



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

**Report No.: 14-12-MAS-217-02**

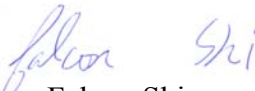
Client: FUJITSU TEN LIMITED  
Product: Car Navigation  
Model: FT0044E  
FCC ID: BABFT0044E

Manufacturer/supplier: FUJITSU TEN LIMITED

Date test item received: 2014/12/25  
Date test campaign completed: 2015/01/21  
Date of issue: 2015/01/21

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Manufacturer : FUJITSU TEN LIMITED  
Address : 2-28, Goshō-dori, 1-chome, Hyogo-ku, Kobe 652-8510 Japan  
EUT : Car Navigation  
Trade name : ----  
Model No. : FT0044E  
Power Source : 12Vdc battery  
Regulations applied : FCC 47 CFR, Part 15 Subpart C

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# 1 GENERAL INFORMATION

## 1.1 Product Description

- a) Type of EUT : Car Navigation
- b) Trade Name : ----
- c) Model No. : FT0044E
- d) FCC ID : BABFT0044E

## 1.2 Characteristics of Device

The EUT is a Car Navigation 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 -0.22 dBm (0.95 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 Modification 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)         | <input checked="" type="checkbox"/> |
| Conducted Emission                          | 15.207             | N/A                                 |
| Antenna Requirement                         | 15.203             | <input checked="" type="checkbox"/> |
| 20dB Emission Bandwidth                     | 15.247 (a)(1)      | <input checked="" type="checkbox"/> |
| Output Power                                | 15.247 (b)(1)      | <input checked="" type="checkbox"/> |
| OUT-OF-BAND RF Conducted Spurious Emission  | 15.247 (c)         | <input checked="" type="checkbox"/> |
| Number of Hopping Channels                  | 15.247 (b)(1)      | <input checked="" type="checkbox"/> |
| Hopping Channel Carrier Frequency Separated | 15.247 (a)(1)      | <input checked="" type="checkbox"/> |
| Dwell Time                                  | 15.247 (a)(1)(iii) | <input checked="" type="checkbox"/> |
| Maximum Permissible Exposure                | 15.247 (b)(5)      | <input checked="" type="checkbox"/> |

## 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<br>MHz | Quasi Peak<br>dB $\mu$ V | Average<br>dB $\mu$ V |
|------------------|--------------------------|-----------------------|
| 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<br>MHz | Distance<br>Meters | Radiated<br>dB $\mu$ V/m | Radiated<br>$\mu$ V/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<br>(MHz) | Field Strength<br>(microvolts/meter) | Measurement Distance<br>(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 54-72MHz, 76-88MHz, 174-216MHz or 470-806MHz. 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 separated 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 Separation**

According to 15.247(a)(1)(iii), the frequency hopping systems shall have hopping channel carrier frequencies separated 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 than 8dBm in any 3kHz band during any time interval 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 highest, middle and lowest frequency and transmit the maximum RF power. Customer would not use it. But never the less ancillary equipment can influence the test results..

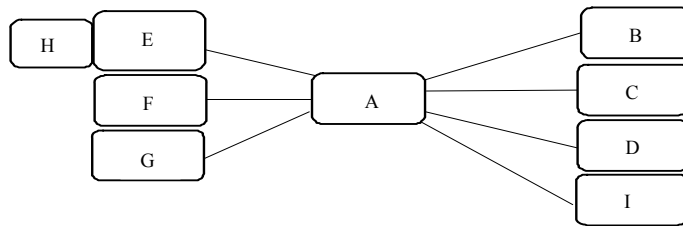
#### 3.2 Devices for Tested System

##### 3.2.1

| No | Device           | Manufacture         | Model No.   | Cable Description             |
|----|------------------|---------------------|-------------|-------------------------------|
| A  | * Car Navigation | FUJITSU TEN LIMITED | FT0044E     | ----                          |
| B  | Steering Switch  | N/A                 | N/A         | 2.8m*1 Unshielded Signal Line |
| C  | Rear Camera      | N/A                 | GP-KD5339RC | 2.8m*1 Unshielded Signal Line |
| D  | GPS Antenna      | TOYOTA              | 86860-22090 | 7.0m*1 Shielded Signal Line   |
| E  | USB Adapter      | N/A                 | N/A         | 2.0m*1 Unshielded Signal Line |
| F  | FM Radio Antenna | N/A                 | N/A         | 0.2m*1 Shielded Signal Line   |
| G  | Speaker*2        | N/A                 | ECLIPSE     | 3.0m*1 Unshielded Signal Line |
| H  | USB Dongle       | Transcend           | NK1939      | ----                          |
| I  | DC Power Supply  | GW                  | GPS-3030D   | 3.7m*1 Unshielded Power Line  |

#### Remark

1. “\*” means equipment under test.



2. Software: Car LanchControl Version 1.3.2.10.
3. During Conducted testing, cable loss is 0.5 dB.

## 3.2.2 Test Mode Description

## 3.2.2.1 Modulation Type

| Test Mode | Type    | Note                            |
|-----------|---------|---------------------------------|
| A         | NON-EDR | GFSK                            |
| B         | EDR     | $\pi/4$ -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 B (note 1) |                      |
| 2.   | 20dB Emission Bandwidth        | A、B             | M (Worse Case)       |
| 3    | Conducted Emission             | -               | -                    |
| 4    | Out of Band Conducted Emission | A、B             | L, M, H              |
| 5.1  | Number of Channel              | A               | L~H                  |
| 5.2  | Channel Separation             | A               | M (note 2)           |
| 5.3  | Dwell Time                     | A               | M (note 2)           |
| 6.1  | Radiated Emission (below 1GHz) | B               | M (Worse Case)       |
| 6.2  | Radiated Emission (above 1GHz) | B               | 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 channel 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 channel 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

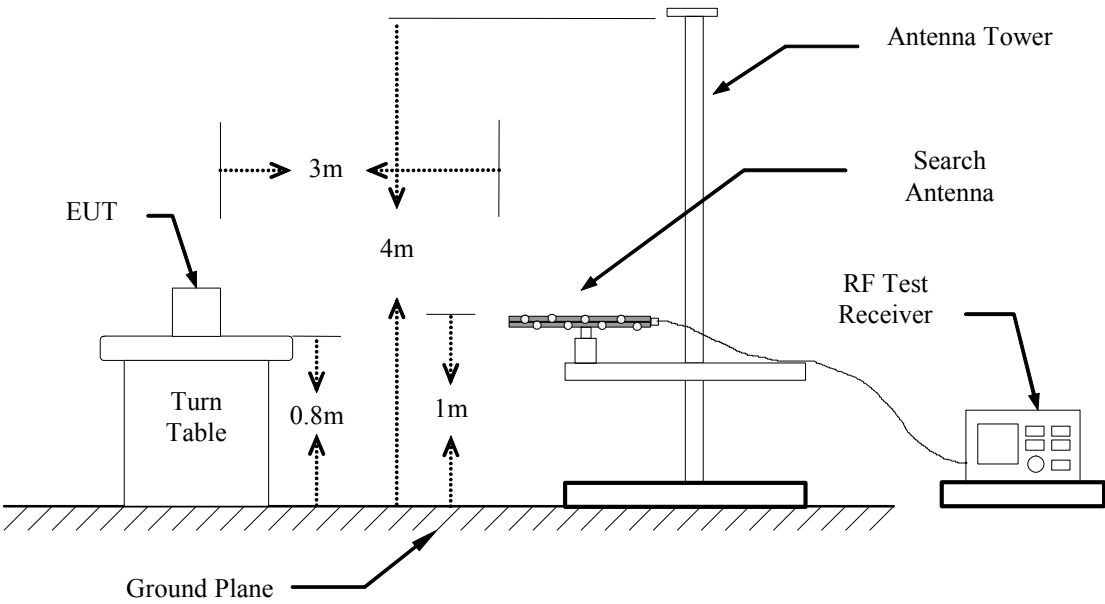
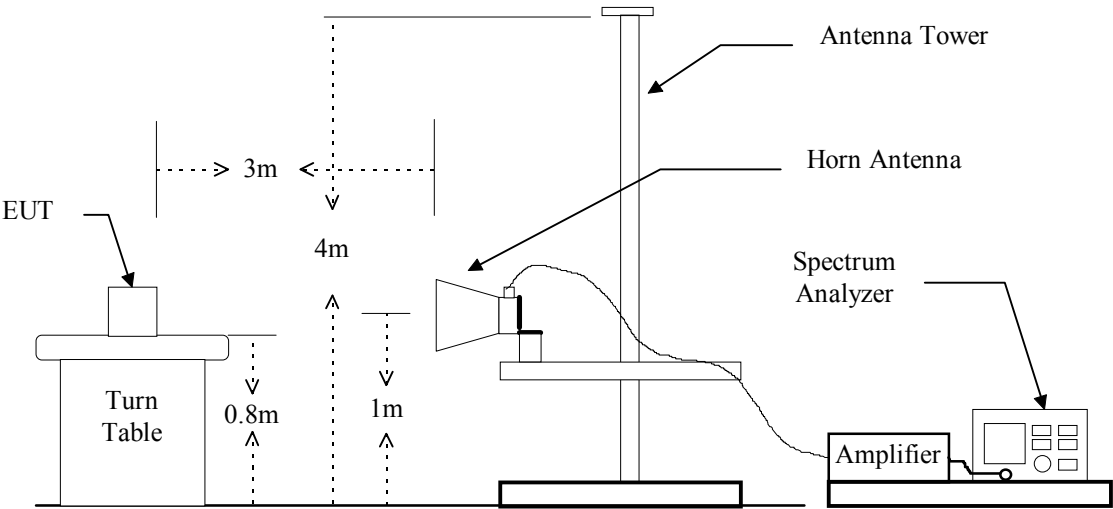


Figure 2 : Frequencies measured above 1 GHz configuration



### 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 | R&S             | FSV 40    |
| 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         |
|                      | Spectrum Analyzer | Peak       | 120 kHz              | 300 kHz         |
| Above 1000           | Spectrum Analyzer | Peak       | 1 MHz                | 1 MHz           |
|                      | Spectrum Analyzer | Average    | 1 MHz                | 10 Hz<br>(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  $20\log(\text{dwell time}/100 \text{ ms})$ . 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:**

$$20\log \frac{1 \times 2.9166(\text{ms})}{100(\text{ms})} = -30.70 \text{ dB}$$

The plotted graph of Duty Factor please see page 18 ~ 19.

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

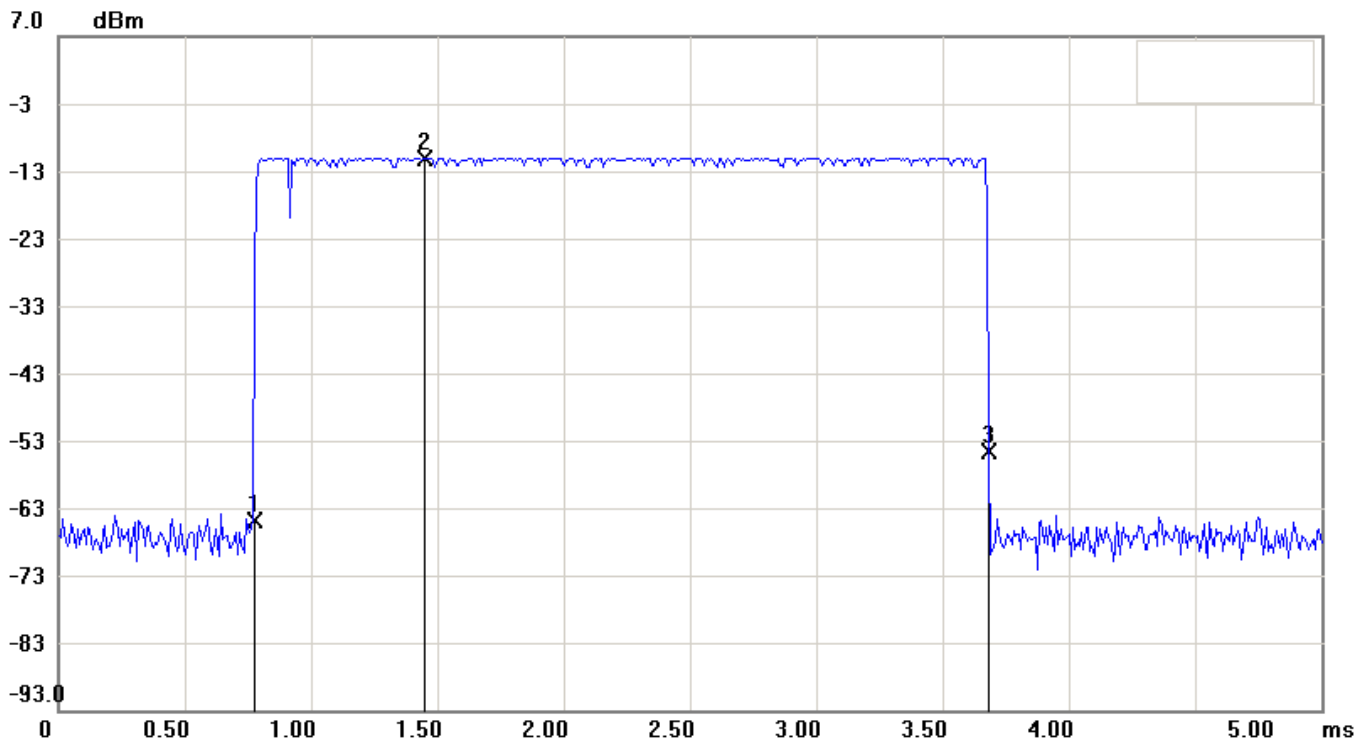
File: FT0044E\_BT\_2015 Data: #32

Date: 2015/1/6

Temperature: 22 °C

Time: AM 10:51:07

Humidity: 60 %



Condition: -31.04dBm

RF Conducted

EUT:

Sweep Time: 5ms Att.: 10dB

Model:

RBW: 1000 KHz VBW: 1000 KHz

Test Mode:

Note: DH5 pulse width

| No. | Sweep time(ms) | Level(dBm) |
|-----|----------------|------------|
| 1   | 0.7667         | -64.94     |
| 2   | 1.4500         | -11.04     |
| 3   | 3.6833         | -54.53     |

| No. |         | $\Delta$ Time(ms) | $\Delta$ Level(dB) |
|-----|---------|-------------------|--------------------|
| 1   | mk3-mk1 | 2.9166            | 10.41              |

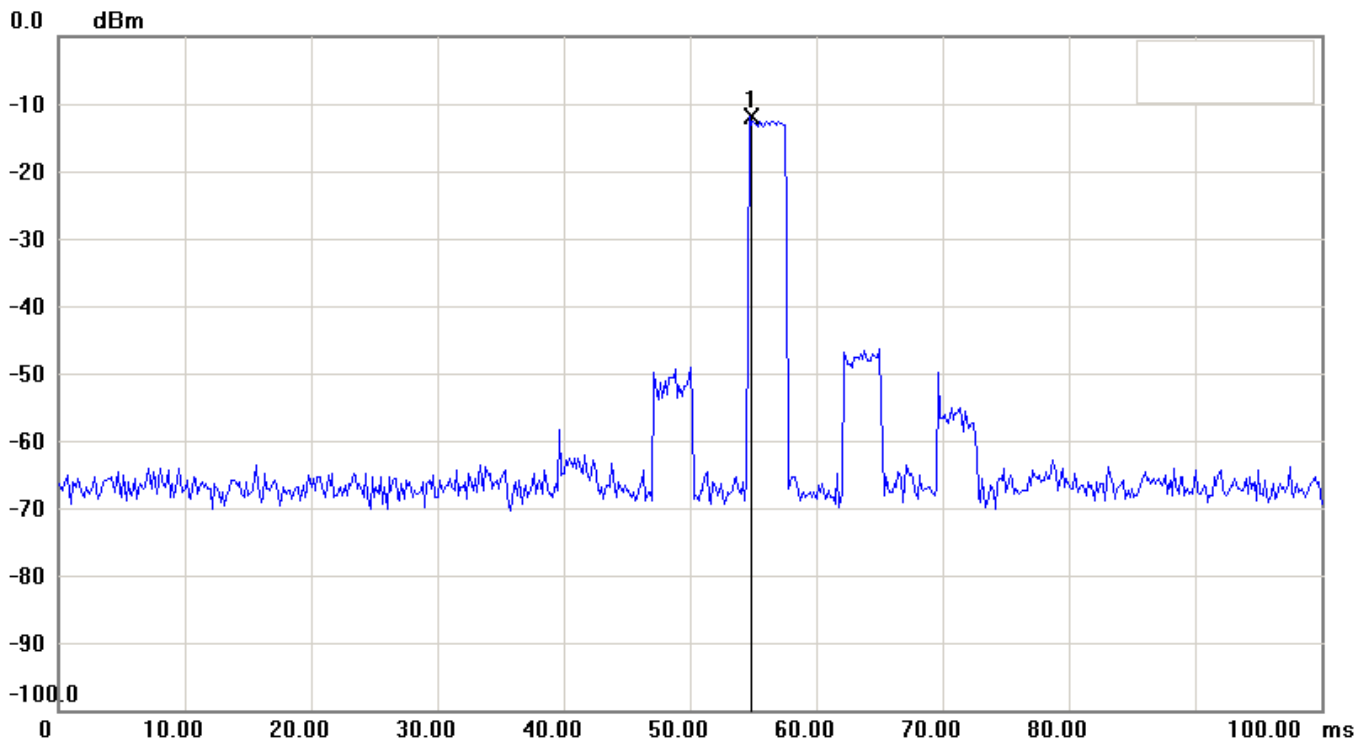
File: FT0044E\_BT\_2015 Data: #86

Date: 2015/1/21

Temperature: 22 °C

Time: PM 06:20:18

Humidity: 60 %



Condition:

Horizontal

EUT:

Sweep Time: 100ms Att.: 30dB

Model:

RBW: 100 KHz VBW: 100 KHz

Test Mode:

Note:

| No. | Sweep time(ms) | Level(dBm) |
|-----|----------------|------------|
| 1   | 54.6667        | -11.98     |

## 4.4 Radiated Emission Data

### 4.4.1 RF Portion

#### a) Channel 0

Operation Mode : Tx

Fundamental Frequency : 2402 MHz

Test Date : Jan. 07, 2015

Temperature : 22°C

Humidity : 60%

| Frequency  | Ant<br>Pol | Reading<br>(dBuV/m)@3m |      | Correct<br>Factor | Result<br>(dBuV/m)@3m |      | Limit<br>(dBuV/m)@3m |      | Margin<br>(worse) |
|------------|------------|------------------------|------|-------------------|-----------------------|------|----------------------|------|-------------------|
| (MHz)      | H/V        | Peak                   | AVG  | (dB)              | Peak                  | AVG  | Peak                 | AVG  | (dB)              |
| 4804.0000  | H          | ----                   | ---- | -1.97             | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 4804.0000  | V          | ----                   | ---- | -1.97             | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 7206.0000  | H          | ----                   | ---- | 1.08              | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 7206.0000  | V          | ----                   | ---- | 1.08              | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 9608.0000  | H          | ----                   | ---- | 2.57              | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 9608.0000  | V          | ----                   | ---- | 2.57              | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 12010.0000 | H          | ----                   | ---- | 4.90              | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 12010.0000 | V          | ----                   | ---- | 4.90              | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 19216.0000 | H          | ----                   | ---- | 14.27             | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 19216.0000 | V          | ----                   | ---- | 14.27             | ----                  | ---- | 74.0                 | 54.0 | ----              |

Note :

1. Item of margin shown in above table refer to average limit.
2. Remark “----” means that the emissions level is too low to be measured.
3. If the peak result is under the average limit, that is deemed to meet the average limit.
4. If there is only peak result, item “Margin” referred to “peak result – average limit”.
5. 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<br>Pol | Reading<br>(dBuV/m)@3m |      | Correct<br>Factor | Result<br>(dBuV/m)@3m |      | Limit<br>(dBuV/m)@3m |      | Margin<br>(worse) |
|------------|------------|------------------------|------|-------------------|-----------------------|------|----------------------|------|-------------------|
| (MHz)      | H/V        | Peak                   | AVG  | (dB)              | Peak                  | AVG  | Peak                 | AVG  | (dB)              |
| 4804.0000  | H          | ----                   | ---- | -1.97             | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 4804.0000  | V          | ----                   | ---- | -1.97             | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 7206.0000  | H          | ----                   | ---- | 1.08              | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 7206.0000  | V          | ----                   | ---- | 1.08              | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 9608.0000  | H          | ----                   | ---- | 2.57              | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 9608.0000  | V          | ----                   | ---- | 2.57              | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 12010.0000 | H          | ----                   | ---- | 4.90              | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 12010.0000 | V          | ----                   | ---- | 4.90              | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 19216.0000 | H          | ----                   | ---- | 14.27             | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 19216.0000 | V          | ----                   | ---- | 14.27             | ----                  | ---- | 74.0                 | 54.0 | ----              |

Note :

1. Item of margin shown in above table refer to average limit.
2. Remark “---” means that the emissions level is too low to be measured.
3. If the peak result is under the average limit, that is deemed to meet the average limit.
4. If there is only peak result, item “Margin” referred to “peak result – average limit”.
5. 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<br>Pol | Reading<br>(dBuV/m)@3m |      | Correct<br>Factor | Result<br>(dBuV/m)@3m |      | Limit<br>(dBuV/m)@3m |      | Margin<br>(worse) |
|------------|------------|------------------------|------|-------------------|-----------------------|------|----------------------|------|-------------------|
| (MHz)      | H/V        | Peak                   | AVG  | (dB)              | Peak                  | AVG  | Peak                 | AVG  | (dB)              |
| 4804.0000  | H          | ----                   | ---- | -1.97             | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 4804.0000  | V          | ----                   | ---- | -1.97             | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 7206.0000  | H          | ----                   | ---- | 1.08              | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 7206.0000  | V          | ----                   | ---- | 1.08              | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 9608.0000  | H          | ----                   | ---- | 2.57              | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 9608.0000  | V          | ----                   | ---- | 2.57              | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 12010.0000 | H          | ----                   | ---- | 4.90              | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 12010.0000 | V          | ----                   | ---- | 4.90              | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 19216.0000 | H          | ----                   | ---- | 14.27             | ----                  | ---- | 74.0                 | 54.0 | ----              |
| 19216.0000 | V          | ----                   | ---- | 14.27             | ----                  | ---- | 74.0                 | 54.0 | ----              |

Note :

1. Item of margin shown in above table refer to average limit.
2. Remark “---” means that the emissions level is too low to be measured.
3. If the peak result is under the average limit, that is deemed to meet the average limit.
4. If there is only peak result, item “Margin” referred to “peak result – average limit”.
5. 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.

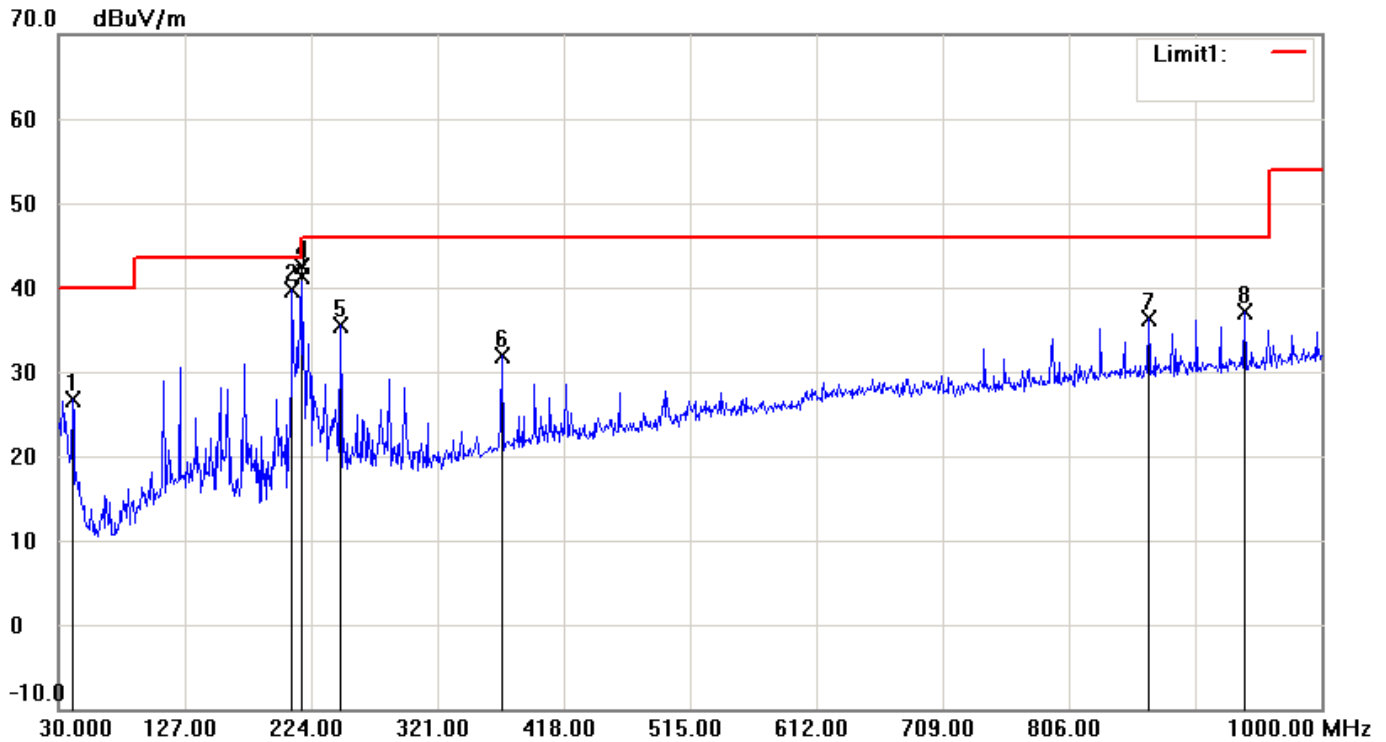
**4.4.2 Other Emission****4.4.2.1 30MHz to 1GHz**File: FT0044E\_15C\_Below Data: #1  
1G\_2015

Date: 2015/1/7

Temperature: 22 °C

Time: AM 11:06:33

Humidity: 60 %



Condition: FCC Class B 3M Radiation

Polarization: Horizontal

EUT:

Distance:

Model:

Test Mode:

| No. | Frequency<br>(MHz) | Reading<br>(dBuV/m) | Detector | Corrected<br>dB/m | Result<br>(dBuV/m) | Limit<br>(dBuV/m) | Margin<br>(dB) |
|-----|--------------------|---------------------|----------|-------------------|--------------------|-------------------|----------------|
| 1   | 40.6700            | 11.94               | peak     | 14.71             | 26.65              | 40.00             | -13.35         |
| 2   | 209.4500           | 27.22               | peak     | 12.55             | 39.77              | 43.50             | -3.73          |
| 3   | 215.9734           | 28.71               | QP       | 12.66             | 41.37              | 43.50             | -2.13          |
| 4   | 216.0760           | 29.84               | QP       | 12.66             | 42.50              | 46.00             | -3.50          |
| 5   | 246.3100           | 20.54               | peak     | 14.91             | 35.45              | 46.00             | -10.55         |
| 6   | 370.4700           | 13.40               | peak     | 18.47             | 31.87              | 46.00             | -14.13         |
| 7   | 867.1100           | 10.72               | peak     | 25.53             | 36.25              | 46.00             | -9.75          |
| 8   | 940.8300           | 10.71               | peak     | 26.30             | 37.01              | 46.00             | -8.99          |

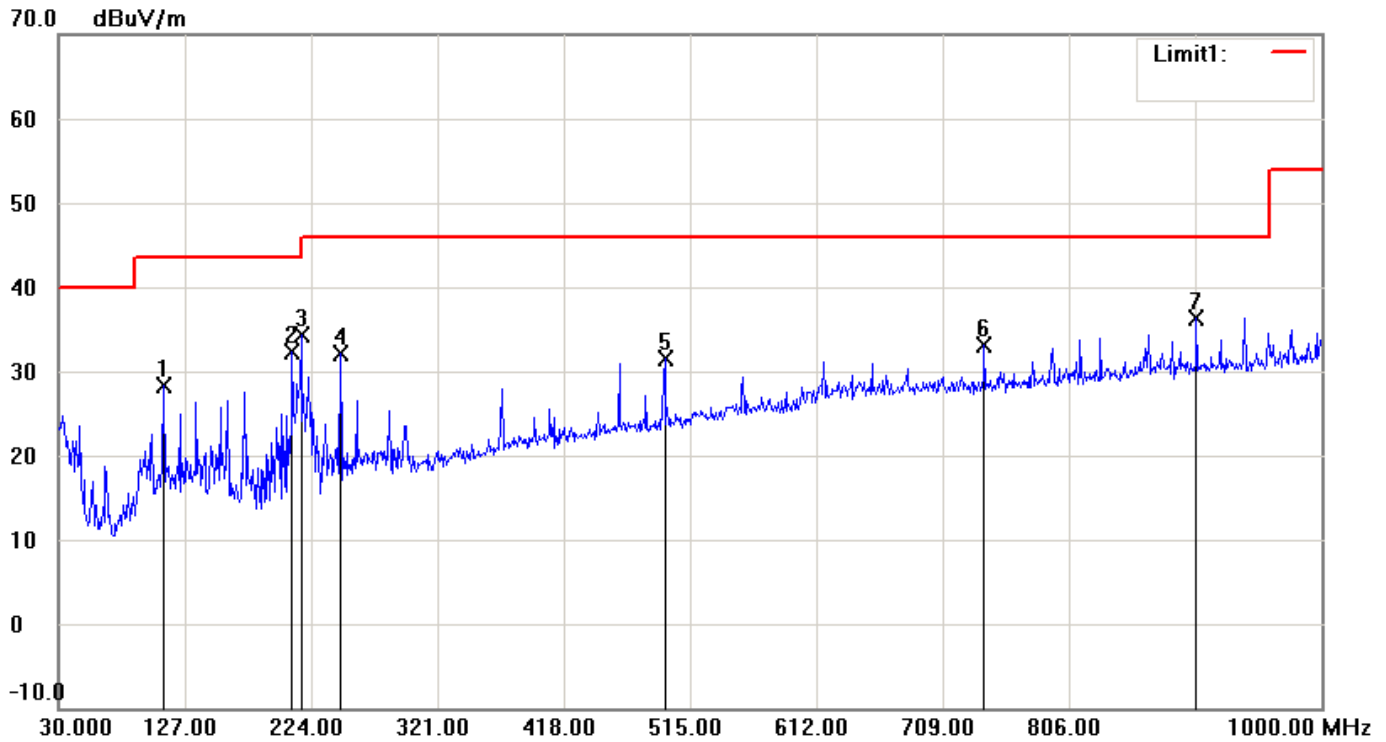
File: FT0044E\_15C\_Below Data: #2  
1G\_2015

