CONFORMANCE TEST REPORT
FOR
FCC 47 CFR, Part 15 Subpart C

Report No.: 14-05-MAS-061-01

Client:	Agilent Technologies Microwave Products (M) Sdn. Bhd.
Product:	Remote Logging Display
Model:	U1115A
FCC ID:	ZKMAGILENT-U1115A
Manufacturer/supplier:	Agilent Technologies Microwave Products (M) Sdn. Bhd.
Date test item received:	2014/05/09
Date test campaign completed:	2014/10/07
Date of issue:	2014/10/07

Total number of pages of this test report: 84 pages
Total number of pages of photos: External photos 1 pages
Internal photos 4 pages
Setup photos 2 pages

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Address	: Bayan Lepas Free Industrial Zone, 11900 Penang, Malaysia
Manufacturer	: Agilent Technologies Microwave Products (M) Sdn. Bhd.
Address	: Bayan Lepas Free Industrial Zone, 11900 Penang, Malaysia
EUT	: Remote Logging Display
Trade name	: Agilent
Model No.	: U1115A
Power Source	: (1) 4.5V dc (2A Battery * 3) ; (2) USB Power DC 5V
Regulations applied	: FCC 47 CFR, Part 15 Subpart C

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1 GENERAL INFORMATION

1.1 Product Description

a) Type of EUT : Remote Logging Display
b) Trade Name : Agilent
c) Model No. : U1115A
d) FCC ID : ZKMAGILENT-U1115A

1.2 Characteristics of Device

The EUT is a Remote Logging Display based on the Bluetooth technology. Bluetooth is a short-range radio link intended to be a cable replacement between portable or fixed electronic devices. Bluetooth operates in the unlicensed ISM Band at 2.4GHz. In this band, 79 RF channels spaced 1MHz apart are defined. The rated output power is 18.82 dBm (76.21 mW).

1.3 Test Methodology

All testing were performed according to the procedures in ANSI C63.4 (2009) and FCC CFR 47 Part 2 and Part 15 and DA 00-705.

1.4 Modifiction List of EUT

N/A

1.5 Test Facility

The semi-anechoic chamber and conducted measurement facility used to collect the radiated and conducted data are located inside the Building at No.8, Lane 29, Wen-ming Road, Lo-shan Tsun, Kweishan Hsiang, Taoyuan, Taiwan, R.O.C.
This site has been accreditation as a FCC filing site.

1.6 Test Summary

Requirement	FCC Paragraph #	Test Pass
Radiated Emission	15.247 (c)	☒
Conducted Emission	15.207	☒
Antenna Requirement	15.203	☒
20dB Emission Bandwidth	15.247 (a)(1)	☒
Output Power	15.247 (b)(1)	☒
OUT-OF-BAND RF Conducted Spurious Emission	15.247 (c)	☒
Number of Hopping Channels	15.247 (b)(1)	☒
Hopping Channel Carrier Frequency Seperated	15.247 (a)(1)	☒
Dwell Time	15.247 (a)(1)(iii)	☒
Maximum Permissible Exposure	15.247 (b)(5)	☒

2 PROVISIONS APPLICABLE

2.1 Definition

Unintentional radiator:

A device that intentionally generates and radio frequency energy for use within the device, or that sends radio frequency signals by conduction to associated equipment via connecting wiring, but which is not intended to emit RF energy by radiation or induction.

Class A Digital Device:

A digital device which is marketed for use in commercial or business environment; exclusive of a device which is market for use by the general public, or which is intended to be used in the home.

Class B Digital Device :

A digital device which is marketed for use in a residential environment notwithstanding use in a commercial, business of industrial environment. Example of such devices that are marketed for the general public.

Note : A manufacturer may also qualify a device intended to be marketed in a commercial, business, or industrial environment as a Class B digital device, and in fact is encouraged to do so, provided the device complies with the technical specifications for a Class B Digital Device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B Digital Device, Regardless of its intended use.

Intentional radiator:

A device that intentionally generates and emits radio frequency energy by radiation or induction.

2.2 Requirement for Compliance

(1) Conducted Emission Requirement

For unintentional device, according to §15.107(a) Line Conducted Emission Limits is as following:

Frequency MHz	Quasi Peak dB μV	Average dB μV
0.15 - 0.5	66-56*	56-46*
0.5 - 5.0	56	46
5.0 - 30.0	60	50

*Decreases with the logarithm of the frequency.

For intentional device, according to §15.207(a) Line Conducted Emission Limits is same as above table.

(2) Radiated Emission Requirement

For unintentional device, according to §15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency MHz	Distance Meters	Radiated dB μV/m	Radiated μV/m
30 - 88	3	40.0	100
88 - 216	3	43.5	150
216 - 960	3	46.0	200
above 960	3	54.0	500

For intentional radiator device, according to §15.209(a), the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table::

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

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

For intentional device, according to §15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

(3) Antenna Requirement

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to §15.247 (c),(i) Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point-to point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. (ii) Systems operating in the 5725-5850 MHz band that are used exclusively for fixed, point-to point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted output power.

(4) 20dB Bandwidth Requirement

For frequency hopping systems, according to 15.247(a)(1), hopping channel carrier frequencies seperated by a minimum of 25kHz or the 20dB bandwidth of hopping channel, whichever is greater.

(5) Output Power Requirement

For frequency hopping systems, according to 15.247(1), operating in the 2400-2483.5MHz band employing at least 75 hopping channels. The maximum peak output power of the transmitter shall not exceed 1 Watt. If transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(6) 100 kHz Bandwidth of Frequency Band Edges Requirement

According to 15.247(c), if any 100 kHz bandwidth outside these frequency bands, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either at least 20 dB below that in any 100 kHz bandwidth within the band that contains the highest level of the desired power or shall not exceed the general levels specified in §15.209(a), whichever results in the lesser attenuation.

(7) Number of Hopping Channels

According to 15.247(b)(1), for frequency hopping systems, operating in the 2400-2483.5MHz band employing at least 75 hopping channels.

(8) Channel Carrier Frequencies Seperation

According to 15.247(a)(1)(iii), the frequency hopping systems shall have hopping channel carrier frequencies seperated by minimum of 25kHz or the 20dB bandwidth of hopping channel, whichever is greater.

(9) Dwell Time

According to 15.247(a)(1)(iii), frequency hopping system in the 2400-2483.5MHz band employing at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 second multiplied by the number of hopping channels employed.

(10) Power Spectral Density

According to 15.247(d), for bluetooth device, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater them 8dBm in any 3kHz band during any time interral of continuous transmission.

2.3 Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below :

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42-16.423	399.9-410	4.5-5.25
0.495 - 0.505 **	16.69475 - 16.69525	608-614	5.35-5.46
2.1735 - 2.1905	16.80425 - 16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475 - 156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2655-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

** : Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

2.4 Labeling Requirement

The device shall bear the following statement in a conspicuous location on the device :

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

2.5 User Information

The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual.

The Federal Communications Commission Radio Frequency Interference Statement includes the following paragraph.

This equipment has been tested and found to comply with the limits for a Class B Digital Device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-- Reorient or relocate the receiving antenna.

-- Increase the separation between the equipment and receiver.

-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-- Consult the dealer or an experienced radio / TV technician for help.

To comply with the FCC RF exposure compliance requirement, this device and its antenna must not be co-located or operating to conjunction with any other antenna or transmitter.

3. SYSTEM TEST CONFIGURATION

3.1 Justification

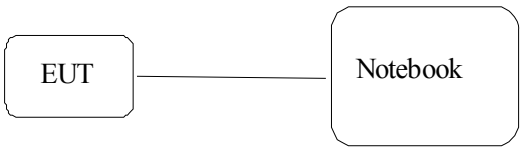
For the purposes of this test report ancillary equipment is defined as equipment which is used in conjunction with the EUT to provide operational and control features to the EUT during the test. Notebook PC was used to control the RF channel under the hightest, middle and lowest frequency and transmit the maximun RF power. Customer would not use it. But never the less ancillary equipment can influence the test results..

3.2 Devices for Tested System

3.2.1

Device	Manufacture	Model	Cable Description
* Remote Logging Display	Agilent Technologies Microwave Products (M) Sdn. Bhd.	U1115A	2.0m *1, Unshielded Power Line / Adapter
Notebook	DELL	E5510	1.8m*1, Unshielded Power Line / Adapter 0.5m*1 Unshielded Signal Line

Remark : "*" means equipment under test.



3.2.2 Test Mode Description

3.2.2.1 Modulation Type

Test Mode	Type	Note
A	NON-EDR	GFSK
B	EDR	π/4-DQPSK, 8-DPSK (note 1)

Test Channel	Frequency (MHz)
Channel Low(L)	2402
Channel Mid(M)	2441
Channel High(H)	2480

3.2.2.2 Test Mode and Worse Case Determination

The EUT was set in continuous operation function for all measurements.

Item	Test Item	Test Mode	Test Frequency (MHz)
1	Output Power	A	L, M, H
		B	L, M, H
	Worse Case	Mode A (note 1)	
2.	20dB Emission Bandwidth	A、B	M (Worse Case)
3	Conducted Emission	A	M (note 2)
4	Out of Band Conducted Emission	A、B	L, M, H
5.1	Number of Channel	A	L~H
5.2	Channel Seperation	A	M (note 2)
5.3	Dwell Time	A	M (note 2)
6.1	Radiated Emission (below 1GHz)	A	M (Worse Case)
6.2	Radiated Emission (above 1GHz)	A	L, M, H
6.3	Radiated Emission (BandEdge)	A, B	L, H

note: 1. 8-DPSK is the worse case determined as the modulation with highest output power.

2. Pretest result is no difference in three test modes by channl low, middle and high. Choose one for final testing and record the result.
3. The worse case is determined as the modulation with highest output power.
4. Pretest result is no difference in three test modes by channl low, middle and high. Choose mode A, channel middle for final testing and record the result.

4 RADIATED EMISSION MEASUREMENT

4.1 Applicable Standard

For unintentional radiator, the radiated emission shall comply with §15.109(a).

For intentional radiators, according to §15.247 (a), operation under this provision is limited to frequency hopping and digitally modulated, and the out band emission shall be comply with § 15.247 (c)

4.2 Measurement Procedure

1. Setup the configuration per figure 1 and 2 for frequencies measured below and above 1 GHz respectively. Turn on EUT and make sure that it is in continuous operating function.
2. For emission frequencies measured below 1 GHz, a pre-scan is performed in a semi-anechoic chamber to determine the accurate frequencies of higher emissions and then each selected frequency is precisely measured. As the same purpose, for emission measured above 1 GHz, a pre-scan also be performed with a 1 meter measuring distance before final test.
3. For emission measured below and above 1 GHz, set the spectrum analyzer on a 120 kHz and 1 MHz resolution bandwidth respectively for each frequency measured in step 2.
4. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 ° to 360 ° with a speed as slow as possible, and keep the azimuth that highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading. A RF test receiver is also used to confirm emissions measured.

Figure 1 : Frequencies measured below 1 GHz configuration

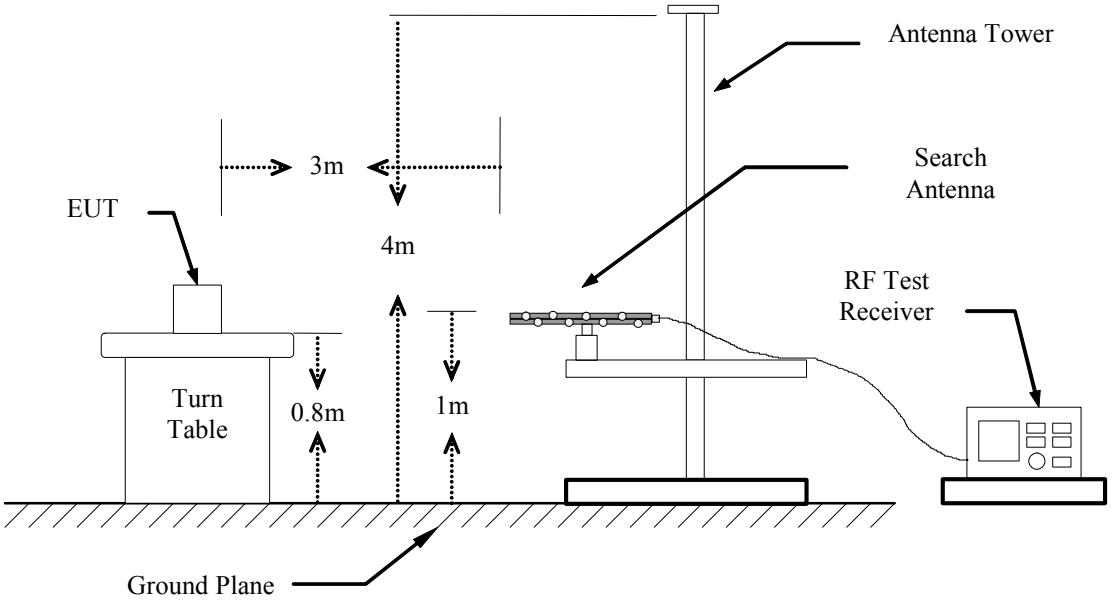
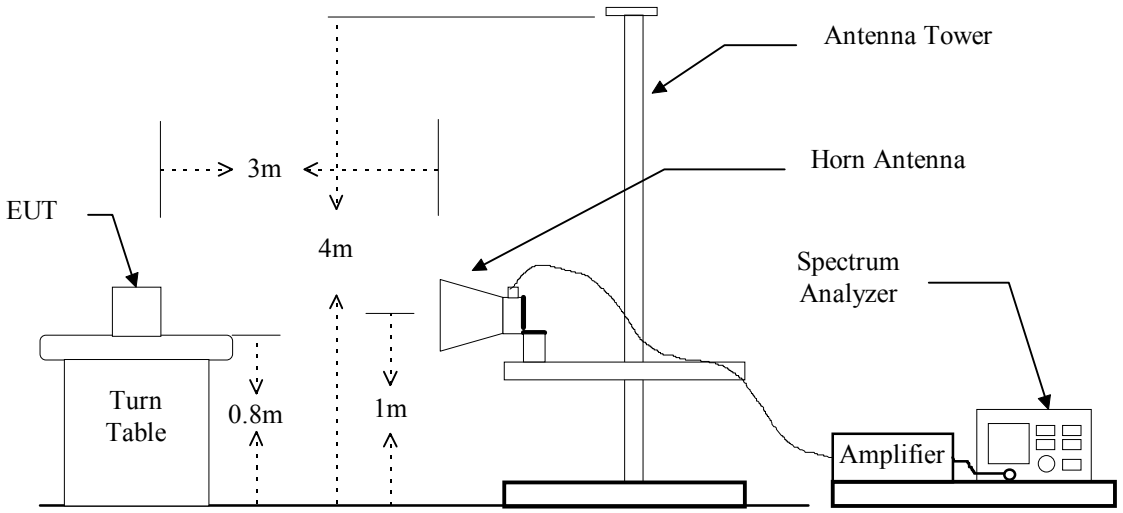


Figure 2 : Frequencies measured above 1 GHz configuration



4.3 Measuring Instrument

The following instrument are used for radiated emissions measurement :

Equipment	Manufacturer	Model No.
EMI Test Receiver	R&S	ESIB7
Spectrum Analyzer	Rohde & Schwarz	FSU46
Horn Antenna	EMCO	3115
BiLog Antenna	ETC	MCTD2786
Horn Antenna	EMCO	3116
Preamplifier	Hewlett-Packard	8449A

Measuring instrument setup in measured frequency band when specified detector function is used :

Frequency Band (MHz)	Instrument	Function	Resolution Bandwidth	Video Bandwidth
30 to 1000	RF Test Receiver	Quasi-Peak	120 kHz	300 kHz
	RF Test Receiver	Peak	120 kHz	300 kHz
Above 1000	Spectrum Analyzer	Peak	1 MHz	1 MHz
	Spectrum Analyzer	Average	1 MHz	10Hz (Note)

Note: For average measuring, If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from 20log(dwell time/100 ms). This correction is only for signals that hop with the fundamental signal, such as band-edge and harmonic. Other spurious signals those are independent of the hopping signal would not use this correction.

Duty Factor:

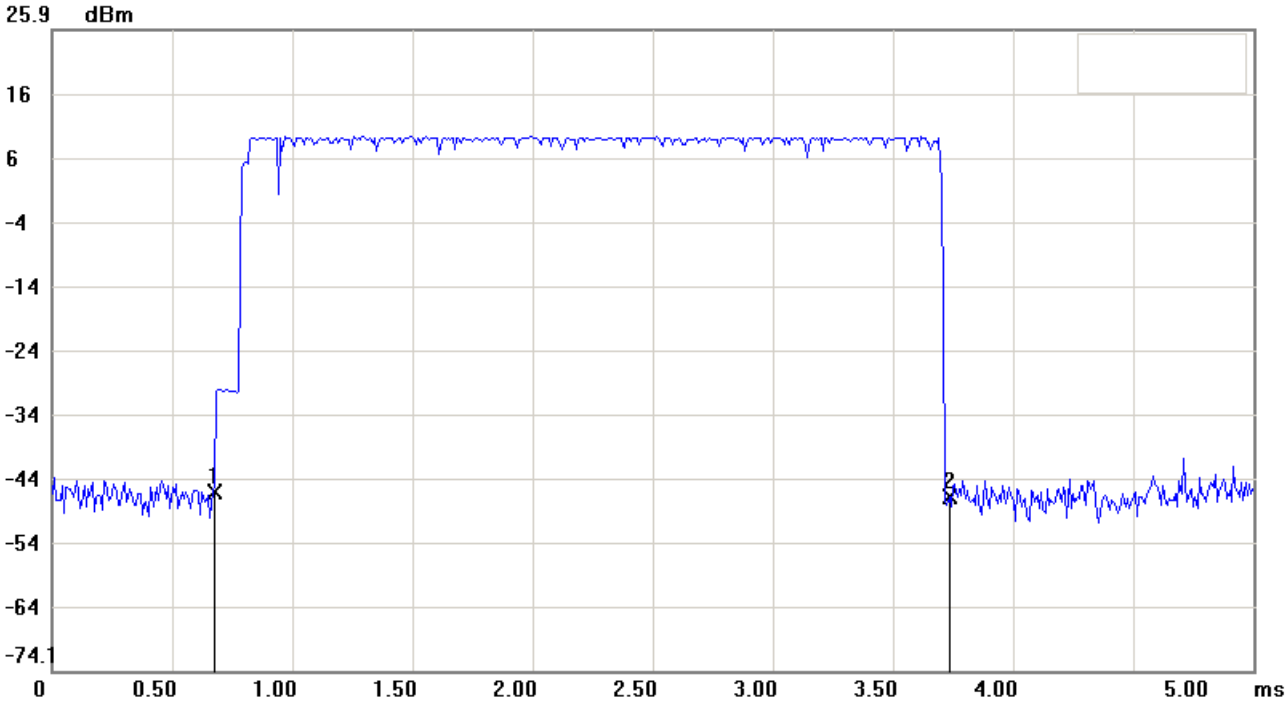
$$20\log\frac{1\times 3.0666(\text{ms})}{100(\text{ms})} = -30.27\ \text{dB}$$

The plotted graph of Duty Factor please see page 17 ~ 18.

Note: 1. Worst case duty cycle ＝ on time/100 ms.
2. Worst case duty factor ＝ 20log(duty cycle).
3. DH5 has highest duty cycle worst case and is reported.

File: 1030 **Data:** #19 **Date:** 2014/05/12 **Temperature:** 26 ℃

Time: AM 09:49:39 **Humidity:** 60 %



Condition: **RF Conducted**

EUT: **Sweep Time: 5ms Att.: 30dB**

Model: **RBW: 1000 KHz VBW: 1000 KHz**

Test Mode:

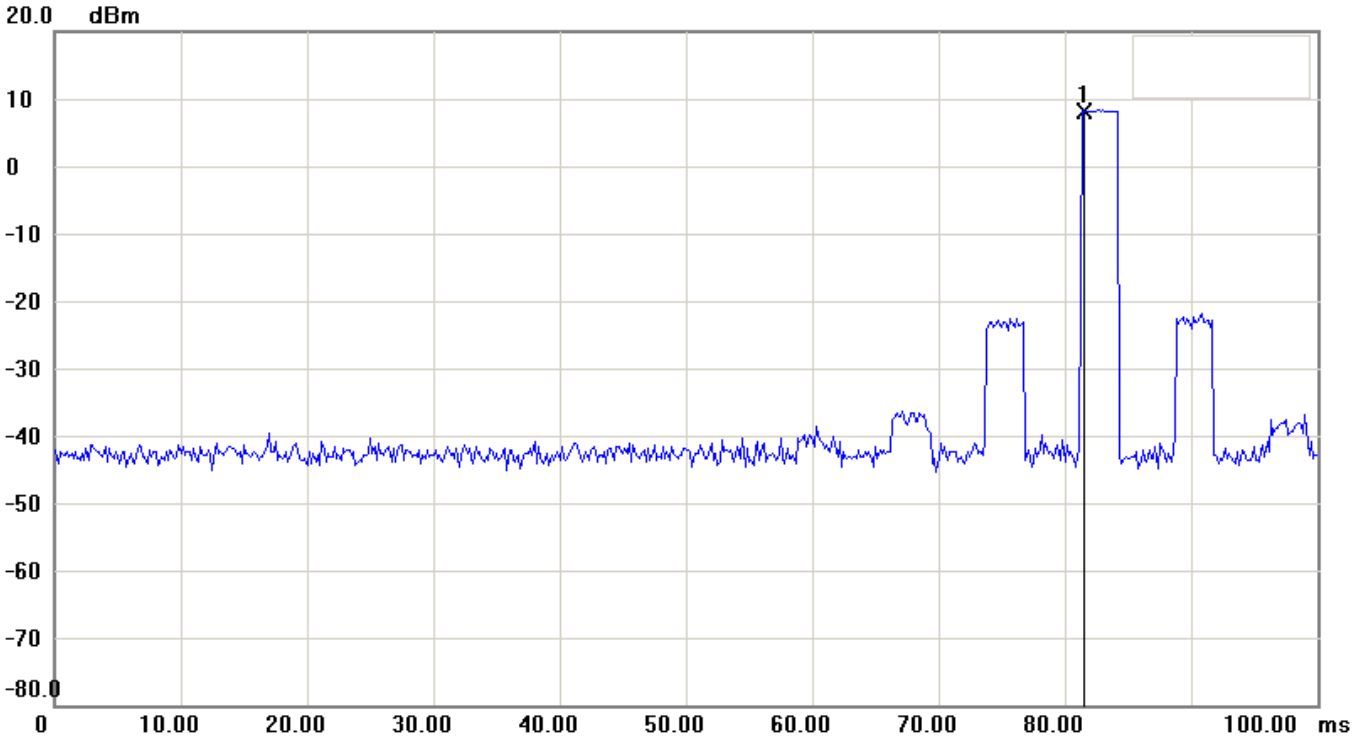
Note: **DH5 pulse width**

No.	Sweep time(ms)	Level(dBm)
1	0.6667	-46.17
2	3.7333	-47.01

No.		△Time(ms)	△Level(dB)
1	mk2-mk1	3.0666	-0.84

File: **1030** **Data:** **#54** **Date:** **2014/9/25** **Temperature:** **22 ℃**

Time: **AM 09:56:16** **Humidity:** **60 %**



Condition: **RF Conducted**

EUT: **Sweep Time: 100ms** **Att.: 30dB**

Model: **RBW: 300 KHz** **VBW: 300 KHz**

Test Mode:

Note:

No.	Sweep time(ms)	Level(dBm)
1	81.5000	8.23

4.4 Radiated Emission Data

4.4.1 RF Portion

a) Channel 0

Operation Mode : Tx
Fundamental Frequency : 2402 MHz
Test Date : May. 14, 2014 Temperature : 22℃ Humidity : 56%

