## 3.8 Radiated Band Edges and Spurious Emission Measurement

### 3.8.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

| Frequency (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|---|---|---|
| 0.009 – 0.490 | 2400/F(kHz) | 300 |
| 0.490 – 1.705 | 24000/F(kHz) | 30 |
| 1.705 – 30.0 | 30 | 30 |
| 30 – 88 | 100 | 3 |
| 88 – 216 | 150 | 3 |
| 216 - 960 | 200 | 3 |
| Above 960 | 500 | 3 |

### 3.8.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

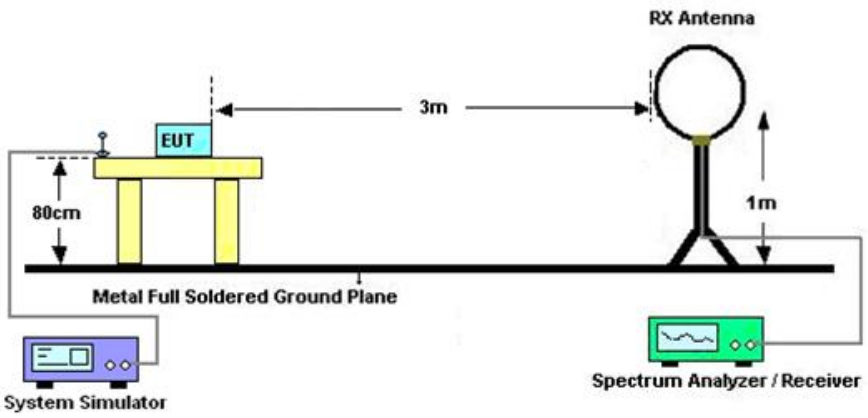
### 3.8.3 Test Procedures

1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
4. Set to the maximum power setting and enable the EUT transmit continuously.
5. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz, RBW=1MHz for f>1GHz ; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
   (3) For average measurement: use duty cycle correction factor method per 15.35(c).
   Duty cycle = On time/100 milliseconds
   On time = $N_1*L_1+N_2*L_2+...+N_{n-1}*LN_{n-1}+N_n*L_n$
   Where $N_1$ is number of type 1 pulses, $L_1$ is length of type 1 pulses, etc.
   Average Emission Level = Peak Emission Level + 20*log(Duty cycle)
6. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
7. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
8. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than peak limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

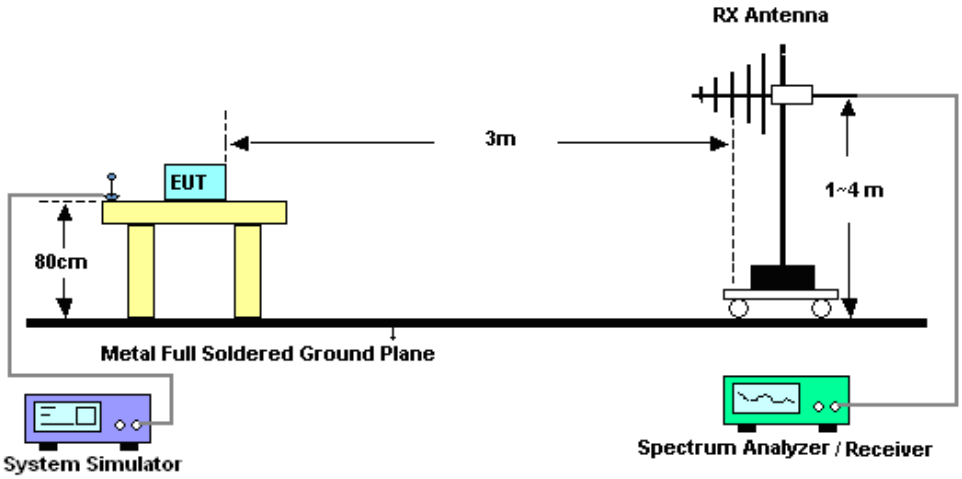
Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (-24.79dB) derived from 20log (dwell time/100ms). This correction is only for signals that hop with the fundamental signal, such as band-edge and harmonic. Other spurious signals that are independent of the hopping signal would not use this correction.

### 3.8.4 Test Setup

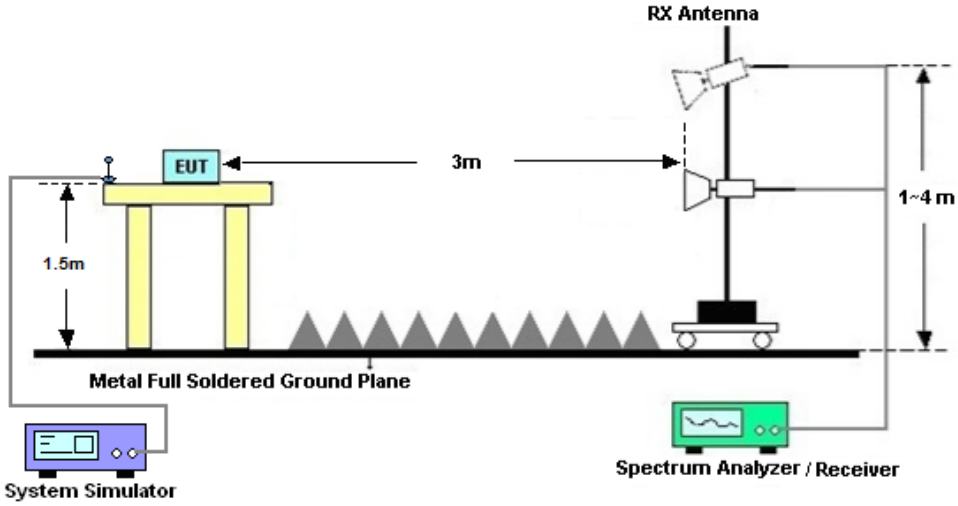
**For radiated emissions below 30MHz**




**For radiated emissions from 30MHz to 1GHz**




**For radiated emissions above 1GHz**



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

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

### 3.8.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C.

### 3.8.7 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic or 40GHz, whichever is lower)

Please refer to Appendix C.

### 3.8.8 Duty cycle correction factor for average measurement

Please refer to Appendix D.

## 3.9 AC Conducted Emission Measurement

### 3.9.1 Limit of AC Conducted Emission

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

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

*Decreases with the logarithm of the frequency.

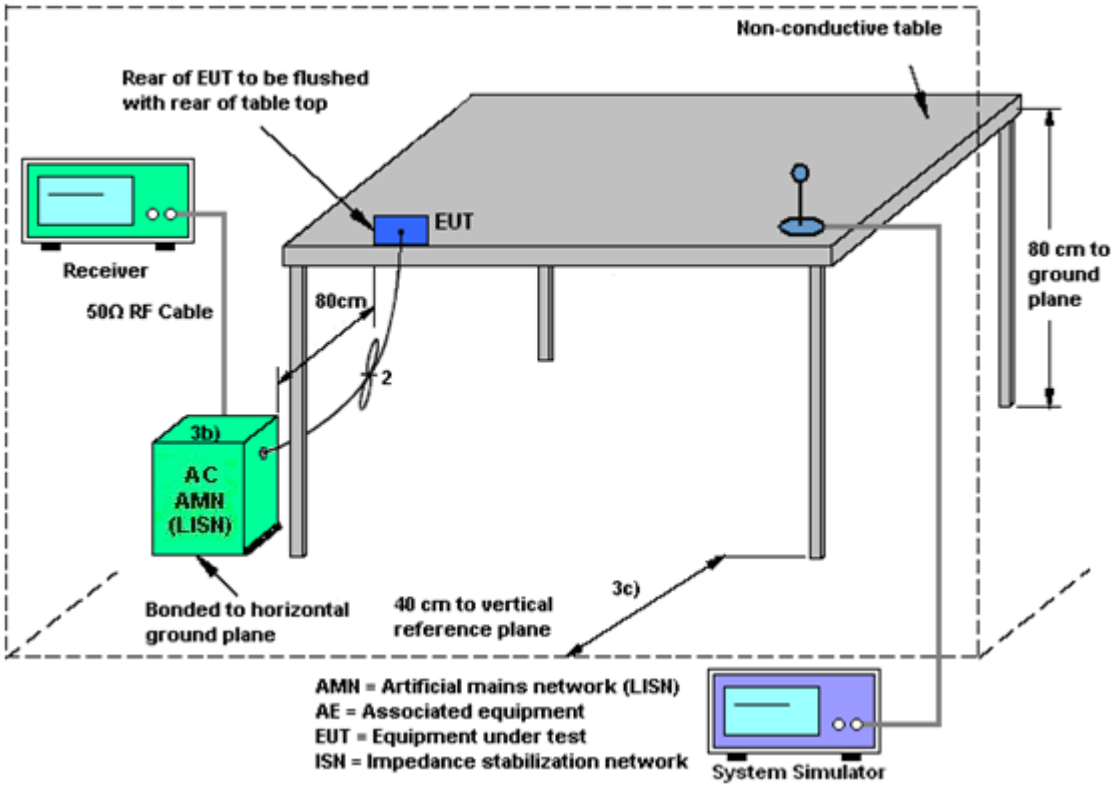
### 3.9.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

### 3.9.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

### 3.9.4 Test Setup




### 3.9.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

# 3.10 Antenna Requirements

## 3.10.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. 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 rule.

## 3.10.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

## 3.10.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

**TXBF modes**

FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

For CDD transmissions, directional gain is calculated as

$$DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$$

*where*

Each antenna is driven by no more than one spatial stream;

$N_{SS}$ = the number of independent spatial streams of data;

$N_{ANT}$ = the total number of antennas

$g_{j,k} = 10^{G_k/20}$ if the $k$th antenna is being fed by spatial stream $j$, or zero if it is not;

$G_k$ is the gain in dBi of the kth antenna.

The EUT supports beamforming for Bluetooth BR/EDR modes.

The directional gain calculation is following F)2)e)ii) of KDB 662911 D01 v02r01.

The power and PSD limit should be modified if the directional gain of EUT is over 6 dBi,

The directional gain “DG” is calculated as following table.

| | Ant 1 (dBi) | Ant 2 (dBi) | DG for Power (dBi) | DG for PSD (dBi) | Power Limit Reduction (dB) | PSD Limit Reduction (dB) |
|---|---|---|---|---|---|---|
| **BT BF** | -3.50 | -0.10 | 1.38 | 1.38 | 0.00 | 0.00 |

*Power Limit Reduction = DG(Power) – 6dBi, ( min = 0 )*

*PSD Limit Reduction = DG(PSD) – 6dBi, ( min = 0 )*

# 4 List of Measuring Equipment

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Test Date | Due Date | Remark |
|---|---|---|---|---|---|---|---|---|
| Spectrum Analyzer | R&S | FSV40 | 101040 | 10Hz~40GHz | Oct. 12, 2022 | Oct. 19, 2022~ Nov. 05, 2022 | Oct. 11, 2023 | Conducted (TH01-KS) |
| Pulse Power Senor | Anritsu | MA2411B | 0917070 | 300MHz~40GHz | Jan. 05, 2022 | Oct. 19, 2022~ Nov. 05, 2022 | Jan. 04, 2023 | Conducted (TH01-KS) |
| Power Meter | Anritsu | ML2495A | 1005002 | 50MHz Bandwidth | Jan. 05, 2022 | Oct. 19, 2022~ Nov. 05, 2022 | Jan. 04, 2023 | Conducted (TH01-KS) |
| EMI Test Receiver | R&S | ESR7 | 101403 | 9kHz~7GHz;Max 30dBm | Oct. 12, 2022 | Oct. 30, 2022 | Oct. 11, 2023 | Radiation (03CH07-KS) |
| EXA Spectrum Analyzer | Keysight | N9010A | MY55370528 | 10Hz-44G,MAX 30dB | Oct. 12, 2022 | Oct. 30, 2022 | Oct. 11, 2023 | Radiation (03CH07-KS) |
| Loop Antenna | R&S | HFH2-Z2 | 100321 | 9kHz~30MHz | Oct. 16, 2022 | Oct. 30, 2022 | Oct. 15, 2023 | Radiation (03CH07-KS) |
| Bilog Antenna | TeseQ | CBL6111D | 59913 | 30MHz-1GHz | Aug. 26, 2022 | Oct. 30, 2022 | Aug. 25, 2023 | Radiation (03CH07-KS) |
| Double Ridge Horn Antenna | ETS-Lindgren | 3117 | 00218652 | 1GHz~18GHz | Apr. 06, 2022 | Oct. 30, 2022 | Apr. 05, 2023 | Radiation (03CH07-KS) |
| high gain Amplifier | EM | EM01G18GA | 060840 | 1Ghz-18Ghz | Oct. 12, 2022 | Oct. 30, 2022 | Oct. 11, 2023 | Radiation (03CH07-KS) |
| SHF-EHF Horn | Com-power | AH-840 | 101070 | 18GHz~40GHz | Jan. 05, 2022 | Oct. 30, 2022 | Jan. 04, 2023 | Radiation (03CH07-KS) |
| Amplifier | SONOMA | 310N | 413740 | 9KHz-1GHz | Jan. 05, 2022 | Oct. 30, 2022 | Jan. 04, 2023 | Radiation (03CH07-KS) |
| Amplifier | EM | EM01G18GA | 060834 | 1Ghz-18Ghz | Oct. 12, 2022 | Oct. 30, 2022 | Oct. 11, 2023 | Radiation (03CH07-KS) |
| Amplifier | MITEQ | EM18G40GGA | 060728 | 18~40GHz | Jan. 05, 2022 | Oct. 30, 2022 | Jan. 04, 2023 | Radiation (03CH07-KS) |
| AC Power Source | Chroma | 61601 | 616010002473 | N/A | NCR | Oct. 30, 2022 | NCR | Radiation (03CH07-KS) |
| Turn Table | EM | EM 1000-T | N/A | 0~360 degree | NCR | Oct. 30, 2022 | NCR | Radiation (03CH07-KS) |
| Antenna Mast | EM | EM 1000-A | N/A | 1 m~4 m | NCR | Oct. 30, 2022 | NCR | Radiation (03CH07-KS) |
| EMI Receiver | R&S | ESCI7 | 100768 | 9kHz~7GHz; | May 24, 2022 | Oct. 21, 2022 | May 23, 2023 | Conduction (CO01-KS) |
| AC LISN (for auxiliary equipment) | MessTec | AN3016 | 060103 | 9kHz~30MHz | Oct. 13, 2022 | Oct. 21, 2022 | Oct. 12, 2023 | Conduction (CO01-KS) |
| AC LISN | MessTec | AN3016 | 060105 | 9kHz~30MHz | May 24, 2022 | Oct. 21, 2022 | May 23, 2023 | Conduction (CO01-KS) |
| AC Power Source | Chroma | 61602 | ABP000000811 | AC 0V~300V, 45Hz~1000Hz | Oct. 12, 2022 | Oct. 21, 2022 | Oct. 11, 2023 | Conduction (CO01-KS) |

