CTK Co., Ltd.
(Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea
Tel: +82-31-339-9970 Fax: +82-31-624-9501
www.e-ctk.com

# TEST REPORT

**FCC Standards : FCC 47CFR part 15 subpart C**
**Industry Canada Standards :RSS-210 Issue 8 & RSS-GEN Issue 3**

| | | |
|---|---|---|
| Test Report No. | : | CTK-2015-00281 |
| Date of Issue | : | 2015-03-05 |
| FCC ID | : | V2R-BT100NC |
| IC ID | : | 10488A-BT100NC |
| Model/Type No. | : | BT 100 NC |
| Kind of Product | : | Neck Band Bluetooth Noise cancelling Earphones |
| Applicant | : | Cresyn Co., Ltd. |
| Applicant Address | : | 5 Gangnam-dearo 107-gil, Seocho-gu, Seoul, Korea |
| Manufacturer | : | Cresyn Co., Ltd. |
| Manufacturer Address | : | 5 Gangnam-dearo 107-gil, Seocho-gu, Seoul, Korea |
| Contact Person | : | Jaesoo, Jung / Research Engineer |
| Telephone | : | +82-2-2041-2646 |
| Received Date | : | 2015-02-02 |
| Test period | : | Start : 2015-02-13 End : 2015-03-04 |

The test results presented in this report relate only to the object tested.

*Tested by*

Won-Jae, Hwang
Test Engineer
Date: 2015-03-05

*Reviewed by*

Young-Joon, Park
Technical Manager
Date: 2015-03-05

# REPORT REVISION HISTORY

| Date | Revision | Page No |
|---|---|---|
| 2015-03-05 | Issued (CTK-2015-00281) | All |
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# TABLE OF CONTENTS

# 1.0 General Product Description

| | |
|---|---|
| Basic Model/Type No. | BT 100 NC |
| Serial number | Prototype |
| EUT condition | Pre-production, not damaged |
| Antenna type | Film antenna Gain -0.3 dBi |
| Frequency Range | 2402 MHz - 2480 MHz |
| RF power | -0.349 dBm Peak Conducted (GFSK)<br>0.256 dBm Peak Conducted (DQPSK) |
| Number of channels | 79 |
| Channel Spacing | 1 MHz |
| Channel Access Protocol | Frequency Hopping |
| Type of Modulation | GFSK(1 Mbps), DQPSK(2 Mbps) |
| Power Source | DC 3.7 V (Lithium Ion Rechargeable Battery) |

## 1.1 Tested Frequency

| | LOW | MID | HIGH |
|---|---|---|---|
| **Frequency (MHz)** | 2402 | 2441 | 2480 |

## 1.2 Tested Mode

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

- Following channel(s) was (were) selected for the final test as listed below.

| Tested Ch | Modulation Technology | Modulation Type | Packet Type |
|---|---|---|---|
| Low, Mid, High | FHSS | GFSK | DH 5 |
| Low, Mid, High | FHSS | DQPSK | 2DH 5 |

## 1.3 Device Modifications

The following modifications was applied by the applicant:

Not applicable

## 1.4 Peripheral Devices

| Device | Manufacturer | Model No. | Serial No. |
|---|---|---|---|
| Notebook Computer | TOSHIBA CORPORATION | PSLB0K-02900V | 58084408Q |
| AC/DC Adaptor | DELTA ELECTRONICS, INC. | ADP-75SB AB | 708W15Y01MK |

## 1.5 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

## 1.6 Test Facility

The measurement facility is located at (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

## 1.7 Laboratory Accreditations and Listings

| Country | Agency | Scope of Accreditation | Logo |
|---|---|---|---|
| USA | **FCC** | 3 m & 10 m SAC and Conducted Test Site to perform FCC Part 15/18 measurements | 805871 |
| JAPAN | **VCCI** | 3 m & 10 m SAC and Conducted Test Site | R-948, C-986, T-1843 |
| KOREA | **KCC** | EMI (10 m SAC and Conducted Test Site)<br>EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and Interruptions) | No. 51, KR0025 |
| International | **KOLAS** | EMC | |

## 2.0 Summary of tests

| FCC Part Section(s) | Parameter | Limit | Test Condition | Status (note 1) |
|---|---|---|---|---|
| 15.247(a) | Carrier Frequency Separation | > 25 kHz | Conducted | C |
| 15.247(a) | Number of Hopping Frequencies | > 15 hops | | C |
| 15.247(a) | 20 dB Bandwidth | NA | | C |
| 15.247 | Dwell Time | < 0.4 seconds | | C |
| 15.247(b) | Transmitter Output Power | < 0.125 Watts | | C |
| 15.247(d) | Conducted Spurious emission | > 20 dBc | | C |
| 15.247(d) | Band Edge | > 20 dBc | | C |
| 15.209 | Field Strength of Harmonics | 15.209(a) | Radiated | C |
| 15.207 | AC Conducted Emissions | 15.207(a) | Line Conducted | C |

*Note 1*: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

*Note 2*: The data in this test report are traceable to the national or international standards.

The sample was tested according to the following specification:
- FCC Part 15.247, ANSI C63.4-2003

The tests were performed according to the method of measurements prescribed in DA 00-705.

# 2.1 Transmitter Requirements

## 2.1.1 Carrier Frequency Separation

### Test Location
RF Test Room

### Test Procedures

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna terminal, while EUT has its hopping function enabled.
After the trace being stable, the reading value between the peaks of the adjacent channels using the marker-delta function was recorded as the measurement results.

The spectrum analyzer is set to:
Span = 5 MHz (wide enough to capture the peaks of two adjacent channels)
RBW = 30 kHz (≥ 1% of the span) Sweep = auto
VBW = 30 kHz (≥ RBW) Detector function = peak
Trace = max hold

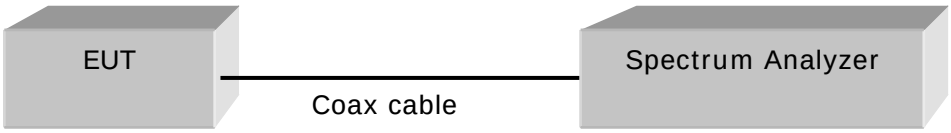



Figure 1 : Measurement setup for the carrier frequency separation

### Limit
§15.247(a)(1) Frequency hopping system operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-third of 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

### Test Results

**Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)**

| Channel | Adjacent Hopping Channel Separation (kHz) | Two-third of 20dB bandwidth (kHz) | Minimum Bandwidth (kHz) | Result |
|---|---|---|---|---|
| 2441MHz | 985 | 627.3 | 25 | Complies |

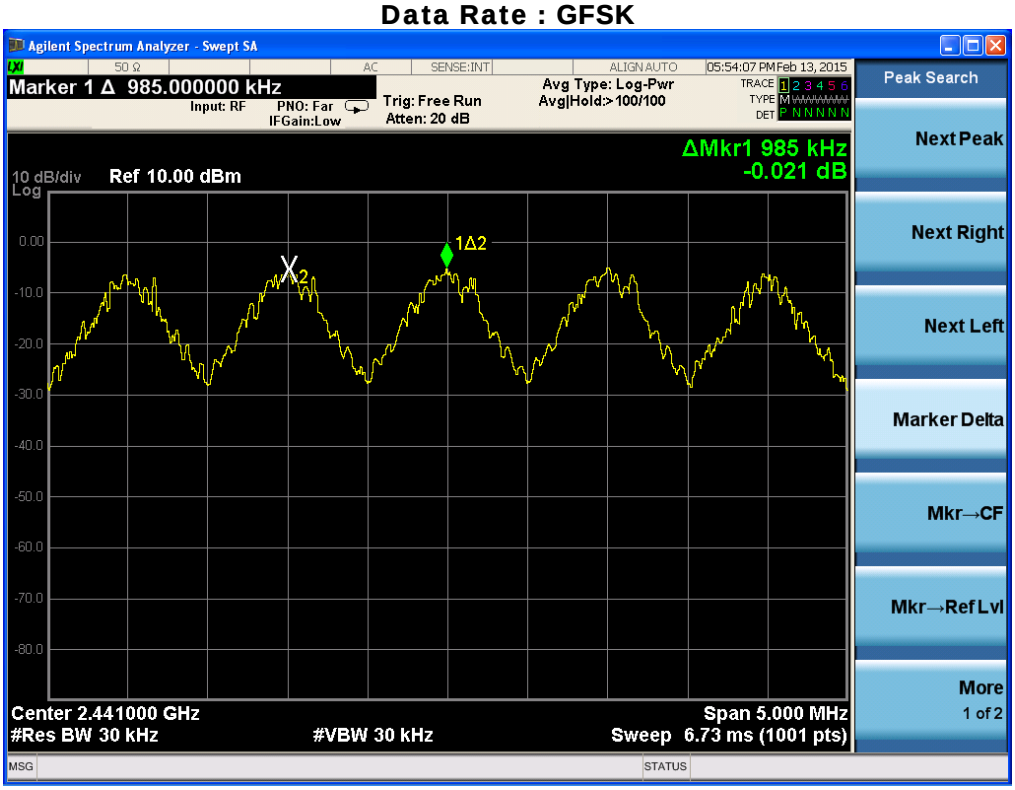
**Test mode : DQPSK, CFG PKT Packet Type : 30 Packet Size : 679(2DH5)**

| Channel | Adjacent Hopping Channel Separation (kHz) | Two-third of 20dB bandwidth (kHz) | Minimum Bandwidth (kHz) | Result |
|---|---|---|---|---|
| 2441MHz | 1005 | 820.0 | 25 | Complies |

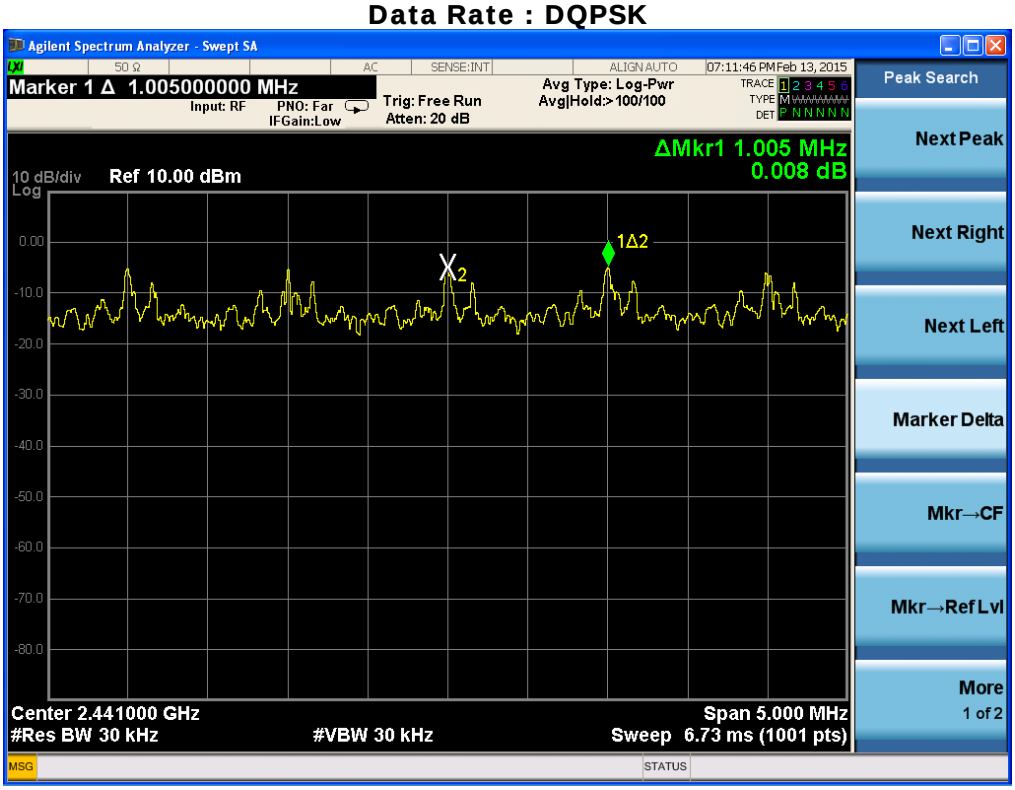
See next pages for actual measured spectrum plots.

## Carrier Frequency Separation

### Data Rate : GFSK




### Data Rate : DQPSK



## 2.1.2 Number of Hopping Frequencies

### Test Location

RF Test Room

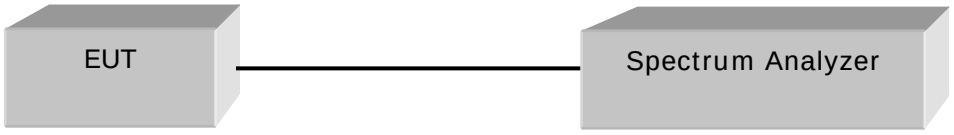
### Test Procedures

The number of hopping frequencies was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

The spectrum analyzer is set to:

Frequency range 1: Start = 2389.5 MHz, Stop = 2439.5 MHz
2: Start = 2439.5 MHz, Stop = 2489.5 MHz

Span = 50 MHz
RBW = 300 kHz (≥ 1% of the span) Sweep = auto
VBW = 300 kHz (≥ RBW) Detector function = peak
Trace = max hold




### Limit

§15.247(a)(1)(iii) For frequency hopping system operating in the 2400-2483.5 MHz band shall use at least 15 hopping frequencies.

### Test Results

**Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)**

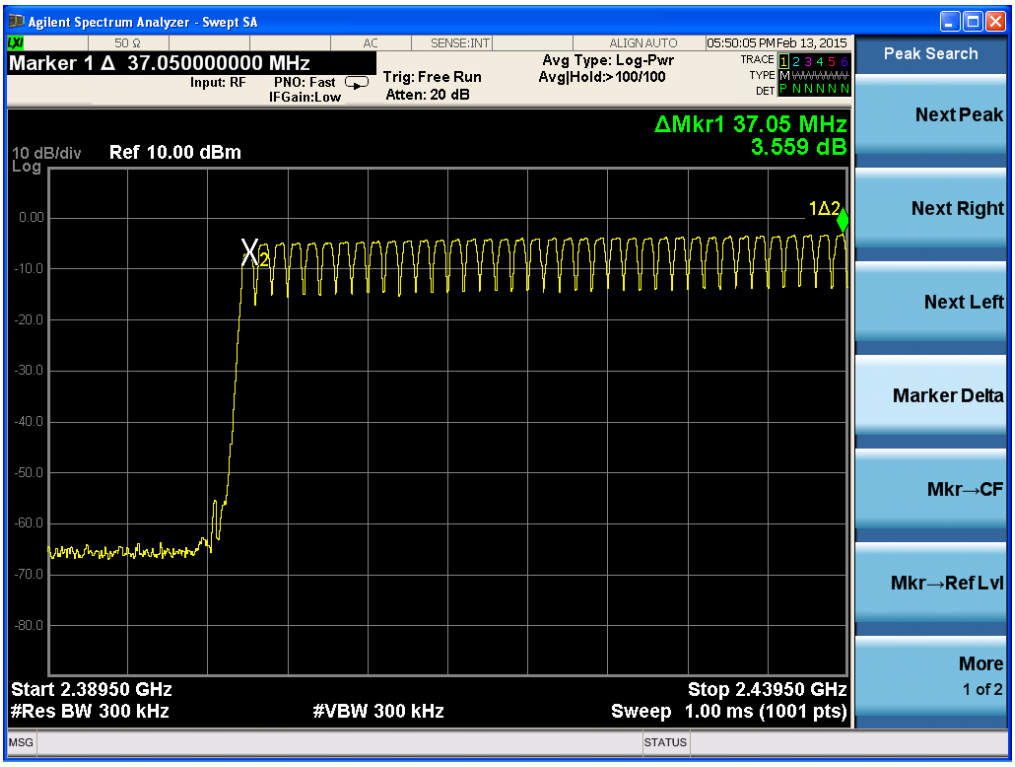
| Total number of Hopping Channels | Result |
|---|---|
| 79 | Complies |

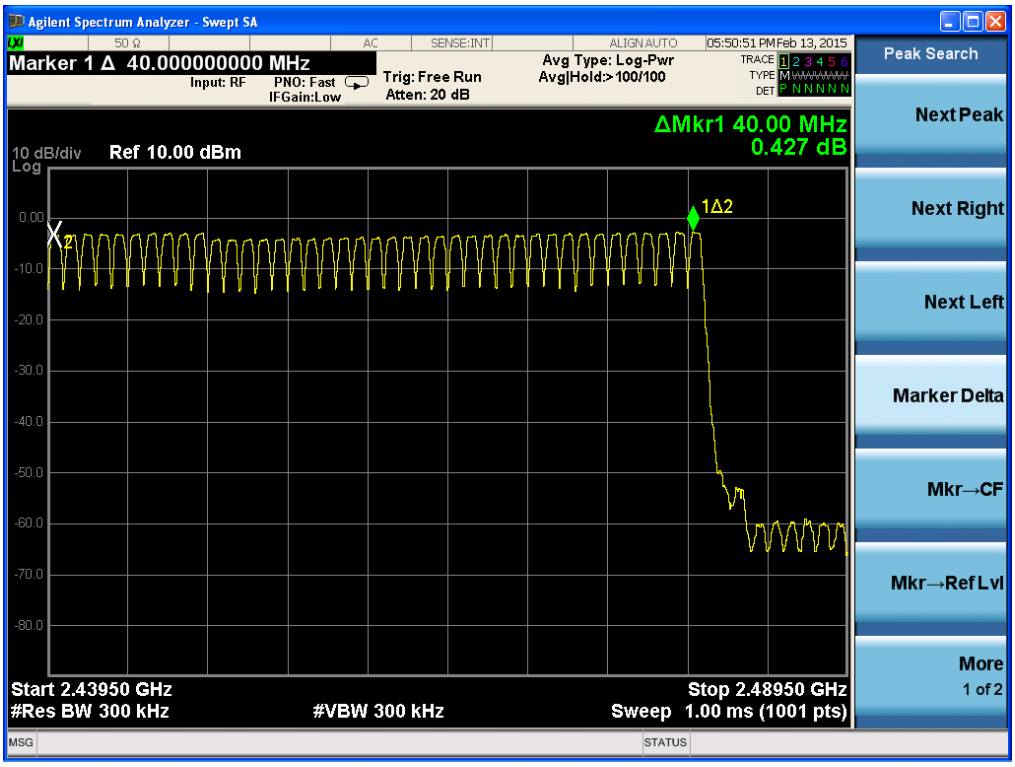
**Test mode : DQPSK, CFG PKT Packet Type : 30 Packet Size : 679(2DH5)**

| Total number of Hopping Channels | Result |
|---|---|
| 79 | Complies |

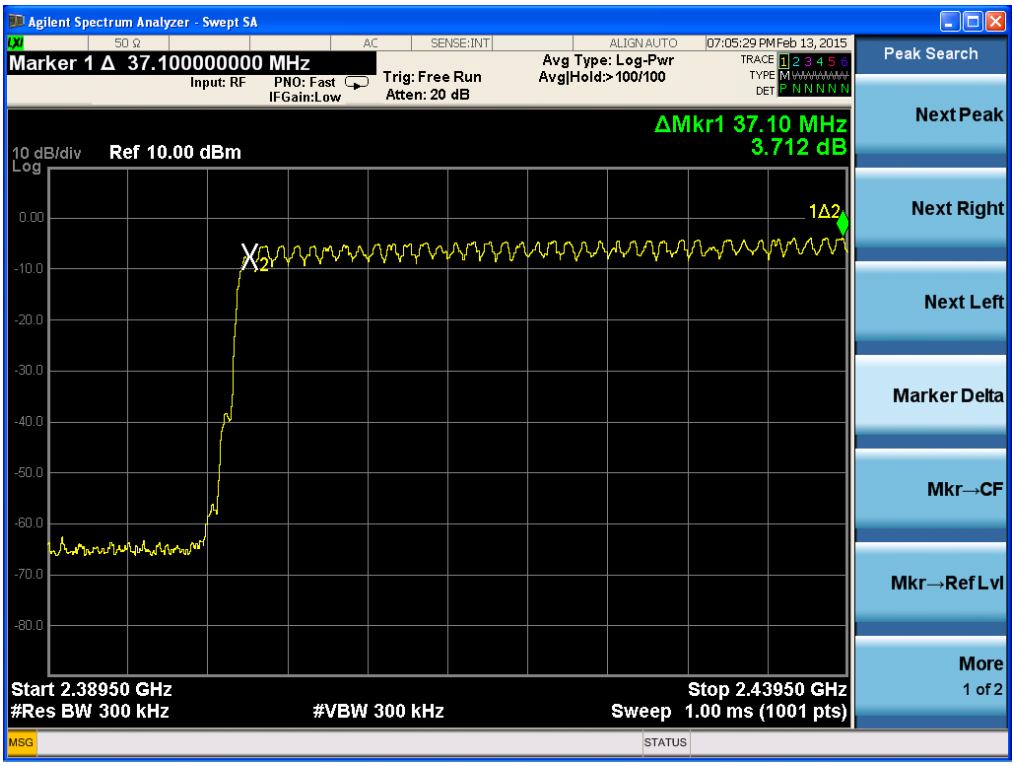
See next pages for actual measured spectrum plots.

