FCC RF Test Report

APPLICANT	:	Motorola, Inc.
EQUIPMENT	:	Enterprise Smartphone
BRAND NAME	:	Motorola
MODEL NAME	:	ES405B
FCC ID	:	UZ7ES405B
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	Digital Spread Spectrum (DSS)

The product was received on Jan. 01, 2010 and completely tested on Feb. 25, 2010. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.4-2003 and shown the compliance with the applicable technical standards.

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

Reviewed by:

Roy Wu / 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
FR010103A	Rev. 01	Initial issue of report	Mar. 18, 2010

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(1)	A8.4(2)	Number of Channels	≥ 15Chs	Pass	-
3.2	15.247(a)(1)	A8.1(a)	20dB Bandwidth	NA	Pass	-
3.2	-	Gen 4.4.1	99% Bandwidth	-	Pass	-
3.3	15.247(a)(1)	A8.1(b)	Channel Separation	≥ 2/3 of 20dB BW	Pass	-
3.4	15.247(a)(1)	A8.1(d)	Dwell Time of Each Channel	≤ 0.4sec in 31.6sec period	Pass	-
3.5	15.247(b)(1)	A8.1(b)	Peak Output Power	≤ 1W	Pass	-
3.6	15.247(d)	A8.5	Frequency Band Edges	≤ 20dBc	Pass	-
3.7	15.247(d)	A8.5	Spurious Emission	< 20 dBc	Pass	-
3.8	15.207	Gen 7.2.2	AC Conducted Emission	15.207(a)	Pass	Under limit 6.7 dB at 0.318 MHz
3.9	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 6.09 dB at 2483.50 MHz
3.10	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

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

1.2 Manufacturer

Inventec Appliances Corp.
No. 37, Wugong 5th Road, Wugu industrial Park, Taipei County 248, Taiwan

1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	Enterprise Smartphone
Brand Name	Motorola
Model Name	ES405B
FCC ID	UZ7ES405B
Tx/Rx Frequency Range	2400 MHz ~ 2483.5 MHz
Number of Channels	79
Carrier Frequency of Each Channel	2402+n*1 MHz; n=0~78
Channel Spacing	1 MHz
Maximum Output Power to Antenna	Bluetooth (1Mbps) : 0.04 dBm (1.01 mW) Bluetooth EDR (2Mbps) : 2.27 dBm (1.69 mW) Bluetooth EDR (3Mbps) : 2.54 dBm (1.79 mW)
Antenna Type	PIFA Antenna with gain 0.4 dBi
HW Version	EVT2
SW Version	BSP2410
Type of Modulation	Bluetooth (1Mbps) : GFSK Bluetooth EDR (2Mbps) : π /4-DQPSK Bluetooth EDR (3Mbps) : 8-DPSK
EUT Stage	Identical Prototype

Remark:

1. For other wireless features of this EUT, test report will be issued separately.
2. This test report recorded only product characteristics and test results of Digital Spread Spectrum (DSS).
3. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Testing Site

Test Site	SPORTON INTERNATIONAL INC.		
Test Site Location	No. 52, Hwa Ya 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.
	CO05-HY	03CH07-HY	TW1022/4086B-1

1.5 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC Public Notice DA 00-705
- ANSI C63.4-2003
- IC RSS-210 Issue 7

Remark:

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

1.6 Ancillary Equipment List

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Agilent	8960	N/A	N/A	Unshielded, 1.8 m
2.	GPS Station	T&E	GS-50	N/A	N/A	Unshielded, 1.8 m
3.	Bluetooth Base Station	R&S	CBT32	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	Lenovo	6135-AB1	FCC DoC	Shielded, 1.6 m	Unshielded, 1.8 m
7.	Bluetooth Earphone	Nokia	BH-102	PYAHS-107W	N/A	N/A
8.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A

2 Test Configuration of Equipment Under Test

2.1 RF Output Power

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

Channel	Frequency	Bluetooth RF Output Power		
		Data Rate / Modulation		
		GFSK	π /4-DQPSK	8-DPSK
		1Mbps	2Mbps	3Mbps
Ch00	2402MHz	-0.57 dBm	1.65 dBm	1.93 dBm
Ch39	2441MHz	-0.38 dBm	1.85 dBm	2.15 dBm
Ch78	2480MHz	0.04 dBm	2.27 dBm	**2.54 dBm**

Remark:

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

2.2 Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction (150 kHz to 30 MHz), radiation (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

Pre-scanned tests were conducted to determine the final configuration from all possible combinations. The following tables are showing the test modes as the worst cases and recorded in this report.

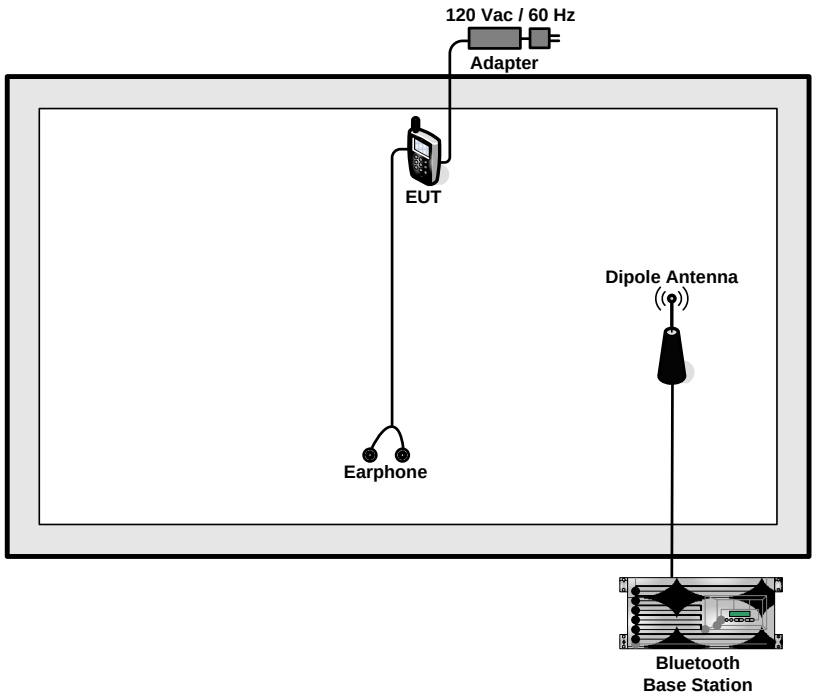
Test Cases			
Test Item	**Data Rate / Modulation**		
	Bluetooth 1Mbps GFSK	**Bluetooth EDR 2Mbps π /4-DQPSK**	**Bluetooth EDR 3Mbps 8-DPSK**
Conducted TCs	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz	Mode 4: CH00_2402 MHz Mode 5: CH39_2441 MHz Mode 6: CH78_2480 MHz	Mode 7: CH00_2402 MHz Mode 8: CH39_2441 MHz Mode 9: CH78_2480 MHz
Radiated TCs	N/A	N/A	Mode 1: CH00_2402 MHz + Battery <3080mAh> Mode 2: CH39_2441 MHz + Battery <3080mAh> Mode 3: CH78_2480 MHz + Battery <3080mAh> Mode 4: CH78_2480 MHz + Battery <1540mAh>
AC Conducted Emission	Mode 1 : GSM 850 Idle + WLAN Link (2.4G) + Bluetooth Link + GPS Rx + USB Cable (Charging from Adapter) + Battery <3080mAh> + Earphone + MP3 + Cradle Mode 2 : WCDMA Band V Idle + WLAN Link (2.4G) + Bluetooth Link + GPS Rx + USB Cable (Link with Notebook) + Battery <3080mAh> + Earphone + Camera + Cradle Mode 3 : CDMA2000 BC0 Idle + WLAN Link (2.4G) + Bluetooth Link + GPS Rx + USB Cable (Link with Notebook) + Battery <1540mAh> + Earphone + Camera + Cradle		

Remark:

1. For radiated TCs, the data rate was set in 3Mbps due to the highest RF output power; only the data of these modes was reported, and the test was performed together with USB Cable (Charging from Adapter) and Earphone.
2. “Bluetooth Link” stands for terminal linked to headset by Bluetooth function.
3. ”WLAN Link” stands for terminal associated with AP at 2.4GHz band.
4. ”GPS Rx” stands for receive signals from GPS station continuously.
5. ”MP3” stands for playing MP3 file.
6. ”Camera” stands for playing camera to capture picture.
7. “USB Link” stands for Activesync RNDIS file transfer.

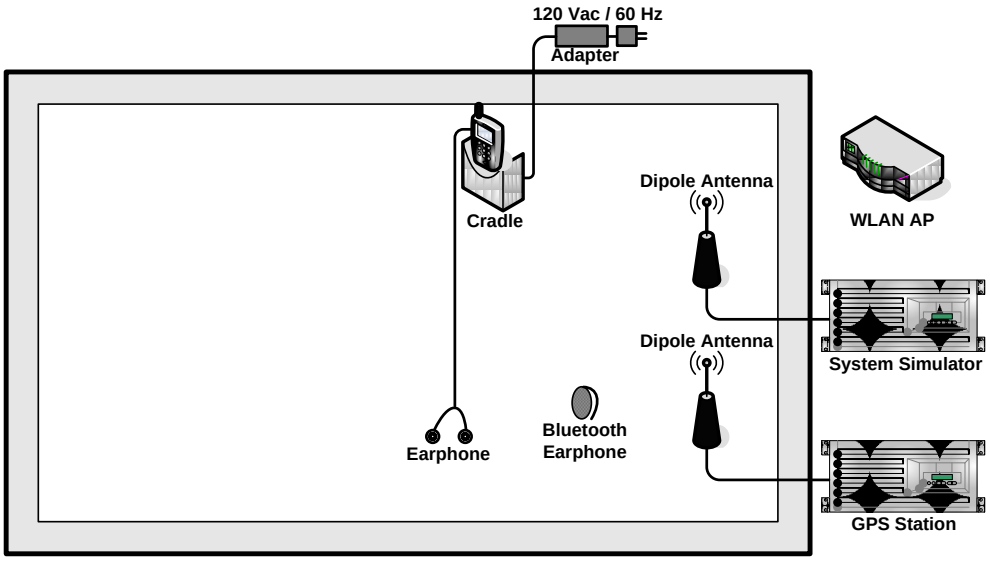
2.3 Connection Diagram of Test System

<Radiation Test>

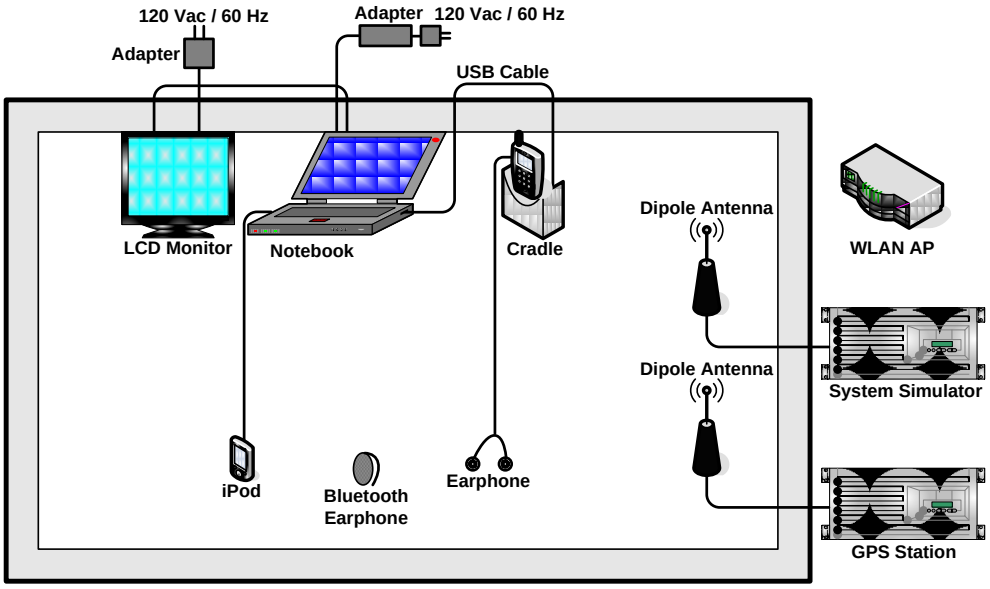


<Conduction Test>

EUT with Adapter Mode



EUT with USB Cable (Link with Notebook) Mode



2.4 RF Utility

For Bluetooth function, the RF utility, “PHM RegEdit” was installed in EUT which was programmed in order to make the EUT contact with Bluetooth base station for transmitting and receiving signals continuously.

3 Test Result

3.1 Number of Channel Measurement

3.1.1 Limits of Number of Hopping Frequency

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

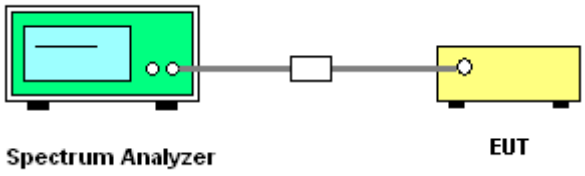
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedure

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. The modulation types of EUT are irrelevant to number of hopping channels deviation.
4. The EUT must have its hopping function enabled. Use the following spectrum analyzer settings: Span = the frequency band of operation; RBW ≥ 1% of the span; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
5. The number of hopping frequency used is defined as the device has the numbers of total channel.

3.1.4 Test Setup

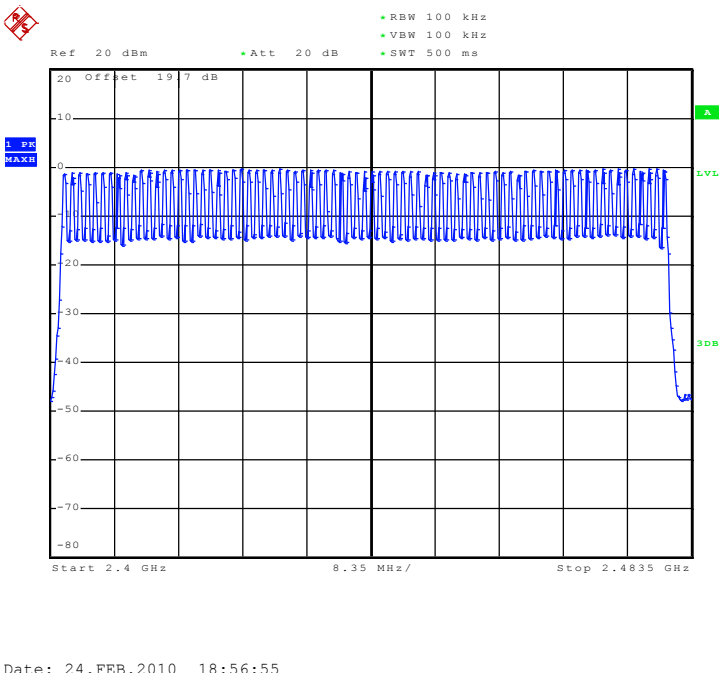


3.1.5 Test Result of Number of Hopping Frequency

Test Mode :	Mode 1~3	Temperature :	25~27℃
Test Engineer :	Ken Hsu	Relative Humidity :	43~45%

Number of Hopping Channels (Channel)	Limits (Channel)	Pass/Fail
79	> 15	Pass

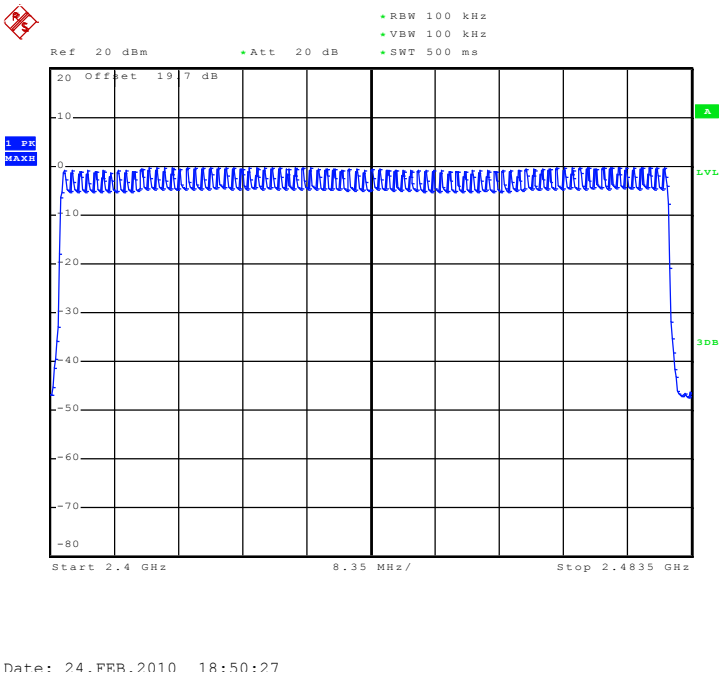
Number of Hopping Channel Plot on Channel 00 - 78



Test Mode :	Mode 4~6	Temperature :	25~27℃
Test Engineer :	Ken Hsu	Relative Humidity :	43~45%

Number of Hopping Channels (Channel)	Limits (Channel)	Pass/Fail
79	> 15	Pass

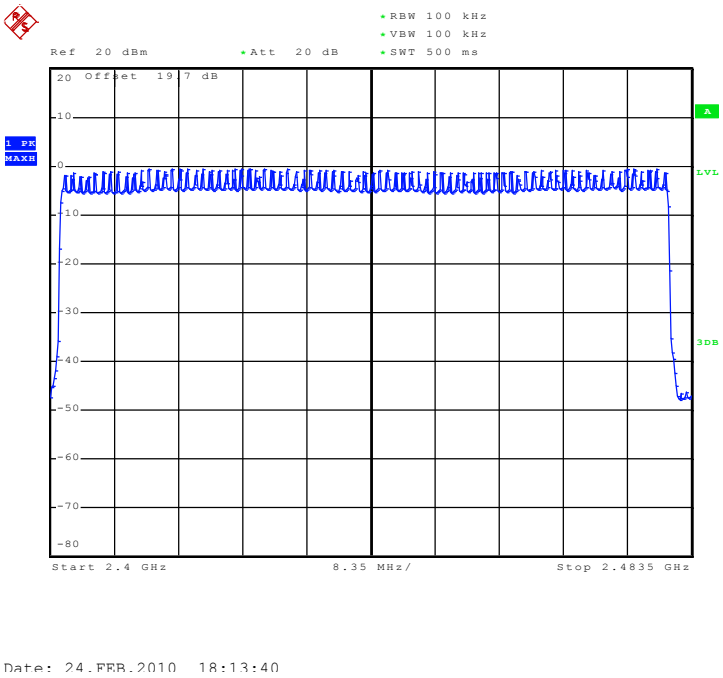
Number of Hopping Channel Plot on Channel 00 - 78



Test Mode :	Mode 7~9	Temperature :	25~27℃
Test Engineer :	Ken Hsu	Relative Humidity :	43~45%

Number of Hopping Channels (Channel)	Limits (Channel)	Pass/Fail
79	> 15	Pass

Number of Hopping Channel Plot on Channel 00 - 78



3.2 20dB and 99% Bandwidth Measurement

3.2.1 Limit of 20dB Bandwidth

N/A

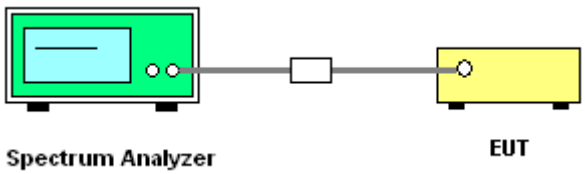
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. The EUT should be transmitting at its maximum data rate as the worst cases.
4. Use the following spectrum analyzer settings:
   Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel;
   RBW ≥ 1% of the 20 dB bandwidth; VBW ≥ RBW; Sweep = auto; Detector function = peak;
   Trace = max hold.
5. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

3.2.4 Test Setup

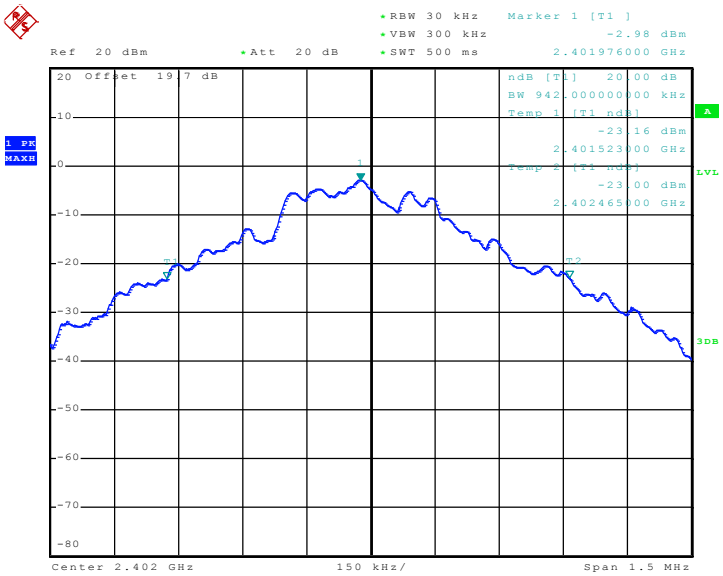


3.2.5 Test Result of 20dB Bandwidth

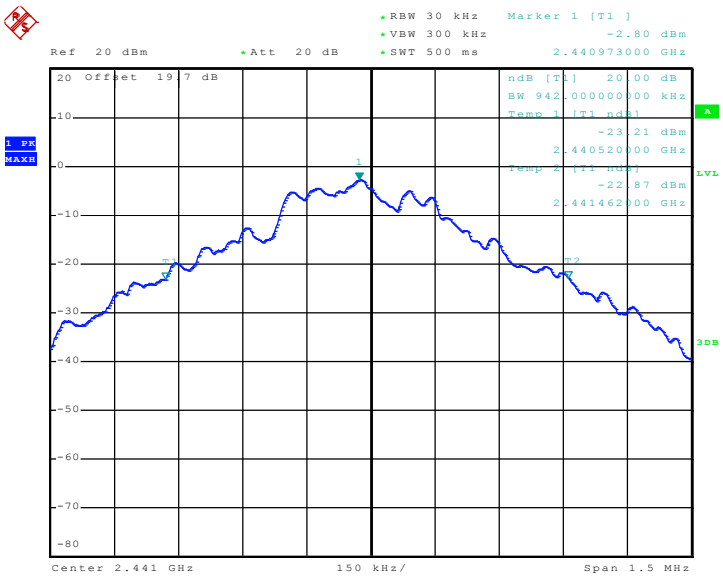
Test Mode :	Mode 1, 2, 3	Temperature :	25~27℃
Test Engineer :	Ken Hsu	Relative Humidity :	43~45%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	0.942
39	2441	0.942
78	2480	0.936

