# FCC Test Report

## Part 15 subpart C

### Client Information:

Applicant: Nanjing University 5D Technology Co., Ltd.

Applicant add.: F6, Building No.4, Accelerator, No.18, East Jialingjiang Street, Jianye District, Nanjing

### Product Information:

EUT Name: 5D Minor Chocolate Bluetooth Speaker

Model No.: Minor, Minor-1.0 (All the same except model name and color)

Brand Name: N/A

FCC ID: 2AHH6-MINOR

Standards: FCC PART 15 Subpart C: 2016 section 15.247

Test procedure used: ANSI C63.10-2013

### Prepared By:

**ATS Electronic Technology Co., Ltd.**

Add. : 3/F, Building A, No. 1 Hedong Three Road, Jinxia Communityt, Changan Town, DongGuan City, GuangDong, P.R.China

Date of Receipt: Oct 21, 2016 Date of Test: Oct 22~Nov 09, 2016

Date of Issue: Nov 14 , 2016 Test Result: Pass

This device described above has been tested by ATT Product Service Co.,Ltd, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

*This test report must not be used by the client to claim product endorsement by any agency of the U.S. government.

**Reviewed by:** Vera Wang **Approved by:** Simon Zeng

# 1 Contents

# 2 Test Summary

## 2.1 Compliance with FCC Part 15 subpart C

| Test | Test Requirement | Standard Paragraph | Result |
|---|---|---|---|
| Antenna Requirement | FCC Part 15 C:2016 | Section 15.247(c) | **PASS** |
| Conduction Emissions | FCC Part 15 C:2016 | Section 15.207(a) | **PASS** |
| Radiated Emissions | FCC Part 15 C:2016 | Section 15.247(d) | **PASS** |
| Carrier Frequencies Separated | FCC Part 15 C:2016 | Section 15.247(a)(1) | **PASS** |
| Hopping Channel Number | FCC Part 15 C:2016 | Section 15.247(a)(1) (iii) | **PASS** |
| Dwell Time | FCC Part 15 C:2016 | Section 15.247(a)(1) (iii) | **PASS** |
| Maximum Peak Output Power | FCC Part 15 C:2016 | Section 15.247(b) | **PASS** |
| Band edge | FCC Part 15 C:2016 | Section 15.247(d) | **PASS** |
| Conducted Spurious Emissions | FCC Part 15 C:2016 | Section 15.247(d) | **PASS** |

## 2.2 Test Location

All tests were performed at:

ATT Product Service Co., Ltd.
No. 3, ChangLianShan Industrial Park, ChangAn Town, DongGuan City, GuangDong, China.

The FCC Registration: 923232

## 2.3 Measurement Uncertainty

All measurements involve certain levels of uncertainties, The following measurements uncertainty Levels have estimated based on ANSI C63.10:2013, the maximum value of the uncertainty as below

| Test Item | Uncertainty |
|---|---|
| Uncertainty for Conduction emission test | 2.44dB |
| Uncertainty for Radiation Emission test (150KHz-30MHz) | 3.21dB |
| Uncertainty for Radiation Emission test (30MHz-1GHz) | 3.52 dB (Polarize: V) |
| | 3.54 dB (Polarize: H) |
| Uncertainty for Radiation Emission test (1GHz to 25GHz) | 5.54dB (Polarize: V) |
| | 3.56dB (Polarize: H) |
| Uncertainty for radio frequency | 1×10-9 |
| Uncertainty for conducted RF Power | 0.65dB |

# 3 General Information

## 3.1 General Description of EUT

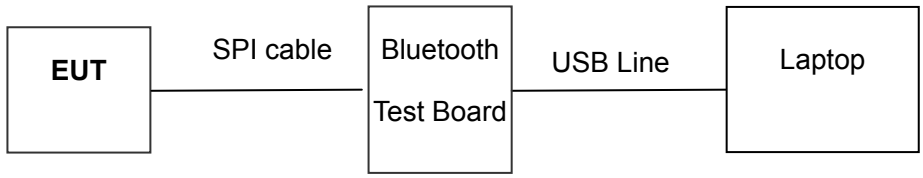
| | |
|---|---|
| Manufacturer: | Nanjing University 5D Technology Co., Ltd. |
| Manufacturer Address: | F6, Building No.4, Accelerator, No.18, East Jialingjiang Street, Jianye District, Nanjing |
| EUT Name: | 5D Minor Chocolate Bluetooth Speaker |
| Model No: | Minor, Minor-1.0 |
| Derivative model No.: | Minor |
| Brand Name: | N/A |
| Operation frequency: | 2402 MHz to 2480 MHz |
| Number of channel: | 79 |
| Modulation Technology: | GFSK, π/4-DQPSK, 8DPSK(1/2/3Mbps) |
| Bluetooth version: | Bluetooth 4.2 |
| H/W No.: | V 2.0 |
| S/W No.: | V1.0 |
| Antenna Type: | Integral Antenna |
| Antenna Gain: | Maximum 0.11 dBi |
| Power Supply Range: | DC 5V from micro-USB or DC 3.7V from battery |
| Power Supply: | DC 5V from adapter, AC 120V/60Hz for adapter,<br>DC 3.7V from battery |
| Power Cord: | N/A |
| Output power（max）: | 1Mbps: -1.16dBm |
| | 3Mbps: -0.9dBm |
| Model description: | Model: Minor and Minor-1.0 (All the same except model name and appearance color)<br>Therefore only one model Minor was tested in this report. |
| Note: | |
| 1. | For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual. |

| Description of Channel: | | | | | |
|---|---|---|---|---|---|
| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
| 00 | 2402 | 27 | 2429 | 54 | 2456 |
| 01 | 2403 | 28 | 2430 | 55 | 2457 |
| 02 | 2404 | 29 | 2431 | 56 | 2458 |
| 03 | 2405 | 30 | 2432 | 57 | 2459 |
| 04 | 2406 | 31 | 2433 | 58 | 2460 |
| 05 | 2407 | 32 | 2434 | 59 | 2461 |
| 06 | 2408 | 33 | 2435 | 60 | 2462 |
| 07 | 2409 | 34 | 2436 | 61 | 2463 |
| 08 | 2410 | 35 | 2437 | 62 | 2464 |
| 09 | 2411 | 36 | 2438 | 63 | 2465 |
| 10 | 2412 | 37 | 2439 | 64 | 2466 |
| 11 | 2413 | 38 | 2440 | 65 | 2467 |
| 12 | 2414 | 39 | 2441 | 66 | 2468 |
| 13 | 2415 | 40 | 2442 | 67 | 2469 |
| 14 | 2416 | 41 | 2443 | 68 | 2470 |
| 15 | 2417 | 42 | 2444 | 69 | 2471 |
| 16 | 2418 | 43 | 2445 | 70 | 2472 |
| 17 | 2419 | 44 | 2446 | 71 | 2473 |
| 18 | 2420 | 45 | 2447 | 72 | 2474 |
| 19 | 2421 | 46 | 2448 | 73 | 2475 |
| 20 | 2422 | 47 | 2449 | 74 | 2476 |
| 21 | 2423 | 48 | 2450 | 75 | 2477 |
| 22 | 2424 | 49 | 2451 | 76 | 2478 |
| 23 | 2425 | 50 | 2452 | 77 | 2479 |
| 24 | 2426 | 51 | 2453 | 78 | 2480 |
| 25 | 2427 | 52 | 2454 | | |
| 26 | 2428 | 53 | 2455 | | |

## 3.2 Description of Test conditions

(1) EUT was tested in normal configuration (Please See following Block diagram)

1. Block diagram of EUT configuration(TX Mode)




Note:
1.Connect the EUT as above block diagram of configuration, Run the software, set the transmit serial port/power/channel/packet type/data type/hopping or not,send configuration,than EUT enter the TX mode.
2.Set EUT in continuous transmission signal mode.
3.Using the laptop and the transform board to control the fixed transmitting frequency and other test mode. After finishing the test setting, the notebook and the transform board will be removed during measurements.
4.This product is performing independent test under the battery is fully charged.

(2) E.U.T. test conditions:

15.31(e): For intentional radiators, measurements of the variation of the input power or the adiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

(3) Test frequencies:

According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and. If required reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

| Frequency range over which device operates | Number of frequencies | Location in the range of operation |
|---|---|---|
| 1 MHz or less | 1 | Middle |
| 1 to 10 MHz | 2 | 1 near top and 1 near bottom |
| More than 10 MHz | 3 | 1 near top, 1 near middle and 1 near bottom |

(4) Frequency range of radiated measurements:
According to the 15.33, the test range will be up to the tenth harmonic of the highest fundamental frequency.

(5) Pre-test the EUT in all transmitting mode at the lowest (2402 MHz), middle (2441 MHz) and highest (2480 MHz) channel with different data packet and conducted to determine the worst-case mode, only the worst-case results(1Mbps/3Mbps) are recorded in this report.

(6) The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

## 3.3 Test Peripheral List

| No. | Equipment | Manufacturer | FCC approved | Model No. | Serial No. | Power cord | signal cable |
|---|---|---|---|---|---|---|---|
| 1 | Lap top | ASUS | DOC | X401A | X16-96072 | N/A | N/A |
| 2 | AC adapter | Stos | VOC | QX6.5W7 5100FG | N/A | N/A | N/A |

## 3.4 EUT Peripheral List

| No. | Equipment | Manufacturer | EMC Compliance | Model No. | Serial No. | Power cord | signal cable |
|---|---|---|---|---|---|---|---|
| 1 | USB cable | N/A | N/A | N/A | N/A | 0.8m/unshielded /detachable | N/A |

# 4 Equipments List for All Test Items

| No | Test Equipment | Manufacturer | Model No | Serial No | Cal. Date | Cal. Due Date |
|---|---|---|---|---|---|---|
| 1 | Spectrum Analyzer | ADVANTEST | R3182 | 150900201 | 2016.06.28 | 2017.06.27 |
| 2 | EMI Measuring Receiver | Schaffner | SCR3501 | 235 | 2016.06.28 | 2017.06.27 |
| 3 | Low Noise Pre Amplifier | Tsj | MLA-10K01-B01-27 | 1205323 | 2016.06.28 | 2017.06.27 |
| 4 | Low Noise Pre Amplifier | Tsj | MLA-0120-A02-34 | 2648A04738 | 2016.06.28 | 2017.06.27 |
| 5 | TRILOG Super Broadband test Antenna | SCHWARZBECK | VULB9160 | 9160-3206 | 2016.06.28 | 2017.06.27 |
| 6 | Broadband Horn Antenna | SCHWARZBECK | BBHA9120D | 452 | 2016.06.28 | 2017.06.27 |
| 7 | SHF-EHF Horn Antenna | SCHWARZBECK | BBHA9170 | BBHA9170367 | 2016.06.28 | 2017.06.27 |
| 8 | 50Ω Coaxial Switch | Anritsu | MP59B | 6200264416 | 2016.06.28 | 2017.06.27 |
| 9 | EMI Test Receiver | R&S | ESCI | 100124 | 2016.06.28 | 2017.06.27 |
| 10 | LISN | Kyoritsu | KNW-242 | 8-837-4 | 2016.06.28 | 2017.06.27 |
| 11 | LISN | Kyoritsu | KNW-407 | 8-1789-3 | 2016.06.28 | 2017.06.27 |
| 12 | 50Ω Coaxial Switch | Anritsu | MP59B | 6200264417 | 2016.06.28 | 2017.06.27 |
| 13 | Loop Antenna | ARA | PLA-1030/B | 1029 | 2016.06.28 | 2017.06.27 |
| 14 | EMI Test Receiver | Rohde & Schwarz | ESIB26 | 100394 | 2016.06.28 | 2017.06.27 |
| 15 | Radiated Cable 1# (30MHz-1GHz) | FUJIKURA | 5D-2W | 01 | 2016.01.04 | 2017.01.03 |
| 16 | Radiated Cable 2# (1GHz -25GHz) | FUJIKURA | 10D2W | 02 | 2015.12.25 | 2016.12.24 |
| 17 | Conducted Cable 1#(9KHz-30MHz) | FUJIKURA | 1D-2W | 01 | 2016.01.04 | 2017.01.03 |
| 18 | SMA Antenna connector (Impedance:50OHM, cable loss:0.5dBm) | Dosin | Dosin-SMA | N/A | N/A | N/A |
| Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list. | | | | | | |

# 5 Test Result

## 5.1 Antenna Requirement

### 5.1.1 Standard requirement

15.203 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.

15.247(c) (1)(i) requirement: (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi 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 6dBi.

### 5.1.2 EUT Antenna

The antenna is Integral Antenna and no consideration of replacement. Antenna gain is Maximum 0.11 dbi from 2.4GHz to 2.5GHz.

## 5.2 Conduction Emissions Measurement

### 5.2.1 Applied procedures / Limit

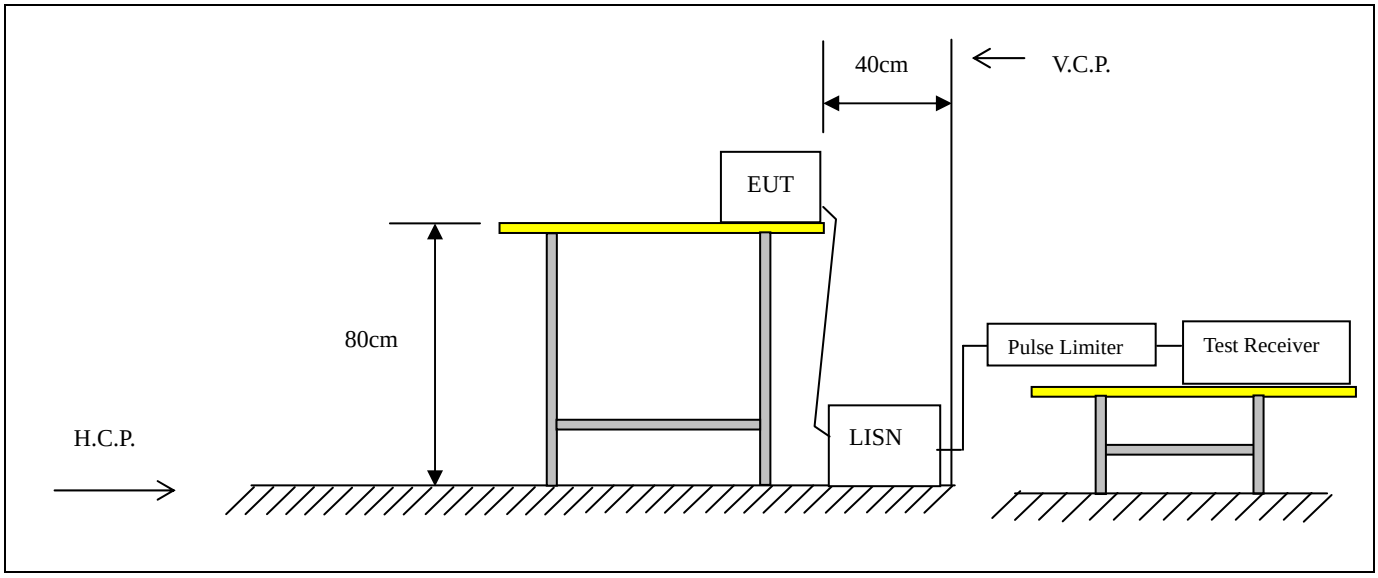
| Frequency of Emission (MHz) | Conducted Limit (dBμV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56 * | 56 to 46 * |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

Note: Decreases with the logarithm of the frequency.

### 5.2.2 Test procedure

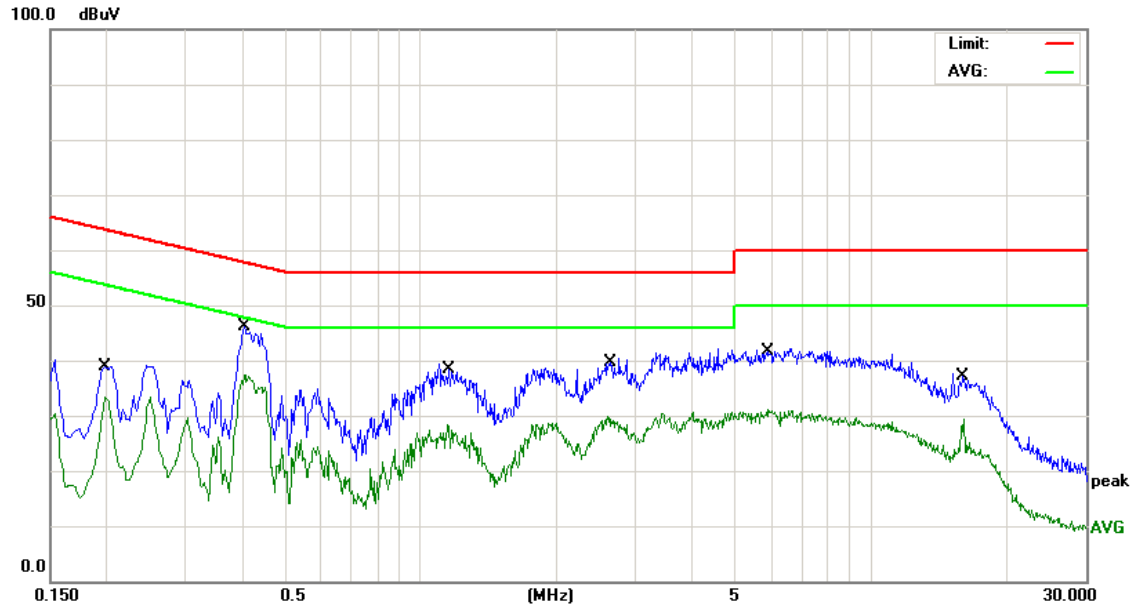
EUT was placed upon a wooden test table 0.8m above the horizontal metal reference plane and 0.4m from the vertical ground plane, and it was connected to an AMN. The closest distance between the boundary of the EUT and the surface of the AMN is 0.8m. All peripherals were connected to another AMN, and placed at a distance of 10cm from each other. A spectrum and receiver was connected to the RF output port of the AMN. Both average and quasi-peak value were detected.

### 5.2.3 Test setup



### 5.2.4 Test results

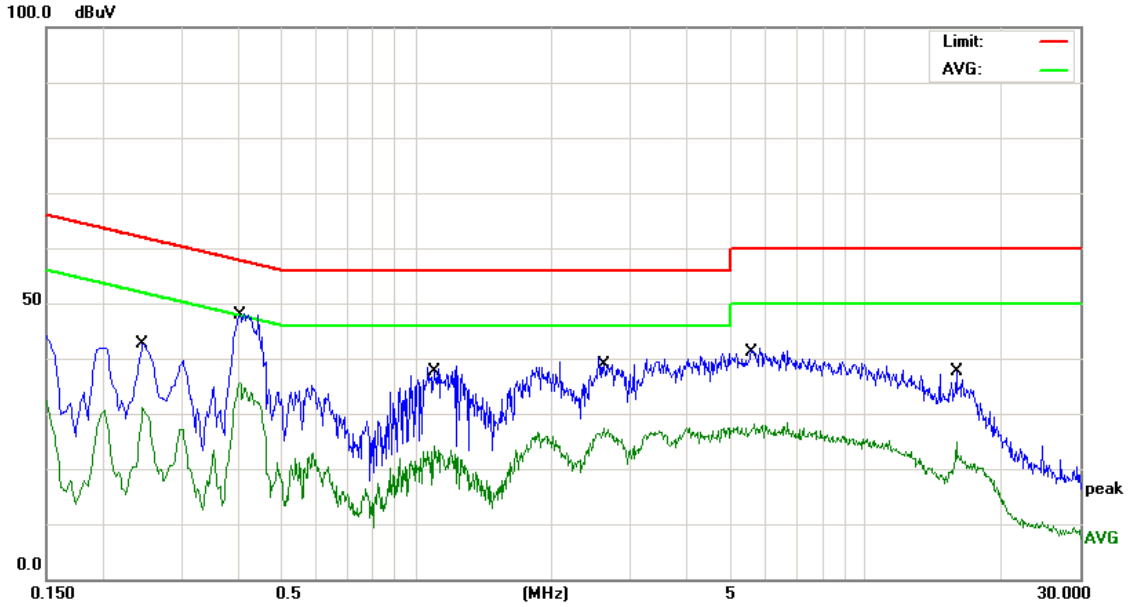
| | | | |
|---|---|---|---|
| EUT: | 5D Minor Chocolate Bluetooth Speaker | Model Name. : | Minor |
| Temperature: | 26 ℃ | Relative Humidity: | 54% |
| Pressure: | 1010hPa | Test Date : | 2016-10-27 |
| Test Mode: | TX (1Mbps) CH00 (worst case) | Phase : | Line |
| **Test Voltage** : | DC 5V from adapter, AC 120V/60Hz for adapter | | |




Remark: Factor = LISN factor + Cable Loss + Pulse limiter factor.

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector |
| 1 | | 0.1980 | 27.83 | 11.16 | 38.99 | 63.69 | -24.70 | QP |
| 2 | | 0.1980 | 22.30 | 11.16 | 33.46 | 53.69 | -20.23 | AVG |
| 3 | | 0.4060 | 36.10 | 10.12 | 46.22 | 57.73 | -11.51 | QP |
| 4 | * | 0.4060 | 27.29 | 10.12 | 37.41 | 47.73 | -10.32 | AVG |
| 5 | | 1.1419 | 25.82 | 9.94 | 35.76 | 56.00 | -20.24 | QP |
| 6 | | 1.1419 | 18.50 | 9.94 | 28.44 | 46.00 | -17.56 | AVG |
| 7 | | 2.5979 | 28.77 | 10.01 | 38.78 | 56.00 | -17.22 | QP |
| 8 | | 2.5979 | 19.93 | 10.01 | 29.94 | 46.00 | -16.06 | AVG |
| 9 | | 5.8799 | 31.44 | 10.12 | 41.56 | 60.00 | -18.44 | QP |
| 10 | | 5.8799 | 21.08 | 10.12 | 31.20 | 50.00 | -18.80 | AVG |
| 11 | | 16.0619 | 35.10 | 1.54 | 36.64 | 60.00 | -23.36 | QP |
| 12 | | 16.0619 | 27.74 | 1.54 | 29.28 | 50.00 | -20.72 | AVG |

| | | | |
|---|---|---|---|
| EUT： | 5D Minor Chocolate Bluetooth Speaker | Model Name. ： | Minor |
| Temperature： | 26 ℃ | Relative Humidity： | 54% |
| Pressure： | 1010hPa | Test Date : | 2016-10-27 |
| Test Mode： | TX (1Mbps) CH00 (worst case) | Phase : | Neutral |
| **Test Voltage** ： | DC 5V from adapter, AC 120V/60Hz for adapter | | |




Remark: Factor = LISN factor + Cable Loss + Pulse limiter factor.

| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector |
| 1 | | 0.2459 | 31.85 | 10.90 | 42.75 | 61.89 | -19.14 | QP |
| 2 | | 0.2459 | 20.16 | 10.90 | 31.06 | 51.89 | -20.83 | AVG |
| 3 | * | 0.4060 | 37.84 | 10.12 | 47.96 | 57.73 | -9.77 | QP |
| 4 | | 0.4060 | 25.41 | 10.12 | 35.53 | 47.73 | -12.20 | AVG |
| 5 | | 1.0940 | 27.78 | 9.94 | 37.72 | 56.00 | -18.28 | QP |
| 6 | | 1.0940 | 14.27 | 9.94 | 24.21 | 46.00 | -21.79 | AVG |
| 7 | | 2.6179 | 28.79 | 10.01 | 38.80 | 56.00 | -17.20 | QP |
| 8 | | 2.6179 | 17.47 | 10.01 | 27.48 | 46.00 | -18.52 | AVG |
| 9 | | 5.6578 | 30.99 | 10.12 | 41.11 | 60.00 | -18.89 | QP |
| 10 | | 5.6578 | 18.13 | 10.12 | 28.25 | 50.00 | -21.75 | AVG |
| 11 | | 15.9618 | 36.00 | 1.52 | 37.52 | 60.00 | -22.48 | QP |
| 12 | | 15.9618 | 23.35 | 1.52 | 24.87 | 50.00 | -25.13 | AVG |

