

ISED CABid: ES1909

Lab. Company Number: 4621A

Test Report No:

79354RRF.003

## Test Report

USA FCC Part 15.247, 15.209

CANADA RSS-247, RSS-Gen

|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (*) Identification of item tested         | Stand-alone Wi-Fi 6 multiradio modules                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| (*) Trademark                             | u-blox                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| (*) Model and /or type reference          | NORA-W401-00B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Other identification of the product       | FCC ID: XPYNORAW4<br>IC: 8595A-NORAW4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| (*) Features                              | BLE, Wi-Fi 6 (2.4 GHz)<br>HW version: 04<br>SW version: v5.2.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Applicant                                 | u-blox AG<br>Zürcherstrasse 68, 8800 Thalwil, Switzerland                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Test method requested, standard           | USA FCC Part 15.247 (10-1-23 Edition): Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz.<br>USA FCC Part 15.209 (10-1-23 Edition): Radiated emission limits; general requirements.<br>CANADA RSS-247 Issue 3 (August 2023).<br>CANADA RSS-Gen Issue 5 amendment 2 (February 2021).<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. 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) | José Manuel Gómez Galván<br>EMC Consumer & RF<br>Lab. Manager                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Date of issue                             | 2025-03-13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Report template No                        | FDT08_25<br>(*) "Data provided by the client"                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

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## Acronyms

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

## Competences and guarantees

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

DEKRA Testing and Certification S.A.U. is an ISED-recognized accredited testing laboratory, CABid: ES1909, Company Number: 4621A, with the appropriate scope of accreditation that covers the performed tests in this report.

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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 Stand-alone Wi-Fi 6 multiradio modules.

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. The laboratory is not responsible for such information and it is not covered by accreditation.

## 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 & S/02 | 79354_12.1     | Antenna on plastic | PRO IS 299    | -         | 2024-08-21        | Element Under Test |
| S/01        | 79354_46.1     | Evaluation board   | NORA-W401-00B | PT3#24    | 2024-08-21        | Element Under Test |
| S/02        | 79354_50.1     | Evaluation board   | NORA-W401-00B | PT3#41    | 2025-02-13        | Element Under Test |

Notes referenced to samples during the project:

| Id   | Type                                                             |
|------|------------------------------------------------------------------|
| S/01 | Samples used for all tests with lower output power configuration |
| S/02 | Sample used for all test with higher output power configuration  |

Test sample description

|                                               |                           |                                |                      |           |    |              |    |
|-----------------------------------------------|---------------------------|--------------------------------|----------------------|-----------|----|--------------|----|
| Ports..... :                                  | Port name and description | Cable                          |                      |           |    |              |    |
|                                               |                           | Specified max length [m]       | Attached during test | Shielded  |    |              |    |
|                                               | -                         | -                              | -                    | -         |    |              |    |
| Supplementary information to the ports..... : | -                         |                                |                      |           |    |              |    |
| Rated power supply .....                      | Voltage and Frequency     |                                | Reference poles      |           |    |              |    |
|                                               |                           |                                | L1                   | L2        | L3 | N            | PE |
|                                               |                           | AC:                            |                      |           |    |              |    |
|                                               |                           | AC:                            |                      |           |    |              |    |
|                                               | X                         | DC: 3.0V - 3.6V                |                      |           |    |              |    |
|                                               | DC:                       |                                |                      |           |    |              |    |
| Rated Power .....                             | -                         |                                |                      |           |    |              |    |
| Clock frequencies..... :                      | -                         |                                |                      |           |    |              |    |
| Other parameters .....                        | -                         |                                |                      |           |    |              |    |
| Software version .....                        | v5.2.3                    |                                |                      |           |    |              |    |
| Hardware version .....                        | 04                        |                                |                      |           |    |              |    |
| Dimensions in cm (W x H x D) .....            | 10.4mm x 14.3mm x 1.9mm   |                                |                      |           |    |              |    |
| Mounting position .....                       |                           | Table top equipment            |                      |           |    |              |    |
|                                               |                           | Wall/Ceiling mounted equipment |                      |           |    |              |    |
|                                               |                           | Floor standing equipment       |                      |           |    |              |    |
|                                               |                           | Hand-held equipment            |                      |           |    |              |    |
|                                               |                           | Other:                         |                      |           |    |              |    |
| Modules/parts..... :                          | Module/parts of test item |                                |                      | Type      |    | Manufacturer |    |
|                                               | -                         |                                |                      | -         |    | -            |    |
| Accessories (not part of the test item) ..... | Description               |                                |                      | Type      |    | Manufacturer |    |
|                                               | -                         |                                |                      | -         |    | -            |    |
| Documents as provided by the applicant..... : | Description               |                                |                      | File name |    | Issue date   |    |
|                                               | -                         |                                |                      | -         |    | -            |    |

## Identification of the client

u-blox AG  
Zürcherstrasse 68, 8800 Thalwil, Switzerland

## Testing period and place

|               |                                        |
|---------------|----------------------------------------|
| Test Location | DEKRA Testing and Certification S.A.U. |
| Date (start)  | 2024-08-29                             |
| Date (finish) | 2024-12-19                             |

## Document history

| Report number | Date       | Description    |
|---------------|------------|----------------|
| 79354RRF.003  | 2025-03-13 | 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: Sergio Carrasco, Álvaro Gutiérrez Naranjo, Carmen Vázquez Perez, Pablo Redondo Reyes, Valentin Andarias Diaz, Rafael Fernandez Martin.

Used instrumentation:

| Control No. | Equipment                                   | Model                    | Manufacturer           | Next Calibration |
|-------------|---------------------------------------------|--------------------------|------------------------|------------------|
| 07445       | DC POWER SUPPLY 30V/5A                      | U8002A                   | KEYSIGHT TECHNOLOGIES  | N/A              |
| 07760       | DIGITAL MULTIMETER                          | 175                      | FLUKE                  | 2025-11-07       |
| 05850       | DIGITAL MULTIMETER                          | 179                      | FLUKE                  | 2025-11-04       |
| 07817       | EMI TEST RECEIVER 2Hz-44GHz                 | ESW44                    | ROHDE AND SCHWARZ      | 2026-07-01       |
| 06609       | ETHERNET TEMPERATURE AND HUMIDITY LOGGER    | HWg-STE                  | HW GROUP               | 2025-04-22       |
| 06615       | ETHERNET TEMPERATURE AND HUMIDITY LOGGER    | HWg-STE                  | HW GROUP               | 2025-04-04       |
| 04953       | HIGH PASS FILTER 1.1-8GHz                   | WHK10-990-1100-8000-40SS | WAINWRIGHT INSTRUMENTS | 2025-02-14       |
| 09029       | HIGH PASS FILTER 17-40 GHZ                  | STHP-17-40G-92           | TEMSTRON/TEM WELL      | 2025-03-29       |
| 08770       | HIGH PASS FILTER 3-18 GHZ                   | ST-3GA2833-HS            | TEMSTRON/TEM WELL      | 2025-08-02       |
| 06496       | HORN ANTENNA 1-18GHz                        | BBHA 9120 D              | SCHWARZBECK            | 2026-12-01       |
| 04657       | HORN ANTENNA 18-40GHz                       | BBHA 9170                | SCHWARZBECK            | 2026-06-12       |
| 06143       | HYBRID BILOG ANTENNA 30MHz-6GHz             | 3142E                    | ETS LINDGREN           | 2027-01-22       |
| 07656       | LOW PASS FILTER TEMSTRON/TEMWELL DC - 1 GHZ | ST-1GA3250-LS            | TEMSTRON/TEM WELL      | 2025-02-02       |
| 07193       | MULTI-DEVICE CONTROLLER                     | CO3000                   | INNCO                  | N/A              |
| 08848       | OPEN SWITCH UNIT UP TO 7.5 GHz              | OSP-B157W8 PLUS          | ROHDE & SCHWARZ        | 2026-12-30       |
| 00922       | POWER SUPPLY DC 40 V / 40 A                 | NGPE 40/40               | ROHDE AND SCHWARZ      | 2027-10-02       |
| 08856       | PRE-AMPLIFIER G>30dB 18-40GHz               | BLMA 1840-4A             | BONN ELEKTRONIK        | 2025-02-27       |
| 03783       | PRE-AMPLIFIER G>30dB 1GHz-18GHz             | BLMA 0118-3A             | BONN ELEKTRONIK        | 2025-03-15       |
| 06142       | PRE-AMPLIFIER G>38dB 30MHz-6GHz             | BLNA 0360-01N            | BONN ELEKTRONIK        | 2025-07-25       |
| 06144       | PRE-AMPLIFIER G>40dB 10MHz-6GHz             | BLNA 0160-01N            | BONN ELEKTRONIK        | 2025-07-22       |



| Control No. | Equipment                               | Model          | Manufacturer      | Next Calibration |
|-------------|-----------------------------------------|----------------|-------------------|------------------|
| 06791       | SEMIANECHOIC ABSORBER LINED CHAMBER IV  | FACT 3 200 STP | ETS LINDGREN      | N/A              |
| 06793       | SHIELDED ROOM                           | S101           | ETS LINDGREN      | N/A              |
| 07794       | SIGNAL AND SPECTRUM ANALYZER 10Hz-40GHz | FSV40          | ROHDE AND SCHWARZ | 2025-04-21       |
| 07791       | SIGNAL GENERATOR 8kHz-6GHz              | SMB100B        | ROHDE AND SCHWARZ | 2026-03-15       |
| 07793       | SIGNAL GENERATOR 8kHz-6GHz              | SMBV100B       | ROHDE AND SCHWARZ | 2026-03-11       |
| 04848       | SOFTWARE FOR EMC/RF TESTING             | EMC32          | ROHDE AND SCHWARZ | N/A              |
| 06611       | TEMPERATURE AND HUMIDITY PROBE          | HWg-STE        | HW GROUP          | 2025-04-04       |
| 08847       | VECTOR SIGNAL GENERATOR 100kHz-7.5GHz   | SMW200A        | ROHDE AND SCHWARZ | 2025-09-29       |
| 07795       | WIRELESS CONNECTIVITY TESTER BW 160 MHz | CMW270         | ROHDE AND SCHWARZ | 2025-03-13       |
| 07798       | WMS32                                   | WMS32          | ROHDE AND SCHWARZ | N/A              |

## Testing verdicts

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

## Summary

### Bluetooth Low Energy (2M, 1M):

| 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.                                         |                                              |         |        |

## 802.11 bgnax 1x1:

| 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       |        |
| Supplementary information and remarks: |                                              |         |        |
| None.                                  |                                              |         |        |

## ZigBee:

| 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       |        |
| Supplementary information and remarks: |                                              |         |        |
| None.                                  |                                              |         |        |

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

|                                                                                                  |    |
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| <i>RSS-247 5.5 / FCC 15.247 (d) [Bndedge] Band-edge emissions compliance (Transmitter)</i> ..... | 57 |
| <i>RSS-247 5.5 / FCC 15.247 (d) [RSE] Emission limitations radiated (Transmitter)</i> .....      | 72 |

# TEST CONDITIONS

(\*): Data provided by the client.

POWER SUPPLY (\*):

Vnominal: 3.3 V  
Type of Power Supply: DC internal.

ANTENNA (\*):

| Chain #    | Antenna Gain (dBi) |
|------------|--------------------|
| PRO-EX-333 | 3,6dBi             |
| PRO-EX-296 | 3,0dBi             |
| PRO-IS-237 | 3,0dBi             |
| PRO-IS-299 | 2,5dBi             |

Radiated testing has been performed with the antenna PRO-IS-299 after a preliminary RSE testing  
Conducted EIPR has been calculated using the highest antenna gain.

| Modulation | Data rates  | Low Channel: | Power adjustment | Middle Channel | Power adjustment | High Channel (1) | Power adjustment | High Channel (2) | Power adjustment |
|------------|-------------|--------------|------------------|----------------|------------------|------------------|------------------|------------------|------------------|
| BTLE GFSK  | 1M 1 Mbit/s | 2402 MHz     | 15               | 2440 MHz       | 15               | 2478 MHz         | 15               | 2480 MHz         | 14               |
| BTLE GFSK  | 2M 2 Mbit/s | 2402 MHz     | 15               | 2440 MHz       | 15               | 2478 MHz         | 15               | 2480 MHz         | 14               |

During transmitter test the EUT was controlled by a SW tool provided by the client to operate in a continuous transmit mode on the modulation schemes and test channels as required. Power adjustment correspond to the parameter value configured in the SW tool.

All channels with frequencies above High Channel (1) will be configured at the same power adjustment as high Channel (2)

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).

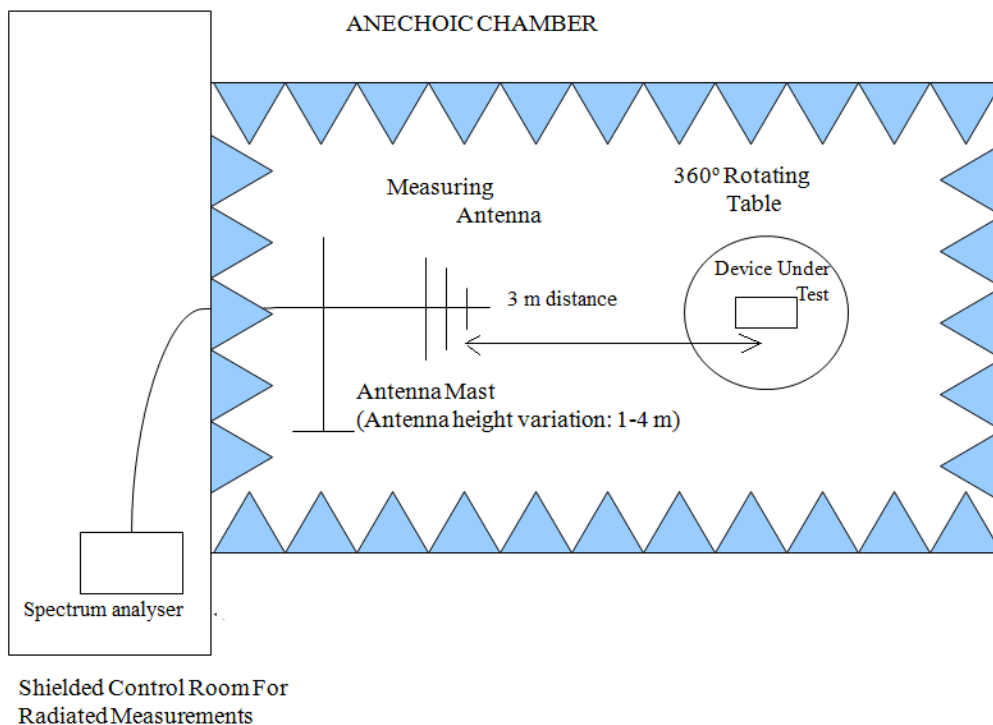
For radiated emissions in the range 17 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

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.

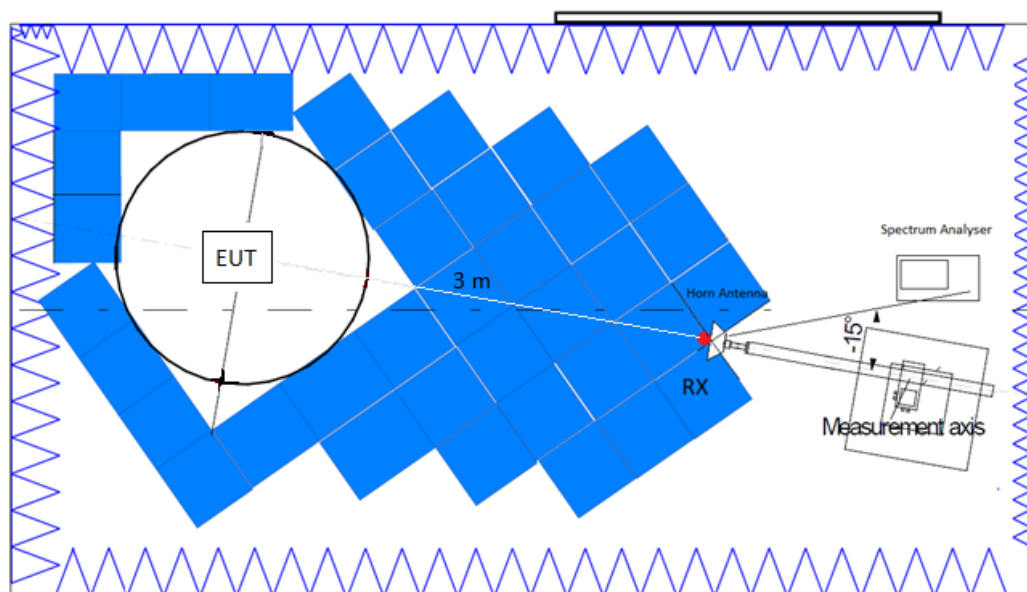
Measurements were made in both horizontal and vertical planes of polarization.

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.

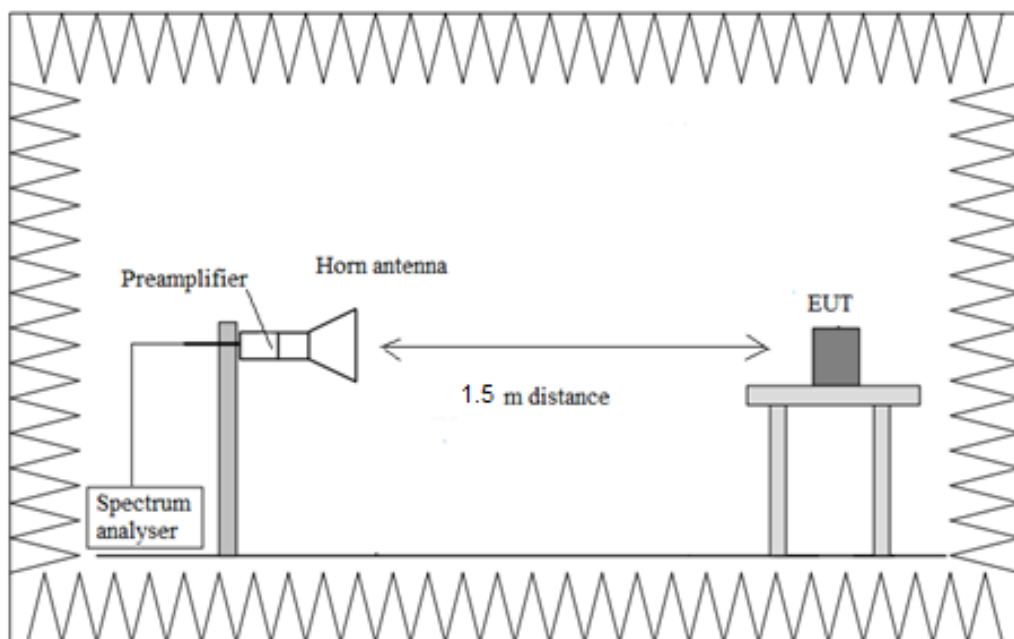
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements setup  $f > 17$  GHz:





# TEST CASES DETAILS

## 99dBw Occupied Channel Bandwidth 99%

### Limits

The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained.

### Results

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)

MIMO Mode: SISO

| Equipment                         | BW (MHz) | Freq (MHz) | Port | Occ Ch BW (MHz) |
|-----------------------------------|----------|------------|------|-----------------|
| Digital Transmission System (DTS) | 1        | 2402.00000 | 1    | 1.053           |
|                                   |          | 2440.00000 |      | 1.053           |
|                                   |          | 2478.00000 |      | 1.038           |
|                                   |          | 2480.00000 |      | 1.030           |

### Verdict

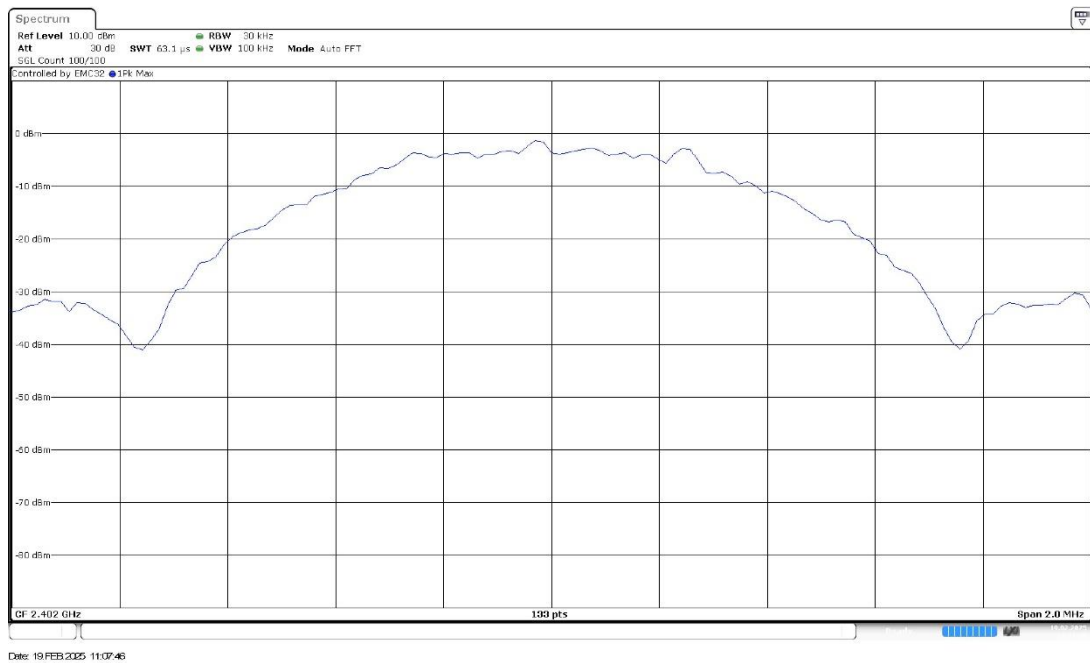
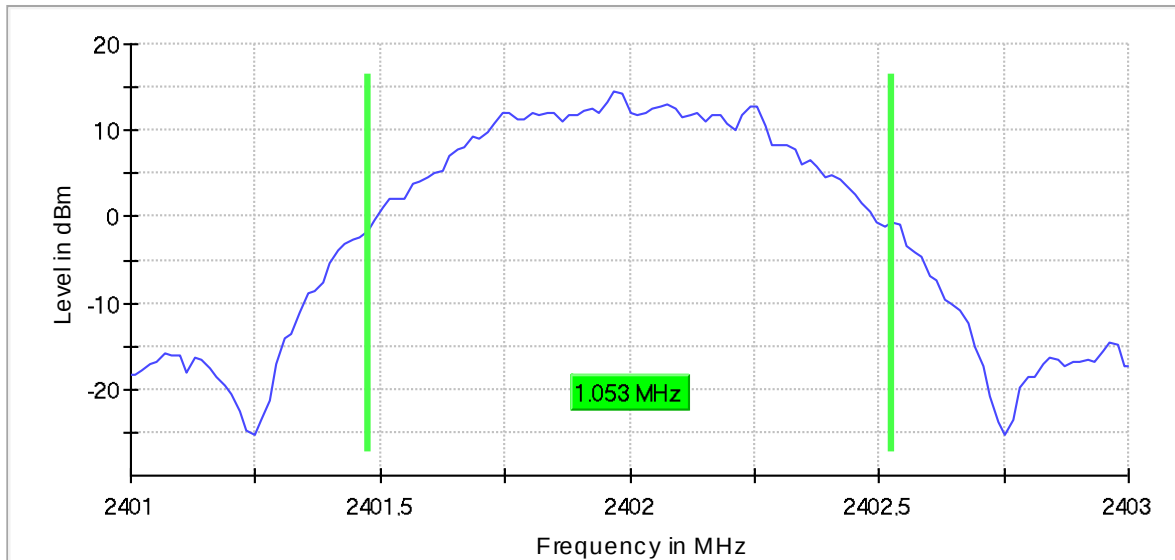
Pass

### Attachments

Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 1  
Modulation = BTLE 5.0 (GFSK 1 Mbit/s) Frequency MHz = 2402.00000  
MIMO Mode = SISO Active Port = 1

### Images:

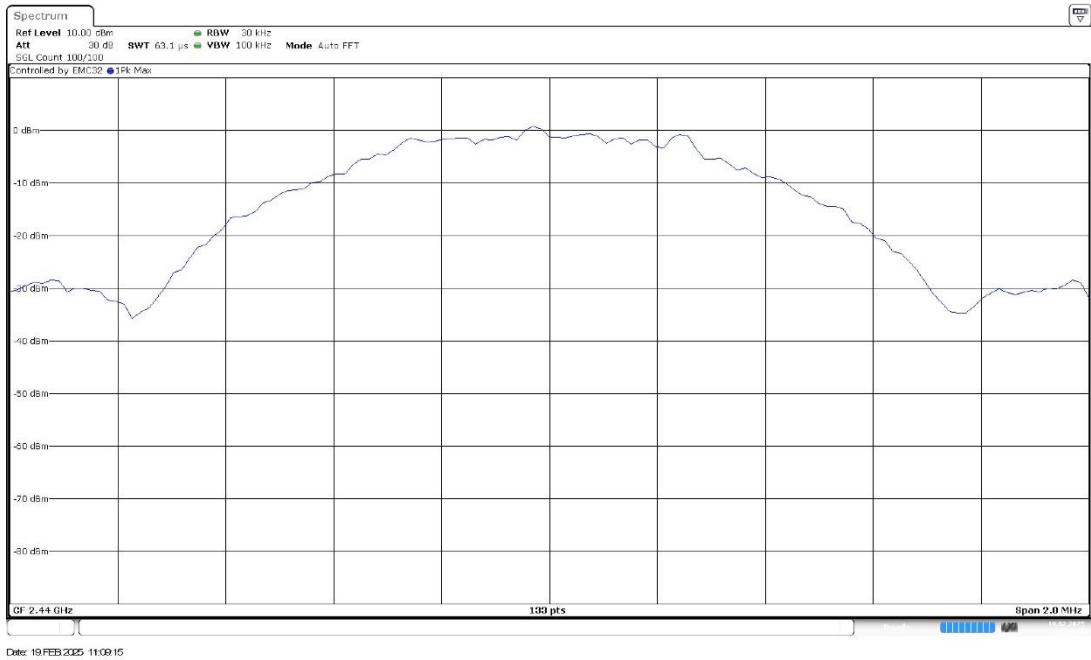
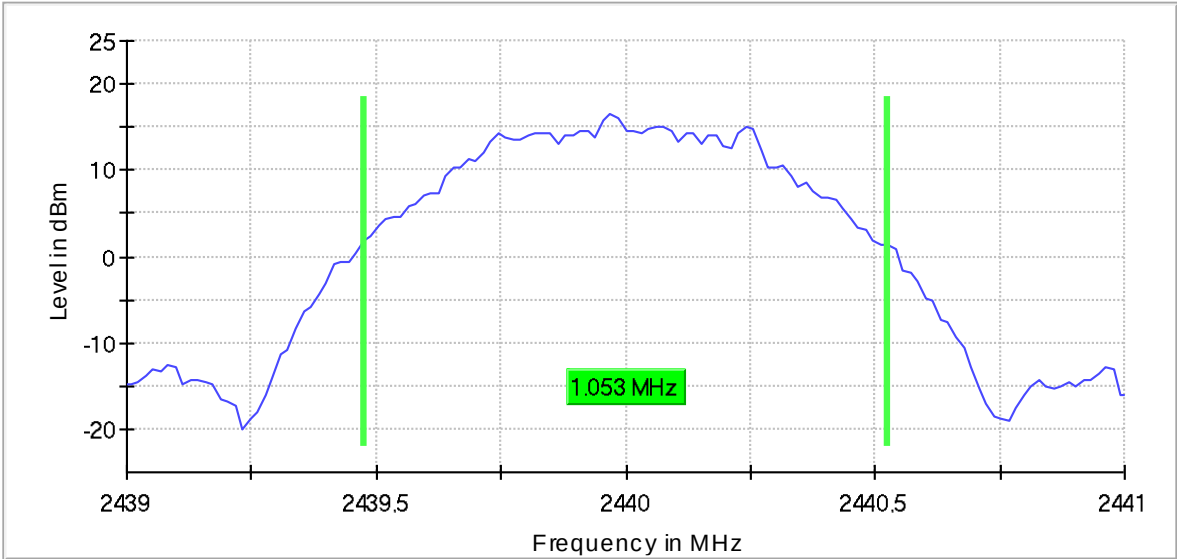
99 % Bandwidth



Equipment Type = Digital Transmission System (DTS)    Bandwidth MHz = 1  
Modulation = BTLE 5.0 (GFSK 1 Mbit/s)    Frequency MHz = 2440.00000  
MIMO Mode = SISO    Active Port = 1