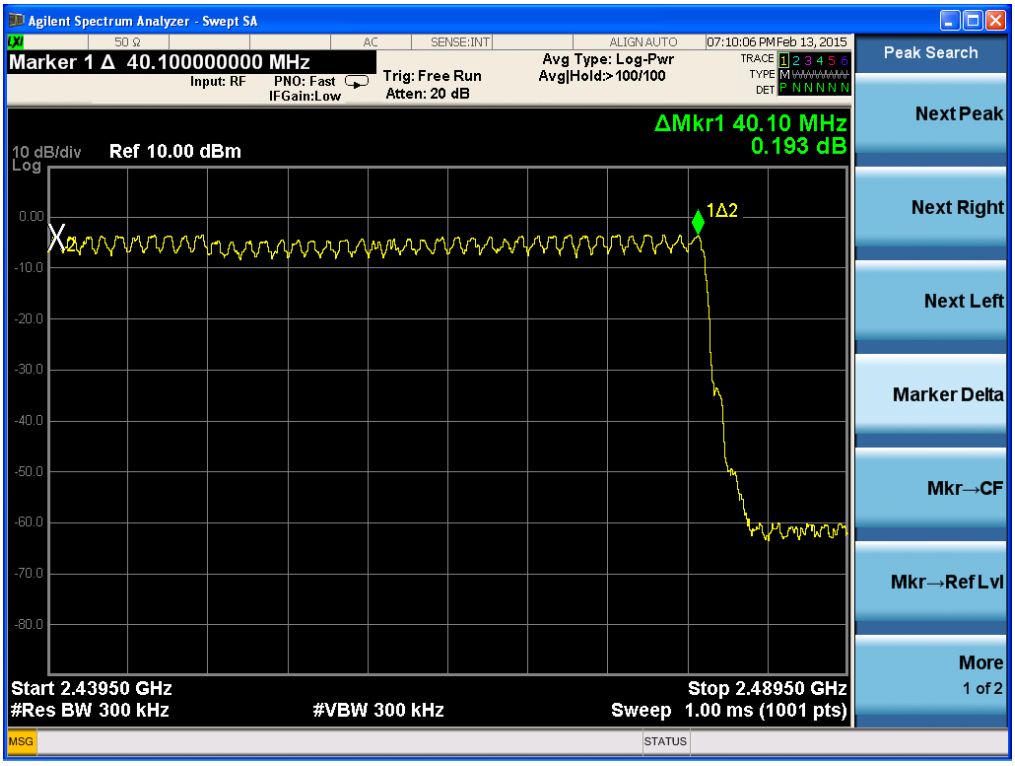
## Number of Hopping Frequencies(GFSK)



## Number of Hopping Frequencies(DQPSK)



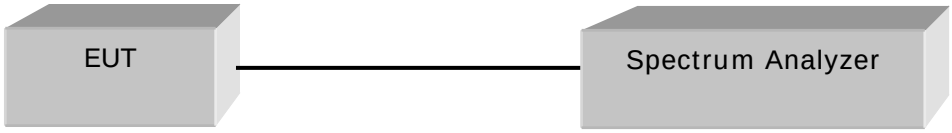
## 2.1.3 20 dB bandwidth

### Test Location
RF Test Room

### Test Procedures

The bandwidth at 20 dB below the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels.
After the trace being stable, Use the marker-to peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

The spectrum analyzer is set to:
Center frequency = the highest, middle and the lowest channels
Span = 3 MHz (approximately 2 or 3 times of the 20 dB bandwidth)
RBW = 30 kHz (≥ 1% of the span) Sweep = auto
VBW = 30 kHz (≥ RBW) Detector function = peak
Trace = max hold




### Limit

Limit : N/A

## Test Results (20 dB bandwidth)

**Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)**

| Frequency (MHz) | Channel Number. | Measured Bandwidth (MHz) | Result |
|---|---|---|---|
| 2402 | 0 | 0.941 | Complies |
| 2441 | 39 | 0.939 | Complies |
| 2480 | 78 | 0.938 | Complies |

**Test mode : DQPSK, CFG PKT Packet Type : 30 Packet Size : 679(2DH5)**

| Frequency (MHz) | Channel Number. | Measured Bandwidth (MHz) | Result |
|---|---|---|---|
| 2402 | 0 | 1.249 | Complies |
| 2441 | 39 | 1.230 | Complies |
| 2480 | 78 | 1.226 | Complies |

## Test Results (Occupied Bandwidth)

**Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)**

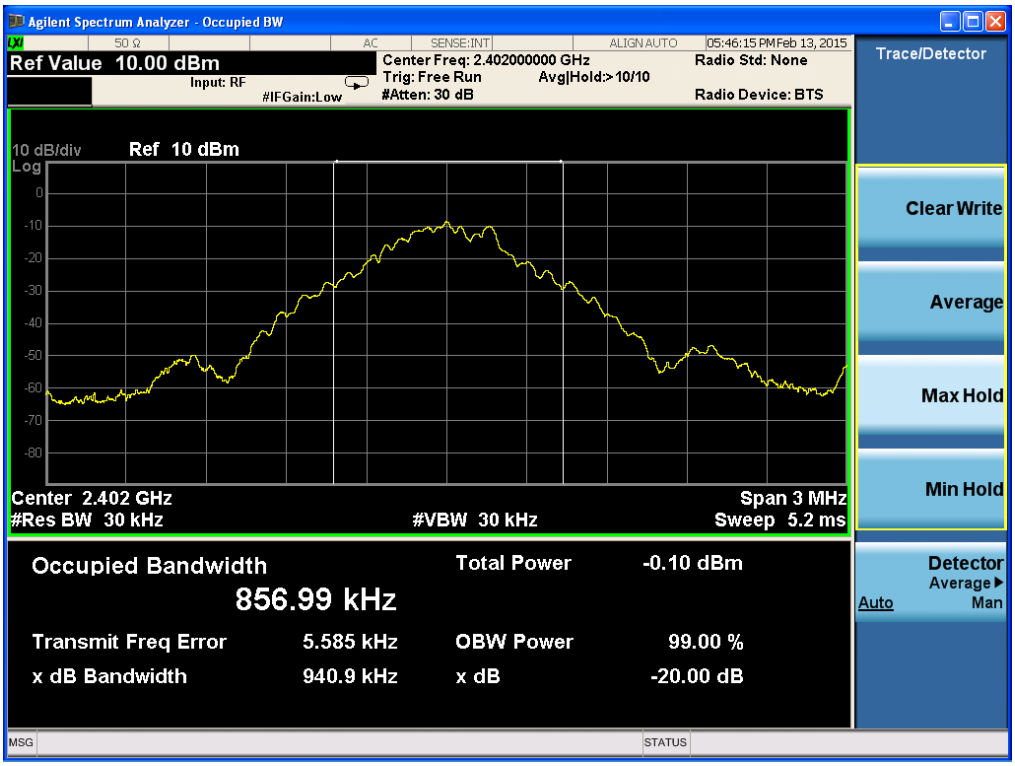
| Frequency (MHz) | Channel Number. | Measured Bandwidth (MHz) | Result |
|---|---|---|---|
| 2402 | 0 | 0.857 | Complies |
| 2441 | 39 | 0.852 | Complies |
| 2480 | 78 | 0.853 | Complies |

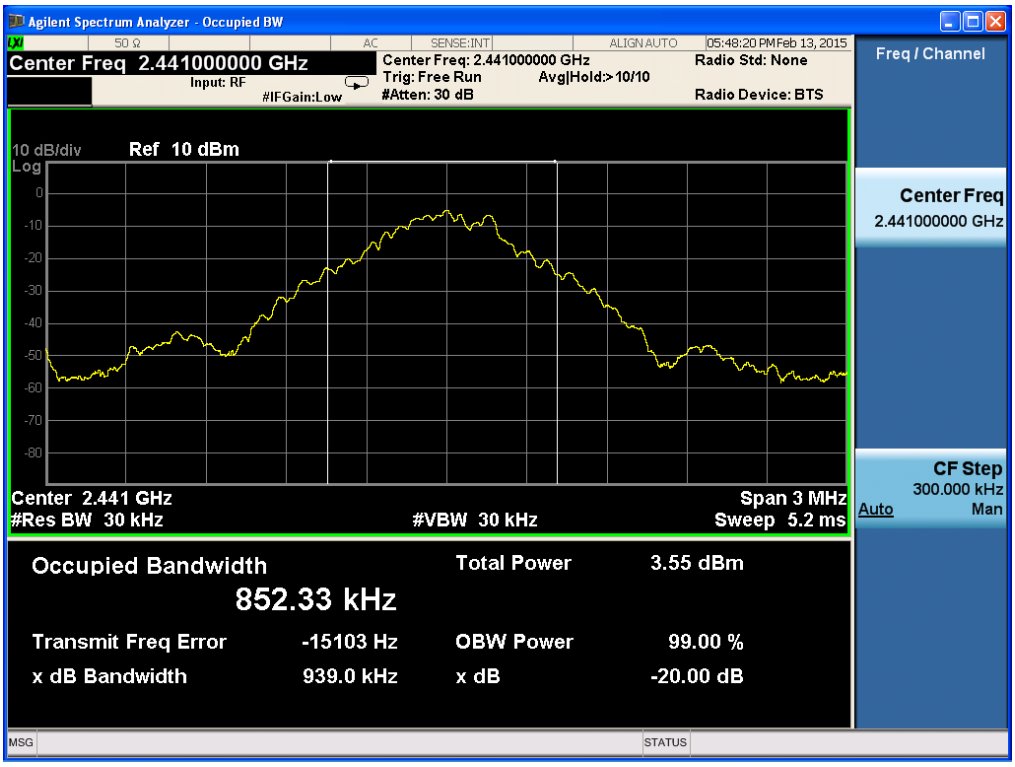
**Test mode : DQPSK, CFG PKT Packet Type : 30 Packet Size : 679(2DH5)**

| Frequency (MHz) | Channel Number. | Measured Bandwidth (MHz) | Result |
|---|---|---|---|
| 2402 | 0 | 1.169 | Complies |
| 2441 | 39 | 1.175 | Complies |
| 2480 | 78 | 1.170 | Complies |

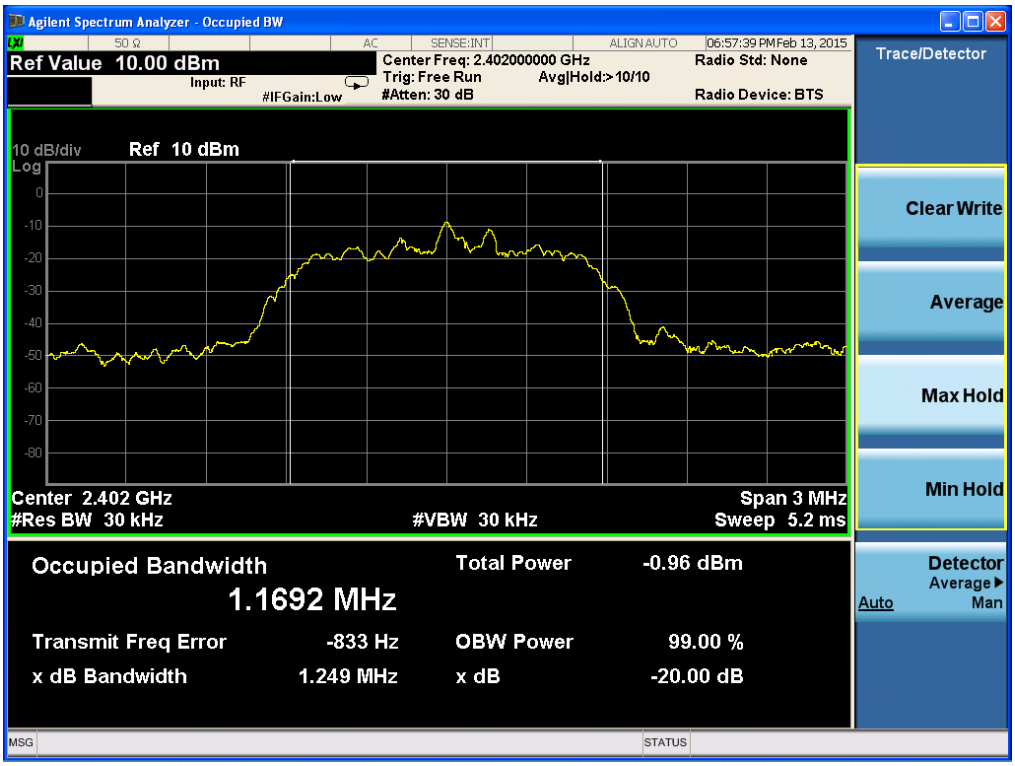
See next pages for actual measured spectrum plots.

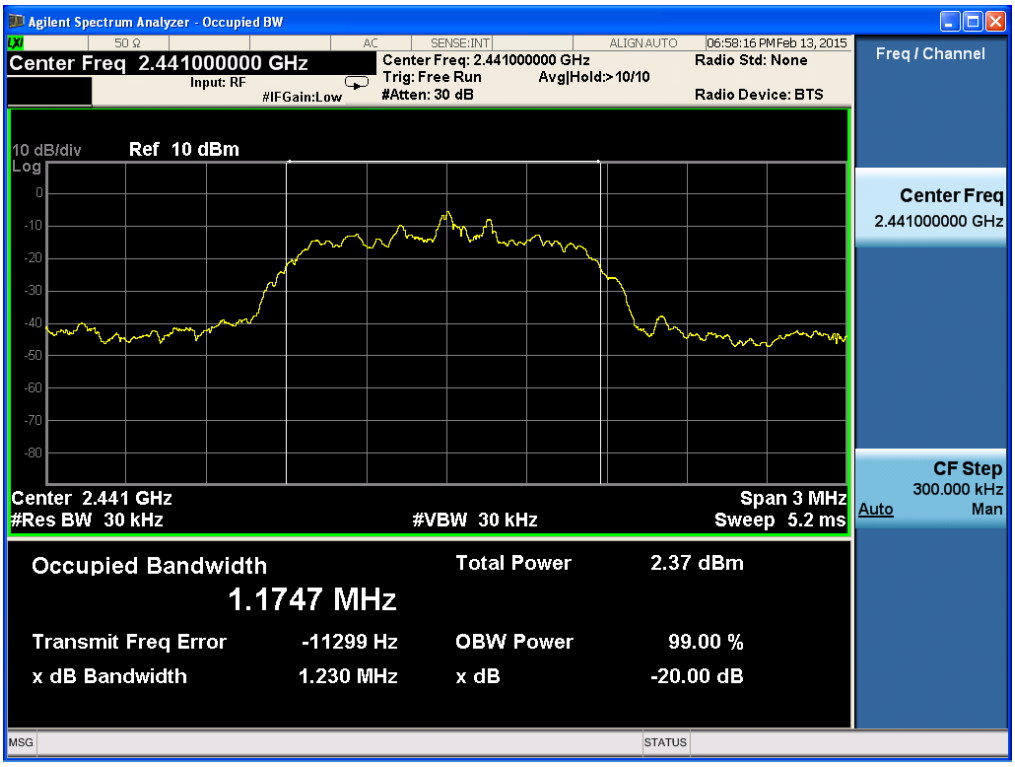
## 20 dB Bandwidth, Occupied Bandwidth - GFSK

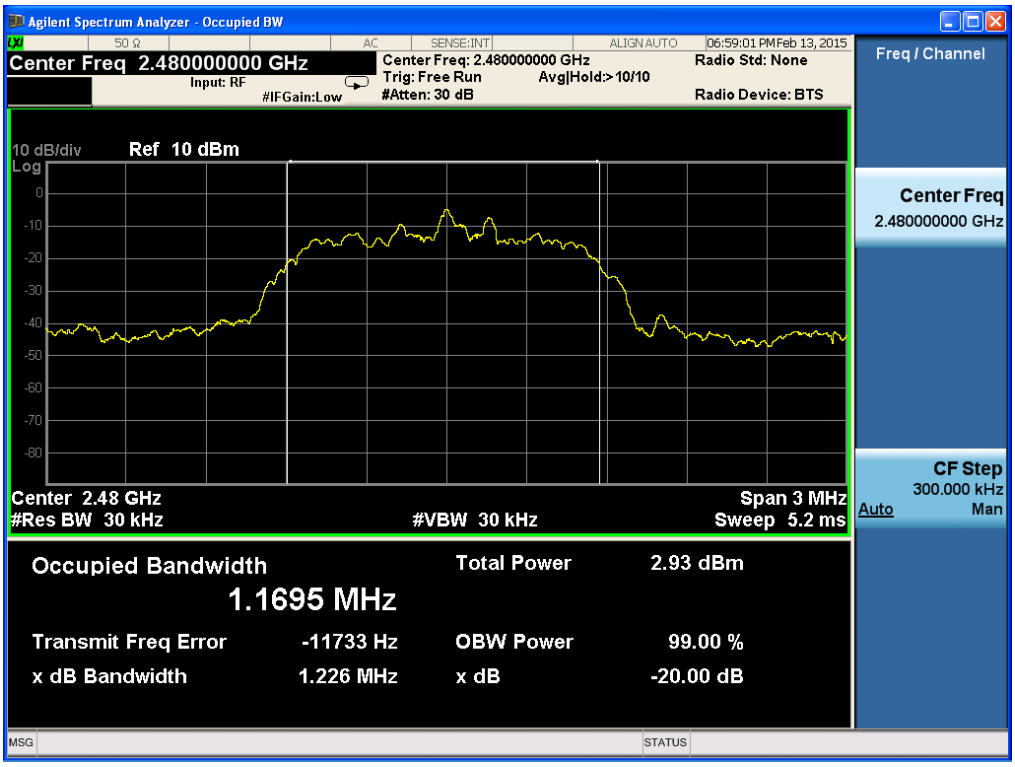


## 20 dB Bandwidth, Occupied Bandwidth - DQPSK





## 2.1.4 Time of Occupancy (Dwell Time)

### Test Location

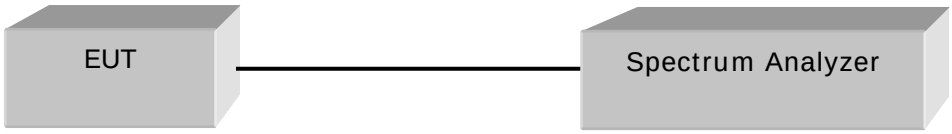
RF Test Room

### Test Procedures

The dwell time was measured with a spectrum analyzer connected to the antenna terminal, while EUT has its hopping function enabled.

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in test setup without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of spectrum analyzer on any frequency be measured and set spectrum analyzer to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.
6. The BT 100 NC has 3 type of payload, DH1, DH3, DH5. The hopping rate is 1600 per second.

The spectrum analyzer is set to:
Center frequency = the highest, middle, and the lowest channels
Span = zero
RBW = 1 MHz Trace = max hold
VBW = 1 MHz (≥ RBW) Detector function = peak
Sweep = as necessary to capture the entire dwell time per hopping channel




### Limit

§15.247(a)(1)(iii) For frequency hopping system operating in 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 0.4 seconds multiplied by the number of hopping channels employed.