## 5.3 Radiated Emissions Measurement

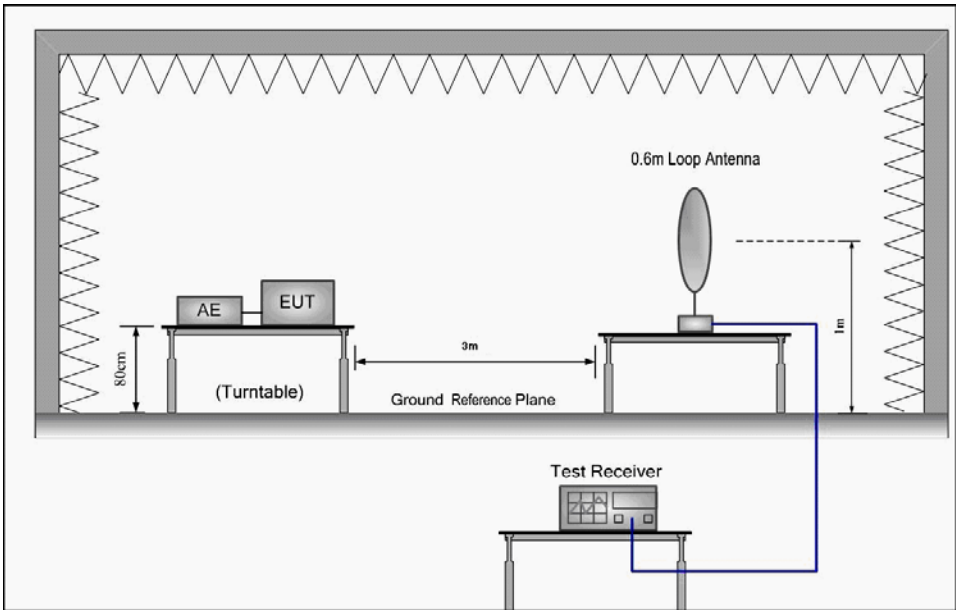
### 5.3.1 Applied procedures / Limit

15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

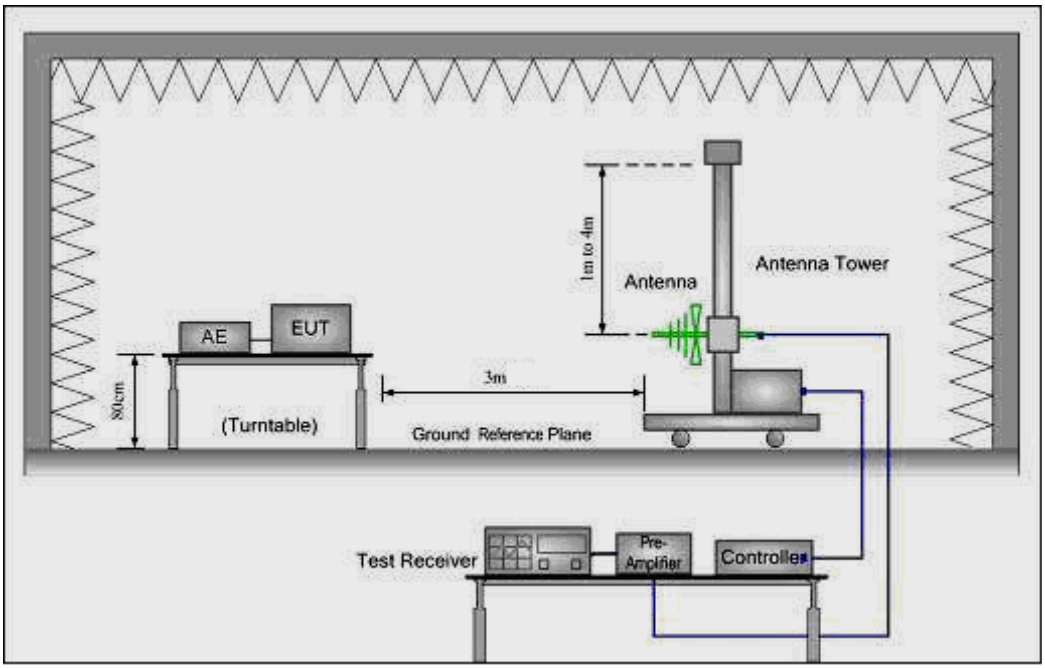
| Frequency of Emission (MHz) | Field Strength | | Measurement Distance (meters) |
|---|---|---|---|
| | μV/m | dBμV/m | |
| 0.009-0.49 | 2400/F(kHz) | | 300 |
| 0.49-1.705 | 24000/F(kHz) | | 30 |
| 1.705-30 | 30 | | 30 |
| 30-88 | 100 | 40 | 3 |
| 88-216 | 150 | 43.5 | 3 |
| 216-960 | 200 | 46 | 3 |
| Above 960 | 500 | 54 | 3 |

### 5.3.2 Test setup

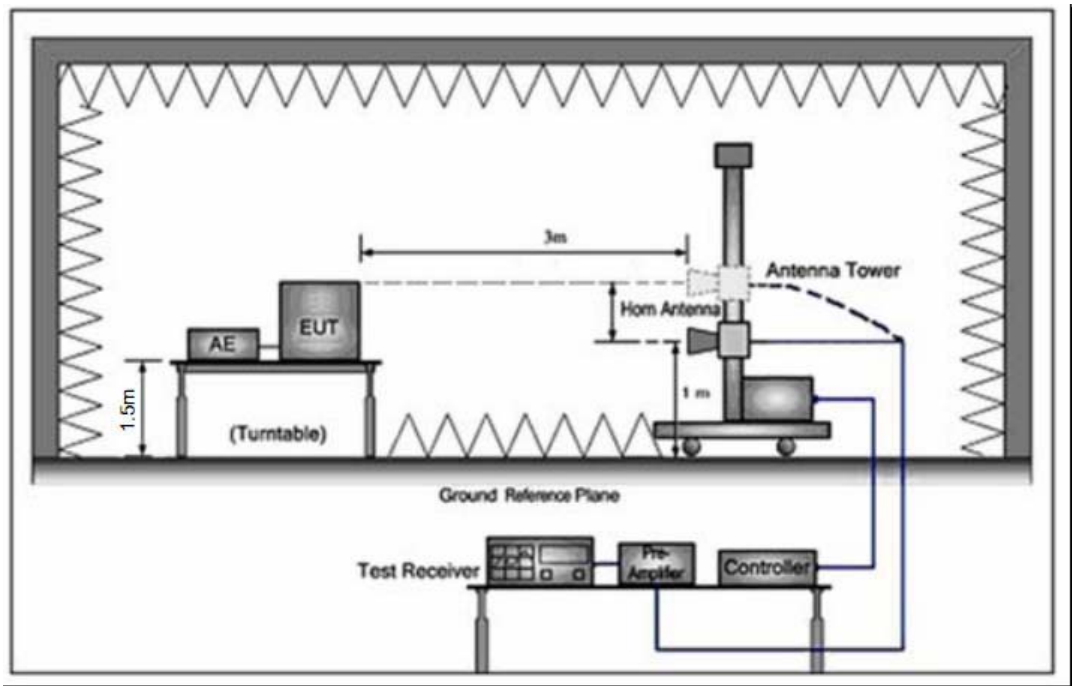
| Test Configuration: |
|---|
| 1) 9 kHz to 30 MHz emissions: |


0.6m Loop Antenna
AE
EUT
80cm
(Turntable)
3m
Ground Reference Plane
1m
Test Receiver

2) 30 MHz to 1 GHz emissions:




3) 1 GHz to 25 GHz emissions:



### 5.3.3 Test procedure

EUT was placed upon a wooden test table which was placed on the turn table and operating in the mode as mentioned above. For emissions testing at or below 1 GHz, the table height shall be 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height shall be 1.5 m. A receiving antenna was placed 3m away from the EUT. During testing, turn around the turn table and move the antenna from 1m to 4m to find the maximum field-strength reading. All peripherals were placed at a distance of 10cm between each other. Both horizontal and vertical antenna polarities were tested. The worst case emissions were reported.

For measurement at frequency above 1GHz
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

### 5.3.4 Test Result

**Radiated Emissions Test Data Below 30MHz**

| | | | |
|---|---|---|---|
| EUT： | 5D Minor Chocolate Bluetooth Speaker | Model Name ： | Minor |
| Temperature： | 25 ℃ | Test Data | 2016-10-31 |
| Pressure： | 1005 hPa | Relative Humidity： | 60% |
| Test Mode ： | TX | Test Voltage ： | DC 3.7V from battery |
| Measurement Distance | 3 m | Frenqucy Range | 9KHz to 30MHz |
| RBW/VBW | 9KHz~150KHz/RB 200Hz for QP, 150KHz~30MHz/RB 9KHz for QP | | |

No emission found between lowest internal used/generated frequencies to 30MHz.

**Radiated Emissions Test Data Below 1GHz**

| | | | |
|---|---|---|---|
| EUT： | 5D Minor Chocolate Bluetooth Speaker | Model Name ： | Minor |
| Temperature： | 25 ℃ | Test Data | 2016-10-31 |
| Pressure： | 1010 hPa | Relative Humidity： | 60% |
| Test Mode ： | TX (1Mbps) CH00 (worst case) | Test Voltage ： | DC 3.7V from battery |
| Measurement Distance | 3 m | Frenqucy Range | 30MHz to 1GHz |
| RBW/VBW | 100KHz / 300KHz for spectrum, RBW=120KHz for receiver. | | |

(a) Antenna polarization: Horizontal

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Over (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 59.6493 | 30.51 | -19.45 | 11.06 | 40.00 | -28.94 | QP |
| 109.4116 | 30.41 | -13.42 | 16.99 | 43.50 | -26.51 | QP |
| 195.1365 | 31.18 | -14.60 | 16.58 | 43.50 | -26.92 | QP |
| 270.3748 | 30.38 | -11.02 | 19.36 | 46.00 | -26.64 | QP |
| 434.0651 | 29.82 | -6.61 | 23.21 | 46.00 | -22.79 | QP |
| 804.6028 | 29.04 | 2.82 | 31.86 | 46.00 | -14.14 | QP |

(b) Antenna polarization: vertical

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Over (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 45.0583 | 28.12 | -14.49 | 13.63 | 40.00 | -26.37 | QP |
| 100.9339 | 29.70 | -15.92 | 13.78 | 43.50 | -29.72 | QP |
| 184.4898 | 30.14 | -11.16 | 18.98 | 43.50 | -24.52 | QP |
| 280.0237 | 29.92 | -10.26 | 19.66 | 46.00 | -26.34 | QP |
| 400.4319 | 28.88 | -6.89 | 21.99 | 46.00 | -24.01 | QP |
| 706.6999 | 30.23 | -0.16 | 30.07 | 46.00 | -15.93 | QP |

Note:

Measurement Level = Reading Level + Factor

Remark: Factor = Antenna Factor + Cable Loss–Pre-amplifier

**Radiated Emissions Test Data Above 1GHz**

| | | | |
|---|---|---|---|
| EUT： | 5D Minor Chocolate Bluetooth Speaker | Model Name ： | Minor |
| Temperature： | 25 ℃ | Test Data | 2016-10-31 |
| Pressure： | 1010 hPa | Relative Humidity： | 60% |
| Test Mode ： | 1Mbps | Test Voltage ： | DC 3.7V from battery |
| Measurement Distance | 3 m | Frenqucy Range | 1GHz to 25GHz |
| RBW/VBW | Spurious emission: 1MHz/3MHz for Peak, 1MHz/10Hz PK detector for Average. | | |

(a) Antenna polarization: Horizontal

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Over (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 4804.000 | 53.76 | 5.06 | 58.82 | 74.00 | -15.18 | peak |
| 4804.000 | 41.58 | 5.06 | 46.64 | 54.00 | -7.36 | AVG |
| 7206.000 | 47.14 | 7.03 | 54.17 | 74.00 | -19.83 | peak |
| 7206.000 | 35.25 | 7.03 | 42.28 | 54.00 | -11.72 | AVG |

(b) Antenna polarization: Vertical

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Over (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 4804.000 | 51.24 | 5.06 | 56.30 | 74.00 | -17.70 | peak |
| 4804.000 | 40.85 | 5.06 | 45.91 | 54.00 | -8.09 | AVG |
| 7206.000 | 46.98 | 7.03 | 54.01 | 74.00 | -19.99 | peak |
| 7206.000 | 35.26 | 7.03 | 42.29 | 54.00 | -11.71 | AVG |

Note:

**8~25GHz at least have 20dB margin. No recording in the test report.**

Measurement Level = Reading Level + Factor

Remark: Factor = Antenna Factor + Cable Loss–Pre-amplifier

Lowest channel: 2402 MHz

Data rate: 1Mbps

(a) Antenna polarization: Horizontal

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Over (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 4882.000 | 52.70 | 5.14 | 57.84 | 74.00 | -16.16 | peak |
| 4882.000 | 41.66 | 5.14 | 46.80 | 54.00 | -7.20 | AVG |
| 7323.000 | 46.72 | 7.54 | 54.26 | 74.00 | -19.74 | peak |
| 7323.000 | 35.38 | 7.54 | 42.92 | 54.00 | -11.08 | AVG |

(b) Antenna polarization: Vertical

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Over (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 4882.000 | 51.94 | 5.14 | 57.08 | 74.00 | -16.92 | peak |
| 4882.000 | 40.28 | 5.14 | 45.42 | 54.00 | -8.58 | AVG |
| 7323.000 | 45.09 | 7.54 | 52.63 | 74.00 | -21.37 | peak |
| 7323.000 | 34.76 | 7.54 | 42.30 | 54.00 | -11.70 | AVG |

Note:

**8~25GHz at least have 20dB margin. No recording in the test report.**

Measurement Level = Reading Level + Factor

Remark: Factor = Antenna Factor + Cable Loss–Pre-amplifier

Middle Channel: 2441 MHz

Data rate: 1Mbps

(a) Antenna polarization: Horizontal

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Over (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 4960.000 | 52.64 | 5.22 | 57.86 | 74.00 | -16.14 | peak |
| 4960.000 | 41.23 | 5.22 | 46.45 | 54.00 | -7.55 | AVG |
| 7440.000 | 45.19 | 8.06 | 53.25 | 74.00 | -20.75 | peak |
| 7440.000 | 34.38 | 8.06 | 42.44 | 54.00 | -11.56 | AVG |

(b) Antenna polarization: Vertical

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Over (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 4960.000 | 52.59 | 5.22 | 57.81 | 74.00 | -16.19 | peak |
| 4960.000 | 39.40 | 5.22 | 44.62 | 54.00 | -9.38 | AVG |
| 7440.000 | 46.37 | 8.06 | 54.43 | 74.00 | -19.57 | peak |
| 7440.000 | 34.67 | 8.06 | 42.73 | 54.00 | -11.27 | AVG |

Note:

**8~25GHz at least have 20dB margin. No recording in the test report.**

Measurement Level = Reading Level + Factor

Remark: Factor = Antenna Factor + Cable Loss–Pre-amplifier

Highest Channel: 2480 MHz

Data rate: 1Mbps

| EUT： | 5D Minor Chocolate Bluetooth Speaker | Model Name ： | Minor |
|---|---|---|---|
| Temperature： | 25 ℃ | Test Data | 2016-10-31 |
| Pressure： | 1010 hPa | Relative Humidity： | 60% |
| Test Mode ： | 3Mbps | Test Voltage ： | DC 3.7V from battery |
| Measurement Distance | 3 m | Frenqucy Range | 1GHz to 25GHz |
| RBW/VBW | Spurious emission: 1MHz/3MHz for Peak, 1MHz/10Hz PK detector for Average. | | |

(a) Antenna polarization: Horizontal

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Over (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 4804.000 | 52.15 | 5.06 | 57.21 | 74.00 | -16.79 | peak |
| 4804.000 | 40.68 | 5.06 | 45.74 | 54.00 | -8.26 | AVG |
| 7206.000 | 46.39 | 7.03 | 53.42 | 74.00 | -20.58 | peak |
| 7206.000 | 35.12 | 7.03 | 42.15 | 54.00 | -11.85 | AVG |

(b) Antenna polarization: Vertical

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Over (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 4804.000 | 52.19 | 5.06 | 57.25 | 74.00 | -16.75 | peak |
| 4804.000 | 41.63 | 5.06 | 46.69 | 54.00 | -7.31 | AVG |
| 7206.000 | 46.87 | 7.03 | 53.90 | 74.00 | -20.10 | peak |
| 7206.000 | 35.24 | 7.03 | 42.27 | 54.00 | -11.73 | AVG |

Note:

**8~25GHz at least have 20dB margin. No recording in the test report.**

Measurement Level = Reading Level + Factor

Remark: Factor = Antenna Factor + Cable Loss–Pre-amplifier

Lowest Channel: 2402 MHz

Data rate: 3Mbps

(a) Antenna polarization: Horizontal

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Over (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 4882.000 | 53.34 | 5.14 | 58.48 | 74.00 | -15.52 | peak |
| 4882.000 | 42.76 | 5.14 | 47.90 | 54.00 | -6.10 | AVG |
| 7323.000 | 45.48 | 7.54 | 53.02 | 74.00 | -20.98 | peak |
| 7323.000 | 33.91 | 7.54 | 41.45 | 54.00 | -12.55 | AVG |

(b) Antenna polarization: Vertical

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Over (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 4882.000 | 52.16 | 5.14 | 57.30 | 74.00 | -16.70 | peak |
| 4882.000 | 41.47 | 5.14 | 46.61 | 54.00 | -7.39 | AVG |
| 7323.000 | 46.35 | 7.54 | 53.89 | 74.00 | -20.11 | peak |
| 7323.000 | 34.98 | 7.54 | 42.52 | 54.00 | -11.48 | AVG |

Note:

**8~25GHz at least have 20dB margin. No recording in the test report.**

Measurement Level = Reading Level + Factor

Remark: Factor = Antenna Factor + Cable Loss–Pre-amplifier

Middle Channel: 2441 MHz

Data rate: 3Mbps

(a) Antenna polarization: Horizontal

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Over (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 4960.000 | 51.81 | 5.22 | 57.03 | 74.00 | -16.97 | peak |
| 4960.000 | 40.36 | 5.22 | 45.58 | 54.00 | -8.42 | AVG |
| 7440.000 | 45.27 | 8.06 | 53.33 | 74.00 | -20.67 | peak |
| 7440.000 | 34.49 | 8.06 | 42.55 | 54.00 | -11.45 | AVG |

(b) Antenna polarization: Vertical

| Frequency (MHz) | Reading Level (dBuV) | Correct Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Over (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 4960.000 | 51.90 | 5.22 | 57.12 | 74.00 | -16.88 | PEAK |
| 4960.000 | 40.34 | 5.22 | 45.56 | 54.00 | -8.44 | AVERAGE |
| 7440.000 | 45.28 | 8.06 | 53.34 | 74.00 | -20.66 | PEAK |
| 7440.000 | 34.61 | 8.06 | 42.67 | 54.00 | -11.33 | AVERAGE |

Note:

**8~25GHz at least have 20dB margin. No recording in the test report.**

Measurement Level = Reading Level + Factor

Remark: Factor = Antenna Factor + Cable Loss–Pre-amplifier

Highest channel: 2480 MHz

Data rate: 3Mbps

## 5.3.5 TEST RESULTS (Restricted Bands Requirements)

| EUT： | 5D Minor Chocolate Bluetooth Speaker | Model Name ： | Minor |
|---|---|---|---|
| Temperature： | 25 ℃ | Test Data | 2016-10-31 |
| Pressure： | 1010 hPa | Relative Humidity： | 60% |
| Test Mode ： | TX 1Mbps\ 3Mbps | Test Voltage ： | DC 3.7V from battery |
| RBW/VBW | 1MHz/3MHz for Peak, 1MHz/10Hz PK detector for Average | | |
| Note： | 1. The transmitter was setup to transmit at the lowest channel. Then the field strength was measured at 2310-2390 MHz.<br>2. The transmitter was setup to transmit at the highest channel. Then the field strength was measured at 2483.5-2500 MHz.<br>3. The data of 2390MHz and 2483.5MHz was the worst. | | |

| Test Mode | Ant.Pol. H/V | Freq. (MHz) | Reading | | Ant/CF CF(dB) | Act | | Limit | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Peak (dBuv) | AV (dBuv) | | Peak (dBuv/m) | AV (dBuv/m) | Peak (dBuv/m) | AV (dBuv/m) |
| Data rate 1Mbps | V | 2390 | 43.57 | 32.42 | -5.79 | 37.78 | 26.63 | 74.00 | 54.00 |
| | H | 2390 | 42.69 | 31.64 | -5.79 | 36.90 | 25.85 | 74.00 | 54.00 |
| | V | 2483.5 | 43.43 | 30.84 | -4.98 | 38.45 | 25.86 | 74.00 | 54.00 |
| | H | 2483.5 | 42.72 | 31.51 | -4.98 | 37.74 | 26.53 | 74.00 | 54.00 |
| Data rate 3Mbps | V | 2390 | 44.26 | 32.54 | -5.79 | 38.47 | 26.75 | 74.00 | 54.00 |
| | H | 2390 | 43.59 | 32.70 | -5.79 | 37.80 | 26.91 | 74.00 | 54.00 |
| | V | 2483.5 | 42.76 | 31.68 | -4.98 | 37.78 | 26.70 | 74.00 | 54.00 |
| | H | 2483.5 | 43.15 | 30.22 | -4.98 | 38.17 | 25.24 | 74.00 | 54.00 |

| Remark： | |
|---|---|
| (1) | Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode. |
| (2) | During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna |
| (3) | Corr.Factor = Antenna Factor + Cable Loss – Pre-amplifier. |

# 5.4 BANDWIDTH TEST

## 5.4.1 Applied procedures / Limit

For frequency hopping system operating in the 2400-2483.5MHz, If the 20dB bandwidth of hopping channel is greater than 25kHz, two-thirds 20dBbandwidth of hopping channel shell be a minimum limit for the hopping channel separation.

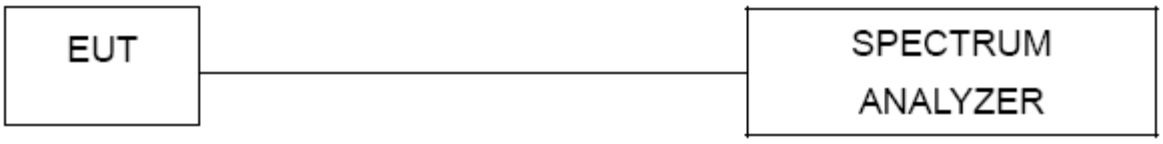
## 5.4.2 Test procedure

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel
RBW ≥ 1% of the 20 dB bandwidth, VBW ≥ RBW, Sweep = auto, Detector function = peak
Trace = max hold

## 5.4.3 Deviation from standard

No deviation.

## 5.4.4 Test setup

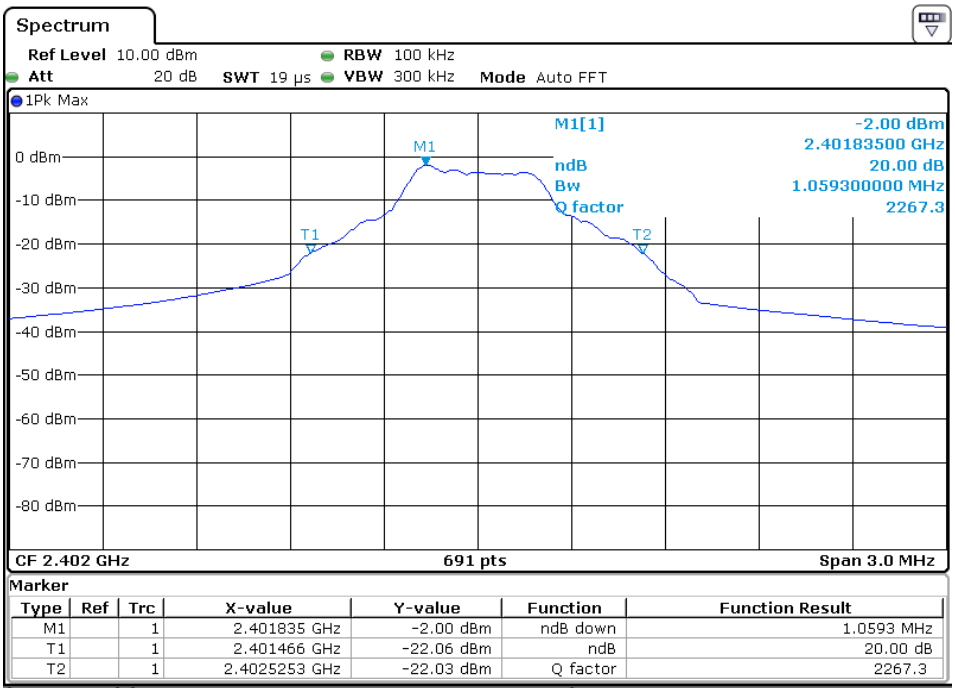


### 5.4.5 Test results

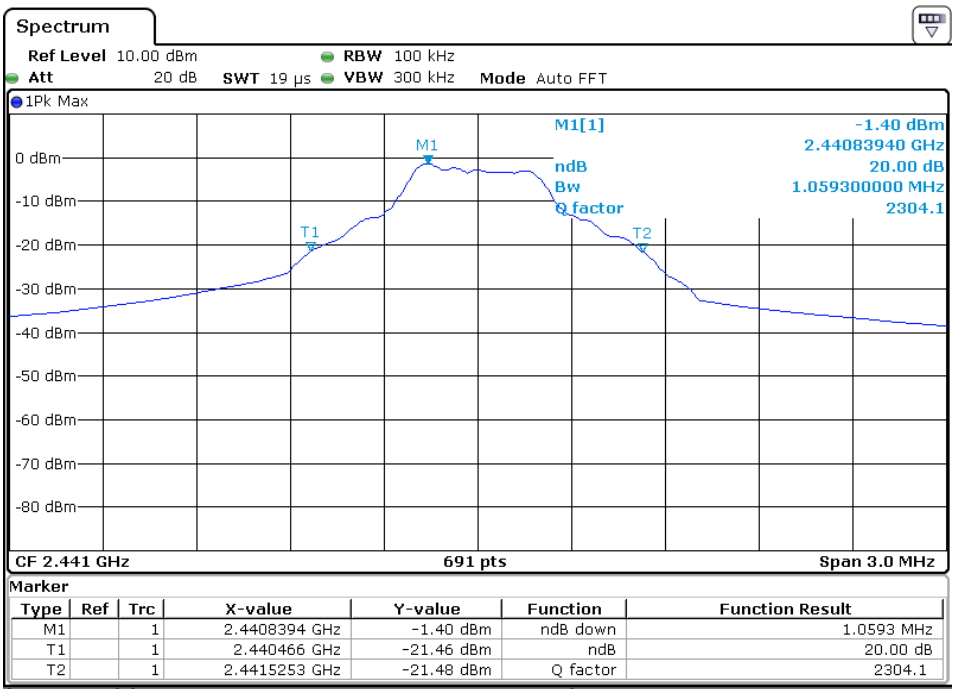
| | | | |
|---|---|---|---|
| EUT： | 5D Minor Chocolate Bluetooth Speaker | Model Name ： | Minor |
| Temperature： | 26 ℃ | Relative Humidity： | 53% |
| Pressure： | 1010 hPa | Test Power ： | DC 3.7V from battery |
| Test Mode ： | TX 1Mbps/ 3Mbps | | |

| Channel | | Channel frenqucy (MHz) | 20dB bandwidth (KHz) | Limit (KHz) | Conclusion |
|---|---|---|---|---|---|
| 1Mbps | Low | 2402 | 1059.3 | N/A | Pass |
| | Middle | 2441 | 1059.3 | N/A | Pass |
| | High | 2480 | 1063.7 | N/A | Pass |
| 3Mbps | Low | 2402 | 1315.5 | N/A | Pass |
| | Middle | 2441 | 1315.5 | N/A | Pass |
| | High | 2480 | 1319.8 | N/A | Pass |