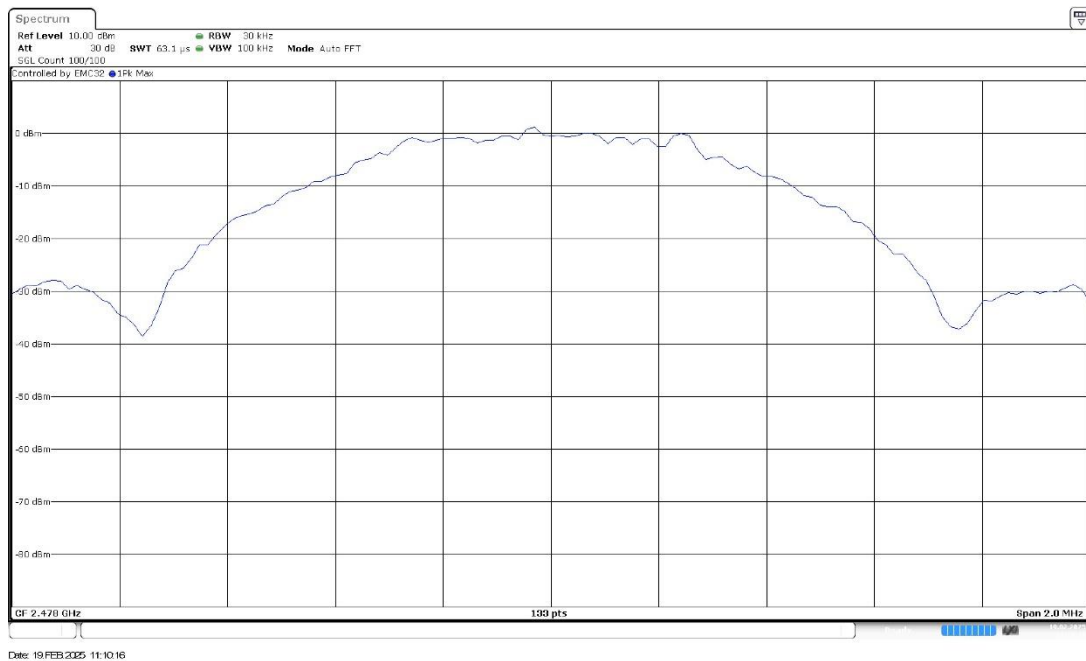
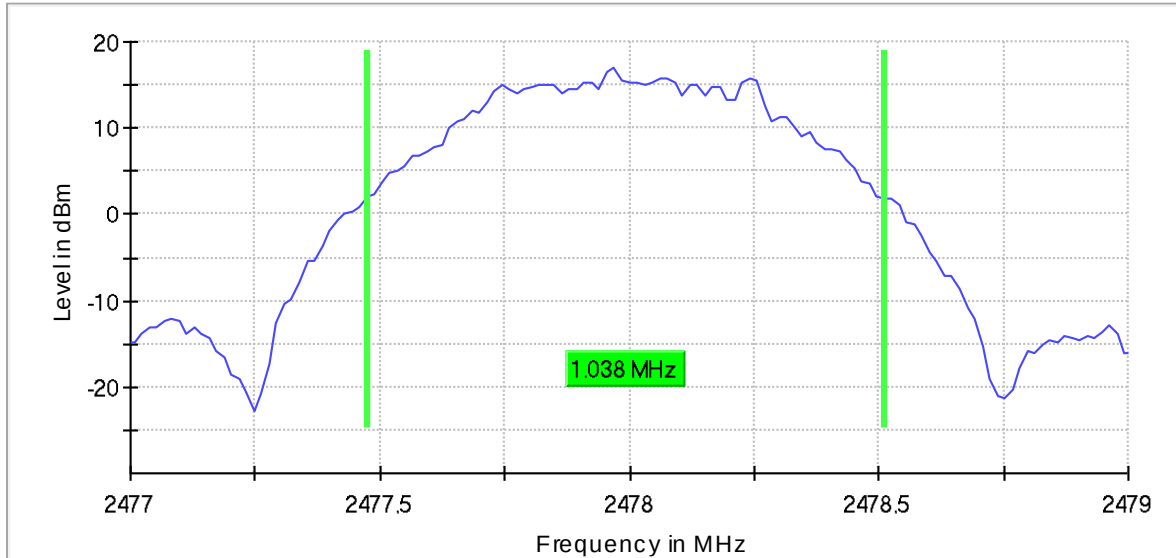
Images:

99 % Bandwidth



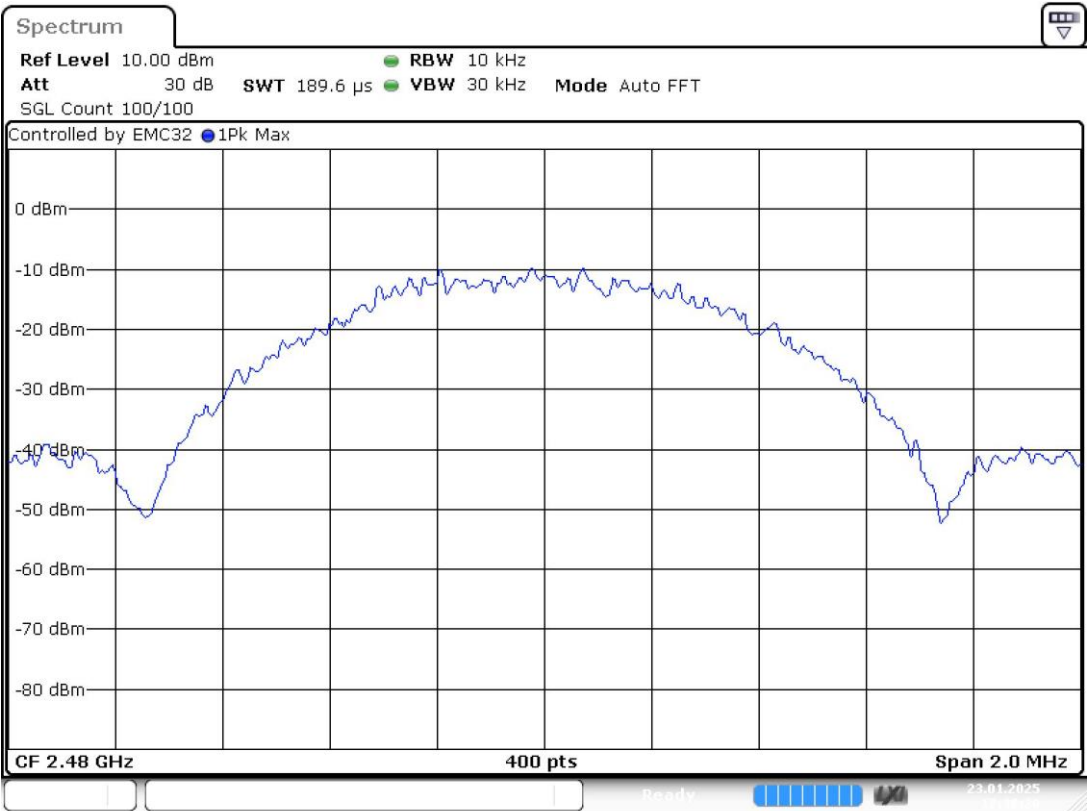
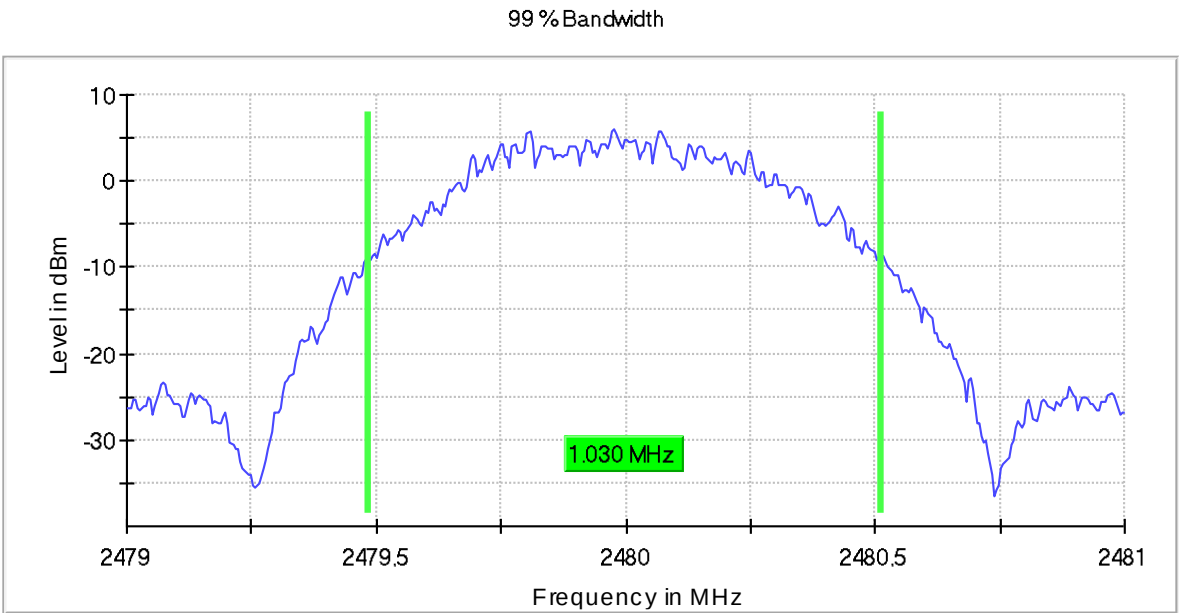
Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 1  
Modulation = BTLE 5.0 (GFSK 1 Mbit/s) Frequency MHz = 2478.00000  
MIMO Mode = SISO Active Port = 1

99 % Bandwidth



Equipment Type = Digital Transmission System (DTS)    Bandwidth MHz = 1  
Modulation = BTLE 5.0 (GFSK 1 Mbit/s)    Frequency MHz = 2480.00000  
MIMO Mode = SISO    Active Port = 1

Images:



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Results

Modulation: BTLE 5.0 (GFSK 2 Mbit/s)

MIMO Mode: SISO

| Equipment                         | BW (MHz) | Freq (MHz) | Port | Occ Ch BW (MHz) |
|-----------------------------------|----------|------------|------|-----------------|
| Digital Transmission System (DTS) | 2        | 2402.00000 | 1    | 2.059           |
|                                   |          | 2440.00000 |      | 2.099           |
|                                   |          | 2478.00000 |      | 2.099           |
|                                   |          | 2480.00000 |      | 1.850           |

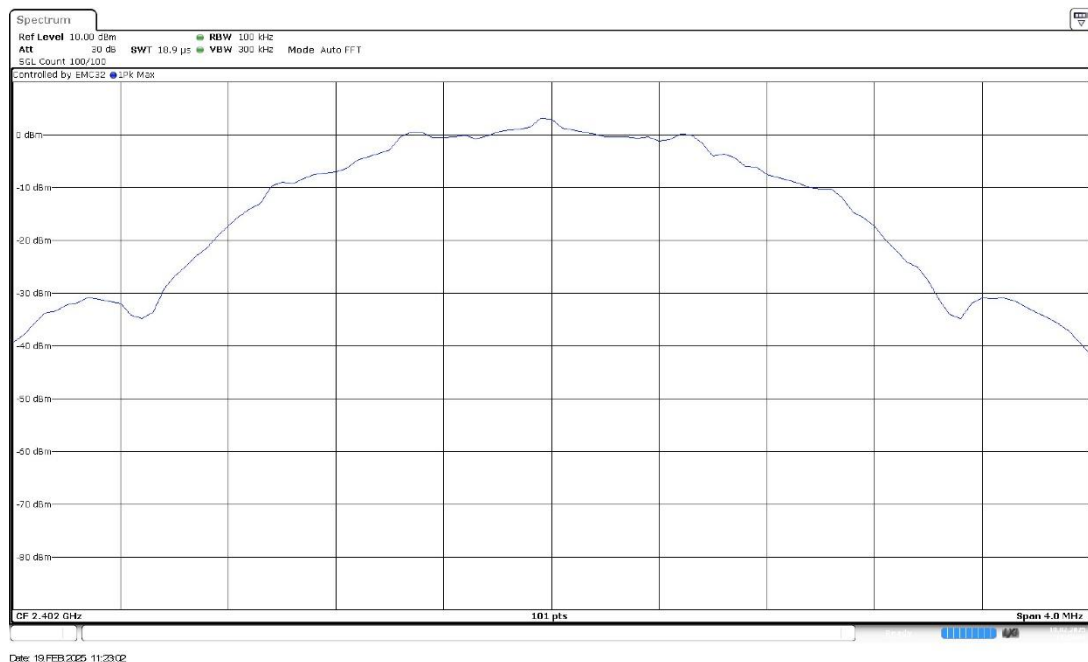
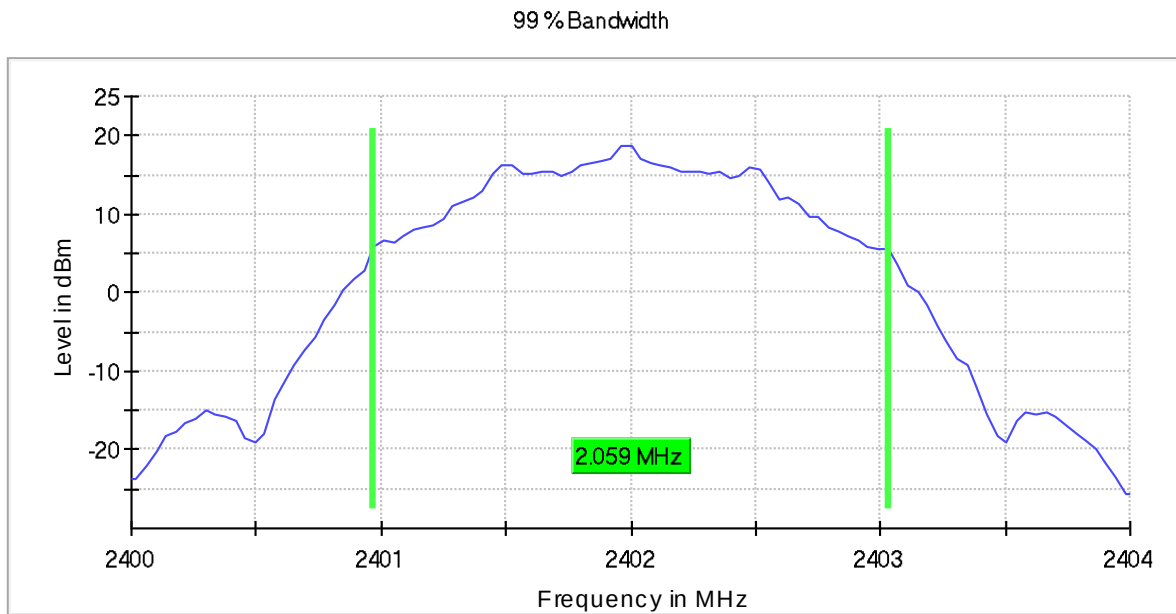
Verdict

Pass

### Attachments

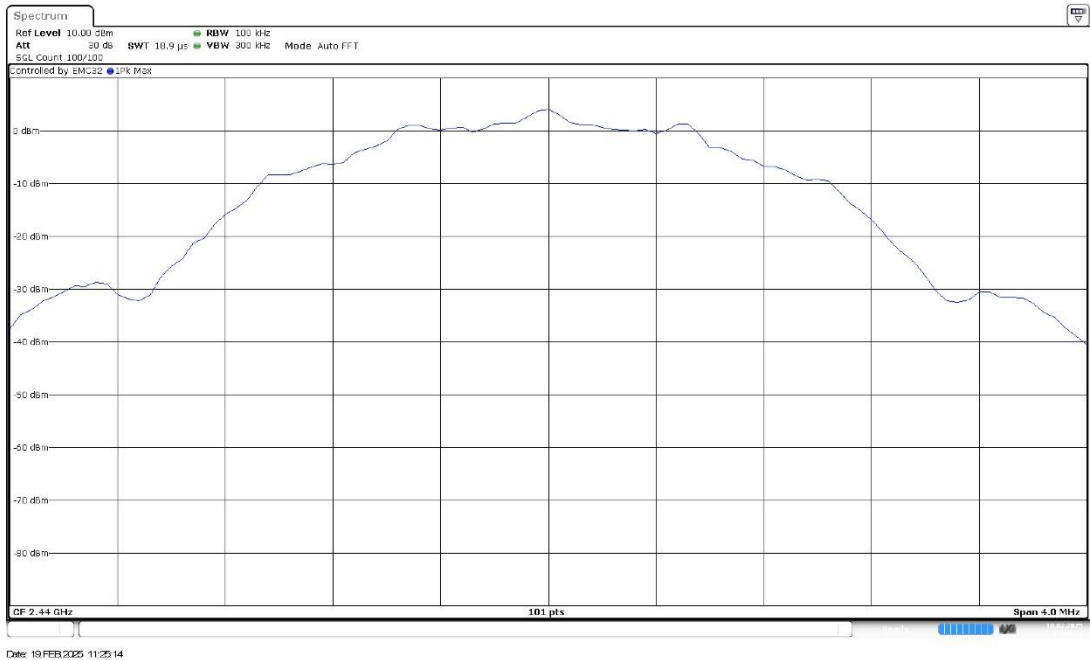
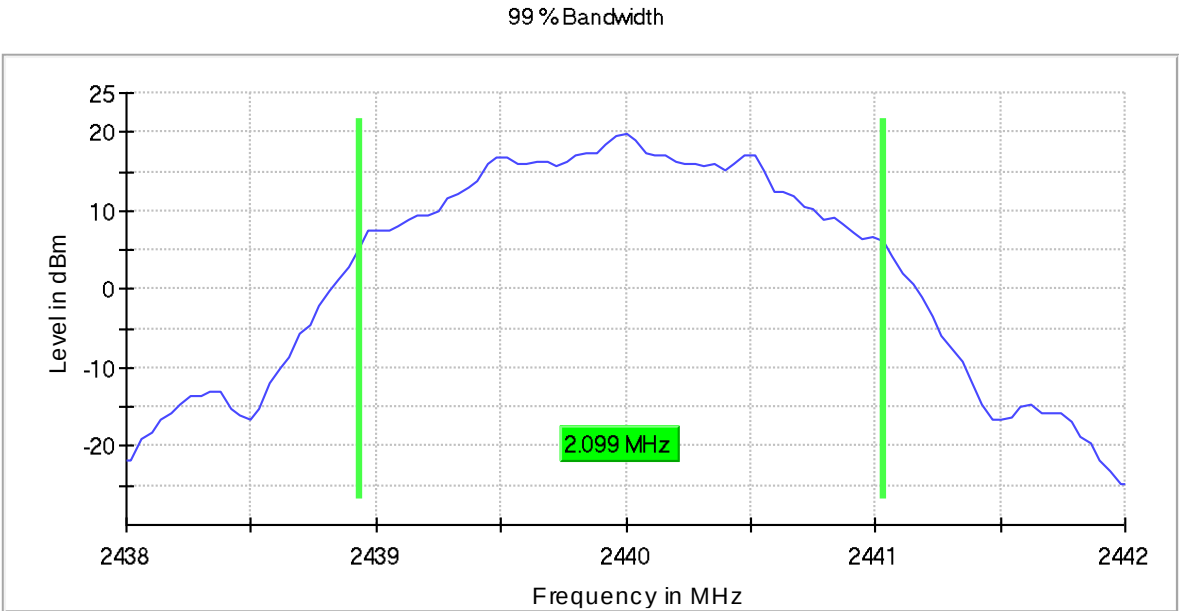
Equipment Type = Digital Transmission System (DTS)    Bandwidth MHz = 2  
Modulation = BTLE 5.0 (GFSK 2 Mbit/s)    Frequency MHz = 2402.00000  
MIMO Mode = SISO    Active Port = 1

### Images:



Equipment Type = Digital Transmission System (DTS)    Bandwidth MHz = 2  
Modulation = BTLE 5.0 (GFSK 2 Mbit/s)    Frequency MHz = 2440.00000  
MIMO Mode = SISO    Active Port = 1

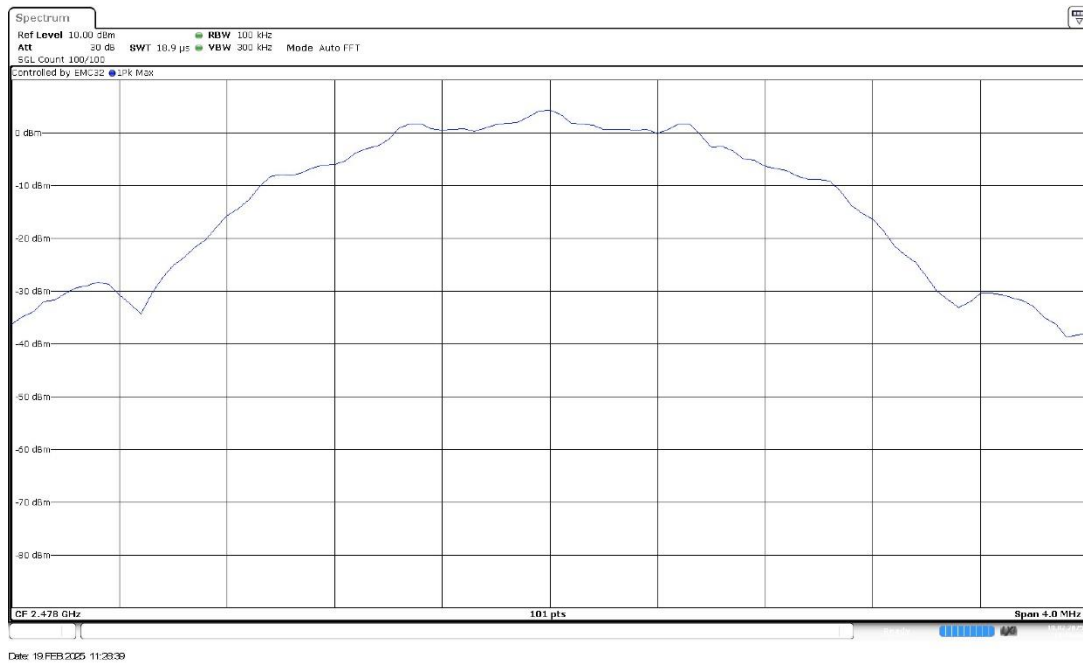
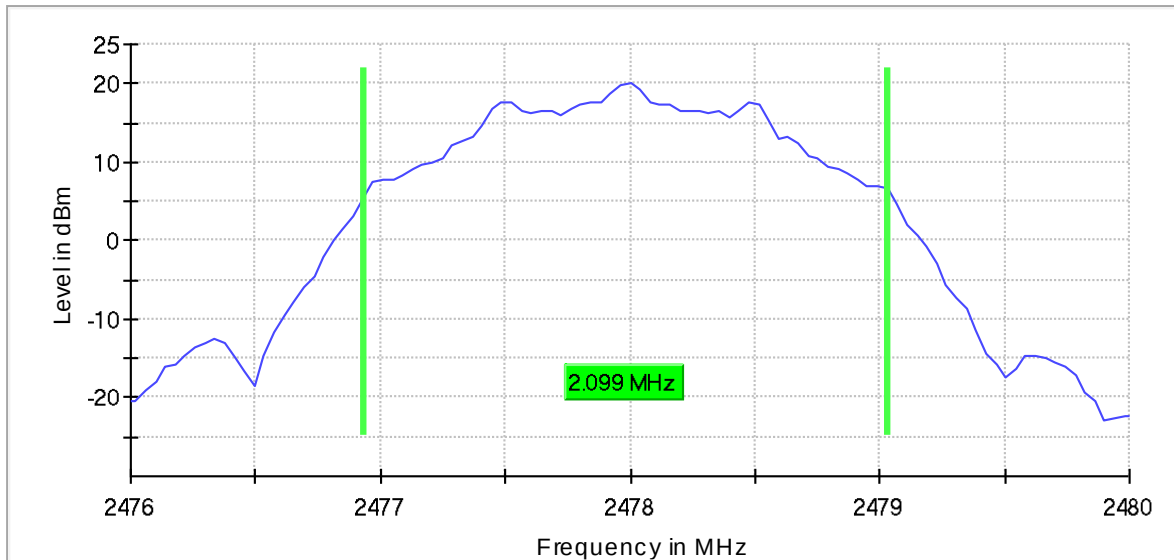
Images:





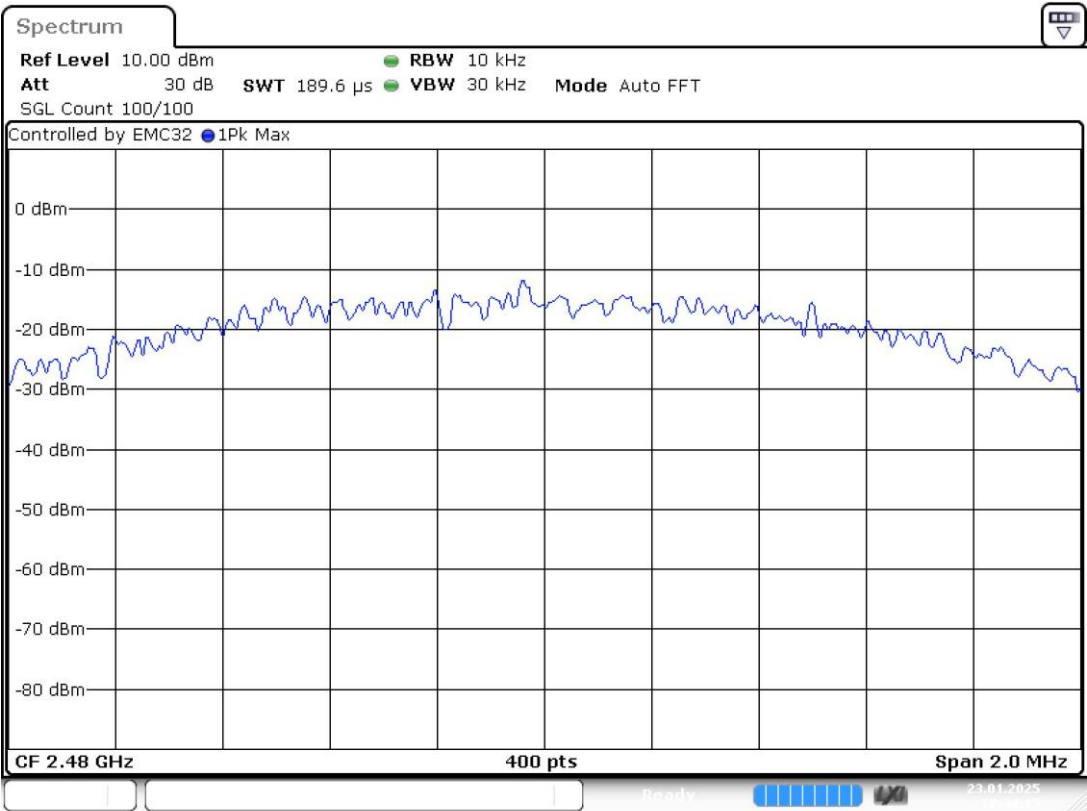
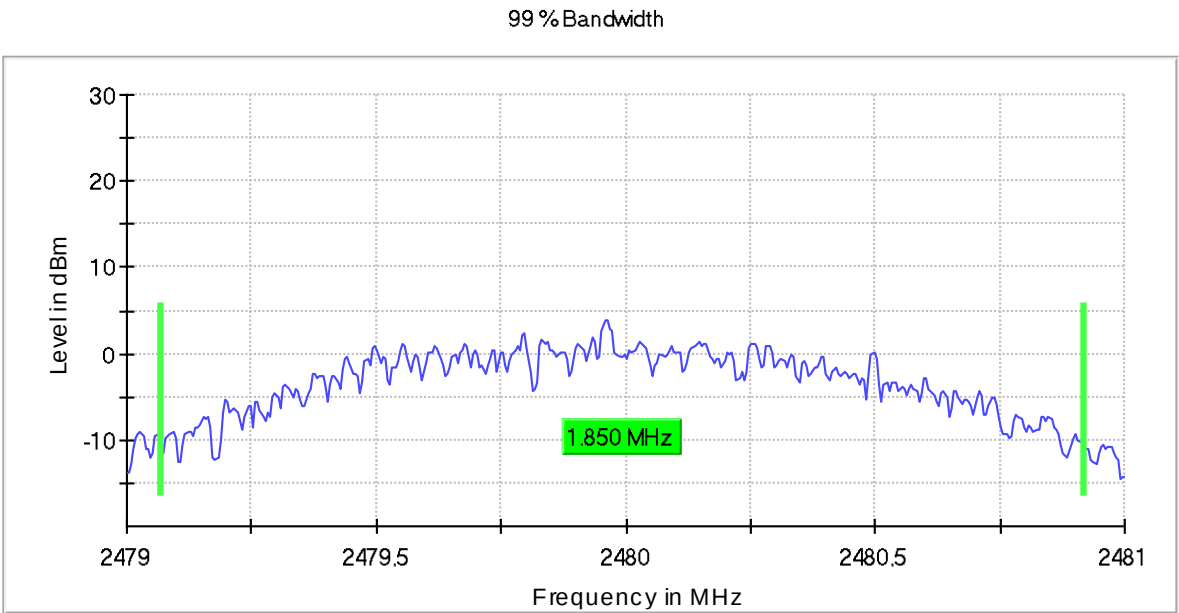
Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 2  
Modulation = BTLE 5.0 (GFSK 2 Mbit/s) Frequency MHz = 2478.00000  
MIMO Mode = SISO Active Port = 1

99 % Bandwidth



Equipment Type = Digital Transmission System (DTS)    Bandwidth MHz = 2  
Modulation = BTLE 5.0 (GFSK 2 Mbit/s)    Frequency MHz = 2480.00000  
MIMO Mode = SISO    Active Port = 1

Images:



Date: 23.JAN.2025 17:44:15

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.