NCR: No Calibration Required

# 5 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

| Test Item | Uncertainty |
|---|---|
| **Conducted Power** | **±0.46 dB** |
| **Conducted Emissions** | **±0.48 dB** |
| **Occupied Channel Bandwidth** | **±0.10 %** |
| **Conducted Power Spectral Density** | **±0.40 dB** |

**Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **2.78dB** |

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

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **5.0dB** |

**Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **5.0dB** |

**Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)**

| | |
|---|---|
| **Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))** | **5.0dB** |

**---------- THE END ----------**

# Appendix A. Conducted Test Results

Report Number : FR291702A

| | | | | |
|---|---|---|---|---|
| Test Engineer: | Kib Shi | Temperature: | 20~26 | °C |
| Test Date: | 2022/10/19~2022/11/5 | Relative Humidity: | 40~51 | % |

Report Number : FR291702A

## Bluetooth Ant.1

| | | | | |
|---|---|---|---|---|
| Test Engineer: | Kib Shi | Temperature: | 20~26 | °C |
| Test Date: | 2022/10/19~2022/11/5 | Relative Humidity: | 40~51 | % |

### TEST RESULTS DATA
### 20dB and 99% Occupied Bandwidth and Hopping Channel Separation

| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | 20db BW (MHz) | 99% Bandwidth (MHz) | Hopping Channel Separation Measurement (KHz) | Hopping Channel Separation Measurement Limit (MHz) | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|
| DH | 1Mbps | 1 | 0 | 2402 | 0.949 | 0.854 | 1002.900 | 0.6329 | Pass |
| DH | 1Mbps | 1 | 39 | 2441 | 0.949 | 0.851 | 1159.200 | 0.6329 | Pass |
| DH | 1Mbps | 1 | 78 | 2480 | 0.947 | 0.851 | 1002.900 | 0.6310 | Pass |
| 2DH | 2Mbps | 1 | 0 | 2402 | 1.303 | 1.169 | 1159.200 | 0.8683 | Pass |
| 2DH | 2Mbps | 1 | 39 | 2441 | 1.303 | 1.169 | 972.500 | 0.8683 | Pass |
| 2DH | 2Mbps | 1 | 78 | 2480 | 1.303 | 1.169 | 1002.900 | 0.8683 | Pass |
| 3DH | 3Mbps | 1 | 0 | 2402 | 1.263 | 1.155 | 937.800 | 0.8423 | Pass |
| 3DH | 3Mbps | 1 | 39 | 2441 | 1.268 | 1.152 | 1159.200 | 0.8451 | Pass |
| 3DH | 3Mbps | 1 | 78 | 2480 | 1.263 | 1.152 | 994.200 | 0.8423 | Pass |

### TEST RESULTS DATA
### Dwell Time

| Mod. | Hopping Channel Number Rate | Hops Over Occupancy Time(hops) | Package Transfer Time (msec) (MHz) | Dwell Time (sec) | Limits (sec) | Pass/Fail |
|---|---|---|---|---|---|---|
| Nomal | 79 | 106.67 | 2.88 | 0.31 | 0.4 | Pass |
| AFH | 20 | 53.33 | 2.88 | 0.15 | 0.4 | Pass |

### TEST RESULTS DATA
### Peak Power Table

| DH | CH. | NTX | Peak Power (dBm) | Power Limit (dBm) | Test Result |
|---|---|---|---|---|---|
| DH1 | 0 | 1 | 15.72 | 20.97 | Pass |
| | 39 | 1 | **16.48** | 20.97 | Pass |
| | 78 | 1 | 13.75 | 20.97 | Pass |

| 2DH | CH. | NTX | Peak Power (dBm) | Power Limit (dBm) | Test Result |
|---|---|---|---|---|---|
| 2DH1 | 0 | 1 | 15.11 | 20.97 | Pass |
| | 39 | 1 | **16.15** | 20.97 | Pass |
| | 78 | 1 | 13.88 | 20.97 | Pass |

| 3DH | CH. | NTX | Peak Power (dBm) | Power Limit (dBm) | Test Result |
|---|---|---|---|---|---|
| 3DH1 | 0 | 1 | 15.83 | 20.97 | Pass |
| | 39 | 1 | **16.86** | 20.97 | Pass |
| | 78 | 1 | 14.16 | 20.97 | Pass |

### TEST RESULTS DATA
### Number of Hopping Frequency

| Number of Hopping (Channel) | Adaptive Frequency Hopping (Channel) | Limits (Channel) | Pass/Fail |
|---|---|---|---|
| 79 | 79 | > 15 | Pass |

Report Number : FR291702A

## Bluetooth Ant.2

| | | | | |
|---|---|---|---|---|
| Test Engineer: | Kib Shi | Temperature: | 20~26 | °C |
| Test Date: | 2022/10/19~2022/11/5 | Relative Humidity: | 40~51 | % |

### TEST RESULTS DATA
### 20dB and 99% Occupied Bandwidth and Hopping Channel Separation

| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | 20db BW (MHz) | 99% Bandwidth (MHz) | Hopping Channel Separation Measurement (KHz) | Hopping Channel Separation Measurement Limit (MHz) | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|
| DH | 1Mbps | 1 | 0 | 2402 | 0.949 | 0.854 | 998.600 | 0.6329 | Pass |
| DH | 1Mbps | 1 | 39 | 2441 | 0.947 | 0.854 | 1007.200 | 0.6310 | Pass |
| DH | 1Mbps | 1 | 78 | 2480 | 0.949 | 0.854 | 1002.900 | 0.6329 | Pass |
| 2DH | 2Mbps | 1 | 0 | 2402 | 1.298 | 1.172 | 1055.000 | 0.8654 | Pass |
| 2DH | 2Mbps | 1 | 39 | 2441 | 1.294 | 1.169 | 1167.900 | 0.8625 | Pass |
| 2DH | 2Mbps | 1 | 78 | 2480 | 1.298 | 1.169 | 1289.400 | 0.8654 | Pass |
| 3DH | 3Mbps | 1 | 0 | 2402 | 1.259 | 1.152 | 1159.200 | 0.8393 | Pass |
| 3DH | 3Mbps | 1 | 39 | 2441 | 1.259 | 1.155 | 1124.500 | 0.8393 | Pass |
| 3DH | 3Mbps | 1 | 78 | 2480 | 1.263 | 1.155 | 1028.900 | 0.8423 | Pass |

### TEST RESULTS DATA
### Dwell Time

| Mod. | Hopping Channel Number Rate | Hops Over Occupancy Time(hops) | Package Transfer Time (msec) (MHz) | Dwell Time (sec) | Limits (sec) | Pass/Fail |
|---|---|---|---|---|---|---|
| Nomal | 79 | 106.67 | 2.89 | 0.31 | 0.4 | Pass |
| AFH | 20 | 53.33 | 2.89 | 0.15 | 0.4 | Pass |

### TEST RESULTS DATA
### Peak Power Table

| DH | CH. | NTX | Peak Power (dBm) | Power Limit (dBm) | Test Result |
|---|---|---|---|---|---|
| DH1 | 0 | 1 | 16.76 | 20.97 | Pass |
| | 39 | 1 | **17.32** | 20.97 | Pass |
| | 78 | 1 | 16.27 | 20.97 | Pass |

| 2DH | CH. | NTX | Peak Power (dBm) | Power Limit (dBm) | Test Result |
|---|---|---|---|---|---|
| 2DH1 | 0 | 1 | 16.12 | 20.97 | Pass |
| | 39 | 1 | **16.63** | 20.97 | Pass |
| | 78 | 1 | 15.75 | 20.97 | Pass |

| 3DH | CH. | NTX | Peak Power (dBm) | Power Limit (dBm) | Test Result |
|---|---|---|---|---|---|
| 3DH1 | 0 | 1 | 16.79 | 20.97 | Pass |
| | 39 | 1 | **17.29** | 20.97 | Pass |
| | 78 | 1 | 16.53 | 20.97 | Pass |

### TEST RESULTS DATA
### Number of Hopping Frequency

| Number of Hopping (Channel) | Adaptive Frequency Hopping (Channel) | Limits (Channel) | Pass/Fail |
|---|---|---|---|
| 79 | 79 | > 15 | Pass |

**Beamforming**

Report Number : FR291702A

## Bluetooth Ant.1

| Test Engineer: | Jiang Jun | Temperature: | 20~26 | °C |
|---|---|---|---|---|
| Test Date: | 2022/10/19~2022/11/5 | Relative Humidity: | 40~51 | % |

### *TEST RESULTS DATA*
### *20dB and 99% Occupied Bandwidth and Hopping Channel Separation*

| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | 20db BW (MHz) | 99% Bandwidth (MHz) | Hopping Channel Separation Measurement (KHz) | Hopping Channel Separation Measurement Limit (MHz) | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|
| DH | 1Mbps | 1 | 0 | 2402 | 0.949 | 0.851 | 1002.900 | 0.6329 | Pass |
| DH | 1Mbps | 1 | 39 | 2441 | 0.949 | 0.854 | 994.200 | 0.6329 | Pass |
| DH | 1Mbps | 1 | 78 | 2480 | 0.949 | 0.857 | 998.600 | 0.6329 | Pass |
| 2DH | 2Mbps | 1 | 0 | 2402 | 1.303 | 1.172 | 998.600 | 0.8683 | Pass |
| 2DH | 2Mbps | 1 | 39 | 2441 | 1.303 | 1.169 | 1033.300 | 0.8683 | Pass |
| 2DH | 2Mbps | 1 | 78 | 2480 | 1.303 | 1.172 | 1198.300 | 0.8683 | Pass |
| 3DH | 3Mbps | 1 | 0 | 2402 | 1.263 | 1.152 | 916.100 | 0.8423 | Pass |
| 3DH | 3Mbps | 1 | 39 | 2441 | 1.263 | 1.152 | 1011.600 | 0.8423 | Pass |
| 3DH | 3Mbps | 1 | 78 | 2480 | 1.263 | 1.152 | 1163.500 | 0.8423 | Pass |

### *TEST RESULTS DATA*
### *Dwell Time*

| Mod. | Hopping Channel Number Rate | Hops Over Occupancy Time(hops) | Package Transfer Time (msec) | Dwell Time (sec) | Limits (sec) | Pass/Fail |
|---|---|---|---|---|---|---|
| Nomal | 79 | 106.67 | 2.90 | 0.31 | 0.4 | Pass |
| AFH | 20 | 53.33 | 2.90 | 0.15 | 0.4 | Pass |

### *TEST RESULTS DATA*
### *Peak Power Table*

| DH | CH. | NTX | Peak Power (dBm) | Power Limit (dBm) | Test Result |
|---|---|---|---|---|---|
| DH1 | 0 | 1 | 8.55 | 20.97 | Pass |
| | 39 | 1 | **10.79** | 20.97 | Pass |
| | 78 | 1 | 10.48 | 20.97 | Pass |

| 2DH | CH. | NTX | Peak Power (dBm) | Power Limit (dBm) | Test Result |
|---|---|---|---|---|---|
| 2DH1 | 0 | 1 | 7.79 | 20.97 | Pass |
| | 39 | 1 | **9.81** | 20.97 | Pass |
| | 78 | 1 | 9.05 | 20.97 | Pass |

| 3DH | CH. | NTX | Peak Power (dBm) | Power Limit (dBm) | Test Result |
|---|---|---|---|---|---|
| 3DH1 | 0 | 1 | 8.27 | 20.97 | Pass |
| | 39 | 1 | **10.18** | 20.97 | Pass |
| | 78 | 1 | 9.61 | 20.97 | Pass |

### *TEST RESULTS DATA*
### *Number of Hopping Frequency*

| Number of Hopping (Channel) | Adaptive Frequency Hopping (Channel) | Limits (Channel) | Pass/Fail |
|---|---|---|---|
| 79 | 79 | > 15 | Pass |

Report Number : FR291702A

## Bluetooth Ant.2

| Test Engineer: | Jiang Jun | Temperature: | 20~26 | °C |
|---|---|---|---|---|
| Test Date: | 2022/10/19~2022/11/5 | Relative Humidity: | 40~51 | % |

