Registration
No.788871

# TEST REPORT FOR BLUETOOTH TESTING

Report No: SRTC2018-9004(F)-18062601(D)

Product Name: Mobile Phone

Product Model: Hisense F15

Applicant: Hisense International Co., Ltd.

Manufacturer: Hisense Communications Co., Ltd.

Specification: FCC Part 15, Subpart C (2018)

FCC ID: 2ADOBF15

The State Radio_monitoring_center Testing Center (SRTC)

15th Building, No.30, Shixing Street, Shijingshan District,

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# 1. GENERAL INFORMATION

## 1.1 Notes of the test report

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written permission of The State Radio_monitoring_center Testing Center (SRTC).
The test results relate only to individual items of the samples which have been tested.

## 1.2 Information about the testing laboratory

| | |
|---|---|
| Company: | The State Radio_monitoring_center Testing Center (SRTC) |
| Address: | 15th Building, No.30 Shixing Street, Shijingshan District, P.R.China |
| City: | Beijing |
| Country or Region: | P.R.China |
| Contacted person: | Liu Jia |
| Tel: | +86 10 57996183 |
| Fax: | +86 10 57996388 |
| Email: | liujiaf@srtc.org.cn |

## 1.3 Applicant's details

| | |
|---|---|
| Company: | Hisense International Co., Ltd. |
| Address: | Floor 22, Hisense Tower, 17 Donghai Xi Road, Qingdao, 266071, China |
| City: | Qingdao |
| Country or Region: | China |
| Contacted person: | Geng Ruifeng |
| Tel: | +86-532-80877742 |
| Fax: | --- |
| Email: | gengruifeng@hisense.com |

## 1.4 Manufacturer's details

| | |
|---|---|
| Company: | Hisense Communications Co., Ltd. |
| Address: | 218 Qianwangang Road, Qingdao Economic & Technological Development Zone, Qingdao, China |
| City: | Qingdao |
| Country or Region: | China |
| Contacted person: | Dai Qingtao |
| Tel: | +86-532-55753749 |
| Fax: | --- |
| Email: | daiqingtao@hisense.com |

## 1.5 Test Environment

| | |
|---|---|
| Date of Receipt of test sample at SRTC: | 2018-06-26 |
| Testing Start Date: | 2018-06-26 |
| Testing End Date: | 2018-08-03 |

| Environmental Data: | Temperature (°C) | Humidity (%) |
|---|---|---|
| Ambient | 25 | 30 |

| | |
|---|---|
| Normal Supply Voltage (V d.c.): | 3.80 |

# 2 DESCRIPTION OF THE DEVICE UNDER TEST

## 2.1 Final Equipment Build Status

| | |
|---|---|
| Frequency Range | 2.402GHz~2.480GHz |
| Number of Channel | 79 |
| Modulation Type | GFSK, π/4DQPSK, 8DPSK |
| Duplex Mode | TDD |
| Channel Spacing | 1MHz |
| Data Rate | 1Mbps, 2 Mbps, 3 Mbps |
| Power Supply | Battery/AC adapter |
| Rated Power Supply Voltage | 3.80V |
| HW Version | YK737_V0.2 |
| SW Version | Hisense_F15_4G_10 |
| IMEI | 861854039418502 |
| Antenna type | Refer to Note |
| Antenna connector | Refer to Note |

Note:

The antenna provide to the EUT, please refer to the following table:

| Brand | Model | Antenna gain | Frequency range(GHz) | Antenna type | Connecter Type |
|---|---|---|---|---|---|
| N/A | N/A | -1.2dBi | 2.402GHz~2.480GHz | PIFA Antenna | N/A |
| Manufacturers ensure that their designs will not be modified by the user or third parties arbitrary antenna parameters and performance. | | | | | |

## 2.2 Description of Test Modes

**79 channels are provided to this EUT:**

| CHANNEL | FREQ. (MHz) | CHANNEL | FREQ. (MHz) | CHANNEL | FREQ. (MHz) | CHANNEL | FREQ. (MHz) | CHANNEL | FREQ. (MHz) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 2402 | 16 | 2418 | 32 | 2434 | 48 | 2450 | 64 | 2466 |
| 1 | 2403 | 17 | 2419 | 33 | 2435 | 49 | 2451 | 65 | 2467 |
| 2 | 2404 | 18 | 2420 | 34 | 2436 | 50 | 2452 | 66 | 2468 |
| 3 | 2405 | 19 | 2421 | 35 | 2437 | 51 | 2453 | 67 | 2469 |
| 4 | 2406 | 20 | 2422 | 36 | 2438 | 52 | 2454 | 68 | 2470 |
| 5 | 2407 | 21 | 2423 | 37 | 2439 | 53 | 2455 | 69 | 2471 |
| 6 | 2408 | 22 | 2424 | 38 | 2440 | 54 | 2456 | 70 | 2472 |
| 7 | 2409 | 23 | 2425 | 39 | 2441 | 55 | 2457 | 71 | 2473 |
| 8 | 2410 | 24 | 2426 | 40 | 2442 | 56 | 2458 | 72 | 2474 |
| 9 | 2411 | 25 | 2427 | 41 | 2443 | 57 | 2459 | 73 | 2475 |
| 10 | 2412 | 26 | 2428 | 42 | 2444 | 58 | 2460 | 74 | 2476 |
| 11 | 2413 | 27 | 2429 | 43 | 2445 | 59 | 2461 | 75 | 2477 |
| 12 | 2414 | 28 | 2430 | 44 | 2446 | 60 | 2462 | 76 | 2478 |
| 13 | 2415 | 29 | 2431 | 45 | 2447 | 61 | 2463 | 77 | 2479 |
| 14 | 2416 | 30 | 2432 | 46 | 2448 | 62 | 2464 | 78 | 2480 |
| 15 | 2417 | 31 | 2433 | 47 | 2449 | 63 | 2465 | | |

### 2.2.1 Test Mode Applicability and Tested Channel Detail

| EUT CONFIGURE MODE | APPLICABLE TO | | | | DESCRIPTION |
|---|---|---|---|---|---|
| | RE ≥ 1G | RE<1G | PLC | APCM | - |
| GFSK, π/4DQPSK, 8DPSK | √ | √ | √ | √ | - |

Where **RE 1G:** Radiated Emission above 1GHz **RE<1G:** Radiated Emission below 1GHz

**PLC:** Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

**Radiated Emission Test (Above 1GHz):**

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.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE | DATA RATE (Mbps) |
|---|---|---|---|
| 0 to 78 | 39 | GFSK, π/4DQPSK, 8DPSK | 1Mbps, 2 Mbps, 3 Mbps |

**Radiated Emission Test (Below 1GHz):**

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.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE | DATA RATE (Mbps) |
|---|---|---|---|
| 0 to 78 | 39 | GFSK, π/4DQPSK, 8DPSK | 1Mbps, 2 Mbps, 3 Mbps |

**Power Line Conducted Emission Test:**

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.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE | DATA RATE (Mbps) |
|---|---|---|---|
| 0 to 78 | 39 | GFSK, π/4DQPSK, 8DPSK | 1Mbps, 2 Mbps, 3 Mbps |

**Antenna Port Conducted Measurement:**

This item includes all test value of each mode, but only includes spectrum plot of worst value of each 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.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE | DATA RATE (Mbps) |
|---|---|---|---|
| 0 to 78 | 0, 39, 78 | GFSK, π/4DQPSK, 8DPSK | 1Mbps, 2 Mbps, 3 Mbps |

## 2.3 Duty Cycle of Test Signal

| Modulation Type | Duty Cycle |
|---|---|
| GFSK(DH1) | 29.84% |
| GFSK(DH3) | 43.44% |
| GFSK(DH5) | 45.92% |
| π/4DQPSK(DH1) | 30.29% |
| π/4DQPSK(DH3) | 43.52% |
| π/4DQPSK(DH5) | 45.78% |
| 8DPSK(DH1) | 30.12% |
| 8DPSK(DH3) | 43.53% |
| 8DPSK(DH5) | 45.27% |

## 2.4 EUT operating conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

## 2.5 Support Equipment

The following support equipment was used to exercise the DUT during testing:

| | |
|---|---|
| Equipment | Charger |
| Manufacturer | Shenzhen Tianyin Electronics Co.,Ltd |
| Model Number | TPA-97050100UU |
| Serial Number | --- |

| | |
|---|---|
| Equipment | Battery |
| Manufacturer | Guangdong Teamgiant New Energy Tech Co.,LTD |
| Model Number | LIW38210A |
| Serial Number | --- |

The products are different on the supplier of LCD/TP/Camera/Flash. There is no change in the RF module and antenna.

Main Supply

| Part Name | Model Name | supplier |
|---|---|---|
| LCD | ST7701S | JIANGXI HOLITECH TECHNOLOGY CO., LTD |
| TP | FT6336U | Guizhou Yuye Opto-Electronic Co., Ltd |
| Camera | GC5025/GC8034 | Shenzhen Chengxiangtong technology CO.,LTD |
| Flash | KMFN60012M-B214 | SAMSUNG |

Secondary Supply

| Part Name | Model Name | supplier |
|---|---|---|
| LCD | ST7701S-G5 | Shenzhen Digital Technology Co., LTD |
| TP | FT6336U | JIANGXI HOLITECH TECHNOLOGY CO., LTD |
| Camera | GC5025/GC8034 | Shenzhen Union lmage Co.,Ltd |
| Flash | 08EMCP08-EL3DT227 | KINGSTON |

# 3 REFERENCE SPECIFICATION

| Specification | Version | Title |
|---|---|---|
| 15.35 | 2018 | Measurement detector functions and bandwidths. |
| 15.209 | 2018 | Radiated emission limits; general requirements. |
| 15.247 | 2018 | Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz. |
| 15.203 | 2018 | Antenna requirement |
| ANSI C63.10 | 2013 | Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices |

# 4 KEY TO NOTES AND RESULT CODES

| Code | Meaning |
|---|---|
| PASS | Test result shows that the requirements of the relevant specification have been met. |
| FAIL | Test result shows that the requirements of the relevant specification have not been met. |
| N/T | Test case is not tested. |
| NTC | Nominal voltage, Normal Temperature |
| HV | High voltage, Normal Temperature |
| LV | Low voltage, Normal Temperature |
| HTHV | high voltage, High Temperature |
| LTHV | High voltage, Low Temperature |
| HTLV | Low voltage, High Temperature |
| LTLV | Low voltage, Low Temperature |

# 5 RESULT SUMMARY

| No. | Test case | Reference | Verdict |
|---|---|---|---|
| 1 | Occupied Bandwidth | 15.247(a)(1) | Pass |
| 2 | Channel Separation | 15.247(a)(1) | Pass |
| 3 | Output Power | 15.247(b)(1) | Pass |
| 4 | Dwell Time | 15.247(a)(1)(iii) | Pass |
| 5 | Number of Hopping Frequencies | 15.247(a)(1)(iii) | Pass |
| 6 | Conducted out of band emission measurement | 15.247(d) | Pass |
| 7 | Band-edge | 15.247(d) | Pass |
| 8 | Spurious Radiated Emissions | 15.247(d)/15.35(b)/15.209 | Pass |
| 9 | AC Power line Conducted Emission | 15.207 | Pass |
| 10 | Antenna requirement | 15.203 | Pass（refer to section 2.1） |

| This Test Report Is Issued by: | Checked by: |
|---|---|
| Mr. Peng Zhen | Mr. Li Bin |
| Tested by: | Issued date: |
| Mr. He Dengshun | 20180823 |

# 6 TEST RESULT

## 6.1 Occupied Bandwidth

### 6.1.1 Ambient condition

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 25°C | 30% | 101.5kPa |

### 6.1.2 Test Description

The bandwidth at 20dB down from the highest in-band spectral density is measured with a spectrum analyzer and Bluetooth test set via a power splitter with a known loss which connected to the transmitter antenna terminal of the EUT while the EUT is operating at maximum power and at the appropriate frequencies. All modes of operation were investigated and the worst case configuration results are reported in this section.

### 6.1.3 Test limit

FCC Part15.247 (a)

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

### 6.1.4 Test settings

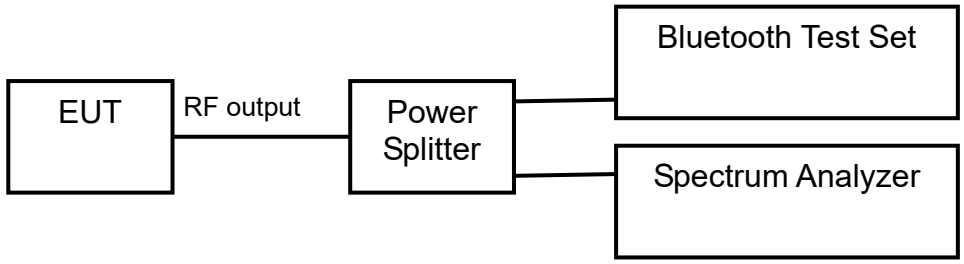
a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.

c. Measure the frequency difference of two frequencies that were attenuated 30dB from the reference level. Record the frequency difference as the emission bandwidth.

d. Repeat above procedures until all frequencies measured were complete.

### 6.1.5 Test Setup




### 6.1.6 Test result

The test results are shown in Appendix A .

## 6.2 Channel Separation

### 6.2.1 Ambient condition

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 25°C | 30% | 101.5kPa |

### 6.2.2 Test Description

The Equipment Under Test (EUT) was set up in a shielded room to perform the channel separation measurements. The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss.

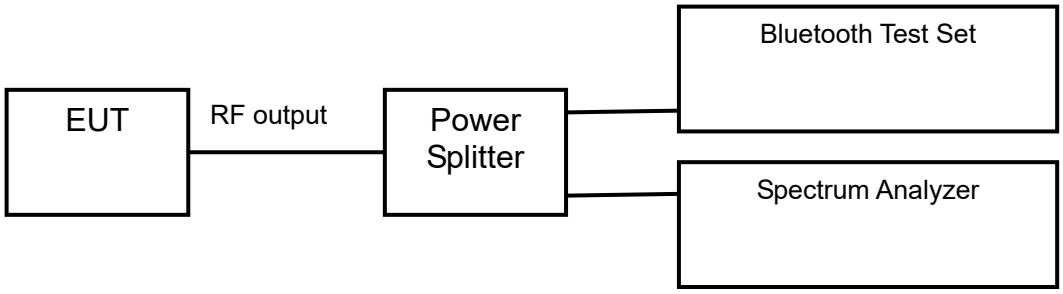
### 6.2.3 Test limit

FCC Part15.247 (a)(1)
Measurement is made with EUT operating in hopping mode. The minimum permissible channel separation for this system is 2/3 the value of the 20dB BW.

### 6.2.4 Test Settings

ANSI C63.10-2013 Section 7.8.2
The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:
a) Span: Wide enough to capture the peaks of two adjacent channels.
b) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
c) Video (or average) bandwidth (VBW) ≥ RBW.
d) Sweep: Auto.
e) Detector function: Peak.
f) Trace: Max hold.
g) Allow the trace to stabilize.
Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Compliance of an EUT with the appropriate regulatory limit shall be determined. A plot of the data shall be included in the test report.

### 6.2.5 Test Setup




### 6.2.6 Test result

The test results are shown in Appendix A .

## 6.3 Output Power

### 6.3.1 Ambient condition

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 25°C | 30% | 101.5kPa |

### 6.3.2 Test Description

Measurement is made while the EUT is operating in non-hopping transmission mode. The powers shown below were measured using a spectrum analyzer with a Bluetooth signalling test set used only to maintain a Bluetooth link with the EUT.

### 6.3.3 Test limit

FCC Part15.247(b)(1)

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt.

Used conversion factor: Limit (dBm) = 10 log (Limit (W)/1mW) ➔

| Modulation type | GFSK | π/4DQPSK | 8DPSK |
|---|---|---|---|
| Maximum Output Power | 30.0dBm | 30.0dBm | 30.0dBm |

For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

Used conversion factor: Limit (dBm) = 10 log (Limit (W)/1mW) ➔

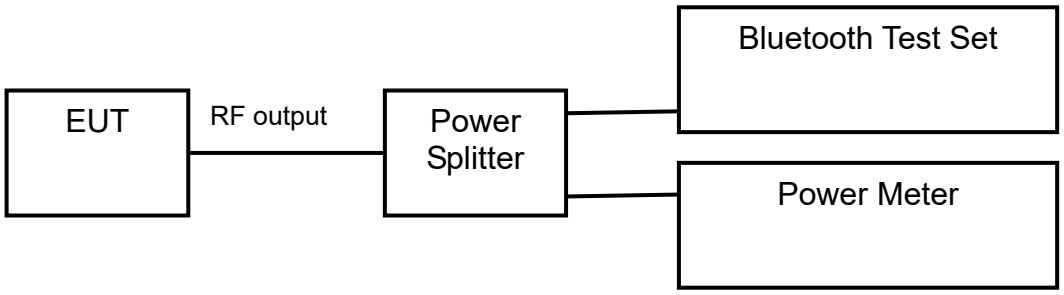
| Modulation type | GFSK | π/4DQPSK | 8DPSK |
|---|---|---|---|
| Maximum Output Power | 21.0dBm | 21.0dBm | 21.0dBm |

### 6.3.4 Test Settings

ANSI C63.10-2013 Section 7.8.5

The transmitter output is connected to a wideband peak and average power meter.

### 6.3.5 Test Setup




### 6.3.6 Test result

The test results are shown in Appendix A .