Frequency	Ant Pol	Reading (dBuV/m)@3m	Correct Factor	Duty Factor	Result (dBuV/m)@3m		Limit (dBuV/m)@3m		Margin (worse)
(MHz)	H/V	Peak	(dB)	(dB)	Peak	AVG	Peak	AVG	(dB)
4804.0000	H	51.6	-1.97	-30.27	49.6	19.33	74.0	54.0	-24.4
4804.0000	V	55.6	-1.97	-30.27	53.6	23.33	74.0	54.0	-20.4
7206.0000	H	---	1.08	-30.27	---	---	74.0	54.0	---
7206.0000	V	---	1.08	-30.27	---	---	74.0	54.0	---
9608.0000	H	---	2.57	-30.27	---	---	74.0	54.0	---
9608.0000	V	---	2.57	-30.27	---	---	74.0	54.0	---
12010.0000	H	---	4.90	-30.27	---	---	74.0	54.0	---
12010.0000	V	---	4.90	-30.27	---	---	74.0	54.0	---
19216.0000	H	---	14.27	-30.27	---	---	74.0	54.0	---
19216.0000	V	---	14.27	-30.27	---	---	74.0	54.0	---

Note :

1. Item of margin shown in above table refer to average limit.
2. Remark "---" means that there is no emission to be measured.
3. Item "Margin" referred to Average limit while there is only peak result.
4. The radiation emissions have been measured to beyond the tenth harmonic of the fundamental frequency and show the significant frequencies, other means the value is too low to be detected.

b) Channel 39
Fundamental Frequency : 2441 MHz

Frequency	Ant Pol	Reading (dBuV/m)@3m	Correct Factor	Duty Factor	Result (dBuV/m)@3m		Limit (dBuV/m)@3m		Margin (worse)
(MHz)	H/V	Peak	(dB)	(dB)	Peak	AVG	Peak	AVG	(dB)
4882.0000	H	52.0	-1.80	-30.27	50.2	19.93	74.0	54.0	-23.8
4882.0000	V	55.6	-1.80	-30.27	53.8	23.53	74.0	54.0	-20.2
7323.0000	H	---	1.36	-30.27	---	---	74.0	54.0	---
7323.0000	V	50.9	1.36	-30.27	52.3	22.03	74.0	54.0	-21.7
9764.0000	H	---	2.73	-30.27	---	---	74.0	54.0	---
9764.0000	V	---	2.73	-30.27	---	---	74.0	54.0	---
12205.0000	H	---	5.02	-30.27	---	---	74.0	54.0	---
12205.0000	V	50.7	5.02	-30.27	50.2	19.93	74.0	54.0	-23.8

Note :

1. Item of margin shown in above table refer to average limit.
2. Remark "---" means that there is no emission to be measured.
3. Item "Margin" referred to Average limit while there is only peak result.
4. The radiation emissions have been measured to beyond the tenth harmonic of the fundamental frequency and show the significant frequencies, other means the value is too low to be detected.

c) Channel 78
Fundamental Frequency : 2480 MHz

Frequency	Ant Pol	Reading (dBuV/m)@3m	Correct Factor	Duty Factor	Result (dBuV/m)@3m		Limit (dBuV/m)@3m		Margin (worse)
(MHz)	H/V	Peak	(dB)	(dB)	Peak	AVG	Peak	AVG	(dB)
4960.0000	H	50.0	-1.63	-30.27	48.4	18.13	74.0	54.0	-25.6
4960.0000	V	62.1	-1.63	-30.27	60.5	31.78	74.0	54.0	-13.5
7440.0000	H	---	1.64	-30.27	---	---	74.0	54.0	---
7440.0000	V	52.0	1.64	-30.27	53.6	23.33	74.0	54.0	-20.4
9920.0000	H	---	2.90	-30.27	---	---	74.0	54.0	---
9920.0000	V	50.4	2.90	-30.27	53.3	31.3	74.0	54.0	-20.07
12400.0000	H	---	5.16	-30.27	---	---	74.0	54.0	---
12400.0000	V	---	5.16	-30.27	---	---	74.0	54.0	---
19840.0000	H	---	14.09	-30.27	---	---	74.0	54.0	---
4960.0000	H	---	14.09	-30.27	---	---	74.0	54.0	---

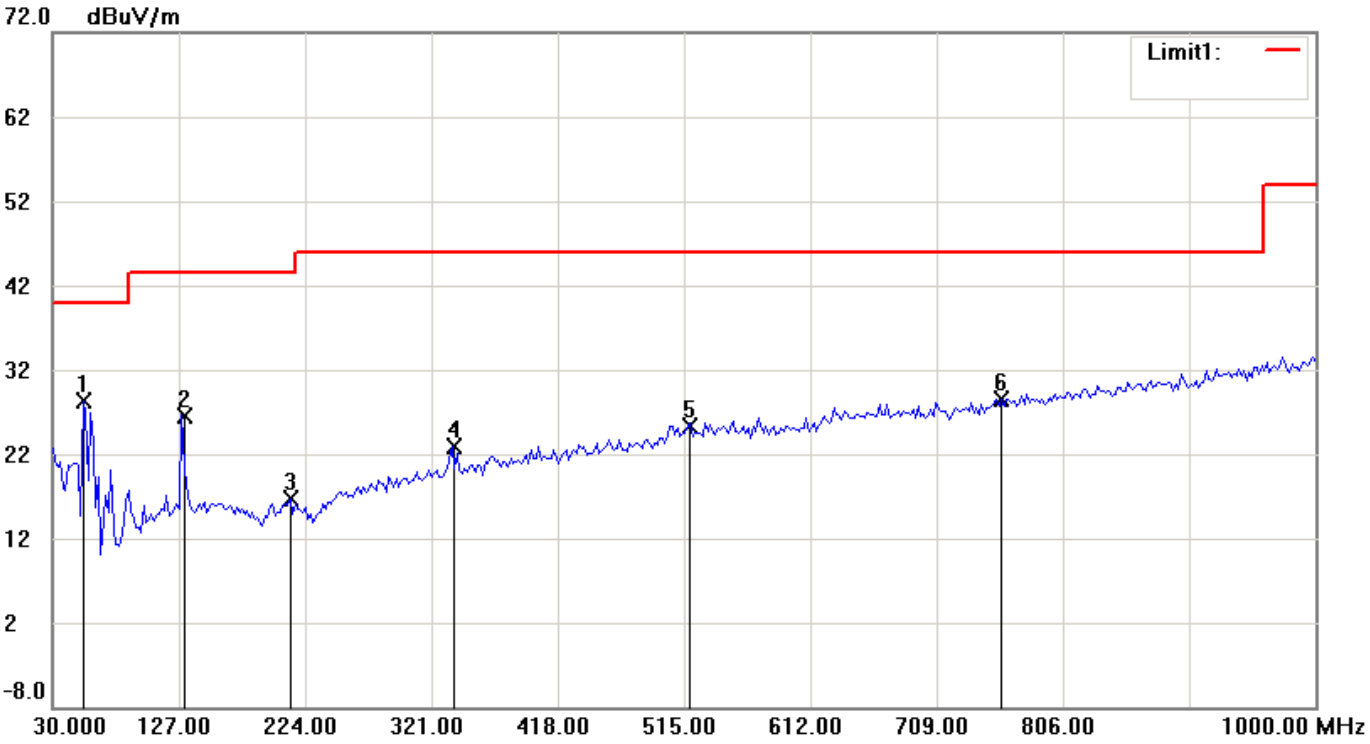
Note :

1. Item of margin shown in above table refer to average limit.
2. Remark "---" means that there is no emission to be measured.
3. Item "Margin" referred to Average limit while there is only peak result.
4. The radiation emissions have been measured to beyond the tenth harmonic of the fundamental frequency and show the significant frequencies, other means the value is too low to be detected.

4.4.2 Other Emission

4.4.2.1 30MHz to 1GHz

File: Agilent **Data:** #43 **Date:** 2014/05/14 **Temperature:** 22 ℃
Time: AM 10:55:13 **Humidity:** 56 %

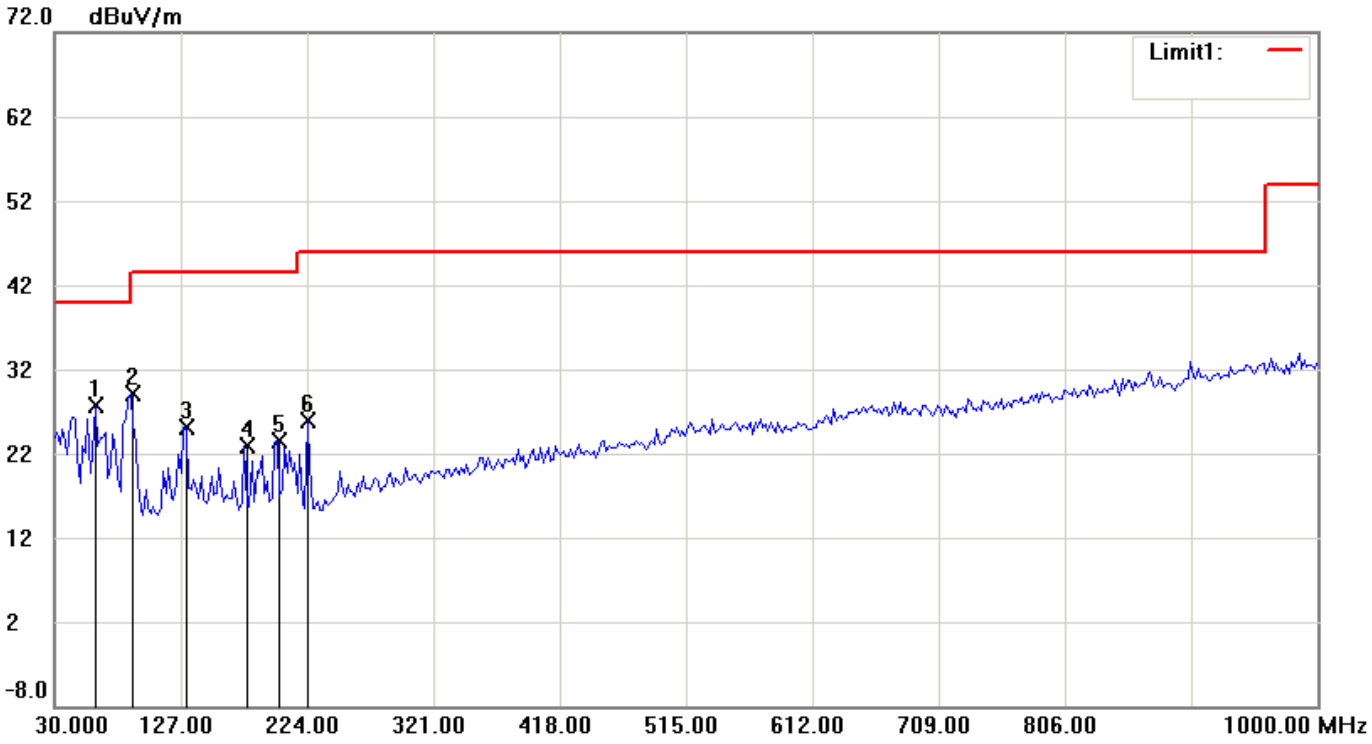


Condition: FCC_30-1000MHz **Polarization:** Horizontal
EUT: **Distance:** 3m
Model:
Test Mode: high
Note:

No.	Frequency (MHz)	Reading (dBuV/m)	Detector	Corrected dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1	53.3267	18.77	peak	9.47	28.24	40.00	-11.76
2	129.1383	13.11	peak	13.49	26.60	43.50	-16.90
3	212.7255	1.76	peak	14.92	16.68	43.50	-26.82
4	337.1343	3.99	peak	18.88	22.87	46.00	-23.13
5	517.9158	2.68	peak	22.63	25.31	46.00	-20.69
6	758.9578	2.57	peak	26.02	28.59	46.00	-17.41

File: **Agilent** **Data:** **#44** **Date:** **2014/05/14** **Temperature:** **22℃**

Time: **AM 10:58:20** **Humidity:** **56 %**



Condition: **FCC_30-1000MHz** **Polarization:** **Vertical**

EUT: **Distance:** **3m**

Model:

Test Mode: **high**

Note:

No.	Frequency	Reading	Detector	Corrected	Result	Limit	Margin
	(MHz)	(dBuV/m)		dB/m	(dBuV/m)	(dBuV/m)	(dB)
1	61.1022	20.54	peak	7.21	27.75	40.00	-12.25
2	88.3166	18.86	peak	10.26	29.12	43.50	-14.38
3	129.1383	11.53	peak	13.49	25.02	43.50	-18.48
4	175.7916	9.93	peak	13.07	23.00	43.50	-20.50
5	201.0621	9.67	peak	13.92	23.59	43.50	-19.91
6	224.3888	11.83	peak	14.10	25.93	46.00	-20.07

4.4.2.2 above 1GHz

4.4.2.2.1 Fundamental Frequency : 2402 MHz

Frequency	Ant Pol	Reading (dBuV/m)@3m		Correct Factor	Result (dBuV/m)@3m		Limit (dBuV/m)@3m		Margin (worse)
(MHz)	H/V	Peak	AVG	(dB)	Peak	AVG	Peak	AVG	(dB)
1601.2820	H	53.9	---	-11.37	42.5	---	74.0	54.0	-11.5
1601.2820	V	51.1	---	-11.37	39.7	---	74.0	54.0	-14.3
1924.3500	H	50.7	---	-9.63	41.1	---	74.0	54.0	-12.9

4.4.2.2.2 Fundamental Frequency : 2441 MHz

Frequency	Ant Pol	Reading (dBuV/m)@3m		Correct Factor	Result (dBuV/m)@3m		Limit (dBuV/m)@3m		Margin (worse)
(MHz)	H/V	Peak	AVG	(dB)	Peak	AVG	Peak	AVG	(dB)
1628.2050	H	53.1	---	-11.22	41.9	---	74.0	54.0	-12.1

4.4.2.2.3 Fundamental Frequency : 2480 MHz

Frequency	Ant Pol	Reading (dBuV/m)@3m		Correct Factor	Result (dBuV/m)@3m		Limit (dBuV/m)@3m		Margin (worse)
(MHz)	H/V	Peak	AVG	(dB)	Peak	AVG	Peak	AVG	(dB)
1655.1280	H	54.4	---	-11.08	43.3	---	74.0	54.0	-10.7
1655.1280	V	50.5	---	-11.08	39.4	---	74.0	54.0	-14.6
1924.3500	V	49.8	---	-9.63	40.2	---	74.0	54.0	-13.8

4.4.2.3 below 30MHz

Frequency	. Reading (dBuV/m)	Duty	Factor	Result @3m (dBuV/m)			Limit @3m (dBuV/m)	
(MHz)	Peak	(dB)	(dB)	Peak	QP	AVG	Peak	AVG
Radiated emission frequencies from 9 kHz to 30 MHz were too low to be measured.								

Note:

1. Place of Measurement: Measuring site of the ETC.
2. If the data table appeared symbol of "***" means the value was too low to be measured.
3. The estimated measurement uncertainty of the result measurement is

±4.2dB (9kHz≦f≦30MHz)
±4.6dB (30MHz≦f<300MHz).
±4.4dB (300MHz≦f<1000MHz).
±4.1dB (1GHz≦f≦18GHz).
±4.4dB (18GHz<f≦40GHz).

4 Remark “---” means that the emissions level is too low to be measured.

4.4.3 Radiated Measurement at Bandedge with Fundamental Frequencies

4.4.3.1 Operation Mode : NON-EDR

(A) Channel 0
Fundamental Frequency : 2402 MHz
Test Date: May. 14, 2014 Temperature : 22℃ Humidity : 56%

Frequency	Reading @3m (dBuV/m)		Antenna Factor	Duty Factor	Result		Limit @3m		Margin (worse)	
	H	V			(dBuV/m)		(dBuV/m)		(dB)	
(MHz)	Peak	Peak	(dB)	(dB)	Peak	Ave	Peak	Ave	Peak	Ave
2390.000	27.6	28.3	29.8	-30.27	58.1	27.83	74.0	54.0	-15.9	-26.2

Note:The result is the highest value of radiated emission from restrict band of 2310 ~2390 MHz.

(B) Channel 78
Operation Mode : Transmitting
Fundamental Frequency : 2480 MHz

Frequenc	Reading @3m (dBuV/m)		Antenna Factor	Duty Factor	Result		Limit @3m		Margin (worse)	
	H	V			(dBuV/m)		(dBuV/m)		(dB)	
(MHz)	Peak	Peak	(dB)	(dB)	Peak	Ave	Peak	Ave	Peak	Ave
2483.500	32.3	34.2	29.8	-30.27	64.0	33.73	74.0	54.0	-10.0	-20.27

Note: The result is the highest value of radiated emission from restrict band of 2483.5 ~2500 MHz.

4.4.3.2 Operation Mode : EDR

(A) Channel 0
Fundamental Frequency : 2402 MHz
Test Date: May. 14, 2014 Temperature : 22℃ Humidity : 56%

Frequency	Reading @3m (dBuV/m)		Antenna Factor	Duty Factor	Result		Limit @3m		Margin (worse)	
	H	V			(dBuV/m)		(dBuV/m)		(dB)	
(MHz)	Peak	Peak	(dB)	(dB)	Peak	Ave	Peak	Ave	Peak	Ave
2390.000	29.7	28.8	29.8	-30.27	59.5	29.23	74.0	54.0	-14.5	-24.77

Note:The result is the highest value of radiated emission from restrict band of 2310 ~2390 MHz.

(B) Channel 78
Operation Mode : Transmitting
Fundamental Frequency : 2480 MHz

Frequenc	Reading @3m (dBuV/m)		AntennaFactor	Duty Factor	Result		Limit @3m		Margin (worse)	
	H	V			(dBuV/m)		(dBuV/m)		(dB)	
(MHz)	Peak	Peak	(dB)	(dB)	Peak	Ave	Peak	Ave	Peak	Ave
2483.500	33.3	36.4	29.8	-30.27	66.2	35.93	74.0	54.0	-7.8	-18.07

Note:The result is the highest value of radiated emission from restrict band of 2483.5 ~2500 MHz.

4.5 Field Strength Calculation

4.5.1 Field Strength

The field strength is calculated by adding the Antenna Factor, High Pass Filter Loss(if used) and Cable Loss, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor + Duty Factor (if needed)

where

Corrected Factor = Antenna Factor + Cable Loss + High Pass Filter Loss - Amplifier Gain

5 CONDUCTED EMISSION MEASUREMENT

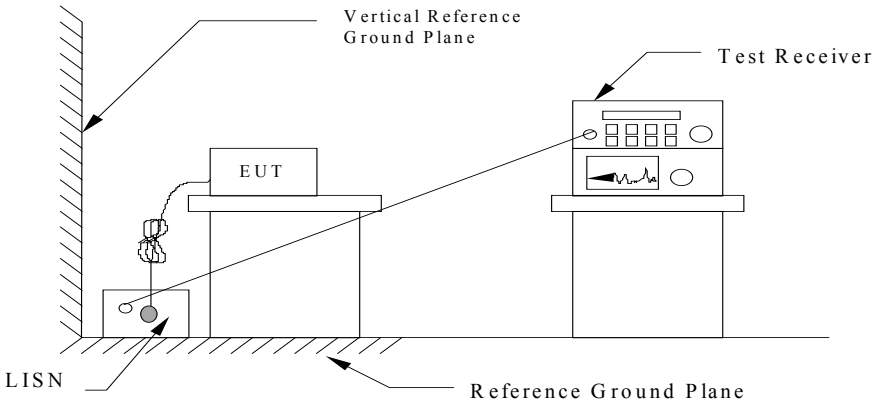
5.1 Standard Applicable

For unintentional and intentional device, Line Conducted Emission Limits are in accordance to § 15.107(a) and §15.207(a) respectively. Both Limits are identical specification.

5.2 Measurement Procedure

1. Setup the configuration per figure 3.
2. A preliminary scan with a spectrum monitor is performed to identify the frequency of emission that has the highest amplitude relative to the limit by operating the EUT in selected modes of operation, typical cable positions, and with a typical system configuration.
3. Record the 6 highest emissions relative to the limit.
4. Measure each frequency obtained from step 3 by a test receiver set on quasi peak detector function, and then record the accuracy frequency and emission level. If all emissions measured in the specified band are attenuated more than 20 dB from the limit, this step would be ignored, and the peak detector function would be used.
5. Confirm the highest three emissions with variation of the EUT cable configuration and record the final data.
6. Repeat all above procedures on measuring each operation mode of EUT.

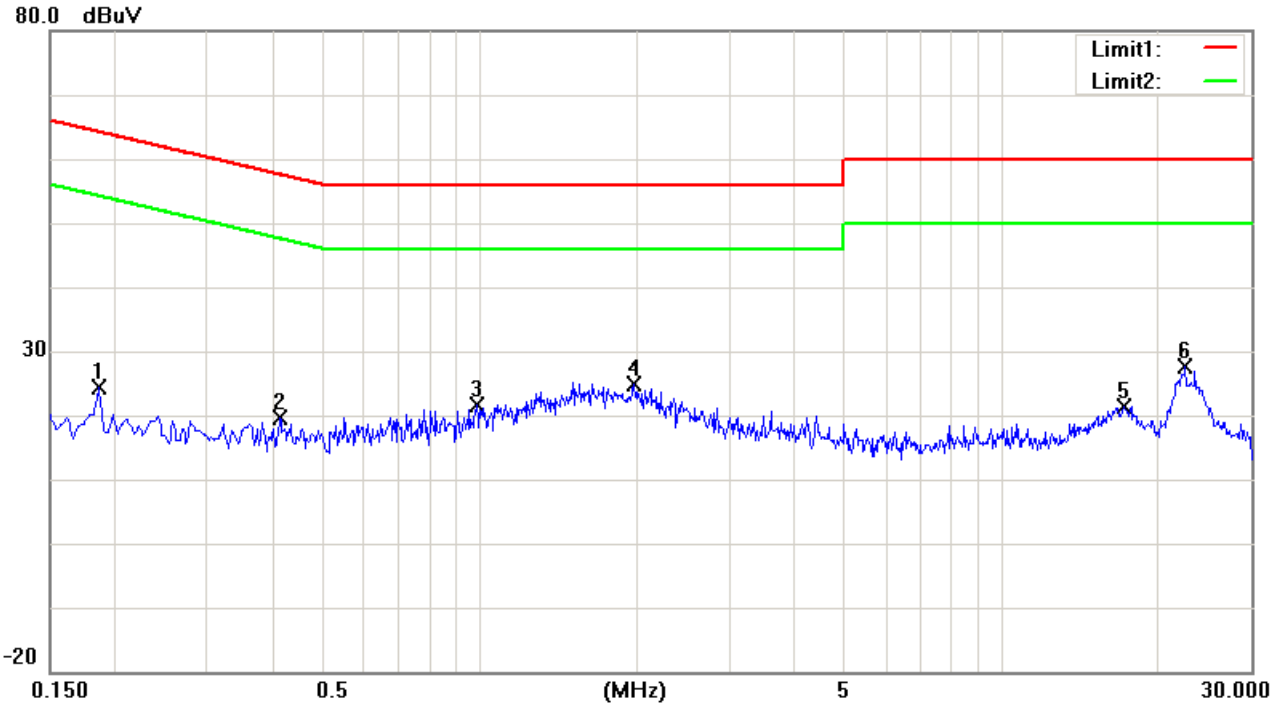
Figure 3: Conducted emissions measurement configuration



5.3 Conducted Emission Data

File: 13-05-MAS-061 **Data:** #1 **Date:** 2014/05/13 **Temperature:** 20 ℃

Time: PM 05:42:41 **Humidity:** 53 %



Condition: **Phase:** L1

EUT:

Model:

Test Mode: USB

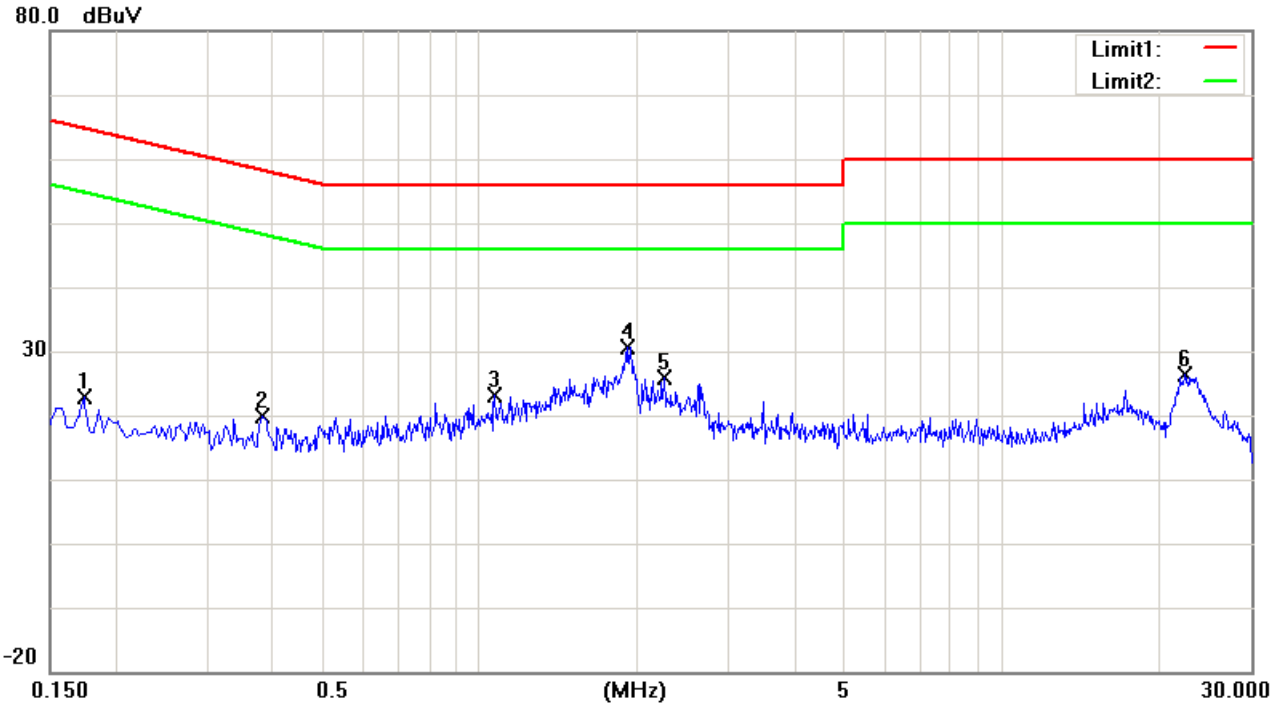
Note:

No.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected dB	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	0.1860	14.84	peak	9.63	24.47	64.21	-39.74
2	0.4140	10.10	peak	9.64	19.74	57.57	-37.83
3	0.9860	12.07	peak	9.66	21.73	56.00	-34.27
4	1.9740	15.28	peak	9.70	24.98	56.00	-31.02
5	17.1740	11.48	peak	9.98	21.46	60.00	-38.54
6	22.4660	17.70	peak	9.99	27.69	60.00	-32.31

Note: 1. Place of measurement: EMC LAB. of the ETC.
2. "***" means the value was too low to be measured.
3. If the data table appeared symbol of "----" means the Q.P. value is under the limit of AVG. so, the AVG. value doesn't need to be measured.
4. "#" means the noise was too low, so record the peak value.
5. The estimated measurement uncertainty of the result measurement is ±2.5dB.

