

# Test Report of FCC CFR 47 Part 15 Subpart C

On Behalf of

**Sentey, Inc.**

**FCC ID:** 2AAUS-LS-4060  
**Product Description:** B-Trek S2 bluetooth speaker  
**Model No.:** LS-4060  
**Supplementary Model:** LS-4061, LS-4062, LS-4063, LS-4064, LS-4065  
**Brand Name:**



**Prepared for:** Sentey, Inc.

11005 NW 33RD ST, Miami, FL 33172 USA

**Prepared by:** Bontek Compliance Testing Laboratory Co., Ltd

1/F, Block East H-3, OCT Eastern Ind. Zone, Qiaocheng East  
Road, Nanshan, Shenzhen, China

Tel: 86-755-86337020

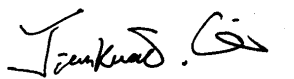
Fax: 86-755-86337028

**Report No.:** BCT14FR229E

**Issue Date:** June11-18, 2014

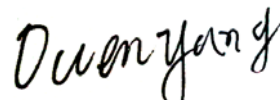
**Test Date:** June11-18, 2014

**Tested by:**

A handwritten signature in black ink, appearing to read "Jiankuai Li", written over a horizontal line.

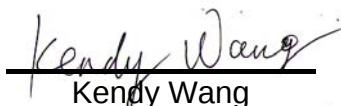
Jiankuai. Li

**Reviewed by:**

A handwritten signature in black ink, appearing to read "Owen Yang", written over a horizontal line.

Owen. Yang

**Approved by:**

A handwritten signature in black ink, appearing to read "Kendy Wang", written over a horizontal line.

Kendy Wang

## TABLE OF CONTENTS

|                                                             |           |
|-------------------------------------------------------------|-----------|
| <b>1. GENERAL INFORMATION.....</b>                          | <b>4</b>  |
| 1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)..... | 4         |
| 1.2 TEST STANDARDS .....                                    | 5         |
| 1.3 TEST FACILITY .....                                     | 5         |
| <b>2. SYSTEM TEST CONFIGURATION .....</b>                   | <b>6</b>  |
| 2.1 EUT CONFIGURATION .....                                 | 6         |
| 2.2 SUPPORT EQUIPMENT .....                                 | 6         |
| 2.3 GENERAL TEST PROCEDURES .....                           | 6         |
| 2.4 MEASUREMENT UNCERTAINTY .....                           | 6         |
| 2.5 LIST OF MEASURING EQUIPMENTS USED .....                 | 7         |
| <b>3. SUMMARY OF TEST RESULTS.....</b>                      | <b>9</b>  |
| <b>4. TEST OF AC POWER LINE CONDUCTED EMISSION .....</b>    | <b>10</b> |
| 4.1 APPLICABLE STANDARD.....                                | 10        |
| 4.2 TEST SETUP DIAGRAM .....                                | 10        |
| 4.3 TEST RESULT .....                                       | 10        |
| <b>5. TEST OF HOPPING CHANNEL BANDWIDTH.....</b>            | <b>11</b> |
| 5.1 APPLICABLE STANDARD.....                                | 11        |
| 5.2 EUT SETUP .....                                         | 11        |
| 5.3 TEST EQUIPMENT LIST AND DETAILS .....                   | 11        |
| 5.4 TEST PROCEDURE .....                                    | 11        |
| 5.5 TEST RESULT .....                                       | 11        |
| <b>6. TEST OF HOPPING CHANNEL SEPARATION .....</b>          | <b>17</b> |
| 6.1 APPLICABLE STANDARD.....                                | 17        |
| 6.2 EUT SETUP .....                                         | 17        |
| 6.3 TEST EQUIPMENT LIST AND DETAILS .....                   | 17        |
| 6.4 TEST PROCEDURE .....                                    | 17        |
| 6.5 TEST RESULT .....                                       | 17        |
| <b>7. TEST OF NUMBER OF HOPPING FREQUENCY .....</b>         | <b>24</b> |
| 7.1 APPLICABLE STANDARD.....                                | 24        |
| 7.2 EUT SETUP .....                                         | 24        |
| 7.3 TEST EQUIPMENT LIST AND DETAILS .....                   | 24        |
| 7.4 TEST PROCEDURE .....                                    | 24        |
| 7.5 TEST RESULT .....                                       | 24        |
| <b>8. TEST OF DWELL TIME OF EACH FREQUENCY .....</b>        | <b>27</b> |
| 8.1 APPLICABLE STANDARD.....                                | 27        |
| 8.2 EUT SETUP .....                                         | 27        |
| 8.3 TEST EQUIPMENT LIST AND DETAILS .....                   | 27        |
| 8.4 TEST PROCEDURE .....                                    | 27        |
| 8.5 TEST RESULT .....                                       | 27        |
| <b>9. TEST OF MAXIMUM PEAK OUTPUT POWER .....</b>           | <b>44</b> |
| 9.1 APPLICABLE STANDARD.....                                | 44        |
| 9.2 EUT SETUP .....                                         | 44        |
| 9.3 TEST EQUIPMENT LIST AND DETAILS .....                   | 44        |
| 9.4 TEST PROCEDURE .....                                    | 44        |
| 9.5 TEST RESULT .....                                       | 45        |
| <b>10. TEST OF BAND EDGES EMISSION.....</b>                 | <b>51</b> |
| 10.1 APPLICABLE STANDARD.....                               | 51        |
| 10.2 EUT SETUP .....                                        | 51        |
| 10.3 TEST EQUIPMENT LIST AND DETAILS .....                  | 51        |
| 10.4 TEST PROCEDURE .....                                   | 51        |
| 10.5 TEST RESULT .....                                      | 52        |

|                                                     |           |
|-----------------------------------------------------|-----------|
| <b>11. TEST OF SPURIOUS RADIATED EMISSION .....</b> | <b>56</b> |
| 11.1 APPLICABLE STANDARD.....                       | 56        |
| 11.2 EUT SETUP .....                                | 56        |
| 11.3 TEST EQUIPMENT LIST AND DETAILS .....          | 57        |
| 11.4 TEST PROCEDURE .....                           | 57        |
| 11.5 TEST RESULT .....                              | 58        |
| <b>12. ANTENNA REQUIREMENT .....</b>                | <b>68</b> |
| 12.1 STANDARD APPLICABLE.....                       | 68        |
| 12.2 ANTENNA CONNECTED CONSTRUCTION .....           | 68        |

## 1. GENERAL INFORMATION

### 1.1 Product Description for Equipment Under Test (EUT)

#### Client Information

|                          |                                       |
|--------------------------|---------------------------------------|
| Applicant:               | <b>Sentey, Inc.</b>                   |
| Address of Applicant:    | 11005 NW 33RD ST, Miami, FL 33172 USA |
| Manufacturer:            | <b>Sentey, Inc.</b>                   |
| Address of Manufacturer: | 11005 NW 33RD ST, Miami, FL 33172 USA |

#### General Description of E.U.T

| Items                 | Description                                                                        |
|-----------------------|------------------------------------------------------------------------------------|
| EUT Description:      | B-Trek S2 bluetooth speaker                                                        |
| Model No.:            | LS-4060                                                                            |
| Supplementary Model:  | LS-4061, LS-4062, LS-4063, LS-4064, LS-4065                                        |
| Trade Name:           |  |
| Frequency Band:       | 2402 MHz ~ 2480 MHz                                                                |
| BT Module             | V2.1+EDR                                                                           |
| Channel Spacing:      | 1 MHz                                                                              |
| Number of Channels:   | 79                                                                                 |
| Modulation Technique: | FHSS                                                                               |
| Type of Modulation:   | GFSK, Pi/4 DQPSK, 8-DPSK                                                           |
| Antenna Type:         | Built-in Antenna                                                                   |
| Antenna Gain:         | 0dBi                                                                               |
| Rated Voltage:        | Input: 5VDC 0.5A , 3.7V from battery                                               |

Remark: \* The test data gathered are from the production sample provided by the manufacturer.

\* Supplementary models have the same circuit, but with different appearance

\*The USB port just use for charging, not use for data transfer.

## **1.2 Test Standards**

The tests were performed based on the Electromagnetic Interference (EMI) tests performed on the EUT. Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 - 2003 Radiated testing was performed at an antenna to EUT distance 3 meters.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.207, 15.209 and 15.247 rules. Test was carried out according to the above mentioned FCC rules and the FCC publication notice DA 00-705: Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems

## **1.3 Test Facility**

All measurement required was performed at laboratory of Shenzhen CTL Testing Technology Co., Ltd. at Floor 1-A, Baisha Technology Park, No.3011, Shahe Xi Road, Nanshan District, Shenzhen, China 518055.

The test facility is recognized, certified, or accredited by the following organizations:

### **FCC – Registration No.: 970318**

Shenzhen CTL Testing Technology Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 970318, December, 2013.

## 2. SYSTEM TEST CONFIGURATION

### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

### 2.2 Support Equipment

The calibrated antennas used to sample the radiated field strength are mounted on a non-conductive, motorized antenna mast 3 or 10 meters from the leading edge of the turntable.

Support equipments or special accessories in test configuration:

| AUX Description: | Manufacturer | Model No. | Certificate | CABLE                                                            |
|------------------|--------------|-----------|-------------|------------------------------------------------------------------|
| Host Computer    | Dell         | 78MD82X   | CE, FCC     | 1.5m Unshielded Power Cord                                       |
| Monitor          | Dell         | E178Pc    | CE, FCC     | 1.5m Unshielded Power Cord<br>1.8m shielded data Cable with core |
| Keyboard         | Dell         | L100      | CE, FCC     | 1.8m shielded data Cable with core                               |

### 2.3 General Test Procedures

**Conducted Emissions:** The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 7.1 of ANSI C63.4-2003 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak detector mode.

**Radiated Emissions:** The EUT is placed on a turntable, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4-2009.

### 2.4 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

| Parameter                     | Uncertainty |
|-------------------------------|-------------|
| Power Line Conducted Emission | +/- 2.3 dB  |
| Radiated Emission             | +/- 3.4 dB  |

Uncertainty figures are valid to a confidence level of 95%.

## 2.5 List of Measuring Equipments Used

Test equipments list of Shenzhen CTL Testing Technology Co., Ltd.

| No. | Instrument no. | Equipment                                | Manufacturer    | Model No.   | S/N        | Last Calculator | Due Calculator |
|-----|----------------|------------------------------------------|-----------------|-------------|------------|-----------------|----------------|
| 1   | BCT-EMC001     | EMI Test Receiver                        | R&S             | ESCI        | 100687     | 2014-4-16       | 2015-4-17      |
| 2   | BCT-EMC002     | EMI Test Receiver                        | R&S             | ESPI        | 100097     | 2013-11-1       | 2014-10-31     |
| 3   | BCT-EMC003     | Amplifier                                | HP              | 8447D       | 1937A02492 | 2014-4-16       | 2015-4-17      |
| 4   | BCT-EMC004     | Single Power Conductor Module            | R&S             | NNBM 8124   | 242        | 2014-4-16       | 2015-4-17      |
| 5   | BCT-EMC005     | Single Power Conductor Module            | R&S             | NNBM 8124   | 243        | 2014-4-16       | 2015-4-17      |
| 6   | BCT-EMC006     | Power Clamp                              | SCHWARZBECK     | MDS-21      | 3812       | 2013-11-1       | 2014-10-31     |
| 7   | BCT-EMC007     | Positioning Controller                   | C&C             | CC-C-1F     | MF7802113  | N/A             | N/A            |
| 8   | BCT-EMC008     | Electrostatic Discharge Simulator        | TESEQ           | NSG437      | 125        | 2013-11-1       | 2014-10-31     |
| 9   | BCT-EMC009     | Fast Transient Burst Generator           | SCHAFFNER       | MODULA6150  | 34572      | 2014-4-16       | 2015-4-17      |
| 10  | BCT-EMC010     | Fast Transient Noise Simulator           | Noiseken        | FNS-105AX   | 10501      | 2013-6-26       | 2014-6-25      |
| 11  | BCT-EMC011     | Color TV Pattern Generator               | PHILIPS         | PM5418      | TM209947   | N/A             | N/A            |
| 12  | BCT-EMC012     | Power Frequency Magnetic Field Generator | EVERFINE        | EMS61000-8K | 608002     | 2014-4-16       | 2015-4-17      |
| 14  | BCT-EMC014     | Capacitive Coupling Clamp                | TESEQ           | CDN8014     | 25096      | 2014-4-16       | 2015-4-17      |
| 15  | BCT-EMC015     | High Field Biconical Antenna             | ELECTRO-METRICS | EM-6913     | 166        | 2013-11-1       | 2014-10-31     |
| 16  | BCT-EMC016     | Log Periodic Antenna                     | ELECTRO-METRICS | EM-6950     | 811        | 2013-11-1       | 2014-10-31     |
| 17  | BCT-EMC017     | Remote Active Vertical Antenna           | ELECTRO-METRICS | EM-6892     | 304        | 2013-11-1       | 2014-10-31     |
| 18  | BCT-EMC018     | TRILOG Broadband Test-Antenna            | SCHWARZBECK     | VULB9163    | 9163-324   | 2014-4-16       | 2015-4-17      |
| 19  | BCT-EMC019     | Horn Antenna                             | SCHWARZBECK     | BBHA9120A   | 0499       | 2013-11-1       | 2014-10-31     |
| 20  | BCT-EMC020     | Teo Line Single Phase Module             | SCHWARZBECK     | NSLK8128    | 8128247    | 2013-11-1       | 2014-10-31     |
| 21  | BCT-EMC021     | Triple-Loop Antenna                      | EVERFINE        | LLA-2       | 711002     | 2013-11-1       | 2014-10-31     |
| 22  | BCT-EMC022     | Electric bridge                          | Jhai            | JK2812C     | 803024     | N/A             | N/A            |
| 23  | BCT-EMC026     | RF POWER AMPLIFIER                       | FRANKONIA       | FLL-75      | 1020A1109  | 2014-4-16       | 2015-4-17      |
| 24  | BCT-EMC027     | CDN                                      | FRANKONIA       | CDN M2+M3   | A3027019   | 2014-4-16       | 2015-4-17      |

|    |            |                                   |                 |                      |               |           |            |
|----|------------|-----------------------------------|-----------------|----------------------|---------------|-----------|------------|
| 25 | BCT-EMC029 | 6DB Attenuator                    | FRANKONIA       | N/A                  | 1001698       | 2014-4-16 | 2015-4-17  |
| 26 | BCT-EMC030 | EM Injection clamp                | FCC             | F-203I-23mm          | 091536        | 2014-4-16 | 2015-4-17  |
| 27 | BCT-EMC031 | 9kHz-2.4GHz signal generator 2024 | MARCONI         | 10S/6625-99-457-8730 | 112260/042    | 2014-4-16 | 2015-4-17  |
| 28 | BCT-EMC032 | 10dB attenuator                   | ELECTRO-METRICS | EM-7600              | 836           | 2014-4-16 | 2015-4-17  |
| 29 | BCT-EMC033 | ISN                               | TESEQ           | ISN-T800             | 30301         | 2013-11-1 | 2014-10-31 |
| 30 | BCT-EMC034 | 10KV surge generator              | SANKI           | SKS-0510M            | 048110003E321 | 2013-11-1 | 2014-10-31 |
| 31 | BCT-EMC035 | HRMONICS&FLICKRE ANALYSER         | VOLTECH         | PM6000               | 200006700433  | 2013-11-1 | 2014-10-31 |
| 32 | BCT-EMC036 | Spectrum Analyzer                 | R&S             | FSP                  | 100397        | 2013-11-1 | 2014-10-31 |
| 33 | BCT-EMC037 | Broadband preamplifier            | SCHWARZBECK     | BBV9718              | 9718-182      | 2014-4-16 | 2015-4-17  |

### 3. SUMMARY OF TEST RESULTS

| FCC Rules                 | Description of Test              | Result |
|---------------------------|----------------------------------|--------|
| FCC §15.207               | AC Power Line Conducted Emission | N/A    |
| FCC §15.247(a)(1)         | Hopping Channel Bandwidth        | Pass   |
| FCC §15.247(a)(1)         | Hopping Channel Separation       | Pass   |
| FCC §15.247(a)(1)         | Number of Hopping Frequency Used | Pass   |
| FCC §15.247(a)(1)(iii)    | Dwell Time of Each Frequency     | Pass   |
| FCC §15.247(b)(1)         | Maximum Peak Output Power        | Pass   |
| FCC §15.247(d)            | Band Edges Emission              | Pass   |
| FCC §15.247(d)            | Spurious Radiated Emission       | Pass   |
| FCC §15.203/15.247(b)/(c) | Antenna Requirement              | Pass   |

## 4. TEST OF AC POWER LINE CONDUCTED EMISSION

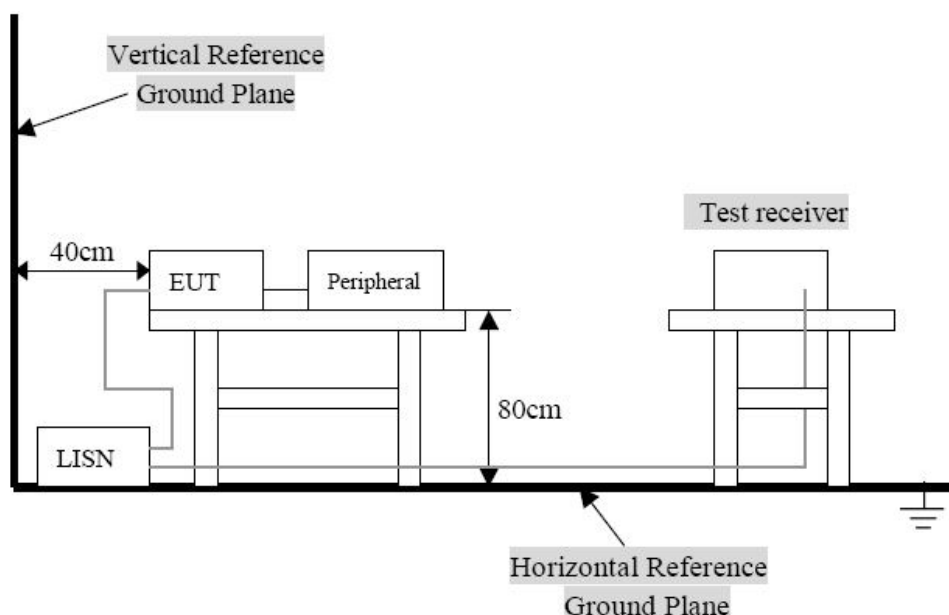
### 4.1 Applicable Standard

Refer to FCC §15.207.

For a Low-power Radio-frequency Device is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

| Frequency Range (MHz) | Limits ( dBuV) |         |
|-----------------------|----------------|---------|
|                       | Quasi-Peak     | Average |
| 0.150~0.500           | 66~56          | 56~46   |
| 0.500~5.000           | 56             | 46      |
| 5.000~30.00           | 60             | 50      |

### 4.2 Test Setup Diagram



Remark: The EUT was connected to a 120 VAC/ 60Hz power source.

### 4.3 Test Result

|                                         |                                       |
|-----------------------------------------|---------------------------------------|
| Temperature ( °C ) : 23~25              | EUT: B-Trek S2 bluetooth speaker      |
| Humidity (%RH ) : 45~58                 | M/N: LS-4060                          |
| Barometric Pressure ( mbar ) : 950~1000 | Operation Condition: Normal operation |

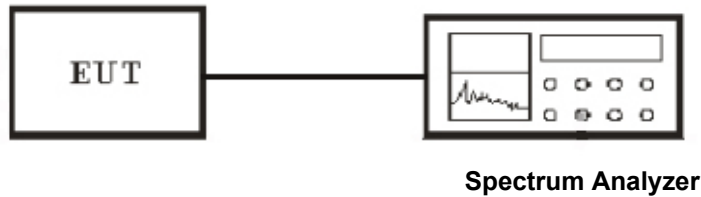
\*No required test, battery power supply.

## 5. Test of Hopping Channel Bandwidth

### 5.1 Applicable Standard

Section 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.

### 5.2 EUT Setup



### 5.3 Test Equipment List and Details

See **section 2.5**.

### 5.4 Test Procedure

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Use the following spectrum analyzer settings:  
Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel  
RBW  $\geq$  1% of the 20 dB bandwidth, VBW  $\geq$  RBW  
Sweep = auto  
Detector function = peak  
Trace = max hold
3. The spectrum width with level higher than 20dB below the peak level.
4. Repeat above 1~3 points for the middle and highest channel of the EUT.

### 5.5 Test Result

|                                         |                                  |
|-----------------------------------------|----------------------------------|
| Temperature ( °C ) : 22~23              | EUT: B-Trek S2 bluetooth speaker |
| Humidity (%RH) : 50~54                  | M/N: LS-4060                     |
| Barometric Pressure ( mbar ) : 950~1000 | Operation Condition: Tx Mode     |

**BDR 1M**

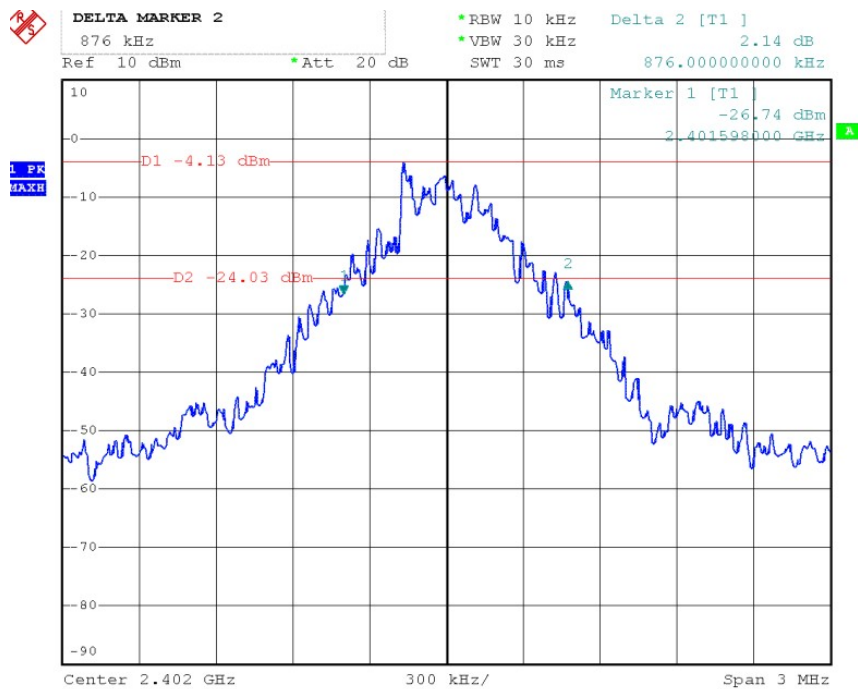
| Modulation Type | Channel No. | Frequency (MHz) | 20dB Bandwidth (kHz) | Min. Limit (kHz) |
|-----------------|-------------|-----------------|----------------------|------------------|
| GFSK            | Low         | 2402.00         | 876                  | >25              |
| GFSK            | Middle      | 2441.00         | 876                  | >25              |
| GFSK            | High        | 2480.00         | 876                  | >25              |

**EDR 2M**

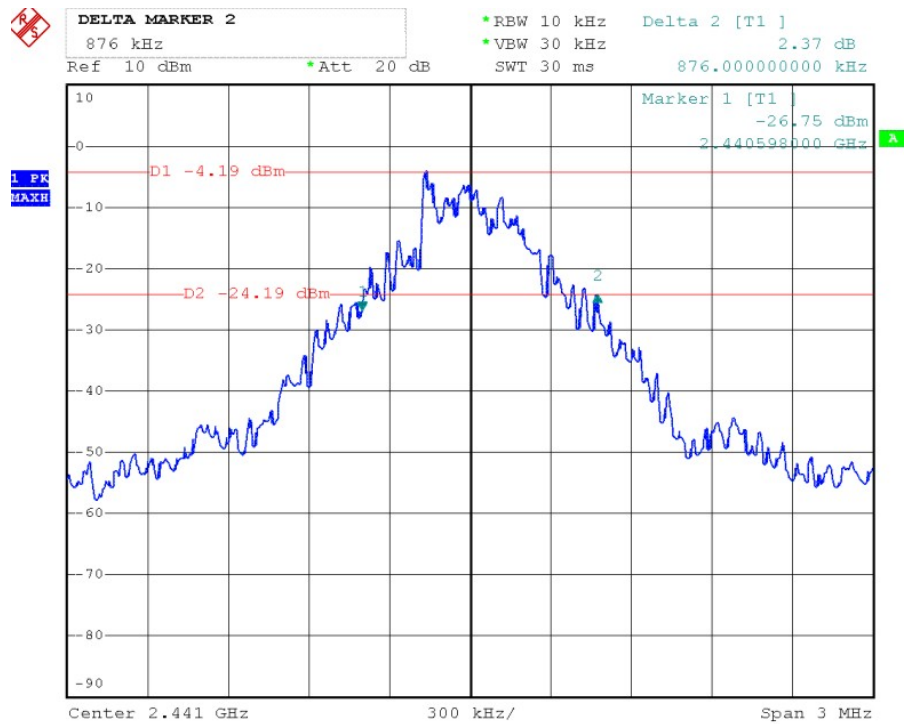
| Modulation Type | Channel No. | Frequency (MHz) | 20dB Bandwidth (kHz) | Min. Limit (kHz) |
|-----------------|-------------|-----------------|----------------------|------------------|
| Pi/4 DQPSK      | Low         | 2402.00         | 1230                 | >25              |
| Pi/4 DQPSK      | Middle      | 2441.00         | 1280                 | >25              |
| Pi/4 DQPSK      | High        | 2480.00         | 1224                 | >25              |

