

FCC/IC RF Test Report

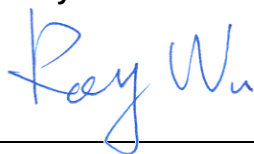
APPLICANT : Atheros Communications, Inc.
EQUIPMENT : 802.11b/g/n WLAN + Bluetooth Combo module
BRAND NAME : Atheros
MODEL NAME : ARS42-SB
FCC ID : PPD-ARS42SB
IC : 4104A-ARS42SB
STANDARD : FCC Part 15 Subpart C §15.247
IC RSS-210 Issue 8
CLASSIFICATION : Digital Spread Spectrum (DSS)

The WiFi + Bluetooth module was tested on extended card inserted to a host laptop PC.

The product was received on Feb. 15, 2011 and completely tested on Mar. 28, 2011. 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 shows 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



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 Manufacturer	5
1.3 Testing Site Facilities	5
1.4 Applied Standards	5
1.5 Ancillary Equipment List	6
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST	7
2.1 General Information of EUT	7
2.2 Maximum Output Power	8
2.3 Antenna Information	8
2.4 Connection Diagram of Test System	9
2.5 RF Utility	9
3 TEST RESULT	10
3.1 Number of Channel Measurement	10
3.2 20dB and 99% Bandwidth Measurement	19
3.3 Hopping Channel Separation Measurement	36
3.4 Dwell Time Measurement	45
3.5 Peak Output Power Measurement	60
3.6 Spurious Emission Measurement	69
3.7 Band Edges Measurement	94
3.8 Radiated Emission Measurement	126
3.9 AC Conducted Emission Measurement	155
4 LIST OF MEASURING EQUIPMENT	159
5 UNCERTAINTY OF EVALUATION	160
APPENDIX A. PHOTOGRAPHS OF EUT	
APPENDIX B. SETUP PHOTOGRAPHS	



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR121516-01A	Rev. 01	Initial issue of report	Apr. 07, 2011

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(1)	A8.4(2)	Number of Channels	$\geq 15\text{Chs}$	Pass	-
3.2	15.247(a)(1)	A8.1(a)	20dB Bandwidth	NA	Pass	-
3.2	-	Gen 4.4.1	99% Bandwidth	-	Pass	-
3.3	15.247(a)(1)	A8.1(b)	Channel Separation	$\geq 2/3$ of 20dB BW	Pass	-
3.4	15.247(a)(1)	A8.1(d)	Dwell Time of Each Channel	$\leq 0.4\text{sec}$ in 31.6sec period	Pass	-
3.5	15.247(b)(1)	A8.1(b)	Peak Output Power	$\leq 125\text{ mW}$	Pass	-
3.6	15.247(d)	A8.5	Spurious Emission	$< 20\text{ dBc}$	Pass	-
3.7	15.247(d)	A8.5	Frequency Band Edges	$\leq 20\text{dBc}$	Pass	-
3.8	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 3.17 dB at 2483.5 MHz
3.9	15.207	Gen 7.2.2	AC Conducted Emission	15.207(a)	Pass	Under limit 17.1 dB at 0.19 MHz

1 General Description

1.1 Applicant

Atheros Communications, Inc.

1700 Technology Drive, San Jose, CA 95110, United States

1.2 Manufacturer

Atheros Communications, Inc.

1700 Technology Drive, San Jose, CA 95110, United States

1.3 Testing Site Facilities

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

1.4 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
- ♦ RSS-210 Issue 8
- ♦ FCC KDB Publication No. 558074 (Measurement Guidelines of DTS)
- ♦ ANSI C63.4-2003

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.

1.5 Ancillary Equipment List

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
2.	Notebook	DELL	Larirude E4300	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
3.	LCD Monitor	Lenovo	6135-AB1	FCC DoC	Shielded, 1.6 m	Unshielded, 1.8 m

2 Test Configuration of Equipment Under Test

2.1 General Information of EUT

Product Feature & Specification	
Equipment	802.11b/g/n WLAN + Bluetooth Combo module
Brand Name	Atheros
Model Name	ARS42-SB
Sample 1	EUT Support Bluetooth and 802.11b/g/n function
Sample 2	EUT Support 802.11b/g/n function only
FCC ID	PPD-ARS42SB
IC	4104A-ARS42SB
Tx/Rx Frequency Range	2400 MHz ~ 2483.5 MHz
Channel Spacing	79
Carrier Frequency of Each Channel	2402+n*1 MHz; n=0~78 for Bluetooth 2.1+EDR 40 Channel(37 hopping + 3 advertising channel) for Bluetooth 4.0
Channel Spacing	1 MHz
Type of Modulation	Bluetooth (1Mbps) : GFSK Bluetooth EDR (2Mbps) : $\pi/4$ -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.

2.2 Maximum Output Power

2.2.1 Peak Power

<Low Energy Bluetooth>

The device has the maximum peak power as below:

Channel	Frequency	Bluetooth RF Output Power	
		Data Rate / Modulation	
		GFSK	
		1Mbps	
Ch00	2402MHz	6.36 dBm	
Ch19	2440MHz	6.33 dBm	
Ch39	2480MHz	6.04 dBm	

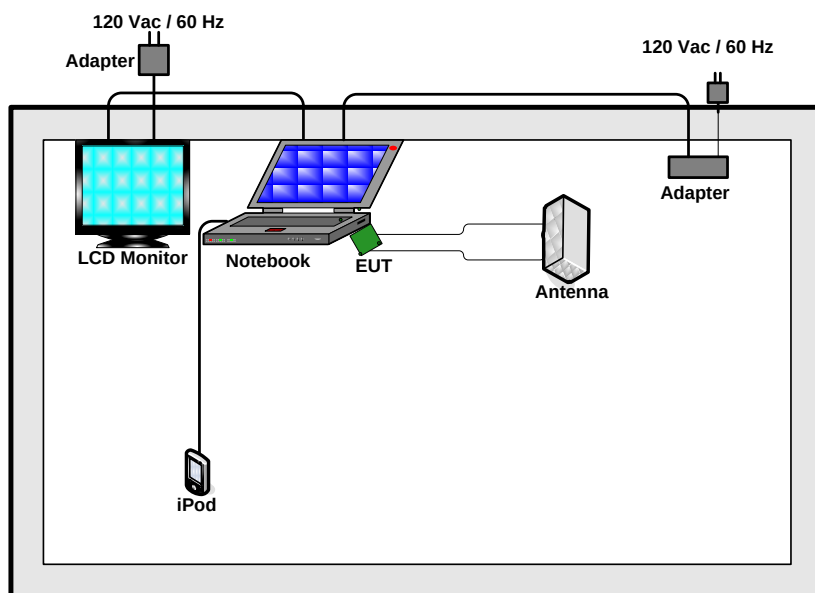
<Standard Bluetooth>

Channel	Frequency	Bluetooth RF Output Power		
		Data Rate / Modulation		
		GFSK	$\pi/4$ -DQPSK	8-DPSK
		1Mbps	2Mbps	3Mbps
Ch00	2402MHz	7.39 dBm	9.69 dBm	10.23 dBm
Ch39	2441MHz	7.33 dBm	9.69 dBm	10.24 dBm
Ch78	2480MHz	7.01 dBm	9.39 dBm	10.00 dBm

2.3 Antenna Information

Brand / Model Name	Type	Frequency Range (MHz)	Antenna Gain (dBi)
Wistron Neweb Corporation / EBJ	PIFA	2400 ~ 2500	3.62

2.4 Connection Diagram of Test System



2.5 RF Utility

For Bluetooth function, the RF utility, "Art" was installed in EUT which was programmed in order to make the EUT into the engineering modes to 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.

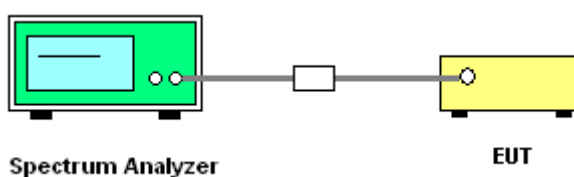
3.1.2 Measuring Instruments

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; $RBW \geq 1\%$ of the span; $VBW \geq RBW$; 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



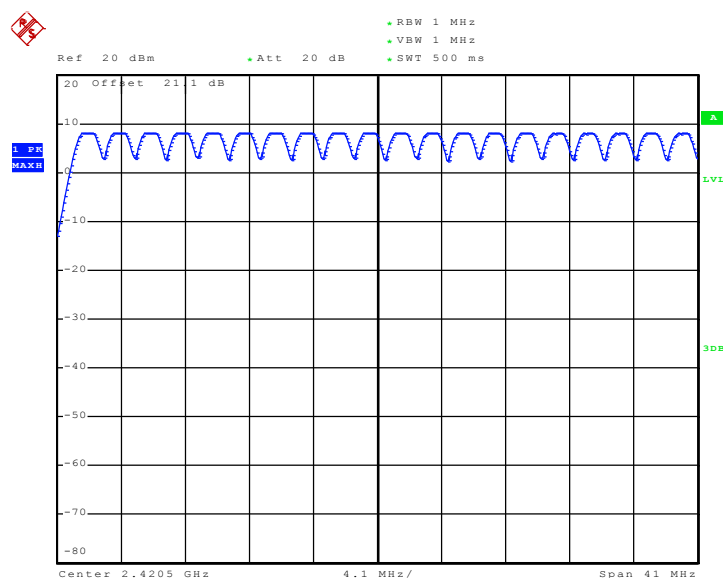
3.1.5 Test Result of Number of Hopping Frequency

<Low Energy Bluetooth>

Test Mode :	Bluetooth LE 1Mbps 8-DPSK L/M/H channel	Temperature :	24~26°C
Test Engineer :	Cona Huang	Relative Humidity :	50~53%

Number of Hopping Channels (Channel)	Limits (Channel)	Pass/Fail
39	> 15	Pass

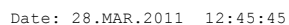
Number of Hopping Channel Plot on Channel 00 - 39



Date: 28.MAR.2011 12:41:46



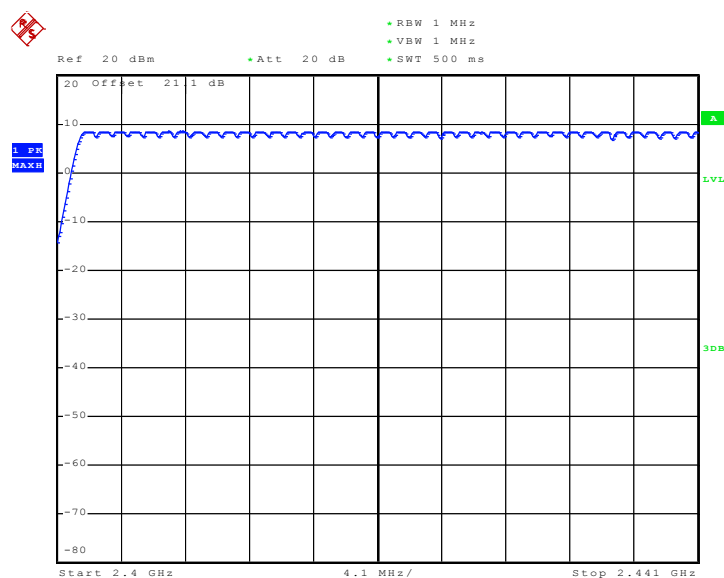
Report No. : FR121516-01A



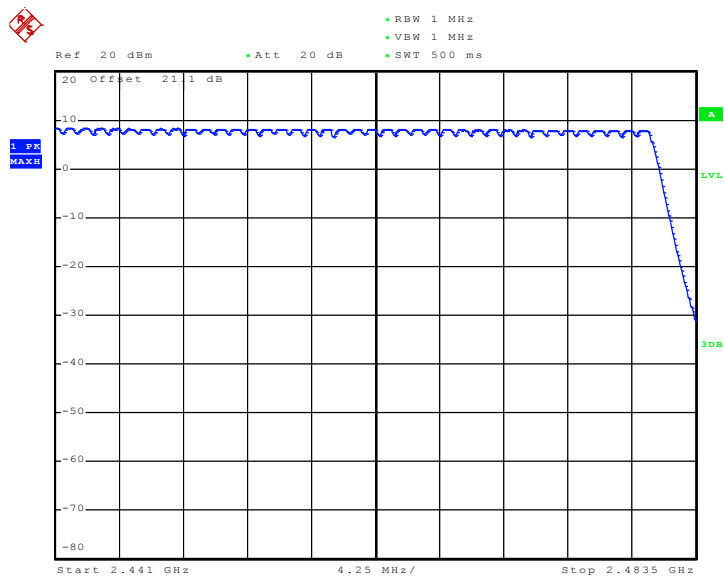
<Standard Bluetooth>

Test Mode :	Bluetooth 1Mbps 8-DPSK L/M/H channel	Temperature :	24~26℃
Test Engineer :	Cona Huang	Relative Humidity :	50~53%

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

Number of Hopping Channel Plot on Channel 00 - 78


Date: 17.MAR.2011 14:35:00



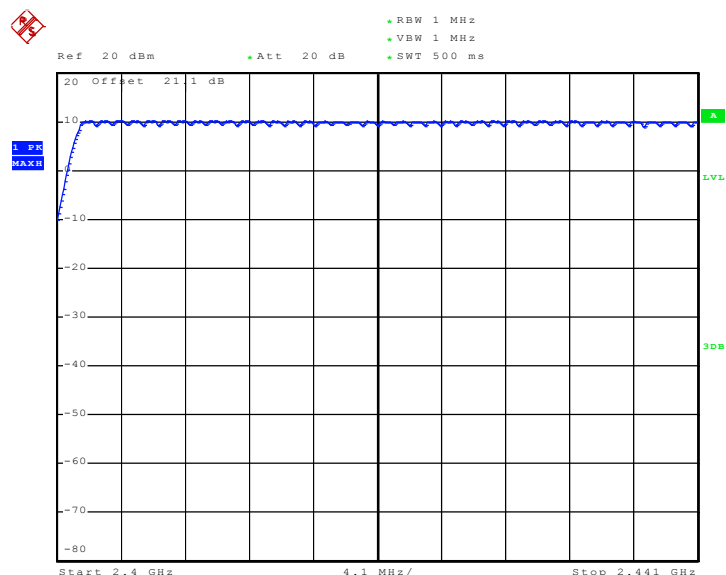
Date: 17.MAR.2011 14:37:50



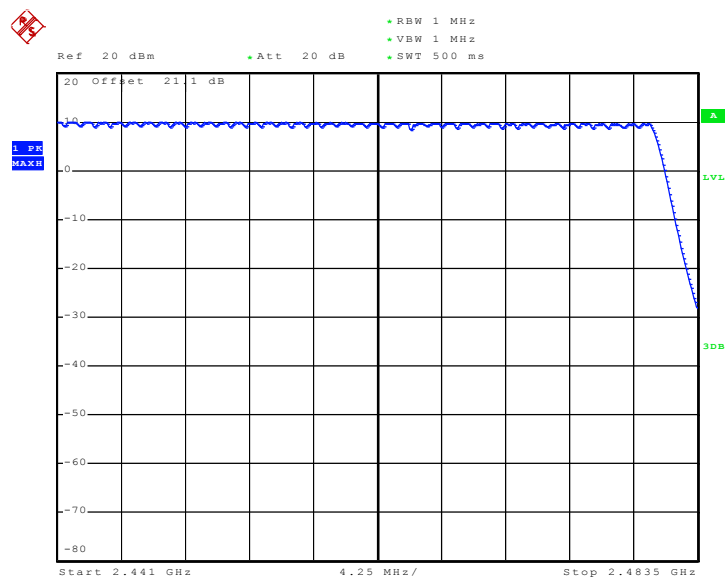
Test Mode :	Bluetooth EDR 2Mbps π /4-DQPSK L/M/H channel	Temperature :	24~26°C
Test Engineer :	Cona Huang	Relative Humidity :	50~53%

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

Number of Hopping Channel Plot on Channel 00 - 78

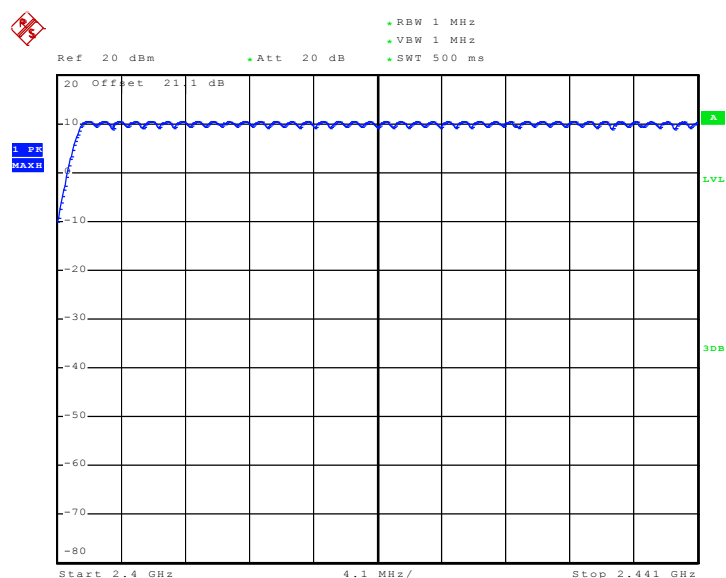


Date: 17.MAR.2011 14:42:58

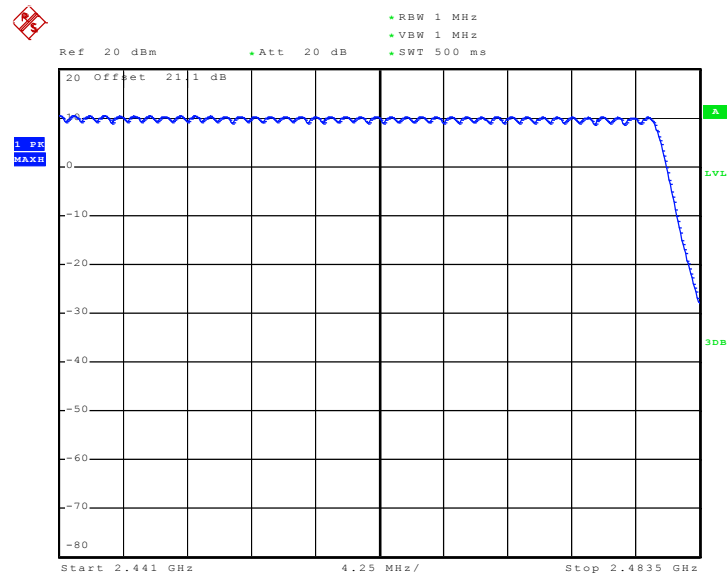


Date: 17.MAR.2011 14:46:15

Test Mode :	Bluetooth EDR 3Mbps 8-DPSK L/M/H channel	Temperature :	24~26℃
Test Engineer :	Cona Huang	Relative Humidity :	50~53%
Number of Hopping Channels (Channel)		Limits (Channel)	Pass/Fail
79		> 15	Pass

Number of Hopping Channel Plot on Channel 00 - 78


Date: 17.MAR.2011 14:51:05



Date: 17.MAR.2011 14:55:40

3.2 20dB and 99% Bandwidth Measurement

3.2.1 Limit of 20dB Bandwidth

N/A

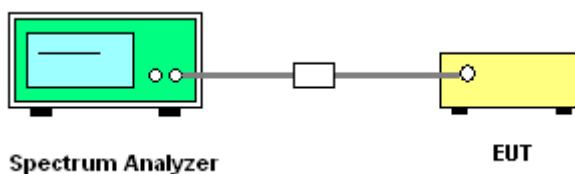
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

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

3.2.4 Test Setup



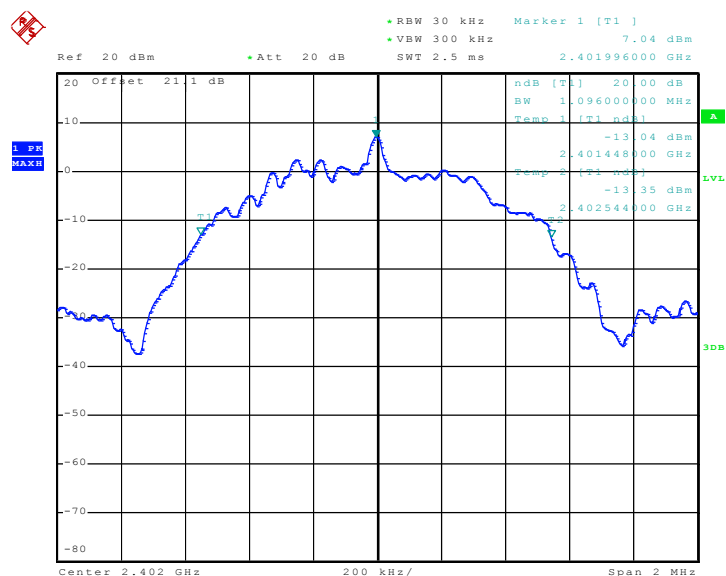
3.2.5 Test Result of 20dB Bandwidth

<Low Energy Bluetooth>

Test Mode :	Bluetooth LE 1Mbps GFSK L/M/H channel	Temperature :	24~26°C
Test Engineer :	Cona Huang	Relative Humidity :	50~53%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.096
19	2440	1.092
39	2480	1.092

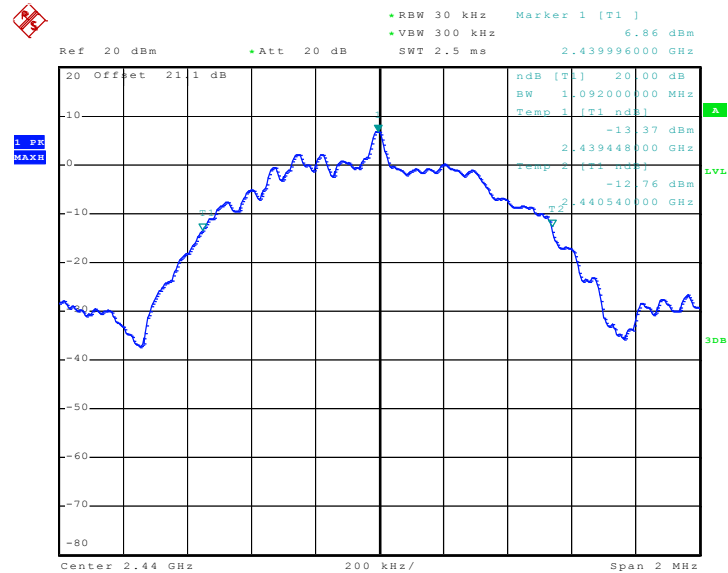
20 dB Bandwidth Plot on Channel 00



Date: 17.MAR.2011 20:21:28

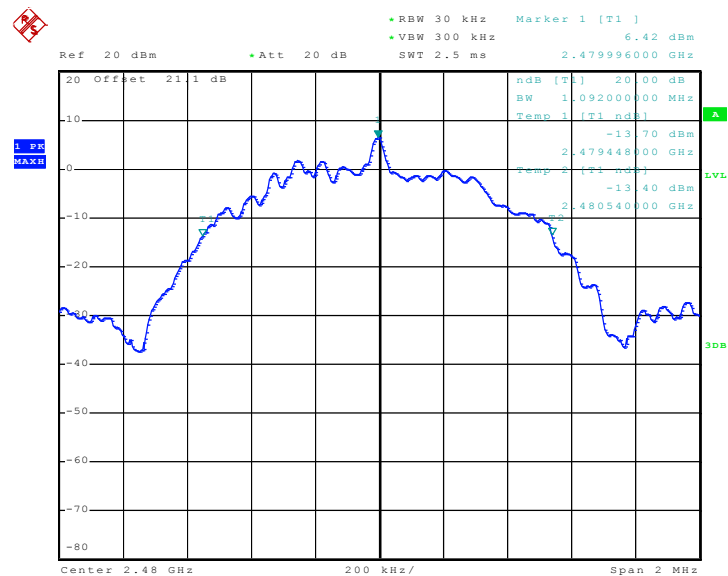


20 dB Bandwidth Plot on Channel 19



Date: 17.MAR.2011 20:30:32

20 dB Bandwidth Plot on Channel 39

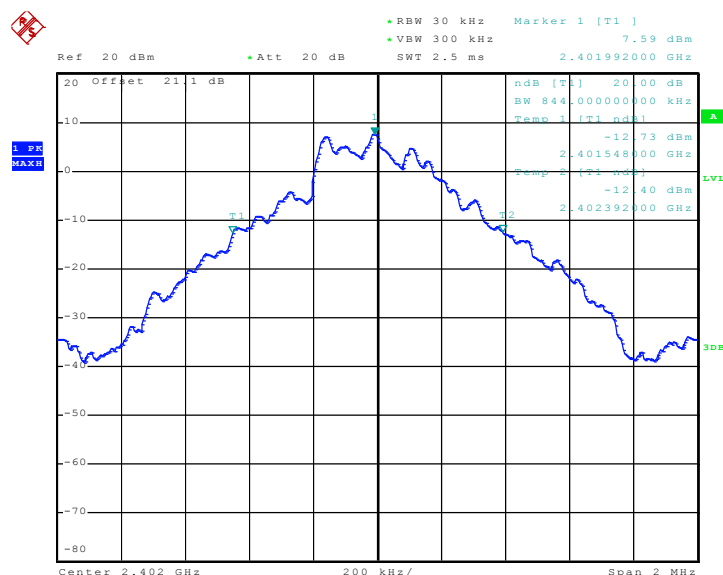


Date: 17.MAR.2011 20:32:56

<Standard Bluetooth>

Test Mode :	Bluetooth 1Mbps GFSK L/M/H channel	Temperature :	24~26℃
Test Engineer :	Cona Huang	Relative Humidity :	50~53%

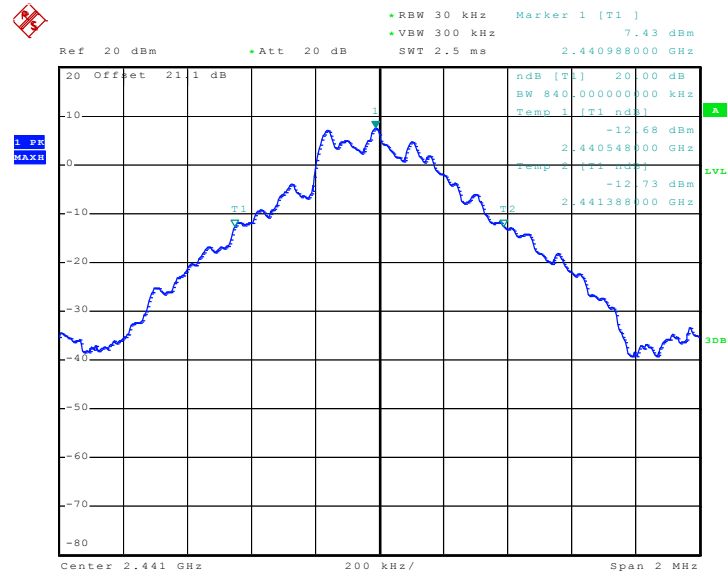
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	0.844
39	2441	0.840
78	2480	0.844

20 dB Bandwidth Plot on Channel 00


Date: 17.MAR.2011 15:26:59

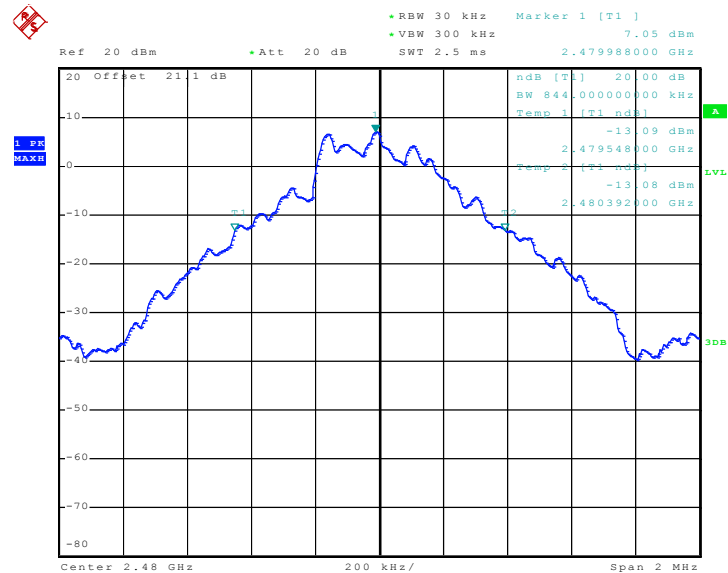


20 dB Bandwidth Plot on Channel 39



Date: 17.MAR.2011 15:27:26

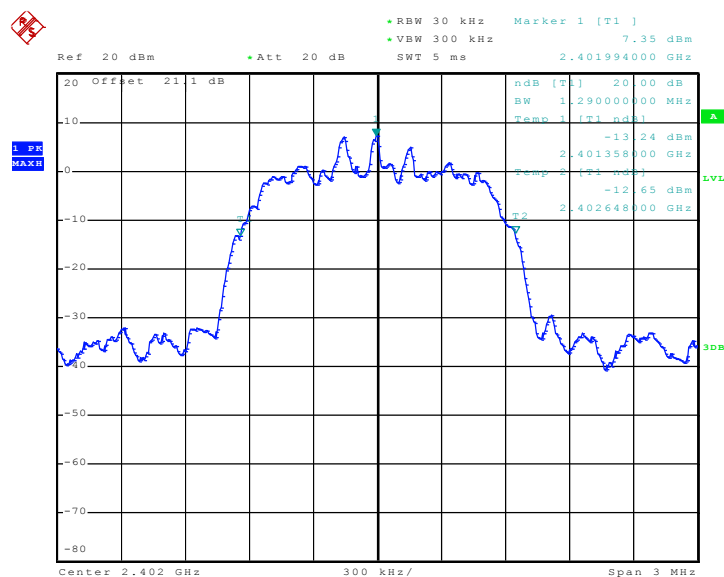
20 dB Bandwidth Plot on Channel 78



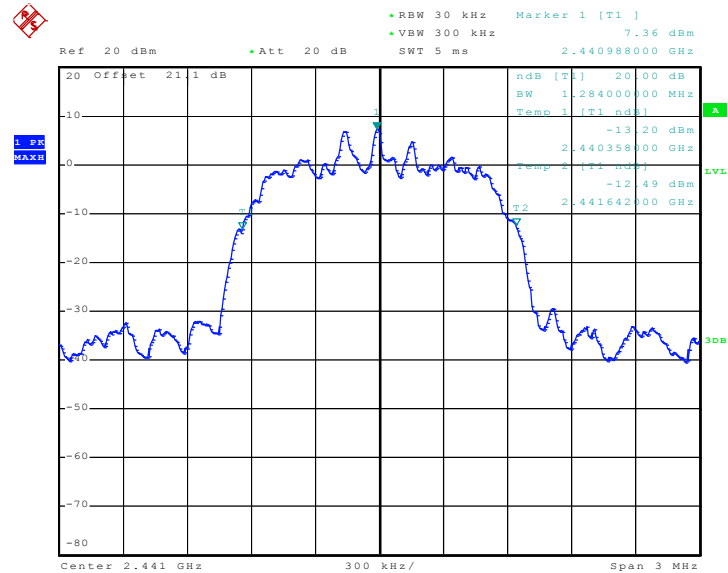
Date: 17.MAR.2011 15:26:09

Test Mode :	Bluetooth EDR 2Mbps π /4-DQPSK L/M/H channel	Temperature :	24~26°C
Test Engineer :	Cona Huang	Relative Humidity :	50~53%

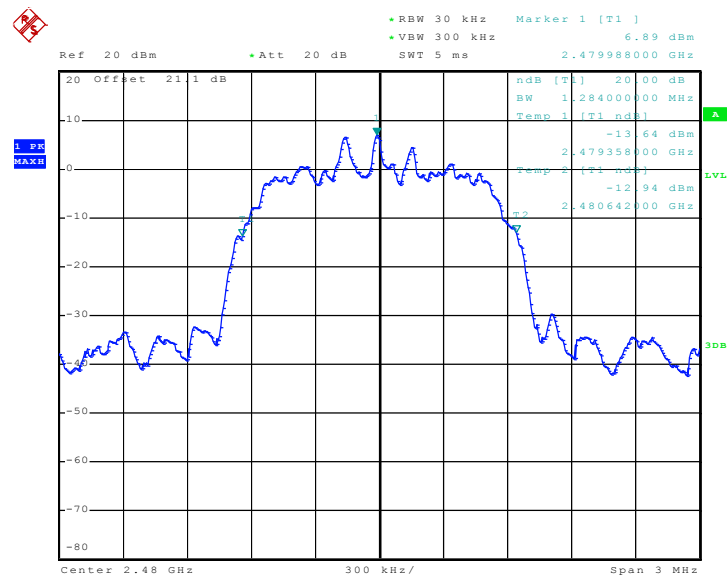
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.290
39	2441	1.284
78	2480	1.284

20 dB Bandwidth Plot on Channel 00


Date: 17.MAR.2011 15:29:01

20 dB Bandwidth Plot on Channel 39


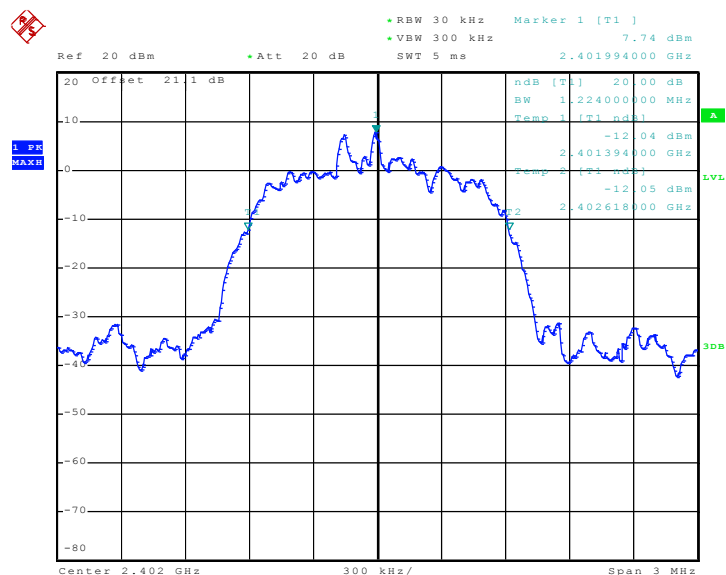
Date: 17.MAR.2011 15:28:36

20 dB Bandwidth Plot on Channel 78


Date: 17.MAR.2011 15:29:25

Test Mode :	Bluetooth EDR 3Mbps 8-DPSK L/M/H channel	Temperature :	24~26℃
Test Engineer :	Cona Huang	Relative Humidity :	50~53%

