# EMI – TEST REPORT

**- FCC Part 15.519, RSS-220 -**

| | | |
|---|---|---|
| **Type / Model Name** | : | BMW FBD5S |
| **Product Description** | : | UWB LIN gateway for comfort access function in vehicles |
| **Applicant** | : | Continental Automotive GmbH |
| Address | : | Siemensstraße 12 |
| | | 93055 REGENSBURG, GERMANY |
| **Manufacturer** | : | Continental Automotive GmbH |
| Address | : | Siemensstraße 12 |
| | | 93055 REGENSBURG, GERMANY |

| | |
|---|---|
| **Test Result** according to the standards listed in clause 1 test standards: | **POSITIVE** |

| | |
|---|---|
| **Test Report No. : 80131514-00 Rev0** | 29. June 2022<br>Date of issue |

Deutsche Akkreditierungsstelle
D-PL-12030-01-01
D-PL-12030-01-02

The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test results without the written permission of the test laboratory.



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**FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23**

# Contents



ATTACHMENT A as separate supplement

# 1 TEST STANDARDS

The tests were performed according to following standards:

**FCC Rules and Regulations Part 15, Subpart A - General (September 2019)**

| | |
|---|---|
| Part 15, Subpart A, Section 15.31 | Measurement standards |
| Part 15, Subpart A, Section 15.33 | Frequency range of radiated measurements |

**FCC Rules and Regulations Part 15, Subpart C - Intentional Radiators (September 2019)**

| | |
|---|---|
| Part 15, Subpart C, Section 15.203 | Antenna requirement |
| Part 15, Subpart C, Section 15.204 | External radio frequency power amplifiers and antenna modifications |
| Part 15, Subpart C, Section 15.205 | Restricted bands of operation |
| Part 15, Subpart C, Section 15.207 | Conducted limits |
| Part 15, Subpart C, Section 15.209 | Radiated emission limits, general requirements |

**FCC Rules and Regulations Part 15, Subpart F – Ultra Wideband Operation (October 2019)**

| | |
|---|---|
| Part 15, Subpart F, Section 15.503 | Definitions |
| Part 15, Subpart F, Section 15.505 | Cross reference |
| Part 15, Subpart F, Section 15.519 | Technical requirements for hand held UWB systems |
| Part 15, Subpart F, Section 15.521 | Technical requirements applicable to all UWB devices |

| | |
|---|---|
| ANSI C63.10: 2013 | Testing Unlicensed Wireless Devices |
| ETSI TR 100 028 V1.3.1: 2001-03 | Electromagnetic Compatibility and Radio Spectrum Matters (ERM); Uncertainties in the Measurement of Mobile Radio Equipment Characteristics—Part 1 and Part 2 |
| KDB 393764 D01 v02 (January 29, 2018) | Ultra-Wideband (UWB) Devices – Frequently Asked Questions |
| KDB 178919 D01 v06 (October 16, 2015) | Permissive Change Policy |

# 2 EQUIPMENT UNDER TEST

## 2.1 Information provided by the Client

Please note, we do not take any responsibility for information provided by the client or his representative which may have an influence on the validity of the test results.

## 2.2 Sampling

The customer is responsible for the choice of sample. Sample configuration, start-up and operation is carried out by the customer or according his/her instructions.

## 2.3 Photo documentation of the EUT – Detailed photos see ATTACHMENT A

## 2.4 Equipment type

Portable UWB Device

## 2.5 Short description of the equipment under test (EUT)

The FBD5s is a wireless UWB transceiver with LIN gateway for comfort access function in vehicles. 4 FBD5s anchors are mounted at the outer body of a vehicle. 2 further anchors (FBD5) are mounted inside the vehicle and provide BLE functionality for data transfer and security purposes between smartphone or ID tag. The anchors are connected to a central control unit and paired with a smartphone or wearable ID tag. The FBD5s can also communicate among each other for an initialization procedure. After initialization and training procedure the distance between FBD5s and smartphone or ID tag is measured and the position in relation to the vehicle is determined. The vehicle is unlocked, locked or started in case the smartphone or ID tag is in a permitted area around or inside the vehicle.

| | |
|---|---|
| Number of tested samples: | 2 |
| Serial number: | GSNr500<br>BMW5A5AFB4-01 |
| Firmware version: | 51C23110 |

## 2.6 Variants of the EUT

There are no variants.

## 2.7 Operation frequency and channel plan

The operating frequency band is 3100 MHz to 10600 MHz.

Channel plan:

| Channel number | $f_c$ (MHz) |
|---|---|
| Channel 5 | 6489.6 |
| Channel 6 | 6988.8 |
| Channel 8 | 7488.8 |
| Channel 9 | 7987.2 |

## 2.8 Transmit operating modes

Modulation: variable pulse position modulation (PPM) in combination with binary phase shift keying (BPSK).

Data rate: 6.8 Mbit/s

The EUT provides the package types “FC1T1ND” and “FC1T2”.

## 2.9 Antenna

The following antennas shall be used with the EUT:

| Number | Characteristic | Type | Plug | f-range (GHz) | Max. Gain (dBi) |
|---|---|---|---|---|---|
| 1 | Omni | PCB antenna | none | 3.1 – 10.6 | 5.9 |
| 2 | Omni | PCB antenna | none | 3.1 – 10.6 | 5.4 |

The both antennas are identical in construction.

## 2.10 Power supply system utilised

Power supply voltage, $V_{nom}$ : 12 VDC (battery powered)

## 2.11 Peripheral devices and interface cables

The following peripheral devices and interface cables are connected during the measurements:

- PCAN-USB FD Model : Peak IPEH 004052-004208
- Notebook Model : Fujitsu Lifebook

## 2.12 Determination of worst case conditions for final measurement

Measurements are made in all three orthogonal axes with horizontal and vertical antenna positions to determine the worst case condition.

### 2.12.1 Test jig

No test jig is used.

### 2.12.2 Test software

Special software is used for setting the EUT in a continuous Tx mode.

# 3 TEST RESULT SUMMARY

UWB device using digital modulation:

Operating in the 3100 MHz – 10600 MHz:

| FCC Rule Part | RSS Rule Part | Description | Result |
|---|---|---|---|
| 15.207(a)<br>15.521(j) | RSS-Gen, 8.8 | AC power line conducted emissions | passed |
| 15.519(b)<br>15.521(e) | RSS-220, 2, 5.1(a) | UWB Bandwidth | passed |
| 15.209(a)<br>15.519(c)<br>15.521(c)(d)(h) | RSS-Gen, 8.9<br>RSS-220, 3.4, 5.3.1(c), 5.3.1(d) | Radiated Emissions 9 kHz to 40 GHz | passed |
| 15.519(d) | RSS-220, 5.3.1(e) | Radiated Emissions at 1164-1240 MHz and 1559-1610 MHz | passed |
| 15.519(e)<br>15.521(g) | RSS-220, 5.3.1(g) | Peak Power radiated | passed |
| 15.519(a) | RSS-220, 5.3.1(b) | Signal deactivation | passed |
| 15.203<br>15.521(b) | --- | Antenna requirement | passed *1 |
| 15.204(a)-(d)<br>15.521(b) | --- | External radio frequency power amplifiers and antenna modifications | passed *1 |
| 15.521(a)(b)(f)(i) | --- | Technical requirements applicable to all UWB devices | passed *2 |

*1: According to the applicant, the EUT has internal PCB antennas. No other antennas can be connected to the EUT. Therefor, the requirements are regarded as fulfilled.
*2: According to the applicant, the EUT will be used in road vehicles only. For details refer to the user manual. The EUT is no imaging system.

The mentioned RSS Rule Parts in the above table are related to:
RSS-Gen, Issue 5, March 2019
RSS-220, Issue 1, July 2018

## 3.1 Revision history of test report

| Test report No | Rev. | Issue Date | Changes |
|---|---|---|---|
| 80131514-00 | 0 | 29 June 2022 | Initial test report |

The test report with the highest revision number replaces the previous test reports.

## 3.2 Final assessment

The equipment under test fulfills the EMI requirements cited in clause 1 test standards.

| | | |
|---|---|---|
| Date of receipt of test sample | : | acc. to storage records |
| Testing commenced on | : | 30 November 2021 |
| Testing concluded on | : | 25 March 2022 |

Checked by:

Klaus Gegenfurtner
I confirm the correctness and integrity of this document
2022.06.30 09:13:34 +02'00'

Klaus Gegenfurtner
Teamleader Radio

Tested by:

I am the author of this document
2022.06.29 21:10:21 +02'00'

Franz-Xaver Schrettenbrunner
Radio Team

# 4 TEST ENVIRONMENT

## 4.1 Address of the test laboratory

**CSA Group Bayern GmbH**
**Ohmstrasse 1-4**
**94342 STRASSKIRCHEN**
**GERMANY**

## 4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

| | |
|---|---|
| Temperature: | 15-35 °C |
| Humidity: | 30-60 % |
| Atmospheric pressure: | 86-106 kPa |

## 4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. It is noted that the expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor k = 2. The true value is located in the corresponding interval with a probability of 95 % The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2 / 2011 + A1 / 2014 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements“ and is documented in the quality system acc. to DIN EN ISO/IEC 17025. For all measurements shown in this report, the measurement uncertainty of the test laboratory, CSA Group Bayern GmbH, is below the measurement uncertainty as defined by CISPR. Therefore, no special measures must be taken into consideration with regard to the limits according to CISPR. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

| Measurement Type | Range | Confidence Level (%) | Calculated Uncertainty |
|---|---|---|---|
| AC Conducted Spurious Emissions | 0.15 MHz to 30 MHz | 95% | ± 3.29 dB |
| 20 dB Bandwidth | Center frequency of EUT | 95% | $\pm 2.5 \times 10^{-7}$ |
| 99% Occupied Bandwidth | Center frequency of EUT | 95% | $\pm 2.5 \times 10^{-7}$ |
| Radiated Spurious Emissions | 9 kHz to 30 MHz | 95% | ± 3.53 dB |
| Radiated Spurious Emissions | 30 MHz to 1000 MHz | 95% | ± 3.71 dB |
| Radiated Spurious Emissions | 1000 MHz to 10000 MHz | 95% | ± 2.34 dB |
| Peak conducted output power | 902 MHz to 928 MHz | 95% | ± 0.35 dB |
| Conducted Spurious Emissions | 9 kHz to 10000 MHz | 95% | ± 2.15 dB |

## 4.4 Conformity Decision Rule

The conformity decision rule is based on the ILAC G8 published at the time of reporting.

## 4.5 Measurement protocol for FCC and ISED

### 4.5.1 General information

CSA Group Bayern GmbH is recognized as wireless testing laboratory under the CAB identifier:

**FCC: DE 0011**
**ISED: DE0009**

### 4.5.2 General Standard information

The test methods used comply with ANSI C63.10 - "Testing Unlicensed Wireless Devices".

4.5.2.1 Justification

The equipment under test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral using the appropriate impedance characteristic or left unterminated. Where appropriate, cables are manually manipulated with respect to each other thus obtaining maximum disturbances from the unit.

4.5.2.2 Radiated emission (electrical field 30 MHz - 1 GHz)

Spurious emissions from the EUT are measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarised antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The setup of the equipment under test is established in accordance with ANSI C63.10.The interface cables that are closer than 40 centimetres to the ground plane are bundled in the center in a serpentine fashion so that they are at least 40 centimetres from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screened room located outside the test area. The antenna is positioned 3, 10 or 30 metres horizontally from the EUT and is repeated vertically. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 metres and the EUT is rotated 360 degrees.
The final level in dBµV/m is calculated by taking the reading from the EMI receiver (Level dBµV) and adding the correction factors and cable loss factor (dB). The FCC or CISPR limit is subtracted from this result in order to provide the limit margin listed in the measurement protocol.

The resolution bandwidth setting:
30 MHz – 1000 MHz: RBW: 120 kHz

Example:

| Frequency | Level | + | Factor | = | Level | - | CISPR Limit | = | Delta |
|---|---|---|---|---|---|---|---|---|---|
| (MHz) | (dBµV) | | (dB) | | (dBµV/m) | | (dBµV/m) | | (dB) |
| 719.0 | 75.0 | + | 32.6 | = | 107.6 | - | 110.0 | = | -2.4 |

4.5.2.3 Radiated emission (electrical field 1 GHz - 40 GHz)

Radiated emissions from the EUT are measured in the frequency range 1 GHz up to the maximum frequency as specified in 47 CFR Part 15, Subpart A, Section 15.33, using a spectrum analyser and appropriate linearly polarized antennas. Table top equipment is placed on a 1.0 X 1.5 metre non-conducting table, 1.5 metre above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The setup of the equipment under test is following set out in ANSI C63.10. The interface cables that are closer than 40 centimetres to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimetres from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screened room located outside the test area. Measurements are made in both the horizontal and vertical polarization planes in a fully anechoic room using a spectrum analyzer set to max peak detector function and a resolution 1 MHz and video bandwidth 3 MHz for peak measurement. The conditions determined as worst case will then be used for the final measurements. When the EUT is larger than the beam width of the measuring antenna it will be moved over the surface for the four sides of the equipment. Where appropriate, the test distance may be reduced in order to detect emissions under better uncertainty and are calculated at the specified test distance.

# 5 TEST CONDITIONS AND RESULTS

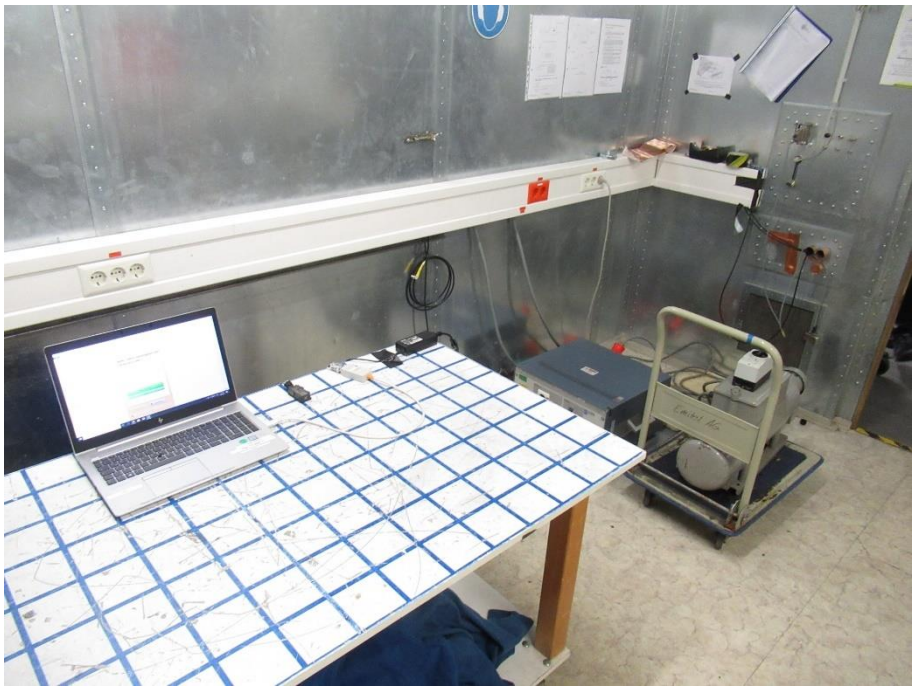
## 5.1 AC power line conducted emissions

For test instruments and accessories used see section 6 Part **A 4**.

### 5.1.1 Description of the test location

Test location: Shielded Room S2

### 5.1.2 Photo documentation of the test set-up



### 5.1.3 Applicable standard

According to FCC Part 15, Section 15.207(a):
Except as shown in paragraphs (b) and (c) of this Section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the given limits.

### 5.1.4 Description of Measurement

The measurements are performed following the procedures set out in ANSI C63.10 described under item 4.4.3. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

For the measurement, the following accesoires according §2.1033 were used:

- 12V 5A Universal Adapter Model : LEYF Adptr12V-5A

### 5.1.5 Test result

Frequency range: 0.15 MHz - 30 MHz

Min. limit margin -22.1 dB at 0.605 MHz

Limit according to FCC Part 15, Section 15.207(a):

| Frequency of Emission (MHz) | Conducted Limit (dBµV) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56 * | 56 to 46 * |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

* Decreases with the logarithm of the frequency

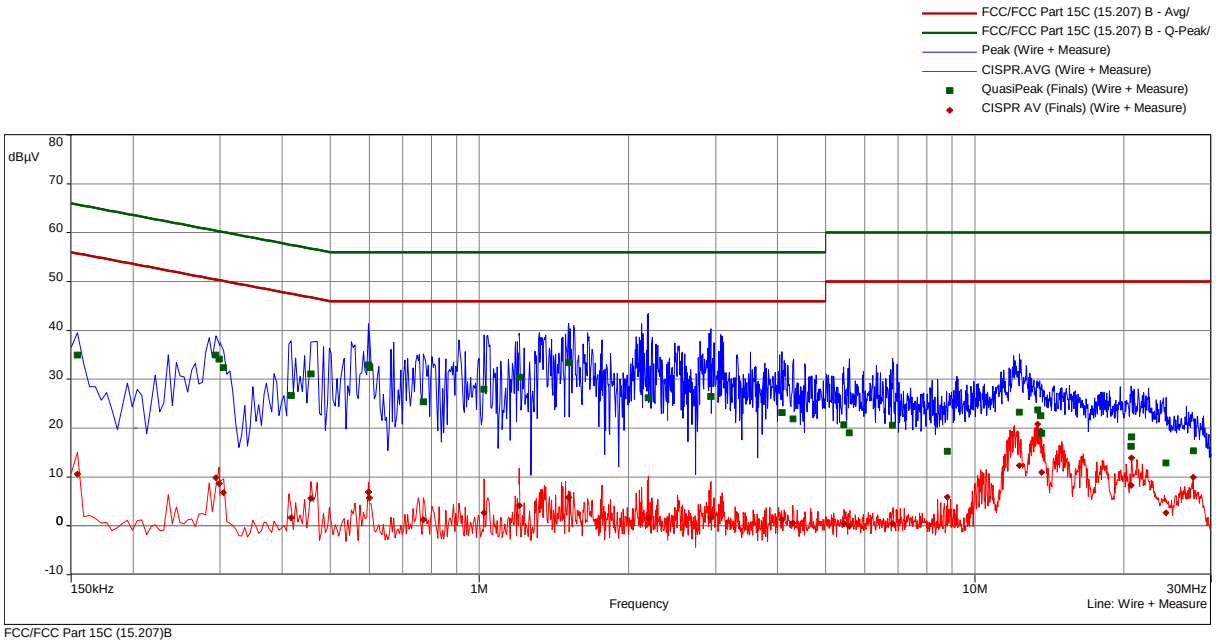
The requirements are **FULFILLED.**

**Remarks:** For detailed test result please refer to following test protocols.

The results are independent of the used antenna path or channel. Tests carried out with ch 5.

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

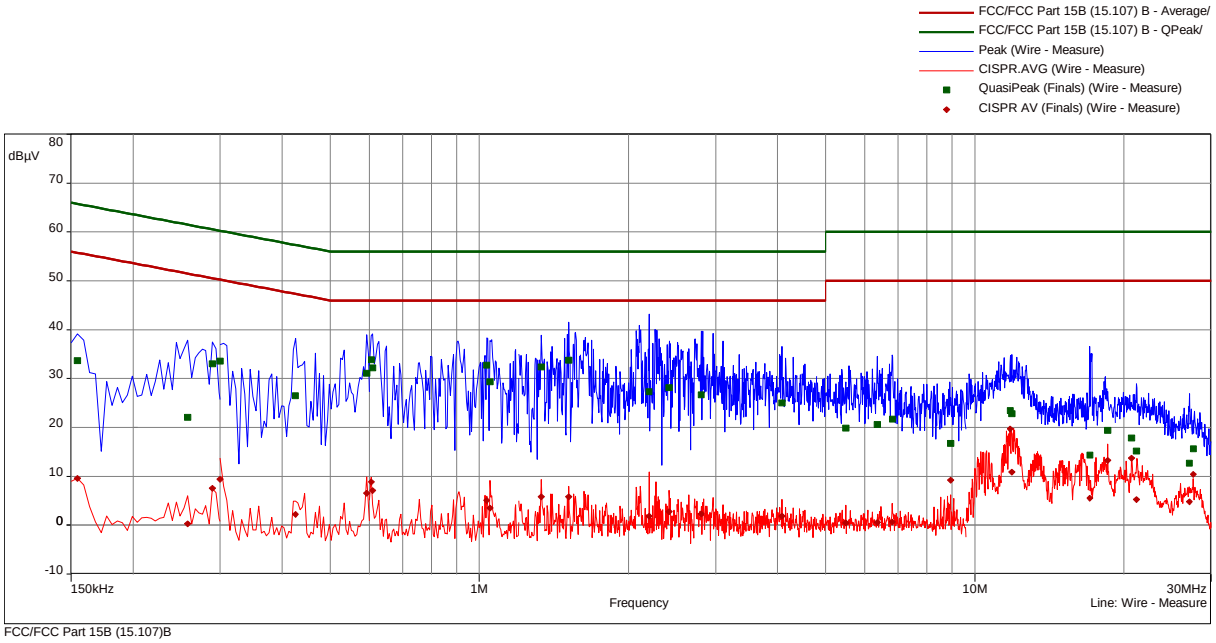
## 5.1.6 Test protocol




FCC/FCC Part 15C (15.207)B

| freq | QP | margin | limit | AV | margin | limit |
|---|---|---|---|---|---|---|
| MHz | dB(µV) | dB | dB | dB(µV) | dB | dB |
| 0.155 | 35.0 | -30.8 | 65.8 | 10.6 | -45.2 | 55.8 |
| 0.294 | 35.0 | -25.4 | 60.4 | 9.9 | -40.5 | 50.4 |
| 0.299 | 34.2 | -26.1 | 60.3 | 8.7 | -41.6 | 50.3 |
| 0.305 | 32.4 | -27.7 | 60.1 | 6.9 | -43.3 | 50.1 |
| 0.417 | 26.7 | -30.8 | 57.5 | 1.7 | -45.8 | 47.5 |
| 0.458 | 31.2 | -25.6 | 56.7 | 5.7 | -41.1 | 46.7 |
| 0.597 | 33.0 | -23.0 | 56.0 | 6.9 | -39.1 | 46.0 |
| 0.600 | 32.4 | -23.6 | 56.0 | 5.7 | -40.3 | 46.0 |
| 0.771 | 25.5 | -30.6 | 56.0 | 1.3 | -44.7 | 46.0 |
| 1.023 | 28.0 | -28.0 | 56.0 | 2.7 | -43.3 | 46.0 |
| 1.205 | 30.5 | -25.5 | 56.0 | 4.2 | -41.8 | 46.0 |
| 1.515 | 33.4 | -22.6 | 56.0 | 5.8 | -40.2 | 46.0 |
| 2.195 | 26.2 | -29.8 | 56.0 | 1.6 | -44.4 | 46.0 |
| 2.931 | 26.6 | -29.4 | 56.0 | 1.8 | -44.2 | 46.0 |
| 4.079 | 23.2 | -32.8 | 56.0 | 1.3 | -44.7 | 46.0 |
| 4.290 | 21.9 | -34.1 | 56.0 | 0.6 | -45.4 | 46.0 |
| 5.444 | 20.7 | -39.3 | 60.0 | 0.5 | -49.5 | 50.0 |
| 5.588 | 19.1 | -40.9 | 60.0 | 0.0 | -50.0 | 50.0 |
| 6.830 | 20.7 | -39.3 | 60.0 | 0.5 | -49.5 | 50.0 |
| 8.810 | 15.3 | -44.7 | 60.0 | 5.9 | -44.1 | 50.0 |
| 12.305 | 23.3 | -36.7 | 60.0 | 12.4 | -37.6 | 50.0 |
| 13.380 | 23.8 | -36.2 | 60.0 | 20.9 | -29.1 | 50.0 |
| 13.587 | 22.6 | -37.4 | 60.0 | 19.5 | -30.5 | 50.0 |
| 13.641 | 19.0 | -41.0 | 60.0 | 11.0 | -39.0 | 50.0 |
| 20.681 | 16.4 | -43.7 | 60.0 | 8.3 | -41.7 | 50.0 |
| 20.744 | 18.3 | -41.8 | 60.0 | 13.9 | -36.1 | 50.0 |
| 24.366 | 13.0 | -47.1 | 60.0 | 2.7 | -47.3 | 50.0 |
| 27.579 | 15.4 | -44.6 | 60.0 | 10.0 | -40.0 | 50.0 |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23




FCC/FCC Part 15B (15.107)B

| freq | QP | margin | limit | AV | margin | limit |
|---|---|---|---|---|---|---|
| 0.155 | 33.8 | -32.0 | 65.8 | 9.6 | -46.2 | 55.8 |
| 0.258 | 22.1 | -39.4 | 61.5 | 0.4 | -51.1 | 51.5 |
| 0.290 | 33.0 | -27.5 | 60.5 | 7.6 | -43.0 | 50.5 |
| 0.300 | 33.6 | -26.6 | 60.2 | 9.4 | -40.9 | 50.2 |
| 0.426 | 26.6 | -30.8 | 57.3 | 2.2 | -45.1 | 47.3 |
| 0.593 | 31.1 | -24.9 | 56.0 | 6.5 | -39.5 | 46.0 |
| 0.605 | 33.9 | -22.1 | 56.0 | 8.8 | -37.2 | 46.0 |
| 0.609 | 32.2 | -23.8 | 56.0 | 7.2 | -38.9 | 46.0 |
| 1.037 | 32.8 | -23.2 | 56.0 | 5.1 | -40.9 | 46.0 |
| 1.050 | 29.4 | -26.6 | 56.0 | 3.6 | -42.4 | 46.0 |
| 1.335 | 32.4 | -23.6 | 56.0 | 5.8 | -40.2 | 46.0 |
| 1.515 | 33.8 | -22.2 | 56.0 | 5.8 | -40.2 | 46.0 |
| 2.204 | 27.4 | -28.6 | 56.0 | 1.9 | -44.1 | 46.0 |
| 2.414 | 28.2 | -27.8 | 56.0 | 2.8 | -43.2 | 46.0 |
| 2.810 | 26.7 | -29.3 | 56.0 | 2.3 | -43.7 | 46.0 |
| 4.079 | 25.0 | -31.0 | 56.0 | 1.9 | -44.1 | 46.0 |
| 5.498 | 20.0 | -40.0 | 60.0 | 0.5 | -49.5 | 50.0 |
| 6.357 | 20.7 | -39.3 | 60.0 | 0.6 | -49.5 | 50.0 |
| 6.816 | 21.7 | -38.3 | 60.0 | 0.6 | -49.4 | 50.0 |
| 8.945 | 16.8 | -43.2 | 60.0 | 9.2 | -40.8 | 50.0 |
| 11.778 | 23.5 | -36.5 | 60.0 | 19.7 | -30.3 | 50.0 |
| 11.873 | 22.8 | -37.2 | 60.0 | 10.9 | -39.1 | 50.0 |
| 17.070 | 14.4 | -45.6 | 60.0 | 5.6 | -44.4 | 50.0 |
| 18.551 | 19.5 | -40.5 | 60.0 | 13.3 | -36.7 | 50.0 |
| 20.744 | 17.9 | -42.1 | 60.0 | 13.7 | -36.3 | 50.0 |
| 21.216 | 15.3 | -44.8 | 60.0 | 5.3 | -44.7 | 50.0 |
| 27.156 | 12.7 | -47.3 | 60.0 | 4.8 | -45.2 | 50.0 |
| 27.579 | 15.7 | -44.3 | 60.0 | 10.4 | -39.6 | 50.0 |

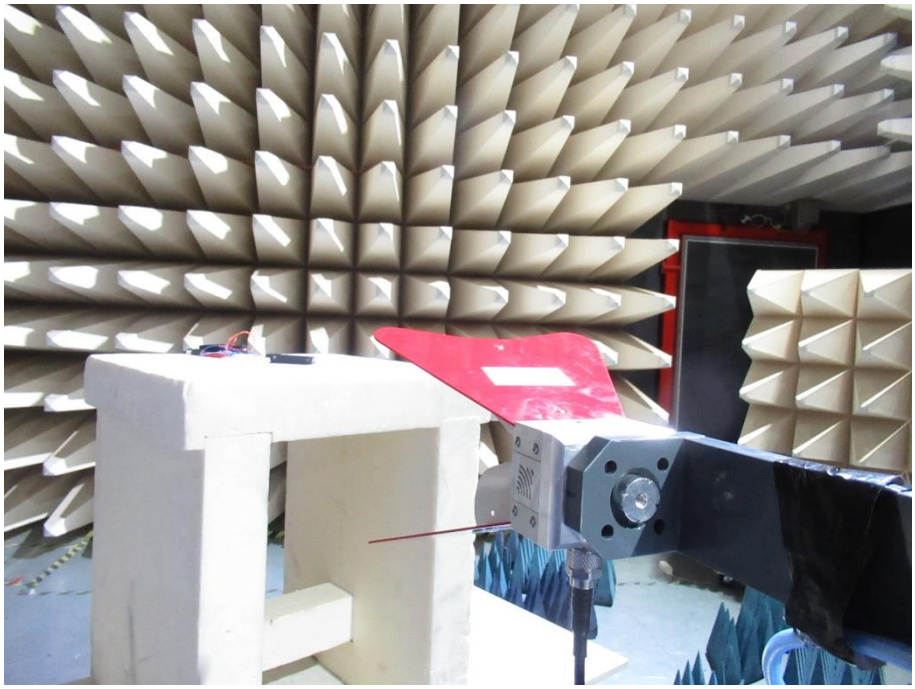
## 5.2 UWB Bandwidth

For test instruments and accessories used see section 6 Part **CPR 3**.

### 5.2.1 Description of the test location

Test location: Anechoic chamber 1

### 5.2.2 Photo documentation of the test set-up



### 5.2.3 Applicable standard

According to FCC Part 15, Section 15.519(b):
The UWB bandwidth of a UWB system operating under the provisions of this section must be contained between 3100 MHz and 10,600 MHz.

According to FCC Part 15, Section 15.503(d):
Ultra-wideband (UWB) transmitter. An intentional radiator that, at any point in time, has a fractional bandwidth equal to or greater than 0.20 or has a UWB bandwidth equal to or greater than 500 MHz, regardless of the fractional bandwidth.

### 5.2.4 Description of Measurement

The measurement was performed radiated at a distance of 3 m. The bandwidth was measured at an amplitude level reduced from the reference level of a modulated channel by a ratio of -10 dB.

Spectrum analyser settings:
RBW: 1 MHz, VBW: 3 MHz, Detector: Peak

### 5.2.5 Test result

| channel | antenna | lowest frequency $f_L$ (MHz) | highest frequency $f_H$ (MHz) | Permitted frequency range (GHz) | UWB bandwidth (MHz) | Required UWB bandwidth (MHz) | result |
|---|---|---|---|---|---|---|---|
| 5 | 1 | 6223.1 | 6770.2 | 3.1 – 10.6 | 547.1 | > 500 | passed |
| 5 | 2 | 6223.6 | 6756.8 | 3.1 – 10.6 | 533.2 | > 500 | passed |
| 6 | 1 | 6691.5 | 7285.5 | 3.1 – 10.6 | 594.0 | > 500 | passed |
| 6 | 2 | 6691.5 | 7270.0 | 3.1 – 10.6 | 578.5 | > 500 | passed |
| 8 | 1 | 7206.3 | 7775.3 | 3.1 – 10.6 | 569.0 | > 500 | passed |
| 8 | 2 | 7190.3 | 7769.7 | 3.1 – 10.6 | 579.4 | > 500 | passed |
| 9 | 1 | 7690.9 | 8268.1 | 3.1 – 10.6 | 577.2 | > 500 | passed |
| 9 | 2 | 7690.0 | 8284.7 | 3.1 – 10.6 | 594.7 | > 500 | passed |

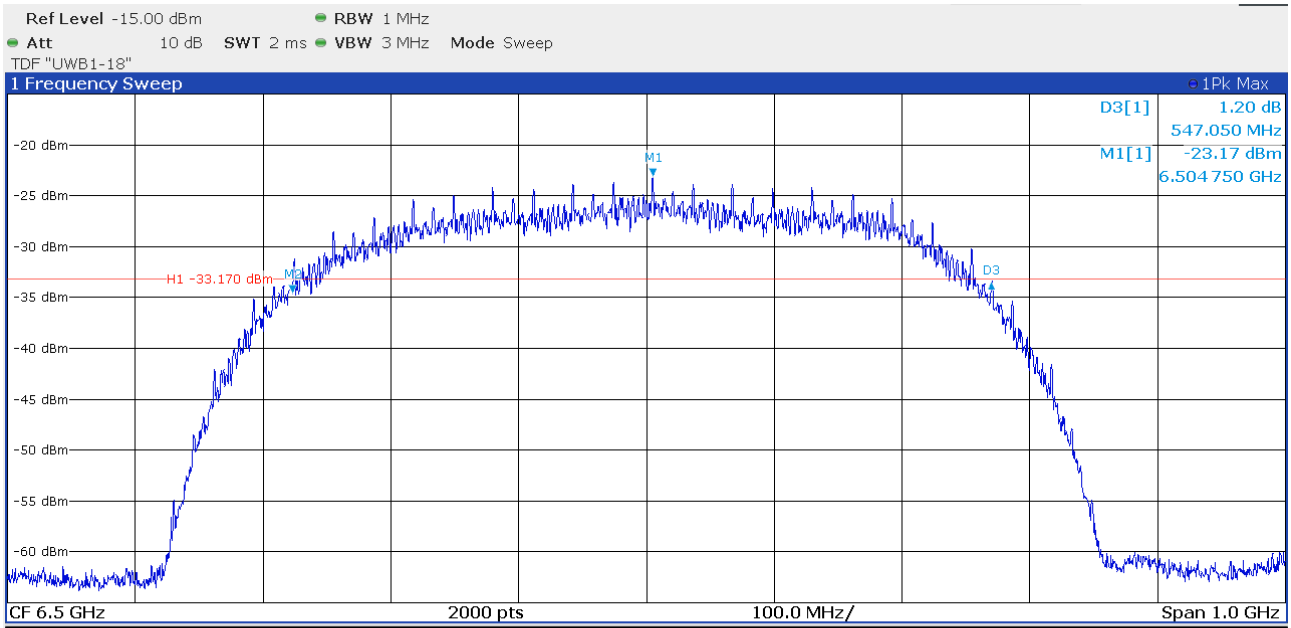
The requirements are **FULFILLED.**

**Remarks:** For detailed test results please refer to following test protocols. EBW tests were performed with EUT GSNr500. OBW tests were performed with EUT BMW5A5AFB4-01 in arbitrary units

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

## 5.2.6 Test protocols EBW

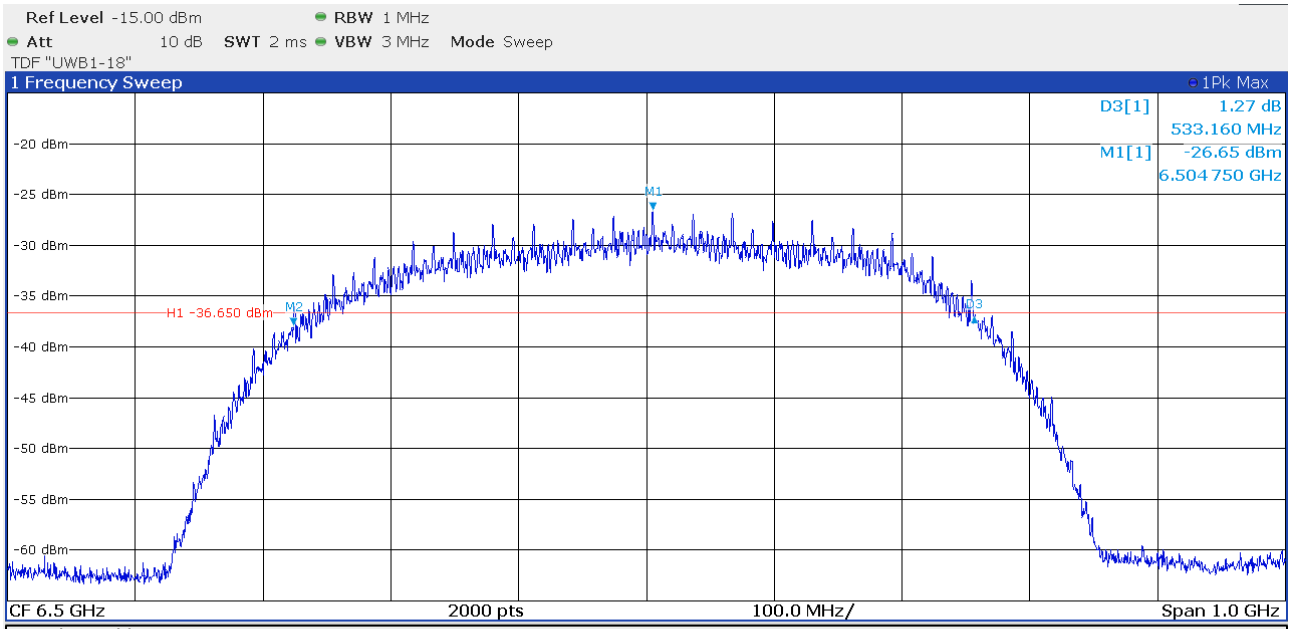
### Channel 5 antenna 1




2 Marker Table

| Type | Ref | Trc | X-Value | Y-Value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 6.504 75 GHz | -23.17 dBm | | |
| M2 | | 1 | 6.223 08 GHz | -34.63 dBm | | |
| D3 | M2 | 1 | 547.05 MHz | 1.20 dB | | |

### Channel 5 antenna 2

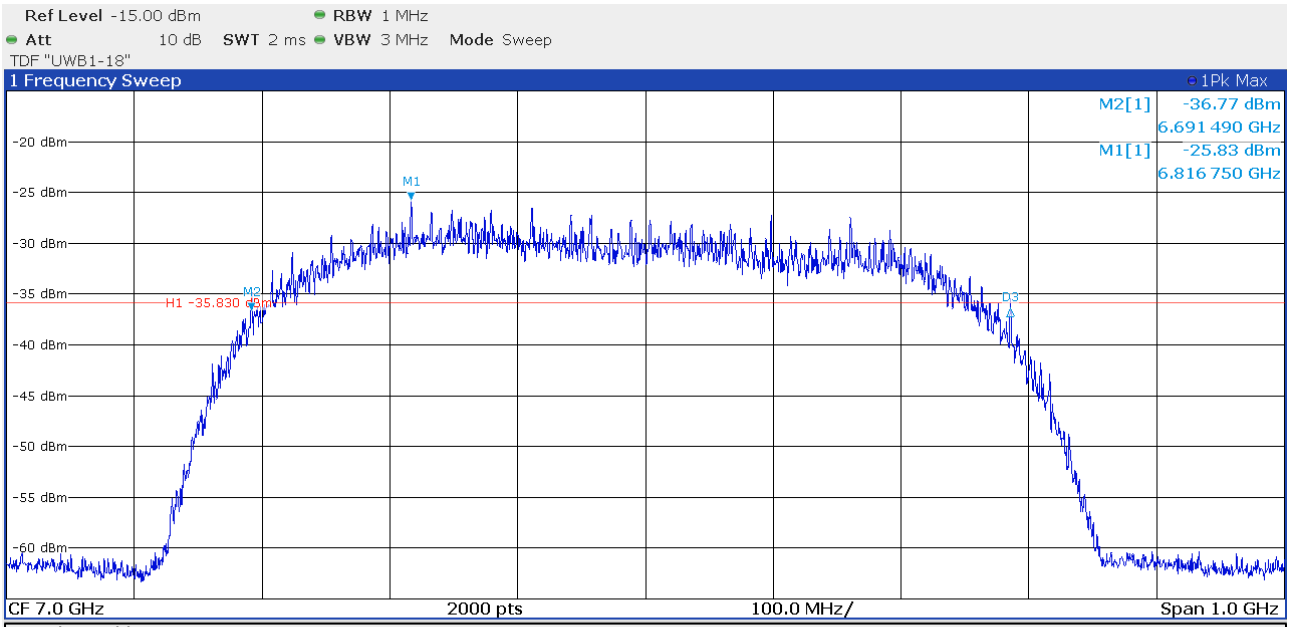



2 Marker Table

| Type | Ref | Trc | X-Value | Y-Value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 6.504 75 GHz | -26.65 dBm | | |
| M2 | | 1 | 6.223 56 GHz | -38.06 dBm | | |
| D3 | M2 | 1 | 533.16 MHz | 1.27 dB | | |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

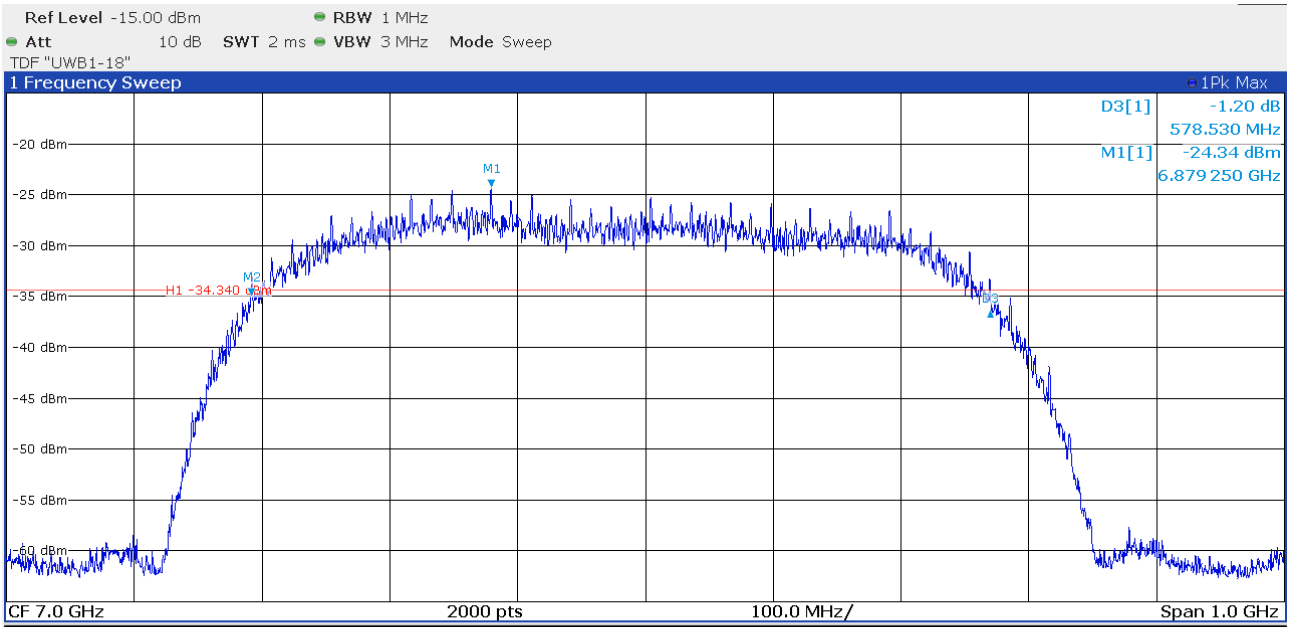
## Channel 6 antenna 1




2 Marker Table

| Type | Ref | Trc | X-Value | Y-Value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 6.816 75 GHz | -25.83 dBm | | |
| M2 | | 1 | 6.691 49 GHz | -36.77 dBm | | |
| D3 | M2 | 1 | 594.03 MHz | 0.45 dB | | |

## Channel 6 antenna 2

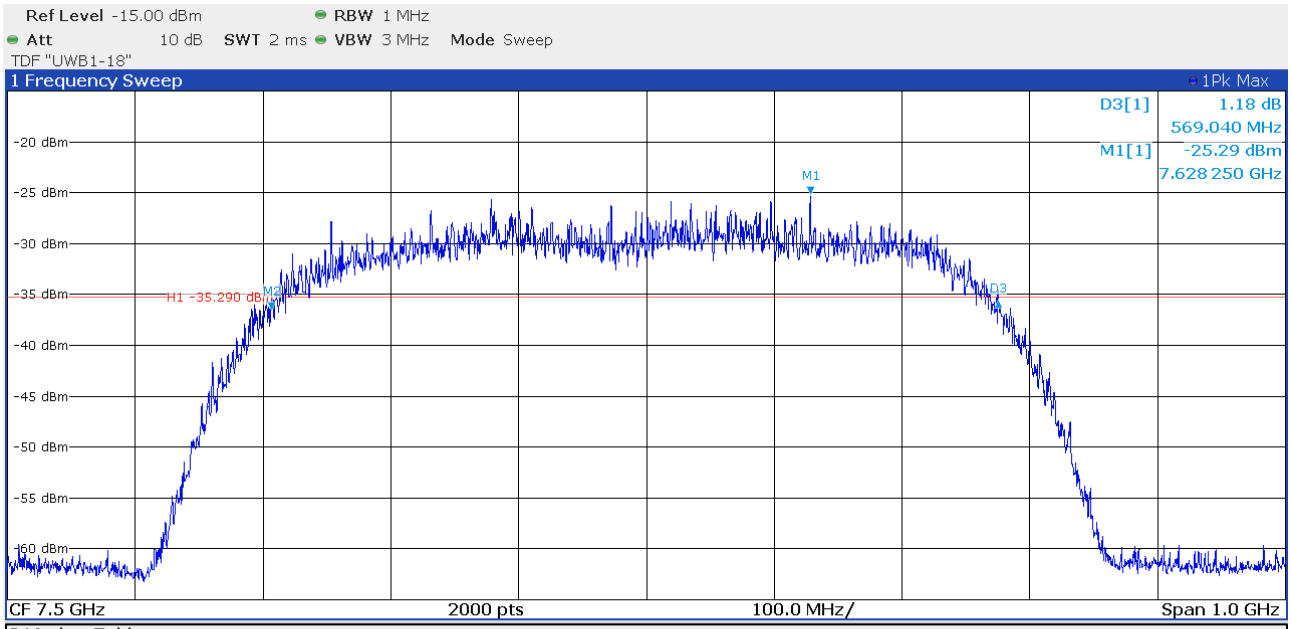



2 Marker Table

| Type | Ref | Trc | X-Value | Y-Value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 6.879 25 GHz | -24.34 dBm | | |
| M2 | | 1 | 6.691 49 GHz | -35.06 dBm | | |
| D3 | M2 | 1 | 578.53 MHz | -1.20 dB | | |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