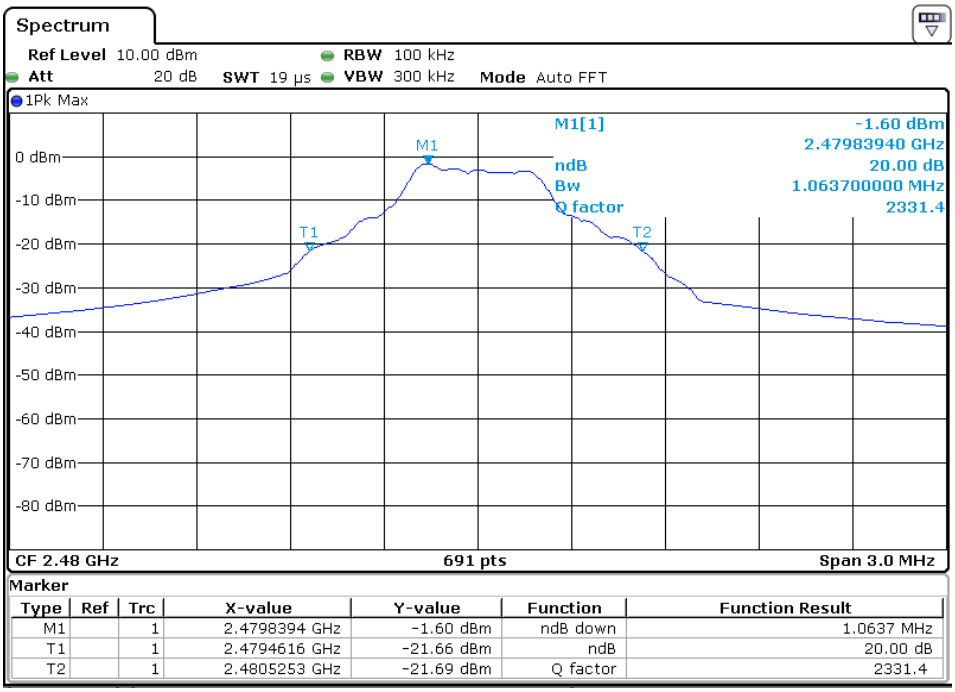
**CH00-1Mbps**




**CH 39-1Mbps**



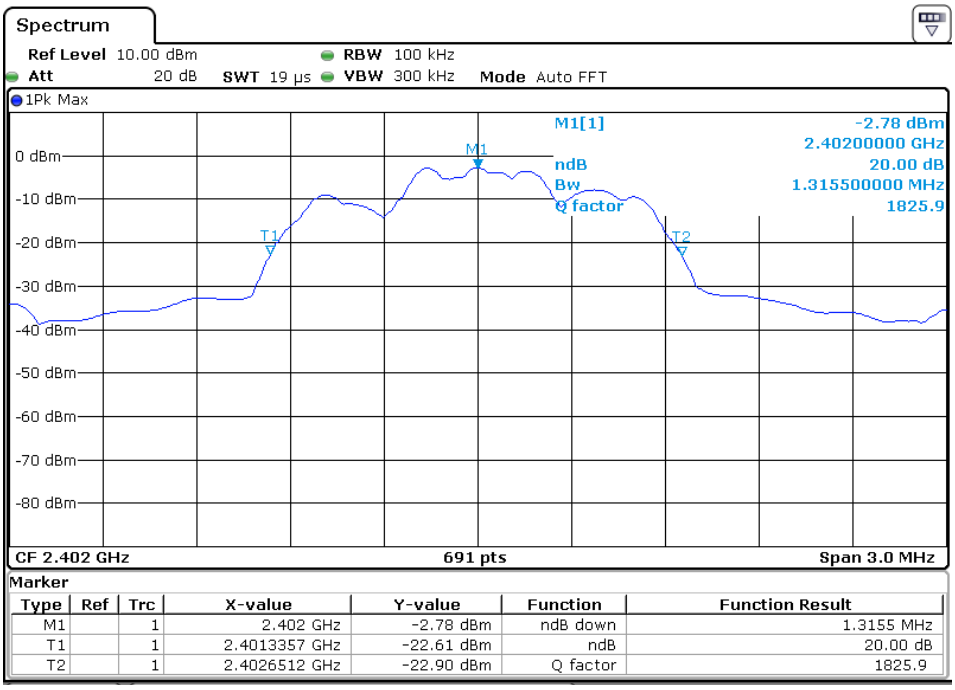
**CH 78-1Mbps**




Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.4798394 GHz | -1.60 dBm | ndB down | 1.0637 MHz |
| T1 | | 1 | 2.4794616 GHz | -21.66 dBm | ndB | 20.00 dB |
| T2 | | 1 | 2.4805253 GHz | -21.69 dBm | Q factor | 2331.4 |

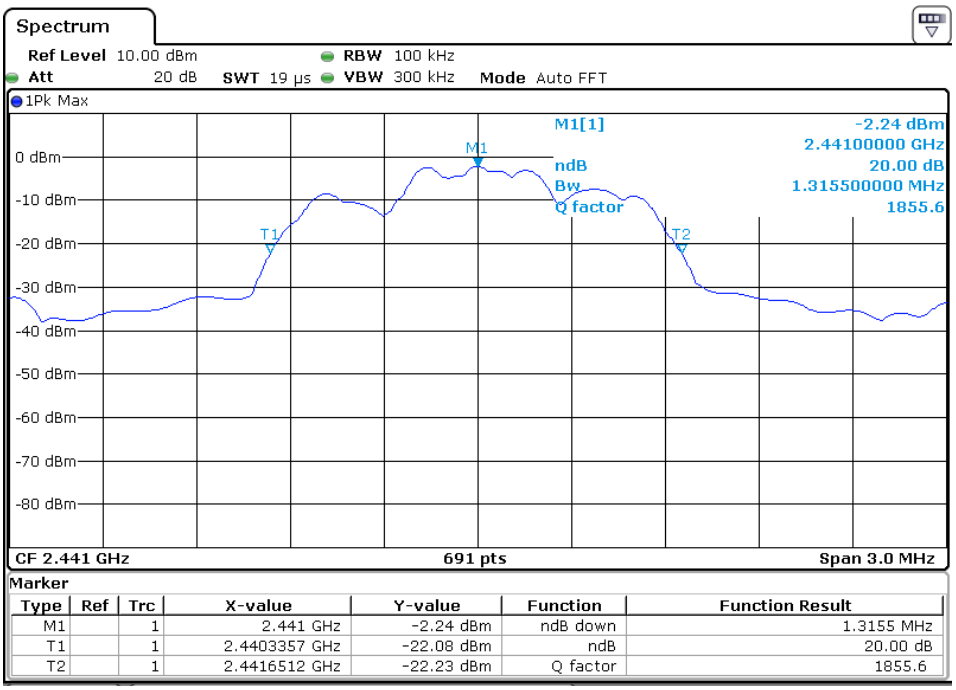
**CH 00-3Mbps**




Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.402 GHz | -2.78 dBm | ndB down | 1.3155 MHz |
| T1 | | 1 | 2.4013357 GHz | -22.61 dBm | ndB | 20.00 dB |
| T2 | | 1 | 2.4026512 GHz | -22.90 dBm | Q factor | 1825.9 |

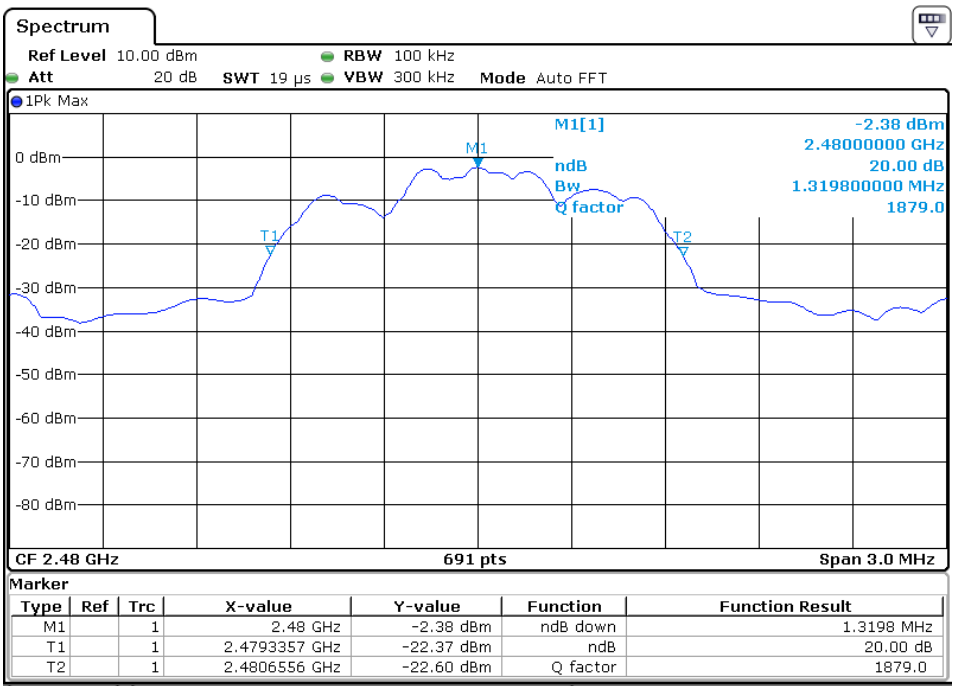
**CH 39-3Mbps**




Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.441 GHz | -2.24 dBm | ndB down | 1.3155 MHz |
| T1 | | 1 | 2.4403357 GHz | -22.08 dBm | ndB | 20.00 dB |
| T2 | | 1 | 2.4416512 GHz | -22.23 dBm | Q factor | 1855.6 |

**CH 78-3Mbps**




Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.48 GHz | -2.38 dBm | ndB down | 1.3198 MHz |
| T1 | | 1 | 2.4793357 GHz | -22.37 dBm | ndB | 20.00 dB |
| T2 | | 1 | 2.4806556 GHz | -22.60 dBm | Q factor | 1879.0 |

## 5.5 Carrier Frequencies Separated

### 5.5.1 Applied procedures / Limit

15.247(a) (1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the 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 125 mW.

### 5.5.2 Test procedure

(1) Connected the antenna port to the Spectrum Analyzer, set the Spectrum Analyzer as Span = wide enough to capture the peaks of two adjacent channels, Resolution (or IF) Bandwidth (RBW) ≥ 1% of the span, Video (or Average) Bandwidth (VBW) ≥ RBW Sweep = auto, Detector function = peak, Trace = max hold

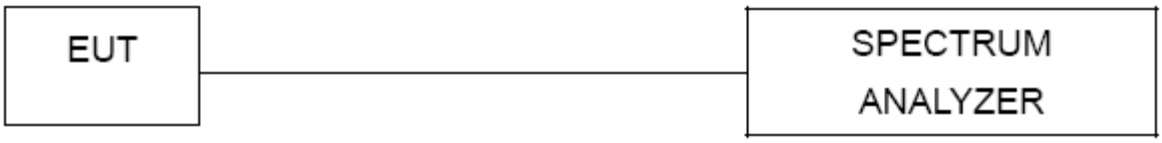
(2) The EUT should be transmitting at its maximum data rate. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

(3) The above procedure shall be repeated at the lowest, the middle, and the highest frequency of the stated frequency range with modulated mode. also shall be performed at different modes of operation.

### 5.5.3 Deviation from standard

No deviation.

### 5.5.4 Test setup



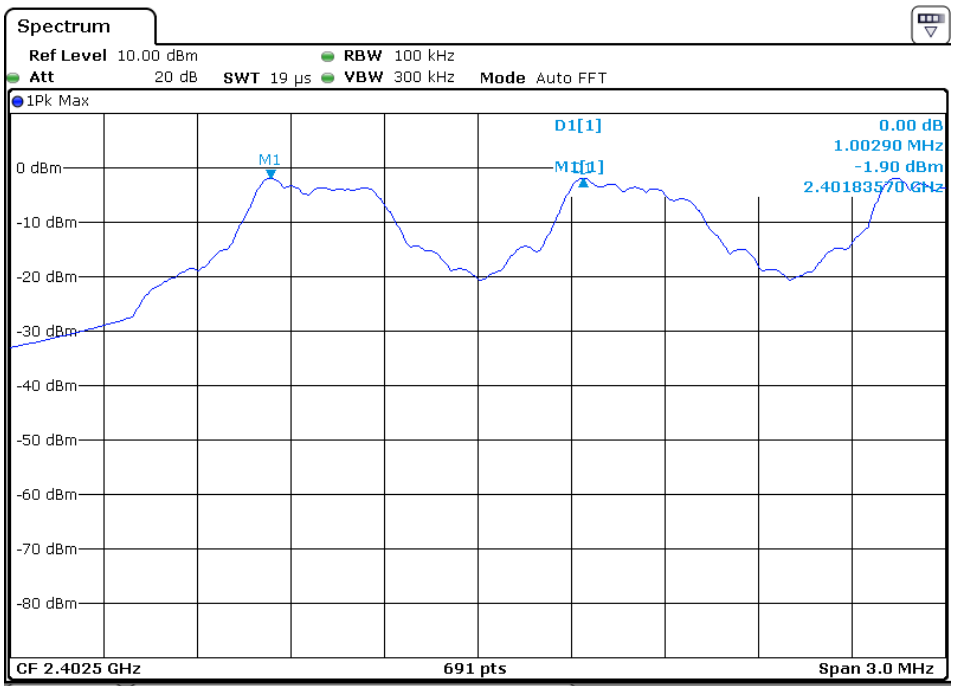
### 5.5.5 Test results

| | | | |
|---|---|---|---|
| EUT： | 5D Minor Chocolate Bluetooth Speaker | Model Name ： | Minor |
| Temperature： | 26 ℃ | Relative Humidity： | 53% |
| Pressure： | 1010 hPa | Test Power ： | DC 3.7V from battery |
| Test Mode ： | TX 1Mbps/ 3Mbps | | |

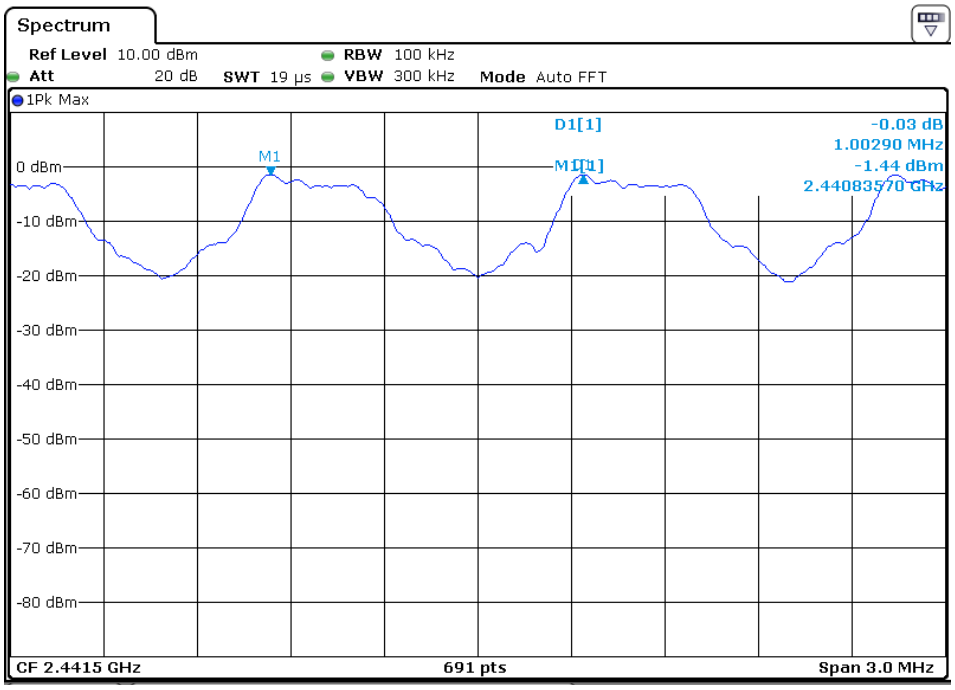
| Channel | | Channel frenqucy (MHz) | Channel Separation (MHz) | Conclusion |
|---|---|---|---|---|
| 1Mbps | Low | 2402 | 1002.9 | Pass |
| | Middle | 2441 | 1002.9 | Pass |
| | Highest | 2480 | 998.6 | Pass |
| 3Mbps | Low | 2402 | 1002.9 | Pass |
| | Middle | 2441 | 1002.9 | Pass |
| | Highest | 2480 | 1007.2 | Pass |

**Ch. Separation >2/3(20dB bandwidth)**

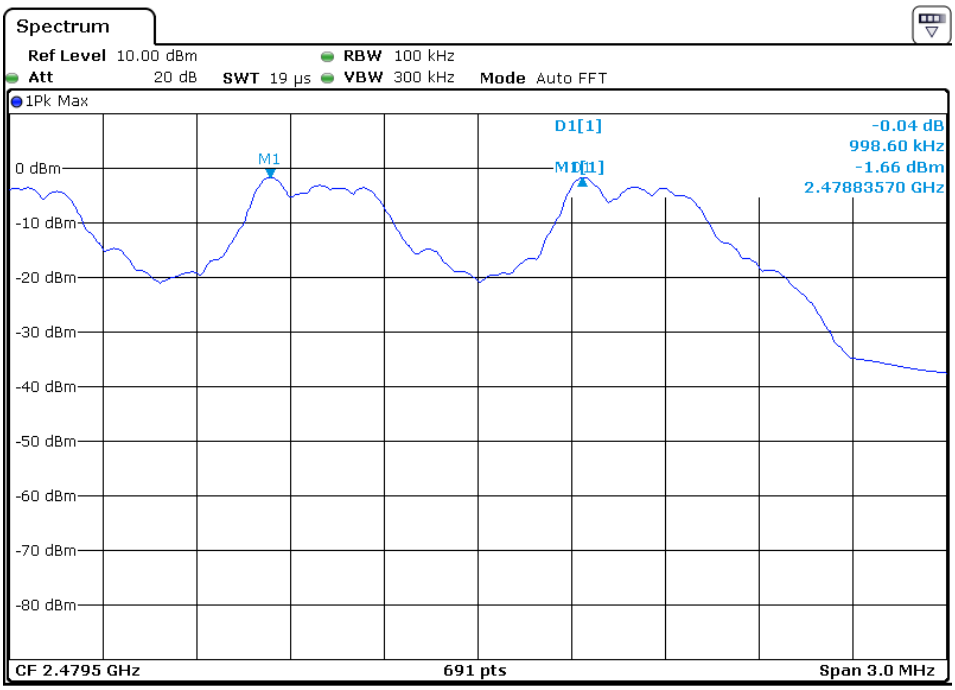
**CH 00-1Mbps**



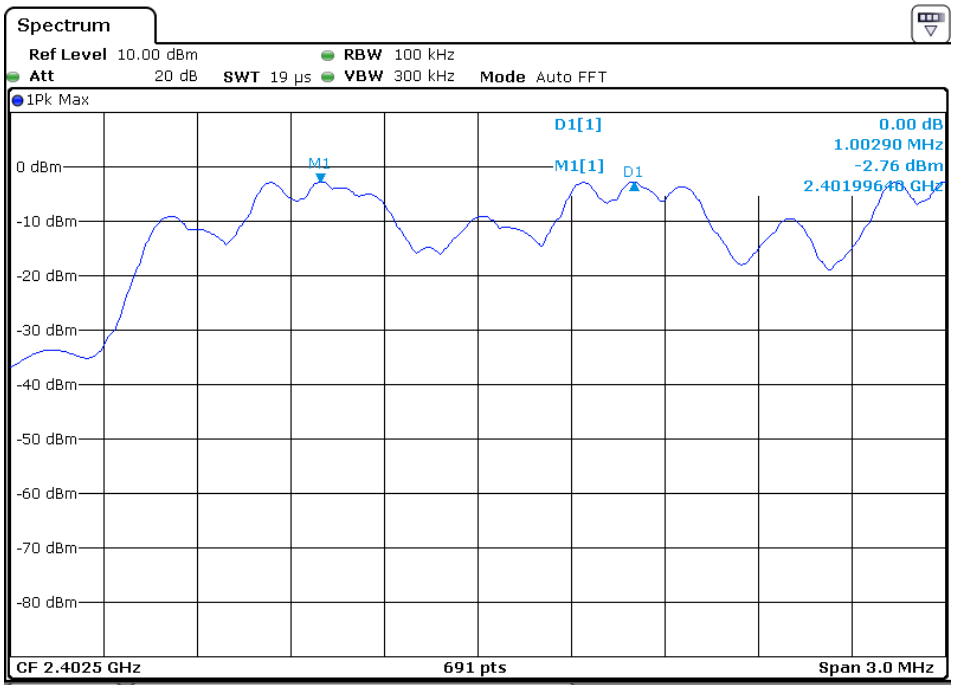

**CH 39-1Mbps**



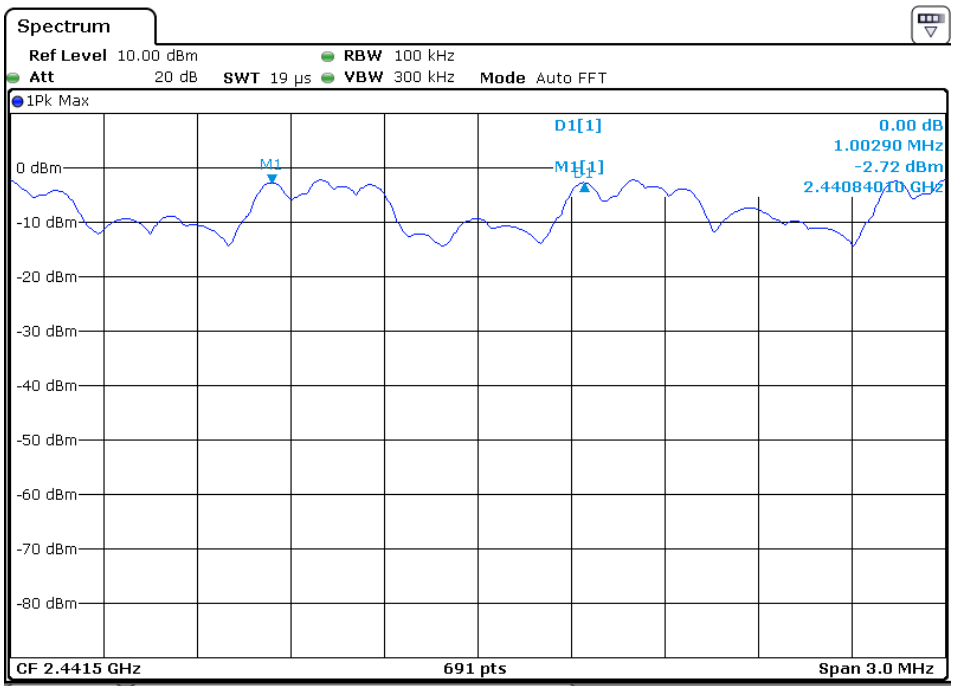
**CH 78-1Mbps**



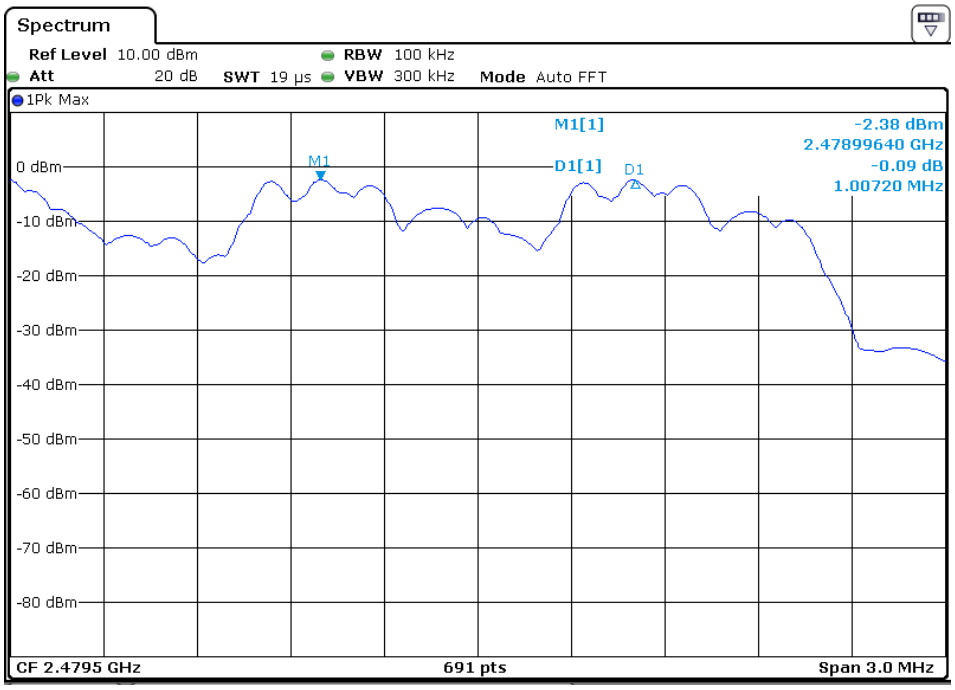

**CH 00-3Mbps**



**CH 39-3Mbps**




**CH 78-3Mbps**



## 5.6 Hopping Channel Number

### 5.6.1 Applied procedures / Limit

15.247(a) (1) (iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

### 5.6.2 Test procedure

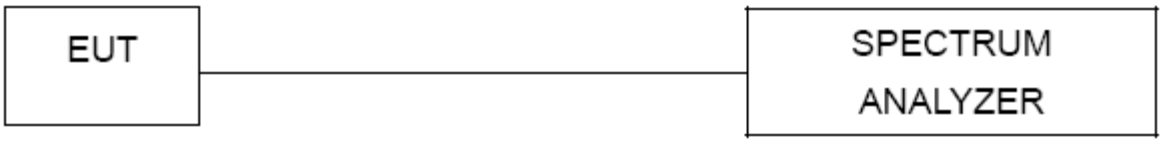
(1) Connected the antenna port to the Spectrum Analyzer , set the Spectrum Analyzer as Span = the frequency band of operation, RBW ≥ 1% of the span, VBW ≥ RBW Sweep = auto Detector function = peak, Trace = max hold

(2) The EUT should be have its hopping function enabled. Maxhold and record hopping channels It may prove necessary to break the span up to sections, in order to clearly show all of the hopping frequencies.

### 5.6.3 Deviation from standard

No deviation.