Results

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)

MIMO Mode: SISO

| BW (MHz) | Freq (MHz) | Port | Ebw (MHz) |
|----------|------------|------|-----------|
| 1        | 2402.00000 | 1    | 0.673     |
|          | 2440.00000 |      | 0.713     |
|          | 2478.00000 |      | 0.693     |
|          | 2480.00000 |      | 0.693     |

Verdict

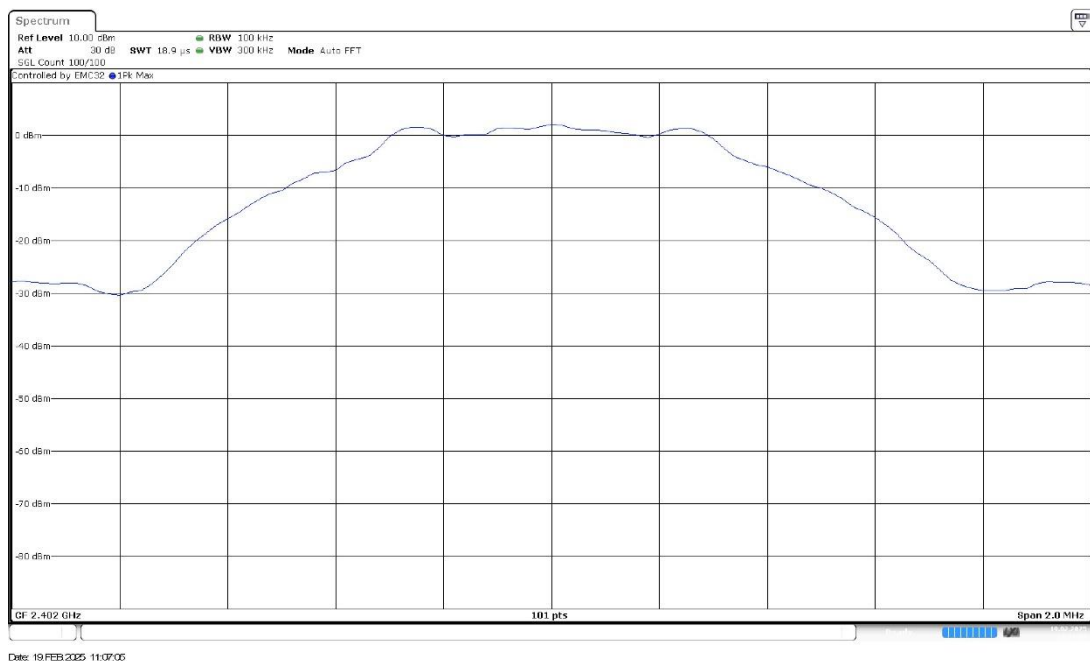
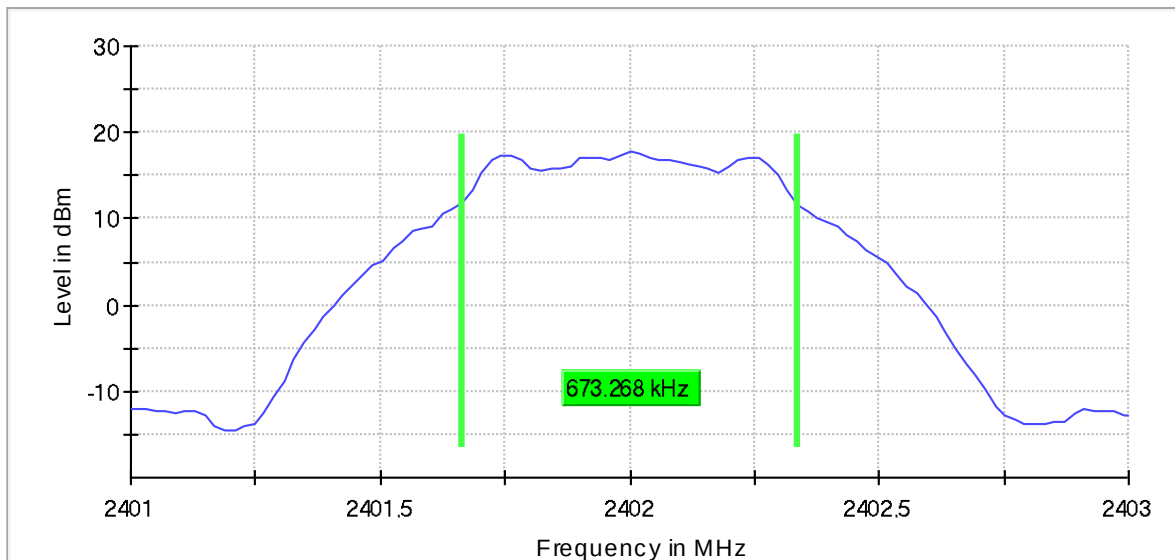
Pass

### Attachments

Bandwidth MHz = 1      Modulation = BTLE 5.0 (GFSK 1 Mbit/s)  
 Frequency MHz = 2402.00000      MIMO Mode = SISO  
 Active Port = 1

### Images:

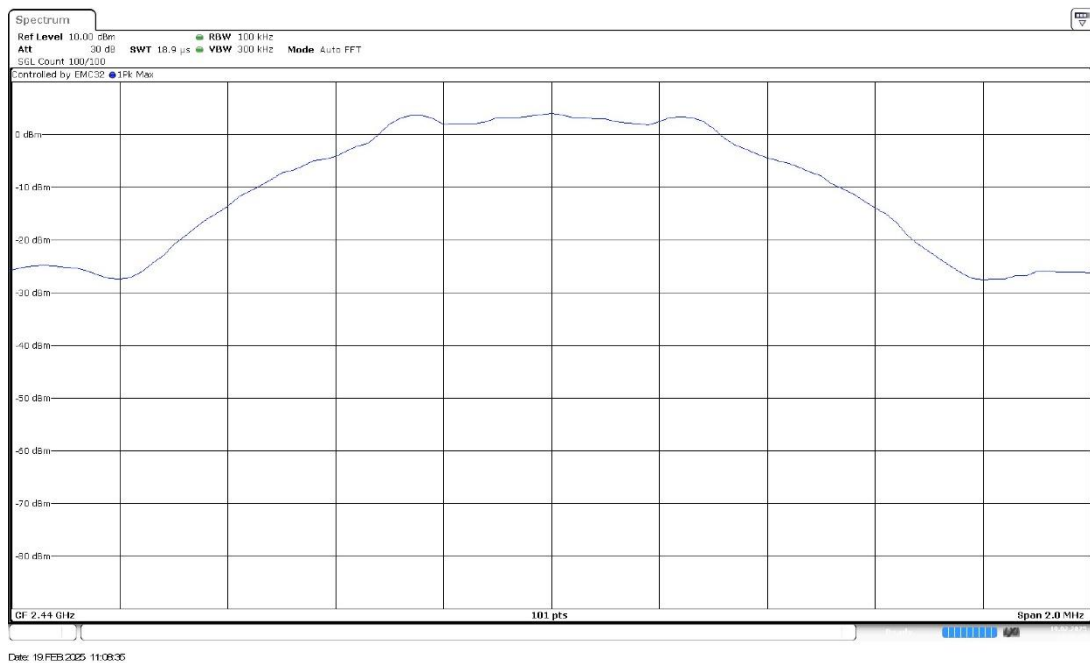
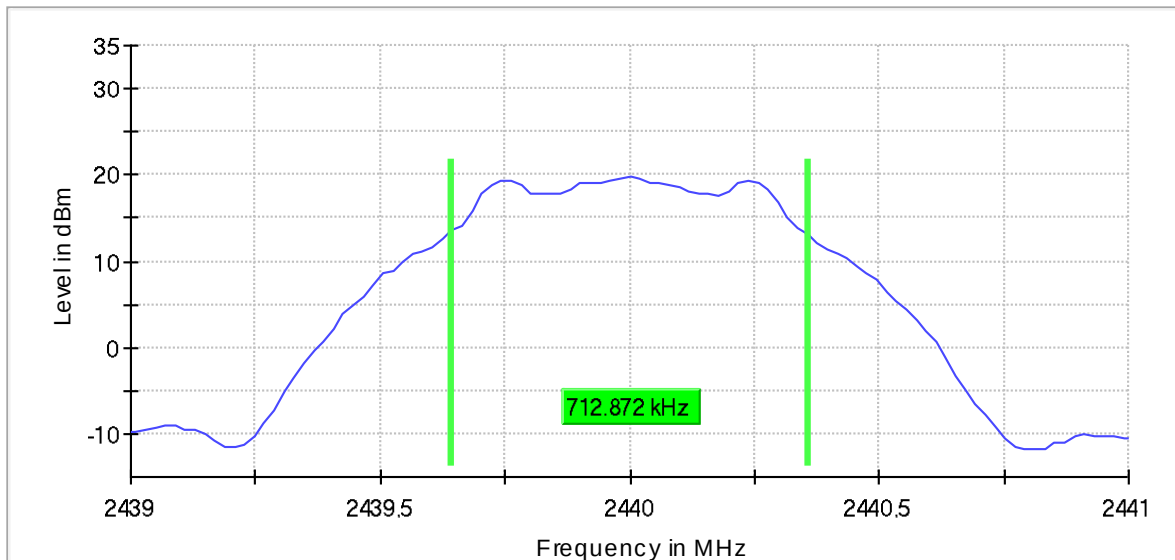
6 dB Bandwidth



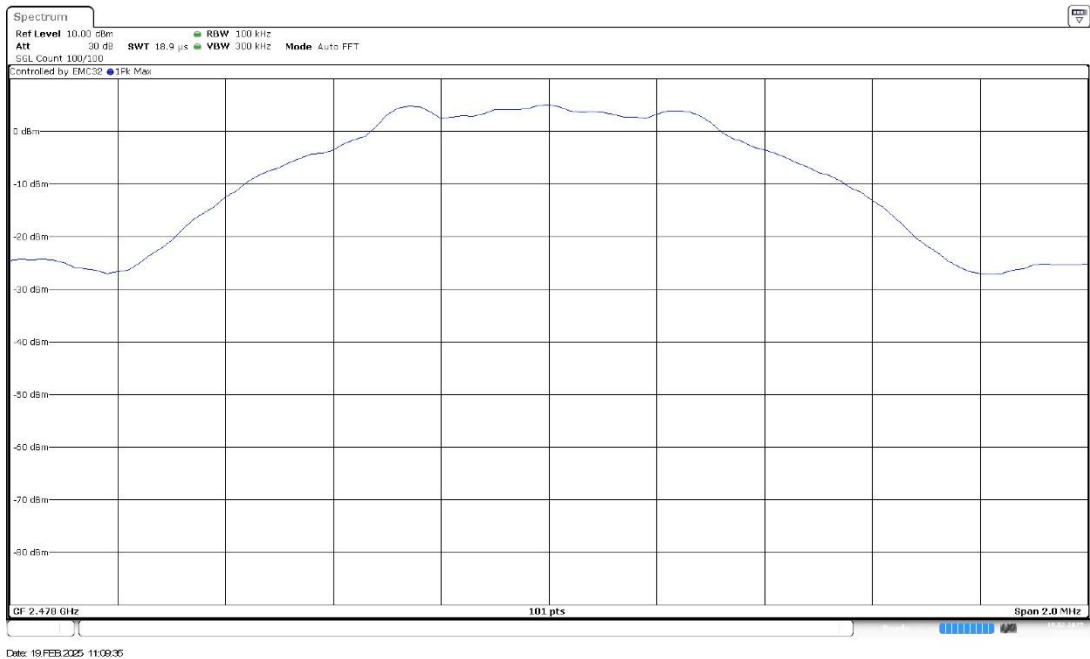
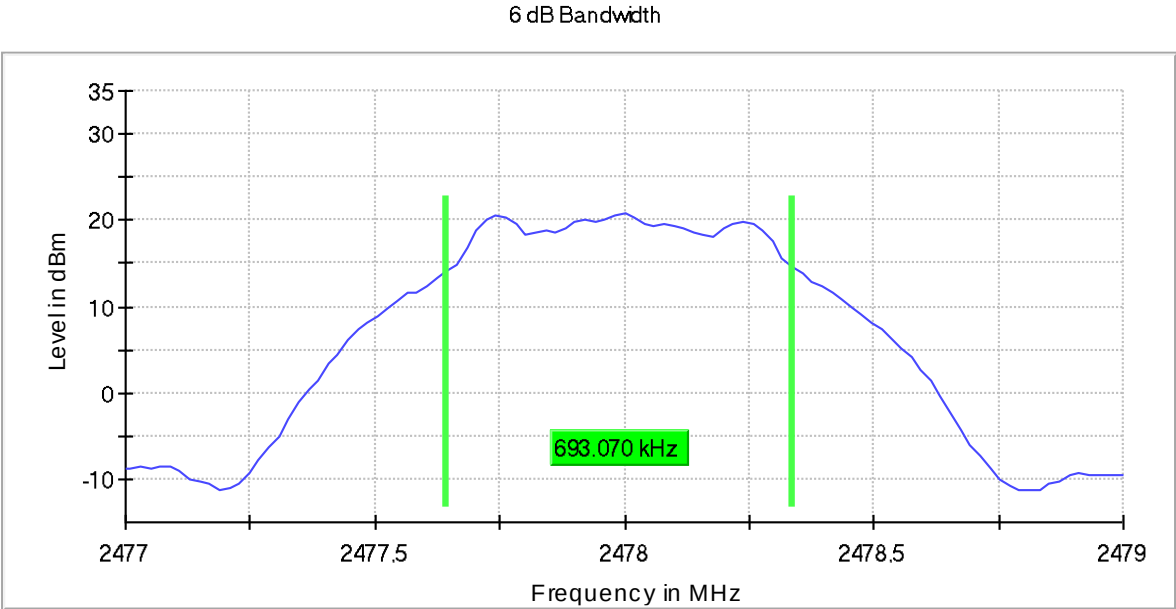
Bandwidth MHz = 1      Modulation = BTLE 5.0 (GFSK 1 Mbit/s)  
Frequency MHz = 2440.00000      MIMO Mode = SISO  
Active Port = 1

Images:

6 dB Bandwidth

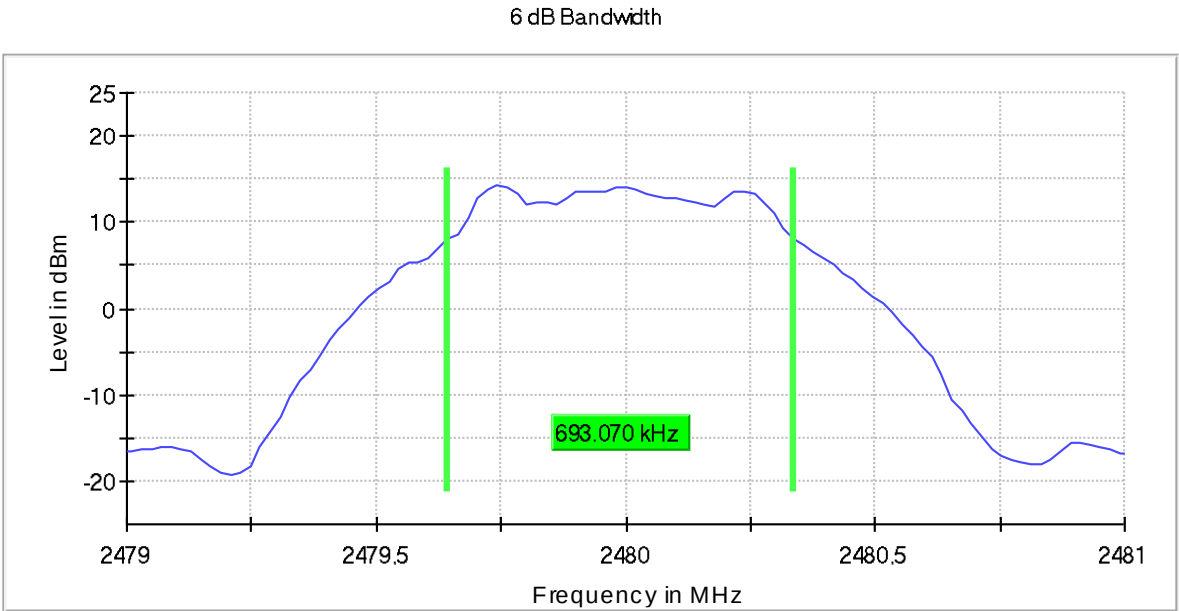


Bandwidth MHz = 1                      Modulation = BTLE 5.0 (GFSK 1 Mbit/s)  
Frequency MHz = 2478.00000      MIMO Mode = SISO  
Active Port = 1



Bandwidth MHz = 1                      Modulation = BTLE 5.0 (GFSK 1 Mbit/s)  
Frequency MHz = 2480.00000    MIMO Mode = SISO  
Active Port = 1

Images:



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Results

Modulation: BTLE 5.0 (GFSK 2 Mbit/s)

MIMO Mode: SISO

| BW (MHz) | Freq (MHz) | Port | Ebw (MHz) |
|----------|------------|------|-----------|
| 2        | 2402.00000 | 1    | 1.188     |
|          | 2440.00000 |      | 1.228     |
|          | 2440.00000 |      | 1.228     |
|          | 2480.00000 |      | 1.168     |

Verdict

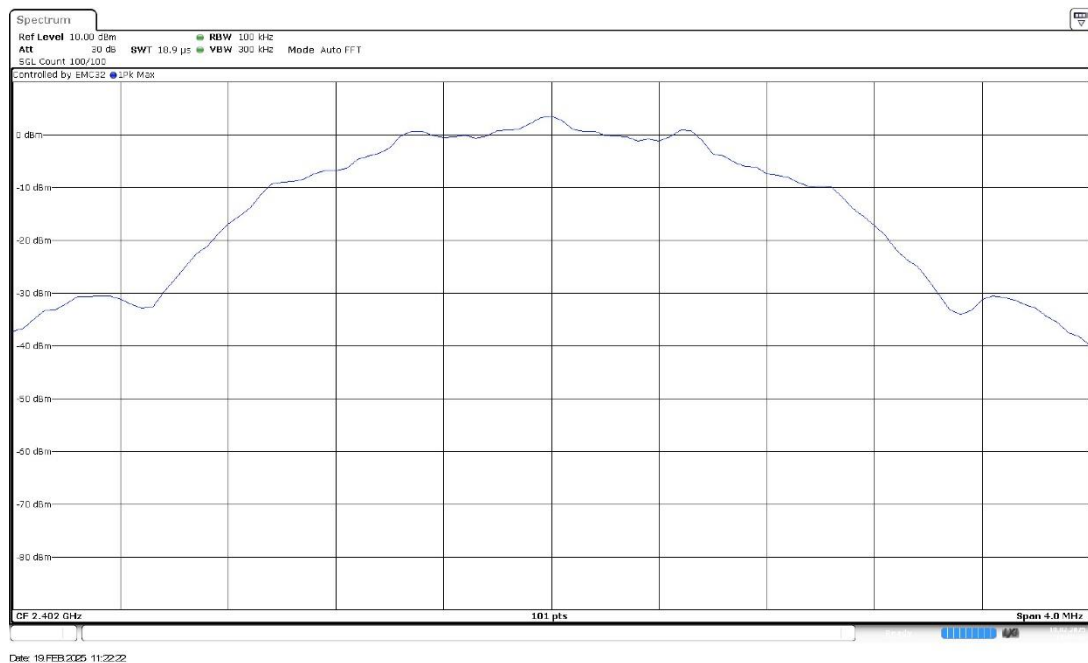
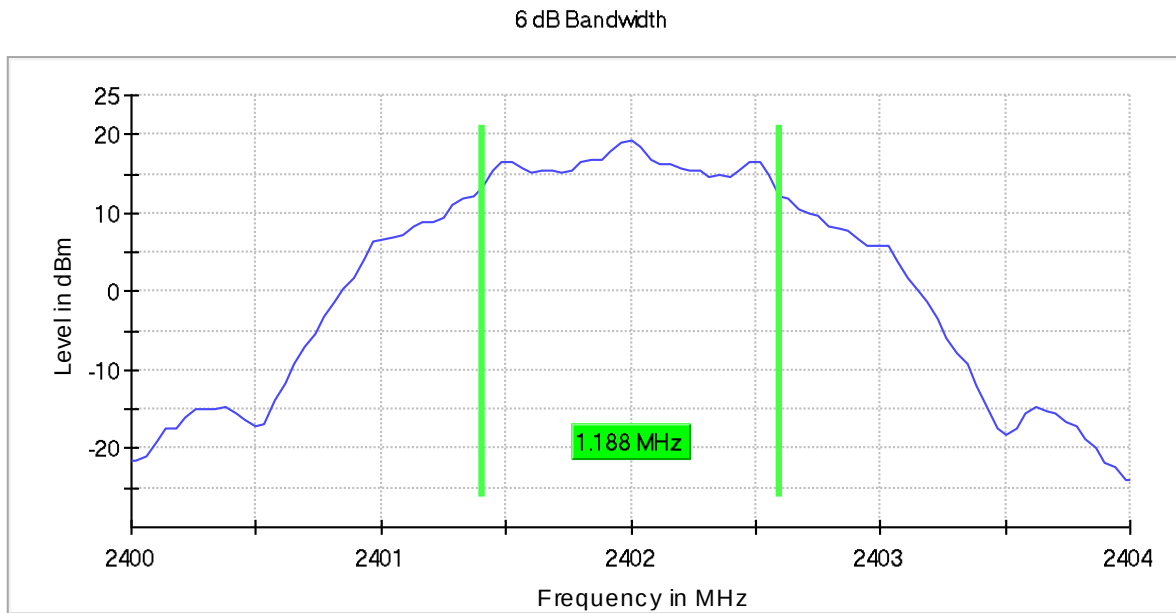
Pass



### Attachments

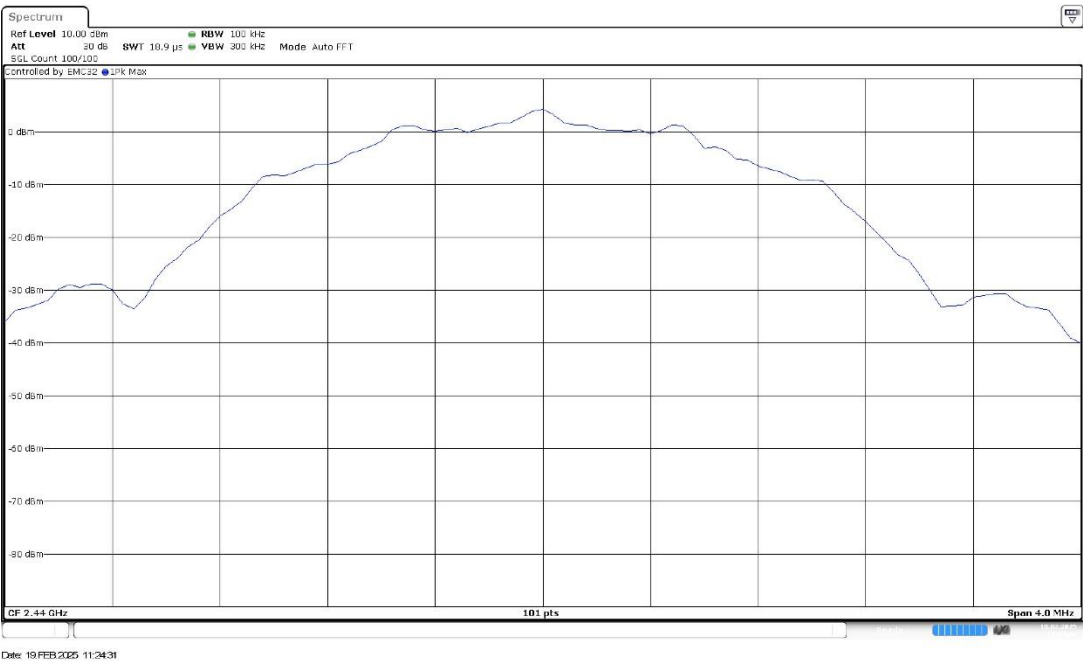
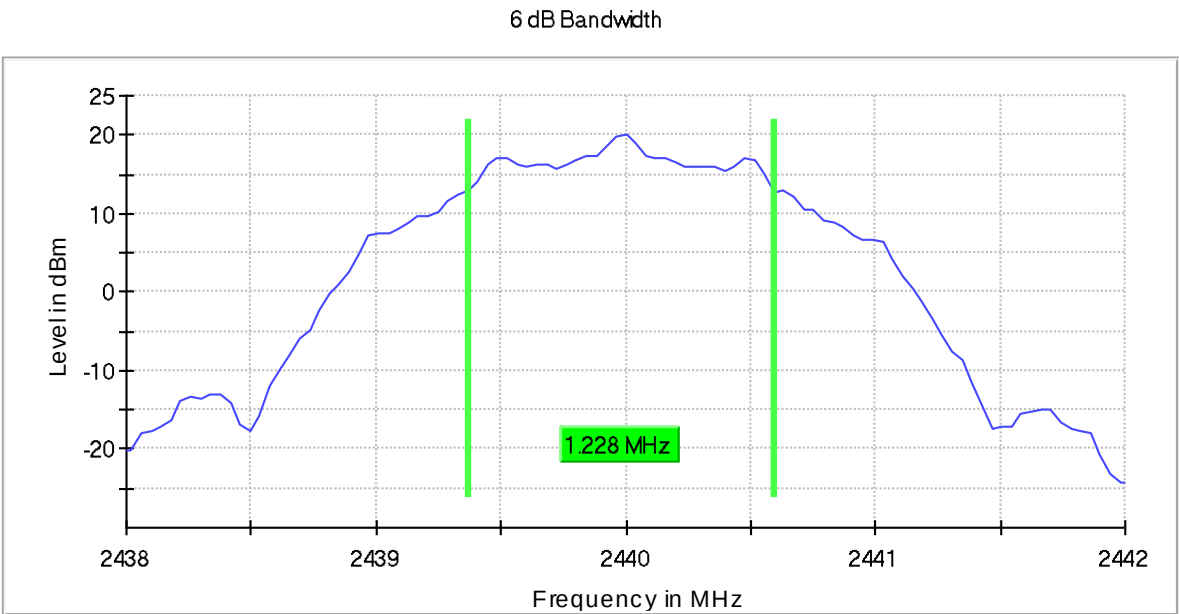
Bandwidth MHz = 2                      Modulation = BTLE 5.0 (GFSK 2 Mbit/s)  
Frequency MHz = 2402.00000      MIMO Mode = SISO  
Active Port = 1

### Images:



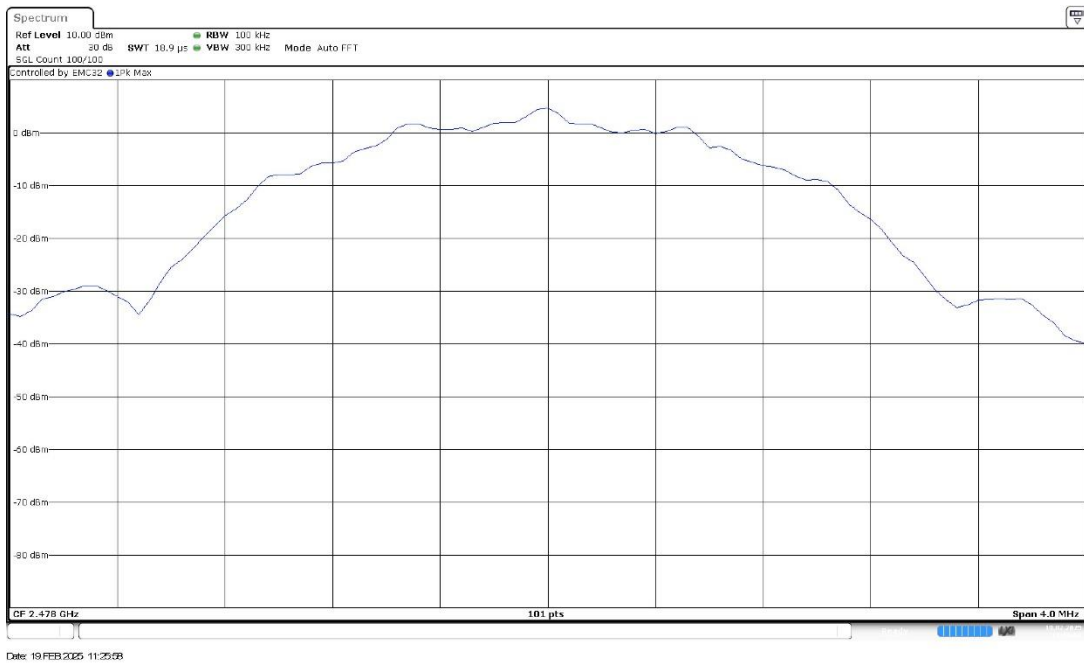
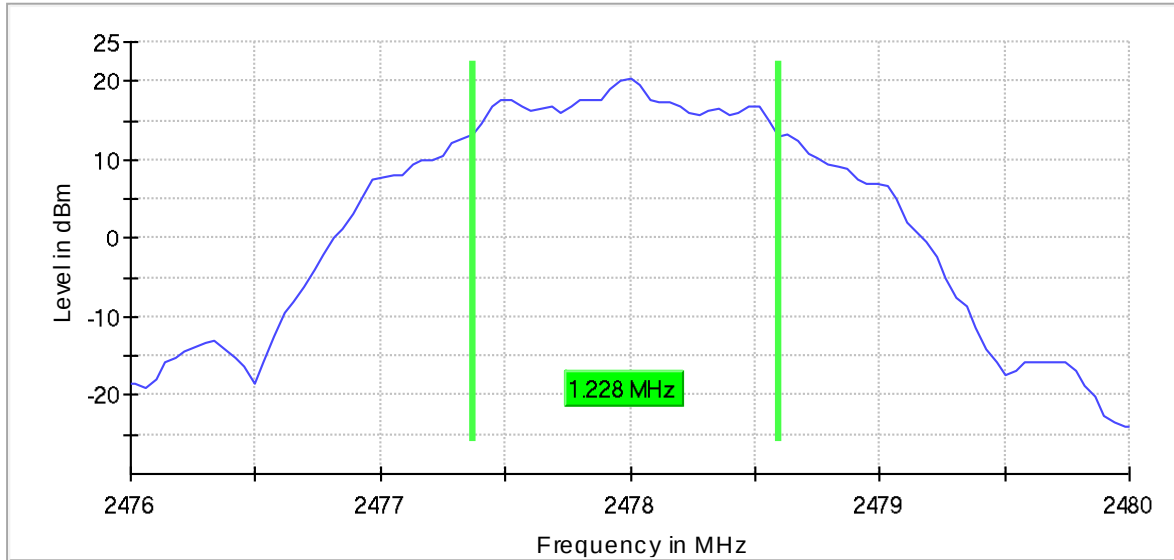
Bandwidth MHz = 2                      Modulation = BTLE 5.0 (GFSK 2 Mbit/s)  
Frequency MHz = 2440.00000      MIMO Mode = SISO  
Active Port = 1