File: 13-05-MAS-061 **Data:** #2 **Date:** 2014/05/13 **Temperature:** 20 ℃

Time: PM 05:43:28 **Humidity:** 53 %



Condition: **Phase:** N

EUT:

Model:

Test Mode: USB

No.	Frequency (MHz)	Reading (dBuV)	Detector	Corrected dB	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	0.1740	13.16	peak	9.63	22.79	64.77	-41.98
2	0.3820	10.29	peak	9.64	19.93	58.24	-38.31
3	1.0660	13.37	peak	9.66	23.03	56.00	-32.97
4	1.9140	20.91	peak	9.70	30.61	56.00	-25.39
5	2.2580	16.16	peak	9.70	25.86	56.00	-30.14
6	22.4380	16.31	peak	10.11	26.42	60.00	-33.58

Note: 1. Place of measurement: EMC LAB. of the ETC.
2. "***" means the value was too low to be measured.
3. If the data table appeared symbol of "----" means the Q.P. value is under the limit of AVG. so, the AVG. value doesn't need to be measured.
4. "#" means the noise was too low, so record the peak value.
5. The estimated measurement uncertainty of the result measurement is ±2.5dB.

5.4 Result Data Calculation

The result data is calculated by adding the LISN Factor to the measured reading. The basic equation with a sample calculation is as follows:

RESULT = READING + LISN FACTOR (Included Cable Loss)

5.5 Conducted Measurement EquiPMent

The following test equiPMent are used during the conducted test.

Equipment	Manufacturer	Model No.
EMI Test Receiver	R&S	ESCI
V-LISN	R&S	ENV216
V-LISN	R&S	ENV216

6 ANTENNA REQUIREMENT

6.1 Standard Applicable

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to §15.247 (c),(i) Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point-to point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. (ii) Systems operating in the 5725-5850 MHz band that are used exclusively for fixed, point-to point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted output power.

6.2 Antenna Construction and Directional Gain

The antennas is a Bluetooth chip antenna.

Antenna Type	Chip
Peak Antenna Gain	0.5 dBi

The directional gain of antenna doesn't greater than 6 dBi, the power won't be reduced.

7 20dB EMISSION BANDWIDTH MEASUREMENT

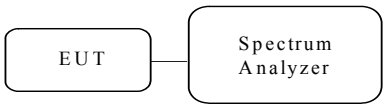
7.1 Standard Applicable

According to 15.247(a)(1), for frequency hopping systems, hopping channel carrier frequencies seperated by a minimum of 25kHz or the 20dB bandwidth of hopping channel, whichever is greater.

7.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The setup of the EUT as shown in figure 4. Turn on the EUT and connect it to measurement instrument. Then set it to any convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

Figure 4: Emission bandwidth measurement configuration.



7.3 Measurement Equipment

Equipment	Manufacturer	Model No.
Spectrum Analyzer	Agilent	E4446A

7.4 Measurement Data

7.4.1 Operation Mode: NON-EDR

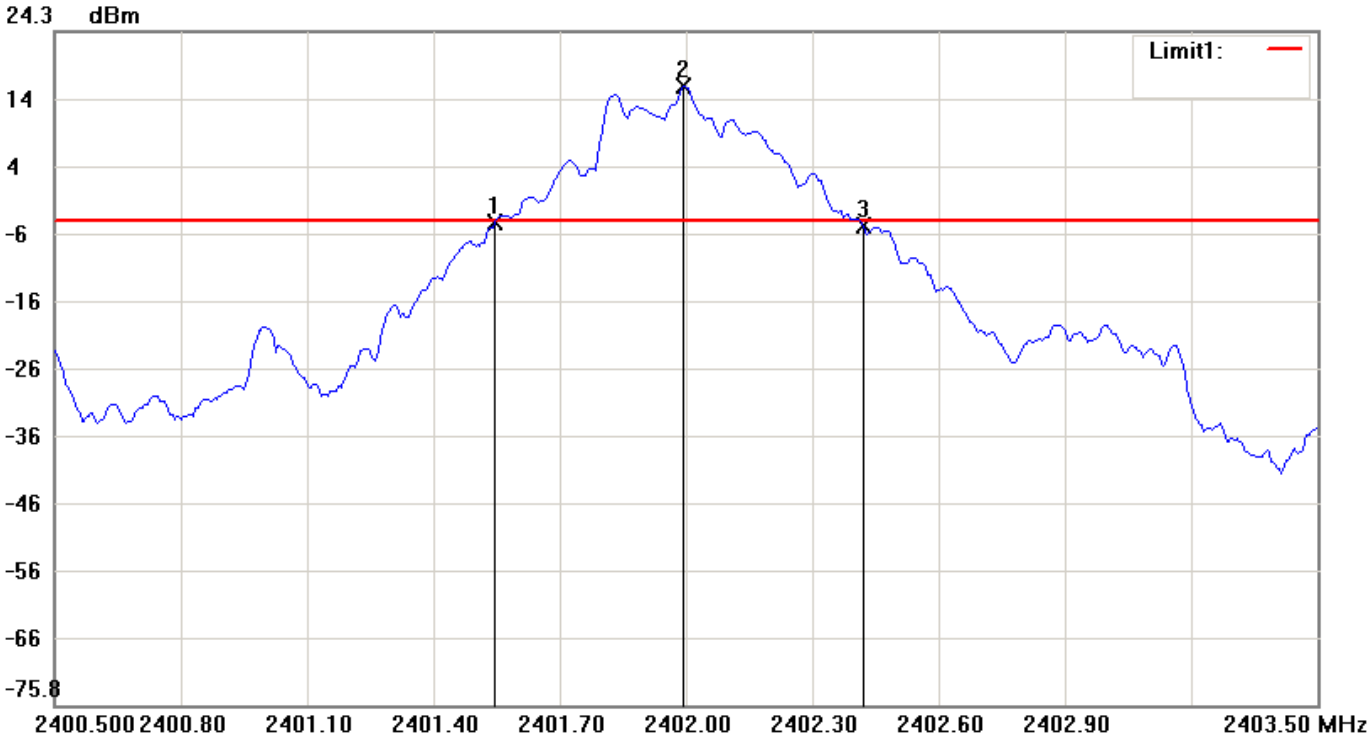
Test Date: May. 12, 2014 Temperature : 26℃ Humidity: 60%

Channel	20 dB Bandwidth (MHz)	Chart
L	0.875	Page 35
M	0.875	Page 36
H	0.875	Page 37

Note: Please refer to page 35 to page 37 for chart.

File: 1030 **Data:** #2 **Date:** 2014/05/12 **Temperature:** 26 ℃

Time: AM 09:23:38 **Humidity:** 60 %



Condition: -3.98dBm **RF Conducted**

EUT: **Sweep Time: 3.2ms** **Att.: 30dB**

Model: **RBW: 30 KHz** **VBW: 100 KHz**

Test Mode:

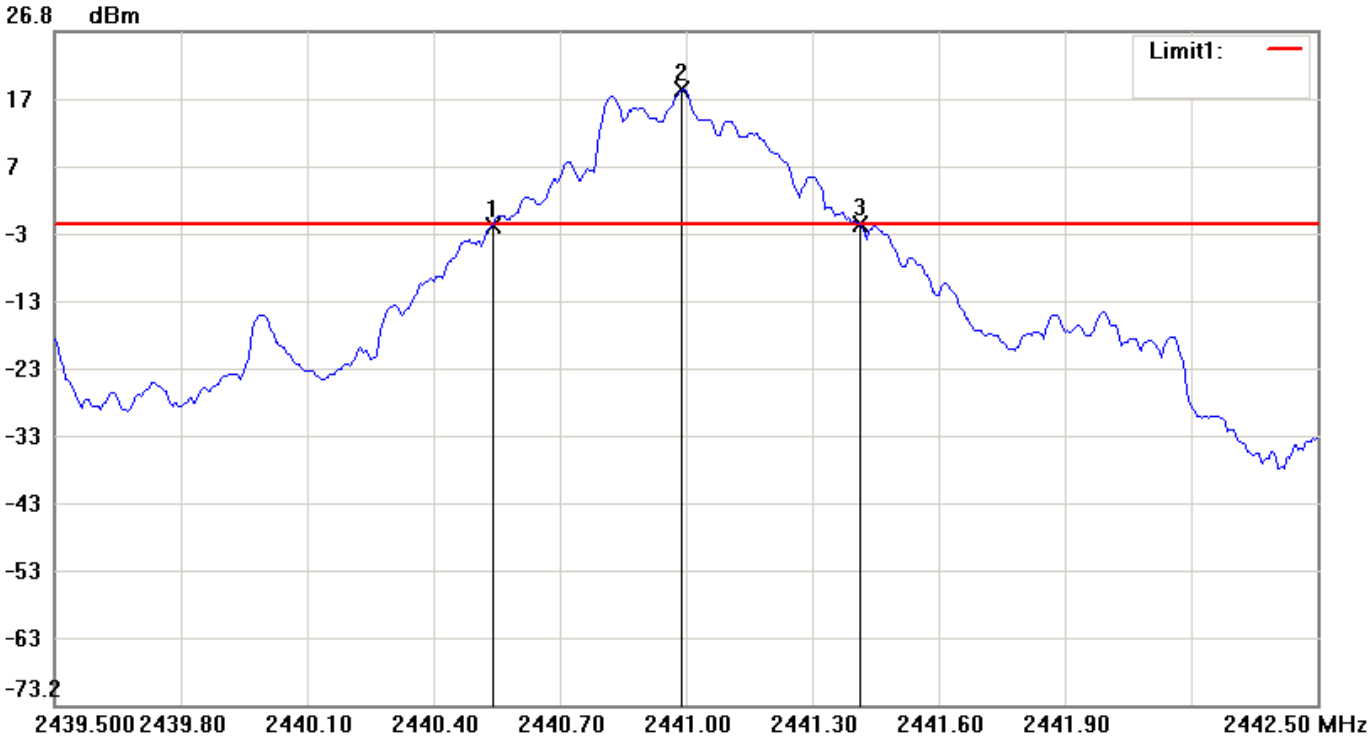
Note: **FCC-Bluetooth Channel 00-20dB EBW**

No.	Frequency(MHz)	Level(dBm)
1	2401.54500	-4.20
2	2401.99500	16.02
3	2402.42000	-4.66

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	0.875	-0.46

File: 1030 **Data:** #10 **Date:** 2014/05/12 **Temperature:** 26 ℃

Time: AM 09:40:23 **Humidity:** 60 %



Condition: -1.75dBm

EUT:

Model:

Test Mode:

Note: FCC-Bluetooth Channel 39-20dB EBW

RF Conducted

Sweep Time: 3.2ms **Att.: 30dB**

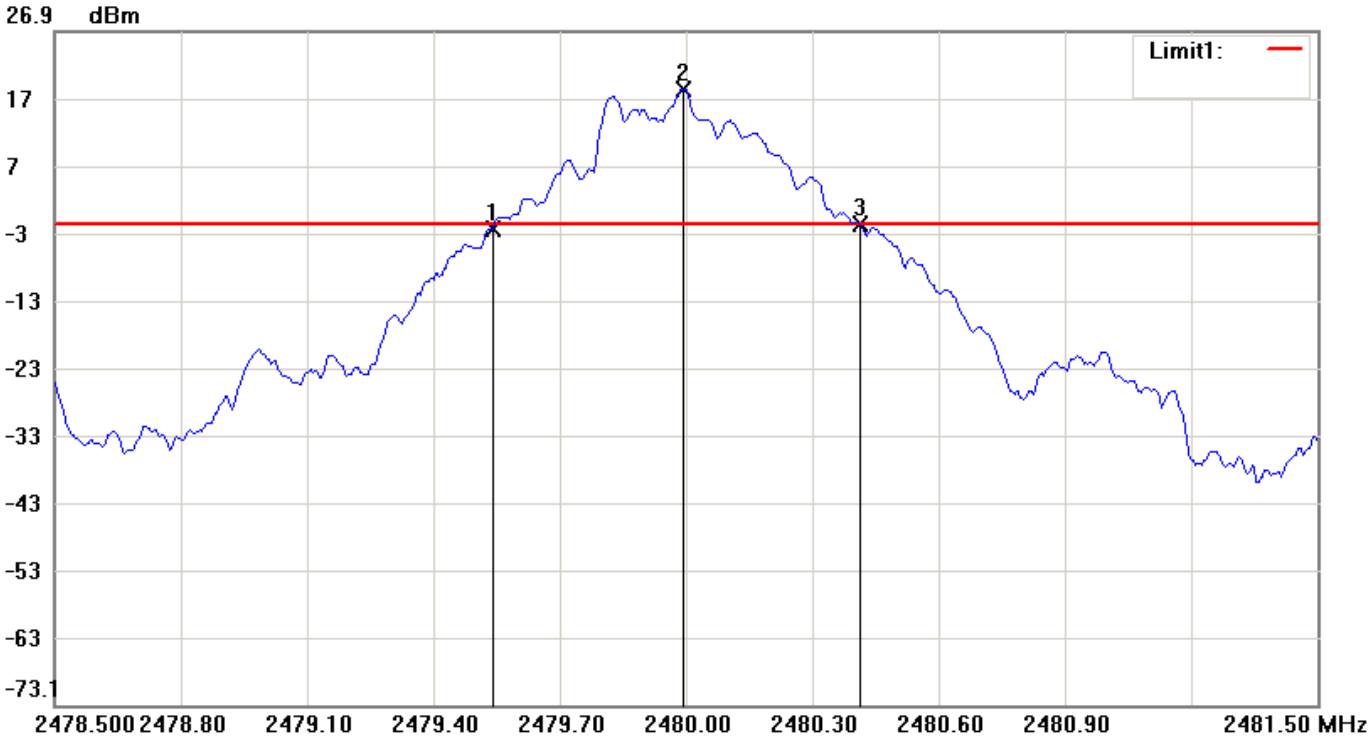
RBW: 30 KHz **VBW: 100 KHz**

No.	Frequency(MHz)	Level(dBm)
1	2440.54000	-2.13
2	2440.99000	18.25
3	2441.41500	-1.86

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	0.875	0.27

File: 1030 **Data:** #6 **Date:** 2014/05/12 **Temperature:** 26 ℃

Time: AM 09:28:28 **Humidity:** 60 %



Condition: -1.61dBm **RF Conducted**

EUT: **Sweep Time: 3.2ms** **Att.: 30dB**

Model: **RBW: 30 KHz** **VBW: 100 KHz**

Test Mode:

Note: **FCC-Bluetooth Channel 78-20dB EBW**

No.	Frequency(MHz)	Level(dBm)
1	2479.54000	-2.35
2	2479.99500	18.39
3	2480.41500	-1.75

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	0.875	0.6

7.4.2 Operation Mode: EDR

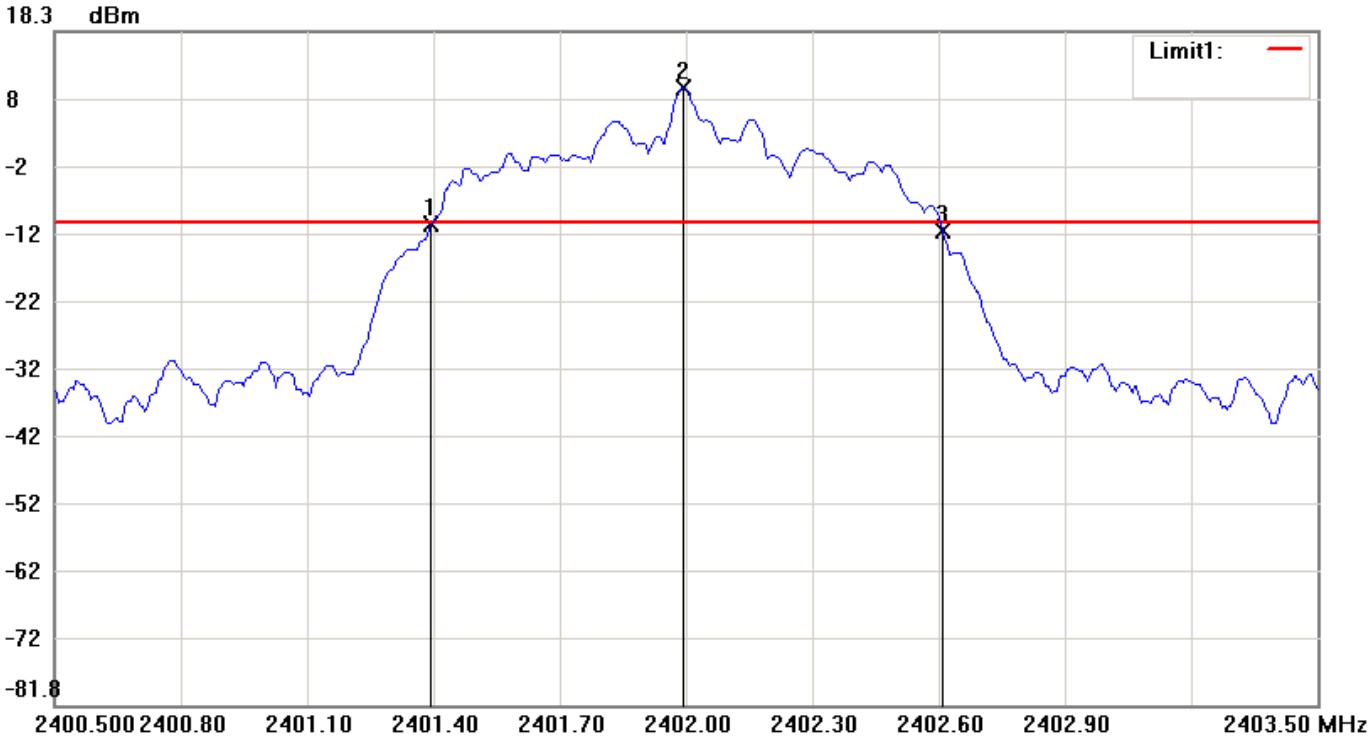
Test Date: May. 12, 2014 Temperature : 26℃ Humidity: 60%

Channel	20 dB Bandwidth (MHz)	Chart
L	1.215	Page 39
M	1.215	Page 40
H	1.215	Page 41

Note: Please refer to page 39 to page 41 for chart.