### 5.6.4 Test setup

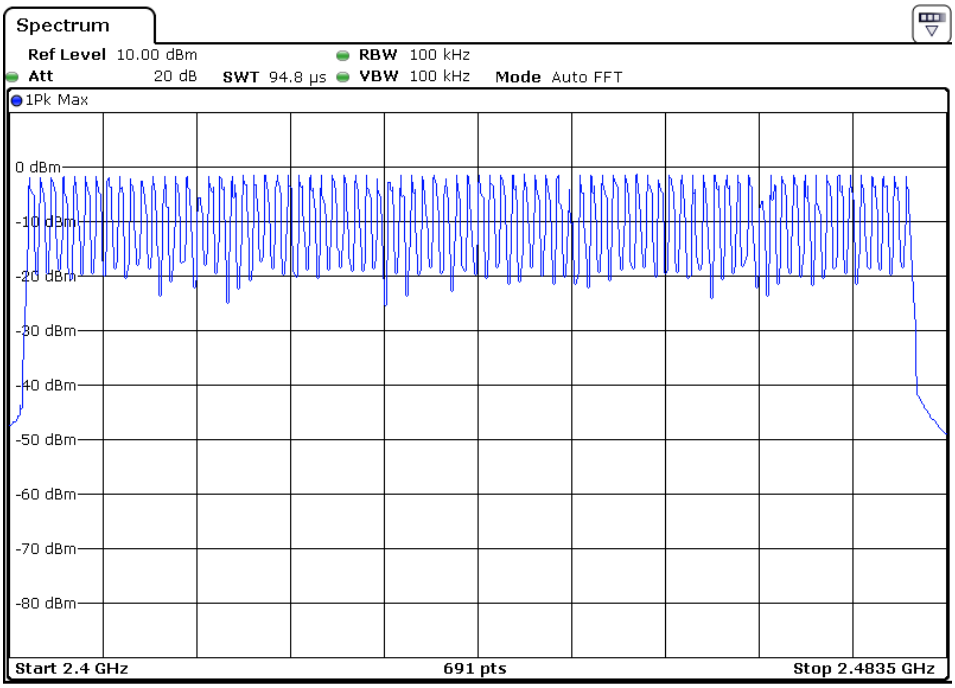


### 5.6.5 Test result

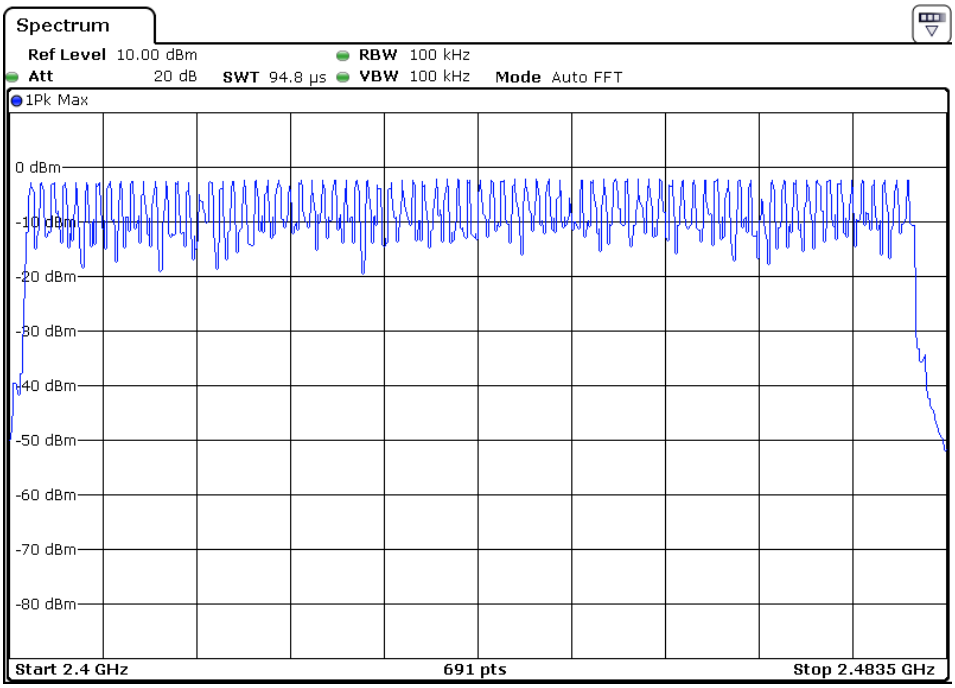
| Hopping Channel Number result | | |
|---|---|---|
| Operating Mode: 1Mbps/ 3Mbps Mode | Test date:2016-05-18 | |
| Result | Limit | Conclusion |
| 79 | 15 | Pass |

| | | | |
|---|---|---|---|
| EUT： | 5D Minor Chocolate Bluetooth Speaker | Model Name ： | Minor |
| Temperature： | 26 ℃ | Relative Humidity： | 53% |
| Pressure： | 1010 hPa | Test Power ： | DC 3.7V from battery |
| Test Mode ： | TX 1Mbps/ 3Mbps | | |

1Mbps




3Mbps



## 5.7 Dwell time

### 5.7.1 Applied procedures / Limit

15.247(a) (1) (iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

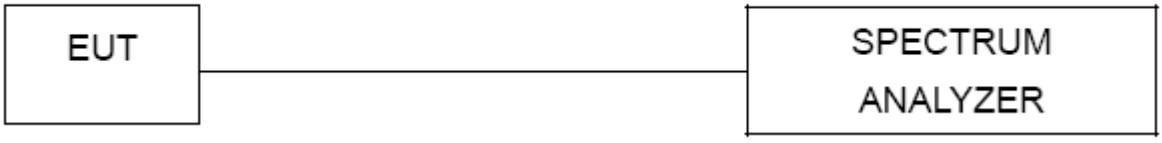
### 5.7.2 Test procedure

(1) Place the EUT on the table in the chamber or connect the antenna port of the EUT to spectrum analyzer and set it in transmitting mode.
(2) Set RBW of spectrum analyzer to 1MHz, VBW ≥ RBW
(3) Use a video trigger with the trigger level set to enable triggering only on full pulses.
(4) Sweep Time is more than once pulse time.
(5) Set the center frequency on any frequency would be measure and set the frequency span to zero span.
(6) Measure the maximum time duration of one single pulse.
(7) Set the EUT for DH5, DH3 and DH1 packet transmitting.
(8) Measure the maximum time duration of one single pulse.
(9) A Period Time = 79*0.4=31.6 S
DH1 Time Slot: Reading * (1600/2)*31.6/79
DH3 Time Slot: Reading * (1600/4)*31.6/79
DH5 Time Slot: Reading * (1600/6)*31.6/79

### 5.7.3 Deviation from standard

No deviation.

### 5.7.4 Test setup

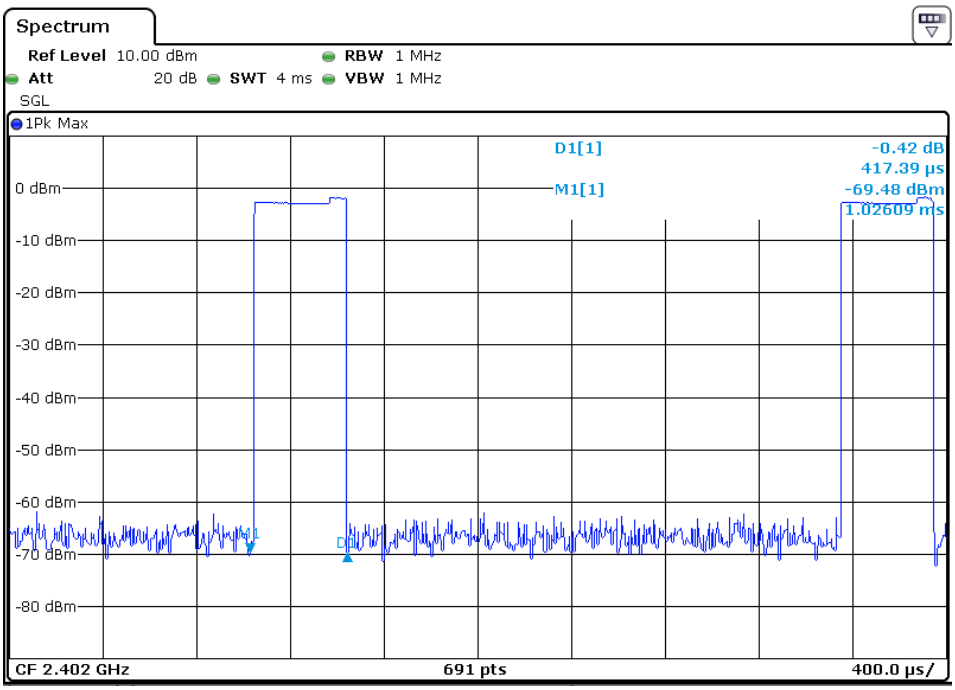


### 5.7.5 Test result

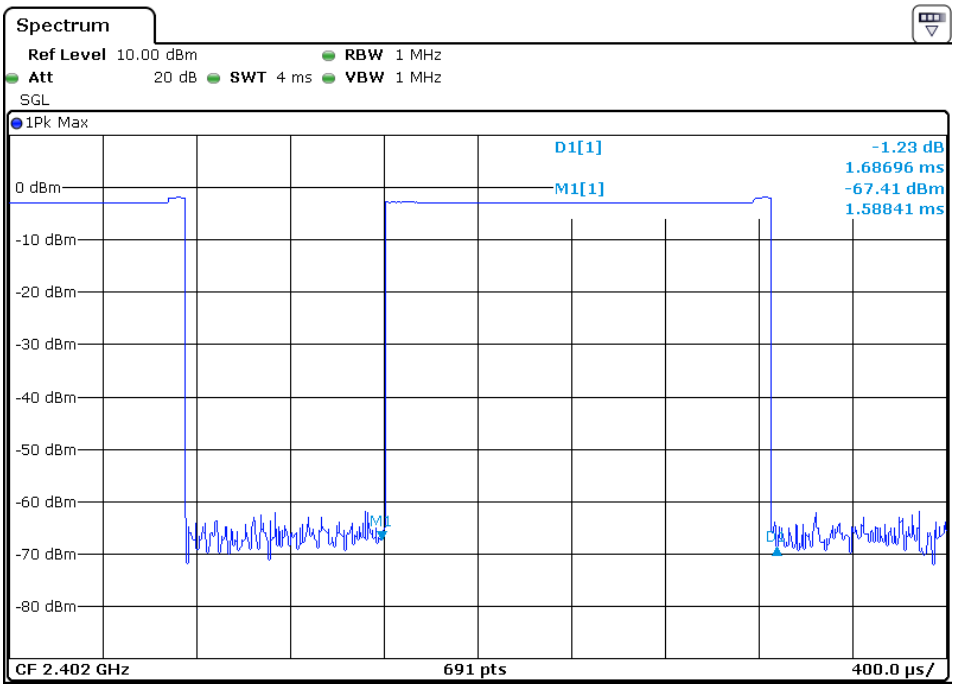
| EUT： | 5D Minor Chocolate Bluetooth Speaker | Model Name ： | Minor |
|---|---|---|---|
| Temperature： | 26 ℃ | Relative Humidity： | 53% |
| Pressure： | 1010 hPa | Test Power ： | DC 3.7V from battery |
| Test Mode ： | CH00-DH1/DH3/DH5 (1Mbps Mode) | | |

| Data Packet | Frequency | Pulse Duration (ms) | Dwell Time (ms) | Limits (s) |
|---|---|---|---|---|
| DH1 | 2402 MHz | 0.417 | 0.133 | 0.4000 |
| DH3 | 2402 MHz | 1.686 | 0.269 | 0.4000 |
| DH5 | 2402 MHz | 2.915 | 0.310 | 0.4000 |

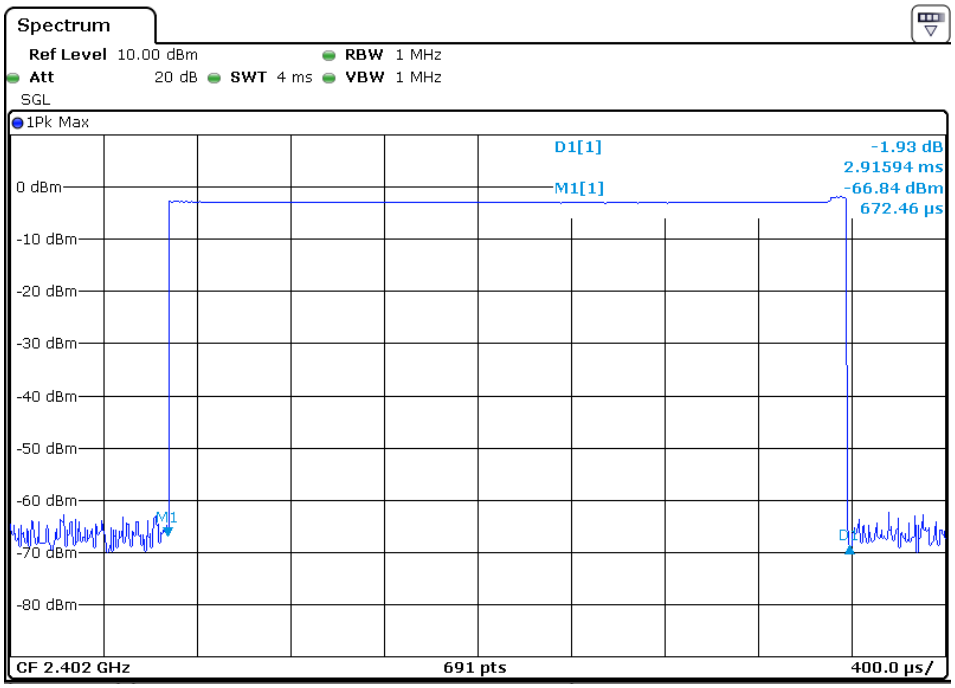
**CH 00- DH1**



**CH 00- DH3**



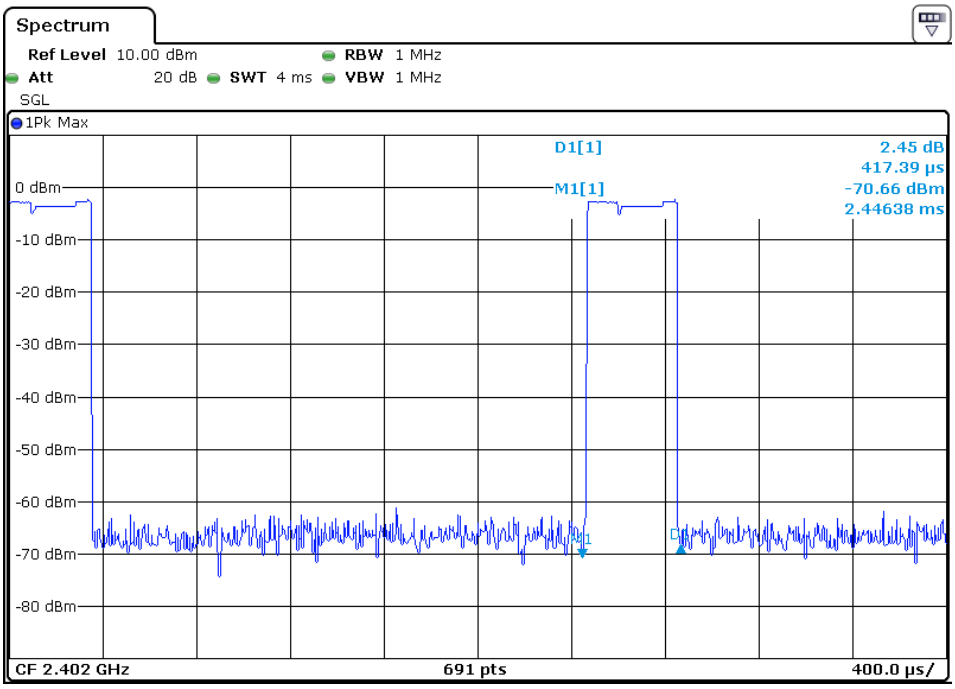

**CH 00- DH5**



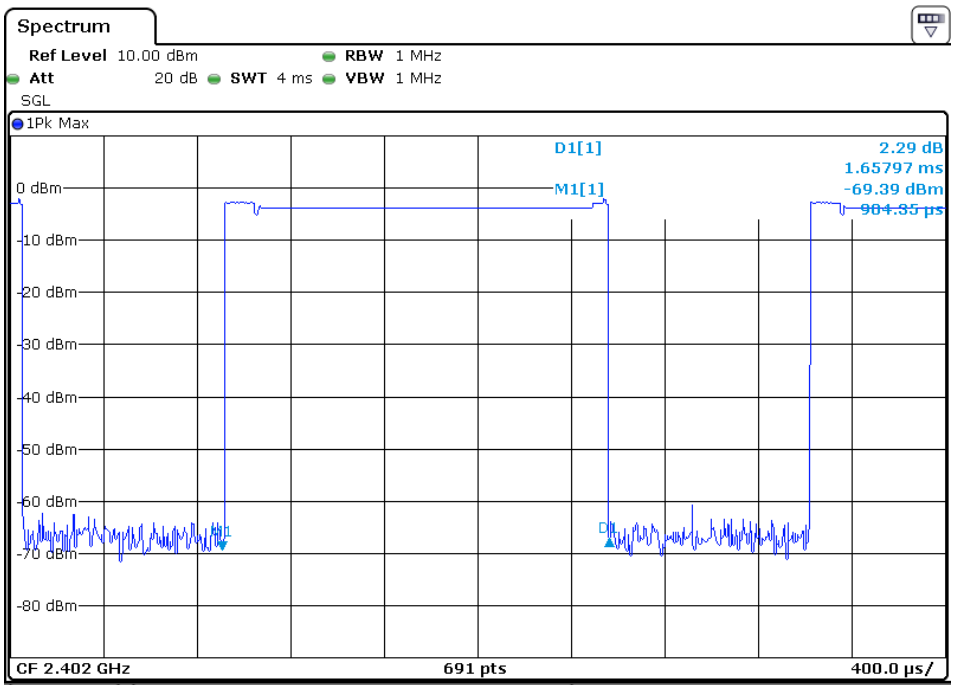
| EUT： | 5D Minor Chocolate Bluetooth Speaker | Model Name ： | Minor |
|---|---|---|---|
| Temperature： | 26 ℃ | Relative Humidity： | 53% |
| Pressure： | 1010 hPa | Test Power ： | DC 3.7V from battery |
| Test Mode ： | CH00-3DH1/3DH3/3DH5 (3Mbps Mode) | | |

| Data Packet | Frequency | Pulse Duration (ms) | Dwell Time (ms) | Limits (s) |
|---|---|---|---|---|
| 3DH1 | 2402 MHz | 0.417 | 0.133 | 0.4000 |
| 3DH3 | 2402 MHz | 1.657 | 0.265 | 0.4000 |
| 3DH5 | 2402 MHz | 2.915 | 0.310 | 0.4000 |

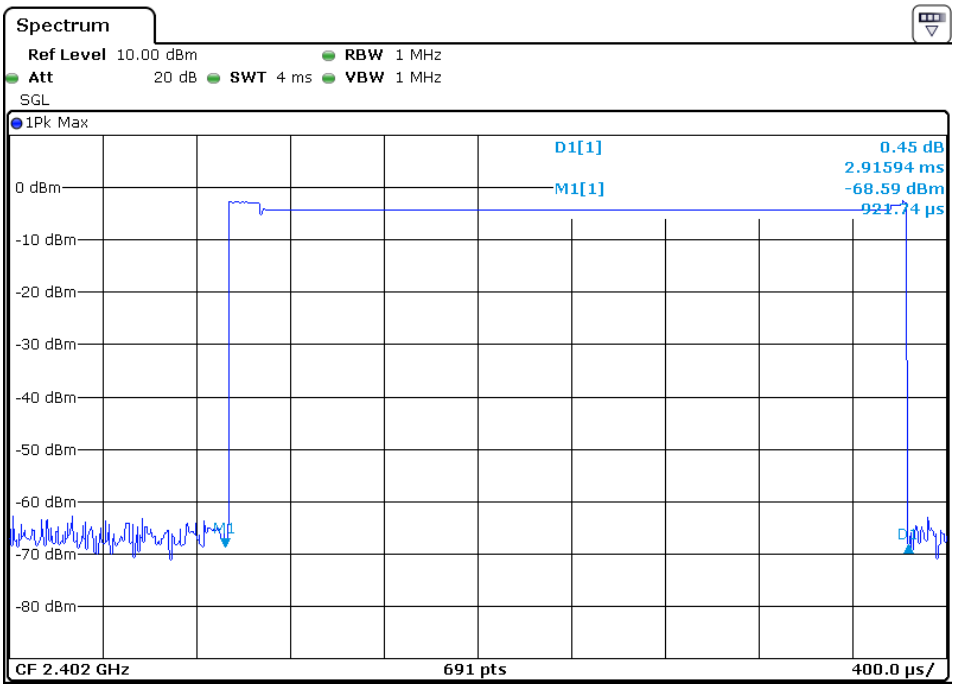
**CH 00- DH1**



**CH 00- DH3**




**CH 00- DH5**



## 5.8 Maximum Peak Output Power

### 5.8.1 Applied procedures / Limit

15.247(a) (1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the 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 125 mW.
15.247(b) (1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

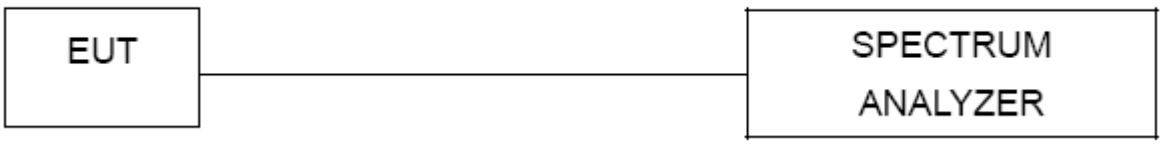
### 5.8.2 Test procedure

(1) Connected the antenna port to the Spectrum Analyzer, set the Spectrum Analyzer as Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel RBW > the 20 dB bandwidth of the emission being measured, VBW ≥ RBW, Sweep = auto Detector function = peak, Trace = max hold
(2) The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.
(3) The above procedure shall be repeated at the lowest, the middle, and the highest frequency of the stated frequency range with modulated mode. Also shall be performed at different modes of operation.

### 5.8.3 Deviation from standard

No deviation.

### 5.8.4 Test setup

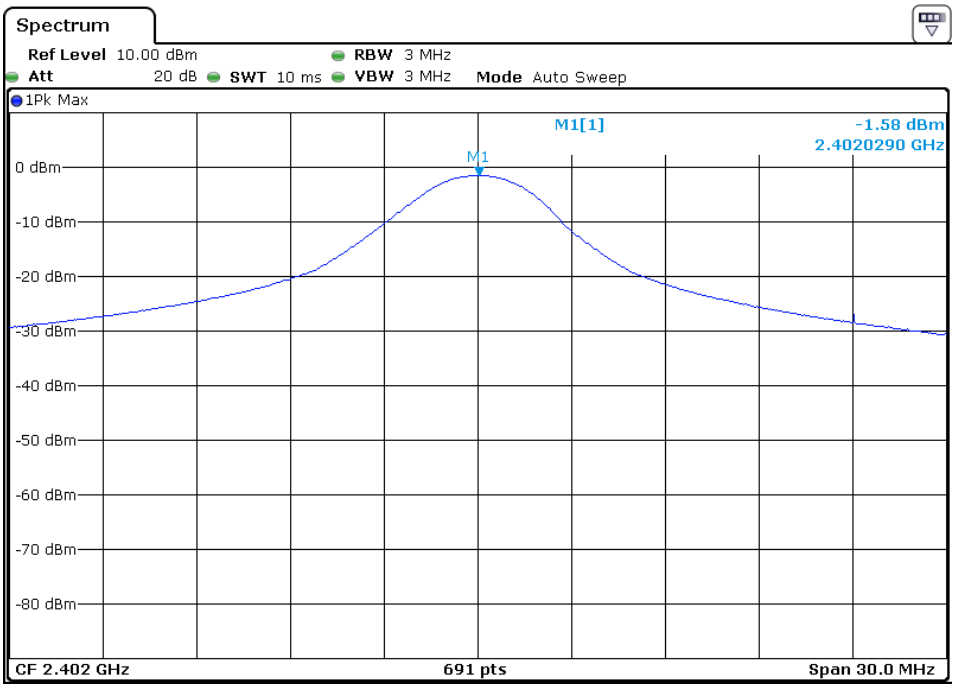


### 5.8.5 Test results

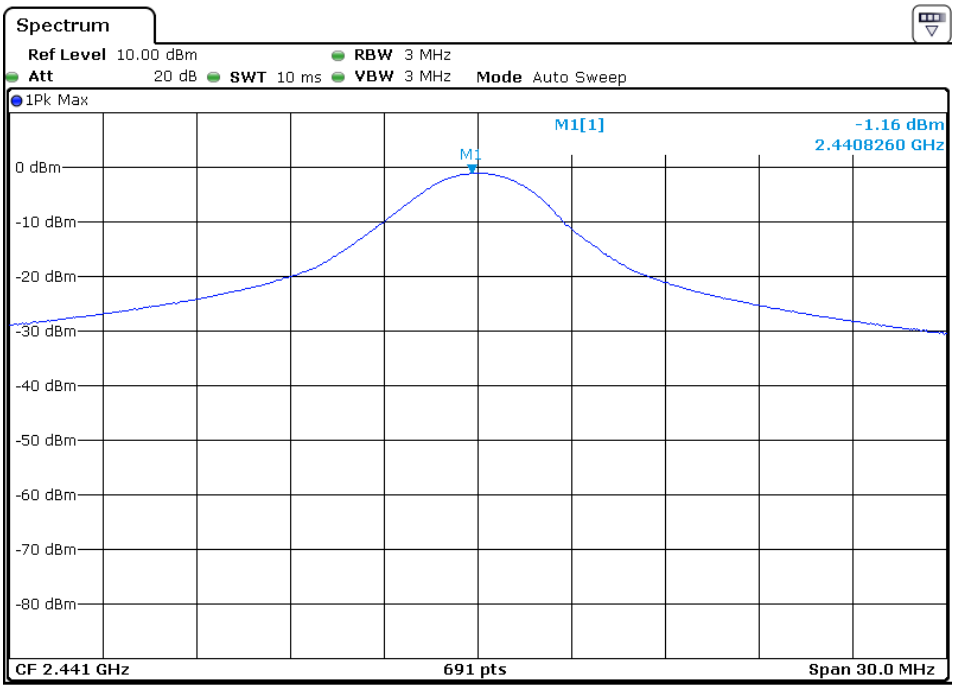
| | | | |
|---|---|---|---|
| EUT： | 5D Minor Chocolate Bluetooth Speaker | Model Name ： | Minor |
| Temperature： | 26 ℃ | Relative Humidity： | 60% |
| Pressure： | 1010 hPa | Test Voltage ： | DC 3.7V from battery |
| Test Mode ： | TX | | |
| Note: All the data rates have be tested and the worst-case as the table below. | | | |

| Test Mode | Frequency | Peak Output Power (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|
| Data rate 1Mbps | 2402 MHz | -1.58 | 21 | Pass |
| | 2441 MHz | -1.16 | 21 | Pass |
| | 2480 MHz | -1.25 | 21 | Pass |
| Data rate 3Mbps | 2402 MHz | -1.26 | 21 | Pass |
| | 2441 MHz | -0.90 | 21 | Pass |
| | 2480 MHz | -1.06 | 21 | Pass |
| Cable loss = 1.0 dBm | | | | |