Images:



Bandwidth MHz = 2                      Modulation = BTLE 5.0 (GFSK 2 Mbit/s)  
Frequency MHz = 2478.00000      MIMO Mode = SISO  
Active Port = 1

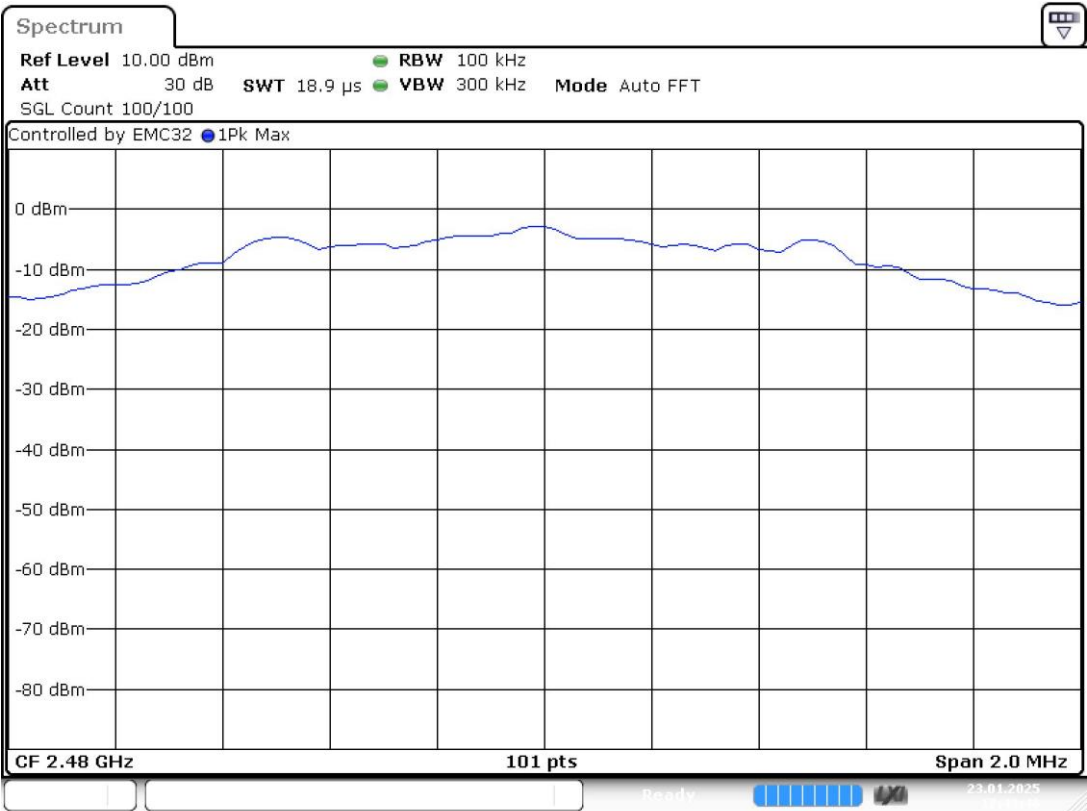
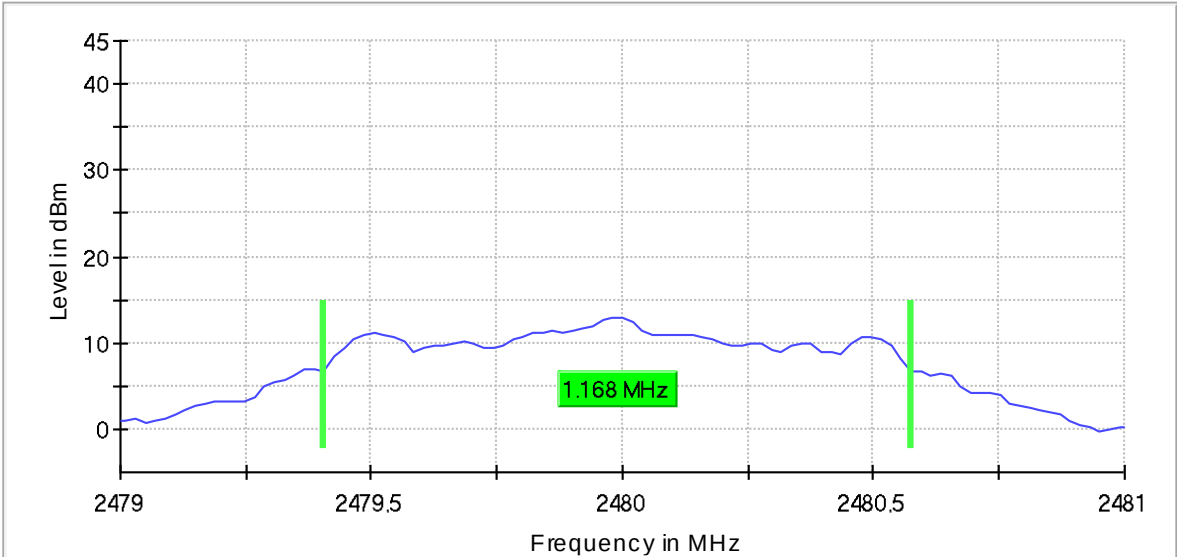
6 dB Bandwidth



Bandwidth MHz = 2                      Modulation = BTLE 5.0 (GFSK 2 Mbit/s)  
Frequency MHz = 2480.00000      MIMO Mode = SISO  
Active Port = 1

Images:

6 dB Bandwidth



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# 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.

## Results

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)

MIMO Mode: SISO

| Equipment                         | BW (MHz) | Freq (MHz) | Port | PSD (dBm) |
|-----------------------------------|----------|------------|------|-----------|
| Digital Transmission System (DTS) | 1        | 2402.00000 | 1    | 4.976     |
|                                   |          | 2440.00000 |      | 6.623     |
|                                   |          | 2478.00000 |      | 7.960     |
|                                   |          | 2480.00000 |      | 6.150     |

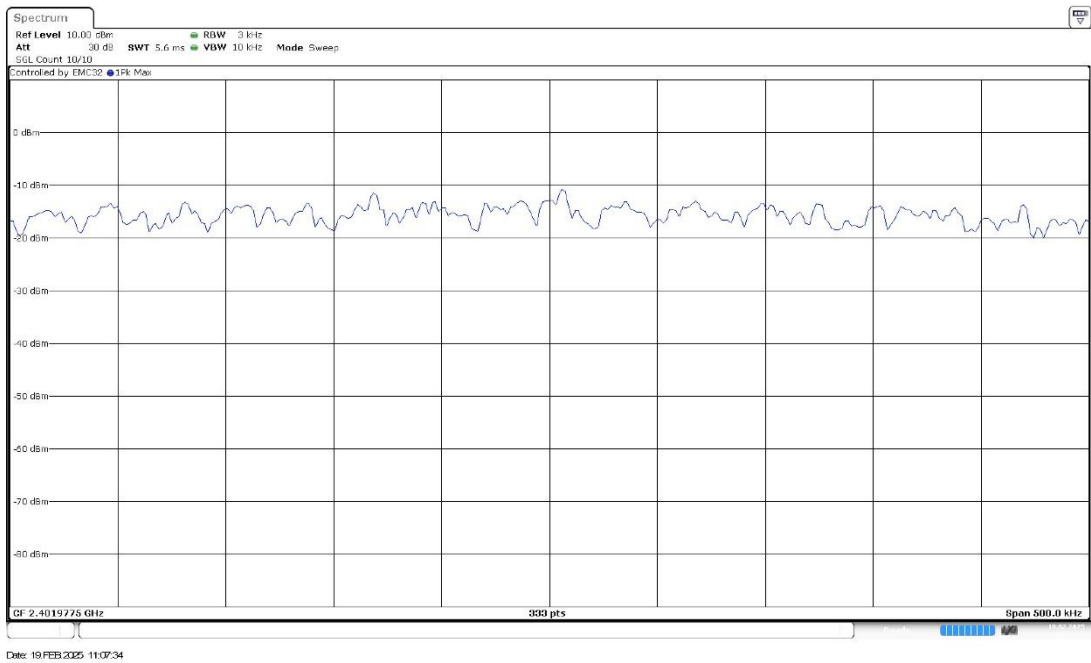
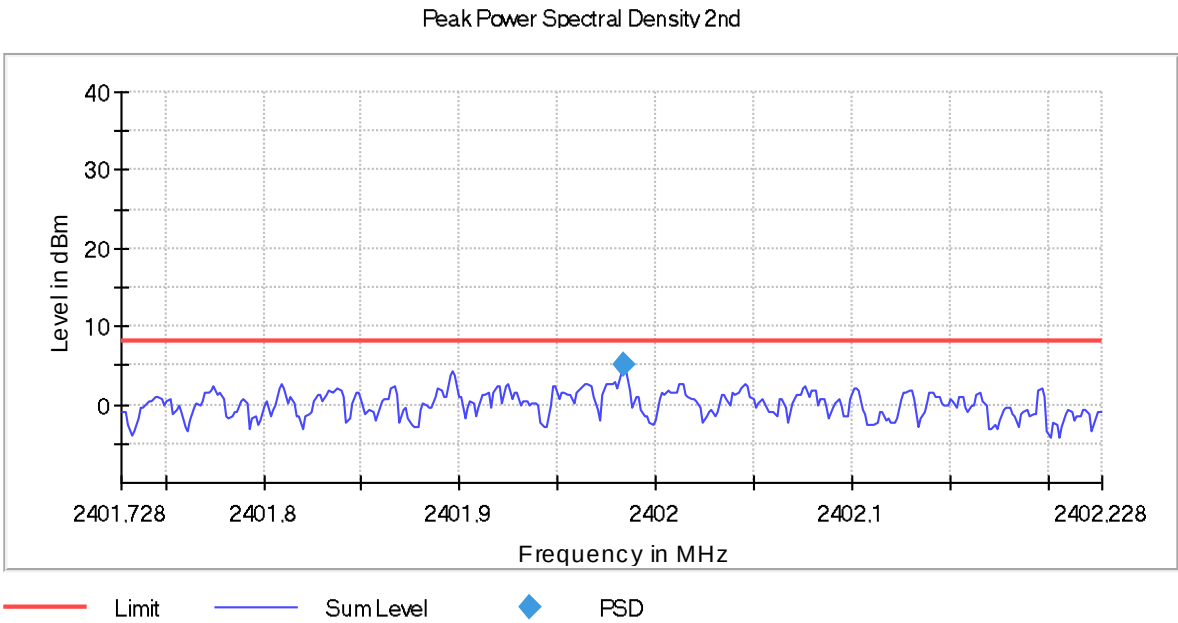
## Verdict

Pass

Attachments

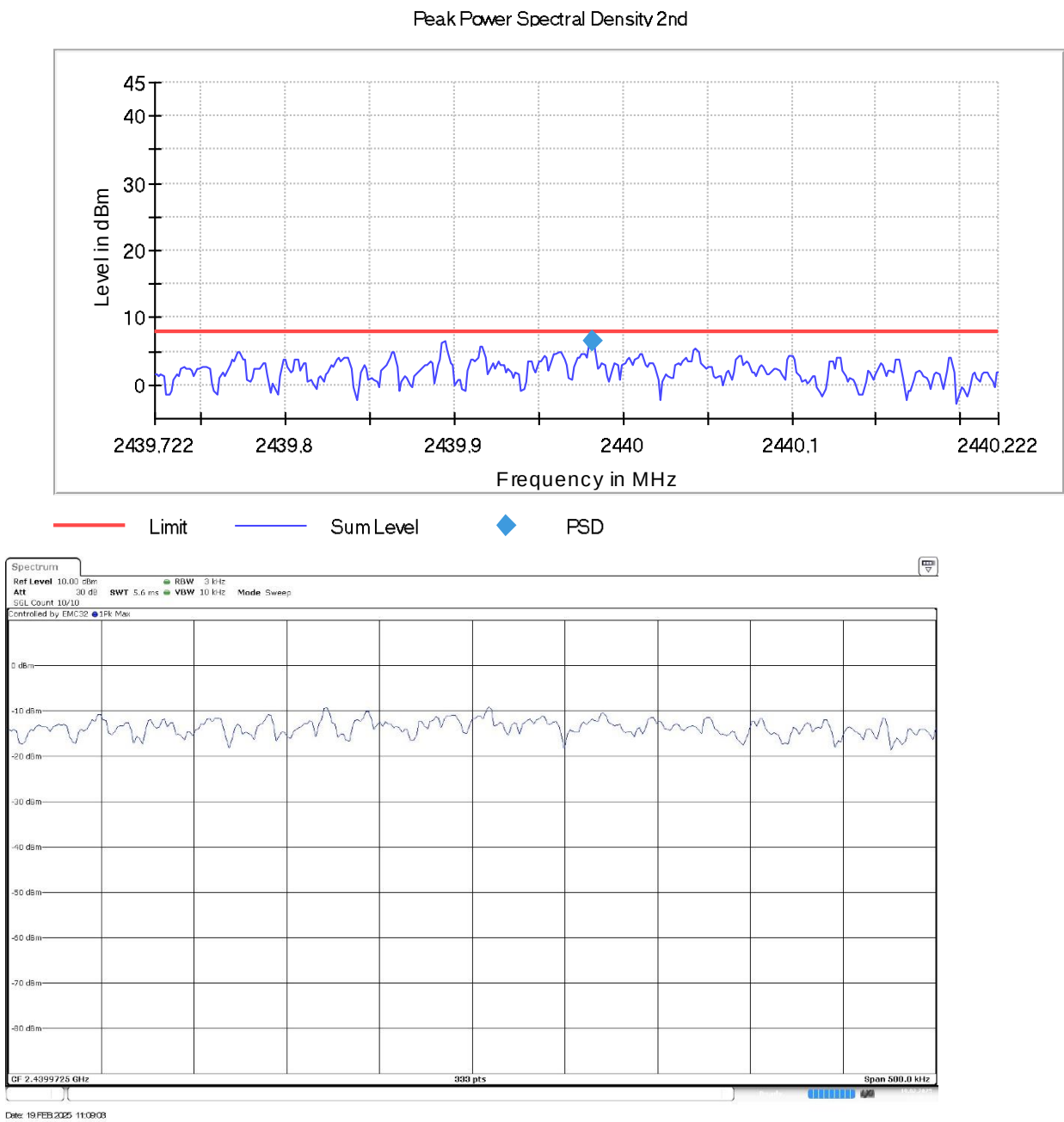
Equipment Type = Digital Transmission System (DTS)    Bandwidth MHz = 1  
Modulation = BTLE 5.0 (GFSK 1 Mbit/s)    Frequency MHz = 2402.00000  
MIMO Mode = SISO    Active Port = 1

Images:



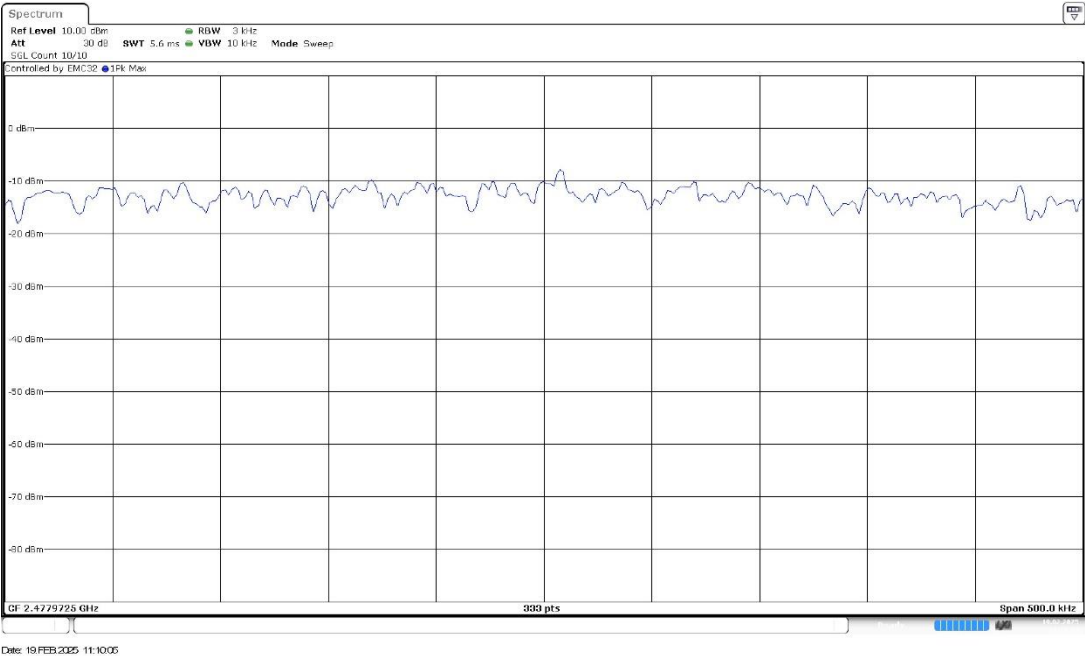
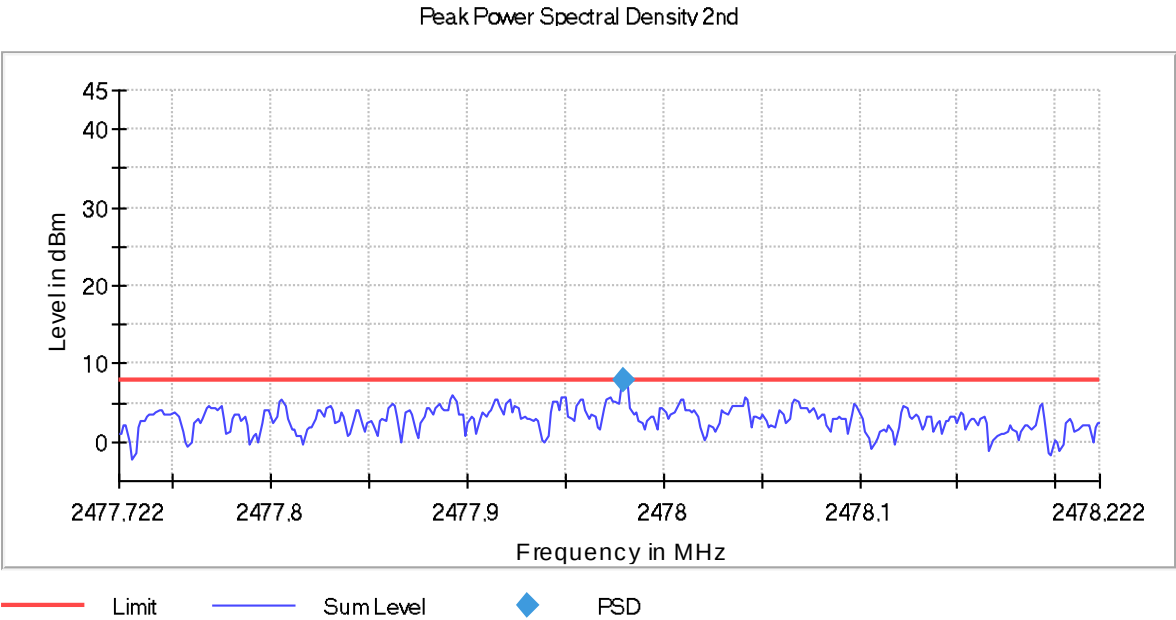
Equipment Type = Digital Transmission System (DTS)    Bandwidth MHz = 1  
Modulation = BTLE 5.0 (GFSK 1 Mbit/s)    Frequency MHz = 2440.00000  
MIMO Mode = SISO    Active Port = 1

Images:



Equipment Type = Digital Transmission System (DTS)    Bandwidth MHz = 1  
Modulation = BTLE 5.0 (GFSK 1 Mbit/s)    Frequency MHz = 2478.00000  
MIMO Mode = SISO    Active Port = 1

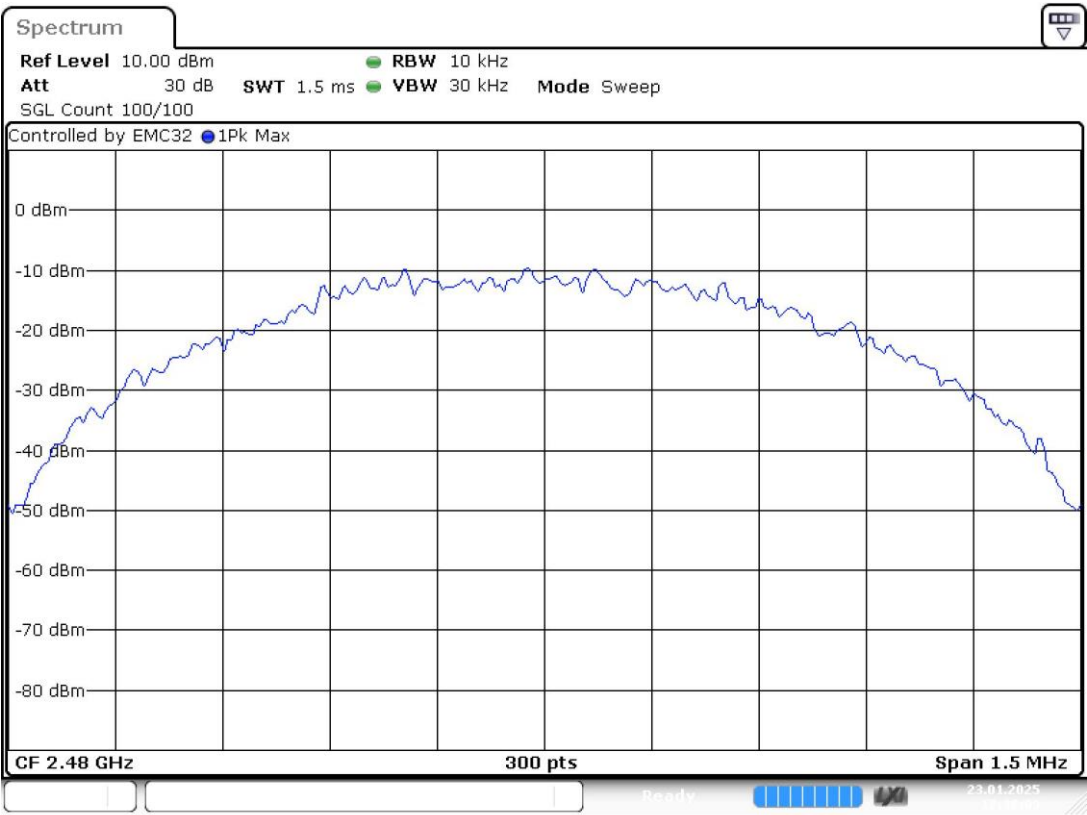
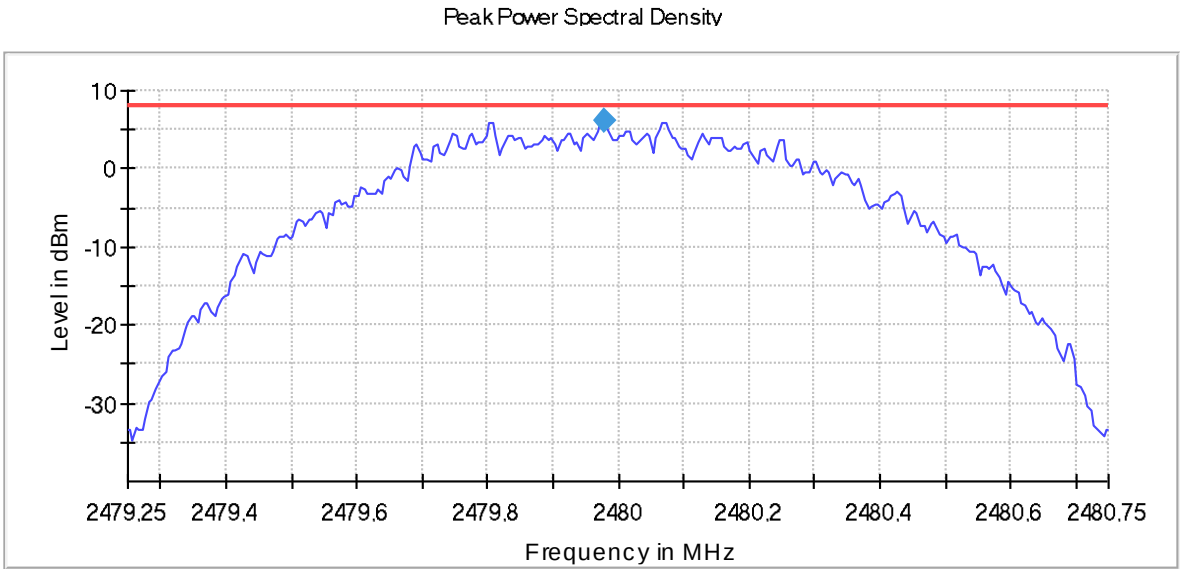
Images:





Equipment Type = Digital Transmission System (DTS)    Bandwidth MHz = 1  
Modulation = BTLE 5.0 (GFSK 1 Mbit/s)    Frequency MHz = 2480.00000  
MIMO Mode = SISO    Active Port = 1

Images:



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Results

Modulation: BTLE 5.0 (GFSK 2 Mbit/s)

MIMO Mode: SISO

| Equipment                         | BW (MHz) | Freq (MHz) | Port | PSD (dBm) |
|-----------------------------------|----------|------------|------|-----------|
| Digital Transmission System (DTS) | 2        | 2402.00000 | 1    | 4.127     |
|                                   |          | 2440.00000 |      | 4.808     |
|                                   |          | 2478.00000 |      | 4.843     |
|                                   |          | 2480.00000 |      | 3.950     |

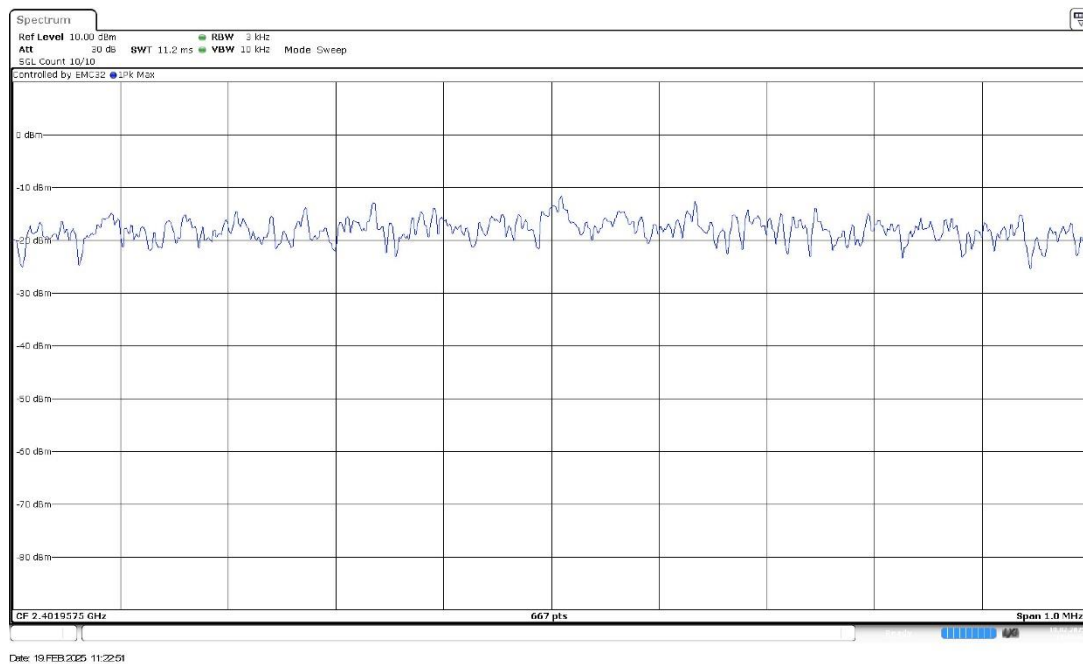
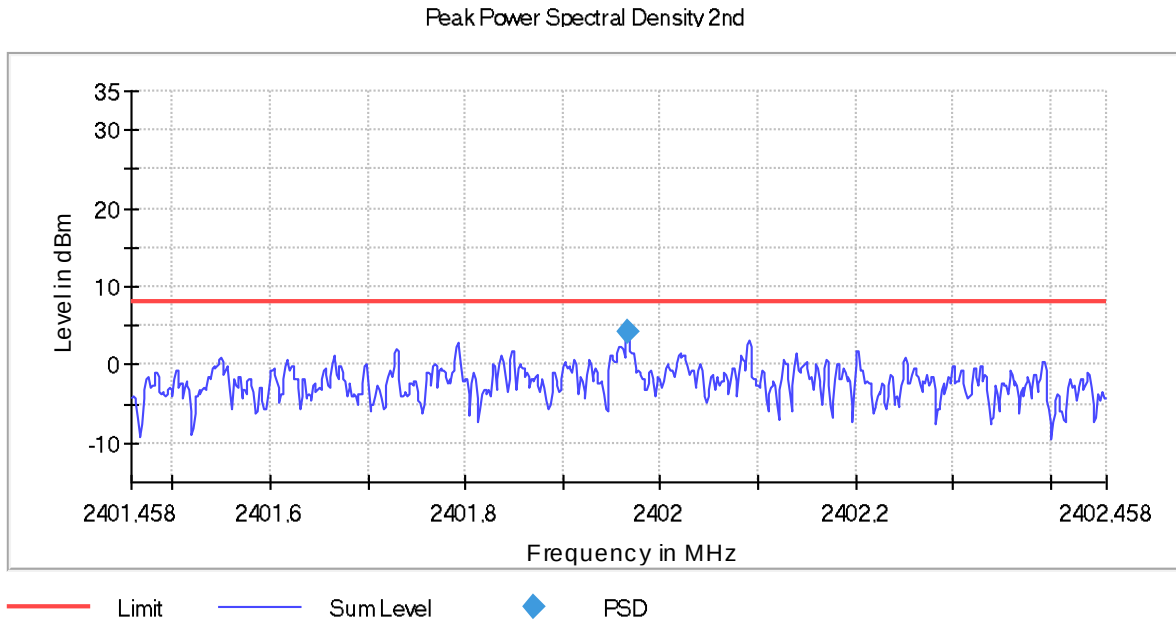
Verdict