20 dB Bandwidth Plot on Channel 00



20 dB Bandwidth Plot on Channel 39



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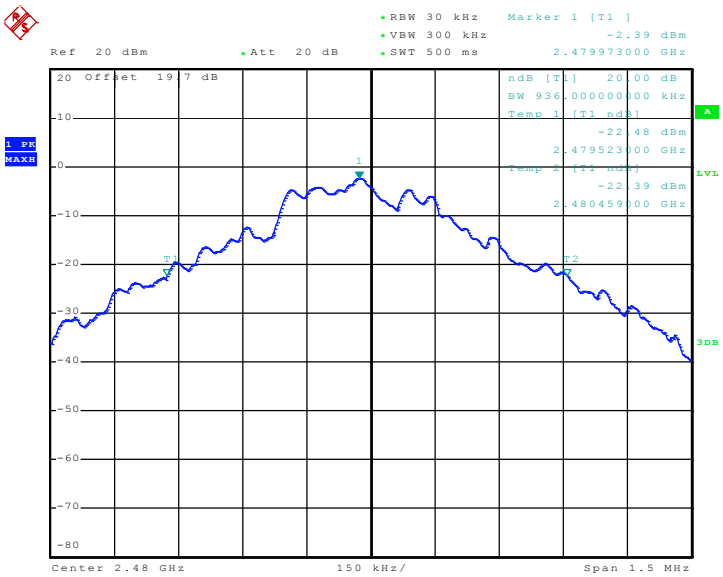
20 dB Bandwidth Plot on Channel 78



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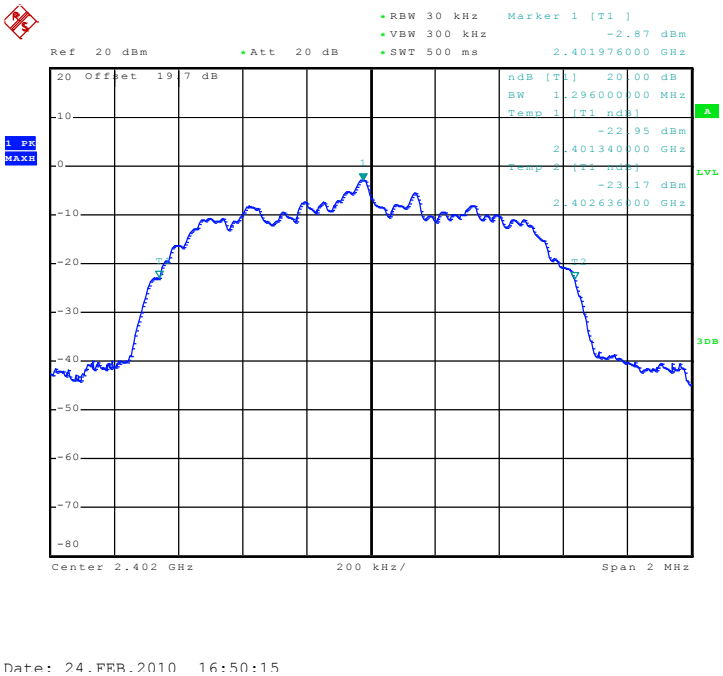
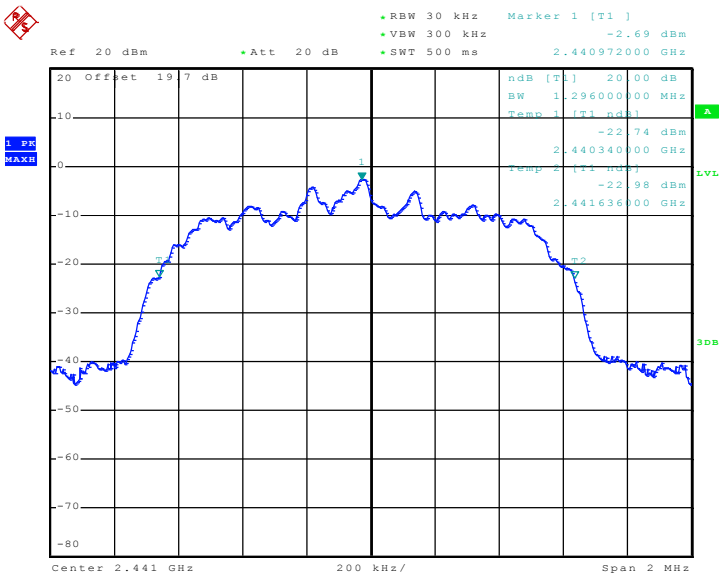
Test Mode :	Mode 4, 5, 6	Temperature :	25~27℃
Test Engineer :	Ken Hsu	Relative Humidity :	43~45%

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

20 dB Bandwidth Plot on Channel 00



20 dB Bandwidth Plot on Channel 39



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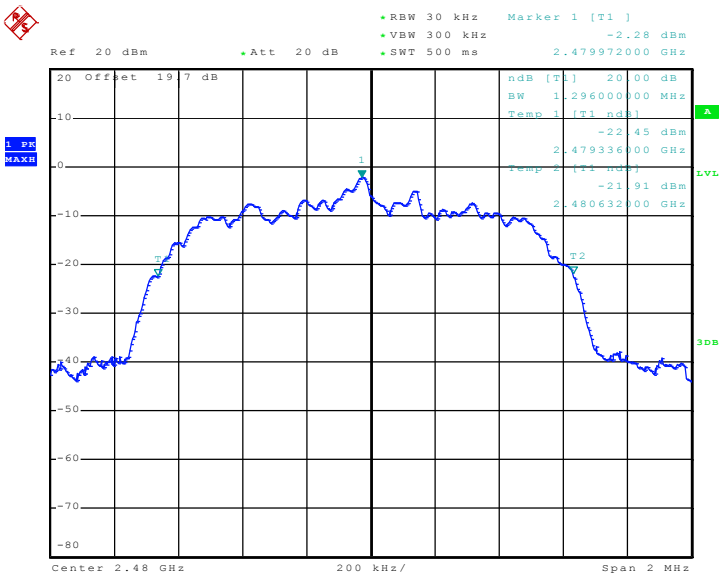
20 dB Bandwidth Plot on Channel 78



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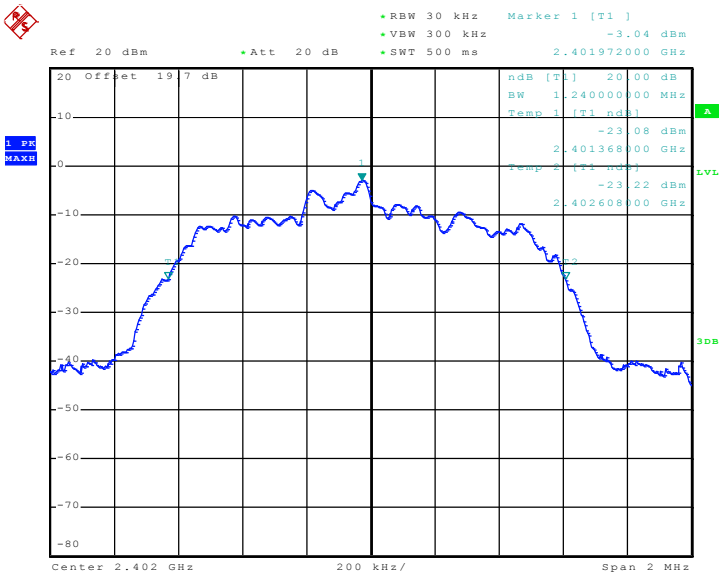
Test Mode :	Mode 7, 8, 9	Temperature :	25~27℃
Test Engineer :	Ken Hsu	Relative Humidity :	43~45%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.240
39	2441	1.236
78	2480	1.240

20 dB Bandwidth Plot on Channel 00



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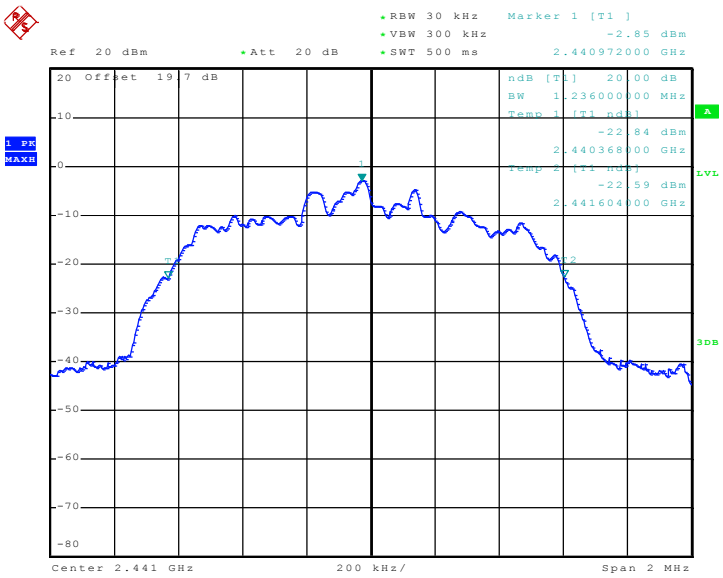
20 dB Bandwidth Plot on Channel 39



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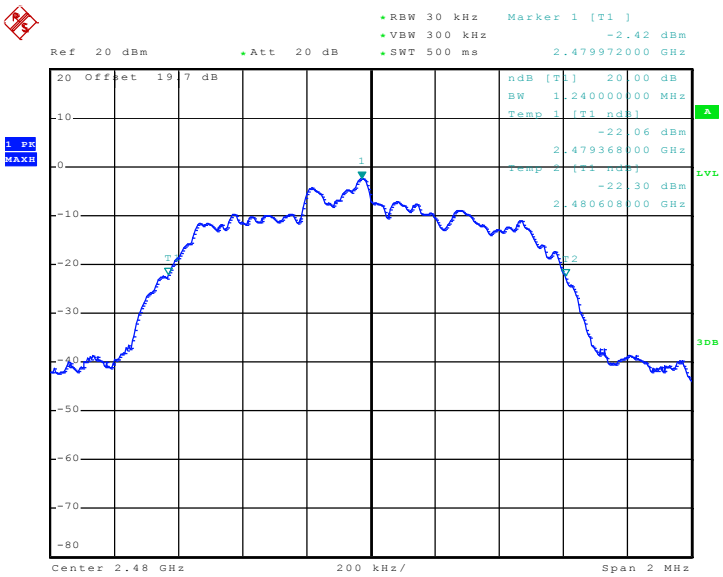
20 dB Bandwidth Plot on Channel 78



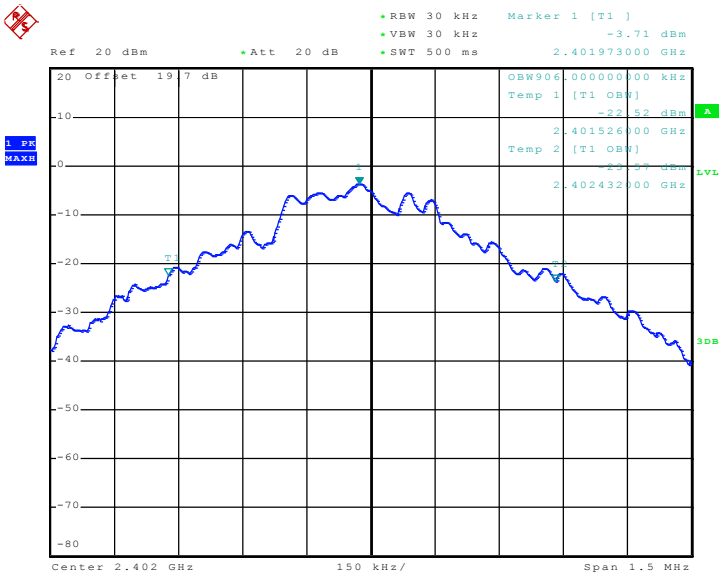
Date: 24.FEB.2010 16:52:40

3.2.6 Test Result of 99% Occupied Bandwidth

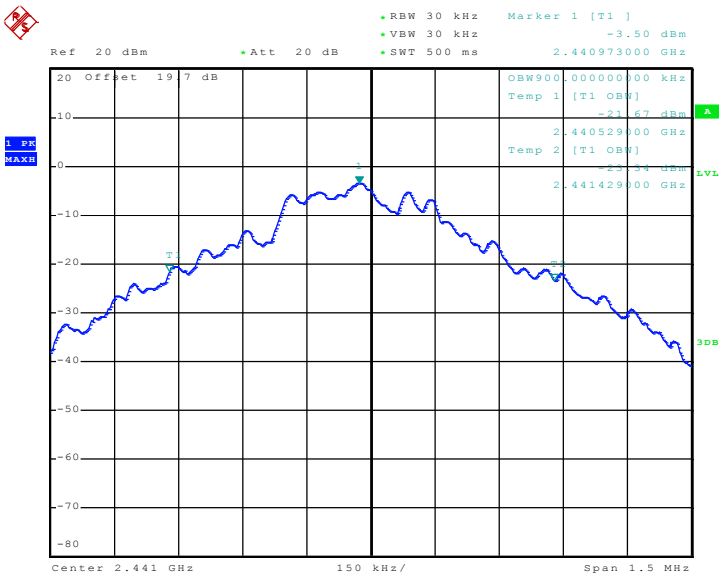
Test Mode :	Mode 1, 2, 3	Temperature :	25~27℃
Test Engineer :	Ken Hsu	Relative Humidity :	43~45%

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	0.906
39	2441	0.900
78	2480	0.900

99% Bandwidth Plot on Channel 00



99% Occupied Bandwidth Plot on Channel 39



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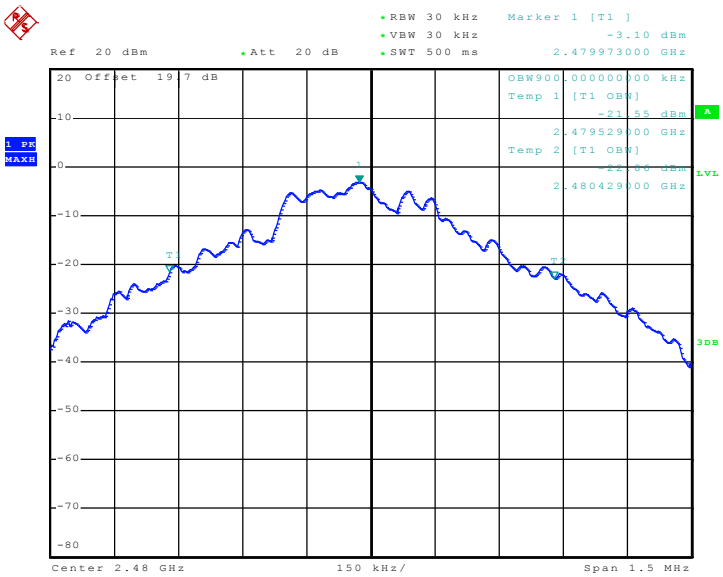
99% Occupied Bandwidth Plot on Channel 78

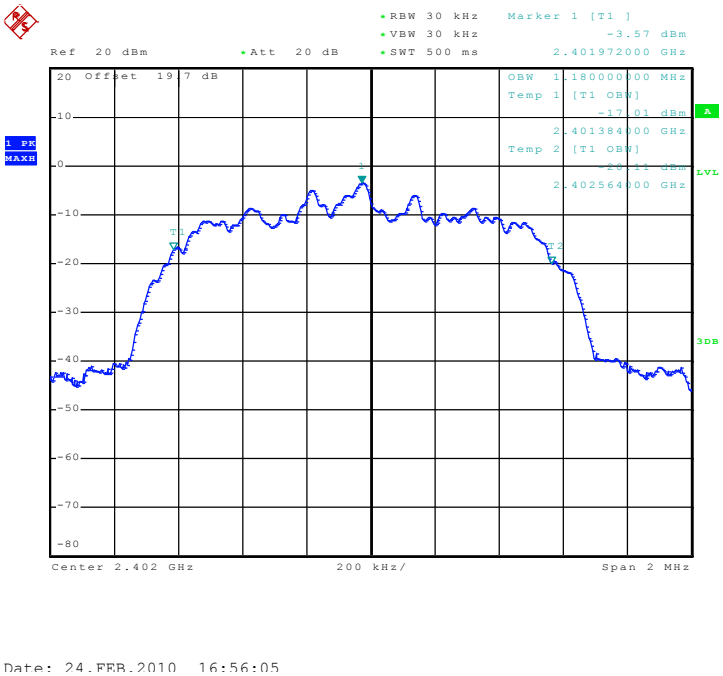


Date: 24.FEB.2010 16:55:03

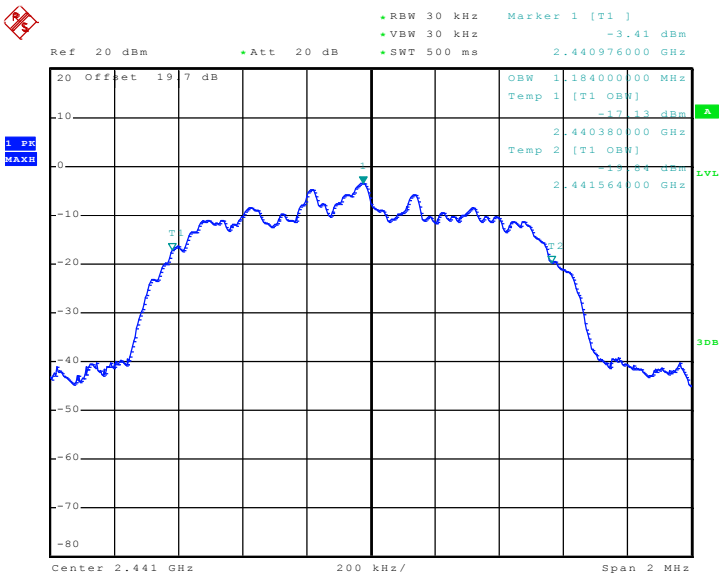
Test Mode :	Mode 4, 5, 6	Temperature :	25~27℃
Test Engineer :	Ken Hsu	Relative Humidity :	43~45%

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	1.180
39	2441	1.184
78	2480	1.188

99% Bandwidth Plot on Channel 00



99% Occupied Bandwidth Plot on Channel 39



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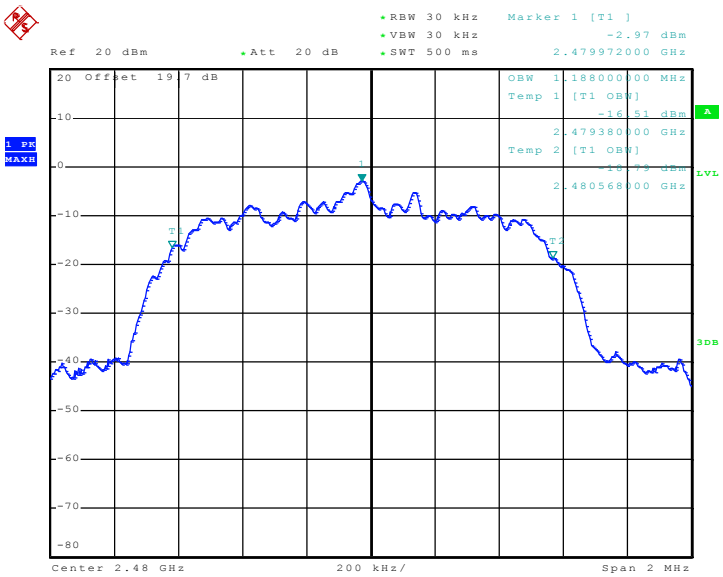
99% Occupied Bandwidth Plot on Channel 78