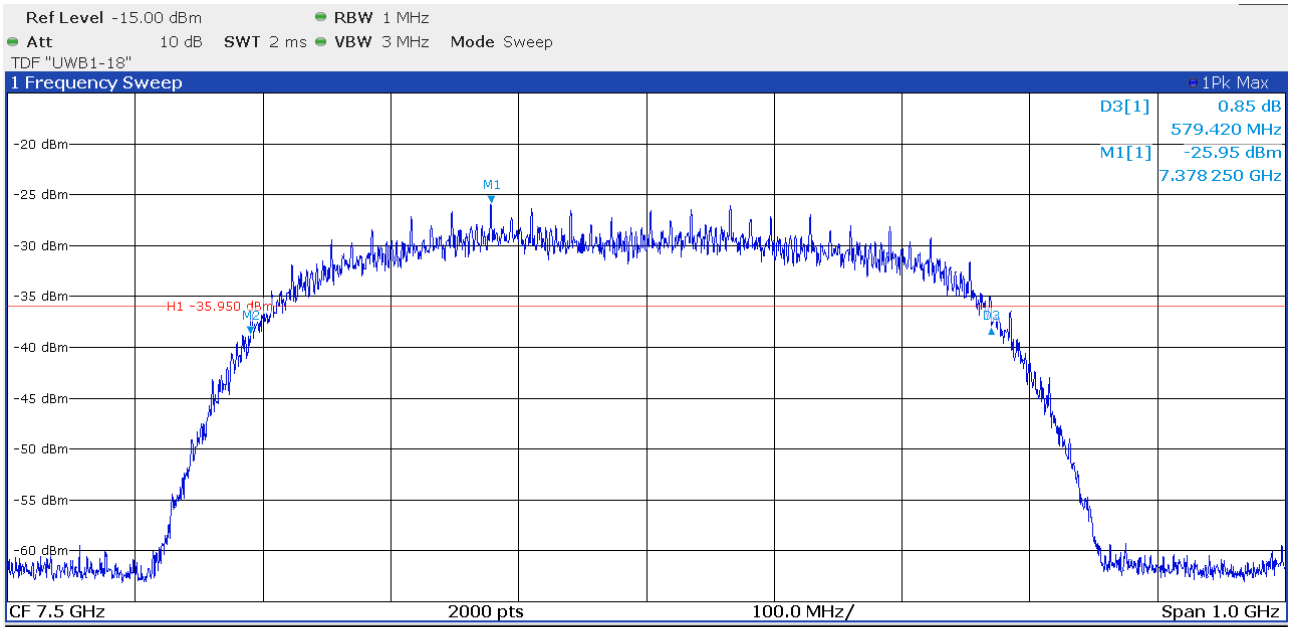
## Channel 8 antenna 1




2 Marker Table

| Type | Ref | Trc | X-Value | Y-Value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 7.628 25 GHz | -25.29 dBm | | |
| M2 | | 1 | 7.206 3 GHz | -36.62 dBm | | |
| D3 | M2 | 1 | 569.04 MHz | 1.18 dB | | |

## Channel 8 antenna 2

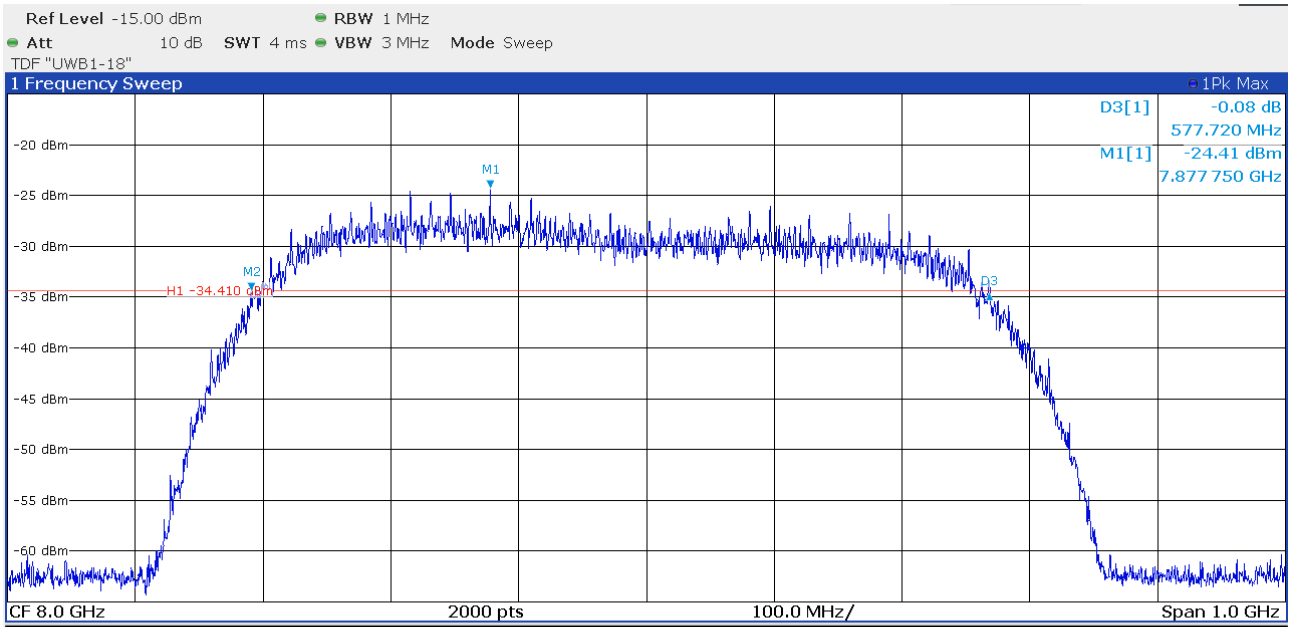



2 Marker Table

| Type | Ref | Trc | X-Value | Y-Value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 7.378 25 GHz | -25.95 dBm | | |
| M2 | | 1 | 7.190 3 GHz | -38.80 dBm | | |
| D3 | M2 | 1 | 579.42 MHz | 0.85 dB | | |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

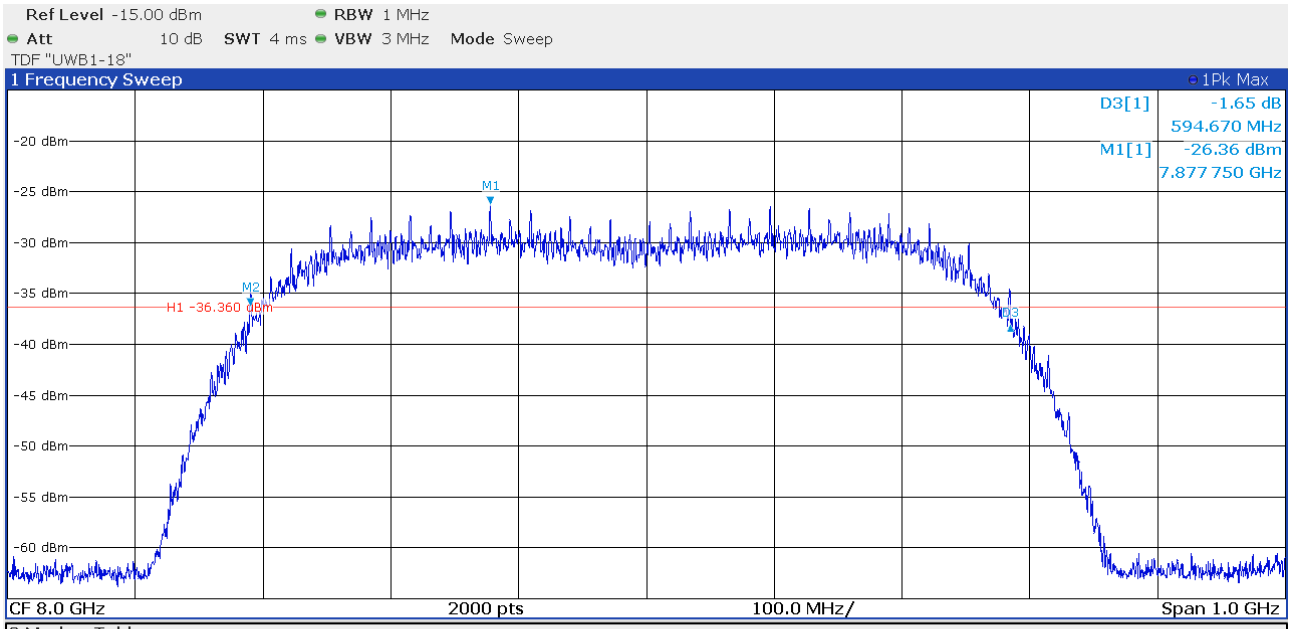
## Channel 9 antenna 1




2 Marker Table

| Type | Ref | Trc | X-Value | Y-Value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 7.877 75 GHz | -24.41 dBm | | |
| M2 | | 1 | 7.690 91 GHz | -34.42 dBm | | |
| D3 | M2 | 1 | 577.72 MHz | -0.08 dB | | |

## Channel 9 antenna 2



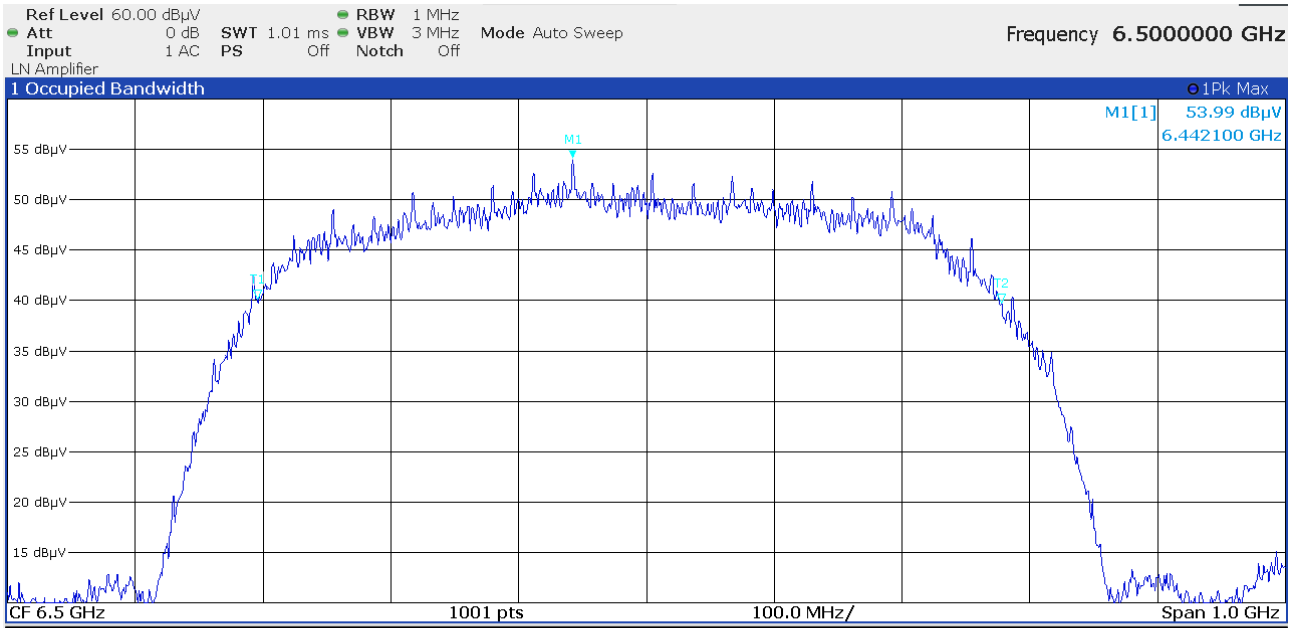

2 Marker Table

| Type | Ref | Trc | X-Value | Y-Value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 7.877 75 GHz | -26.36 dBm | | |
| M2 | | 1 | 7.689 96 GHz | -36.30 dBm | | |
| D3 | M2 | 1 | 594.67 MHz | -1.65 dB | | |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

## 5.2.7 Test protocols OBW

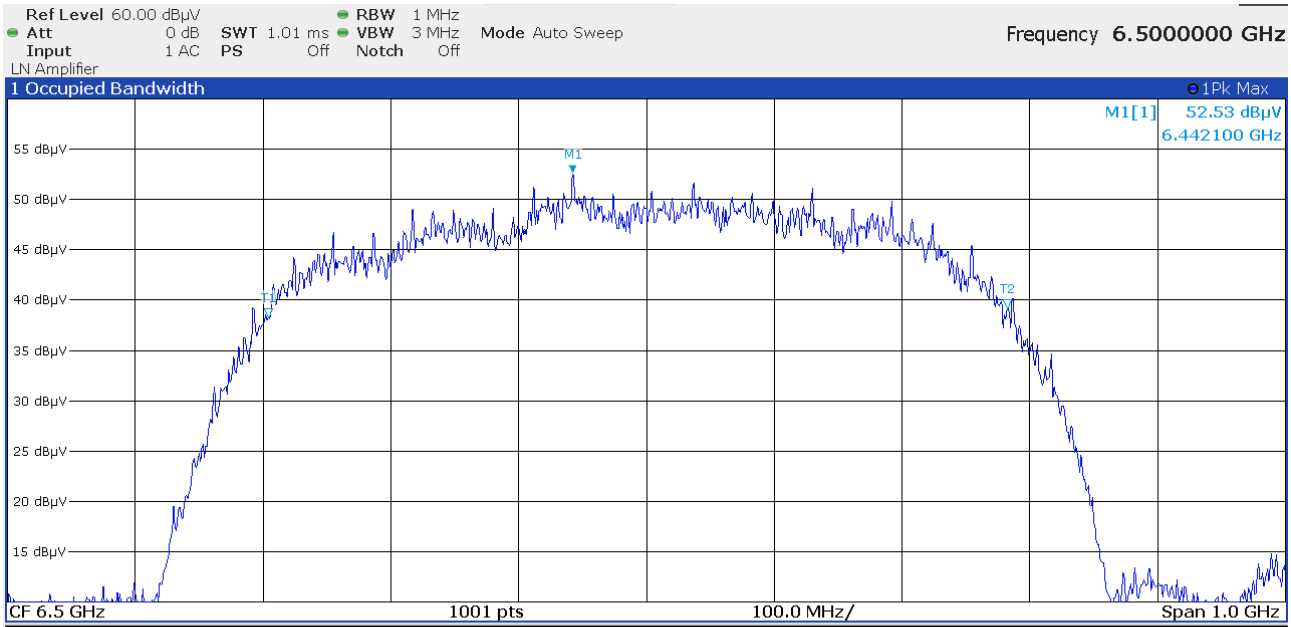
### Channel 5 antenna 1




2 Marker Table

| Type | Ref | Trc | X-Value | Y-Value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | **6.4421 GHz** | **53.99 dBµV** | Occ Bw | **581.978259643 MHz** |
| T1 | | 1 | 6.195758 GHz | 40.19 dBµV | Occ Bw Centroid | 6.486747404 GHz |
| T2 | | 1 | 6.777737 GHz | 39.79 dBµV | Occ Bw Freq Offset | -13.252595873 MHz |

### Channel 5 antenna 2

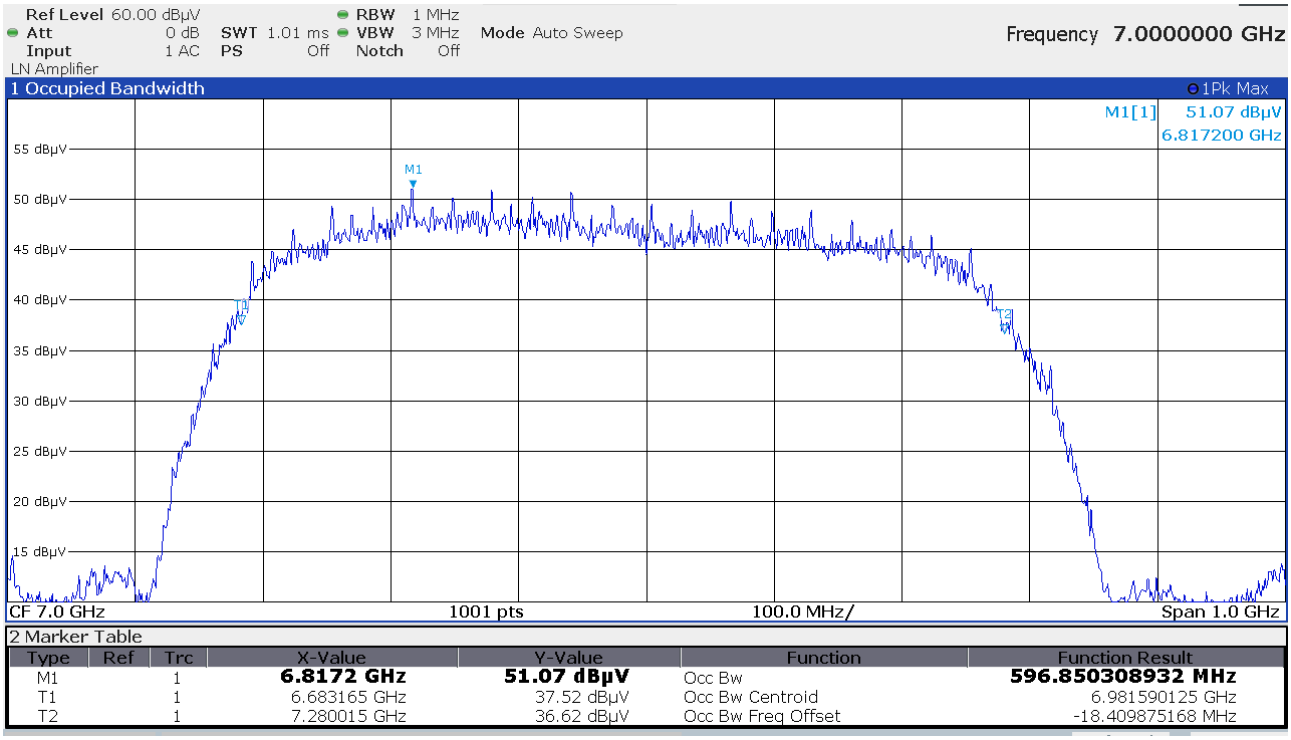



2 Marker Table

| Type | Ref | Trc | X-Value | Y-Value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | **6.4421 GHz** | **52.53 dBµV** | Occ Bw | **578.143983903 MHz** |
| T1 | | 1 | 6.204493 GHz | 38.29 dBµV | Occ Bw Centroid | 6.493565485 GHz |
| T2 | | 1 | 6.782637 GHz | 39.15 dBµV | Occ Bw Freq Offset | -6.434514833 MHz |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

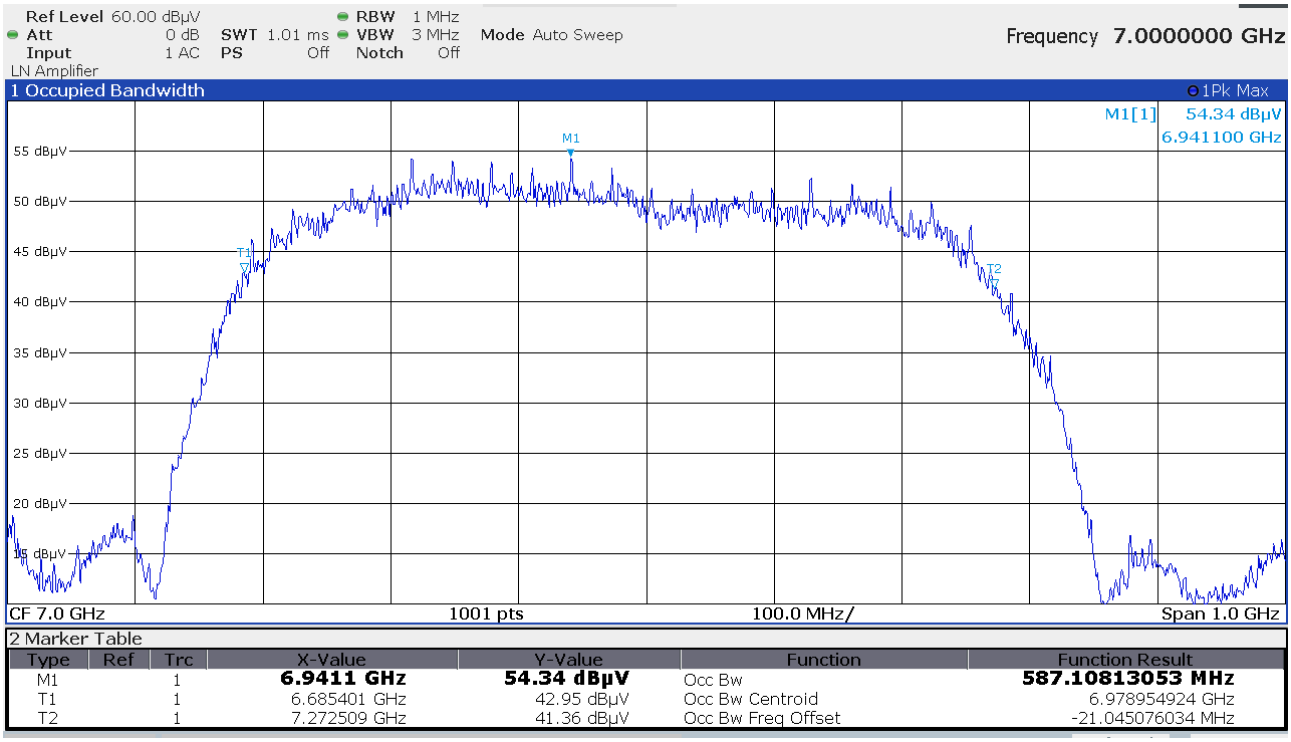
## Channel 6 antenna 1




2 Marker Table

| Type | Ref | Trc | X-Value | Y-Value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | **6.8172 GHz** | **51.07 dBµV** | Occ Bw | **596.850308932 MHz** |
| T1 | | 1 | 6.683165 GHz | 37.52 dBµV | Occ Bw Centroid | 6.981590125 GHz |
| T2 | | 1 | 7.280015 GHz | 36.62 dBµV | Occ Bw Freq Offset | -18.409875168 MHz |

## Channel 6 antenna 2

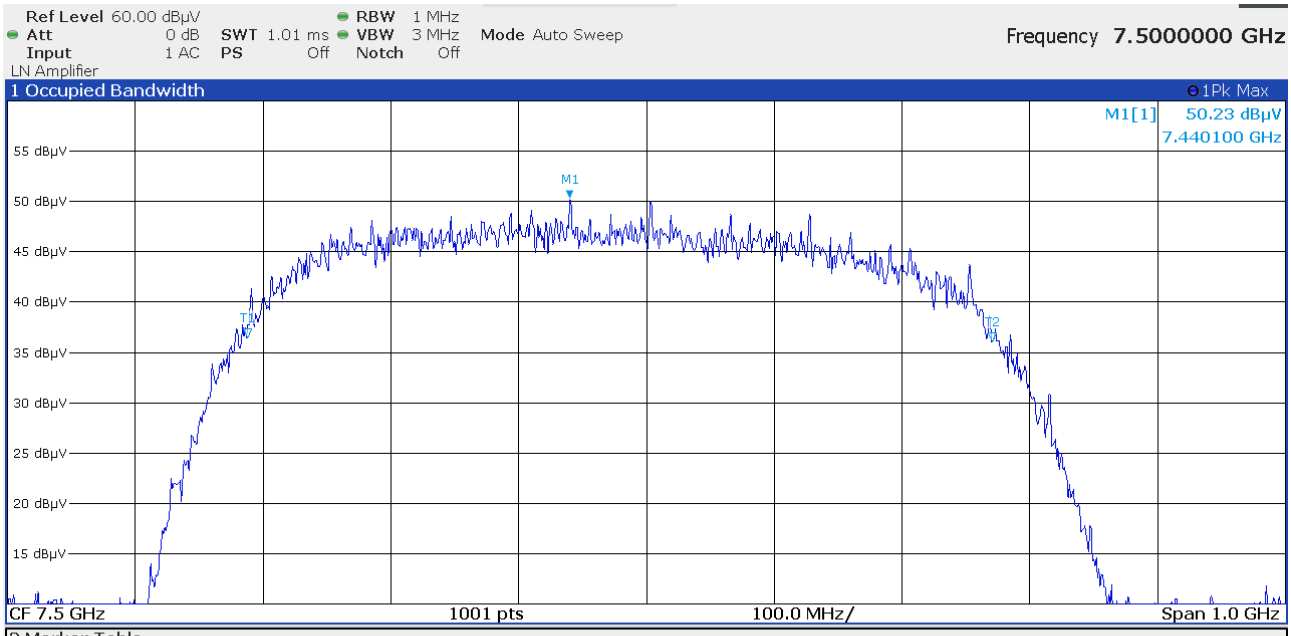



2 Marker Table

| Type | Ref | Trc | X-Value | Y-Value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | **6.9411 GHz** | **54.34 dBµV** | Occ Bw | **587.10813053 MHz** |
| T1 | | 1 | 6.685401 GHz | 42.95 dBµV | Occ Bw Centroid | 6.978954924 GHz |
| T2 | | 1 | 7.272509 GHz | 41.36 dBµV | Occ Bw Freq Offset | -21.045076034 MHz |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

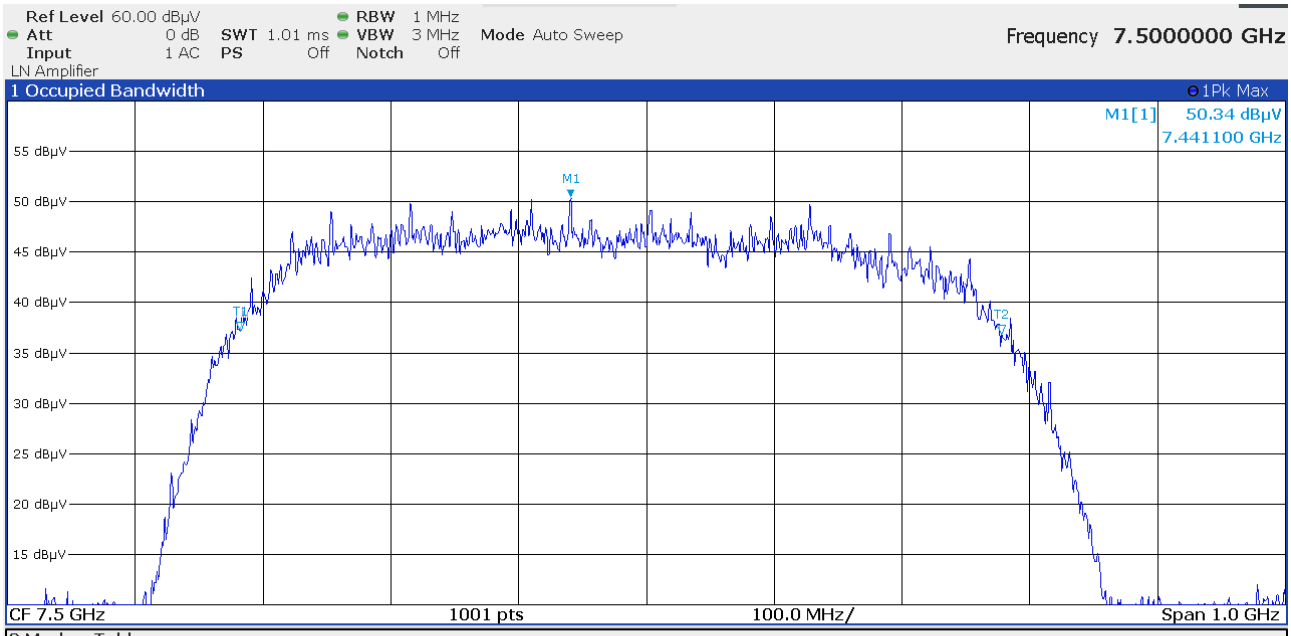
## Channel 8 antenna 1




2 Marker Table

| Type | Ref | Trc | X-Value | Y-Value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | **7.4401 GHz** | **50.23 dBµV** | Occ Bw | **583.558640577 MHz** |
| T1 | | 1 | 7.187451 GHz | 36.45 dBµV | Occ Bw Centroid | 7.479230527 GHz |
| T2 | | 1 | 7.77101 GHz | 36.09 dBµV | Occ Bw Freq Offset | -20.769472965 MHz |

## Channel 8 antenna 2

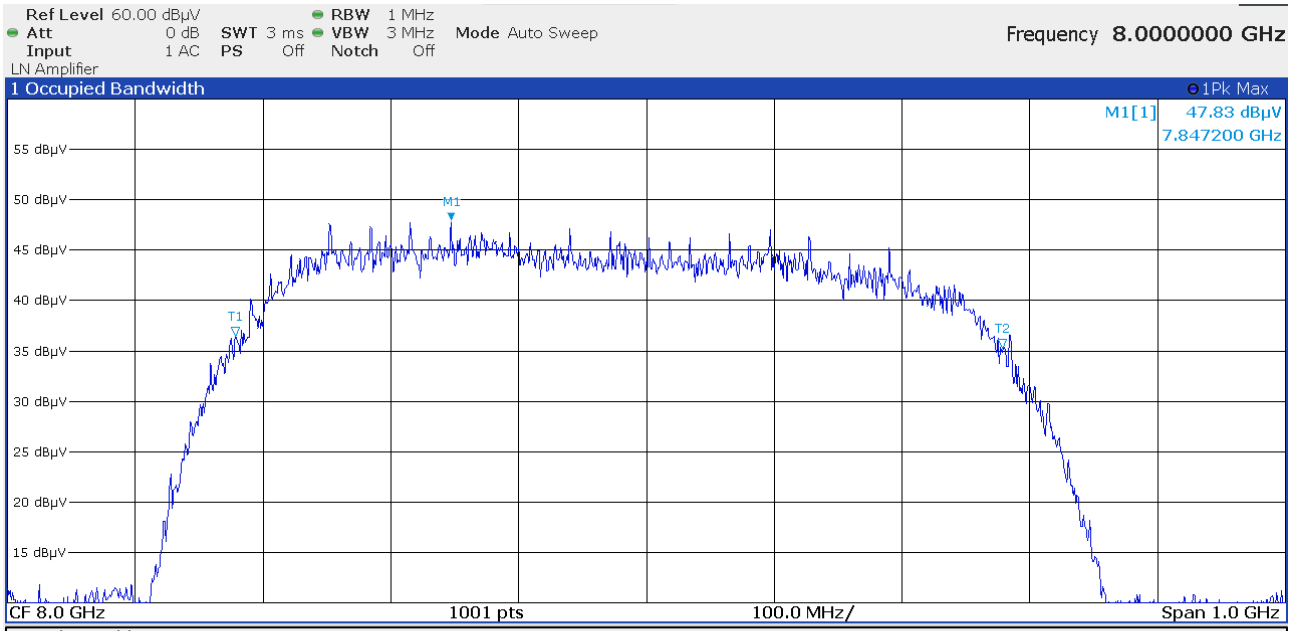



2 Marker Table

| Type | Ref | Trc | X-Value | Y-Value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | **7.4411 GHz** | **50.34 dBµV** | Occ Bw | **595.014384869 MHz** |
| T1 | | 1 | 7.182323 GHz | 37.10 dBµV | Occ Bw Centroid | 7.479830324 GHz |
| T2 | | 1 | 7.777338 GHz | 36.83 dBµV | Occ Bw Freq Offset | -20.169675541 MHz |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

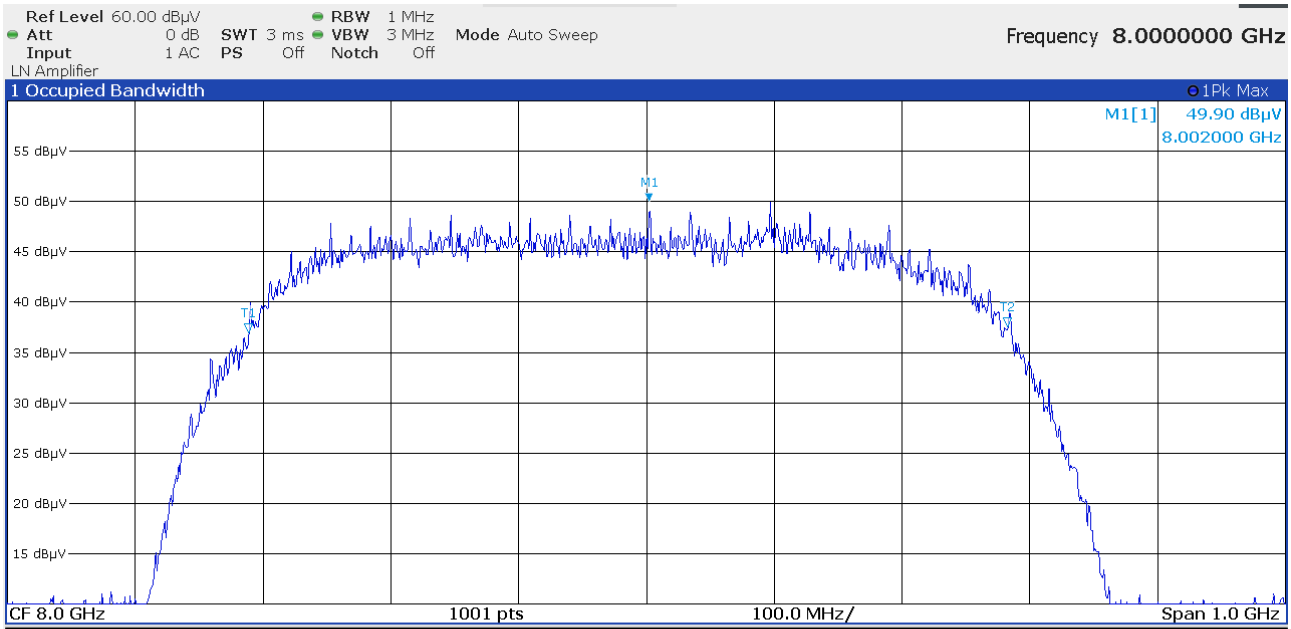
## Channel 9 antenna 1




2 Marker Table

| Type | Ref | Trc | X-Value | Y-Value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | **7.8472 GHz** | **47.83 dBµV** | Occ Bw | **599.724960162 MHz** |
| T1 | | 1 | 7.678649 GHz | 36.46 dBµV | Occ Bw Centroid | 7.978511572 GHz |
| T2 | | 1 | 8.278374 GHz | 35.21 dBµV | Occ Bw Freq Offset | -21.488427871 MHz |

## Channel 9 antenna 2




2 Marker Table

| Type | Ref | Trc | X-Value | Y-Value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | **8.002 GHz** | **49.90 dBµV** | Occ Bw | **593.325424875 MHz** |
| T1 | | 1 | 7.68891 GHz | 36.98 dBµV | Occ Bw Centroid | 7.985573128 GHz |
| T2 | | 1 | 8.282236 GHz | 37.50 dBµV | Occ Bw Freq Offset | -14.426871897 MHz |

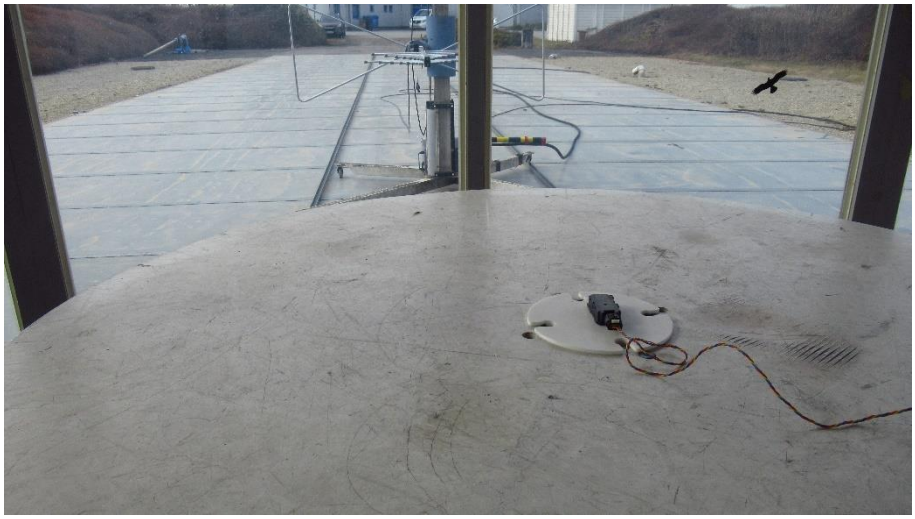
## 5.3 Radiated Emissions 9 kHz to 40 GHz

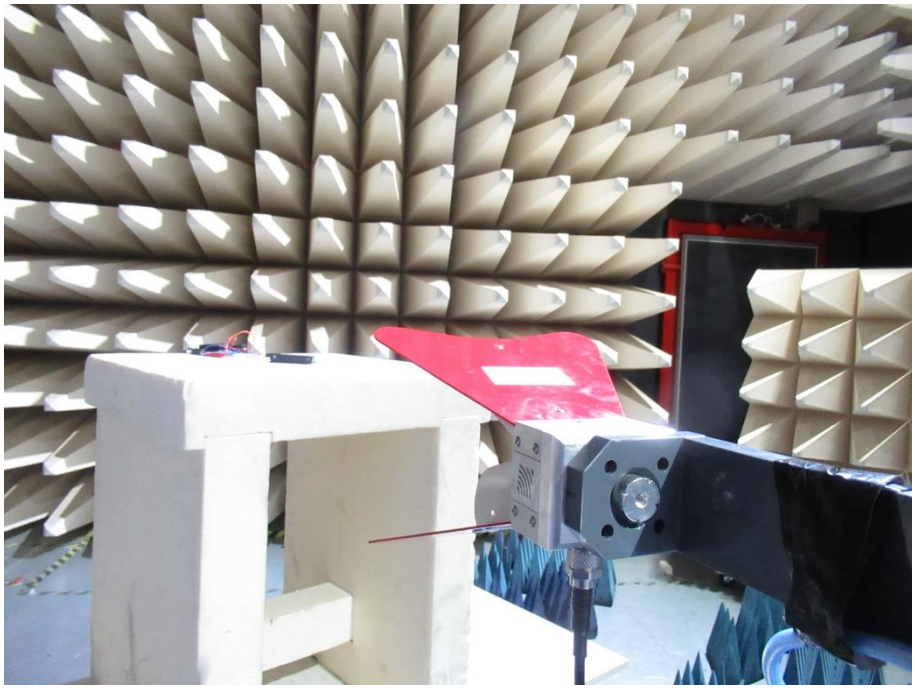
For test instruments and accessories used see section 6 Part **SER 2** and **SER 3**.

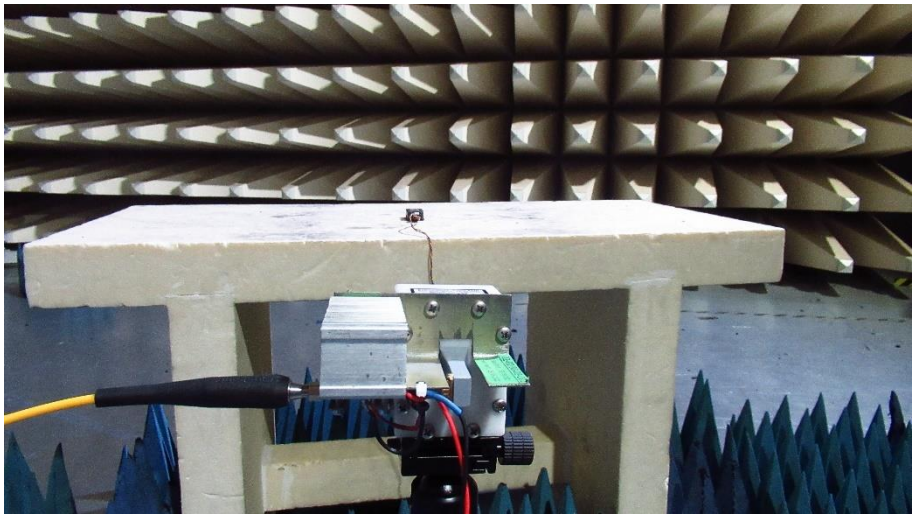
### 5.3.1 Description of the test location

Test location: OATS 1
Test location: Anechoic chamber 1

### 5.3.2 Photo documentation of the test set-up







### 5.3.3 Applicable standard

According to FCC Part 15, Section 15.519(c):
The radiated emissions at or below 960 MHz from a device operating under the provisions of this section shall not exceed the emission levels in §15.209. The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz.

According to FCC Part 15, Section 15.521(c):
Emissions from digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in § 15.209, rather than the limits specified in this subpart, provided it can be clearly demonstrated that those emissions from the UWB device are due solely to emissions from digital circuitry contained within the transmitter and that the emissions are not intended to be radiated from the transmitter's antenna. Emissions from associated digital devices, as defined in § 15.3(k), e.g., emissions from digital circuitry used to control additional functions or capabilities other than the UWB transmission, are subject to the limits contained in Subpart B of this part.

### 5.3.4 Analyser settings

| | | | | |
|---|---|---|---|---|
| 9 kHz – 150 kHz | RBW: 200 Hz | | | |
| 150 kHz - 30 MHz | RBW: 9 kHz | | | |
| 30 MHz – 960 MHz | RBW: 120 kHz | Detector: QP | | |
| 960 MHz – 40 GHz | RBW: 1 MHz | VBW: 3 MHz | Detector: RMS | Sweeptime: 1ms per MHz |

### 5.3.5 Test result

#### 5.3.5.1 Measurement 9 kHz to 30 MHz

Note: Pre-measurements have shown, there are no detectable emissions in this frequency range.

#### 5.3.5.2 Measurement 30 MHz to 960 MHz

| Frequency (MHz) | Reading Vert. (dBµV) | Reading Hor. (dBµV) | Correct. Vert. (dB) | Correct. Hor. (dB) | Level Vert. (dBµV/m) | Level Hor. (dBµV/m) | Limit (dBµV/m) | Dlimit (dB) |
|---|---|---|---|---|---|---|---|---|
| 49.25 | -1.4 | -1.6 | 17.5 | 18.8 | 16.1 | 17.2 | 40.0 | -22.8 |
| 140.00 | 1.2 | 1.8 | 19.3 | 18.4 | 20.5 | 20.2 | 43.5 | -23.0 |
| 236.97 | 1.8 | -0.7 | 18.3 | 18.1 | 20.1 | 17.4 | 46.0 | -25.9 |
| 341.00 | -1.7 | -1.9 | 21.4 | 21.8 | 19.7 | 19.9 | 46.0 | -26.1 |
| 462.21 | -0.4 | -2.1 | 24.7 | 25.1 | 24.3 | 23.0 | 46.0 | -21.7 |
| 573.65 | -4.2 | -4.3 | 27.4 | 27.8 | 23.2 | 23.5 | 46.0 | -22.5 |
| 720.00 | -3.0 | -3.1 | 29.9 | 30.4 | 26.9 | 27.3 | 46.0 | -18.7 |

Note: Measurements were performed in the whole frequency range from 30 MHz to 1000 MHz. No significant emissions above the noise leve could be detected.

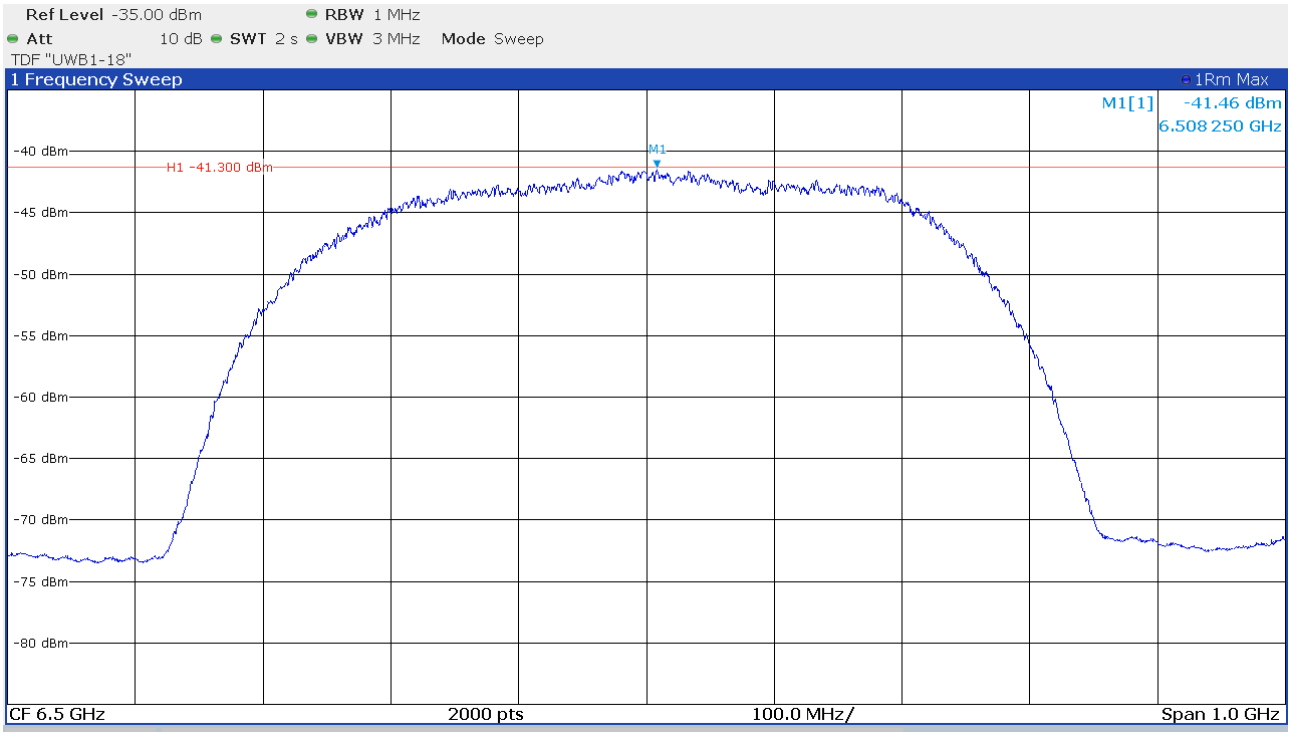
#### 5.3.5.3 Measurement 960 MHz to 40 GHz

According to § 15.521(c), missions from digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in § 15.209. The average limit is given by 54dBµV/m at 3 meter distance, which corresponds to an EIRP of -41.3 dBm according to ANSI C63.10 2013 clause 10.3.9.
As proven in the following measurements, no emissions outside the UWB transmission can be detected in in the frequency range 960 MHz and 40 GHz and the highest emissions occurs by the UWB emission itself, which lies under the UWB limit of -41.3 dBm. Therefor, the requirements according to § 15.209 can be regarded as fulfilled.