Pass

## Attachments

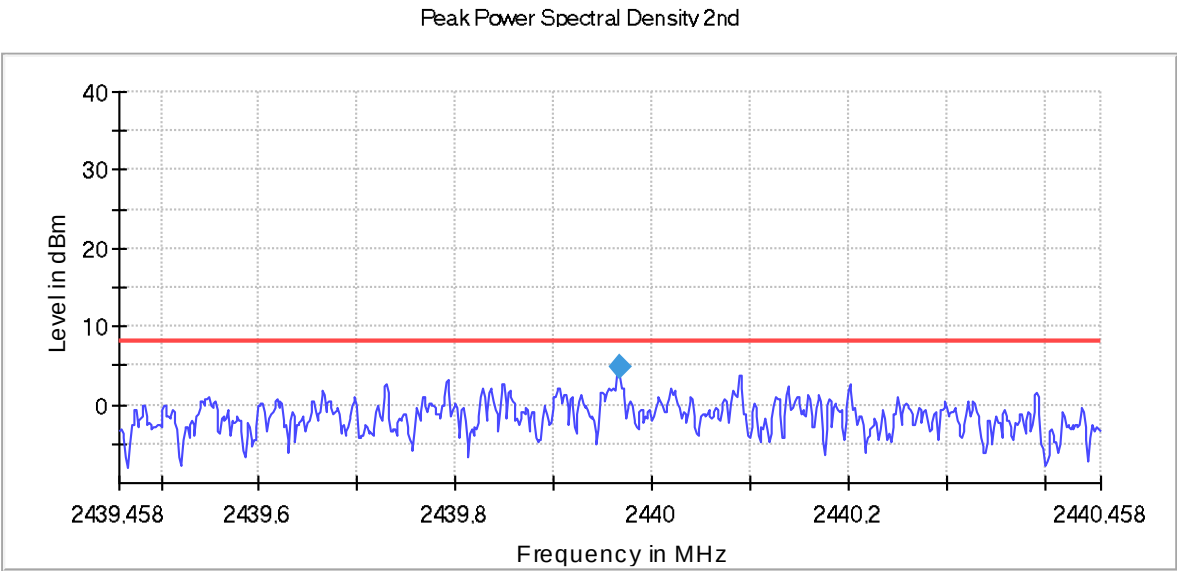
Equipment Type = Digital Transmission System (DTS)    Bandwidth MHz = 2  
Modulation = BTLE 5.0 (GFSK 2 Mbit/s)    Frequency MHz = 2402.00000  
MIMO Mode = SISO    Active Port = 1

## Images:

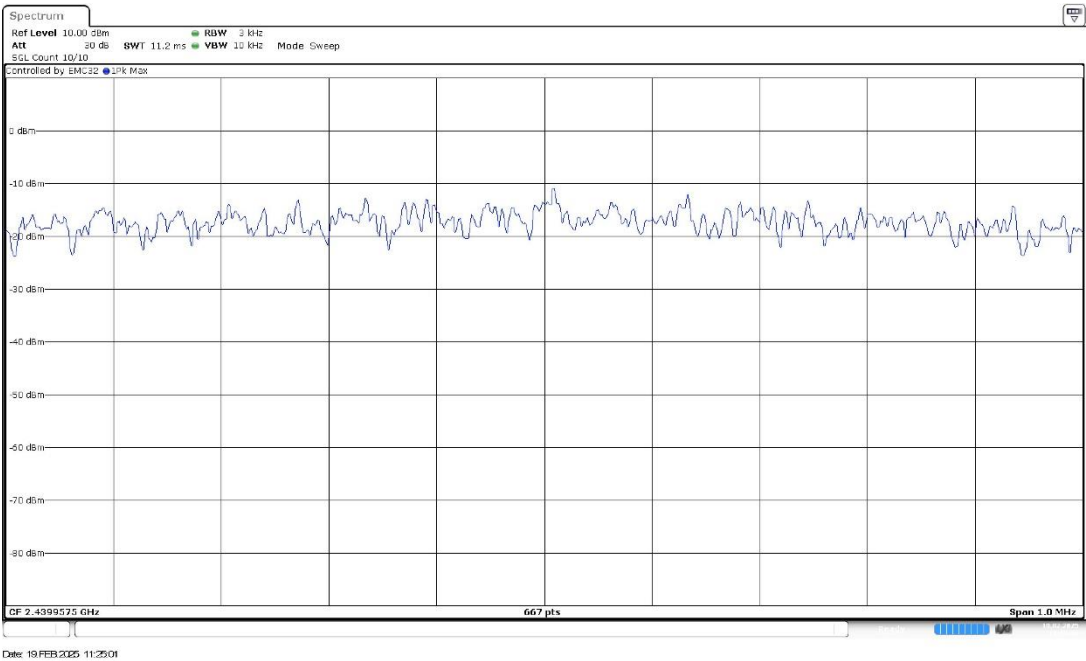


Equipment Type = Digital Transmission System (DTS)    Bandwidth MHz = 2  
Modulation = BTLE 5.0 (GFSK 2 Mbit/s)    Frequency MHz = 2440.00000  
MIMO Mode = SISO    Active Port = 1

Images:

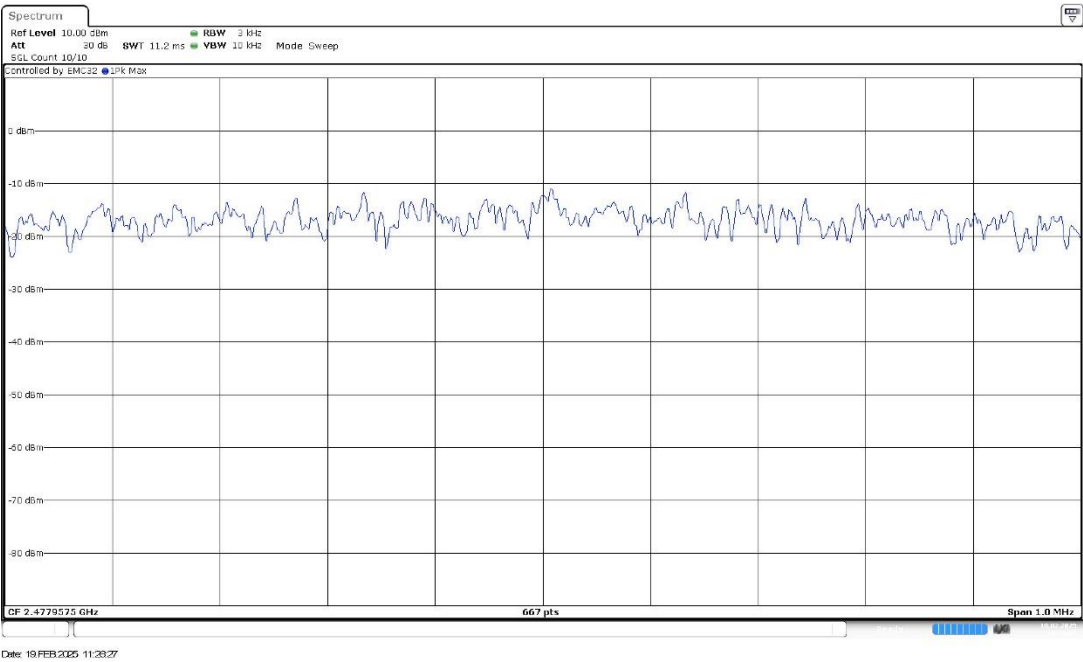
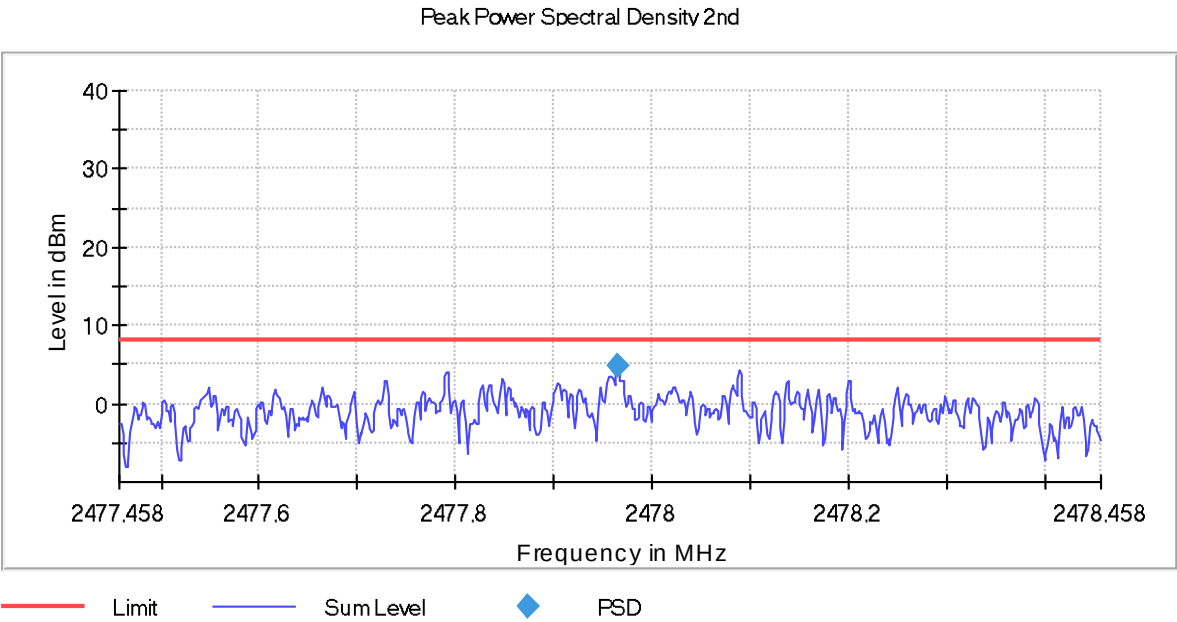


— Limit    — Sum Level    ◆ PSD



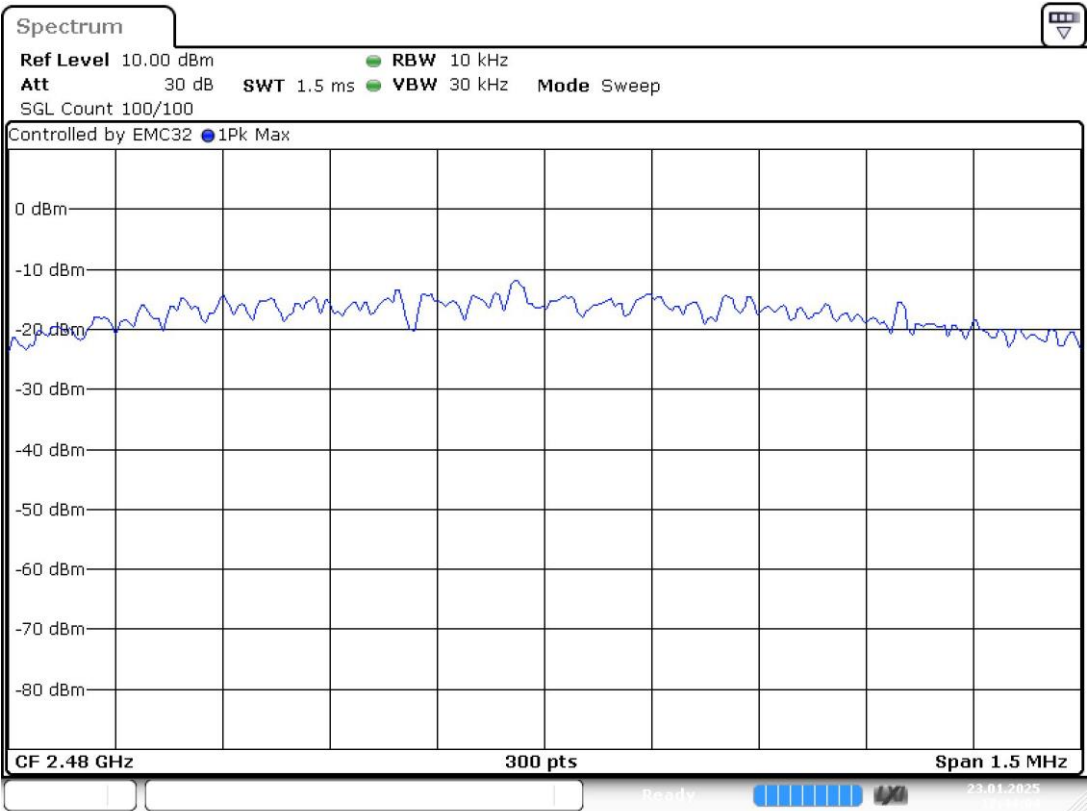
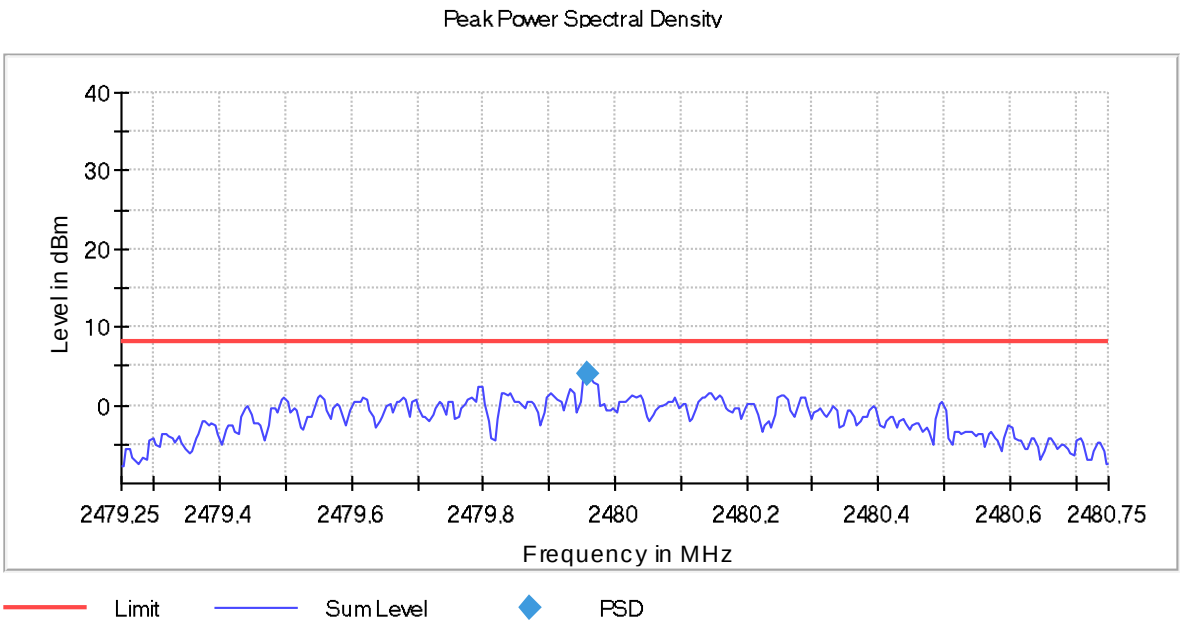
Equipment Type = Digital Transmission System (DTS)    Bandwidth MHz = 2  
Modulation = BTLE 5.0 (GFSK 2 Mbit/s)    Frequency MHz = 2478.00000  
MIMO Mode = SISO    Active Port = 1

Images:



Equipment Type = Digital Transmission System (DTS)    Bandwidth MHz = 2  
Modulation = BTLE 5.0 (GFSK 2 Mbit/s)    Frequency MHz = 2480.00000  
MIMO Mode = SISO    Active Port = 1

Images:



Date: 23.JAN.2025 17:44:04

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).

Results

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)  
MIMO Mode: SISO

| Equipment                         | BW (MHz) | Freq (MHz) | Port | Peak Power (dBm) | EIRP Power (dBm) |
|-----------------------------------|----------|------------|------|------------------|------------------|
| Digital Transmission System (DTS) | 1        | 2402.00000 | 1    | 14.884           | 18.484           |
| Digital Transmission System (DTS) | 1        | 2440.00000 | 1    | 17.057           | 20.657           |
| Digital Transmission System (DTS) | 1        | 2478.00000 |      | 17.727           | 21.327           |
| Digital Transmission System (DTS) | 1        | 2480.00000 | 1    | 11.295           | 14.895           |

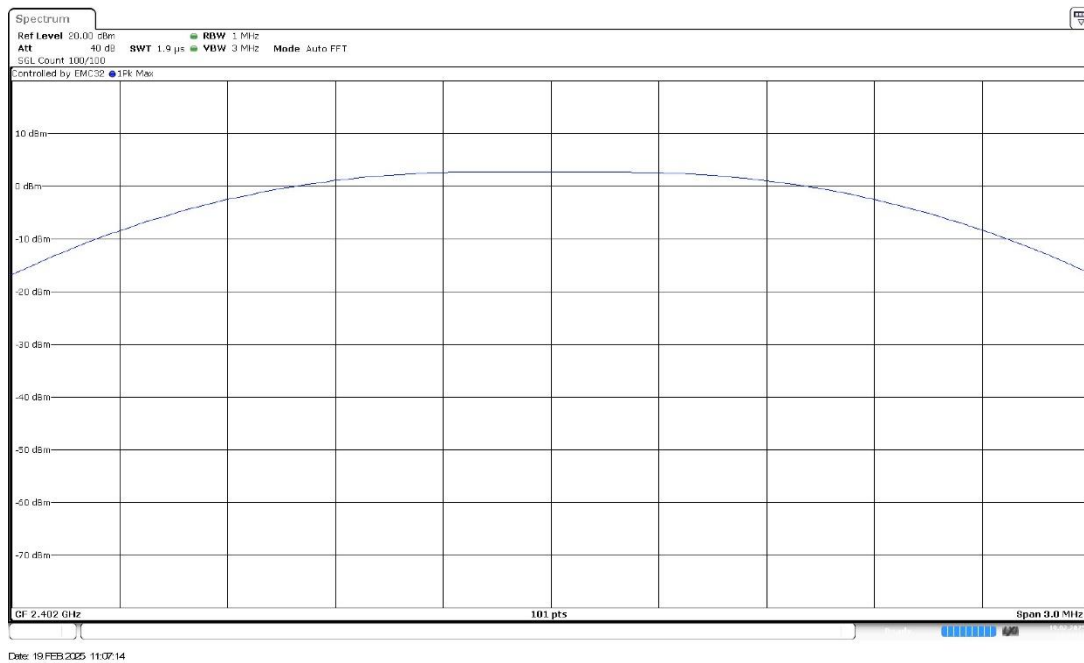
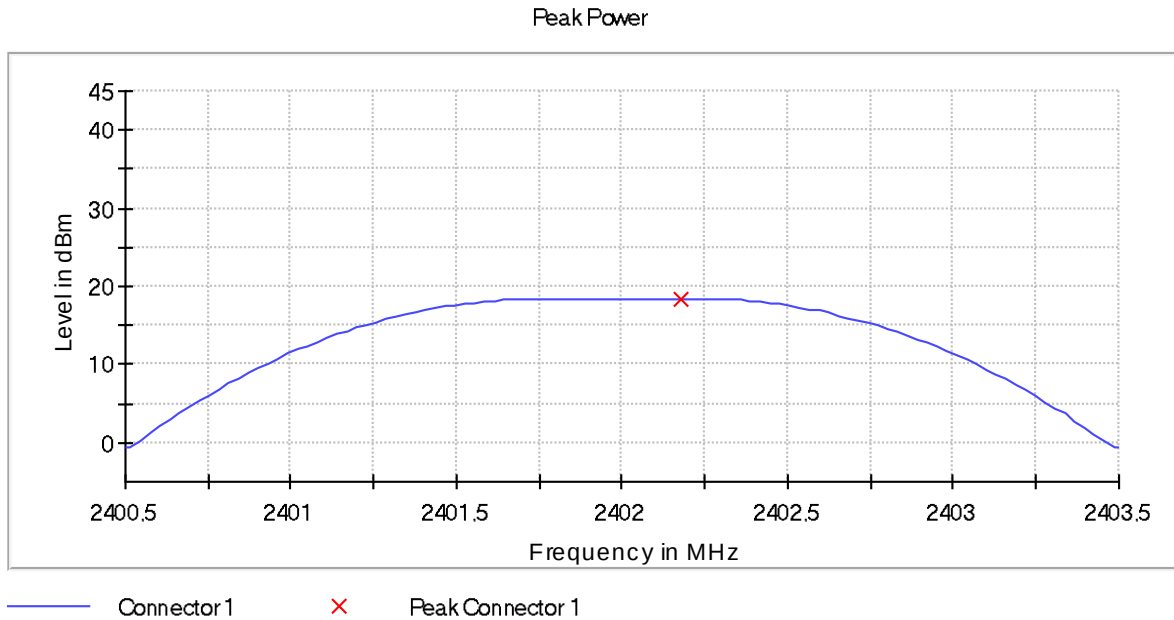
Verdict

Pass

## Attachments

Equipment Type = Digital Transmission System (DTS) Bandwidth MHz = 1  
 Modulation = BTLE 5.0 (GFSK 1 Mbit/s) Frequency MHz = 2402.00000  
 MIMO Mode = SISO Active Port = 1

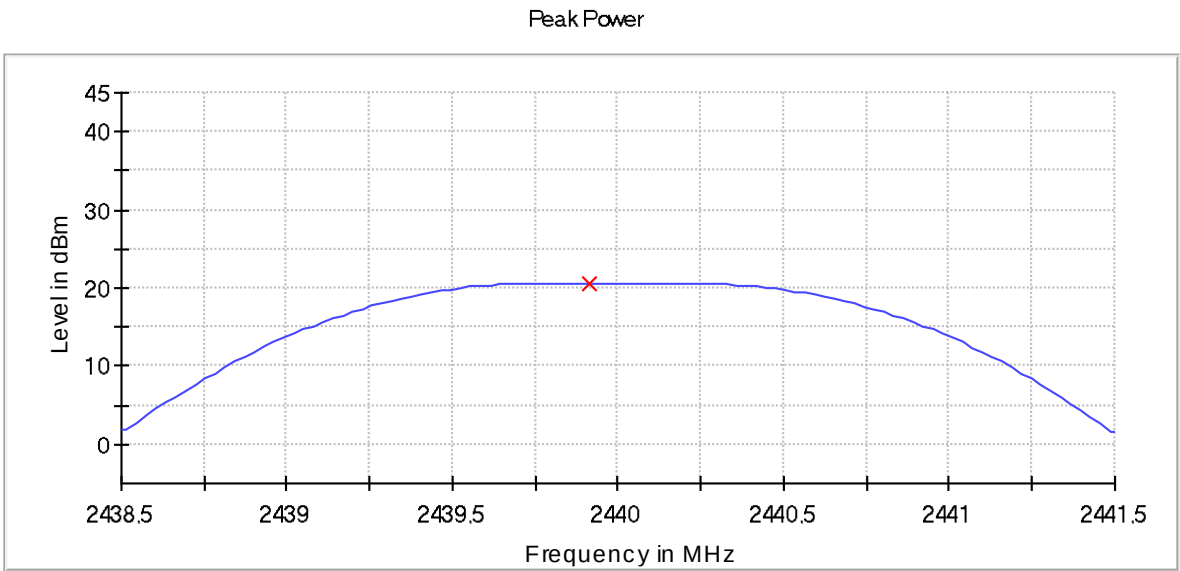
## Images:



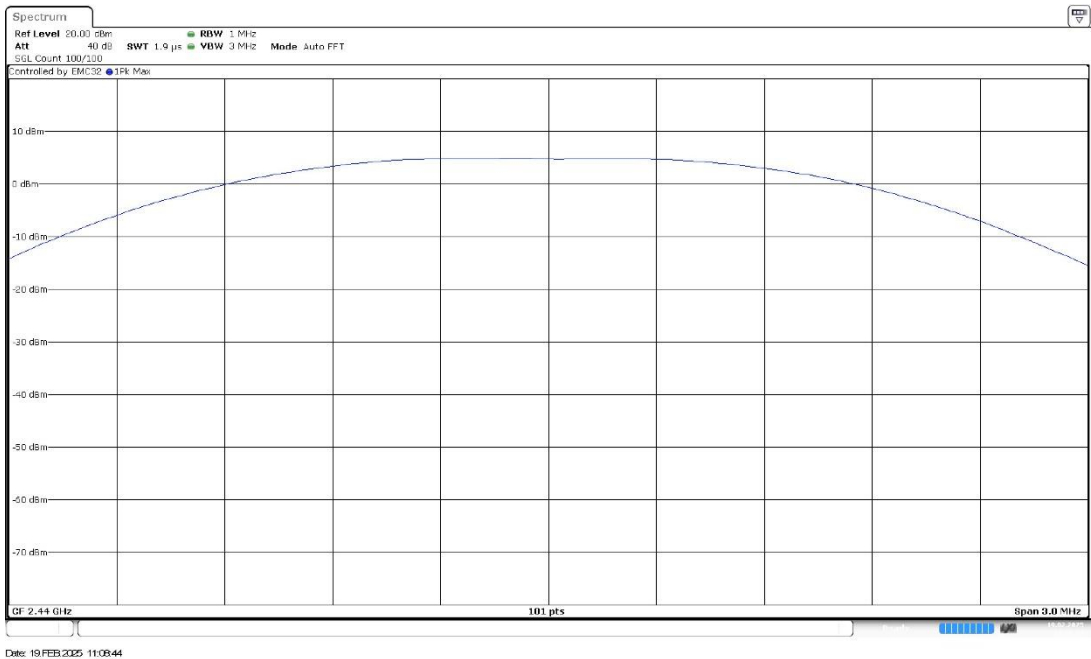


Equipment Type = Digital Transmission System (DTS)    Bandwidth MHz = 1  
Modulation = BTLE 5.0 (GFSK 1 Mbit/s)    Frequency MHz = 2440.00000  
MIMO Mode = SISO    Active Port = 1

Images:

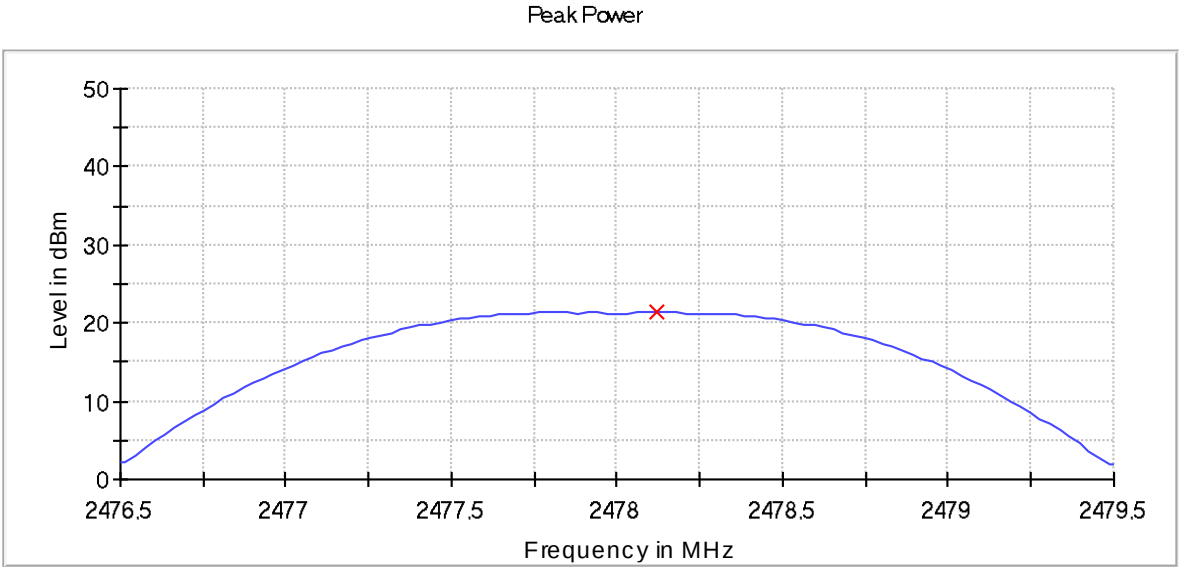


Connector 1    X    Peak Connector 1

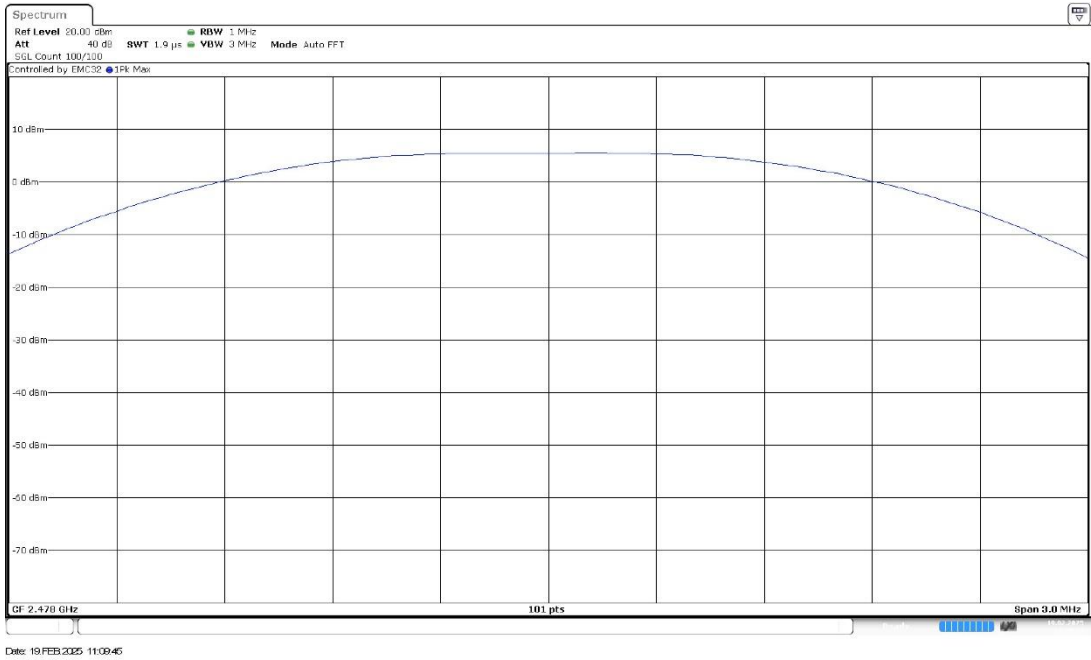


Equipment Type = Digital Transmission System (DTS)    Bandwidth MHz = 1  
Modulation = BTLE 5.0 (GFSK 1 Mbit/s)    Frequency MHz = 2478.00000  
MIMO Mode = SISO    Active Port = 1