Date: 2015/1/7

Temperature: 22 °C

Time: AM 11:11:49

Humidity: 60 %



Condition: FCC Class B 3M Radiation

Polarization: Vertical

EUT:

Distance:

Model:

Test Mode:

Note: BT

| No. | Frequency | Reading  | Detector | Corrected | Result   | Limit    | Margin |
|-----|-----------|----------|----------|-----------|----------|----------|--------|
|     | (MHz)     | (dBuV/m) |          | dB/m      | (dBuV/m) | (dBuV/m) | (dB)   |
| 1   | 110.5100  | 14.58    | peak     | 13.75     | 28.33    | 43.50    | -15.17 |
| 2   | 209.4500  | 19.80    | peak     | 12.55     | 32.35    | 43.50    | -11.15 |
| 3   | 216.2400  | 21.69    | peak     | 12.66     | 34.35    | 46.00    | -11.65 |
| 4   | 246.3100  | 17.16    | peak     | 14.91     | 32.07    | 46.00    | -13.93 |
| 5   | 495.6000  | 10.49    | peak     | 21.02     | 31.51    | 46.00    | -14.49 |
| 6   | 741.0100  | 9.09     | peak     | 23.96     | 33.05    | 46.00    | -12.95 |
| 7   | 903.9700  | 10.32    | peak     | 25.97     | 36.29    | 46.00    | -9.71  |



**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)           |
| 1013.4615 | V       | 51.3                | --- | -14.33         | 37.0               | --- | 74                | 54  | -17.0          |
| 1123.3974 | H       | 52.1                | --- | -13.78         | 38.3               | --- | 74                | 54  | -15.7          |
| 1336.5385 | V       | 51.0                | --- | -12.72         | 38.3               | --- | 74                | 54  | -15.7          |
| 1385.8974 | V       | 51.3                | --- | -12.48         | 38.8               | --- | 74                | 54  | -15.2          |
| 1435.2563 | H       | 51.6                | --- | -12.23         | 39.4               | --- | 74                | 54  | -14.6          |
| 1984.9358 | H       | 50.4                | --- | -9.39          | 41.0               | --- | 74                | 54  | -13.0          |
| 2707.2957 | V       | 49.8                | --- | -6.86          | 42.9               | --- | 74                | 54  | -11.1          |
| 2732.1620 | H       | 50.2                | --- | -6.77          | 43.4               | --- | 74                | 54  | -10.6          |
| 2980.8236 | V       | 49.9                | --- | -5.88          | 44.0               | --- | 74                | 54  | -10.0          |
| 3130.0207 | H       | 51.3                | --- | -5.43          | 45.9               | --- | 74                | 54  | -8.1           |
| 3130.0207 | V       | 51.4                | --- | -5.43          | 46.0               | --- | 74                | 54  | -8.0           |
| 3353.8164 | V       | 50.6                | --- | -4.81          | 45.8               | --- | 74                | 54  | -8.2           |

**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)           |
| 1123.3974 | H       | 51.8                | --- | -13.78         | 38.0               | --- | 74                | 54  | -16.0          |
| 1143.5896 | H       | 52.6                | --- | -13.68         | 38.9               | --- | 74                | 54  | -15.1          |
| 1161.5385 | H       | 51.6                | --- | -13.60         | 38.0               | --- | 74                | 54  | -16.0          |
| 1385.8974 | V       | 51.8                | --- | -12.48         | 39.3               | --- | 74                | 54  | -14.7          |
| 1783.0127 | H       | 55.2                | --- | -10.43         | 44.8               | --- | 74                | 54  | -9.2           |
| 1895.1922 | V       | 50.6                | --- | -9.84          | 40.8               | --- | 74                | 54  | -13.2          |
| 1933.3333 | V       | 52.3                | --- | -9.65          | 42.7               | --- | 74                | 54  | -11.3          |
| 1960.2563 | V       | 54.6                | --- | -9.51          | 45.1               | --- | 74                | 54  | -8.9           |
| 1980.4486 | V       | 50.6                | --- | -9.40          | 41.2               | --- | 74                | 54  | -12.8          |
| 3105.1545 | V       | 54.2                | --- | -5.51          | 48.7               | --- | 74                | 54  | -5.3           |
| 3130.0207 | H       | 50.2                | --- | -5.43          | 44.8               | --- | 74                | 54  | -9.2           |
| 3403.5488 | H       | 52.2                | --- | -4.67          | 47.5               | --- | 74                | 54  | -6.5           |
| 3453.2813 | V       | 50.5                | --- | -4.53          | 46.0               | --- | 74                | 54  | -8.0           |

## 4.4.2.2.3 Fundamental Frequency : 2480 MHz

| Frequency | Ant Pol | Reading<br>(dBuV/m)@3m |     | Correct Factor | Result<br>(dBuV/m)@3m |     | Limit<br>(dBuV/m)@3m |     | Margin<br>(worse) |
|-----------|---------|------------------------|-----|----------------|-----------------------|-----|----------------------|-----|-------------------|
| (MHz)     | H/V     | Peak                   | AVG | (dB)           | Peak                  | AVG | Peak                 | AVG | (dB)              |
| 1035.8974 | H       | 51.4                   | --- | -14.23         | 37.2                  | --- | 74                   | 54  | -16.8             |
| 1123.3974 | H       | 51.5                   | --- | -13.78         | 37.7                  | --- | 74                   | 54  | -16.3             |
| 1143.5896 | H       | 52.3                   | --- | -13.68         | 38.6                  | --- | 74                   | 54  | -15.4             |
| 1143.5896 | V       | 51.4                   | --- | -13.68         | 37.7                  | --- | 74                   | 54  | -16.3             |
| 1161.5385 | H       | 51.5                   | --- | -13.60         | 37.9                  | --- | 74                   | 54  | -16.1             |
| 1186.2180 | H       | 53.0                   | --- | -13.47         | 39.5                  | --- | 74                   | 54  | -14.5             |
| 1385.8974 | V       | 51.4                   | --- | -12.48         | 38.9                  | --- | 74                   | 54  | -15.1             |
| 1980.4486 | V       | 55.1                   | --- | -9.40          | 45.7                  | --- | 74                   | 54  | -8.3              |
| 2000.6410 | V       | 51.1                   | --- | -9.30          | 41.8                  | --- | 74                   | 54  | -12.2             |
| 2732.1620 | H       | 50.5                   | --- | -6.77          | 43.7                  | --- | 74                   | 54  | -10.3             |
| 2757.0280 | V       | 49.9                   | --- | -6.68          | 43.2                  | --- | 74                   | 54  | -10.8             |
| 3080.2885 | V       | 54.1                   | --- | -5.57          | 48.5                  | --- | 74                   | 54  | -5.5              |
| 3130.0207 | H       | 50.9                   | --- | -5.43          | 45.5                  | --- | 74                   | 54  | -8.5              |
| 3453.2813 | V       | 51.0                   | --- | -4.53          | 46.5                  | --- | 74                   | 54  | -7.5              |

## 4.4.2.3 below 30MHz

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

- Note: 1. Place of Measurement: Measuring site of the ETC.  
 2. Item of margin shown in above table refer to average limit.  
 3. Remark “---” means that the emissions level is too low to be measured.  
 4. If the peak result is under the average limit, that is deemed to meet the average limit.  
 5. If there is only peak result, item “Margin” referred to “peak result – average limit”.  
 6. 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.  
 7. The estimated measurement uncertainty of the result measurement is  
 $\pm 4.2\text{dB}$  ( $9\text{kHz} \leq f \leq 30\text{MHz}$ )  
 $\pm 4.6\text{dB}$  ( $30\text{MHz} \leq f < 300\text{MHz}$ ).  
 $\pm 4.4\text{dB}$  ( $300\text{MHz} \leq f < 1000\text{MHz}$ ).  
 $\pm 2.9\text{dB}$  ( $1\text{GHz} \leq f < 18\text{GHz}$ ).  
 $\pm 3.5\text{dB}$  ( $18\text{GHz} \leq f \leq 40\text{GHz}$ ).

**4.4.3 Radiated Measurement at Bandedge with Fundamental Frequencies**4.4.3.1 Operation Mode : NON-EDR

## (A) Channel 0

Operation Mode : Transmitting

Fundamental Frequency : 2402 MHz

Test Date: Jan. 07, 2015 Temperature : 22°C

Humidity : 60%

| 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  | 27.5                 | 27.7 | 29.8           | -30.70      | 57.5     | 26.8 | 74.0      | 54.0 | -16.5          | -27.2 |

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

| 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   |
| 2483.500  | 28.0                 | 27.5 | 29.8           | -30.70      | 57.8     | 27.1 | 74.0      | 54.0 | -16.2          | -26.9 |

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: Jan. 07, 2015

Temperature : 22°C

Humidity : 60%

| 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  | 27.0                 | 28.2 | 29.8           | -30.70      | 58.0     | 27.3 | 74.0      | 54.0 | -16.0          | -26.7 |

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

| 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   |
| 2483.500  | 27.7                 | 28.1 | 29.8           | -30.70      | 57.9     | 27.2 | 74.0      | 54.0 | -16.1          | -26.8 |

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

## 4.5 Field Strength Calculation

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:

$$\text{Result} = \text{Reading} + \text{Corrected Factor} + \text{Duty Factor (if needed)}$$

where

$$\text{Corrected Factor} = \text{Antenna Factor} + \text{Cable Loss} + \text{High Pass Filter Loss} - \text{Amplifier Gain}$$

## 5 CONDUCTED EMISSION MEASUREMENT

This EUT is excused from investigation of conducted emission, for it is powered by battery only. According to §15.207 (d), measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.

## 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 Inverted-F antenna.

|                   |                          |
|-------------------|--------------------------|
| Antenna Type      | Surface mounting antenna |
| Peak Antenna Gain | 0.99 dBi                 |

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

## 7 20dB EMISSION BANDWIDTH MEASUREMENT

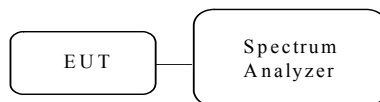
### 7.1 Standard Applicable

According to 15.247(a)(1), for frequency hopping systems, hopping channel carrier frequencies separated 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 3. 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 3: 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: Jan. 06, 2015

Temperature : 22°C

Humidity: 60%

| Channel | 20 dB Bandwidth<br>(MHz) | Chart   |
|---------|--------------------------|---------|
| L       | 0.920                    | Page 33 |
| M       | 0.895                    | Page 34 |
| H       | 0.895                    | Page 35 |

***Note: Please refer to page 33 to page 35 for chart.***



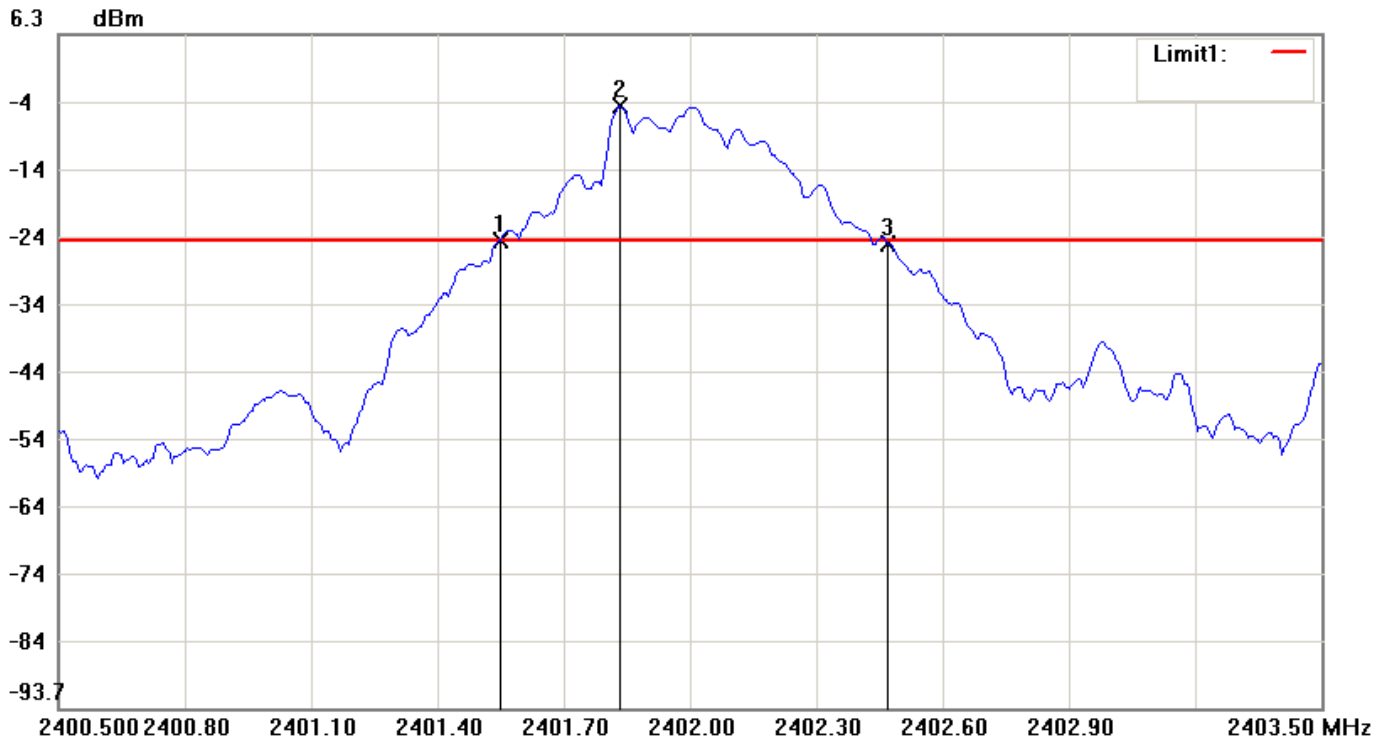
File: FT0044E\_BT\_2015 Data: #15

Date: 2015/1/6

Temperature: 22 °C

Time: AM 10:34:17

Humidity: 60 %



Condition: -24.37dBm

RF Conducted

EUT:

Sweep Time: 3.2ms Att.: 10dB

Model:

RBW: 30 KHz

VBW: 100 KHz

Test Mode:

Note: FCC-Bluetooth Channel 00-20dB EBW

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2401.55000     | -24.42     |
| 2   | 2401.83500     | -4.37      |
| 3   | 2402.47000     | -24.78     |

| No. |         | $\Delta$ Frequency(MHz) | $\Delta$ Level(dB) |
|-----|---------|-------------------------|--------------------|
| 1   | mk3-mk1 | 0.92                    | -0.36              |

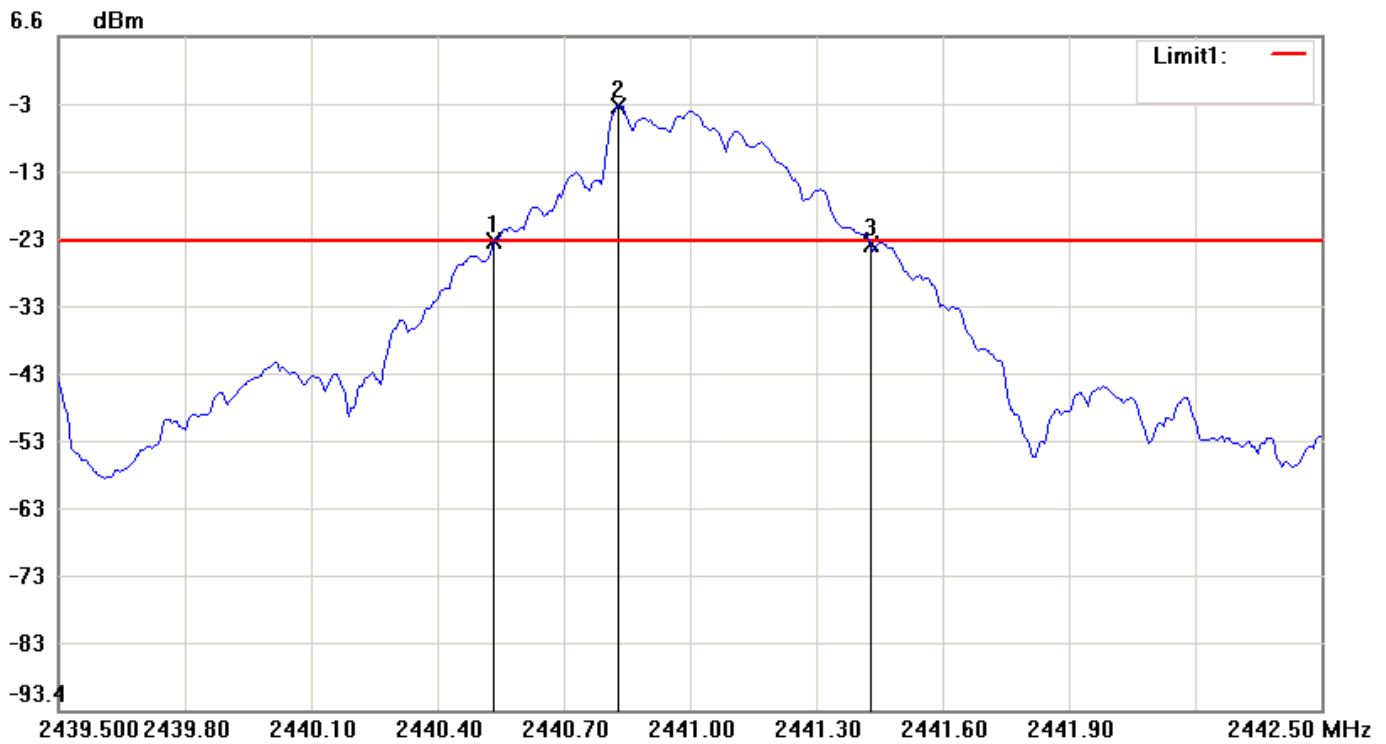
File: FT0044E\_BT\_2015 Data: #23

Date: 2015/1/6

Temperature: 22 °C

Time: AM 10:42:36

Humidity: 60 %



Condition: -23.63dBm

RF Conducted

EUT:

Sweep Time: 3.2ms Att.: 10dB

Model:

RBW: 30 KHz

VBW: 100 KHz

Test Mode:

Note: FCC-Bluetooth Channel 39-20dB EBW

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2440.53500     | -23.74     |
| 2   | 2440.83000     | -3.63      |
| 3   | 2441.43000     | -24.35     |

| No. |         | $\Delta$ Frequency(MHz) | $\Delta$ Level(dB) |
|-----|---------|-------------------------|--------------------|
| 1   | mk3-mk1 | 0.895                   | -0.61              |

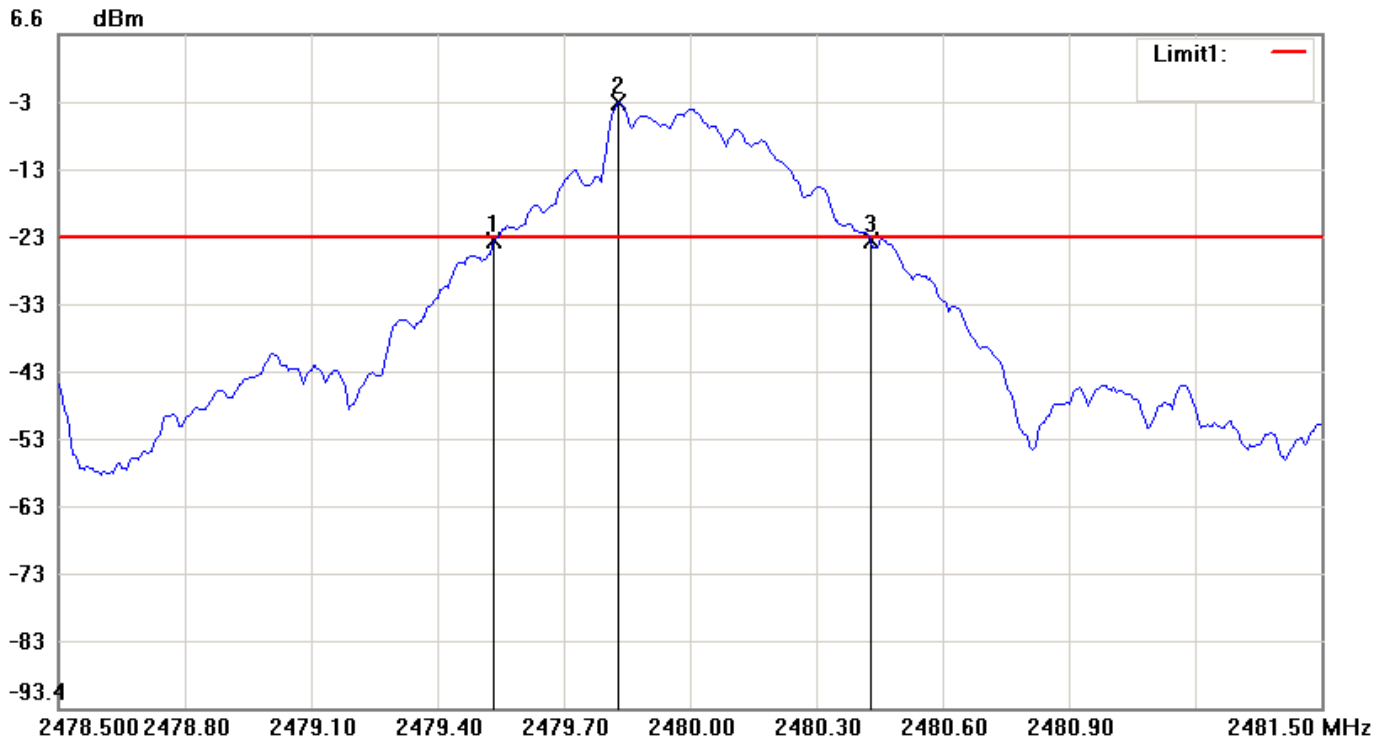
File: FT0044E\_BT\_2015 Data: #19

Date: 2015/1/6

Temperature: 22 °C

Time: AM 10:38:48

Humidity: 60 %



Condition: -23.59dBm

RF Conducted

EUT:

Sweep Time: 3.2ms Att.: 10dB

Model:

RBW: 30 KHz

VBW: 100 KHz

Test Mode:

Note: FCC-Bluetooth Channel 78-20dB EBW

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2479.53500     | -23.90     |
| 2   | 2479.83000     | -3.59      |
| 3   | 2480.43000     | -23.93     |

| No. |         | $\Delta$ Frequency(MHz) | $\Delta$ Level(dB) |
|-----|---------|-------------------------|--------------------|
| 1   | mk3-mk1 | 0.895                   | -0.03              |

7.4.2 Operation Mode: EDR

Test Date: Jan. 06, 2015

Temperature : 22°C

Humidity: 60%

| Channel | 20 dB Bandwidth<br>(MHz) | Chart   |
|---------|--------------------------|---------|
| L       | 1.230                    | Page 37 |
| M       | 1.240                    | Page 38 |
| H       | 1.250                    | Page 39 |

***Note: Please refer to page 37 to page 39 for chart.***

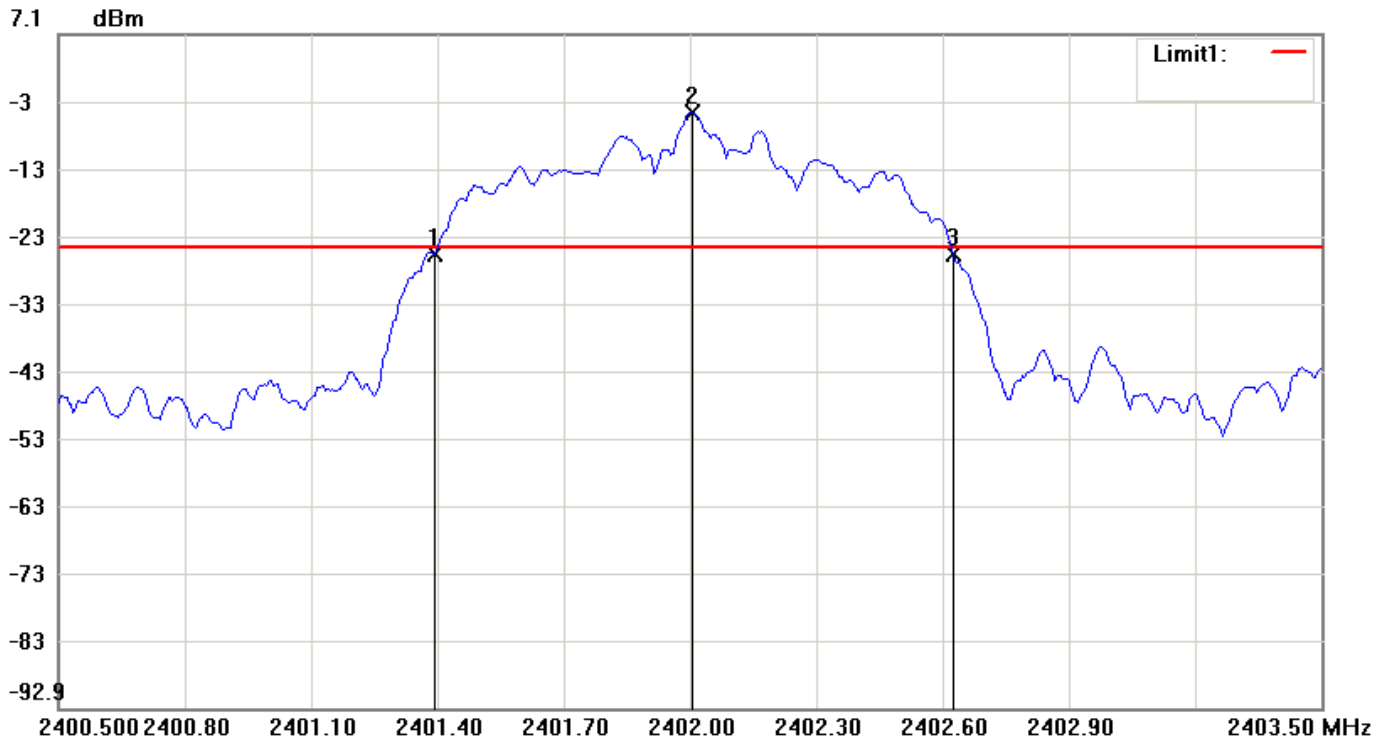
File: FT0044E\_BT\_2015 Data: #38

Date: 2015/1/6

Temperature: 22 °C

Time: AM 10:59:07

Humidity: 60 %



Condition: -24.53dBm

RF Conducted

EUT:

Sweep Time: 3.2ms Att.: 10dB

Model:

RBW: 30 KHz

VBW: 100 KHz

Test Mode:

Note: FCC-Bluetooth Channel 00-20dB EBW

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2401.39500     | -25.53     |
| 2   | 2402.00500     | -4.53      |
| 3   | 2402.62500     | -25.48     |

| No. |         | $\Delta$ Frequency(MHz) | $\Delta$ Level(dB) |
|-----|---------|-------------------------|--------------------|
| 1   | mk3-mk1 | 1.23                    | 0.05               |