**EDR 3M**

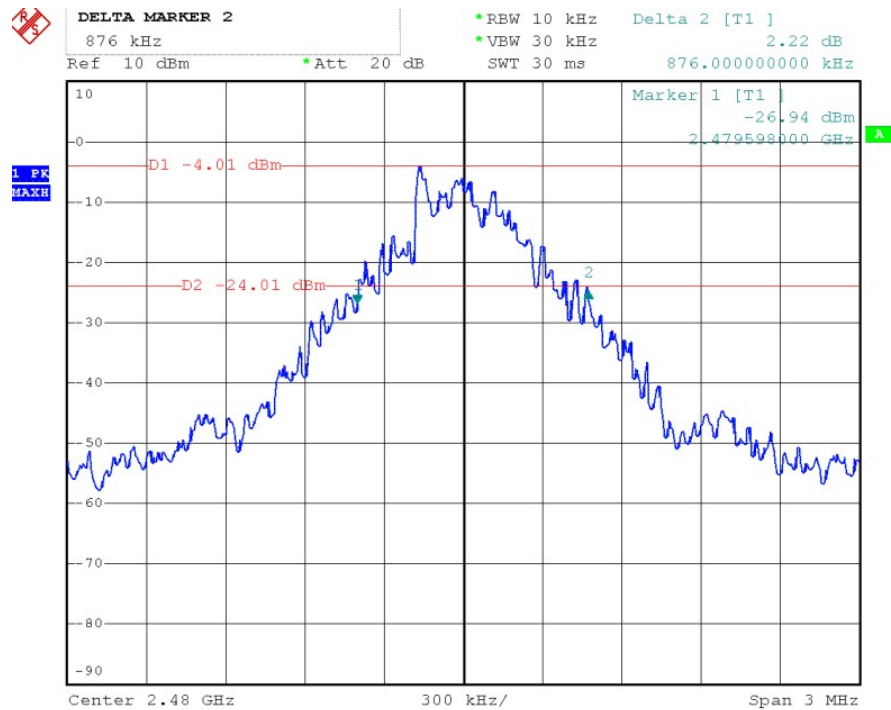
| Modulation Type | Channel No. | Frequency (MHz) | 20dB Bandwidth (kHz) | Min. Limit (kHz) |
|-----------------|-------------|-----------------|----------------------|------------------|
| 8-DPSK          | Low         | 2402.00         | 1218                 | >25              |
| 8-DPSK          | Middle      | 2441.00         | 1218                 | >25              |
| 8-DPSK          | High        | 2480.00         | 1224                 | >25              |

**BDR 1M  
Channel Low**

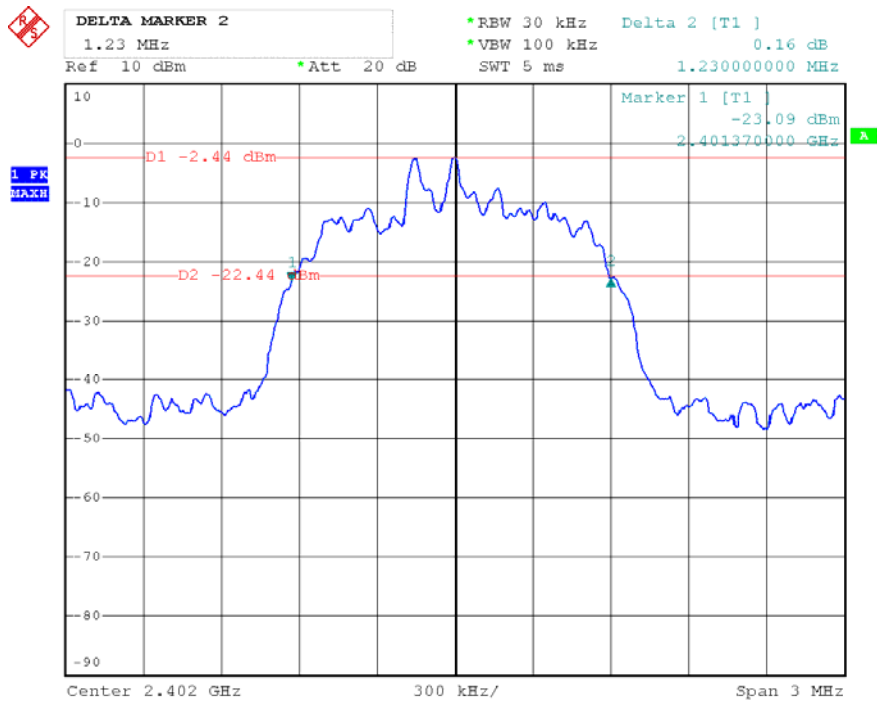
## Channel Middle



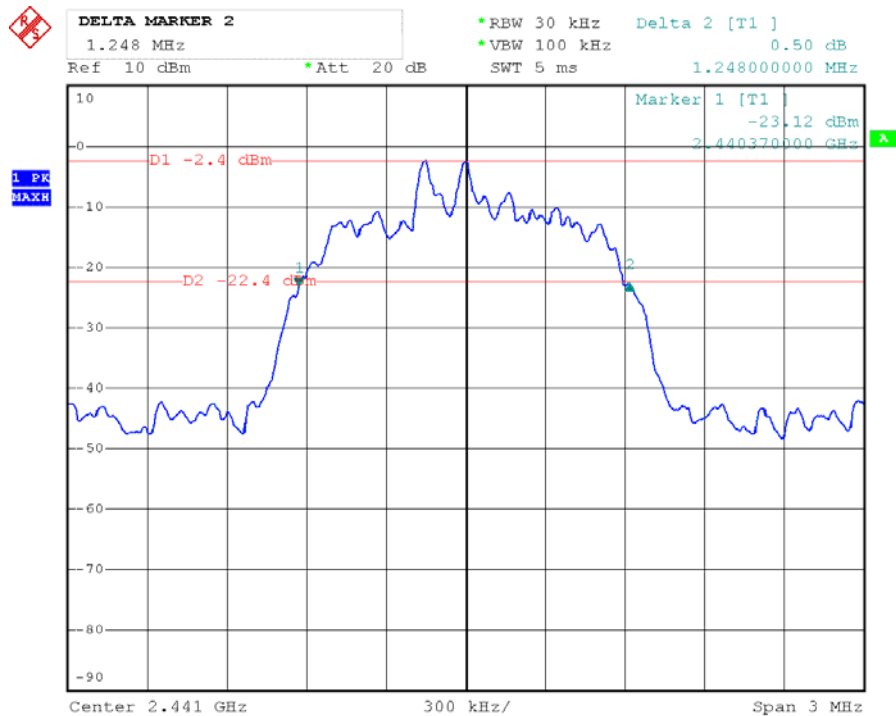
## Channel High



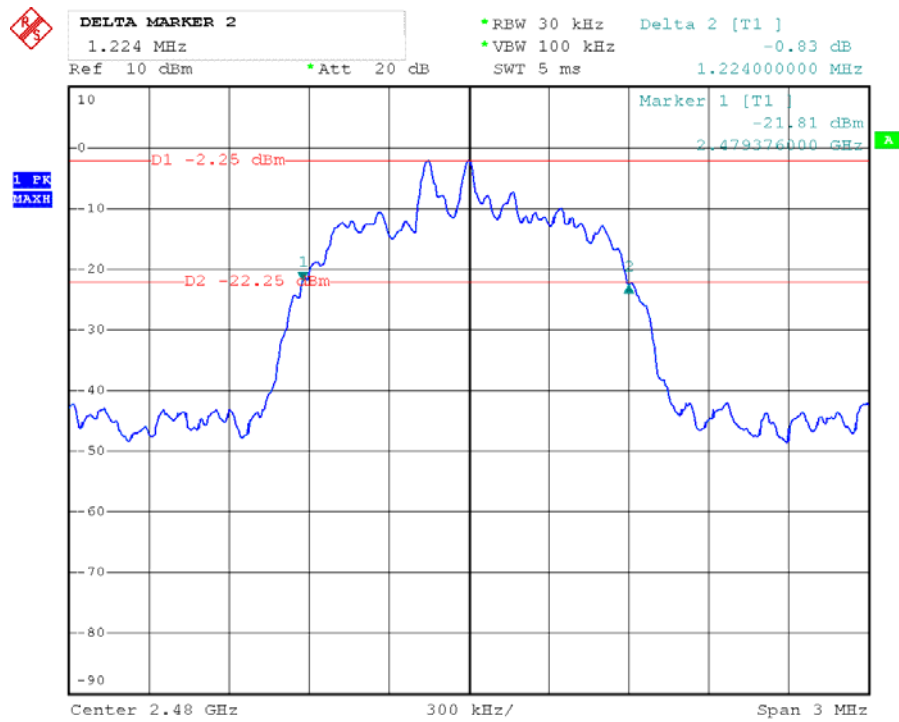
## EDR 2M Channel Low



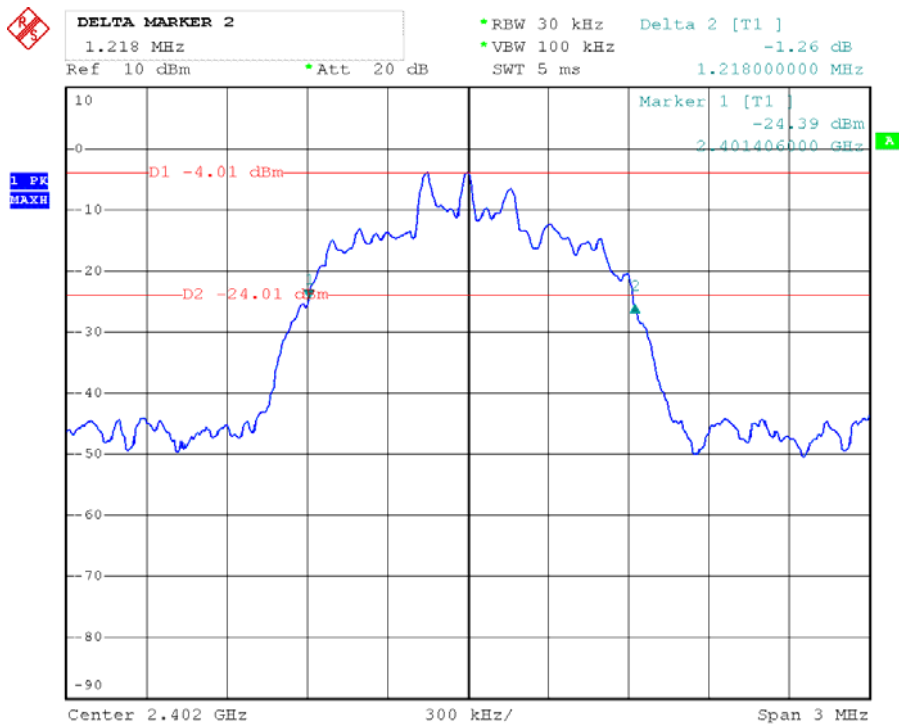
## Channel Middle



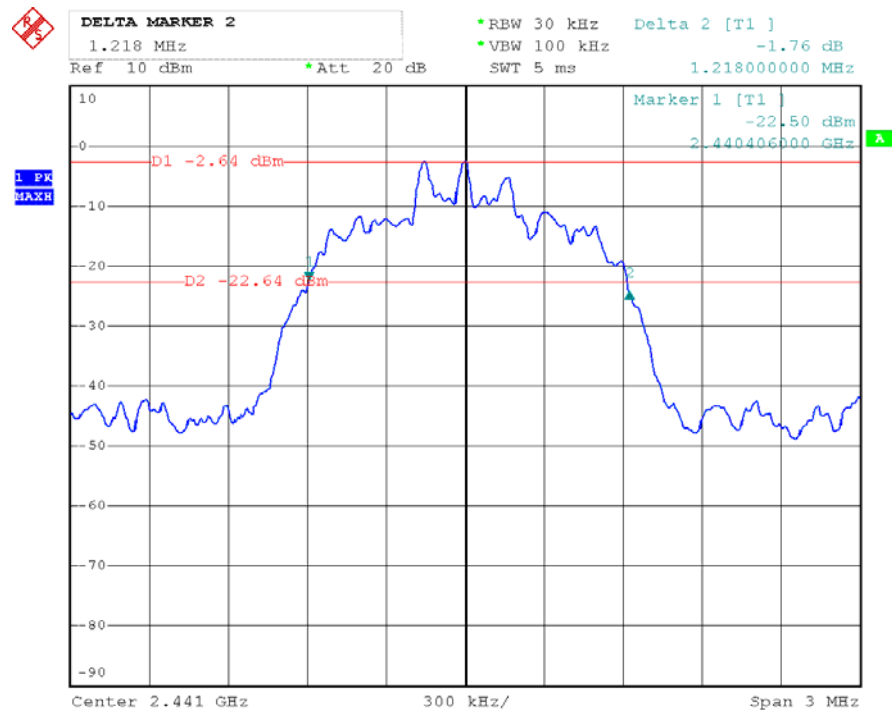
## Channel High



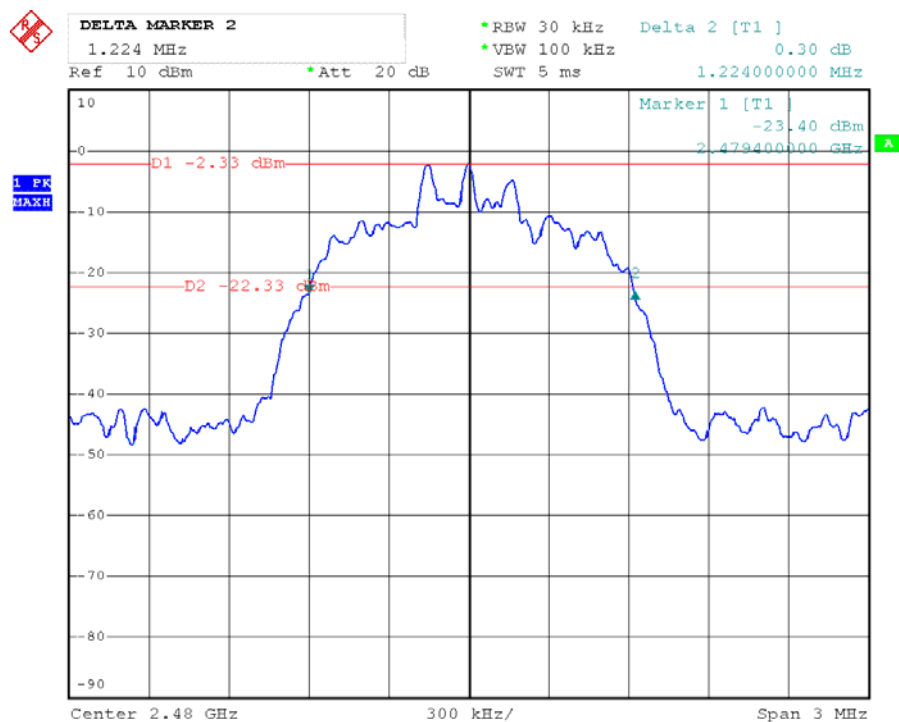
## EDR 3M Channel Low



## Channel Middle



## Channel High

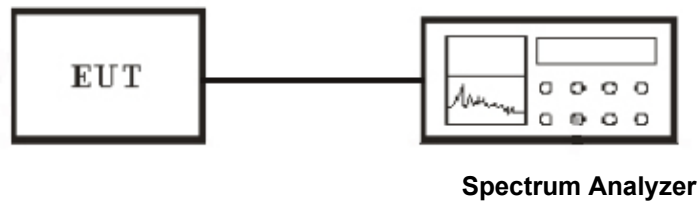


## 6. Test of Hopping Channel Separation

### 6.1 Applicable Standard

Section 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.

### 6.2 EUT Setup



### 6.3 Test Equipment List and Details

See section 2.5.

### 6.4 Test Procedure

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Use the following spectrum analyzer settings:
  - Span = wide enough to capture the peaks of two adjacent channels
  - $RBW \geq 1\%$  of the span,  $VBW \geq RBW$
  - Sweep = auto
  - Detector function = peak
  - Trace = max hold
3. The Hopping Channel Separation is defined as the separation between 2 neighboring hopping frequencies.
4. Repeat above 1~3 points for the middle and highest channel of the EUT.

### 6.5 Test Result

|                                         |                                  |
|-----------------------------------------|----------------------------------|
| Temperature ( °C ) : 22~23              | EUT: B-Trek S2 bluetooth speaker |
| Humidity (%RH ) : 50~54                 | M/N: LS-4060                     |
| Barometric Pressure ( mbar ) : 950~1000 | Operation Condition: Tx Mode     |

**BDR 1M**

| Modulation Type | Frequency (MHz) | Channel Separation (MHz) | Min. Limit (kHz) |
|-----------------|-----------------|--------------------------|------------------|
| GFSK            | 2402~2403       | 1.160                    | >25              |
| GFSK            | 2441~2442       | 1.144                    | >25              |
| GFSK            | 2479~2480       | 1.004                    | >25              |

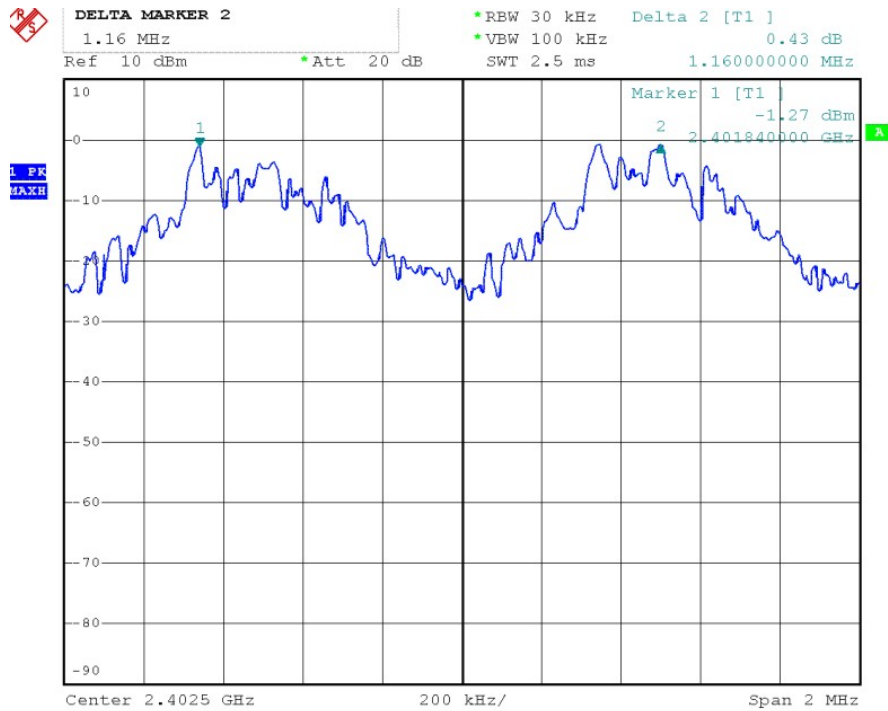
**EDR 2M**

| Modulation Type | Frequency (MHz) | Channel Separation (MHz) | Min. Limit (kHz) |
|-----------------|-----------------|--------------------------|------------------|
| Pi/4 DQPSK      | 2402~2403       | 1.002                    | >25              |
| Pi/4 DQPSK      | 2441~2442       | 1.004                    | >25              |
| Pi/4 DQPSK      | 2479~2480       | 1.008                    | >25              |

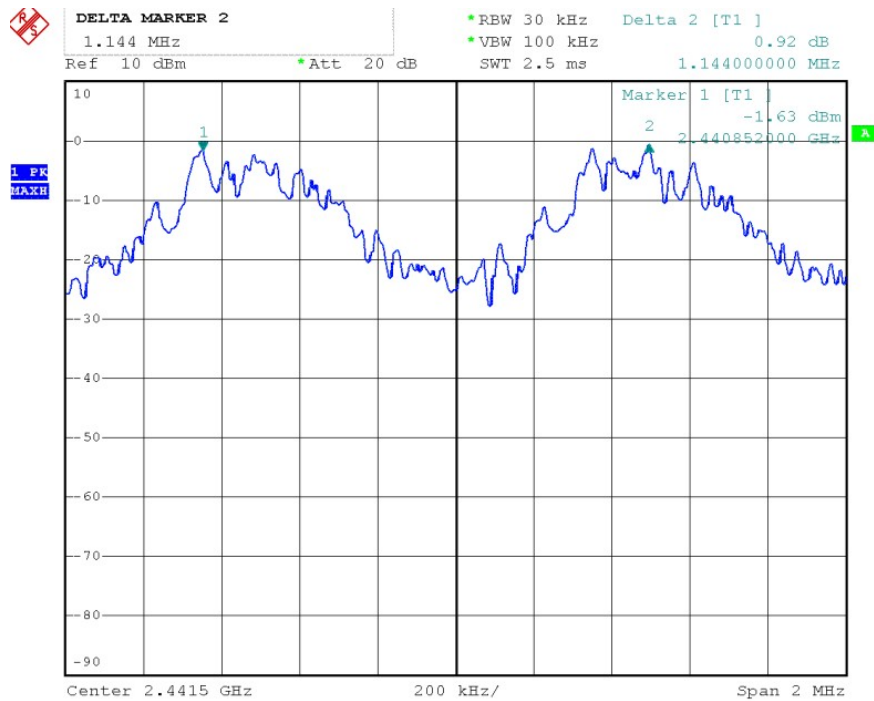
**EDR 3M**

| Modulation Type | Frequency (MHz) | Channel Separation (MHz) | Min. Limit (kHz) |
|-----------------|-----------------|--------------------------|------------------|
| 8-DPSK          | 2402~2403       | 1.004                    | >25              |
| 8-DPSK          | 2441~2442       | 1.004                    | >25              |
| 8-DPSK          | 2479~2480       | 1.004                    | >25              |

