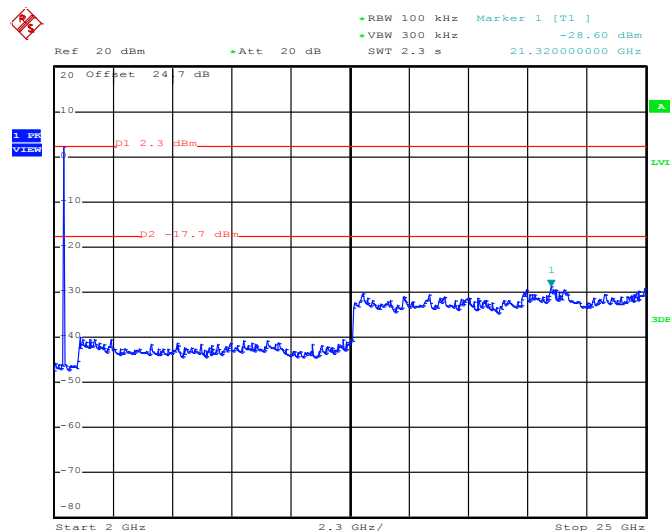
Test Mode :	3Mbps	Temperature :	24~26℃
Test Channel :	00	Relative Humidity :	48~51%
		Test Engineer :	Coyote Lin

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



Date: 8.AUG.2013 23:52:53

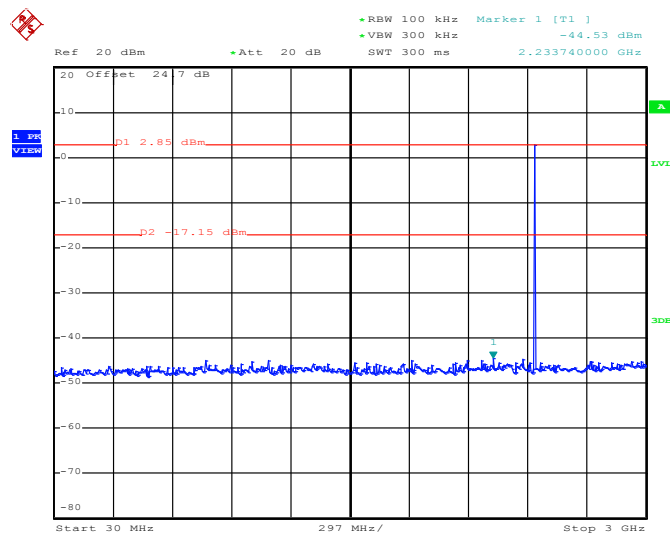
3Mbps CSE Plot on Ch 00 between 2 GHz ~ 25 GHz



Date: 8.AUG.2013 23:53:15

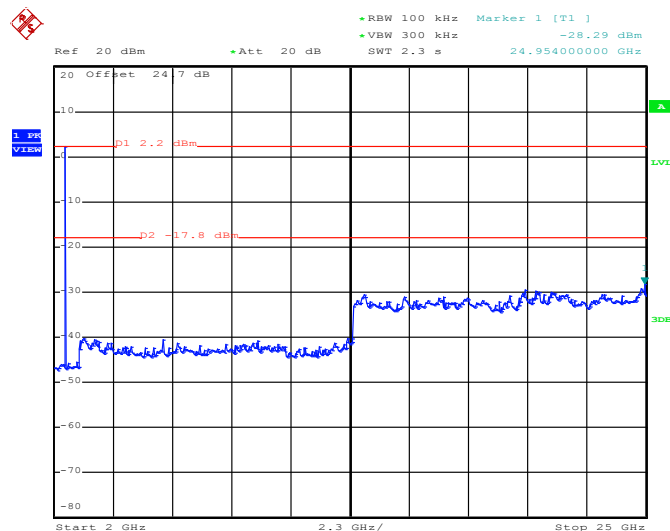
Test Mode :	3Mbps	Temperature :	24~26℃
Test Channel :	39	Relative Humidity :	48~51%
		Test Engineer :	Coyote Lin