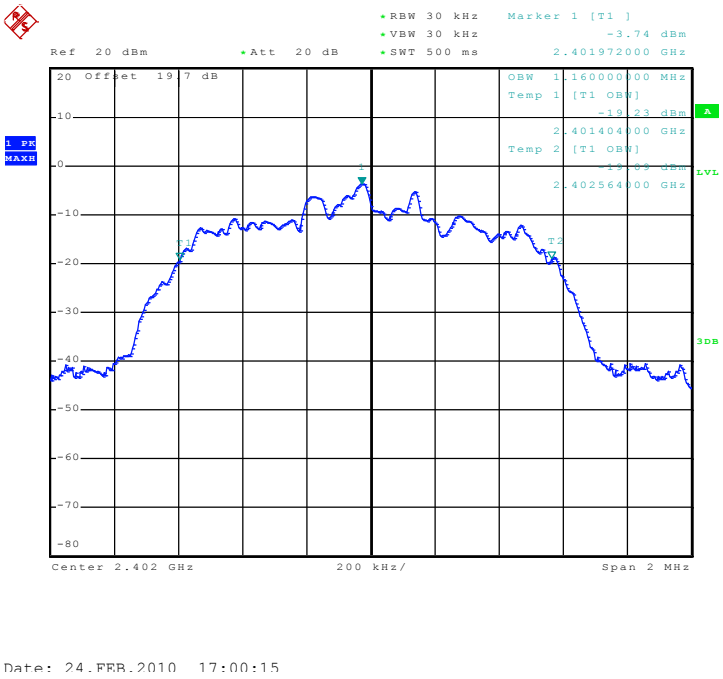


Date: 24.FEB.2010 16:58:07

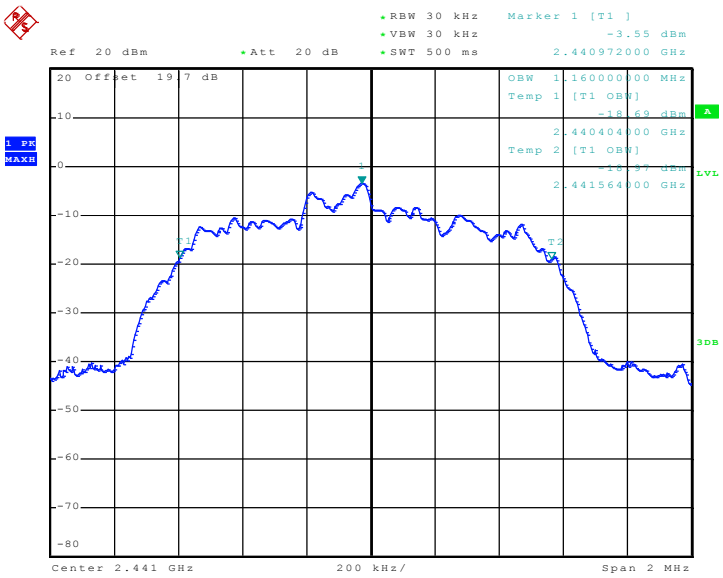
Test Mode :	Mode 7, 8, 9	Temperature :	25~27℃
Test Engineer :	Ken Hsu	Relative Humidity :	43~45%

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

99% Bandwidth Plot on Channel 00



99% Occupied Bandwidth Plot on Channel 39



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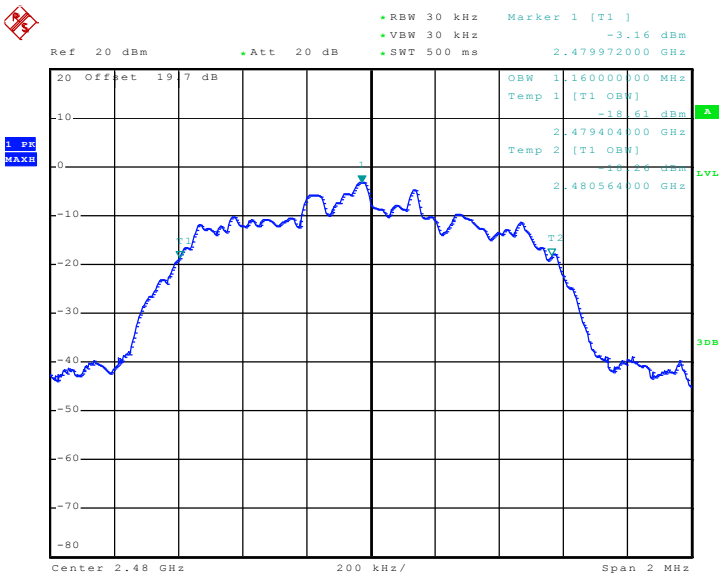
99% Occupied Bandwidth Plot on Channel 78



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3.3 Hopping Channel Separation Measurement

3.3.1 Limit of Hopping Channel Separation

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. Please refer FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. The EUT should be transmitting at its maximum data rate as the worst cases.
4. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels; RBW ≥ 1% of the span; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
5. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

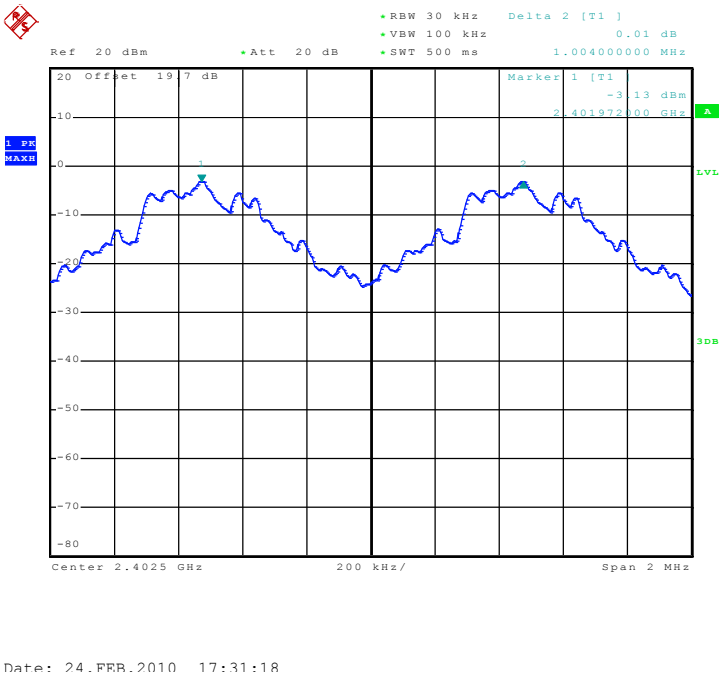
3.3.4 Test Setup

3.3.5 Test Result of Hopping Channel Separation

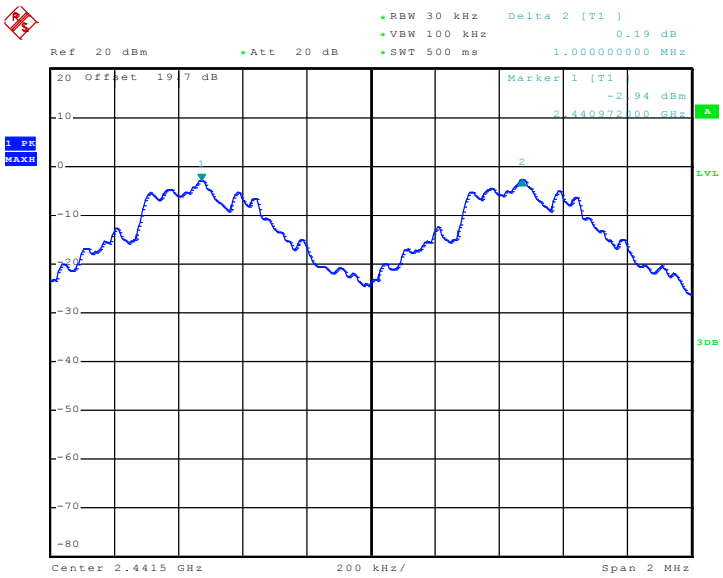
Test Mode :	Mode 1, 2, 3	Temperature :	25~27℃
Test Engineer :	Ken Hsu	Relative Humidity :	43~45%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.004	0.628	Pass
39	2441	1.000	0.628	Pass
78	2480	1.000	0.624	Pass

Channel Separation Plot on Channel 00 - 01

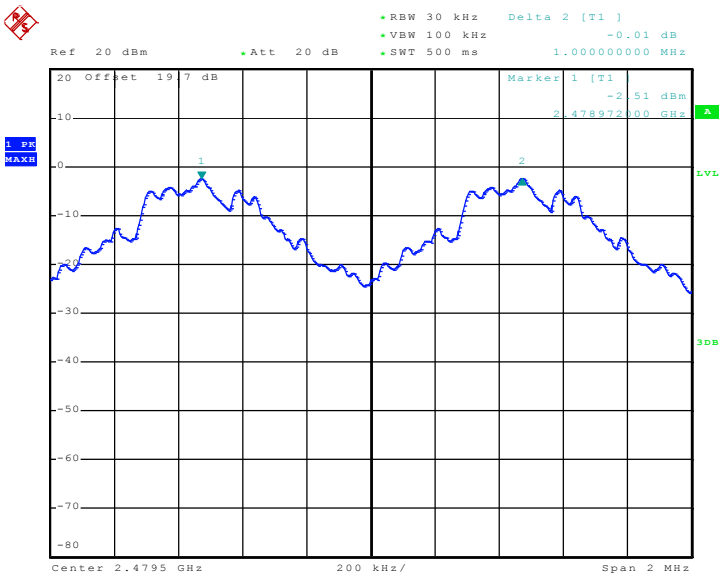


Channel Separation Plot on Channel 39 - 40



Date: 24.FEB.2010 17:32:39

Channel Separation Plot on Channel 77 - 78

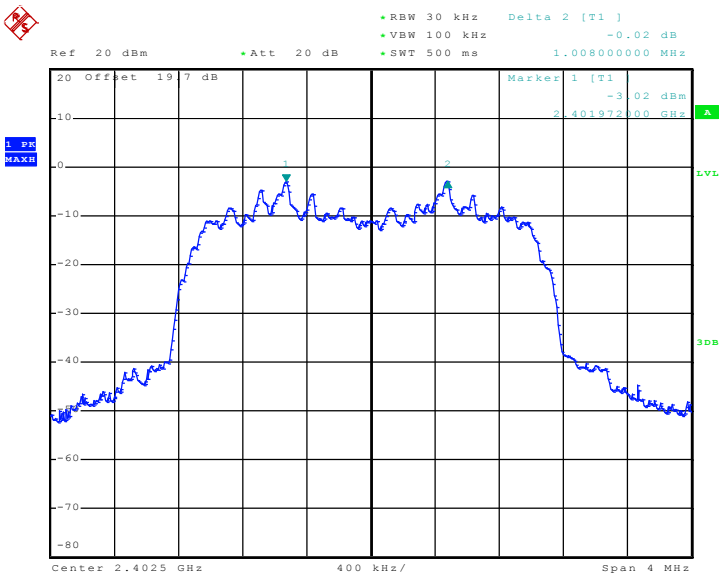


Date: 24.FEB.2010 17:33:16

Test Mode :	Mode 4, 5, 6	Temperature :	25~27℃
Test Engineer :	Ken Hsu	Relative Humidity :	43~45%

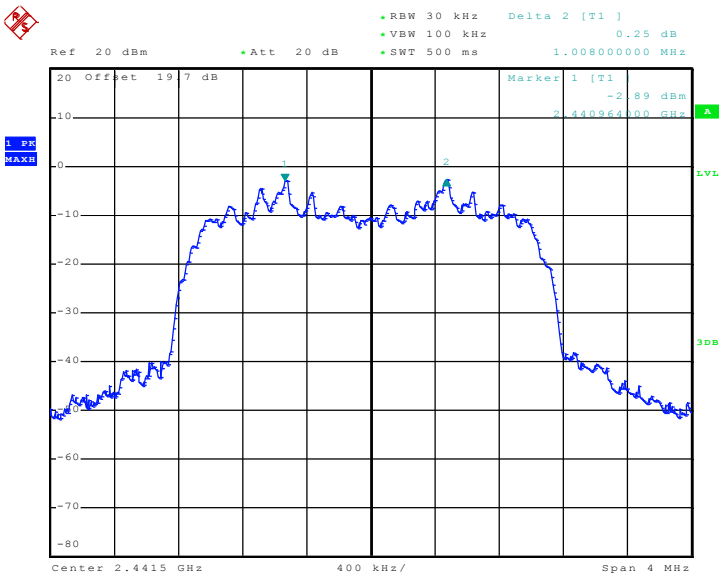
Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.008	0.864	Pass
39	2441	1.008	0.864	Pass
78	2480	1.000	0.864	Pass

Channel Separation Plot on Channel 00 - 01



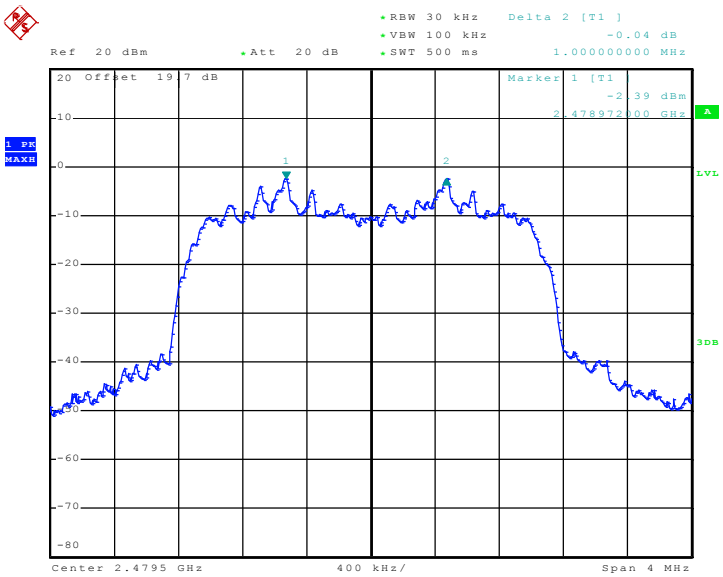
Date: 24.FEB.2010 17:35:13

Channel Separation Plot on Channel 39 - 40



Date: 24.FEB.2010 17:35:47

Channel Separation Plot on Channel 77 - 78

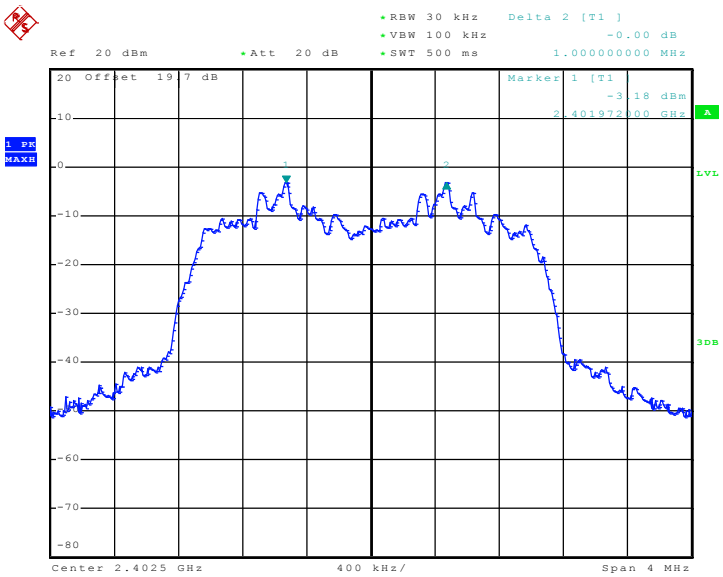


Date: 24.FEB.2010 17:36:43

Test Mode :	Mode 7, 8, 9	Temperature :	25~27℃
Test Engineer :	Ken Hsu	Relative Humidity :	43~45%

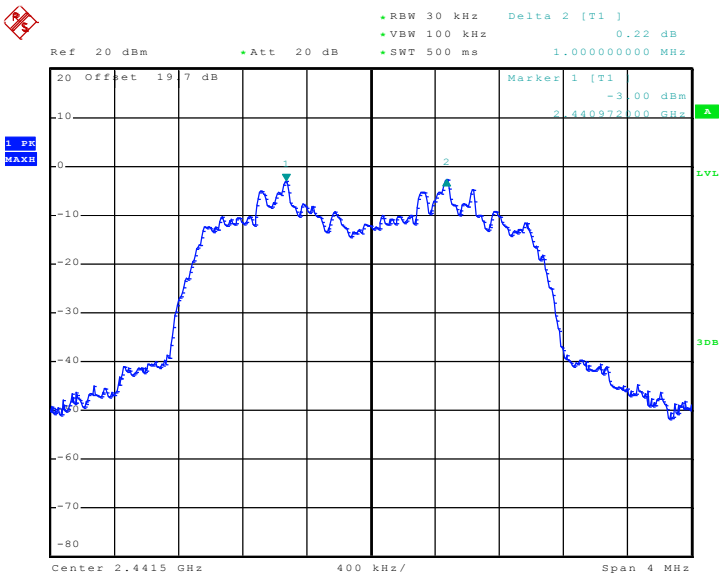
Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.000	0.827	Pass
39	2441	1.000	0.824	Pass
78	2480	1.000	0.827	Pass

Channel Separation Plot on Channel 00 - 01



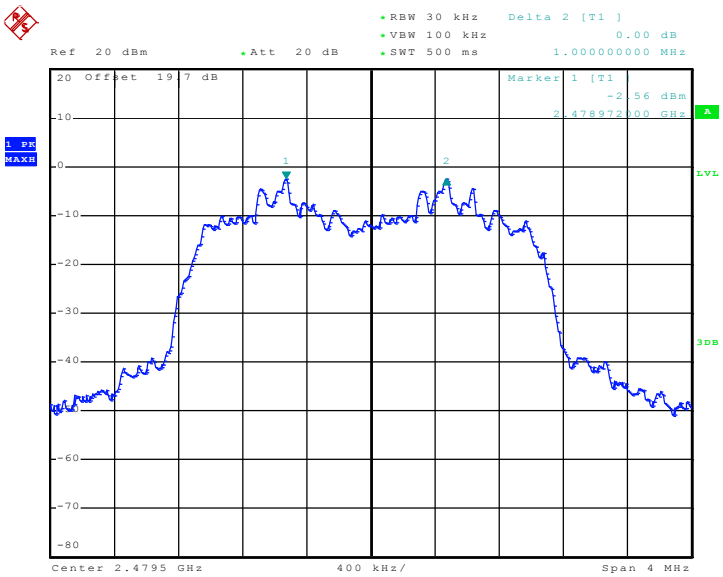
Date: 24.FEB.2010 17:37:27

Channel Separation Plot on Channel 39 - 40



Date: 24.FEB.2010 17:38:18

Channel Separation Plot on Channel 77 - 78



Date: 24.FEB.2010 17:38:57

3.4 Dwell Time Measurement

3.4.1 Limit of Dwell Time

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. The EUT should be transmitting at its maximum data rate as the worst cases.
4. The EUT must have its hopping function enabled. Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel; RBW = 1 MHz; VBW ≥ RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold.
5. Use the marker-delta function to calculate the dwell time.