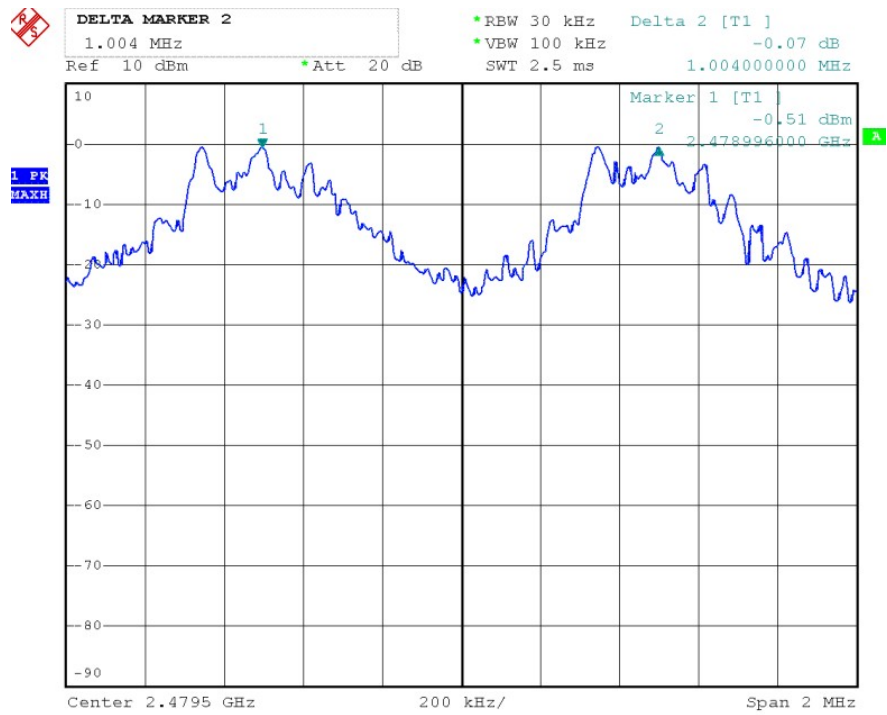
## BDR 1M Channel Low



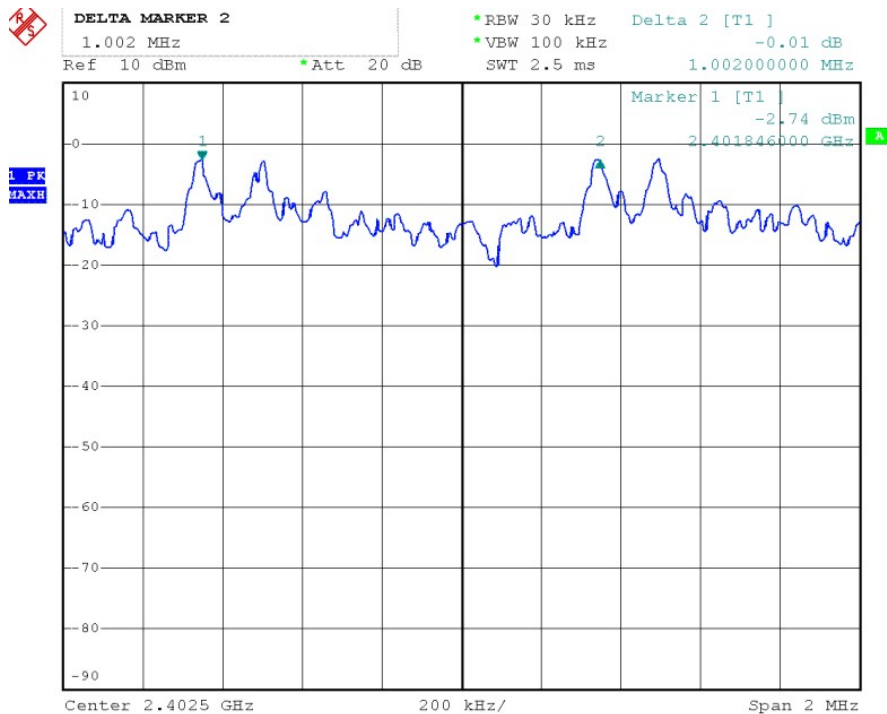
## Channel Middle



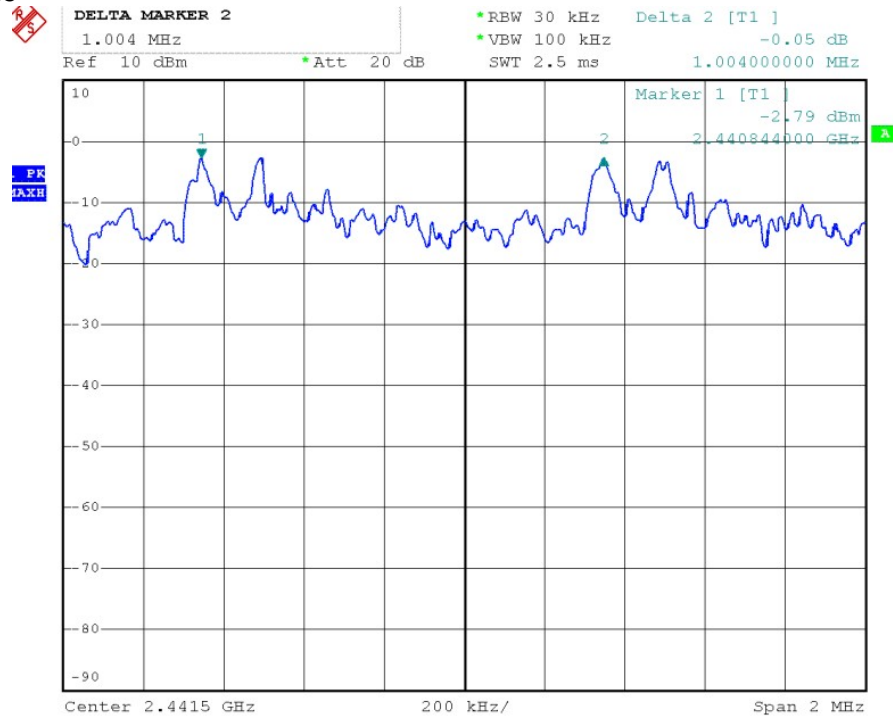
## Channel High



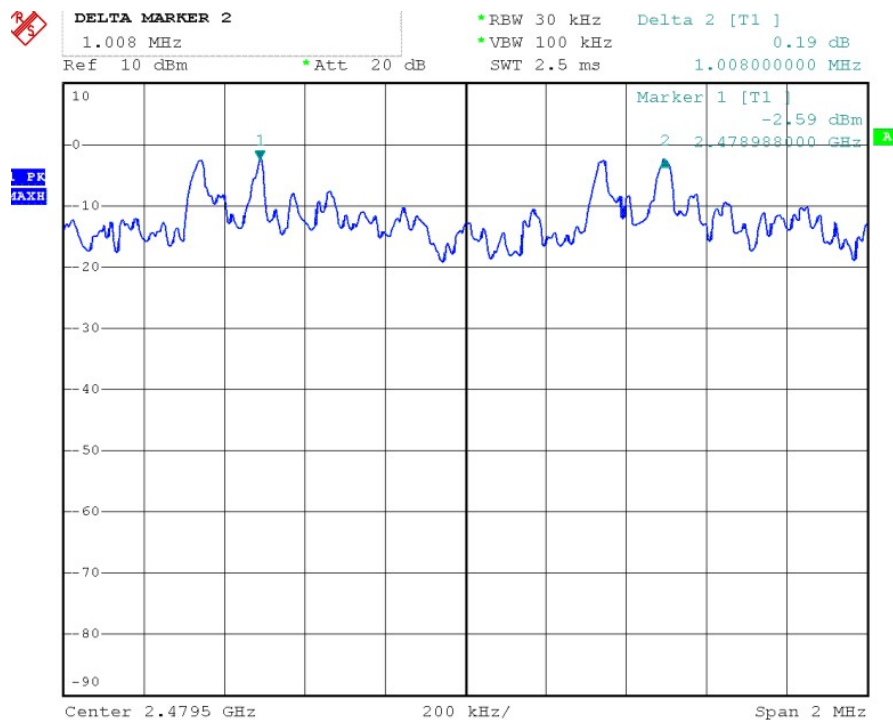
## EDR 2M Channel Low



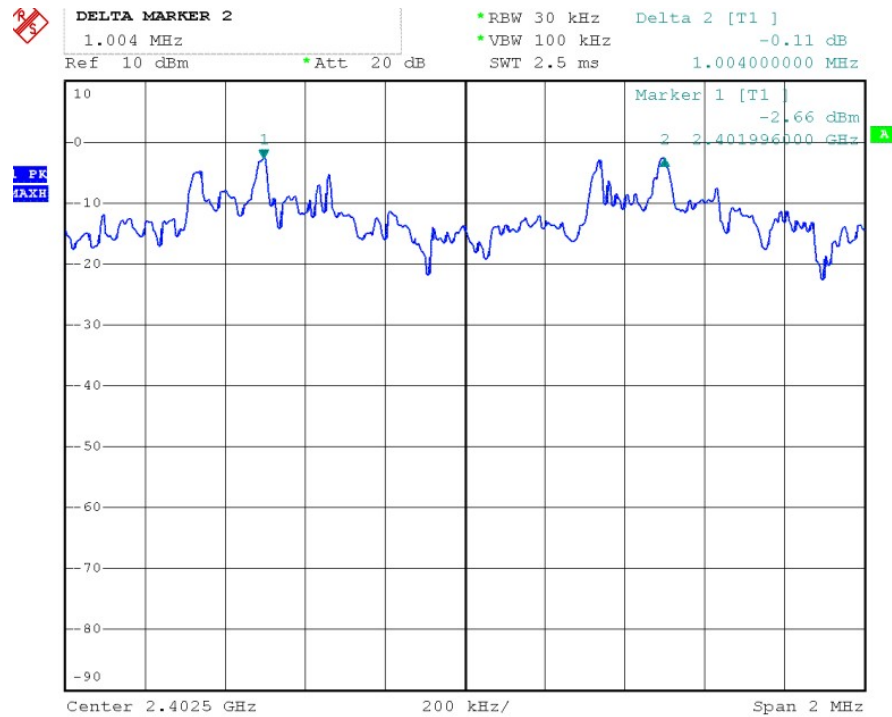
## Channel Middle



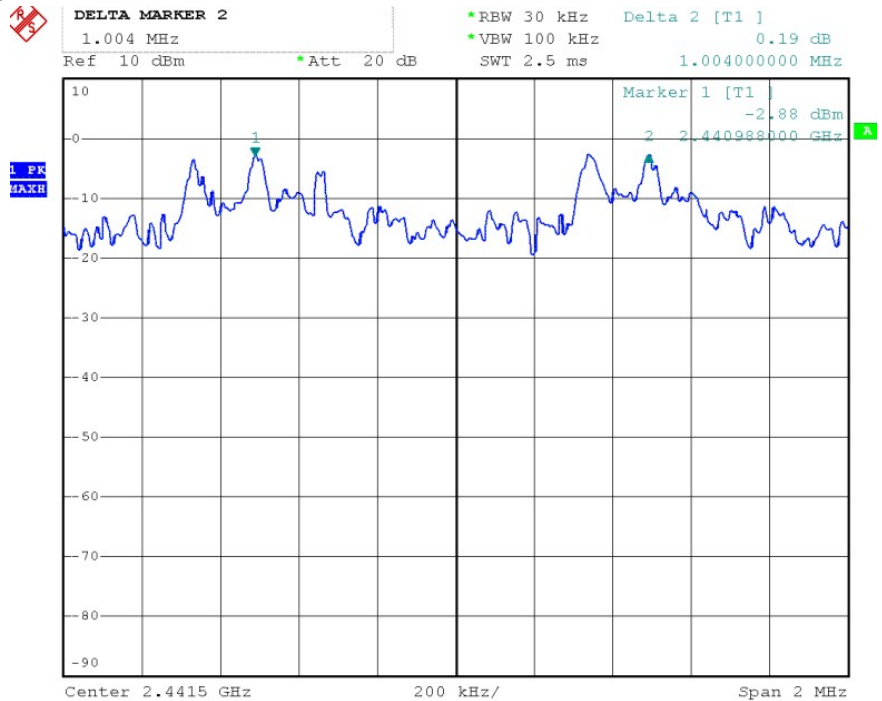
## Channel High



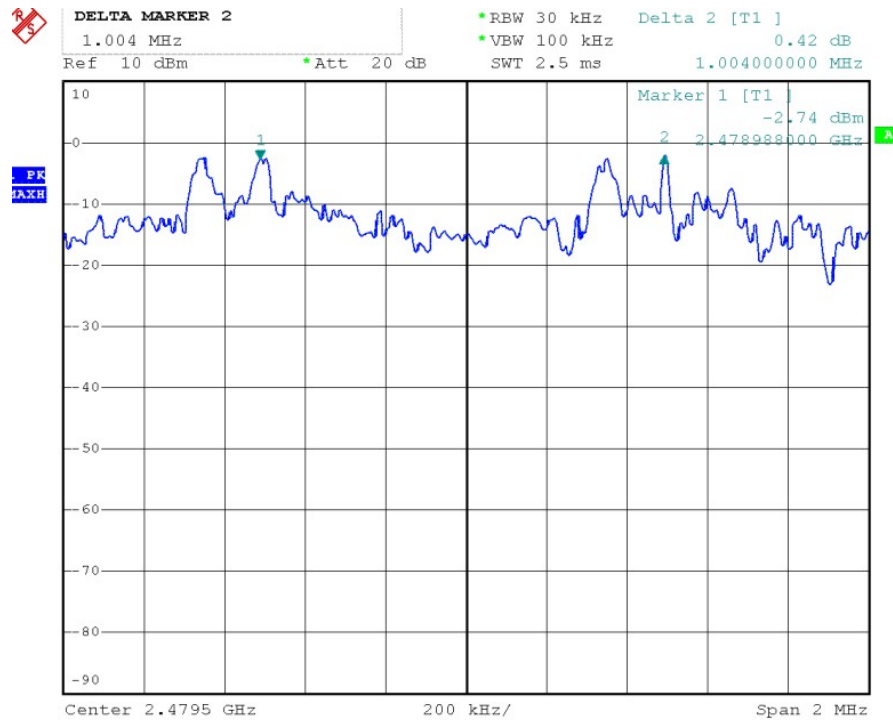
## EDR 3M Channel Low



## Channel Middle



## Channel High

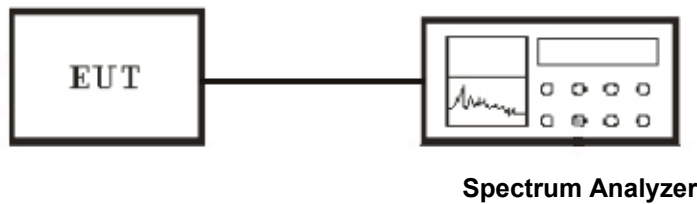


## 7. Test of Number of Hopping Frequency

### 7.1 Applicable Standard

Section 15.247(a)(1)(iii): For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 15 non-overlapping hopping channels. Frequency hopping system which use fewer than 75 hopping frequencies may employ intelligent hopping techniques to avoid interference to other transmissions. Frequency hopping system may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 non-overlapping channels are used.

### 7.2 EUT Setup



### 7.3 Test Equipment List and Details

See **section 2.5**.

### 7.4 Test Procedure

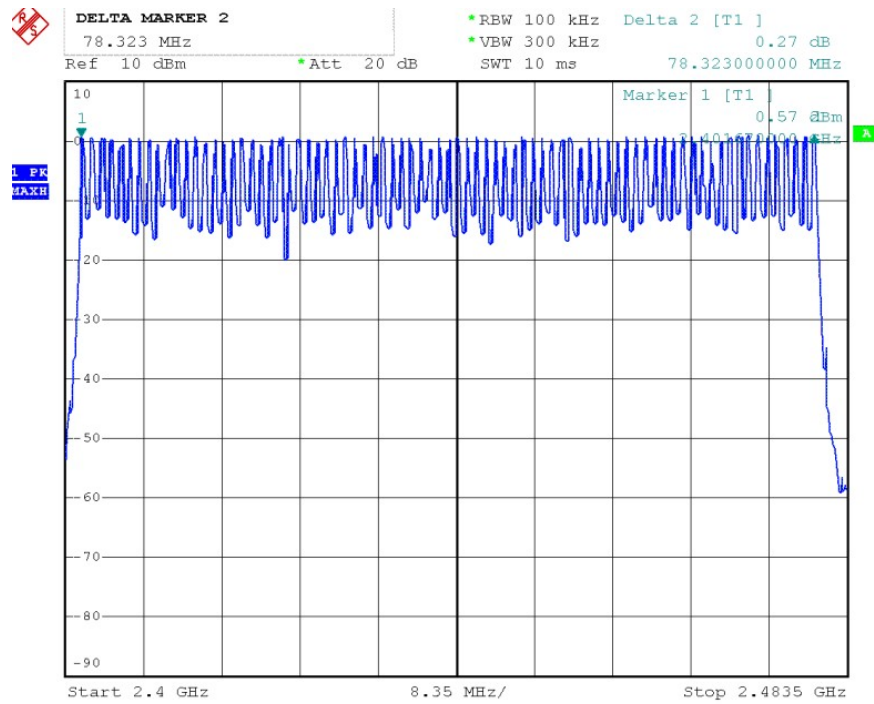
1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Use the following spectrum analyzer settings:  
Span = the frequency band of operation  
RBW  $\geq$  1% of the span, VBW  $\geq$  RBW  
Sweep = auto  
Detector function = peak  
Trace = max hold
3. Observe frequency hopping in 2400MHz~2483.5MHz, there are at least 32 non-overlapping channels.
4. Repeat above 1~3 points for the middle and highest channel of the EUT.

### 7.5 Test Result

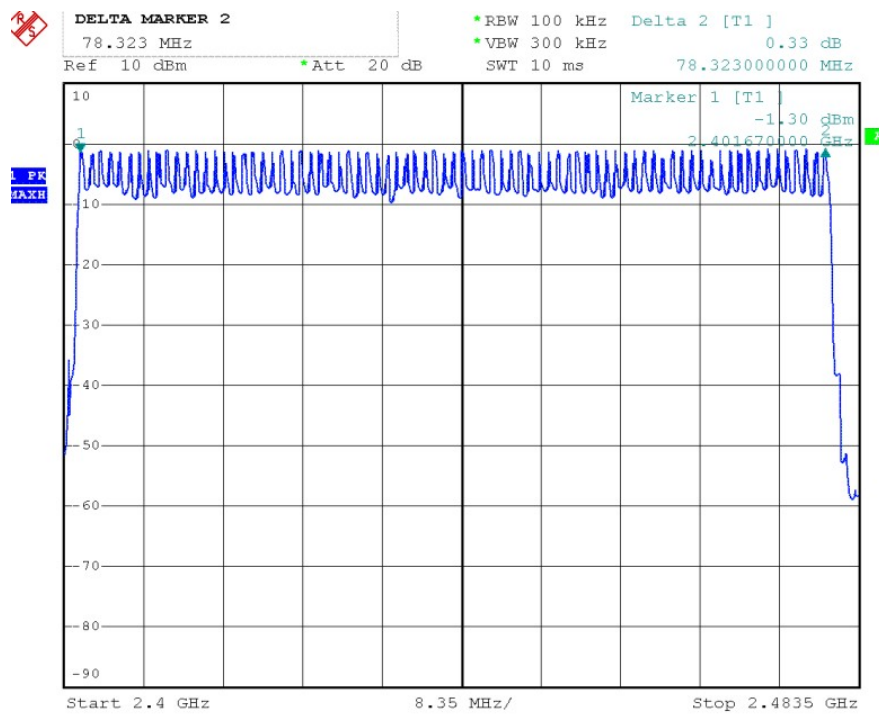
|                                         |                                  |
|-----------------------------------------|----------------------------------|
| Temperature ( °C ) : 22~23              | EUT: B-Trek S2 bluetooth speaker |
| Humidity (%RH ) : 50~54                 | M/N: LS-4060                     |
| Barometric Pressure ( mbar ) : 950~1000 | Operation Condition: Tx Mode     |

| Modulation Type | Frequency (MHz) | Number of Hopping Channels | Min. Limit |
|-----------------|-----------------|----------------------------|------------|
| GFSK            | 2402.0~2480.0   | 79                         | >15        |
| Pi/4 DQPSK      | 2402.0~2480.0   | 79                         | >15        |
| 8-DPSK          | 2402.0~2480.0   | 79                         | >15        |

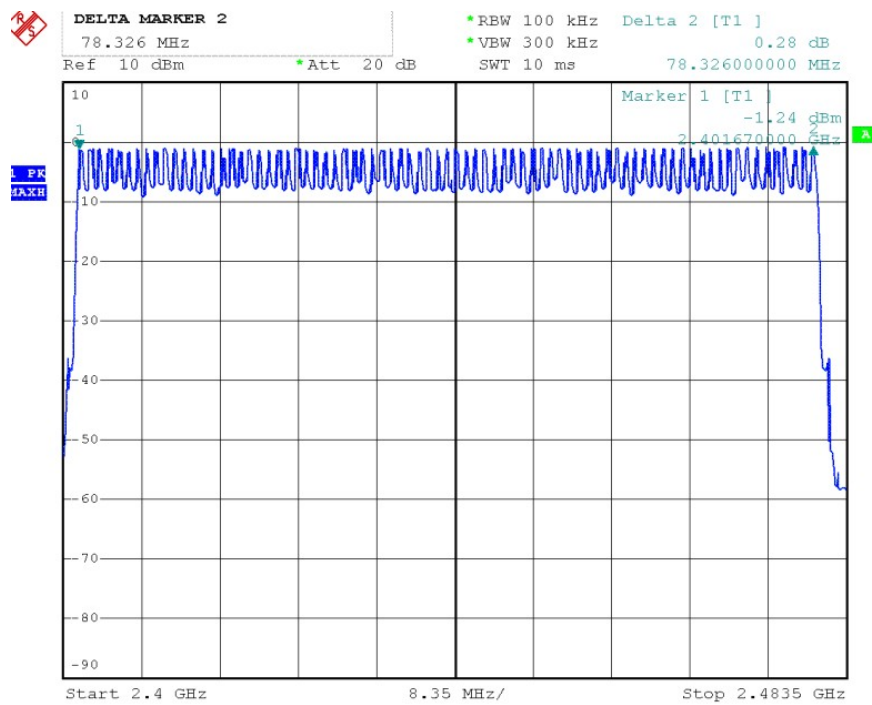
## BDR 1M



## EDR 2M



## EDR 3M

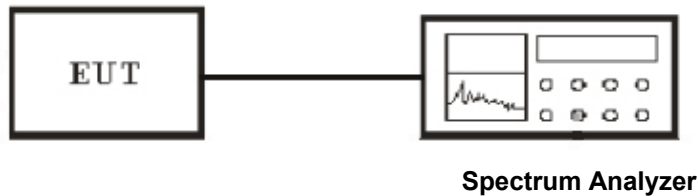


## 8. Test of Dwell Time of Each Frequency

### 8.1 Applicable Standard

Section 15.247(a)(1)(iii): For frequency hopping systems operating in the 2400-2483.5 MHz band The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4seconds multiplied by the number of hopping channels employed.

### 8.2 EUT Setup



### 8.3 Test Equipment List and Details

See **section 2.5**.

### 8.4 Test Procedure

1. The transmitter output was connected to the spectrum analyzer through an attenuator.
2. Use the following spectrum analyzer settings:  
Span = zero span, centered on a hopping channel  
RBW = 1 MHz, VBW  $\geq$  RBW  
Sweep = as necessary to capture the entire dwell time per hopping channel  
Detector function = peak  
Trace = max hold
3. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
4. Measure the maximum time duration of one single pulse.

### 8.5 Test Result

|                                         |                                  |
|-----------------------------------------|----------------------------------|
| Temperature ( °C ) : 22~23              | EUT: B-Trek S2 bluetooth speaker |
| Humidity (%RH ) : 50~54                 | M/N: LS-4060                     |
| Barometric Pressure ( mbar ) : 950~1000 | Operation Condition: Tx Mode     |

DH1

Dwell time=  $t \cdot (1.6/2/79) \cdot 31.6$

DH3

Dwell time=  $t \cdot (1.6/4/79) \cdot 31.6$

DH5

Dwell time=  $t \cdot (1.6/6/79) \cdot 31.6$

**BDR 1M**  
**Low Channel**

| Modulation Type |     | Reading (ms) | Dwell Time (ms) | Limit (ms) |
|-----------------|-----|--------------|-----------------|------------|
| GFSK            | DH1 | 0.396        | 126.72          | 400        |
| GFSK            | DH3 | 1.666        | 266.56          | 400        |
| GFSK            | DH5 | 2.898        | 309.12          | 400        |

**Middle Channel**

| Modulation Type |     | Reading (ms) | Dwell Time (ms) | Limit (ms) |
|-----------------|-----|--------------|-----------------|------------|
| GFSK            | DH1 | 0.396        | 126.72          | 400        |
| GFSK            | DH3 | 1.666        | 266.56          | 400        |
| GFSK            | DH5 | 2.898        | 309.12          | 400        |

**High Channel**

| Modulation Type |     | Reading (ms) | Dwell Time (ms) | Limit (ms) |
|-----------------|-----|--------------|-----------------|------------|
| GFSK            | DH1 | 0.400        | 128.00          | 400        |
| GFSK            | DH3 | 1.666        | 266.56          | 400        |
| GFSK            | DH5 | 2.898        | 309.12          | 400        |

**EDR 2M**  
**Low Channel**

| Modulation Type |      | Reading (ms) | Dwell Time (ms) | Limit (ms) |
|-----------------|------|--------------|-----------------|------------|
| Pi/4 DQPSK      | 2DH1 | 0.412        | 131.84          | 400        |
| Pi/4 DQPSK      | 2DH3 | 1.650        | 264.00          | 400        |
| Pi/4 DQPSK      | 2DH5 | 2.914        | 310.83          | 400        |

**Middle Channel**

| Modulation Type |      | Reading (ms) | Dwell Time (ms) | Limit (ms) |
|-----------------|------|--------------|-----------------|------------|
| Pi/4 DQPSK      | 2DH1 | 0.412        | 131.84          | 400        |
| Pi/4 DQPSK      | 2DH3 | 1.650        | 264.00          | 400        |
| Pi/4 DQPSK      | 2DH5 | 2.912        | 310.61          | 400        |

### High Channel

| Modulation Type |      | Reading (ms) | Dwell Time (ms) | Limit (ms) |
|-----------------|------|--------------|-----------------|------------|
| Pi/4 DQPSK      | 2DH1 | 0.412        | 131.84          | 400        |
| Pi/4 DQPSK      | 2DH3 | 1.650        | 264.00          | 400        |
| Pi/4 DQPSK      | 2DH5 | 2.912        | 310.61          | 400        |

### EDR 3M Low Channel

| Modulation Type |      | Reading (ms) | Dwell Time (ms) | Limit (ms) |
|-----------------|------|--------------|-----------------|------------|
| 8-DPSK          | 3DH1 | 0.412        | 131.84          | 400        |
| 8-DPSK          | 3DH3 | 1.642        | 262.72          | 400        |
| 8-DPSK          | 3DH5 | 2.908        | 310.19          | 400        |

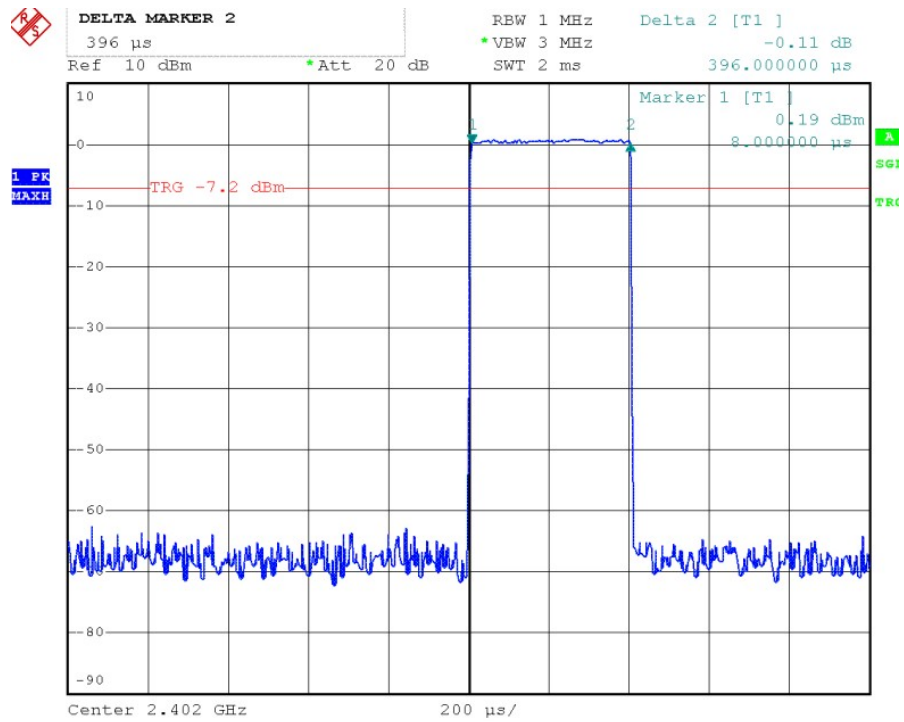
### Middle Channel

| Modulation Type |      | Reading (ms) | Dwell Time (ms) | Limit (ms) |
|-----------------|------|--------------|-----------------|------------|
| 8-DPSK          | 3DH1 | 0.412        | 131.84          | 400        |
| 8-DPSK          | 3DH3 | 1.642        | 262.72          | 400        |
| 8-DPSK          | 3DH5 | 2.908        | 310.19          | 400        |