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



Date: 8.AUG.2013 23:50:49

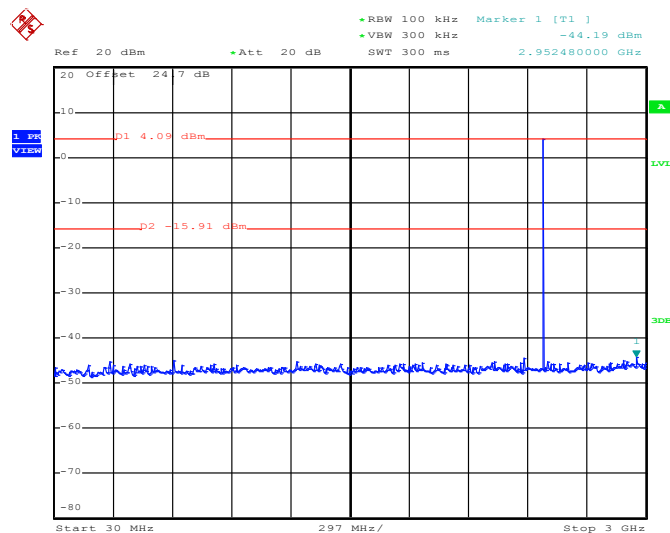
3Mbps CSE Plot on Ch 39 between 2 GHz ~ 25 GHz



Date: 8.AUG.2013 23:51:10

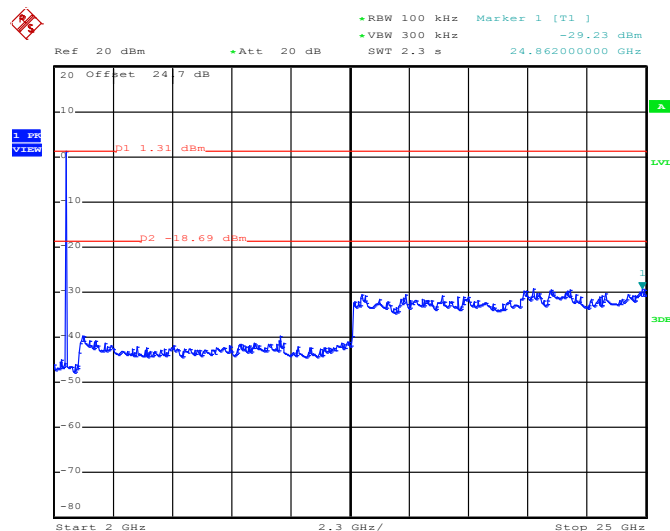
Test Mode :	3Mbps	Temperature :	24~26℃
Test Channel :	78	Relative Humidity :	48~51%
		Test Engineer :	Coyote Lin