3.4.4 Test Setup

3.4.5 Test Result of Dwell Time

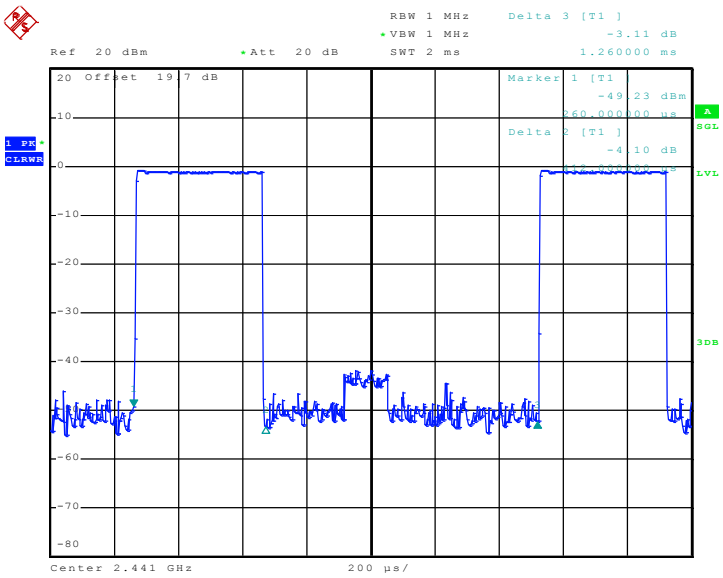
Test Mode :	Mode 2	Temperature :	25~27℃
Test Engineer :	Ken Hsu	Relative Humidity :	43~45%

Package Mode	Average Hopping Channel	Package Transfer Time (usec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
DH1	8.40	412.00	0.11	0.4	Pass
DH3	4.80	1682.00	0.26	0.4	Pass
DH5	2.90	2922.00	0.27	0.4	Pass

Remark:

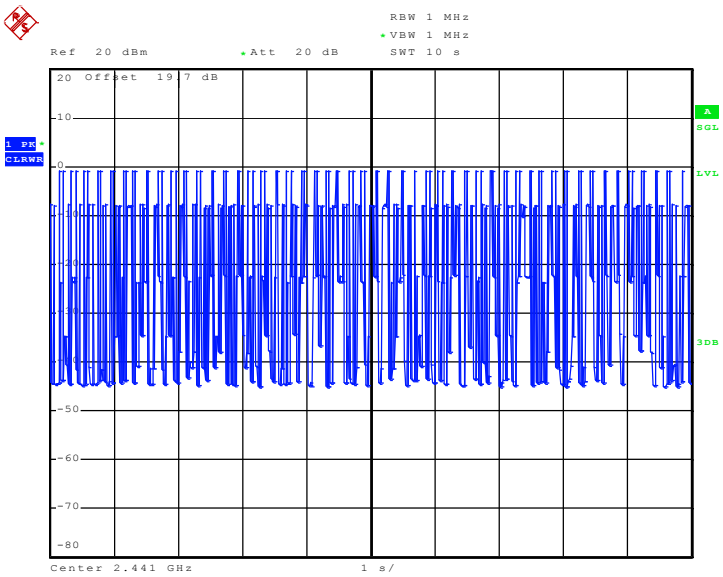
1. Dwell Time=79(channels) x 0.4(s) x average hopping channel x package transfer time
2. 79 channels come from the Hopping Channel number.
3. Average Hopping Channel = hops/sweep time
4. t: Package Transfer Time(us)

DH1 Dwell Time (One Pulse) Plot on Channel 39



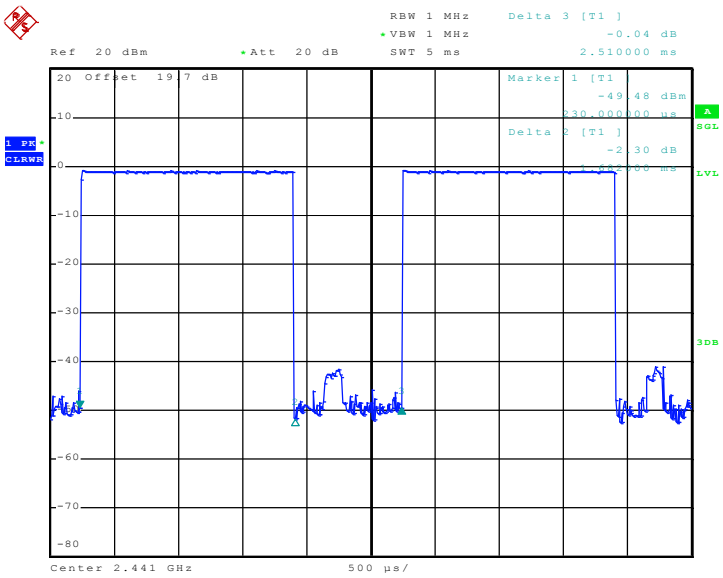
Date: 24.FEB.2010 17:49:51

DH1 Dwell Time (Count Pulses) Plot on Channel 39



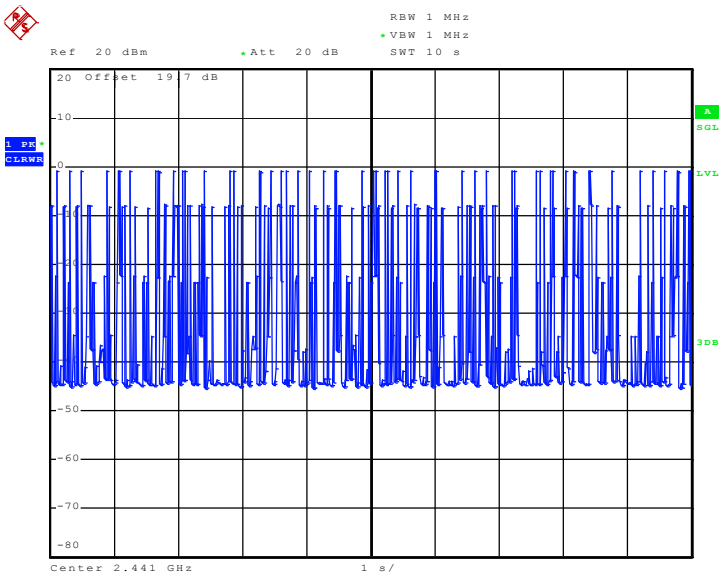
Date: 24.FEB.2010 17:58:09

DH3 Dwell Time (One Pulse) Plot on Channel 39



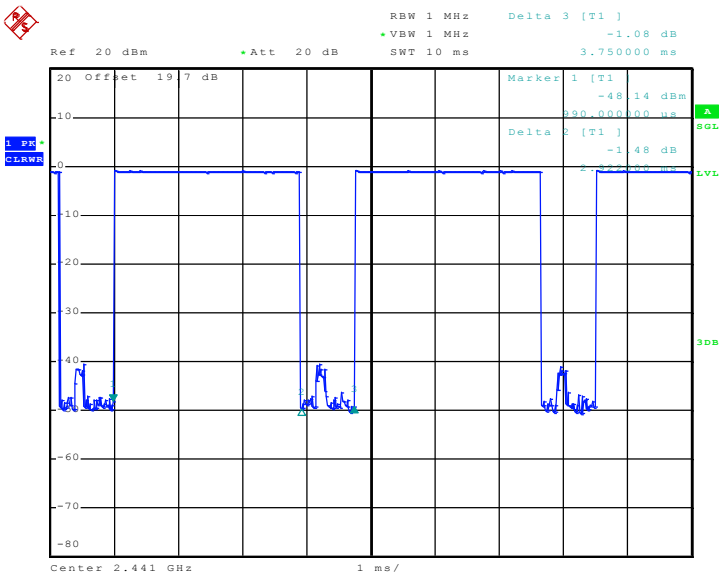
Date: 24.FEB.2010 17:50:29

DH3 Dwell Time (Count Pulses) Plot on Channel 39



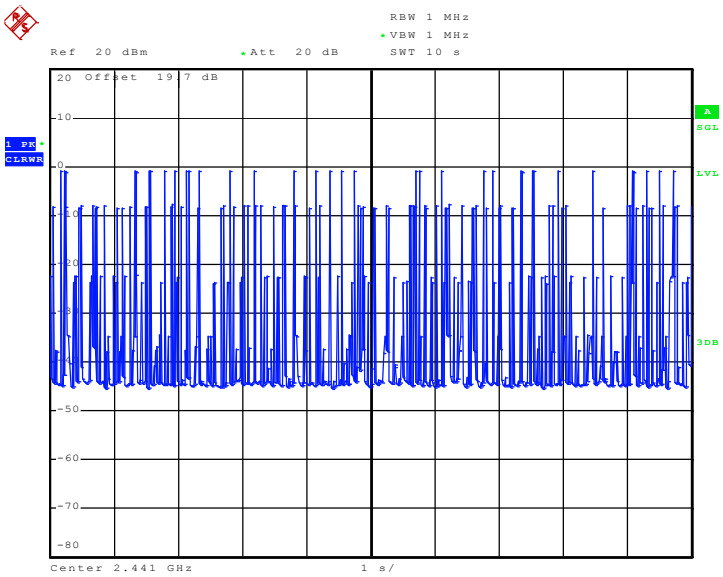
Date: 24.FEB.2010 17:58:40

DH5 Dwell Time (One Pulse) Plot on Channel 39



Date: 24.FEB.2010 17:51:02

DH5 Dwell Time (Count Pulses) Plot on Channel 39



Date: 24.FEB.2010 17:59:19

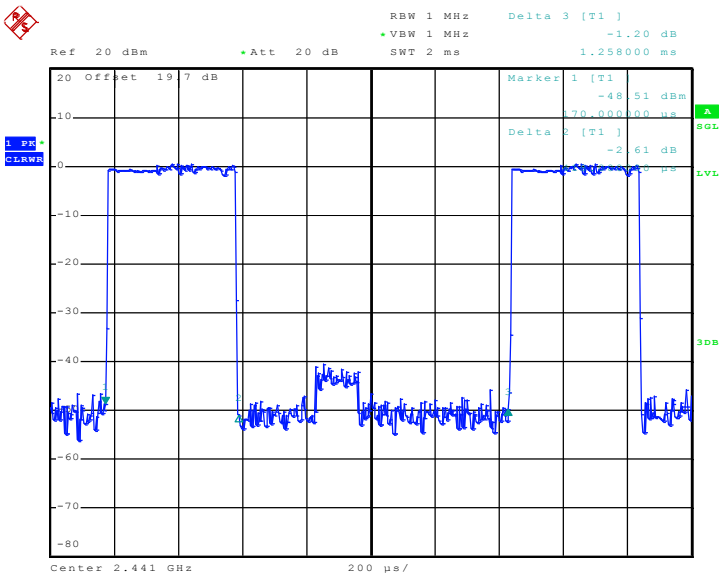
Test Mode :	Mode 5	Temperature :	25~27℃
Test Engineer :	Ken Hsu	Relative Humidity :	43~45%

Package Mode	Average Hopping Channel	Package Transfer Time (usec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
2DH1	9.10	418.00	0.12	0.4	Pass
2DH3	4.60	1690.00	0.25	0.4	Pass
2DH5	2.80	2950.00	0.26	0.4	Pass

Remark:

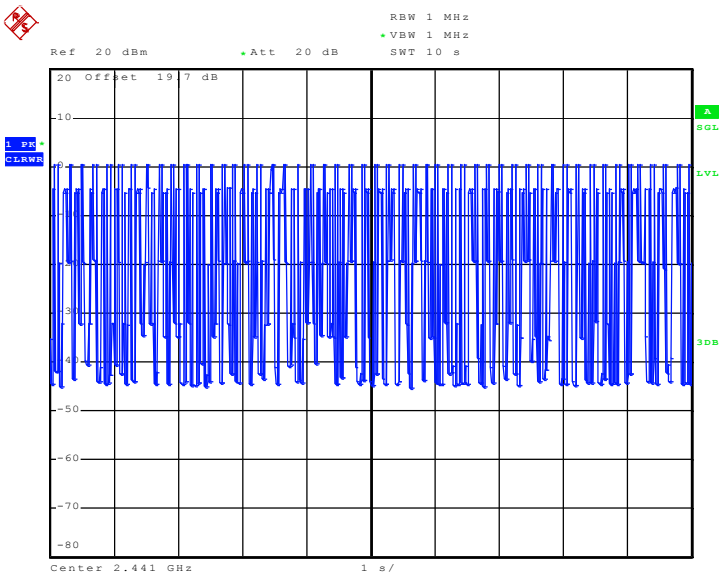
1. Dwell Time=79(channels) x 0.4(s) x average hopping channel x package transfer time
2. 79 channels come from the Hopping Channel number.
3. Average Hopping Channel = hops/sweep time
4. t: Package Transfer Time(us)

2DH1 Dwell Time (One Pulse) Plot on Channel 39



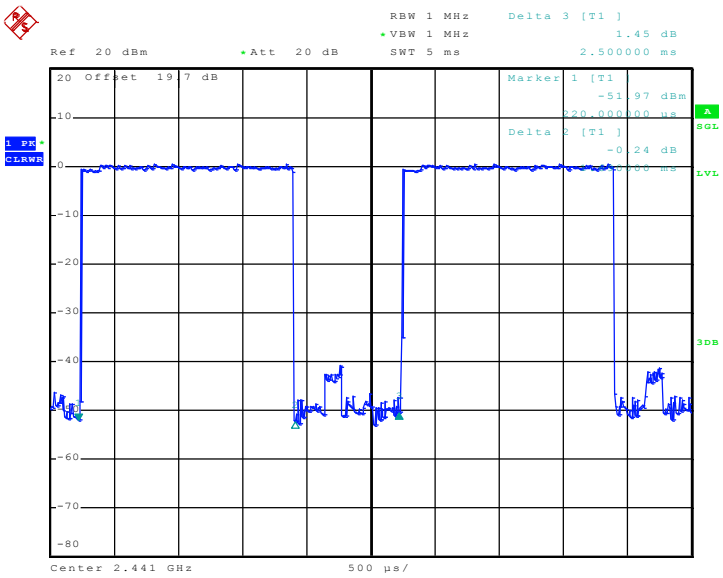
Date: 24.FEB.2010 17:51:57

2DH1 Dwell Time (Count Pulses) Plot on Channel 39



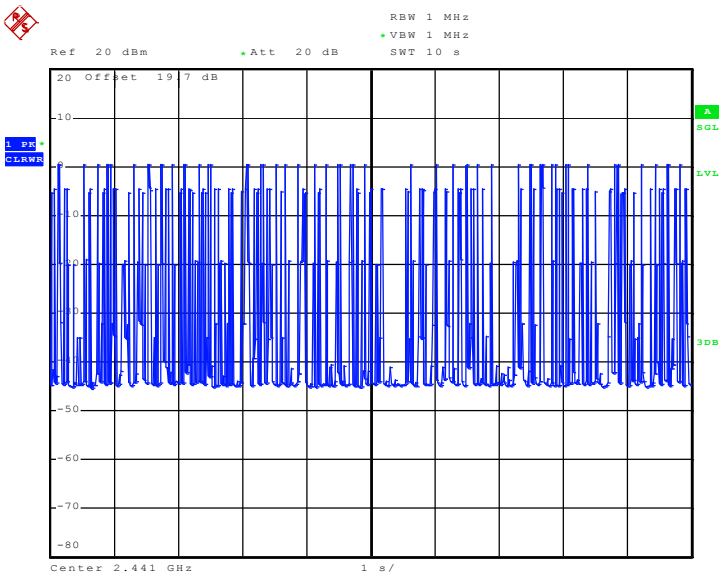
Date: 24.FEB.2010 17:59:55

2DH3 Dwell Time (One Pulse) Plot on Channel 39



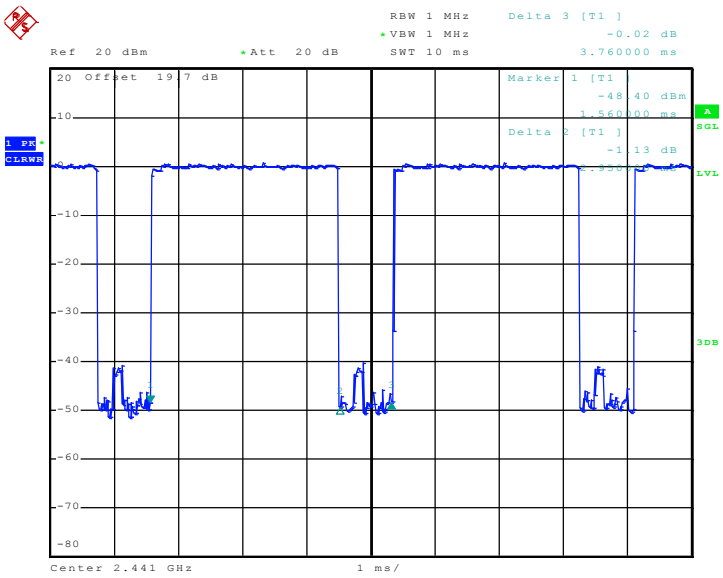
Date: 24.FEB.2010 17:53:03

2DH3 Dwell Time (Count Pulses) Plot on Channel 39



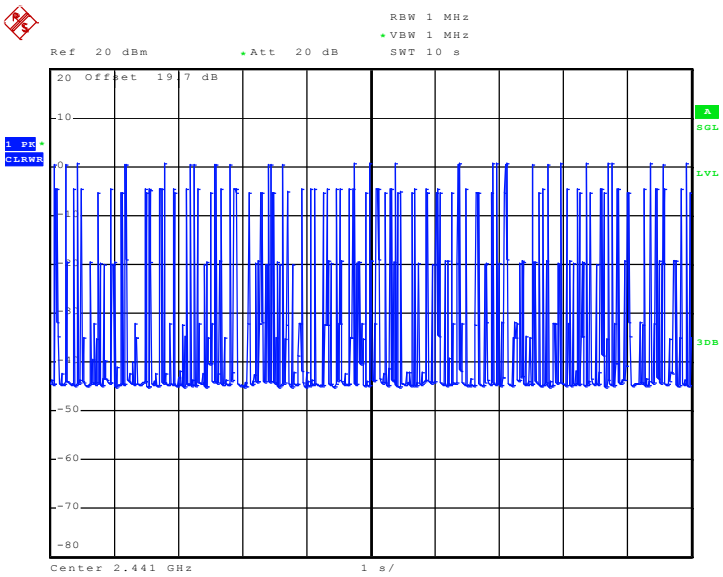
Date: 24.FEB.2010 18:01:18

2DH5 Dwell Time (One Pulse) Plot on Channel 39



Date: 24.FEB.2010 17:53:38

2DH5 Dwell Time (Count Pulses) Plot on Channel 39



Date: 24.FEB.2010 18:01:49

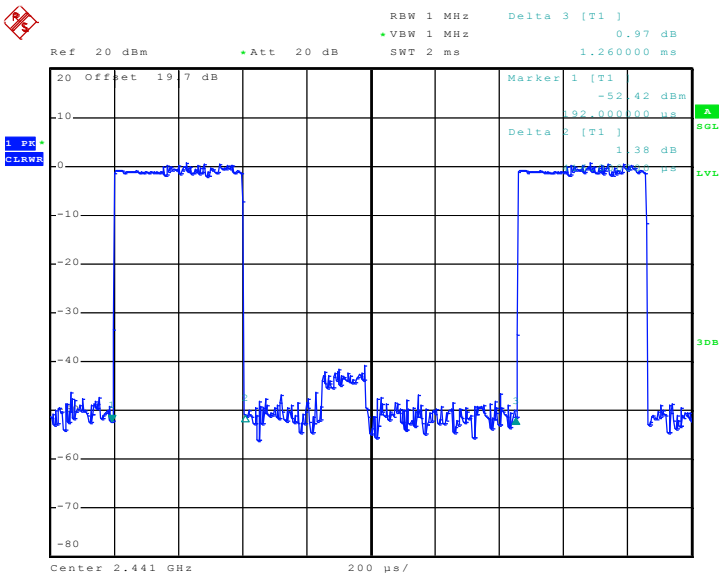
Test Mode :	Mode 8	Temperature :	25~27℃
Test Engineer :	Ken Hsu	Relative Humidity :	43~45%

Package Mode	Average Hopping Channel	Package Transfer Time (usec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
3DH1	8.60	416.00	0.11	0.4	Pass
3DH3	5.40	1680.00	0.29	0.4	Pass
3DH5	3.40	2960.00	0.32	0.4	Pass

Remark:

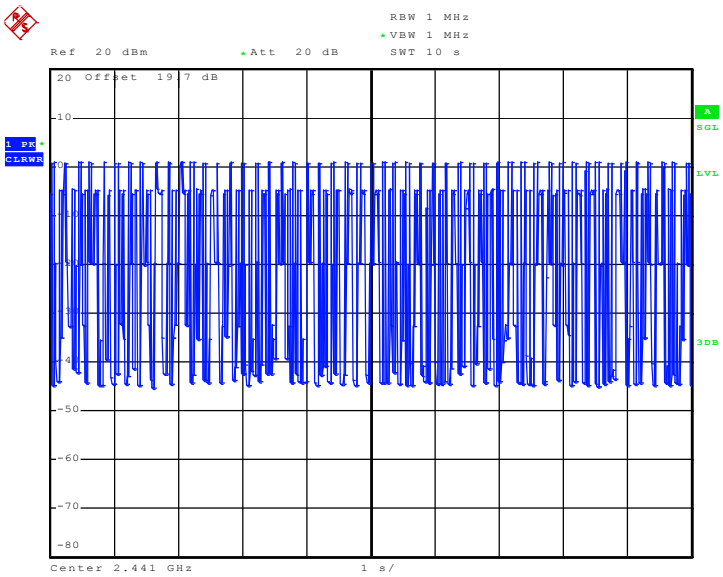
1. Dwell Time=79(channels) x 0.4(s) x average hopping channel x package transfer time
2. 79 channels come from the Hopping Channel number.
3. Average Hopping Channel = hops/sweep time
4. t: Package Transfer Time(us)