Images:

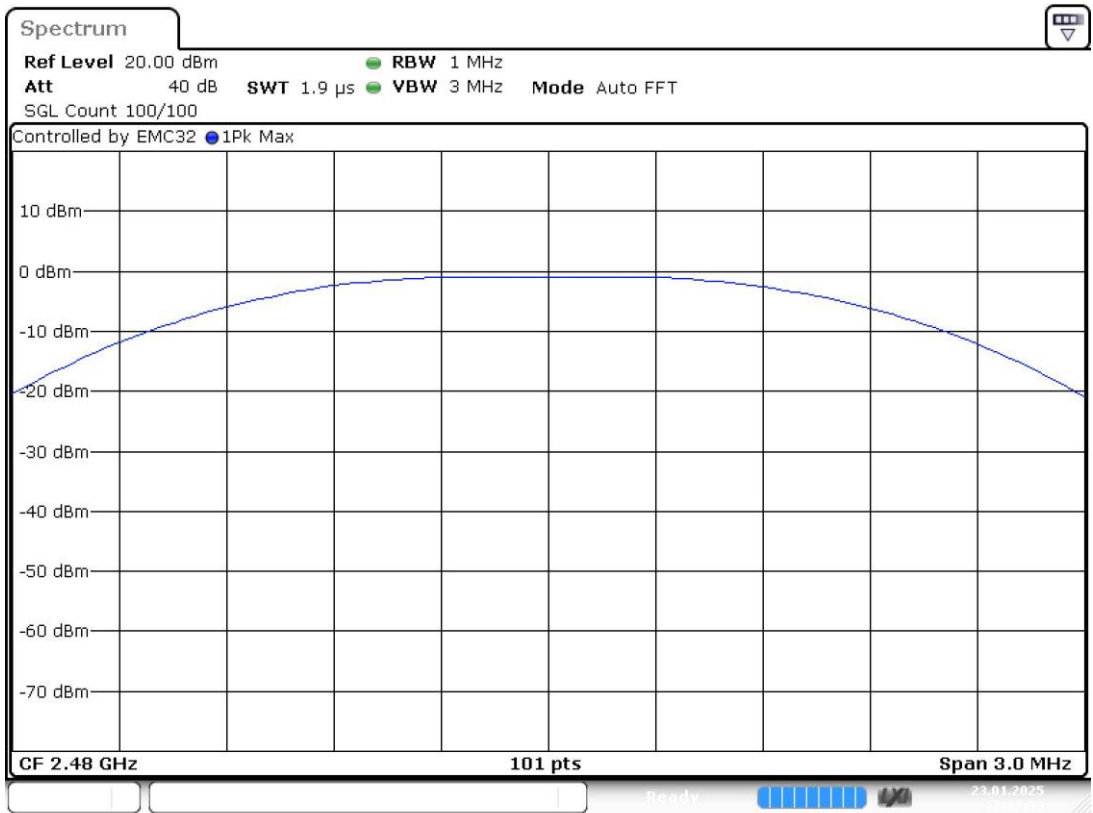
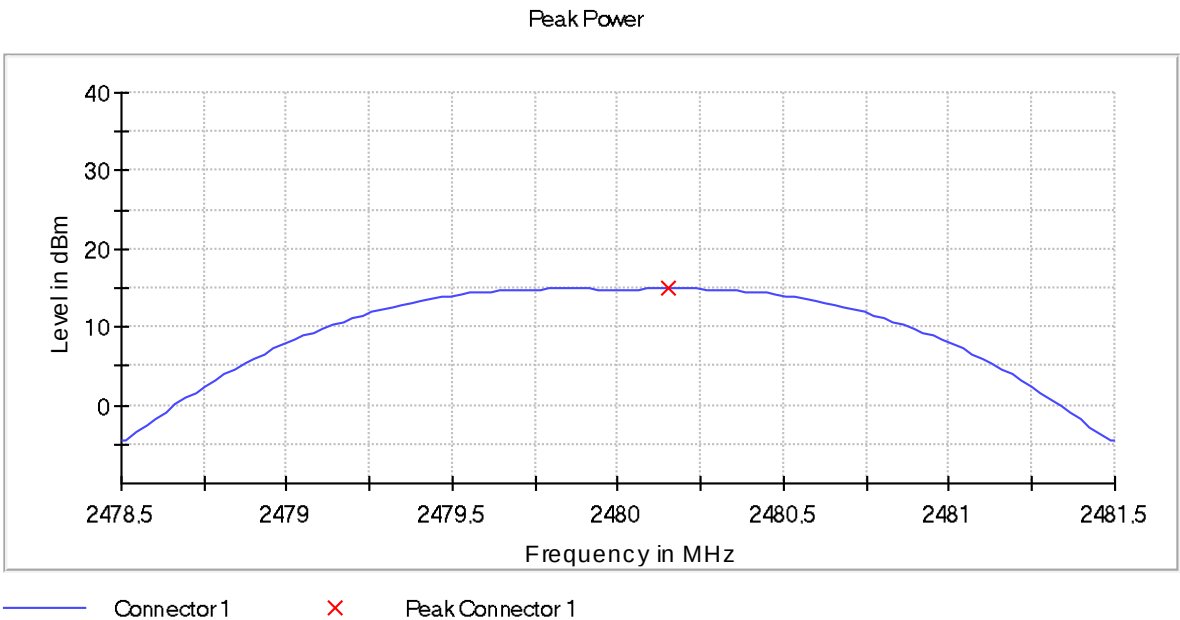


Connector1    X    Peak Connector 1



Equipment Type = Digital Transmission System (DTS)    Bandwidth MHz = 1  
Modulation = BTLE 5.0 (GFSK 1 Mbit/s)    Frequency MHz = 2480.00000  
MIMO Mode = SISO    Active Port = 1

Images:



Date: 23.JAN.2025 17:37:59

Results

Modulation: BTLE 5.0 (GFSK 2 Mbit/s)

MIMO Mode: SISO

| Equipment                         | BW (MHz) | Freq (MHz) | Port | Peak Power (dBm) | EIRP Power (dBm) |
|-----------------------------------|----------|------------|------|------------------|------------------|
| Digital Transmission System (DTS) | 2        | 2402.00000 | 1    | 16.663           | 20.263           |
| Digital Transmission System (DTS) | 2        | 2440.00000 | 1    | 17.210           | 20.810           |
| Digital Transmission System (DTS) | 2        | 2478.00000 | 1    | 17.735           | 21.335           |
| Digital Transmission System (DTS) | 2        | 2480.00000 | 1    | 11.330           | 14.930           |

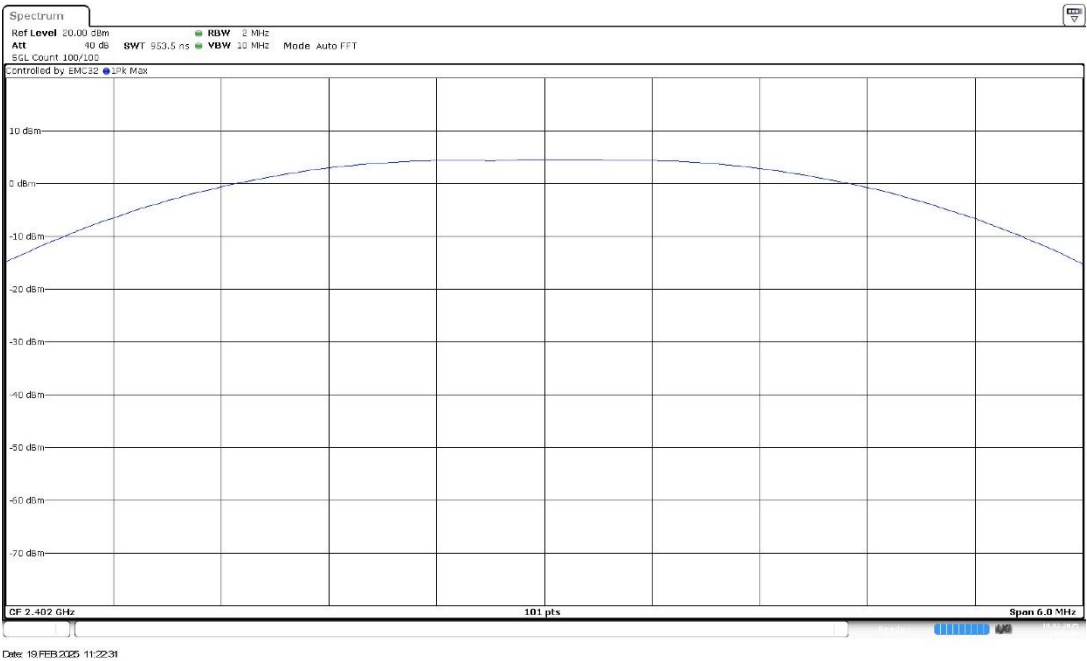
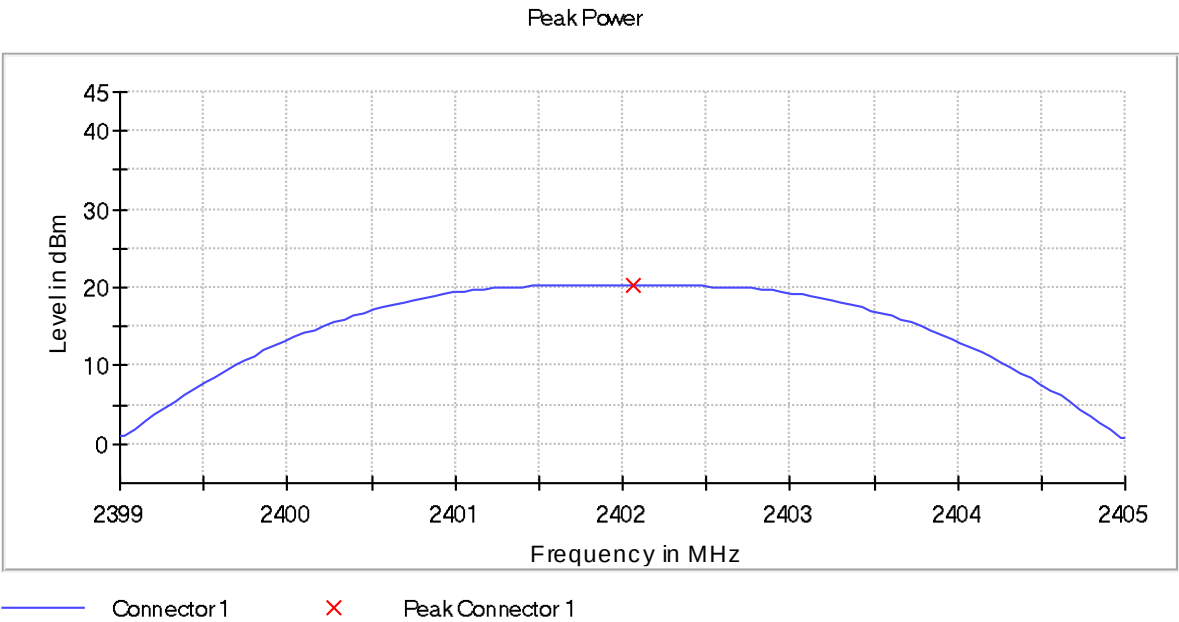
Verdict

Pass

Attachments

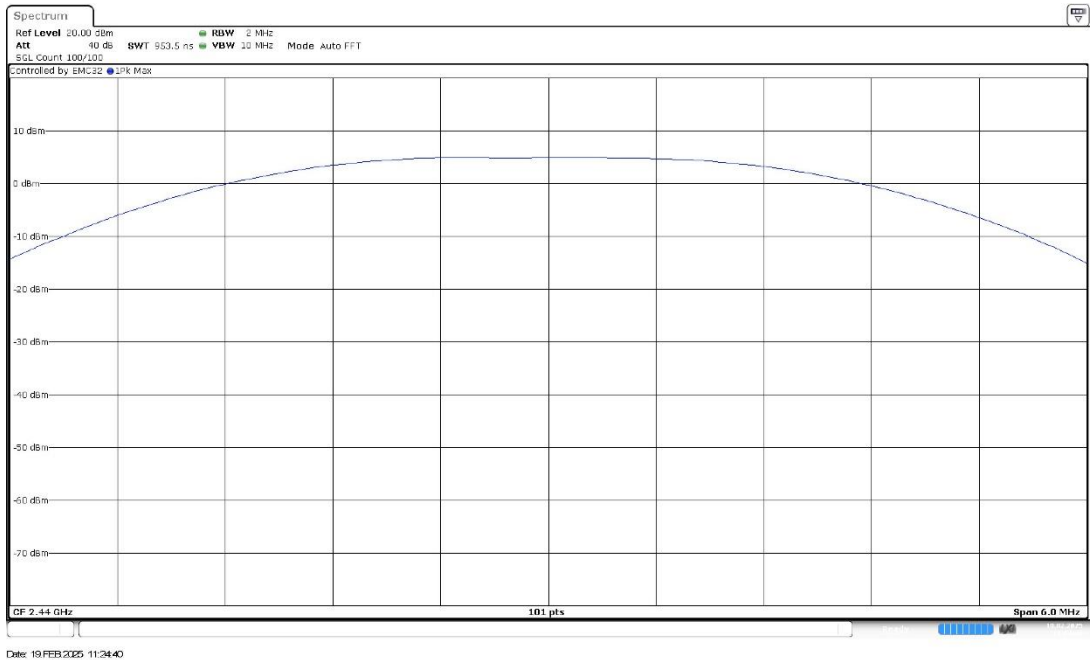
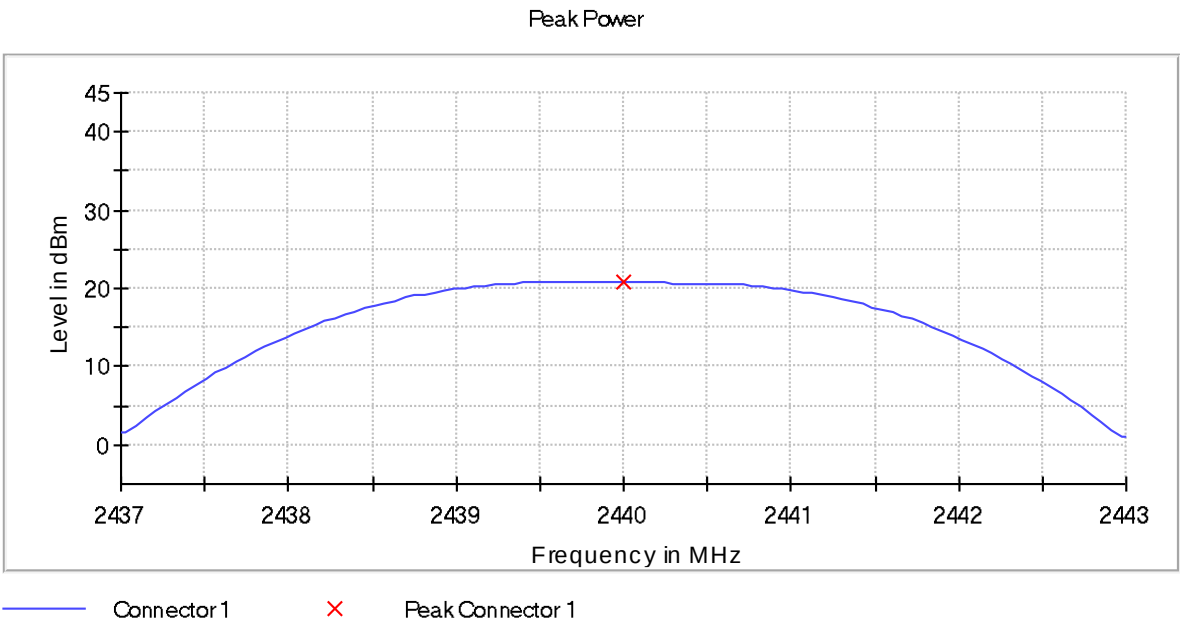
Equipment Type = Digital Transmission System (DTS)    Bandwidth MHz = 2  
Modulation = BTLE 5.0 (GFSK 2 Mbit/s)    Frequency MHz = 2402.00000  
MIMO Mode = SISO    Active Port = 1

Images:



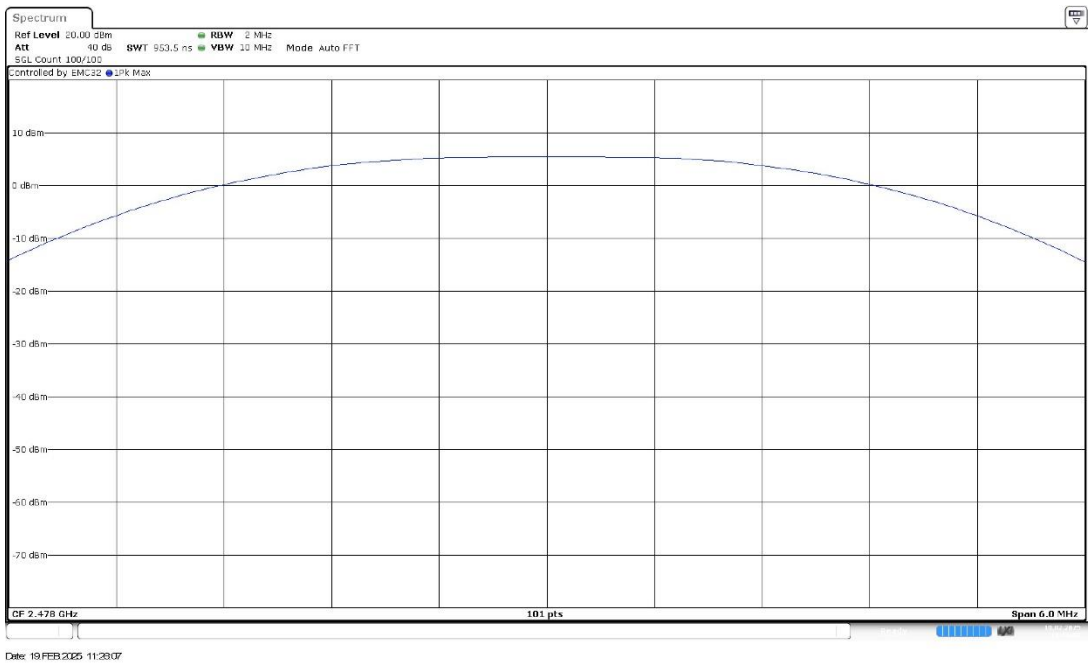
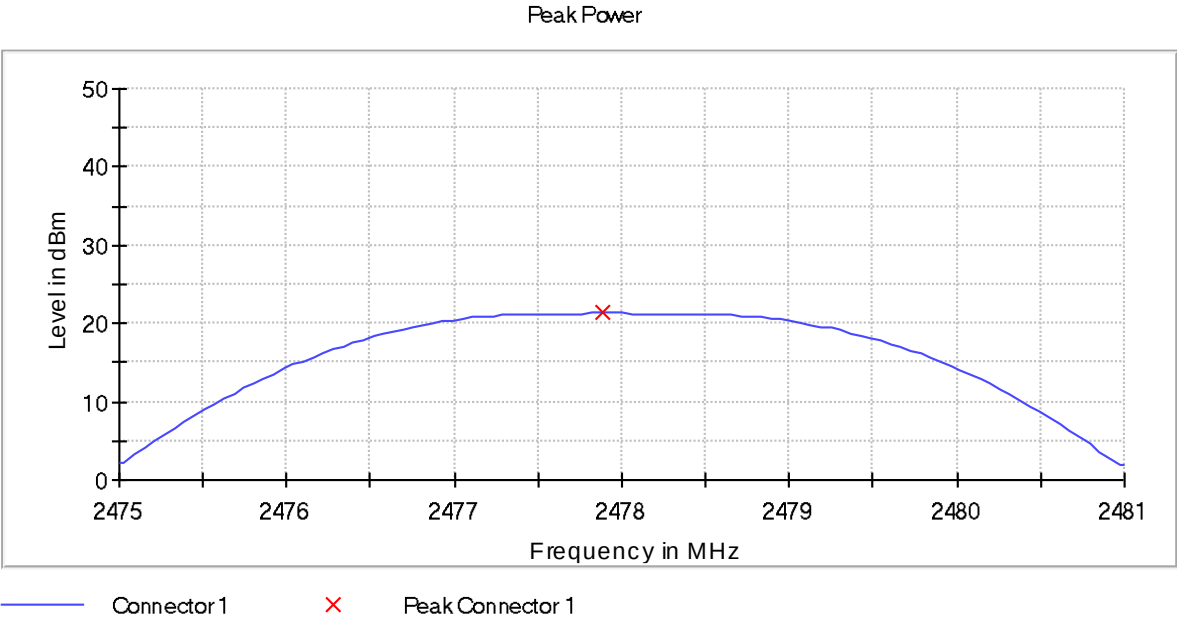
Equipment Type = Digital Transmission System (DTS)    Bandwidth MHz = 2  
Modulation = BTLE 5.0 (GFSK 2 Mbit/s)    Frequency MHz = 2440.00000  
MIMO Mode = SISO    Active Port = 1

Images:



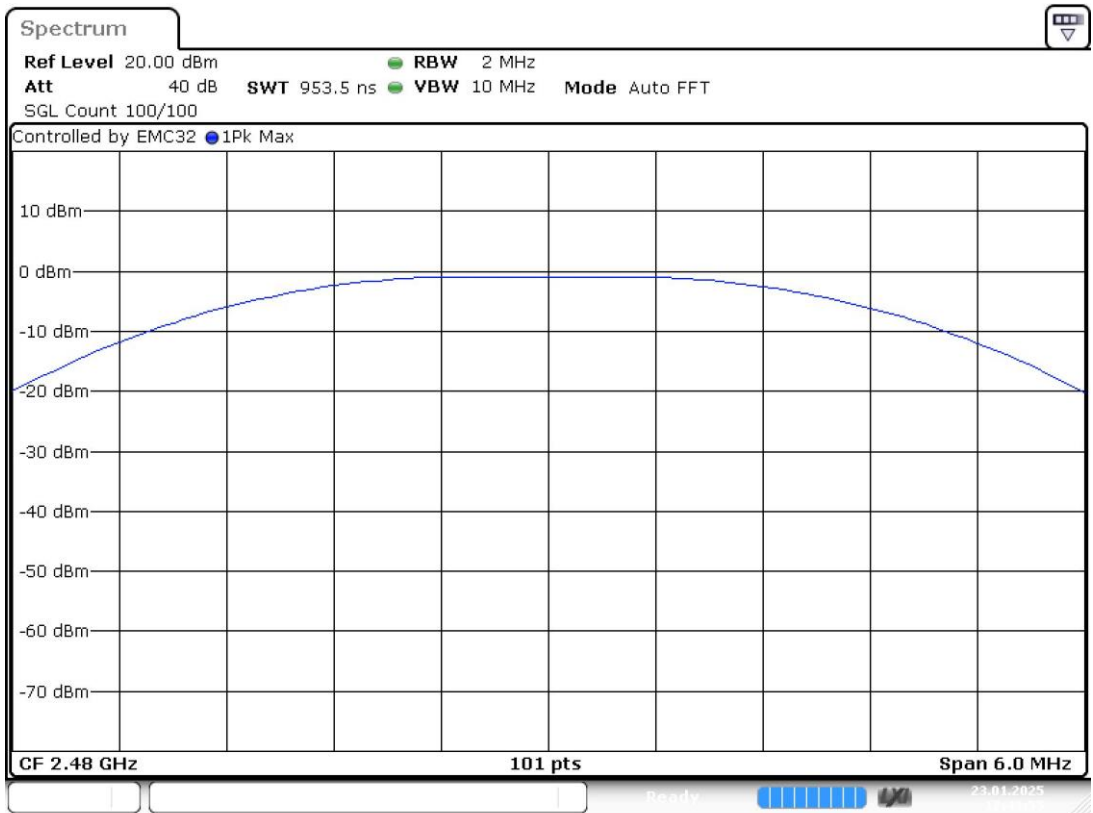
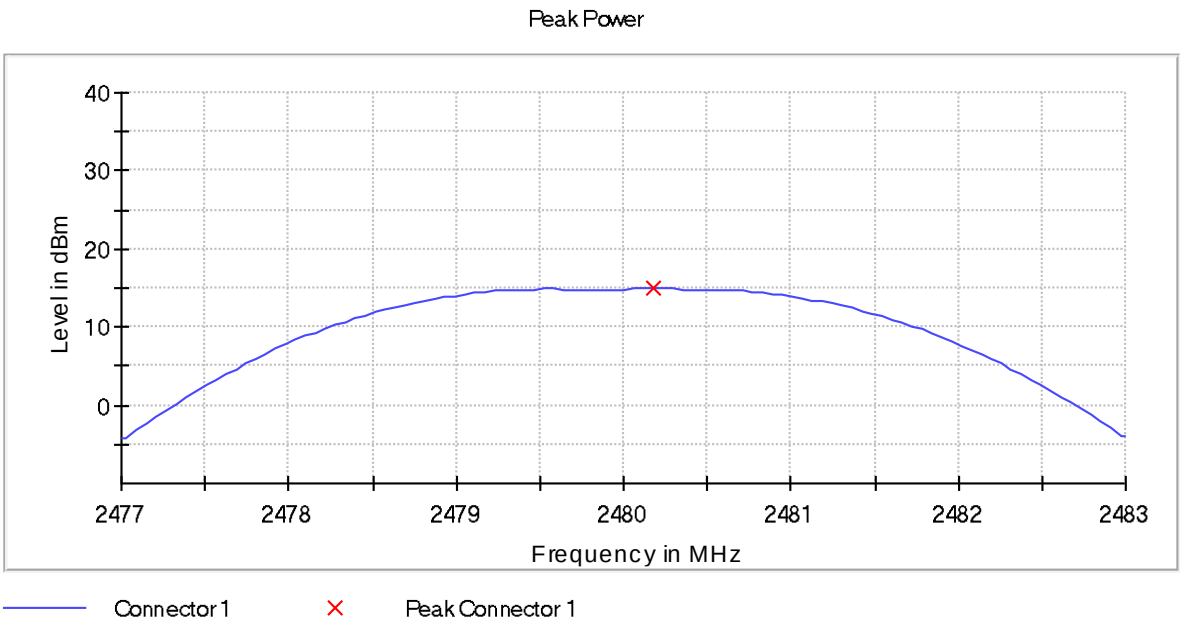
Equipment Type = Digital Transmission System (DTS)    Bandwidth MHz = 2  
Modulation = BTLE 5.0 (GFSK 2 Mbit/s)    Frequency MHz = 2478.00000  
MIMO Mode = SISO    Active Port = 1

Images:



Equipment Type = Digital Transmission System (DTS)    Bandwidth MHz = 2  
Modulation = BTLE 5.0 (GFSK 2 Mbit/s)    Frequency MHz = 2480.00000  
MIMO Mode = SISO    Active Port = 1

Images:



Date: 23.JAN.2025 17:43:55



## 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.

### Results

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)