### TEST RESULTS DATA
### 20dB and 99% Occupied Bandwidth and Hopping Channel Separation

| Mod. | Data Rate | NTX | CH. | Freq. (MHz) | 20db BW (MHz) | 99% Bandwidth (MHz) | Hopping Channel Separation Measurement (KHz) | Hopping Channel Separation Measurement Limit (MHz) | Pass/Fail |
|---|---|---|---|---|---|---|---|---|---|
| DH | 1Mbps | 1 | 0 | 2402 | 0.947 | 0.854 | 1002.900 | 0.6310 | Pass |
| DH | 1Mbps | 1 | 39 | 2441 | 0.949 | 0.860 | 998.600 | 0.6329 | Pass |
| DH | 1Mbps | 1 | 78 | 2480 | 0.949 | 0.860 | 998.600 | 0.6329 | Pass |
| 2DH | 2Mbps | 1 | 0 | 2402 | 1.298 | 1.169 | 1115.800 | 0.8654 | Pass |
| 2DH | 2Mbps | 1 | 39 | 2441 | 1.303 | 1.169 | 1007.200 | 0.8683 | Pass |
| 2DH | 2Mbps | 1 | 78 | 2480 | 1.298 | 1.169 | 998.600 | 0.8654 | Pass |
| 3DH | 3Mbps | 1 | 0 | 2402 | 1.259 | 1.155 | 998.600 | 0.8393 | Pass |
| 3DH | 3Mbps | 1 | 39 | 2441 | 1.263 | 1.155 | 1167.900 | 0.8423 | Pass |
| 3DH | 3Mbps | 1 | 78 | 2480 | 1.263 | 1.152 | 1228.700 | 0.8423 | Pass |

### TEST RESULTS DATA
### Dwell Time

| Mod. | Hopping Channel Number Rate | Hops Over Occupancy Time(hops) | Package Transfer Time (msec) | Dwell Time (sec) | Limits (sec) | Pass/Fail |
|---|---|---|---|---|---|---|
| Nomal | 79 | 106.67 | 2.90 | 0.31 | 0.4 | Pass |
| AFH | 20 | 53.33 | 2.90 | 0.15 | 0.4 | Pass |

### TEST RESULTS DATA
### Peak Power Table

| DH | CH. | NTX | Peak Power (dBm) | Power Limit (dBm) | Test Result |
|---|---|---|---|---|---|
| DH1 | 0 | 1 | 8.55 | 20.97 | Pass |
| | 39 | 1 | **10.79** | 20.97 | Pass |
| | 78 | 1 | 10.48 | 20.97 | Pass |

| 2DH | CH. | NTX | Peak Power (dBm) | Power Limit (dBm) | Test Result |
|---|---|---|---|---|---|
| 2DH1 | 0 | 1 | 7.79 | 20.97 | Pass |
| | 39 | 1 | **9.81** | 20.97 | Pass |
| | 78 | 1 | 9.05 | 20.97 | Pass |

| 3DH | CH. | NTX | Peak Power (dBm) | Power Limit (dBm) | Test Result |
|---|---|---|---|---|---|
| 3DH1 | 0 | 1 | 8.27 | 20.97 | Pass |
| | 39 | 1 | **10.18** | 20.97 | Pass |
| | 78 | 1 | 9.61 | 20.97 | Pass |

### TEST RESULTS DATA
### Number of Hopping Frequency

| Number of Hopping (Channel) | Adaptive Frequency Hopping (Channel) | Limits (Channel) | Pass/Fail |
|---|---|---|---|
| 79 | 79 | > 15 | Pass |

Report Number : FR291702A

## Bluetooth Ant.1+2

| | | | | |
|---|---|---|---|---|
| Test Engineer: | Jiang Jun | Temperature: | 20~26 | °C |
| Test Date: | 2022/10/19~2022/11/5 | Relative Humidity: | 40~51 | % |

### *TEST RESULTS DATA*
### *Peak Power Table*

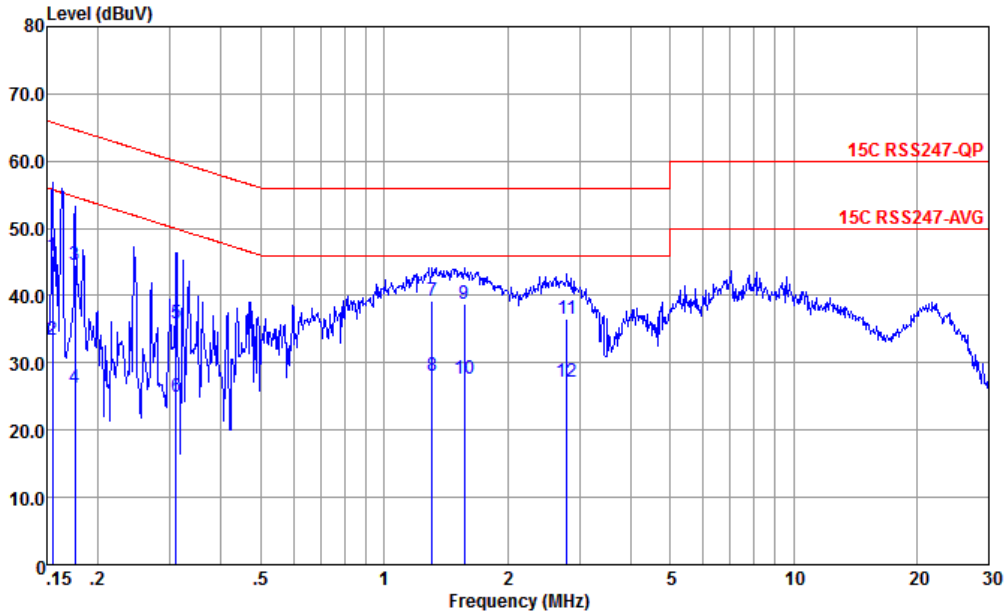
| DH | CH. | NTX | Peak Power (dBm) | Power Limit (dBm) | Test Result |
|---|---|---|---|---|---|
| DH1 | 0 | 2 | 13.74 | 20.97 | Pass |
| | 39 | 2 | 14.58 | 20.97 | Pass |
| | 78 | 2 | **14.63** | 20.97 | Pass |

| 2DH | CH. | NTX | Peak Power (dBm) | Power Limit (dBm) | Test Result |
|---|---|---|---|---|---|
| 2DH1 | 0 | 2 | 12.48 | 20.97 | Pass |
| | 39 | 2 | **13.29** | 20.97 | Pass |
| | 78 | 2 | 12.48 | 20.97 | Pass |

| 3DH | CH. | NTX | Peak Power (dBm) | Power Limit (dBm) | Test Result |
|---|---|---|---|---|---|
| 3DH1 | 0 | 2 | 12.81 | 20.97 | Pass |
| | 39 | 2 | **13.63** | 20.97 | Pass |
| | 78 | 2 | 12.95 | 20.97 | Pass |

# Appendix B. AC Conducted Emission Test Results

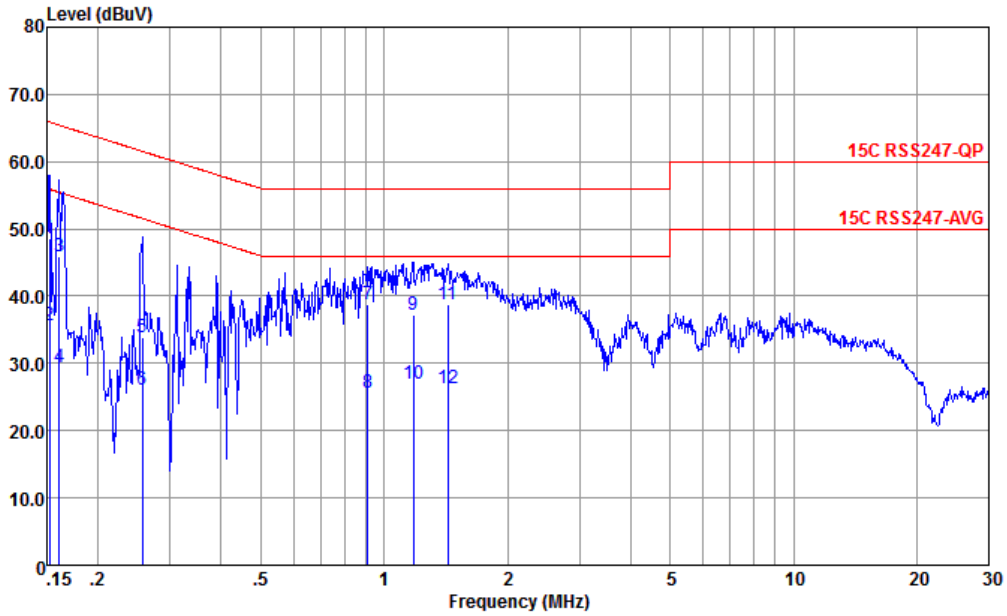
| | | | |
|---|---|---|---|
| **Test Engineer :** | Amos Zhang | **Temperature :** | 25.3~26.2℃ |
| | | **Relative Humidity :** | 38~40% |
| **Test Voltage :** | 120Vac / 60Hz | **Phase :** | Line |
| **Remark :** | All emissions not reported here are more than 10 dB below the prescribed limit. | | |




Site : CO01-KS
Condition : 15C RSS247-QP LISN-060105-LINE LINE

| | | Freq MHz | Level dBuV | Over Limit dB | Limit Line dBuV | Read Level dBuV | LISN Factor dB | Cable Loss dB | Remark |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | 0.155 | 45.99 | -19.75 | 65.74 | 35.50 | 0.06 | 10.43 | QP |
| 2 | | 0.155 | 33.39 | -22.35 | 55.74 | 22.90 | 0.06 | 10.43 | Average |
| 3 | | 0.176 | 44.67 | -20.01 | 64.68 | 34.21 | 0.04 | 10.42 | QP |
| 4 | | 0.176 | 26.37 | -28.31 | 54.68 | 15.91 | 0.04 | 10.42 | Average |
| 5 | | 0.310 | 35.90 | -24.07 | 59.97 | 25.51 | 0.05 | 10.34 | QP |
| 6 | | 0.310 | 25.00 | -24.97 | 49.97 | 14.61 | 0.05 | 10.34 | Average |
| 7 | * | 1.310 | 39.18 | -16.82 | 56.00 | 29.20 | -0.11 | 10.09 | QP |
| 8 | | 1.310 | 28.18 | -17.82 | 46.00 | 18.20 | -0.11 | 10.09 | Average |
| 9 | | 1.568 | 38.76 | -17.24 | 56.00 | 28.79 | -0.11 | 10.08 | QP |
| 10 | | 1.568 | 27.56 | -18.44 | 46.00 | 17.59 | -0.11 | 10.08 | Average |
| 11 | | 2.794 | 36.55 | -19.45 | 56.00 | 26.59 | -0.10 | 10.06 | QP |
| 12 | | 2.794 | 27.15 | -18.85 | 46.00 | 17.19 | -0.10 | 10.06 | Average |

| | | | |
|---|---|---|---|
| **Test Engineer :** | Amos Zhang | **Temperature :** | 25.3~26.2℃ |
| | | **Relative Humidity :** | 38~40% |
| **Test Voltage :** | 120Vac / 60Hz | **Phase :** | Neutral |
| **Remark :** | All emissions not reported here are more than 10 dB below the prescribed limit. | | |




Site : CO01-KS
Condition : 15C RSS247-QP LISN-060105-NEUTRAL NEUTRAL

| | | Freq | Level | Over Limit | Limit Line | Read Level | LISN Factor | Cable Loss | Remark |
|---|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | dB | |
| 1 | | 0.152 | 48.66 | -17.21 | 65.87 | 38.20 | 0.03 | 10.43 | QP |
| 2 | | 0.152 | 35.66 | -20.21 | 55.87 | 25.20 | 0.03 | 10.43 | Average |
| 3 | | 0.161 | 45.96 | -19.47 | 65.43 | 35.50 | 0.03 | 10.43 | QP |
| 4 | | 0.161 | 29.36 | -26.07 | 55.43 | 18.90 | 0.03 | 10.43 | Average |
| 5 | | 0.256 | 33.96 | -27.60 | 61.56 | 23.59 | -0.01 | 10.38 | QP |
| 6 | | 0.256 | 25.96 | -25.60 | 51.56 | 15.59 | -0.01 | 10.38 | Average |
| 7 | * | 0.914 | 38.82 | -17.18 | 56.00 | 28.81 | -0.11 | 10.12 | QP |
| 8 | | 0.914 | 25.52 | -20.48 | 46.00 | 15.51 | -0.11 | 10.12 | Average |
| 9 | | 1.178 | 37.18 | -18.82 | 56.00 | 27.19 | -0.11 | 10.10 | QP |
| 10 | | 1.178 | 26.88 | -19.12 | 46.00 | 16.89 | -0.11 | 10.10 | Average |
| 11 | | 1.433 | 38.77 | -17.23 | 56.00 | 28.81 | -0.12 | 10.08 | QP |
| 12 | | 1.433 | 26.27 | -19.73 | 46.00 | 16.31 | -0.12 | 10.08 | Average |

Note:

1. Level(dBμV) = Read Level(dBμV) + LISN Factor(dB) + Cable Loss(dB)
2. Over Limit(dB) = Level(dBμV) – Limit Line(dBμV)

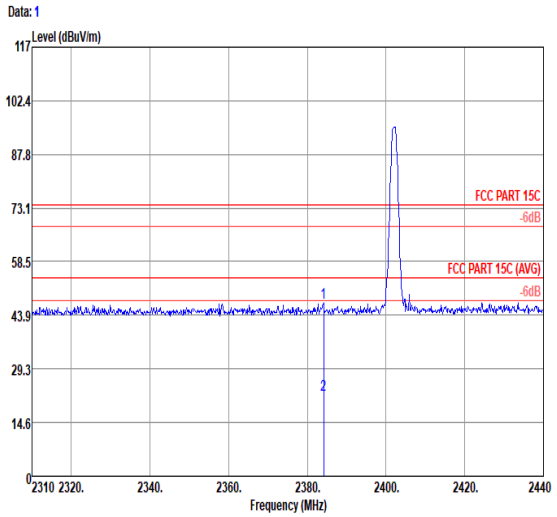
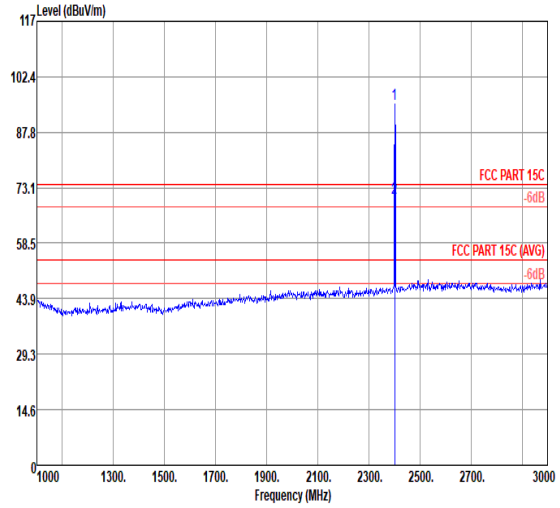
# Appendix C. Radiated Spurious Emission