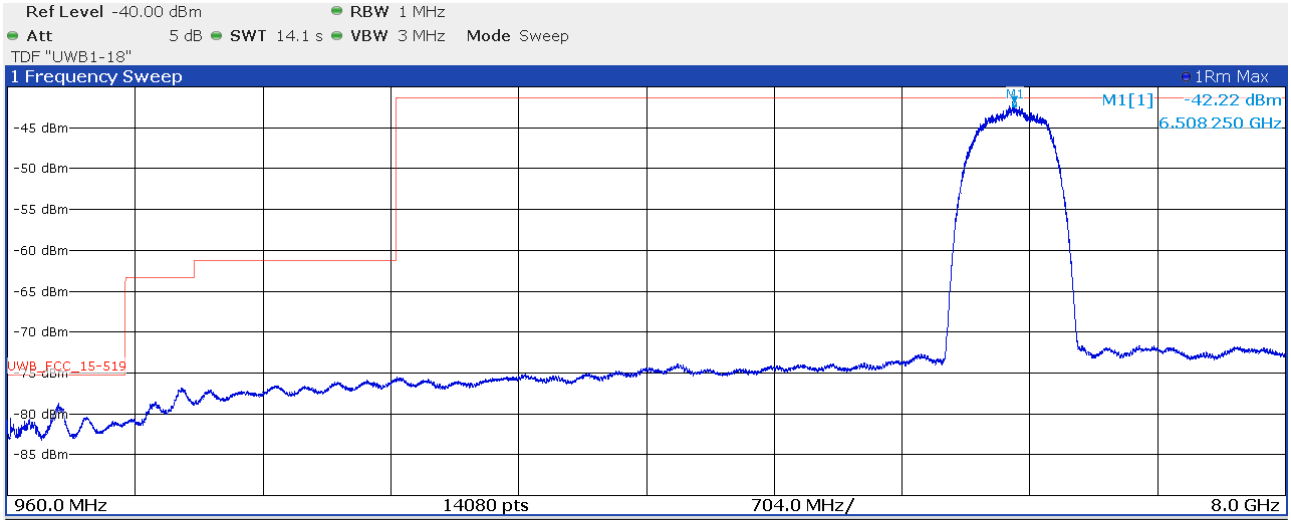
# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

## Channel 5 antenna 1

Mean Power




960 MHz to 40 GHz



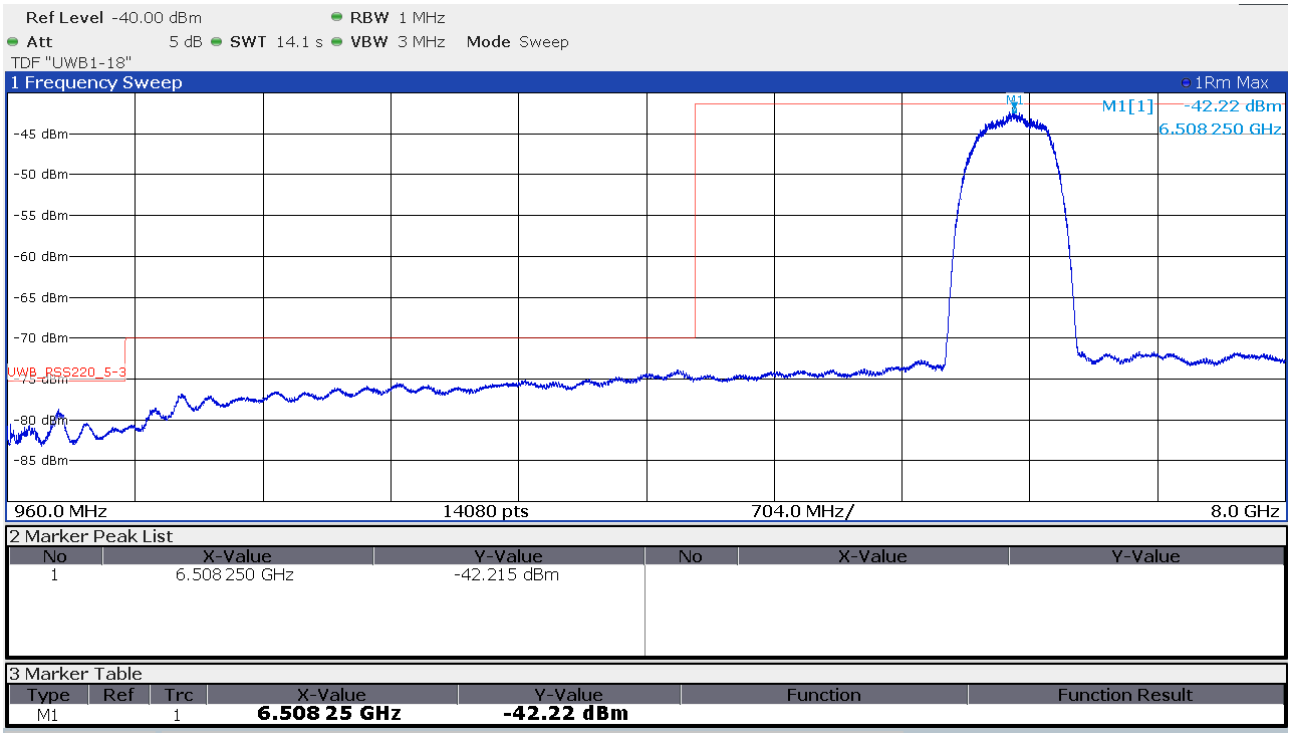

2 Marker Peak List

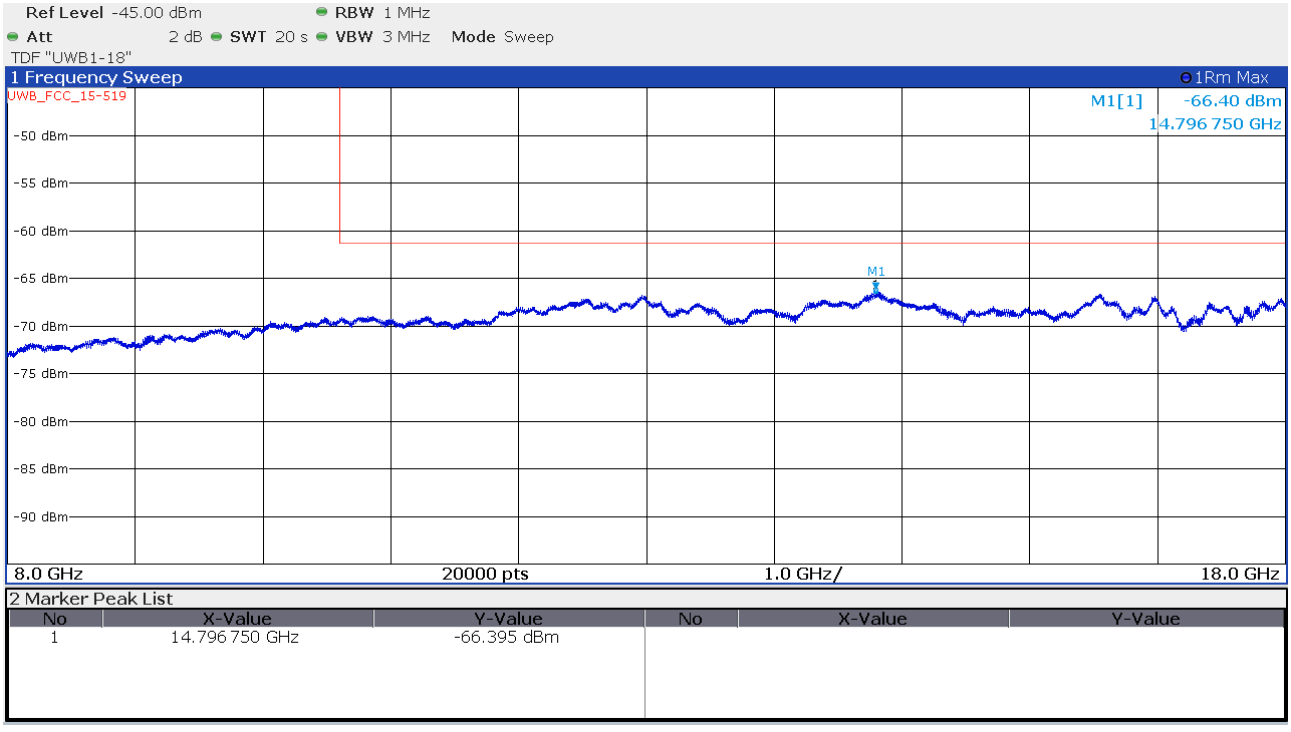
| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 6.508 250 GHz | -42.215 dBm | | | |

3 Marker Table

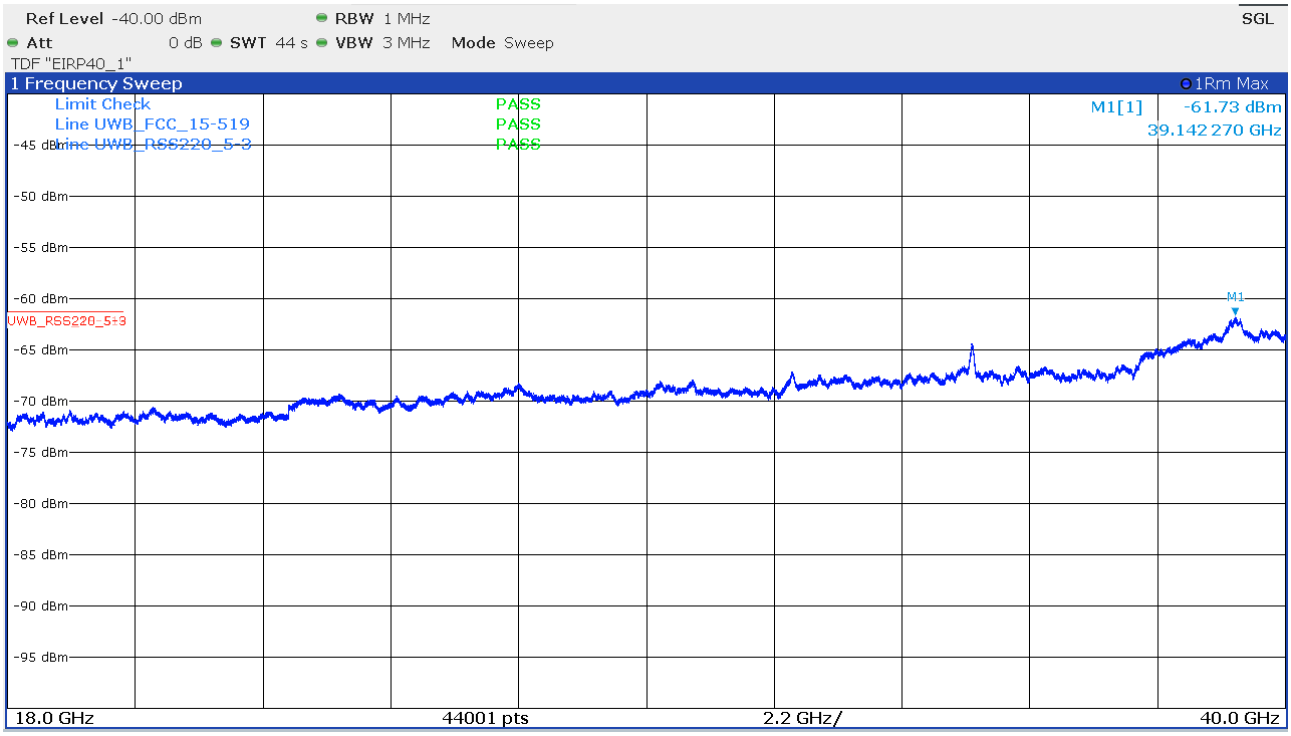
| Type | Ref | Trc | X-Value | Y-Value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | **6.508 25 GHz** | **-42.22 dBm** | | |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23



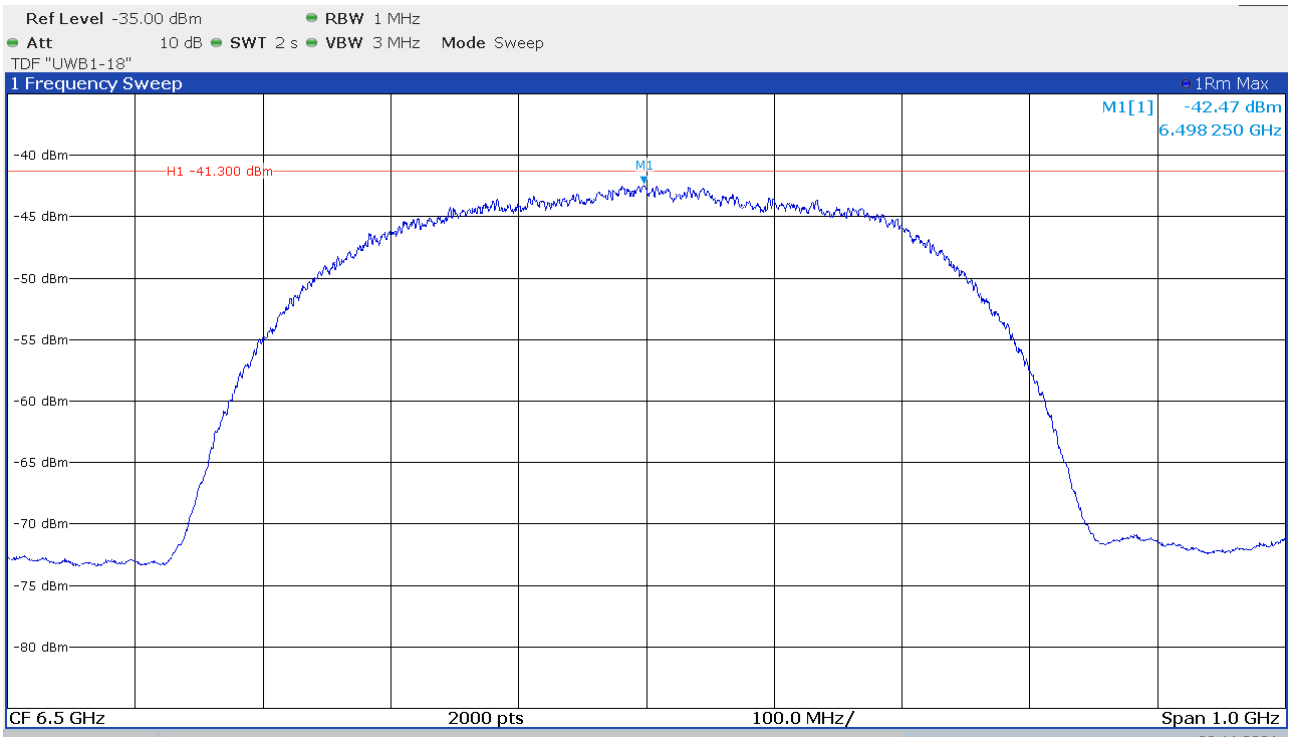



# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23



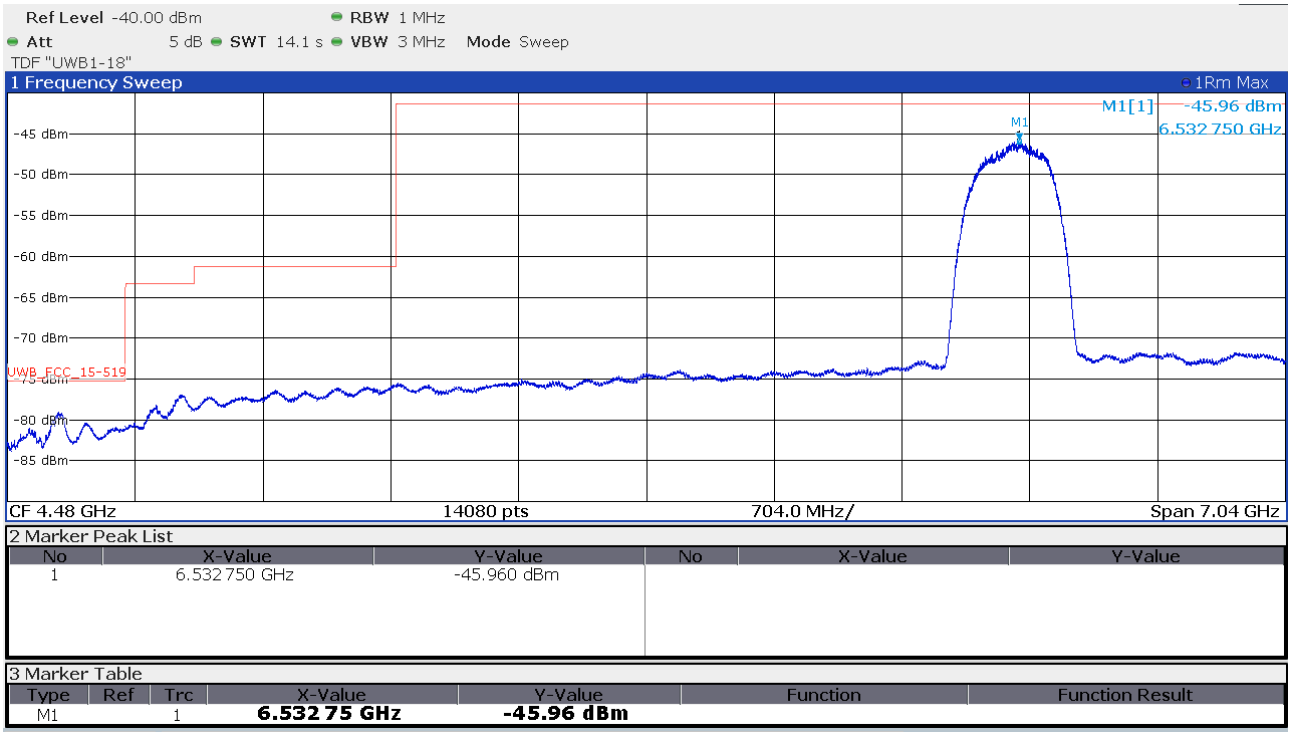

## Channel 5 antenna 2

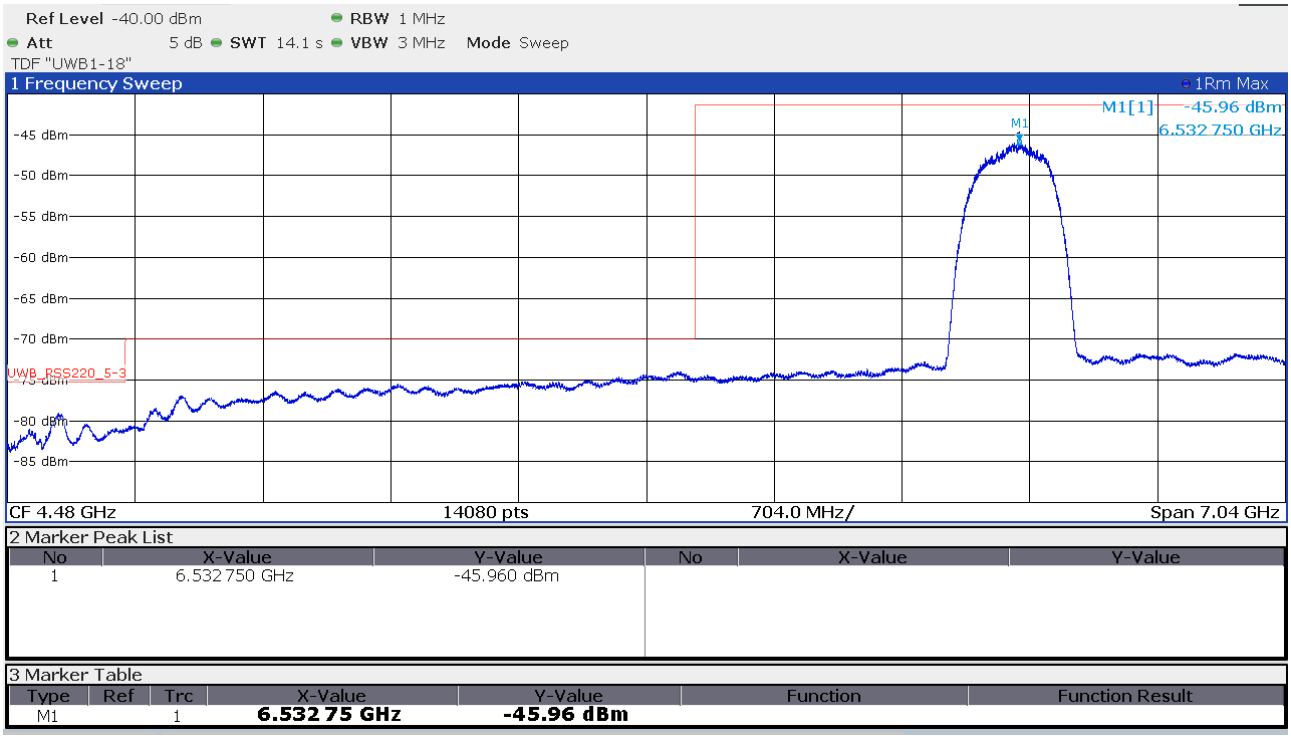
Mean Power



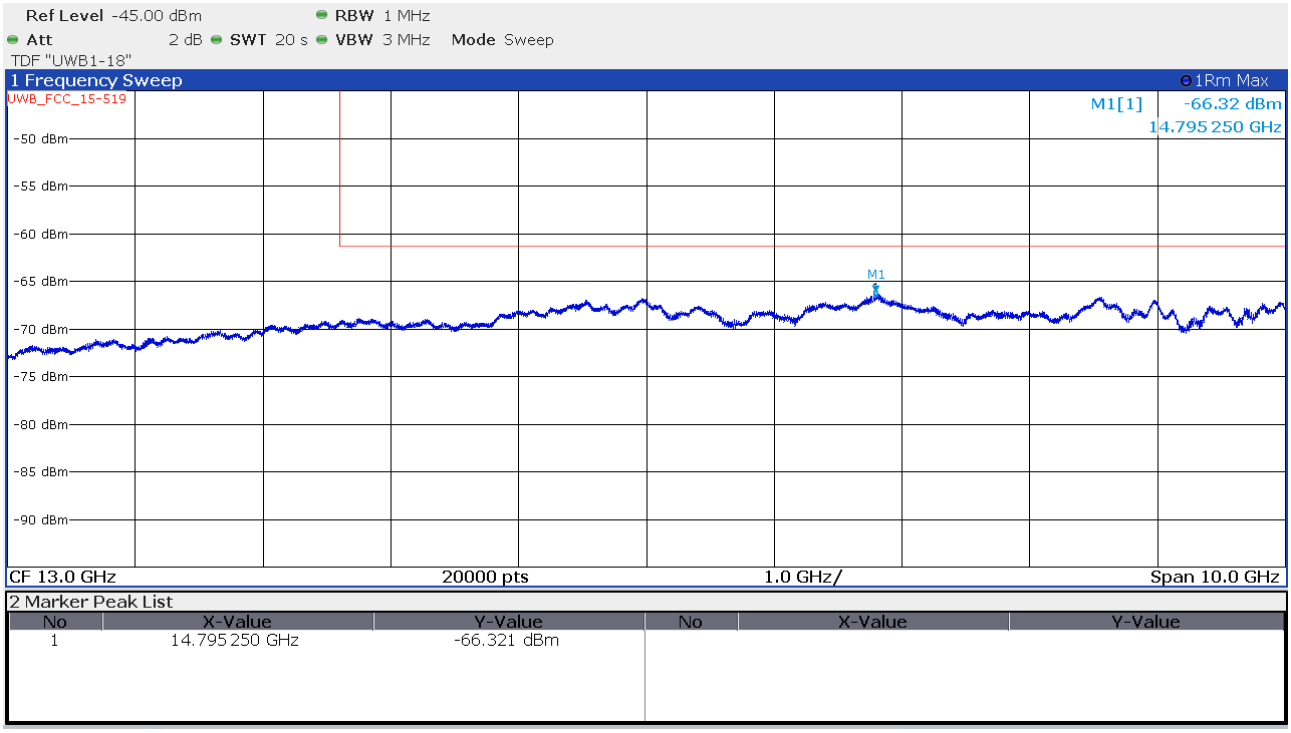
# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

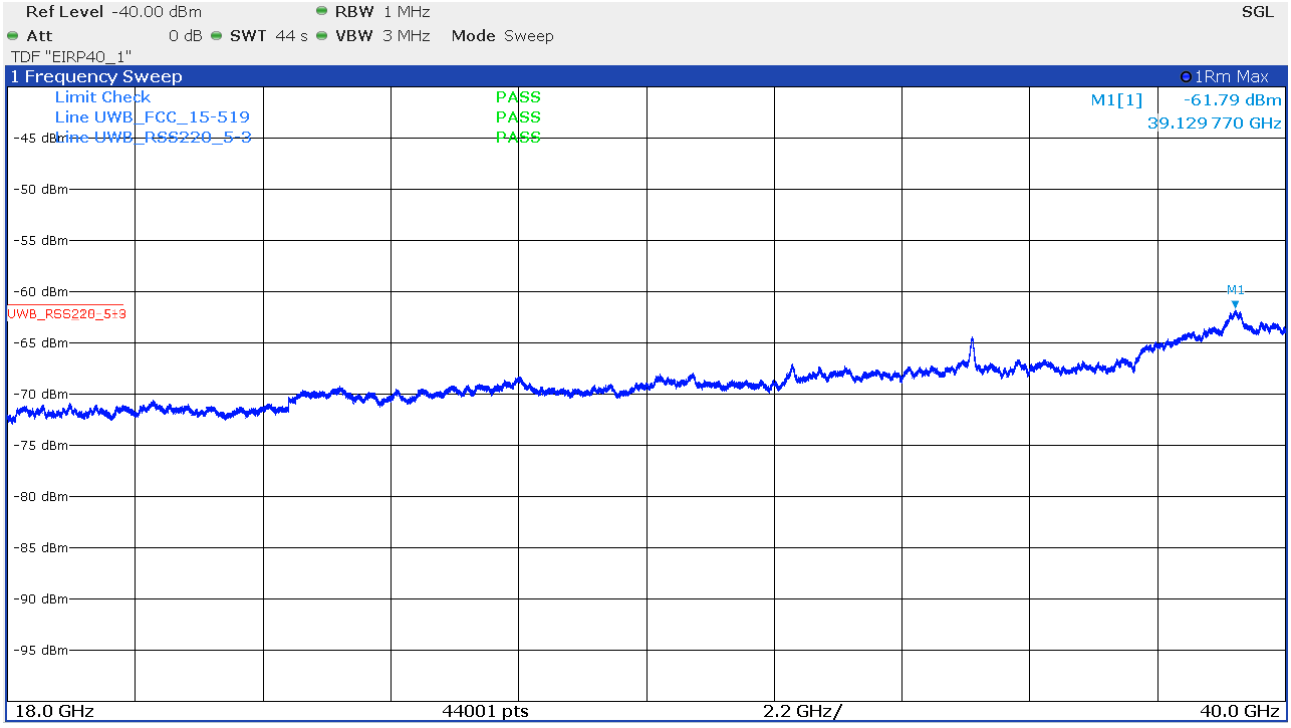
960 MHz to 40 GHz



# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

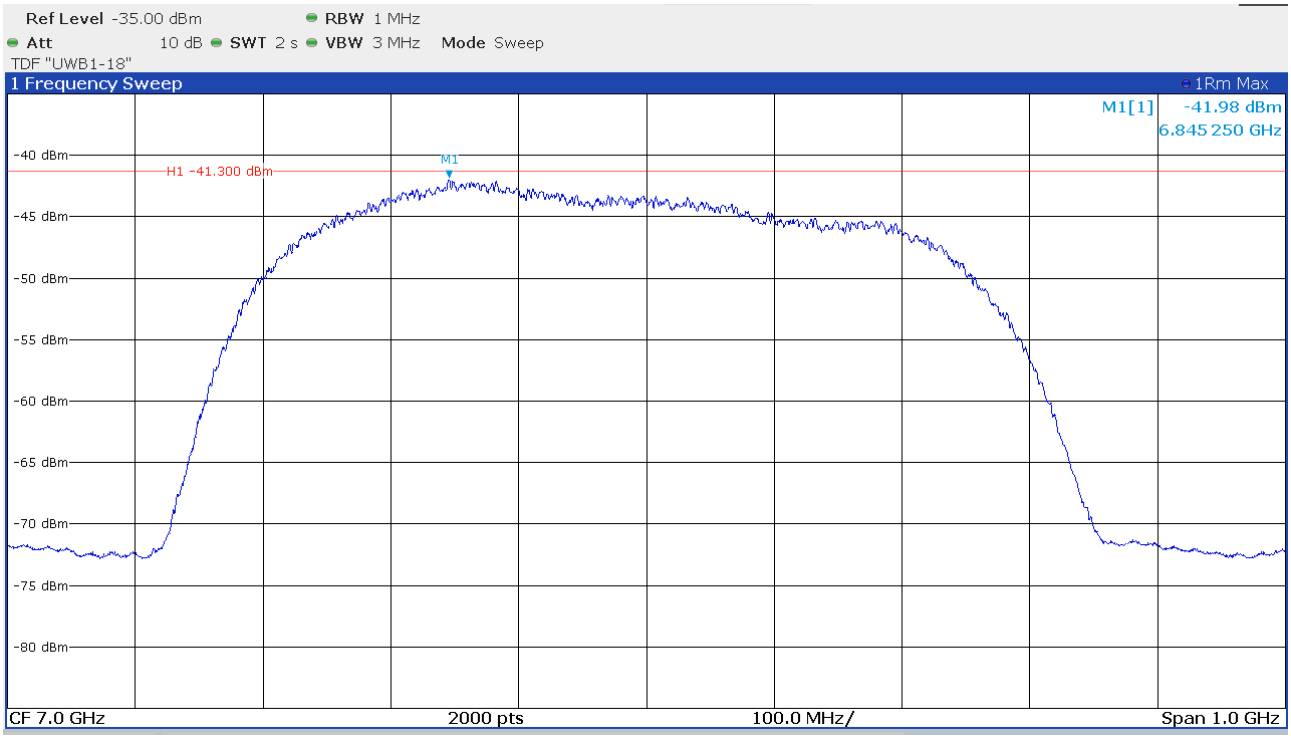


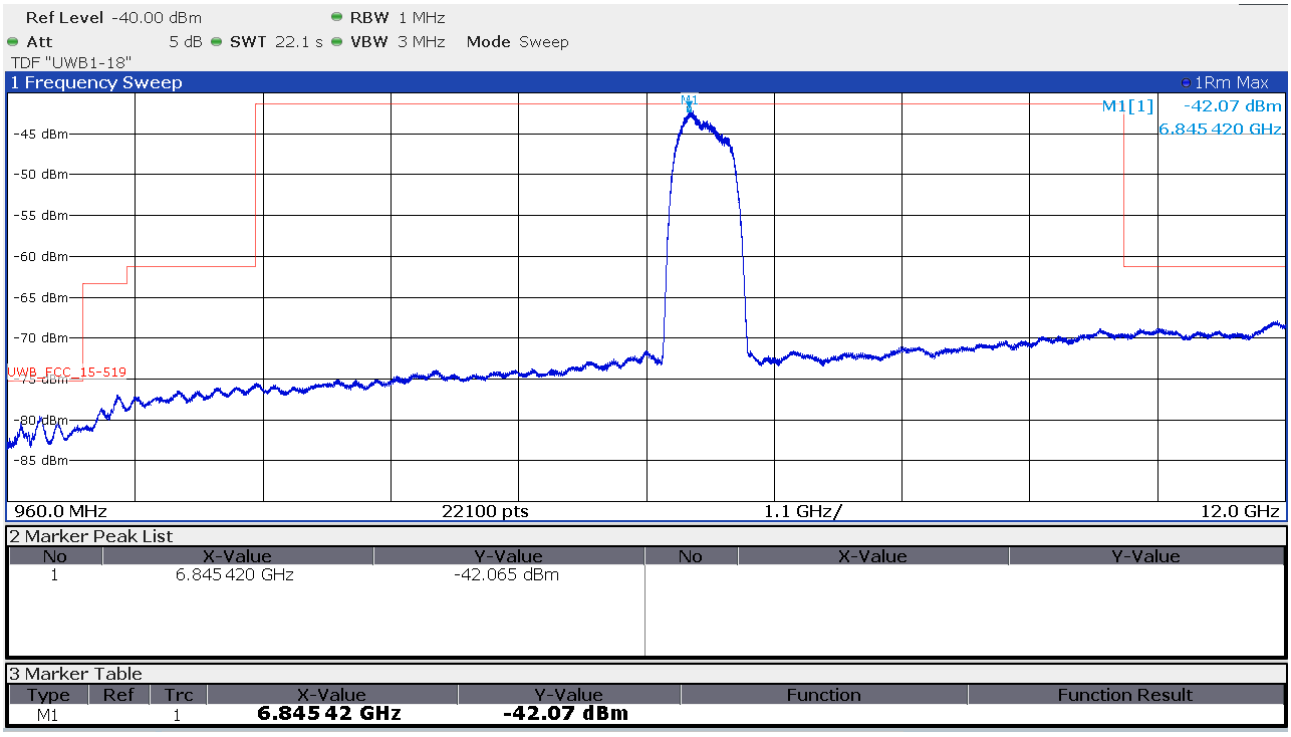
# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

## Channel 6 antenna 1

Mean Power




960 MHz to 40 GHz



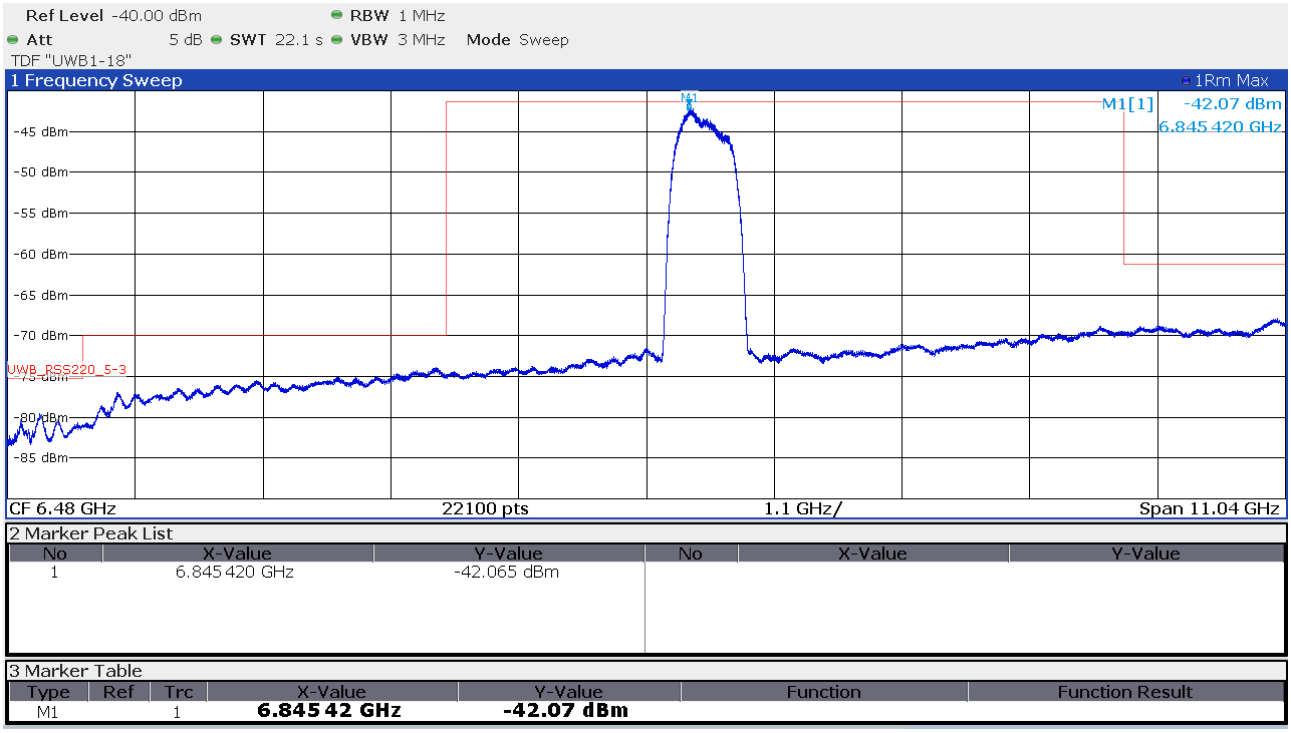

2 Marker Peak List

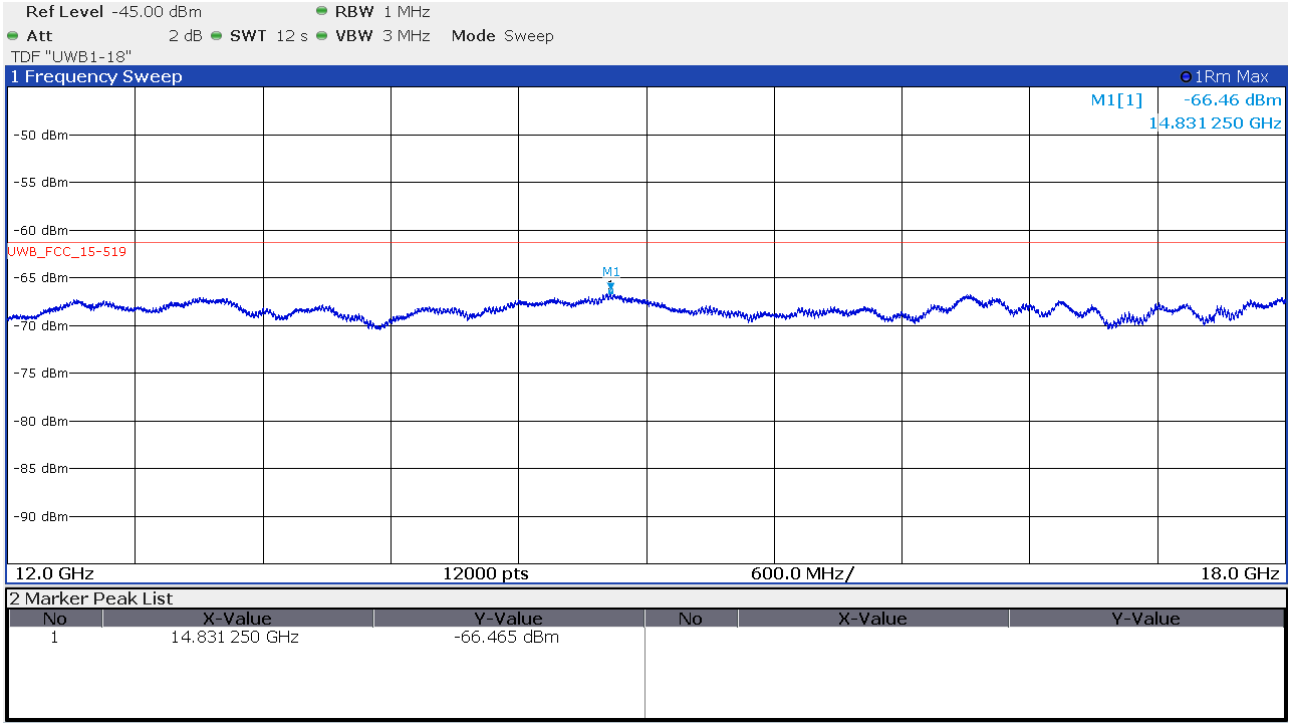
| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 6.845 420 GHz | -42.065 dBm | | | |

3 Marker Table

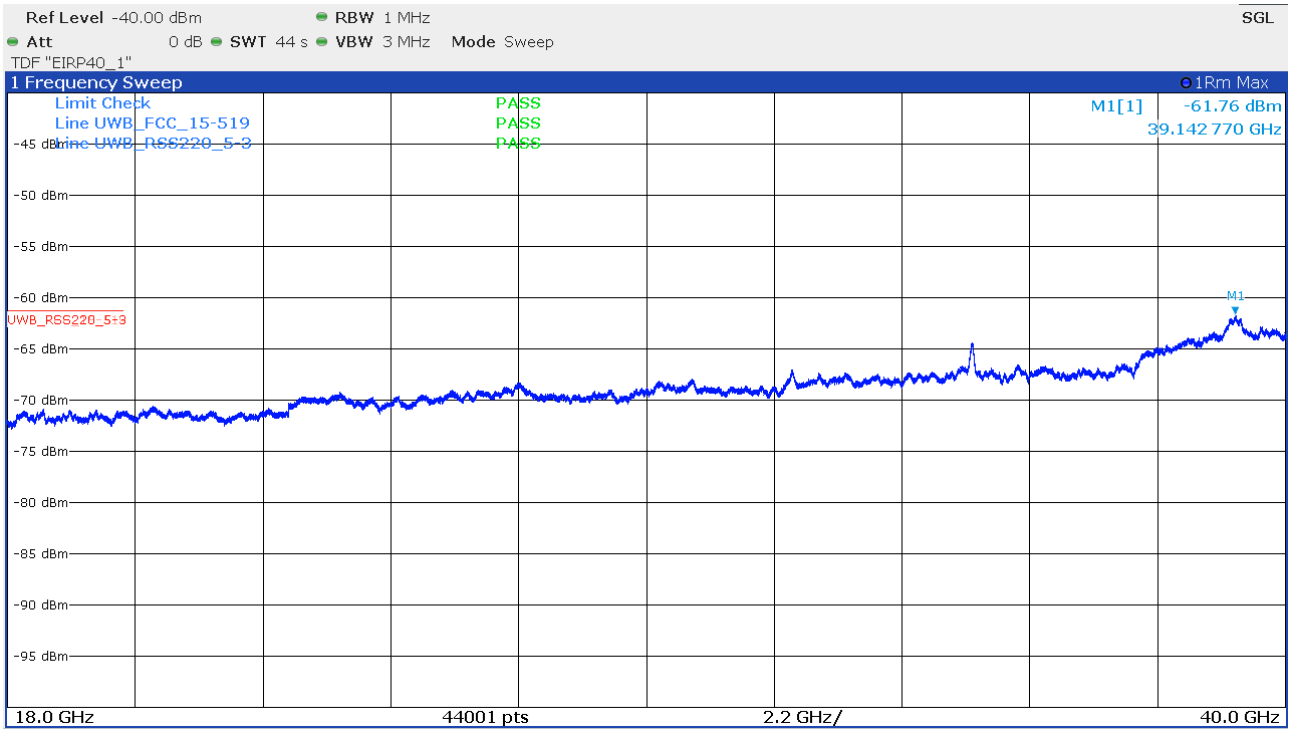
| Type | Ref | Trc | X-Value | Y-Value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | **6.845 42 GHz** | **-42.07 dBm** | | |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23