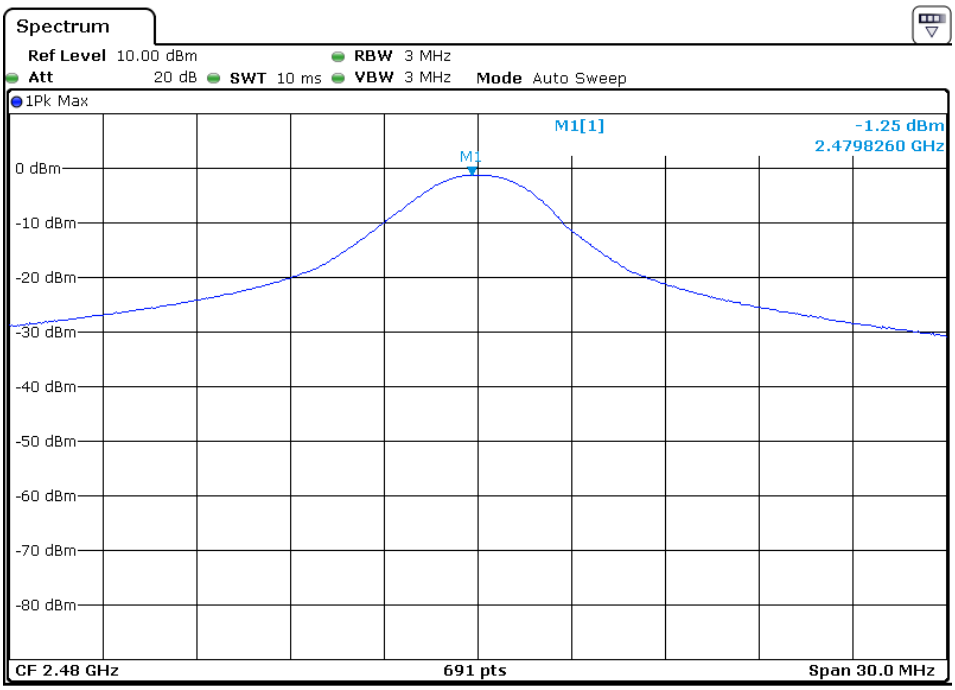
**CH 00-1Mbps**



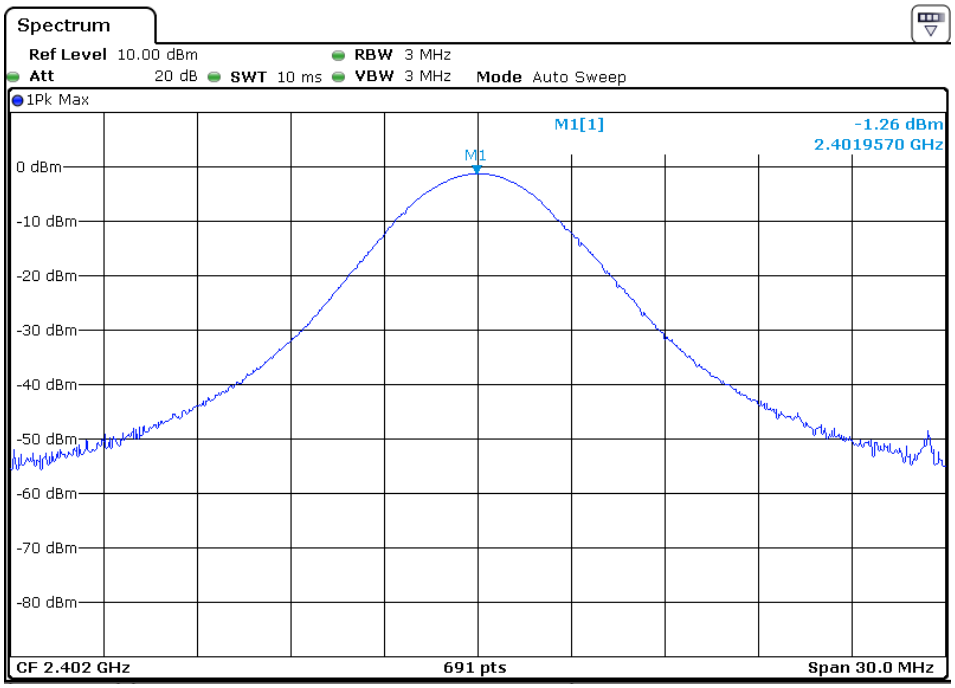

**CH 39-1Mbps**



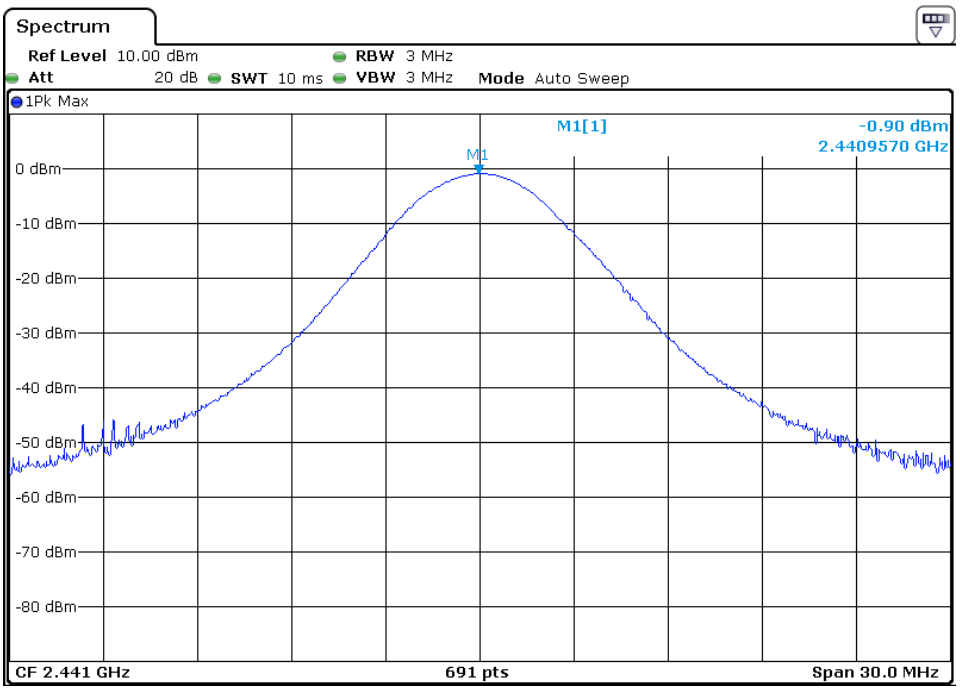
**CH 78-1Mbps**



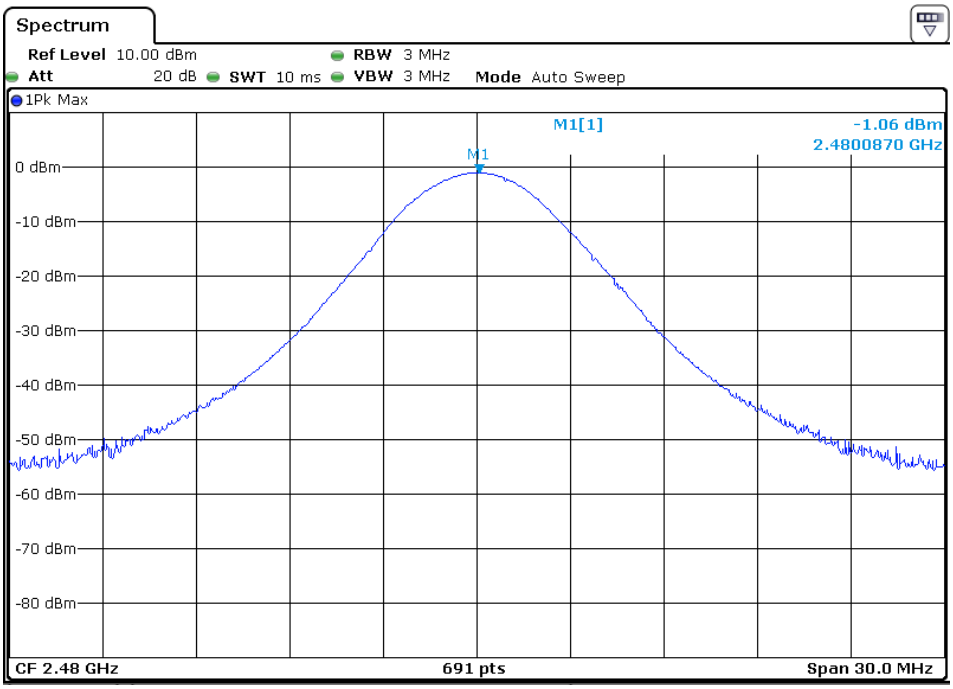

**CH 00-3Mbps**



**CH 39-3Mbps**




**CH 78-3Mbps**



## 5.9 Band edge

### 5.9.1 Applied procedures / Limit

15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

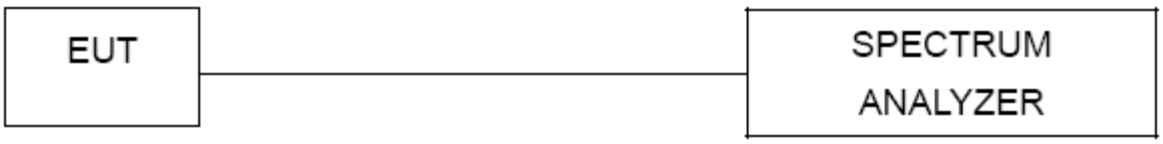
### 5.9.2 Test procedure

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. Span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation, RBW ≥ 1% of the span, VBW ≥ RBW, Sweep = auto,
Detector function = peak, Trace = max hold

### 5.9.3 Deviation from standard

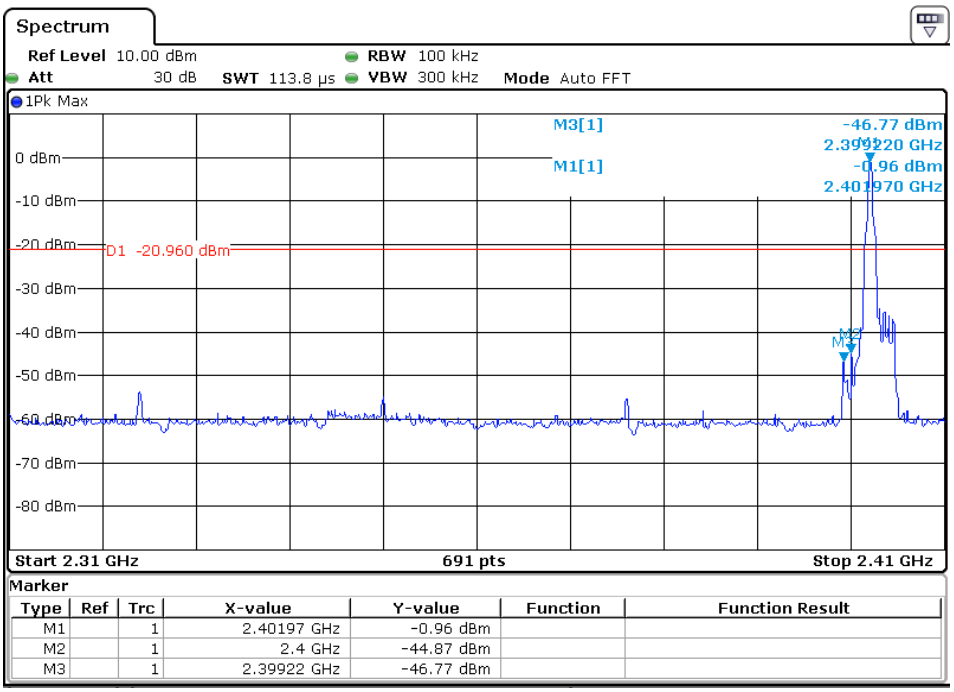
No deviation.

### 5.9.4 Test setup

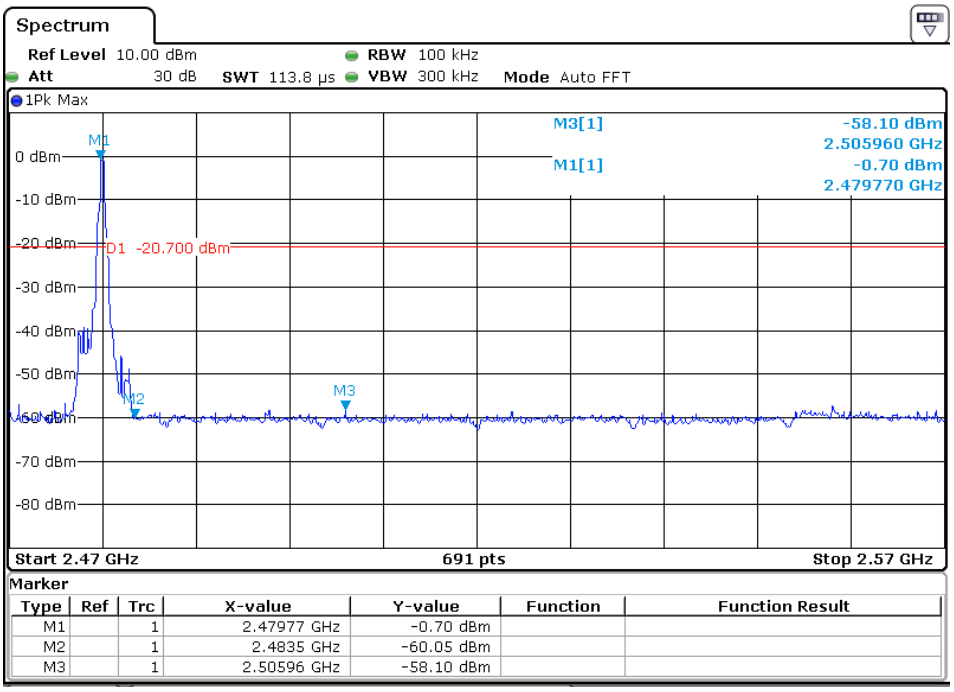


### 5.9.5 Test results

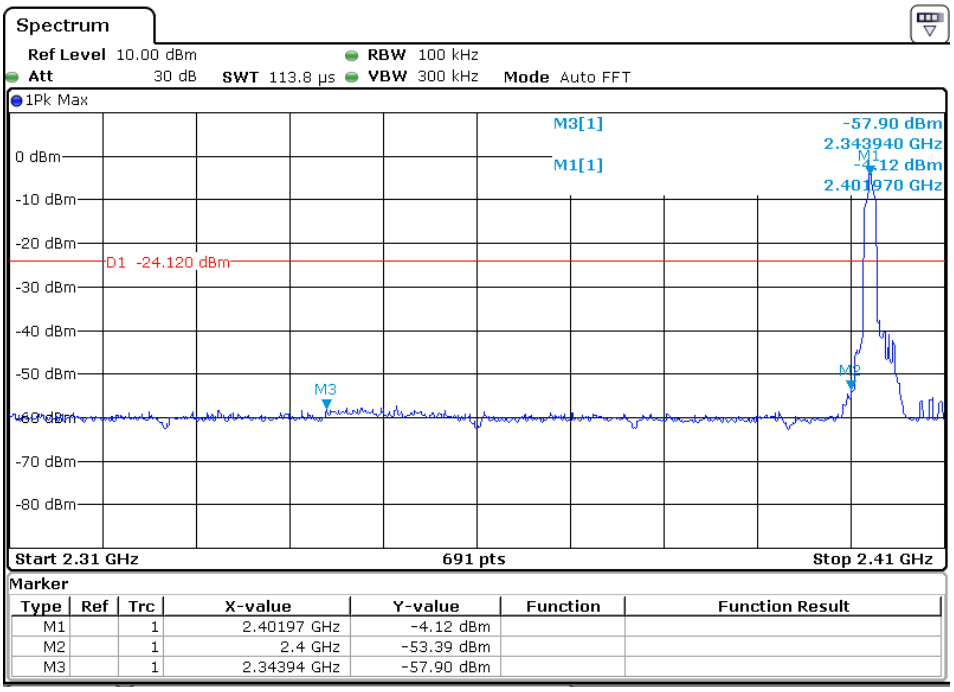
**CH00 (Lower) Data rate 1Mbps**




**CH 78 (Upper) Data rate 1Mbps**



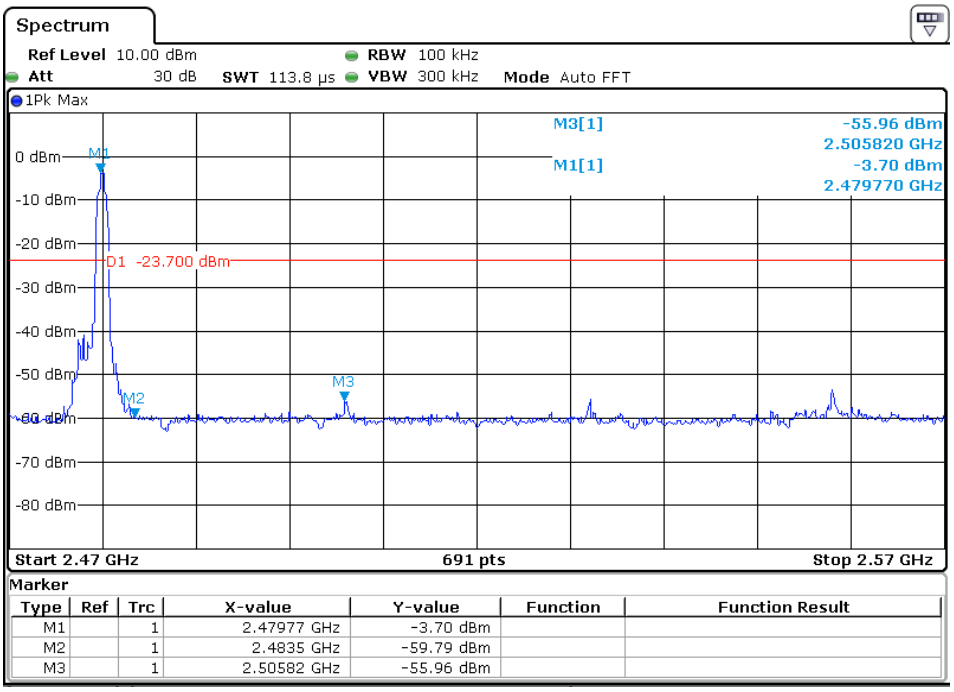
**CH00 (Lower) Data rate 3Mbps**




Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.40197 GHz | -4.12 dBm | | |
| M2 | | 1 | 2.4 GHz | -53.39 dBm | | |
| M3 | | 1 | 2.34394 GHz | -57.90 dBm | | |

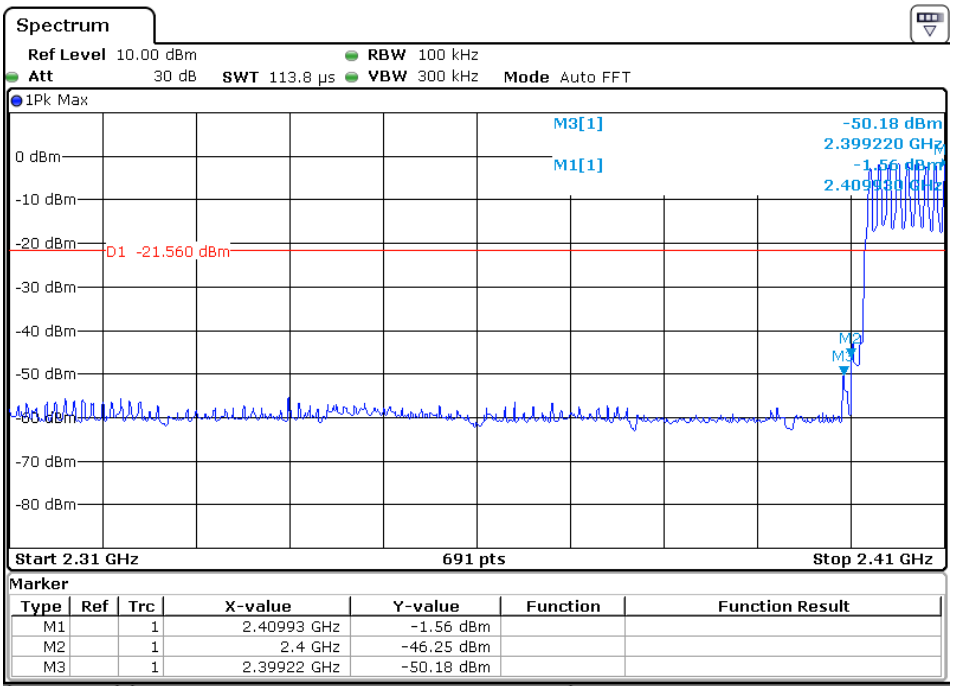
**CH 78 (Upper) Data rate 3Mbps**




Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.47977 GHz | -3.70 dBm | | |
| M2 | | 1 | 2.4835 GHz | -59.79 dBm | | |
| M3 | | 1 | 2.50582 GHz | -55.96 dBm | | |

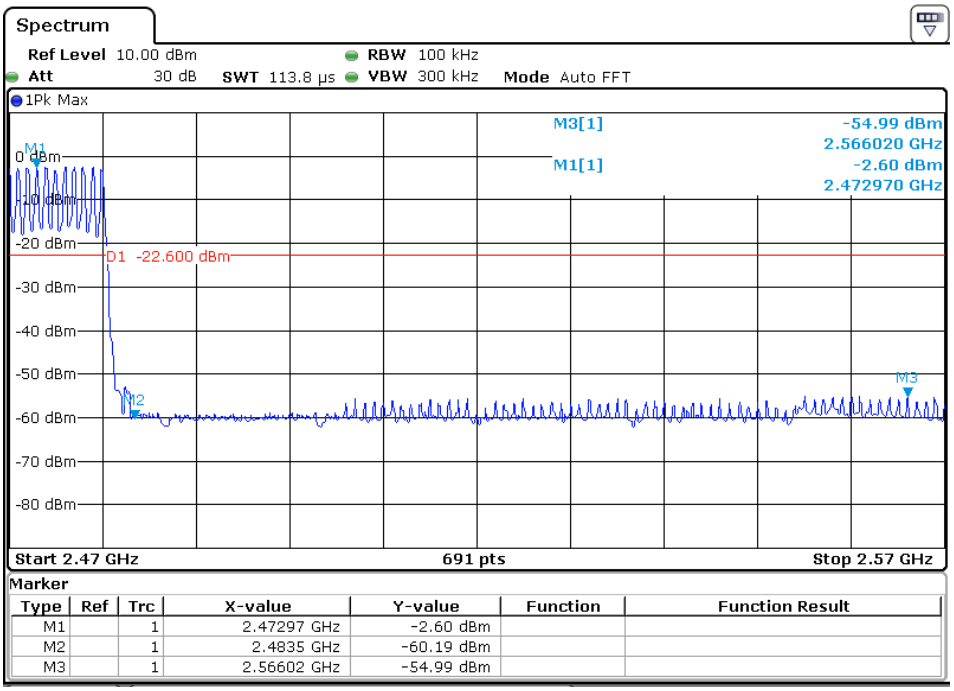
## CH00 (Lower) Data rate 1Mbps




Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.40993 GHz | -1.56 dBm | | |
| M2 | | 1 | 2.4 GHz | -46.25 dBm | | |
| M3 | | 1 | 2.39922 GHz | -50.18 dBm | | |

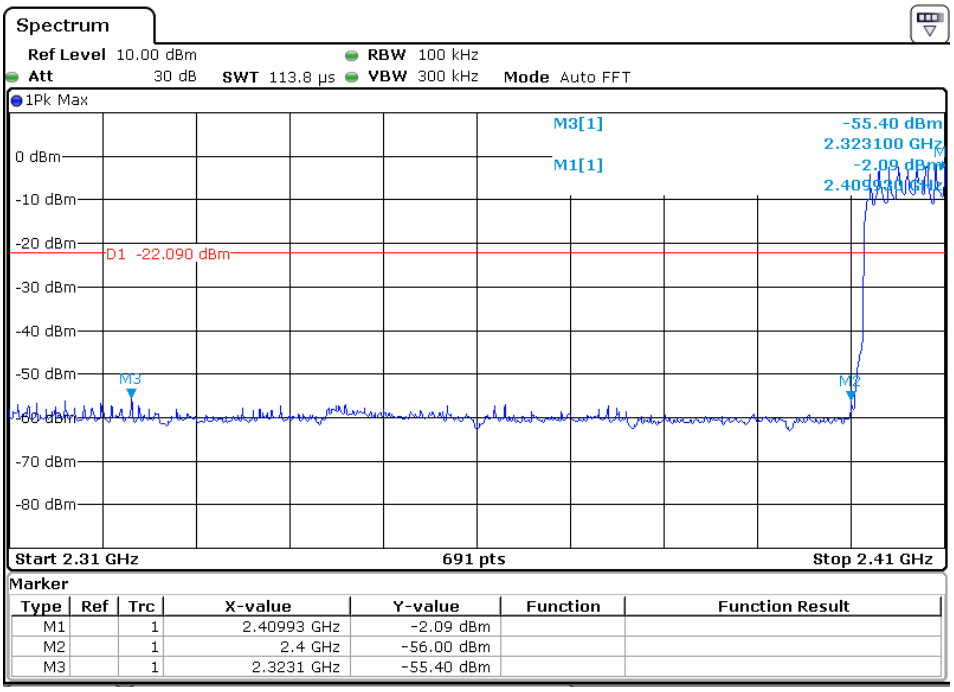
## CH 78 (Upper) Data rate 1Mbps




Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.47297 GHz | -2.60 dBm | | |
| M2 | | 1 | 2.4835 GHz | -60.19 dBm | | |
| M3 | | 1 | 2.56602 GHz | -54.99 dBm | | |

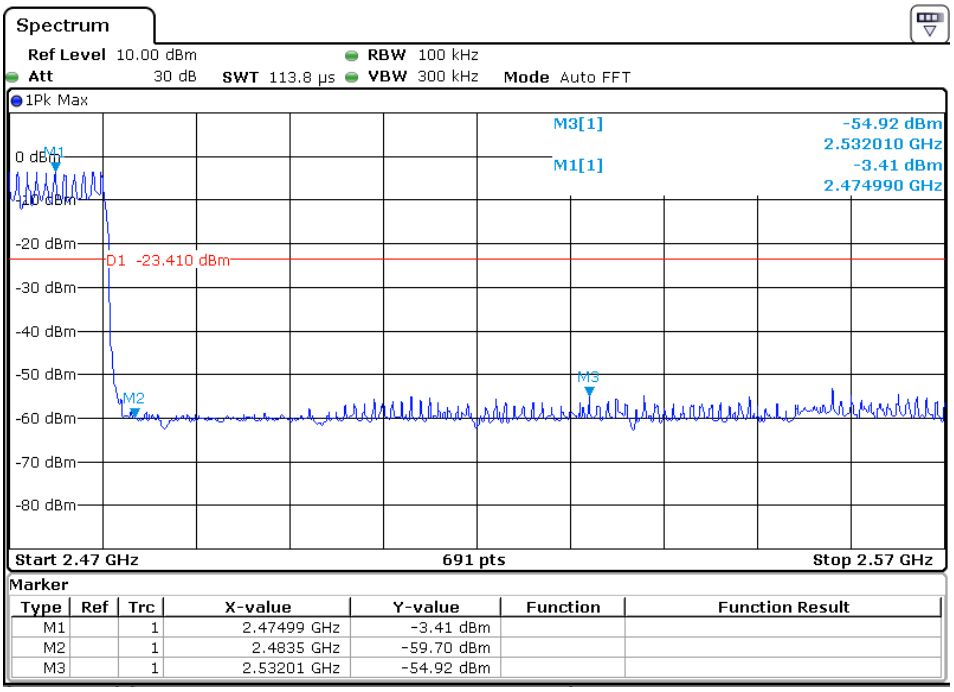
**CH00 (Lower) Data rate 3Mbps**




Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.40993 GHz | -2.09 dBm | | |
| M2 | | 1 | 2.4 GHz | -56.00 dBm | | |
| M3 | | 1 | 2.3231 GHz | -55.40 dBm | | |

**CH 78 (Upper) Data rate 3Mbps**




Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 2.47499 GHz | -3.41 dBm | | |
| M2 | | 1 | 2.4835 GHz | -59.70 dBm | | |
| M3 | | 1 | 2.53201 GHz | -54.92 dBm | | |

## 5.10 Conducted Spurious Emissions

### 5.10.1 Applied procedures / Limit

15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

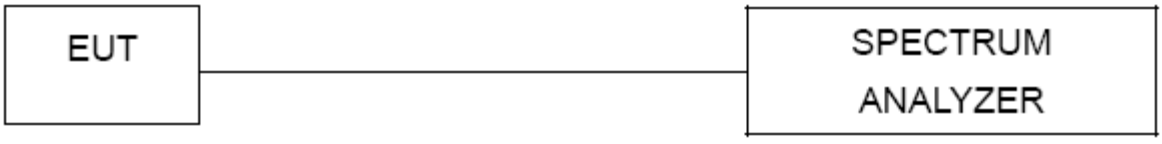
### 5.10.2 Test procedure

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
b. Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the $10^{th}$ harmonic. Typically, several plots are required to cover this entire span. RBW = 100 kHz
VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold
sweep points ≥ investigated frequency range/RBW.

### 5.10.3 Deviation from standard

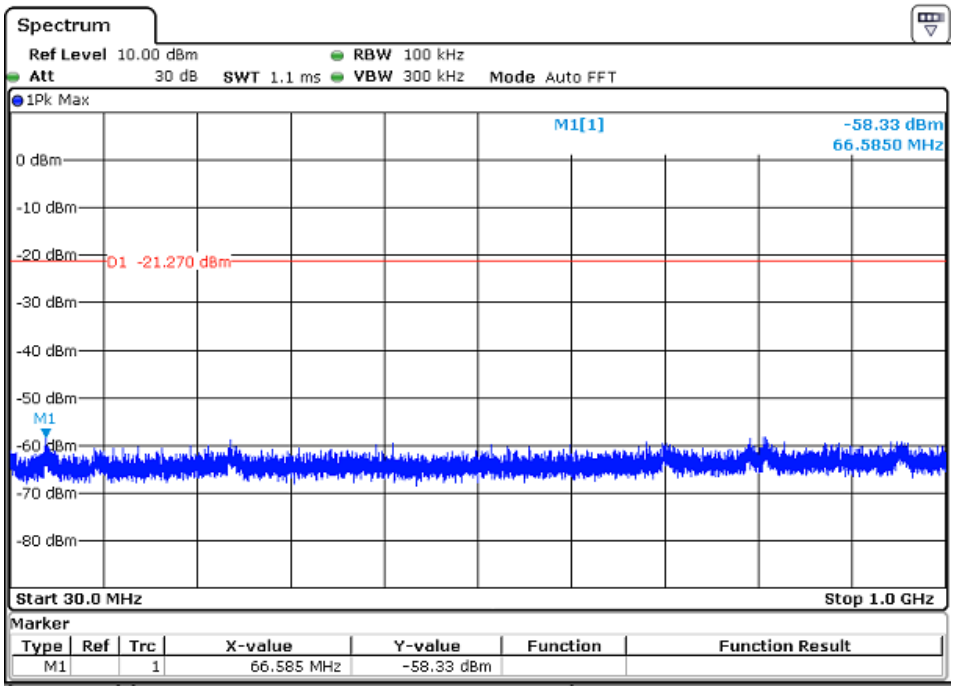
No deviation.

### 5.10.4 Test setup



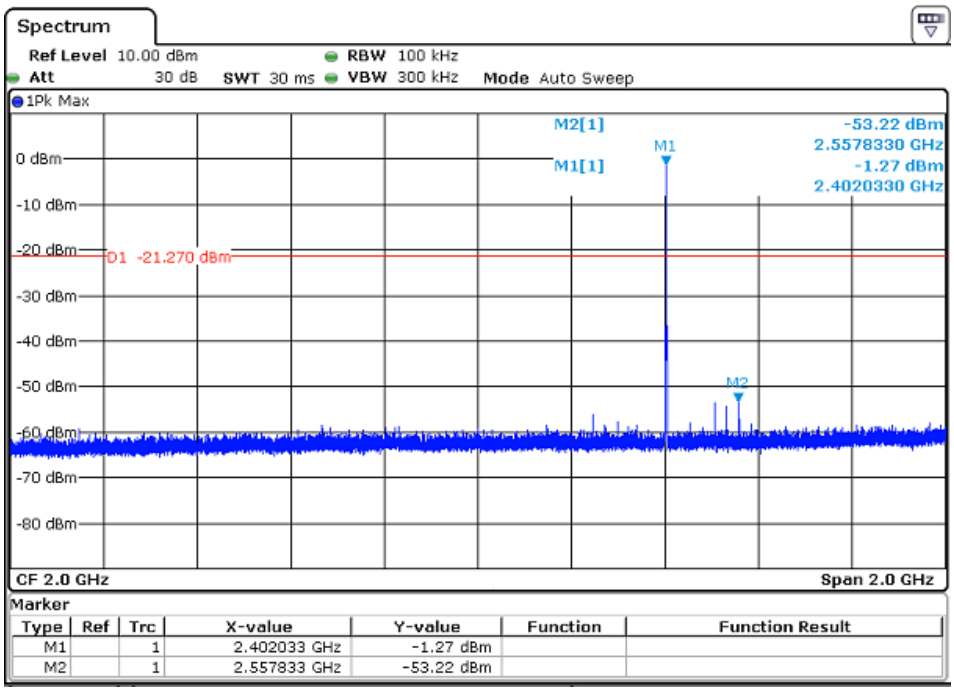
## 5.10.5Test results

**CH00 Data rate 1Mbps**



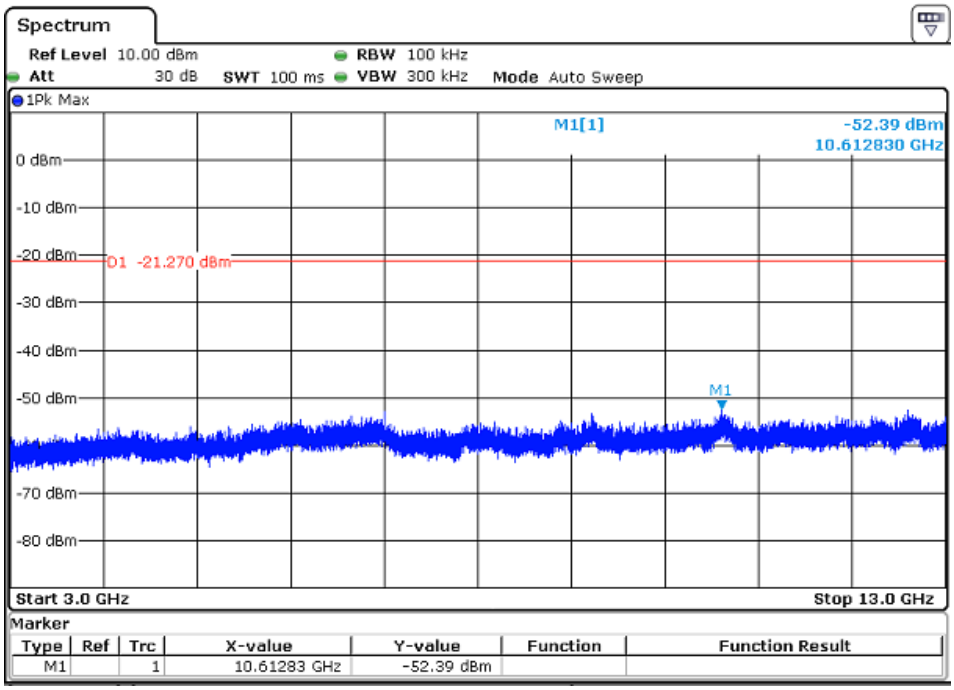

**Note: Sweep Points=9700**

**CH00 Data rate 1Mbps**



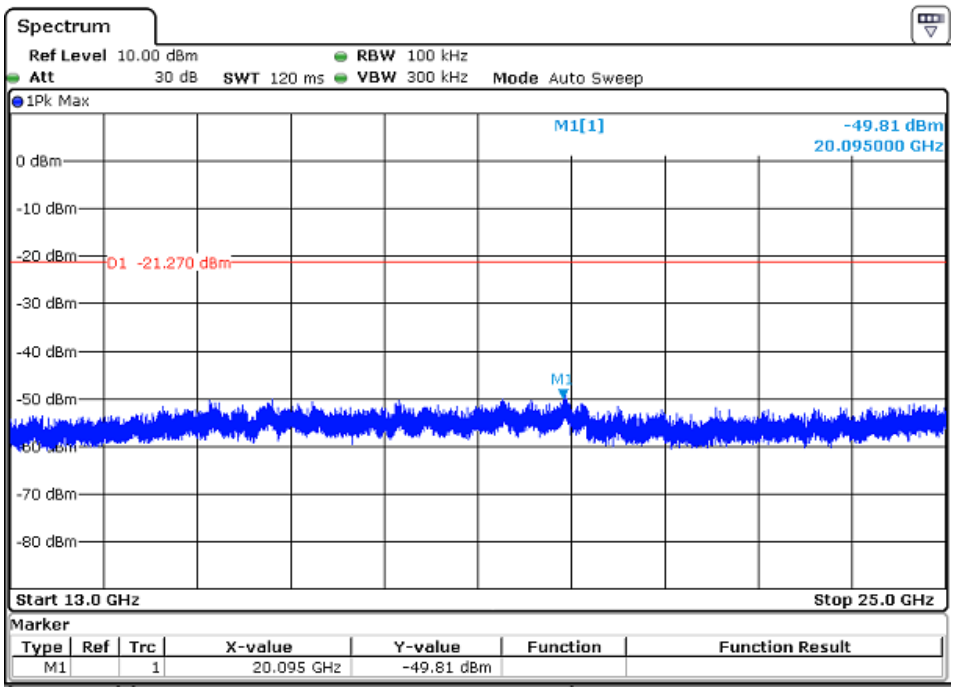

**Note: Sweep Points=20000**

**CH00 Data rate 1Mbps**



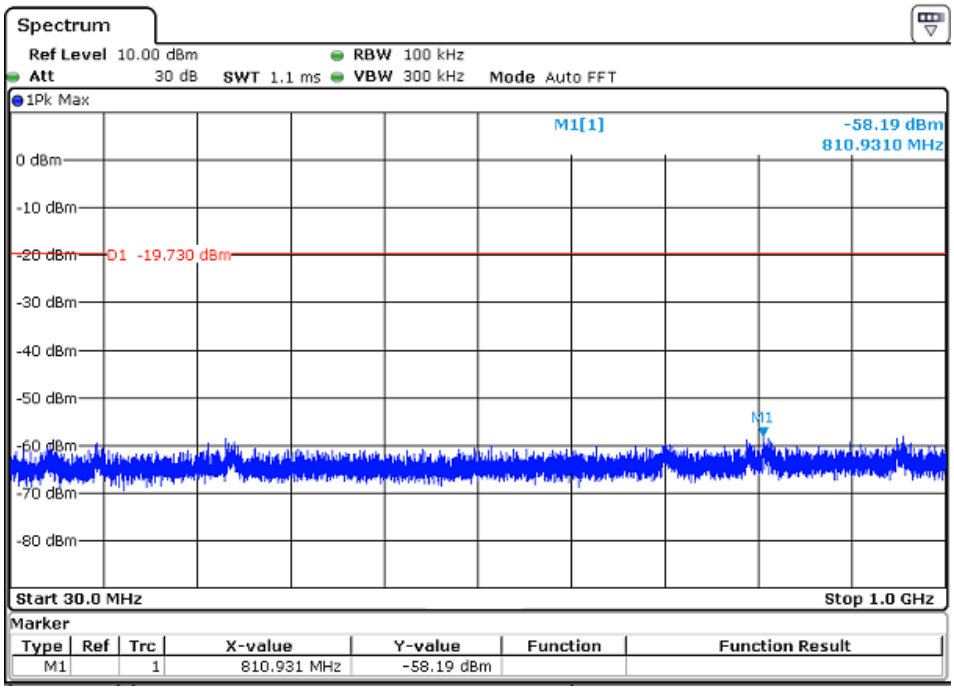

**Note: Sweep Points=100000**

**CH00 Data rate 1Mbps**



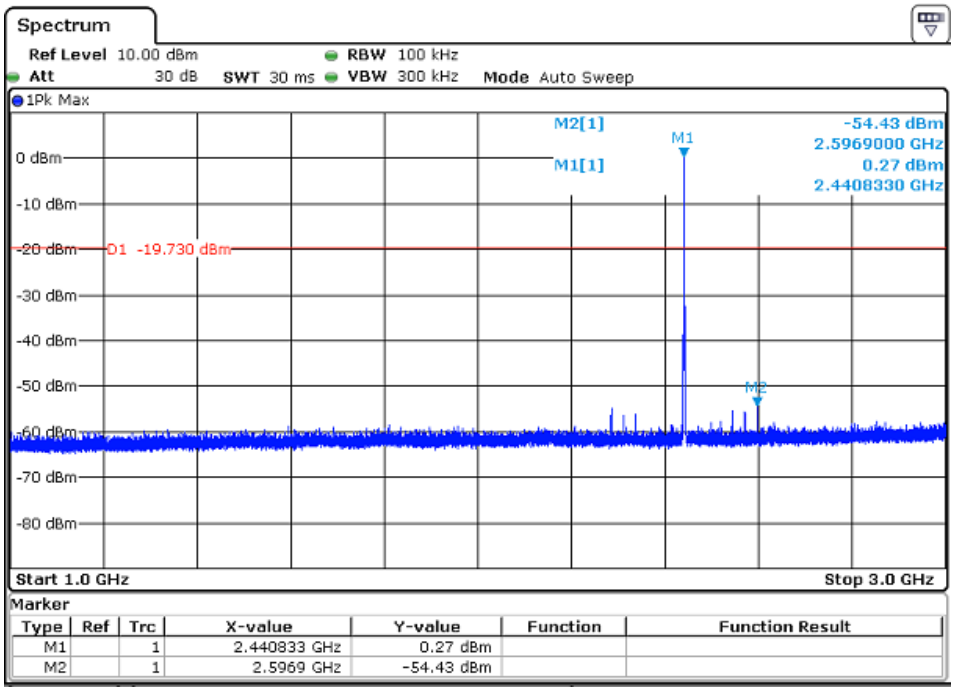

**Note: Sweep Points=120000**

**CH39 Data rate 1Mbps**



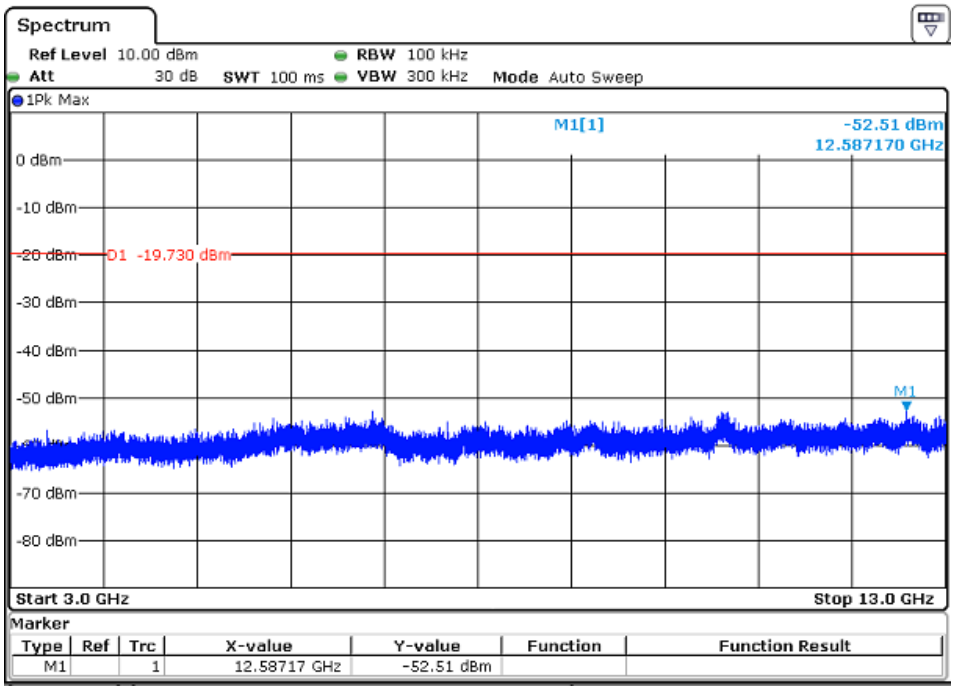

**Note: Sweep Points=9700**

**CH39 Data rate 1Mbps**



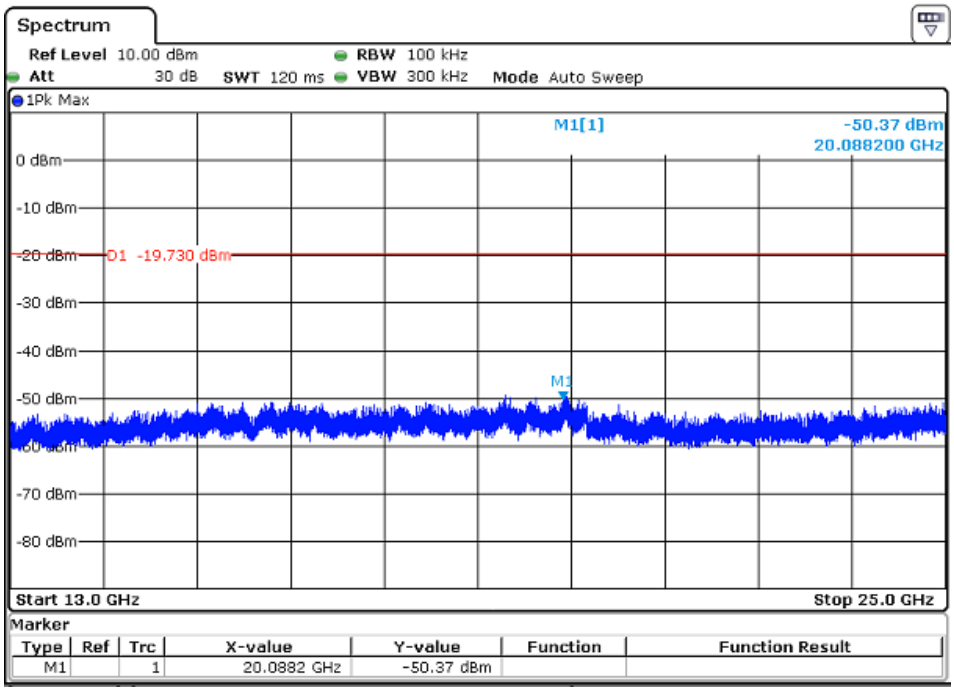

**Note: Sweep Points=20000**

**CH39 Data rate 1Mbps**



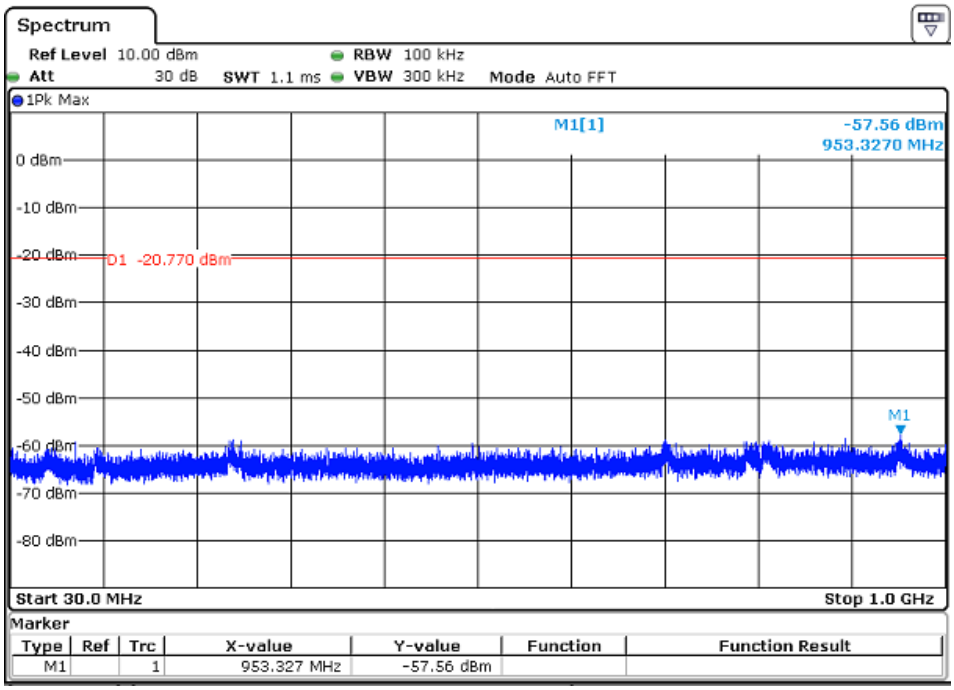

**Note: Sweep Points=100000**

**CH39 Data rate 1Mbps**



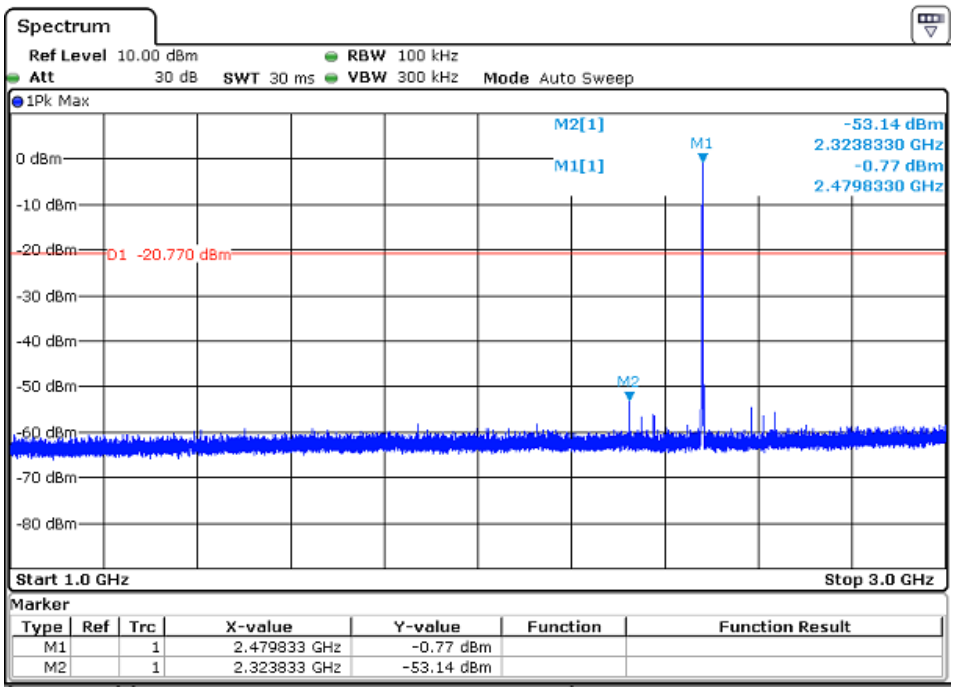

**Note: Sweep Points=120000**

**CH78 Data rate 1Mbps**



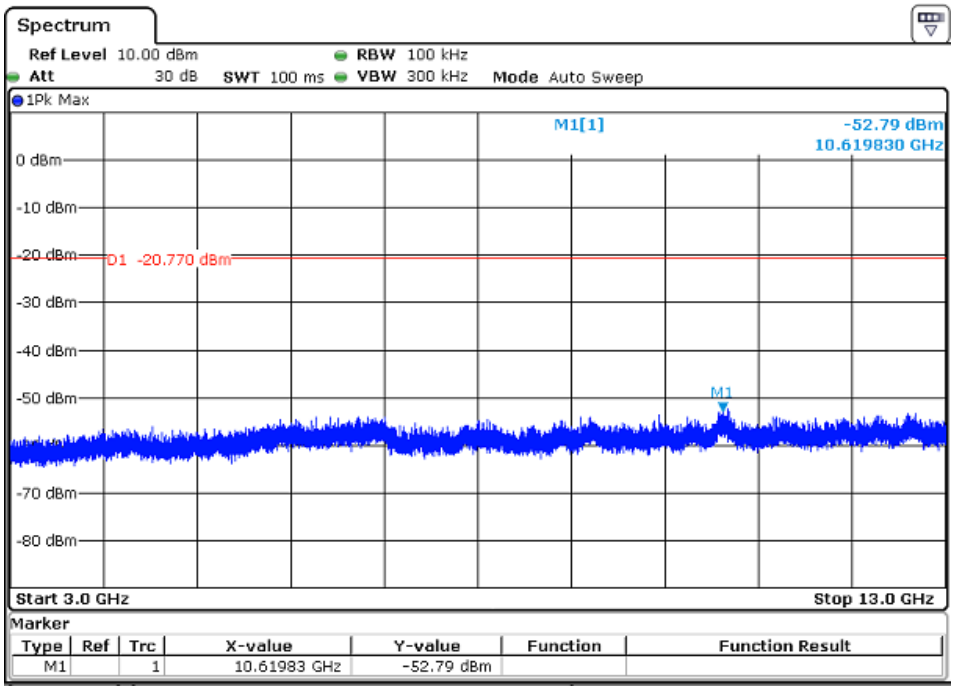

**Note: Sweep Points=9700**

**CH78 Data rate 1Mbps**



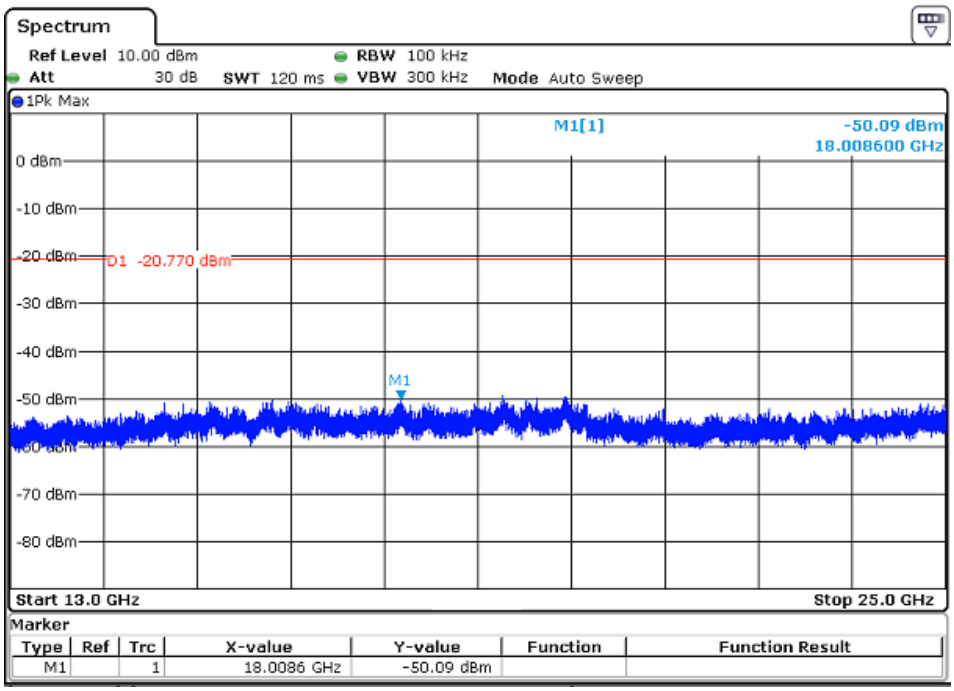

**Note: Sweep Points=20000**

**CH78 Data rate 1Mbps**



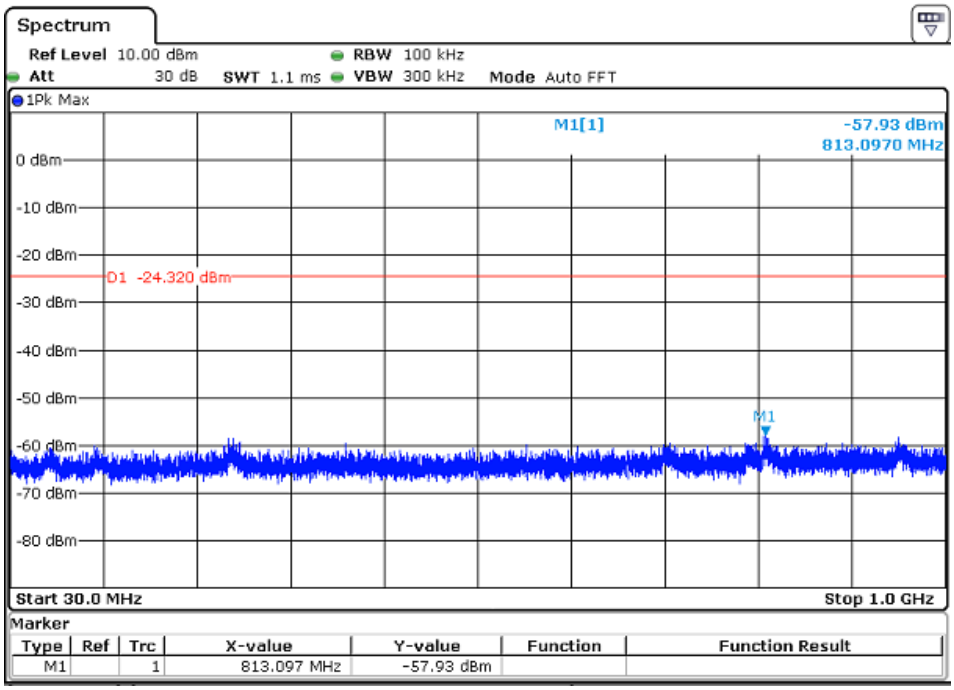

**Note: Sweep Points=100000**

**CH78 Data rate 1Mbps**



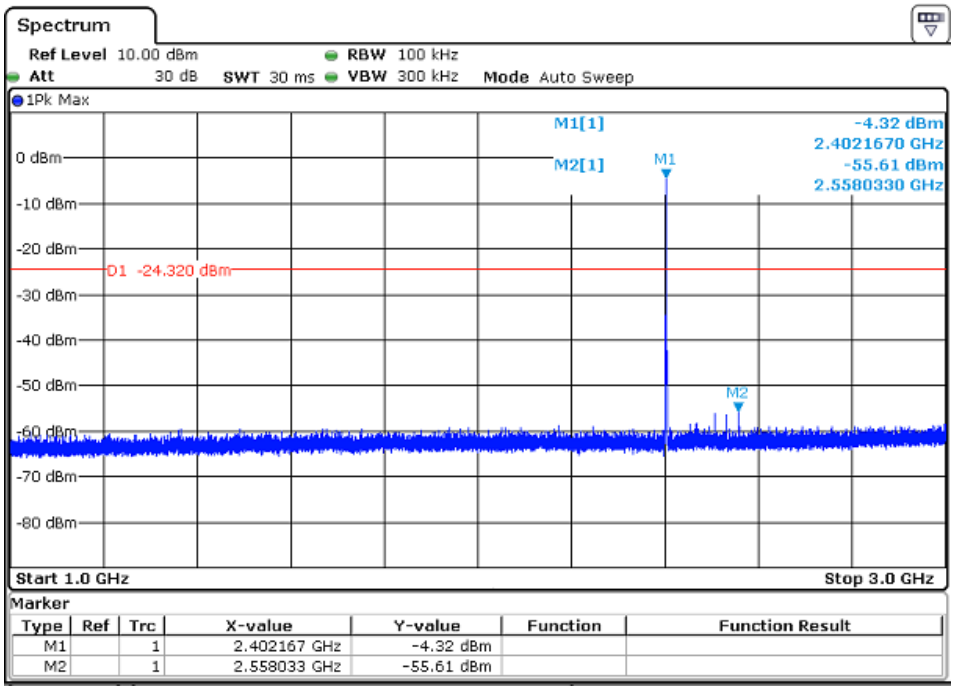

**Note: Sweep Points=120000**

**CH00 Data rate 3Mbps**



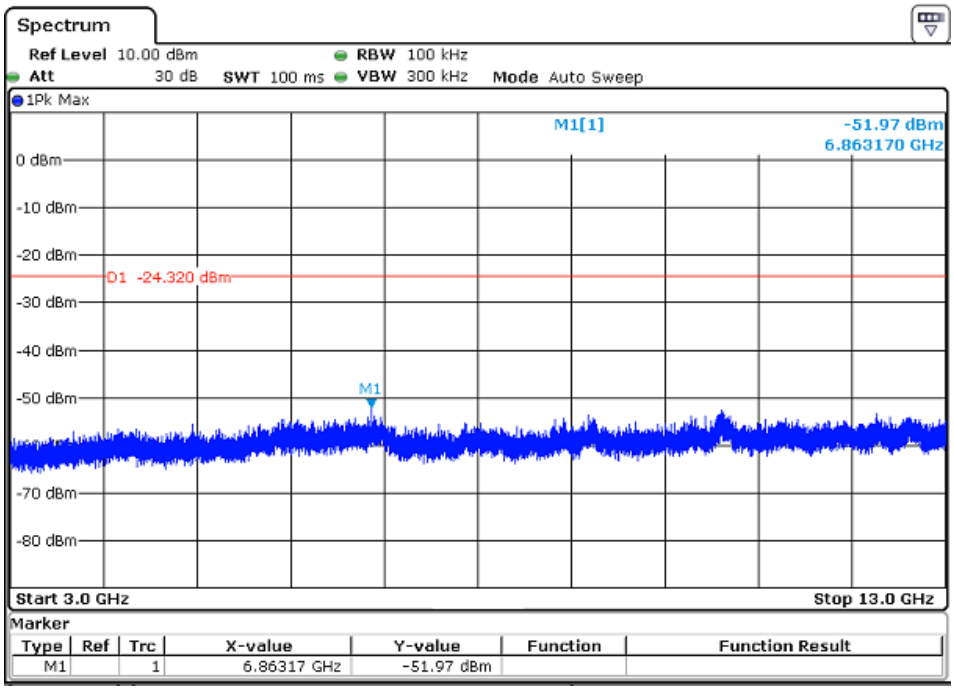

**Note: Sweep Points=9700**

**CH00 Data rate 3Mbps**



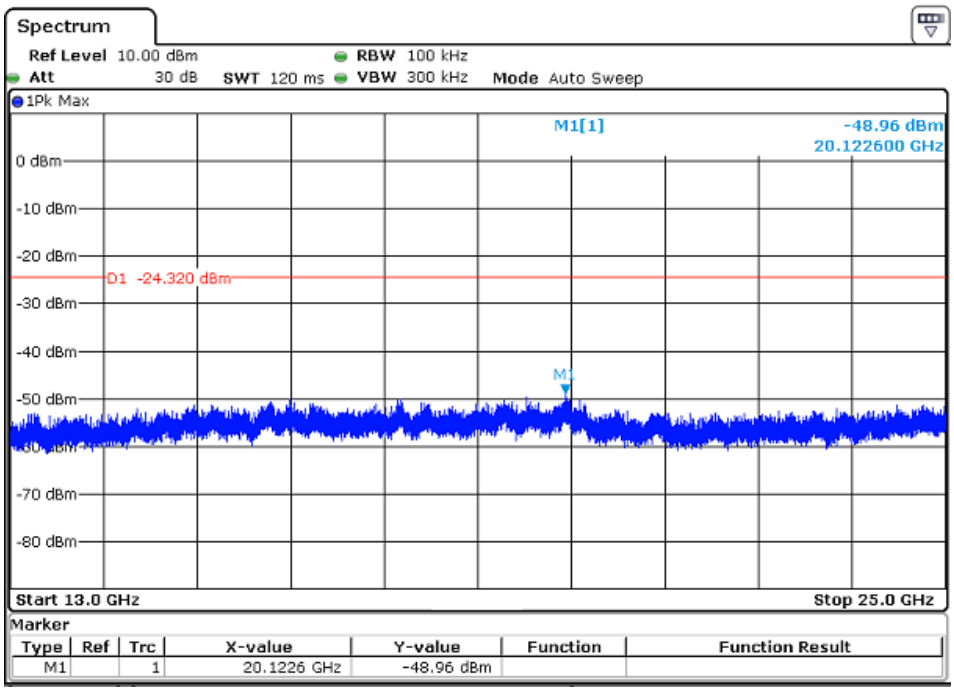

**Note: Sweep Points=20000**

**CH00 Data rate 3Mbps**



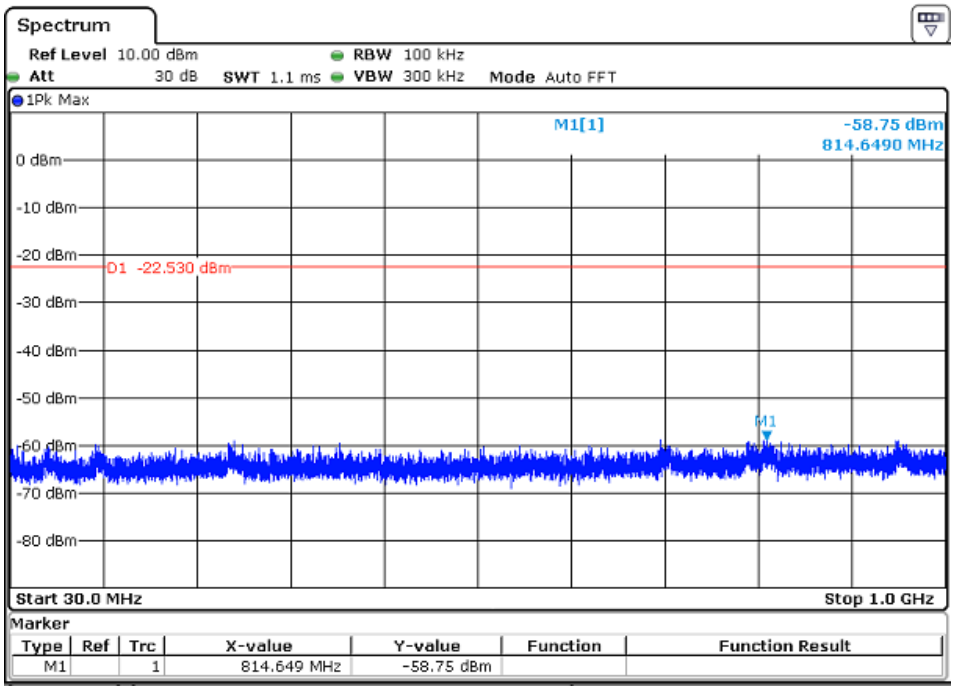