File: 1030 **Data:** #25 **Date:** 2014/05/12 **Temperature:** 26 ℃

Time: AM 10:00:13 **Humidity:** 60 %



Condition: -10.23dBm **RF Conducted**

EUT: **Sweep Time: 3.2ms** **Att.: 20dB**

Model: **RBW: 30 KHz** **VBW: 100 KHz**

Test Mode:

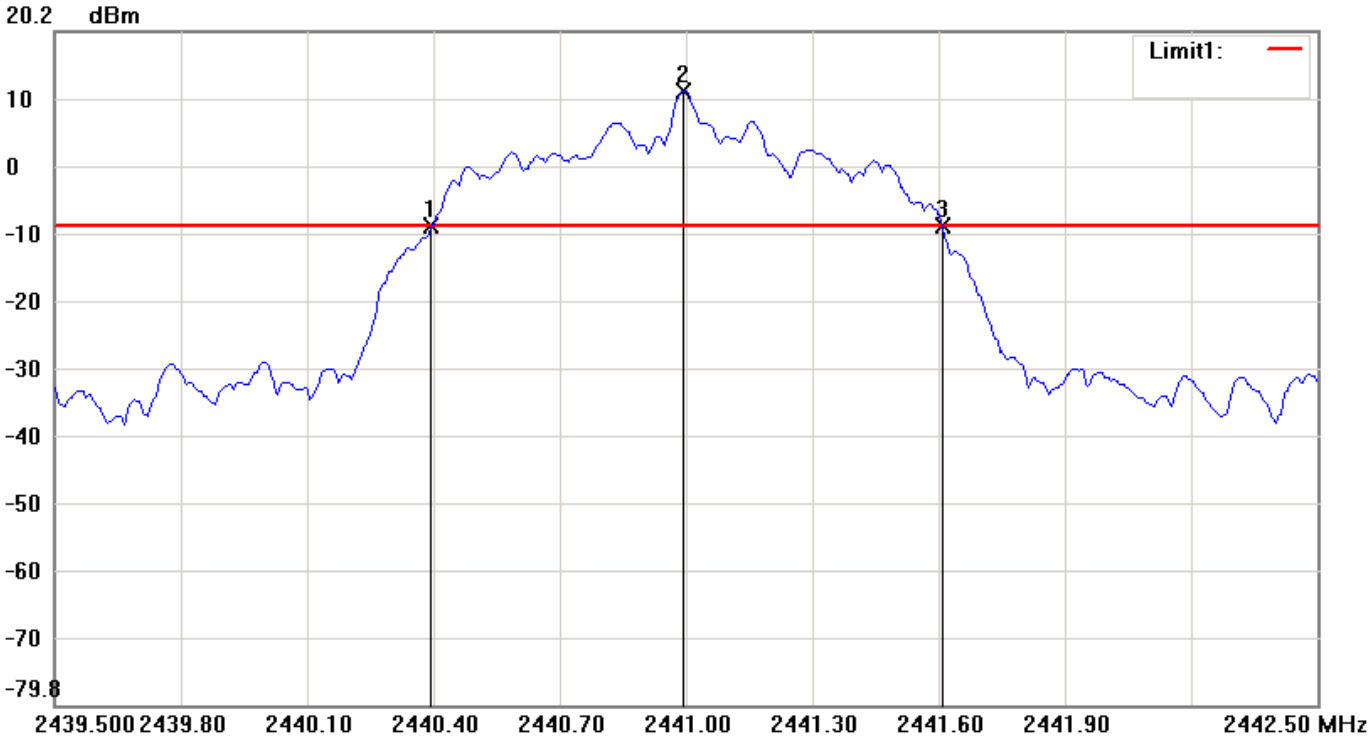
Note: **FCC-Bluetooth Channel 00-20dB EBW**

No.	Frequency(MHz)	Level(dBm)
1	2401.39500	-10.39
2	2401.99500	9.77
3	2402.61000	-11.43

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	1.215	-1.04

File: 1030 **Data:** #33 **Date:** 2014/05/12 **Temperature:** 26 ℃

Time: AM 10:13:28 **Humidity:** 60 %



Condition: -8.67dBm **RF Conducted**

EUT: **Sweep Time: 3.2ms** **Att.: 20dB**

Model: **RBW: 30 KHz** **VBW: 100 KHz**

Test Mode:

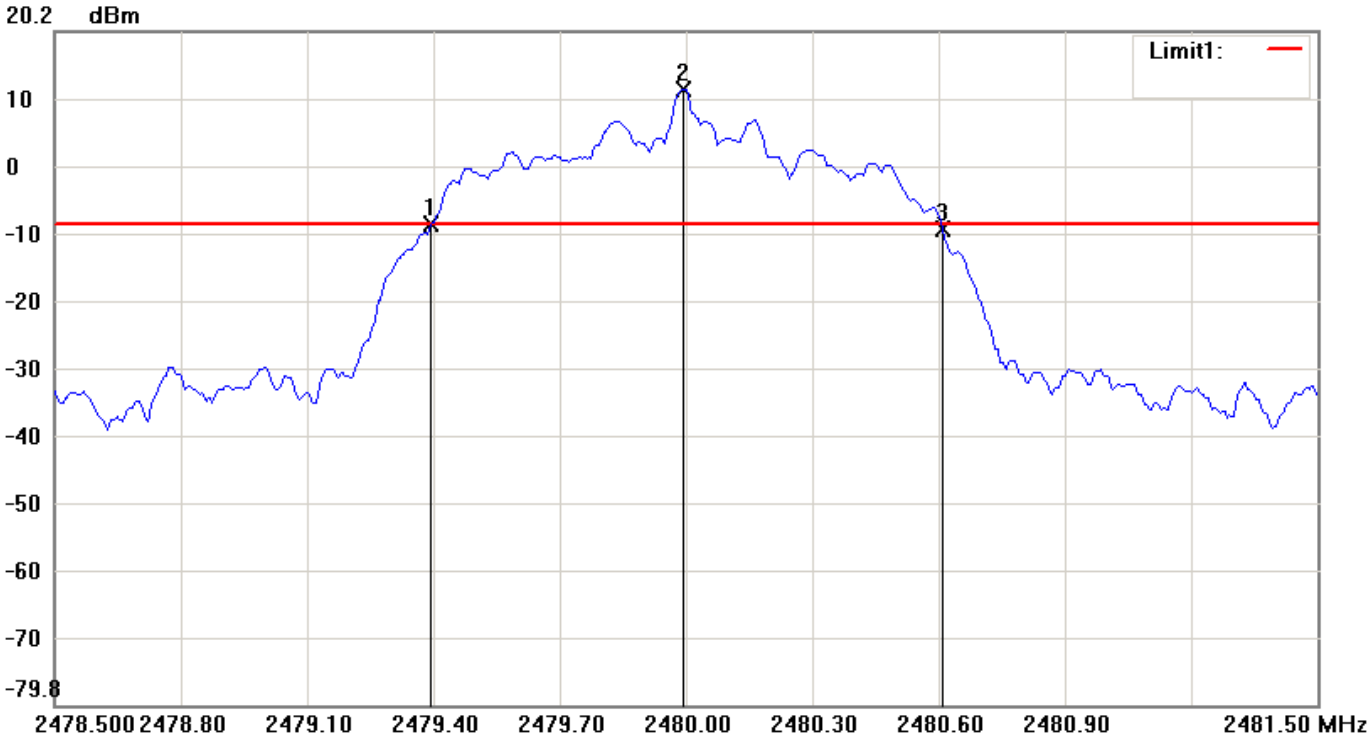
Note: **FCC-Bluetooth Channel 39-20dB EBW**

No.	Frequency(MHz)	Level(dBm)
1	2440.39500	-8.71
2	2440.99500	11.33
3	2441.61000	-8.78

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	1.215	-0.07

File: 1030 **Data:** #29 **Date:** 2014/05/12 **Temperature:** 26 ℃

Time: AM 10:07:09 **Humidity:** 60 %



Condition: -8.38dBm **RF Conducted**

EUT: **Sweep Time: 3.2ms** **Att.: 20dB**

Model: **RBW: 30 KHz** **VBW: 100 KHz**

Test Mode:

Note: **FCC-Bluetooth Channel 78-20dB EBW**

No.	Frequency(MHz)	Level(dBm)
1	2479.39500	-8.51
2	2479.99500	11.62
3	2480.61000	-9.08

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	1.215	-0.57

8 OUTPUT POWER MEASUREMENT

8.1 Standard Applicable

For frequency hopping system, according to 15.247(b), the maximum peak output power of the transmitter shall not exceed 1 Watt. If Receving antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

8.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The setup of the EUT as shown in figure 4. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Add cable loss factor to measurement instrument to get maximum peak output power. Then set it to any measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 2 MHz and VBW to 2 MHz.
4. Measure the highest amplitude appearing on spectral display and record the level to calculate result data.
5. Repeat above procedures until all frequencies measured were complete.

8.3 Measurement Equipment

Equipment	Manufacturer	Model No.
Spectrum Analyzer	Agilent	E4446A

8.4 Measurement Data

8.4.1 Operation Mode: NON-EDR

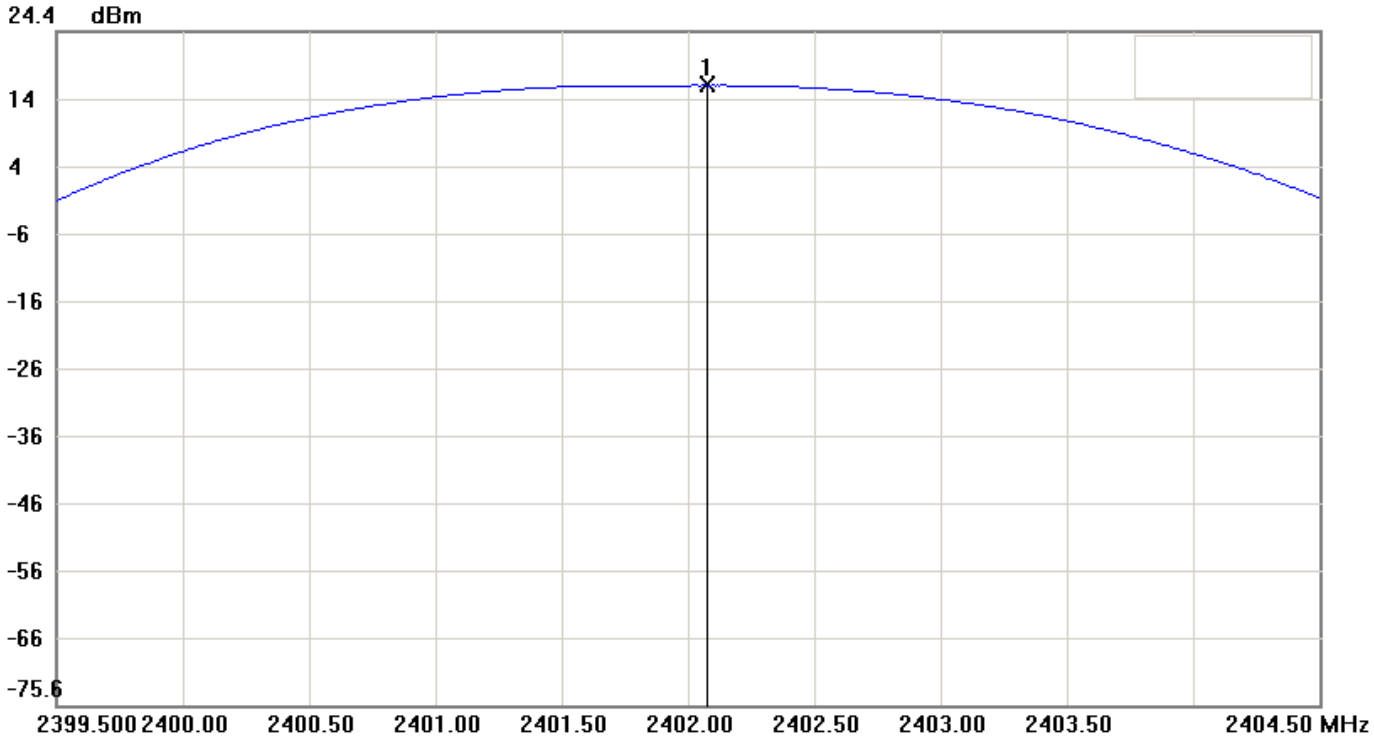
Test Date: May. 12, 2014 Temperature : 26℃ Humidity: 60%

Channel	Maximum Peak Output Power (dBm)	Maximum Peak Output Power (mW)	FCC Limit (mW)	Chart
L	16.41	43.75	125	Page 44
M	18.76	75.16	125	Page 45
H	18.82	76.21	125	Page 46

Note: Please refer to page 44 to page 46 for chart.

File: **1030** **Data:** **#1** **Date:** **2014/05/12** **Temperature:** **26 ℃**

Time: **AM 09:23:05** **Humidity:** **60 %**



Condition: **RF Conducted**

EUT: **Sweep Time: 1ms** **Att.: 30dB**

Model: **RBW: 2000 KHz** **VBW: 2000 KHz**

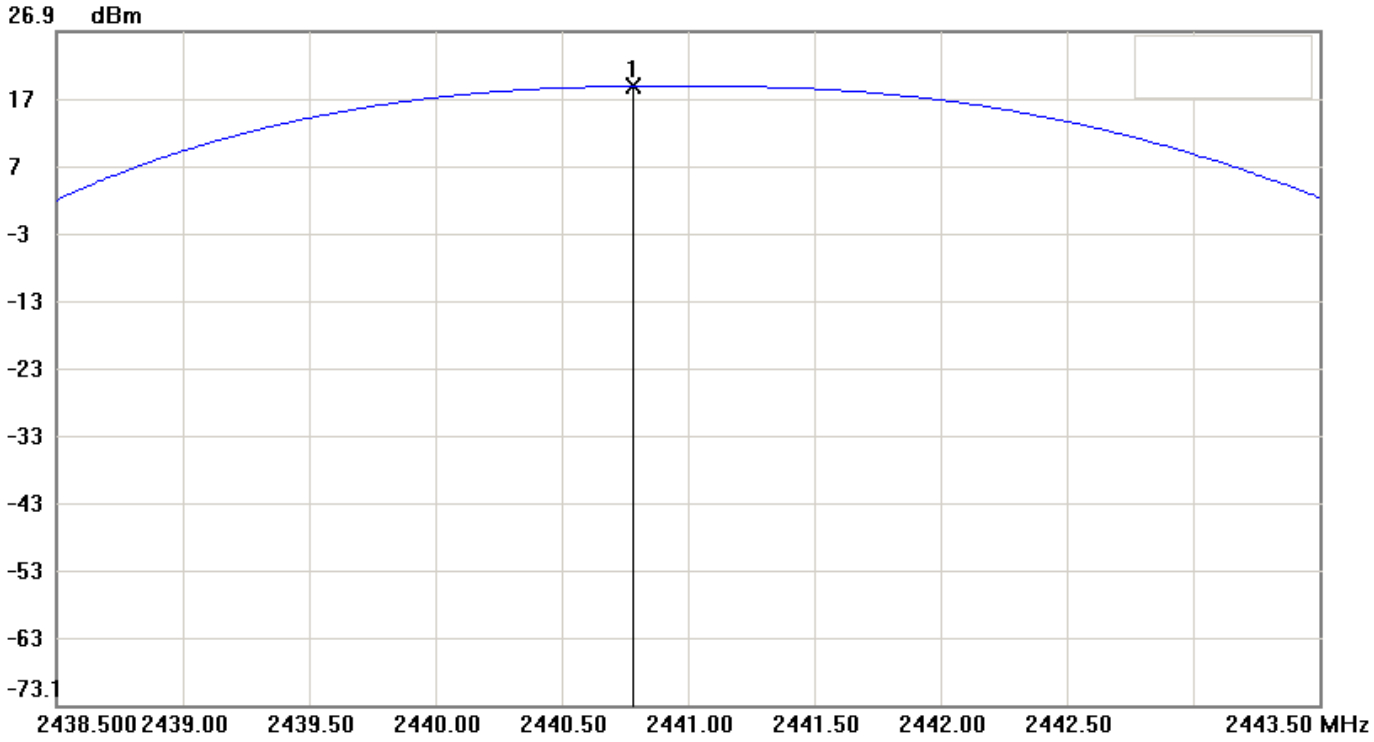
Test Mode:

Note: **FCC Bluetooth CH00 Output Power (NON-EDR)**

No.	Frequency(MHz)	Level(dBm)
1	2402.06670	16.41

File: **1030** **Data:** **#9** **Date:** **2014/05/12** **Temperature:** **26 ℃**

Time: **AM 09:36:23** **Humidity:** **60 %**



Condition: **RF Conducted**

EUT: **Sweep Time: 1ms** **Att.: 30dB**

Model: **RBW: 2000 KHz** **VBW: 2000 KHz**

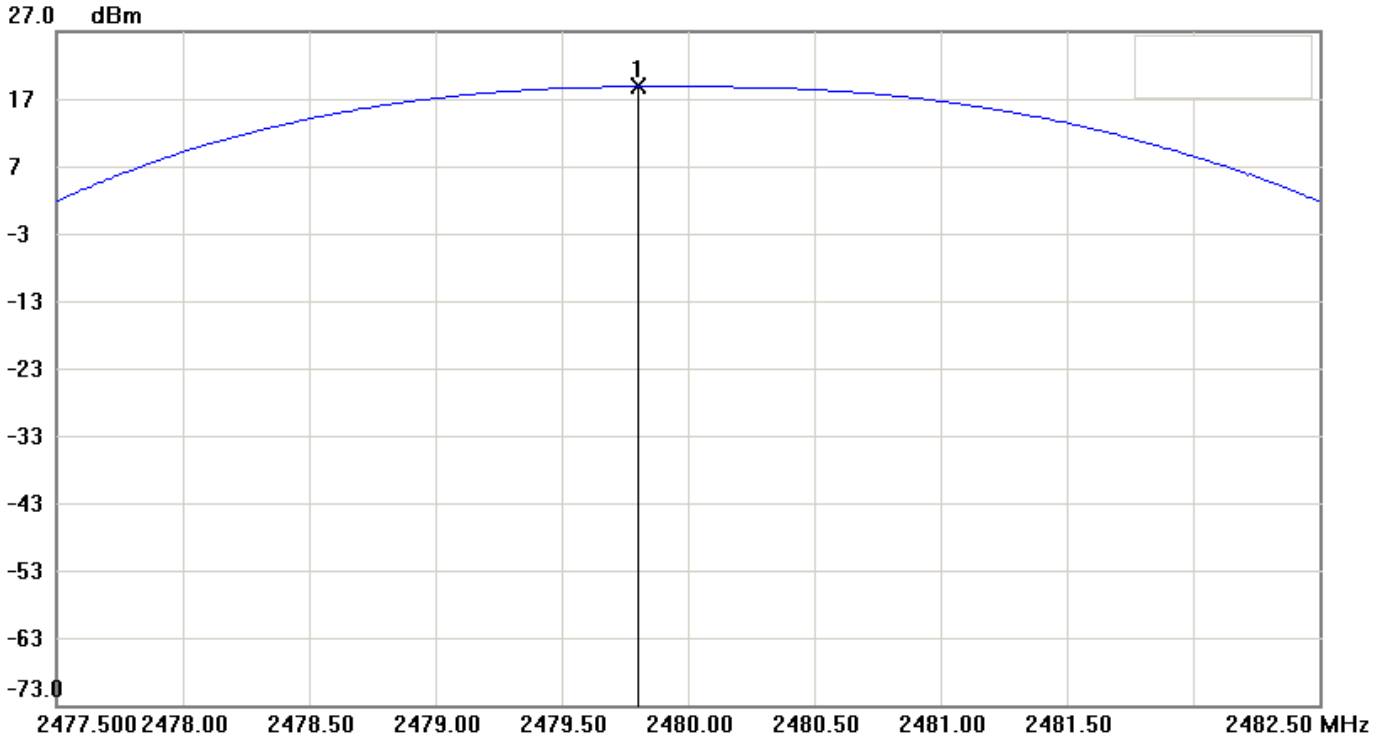
Test Mode:

Note: **FCC Bluetooth CH39 Output Power (NON-EDR)**

No.	Frequency(MHz)	Level(dBm)
1	2440.78330	18.76

File: **1030** **Data:** **#5** **Date:** **2014/05/12** **Temperature:** **26 ℃**

Time: **AM 09:27:58** **Humidity:** **60 %**



Condition: **RF Conducted**

EUT: **Sweep Time: 1ms** **Att.: 30dB**

Model: **RBW: 2000 KHz** **VBW: 2000 KHz**

Test Mode:

Note: **FCC Bluetooth CH78 Output Power (NON-EDR)**

No.	Frequency(MHz)	Level(dBm)
1	2479.80000	18.82

8.4.2 Operation Mode: EDR

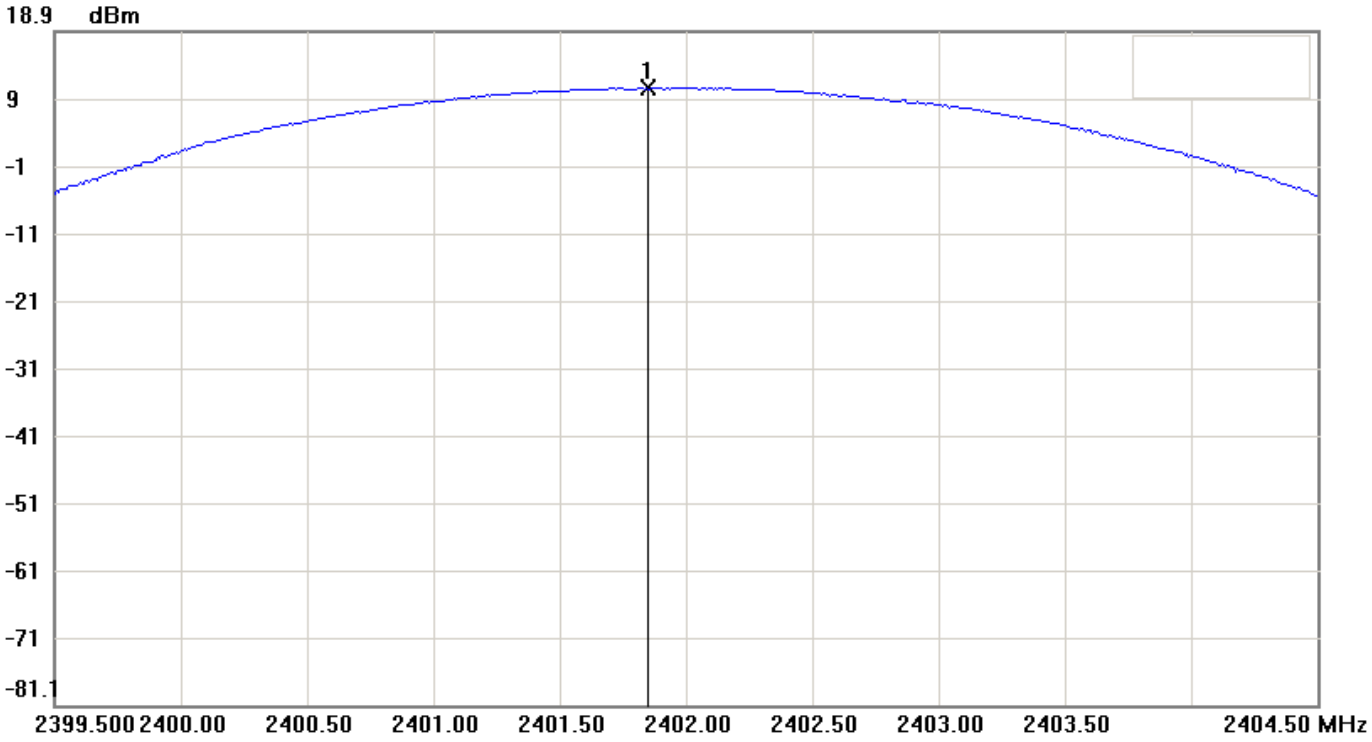
Test Date: May. 12, 2014 Temperature : 26℃ Humidity: 60%

Channel	Maximum Peak Output Power (dBm)	Maximum Peak Output Power (mW)	FCC Limit (mW)	Chart
L	10.56	11.38	125	Page 48
M	12.59	18.16	125	Page 49
H	12.57	18.07	125	Page 50

Note: Please refer to page 48 to page 50 for chart.