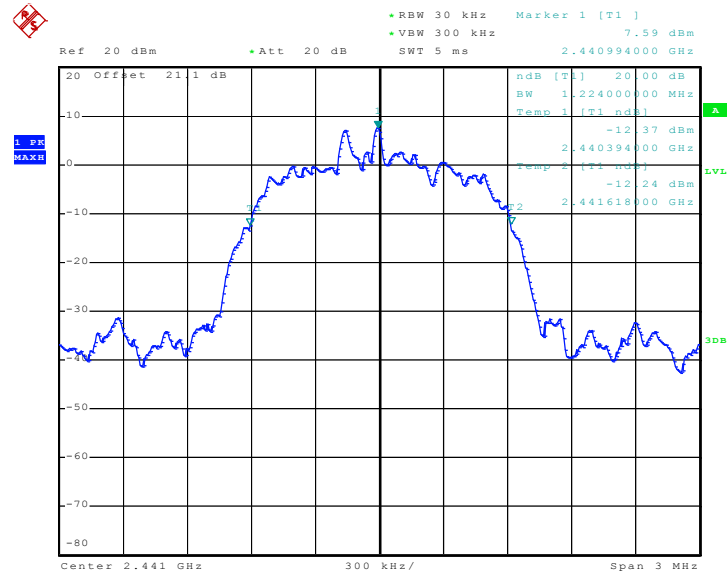
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.224
39	2441	1.224
78	2480	1.224

20 dB Bandwidth Plot on Channel 00


Date: 17.MAR.2011 14:56:59

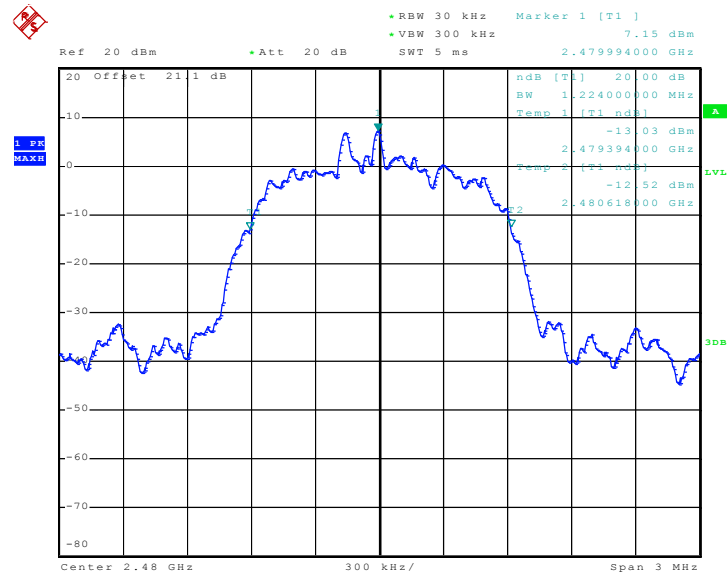


20 dB Bandwidth Plot on Channel 39



Date: 17.MAR.2011 14:57:36

20 dB Bandwidth Plot on Channel 78



Date: 17.MAR.2011 14:58:05

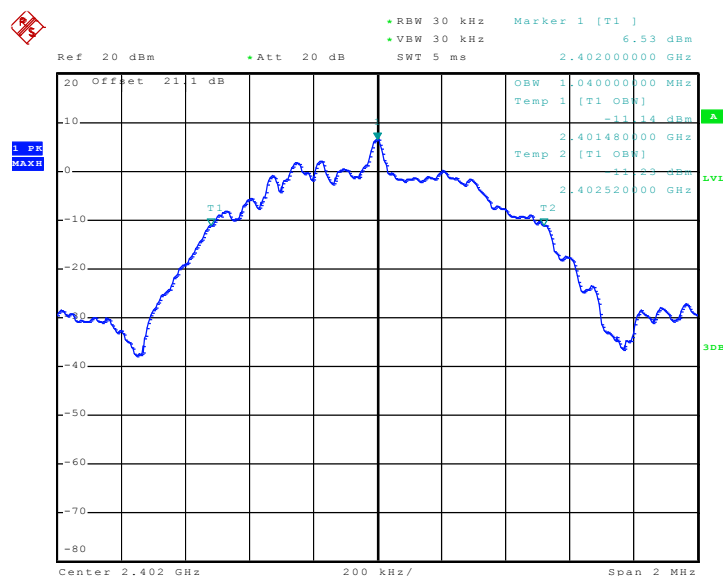
3.2.6 Test Result of 99% Occupied Bandwidth

<Low Energy Bluetooth>

Test Mode :	Bluetooth LE 1Mbps GFSK L/M/H channel	Temperature :	24~26°C
Test Engineer :	Cona Huang	Relative Humidity :	50~53%

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	1.040
19	2440	1.040
39	2480	1.040

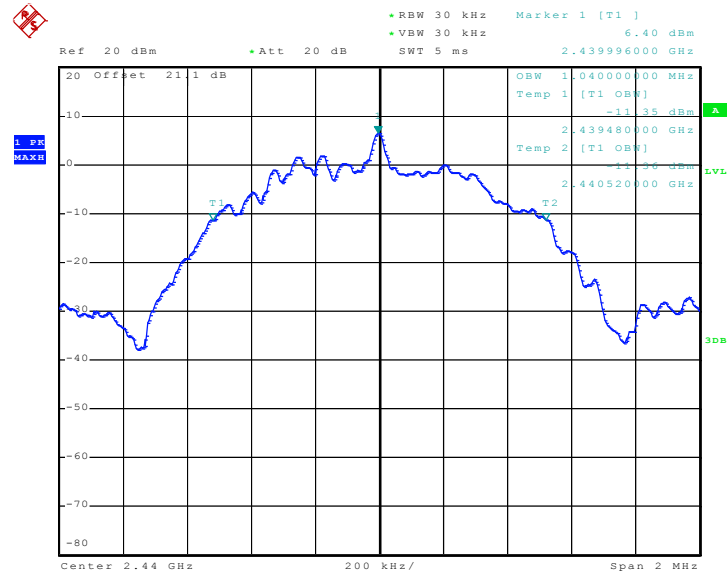
99% Bandwidth Plot on Channel 00



Date: 17.MAR.2011 20:22:26

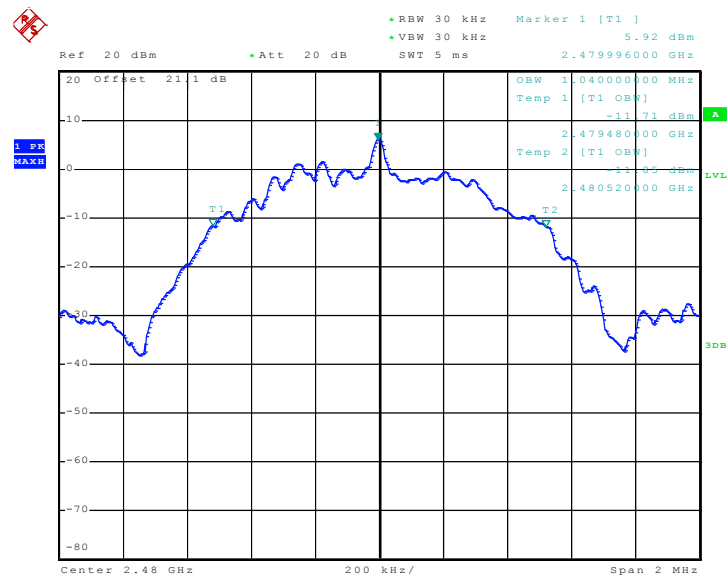


99% Occupied Bandwidth Plot on Channel 19



Date: 17.MAR.2011 20:31:21

99% Occupied Bandwidth Plot on Channel 39

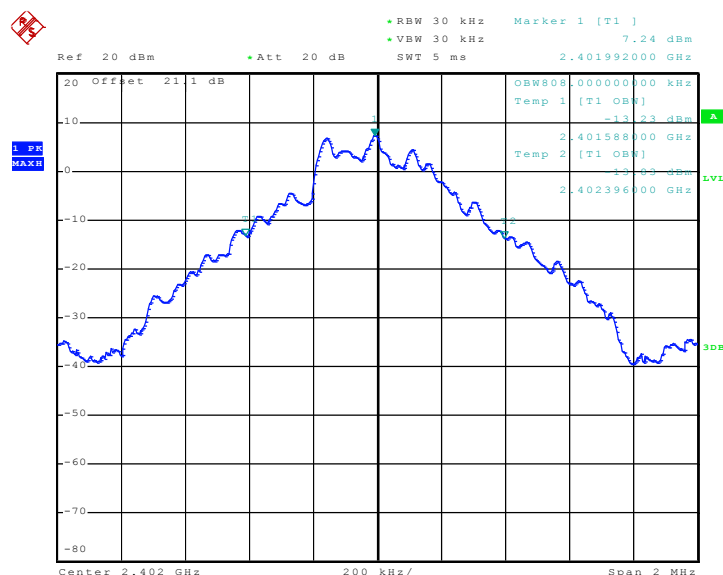


Date: 17.MAR.2011 20:33:40

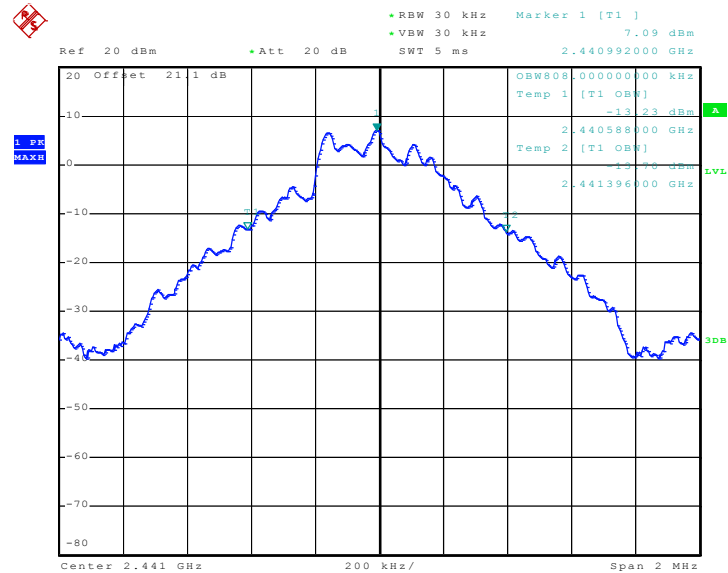
<Standard Bluetooth>

Test Mode :	Bluetooth 1Mbps GFSK L/M/H channel	Temperature :	24~26℃
Test Engineer :	Cona Huang	Relative Humidity :	50~53%

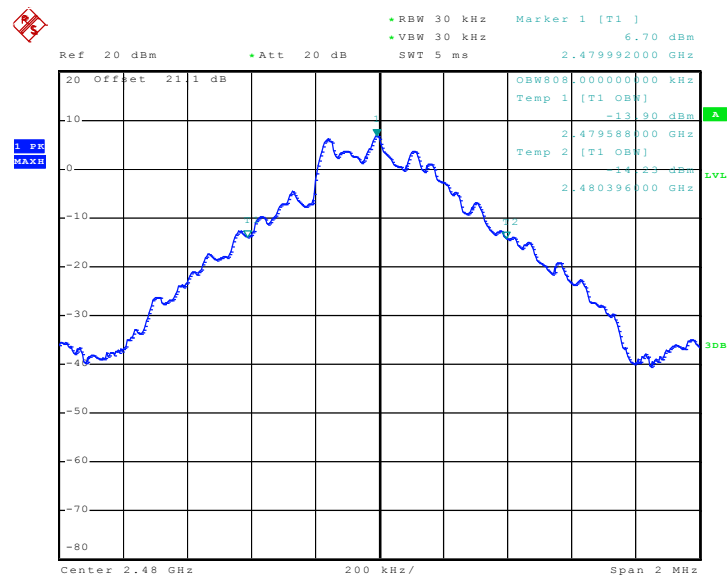
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	0.808
39	2441	0.808
78	2480	0.808

99% Bandwidth Plot on Channel 00


Date: 17.MAR.2011 15:14:48

99% Occupied Bandwidth Plot on Channel 39


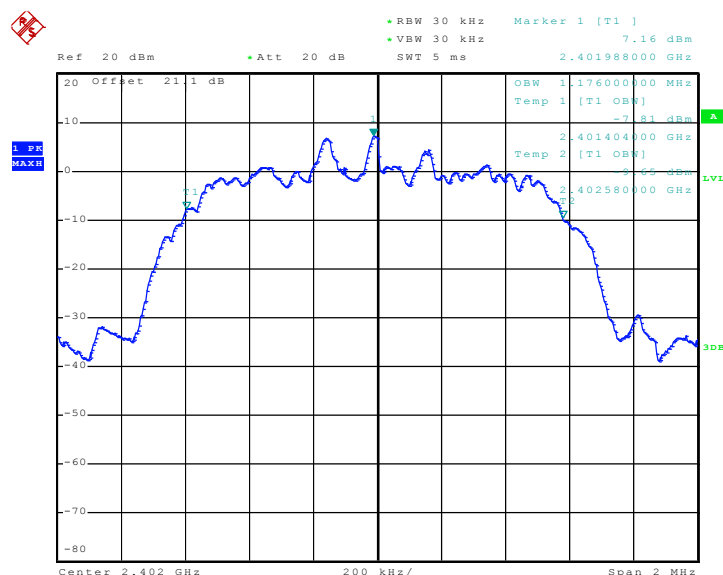
Date: 17.MAR.2011 15:15:16

99% Occupied Bandwidth Plot on Channel 78


Date: 17.MAR.2011 15:14:24

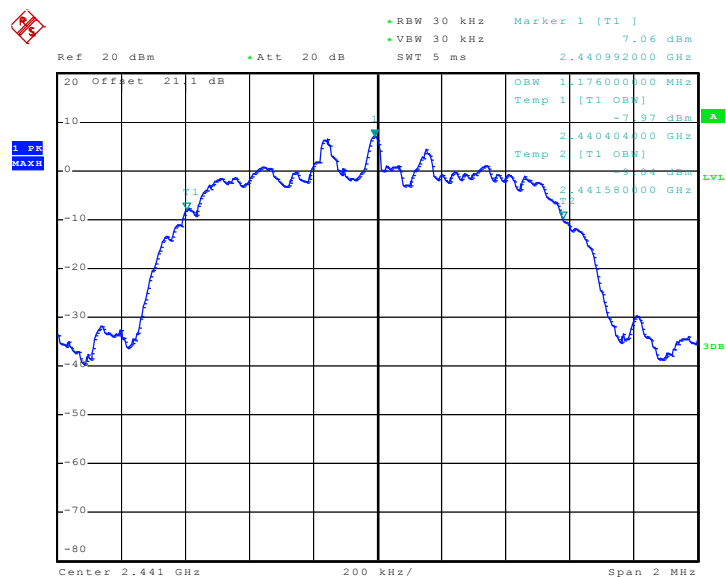
Test Mode :	Bluetooth EDR 2Mbps	Temperature :	24~26°C
	π /4-DQPSK L/M/H channel		
Test Engineer :	Cona Huang	Relative Humidity :	50~53%

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	1.176
39	2441	1.176
78	2480	1.172

99% Bandwidth Plot on Channel 00


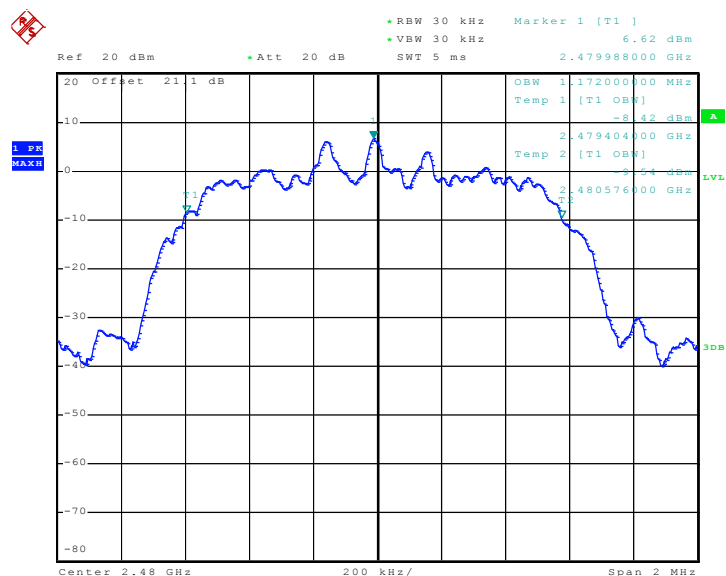
Date: 17.MAR.2011 15:05:16

99% Occupied Bandwidth Plot on Channel 39



Date: 17.MAR.2011 15:05:47

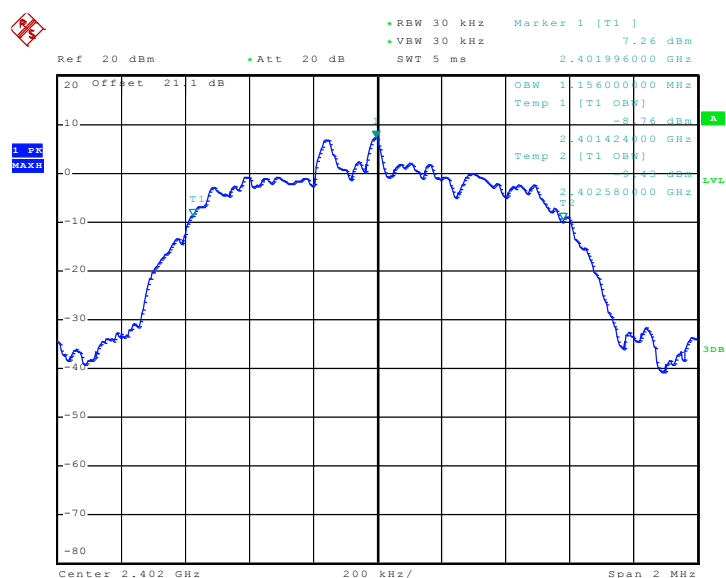
99% Occupied Bandwidth Plot on Channel 78



Date: 17.MAR.2011 15:06:13

Test Mode :	Bluetooth EDR 3Mbps 8-DPSK L/M/H channel	Temperature :	24~26℃
Test Engineer :	Cona Huang	Relative Humidity :	50~53%

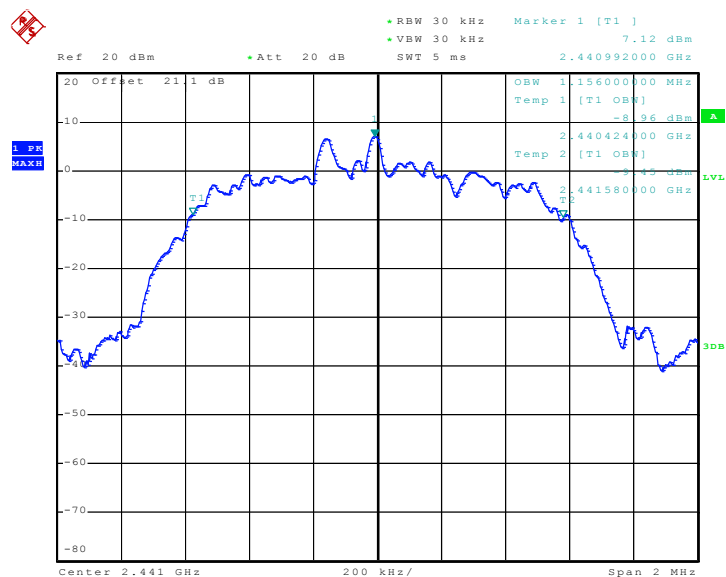
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	1.156
39	2441	1.156
78	2480	1.160

99% Bandwidth Plot on Channel 00


Date: 17.MAR.2011 15:12:41

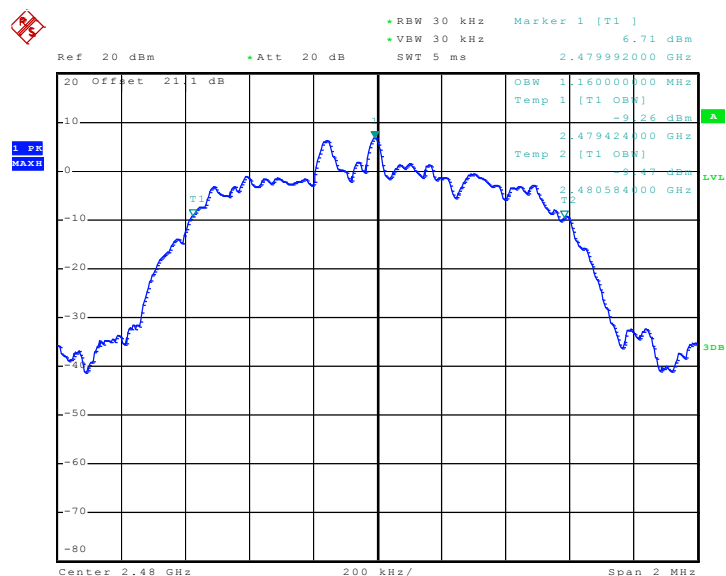


99% Occupied Bandwidth Plot on Channel 39



Date: 17.MAR.2011 15:13:07

99% Occupied Bandwidth Plot on Channel 78



Date: 17.MAR.2011 15:13:34

3.3 Hopping Channel Separation Measurement

3.3.1 Limit of Hopping Channel Separation

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

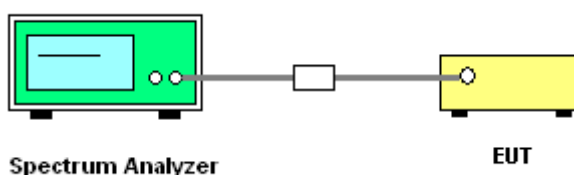
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

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

3.3.4 Test Setup



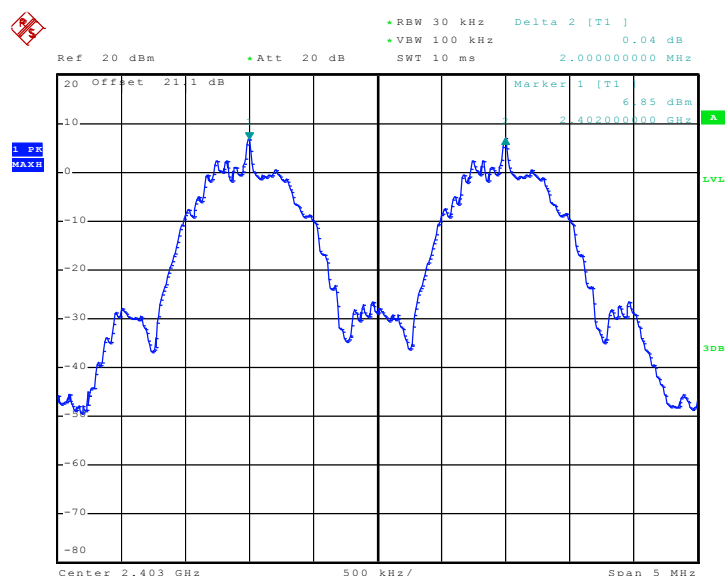
3.3.5 Test Result of Hopping Channel Separation

<Low Energy Bluetooth>

Test Mode :	Bluetooth LE 1Mbps GFSK L/M/H channel	Temperature :	24~26°C
Test Engineer :	Cona Huang	Relative Humidity :	50~53%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	2.000	0.025	Pass
19	2440	2.000	0.025	Pass
39	2480	2.000	0.025	Pass

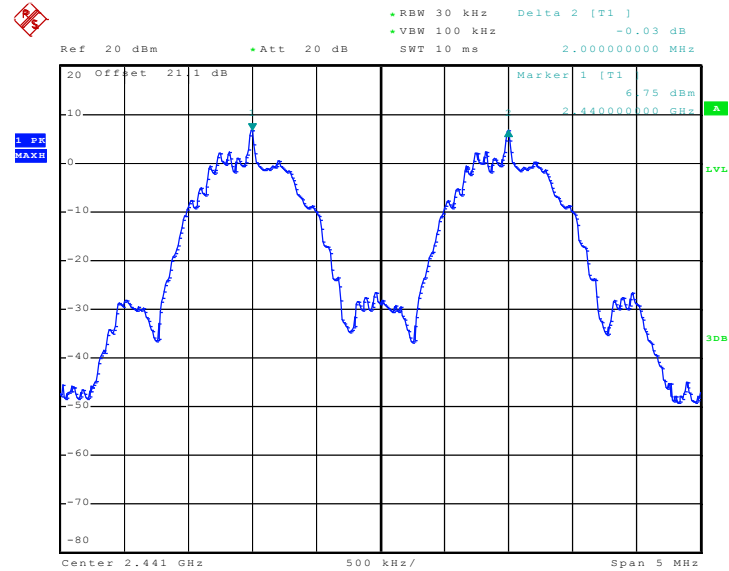
Channel Separation Plot on Channel 00 - 01



Date: 17.MAR.2011 20:15:13

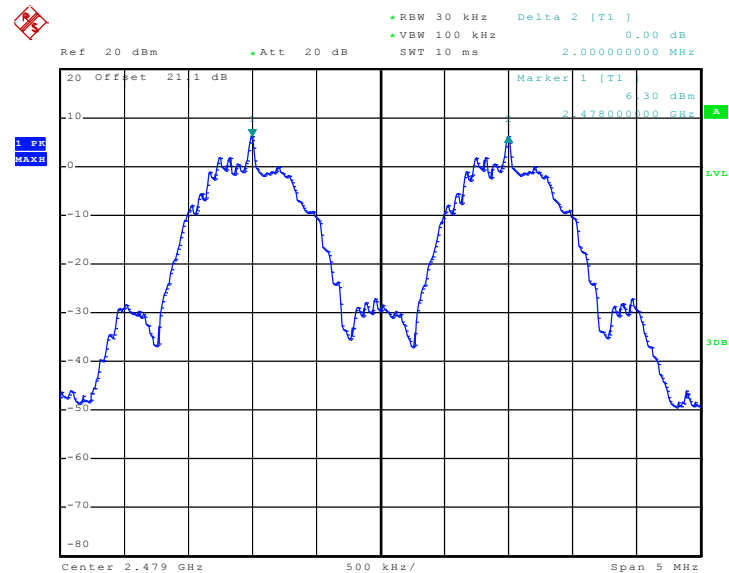


Channel Separation Plot on Channel 19-20



Date: 17.MAR.2011 20:16:31

Channel Separation Plot on Channel 38 - 39

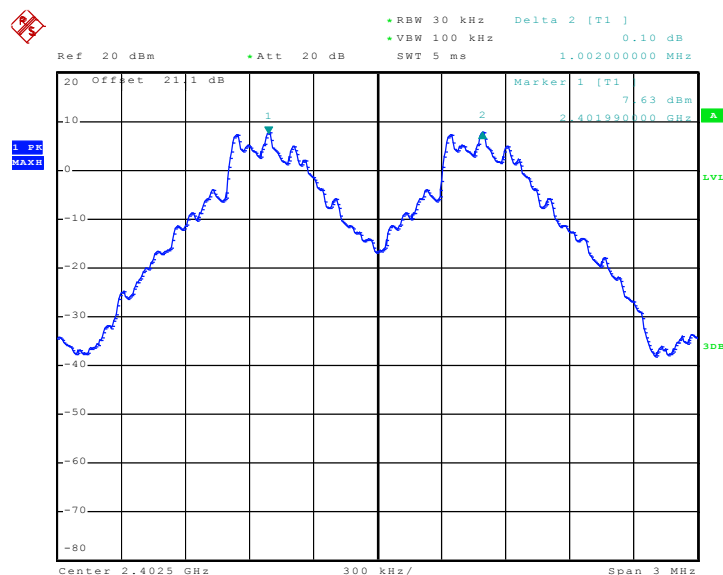


Date: 17.MAR.2011 20:18:37

<Standard Bluetooth>

Test Mode :	Bluetooth 1Mbps GFSK L/M/H channel	Temperature :	24~26℃
Test Engineer :	Cona Huang	Relative Humidity :	50~53%

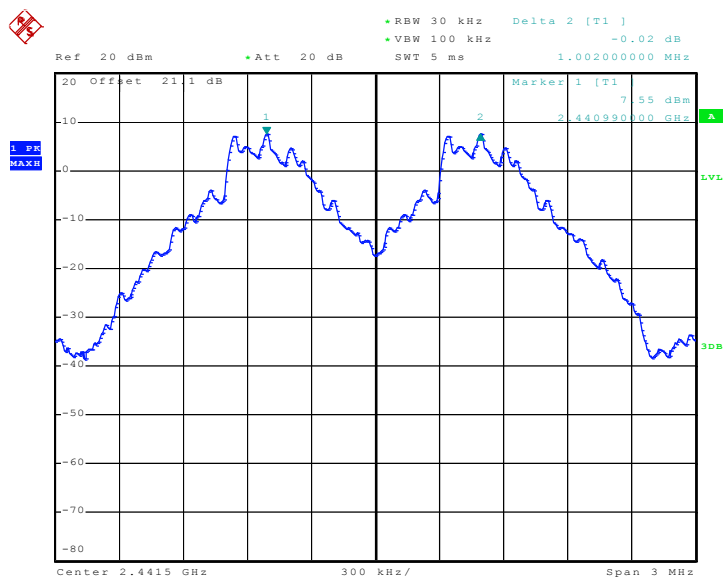
Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.002	0.025	Pass
39	2441	1.002	0.025	Pass
78	2480	1.002	0.025	Pass

Channel Separation Plot on Channel 00 - 01


Date: 17.MAR.2011 11:59:37

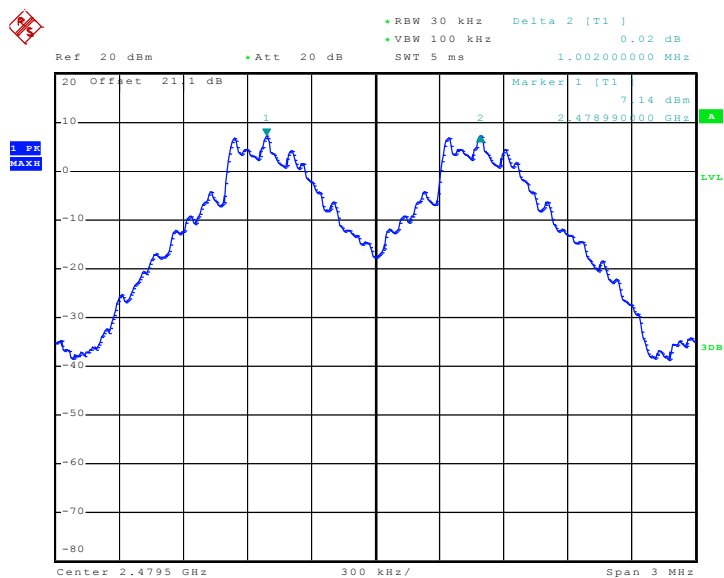


Channel Separation Plot on Channel 39 - 40



Date: 17.MAR.2011 12:00:52

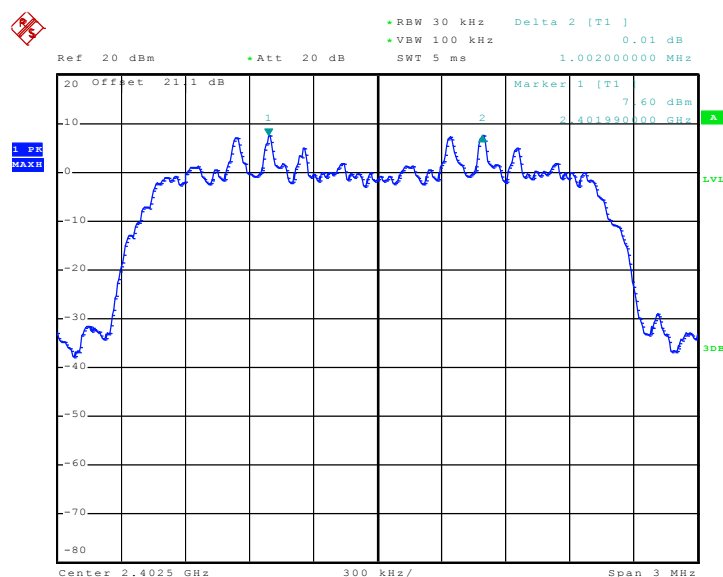
Channel Separation Plot on Channel 77 - 78



Date: 17.MAR.2011 12:03:51

Test Mode :	Bluetooth EDR 2Mbps	Temperature :	24~26°C
	π /4-DQPSK L/M/H channel		
Test Engineer :	Cona Huang	Relative Humidity :	50~53%