## Test Results

Time of occupancy on the TX channel in 31.6 sec = time domain slot length × hop rate ÷ number of hop per channel × 31.6

**Test mode : GFSK**

| Channel Frequency (MHz) | Packet Type | Dwell Time (ms) | Test Results | |
|---|---|---|---|---|
| | | | Time of occupancy on the TX channel in 31.6sec (ms) | Result |
| 2441 | DH 1 | 0.402 | 128.6 | Complies |
| | DH 3 | 1.650 | 264.0 | Complies |
| | DH 5 | 2.900 | 309.3 | Complies |

DH1 Dwell time = 0.402 ms × (1600÷2) ÷ 79 × 31.6 = 128.6 ms
DH3 Dwell time = 1.650 ms × (1600÷4) ÷ 79 × 31.6 = 264.0 ms
DH5 Dwell time = 2.900 ms × (1600÷6) ÷ 79 × 31.6 = 309.3 ms

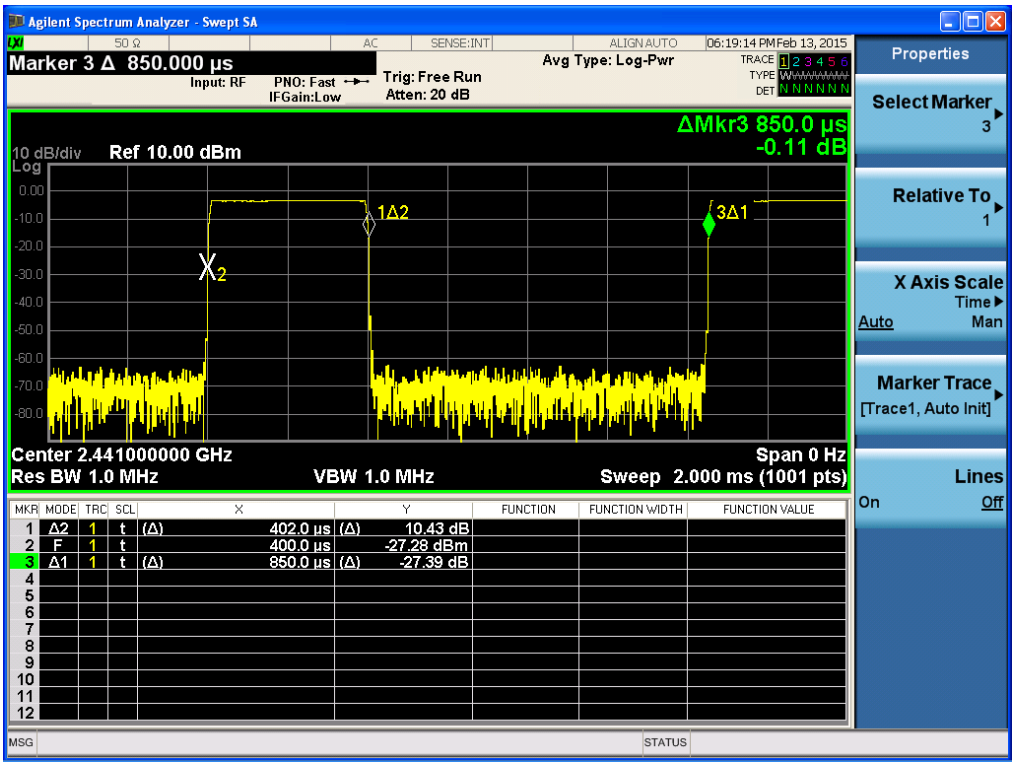
**Test mode : DQPSK**

| Channel Frequency (MHz) | Packet Type | Dwell Time (ms) | Test Results | |
|---|---|---|---|---|
| | | | Time of occupancy on the TX channel in 31.6sec (ms) | Result |
| 2441 | 2DH 1 | 0.416 | 131.5 | Complies |
| | 2DH 3 | 1.657 | 266.4 | Complies |
| | 2DH 5 | 2.910 | 310.4 | Complies |

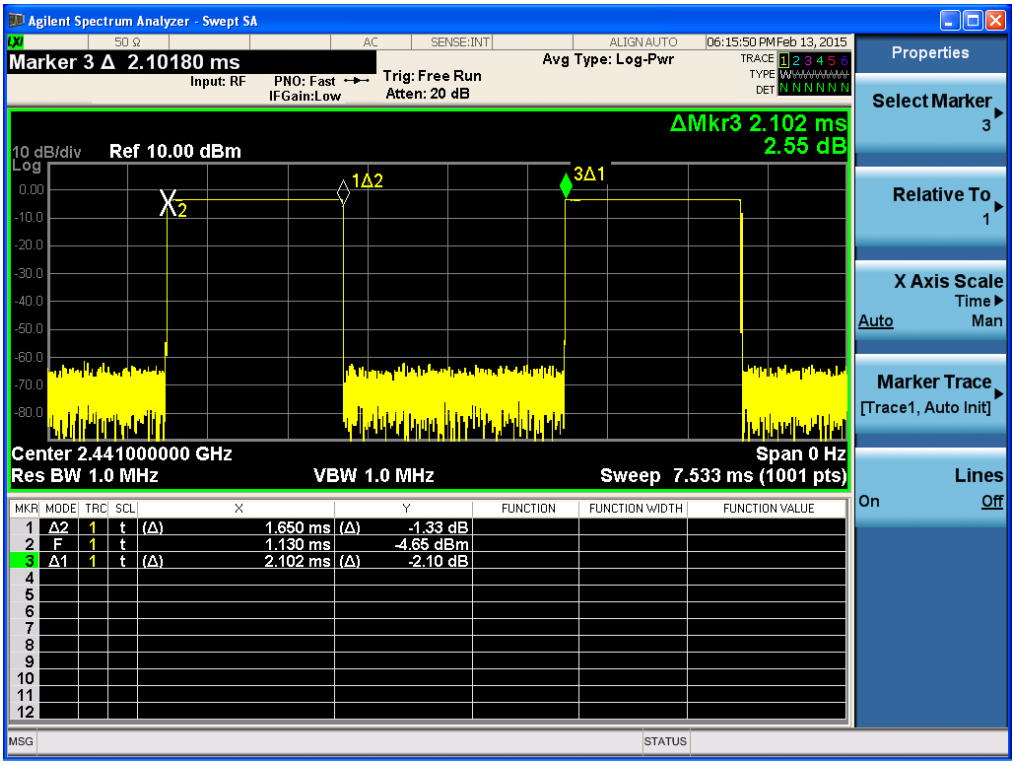
2DH1 Dwell time = 0.416 ms × (1600÷2) ÷ 79 × 31.6 = 131.5 ms
2DH3 Dwell time = 1.657 ms × (1600÷4) ÷ 79 × 31.6 = 266.4 ms
2DH5 Dwell time = 2.910 ms × (1600÷6) ÷ 79 × 31.6 = 310.4 ms

See next pages for actual measured spectrum plots.

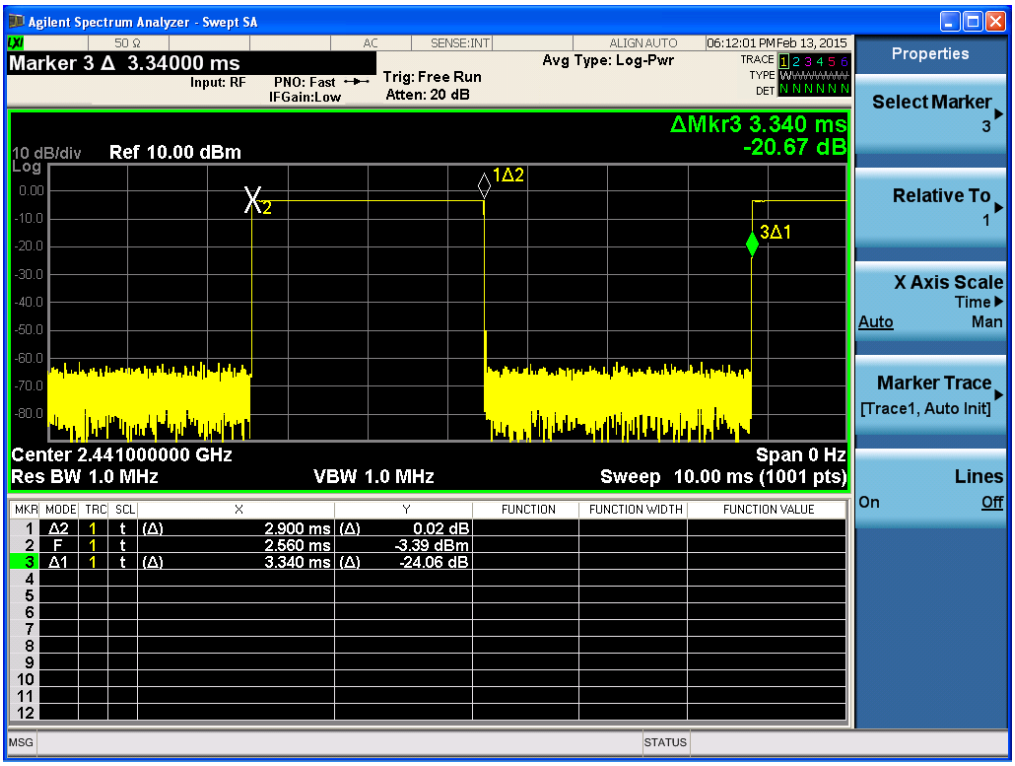
## Time of Occupancy for PACKET Type DH1(GFSK)



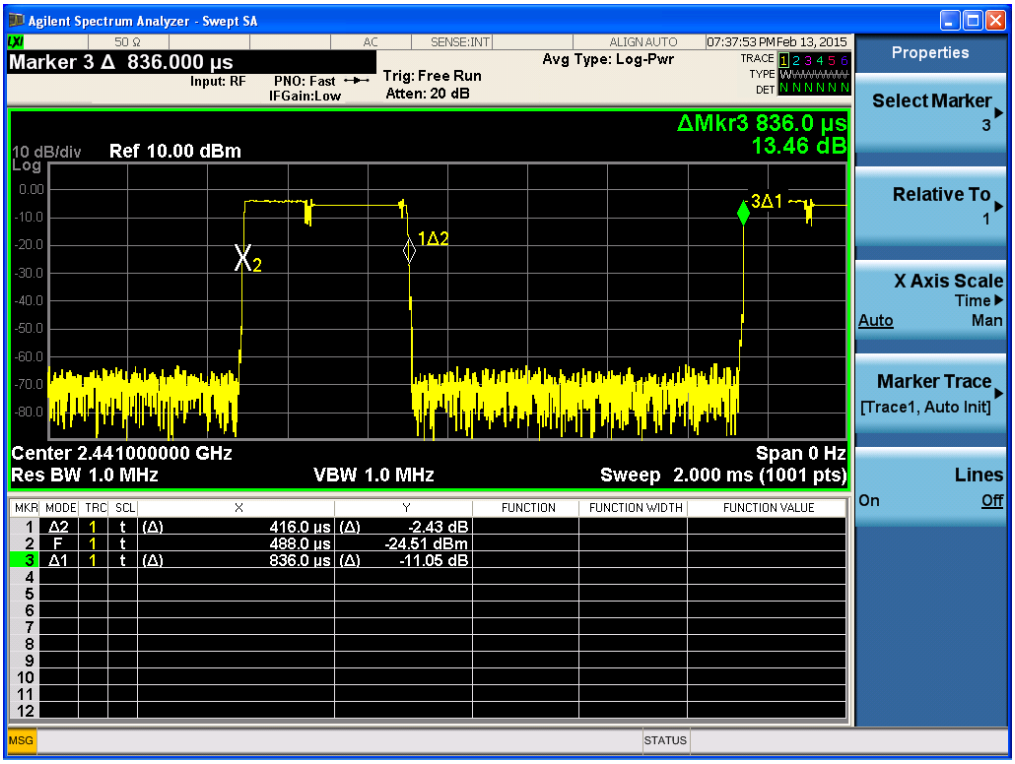

## Time of Occupancy for PACKET Type DH3(GFSK)



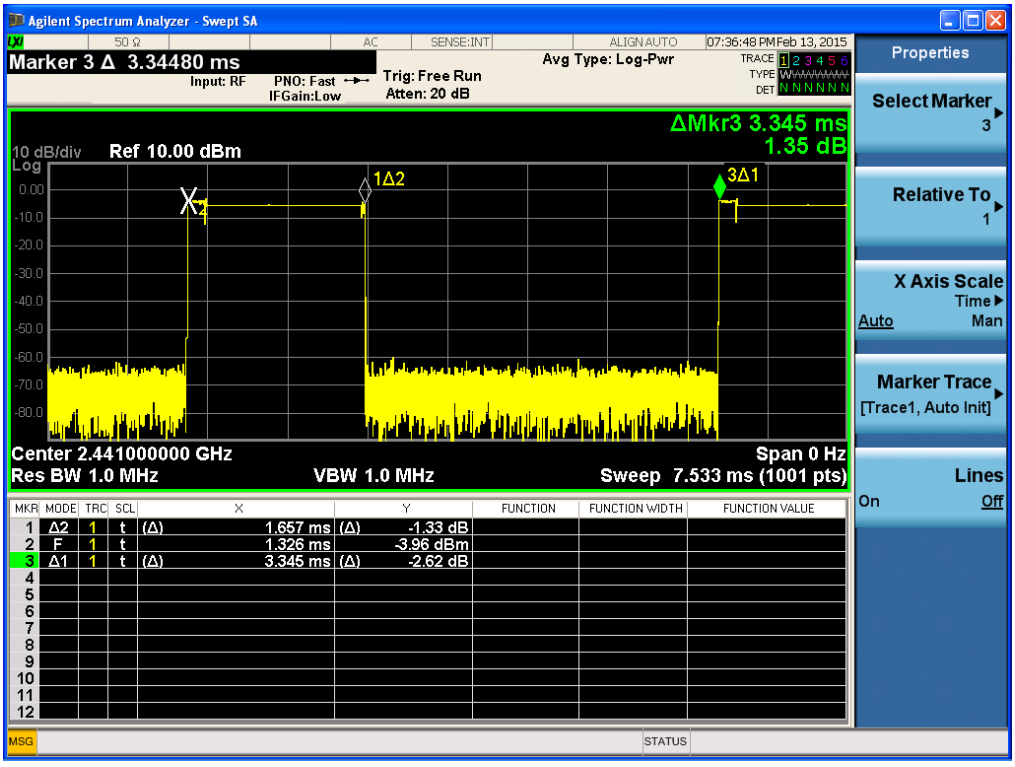
## Time of Occupancy for PACKET Type DH5(GFSK)



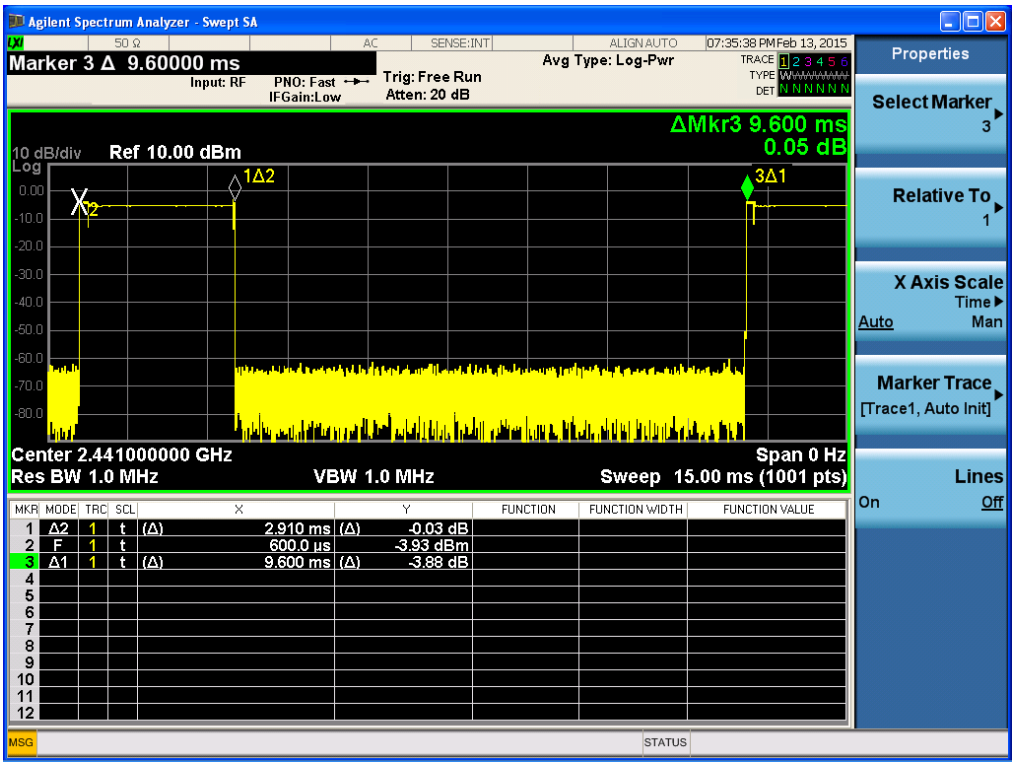
## Time of Occupancy for PACKET Type 2DH1(DQPSK)




## Time of Occupancy for PACKET Type 2DH3(DQPSK)



## Time of Occupancy for PACKET Type 2DH5(DQPSK)



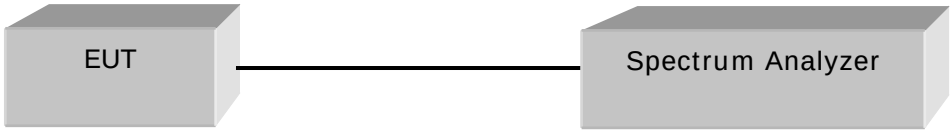
## 2.1.5 Maximum peak Conducted Output Power

### Test Location
RF Test Room

### Test Procedures

The maximum peak conducted output power was measured with a spectrum analyzer connected to the antenna terminal, while EUT has its hopping function disabled at the highest, middle and the lowest available channels.

The spectrum analyzer is set to:
Center frequency = the highest, middle, and the lowest channels
Span = 5 MHz (approximately 5 times of the 20 dB bandwidth)
RBW = 1 MHz (greater than the 20 dB bandwidth of the emission being measured)
VBW = 1 MHz (≥ RBW) Detector function = peak
Trace = max hold Sweep = auto




### Limit

§5.247(b)(1) The Maximum Peak Output Power Measurement is 0.125 Watts for frequency hopping system operating in 2400-2483.5 MHz employing at least 15 Hopping channels.