File: **1030** **Data:** **#24** **Date:** **2014/05/12** **Temperature:** **26 ℃**

Time: **AM 09:58:39** **Humidity:** **60 %**



Condition: **RF Conducted**

EUT: **Sweep Time: 1ms** **Att.: 20dB**

Model: **RBW: 2000 KHz** **VBW: 2000 KHz**

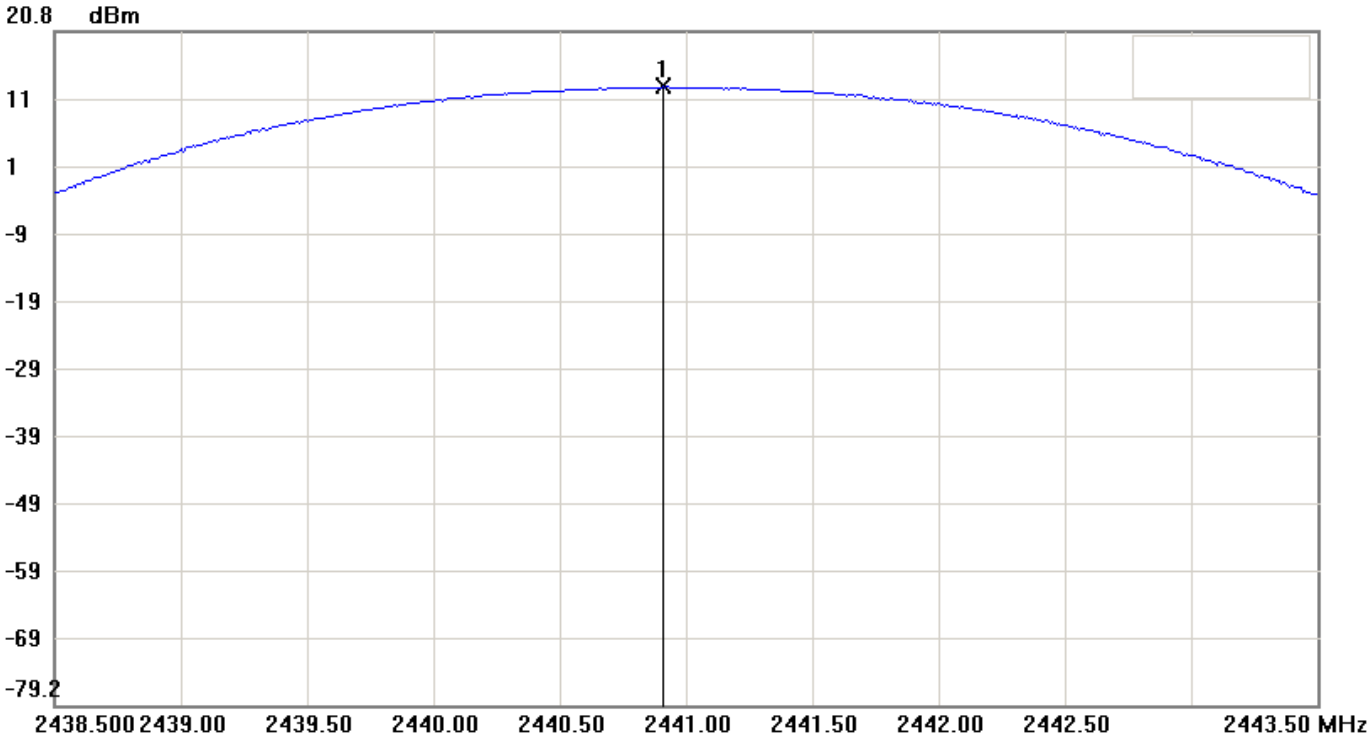
Test Mode:

Note: **FCC Bluetooth CH00 Output Power (EDR)**

No.	Frequency(MHz)	Level(dBm)
1	2401.84170	10.56

File: **1030** **Data:** **#32** **Date:** **2014/05/12** **Temperature:** **26 ℃**

Time: **AM 10:12:47** **Humidity:** **60 %**



Condition: **RF Conducted**

EUT: **Sweep Time: 1ms** **Att.: 30dB**

Model: **RBW: 2000 KHz** **VBW: 2000 KHz**

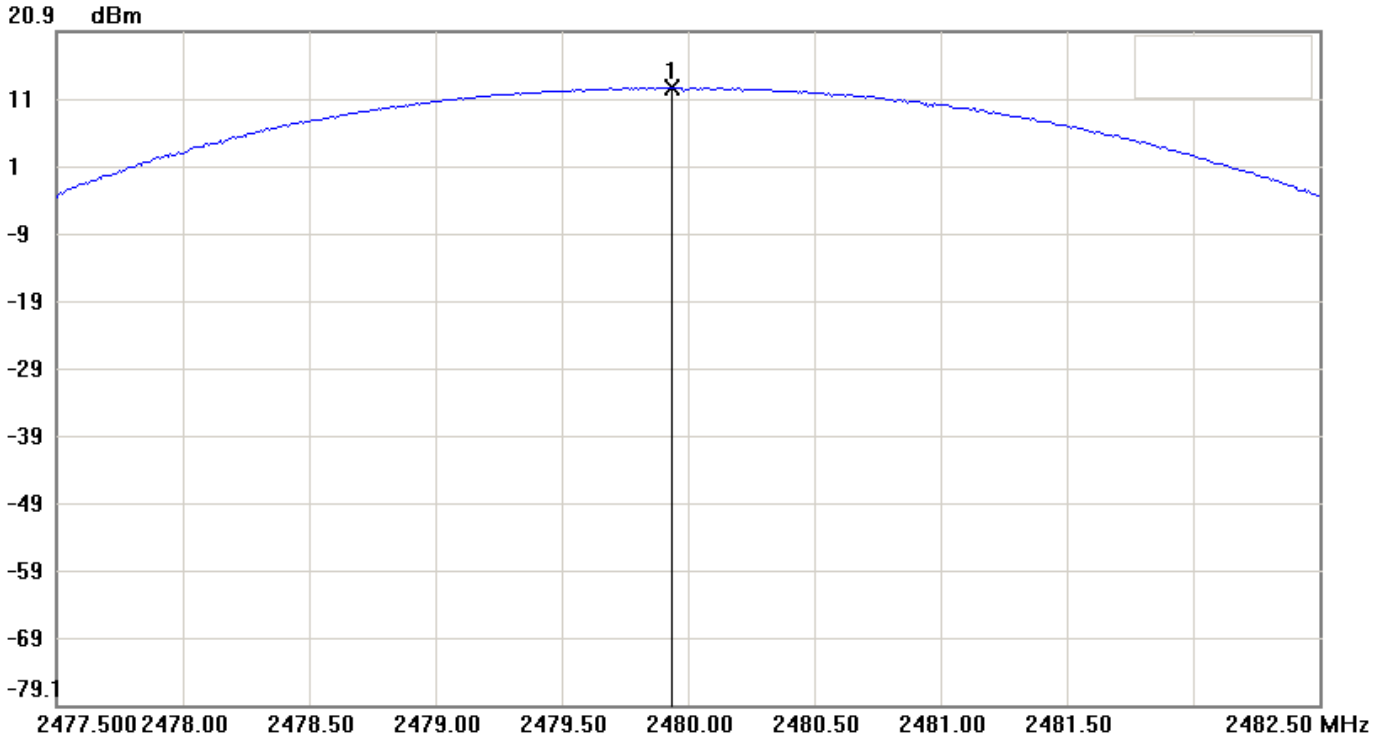
Test Mode:

Note: **FCC Bluetooth CH39 Output Power (EDR)**

No.	Frequency(MHz)	Level(dBm)
1	2440.90830	12.59

File: 1030 **Data:** #28 **Date:** 2014/05/12 **Temperature:** 26 ℃

Time: AM 10:06:39 **Humidity:** 60 %



Condition: **RF Conducted**

EUT: **Sweep Time: 1ms Att.: 30dB**

Model: **RBW: 2000 KHz VBW: 2000 KHz**

Test Mode:

Note: **FCC Bluetooth CH78 Output Power (EDR)**

No.	Frequency(MHz)	Level(dBm)
1	2479.93330	12.57

9 OUT-OF-BAND RF CONDUCTED SPURIOUS EMISSION MEASUREMENT

9.1 Standard Applicable

According to 15.247(c), if any 100 kHz bandwidth outside these frequency bands, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency shall be either at least 20 dB below that in any 100 kHz bandwidth within the band that contains the highest level of the desired power or shall not exceed the general levels specified in §15.209(a), whichever results in the lesser attenuation.

9.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The setup of the EUT as shown in figure 4. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

9.3 Measurement Equipment

Equipment	Manufacturer	Model No.
Spectrum Analyzer	Agilent	E4446A

9.4 Measurement Data

9.4.1 Operation Mode: NON-EDR

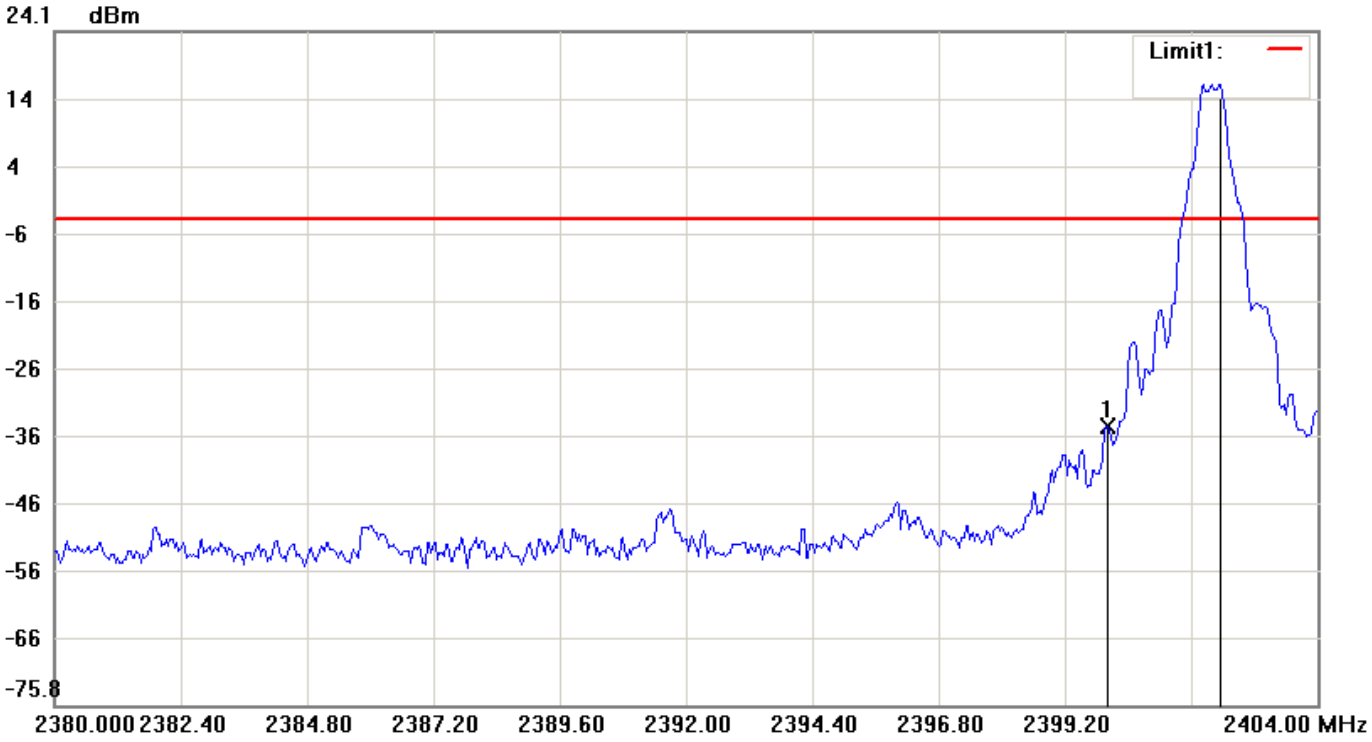
Test Date: May. 12, 2014 Temperature： 26℃ Humidity: 60%

Channel	Test Frequency Range	Note	Chart
0	2380 MHz - 2404 MHz	Lower Band Edge	Page 53-54
78	2478 MHz – 2500 MHz	Upper Band Edge	Page 55-56
0	30 MHz - 25 GHz		Page 57
39	30 MHz - 25 GHz		Page 58
78	30 MHz - 25 GHz		Page 59

Note: Please refer to page 53 to page 59 for chart.

File: **1030** **Data:** **#4** **Date:** **2014/05/12** **Temperature:** **26 ℃**

Time: **AM 09:25:53** **Humidity:** **60 %**



Condition: **-3.7dBm** **RF Conducted**

EUT: **Sweep Time: 2.32ms** **Att.: 30dB**

Model: **RBW: 100 KHz** **VBW: 300 KHz**

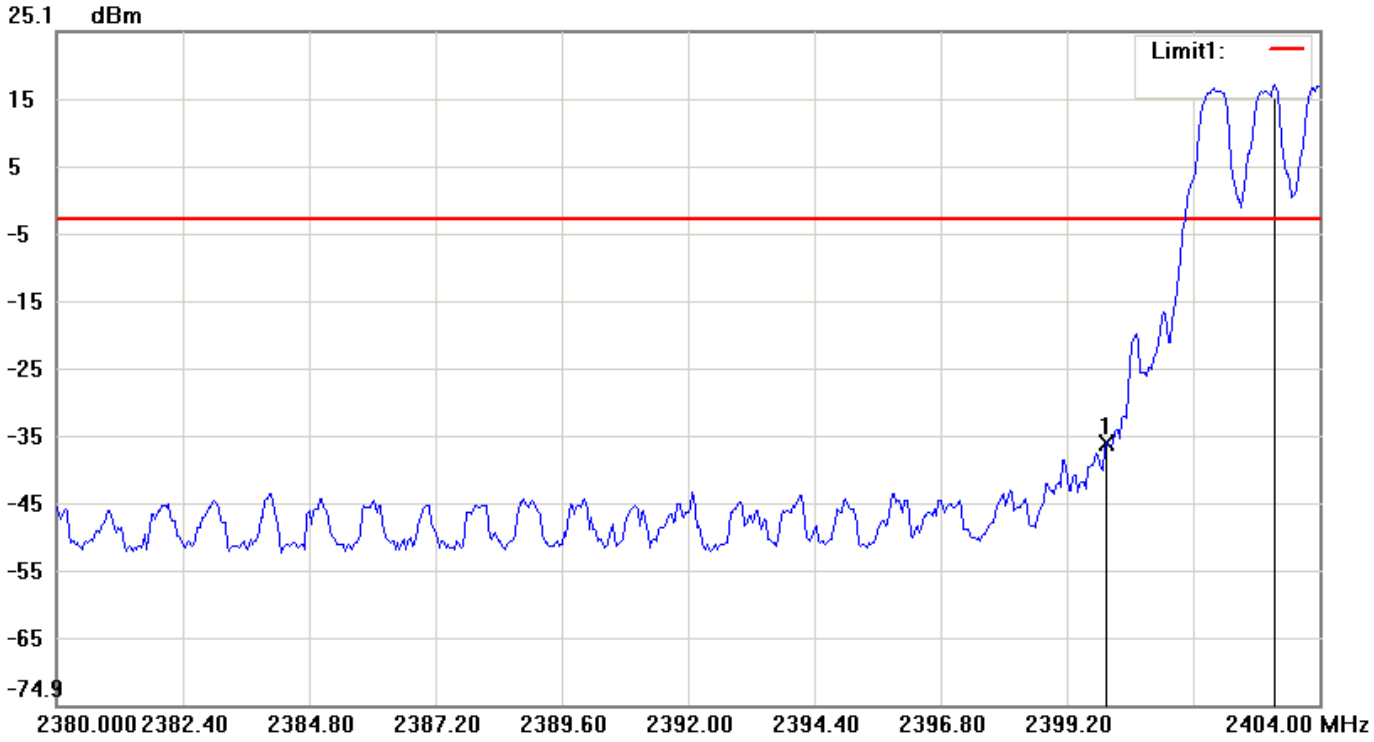
Test Mode:

Note: **FCC-Bluetooth Channel 00-Bandedge (Fixed)**

No.	Frequency(MHz)	Level(dBm)
1	2400.00000	-34.38
2	2402.16000	16.30

File: 1030 **Data:** #12 **Date:** 2014/05/12 **Temperature:** 26 ℃

Time: AM 09:44:38 **Humidity:** 60 %



Condition: -2.84dBm **RF Conducted**

EUT: **Sweep Time: 2.32ms** **Att.: 30dB**

Model: **RBW: 100 KHz** **VBW: 300 KHz**

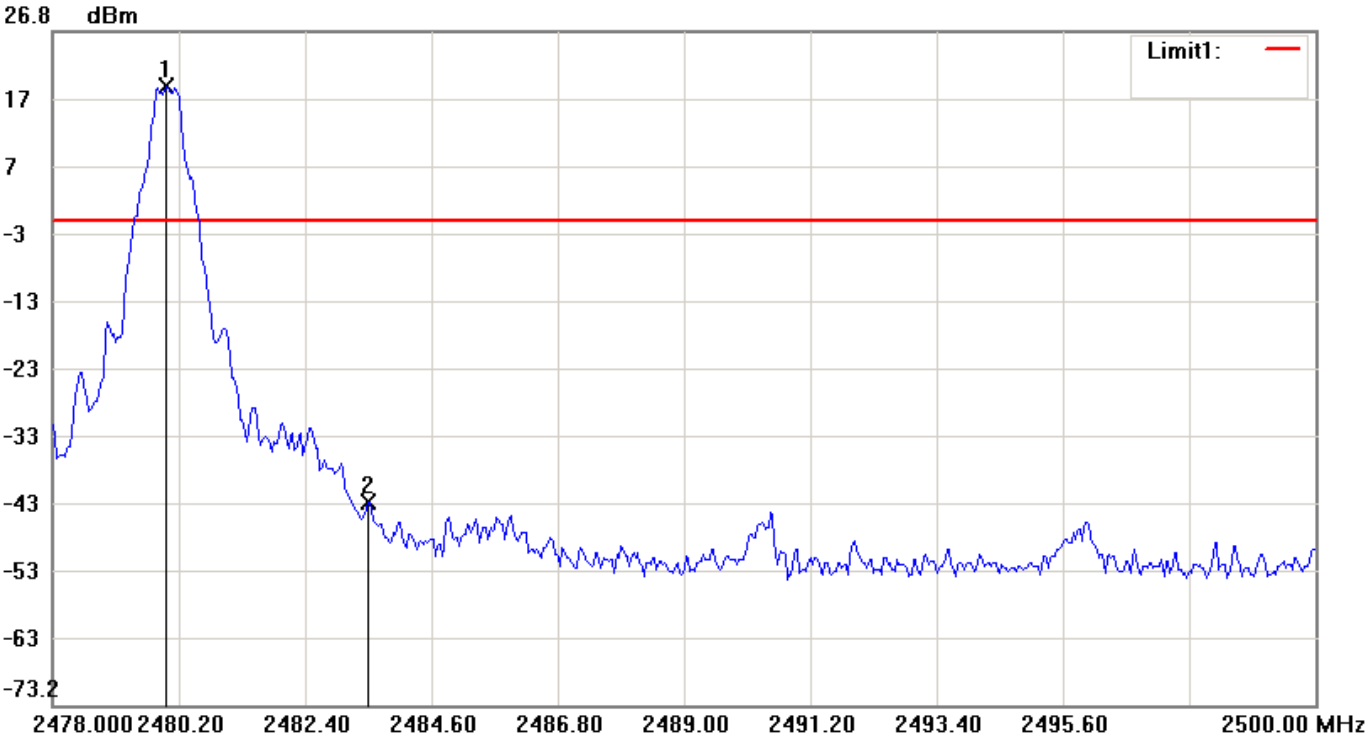
Test Mode:

Note: **FCC-Bluetooth Channel 00-Bandedge (Hopping)**

No.	Frequency(MHz)	Level(dBm)
1	2399.96000	-35.97
2	2403.16000	17.16

File: **1030** **Data:** **#8** **Date:** **2014/05/12** **Temperature:** **26 ℃**

Time: **AM 09:35:11** **Humidity:** **60 %**



Condition: **-1.32dBm** **RF Conducted**

EUT: **Sweep Time: 2.12ms** **Att.: 30dB**

Model: **RBW: 100 KHz** **VBW: 300 KHz**

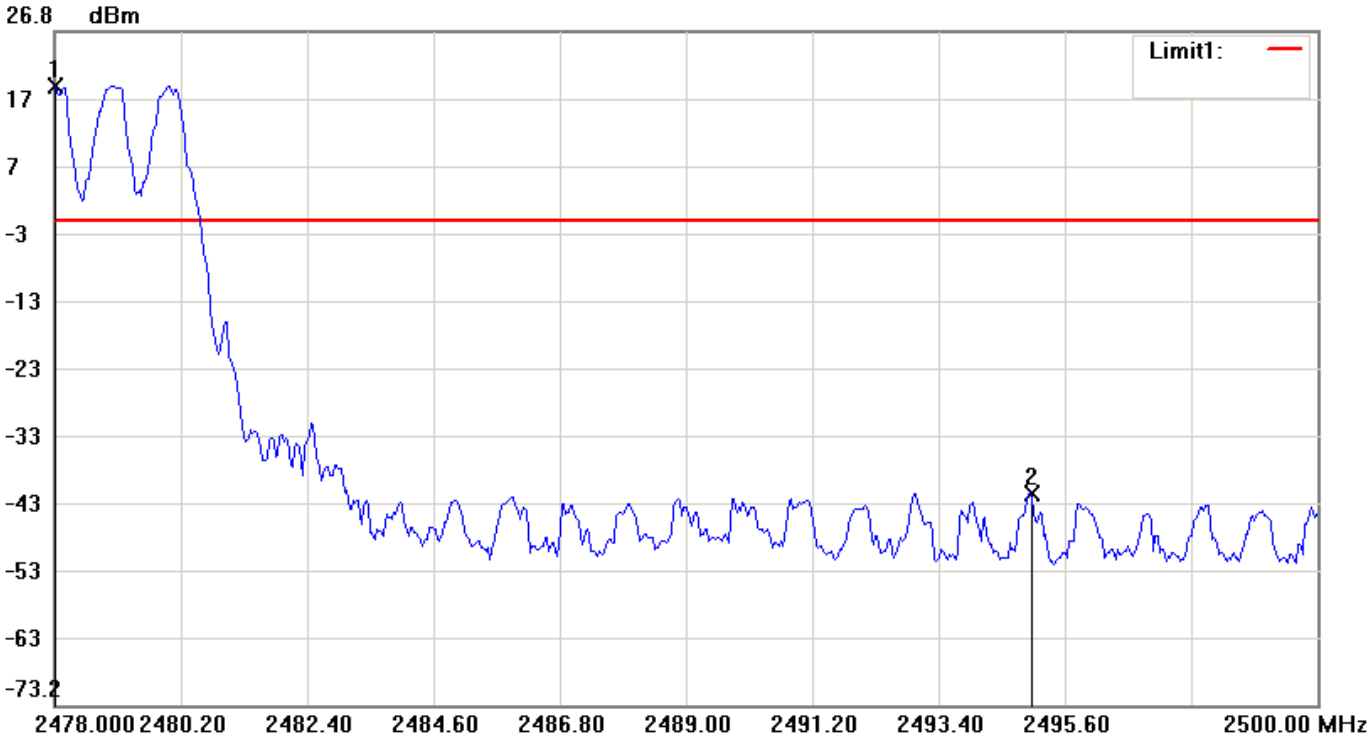
Test Mode:

Note: **FCC-Bluetooth Channel 78-Bandedge (Fixed)**

No.	Frequency(MHz)	Level(dBm)
1	2479.98000	18.68
2	2483.50000	-43.04

File: 1030 **Data:** #13 **Date:** 2014/05/12 **Temperature:** 26 ℃

Time: AM 09:46:43 **Humidity:** 60 %



Condition: -1.22dBm **RF Conducted**

EUT: **Sweep Time: 2.12ms** **Att.: 30dB**

Model: **RBW: 100 KHz** **VBW: 300 KHz**

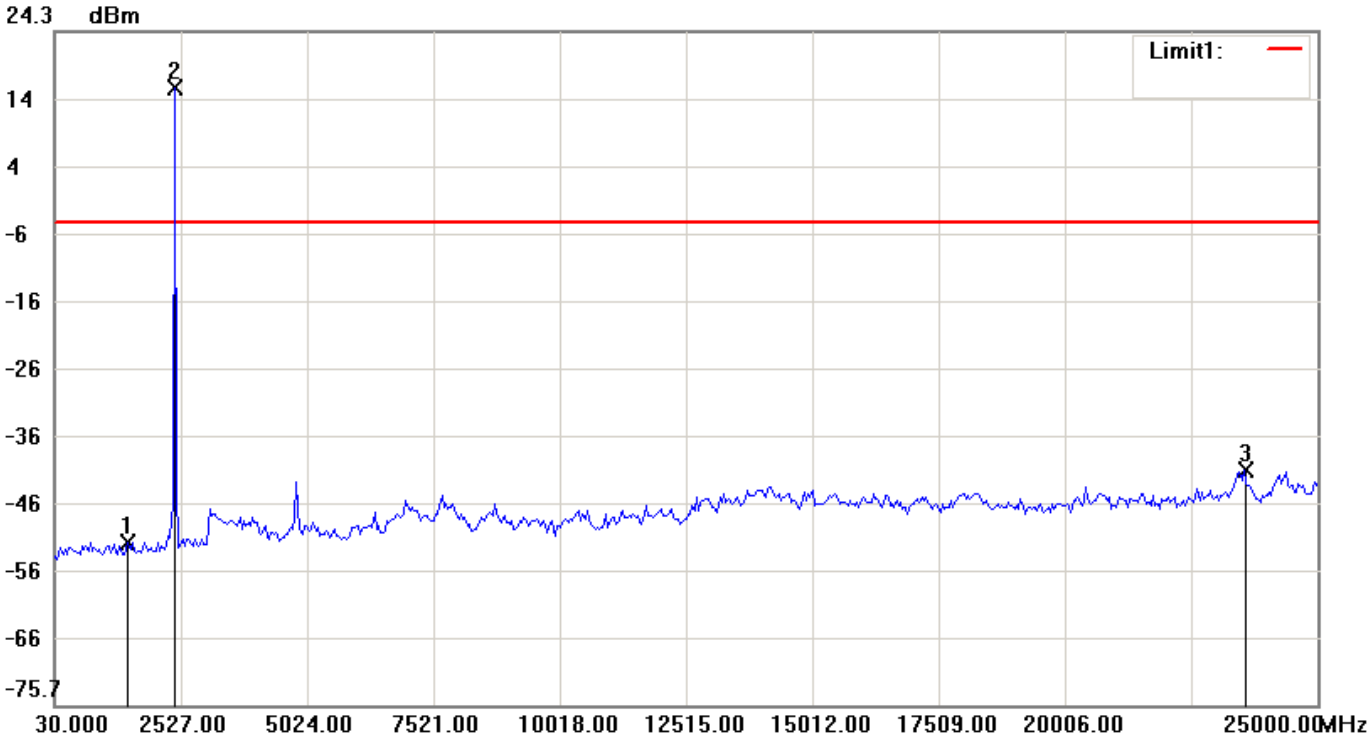
Test Mode:

Note: **FCC-Bluetooth Channel 78-Bandedge (Hopping)**

No.	Frequency(MHz)	Level(dBm)
1	2478.00000	18.78
2	2494.97670	-41.68

File: 1030 **Data:** #3 **Date:** 2014/05/12 **Temperature:** 26 ℃

Time: AM 09:25:24 **Humidity:** 60 %



Condition: -4.08dBm **RF Conducted**

EUT: **Sweep Time: 2386.4ms Att.: 30dB**

Model: **RBW: 100 KHz VBW: 300 KHz**

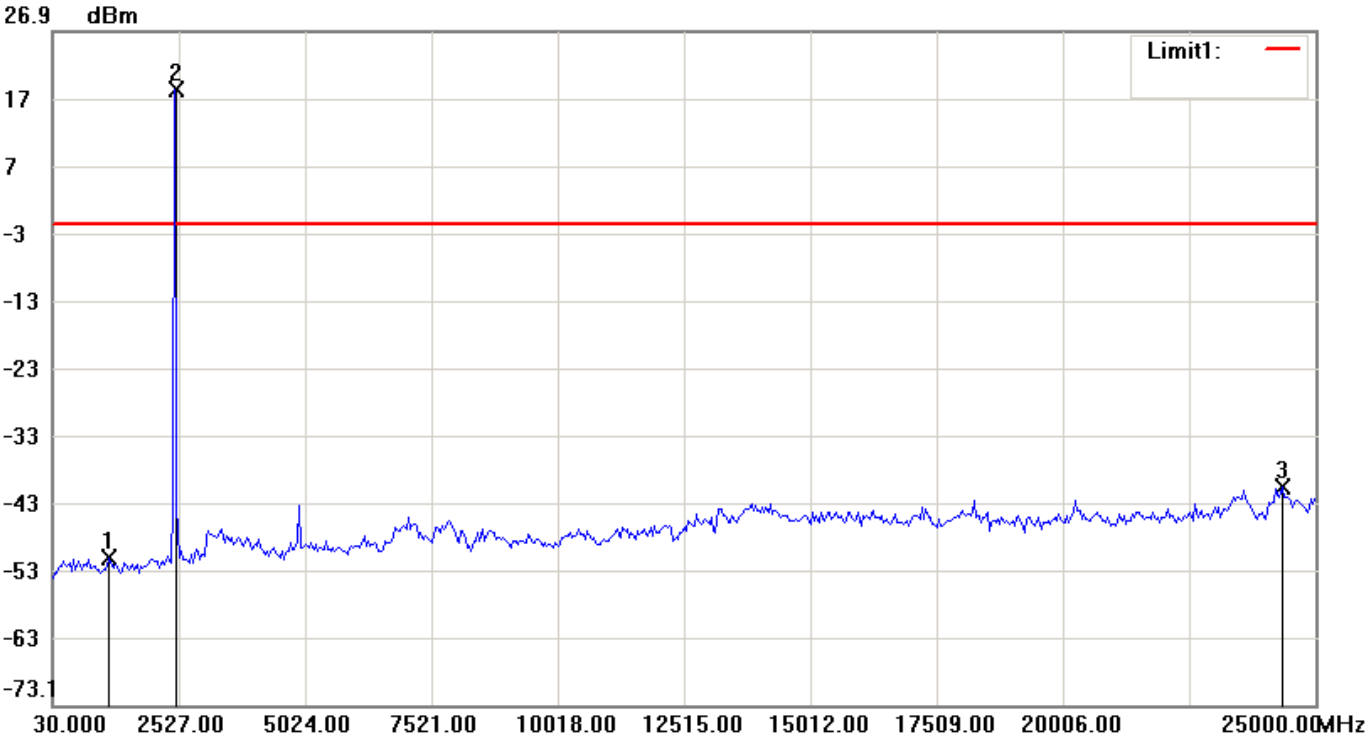
Test Mode:

Note: **FCC-BT Channel 00-Conducted Spurious**

No.	Frequency(MHz)	Level(dBm)
1	1486.58330	-51.50
2	2402.15000	15.92
3	23543.41670	-40.93

File: 1030 **Data:** #11 **Date:** 2014/05/12 **Temperature:** 26 ℃

Time: AM 09:42:04 **Humidity:** 60 %



Condition: -1.73dBm

EUT:

Model:

Test Mode:

Note: FCC-BT Channel 39-Conducted Spurious

RF Conducted

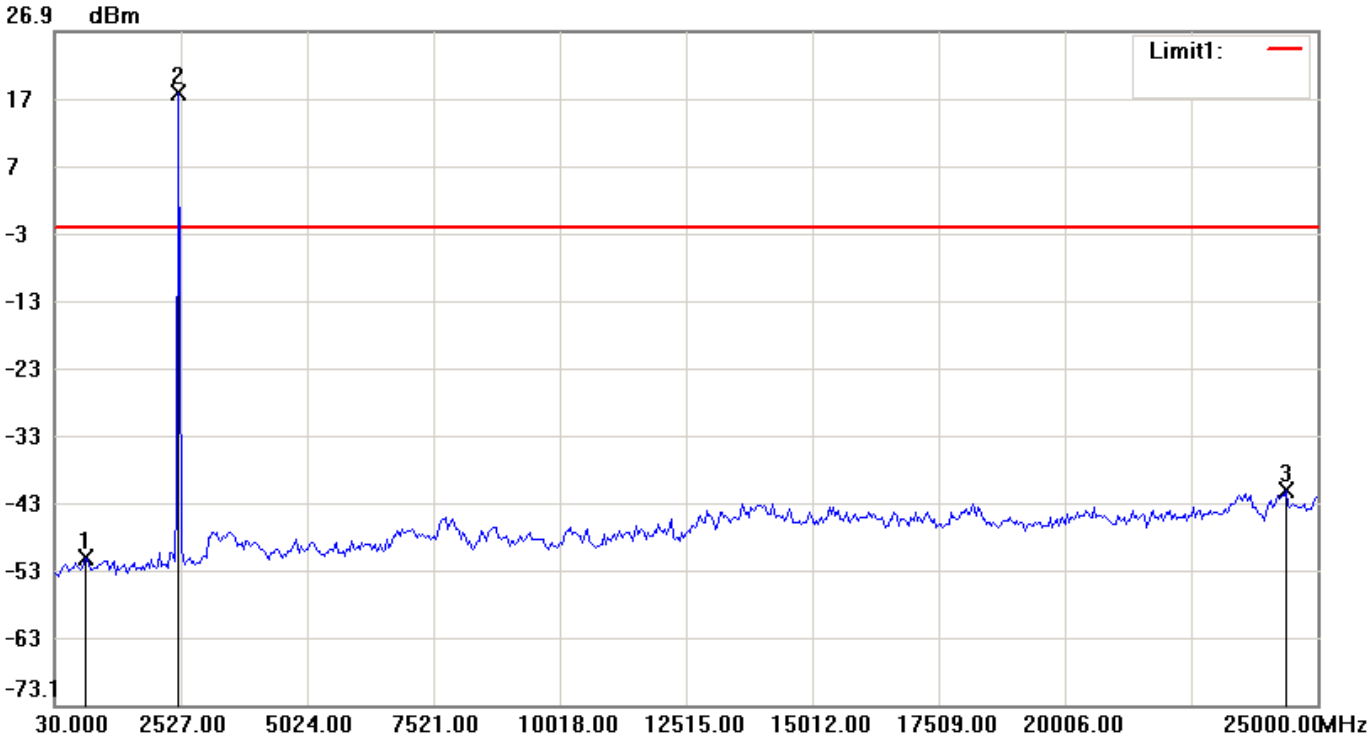
Sweep Time: 2386.4ms Att.: 30dB

RBW: 100 KHz VBW: 300 KHz

No.	Frequency(MHz)	Level(dBm)
1	1153.65000	-51.31
2	2443.76670	18.27
3	24334.13330	-40.82

File: 1030 **Data:** #7 **Date:** 2014/05/12 **Temperature:** 26 ℃

Time: AM 09:34:36 **Humidity:** 60 %



Condition: -2.18dBm

EUT:

Model:

Test Mode:

Note: FCC-BT Channel 78-Conducted Spurious

RF Conducted

Sweep Time: 2386.4ms Att.: 30dB

RBW: 100 KHz VBW: 300 KHz

No.	Frequency(MHz)	Level(dBm)
1	654.2500	-51.12
2	2485.38330	17.82
3	24375.75000	-41.28

9.4.2 Operation Mode: EDR

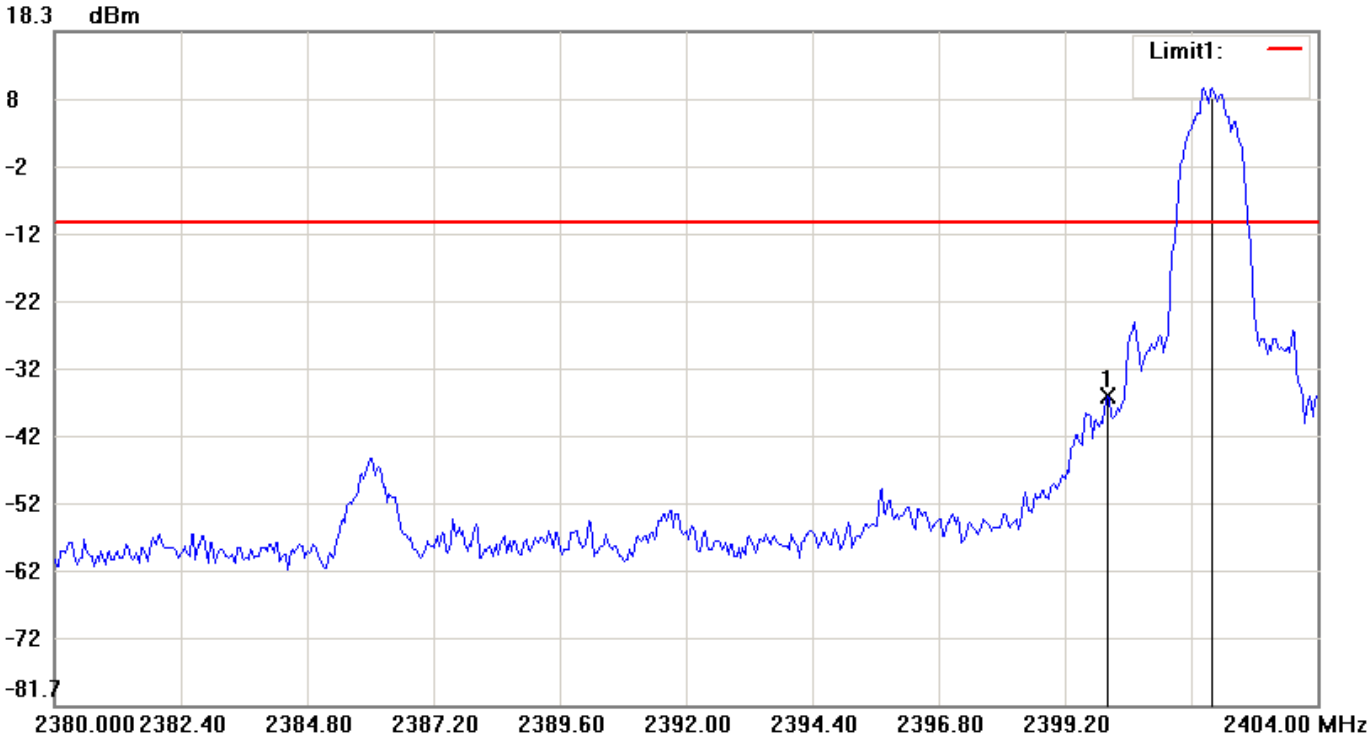
Test Date: May. 12, 2014 Temperature : 26℃ Humidity: 60%

Channel	Test Frequency Range	Note	Chart
0	2380 MHz - 2404 MHz	Lower Band Edge	Page 61-62
78	2478 MHz - 2500 MHz	Upper Band Edge	Page 63-64
0	30 MHz - 25 GHz		Page 65
39	30 MHz - 25 GHz		Page 66
78	30 MHz - 25 GHz		Page 67

Note: Please refer to page 61 to page 67 for chart.

File: 1030 **Data:** #27 **Date:** 2014/05/12 **Temperature:** 26 ℃

Time: AM 10:04:39 **Humidity:** 60 %



Condition: -10.18dBm

EUT:

Model:

Test Mode:

Note: FCC-Bluetooth Channel 00-Bandedge (Fixed)

RF Conducted

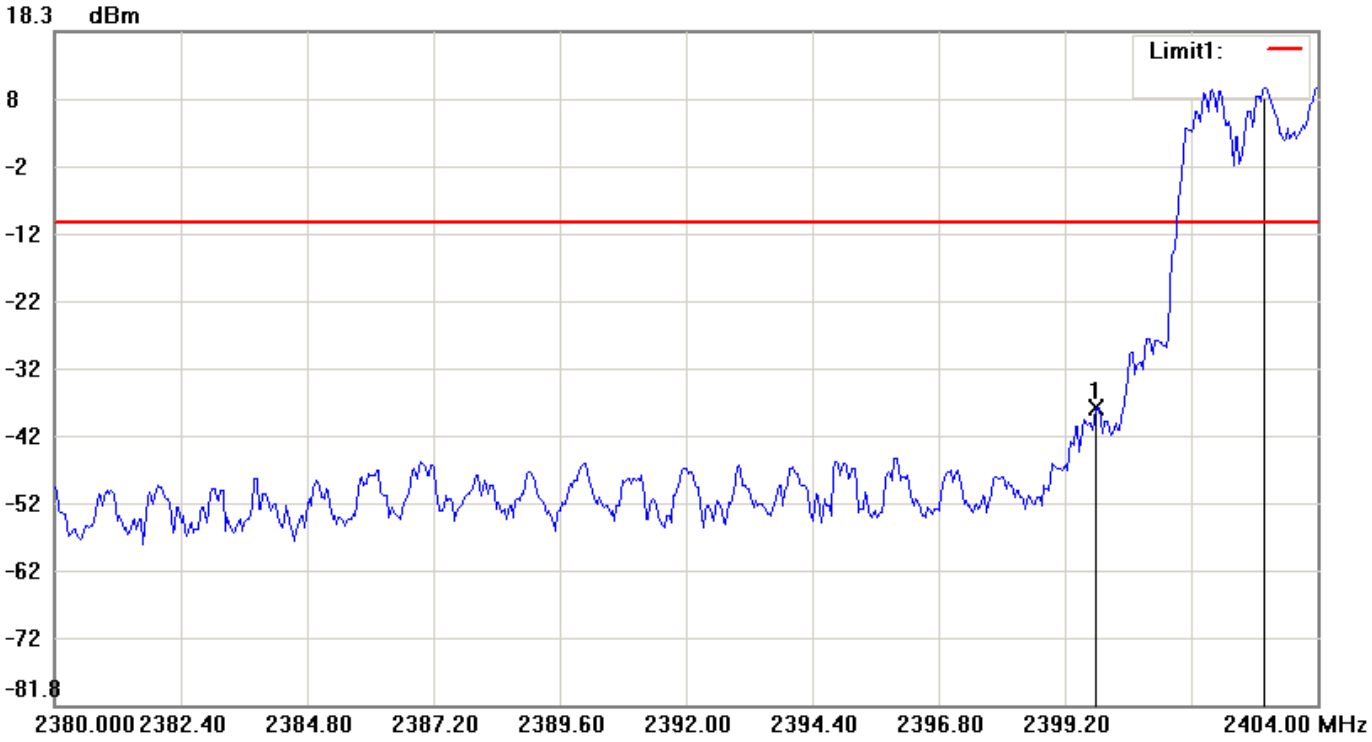
Sweep Time: 2.32ms Att.: 20dB

RBW: 100 KHz VBW: 300 KHz

No.	Frequency(MHz)	Level(dBm)
1	2400.00000	-35.90
2	2402.00000	9.82

File: 1030 **Data:** #35 **Date:** 2014/05/12 **Temperature:** 26 ℃

Time: AM 10:20:41 **Humidity:** 60 %



Condition: -10.11dBm **RF Conducted**

EUT: **Sweep Time: 2.32ms** **Att.: 20dB**

Model: **RBW: 100 KHz** **VBW: 300 KHz**

Test Mode:

Note: **FCC-Bluetooth Channel 00-Bandedge (Hopping)**

No.	Frequency(MHz)	Level(dBm)
1	2399.80000	-37.67
2	2403.00000	9.89

File: 1030 **Data:** #31 **Date:** 2014/05/12 **Temperature:** 26 ℃

Time: AM 10:11:47 **Humidity:** 60 %

Condition: -8.28dBm **RF Conducted**

EUT: **Sweep Time: 2.12ms** **Att.: 20dB**

Model: **RBW: 100 KHz** **VBW: 300 KHz**

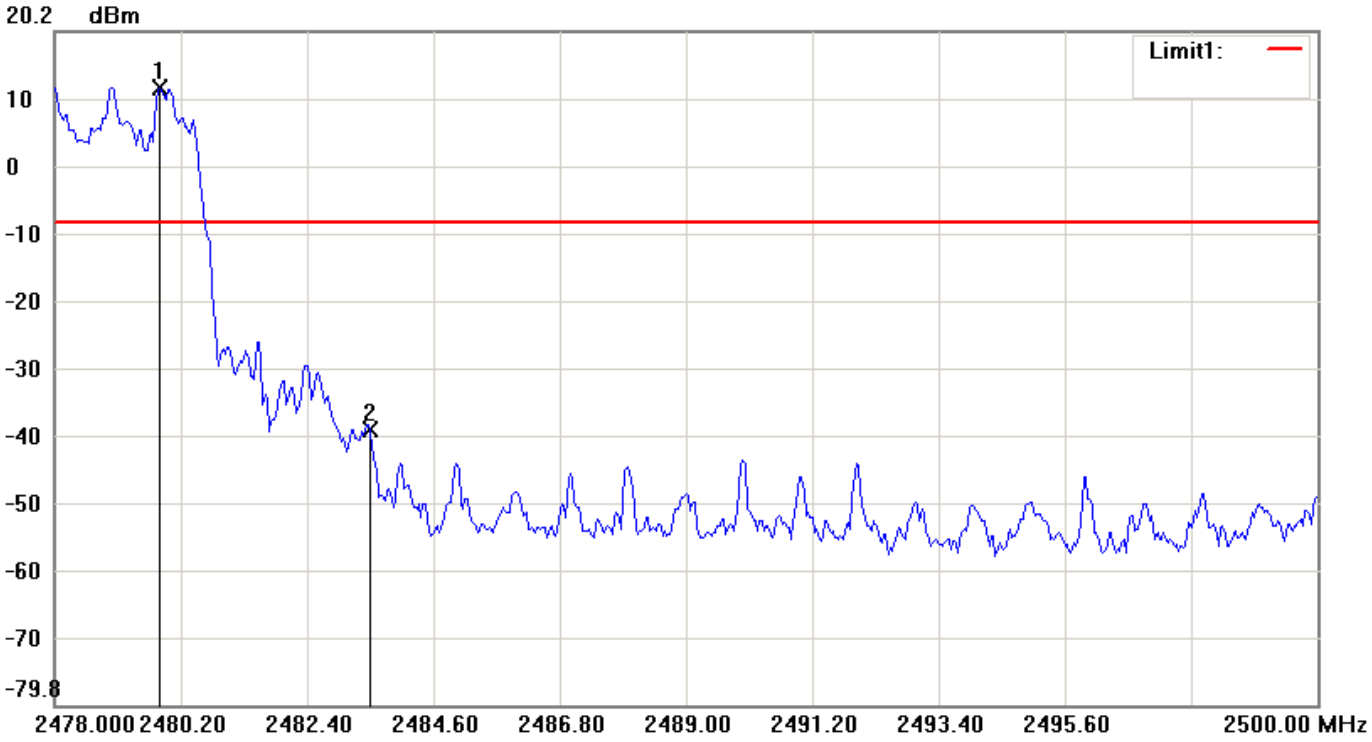
Test Mode:

Note: **FCC-Bluetooth Channel 78-Bandedge (Fixed)**

No.	Frequency(MHz)	Level(dBm)
1	2479.98000	11.72
2	2483.50000	-39.98

File: 1030 **Data:** #36 **Date:** 2014/05/12 **Temperature:** 26 ℃

Time: AM 10:22:28 **Humidity:** 60 %



Condition: -8.16dBm **RF Conducted**

EUT: **Sweep Time: 2.12ms** **Att.: 20dB**

Model: **RBW: 100 KHz** **VBW: 300 KHz**

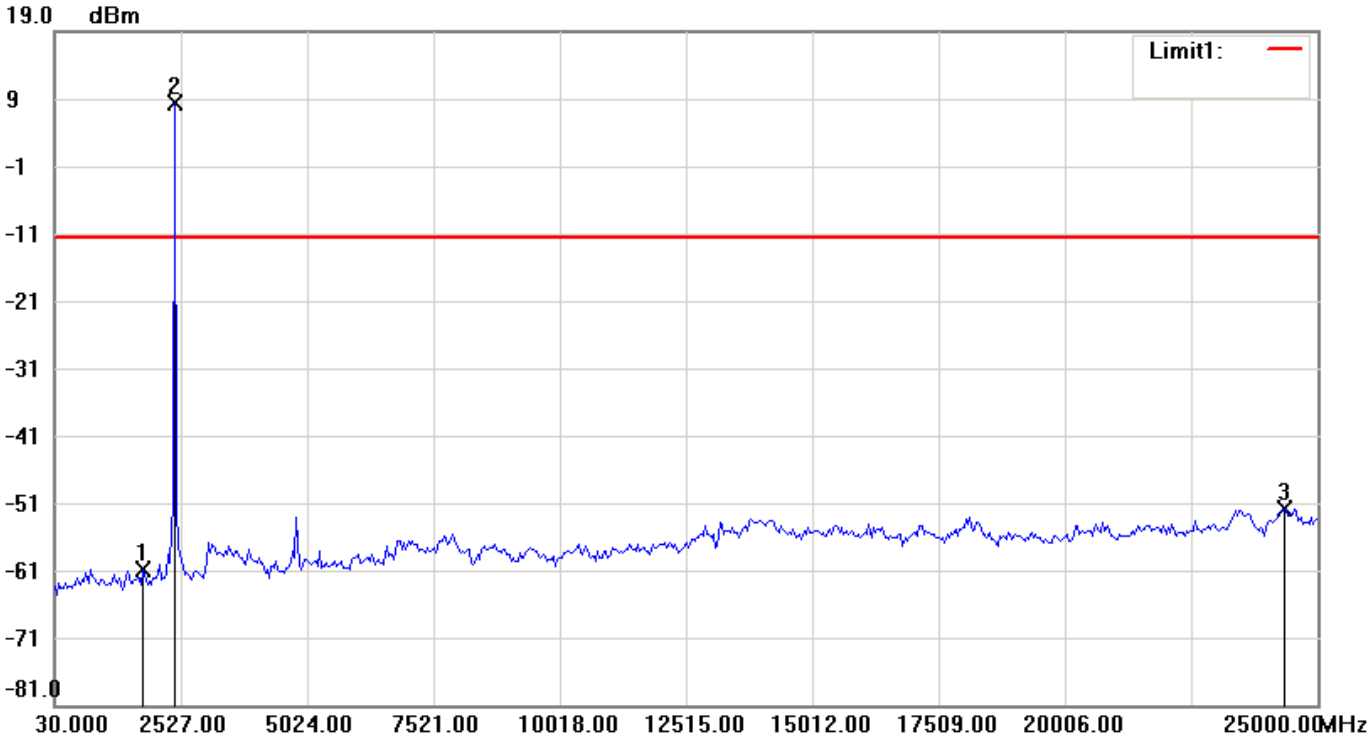
Test Mode:

Note: **FCC-Bluetooth Channel 78-Bandedge (Hopping)**

No.	Frequency(MHz)	Level(dBm)
1	2479.83330	11.84
2	2483.50000	-38.90

File: 1030 **Data:** #26 **Date:** 2014/05/12 **Temperature:** 26 ℃

Time: AM 10:04:09 **Humidity:** 60 %



Condition: -11.68dBm **RF Conducted**

EUT: **Sweep Time: 2386.4ms Att.: 20dB**

Model: **RBW: 100 KHz VBW: 300 KHz**

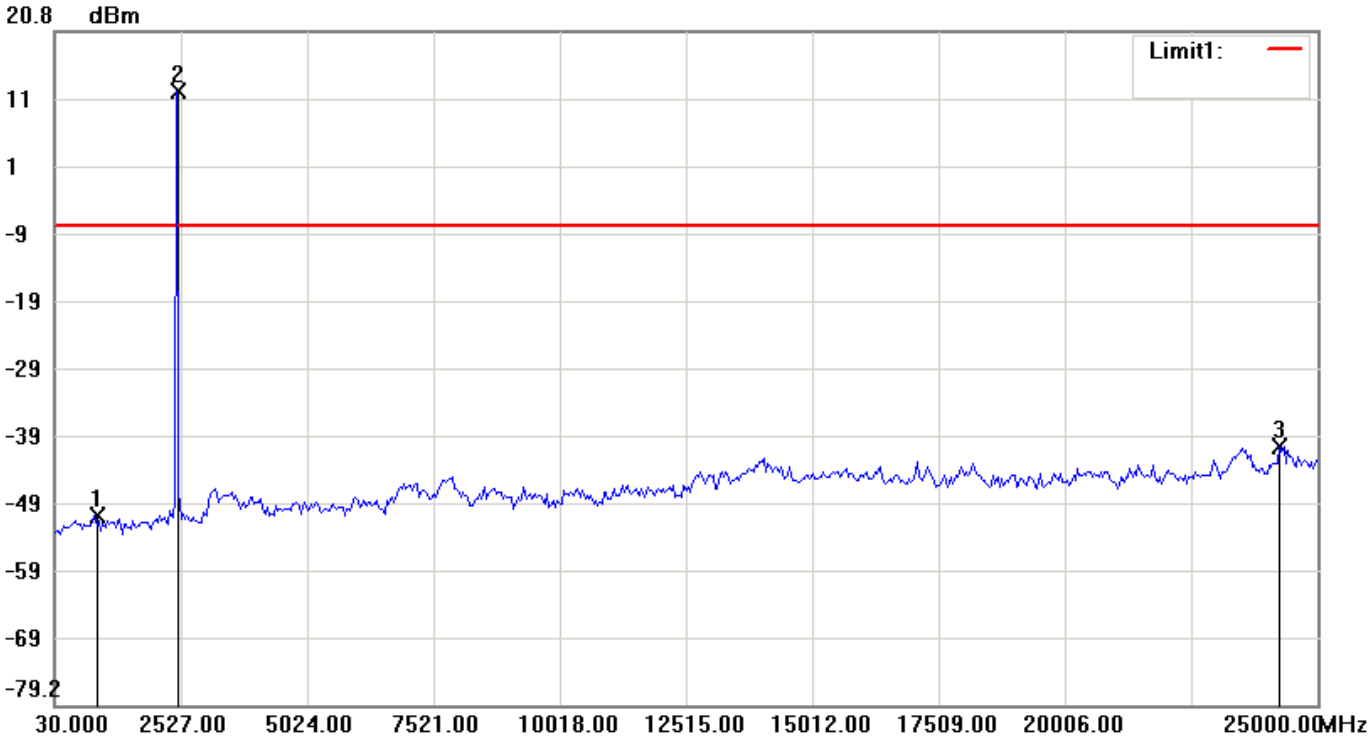
Test Mode:

Note: **FCC-BT Channel 00-Conducted Spurious**

No.	Frequency(MHz)	Level(dBm)
1	1777.90000	-60.84
2	2402.15000	8.32
3	24334.13330	-51.75

File: 1030 **Data:** #34 **Date:** 2014/05/12 **Temperature:** 26 ℃

Time: AM 10:16:30 **Humidity:** 60 %



Condition: -7.99dBm **RF Conducted**

EUT: **Sweep Time: 2386.4ms Att.: 30dB**

Model: **RBW: 100 KHz VBW: 300 KHz**

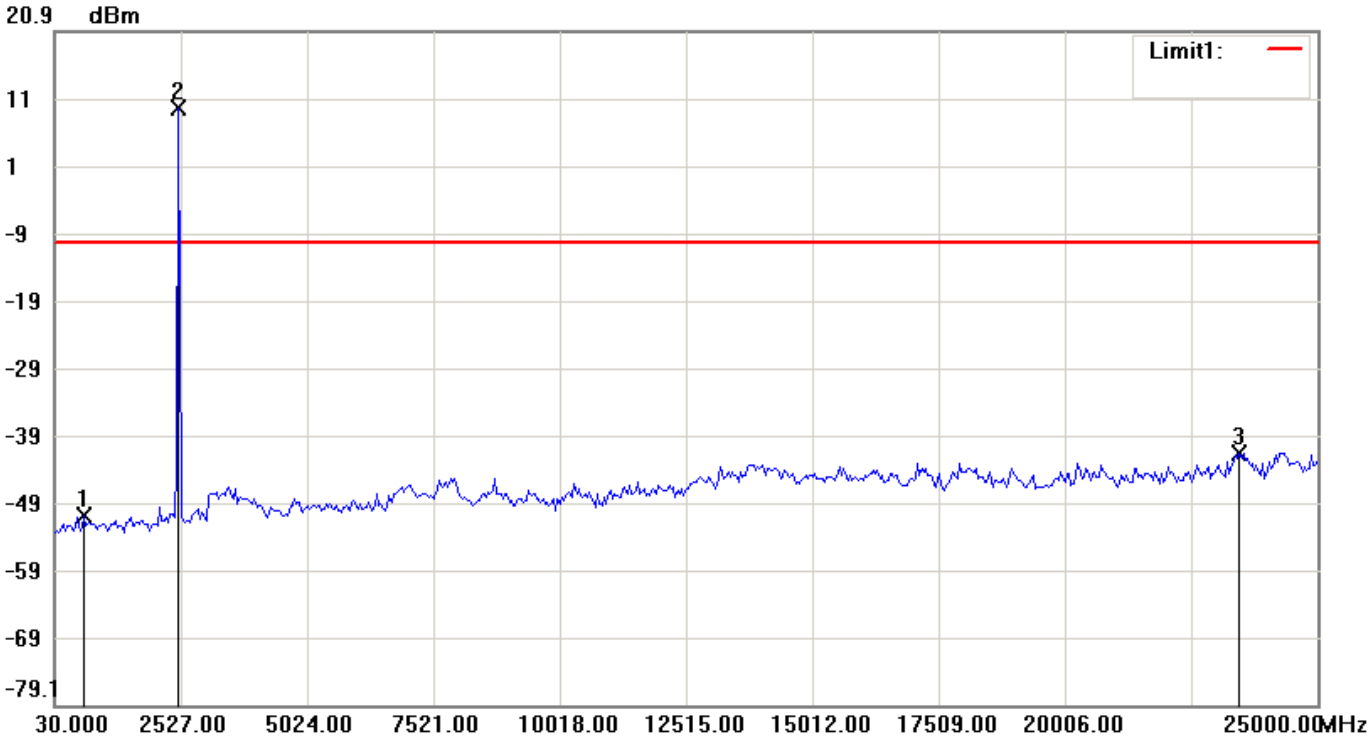
Test Mode:

Note: **FCC-BT Channel 39-Conducted Spurious**

No.	Frequency(MHz)	Level(dBm)
1	820.7167	-51.09
2	2443.76670	12.01
3	24250.90000	-40.70

File: 1030 **Data:** #30 **Date:** 2014/05/12 **Temperature:** 26 ℃

Time: AM 10:11:18 **Humidity:** 60 %



Condition: -10.54dBm

EUT:

Model:

Test Mode:

Note: FCC-BT Channel 78-Conducted Spurious

RF Conducted

Sweep Time: 2386.4ms Att.: 30dB

RBW: 100 KHz VBW: 300 KHz

No.	Frequency(MHz)	Level(dBm)
1	612.6333	-51.06
2	2485.38330	9.46
3	23460.18330	-41.65

10 NUMBER of HOPPING CHANNELS

10.1 Standard Applicable

According to 15.247(b)(1), for frequency hopping systems, operating in the 2400-2483.5MHz band employing at least 75 hopping channels

10.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The setup of the EUT as shown in figure 4. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set EUT to hopping operating mode and set spectrum analyzer miximum to measure the number of hopping channels.

10.3 Measurement Equipment

Equipment	Manufacturer	Model No.
Spectrum Analyzer	Agilent	E4446A

10.4 Measurement Data

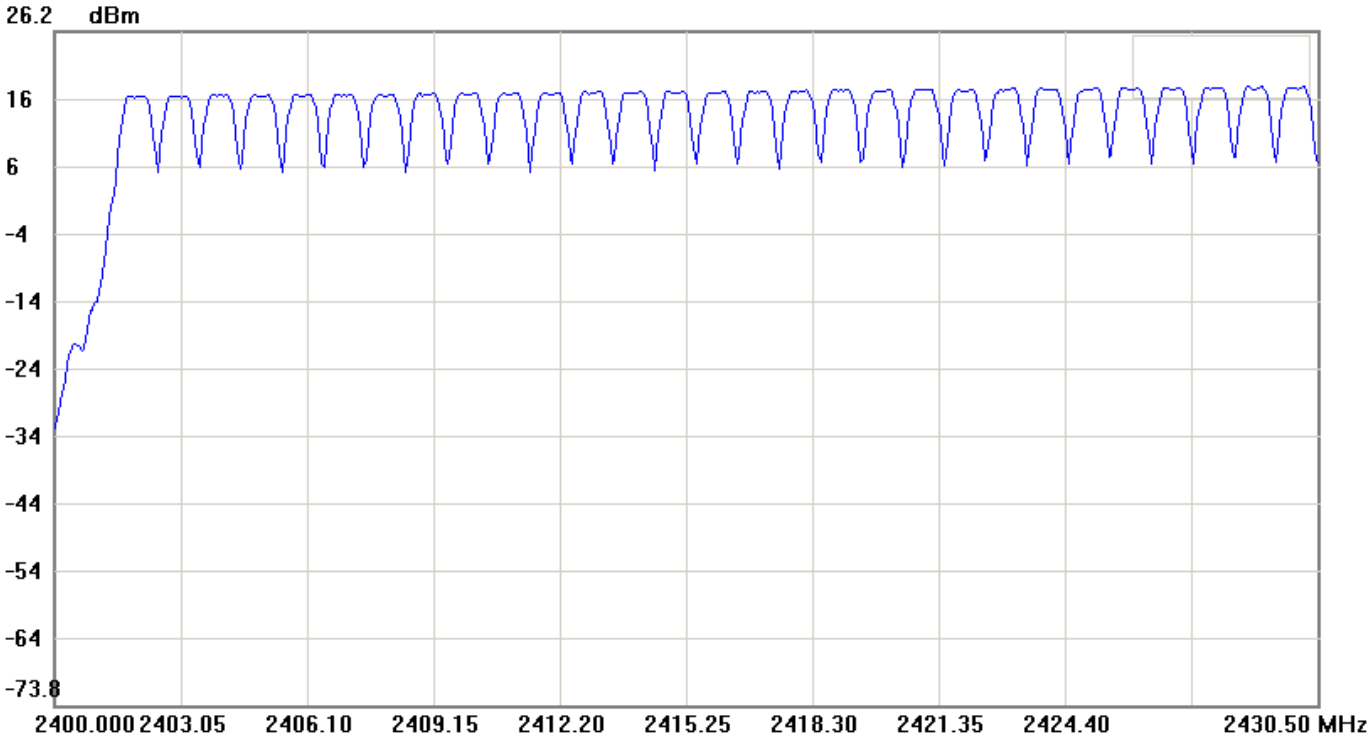
Test Date: May. 12, 2014 Temperature : 26℃ Humidity: 60%

Number of hopping channels = 79 channels

Note: Please refer to page 69 to page 71 for chart.

File: **1030** **Data:** **#21** **Date:** **2014/05/12** **Temperature:** **26 ℃**

Time: **AM 09:52:45** **Humidity:** **60 %**



Condition: **RF Conducted**

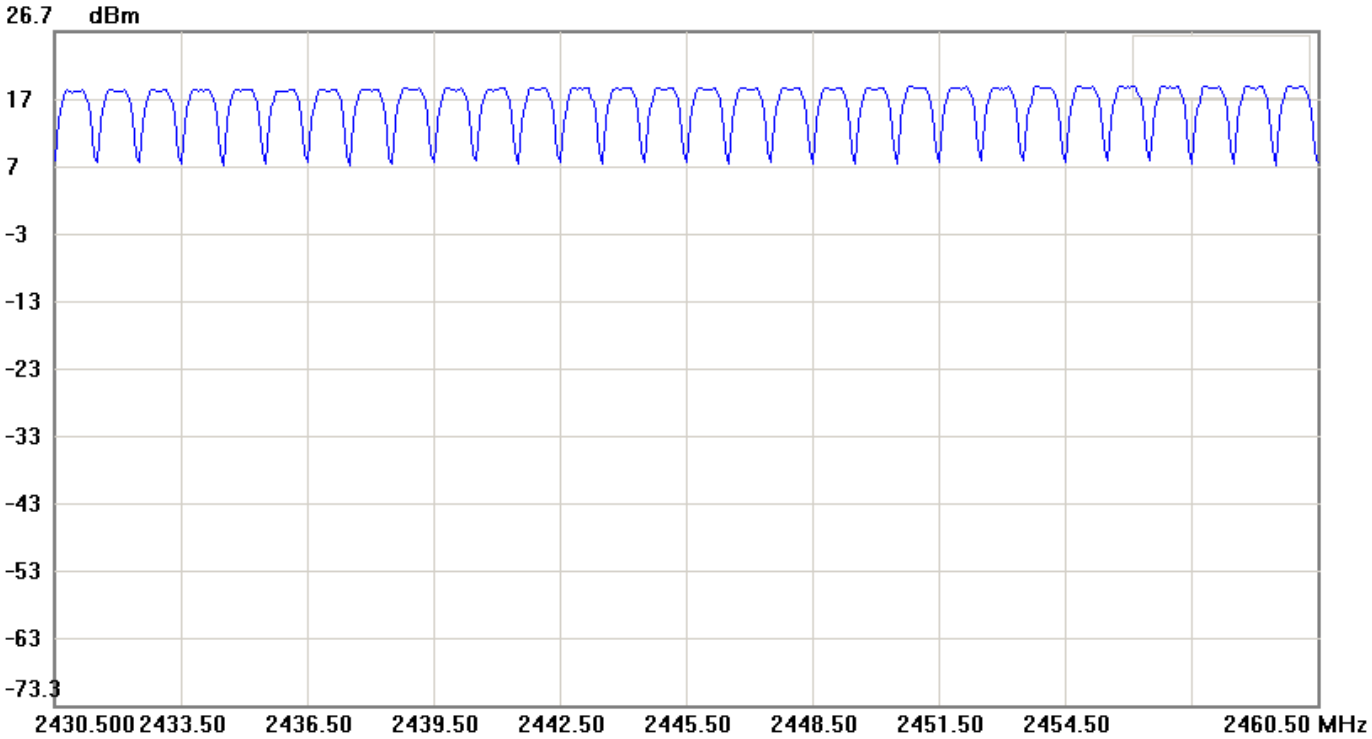
EUT: **Sweep Time: 1ms** **Att.: 30dB**

Model: **RBW: 300 KHz** **VBW: 300 KHz**

Test Mode:

Note: **FCC-Bluetooth Number of Hopping Channels -Part1**

File:	**1030**	**Data:**	**#22**	**Date:**	**2014/05/12**	**Temperature:**	**26 ℃**
				Time:	**AM 09:54:37**	**Humidity:**	**60 %**



Condition: **RF Conducted**

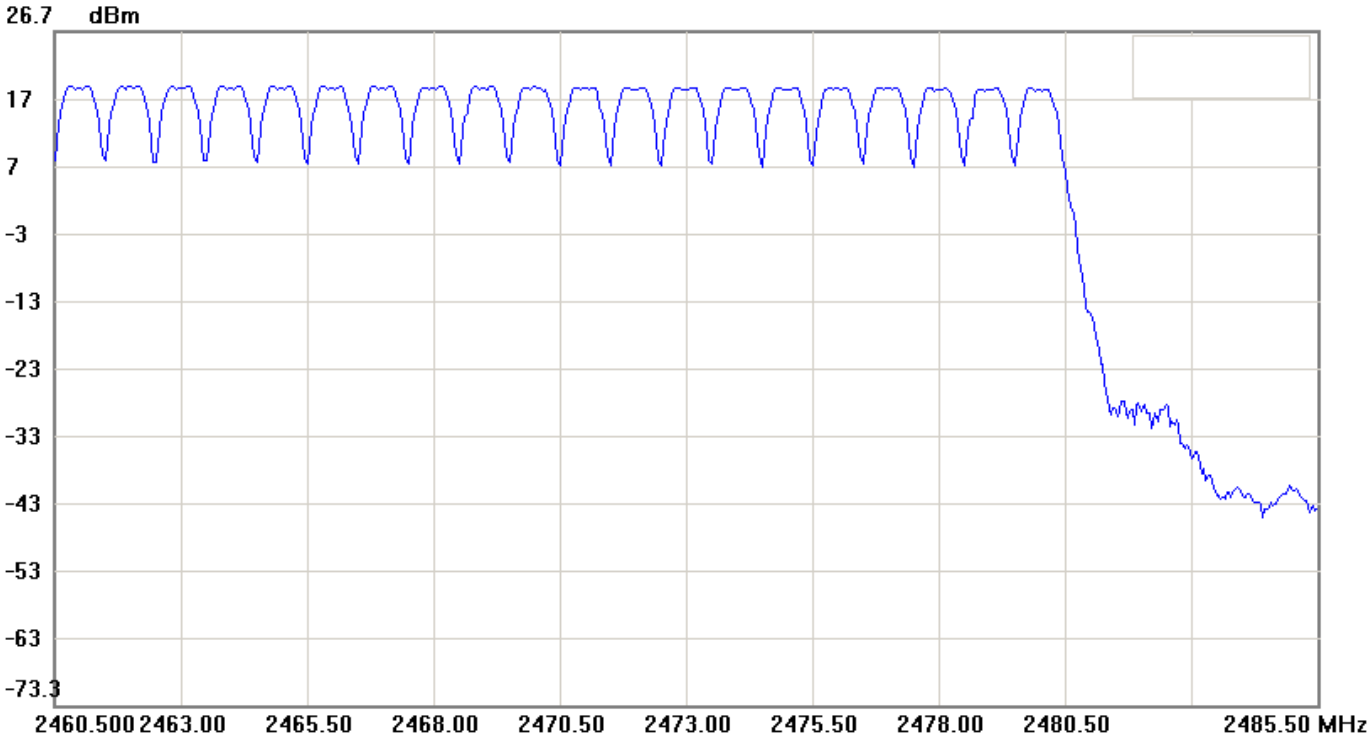
EUT: **Sweep Time: 1ms Att.: 30dB**

Model: **RBW: 300 KHz VBW: 300 KHz**

Test Mode:

Note: **FCC-Bluetooth Number of Hopping Channels -Part2**

File:	**1030**	**Data:**	**#23**	**Date:**	**2014/05/12**	**Temperature:**	**26 ℃**
				Time:	**AM 09:56:25**	**Humidity:**	**60 %**



Condition: **RF Conducted**

EUT: **Sweep Time: 1ms Att.: 30dB**

Model: **RBW: 300 KHz VBW: 300 KHz**

Test Mode:

Note: **FCC-Bluetooth Number of Hopping Channels -Part3**

11 HOPPING CHANNEL CARRIER FREQUENCY SEPARATED

11.1 Standard Applicable

According to 15.247(a)(1), the frequency hopping system shall have hopping channel carrier frequencies seperated by minimum of 25kHz or the 20dB bandwidth of hopping channel, whichever is greater.

Alternatively, 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 125mW.

11.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The setup of the EUT as shown in figure 4. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any measurement frequency within its operating ragne and make sure the instrument is operated in its linear range.
3. Set spectrum analyzer maximum hold to measure channel carrier frequency , then adjust channel carrier frequency to adjacent channel.
4. Repeat above procedure until all measured frequencies were complete.

11.3 Measurement Equipment

Equipment	Manufacturer	Model No.
Spectrum Analyzer	Agilent	E4446A

11.4 Measurement Data

Test Date: May. 12, 2014 Temperature : 26℃ Humidity: 60%

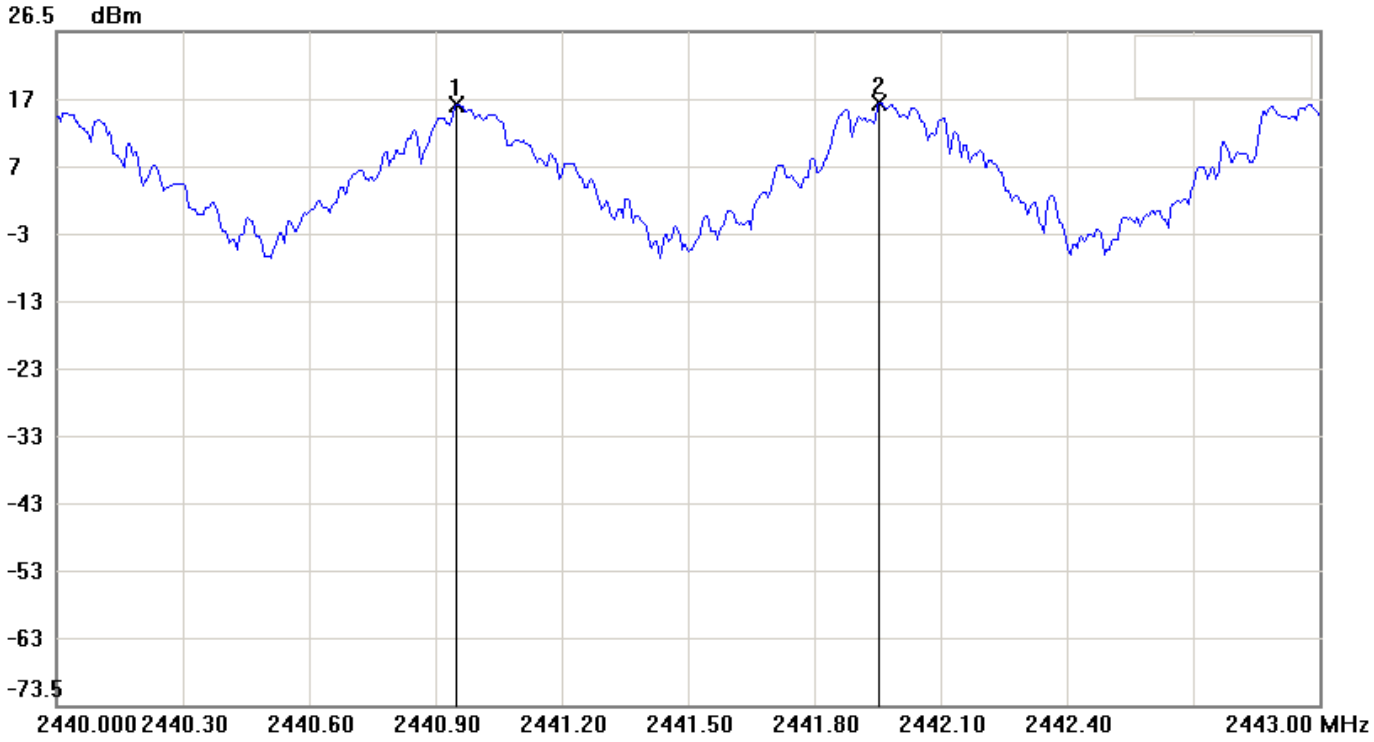
Channel	Hopping Channel Carrier Frequency Separated (MHz)	Chart
M	1.005	Page 74

Note: 1. Please refer to page 74 for chart.

2. CH Low, CH Mid and CH High have the same test result. Only CH Mid test result showed in the test report.

File: 1030 **Data:** #20 **Date:** 2014/05/12 **Temperature:** 26 ℃

Time: AM 09:50:47 **Humidity:** 60 %



Condition: **RF Conducted**

EUT: **Sweep Time: 3.2ms Att.: 30dB**

Model: **RBW: 30 KHz VBW: 100 KHz**

Test Mode:

Note: **FCC-Bluetooth Carrier Frequency Separation**

No.	Frequency(MHz)	Level(dBm)
1	2440.95000	15.64
2	2441.95500	15.89

No.		△Frequency(MHz)	△Level(dB)
1	mk2-mk1	1.005	0.25

12 Dwell Time

12.1 Standard Applicable

According to 15.247(a)(1)(iii), frequency hopping system in the 2400-2483.5MHz band employing at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 second multiplied by the number of hopping channels employed.

12.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. The setup of the EUT as shown in figure 4.