3DH1 Dwell Time (One Pulse) Plot on Channel 39



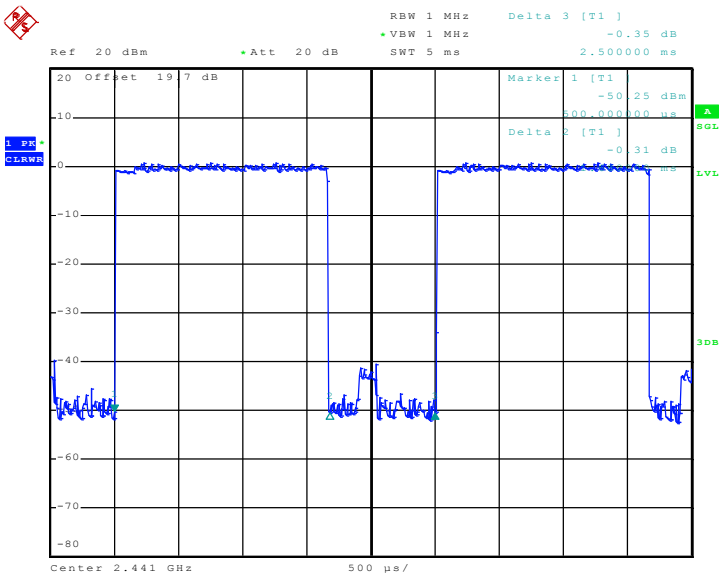
Date: 24.FEB.2010 17:54:56

3DH1 Dwell Time (Count Pulses) Plot on Channel 39



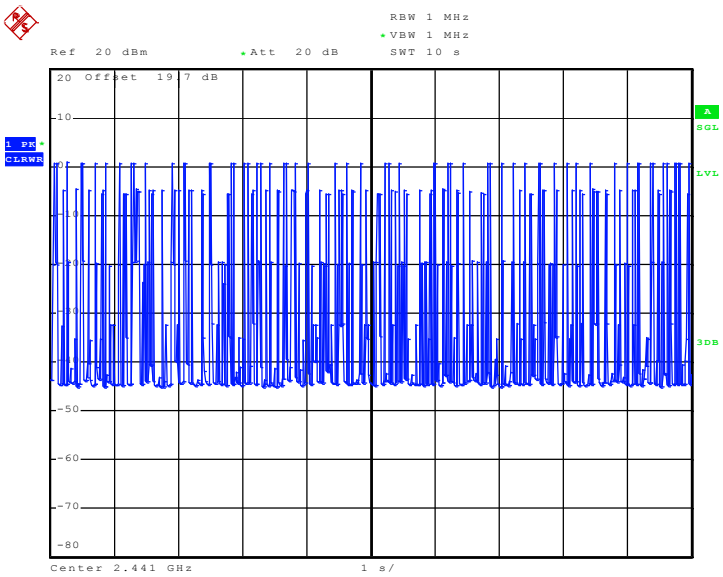
Date: 24.FEB.2010 18:03:49

3DH3 Dwell Time (One Pulse) Plot on Channel 39



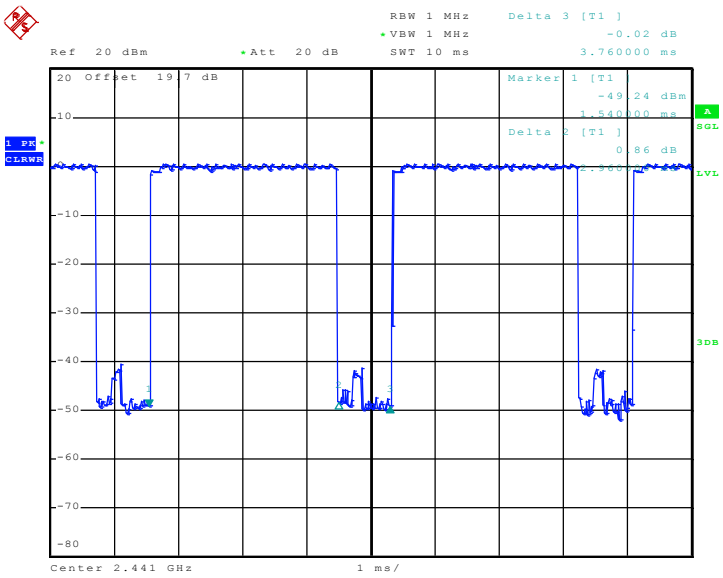
Date: 24.FEB.2010 17:55:55

3DH3 Dwell Time (Count Pulses) Plot on Channel 39



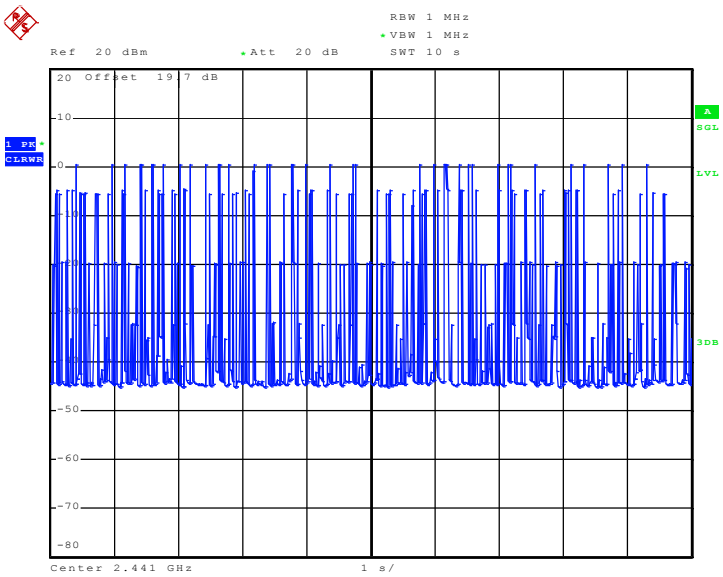
Date: 24.FEB.2010 18:04:28

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



Date: 24.FEB.2010 17:56:48

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



Date: 24.FEB.2010 18:05:08

3.5 Peak Output Power Measurement

3.5.1 Limit of Peak Output Power

Frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels: 1W (30 dBm).

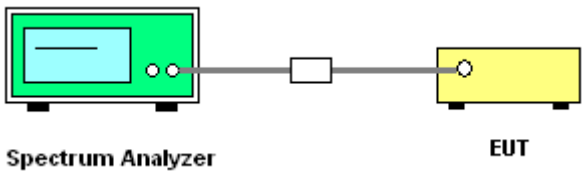
3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

3.5.3 Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.

3.5.4 Test Setup

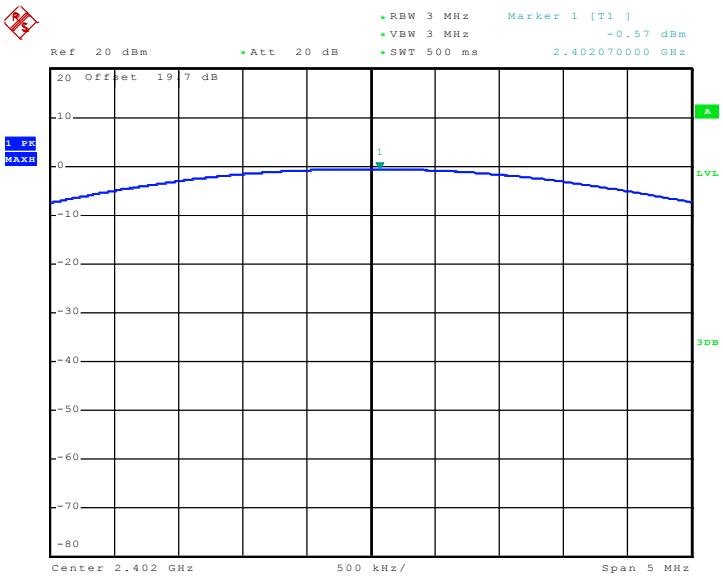


3.5.5 Test Result of Peak Output Power

Test Mode :	Mode 1, 2, 3	Temperature :	25~27℃
Test Engineer :	Ken Hsu	Relative Humidity :	43~45%

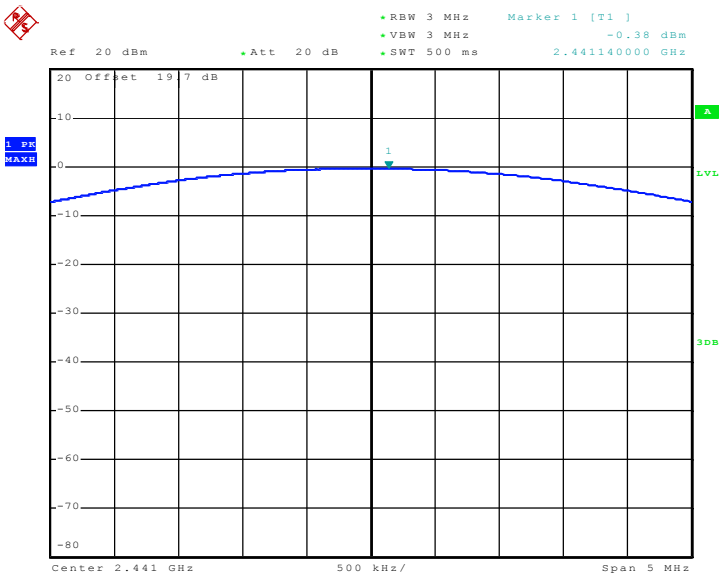
Channel	Frequency (MHz)	RF Power (dBm)		
		GFSK	Max. Limits (dBm)	Pass/Fail
		1 Mbps		
00	2402	-0.57	30	Pass
39	2441	-0.38	30	Pass
78	2480	0.04	30	Pass

Peak Output Power Plot on Channel 00



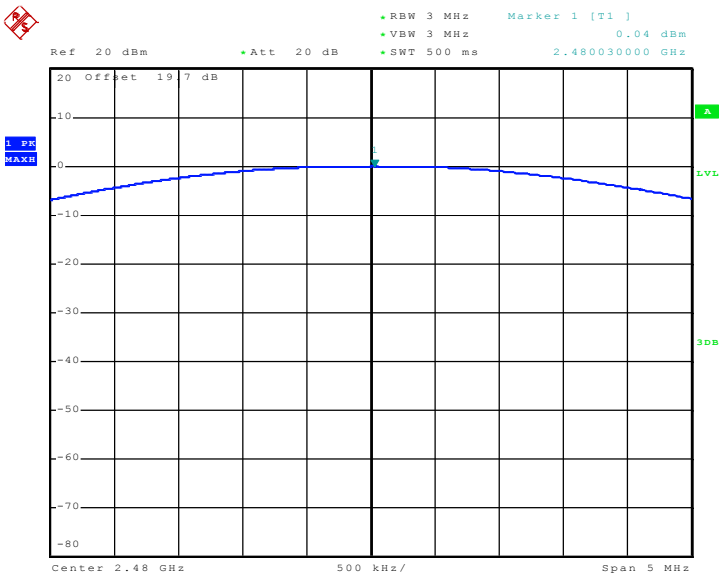
Date: 24.FEB.2010 14:37:58

Peak Output Power Plot on Channel 39



Date: 24.FEB.2010 14:40:23

Peak Output Power Plot on Channel 78

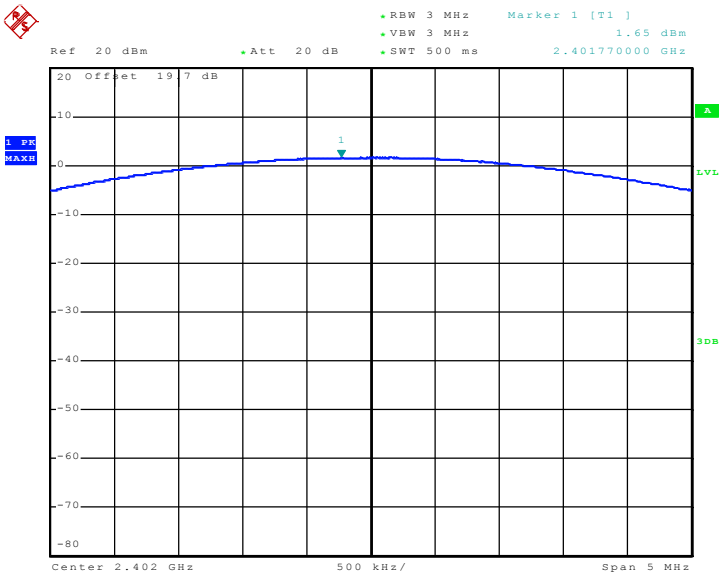


Date: 24.FEB.2010 14:43:38

Test Mode :	Mode 4, 5, 6	Temperature :	25~27℃
Test Engineer :	Ken Hsu	Relative Humidity :	43~45%

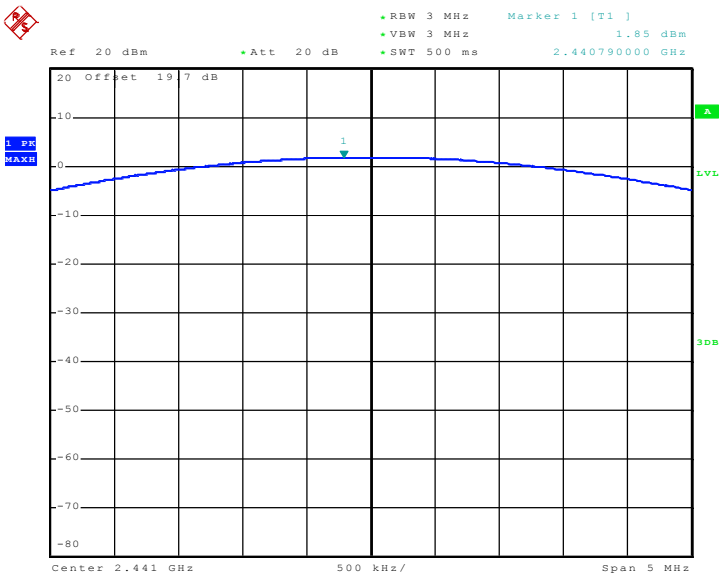
Channel	Frequency (MHz)	RF Power (dBm)		
		π /4-DQPSK	Max. Limits	Pass/Fail
		2 Mbps	(dBm)	
00	2402	1.65	30	Pass
39	2441	1.85	30	Pass
78	2480	2.27	30	Pass

Peak Output Power Plot on Channel 00



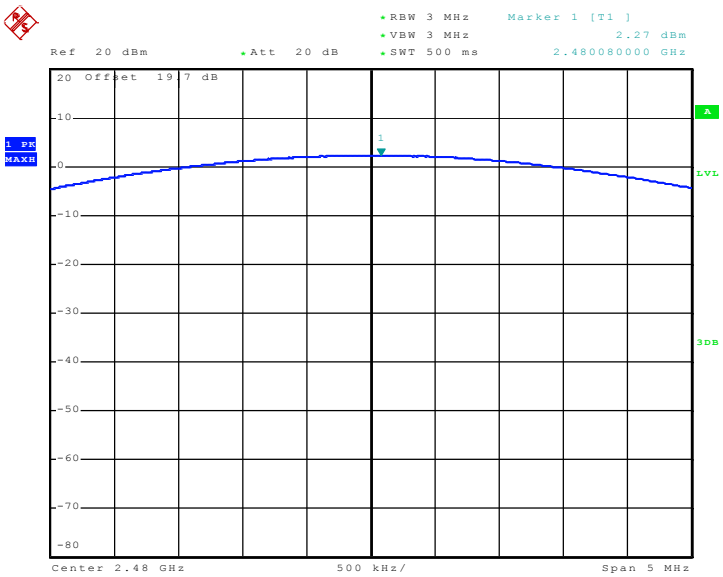
Date: 24.FEB.2010 14:38:54

Peak Output Power Plot on Channel 39



Date: 24.FEB.2010 14:41:33

Peak Output Power Plot on Channel 78

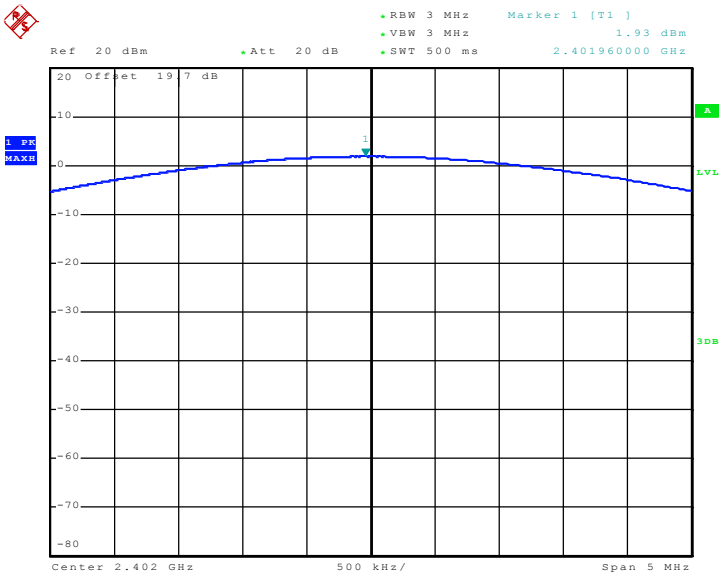


Date: 24.FEB.2010 14:45:02

Test Mode :	Mode 7, 8, 9	Temperature :	25~27℃
Test Engineer :	Ken Hsu	Relative Humidity :	43~45%

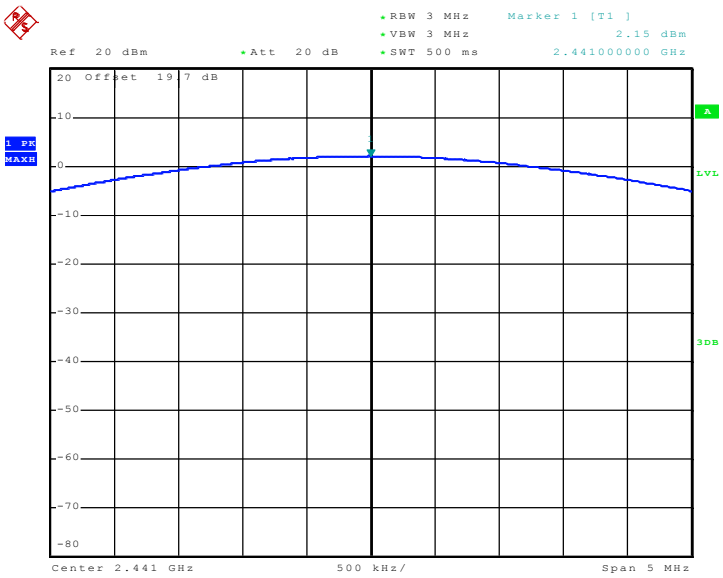
Channel	Frequency (MHz)	RF Power (dBm)		
		8-DPSK	Max. Limits	Pass/Fail
		3 Mbps	(dBm)	
00	2402	1.93	30	Pass
39	2441	2.15	30	Pass
78	2480	2.54	30	Pass

Peak Output Power Plot on Channel 00



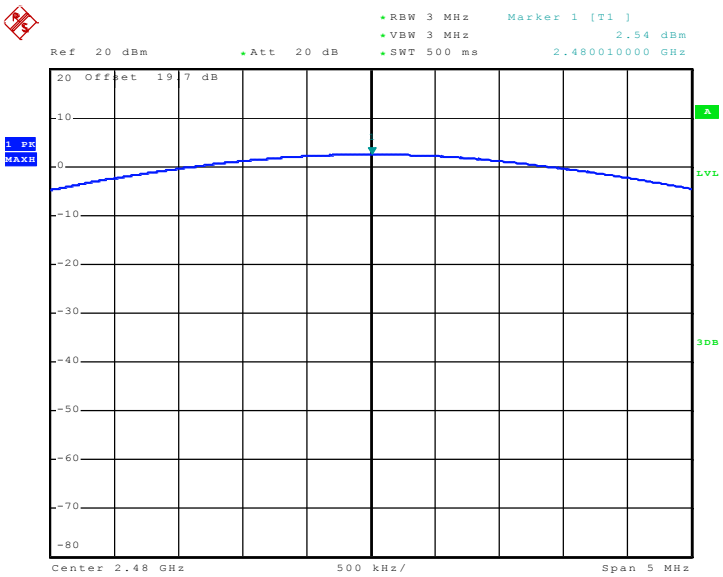
Date: 24.FEB.2010 14:39:07

Peak Output Power Plot on Channel 39



Date: 24.FEB.2010 14:42:01

Peak Output Power Plot on Channel 78



Date: 24.FEB.2010 14:54:38

3.6 Band Edges Measurement

3.6.1 Limit of Band Edges

In any 100 kHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

3.6.2 Measuring Instruments

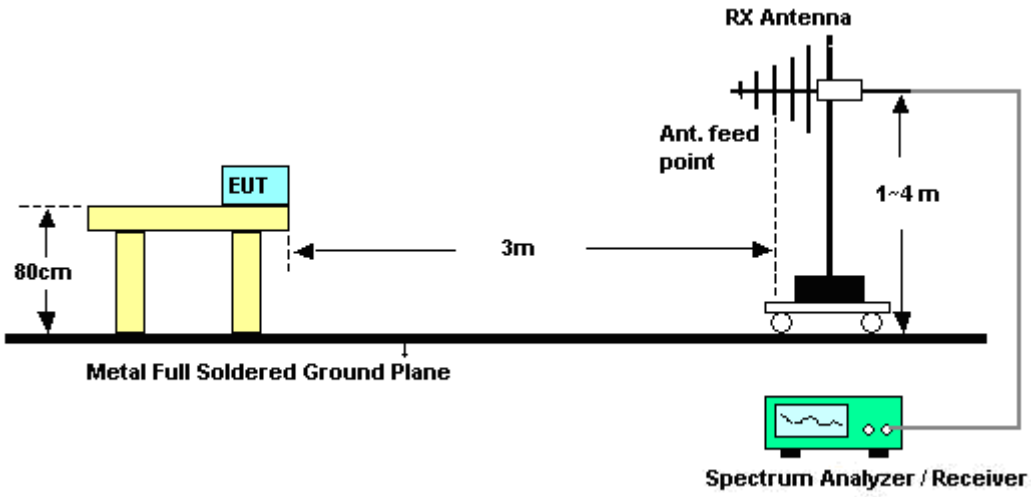
See list of measuring instruments of this test report.

3.6.3 Test Procedures

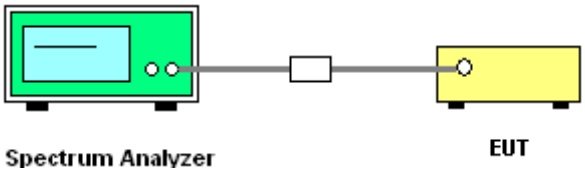
1. The testing follows the guidelines in ANSI C63.4-2003 and FCC Public Notice DA 00-705 Measurement Guidelines.
2. RF antenna conducted test: Set RBW = 300kHz, Video bandwidth (VBW) ≥ RBW. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 300k Hz RBW. Note: If the device complies with the use of power option 2 the attenuation under this paragraph shall be 30 dB instead of 20 dB.
3. Radiated emission test: Applies to band edge emissions that fall in the restricted bands listed in FCC Section 15.205. The maximum permitted average field strength is listed in FCC Section 15.209. A pre-amp is necessary for this measurement. For measurements above 1 GHz, set RBW = 1MHz, VBW = 1MHz, Sweep: Auto for Peak; set RBW = 1MHz, VBW = 10 Hz, Sweep: Auto for Average. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation. See FCC Section 15.35(b) and (c).
4. In case the emission is fail due to the used RBW / VBW is too wide, marker-delta method of FCC Public Notice DA 00-705 will be followed.