### Test Results

**Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)**

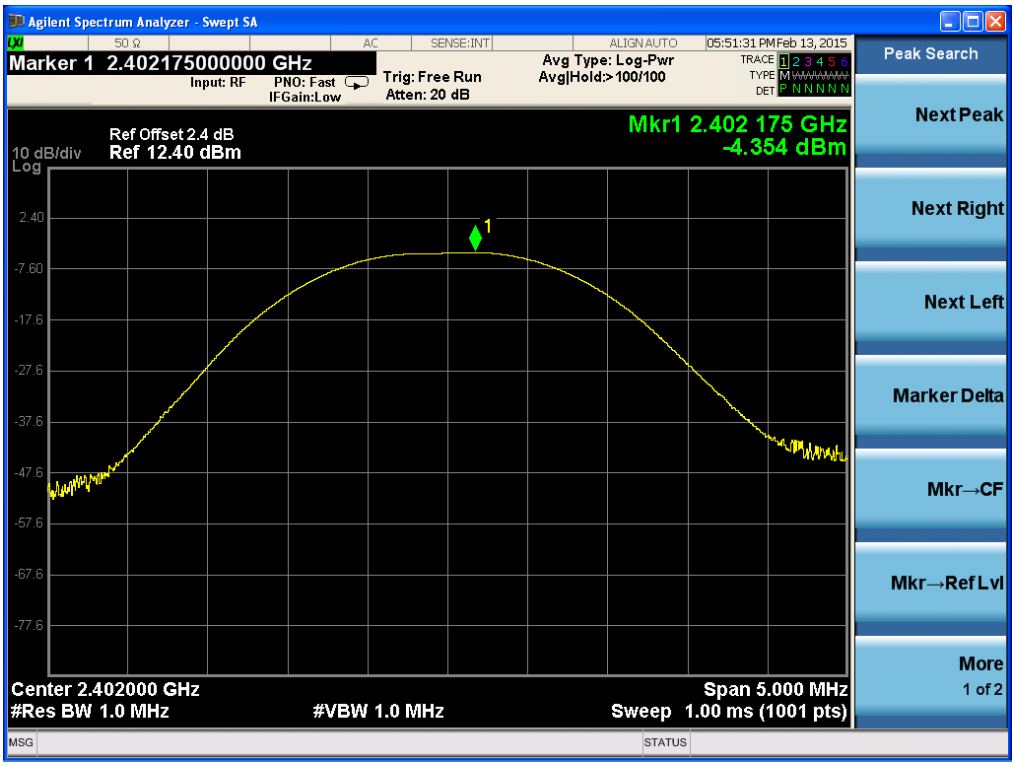
| Frequency (MHz) | Channel No. | Peak output power(dBm) | Peak output power(mW) | Result |
|---|---|---|---|---|
| 2402 | 0 | -4.354 | 0.367 | Complies |
| 2441 | 39 | -0.771 | 0.837 | Complies |
| 2480 | 78 | -0.349 | 0.923 | Complies |

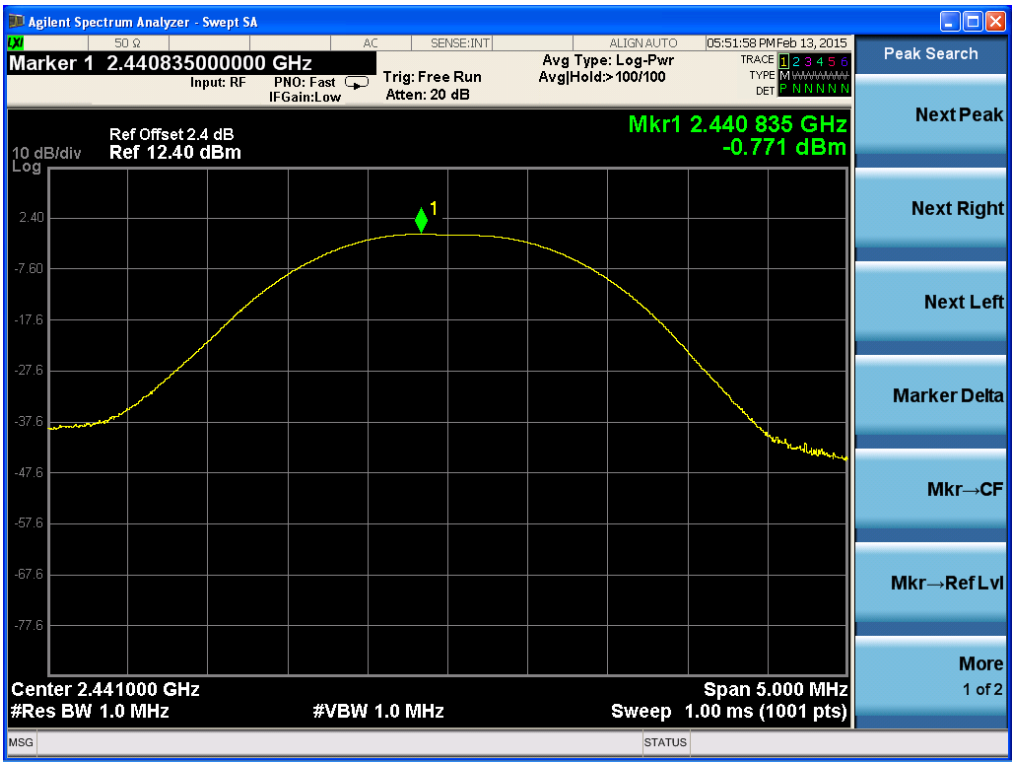
**Test mode : DQPSK, CFG PKT Packet Type : 30 Packet Size : 679(2DH5)**

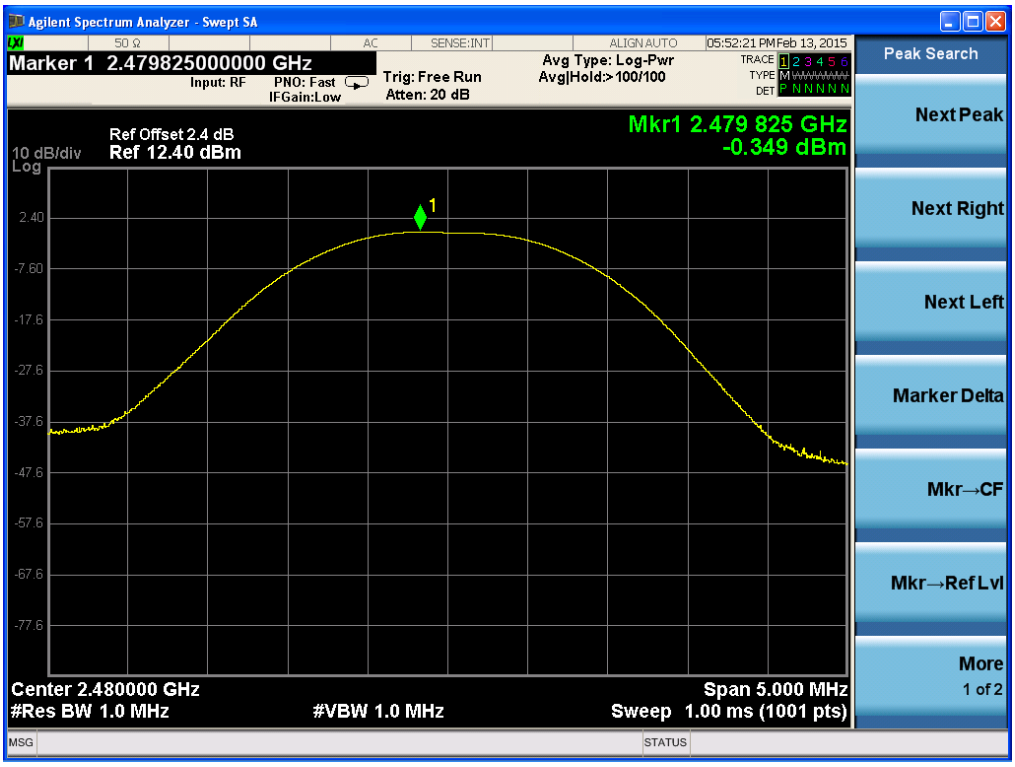
| Frequency (MHz) | Channel No. | Peak output power(dBm) | Peak output power(mW) | Result |
|---|---|---|---|---|
| 2402 | 0 | -3.693 | 0.427 | Complies |
| 2441 | 39 | -0.224 | 0.950 | Complies |
| 2480 | 78 | 0.256 | 1.061 | Complies |

See next pages for actual measured spectrum plots.

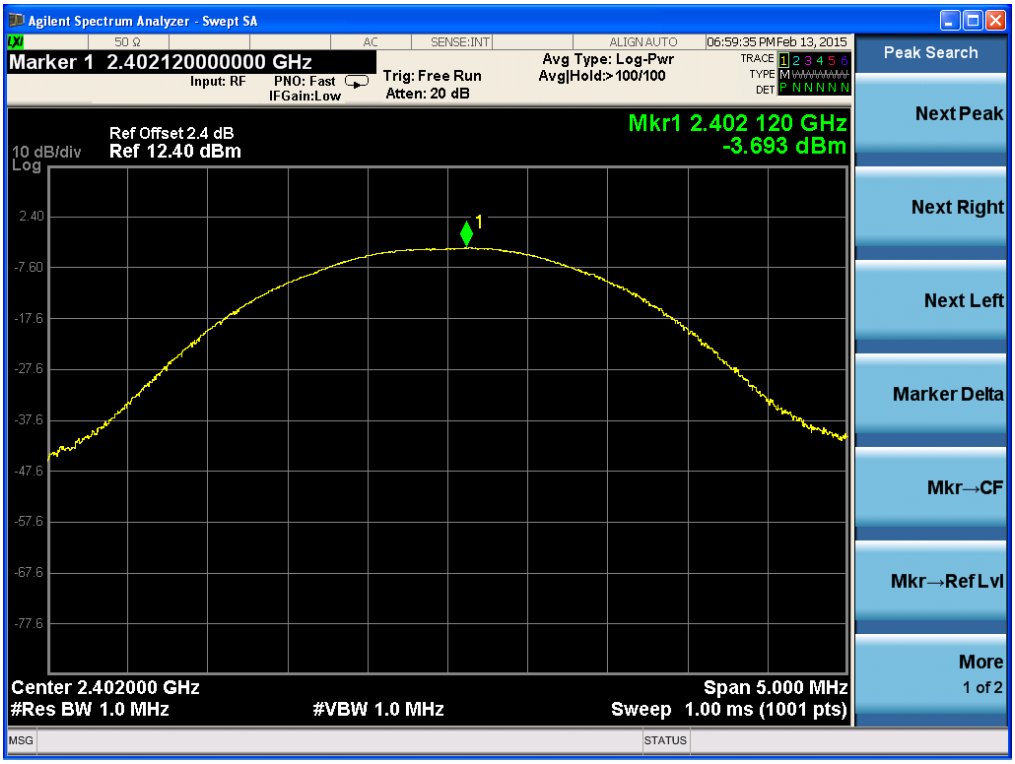
## Maximum peak Conducted Output Power - GFSK

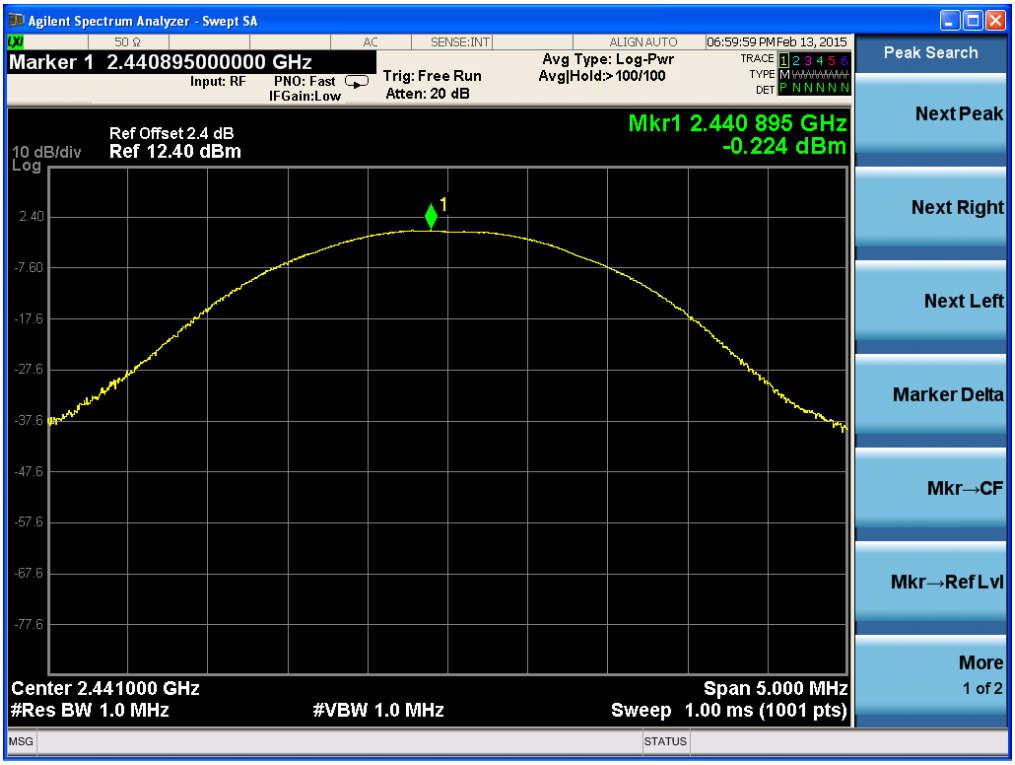


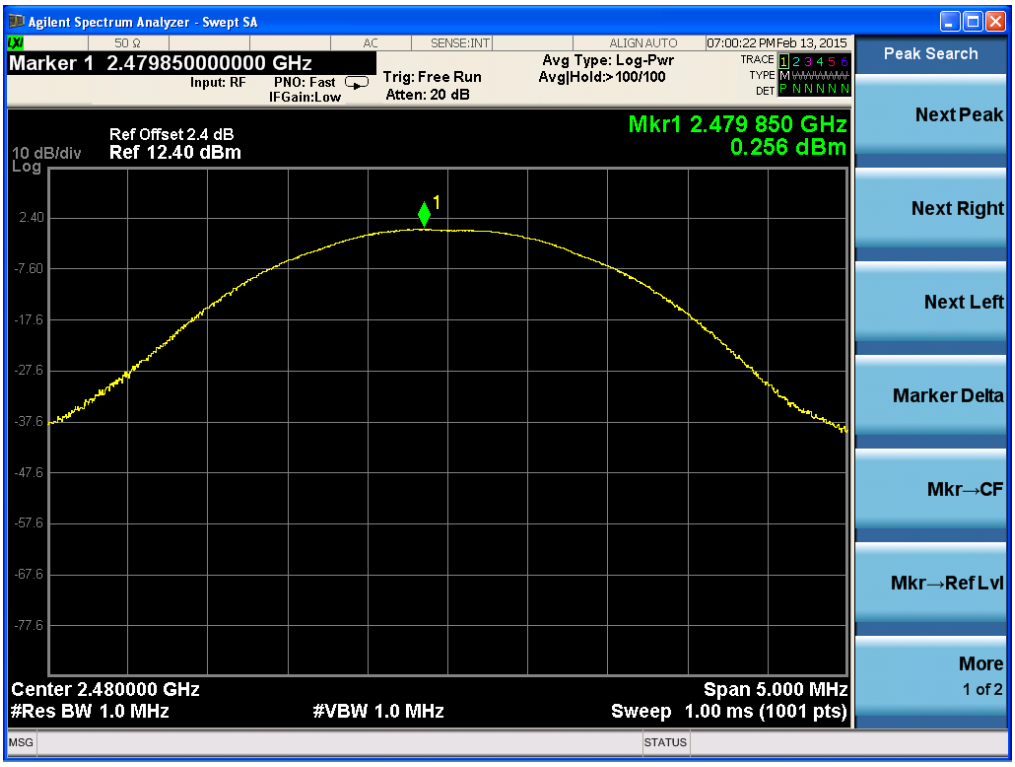





## Maximum peak Conducted Output Power - DQPSK





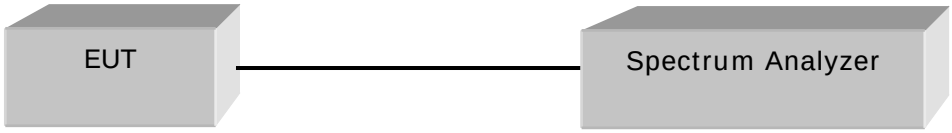
## 2.1.6 Band-edge

### Test Location
RF Test Room

### Test Procedures

The bandwidth at 20 dB down from the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT has its hopping function disabled at the highest, middle and the lowest available channels.

The spectrum analyzer is set to:
Center frequency = the highest, middle, and the lowest channels
RBW = 100 kHz
VBW = 100 kHz (≥ RBW)
Span = 10 MHz
Detector function = peak
Trace = max hold
Sweep = auto




### Limit

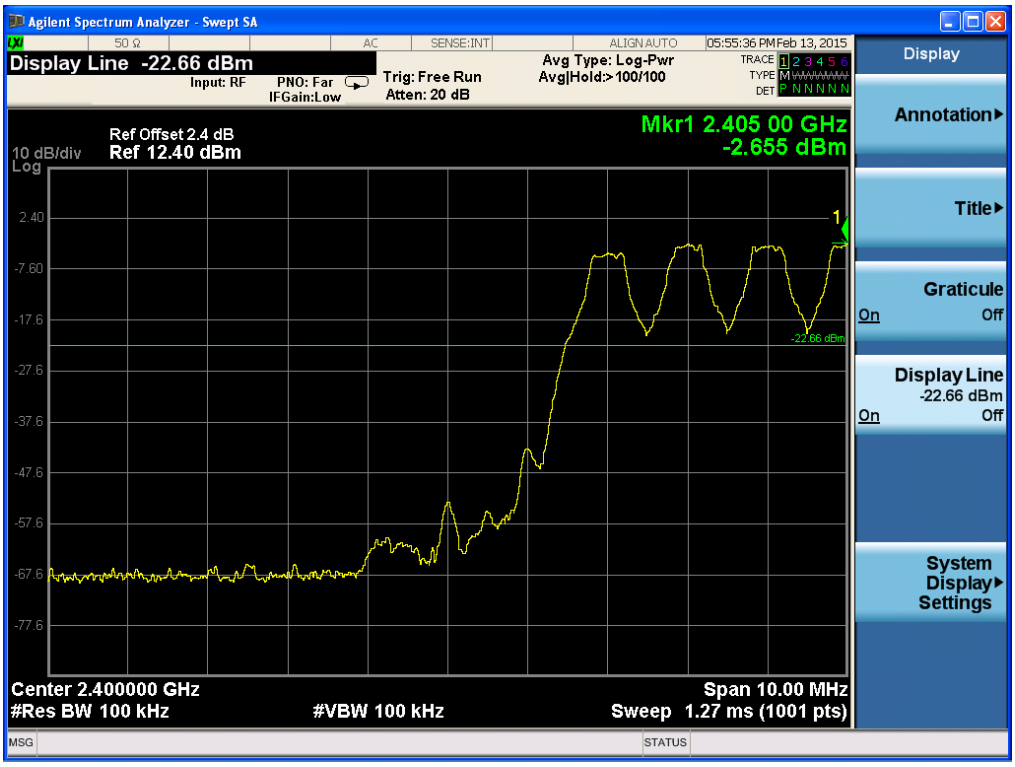
> 20 dBc

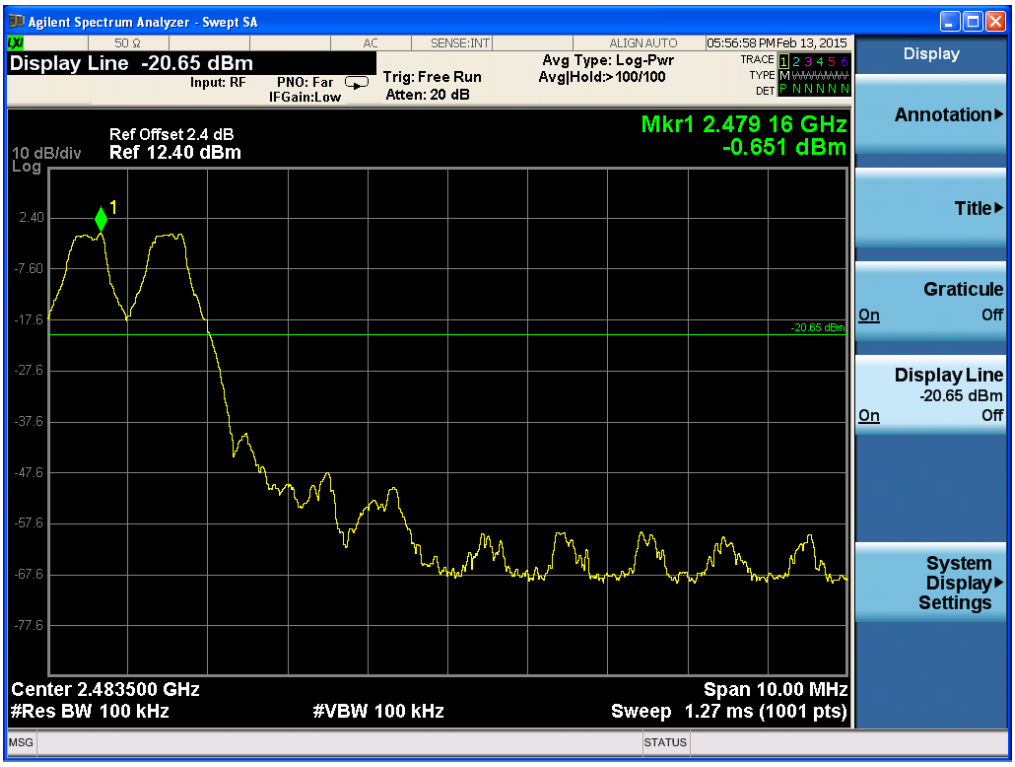
### Test Results

All conducted emission in any 100 kHz bandwidth outside of the spectrum band was at least 20 dB lower than the highest level of the inband spectral density.
Therefore the applying equipment meets the requirement.