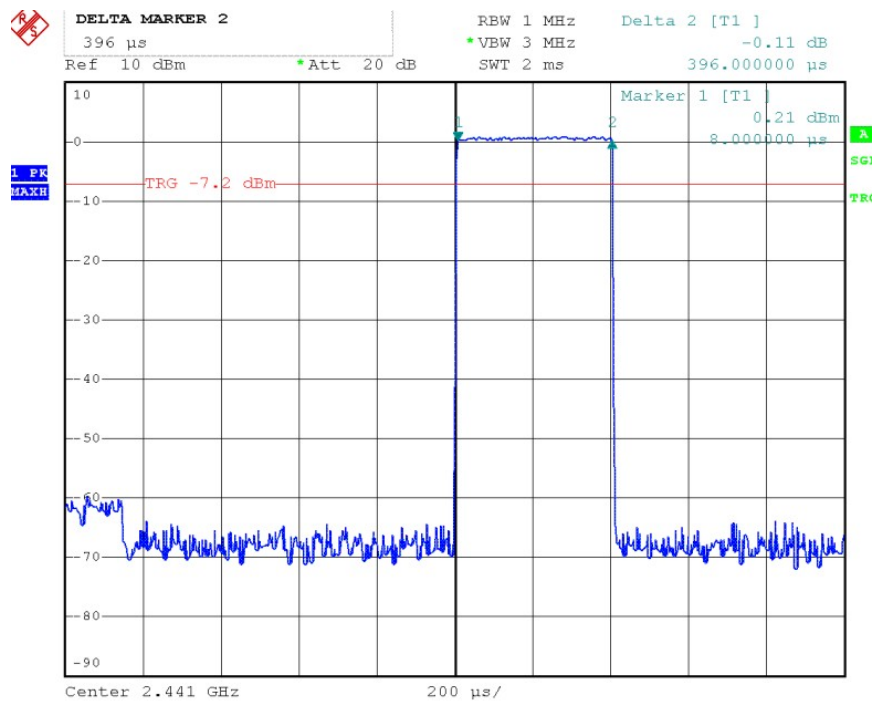
### High Channel

| Modulation Type |      | Reading (ms) | Dwell Time (ms) | Limit (ms) |
|-----------------|------|--------------|-----------------|------------|
| 8-DPSK          | 3DH1 | 0.412        | 131.84          | 400        |
| 8-DPSK          | 3DH3 | 1.642        | 262.72          | 400        |
| 8-DPSK          | 3DH5 | 208.9        | 310.19          | 400        |