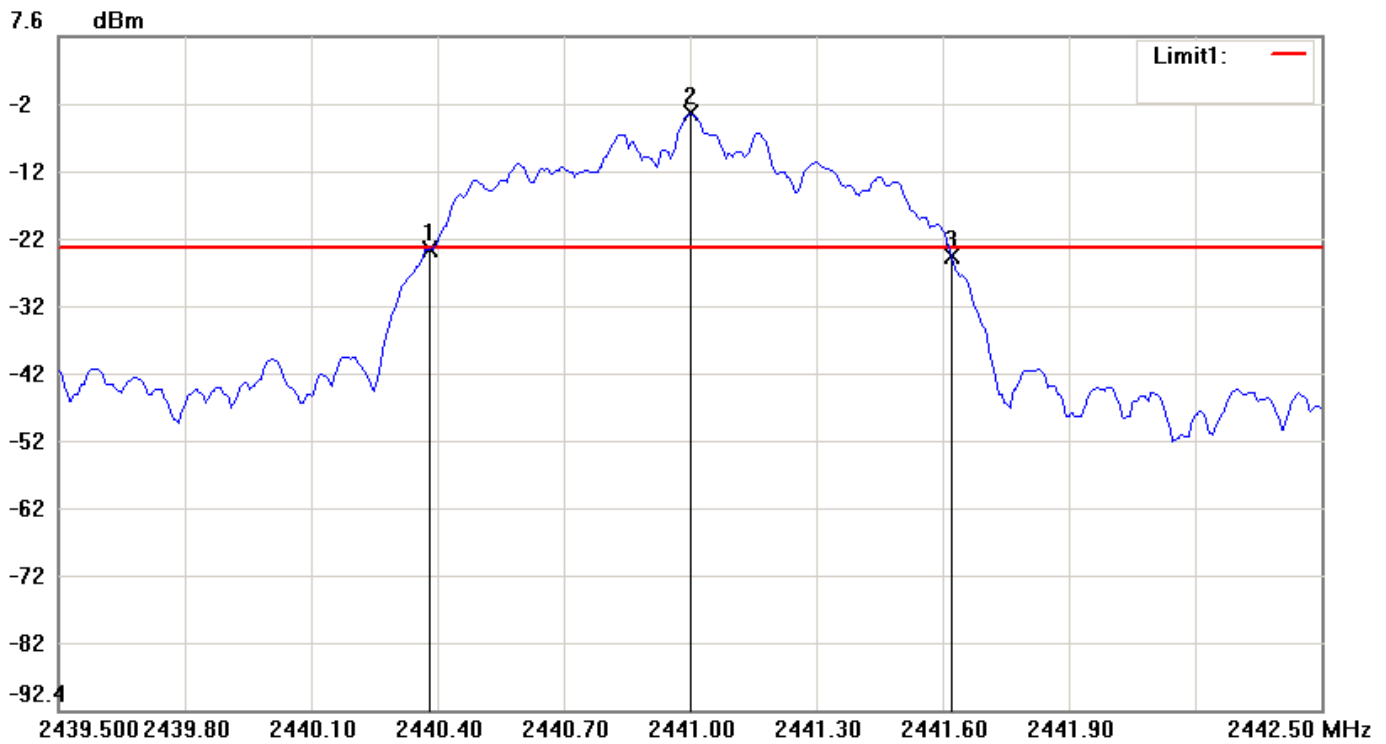
File: FT0044E\_BT\_2015 Data: #46

Date: 2015/1/6

Temperature: 22 °C

Time: AM 11:10:39

Humidity: 60 %



Condition: -23.91dBm

RF Conducted

EUT:

Sweep Time: 3.2ms Att.: 10dB

Model:

RBW: 30 KHz

VBW: 100 KHz

Test Mode:

Note: FCC-Bluetooth Channel 39-20dB EBW

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2440.38000     | -23.99     |
| 2   | 2441.00000     | -3.91      |
| 3   | 2441.62000     | -25.14     |

| No. |         | $\Delta$ Frequency(MHz) | $\Delta$ Level(dB) |
|-----|---------|-------------------------|--------------------|
| 1   | mk3-mk1 | 1.24                    | -1.15              |

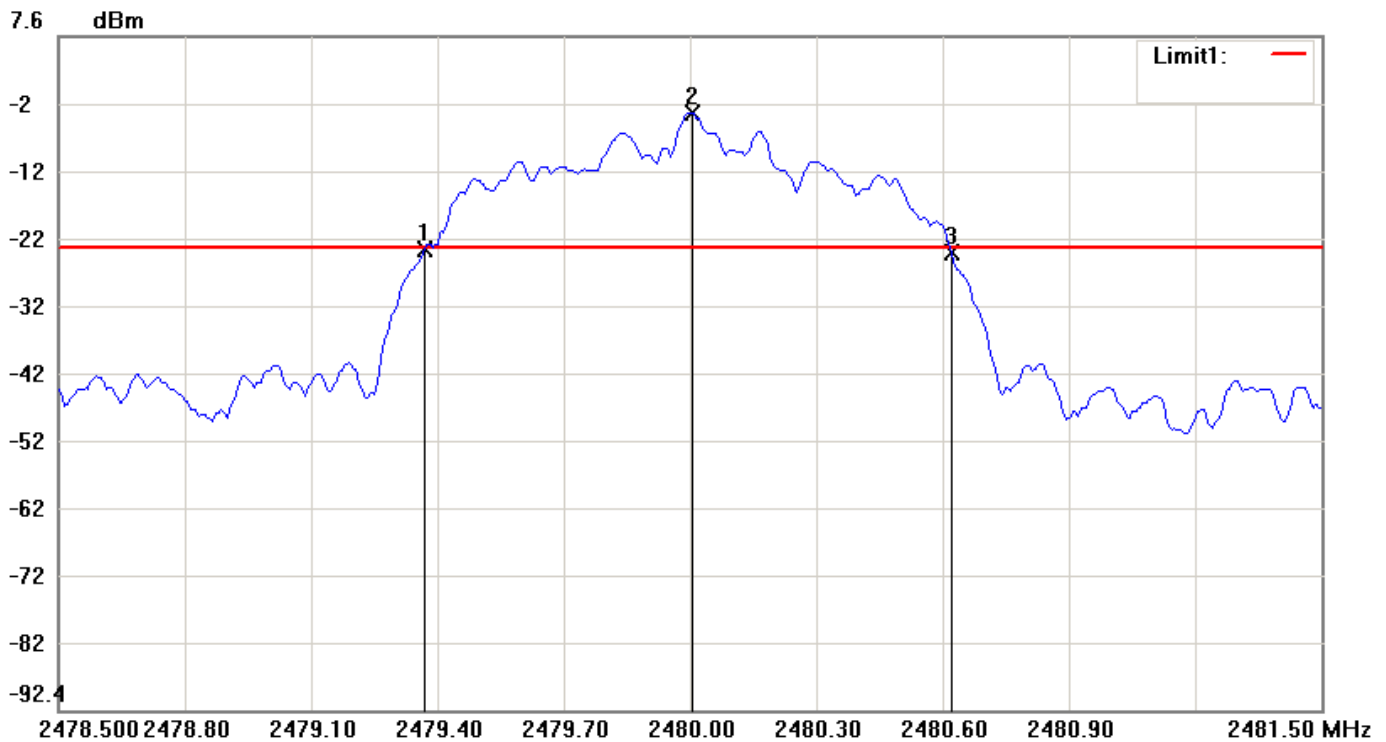
File: FT0044E\_BT\_2015 Data: #42

Date: 2015/1/6

Temperature: 22 °C

Time: AM 11:03:46

Humidity: 60 %



Condition: -23.73dBm

RF Conducted

EUT:

Sweep Time: 3.2ms Att.: 10dB

Model:

RBW: 30 KHz

VBW: 100 KHz

Test Mode:

Note: FCC-Bluetooth Channel 78-20dB EBW

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2479.37000     | -24.02     |
| 2   | 2480.00500     | -3.73      |
| 3   | 2480.62000     | -24.49     |

| No. |         | $\Delta$ Frequency(MHz) | $\Delta$ Level(dB) |
|-----|---------|-------------------------|--------------------|
| 1   | mk3-mk1 | 1.25                    | -0.47              |

## 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 Receiving 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 3. 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: Jan. 06, 2015

Temperature : 22°C

Humidity: 60%

| Channel | Maximum<br>Peak Output Power<br>(dBm) | Maximum<br>Peak Output Power<br>(mW) | FCC Limit<br>(mW) | Chart   |
|---------|---------------------------------------|--------------------------------------|-------------------|---------|
| L       | -2.65                                 | 0.54                                 | 125               | Page 42 |
| M       | -2.18                                 | 0.61                                 | 125               | Page 43 |
| H       | -2.18                                 | 0.61                                 | 125               | Page 44 |

**Note: Please refer to page 42 to page 44 for chart.**

File: FT0044E\_BT\_2015

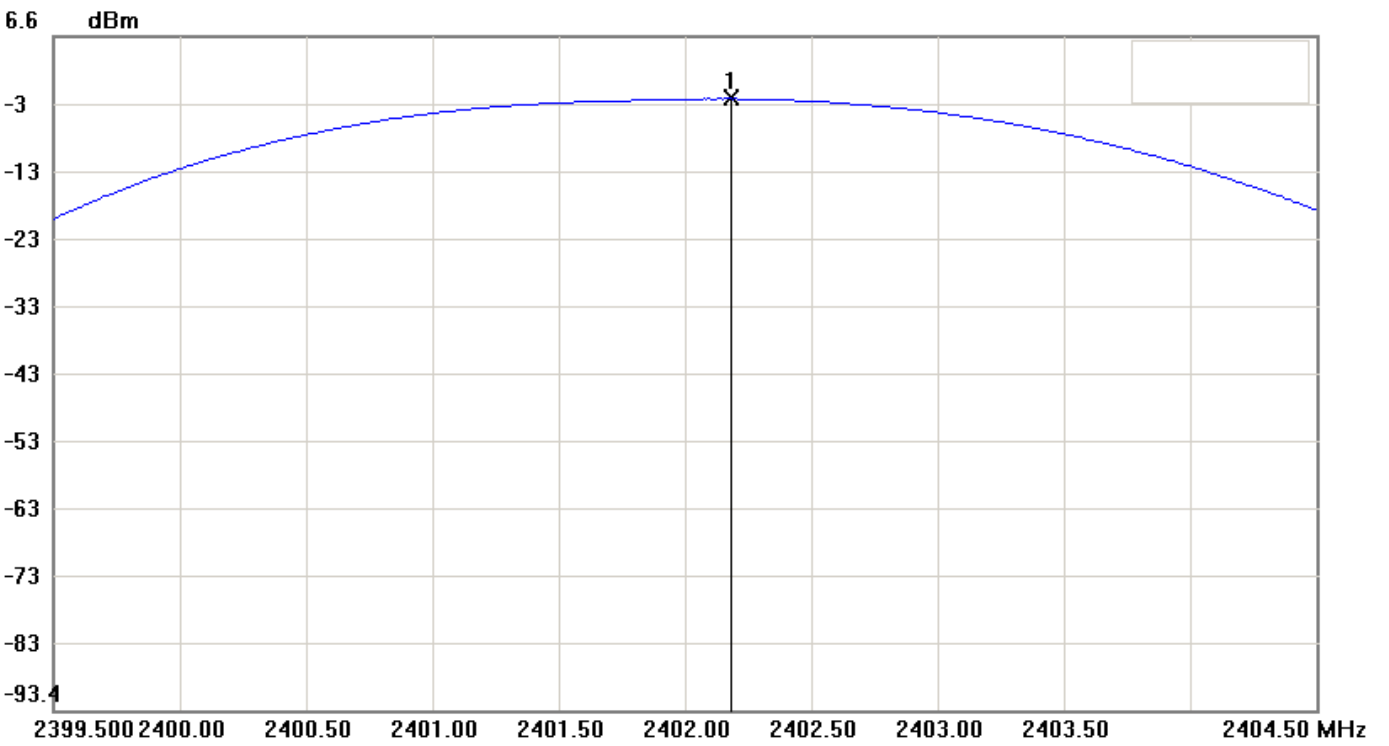
Data: #50

Date: 2015/1/6

Temperature: 22 °C

Time: AM 11:32:05

Humidity: 60 %



Condition:

EUT:

Model:

Test Mode:

Note:

RF Conducted

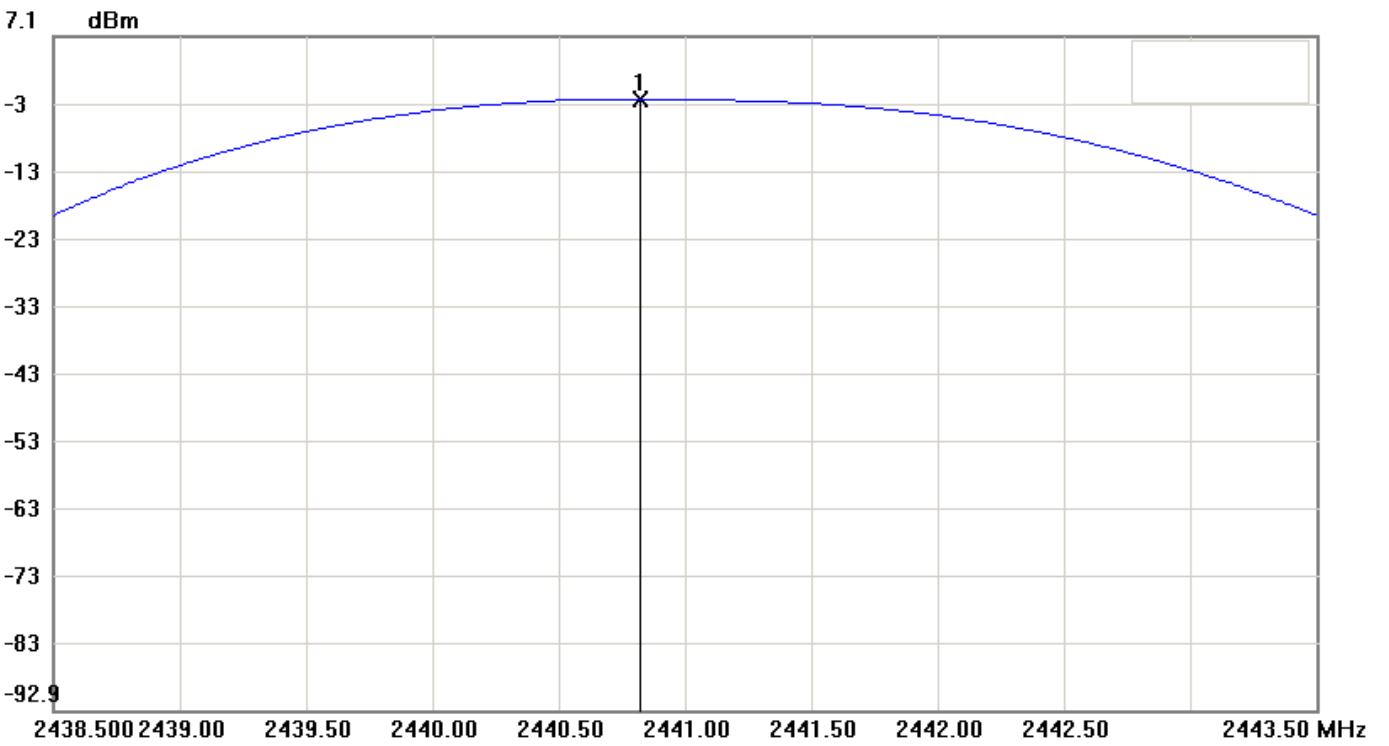
Sweep Time: 1ms Att.: 10dB

RBW: 2000 KHz VBW: 2000 KHz

FCC Bluetooth CH00 Output Power (NON-EDR)

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2402.18330     | -2.65      |

File: FT0044E\_BT\_2015    Data: #52    Date: 2015/1/6    Temperature: 22 °C  
Time: AM 11:36:13    Humidity: 60 %



Condition: RF Conducted  
EUT: Sweep Time: 1ms Att.: 10dB  
Model: RBW: 2000 KHz VBW: 2000 KHz  
Test Mode:  
Note: FCC Bluetooth CH39 Output Power (NON-EDR)

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2440.82500     | -2.18      |

File: FT0044E\_BT\_2015

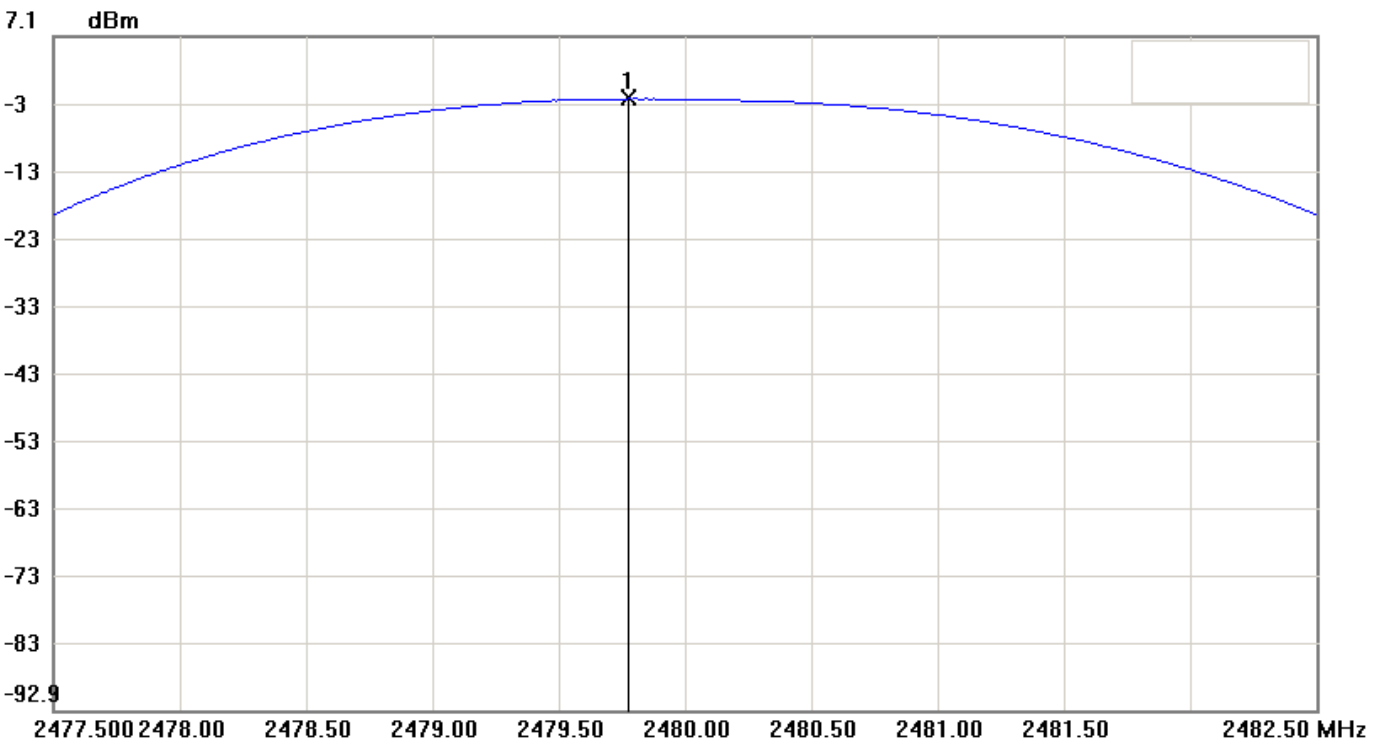
Data: #51

Date: 2015/1/6

Temperature: 22 °C

Time: AM 11:34:23

Humidity: 60 %



Condition:

EUT:

Model:

Test Mode:

Note:

RF Conducted

Sweep Time: 1ms Att.: 10dB

RBW: 2000 KHz VBW: 2000 KHz

FCC Bluetooth CH78 Output Power (NON-EDR)

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2479.77500     | -2.18      |

8.4.2 Operation Mode: EDR

Test Date: Jan. 06, 2015

Temperature : 22°C

Humidity: 60%

| Channel | Maximum<br>Peak Output Power<br>(dBm) | Maximum<br>Peak Output Power<br>(mW) | FCC Limit<br>(mW) | Chart   |
|---------|---------------------------------------|--------------------------------------|-------------------|---------|
| L       | -0.84                                 | 0.82                                 | 125               | Page 46 |
| M       | -0.40                                 | 0.91                                 | 125               | Page 47 |
| H       | -0.22                                 | 0.95                                 | 125               | Page 48 |

***Note: Please refer to page 46 to page 48 for chart.***

File: FT0044E\_BT\_2015

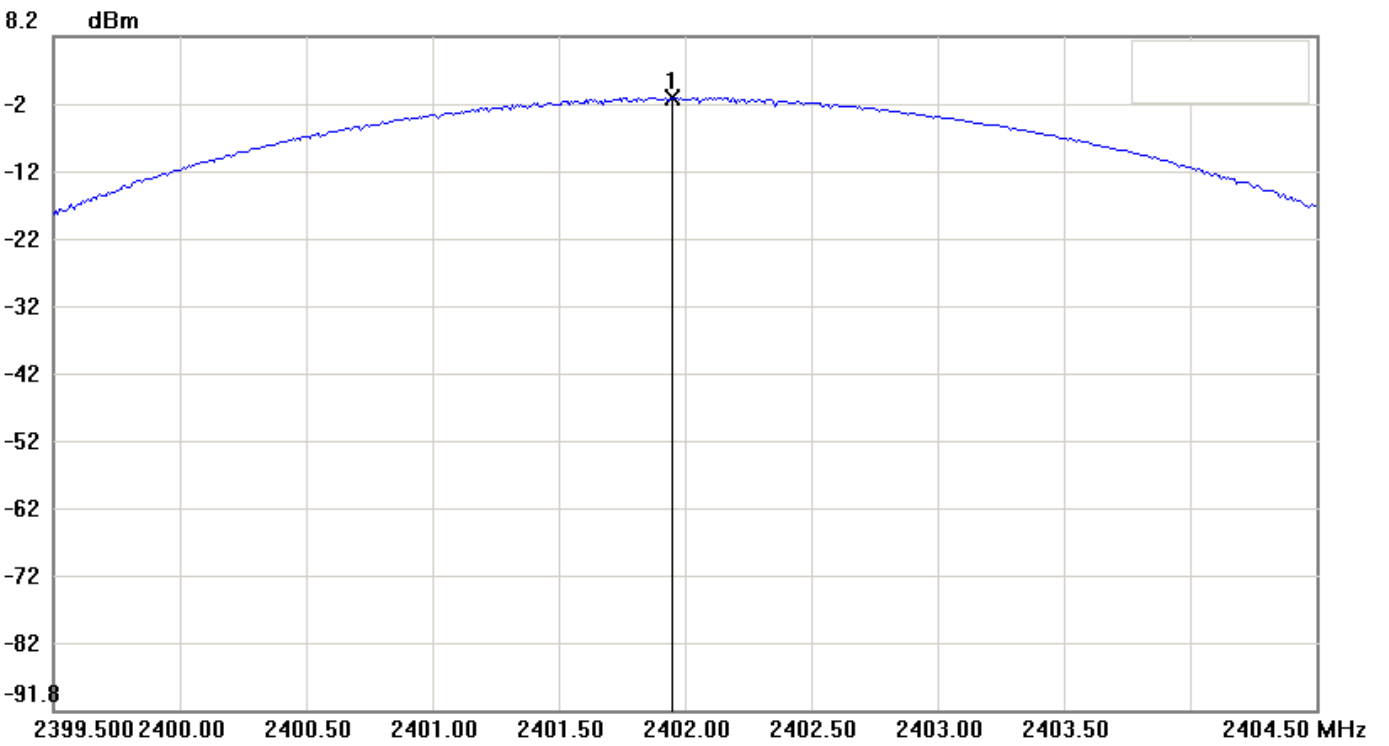
Data: #53

Date: 2015/1/6

Temperature: 22 °C

Time: AM 11:39:07

Humidity: 60 %



Condition:

EUT:

Model:

Test Mode:

Note:

RF Conducted

Sweep Time: 1ms Att.: 10dB

RBW: 2000 KHz VBW: 2000 KHz

FCC Bluetooth CH00 Output Power (EDR)

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2401.94170     | -0.84      |

File: FT0044E\_BT\_2015

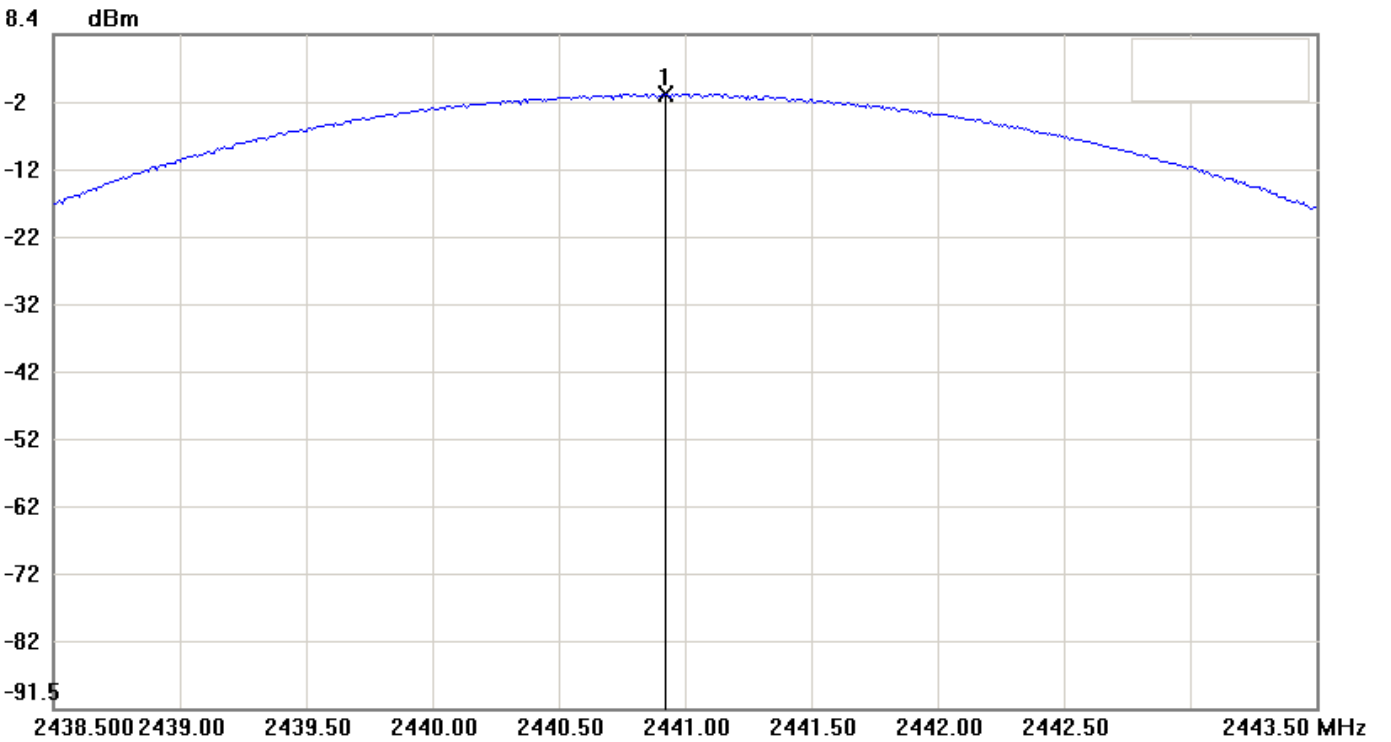
Data: #55

Date: 2015/1/6

Temperature: 22 °C

Time: AM 11:45:37

Humidity: 60 %



Condition:

EUT:

Model:

Test Mode:

Note:

RF Conducted

Sweep Time: 1ms Att.: 10dB

RBW: 2000 KHz VBW: 2000 KHz

FCC Bluetooth CH39 Output Power (EDR)

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2440.92500     | -0.40      |

File: FT0044E\_BT\_2015

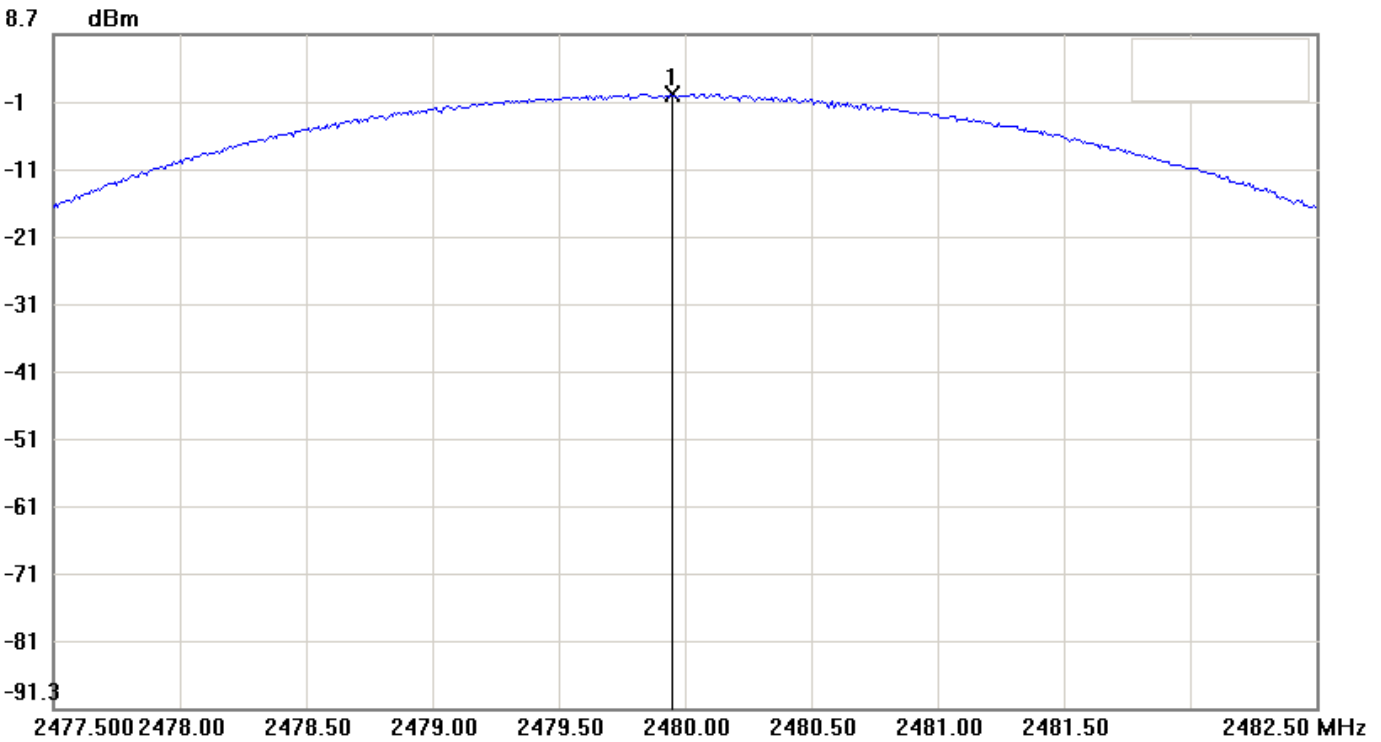
Data: #54

Date: 2015/1/6

Temperature: 22 °C

Time: AM 11:44:22

Humidity: 60 %



Condition:

EUT:

Model:

Test Mode:

Note:

RF Conducted

Sweep Time: 1ms Att.: 10dB

RBW: 2000 KHz VBW: 2000 KHz

FCC Bluetooth CH78 Output Power (EDR)

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2479.94170     | -0.22      |



## 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 3. 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: Jan. 06, 2015

Temperature : 22°C

Humidity: 60%

Test Date: Jan. 21, 2015

Temperature : 22°C

Humidity: 60%

| Channel | Test Frequency Range    | Note            | Chart      |
|---------|-------------------------|-----------------|------------|
| 0       | 2350 MHz - 2450 MHz     | Lower Band Edge | Page 51-52 |
| 78      | 2433.5 MHz - 2533.5 MHz | Upper Band Edge | Page 53-54 |
| 0       | 30 MHz - 25 GHz         |                 | Page 55-58 |
| 39      | 30 MHz - 25 GHz         |                 | Page 59-62 |
| 78      | 30 MHz - 25 GHz         |                 | Page 63-66 |

**Note: Please refer to page 51 to page 66 for chart.**

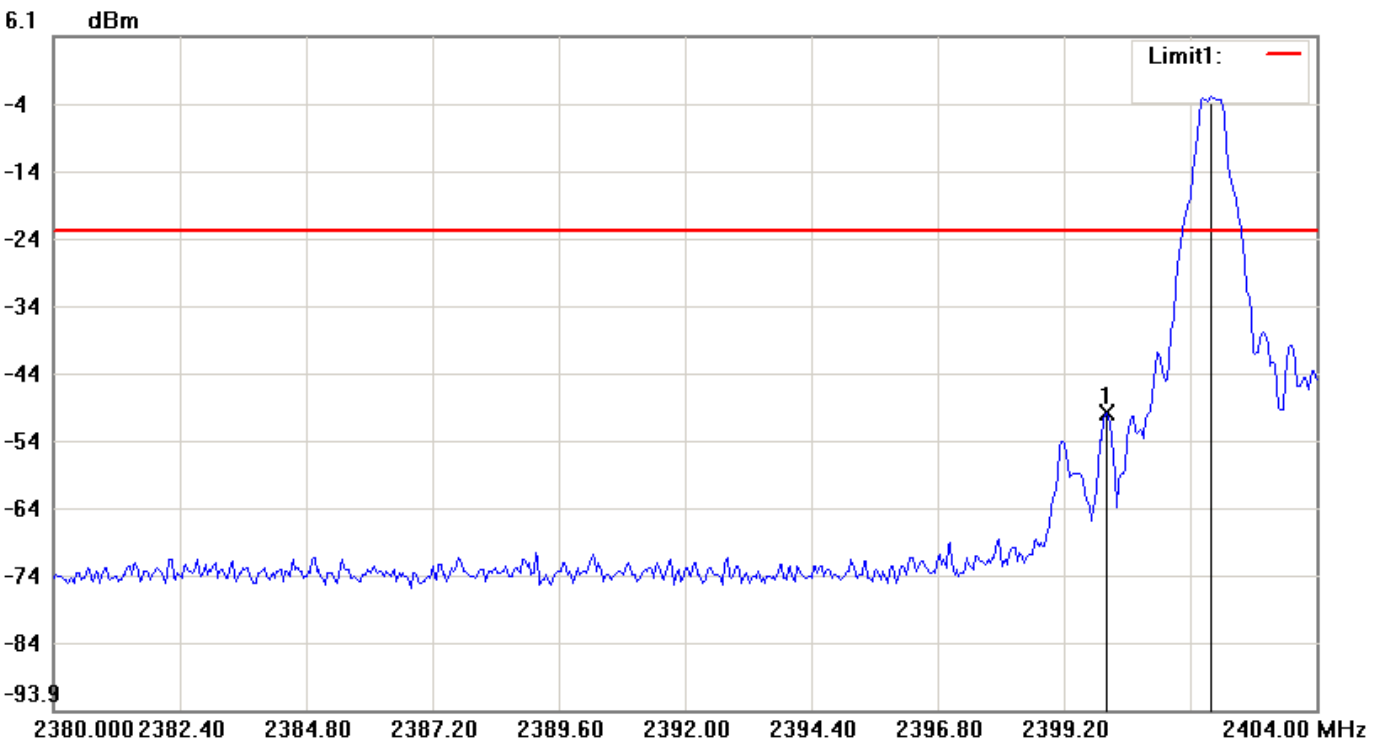
File: FT0044E\_BT\_2015 Data: #17

Date: 2015/1/6

Temperature: 22 °C

Time: AM 10:36:20

Humidity: 60 %



Condition: -22.72dBm

RF Conducted

EUT:

Sweep Time: 2.32ms Att.: 10dB

Model:

RBW: 100 KHz VBW: 300 KHz

Test Mode:

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

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2400.00000     | -49.81     |
| 2   | 2402.00000     | -2.72      |

File: FT0044E\_BT\_2015

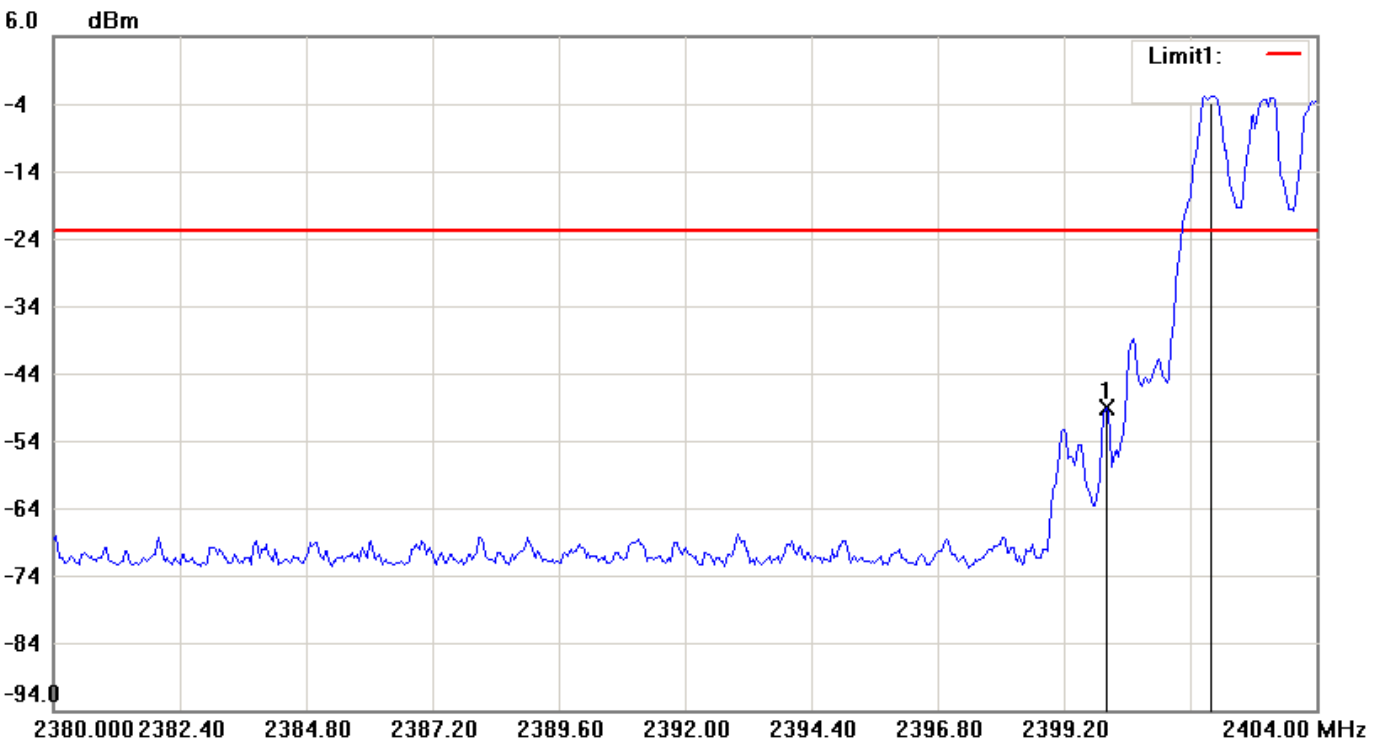
Data: #25

Date: 2015/1/6

Temperature: 22 °C

Time: AM 10:46:27

Humidity: 60 %



Condition: -22.8dBm

EUT:

Model:

Test Mode:

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

RF Conducted

Sweep Time: 2.32ms Att.: 10dB

RBW: 100 KHz VBW: 300 KHz

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2400.00000     | -49.25     |
| 2   | 2402.00000     | -2.80      |

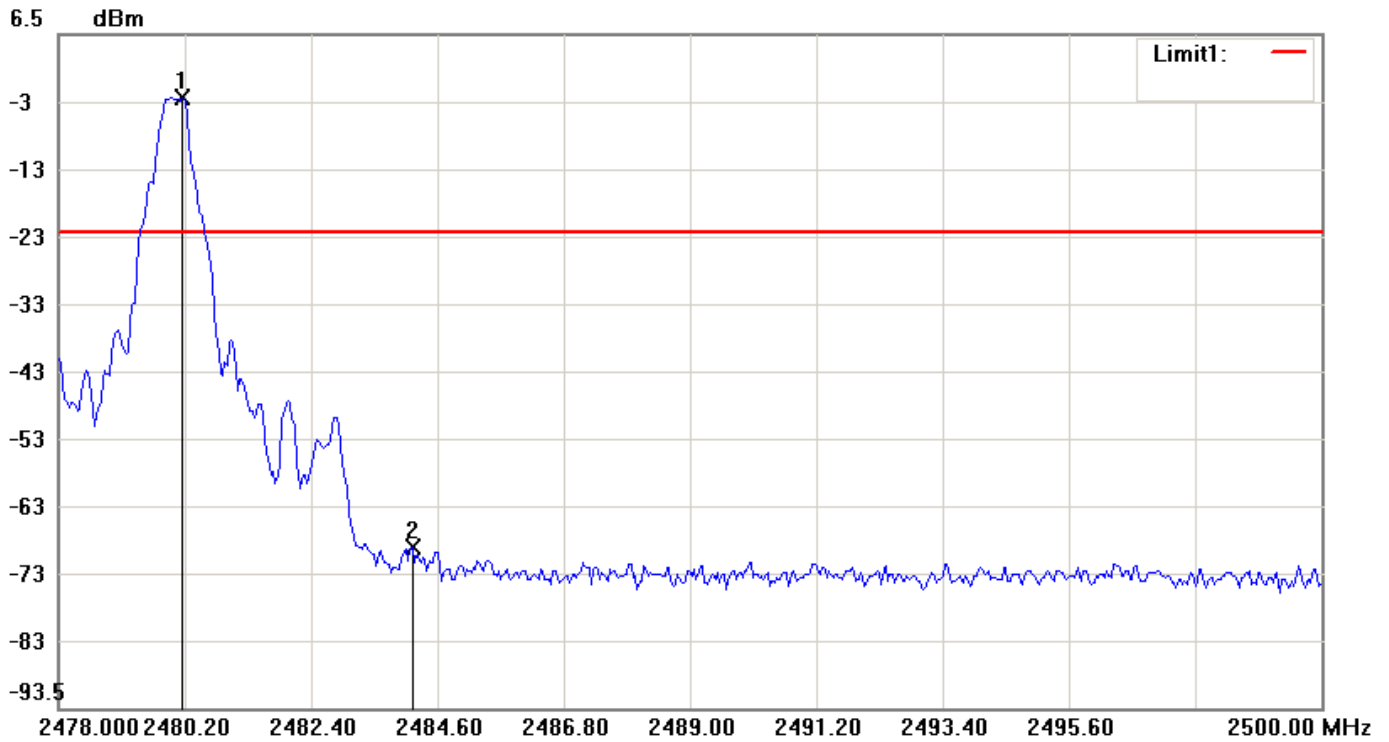
File: FT0044E\_BT\_2015 Data: #21

Date: 2015/1/6

Temperature: 22 °C

Time: AM 10:40:49

Humidity: 60 %



Condition: -22.79dBm

RF Conducted

EUT:

Sweep Time: 2.12ms Att.: 10dB

Model:

RBW: 100 KHz VBW: 300 KHz

Test Mode:

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

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2480.16330     | -2.79      |
| 2   | 2484.16000     | -69.68     |

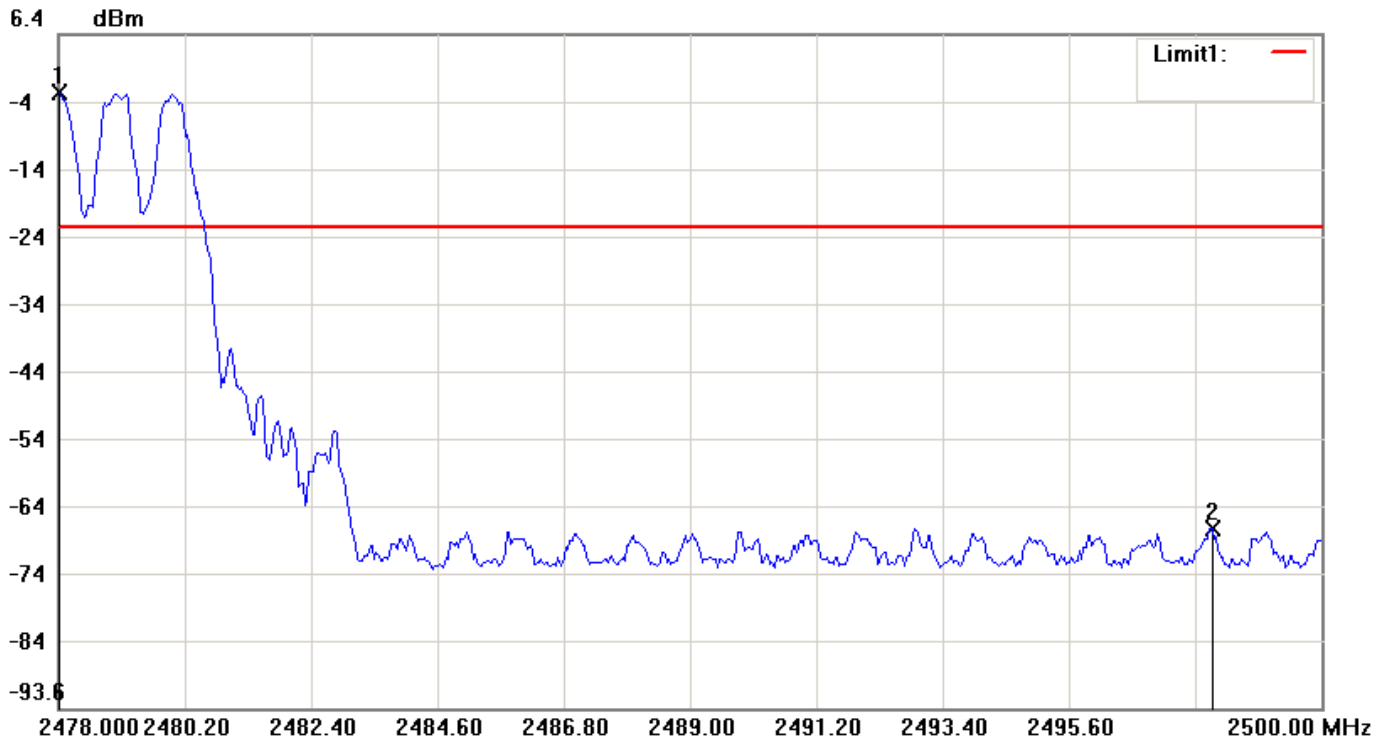
File: FT0044E\_BT\_2015 Data: #26

Date: 2015/1/6

Temperature: 22 °C

Time: AM 10:48:12

Humidity: 60 %



Condition: -22.13dBm

RF Conducted

EUT:

Sweep Time: 2.12ms Att.: 10dB

Model:

RBW: 100 KHz VBW: 300 KHz

Test Mode:

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

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2478.00000     | -2.13      |
| 2   | 2498.09330     | -66.90     |

File: FT0044E\_BT\_2015

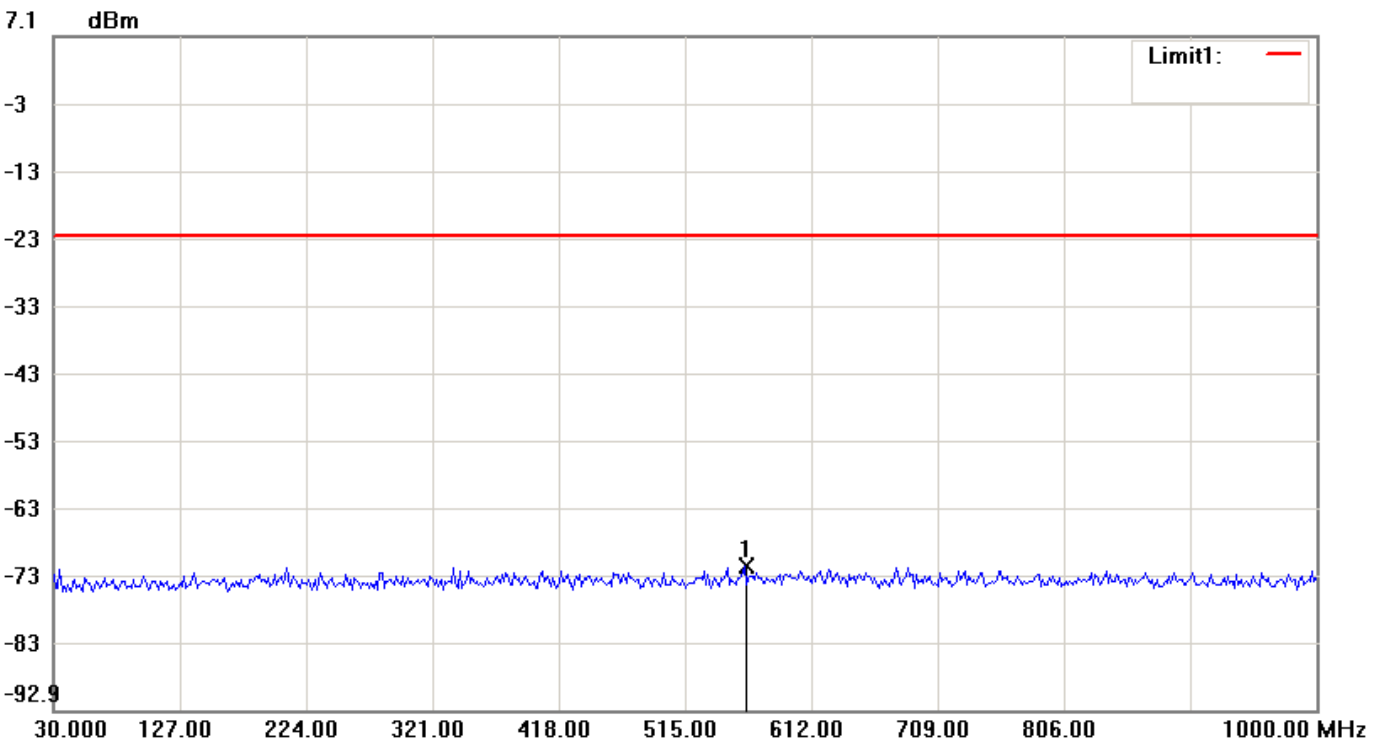
Data: #62

Date: 2015/1/21

Temperature: 22 °C

Time: AM 09:12:47

Humidity: 60 %



Condition: -22.48

Horizontal

EUT:

Sweep Time: 92.72ms Att.: 10dB

Model:

RBW: 100 KHz VBW: 300 KHz

Test Mode:

Note: FCC-BT Channel 00-Conducted Spurious-1

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 560.2667       | -71.45     |

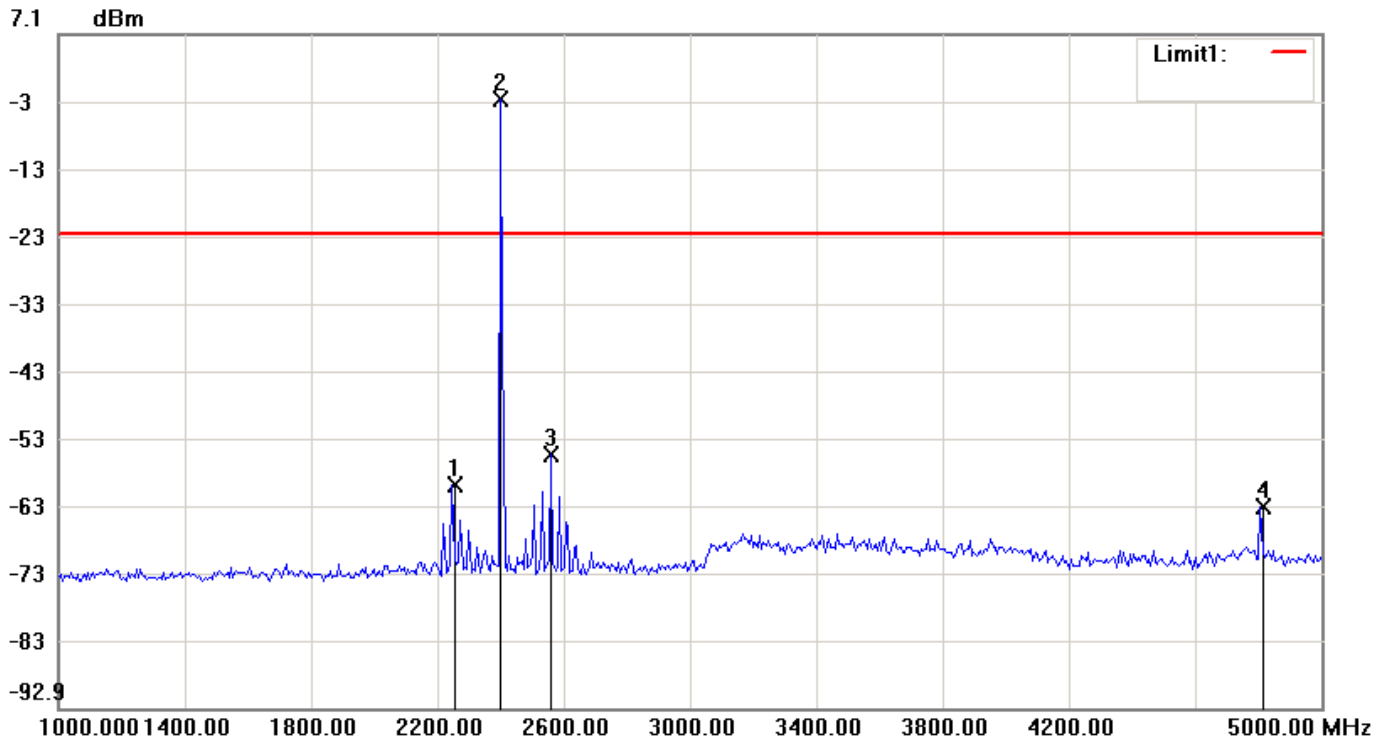
File: FT0044E\_BT\_2015 Data: #63

Date: 2015/1/21

Temperature: 22 °C

Time: AM 09:13:56

Humidity: 60 %



Condition:

Horizontal

EUT:

Sweep Time: 382.28ms Att.: 10dB

Model:

RBW: 100 KHz

VBW: 300 KHz

Test Mode:

Note: FCC-BT Channel 00-Conducted Spurious-2

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2246.66670     | -59.76     |
| 2   | 2400.00000     | -2.48      |
| 3   | 2560.00000     | -55.38     |
| 4   | 4806.66670     | -63.10     |



File: FT0044E\_BT\_2015

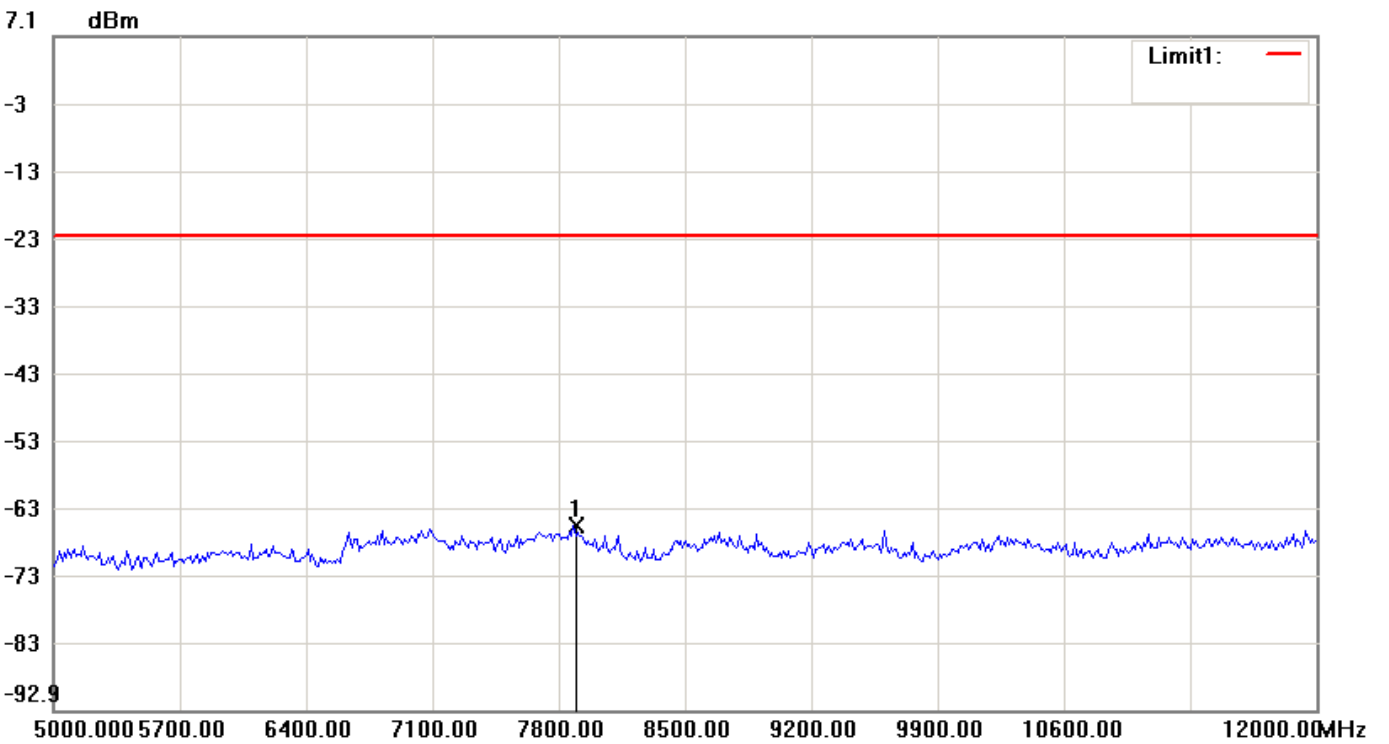
Data: #64

Date: 2015/1/21

Temperature: 22 °C

Time: AM 09:15:12

Humidity: 60 %



Condition: -22.48

EUT:

Model:

Test Mode:

Note: FCC-BT Channel 00-Conducted Spurious-3

Horizontal

Sweep Time: 669ms Att.: 10dB

RBW: 100 KHz VBW: 300 KHz

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 7881.66670     | -65.52     |