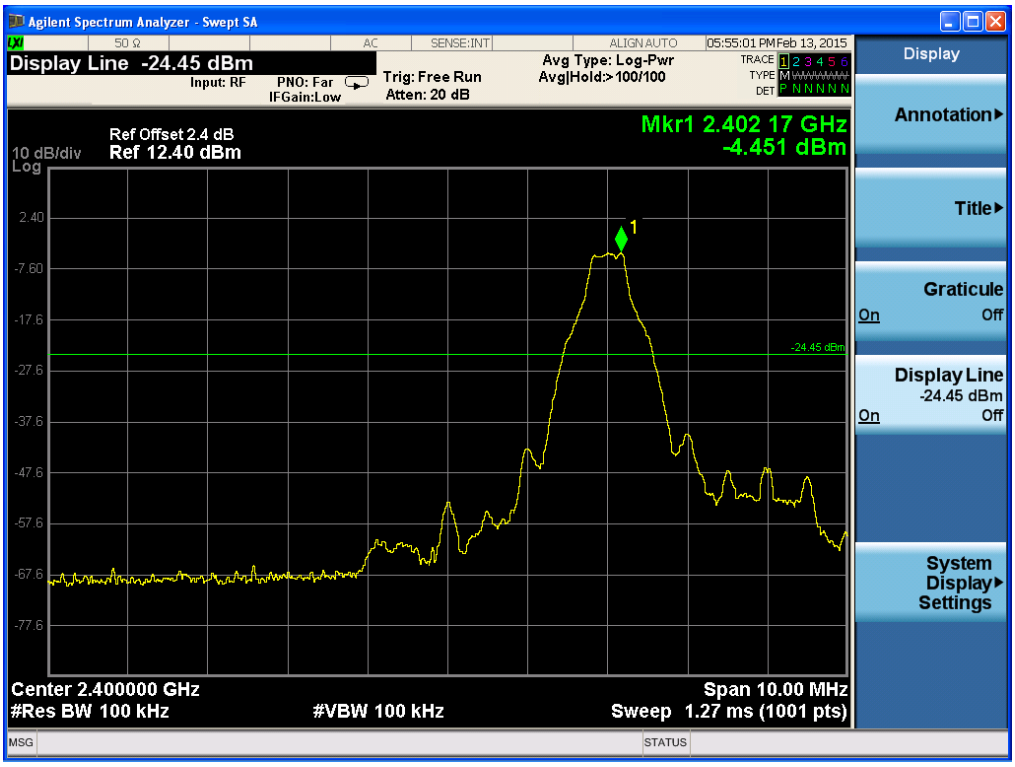
See next pages for actual measured spectrum plots.