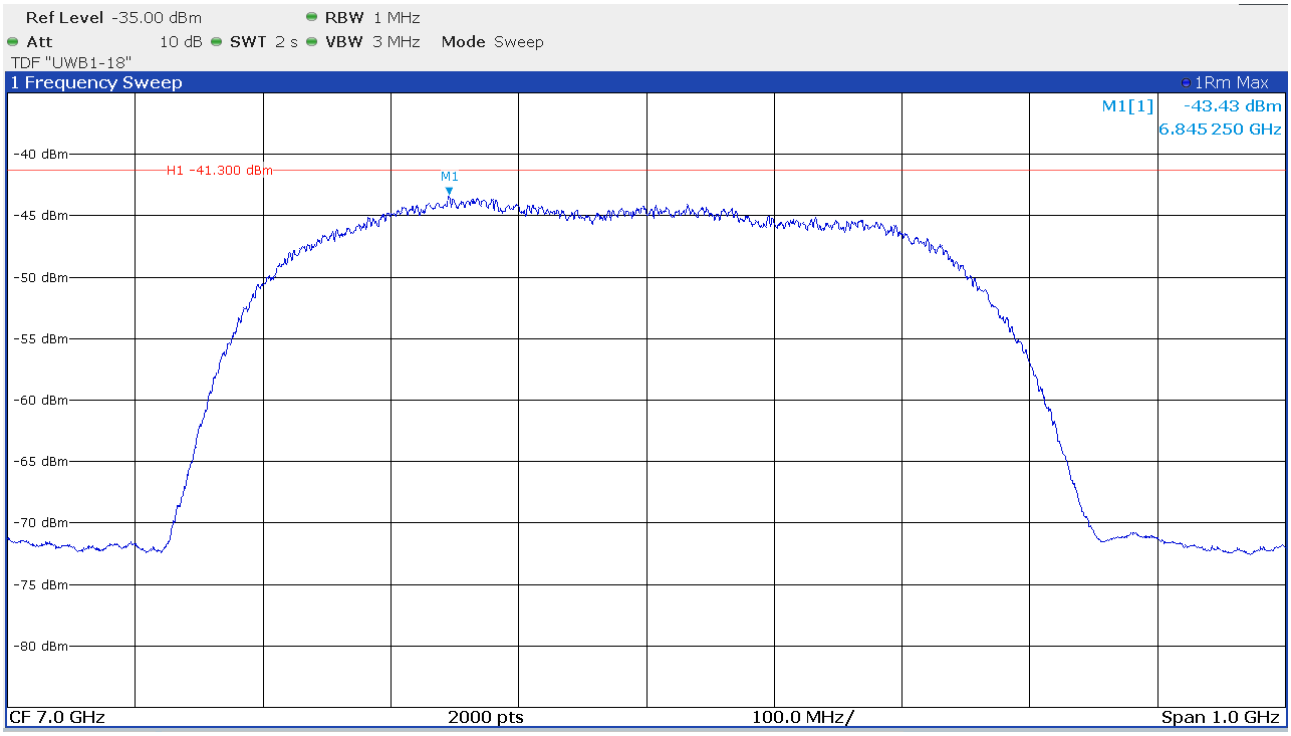



# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23



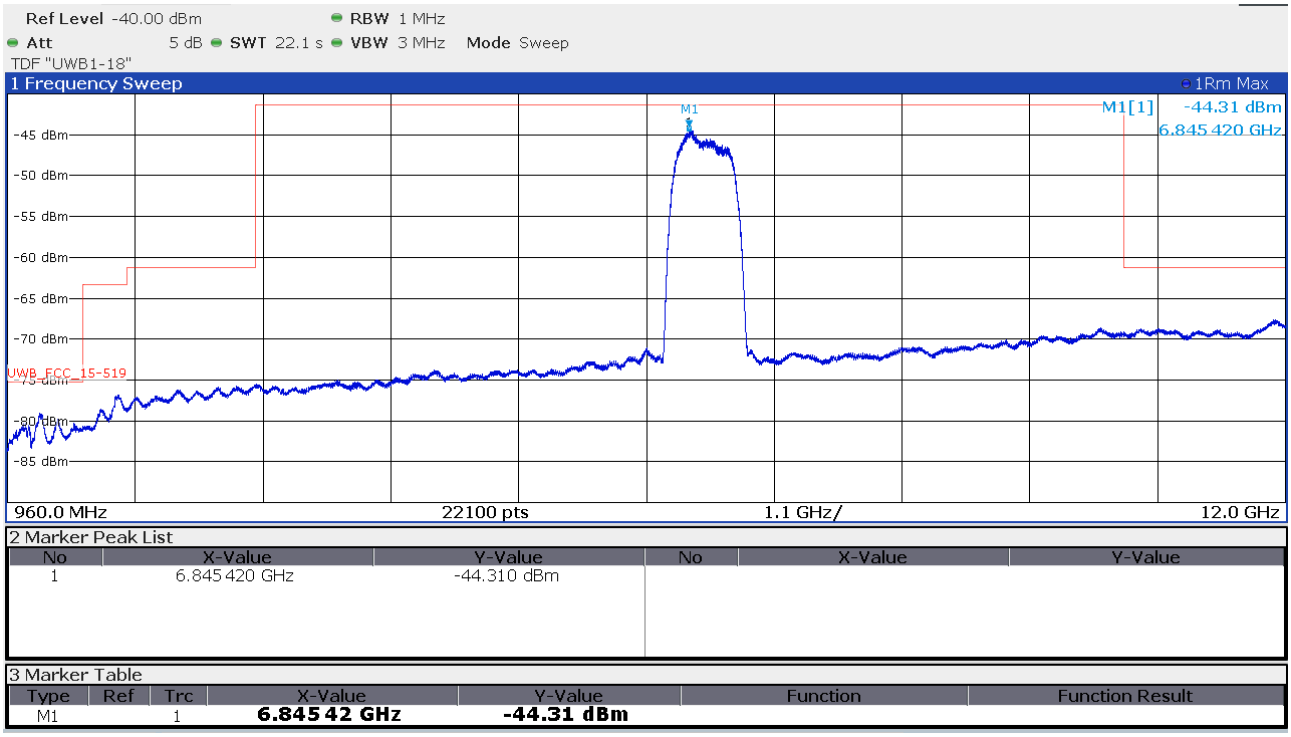

## Channel 6 antenna 2

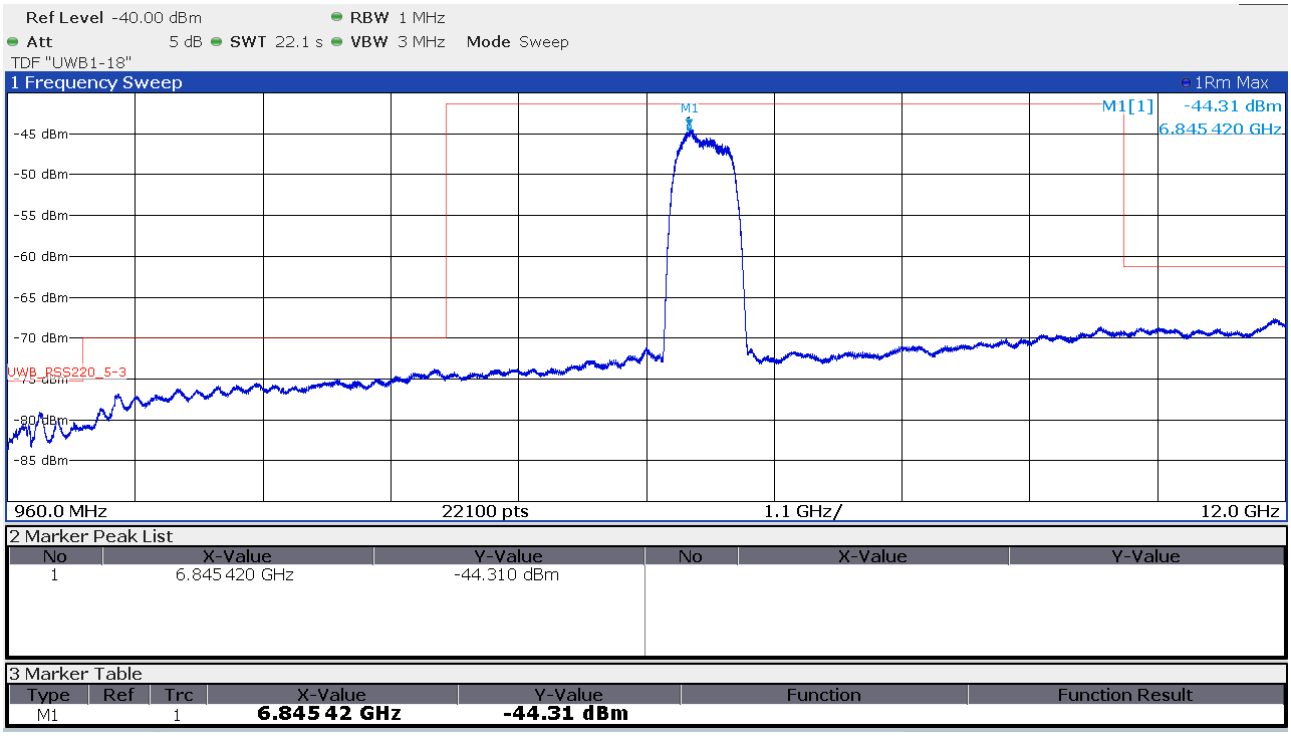
Mean Power



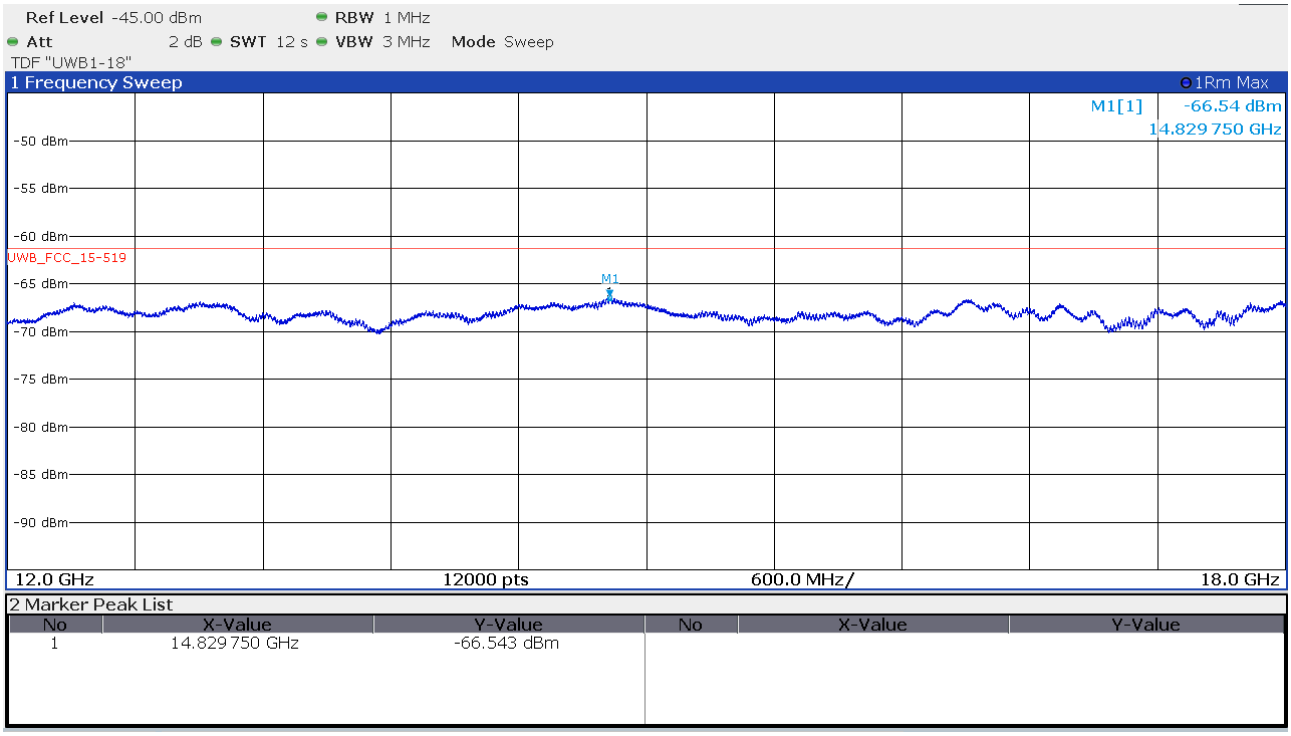
# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

960 MHz to 40 GHz



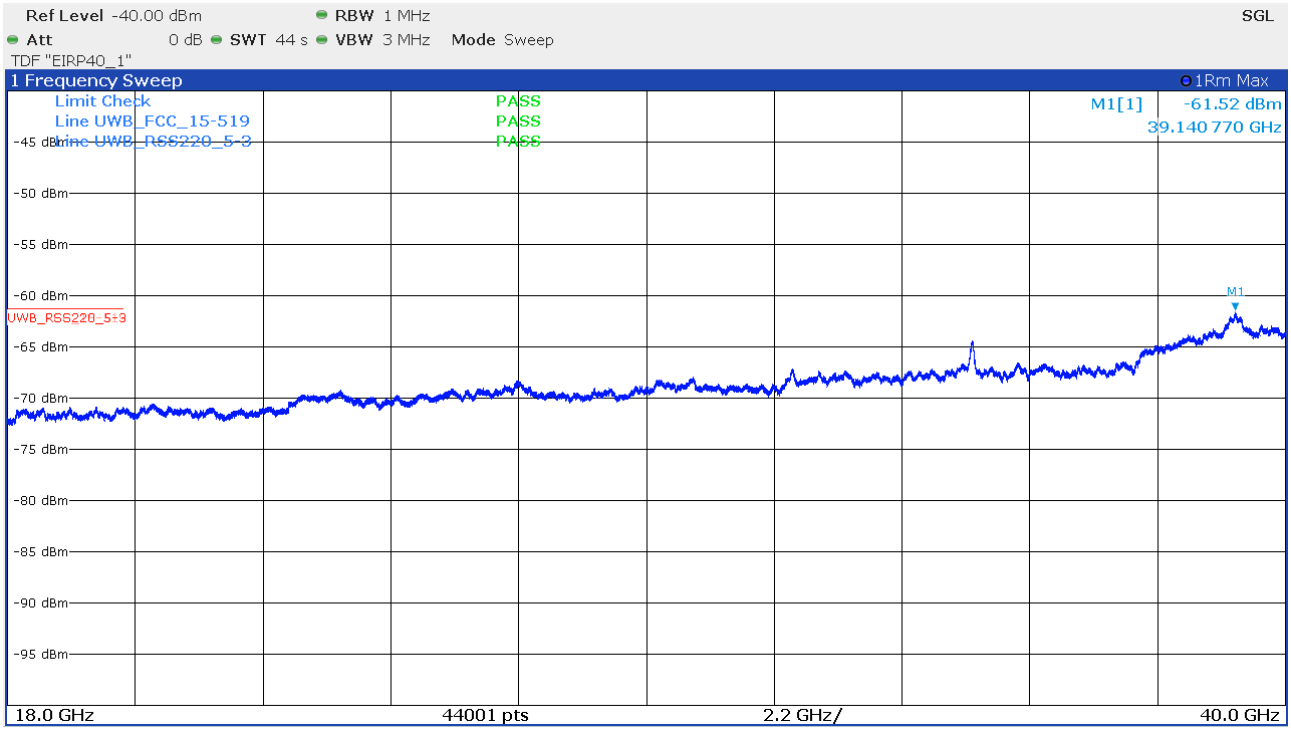



# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23




2 Marker Peak List

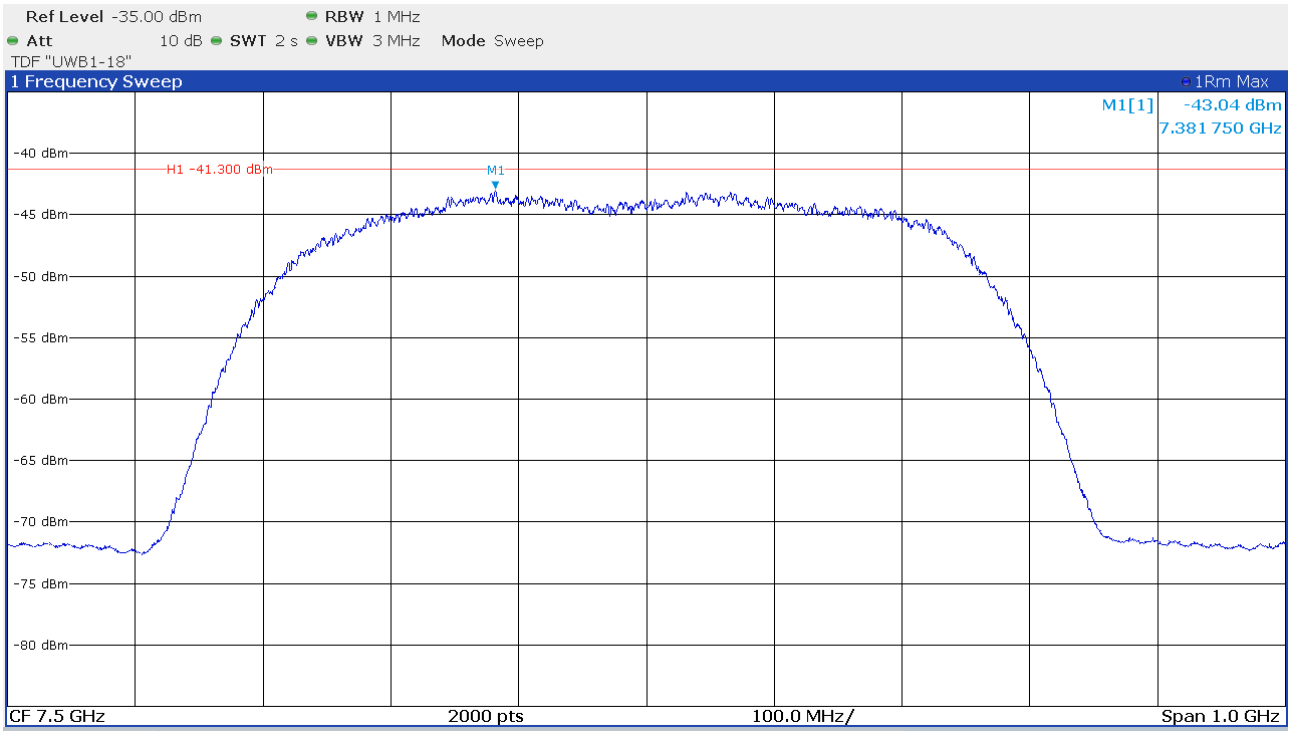
| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 14.829 750 GHz | -66.543 dBm | | | |



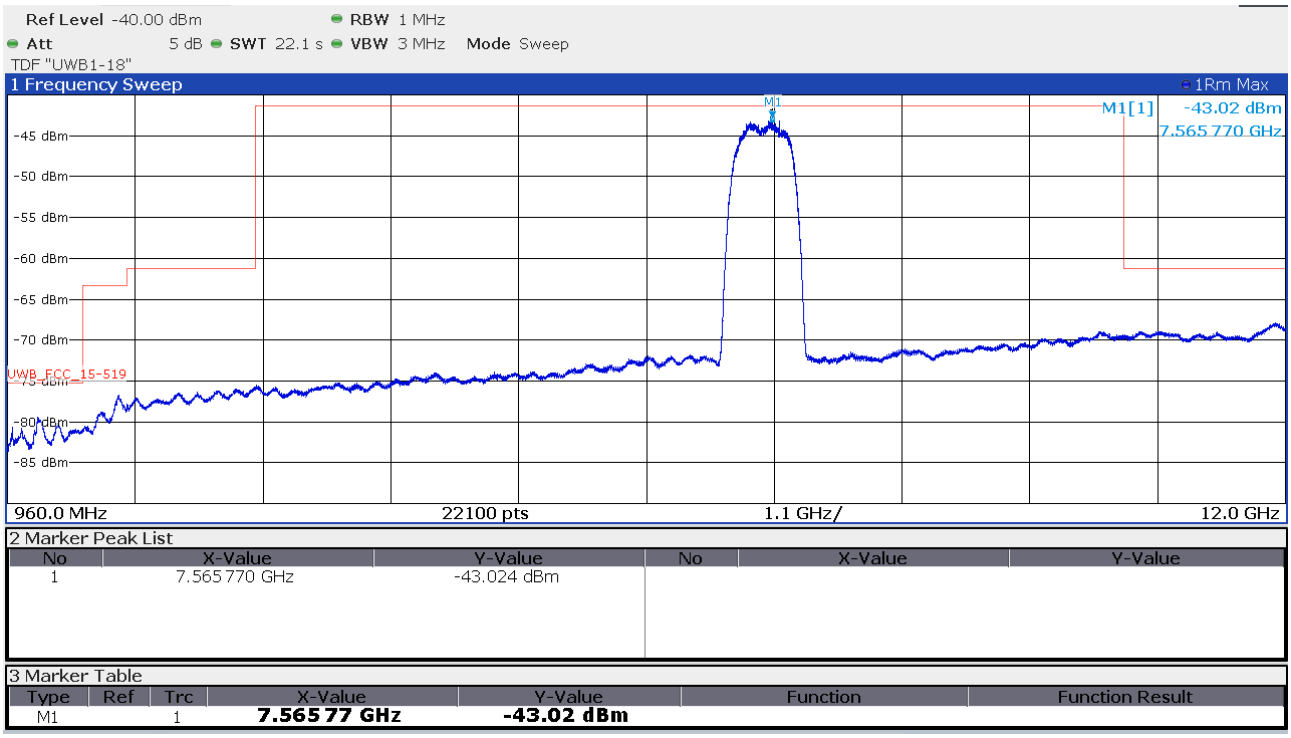
# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

## Channel 8 antenna 1

Mean Power




960 MHz to 40 GHz



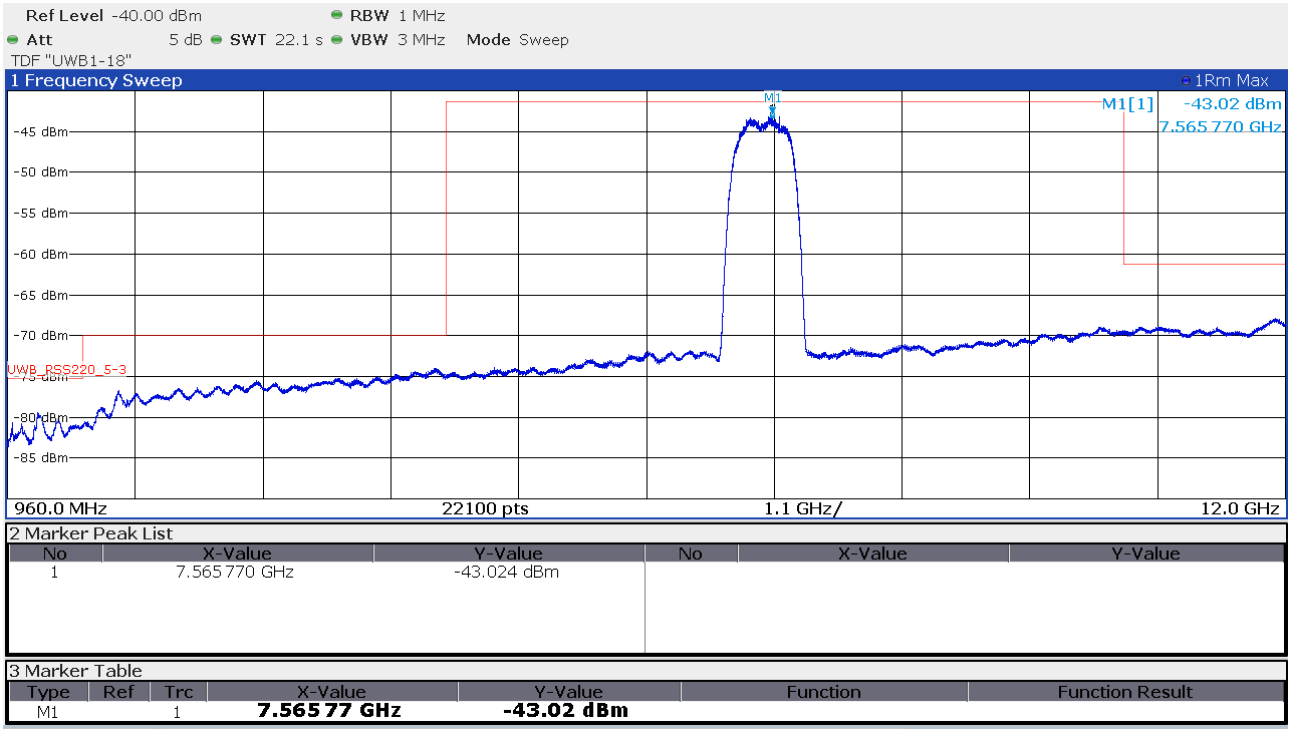

2 Marker Peak List

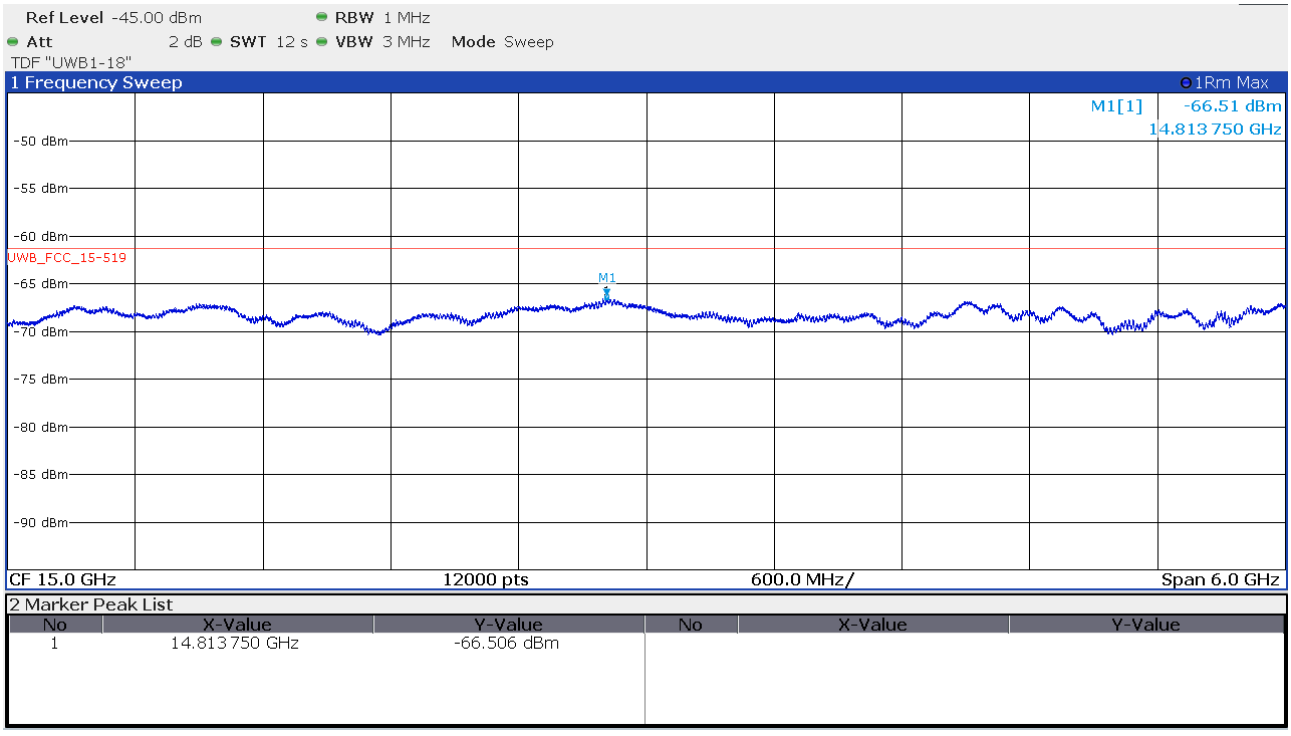
| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 7.565 770 GHz | -43.024 dBm | | | |

3 Marker Table

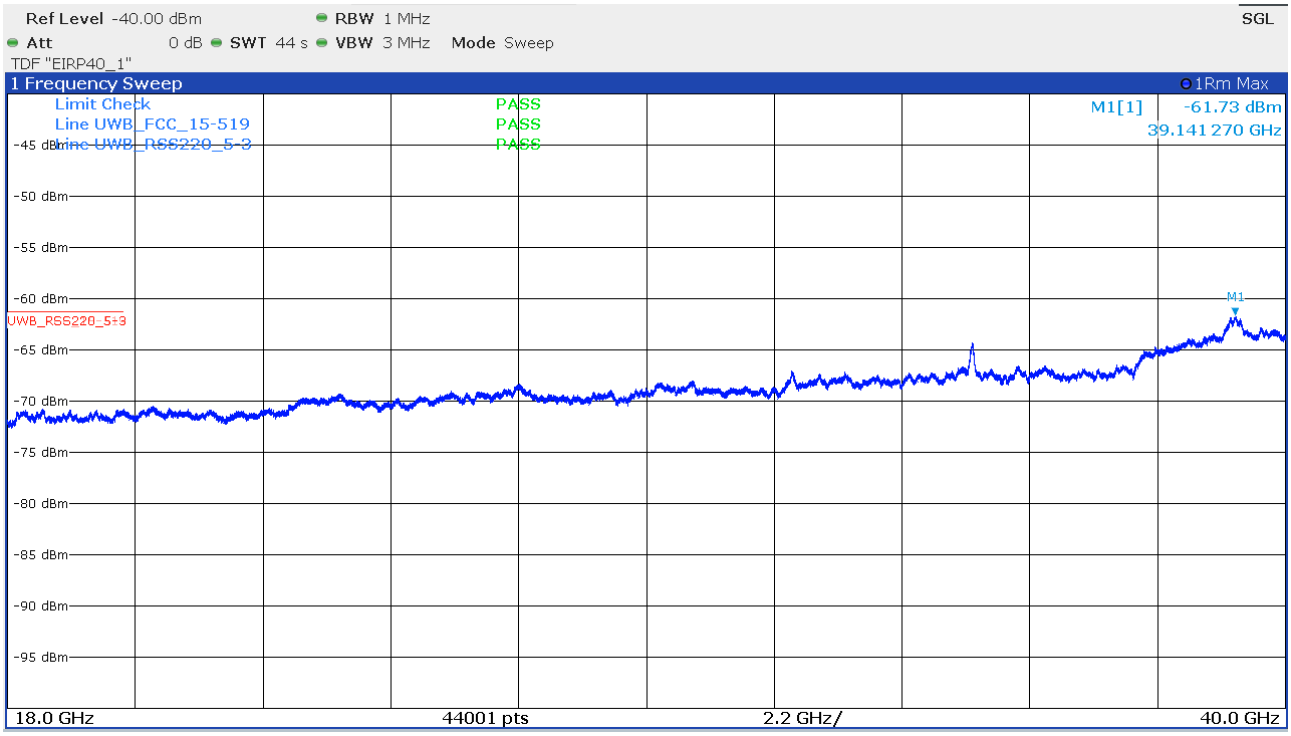
| Type | Ref | Trc | X-Value | Y-Value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | **7.565 77 GHz** | **-43.02 dBm** | | |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23



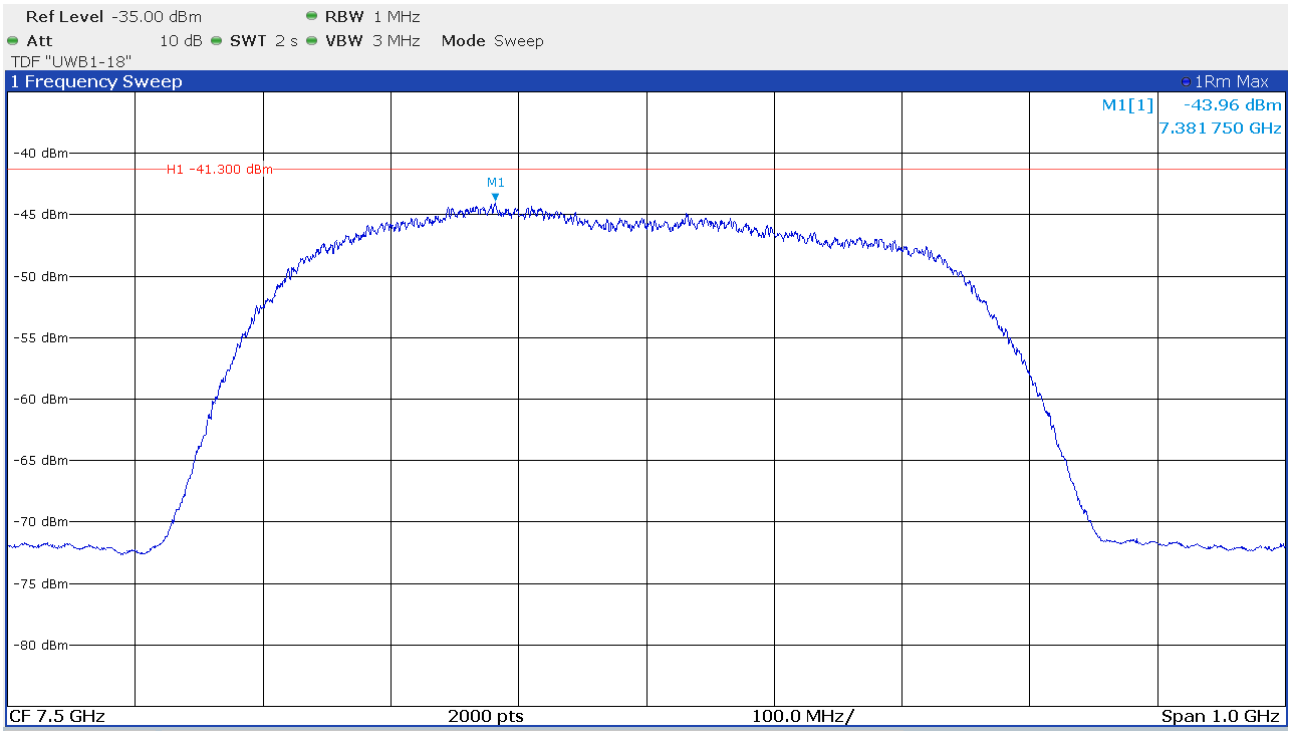



# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23



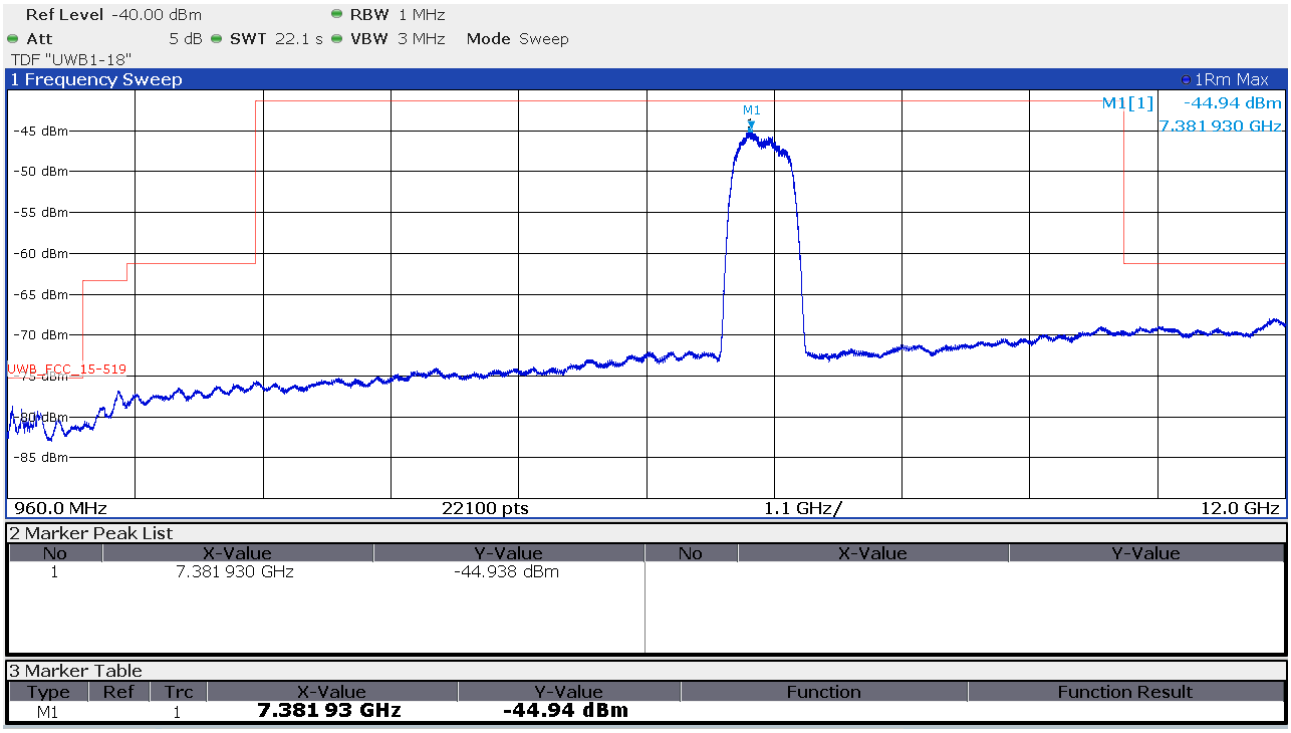

## Channel 8 antenna 2

Mean Power



# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

960 MHz to 40 GHz

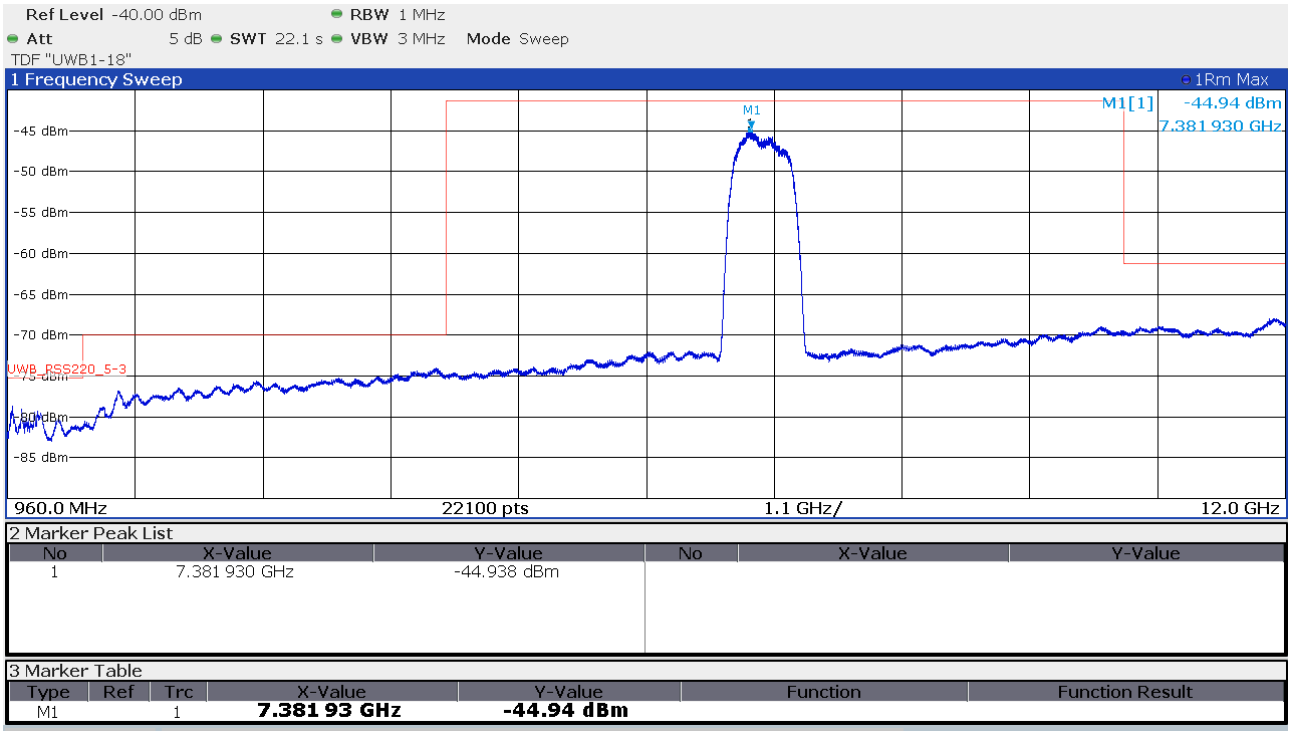



2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 7.381 930 GHz | -44.938 dBm | | | |

3 Marker Table

| Type | Ref | Trc | X-Value | Y-Value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | **7.381 93 GHz** | **-44.94 dBm** | | |



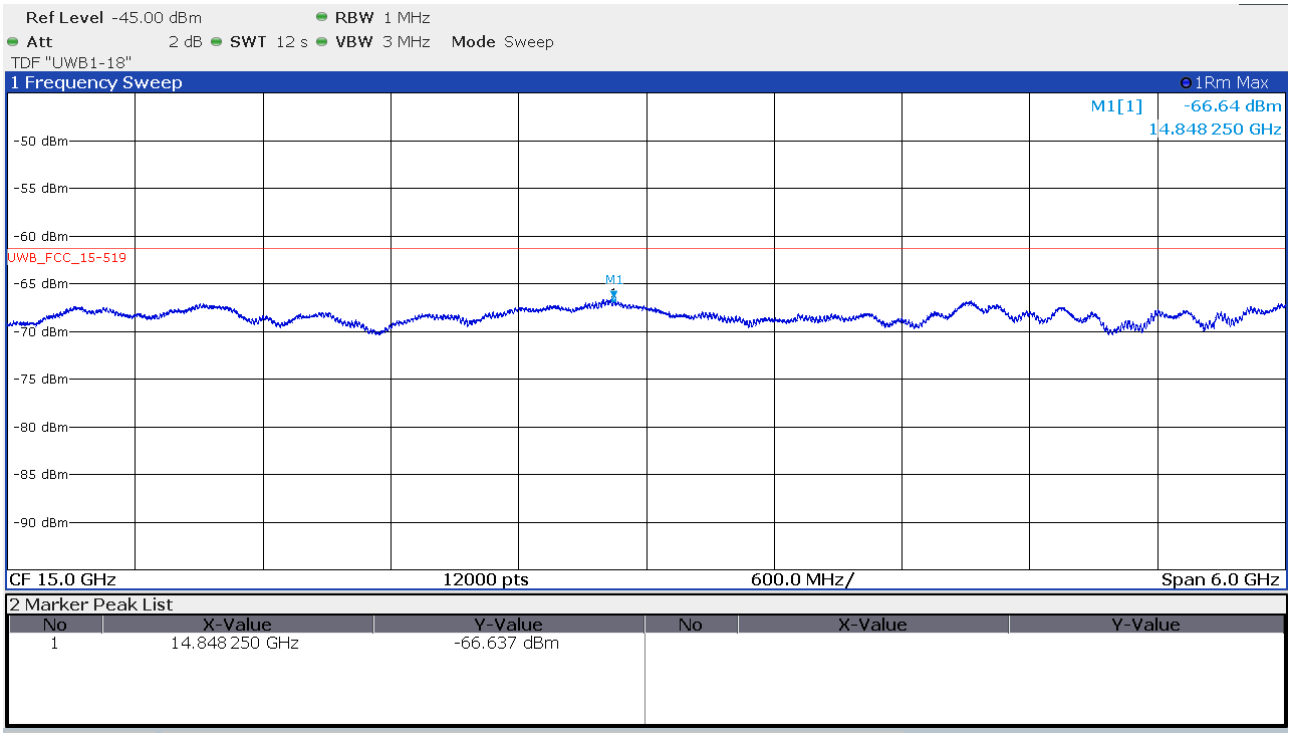

2 Marker Peak List

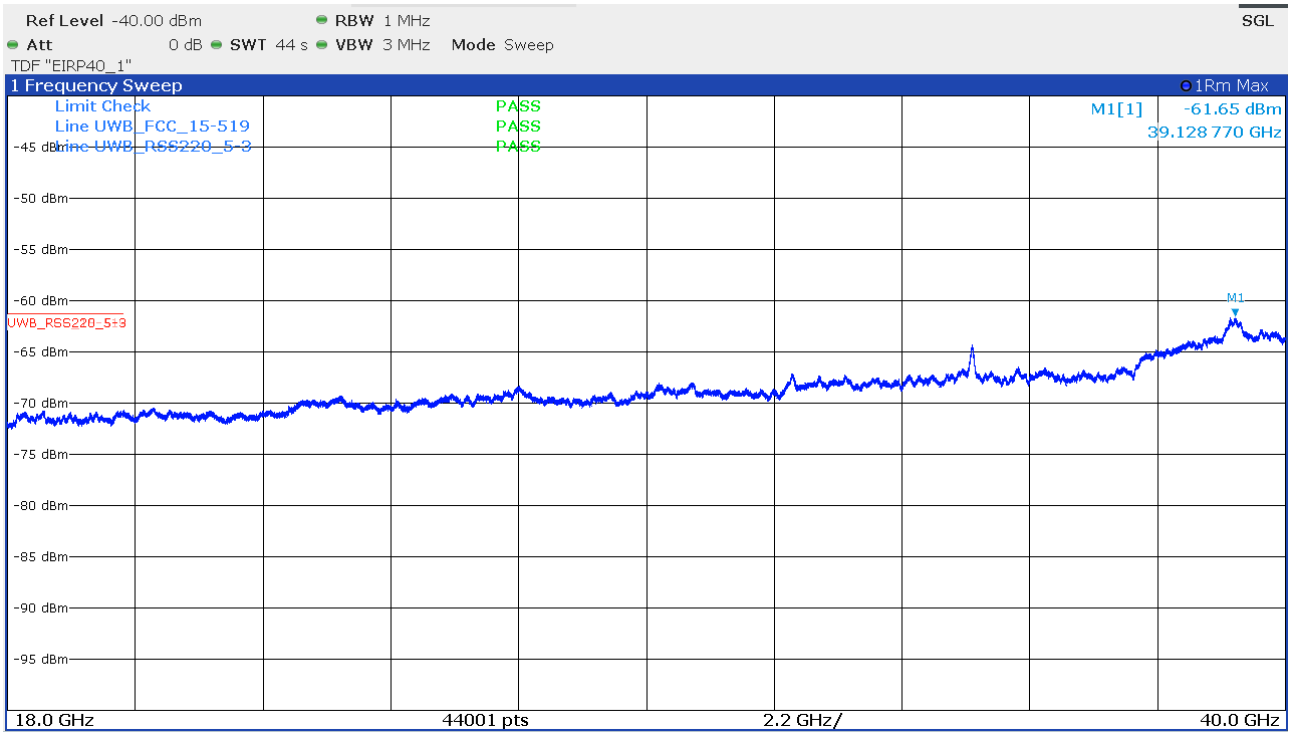
| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 7.381 930 GHz | -44.938 dBm | | | |

3 Marker Table

| Type | Ref | Trc | X-Value | Y-Value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | **7.381 93 GHz** | **-44.94 dBm** | | |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

