

ISED CABid: ES1909

Test Report No:  
NIE: 70193RRF.001

## Test Report

USA FCC Part 15.247, 15.209

CANADA RSS-247, RSS-Gen

|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (*) Identification of item tested         | Rechargeable wireless hearing instrument                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| (*) Trademark                             | ReSound, Beltone, Interton, GN Hearing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| (*) Model and /or type reference          | CARR1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Other identification of the product       | HW version: PCBA,CAMBR RHI FEM,V3.A,C6.0<br>SW version: Dooku 3<br>FCC ID: X26CARR1<br>IC: 6941C-CARR1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| (*) Features                              | Audio amplification, proprietary 2.4 GHz wireless functionality(Proximity), Bluetooth 5.0 and 10.667 MHz wireless magnetic induction functionality.<br>Wireless rechargeability at 333 kHz.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Manufacturer                              | GN HEARING A/S<br>Lautrupbjerg 7, 2750 Ballerup, Denmark.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Test method requested, standard           | USA FCC Part 15.247 (10-1-20 Edition): Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz.<br>USA FCC Part 15.209 (10-1-20 Edition): Radiated emission limits; general requirements.<br>CANADA RSS-247 Issue 2 (February 2017).<br>CANADA RSS-Gen Issue 5 amendment 1 (March 2019).<br>Guidance for Performing Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid Systems Devices Operating Under Section 15.247 of the FCC Rules.<br>558074 D01 Meas Guidance v05r02 dated April 2, 2019.<br>ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices. |
| Summary                                   | IN COMPLIANCE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Approved by (name / position & signature) | Rafael López Martín<br>EMC Consumer & RF Lab. Manager  2022.06.30 09:53:31 +02'00'                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Date of issue                             | 2022-06-28                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Report template No                        | FDT08_24<br>(*) "Data provided by the client"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

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## Acronyms

| Acronym ID      | Acronym Description                 |
|-----------------|-------------------------------------|
|                 | Emission Bandwidth                  |
| Detector        | Detector used                       |
| Equipment       | Equipment Type                      |
| Freq            | Frequency                           |
| Freq Rng        | Frequency Range                     |
| Inband Peak Lvl | Inband Peak Level                   |
| Lvl             | Level                               |
| MP              | Measurement Point                   |
| Mod             | Modulation                          |
| Occ Ch BW       | Occupied Channel Bandwidth          |
| PSD             | Power Spectrum Density              |
| Peak Power      | Maximum Peak Conducted Output Power |
| Pol             | Polarization                        |
| Unwanted Freq   | Unwanted Emissions Frequency        |
| Unwanted Lvl    | Unwanted Emissions Level            |

## Competences and guarantees

DEKRA Testing and Certification S.A.U. is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

DEKRA Testing and Certification is a FCC-recognized accredited testing laboratory with appropriate scope of accreditation that covers the performed tests in this report.

DEKRA Testing and Certification is an ISED-recognized accredited testing laboratory, CABid: ES1909, with the appropriate scope of accreditation that covers the performed tests in this report.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification S.A.U. has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification S.A.U. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification S.A.U. at the time of performance of the test.

DEKRA Testing and Certification S.A.U. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

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## Uncertainty

Uncertainty (factor  $k=2$ ) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

The total uncertainty of the measurement system for the radiated emissions of EUT from 30 MHz to 1 GHz is:  
Measurement uncertainty  $\leq \pm 5,35$  dB with factor ( $k = 2$ ).

The total uncertainty of the measurement system for the radiated emissions of EUT from 1 GHz to 17 GHz is:  
Measurement uncertainty  $\leq \pm 4,32$  dB with factor ( $k = 2$ ).

The total uncertainty of the measurement system for the radiated emissions of EUT from 17 GHz to 26 GHz is:  
Measurement uncertainty  $\leq \pm 5,51$  dB with factor ( $k = 2$ ).

The total uncertainty of the measurement system for the conducted testing of EUT is:

RF Peak Output Power: Measurement uncertainty  $\leq \pm 0,80$  dB

RF Average Output Power: Measurement uncertainty  $\leq \pm 0,99$  dB

Power Spectral Density: Measurement uncertainty  $\leq \pm 0,99$  dB

6dB Bandwidth: Measurement uncertainty  $\leq \pm 2,84$  %

Occupied Channel Bandwidth: Measurement uncertainty  $\leq \pm 1,17$  %

Conducted Band-edge spurious emissions: Measurement uncertainty  $\leq \pm 1,76$  dB

## Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").
2. The sample consists of a rechargeable wireless hearing aid.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

## Usage of samples

Samples undergoing test have been selected by: The client.

| Id   | Control Number | Description                | Model             | Serial N°  | Date of Reception | Application        |
|------|----------------|----------------------------|-------------------|------------|-------------------|--------------------|
| S/01 | 70193E_123     | Hearing aid (RF Radiated)  | HI,RT961-DRWC     | 2100818652 | 2022-03-21        | Element Under Test |
| S/02 | 70193E_130     | Hearing aid (RF Conducted) | --                | --         | 2022-03-21        | Element Under Test |
| S/02 | 70193E_190     | Audio Cable                | CS 44 HIPRO CABLE | --         | 2022-03-22        | Auxiliary Element  |

| Id   | Control Number | Description | Model | Serial N°  | Date of Reception | Application       |
|------|----------------|-------------|-------|------------|-------------------|-------------------|
| S/02 | 70193E_77      | Speedlink   | --    | 2181059641 | 2022-03-21        | Auxiliary Element |
| S/02 | 70193E_78      | USB Cable   | --    | --         | 2022-03-21        | Auxiliary Element |

Notes referenced to samples during the project:

| Id   | Type                            |
|------|---------------------------------|
| S/01 | Sample used for Radiated tests  |
| S/02 | Sample used for Conducted tests |

## Test sample description

### Test Sample description (compulsory information for EMC and RF testing services)

|                                               |                           |                                   |                      |          |                                   |   |    |
|-----------------------------------------------|---------------------------|-----------------------------------|----------------------|----------|-----------------------------------|---|----|
| Ports..... :                                  | Port name and description | Cable                             |                      |          |                                   |   |    |
|                                               |                           | Specified max length [m]          | Attached during test | Shielded | Coupled to patient <sup>(3)</sup> |   |    |
|                                               | ---                       | ---                               | ---                  | ---      | ---                               |   |    |
|                                               |                           |                                   |                      |          |                                   |   |    |
|                                               |                           |                                   |                      |          |                                   |   |    |
|                                               |                           |                                   |                      |          |                                   |   |    |
|                                               |                           |                                   |                      |          |                                   |   |    |
|                                               |                           |                                   |                      |          |                                   |   |    |
| Supplementary information to the ports..... : |                           |                                   |                      |          |                                   |   |    |
| Rated power supply .....                      | Voltage and Frequency     |                                   | Reference poles      |          |                                   |   |    |
|                                               |                           |                                   | L1                   | L2       | L3                                | N | PE |
|                                               |                           | AC:                               |                      |          |                                   |   |    |
|                                               |                           | AC:                               |                      |          |                                   |   |    |
|                                               | X                         | DC: Internal rechargeable battery |                      |          |                                   |   |    |
|                                               | DC:                       |                                   |                      |          |                                   |   |    |
| Rated Power .....                             | 3.7V                      |                                   |                      |          |                                   |   |    |
| Clock frequencies.....                        | 2.48GHz and 10.667MHz     |                                   |                      |          |                                   |   |    |
| Other parameters .....                        | ---                       |                                   |                      |          |                                   |   |    |
| Software version .....                        | Dooku 2                   |                                   |                      |          |                                   |   |    |
| Hardware version .....                        | ---                       |                                   |                      |          |                                   |   |    |
| Dimensions in cm (W x H x D) .....            | ---                       |                                   |                      |          |                                   |   |    |
| Mounting position .....                       |                           | Table top equipment               |                      |          |                                   |   |    |
|                                               |                           | Wall/Ceiling mounted equipment    |                      |          |                                   |   |    |
|                                               |                           | Floor standing equipment          |                      |          |                                   |   |    |
|                                               |                           | Hand-held equipment               |                      |          |                                   |   |    |
|                                               | X                         | Other: Placed behind ear          |                      |          |                                   |   |    |

|                                               |                           |                                                                        |              |
|-----------------------------------------------|---------------------------|------------------------------------------------------------------------|--------------|
| Modules/parts.....:                           | Module/parts of test item | Type                                                                   | Manufacturer |
|                                               | ---                       | ---                                                                    | ---          |
|                                               |                           |                                                                        |              |
|                                               |                           |                                                                        |              |
|                                               |                           |                                                                        |              |
| Accessories (not part of the test item) ..... | Description               | Type                                                                   | Manufacturer |
|                                               | Computer                  | Certified according to IEC 60950-1, IEC 62368-1 or equivalent standard |              |
|                                               |                           |                                                                        |              |
|                                               |                           |                                                                        |              |
|                                               |                           |                                                                        |              |
|                                               |                           |                                                                        |              |
|                                               |                           |                                                                        |              |
|                                               |                           |                                                                        |              |
| Documents as provided by the applicant.....:  | Description               | File name                                                              | Issue date   |
|                                               | ---                       | ---                                                                    | ---          |
|                                               |                           |                                                                        |              |
|                                               |                           |                                                                        |              |
|                                               |                           |                                                                        |              |

<sup>(3)</sup> Only for Medical Equipment

## Identification of the client

GN HEARING A/S  
Lautrupbjerg 7, 2750 Ballerup, Denmark.

## Testing period and place

|               |                                        |
|---------------|----------------------------------------|
| Test Location | DEKRA Testing and Certification S.A.U. |
| Date (start)  | 2022-04-04                             |
| Date (finish) | 2022-05-24                             |

## Document history

| Report number | Date       | Description    |
|---------------|------------|----------------|
| 70193RRF.001  | 2022-06-22 | First release. |

## Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

|                   |                              |
|-------------------|------------------------------|
| Temperature       | Min. = 15 °C<br>Max. = 35 °C |
| Relative humidity | Min. = 20 %<br>Max. = 75 %   |

In the semianechoic chamber, the following limits were not exceeded during the test.

|                   |                              |
|-------------------|------------------------------|
| Temperature       | Min. = 15 °C<br>Max. = 35 °C |
| Relative humidity | Min. = 20 %<br>Max. = 75 %   |

In the chamber for conducted measurements, the following limits were not exceeded during the test:

|                   |                              |
|-------------------|------------------------------|
| Temperature       | Min. = 15 °C<br>Max. = 35 °C |
| Relative humidity | Min. = 20 %<br>Max. = 75 %   |

## Remarks and comments

The tests have been performed by the technical personnel: Daniel Mejías Herrera, Miguel Angel Torres Camara and Victoria Olmedo Villalba.

Used instrumentation:

| Control No. | Equipment                                  | Model        | Manufacturer                | Next Calibration |
|-------------|--------------------------------------------|--------------|-----------------------------|------------------|
| 7817        | EMI TEST RECEIVER 2Hz-44GHz                | ESW44        | ROHDE AND SCHWARZ           | 2023-12-30       |
| 7763        | HORN ANTENNA 1-18GHz                       | BBHA 9120D   | SCHWARZBECK MESS-ELEKTRONIK | 2022-11-15       |
| 6495        | HORN ANTENNA 18-40GHz                      | BBHA 9170    | SCHWARZBECK                 | 2024-03-19       |
| 7862        | PRE-AMPLIFIER G>30dB 18-40GHz              | BLMA 1840-3G | BONN ELEKTRONIK             | 2023-02-15       |
| 7769        | PREAMPLIFIER 30dB 500MHz-18GHz             | BBV 9718 C   | SCHWARZBECK                 | 2023-03-25       |
| 8130        | SEMIANECHOIC ABSORBER LINED CHAMBER        | P29419       | ALBATROSS                   | N/A              |
| 8661        | SHIELDED ROOM                              | -            | SIEPEL                      | N/A              |
| 8134        | SHIELDED ROOM                              | P29419       | ALBATROSS PROJECTS GMBH     | N/A              |
| 8835        | SIGNAL AND SPECTRUM ANALYZER 2Hz-50GHz     | FSW50        | ROHDE AND SCHWARZ           | 2023-07-29       |
| 4761        | SIGNAL GENERATOR 9kHz-6GHz                 | SMB100A      | ROHDE AND SCHWARZ           | 2023-11-05       |
| 7826        | ULTRALOG ANTENNA 30MHz-6GHz                | HL562E_UPG   | ROHDE AND SCHWARZ           | 2022-10-15       |
| 4848        | SOFTWARE FOR EMC/RF TESTING                | EMC32        | ROHDE AND SCHWARZ           | N/A              |
| 7798        | SOFTWARE FOR EMC/RF TESTING                | WMS32        | ROHDE AND SCHWARZ           | N/A              |
| 7040        | EXTENSION FOR OPEN SWITCH UNIT UP TO 40GHz | OSP-B157Wx   | ROHDE AND SCHWARZ           | 2023-03-23       |

## Testing verdicts

|                |     |
|----------------|-----|
| Fail           | F   |
| Not applicable | N/A |
| Not measured   | N/M |
| Pass           | P   |

## Summary

### Bluetooth Low Energy 5.0 (2M, 1M) and Proximity

| FCC PART 15 PARAGRAPH/ RSS-247                |                                              |         |        |
|-----------------------------------------------|----------------------------------------------|---------|--------|
| Requirement – Test case                       |                                              | Verdict | Remark |
| FCC 15.247 (a)(2) / RSS-247 5.2. (a)          | 6 dB Bandwidth                               | P       |        |
| FCC 15.247 (b) / RSS-247 5.4. (d)             | Maximum output power and antenna gain        | P       |        |
| FCC 15.247 (d) / RSS-247 5.5.                 | Band-edge emissions compliance (Transmitter) | P       |        |
| FCC 15.247 (e) / RSS-247 5.2. (b)             | Power spectral density                       | P       |        |
| FCC 15.247 (d) / RSS-247 5.5.                 | Emission limitations radiated (Transmitter)  | P       |        |
| <u>Supplementary information and remarks:</u> |                                              |         |        |
| None                                          |                                              |         |        |

## Appendix A: Test results. Bluetooth Low Energy 5.0 (2M, 1M) and Proximity

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| RSS-247 5.4 (d) / FCC 15.247 (b) (3) [Pkc] Maximum Peak Conducted output power .....      | 28 |
| RSS-247 5.5 / FCC 15.247 (d) [Bndedge] Band-edge emissions compliance (Transmitter) ..... | 38 |
| RSS-247 5.5 / FCC 15.247 (d) [RSE] Emission limitations radiated (Transmitter) .....      | 42 |
| 99dBw Occupied Channel Bandwidth 99% .....                                                | 68 |

## TEST CONDITIONS

(\*): Data provided by the client.

### POWER SUPPLY (\*):

|                       |                                   |
|-----------------------|-----------------------------------|
| Vnominal:             | 3.7 VDC                           |
| Type of Power Supply: | Internal non-rechargeable battery |

### ANTENNA (\*):

|                                                                 |            |
|-----------------------------------------------------------------|------------|
| Type of Antenna:                                                | Internal   |
| Maximum Declared Antenna Gain for Bluetooth LE:                 | -14.43 dBi |
| Maximum Declared Antenna Gain for Proprietary protocol 2.4 GHz: | -14.43 dBi |

### TEST FREQUENCIES (\*):

#### Proprietary protocol 2.4 GHz / DTS

|                 |          |
|-----------------|----------|
| Low Channel:    | 2402 MHz |
| Middle Channel: | 2440 MHz |
| High Channel:   | 2480 MHz |

#### Bluetooth Low Energy 5.0 (2M, 1M) / DTS

|                 |          |
|-----------------|----------|
| Low Channel:    | 2402 MHz |
| Middle Channel: | 2440 MHz |
| High Channel:   | 2480 MHz |

### CONDUCTED MEASUREMENTS:

The equipment under test was set up in a shielded room and it is connected to the TS8997 using a low loss RF cable. The reading of the spectrum analyser is corrected taking into account the cable loss.



### RADIATED MEASUREMENTS:

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Bilog antenna for the range between 30 MHz to 1000 MHz and 1 GHz-17 GHz Double ridge horn antenna) is situated at a distance of 3 m and at a distance of 1.5 m for the frequency range 17 GHz-26 GHz (17 GHz-40 GHz horn antenna).

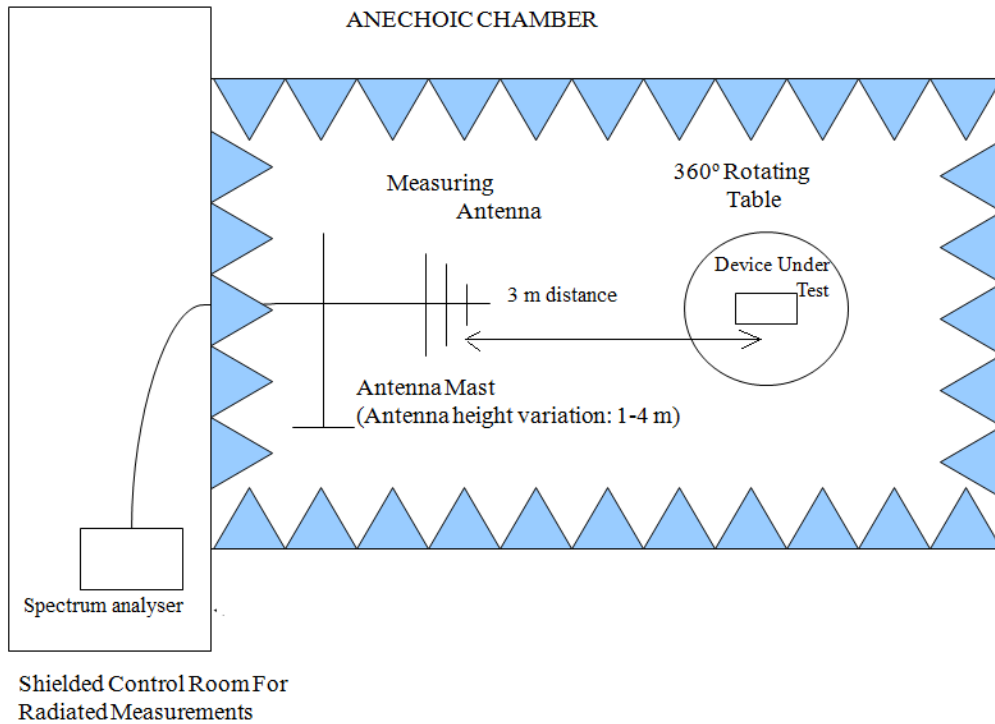
For radiated emissions in the range 17 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height (Bilog antenna and Double ridge horn antenna) was varied from 1 to 4 meters to find the maximum radiated emission.

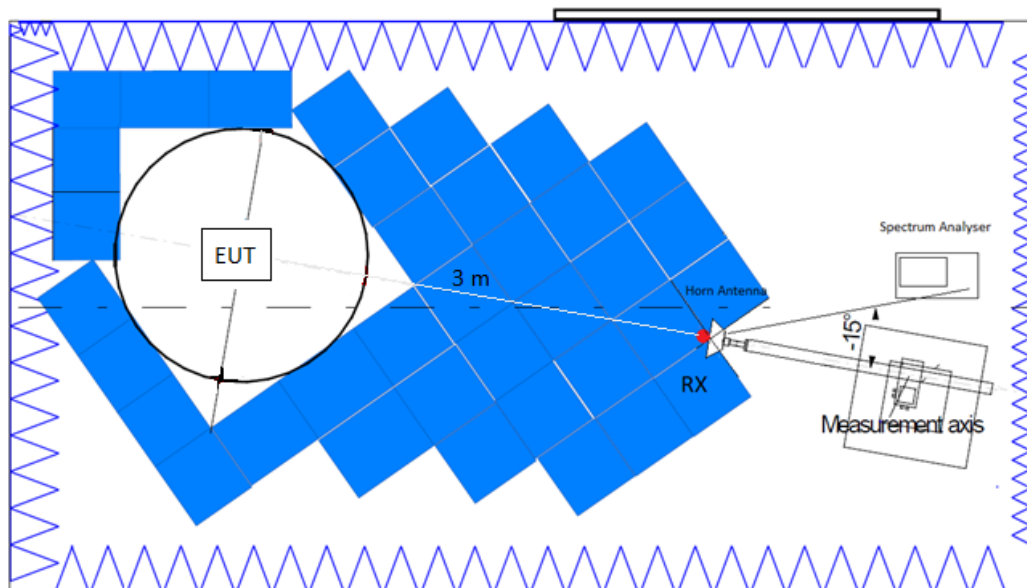
Measurements were made in both horizontal and vertical planes of polarization.

A resolution bandwidth/video bandwidth of 100 kHz / 300 kHz was used for frequencies below 1 GHz and 1 MHz / 3 MHz for frequencies above 1 GHz.

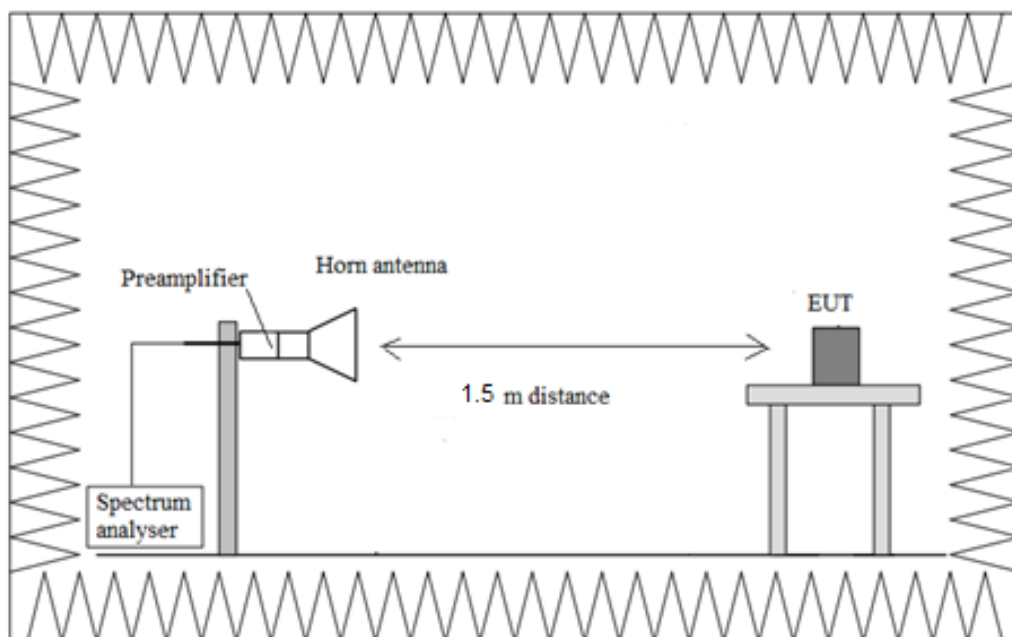
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements setup  $f > 17$  GHz:



## TEST CASES DETAILS

### FCC 47 CFR Part 15.247 / RSS-247

#### RSS-247 5.2 (a) / FCC 15.247 (a) (2) [6dBw] 6 dB Bandwidth

##### Limits

The minimum 6 dB bandwidth shall be at least 500 kHz.

Modulation: Proximity

##### Results

| Freq (MHz) | Emission Bandwidth (MHz) |
|------------|--------------------------|
| 2402.00000 | 0.71                     |
| 2440.00000 | 0.79                     |
| 2480.00000 | 0.63                     |

##### Verdict

Pass

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)

##### Results

| Freq (MHz) | Emission Bandwidth (MHz) |
|------------|--------------------------|
| 2402.00000 | 0.79                     |
| 2440.00000 | 0.79                     |
| 2480.00000 | 0.77                     |

##### Verdict

Pass

Modulation: BTLE 5.0 (GFSK 2 Mbit/s)

##### Results

| Freq (MHz) | Emission Bandwidth (MHz) |
|------------|--------------------------|
| 2402.00000 | 1.11                     |
| 2440.00000 | 1.39                     |
| 2480.00000 | 0.79                     |

##### Verdict

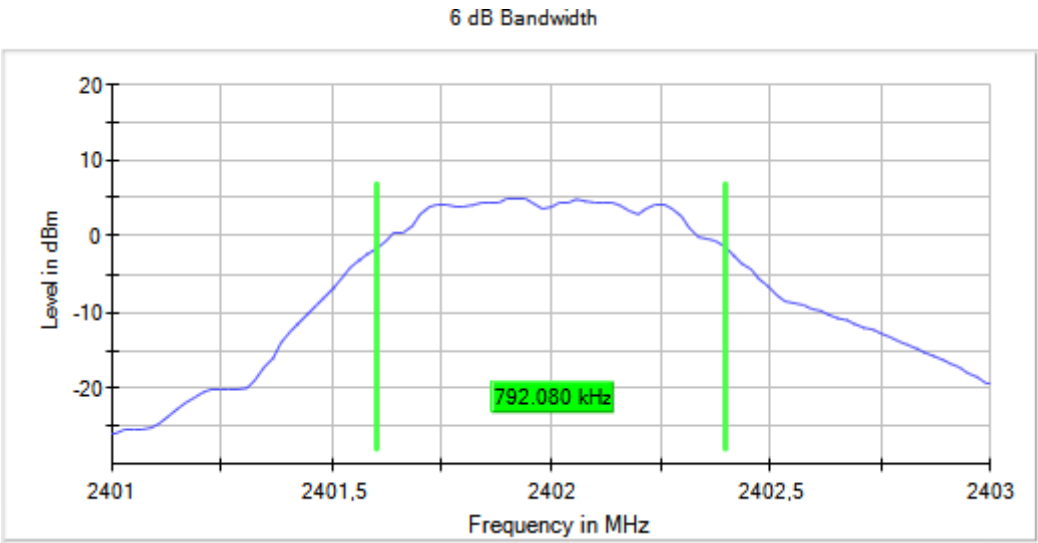
Pass

Attachments

| Setting               | Instrument Value |
|-----------------------|------------------|
| Span                  | 2.000 MHz        |
| RBW                   | 100.000 kHz      |
| VBW                   | 300.000 kHz      |
| SweepPoints           | 101              |
| SweepTime             | 41.830 µs        |
| Reference Level       | 0.000 dBm        |
| Attenuation           | 10.000 dB        |
| Detector              | MaxPeak          |
| SweepCount            | 100              |
| Filter                | 3 dB             |
| Trace Mode            | Max Hold         |
| Sweeptype             | FFT              |
| Preamp                | off              |
| Stablemode            | Trace            |
| Stablevalue           | 0.50 dB          |
| Run                   | 20 / max. 150    |
| Stable                | 5 / 5            |
| Max Stable Difference | 0.31 dB          |