12.3 Measurement Equipment

Equipment	Manufacturer	Model No.
Spectrum Analyzer	Agilent	E4446A

12.4 Measurement Data

Test Date: May. 12, 2014 Temperature : 26℃ Humidity: 60%

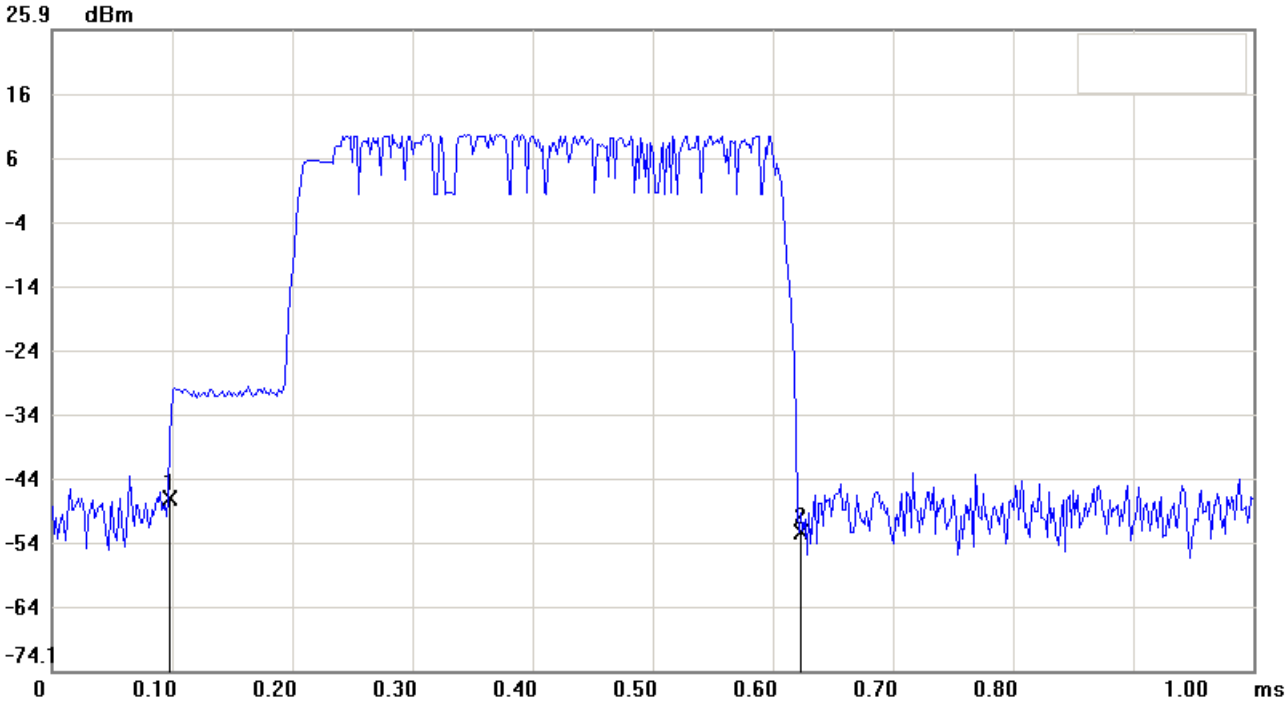
12.4.1 3DH1

Test period=0.4(second/channel)× 79 channel=31.6sec
2402MHz dwell time= 525 us× 340 = 178.5 ms

Note: 1.Please refer to page 76 to page 77 for chart.
2. This device complies with the Bluetooth specifications and can operate in hopping mode on N channels, where 20 <or= N <or= 79. As the same pseudo random hopping channel selection mechanism is used for all cases of N, by complying with the dwell time requirements of channel occupancy < 0.4s in N x 0.4s for N = 79, compliance with any value for N is demonstrated.

File: 1030 **Data:** #15 **Date:** 2014/05/12 **Temperature:** 26 ℃

Time: AM 09:47:28 **Humidity:** 60 %



Condition: -0.470000000000001dBm

EUT:

Model:

Test Mode:

Note: DH1 pulse width

RF Conducted

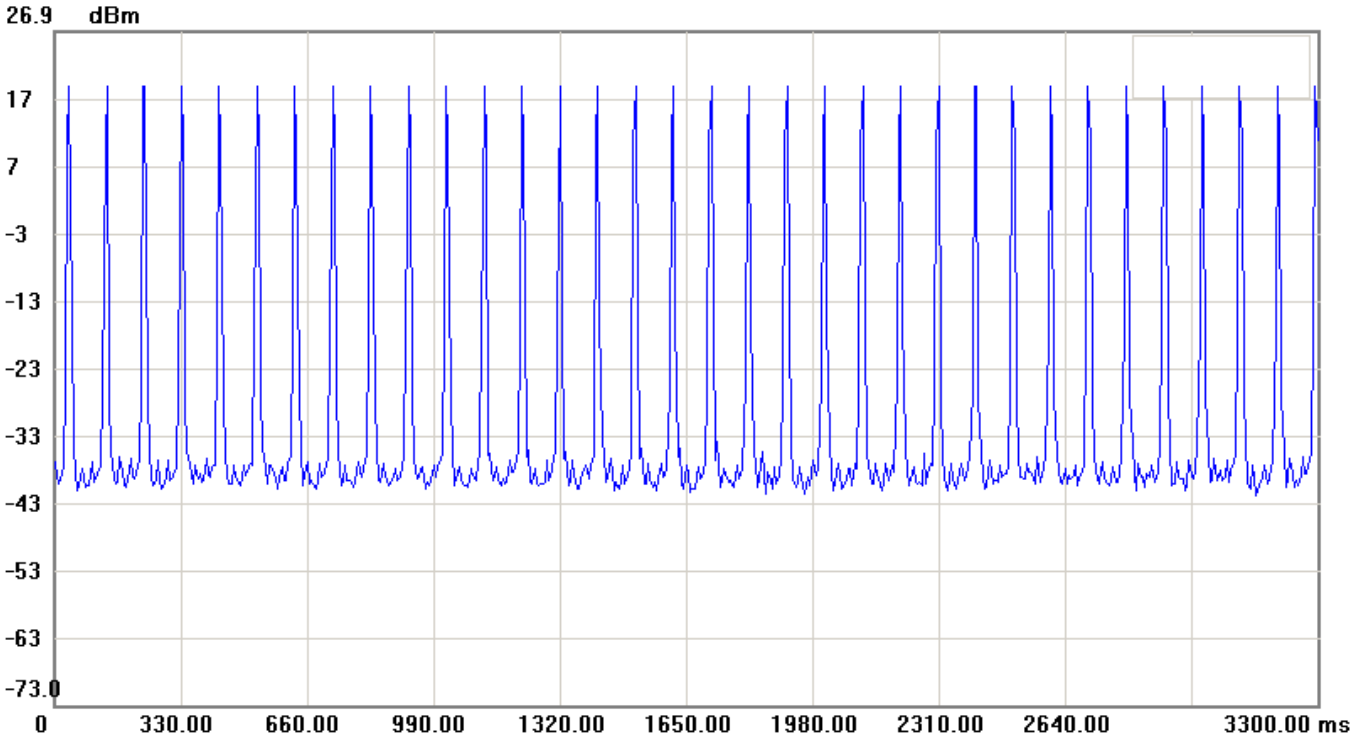
Sweep Time: 1ms **Att.: 30dB**

RBW: 1000 KHz **VBW: 1000 KHz**

No.	Sweep time(ms)	Level(dBm)
1	0.0967	-47.19
2	0.6217	-52.53

No.		△Time(ms)	△Level(dB)
1	mk2-mk1	0.525	-5.34

File:	**1030**	**Data:**	**#14**	**Date:**	**2014/05/12**	**Temperature:**	**26 ℃**
				Time:	**AM 09:47:28**	**Humidity:**	**60 %**



Condition: **RF Conducted**

EUT: **Sweep Time: 3300ms** **Att.: 30dB**

Model: **RBW: 1000 KHz** **VBW: 1000 KHz**

Test Mode:

Note: **DH1 Hops per 3.16 seconds**

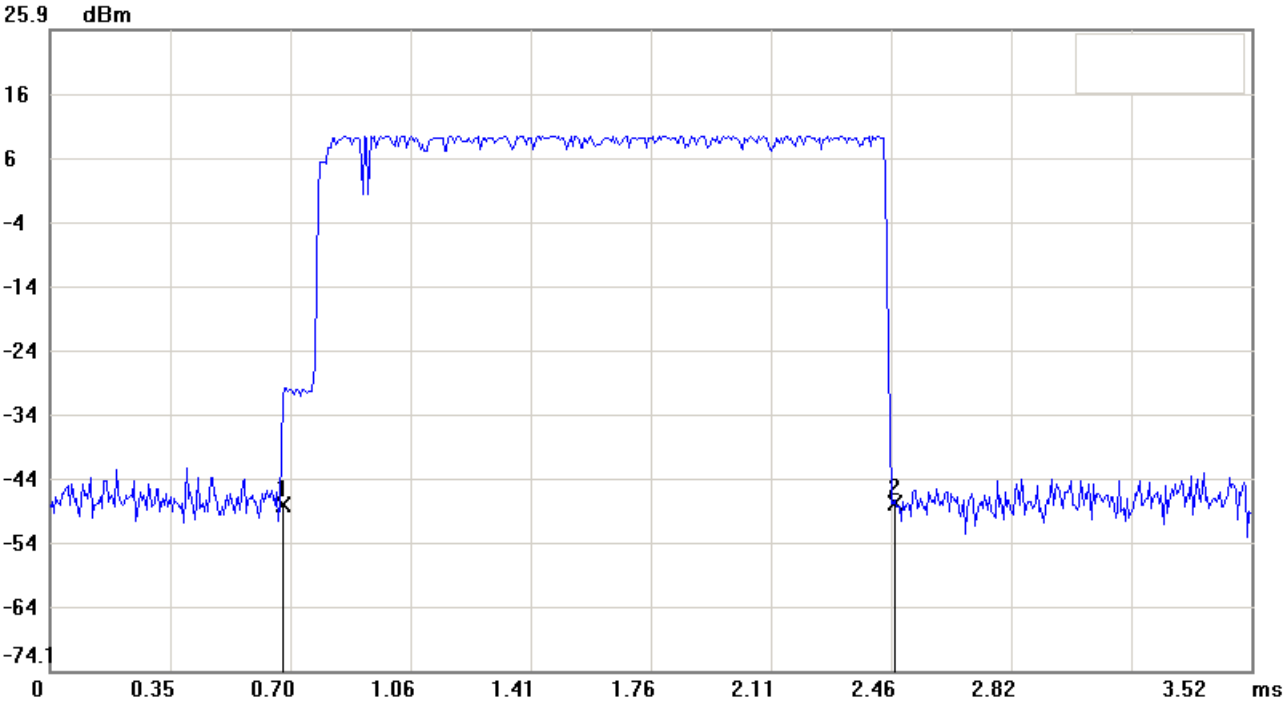
12.4.2 3DH3

Test period=0.4(second/channel)$\times$79 channel=31.6sec
2441MHz dwell time= 1.7953 ms$\times$170 = 305.201 ms

Note: 1.Please refer to page 79 to page 80 for chart.
2. This device complies with the Bluetooth specifications and can operate in hopping mode on N channels, where 20 <or= N <or= 79. As the same pseudo random hopping channel selection mechanism is used for all cases of N, by complying with the dwell time requirements of channel occupancy < 0.4s in N x 0.4s for N = 79, compliance with any value for N is demonstrated.

File: **1030** **Data:** **#17** **Date:** **2014/05/12** **Temperature:** **26 ℃**

Time: **AM 09:48:24** **Humidity:** **60 %**



Condition: **RF Conducted**

EUT: **Sweep Time: 3.52ms** **Att.: 30dB**

Model: **RBW: 1000 KHz** **VBW: 1000 KHz**

Test Mode:

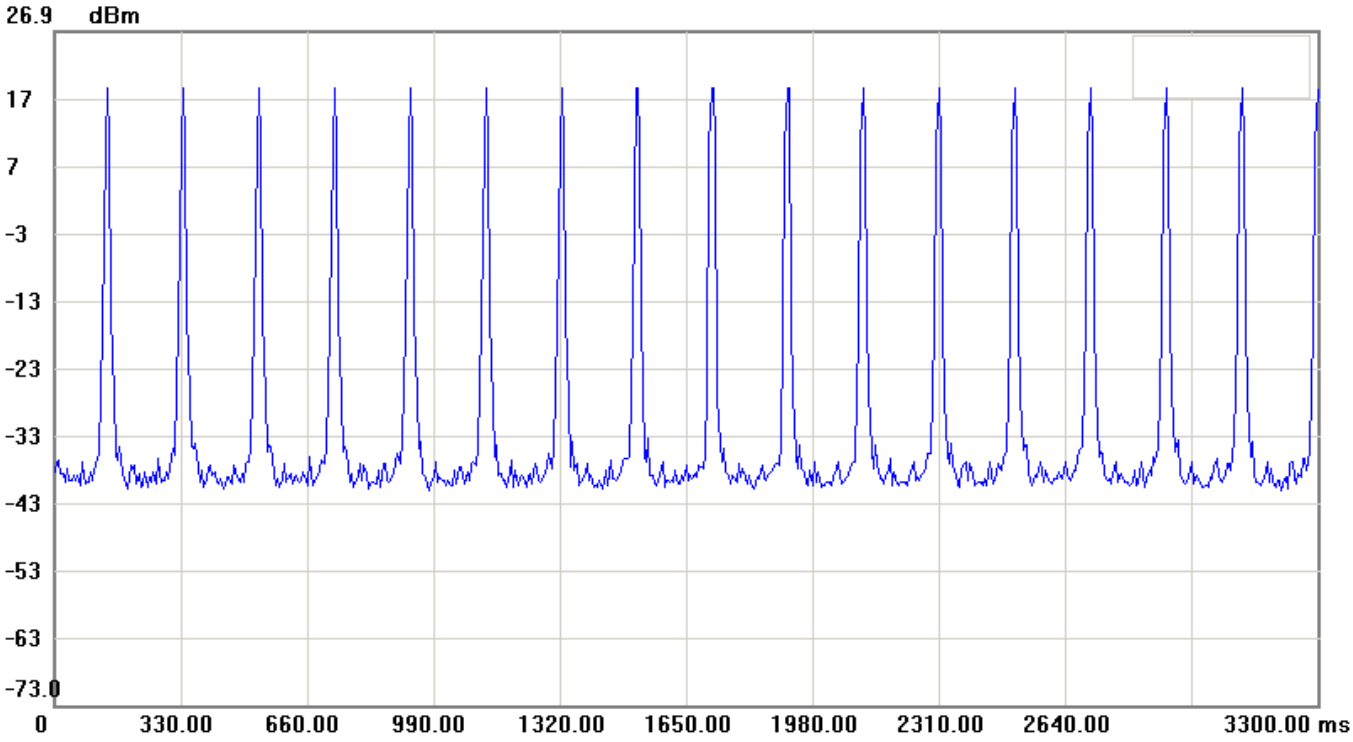
Note: **DH3 pusle width**

No.	Sweep time(ms)	Level(dBm)
1	0.6747	-48.32
2	2.4700	-47.85

No.		△Time(ms)	△Level(dB)
1	mk2-mk1	1.7953	0.47

File: 1030 **Data:** #16 **Date:** 2014/05/12 **Temperature:** 26 ℃

Time: AM 09:48:38 **Humidity:** 60 %



Condition: **RF Conducted**

EUT: **Sweep Time: 3300ms** **Att.: 30dB**

Model: **RBW: 1000 KHz** **VBW: 1000 KHz**

Test Mode:

Note: **DH3 Hops per 3.16 seconds**

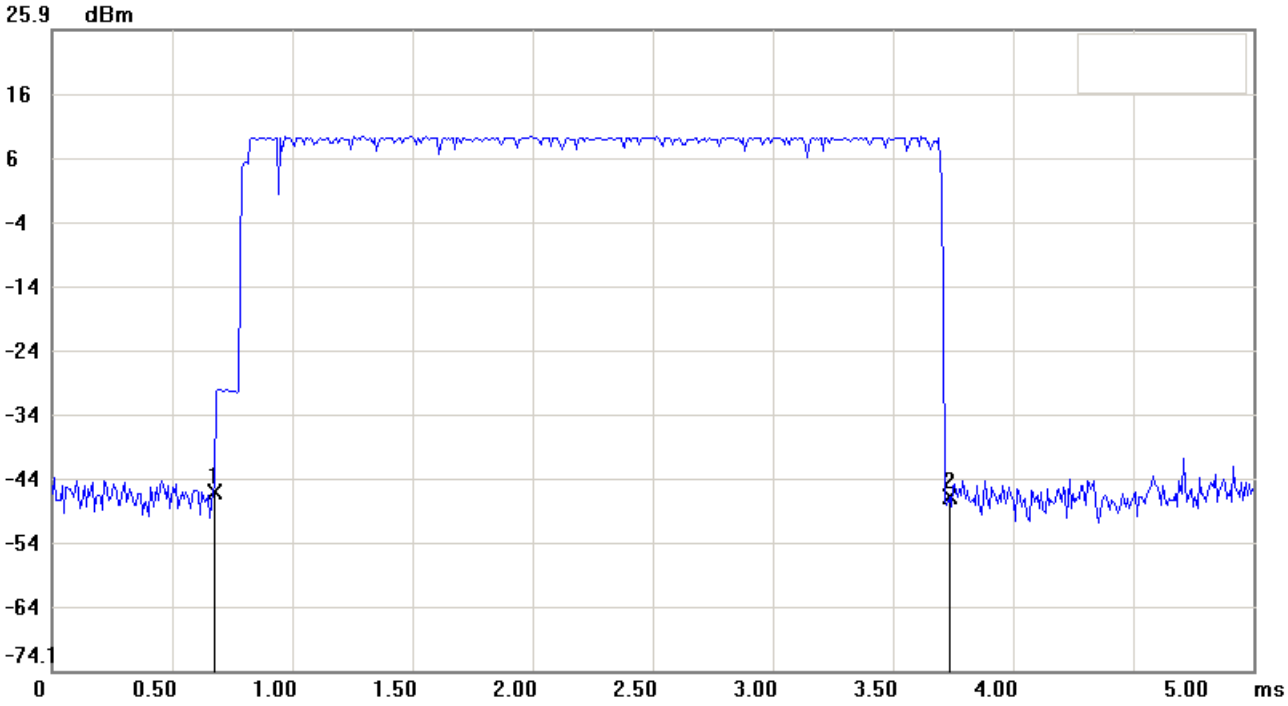
12.4.3 3DH5

Test period=0.4(second/channel)$\times$79 channel=31.6sec
2480MHz dwell time= 3.0666 ms$\times$110 = 337.326 ms

Note: 1.Please refer to page 82 to page 83 for chart.
2. This device complies with the Bluetooth specifications and can operate in hopping mode on N channels, where 20 <or= N <or= 79. As the same pseudo random hopping channel selection mechanism is used for all cases of N, by complying with the dwell time requirements of channel occupancy < 0.4s in N x 0.4s for N = 79, compliance with any value for N is demonstrated.

File: 1030 **Data:** #19 **Date:** 2014/05/12 **Temperature:** 26 ℃

Time: AM 09:49:39 **Humidity:** 60 %



Condition: **RF Conducted**

EUT: **Sweep Time: 5ms Att.: 30dB**

Model: **RBW: 1000 KHz VBW: 1000 KHz**

Test Mode:

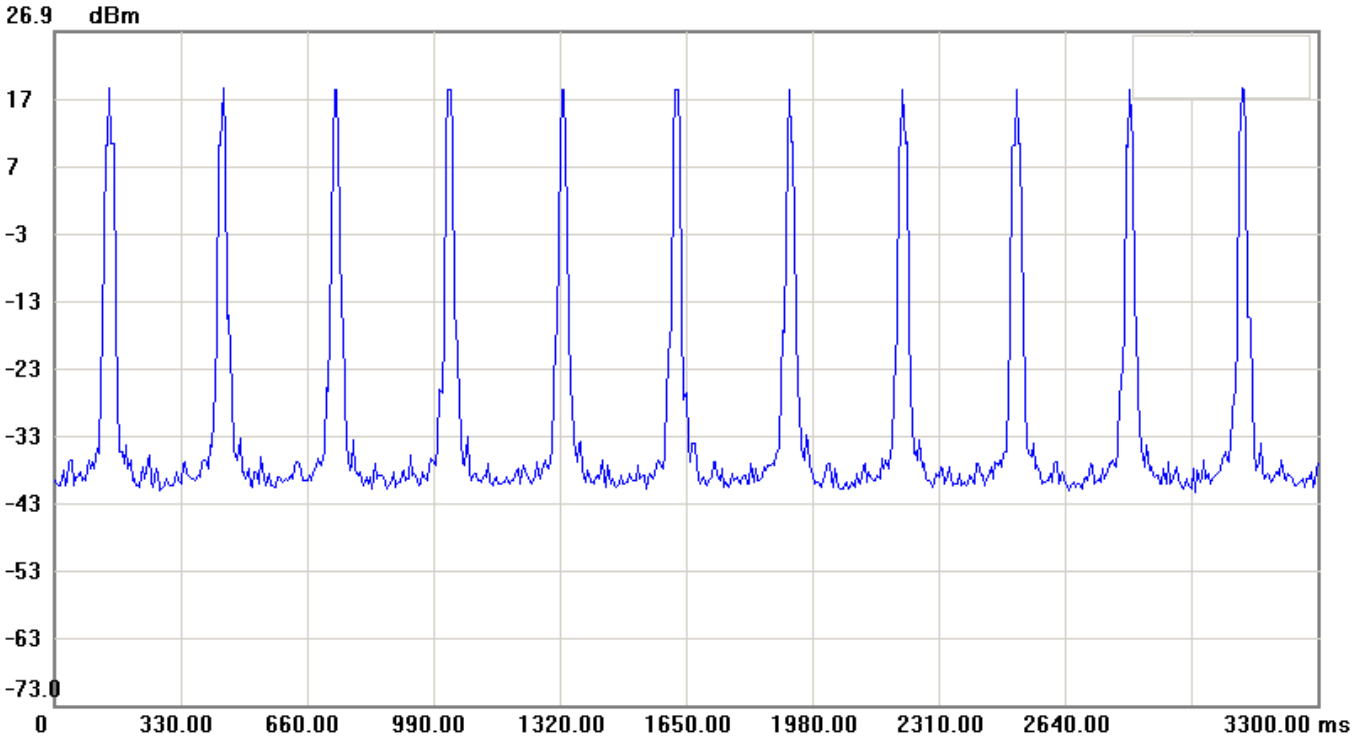
Note: **DH5 pulse width**

No.	Sweep time(ms)	Level(dBm)
1	0.6667	-46.17
2	3.7333	-47.01

No.		△Time(ms)	△Level(dB)
1	mk2-mk1	3.0666	-0.84

File: 1030 **Data:** #18 **Date:** 2014/05/12 **Temperature:** 26 ℃

Time: AM 09:49:32 **Humidity:** 60 %



Condition: **RF Conducted**

EUT: **Sweep Time: 3300ms** **Att.: 30dB**

Model: **RBW: 1000 KHz** **VBW: 1000 KHz**

Test Mode:

Note: **DH5 Hops per 3.16 seconds**

13 Measurement Equipment

Equipment	Manufacturer	Model No.	S/N	Calibration Date	Next Cal. Due
EMI Receiver	R&S	ESIB 7	13054414-001	07/11/2013	07/10/2014
Spectrum Analyzer	Rohde & Schwarz	FSU46	13040904-001	01/20/2014	01/19/2015
Horn Antenna	EMCO	3115	13059201-001	07/22/2013	07/21/2014
BiLog Antenna	ETC	MCTD2786	BL09D01004	02/07/2014	02/06/2015
Hom Antenna	EMCO	3116	13059202-001	08/22/2013	08/21/2014
PRE-Amplifier	Agilent	8449B	13040709-001	11/26/2013	11/25/2014
EMI Test Receiver	R&S	ESCI	13054418-001	07/04/2013	07/03/2014
V-LISN	R&S	ENV216	13057719-001	10/16/2013	10/15/2014
V-LISN	R&S	ENV216	13057719-002	12/12/2013	12/11/2014
Spectrum Analyzer	Agilent	E4446A	13052013-001	10/04/2013	10/03/2014