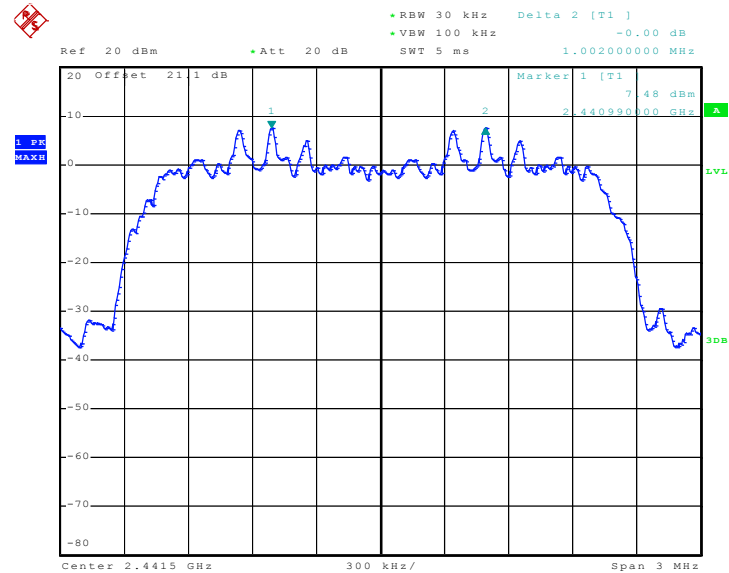
Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.002	0.025	Pass
39	2441	1.002	0.025	Pass
78	2480	1.002	0.025	Pass

Channel Separation Plot on Channel 00 - 01


Date: 17.MAR.2011 12:06:16

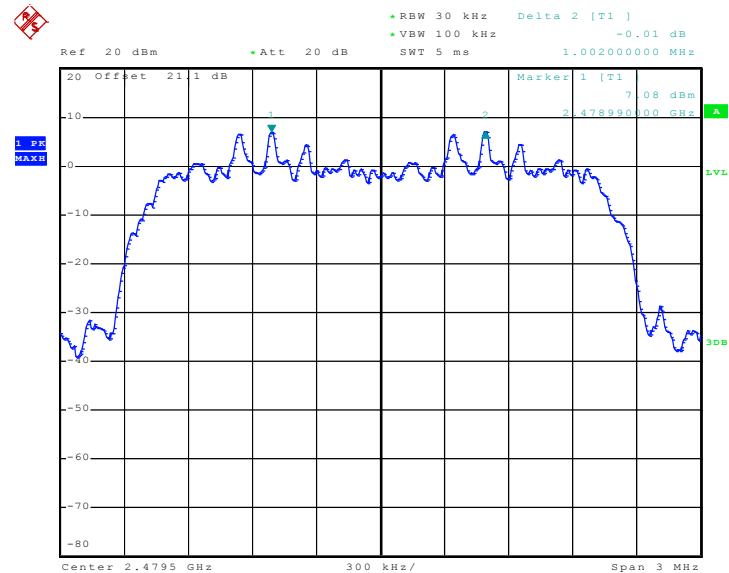


Channel Separation Plot on Channel 39 - 40



Date: 17.MAR.2011 12:07:09

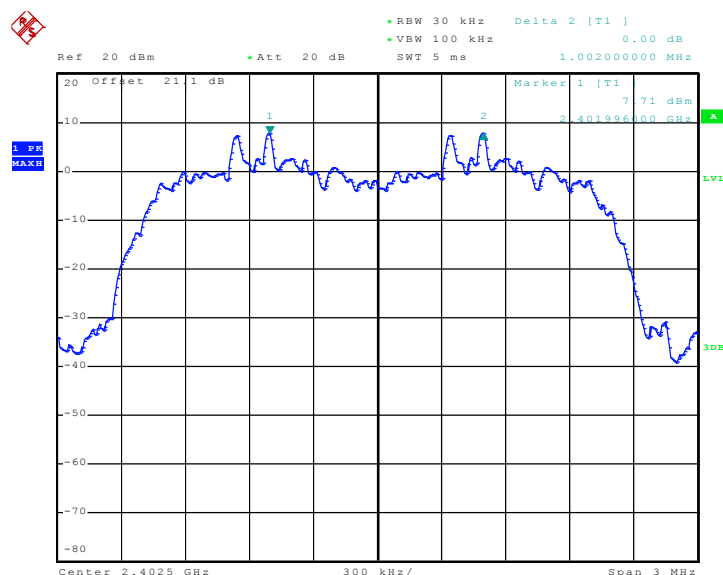
Channel Separation Plot on Channel 77 - 78



Date: 17.MAR.2011 12:08:06

Test Mode :	Bluetooth EDR 3Mbps 8-DPSK L/M/H channel	Temperature :	24~26℃
Test Engineer :	Cona Huang	Relative Humidity :	50~53%

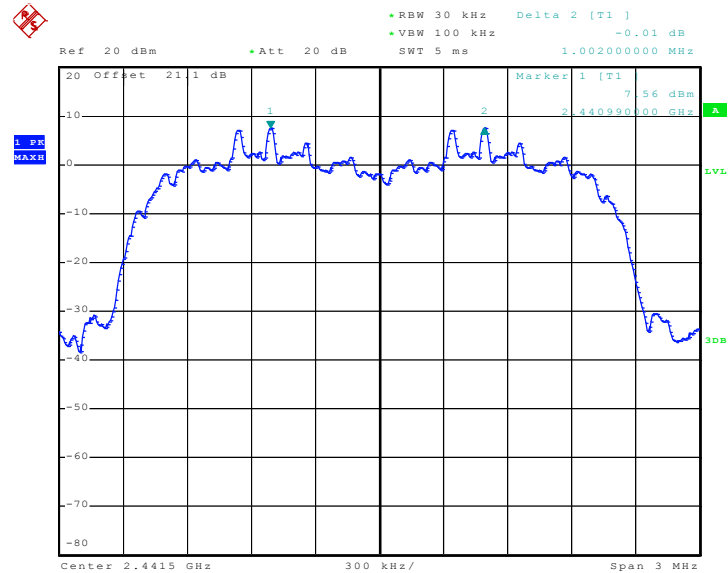
Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.002	0.025	Pass
39	2441	1.002	0.025	Pass
78	2480	1.002	0.025	Pass

Channel Separation Plot on Channel 00 - 01


Date: 17.MAR.2011 12:09:21

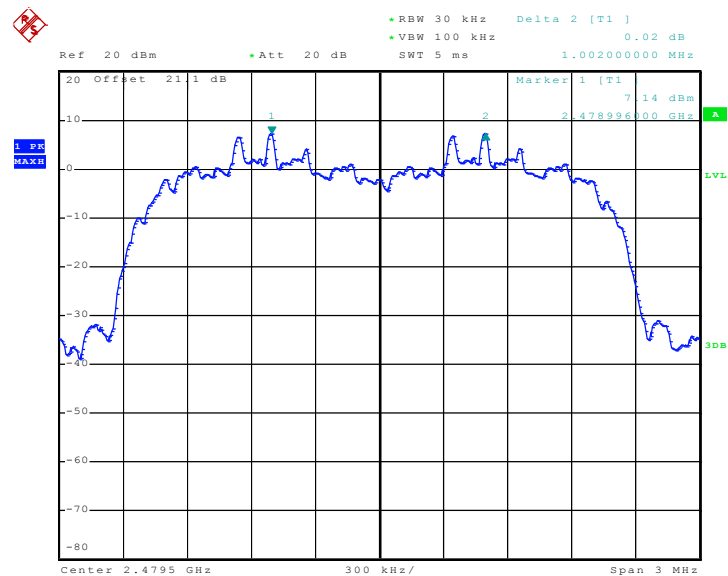


Channel Separation Plot on Channel 39 - 40



Date: 17.MAR.2011 14:02:40

Channel Separation Plot on Channel 77 - 78



Date: 17.MAR.2011 14:05:14

3.4 Dwell Time Measurement

3.4.1 Limit of Dwell Time

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

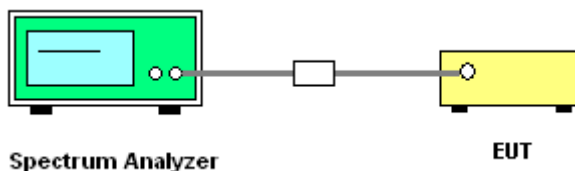
3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 Test Procedures

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

3.4.4 Test Setup



3.4.5 Test Result of Dwell Time

<Low Energy Bluetooth>

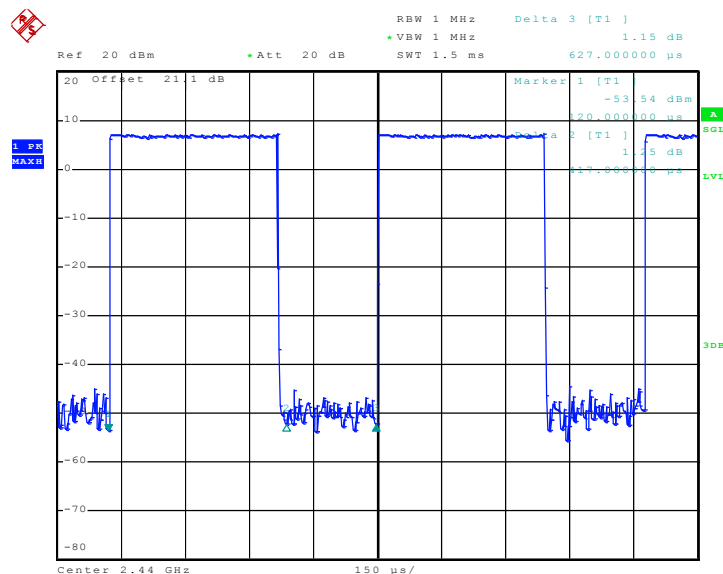
Test Mode :	Bluetooth LE 1Mbps GFSK M channel	Temperature :	24~26°C
Test Engineer :	Cona Huang	Relative Humidity :	50~53%

Package Mode	Average Hopping Channel	Package Transfer Time (usec)	Dwell Time (msec)	Limits (msec)	Pass/Fail
DH	0.32	417.00	0.00	0.4	Pass

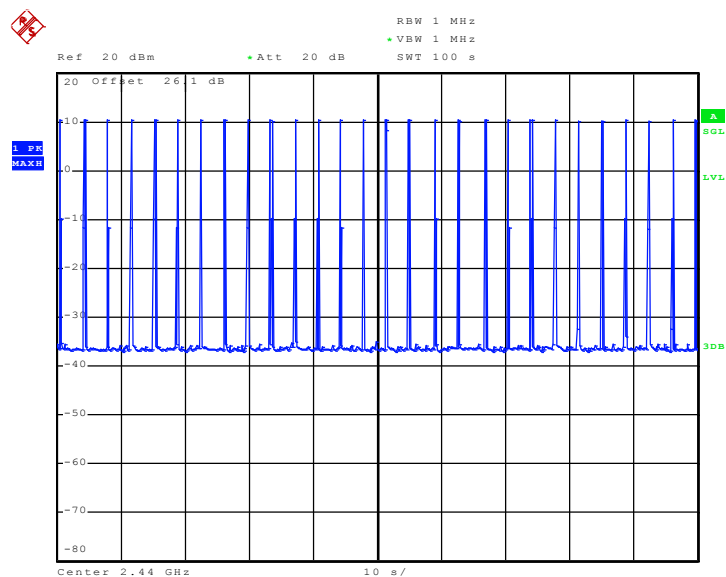
Remark:

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)

DH Dwell Time (One Pulse) Plot on Channel 19



Date: 17.MAR.2011 20:04:06

DH Dwell Time (Count Pulses) Plot on Channel 19


Date: 23.MAR.2011 14:52:37

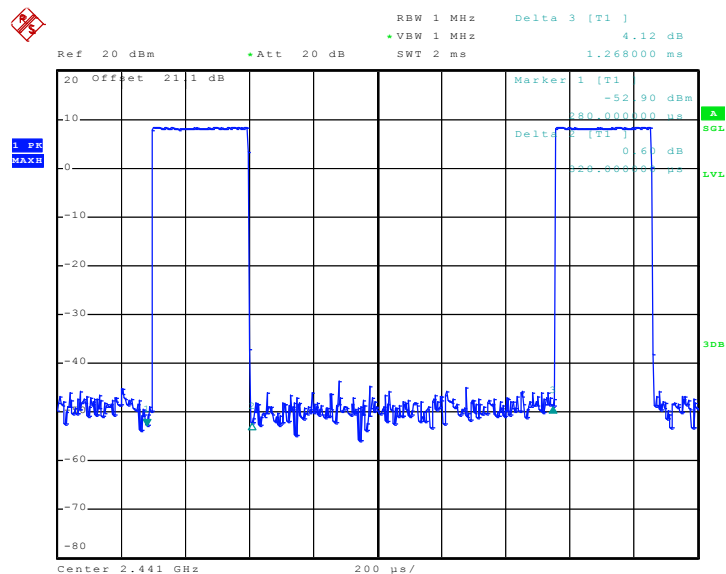
<Standard Bluetooth>

Test Mode :	Bluetooth 1Mbps GFSK M channel	Temperature :	24~26℃
Test Engineer :	Cona Huang	Relative Humidity :	50~53%

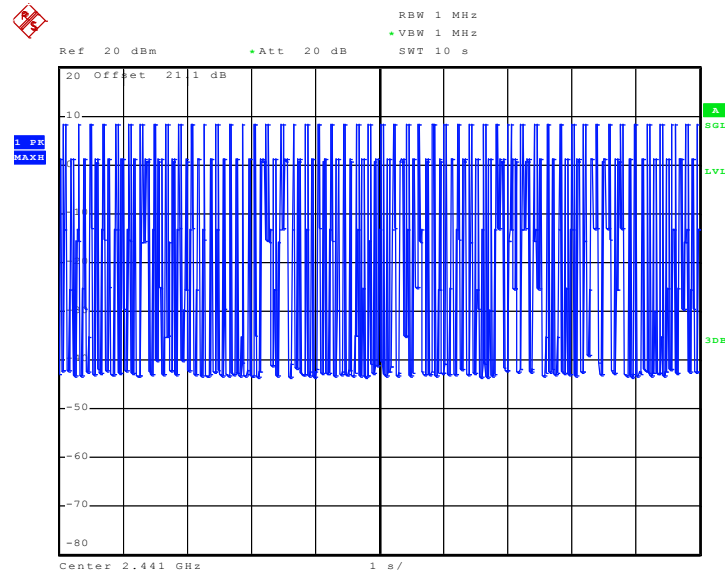
Package Mode	Average Hopping Channel	Package Transfer Time (usec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
DH1	7.90	328.00	0.08	0.4	Pass
DH3	4.40	1708.00	0.24	0.4	Pass
DH5	3.20	3008.00	0.30	0.4	Pass

Remark:

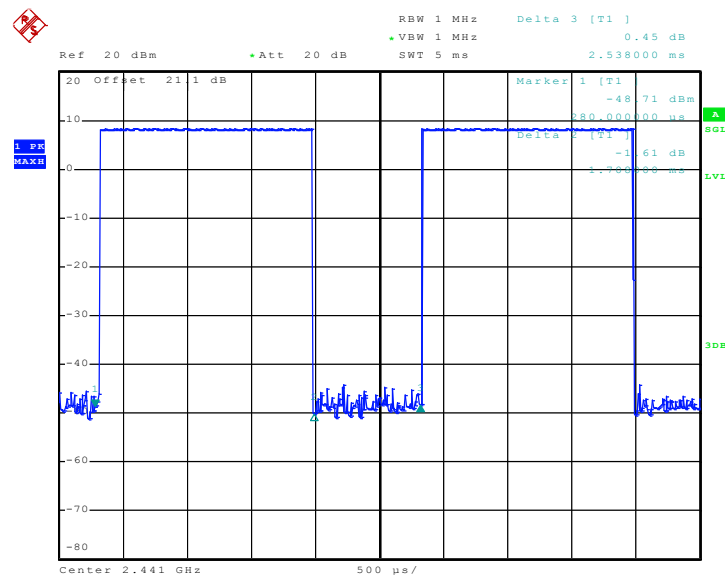
1. Dwell Time=79(channels) x 0.4(s) x average hopping channel x package transfer time
2. 79 channels come from the Hopping Channel number.
3. Average Hopping Channel = hops/sweep time
4. t: Package Transfer Time(us)

DH1 Dwell Time (One Pulse) Plot on Channel 39


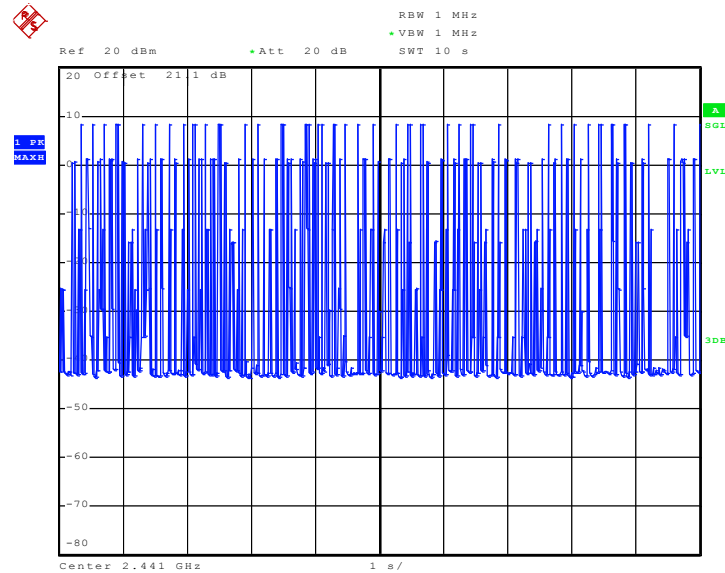
Date: 17.MAR.2011 11:50:37

DH1 Dwell Time (Count Pulses) Plot on Channel 39


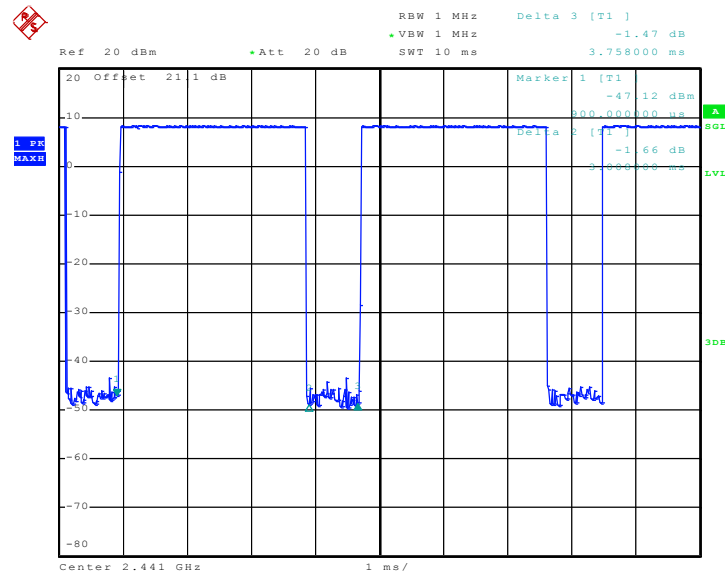
Date: 17.MAR.2011 14:10:55

DH3 Dwell Time (One Pulse) Plot on Channel 39


Date: 17.MAR.2011 11:51:24

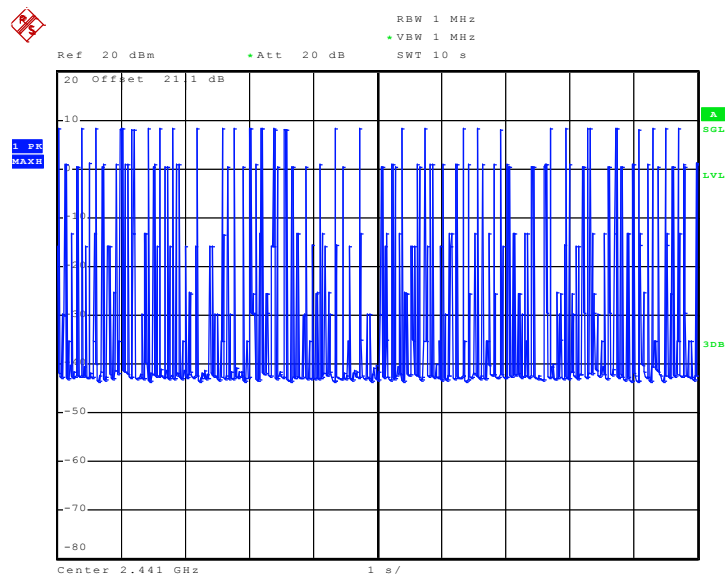
DH3 Dwell Time (Count Pulses) Plot on Channel 39


Date: 17.MAR.2011 14:11:27

DH5 Dwell Time (One Pulse) Plot on Channel 39


Date: 17.MAR.2011 11:51:54

DH5 Dwell Time (Count Pulses) Plot on Channel 39



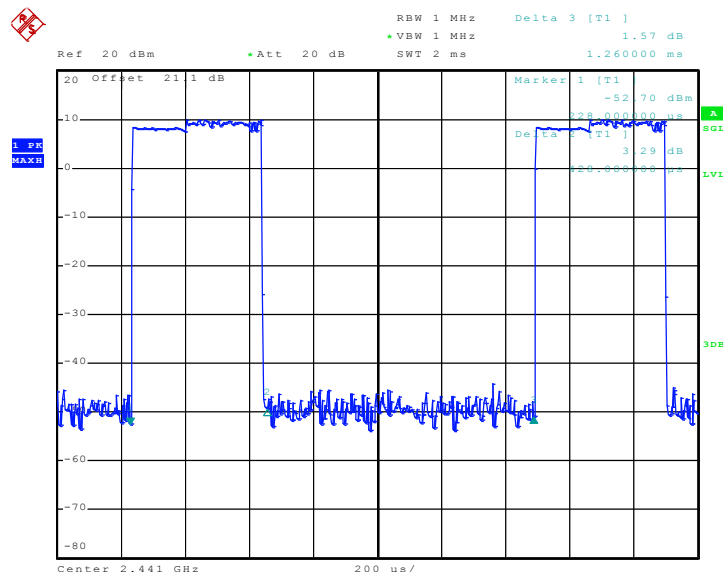
Date: 17.MAR.2011 14:11:57

Test Mode :	Bluetooth EDR 2Mbps $\pi/4$ -DQPSK M channel	Temperature :	24~26°C
Test Engineer :	Cona Huang	Relative Humidity :	50~53%

Package Mode	Average Hopping Channel	Package Transfer Time (usec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
2DH1	7.70	428.00	0.10	0.4	Pass
2DH3	4.80	1696.00	0.26	0.4	Pass
2DH5	3.30	3036.00	0.32	0.4	Pass

Remark:

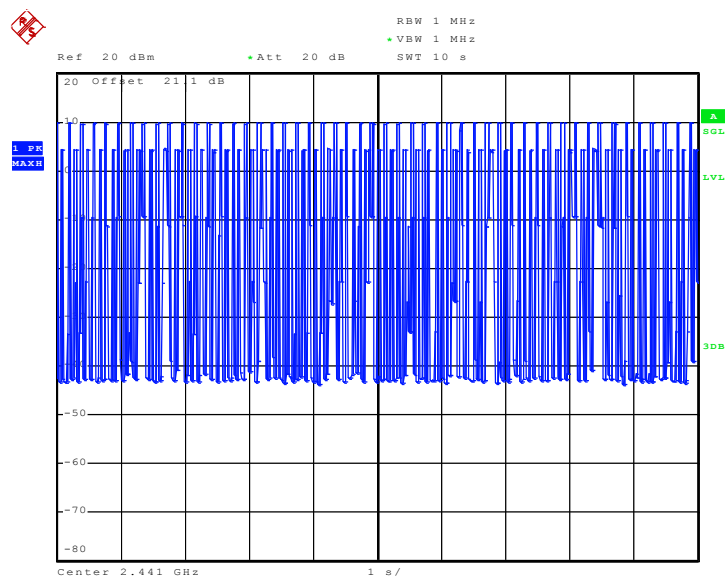
1. Dwell Time=79(channels) x 0.4(s) x average hopping channel x package transfer time
2. 79 channels come from the Hopping Channel number.
3. Average Hopping Channel = hops/sweep time
4. t: Package Transfer Time(us)

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


Date: 17.MAR.2011 11:52:54

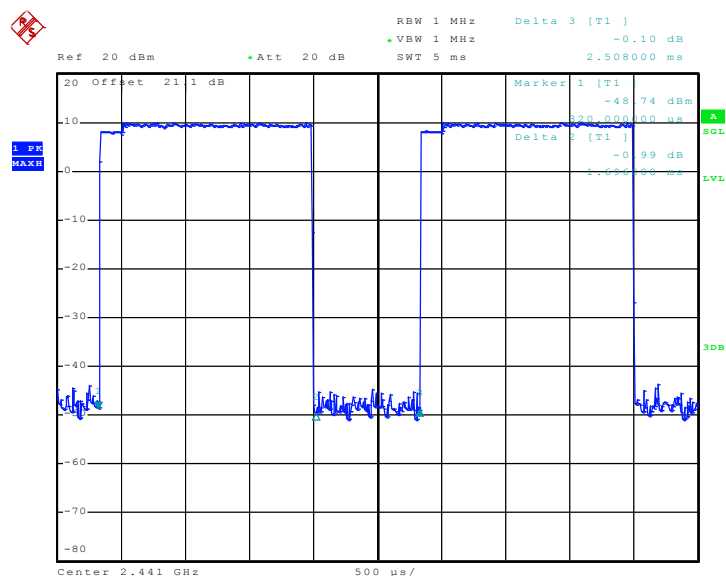


2DH1 Dwell Time (Count Pulses) Plot on Channel 39

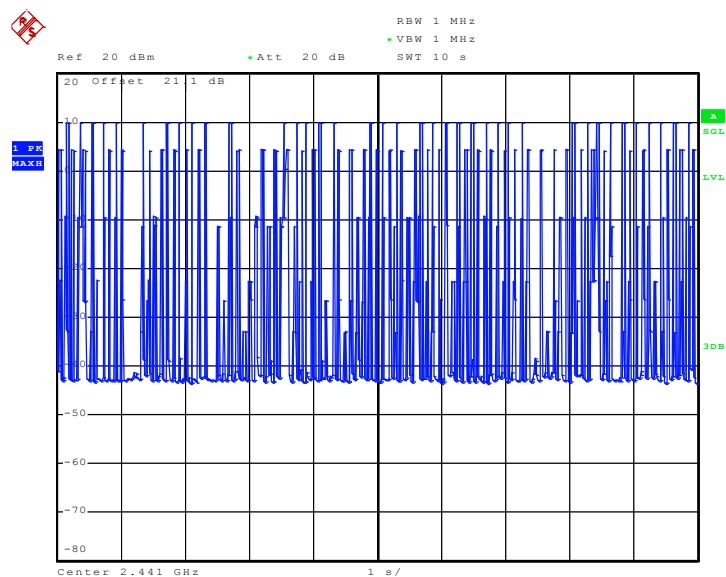


Date: 17.MAR.2011 14:12:54

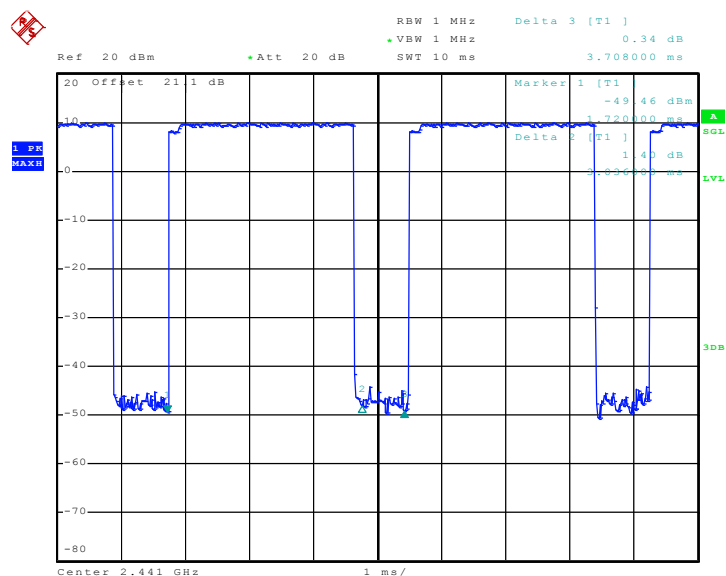
2DH3 Dwell Time (One Pulse) Plot on Channel 39



Date: 17.MAR.2011 11:53:33

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


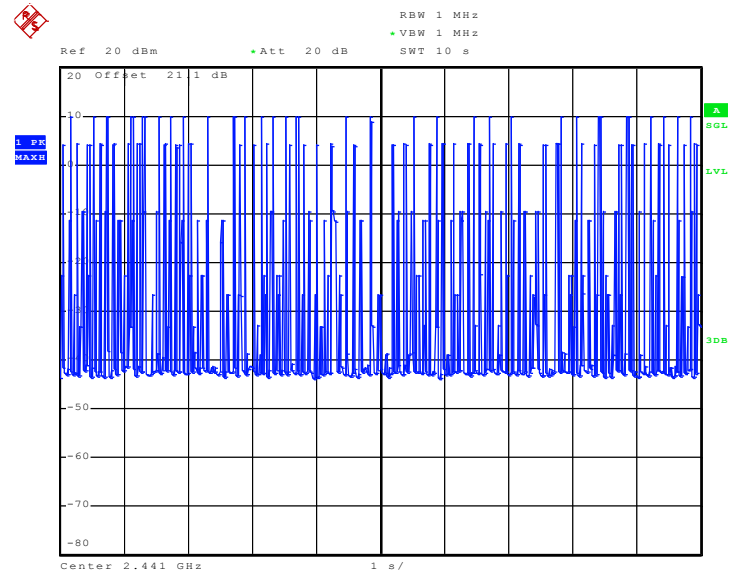
Date: 17.MAR.2011 14:13:17

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


Date: 17.MAR.2011 11:54:17



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



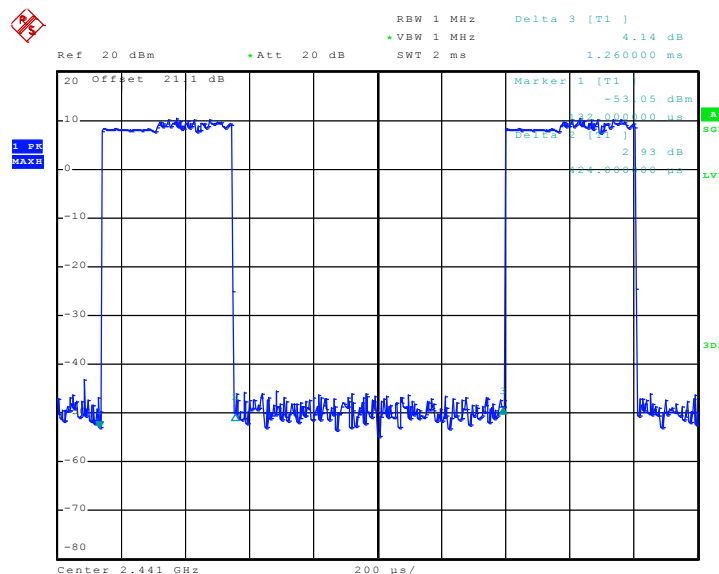
Date: 17.MAR.2011 14:13:45

Test Mode :	Bluetooth EDR 3Mbps 8-DPSK M channel	Temperature :	24~26°C
Test Engineer :	Cona Huang	Relative Humidity :	50~53%

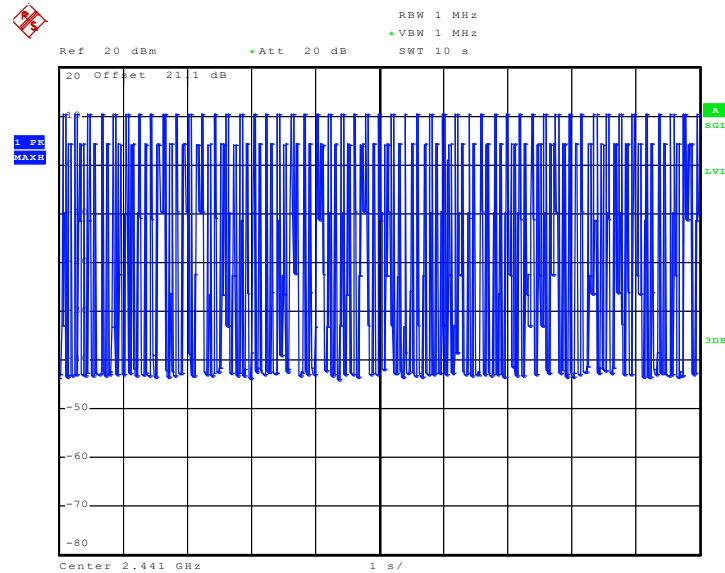
Package Mode	Average Hopping Channel	Package Transfer Time (usec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
3DH1	7.50	424.00	0.10	0.4	Pass
3DH3	4.80	1714.00	0.26	0.4	Pass
3DH5	3.20	2974.00	0.30	0.4	Pass

Remark:

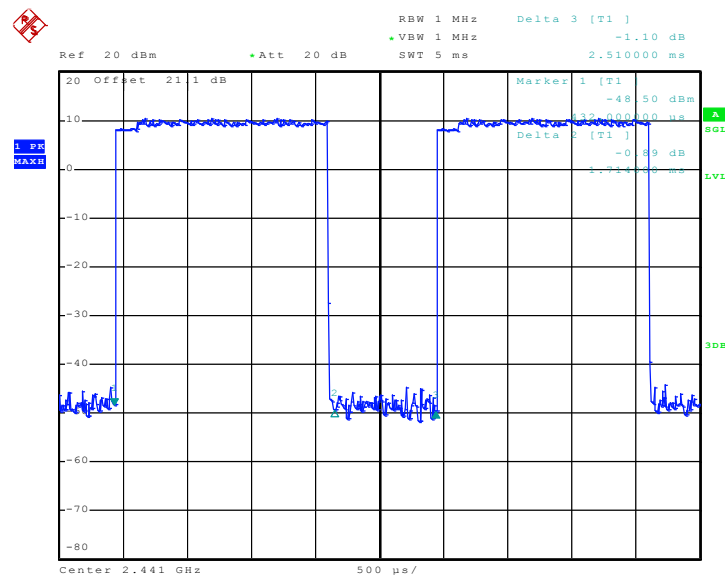
1. Dwell Time=79(channels) x 0.4(s) x average hopping channel x package transfer time
2. 79 channels come from the Hopping Channel number.
3. Average Hopping Channel = hops/sweep time
4. t: Package Transfer Time(us)

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


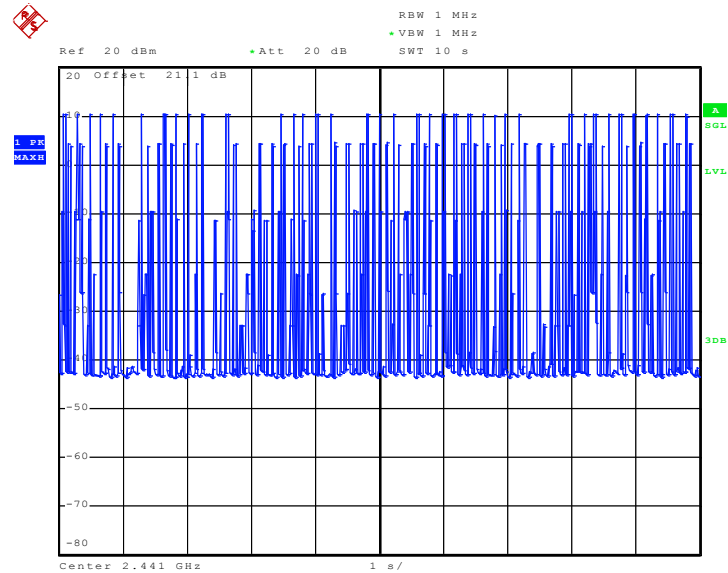
Date: 17.MAR.2011 11:55:29

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


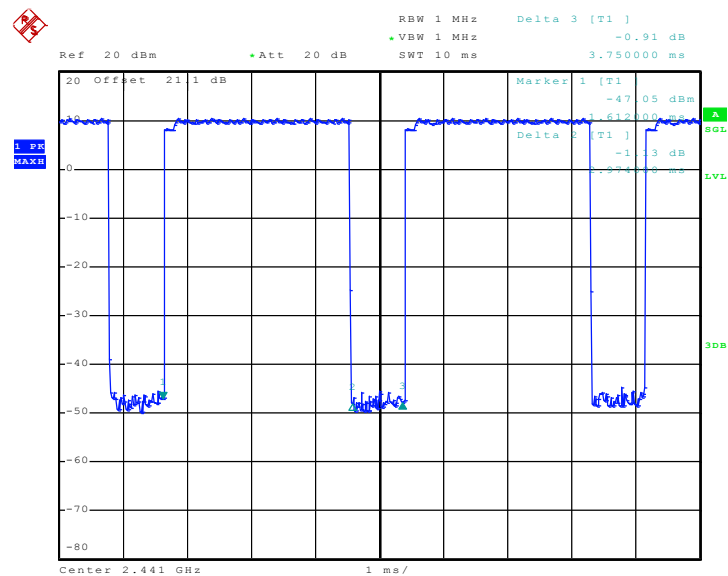
Date: 17.MAR.2011 14:14:10

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


Date: 17.MAR.2011 11:56:05

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


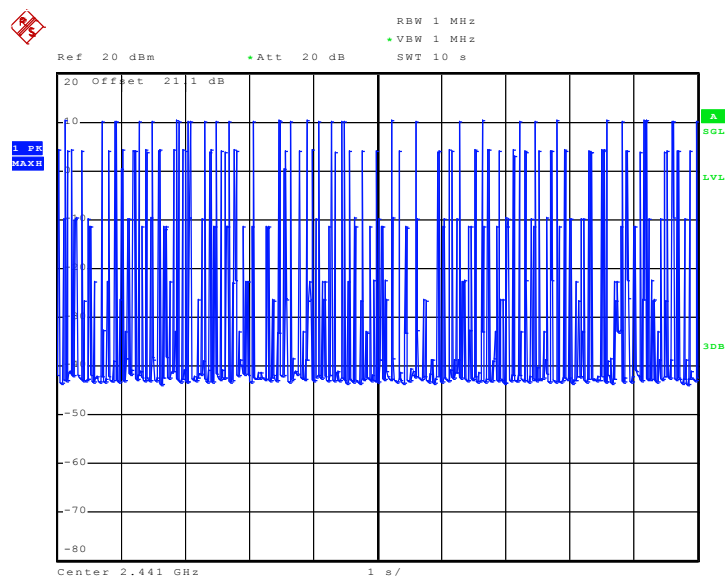
Date: 17.MAR.2011 14:14:40

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


Date: 17.MAR.2011 11:56:37



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



Date: 17.MAR.2011 14:15:31

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 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, provided the systems operate with an output power no greater than 125 mW (20.97dBm).