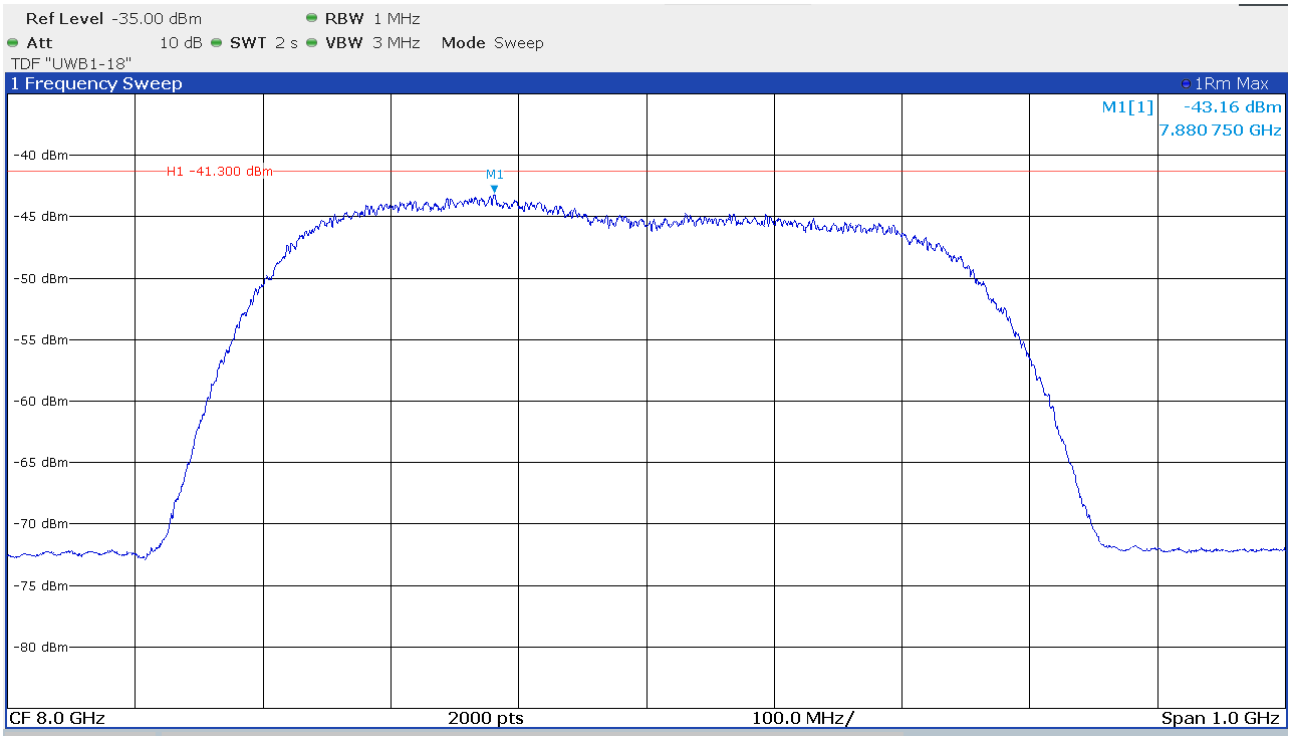


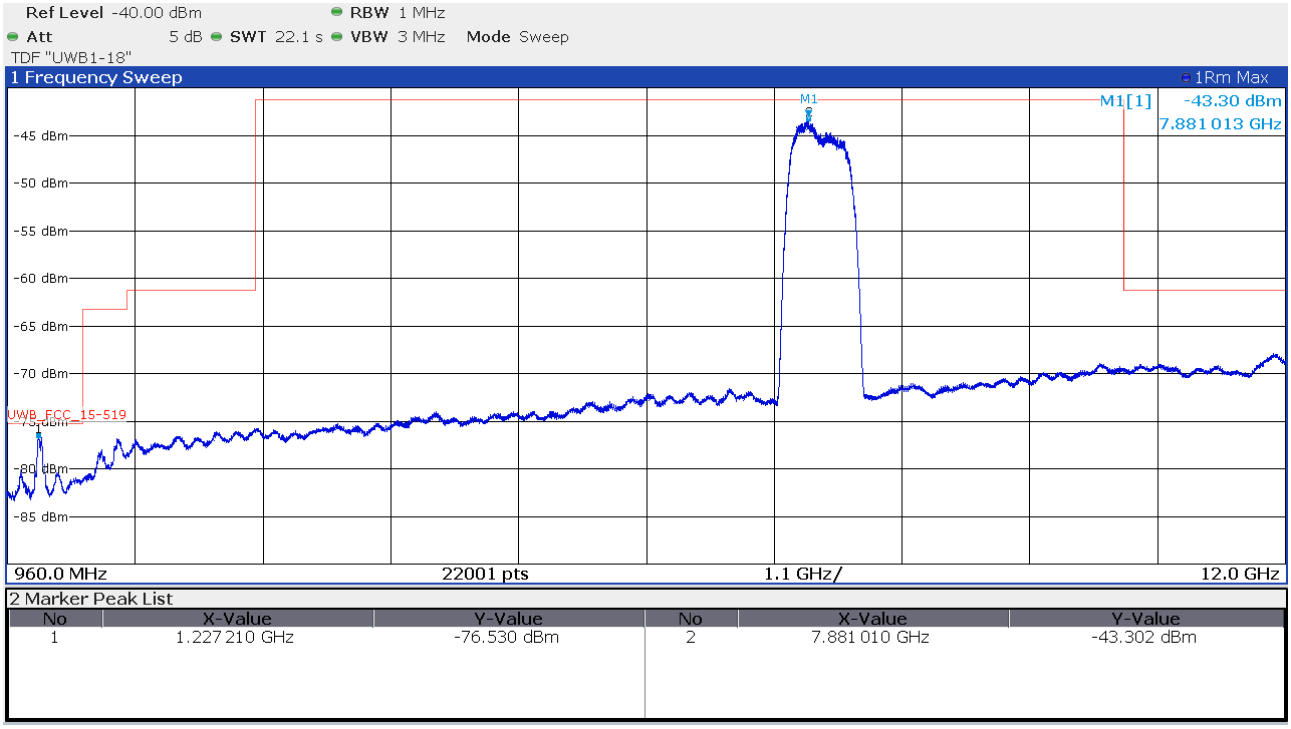
# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

## Channel 9 antenna 1

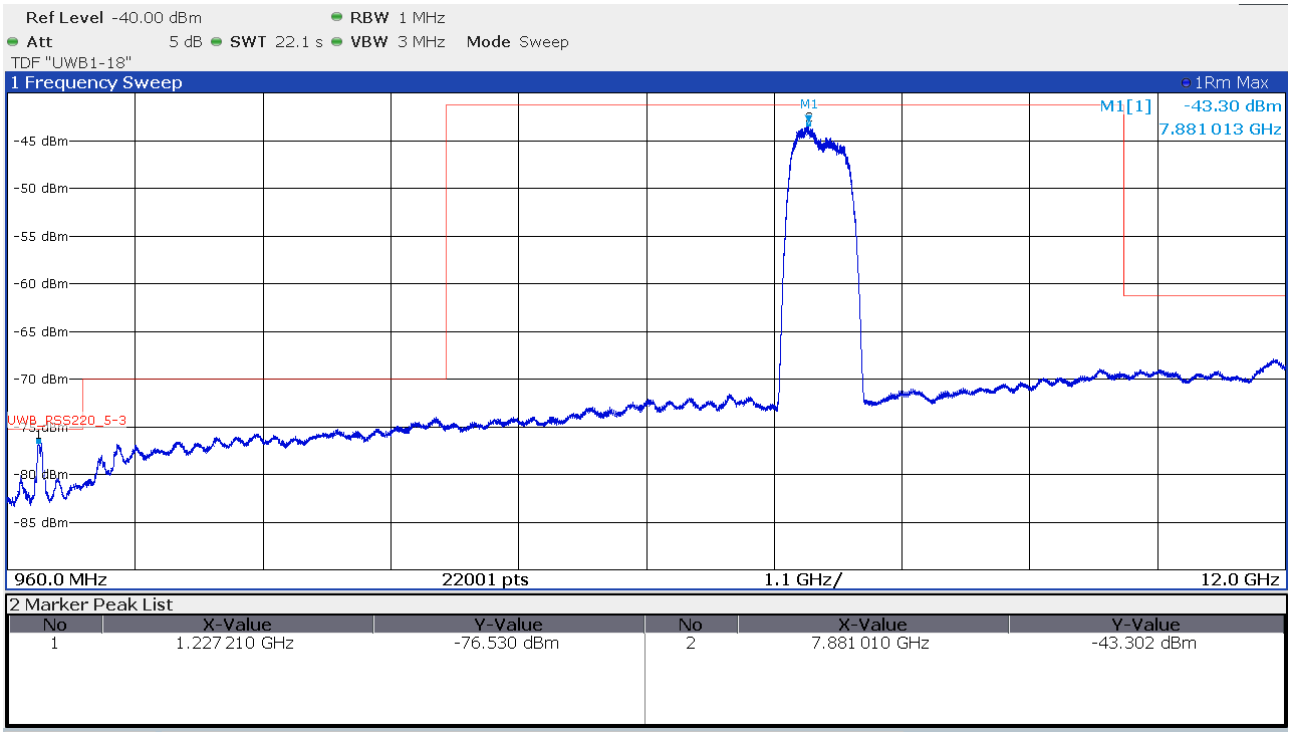
Mean Power

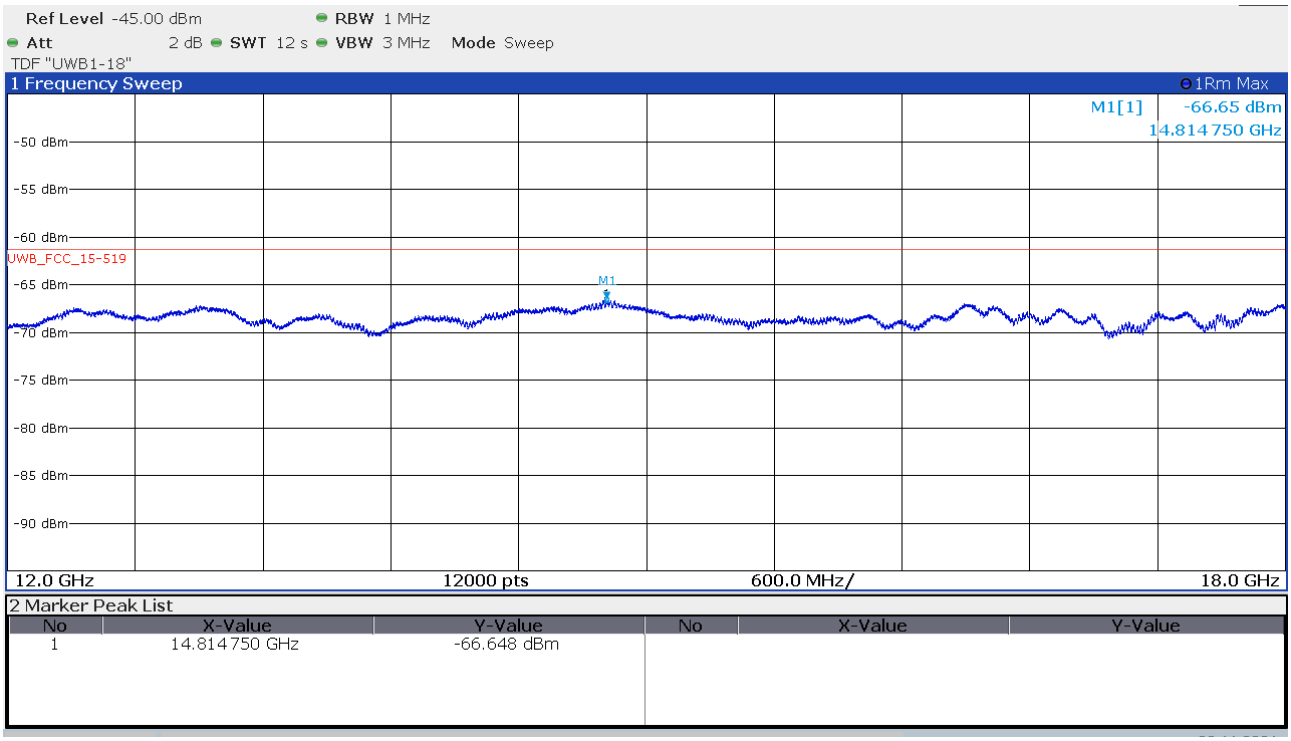



960 MHz to 40 GHz

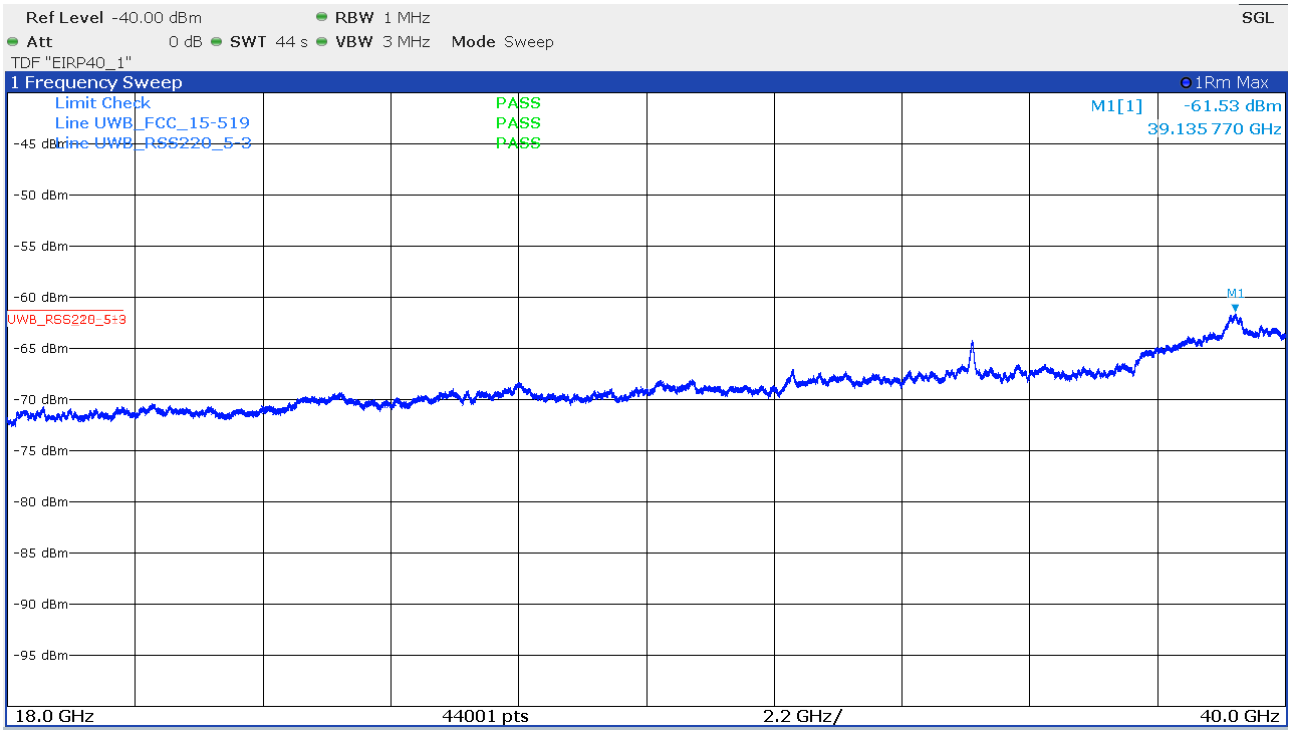


# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23



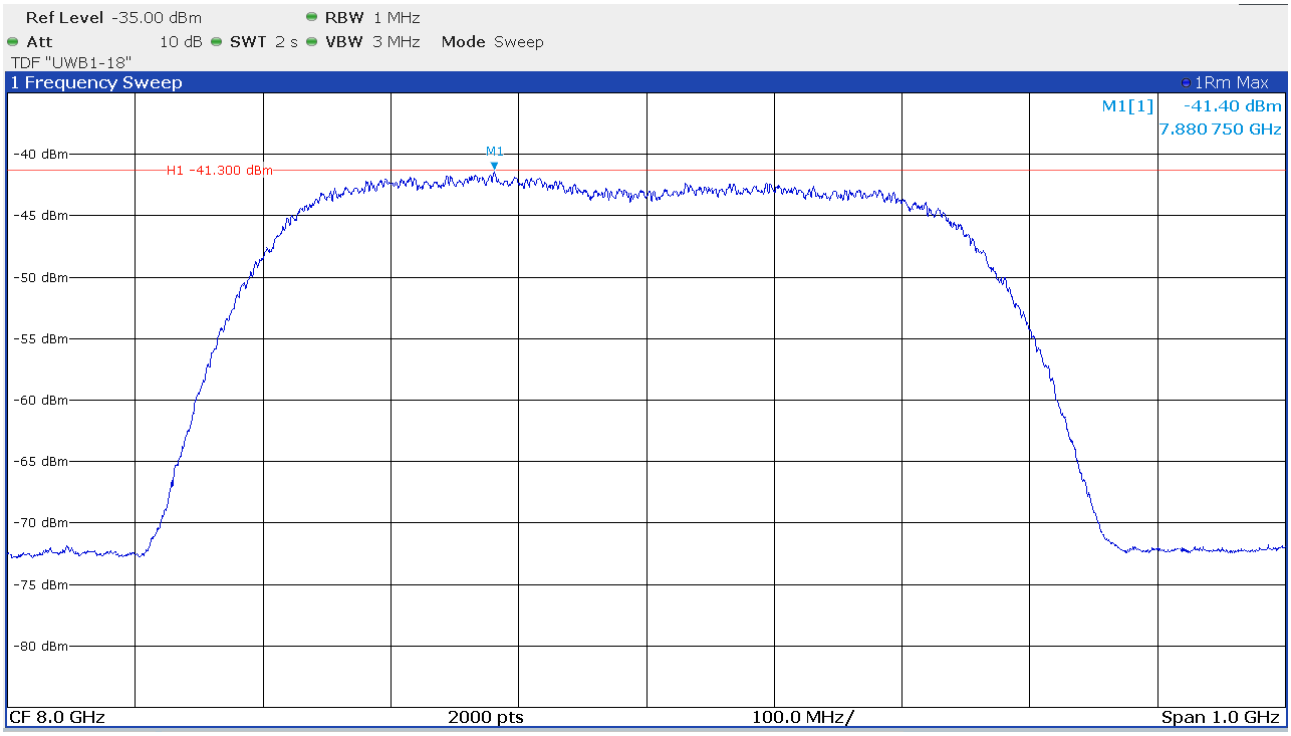



# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23



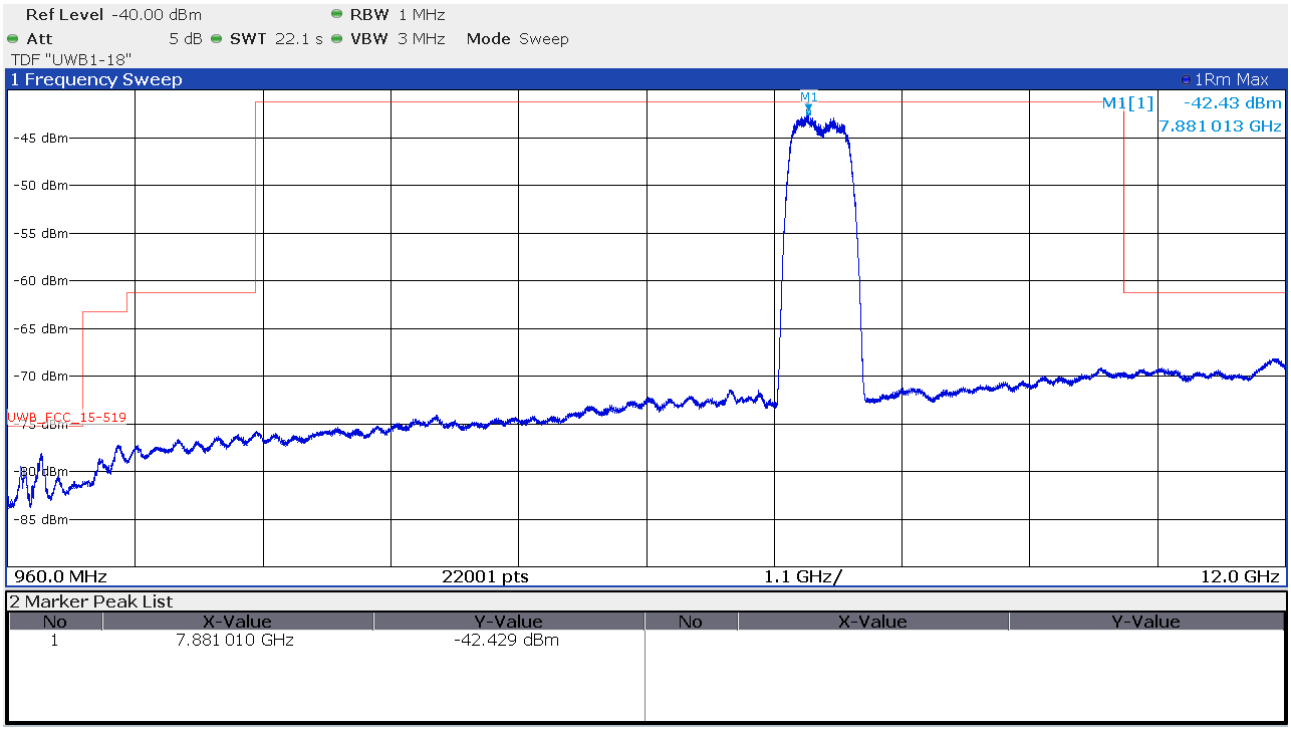

## Channel 9 antenna 2

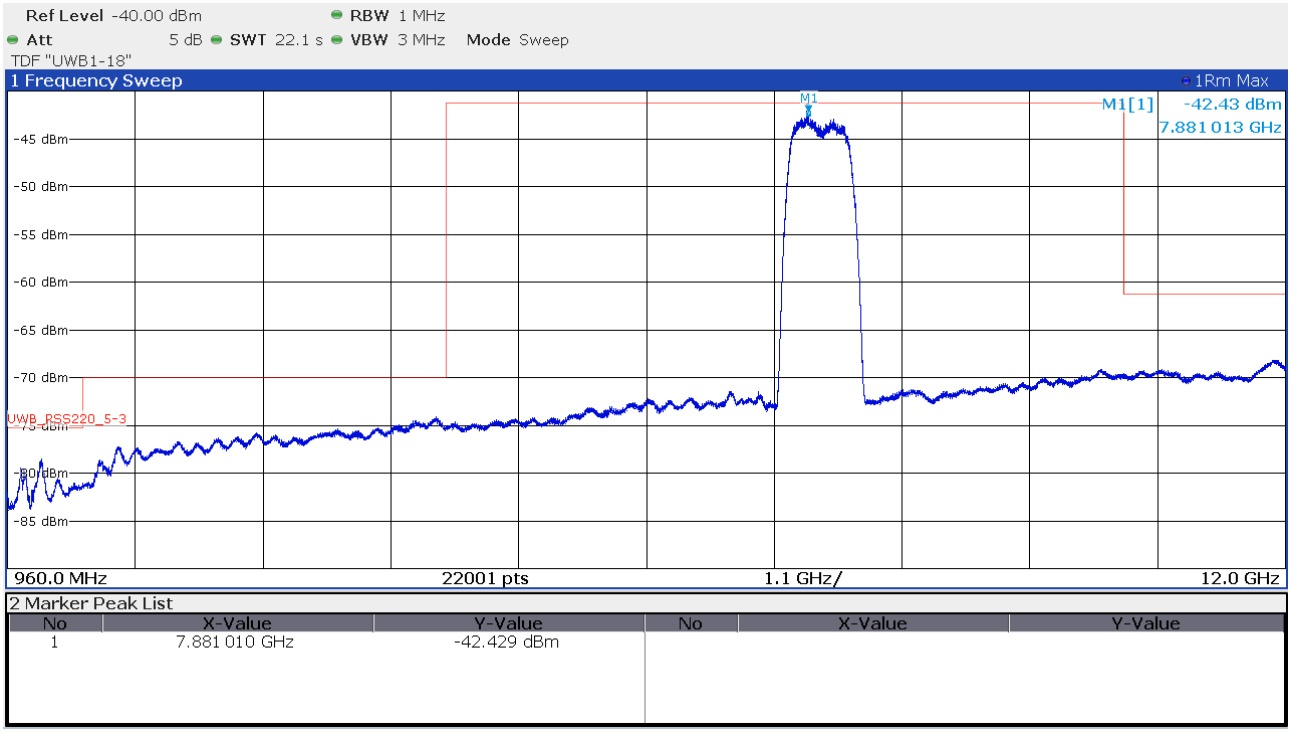
Mean Power



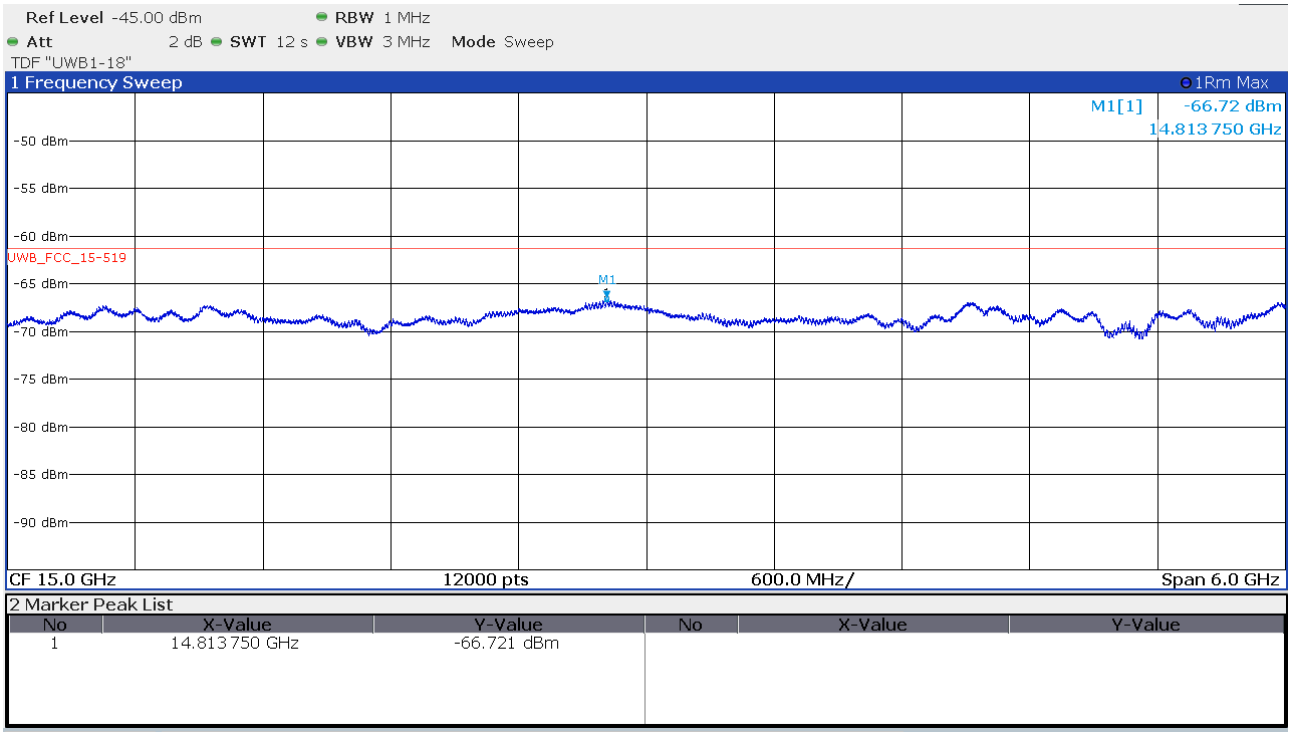
# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

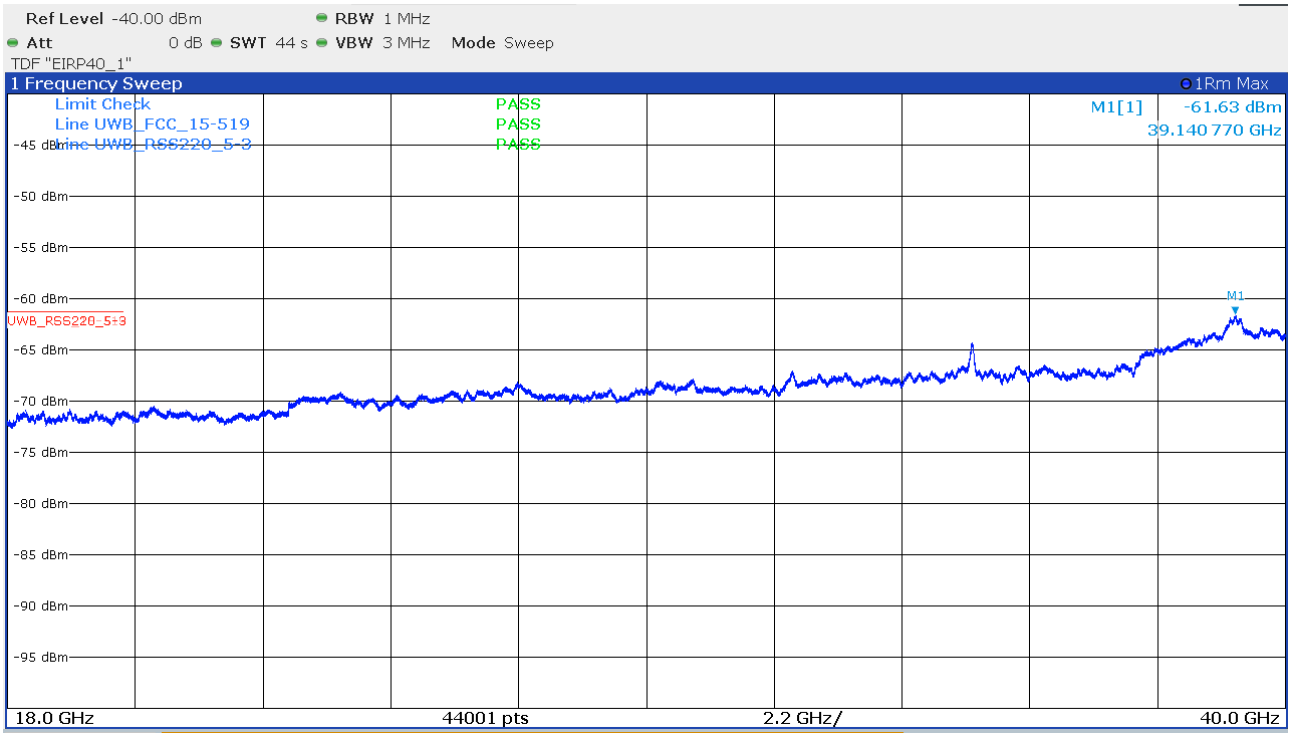
960 MHz to 40 GHz



# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23



## FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

**Limits:**

Limit according §15.209(a) in the frequency range 9 kHz 960 MHz:

| Frequency (MHz) | Field strength (microvolts/meter) | Measurement distance (meters) |
|---|---|---|
| 0.009-0.490 | 2400/F(kHz) | 300 |
| 0.490-1.705 | 24000/F(kHz) | 30 |
| 1.705-30.0 | 30 | 30 |
| 30-88 | 100** | 3 |
| 88-216 | 150** | 3 |
| 216-960 | 200** | 3 |
| Above 960 | 500 | 3 |

Limit according §15.519(c) in the frequency range 960 MHz to 40 GHz:

| Frequency in MHz | EIRP in dBm |
|---|---|
| 960-1610 | −75.3 |
| 1610-1990 | −63.3 |
| 1990-3100 | −61.3 |
| 3100-10600 | −41.3 |
| Above 10600 | −61.3 |

Limit according RSS-220 5.3.1 (d) in the frequency range 960 MHz to 40 GHz:

| Frequency in MHz | EIRP in dBm |
|---|---|
| 960-1610 | −75.3 |
| 1610-4750 | −70.0 |
| 4750-10600 | −41.3 |
| Above 10600 | −61.3 |

The requirements are **FULFILLED.**

**Remarks:** Tests for f < 1 GHz and f > 18 GHz were performed with EUT BMW5A5AFB4-01.

Tests for between 1 GHz and 18 GHz were performed with EUT GSNr500.

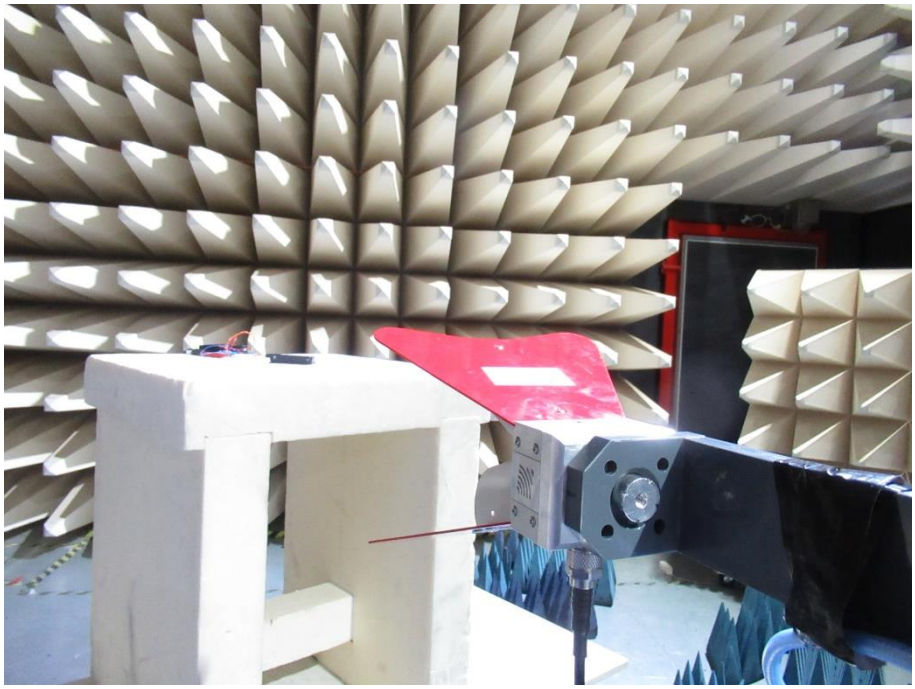
## 5.4 Radiated Emissions at 1164-1240 MHz and 1559-1610 MHz

For test instruments and accessories used see section 6 Part **SER 3**.

### 5.4.1 Description of the test location

Test location: Anechoic chamber 1

### 5.4.2 Photo documentation of the test set-up



### 5.4.3 Applicable standard

According to FCC Part 15, Section 15.519(d):
In addition to the radiated emission limits specified in the table in paragraph (c) of this section, UWB transmitters operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of no less than 1 kHz.

### 5.4.4 Analyser settings

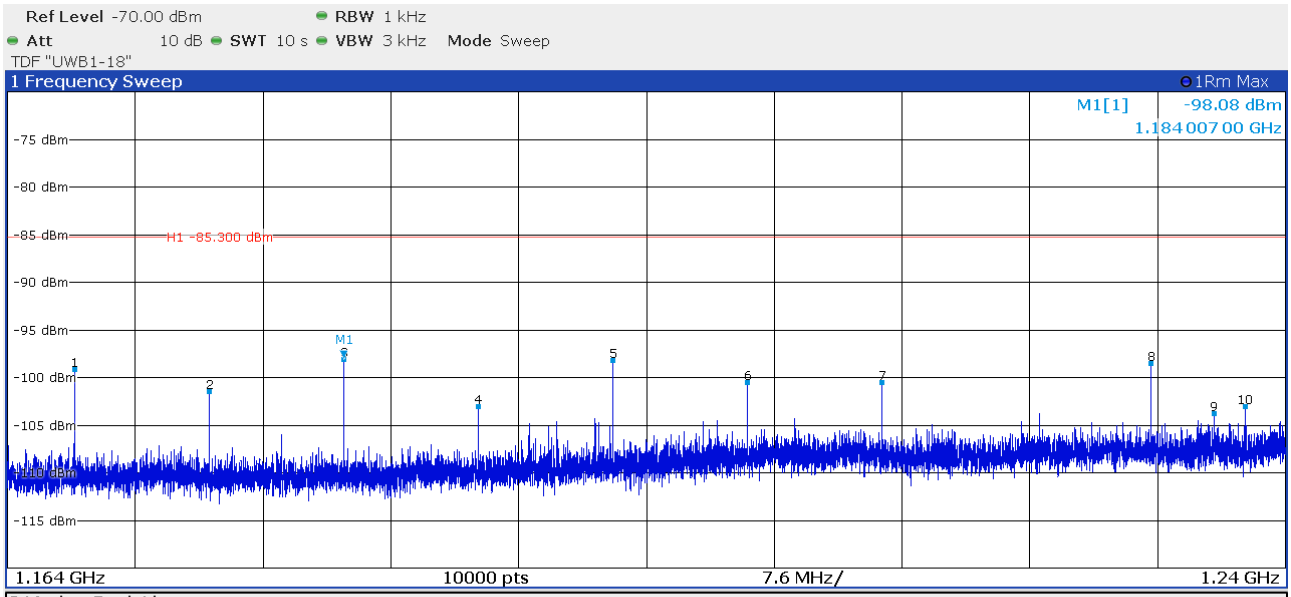
RBW: 1 kHz, VBW: 3 kHz, Detector: RMS, Sweep time: 1 ms/1kHz,

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

### 5.4.5 Test result

**Channel 5 antenna 1 horizontal**

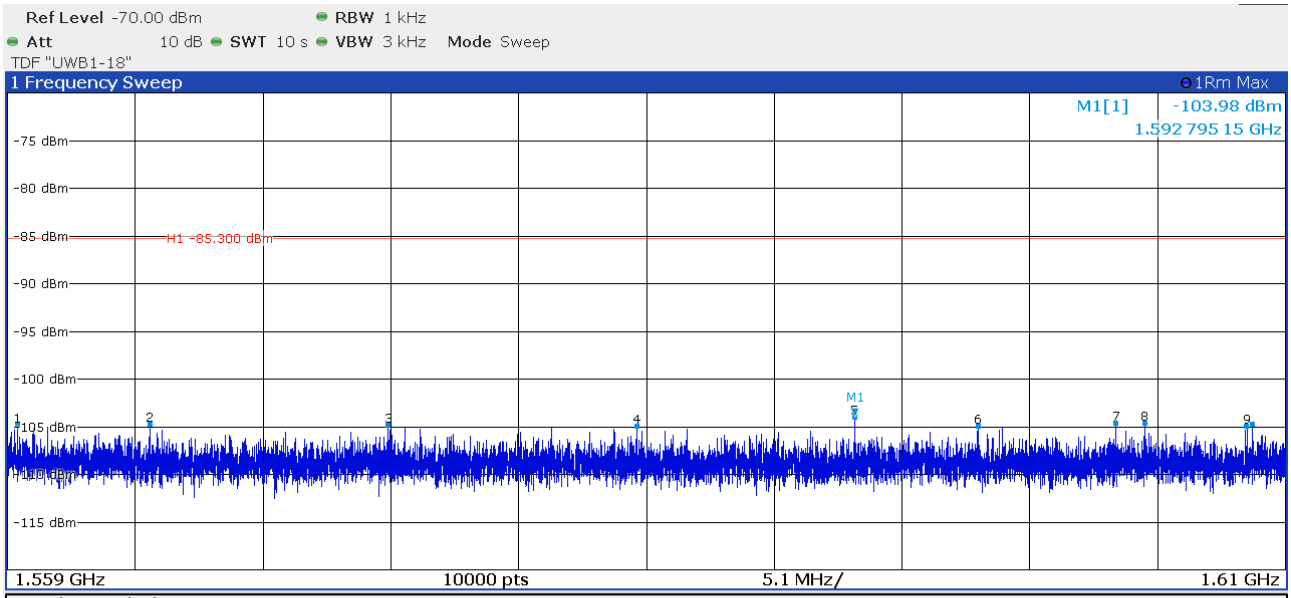
1164 MHz to 1240 MHz




2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.168 009 GHz | -99.197 dBm | 6 | 1.208 008 GHz | -100.530 dBm |
| 2 | 1.176 004 GHz | -101.487 dBm | 7 | 1.216 003 GHz | -100.517 dBm |
| 3 | 1.184 007 GHz | -98.083 dBm | 8 | 1.232 009 GHz | -98.508 dBm |
| 4 | 1.192 010 GHz | -103.051 dBm | 9 | 1.235 733 GHz | -103.758 dBm |
| 5 | 1.200 005 GHz | -98.202 dBm | 10 | 1.237 587 GHz | -103.048 dBm |

1559 MHz to 1610 MHz



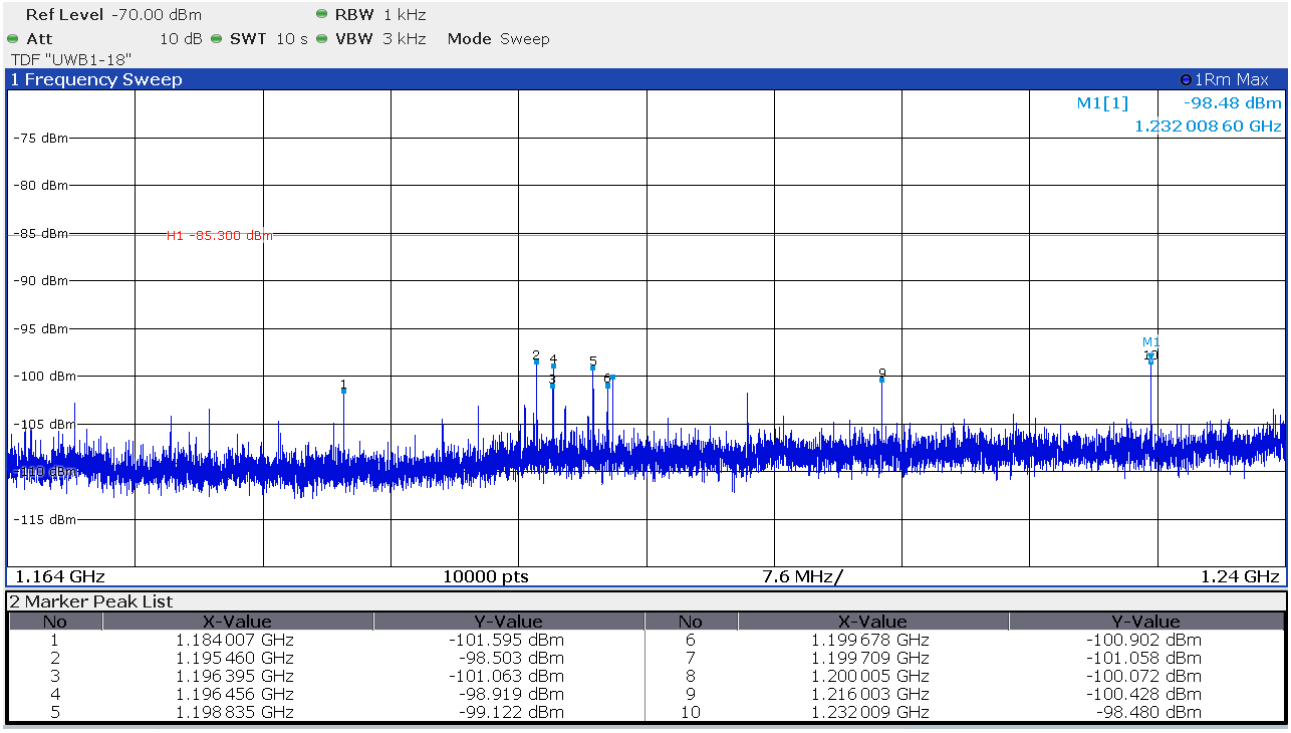

2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.559 405 GHz | -104.893 dBm | 6 | 1.597 727 GHz | -104.929 dBm |
| 2 | 1.564 674 GHz | -104.691 dBm | 7 | 1.603 235 GHz | -104.582 dBm |
| 3 | 1.574 185 GHz | -104.841 dBm | 8 | 1.604 372 GHz | -104.632 dBm |
| 4 | 1.584 135 GHz | -104.988 dBm | 9 | 1.608 457 GHz | -104.961 dBm |
| 5 | 1.592 795 GHz | -103.984 dBm | 10 | 1.608 692 GHz | -104.747 dBm |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

## Channel 5 antenna 1 vertical

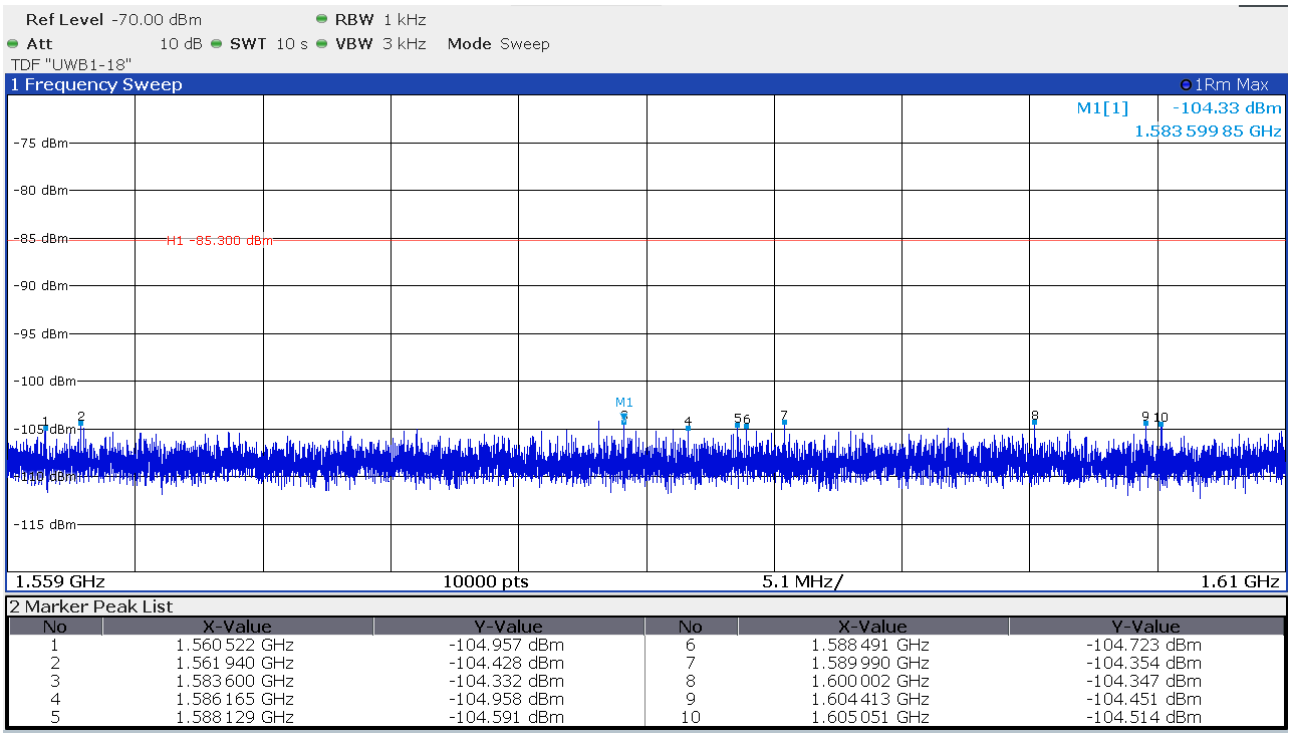
1164 MHz to 1240 MHz




2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.184 007 GHz | -101.595 dBm | 6 | 1.199 678 GHz | -100.902 dBm |
| 2 | 1.195 460 GHz | -98.503 dBm | 7 | 1.199 709 GHz | -101.058 dBm |
| 3 | 1.196 395 GHz | -101.063 dBm | 8 | 1.200 005 GHz | -100.072 dBm |
| 4 | 1.196 456 GHz | -98.919 dBm | 9 | 1.216 003 GHz | -100.428 dBm |
| 5 | 1.198 835 GHz | -99.122 dBm | 10 | 1.232 009 GHz | -98.480 dBm |