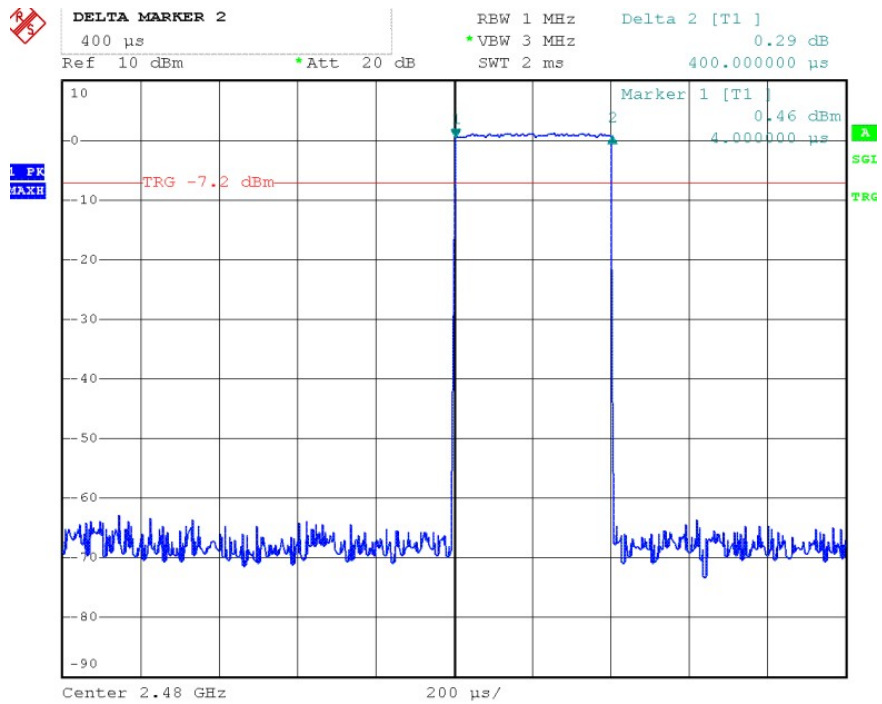
## BDR 1M DH1 Channel Low



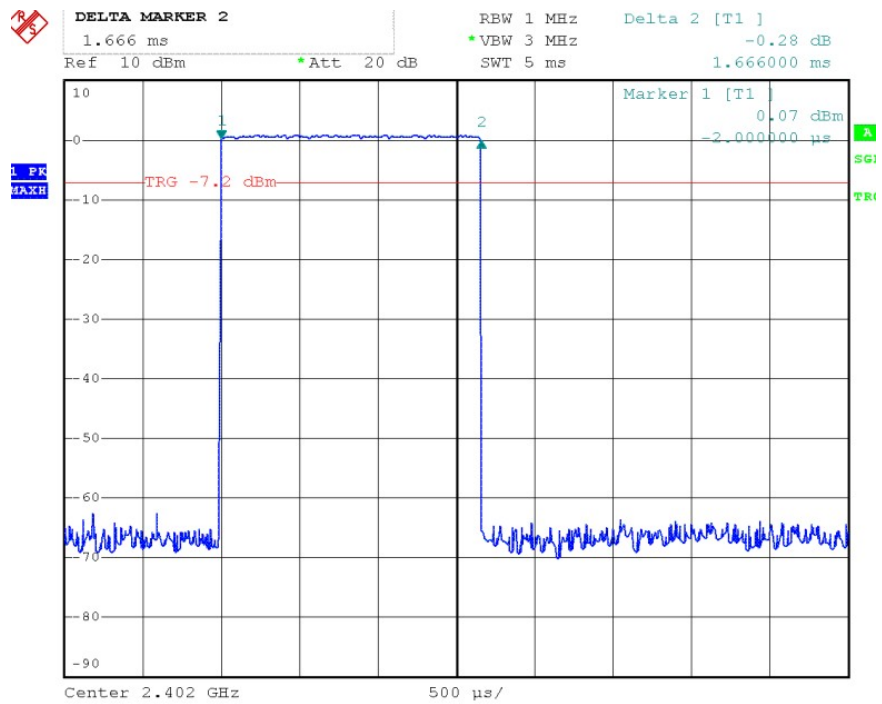
## Channel Middle



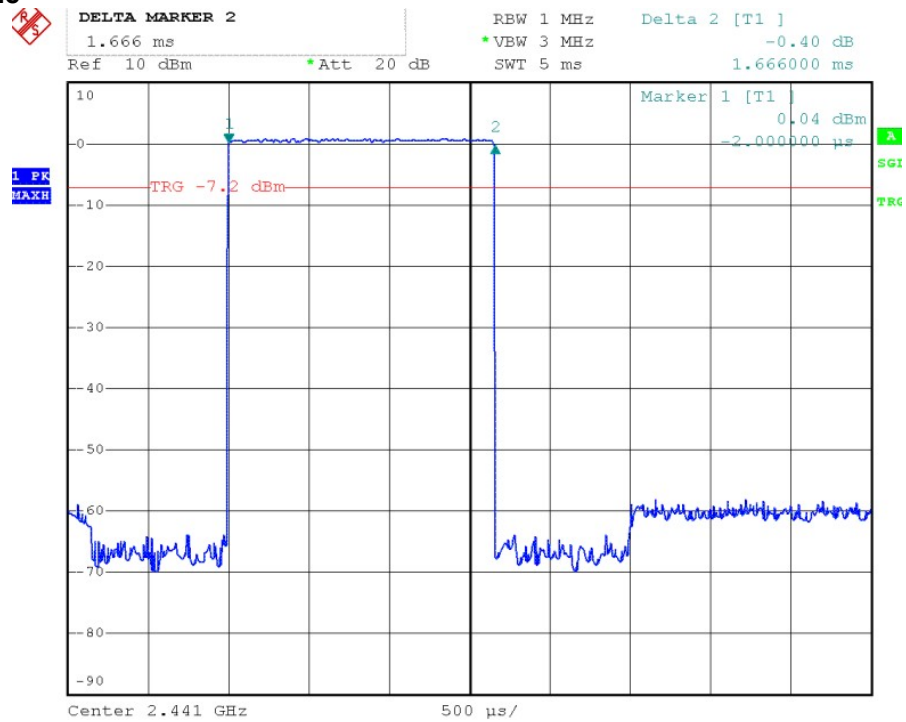
## Channel High



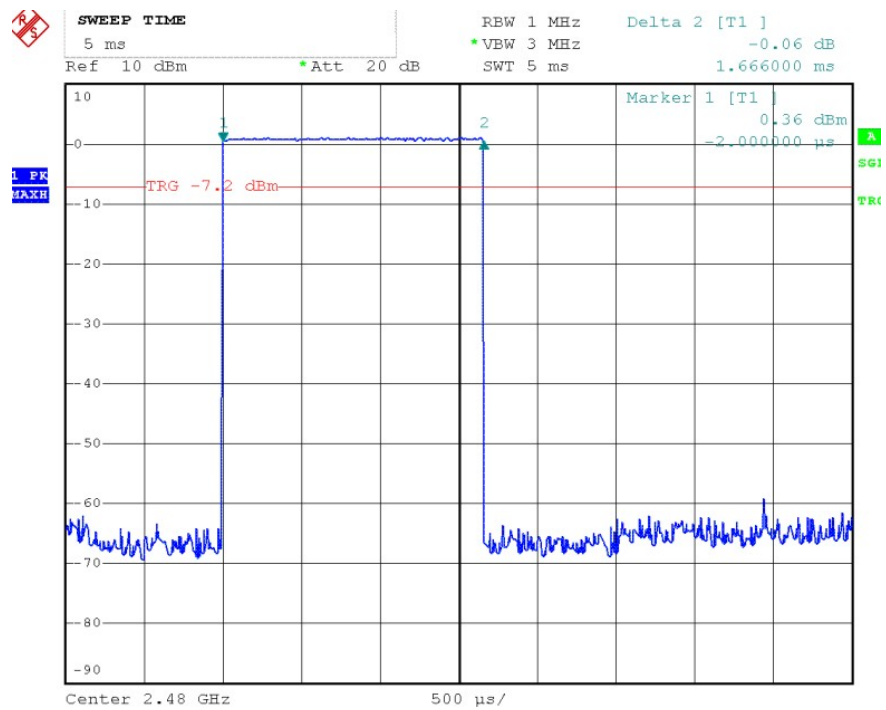
## BDR 1M DH3 Channel Low



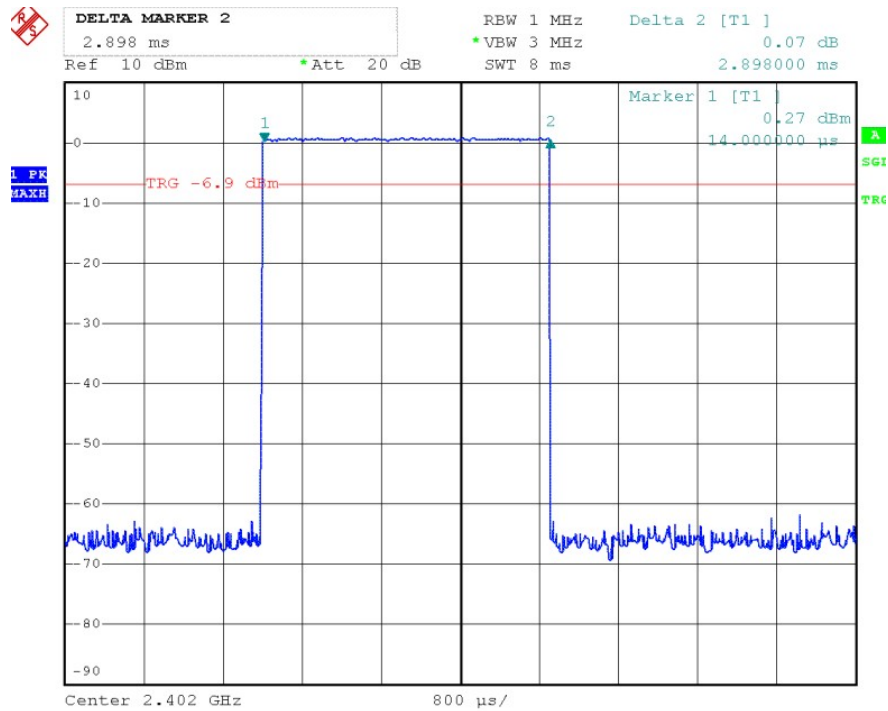
## Channel Middle



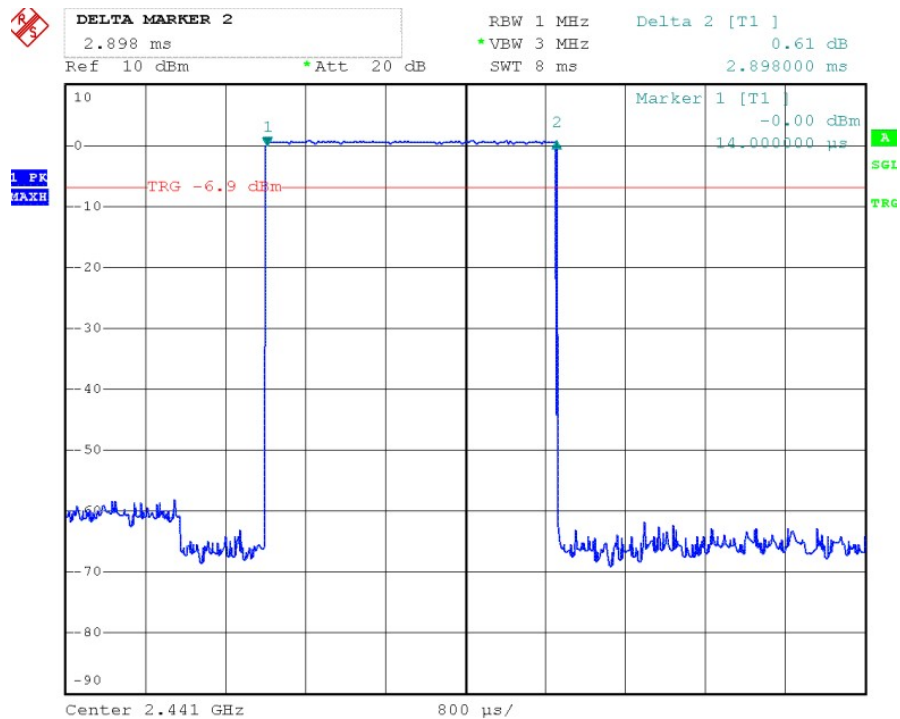
## Channel High



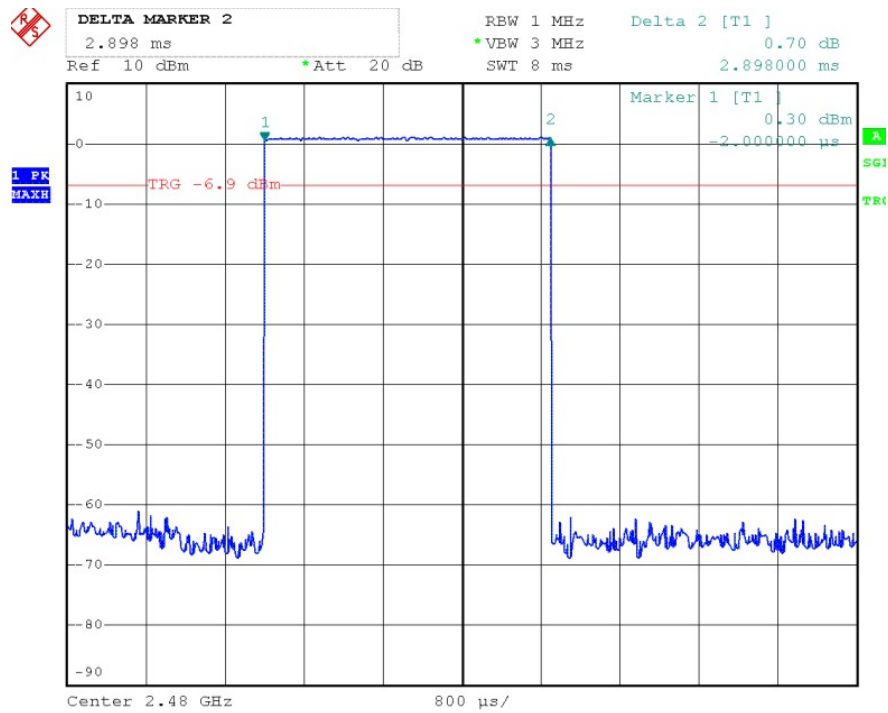
## BDR 1M DH5 Channel Low



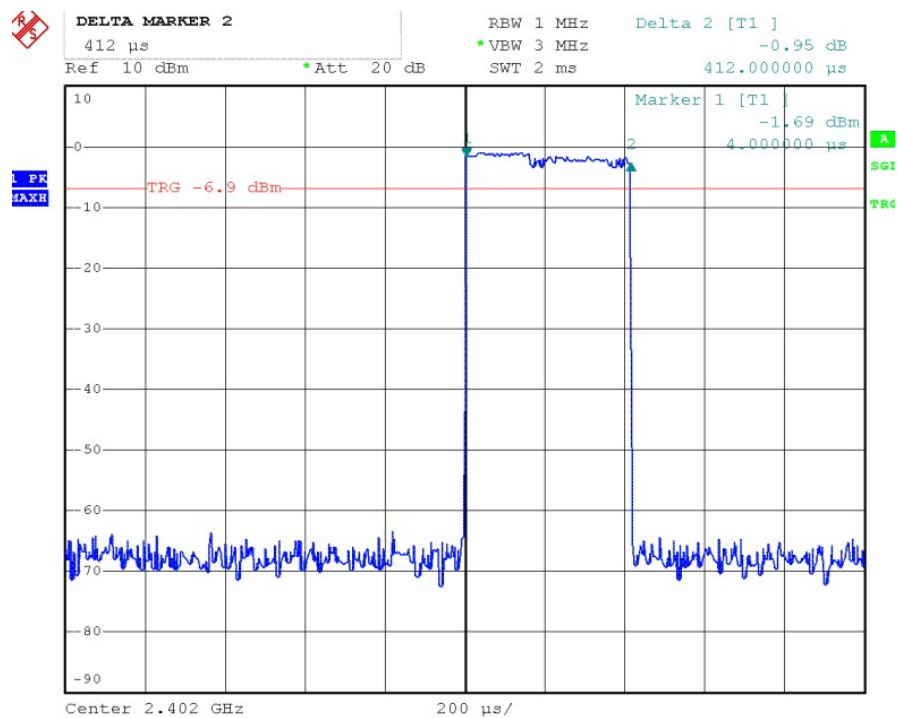
## Channel Middle



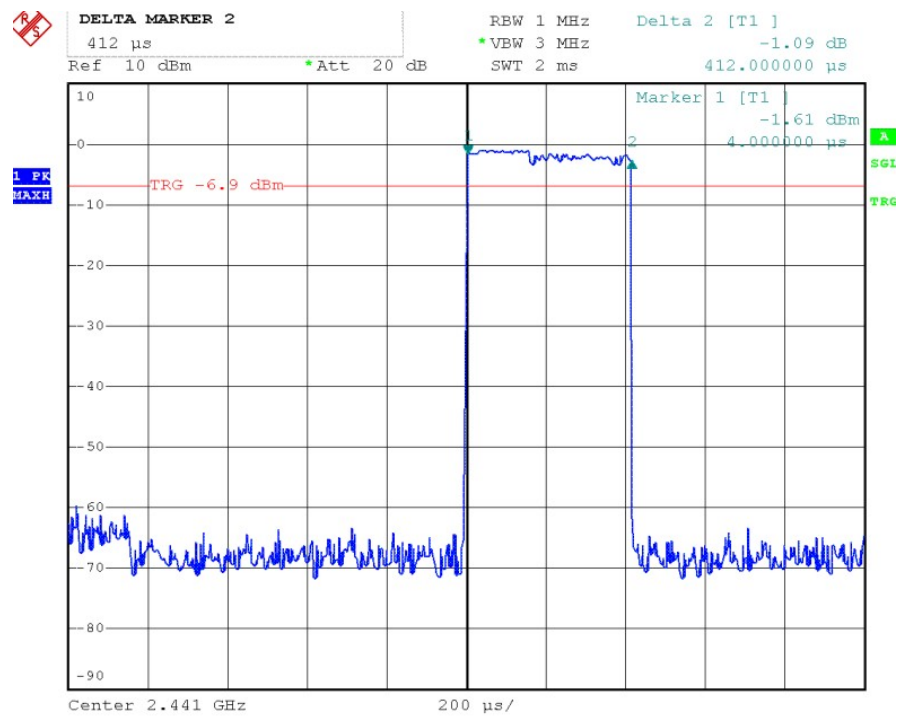
## Channel High



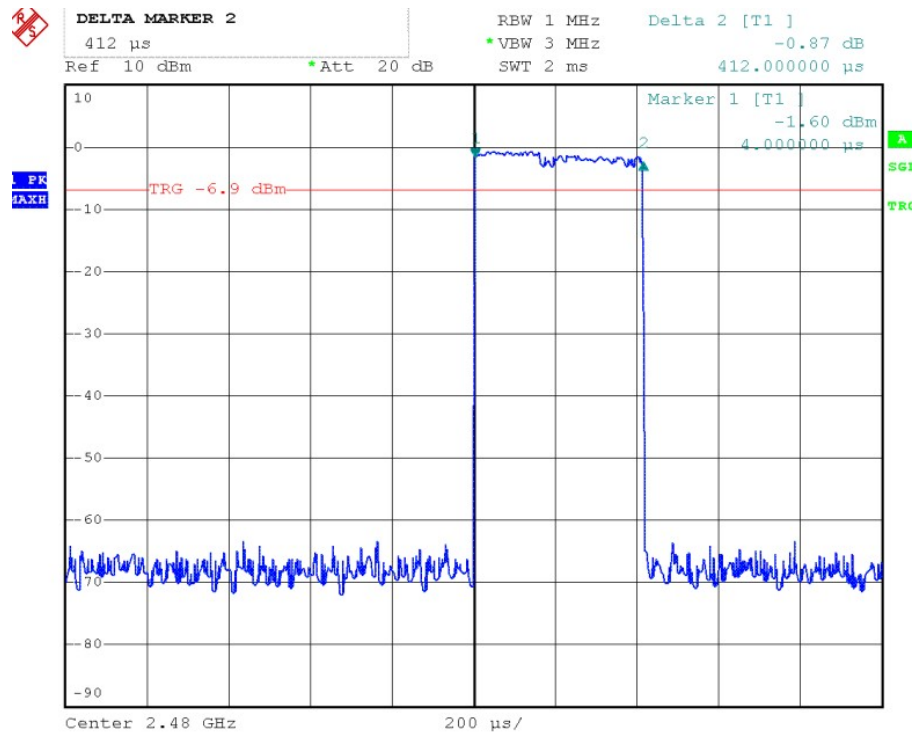
## EDR 2M 2DH1 Channel Low



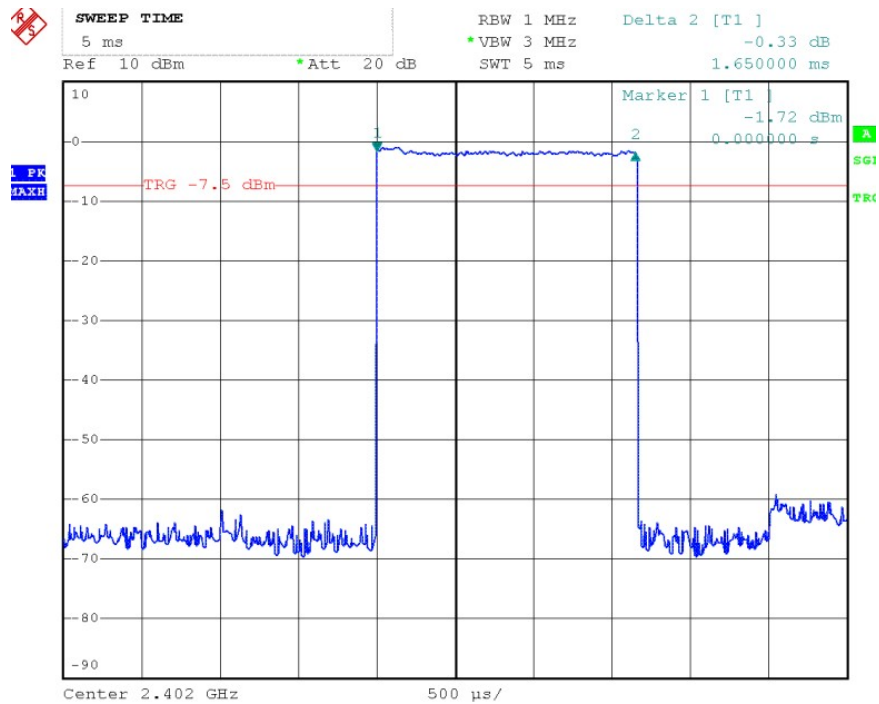
## Channel Middle



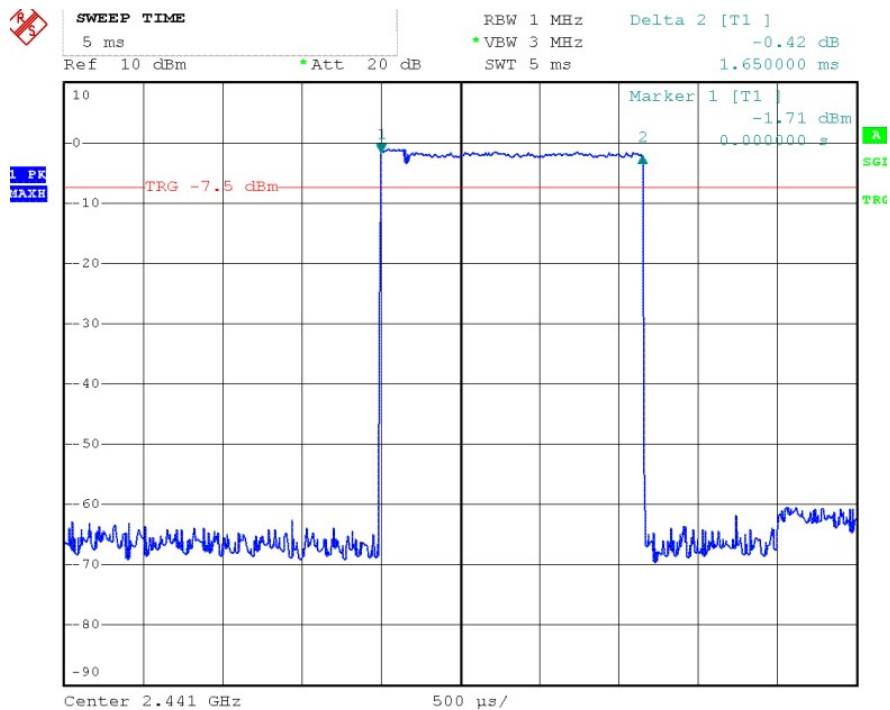
## Channel High



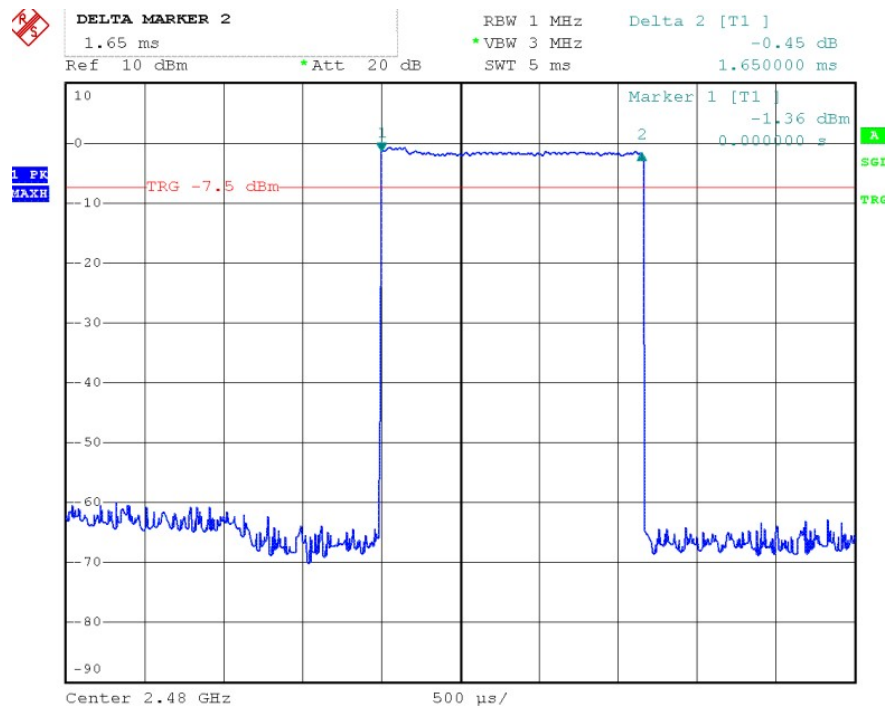
## EDR 2M 2DH3 Channel Low



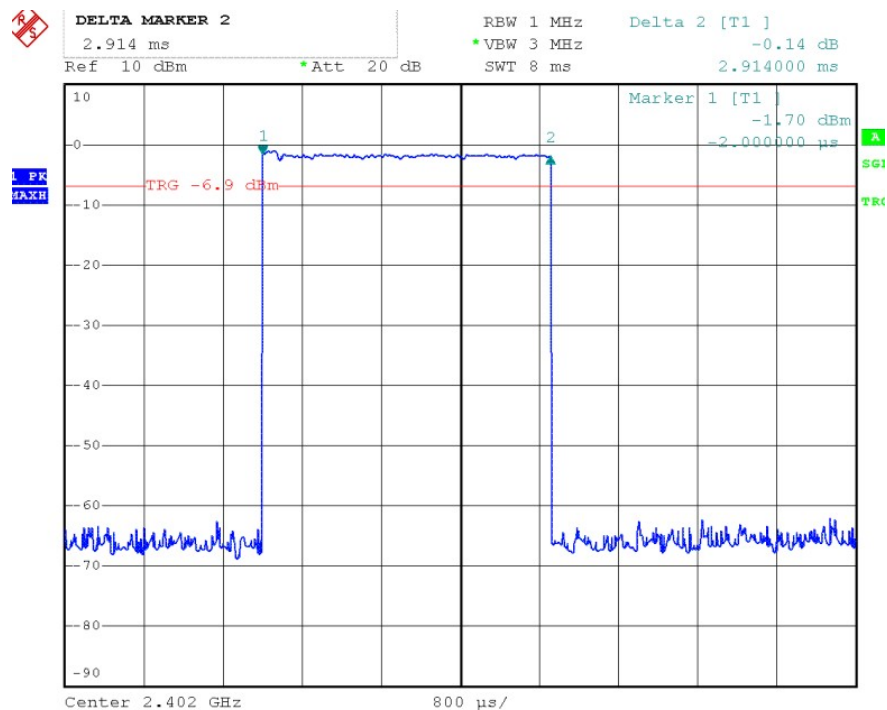
## Channel Middle



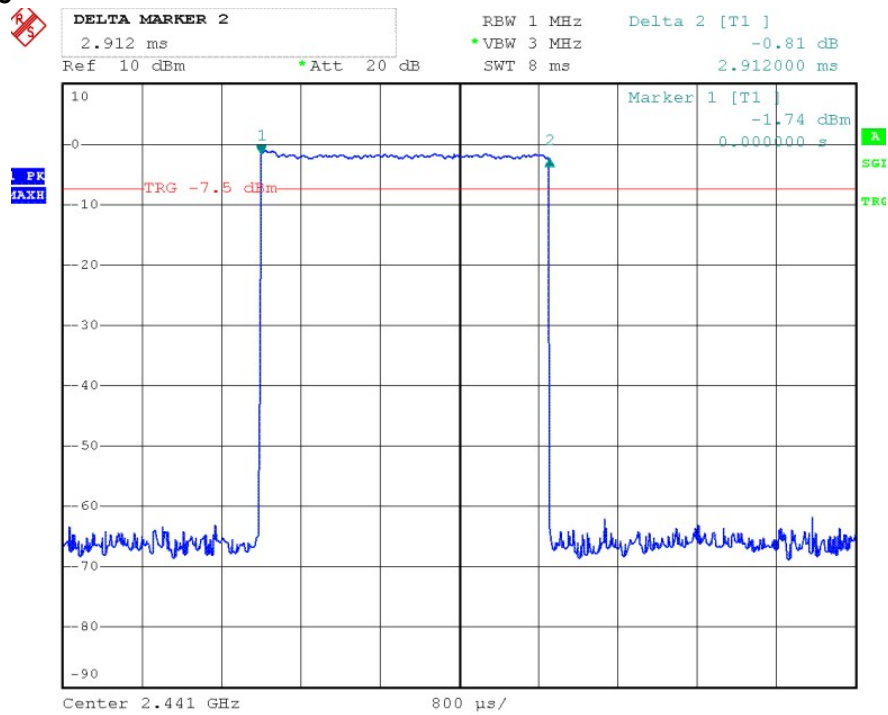
## Channel High



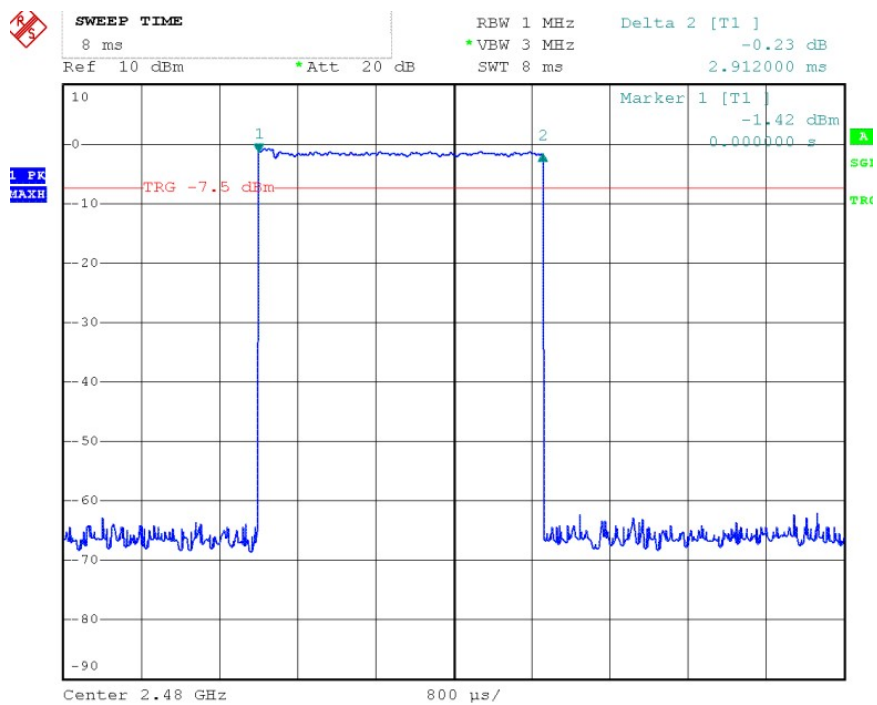
## EDR 2M 2DH5 Channel Low



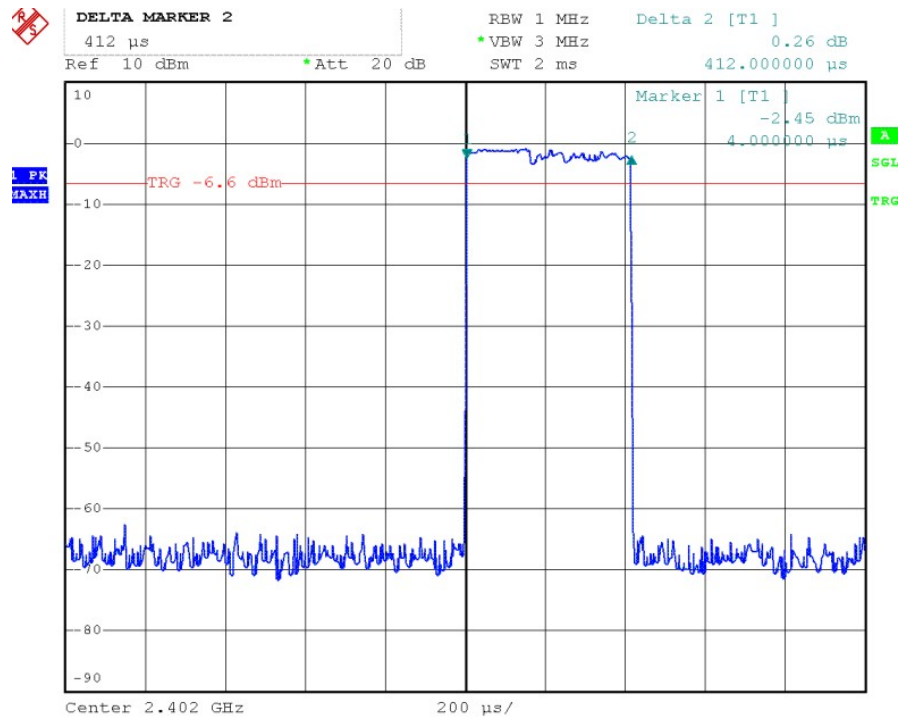
## Channel Middle



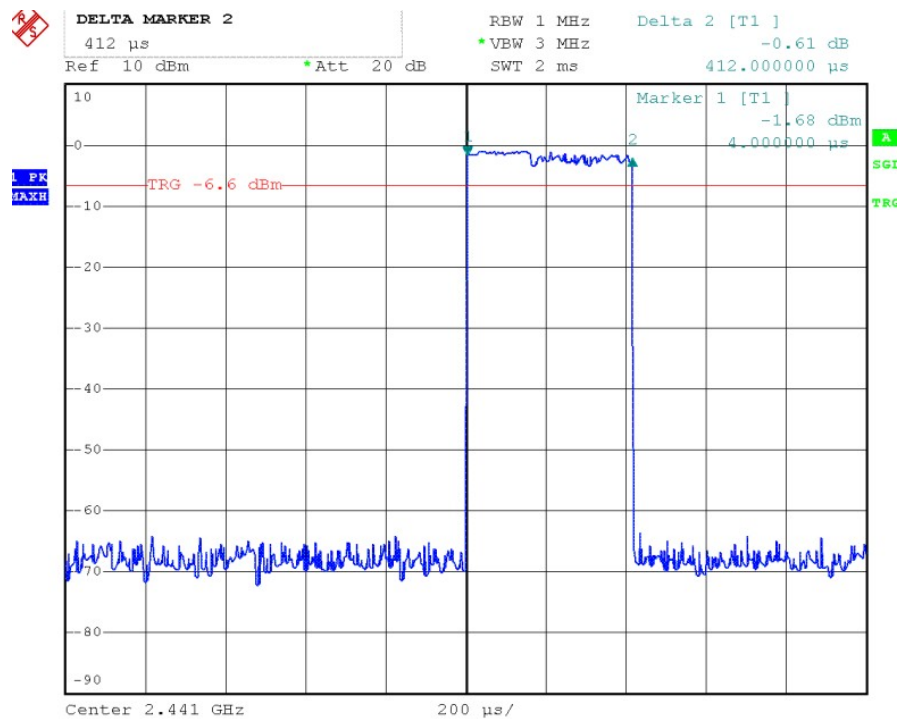
## Channel High



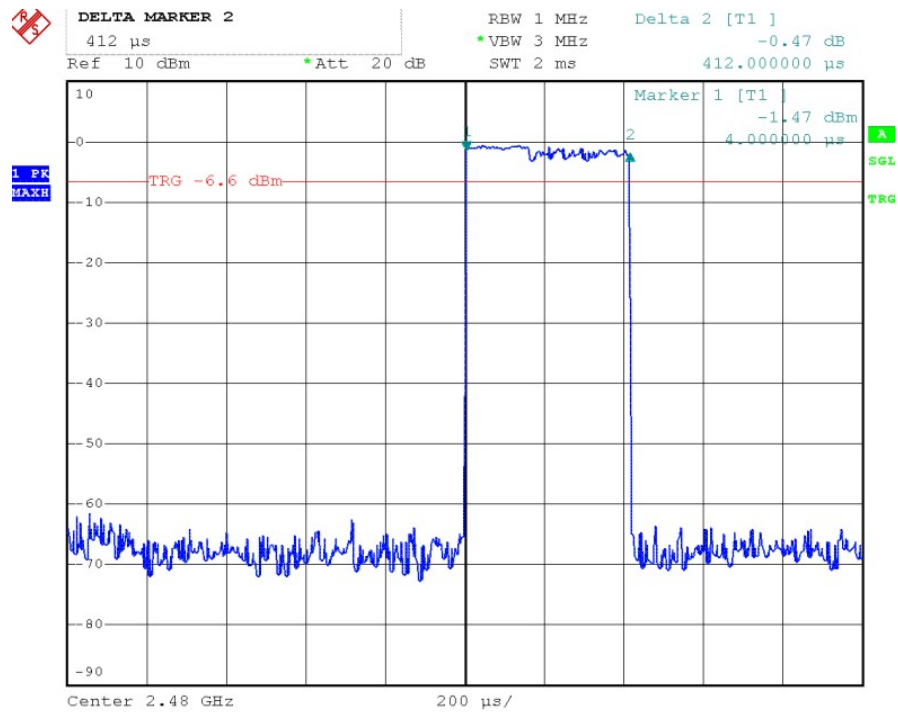
## EDR 3M 3DH1 Channel Low



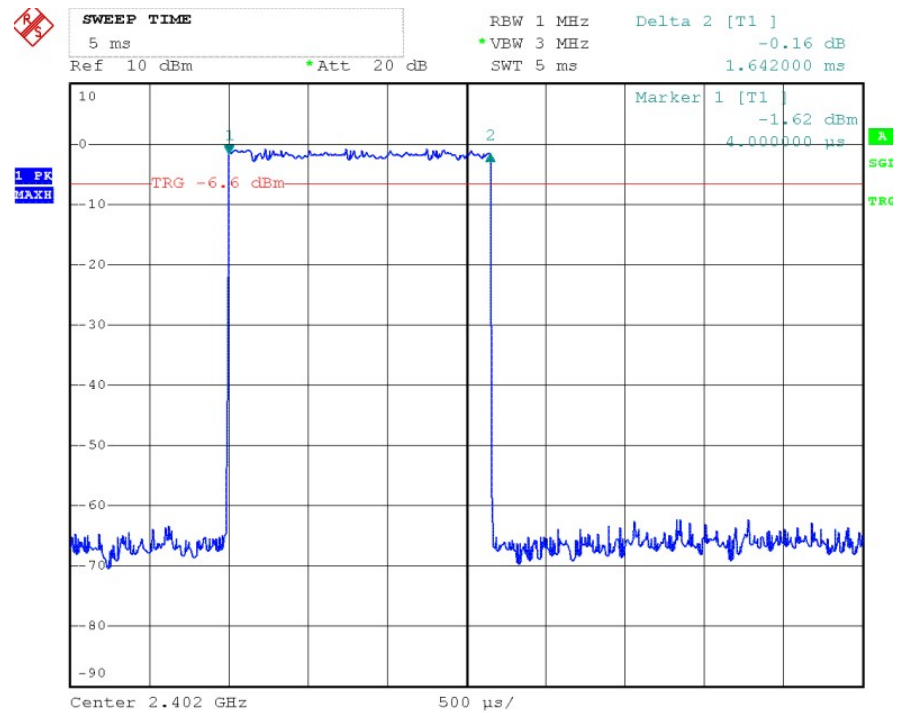
## Channel Middle



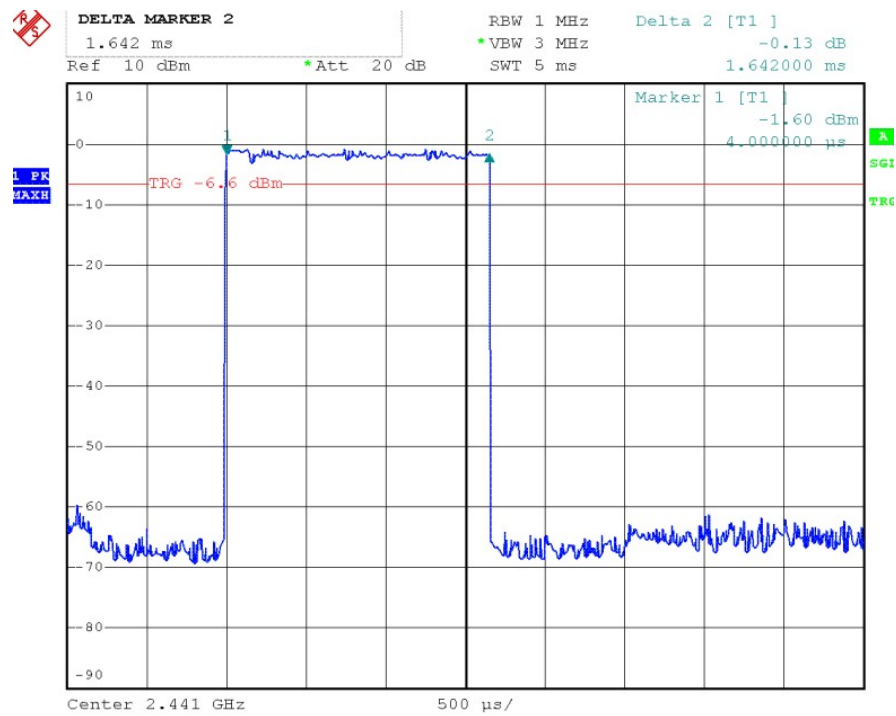
## Channel High



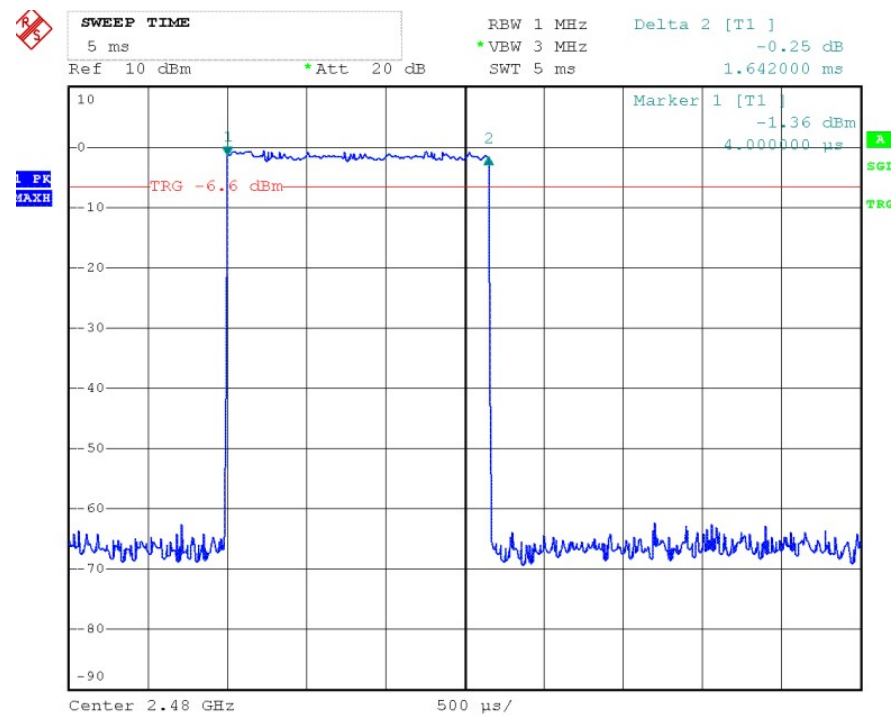
## EDR 3M 3DH3 Channel Low



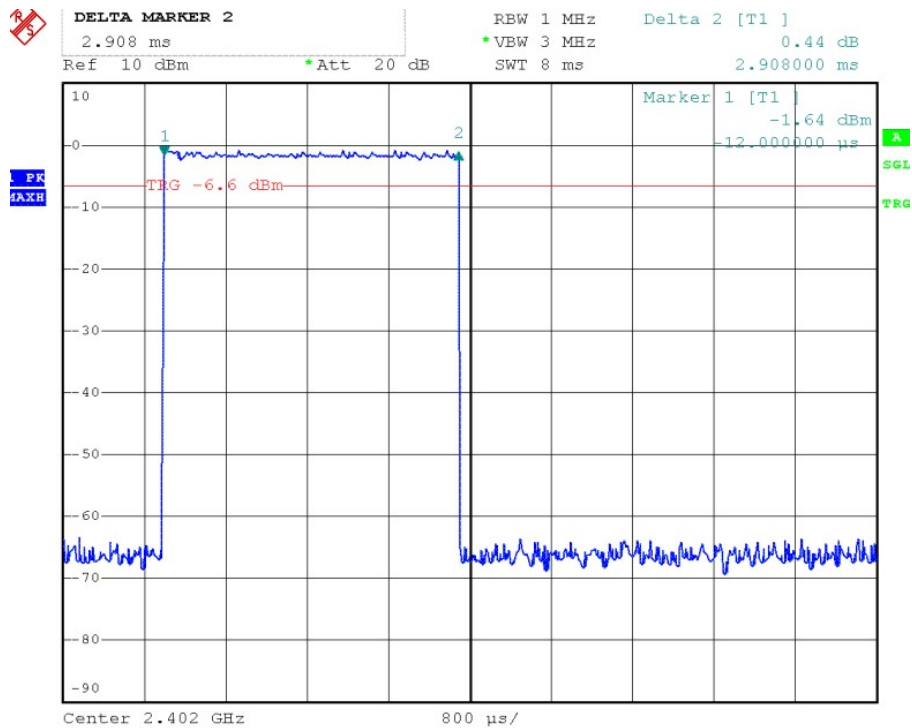
## Channel Middle



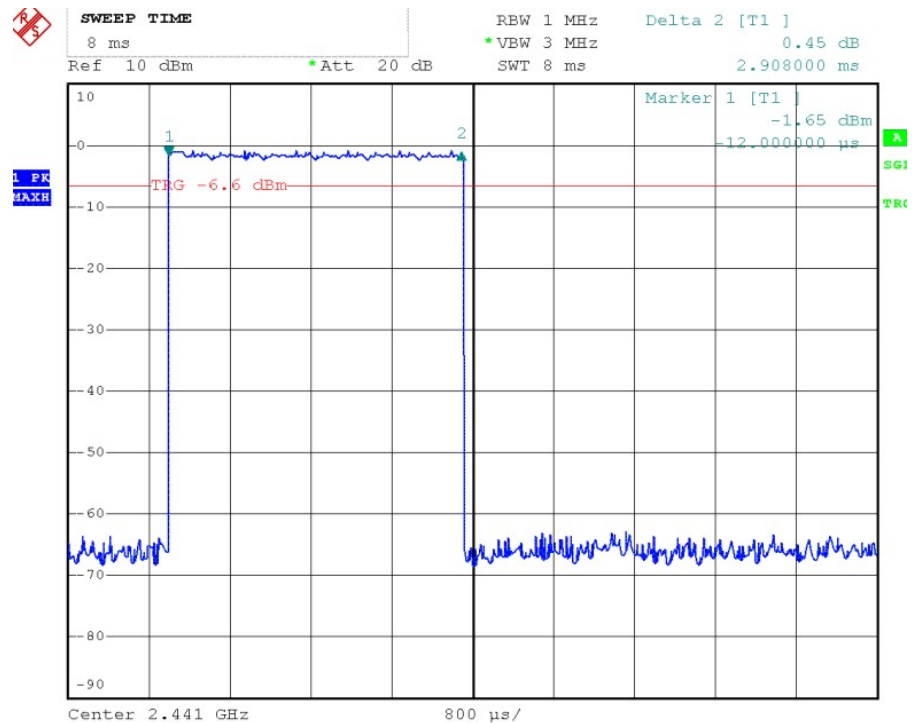
## Channel High



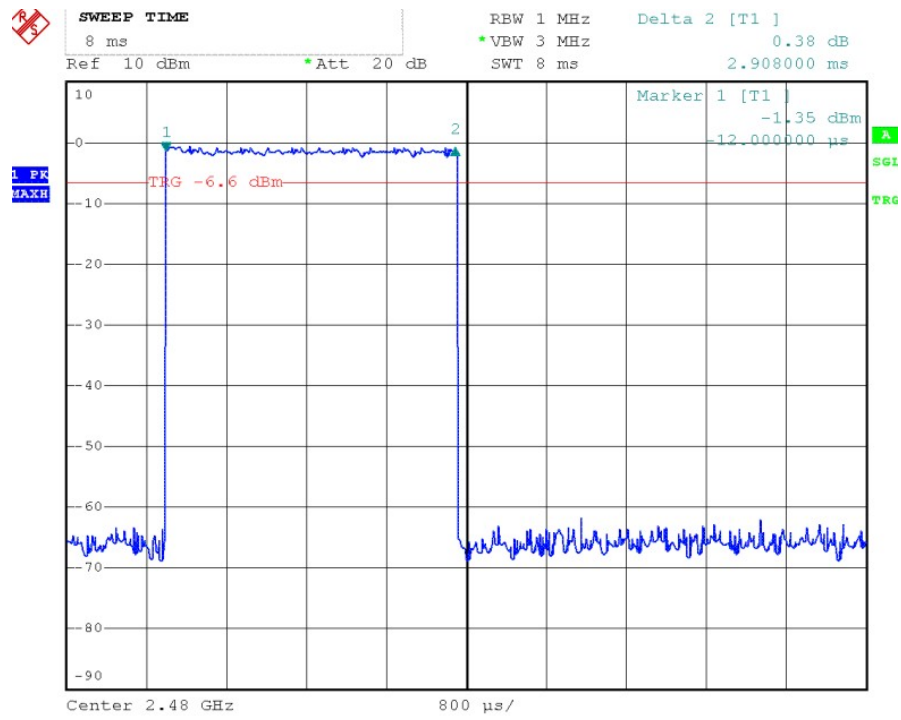
## EDR 3M 3DH5 Channel Low



## Channel Middle



## Channel High

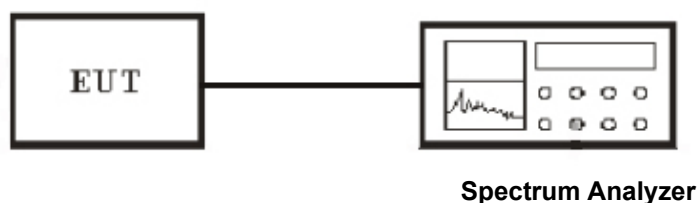


## 9. Test of Maximum Peak Output Power

### 9.1 Applicable Standard

Section 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 The maximum peak output power shall not exceed 1 watt. For all other frequency hopping systems in this frequency band, The maximum peak output power shall not exceed 0.125 watt.

