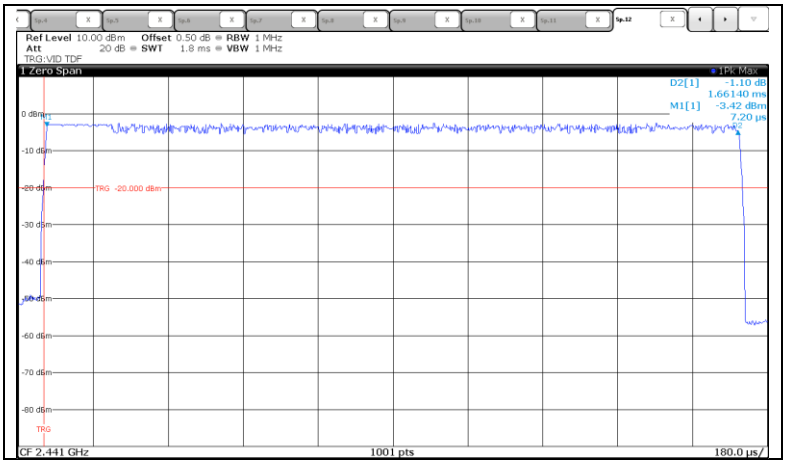
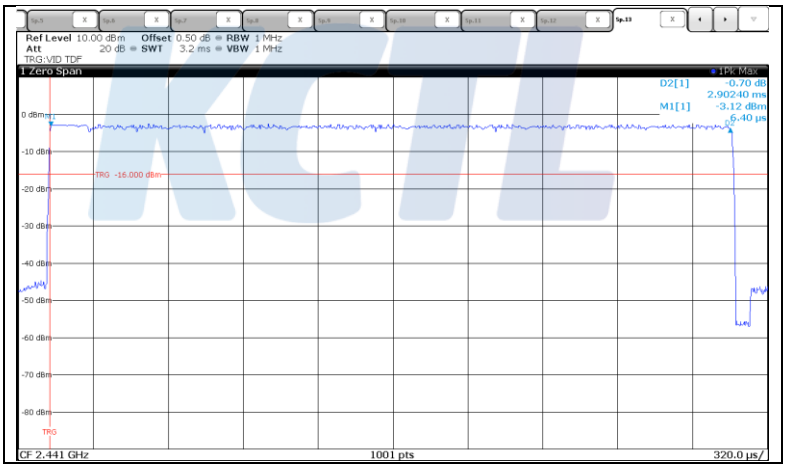
2-DH3 (2 441 ㎒)

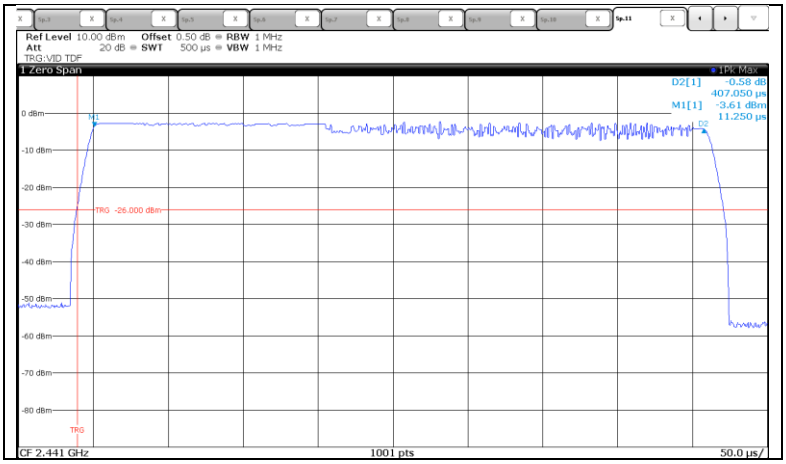



2-DH5 (2 441 ㎒)

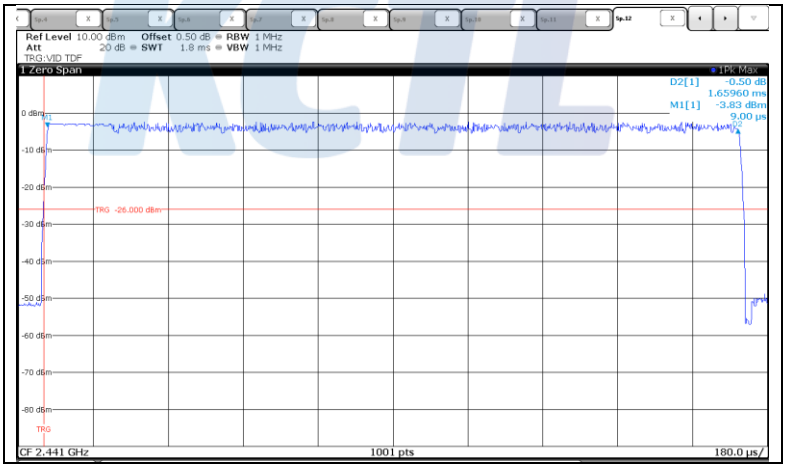


**- 8DPSK_Non AFH mode**

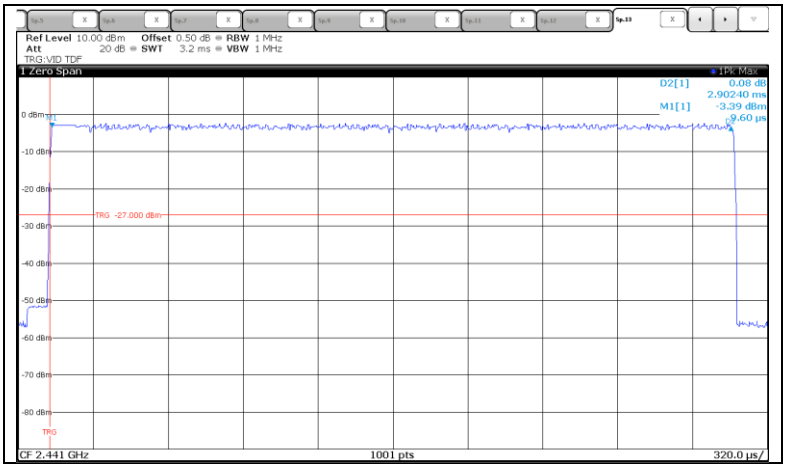
3-DH1 (2 441 ㎒)




3-DH3 (2 441 ㎒)

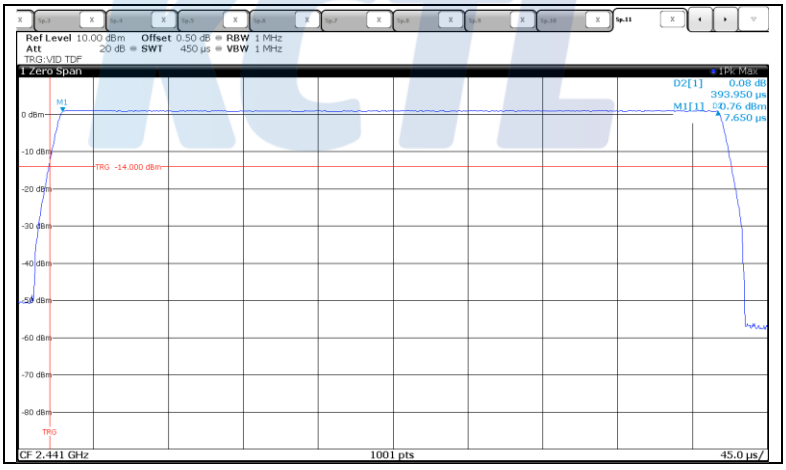


3-DH5 (2 441 ㎒)

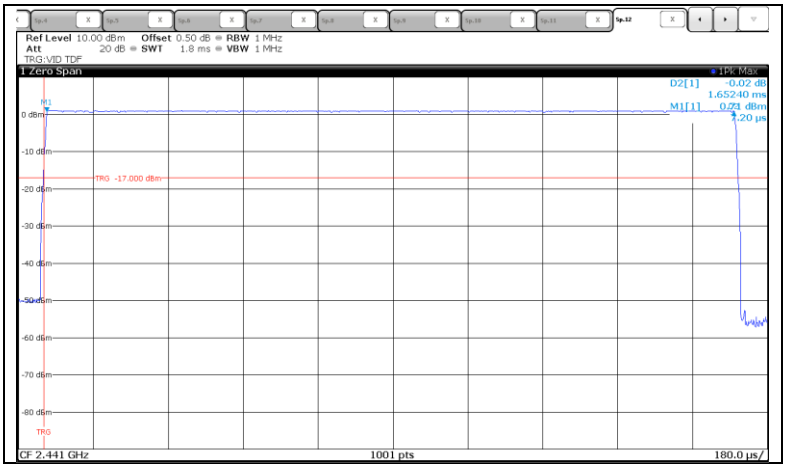



**- GFSK_AFH mode**

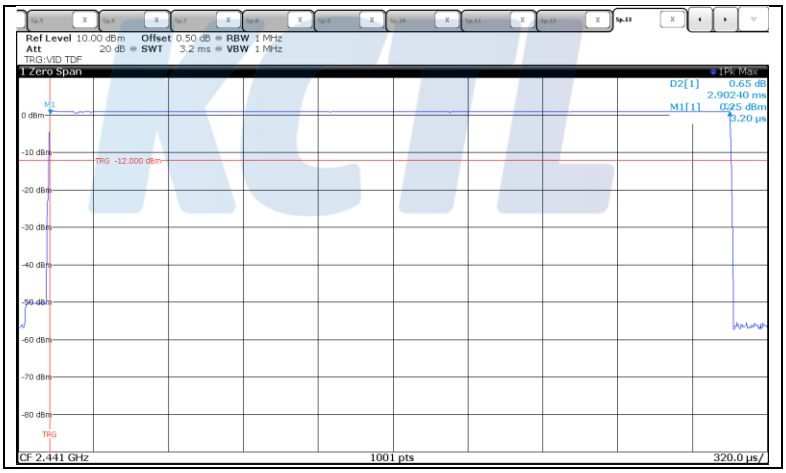
DH1 (2 441 ㎒)



DH3 (2 441 ㎒)

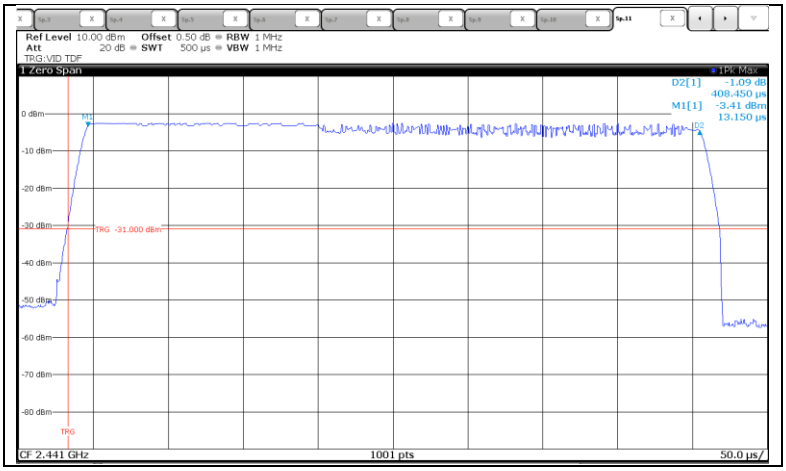



DH5 (2 441 ㎒)

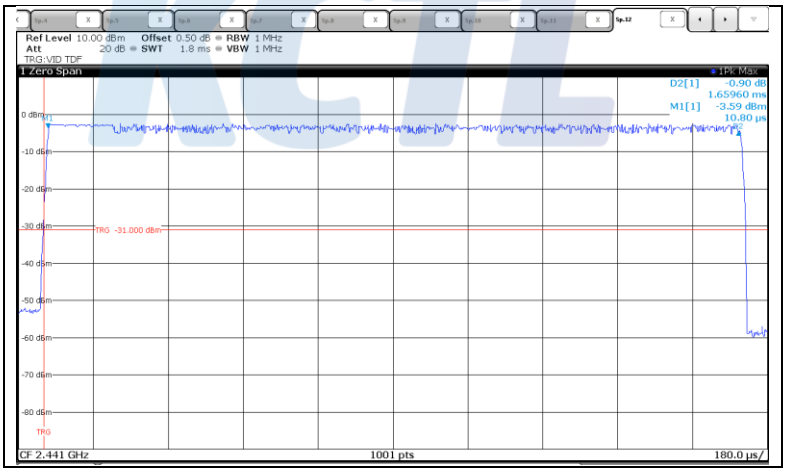


**- π/4DQPSK_AFH mode**

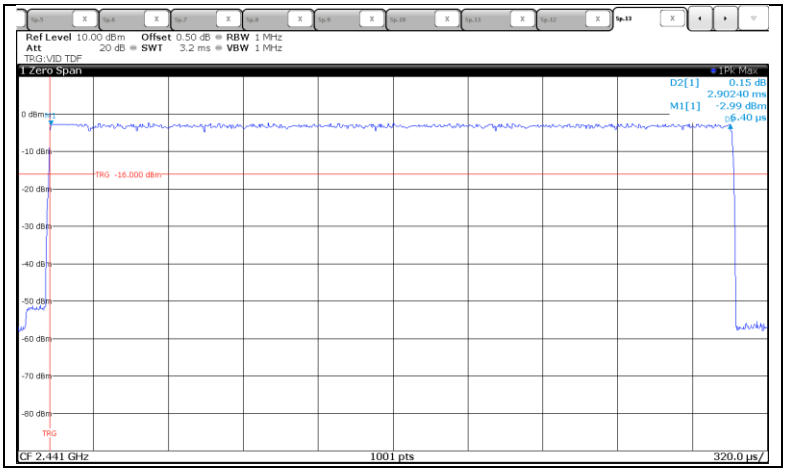
2-DH1 (2 441 ㎒)




2-DH3 (2 441 ㎒)

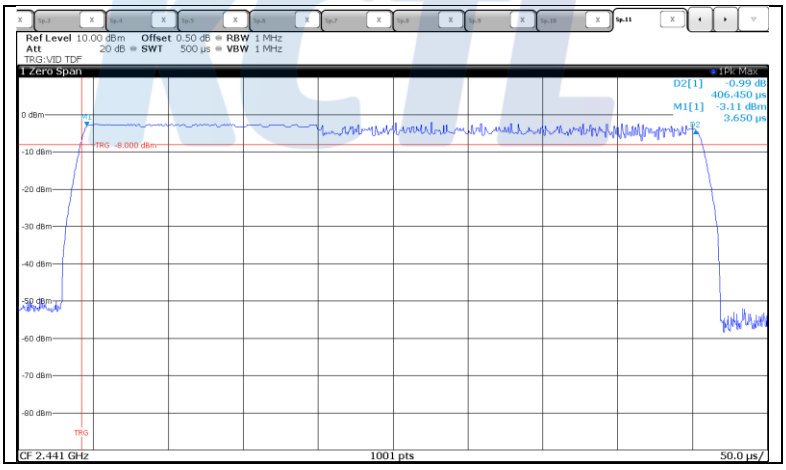


2-DH5 (2 441 ㎒)

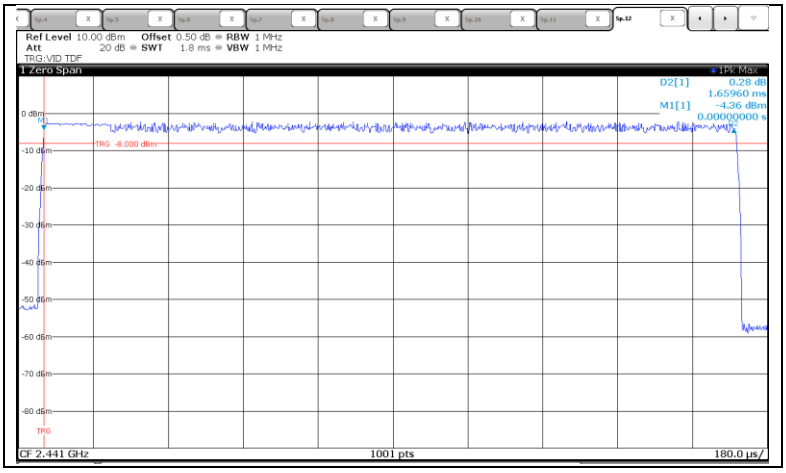



**- 8DPSK_AFH mode**

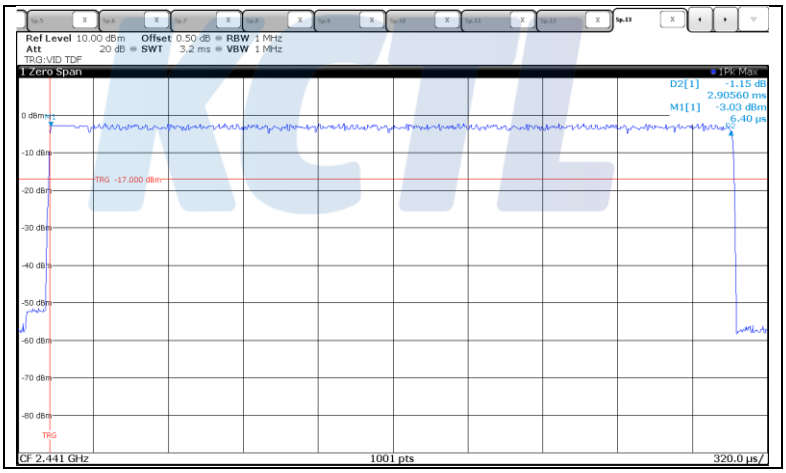
3-DH1 (2 441 ㎒)



3-DH3 (2 441 ㎒)




3-DH5 (2 441 ㎒)



## 5.7 Spurious Emission, Band edge and Restricted bands

### 5.7.1 Regulation

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

According to §15.209(a), Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall notexceed the field strength levels specified in the following table:

| Frequency (㎒) | Field strength (㎶/m) | Measurement distance (m) |
|---|---|---|
| 0.009 - 0.490 | 2 400/F(㎑) | 300 |
| 0.490 -1.705 | 24 000/F(㎑) | 30 |
| 1.705 – 30 | 30 | 30 |
| 30 - 88 | 100** | 3 |
| 88 - 216 | 150** | 3 |
| 216 - 960 | 200** | 3 |
| Above 960 | 500 | 3 |

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 ㎒, 76–88 ㎒, 174–216 ㎒ or 470–806 ㎒. However, operation within these frequency bands is permItted under other sections of this part, e.g., §§15.231 and 15.241.

According to § 15.205(a) and (b), only spurious emissions are permitted in any of the frequency bands listed below:

| MHz | MHz | MHz | GHz |
|---|---|---|---|
| 0.009 - 0.110 | 16.42 - 16.423 | 399.9 - 410 | 4.5 - 5.15 |
| 0.495 - 0.505 | 16.69475 - 16.69525 | 608 - 614 | 5.35 - 5.46 |
| 2.1735 - 2.1905 | 16.80425 - 16.80475 | 960 - 1240 | 7.25 - 7.75 |
| 4.125 - 4.128 | 25.5 - 25.67 | 1300 - 1427 | 8.025 - 8.5 |
| 4.17725 - 4.17775 | 37.5 - 38.25 | 1435 - 1626.5 | 9.0 - 9.2 |
| 4.20725 - 4.20775 | 73 - 74.6 | 1645.5 - 1646.5 | 9.3 - 9.5 |
| 6.215 - 6.218 | 74.8 - 75.2 | 1660 - 1710 | 10.6 - 12.7 |
| 6.26775 - 6.26825 | 108 - 121.94 | 1718.8 - 1722.2 | 13.25 - 13.4 |
| 6.31175 - 6.31225 | 123 - 138 | 2200 - 2300 | 14.47 - 14.5 |
| 8.291 - 8.294 | 149.9 - 150.05 | 2310 - 2390 | 15.35 - 16.2 |
| 8.362 - 8.366 | 156.52475 - | 2483.5 - 2500 | 17.7 - 21.4 |
| 8.37625 - 8.38675 | 156.52525 | 2690 - 2900 | 22.01 - 23.12 |
| 8.41425 - 8.41475 | 156.7 - 156.9 | 3260 - 3267 | 23.6 - 24.0 |
| 12.29 - 12.293 | 162.0125 - 167.17 | 3332 - 3339 | 31.2 - 31.8 |
| 12.51975 - 12.52025 | 167.72 - 173.2 | 3345.8 - 3358 | 36.43 - 36.5 |
| 12.57675 - 12.57725 | 240 - 285 | 3600 - 4400 | Above 38.6 |
| 13.36 - 13.41 | 322 - 335.4 | | |

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1 000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1 000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

## 5.7.2 Measurement Procedure

The method of measurement used to test this FHSS device is ANSI C63.10-2013.

1) Band-edge Compliance of RF Conducted Emissions

These procedures are applicable for determining compliance at authorized-band band-edges where the requirements are expressed as a value relative to the in-band signal level. Procedures for determining compliance with field strength limits at or close to the band-edges are given in 6.10.6 (see also Table A.2).
Band-edge tests are typically performed as a conducted test but may be performed as Radiated measurements on a test site meeting the specifications in 5.2, at the measurement distances specified in 5.3. The instrumentation shall meet the requirements in 4.1.1 using the bandwidths and detectors Specified in 4.1.4.2.
When performing radiated measurements, the measurement antenna(s) shall meet the specifications in 4.3. The EUT shall be connected to an antenna and operated at the highest power settings following procedures in 6.3.

For other than frequency-hopping devices, this test sequence shall be performed once. For devices that support frequency hopping, this test sequence shall be performed twice: once with the hopping function turned OFF and then repeated with the hopping function turned ON. The purpose of the test with the hopping function turned on is to confirm that the RF power remains OFF while the device is changing frequencies, and that the oscillator stabilizes at the new frequency before RF power is turned back ON.Overshoot of any oscillator, including phase-lock-loop stabilized oscillators, can cause the device to be temporarily tuned to frequencies outside the authorized band, and it is important that no transmissions occur during such temporary periods. Particular attention to the hopping sequence requirements specified below is needed in the case of adaptive frequency-hopping devices:

a) Connect the EMI receiver or spectrum analyzer to the EUT using an appropriate RF cable connected to the EUT output. Configure the spectrum analyzer settings as described in step e) (be sure to enter all losses between the unlicensed wireless device output and the spectrum analyzer).

b) Set the EUT to the lowest frequency channel (for the hopping on test, the hopping sequence shall include the lowest frequency channel).

c) Set the EUT to operate at maximum output power and 100 % duty cycle, or equivalent “normal mode of operation” as specified in 6.10.3.

d) If using the radiated method, then use the applicable procedure(s) of 6.4, 6.5, or 6.6, and orient the EUT and measurement antenna positions to produce the highest emission level.

e) Perform the test as follows:

1) Span: Wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products that fall outside of the authorized band of operation.

2) Reference level: As required to keep the signal from exceeding the maximum instrument input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.

3) Attenuation: Auto (at least 10 dB preferred).

4) Sweep time: Coupled.

5) Resolution bandwidth: 100 ㎑.

6) Video bandwidth: 300 ㎑.

7) Detector: Peak.

8) Trace: Max hold.

f) Allow the trace to stabilize. For the test with the hopping function turned ON, this can take several minutes to achieve a reasonable probability of intercepting any emissions due to oscillator overshoot.

g) Set the marker on the emission at the band edge, or on the highest modulation product outside of the band, if this level is greater than that at the band edge. Enable the marker-delta function, and then use the marker-to-peak function to move the marker to the peak of the in-band emission.

h) Repeat step c) through step e) for every applicable modulation.

i) Set the EUT to the highest frequency channel (for the hopping on test, the hopping sequence shall include the highest frequency channel) and repeat step c) through step d).

j) The band-edge measurement shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

2) Spurious RF Conducted Emissions:

Conducted spurious emissions shall be measured for the transmit frequency, per 5.5 and 5.6, and at the Maximum transmit powers.
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 ㎒ to 10 times the operating frequency in ㎓, with a resolution bandwidth of 100 ㎑, video bandwidth of 300 ㎑, and a coupled sweep time with a peak detector. The band 30 ㎒ to the highest frequency may be split into smaller spans, as long as the entire spectrum is covered.

3) Spurious Radiated Emissions:

1. The preliminary radiated measurements were performed to determine the frequency producing the maximum emissions in an semi-anechoic chamber at a distance of 3 meters.
2. The EUT was placed on the top of the 0.8-meter height, 1 × 1.5 meter non-metallic table. To find the maximum emission levels, the height of a measuring antenna was changed and the turntable was rotated 360°.
3. The antenna polarization was also changed from vertical to horizontal. The spectrum was scanned from 9 ㎑ to 30 ㎒ using the loop antenna, and from 30 to 1 000 ㎒ using the Bi-Log antenna, and from 1 000 ㎒ to 26 500 ㎒ using the horn antenna.
4. To obtain the final measurement data, the EUT was arranged on a turntable situated on a 4 × 4 meter in an semi-anechoic chamber. The EUT was tested at a distance 3 meters.
5. Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth.
6. The 0.8m height is for below 1 G testing, and 1.5m is for above 1G testing.

- **Procedure for unwanted emissions measurements below 1 000 ㎒**

The procedure for unwanted emissions measurements below 1 000 ㎒ is as follows:

a) Follow the requirements in 12.7.4.

b) Compliance shall be determined using CISPR quasi-peak detection; however, peak detection is permitted as an alternative to quasi-peak detection.

- **Procedure for peak unwanted emissions measurements above 1 000 ㎒**

The procedure for peak unwanted emissions measurements above 1 000 ㎒ is as follows:

a) Follow the requirements in 12.7.4.

b) Peak emission levels are measured by setting the instrument as follows:

1) RBW = 1 ㎒.

2) VBW ≥ [3 ㎒ RBW].

3) Detector = peak.

4) Sweep time = auto.

5) Trace mode = max hold.

6) Allow sweeps to continue until the trace stabilizes. Note that if the transmission is not continuous, then the time required for the trace to stabilize will increase by a factor of approximately 1 / D, where *D* is the duty cycle. For example, at 50 ㆍ duty cycle, the measurement time will increase by a factor of two, relative to measurement time for continuous transmission.

- **Procedures for average unwanted emissions measurements above 1 000 ㎒**

Method VB-A is averaging using reduced video bandwidth. The procedure for this method is as follows:

a) RBW = 1 ㎒.

b) Video bandwidth:

1) If the EUT is configured to transmit with D ≥ 98 ㆍ, then set VBW ≤ RBW / 100 (i.e., 10 ㎑), but not less than 10 ㎐.

2) The resolution bandwidth of the test receiver/spectrum analyzer is 1MHz and the video bandwidth Is 1/Ton Hz. VBW = 500 Hz, 1/Ton Hz, pulse width in seconds (Ton = 2.9 ms for DH5, 3DH5). For more detail, please refer to time of occupancy section.

c) Video bandwidth mode or display mode:

1) The instrument shall be set with video filtering applied in the power domain. Typically, this requires setting the detector mode to RMS (power averaging) and setting the average-VBW type to power (rms).

2) As an alternative, the instrument may be set to linear detector mode. Video filtering shall be applied in linear voltage domain (rather than in a log or ㏈ domain). Some instruments require linear display mode to accomplish this. Others have a setting for average-VBW type, which can be set to “voltage” regardless of the display mode.

d) Detector = peak.

e) Sweep time = auto.

f) Trace mode = max hold.

g) Allow max hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98% duty cycle. For lower duty cycles, increase the minimum number of traces by a factor of 1/x, where D is the duty cycle. For example, use at least 200 traces if the duty cycle is 25%. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—then rather than turning ON and OFF with the transmit cycle, at least 50 traces should be averaged.)

## 5.7.3 Test Result

## - Complied

1. Conducted Spurious Emissions was shown in figure 3.
   Note: We took the insertion loss of the cable into consideration within the measuring instrument.
2. Measured value of the Field strength of spurious Emissions (Radiated)
3. Each axis (x, y and z) was investigated and reported test result was x-axis as a worst case.
4. The device can connect to PC via USB or AC adapter, Therefore for the meansurement all possible configurations were investigated and the worst one (Battery) was reported.