File: FT0044E\_BT\_2015

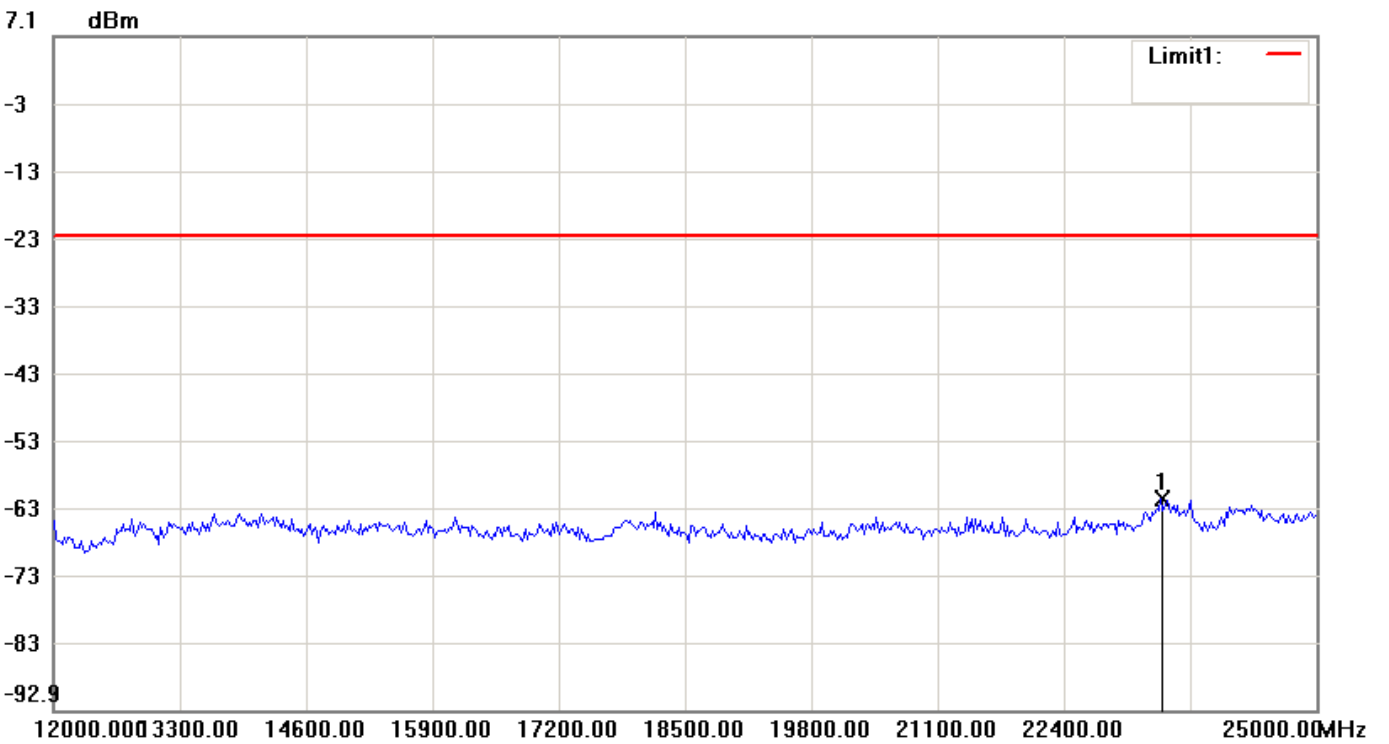
Data: #65

Date: 2015/1/21

Temperature: 22 °C

Time: AM 09:15:57

Humidity: 60 %



Condition: -22.48

Horizontal

EUT:

Sweep Time: 1242.44ms Att.: 10dB

Model:

RBW: 100 KHz VBW: 300 KHz

Test Mode:

Note: FCC-BT Channel 00-Conducted Spurious-4

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 23396.66670    | -61.50     |

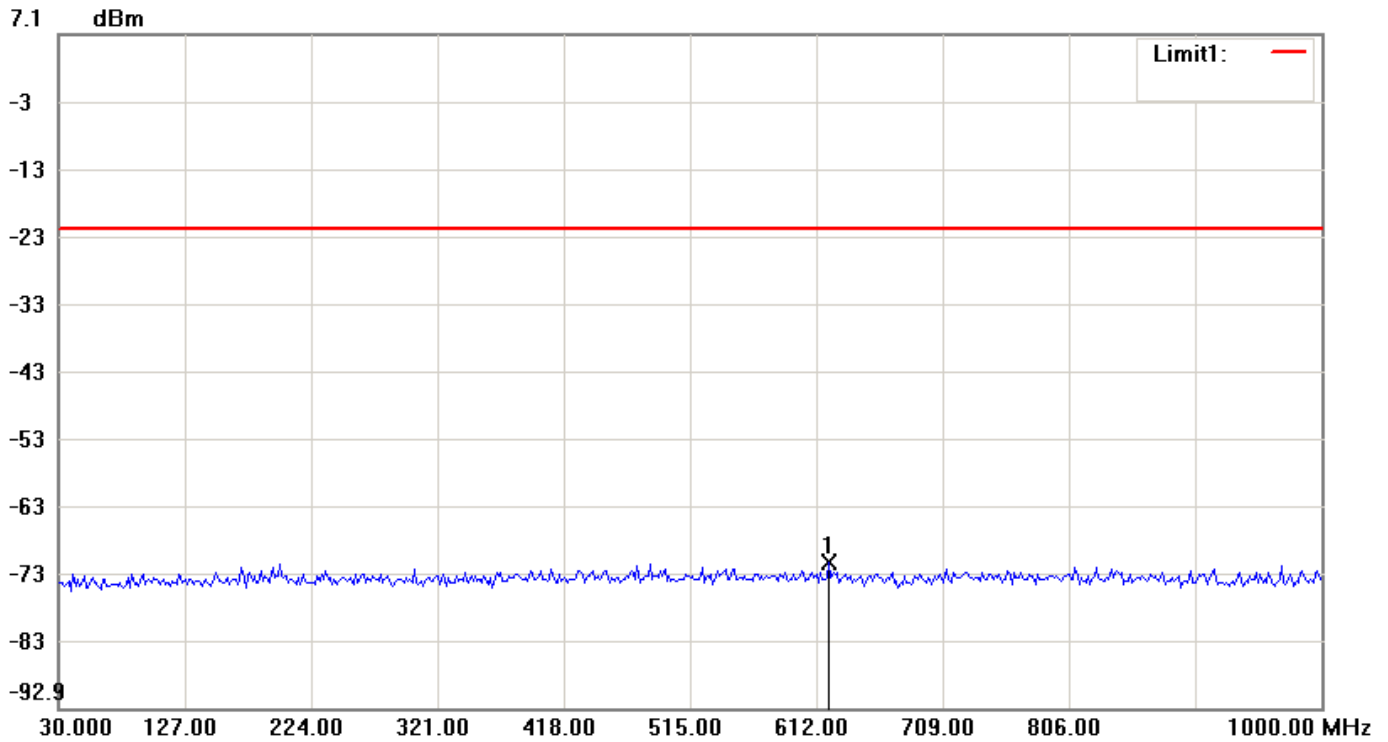
File: FT0044E\_BT\_2015 Data: #66

Date: 2015/1/21

Temperature: 22 °C

Time: AM 09:23:51

Humidity: 60 %



Condition: -21.80

Horizontal

EUT:

Sweep Time: 200ms Att.: 10dB

Model:

RBW: 100 KHz VBW: 300 KHz

Test Mode:

Note: FCC-BT Channel 39-Conducted Spurious-1

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 621.7000       | -71.25     |

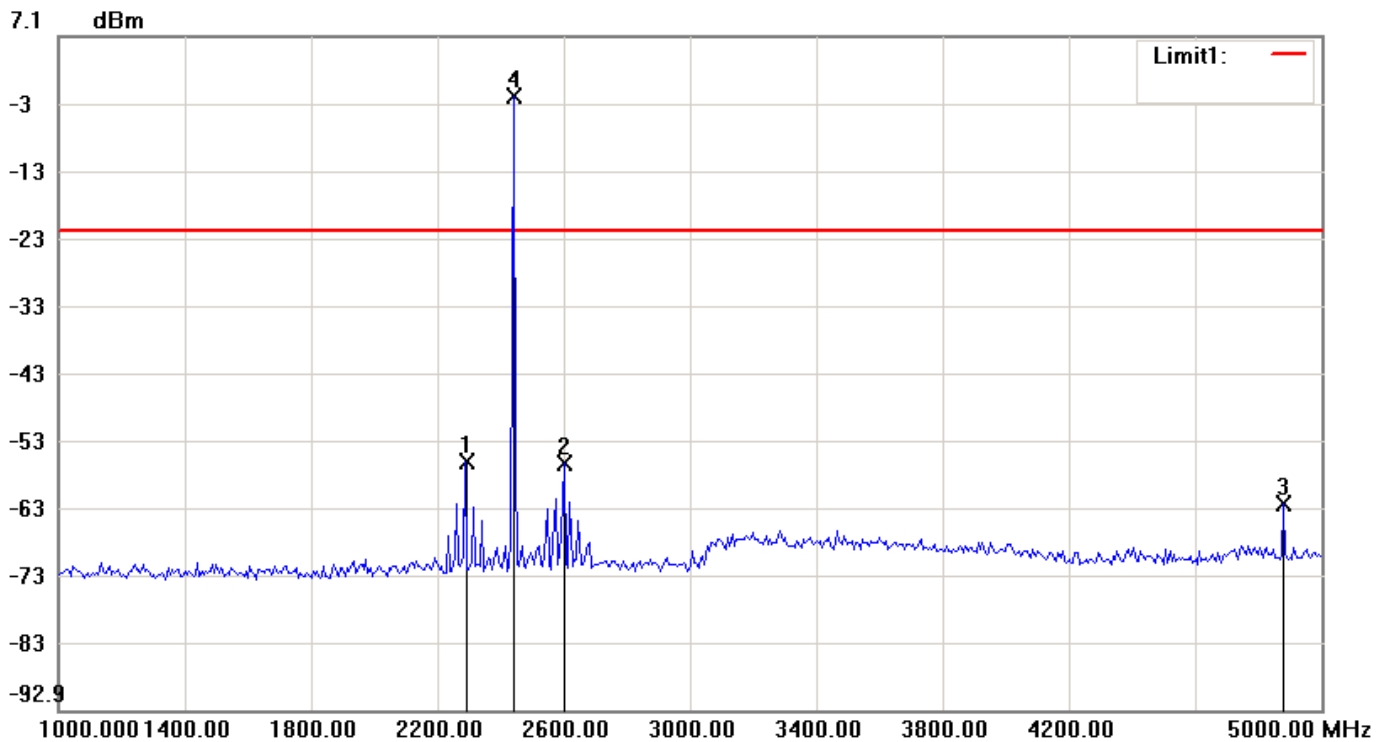
File: FT0044E\_BT\_2015 Data: #67

Date: 2015/1/21

Temperature: 22 °C

Time: AM 09:24:49

Humidity: 60 %



Condition:

Horizontal

EUT:

Sweep Time: 200ms Att.: 10dB

Model:

RBW: 100 KHz

VBW: 300 KHz

Test Mode:

Note: FCC-BT Channel 39-Conducted Spurious-2

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2286.66670     | -56.03     |
| 2   | 2600.00000     | -56.35     |
| 3   | 4880.00000     | -62.28     |
| 4   | 2440.00000     | -1.80      |

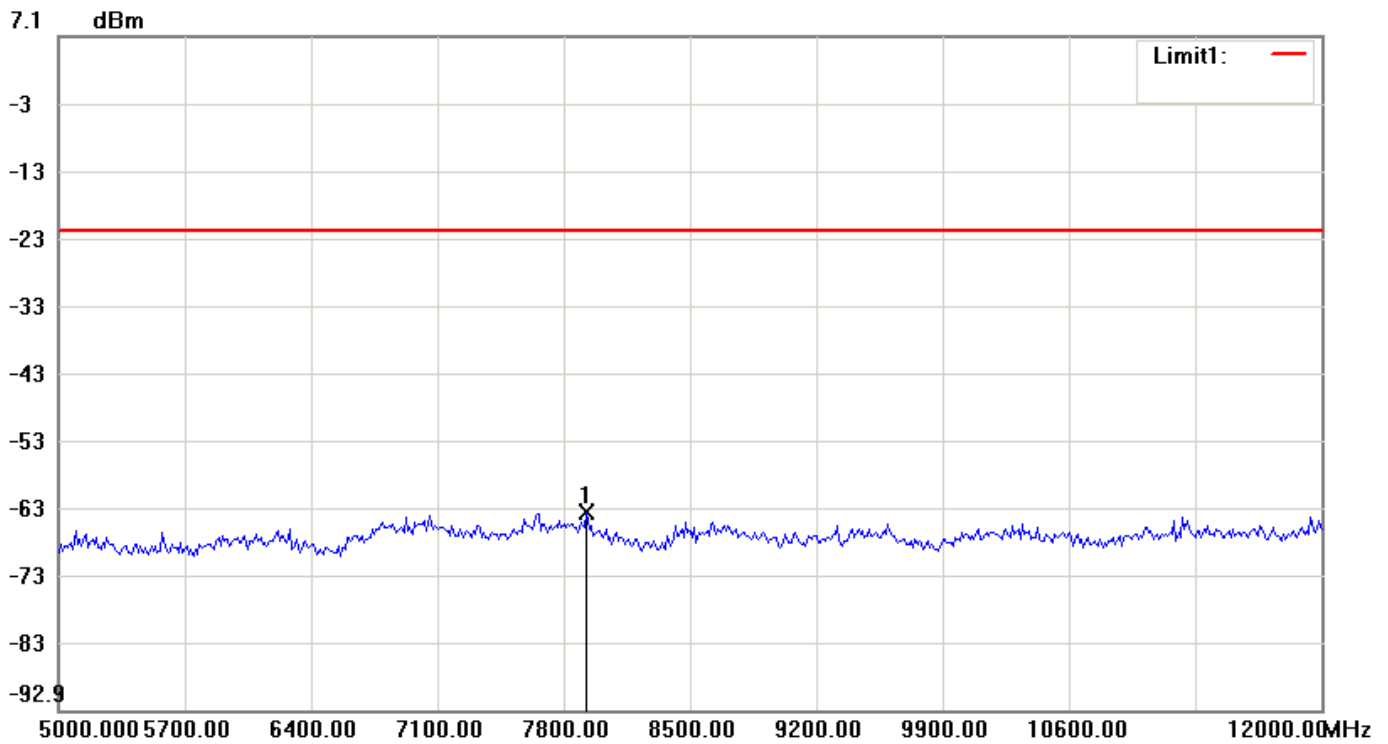
File: FT0044E\_BT\_2015 Data: #68

Date: 2015/1/21

Temperature: 22 °C

Time: AM 09:26:09

Humidity: 60 %



Condition: -21.80

Horizontal

EUT:

Sweep Time: 200ms Att.: 10dB

Model:

RBW: 100 KHz VBW: 300 KHz

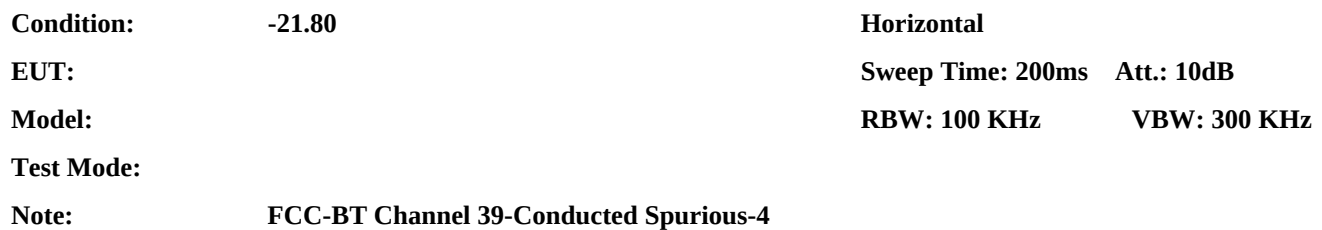
Test Mode:

Note: FCC-BT Channel 39-Conducted Spurious-3

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 7928.33330     | -63.59     |

**Temperature:** 22 °C

**Humidity:** 60 %



| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 24176.66670    | -60.30     |

File: FT0044E\_BT\_2015

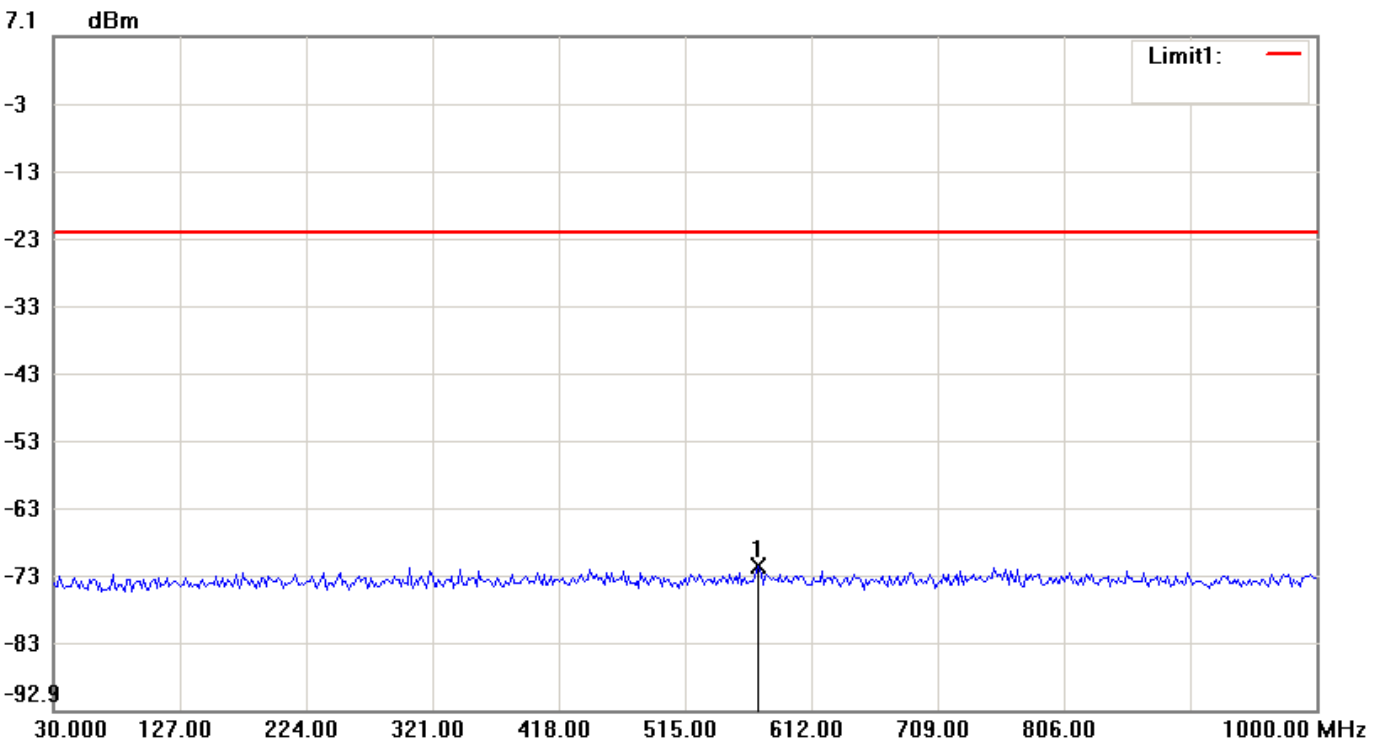
Data: #70

Date: 2015/1/21

Time: AM 09:28:47

Temperature: 22 °C

Humidity: 60 %



Condition: -22.13

EUT:

Model:

Test Mode:

Note: FCC-BT Channel 78-Conducted Spurious-1

Horizontal

Sweep Time: 200ms Att.: 10dB

RBW: 100 KHz VBW: 300 KHz

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 571.5833       | -71.43     |

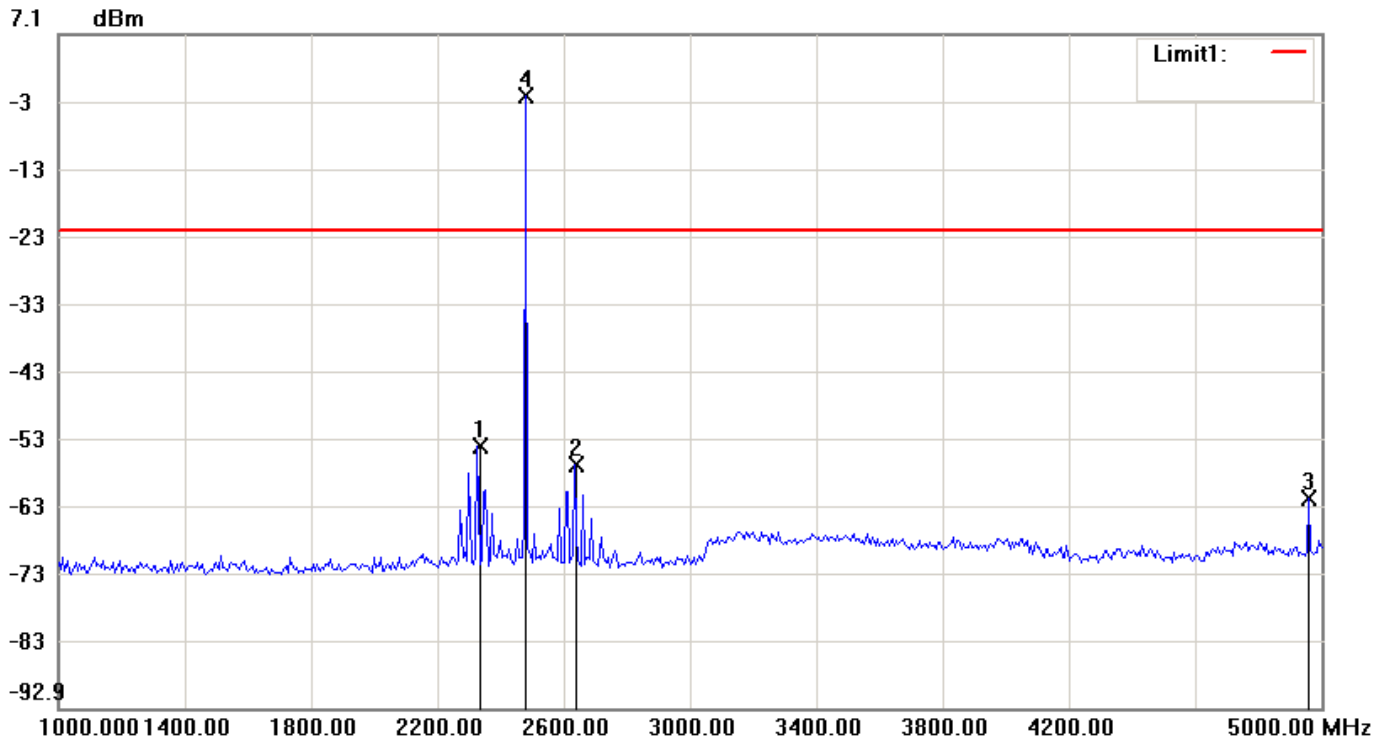
File: FT0044E\_BT\_2015 Data: #71

Date: 2015/1/21

Temperature: 22 °C

Time: AM 09:29:44

Humidity: 60 %



Condition:

Horizontal

EUT:

Sweep Time: 200ms Att.: 10dB

Model:

RBW: 100 KHz

VBW: 300 KHz

Test Mode:

Note: FCC-BT Channel 78-Conducted Spurious-2

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2326.66670     | -54.00     |
| 2   | 2633.33330     | -56.73     |
| 3   | 4960.00000     | -61.74     |
| 4   | 2480.00000     | -2.13      |



File: FT0044E\_BT\_2015

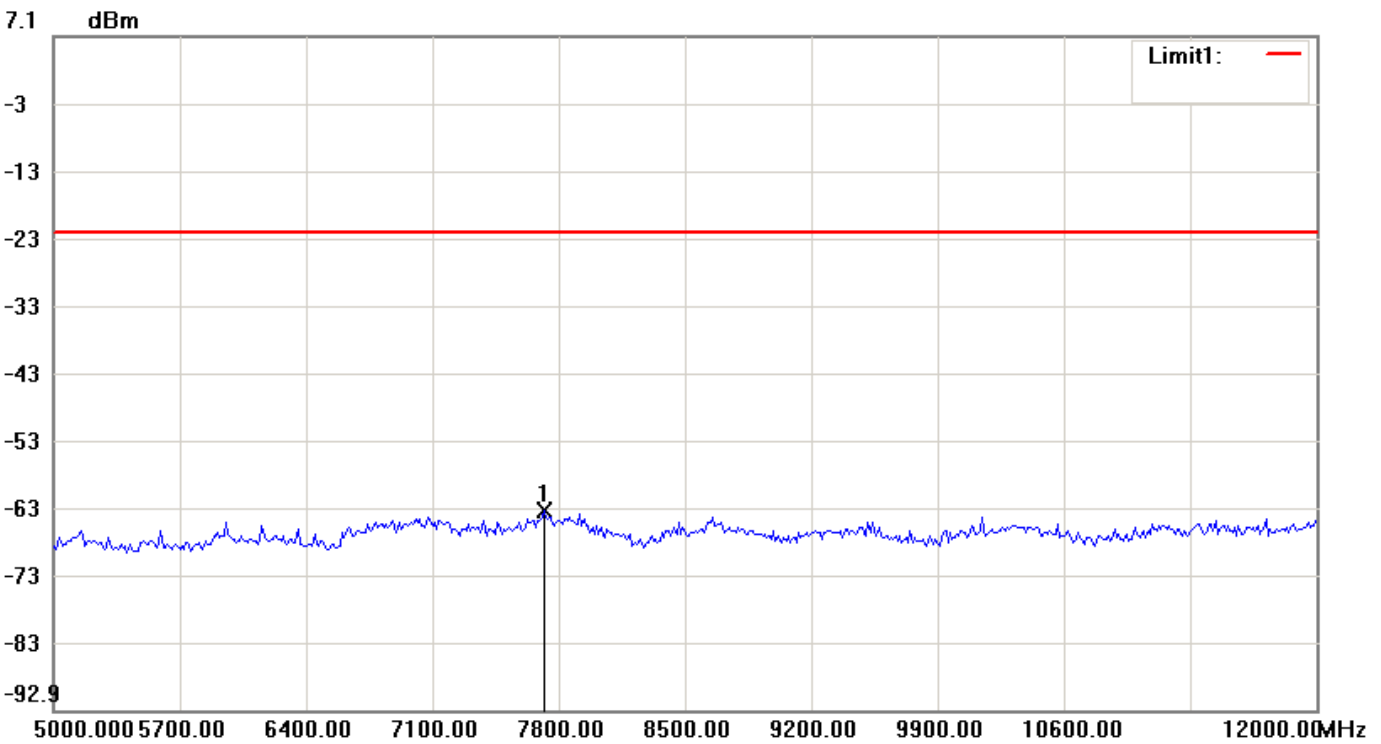
Data: #72

Date: 2015/1/21

Temperature: 22 °C

Time: AM 09:31:29

Humidity: 60 %



Condition: -22.13

EUT:

Model:

Test Mode:

Note: FCC-BT Channel 78-Conducted Spurious-3

Horizontal

Sweep Time: 200ms Att.: 10dB

RBW: 100 KHz VBW: 300 KHz

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 7718.33330     | -63.36     |

File: FT0044E\_BT\_2015

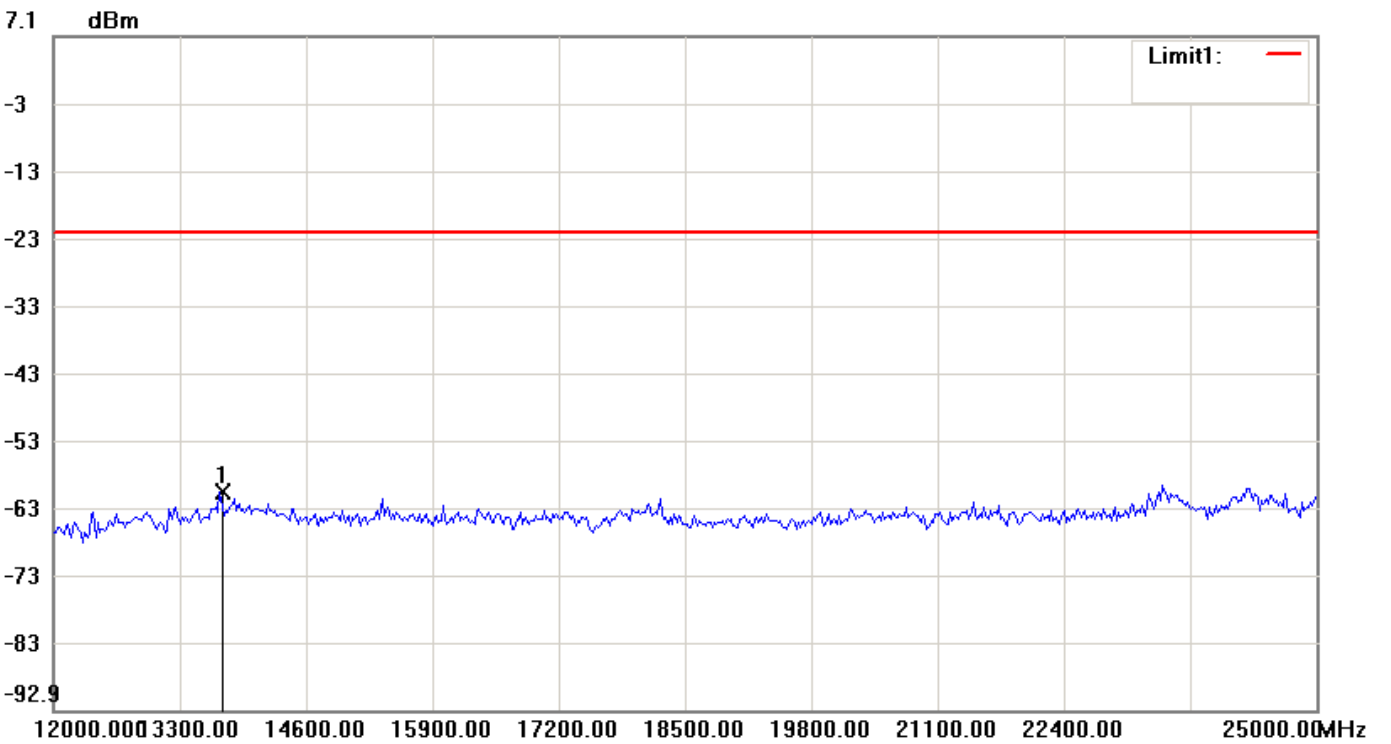
Data: #73

Date: 2015/1/21

Temperature: 22 °C

Time: AM 09:32:07

Humidity: 60 %



Condition: -22.13

EUT:

Model:

Test Mode:

Note: FCC-BT Channel 78-Conducted Spurious-4

Horizontal

Sweep Time: 200ms Att.: 10dB

RBW: 100 KHz VBW: 300 KHz

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 13711.66670    | -60.56     |

9.4.2 Operation Mode: EDR

Test Date: Jan. 06, 2015

Temperature : 22°C

Humidity: 60%

Test Date: Jan. 21, 2015

Temperature : 22°C

Humidity: 60%

| Channel | Test Frequency Range    | Note            | Chart      |
|---------|-------------------------|-----------------|------------|
| 0       | 2350 MHz - 2450 MHz     | Lower Band Edge | Page 68-69 |
| 78      | 2433.5 MHz - 2533.5 MHz | Upper Band Edge | Page 70-71 |
| 0       | 30 MHz - 25 GHz         |                 | Page 72-75 |
| 39      | 30 MHz - 25 GHz         |                 | Page 76-79 |
| 78      | 30 MHz - 25 GHz         |                 | Page 80-83 |

***Note: Please refer to page 68 to page 83 for chart.***

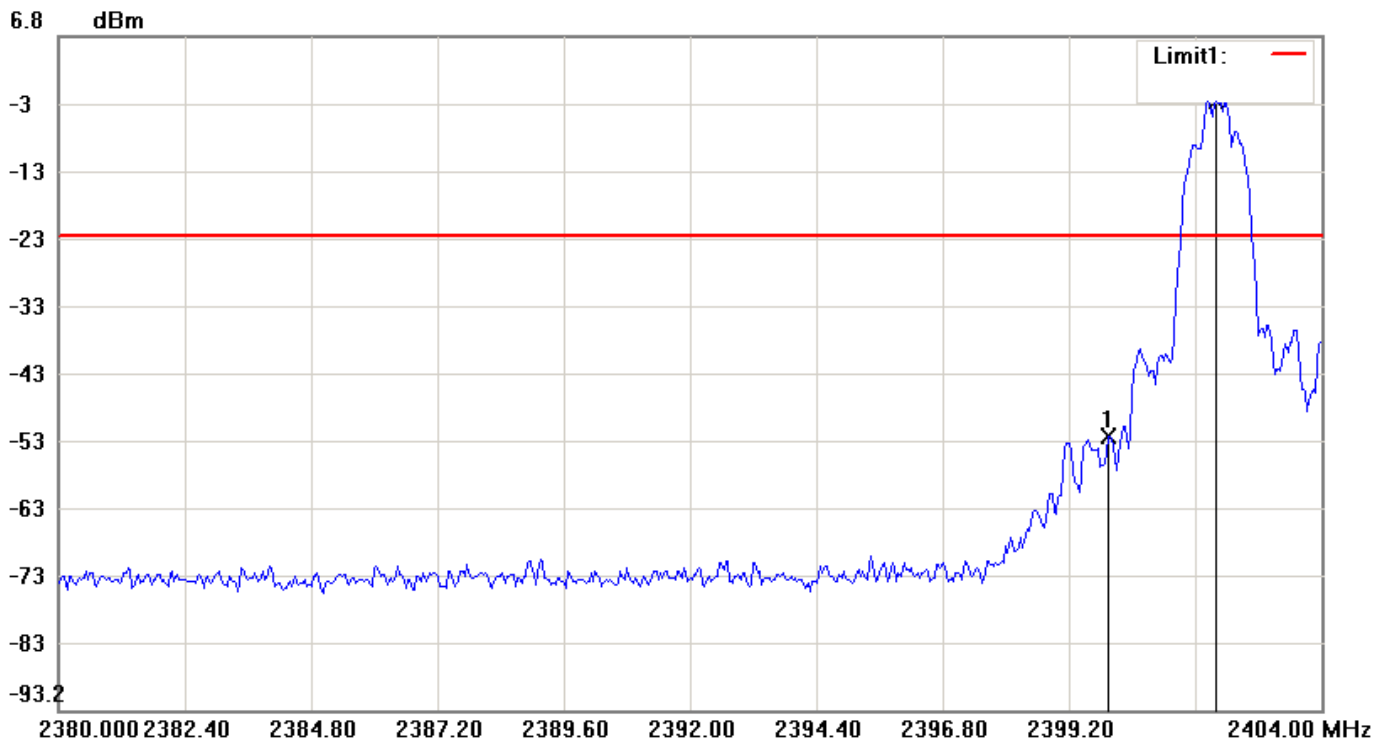
File: FT0044E\_BT\_2015 Data: #40

Date: 2015/1/6

Temperature: 22 °C

Time: AM 11:01:08

Humidity: 60 %



Condition: -22.75dBm

RF Conducted

EUT:

Sweep Time: 2.32ms Att.: 10dB

Model:

RBW: 100 KHz VBW: 300 KHz

Test Mode:

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

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2399.96000     | -52.54     |
| 2   | 2402.00000     | -2.75      |

File: FT0044E\_BT\_2015

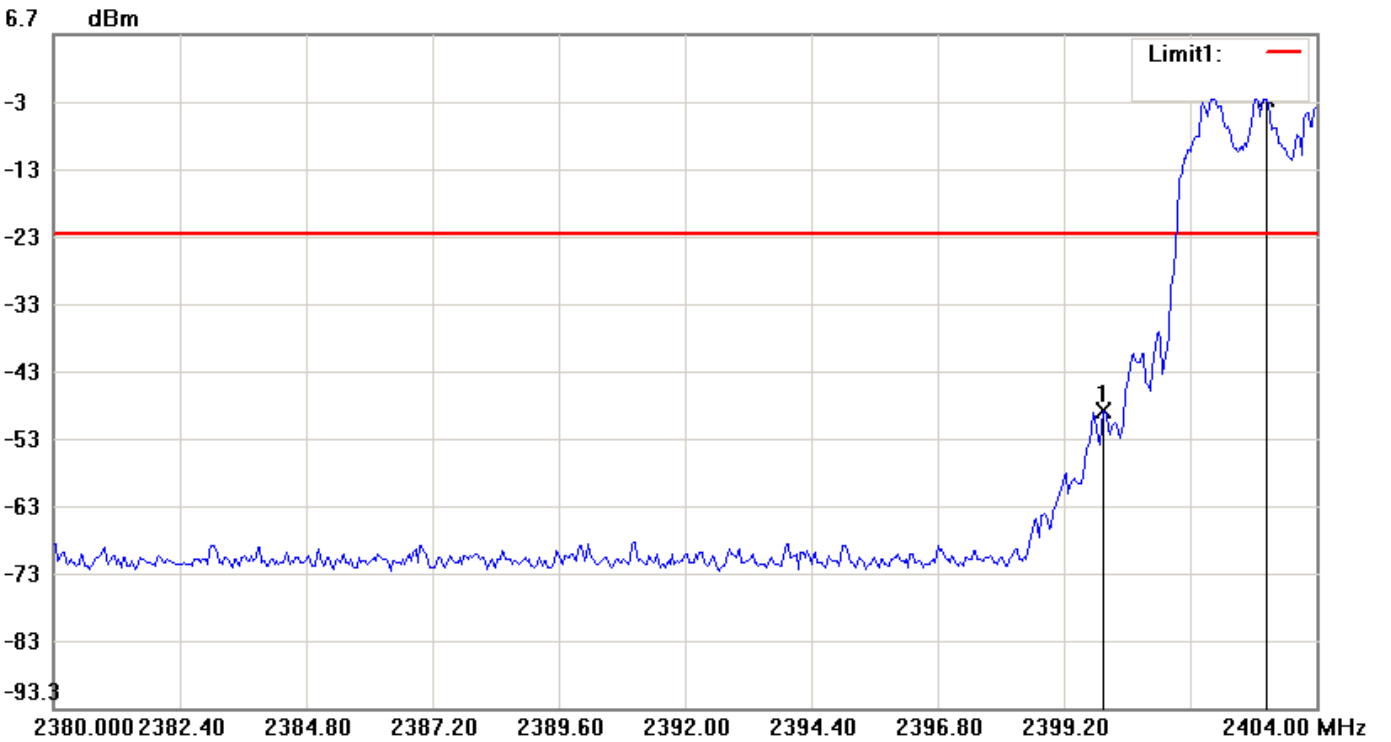
Data: #48

Date: 2015/1/6

Temperature: 22 °C

Time: AM 11:14:56

Humidity: 60 %



Condition: -22.92dBm

EUT:

Model:

Test Mode:

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

RF Conducted

Sweep Time: 2.32ms Att.: 10dB

RBW: 100 KHz VBW: 300 KHz

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2399.96000     | -49.06     |
| 2   | 2403.04000     | -2.92      |

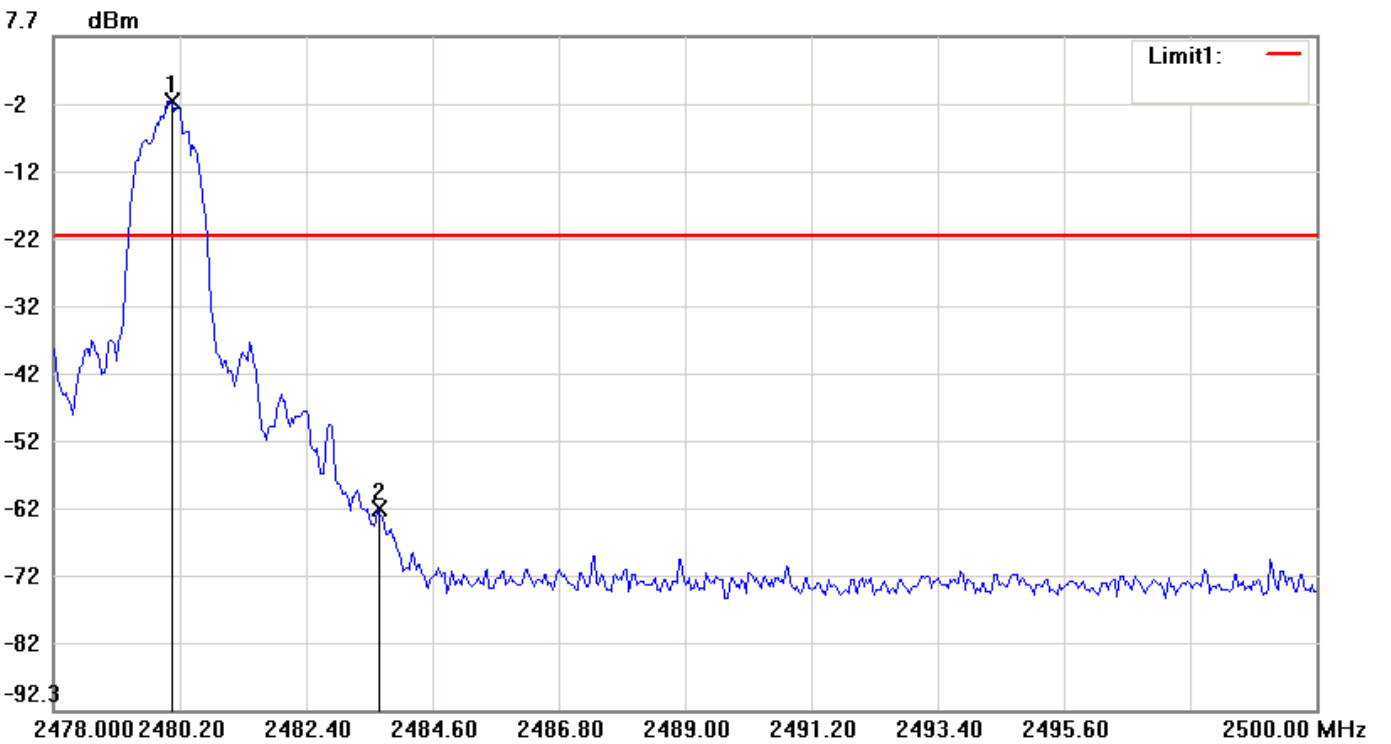
File: FT0044E\_BT\_2015 Data: #44

Date: 2015/1/6

Temperature: 22 °C

Time: AM 11:05:47

Humidity: 60 %



Condition: -21.94dBm

RF Conducted

EUT:

Sweep Time: 2.12ms Att.: 10dB

Model:

RBW: 100 KHz VBW: 300 KHz

Test Mode:

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

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2480.01670     | -1.94      |
| 2   | 2483.64670     | -62.50     |

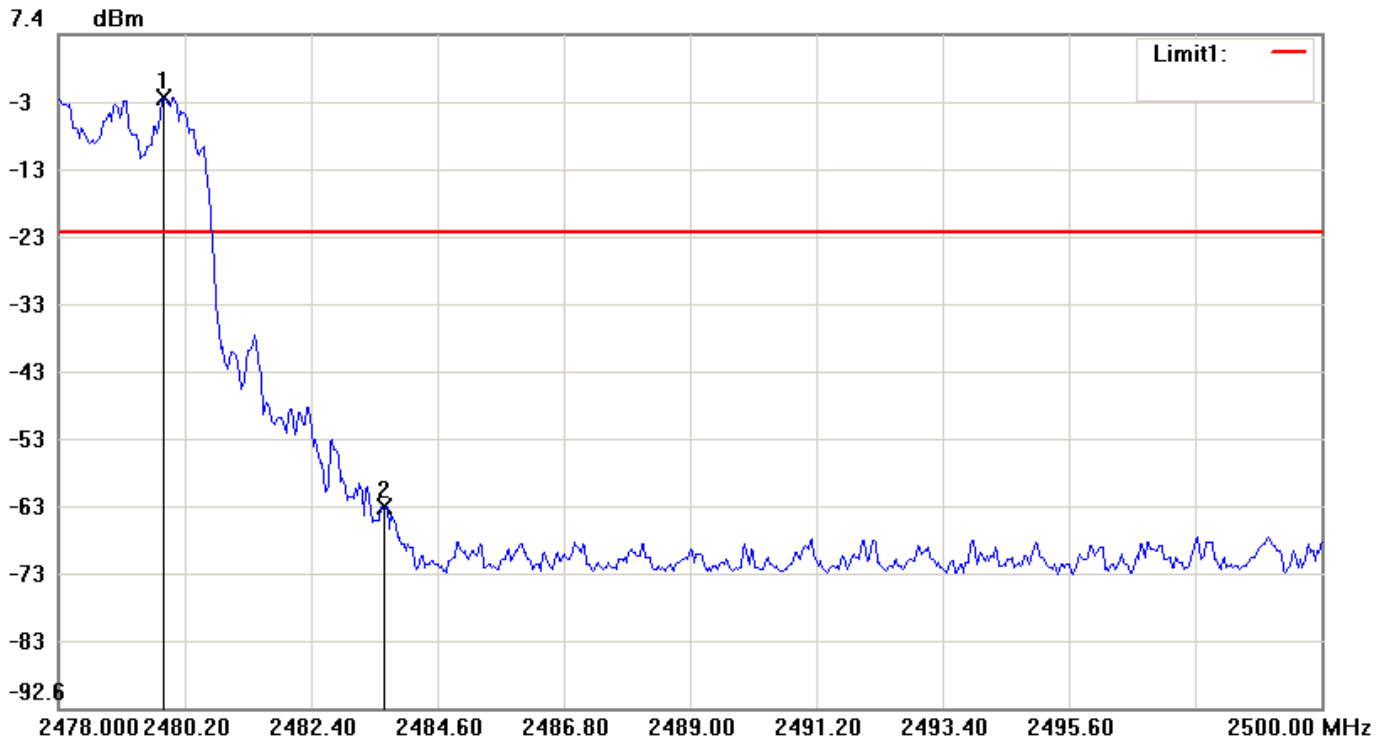
File: FT0044E\_BT\_2015 Data: #49

Date: 2015/1/6

Temperature: 22 °C

Time: AM 11:16:42

Humidity: 60 %



Condition: -21.85dBm

RF Conducted

EUT:

Sweep Time: 2.12ms Att.: 10dB

Model:

RBW: 100 KHz

VBW: 300 KHz

Test Mode:

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

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2479.83330     | -1.85      |
| 2   | 2483.64670     | -62.60     |

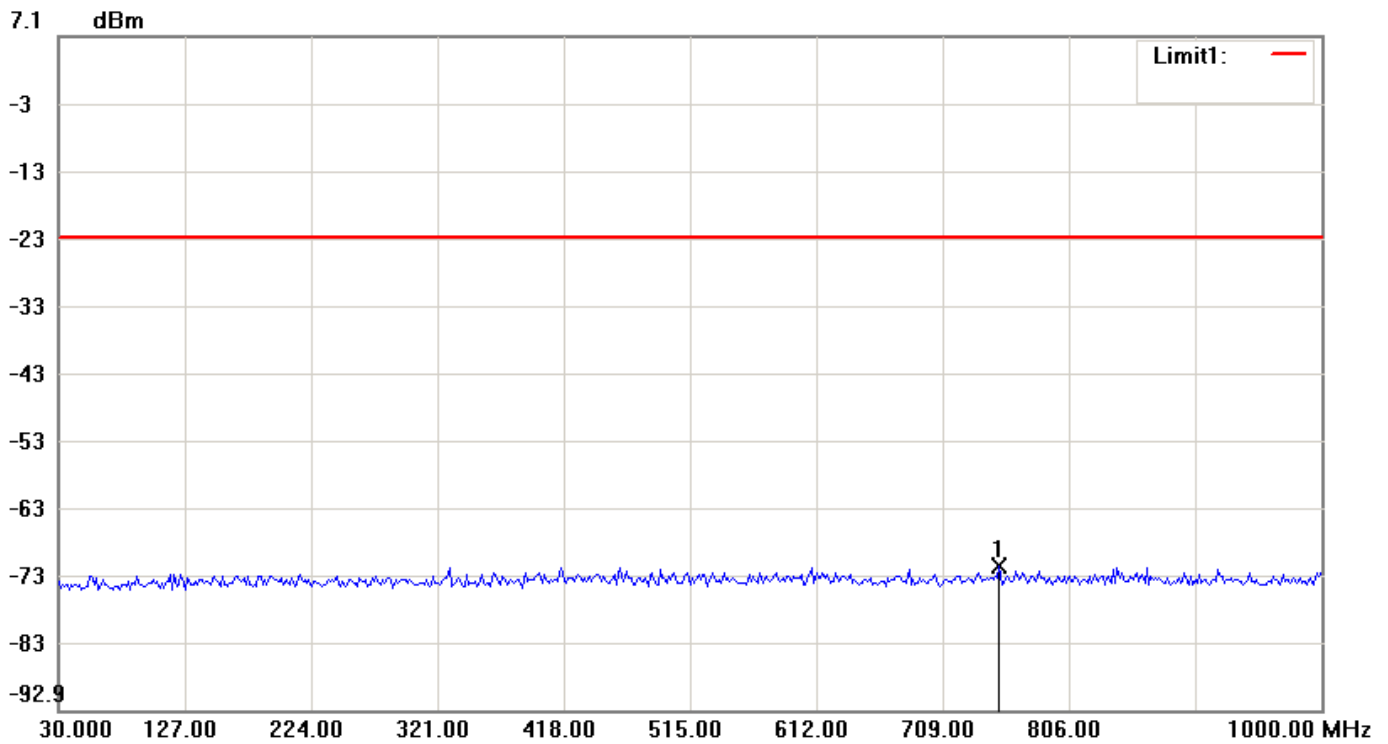
File: FT0044E\_BT\_2015 Data: #74

Date: 2015/1/21

Temperature: 22 °C

Time: AM 09:42:24

Humidity: 60 %



Condition: -22.71

Horizontal

EUT:

Sweep Time: 200ms Att.: 10dB

Model:

RBW: 100 KHz VBW: 300 KHz

Test Mode:

Note: FCC-BT Channel 00-Conducted Spurious-1

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 752.6500       | -71.39     |



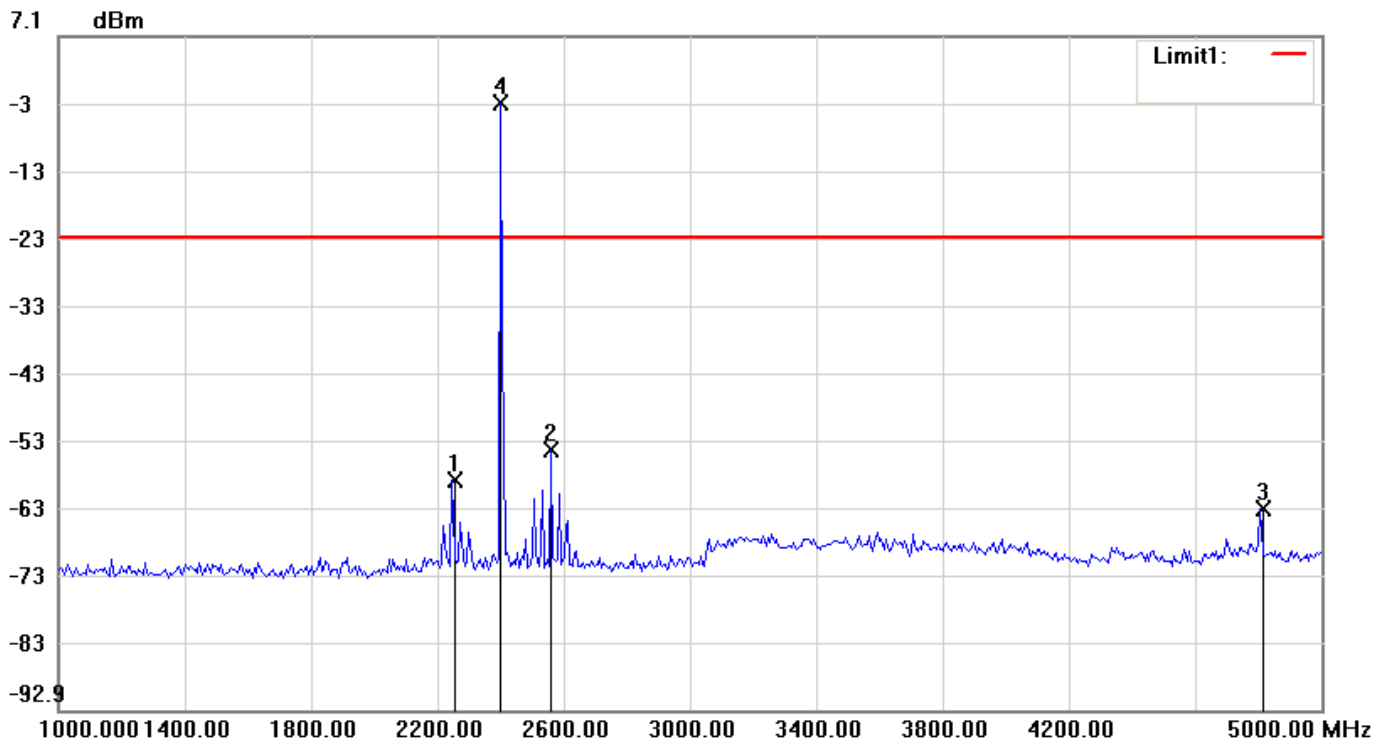
File: FT0044E\_BT\_2015 Data: #75

Date: 2015/1/21

Temperature: 22 °C

Time: AM 09:43:25

Humidity: 60 %



Condition:

Horizontal

EUT:

Sweep Time: 200ms Att.: 10dB

Model:

RBW: 100 KHz

VBW: 300 KHz

Test Mode:

Note: FCC-BT Channel 00-Conducted Spurious-2

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2246.66670     | -58.87     |
| 2   | 2560.00000     | -54.29     |
| 3   | 4806.66670     | -63.02     |
| 4   | 2400.00000     | -2.71      |

File: FT0044E\_BT\_2015

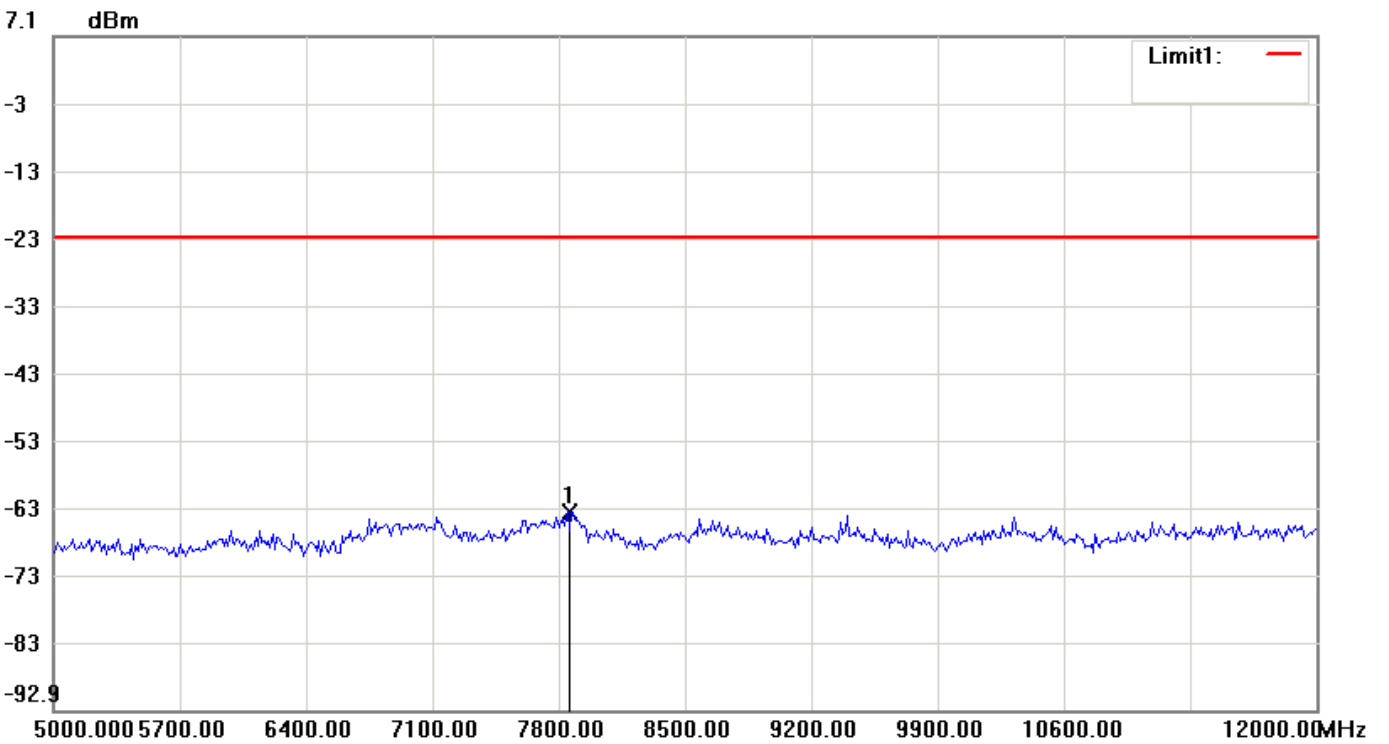
Data: #76

Date: 2015/1/21

Temperature: 22 °C

Time: AM 09:44:18

Humidity: 60 %



Condition: -22.71

Horizontal

EUT:

Sweep Time: 200ms Att.: 10dB

Model:

RBW: 100 KHz VBW: 300 KHz

Test Mode:

Note: FCC-BT Channel 00-Conducted Spurious-3

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 7846.66670     | -63.39     |

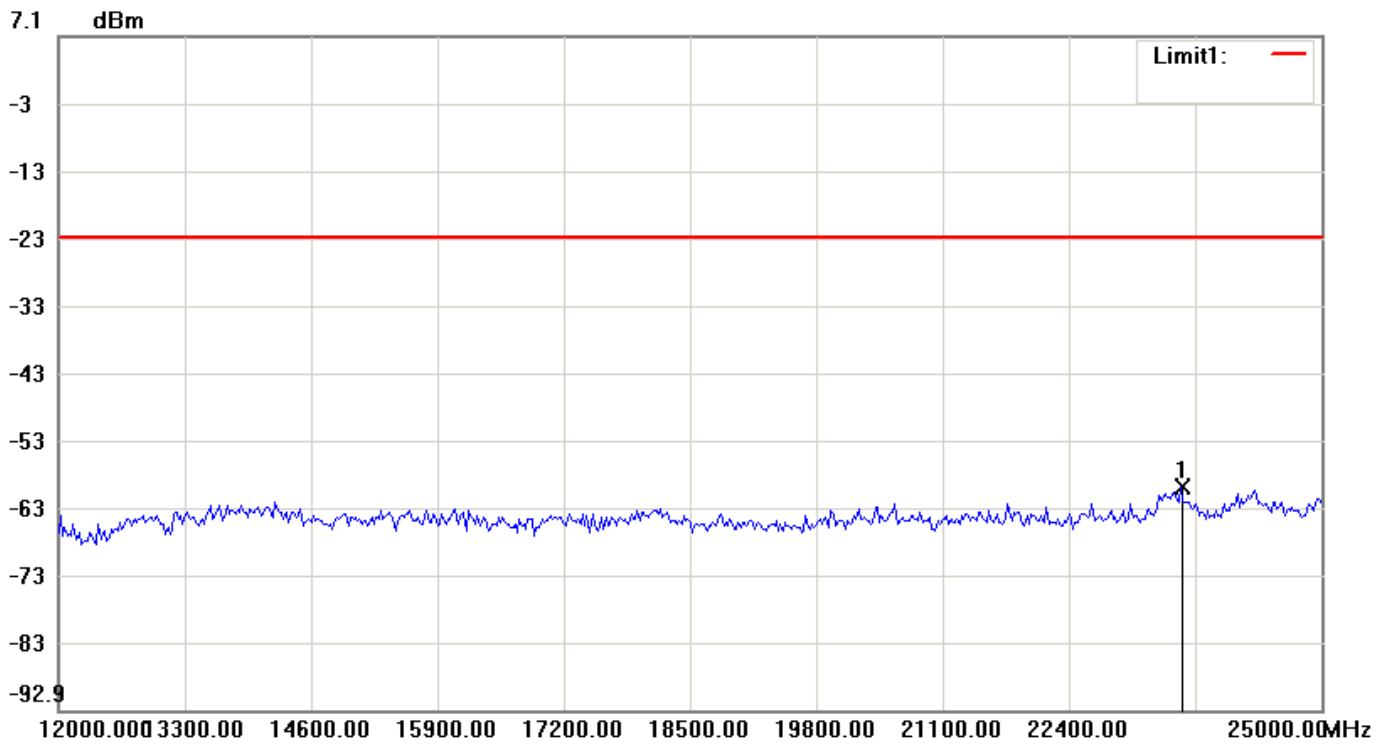
File: FT0044E\_BT\_2015 Data: #77

Date: 2015/1/21

Temperature: 22 °C

Time: AM 09:44:55

Humidity: 60 %



Condition: -22.71

Horizontal

EUT:

Sweep Time: 200ms Att.: 10dB

Model:

RBW: 100 KHz

VBW: 300 KHz

Test Mode:

Note: FCC-BT Channel 00-Conducted Spurious-4

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 23548.33330    | -59.79     |

File: FT0044E\_BT\_2015

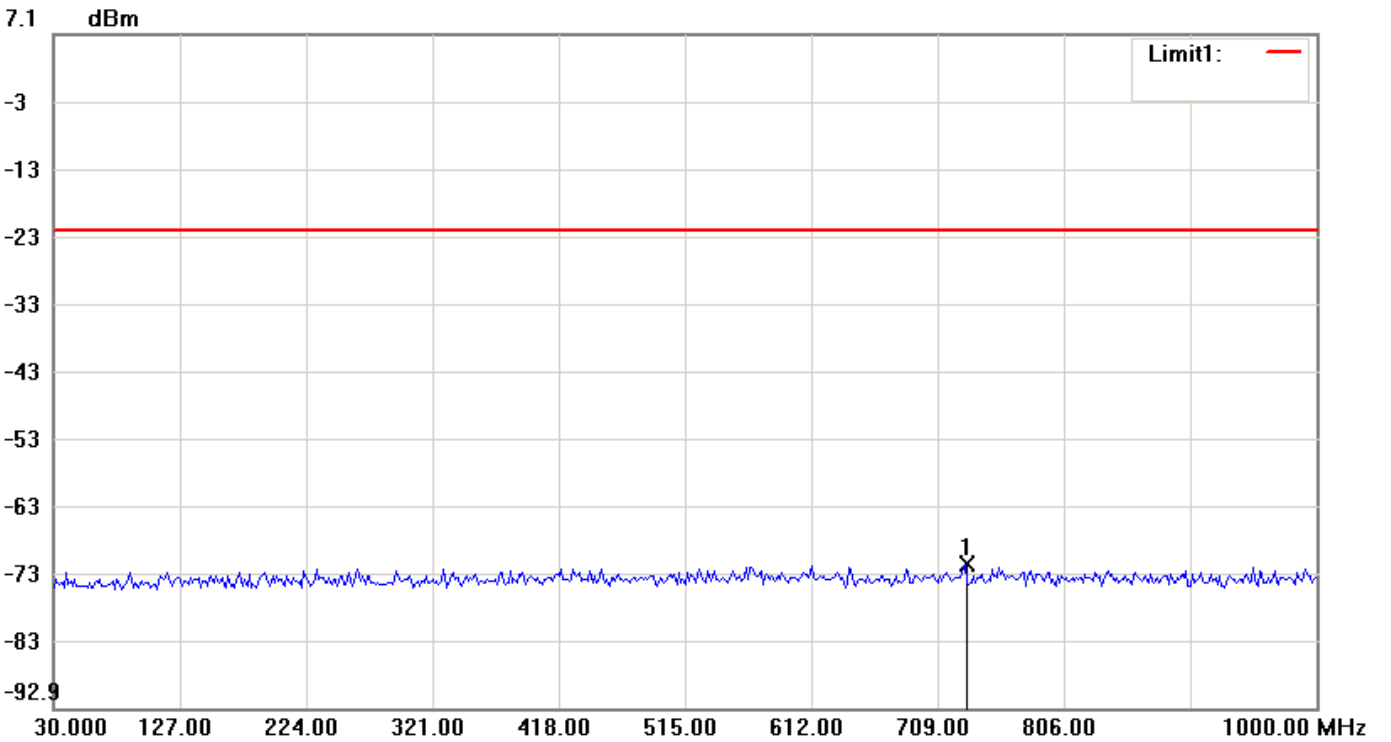
Data: #78

Date: 2015/1/21

Temperature: 22 °C

Time: AM 09:48:40

Humidity: 60 %



Condition: -21.97

Horizontal

EUT:

Sweep Time: 200ms Att.: 10dB

Model:

RBW: 100 KHz VBW: 300 KHz

Test Mode:

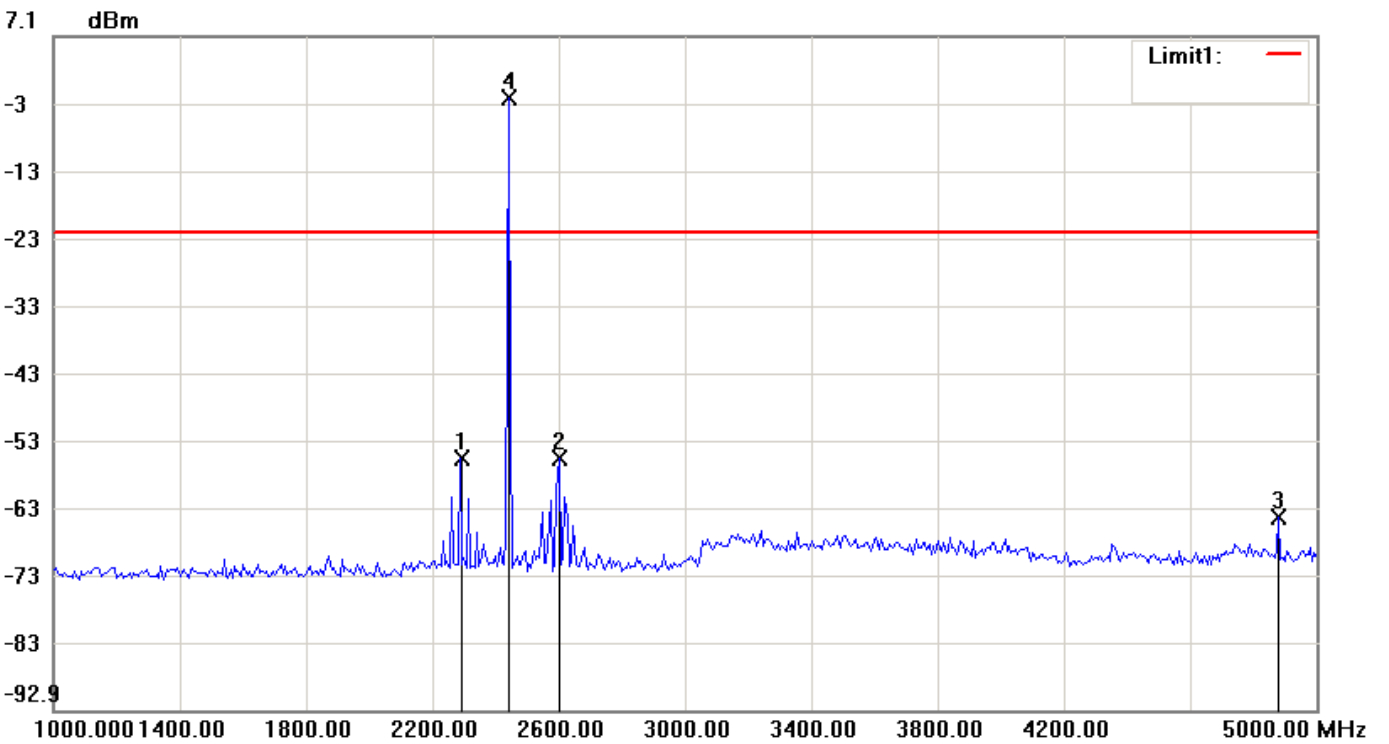
Note: FCC-BT Channel 39-Conducted Spurious-1

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 730.0167       | -71.49     |

File: FT0044E\_BT\_2015    Data:    #79

Date: 2015/1/21    Temperature: 22 °C

Time: AM 09:49:38    Humidity: 60 %



Condition: Horizontal

EUT: Sweep Time: 200ms    Att.: 10dB

Model: RBW: 100 KHz    VBW: 300 KHz

Test Mode:

Note: FCC-BT Channel 39-Conducted Spurious-2

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2286.66670     | -55.56     |
| 2   | 2600.00000     | -55.40     |
| 3   | 4880.00000     | -64.17     |
| 4   | 2440.00000     | -1.97      |

File: FT0044E\_BT\_2015

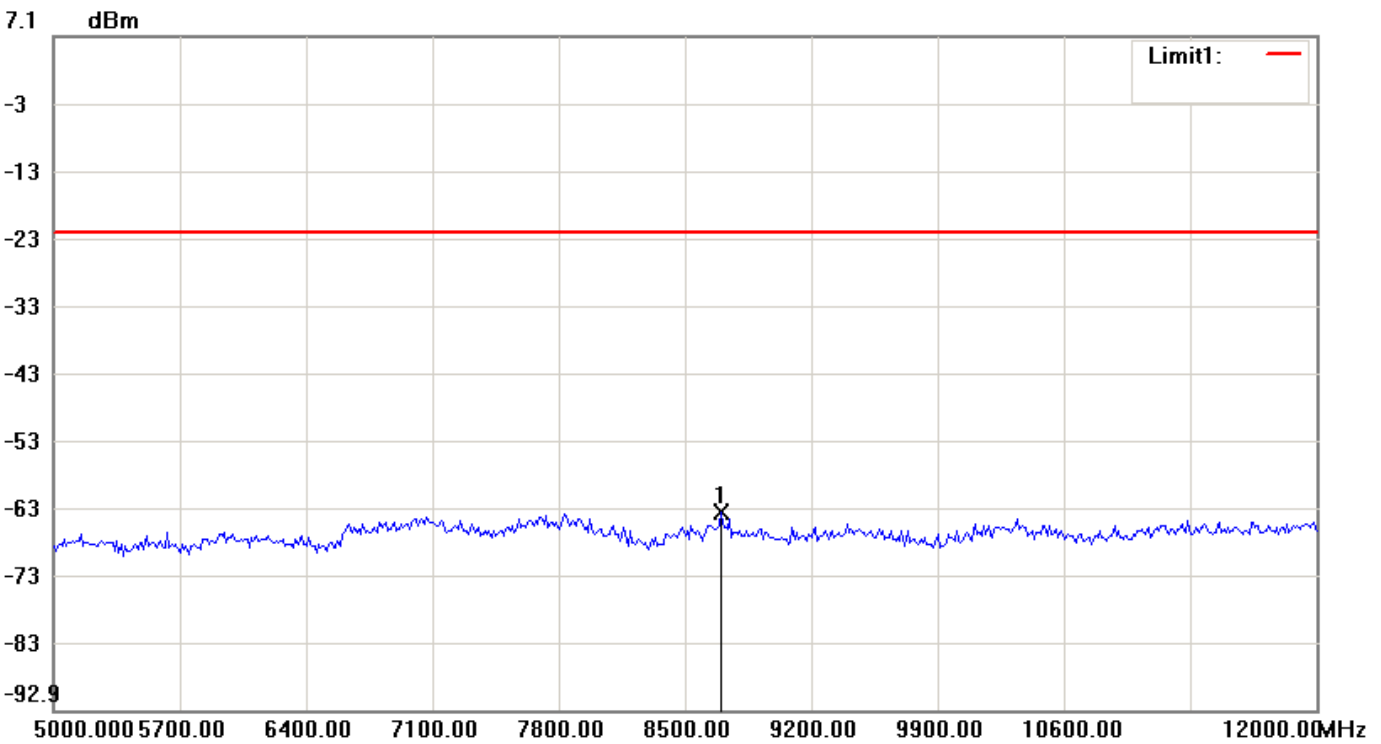
Data: #80

Date: 2015/1/21

Temperature: 22 °C

Time: AM 09:50:44

Humidity: 60 %



Condition: -21.97

Horizontal

EUT:

Sweep Time: 200ms Att.: 10dB

Model:

RBW: 100 KHz VBW: 300 KHz

Test Mode:

Note: FCC-BT Channel 39-Conducted Spurious-3

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 8698.33330     | -63.42     |

File: FT0044E\_BT\_2015

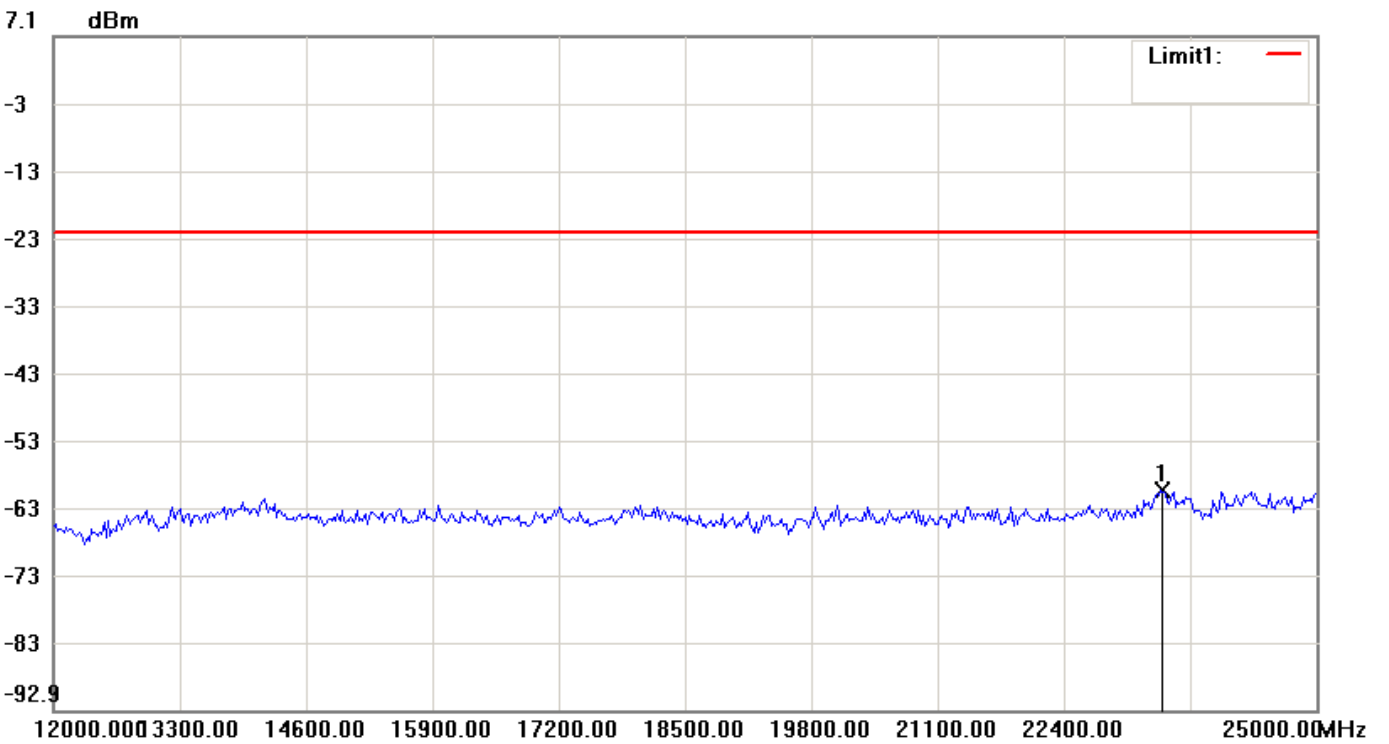
Data: #81

Date: 2015/1/21

Temperature: 22 °C

Time: AM 09:51:25

Humidity: 60 %



Condition: -21.97

Horizontal

EUT:

Sweep Time: 200ms Att.: 10dB

Model:

RBW: 100 KHz VBW: 300 KHz

Test Mode:

Note: FCC-BT Channel 39-Conducted Spurious-4

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 23396.66670    | -60.22     |

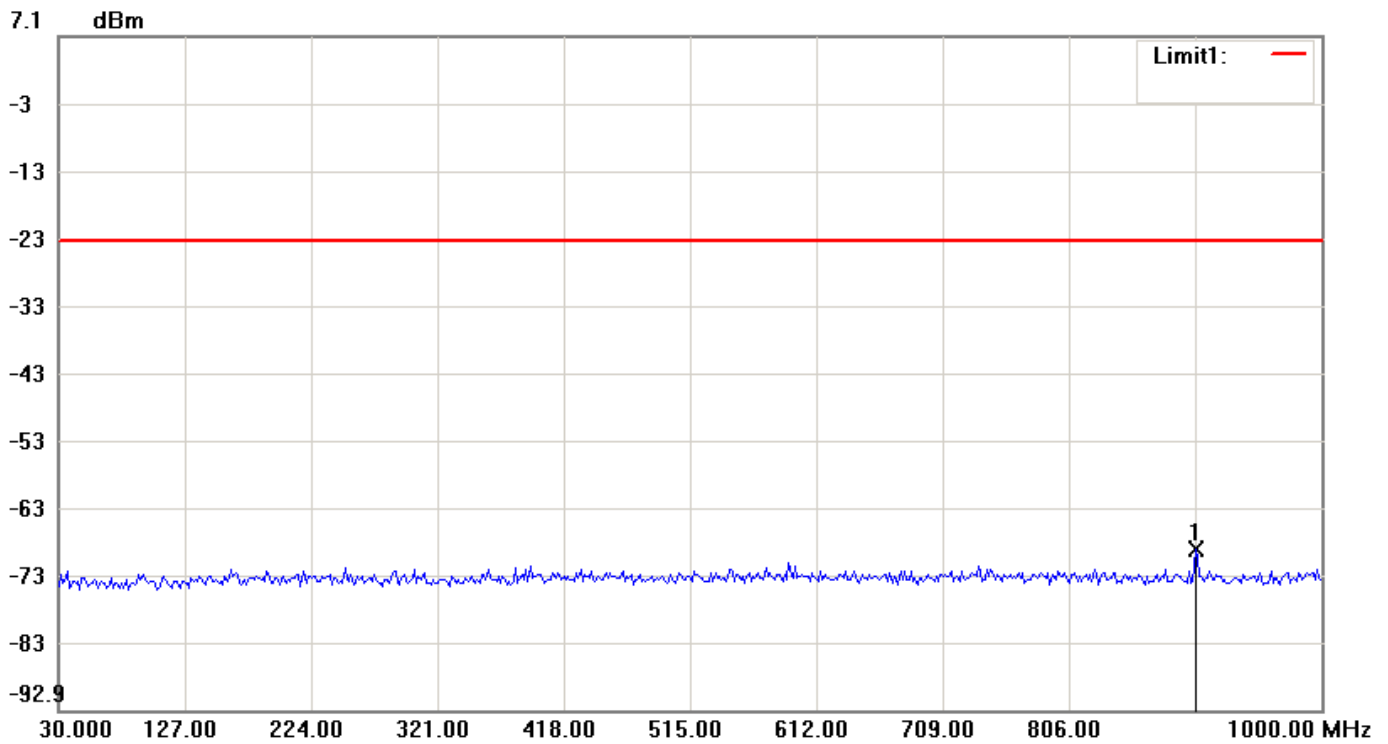
File: FT0044E\_BT\_2015 Data: #82

Date: 2015/1/21

Temperature: 22 °C

Time: AM 09:54:01

Humidity: 60 %



Condition: -23.32

Horizontal

EUT:

Sweep Time: 200ms Att.: 10dB

Model:

RBW: 100 KHz VBW: 300 KHz

Test Mode:

Note: FCC-BT Channel 78-Conducted Spurious-1

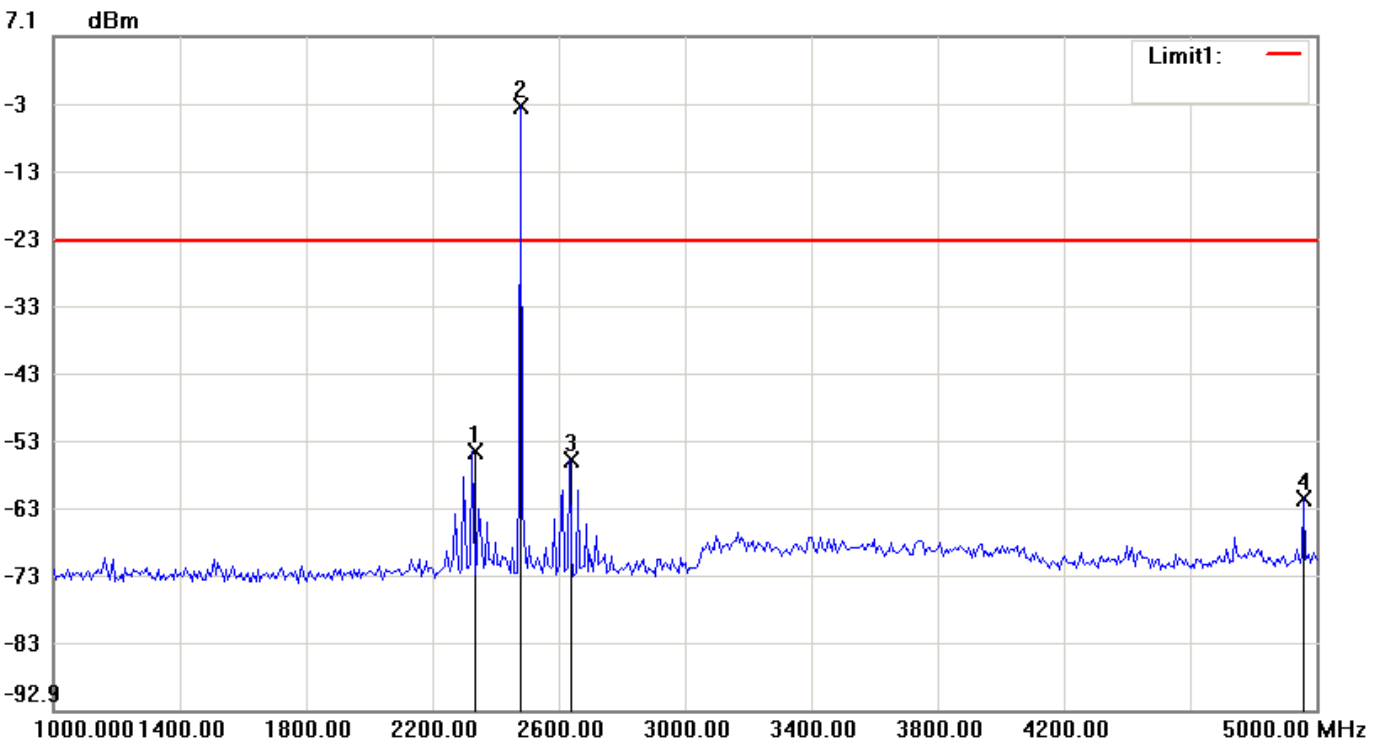
| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 903.0000       | -69.00     |



File: FT0044E\_BT\_2015    Data:    #83

Date: 2015/1/21    Temperature: 22 °C

Time: AM 09:54:39    Humidity: 60 %



Condition: Horizontal

EUT: Sweep Time: 200ms    Att.: 10dB

Model: RBW: 100 KHz    VBW: 300 KHz

Test Mode:

Note: FCC-BT Channel 78-Conducted Spurious-2

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2326.66670     | -54.61     |
| 2   | 2480.00000     | -3.32      |
| 3   | 2633.33330     | -55.81     |
| 4   | 4960.00000     | -61.62     |

File: FT0044E\_BT\_2015

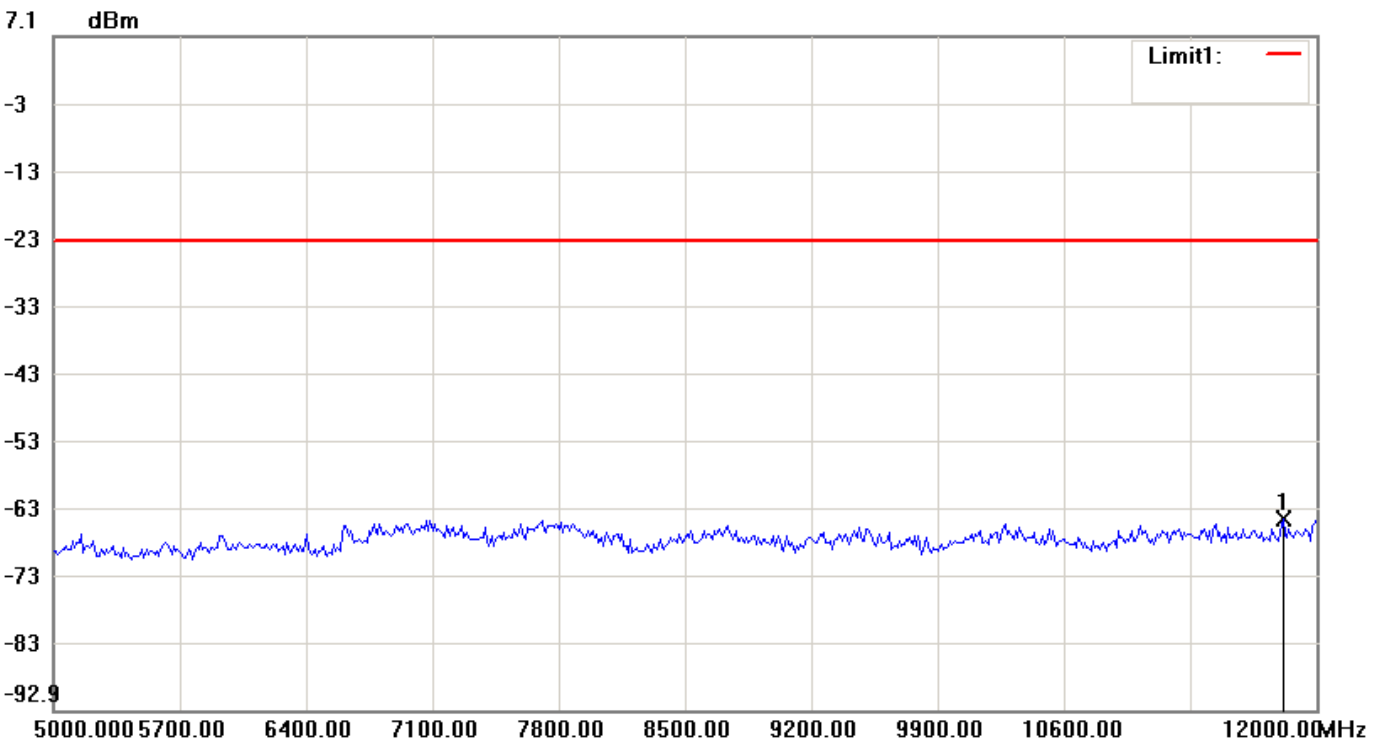
Data: #84

Date: 2015/1/21

Temperature: 22 °C

Time: AM 09:55:24

Humidity: 60 %



Condition: -23.32

EUT:

Model:

Test Mode:

Note: FCC-BT Channel 78-Conducted Spurious-3

Horizontal

Sweep Time: 200ms Att.: 10dB

RBW: 100 KHz VBW: 300 KHz

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 11813.33330    | -64.53     |