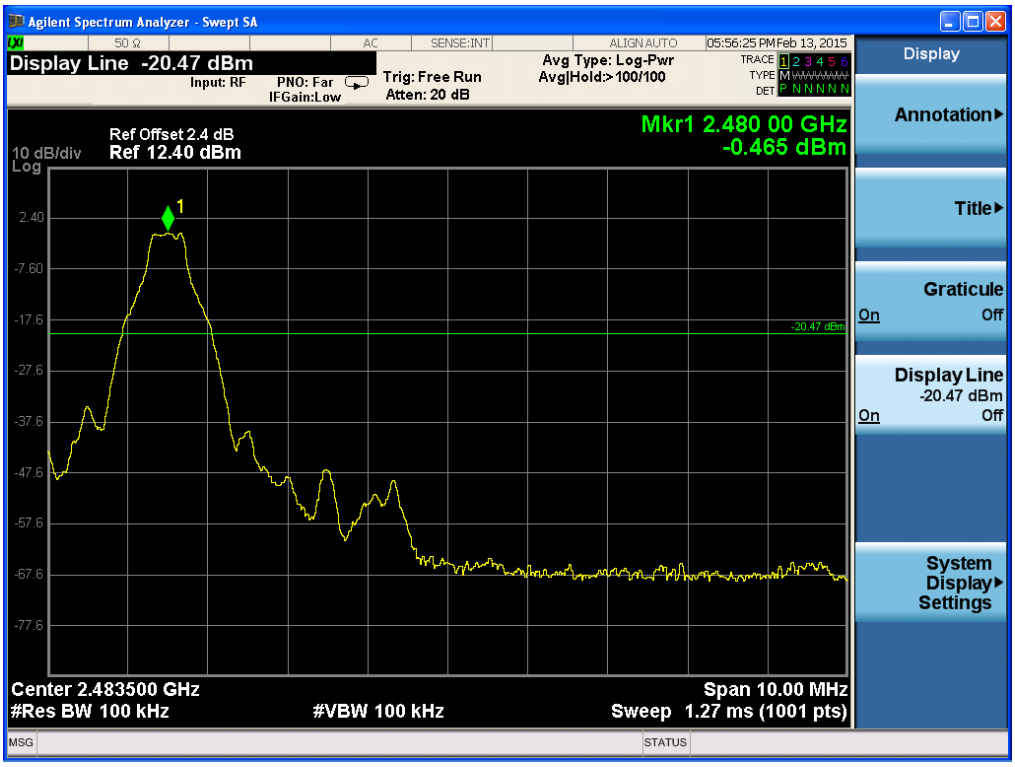
## Band – edge (with Hopping) - GFSK



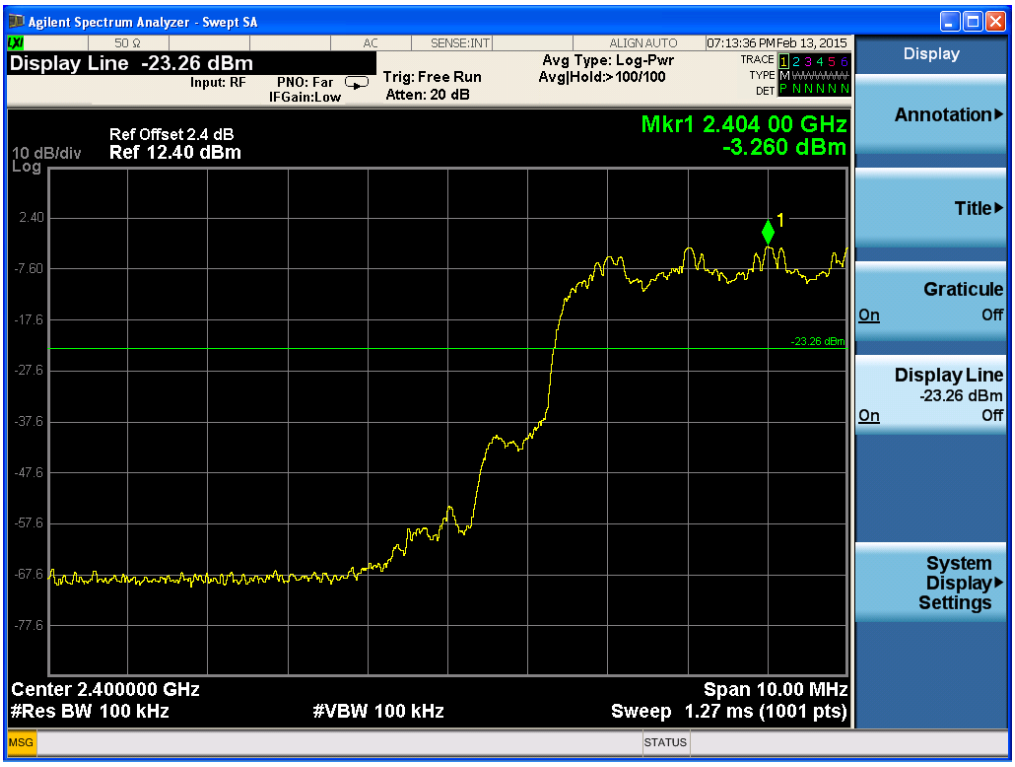



## Band – edge (without Hopping) - GFSK

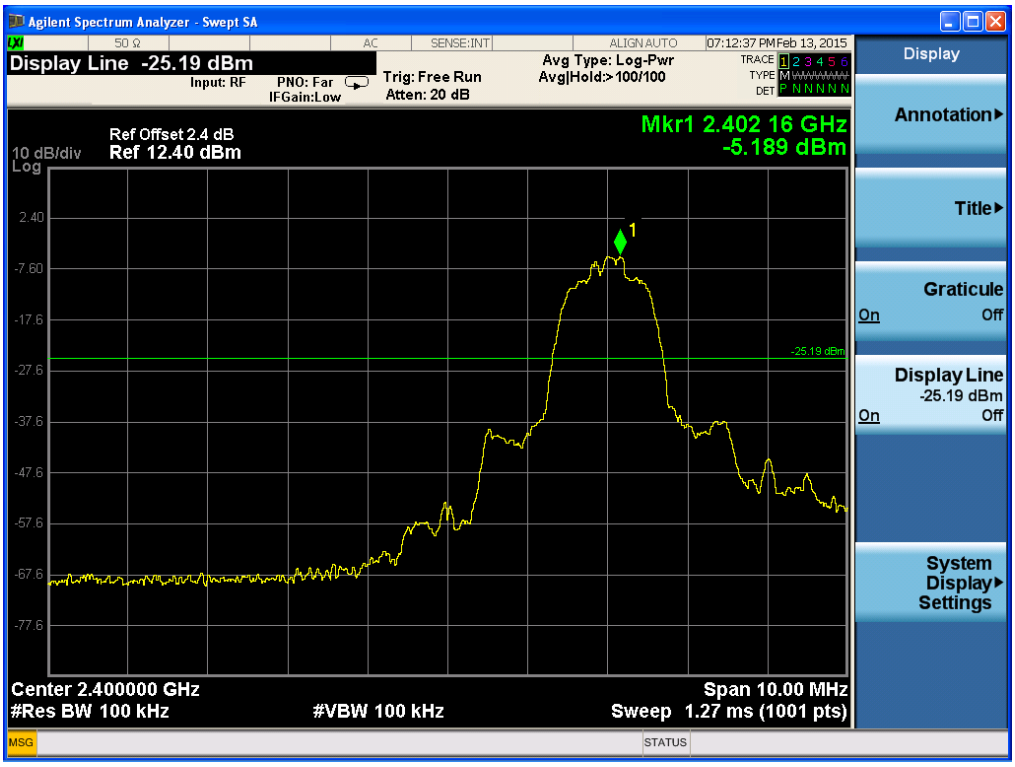


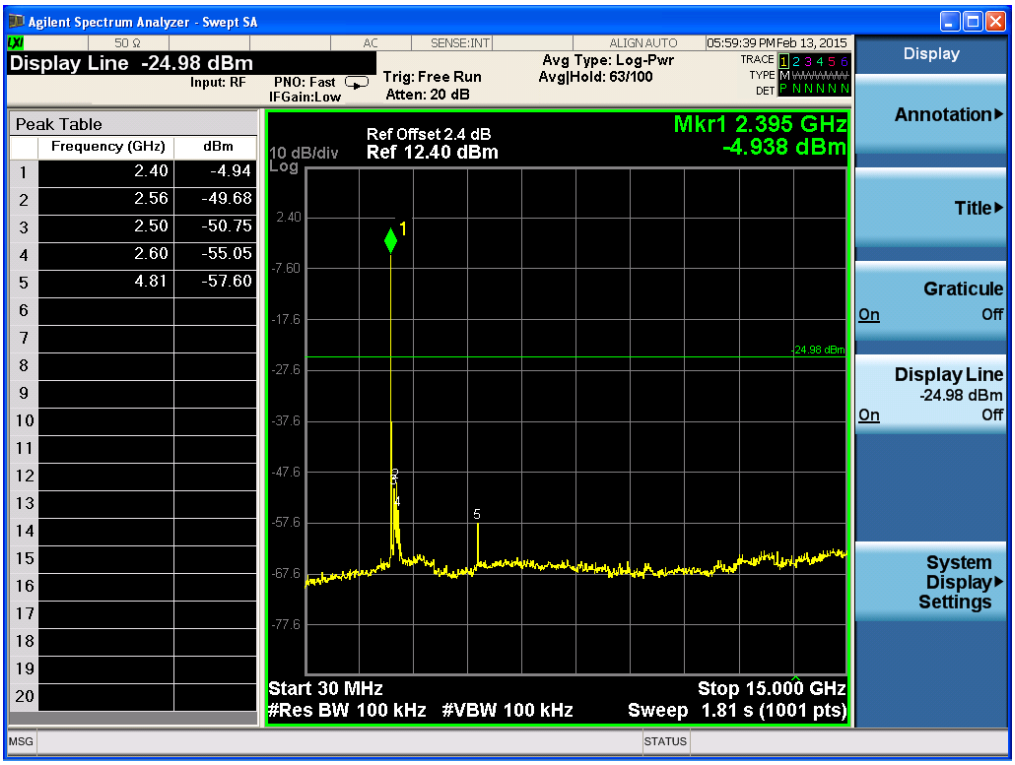
## Band – edge (with Hopping) - DQPSK

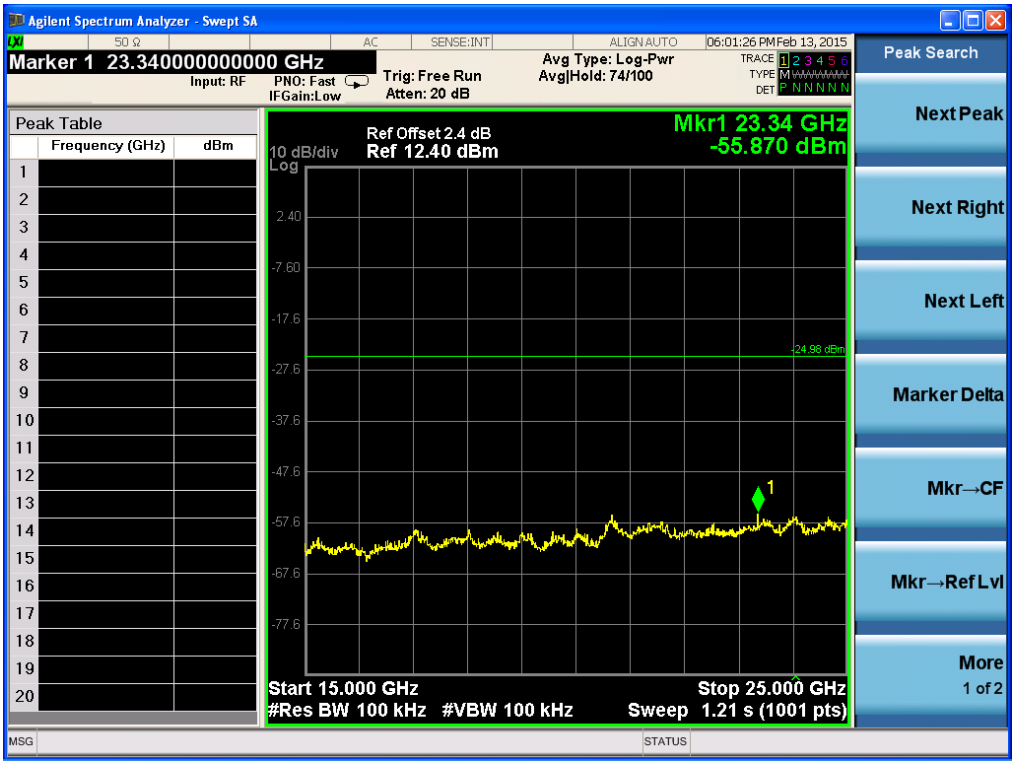



## Band – edge (without Hopping) - DQPSK

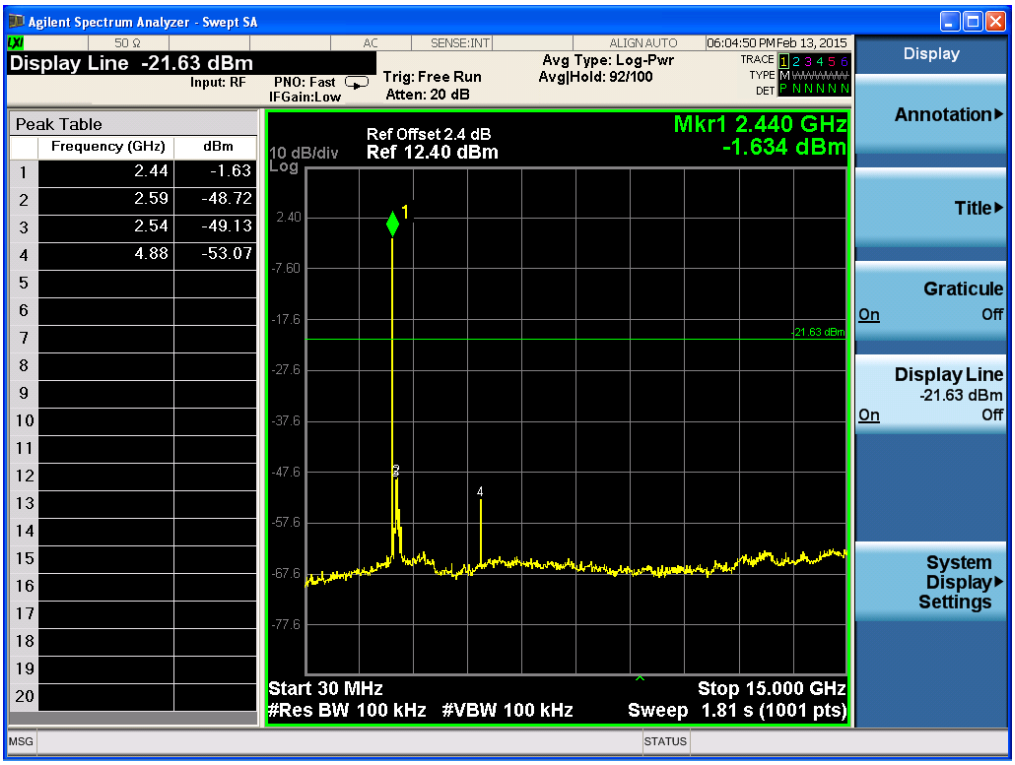


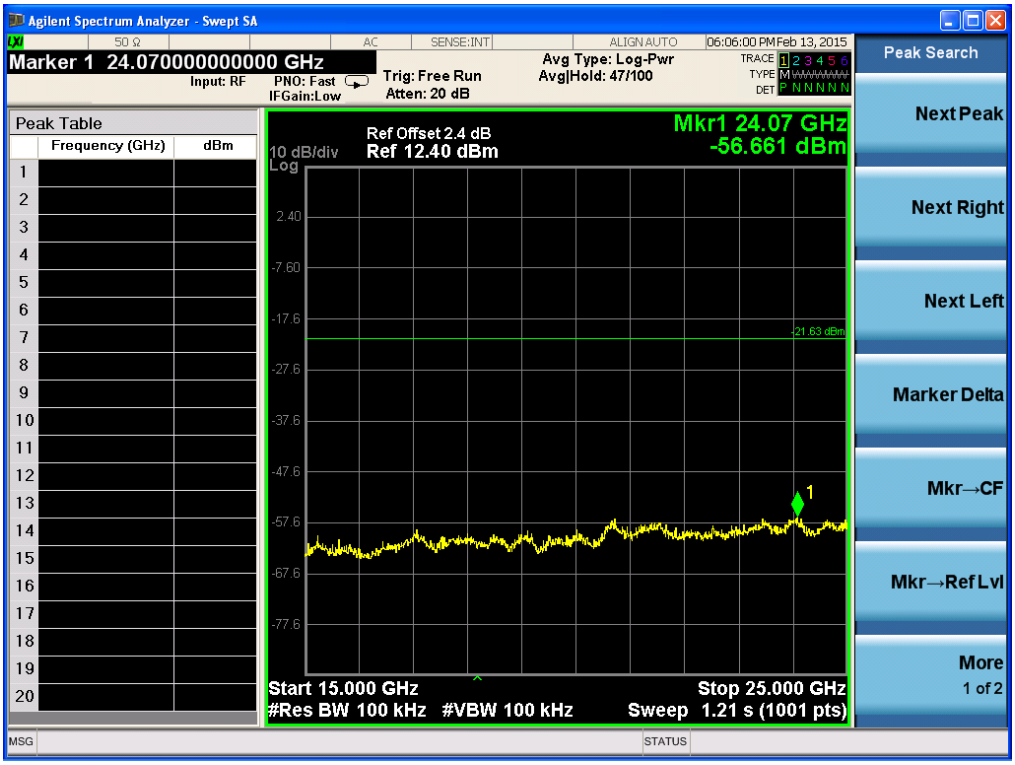

**Band – edge (at 20 dB blow) – Low channel**
**Frequency Range = 30 MHz ~ 10th harmonic**
**(GFSK : Worst-Case)**



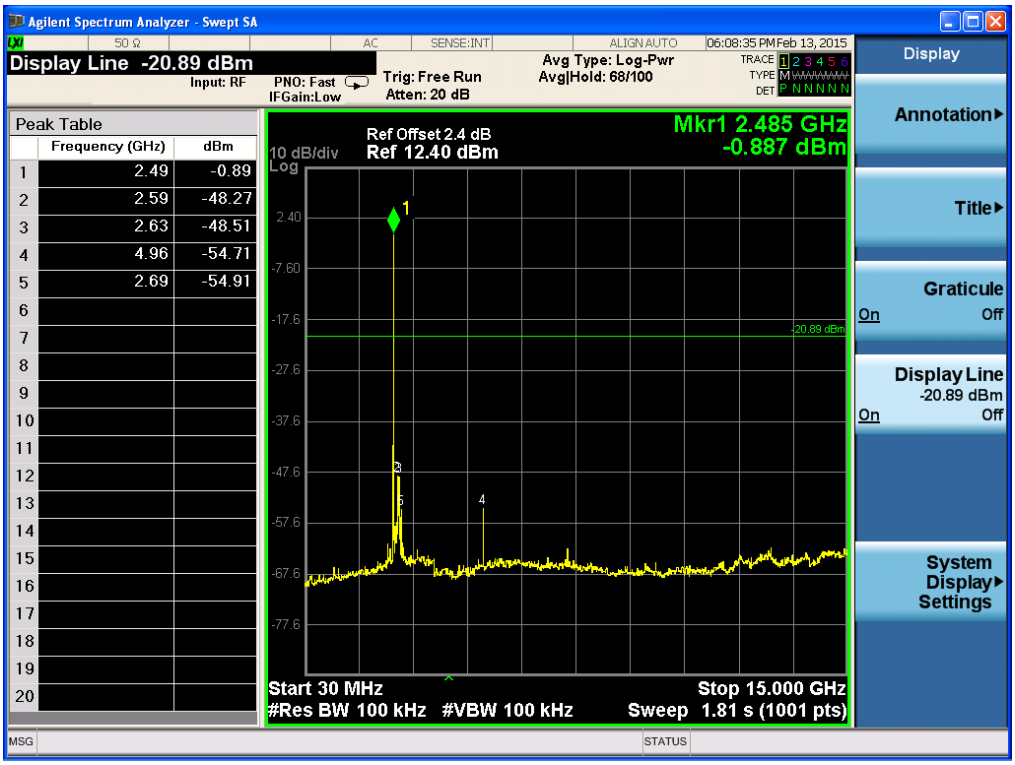



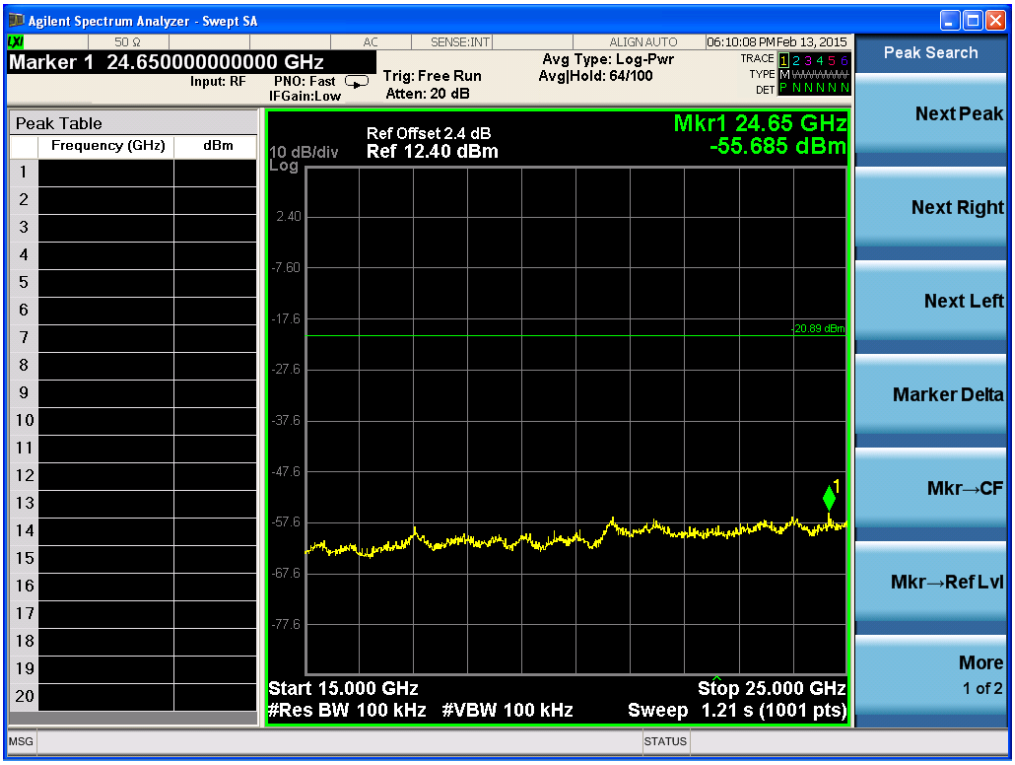
**Band – edge (at 20 dB blow) – Mid channel**
**Frequency Range = 30 MHz ~ 10th harmonic**
**(GFSK : Worst-Case)**



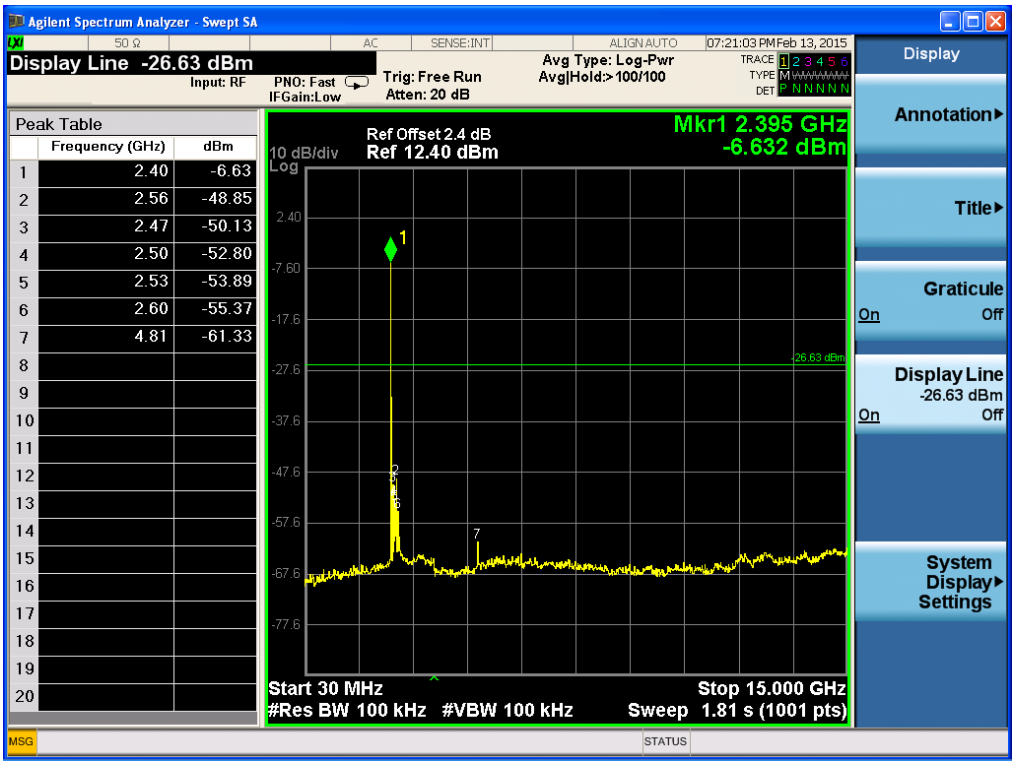



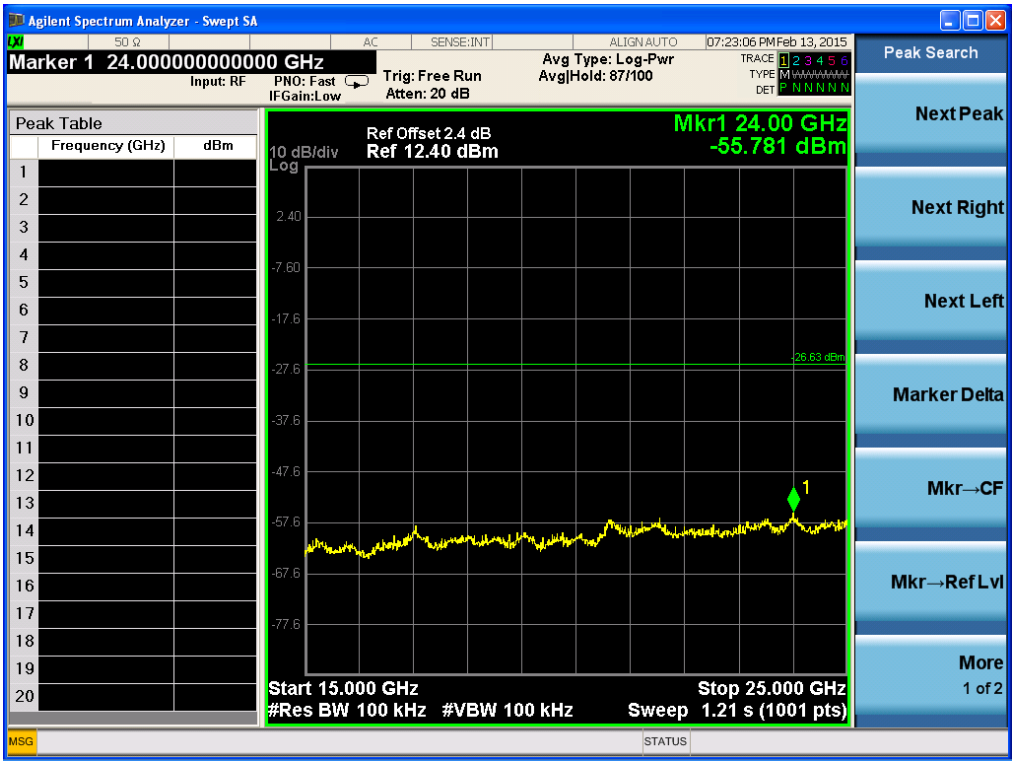
**Band – edge (at 20 dB blow) – High channel**
**Frequency Range = 30 MHz ~ 10th harmonic**
**(GFSK : Worst-Case)**



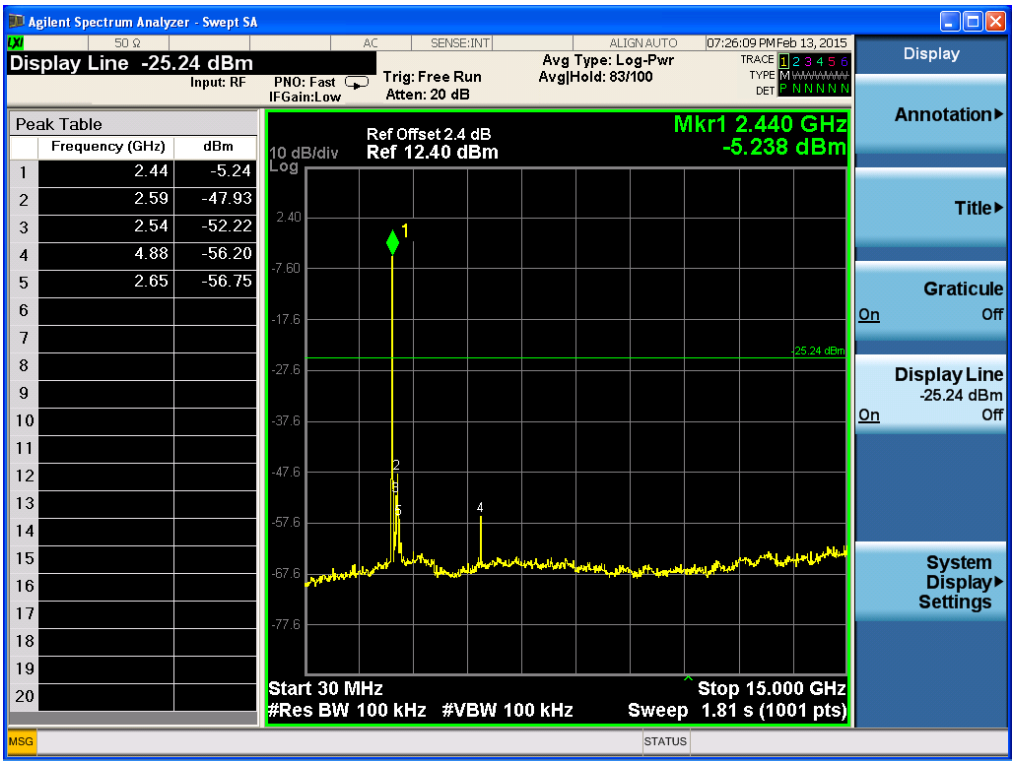



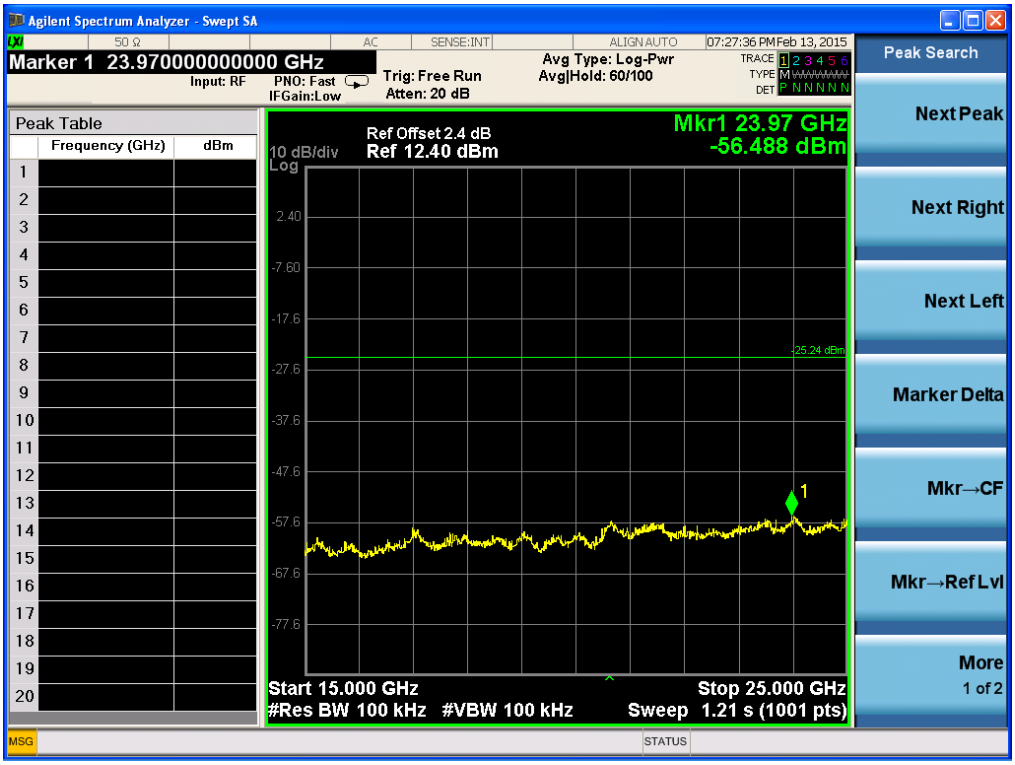
**Band – edge (at 20 dB blow) – Low channel**
**Frequency Range = 30 MHz ~ 10th harmonic**
**(DQPSK : Worst-Case)**



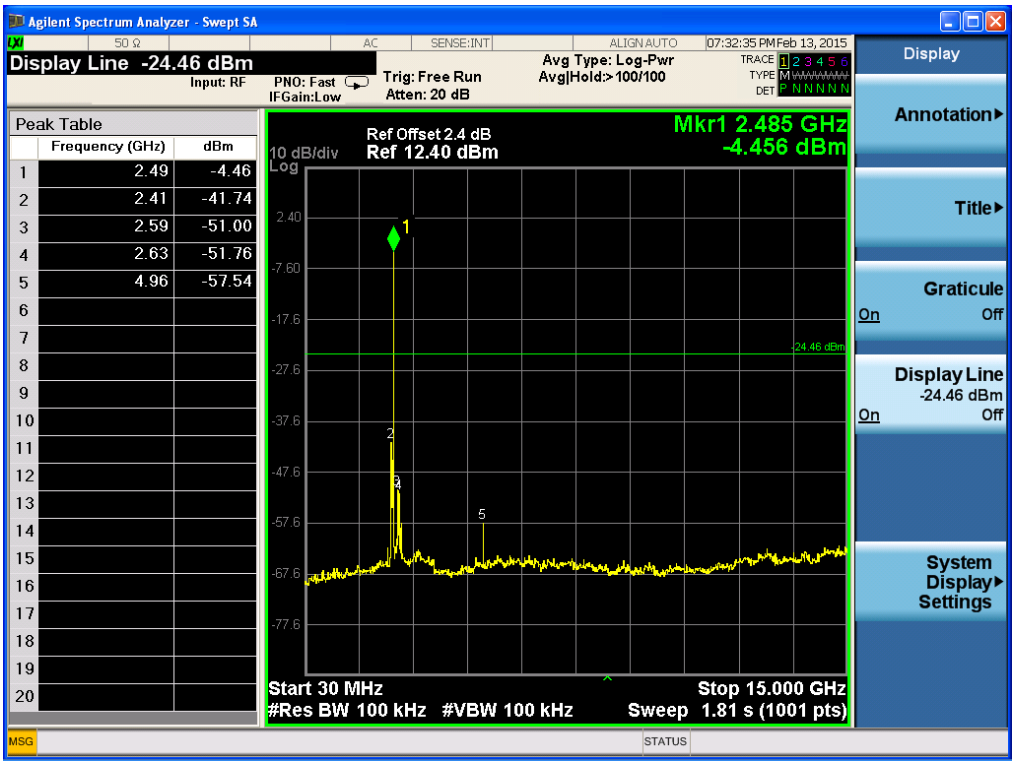



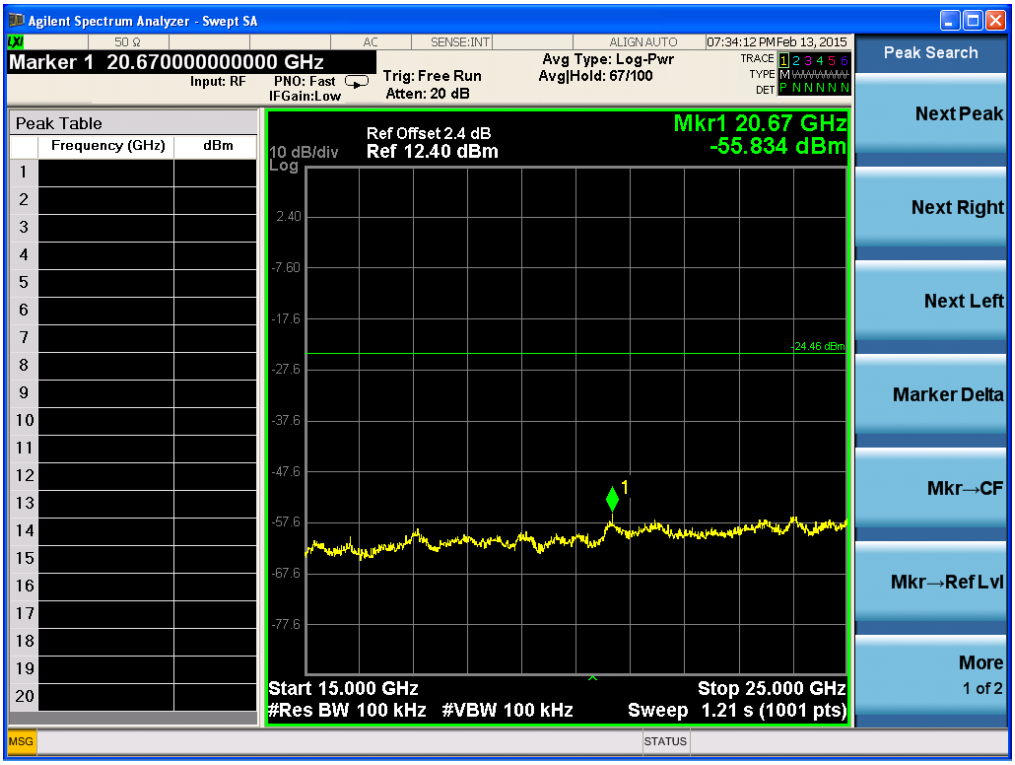
**Band – edge (at 20 dB blow) – Mid channel**
**Frequency Range = 30 MHz ~ 10th harmonic**
**(DQPSK : Worst-Case)**



**Band – edge (at 20 dB blow) – High channel**
**Frequency Range = 30 MHz ~ 10th harmonic**
**(DQPSK : Worst-Case)**



## 2.1.7 Field Strength of Emissions

### Test Location

☒ 10 m SAC (test distance : ☐ 10 m, ☒ 3 m)
☒ 3 m SAC (test distance : 3 m)

### Test Procedures

1) In the frequency range of 9 kHz to 30 MHz, magnetic field is measured with Loop Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
2) In the frequency rage above 30 MHz, Bi-Log Test Antenna(30 MHz to 1 GHz) and Horn Test Antenna(above 1 GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is carried from 1m to 4m above the ground to determine the maximum value of the field strength. The emissions levels at both horizontal and vertical polarizations should be tested.

The spectrum analyzer is set to:

Frequency Range = 9 kHz ~ 25 GHz (2.4 GHz $10^{th}$ harmonic)
RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz, 9 kHz for f < 30 MHz
VBW ≥ RBW
Sweep = auto

### Limit

- **15.209(a)**

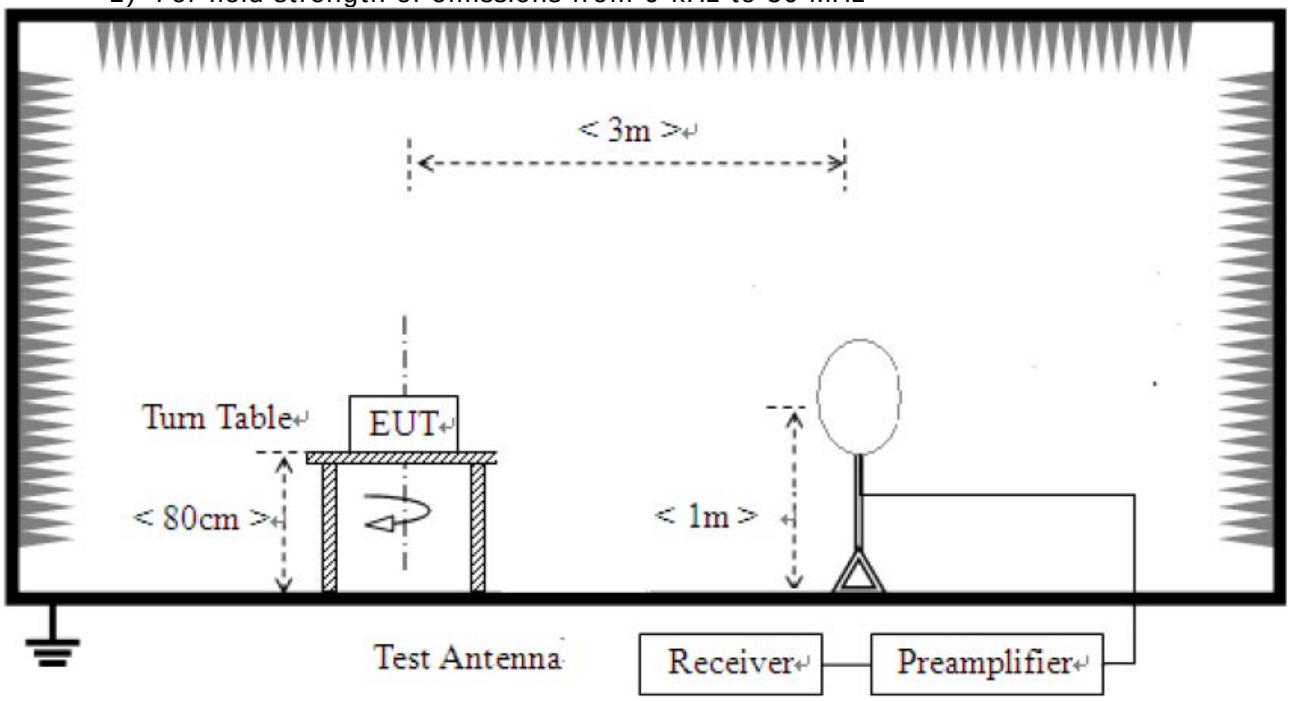
| Frequency(MHz) | Field Strength uV/m@3m | Field Strength dBuV/m@3m | Deasurement Distance (meters) |
|---|---|---|---|
| 0.009-0.490 | 2400/F(kHz) | - | 300 |
| 0.490-1.705 | 24000/F(kHz) | - | 30 |
| 1.705-30 | 30 | - | 30 |
| 30-88 | 100** | 40 | 3 |
| 88-216 | 150** | 43.5 | 3 |
| 216-960 | 200** | 46 | 3 |
| Above 960 | 500 | 54 | 3 |

** Except as provided in 15.209(g).fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72MHz, 76-88MHz, 174-216MHz, 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g.15.231 and 15.241.

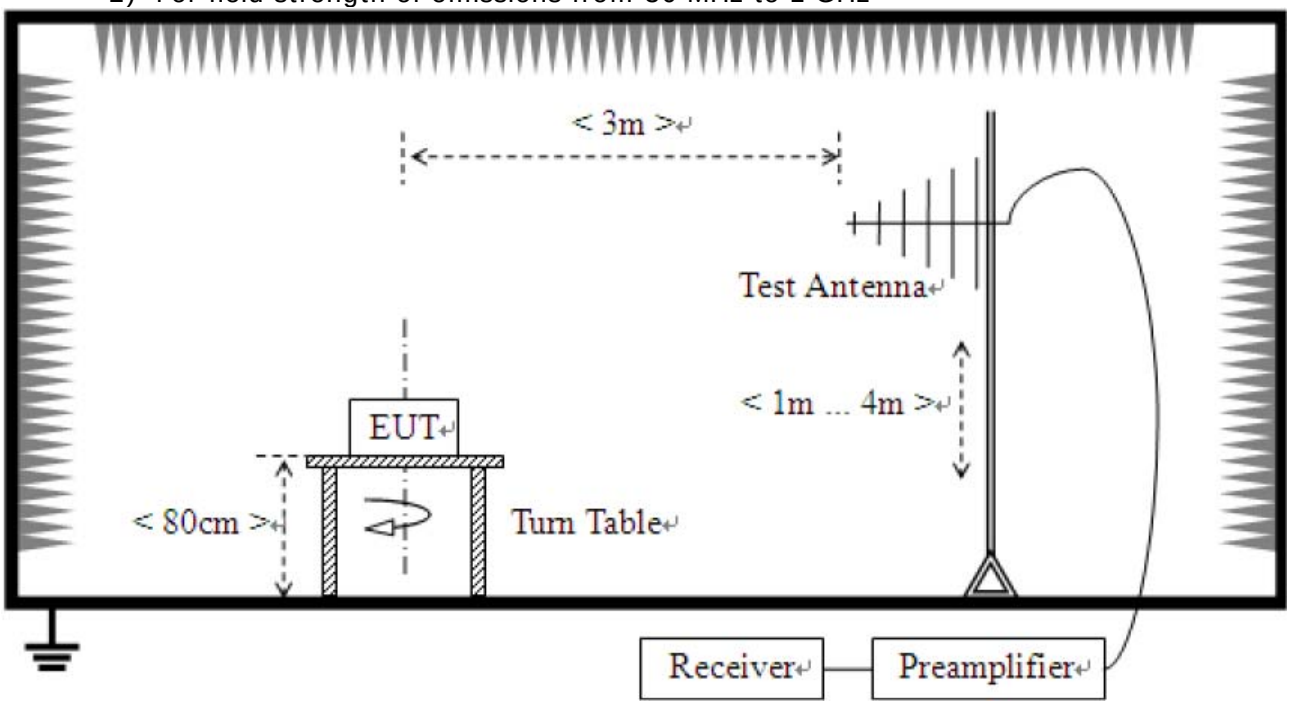
Note :
1) For above 1 GHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.
2) For above 1 GHz, limit field strength of harmonics : 54 dBuV/m@3m (AV) and 74 dBuV/m@3m (PK)

**Test Setup:**

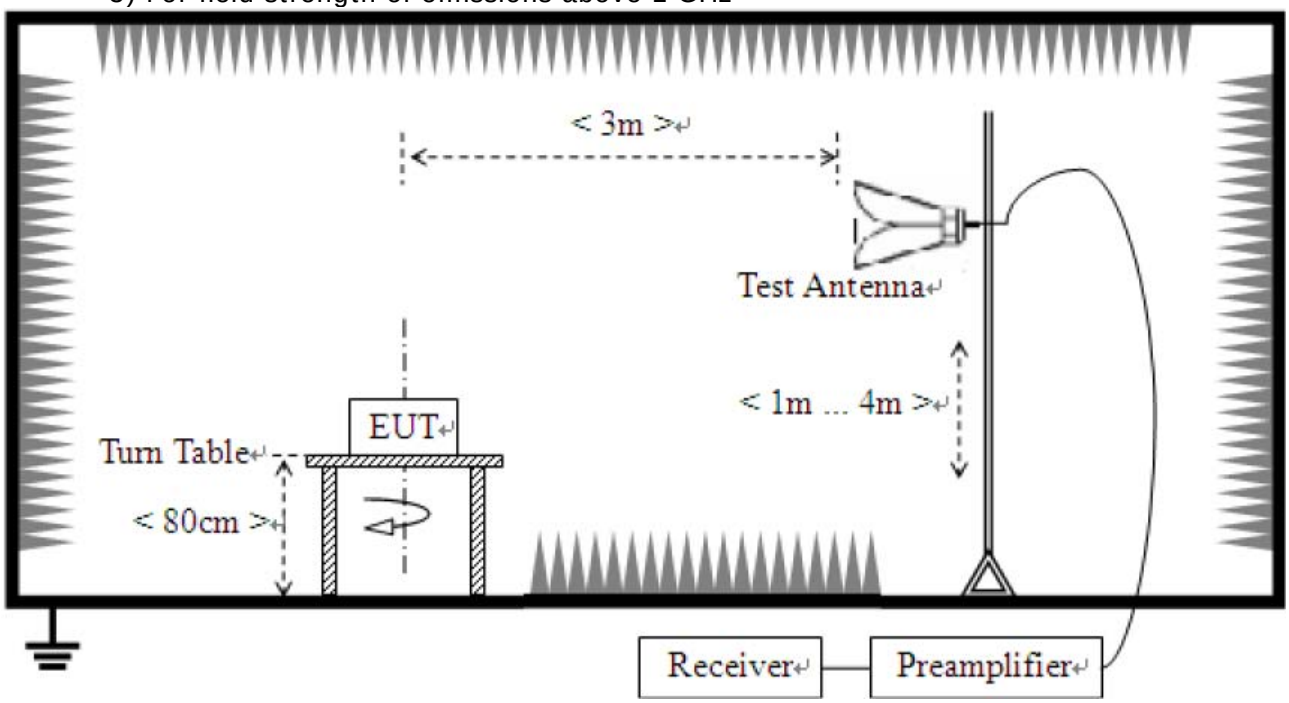
1) For field strength of emissions from 9 kHz to 30 MHz




2) For field strength of emissions from 30 MHz to 1 GHz



3) For field strength of emissions above 1 GHz




**Test Results**

**1) 9 kHz to 30 MHz**

**Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)**
**Test mode : DQPSK, CFG PKT Packet Type : 30 Packet Size : 679(2DH5)**

| EUT | Neck Band Bluetooth Noise cancelling Earphones | Measurement Detail | |
|---|---|---|---|
| Model | BT 100 NC | Frequency Range | 9 kHz – 30 MHz |
| Test mode | GFSK, DQPSK | Detector function | Quasi-Peak |

The requirements are:

☒ Complies

| Frequency (MHz) | Measured Data (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|
| - | - | - | See note |

**Note :**
The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.
Distance extrapolation factor = 40 log (specific distance / test distance) (dB)

### 2) 30 MHz to 1 GHz

**Test mode : GFSK, CFG PKT Packet Type : 30 Packet Size : 679(2DH5)**

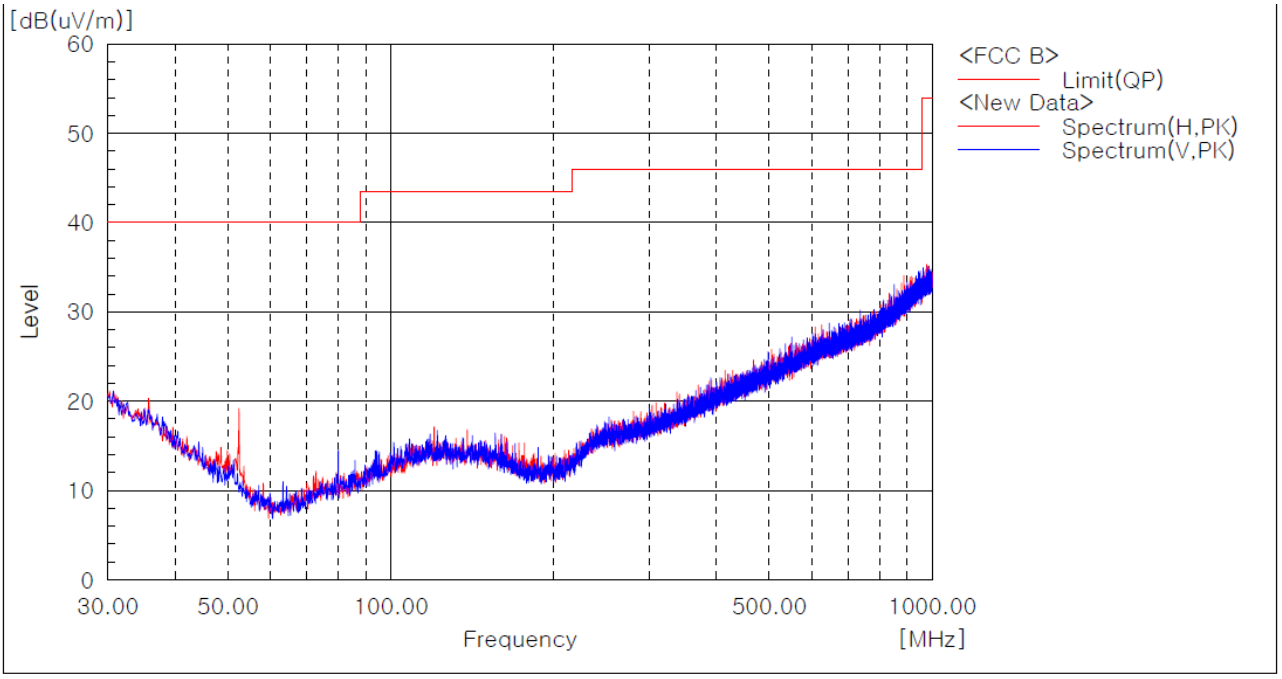
| EUT | Neck Band Bluetooth Noise cancelling Earphones | Measurement Detail | |
|---|---|---|---|
| Model | BT 100 NC | Frequency Range | Below 1000MHz |
| Test mode | DQPSK Hopping(Worst Case) | Detector function | Quasi-Peak / Peak |

The requirements are:

☒ Complies

| Frequency (MHz) | Measured Data (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|
| No emissions were detected at a level greater than 20dB below limit. | | | |

**Test Data**




Final Result

| No. | Frequency [MHz] | (P) | c.f [dB(1/m)] | Height [cm] | Angle [deg] |
|---|---|---|---|---|---|

**Remark :**

1. The field strength of spurious emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.

### 3) above 1 GHz

**Test mode : GFSK, CFG PKT Packet Type : 15 Packet Size : 339(DH5)**

| EUT | Neck Band Bluetooth Noise cancelling Earphones | Measurement Detail | |
|---|---|---|---|
| Model | BT 100 NC | Frequency Range | 1-25GHz |
| | | Detector function | Average / Peak |

**Remarks**
We have tested three mode (X, Y, Z). The worst mode (Z axis) for final test.

The requirements are:

☒ Complies

| Frequency (MHz) | Measured Data (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|
| No emissions were detected at a level greater than 20dB below limit. | | | |

### Test Data

Ch.0(Low Channel)

| Frequency [MHz] | (P) | Reading AV [dB(uV)] | Reading PK [dB(uV)] | Factor [dB(1/m)] | Level AV [dB(uV/m)] | Level PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Limit PK [dB(uV/m)] | Margin AV [dB] | Margin PK [dB] |
|---|---|---|---|---|---|---|---|---|---|---|

No emissions were detected at a level greater than 20dB below limit.

Ch.39(Mid Channel)

| Frequency [MHz] | (P) | Reading AV [dB(uV)] | Reading PK [dB(uV)] | Factor [dB(1/m)] | Level AV [dB(uV/m)] | Level PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Limit PK [dB(uV/m)] | Margin AV [dB] | Margin PK [dB] |
|---|---|---|---|---|---|---|---|---|---|---|

No emissions were detected at a level greater than 20dB below limit.

Ch.78(High Channel)

| Frequency [MHz] | (P) | Reading AV [dB(uV)] | Reading PK [dB(uV)] | Factor [dB(1/m)] | Level AV [dB(uV/m)] | Level PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Limit PK [dB(uV/m)] | Margin AV [dB] | Margin PK [dB] |
|---|---|---|---|---|---|---|---|---|---|---|

No emissions were detected at a level greater than 20dB below limit.

### Restricted band edge test data

Measured frequency range : 2310-2390 MHz, 2483.5-2500 MHz

| Frequency [MHz] | (P) | Reading AV [dB(uV)] | Reading PK [dB(uV)] | Factor [dB(1/m)] | Level AV [dB(uV/m)] | Level PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Limit PK [dB(uV/m)] | Margin AV [dB] | Margin PK [dB] |
|---|---|---|---|---|---|---|---|---|---|---|

No emissions were detected at a level greater than 20dB below limit.

**Test mode : DQPSK, CFG PKT Packet Type : 30 Packet Size : 679(2DH5)**

| EUT | Neck Band Bluetooth Noise cancelling Earphones | Measurement Detail | |
|---|---|---|---|
| Model | BT 100 NC | Frequency Range | 1-25GHz |
| | | Detector function | Average / Peak |

**Remarks**

We have tested three mode (X, Y, Z). The worst mode (Z axis) for final test.

The requirements are:

☒ Complies

| Frequency (MHz) | Measured Data (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|
| No emissions were detected at a level greater than 20dB below limit. | | | |

## Test Data

Ch.0(Low Channel)

| Frequency [MHz] | (P) | Reading AV [dB(uV)] | Reading PK [dB(uV)] | Factor [dB(1/m)] | Level AV [dB(uV/m)] | Level PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Limit PK [dB(uV/m)] | Margin AV [dB] | Margin PK [dB] |
|---|---|---|---|---|---|---|---|---|---|---|

No emissions were detected at a level greater than 20dB below limit.

Ch.39(Mid Channel)

| Frequency [MHz] | (P) | Reading AV [dB(uV)] | Reading PK [dB(uV)] | Factor [dB(1/m)] | Level AV [dB(uV/m)] | Level PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Limit PK [dB(uV/m)] | Margin AV [dB] | Margin PK [dB] |
|---|---|---|---|---|---|---|---|---|---|---|

No emissions were detected at a level greater than 20dB below limit.

Ch.78(High Channel)

| Frequency [MHz] | (P) | Reading AV [dB(uV)] | Reading PK [dB(uV)] | Factor [dB(1/m)] | Level AV [dB(uV/m)] | Level PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Limit PK [dB(uV/m)] | Margin AV [dB] | Margin PK [dB] |
|---|---|---|---|---|---|---|---|---|---|---|

No emissions were detected at a level greater than 20dB below limit.

## Restricted band edge test data

Measured frequency range : 2310-2390 MHz, 2483.5-2500 MHz

| Frequency [MHz] | (P) | Reading AV [dB(uV)] | Reading PK [dB(uV)] | Factor [dB(1/m)] | Level AV [dB(uV/m)] | Level PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Limit PK [dB(uV/m)] | Margin AV [dB] | Margin PK [dB] |
|---|---|---|---|---|---|---|---|---|---|---|

No emissions were detected at a level greater than 20dB below limit.

## Test Results

### 1) 9 kHz to 30 MHz

**Test mode : Receiver**

| EUT | Neck Band Bluetooth Noise cancelling Earphones | Measurement Detail | |
|---|---|---|---|
| Model | BT 100 NC | Frequency Range | 9 kHz – 30 MHz |
| Test mode | Receiver | Detector function | Quasi-Peak |

The requirements are:

☒ Complies

| Frequency (MHz) | Measured Data (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|
| - | - | - | See note |

**Note :**
The amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.
Distance extrapolation factor = 40 log (specific distance / test distance) (dB)

### 2) 30 MHz to 1 GHz

**Test mode : Receiver**

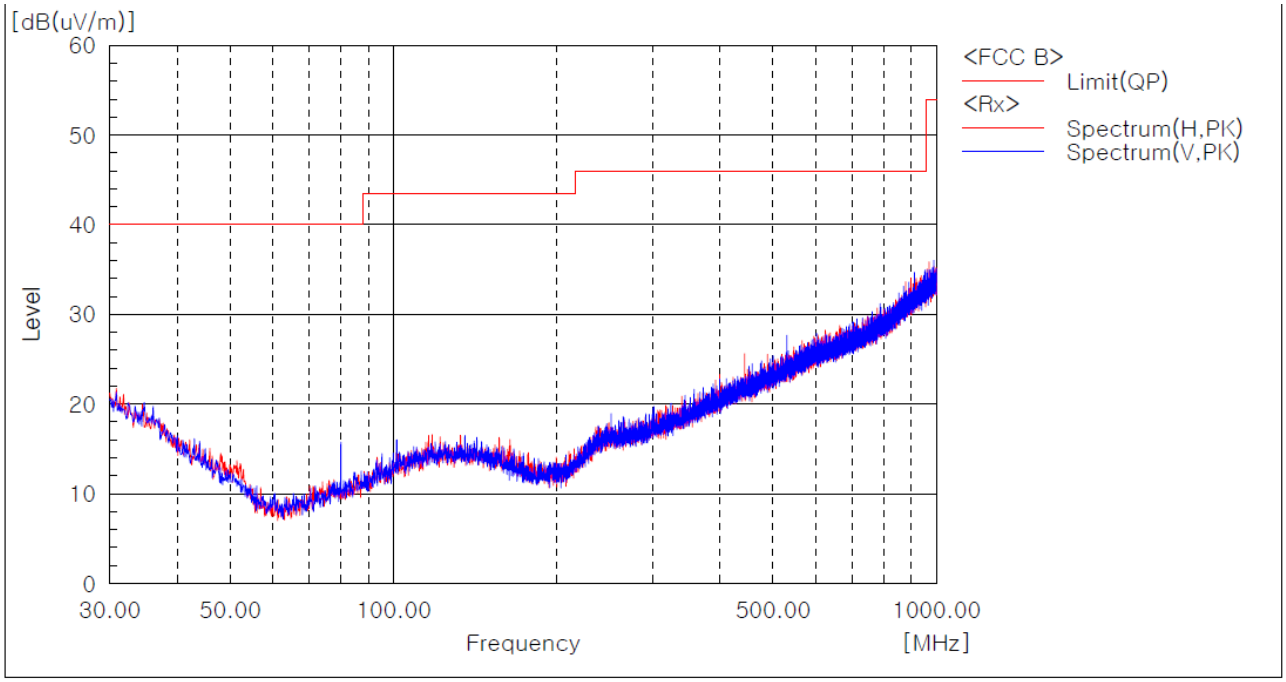
| EUT | Neck Band Bluetooth Noise cancelling Earphones | Measurement Detail | |
|---|---|---|---|
| Model | BT 100 NC | Frequency Range | Below 1000MHz |
| Test mode | Receiver | Detector function | Quasi-Peak / Peak |

The requirements are:

☒ Complies

| Frequency (MHz) | Measured Data (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|
| No emissions were detected at a level greater than 20dB below limit. | | | |

**Test Data**




Final Result

| No. | Frequency [MHz] | (P) | c.f [dB(1/m)] | Height [cm] | Angle [deg] |
|---|---|---|---|---|---|

**Remark :**

1. The field strength of spurious emission was measured in the following position: EUT stand-up position(Z axis), lie-down position(X,Y axis). The worst emission was found in stand-up position(Z axis) and the worst case was recorded.

### 3) above 1 GHz

**Test mode : Receiver**

| EUT | Neck Band Bluetooth Noise cancelling Earphones | Measurement Detail | |
|---|---|---|---|
| Model | BT 100 NC | Frequency Range | 1-25GHz |
| | | Detector function | Average / Peak |

**Remarks**

We have tested three mode (X, Y, Z). The worst mode (Z axis) for final test.

The requirements are:

☒ Complies

| Frequency (MHz) | Measured Data (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|
| No emissions were detected at a level greater than 20dB below limit. | | | |

### Test Data

Ch.0(Low Channel)

| Frequency [MHz] | (P) | Reading AV [dB(uV)] | Reading PK [dB(uV)] | Factor [dB(1/m)] | Level AV [dB(uV/m)] | Level PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Limit PK [dB(uV/m)] | Margin AV [dB] | Margin PK [dB] |
|---|---|---|---|---|---|---|---|---|---|---|

No emissions were detected at a level greater than 20dB below limit.

Ch.39(Mid Channel)

| Frequency [MHz] | (P) | Reading AV [dB(uV)] | Reading PK [dB(uV)] | Factor [dB(1/m)] | Level AV [dB(uV/m)] | Level PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Limit PK [dB(uV/m)] | Margin AV [dB] | Margin PK [dB] |
|---|---|---|---|---|---|---|---|---|---|---|

No emissions were detected at a level greater than 20dB below limit.

Ch.78(High Channel)

| Frequency [MHz] | (P) | Reading AV [dB(uV)] | Reading PK [dB(uV)] | Factor [dB(1/m)] | Level AV [dB(uV/m)] | Level PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Limit PK [dB(uV/m)] | Margin AV [dB] | Margin PK [dB] |
|---|---|---|---|---|---|---|---|---|---|---|

No emissions were detected at a level greater than 20dB below limit.

### Restricted band edge test data

Measured frequency range : 2310-2390 MHz, 2483.5-2500 MHz

| Frequency [MHz] | (P) | Reading AV [dB(uV)] | Reading PK [dB(uV)] | Factor [dB(1/m)] | Level AV [dB(uV/m)] | Level PK [dB(uV/m)] | Limit AV [dB(uV/m)] | Limit PK [dB(uV/m)] | Margin AV [dB] | Margin PK [dB] |
|---|---|---|---|---|---|---|---|---|---|---|

No emissions were detected at a level greater than 20dB below limit.

## 2.1.8 AC Conducted Emissions

### Test Location
Shielded Room

### Frequency Range of Measurement
150 kHz to 30 MHz

### Instrument Settings
IF Band Width: 9 kHz

### Test Procedures

The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m.
Amplitude measurements were performed with a quasi-peak detector and an average detector.

### Limit

- **15.207(a)**

| Frequency (MHz) | Conducted Limit (dBuV) | |
|---|---|---|
| | 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.

### Test Results
The requirements are:

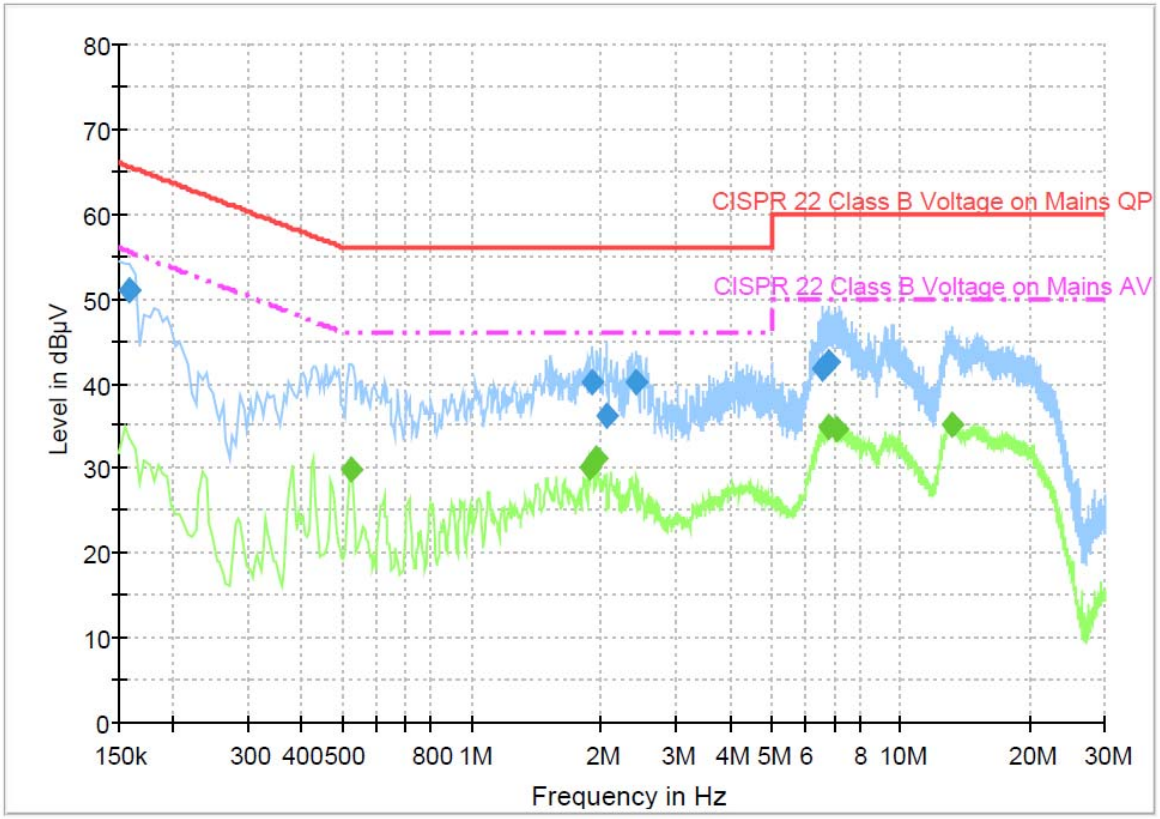
☒ Complies

**Test mode : USB Charge**

| Frequency (MHz) | Measured Data (dBuV/m) | Margin (dB) | Remark |
|---|---|---|---|
| 0.15 | 51.5 | 14.5 | Quasi-peak |

Test Data

**[HOT]**



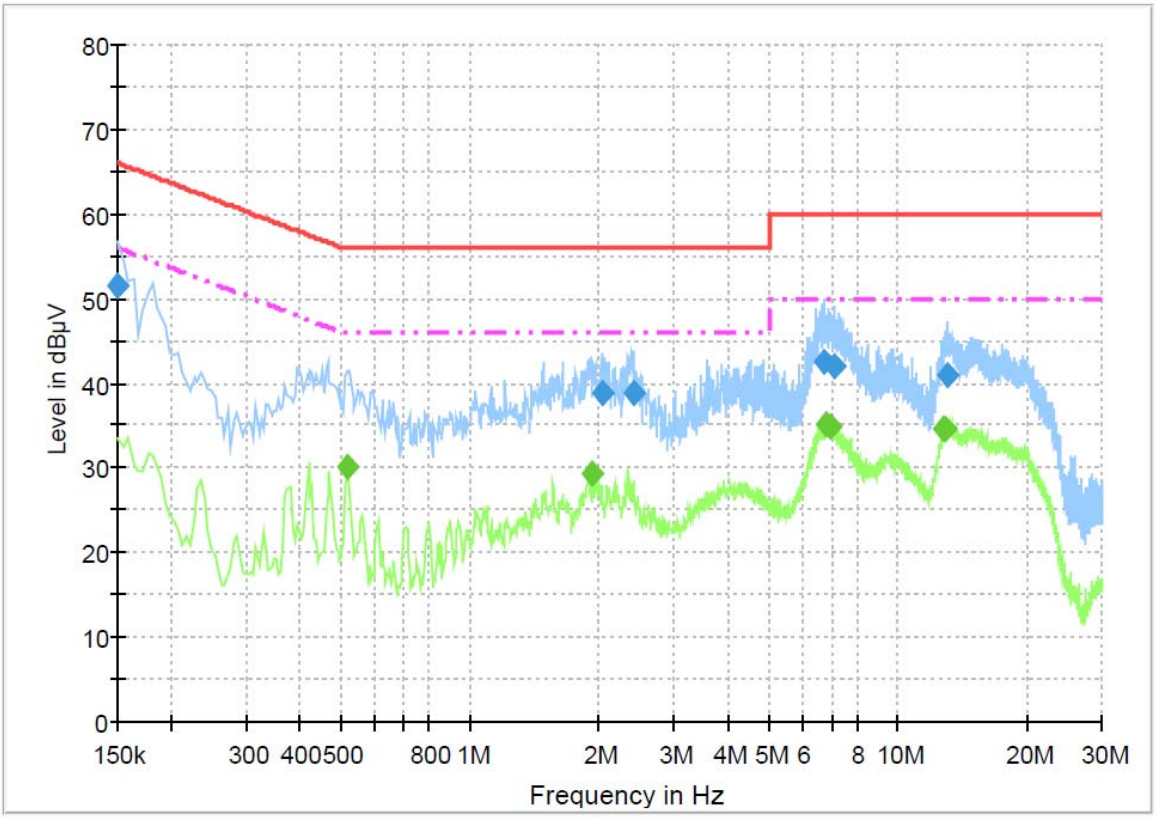

# Final Result 1

| Frequency (MHz) | QuasiPeak (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|---|---|
| 0.159000 | 51.0 | 1000.0 | 9.000 | On | L1 | 9.8 | 14.6 | 65.5 |
| 1.905000 | 40.1 | 1000.0 | 9.000 | On | L1 | 9.7 | 15.9 | 56.0 |
| 2.067000 | 36.3 | 1000.0 | 9.000 | On | L1 | 9.7 | 19.7 | 56.0 |
| 2.418000 | 40.1 | 1000.0 | 9.000 | On | L1 | 9.8 | 15.9 | 56.0 |
| 6.558000 | 41.8 | 1000.0 | 9.000 | On | L1 | 9.7 | 18.2 | 60.0 |
| 6.810000 | 42.5 | 1000.0 | 9.000 | On | L1 | 9.7 | 17.5 | 60.0 |

# Final Result 2

| Frequency (MHz) | CAverage (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|---|---|
| 0.523500 | 29.8 | 1000.0 | 9.000 | On | L1 | 9.9 | 16.2 | 46.0 |
| 1.891500 | 30.1 | 1000.0 | 9.000 | On | L1 | 9.7 | 15.9 | 46.0 |
| 1.959000 | 31.1 | 1000.0 | 9.000 | On | L1 | 9.7 | 14.9 | 46.0 |
| 6.765000 | 34.9 | 1000.0 | 9.000 | On | L1 | 9.7 | 15.1 | 50.0 |
| 7.093500 | 34.7 | 1000.0 | 9.000 | On | L1 | 9.7 | 15.3 | 50.0 |
| 13.204500 | 35.2 | 1000.0 | 9.000 | On | L1 | 9.9 | 14.8 | 50.0 |

**[NEUTRAL]**




## Final Result 1

| Frequency (MHz) | QuasiPeak (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|---|---|
| 0.150000 | 51.5 | 1000.0 | 9.000 | On | N | 9.7 | 14.5 | 66.0 |
| 2.031000 | 38.8 | 1000.0 | 9.000 | On | N | 9.6 | 17.2 | 56.0 |
| 2.409000 | 38.9 | 1000.0 | 9.000 | On | N | 9.7 | 17.1 | 56.0 |
| 6.706500 | 42.4 | 1000.0 | 9.000 | On | N | 9.7 | 17.6 | 60.0 |
| 7.102500 | 41.9 | 1000.0 | 9.000 | On | N | 9.7 | 18.1 | 60.0 |
| 13.038000 | 40.9 | 1000.0 | 9.000 | On | N | 9.9 | 19.1 | 60.0 |

## Final Result 2

| Frequency (MHz) | CAverage (dBµV) | Meas. Time (ms) | Bandwidth (kHz) | Filter | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|---|---|
| 0.519000 | 30.0 | 1000.0 | 9.000 | On | N | 9.9 | 16.0 | 46.0 |
| 1.932000 | 29.2 | 1000.0 | 9.000 | On | N | 9.7 | 16.8 | 46.0 |
| 6.765000 | 35.1 | 1000.0 | 9.000 | On | N | 9.7 | 14.9 | 50.0 |
| 6.949500 | 34.9 | 1000.0 | 9.000 | On | N | 9.7 | 15.1 | 50.0 |
| 12.831000 | 34.6 | 1000.0 | 9.000 | On | N | 9.9 | 15.4 | 50.0 |
| 12.871500 | 34.6 | 1000.0 | 9.000 | On | N | 9.9 | 15.4 | 50.0 |

# APPENDIX A – Test Equipment Used For Tests

| | Name of Equipment | Manufacturer | Model No. | Serial No. | Cal Date | Due Date |
|---|---|---|---|---|---|---|
| 1 | Signal Analyzer | Agilent | N9020A | MY48011598 | 2014-11-07 | 2015-11-07 |
| 2 | Spectrum Analyzer | Rohde & Schwarz | FSP-30 | 100994 | 2014-11-07 | 2015-11-07 |
| 3 | EMI Test Receiver | Rohde & Schwarz | ESCI7 | 100814 | 2014-12-05 | 2015-12-05 |
| 4 | EMI Test Receiver | Rohde & Schwarz | ESCI7 | 100816 | 2014-12-05 | 2015-12-05 |
| 5 | Active Loop Antenna | SCHWARZBECK | FMZB 1513 | 1513-126 | 2014-05-19 | 2016-05-19 |
| 6 | Attenuator | HP | 8498A | 1801A06913 | 2014-11-11 | 2015-11-11 |
| 7 | EPM Series Power Meter | HP | E4418A | GB38272734 | 2014-11-17 | 2015-11-17 |
| 8 | Power Sensor | HP | 8487A | 3318A03524 | 2015-02-06 | 2016-02-06 |
| 9 | Audio Analyzer | HP | 8903B | 2747A03432 | 2014-11-10 | 2015-11-10 |
| 10 | ESG-D Series Signal Generator | Agilent | E4432B | US40054094 | 2014-11-12 | 2015-11-12 |
| 11 | SYNTHESIZED SWEEPER | HP | 8341B | 2819A01563 | 2014-11-14 | 2015-11-14 |
| 12 | Attenuator | HP | 8494A | 3308A33351 | 2014-11-07 | 2015-11-07 |
| 13 | Temp&Humi Chamber | Kunpoong | JT-TH-556-1 | 9QE5-002 | 2015-01-16 | 2016-01-16 |
| 14 | Temp&Humi Chamber | Kunpoong | JT-TH-556-2 | 9QE5-003 | 2015-01-16 | 2016-01-16 |
| 15 | Temp&Humi Chamber | ESPEC CORP. | SH-241 | 92000872 | 2014-08-18 | 2015-08-18 |
| 16 | DC POWER SUPPLY | Agilent | E3632A | MY40011638 | 2014-11-07 | 2015-11-07 |
| 17 | Horn Antenna | ETS-Lindgren | 3115 | 00078895 | 2013-02-28 | 2015-02-28 |
| 18 | Horn Antenna | ETS-Lindgren | 3115 | 00078894 | 2013-05-13 | 2015-05-13 |
| 19 | Horn Antenna | ETS-Lindgren | 3116 | 00062916 | 2013-03-20 | 2015-03-20 |
| 20 | Horn Antenna | ETS-Lindgren | 3116 | 00062504 | 2013-05-27 | 2015-05-27 |
| 21 | Horn Antenna | ETS-Lindgren | 3117 | 00154525 | 2013-07-03 | 2015-07-03 |
| 22 | OPT H64 AMPLIFIER | HP | 8447F | 3113A06814 | 2015-02-06 | 2016-02-06 |
| 23 | PREAMPLIFIER | Agilent | 8449B | 3008A02307 | 2014-10-24 | 2015-10-24 |
| 24 | Radio Communication Tester | Rohde & Schwarz | CMU200 | 106765 | 2015-02-02 | 2016-02-02 |
| 25 | LISN | Rohde & Schwarz | ENV216 | 101235 | 2014-07-30 | 2015-07-30 |
| 26 | LISN | Rohde & Schwarz | ENV216 | 101236 | 2014-07-30 | 2015-07-30 |
| 27 | LISN | Rohde & Schwarz | ENV216 | 101151 | 2014-11-07 | 2015-11-07 |
| 28 | DC POWER SUPPLY | Agilent | E3632A | MY40011638 | 2014-11-07 | 2015-11-07 |
| 29 | EMI Test Receiver | Rohde & Schwarz | ESCI3 | 100032 | 2015-02-02 | 2016-02-02 |
| 30 | 6dB Attenuator | R&S | DNF | 272.4110.50 | 2014-11-07 | 2015-11-07 |
| 31 | AMPLIFIER | Sonoma Instrument Co. | 310 | 291721 | 2015-02-02 | 2016-02-02 |
| 32 | EMI Test Receiver | Rohde & Schwarz | ESU40 | 100336 | 2014-05-15 | 2015-05-15 |
| 33 | Signal Generator | Rohde & Schwarz | SMBV100A | 258008 | 2014-08-21 | 2015-08-21 |
| 34 | Bilog Antenna | Schaffner | CBL6111C | 2551 | 2014-05-08 | 2016-05-08 |