MIMO Mode: SISO

| Equipment                         | BW (MHz) | Freq (MHz) | Port | Freq (MHz)  | Lvl (dBm) |
|-----------------------------------|----------|------------|------|-------------|-----------|
| Digital Transmission System (DTS) | 1        | 2402.00000 | 1    | 2399.975000 | -32.940   |
| Digital Transmission System (DTS) | 1        | 2402.00000 | 1    | 2399.925000 | -33.737   |
| Digital Transmission System (DTS) | 1        | 2402.00000 | 1    | 2399.875000 | -37.461   |
| Digital Transmission System (DTS) | 1        | 2402.00000 | 1    | 2398.925000 | -38.208   |
| Digital Transmission System (DTS) | 1        | 2402.00000 | 1    | 2398.875000 | -38.321   |
| Digital Transmission System (DTS) | 1        | 2402.00000 | 1    | 2399.175000 | -38.420   |
| Digital Transmission System (DTS) | 1        | 2402.00000 | 1    | 2399.625000 | -38.643   |
| Digital Transmission System (DTS) | 1        | 2402.00000 | 1    | 2399.825000 | -38.672   |
| Digital Transmission System (DTS) | 1        | 2402.00000 | 1    | 2399.125000 | -38.719   |
| Digital Transmission System (DTS) | 1        | 2402.00000 | 1    | 2399.575000 | -38.807   |
| Digital Transmission System (DTS) | 1        | 2402.00000 | 1    | 2399.775000 | -38.915   |
| Digital Transmission System (DTS) | 1        | 2402.00000 | 1    | 2399.375000 | -39.065   |
| Digital Transmission System (DTS) | 1        | 2402.00000 | 1    | 2398.975000 | -39.145   |
| Digital Transmission System (DTS) | 1        | 2402.00000 | 1    | 2399.525000 | -39.171   |
| Digital Transmission System (DTS) | 1        | 2402.00000 | 1    | 2399.225000 | -39.245   |
| Digital Transmission System (DTS) | 1        | 2478.00000 | 1    | 2483.875000 | -39.025   |
| Digital Transmission System (DTS) | 1        | 2478.00000 | 1    | 2483.925000 | -39.034   |
| Digital Transmission System (DTS) | 1        | 2478.00000 | 1    | 2485.825000 | -39.036   |
| Digital Transmission System (DTS) | 1        | 2478.00000 | 1    | 2485.775000 | -39.096   |
| Digital Transmission System (DTS) | 1        | 2478.00000 | 1    | 2484.225000 | -39.655   |
| Digital Transmission System (DTS) | 1        | 2478.00000 | 1    | 2484.375000 | -39.820   |
| Digital Transmission System (DTS) | 1        | 2478.00000 | 1    | 2483.975000 | -39.895   |
| Digital Transmission System (DTS) | 1        | 2478.00000 | 1    | 2490.575000 | -39.996   |
| Digital Transmission System (DTS) | 1        | 2478.00000 | 1    | 2484.475000 | -40.116   |
| Digital Transmission System (DTS) | 1        | 2478.00000 | 1    | 2484.925000 | -40.185   |

| Equipment                         | BW (MHz) | Freq (MHz) | Port | Freq (MHz)  | Lvl (dBm) |
|-----------------------------------|----------|------------|------|-------------|-----------|
| Digital Transmission System (DTS) | 1        | 2478.00000 | 1    | 2484.175000 | -40.188   |
| Digital Transmission System (DTS) | 1        | 2478.00000 | 1    | 2484.325000 | -40.257   |
| Digital Transmission System (DTS) | 1        | 2478.00000 | 1    | 2490.525000 | -40.293   |
| Digital Transmission System (DTS) | 1        | 2478.00000 | 1    | 2484.975000 | -40.301   |
| Digital Transmission System (DTS) | 1        | 2478.00000 | 1    | 2489.375000 | -40.350   |
| Digital Transmission System (DTS) | 1        | 2480.00000 | 1    | 2483.725000 | -38.642   |
| Digital Transmission System (DTS) | 1        | 2480.00000 | 1    | 2483.775000 | -38.658   |
| Digital Transmission System (DTS) | 1        | 2480.00000 | 1    | 2483.625000 | -39.735   |
| Digital Transmission System (DTS) | 1        | 2480.00000 | 1    | 2483.525000 | -40.050   |
| Digital Transmission System (DTS) | 1        | 2480.00000 | 1    | 2483.675000 | -40.095   |
| Digital Transmission System (DTS) | 1        | 2480.00000 | 1    | 2483.825000 | -40.156   |
| Digital Transmission System (DTS) | 1        | 2480.00000 | 1    | 2483.575000 | -40.192   |
| Digital Transmission System (DTS) | 1        | 2480.00000 | 1    | 2483.875000 | -40.374   |
| Digital Transmission System (DTS) | 1        | 2480.00000 | 1    | 2488.625000 | -40.731   |
| Digital Transmission System (DTS) | 1        | 2480.00000 | 1    | 2488.675000 | -40.741   |
| Digital Transmission System (DTS) | 1        | 2480.00000 | 1    | 2485.375000 | -40.880   |
| Digital Transmission System (DTS) | 1        | 2480.00000 | 1    | 2485.425000 | -40.976   |
| Digital Transmission System (DTS) | 1        | 2480.00000 | 1    | 2483.925000 | -41.029   |
| Digital Transmission System (DTS) | 1        | 2480.00000 | 1    | 2484.075000 | -41.040   |
| Digital Transmission System (DTS) | 1        | 2480.00000 | 1    | 2485.075000 | -41.110   |

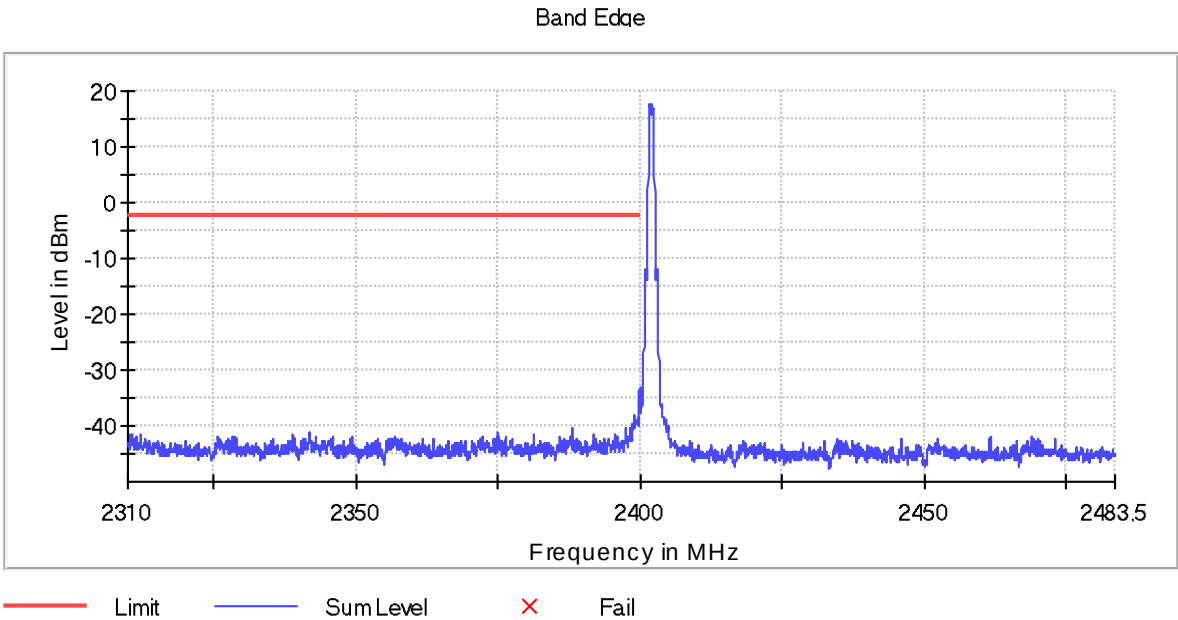
Verdict

Pass

Attachments

Equipment Type = Digital Transmission System (DTS)    Bandwidth MHz = 1  
Modulation = BTLE 5.0 (GFSK 1 Mbit/s)                      Frequency MHz = 2402.00000  
MIMO Mode = SISO                                                      Active Port = 1

Images:



Tables:

Spectrum Analyzer Parameters 1

| Setting         | Instrument Value | Target Value   |
|-----------------|------------------|----------------|
| Start Frequency | 2.31000 GHz      | 2.31000 GHz    |
| Stop Frequency  | 2.40000 GHz      | 2.40000 GHz    |
| Span            | 90.000 MHz       | 90.000 MHz     |
| RBW             | 100.000 kHz      | <= 100.000 kHz |
| VBW             | 300.000 kHz      | >= 300.000 kHz |
| SweepPoints     | 1800             | ~ 1800         |
| SweepTime       | 113.672 µs       | AUTO           |
| Reference Level | 20.000 dBm       | 20.000 dBm     |
| Attenuation     | 40.000 dB        | AUTO           |
| Detector        | MaxPeak          | MaxPeak        |
| SweepCount      | 100              | 100            |
| Filter          | 3 dB             | 3 dB           |
| Trace Mode      | Max Hold         | Max Hold       |
| SweepType       | FFT              | AUTO           |
| Preamplifier    | off              | off            |
| Stablemode      | Trace            | Trace          |
| Stablevalue     | 0.50 dB          | 0.50 dB        |
| Run             | 7 / max. 150     | max. 150       |

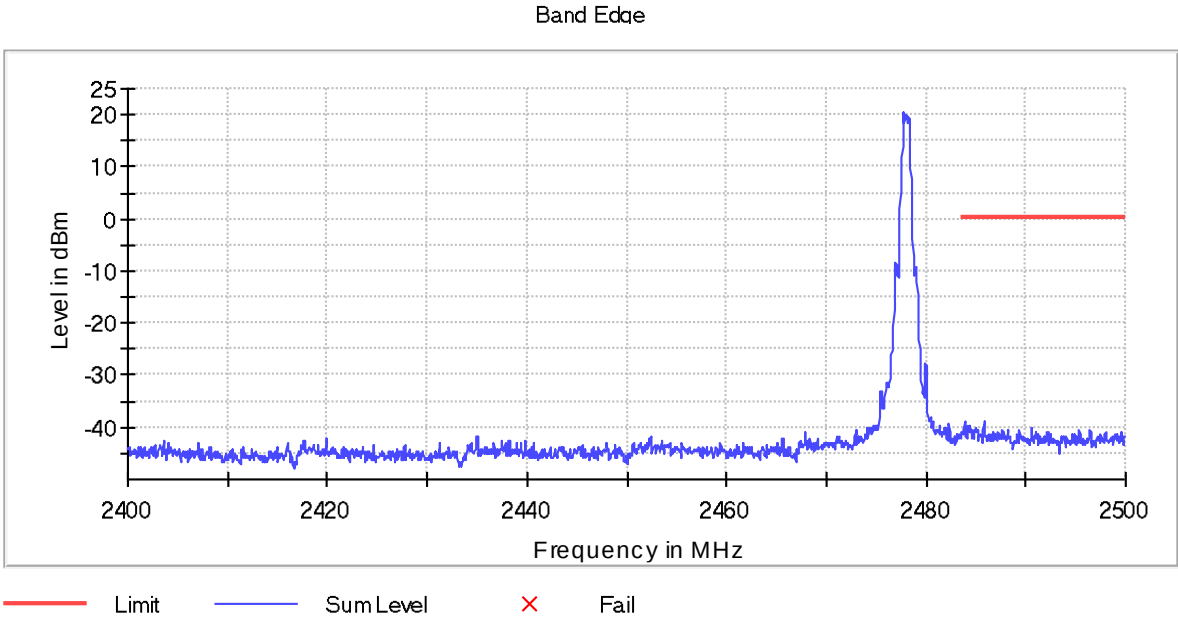
| Setting               | Instrument Value | Target Value |
|-----------------------|------------------|--------------|
| Stable                | 3 / 3            | 3            |
| Max Stable Difference | 0.00 dB          | 0.50 dB      |

Spectrum Analyzer Parameters 2

| Setting               | Instrument Value | Target Value   |
|-----------------------|------------------|----------------|
| Start Frequency       | 2.40000 GHz      | 2.40000 GHz    |
| Stop Frequency        | 2.48350 GHz      | 2.48350 GHz    |
| Span                  | 83.500 MHz       | 83.500 MHz     |
| RBW                   | 100.000 kHz      | <= 100.000 kHz |
| VBW                   | 300.000 kHz      | >= 300.000 kHz |
| SweepPoints           | 1670             | ~ 1670         |
| SweepTime             | 94.727 µs        | AUTO           |
| Reference Level       | 20.000 dBm       | 20.000 dBm     |
| Attenuation           | 40.000 dB        | AUTO           |
| Detector              | MaxPeak          | MaxPeak        |
| SweepCount            | 100              | 100            |
| Filter                | 3 dB             | 3 dB           |
| Trace Mode            | Max Hold         | Max Hold       |
| SweepType             | FFT              | AUTO           |
| Preamplifier          | off              | off            |
| Stablemode            | Trace            | Trace          |
| Stablevalue           | 0.50 dB          | 0.50 dB        |
| Run                   | 8 / max. 150     | max. 150       |
| Stable                | 3 / 3            | 3              |
| Max Stable Difference | 0.15 dB          | 0.50 dB        |

Equipment Type = Digital Transmission System (DTS)    Bandwidth MHz = 1  
Modulation = BTLE 5.0 (GFSK 1 Mbit/s)                      Frequency MHz = 2478.00000  
MIMO Mode = SISO                                                      Active Port = 1

Images:



Tables:  
Spectrum Analyzer Parameters 1

| Setting         | Instrument Value | Target Value   |
|-----------------|------------------|----------------|
| Start Frequency | 2.31000 GHz      | 2.31000 GHz    |
| Stop Frequency  | 2.40000 GHz      | 2.40000 GHz    |
| Span            | 90.000 MHz       | 90.000 MHz     |
| RBW             | 100.000 kHz      | <= 100.000 kHz |
| VBW             | 300.000 kHz      | >= 300.000 kHz |
| SweepPoints     | 1800             | ~ 1800         |
| SweepTime       | 113.672 µs       | AUTO           |
| Reference Level | 20.000 dBm       | 20.000 dBm     |
| Attenuation     | 40.000 dB        | AUTO           |
| Detector        | MaxPeak          | MaxPeak        |
| SweepCount      | 100              | 100            |
| Filter          | 3 dB             | 3 dB           |
| Trace Mode      | Max Hold         | Max Hold       |
| SweepType       | FFT              | AUTO           |
| Preamp          | off              | off            |
| Stablemode      | Trace            | Trace          |
| Stablevalue     | 0.50 dB          | 0.50 dB        |
| Run             | 7 / max. 150     | max. 150       |
| Stable          | 3 / 3            | 3              |

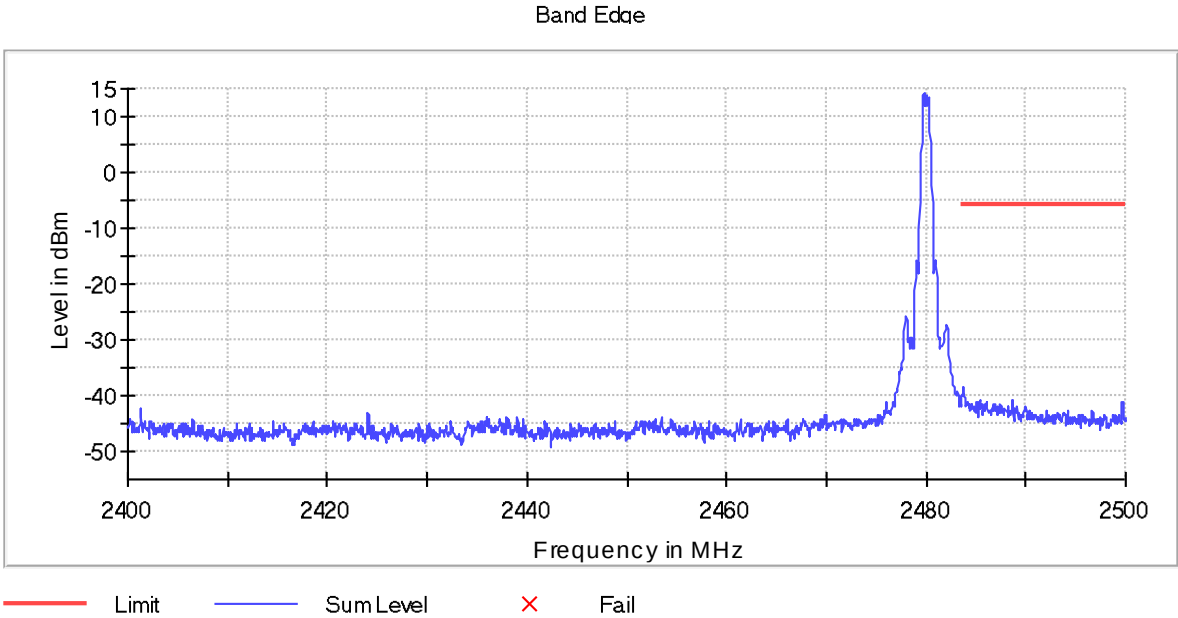
| Setting               | Instrument Value | Target Value |
|-----------------------|------------------|--------------|
| Max Stable Difference | 0.00 dB          | 0.50 dB      |

Spectrum Analyzer Parameters 2

| Setting               | Instrument Value | Target Value   |
|-----------------------|------------------|----------------|
| Start Frequency       | 2.40000 GHz      | 2.40000 GHz    |
| Stop Frequency        | 2.48350 GHz      | 2.48350 GHz    |
| Span                  | 83.500 MHz       | 83.500 MHz     |
| RBW                   | 100.000 kHz      | <= 100.000 kHz |
| VBW                   | 300.000 kHz      | >= 300.000 kHz |
| SweepPoints           | 1670             | ~ 1670         |
| SweepTime             | 94.727 µs        | AUTO           |
| Reference Level       | 20.000 dBm       | 20.000 dBm     |
| Attenuation           | 40.000 dB        | AUTO           |
| Detector              | MaxPeak          | MaxPeak        |
| SweepCount            | 100              | 100            |
| Filter                | 3 dB             | 3 dB           |
| Trace Mode            | Max Hold         | Max Hold       |
| SweepType             | FFT              | AUTO           |
| Preamplifier          | off              | off            |
| Stablemode            | Trace            | Trace          |
| Stablevalue           | 0.50 dB          | 0.50 dB        |
| Run                   | 8 / max. 150     | max. 150       |
| Stable                | 3 / 3            | 3              |
| Max Stable Difference | 0.15 dB          | 0.50 dB        |

Equipment Type = Digital Transmission System (DTS)    Bandwidth MHz = 1  
Modulation = BTLE 5.0 (GFSK 1 Mbit/s)                      Frequency MHz = 2480.00000  
MIMO Mode = SISO                                                      Active Port = 1

Images:



Tables:

Spectrum Analyzer Parameters 1

| Setting         | Instrument Value | Target Value   |
|-----------------|------------------|----------------|
| Start Frequency | 2.31000 GHz      | 2.31000 GHz    |
| Stop Frequency  | 2.40000 GHz      | 2.40000 GHz    |
| Span            | 90.000 MHz       | 90.000 MHz     |
| RBW             | 100.000 kHz      | <= 100.000 kHz |
| VBW             | 300.000 kHz      | >= 300.000 kHz |
| SweepPoints     | 1800             | ~ 1800         |
| SweepTime       | 113.672 µs       | AUTO           |
| Reference Level | 20.000 dBm       | 20.000 dBm     |
| Attenuation     | 40.000 dB        | AUTO           |
| Detector        | MaxPeak          | MaxPeak        |
| SweepCount      | 100              | 100            |
| Filter          | 3 dB             | 3 dB           |
| Trace Mode      | Max Hold         | Max Hold       |
| SweepType       | FFT              | AUTO           |
| Preamplifier    | off              | off            |
| Stablemode      | Trace            | Trace          |
| Stablevalue     | 0.50 dB          | 0.50 dB        |
| Run             | 7 / max. 150     | max. 150       |
| Stable          | 3 / 3            | 3              |

| Setting               | Instrument Value | Target Value |
|-----------------------|------------------|--------------|
| Max Stable Difference | 0.00 dB          | 0.50 dB      |

Spectrum Analyzer Parameters 2

| Setting               | Instrument Value | Target Value   |
|-----------------------|------------------|----------------|
| Start Frequency       | 2.40000 GHz      | 2.40000 GHz    |
| Stop Frequency        | 2.48350 GHz      | 2.48350 GHz    |
| Span                  | 83.500 MHz       | 83.500 MHz     |
| RBW                   | 100.000 kHz      | <= 100.000 kHz |
| VBW                   | 300.000 kHz      | >= 300.000 kHz |
| SweepPoints           | 1670             | ~ 1670         |
| SweepTime             | 94.727 µs        | AUTO           |
| Reference Level       | 20.000 dBm       | 20.000 dBm     |
| Attenuation           | 40.000 dB        | AUTO           |
| Detector              | MaxPeak          | MaxPeak        |
| SweepCount            | 100              | 100            |
| Filter                | 3 dB             | 3 dB           |
| Trace Mode            | Max Hold         | Max Hold       |
| SweepType             | FFT              | AUTO           |
| Preamplifier          | off              | off            |
| Stablemode            | Trace            | Trace          |
| Stablevalue           | 0.50 dB          | 0.50 dB        |
| Run                   | 8 / max. 150     | max. 150       |
| Stable                | 3 / 3            | 3              |
| Max Stable Difference | 0.15 dB          | 0.50 dB        |



Results

Modulation: BTLE 5.0 (GFSK 2 Mbit/s)

MIMO Mode: SISO

| Equipment                         | BW (MHz) | Freq (MHz) | Port | Freq (MHz)  | Lvl (dBm) |
|-----------------------------------|----------|------------|------|-------------|-----------|
| Digital Transmission System (DTS) | 2        | 2402.00000 | 1    | 2399.975000 | -20.368   |
| Digital Transmission System (DTS) | 2        | 2402.00000 | 1    | 2399.925000 | -21.781   |
| Digital Transmission System (DTS) | 2        | 2402.00000 | 1    | 2399.875000 | -25.923   |
| Digital Transmission System (DTS) | 2        | 2402.00000 | 1    | 2399.825000 | -28.204   |
| Digital Transmission System (DTS) | 2        | 2402.00000 | 1    | 2399.675000 | -28.875   |
| Digital Transmission System (DTS) | 2        | 2402.00000 | 1    | 2399.625000 | -29.084   |
| Digital Transmission System (DTS) | 2        | 2402.00000 | 1    | 2399.725000 | -30.080   |
| Digital Transmission System (DTS) | 2        | 2402.00000 | 1    | 2399.775000 | -30.133   |
| Digital Transmission System (DTS) | 2        | 2402.00000 | 1    | 2399.575000 | -30.526   |
| Digital Transmission System (DTS) | 2        | 2402.00000 | 1    | 2399.525000 | -30.827   |
| Digital Transmission System (DTS) | 2        | 2402.00000 | 1    | 2399.475000 | -30.935   |
| Digital Transmission System (DTS) | 2        | 2402.00000 | 1    | 2399.425000 | -32.553   |
| Digital Transmission System (DTS) | 2        | 2402.00000 | 1    | 2399.375000 | -32.963   |
| Digital Transmission System (DTS) | 2        | 2402.00000 | 1    | 2399.325000 | -33.675   |
| Digital Transmission System (DTS) | 2        | 2402.00000 | 1    | 2399.275000 | -33.702   |
| Digital Transmission System (DTS) | 2        | 2478.00000 | 1    | 2483.975000 | -38.770   |
| Digital Transmission System (DTS) | 2        | 2478.00000 |      | 2484.025000 | -38.948   |
| Digital Transmission System (DTS) | 2        | 2478.00000 |      | 2485.825000 | -39.125   |
| Digital Transmission System (DTS) | 2        | 2478.00000 |      | 2484.225000 | -39.162   |
| Digital Transmission System (DTS) | 2        | 2478.00000 |      | 2486.125000 | -39.238   |
| Digital Transmission System (DTS) | 2        | 2478.00000 |      | 2484.175000 | -39.245   |
| Digital Transmission System (DTS) | 2        | 2478.00000 |      | 2483.775000 | -39.326   |
| Digital Transmission System (DTS) | 2        | 2478.00000 |      | 2483.725000 | -39.332   |
| Digital Transmission System (DTS) | 2        | 2478.00000 |      | 2483.825000 | -39.456   |
| Digital Transmission System (DTS) | 2        | 2478.00000 |      | 2486.175000 | -39.485   |
| Digital Transmission System (DTS) | 2        | 2478.00000 |      | 2483.575000 | -39.506   |
| Digital Transmission System (DTS) | 2        | 2478.00000 |      | 2485.775000 | -39.747   |
| Digital Transmission System (DTS) | 2        | 2478.00000 |      | 2485.875000 | -39.781   |
| Digital Transmission System (DTS) | 2        | 2478.00000 |      | 2484.325000 | -39.783   |
| Digital Transmission System (DTS) | 2        | 2478.00000 |      | 2485.075000 | -39.864   |
| Digital Transmission System (DTS) | 2        | 2480.00000 | 1    | 2484.025000 | -39.472   |
| Digital Transmission System (DTS) | 2        | 2480.00000 | 1    | 2483.975000 | -39.613   |
| Digital Transmission System (DTS) | 2        | 2480.00000 | 1    | 2483.525000 | -39.650   |

| Equipment                         | BW (MHz) | Freq (MHz) | Port | Freq (MHz)  | Lvl (dBm) |
|-----------------------------------|----------|------------|------|-------------|-----------|
| Digital Transmission System (DTS) | 2        | 2480.00000 | 1    | 2483.575000 | -39.722   |
| Digital Transmission System (DTS) | 2        | 2480.00000 | 1    | 2483.625000 | -39.916   |
| Digital Transmission System (DTS) | 2        | 2480.00000 | 1    | 2483.825000 | -39.988   |
| Digital Transmission System (DTS) | 2        | 2480.00000 | 1    | 2484.675000 | -40.076   |
| Digital Transmission System (DTS) | 2        | 2480.00000 | 1    | 2484.975000 | -40.095   |
| Digital Transmission System (DTS) | 2        | 2480.00000 | 1    | 2484.625000 | -40.125   |
| Digital Transmission System (DTS) | 2        | 2480.00000 | 1    | 2484.925000 | -40.193   |
| Digital Transmission System (DTS) | 2        | 2480.00000 | 1    | 2486.425000 | -40.407   |
| Digital Transmission System (DTS) | 2        | 2480.00000 | 1    | 2483.925000 | -40.409   |
| Digital Transmission System (DTS) | 2        | 2480.00000 | 1    | 2485.875000 | -40.432   |
| Digital Transmission System (DTS) | 2        | 2480.00000 | 1    | 2486.475000 | -40.484   |
| Digital Transmission System (DTS) | 2        | 2480.00000 | 1    | 2483.875000 | -40.497   |

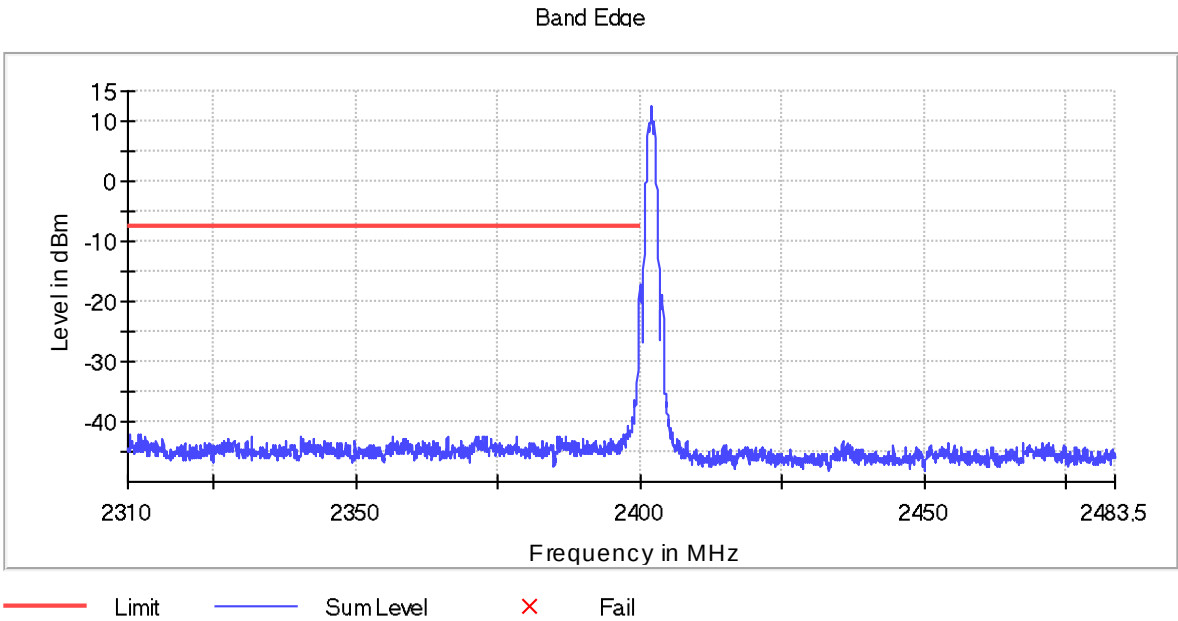
Verdict

Pass

Attachments

Equipment Type = Digital Transmission System (DTS)    Bandwidth MHz = 2  
Modulation = BTLE 5.0 (GFSK 2 Mbit/s)    Frequency MHz = 2402.00000  
MIMO Mode = SISO    Active Port = 1

Images:



Tables:  
Spectrum Analyzer Parameters 1

| Setting               | Instrument Value | Target Value   |
|-----------------------|------------------|----------------|
| Start Frequency       | 2.31000 GHz      | 2.31000 GHz    |
| Stop Frequency        | 2.40000 GHz      | 2.40000 GHz    |
| Span                  | 90.000 MHz       | 90.000 MHz     |
| RBW                   | 100.000 kHz      | <= 100.000 kHz |
| VBW                   | 300.000 kHz      | >= 300.000 kHz |
| SweepPoints           | 1800             | ~ 1800         |
| SweepTime             | 113.672 µs       | AUTO           |
| Reference Level       | 20.000 dBm       | 20.000 dBm     |
| Attenuation           | 40.000 dB        | AUTO           |
| Detector              | MaxPeak          | MaxPeak        |
| SweepCount            | 100              | 100            |
| Filter                | 3 dB             | 3 dB           |
| Trace Mode            | Max Hold         | Max Hold       |
| SweepType             | FFT              | AUTO           |
| Preamp                | off              | off            |
| Stablemode            | Trace            | Trace          |
| Stablevalue           | 0.50 dB          | 0.50 dB        |
| Run                   | 4 / max. 150     | max. 150       |
| Stable                | 3 / 3            | 3              |
| Max Stable Difference | 0.22 dB          | 0.50 dB        |