### 9.2 EUT Setup



### 9.3 Test Equipment List and Details

See **section 2.5**.

### 9.4 Test Procedure

1. The transmitter output was connected to the peak power meter and recorded the peak value.
2. Peak power meter parameter set to auto attenuator and filter is the same as.
3. Repeated the 1 for the middle and highest channel of the EUT.

## 9.5 Test Result

|                                         |                                  |
|-----------------------------------------|----------------------------------|
| Temperature ( °C ) : 22~23              | EUT: B-Trek S2 bluetooth speaker |
| Humidity (%RH ) : 50~54                 | M/N: LS-4060                     |
| Barometric Pressure ( mbar ) : 950~1000 | Operation Condition: Tx Mode     |

### BDR 1M

| Modulation Type | Channel No. | Frequency (MHz) | Output Power (dBm) | Limits (dBm) | Margin (dB) |
|-----------------|-------------|-----------------|--------------------|--------------|-------------|
| GFSK            | Low         | 2402.00         | 0.98               | 21           | -20.02      |
| GFSK            | Middle      | 2441.00         | 0.94               | 21           | -20.06      |
| GFSK            | High        | 2480.00         | 1.25               | 21           | -19.75      |

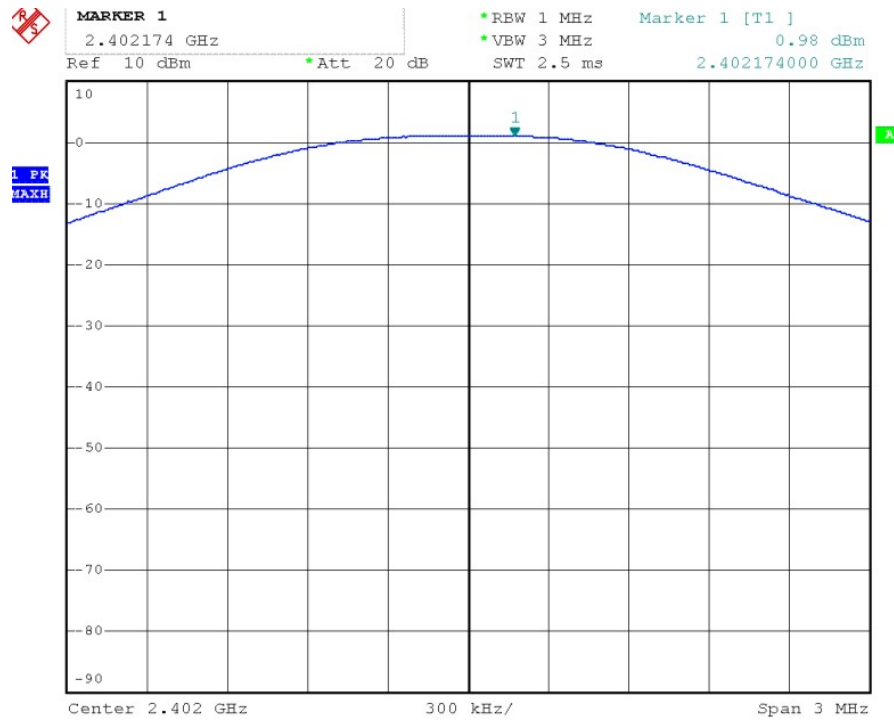
### EDR 2M

| Modulation Type | Channel No. | Frequency (MHz) | Output Power (dBm) | Limits (dBm) | Margin (dB) |
|-----------------|-------------|-----------------|--------------------|--------------|-------------|
| Pi/4 DQPSK      | Low         | 2402.00         | -0.95              | 21           | -20.05      |
| Pi/4 DQPSK      | Middle      | 2441.00         | -0.76              | 21           | -20.24      |
| Pi/4 DQPSK      | High        | 2480.00         | -0.44              | 21           | -20.56      |

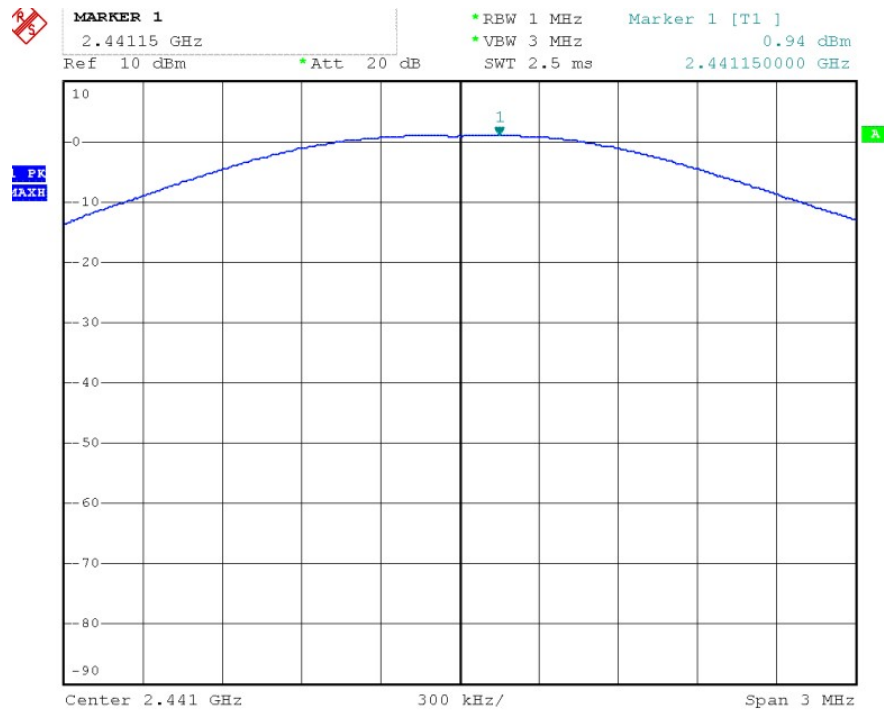
### EDR 3M

| Modulation Type | Channel No. | Frequency (MHz) | Output Power (dBm) | Limits (dBm) | Margin (dB) |
|-----------------|-------------|-----------------|--------------------|--------------|-------------|
| 8-DPSK          | Low         | 2402.00         | -0.72              | 21           | -20.08      |
| 8-DPSK          | Middle      | 2441.00         | -0.74              | 21           | -20.26      |
| 8-DPSK          | High        | 2480.00         | -0.42              | 21           | -20.58      |

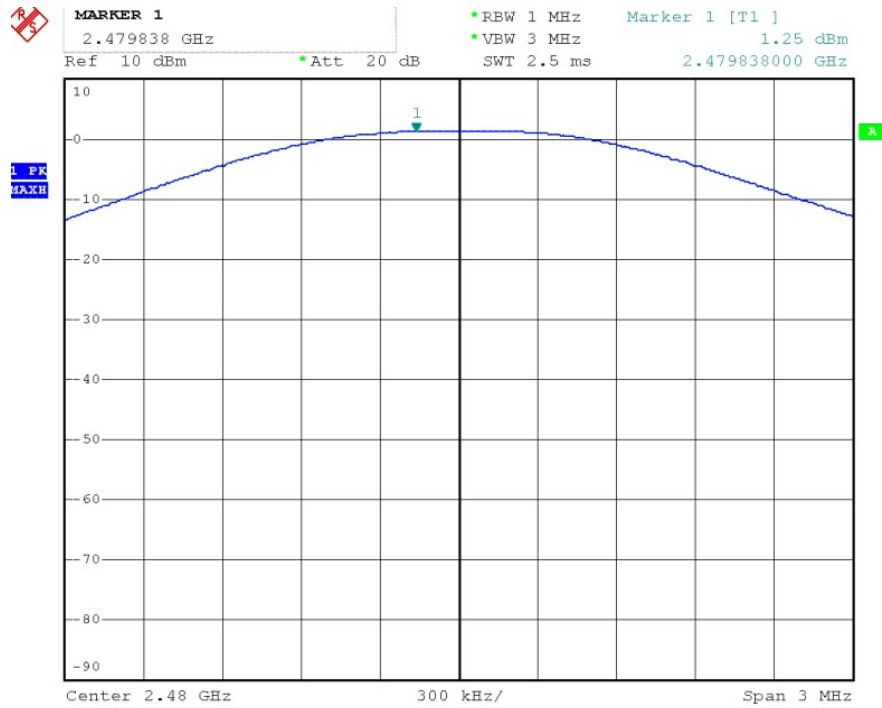
## BDR 1M Channel Low



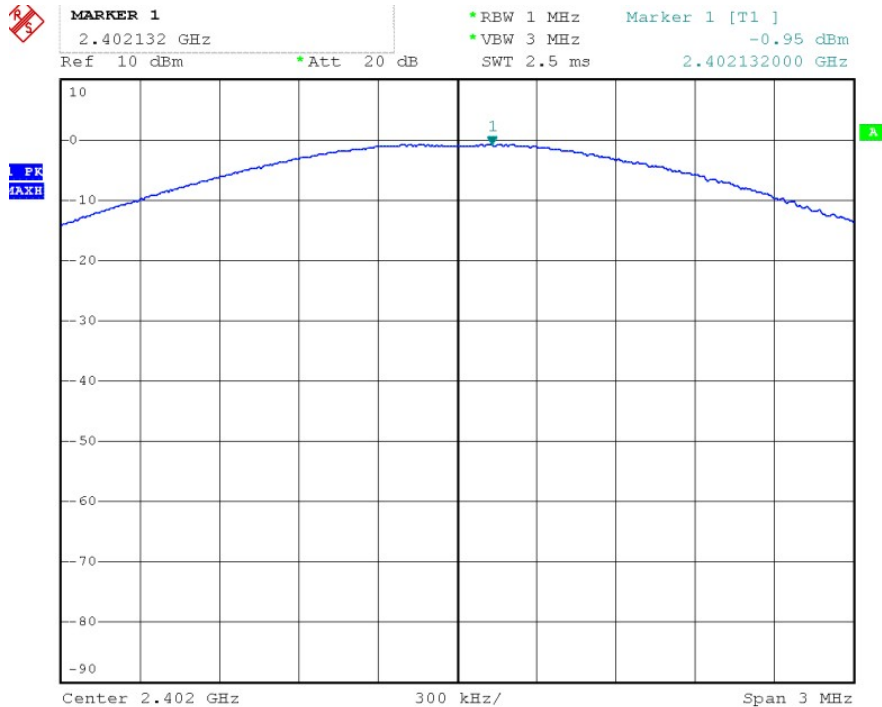
## Channel Middle



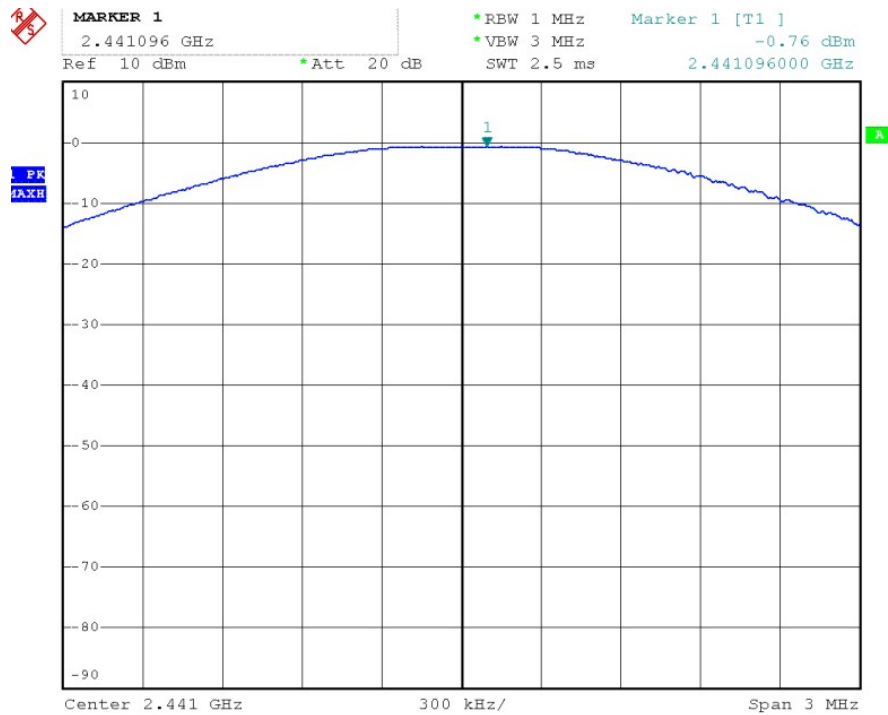
## Channel High



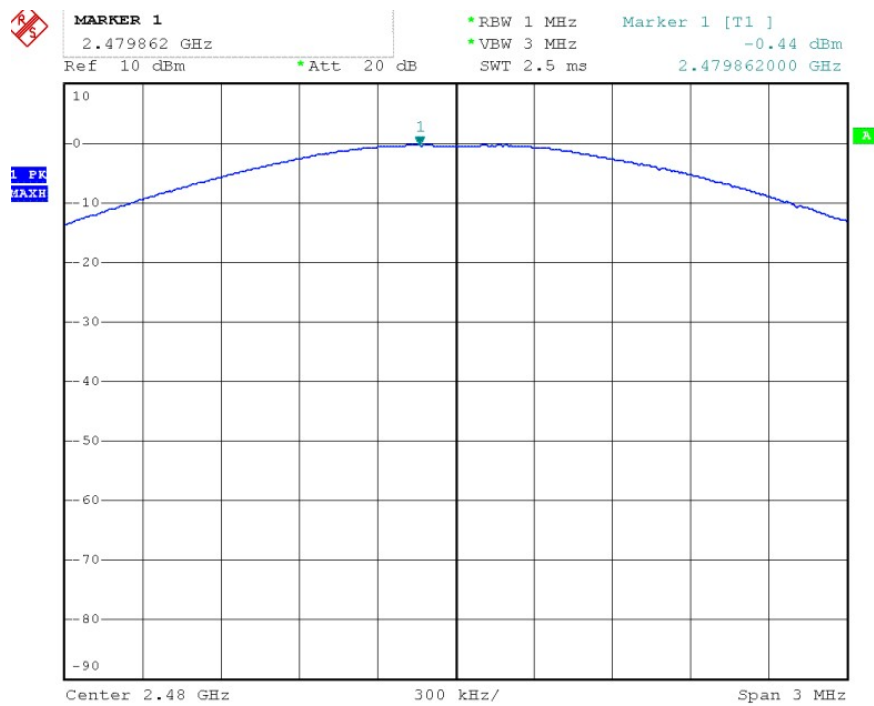
## EDR 2M Channel Low



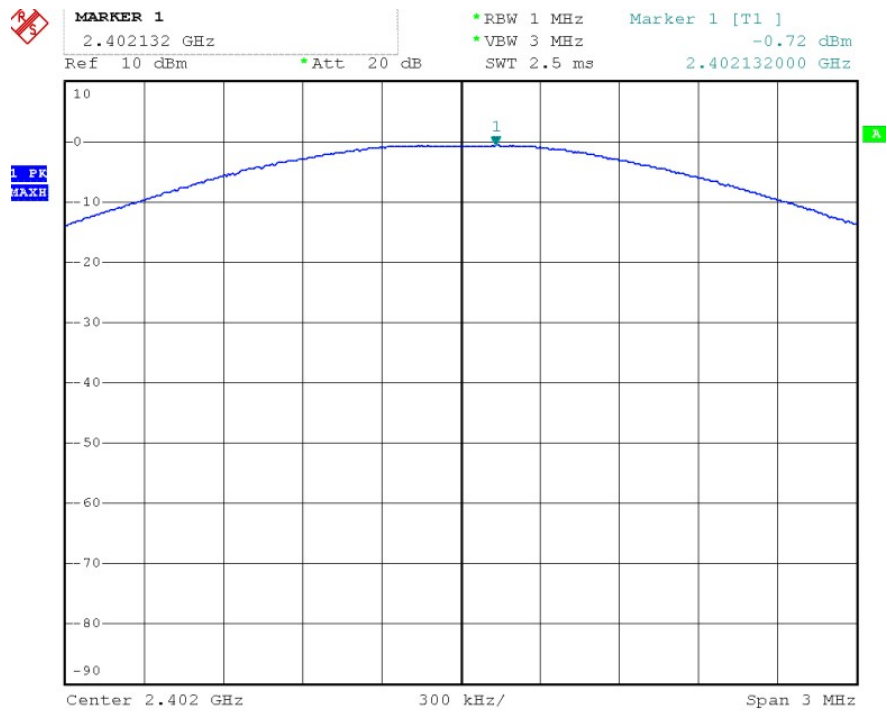
## Channel Middle



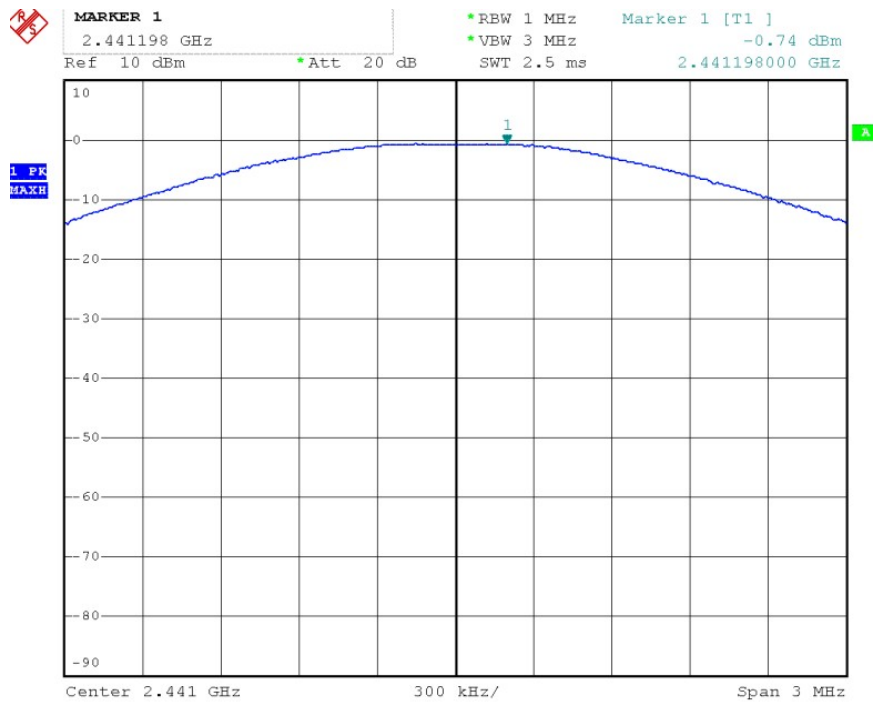
## Channel High



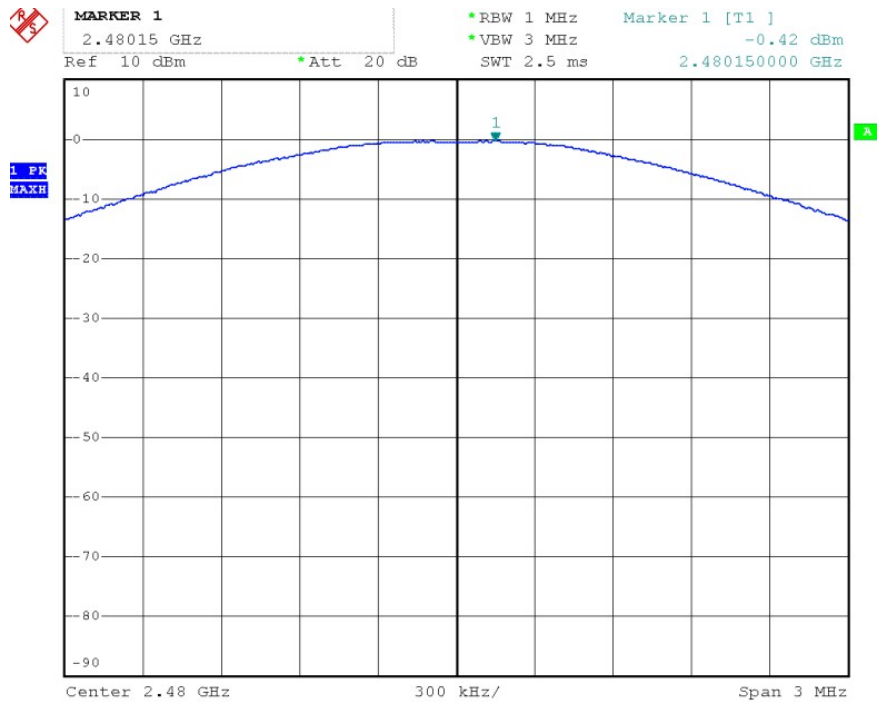
## EDR 3M Channel Low



## Channel Middle



## Channel High



## 10. Test of Band Edges Emission

### 10.1 Applicable Standard

Section 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. In addition, radiated emissions that fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209.

### 10.2 EUT Setup

#### Radiated Measurement Setup

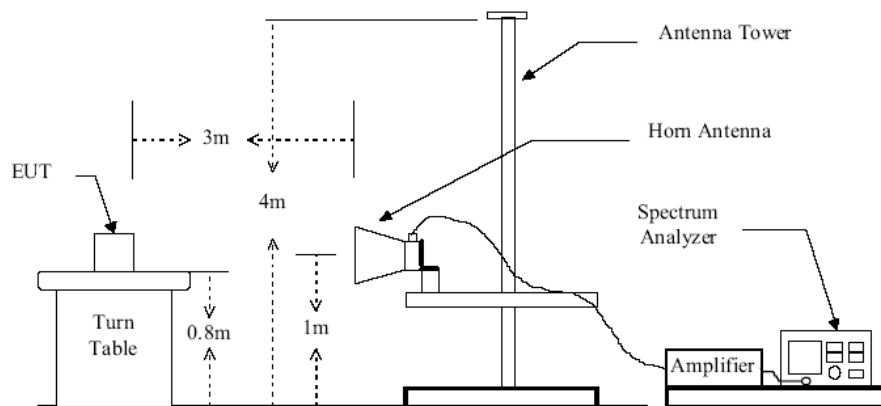
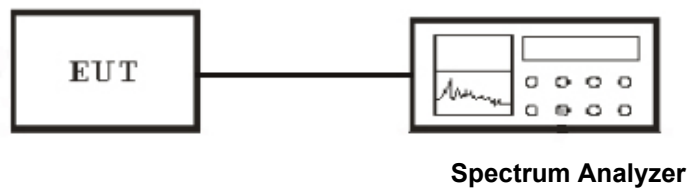


Figure 2 : Frequencies measured above 1 GHz configuration

#### Conducted Measurement Setup



### 10.3 Test Equipment List and Details

See section 2.5.