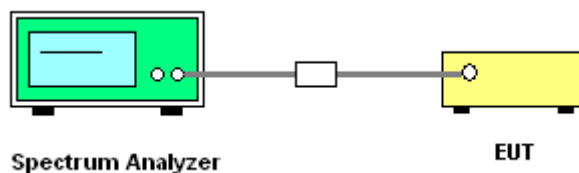
3.5.2 Measuring Instruments

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



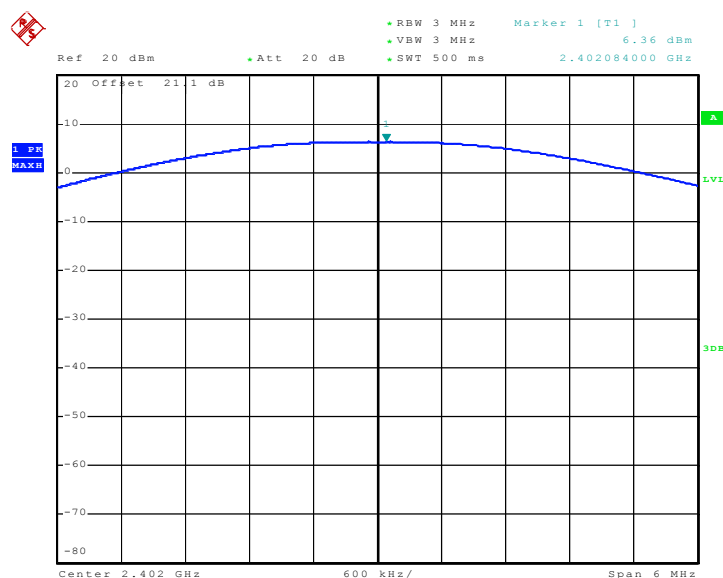
3.5.5 Test Result of Peak Output Power

<Low Energy Bluetooth>

Test Mode :	Bluetooth LE 1Mbps GFSK L/M/H channel	Temperature :	24~26°C
Test Engineer :	Cona Huang	Relative Humidity :	50~53%

Channel	Frequency (MHz)	RF Power (dBm)		
		GFSK	Max. Limits (dBm)	Pass/Fail
		1 Mbps		
00	2402	6.36	20.97	Pass
19	2440	6.33	20.97	Pass
39	2480	6.04	20.97	Pass

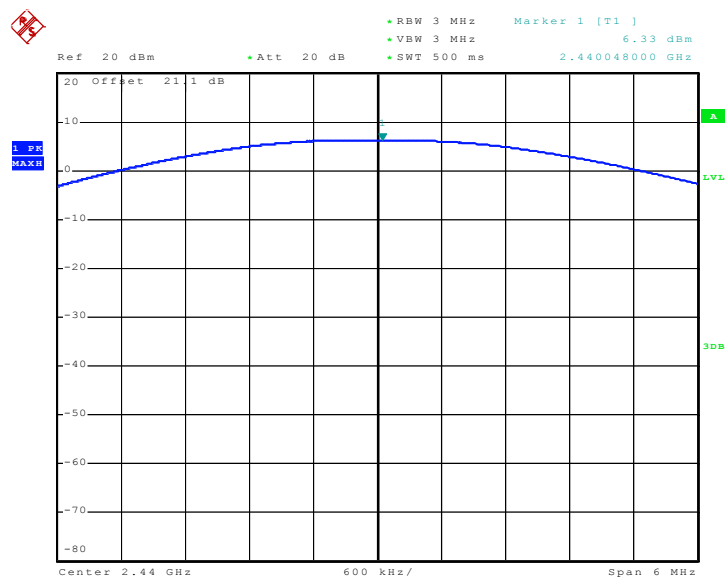
Peak Output Power Plot on Channel 00



Date: 11.MAR.2011 14:31:57

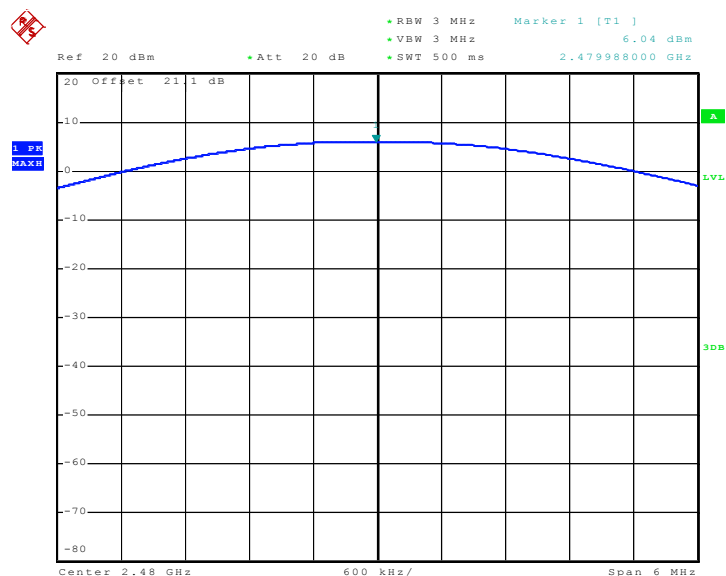


Peak Output Power Plot on Channel 19



Date: 11.MAR.2011 14:33:00

Peak Output Power Plot on Channel 39

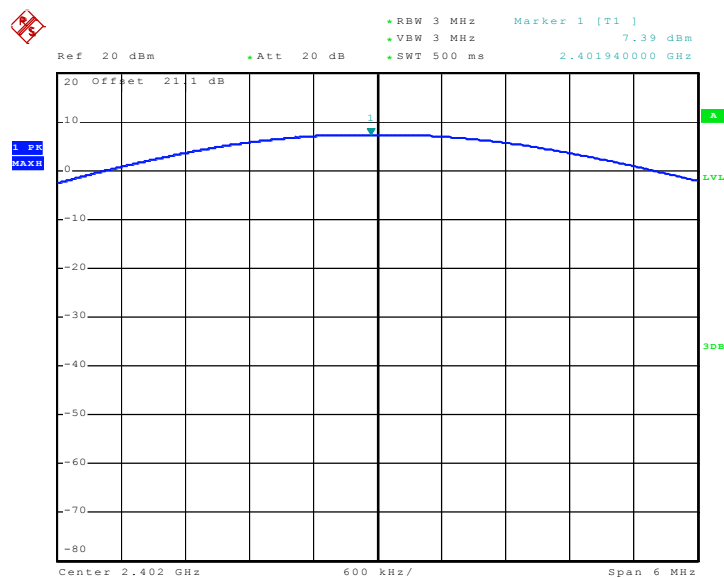


Date: 11.MAR.2011 14:33:32

<Standard Bluetooth>

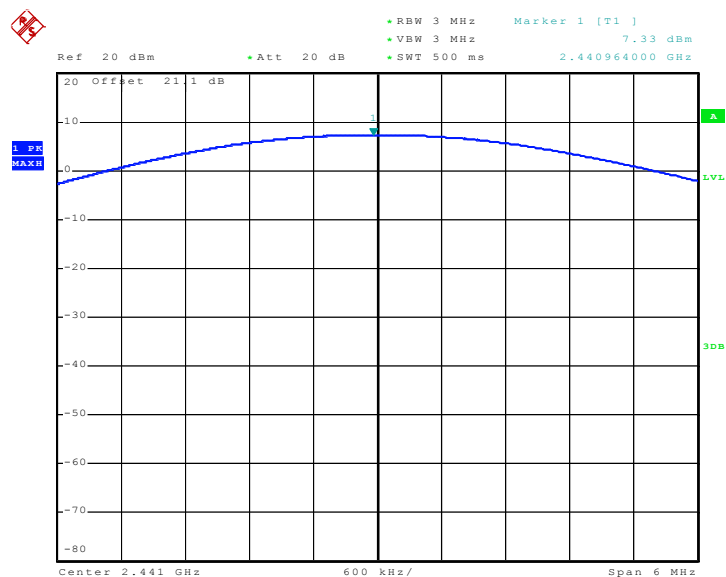
Test Mode :	Bluetooth 1Mbps GFSK L/M/H channel	Temperature :	24~26°C
Test Engineer :	Cona Huang	Relative Humidity :	50~53%

Channel	Frequency (MHz)	RF Power (dBm)		
		GFSK	Max. Limits (dBm)	Pass/Fail
		1 Mbps		
00	2402	7.39	20.97	Pass
39	2441	7.33	20.97	Pass
78	2480	7.01	20.97	Pass

Peak Output Power Plot on Channel 00


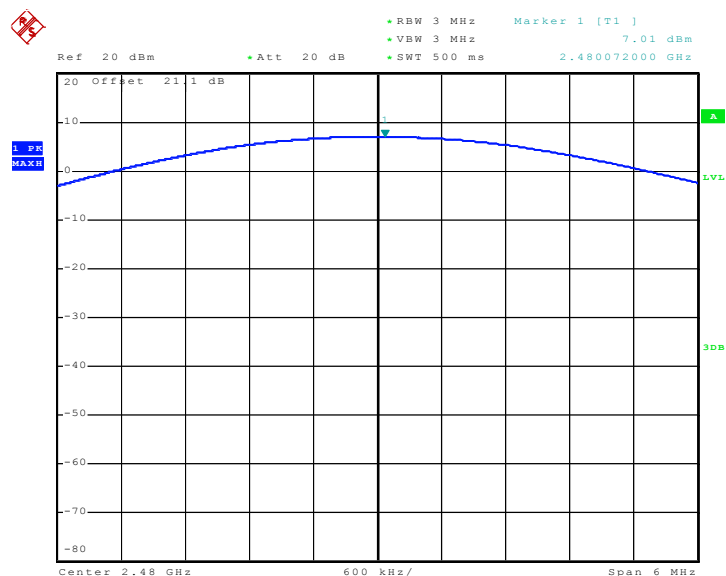
Date: 11.MAR.2011 14:15:26

Peak Output Power Plot on Channel 39



Date: 11.MAR.2011 14:18:14

Peak Output Power Plot on Channel 78

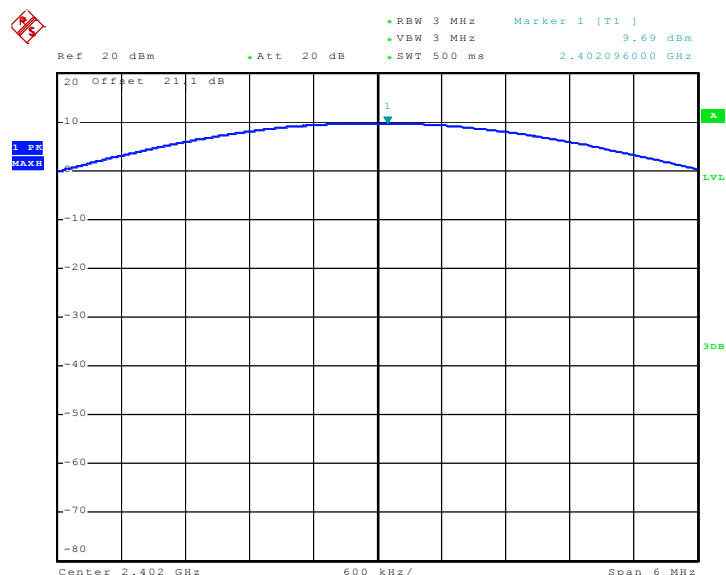


Date: 11.MAR.2011 14:21:18



Test Mode :	Bluetooth EDR 2Mbps	Temperature :	24~26°C
	π /4-DQPSK L/M/H channel		
Test Engineer :	Cona Huang	Relative Humidity :	50~53%

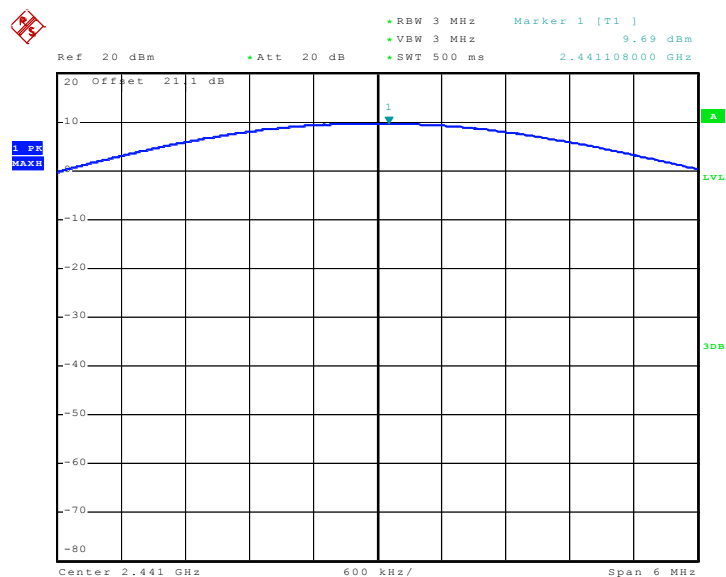
Channel	Frequency (MHz)	RF Power (dBm)		
		π /4-DQPSK	Max. Limits (dBm)	Pass/Fail
		2 Mbps		
00	2402	9.69	20.97	Pass
39	2441	9.69	20.97	Pass
78	2480	9.39	20.97	Pass

Peak Output Power Plot on Channel 00

Date: 11.MAR.2011 14:16:54

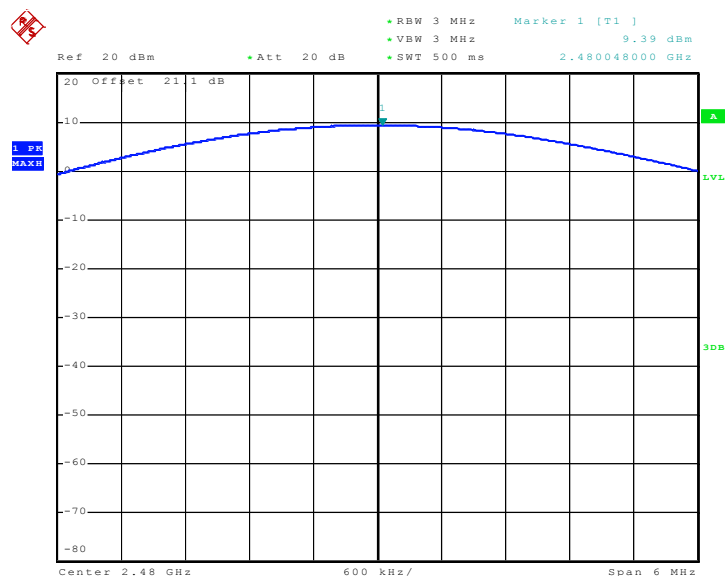


Peak Output Power Plot on Channel 39



Date: 11.MAR.2011 14:19:40

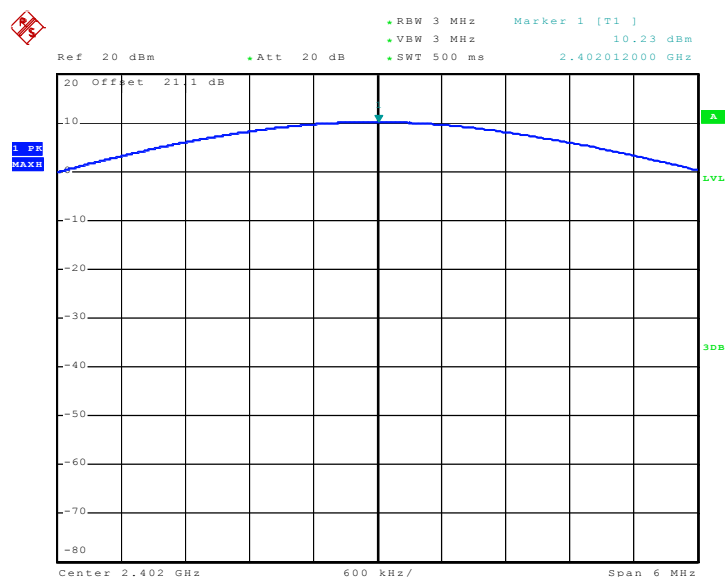
Peak Output Power Plot on Channel 78



Date: 11.MAR.2011 14:22:40

Test Mode :	Bluetooth EDR 3Mbps 8-DPSK L/M/H channel	Temperature :	24~26°C
Test Engineer :	Cona Huang	Relative Humidity :	50~53%

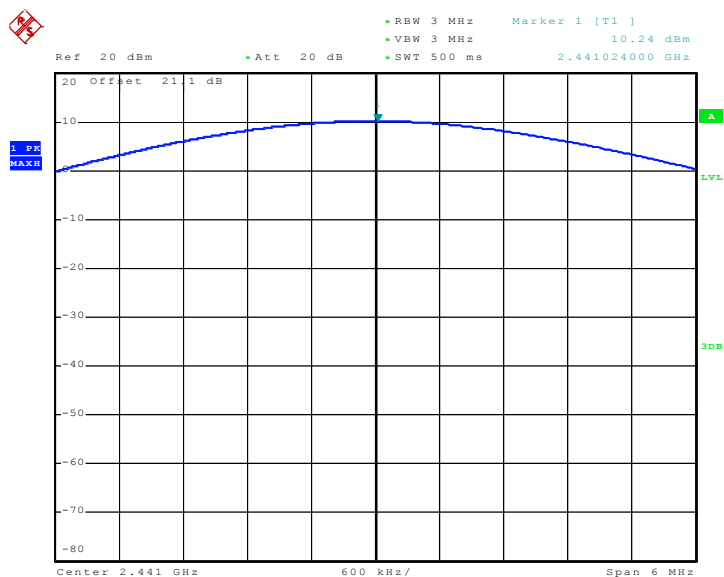
Channel	Frequency (MHz)	RF Power (dBm)		
		8-DPSK	Max. Limits (dBm)	Pass/Fail
		3 Mbps		
00	2402	10.23	20.97	Pass
39	2441	10.24	20.97	Pass
78	2480	10.00	20.97	Pass

Peak Output Power Plot on Channel 00


Date: 11.MAR.2011 14:17:09

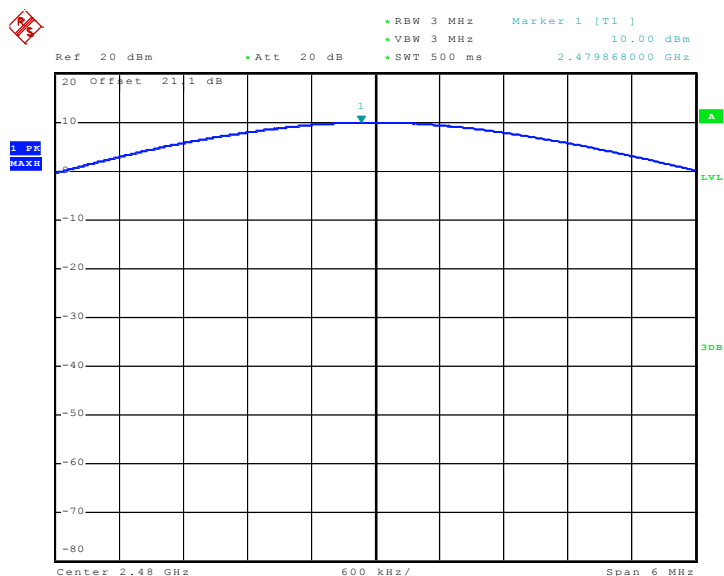


Peak Output Power Plot on Channel 39



Date: 11.MAR.2011 14:19:55

Peak Output Power Plot on Channel 78



Date: 11.MAR.2011 14:22:55

3.6 Spurious Emission Measurement

3.6.1 Limit of Spurious Emission Measurement

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

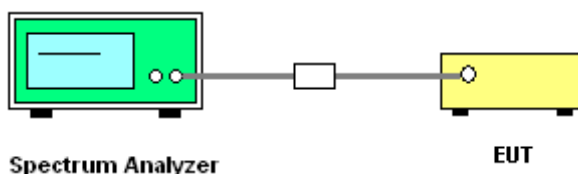
3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

3.6.3 Test Procedure

1. The transmitter output was connected to the spectrum analyzer via a low lose cable.
2. Set RBW = 100 kHz, VBW = 300kHz, scan up through 10th harmonic. All harmonics / spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW.

3.6.4 Test Setup

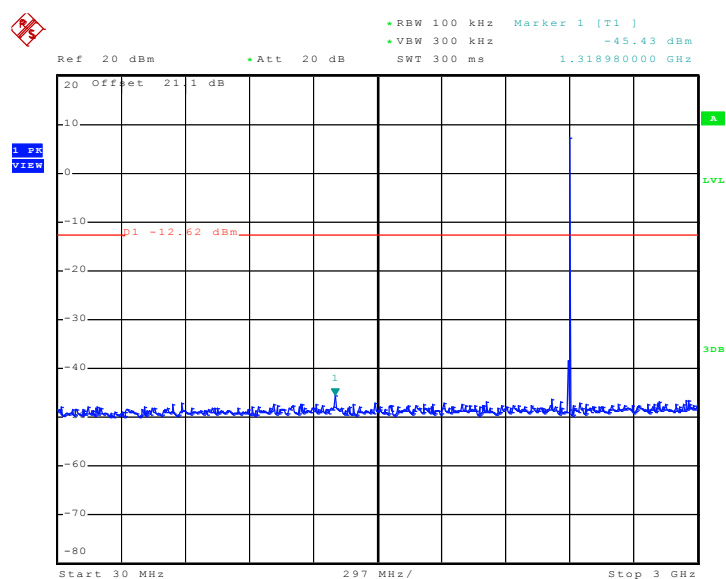


3.6.5 Test Result

<Low Energy Bluetooth>

Test Mode :	Bluetooth LE 1Mbps GFSK L channel	Temperature :	24~26°C
Test Channel :	00	Relative Humidity :	50~53%
		Test Engineer :	Cona Huang

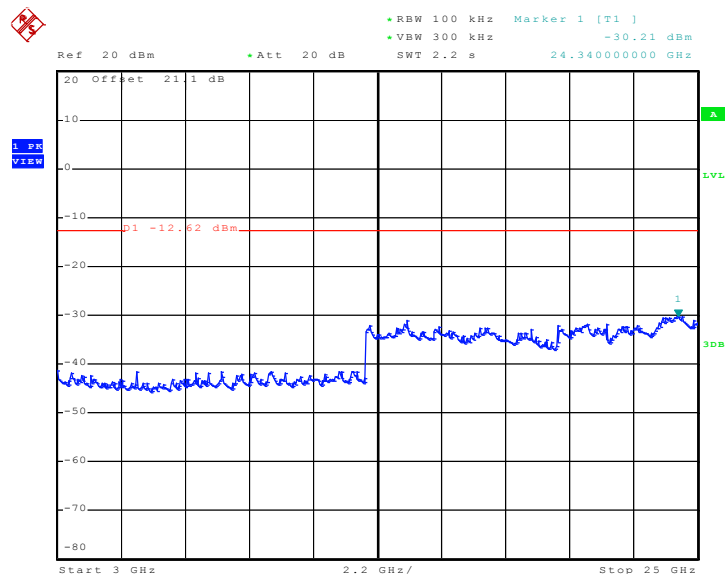
Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 00



Date: 17.MAR.2011 20:23:17



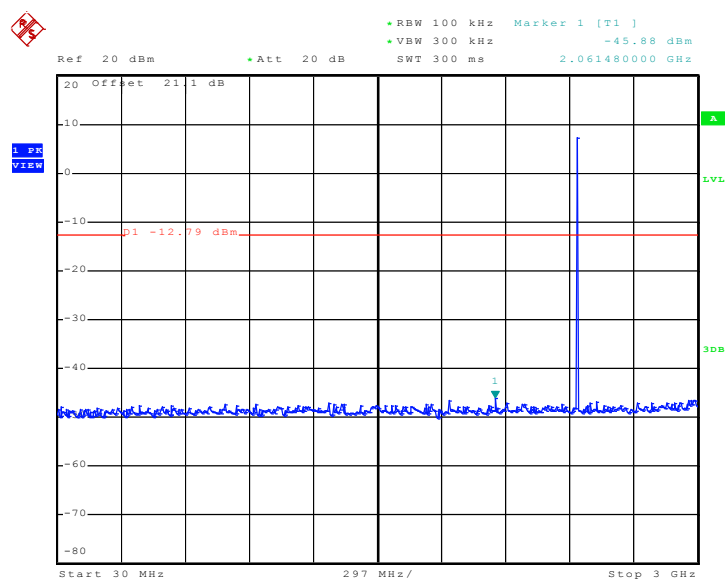
Conducted Spurious Emission Plot on Bluetooth LE 1Mbps
GFSK Channel 00



Date: 17.MAR.2011 20:23:40

Test Mode :	Bluetooth LE 1Mbps GFSK M channel	Temperature :	24~26℃
Test Channel :	19	Relative Humidity :	50~53%
		Test Engineer :	Cona Huang

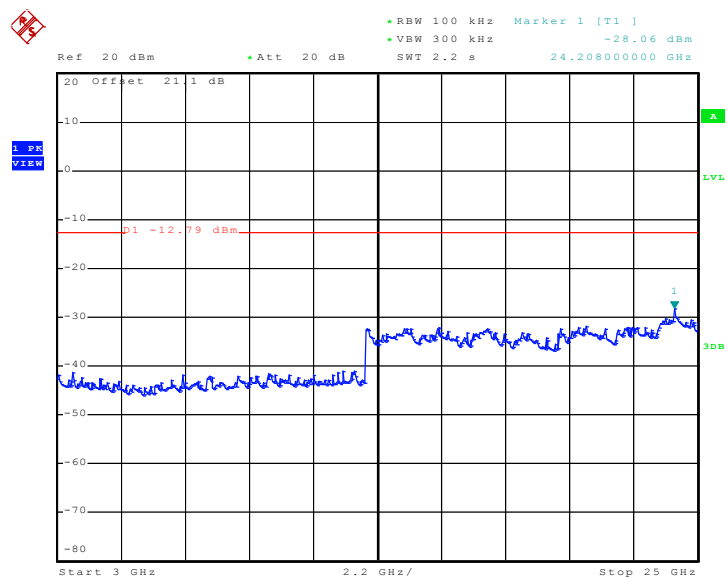
**Conducted Spurious Emission Plot on Bluetooth LE 1Mbps
GFSK Channel 19**



Date: 17.MAR.2011 20:31:51



Conducted Spurious Emission Plot on Bluetooth LE 1Mbps
GFSK Channel 19

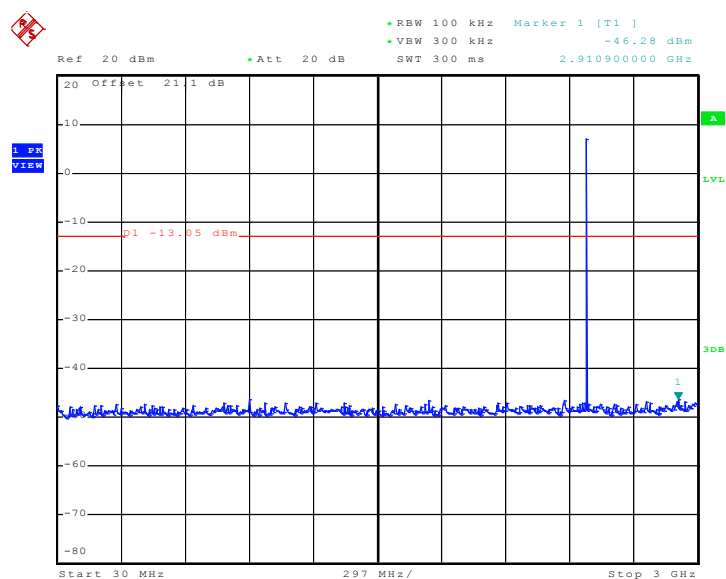


Date: 17.MAR.2011 20:32:13



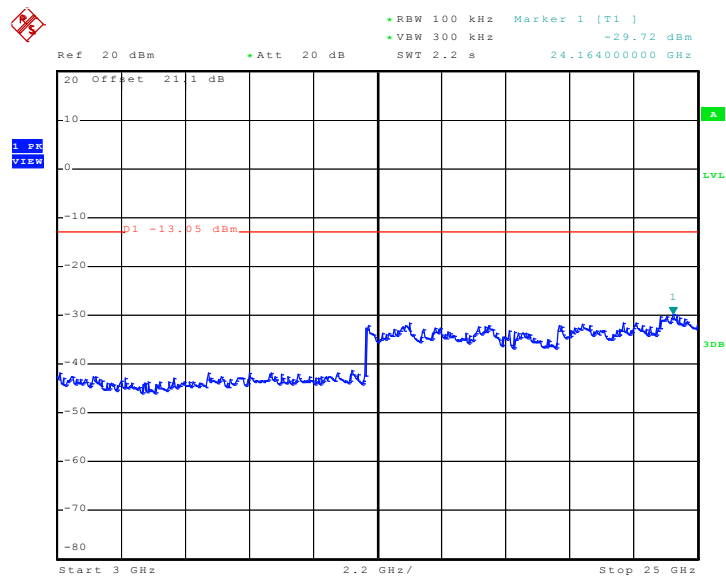
Test Mode :	Bluetooth LE 1Mbps GFSK H channel	Temperature :	24~26℃
Test Channel :	39	Relative Humidity :	50~53%
		Test Engineer :	Cona Huang