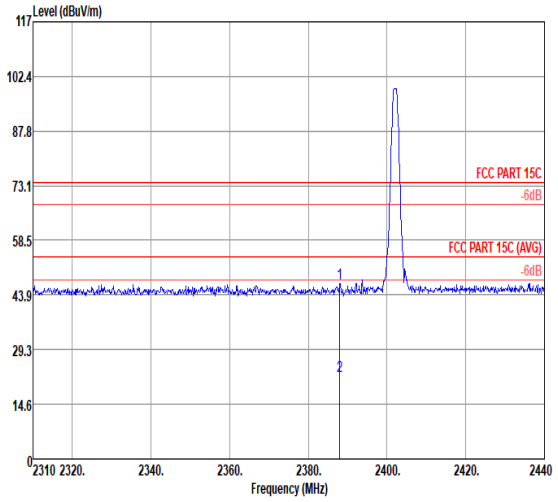
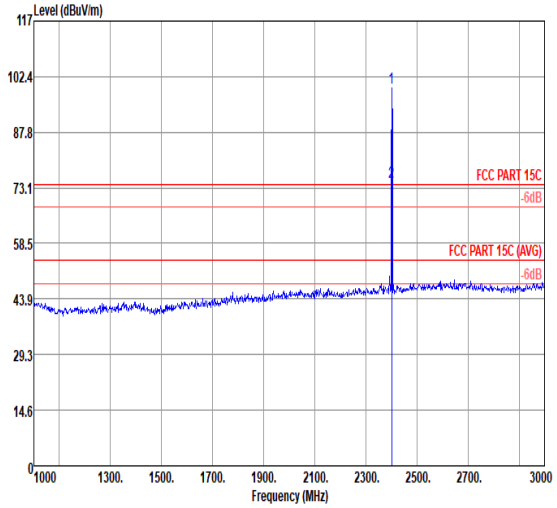
## Radiated Spurious Emission Test Modes

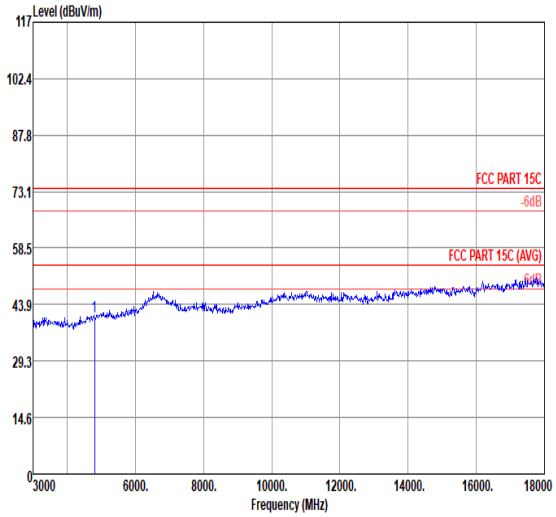
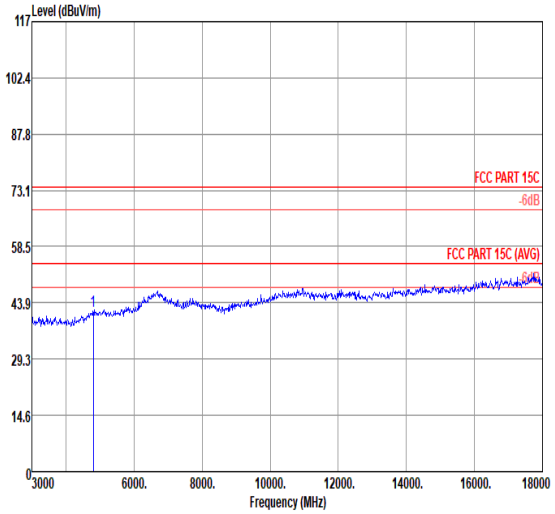
| Mode | Band (MHz) | Antenna | Modulation | Channel | Frequency | Data Rate | RU | Remark |
|---|---|---|---|---|---|---|---|---|
| Mode 1 | 2400-2483.5 | 15 | Bluetooth EDR_8-DPSK | 00 | 2402 | 3Mbps | - | - |
| Mode 2 | 2400-2483.5 | 15 | Bluetooth EDR_8-DPSK | 39 | 2441 | 3Mbps | - | - |
| Mode 3 | 2400-2483.5 | 15 | Bluetooth EDR_8-DPSK | 78 | 2480 | 3Mbps | - | - |
| Mode 4 | 2400-2483.5 | 18 | Bluetooth EDR_8-DPSK | 00 | 2402 | 3Mbps | - | - |
| Mode 5 | 2400-2483.5 | 18 | Bluetooth EDR_8-DPSK | 39 | 2441 | 3Mbps | - | - |
| Mode 6 | 2400-2483.5 | 18 | Bluetooth EDR_8-DPSK | 78 | 2480 | 3Mbps | - | - |
| Mode 7 | 2400-2483.5 | BF 15+18 | Bluetooth BR_GFSK | 00 | 2402 | 1Mbps | - | - |
| Mode 8 | 2400-2483.5 | BF 15+18 | Bluetooth BR_GFSK | 39 | 2441 | 1Mbps | - | - |
| Mode 9 | 2400-2483.5 | BF 15+18 | Bluetooth BR_GFSK | 78 | 2480 | 1Mbps | - | - |

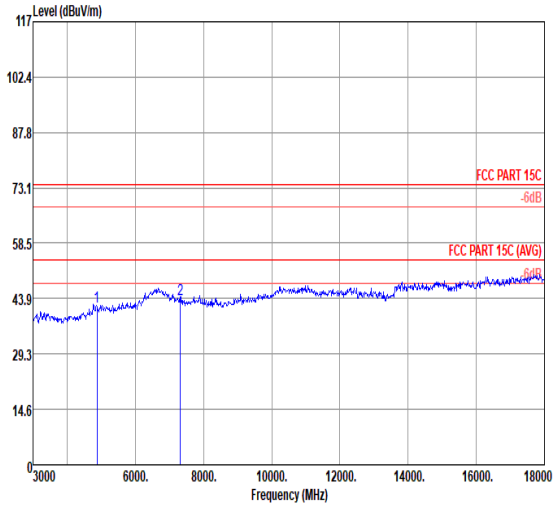
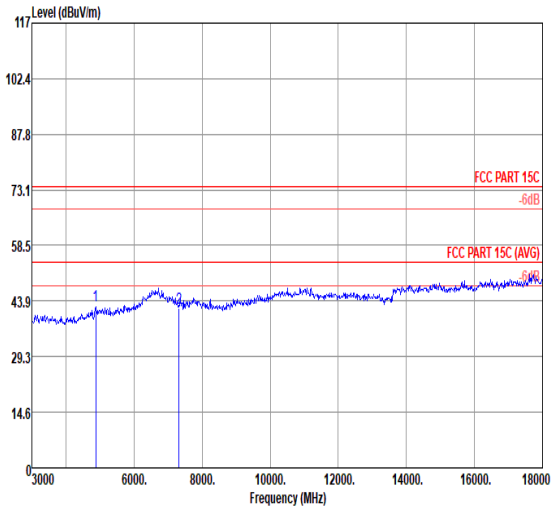
## Summary of each worse mode

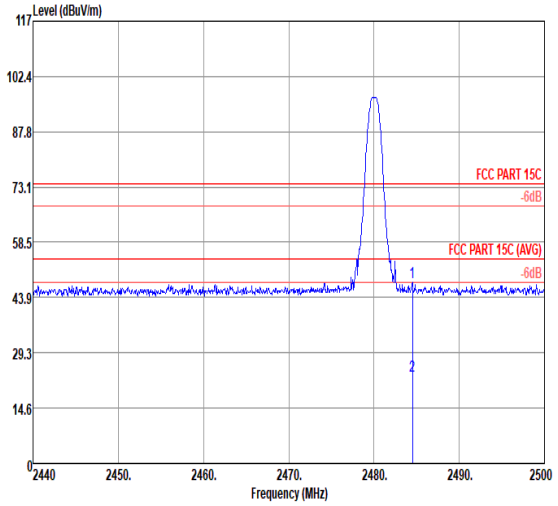
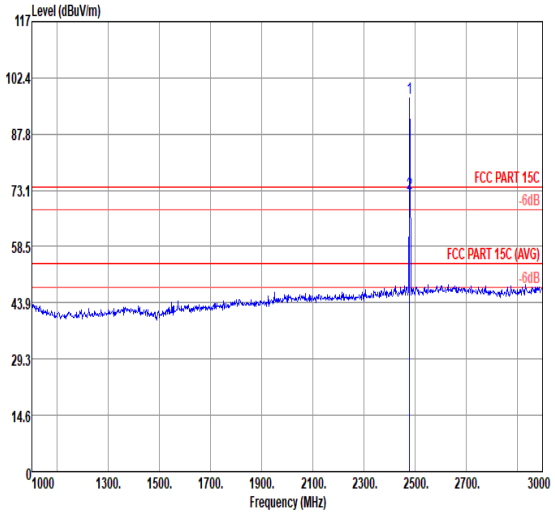
| Mode | Modulation | Ch. | Freq. (MHz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Pol. | Peak Avg. | Result | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Bluetooth EDR_8-DPSK | 00 | 2384.1 | 47.1 | 74 | -26.9 | H | PEAK | Pass | Band Edge |
| 2 | Bluetooth EDR_8-DPSK | 39 | 7323 | 43.53 | 74 | -30.47 | H | PEAK | Pass | Harmonic |
| 3 | Bluetooth EDR_8-DPSK | 78 | 2483.62 | 54.42 | 74 | -19.58 | V | PEAK | Pass | Band Edge |
| 4 | Bluetooth EDR_8-DPSK | 00 | 2389.56 | 50.14 | 74 | -23.86 | H | PEAK | Pass | Band Edge |
| 5 | Bluetooth EDR_8-DPSK | 39 | 7323 | 44.48 | 74 | -29.52 | H | PEAK | Pass | Harmonic |
| 6 | Bluetooth EDR_8-DPSK | 78 | 2488.18 | 48.05 | 74 | -25.95 | V | PEAK | Pass | Band Edge |
| 7 | Bluetooth BR_GFSK | 00 | 2325.21 | 56.09 | 74 | -17.91 | H | PEAK | Pass | Band Edge |
| 8 | Bluetooth BR_GFSK | 39 | 7323.00 | 45.89 | 74 | -28.11 | H | PEAK | Pass | Harmonic |
| 9 | Bluetooth BR_GFSK | 78 | 2484.01 | 60.86 | 74 | -13.14 | H | PEAK | Pass | Band Edge |

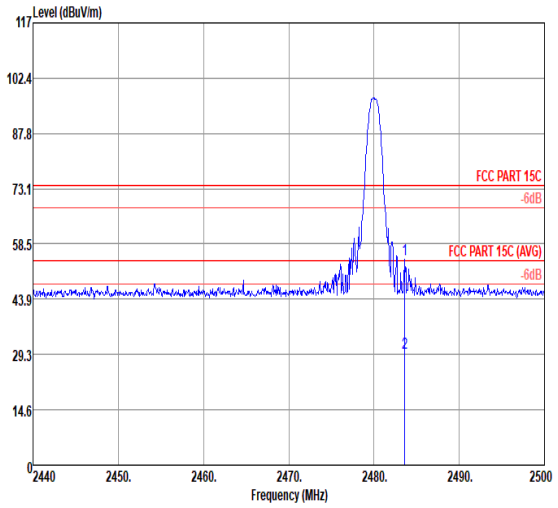
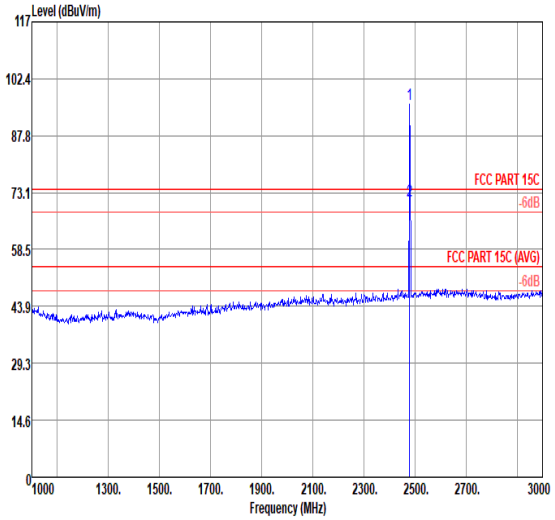
| Mode | 1 | |
|---|---|---|
| | Band Edge | |
| | 2400-2483.5_ Bluetooth EDR_8-DPSK _CH00_2402MHz | |
| ANT | 15 | |
| Pol. | Horizontal | Fundamental |
| Peak |  <br>Freq Level Limit Line Over Limit ReadAntenna Level Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 2384.10 47.10 74.00 -26.90 33.05 31.87 7.11 30.93 6.00 100 63 Peak<br>2 2384.10 22.31 54.00 -31.69 8.26 31.87 7.11 30.93 6.00 100 63 Average |  <br>Freq Level Limit Line Over Limit ReadAntenna Level Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 * 2402.00 95.32 74.00 21.32 81.17 31.90 7.13 30.88 6.00 100 63 Peak<br>2 * 2402.00 70.53 54.00 16.53 56.38 31.90 7.13 30.88 6.00 100 63 Average |