## 6.4 Dwell Time

### 6.4.1 Ambient condition

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 25°C | 30% | 101.5kPa |

### 6.4.2 Test Description

The Equipment Under Test (EUT) was set up in a shielded room to perform the dwell time measurements.
The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss.
The time slot length is measured of three different packet types which are available in the Bluetooth technology. Those are DH1, DH3 and DH5 packets. The dwell time is calculated by:
Dwell time = time slot length * hop rate * 31.6/ number of hopping channels with:
- hop rate=1600/2 * 1/s for DH1 packets =800
- hop rate=1600/4 * 1/s for DH3 packets =400
- hop rate=1600/6 * 1/s for DH5 packets =266.67
- number of hopping channels=79
- 31.6 s=0.4 seconds multiplied by the number of hopping channels=0.4s * 79

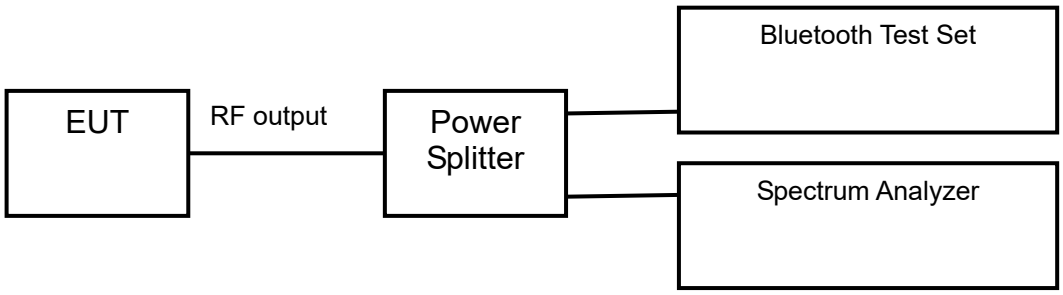
### 6.4.3 Test limit

FCC Part15.247(a)(1)(iii)
Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

### 6.4.4 Test Settings

ANSI C63.10-2013 Section 7.8.4
The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:
a) Span: Zero span, centered on a hopping channel.
b) RBW shall be ≤ channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel.
c) Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.
d) Detector function: Peak.
e) Trace: Max hold.
Use the marker-delta function to determine the transmit time per hop. If this value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in transmit time.

### 6.4.5 Test Setup




### 6.4.6 Test result

The test results are shown in Appendix A .

## 6.5 Number of Hopping Frequencies

### 6.5.1 Ambient condition

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 25°C | 30% | 101.5kPa |

### 6.5.2 Test Description

The Equipment Under Test (EUT) was set up in a shielded room to perform the number of hopping frequencies measurement. The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss.

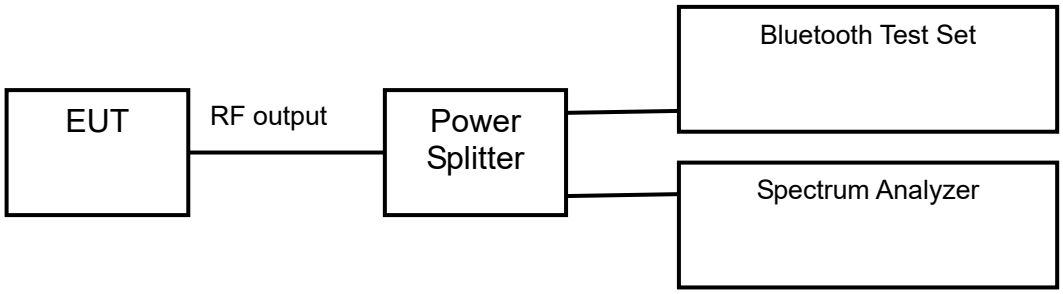
### 6.5.3 Test limit

FCC Part15.247(a)(1)(iii)
Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

### 6.5.4 Test Settings

ANSI C63.10-2013 Section 7.8.3
The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:
a) Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
b) RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
c) VBW ≥ RBW.
d) Sweep: Auto.
e) Detector function: Peak.
f) Trace: Max hold.
g) Allow the trace to stabilize.

### 6.5.5 Test Setup




### 6.5.6 Test result

The test results are shown in Appendix A.

## 6.6 Conducted out of band emission measurement

### 6.6.1 Ambient condition

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 25°C | 30% | 101.5kPa |

### 6.6.2 Test Description

The Equipment Under Test (EUT) was set up in a shielded room to perform the spurious emissions measurements. The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss.

### 6.6.3 Test limit

FCC Part15.247(d)

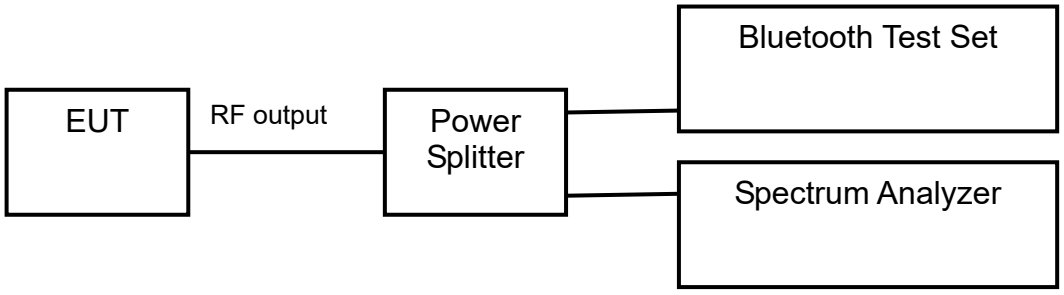
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

### 6.6.4 Test Settings

ANSI C63.10-2013 Section 7.8.8

Connect the primary antenna port through an attenuator to the spectrum analyzer input; in the results, account for all losses between the unlicensed wireless device output and the spectrum analyzer. The instrument shall span 30 MHz to 10 times the operating frequency in GHz, with a resolution bandwidth of 100 kHz, video bandwidth of 300 kHz, and a coupled sweep time with a peak detector. The band 30 MHz to the highest frequency may be split into smaller spans, as long as the entire spectrum is covered.

### 6.6.5 Test Setup




### 6.6.6 Test result

The test results are shown in Appendix A .

The spectrum plots are attached on the following images. D1 line indicates the highest level, D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

## 6.7 Band-edge measurement

### 6.7.1 Ambient condition

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 25°C | 30% | 101.5kPa |

### 6.7.2 Test Description

The Equipment Under Test (EUT) was set up in a shielded room to perform the spurious emissions measurements. The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss.

### 6.7.3 Test limit

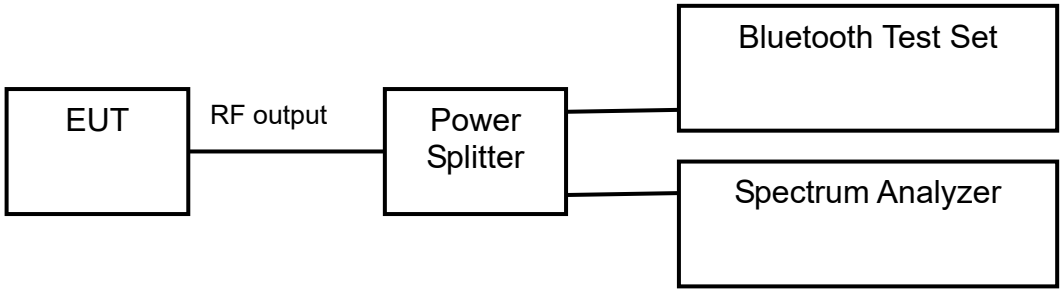
FCC Part15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

### 6.7.4 Test Settings

ANSI C63.10-2013 Section 6.10.4

### 6.7.5 Test Setup




### 6.7.6 Test result

The test results are shown in Appendix A .

The spectrum plots are attached on the following images. D1 line indicates the highest level, D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

## 6.8 Spurious Radiated Emissions

### 6.8.1 Ambient condition

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 25°C | 30% | 101.5kPa |

### 6.8.2 Test Description

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at maximum power and at the appropriate frequencies. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section. The measurements shall be repeated with orthogonal polarization of the test antenna. The results shall be showed the worst case of the three orthogonal axes of EUT.

### 6.8.3 Test limit

Part15.205, 15.209, 15.247(d)

All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in below Table per Section 15.209.

| Frequency [MHz] | Field strength [ μV/m ] | Measured 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 |

**Radiated Limits**

Part15.35(b):

there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit

**Used conversion factor: Limit (dBμV/m) = 20 log (Limit (μV/m)/1μV/m)**

| Frequency [MHz] | Detector | Unit (dBμV/m) |
|---|---|---|
| 30～88 | Quasi-peak | 40.0 |
| 88～216 | Quasi-peak | 43.5 |
| 216～960 | Quasi-peak | 46.0 |
| 960～1000 | Quasi-peak | 54.0 |
| 1000～5th harmonic of the highest frequency or 40GHz, whichever is lower | Average | 54.0 |
| | Peak | 74.0 |

**Conversion Radiated limits**

### 6.8.4 Test Procedure Used

ANSI C63.10-2013 Section 6.3&6.5&6.6
The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing.

### For Radiated emission below 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. Both X and Y axes of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

### For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

### For the radiated emission test above 1GHz:

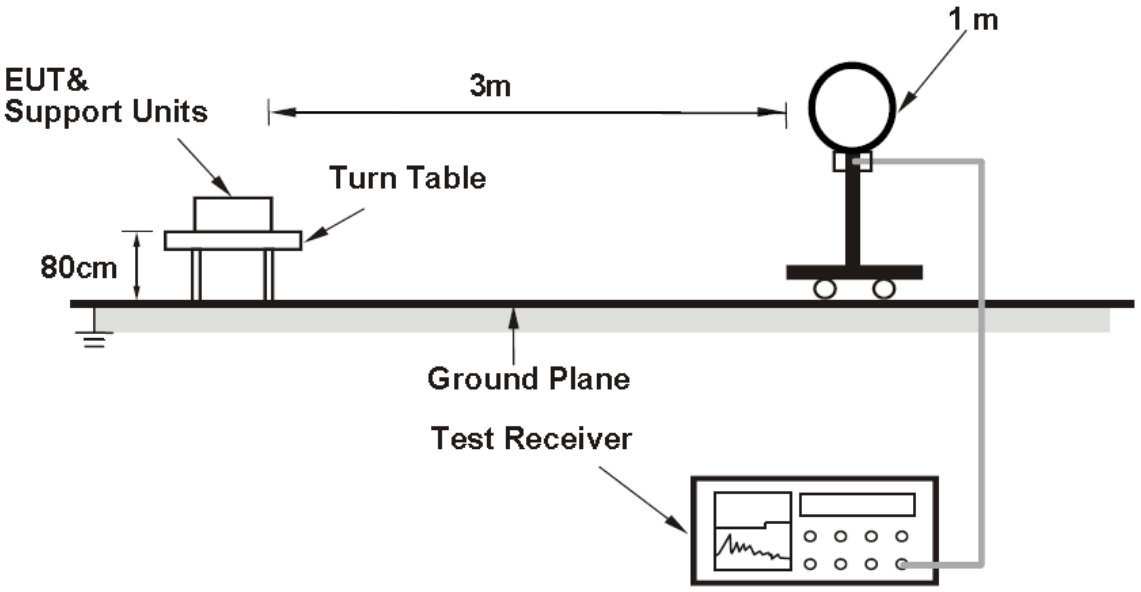
Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.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

maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

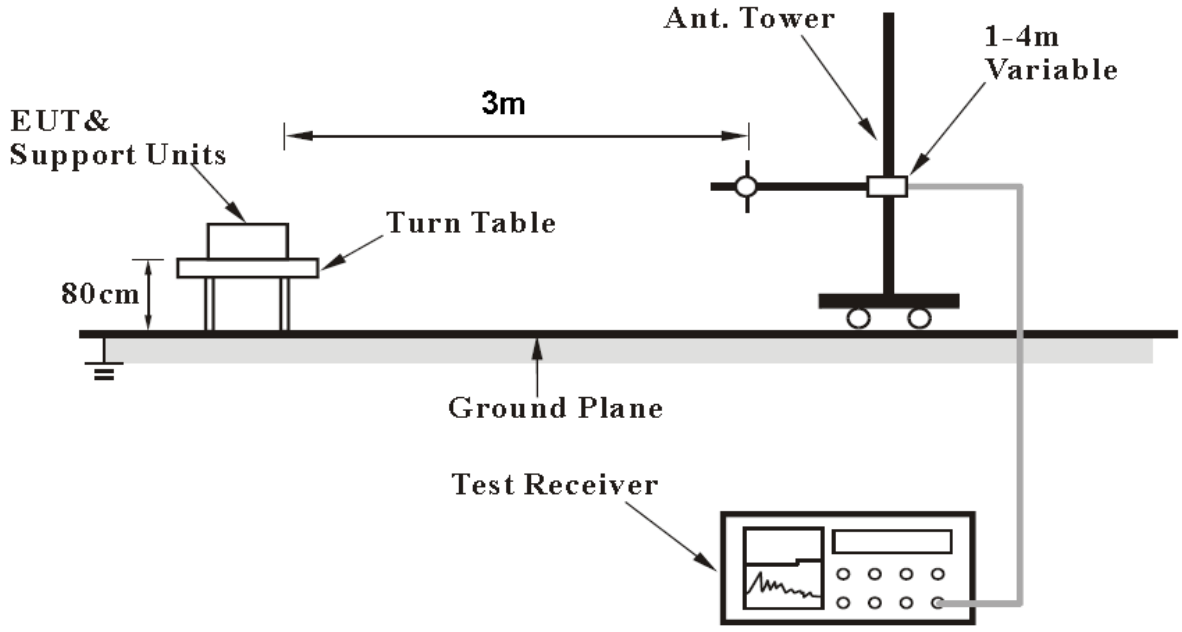
NOTE:
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Average detection (AV) at frequency above 1GHz. If duty cycle of test signal is < 98%, the duty factor need added to measured value.
4. All modes of operation were investigated and the worst-case emissions are reported.

### 6.8.5 Test Setup

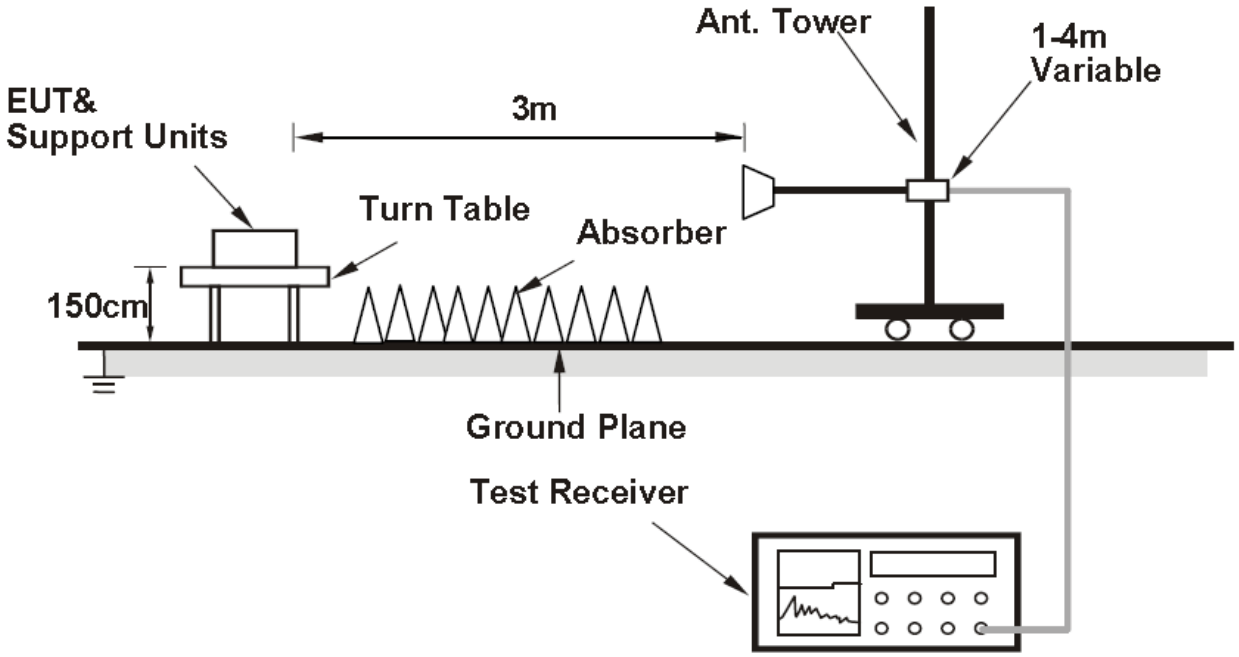
**For Radiated emission below 30MHz**




**For Radiated emission 30MHz to 1GHz**



**For Radiated emission above 1GHz**




## 6.8.6 Test result

The test results are shown in Appendix B.

## 6.9 AC Power line Conducted Emission

### 6.9.1 Ambient condition

| Temperature | Relative humidity | Pressure |
|---|---|---|
| 25°C | 30% | 101.5kPa |

### 6.9.2 Test limit

FCC Part15.207

| Frequency of Emission (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.

The measurement is made according to ANSI C63.10-2013

### 6.9.3 Test Procedures

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

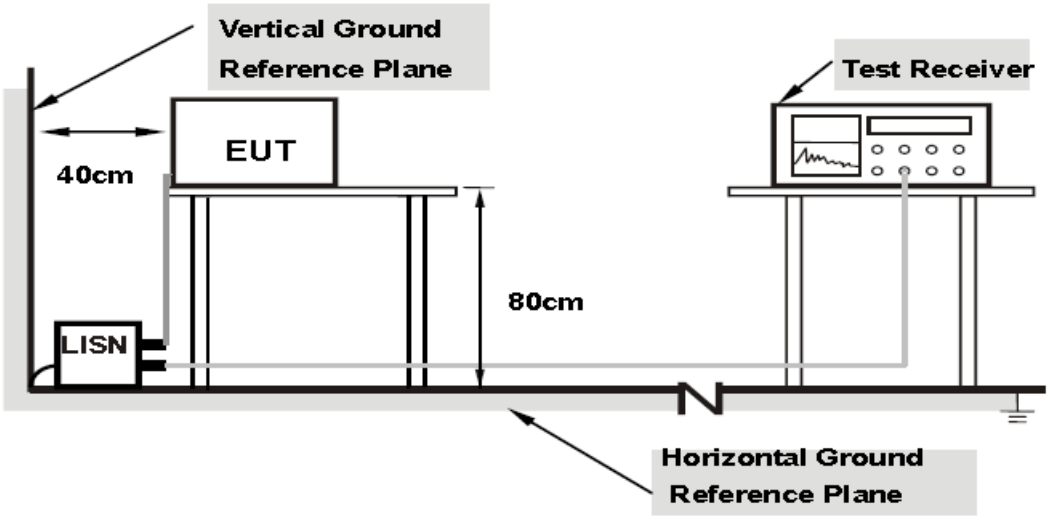
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

**NOTE:** The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

The EUT shall test under the power AC120V/60Hz.