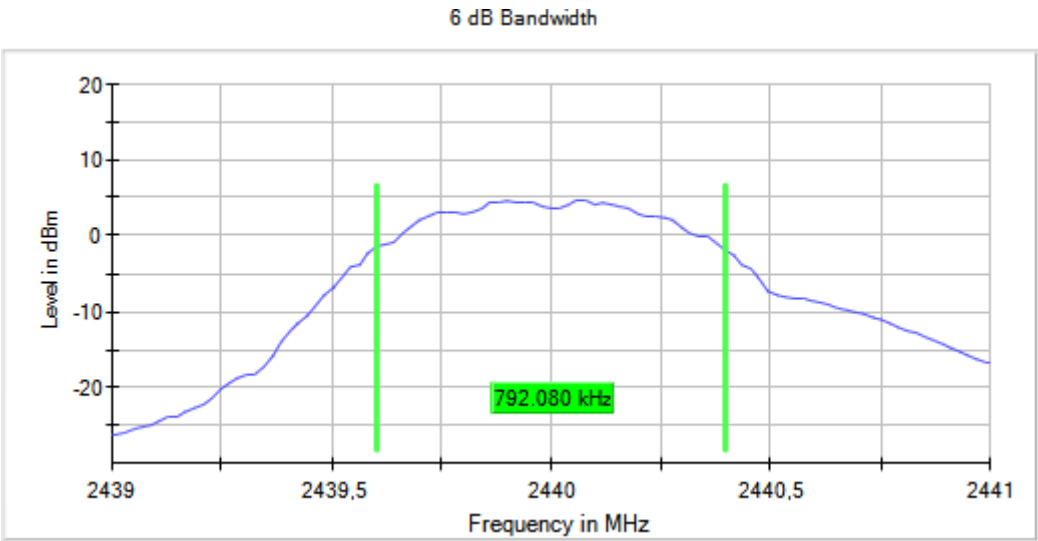
Frequency MHz = 2402.00000, Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Images:



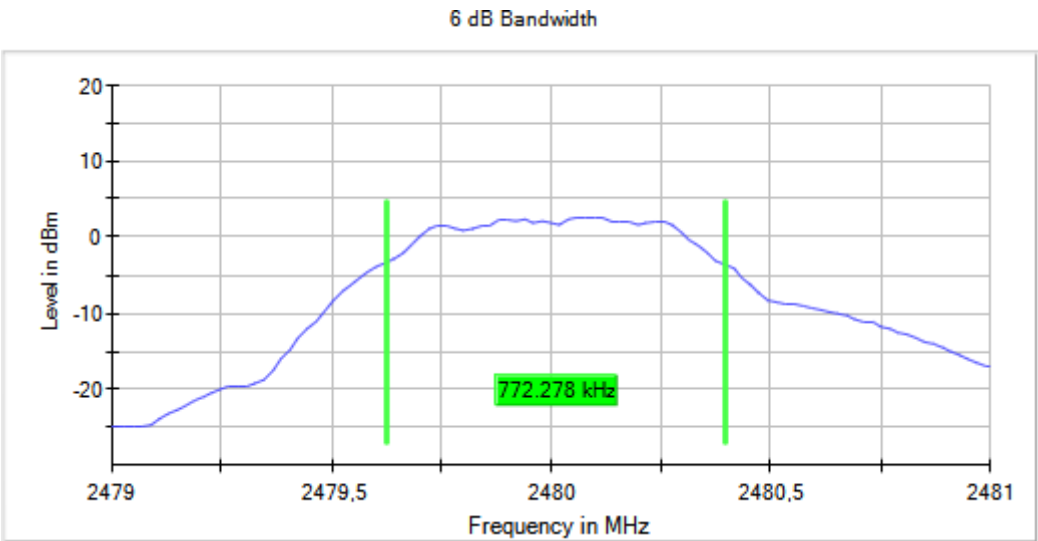
Frequency MHz = 2440.00000, Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Images:



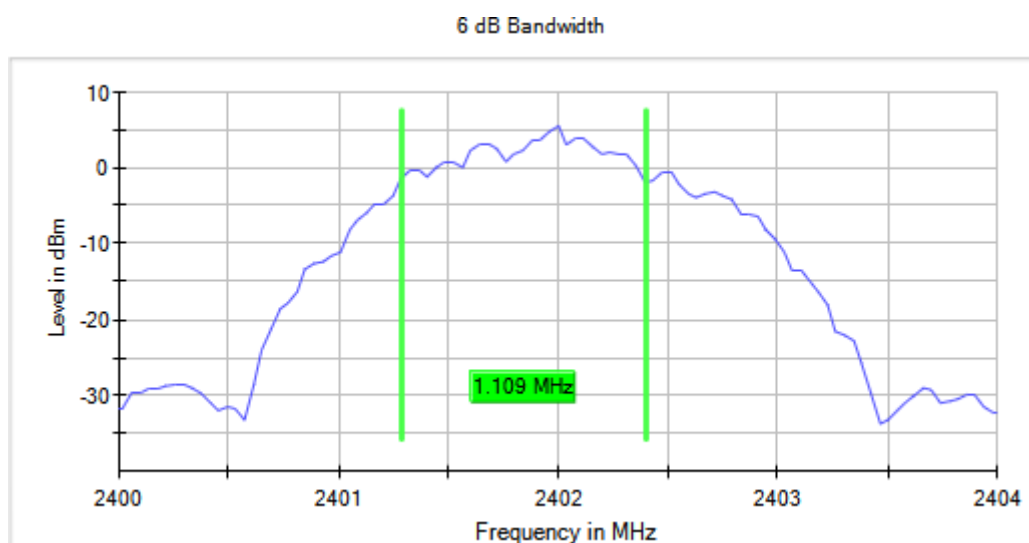
Frequency MHz = 2480.00000, Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Images:



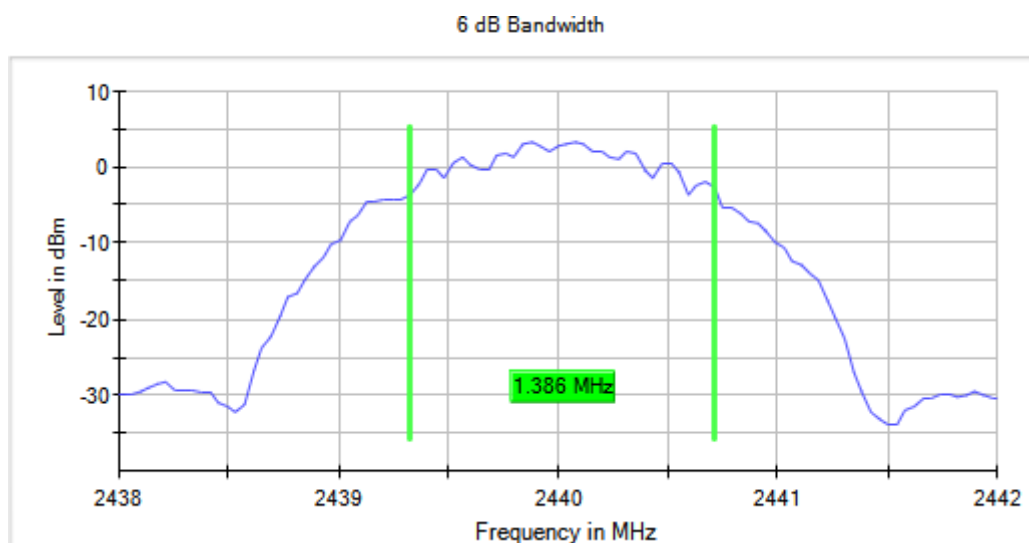
Frequency MHz = 2402.00000, Modulation = BTLE 5.0 (GFSK 2 Mbit/s)

Images:



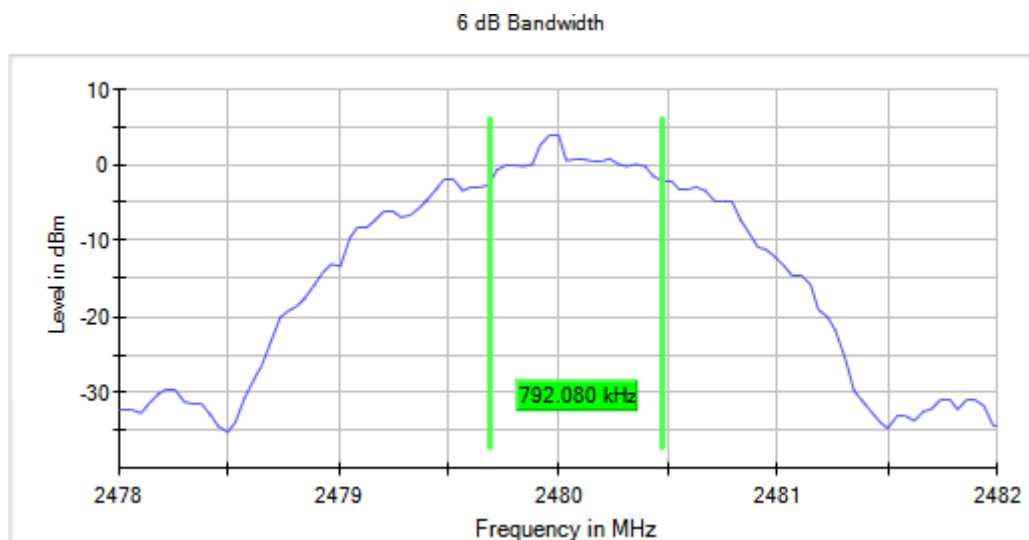
Frequency MHz = 2440.00000, Modulation = BTLE 5.0 (GFSK 2 Mbit/s)

Images:



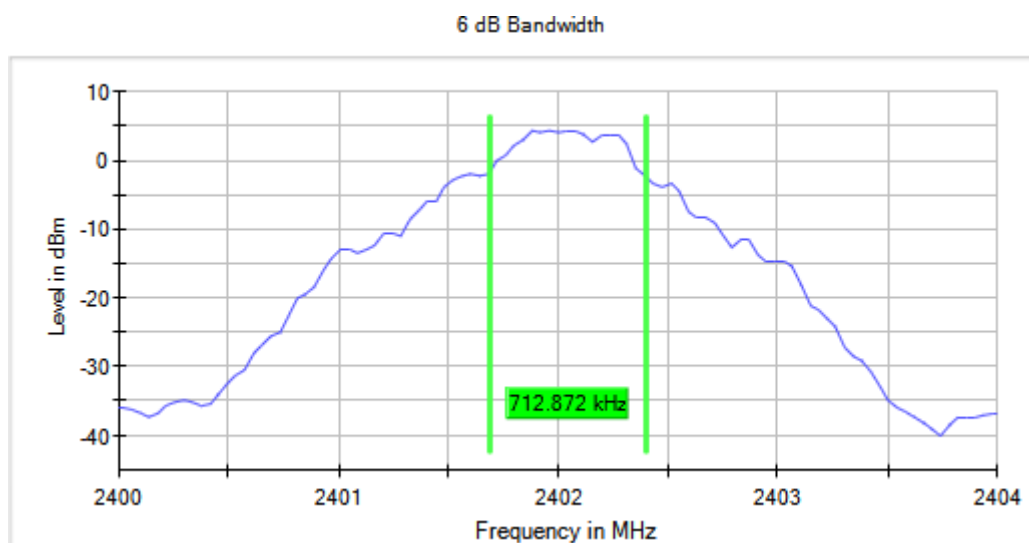
Frequency MHz = 2480.00000, Modulation = BTLE 5.0 (GFSK 2 Mbit/s)

Images:



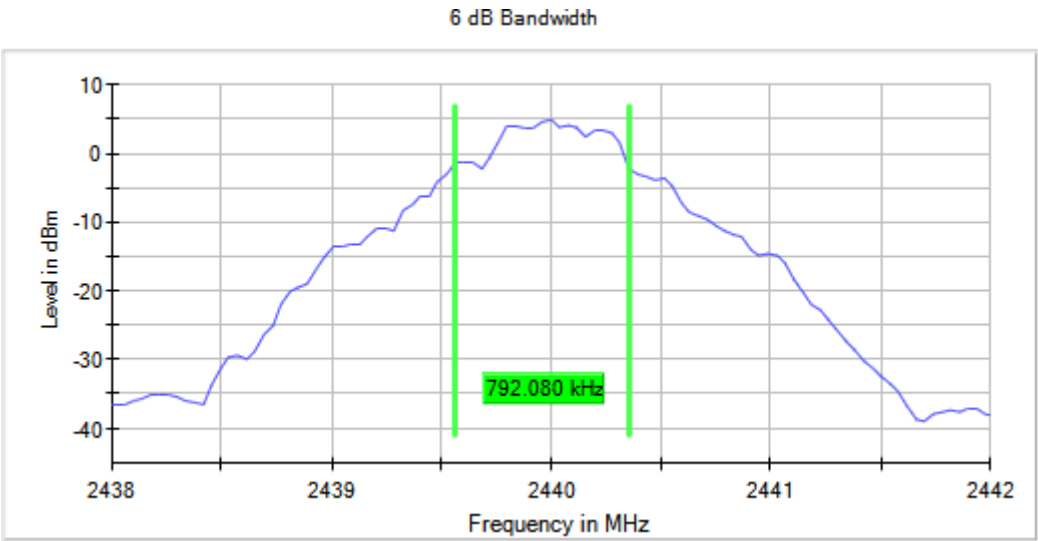
Frequency MHz = 2402.00000, Modulation = Proximity

Images:



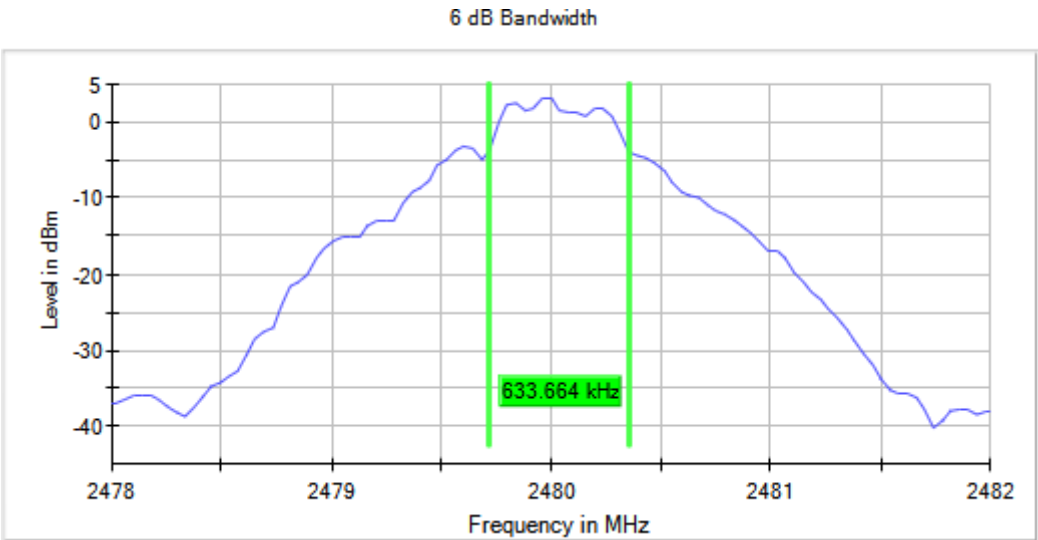
Frequency MHz = 2440.00000, Modulation = Proximity

Images:



Frequency MHz = 2480.00000, Modulation = Proximity

Images:



## RSS-247 5.2 (b) / FCC 15.247 (e) [Psd] Power spectral density

### Limits

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Modulation: Proximity

### Results

| Freq (MHz) | PSD (dBm) |
|------------|-----------|
| 2402.00000 | -2.88     |
| 2440.00000 | -3.05     |
| 2480.00000 | -4.78     |

### Verdict

Pass

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)

### Results

| Freq (MHz) | PSD (dBm) |
|------------|-----------|
| 2402.00000 | -2.51     |
| 2440.00000 | -2.42     |
| 2480.00000 | -3.78     |

### Verdict

Pass

Modulation: BTLE 5.0 (GFSK 2 Mbit/s)

### Results

| Freq (MHz) | PSD (dBm) |
|------------|-----------|
| 2402.00000 | -3.37     |
| 2440.00000 | -4.61     |
| 2480.00000 | -5.88     |

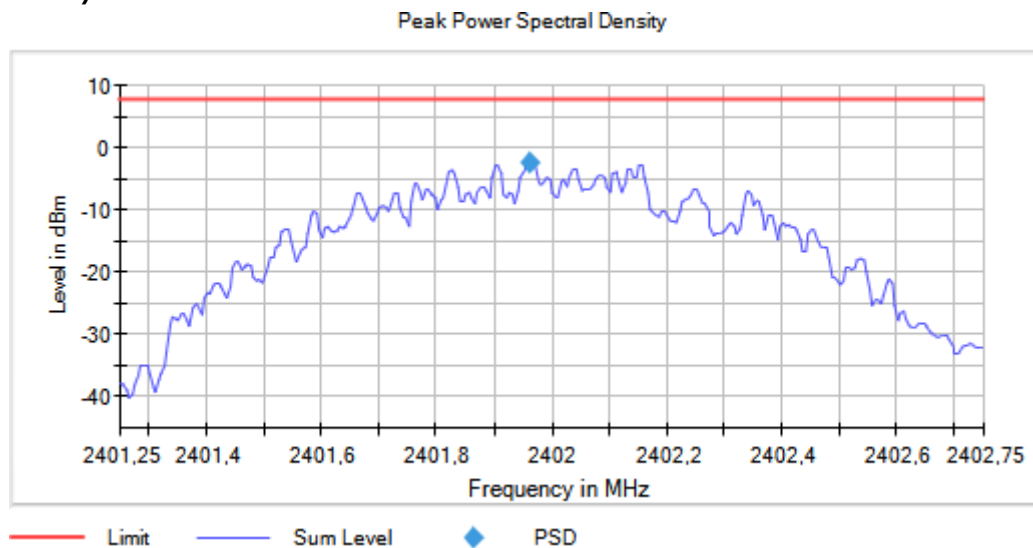
### Verdict

Pass

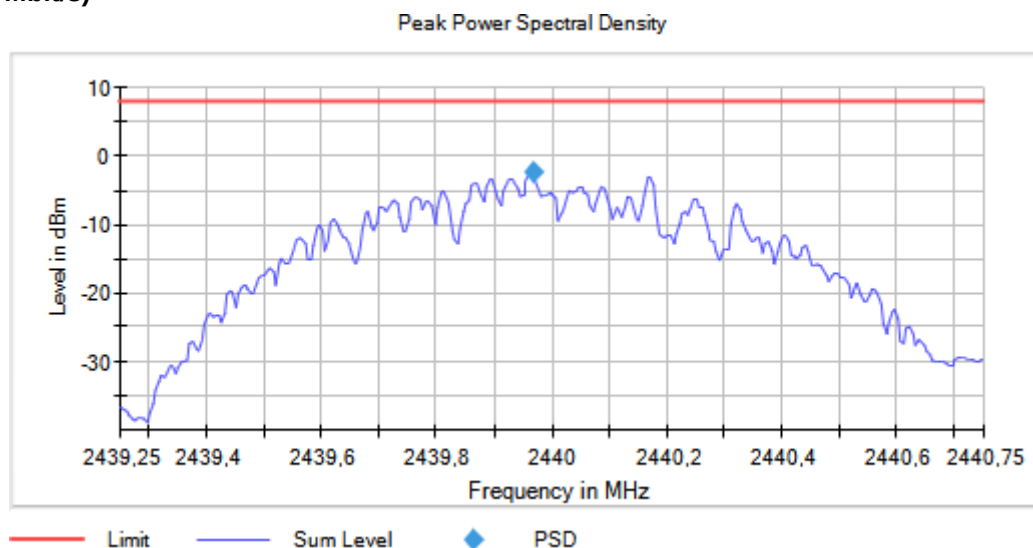
## Attachments

| Setting         | Instrument Value |
|-----------------|------------------|
| Span            | 1.500 MHz        |
| RBW             | 10.000 kHz       |
| VBW             | 30.000 kHz       |
| SweepPoints     | 300              |
| Sweptime        | 1.500 ms         |
| Reference Level | 0.000 dBm        |
| Attenuation     | 10.000 dB        |
| Detector        | MaxPeak          |
| SweepCount      | 100              |
| Filter          | 3 dB             |
| Trace Mode      | Max Hold         |
| Sweeptype       | Sweep            |
| Preamp          | off              |
| Stablemode      | Trace            |
| Stablevalue     | 0.50 dB          |

Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

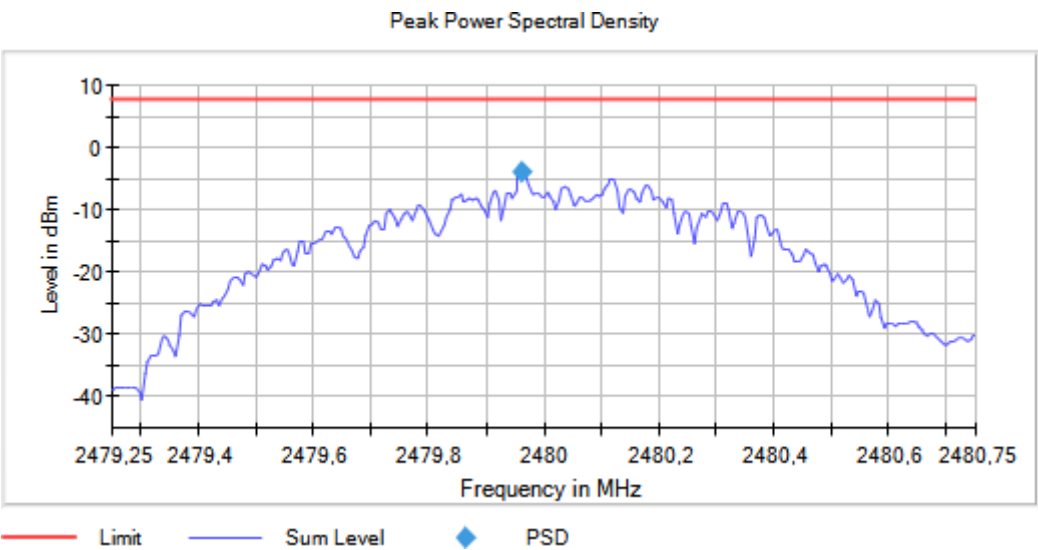


Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s)



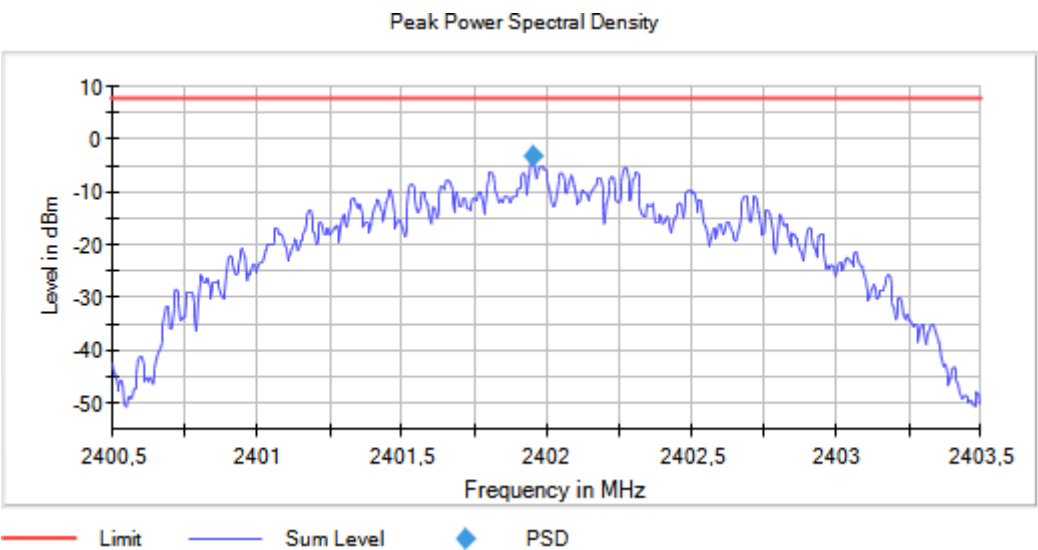
Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Images:



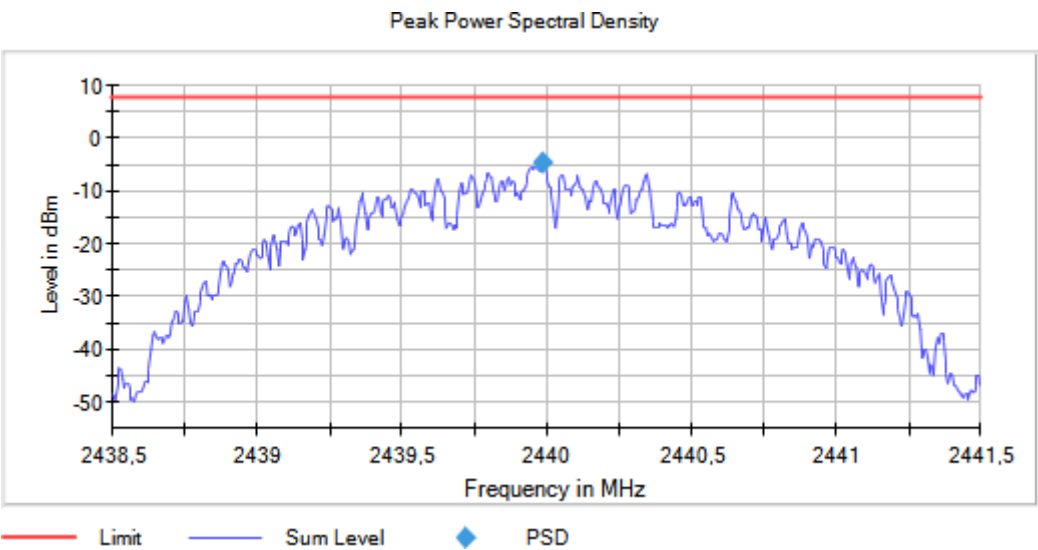
Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s)

Images:



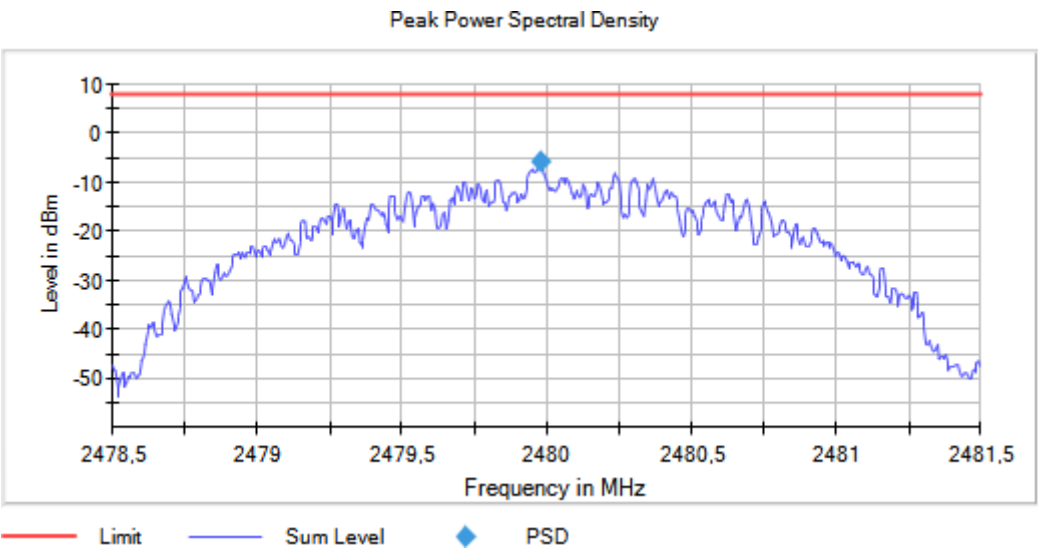
Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s)

Images:



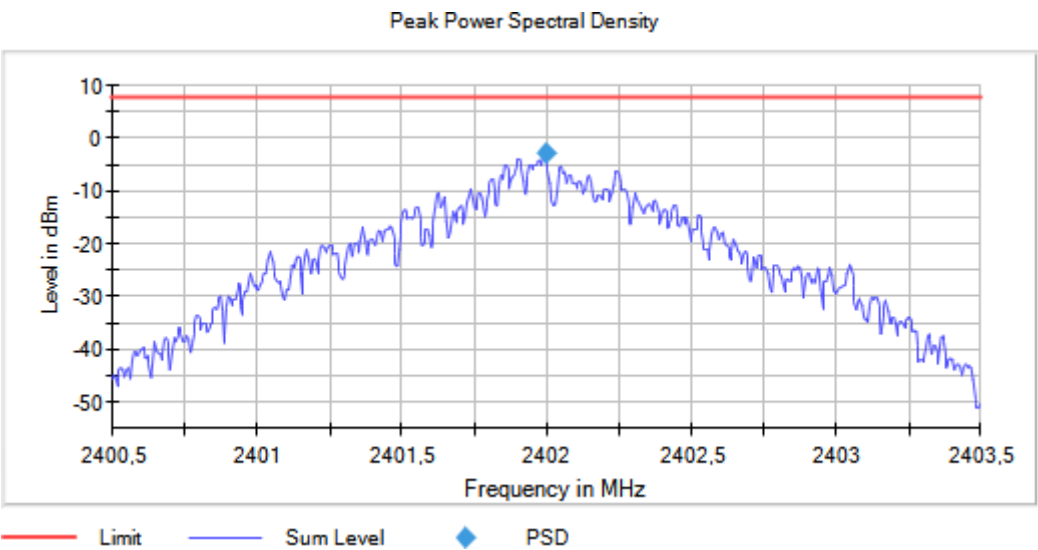
Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s)

Images:



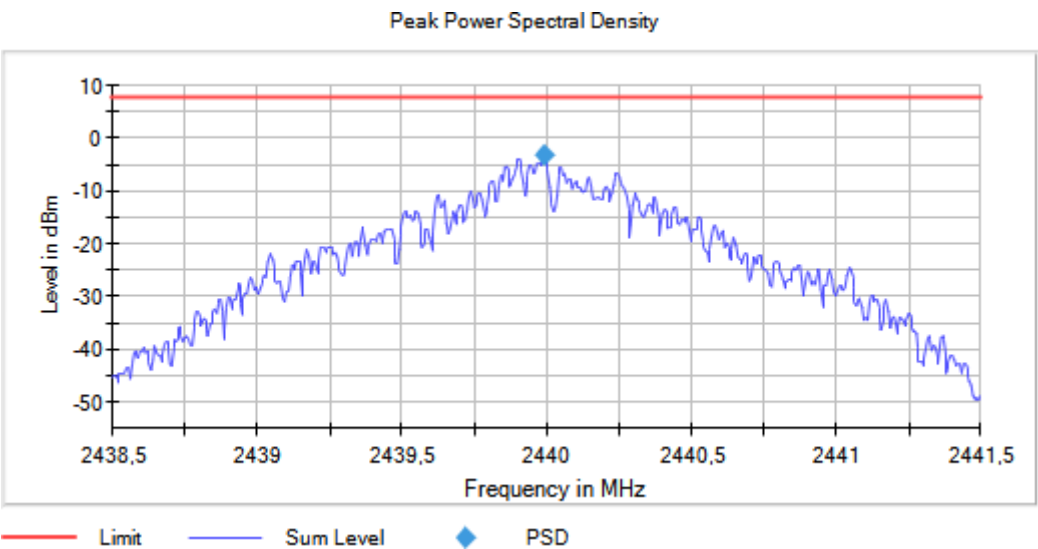
Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Modulation = Proximity

Images:



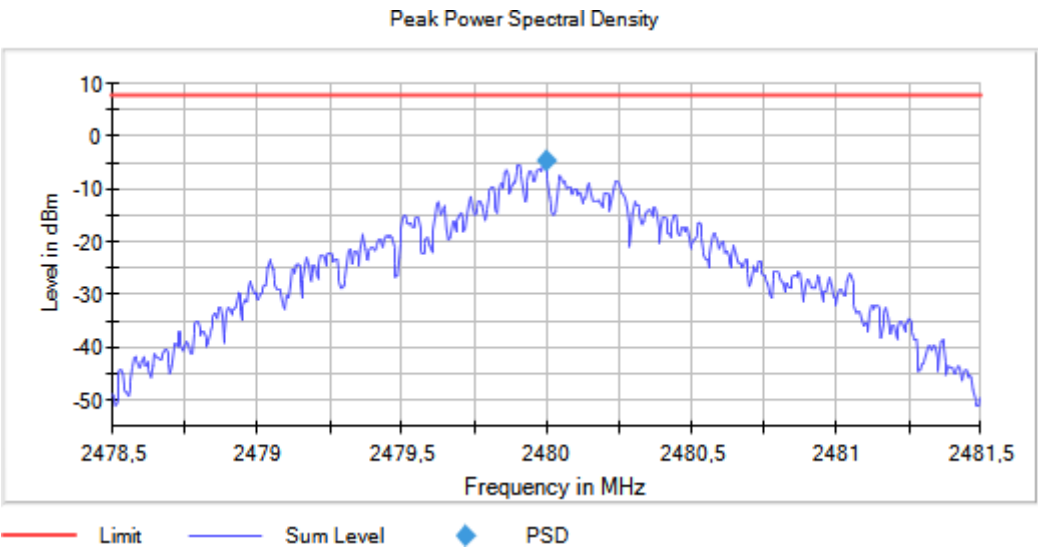
Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Modulation = Proximity

Images:



Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Modulation = Proximity

Images:



## RSS-247 5.4 (d) / FCC 15.247 (b) (3) [Pkcp] Maximum Peak Conducted output power

### Limits

For systems using digital modulation in the 2400-2483.5 MHz band: 1 watt (30 dBm).

The e.i.r.p. shall not exceed 4 W (36 dBm) (Canada).

The maximum peak conducted output power level in the fundamental emission was measured using the method according to point 11.9.1.1 "RBW  $\geq$  DTS bandwidth" of ANSI C.63.10-2013.

Maximum Declared Antenna Gain: -14.43 dBi

Modulation: Proximity

### Results

| Freq (MHz) | Peak Power (dBm) | Maximum EIRP Power (dBm) |
|------------|------------------|--------------------------|
| 2402.00000 | 6.3              | -8,2                     |
| 2440.00000 | 6.3              | -8,2                     |
| 2480.00000 | 4.4              | -10,1                    |

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)

### Results

| Freq (MHz) | Peak Power (dBm) | Maximum EIRP Power (dBm) |
|------------|------------------|--------------------------|
| 2402.00000 | 6.4              | -8,1                     |
| 2440.00000 | 6.1              | -8,4                     |
| 2480.00000 | 4.4              | -10,1                    |

Modulation: BTLE 5.0 (GFSK 2 Mbit/s)

### Results

| Freq (MHz) | Peak Power (dBm) | Maximum EIRP Power (dBm) |
|------------|------------------|--------------------------|
| 2402.00000 | 6.6              | -7,9                     |
| 2440.00000 | 6.4              | -8,1                     |
| 2480.00000 | 4.5              | -10                      |

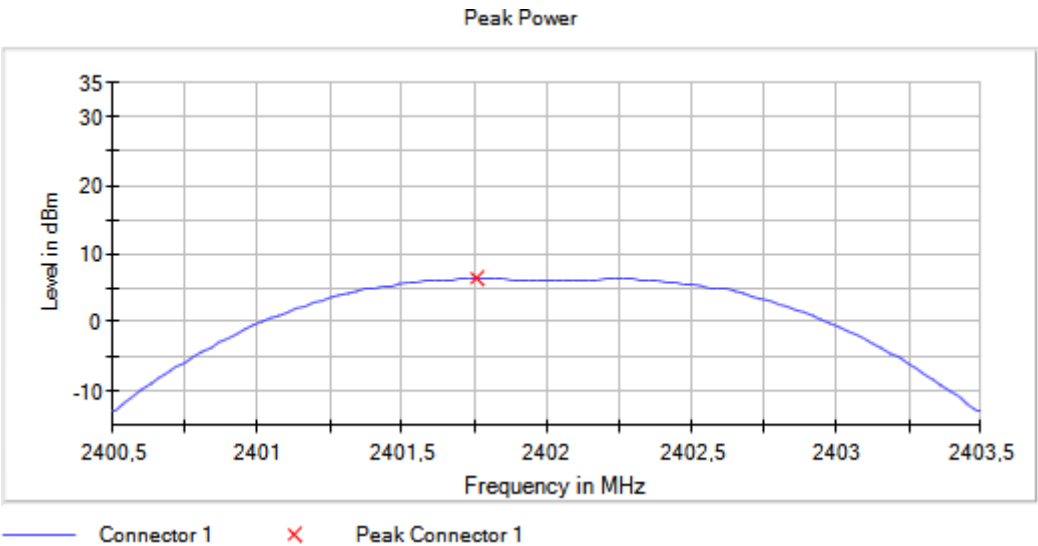
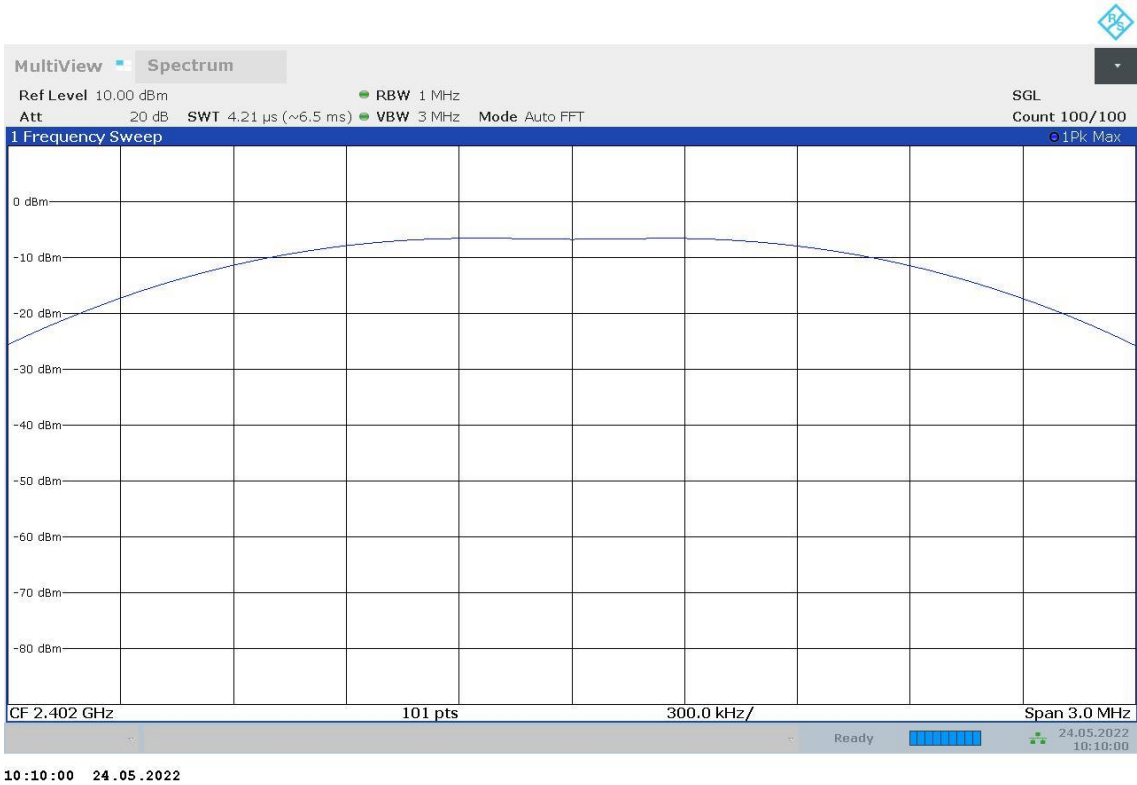
### Verdict

Pass

Attachments

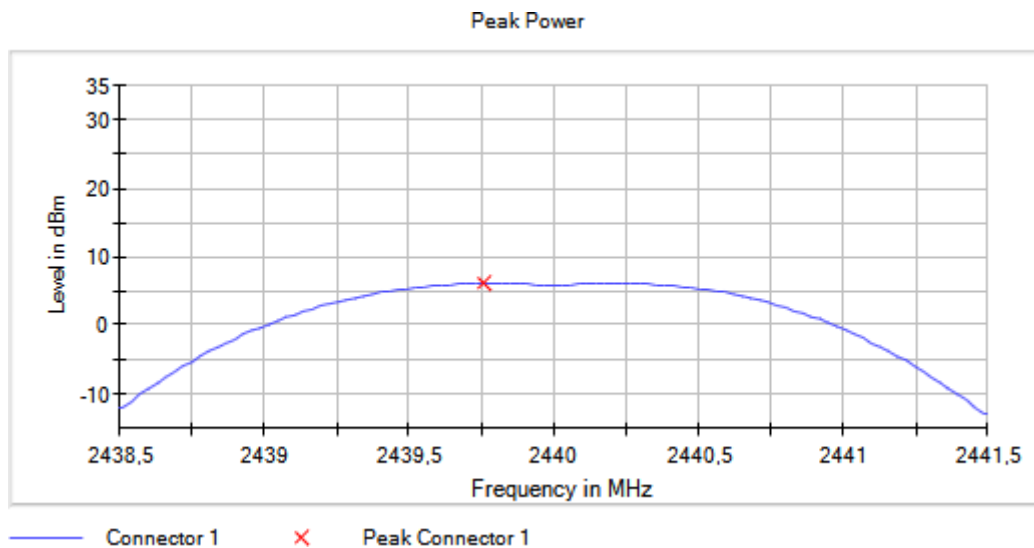
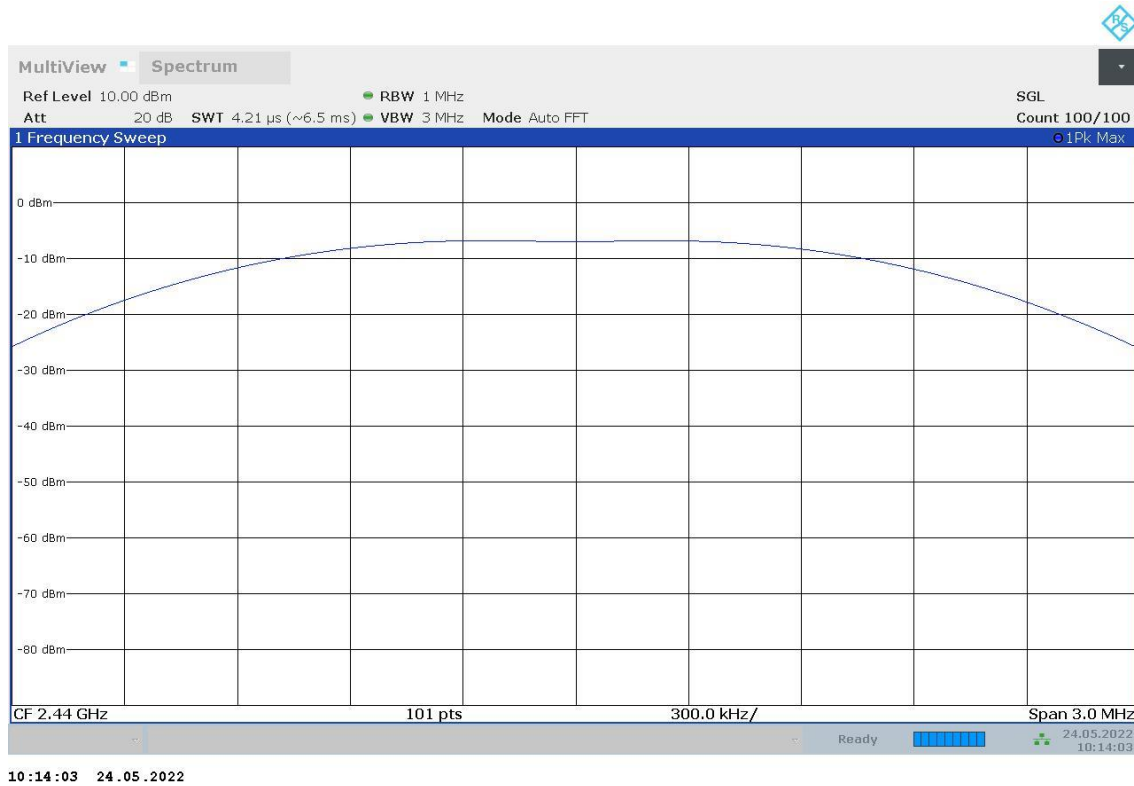
Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Images:



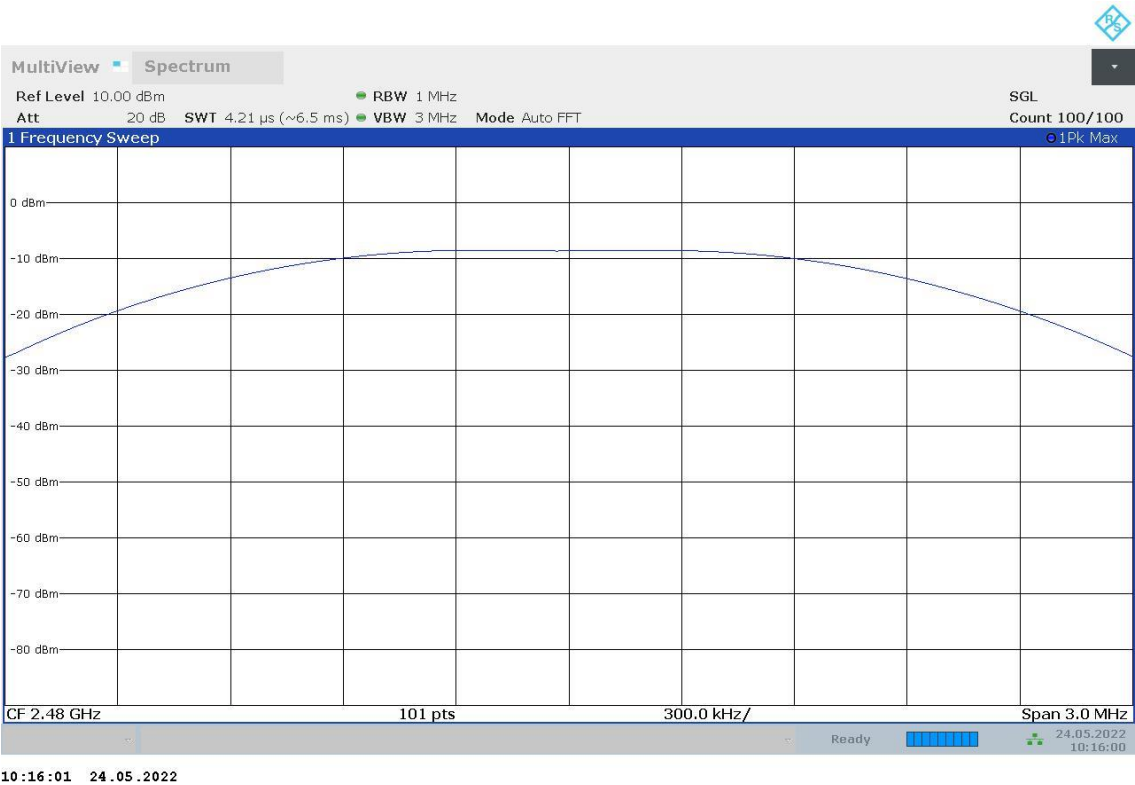
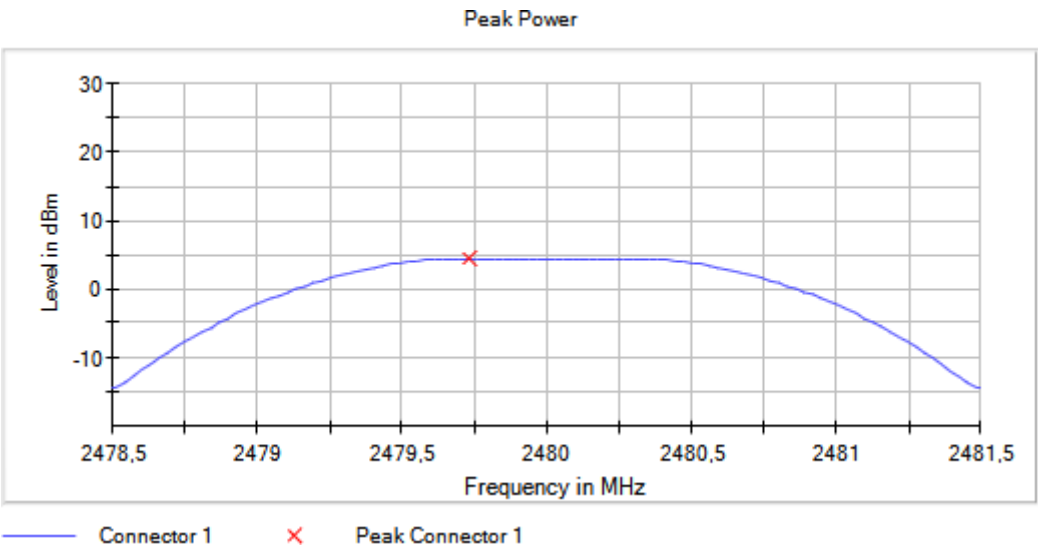
**Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s)**

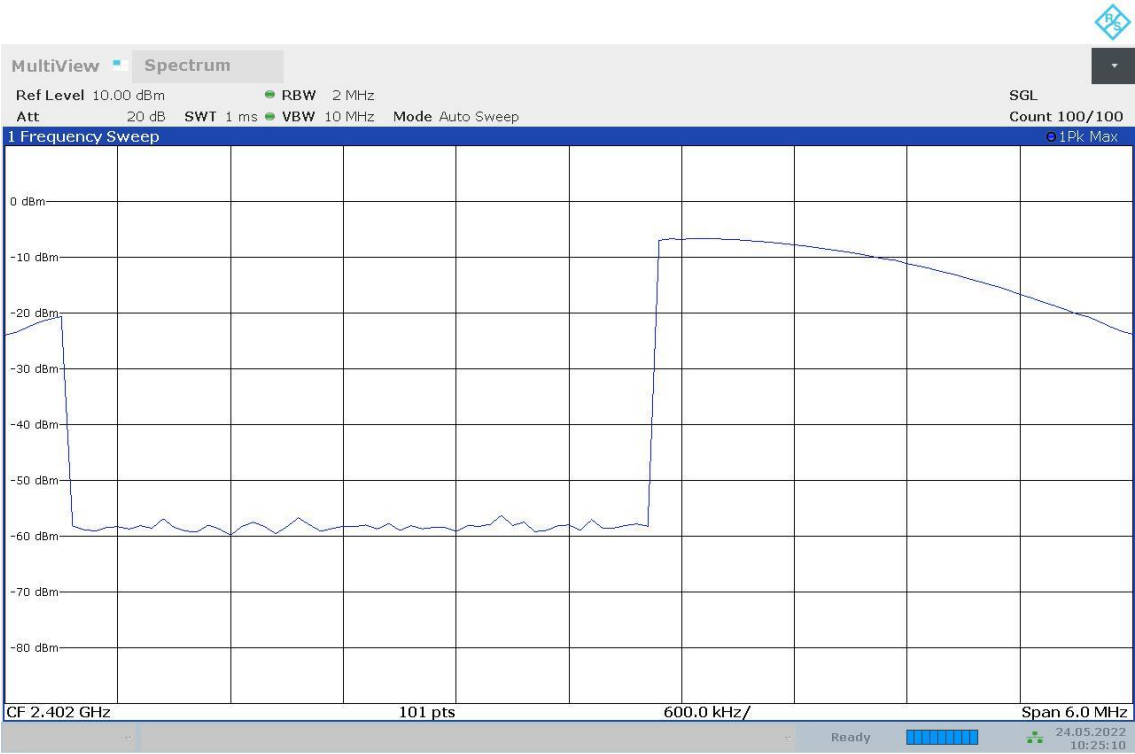
**Images:**



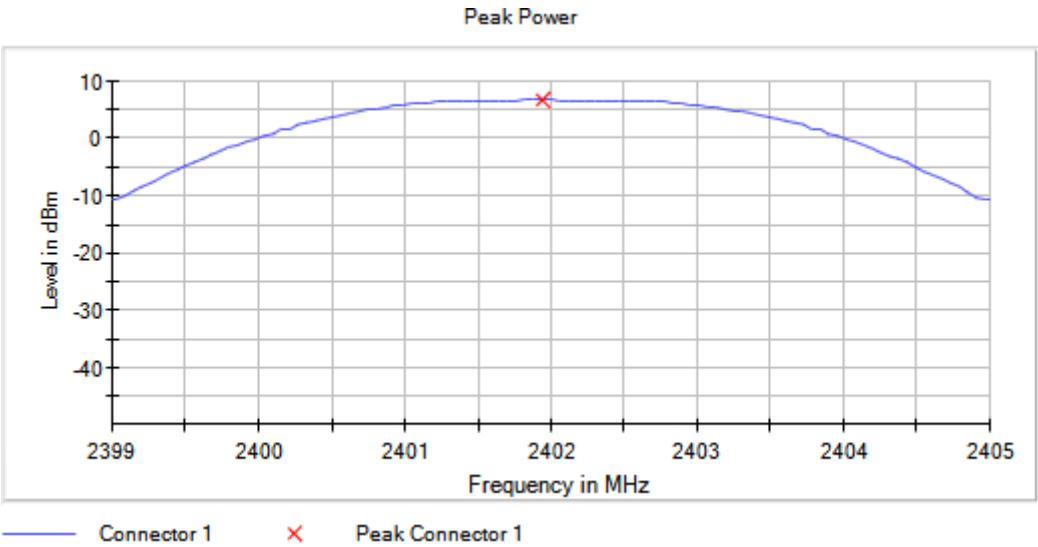
Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Images:



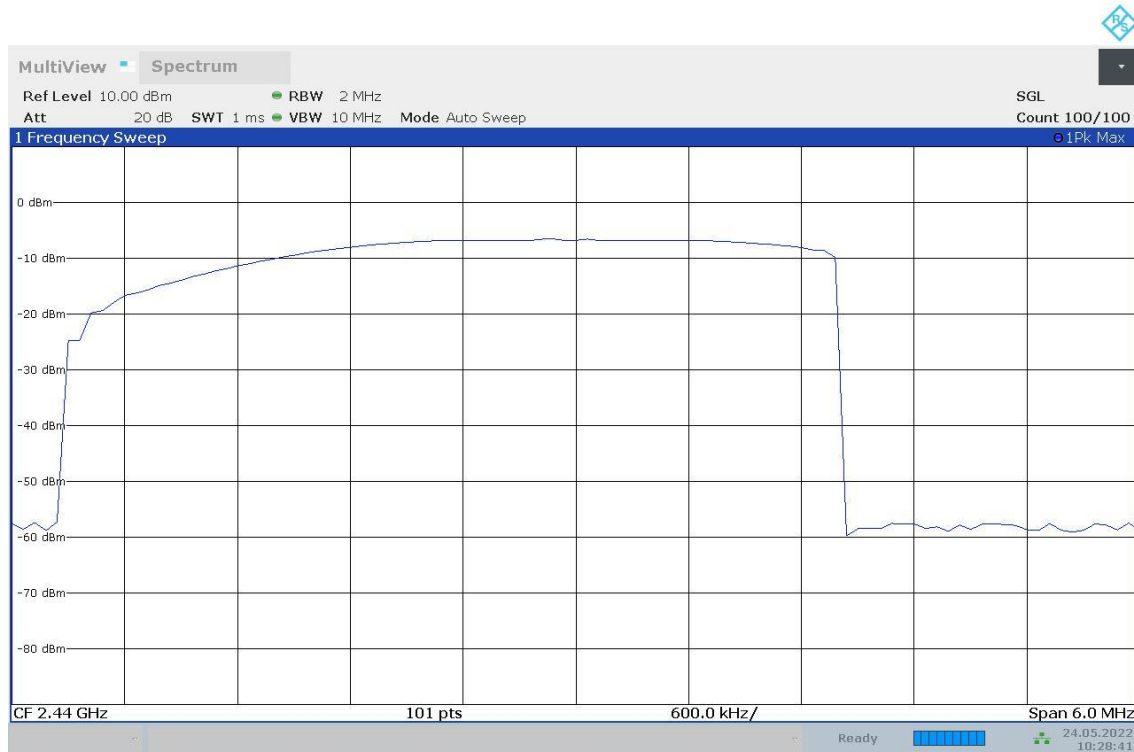


10:25:11 24.05.2022

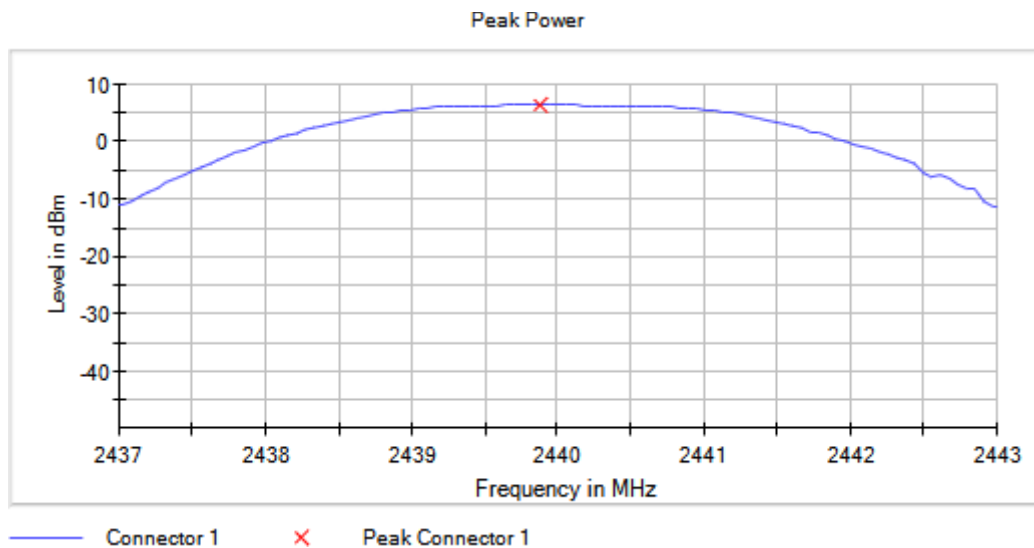


**Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s)**

**Images:**

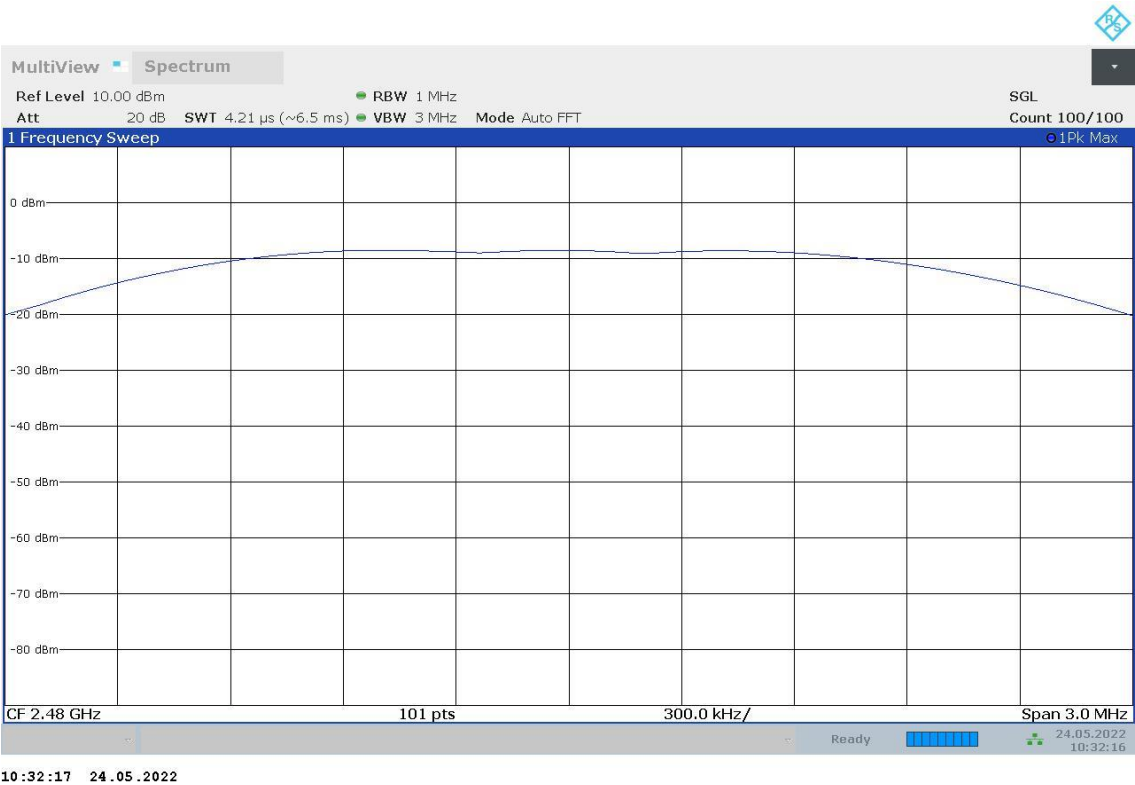
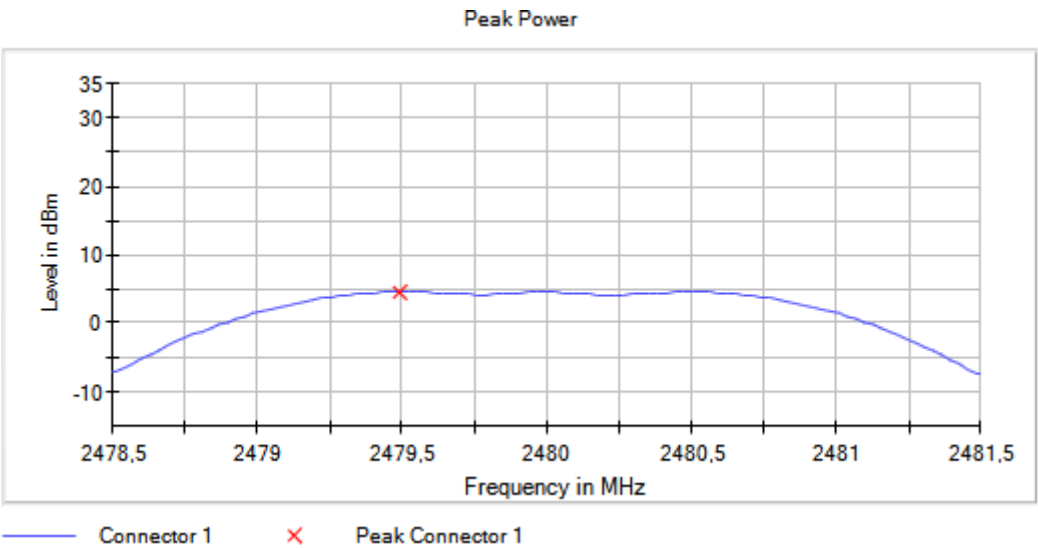


10:28:42 24.05.2022



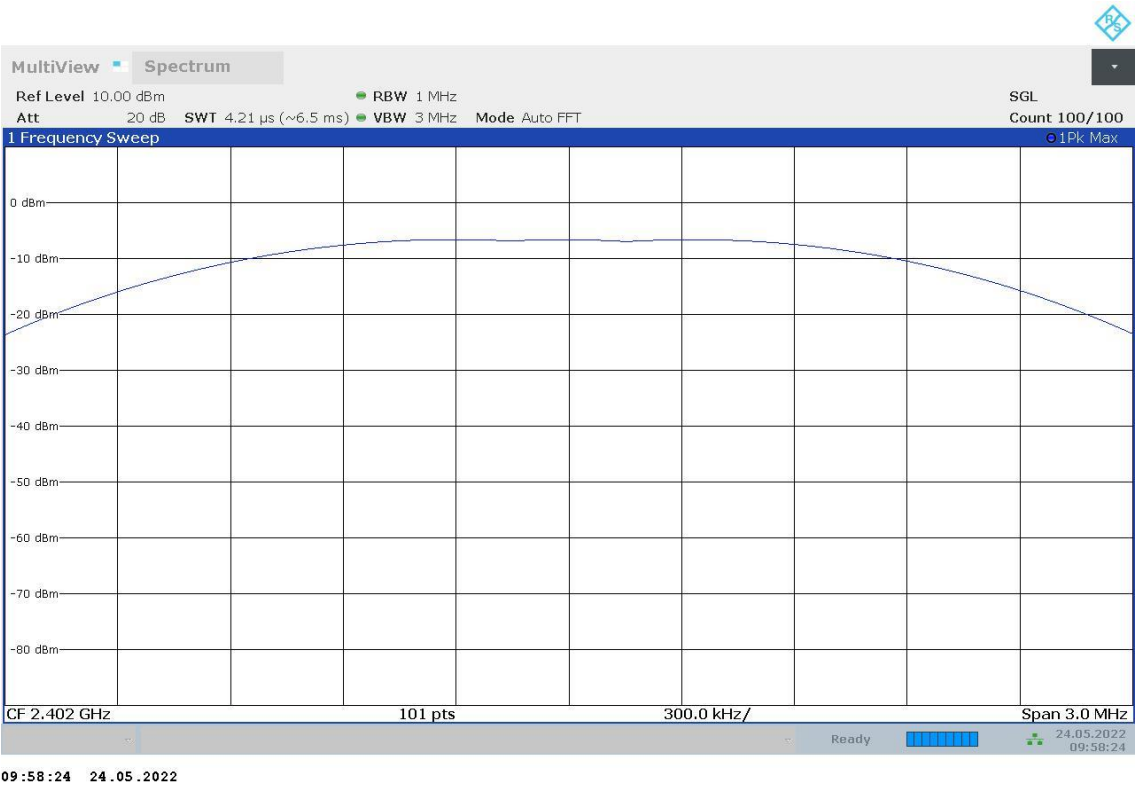
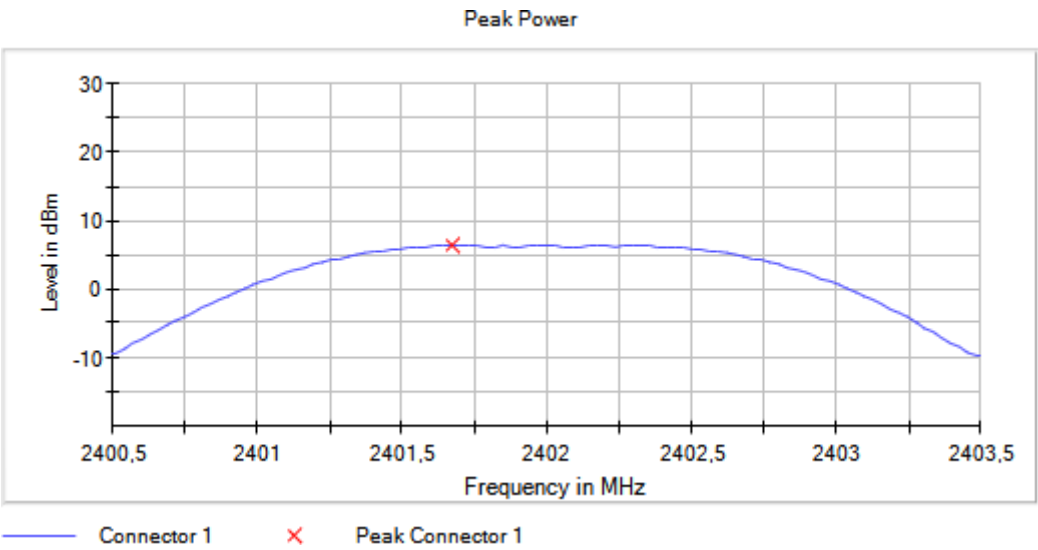
Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s)

Images:



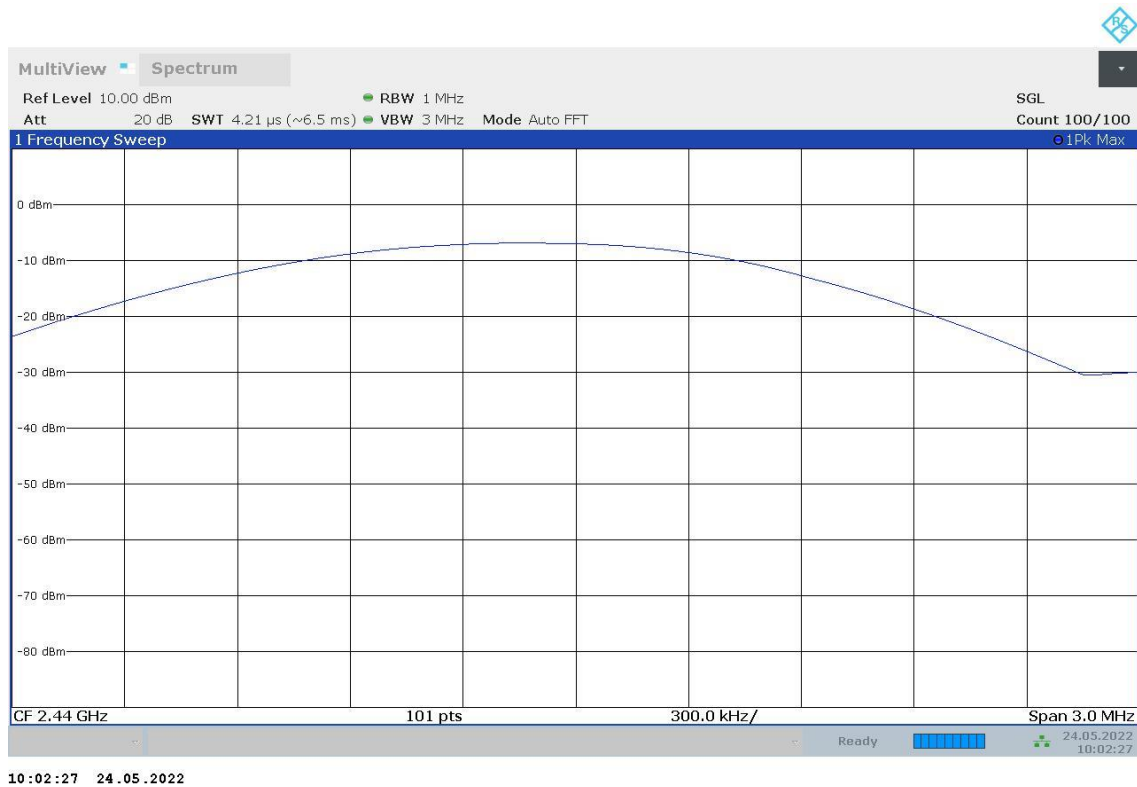
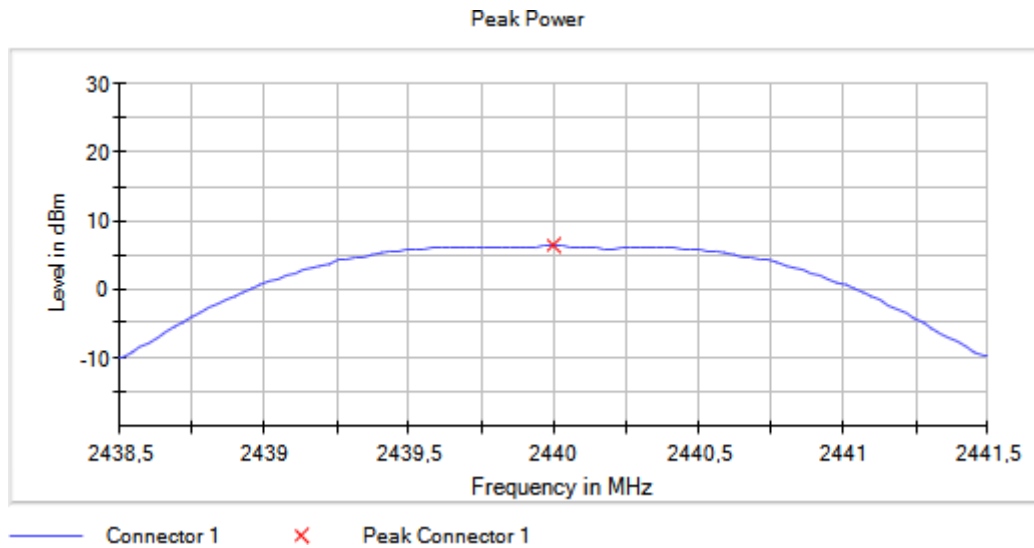
Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Modulation = Proximity

Images:



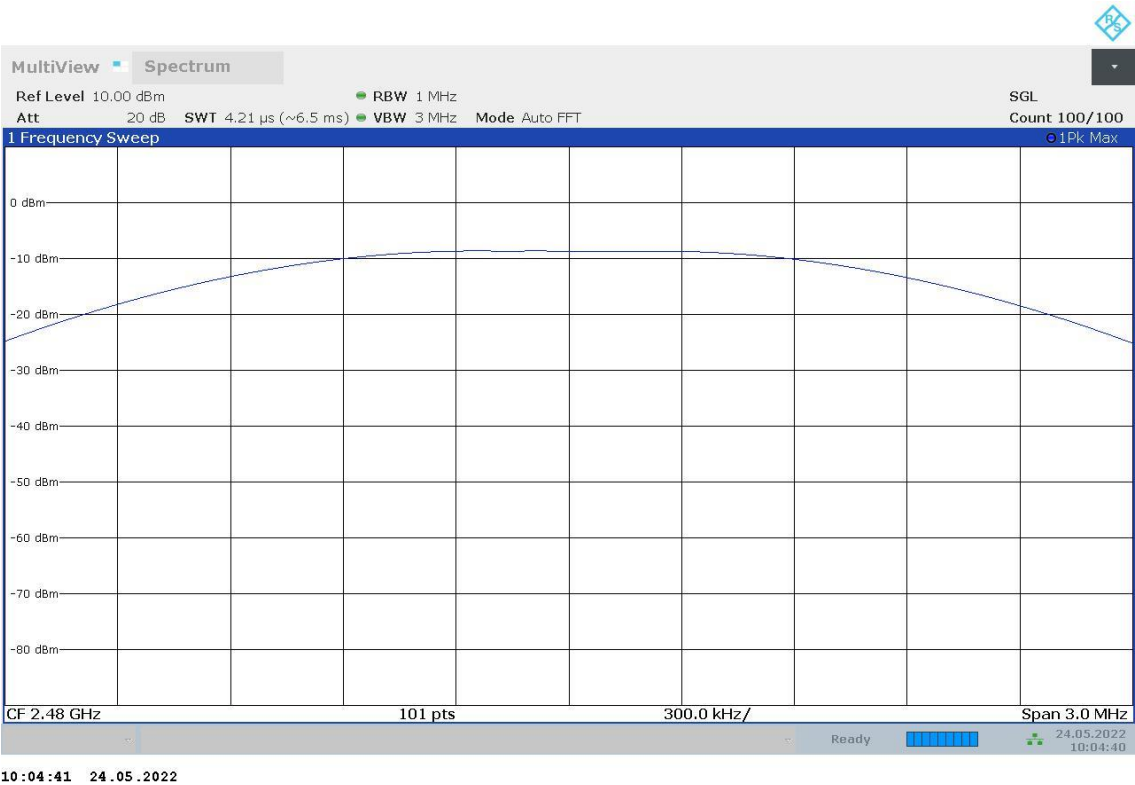
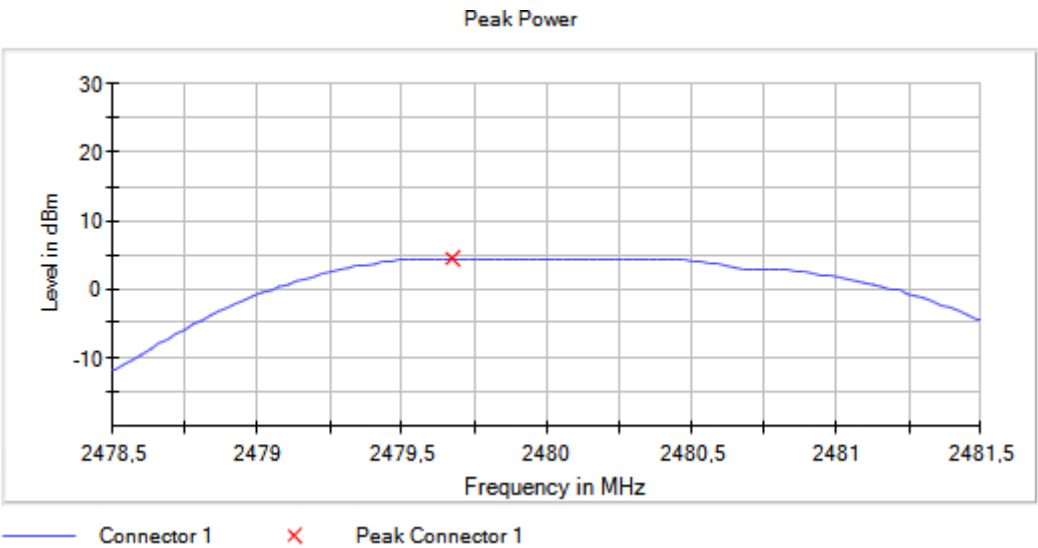
Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Modulation = Proximity

Images:



Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Modulation = Proximity

Images:



## RSS-247 5.5 / FCC 15.247 (d) [Bndedge] Band-edge emissions compliance (Transmitter)

### Limits

In any 100 kHz bandwidths outside the frequency band in which the intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, 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, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

Modulation: Proximity

### Results

Radiated measurements were used to show compliance with the limits in the restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz.

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)

### Results

Radiated measurements were used to show compliance with the limits in the restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz.

Modulation: BTLE 5.0 (GFSK 2 Mbit/s)

### Results

Radiated measurements were used to show compliance with the limits in the restricted bands 2.31-2.39 GHz and 2.4835-2.5 GHz.

### Verdict

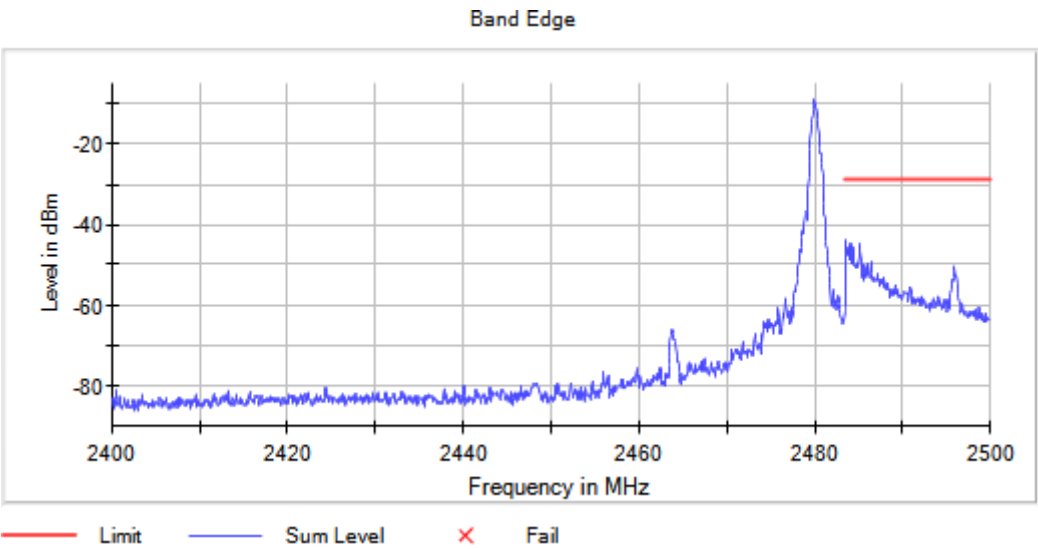
Pass

### Attachments

| Setting         | Instrument Value |
|-----------------|------------------|
| Span            | 90.000 MHz       |
| RBW             | 100.000 kHz      |
| VBW             | 300.000 kHz      |
| SweepPoints     | 1800             |
| SweepTime       | 1.800 ms         |
| Reference Level | 10.000 dBm       |
| Attenuation     | 20.000 dB        |
| Detector        | MaxPeak          |
| SweepCount      | 100              |
| Filter          | 3 dB             |
| Trace Mode      | Max Hold         |
| SweepType       | Sweep            |
| Preamp          | off              |
| Stablemode      | Trace            |

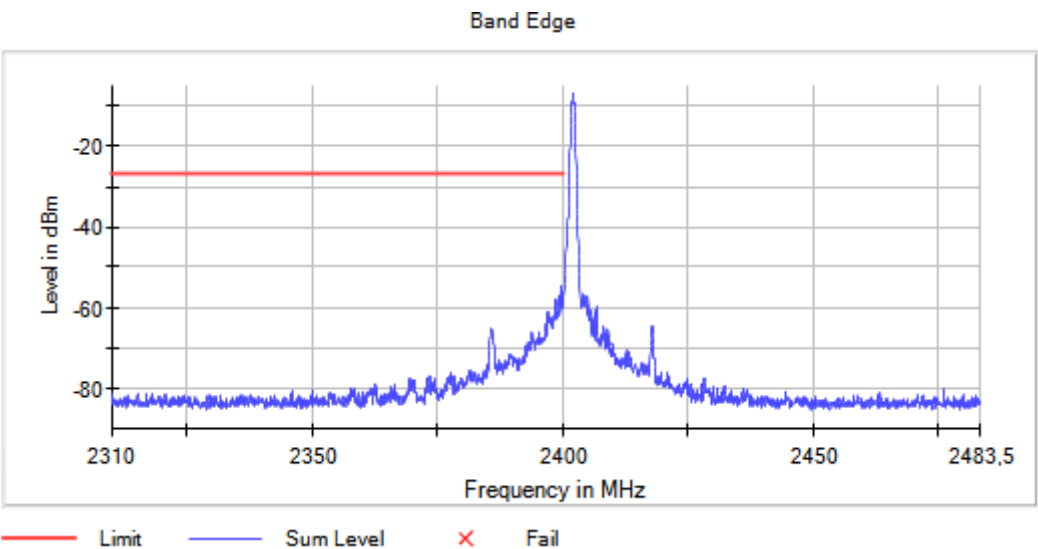
Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s),  
Measurement Point = 1