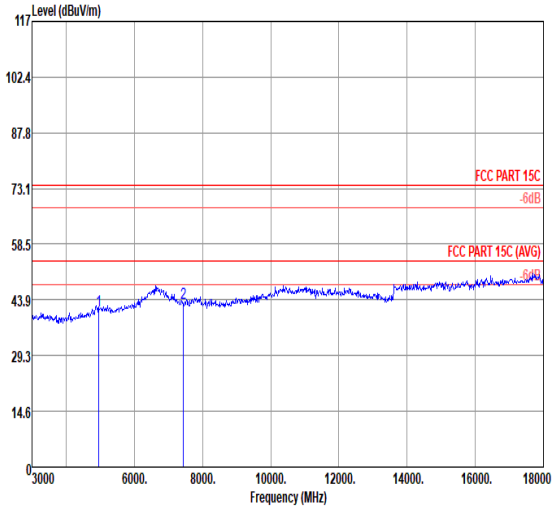
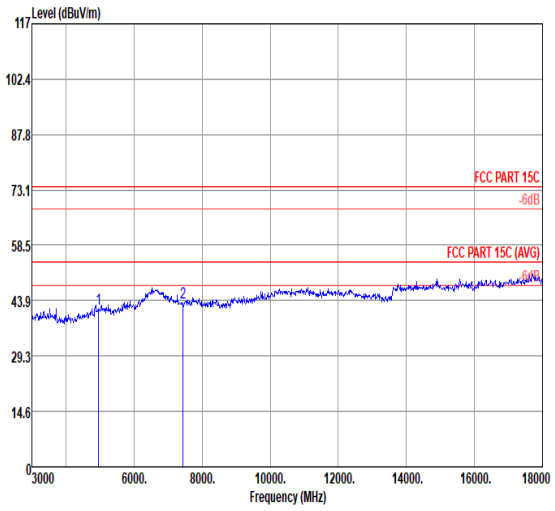
| Mode | 1 | |
|---|---|---|
| | Band Edge | |
| | 2400-2483.5_ Bluetooth EDR_8-DPSK_CH00_2402MHz | |
| ANT | 15 | |
| Pol. | Vertical | Fundamental |
| Peak |  <br>Freq Level Limit Line Over Limit ReadLevel Antenna Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 2388.00 46.79 74.00 -27.21 32.69 31.90 7.13 30.93 6.00 261 360 Peak<br>2 2388.00 22.00 54.00 -32.00 7.90 31.90 7.13 30.93 6.00 261 360 Average |  <br>Freq Level Limit Line Over Limit ReadLevel Antenna Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 * 2402.00 99.36 74.00 25.36 85.21 31.90 7.13 30.88 6.00 261 360 Peak<br>2 * 2402.00 74.57 54.00 20.57 60.42 31.90 7.13 30.88 6.00 261 360 Average |

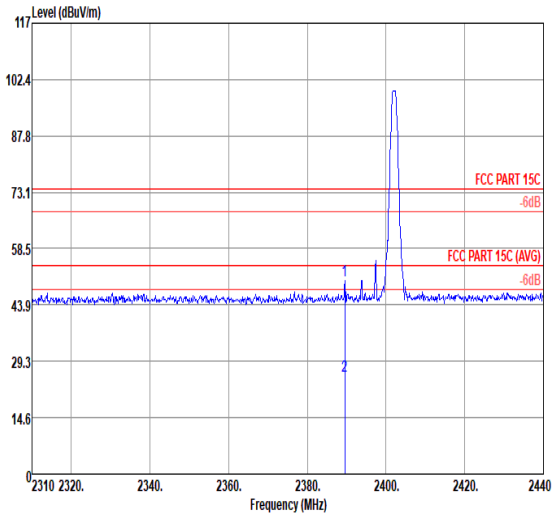
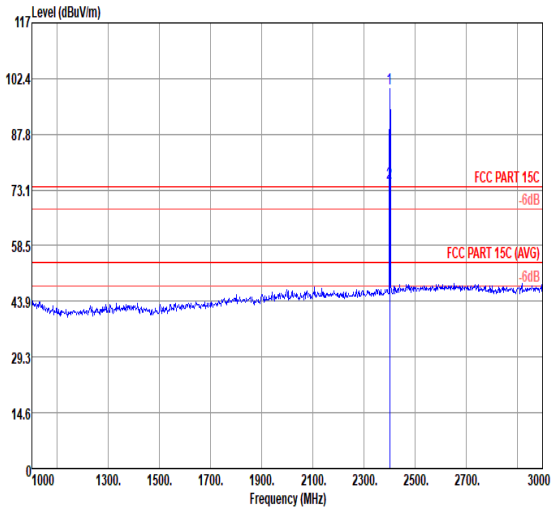
| Mode | 1 | |
|---|---|---|
| | Harmonic | |
| | 2400-2483.5_ Bluetooth EDR_8-DPSK _CH00_2402MHz | |
| ANT | 15 | |
| Pol. | Horizontal | Vertical |
| Peak<br>Avg |  <br><br>Freq Level Limit Line Over Limit ReadLevel Antenna Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 4804.00 40.66 74.00 -33.34 55.65 34.30 10.29 65.58 6.00 100 0 Peak |  <br><br>Freq Level Limit Line Over Limit ReadLevel Antenna Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 4804.00 41.74 74.00 -32.26 56.73 34.30 10.29 65.58 6.00 300 0 Peak |

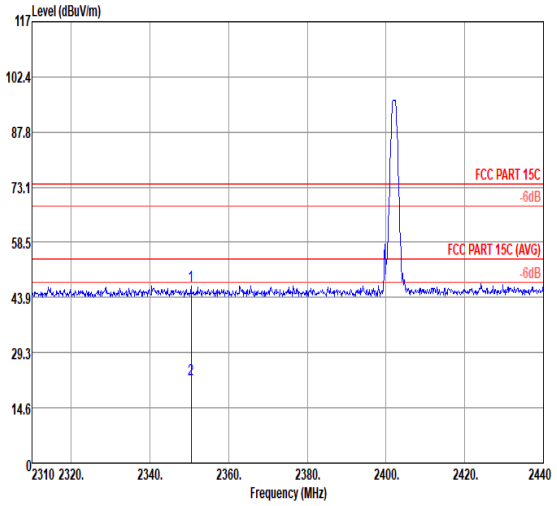
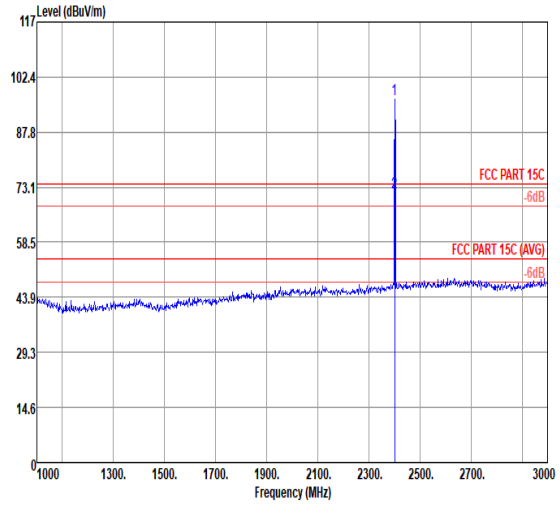
| Mode | 2 | |
|---|---|---|
| | Harmonic | |
| | 2400-2483.5_ Bluetooth EDR_8-DPSK _CH39_2441MHz | |
| ANT | 15 | |
| Pol. | Horizontal | Vertical |
| Peak<br>Avg |  <br>Freq Level Limit Line Over Limit ReadLevel Antenna Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 4882.00 41.65 74.00 -32.35 56.57 34.14 10.39 65.45 6.00 100 360 Peak<br>2 7323.00 43.53 74.00 -30.47 53.83 35.52 12.82 64.64 6.00 100 360 Peak |  <br>Freq Level Limit Line Over Limit ReadLevel Antenna Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 4882.00 42.68 74.00 -31.32 63.60 34.14 10.39 65.45 0.00 300 360 Peak<br>2 7323.00 42.14 74.00 -31.86 58.44 35.52 12.82 64.64 0.00 300 360 Peak |

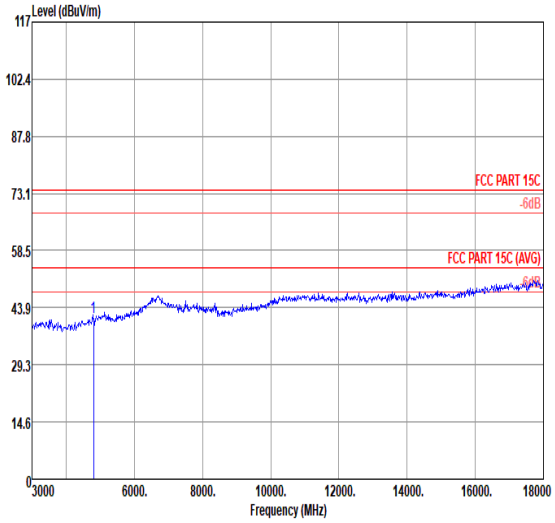
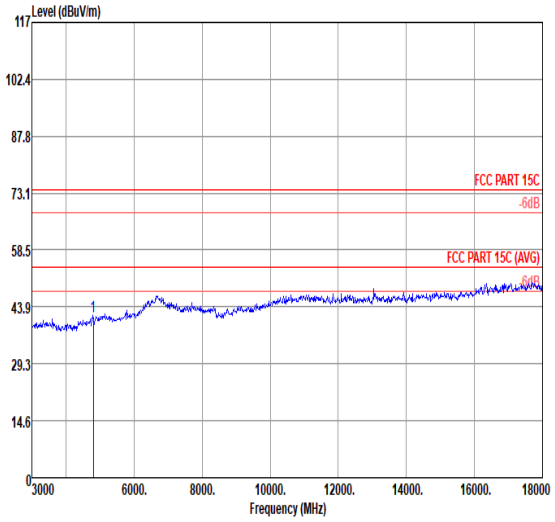
| | | |
|---|---|---|
| Mode | 3 | |
| | Band Edge | |
| | 2400-2483.5_ Bluetooth EDR_8-DPSK_CH78_2480MHz | |
| ANT | 15 | |
| Pol. | Horizontal | Fundamental |
| Peak |  <br>Freq Level Limit Line Over Limit ReadLevel Antenna Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 2484.52 47.97 74.00 -26.03 33.11 32.23 7.28 30.65 6.00 100 356 Peak<br>2 2484.52 23.18 54.00 -30.82 8.32 32.23 7.28 30.65 6.00 100 356 Average |  <br>Freq Level Limit Line Over Limit ReadLevel Antenna Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 * 2480.00 97.06 74.00 23.06 82.20 32.23 7.28 30.65 6.00 100 356 Peak<br>2 * 2480.00 72.27 54.00 18.27 57.41 32.23 7.28 30.65 6.00 100 356 Average |

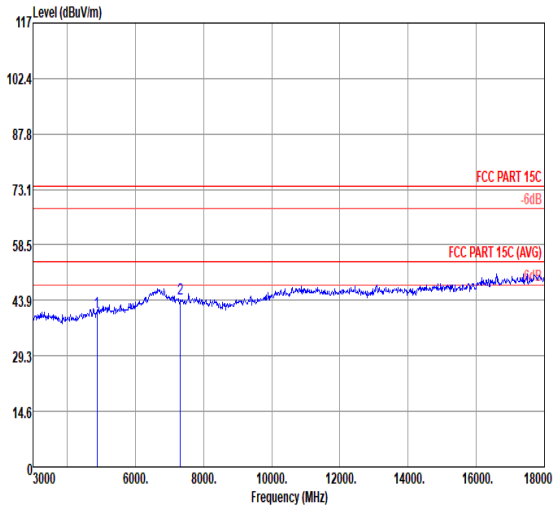
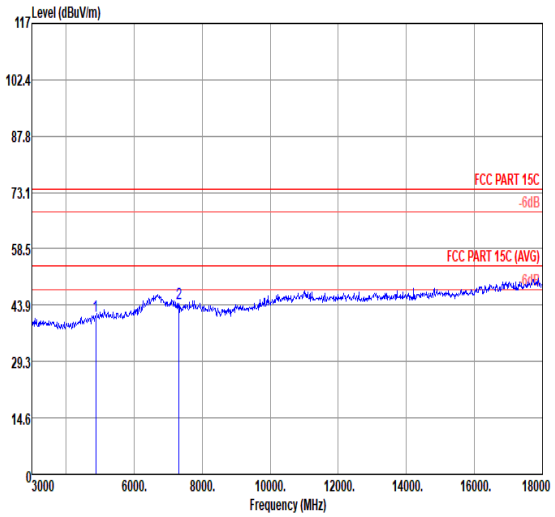
| | | |
|---|---|---|
| Mode | 3 | |
| | Band Edge | |
| | 2400-2483.5_ Bluetooth EDR_8-DPSK _CH78_2480MHz | |
| ANT | 15 | |
| Pol. | Vertical | Fundamental |
| Peak |  <br>Freq Level Limit Line Over Limit ReadLevel Antenna Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 2483.62 54.42 74.00 -19.58 39.56 32.23 7.28 30.65 6.00 246 0 Peak<br>2 2483.62 29.63 54.00 -24.37 14.77 32.23 7.28 30.65 6.00 246 0 Average |  <br>Freq Level Limit Line Over Limit ReadLevel Antenna Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 * 2480.00 95.87 74.00 21.87 81.01 32.23 7.28 30.65 6.00 246 0 Peak<br>2 * 2480.00 71.08 54.00 17.08 56.22 32.23 7.28 30.65 6.00 246 0 Average |