**Conducted Spurious Emission Plot on Bluetooth LE 1Mbps
GFSK Channel 39**



Date: 17.MAR.2011 20:34:14

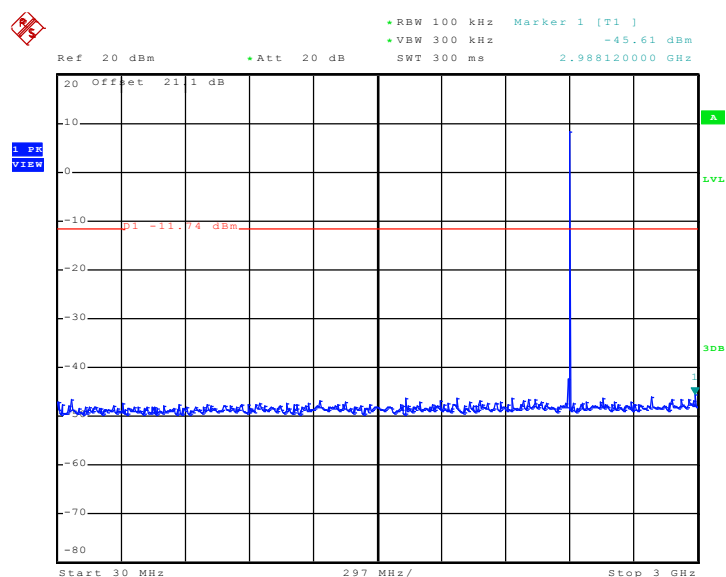
Conducted Spurious Emission Plot on Bluetooth LE 1Mbps GFSK Channel 39



Date: 17.MAR.2011 20:34:37

<Standard Bluetooth>

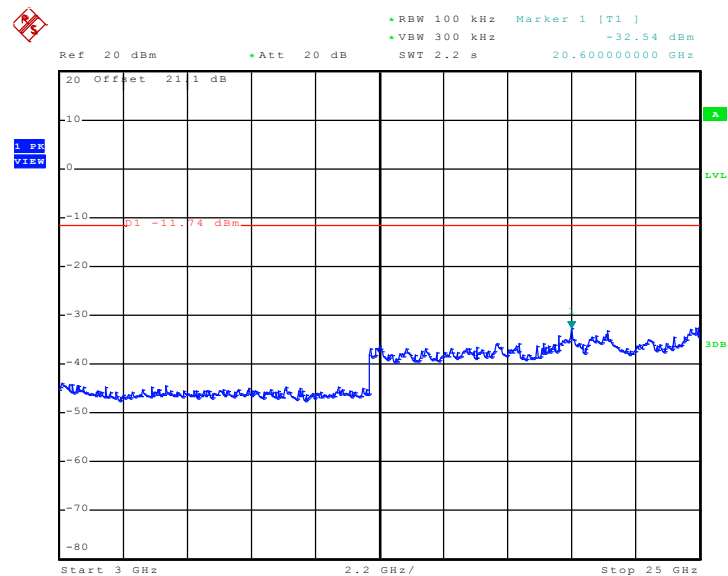
Test Mode :	Bluetooth 1Mbps GFSK L channel	Temperature :	24~26℃
Test Channel :	00	Relative Humidity :	50~53%
		Test Engineer :	Cona Huang

**Conducted Spurious Emission Plot on Bluetooth 1Mbps
GFSK Channel 00**


Date: 22.MAR.2011 13:30:01



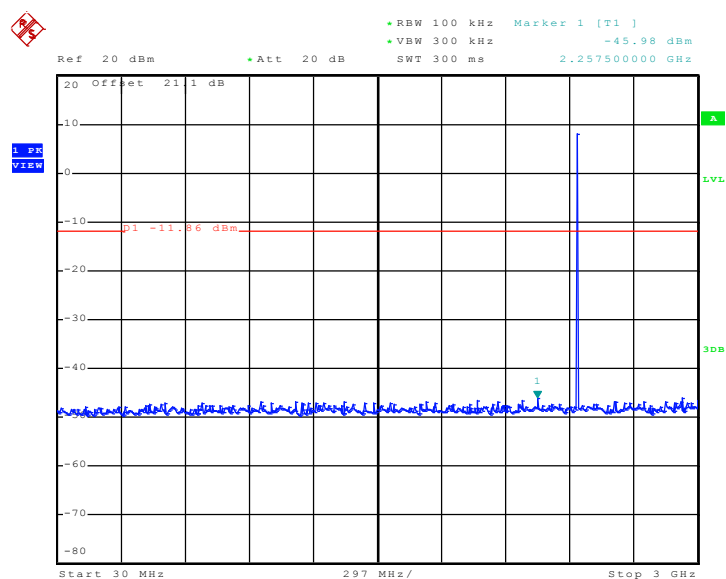
Conducted Spurious Emission Plot on Bluetooth 1Mbps
GFSK Channel 00



Date: 22.MAR.2011 13:30:23

Test Mode :	Bluetooth 1Mbps GFSK M channel	Temperature :	24~26℃
Test Channel :	39	Relative Humidity :	50~53%
		Test Engineer :	Cona Huang

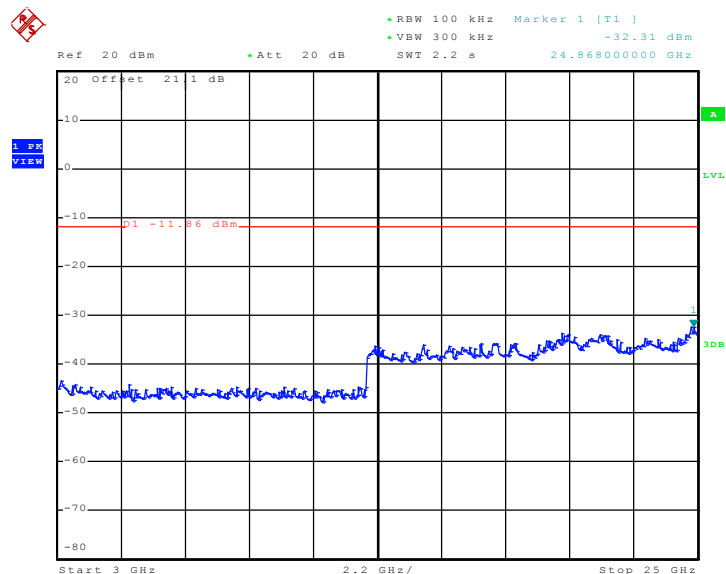
**Conducted Spurious Emission Plot on Bluetooth 1Mbps
GFSK Channel 39**



Date: 22.MAR.2011 13:31:10



Conducted Spurious Emission Plot on Bluetooth 1Mbps
GFSK Channel 39

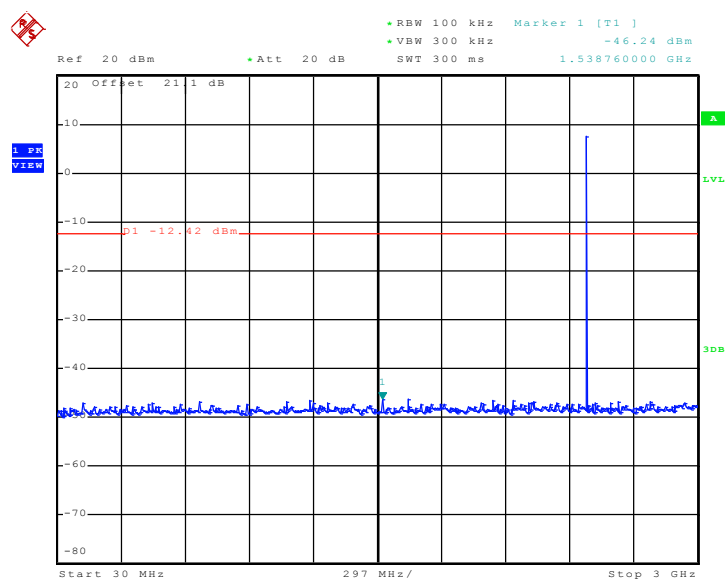


Date: 22.MAR.2011 13:31:32



Test Mode :	Bluetooth 1Mbps GFSK H channel	Temperature :	24~26℃
Test Channel :	78	Relative Humidity :	50~53%
		Test Engineer :	Cona Huang

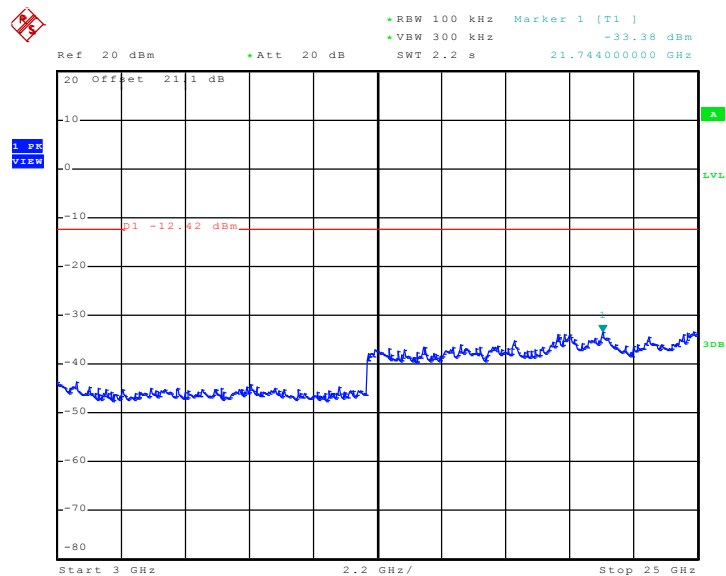
Conducted Spurious Emission Plot on Bluetooth 1Mbps
GFSK Channel 78



Date: 22.MAR.2011 13:32:12



Conducted Spurious Emission Plot on Bluetooth 1Mbps
GFSK Channel 78

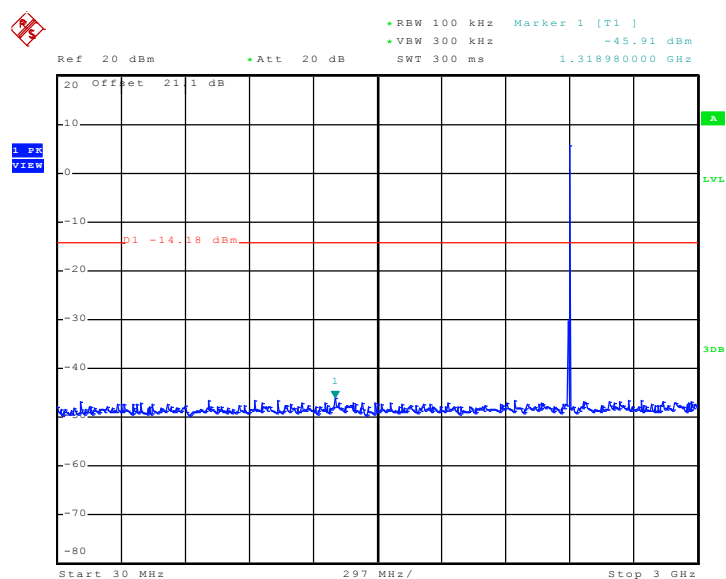


Date: 22.MAR.2011 13:32:34



Test Mode :	Bluetooth EDR 2Mbps π /4-DQPSK L channel	Temperature :	24~26°C
Test Channel :	00	Relative Humidity :	50~53%
		Test Engineer :	Cona Huang

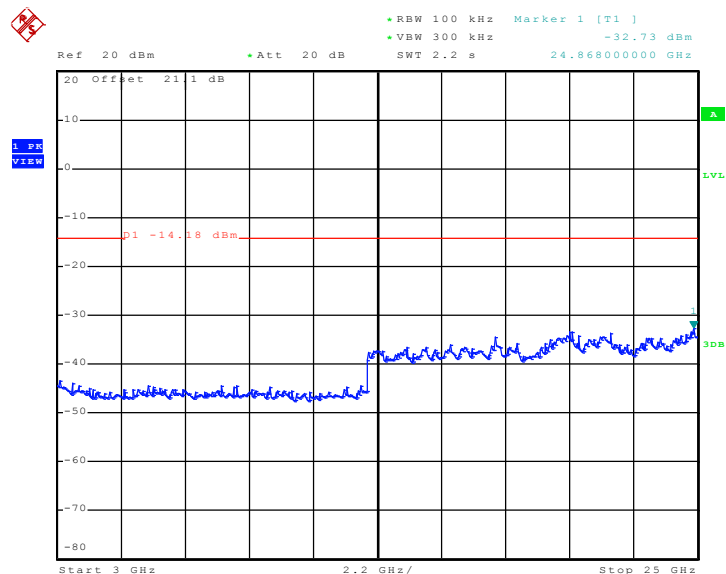
**Conducted Spurious Emission Plot on Bluetooth EDR 2Mbps
 π /4-DQPSK Channel 00**



Date: 22.MAR.2011 13:36:01



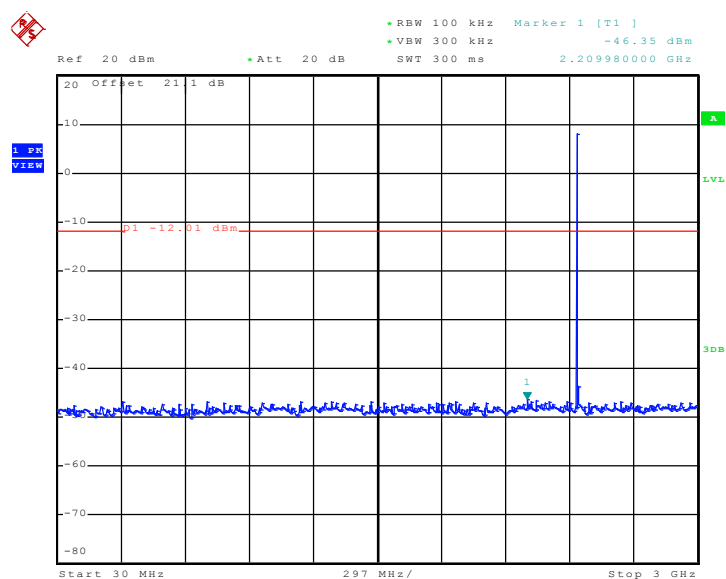
Conducted Spurious Emission Plot on Bluetooth EDR 2Mbps
 $\pi/4$ -DQPSK Channel 00



Date: 22.MAR.2011 13:36:23

Test Mode :	Bluetooth EDR 2Mbps π /4-DQPSK channel	Temperature :	24~26°C
Test Channel :	39	Relative Humidity :	50~53%
		Test Engineer :	Cona Huang

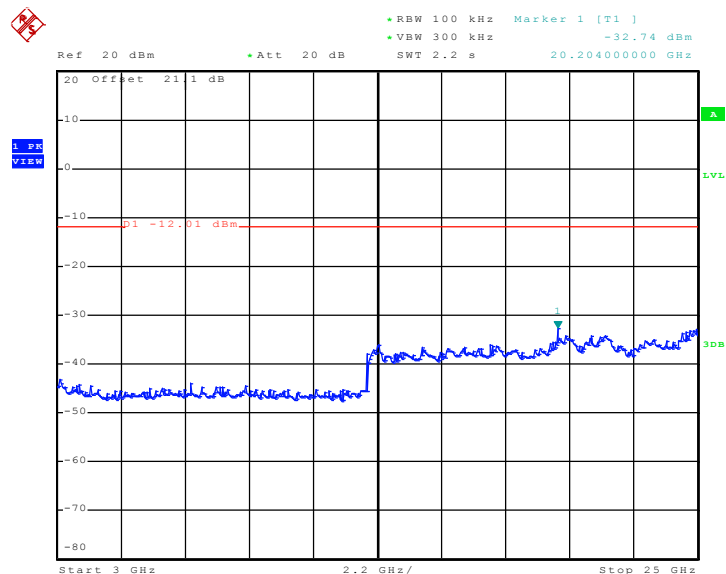
**Conducted Spurious Emission Plot on Bluetooth EDR 2Mbps
 π /4-DQPSK Channel 39**



Date: 22.MAR.2011 13:35:06



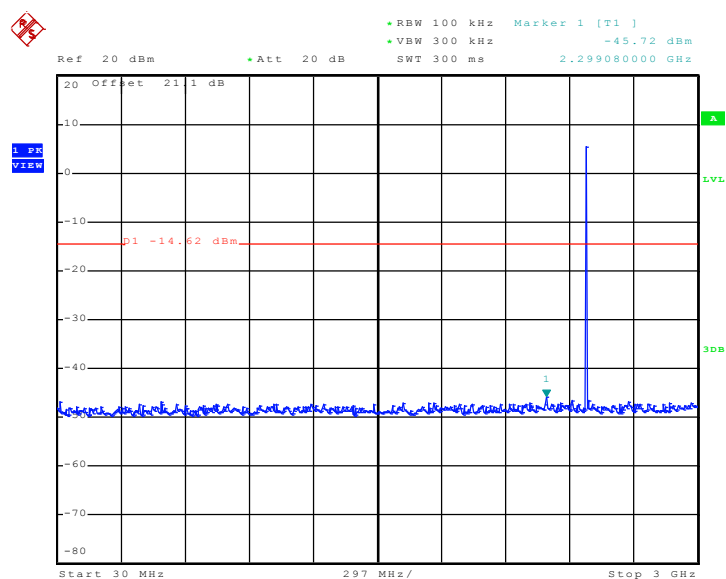
Conducted Spurious Emission Plot on Bluetooth EDR 2Mbps
 $\pi/4$ -DQPSK Channel 39



Date: 22.MAR.2011 13:35:28

Test Mode :	Bluetooth EDR 2Mbps π /4-DQPSK H channel	Temperature :	24~26°C
Test Channel :	78	Relative Humidity :	50~53%
		Test Engineer :	Cona Huang

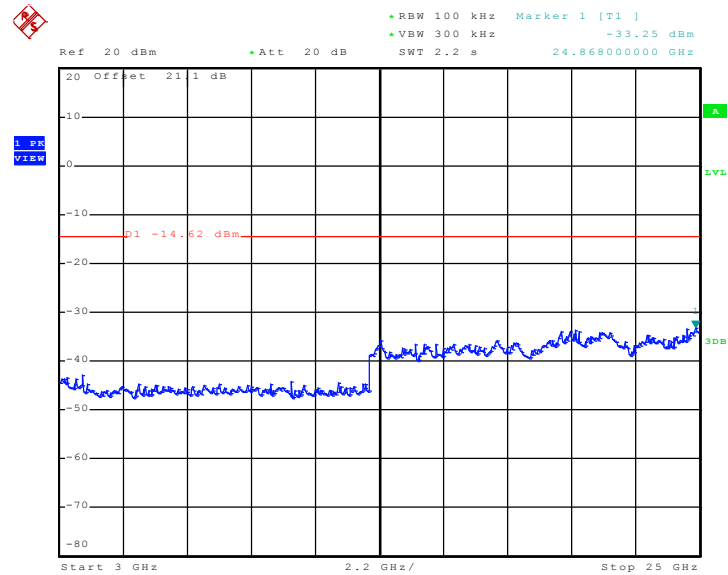
**Conducted Spurious Emission Plot on Bluetooth EDR 2Mbps
 π /4-DQPSK Channel 78**



Date: 22.MAR.2011 13:34:08



Conducted Spurious Emission Plot on Bluetooth EDR 2Mbps
 $\pi/4$ -DQPSK Channel 78

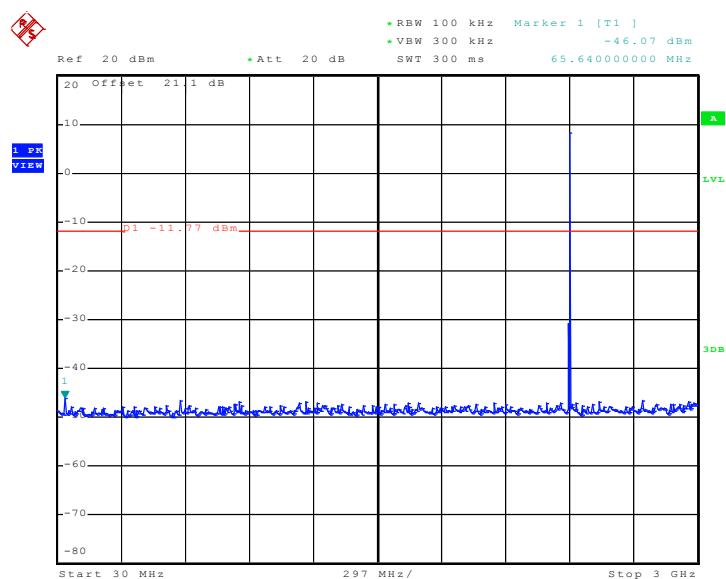


Date: 22.MAR.2011 13:34:30



Test Mode :	Bluetooth EDR 3Mbps 8-DPSK L channel	Temperature :	24~26℃
Test Channel :	00	Relative Humidity :	50~53%
		Test Engineer :	Cona Huang

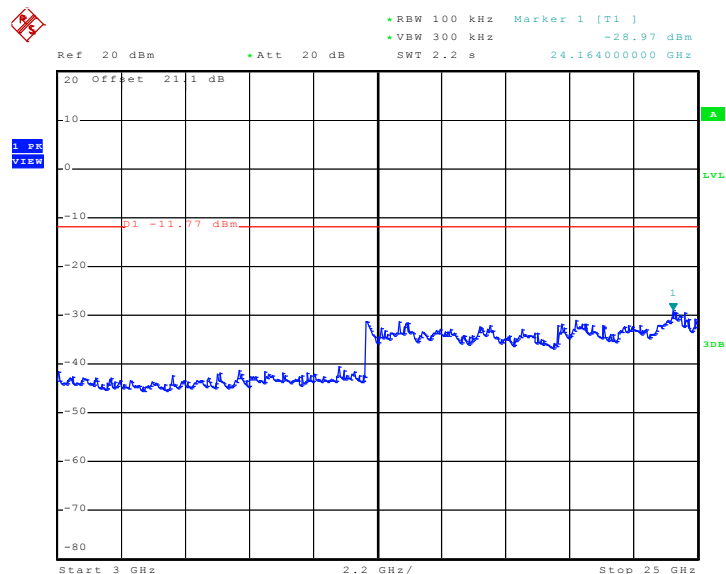
**Conducted Spurious Emission Plot on Bluetooth EDR 3Mbps
8-DPSK Channel 00**



Date: 17.MAR.2011 15:18:49



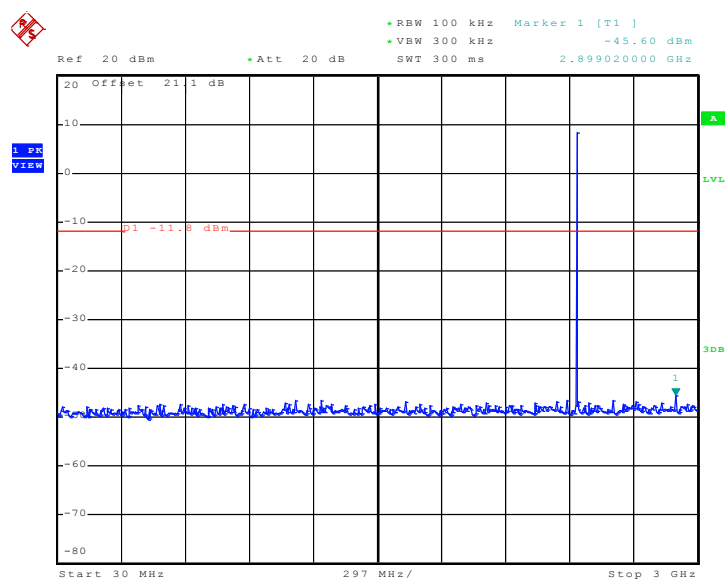
Conducted Spurious Emission Plot on Bluetooth EDR 3Mbps
8-DPSK Channel 00



Date: 17.MAR.2011 15:19:12

Test Mode :	Bluetooth EDR 3Mbps 8-DPSK M channel	Temperature :	24~26°C
Test Channel :	39	Relative Humidity :	50~53%
		Test Engineer :	Cona Huang

**Conducted Spurious Emission Plot on Bluetooth EDR 3Mbps
8-DPSK Channel 39**

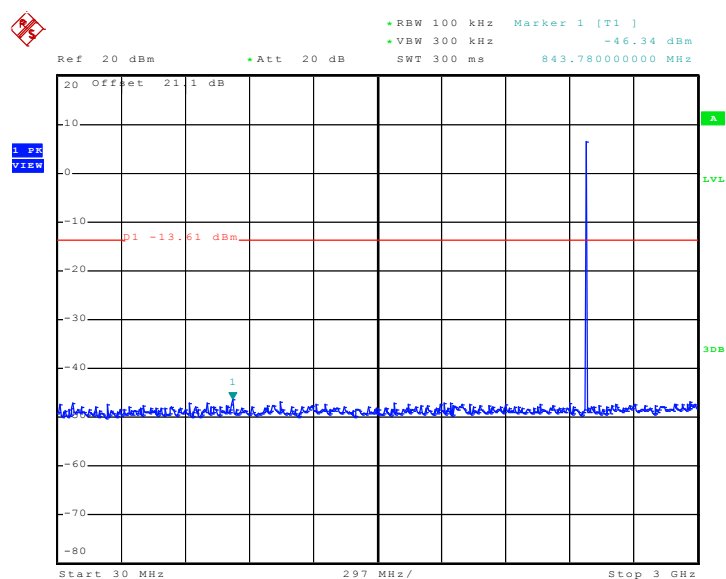


Date: 17.MAR.2011 15:20:05

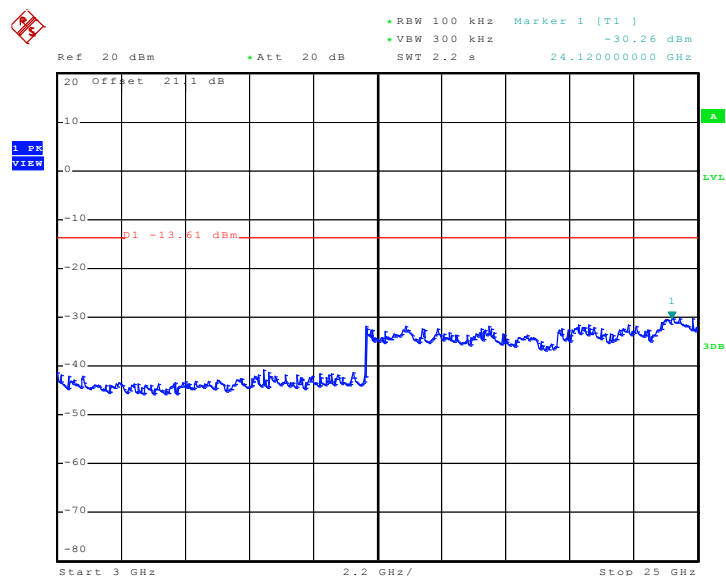


Test Mode :	Bluetooth EDR 3Mbps 8-DPSK H channel	Temperature :	24~26℃
Test Channel :	78	Relative Humidity :	50~53%
		Test Engineer :	Cona Huang

**Conducted Spurious Emission Plot on Bluetooth EDR 3Mbps
8-DPSK Channel 78**



Date: 17.MAR.2011 15:21:11



Date: 17.MAR.2011 15:21:34

3.7 Band Edges Measurement

3.7.1 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.

3.7.2 Measuring Instruments

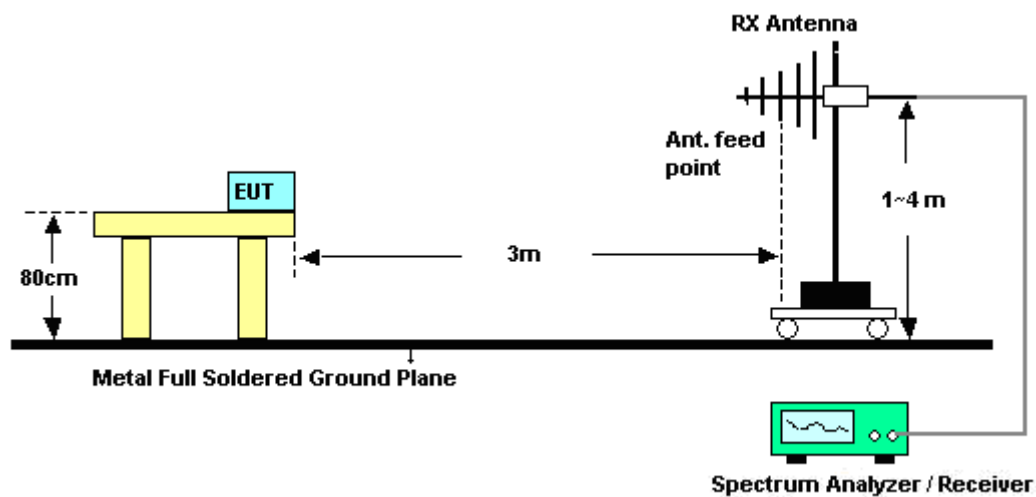
See list of measuring instruments of this test report.

3.7.3 Test Procedures

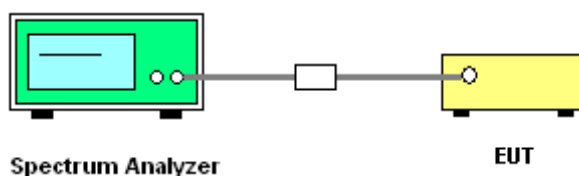
1. The testing follows the guidelines in ANSI C63.4-2003 and FCC Public Notice DA 00-705 Measurement Guidelines.
2. RF antenna conducted test: Set RBW = 300kHz, Video bandwidth (VBW) $\geq$ RBW. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 300k Hz RBW. Note: If the device complies with the use of power option 2 the attenuation under this paragraph shall be 30 dB instead of 20 dB.
3. Radiated emission test: Applies to band edge emissions that fall in the restricted bands listed in FCC Section 15.205. The maximum permitted average field strength is listed in FCC Section 15.209. A pre-amp is necessary for this measurement. For measurements above 1 GHz, set RBW = 1MHz, VBW = 1MHz, Sweep = Auto for Peak detector, RBW = 1MHz, VBW = 10 Hz, Sweep=Auto for Average detector. 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.