File: FT0044E\_BT\_2015

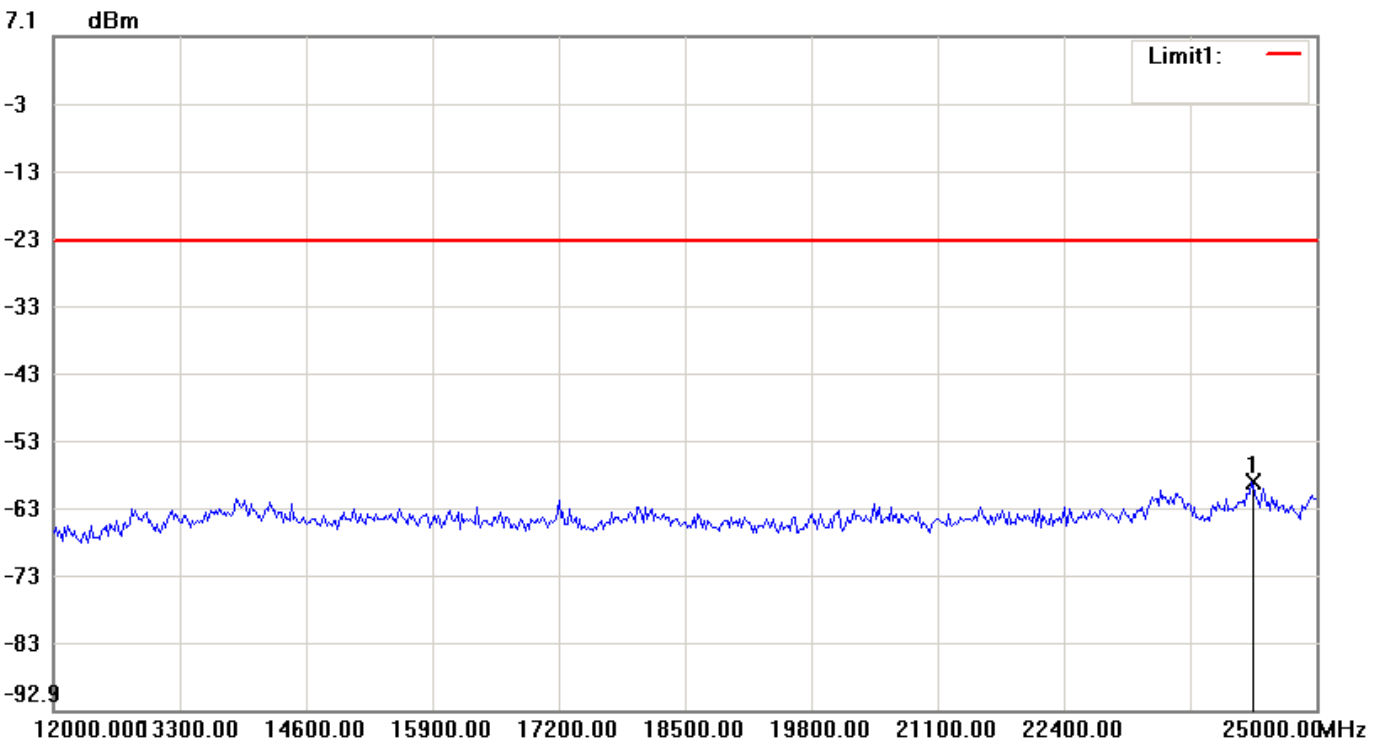
Data: #85

Date: 2015/1/21

Temperature: 22 °C

Time: AM 09:56:03

Humidity: 60 %



Condition: -23.32

EUT:

Model:

Test Mode:

Note: FCC-BT Channel 78-Conducted Spurious-4

Horizontal

Sweep Time: 200ms Att.: 10dB

RBW: 100 KHz VBW: 300 KHz

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 24328.33330    | -59.06     |

## 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 3. 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 maximum 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: Jan. 06, 2015

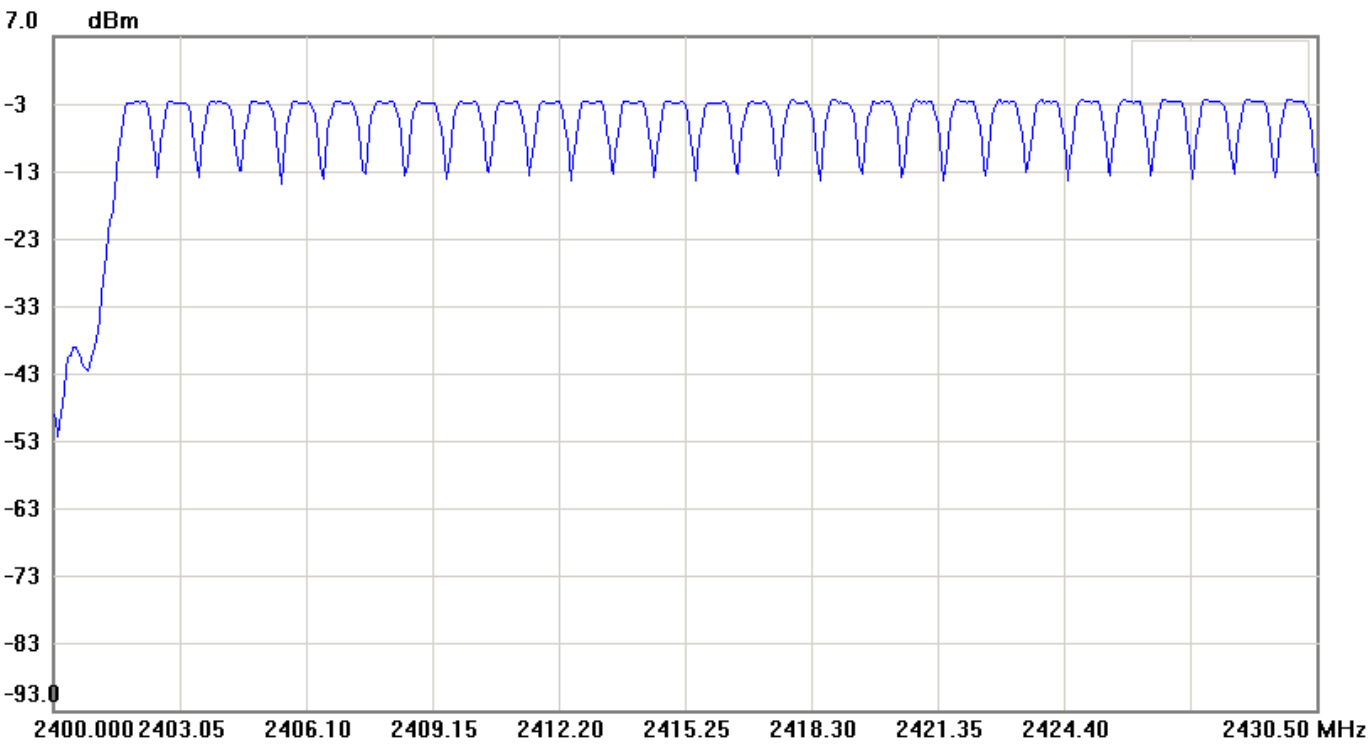
Temperature : 22°C

Humidity: 60%

Number of hopping channels = 79 channels

**Note: Please refer to page 85 to page 87 for chart.**

|                       |           |                   |                    |
|-----------------------|-----------|-------------------|--------------------|
| File: FT0044E_BT_2015 | Data: #34 | Date: 2015/1/6    | Temperature: 22 °C |
|                       |           | Time: AM 10:53:55 | Humidity: 60 %     |



|            |                                                 |
|------------|-------------------------------------------------|
| Condition: | RF Conducted                                    |
| EUT:       | Sweep Time: 1ms Att.: 10dB                      |
| Model:     | RBW: 300 KHz VBW: 300 KHz                       |
| Test Mode: |                                                 |
| Note:      | FCC-Bluetooth Number of Hopping Channels -Part1 |

**Humidity:** 60 %



**Humidity:** 60 %

## 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 separated 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 3. 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 range 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: Jan. 06, 2015

Temperature : 22°C

Humidity: 60%

| Channel | Hopping Channel Carrier Frequency Separated<br>(MHz) | Chart   |
|---------|------------------------------------------------------|---------|
| M       | 0.980                                                | Page 90 |

**Note: 1. Please refer to page 90 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.**

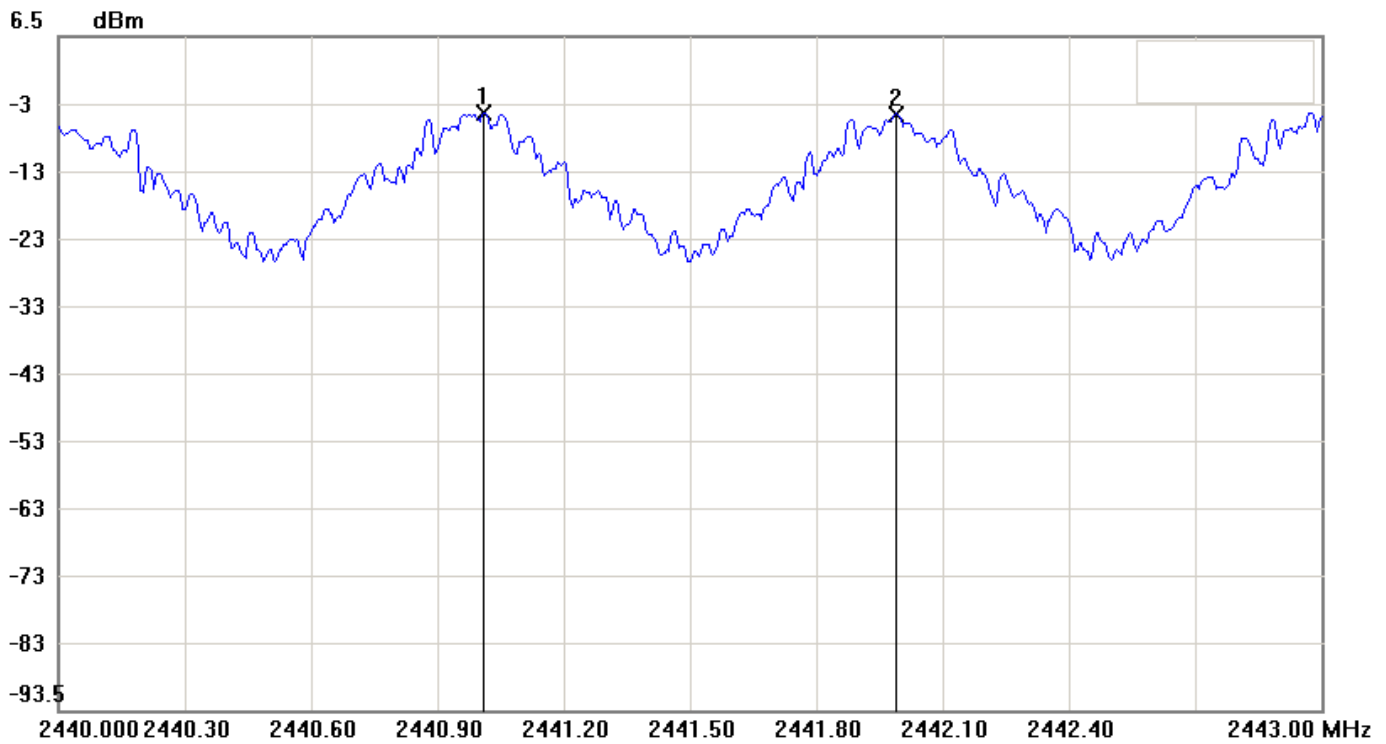
File: FT0044E\_BT\_2015 Data: #33

Date: 2015/1/6

Temperature: 22 °C

Time: AM 10:52:04

Humidity: 60 %



Condition:

RF Conducted

EUT:

Sweep Time: 3.2ms Att.: 10dB

Model:

RBW: 30 KHz

VBW: 100 KHz

Test Mode:

Note: FCC-Bluetooth Carrier Frequency Separation

| No. | Frequency(MHz) | Level(dBm) |
|-----|----------------|------------|
| 1   | 2441.01000     | -4.85      |
| 2   | 2441.99000     | -4.96      |

| No. |         | $\Delta$ Frequency(MHz) | $\Delta$ Level(dB) |
|-----|---------|-------------------------|--------------------|
| 1   | mk2-mk1 | 0.98                    | -0.11              |

## 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 3.

### 12.3 Measurement Equipment

| Equipment         | Manufacturer | Model No. |
|-------------------|--------------|-----------|
| Spectrum Analyzer | Agilent      | E4446A    |

### 12.4 Measurement Data

Test Date: Jan. 06, 2015

Temperature : 22°C

Humidity: 60%

#### 12.4.1 3DH1

Test period=0.4(second/channel)×79 channel=31.6sec

2402MHz dwell time= 396.7 us×340 = 134.878 ms

*Note: 1.Please refer to page 92 to page 93 for chart.*

*2. This device complies with the Bluetooth specifications and can operate in hopping mode on N channels, where  $20 \leq N \leq 79$ . 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  $N \times 0.4s$  for  $N = 79$ , compliance with any value for N is demonstrated.*

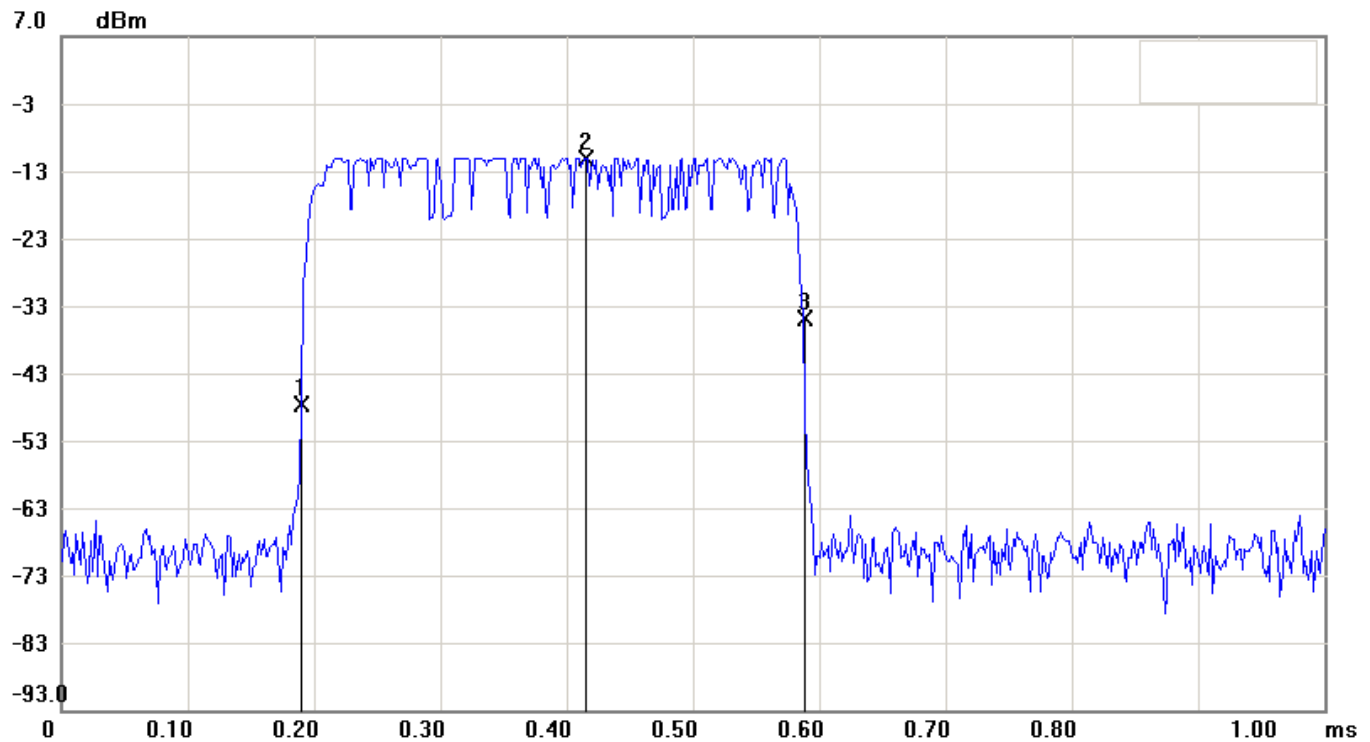
File: FT0044E\_BT\_2015 Data: #28

Date: 2015/1/6

Temperature: 22 °C

Time: AM 10:49:13

Humidity: 60 %



Condition: -31.05dBm

RF Conducted

EUT:

Sweep Time: 1ms Att.: 10dB

Model:

RBW: 1000 KHz VBW: 1000 KHz

Test Mode:

Note: DH1 pulse width

| No. | Sweep time(ms) | Level(dBm) |
|-----|----------------|------------|
| 1   | 0.1900         | -47.58     |
| 2   | 0.4150         | -11.05     |
| 3   | 0.5867         | -34.75     |

| No. |         | $\Delta$ Time(ms) | $\Delta$ Level(dB) |
|-----|---------|-------------------|--------------------|
| 1   | mk3-mk1 | 0.3967            | 12.83              |

**Humidity:** 60 %

## 12.4.2 3DH3

Test period=0.4(second/channel)×79 channel=31.6sec

2441MHz dwell time= 1.66 ms×170 = 282.2 ms

*Note: 1.Please refer to page 95 to page 96 for chart.*

*2. This device complies with the Bluetooth specifications and can operate in hopping mode on N channels, where  $20 \leq N \leq 79$ . 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  $N \times 0.4s$  for  $N = 79$ , compliance with any value for N is demonstrated.*

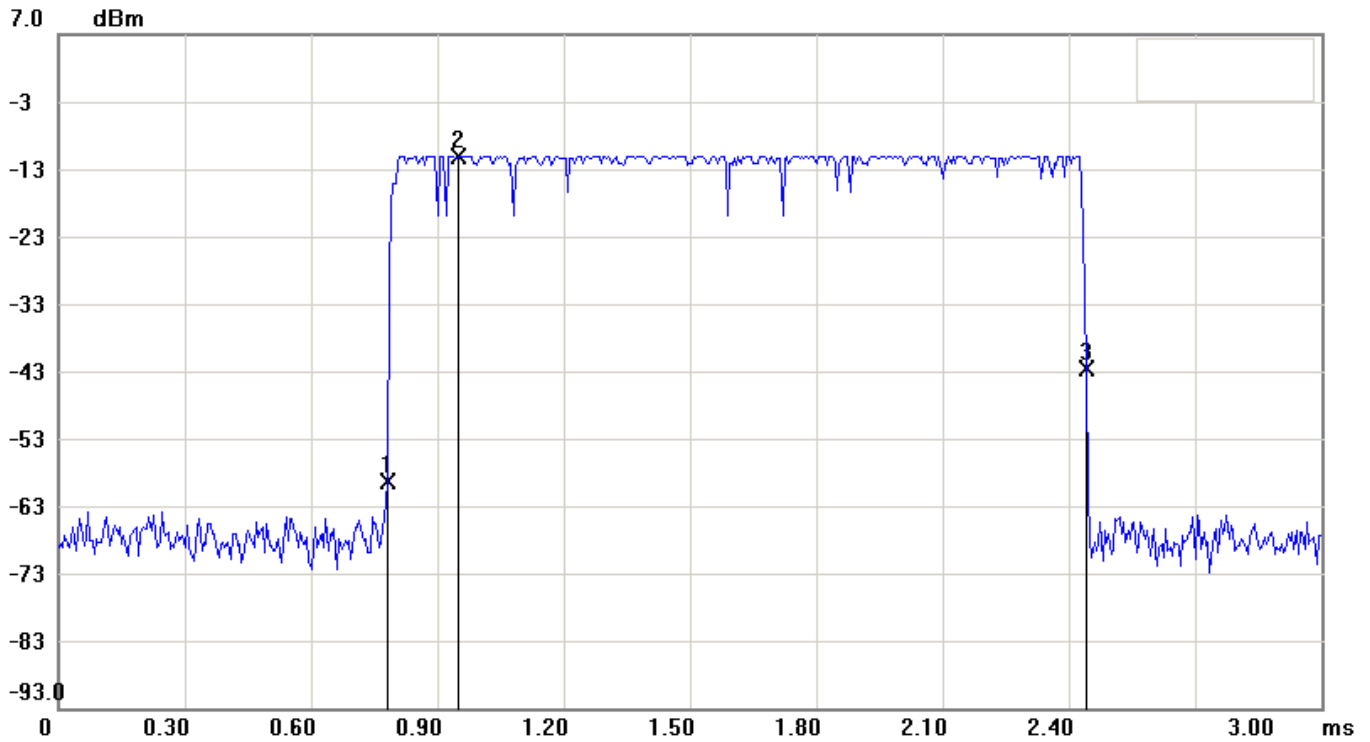
File: FT0044E\_BT\_2015 Data: #30

Date: 2015/1/6

Temperature: 22 °C

Time: AM 10:50:19

Humidity: 60 %



Condition: -31.03dBm

RF Conducted

EUT:

Sweep Time: 3ms Att.: 10dB

Model:

RBW: 1000 KHz VBW: 1000 KHz

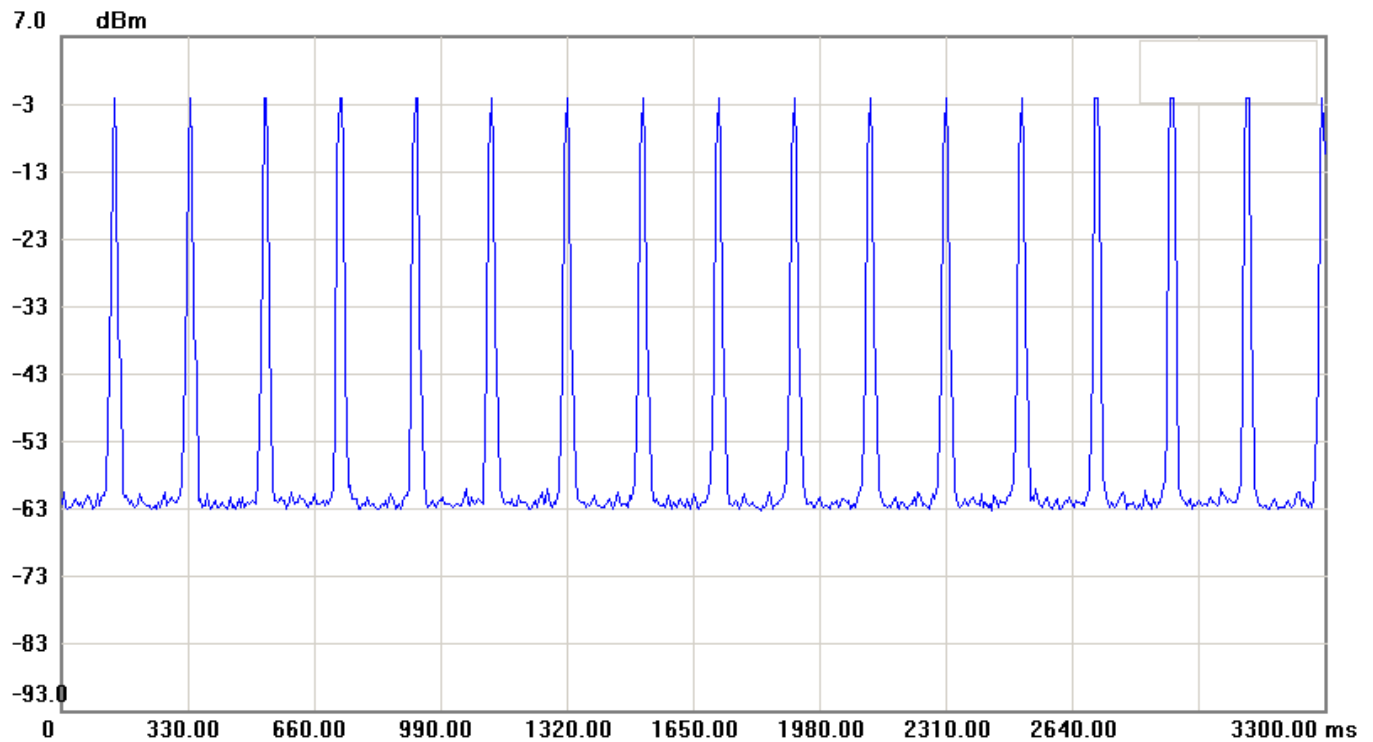
Test Mode:

Note: DH3 pusle width

| No. | Sweep time(ms) | Level(dBm) |
|-----|----------------|------------|
| 1   | 0.7800         | -59.31     |
| 2   | 0.9500         | -11.03     |
| 3   | 2.4400         | -42.51     |

| No. |         | $\Delta$ Time(ms) | $\Delta$ Level(dB) |
|-----|---------|-------------------|--------------------|
| 1   | mk3-mk1 | 1.66              | 16.8               |

**Humidity:** 60 %



**Test Mode:**

**Note:** DH3 Hops per 3.16 seconds



## 12.4.3 3DH5

Test period=0.4(second/channel)× 79 channel=31.6sec

2480MHz dwell time= 2.9166 ms× 110 = 320.826 ms

*Note: 1.Please refer to page 98 to page 99 for chart.*

*2. This device complies with the Bluetooth specifications and can operate in hopping mode on N channels, where  $20 \leq N \leq 79$ . 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  $N \times 0.4s$  for  $N = 79$ , compliance with any value for N is demonstrated.*

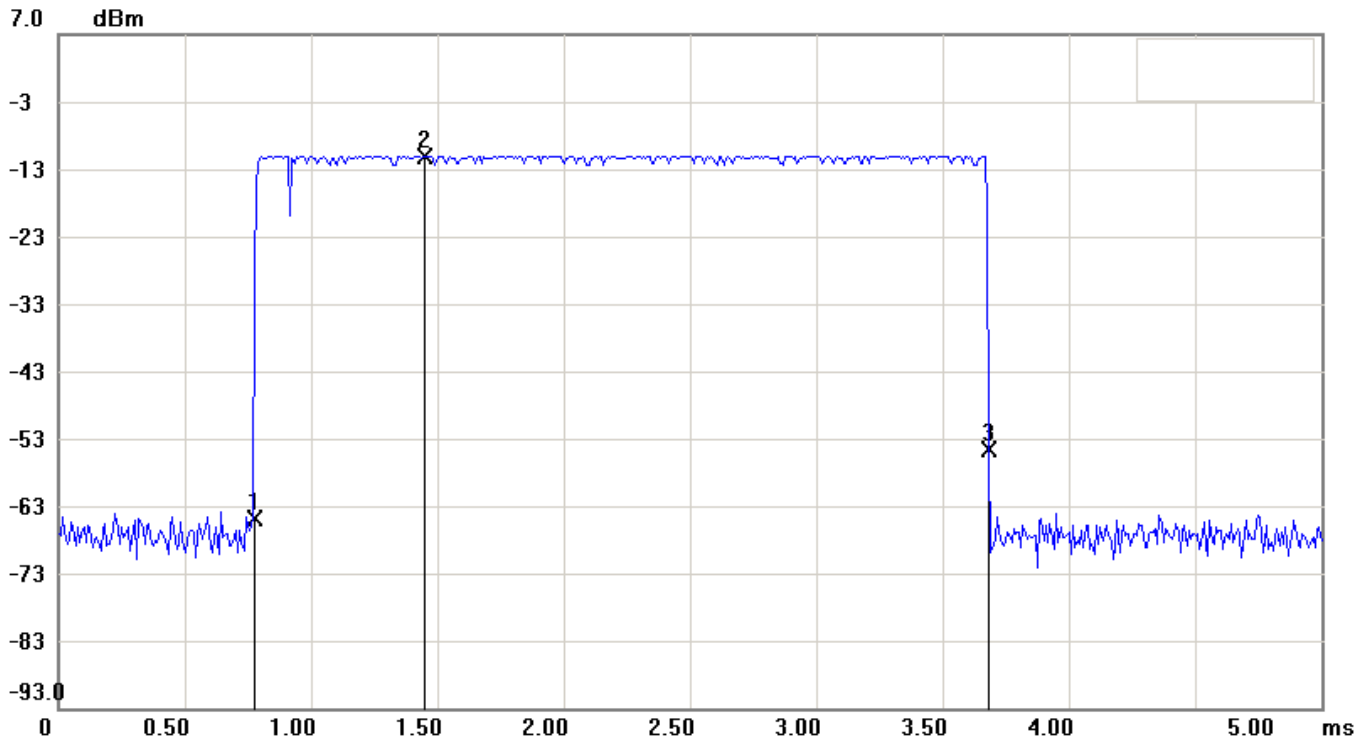
File: FT0044E\_BT\_2015 Data: #32

Date: 2015/1/6

Temperature: 22 °C

Time: AM 10:51:07

Humidity: 60 %



Condition: -31.04dBm

RF Conducted

EUT:

Sweep Time: 5ms Att.: 10dB

Model:

RBW: 1000 KHz VBW: 1000 KHz

Test Mode:

Note: DH5 pulse width

| No. | Sweep time(ms) | Level(dBm) |
|-----|----------------|------------|
| 1   | 0.7667         | -64.94     |
| 2   | 1.4500         | -11.04     |
| 3   | 3.6833         | -54.53     |

| No. |         | $\Delta$ Time(ms) | $\Delta$ Level(dB) |
|-----|---------|-------------------|--------------------|
| 1   | mk3-mk1 | 2.9166            | 10.41              |

**Humidity:** 60 %

**13 Measurement Equipment**

| <b>Equipment</b>  | <b>Manufacturer</b> | <b>Model No.</b> | <b>S/N</b>   | <b>Calibration Date</b> | <b>Next Cal. Due</b> |
|-------------------|---------------------|------------------|--------------|-------------------------|----------------------|
| EMI Receiver      | R&S                 | ESIB 7           | 13054414-001 | 07/20/2014              | 07/19/2015           |
| Spectrum Analyzer | R&S                 | FSV 40           | 13052017-001 | 02/07/2014              | 02/06/2015           |
| Horn Antenna      | EMCO                | 3115             | 13059201-001 | 07/22/2014              | 07/21/2015           |
| BiLog Antenna     | ETC                 | MCTD2786         | BL09D01004   | 02/07/2014              | 02/06/2015           |
| Hom Antenna       | EMCO                | 3116             | 13059202-001 | 08/22/2014              | 08/21/2015           |
| PRE-Amplifier     | Agilent             | 8449B            | 13040709-001 | 11/21/2014              | 11/20/2015           |
| Spectrum Analyzer | Agilent             | E4446A           | 13052013-001 | 10/07/2014              | 10/06/2015           |