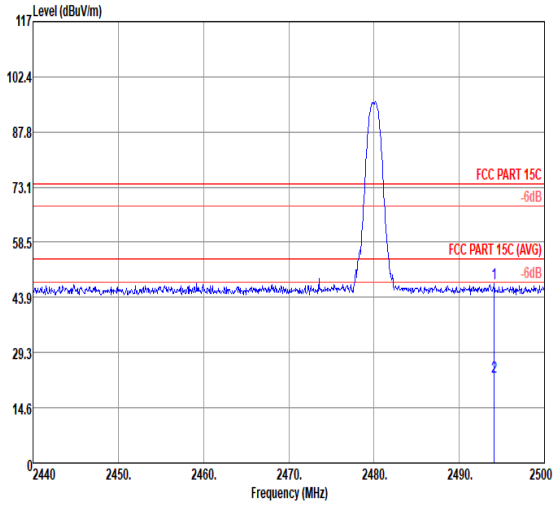
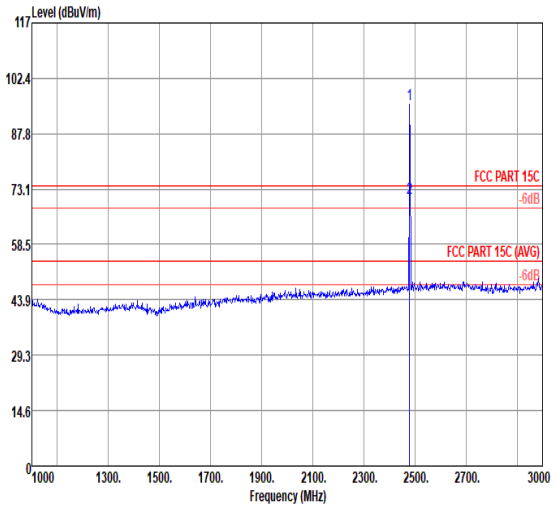
| Mode | 3 | |
|---|---|---|
| | Harmonic | |
| | 2400-2483.5_ Bluetooth EDR_8-DPSK _CH78_2480MHz | |
| ANT | 15 | |
| Pol. | Horizontal | Vertical |
| Peak<br>Avg |  <br><br>Freq Level Limit Line Over Limit ReadAntenna Level Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 4960.00 41.12 74.00 -32.88 55.66 34.23 10.51 65.28 6.00 100 0 Peak<br>2 7440.00 43.11 74.00 -30.89 53.36 35.65 12.88 64.78 6.00 100 0 Peak |  <br><br>Freq Level Limit Line Over Limit ReadAntenna Level Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 4960.00 41.59 74.00 -32.41 56.13 34.23 10.51 65.28 6.00 300 0 Peak<br>2 7440.00 43.44 74.00 -30.56 53.69 35.65 12.88 64.78 6.00 300 0 Peak |

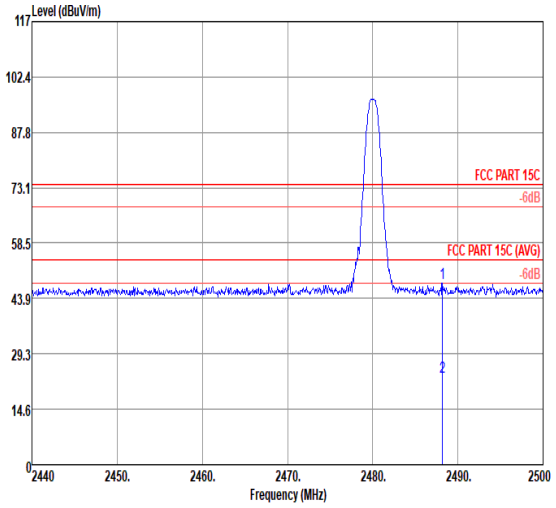
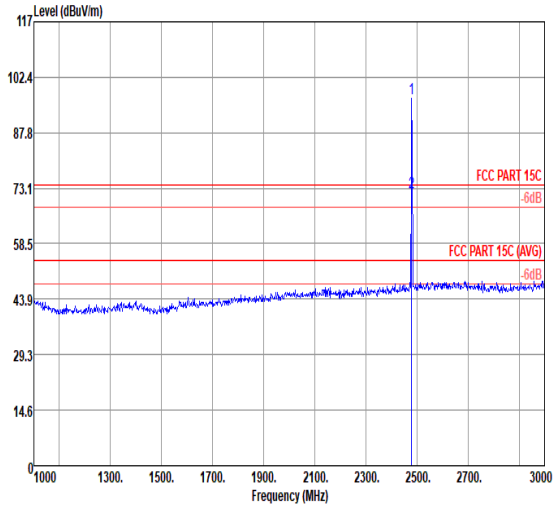
| Mode | 4 | |
|---|---|---|
| | Band Edge | |
| | 2400-2483.5_ Bluetooth EDR_8-DPSK _CH00_2402MHz | |
| ANT | 18 | |
| Pol. | Horizontal | Fundamental |
| Peak |  <br>Freq Level Limit Line Over Limit ReadLevel Antenna Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 2389.56 50.14 74.00 -23.86 36.04 31.90 7.13 30.93 6.00 100 234 Peak<br>2 2389.56 25.35 54.00 -28.65 11.25 31.90 7.13 30.93 6.00 100 234 Average |  <br>Freq Level Limit Line Over Limit ReadLevel Antenna Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 * 2402.00 99.63 74.00 25.63 85.48 31.90 7.13 30.88 6.00 100 234 Peak<br>2 * 2402.00 74.84 54.00 20.84 60.69 31.90 7.13 30.88 6.00 100 234 Average |

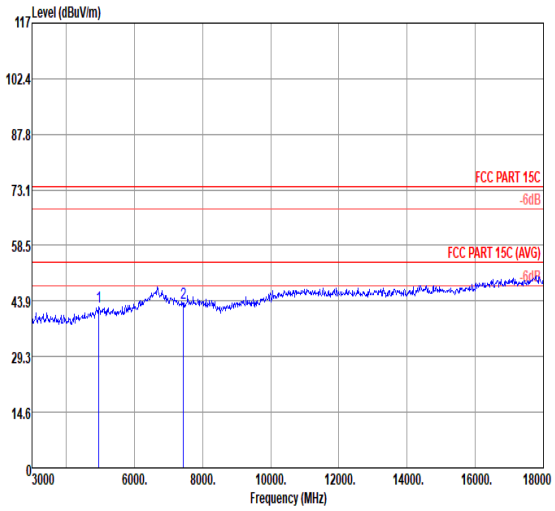
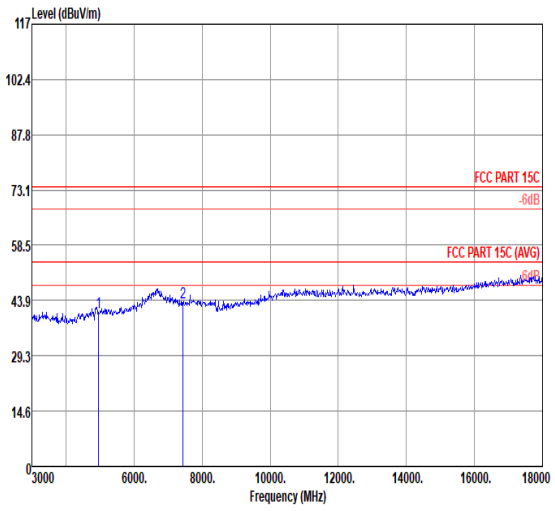
| Mode | 4 | |
|---|---|---|
| | Band Edge | |
| | 2400-2483.5_ Bluetooth EDR_8-DPSK _CH00_2402MHz | |
| ANT | 18 | |
| Pol. | Vertical | Fundamental |
| Peak |  <br>Freq Level Limit Line Over Limit ReadLevel Antenna Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 2350.43 46.95 74.00 -27.05 33.08 31.80 7.06 30.99 6.00 100 130 Peak<br>2 2350.43 22.16 54.00 -31.84 8.29 31.80 7.06 30.99 6.00 100 130 Average |  <br>Freq Level Limit Line Over Limit ReadLevel Antenna Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 * 2402.00 96.40 74.00 22.40 82.25 31.90 7.13 30.88 6.00 100 130 Peak<br>2 * 2402.00 71.61 54.00 17.61 57.46 31.90 7.13 30.88 6.00 100 130 Average |

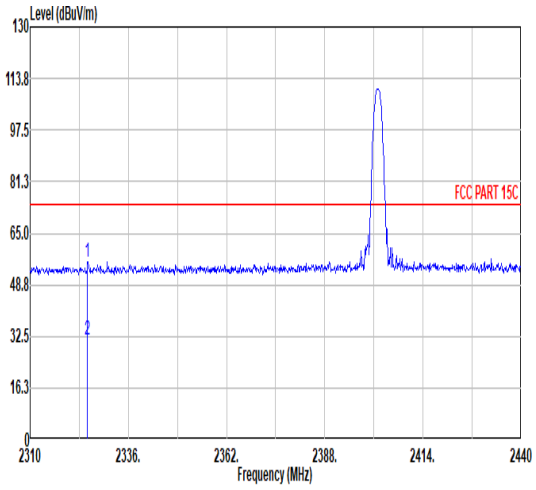
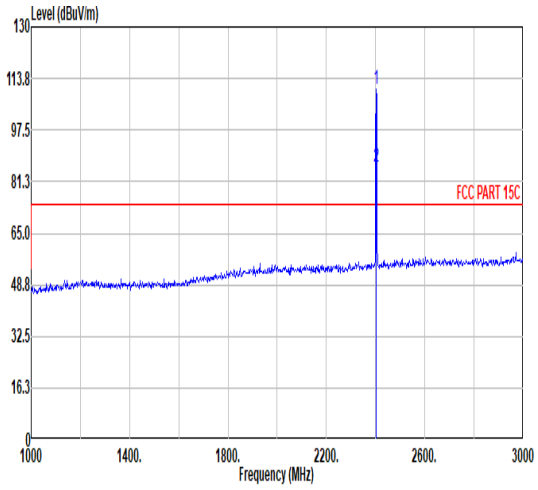
| Mode | 4 | |
|---|---|---|
| | Harmonic | |
| | 2400-2483.5_ Bluetooth EDR_8-DPSK _CH00_2402MHz | |
| ANT | 18 | |
| Pol. | Horizontal | Vertical |
| Peak<br>Avg |  <br><br>Freq Level Limit Line Over Limit ReadAntenna Level Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 4804.00 41.39 74.00 -32.61 56.38 34.30 10.29 65.58 6.00 300 0 Peak |  <br><br>Freq Level Limit Line Over Limit ReadAntenna Level Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 4804.00 41.53 74.00 -32.47 56.52 34.30 10.29 65.58 6.00 100 0 Peak |

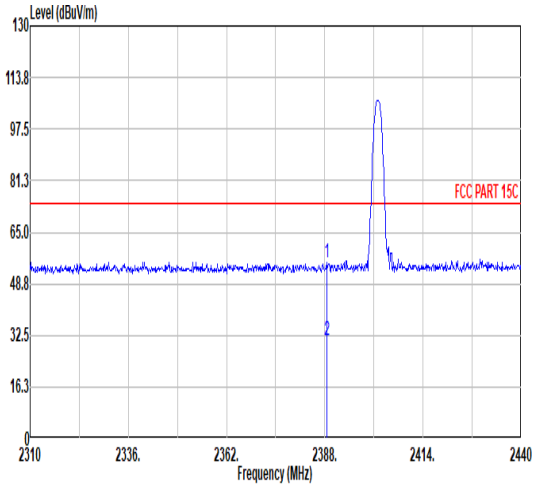
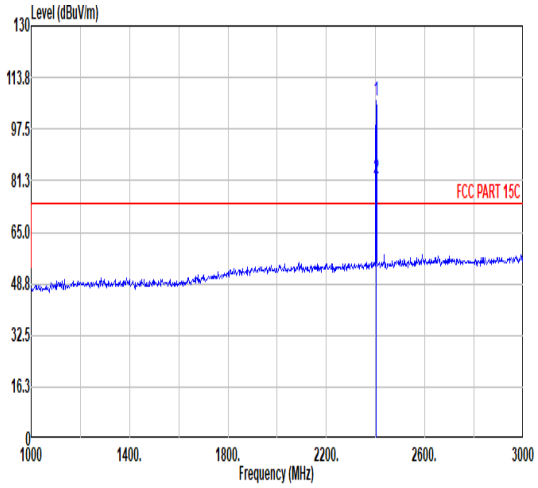
| Mode | 5 | |
|---|---|---|
| | Harmonic | |
| | 2400-2483.5_ Bluetooth EDR_8-DPSK _CH39_2441MHz | |
| ANT | 18 | |
| Pol. | Horizontal | Vertical |
| Peak<br>Avg |  <br><br>Freq Level Limit Line Over Limit ReadLevel Antenna Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 4882.00 40.72 74.00 -33.28 55.64 34.14 10.39 65.45 6.00 300 360 Peak<br>2 7323.00 44.48 74.00 -29.52 54.78 35.52 12.82 64.64 6.00 300 360 Peak |  <br><br>Freq Level Limit Line Over Limit ReadLevel Antenna Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 4882.00 41.13 74.00 -32.87 56.05 34.14 10.39 65.45 6.00 100 0 Peak<br>2 7323.00 44.17 74.00 -29.83 54.47 35.52 12.82 64.64 6.00 100 0 Peak |