3.7.4 Test Setup

<Radiated Band Edges>



<Conducted Band Edges>



3.7.5 Test Result of Radiated Band Edges

<Low Energy Bluetooth>

Test Mode :	Bluetooth LE 1Mbps GFSK L channel	Temperature :	20~22°C
Test Channel :	00	Relative Humidity :	40~42%
		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
2390	46.23	-27.77	74	44.11	31.7	4.5	34.08	119	40	Peak
2390	33.98	-20.02	54	31.86	31.7	4.5	34.08	119	40	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
2354	46.99	-27.01	74	44.98	31.66	4.44	34.09	100	307	Peak
2354	34.68	-19.32	54	32.67	31.66	4.44	34.09	100	307	Average

Test Mode :	Bluetooth LE 1Mbps GFSK H channel	Temperature :	20~22°C
Test Channel :	39	Relative Humidity :	40~42%
		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	65.66	-8.34	74	63.37	31.78	4.59	34.08	104	25	Peak
2483.5	48.54	-5.46	54	46.25	31.78	4.59	34.08	104	25	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	68.34	-5.66	74	66.05	31.78	4.59	34.08	120	319	Peak
2483.5	50.63	-3.37	54	48.34	31.78	4.59	34.08	120	319	Average

<Standard Bluetooth>

Test Mode :	Bluetooth 1Mbps GFSK L channel	Temperature :	20~22°C
Test Channel :	00	Relative Humidity :	40~42%
		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
2388	47.55	-26.45	74	45.46	31.7	4.47	34.08	100	41	Peak
2388	35.32	-18.68	54	33.23	31.7	4.47	34.08	100	41	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
2382.77	48.71	-25.29	74	46.64	31.68	4.47	34.08	104	334	Peak
2382.77	34.7	-19.3	54	32.63	31.68	4.47	34.08	104	334	Average

Test Mode :	Bluetooth 1Mbps GFSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
		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	66.85	-7.15	74	64.56	31.78	4.59	34.08	100	48	Peak
2483.5	30.3	-23.7	54	28.01	31.78	4.59	34.08	100	48	Average

Summary results of marker-delta method:

Test mode	Maximum field strength of the fundamental emission (dBμV/m)	Delta Result (dB)	Average Result (dBμV/m)	Average Limit (dBμV/m)	Margin (dB)	Result
Single Carrier Mode	86.88	56.58	30.3	54	-23.7	Pass
Hopping Mode	86.88	58.62	28.26	54	-25.74	Pass

Note : Average result = Maximum field strength – Delta result

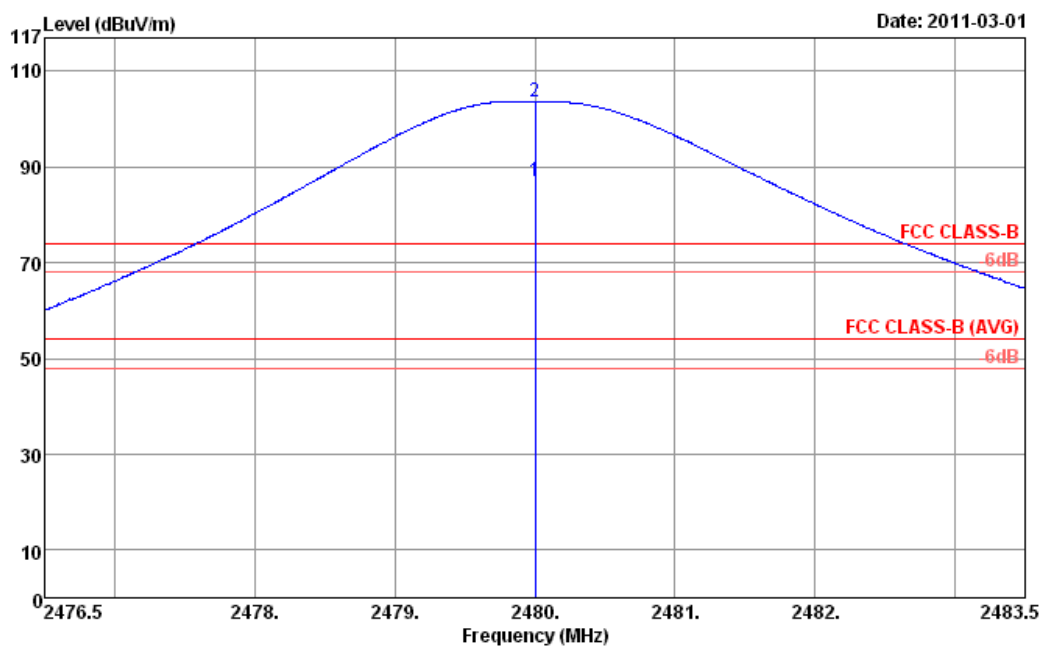
ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	68.34	-5.66	74	66.05	31.78	4.59	34.08	122	319	Peak
2483.5	31.1	-22.9	54	28.81	31.78	4.59	34.08	122	319	Average

Summary results of marker-delta method:

Test mode	Maximum field strength of the fundamental emission (dB μ V/m)	Delta Result (dB)	Average Result (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
Single Carrier Mode	88.84	57.74	31.10	54	-22.90	Pass
Hopping Mode	88.84	59.18	29.66	54	-24.34	Pass

Note : Average result = Maximum field strength – Delta result

Test Mode :	Bluetooth 1Mbps GFSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
Test Engineer :	Cona Huang	Polarization :	Horizontal



Site : 03CH07-HY
Condition : FCC CLASS-B HF_ANT_100824 HORIZONTAL
Project : FR 121516-01

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Factor	Preamp Loss	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 X	2480.00	86.88	32.88	54.00	84.59	31.78	4.59	34.08	100	48 Average
2 X	2480.00	103.80	29.80	74.00	101.51	31.78	4.59	34.08	100	48 Peak

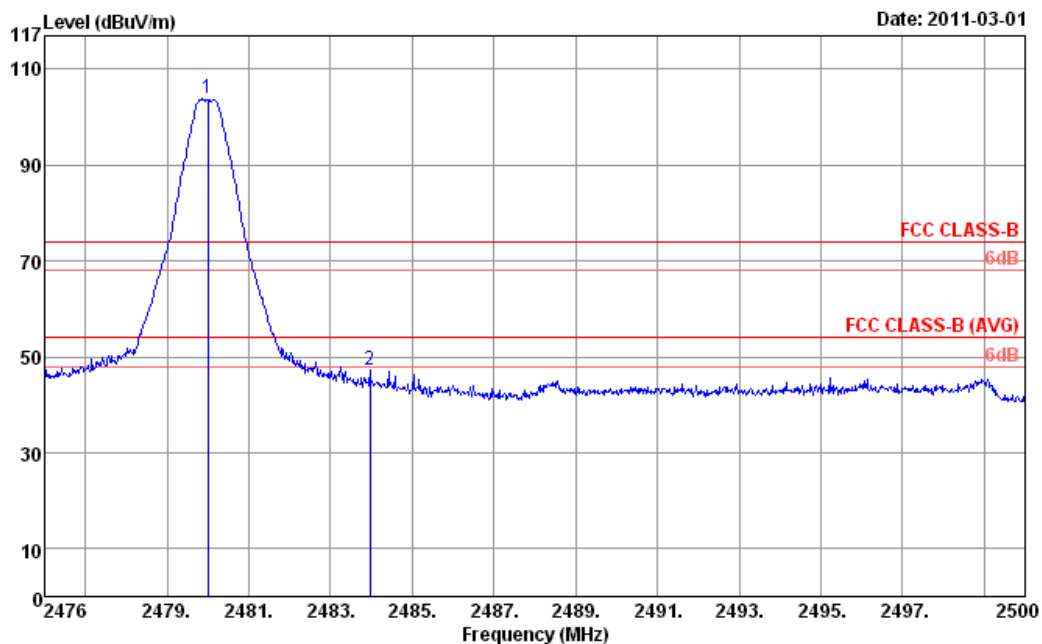
* Maximum field strength of the fundamental emission



FCC RF Test Report

Report No. : FR121516-01A

Test Mode :	Bluetooth 1Mbps GFSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
Test Engineer :	Cona Huang	Polarization :	Horizontal



Site : 03CH07-HY
Condition : FCC CLASS-B HF_ANT_100824 HORIZONTAL
Project : FR 121516-01

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 X	2480.00	103.81	29.81	74.00	101.52	31.78	4.59	34.08	100	48 Peak
2	2483.97	47.23	-26.77	74.00	44.94	31.78	4.59	34.08	100	48 Peak

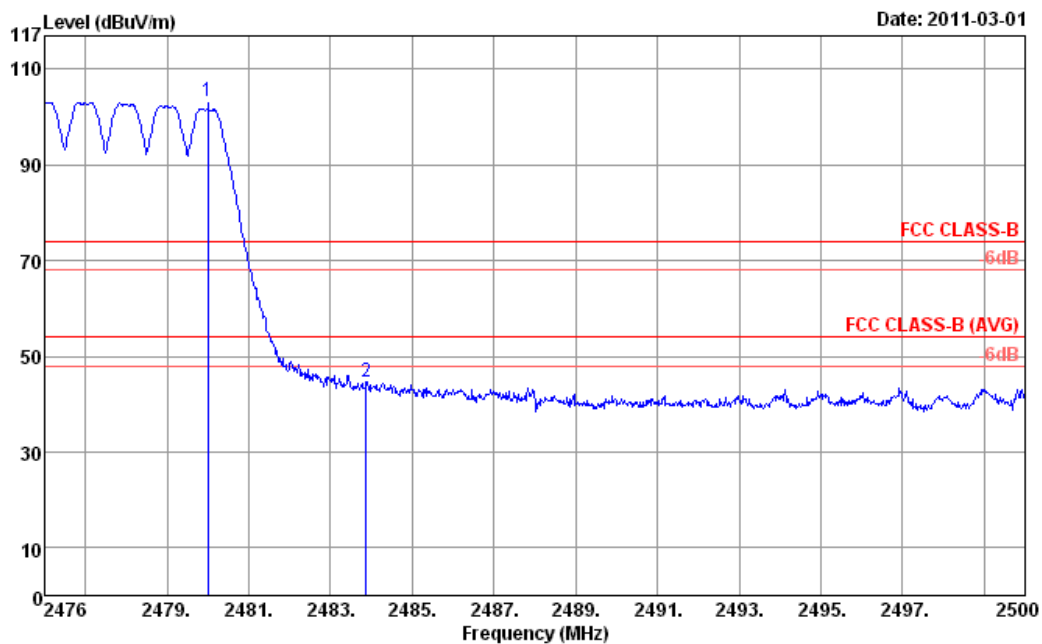
* Marker-Delta Method (RBW/VBW=100KHz): 56.58 dB , single carrier Mode



FCC RF Test Report

Report No. : FR121516-01A

Test Mode :	Bluetooth 1Mbps GFSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
Test Engineer :	Cona Huang	Polarization :	Horizontal

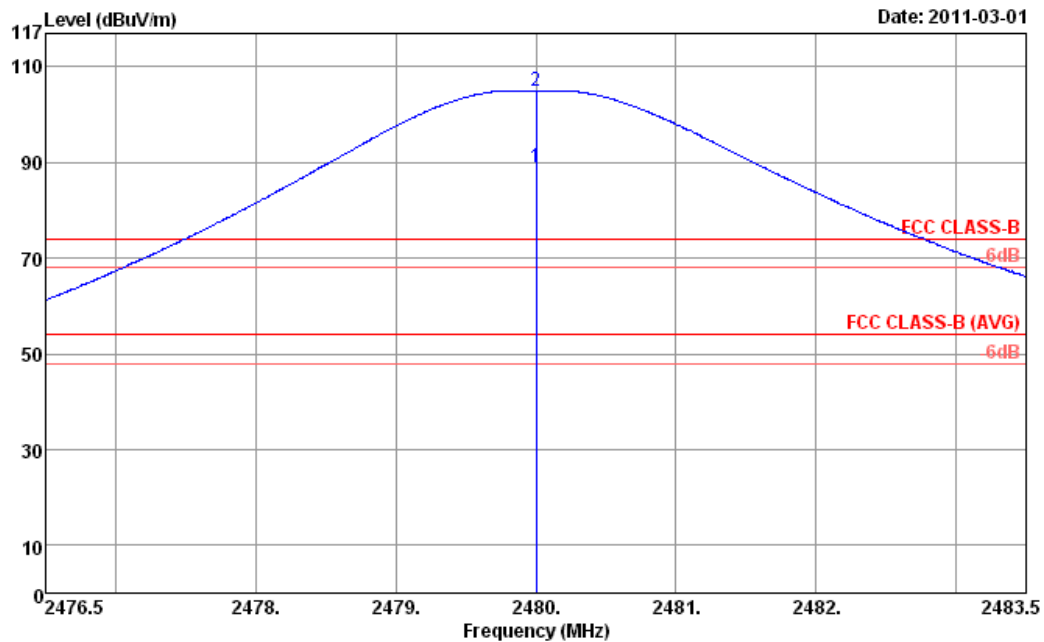


Site : 03CH07-HY
Condition : FCC CLASS-B HF_ANT_100824 HORIZONTAL
Project : FR 121516-01

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 X	2480.00	103.16	29.16	74.00	100.87	31.78	4.59	34.08	100	48 Peak
2	2483.87	44.54	-29.46	74.00	42.25	31.78	4.59	34.08	100	48 Peak

* Marker-Delta Method (RBW/VBW=100KHz): 58.62 dB , Hopping Mode

Test Mode :	Bluetooth 1Mbps GFSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
Test Engineer :	Cona Huang	Polarization :	Vertical



Site : 03CH07-HY
 Condition : FCC CLASS-B HF_ANT_100824 VERTICAL
 Project : FR 121516-01

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 X	2480.00	88.84	34.84	54.00	86.55	31.78	4.59	34.08	122	319 Average
2 X	2480.00	105.09	31.09	74.00	102.80	31.78	4.59	34.08	122	319 Peak

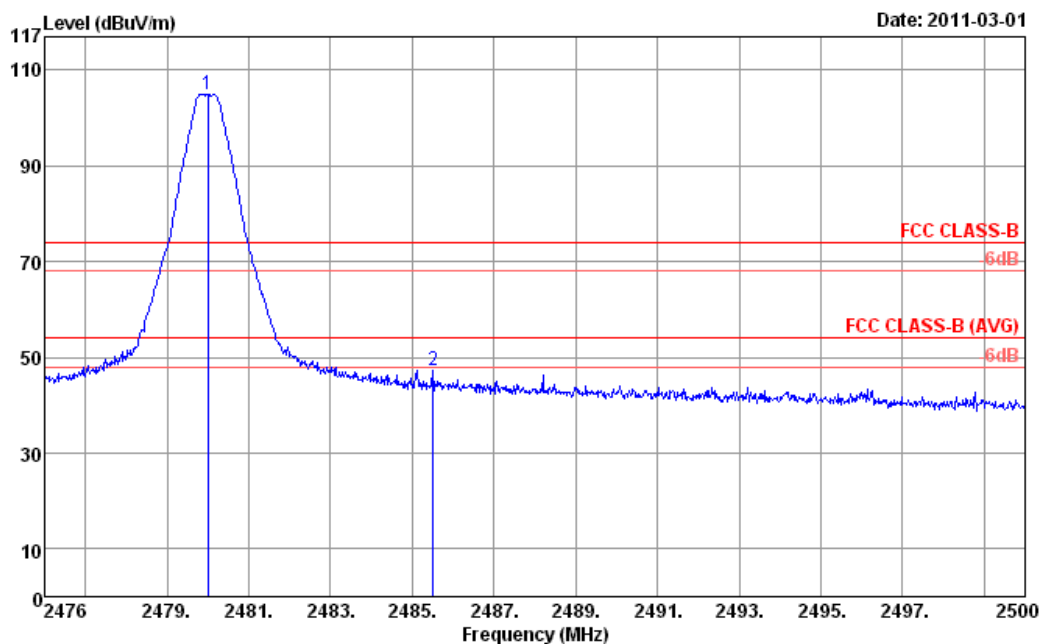
* Maximum field strength of the fundamental emission



FCC RF Test Report

Report No. : FR121516-01A

Test Mode :	Bluetooth 1Mbps GFSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
Test Engineer :	Cona Huang	Polarization :	Vertical

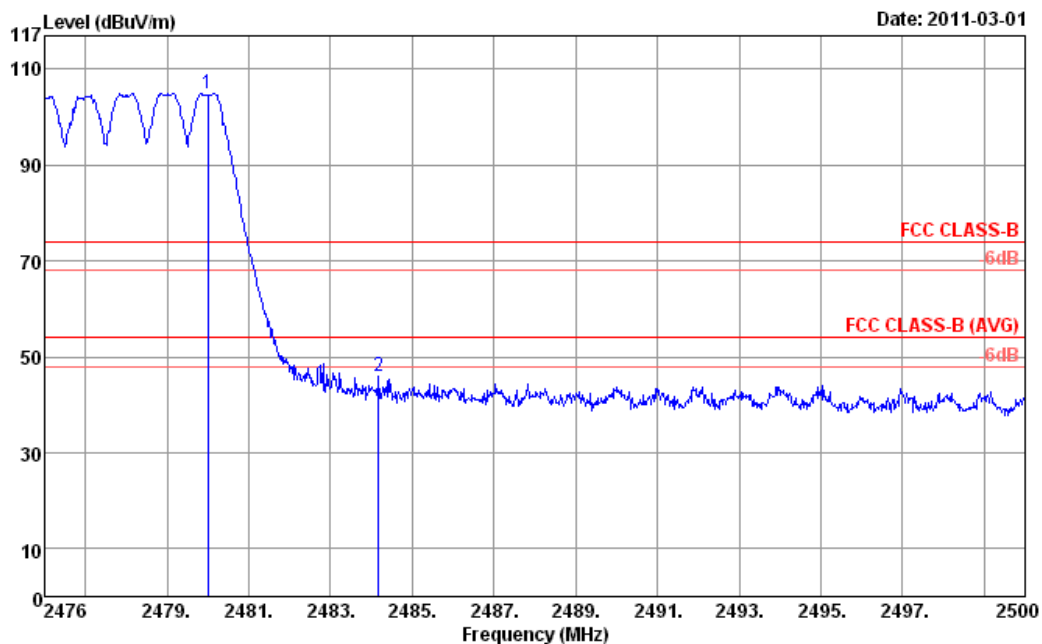


Site : 03CH07-HY
Condition : FCC CLASS-B HF_ANT_100824 VERTICAL
Project : FR 121516-01

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 X	2480.00	105.04	31.04	74.00	102.75	31.78	4.59	34.08	122	319 Peak
2	2485.50	47.30	-26.70	74.00	45.01	31.78	4.59	34.08	122	319 Peak

* Marker-Delta Method (RBW/VBW=100KHz): 57.74 dB , single carrier Mode

Test Mode :	Bluetooth 1Mbps GFSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
Test Engineer :	Cona Huang	Polarization :	Vertical



Site : 03CH07-HY
Condition : FCC CLASS-B HF_ANT_100824 VERTICAL
Project : FR 121516-01

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level Factor	Cable Preamp Loss Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm deg
1 X	2480.00	105.00	31.00	74.00	102.71	31.78	4.59	34.08	122 319 Peak
2	2484.18	45.82	-28.18	74.00	43.53	31.78	4.59	34.08	122 319 Peak

* Marker-Delta Method (RBW/VBW=100KHz): 59.18 dB , Hopping Mode

Test Mode :	Bluetooth EDR 2Mbps $\pi/4$ -DQPSK L channel	Temperature :	20~22°C
Test Channel :	00	Relative Humidity :	40~42%
		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
2390	48.58	-25.42	74	46.46	31.7	4.5	34.08	100	43	Peak
2390	35.86	-18.14	54	33.74	31.7	4.5	34.08	100	43	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
2380	46.68	-27.32	74	44.61	31.68	4.47	34.08	104	334	Peak
2380	34.61	-19.39	54	32.54	31.68	4.47	34.08	104	334	Average

Test Mode :	Bluetooth EDR 2Mbps $\pi/4$ -DQPSK L channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
		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	68.46	-5.54	74	66.17	31.78	4.59	34.08	100	49	Peak
2483.5	32.15	-21.85	54	29.86	31.78	4.59	34.08	100	49	Average

Summary results of marker-delta method:

Test mode	Maximum field strength of the fundamental emission (dB μ V/m)	Delta Result (dB)	Average Result (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
Single Carrier Mode	87.05	54.9	32.15	54	-21.85	Pass
Hopping Mode	87.05	58.76	28.29	54	-25.71	Pass

Note : Average result = Maximum field strength – Delta result

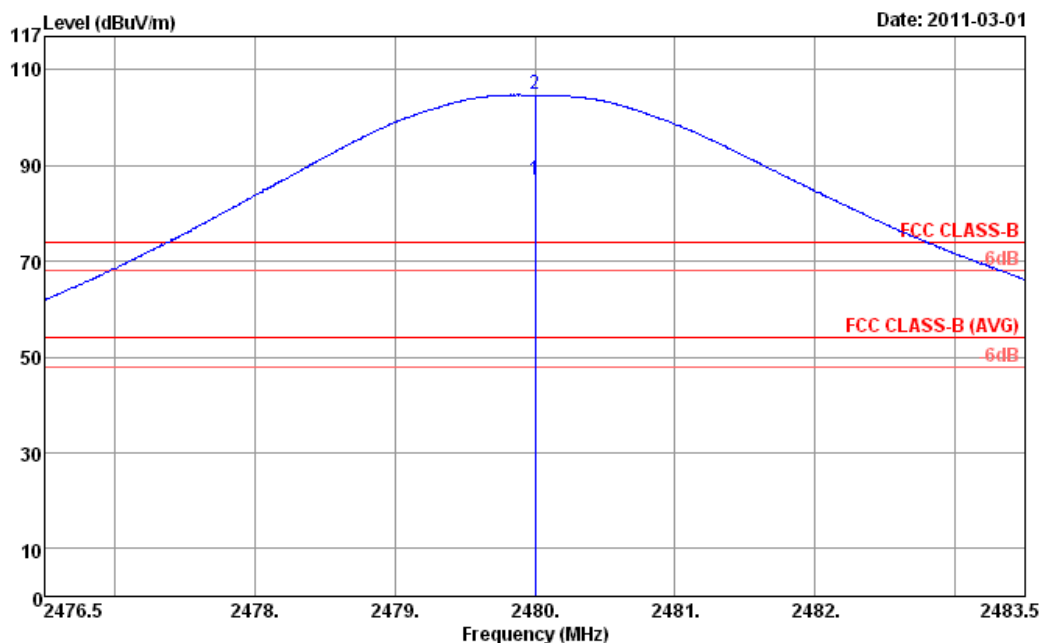
ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	70.83	-3.17	74	68.54	31.78	4.59	34.08	122	319	Peak
2483.5	33.3	-20.7	54	31.01	31.78	4.59	34.08	122	319	Average

Summary results of marker-delta method:

Test mode	Maximum field strength of the fundamental emission (dBμV/m)	Delta Result (dB)	Average Result (dBμV/m)	Average Limit (dBμV/m)	Margin (dB)	Result
Single Carrier Mode	88.94	55.64	33.30	54	-20.70	Pass
Hopping Mode	88.94	59.43	29.51	54	-24.49	Pass

Note : Average result = Maximum field strength – Delta result

Test Mode :	Bluetooth EDR 2Mbps π /4-DQPSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
Test Engineer :	Cona Huang	Polarization :	Horizontal



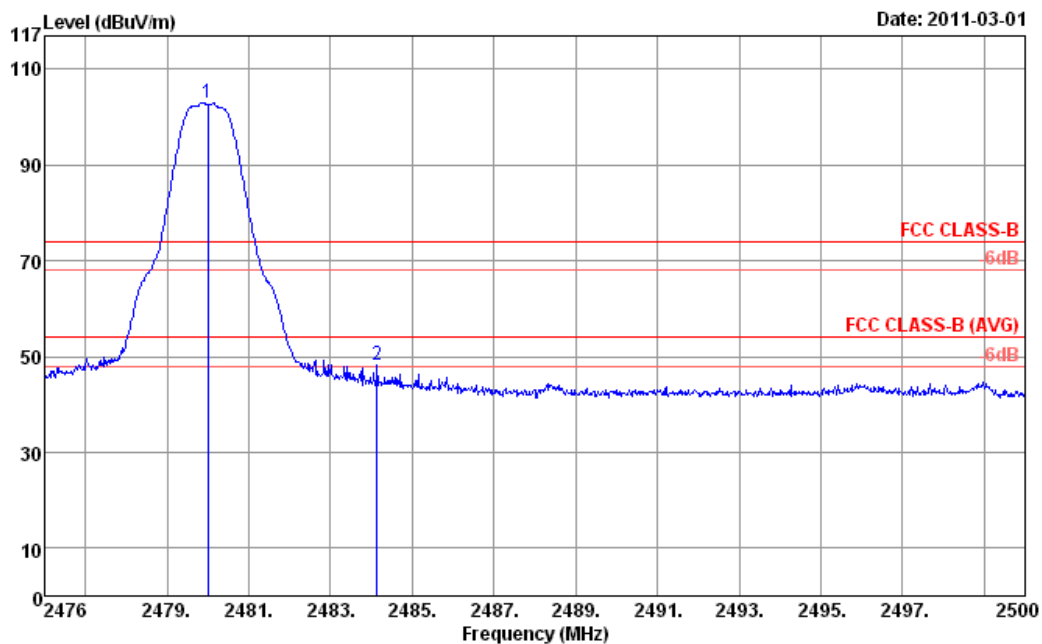
Site : 03CH07-HY
 Condition : FCC CLASS-B HF_ANT_100824 HORIZONTAL
 Project : FR 121516-01

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Factor	Preamp Loss	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 X	2480.00	87.05	33.05	54.00	84.76	31.78	4.59	34.08	100	49 Average
2 X	2480.00	104.80	30.80	74.00	102.51	31.78	4.59	34.08	100	49 Peak

* Maximum field strength of the fundamental emission



Test Mode :	Bluetooth EDR 2Mbps π /4-DQPSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
Test Engineer :	Cona Huang	Polarization :	Horizontal

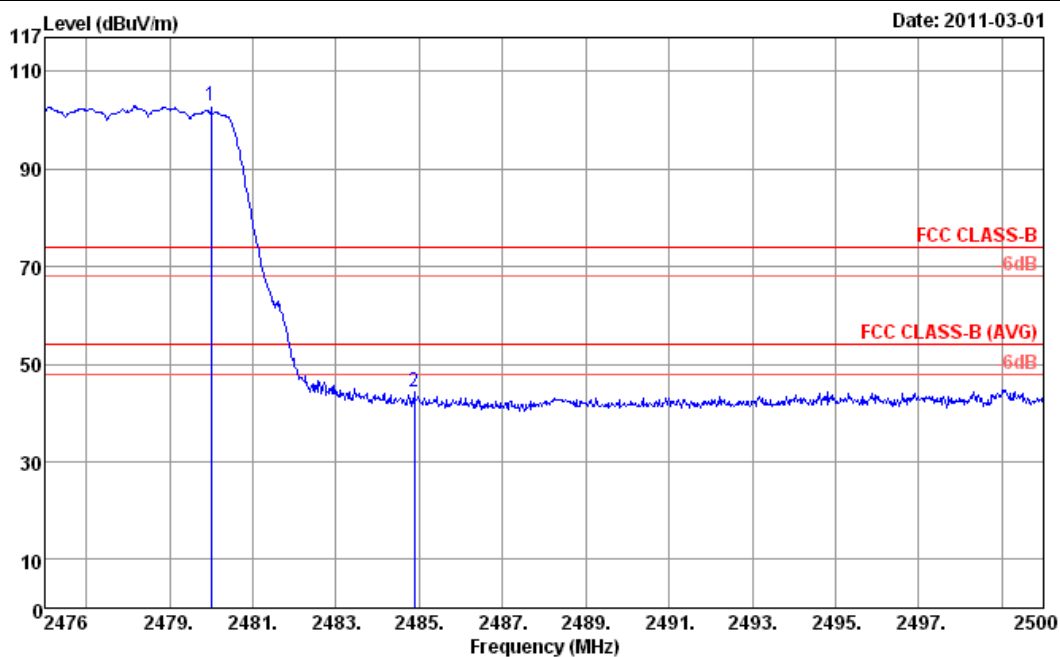


Site : 03CH07-HY
Condition : FCC CLASS-B HF_ANT_100824 HORIZONTAL
Project : FR 121516-01

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 X	2480.00	103.11	29.11	74.00	100.82	31.78	4.59	34.08	100	49 Peak
2	2484.14	48.21	-25.79	74.00	45.92	31.78	4.59	34.08	100	49 Peak

* Marker-Delta Method (RBW/VBW=100KHz): 54.90 dB , single carrier Mode

Test Mode :	Bluetooth EDR 2Mbps π /4-DQPSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
Test Engineer :	Cona Huang	Polarization :	Horizontal

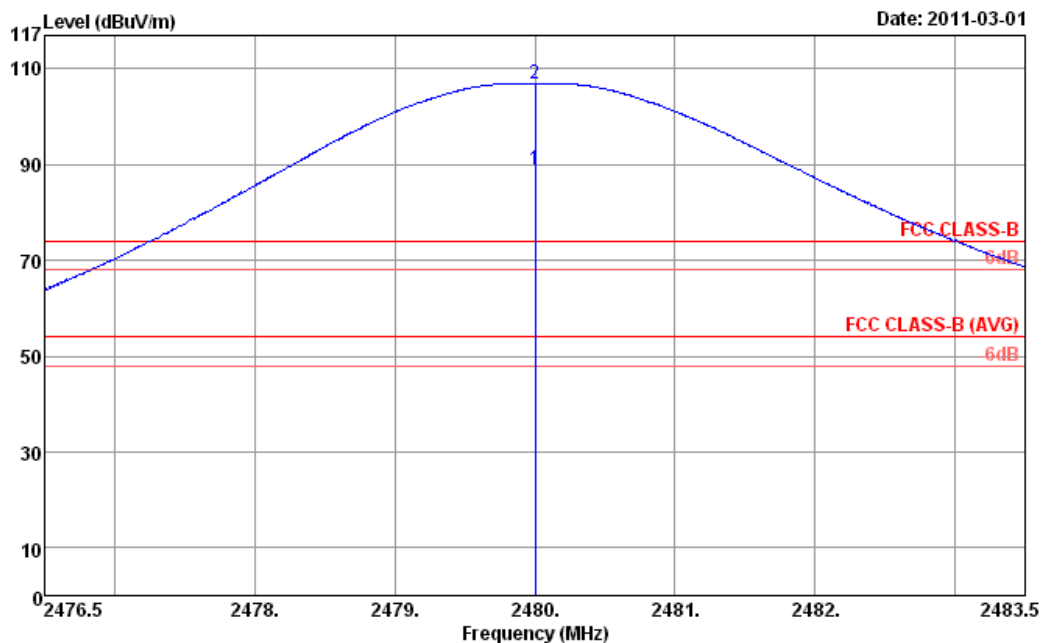


Site : 03CH07-HY
Condition : FCC CLASS-B HF_ANT_100824 HORIZONTAL
Project : FR 121516-01

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Preamp Loss	A/Pos	T/Pos	Remark
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB	cm deg
1 X	2480.00	102.94	28.94	74.00	100.65	31.78	4.59	34.08	100 49 Peak
2	2484.88	44.18	-29.82	74.00	41.89	31.78	4.59	34.08	100 49 Peak

* Marker-Delta Method (RBW/VBW=100KHz): 58.76 dB , Hopping Mode

Test Mode :	Bluetooth EDR 2Mbps π /4-DQPSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
Test Engineer :	Cona Huang	Polarization :	Vertical

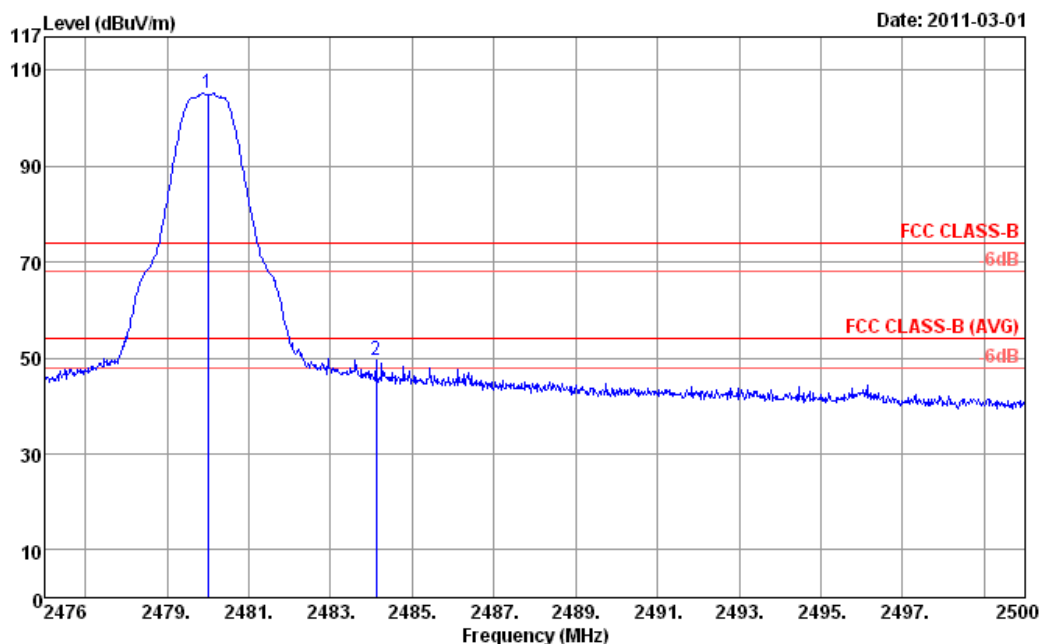


Site : 03CH07-HY
Condition : FCC CLASS-B HF_ANT_100824 VERTICAL
Project : FR 121516-01

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 X	2480.00	88.94	34.94	54.00	86.65	31.78	4.59	34.08	122	319	Average
2 X	2480.00	107.03	33.03	74.00	104.74	31.78	4.59	34.08	122	319	Peak

* Maximum field strength of the fundamental emission

Test Mode :	Bluetooth EDR 2Mbps π /4-DQPSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
Test Engineer :	Cona Huang	Polarization :	Vertical

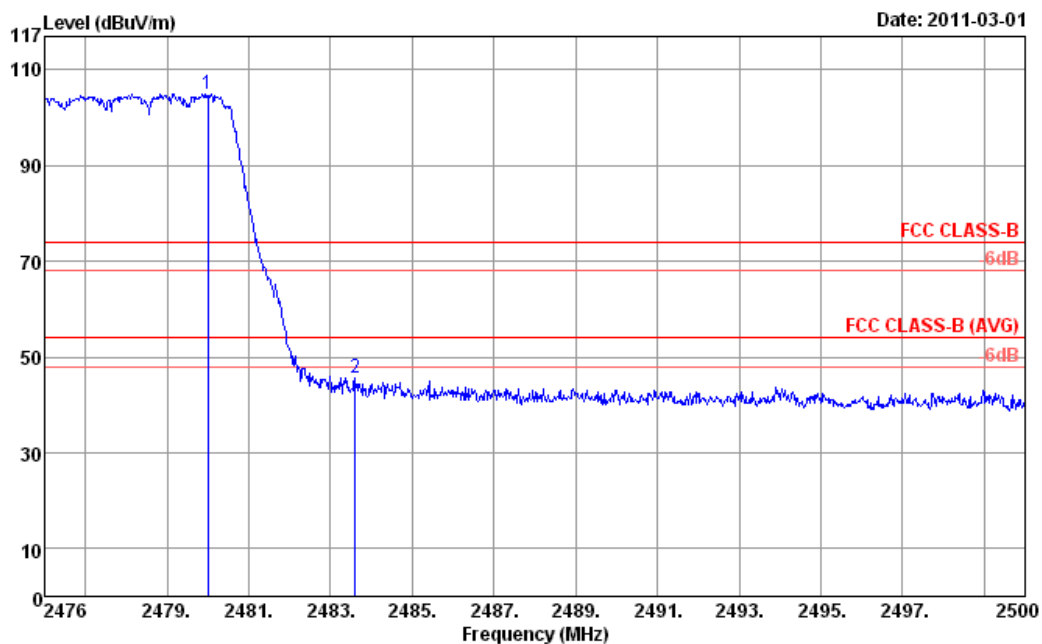


Site : 03CH07-HY
Condition : FCC CLASS-B HF_ANT_100824 VERTICAL
Project : FR 121516-01

	Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 X	2480.00	105.29	31.29	74.00	103.00	31.78	4.59	34.08	122	319	Peak
2	2484.11	49.65	-24.35	74.00	47.36	31.78	4.59	34.08	122	319	Peak

* Marker-Delta Method (RBW/VBW=100KHz): 55.64 dB , single carrier Mode

Test Mode :	Bluetooth EDR 2Mbps π /4-DQPSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
Test Engineer :	Cona Huang	Polarization :	Vertical



Site : 03CH07-HY
 Condition : FCC CLASS-B HF_ANT_100824 VERTICAL
 Project : FR 121516-01

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 X	2480.00	105.00	31.00	74.00	102.71	31.78	4.59	34.08	122	319 Peak
2	2483.61	45.57	-28.43	74.00	43.28	31.78	4.59	34.08	122	319 Peak

* Marker-Delta Method (RBW/VBW=100KHz): 59.43 dB , Hopping Mode

Test Mode :	Bluetooth EDR 3Mbps 8-DPSK L channel	Temperature :	20~22°C
Test Channel :	00	Relative Humidity :	40~42%
		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
2390	47.84	-26.16	74	45.72	31.7	4.5	34.08	100	43	Peak
2390	33.82	-20.18	54	31.7	31.7	4.5	34.08	100	43	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
2380.49	48.57	-25.43	74	46.5	31.68	4.47	34.08	104	334	Peak
2380.49	34.7	-19.3	54	32.63	31.68	4.47	34.08	104	334	Average