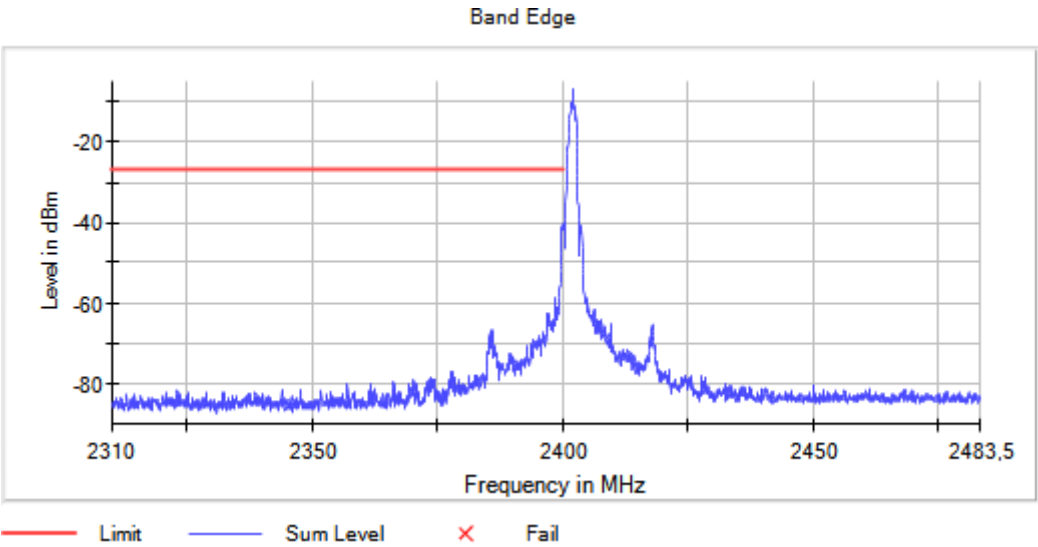
Images:



Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s),  
Measurement Point = 1

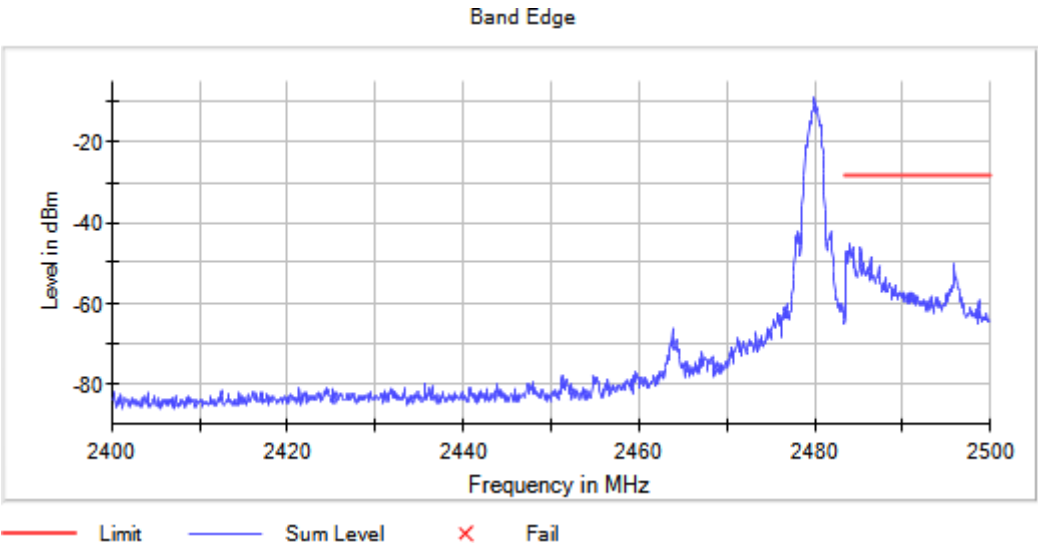
Images:





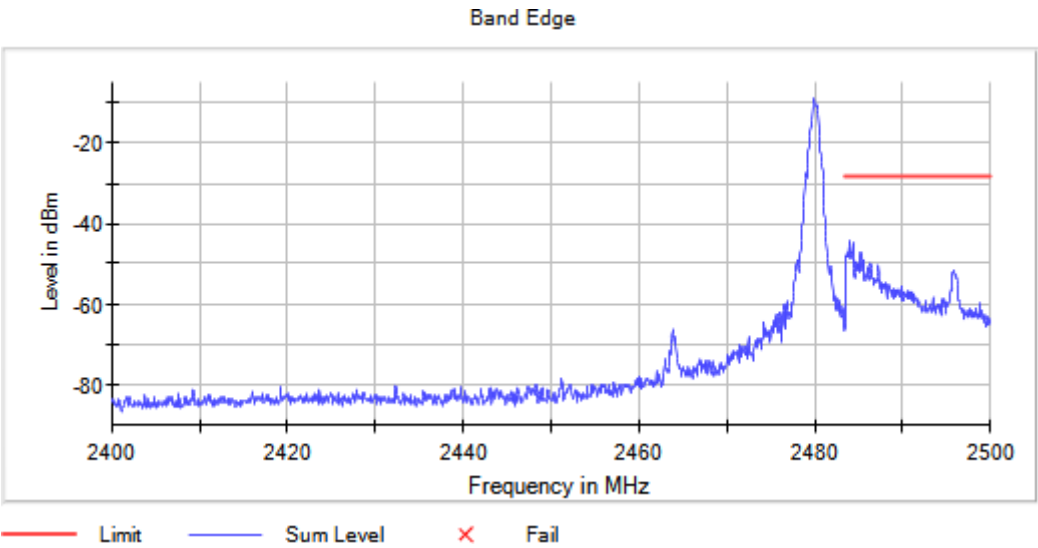
Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s),  
Measurement Point = 1

Images:



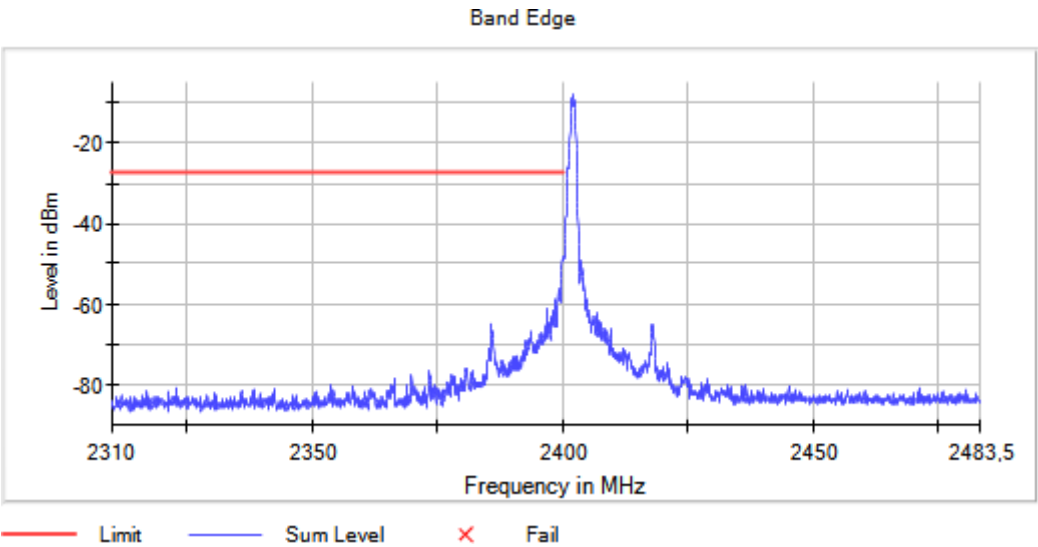
Equipment Type = Digital Transmission System (DTS), Modulation = Proximity, Measurement Point = 1

Images:



Equipment Type = Digital Transmission System (DTS), Modulation = Proximity, Measurement Point = 1

Images:



## RSS-247 5.5 / FCC 15.247 (d) [RSE] Emission limitations radiated (Transmitter)

### Limits

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)/RSS-Gen):

| Frequency Range (MHz) | Field strength ( $\mu\text{V/m}$ ) | Field strength ( $\text{dB}\mu\text{V/m}$ ) | Measurement distance (m) |
|-----------------------|------------------------------------|---------------------------------------------|--------------------------|
| 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                                | 40                                          | 3                        |
| 88 - 216              | 150                                | 43.5                                        | 3                        |
| 216 - 960             | 200                                | 46                                          | 3                        |
| Above 960             | 500                                | 54                                          | 3                        |

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

RSS-247: Attenuation below the general field strength limits specified in RSS-Gen is not required.

Modulation: Proximity

### Results

| Freq (MHz) | Equipment                         | Freq Rng (GHz) | Unwanted Freq (MHz) | Unwanted Lvl ( $\text{dB}\mu\text{V/m}$ ) | Pol | Detector |
|------------|-----------------------------------|----------------|---------------------|-------------------------------------------|-----|----------|
| 2402.00000 | Digital Transmission System (DTS) | [3, 17]        | 4804.030            | 49.93                                     | V   | PK       |
|            |                                   |                | 4804.030            | 39.59                                     | V   | AVG      |
| 2440.00000 |                                   |                | 4879.990            | 52.81                                     | V   | PK       |
|            |                                   |                | 4879.990            | 42.55                                     | V   | AVG      |
| 2480.00000 |                                   |                | 4960.000            | 58.01                                     | V   | PK       |
|            |                                   |                | 4960.000            | 35.68                                     | V   | AVG      |

### Verdict

Pass

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)

### Results

| Freq (MHz) | Equipment                         | Freq Rng (GHz) | Unwanted Freq (MHz) | Unwanted Lvl (dBµV/m) | Pol | Detector |
|------------|-----------------------------------|----------------|---------------------|-----------------------|-----|----------|
| 2402.00000 | Digital Transmission System (DTS) | [3, 17]        | 4804.000            | 51.54                 | V   | PK       |
|            |                                   |                | 4804.000            | 41.37                 | V   | AVG      |
| 2440.00000 |                                   |                | 4880.000            | 52.24                 | V   | PK       |
|            |                                   |                | 4880.000            | 42.44                 | V   | AVG      |
| 2480.00000 |                                   |                | 4960.000            | 57.26                 | V   | PK       |
|            |                                   |                | 4960.000            | 39.78                 | V   | AVG      |

Modulation: BTLE 5.0 (GFSK 2 Mbit/s)

### Results

| Freq (MHz) | Equipment                         | Freq Rng (GHz) | Unwanted Freq (MHz) | Unwanted Lvl (dBμV/m) | Pol   | Detector |
|------------|-----------------------------------|----------------|---------------------|-----------------------|-------|----------|
| 2402.00000 | Digital Transmission System (DTS) | [3, 17]        | 4803.840            | 50.76                 | V     | PK       |
| 2440.00000 |                                   |                | 4803.840            | 38.86                 | V     | AVG      |
|            |                                   |                | 4879.960            | 53.27                 | V     | PK       |
|            |                                   |                | 4879.960            | 41.82                 | V     | AVG      |
|            |                                   |                | 2480.00000          | 4960.500              | 57.40 | V        |
| 4960.500   |                                   |                |                     | 45.55                 | V     | AVG      |

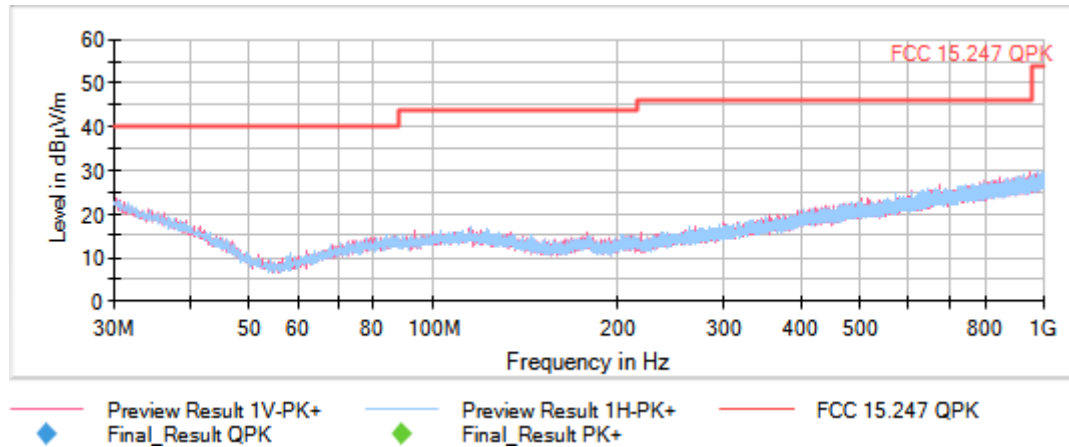
### Verdict

Pass

## Attachments

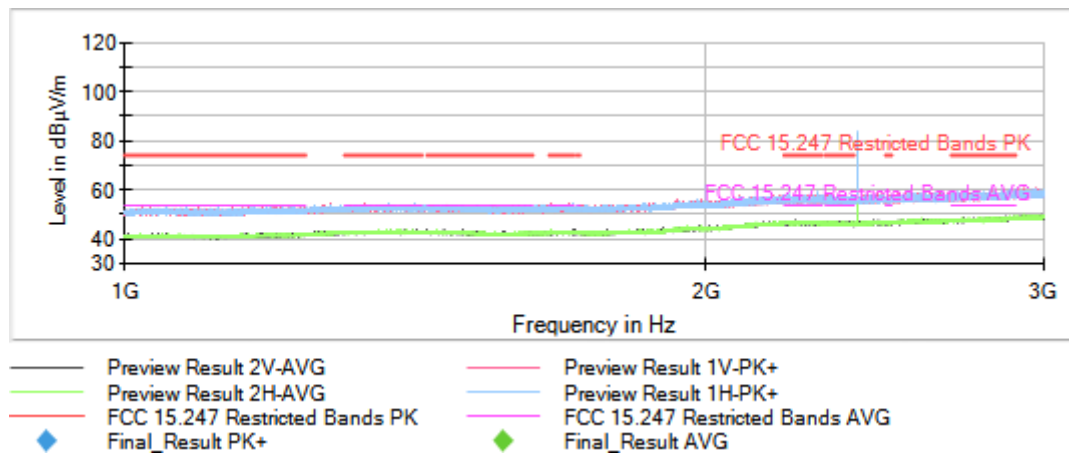
Frequency MHz = The spurious frequencies detected do not depend neither on the operating channel,  
Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency  
Range GHz = [0.03, 1], Measurement Point = 1

Images:

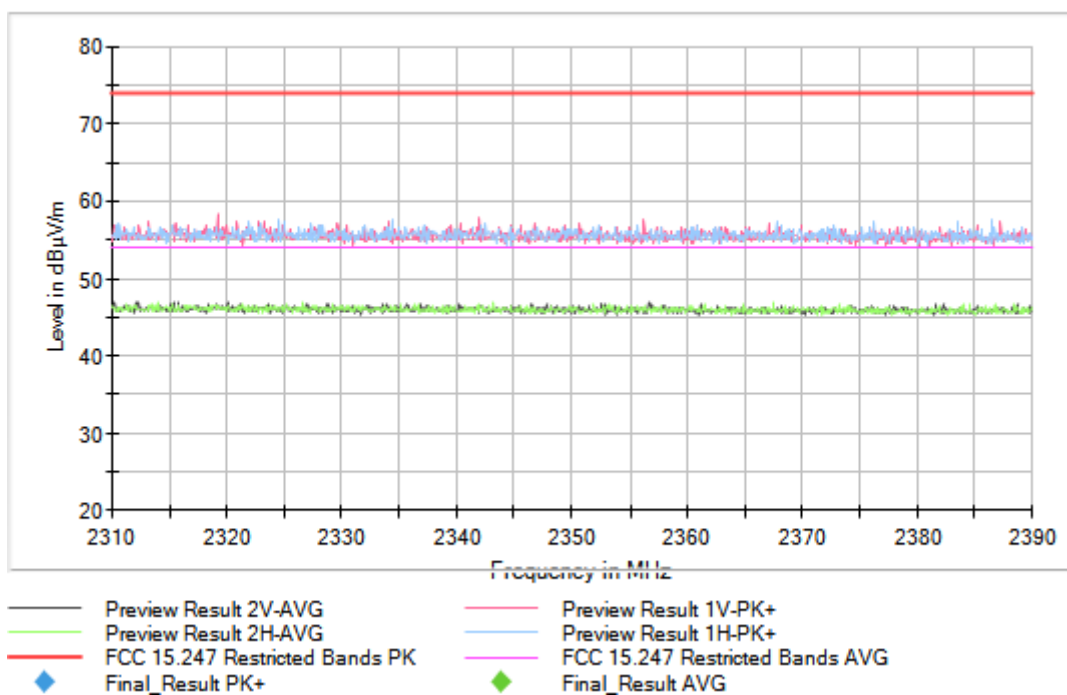


Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency Range GHz = [1, 3], Measurement Point = 1

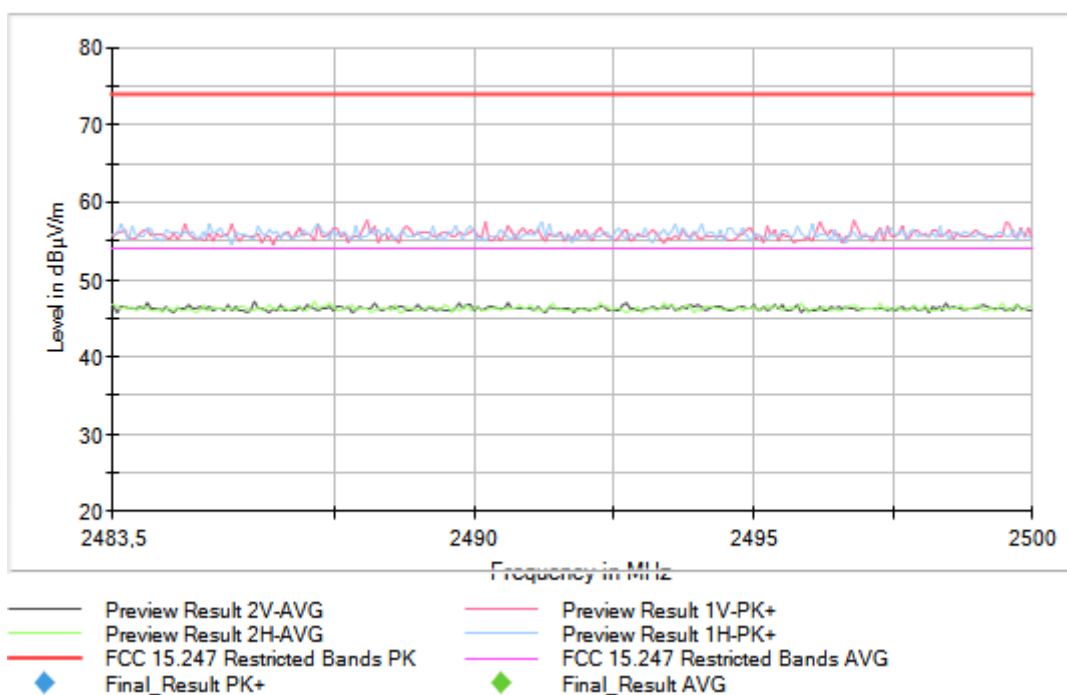
Images:



Full Spectrum

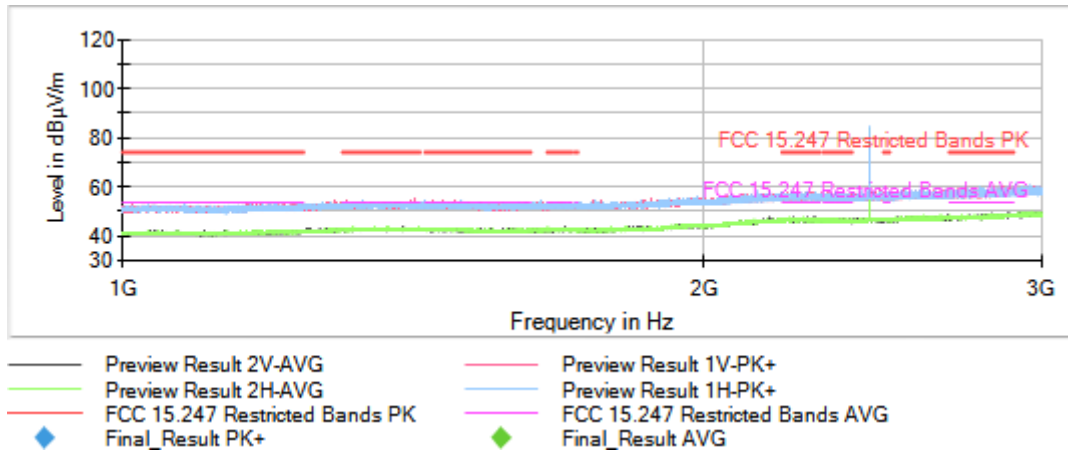


Full Spectrum

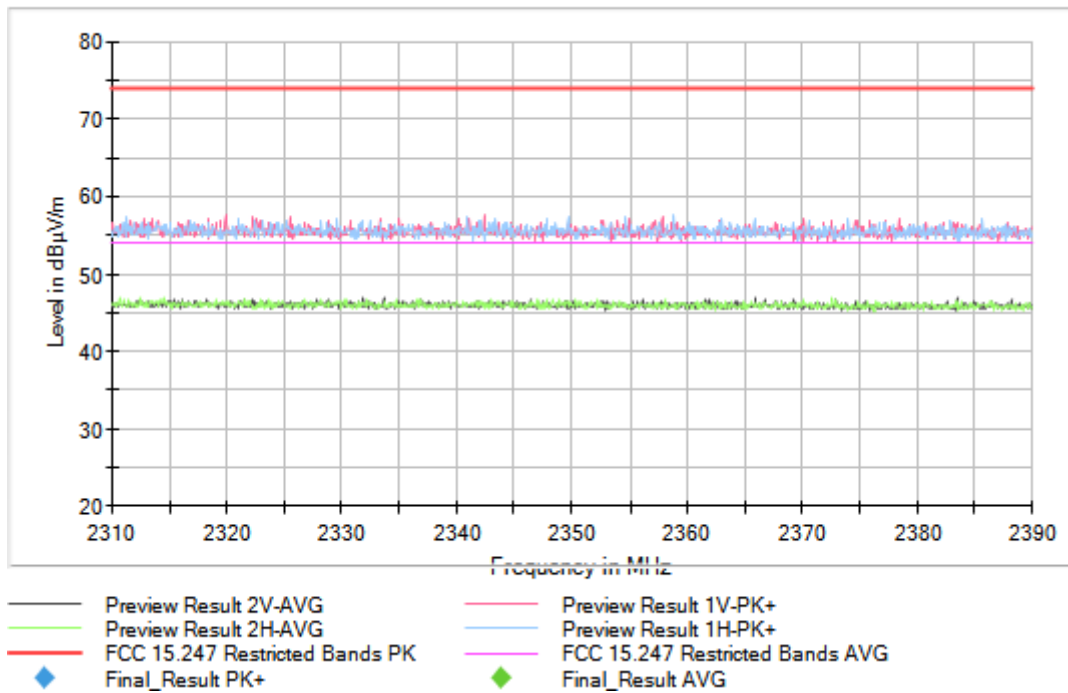


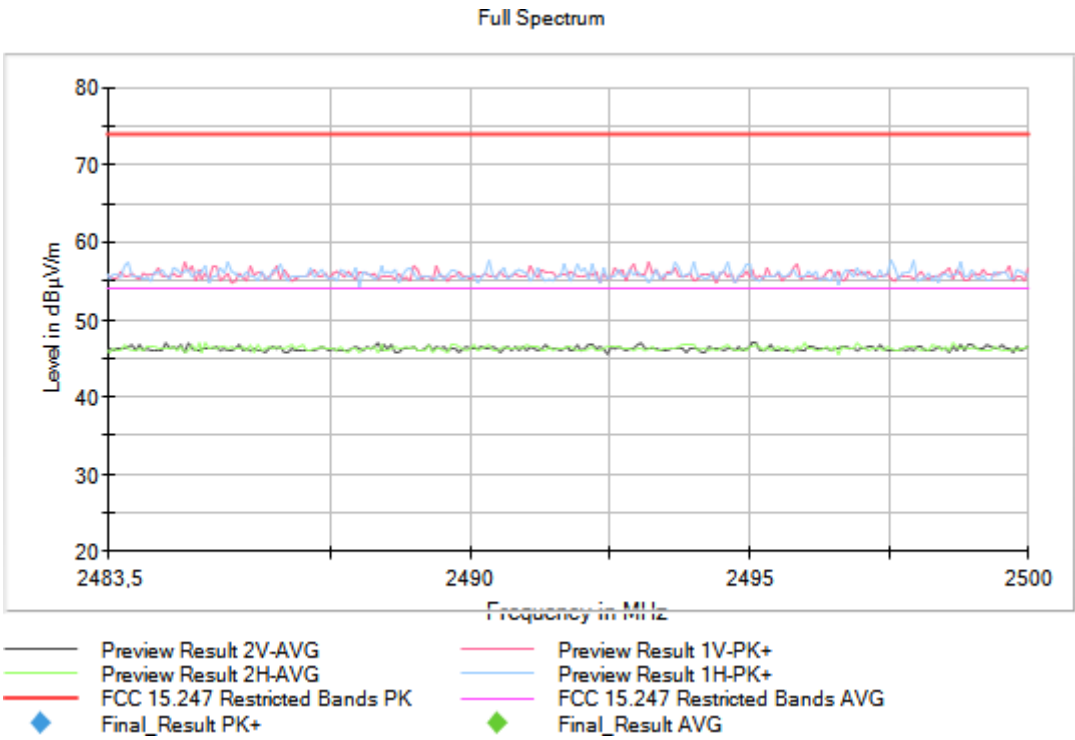
Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency Range GHz = [1, 3], Measurement Point = 1

Images:



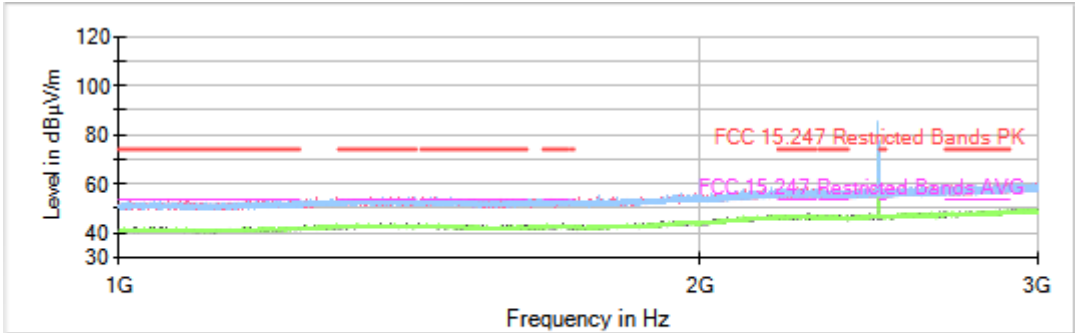
Full Spectrum



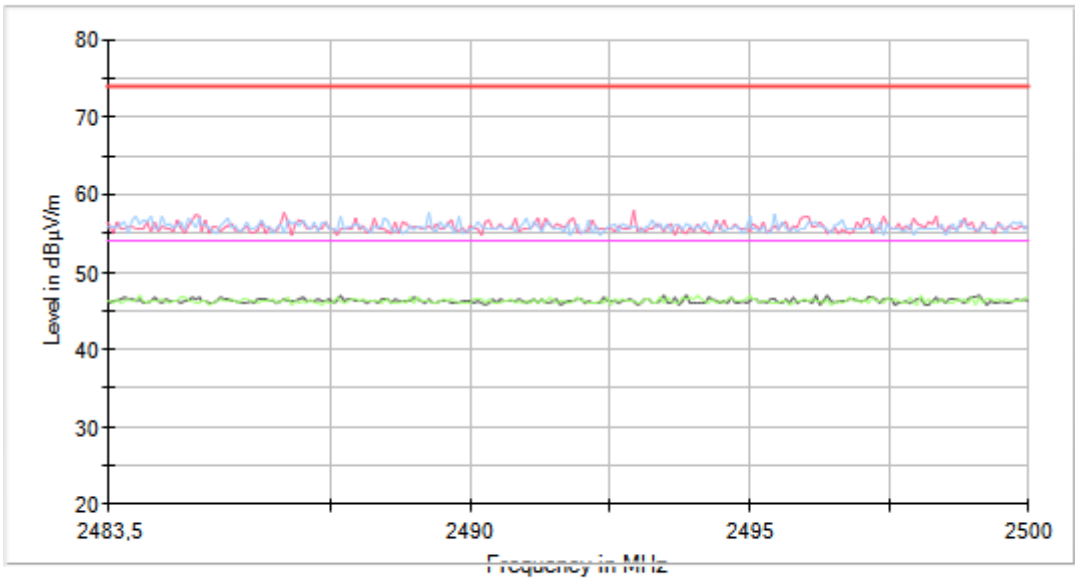


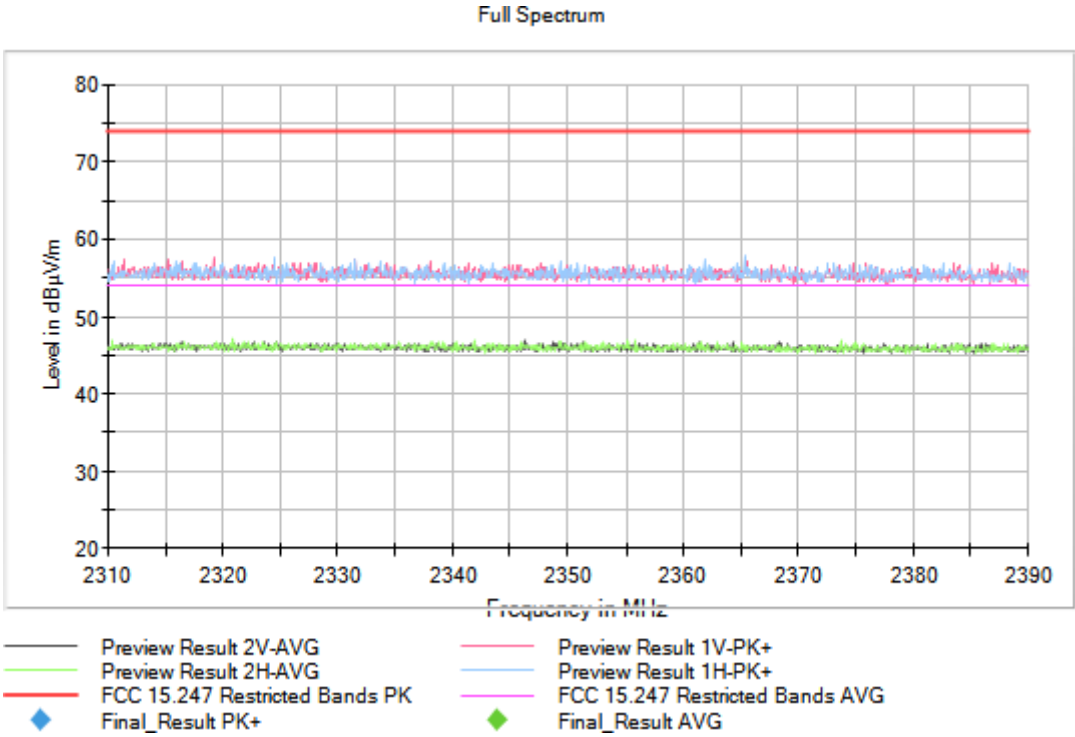
Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency Range GHz = [1, 3], Measurement Point = 1

Images:



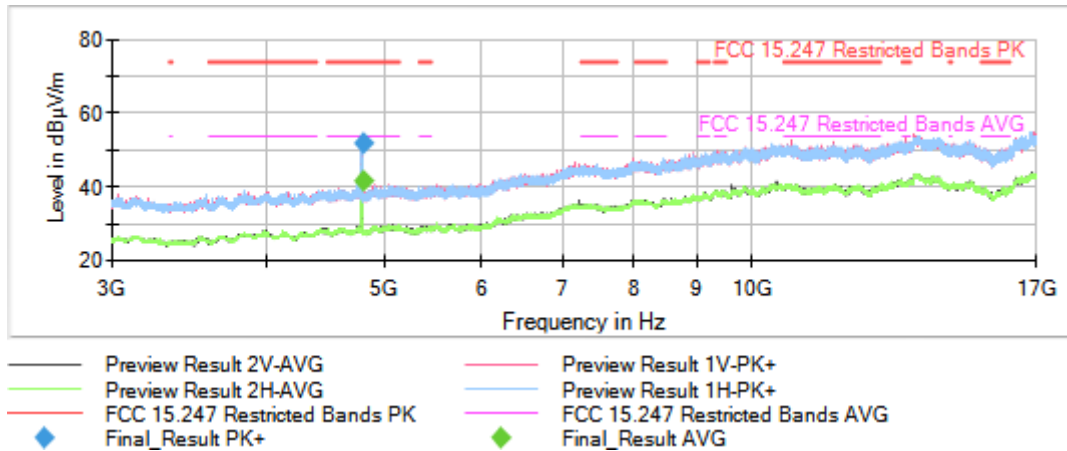
Full Spectrum





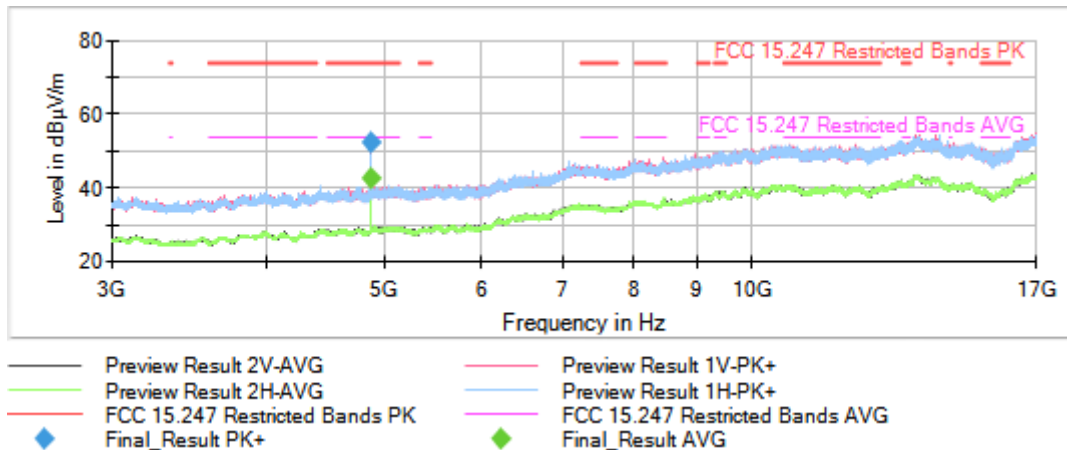
Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency Range GHz = [3, 17], Measurement Point = 1

Images:



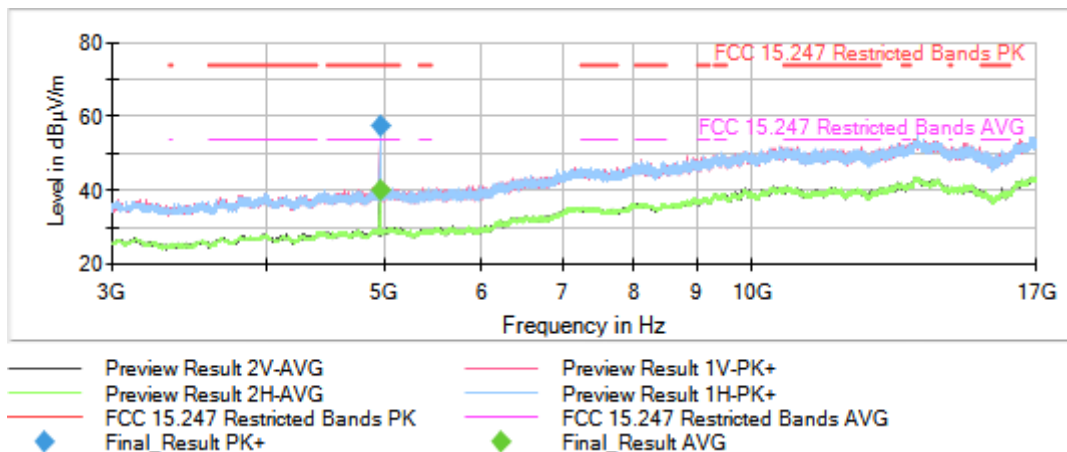
Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency Range GHz = [3, 17], Measurement Point = 1

Images:



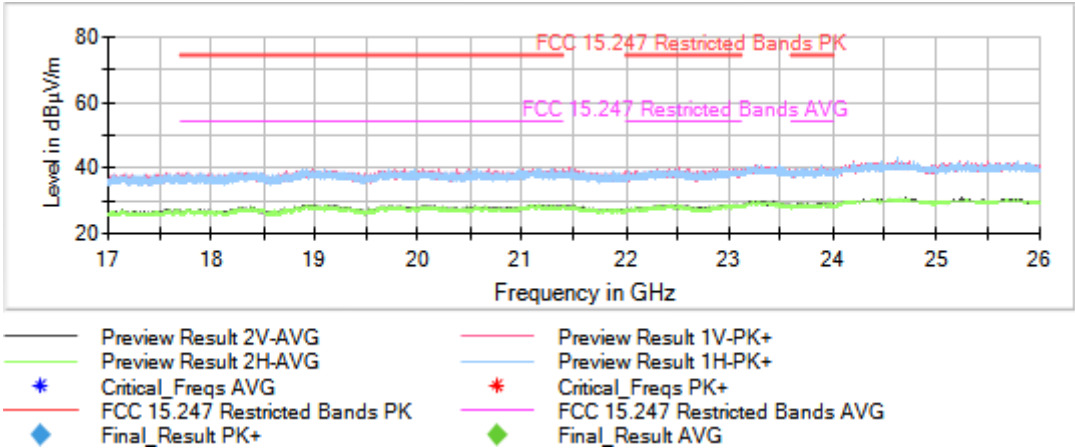
Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency Range GHz = [3, 17], Measurement Point = 1

Images:



Frequency MHz = The spurious frequencies detected do not depend neither on the operating channel,  
Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s), Frequency  
Range GHz = [17, 26], Measurement Point = 1

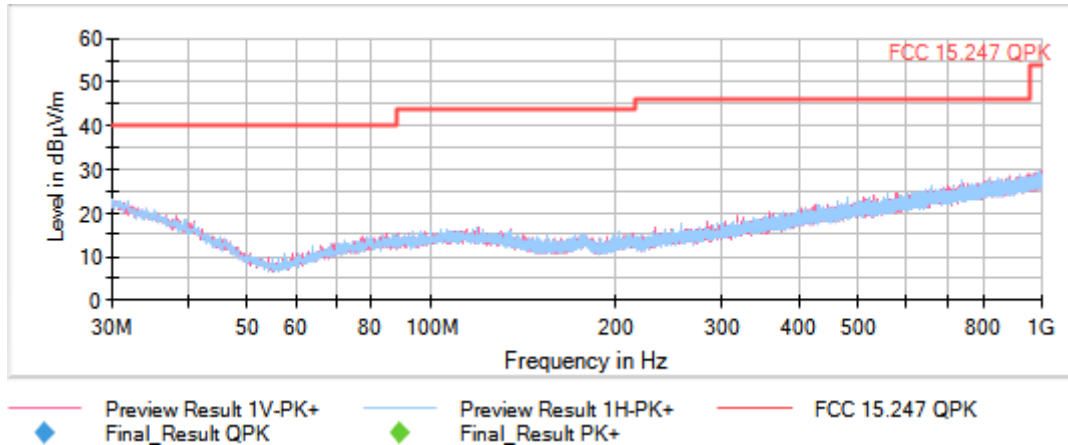
Images:



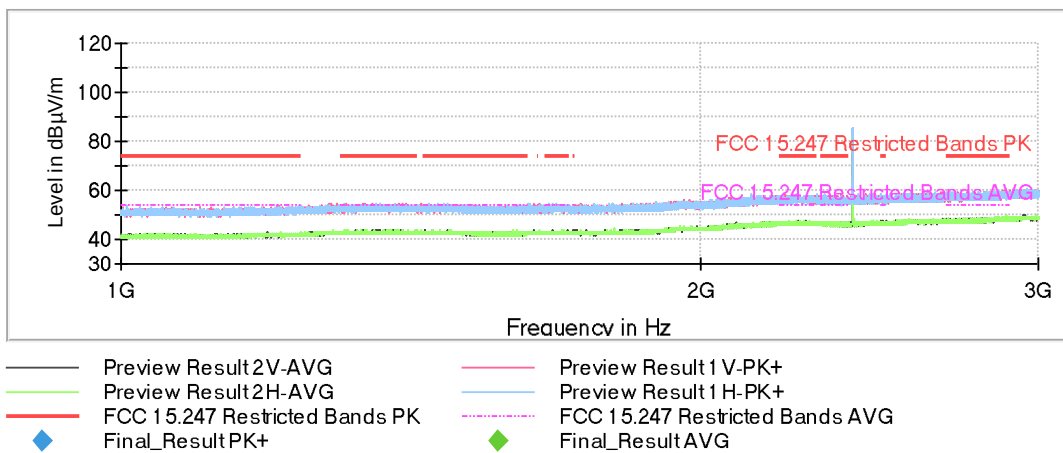
Modulation: BTLE 5.0 (GFSK 2 Mbit/s)

Frequency MHz = The spurious frequencies detected do not depend neither on the operating channe,  
Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency  
Range GHz = [0.03, 1], Measurement Point = 1

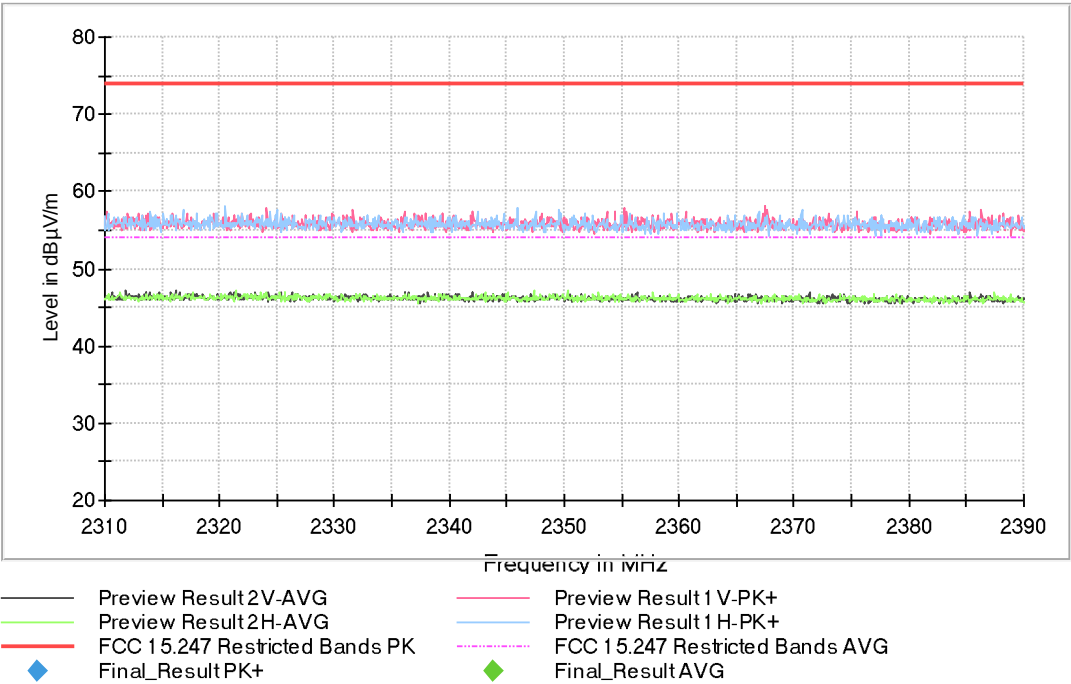
Images:



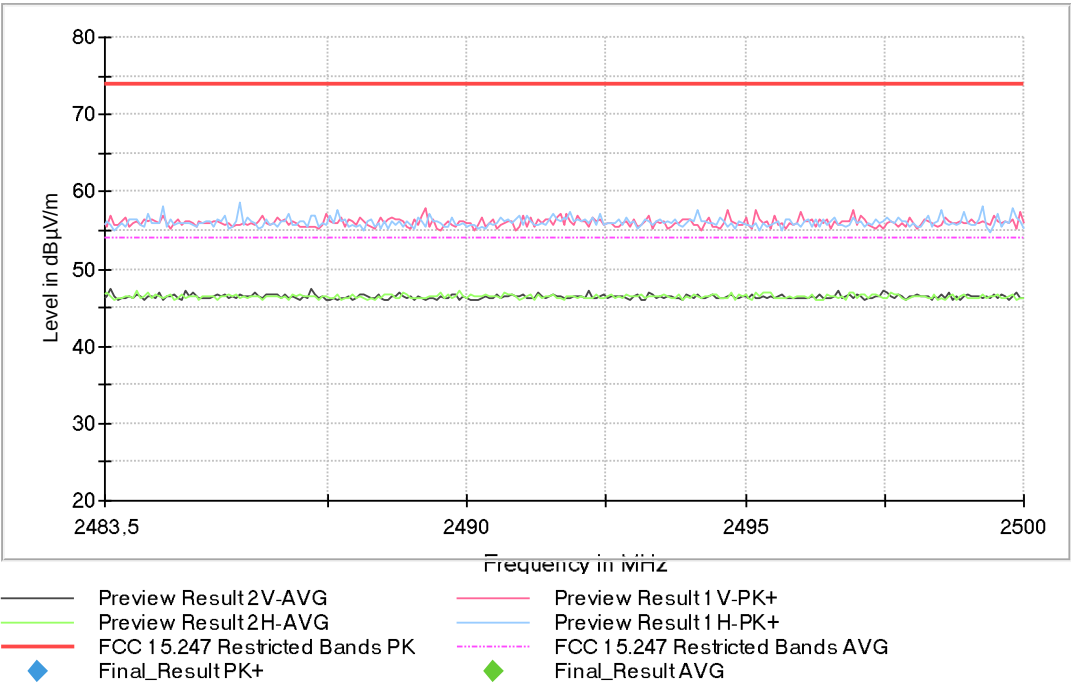
Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE  
5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [1, 3], Measurement Point = 1



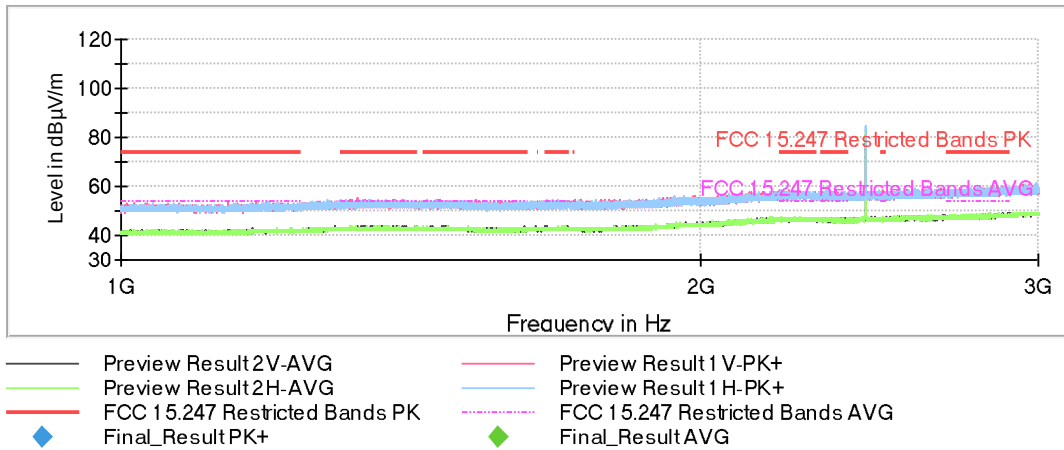
Full Spectrum



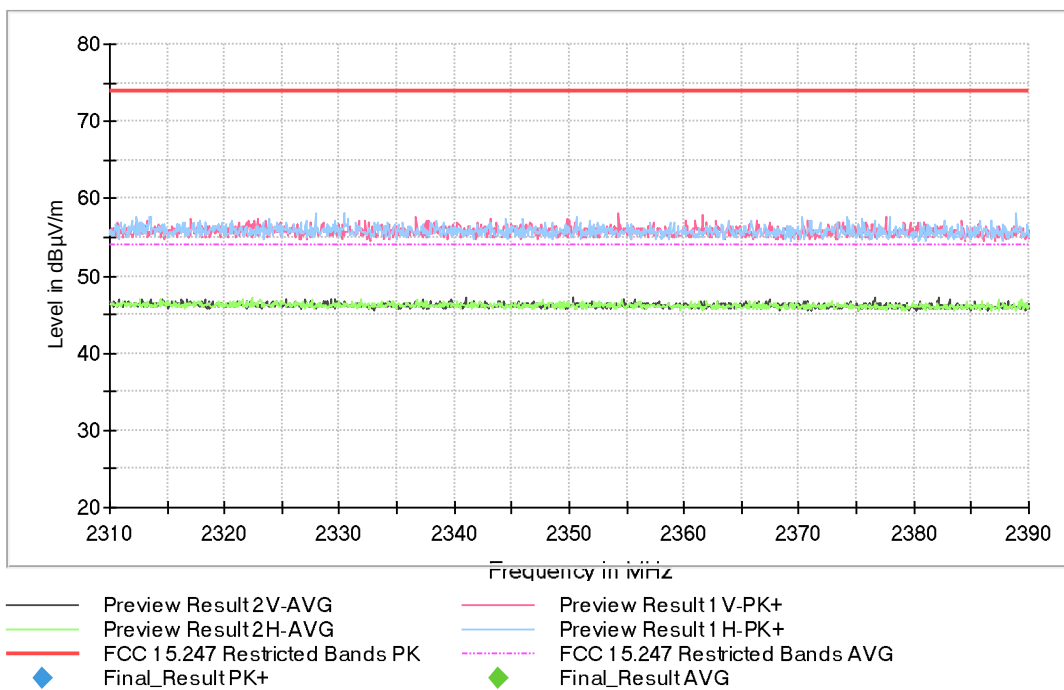
Full Spectrum



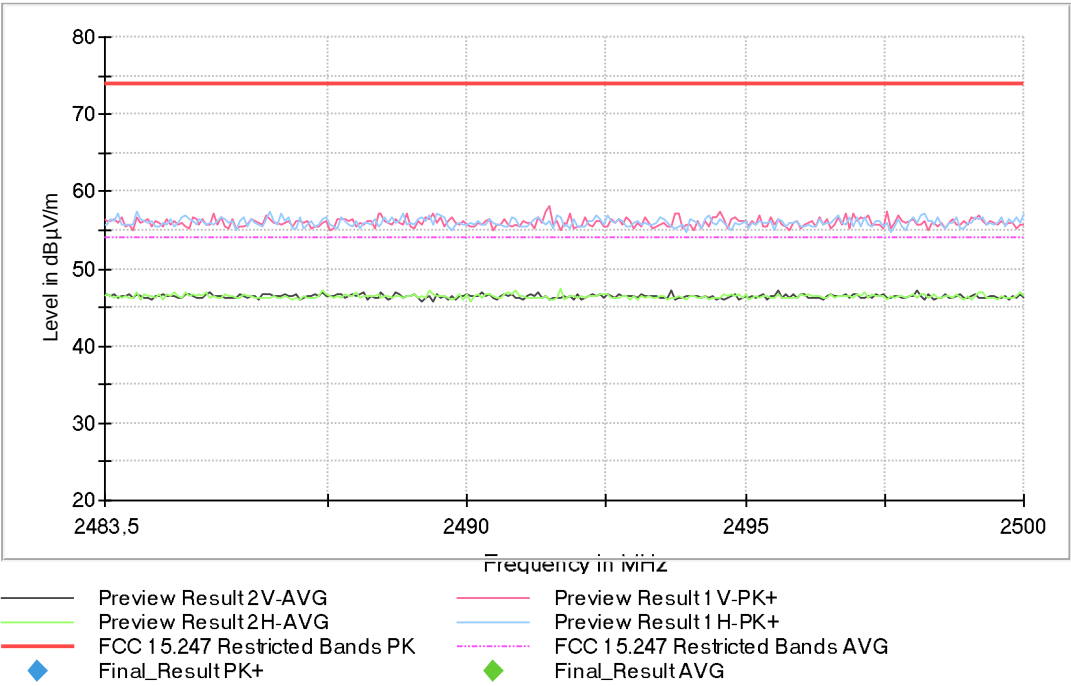
Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [1, 3], Measurement Point = 1