Spectrum Analyzer Parameters 2

| Setting               | Instrument Value | Target Value   |
|-----------------------|------------------|----------------|
| Start Frequency       | 2.40000 GHz      | 2.40000 GHz    |
| Stop Frequency        | 2.48350 GHz      | 2.48350 GHz    |
| Span                  | 83.500 MHz       | 83.500 MHz     |
| RBW                   | 100.000 kHz      | <= 100.000 kHz |
| VBW                   | 300.000 kHz      | >= 300.000 kHz |
| SweepPoints           | 1670             | ~ 1670         |
| SweepTime             | 94.727 µs        | AUTO           |
| Reference Level       | 20.000 dBm       | 20.000 dBm     |
| Attenuation           | 40.000 dB        | AUTO           |
| Detector              | MaxPeak          | MaxPeak        |
| SweepCount            | 100              | 100            |
| Filter                | 3 dB             | 3 dB           |
| Trace Mode            | Max Hold         | Max Hold       |
| SweepType             | FFT              | AUTO           |
| Preamp                | off              | off            |
| Stablemode            | Trace            | Trace          |
| Stablevalue           | 0.50 dB          | 0.50 dB        |
| Run                   | 15 / max. 150    | max. 150       |
| Stable                | 3 / 3            | 3              |
| Max Stable Difference | 0.07 dB          | 0.50 dB        |

**Images:**



| Setting         | Instrument Value | Target Value   |
|-----------------|------------------|----------------|
| Start Frequency | 2.31000 GHz      | 2.31000 GHz    |
| Stop Frequency  | 2.40000 GHz      | 2.40000 GHz    |
| Span            | 90.000 MHz       | 90.000 MHz     |
| RBW             | 100.000 kHz      | <= 100.000 kHz |
| VBW             | 300.000 kHz      | >= 300.000 kHz |
| SweepPoints     | 1800             | ~ 1800         |
| Sweeptime       | 113.672 $\mu$ s  | AUTO           |
| Reference Level | 20.000 dBm       | 20.000 dBm     |
| Attenuation     | 40.000 dB        | AUTO           |
| Detector        | MaxPeak          | MaxPeak        |
| SweepCount      | 100              | 100            |
| Filter          | 3 dB             | 3 dB           |
| Trace Mode      | Max Hold         | Max Hold       |
| SweepType       | FFT              | AUTO           |
| Preamp          | off              | off            |
| Stablemode      | Trace            | Trace          |
| Stablevalue     | 0.50 dB          | 0.50 dB        |
| Run             | 4 / max. 150     | max. 150       |
| Stable          | 3 / 3            | 3              |

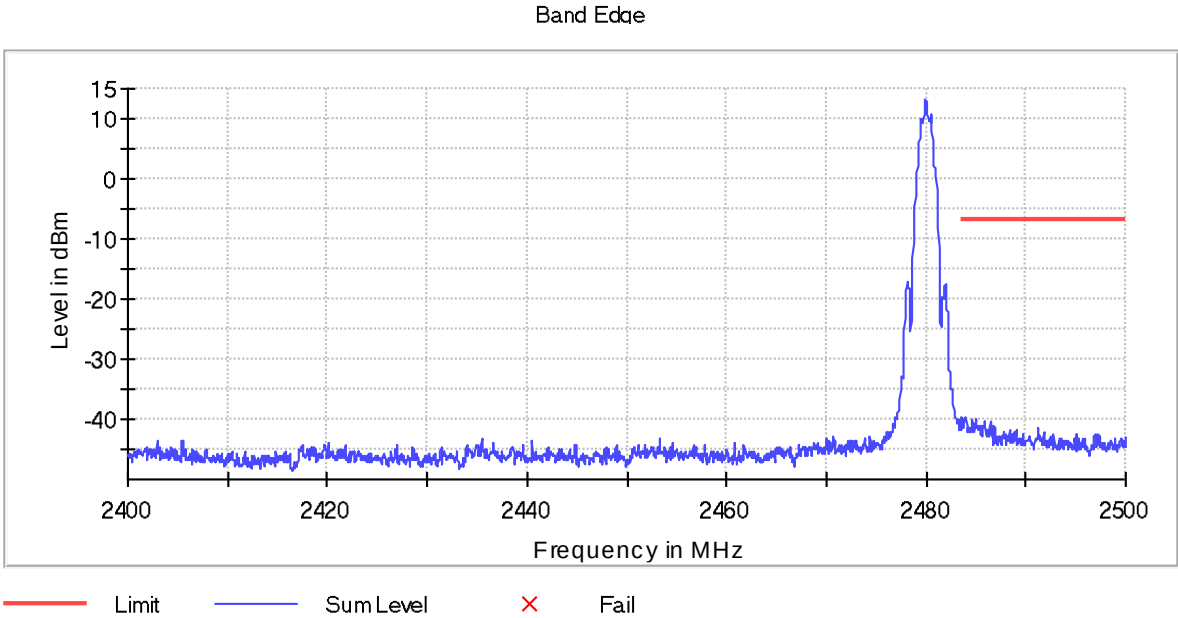
| Setting               | Instrument Value | Target Value |
|-----------------------|------------------|--------------|
| Max Stable Difference | 0.22 dB          | 0.50 dB      |

Spectrum Analyzer Parameters 2

| Setting               | Instrument Value | Target Value   |
|-----------------------|------------------|----------------|
| Start Frequency       | 2.40000 GHz      | 2.40000 GHz    |
| Stop Frequency        | 2.48350 GHz      | 2.48350 GHz    |
| Span                  | 83.500 MHz       | 83.500 MHz     |
| RBW                   | 100.000 kHz      | <= 100.000 kHz |
| VBW                   | 300.000 kHz      | >= 300.000 kHz |
| SweepPoints           | 1670             | ~ 1670         |
| SweepTime             | 94.727 µs        | AUTO           |
| Reference Level       | 20.000 dBm       | 20.000 dBm     |
| Attenuation           | 40.000 dB        | AUTO           |
| Detector              | MaxPeak          | MaxPeak        |
| SweepCount            | 100              | 100            |
| Filter                | 3 dB             | 3 dB           |
| Trace Mode            | Max Hold         | Max Hold       |
| SweepType             | FFT              | AUTO           |
| Preamplifier          | off              | off            |
| Stablemode            | Trace            | Trace          |
| Stablevalue           | 0.50 dB          | 0.50 dB        |
| Run                   | 15 / max. 150    | max. 150       |
| Stable                | 3 / 3            | 3              |
| Max Stable Difference | 0.07 dB          | 0.50 dB        |

Equipment Type = Digital Transmission System (DTS)    Bandwidth MHz = 2  
Modulation = BTLE 5.0 (GFSK 2 Mbit/s)                      Frequency MHz = 2480.00000  
MIMO Mode = SISO                                                      Active Port = 1

Images:



Tables:  
Spectrum Analyzer Parameters 1

| Setting         | Instrument Value | Target Value   |
|-----------------|------------------|----------------|
| Start Frequency | 2.31000 GHz      | 2.31000 GHz    |
| Stop Frequency  | 2.40000 GHz      | 2.40000 GHz    |
| Span            | 90.000 MHz       | 90.000 MHz     |
| RBW             | 100.000 kHz      | <= 100.000 kHz |
| VBW             | 300.000 kHz      | >= 300.000 kHz |
| SweepPoints     | 1800             | ~ 1800         |
| Sweeptime       | 113.672 µs       | AUTO           |
| Reference Level | 20.000 dBm       | 20.000 dBm     |
| Attenuation     | 40.000 dB        | AUTO           |
| Detector        | MaxPeak          | MaxPeak        |
| SweepCount      | 100              | 100            |
| Filter          | 3 dB             | 3 dB           |
| Trace Mode      | Max Hold         | Max Hold       |
| Sweeptype       | FFT              | AUTO           |
| Preamplifier    | off              | off            |
| Stablemode      | Trace            | Trace          |
| Stablevalue     | 0.50 dB          | 0.50 dB        |
| Run             | 4 / max. 150     | max. 150       |
| Stable          | 3 / 3            | 3              |

| Setting               | Instrument Value | Target Value |
|-----------------------|------------------|--------------|
| Max Stable Difference | 0.22 dB          | 0.50 dB      |

Spectrum Analyzer Parameters 2

| Setting               | Instrument Value | Target Value   |
|-----------------------|------------------|----------------|
| Start Frequency       | 2.40000 GHz      | 2.40000 GHz    |
| Stop Frequency        | 2.48350 GHz      | 2.48350 GHz    |
| Span                  | 83.500 MHz       | 83.500 MHz     |
| RBW                   | 100.000 kHz      | <= 100.000 kHz |
| VBW                   | 300.000 kHz      | >= 300.000 kHz |
| SweepPoints           | 1670             | ~ 1670         |
| SweepTime             | 94.727 µs        | AUTO           |
| Reference Level       | 20.000 dBm       | 20.000 dBm     |
| Attenuation           | 40.000 dB        | AUTO           |
| Detector              | MaxPeak          | MaxPeak        |
| SweepCount            | 100              | 100            |
| Filter                | 3 dB             | 3 dB           |
| Trace Mode            | Max Hold         | Max Hold       |
| SweepType             | FFT              | AUTO           |
| Preamplifier          | off              | off            |
| Stablemode            | Trace            | Trace          |
| Stablevalue           | 0.50 dB          | 0.50 dB        |
| Run                   | 15 / max. 150    | max. 150       |
| Stable                | 3 / 3            | 3              |
| Max Stable Difference | 0.07 dB          | 0.50 dB        |

## 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.

### Frequency range tested for Radiated emissions:

Start frequency: no radiofrequency signal generated in the device found below 10<sup>th</sup> sub-harmonic, no further investigation required.

Stop frequency: it has been performed the radiated spurious emissions until 10<sup>th</sup> harmonic.

### Verdict

Pass

### Results

Modulation: BTLE 5.0 (GFSK 1 Mbit/s)

MIMO Mode: SISO



Attachments

Spectrum analyzer parameter:

| Subrange           | Step Size | Detectors | Bandwidth | Sweep Time | Preamp |
|--------------------|-----------|-----------|-----------|------------|--------|
| Receiver: [ESW 44] |           |           |           |            |        |
| 30 MHz - 1 GHz     | 9,7 kHz   | PK+       | 100 kHz   | 1 s        | 0 dB   |
| 1 GHz - 3 GHz      | 20 kHz    | PK+ ; AVG | 1 MHz     | 1 s        | 0 dB   |
| 3 GHz - 17 GHz     | 140 kHz   | PK+ ; AVG | 1 MHz     | 1 s        | 0 dB   |
| 17 GHz - 26 GHz    | 300 kHz   | PK+ ; AVG | 1 MHz     | 1 s        | 0 dB   |

Frequency Range GHz = [0.03, 1]

Equipment Type = Digital Transmission System (DTS)

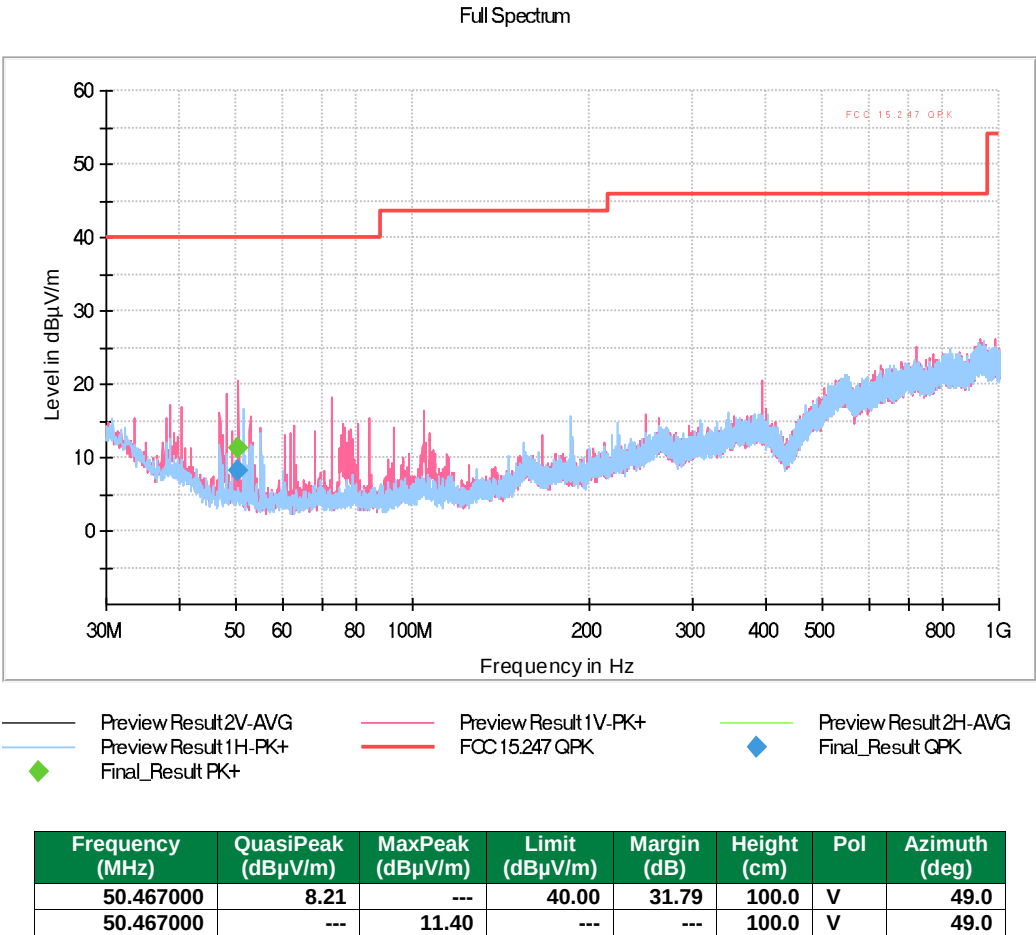
Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

Frequency MHz = 2402.00000

MIMO Mode = SISO

Active Port = 1

Images:



Frequency Range GHz = [1, 17]

Equipment Type = Digital Transmission System (DTS)

Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

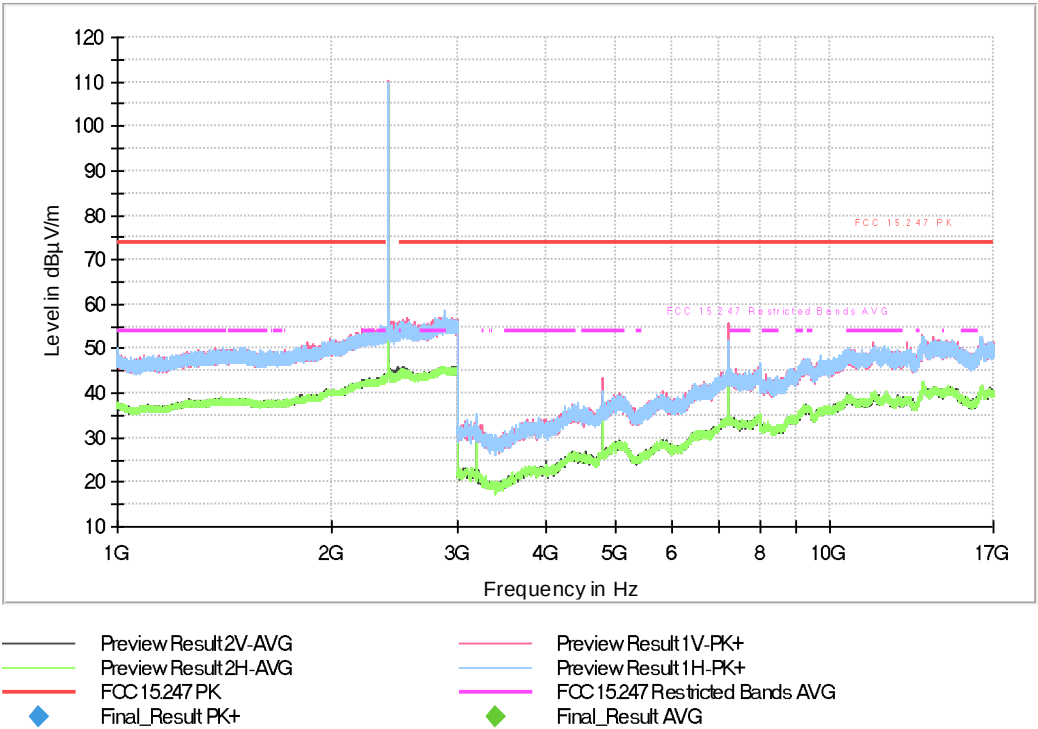
Frequency MHz = 2402.00000

MIMO Mode = SISO

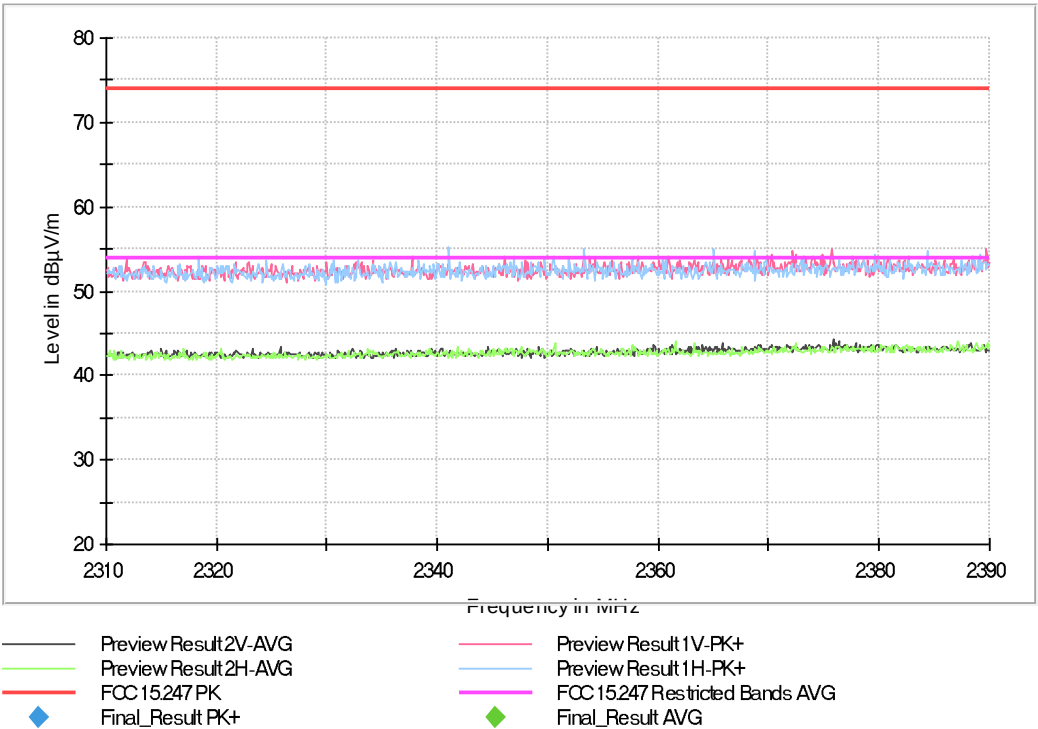
Active Port = 1

**Images:**

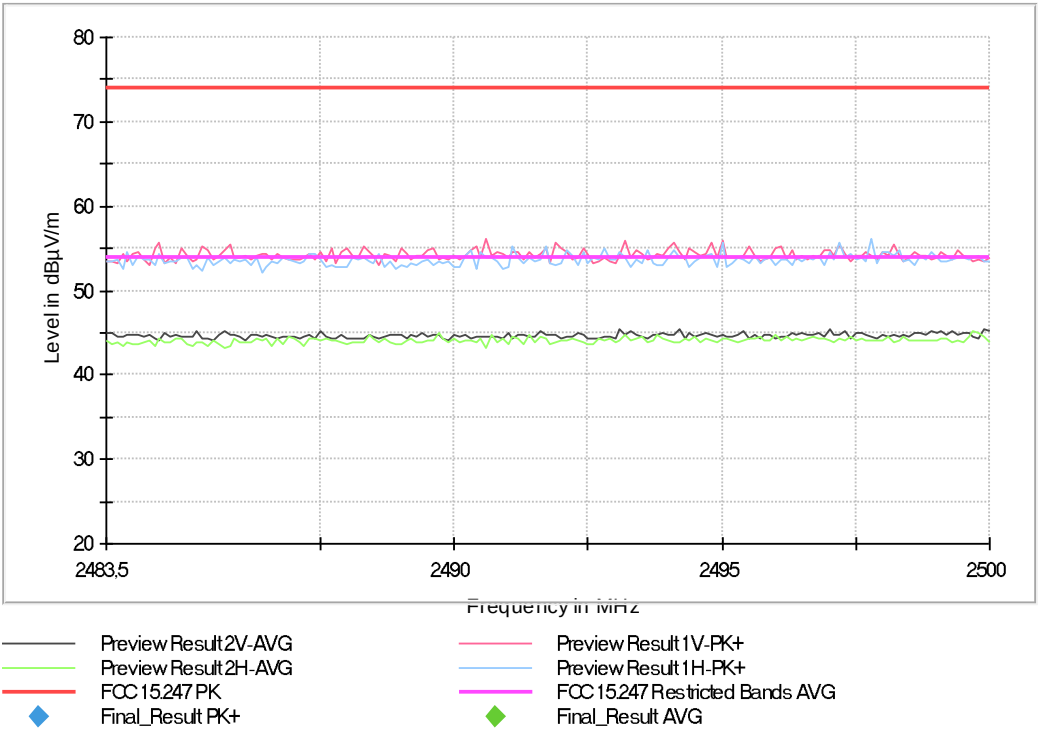
Full Spectrum



Full Spectrum



Full Spectrum



Frequency Range GHz = [1, 17]

Modulation = BTLE 5.0 (GFSK 1 Mbit/s)

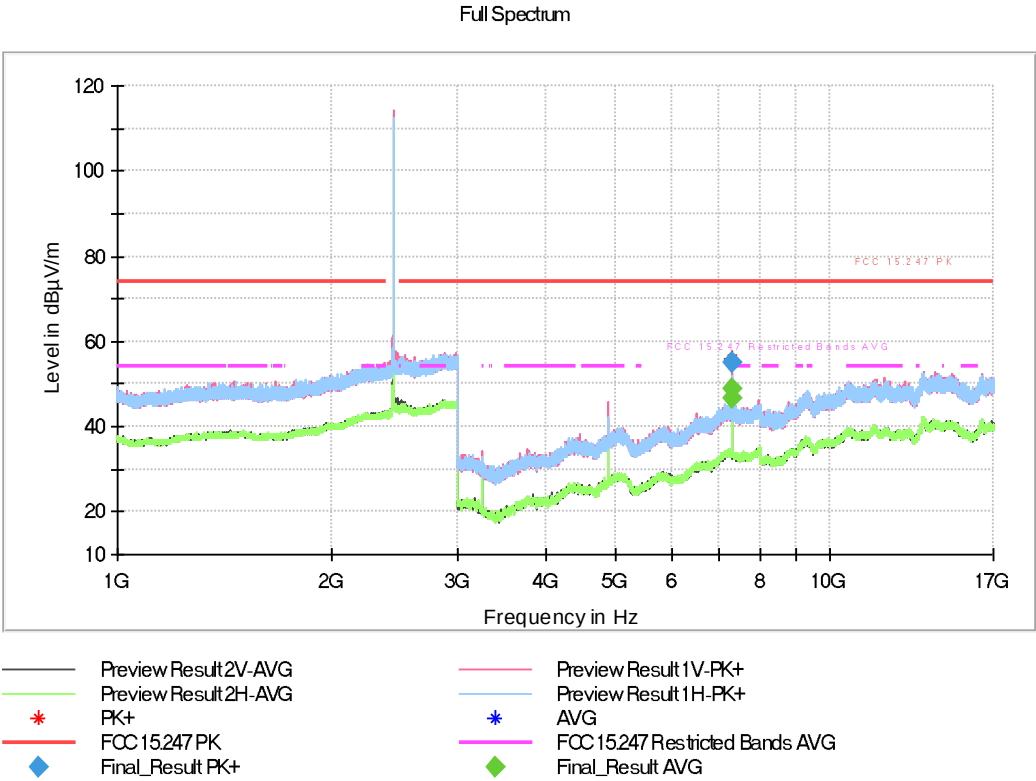
MIMO Mode = SISO

Equipment Type = Digital Transmission System (DTS)

Frequency MHz = The spurious frequencies detected do not depend on the transmission channel

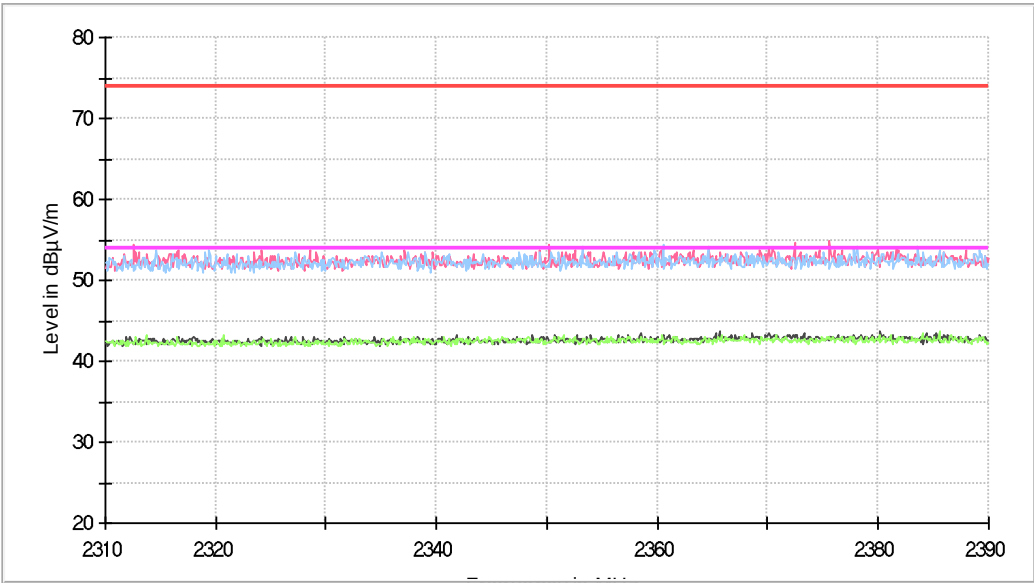
Active Port = 1

Images:



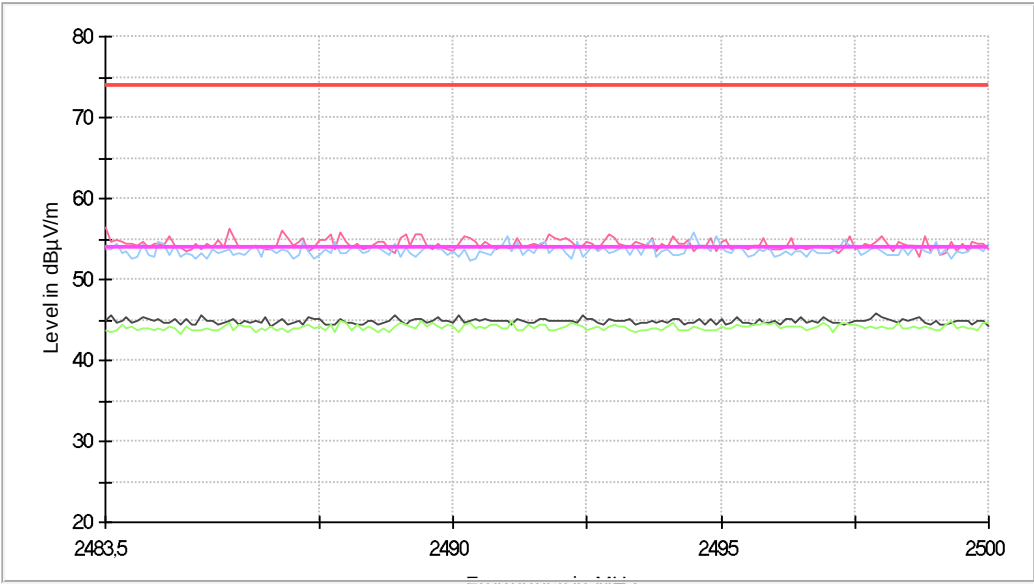
| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) |
|-----------------|------------------|------------------|----------------|-------------|-----------------|-------------|-----|---------------|
| 7320.400000     | ---              | 48.91            | 54.00          | 5.09        | 1000.000        | 208.0       | V   | 285.0         |
| 7320.400000     | 55.00            | 46.69            | 74.00          | 19.00       | 1000.000        | 208.0       | V   | 285.0         |

Full Spectrum



- Preview Result 2V-AVG
- Preview Result 2H-AVG
- \* PK+
- FCC 15.247 PK
- Final\_Result PK+
- Preview Result 1V-PK+ AVG
- Preview Result 1H-PK+ AVG
- FCC 15.247 Restricted Bands AVG
- Final\_Result AVG

Full Spectrum



- Preview Result 2V-AVG
- Preview Result 2H-AVG
- \* PK+
- FCC 15.247 PK
- Final\_Result PK+
- Preview Result 1V-PK+ AVG
- Preview Result 1H-PK+ AVG
- FCC 15.247 Restricted Bands AVG
- Final\_Result AVG