### 10.4 Test Procedure

#### Conducted Measurement

1. The transmitter is set to the lowest channel.
2. The transmitter output was connected to the spectrum analyzer via a cable and cable loss is used as the offset of the spectrum analyzer.

3. Set both RBW and VBW of spectrum analyzer to 100KHz with convenient frequency span including 100MHz bandwidth from lower band edge. Then detector set to peak and max hold this trace.
4. The lowest band edges emission was measured and recorded.
5. The transmitter set to the highest channel and repeated 2~4.

#### Radiated Measurement

1. Configure the EUT according to ANSI C63.4-2003
2. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization.
4. For band edge emission, the antenna tower was scan (from 1 M to 4 M) and then the turn table was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. For band edge emission, use 1MHz VBW and 1MHz RBW for reading under AV and use 1MHz VBW and 1MHz RBW for reading under PK.

#### 10.5 Test Result

|                                         |                                  |
|-----------------------------------------|----------------------------------|
| Temperature ( °C ) : 22~23              | EUT: B-Trek S2 bluetooth speaker |
| Humidity (%RH) : 50~54                  | M/N: LS-4060                     |
| Barometric Pressure ( mbar ) : 950~1000 | Operation Condition: Tx Mode     |

#### Radiated Test Result

##### Worst Case BDR 1M

| Frequency (MHz) | Antenna Polarization | Emission Read Value (dBμV/m) | Limits (dBμV/m) |
|-----------------|----------------------|------------------------------|-----------------|
| 2389.5          | H                    | 34.14                        | 54              |
| 2483.6          | H                    | 33.84                        | 54              |

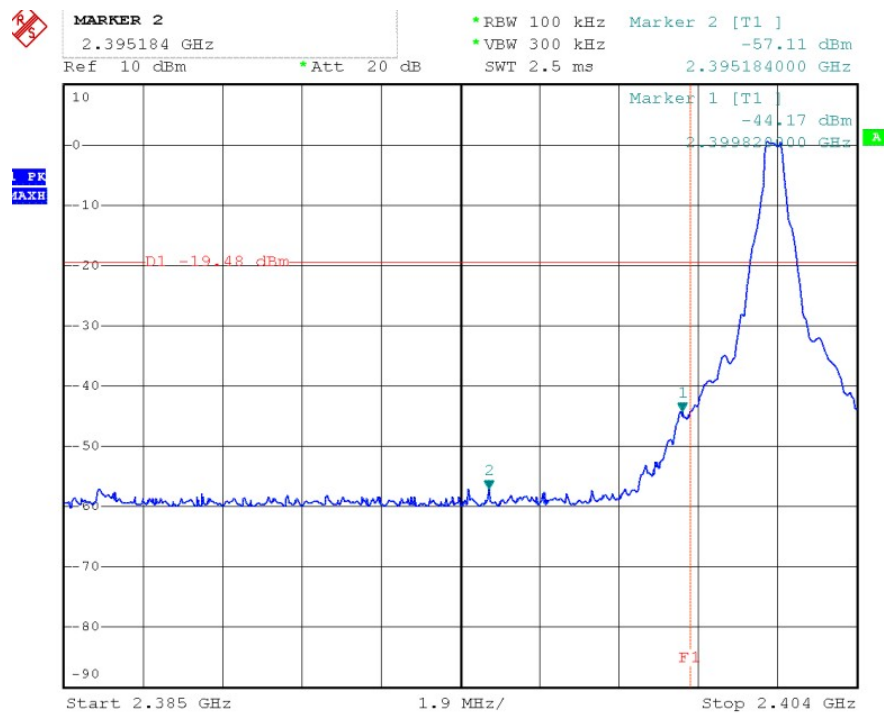
##### Worst Case EDR 2M

| Frequency (MHz) | Antenna Polarization | Emission Read Value (dBμV/m) | Limits (dBμV/m) |
|-----------------|----------------------|------------------------------|-----------------|
| 2389.4          | H                    | 33.45                        | 54              |
| 2483.7          | H                    | 34.87                        | 54              |

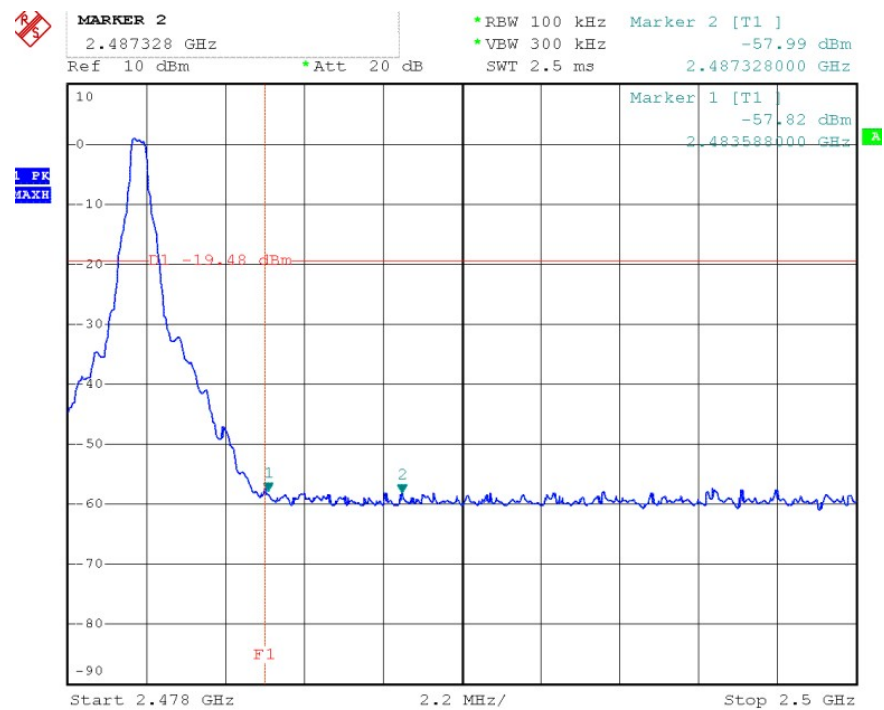
##### Worst Case EDR 3M

| Frequency (MHz) | Antenna Polarization | Emission Read Value (dBμV/m) | Limits (dBμV/m) |
|-----------------|----------------------|------------------------------|-----------------|
| 2389.5          | H                    | 34.28                        | 54              |
| 2483.6          | H                    | 34.84                        | 54              |

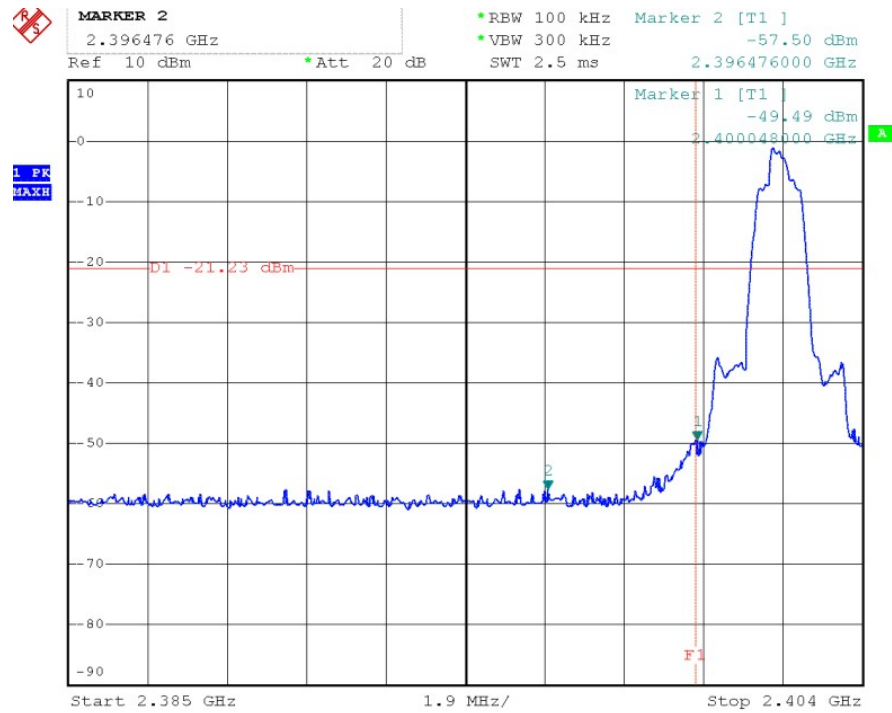
# Conducted Test Result BDR 1M Low Channel



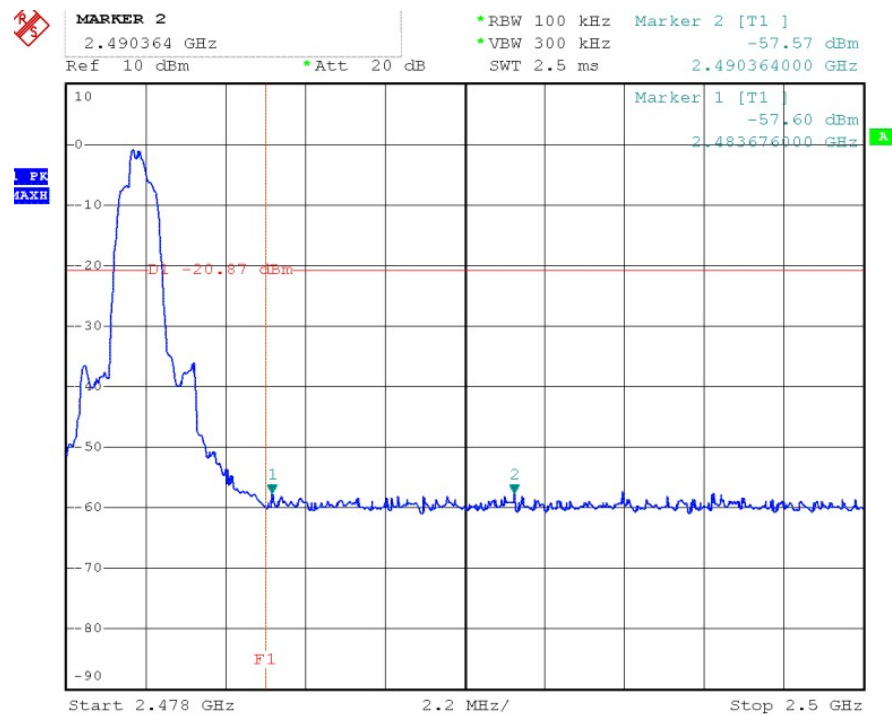
## High Channel



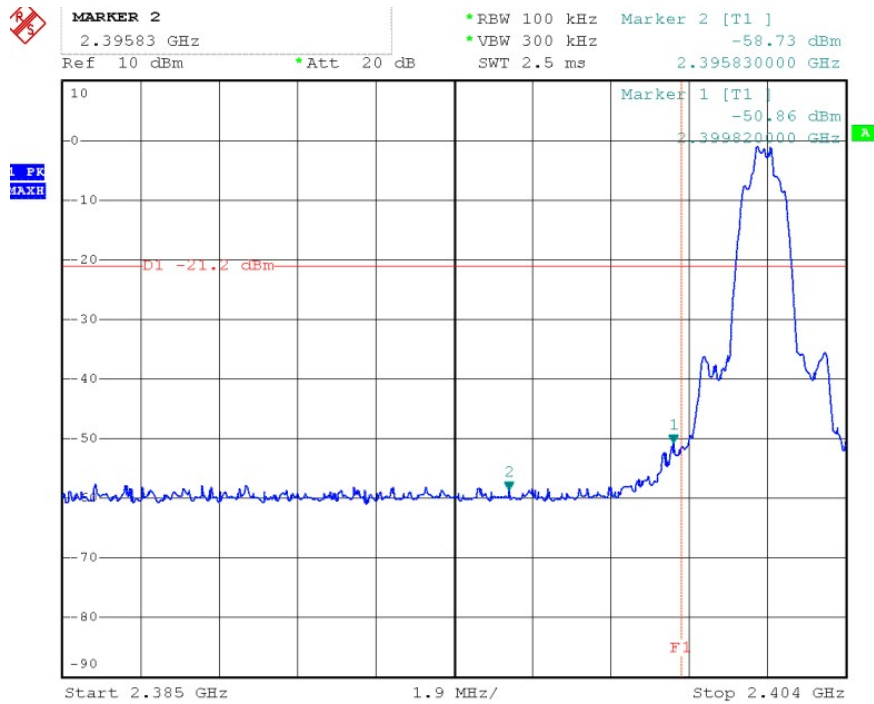
## EDR 2M Low Channel



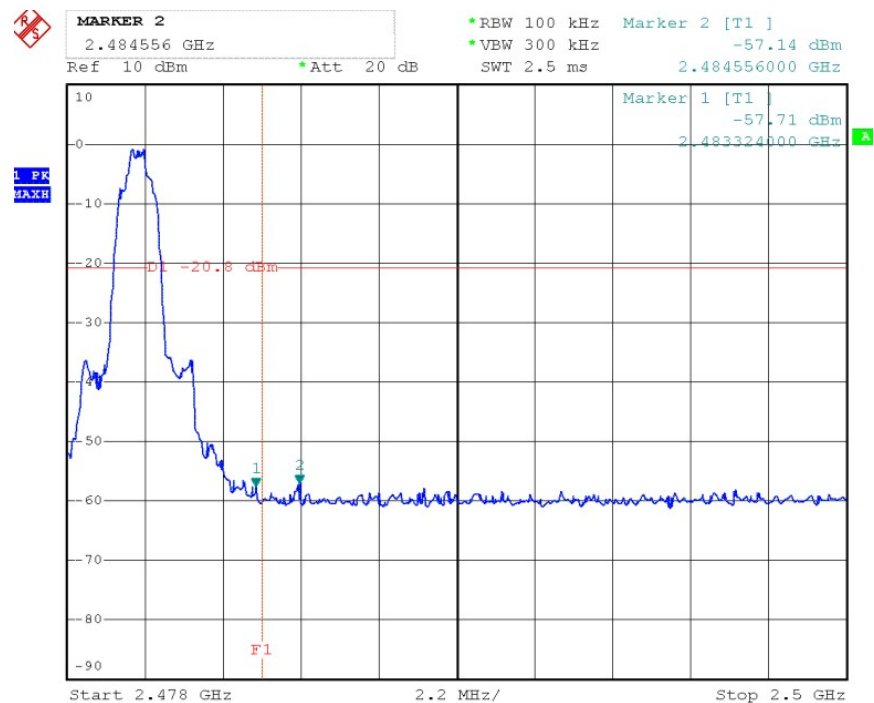
## High Channel



## EDR 3M Low Channel



## High Channel



## 11. Test of Spurious Radiated Emission

### 11.1 Applicable Standard

Section 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. In addition, radiated emissions that fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209.

### 11.2 EUT Setup

#### Radiated Measurement Setup

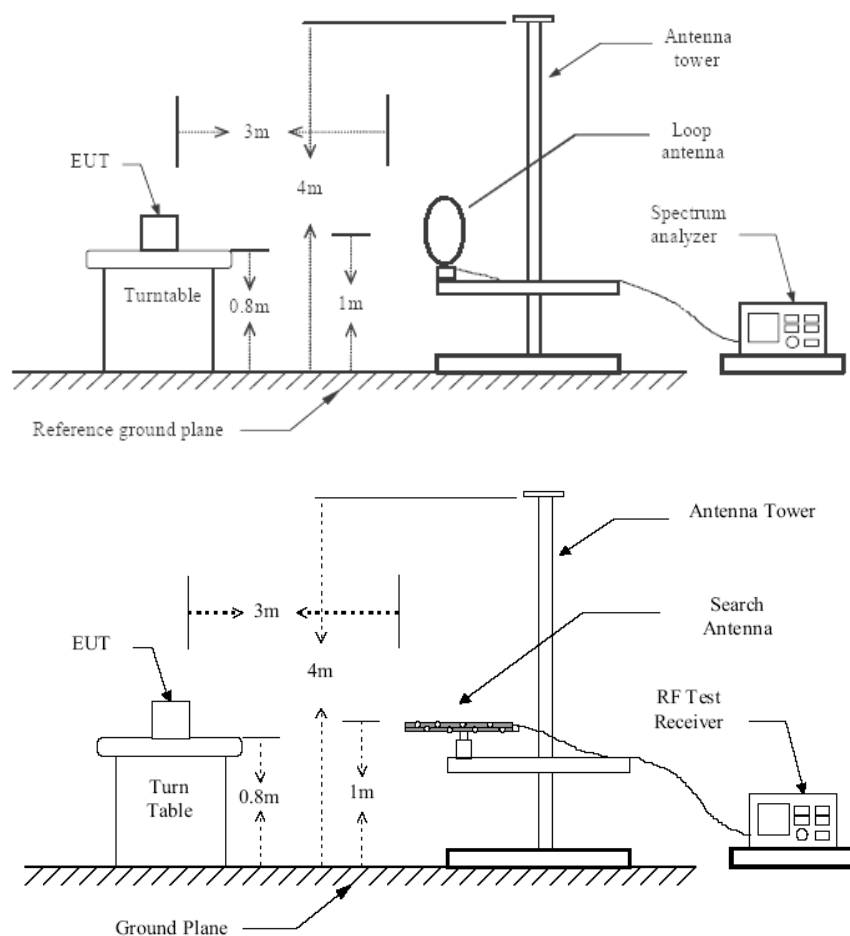


Figure 1 : Frequencies measured below 1 GHz configuration

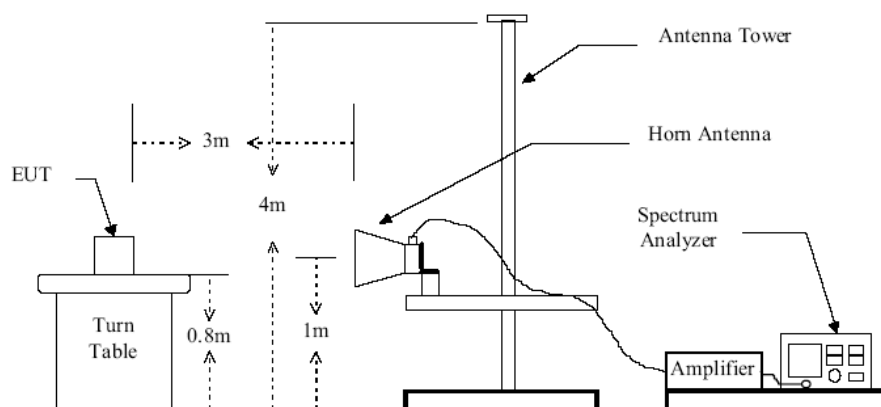
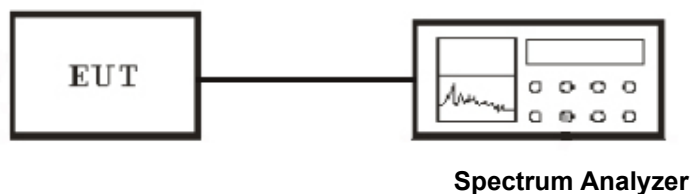


Figure 2 : Frequencies measured above 1 GHz configuration

## Conducted Measurement Setup



## 11.3 Test Equipment List and Details

See **section 2.5**.

## 11.4 Test Procedure

### Radiated Measurement

1. Configure the EUT according to ANSI C63.4-2009
2. The EUT was placed on the top of the turntable 0.8 meter above ground.
3. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
4. Power on the EUT and all the supporting units.
5. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
6. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emission field strength of both horizontal and vertical polarization.
7. For each suspected emission, the antenna tower was scanned (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
8. According to the characteristic of the EUT crystals, the range of frequencies was investigated from 9KHz to 30MHz, 30MHz to 1GHz and 1GHz to 26GHz.
9. For emission below 1GHz, Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.

10. For emission above 1GHz, Set the RBW=1MHz,VBW=3MHz for Peak Detector while the RBW=1MHz, VBW=10Hz for Average Detector, Readings are both peak and average values.

11. The pre-test have done for the EUT in three axes and found the worst emission at position shown in test setup photos. The worst case data is recorded in the report. All emission not reported are much lower than the prescribed limits.

### Conducted Measurement

1. For emission above 1GHz to 26G,conducted measurement method is used.
2. The transmitter is set to the lowest channel.
3. The transmitter output was connected to the spectrum analyzer via a cable and cable loss is used as the offset of the spectrum analyzer.
4. Set RBW to 1 MHz and VBW to 3 MHz, Then detector set to peak and max hold this trace.
5. The lowest band edges emission was measured and recorded.
6. The transmitter set to the highest channel and repeated 2~4.

### 11.5 Test Result

|                                         |                                        |
|-----------------------------------------|----------------------------------------|
| Temperature ( °C ) : 22~23              | EUT: B-Trek S2 bluetooth speaker       |
| Humidity (%RH ) : 50~54                 | M/N: LS-4060                           |
| Barometric Pressure ( mbar ) : 950~1000 | Operation Condition: Charging, playing |

Note: In this testing, the EUT was respectively tested in three different orientations. That is:

1. EUT was lie vertically, and then its Antenna oriented upward
2. EUT was lie vertically, and then its Antenna oriented downward
3. EUT was lie flatwise, and then its Antenna oriented to the receiving antenna

The worst test data see following pages

When the EUT was lie flatwise, and its Antenna oriented to the receiving antenna, the worst test data was got as following table.

## WORST-CASE RADIATED EMISSION BELOW 30 MHz

Normal operating Mode:

| Frequency | Meter Reading | Antenna Factor | Cable Loss | Emission Levels | Limits         | Margin | Detector Mode |
|-----------|---------------|----------------|------------|-----------------|----------------|--------|---------------|
| (MHz)     | (dB $\mu$ V)  | (dB/M)         | (dB)       | (dB $\mu$ V/M)  | (dB $\mu$ V/M) | (dB)   | PK/QP         |
| 0.42      | 24.74         | 7.81           | 1.03       | 31.52           | 67             | -35.48 | QP            |
| 15.89     | 22.96         | 8.21           | 1.19       | 29.98           | 49.5           | -19.52 | QP            |
| 16.56     | 22.38         | 8.63           | 1.08       | 29.93           | 49.5           | -19.57 | QP            |
| 21.31     | 22.78         | 7.71           | 1.66       | 28.83           | 49.5           | -20.67 | QP            |

## WORST-CASE RADIATED EMISSION BELOW 1 GHz

Tx operating BDR Low Channel Mode:  
Horizontal

| Frequency | Meter Reading | Tansd | Limits         | Margin | Detector Mode |
|-----------|---------------|-------|----------------|--------|---------------|
| (MHz)     | (dB $\mu$ V)  | (dB)  | (dB $\mu$ V/M) | (dB)   | PK/QP         |
| 47.46     | 23.78         | 15.8  | 40             | -16.22 | QP            |
| 59.1      | 22.35         | 14.2  | 40             | -17.65 | QP            |
| 103.72    | 23.86         | 17.1  | 43.5           | -19.64 | QP            |
| 239.52    | 29.35         | 16.9  | 46             | -16.65 | QP            |
| 511.12    | 33.36         | 24.1  | 46             | -12.64 | QP            |
| 908.82    | 38.79         | 29.3  | 46             | -7.21  | QP            |
| N/A       | ----          | ----  | ----           | ----   | ----          |

Vertical

| Frequency | Meter Reading | Tansd | Limits         | Margin | Detector Mode |
|-----------|---------------|-------|----------------|--------|---------------|
| (MHz)     | (dB $\mu$ V)  | (dB)  | (dB $\mu$ V/M) | (dB)   | PK/QP         |
| 47.46     | 25.35         | 15.8  | 40             | -14.65 | QP            |
| 61.04     | 23.46         | 14.2  | 40             | -16.54 | QP            |
| 101.27    | 24.51         | 17.3  | 43.5           | -18.99 | QP            |
| 286.08    | 27.65         | 18.3  | 46             | -18.35 | QP            |
| 549.92    | 31.32         | 25    | 46             | -14.68 | QP            |
| 881.66    | 37.2          | 29    | 46             | -8.8   | QP            |
| N/A       | ----          | ----  | ----           | ----   | ----          |