3.6.4 Test Setup

<Radiated Band Edges>



<Conducted Band Edges>



3.6.5 Test Result of Radiated Band Edges

Test Mode :	Mode 1	Temperature :	22~25°C
Test Channel :	00	Relative Humidity :	47~51%
		Test Engineer :	Cona Huang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2369.85	45.58	-28.42	74	42.15	32.11	5.47	34.15	185	9	Peak
2369.85	33.38	-20.62	54	29.95	32.11	5.47	34.15	185	9	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2319.69	46.32	-27.68	74	42.92	32.02	5.51	34.13	100	342	Peak
2319.69	33.40	-20.60	54	30	32.02	5.51	34.13	100	342	Average

Test Mode :	Mode 3	Temperature :	22~25°C
Test Channel :	78	Relative Humidity :	47~51%
		Test Engineer :	Cona Huang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	60.15	-13.85	74	56.69	32.27	5.38	34.19	104	16	Peak
2483.5	47.42	-6.58	54	43.96	32.27	5.38	34.19	104	16	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	59.16	-14.84	74	55.7	32.27	5.38	34.19	100	168	Peak
2483.5	47.57	-6.43	54	44.11	32.27	5.38	34.19	100	168	Average

Test Mode :	Mode 4	Temperature :	22~25°C
Test Channel :	78	Relative Humidity :	47~51%
		Test Engineer :	Cona Huang

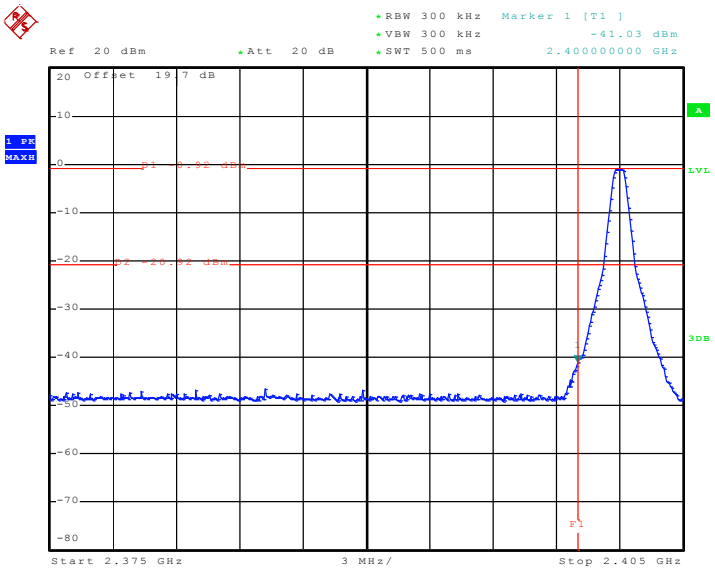
ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	59.47	-14.53	74	56.01	32.27	5.38	34.19	100	337	Peak
2483.5	47.91	-6.09	54	44.45	32.27	5.38	34.19	100	337	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	61.98	-12.02	74	58.52	32.27	5.38	34.19	186	11	Peak
2483.5	47.73	-6.27	54	44.27	32.27	5.38	34.19	186	11	Average

3.6.6 Test Result of Conducted Band Edges

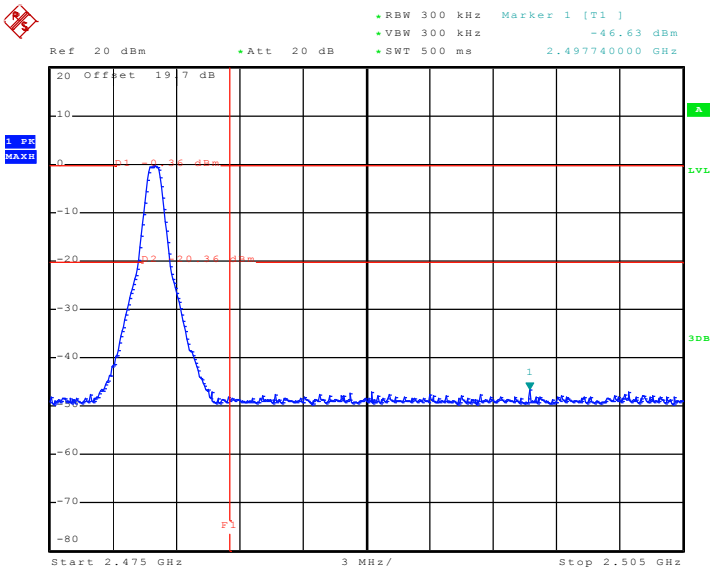
Test Mode :	Mode 1 and 3	**Temperature :**	25~27℃
Test Channel :	00 and 78	**Relative Humidity :**	43~45%
		Test Engineer :	Ken Hsu

Low Band Edge Plot on Channel 00



Date: 24.FEB.2010 17:06:46

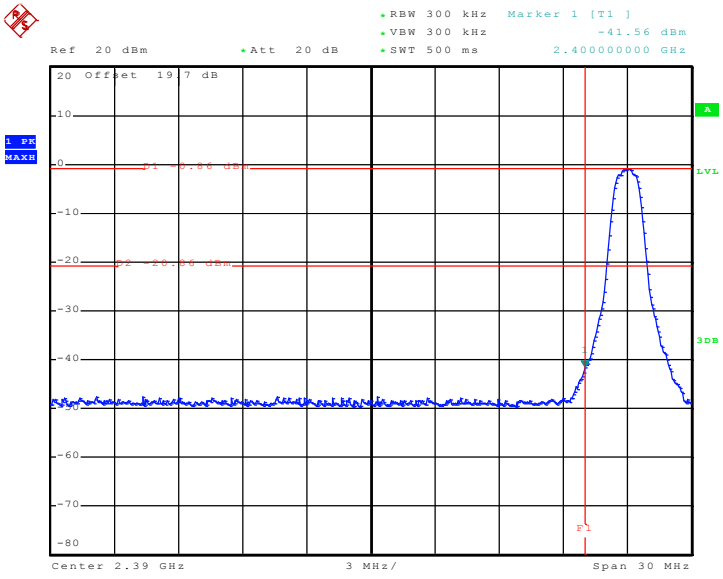
High Band Edge Plot on Channel 78



Date: 24.FEB.2010 19:00:45

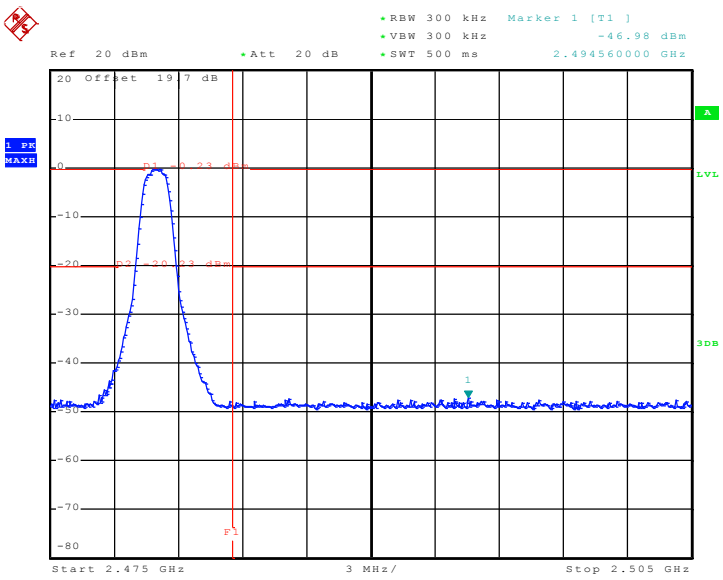
Test Mode :	Mode 4 and 6	**Temperature :**	25~27℃
Test Channel :	00 and 78	**Relative Humidity :**	43~45%
		Test Engineer :	Ken Hsu

Low Band Edge Plot on Channel 00



Date: 24.FEB.2010 17:29:09

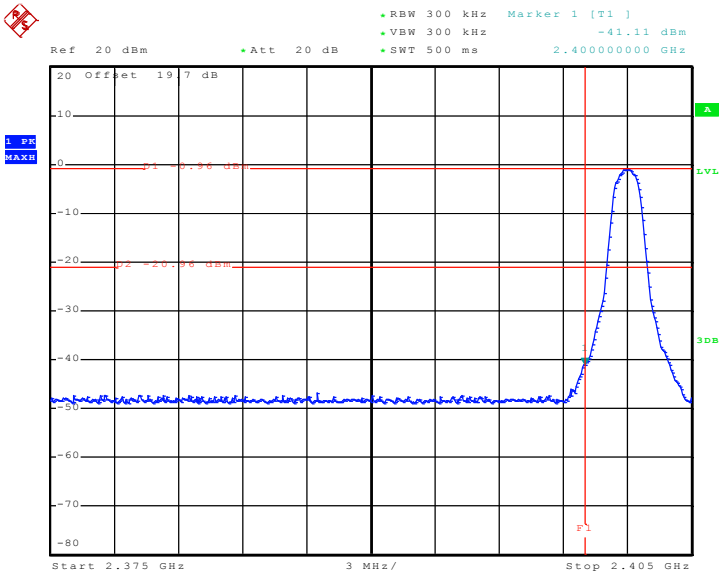
High Band Edge Plot on Channel 78



Date: 24.FEB.2010 17:16:58

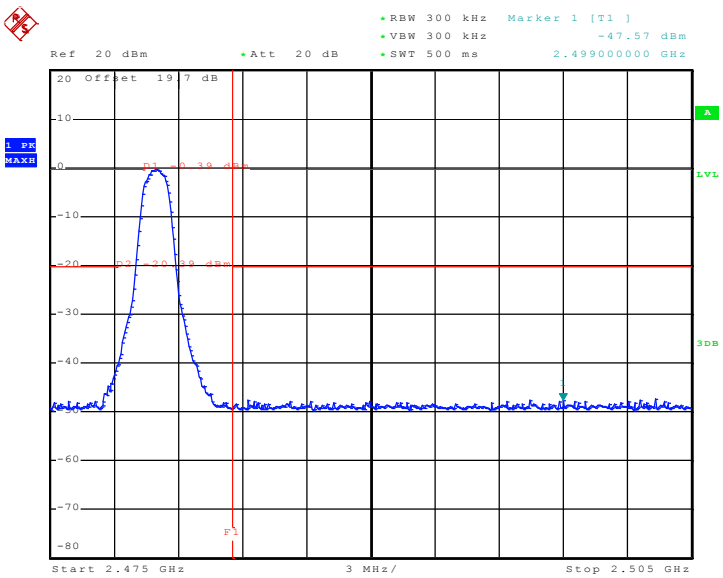
Test Mode :	Mode 7 and 9	**Temperature :**	25~27℃
Test Channel :	00 and 78	**Relative Humidity :**	43~45%
		Test Engineer :	Ken Hsu

Low Band Edge Plot on Channel 00



Date: 24.FEB.2010 17:23:40

High Band Edge Plot on Channel 78



Date: 24.FEB.2010 17:18:21

3.7 Spurious Emission Measurement

3.7.1 Limit of Spurious Emission Measurement

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

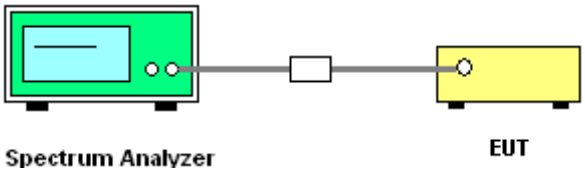
3.7.2 Measuring Instruments

See list of measuring instruments of this test report.

3.7.3 Test Procedure

1. The transmitter output was connected to the spectrum analyzer via a low lose cable.
2. Set RBW = 100 kHz, Video bandwidth (VBW) ≥ RBW, scan up through 10th harmonic. All harmonics / spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

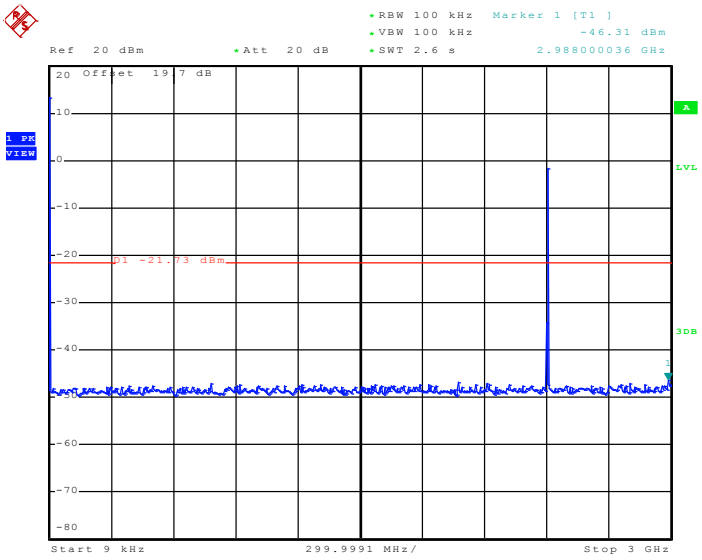
3.7.4 Test Setup



3.7.5 Test Result

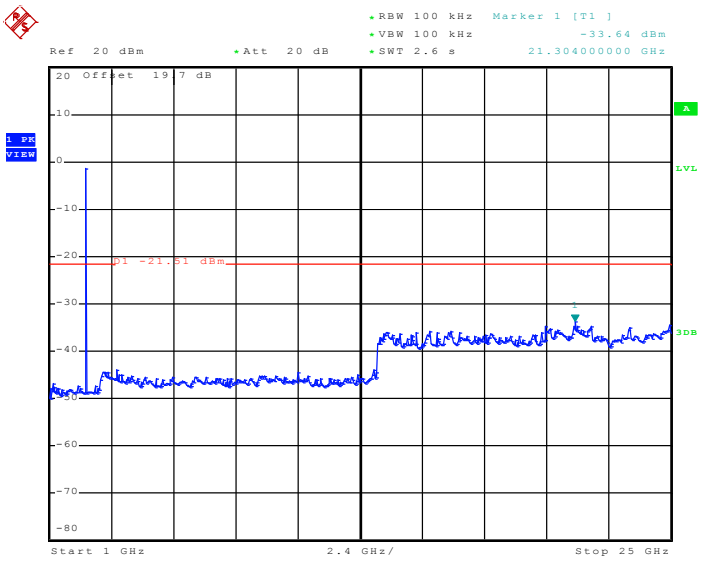
Test Mode :	Mode 7	Temperature :	25~27℃
Test Channel :	00	Relative Humidity :	43~45%
		Test Engineer :	Ken Hsu

Conducted Spurious Emission Plot between 9 kHz ~ 3 GHz



Date: 25.FEB.2010 08:11:58

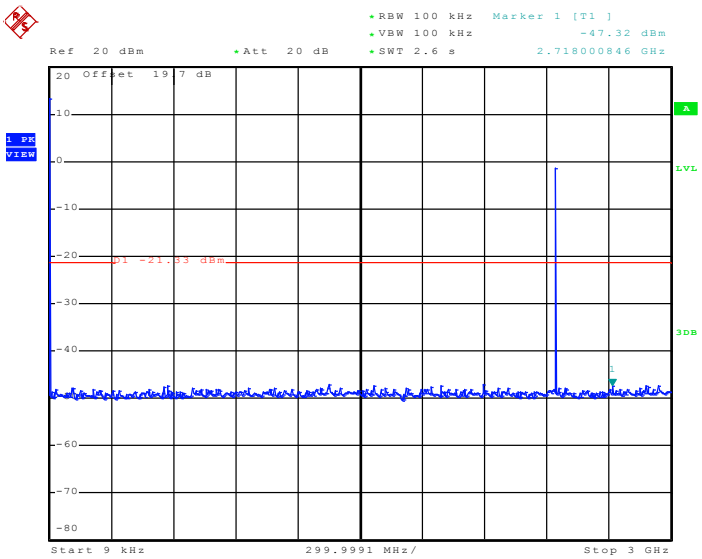
Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz



Date: 25.FEB.2010 08:12:22

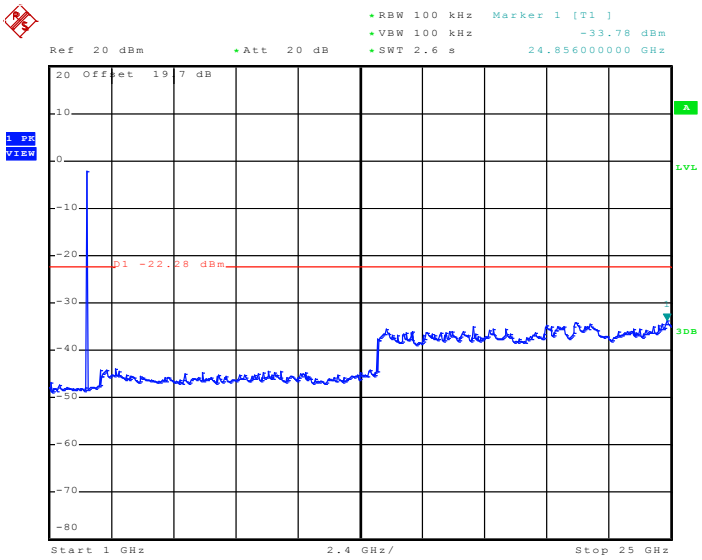
Test Mode :	Mode 8	Temperature :	25~27℃
Test Channel :	39	Relative Humidity :	43~45%
		Test Engineer :	Ken Hsu

Conducted Spurious Emission Plot between 9 kHz ~ 3 GHz



Date: 25.FEB.2010 08:12:42

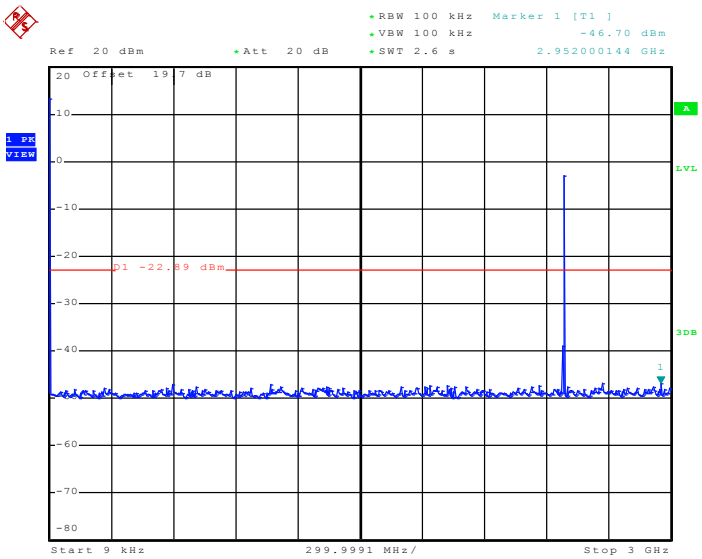
Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz



Date: 25.FEB.2010 08:13:48

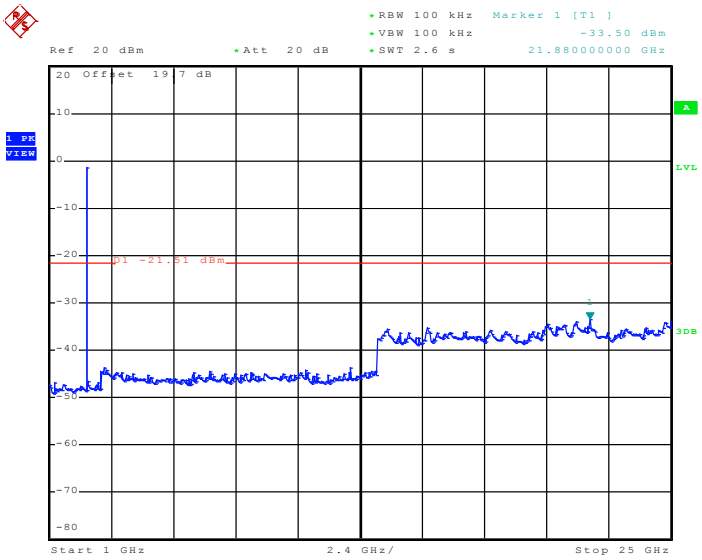
Test Mode :	Mode 9	Temperature :	25~27℃
Test Channel :	78	Relative Humidity :	43~45%
		Test Engineer :	Ken Hsu

Conducted Spurious Emission Plot between 9 kHz ~ 3 GHz



Date: 25.FEB.2010 08:14:18

Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz



Date: 25.FEB.2010 08:15:19

3.8 AC Conducted Emission Measurement

3.8.1 Limit of AC Conducted Emission

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

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

*Decreases with the logarithm of the frequency.