### 6.9.4 Test Setup




For the actual test configuration, please refer to the attached file (Test Setup Photo).

### 6.9.5 Test result

The test results are shown in AppendixB .

# 7 MEASUREMENT UNCERTAINTIES

| Items | Uncertainty | |
|---|---|---|
| Occupied Bandwidth | 3kHz | |
| Peak power output | 0.67dB | |
| Band edge compliance | 1.20dB | |
| Spurious emissions | 30MHz～1GHz | 2.83dB |
| | 1GHz～12.75GHz | 2.50dB |
| | 12.75GHz～25GHz | 2.75dB |

# 8 TEST EQUIPMENTS

| No. | Name/ Model | Manufacturer | S/N | Cal date | Cal Due date |
|---|---|---|---|---|---|
| 1. | Spectrum Analyzer FSV | ROHDE&SCHWARZ | 101065 | 2017.08.20 | 2018.08.19 |
| 2. | Bluetooth Test Set MT8852B | Anritsu | 1142010 | 2018.03.01 | 2019.02.28 |
| 3. | Power Meter E4416A | Agilent | MY52370013 | 2018.03.01 | 2019.02.28 |
| 4. | Power Sensor E9327A | Agilent | MY52420006 | 2018.03.01 | 2019.02.28 |
| 5. | 12.65m×8.03m×7.50m Fully-Anechoic Chamber | FRANKONIA | ----- | ----- | ----- |
| 6. | 23.18m×16.88m×9.60m Semi-Anechoic Chamber | FRANKONIA | --- | ----- | ----- |
| 7. | Turn table Diameter:1m | HD | ----- | ----- | ----- |
| 8. | Turn table Diameter:5m | HD | ----- | ----- | ----- |
| 9. | Antenna master FAC(MA4.0) | MATURO | ----- | ----- | ----- |
| 10. | Antenna master SAC(MA4.0) | MATURO | ----- | ----- | ----- |
| 11. | 9.080m×5.255m×3.525m Shielding room | FRANKONIA | ----- | ----- | ----- |
| 12. | HF 906 Double-Ridged Waveguide Horn Antenna | R&S | 100030 | 2017.08.20 | 2018.08.19 |
| 13. | HF 906 Double-Ridged Waveguide Horn Antenna | R&S | 100029 | 2017.08.20 | 2018.08.19 |
| 14. | HL562 Ultra log antenna | R&S | 100016 | 2017.08.20 | 2018.08.19 |
| 15. | 3160-09 Receive antenna | SCHWARZ-BECK | 002058-002 | 2017.08.20 | 2018.08.19 |
| 16. | ESI 40 EMI test receiver | R&S | 100015 | 2017.08.20 | 2018.08.19 |
| 17. | ESCS30 EMI test receiver | R&S | 100029 | 2017.08.20 | 2018.08.19 |
| 18. | HL562 Receive antenna | R&S | 100167 | 2017.08.20 | 2018.08.19 |
| 19. | ESH3-Z5 LISN | R&S | 100020 | 2017.08.20 | 2018.08.19 |

# APPENDIX A – TEST DATA OF CONDUCTED EMISSION

Please refer to the attachment.

# APPENDIX B – TEST DATA OF RADIATED EMISSION

Please refer to the attachment.

# APPENDIX A – TEST DATA OF CONDUCTED EMISSION

**20dB Bandwidth**

Offset 6.5dB = Attenuator 6dB+ Temporary antenna connector loss 0.2dB+ Cable loss 0.3dB

Modulation type: GFSK

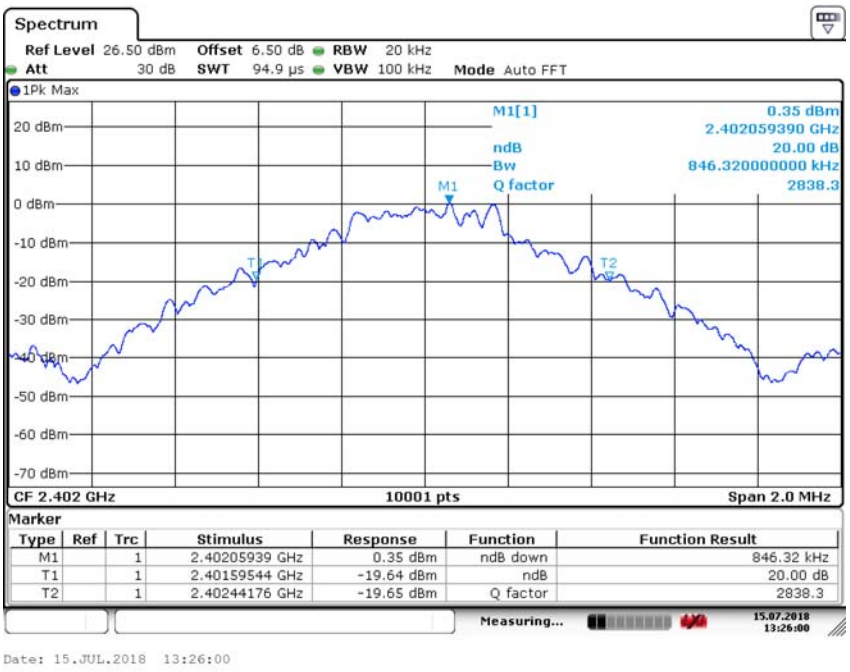
| Carrier frequency (MHz) | Channel No. | 20 dB bandwidth(kHz) |
|---|---|---|
| 2402 | 0 | 846.32 |
| 2441 | 39 | 846.72 |
| 2480 | 78 | 848.72 |

Modulation type: π/4DQPSK

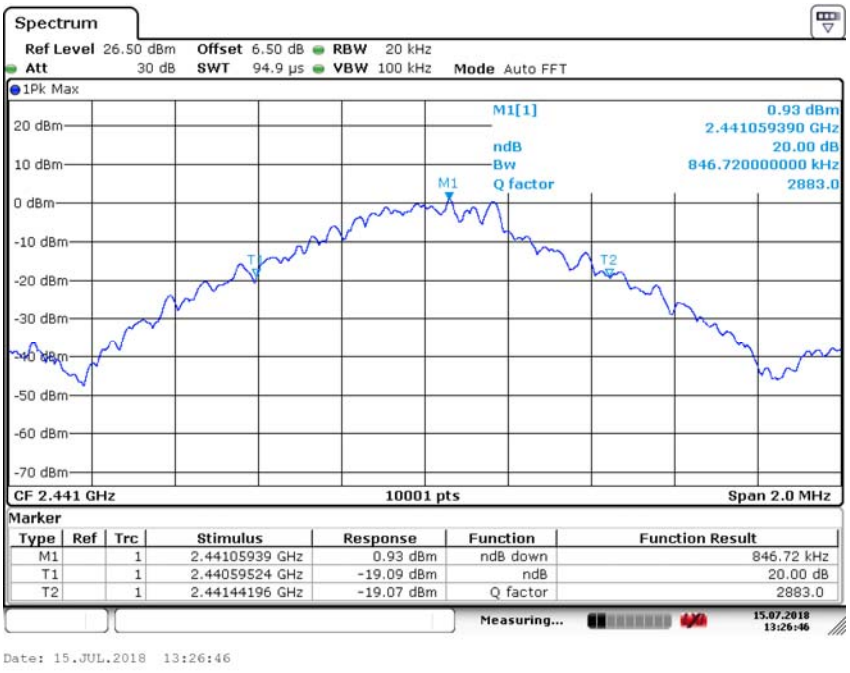
| Carrier frequency (MHz) | Channel No. | 20 dB bandwidth(kHz) |
|---|---|---|
| 2402 | 0 | 1231.48 |
| 2441 | 39 | 1233.28 |
| 2480 | 78 | 1233.08 |

Modulation type: 8DPSK

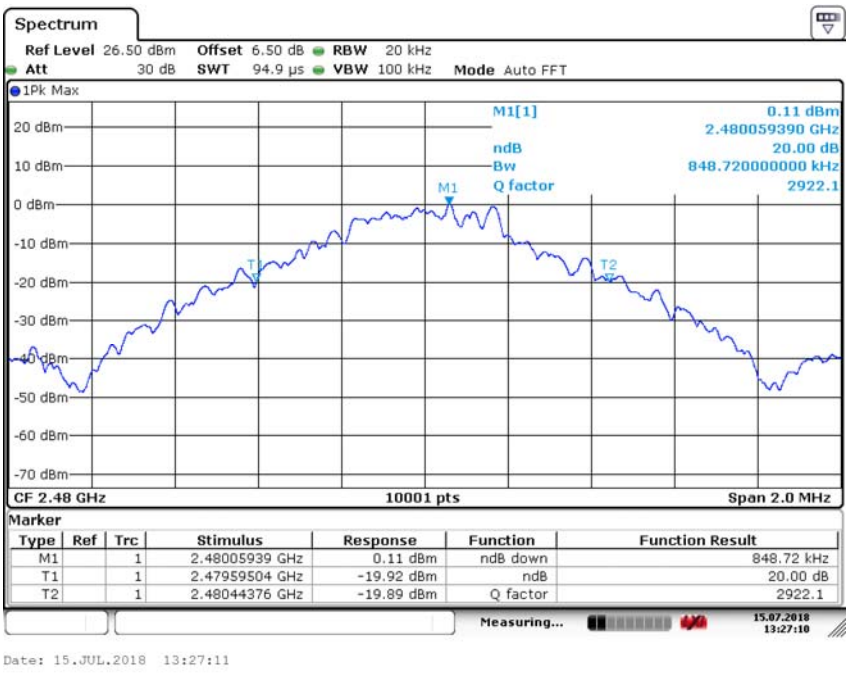
| Carrier frequency (MHz) | Channel No. | 20 dB bandwidth(kHz) |
|---|---|---|
| 2402 | 0 | 1263.87 |
| 2441 | 39 | 1217.48 |
| 2480 | 78 | 1217.08 |