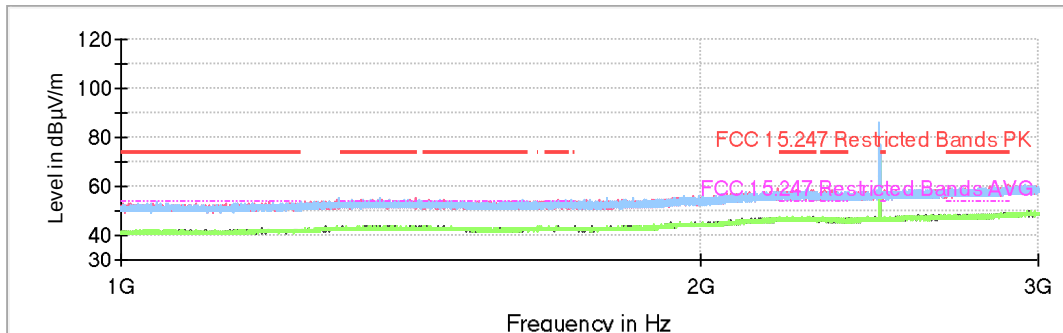
Full Spectrum



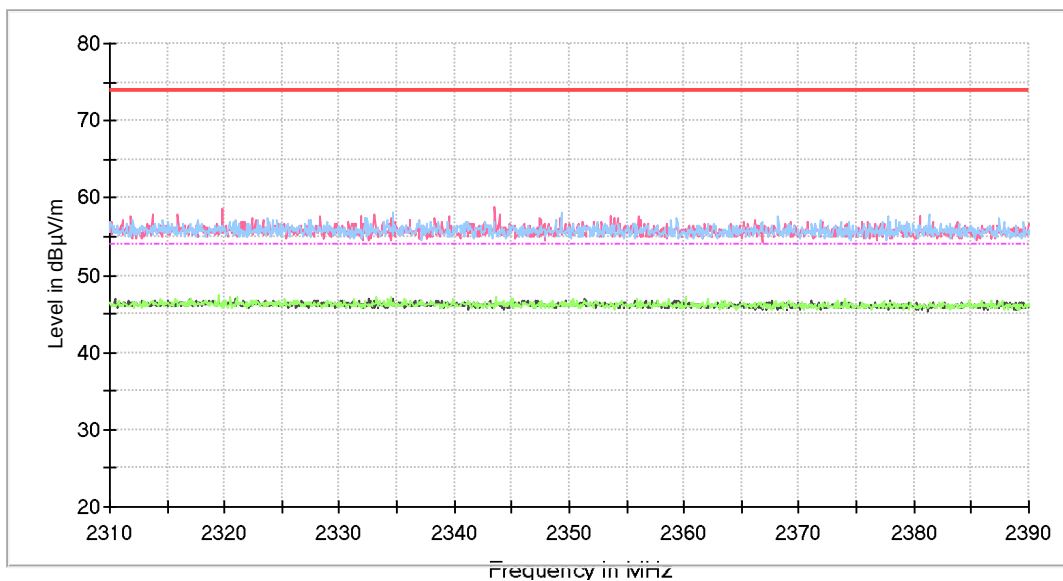
Full Spectrum



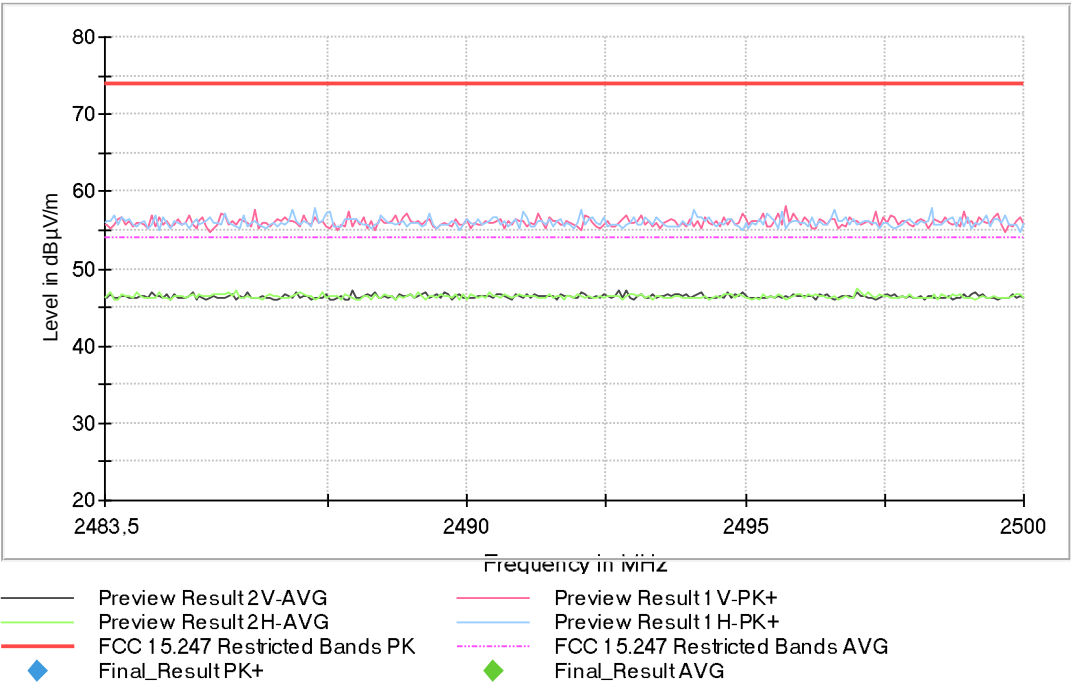
**Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [1, 3], Measurement Point = 1**



Full Spectrum

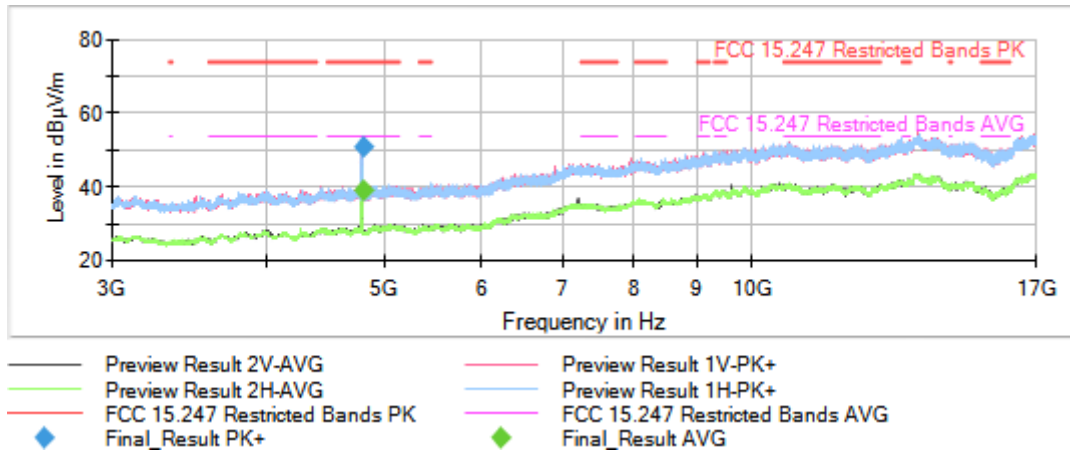


Full Spectrum

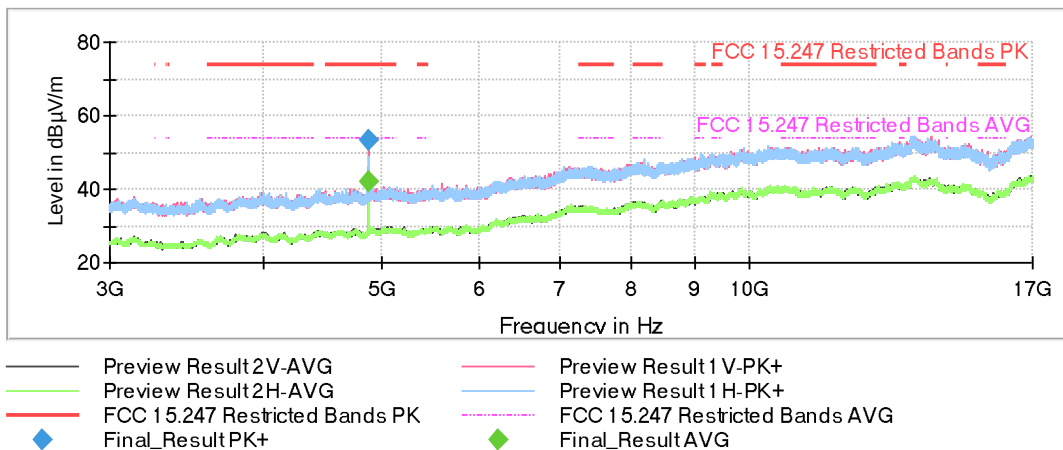


Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [3, 17], Measurement Point = 1

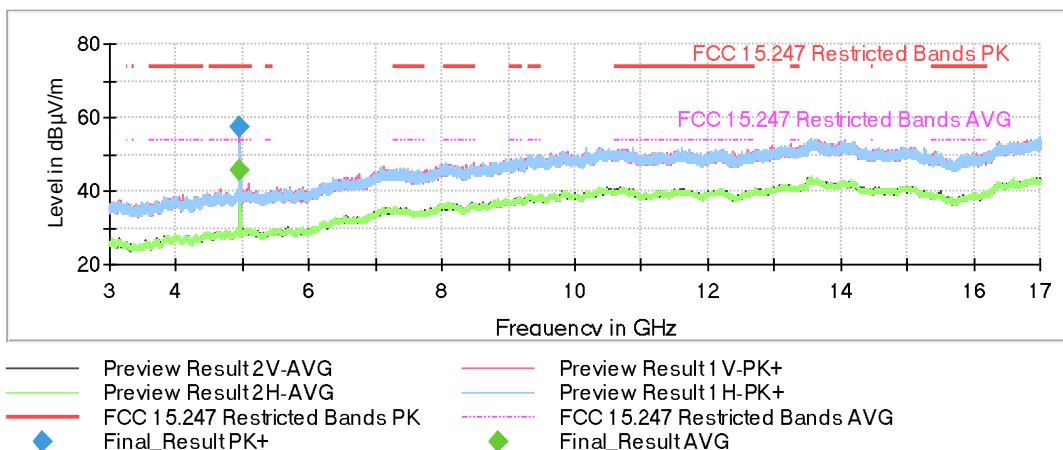
Images:



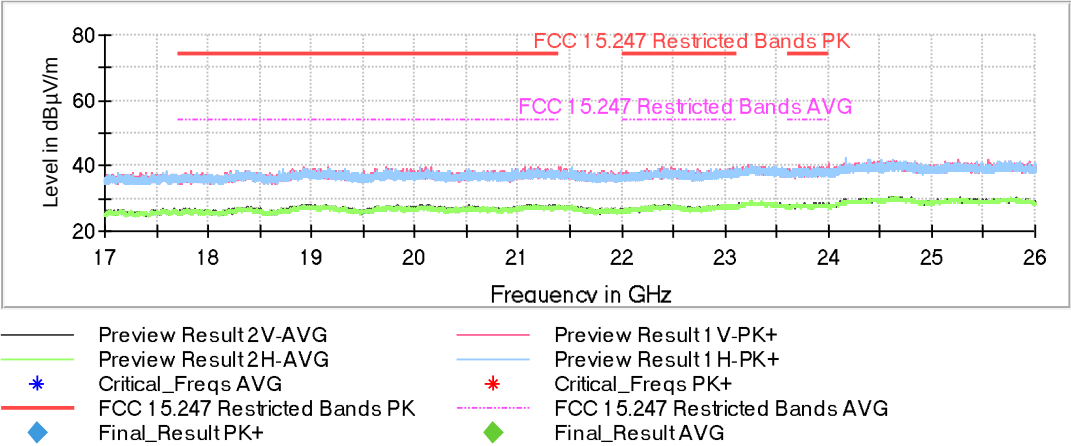
Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [3, 17], Measurement Point = 1



Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency Range GHz = [3, 17], Measurement Point = 1



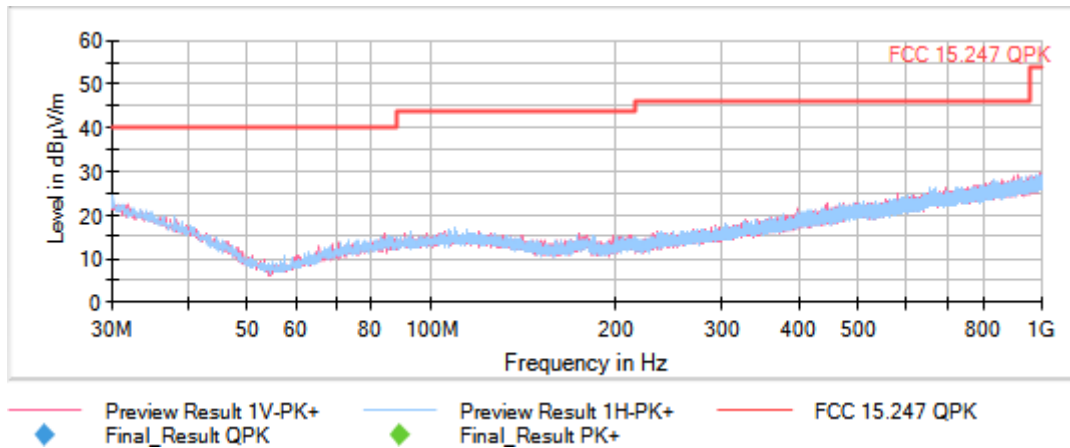
Frequency MHz = The spurious frequencies detected do not depend neither on the operating channel,  
Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s), Frequency  
Range GHz = [3, 17], Measurement Point = 1



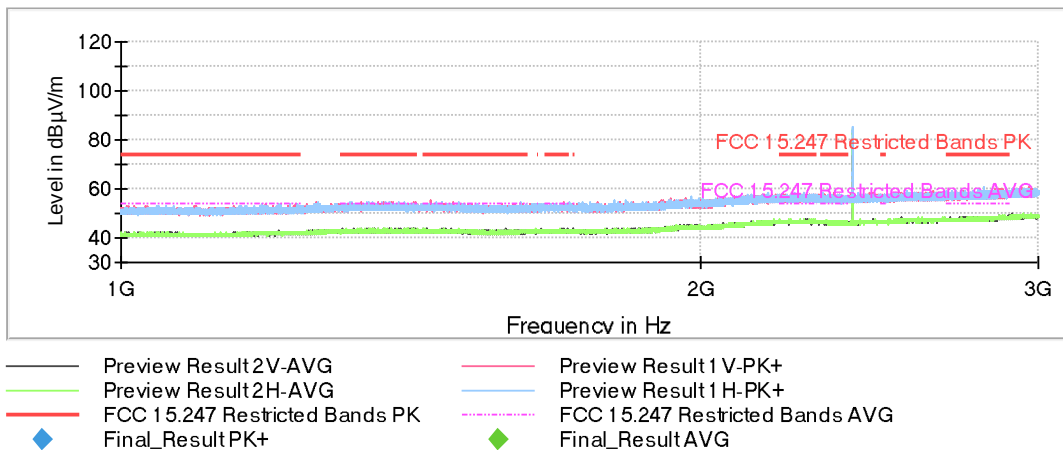
Modulation: BTLE 5.0 (GFSK 2 Mbit/s)

Frequency MHz = The spurious frequencies detected do not depend neither on the operating channel,  
Equipment Type = Digital Transmission System (DTS), Modulation = Proximity, Frequency Range GHz = [0.03, 1], Measurement Point = 1

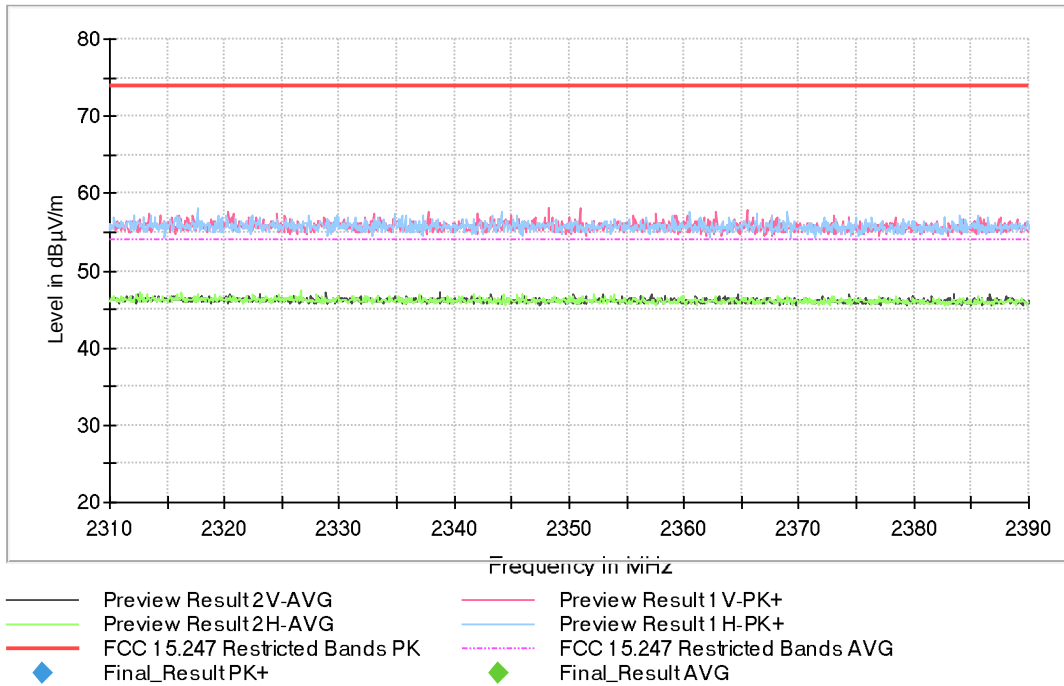
Images:



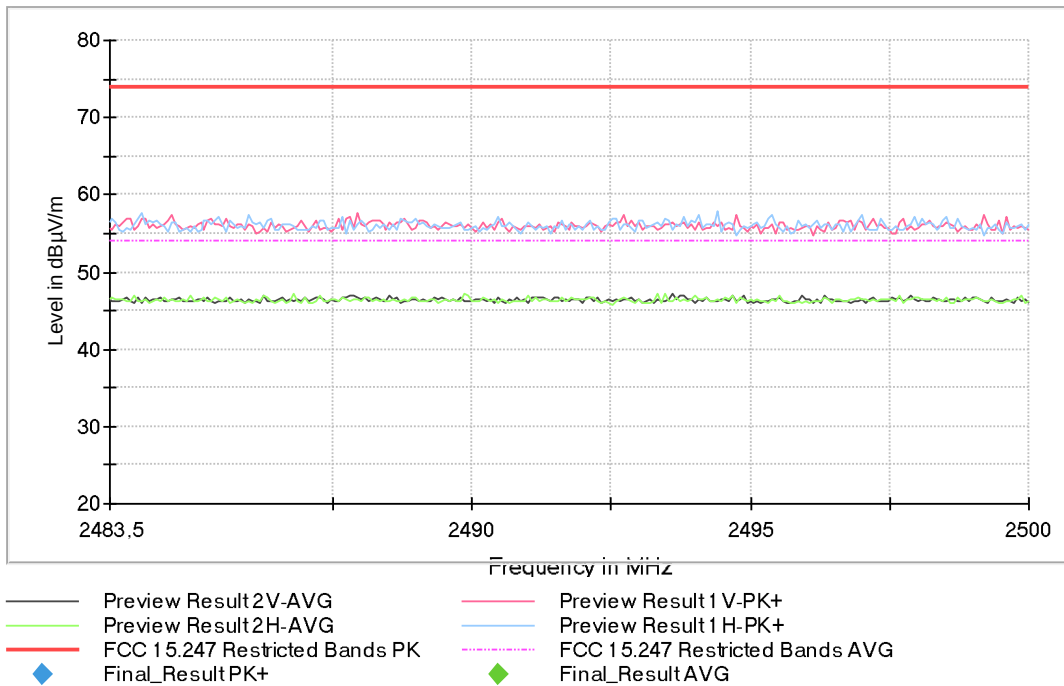
Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Modulation = Proximity, Frequency Range GHz = [1, 3], Measurement Point = 1



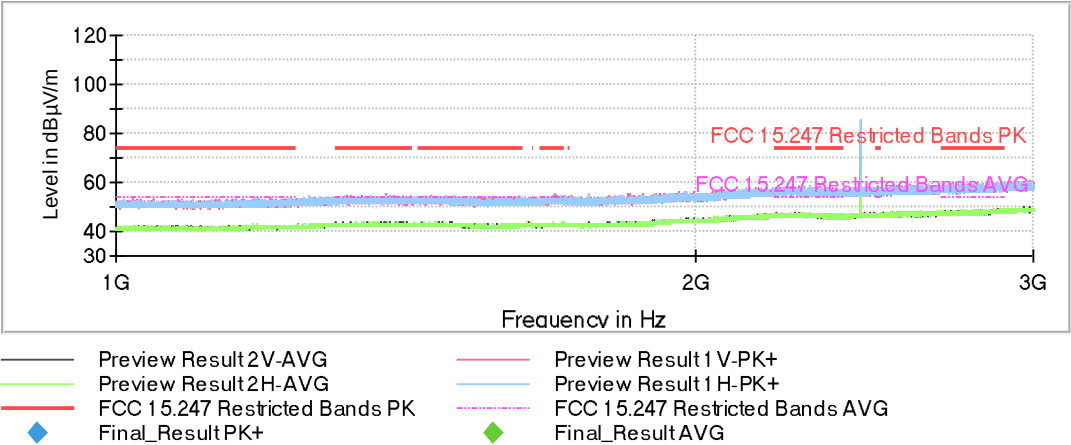
Full Spectrum



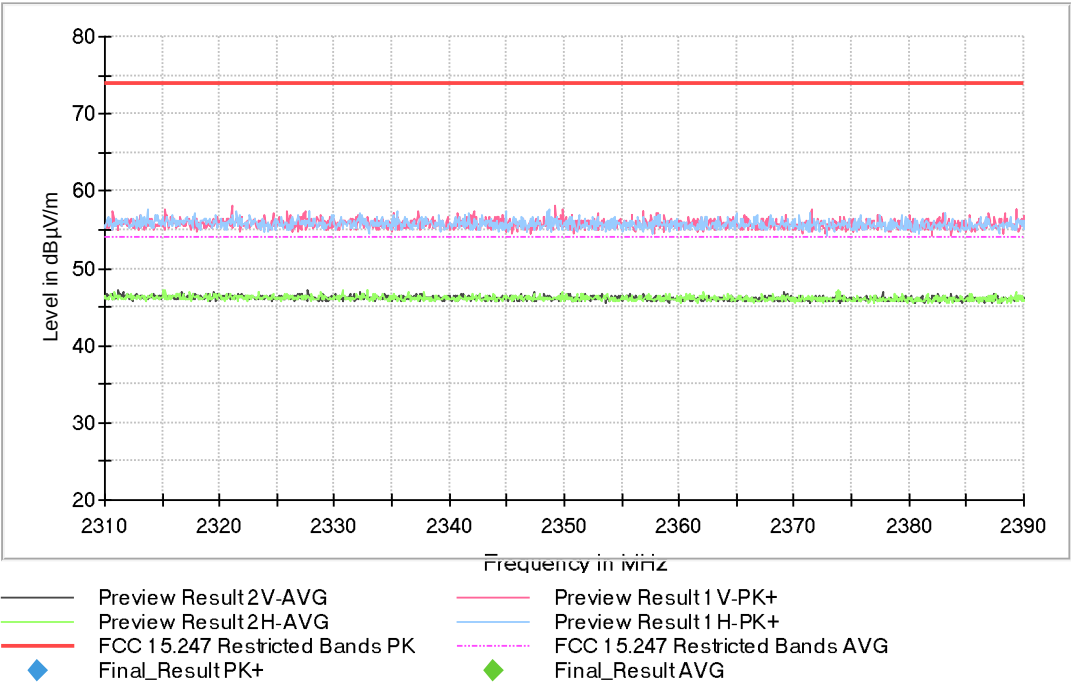
Full Spectrum



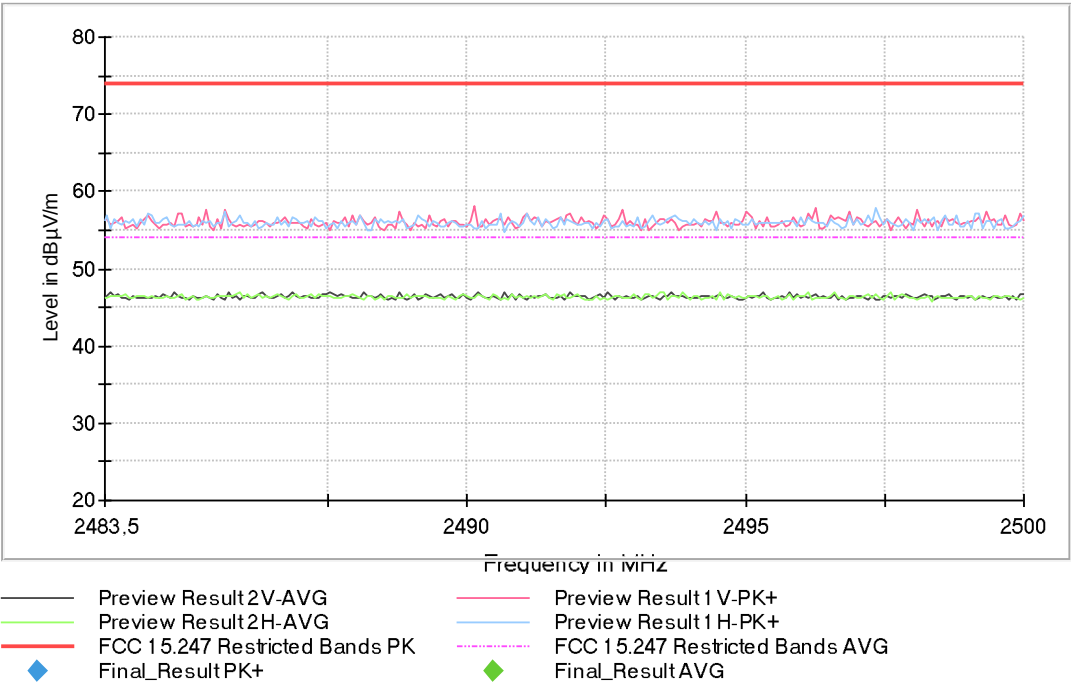
Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Modulation = Proximity, Frequency Range GHz = [1, 3], Measurement Point = 1