**- Below 1 ㎓ data (Worst-case: 8DPSK)**

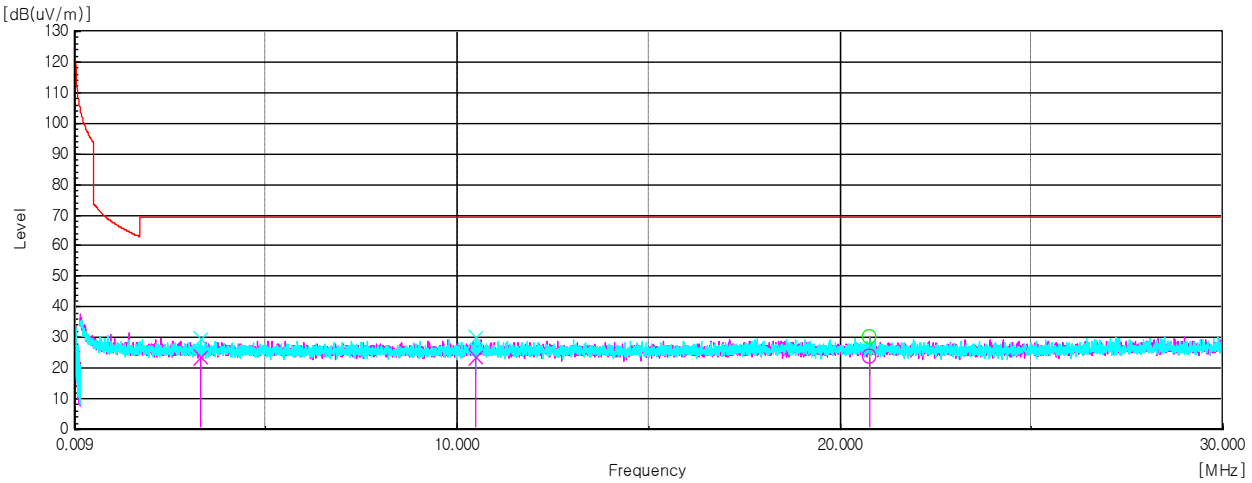
**- Module 1**

**Highest Channel (2 480 ㎒)**

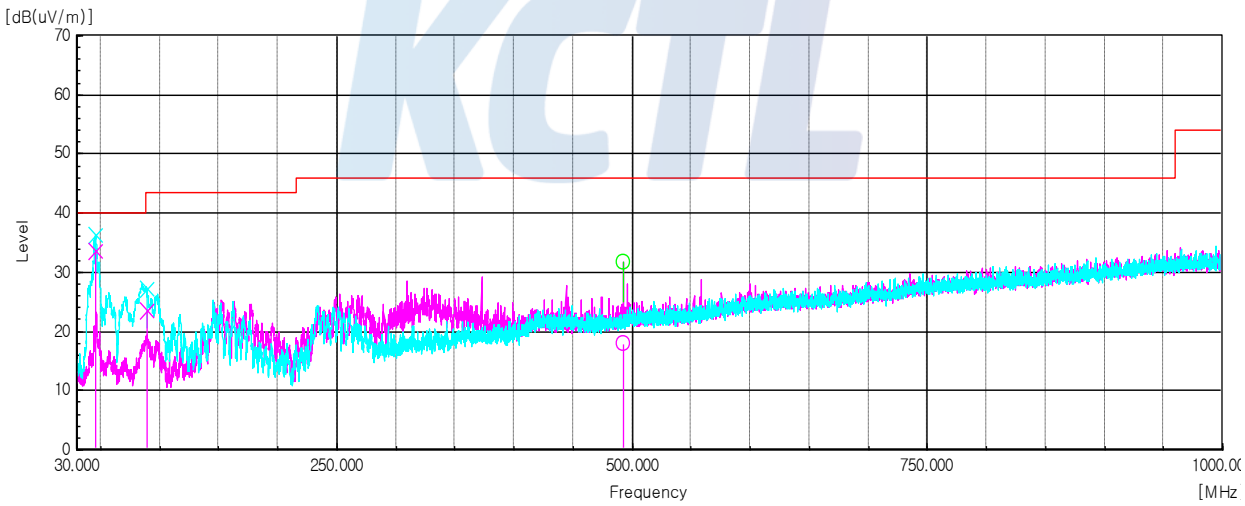
| Frequency [㎒] | Receiver Bandwidth [㎑] | Pol. [V/H] | Reading [dB(㎶)] | Cable Loss [dB] | Amp Gain [dB] | Antenna Factor [dB] | Factor [dB] | Result [dB(㎶/m)] | Limit [dB(㎶/m)] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| **Quasi-Peak DATA. Emissions below 30 ㎒** | | | | | | | | | | |
| 3.30 | 9 | V | 35.80 | 0.84 | -32.70 | 19.66 | -12.20 | 23.60 | 69.50 | 45.90 |
| 10.47 | 9 | V | 36.50 | 0.39 | -32.67 | 19.68 | -12.60 | 23.90 | 69.50 | 45.60 |
| 20.78 | 9 | H | 36.30 | 0.80 | -32.68 | 19.28 | -12.60 | 23.70 | 69.50 | 45.80 |
| **Quasi-Peak DATA. Emissions below 1 ㎓** | | | | | | | | | | |
| 45.16 | 120 | V | 45.50 | 1.37 | -29.50 | 16.33 | -11.80 | 33.70 | 40.00 | 6.30 |
| 88.81 | 120 | V | 39.40 | 1.99 | -32.29 | 14.60 | -15.70 | 23.70 | 43.50 | 19.80 |
| 492.69 | 120 | H | 19.60 | 5.09 | -29.97 | 23.18 | -1.70 | 17.90 | 46.00 | 28.10 |

NOTE 1. Factor = Cable loss + Amp gain + Antenna factor
NOTE 2. Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open field test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

**-Below 30 ㎒**




**-Below 1 ㎓**



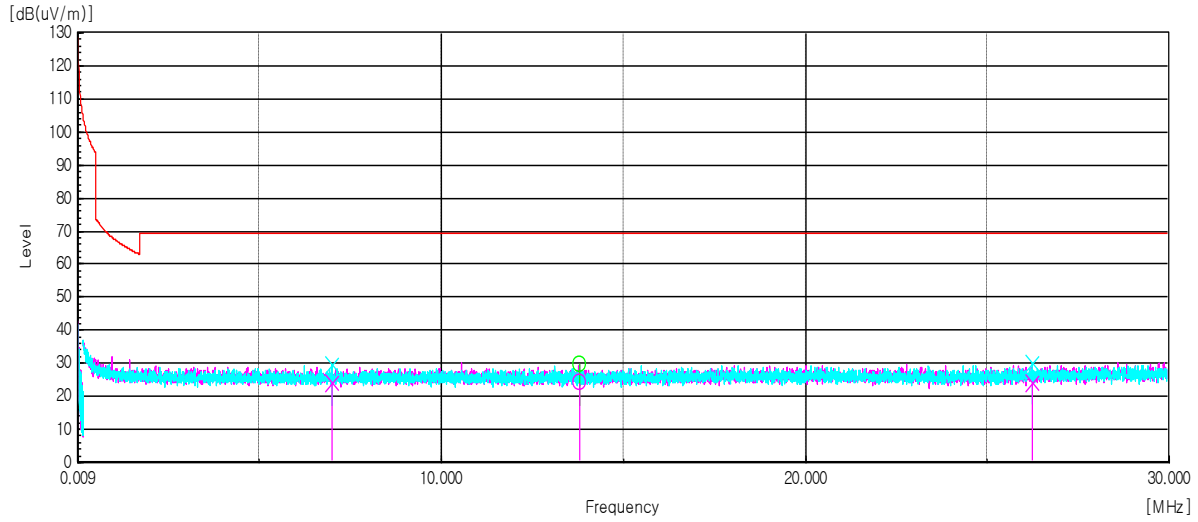
## - Module 2

### Highest Channel (2 480 ㎒)

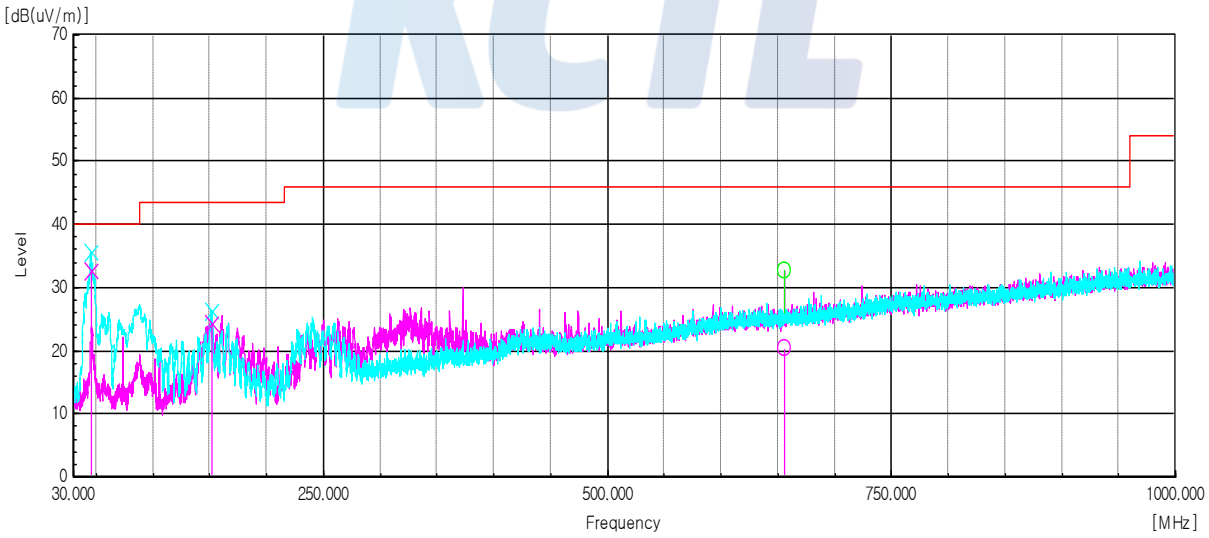
| Frequency [㎒] | Receiver Bandwidth [㎑] | Pol. [V/H] | Reading [dB(㎶)] | Cable Loss [dB] | Amp Gain [dB] | Antenna Factor [dB] | Factor [dB] | Result [dB(㎶/m)] | Limit [dB(㎶/m)] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| **Quasi-Peak DATA. Emissions below 30 ㎒** | | | | | | | | | | |
| 6.99 | 9 | V | 36.50 | 0.58 | -32.68 | 19.70 | -12.40 | 24.10 | 69.50 | 45.40 |
| 13.78 | 9 | H | 36.80 | 0.52 | -32.67 | 19.55 | -12.60 | 24.20 | 69.50 | 45.30 |
| 26.22 | 9 | V | 36.40 | 1.25 | -32.68 | 19.13 | -12.30 | 24.10 | 69.50 | 45.40 |
| **Quasi-Peak DATA. Emissions below 1 ㎓** | | | | | | | | | | |
| 45.16 | 120 | V | 44.50 | 1.37 | -29.50 | 16.33 | -11.80 | 32.70 | 40.00 | 7.30 |
| 151.61 | 120 | V | 33.70 | 2.68 | -28.58 | 16.60 | -9.30 | 24.40 | 43.50 | 19.10 |
| 655.65 | 120 | H | 18.40 | 5.98 | -28.70 | 24.82 | 2.10 | 20.50 | 46.00 | 25.50 |

NOTE 1. Factor = Cable loss + Amp gain + Antenna factor
NOTE 2. Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open field test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

**-Below 30 ㎒**




**-Below 1 ㎓**



## - Module 1

### - Above 1 ㎓ data

**GFSK_Lowest channel (2 402 ㎒)**

| Frequency [㎒] | Receiver Bandwidth [㎑] | Pol. [V/H] | Reading [dB(㎶)] | Cable Loss [dB] | Amp Gain [dB] | Antenna Factor [dB] | Factor [dB] | DCCF [dB] | Result [dB(㎶/m)] | Limit [dB(㎶/m)] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Peak DATA. Emissions above 1 ㎓** | | | | | | | | | | | |
| 1 497.31[1)] | 1 000 | V | 75.08 | 2.94 | -60.82 | 25.78 | -32.10 | - | 42.98 | 74.00 | 31.02 |
| 2 385.91[1)] | 1 000 | H | 75.23 | 3.66 | -59.07 | 28.41 | -27.00 | - | 48.23 | 74.00 | 25.77 |
| 4 803.64[1)] | 1 000 | V | 71.45 | 5.34 | -61.69 | 32.80 | -23.55 | - | 47.90 | 74.00 | 26.10 |
| 17 625.72 | 1 000 | H | 58.74 | 10.71 | -62.89 | 44.05 | -8.13 | - | 50.61 | 74.00 | 23.39 |
| 21 580.89 | 1 000 | V | 47.72 | 12.00 | -49.47 | 45.00 | 7.53 | - | 55.25 | 74.00 | 18.75 |
| 26 430.41 | 1 000 | V | 45.67 | 13.70 | -46.82 | 45.60 | 12.48 | - | 58.15 | 74.00 | 15.85 |
| **Average DATA. Emissions above 1 ㎓** | | | | | | | | | | | |
| 1 497.31[1)] | 1 000 | V | 53.62 | 2.94 | -60.82 | 25.78 | -32.10 | - | 21.52 | 54.00 | 32.48 |
| 2 385.91[1)] | 1 000 | H | 59.41 | 3.66 | -59.07 | 28.41 | -27.00 | - | 32.41 | 54.00 | 21.59 |
| 4 803.64[1)] | 1 000 | V | 71.45 | 5.34 | -61.69 | 32.80 | -23.55 | -22.50 | 25.40 | 54.00 | 28.60 |

[1)] Restricted band.

**GFSK_Middle channel (2 441 ㎒)**

| Frequency [㎒] | Receiver Bandwidth [㎑] | Pol. [V/H] | Reading [dB(㎶)] | Cable Loss [dB] | Amp Gain [dB] | Antenna Factor [dB] | Factor [dB] | DCCF [dB] | Result [dB(㎶/m)] | Limit [dB(㎶/m)] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Peak DATA. Emissions above 1 ㎓** | | | | | | | | | | | |
| 1 627.81 | 1 000 | V | 73.38 | 3.07 | -60.48 | 26.31 | -31.10 | - | 42.28 | 74.00 | 31.72 |
| 2 507.27 | 1 000 | H | 72.25 | 3.79 | -59.08 | 28.76 | -26.53 | - | 45.72 | 74.00 | 28.28 |
| 4 881.58[1)] | 1 000 | V | 74.97 | 5.39 | -61.23 | 32.84 | -23.00 | - | 51.97 | 74.00 | 22.03 |
| 17 155.38 | 1 000 | V | 58.93 | 10.49 | -60.24 | 41.23 | -8.52 | - | 50.41 | 74.00 | 23.59 |
| 21 612.50 | 1 000 | H | 48.35 | 12.00 | -49.47 | 45.00 | 7.53 | - | 55.88 | 74.00 | 18.12 |
| 26 384.72 | 1 000 | H | 45.74 | 13.70 | -46.78 | 45.60 | 12.52 | - | 58.26 | 74.00 | 15.74 |
| **Average DATA. Emissions above 1 ㎓** | | | | | | | | | | | |
| 4 881.58[1)] | 1 000 | V | 74.97 | 5.39 | -61.23 | 32.84 | -23.00 | -22.50 | 29.47 | 54.00 | 24.53 |

[1)] Restricted band.

### GFSK_Highest channel (2 480 ㎒)

| Frequency [㎒] | Receiver Bandwidth [㎑] | Pol. [V/H] | Reading [dB(㎶)] | Cable Loss [dB] | Amp Gain [dB] | Antenna Factor [dB] | Factor [dB] | DCCF [dB] | Result [dB(㎶/m)] | Limit [dB(㎶/m)] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Peak DATA. Emissions above 1 ㎓** | | | | | | | | | | | |
| 1 653.83 | 1 000 | V | 71.74 | 3.09 | -60.38 | 26.42 | -30.87 | - | 40.87 | 74.00 | 33.13 |
| 2 483.99[1)] | 1 000 | V | 76.86 | 3.77 | -59.10 | 28.72 | -26.61 | - | 50.25 | 74.00 | 23.75 |
| 4 960.42[1)] | 1 000 | V | 79.00 | 5.45 | -60.81 | 32.88 | -22.48 | - | 56.52 | 74.00 | 17.48 |
| 17 598.98 | 1 000 | H | 59.17 | 10.70 | -62.72 | 43.89 | -8.13 | - | 51.04 | 74.00 | 22.96 |
| 21 888.48 | 1 000 | V | 48.15 | 12.10 | -49.52 | 45.00 | 7.58 | - | 55.73 | 74.00 | 18.27 |
| 25 983.36 | 1 000 | H | 46.13 | 13.70 | -46.63 | 45.70 | 12.77 | - | 58.90 | 74.00 | 15.10 |
| **Average DATA. Emissions above 1 ㎓** | | | | | | | | | | | |
| 2 483.99[1)] | 1 000 | V | 68.73 | 3.77 | -59.10 | 28.72 | -26.61 | - | 42.12 | 54.00 | 11.88 |
| 4 960.42[1)] | 1 000 | V | 79.00 | 5.45 | -60.81 | 32.88 | -22.48 | -22.50 | 34.02 | 54.00 | 19.98 |

[1)] Restricted band.

### 8DPSK_Lowest channel (2 402 ㎒)

| Frequency [㎒] | Receiver Bandwidth [㎑] | Pol. [V/H] | Reading [dB(㎶)] | Cable Loss [dB] | Amp Gain [dB] | Antenna Factor [dB] | Factor [dB] | DCCF [dB] | Result [dB(㎶/m)] | Limit [dB(㎶/m)] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Peak DATA. Emissions above 1 ㎓** | | | | | | | | | | | |
| 1 602.04[1)] | 1 000 | V | 73.52 | 3.04 | -60.59 | 26.21 | -31.34 | - | 42.18 | 74.00 | 31.82 |
| 2 386.18[1)] | 1 000 | V | 71.87 | 3.65 | -59.06 | 28.40 | -27.01 | - | 44.86 | 74.00 | 29.14 |
| 4 803.64[1)] | 1 000 | V | 62.37 | 5.34 | -61.69 | 32.80 | -23.55 | - | 38.82 | 74.00 | 35.18 |
| 17 554.13 | 1 000 | H | 59.58 | 10.68 | -62.43 | 43.62 | -8.13 | - | 51.45 | 74.00 | 22.55 |
| 21 598.95 | 1 000 | V | 47.44 | 12.00 | -49.47 | 45.00 | 7.53 | - | 54.97 | 74.00 | 19.03 |
| 26 362.94 | 1 000 | V | 45.97 | 13.70 | -46.77 | 45.60 | 12.53 | - | 58.50 | 74.00 | 15.50 |
| **Average DATA. Emissions above 1 ㎓** | | | | | | | | | | | |
| 1 602.04[1)] | 1 000 | V | 71.64 | 3.04 | -60.59 | 26.21 | -31.34 | - | 40.30 | 54.00 | 13.70 |
| 2 386.18[1)] | 1 000 | V | 58.43 | 3.65 | -59.06 | 28.40 | -27.01 | - | 31.42 | 54.00 | 22.58 |
| 4 803.64[1)] | 1 000 | V | 62.37 | 5.34 | -61.69 | 32.80 | -23.55 | -22.50 | 16.32 | 54.00 | 37.68 |

[1)] Restricted band.

### 8DPSK_Middle channel (2 441 ㎒)

| Frequency [㎒] | Receiver Bandwidth [㎑] | Pol. [V/H] | Reading [dB(㎶)] | Cable Loss [dB] | Amp Gain [dB] | Antenna Factor [dB] | Factor [dB] | DCCF [dB] | Result [dB(㎶/m)] | Limit [dB(㎶/m)] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Peak DATA. Emissions above 1 ㎓** | | | | | | | | | | | |
| 1 627.89 | 1 000 | V | 73.00 | 3.07 | -60.48 | 26.31 | -31.10 | - | 41.90 | 74.00 | 32.10 |
| 2 935.39 | 1 000 | V | 69.28 | 4.09 | -59.33 | 29.58 | -25.66 | - | 43.62 | 74.00 | 30.38 |
| 4 881.13[1)] | 1 000 | V | 67.16 | 5.39 | -61.23 | 32.84 | -23.00 | - | 44.16 | 74.00 | 29.84 |
| 17 670.58 | 1 000 | H | 58.26 | 10.73 | -63.19 | 44.32 | -8.14 | - | 50.12 | 74.00 | 23.88 |
| 21 578.23 | 1 000 | V | 48.40 | 12.00 | -49.47 | 45.00 | 7.53 | - | 55.93 | 74.00 | 18.07 |
| 26 428.02 | 1 000 | V | 45.27 | 13.70 | -46.82 | 45.60 | 12.48 | - | 57.75 | 74.00 | 16.25 |
| **Average DATA. Emissions above 1 ㎓** | | | | | | | | | | | |
| 4 881.13[1)] | 1 000 | V | 67.16 | 5.39 | -61.23 | 32.84 | -23.00 | -22.50 | 21.66 | 54.00 | 32.34 |

[1)] Restricted band.

### 8DPSK_Highest channel (2 480 ㎒)

| Frequency [㎒] | Receiver Bandwidth [㎑] | Pol. [V/H] | Reading [dB(㎶)] | Cable Loss [dB] | Amp Gain [dB] | Antenna Factor [dB] | Factor [dB] | DCCF [dB] | Result [dB(㎶/m)] | Limit [dB(㎶/m)] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Peak DATA. Emissions above 1 ㎓** | | | | | | | | | | | |
| 1 654.22 | 1 000 | V | 73.94 | 3.09 | -60.37 | 26.42 | -30.86 | - | 43.08 | 74.00 | 30.92 |
| 2 483.51[1)] | 1 000 | V | 77.86 | 3.77 | -59.10 | 28.72 | -26.61 | - | 51.25 | 74.00 | 22.75 |
| 4 959.52[1)] | 1 000 | V | 69.31 | 5.44 | -60.80 | 32.88 | -22.48 | - | 46.83 | 74.00 | 27.17 |
| 17 553.67 | 1 000 | V | 58.41 | 10.68 | -62.43 | 43.62 | -8.13 | - | 50.28 | 74.00 | 23.72 |
| 21 616.22 | 1 000 | V | 48.25 | 12.00 | -49.47 | 45.00 | 7.53 | - | 55.78 | 74.00 | 18.22 |
| 26 451.92 | 1 000 | V | 46.08 | 13.70 | -46.83 | 45.60 | 12.47 | - | 58.55 | 74.00 | 15.45 |
| **Average DATA. Emissions above 1 ㎓** | | | | | | | | | | | |
| 2 483.51[1)] | 1 000 | V | 63.24 | 3.77 | -59.10 | 28.72 | -26.61 | - | 36.63 | 54.00 | 17.37 |
| 4 959.52[1)] | 1 000 | V | 69.31 | 5.44 | -60.80 | 32.88 | -22.48 | -22.50 | 24.33 | 54.00 | 29.67 |

[1)] Restricted band.

NOTE : Duty Cycle Correction Factor Calculation
-Worst case : AFH mode
-Channel hop rate = 800 hops/second
-Hopping rate for DH5 mode = 800 hops/second / 6 (6 slots for DH5) = 133.33 hops/second
-Time per channel hop = 1 / 133.33 hops/second = 7.50 ms
-Time to cycle through all channels = 7.50 x 20 channels (AFH mode) = 150 ms
-Number of times transmitter hits on one channel = 100 ms /
Time to cycle through all channels [ms] = 100 ms / 150 ms =1 time
-Worst case Dwell = 7.5 ms
- Duty Cycle Correction Factor = 20log(7.5 ms/100 ms) = -22.5 dB
For duty cycle information, please refer to section 5.6 (Time of occupancy)

## - Module 2

### - Above 1 ㎓ data

**GFSK_Lowest channel (2 402 ㎒)**

| Frequency [㎒] | Receiver Bandwidth [㎑] | Pol. [V/H] | Reading [dB(㎶)] | Cable Loss [dB] | Amp Gain [dB] | Antenna Factor [dB] | Factor [dB] | DCCF [dB] | Result [dB(㎶/m)] | Limit [dB(㎶/m)] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Peak DATA. Emissions above 1 ㎓** | | | | | | | | | | | |
| 1 602.00[1)] | 1 000 | H | 75.88 | 3.04 | -60.59 | 26.21 | -31.34 | - | 44.54 | 74.00 | 29.46 |
| 2 335.47[1)] | 1 000 | V | 70.65 | 3.65 | -59.07 | 28.41 | -27.01 | - | 43.64 | 74.00 | 30.36 |
| 4 804.09[1)] | 1 000 | V | 76.30 | 5.34 | -61.68 | 32.80 | -23.54 | - | 52.76 | 74.00 | 21.24 |
| 14 823.59 | 1 000 | H | 58.41 | 9.73 | -60.36 | 40.42 | -10.21 | - | 48.20 | 74.00 | 25.80 |
| 21 524.31 | 1 000 | V | 47.78 | 12.00 | -49.48 | 45.00 | 7.52 | - | 55.30 | 74.00 | 18.70 |
| 26 399.06 | 1 000 | V | 45.86 | 13.70 | -46.79 | 45.60 | 12.51 | - | 58.37 | 74.00 | 15.63 |
| **Average DATA. Emissions above 1 ㎓** | | | | | | | | | | | |
| 1 602.00[1)] | 1 000 | H | 74.17 | 3.04 | -60.59 | 26.21 | -31.34 | - | 42.83 | 54.00 | 11.17 |
| 2 335.47[1)] | 1 000 | V | 67.32 | 3.65 | -59.07 | 28.41 | -27.01 | - | 40.31 | 54.00 | 13.69 |
| 4 804.09[1)] | 1 000 | V | 76.30 | 5.34 | -61.68 | 32.80 | -23.54 | -22.50 | 30.26 | 54.00 | 23.74 |

[1)] Restricted band.

**GFSK_Middle channel (2 441 ㎒)**

| Frequency [㎒] | Receiver Bandwidth [㎑] | Pol. [V/H] | Reading [dB(㎶)] | Cable Loss [dB] | Amp Gain [dB] | Antenna Factor [dB] | Factor [dB] | DCCF [dB] | Result [dB(㎶/m)] | Limit [dB(㎶/m)] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Peak DATA. Emissions above 1 ㎓** | | | | | | | | | | | |
| 1 627.89 | 1 000 | V | 74.47 | 3.07 | -60.48 | 26.31 | -31.10 | - | 43.37 | 74.00 | 30.63 |
| 2 507.42 | 1 000 | V | 70.89 | 3.79 | -59.08 | 28.76 | -26.53 | - | 44.36 | 74.00 | 29.64 |
| 4 882.03[1)] | 1 000 | V | 80.23 | 5.39 | -61.22 | 32.84 | -22.99 | - | 57.24 | 74.00 | 16.76 |
| 14 947.30 | 1 000 | H | 58.14 | 9.75 | -60.03 | 40.34 | -9.94 | - | 48.20 | 74.00 | 25.80 |
| 21 495.63 | 1 000 | V | 50.02 | 11.90 | -49.39 | 45.00 | 7.51 | - | 57.53 | 74.00 | 16.47 |
| 25 634.86 | 1 000 | H | 46.18 | 13.40 | -46.94 | 45.50 | 11.96 | - | 58.14 | 74.00 | 15.86 |
| **Average DATA. Emissions above 1 ㎓** | | | | | | | | | | | |
| 4 882.03[1)] | 1 000 | V | 80.23 | 5.39 | -61.22 | 32.84 | -22.99 | -22.50 | 34.74 | 54.00 | 19.26 |

[1)] Restricted band.

### GFSK_Highest channel (2 480 ㎒)

| Frequency [㎒] | Receiver Bandwidth [㎑] | Pol. [V/H] | Reading [dB(㎶)] | Cable Loss [dB] | Amp Gain [dB] | Antenna Factor [dB] | Factor [dB] | DCCF [dB] | Result [dB(㎶/m)] | Limit [dB(㎶/m)] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Peak DATA. Emissions above 1 ㎓** | | | | | | | | | | | |
| 1 654.06 | 1 000 | H | 76.48 | 3.09 | -60.37 | 26.42 | -30.86 | - | 45.62 | 74.00 | 28.38 |
| 2 483.79[1)] | 1 000 | V | 76.83 | 3.77 | -59.10 | 28.72 | -26.61 | - | 50.22 | 74.00 | 23.78 |
| 4 959.97[1)] | 1 000 | V | 84.08 | 5.44 | -60.80 | 32.88 | -22.48 | - | 61.60 | 74.00 | 12.40 |
| 16 861.30 | 1 000 | V | 59.22 | 10.38 | -59.11 | 39.91 | -8.82 | - | 50.40 | 74.00 | 23.60 |
| 21 554.86 | 1 000 | V | 47.51 | 12.00 | -49.48 | 45.00 | 7.52 | - | 55.03 | 74.00 | 18.97 |
| 25 788.66 | 1 000 | V | 46.22 | 13.50 | -46.78 | 45.60 | 12.32 | - | 58.54 | 74.00 | 15.46 |
| **Average DATA. Emissions above 1 ㎓** | | | | | | | | | | | |
| 2 483.79[1)] | 1 000 | V | 61.92 | 3.77 | -59.10 | 28.72 | -26.61 | - | 35.31 | 54.00 | 18.69 |
| 4 959.97[1)] | 1 000 | V | 84.08 | 5.44 | -60.80 | 32.88 | -22.48 | -22.50 | 39.10 | 54.00 | 14.90 |

[1)] Restricted band.

### 8DPSK_Lowest channel (2 402 ㎒)

| Frequency [㎒] | Receiver Bandwidth [㎑] | Pol. [V/H] | Reading [dB(㎶)] | Cable Loss [dB] | Amp Gain [dB] | Antenna Factor [dB] | Factor [dB] | DCCF [dB] | Result [dB(㎶/m)] | Limit [dB(㎶/m)] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Peak DATA. Emissions above 1 ㎓** | | | | | | | | | | | |
| 1 602.01[1)] | 1 000 | V | 75.43 | 3.04 | -60.59 | 26.21 | -31.34 | - | 44.09 | 74.00 | 29.91 |
| 2 335.41[1)] | 1 000 | V | 71.80 | 3.65 | -59.07 | 28.41 | -27.01 | - | 44.79 | 74.00 | 29.21 |
| 4 803.19[1)] | 1 000 | V | 65.95 | 5.34 | -61.69 | 32.80 | -23.55 | - | 42.40 | 74.00 | 31.60 |
| 17 512.44 | 1 000 | H | 58.41 | 10.66 | -62.16 | 43.37 | -8.13 | - | 50.28 | 74.00 | 23.72 |
| 21 565.22 | 1 000 | V | 47.77 | 12.00 | -49.48 | 45.00 | 7.52 | - | 55.29 | 74.00 | 18.71 |
| 25 925.45 | 1 000 | H | 45.45 | 13.60 | -46.66 | 45.70 | 12.64 | - | 58.09 | 74.00 | 15.91 |
| **Average DATA. Emissions above 1 ㎓** | | | | | | | | | | | |
| 1 602.01[1)] | 1 000 | V | 74.24 | 3.04 | -60.59 | 26.21 | -31.34 | - | 42.90 | 54.00 | 11.10 |
| 2 335.41[1)] | 1 000 | V | 60.43 | 3.65 | -59.07 | 28.41 | -27.01 | - | 33.42 | 54.00 | 20.58 |
| 4 803.19[1)] | 1 000 | V | 65.95 | 5.34 | -61.69 | 32.80 | -23.55 | -22.50 | 19.90 | 54.00 | 34.10 |

[1)] Restricted band.

### 8DPSK_Middle channel (2 441 ㎒)

| Frequency [㎒] | Receiver Bandwidth [㎑] | Pol. [V/H] | Reading [dB(㎶)] | Cable Loss [dB] | Amp Gain [dB] | Antenna Factor [dB] | Factor [dB] | DCCF [dB] | Result [dB(㎶/m)] | Limit [dB(㎶/m)] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Peak DATA. Emissions above 1 ㎓** | | | | | | | | | | | |
| 1 627.89 | 1 000 | V | 75.00 | 3.07 | -60.48 | 26.31 | -31.10 | - | 43.90 | 74.00 | 30.10 |
| 3 234.84 | 1 000 | H | 69.44 | 4.29 | -59.90 | 30.33 | -25.28 | - | 44.16 | 74.00 | 29.84 |
| 4 882.03[1)] | 1 000 | V | 71.66 | 5.39 | -61.22 | 32.84 | -22.99 | - | 48.67 | 74.00 | 25.33 |
| 17 643.39 | 1 000 | H | 58.86 | 10.72 | -63.02 | 44.16 | -8.14 | - | 50.72 | 74.00 | 23.28 |
| 21 652.88 | 1 000 | V | 48.08 | 12.00 | -49.46 | 45.00 | 7.54 | - | 55.62 | 74.00 | 18.38 |
| 26 478.48 | 1 000 | V | 45.51 | 13.70 | -46.86 | 45.60 | 12.44 | - | 57.95 | 74.00 | 16.05 |
| **Average DATA. Emissions above 1 ㎓** | | | | | | | | | | | |
| 4 882.03[1)] | 1 000 | V | 71.66 | 5.39 | -61.22 | 32.84 | -22.99 | -22.50 | 26.17 | 54.00 | 27.83 |

[1)] Restricted band.

### 8DPSK_Highest channel (2 480 ㎒)

| Frequency [㎒] | Receiver Bandwidth [㎑] | Pol. [V/H] | Reading [dB(㎶)] | Cable Loss [dB] | Amp Gain [dB] | Antenna Factor [dB] | Factor [dB] | DCCF [dB] | Result [dB(㎶/m)] | Limit [dB(㎶/m)] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Peak DATA. Emissions above 1 ㎓** | | | | | | | | | | | |
| 1 654.14 | 1 000 | V | 74.14 | 3.09 | -60.37 | 26.42 | -30.86 | - | 43.28 | 74.00 | 30.72 |
| 2 483.50[1)] | 1 000 | H | 78.39 | 3.77 | -59.10 | 28.72 | -26.61 | - | 51.78 | 74.00 | 22.22 |
| 4 959.97[1)] | 1 000 | V | 72.06 | 5.44 | -60.80 | 32.88 | -22.48 | - | 49.58 | 74.00 | 24.42 |
| 16 718.56 | 1 000 | V | 58.84 | 10.34 | -58.79 | 39.51 | -8.94 | - | 49.90 | 74.00 | 24.10 |
| 21 662.70 | 1 000 | H | 47.79 | 12.00 | -49.46 | 45.00 | 7.54 | - | 55.33 | 74.00 | 18.67 |
| 25 759.17 | 1 000 | V | 45.82 | 13.50 | -46.85 | 45.60 | 12.25 | - | 58.07 | 74.00 | 15.93 |
| **Average DATA. Emissions above 1 ㎓** | | | | | | | | | | | |
| 2 483.50[1)] | 1 000 | H | 62.28 | 3.77 | -59.10 | 28.72 | -26.61 | - | 35.67 | 54.00 | 18.33 |
| 4 959.97[1)] | 1 000 | V | 72.06 | 5.44 | -60.80 | 32.88 | -22.48 | -22.50 | 27.08 | 54.00 | 26.92 |

[1)] Restricted band.

NOTE : Duty Cycle Correction Factor Calculation
-Worst case : AFH mode
-Channel hop rate = 800 hops/second
-Hopping rate for DH5 mode = 800 hops/second / 6 (6 slots for DH5) = 133.33 hops/second
-Time per channel hop = 1 / 133.33 hops/second = 7.50 ms
-Time to cycle through all channels = 7.50 x 20 channels (AFH mode) = 150 ms
-Number of times transmitter hits on one channel = 100 ms /
Time to cycle through all channels [ms] = 100 ms / 150 ms =1 time
-Worst case Dwell = 7.5 ms
- Duty Cycle Correction Factor = 20log(7.5 ms/100 ms) = -22.5 ㏈
For duty cycle information, please refer to section 5.6 (Time of occupancy)

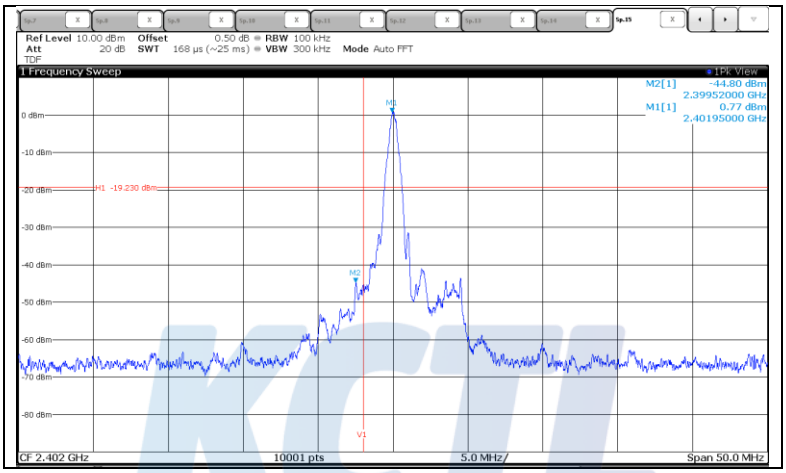
## 5.7.4 Test Plot

Figure 5. Plot of the Band Edge (Conducted)

**- Module 1**

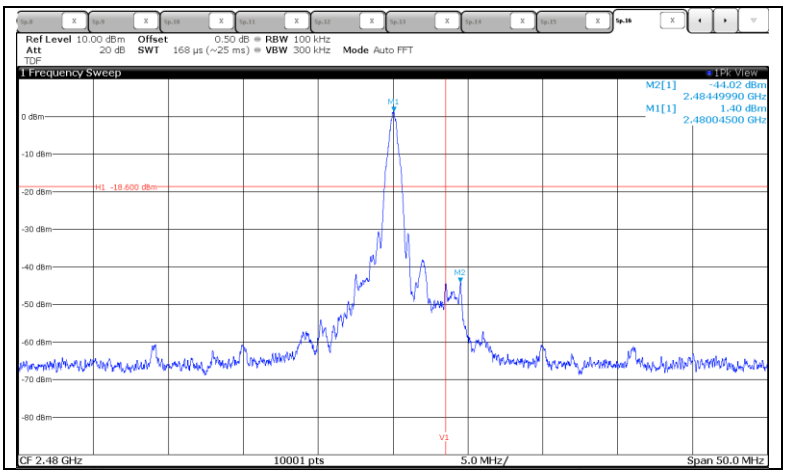
**- GFSK (Without hopping)**

Lowest Channel (2 402 ㎒)



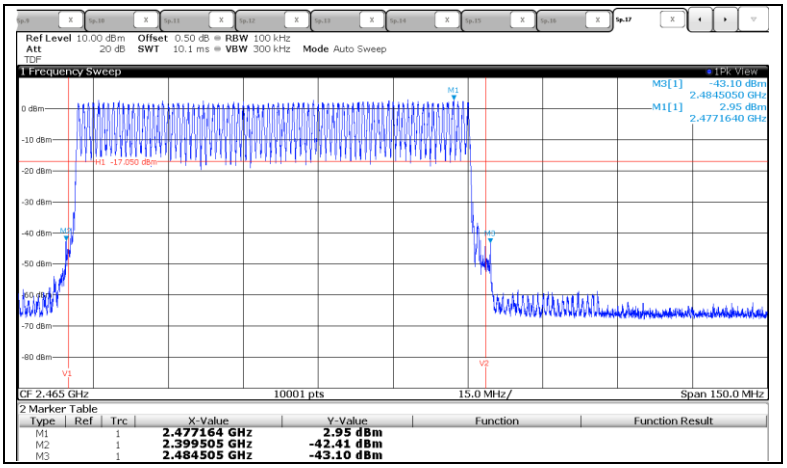

- Result of 2 400.0 ㎒

Highest Channel (2 480 ㎒)




- Result of 2 483.5 ㎒

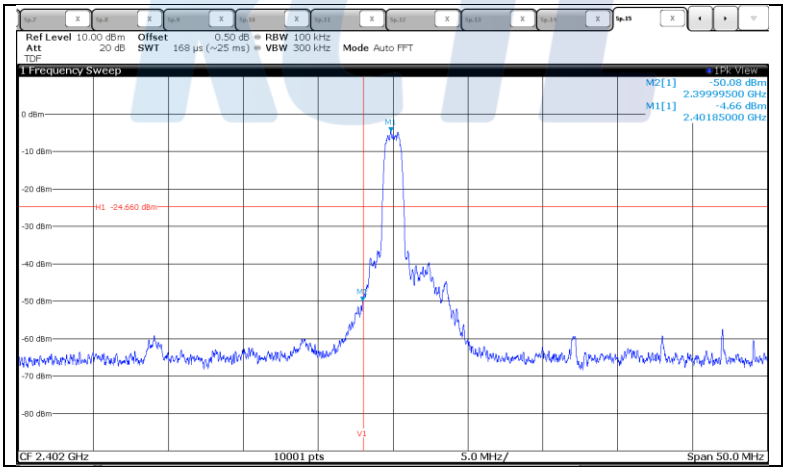
**- GFSK (With hopping)**




- Result of 2 400.0 ㎒ - 2 483.5 ㎒

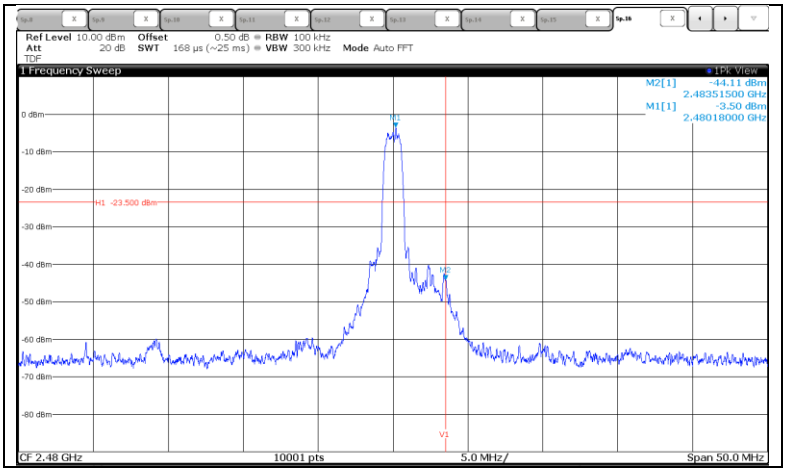
**- π/4DQPSK (Without hopping)**

Lowest Channel (2 402 ㎒)



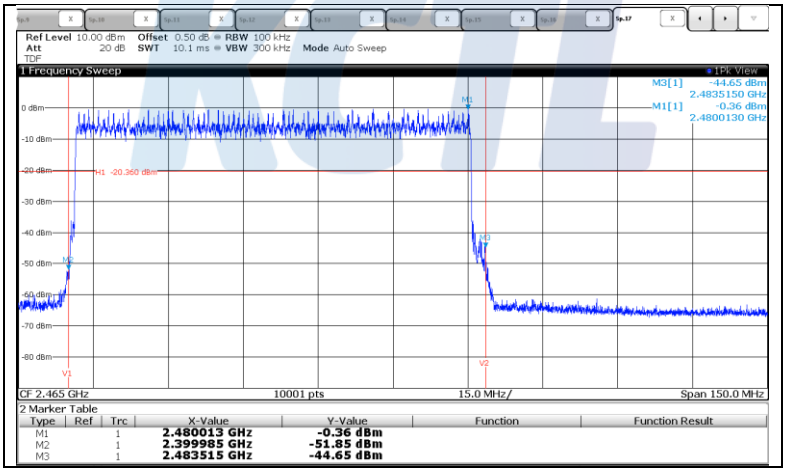

- Result of 2 400.0 ㎒

Highest Channel (2 480 ㎒)




- Result of 2 483.5 ㎒

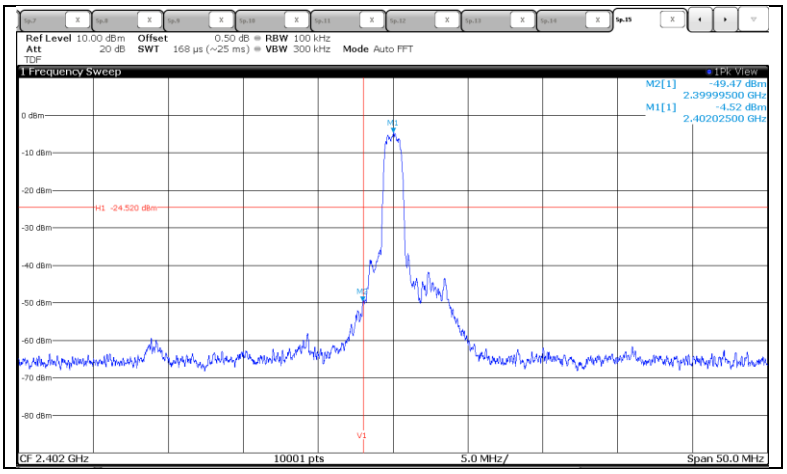
**- π/4DQPSK (With hopping)**




- Result of 2 400.0 ㎒ - 2 483.5 ㎒

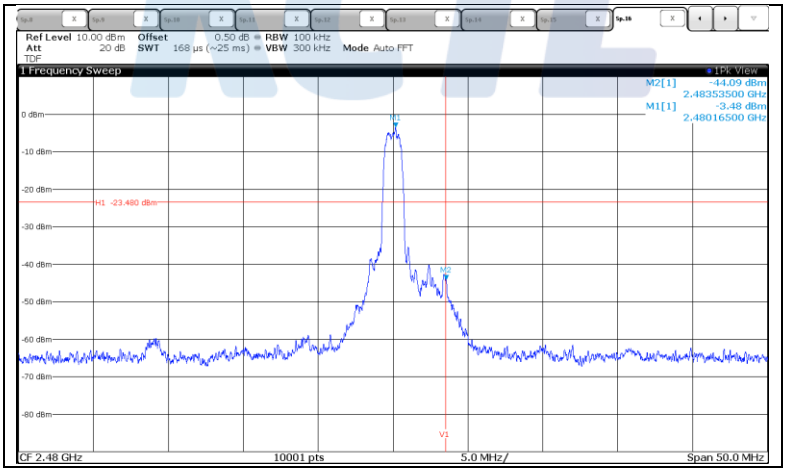
**- 8DPSK (Without hopping)**

Lowest Channel (2 402 ㎒)



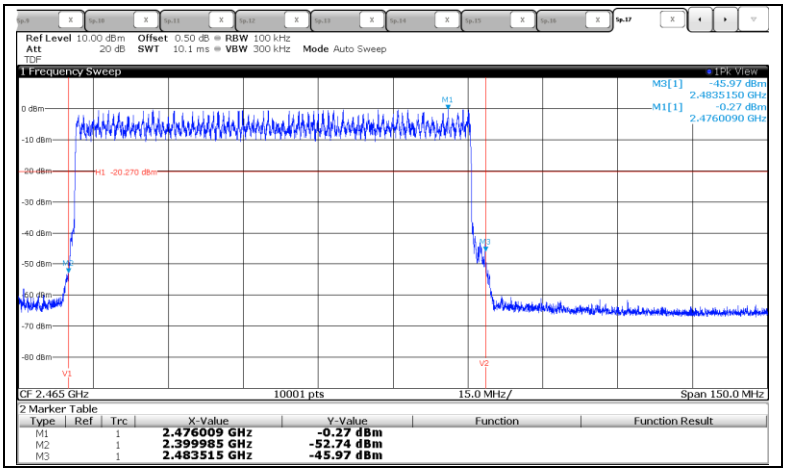

- Result of 2 400.0 ㎒

Highest Channel (2 480 ㎒)




- Result of 2 483.5 ㎒

**- 8DPSK (With hopping)**

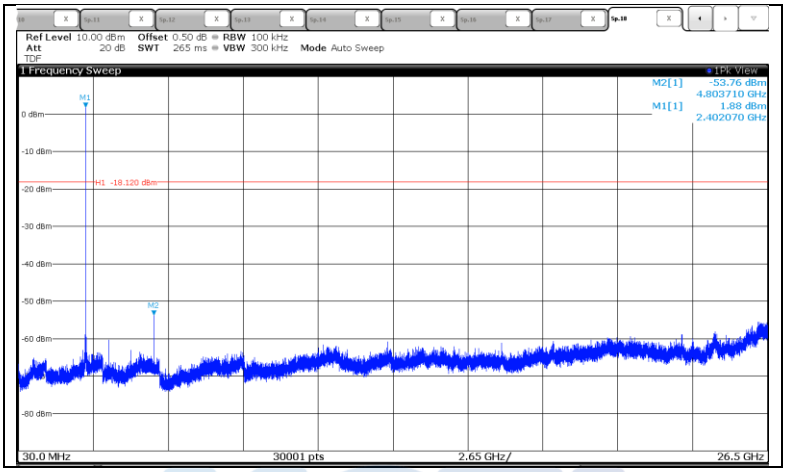



- Result of 2 400.0 ㎒ - 2 483.5 ㎒

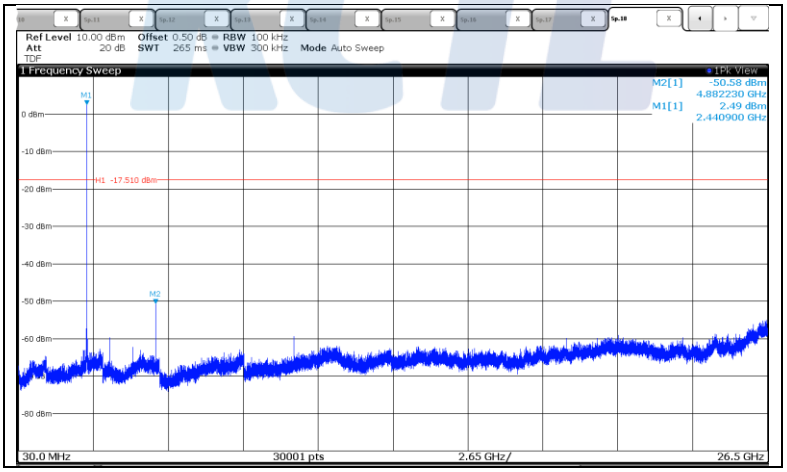
Figure 6. Plot of the Spurious RF conducted emissions

**- GFSK**

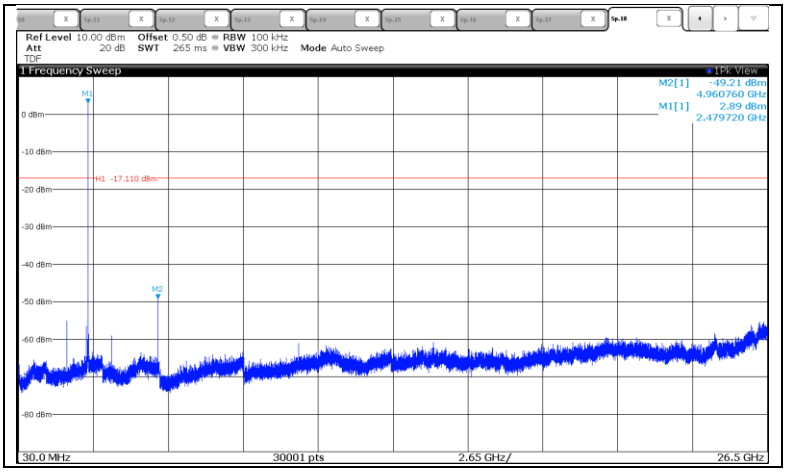
Lowest Channel (2 402 ㎒)




Middle Channel (2 441 ㎒)

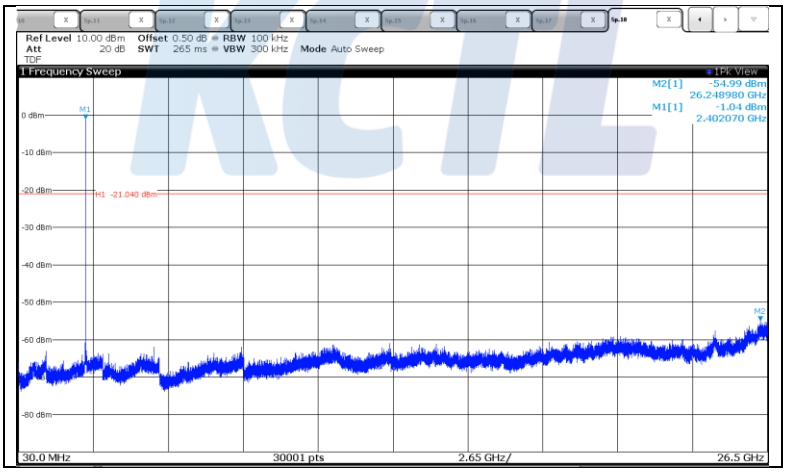


Highest Channel (2 480 ㎒)

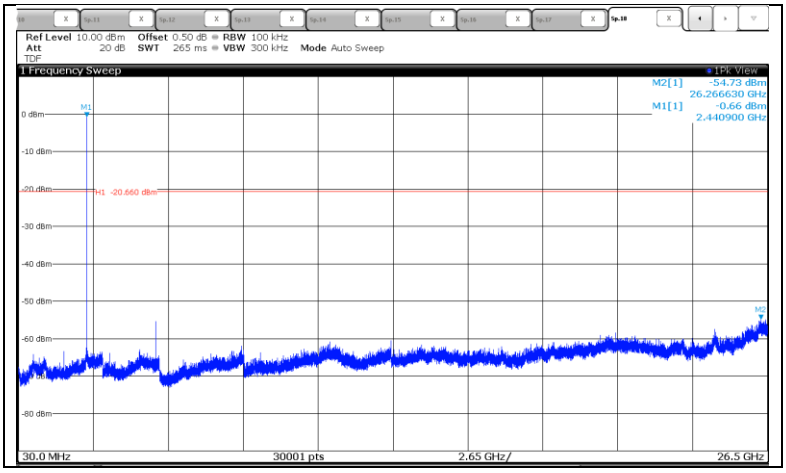



**- π/4DQPSK**

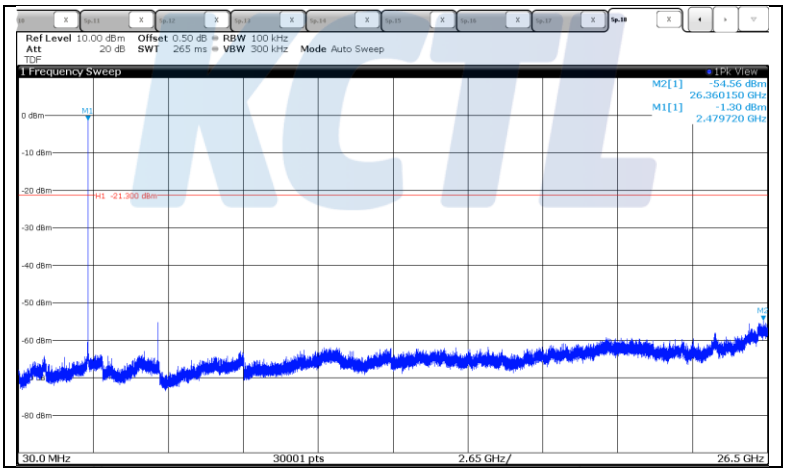
Lowest Channel (2 402 ㎒)



Middle Channel (2 441 ㎒)

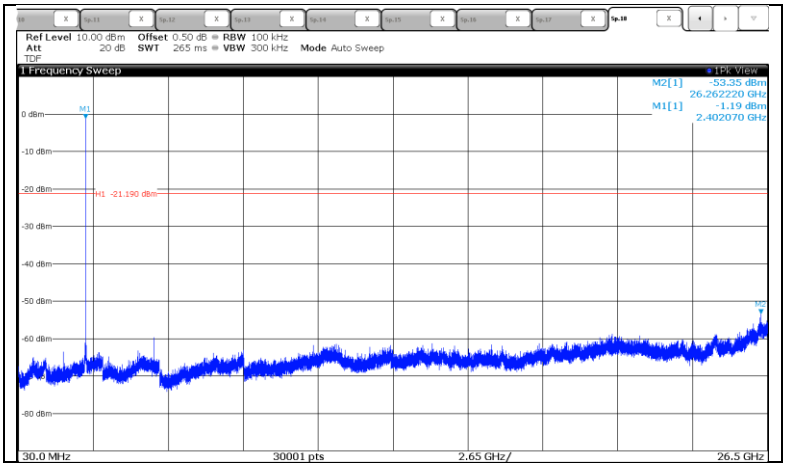



Highest Channel (2 480 ㎒)

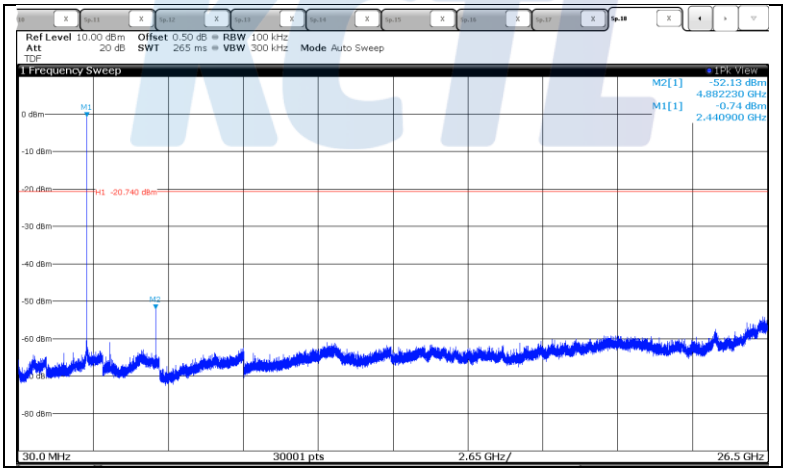


**- 8DPSK**

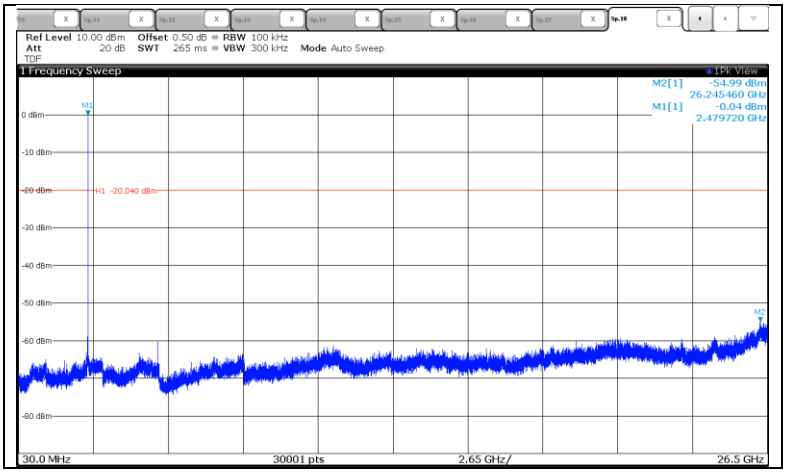
Lowest Channel (2 402 ㎒)




Middle Channel (2 441 ㎒)



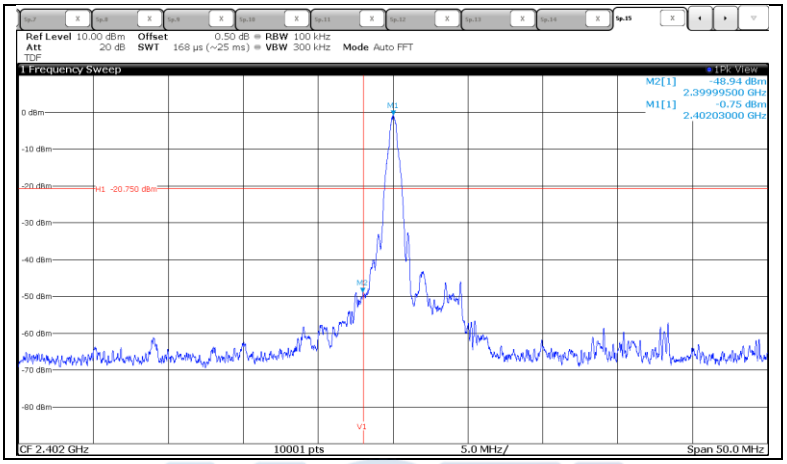
Highest Channel (2 480 ㎒)



**- Module 2**

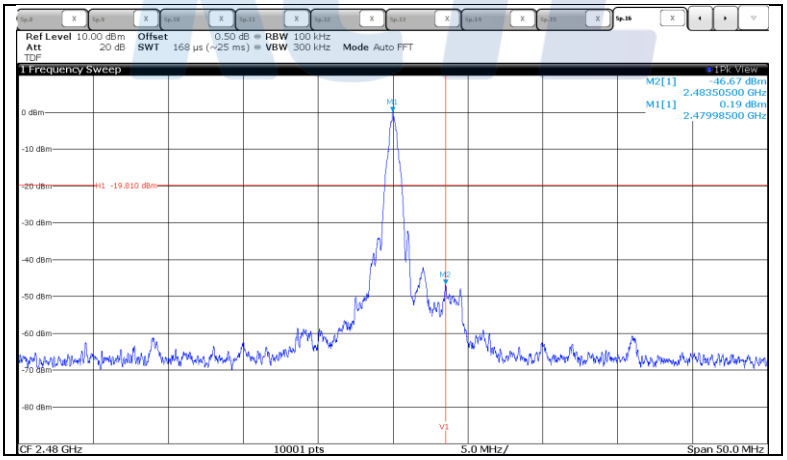
**- GFSK (Without hopping)**

Lowest Channel (2 402 ㎒)



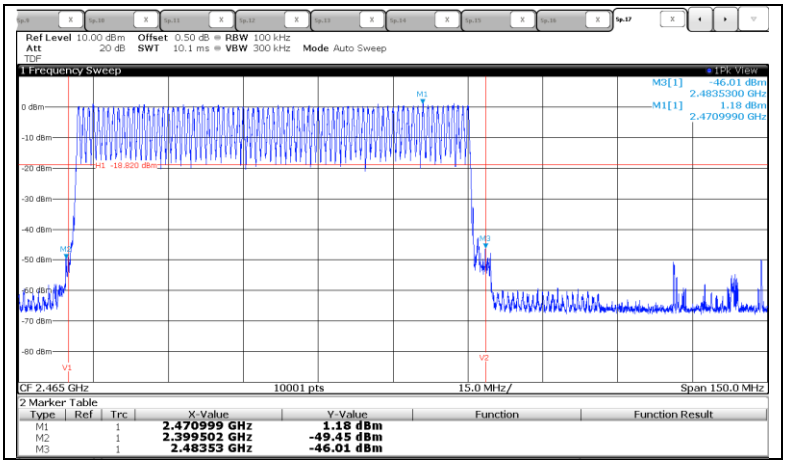

- Result of 2 400.0 ㎒

Highest Channel (2 480 ㎒)




- Result of 2 483.5 ㎒

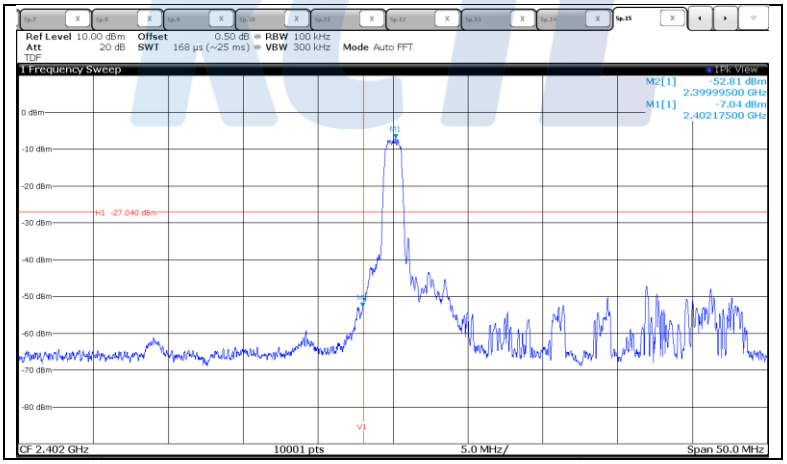
**- GFSK (With hopping)**




- Result of 2 400.0 ㎒ - 2 483.5 ㎒

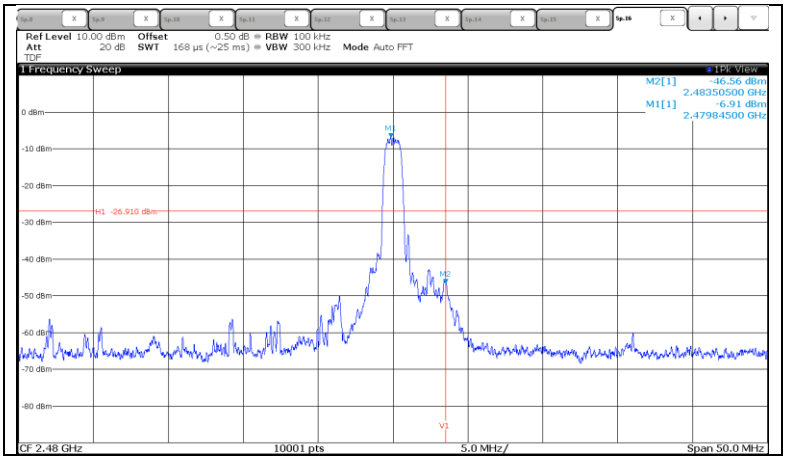
**- π/4DQPSK (Without hopping)**

Lowest Channel (2 402 ㎒)



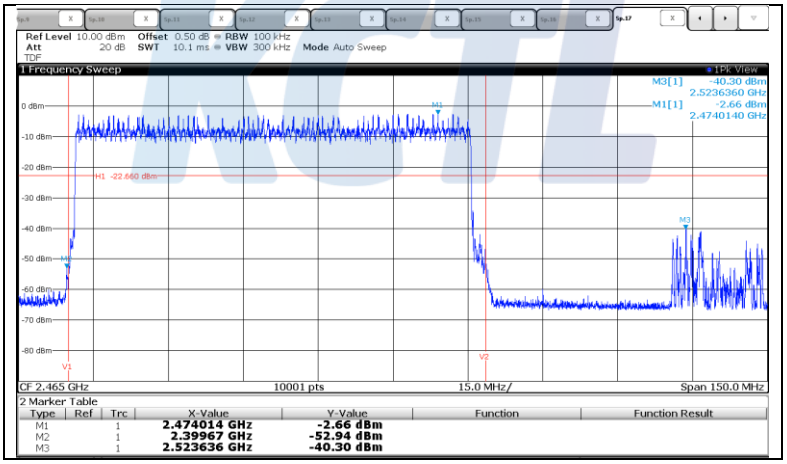

- Result of 2 400.0 ㎒

Highest Channel (2 480 ㎒)




- Result of 2 483.5 ㎒

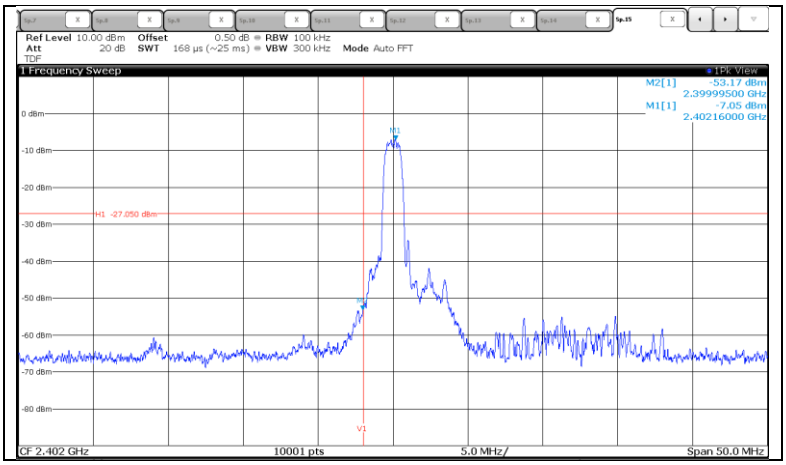
**- π/4DQPSK (With hopping)**




- Result of 2 400.0 ㎒ - 2 483.5 ㎒

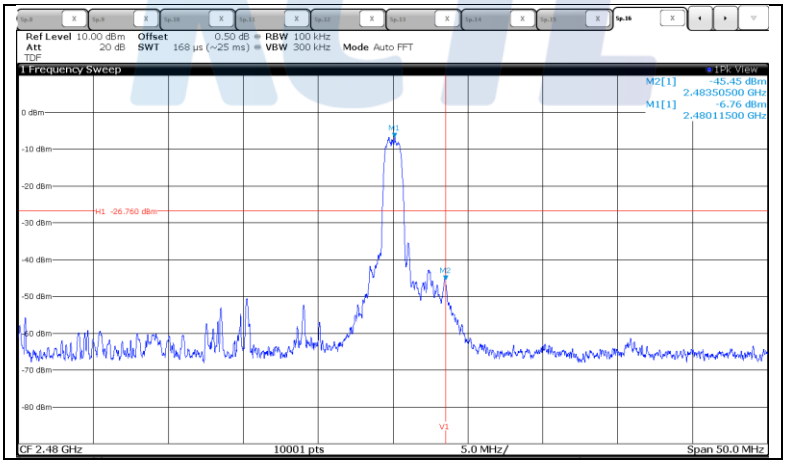
**- 8DPSK (Without hopping)**

Lowest Channel (2 402 ㎒)



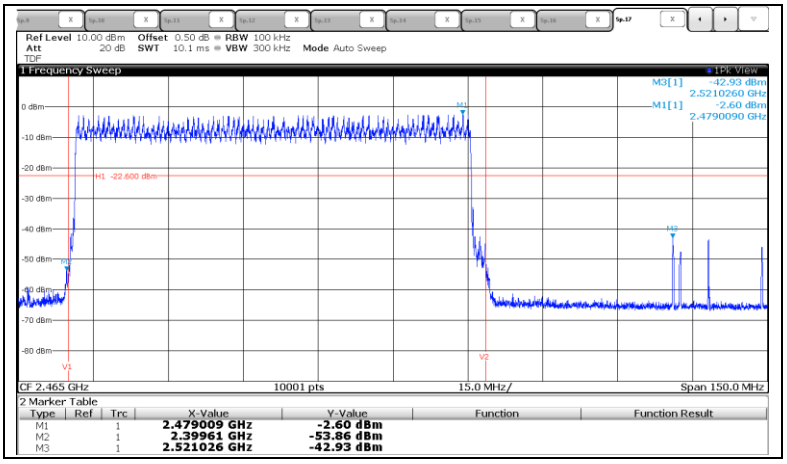

- Result of 2 400.0 ㎒

Highest Channel (2 480 ㎒)




- Result of 2 483.5 ㎒

**- 8DPSK (With hopping)**

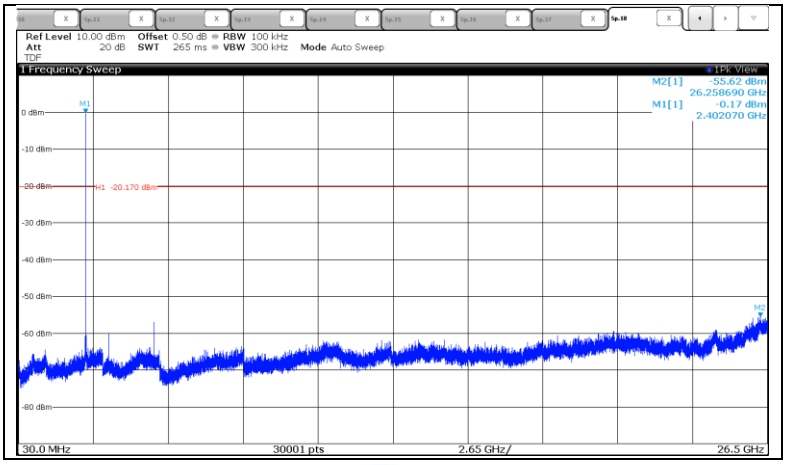



- Result of 2 400.0 ㎒ - 2 483.5 ㎒

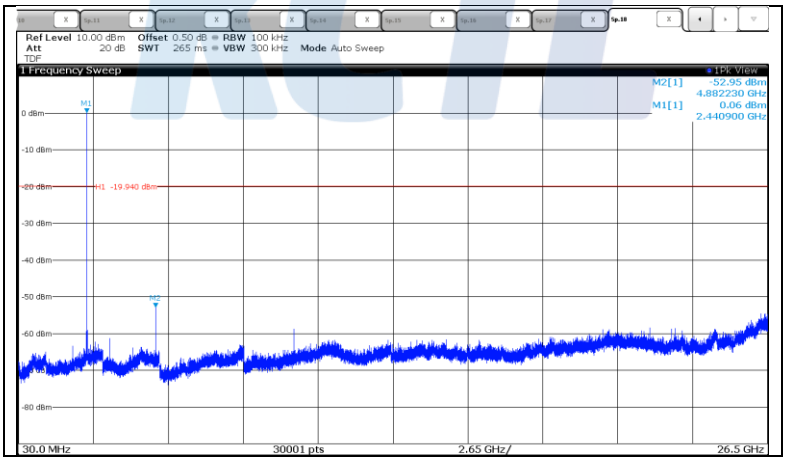
Figure 6. Plot of the Spurious RF conducted emissions

**- GFSK**

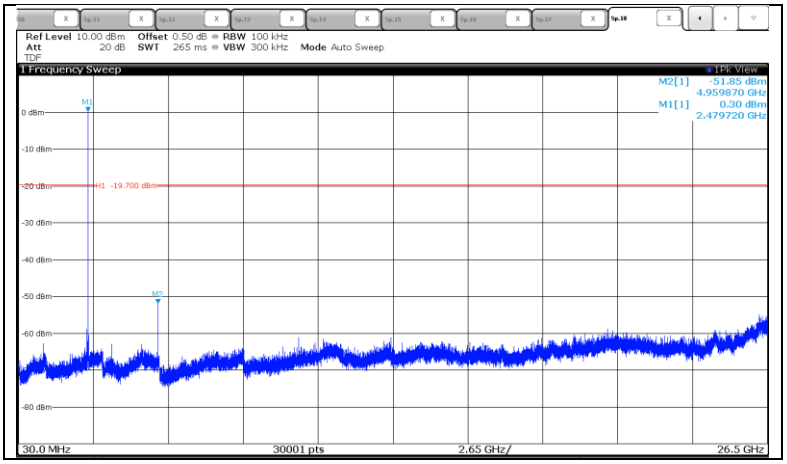
Lowest Channel (2 402 ㎒)




Middle Channel (2 441 ㎒)

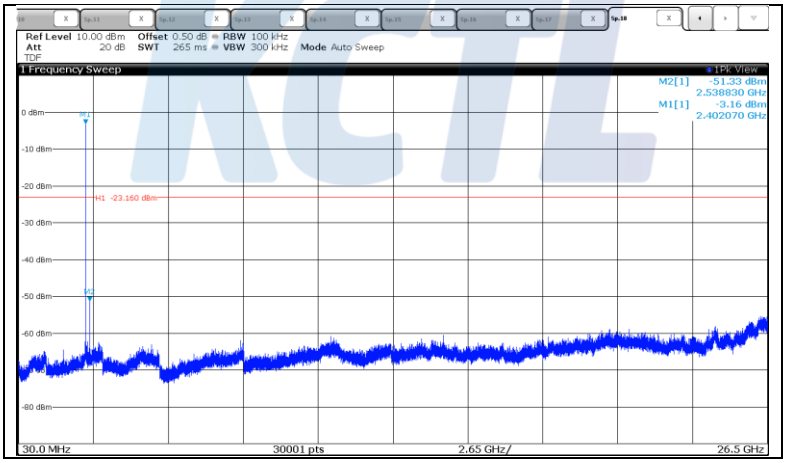


Highest Channel (2 480 ㎒)

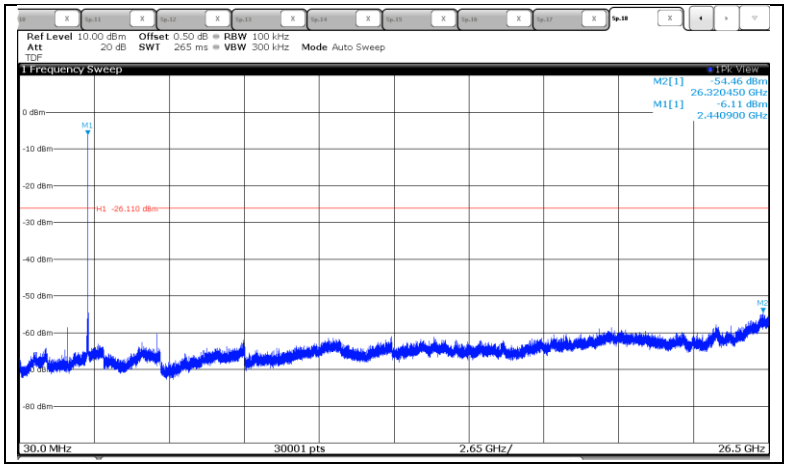



**- π/4DQPSK**

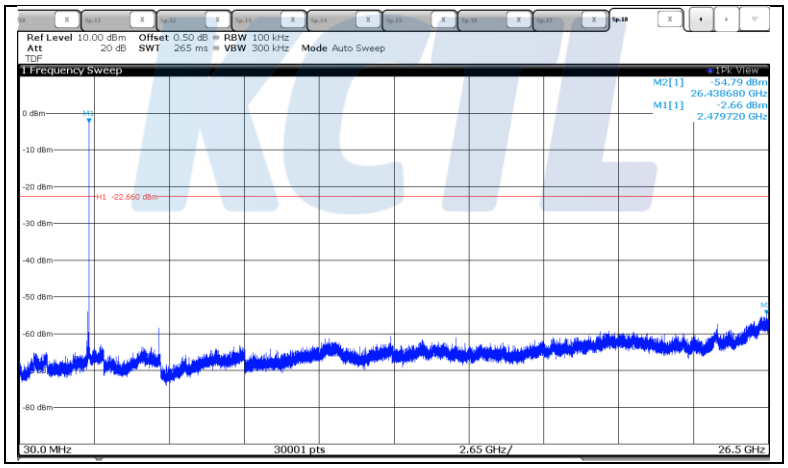
Lowest Channel (2 402 ㎒)



Middle Channel (2 441 ㎒)

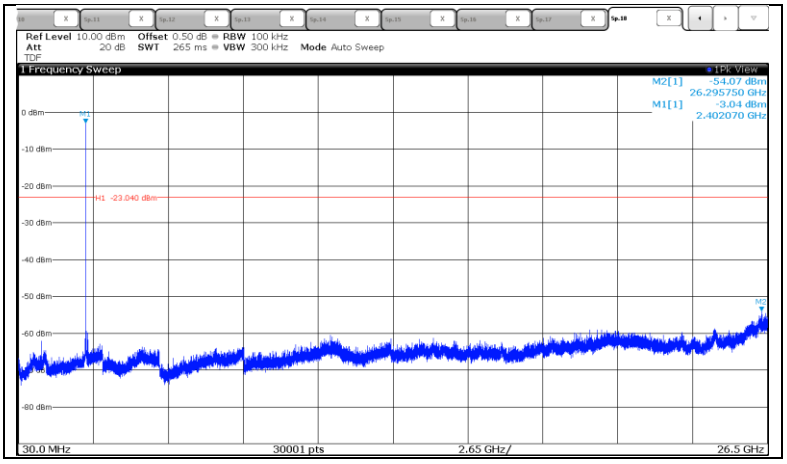



Highest Channel (2 480 ㎒)

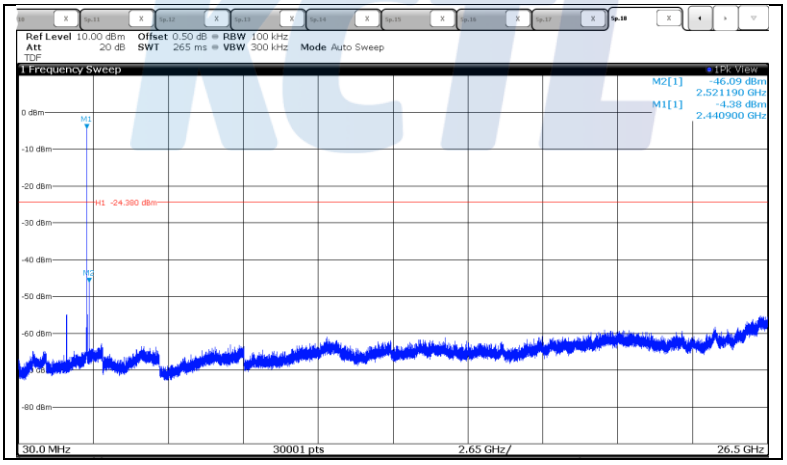


**- 8DPSK**

Lowest Channel (2 402 ㎒)




Middle Channel (2 441 ㎒)



Highest Channel (2 480 ㎒)

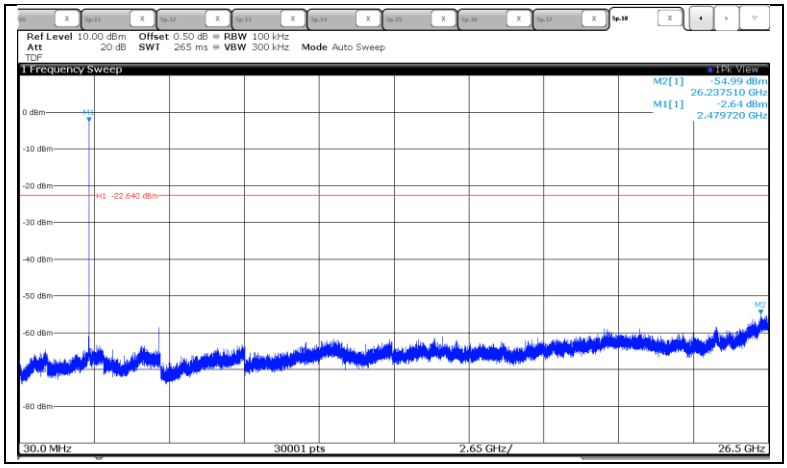
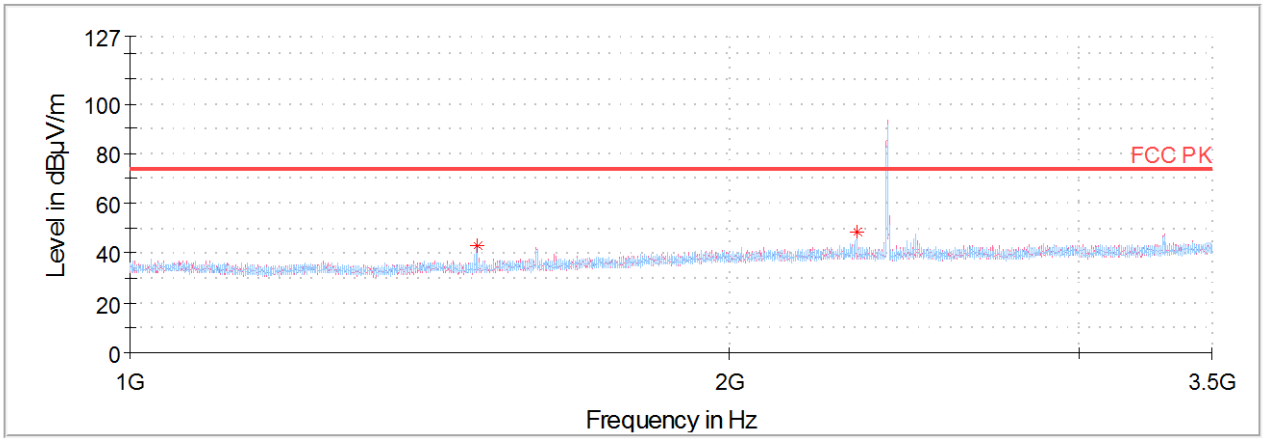
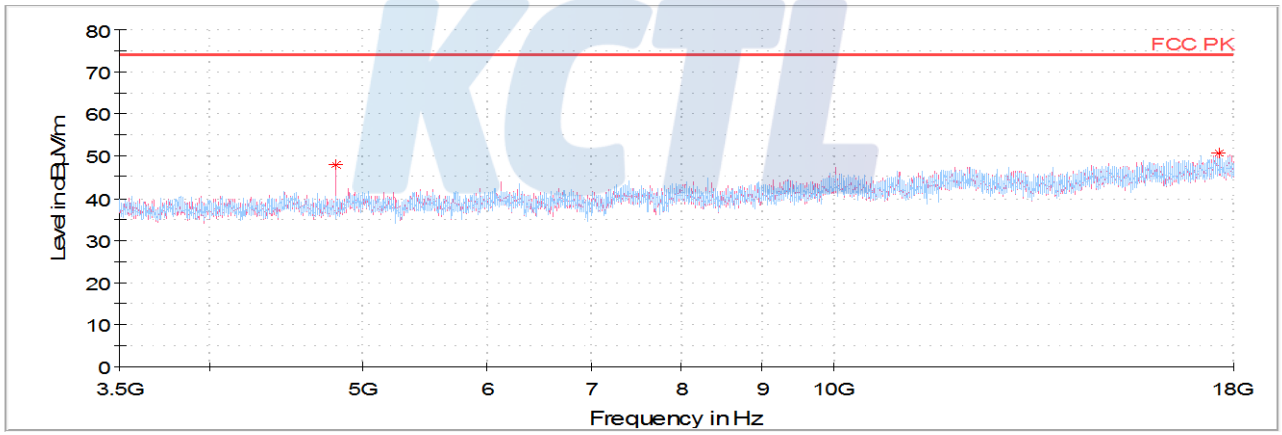


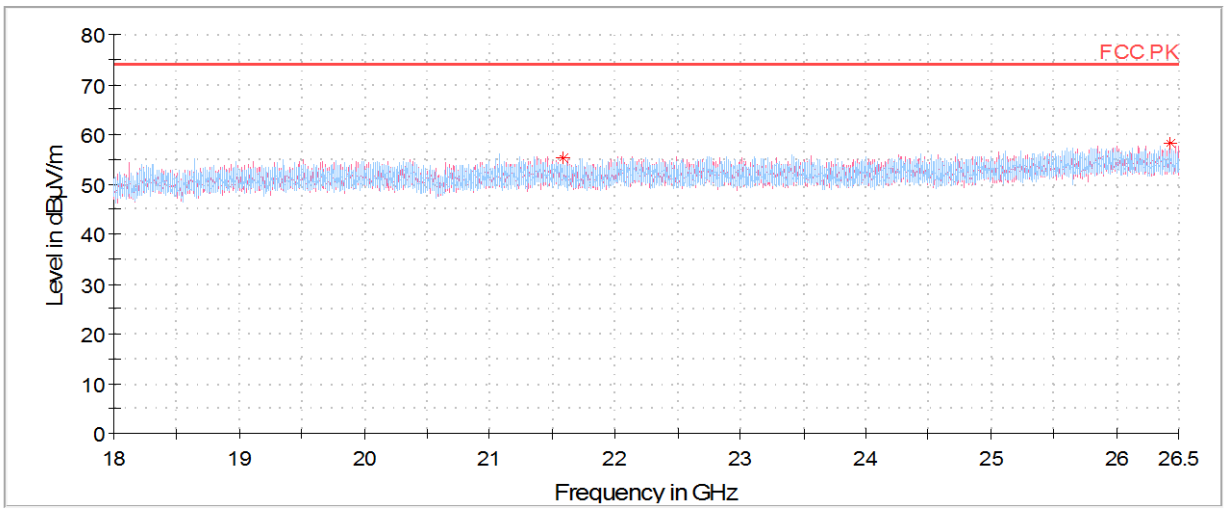
Figure 7. Plot of the Spurious Emission (Radiated)

**- Above 1 ㎓ data_Module 1**

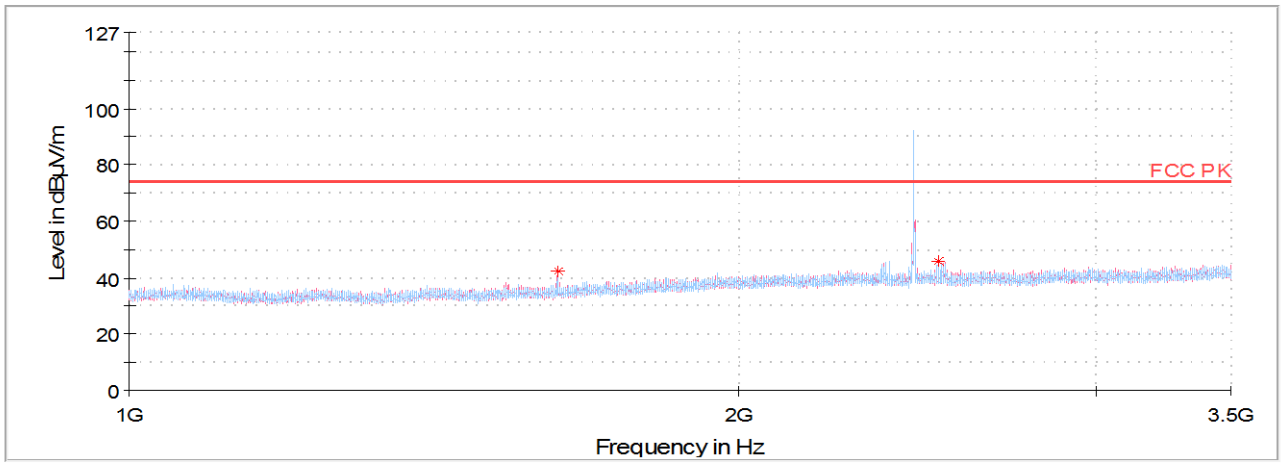
**GFSK_Lowest channel (2 402 ㎒)**

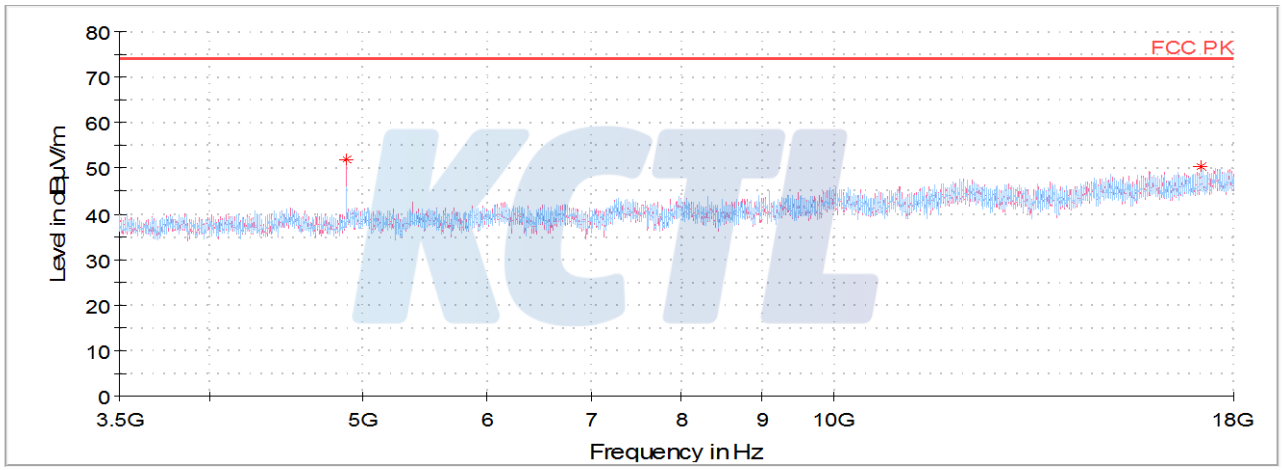


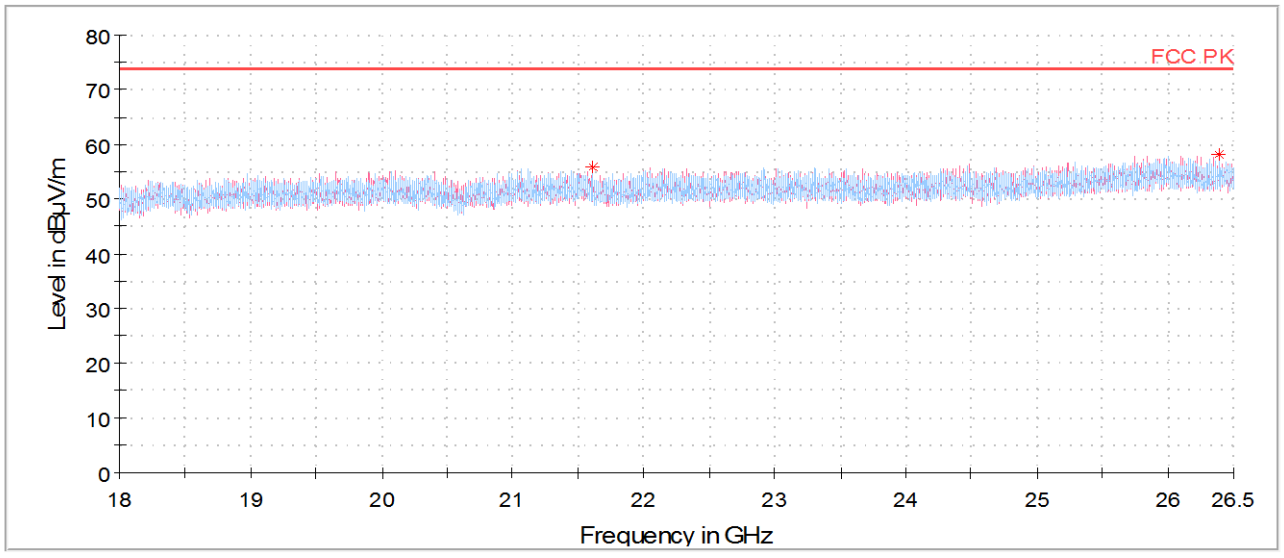



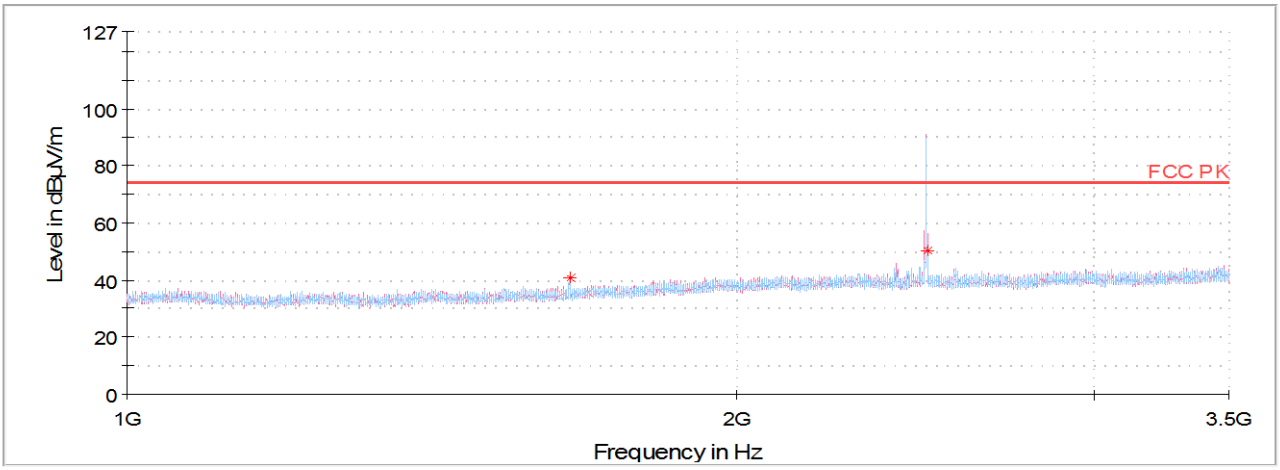
**GFSK_Middle channel (2 441 ㎒)**

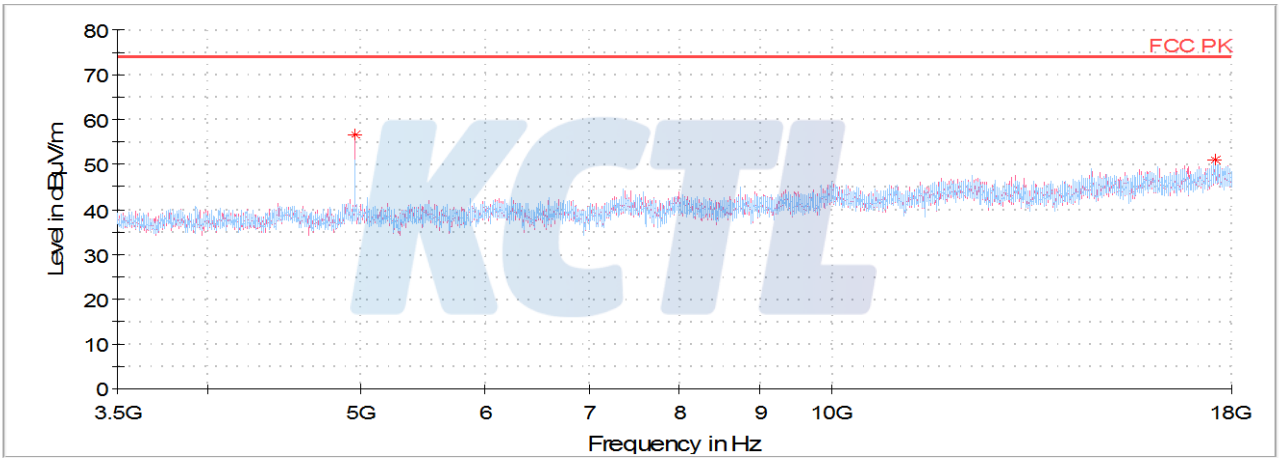


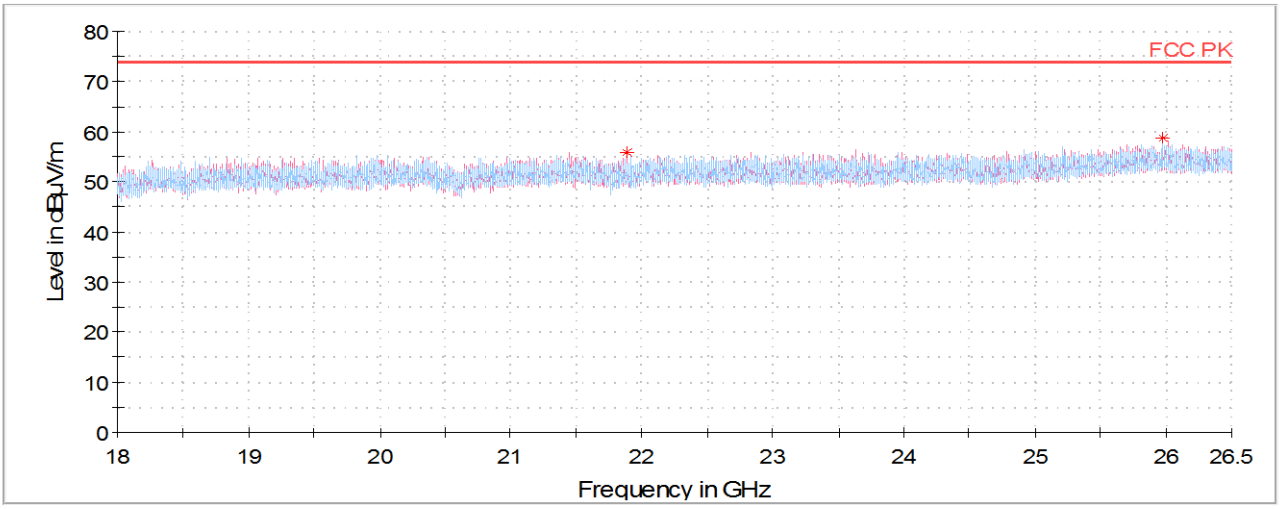



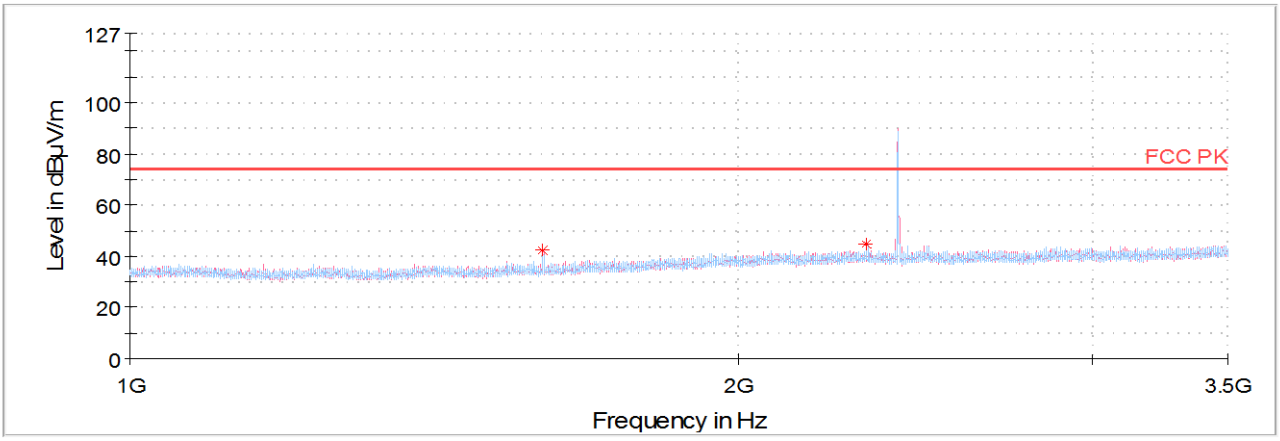
**GFSK_Highest channel (2 480 ㎒)**

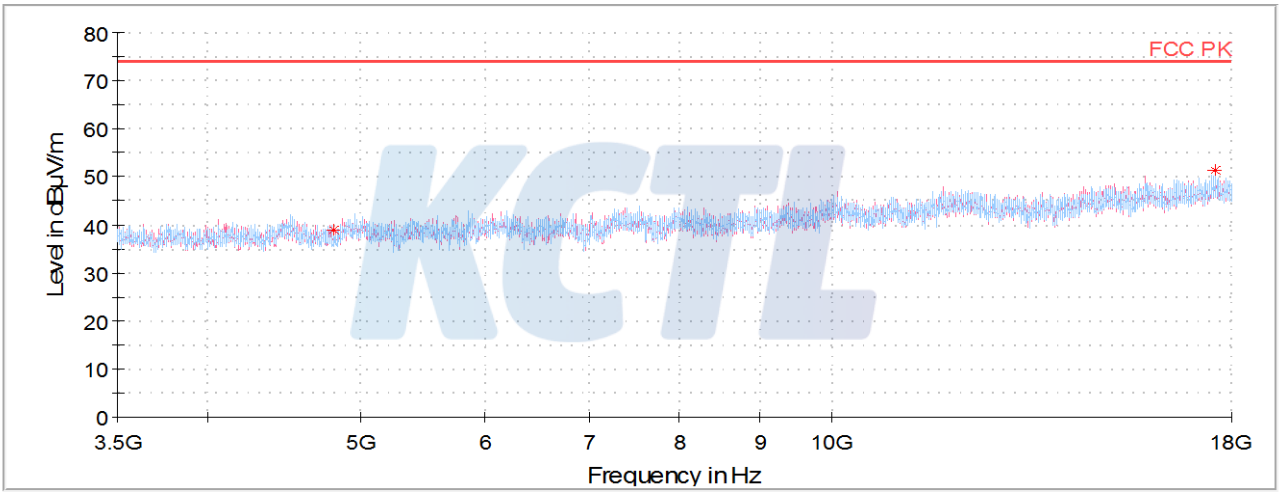


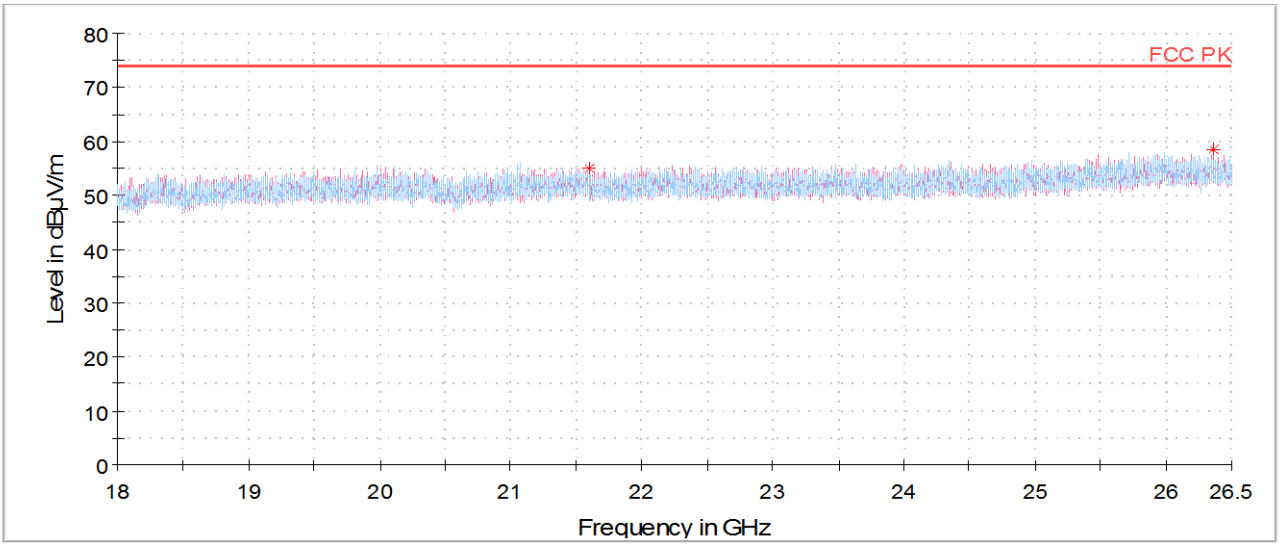



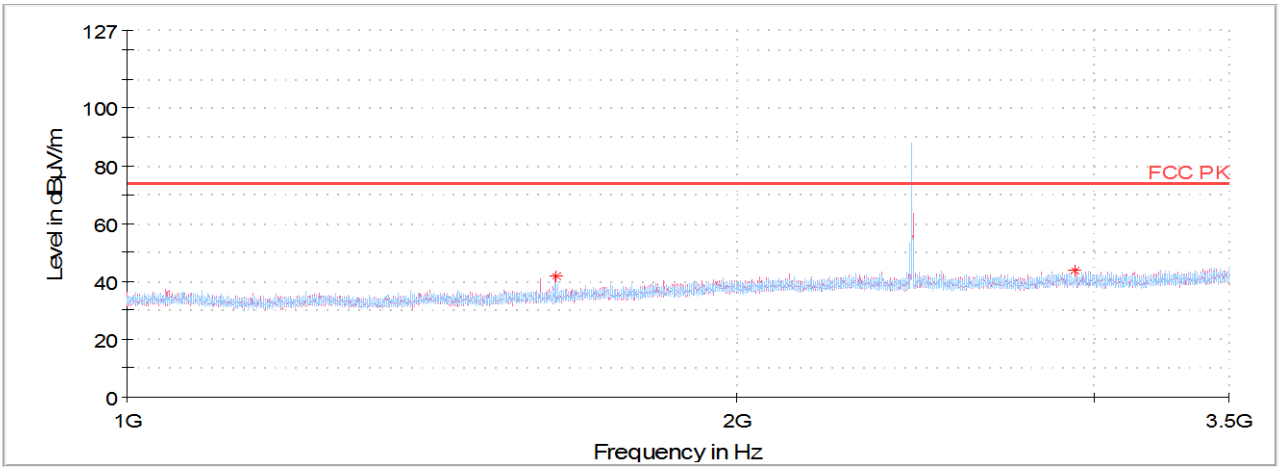
**8DPSK_Lowest channel (2 402 ㎒)**

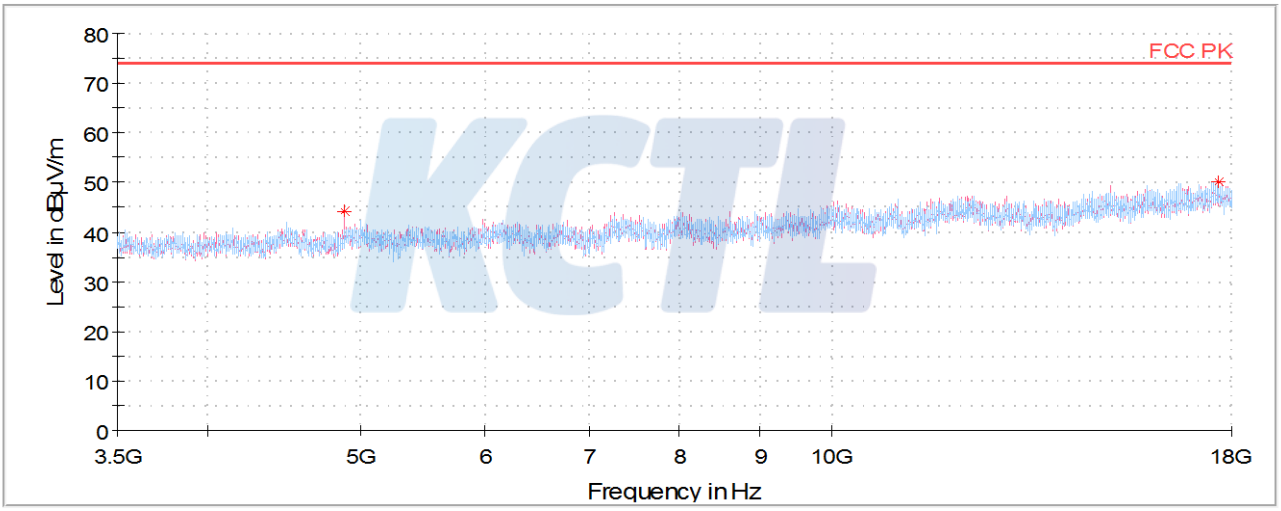


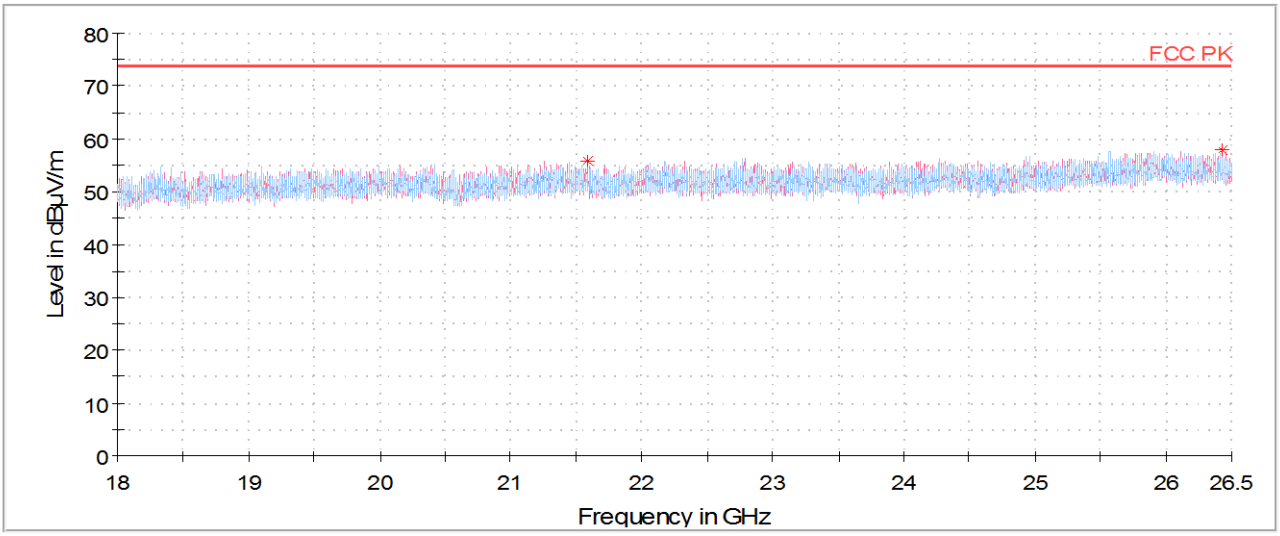



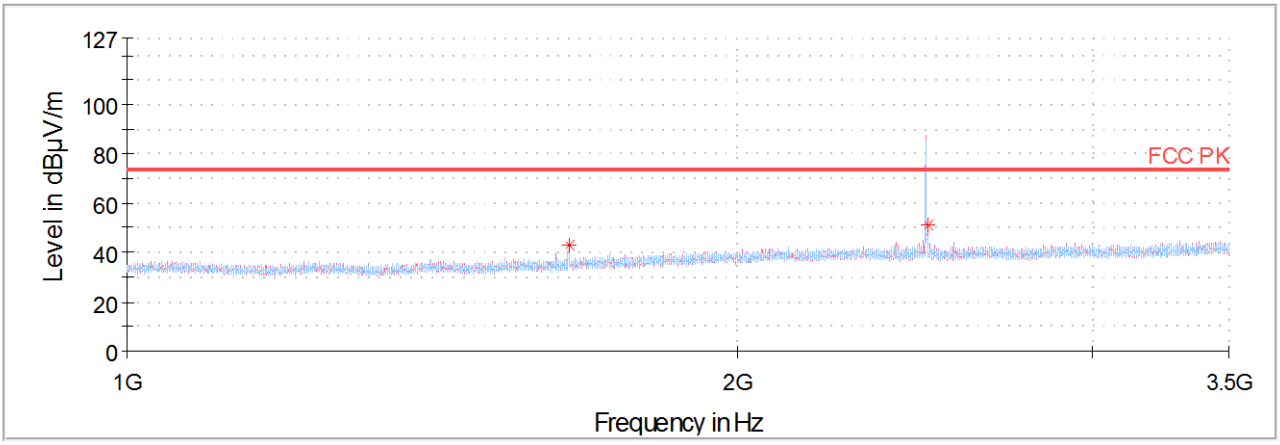
**8DPSK_Middle channel (2 441 ㎒)**

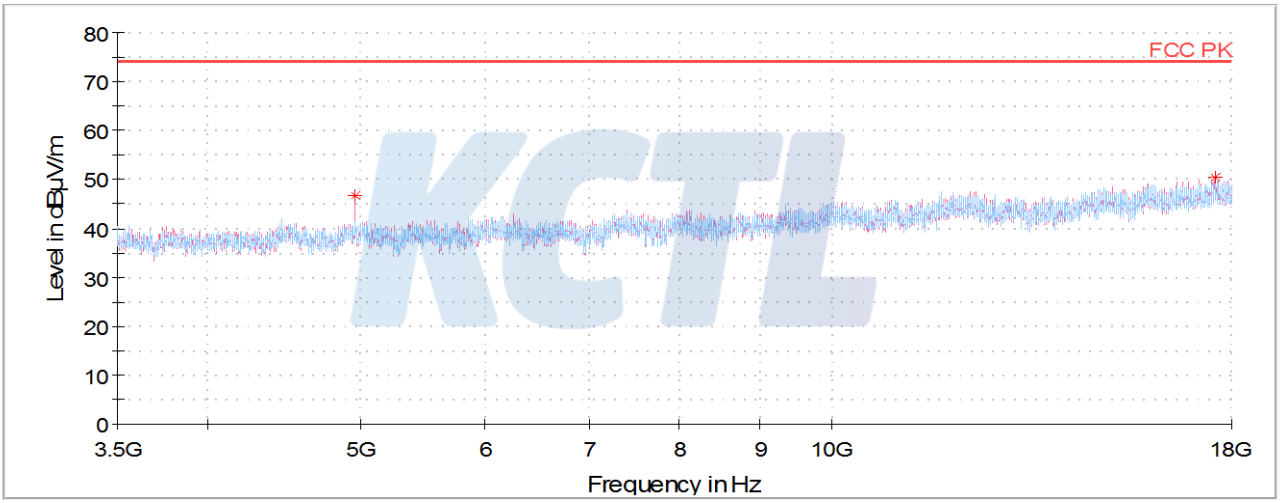


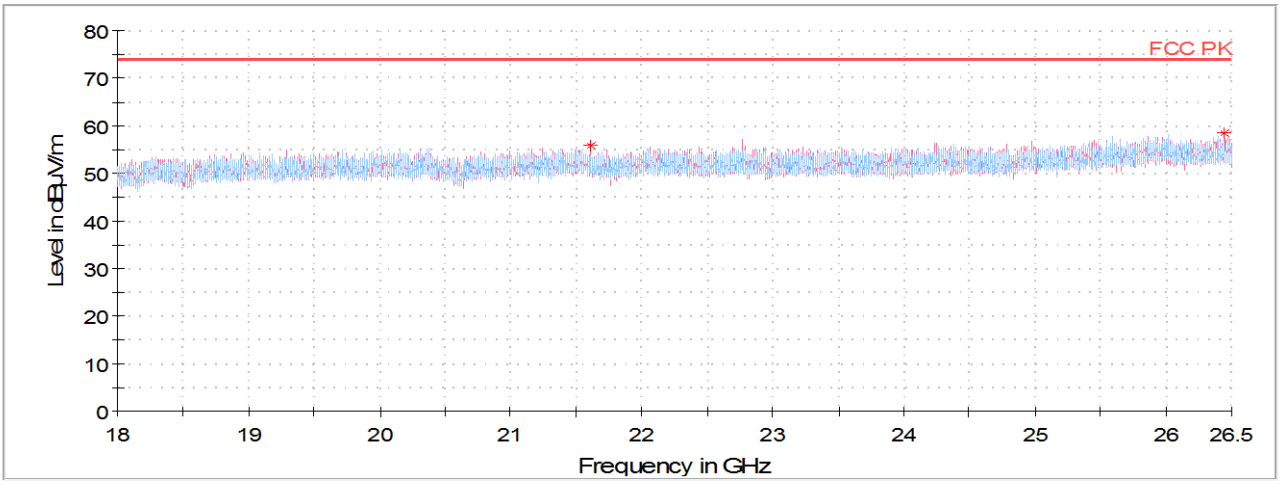



**8DPSK_Highest channel (2 480 ㎒)**

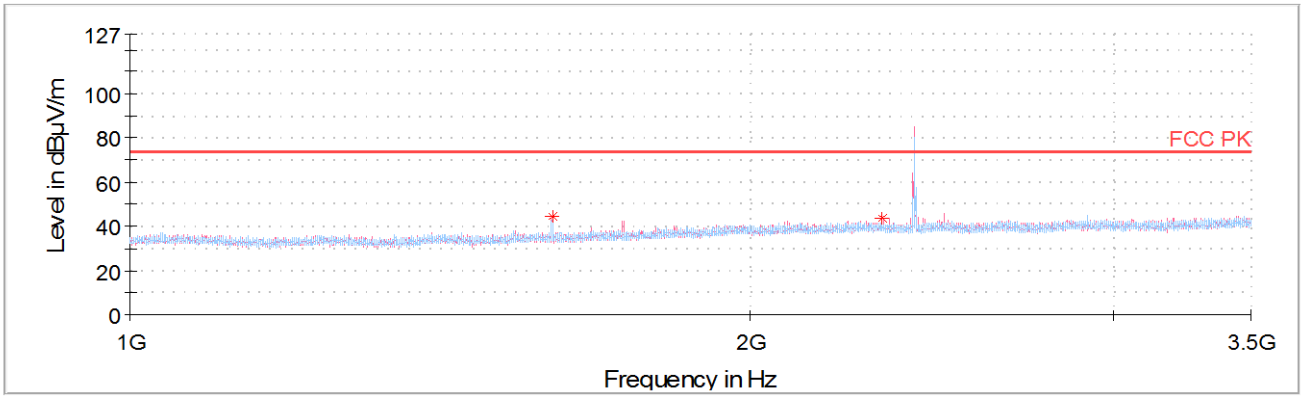


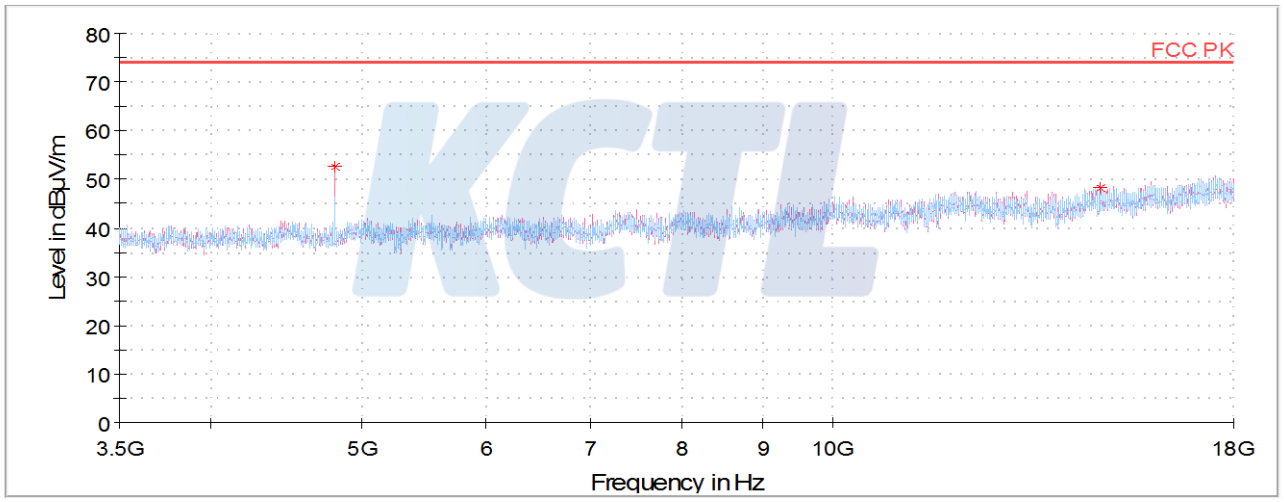



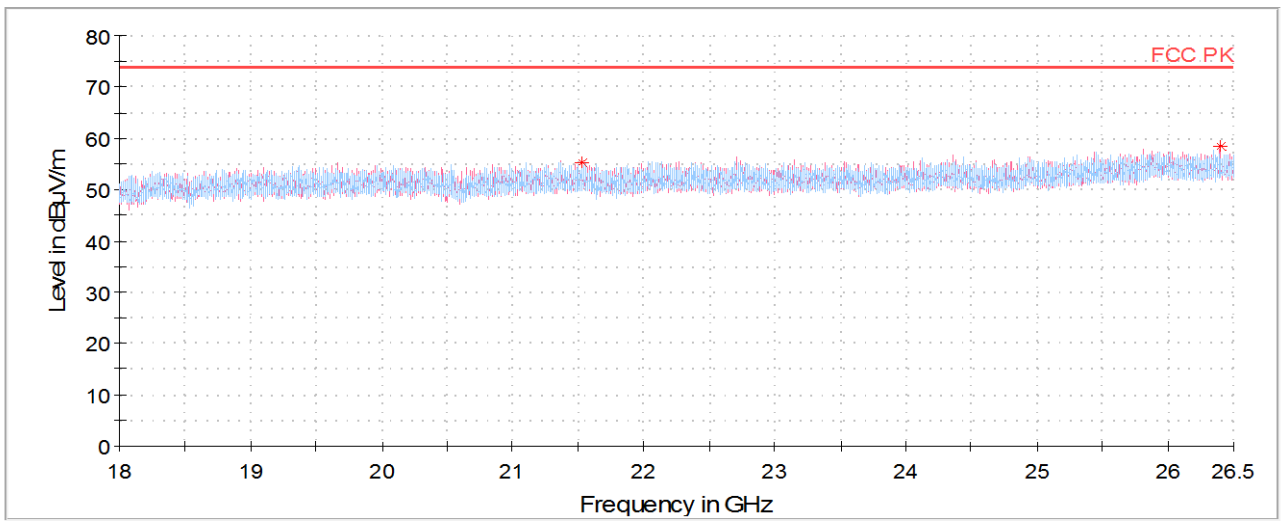



**- Above 1 ㎓ data_ Module 2**

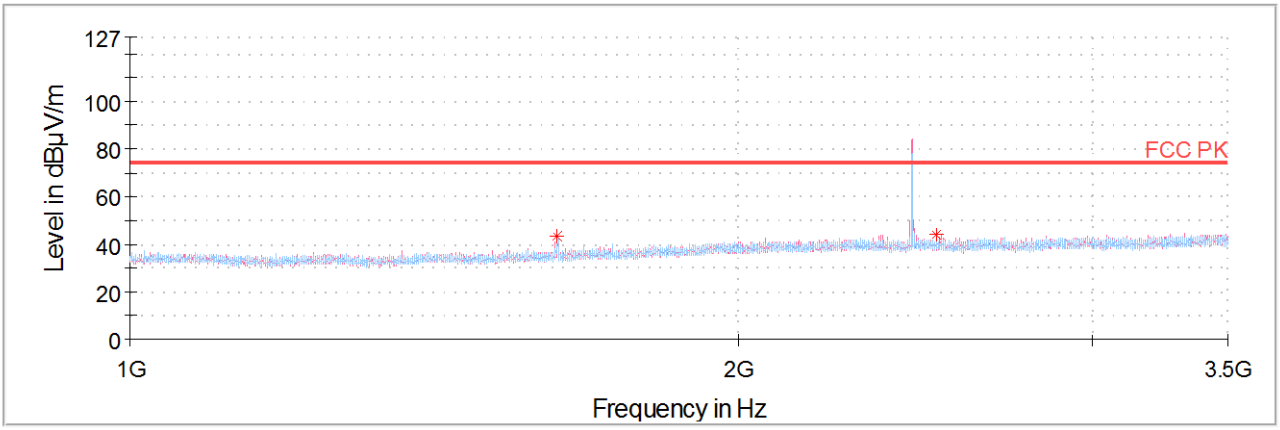
**GFSK_Lowest channel (2 402 ㎒)**

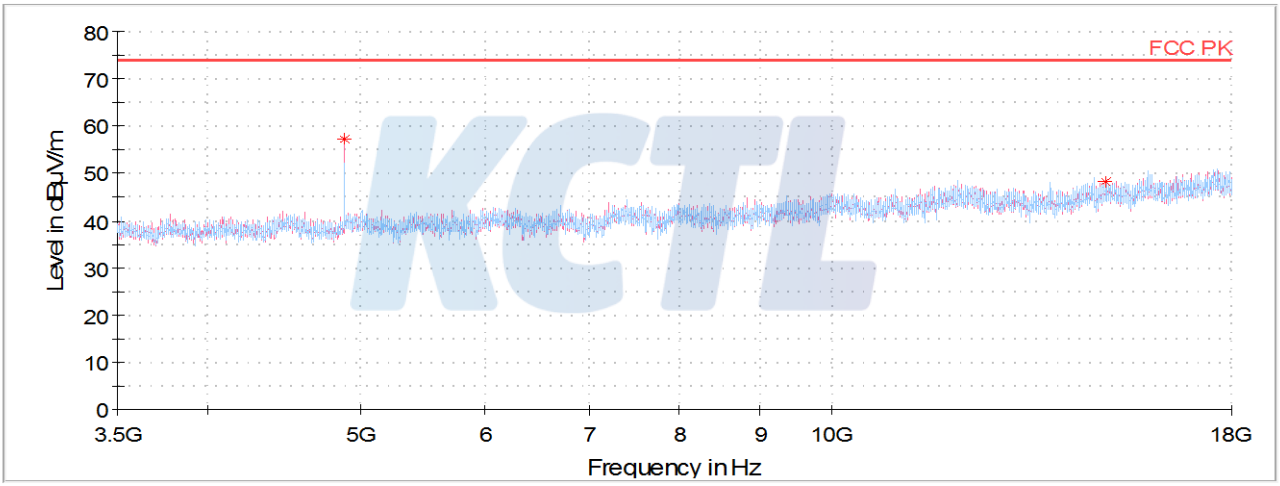


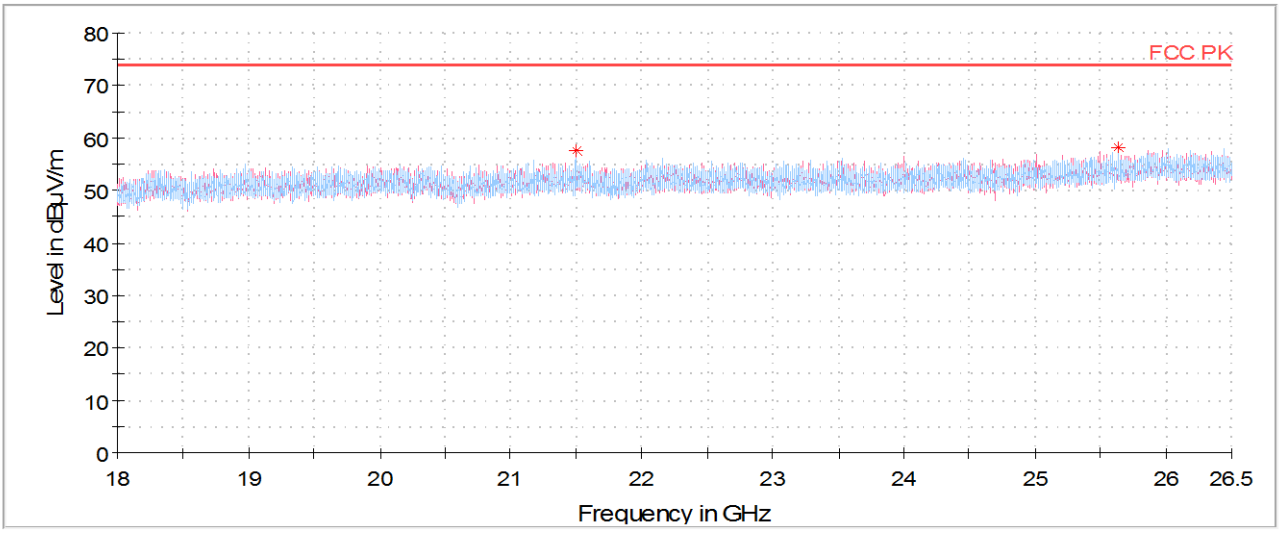



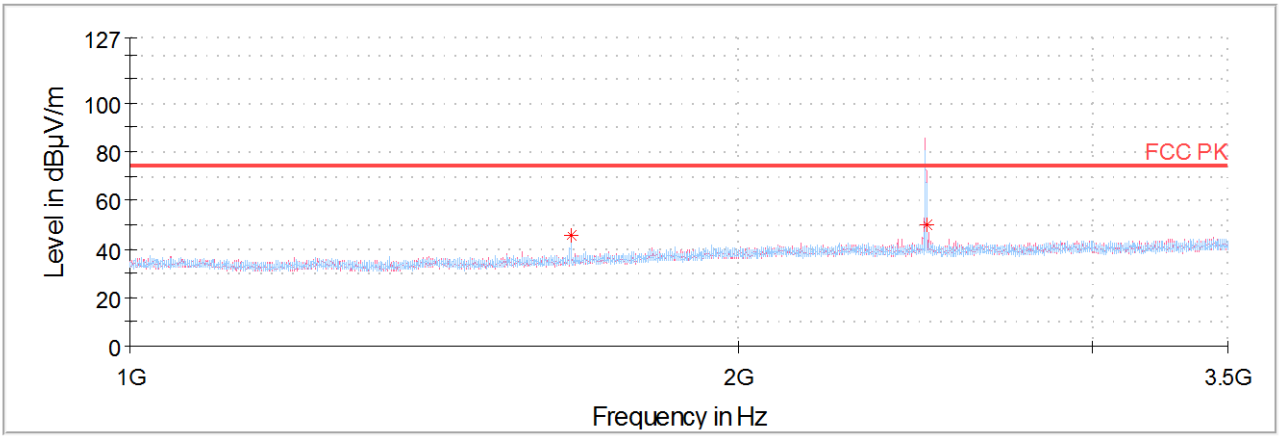
**GFSK_Middle channel (2 441 ㎒)**

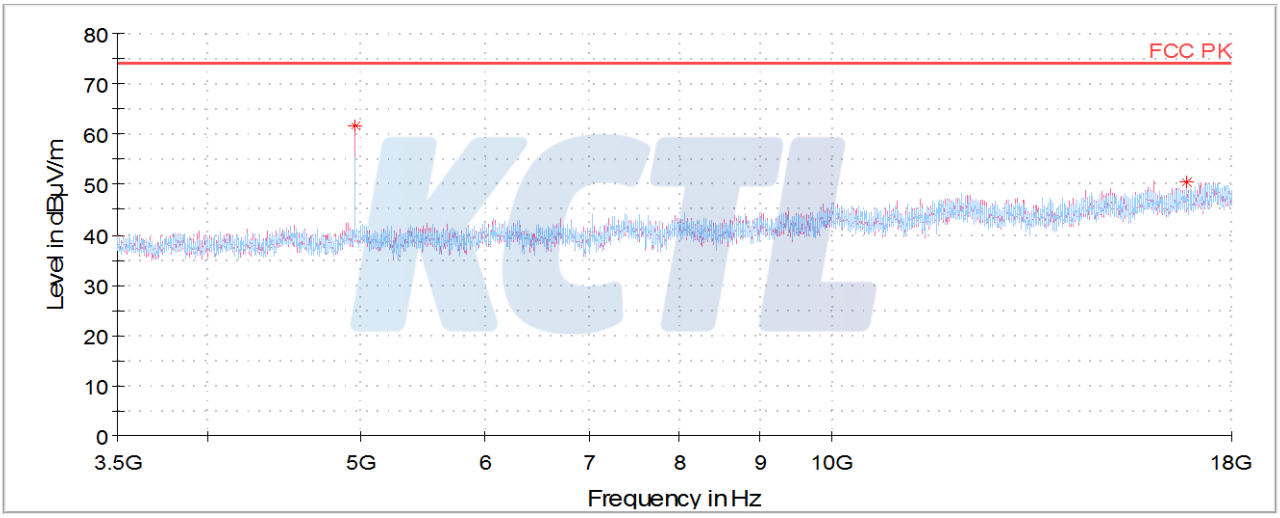


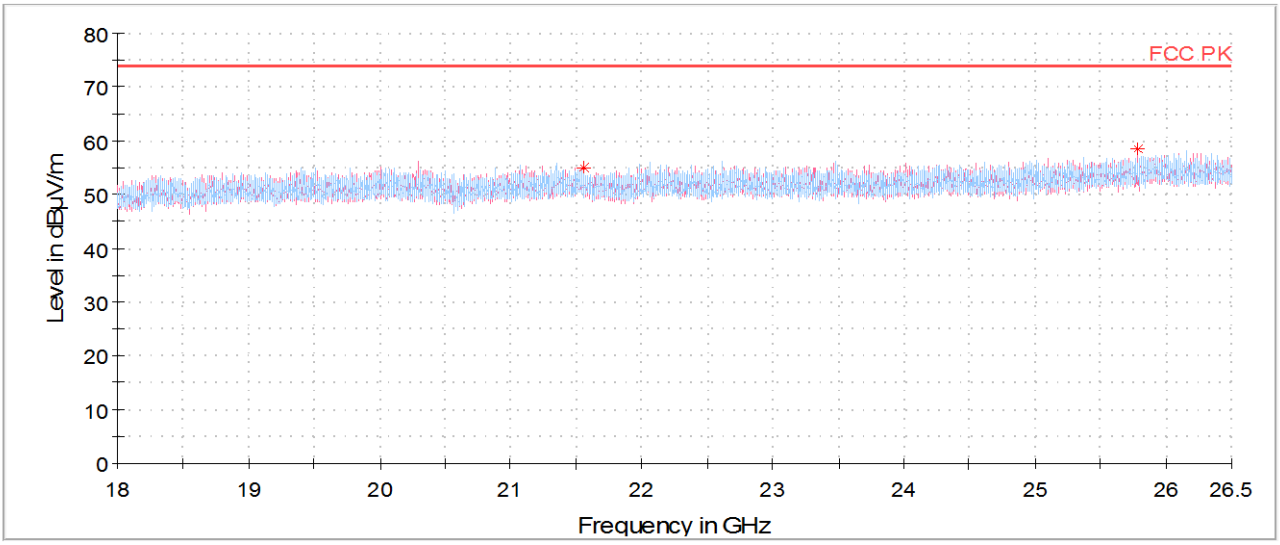



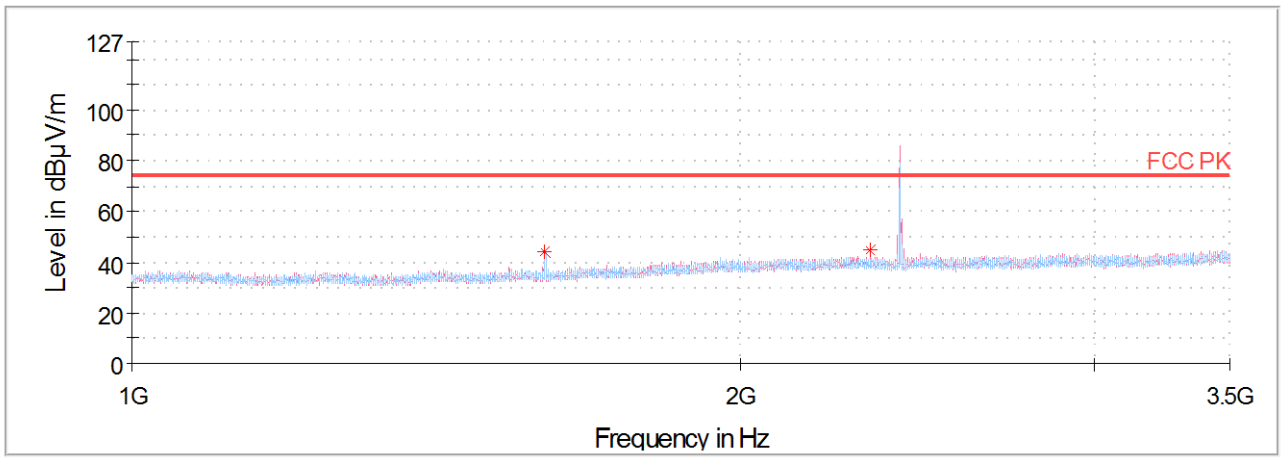
**GFSK_Highest channel (2 480 ㎒)**

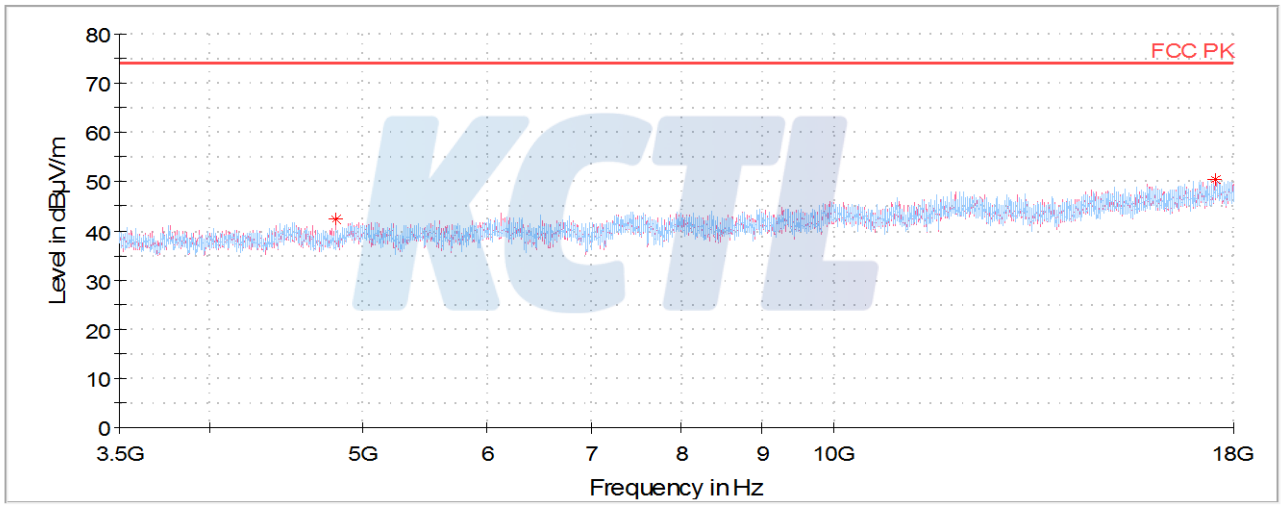


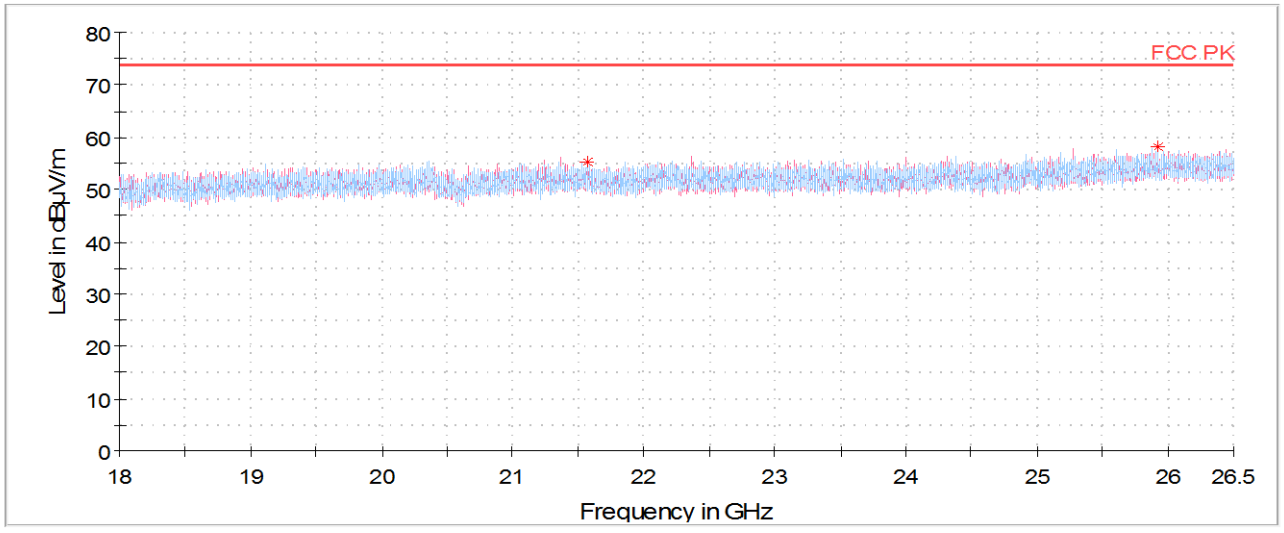



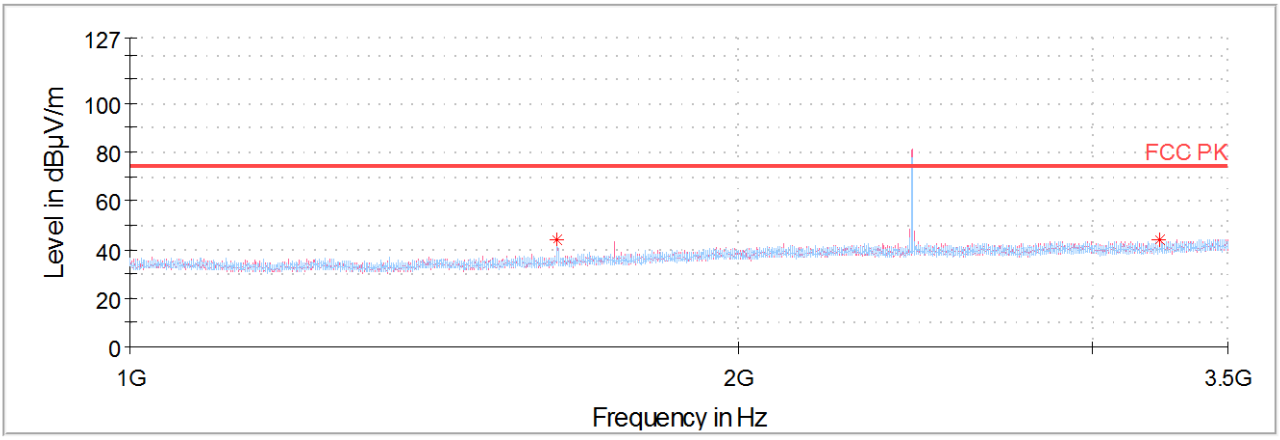
**8DPSK_Lowest channel (2 402 ㎒)**

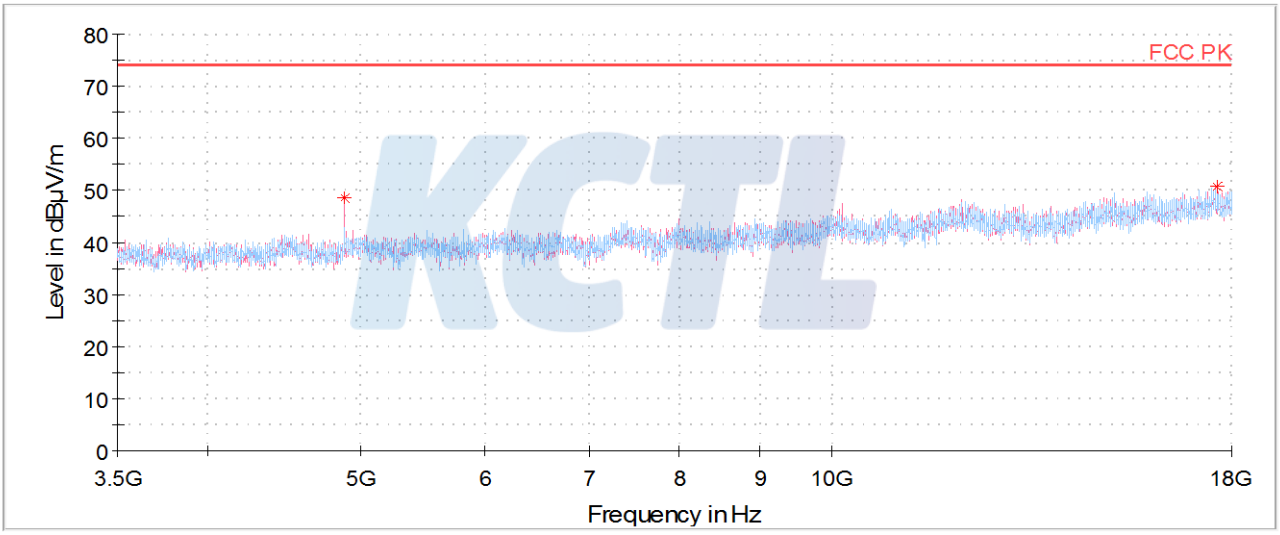


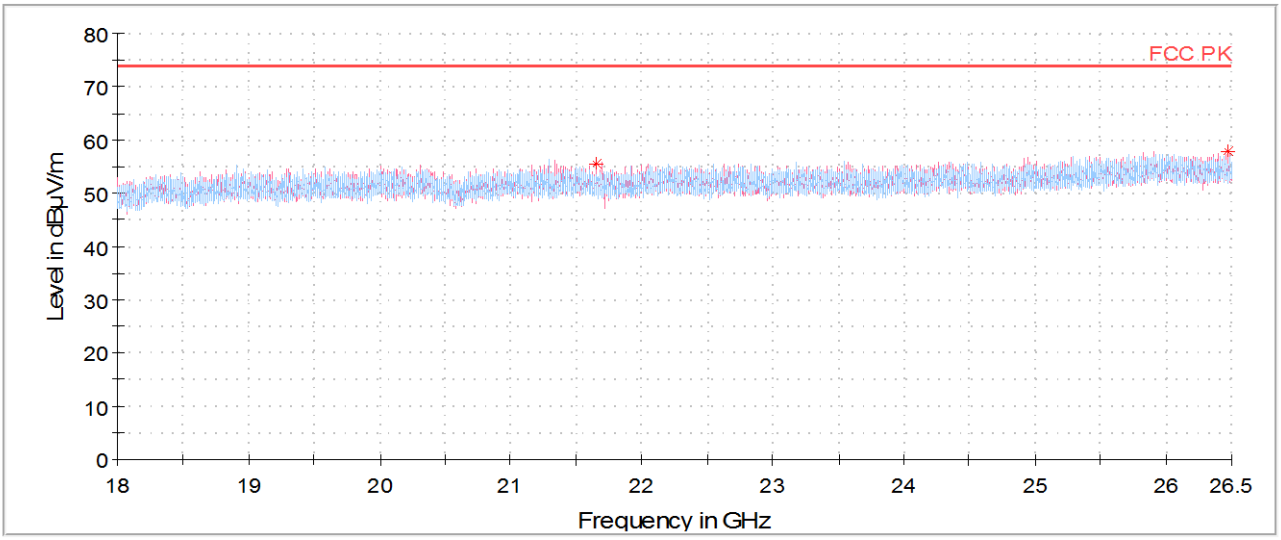



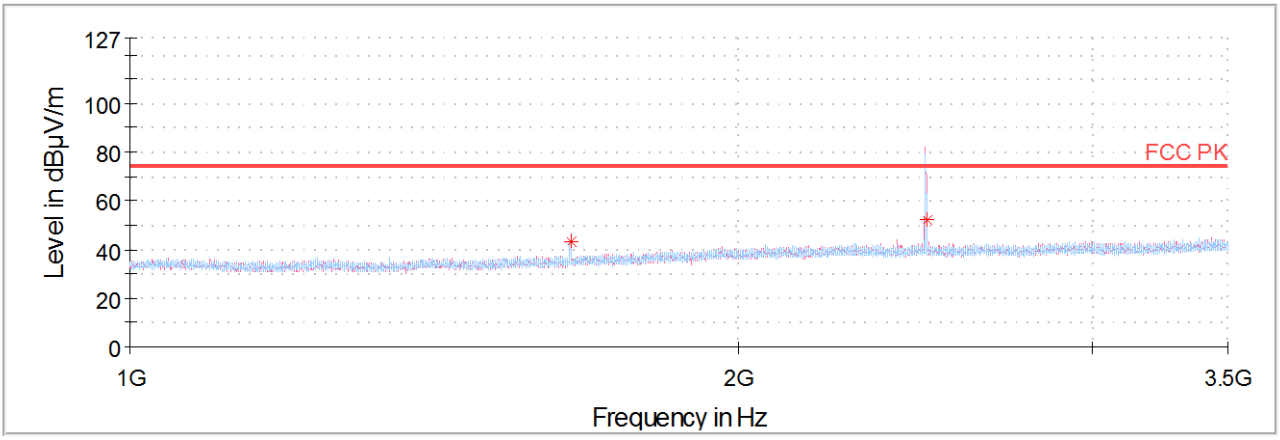
**8DPSK_Middle channel (2 441 ㎒)**

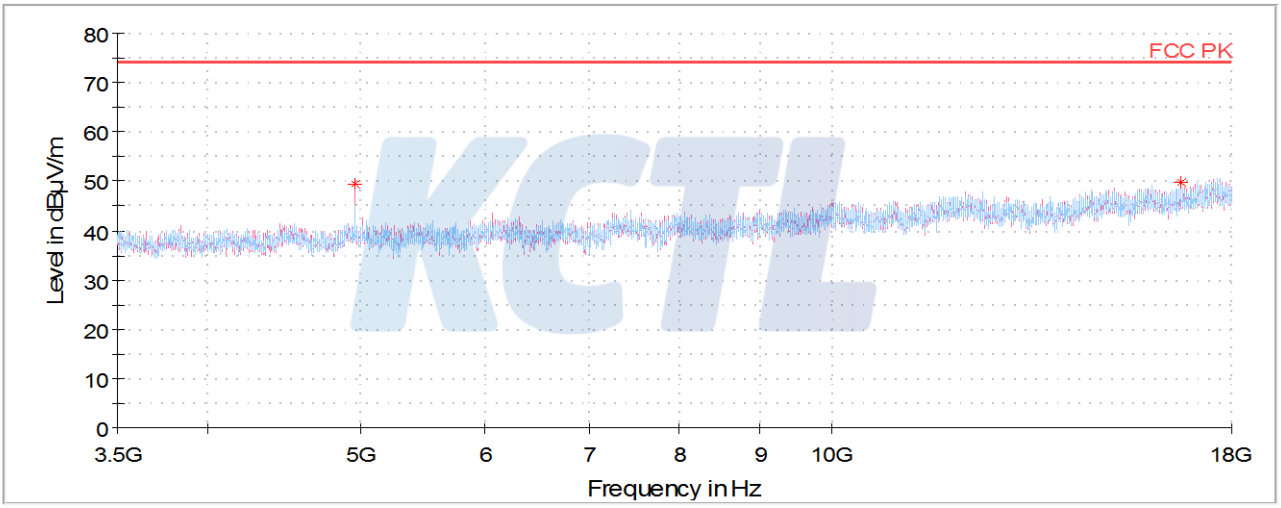


**8DPSK_Highest channel (2 480 ㎒)**



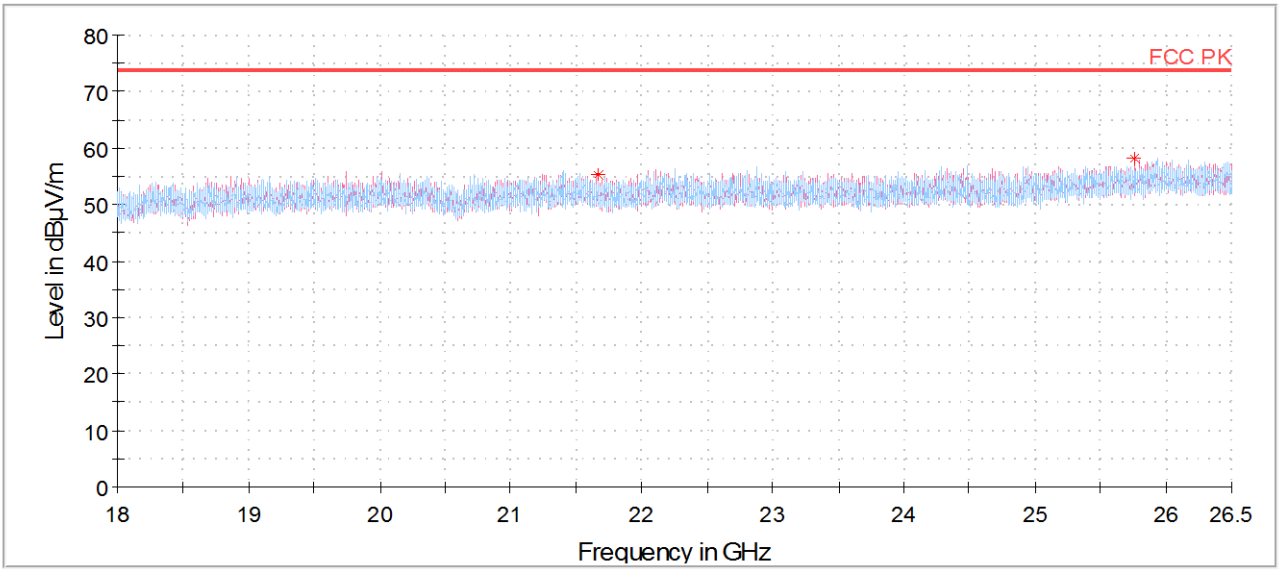
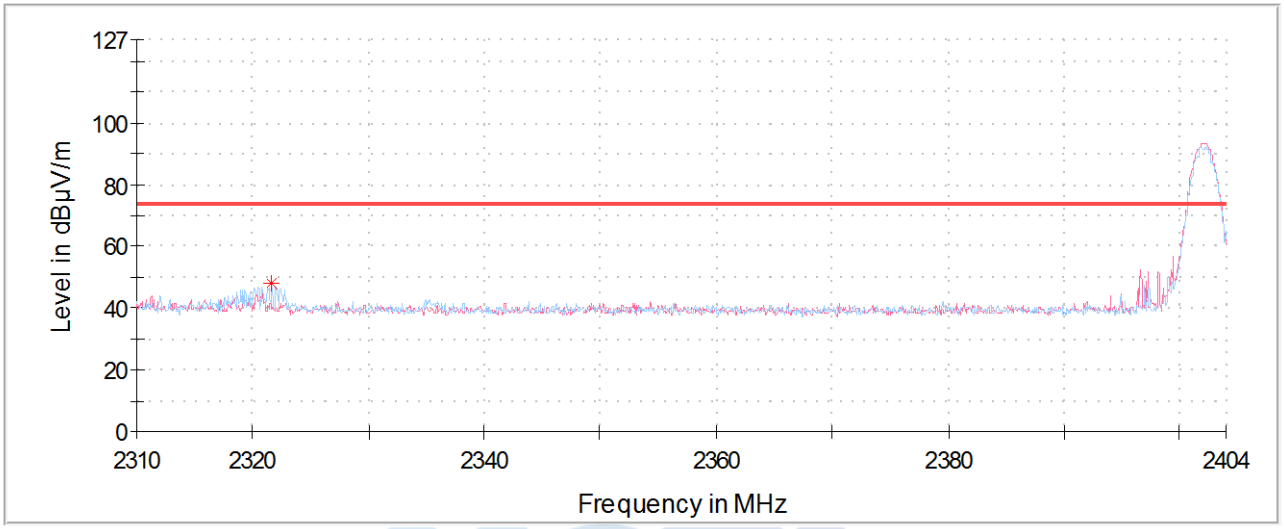
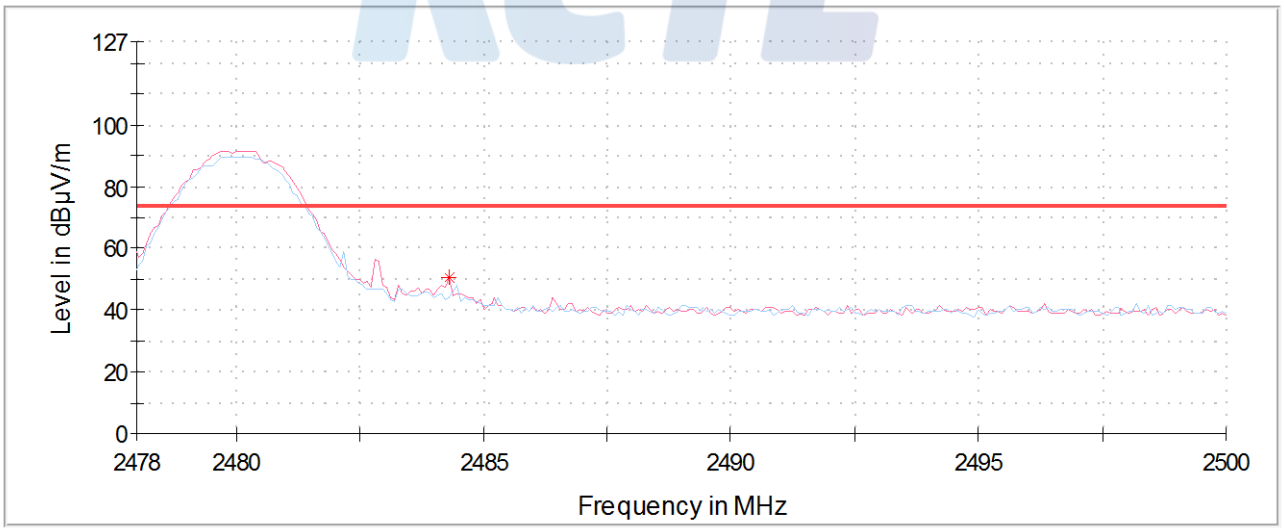



Figure 8. Restricted Bandedge data (Radiated)

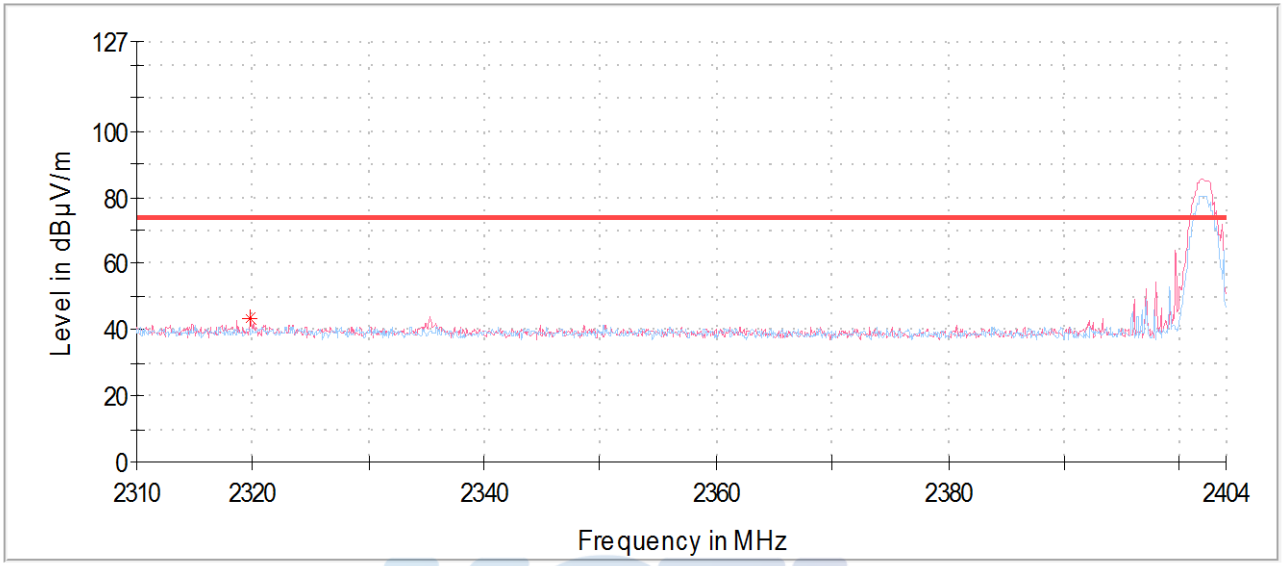
**- GFSK_Lowest channel (2 402 ㎒)_Module 1**



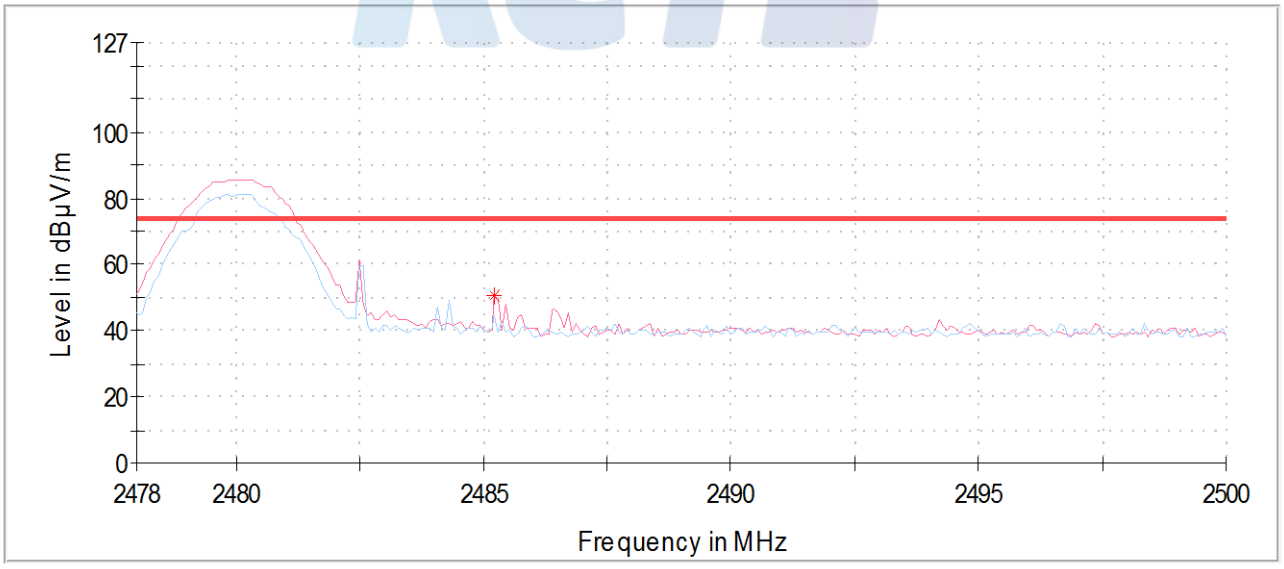

**- GFSK_ Highest channel (2 480 ㎒)_ Module 1**



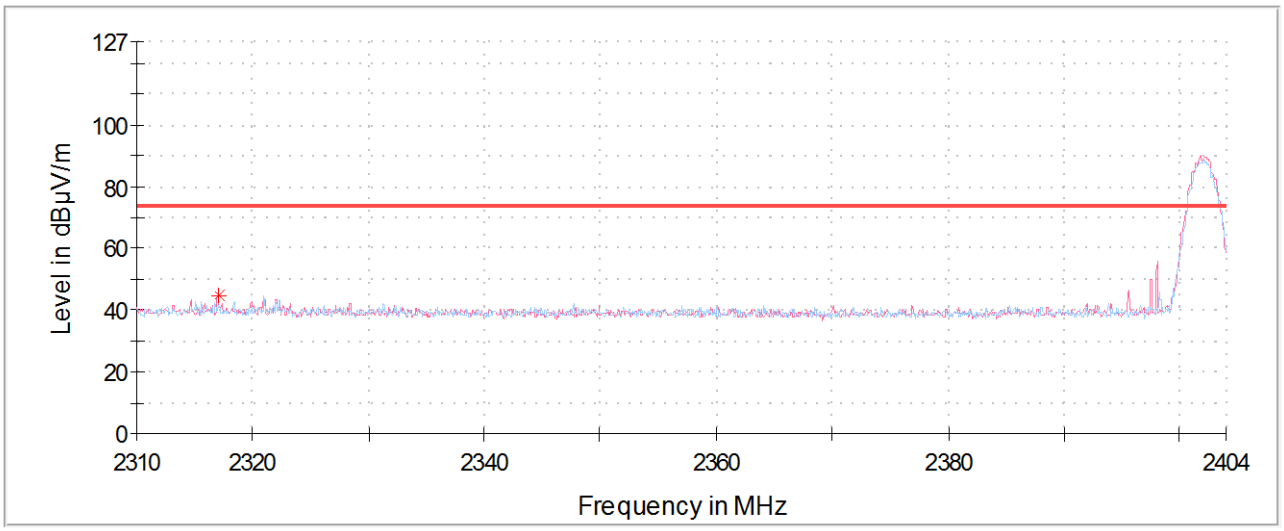
**- GFSK_Lowest channel (2 402 ㎒)_ Module 2**



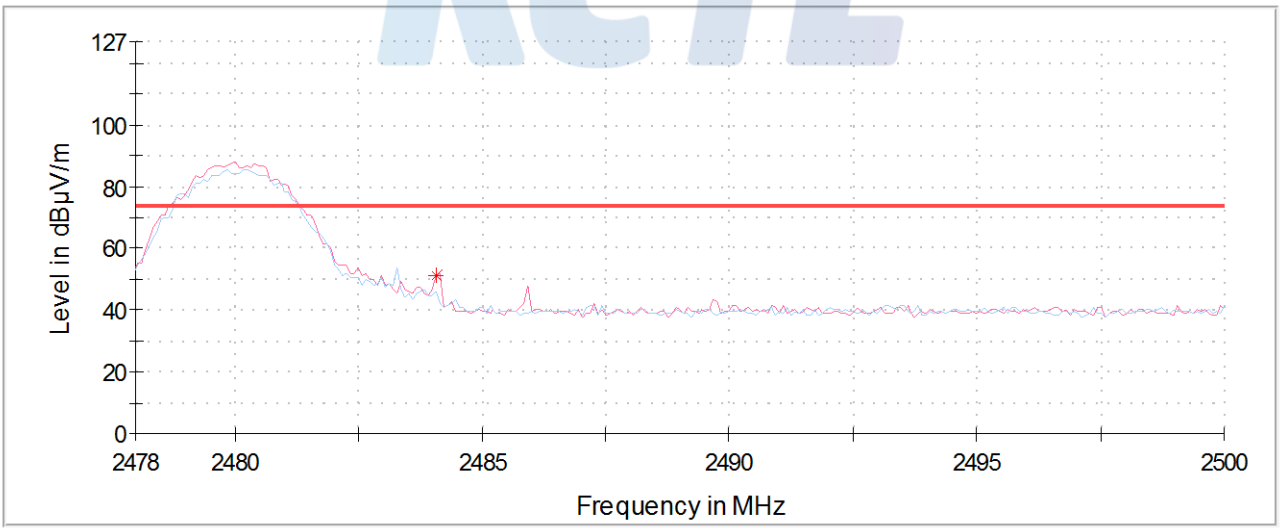

**- GFSK_ Highest channel (2 480 ㎒)_ Module 2**



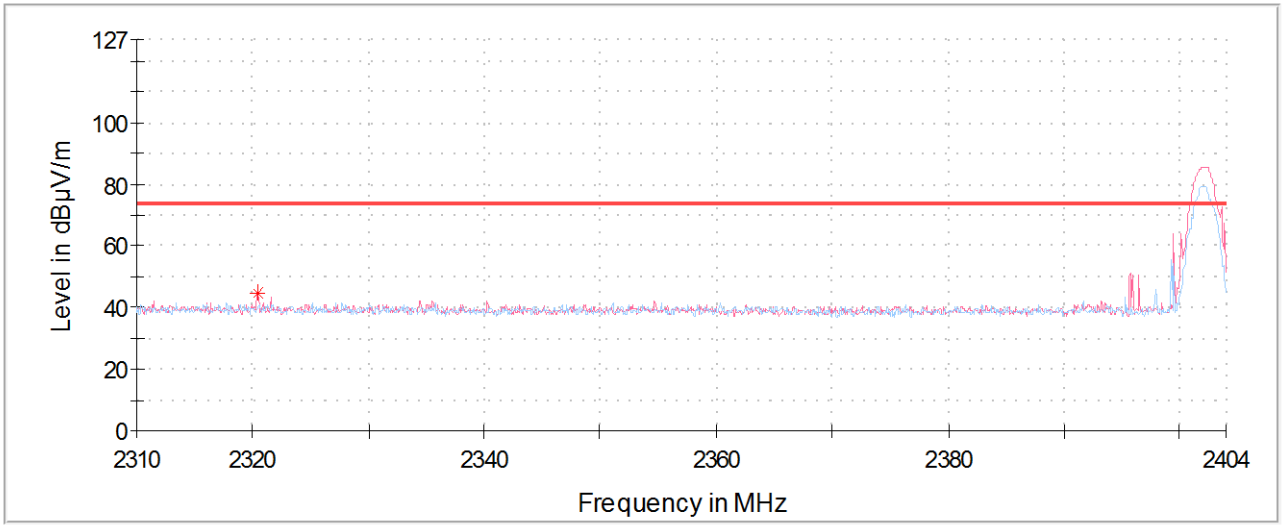
**- 8DPSK_Lowest channel (2 402 ㎒)_ Module 1**




**- 8DPSK _ Highest channel (2 480 ㎒)_ Module 1**



**- 8DPSK _Lowest channel (2 402 ㎒)_ Module 2**




**- 8DPSK _ Highest channel (2 480 ㎒)_ Module 2**

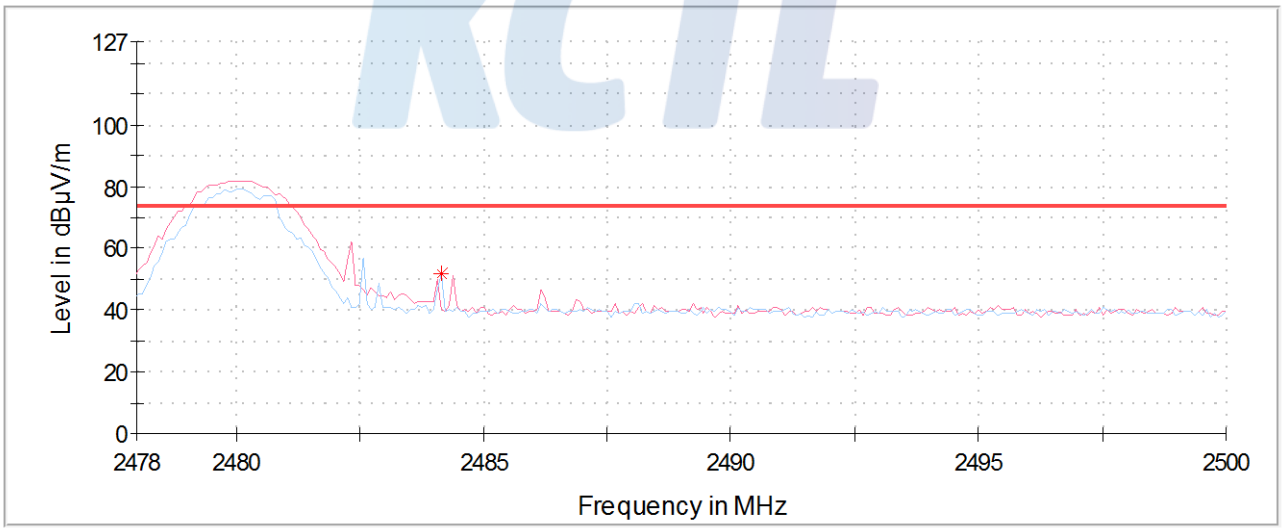
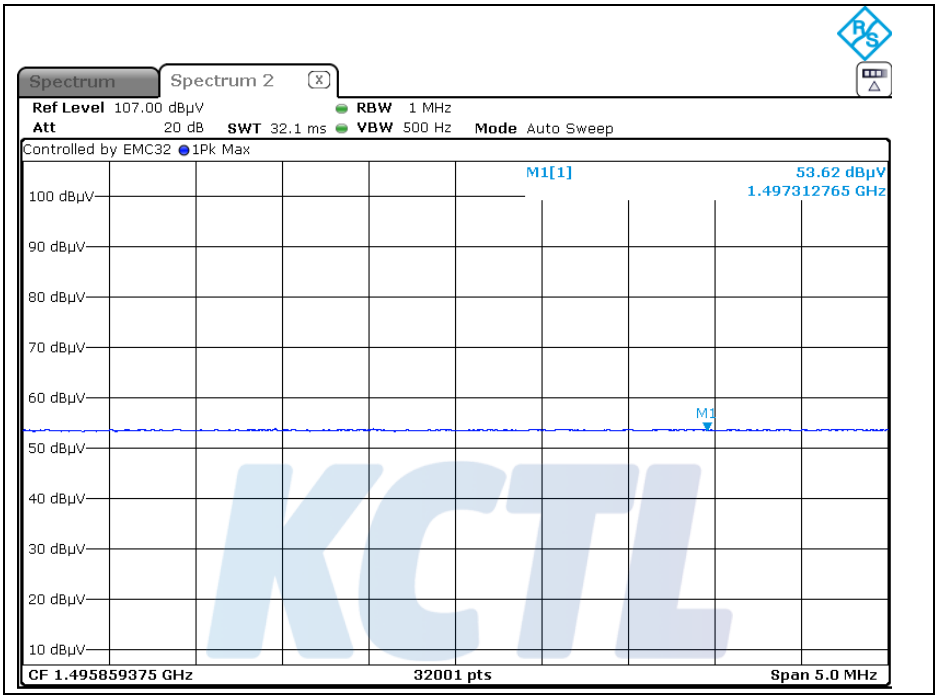
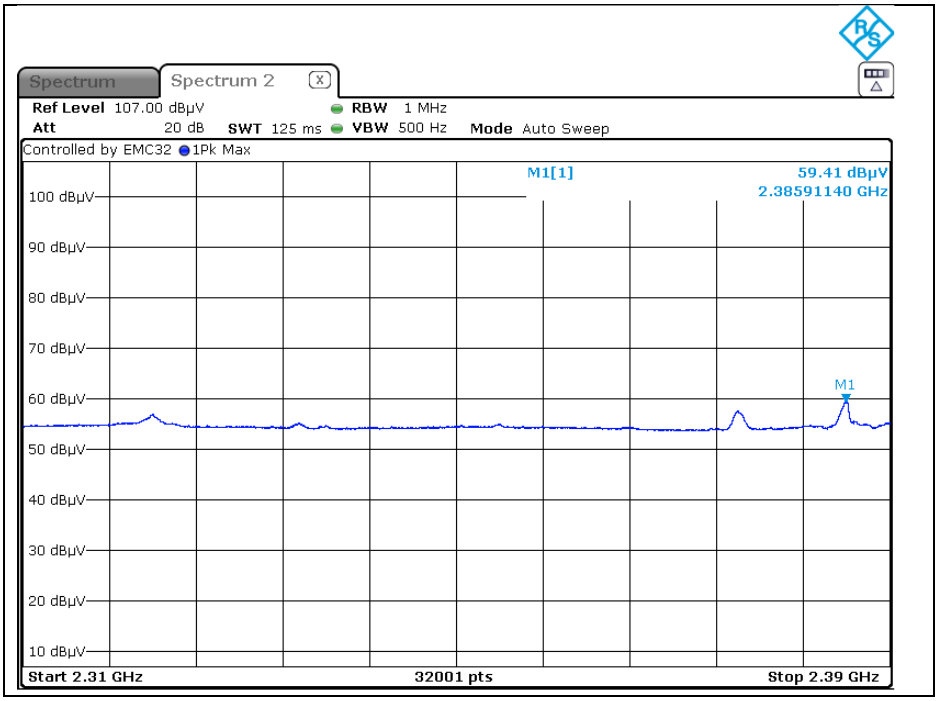


Figure 9. Plot of the Average Measurement (Radiated)