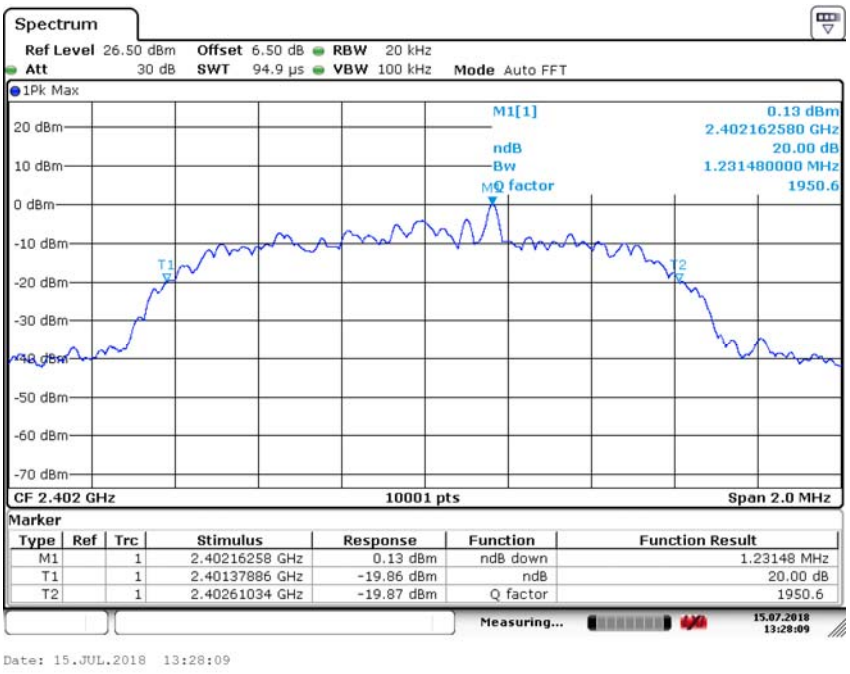

Carrier frequency (MHz): 2402
Channel No.:0
Modulation type: GFSK



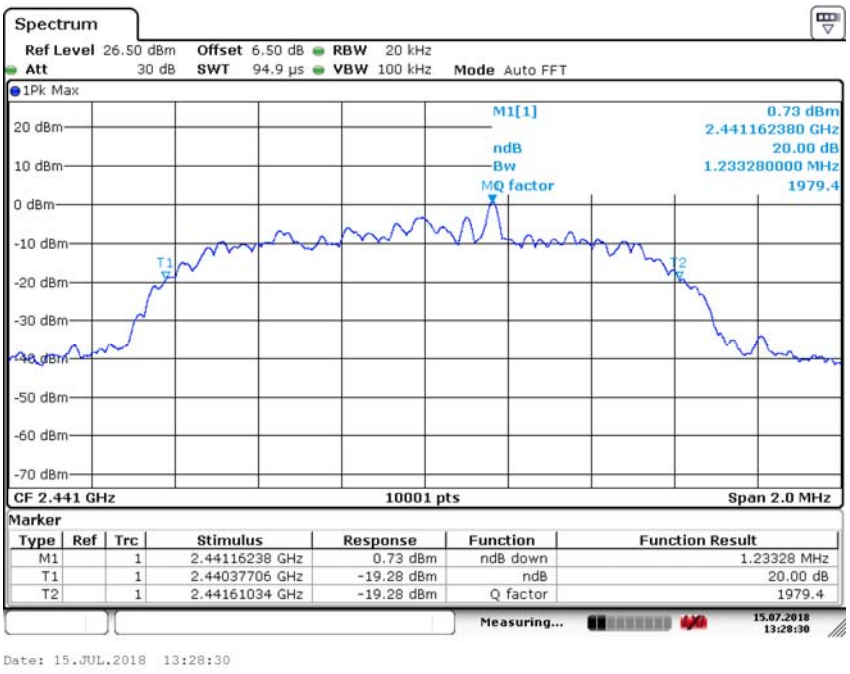

Carrier frequency (MHz): 2441
Channel No.:39
Modulation type: GFSK



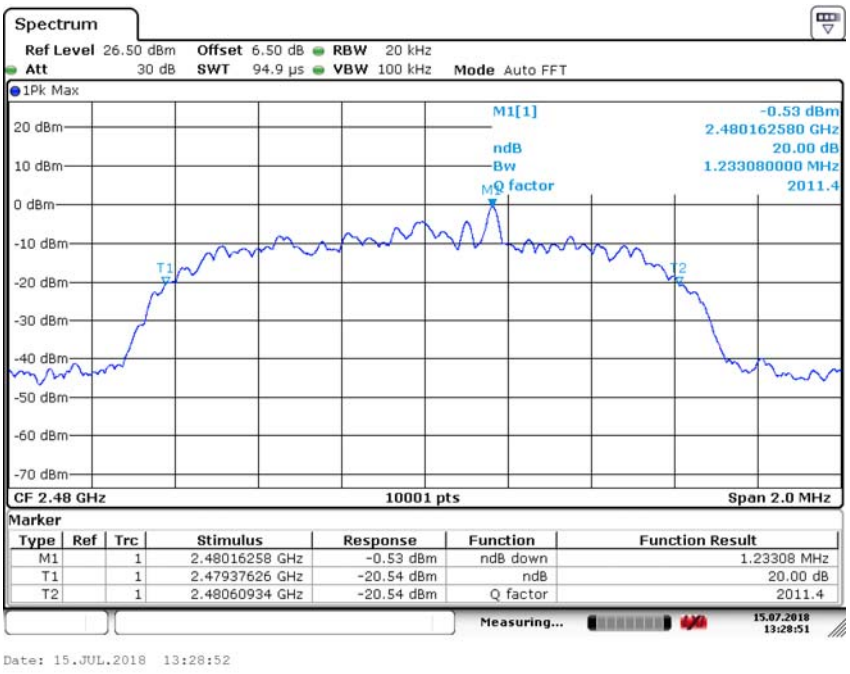

Carrier frequency (MHz): 2480
Channel No.:78
Modulation type: GFSK



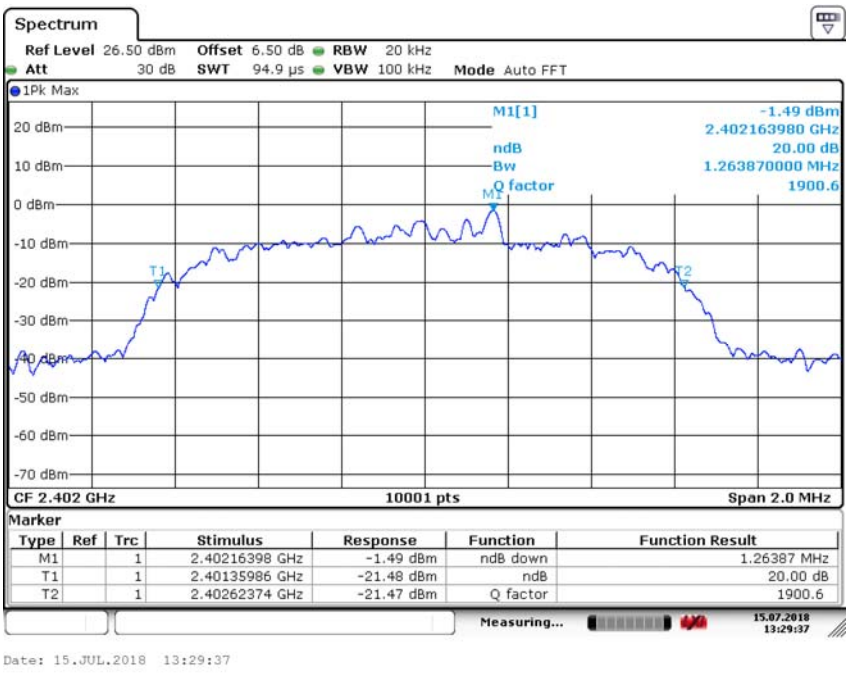

Carrier frequency (MHz): 2402
Channel No.:0
Modulation type: π/4DQPSK



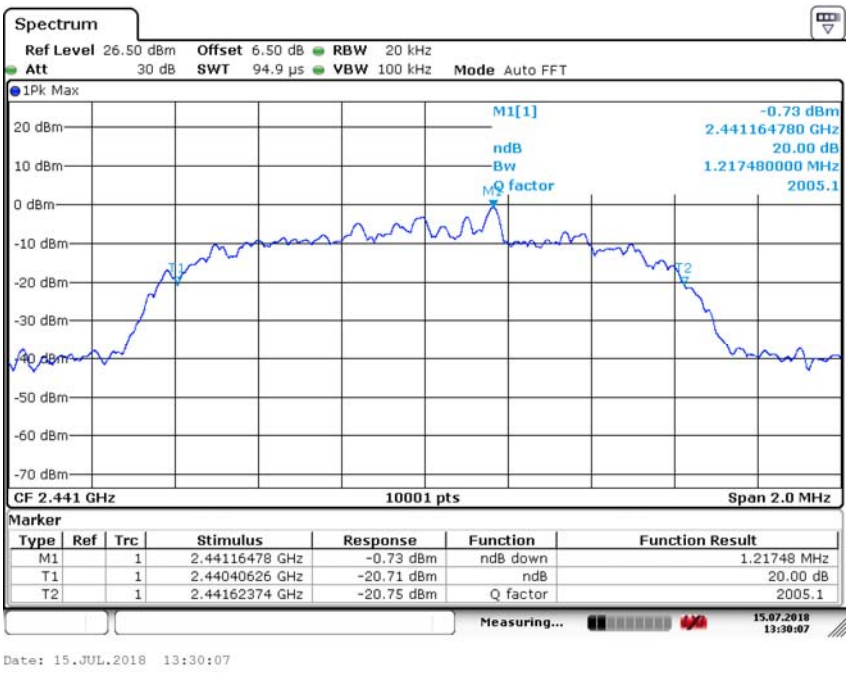

Carrier frequency (MHz): 2441
Channel No.:39
Modulation type: π/4DQPSK



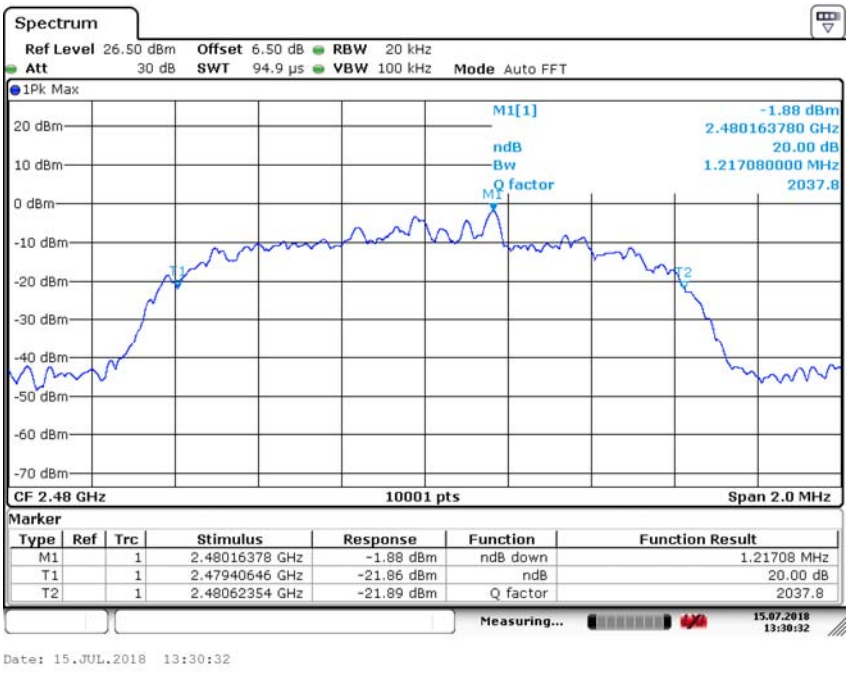

Carrier frequency (MHz): 2480
Channel No.:78
Modulation type: π/4DQPSK




Carrier frequency (MHz): 2402
Channel No.:0
Modulation type: 8DPSK




Carrier frequency (MHz): 2441
Channel No.:39
Modulation type: 8DPSK

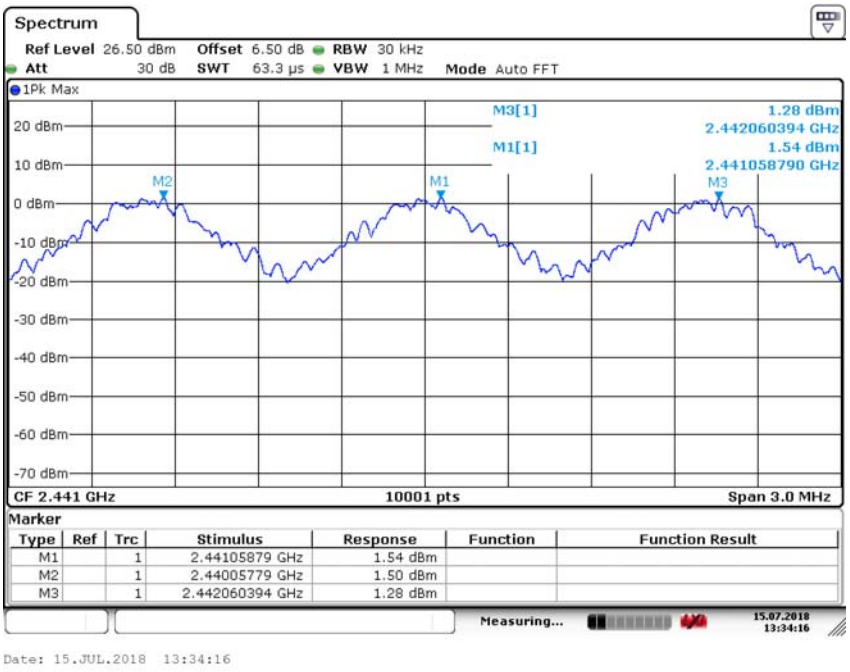



Carrier frequency (MHz): 2480
Channel No.:78
Modulation type: 8DPSK

## Channel Separation

Offset 6.5dB = Attenuator 6dB+ Temporary antenna connector loss 0.2dB+ Cable loss 0.3dB

| Op-mode | Channel separation MHz |
|---|---|
| Hopping mode | 1 |




Op-mode: Hopping mode

**Peak Power Output**

Offset 6.5dB = Attenuator 6dB+ Temporary antenna connector loss 0.2dB+ Cable loss 0.3dB

| Modulation type | Average Power Output (dBm) | | |
|---|---|---|---|
| | 2402MHz (Ch0) | 2441MHz (Ch39) | 2480MHz (Ch78) |
| GFSK | 2.13 | 2.79 | 1.89 |
| π/4DQPSK | -0.44 | 0.24 | -1.13 |
| 8DPSK | -0.42 | 0.24 | -1.12 |

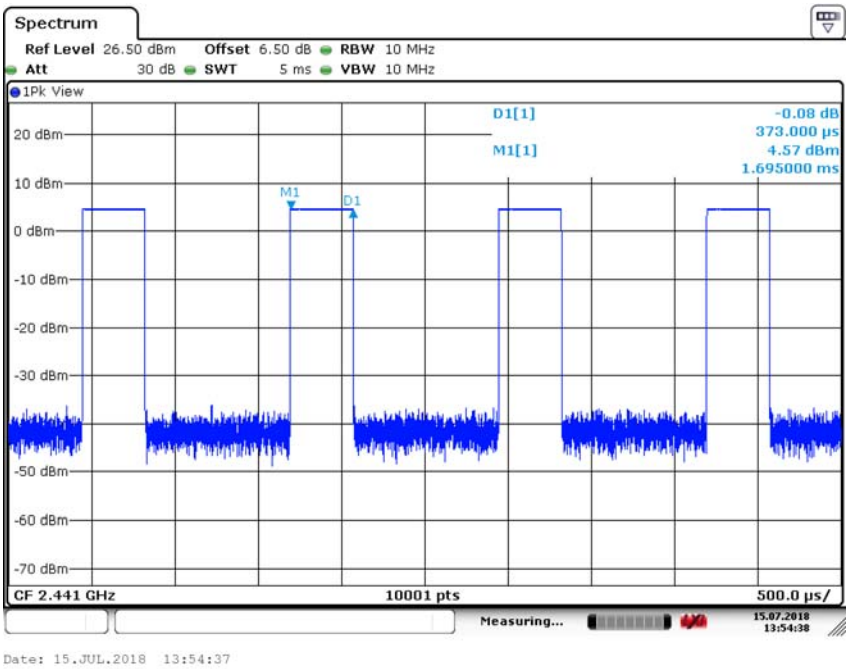
| Modulation type | Peak Power Output (dBm) | | |
|---|---|---|---|
| | 2402MHz (Ch0) | 2441MHz (Ch39) | 2480MHz (Ch78) |
| GFSK | 5.51 | 6.14 | 5.33 |
| π/4DQPSK | 4.92 | 5.56 | 4.54 |
| 8DPSK | 5.01 | 5.67 | 4.65 |

**Dwell Time**

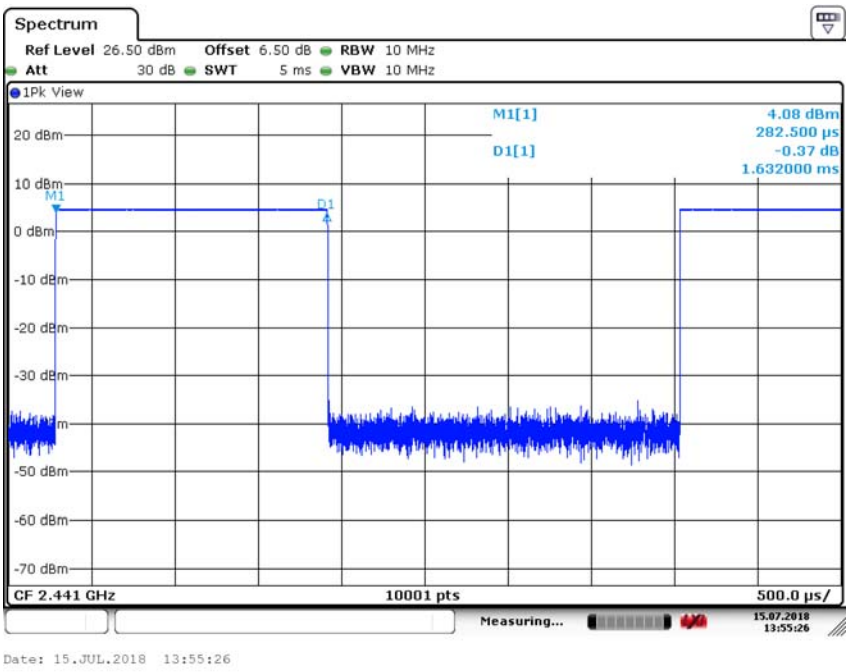
Offset 6.5dB = Attenuator 6dB+ Temporary antenna connector loss 0.2dB+ Cable loss 0.3dB

Modulation type: GFSK

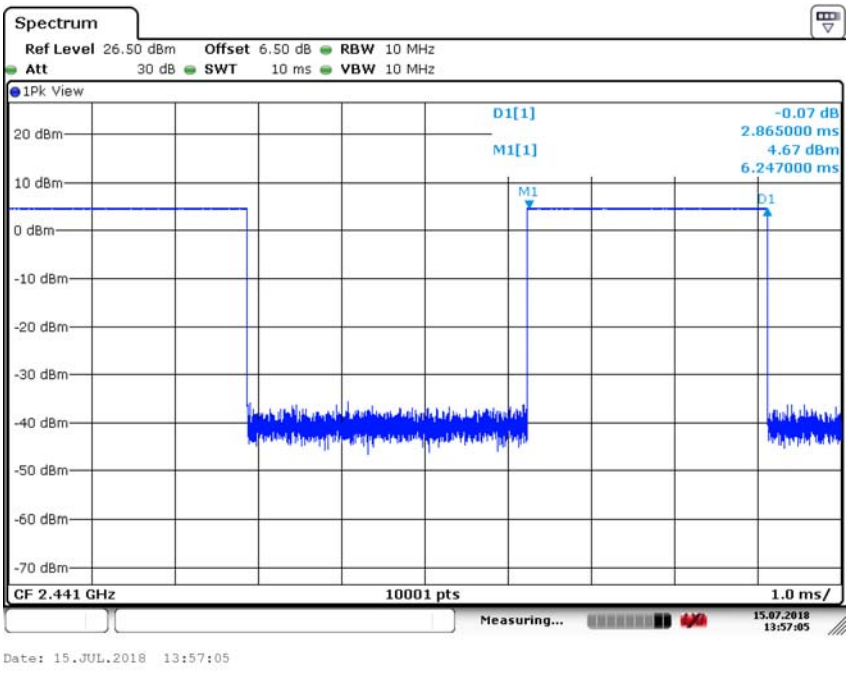
| Packet type | Time slot length μs | Dwell time | Dwell time ms |
|---|---|---|---|
| DH1 | 373 | time slot length * 31.6 *1600/2 /79 | 119 |
| DH3 | 1632 | time slot length * 31.6 *1600/4 /79 | 261 |
| DH5 | 2865 | time slot length * 31.6 *1600/6 /79 | 306 |




Carrier frequency (MHz): 2441
Packet type: DH1
Modulation type: GFSK



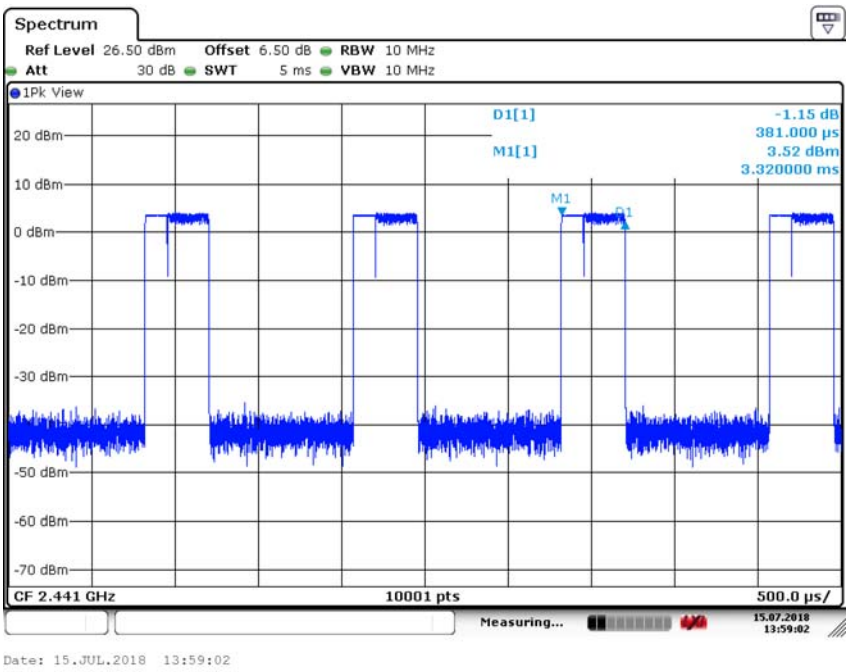

Carrier frequency (MHz): 2441
Packet type: DH3
Modulation type: GFSK



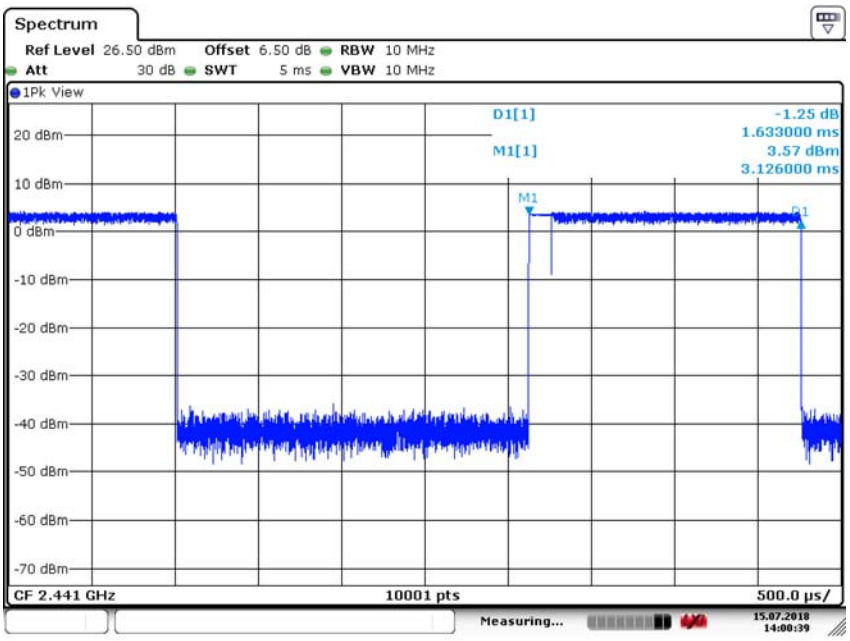

Carrier frequency (MHz): 2441
Packet type: DH5
Modulation type: GFSK

Modulation type: π/4DQPSK

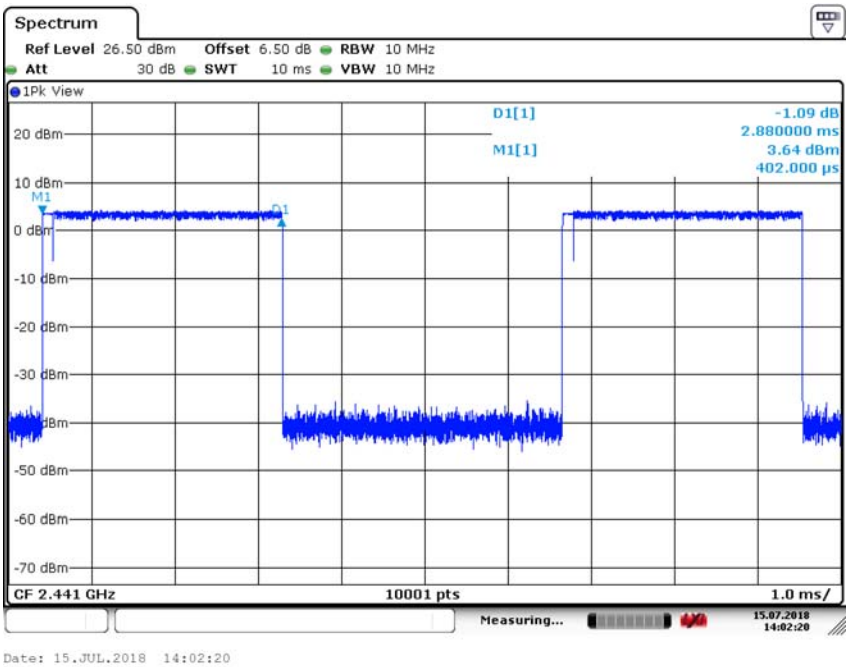
| Packet type | Time slot length μs | Dwell time | Dwell time ms |
|---|---|---|---|
| DH1 | 381 | time slot length * 31.6 *1600/2 /79 | 122 |
| DH3 | 1633 | time slot length * 31.6 *1600/4 /79 | 261 |
| DH5 | 2880 | time slot length * 31.6 *1600/6 /79 | 307 |