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



Date: 8.AUG.2013 23:49:23

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



Date: 8.AUG.2013 23:49:45

3.8 AC Conducted Emission Measurement

3.8.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

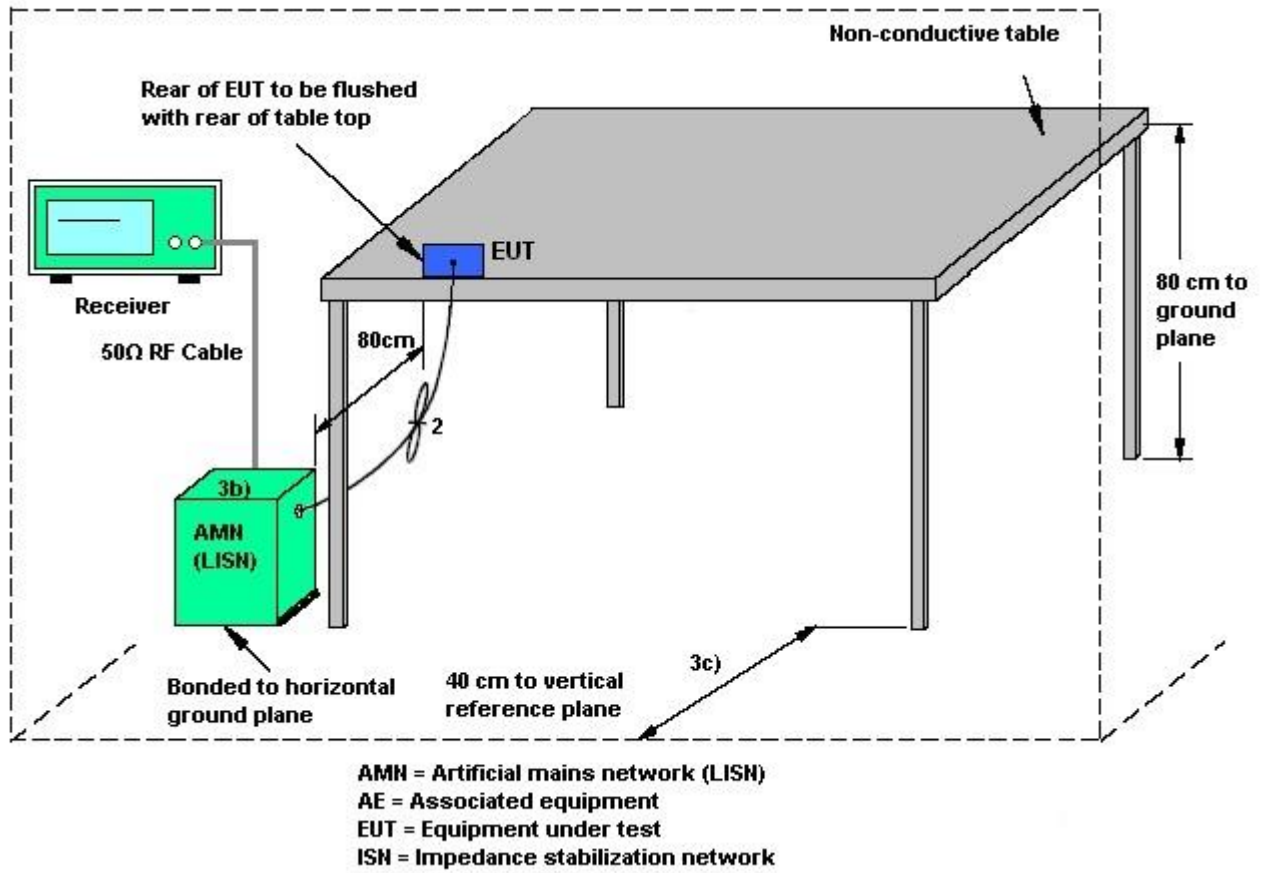
3.8.2 Measuring Instruments

See list of measuring instruments of this test report.

3.8.3 Test Procedures

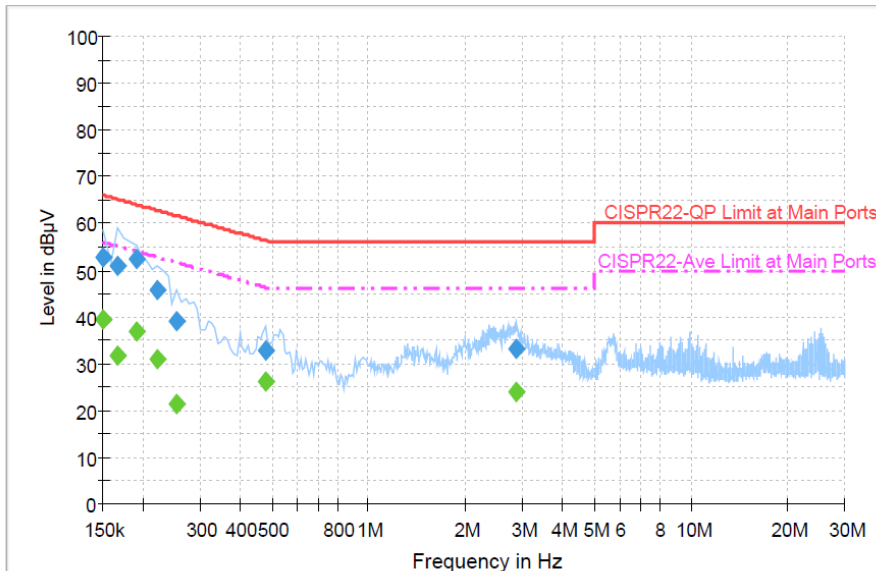
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.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

3.8.4 Test Setup



3.8.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	20~22℃
Test Engineer :	Kai-Chun Chu	Relative Humidity :	45~47%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN (2.4G) Link + Bluetooth Link + Earphone + USB Cable (Data Link with Notebook) + Camera		



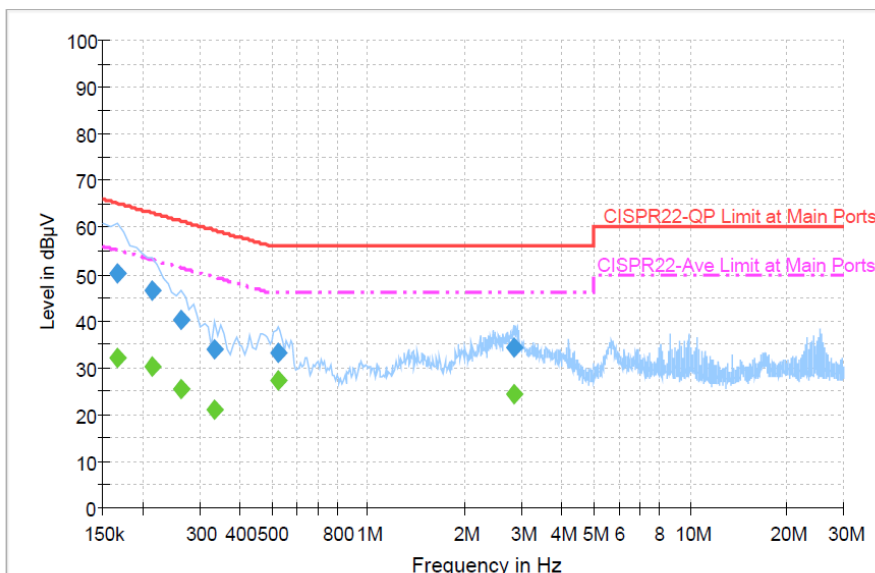
Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	52.6	Off	L1	19.4	13.4	66.0
0.166000	51.0	Off	L1	19.4	14.2	65.2
0.190000	52.5	Off	L1	19.4	11.5	64.0
0.222000	45.8	Off	L1	19.4	16.9	62.7
0.254000	39.1	Off	L1	19.5	22.5	61.6
0.478000	32.9	Off	L1	19.4	23.5	56.4
2.878000	33.3	Off	L1	19.6	22.7	56.0

Final Result : Average

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	39.4	Off	L1	19.4	16.6	56.0
0.166000	31.6	Off	L1	19.4	23.6	55.2
0.190000	37.0	Off	L1	19.4	17.0	54.0
0.222000	31.0	Off	L1	19.4	21.7	52.7
0.254000	21.4	Off	L1	19.5	30.2	51.6
0.478000	26.1	Off	L1	19.4	20.3	46.4
2.878000	23.9	Off	L1	19.6	22.1	46.0

Test Mode :	Mode 1	Temperature :	20~22℃
Test Engineer :	Kai-Chun Chu	Relative Humidity :	45~47%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN (2.4G) Link + Bluetooth Link + Earphone + USB Cable (Data Link with Notebook) + Camera		