Note: 1. Transd.=Antenna Factor+Cable Loss-Pre-amplifier  
Margin = Level-Limit

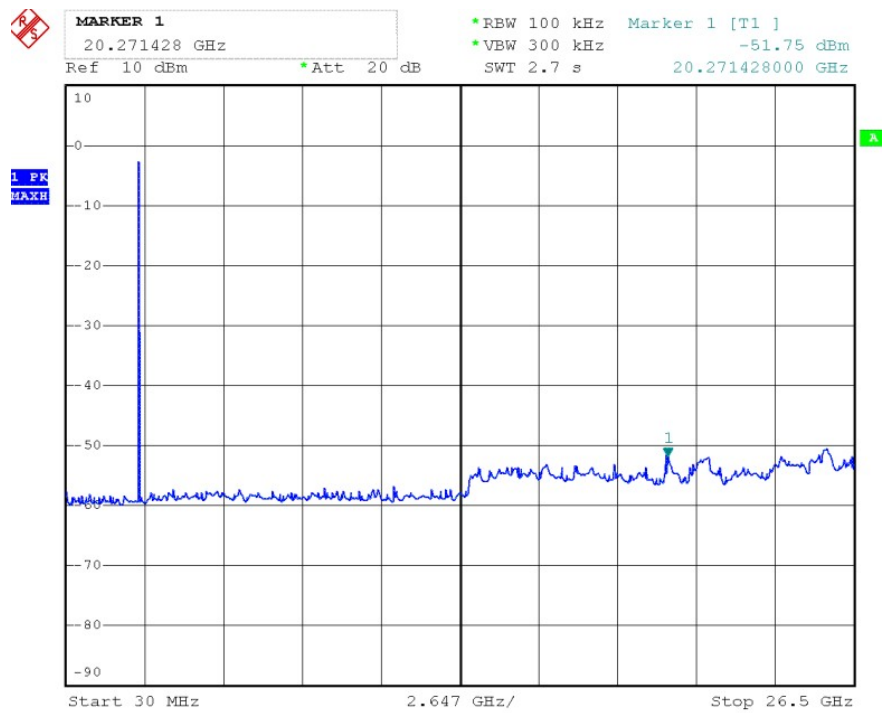
**Worst case BDR 1M**  
**Spurious Emission test data above 1G**

| Channel Low                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                    |            |              |        |               |                |                 |              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------------|--------------|--------|---------------|----------------|-----------------|--------------|
| Maximum Frequency (MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Polarity and Level |            |              |        |               | Limit (dBμV/m) | Margin (dBμV/m) | Mark (P/Q/A) |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Polarity           | Height (m) | Reading dBμV | Transd | Result dBμV/m |                |                 |              |
| 2402                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | H                  | 1          | 71.89        | -6.61  | 65.28         | ---            | ---             | P            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |            | 64.76        | -6.61  | 58.15         | ---            | ---             | A            |
| 2402                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | V                  | 1          | 72.56        | -6.61  | 65.95         | ---            | ---             | P            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |            | 65.36        | -6.61  | 58.75         | ---            | ---             | A            |
| 4804.03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | H                  | 1          | 51.38        | -0.67  | 50.71         | 74             | -23.29          | P            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |            | 38.36        | -0.67  | 37.69         | 54             | -16.31          | A            |
| 4804.03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | V                  | 1          | 55.64        | -0.67  | 54.97         | 74             | -19.03          | P            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |            | 39.89        | -0.67  | 39.22         | 54             | -14.78          | A            |
| 7206.05                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | H                  | 1          | 43.98        | 1.35   | 45.33         | 74             | -28.67          | P            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |            | 35.76        | 1.35   | 37.11         | 54             | -16.89          | A            |
| 7206.05                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | V                  | 1          | 44.41        | 1.35   | 45.76         | 74             | -28.24          | P            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |            | 35.36        | 1.35   | 36.71         | 54             | -17.29          | A            |
| 9608.06                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | H                  | 1          | 44.37        | 2.73   | 47.1          | 74             | -26.9           | P            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |            | 35.06        | 2.73   | 37.79         | 54             | -16.21          | A            |
| 9608.06                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | V                  | 1          | 45.38        | 2.73   | 48.11         | 74             | -25.89          | P            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |            | 35.75        | 2.73   | 38.48         | 54             | -15.52          | A            |
| 12010.07                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ---                |            | ---          | ---    | ---           | ---            | ---             |              |
| 14412.08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ---                |            | ---          | ---    | ---           | ---            | ---             |              |
| 16814.09                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ---                |            | ---          | ---    | ---           | ---            | ---             |              |
| 19216.11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ---                |            | ---          | ---    | ---           | ---            | ---             |              |
| 21618.12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ---                |            | ---          | ---    | ---           | ---            | ---             |              |
| 24020.13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ---                |            | ---          | ---    | ---           | ---            | ---             |              |
| Remark: 1. Transd.=Antenna Factor+Cable Loss-Pre-amplifier<br>Margin = Level-Limit<br>Mark: P means Peak Value, Q means Quasi Peak Value, A means Average Value<br>2. Data of measurement within this frequency range shown “-” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.<br>3. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz.<br>4. The test limit distance is 3m limit |                    |            |              |        |               |                |                 |              |

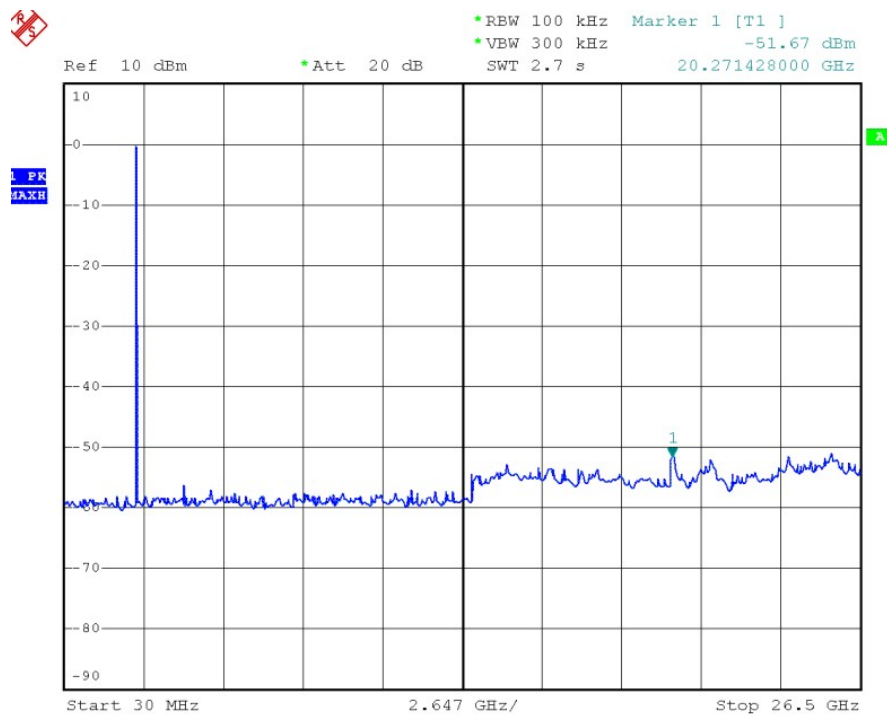
| Channel Mid                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                    |            |              |        |               |                |                 |              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------------|--------------|--------|---------------|----------------|-----------------|--------------|
| Maximum Frequency (MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Polarity and Level |            |              |        |               | Limit (dBµV/m) | Margin (dBµV/m) | Mark (P/Q/A) |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Polarity           | Height (m) | Reading dBµV | Transd | Result dBµV/m |                |                 |              |
| 2441                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | H                  | 1          | 70.17        | -6.37  | 63.8          | ---            | ---             | P            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |            | 65.36        | -6.37  | 58.99         | ---            | ---             | A            |
| 2441                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | V                  | 1          | 71.93        | -6.37  | 65.56         | ---            | ---             | P            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |            | 64.75        | -6.37  | 58.38         | ---            | ---             | A            |
| 4882.05                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | H                  | 1          | 51           | -2.92  | 48.08         | 74             | -25.92          | P            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |            | 41.56        | -2.92  | 38.64         | 54             | -15.36          | A            |
| 4882.05                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | V                  | 1          | 52.51        | -2.92  | 49.59         | 74             | -24.41          | P            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |            | 42.15        | -2.92  | 39.23         | 54             | -14.77          | A            |
| 7323.07                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | H                  | 1          | 42.52        | 0.52   | 43.04         | 74             | -30.96          | P            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |            | 35.38        | 0.52   | 35.9          | 54             | -18.1           | A            |
| 7323.07                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | V                  | 1          | 43.25        | 0.52   | 43.77         | 74             | -30.23          | P            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |            | 36.78        | 0.52   | 37.3          | 54             | -16.7           | A            |
| 9764.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | H                  | 1          | 45.37        | 1.48   | 46.85         | 74             | -27.15          | P            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |            | 36.75        | 1.48   | 38.23         | 54             | -15.77          | A            |
| 9764.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | V                  | 1          | 45.94        | 1.48   | 47.42         | 74             | -26.58          | P            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |            | 36.85        | 1.48   | 38.33         | 54             | -15.67          | A            |
| 12205.11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ---                |            | ---          | ---    | ---           | ---            | ---             |              |
| 14646.13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ---                |            | ---          | ---    | ---           | ---            | ---             |              |
| 17087.14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ---                |            | ---          | ---    | ---           | ---            | ---             |              |
| 19528.16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ---                |            | ---          | ---    | ---           | ---            | ---             |              |
| 21969.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ---                |            | ---          | ---    | ---           | ---            | ---             |              |
| 24410.21                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ---                |            | ---          | ---    | ---           | ---            | ---             |              |
| Remark: 1. Transd.=Antenna Factor+Cable Loss-Pre-amplifier<br>Margin = Level-Limit<br>Mark: P means Peak Value, Q means Quasi Peak Value, A means Average Value<br>2. Data of measurement within this frequency range shown “-” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.<br>3. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz.<br>4. The test limit distance is 3m limit |                    |            |              |        |               |                |                 |              |

| Channel High                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                    |            |              |        |               |                |                 |              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------------|--------------|--------|---------------|----------------|-----------------|--------------|
| Maximum Frequency (MHz)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Polarity and Level |            |              |        |               | Limit (dBµV/m) | Margin (dBµV/m) | Mark (P/Q/A) |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Polarity           | Height (m) | Reading dBµV | Transd | Result dBµV/m |                |                 |              |
| 2480.01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | H                  | 1          | 72.5         | -6.28  | 66.22         | ---            | ---             | P            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |            | 65.85        | -6.28  | 59.57         | ---            | ---             | A            |
| 2480.01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | V                  | 1          | 73.25        | -6.28  | 66.97         | ---            | ---             | P            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |            | 66.56        | -6.28  | 60.28         | ---            | ---             | A            |
| 4960.02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | H                  | 1          | 47.35        | 1.17   | 48.52         | 74             | -25.48          | P            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |            | 37.06        | 1.17   | 38.23         | 54             | -15.77          | A            |
| 4960.02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | V                  | 1          | 48.85        | 1.17   | 50.02         | 74             | -23.98          | P            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |            | 37.35        | 1.17   | 38.52         | 54             | -15.48          | A            |
| 7440.03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | H                  | 1          | 43.55        | 2.25   | 45.8          | 74             | -28.2           | P            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |            | 36.76        | 2.25   | 39.01         | 54             | -14.99          | A            |
| 7440.03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | V                  | 1          | 43.19        | 2.25   | 45.44         | 74             | -28.56          | P            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |            | 36.54        | 2.25   | 38.79         | 54             | -15.21          | A            |
| 9920.04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | H                  | 1          | 46.35        | 4.53   | 50.88         | 74             | -23.12          | P            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |            | 37.84        | 4.53   | 42.37         | 54             | -11.63          | A            |
| 9920.04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | V                  | 1          | 45.38        | 4.53   | 49.91         | 74             | -24.09          | P            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |            | 37.38        | 4.53   | 41.91         | 54             | -12.09          | A            |
| 12400.05                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ---                |            | ---          | ---    | ---           | ---            | ---             |              |
| 14880.06                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ---                |            | ---          | ---    | ---           | ---            | ---             |              |
| 17360.07                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ---                |            | ---          | ---    | ---           | ---            | ---             |              |
| 19840.08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ---                |            | ---          | ---    | ---           | ---            | ---             |              |
| 22320.09                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | ---                |            | ---          | ---    | ---           | ---            | ---             |              |
| 24800.1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ---                |            | ---          | ---    | ---           | ---            | ---             |              |
| Remark: 1. Transd.=Antenna Factor+Cable Loss-Pre-amplifier<br>Margin = Level-Limit<br>Mark: P means Peak Value, Q means Quasi Peak Value, A means Average Value<br>2. Data of measurement within this frequency range shown “-” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.<br>3. Spectrum analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz.<br>4. The test limit distance is 3m limit |                    |            |              |        |               |                |                 |              |

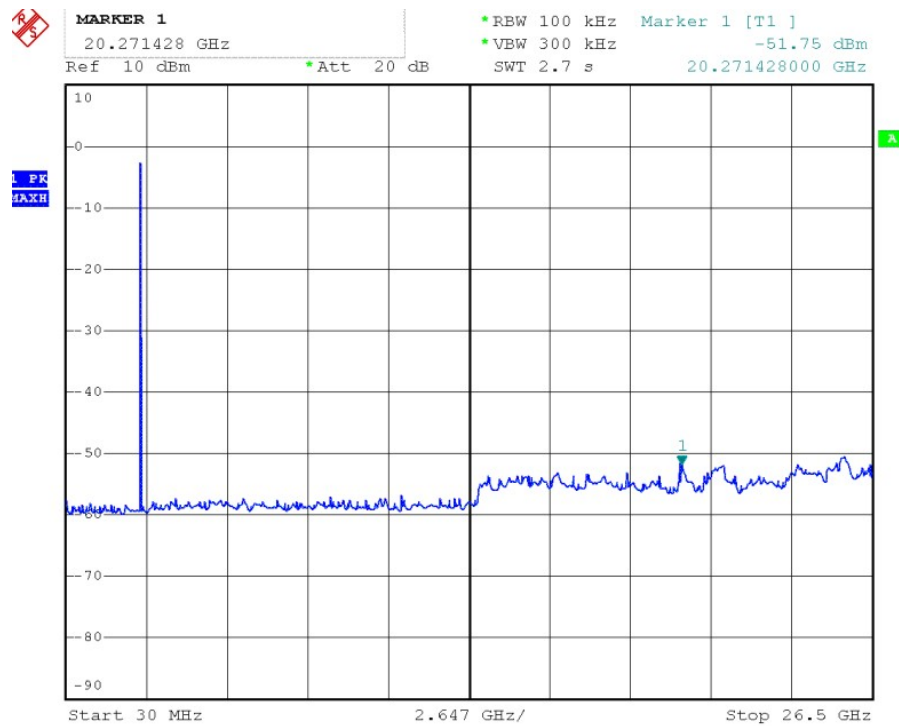
**Conducted Spurious Emission**  
**BDR 1M**  
**Channel Low**



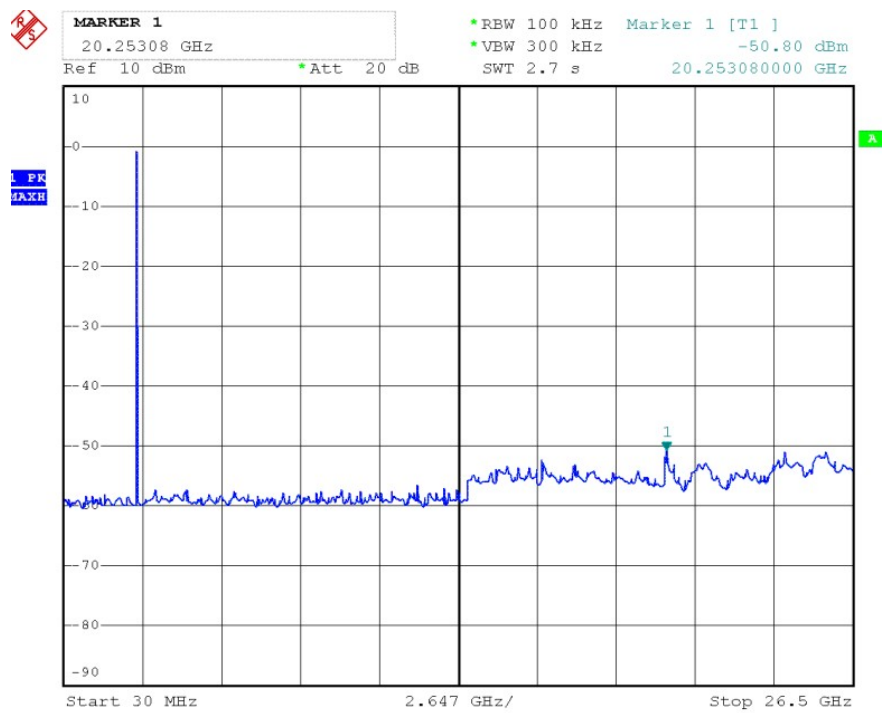
**Channel Mid**



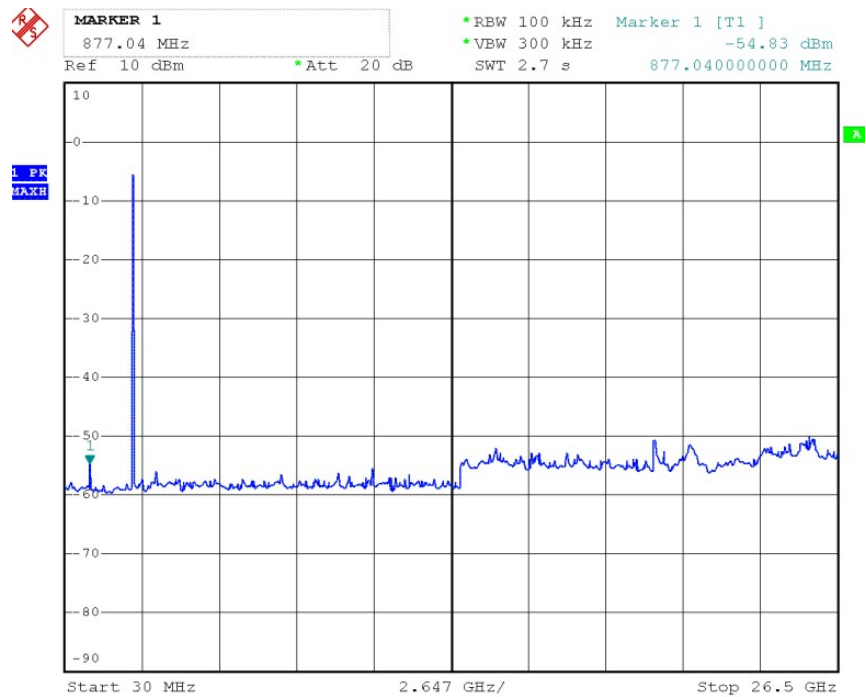
## Channel High



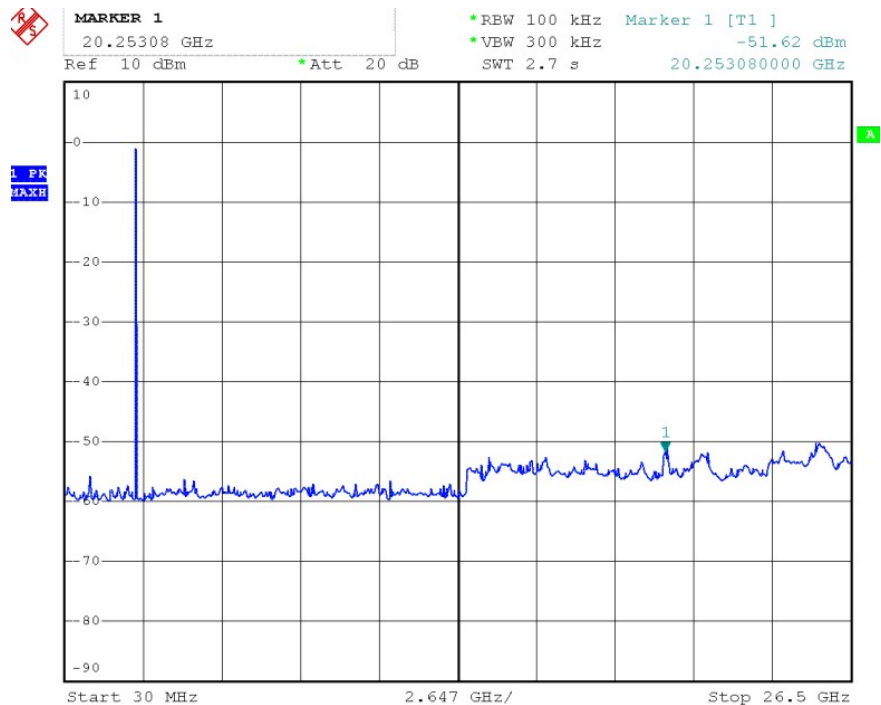
## BDR 2M Channel Low



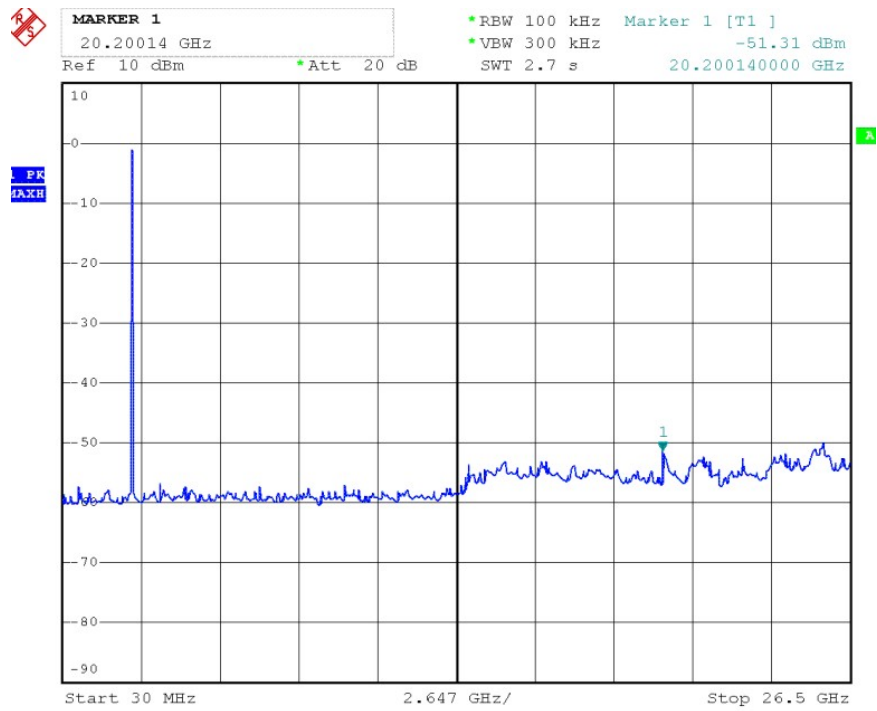
## Channel Middle



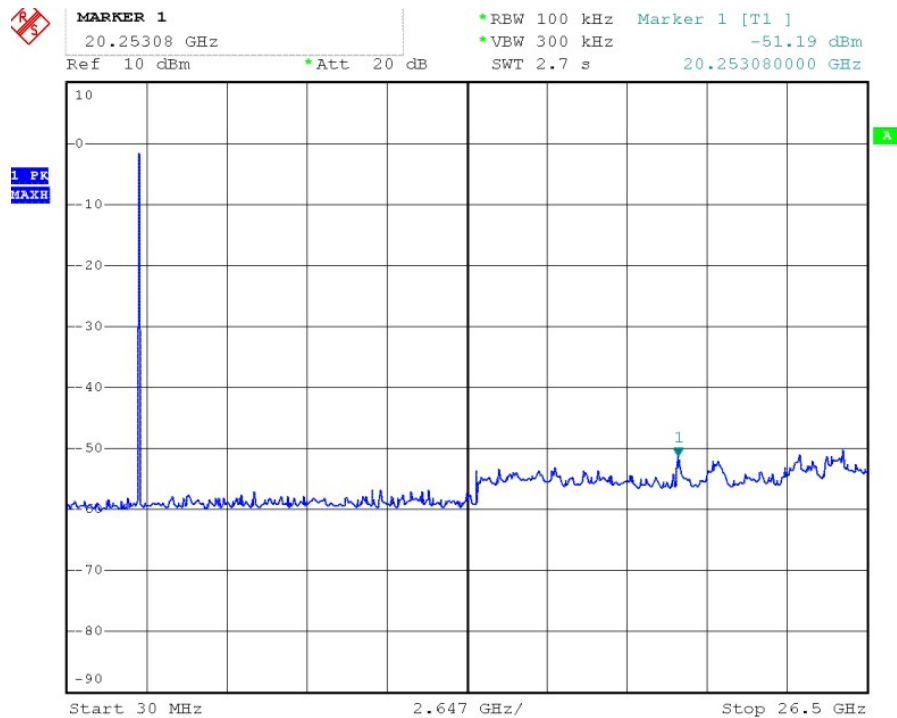
## Channel High



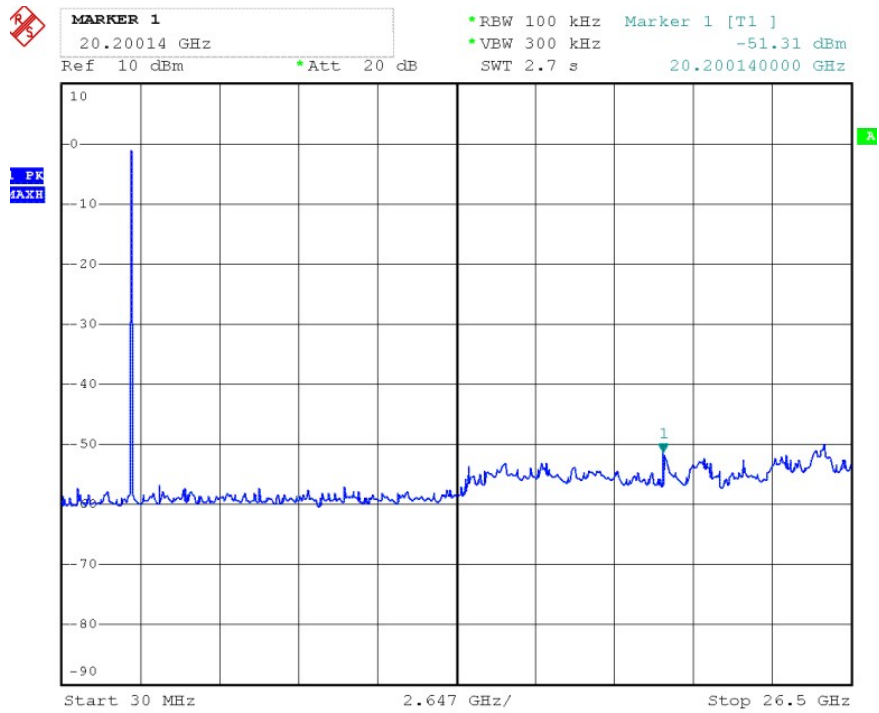
## BDR 3M Channel Low



## Channel Middle



## Channel High



## **12. ANTENNA REQUIREMENT**

### **12.1 Standard Applicable**

Section 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Section 15.247(b)/(c):

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

If the intentional radiator is used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak 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.

### **12.2 Antenna Connected Construction**

The antenna is designed with permanent attachment and no consideration of replacement. The antenna used in this product is complied with Standard. The maximum Gain of the antenna lower than 6.0dBi and have the definite antenna Specification.