Carrier frequency (MHz): 2441
Packet type: DH1
Modulation type: π/4DQPSK



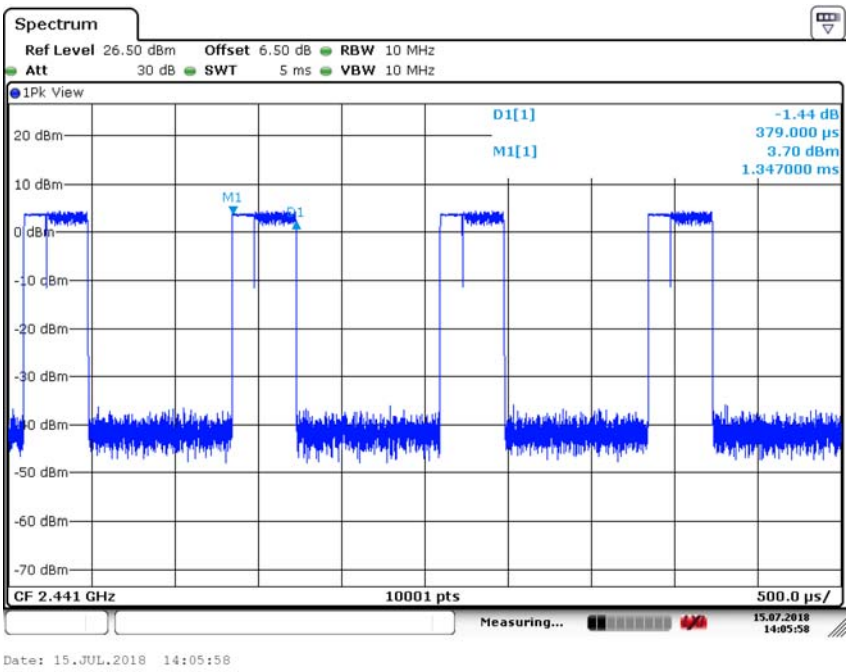

Carrier frequency (MHz): 2441
Packet type: DH3
Modulation type: π/4DQPSK



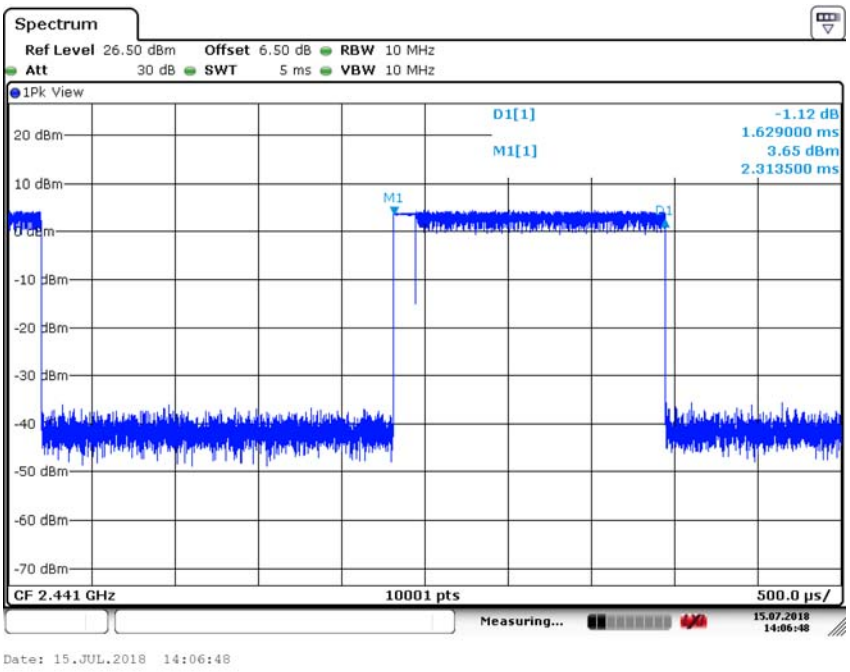

Carrier frequency (MHz): 2441
Packet type: DH5
Modulation type: π/4DQPSK

Modulation type: 8DPSK

| Packet type | Time slot length μs | Dwell time | Dwell time ms |
|---|---|---|---|
| DH1 | 379 | time slot length * 31.6 *1600/2 /79 | 121 |
| DH3 | 1629 | time slot length * 31.6 *1600/4 /79 | 261 |
| DH5 | 2885 | time slot length * 31.6 *1600/6 /79 | 308 |

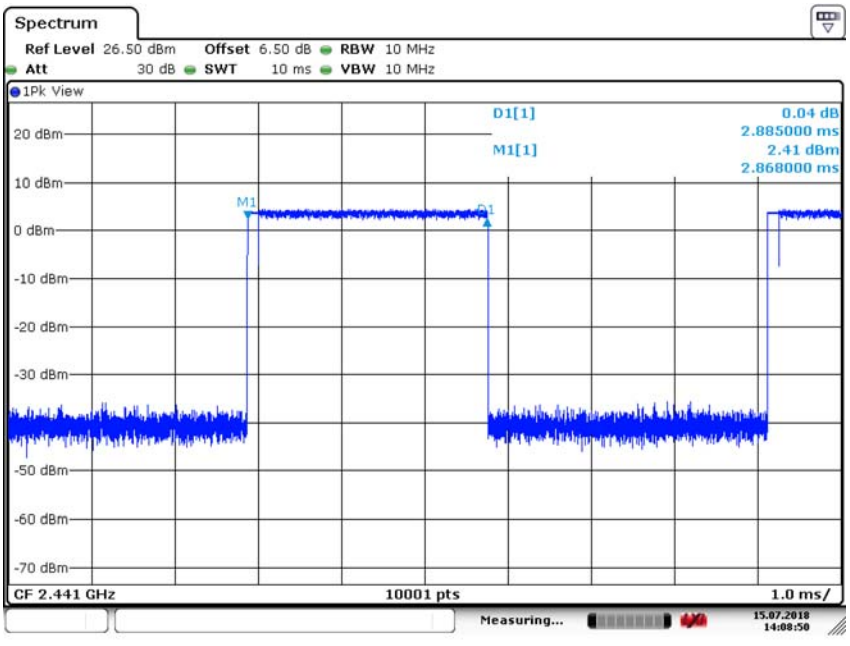



Carrier frequency (MHz): 2441
Packet type:DH1
Modulation type: 8DPSK




Date: 15.JUL.2018 14:06:48

Carrier frequency (MHz): 2441
Packet type:DH3
Modulation type: 8DPSK



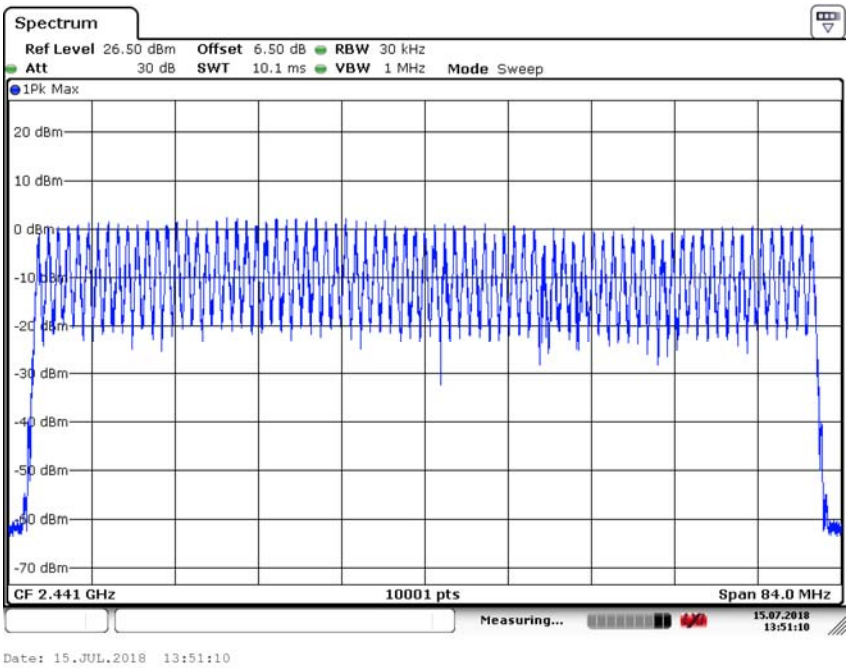

Date: 15.JUL.2018 14:08:50

Carrier frequency (MHz): 2441
Packet type:DH5
Modulation type: 8DPSK

## Number of Hopping Frequencies

Offset 6.5dB = Attenuator 6dB+ Temporary antenna connector loss 0.2dB+ Cable loss 0.3dB

| Op-mode | Result |
|---|---|
| Hopping mode | 79 |



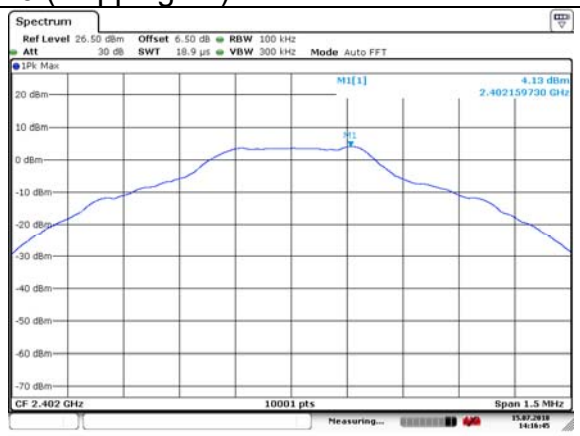

Op-mode: Hopping mode

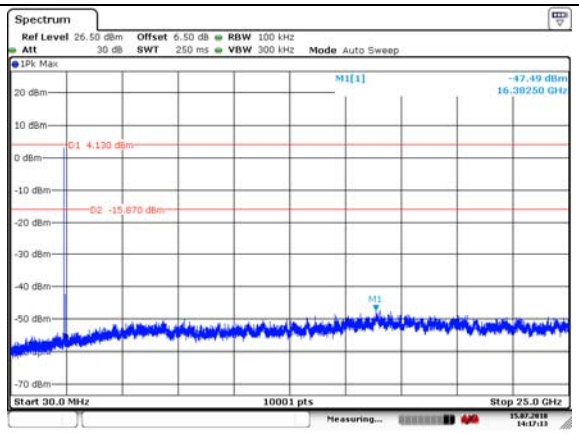
## Conducted out of band emission measurement

Offset 6.5dB = Attenuator 6dB+ Temporary antenna connector loss 0.2dB+ Cable loss 0.3dB

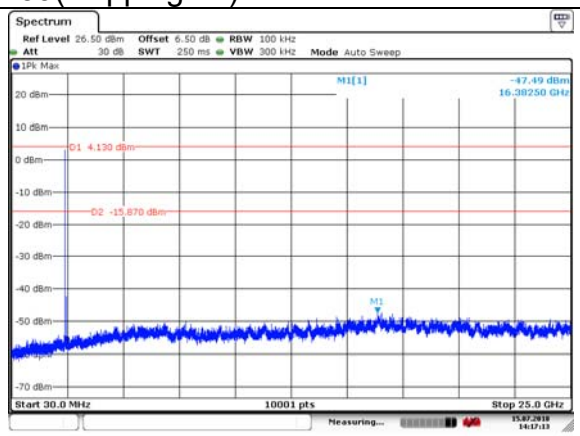
**GFSK**

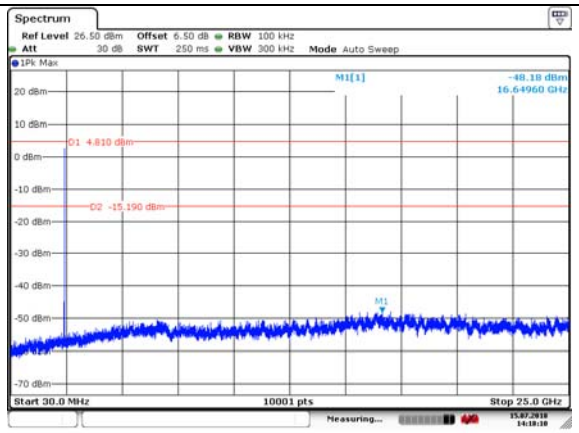
CH0 (Hopping off)



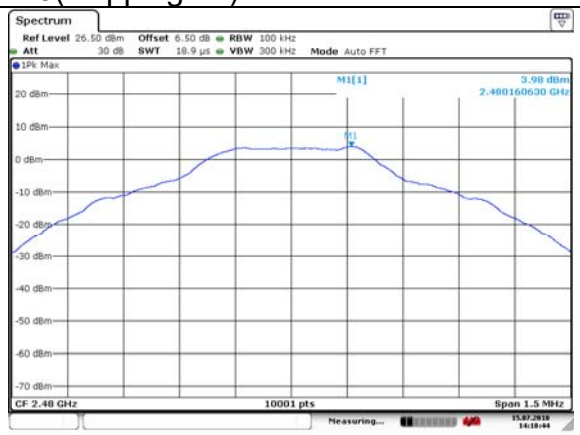



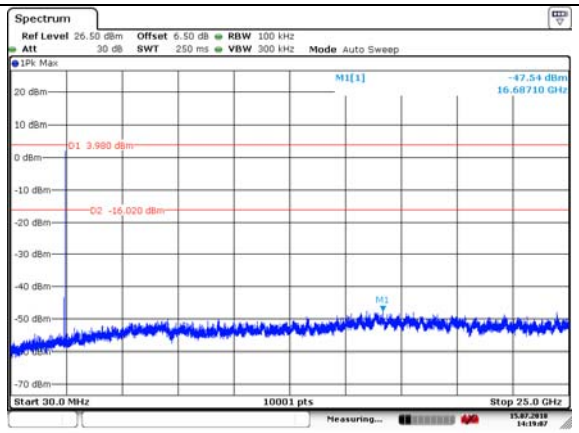

CH39(Hopping off)



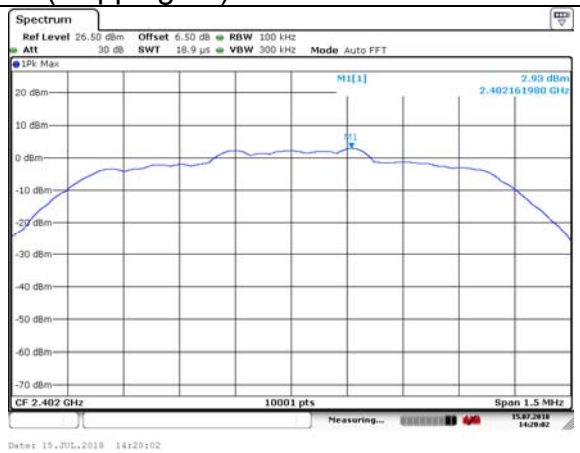

CH78(Hopping off)