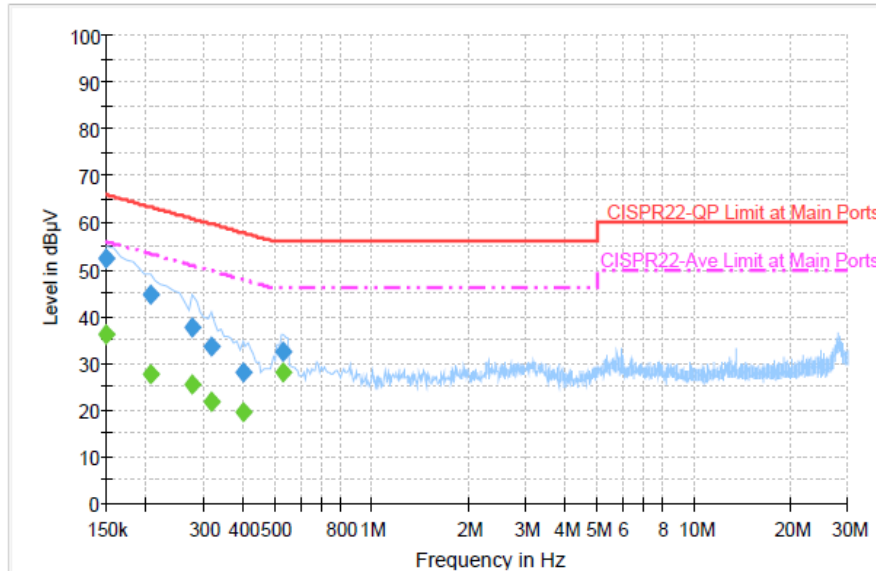
Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.166000	50.1	Off	N	19.4	15.1	65.2
0.214000	46.7	Off	N	19.4	16.3	63.0
0.262000	40.2	Off	N	19.4	21.2	61.4
0.334000	34.0	Off	N	19.4	25.4	59.4
0.526000	33.1	Off	N	19.4	22.9	56.0
2.822000	34.3	Off	N	19.6	21.7	56.0

Final Result : Average

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.166000	32.2	Off	N	19.4	23.0	55.2
0.214000	30.4	Off	N	19.4	22.6	53.0
0.262000	25.4	Off	N	19.4	26.0	51.4
0.334000	21.0	Off	N	19.4	28.4	49.4
0.526000	27.3	Off	N	19.4	18.7	46.0
2.822000	24.4	Off	N	19.6	21.6	46.0

Test Mode :	Mode 2	Temperature :	20~22℃
Test Engineer :	Kai-Chun Chu	Relative Humidity :	45~47%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN (5G) Link + Bluetooth Link + Earphone + USB Cable (Data Link with Notebook) + Camera		



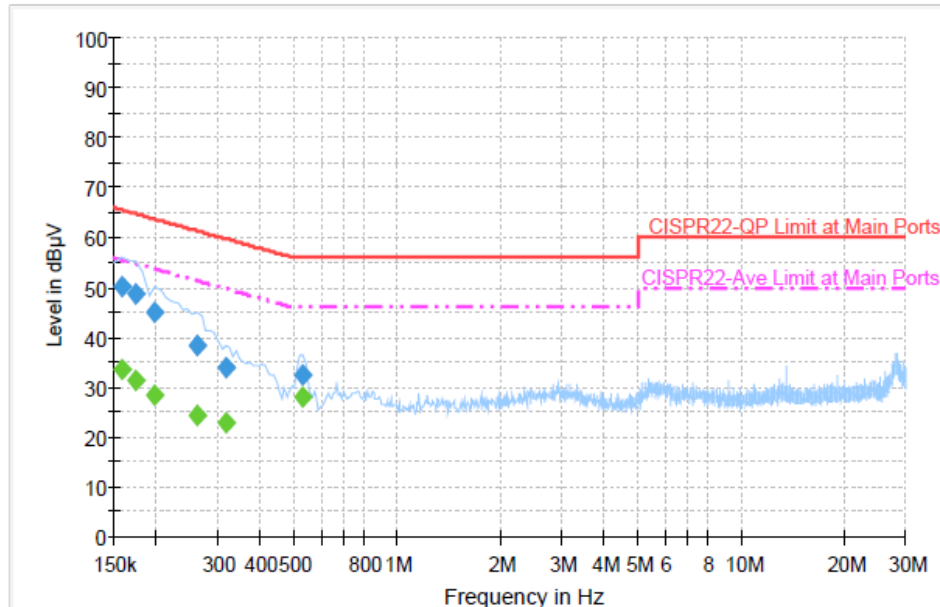
Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	52.4	Off	L1	19.4	13.6	66.0
0.206000	44.6	Off	L1	19.4	18.8	63.4
0.278000	37.5	Off	L1	19.3	23.4	60.9
0.318000	33.6	Off	L1	19.4	26.2	59.8
0.398000	28.0	Off	L1	19.5	29.9	57.9
0.534000	32.3	Off	L1	19.4	23.7	56.0