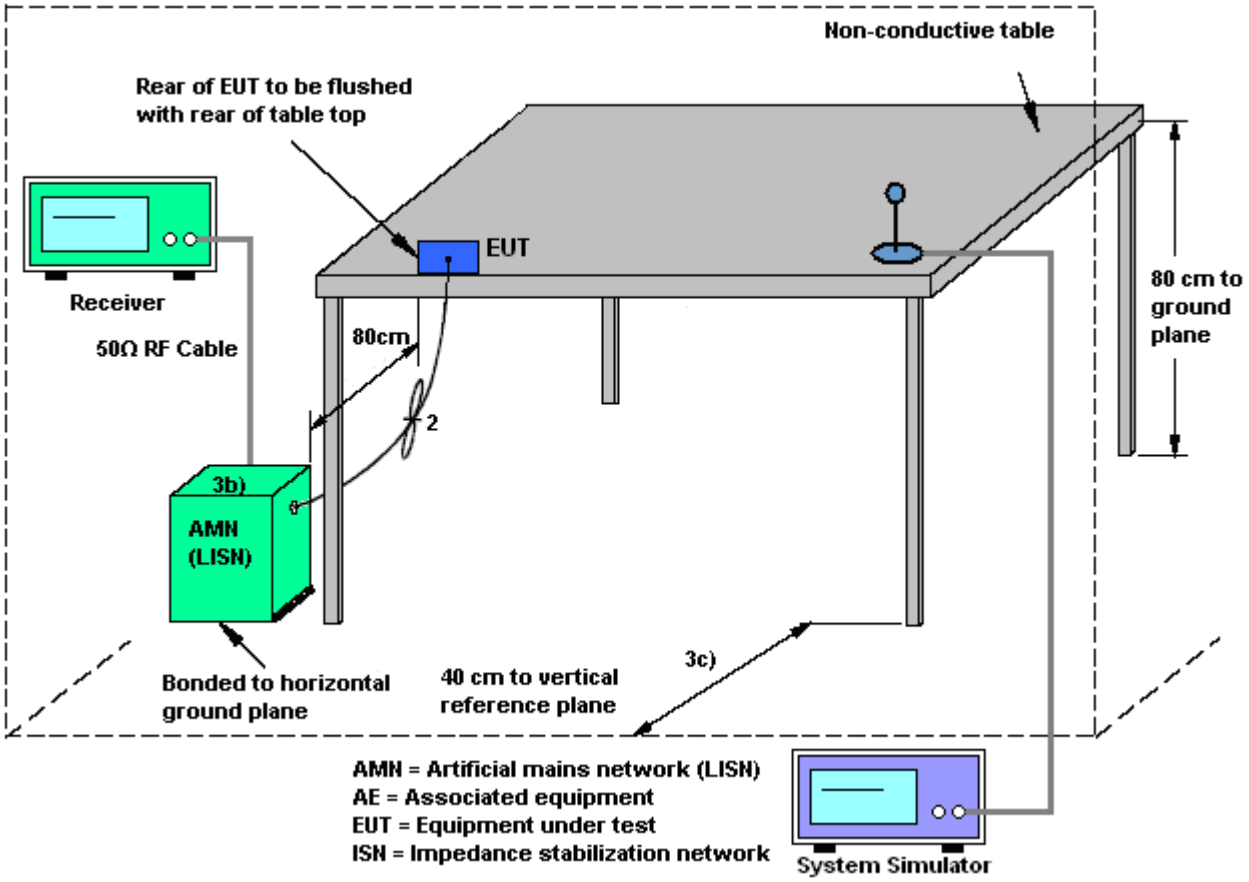
3.8.2 Measuring Instruments

See list of measuring instruments of this test report.

3.8.3 Test Procedures

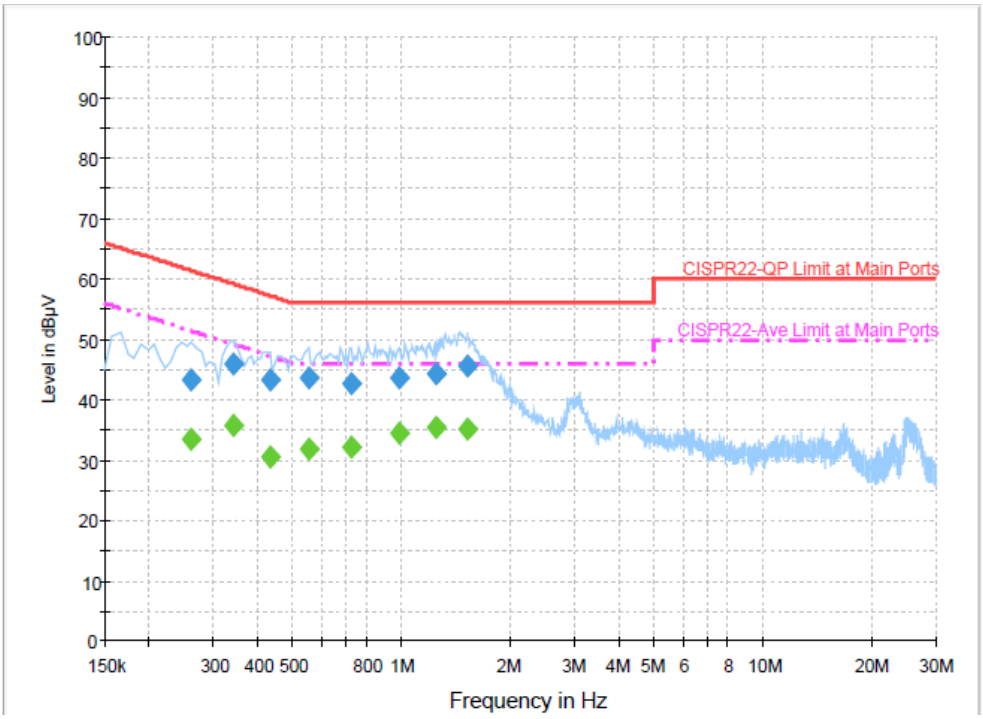
1. Please follow the guidelines in ANSI C63.4-2003.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All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

3.8.4 Test Setup



3.8.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	**Temperature :**	20~22℃
Test Engineer :	Hayden Wu	**Relative Humidity :**	45~48%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	GSM 850 Idle + WLAN Link (2.4G) + Bluetooth Link + GPS Rx + USB Cable (Charging from Adapter) + Battery <3080mAh> + Earphone + MP3 + Cradle		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



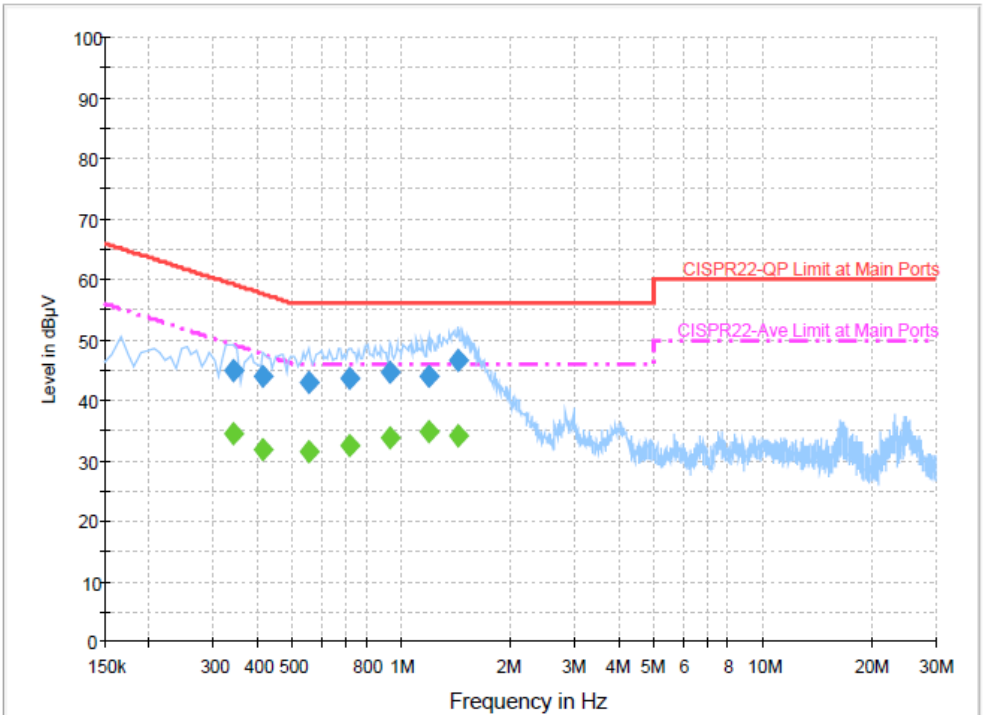
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.262000	43.4	Off	L1	19.4	18.0	61.4
0.342000	45.8	Off	L1	19.5	13.4	59.2
0.430000	43.3	Off	L1	19.4	14.0	57.3
0.550000	43.7	Off	L1	19.5	12.3	56.0
0.726000	42.6	Off	L1	19.5	13.4	56.0
0.982000	43.5	Off	L1	19.4	12.5	56.0
1.238000	44.1	Off	L1	19.5	11.9	56.0
1.518000	45.6	Off	L1	19.5	10.4	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.262000	33.4	Off	L1	19.4	18.0	51.4
0.342000	35.9	Off	L1	19.5	13.3	49.2
0.430000	30.4	Off	L1	19.4	16.9	47.3
0.550000	31.7	Off	L1	19.5	14.3	46.0
0.726000	32.2	Off	L1	19.5	13.8	46.0
0.982000	34.3	Off	L1	19.4	11.7	46.0
1.238000	35.5	Off	L1	19.5	10.5	46.0
1.518000	35.0	Off	L1	19.5	11.0	46.0

Test Mode :	Mode 1	Temperature :	20~22℃
Test Engineer :	Hayden Wu	Relative Humidity :	45~48%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM 850 Idle + WLAN Link (2.4G) + Bluetooth Link + GPS Rx + USB Cable (Charging from Adapter) + Battery <3080mAh> + Earphone + MP3 + Cradle		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



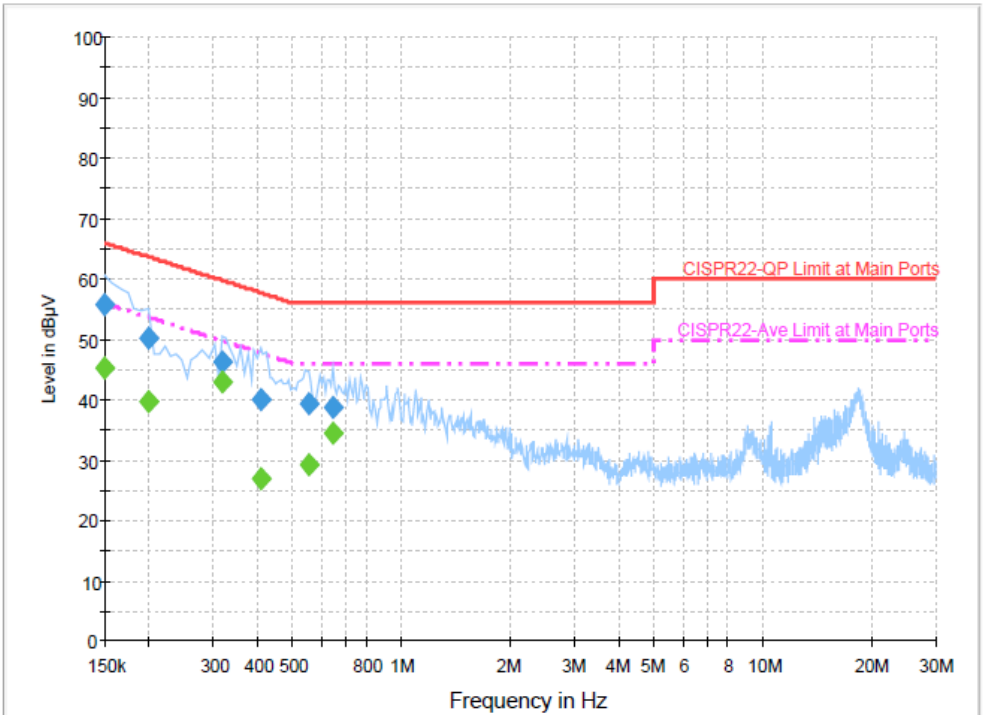
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.342000	45.0	Off	N	19.4	14.2	59.2
0.414000	44.0	Off	N	19.4	13.6	57.6
0.550000	43.0	Off	N	19.5	13.0	56.0
0.718000	43.7	Off	N	19.5	12.3	56.0
0.926000	44.6	Off	N	19.4	11.4	56.0
1.182000	44.1	Off	N	19.5	11.9	56.0
1.430000	46.7	Off	N	19.5	9.3	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.342000	34.3	Off	N	19.4	14.9	49.2
0.414000	31.8	Off	N	19.4	15.8	47.6
0.550000	31.5	Off	N	19.5	14.5	46.0
0.718000	32.6	Off	N	19.5	13.4	46.0
0.926000	33.9	Off	N	19.4	12.1	46.0
1.182000	34.6	Off	N	19.5	11.4	46.0
1.430000	34.2	Off	N	19.5	11.8	46.0

Test Mode :	Mode 2	Temperature :	20~22℃
Test Engineer :	Hayden Wu	Relative Humidity :	45~48%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WCDMA Band V Idle + WLAN Link (2.4G) + Bluetooth Link + GPS Rx + USB Cable (Link with Notebook) + Battery <3080mAh> + Earphone + Camera + Cradle		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



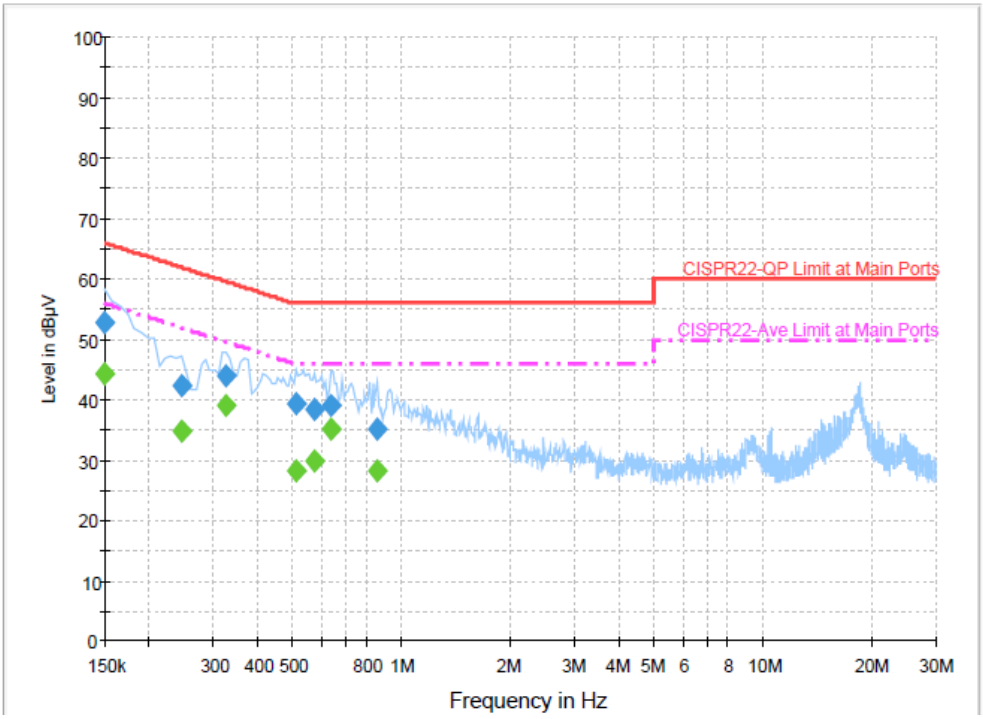
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	55.6	Off	L1	19.5	10.4	66.0
0.198000	50.3	Off	L1	19.6	13.4	63.7
0.318000	46.1	Off	L1	19.5	13.7	59.8
0.406000	39.9	Off	L1	19.4	17.8	57.7
0.550000	39.3	Off	L1	19.5	16.7	56.0
0.646000	38.8	Off	L1	19.5	17.2	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	45.1	Off	L1	19.5	10.9	56.0
0.198000	39.6	Off	L1	19.6	14.1	53.7
0.318000	43.1	Off	L1	19.5	6.7	49.8
0.406000	26.9	Off	L1	19.4	20.8	47.7
0.550000	29.2	Off	L1	19.5	16.8	46.0
0.646000	34.3	Off	L1	19.5	11.7	46.0

Test Mode :	Mode 2	**Temperature :**	20~22℃
Test Engineer :	Hayden Wu	**Relative Humidity :**	45~48%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral
Function Type :	WCDMA Band V Idle + WLAN Link (2.4G) + Bluetooth Link + GPS Rx + USB Cable (Link with Notebook) + Battery <3080mAh> + Earphone + Camera + Cradle		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



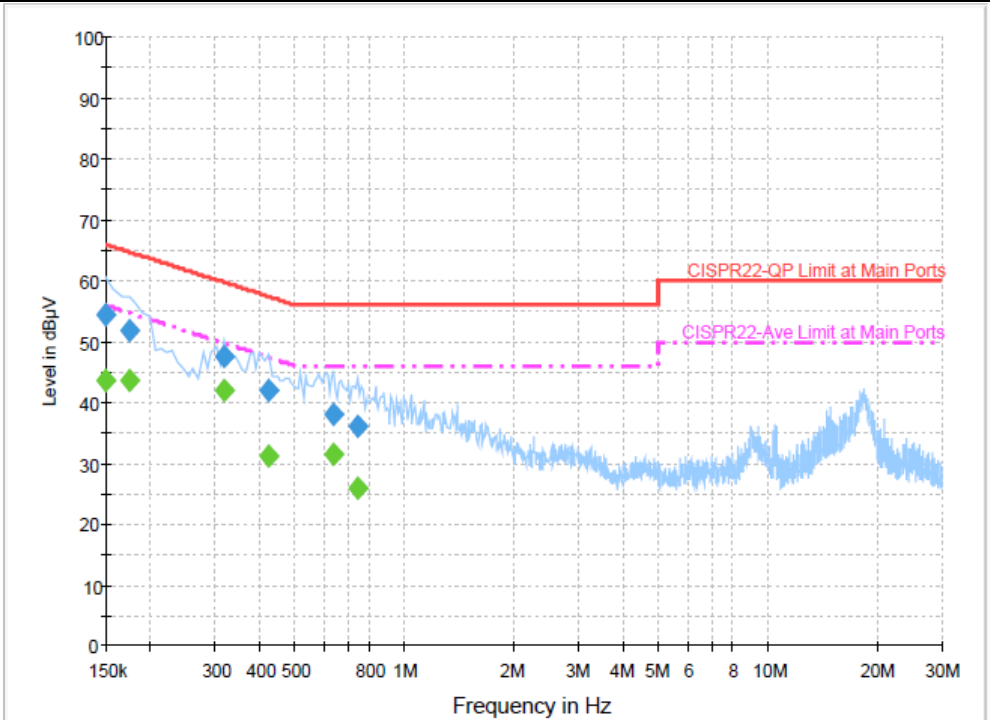
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	52.9	Off	N	19.5	13.1	66.0
0.246000	42.2	Off	N	19.5	19.7	61.9
0.326000	43.9	Off	N	19.5	15.7	59.6
0.510000	39.2	Off	N	19.4	16.8	56.0
0.574000	38.2	Off	N	19.5	17.8	56.0
0.638000	39.1	Off	N	19.5	16.9	56.0
0.854000	35.0	Off	N	19.4	21.0	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	44.1	Off	N	19.5	11.9	56.0
0.246000	34.7	Off	N	19.5	17.2	51.9
0.326000	38.9	Off	N	19.5	10.7	49.6
0.510000	28.1	Off	N	19.4	17.9	46.0
0.574000	29.8	Off	N	19.5	16.2	46.0
0.638000	35.1	Off	N	19.5	10.9	46.0
0.854000	28.3	Off	N	19.4	17.7	46.0

Test Mode :	Mode 3	Temperature :	20~22℃
Test Engineer :	Hayden Wu	Relative Humidity :	45~48%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	CDMA2000 BC0 Idle + WLAN Link (2.4G) + Bluetooth Link + GPS Rx + USB Cable (Link with Notebook) + Battery <1540mAh> + Earphone + Camera + Cradle		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



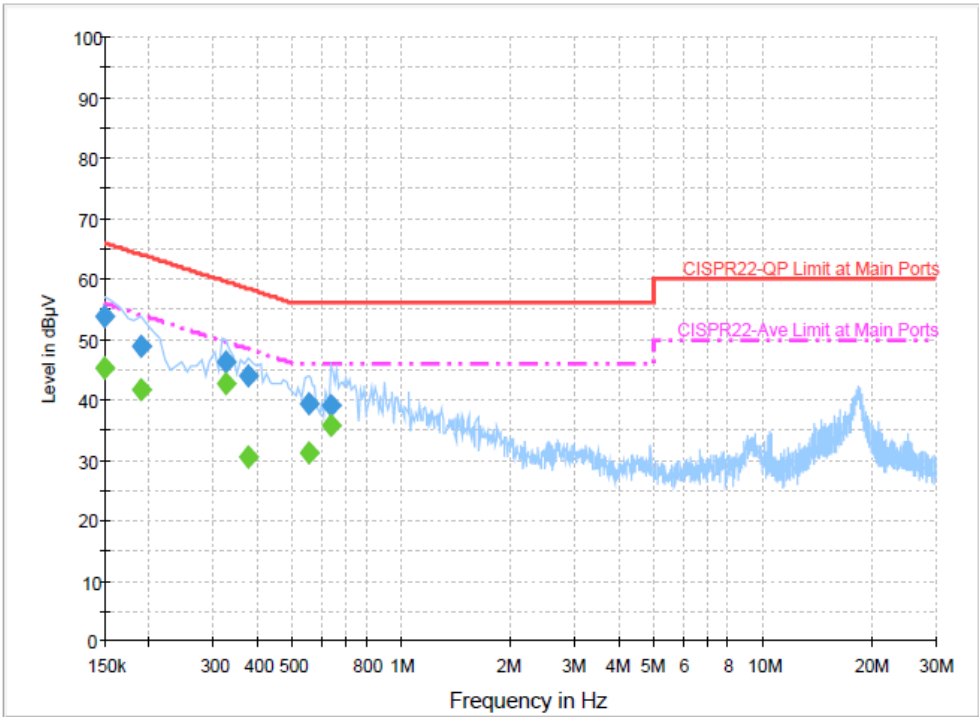
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	54.6	Off	L1	19.5	11.4	66.0
0.174000	51.7	Off	L1	19.5	13.1	64.8
0.318000	47.5	Off	L1	19.5	12.3	59.8
0.422000	42.0	Off	L1	19.4	15.4	57.4
0.638000	38.0	Off	L1	19.5	18.0	56.0
0.742000	36.1	Off	L1	19.5	19.9	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	43.7	Off	L1	19.5	12.3	56.0
0.174000	43.6	Off	L1	19.5	11.2	54.8
0.318000	41.8	Off	L1	19.5	8.0	49.8
0.422000	31.0	Off	L1	19.4	16.4	47.4
0.638000	31.5	Off	L1	19.5	14.5	46.0
0.742000	26.0	Off	L1	19.5	20.0	46.0

Test Mode :	Mode 3	Temperature :	20~22℃
Test Engineer :	Hayden Wu	Relative Humidity :	45~48%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	CDMA2000 BC0 Idle + WLAN Link (2.4G) + Bluetooth Link + GPS Rx + USB Cable (Link with Notebook) + Battery <1540mAh> + Earphone + Camera + Cradle		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	53.6	Off	N	19.5	12.4	66.0
0.190000	48.7	Off	N	19.5	15.3	64.0
0.326000	46.3	Off	N	19.5	13.3	59.6
0.374000	44.0	Off	N	19.4	13.6	58.4
0.550000	39.5	Off	N	19.5	16.5	56.0
0.638000	39.1	Off	N	19.5	16.9	56.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	45.4	Off	N	19.5	10.6	56.0
0.190000	41.7	Off	N	19.5	12.3	54.0
0.326000	42.7	Off	N	19.5	6.9	49.6
0.374000	30.6	Off	N	19.4	17.8	48.4
0.550000	31.1	Off	N	19.5	14.9	46.0
0.638000	35.8	Off	N	19.5	10.2	46.0

3.9 Radiated Emission Measurement

3.9.1 Limit of Radiated Emission

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

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

3.9.2 Measuring Instruments

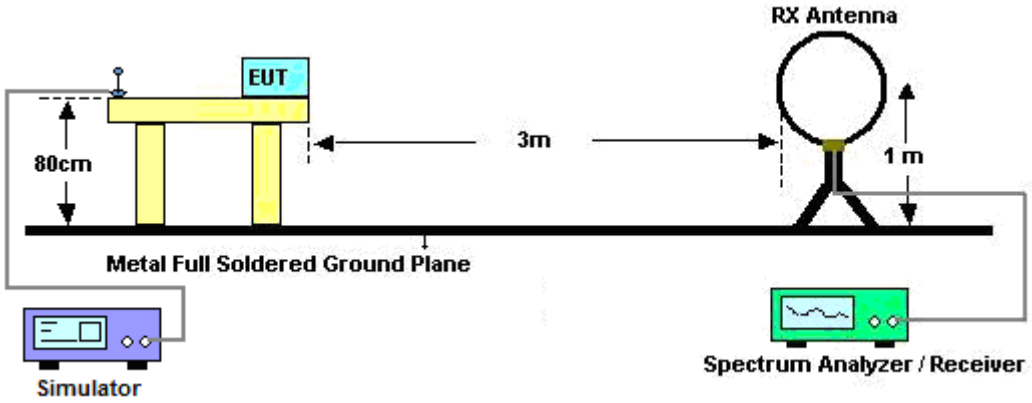
See list of measuring instruments of this test report.

3.9.3 Test Procedures

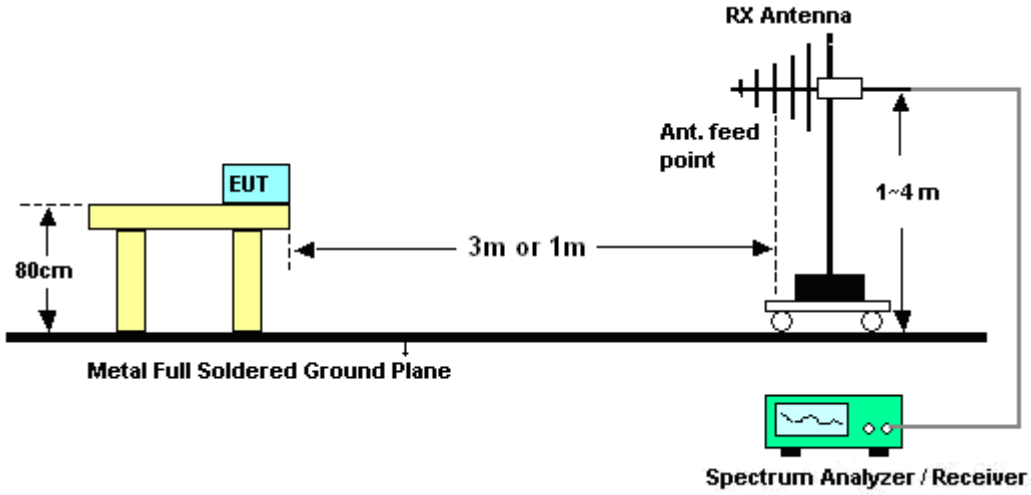
1. The testing follows the guidelines in FCC Public Notice DA 00-705 Measurement Guidelines.
2. Use the following spectrum analyzer settings:
   (1) Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
   (2) Above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.
   Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1m]) (dB)
3. Follow the guidelines in ANSI C63.4-2003 with respect to maximizing the emission by rotating the EUT, measuring the emission for three EUT orthogonal planes, and adjusting the measurement antenna height and polarization. A pre-amp and a high pass filter are used for this test in order to get the good signal level.

3.9.4 Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



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

Test Engineer :	Cona Huang	Temperature :	22~25°C
		Relative Humidity :	47~51%

Frequency (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

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

Test Mode :	Mode 1	**Temperature :**	22~25°C
Test Channel :	00	**Relative Humidity :**	47~51%
Test Engineer :	Cona Huang	**Polarization :**	Horizontal
Remark :	2402 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30	21.82	-18.18	40	33.37	19.51	0.64	31.7	-	-	Peak
80.22	18.05	-21.95	40	41.18	7.57	1	31.7	-	-	Peak
298.65	20.8	-25.2	46	36.63	13.45	2.12	31.4	-	-	Peak
438.6	25.85	-20.15	46	37.34	16.91	2.76	31.16	-	-	Peak
542.9	30.37	-15.63	46	39.37	18.99	3.07	31.06	-	-	Peak
915.3	36.15	-9.85	46	39.23	23.41	4.19	30.68	120	331	Peak
2369.85	33.38	-20.62	54	29.95	32.11	5.47	34.15	185	9	Average
2369.85	45.58	-28.42	74	42.15	32.11	5.47	34.15	185	9	Peak
2402	95.11	-	-	91.67	32.16	5.44	34.16	185	9	Peak
2402	78.12	-	-	74.69	32.13	5.46	34.16	185	9	Average
2500	33.3	-20.7	54	29.83	32.3	5.37	34.2	185	9	Average
2500	45.61	-28.39	74	42.14	32.3	5.37	34.2	185	9	Peak
8454	55.34	-18.66	74	44.3	36	10.14	35.1	100	131	Peak
8454	40.48	-13.52	54	29.44	36	10.14	35.1	100	131	Average

Test Mode :	Mode 1	Temperature :	22~25°C
Test Channel :	00	Relative Humidity :	47~51%
Test Engineer :	Cona Huang	Polarization :	Vertical
Remark :	2402 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30	26.26	-13.74	40	37.81	19.51	0.64	31.7	-	-	Peak
92.37	26.55	-16.95	43.5	47.96	9.17	1.12	31.7	-	-	Peak
182.82	23.31	-20.19	43.5	44.3	9	1.63	31.62	-	-	Peak
368.6	27.25	-18.75	46	40.79	15.29	2.43	31.26	-	-	Peak
542.9	31.31	-14.69	46	40.31	18.99	3.07	31.06	-	-	Peak
914.6	38.54	-7.46	46	41.64	23.4	4.19	30.69	100	15	Peak
2319.69	46.32	-27.68	74	42.92	32.02	5.51	34.13	100	342	Peak
2319.69	33.4	-20.6	54	30	32.02	5.51	34.13	100	342	Average
2402	97.57	-	-	94.13	32.16	5.44	34.16	100	342	Peak
2402	81.26	-	-	77.83	32.13	5.46	34.16	100	342	Average
2484	32.84	-21.16	54	29.38	32.27	5.38	34.19	100	342	Average
2484	46.04	-27.96	74	42.58	32.27	5.38	34.19	100	342	Peak
8289	54.66	-19.34	74	43.72	36	10.04	35.1	100	198	Peak
8289	40.09	-13.91	54	29.15	36	10.04	35.1	100	198	Average

Test Mode :	Mode 2	Temperature :	22~25°C
Test Channel :	39	Relative Humidity :	47~51%
Test Engineer :	Cona Huang	Polarization :	Horizontal
Remark :	2441 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30	21.52	-18.48	40	33.07	19.51	0.64	31.7	-	-	Peak
157.98	20.9	-22.6	43.5	40.5	10.54	1.5	31.64	-	-	Peak
298.65	20.09	-25.91	46	35.92	13.45	2.12	31.4	-	-	Peak
368.6	24.56	-21.44	46	38.1	15.29	2.43	31.26	-	-	Peak
542.9	30.51	-15.49	46	39.51	18.99	3.07	31.06	-	-	Peak
915.3	37.76	-8.24	46	40.84	23.41	4.19	30.68	100	49	Peak
2334	46.73	-27.27	74	43.33	32.02	5.51	34.13	107	15	Peak
2334	33.36	-20.64	54	29.96	32.02	5.51	34.13	107	15	Average
2441	95.91	-	-	92.46	32.22	5.41	34.18	107	15	Peak
2441	79.25	-	-	75.8	32.22	5.41	34.18	107	15	Average
2500	46.02	-27.98	74	42.55	32.3	5.37	34.2	107	15	Peak
2500	32.85	-21.15	54	29.38	32.3	5.37	34.2	107	15	Average
8322	55.13	-18.87	74	44.17	36	10.06	35.1	100	199	Peak
8322	40.62	-13.38	54	29.66	36	10.06	35.1	100	199	Average

Test Mode :	Mode 2	Temperature :	22~25°C
Test Channel :	39	Relative Humidity :	47~51%
Test Engineer :	Cona Huang	Polarization :	Vertical
Remark :	2441 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30	26.63	-13.37	40	38.18	19.51	0.64	31.7	-	-	Peak
92.37	26.98	-16.52	43.5	48.39	9.17	1.12	31.7	-	-	Peak
286.5	23.19	-22.81	46	39.29	13.27	2.06	31.43	-	-	Peak
368.6	25.89	-20.11	46	39.43	15.29	2.43	31.26	-	-	Peak
542.9	31.89	-14.11	46	40.89	18.99	3.07	31.06	-	-	Peak
915.3	35.67	-10.33	46	38.75	23.41	4.19	30.68	100	211	Peak
2334	46.2	-27.8	74	42.8	32.02	5.51	34.13	100	352	Peak
2334	33.38	-20.62	54	29.98	32.02	5.51	34.13	100	352	Average
2441	95.84	-	-	92.39	32.22	5.41	34.18	100	352	Peak
2441	80.38	-	-	76.93	32.22	5.41	34.18	100	352	Average
2492	32.83	-21.17	54	29.36	32.3	5.37	34.2	100	352	Average
2492	46.06	-27.94	74	42.59	32.3	5.37	34.2	100	352	Peak
8298	54.87	-19.13	74	43.93	36	10.04	35.1	100	174	Peak
8298	40.82	-13.18	54	29.88	36	10.04	35.1	100	174	Average

Test Mode :	Mode 3	Temperature :	22~25°C
Test Channel :	78	Relative Humidity :	47~51%
Test Engineer :	Cona Huang	Polarization :	Horizontal
Remark :	2480 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30	27.71	-12.29	40	39.26	19.51	0.64	31.7	-	-	Peak
96.69	26.55	-16.95	43.5	47.21	9.9	1.14	31.7	-	-	Peak
157.98	22.61	-20.89	43.5	42.21	10.54	1.5	31.64	-	-	Peak
438.6	25.78	-20.22	46	37.27	16.91	2.76	31.16	-	-	Peak
542.9	30.74	-15.26	46	39.74	18.99	3.07	31.06	-	-	Peak
915.3	38.28	-7.72	46	41.36	23.41	4.19	30.68	100	154	Peak
2366	46.29	-27.71	74	42.87	32.08	5.49	34.15	104	16	Peak
2366	33.4	-20.6	54	29.98	32.08	5.49	34.15	104	16	Average
2480	94.52	-	-	91.06	32.27	5.38	34.19	104	16	Peak
2480	79.09	-	-	75.63	32.27	5.38	34.19	104	16	Average
2483.5	60.15	-13.85	74	56.69	32.27	5.38	34.19	104	16	Peak
2483.5	47.42	-6.58	54	43.96	32.27	5.38	34.19	104	16	Average
8349	54.56	-19.44	74	43.59	36	10.07	35.1	100	199	Peak
8349	40.63	-13.37	54	29.66	36	10.07	35.1	100	199	Average

Test Mode :	Mode 3	Temperature :	22~25°C
Test Channel :	78	Relative Humidity :	47~51%
Test Engineer :	Cona Huang	Polarization :	Vertical
Remark :	2480 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30	26.07	-13.93	40	37.62	19.51	0.64	31.7	-	-	Peak
92.37	28.05	-15.45	43.5	49.46	9.17	1.12	31.7	-	-	Peak
157.98	22.17	-21.33	43.5	41.77	10.54	1.5	31.64	-	-	Peak
368.6	26.29	-19.71	46	39.83	15.29	2.43	31.26	-	-	Peak
542.9	31.69	-14.31	46	40.69	18.99	3.07	31.06	-	-	Peak
915.3	38.9	-7.1	46	41.98	23.41	4.19	30.68	100	114	Peak
2342	46.06	-27.94	74	42.65	32.05	5.5	34.14	100	168	Peak
2342	33.37	-20.63	54	29.96	32.05	5.5	34.14	100	168	Average
2480	94.94	-	-	91.48	32.27	5.38	34.19	100	168	Peak
2480	78.46	-	-	75	32.27	5.38	34.19	100	168	Average
2483.5	47.57	-6.43	54	44.11	32.27	5.38	34.19	100	168	Average
2483.5	59.16	-14.84	74	55.7	32.27	5.38	34.19	100	168	Peak
8445	54.85	-19.15	74	43.81	36	10.14	35.1	100	121	Peak
8445	40.92	-13.08	54	29.88	36	10.14	35.1	100	121	Average

Test Mode :	Mode 4	Temperature :	22~25°C
Test Channel :	78	Relative Humidity :	47~51%
Test Engineer :	Cona Huang	Polarization :	Horizontal
Remark :	2480 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
34.05	21.73	-18.27	40	35.47	17.29	0.67	31.7	-	-	Peak
96.69	26.55	-16.95	43.5	47.21	9.9	1.14	31.7	-	-	Peak
153.66	19.52	-23.98	43.5	38.74	10.95	1.48	31.65	-	-	Peak
438.6	26.78	-19.22	46	38.27	16.91	2.76	31.16	-	-	Peak
578.6	30.68	-15.32	46	38.85	19.67	3.18	31.02	100	19	Peak
850.9	26.26	-19.74	46	30.3	22.7	3.96	30.7	-	-	Peak
2318	46.11	-27.89	74	42.71	32.02	5.51	34.13	100	337	Peak
2318	29.82	-24.18	54	26.42	32.02	5.51	34.13	100	337	Average
2480	93.95	-	-	90.49	32.27	5.38	34.19	100	337	Peak
2480	78.55	-	-	75.09	32.27	5.38	34.19	100	337	Average
2483.5	59.47	-14.53	74	56.01	32.27	5.38	34.19	100	337	Peak
2483.5	47.91	-6.09	54	44.45	32.27	5.38	34.19	100	337	Average
8301	54.48	-19.52	74	43.54	36	10.04	35.1	100	99	Peak
8301	40.6	-13.4	54	29.66	36	10.04	35.1	100	99	Average

Test Mode :	Mode 4	Temperature :	22~25°C
Test Channel :	78	Relative Humidity :	47~51%
Test Engineer :	Cona Huang	Polarization :	Vertical
Remark :	2480 MHz is Fundamental Signals which can be ignored.		

Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
30.81	24.22	-15.78	40	36.32	18.95	0.65	31.7	-	-	Peak
80.49	25.95	-14.05	40	49.08	7.57	1	31.7	100	66	Peak
182.82	21.86	-21.64	43.5	42.85	9	1.63	31.62	-	-	Peak
368.6	26.29	-19.71	46	39.83	15.29	2.43	31.26	-	-	Peak
615	29.82	-16.18	46	37.33	20.18	3.3	30.99	-	-	Peak
862.1	25.6	-20.4	46	29.47	22.82	4.01	30.7	-	-	Peak
2364	45.77	-28.23	74	42.34	32.08	5.49	34.14	186	11	Peak
2364	27.55	-26.45	54	24.12	32.08	5.49	34.14	186	11	Average
2480	96.54	-	-	93.08	32.27	5.38	34.19	186	11	Peak
2480	82.56	-	-	79.1	32.27	5.38	34.19	186	11	Average
2483.5	47.73	-6.27	54	44.27	32.27	5.38	34.19	186	11	Average
2483.5	61.98	-12.02	74	58.52	32.27	5.38	34.19	186	11	Peak
8301	55.6	-18.4	74	44.66	36	10.04	35.1	100	241	Peak
8301	40.09	-13.91	54	29.15	36	10.04	35.1	100	241	Average

3.10 Antenna Requirements

3.10.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

3.10.2 Antenna Connected Construction

The antennas type used in this product is PIFA Antenna without connector and it is considered to meet antenna requirement.

3.10.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100055	9kHz~40GHz	Jun. 23, 2009	Jun. 22, 2010	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	0932001	N/A	Sep. 17, 2009	Sep. 16, 2010	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	0846202	N/A	Sep. 10, 2009	Sep. 09, 2010	Conducted (TH02-HY)
EMI Test Receive	R&S	ESCS 30	100356	9KHz – 2.75GHz	Aug. 05, 2009	Aug. 04, 2010	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100081	9kHz~30MHz	Nov. 30, 2009	Nov. 29, 2010	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100080	9kHz~30MHz	Nov. 23, 2009	Nov. 22, 2010	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	N/A	Conduction (CO05-HY)
System Simulator	Agilent	E5515C (8960)	MY48360820	N/A	Dec. 15 , 2008	Dec. 14 , 2010	Conduction (CO05-HY)
GPS Station	T&E	GS-50	N/A	N/A	N/A	N/A	Conduction (CO05-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2726	30MHz ~ 1GHz	Oct. 31, 2009	Oct. 30, 2010	Radiation (03CH07-HY)
Spectrum Analyzer	R&S	FSP	101067	9KHz ~ 30GHz	Dec. 04, 2009	Dec. 03, 2010	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 20, 2009	Aug. 19, 2010	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz- 40GHz	Oct. 14, 2009	Oct. 13, 2010	Radiation (03CH07-HY)
Pre Amplifier	Agilent	8449B	3008A02362	1GHz~ 26.5GHz	Dec.09,2009	Dec. 08, 2010	Radiation (03CH07-HY)
Pre Amplifier	COM-POWER	PA-103A	161241	10-1000MHz.32 dB.GAIN	Mar. 27, 2009	Mar. 26, 2010	Radiation (03CH07-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 KHz~30 MHz	May 22, 2008	May 21, 2010	Radiation (03CH07-HY)
Bluetooth Base Station	R&S	CBT32	100519	N/A	May 12, 2009	May 11, 2011	Radiation (03CH07-HY)

5 Uncertainty of Evaluation

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

Contribution	Uncertainty of X_i		$u(X_i)$
	dB	Probability Distribution	
Receiver Reading	0.10	Normal (k=2)	0.05
Cable Loss	0.10	Normal (k=2)	0.05
AMN Insertion Loss	2.50	Rectangular	0.63
Receiver Specification	1.50	Rectangular	0.43
Site Imperfection	1.39	Rectangular	0.80
Mismatch	+0.34 / -0.35	U-Shape	0.24
Combined Standard Uncertainty Uc(y)	**1.13**		
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.26**		

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

Contribution	Uncertainty of X_i		$u(X_i)$
	dB	Probability Distribution	
Receiver Reading	0.41	Normal (k=2)	0.21
Antenna Factor Calibration	0.83	Normal (k=2)	0.42
Cable Loss Calibration	0.25	Normal (k=2)	0.13
Pre-Amplifier Gain Calibration	0.27	Normal (k=2)	0.14
RCV/SPA Specification	2.50	Rectangular	0.72
Antenna Factor Interpolation for Frequency	1.00	Rectangular	0.29
Site Imperfection	1.43	Rectangular	0.83
Mismatch	+0.39 / -0.41	U-Shape	0.28
Combined Standard Uncertainty Uc(y)	**1.27**		
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.54**		

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

Contribution	Uncertainty of X_i		$u(X_i)$	C_i	$C_i * u(X_i)$
	dB	Probability Distribution			
Receiver Reading	±0.10	Normal (k=2)	0.10	1	0.10
Antenna Factor Calibration	±1.70	Normal (k=2)	0.85	1	0.85
Cable Loss Calibration	±0.50	Normal (k=2)	0.25	1	0.25
Receiver Correction	±2.00	Rectangular	1.15	1	1.15
Antenna Factor Directional	±1.50	Rectangular	0.87	1	0.87
Site Imperfection	±2.80	Triangular	1.14	1	1.14
Mismatch Receiver VSWR Γ1 = 0.197 Antenna VSWR Γ2 = 0.194 Uncertainty = 20Log(1-Γ1*Γ2)	+0.34 / -0.35	U-Shape	0.244	1	0.244
Combined Standard Uncertainty Uc(y)	**2.36**				
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 EP010103 as below.