**Note: Sweep Points=100000**

**CH00 Data rate 3Mbps**



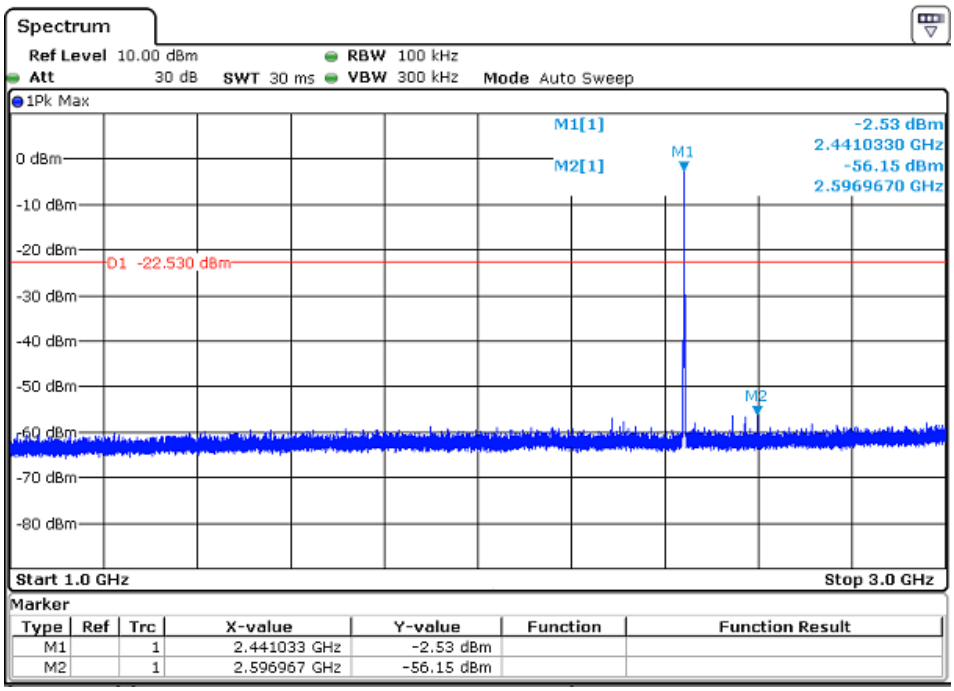

**Note: Sweep Points=120000**

**CH39 Data rate 3Mbps**



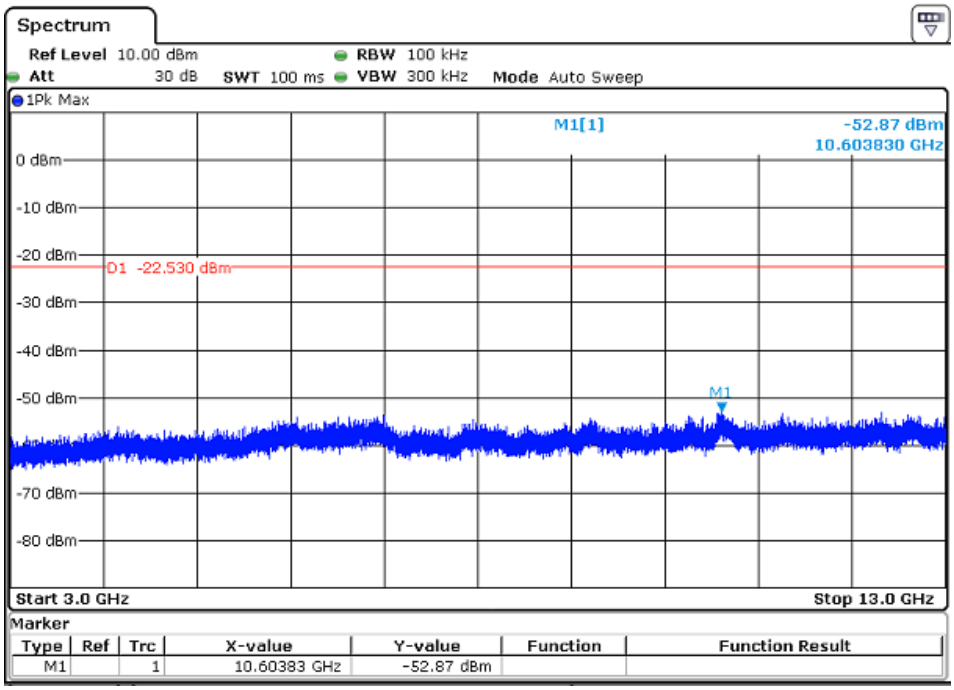

**Note: Sweep Points=9700**

**CH39 Data rate 3Mbps**



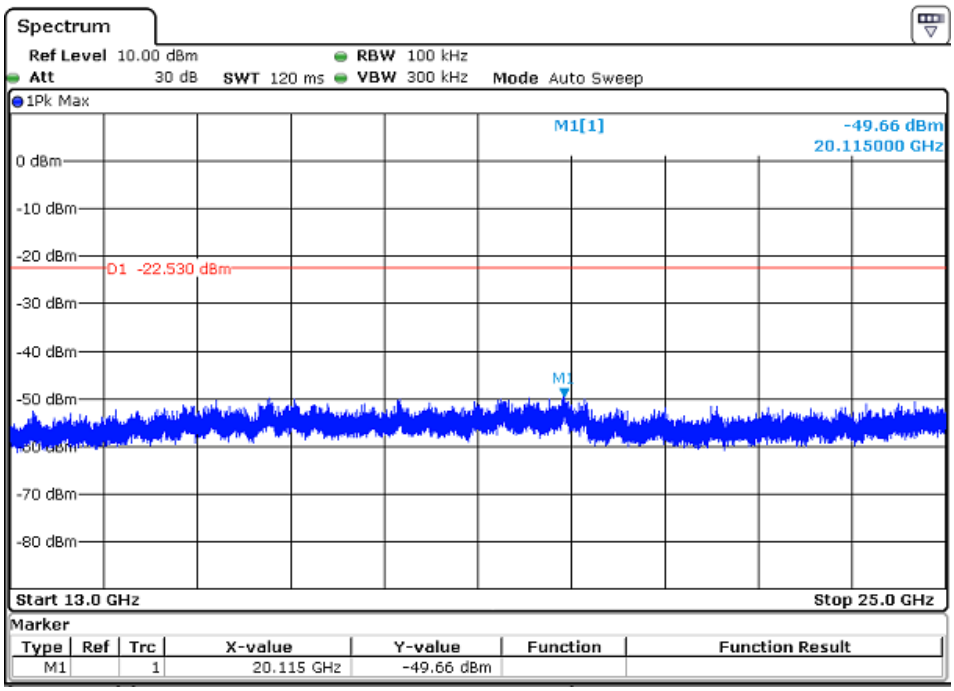

**Note: Sweep Points=20000**

**CH39 Data rate 3Mbps**



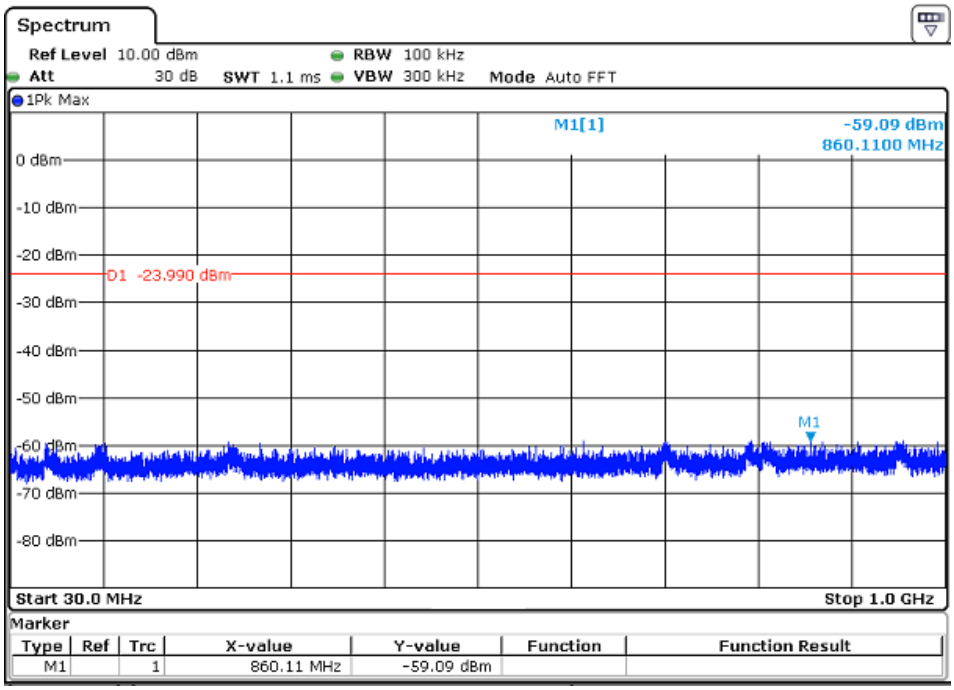

**Note: Sweep Points=100000**

**CH39 Data rate 3Mbps**



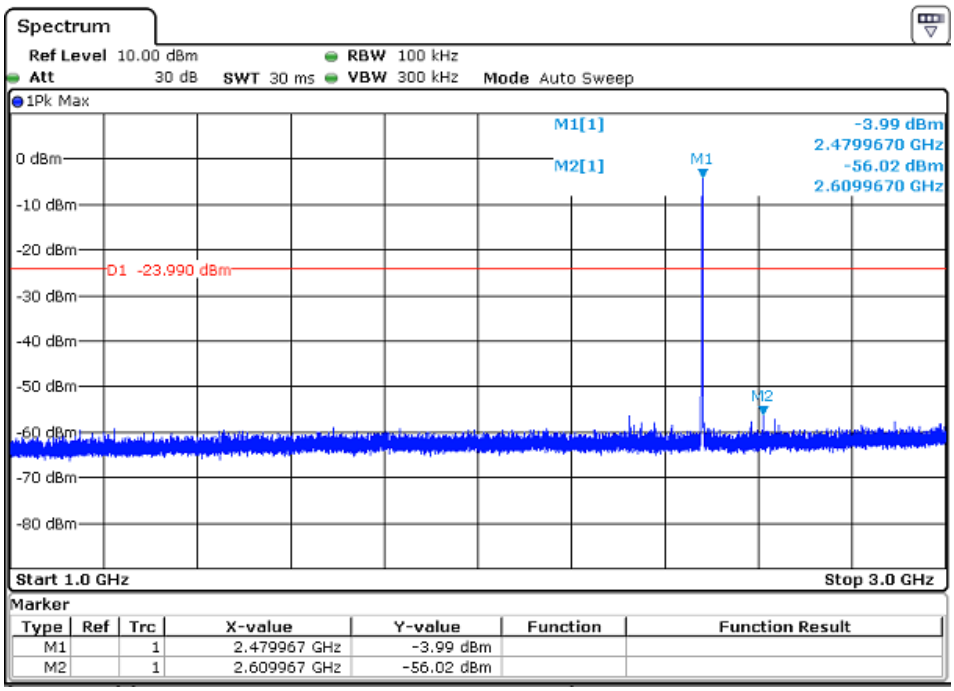

**Note: Sweep Points=120000**

**CH78 Data rate 3Mbps**



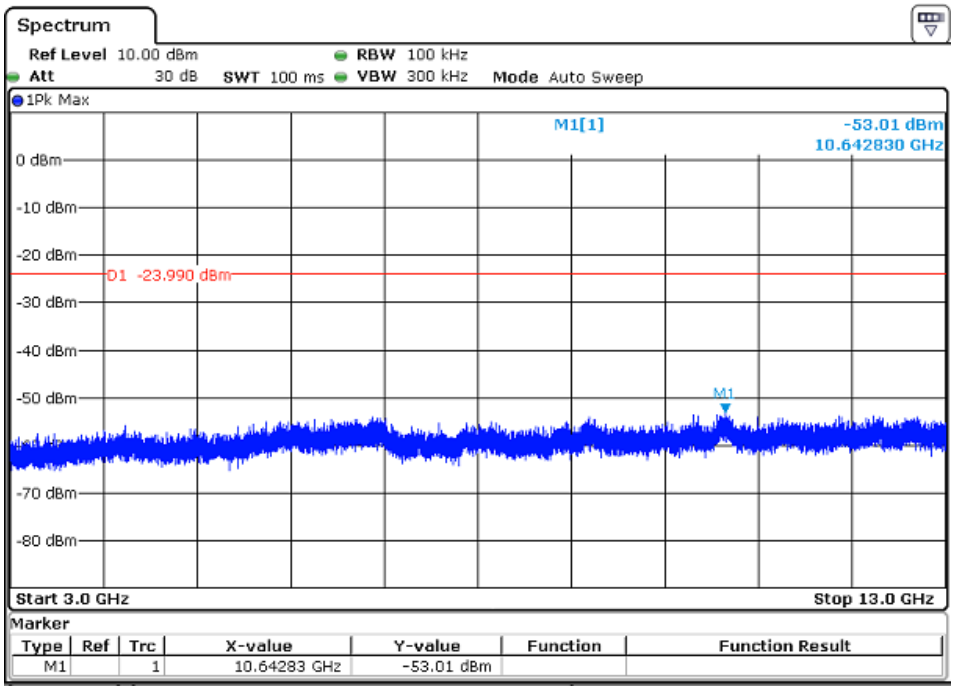

**Note: Sweep Points=9700**

**CH78 Data rate 3Mbps**



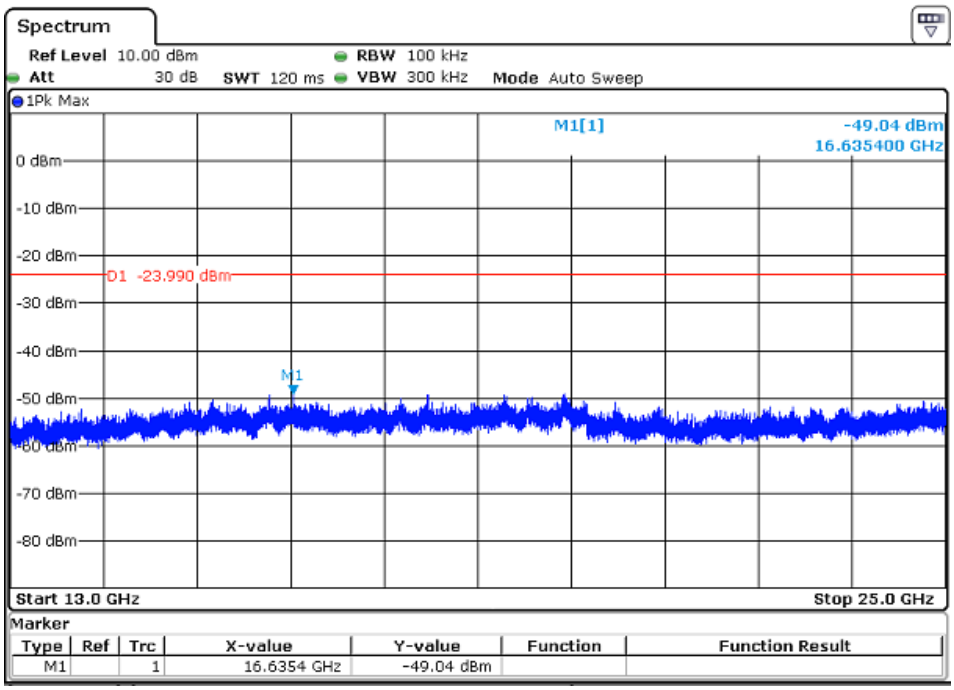

**Note: Sweep Points=20000**

**CH78 Data rate 3Mbps**




**Note: Sweep Points=100000**

**CH78 Data rate 3Mbps**

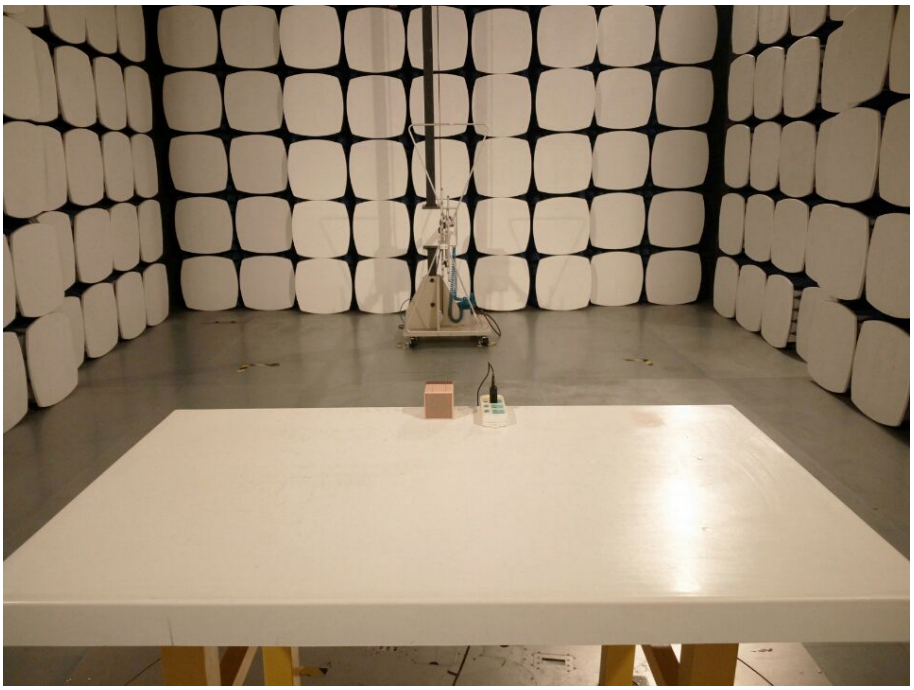



**Note: Sweep Points=120000**

# 6 Photographs

## 6.1 Radiated Spurious Emission Test Setup

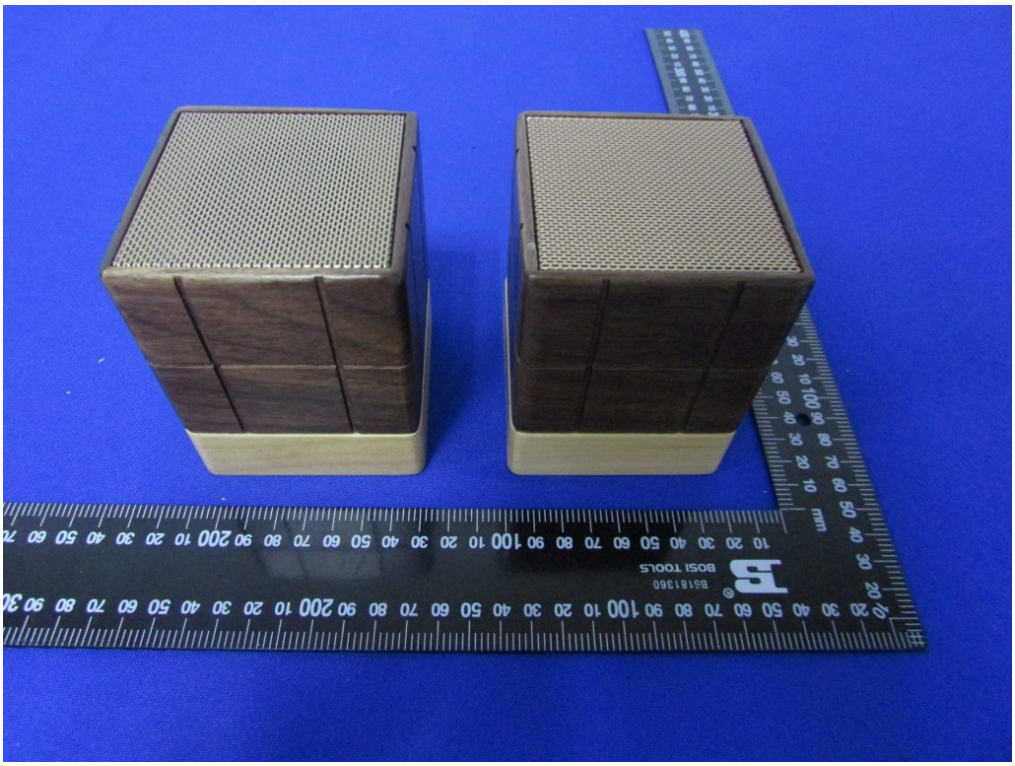
Below 1GHz:

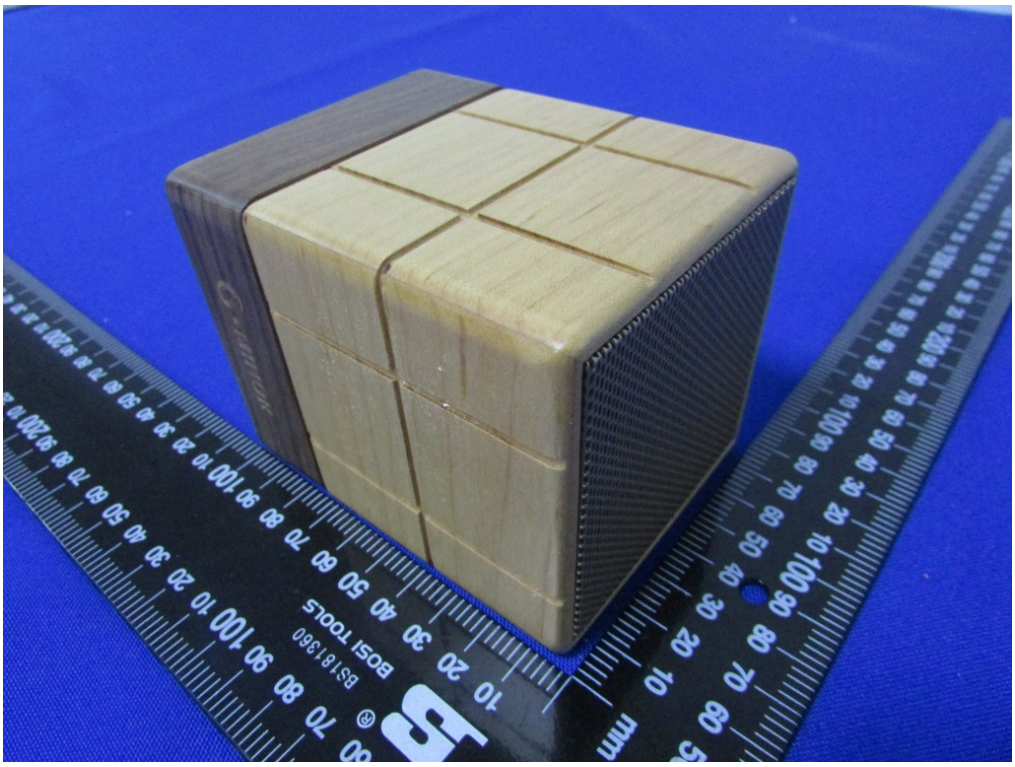


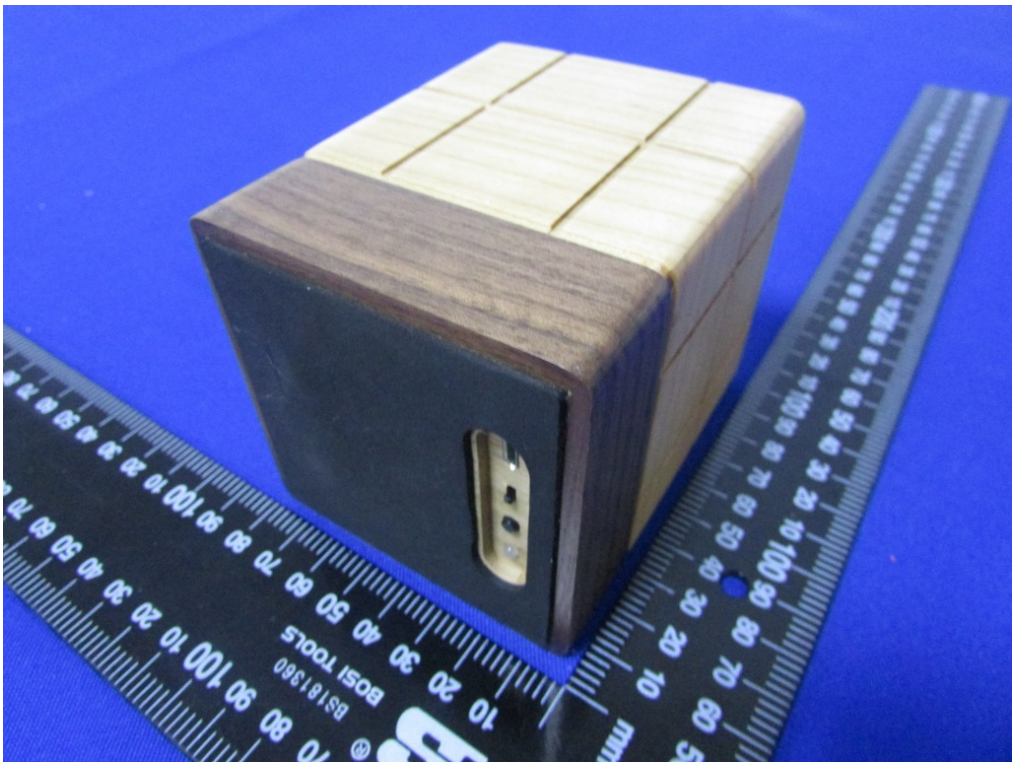
Above 1GHz:

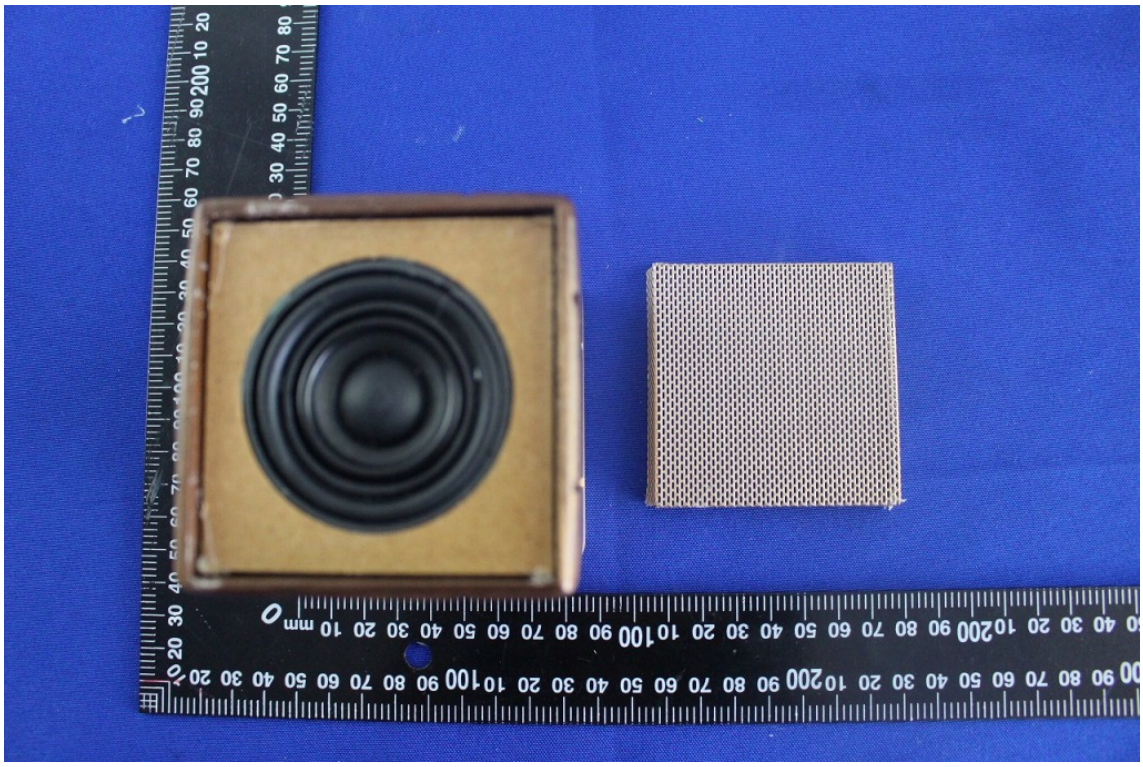
## 6.2 Conducted Emission Test Setup

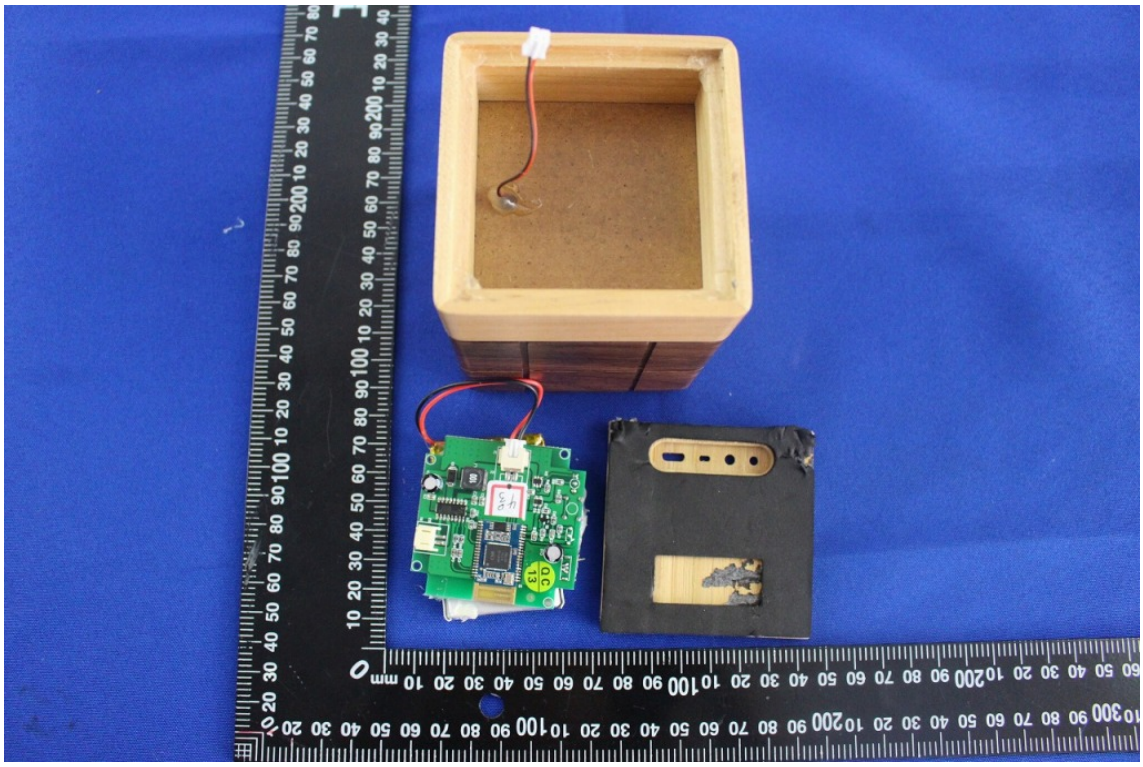
# 7 APPENDIX-Photographs of EUT Constructional Details




BOSI TOOLS


BOSI TOOLS





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DongGuan City, GuangDong, P.R.China
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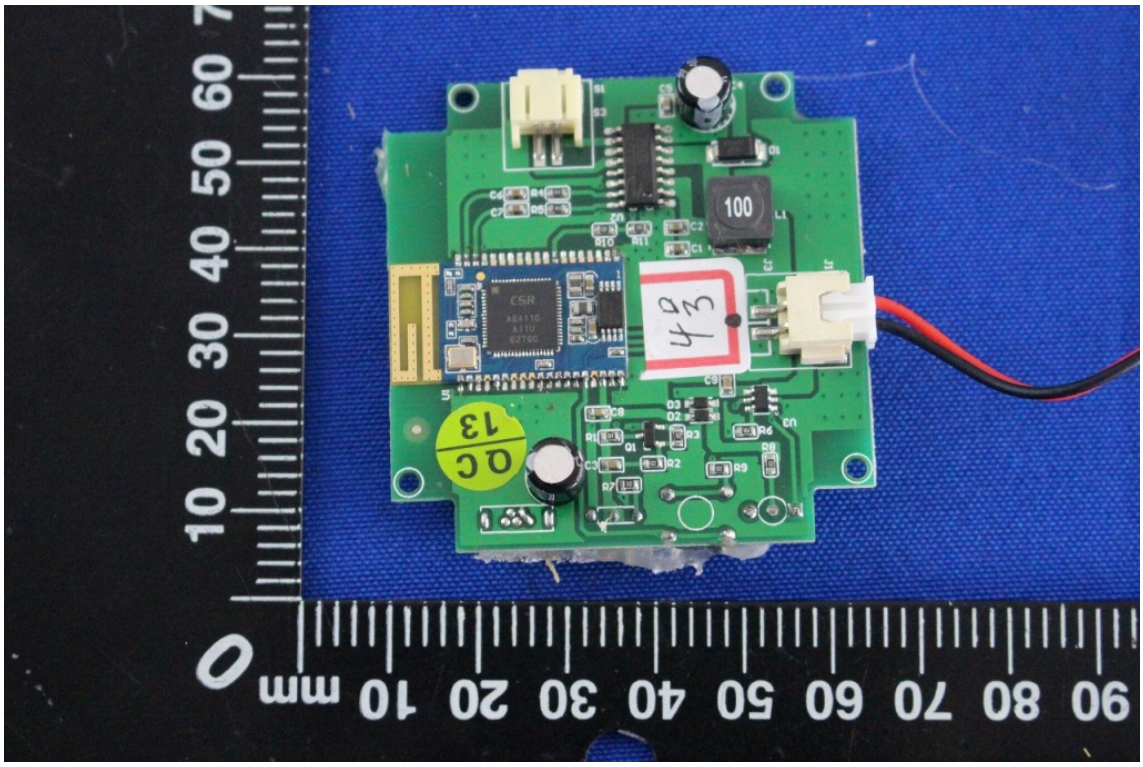


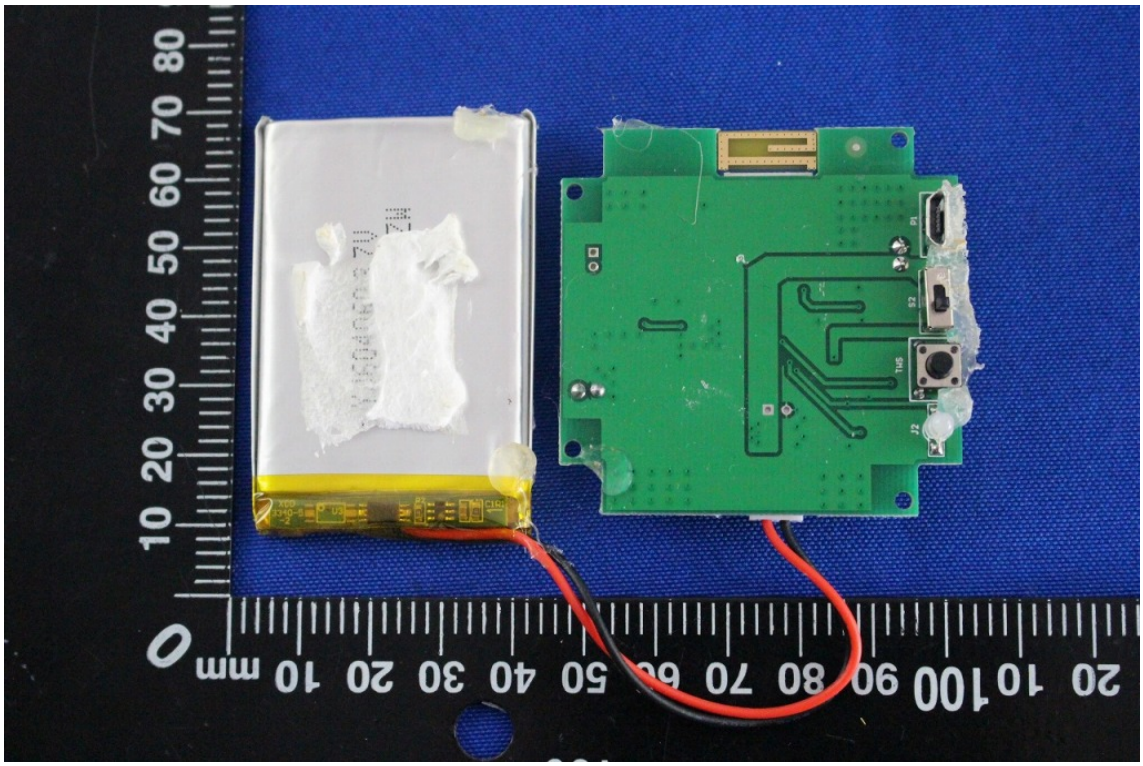

**** End of report ****