Final Result : Average

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	36.1	Off	L1	19.4	19.9	56.0
0.206000	27.7	Off	L1	19.4	25.7	53.4
0.278000	25.5	Off	L1	19.3	25.4	50.9
0.318000	21.7	Off	L1	19.4	28.1	49.8
0.398000	19.4	Off	L1	19.5	28.5	47.9
0.534000	27.9	Off	L1	19.4	18.1	46.0

Test Mode :	Mode 2	Temperature :	20~22℃
Test Engineer :	Kai-Chun Chu	Relative Humidity :	45~47%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN (5G) Link + Bluetooth Link + Earphone + USB Cable (Data Link with Notebook) + Camera		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.158000	50.2	Off	N	19.3	15.4	65.6
0.174000	48.7	Off	N	19.4	16.1	64.8
0.198000	44.8	Off	N	19.3	18.9	63.7
0.262000	38.4	Off	N	19.4	23.0	61.4
0.318000	33.8	Off	N	19.4	26.0	59.8
0.534000	32.6	Off	N	19.4	23.4	56.0

Final Result : Average

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.158000	33.4	Off	N	19.3	22.2	55.6
0.174000	31.5	Off	N	19.4	23.3	54.8
0.198000	28.4	Off	N	19.3	25.3	53.7
0.262000	24.2	Off	N	19.4	27.2	51.4
0.318000	22.8	Off	N	19.4	27.0	49.8
0.534000	27.9	Off	N	19.4	18.1	46.0

3.9 Antenna Requirements

3.9.1 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.

3.9.2 Antenna Connected Construction

Embedded in Antenna.

3.9.3 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	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Jun. 07, 2013	Aug. 05, 2013~ Aug. 30, 2013	Jun. 06, 2014	Conducted (TH02-HY)
Power Meter	Agilent	E4416A	GB412923 44	300MHz~40GHz	Feb. 05, 2013	Aug. 05, 2013~ Aug. 30, 2013	Feb. 04, 2014	Conducted (TH02-HY)
Power Sensor	Agilent	E9327A	US404415 48	300MHz~40GHz	Feb. 05, 2013	Aug. 05, 2013~ Aug. 30, 2013	Feb. 04, 2014	Conducted (TH02-HY)
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100356	9kHz ~ 2.75GHz	Nov. 13, 2012	Jun. 24, 2013~ Jul. 16, 2013	Nov. 12, 2013	Conduction (CO05-HY)
Two-LISN (for auxiliary equipment)	Rohde & Schwarz	ENV216	100081	9kHz ~ 30MHz	Dec. 12, 2012	Jun. 24, 2013~ Jul. 16, 2013	Dec. 11, 2013	Conduction (CO05-HY)
Two-LISN	Rohde & Schwarz	ENV216	100080	9kHz ~ 30MHz	Dec. 06, 2012	Jun. 24, 2013~ Jul. 16, 2013	Dec. 05, 2013	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	Jun. 24, 2013~ Jul. 16, 2013	N/A	Conduction (CO05-HY)

5 Uncertainty of Evaluation

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

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