1559 MHz to 1610 MHz



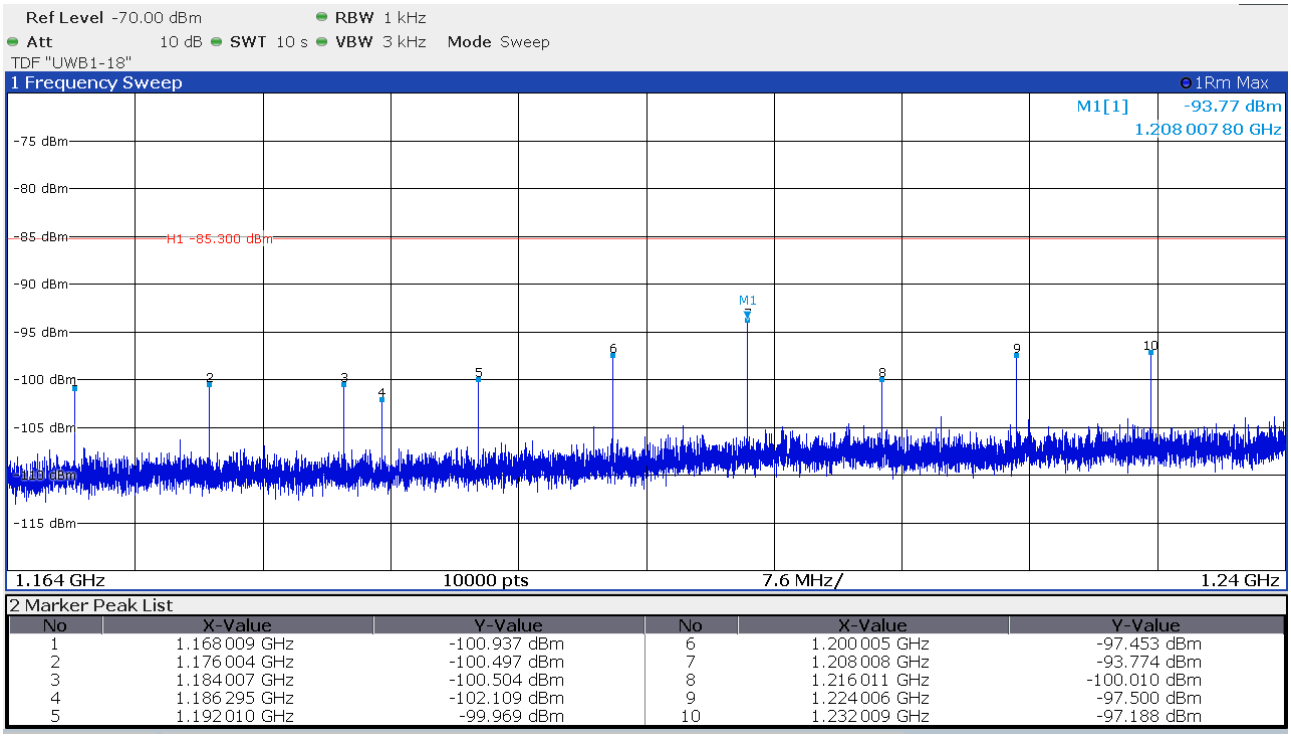

2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.560 522 GHz | -104.957 dBm | 6 | 1.588 491 GHz | -104.723 dBm |
| 2 | 1.561 940 GHz | -104.428 dBm | 7 | 1.589 990 GHz | -104.354 dBm |
| 3 | 1.583 600 GHz | -104.332 dBm | 8 | 1.600 002 GHz | -104.347 dBm |
| 4 | 1.586 165 GHz | -104.958 dBm | 9 | 1.604 413 GHz | -104.451 dBm |
| 5 | 1.588 129 GHz | -104.591 dBm | 10 | 1.605 051 GHz | -104.514 dBm |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

## Channel 5 antenna 2 horizontal

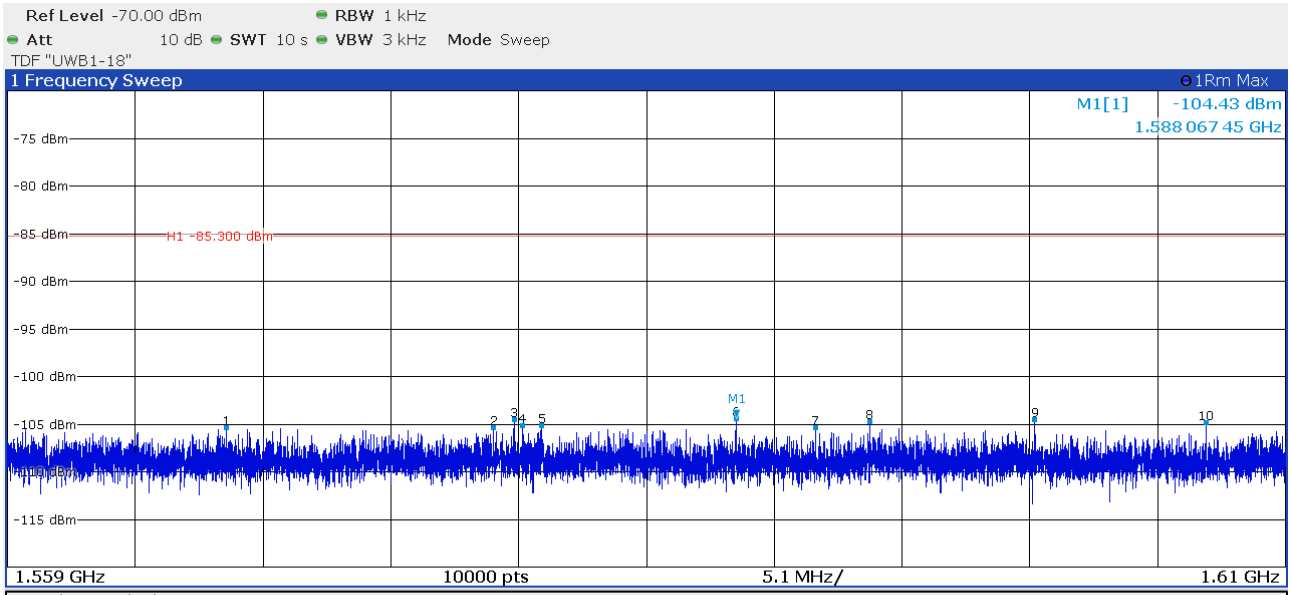
1164 MHz to 1240 MHz




2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.168 009 GHz | -100.937 dBm | 6 | 1.200 005 GHz | -97.453 dBm |
| 2 | 1.176 004 GHz | -100.497 dBm | 7 | 1.208 008 GHz | -93.774 dBm |
| 3 | 1.184 007 GHz | -100.504 dBm | 8 | 1.216 011 GHz | -100.010 dBm |
| 4 | 1.186 295 GHz | -102.109 dBm | 9 | 1.224 006 GHz | -97.500 dBm |
| 5 | 1.192 010 GHz | -99.969 dBm | 10 | 1.232 009 GHz | -97.188 dBm |

1559 MHz to 1610 MHz



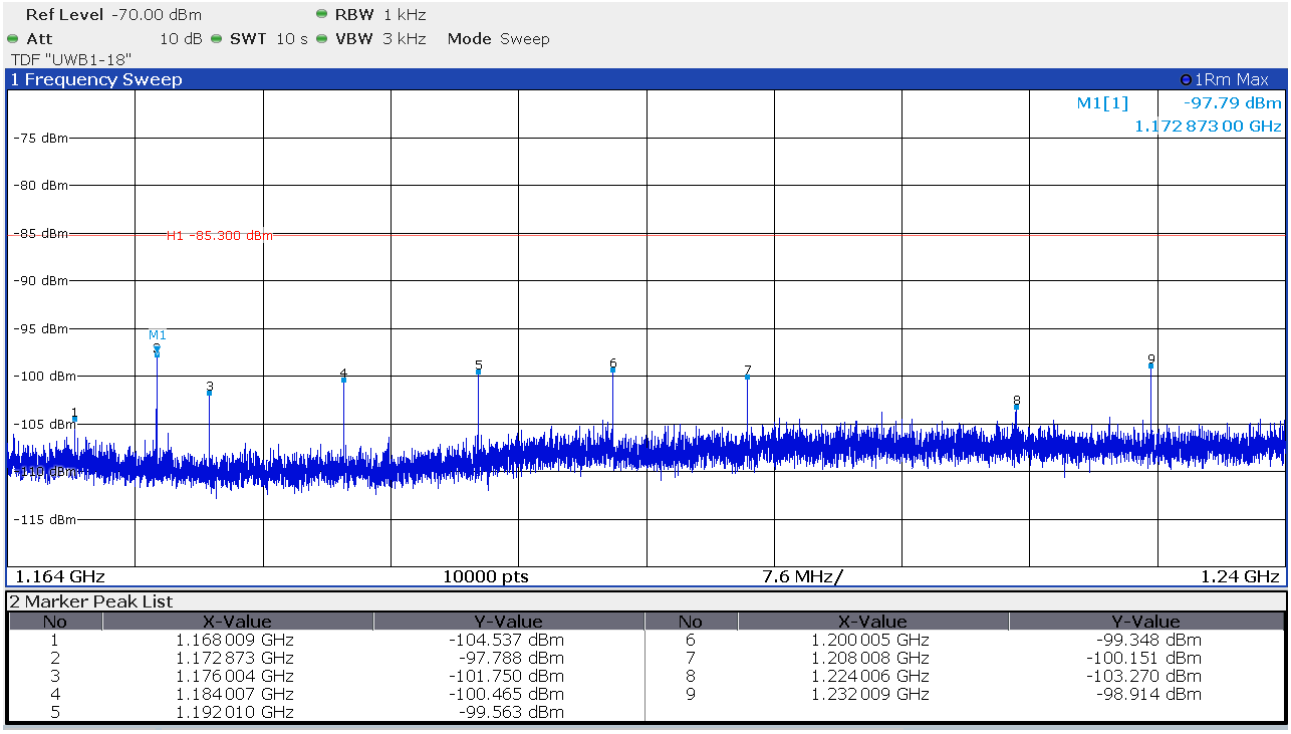

2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.567 739 GHz | -105.396 dBm | 6 | 1.588 068 GHz | -104.434 dBm |
| 2 | 1.578 403 GHz | -105.352 dBm | 7 | 1.591 235 GHz | -105.331 dBm |
| 3 | 1.579 214 GHz | -104.562 dBm | 8 | 1.593 407 GHz | -104.742 dBm |
| 4 | 1.579 571 GHz | -105.147 dBm | 9 | 1.600 002 GHz | -104.517 dBm |
| 5 | 1.580 315 GHz | -105.194 dBm | 10 | 1.606 820 GHz | -104.811 dBm |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

## Channel 5 antenna 2 vertical

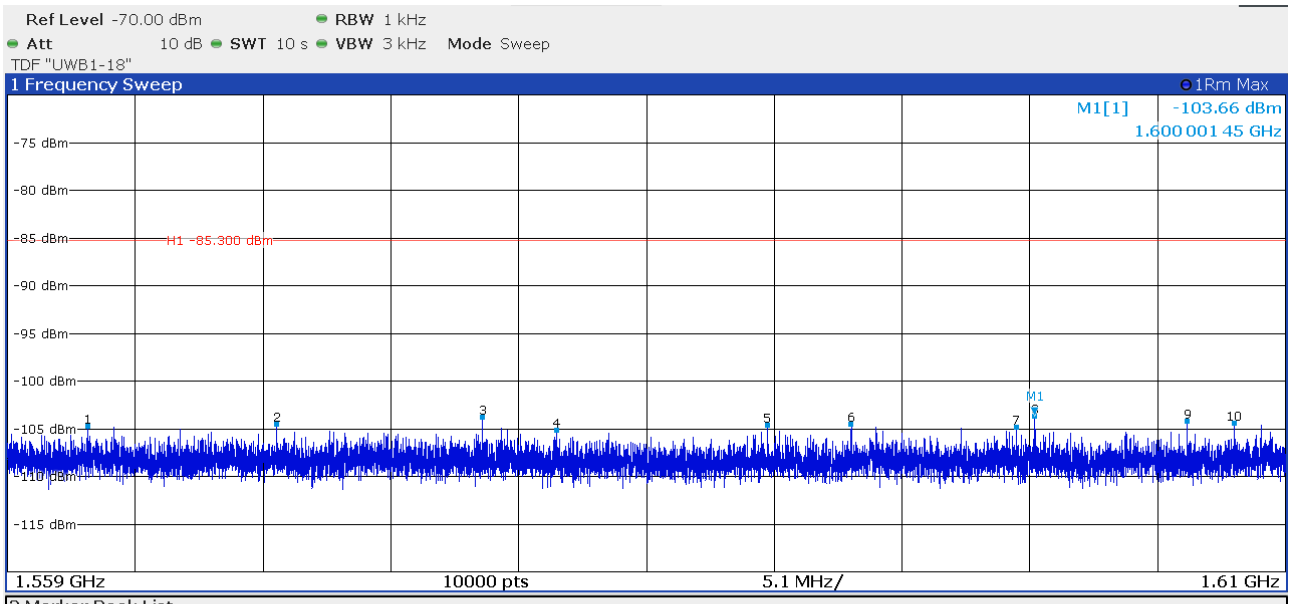
1164 MHz to 1240 MHz




2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.168 009 GHz | -104.537 dBm | 6 | 1.200 005 GHz | -99.348 dBm |
| 2 | 1.172 873 GHz | -97.788 dBm | 7 | 1.208 008 GHz | -100.151 dBm |
| 3 | 1.176 004 GHz | -101.750 dBm | 8 | 1.224 006 GHz | -103.270 dBm |
| 4 | 1.184 007 GHz | -100.465 dBm | 9 | 1.232 009 GHz | -98.914 dBm |
| 5 | 1.192 010 GHz | -99.563 dBm | | | |

1559 MHz to 1610 MHz



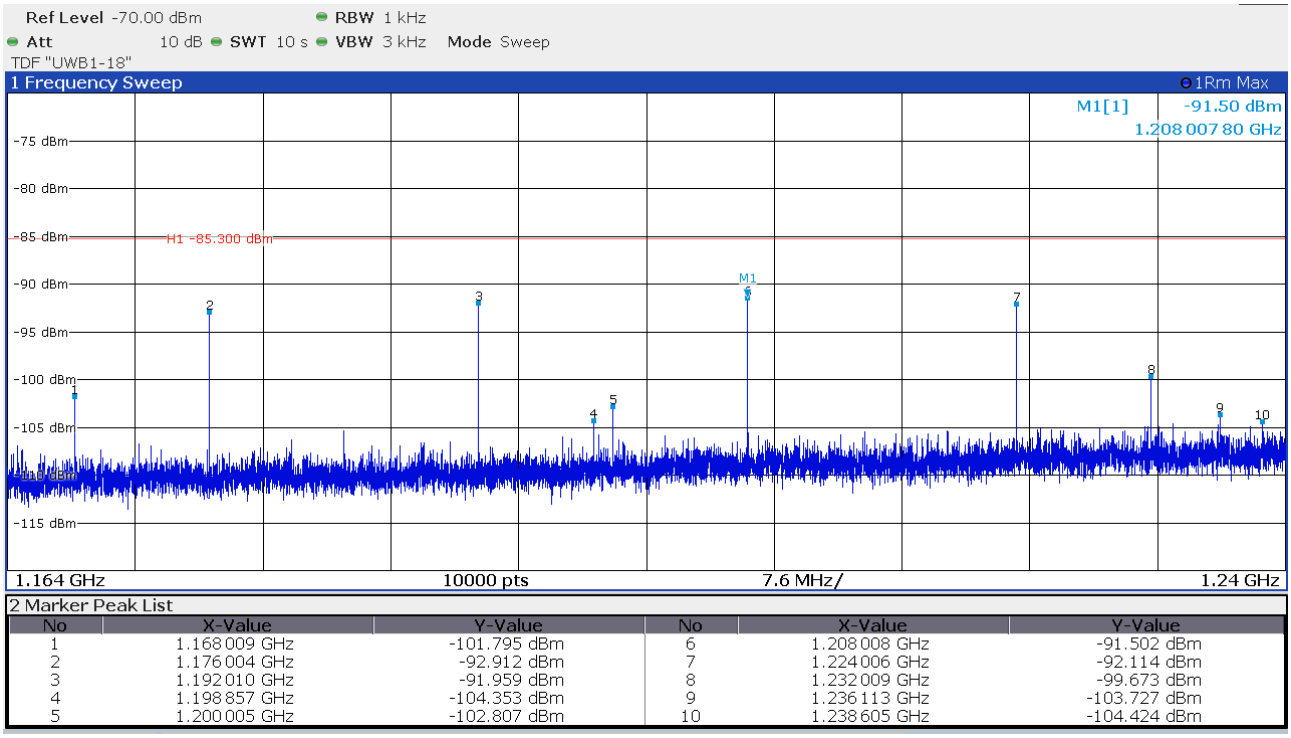

2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.562 200 GHz | -104.685 dBm | 6 | 1.592 673 GHz | -104.486 dBm |
| 2 | 1.569 753 GHz | -104.506 dBm | 7 | 1.599 262 GHz | -104.834 dBm |
| 3 | 1.577 954 GHz | -103.789 dBm | 8 | 1.600 002 GHz | -103.658 dBm |
| 4 | 1.580 922 GHz | -105.132 dBm | 9 | 1.606 086 GHz | -104.172 dBm |
| 5 | 1.589 322 GHz | -104.588 dBm | 10 | 1.607 963 GHz | -104.421 dBm |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

## Channel 6 antenna 1 horizontal

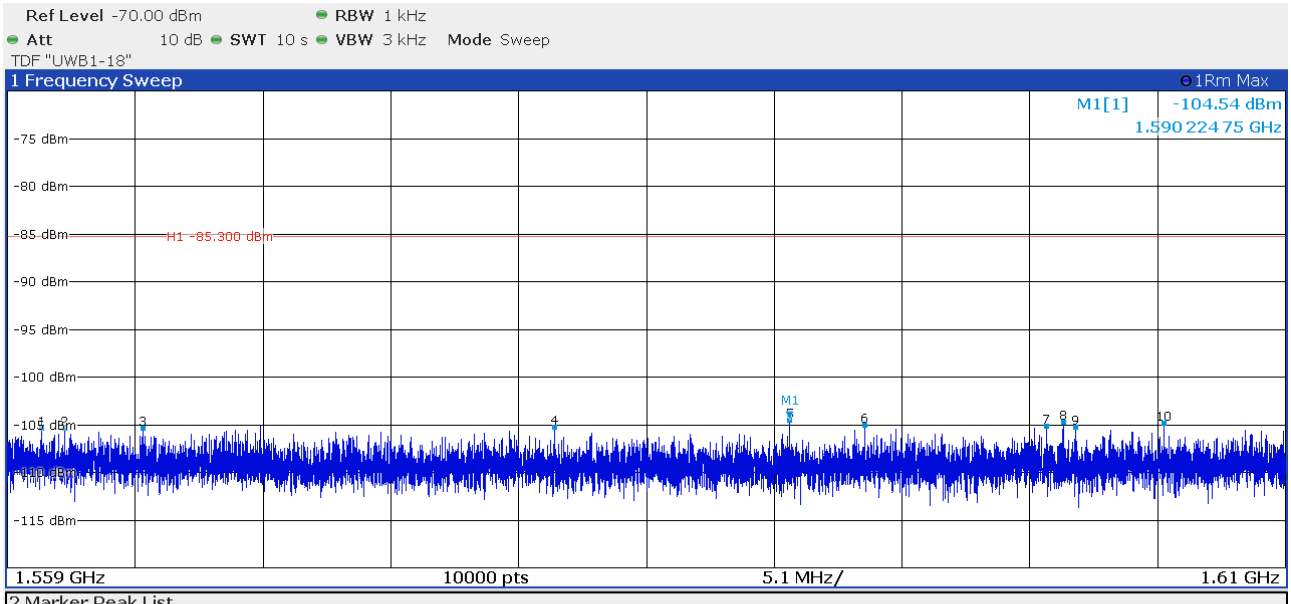
1164 MHz to 1240 MHz




2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.168 009 GHz | -101.795 dBm | 6 | 1.208 008 GHz | -91.502 dBm |
| 2 | 1.176 004 GHz | -92.912 dBm | 7 | 1.224 006 GHz | -92.114 dBm |
| 3 | 1.192 010 GHz | -91.959 dBm | 8 | 1.232 009 GHz | -99.673 dBm |
| 4 | 1.198 857 GHz | -104.353 dBm | 9 | 1.236 113 GHz | -103.727 dBm |
| 5 | 1.200 005 GHz | -102.807 dBm | 10 | 1.238 605 GHz | -104.424 dBm |

1559 MHz to 1610 MHz



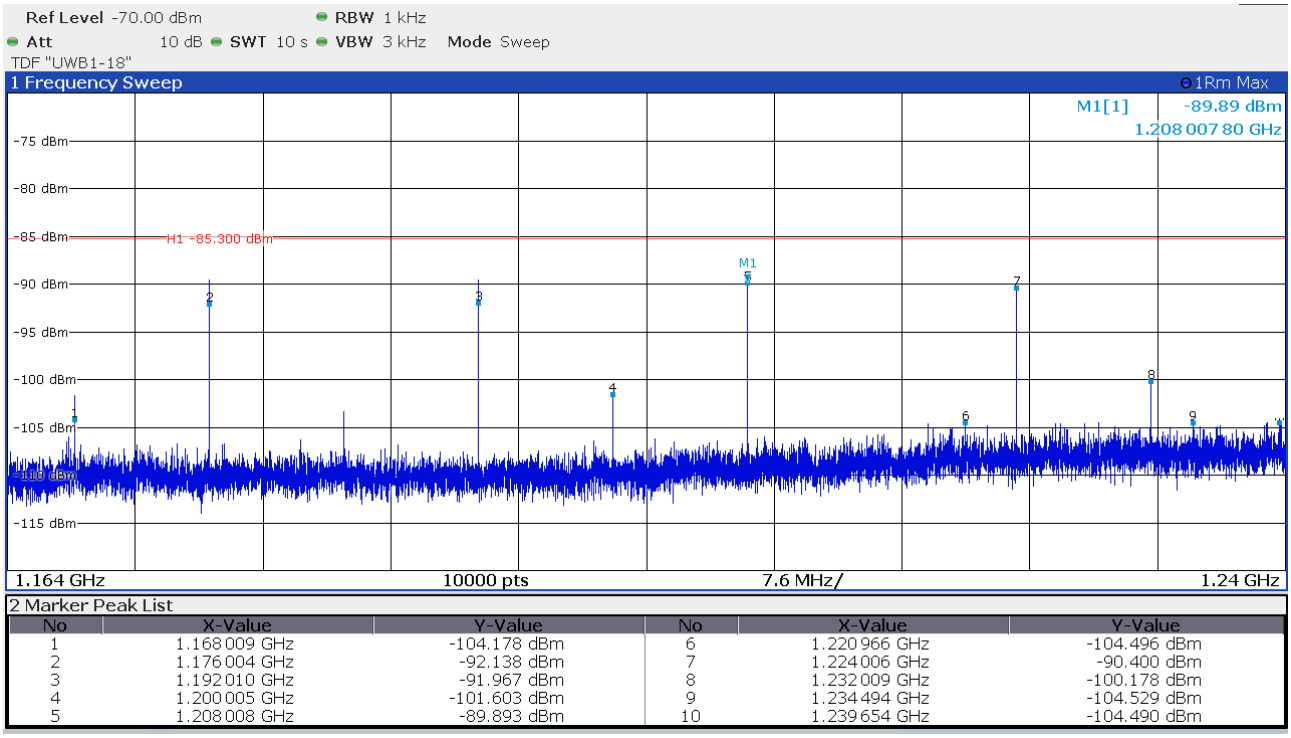

2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.560 364 GHz | -105.333 dBm | 6 | 1.593 208 GHz | -105.050 dBm |
| 2 | 1.561 272 GHz | -105.376 dBm | 7 | 1.600 460 GHz | -105.132 dBm |
| 3 | 1.564 403 GHz | -105.368 dBm | 8 | 1.601 144 GHz | -104.723 dBm |
| 4 | 1.580 846 GHz | -105.258 dBm | 9 | 1.601 608 GHz | -105.229 dBm |
| 5 | 1.590 225 GHz | -104.541 dBm | 10 | 1.605 152 GHz | -104.799 dBm |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

## Channel 6 antenna 1 vertical

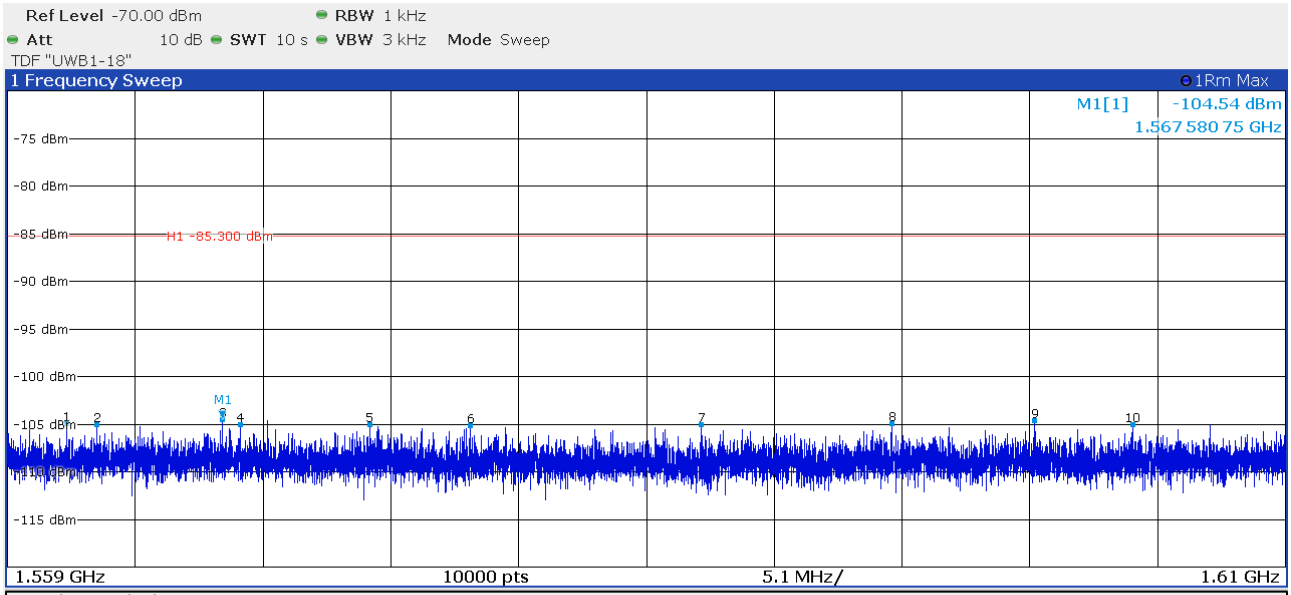
1164 MHz to 1240 MHz




2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.168 009 GHz | -104.178 dBm | 6 | 1.220 966 GHz | -104.496 dBm |
| 2 | 1.176 004 GHz | -92.138 dBm | 7 | 1.224 006 GHz | -90.400 dBm |
| 3 | 1.192 010 GHz | -91.967 dBm | 8 | 1.232 009 GHz | -100.178 dBm |
| 4 | 1.200 005 GHz | -101.603 dBm | 9 | 1.234 494 GHz | -104.529 dBm |
| 5 | 1.208 008 GHz | -89.893 dBm | 10 | 1.239 654 GHz | -104.490 dBm |

1559 MHz to 1610 MHz



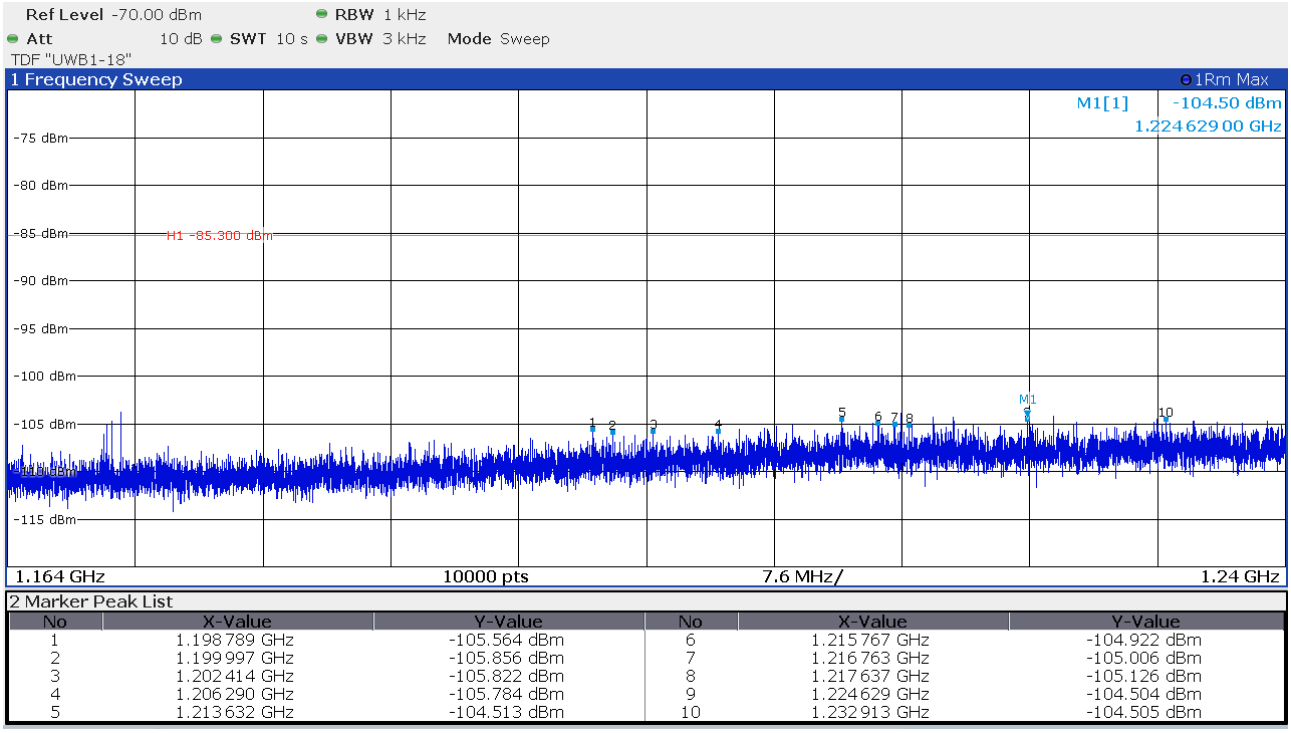

2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.561 359 GHz | -104.945 dBm | 6 | 1.577 475 GHz | -105.128 dBm |
| 2 | 1.562 578 GHz | -105.073 dBm | 7 | 1.586 696 GHz | -105.017 dBm |
| 3 | 1.567 581 GHz | -104.544 dBm | 8 | 1.594 300 GHz | -104.993 dBm |
| 4 | 1.568 285 GHz | -105.015 dBm | 9 | 1.600 002 GHz | -104.599 dBm |
| 5 | 1.573 461 GHz | -105.082 dBm | 10 | 1.603 893 GHz | -105.023 dBm |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

## Channel 6 antenna 2 horizontal

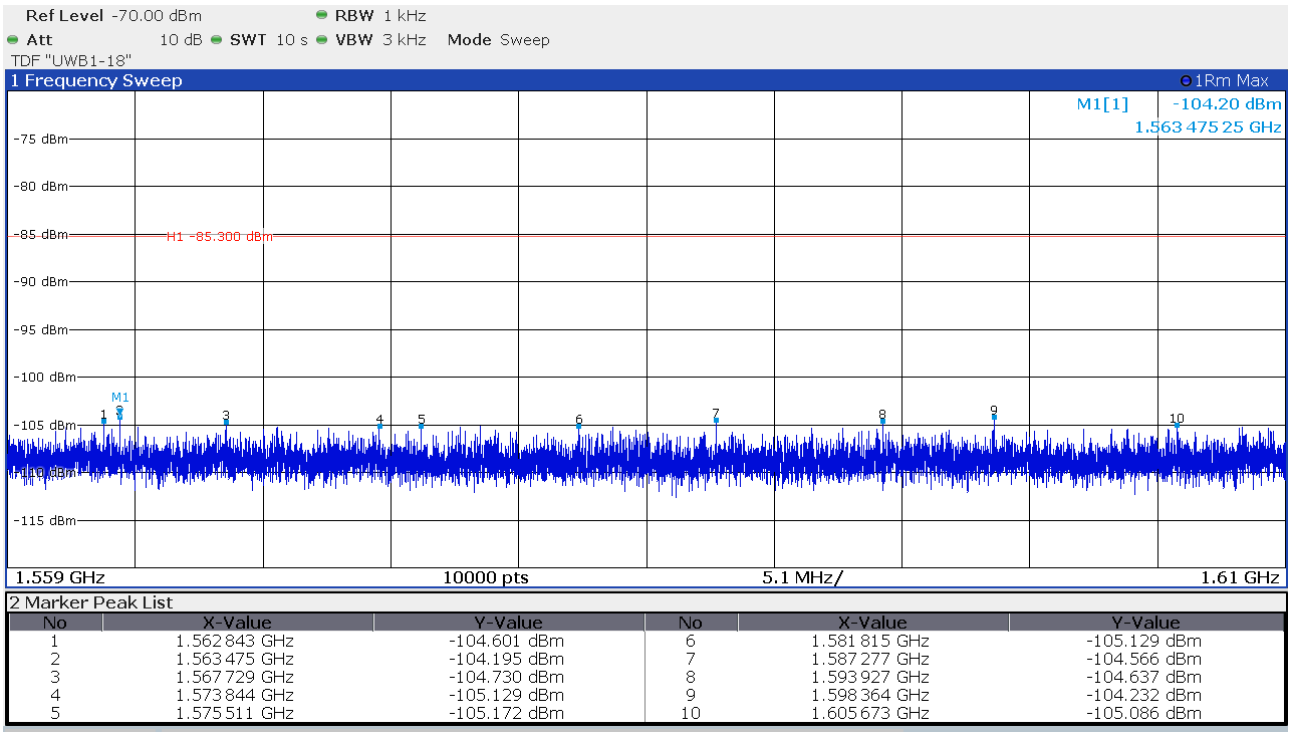
1164 MHz to 1240 MHz




2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.198 789 GHz | -105.564 dBm | 6 | 1.215 767 GHz | -104.922 dBm |
| 2 | 1.199 997 GHz | -105.856 dBm | 7 | 1.216 763 GHz | -105.006 dBm |
| 3 | 1.202 414 GHz | -105.822 dBm | 8 | 1.217 637 GHz | -105.126 dBm |
| 4 | 1.206 290 GHz | -105.784 dBm | 9 | 1.224 629 GHz | -104.504 dBm |
| 5 | 1.213 632 GHz | -104.513 dBm | 10 | 1.232 913 GHz | -104.505 dBm |

1559 MHz to 1610 MHz



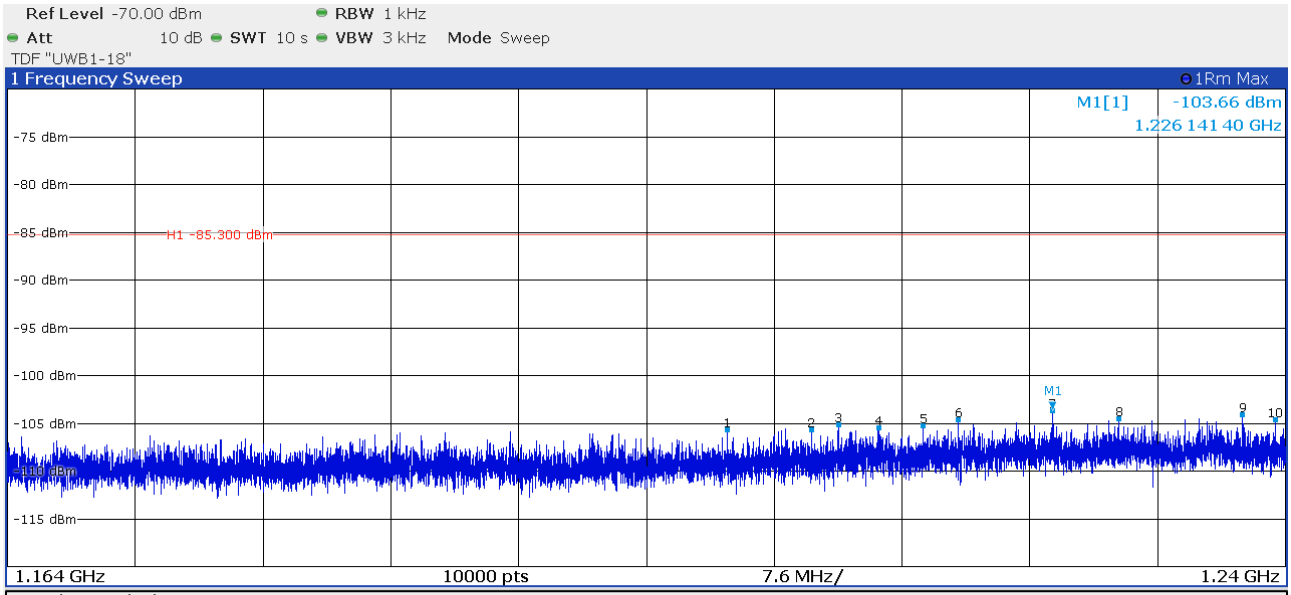

2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.562 843 GHz | -104.601 dBm | 6 | 1.581 815 GHz | -105.129 dBm |
| 2 | 1.563 475 GHz | -104.195 dBm | 7 | 1.587 277 GHz | -104.566 dBm |
| 3 | 1.567 729 GHz | -104.730 dBm | 8 | 1.593 927 GHz | -104.637 dBm |
| 4 | 1.573 844 GHz | -105.129 dBm | 9 | 1.598 364 GHz | -104.232 dBm |
| 5 | 1.575 511 GHz | -105.172 dBm | 10 | 1.605 673 GHz | -105.086 dBm |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

## Channel 6 antenna 2 vertical

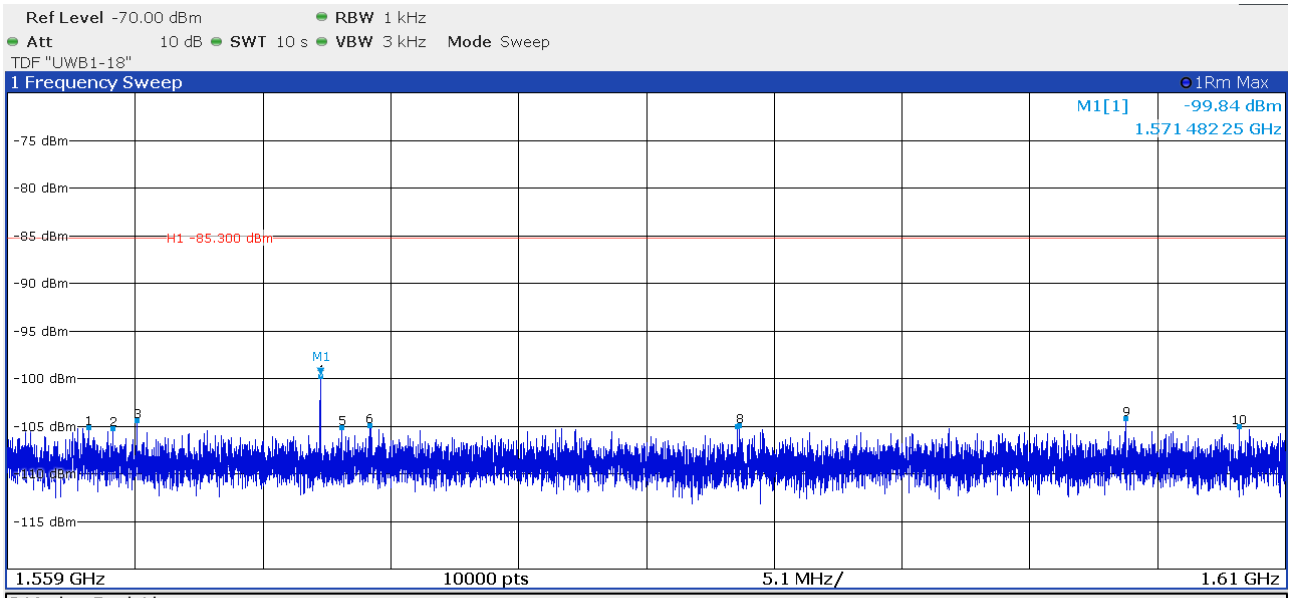
1164 MHz to 1240 MHz




2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.206 807 GHz | -105.709 dBm | 6 | 1.220 548 GHz | -104.662 dBm |
| 2 | 1.211 808 GHz | -105.651 dBm | 7 | 1.226 141 GHz | -103.658 dBm |
| 3 | 1.213 404 GHz | -105.122 dBm | 8 | 1.230 109 GHz | -104.572 dBm |
| 4 | 1.215 843 GHz | -105.504 dBm | 9 | 1.237 458 GHz | -104.088 dBm |
| 5 | 1.218 473 GHz | -105.245 dBm | 10 | 1.239 411 GHz | -104.589 dBm |

1559 MHz to 1610 MHz



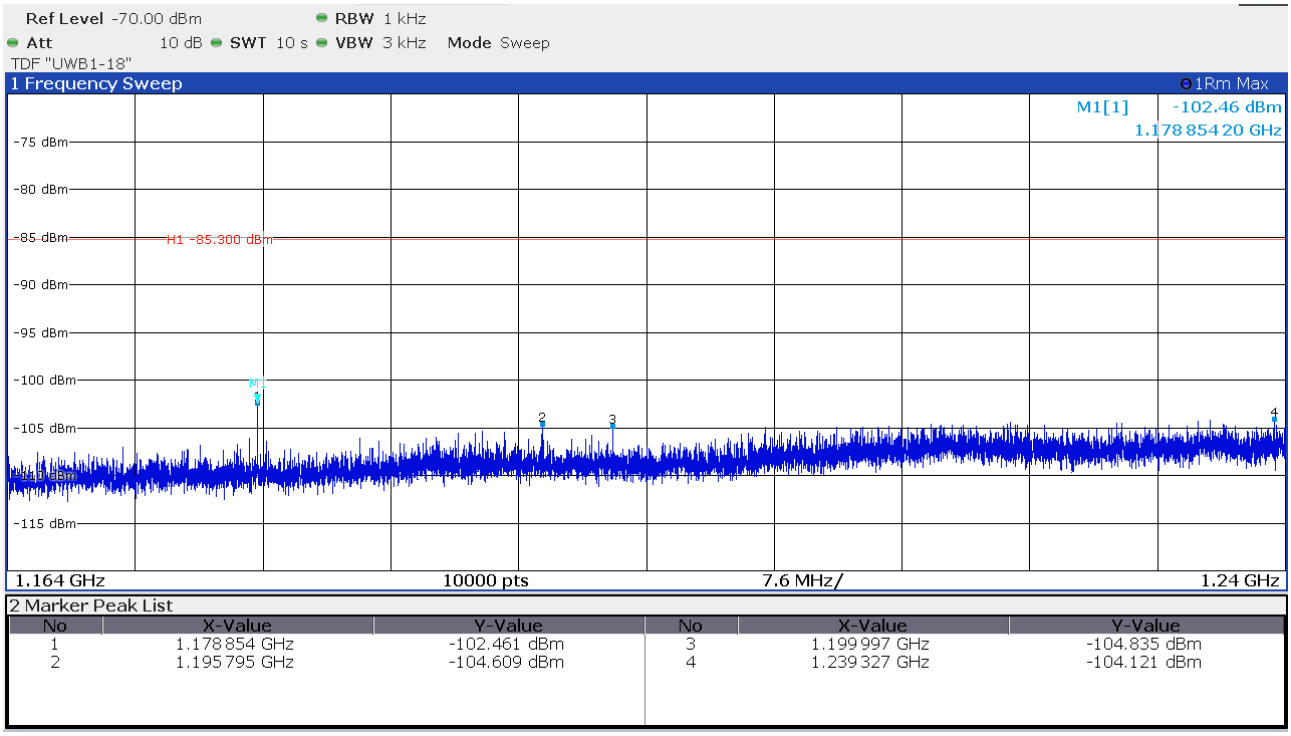

2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.562 261 GHz | -105.120 dBm | 6 | 1.573 451 GHz | -104.975 dBm |
| 2 | 1.563 220 GHz | -105.225 dBm | 7 | 1.588 139 GHz | -105.041 dBm |
| 3 | 1.564 174 GHz | -104.382 dBm | 8 | 1.588 220 GHz | -104.932 dBm |
| 4 | 1.571 482 GHz | -99.841 dBm | 9 | 1.603 638 GHz | -104.255 dBm |
| 5 | 1.572 349 GHz | -105.181 dBm | 10 | 1.608 162 GHz | -105.053 dBm |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