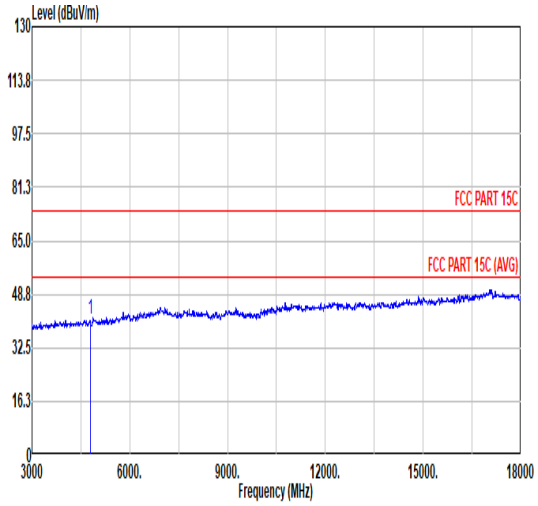
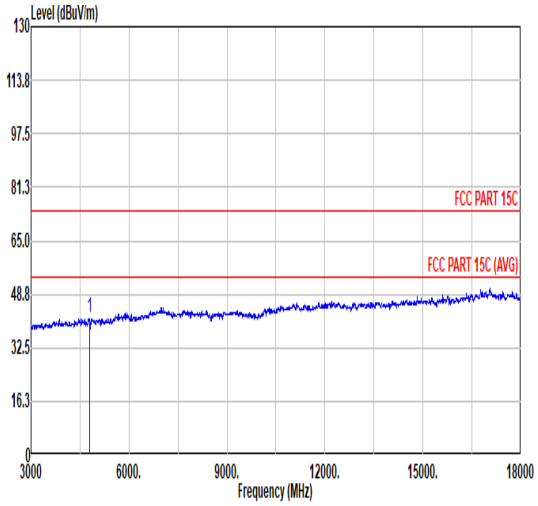
| | | |
|---|---|---|
| Mode | 6 | |
| | Band Edge | |
| | 2400-2483.5_ Bluetooth EDR_8-DPSK _CH78_2480MHz | |
| ANT | 18 | |
| Pol. | Horizontal | Fundamental |
| Peak |  <br>Freq Level Limit Line Over Limit ReadLevel Antenna Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 2494.12 47.70 74.00 -26.30 32.65 32.30 7.32 30.57 6.00 207 285 Peak<br>2 2494.12 22.91 54.00 -31.09 7.86 32.30 7.32 30.57 6.00 207 285 Average |  <br>Freq Level Limit Line Over Limit ReadLevel Antenna Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 * 2480.00 95.48 74.00 21.48 80.62 32.23 7.28 30.65 6.00 207 285 Peak<br>2 * 2480.00 70.69 54.00 16.69 55.83 32.23 7.28 30.65 6.00 207 285 Average |

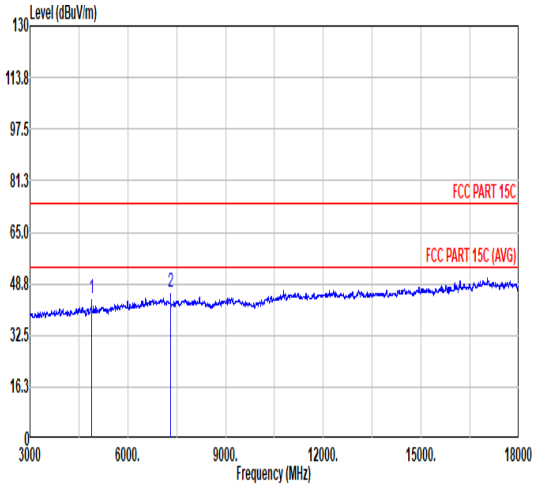
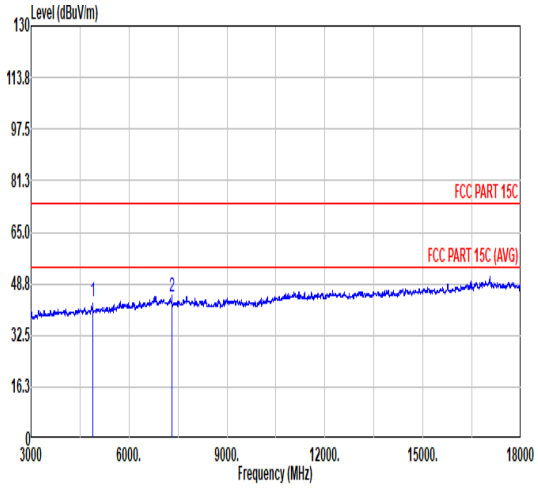
| Mode | 6 | |
|---|---|---|
| | Band Edge | |
| | 2400-2483.5_ Bluetooth EDR_8-DPSK _CH78_2480MHz | |
| ANT | 18 | |
| Pol. | Vertical | Fundamental |
| Peak |  <br>Freq Level Limit Line Over Limit ReadLevel Antenna Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 2488.18 48.05 74.00 -25.95 33.08 32.30 7.32 30.65 6.00 100 355 Peak<br>2 2488.18 23.26 54.00 -30.74 8.29 32.30 7.32 30.65 6.00 100 355 Average |  <br>Freq Level Limit Line Over Limit ReadLevel Antenna Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 * 2480.00 96.78 74.00 22.78 81.92 32.23 7.28 30.65 6.00 100 355 Peak<br>2 * 2480.00 71.99 54.00 17.99 57.13 32.23 7.28 30.65 6.00 100 355 Average |

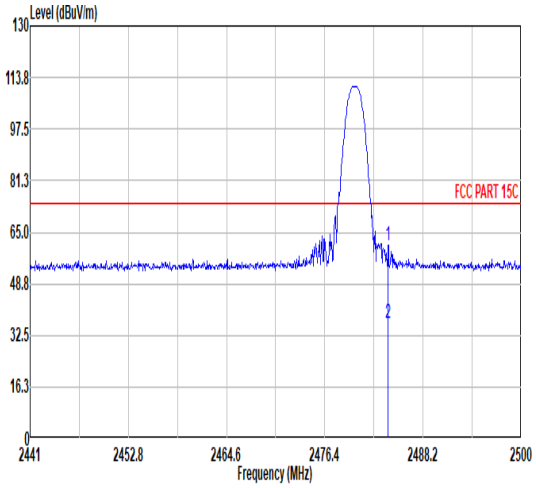
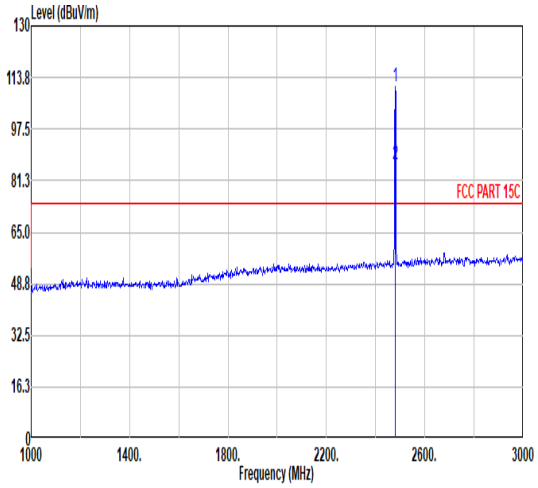
| Mode | 6 | |
|---|---|---|
| | Harmonic | |
| | 2400-2483.5_ Bluetooth EDR_8-DPSK _CH78_2480MHz | |
| ANT | 18 | |
| Pol. | Horizontal | Vertical |
| Peak<br>Avg |  <br><br>Freq Level Limit Line Over Limit ReadLevel Antenna Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 4965.00 42.25 74.00 -31.75 56.79 34.23 10.51 65.28 6.00 300 360 Peak<br>2 7440.00 43.39 74.00 -30.61 53.64 35.65 12.88 64.78 6.00 300 360 Peak |  <br><br>Freq Level Limit Line Over Limit ReadLevel Antenna Factor Cable Loss Preamp Factor Aux Factor A/Pos T/Pos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 4965.00 40.83 74.00 -33.17 55.37 34.23 10.51 65.28 6.00 100 360 Peak<br>2 7440.00 43.24 74.00 -30.76 53.49 35.65 12.88 64.78 6.00 100 360 Peak |

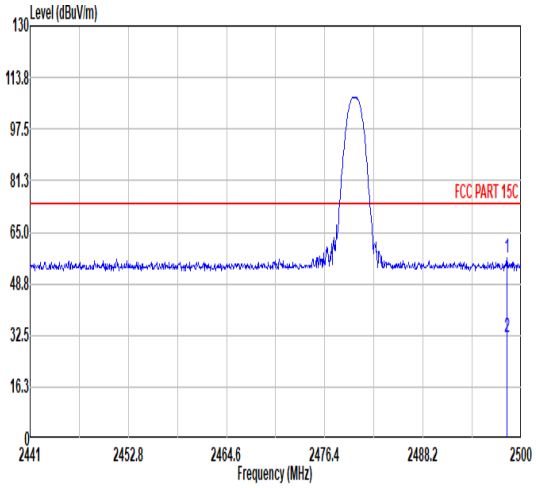
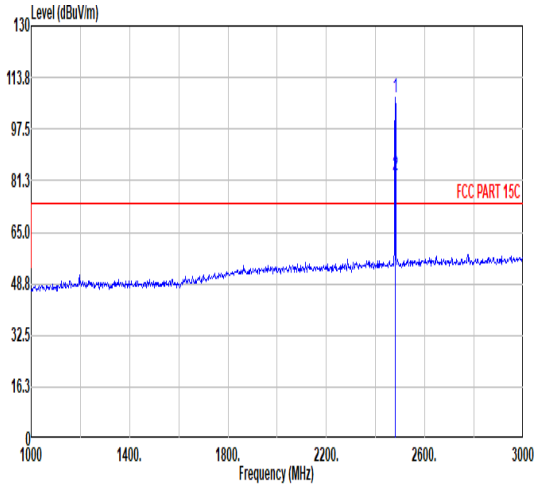
| Mode | 7 | |
|---|---|---|
| | Band Edge | |
| | 2400-2483.5_Bluetooth BR_GFSK_CH00_2402MHz | |
| ANT | BF 15+18 | |
| Pol. | Horizontal | Fundamental |
| Peak |  <br>Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor Aux Factor APos TPos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 2325.21 56.09 74.00 -17.91 42.17 31.84 7.02 30.94 6.00 100 103 PEAK<br>2 2325.21 31.30 54.00 -22.70 17.38 31.84 7.02 30.94 6.00 100 103 AVERAGE |  <br>Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor Aux Factor APos TPos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 2402.00 110.50 ------ ------ 96.24 32.00 7.13 30.87 6.00 100 103 PEAK<br>2 2402.00 85.71 ------ ------ 71.45 32.00 7.13 30.87 6.00 100 103 AVERAGE |

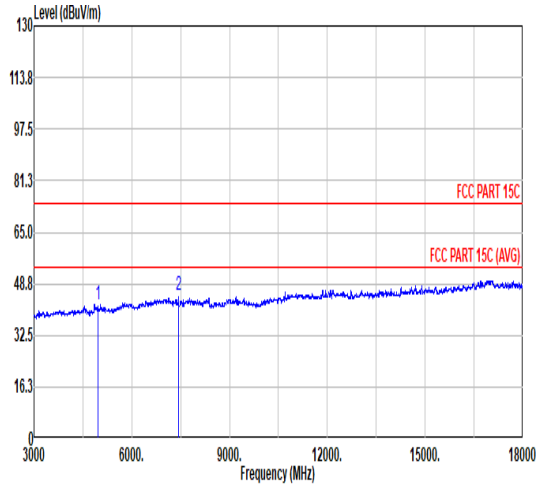
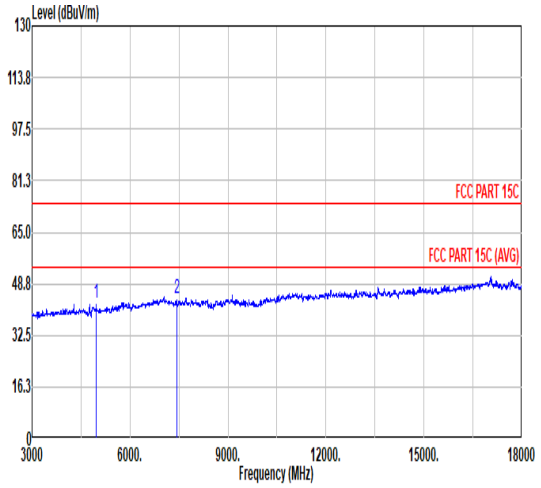
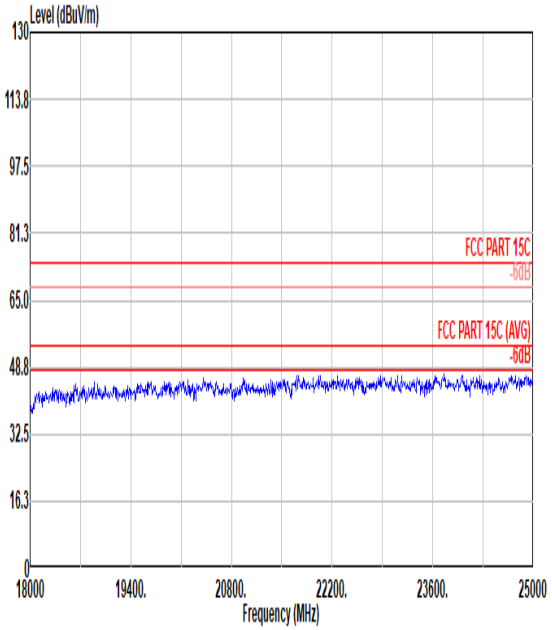
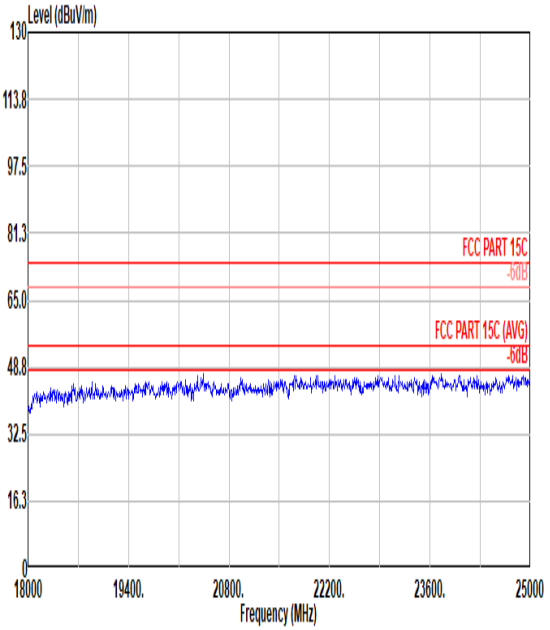
| Mode | 7 | |
|---|---|---|
| | Band Edge | |
| | 2400-2483.5_Bluetooth BR_GFSK_CH00_2402MHz | |
| ANT | BF 15+18 | |
| Pol. | Vertical | Fundamental |
| Peak |  <br>Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor Aux Factor APos TPos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 2388.52 55.61 74.00 -18.39 41.42 31.97 7.11 30.89 6.00 371 116 PEAK<br>2 2388.52 30.82 54.00 -23.18 16.63 31.97 7.11 30.89 6.00 371 116 AVERAGE |  <br>Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor Aux Factor APos TPos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 2402.00 106.54 ------ ------ 92.28 32.00 7.13 30.87 6.00 371 116 PEAK<br>2 2402.00 81.75 ------ ------ 67.49 32.00 7.13 30.87 6.00 371 116 AVERAGE |

| Mode | 7 | |
|---|---|---|
| | Harmonic | |
| | 2400-2483.5_Bluetooth BR_GFSK_CH00_2402MHz | |
| ANT | BF 15+18 | |
| Pol. | Horizontal | Vertical |
| Peak<br>Avg |  <br><br>Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor Aux Factor APos TPos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 4804.00 41.20 74.00 -32.80 62.24 34.10 10.29 65.43 0.00 300 0 PEAK |  <br><br>Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor Aux Factor APos TPos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 4804.00 41.65 74.00 -32.35 62.69 34.10 10.29 65.43 0.00 100 0 PEAK |