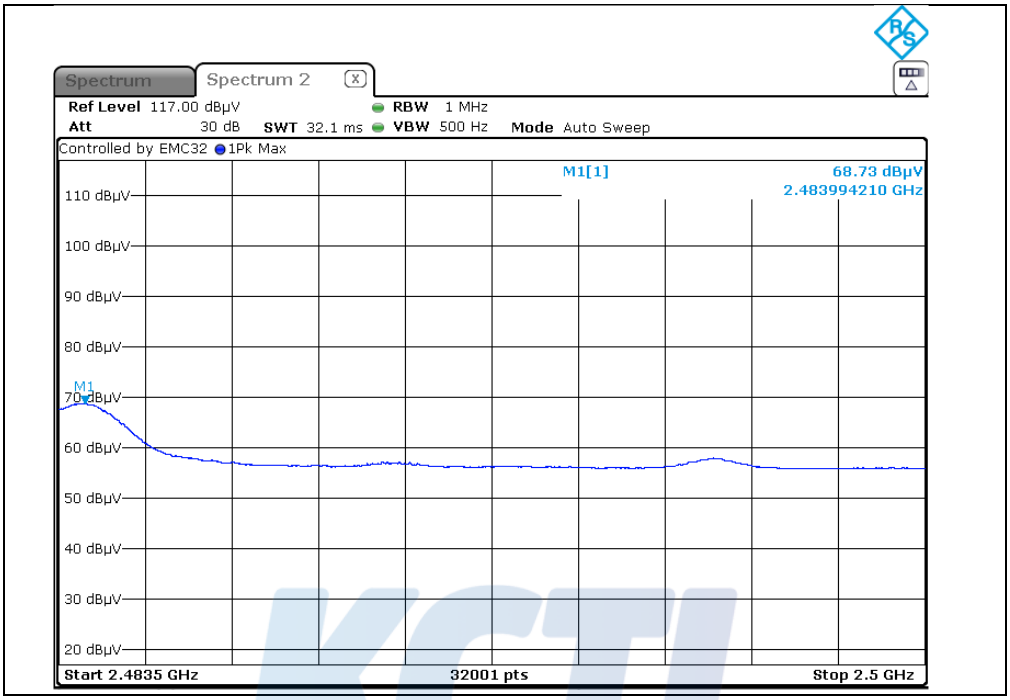
**Module 1**

**- GFSK_Lowest Channel**

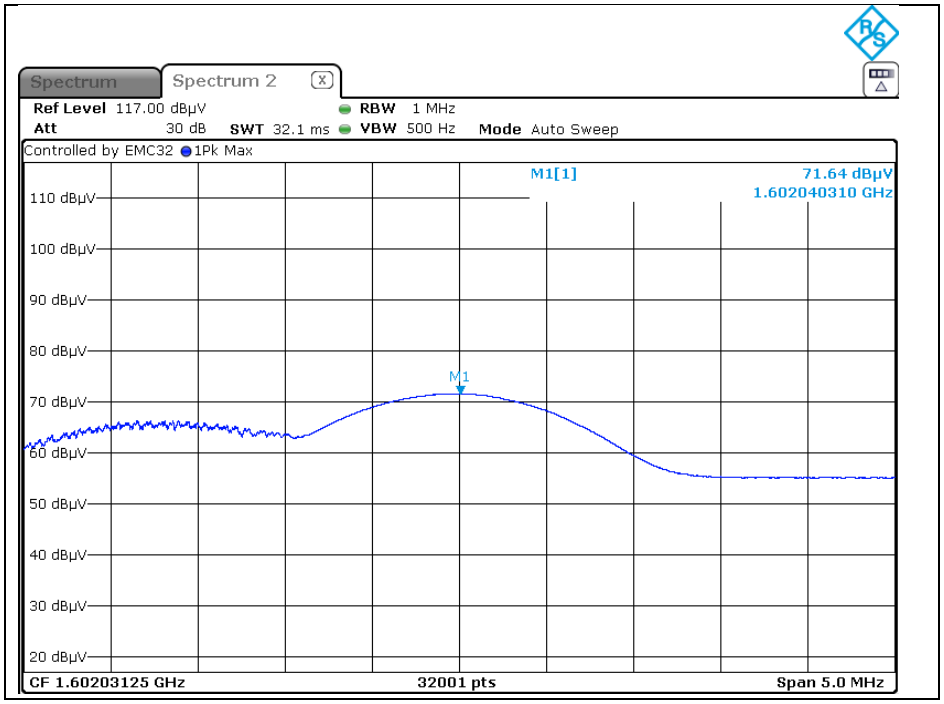


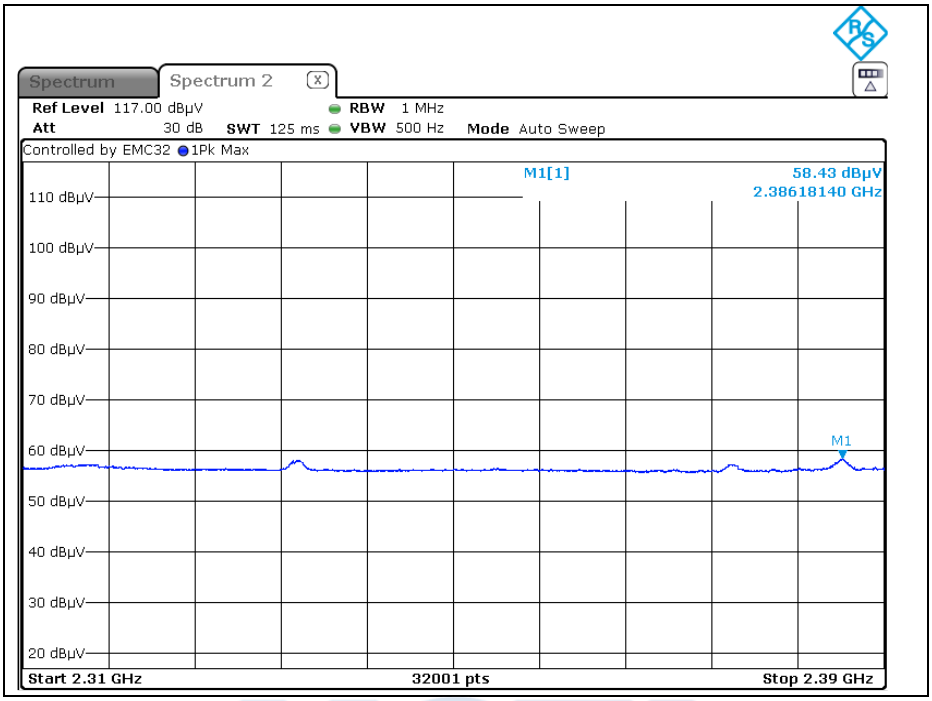



**- GFSK_Highest Channel**

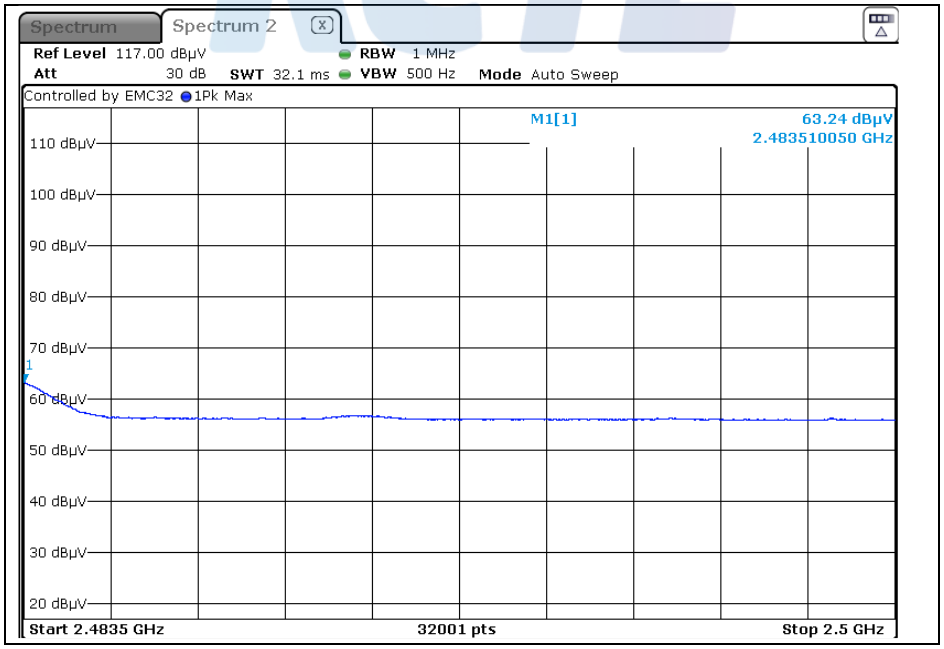



**- 8DPSK_Lowest Channel**



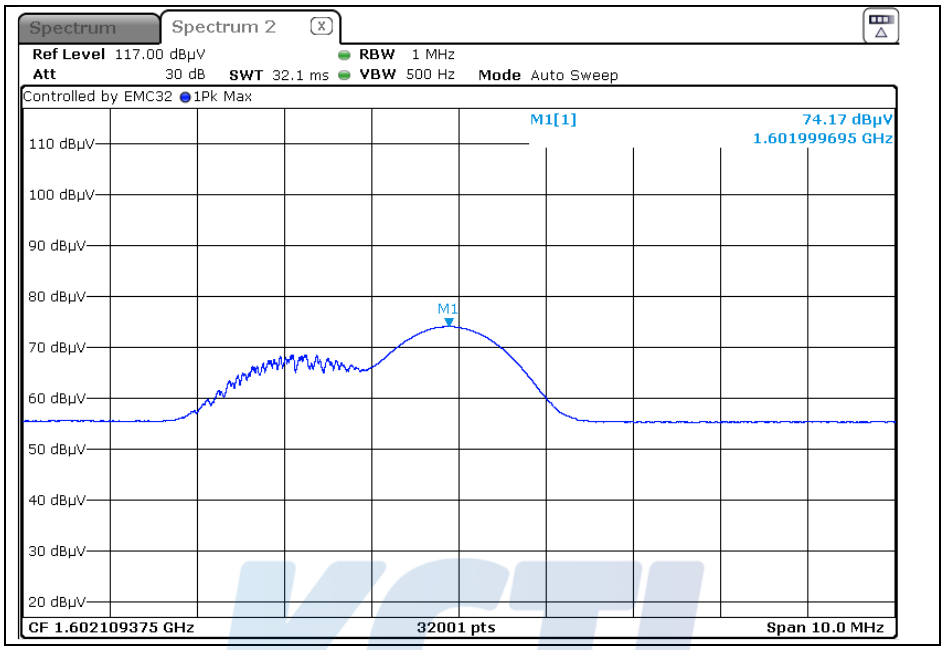


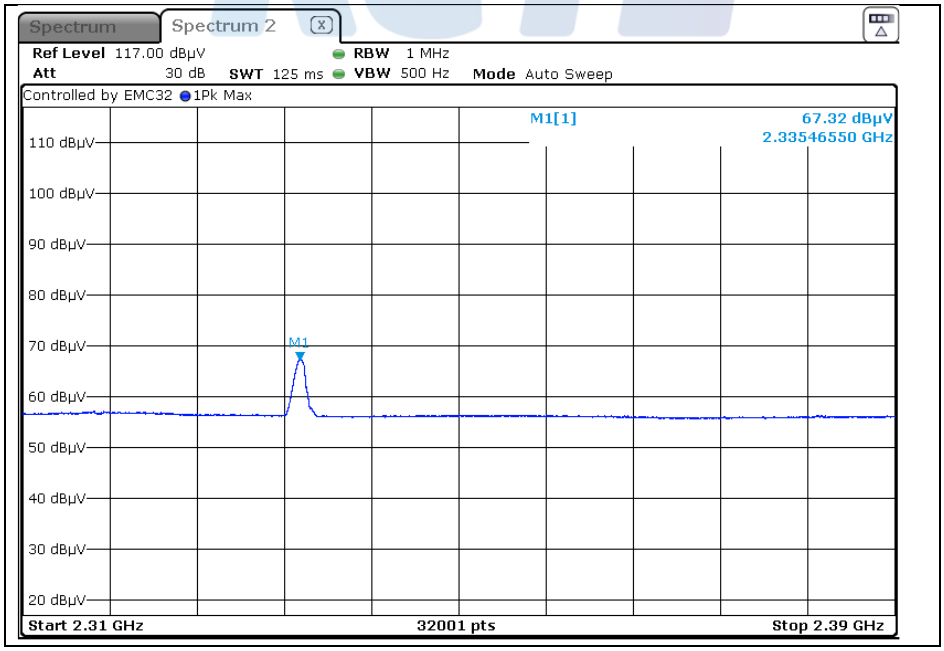

**- 8DPSK_Highest Channel**



## Module 2

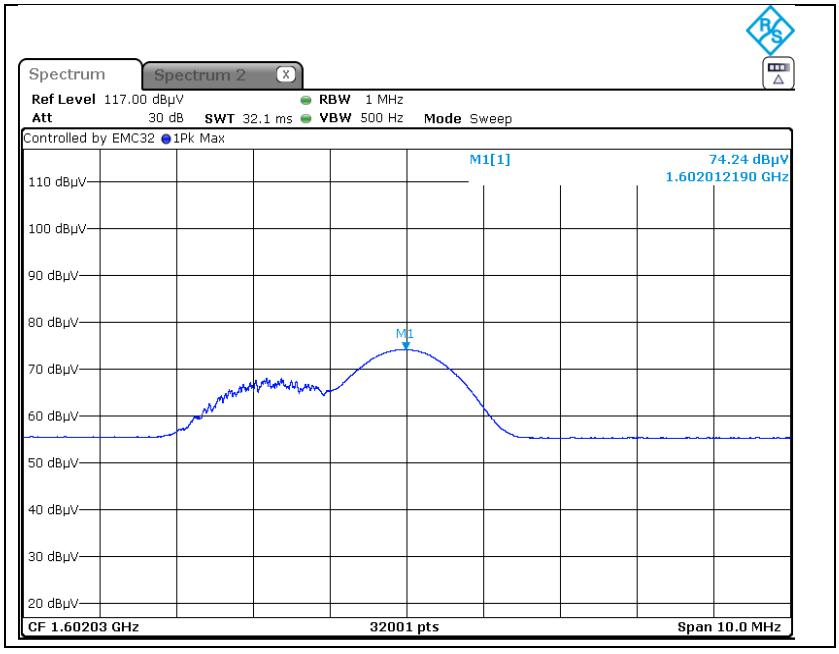
### - GFSK_Lowest Channel

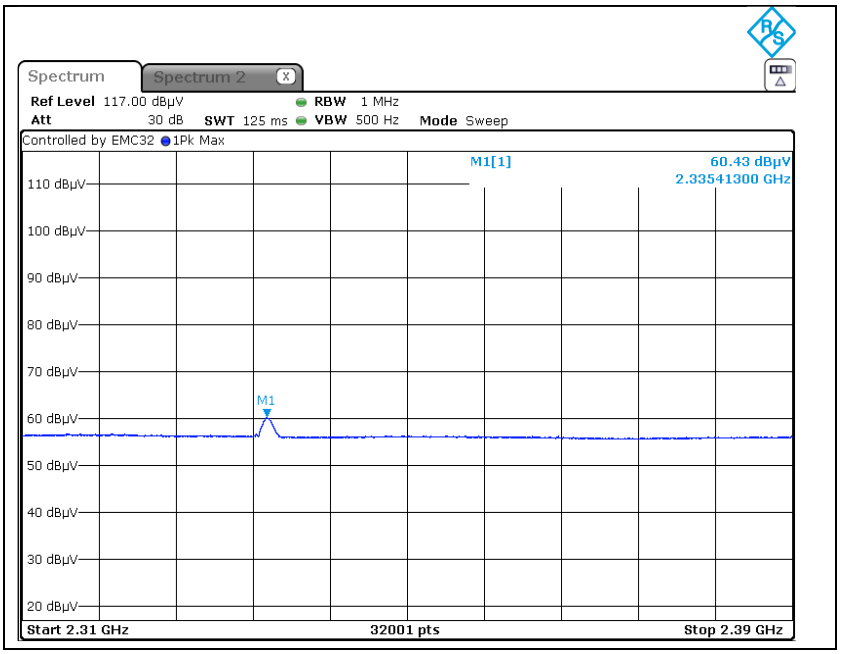


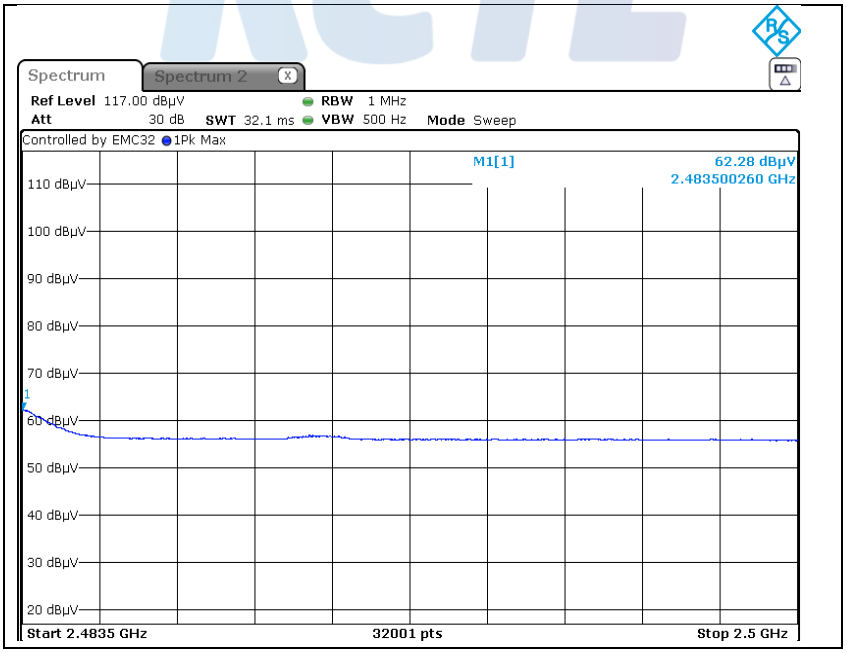
**- GFSK_Highest Channel**


**- 8DPSK_Lowest Channel**






**- 8DPSK_Highest Channel**



## 5.8 Conducted Emission

### 5.8.1 Regulation

According to §15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 ㎑ to 30 ㎒, shall not exceed the limits in the following table, as measured using a 50 μH/50 Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

| Frequency of emission (㎒) | Conducted limit (㏈㎶) | |
|---|---|---|
| | Qausi-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.

According to §15.107(a), for unintentional device, except for Class A digital devices, line conducted emission limits are the same as the above table.

### 5.8.2 Measurement Procedure

1) The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 ㎝ in which is located 40 ㎝ away from the vertical wall and 1.5m away from the side wall of the shielded room.

2) Each current-carrying conductor of the EUT power cord was individually connected through a 50Ω/50μH LISN, which is an input transducer to a Spectrum Analyzer or an EMI/Field Intensity Meter, to the input power source.

3) Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.

4) The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 ㎒ to 30 ㎒.

5) The measurements were made with the detector set to PEAK amplitude within a bandwidth of 10 ㎑ or to QUASI-PEAK and AVERAGE within a bandwidth of 9 ㎑. The EUT was in transmitting mode during the measurements.

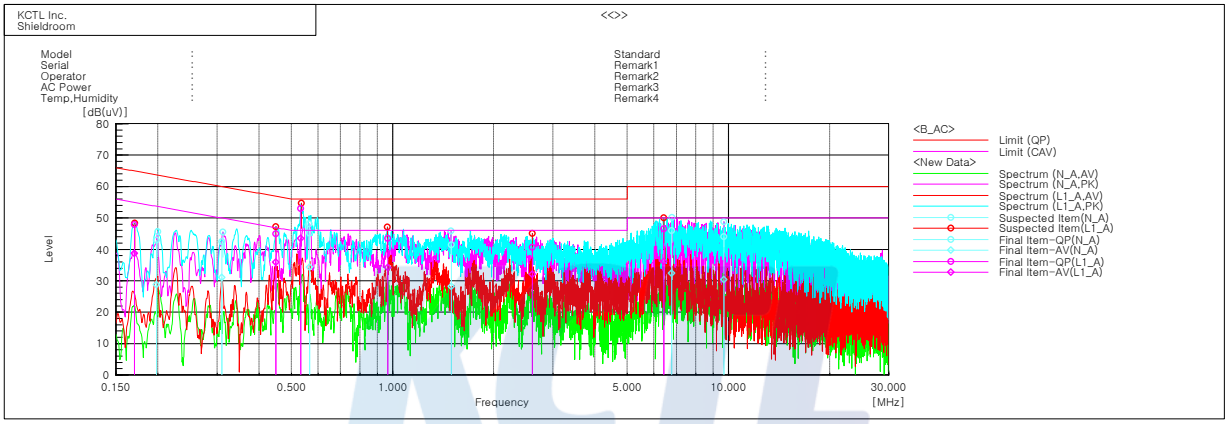
## 5.8.3 Test Result

**-Complied**

Figure 10. plot of Conducted Emission

- The device can connect to PC via USB or AC adapter, Therefore for the meansurement all possible configurations were investigated and the worst one (Adapter) was reported.

-Module 1 (Worst-case: 8DPSK)




Final Result

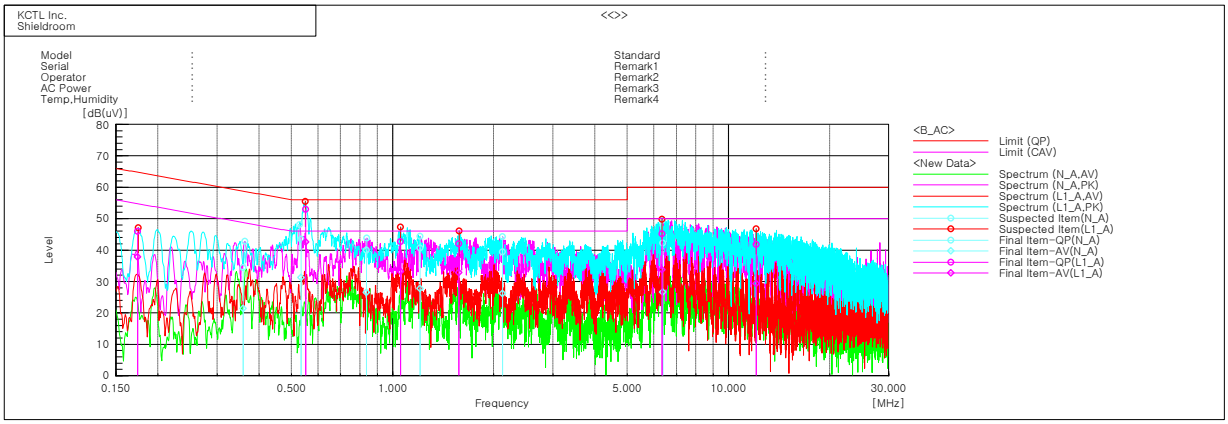
--- N_A Phase ---

| No. | Frequency [MHz] | Reading QP [dB(uV)] | Reading CAV [dB(uV)] | c.f [dB] | Result QP [dB(uV)] | Result CAV [dB(uV)] | Limit QP [dB(uV)] | Limit AV [dB(uV)] | Margin QP [dB] | Margin CAV [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.19786 | 32.8 | 18.6 | 10.1 | 42.9 | 28.7 | 63.7 | 53.7 | 20.8 | 25.0 |
| 2 | 0.30963 | 32.7 | 21.2 | 9.8 | 42.5 | 31.0 | 60.0 | 50.0 | 17.5 | 19.0 |
| 3 | 0.5663 | 35.1 | 24.3 | 10.0 | 45.1 | 34.3 | 56.0 | 46.0 | 10.9 | 11.7 |
| 4 | 1.49474 | 31.5 | 18.3 | 9.9 | 41.4 | 28.2 | 56.0 | 46.0 | 14.6 | 17.8 |
| 5 | 6.77986 | 35.9 | 22.3 | 10.1 | 46.0 | 32.4 | 60.0 | 50.0 | 14.0 | 17.6 |
| 6 | 9.68373 | 33.8 | 20.0 | 10.3 | 44.1 | 30.3 | 60.0 | 50.0 | 15.9 | 19.7 |

--- L1_A Phase ---

| No. | Frequency [MHz] | Reading QP [dB(uV)] | Reading CAV [dB(uV)] | c.f [dB] | Result QP [dB(uV)] | Result CAV [dB(uV)] | Limit QP [dB(uV)] | Limit AV [dB(uV)] | Margin QP [dB] | Margin CAV [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.1701 | 37.6 | 28.5 | 10.2 | 47.8 | 38.7 | 65.0 | 55.0 | 17.2 | 16.3 |
| 2 | 0.44837 | 34.9 | 25.8 | 10.0 | 44.9 | 35.8 | 56.9 | 46.9 | 12.0 | 11.1 |
| 3 | 0.53175 | 43.0 | 33.5 | 10.0 | 53.0 | 43.5 | 56.0 | 46.0 | 3.0 | 2.5 |
| 4 | 0.96621 | 33.5 | 24.3 | 9.9 | 43.4 | 34.2 | 56.0 | 46.0 | 12.6 | 11.8 |
| 5 | 2.60432 | 30.8 | 22.1 | 9.9 | 40.7 | 32.0 | 56.0 | 46.0 | 15.3 | 14.0 |
| 6 | 6.42296 | 36.4 | 26.0 | 10.1 | 46.5 | 36.1 | 60.0 | 50.0 | 13.5 | 13.9 |

-Module 2 (Worst-case: 8DPSK)




Final Result

--- N_A Phase ---

| No. | Frequency [MHz] | Reading QP [dB(uV)] | Reading CAV [dB(uV)] | c.f [dB] | Result QP [dB(uV)] | Result CAV [dB(uV)] | Limit QP [dB(uV)] | Limit AV [dB(uV)] | Margin QP [dB] | Margin CAV [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.35848 | 24.5 | 11.5 | 9.9 | 34.4 | 21.4 | 58.8 | 48.8 | 24.4 | 27.4 |
| 2 | 0.53359 | 33.5 | 21.2 | 10.0 | 43.5 | 31.2 | 56.0 | 46.0 | 12.5 | 14.8 |
| 3 | 0.83482 | 29.9 | 16.5 | 10.0 | 39.9 | 26.5 | 56.0 | 46.0 | 16.1 | 19.5 |
| 4 | 1.20644 | 30.7 | 17.8 | 9.9 | 40.6 | 27.7 | 56.0 | 46.0 | 15.4 | 18.3 |
| 5 | 2.12171 | 29.4 | 16.2 | 9.9 | 39.3 | 26.1 | 56.0 | 46.0 | 16.7 | 19.9 |
| 6 | 6.36725 | 32.1 | 16.5 | 10.1 | 42.2 | 26.6 | 60.0 | 50.0 | 17.8 | 23.4 |

--- L1_A Phase ---

| No. | Frequency [MHz] | Reading QP [dB(uV)] | Reading CAV [dB(uV)] | c.f [dB] | Result QP [dB(uV)] | Result CAV [dB(uV)] | Limit QP [dB(uV)] | Limit AV [dB(uV)] | Margin QP [dB] | Margin CAV [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.17403 | 35.7 | 27.6 | 10.2 | 45.9 | 37.8 | 64.8 | 54.8 | 18.9 | 17.0 |
| 2 | 0.55112 | 42.9 | 32.5 | 10.0 | 52.9 | 42.5 | 56.0 | 46.0 | 3.1 | 3.5 |
| 3 | 1.05644 | 32.7 | 23.3 | 9.9 | 42.6 | 33.2 | 56.0 | 46.0 | 13.4 | 12.8 |
| 4 | 1.57384 | 32.0 | 22.9 | 9.9 | 41.9 | 32.8 | 56.0 | 46.0 | 14.1 | 13.2 |
| 5 | 6.34338 | 35.1 | 23.6 | 10.1 | 45.2 | 33.7 | 60.0 | 50.0 | 14.8 | 16.3 |
| 6 | 12.09785 | 31.3 | 18.9 | 10.4 | 41.7 | 29.3 | 60.0 | 50.0 | 18.3 | 20.7 |

## 6. Test equipment used for test

| | Equipment Name | Manufacturer | Model No. | Serial No. | Next Cal. Date |
|---|---|---|---|---|---|
| ■ | Spectrum Analyzer | R&S | FSW26 | 101353 | 19.03.22 |
| ■ | Spectrum Analyzer | R & S | FSV40 | 100988 | 19.01.05 |
| ■ | Wideband Power Sensor | R & S | NRP-Z81 | 102398 | 19.01.31 |
| ■ | DC Power Supply | AGILENT | E3632A | MY40016393 | 18.12.21 |
| ■ | Bluetooth Tester | TESCOM | TC-3000C | 3000C000270 | 19.08.02 |
| ■ | Power Divider | Aeroflex/Weinschel, Inc. | 1580-1 | RZ184 | 19.08.02 |
| ■ | ATTENUATOR | R & S | DNF Dämpfungsglied 10 dB in N-50 Ohm | 31212 | 19.05.14 |
| ■ | EMI TEST RECEIVER | R & S | ESCI | 100732 | 18.08.24 |
| ■ | Bilog Antenna | SCHWARZBECK | VULB9168 | 583 | 20.05.04 |
| ■ | Amplifier | SONOMA INSTRUMENT | 310N | 284608 | 20.05.04 |
| ■ | COAXIAL FIXED ATTENUATOR | Agilent | 8491B-003 | 2708A18758 | 20.05.04 |
| ■ | Horn antenna | ETS.lindgren | 3116 | 00086632 | 19.04.20 |
| ■ | Horn antenna | ETS.lindgren | 3117 | 155787 | 18.10.20 |
| ■ | AMPLIFIER | L-3 Narda-MITEQ | AMF-7D-01001800-22-10P | 2003683 | 19.05.15 |
| ■ | AMPLIFIER | L-3 Narda-MITEQ | JS44-18004000-33-8P | 2000997 | 19.08.02 |
| ■ | LOOP Antenna | R & S | HFH2-Z2 | 892665/035 | 19.01.25 |
| ■ | Highpass Filter | WT | WT-A1698-HS | WT160411001 | 19.05.14 |
| ■ | Vector Signal Generator | R & S | SMBV100A | 257566 | 19.01.05 |
| ■ | Signal Generator | R & S | SMR40 | 100007 | 19.05.15 |
| ■ | Antenna Mast | Innco Systems | MA4640-XP-ET | - | - |
| ■ | Turn Table | Innco Systems | DT2000 | 79 | - |
| ■ | Antenna Mast | Innco Systems | MA4000-EP | 303 | - |
| ■ | Turn Table | Innco Systems | DT2000 | 79 | - |
| ■ | Cable Assembly | RadiAll | 2301761768000PJ | 1724.659 | - |
| ■ | Cable Assembly | gigalane | RG-400 | - | - |
| ■ | Cable Assembly | HUER+SUHNER | SUCOFLEX 104 | MY4342/4 | - |