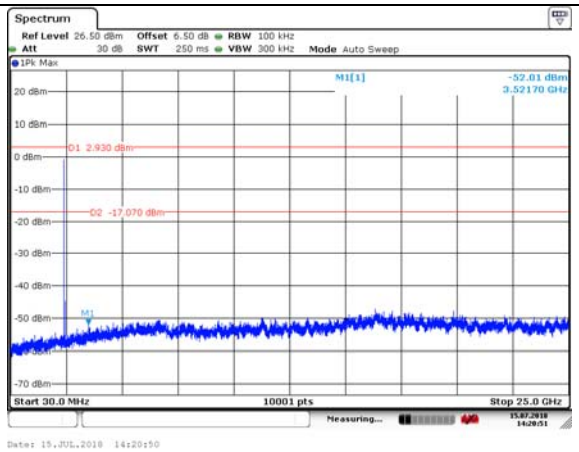


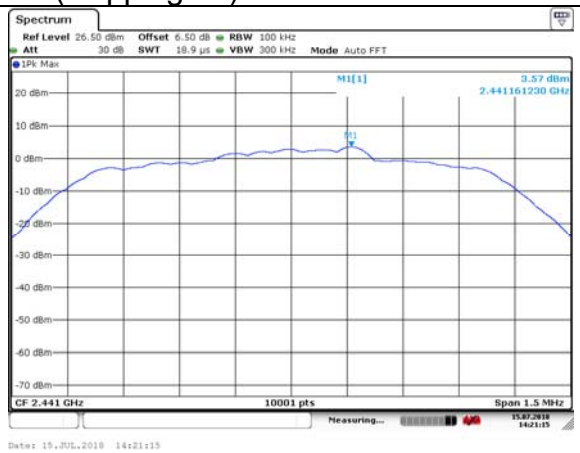
## π/4DQPSK

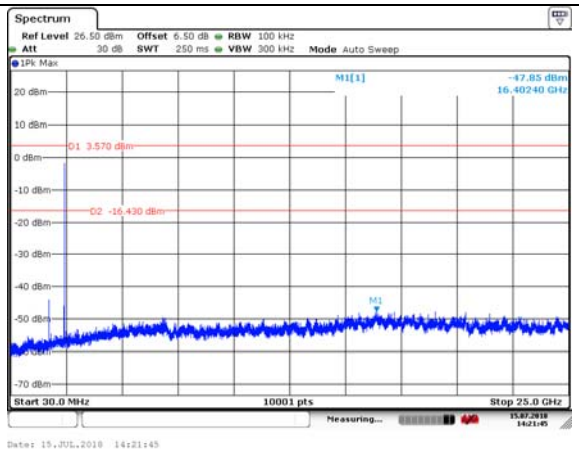
CH0 (Hopping off)



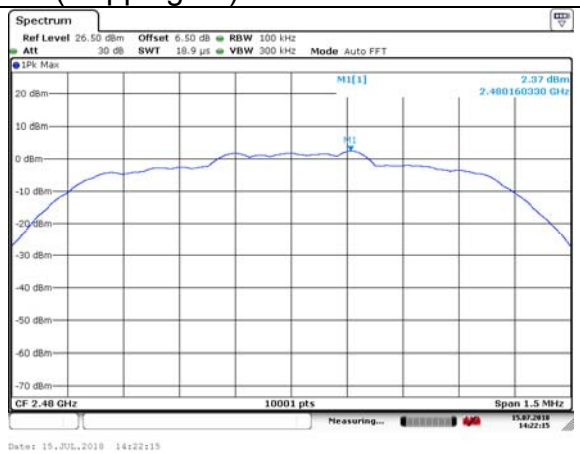



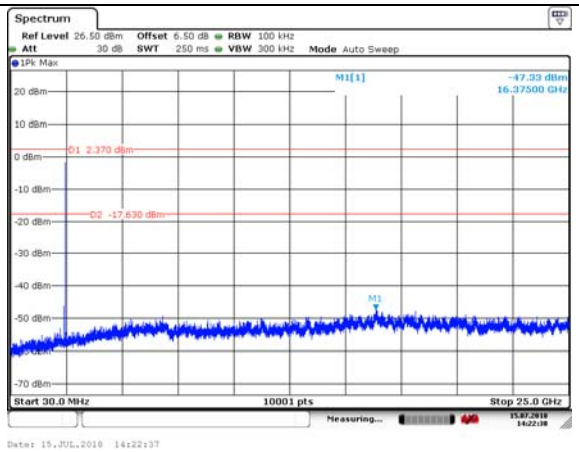

CH39(Hopping off)



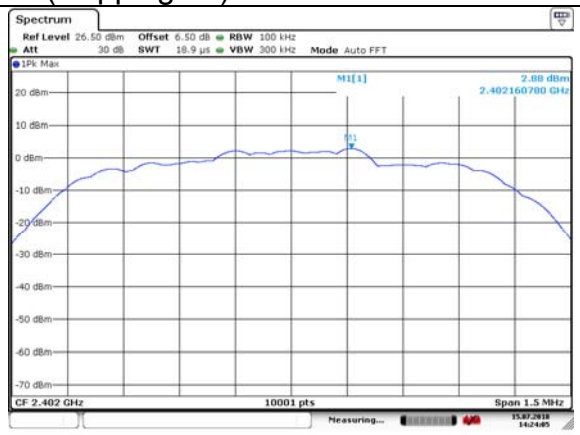

CH78(Hopping off)

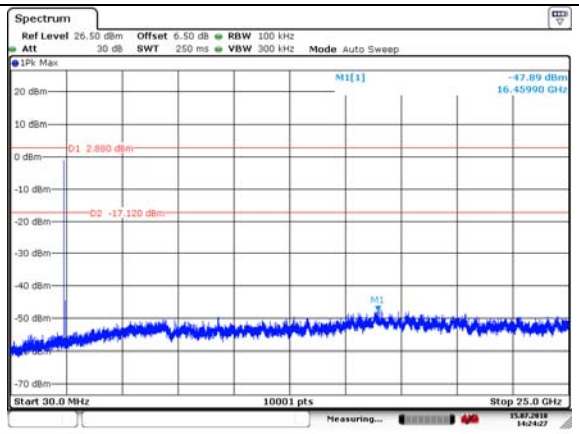


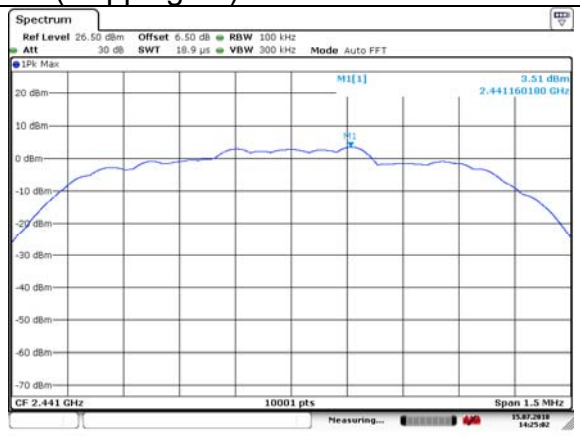
## 8DPSK

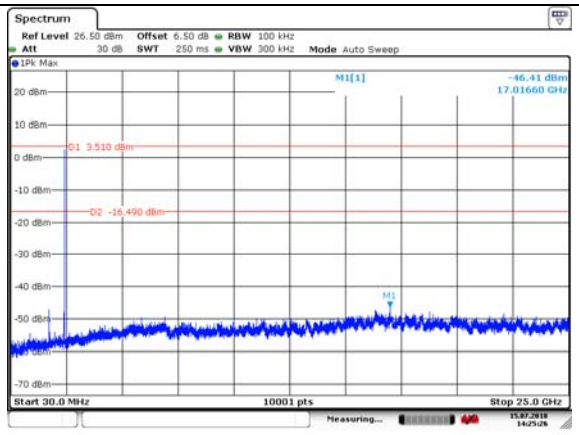
CH0 (Hopping off)



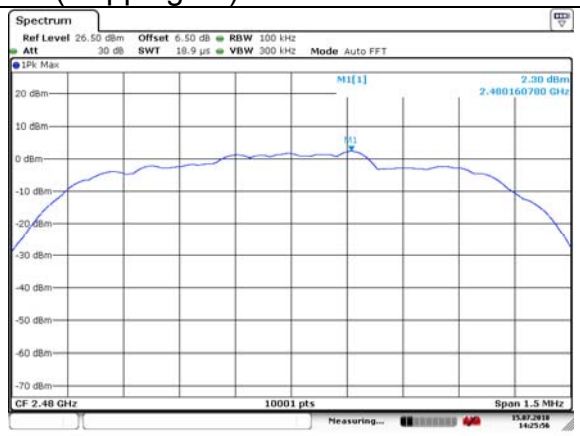



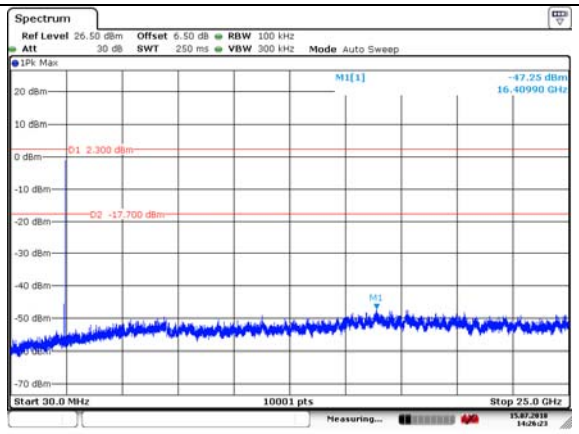

CH39(Hopping off)




CH78(Hopping off)



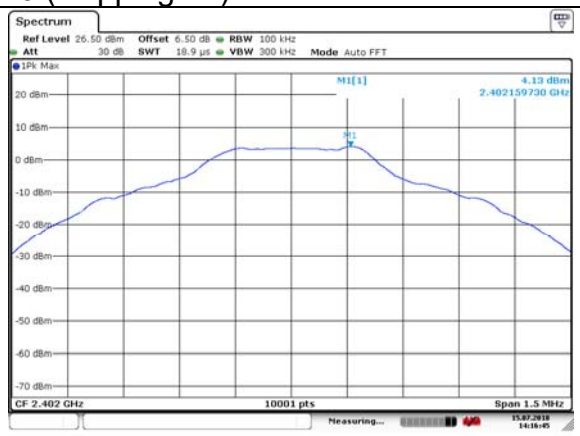



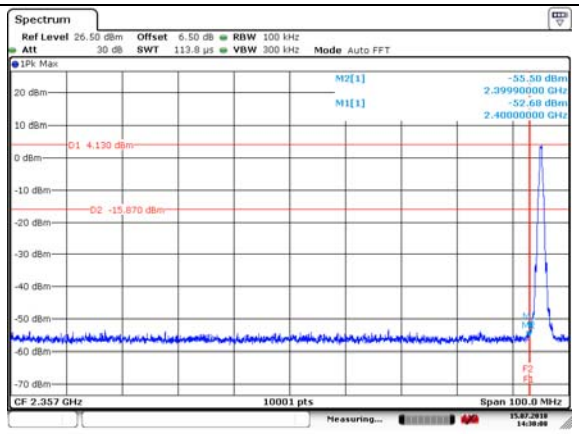
## Band Edge measurement

Offset 6.5dB = Attenuator 6dB+ Temporary antenna connector loss 0.2dB+ Cable loss 0.3dB

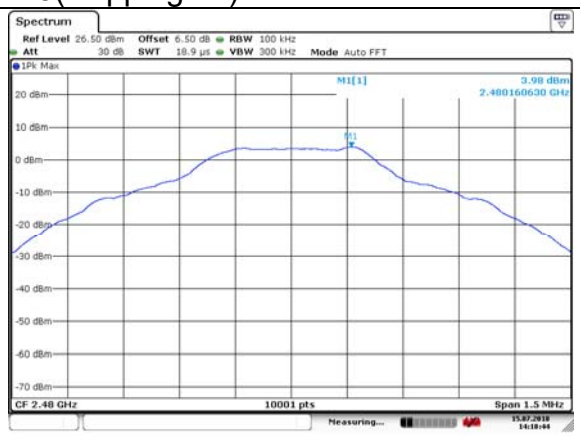
## GFSK

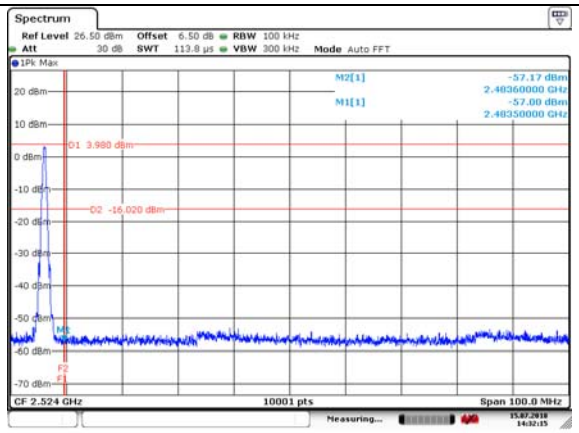
CH0 (Hopping off)



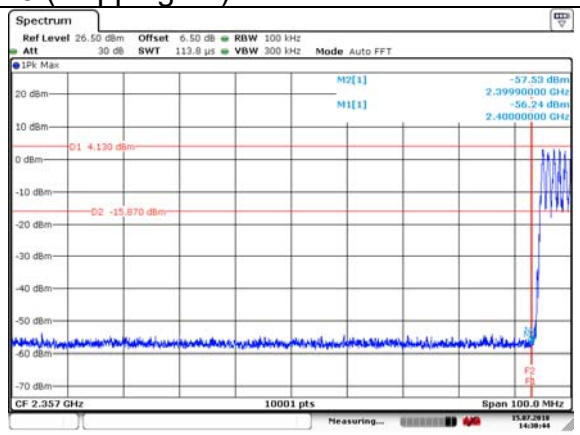




CH78(Hopping off)

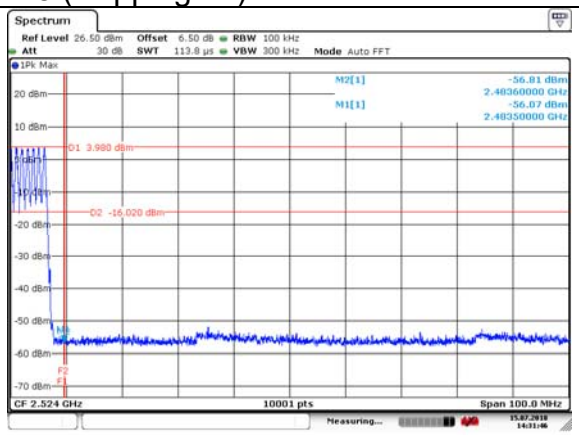



CH0 (Hopping on)

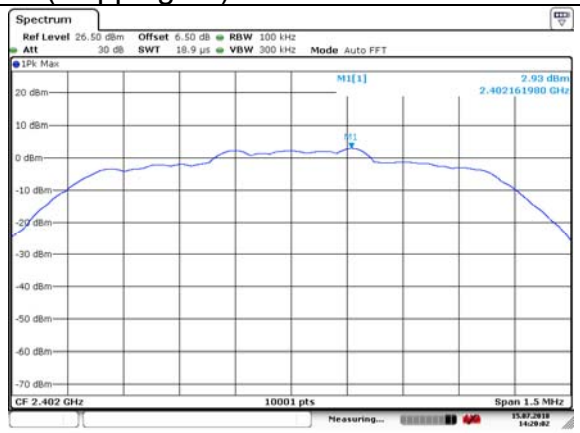


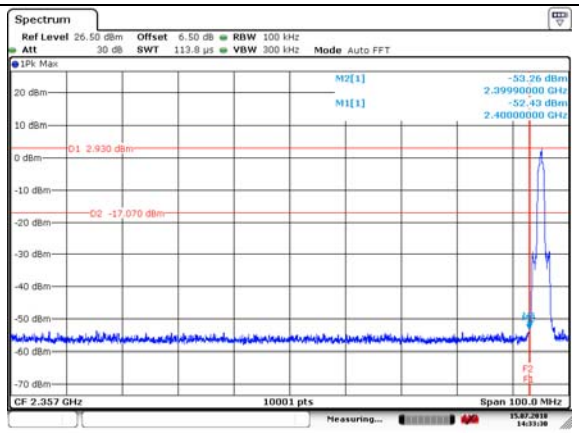

CH78 (Hopping on)



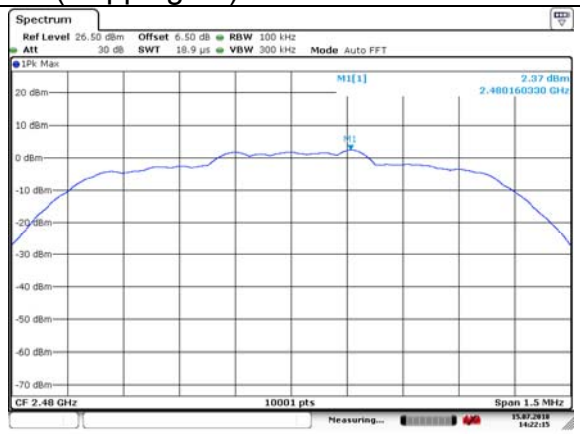
## π/4DQPSK

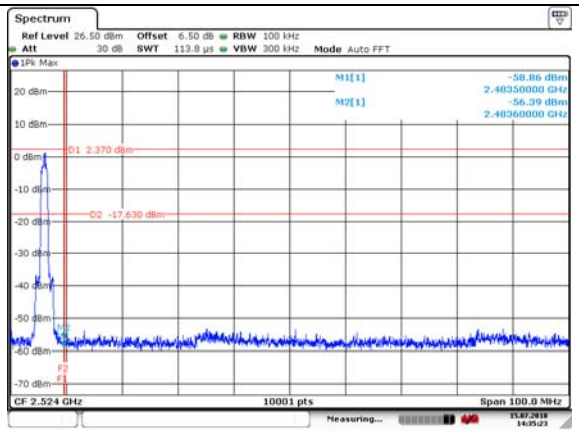
CH0 (Hopping off)



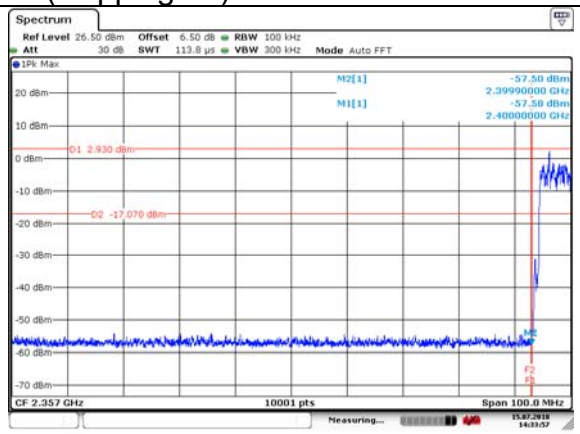




CH78(Hopping off)

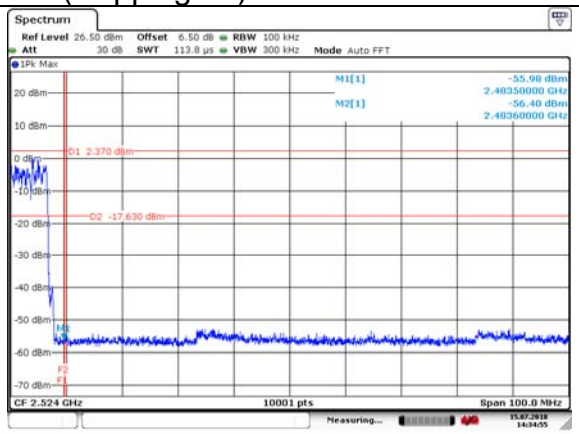



CH0 (Hopping on)

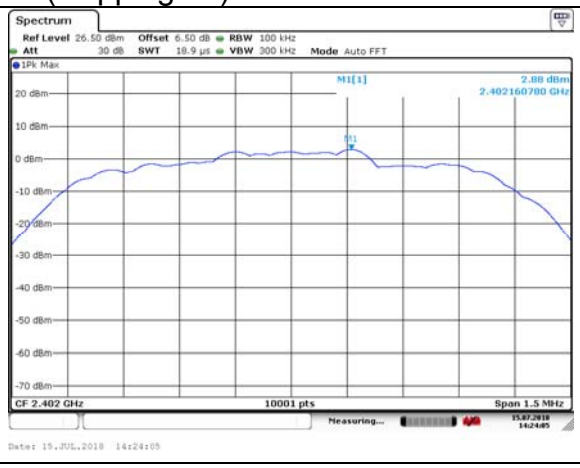


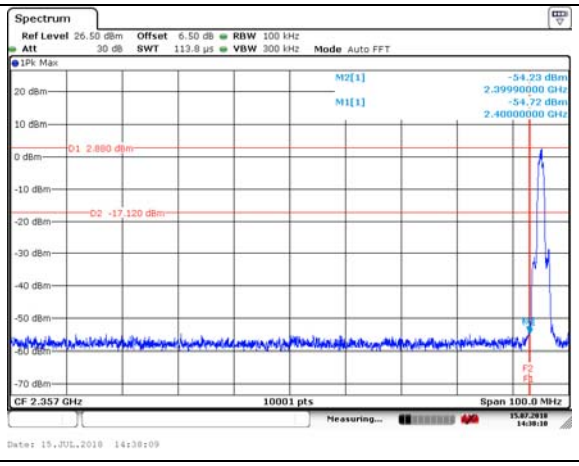

CH78 (Hopping on)



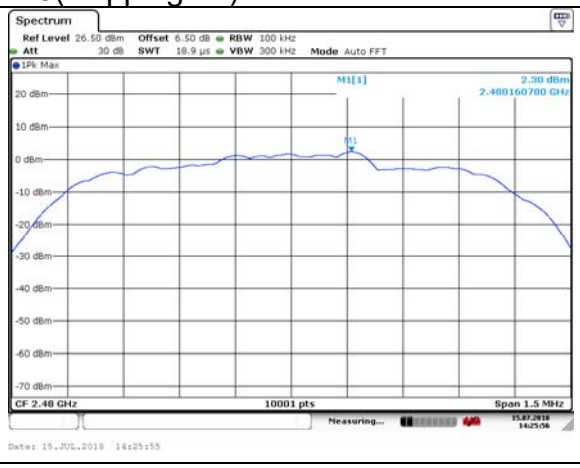
## 8DPSK

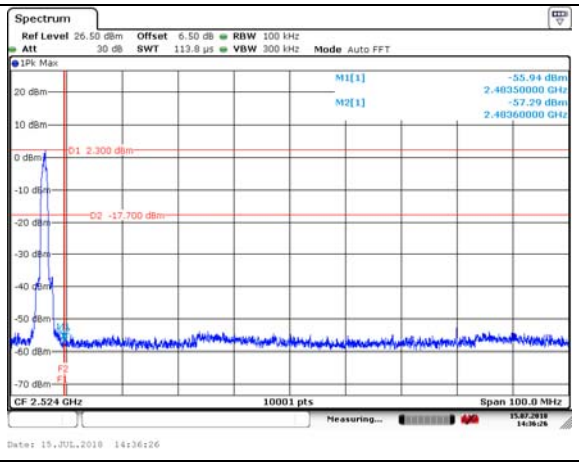
CH0 (Hopping off)



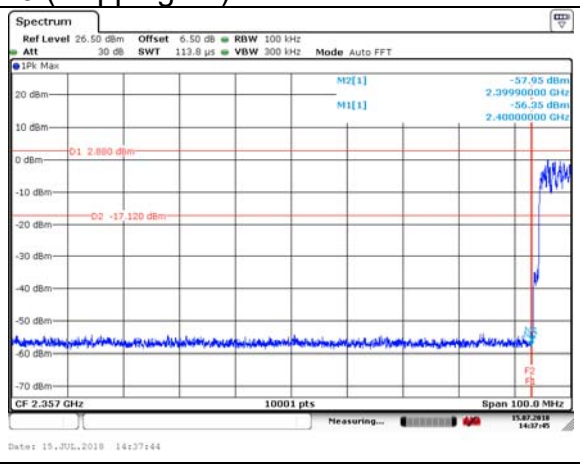




CH78(Hopping off)

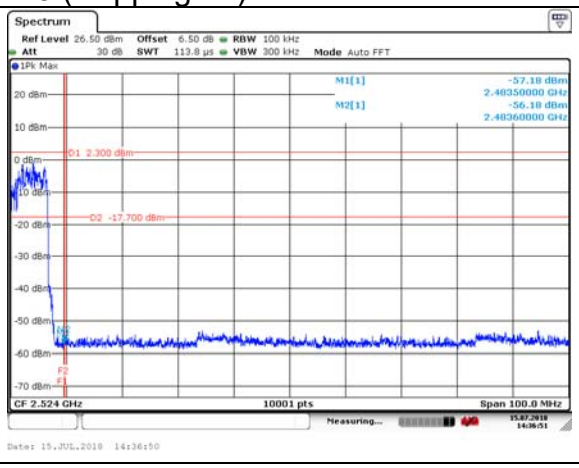



CH0 (Hopping on)




CH78 (Hopping on)



# APPENDIX B – TEST DATA OF RADIATED EMISSION

**Spurious Radiated Emissions**

The worst case attitude: The mobile lay down.
Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: GFSK
Polarity: Vertical
Detector: Peak

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2402 | 101.01 | 64.81 | N/A | N/A | 7.90 | 28.3 |
| 2 | 2390 | 49.84 | 13.64 | -24.16 | 74.00 | 7.90 | 28.3 |

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: GFSK
Polarity: Horizontal
Detector: Peak

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2402 | 102.13 | 65.93 | N/A | N/A | 7.90 | 28.3 |
| 2 | 2390 | 50.54 | 23.46 | -23.46 | 74.00 | 7.90 | 28.3 |

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: GFSK
Polarity: Vertical
Detector: Average

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2402 | 97.78 | 61.58 | N/A | N/A | 7.90 | 28.3 |
| 2 | 2390 | 48.46 | 12.26 | -5.54 | 54.00 | 7.90 | 28.3 |

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: GFSK
Polarity: Horizontal
Detector: Average

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2402 | 98.35 | 62.15 | N/A | N/A | 7.90 | 28.3 |
| 2 | 2390 | 47.64 | 11.44 | -6.36 | 54.00 | 7.90 | 28.3 |

Carrier frequency (MHz): 2480
Channel No.:39
Test Mode: GFSK
Polarity: Vertical
Detector: Peak

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2480 | 101.51 | 65.31 | N/A | N/A | 7.90 | 28.3 |
| 2 | 2483.5 | 50.36 | 14.16 | -23.64 | 74.00 | 7.90 | 28.3 |

Carrier frequency (MHz): 2480
Channel No.:39
Test Mode: GFSK
Polarity: Horizontal
Detector: Peak

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2480 | 102.18 | 65.98 | N/A | N/A | 7.90 | 28.3 |
| 2 | 2483.5 | 50.29 | 14.09 | -23.71 | 74.00 | 7.90 | 28.3 |

Carrier frequency (MHz): 2480
Channel No.:39
Test Mode: GFSK
Polarity: Vertical
Detector: Average

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2480 | 97.99 | 61.79 | N/A | N/A | 7.90 | 28.3 |
| 2 | 2483.5 | 48.14 | 11.94 | -5.86 | 54.00 | 7.90 | 28.3 |

Carrier frequency (MHz): 2480
Channel No.:39
Test Mode: GFSK
Polarity: Horizontal
Detector: Average

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2480 | 98.40 | 62.20 | N/A | N/A | 7.90 | 28.3 |
| 2 | 2483.5 | 48.41 | 12.21 | -5.59 | 54.00 | 7.90 | 28.3 |

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: π/4DQPSK
Polarity: Vertical
Detector: Peak

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2402 | 100.18 | 63.98 | N/A | N/A | 7.90 | 28.3 |
| 2 | 2390 | 49.69 | 13.49 | -24.31 | 74.00 | 7.90 | 28.3 |

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: π/4DQPSK
Polarity: Horizontal
Detector: Peak

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2402 | 100.01 | 63.81 | N/A | N/A | 7.90 | 28.3 |
| 2 | 2390 | 49.33 | 13.13 | -24.67 | 74 | 7.90 | 28.3 |

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: π/4DQPSK
Polarity: Vertical
Detector: Average

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2402 | 97.12 | 60.92 | N/A | N/A | 7.90 | 28.3 |
| 2 | 2390 | 45.26 | 9.06 | -8.74 | 54.00 | 7.90 | 28.3 |

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: π/4DQPSK
Polarity: Horizontal
Detector: Average

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2402 | 96.21 | 60.01 | N/A | N/A | 7.90 | 28.3 |
| 2 | 2390 | 45.22 | 9.02 | -8.78 | 54.00 | 7.90 | 28.3 |

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: π/4DQPSK
Polarity: Vertical
Detector: Peak

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2480 | 101.23 | 65.03 | N/A | N/A | 7.90 | 28.3 |
| 2 | 2483.5 | 49.98 | 13.78 | -24.02 | 74.00 | 7.90 | 28.3 |

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: π/4DQPSK
Polarity: Horizontal
Detector: Peak

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2480 | 100.92 | 64.72 | N/A | N/A | 7.90 | 28.3 |
| 2 | 2483.5 | 49.46 | 13.26 | -24.54 | 74.00 | 7.90 | 28.3 |

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: π/4DQPSK
Polarity: Vertical
Detector: Average

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2480 | 96.14 | 59.94 | N/A | N/A | 7.90 | 28.3 |
| 2 | 2483.5 | 45.19 | 8.99 | -8.81 | 54.00 | 7.90 | 28.3 |

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: π/4DQPSK
Polarity: Horizontal
Detector: Average

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2480 | 96.98 | 60.78 | N/A | N/A | 7.90 | 28.3 |
| 2 | 2483.5 | 45.11 | 8.91 | -8.89 | 54.00 | 7.90 | 28.3 |

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: 8DPSK
Polarity: Vertical
Detector: Peak

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2402 | 100.98 | 64.78 | N/A | N/A | 7.90 | 28.3 |
| 2 | 2390 | 50.84 | 14.64 | -23.16 | 74.00 | 7.90 | 28.3 |

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: 8DPSK
Polarity: Horizontal
Detector: Peak

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2402 | 101.08 | 64.88 | N/A | N/A | 7.90 | 28.3 |
| 2 | 2390 | 50.11 | 13.91 | -23.89 | 74.00 | 7.90 | 28.3 |

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: 8DPSK
Polarity: Vertical
Detector: Average

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2402 | 96.45 | 60.25 | N/A | N/A | 7.90 | 28.3 |
| 2 | 2390 | 45.75 | 9.55 | -8.25 | 54.00 | 7.90 | 28.3 |

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: 8DPSK
Polarity: Horizontal
Detector: Average

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2402 | 96.19 | 59.99 | N/A | N/A | 7.90 | 28.3 |
| 2 | 2390 | 45.02 | 8.82 | -8.98 | 54.00 | 7.90 | 28.3 |

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: 8DPSK
Polarity: Vertical
Detector: Peak

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2480 | 101.56 | 65.36 | N/A | N/A | 7.90 | 28.3 |
| 2 | 2483.5 | 50.31 | 14.11 | -23.69 | 74.00 | 7.90 | 28.3 |

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: 8DPSK
Polarity: Horizontal
Detector: Peak

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2480 | 101.87 | 65.67 | N/A | N/A | 7.90 | 28.3 |
| 2 | 2483.5 | 49.48 | 13.28 | -24.52 | 74.00 | 7.90 | 28.3 |

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: 8DPSK
Polarity: Vertical
Detector: Average

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2480 | 97.21 | 61.01 | N/A | N/A | 7.90 | 28.3 |
| 2 | 2483.5 | 45.07 | 8.87 | -8.93 | 54.00 | 7.90 | 28.3 |

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: 8DPSK
Polarity: Horizontal
Detector: Average

| No | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | cable loss (dB) | antenna factor (dB) |
|---|---|---|---|---|---|---|---|
| 1 | 2480 | 95.97 | 59.77 | N/A | N/A | 7.90 | 28.3 |
| 2 | 2483.5 | 45.06 | 8.86 | -8.94 | 54.00 | 7.90 | 28.3 |

***Sample Calculations***

Determining Spurious Emissions Levels

A “reference path loss” is established and the $A_{Rpl}$ is the attenuation of “reference path loss”, and including the gain of receive antenna, the gain of the preamplifier, the cable loss.
The measurement results are obtained as described below:
Result= $P_{mea}$ + $A_{Rpl}$

The worst case attitude: The mobile lay down.
For GFSK
Channel No.:39

| Frequency (MHz) | QuasiPeak (dBuV/m) | Average (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol |
|---|---|---|---|---|---|---|---|---|
| 42.448750 | 24.82 | --- | 30.00 | 5.18 | 500.0 | 120.000 | 100.0 | V |
| 89.743750 | 15.43 | --- | 33.50 | 18.07 | 500.0 | 120.000 | 100.0 | V |
| 93.093750 | 10.68 | --- | 33.50 | 22.82 | 500.0 | 120.000 | 100.0 | V |
| 95.985625 | 13.84 | --- | 33.50 | 19.66 | 500.0 | 120.000 | 100.0 | V |
| 98.615625 | 13.07 | --- | 33.50 | 20.43 | 500.0 | 120.000 | 100.0 | V |
| 101.825000 | 12.78 | --- | 33.50 | 20.72 | 500.0 | 120.000 | 100.0 | V |

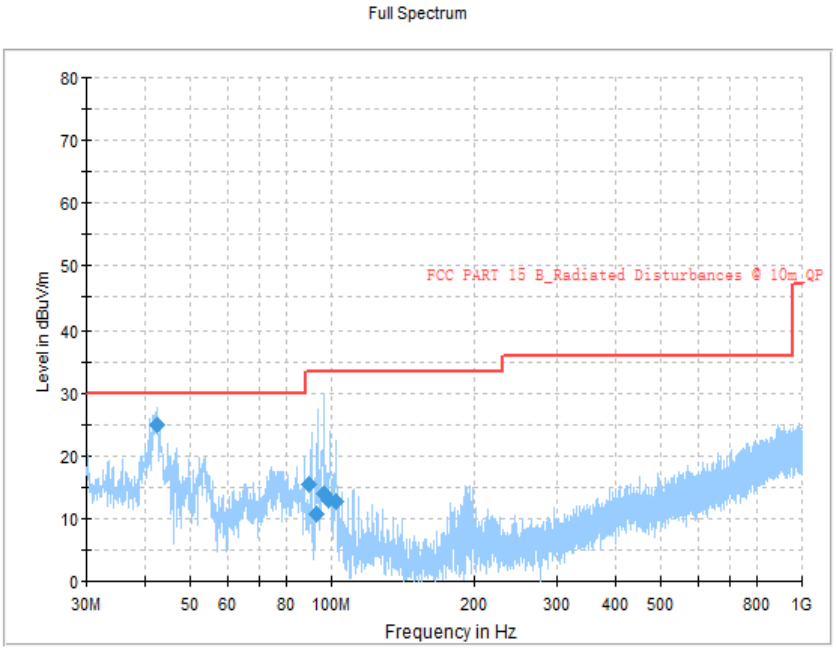
For π/4DQPSK
Channel No.:39

| Frequency (MHz) | QuasiPeak (dBuV/m) | Average (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol |
|---|---|---|---|---|---|---|---|---|
| 42.445000 | 23.96 | --- | 30.00 | 6.04 | 500.0 | 120.000 | 100.0 | V |
| 53.362500 | 20.37 | --- | 30.00 | 9.63 | 500.0 | 120.000 | 100.0 | V |
| 92.388125 | 13.47 | --- | 33.50 | 20.03 | 500.0 | 120.000 | 100.0 | V |
| 94.957500 | 14.30 | --- | 33.50 | 19.20 | 500.0 | 120.000 | 100.0 | V |
| 97.912500 | 13.98 | --- | 33.50 | 19.52 | 500.0 | 120.000 | 100.0 | V |
| 100.989375 | 13.47 | --- | 33.50 | 20.03 | 500.0 | 120.000 | 100.0 | V |