## Channel 8 antenna 1 horizontal

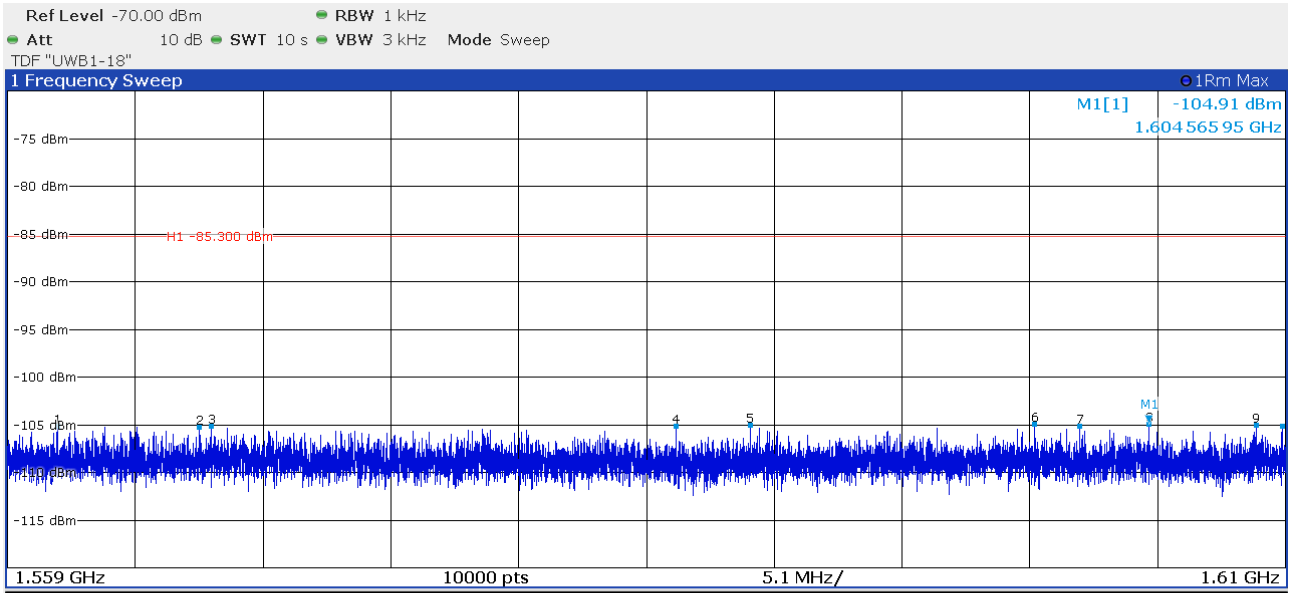
1164 MHz to 1240 MHz




2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.178 854 GHz | -102.461 dBm | 3 | 1.199 997 GHz | -104.835 dBm |
| 2 | 1.195 795 GHz | -104.609 dBm | 4 | 1.239 327 GHz | -104.121 dBm |

1559 MHz to 1610 MHz



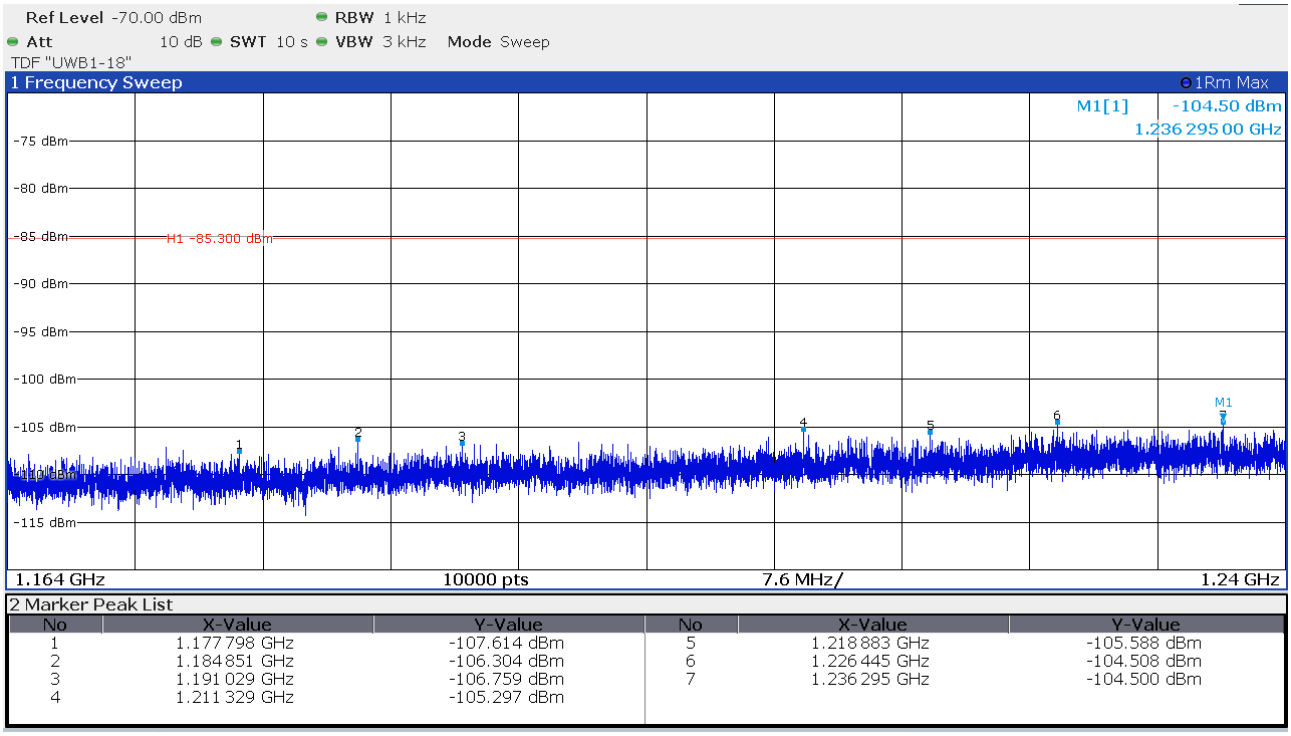

2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.560 987 GHz | -105.171 dBm | 6 | 1.600 002 GHz | -104.960 dBm |
| 2 | 1.566 653 GHz | -105.267 dBm | 7 | 1.601 792 GHz | -105.151 dBm |
| 3 | 1.567 152 GHz | -105.205 dBm | 8 | 1.604 566 GHz | -104.910 dBm |
| 4 | 1.585 691 GHz | -105.115 dBm | 9 | 1.608 819 GHz | -105.033 dBm |
| 5 | 1.588 634 GHz | -105.097 dBm | 10 | 1.609 865 GHz | -105.147 dBm |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

## Channel 8 antenna 1 vertical

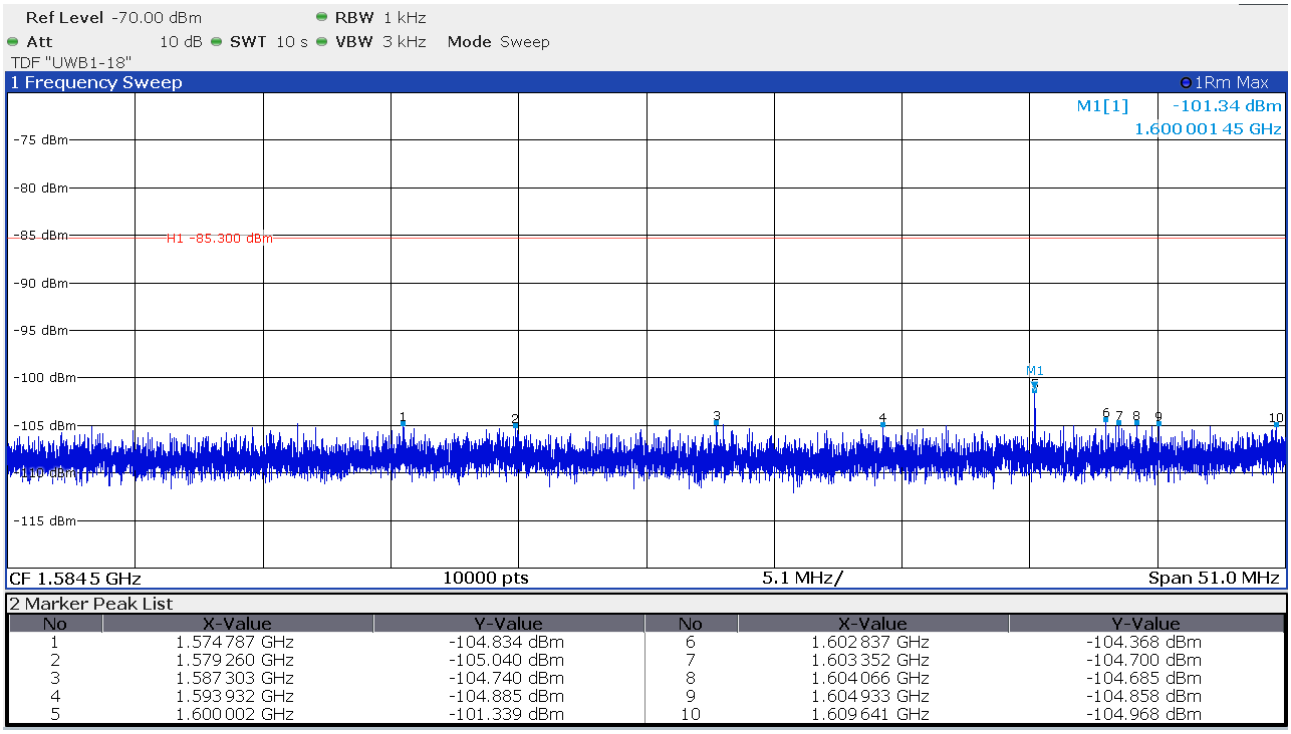
1164 MHz to 1240 MHz




2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.177 798 GHz | -107.614 dBm | 5 | 1.218 883 GHz | -105.588 dBm |
| 2 | 1.184 851 GHz | -106.304 dBm | 6 | 1.226 445 GHz | -104.508 dBm |
| 3 | 1.191 029 GHz | -106.759 dBm | 7 | 1.236 295 GHz | -104.500 dBm |
| 4 | 1.211 329 GHz | -105.297 dBm | | | |

1559 MHz to 1610 MHz



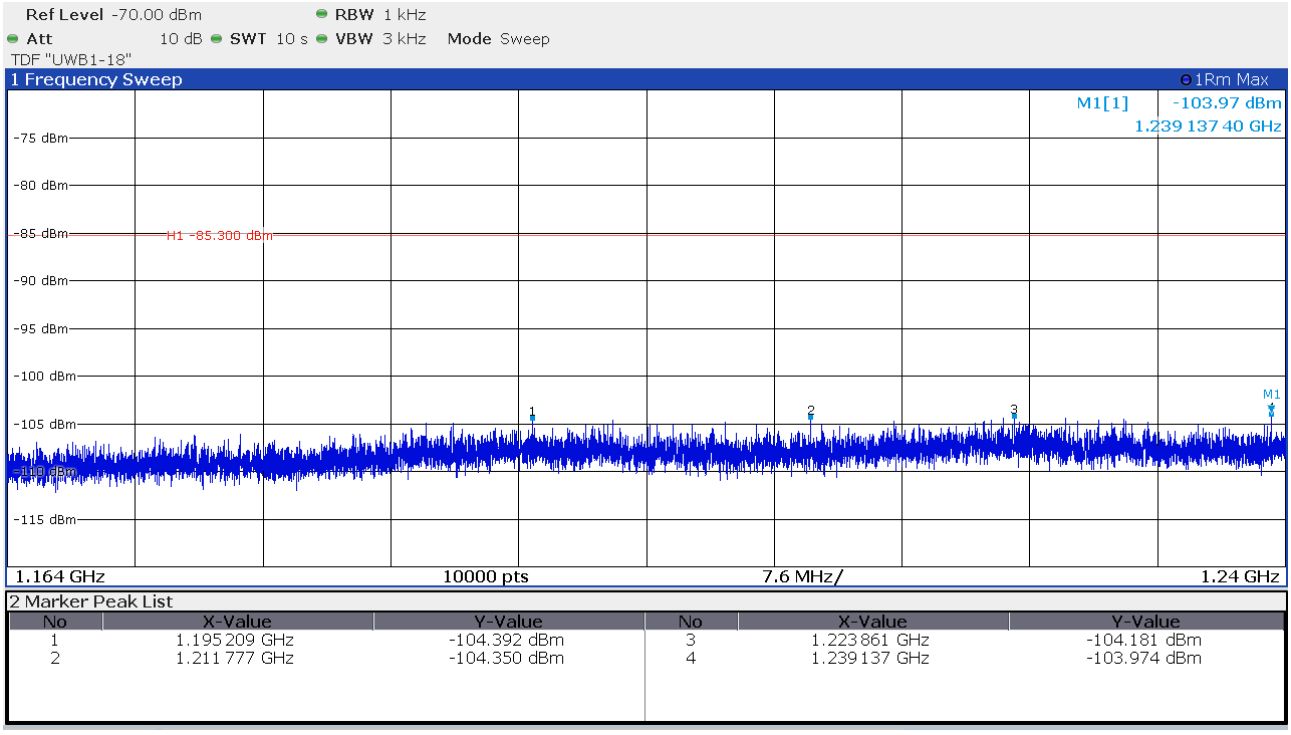

2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.574 787 GHz | -104.834 dBm | 6 | 1.602 837 GHz | -104.368 dBm |
| 2 | 1.579 260 GHz | -105.040 dBm | 7 | 1.603 352 GHz | -104.700 dBm |
| 3 | 1.587 303 GHz | -104.740 dBm | 8 | 1.604 066 GHz | -104.685 dBm |
| 4 | 1.593 932 GHz | -104.885 dBm | 9 | 1.604 933 GHz | -104.858 dBm |
| 5 | 1.600 002 GHz | -101.339 dBm | 10 | 1.609 641 GHz | -104.968 dBm |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

## Channel 8 antenna 2 horizontal

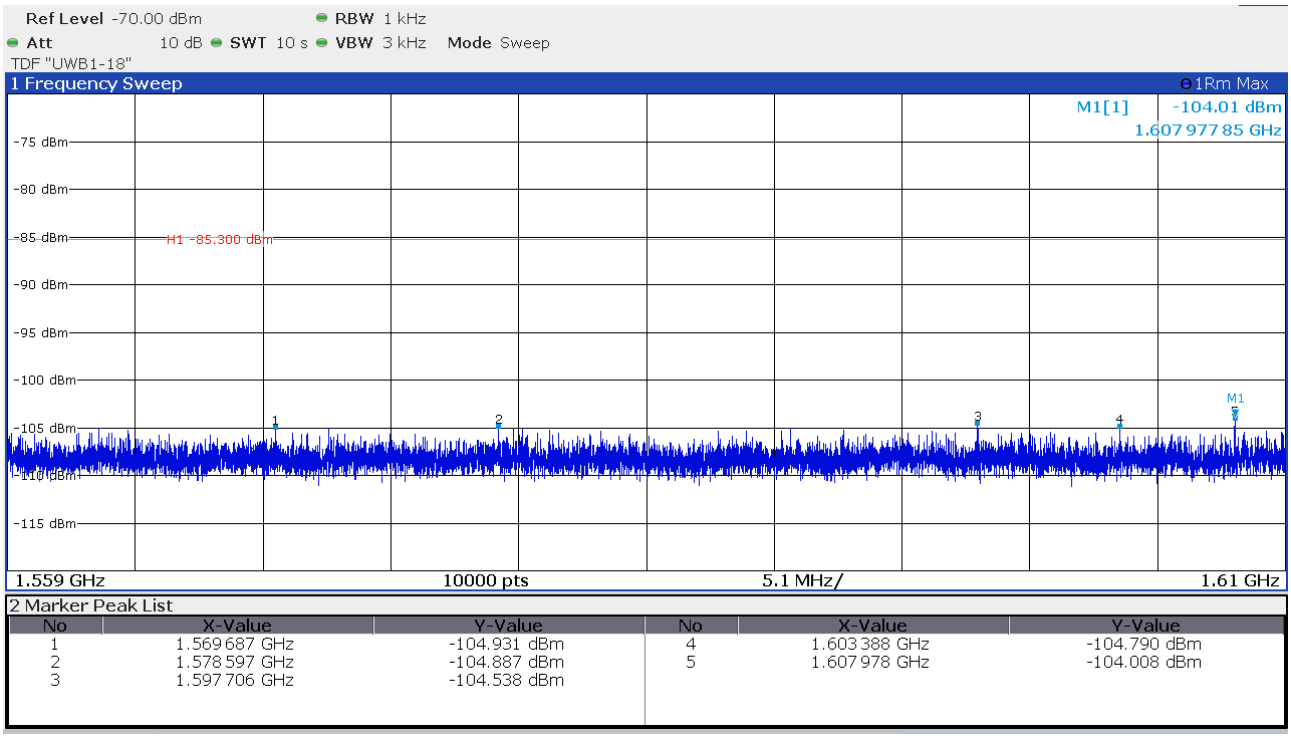
1164 MHz to 1240 MHz




2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.195 209 GHz | -104.392 dBm | 3 | 1.223 861 GHz | -104.181 dBm |
| 2 | 1.211 777 GHz | -104.350 dBm | 4 | 1.239 137 GHz | -103.974 dBm |

1559 MHz to 1610 MHz



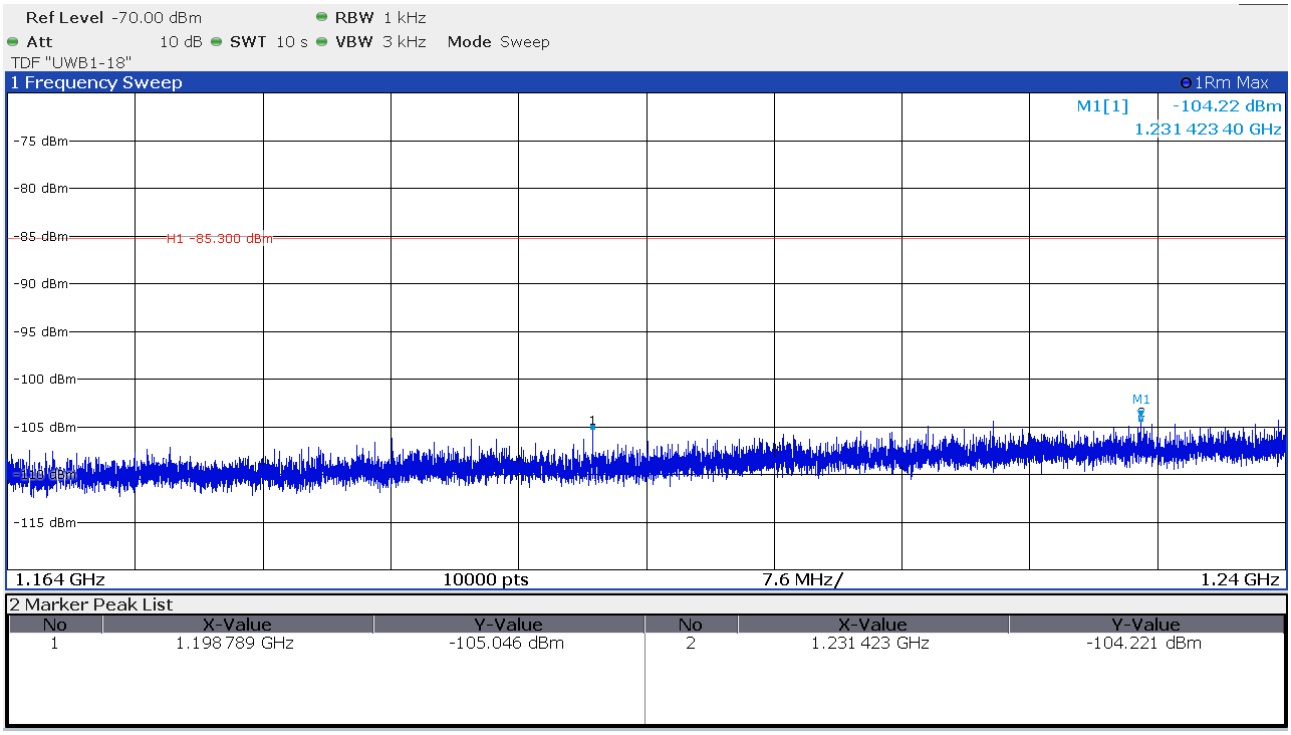

2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.569 687 GHz | -104.931 dBm | 4 | 1.603 388 GHz | -104.790 dBm |
| 2 | 1.578 597 GHz | -104.887 dBm | 5 | 1.607 978 GHz | -104.008 dBm |
| 3 | 1.597 706 GHz | -104.538 dBm | | | |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

## Channel 8 antenna 2 vertical

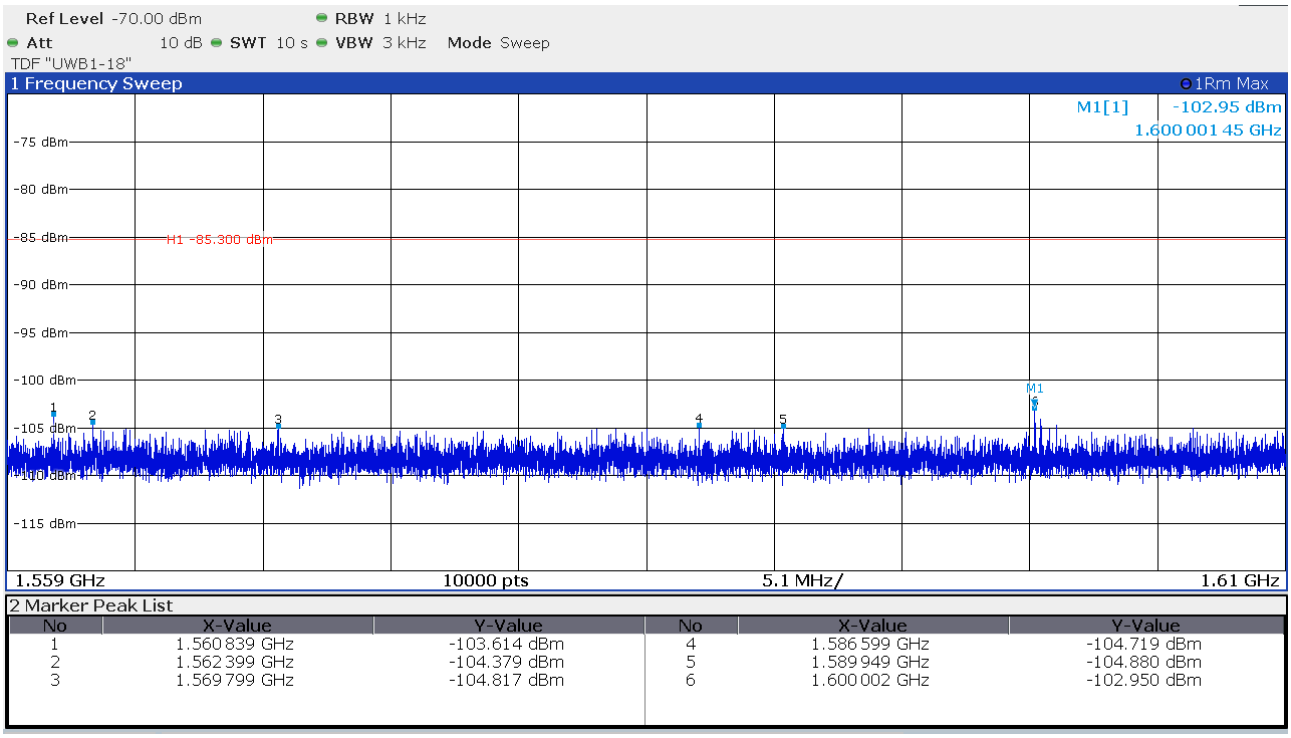
1164 MHz to 1240 MHz




2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.198 789 GHz | -105.046 dBm | 2 | 1.231 423 GHz | -104.221 dBm |

1559 MHz to 1610 MHz



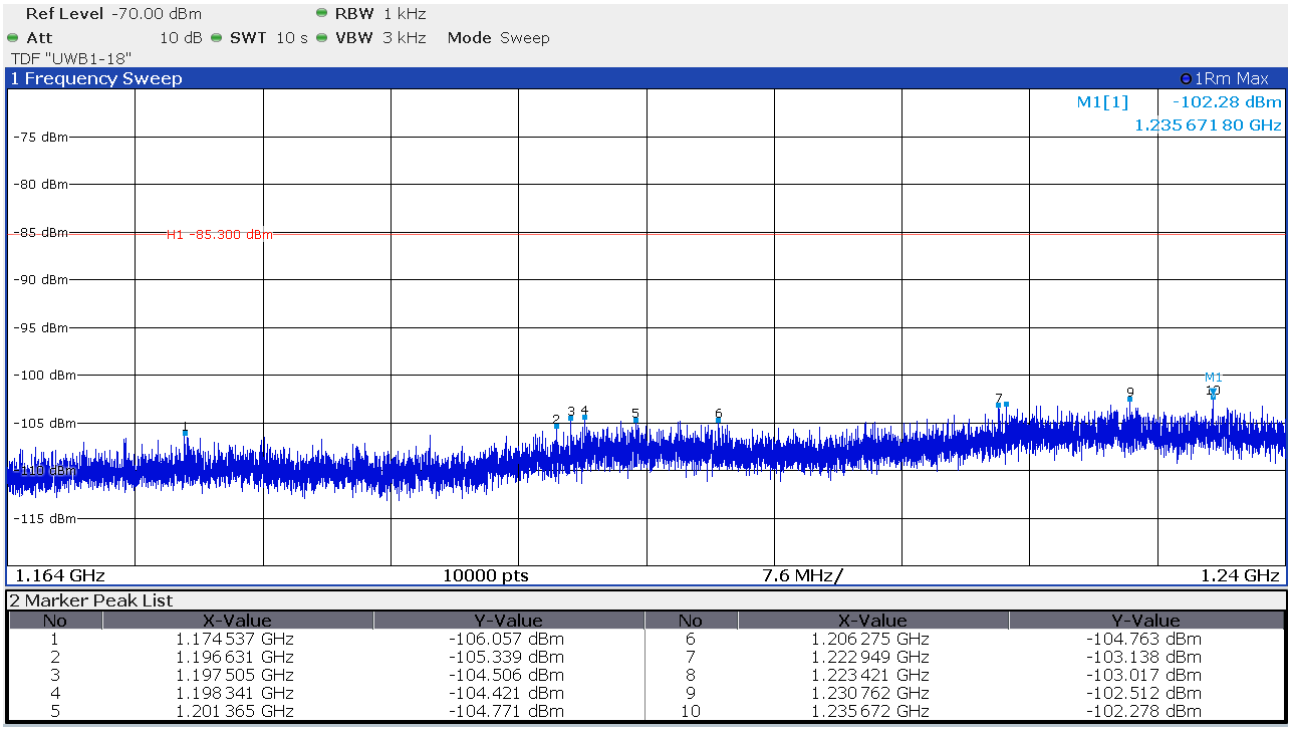

2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.560 839 GHz | -103.614 dBm | 4 | 1.586 599 GHz | -104.719 dBm |
| 2 | 1.562 399 GHz | -104.379 dBm | 5 | 1.589 949 GHz | -104.880 dBm |
| 3 | 1.569 799 GHz | -104.817 dBm | 6 | 1.600 002 GHz | -102.950 dBm |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

## Channel 9 antenna 1 horizontal

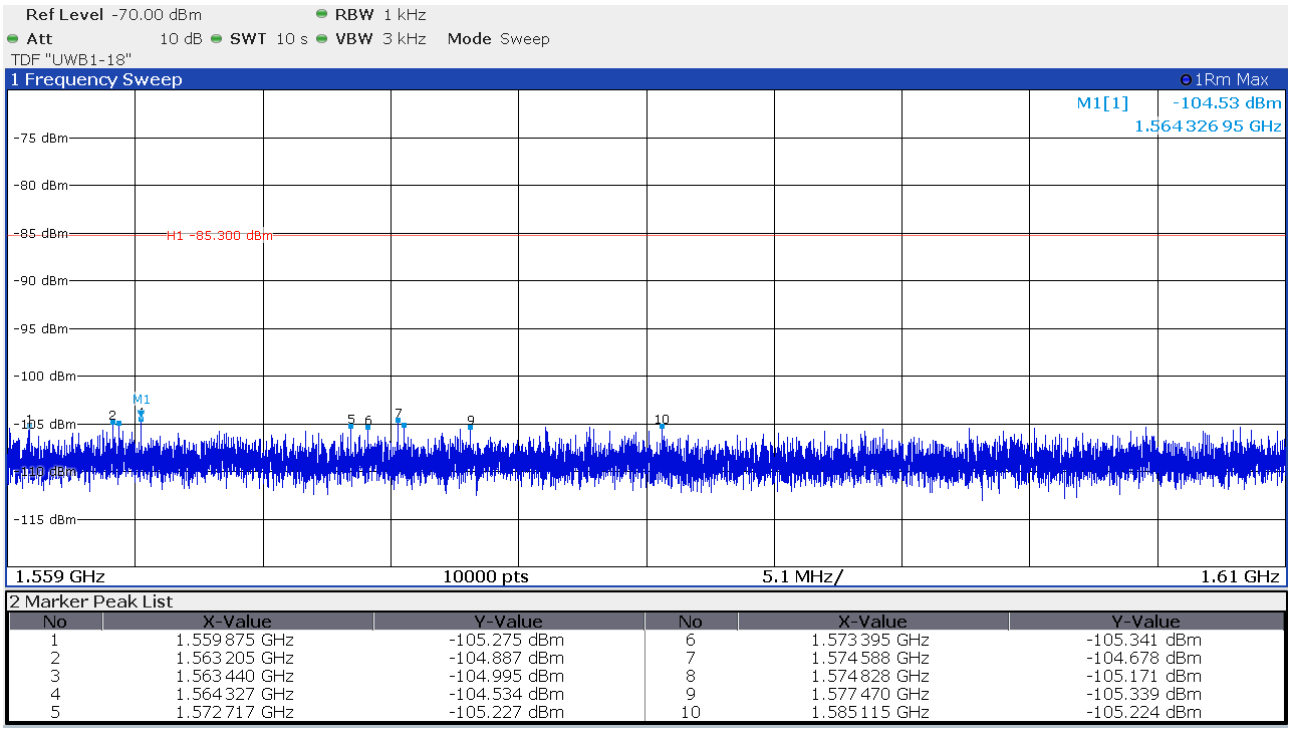
1164 MHz to 1240 MHz




2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.174 537 GHz | -106.057 dBm | 6 | 1.206 275 GHz | -104.763 dBm |
| 2 | 1.196 631 GHz | -105.339 dBm | 7 | 1.222 949 GHz | -103.138 dBm |
| 3 | 1.197 505 GHz | -104.506 dBm | 8 | 1.223 421 GHz | -103.017 dBm |
| 4 | 1.198 341 GHz | -104.421 dBm | 9 | 1.230 762 GHz | -102.512 dBm |
| 5 | 1.201 365 GHz | -104.771 dBm | 10 | 1.235 672 GHz | -102.278 dBm |

1559 MHz to 1610 MHz



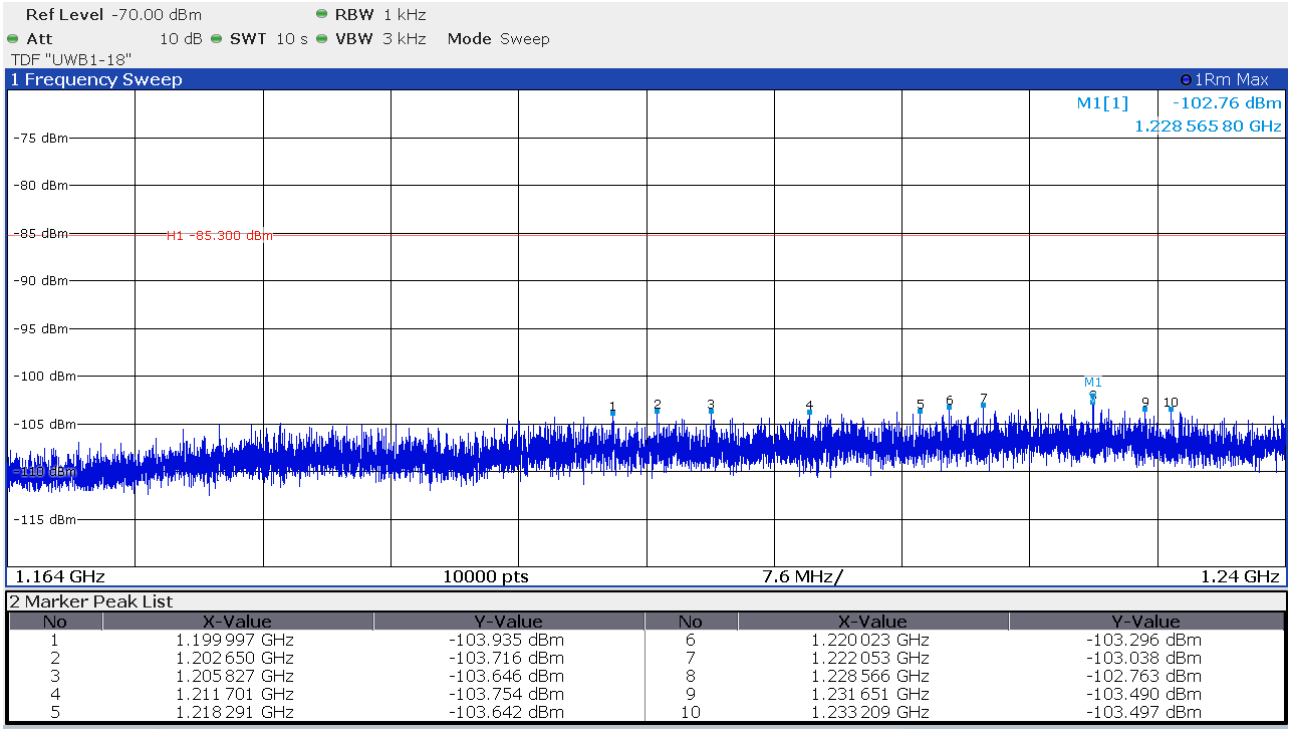

2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.559 875 GHz | -105.275 dBm | 6 | 1.573 395 GHz | -105.341 dBm |
| 2 | 1.563 205 GHz | -104.887 dBm | 7 | 1.574 588 GHz | -104.678 dBm |
| 3 | 1.563 440 GHz | -104.995 dBm | 8 | 1.574 828 GHz | -105.171 dBm |
| 4 | 1.564 327 GHz | -104.534 dBm | 9 | 1.577 470 GHz | -105.339 dBm |
| 5 | 1.572 717 GHz | -105.227 dBm | 10 | 1.585 115 GHz | -105.224 dBm |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

## Channel 9 antenna 1 vertical

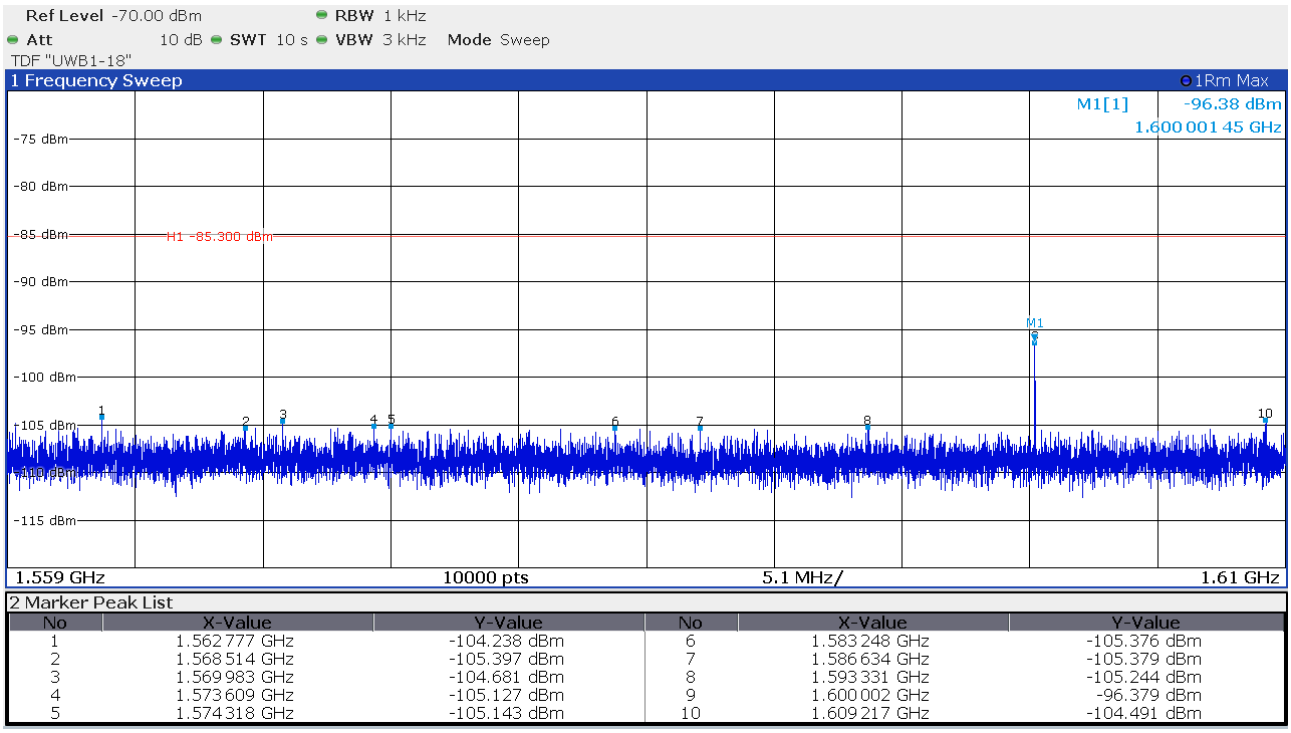
1164 MHz to 1240 MHz




2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.199 997 GHz | -103.935 dBm | 6 | 1.220 023 GHz | -103.296 dBm |
| 2 | 1.202 650 GHz | -103.716 dBm | 7 | 1.222 053 GHz | -103.038 dBm |
| 3 | 1.205 827 GHz | -103.646 dBm | 8 | 1.228 566 GHz | -102.763 dBm |
| 4 | 1.211 701 GHz | -103.754 dBm | 9 | 1.231 651 GHz | -103.490 dBm |
| 5 | 1.218 291 GHz | -103.642 dBm | 10 | 1.233 209 GHz | -103.497 dBm |

1559 MHz to 1610 MHz



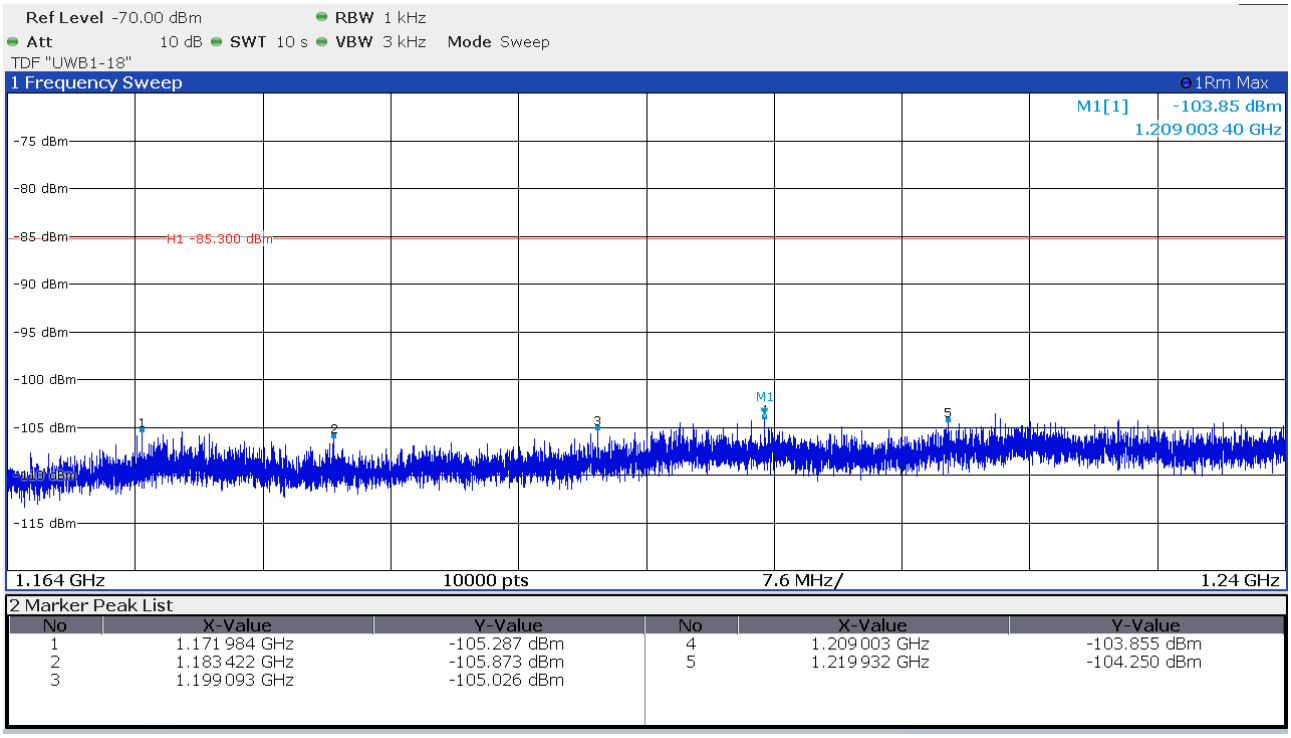

2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.562 777 GHz | -104.238 dBm | 6 | 1.583 248 GHz | -105.376 dBm |
| 2 | 1.568 514 GHz | -105.397 dBm | 7 | 1.586 634 GHz | -105.379 dBm |
| 3 | 1.569 983 GHz | -104.681 dBm | 8 | 1.593 331 GHz | -105.244 dBm |
| 4 | 1.573 609 GHz | -105.127 dBm | 9 | 1.600 002 GHz | -96.379 dBm |
| 5 | 1.574 318 GHz | -105.143 dBm | 10 | 1.609 217 GHz | -104.491 dBm |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

## Channel 9 antenna 2 horizontal

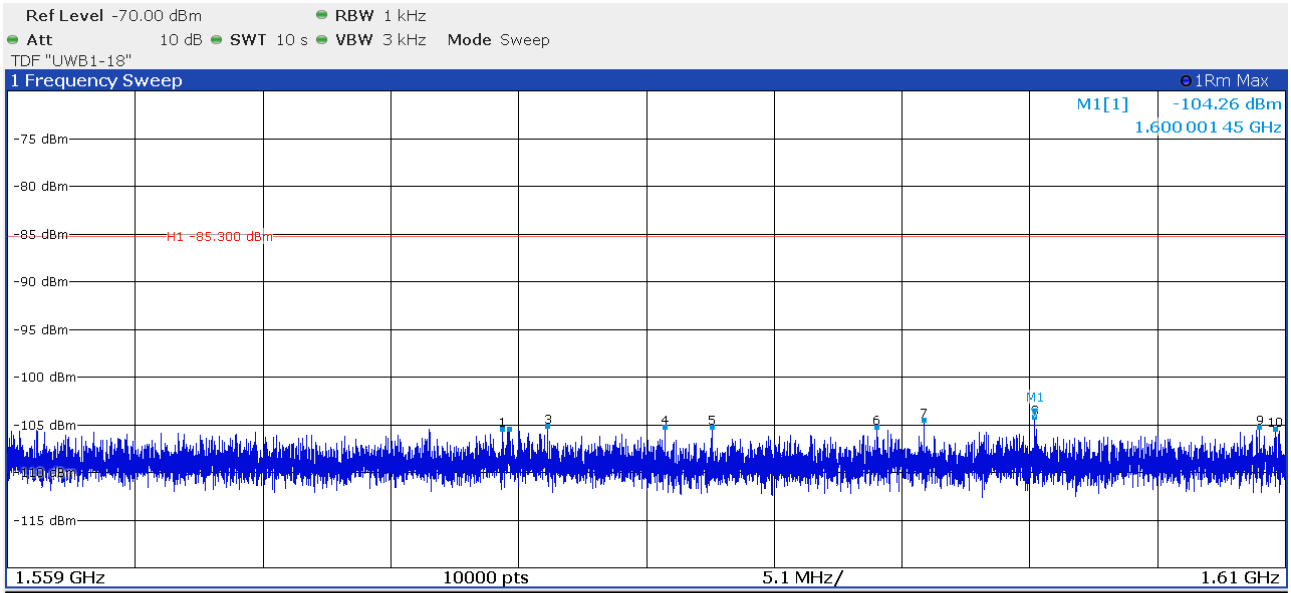
1164 MHz to 1240 MHz




2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.171 984 GHz | -105.287 dBm | 4 | 1.209 003 GHz | -103.855 dBm |
| 2 | 1.183 422 GHz | -105.873 dBm | 5 | 1.219 932 GHz | -104.250 dBm |
| 3 | 1.199 093 GHz | -105.026 dBm | | | |