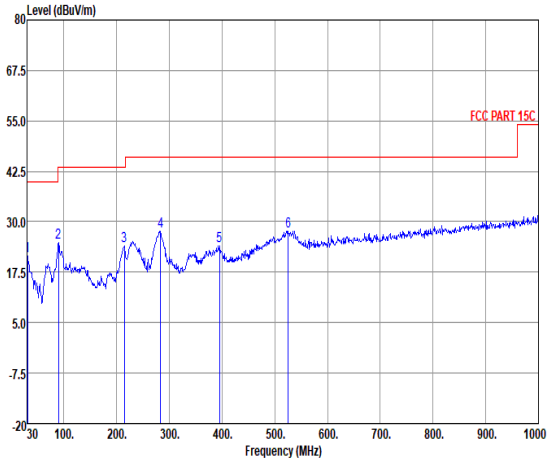
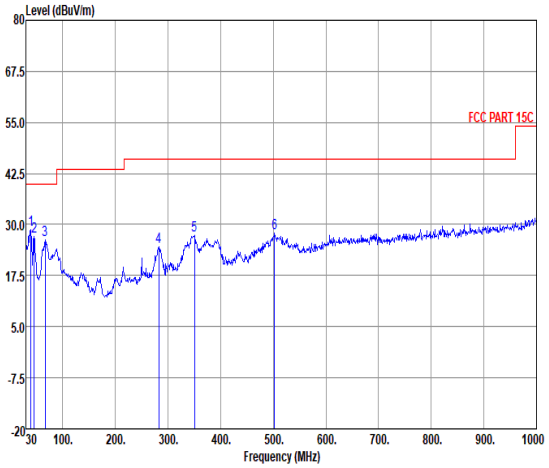
| Mode | 8 | |
|---|---|---|
| | Harmonic | |
| | 2400-2483.5_Bluetooth BR_GFSK_CH39_2441MHz | |
| ANT | BF 15+18 | |
| Pol. | Horizontal | Vertical |
| Peak<br>Avg |  <br><br>Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor Aux Factor APos TPos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 4882.00 44.00 74.00 -30.00 64.95 34.10 10.39 65.44 0.00 300 0 PEAK<br>2 7323.00 45.89 74.00 -28.11 62.52 35.80 12.82 65.25 0.00 300 0 PEAK |  <br><br>Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor Aux Factor APos TPos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 4882.00 42.99 74.00 -31.01 63.94 34.10 10.39 65.44 0.00 100 0 PEAK<br>2 7323.00 44.68 74.00 -29.32 61.31 35.80 12.82 65.25 0.00 100 0 PEAK |

| Mode | 9 | |
|---|---|---|
| | Band Edge | |
| | 2400-2483.5_Bluetooth BR_GFSK_CH78_2480MHz | |
| ANT | BF 15+18 | |
| Pol. | Horizontal | Fundamental |
| Peak |  <br>Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor Aux Factor APos TPos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 2484.01 60.86 74.00 -13.14 46.08 32.13 7.29 30.64 6.00 100 100 PEAK<br>2 2484.01 36.07 54.00 -17.93 21.29 32.13 7.29 30.64 6.00 100 100 AVERAGE |  <br>Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor Aux Factor APos TPos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 2480.00 111.09 ------ ------ 96.35 32.12 7.28 30.66 6.00 100 100 PEAK<br>2 2480.00 86.30 ------ ------ 71.56 32.12 7.28 30.66 6.00 100 100 AVERAGE |

| Mode | 9 | |
|---|---|---|
| | Band Edge | |
| | 2400-2483.5_Bluetooth BR_GFSK_CH78_2480MHz | |
| ANT | BF 15+18 | |
| Pol. | Vertical | Fundamental |
| Peak |  <br>Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor Aux Factor APos TPos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 2498.29 56.71 74.00 -17.29 41.84 32.15 7.32 30.60 6.00 352 79 PEAK<br>2 2498.29 31.92 54.00 -22.08 17.05 32.15 7.32 30.60 6.00 352 79 AVERAGE |  <br>Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor Aux Factor APos TPos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 2480.00 107.58 ------ ------ 92.84 32.12 7.28 30.66 6.00 352 79 PEAK<br>2 2480.00 82.79 ------ ------ 68.05 32.12 7.28 30.66 6.00 352 79 AVERAGE |

| Mode | 9 | |
|---|---|---|
| | Harmonic | |
| | 2400-2483.5_Bluetooth BR_GFSK_CH78_2480MHz | |
| ANT | BF 15+18 | |
| Pol. | Horizontal | Vertical |
| Peak<br>Avg |  <br>Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor Aux Factor APos TPos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 4960.00 42.41 74.00 -31.59 63.26 34.10 10.50 65.45 0.00 300 0 PEAK<br>2 7440.00 45.22 74.00 -28.78 61.88 35.80 12.87 65.33 0.00 300 0 PEAK |  <br>Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor Aux Factor APos TPos Remark<br>MHz dBuV/m dBuV/m dB dBuV dB/m dB dB dB cm deg<br>1 4960.00 42.74 74.00 -31.26 63.59 34.10 10.50 65.45 0.00 100 0 PEAK<br>2 7440.00 44.22 74.00 -29.78 60.88 35.80 12.87 65.33 0.00 100 0 PEAK |
| Peak<br>Avg |  |  |

Note: For 18GHz to 25GHz, only wore case is verified in this report.

| Mode | 9 | |
|---|---|---|
| | Emission below 1GHz | |
| | 2400-2483.5_Bluetooth BR_GFSK_CH78_2480MHz | |
| ANT | BF 15+18 | |
| Pol. | Horizontal | Vertical |
| Peak<br>QP |  <br> |  <br> |

Horizontal:

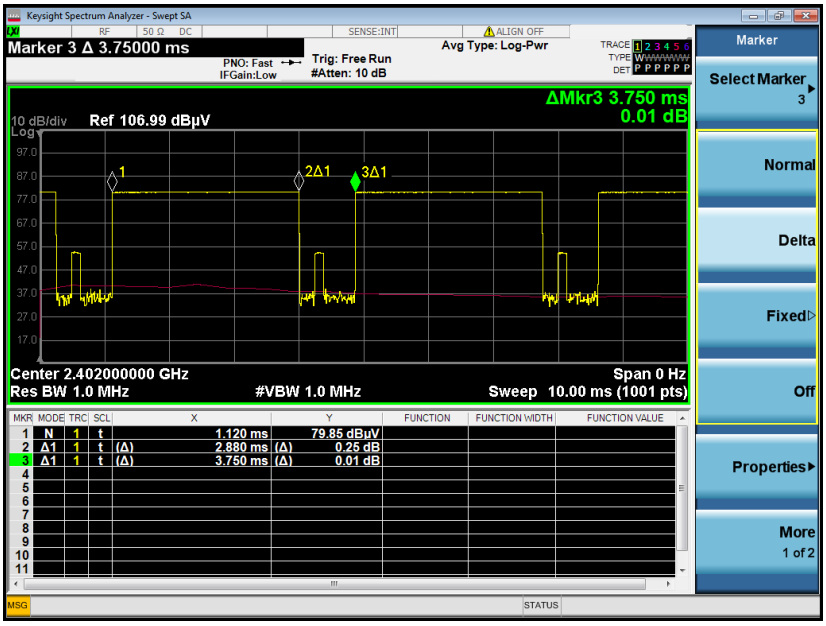
| | Freq | Level | Limit Line | Over Limit | ReadLevel | Antenna Factor | Cable Loss | Preamp Factor | Aux Factor | A/Pos | T/Pos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB/m | dB | dB | dB | cm | deg | |
| 1 | 30.97 | 21.57 | 40.00 | -18.43 | 28.71 | 24.55 | 0.51 | 32.20 | 0.00 | --- | --- | Peak |
| 2 | 90.14 | 24.76 | 43.50 | -18.74 | 41.14 | 14.60 | 1.32 | 32.30 | 0.00 | --- | --- | Peak |
| 3 | 214.30 | 24.13 | 43.50 | -19.37 | 39.07 | 15.05 | 2.14 | 32.13 | 0.00 | --- | --- | Peak |
| 4 | 283.17 | 27.59 | 46.00 | -18.41 | 38.42 | 18.84 | 2.46 | 32.13 | 0.00 | --- | --- | Peak |
| 5 | 394.72 | 24.02 | 46.00 | -21.98 | 31.84 | 21.57 | 2.90 | 32.29 | 0.00 | --- | --- | Peak |
| 6 | 525.67 | 27.74 | 46.00 | -18.26 | 32.13 | 24.62 | 3.34 | 32.35 | 0.00 | --- | --- | Peak |

Vertical:

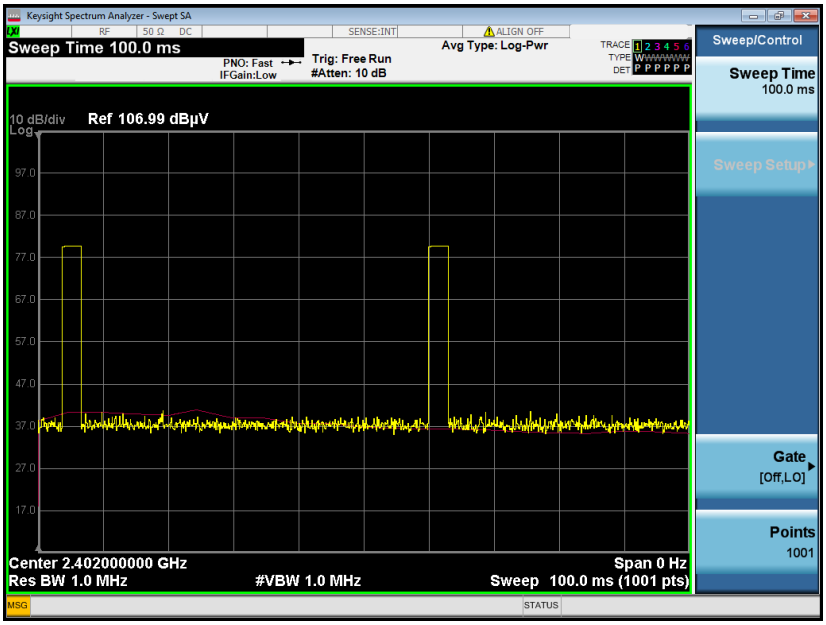
| | Freq | Level | Limit Line | Over Limit | ReadLevel | Antenna Factor | Cable Loss | Preamp Factor | Aux Factor | A/Pos | T/Pos | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MHz | dBuV/m | dBuV/m | dB | dBuV | dB/m | dB | dB | dB | cm | deg | |
| 1 | 39.70 | 28.66 | 40.00 | -11.34 | 40.48 | 19.68 | 0.62 | 32.12 | 0.00 | --- | --- | Peak |
| 2 | 45.52 | 26.97 | 40.00 | -13.03 | 42.04 | 16.42 | 0.71 | 32.20 | 0.00 | --- | --- | Peak |
| 3 | 66.86 | 26.34 | 40.00 | -13.66 | 45.30 | 12.17 | 1.01 | 32.14 | 0.00 | --- | --- | Peak |
| 4 | 282.20 | 24.46 | 46.00 | -21.54 | 35.34 | 18.80 | 2.46 | 32.14 | 0.00 | --- | --- | Peak |
| 5 | 350.10 | 27.32 | 46.00 | -18.68 | 36.50 | 20.29 | 2.73 | 32.20 | 0.00 | --- | --- | Peak |
| 6 | 502.39 | 27.91 | 46.00 | -18.09 | 33.13 | 23.91 | 3.27 | 32.40 | 0.00 | --- | --- | Peak |

# Appendix D. Duty Cycle Plots

### 3DH5 on time (One Pulse) Plot on Channel 00




### 3DH5 on time (Count Pulses) Plot on Channel 00




**Note:**

1. Worst case Duty cycle = on time/100 milliseconds = 2 * 2.88 / 100 = 5.76 %
2. Worst case Duty cycle correction factor = 20*log(Duty cycle) = -24.79 dB
3. 3DH5 has the highest duty cycle worst case and is reported.