Test Mode :	Bluetooth EDR 3Mbps 8-DPSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
		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	68.6	-5.4	74	66.31	31.78	4.59	34.08	100	49	Peak
2483.5	29.47	-24.53	54	27.18	31.78	4.59	34.08	100	49	Average

Summary results of marker-delta method:

Test mode	Maximum field strength of the fundamental emission (dBμV/m)	Delta Result (dB)	Average Result (dBμV/m)	Average Limit (dBμV/m)	Margin (dB)	Result
Single Carrier Mode	86.03	56.56	29.47	54	-24.53	Pass
Hopping Mode	86.03	58.87	27.16	54	-26.84	Pass

Note : Average result = Maximum field strength – Delta result



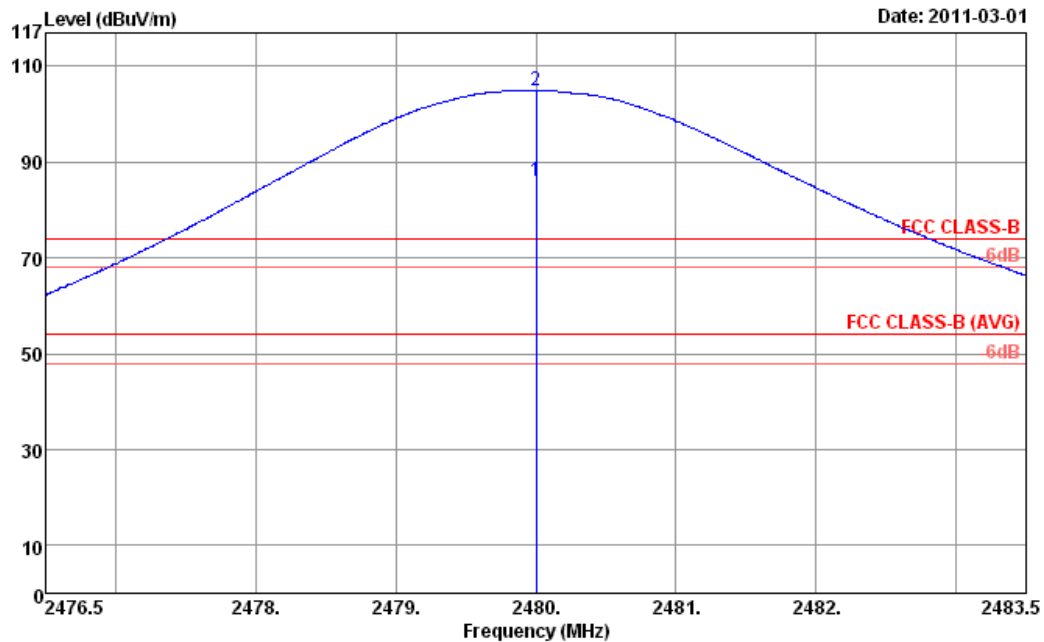
ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	70.81	-3.19	74	68.52	31.78	4.59	34.08	122	319	Peak
2483.5	30.39	-23.61	54	28.1	31.78	4.59	34.08	122	319	Average

Summary results of marker-delta method:

Test mode	Maximum field strength of the fundamental emission (dB μ V/m)	Delta Result (dB)	Average Result (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
Single Carrier Mode	87.84	57.45	30.39	54	-23.61	Pass
Hopping Mode	87.84	59.89	27.95	54	-26.05	Pass

Note : Average result = Maximum field strength – Delta result

Test Mode :	Bluetooth EDR 3Mbps 8-DPSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
Test Engineer :	Cona Huang	Polarization :	Horizontal



Site : 03CH07-HY
 Condition : FCC CLASS-B HF_ANT_100824 HORIZONTAL
 Project : FR 121516-01

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Factor	Preamplifier Loss	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 X	2480.00	86.03	32.03	54.00	83.74	31.78	4.59	34.08	100	49 Average
2 X	2480.00	105.00	31.00	74.00	102.71	31.78	4.59	34.08	100	49 Peak

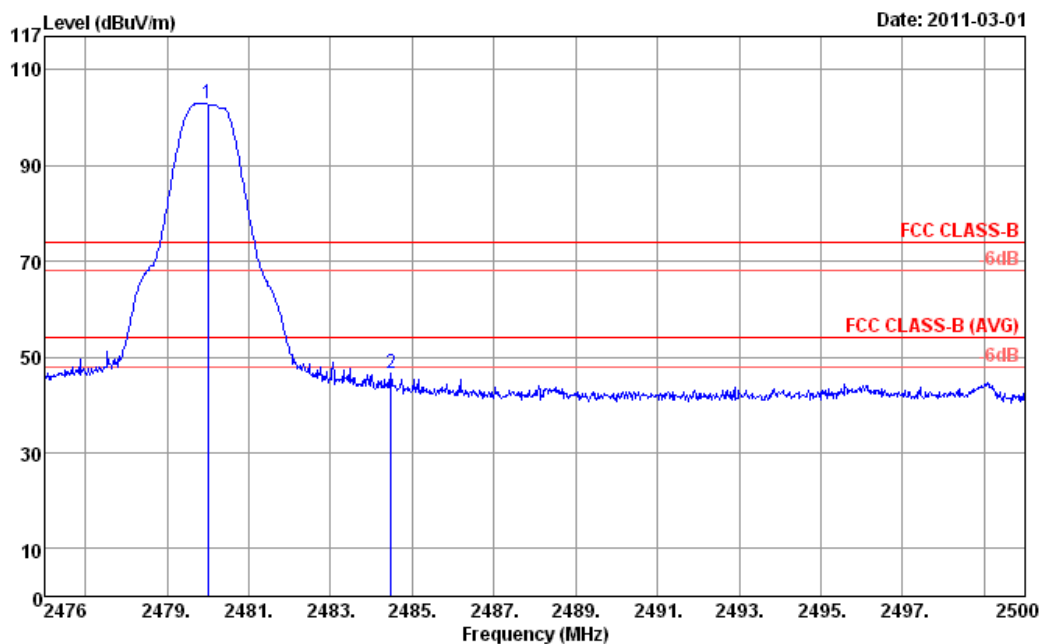
* Maximum field strength of the fundamental emission



FCC RF Test Report

Report No. : FR121516-01A

Test Mode :	Bluetooth EDR 3Mbps 8-DPSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
Test Engineer :	Cona Huang	Polarization :	Horizontal



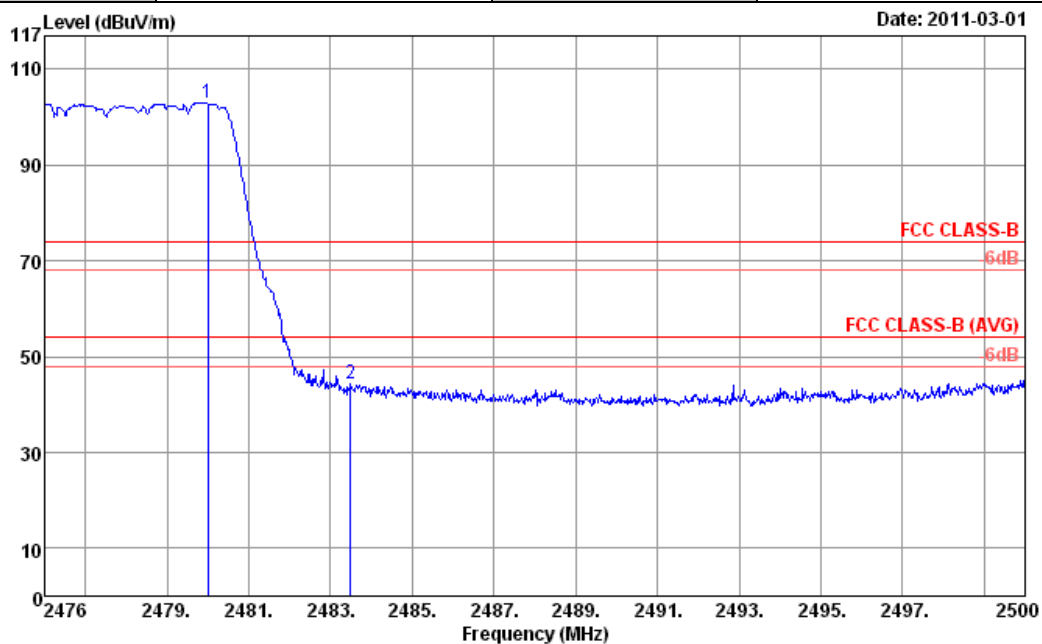
Site : 03CH07-HY
Condition : FCC CLASS-B HF_ANT_100824 HORIZONTAL
Project : FR 121516-01

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamplifier	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 X	2480.00	103.11	29.11	74.00	100.82	31.78	4.59	34.08	100	49	Peak
2	2484.47	46.55	-27.45	74.00	44.26	31.78	4.59	34.08	100	49	Peak

* Marker-Delta Method (RBW/VBW=100KHz): 56.56 dB , single carrier Mode



Test Mode :	Bluetooth EDR 3Mbps 8-DPSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
Test Engineer :	Cona Huang	Polarization :	Horizontal



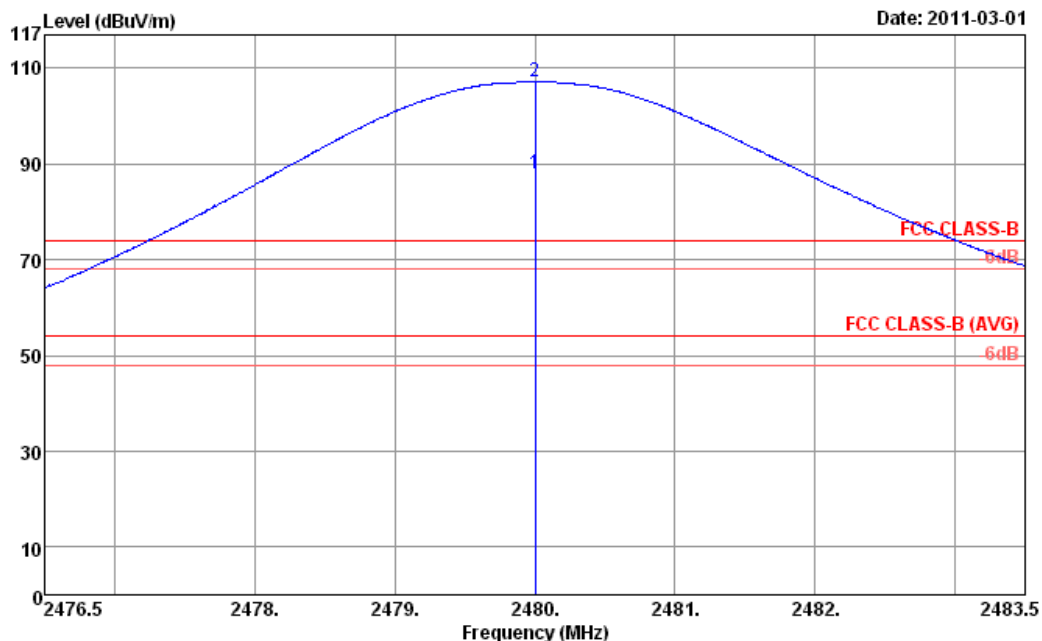
Site : 03CH07-HY
Condition : FCC CLASS-B HF_ANT_100824 HORIZONTAL
Project : FR 121516-01

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1 X	2480.00	103.12	29.12	74.00	100.83	31.78	4.59	34.08	100	49	Peak
2	2483.49	44.25	-29.75	74.00	41.96	31.78	4.59	34.08	100	49	Peak

* Marker-Delta Method (RBW/VBW=100KHz): 58.87 dB , Hopping Mode



Test Mode :	Bluetooth EDR 3Mbps 8-DPSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
Test Engineer :	Cona Huang	Polarization :	Vertical



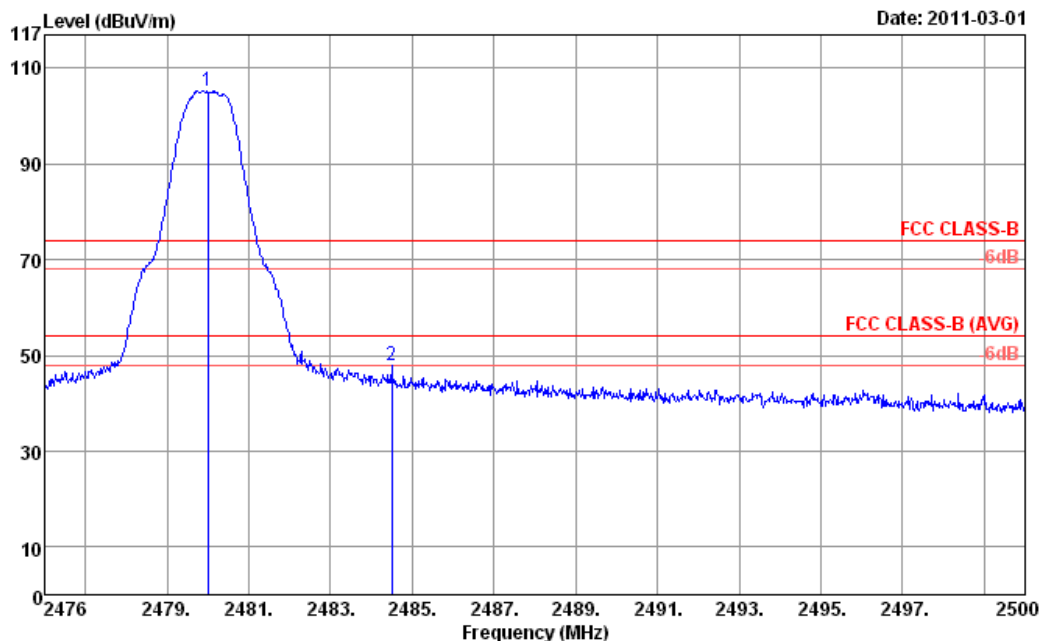
Site : 03CH07-HY
 Condition : FCC CLASS-B HF_ANT_100824 VERTICAL
 Project : FR 121516-01

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 X	2480.00	87.84	33.84	54.00	85.55	31.78	4.59	34.08	122	319 Average
2 X	2480.00	107.26	33.26	74.00	104.97	31.78	4.59	34.08	122	319 Peak

* Maximum field strength of the fundamental emission



Test Mode :	Bluetooth EDR 3Mbps 8-DPSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
Test Engineer :	Cona Huang	Polarization :	Vertical



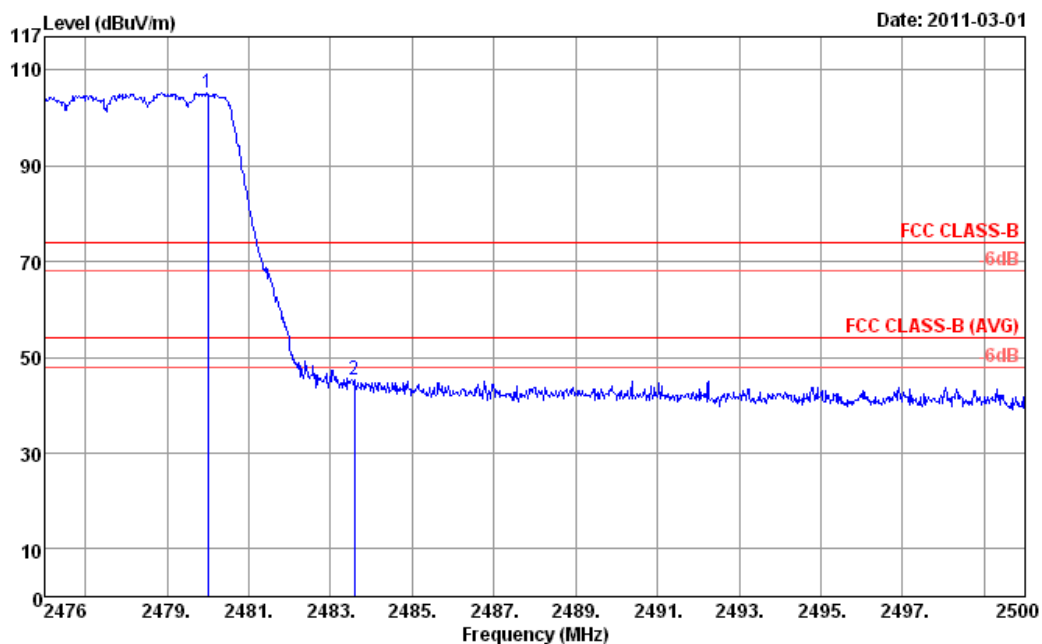
Site : 03CH07-HY
Condition : FCC CLASS-B HF_ANT_100824 VERTICAL
Project : FR 121516-01

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level Factor	Cable Loss Factor	Preamplifier Loss Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 X	2480.00	105.24	31.24	74.00	102.95	31.78	4.59	34.08	122	319 Peak
2	2484.50	47.79	-26.21	74.00	45.50	31.78	4.59	34.08	122	319 Peak

* Marker-Delta Method (RBW/VBW=100KHz): 57.45 dB , single carrier Mode



Test Mode :	Bluetooth EDR 3Mbps 8-DPSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
Test Engineer :	Cona Huang	Polarization :	Vertical



Site : 03CH07-HY
Condition : FCC CLASS-B HF_ANT_100824 VERTICAL
Project : FR 121516-01

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1 X	2480.00	105.16	31.16	74.00	102.87	31.78	4.59	34.08	122	319 Peak
2	2483.58	45.27	-28.73	74.00	42.98	31.78	4.59	34.08	122	319 Peak

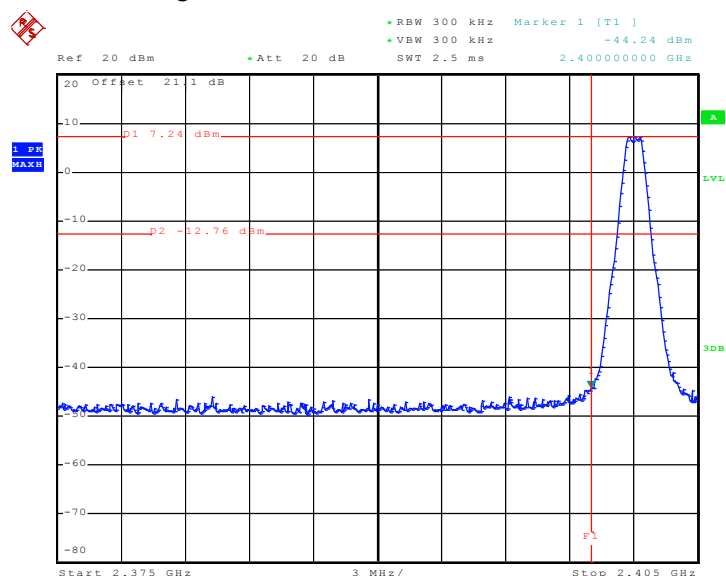
* Marker-Delta Method (RBW/VBW=100KHz): 59.89 dB , Hopping Mode



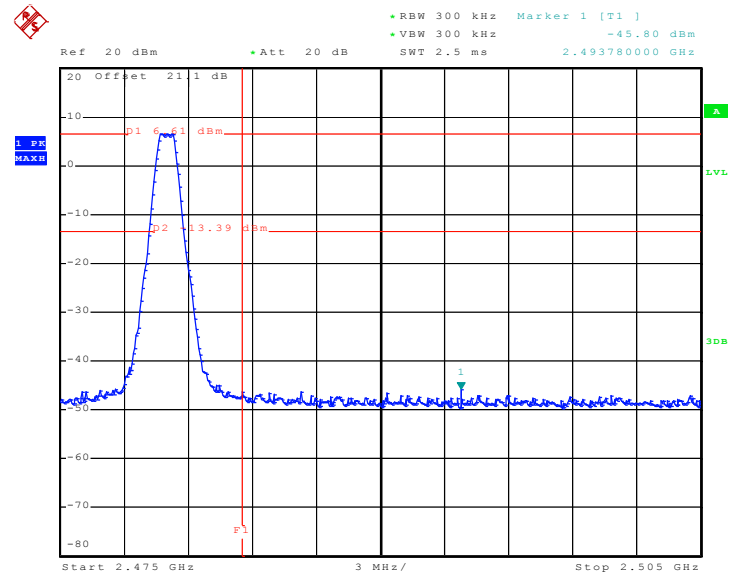
<Low Energy Bluetooth>

Test Mode :	Bluetooth LE 1Mbps GFSK L/H channel	Temperature :	24~26℃
Test Channel :	00 and 39	Relative Humidity :	50~53%
		Test Engineer :	Cona Huang

Low Band Edge Plot on Channel 01



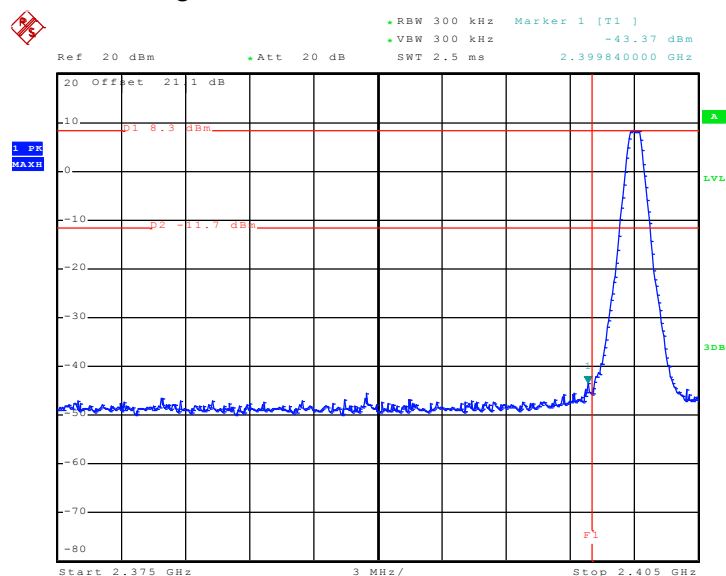
Date: 17.MAR.2011 20:21:53

High Band Edge Plot on Channel 39


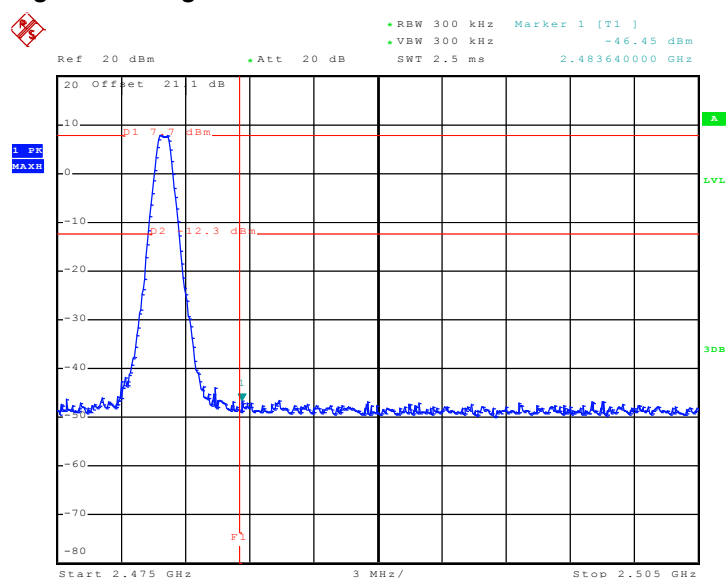
Date: 17.MAR.2011 20:35:07

<Standard Bluetooth>

Test Mode :	Bluetooth 1Mbps GFSK L/H channel	Temperature :	24~26°C
Test Channel :	00 and 78	Relative Humidity :	50~53%
		Test Engineer :	Cona Huang

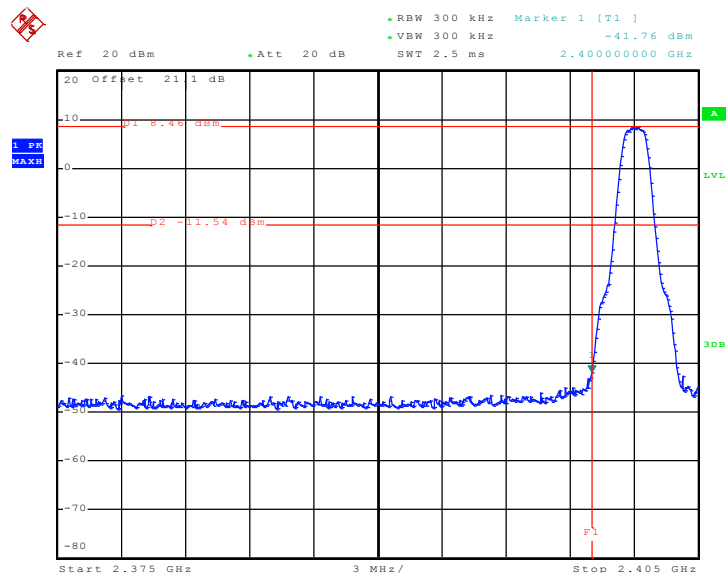
Low Band Edge Plot on Channel 01


Date: 17.MAR.2011 15:02:35

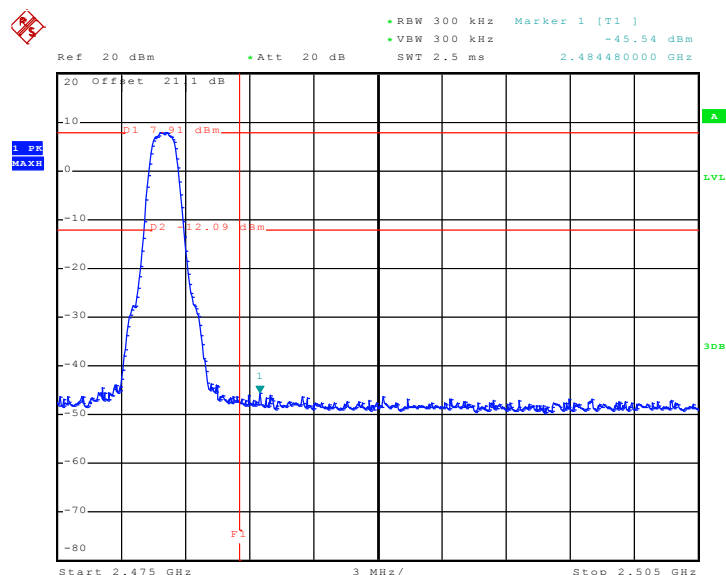
High Band Edge Plot on Channel 78


Date: 17.MAR.2011 15:01:54

Test Mode :	Bluetooth EDR 2Mbps π /4-DQPSK L/H channel	Temperature :	24~26°C
Test Channel :	00 and 78	Relative Humidity :	50~53%
		Test Engineer :	Cona Huang

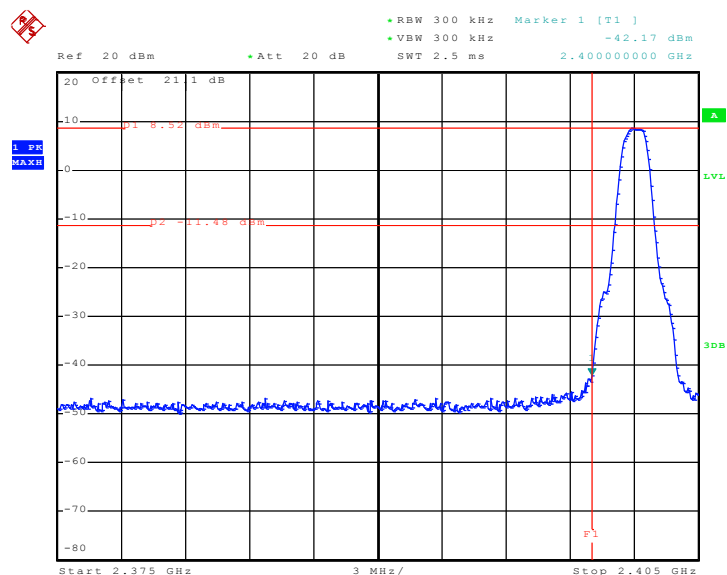
Low Band Edge Plot on Channel 01


Date: 17.MAR.2011 15:03:33

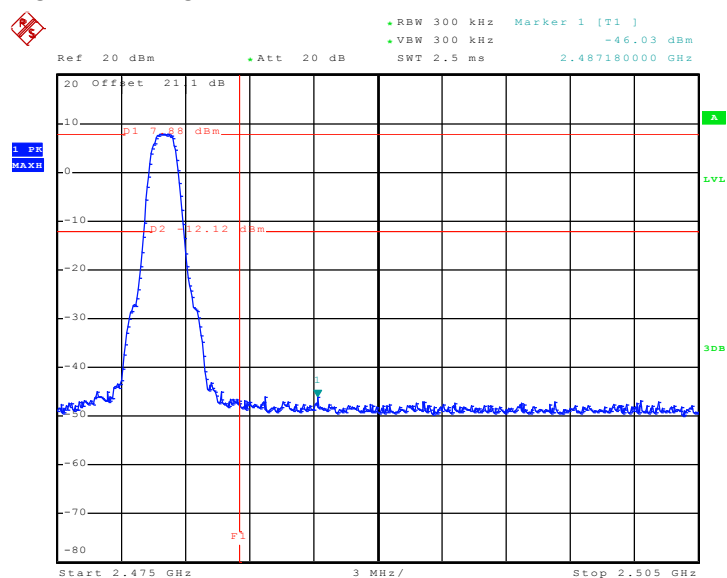
High Band Edge Plot on Channel 78


Date: 17.MAR.2011 15:04:22

Test Mode :	Bluetooth EDR 3Mbps 8-DPSK L/H channel	Temperature :	24~26°C
Test Channel :	00 and 78	Relative Humidity :	50~53%
		Test Engineer :	Cona Huang

Low Band Edge Plot on Channel 01


Date: 17.MAR.2011 14:59:32

High Band Edge Plot on Channel 78


Date: 17.MAR.2011 15:01:00

3.8 Radiated Emission Measurement

3.8.1 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

3.8.2 Measuring Instruments

See list of measuring instruments of this test report.

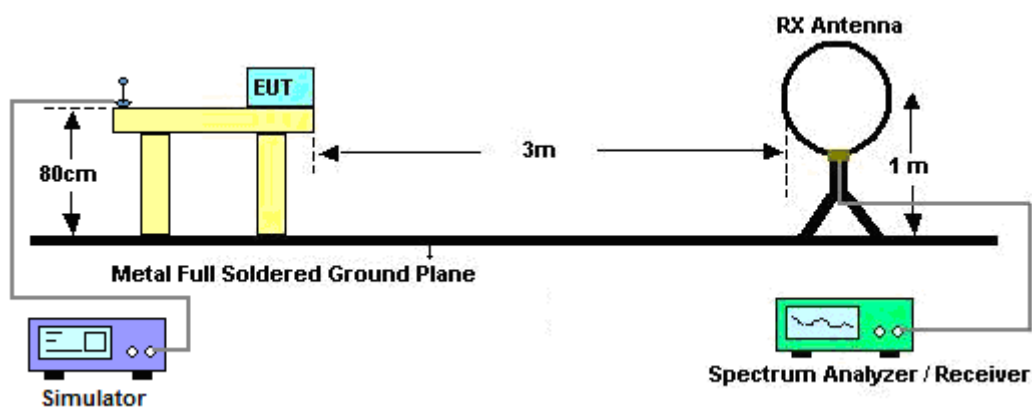
3.8.3 Test Procedures

1. The testing follows the guidelines in FCC Public Notice DA 00-705 Measurement Guidelines.
2. Use the following spectrum analyzer settings:
 - (1) If $f < 1$ GHz,
Span = wide enough to fully capture the emission being measured; RBW = 100 kHz; VBW = 300kHz; Sweep = auto; Detector function = peak; Trace = max hold.
 - (2) If $f \geq 1$ GHz
Span = wide enough to fully capture the emission being measured; RBW = 1 MHz, VBW = 1MHz for Peak mode, RBW = 1 MHz, VBW = 10Hz for Average mode; Sweep = auto; Detector function = peak; Trace = max hold.
 - (3) Above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.
Distance extrapolation factor = $20 \log (\text{specific distance [3m]} / \text{test distance [1m]})$ (dB)

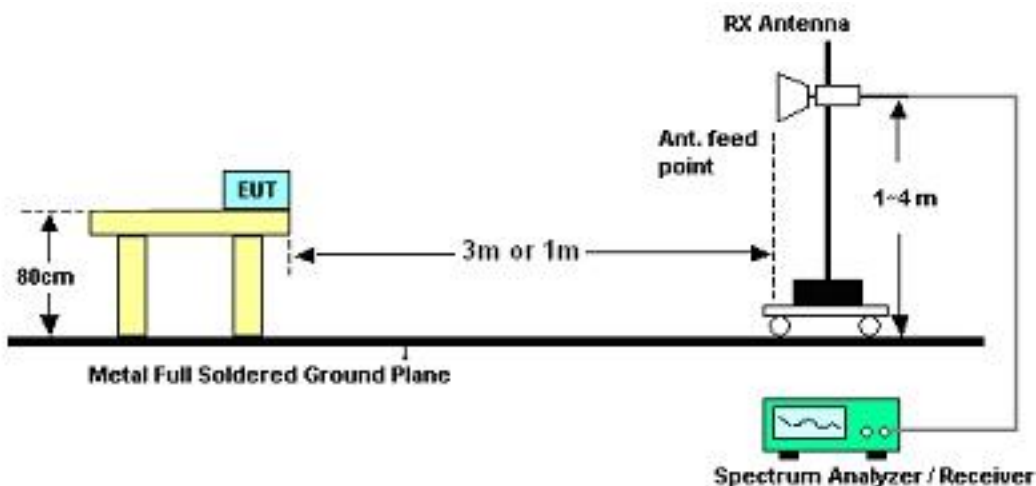
3. Follow the guidelines in ANSI C63.4-2003 with respect to maximizing the emission by rotating the EUT, measuring the emission for three EUT orthogonal planes, and adjusting the measurement antenna height and polarization. A pre-amp and a high pass filter are used for this test in order to get the good signal level.
4. Measured average value for the peak value is greater than 54 dBuV/m

3.8.4 Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz



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

Test Engineer :	Cona Huang	Temperature :	20~22°C	
		Relative Humidity :	40~42%	

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 = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

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

3.8.6 Test Result of Radiated Emission (30MHz ~ 1GHz)

<Low Energy Bluetooth>

Test Mode :	Bluetooth LE 1Mbps GFSK L channel	Temperature :	20~22°C
Test Channel :	00	Relative Humidity :	40~42%
Test Engineer :	Cona Huang	Polarization :	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
125.31	36.44	-7.06	43.5	55.93	10.96	1.07	31.52	-	-	Peak
154.2	39.42	-4.08	43.5	59.78	10	1.14	31.5	100	54	Peak
174.18	38.74	-4.76	43.5	60.37	8.67	1.23	31.53	-	-	Peak
405	41.28	-4.72	46	55.75	14.89	1.82	31.18	-	-	Peak
441.4	39.87	-6.13	46	53.44	15.72	1.87	31.16	-	-	Peak
456.1	39.89	-6.11	46	53.06	16.05	1.92	31.14	-	-	Peak

Test Mode :	Bluetooth LE 1Mbps GFSK L channel	Temperature :	20~22°C
Test Channel :	00	Relative Humidity :	40~42%
Test Engineer :	Cona Huang	Polarization :	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
92.1	35.06	-8.44	43.5	57.14	8.62	0.84	31.54	-	-	Peak
141.24	39	-4.5	43.5	58.82	10.62	1.07	31.51	111	154	Peak
166.08	32.96	-10.54	43.5	54.1	9.25	1.14	31.53	-	-	Peak
391.7	39.22	-6.78	46	54.09	14.56	1.77	31.2	-	-	Peak
440.7	41.03	-4.97	46	54.62	15.7	1.87	31.16	-	-	Peak
456.8	40.96	-5.04	46	54.1	16.08	1.92	31.14	-	-	Peak

<Standard Bluetooth>

Test Mode :	Bluetooth 1Mbps GFSK L channel	Temperature :	20~22°C
Test Channel :	00	Relative Humidity :	40~42%
Test Engineer :	Cona Huang	Polarization :	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
138.81	39.42	-4.08	43.5	59.14	10.72	1.07	31.51	-	-	Peak
156.09	40.17	-3.33	43.5	60.65	9.88	1.14	31.5	151	111	Peak
173.91	39.69	-3.81	43.5	61.27	8.73	1.23	31.54	-	-	Peak
422.5	39.33	-6.67	46	53.33	15.3	1.87	31.17	-	-	Peak
442.1	40.96	-5.04	46	54.45	15.74	1.92	31.15	-	-	Peak
454.7	37.94	-8.06	46	51.13	16.03	1.92	31.14	-	-	Peak

Test Mode :	Bluetooth 1Mbps GFSK L channel	Temperature :	20~22°C
Test Channel :	00	Relative Humidity :	40~42%
Test Engineer :	Cona Huang	Polarization :	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
40.53	34.32	-5.68	40	52.58	12.68	0.58	31.52	-	-	Peak
132.87	35.88	-7.62	43.5	55.51	10.82	1.07	31.52	-	-	Peak
166.08	33.16	-10.34	43.5	54.3	9.25	1.14	31.53	-	-	Peak
405.7	42.44	-3.56	46	56.91	14.89	1.82	31.18	100	154	Peak
419.7	39.57	-6.43	46	53.64	15.23	1.87	31.17	-	-	Peak
497.4	40.65	-5.35	46	52.68	17.01	2.04	31.08	-	-	Peak

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

<Low Energy Bluetooth>

Test Mode :	Bluetooth LE 1Mbps GFSK L channel	Temperature :	20~22°C
Test Channel :	00	Relative Humidity :	40~42%
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
2390	33.98	-20.02	54	31.86	31.7	4.5	34.08	119	40	Average
2390	46.23	-27.77	74	44.11	31.7	4.5	34.08	119	40	Peak
2402	77.25	-	-	75.13	31.7	4.5	34.08	119	40	Average
2402	104.7	-	-	102.58	31.7	4.5	34.08	119	40	Peak
2500	33.31	-20.69	54	30.97	31.8	4.62	34.08	119	40	Average
2500	45.79	-28.21	74	43.45	31.8	4.62	34.08	119	40	Peak



Test Mode :	Bluetooth LE 1Mbps GFSK L channel	Temperature :	20~22°C
Test Channel :	00	Relative Humidity :	40~42%
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
2354	34.68	-19.32	54	32.67	31.66	4.44	34.09	100	307	Average
2354	46.99	-27.01	74	44.98	31.66	4.44	34.09	100	307	Peak
2402	78.56	-	-	76.44	31.7	4.5	34.08	100	307	Average
2402	106.2	-	-	104.08	31.7	4.5	34.08	100	307	Peak
2498	35.48	-18.52	54	33.14	31.8	4.62	34.08	100	307	Average
2498	47.35	-26.65	74	45.01	31.8	4.62	34.08	100	307	Peak

Test Mode :	Bluetooth LE 1Mbps GFSK M channel	Temperature :	20~22°C
Test Channel :	19	Relative Humidity :	40~42%
Test Engineer :	Cona Huang	Polarization :	Horizontal
Remark :	2440 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
2344	33.56	-20.44	54	31.57	31.64	4.44	34.09	115	43	Average
2344	44.35	-29.65	74	42.36	31.64	4.44	34.09	115	43	Peak
2440	76.21	-	-	73.98	31.75	4.56	34.08	115	43	Average
2440	103.36	-	-	101.13	31.75	4.56	34.08	115	43	Peak
2492	33.28	-20.72	54	30.94	31.8	4.62	34.08	115	43	Average
2492	45.09	-28.91	74	42.75	31.8	4.62	34.08	115	43	Peak

Test Mode :	Bluetooth LE 1Mbps GFSK M channel	Temperature :	20~22°C
Test Channel :	19	Relative Humidity :	40~42%
Test Engineer :	Cona Huang	Polarization :	Vertical
Remark :	2440 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
2390	35.91	-18.09	54	33.79	31.7	4.5	34.08	125	269	Average
2390	48.76	-25.24	74	46.64	31.7	4.5	34.08	125	269	Peak
2440	78.08	-	-	75.85	31.75	4.56	34.08	125	269	Average
2440	105.11	-	-	102.88	31.75	4.56	34.08	125	269	Peak
2484	34.08	-19.92	54	31.79	31.78	4.59	34.08	125	269	Average
2484	46.04	-27.96	74	43.75	31.78	4.59	34.08	125	269	Peak

Test Mode :	Bluetooth LE 1Mbps GFSK H channel	Temperature :	20~22°C
Test Channel :	39	Relative Humidity :	40~42%
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
2324	36.69	-17.31	54	34.74	31.63	4.41	34.09	104	25	Average
2324	47.2	-26.8	74	45.25	31.63	4.41	34.09	104	25	Peak
2480	75.6	-	-	73.31	31.78	4.59	34.08	104	25	Average
2480	101.55	-	-	99.26	31.78	4.59	34.08	104	25	Peak
2483.5	48.54	-5.46	54	46.25	31.78	4.59	34.08	104	25	Average
2483.5	65.66	-8.34	74	63.37	31.78	4.59	34.08	104	25	Peak



Test Mode :	Bluetooth LE 1Mbps GFSK H channel	Temperature :	20~22°C
Test Channel :	39	Relative Humidity :	40~42%
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
2374	34.53	-19.47	54	32.46	31.68	4.47	34.08	120	319	Average
2374	45.05	-28.95	74	42.98	31.68	4.47	34.08	120	319	Peak
2480	77.23	-	-	74.94	31.78	4.59	34.08	120	319	Average
2480	104.2	-	-	101.91	31.78	4.59	34.08	120	319	Peak
2483.5	50.63	-3.37	54	48.34	31.78	4.59	34.08	120	319	Average
2483.5	68.34	-5.66	74	66.05	31.78	4.59	34.08	120	319	Peak

<Standard Bluetooth>

Test Mode :	Bluetooth 1Mbps GFSK L channel	Temperature :	20~22°C
Test Channel :	00	Relative Humidity :	40~42%
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
2388	35.32	-18.68	54	33.23	31.7	4.47	34.08	100	41	Average
2388	47.55	-26.45	74	45.46	31.7	4.47	34.08	100	41	Peak
2402	87.95	-	-	85.83	31.7	4.5	34.08	100	41	Average
2402	104.94	-	-	102.82	31.7	4.5	34.08	100	41	Peak
2498	35.57	-18.43	54	33.23	31.8	4.62	34.08	100	41	Average
2498	48.51	-25.49	74	46.17	31.8	4.62	34.08	100	41	Peak

Test Mode :	Bluetooth 1Mbps GFSK L channel	Temperature :	20~22°C
Test Channel :	00	Relative Humidity :	40~42%
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
2382.77	34.7	-19.3	54	32.63	31.68	4.47	34.08	104	334	Average
2382.77	48.71	-25.29	74	46.64	31.68	4.47	34.08	104	334	Peak
2402	89.16	-	-	87.04	31.7	4.5	34.08	104	334	Average
2402	107.1	-	-	104.98	31.7	4.5	34.08	104	334	Peak
2498	35.45	-18.55	54	33.11	31.8	4.62	34.08	104	334	Average
2498	46.32	-27.68	74	43.98	31.8	4.62	34.08	104	334	Peak

Test Mode :	Bluetooth 1Mbps GFSK M channel	Temperature :	20~22°C
Test Channel :	39	Relative Humidity :	40~42%
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
2338	37.21	-16.79	54	35.25	31.64	4.41	34.09	101	48	Average
2338	47.22	-26.78	74	45.26	31.64	4.41	34.09	101	48	Peak
2441	87.28	-	-	85.05	31.75	4.56	34.08	101	48	Average
2441	106.14	-	-	103.91	31.75	4.56	34.08	101	48	Peak
2494	35.88	-18.12	54	33.54	31.8	4.62	34.08	101	48	Average
2494	49.44	-24.56	74	47.1	31.8	4.62	34.08	101	48	Peak

Test Mode :	Bluetooth 1Mbps GFSK M channel	Temperature :	20~22°C
Test Channel :	39	Relative Humidity :	40~42%
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
2390	36.83	-17.17	54	34.71	31.7	4.5	34.08	125	271	Average
2390	47.85	-26.15	74	45.73	31.7	4.5	34.08	125	271	Peak
2441	89.33	-	-	87.1	31.75	4.56	34.08	125	271	Average
2441	108.43	-	-	106.2	31.75	4.56	34.08	125	271	Peak
2494	34.63	-19.37	54	32.29	31.8	4.62	34.08	125	271	Average
2494	46.12	-27.88	74	43.78	31.8	4.62	34.08	125	271	Peak

Test Mode :	Bluetooth 1Mbps GFSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
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
2324	39.15	-14.85	54	37.2	31.63	4.41	34.09	100	48	Average
2324	48.53	-25.47	74	46.58	31.63	4.41	34.09	100	48	Peak
2480	86.88	-	-	84.59	31.78	4.59	34.08	100	48	Average
2480	103.9	-	-	101.61	31.78	4.59	34.08	100	48	Peak
2483.5	30.3	-23.7	54	28.01	31.78	4.59	34.08	100	48	Average
2483.5	66.85	-7.15	74	64.56	31.78	4.59	34.08	100	48	Peak



Test Mode :	Bluetooth 1Mbps GFSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
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
2376	37.6	-16.4	54	35.53	31.68	4.47	34.08	122	319	Average
2376	46.45	-27.55	74	44.38	31.68	4.47	34.08	122	319	Peak
2480	88.84	-	-	86.55	31.78	4.59	34.08	122	319	Average
2480	106.12	-	-	103.83	31.78	4.59	34.08	122	319	Peak
2483.5	31.1	-22.9	54	28.81	31.78	4.59	34.08	122	319	Average
2483.5	68.34	-5.66	74	66.05	31.78	4.59	34.08	122	319	Peak

Test Mode :	Bluetooth EDR 2Mbps $\pi/4$ -DQPSK L channel	Temperature :	20~22°C
Test Channel :	00	Relative Humidity :	40~42%
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
2390	35.86	-18.14	54	33.74	31.7	4.5	34.08	100	43	Average
2390	48.58	-25.42	74	46.46	31.7	4.5	34.08	100	43	Peak
2402	86.12	-	-	84	31.7	4.5	34.08	100	43	Average
2402	105.07	-	-	102.95	31.7	4.5	34.08	100	43	Peak
2498	36.26	-17.74	54	33.92	31.8	4.62	34.08	100	43	Average
2498	49.79	-24.21	74	47.45	31.8	4.62	34.08	100	43	Peak

Test Mode :	Bluetooth EDR 2Mbps $\pi/4$ -DQPSK L channel	Temperature :	20~22°C
Test Channel :	00	Relative Humidity :	40~42%
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
2380	34.61	-19.39	54	32.54	31.68	4.47	34.08	104	334	Average
2380	46.68	-27.32	74	44.61	31.68	4.47	34.08	104	334	Peak
2402	88.5	-	-	86.38	31.7	4.5	34.08	104	334	Average
2402	107.4	-	-	105.28	31.7	4.5	34.08	104	334	Peak
2498	33.05	-20.95	54	30.71	31.8	4.62	34.08	104	334	Average
2498	45.16	-28.84	74	42.82	31.8	4.62	34.08	104	334	Peak

Test Mode :	Bluetooth EDR 2Mbps $\pi/4$ -DQPSK M channel	Temperature :	20~22°C
Test Channel :	39	Relative Humidity :	40~42%
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
2338	37.21	-16.79	54	35.25	31.64	4.41	34.09	101	48	Average
2338	47.22	-26.78	74	45.26	31.64	4.41	34.09	101	48	Peak
2441	87.28	-	-	85.05	31.75	4.56	34.08	101	48	Average
2441	106.14	-	-	103.91	31.75	4.56	34.08	101	48	Peak
2494	35.88	-18.12	54	33.54	31.8	4.62	34.08	101	48	Average
2494	49.44	-24.56	74	47.1	31.8	4.62	34.08	101	48	Peak

Test Mode :	Bluetooth EDR 2Mbps $\pi/4$ -DQPSK M channel	Temperature :	20~22°C
Test Channel :	39	Relative Humidity :	40~42%
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
2390	36.83	-17.17	54	34.71	31.7	4.5	34.08	125	271	Average
2390	47.85	-26.15	74	45.73	31.7	4.5	34.08	125	271	Peak
2441	89.33	-	-	87.1	31.75	4.56	34.08	125	271	Average
2441	108.43	-	-	106.2	31.75	4.56	34.08	125	271	Peak
2494	34.63	-19.37	54	32.29	31.8	4.62	34.08	125	271	Average
2494	46.12	-27.88	74	43.78	31.8	4.62	34.08	125	271	Peak

Test Mode :	Bluetooth EDR 2Mbps $\pi/4$ -DQPSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
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
2324	38.52	-15.48	54	36.57	31.63	4.41	34.09	100	49	Average
2324	49.15	-24.85	74	47.2	31.63	4.41	34.09	100	49	Peak
2480	87.05	-	-	84.76	31.78	4.59	34.08	100	49	Average
2480	104.81	-	-	102.52	31.78	4.59	34.08	100	49	Peak
2483.5	32.15	-21.85	54	29.86	31.78	4.59	34.08	100	49	Average
2483.5	68.46	-5.54	74	66.17	31.78	4.59	34.08	100	49	Peak

Test Mode :	Bluetooth EDR 2Mbps $\pi/4$ -DQPSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
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
2376	36.79	-17.21	54	34.72	31.68	4.47	34.08	122	319	Average
2376	47.21	-26.79	74	45.14	31.68	4.47	34.08	122	319	Peak
2480	88.94	-	-	86.65	31.78	4.59	34.08	122	319	Average
2480	106.7	-	-	104.41	31.78	4.59	34.08	122	319	Peak
2483.5	33.3	-20.7	54	31.01	31.78	4.59	34.08	122	319	Average
2483.5	70.83	-3.17	74	68.54	31.78	4.59	34.08	122	319	Peak

Test Mode :	Bluetooth EDR 3Mbps 8-DPSK L channel	Temperature :	20~22°C
Test Channel :	00	Relative Humidity :	40~42%
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
2390	33.82	-20.18	54	31.7	31.7	4.5	34.08	100	43	Average
2390	47.84	-26.16	74	45.72	31.7	4.5	34.08	100	43	Peak
2402	86.21	-	-	84.09	31.7	4.5	34.08	100	43	Average
2402	105.02	-	-	102.9	31.7	4.5	34.08	100	43	Peak
2500	36.32	-17.68	54	33.98	31.8	4.62	34.08	100	43	Average
2500	50.15	-23.85	74	47.81	31.8	4.62	34.08	100	43	Peak

Test Mode :	Bluetooth EDR 3Mbps 8-DPSK L channel	Temperature :	20~22°C
Test Channel :	00	Relative Humidity :	40~42%
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
2380.49	34.7	-19.3	54	32.63	31.68	4.47	34.08	104	334	Average
2380.49	48.57	-25.43	74	46.5	31.68	4.47	34.08	104	334	Peak
2402	88.32	-	-	86.2	31.7	4.5	34.08	104	334	Average
2402	107.55	-	-	105.43	31.7	4.5	34.08	104	334	Peak
2496	32.51	-21.49	54	30.17	31.8	4.62	34.08	104	334	Average
2496	44.63	-29.37	74	42.29	31.8	4.62	34.08	104	334	Peak

Test Mode :	Bluetooth EDR 3Mbps 8-DPSK M channel	Temperature :	20~22°C
Test Channel :	39	Relative Humidity :	40~42%
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
2338	37.49	-16.51	54	35.15	31.8	4.62	34.08	101	48	Average
2338	47.01	-26.99	74	45.05	31.64	4.41	34.09	101	48	Peak
2441	87.03	-	-	84.8	31.75	4.56	34.08	101	48	Average
2441	106.42	-	-	104.19	31.75	4.56	34.08	101	48	Peak
2494	35.88	-18.12	54	33.54	31.8	4.62	34.08	101	48	Average
2494	49.39	-24.61	74	47.05	31.8	4.62	34.08	101	48	Peak

Test Mode :	Bluetooth EDR 3Mbps 8-DPSK M channel	Temperature :	20~22°C
Test Channel :	39	Relative Humidity :	40~42%
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
2388	36.78	-17.22	54	34.69	31.7	4.47	34.08	125	271	Average
2388	47.14	-26.86	74	45.05	31.7	4.47	34.08	125	271	Peak
2441	89.07	-	-	86.84	31.75	4.56	34.08	125	271	Average
2441	108.43	-	-	106.2	31.75	4.56	34.08	125	271	Peak
2492	34.82	-19.18	54	32.48	31.8	4.62	34.08	125	271	Average
2492	45.97	-28.03	74	43.63	31.8	4.62	34.08	125	271	Peak

Test Mode :	Bluetooth EDR 3Mbps 8-DPSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
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
2350	38.61	-15.39	54	36.62	31.64	4.44	34.09	100	49	Average
2350	48.03	-25.97	74	46.04	31.64	4.44	34.09	100	49	Peak
2480	86.03	-	-	83.74	31.78	4.59	34.08	100	49	Average
2480	104.86	-	-	102.57	31.78	4.59	34.08	100	49	Peak
2483.5	29.47	-24.53	54	27.18	31.78	4.59	34.08	100	49	Average
2483.5	68.6	-5.4	74	66.31	31.78	4.59	34.08	100	49	Peak

Test Mode :	Bluetooth EDR 3Mbps 8-DPSK H channel	Temperature :	20~22°C
Test Channel :	78	Relative Humidity :	40~42%
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
2376	36.86	-17.14	54	34.79	31.68	4.47	34.08	122	319	Average
2376	46.71	-27.29	74	44.64	31.68	4.47	34.08	122	319	Peak
2480	87.84	-	-	85.55	31.78	4.59	34.08	122	319	Average
2480	106.99	-	-	104.7	31.78	4.59	34.08	122	319	Peak
2483.5	30.39	-23.61	54	28.1	31.78	4.59	34.08	122	319	Average
2483.5	70.81	-3.19	74	68.52	31.78	4.59	34.08	122	319	Peak

3.9 AC Conducted Emission Measurement

3.9.1 Limit of AC Conducted Emission

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

Frequency of emission (MHz)	Conducted limit (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.

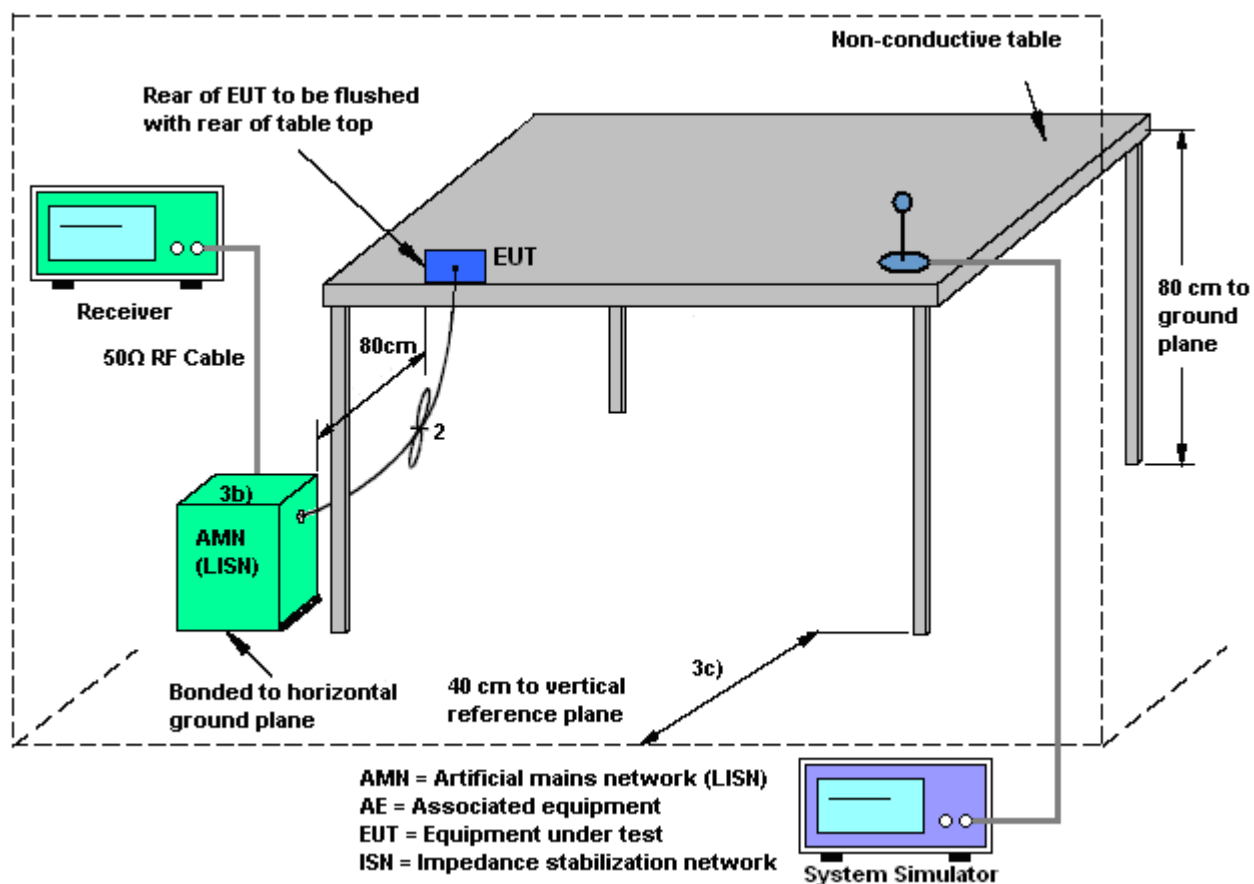
3.9.2 Measuring Instruments

See list of measuring instruments of this test report.

3.9.3 Test Procedures

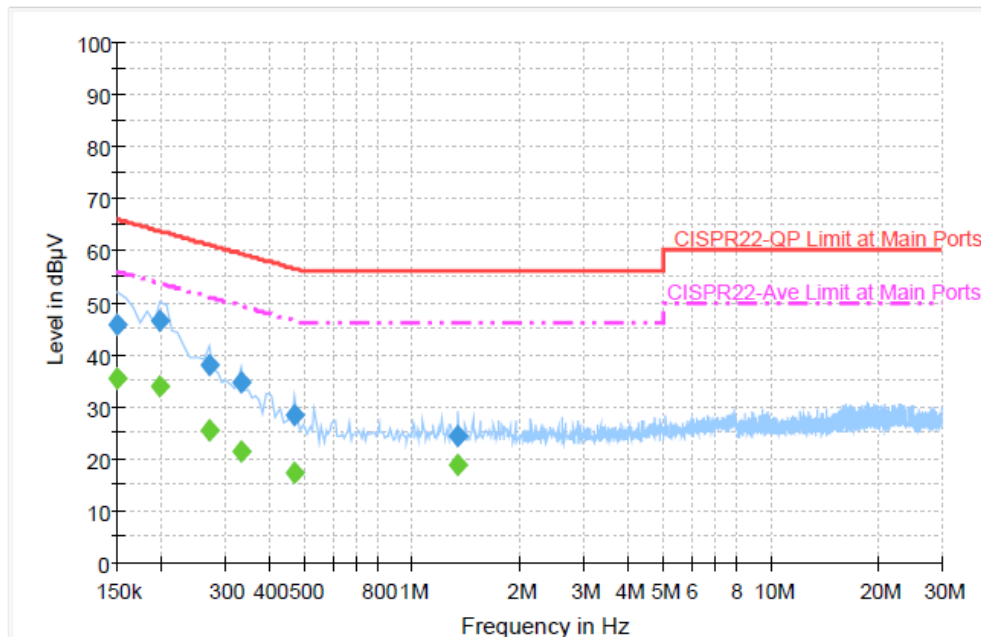
1. Please follow the guidelines in ANSI C63.4-2003.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All 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.

3.9.4 Test Setup



3.9.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Cona Huang	Relative Humidity :	40~42%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN Tx + Bluetooth Tx		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



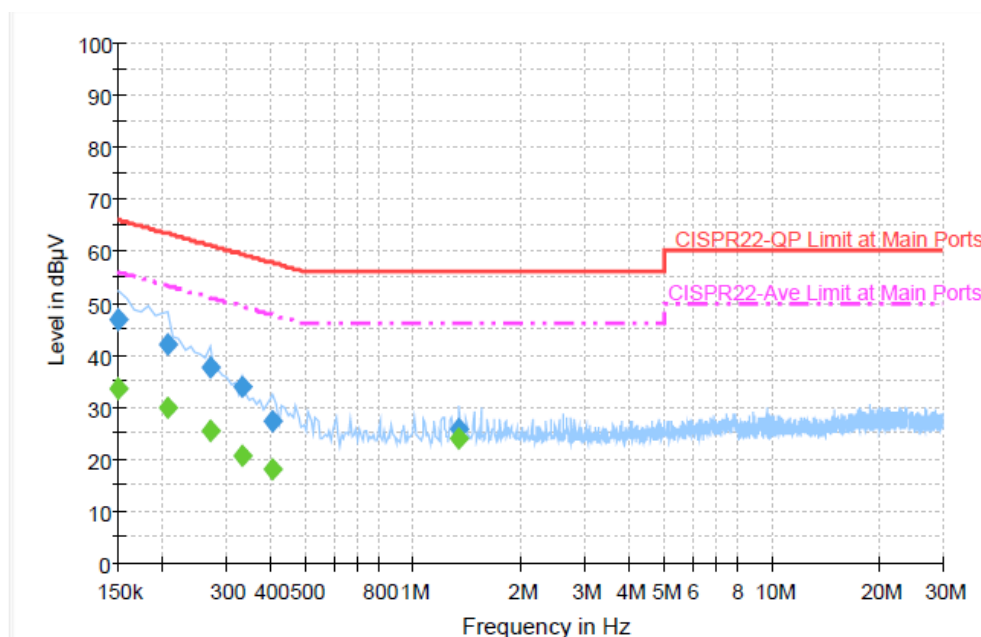
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	45.7	Off	L1	19.4	20.3	66.0
0.198000	46.6	Off	L1	19.3	17.1	63.7
0.270000	37.9	Off	L1	19.3	23.2	61.1
0.334000	34.8	Off	L1	19.3	24.6	59.4
0.470000	28.3	Off	L1	19.4	28.2	56.5
1.342000	24.2	Off	L1	19.4	21.8	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	35.4	Off	L1	19.4	20.6	56.0
0.198000	33.8	Off	L1	19.3	19.9	53.7
0.270000	25.5	Off	L1	19.3	25.6	51.1
0.334000	21.3	Off	L1	19.3	28.1	49.4
0.470000	17.3	Off	L1	19.4	29.2	46.5
1.342000	18.9	Off	L1	19.4	27.1	46.0

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Cona Huang	Relative Humidity :	40~42%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN Tx + Bluetooth Tx		
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	46.8	Off	N	19.4	19.2	66.0
0.206000	42.2	Off	N	19.3	21.2	63.4
0.270000	37.6	Off	N	19.3	23.5	61.1
0.334000	34.0	Off	N	19.3	25.4	59.4
0.406000	27.4	Off	N	19.4	30.3	57.7
1.342000	25.7	Off	N	19.4	30.3	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	33.6	Off	N	19.4	22.4	56.0
0.206000	30.0	Off	N	19.3	23.4	53.4
0.270000	25.5	Off	N	19.3	25.6	51.1
0.334000	20.6	Off	N	19.3	28.8	49.4
0.406000	18.1	Off	N	19.4	29.6	47.7
1.342000	24.1	Off	N	19.4	21.9	46.0

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Due Date	Remark
System Simulator	R&S	CMU200	117995	N/A	Jun. 08, 2009	Jun. 07, 2011	Conducted (TH02-HY)
Spectrum Analyzer	R&S	FSP40	100055	9kHz~40GHz	Jun. 11, 2010	Jun. 10, 2011	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	0932001	N/A	Sep. 13, 2010	Sep. 12, 2011	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	0846202	N/A	Sep. 14, 2010	Sep. 13, 2011	Conducted (TH02-HY)
Power Meter	Agilent	E4416A	GB41292344	N/A	Feb. 18, 2011	Feb. 17, 2012	Conducted (TH02-HY)
Power Sensor	Agilent	E9327A	US40441548	N/A	Feb. 18, 2011	Feb. 17, 2012	Conducted (TH02-HY)
Thermal Chamber	Ten Billion	TTH-D35P	TBN-930701	N/A	Jul. 30, 2010	Jul. 29, 2011	Conducted (TH02-HY)
EMI Test Receive	R&S	ESCS 30	100356	9KHz – 2.75GHz	Aug. 16, 2010	Aug. 15, 2011	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100081	9KHz – 30MHz	Dec. 03, 2010	Dec. 02, 2011	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100080	9KHz – 30MHz	Dec. 01, 2010	Nov. 30, 2011	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	N/A	Conduction (CO05-HY)
ISN	Teseq GmbH	ISN T400A	25696	N/A	Jun. 19, 2010	Jun. 18, 2011	Conduction (CO05-HY)
ISN	Teseq GmbH	ISN T800	27134	N/A	Jun. 19, 2010	Jun. 18, 2011	Conduction (CO05-HY)
DC- LISN	R&S	ESH3-26	1000485	0.1MHz~200MHz	Jun. 17, 2010	Jun. 16, 2011	Conduction (CO05-HY)
DC- LISN	R&S	ESH3-26	1000484	0.1MHz~200MHz	Jun. 17, 2010	Jun. 16, 2011	Conduction (CO05-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2726	30MHz ~ 1GHz	Oct. 31, 2010	Oct. 30, 2011	Radiation (03CH07-HY)
Spectrum Analyzer	R&S	FSP	101067	9KHz ~ 30GHz	Dec. 03, 2010	Dec. 02, 2011	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 19, 2010	Aug. 18, 2011	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz- 40GHz	Oct. 18, 2010	Oct. 17, 2011	Radiation (03CH07-HY)
Pre Amplifier	Agilent	8449B	3008A02362	1GHz~ 26.5GHz	Dec. 06, 2010	Dec. 05, 2011	Radiation (03CH07-HY)
Pre Amplifier	COM-POWER	PA-103A	161241	10-1000MHz.32dB.GAIN	Mar. 29, 2010	Mar. 28, 2011	Radiation (03CH07-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz~30 MHz	Jul. 29, 2010	Jul. 28, 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 $U_c(y)$	1.13		
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	2.26		

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

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

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

Contribution	Uncertainty of X_i		$u(X_i)$	C_i	$C_i * u(X_i)$
	dB	Probability Distribution			
Receiver Reading	± 0.10	Normal (k=2)	0.10	1	0.10
Antenna Factor Calibration	± 1.70	Normal (k=2)	0.85	1	0.85
Cable Loss Calibration	± 0.50	Normal (k=2)	0.25	1	0.25
Receiver Correction	± 2.00	Rectangular	1.15	1	1.15
Antenna Factor Directional	± 1.50	Rectangular	0.87	1	0.87
Site Imperfection	± 2.80	Triangular	1.14	1	1.14
Mismatch Receiver VSWR $\Gamma_1 = 0.197$ Antenna VSWR $\Gamma_2 = 0.194$ Uncertainty = $20\text{Log}(1-\Gamma_1*\Gamma_2)$	+0.34 / -0.35	U-Shape	0.244	1	0.244
Combined Standard Uncertainty $U_c(y)$	2.36				
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	4.72				



Appendix A. Photographs of EUT

Please refer to Sporton report number EP121516-01 as below.