1559 MHz to 1610 MHz



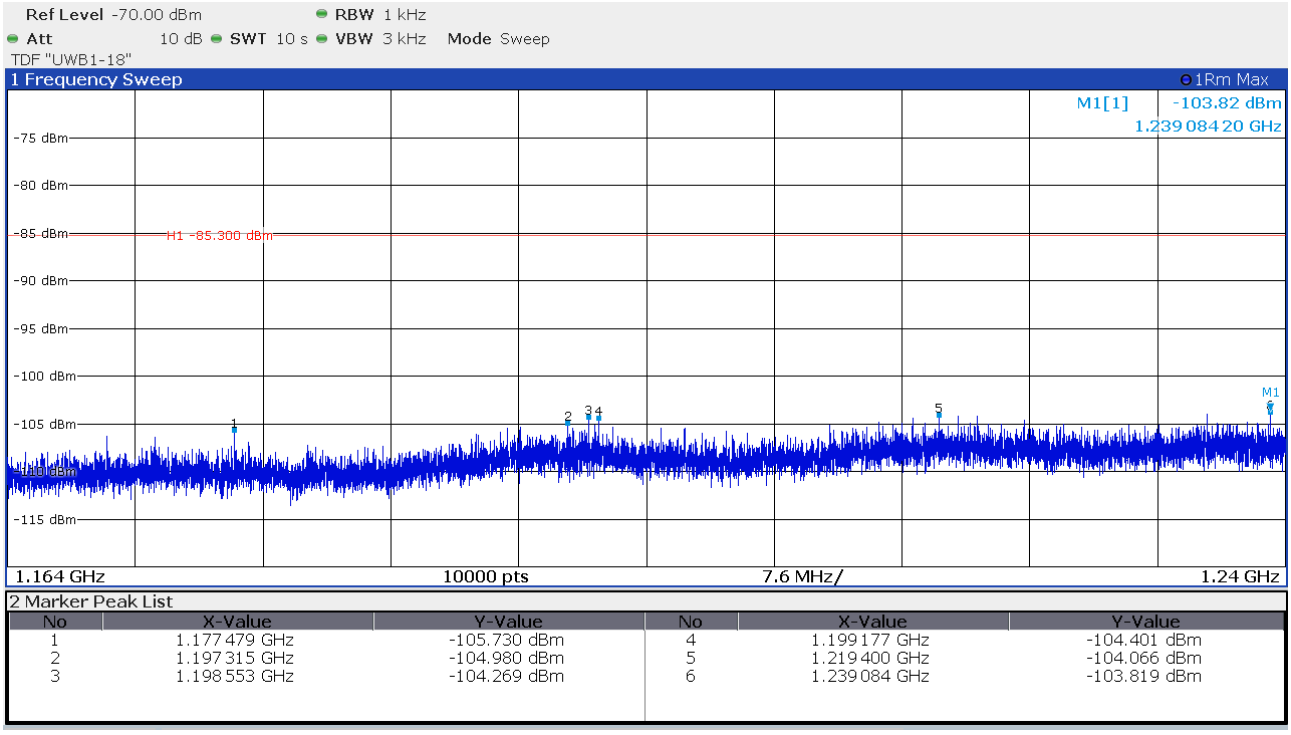

2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.578 750 GHz | -105.459 dBm | 6 | 1.593 693 GHz | -105.226 dBm |
| 2 | 1.579 030 GHz | -105.455 dBm | 7 | 1.595 575 GHz | -104.529 dBm |
| 3 | 1.580 555 GHz | -105.200 dBm | 8 | 1.600 002 GHz | -104.261 dBm |
| 4 | 1.585 227 GHz | -105.266 dBm | 9 | 1.608 972 GHz | -105.211 dBm |
| 5 | 1.587 119 GHz | -105.312 dBm | 10 | 1.609 615 GHz | -105.470 dBm |

# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

## Channel 9 antenna 2 vertical

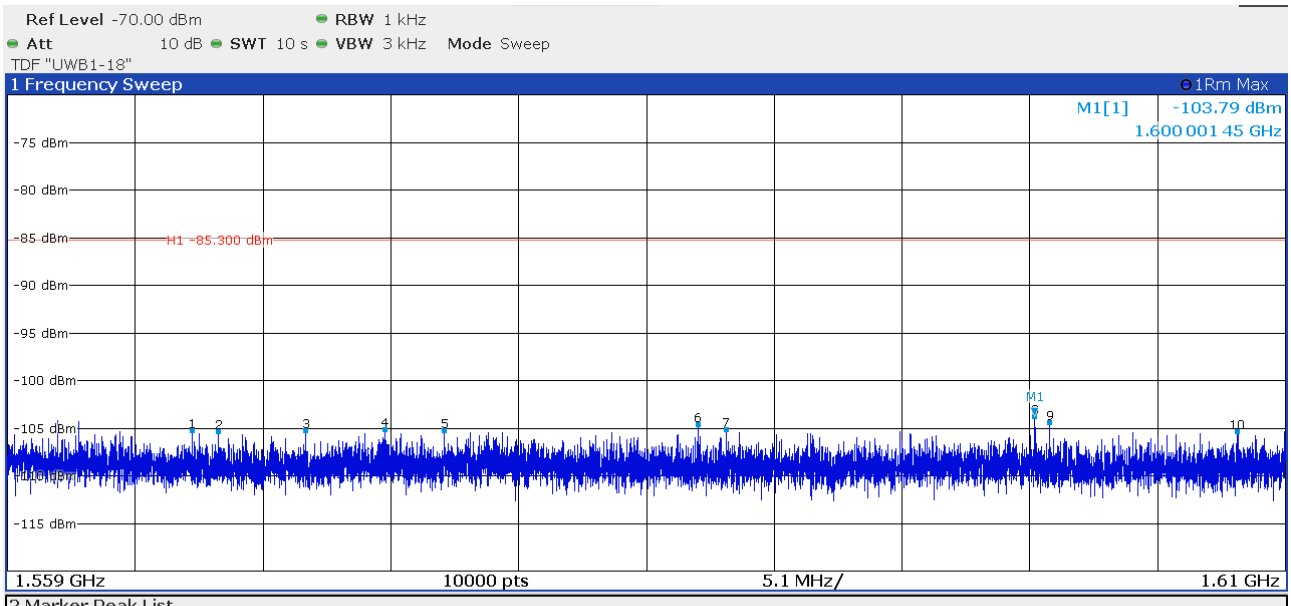
1164 MHz to 1240 MHz




2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.177 479 GHz | -105.730 dBm | 4 | 1.199 177 GHz | -104.401 dBm |
| 2 | 1.197 315 GHz | -104.980 dBm | 5 | 1.219 400 GHz | -104.066 dBm |
| 3 | 1.198 553 GHz | -104.269 dBm | 6 | 1.239 084 GHz | -103.819 dBm |

1559 MHz to 1610 MHz




2 Marker Peak List

| No | X-Value | Y-Value | No | X-Value | Y-Value |
|---|---|---|---|---|---|
| 1 | 1.566 362 GHz | -105.229 dBm | 6 | 1.586 558 GHz | -104.645 dBm |
| 2 | 1.567 423 GHz | -105.341 dBm | 7 | 1.587 675 GHz | -105.108 dBm |
| 3 | 1.570 916 GHz | -105.285 dBm | 8 | 1.600 002 GHz | -103.793 dBm |
| 4 | 1.574 073 GHz | -105.127 dBm | 9 | 1.600 588 GHz | -104.451 dBm |
| 5 | 1.576 439 GHz | -105.295 dBm | 10 | 1.608 095 GHz | -105.323 dBm |

## FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

Limit according §15.519(c) in the frequency

| Frequency in MHz | EIRP in dBm |
|---|---|
| 1164-1240 | −85.3 |
| 1559-1610 | −85.3 |

The requirements are **FULFILLED.**

**Remarks:** Tests were performed with EUT GSNr500.

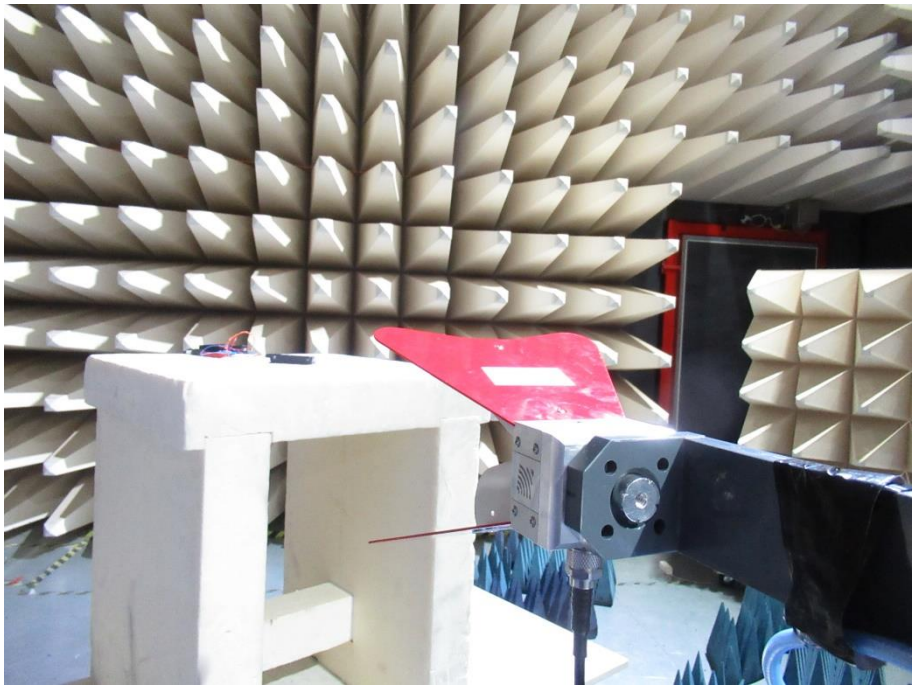
## 5.5 Peak Power radiated

For test instruments and accessories used see section 6 Part **CPR 3**.

### 5.5.1 Description of the test location

Test location: Anechoic chamber 1

### 5.5.2 Photo documentation of the test set-up



### 5.5.3 Applicable standard

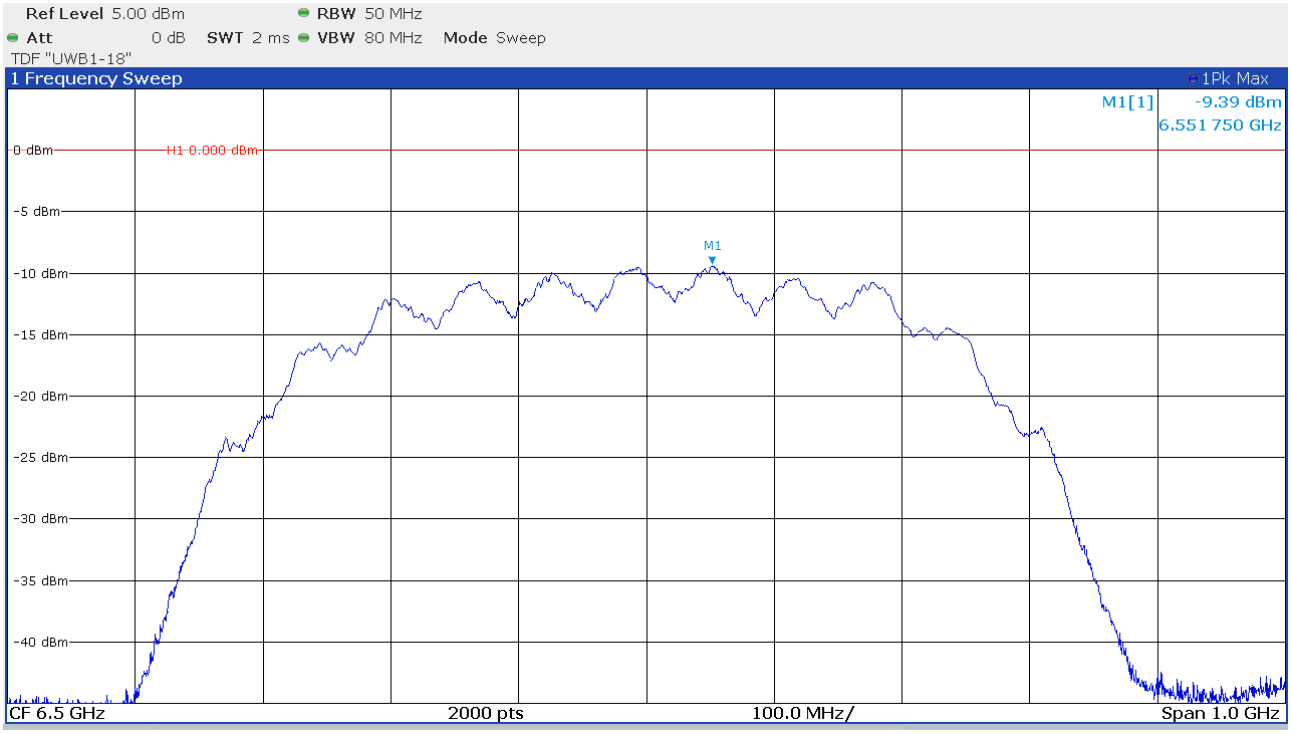
According to FCC Part 15, Section 15.519(e):
There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs, $f_M$. That limit is 0 dBm EIRP. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures described in §15.521.

### 5.5.4 Analyser settings

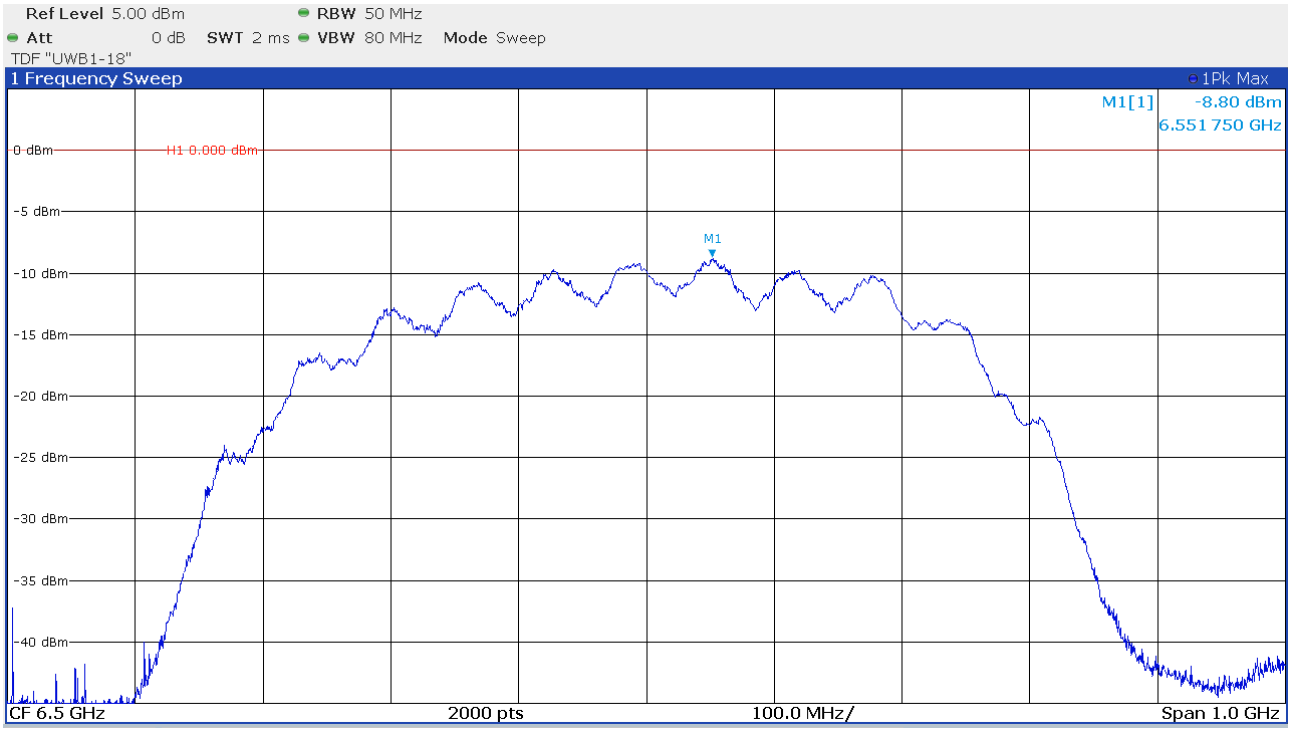
RBW: 50 MHz, VBW: 80 MHz, Detector: Peak, Trace Mode: Max hold

### 5.5.5 Test result

**Channel 5 antenna 1**

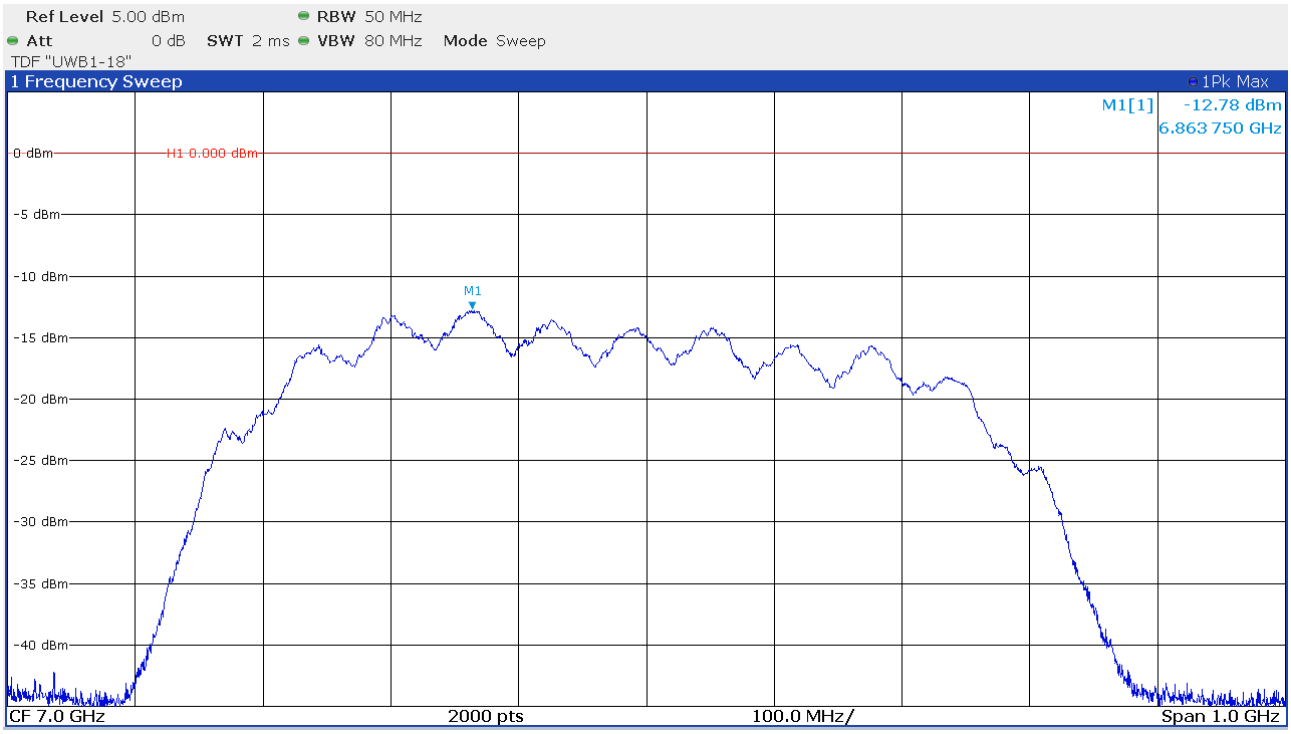



**Channel 5 antenna 2**

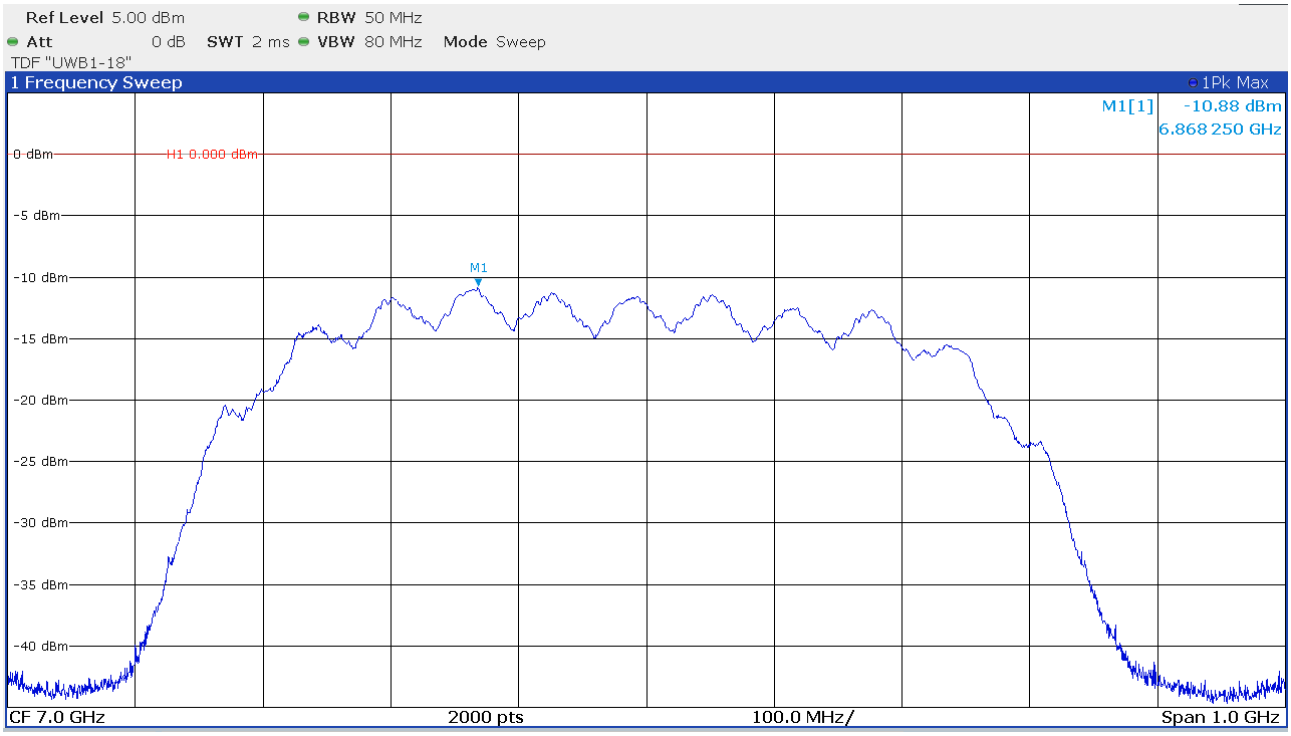


# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

## Channel 6 antenna 1

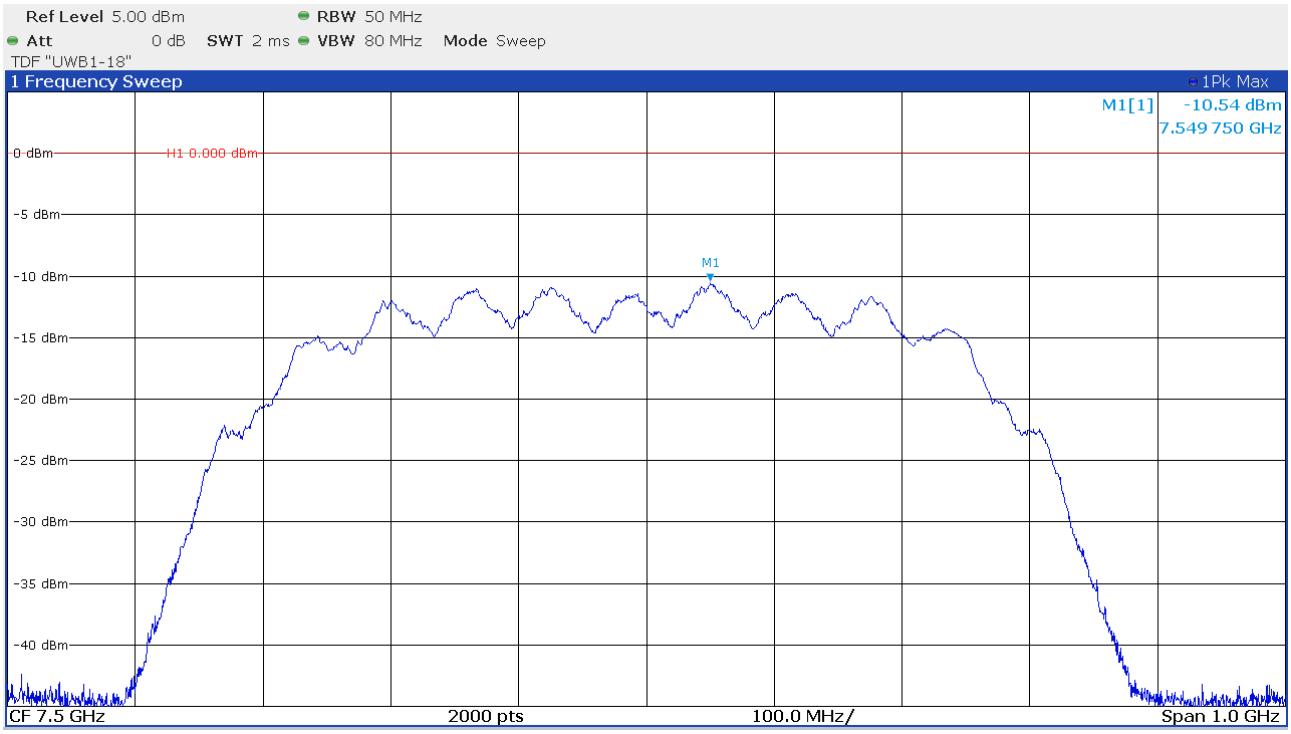



## Channel 6 antenna 2

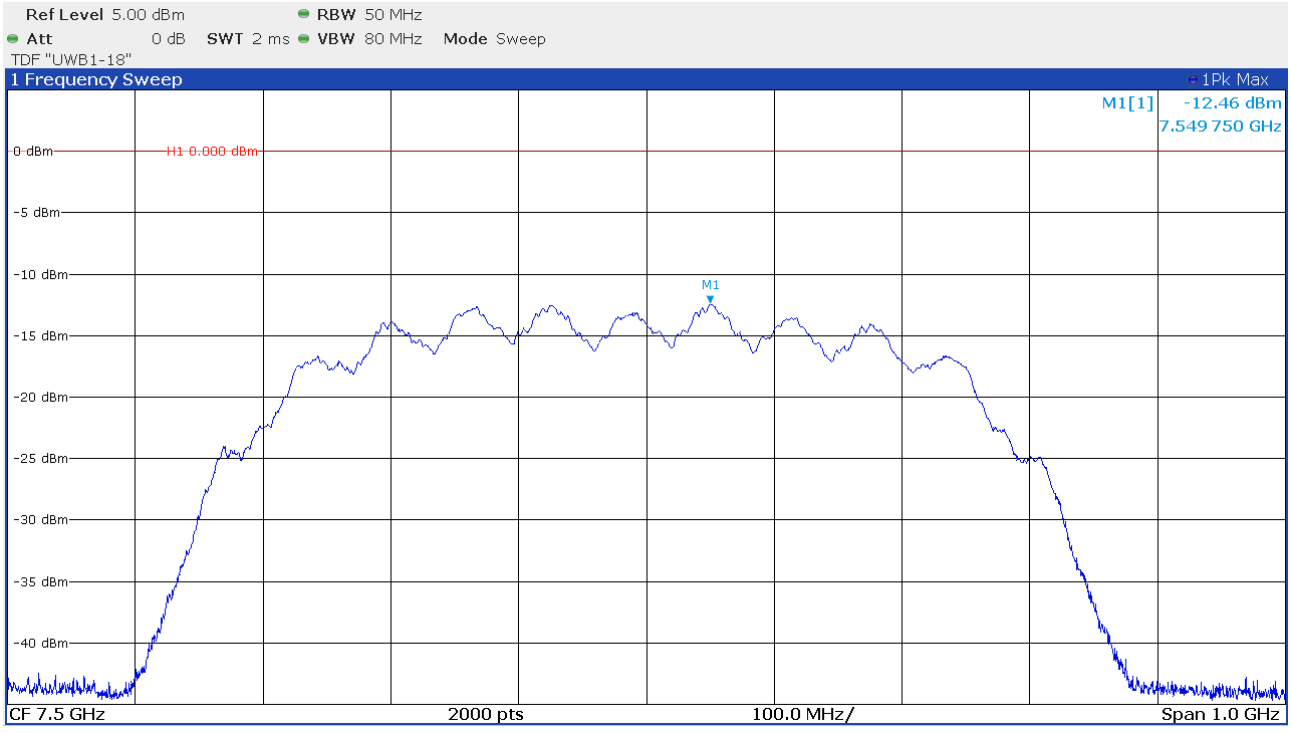


# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

## Channel 8 antenna 1

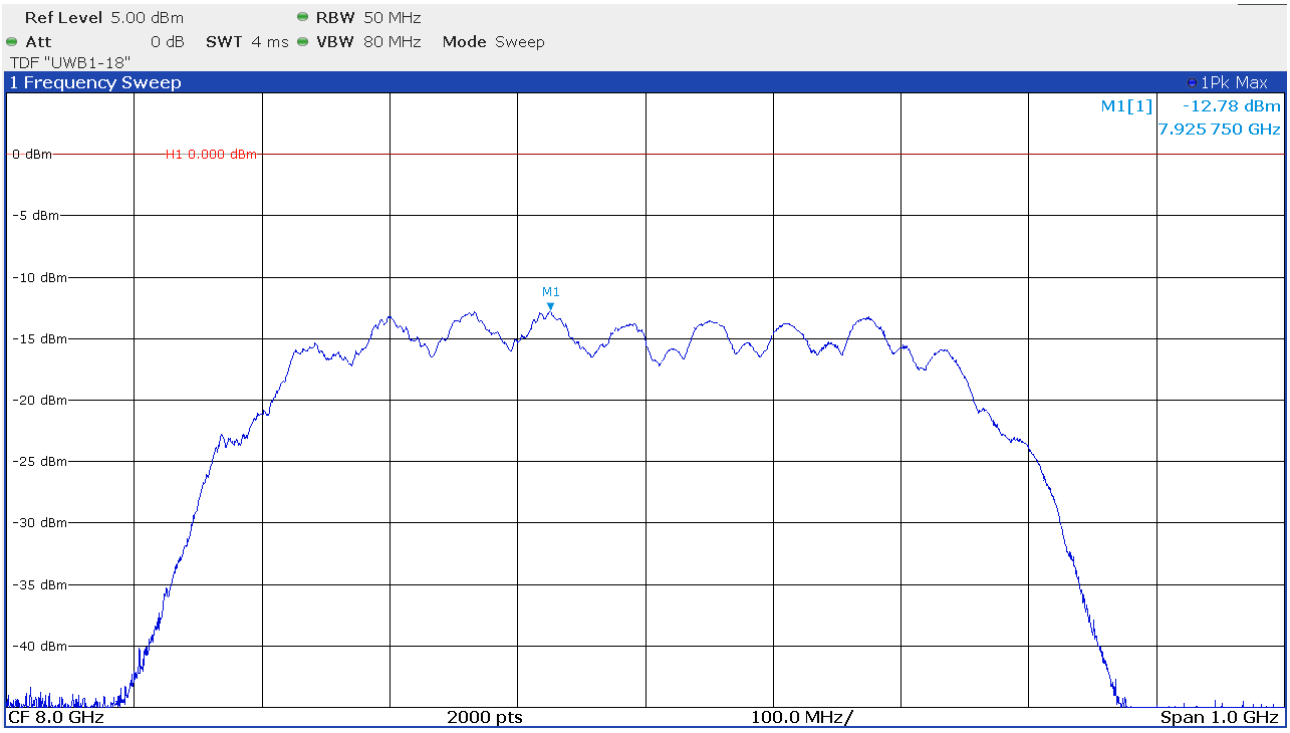



## Channel 8 antenna 2

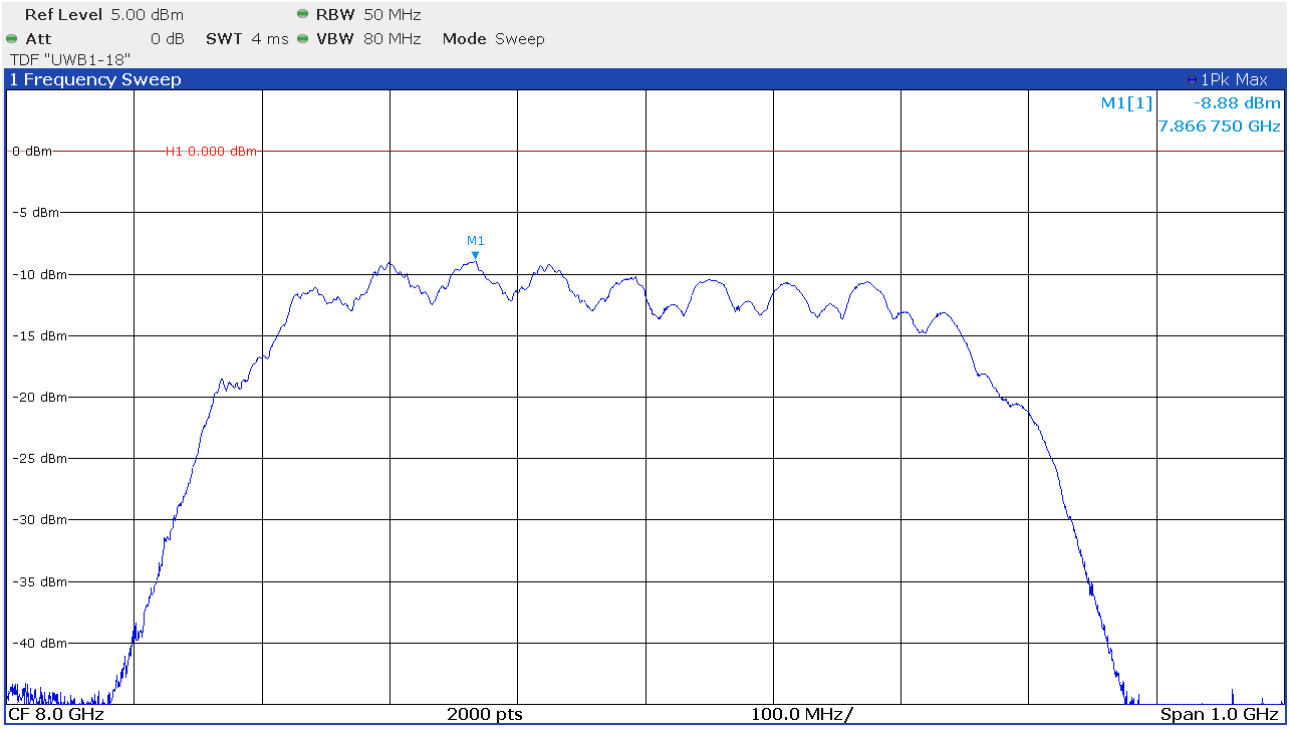


# FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

## Channel 9 antenna 1




## Channel 9 antenna 2



## FCC ID: KR5FBD5SMY23 IC: 7812D-FBD5SMY23

Min. limit margin: -8.88 dB at 7.86675 GHz

The requirements are **FULFILLED.**

**Remarks:** Tests were performed with EUT GSNr500.

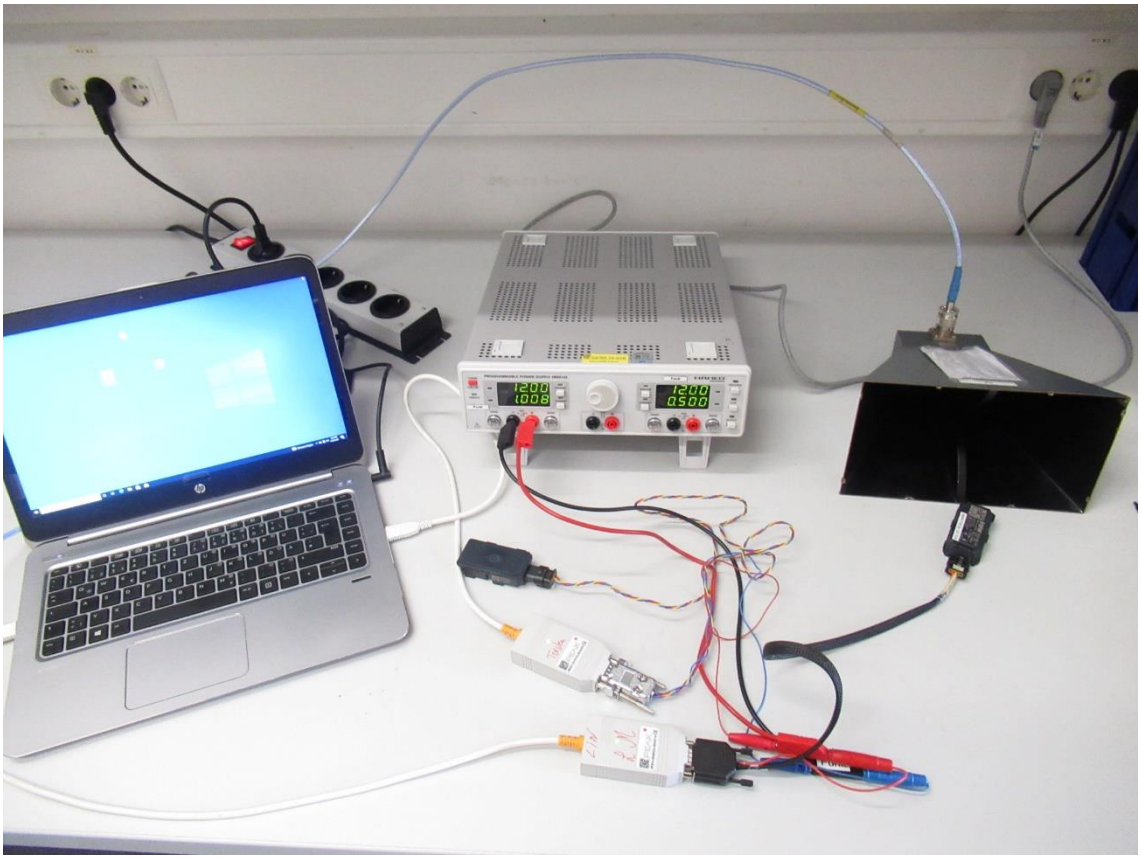
## 5.6 Signal deactivation

For test instruments and accessories used see section 6 Part **MB**.

### 5.6.1 Description of the test location

Test location: Shielded room S6

### 5.6.2 Photo documentation of the test set-up



### 5.6.3 Applicable standard

According to FCC Part 15, Section 15.519(a)(1):
A UWB device operating under the provisions of this section shall transmit only when it is sending information to an associated receiver. The UWB intentional radiator shall cease transmission within 10 seconds unless it receives an acknowledgement from the associated receiver that its transmission is being received. An acknowledgment of reception must continue to be received by the UWB intentional radiator at least every 10 seconds or the UWB device must cease transmitting.

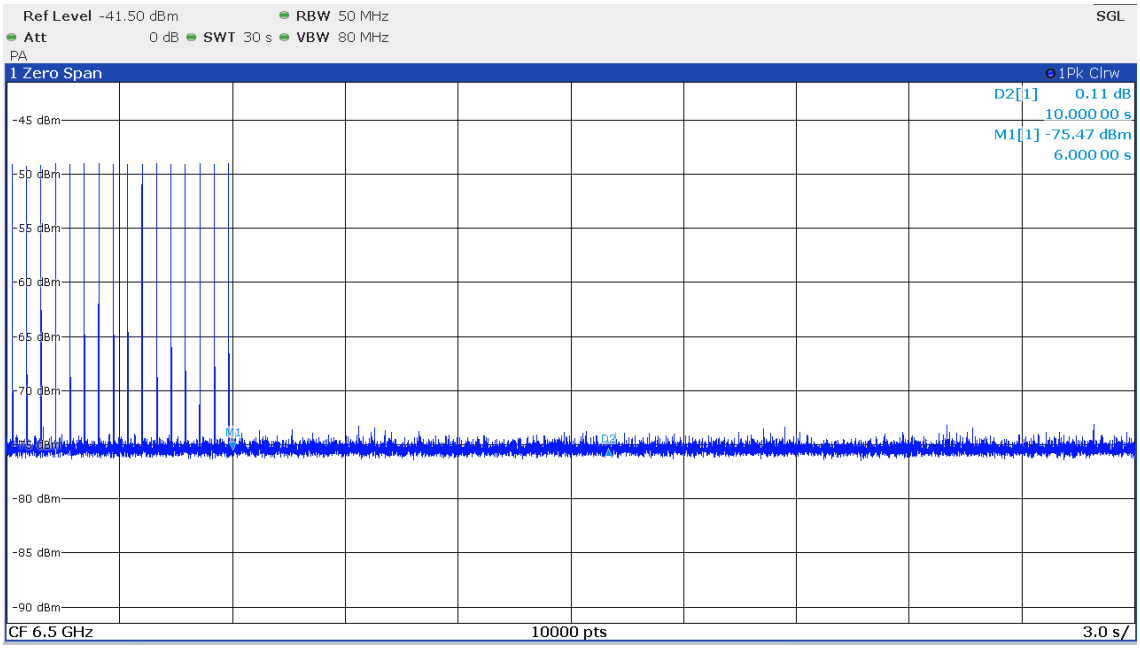
According to KDB 393764 D01 UWB FAQ v02 section 4:
An acknowledgement of reception must continue to be received by the UWB device at least once every 10 seconds, or else the device shall cease transmission of any information other than periodic signals for use in the establishment or re-establishment of a communications link with an associated receiver.

### 5.6.4 Description of Measurement

The measurement was performed radiated.

Spectrum analyser settings:
RBW: 50 MHz, VBW: 80 MHz, Detector: peak, zero span

### 5.6.5 Test result




**Explanation:**

The tests were performed with an EUT, which supports a total of four channels. The signal deactivation is independent of the chosen channel and shown here for a signal with channel 5.

At the time M1 (6 sec.) the companion device was powered off. The EUT immediately stops all transmissions. This behaviour is in accordance with the applicable standards.

The requirements are **FULFILLED.**

**Remarks:** None.

## 5.7 Antenna application

### 5.7.1 Applicable standard

According to FCC Part 15C, Section 15.203:
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit that broken antennas can be replaced by the user, but the use of a standard antenna jack is prohibited.

The EUT has integrated antennas. No other antenna can be used with the device.

All supplied antennas meet the requirements of part 15.203 and 15.204.

**Remarks:** None.

# 6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used are calibrated and verified regularly. The calibration history is available on request.

| Test ID | Model Type | Equipment No. | Next Calib. | Last Calib. | Next Verif. | Last Verif. |
|---|---|---|---|---|---|---|
| A 4 | BAT-EMC 3.21.0.24 | 01-02/68-13-001 | | | | |
| | ESCI | 02-02/03-15-001 | 17/06/2023 | 17/06/2022 | | |
| | ESH 2 - Z 5 | 02-02/20-05-004 | 31/10/2022 | 31/10/2019 | 22/09/2022 | 22/03/2022 |
| | N-4000-BNC | 02-02/50-05-138 | | | | |
| | ESH 3 - Z 2 | 02-02/50-05-155 | 13/11/2022 | 13/11/2019 | 08/09/2022 | 08/03/2022 |
| CPR 3 | FSW43 | 02-02/11-15-001 | 22/04/2023 | 22/04/2022 | | |
| | AMF-6D-01002000-22-10P | 02-02/17-15-004 | | | | |
| | 311702-02/24-05-009 | 28/06/2022 | 28/06/2021 | | | |
| | BAM 4.5-P | 02-02/50-17-024 | | | | |
| | NCD | 02-02/50-17-025 | | | | |
| | KK-SF106-2X11N-6,5M | 02-02/50-18-016 | | | | |
| | BAT-EMC 3.21.0.24 | 02-02/68-13-001 | | | | |
| MB | FSW43 | 02-02/11-21-001 | 16/05/2023 | 16/05/2022 | | |
| | BBHA 9120 | 02-02/24-05-031 | | | | |
| | HM 8143 | 02-02/50-10-016 | | | | |
| SER 2 | ESVS 30 | 02-02/03-05-006 | 09/07/2022 | 09/07/2021 | | |
| | VULB 9168 | 02-02/24-05-005 | 20/12/2022 | 20/12/2021 | 07/07/2022 | 07/07/2021 |
| | NW-2000-NB | 02-02/50-05-113 | | | | |
| | KK-EF393/U-16N-21N20 m | 02-02/50-12-018 | | | | |
| | KK-SD_7/8-2X21N-33,0M | 02-02/50-15-028 | | | | |
| | 50F-003 N 3 dB | 02-02/50-21-010 | | | | |
| SER 3 | FSW43 | 02-02/11-15-001 | 22/04/2023 | 22/04/2022 | | |
| | AMF-6D-01002000-22-10P | 02-02/17-15-004 | | | | |
| | LNA-40-18004000-33-5P | 02-02/17-20-002 | | | | |
| | 3117 | 02-02/24-05-009 | 28/06/2022 | 28/06/2021 | | |
| | BBHA 9170 | 02-02/24-05-013 | 19/05/2023 | 19/05/2020 | 10/03/2023 | 10/03/2022 |
| | BAM 4.5-P | 02-02/50-17-024 | | | | |
| | NCD | 02-02/50-17-025 | | | | |
| | KK-SF106-2X11N-6,5M | 02-02/50-18-016 | | | | |
| | ZHSS-11G-S+ | 02-02/50-20-025 | | | | |
| | KMS116-GL140SE-KMS116- | 02-02/50-20-026 | | | | |
| | BAT-EMC 3.21.0.24 | 02-02/68-13-001 | | | | |