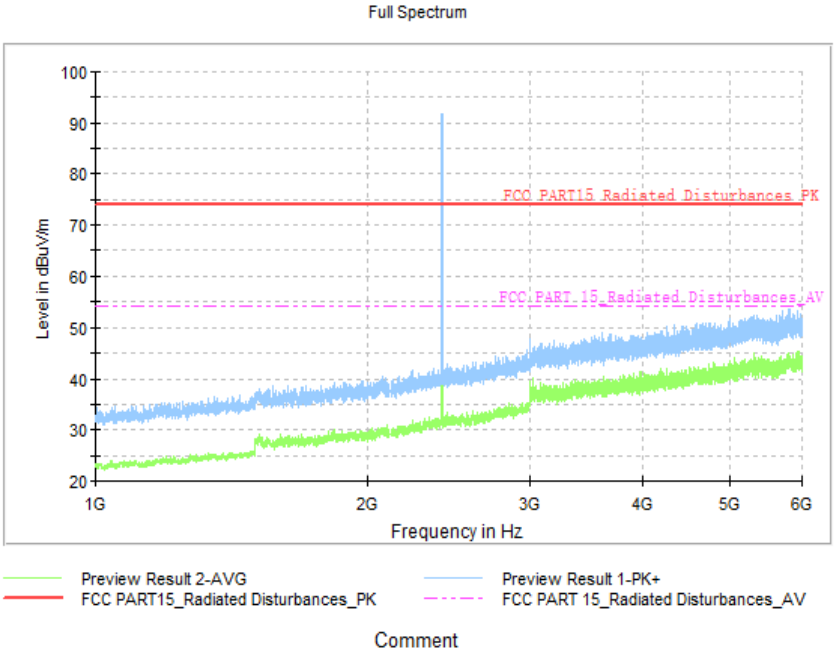
For 8DPSK
Channel No.:39

| Frequency (MHz) | QuasiPeak (dBuV/m) | Average (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol |
|---|---|---|---|---|---|---|---|---|
| 42.363750 | 19.90 | --- | 30.00 | 10.10 | 500.0 | 120.000 | 100.0 | V |
| 53.220625 | 13.21 | --- | 30.00 | 16.79 | 500.0 | 120.000 | 100.0 | V |
| 53.312500 | 13.21 | --- | 30.00 | 16.79 | 500.0 | 120.000 | 100.0 | V |
| 74.898750 | 12.50 | --- | 30.00 | 17.50 | 500.0 | 120.000 | 100.0 | V |
| 93.791875 | 4.26 | --- | 33.50 | 29.24 | 500.0 | 120.000 | 100.0 | V |
| 97.122500 | 4.20 | --- | 33.50 | 29.30 | 500.0 | 120.000 | 100.0 | V |

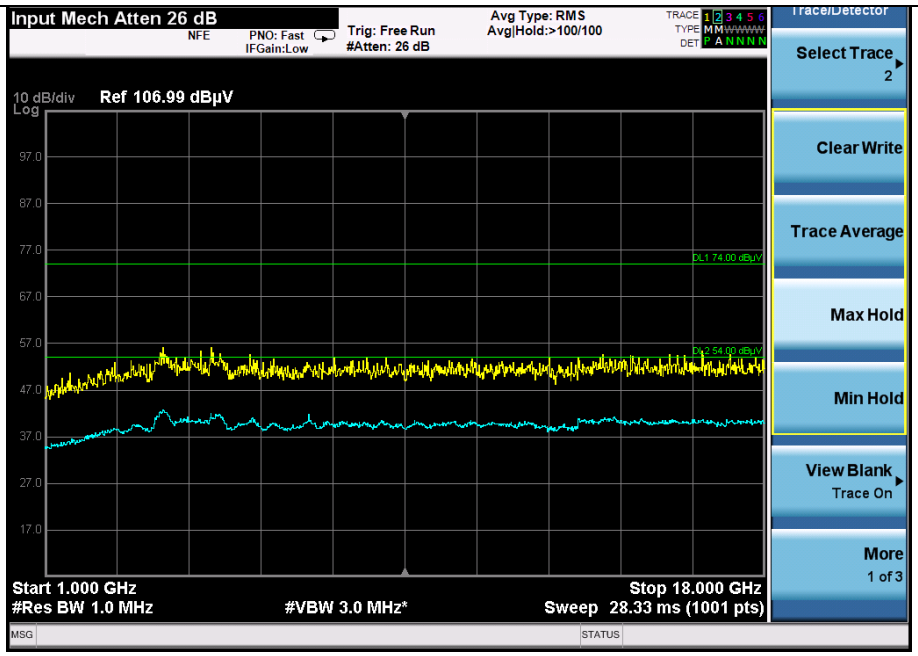
Carrier frequency (MHz): 2441
Channel No.:39




Frequency Range: 30MHz-1000MHz
Detector: QP mode
Modulation type: GFSK

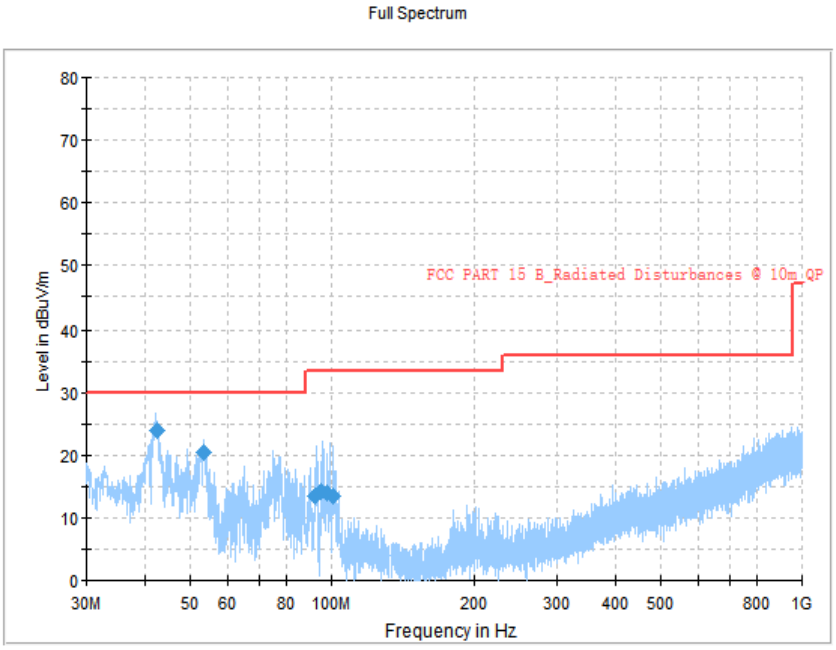



Frequency Range: 1GHz-6GHz
Detector: Av mode and PK mode
Modulation type: GFSK

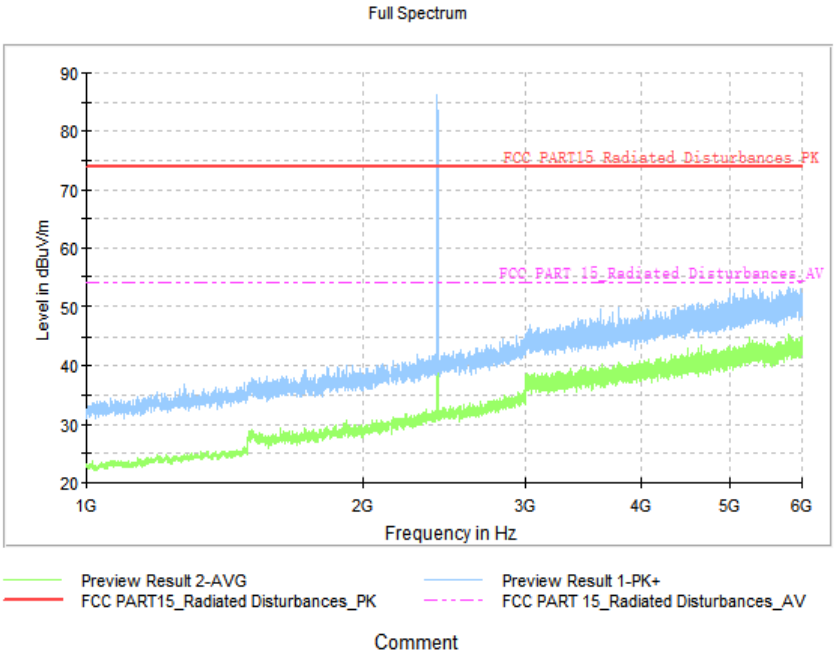



Frequency Range: 1GHz-18GHz
Detector: Av mode and PK mode
Modulation type: GFSK

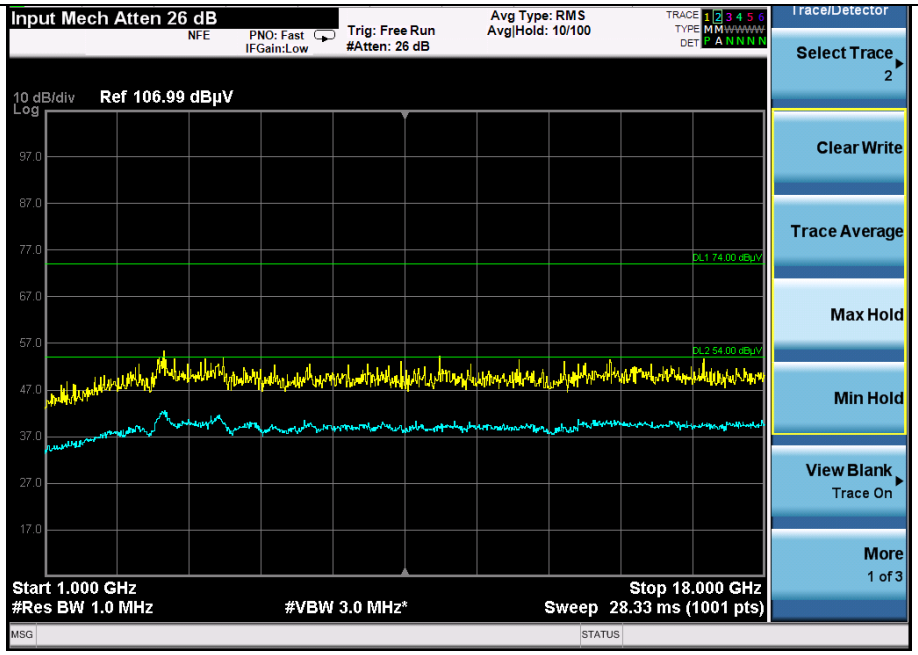
The test results of18GHz-40GHz is attenuated more than 20dB below the permissible limits, so the results don't record in the report.




Frequency Range: 30MHz-1000 MHz
Detector: QP mode
Modulation type: π/4DQPSK

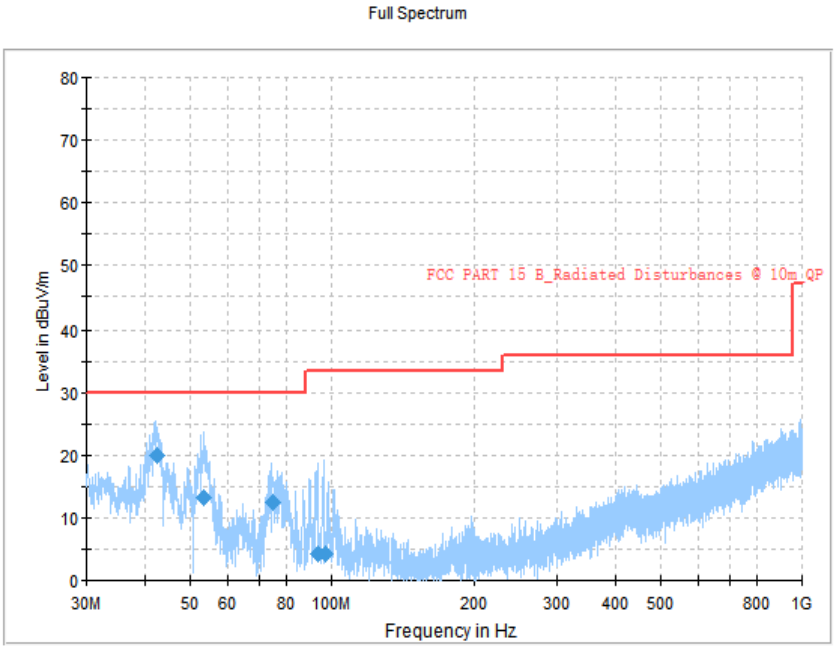



Frequency Range: 1GHz-6GHz
Detector: Av mode and PK mode
Modulation type: π/4DQPSK

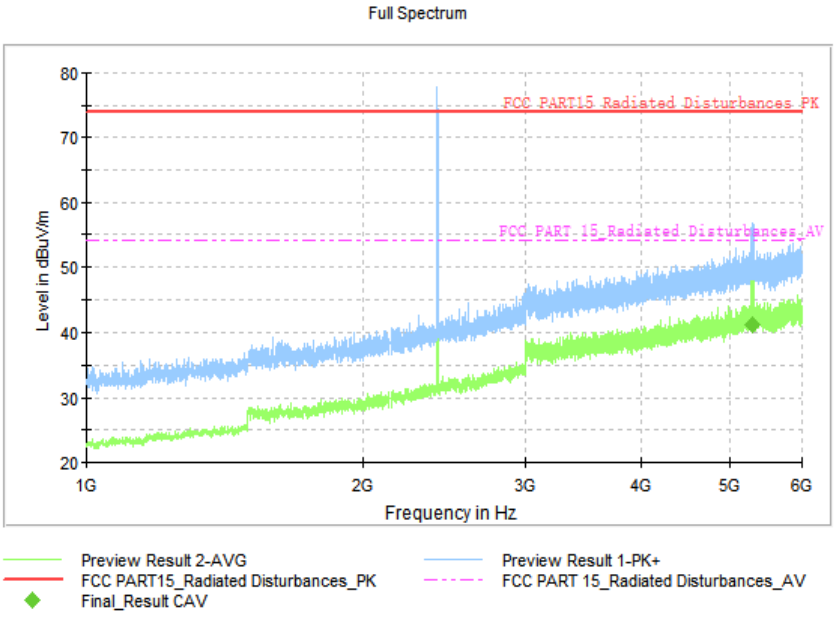



Frequency Range: 1GHz-18GHz
Detector: Av mode and PK mode
Modulation type: π/4DQPSK

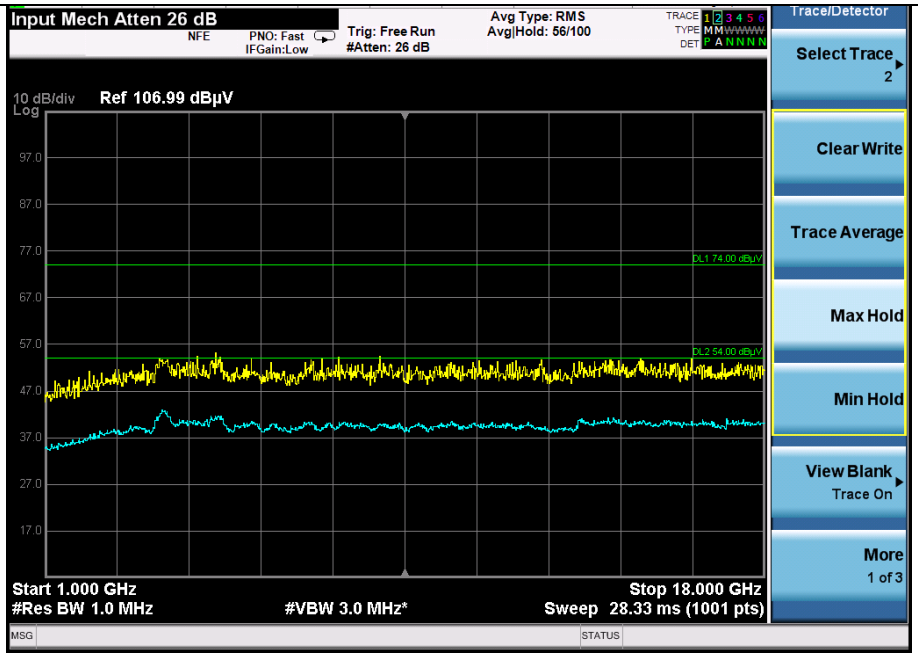
The test results of18GHz-40GHz is attenuated more than 20dB below the permissible limits, so the results don't record in the report.




Frequency Range: 30MHz-1000 MHz
Detector: QP mode
Modulation type: 8DPSK



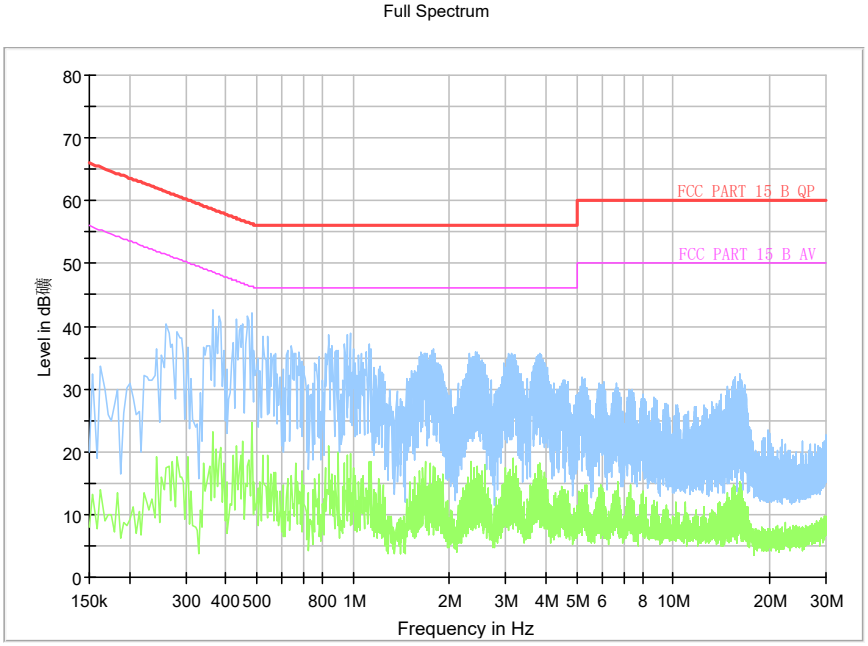

Frequency Range: 1GHz-6GHz
Detector: Av mode and PK mode
Modulation type: 8DPSK




Frequency Range: 1GHz-18GHz
Detector: Av mode and PK mode
Modulation type: 8DPSK

The test results of18GHz-40GHz is attenuated more than 20dB below the permissible limits, so the results don't record in the report.

# AC Power line Conducted Emission




L+N Line

---End of Test Report---