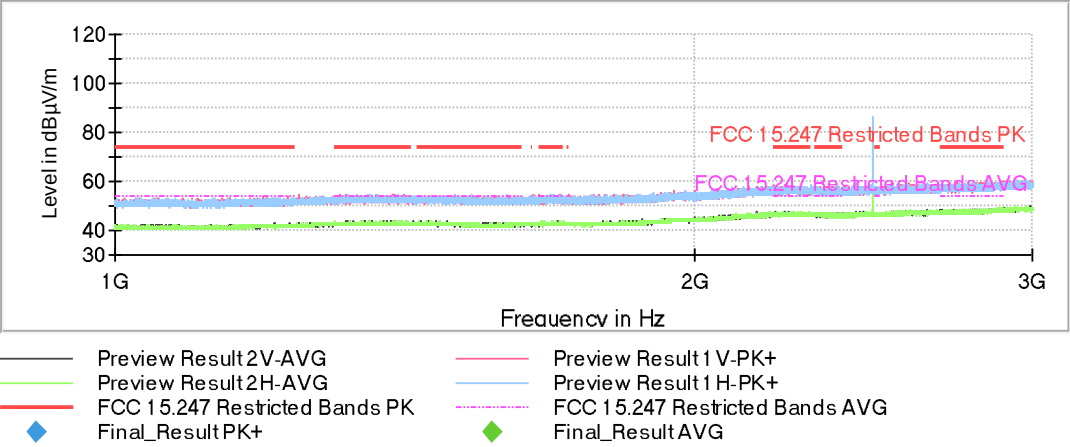
Full Spectrum



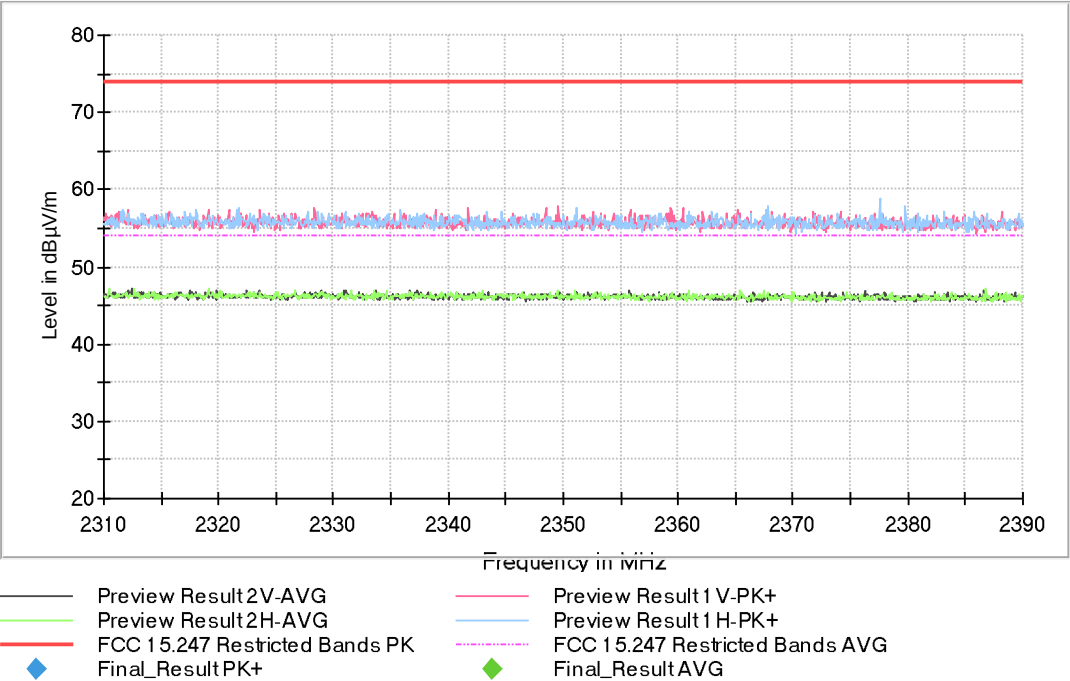
Full Spectrum



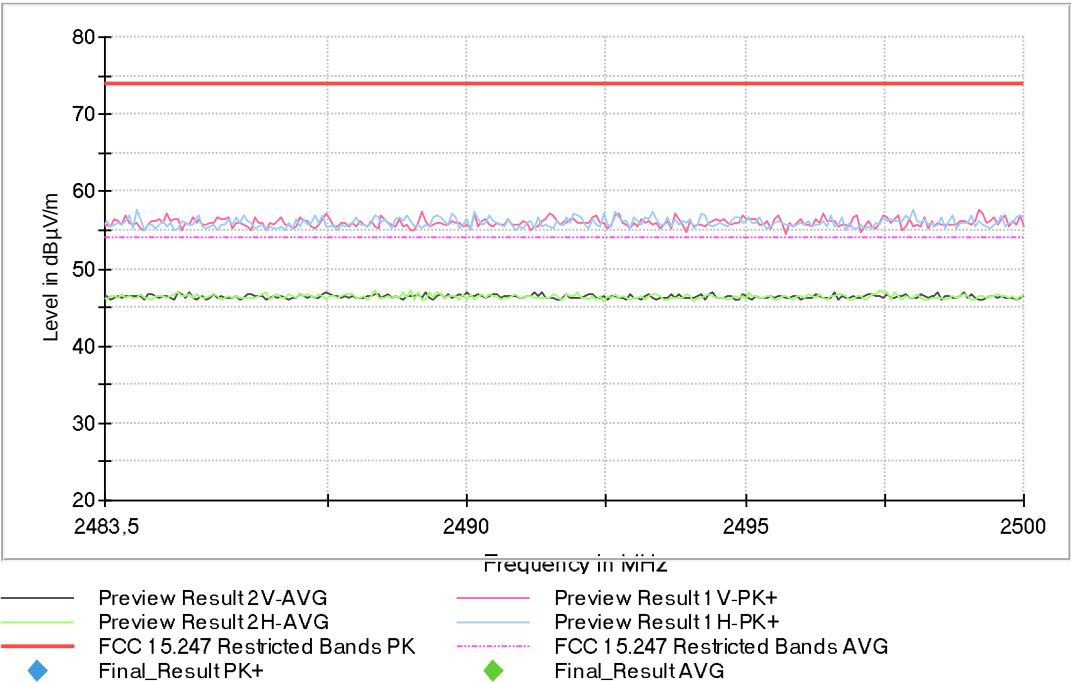
Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Modulation = Proximity, Frequency Range GHz = [1, 3], Measurement Point = 1



Full Spectrum

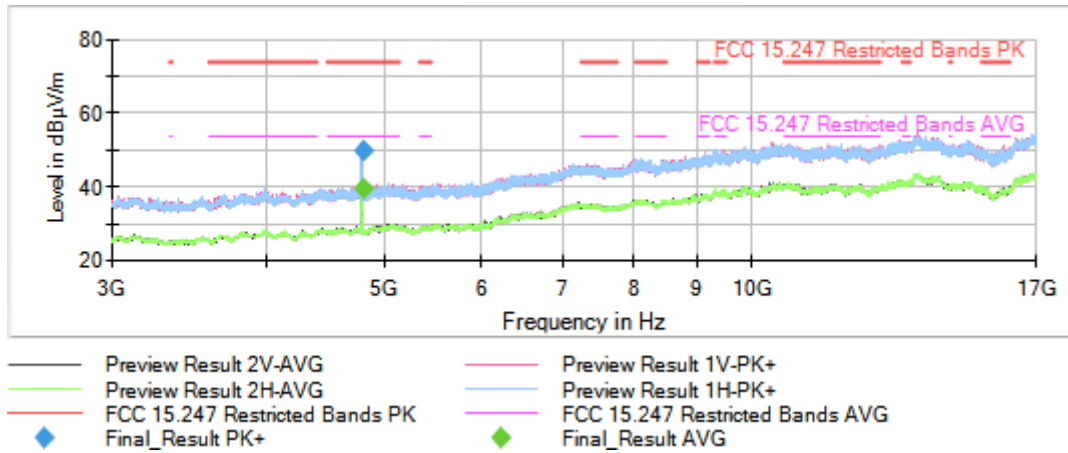


Full Spectrum



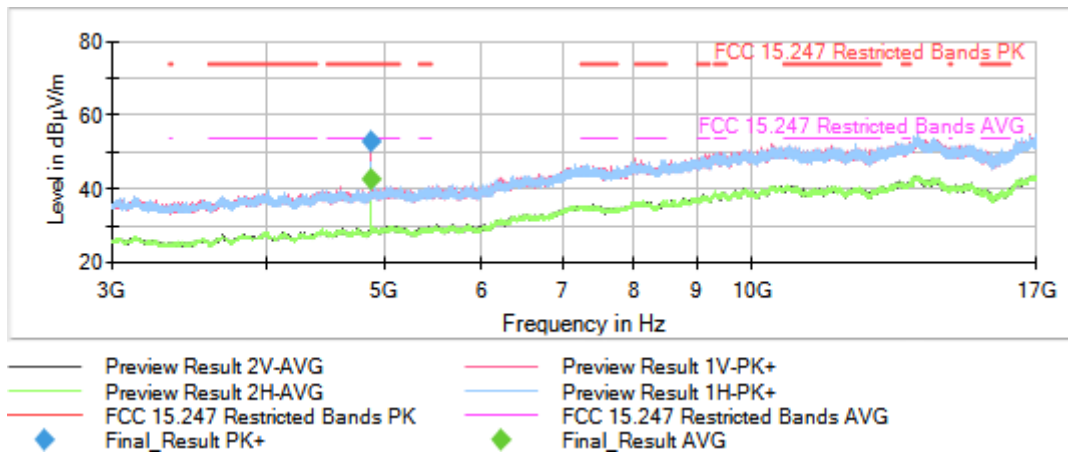
Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Modulation = Proximity, Frequency Range GHz = [3, 17], Measurement Point = 1

Images:



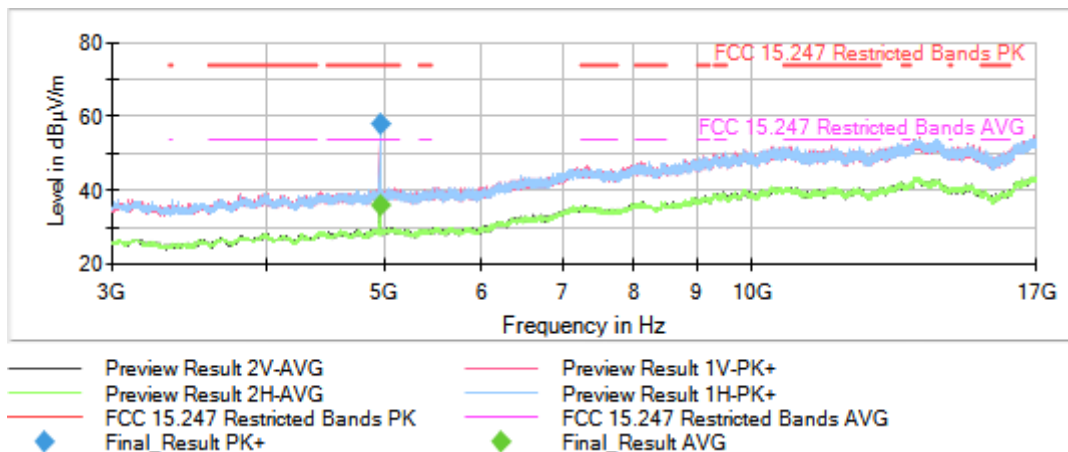
Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Modulation = Proximity, Frequency Range GHz = [3, 17], Measurement Point = 1

Images:



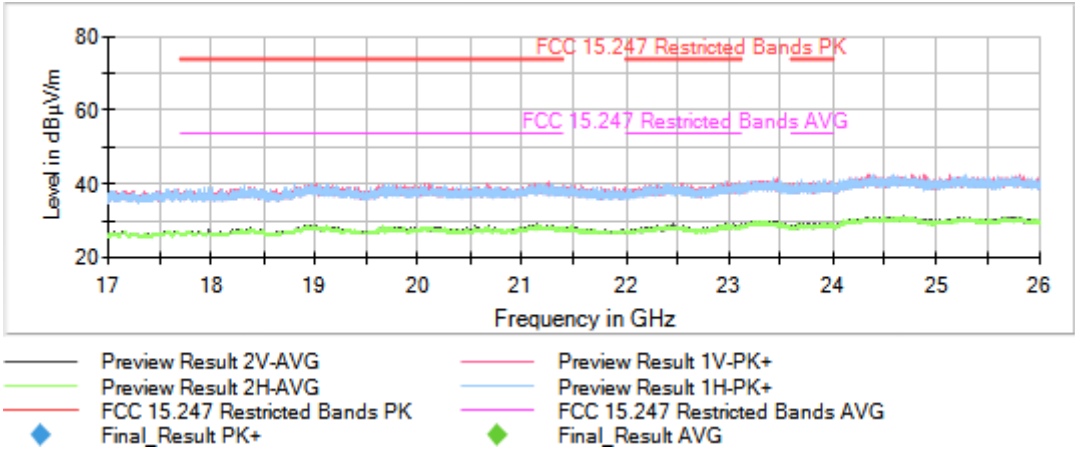
Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Modulation = Proximity, Frequency Range GHz = [3, 17], Measurement Point = 1

Images:



Frequency MHz = The spurious frequencies detected do not depend neither on the operating channel,  
Equipment Type = Digital Transmission System (DTS), Modulation = Proximity, Frequency Range GHz =  
[17, 26], Measurement Point = 1

Images:



## 99dBw Occupied Channel Bandwidth 99%

Modulation: Proximity

### Results

| Freq (MHz) | Occ Ch BW (MHz) |
|------------|-----------------|
| 2402.00000 | 1.710           |
| 2440.00000 | 1.710           |
| 2480.00000 | 1.710           |

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)

### Results

| Freq (MHz) | Occ Ch BW (MHz) |
|------------|-----------------|
| 2402.00000 | 1.050           |
| 2440.00000 | 1.060           |
| 2480.00000 | 1.065           |

Modulation: BTLE 5.0 (GFSK 2 Mbit/s)

### Results

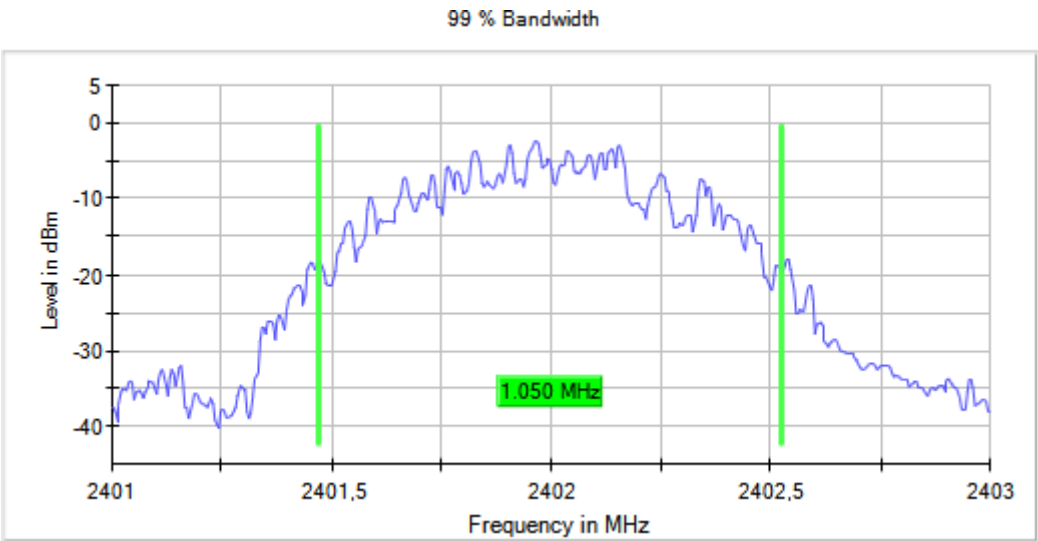
| Freq (MHz) | Occ Ch BW (MHz) |
|------------|-----------------|
| 2402.00000 | 2.030           |
| 2440.00000 | 2.030           |
| 2480.00000 | 2.020           |

### Attachments

| Setting         | Instrument Value |
|-----------------|------------------|
| Span            | 2.000 MHz        |
| RBW             | 10.000 kHz       |
| VBW             | 30.000 kHz       |
| SweepPoints     | 400              |
| SweepTime       | 419.000 µs       |
| Reference Level | 0.000 dBm        |
| Attenuation     | 10.000 dB        |
| Detector        | MaxPeak          |
| SweepCount      | 100              |
| Filter          | 3 dB             |
| Trace Mode      | Max Hold         |
| SweepType       | FFT              |
| Preamp          | off              |
| Stablemode      | Trace            |

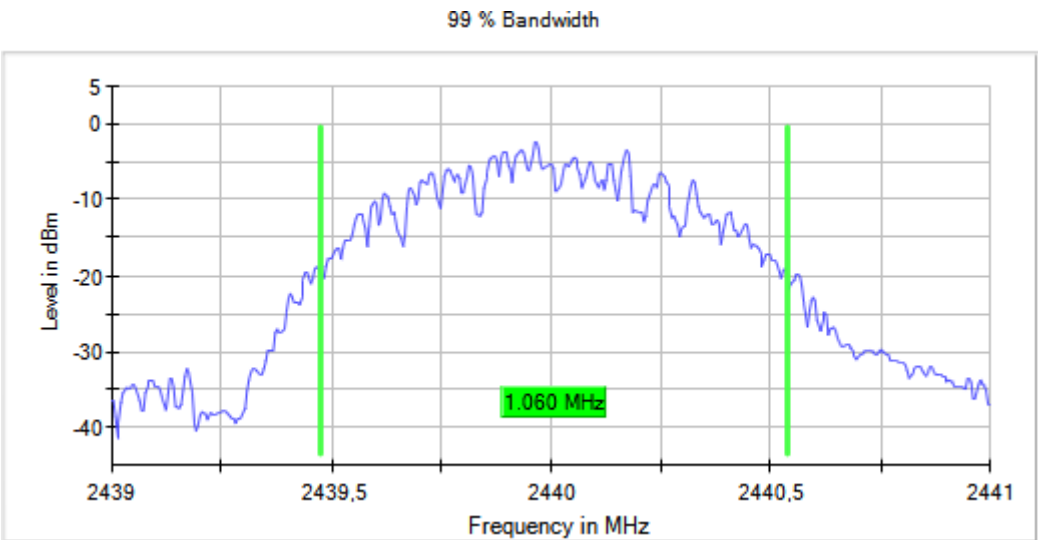
Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Images:



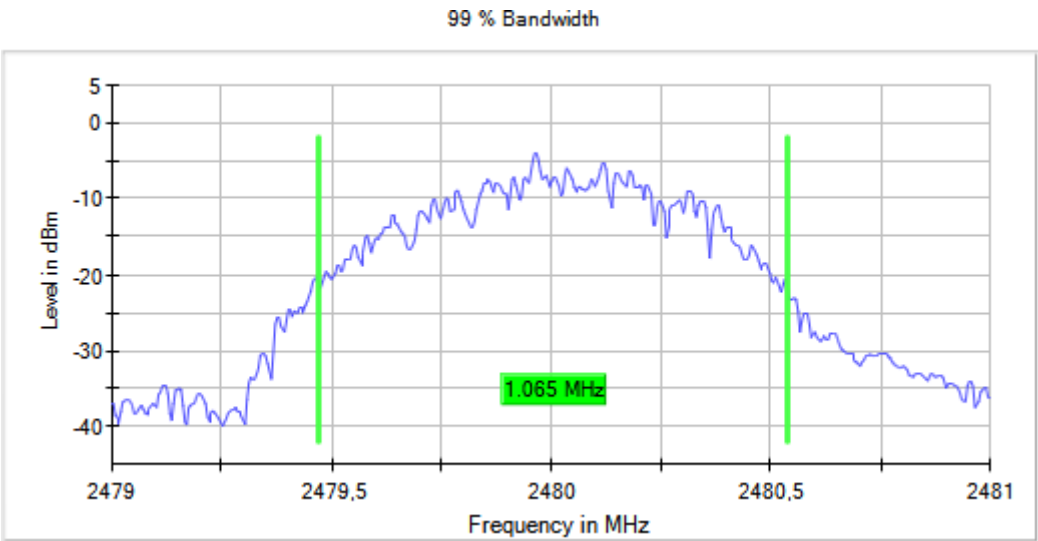
Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Images:



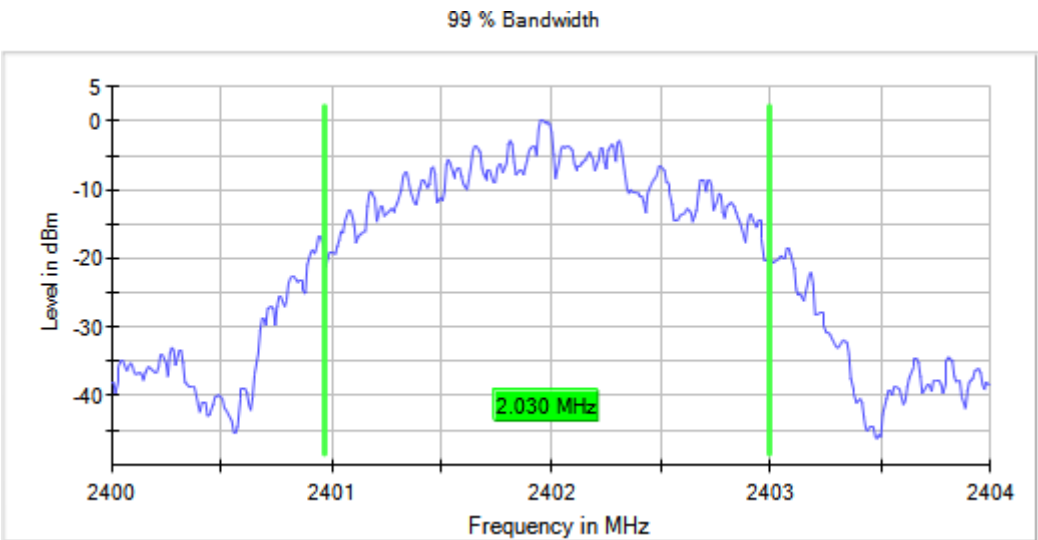
Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Images:



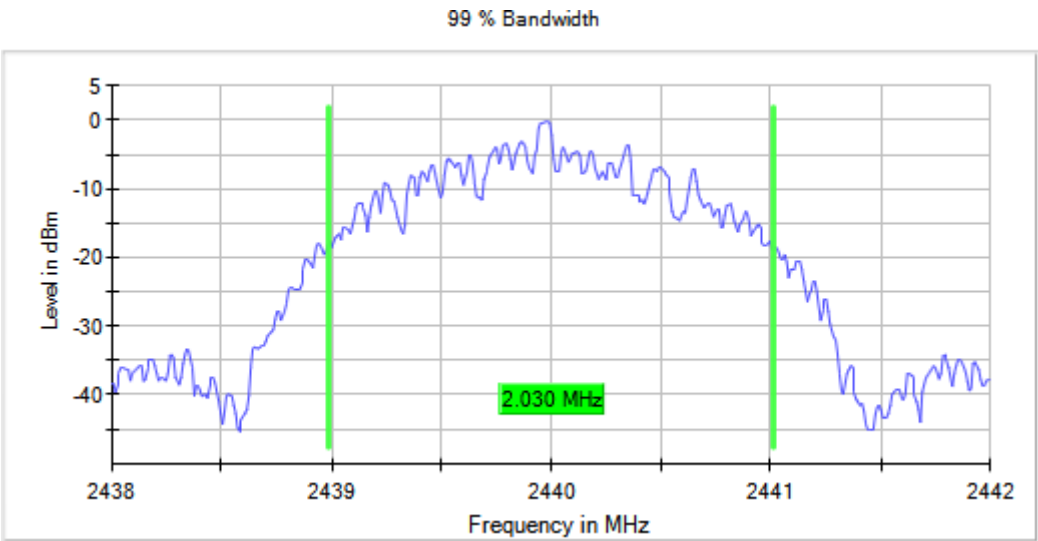
Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s)

Images:



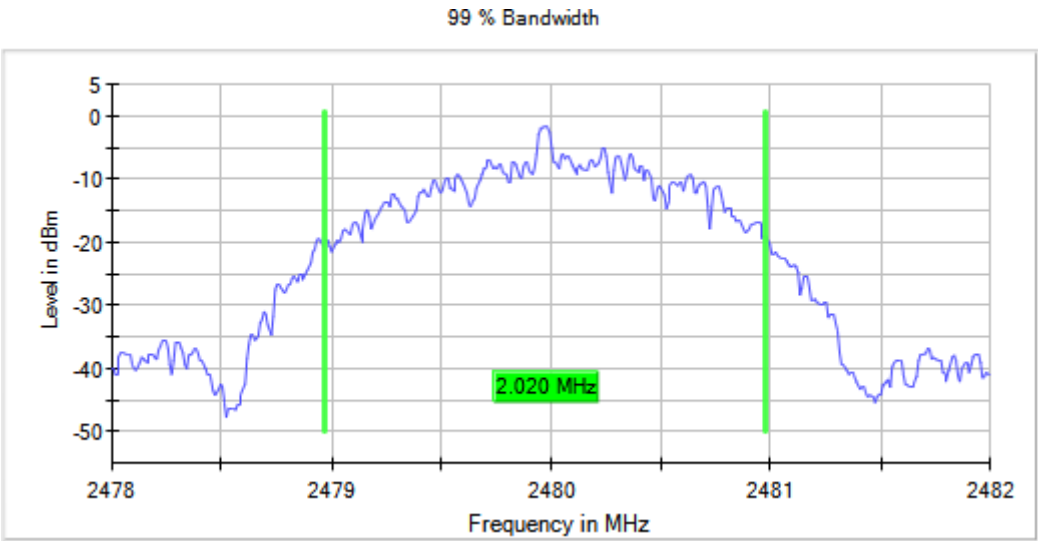
Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s)

Images:



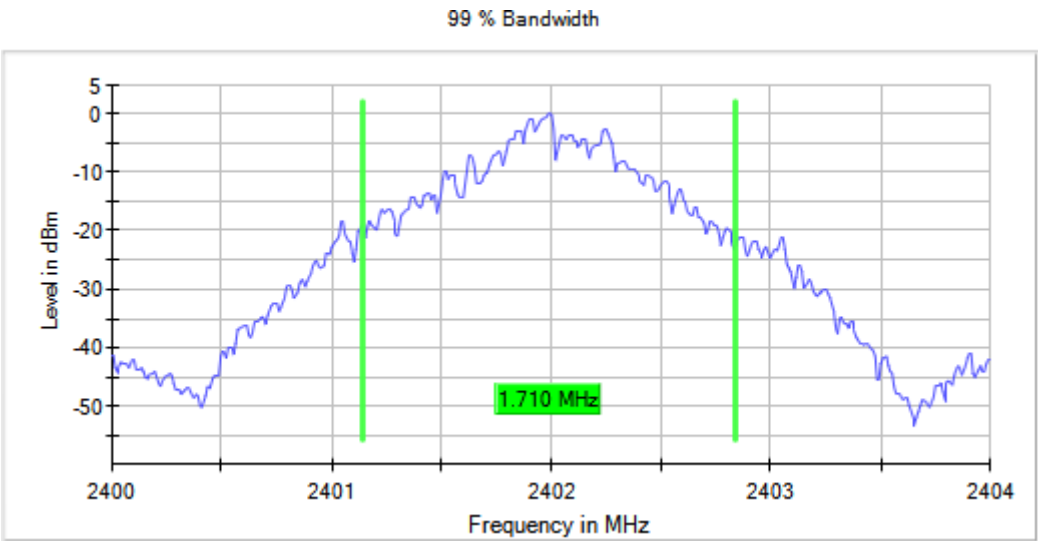
Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Modulation = BTLE 5.0 (GFSK 2 Mbit/s)

Images:



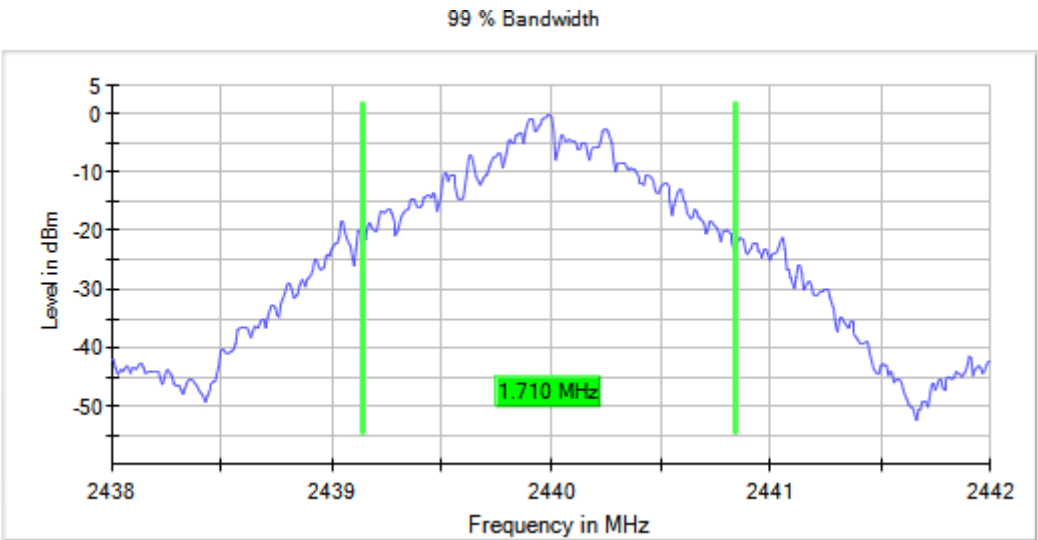
Frequency MHz = 2402.00000, Equipment Type = Digital Transmission System (DTS), Modulation = Proximity

Images:



Frequency MHz = 2440.00000, Equipment Type = Digital Transmission System (DTS), Modulation = Proximity

Images:



Frequency MHz = 2480.00000, Equipment Type = Digital Transmission System (DTS), Modulation = Proximity

Images:

