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. : T46615-00-04FX	14. June 2021 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.

FCC ID: KR5FBD5S IC: 7812D-FBD5S

Contents

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 A1 and A2

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:	9
Serial number:	LM871 (continuous transmitting, channel 5, antenna 1), LM872 (continuous transmitting, channel 5, antenna 2), LM873 (continuous transmitting, channel 6, antenna 1), LM874 (continuous transmitting, channel 6, antenna 2), LM875 (continuous transmitting, channel 8, antenna 1), LM876 (continuous transmitting, channel 8, antenna 2), LM877 (continuous transmitting, channel 9, antenna 1), LM878 (continuous transmitting, channel 9, antenna 2), LM933 (UWB transceiver)
Firmware version:	A3C04888905
UWB driver version:	50D2C100_ATIC234

EUT configuration:
(The CDF filled by the applicant can be viewed at the test laboratory.)

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

2.9 Antenna

The following antennas shall be used with the EUT:

Number	Characteristic	Model number	Plug	f-range (GHz)	Gain (dBi)	Average Gain (dBi)
1	Omni	PCB antenna	none	3.1 – 10.6	5.9	1
2	Omni	PCB antenna	none	3.1 – 10.6	5.4	2

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:

- --- Model : ---

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 test software is used for continuous transmission and free power setting.

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)	RSS-Gen, 8.8	AC power line conducted emissions	passed
15.519(b)	RSS-220, 2, 5.1(a)	UWB Bandwidth	passed
15.209(a) 15.519(c)	RSS-Gen, 8.9 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)	RSS-220, 5.3.1(g)	Peak Power radiated	passed
15.519(a)	RSS-220, 5.3.1(b)	Signal deactivation	passed

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 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 : 04 August 2020

Testing concluded on : 07 October 2020

Checked by:

K. Gegenfurtner

Klaus Gegenfurtner
I confirm the correctness and integrity of this document
2021.06.15 09:10:17 +02'00'

Klaus Gegenfurtner
Teamleader Radio

Tested by:

I am the author of this document
2021.06.14 16:59:24 +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 (MHz)	Level (dBµV)	+	Factor (dB)	=	Level (dBµV/m)	-	CISPR Limit (dBµV/m)	=	Delta (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.

5.1.5 Test result

Frequency range: 0.15 MHz - 30 MHz

Min. limit margin -28.0 dB at 24.078 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

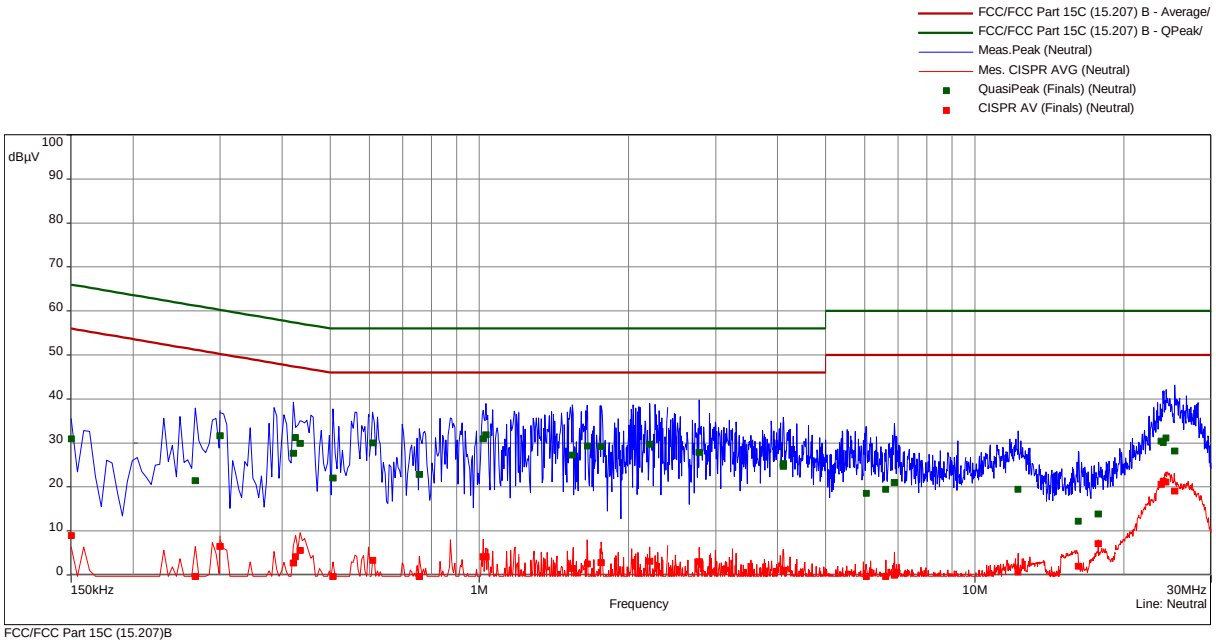
* Decreases with the logarithm of the frequency

The requirements are **FULFILLED.**

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

FCC ID: KR5FBD5S IC: 7812D-FBD5S

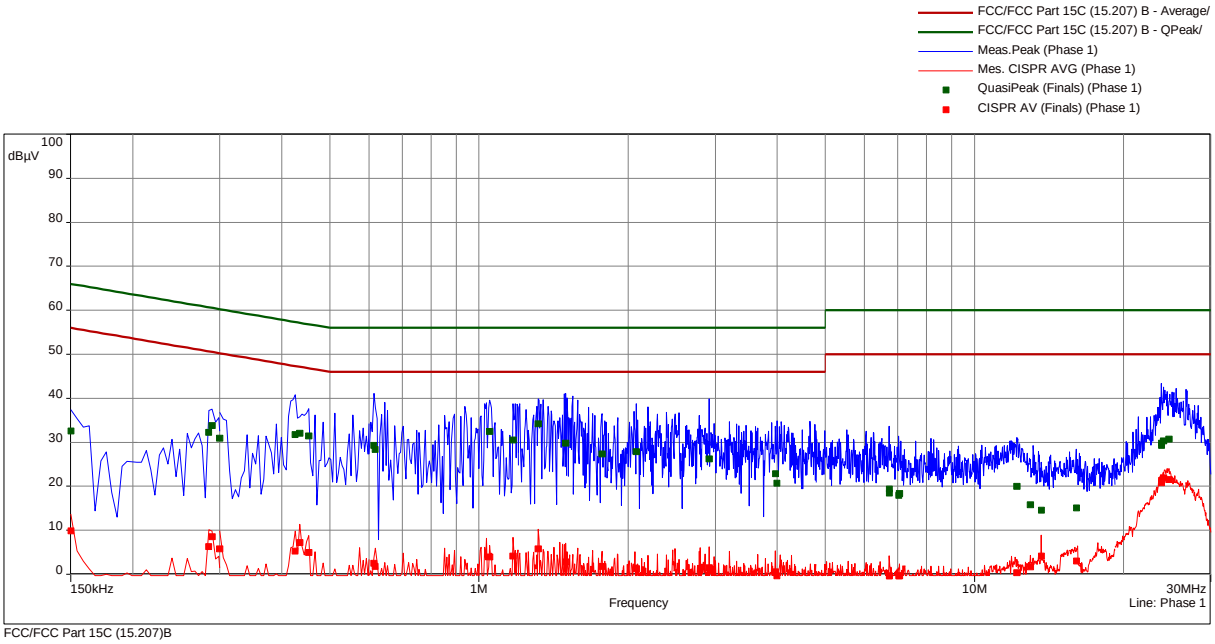
5.1.6 Test protocol



FCC/FCC Part 15C (15.207)B

freq	QP	margin	limit	AV	margin	limit	corr
MHz	dB(µV)	dB	dB	dB(µV)	dB	dB	dB
0.150	32.6	-33.4	66.0	10.0	-46.0	56.0	10.1
0.285	32.3	-28.4	60.7	6.3	-44.4	50.7	10.1
0.290	33.9	-26.7	60.5	8.6	-42.0	50.5	10.1
0.300	31.0	-29.2	60.2	5.8	-44.4	50.2	10.1
0.426	31.8	-25.5	57.3	5.4	-42.0	47.3	10.2
0.435	32.1	-25.1	57.2	7.3	-39.9	47.2	10.2
0.453	31.5	-25.4	56.8	5.1	-41.8	46.8	10.2
0.614	29.3	-26.7	56.0	2.6	-43.4	46.0	10.2
0.618	28.4	-27.6	56.0	1.8	-44.2	46.0	10.2
1.050	32.5	-23.5	56.0	4.0	-42.0	46.0	10.2
1.172	30.6	-25.4	56.0	4.2	-41.8	46.0	10.2
1.317	34.3	-21.8	56.0	5.9	-40.2	46.0	10.3
1.497	29.9	-26.1	56.0	2.9	-43.1	46.0	10.3
1.772	27.5	-28.5	56.0	1.9	-44.1	46.0	10.3
2.078	27.9	-28.1	56.0	1.3	-44.7	46.0	10.3
2.913	26.3	-29.7	56.0	1.6	-44.5	46.0	10.3
3.966	22.9	-33.1	56.0	0.6	-45.4	46.0	10.4
3.998	20.8	-35.2	56.0	-0.1	-46.1	46.0	10.4
6.722	18.6	-41.5	60.0	-0.1	-50.1	50.0	10.6
6.726	19.5	-40.5	60.0	-0.1	-50.1	50.0	10.6
7.028	18.0	-42.0	60.0	-0.2	-50.2	50.0	10.6
7.064	18.4	-41.6	60.0	-0.3	-50.3	50.0	10.6
12.174	20.1	-40.0	60.0	0.4	-49.6	50.0	10.9
12.984	15.8	-44.2	60.0	1.7	-48.3	50.0	11.0
13.637	14.6	-45.4	60.0	4.2	-45.8	50.0	11.1
16.053	15.1	-44.9	60.0	3.1	-46.9	50.0	11.3
23.844	29.8	-30.2	60.0	21.3	-28.7	50.0	11.6
23.889	29.4	-30.6	60.0	20.8	-29.2	50.0	11.6
24.078	30.4	-29.7	60.0	22.0	-28.0	50.0	11.6
24.677	30.8	-29.2	60.0	21.6	-28.4	50.0	11.7

FCC ID: KR5FBD5S IC: 7812D-FBD5S



FCC/FCC Part 15C (15.207)B

freq	QP	margin	limit	AV	margin	limit	corr
MHz	dB(µV)	dB	dB	dB(µV)	dB	dB	dB
0.150	31.0	-35.0	66.0	9.0	-47.0	56.0	10.1
0.267	21.5	-39.7	61.2	-0.2	-51.5	51.2	10.1
0.300	31.8	-28.5	60.2	6.5	-43.7	50.2	10.1
0.422	27.7	-29.7	57.4	2.8	-44.6	47.4	10.2
0.426	31.3	-26.1	57.3	4.2	-43.1	47.3	10.2
0.435	30.0	-27.2	57.2	5.6	-41.5	47.2	10.2
0.507	22.1	-33.9	56.0	-0.7	-46.7	46.0	10.2
0.609	30.1	-25.9	56.0	3.4	-42.7	46.0	10.2
0.758	22.9	-33.1	56.0	-0.2	-46.2	46.0	10.2
1.019	31.0	-25.0	56.0	4.2	-41.8	46.0	10.2
1.032	31.9	-24.1	56.0	4.2	-41.8	46.0	10.2
1.542	27.3	-28.7	56.0	1.5	-44.5	46.0	10.3
1.650	29.3	-26.7	56.0	2.6	-43.4	46.0	10.3
1.763	29.2	-26.8	56.0	2.8	-43.2	46.0	10.3
2.208	29.7	-26.3	56.0	3.2	-42.9	46.0	10.3
2.778	27.9	-28.1	56.0	3.1	-42.9	46.0	10.3
4.106	25.3	-30.7	56.0	1.0	-45.1	46.0	10.4
4.110	24.8	-31.3	56.0	1.1	-44.9	46.0	10.4
6.038	18.7	-41.3	60.0	-1.0	-51.0	50.0	10.5
6.614	19.5	-40.5	60.0	-0.1	-50.1	50.0	10.6
6.879	21.1	-38.9	60.0	0.0	-50.0	50.0	10.6
12.246	19.6	-40.5	60.0	0.7	-49.3	50.0	10.8
16.184	12.3	-47.7	60.0	2.1	-47.9	50.0	11.1
17.741	13.9	-46.1	60.0	7.2	-42.8	50.0	11.2
23.808	30.4	-29.6	60.0	20.7	-29.4	50.0	11.3
23.993	30.2	-29.8	60.0	21.4	-28.6	50.0	11.3
24.339	31.2	-28.8	60.0	21.2	-28.8	50.0	11.3
25.338	28.2	-31.8	60.0	19.1	-30.9	50.0	11.2

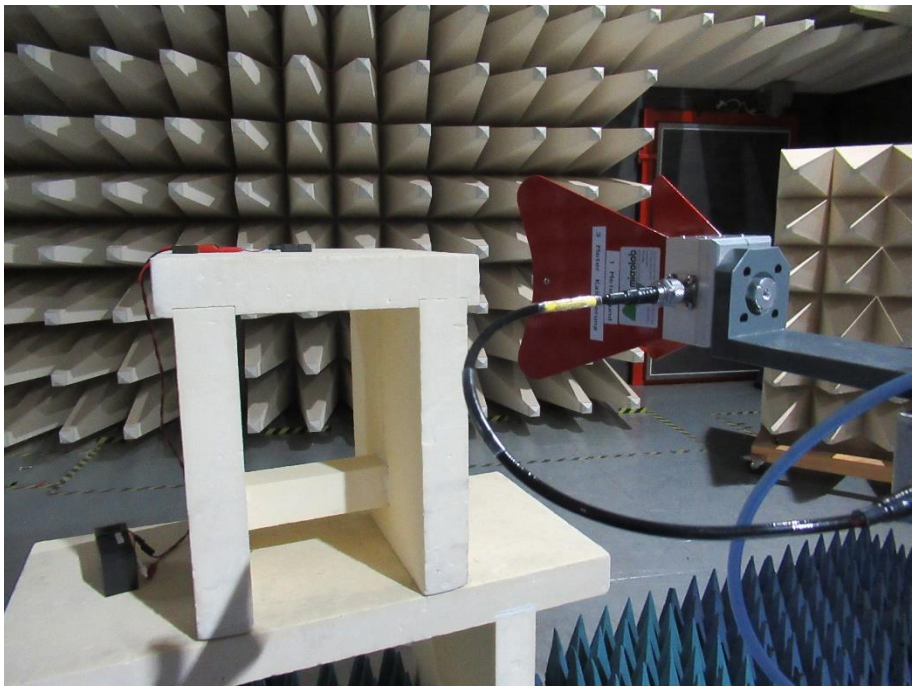
5.2 UWB Bandwidth

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	6229.11	6758.28	3.1 – 10.6	529.17	> 500	passed
5	2	6243.86	6755.15	3.1 – 10.6	511.29	> 500	passed
6	1	6701.45	7278.82	3.1 – 10.6	577.37	> 500	passed
6	2	6706.95	7272.32	3.1 – 10.6	565.37	> 500	passed
8	1	7201.04	7764.13	3.1 – 10.6	563.09	> 500	passed
8	2	7206.15	7761.63	3.1 – 10.6	555.48	> 500	passed
9	1	7703.62	8268.63	3.1 – 10.6	565.01	> 500	passed
9	2	7703.62	8266.49	3.1 – 10.6	562.87	> 500	passed

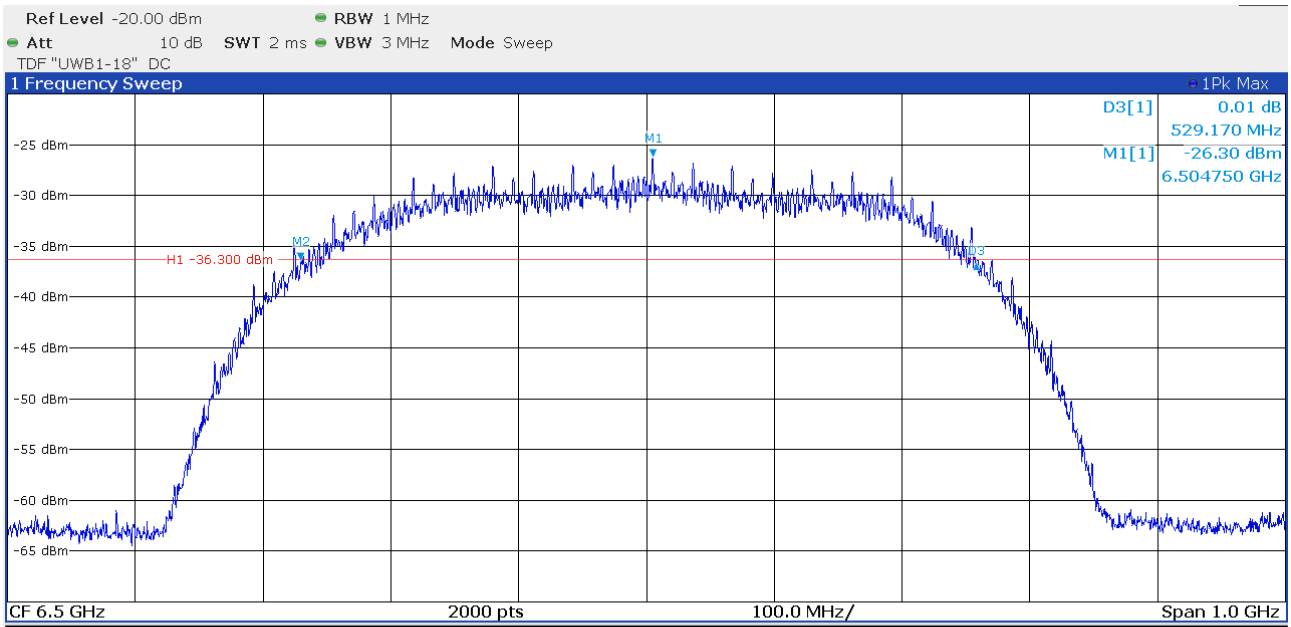
The requirements are **FULFILLED.**

Remarks: For detailed test results please refer to following test protocols.

FCC ID: KR5FBD5S IC: 7812D-FBD5S

5.2.6 Test protocols EBW

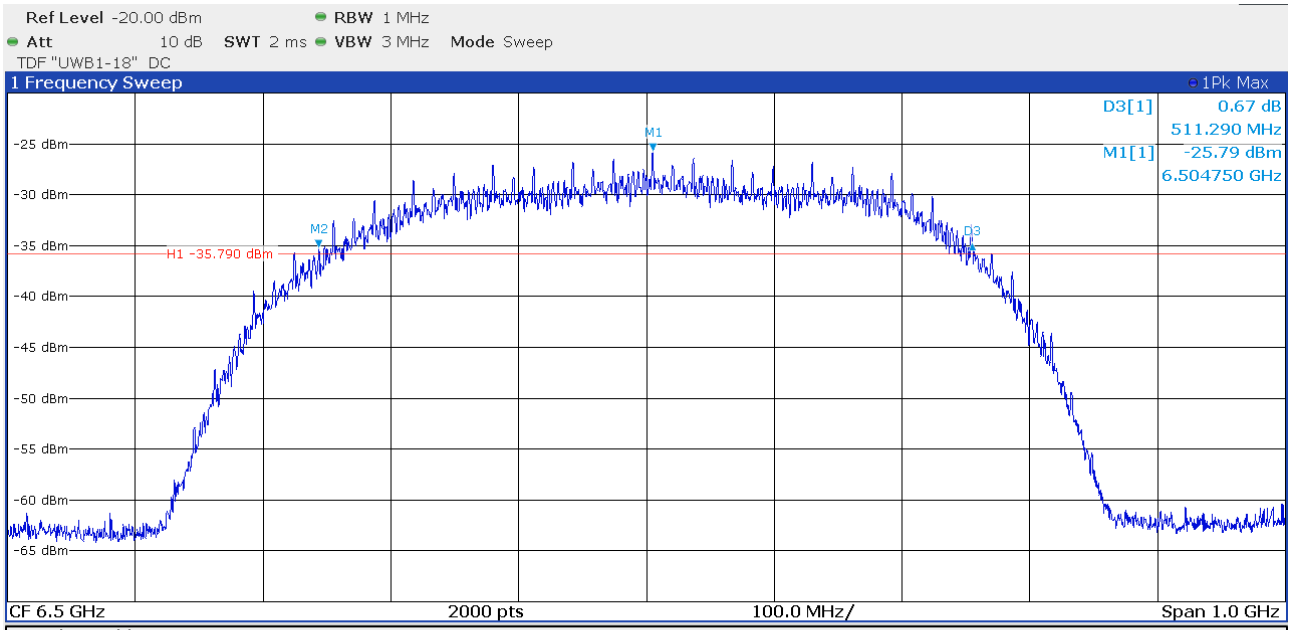
Channel 5 antenna 1



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	6.50475 GHz	-26.30 dBm		
M2		1	6.22911 GHz	-36.49 dBm		
D3	M2	1	529.17 MHz	0.01 dB		

Channel 5 antenna 2

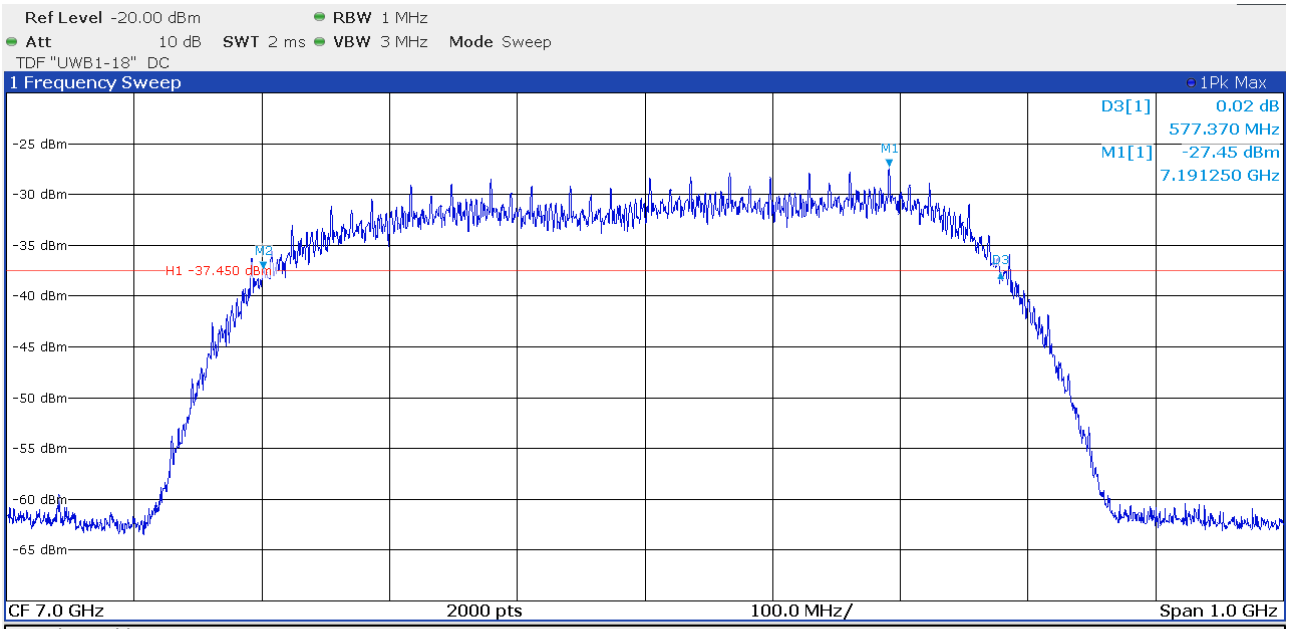


2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	6.50475 GHz	-25.79 dBm		
M2		1	6.24386 GHz	-35.34 dBm		
D3	M2	1	511.29 MHz	0.67 dB		

FCC ID: KR5FBD5S IC: 7812D-FBD5S

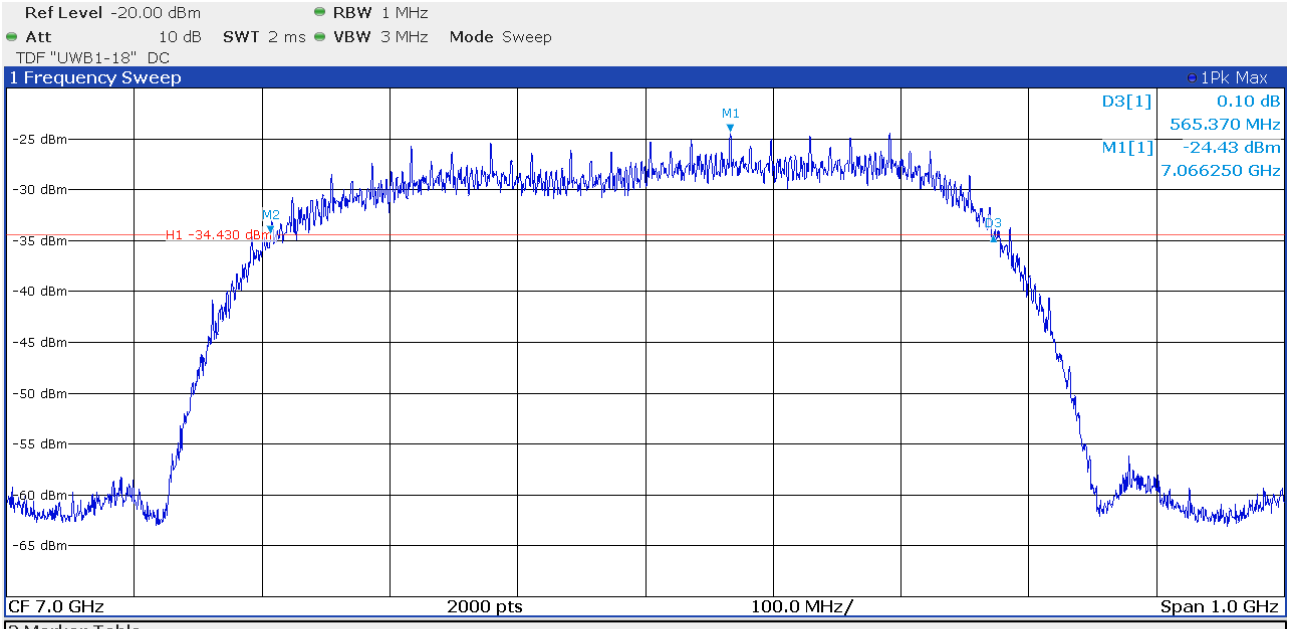
Channel 6 antenna 1



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	7.19125 GHz	-27.45 dBm		
M2		1	6.70145 GHz	-37.50 dBm		
D3	M2	1	577.37 MHz	0.02 dB		

Channel 6 antenna 2

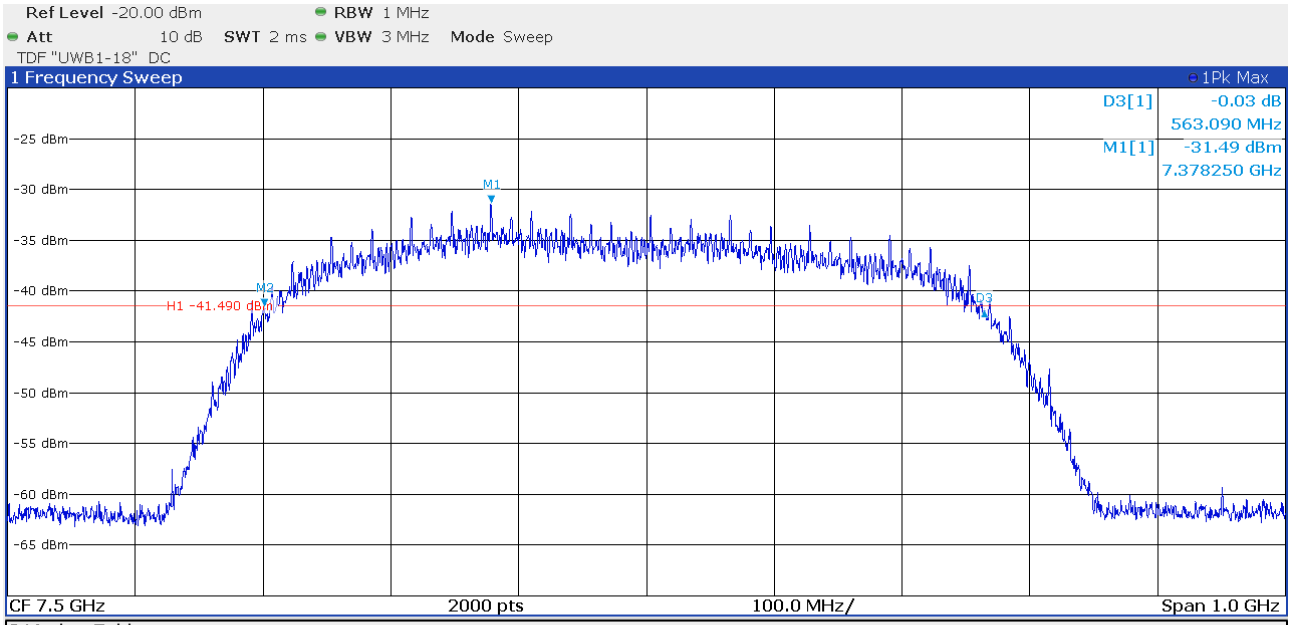


2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	7.06625 GHz	-24.43 dBm		
M2		1	6.70695 GHz	-34.45 dBm		
D3	M2	1	565.37 MHz	0.10 dB		

FCC ID: KR5FBD5S IC: 7812D-FBD5S

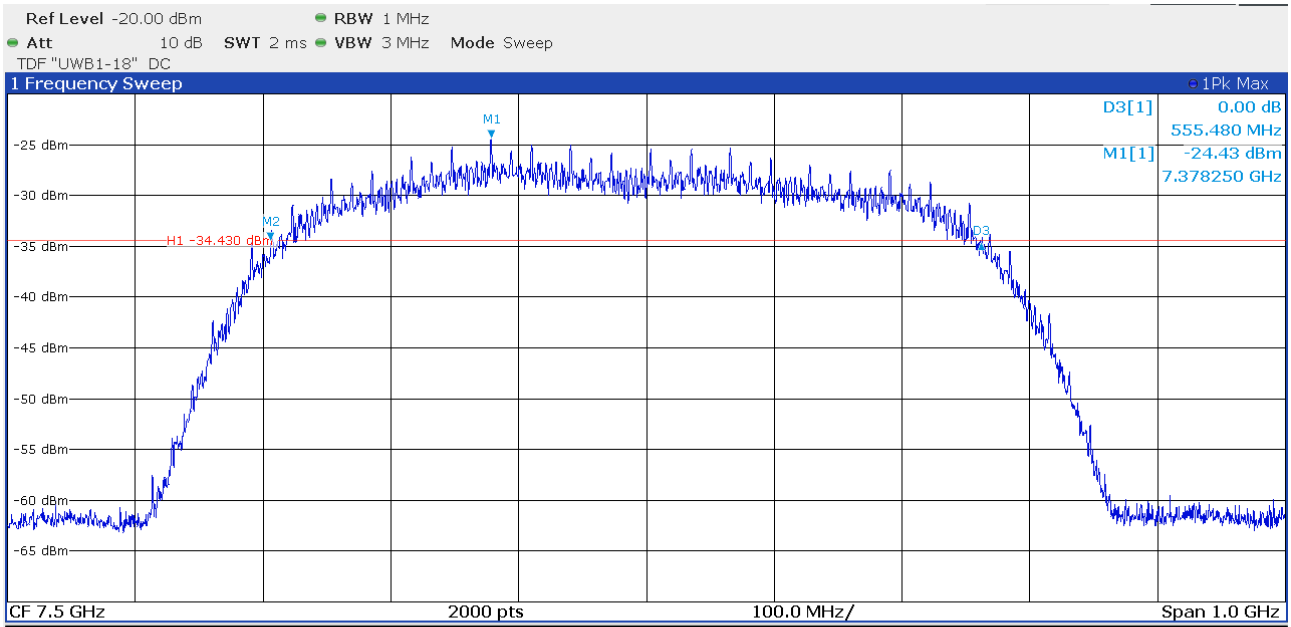
Channel 8 antenna 1



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	7.37825 GHz	-31.49 dBm		
M2		1	7.20104 GHz	-41.66 dBm		
D3	M2	1	563.09 MHz	-0.03 dB		

Channel 8 antenna 2

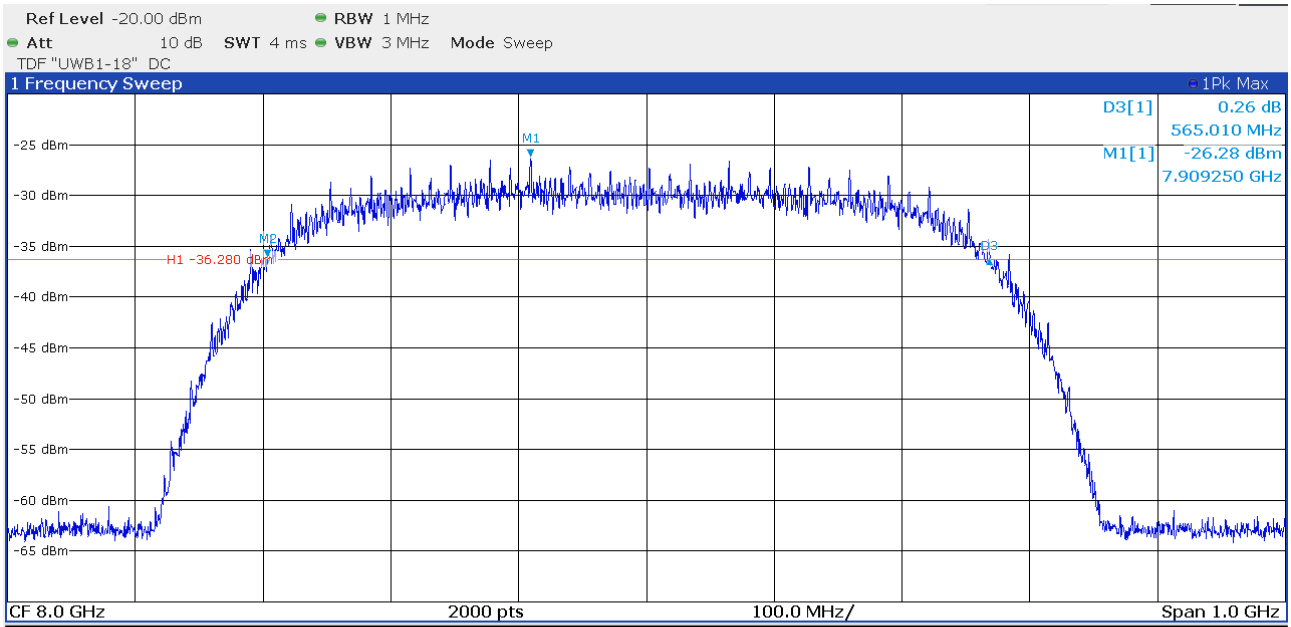


2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	7.37825 GHz	-24.43 dBm		
M2		1	7.20615 GHz	-34.50 dBm		
D3	M2	1	555.48 MHz	-0.00 dB		

FCC ID: KR5FBD5S IC: 7812D-FBD5S

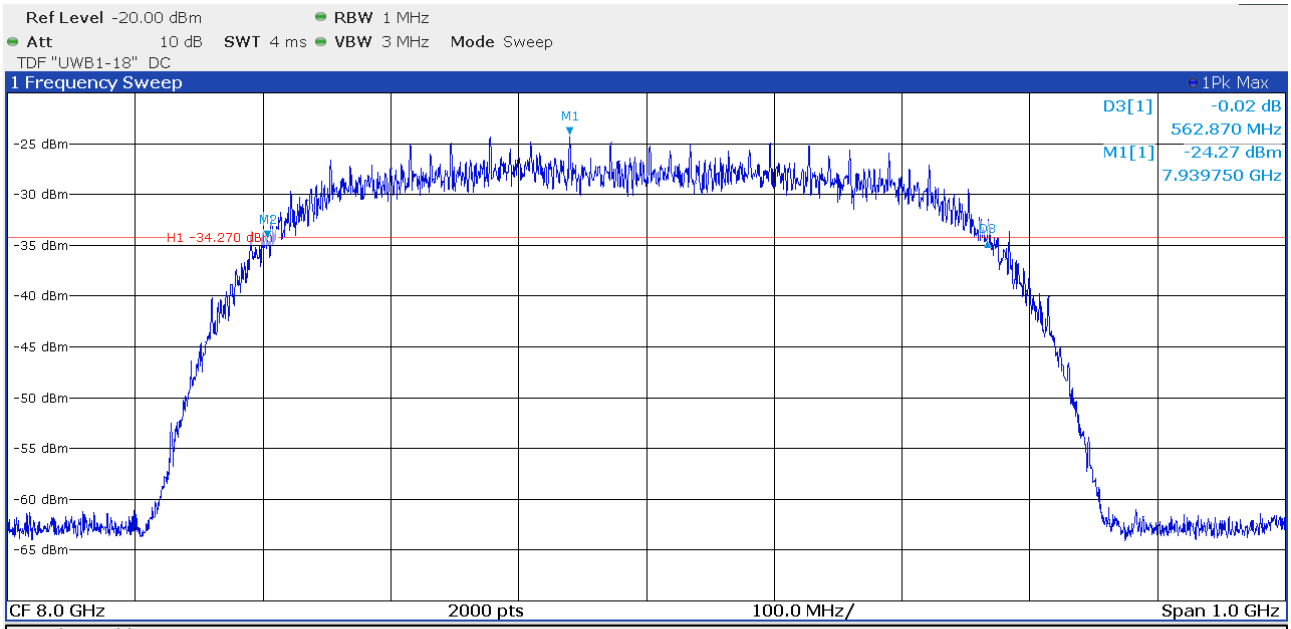
Channel 9 antenna 1



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	7.90925 GHz	-26.28 dBm		
M2		1	7.70362 GHz	-36.25 dBm		
D3	M2	1	565.01 MHz	0.26 dB		

Channel 9 antenna 2



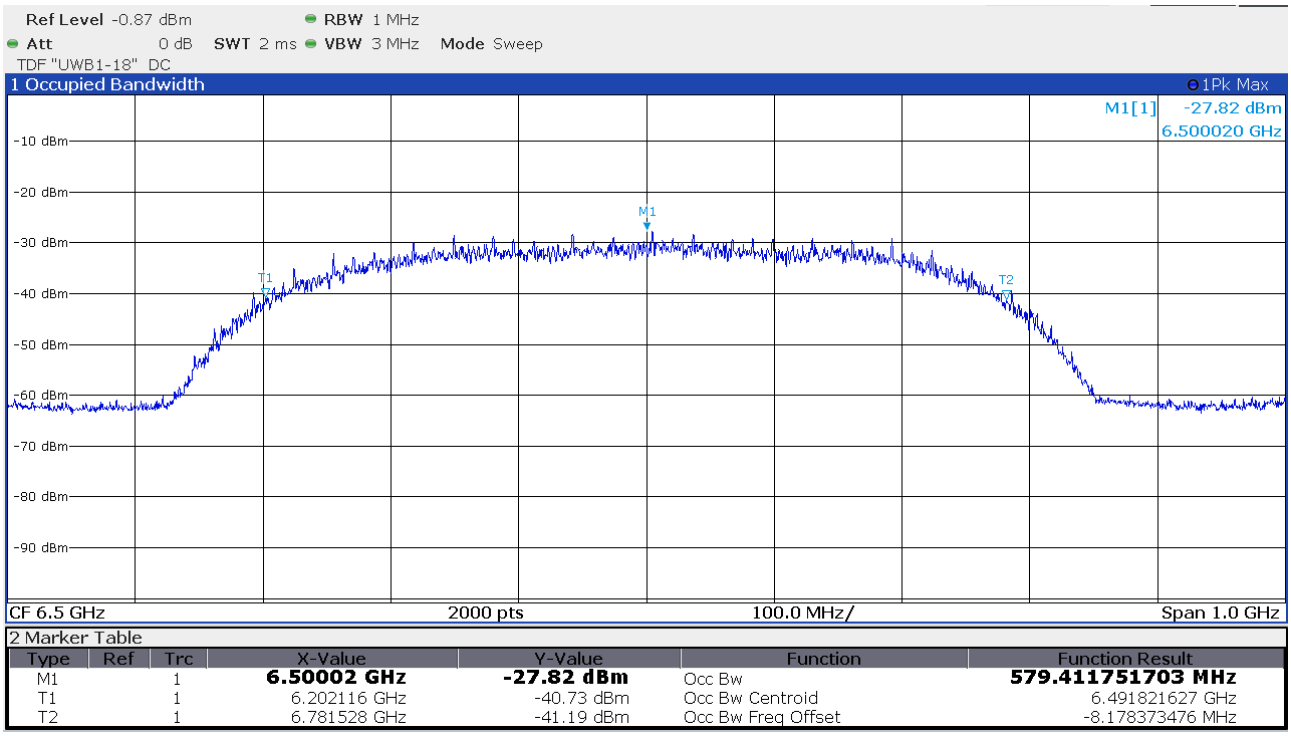
2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	7.93975 GHz	-24.27 dBm		
M2		1	7.70362 GHz	-34.42 dBm		
D3	M2	1	562.87 MHz	-0.02 dB		

FCC ID: KR5FBD5S IC: 7812D-FBD5S

5.2.7 Test protocols OBW 99%

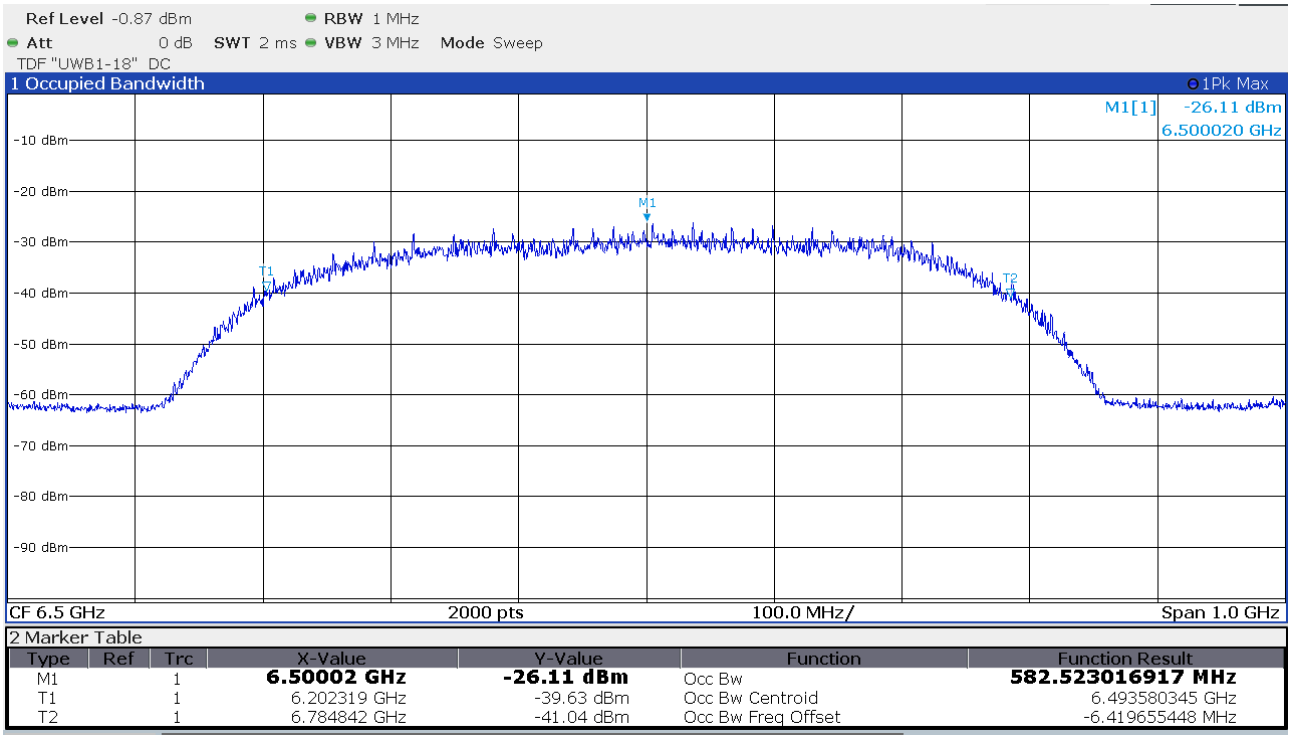
Channel 5 antenna 1



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**6.50002 GHz**	**-27.82 dBm**	Occ Bw	**579.411751703 MHz**
T1		1	6.202116 GHz	-40.73 dBm	Occ Bw Centroid	6.491821627 GHz
T2		1	6.781528 GHz	-41.19 dBm	Occ Bw Freq Offset	-8.178373476 MHz

Channel 5 antenna 2

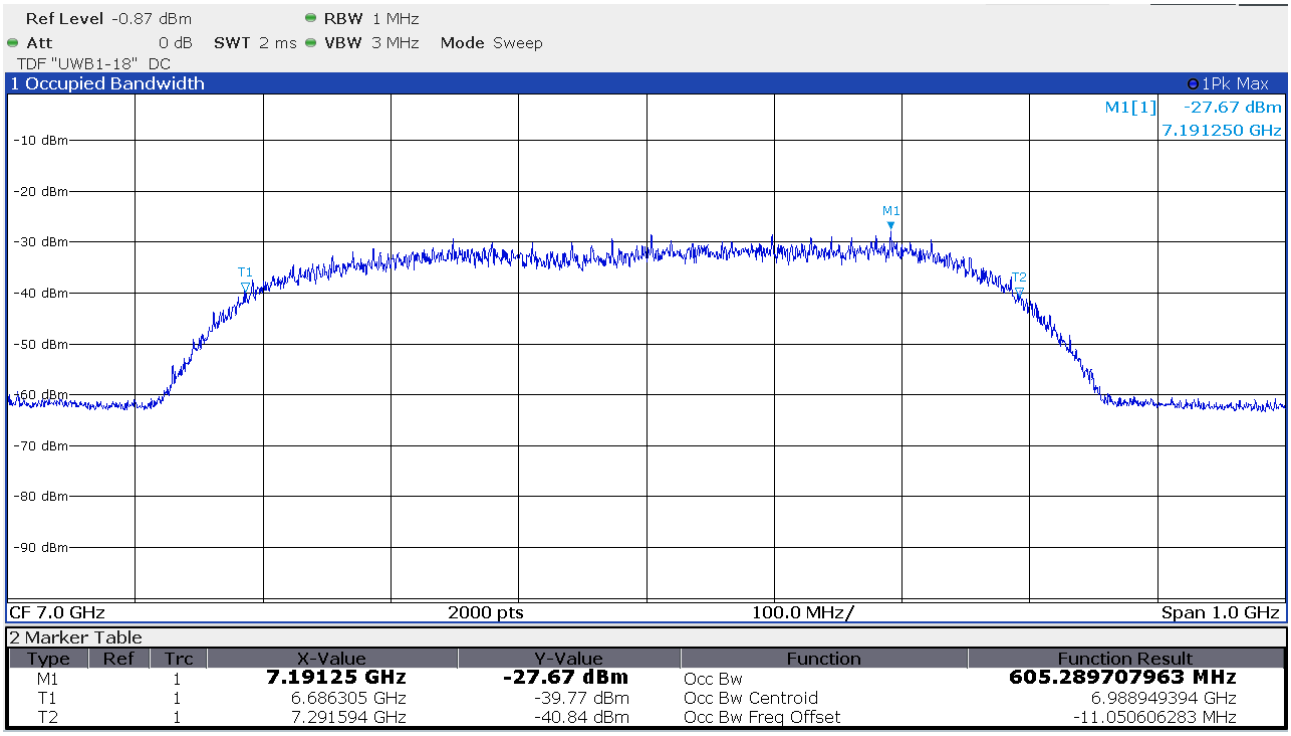


2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**6.50002 GHz**	**-26.11 dBm**	Occ Bw	**582.523016917 MHz**
T1		1	6.202319 GHz	-39.63 dBm	Occ Bw Centroid	6.493580345 GHz
T2		1	6.784842 GHz	-41.04 dBm	Occ Bw Freq Offset	-6.419655448 MHz

FCC ID: KR5FBD5S IC: 7812D-FBD5S

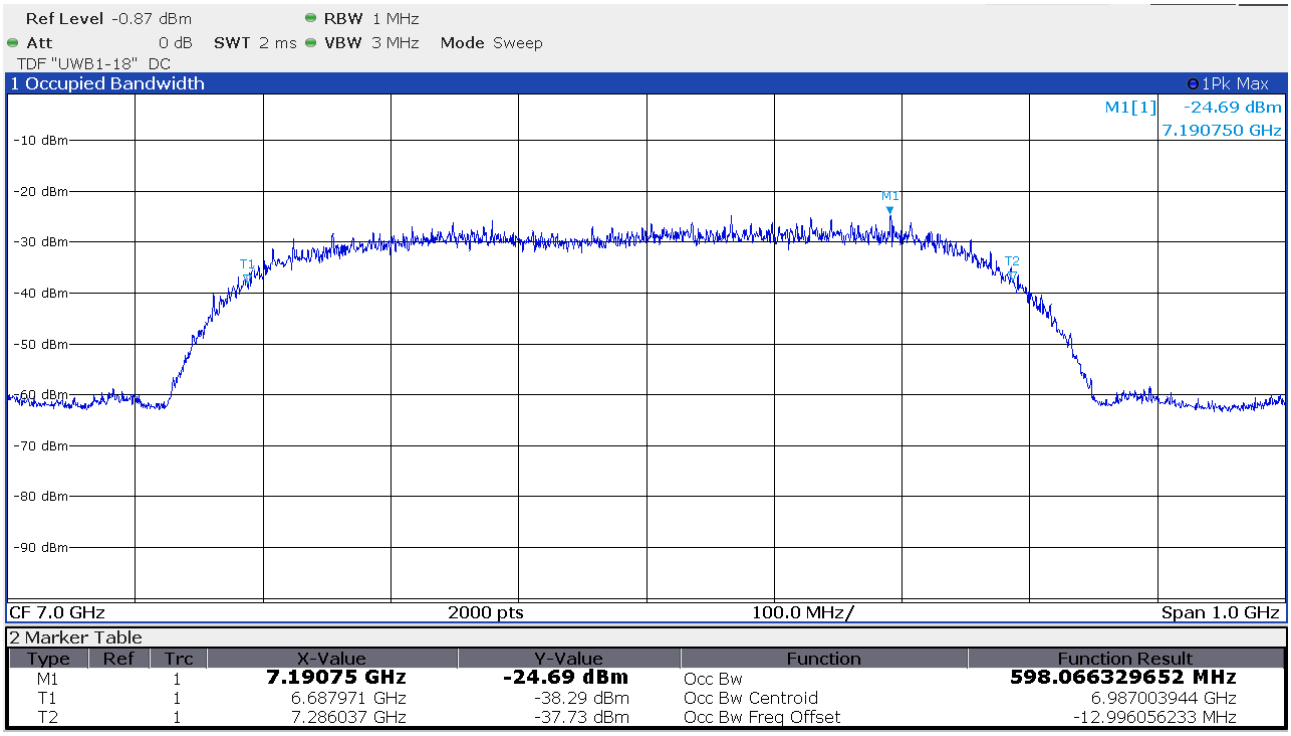
Channel 6 antenna 1



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**7.19125 GHz**	**-27.67 dBm**	Occ Bw	**605.289707963 MHz**
T1		1	6.686305 GHz	-39.77 dBm	Occ Bw Centroid	6.988949394 GHz
T2		1	7.291594 GHz	-40.84 dBm	Occ Bw Freq Offset	-11.050606283 MHz

Channel 6 antenna 2

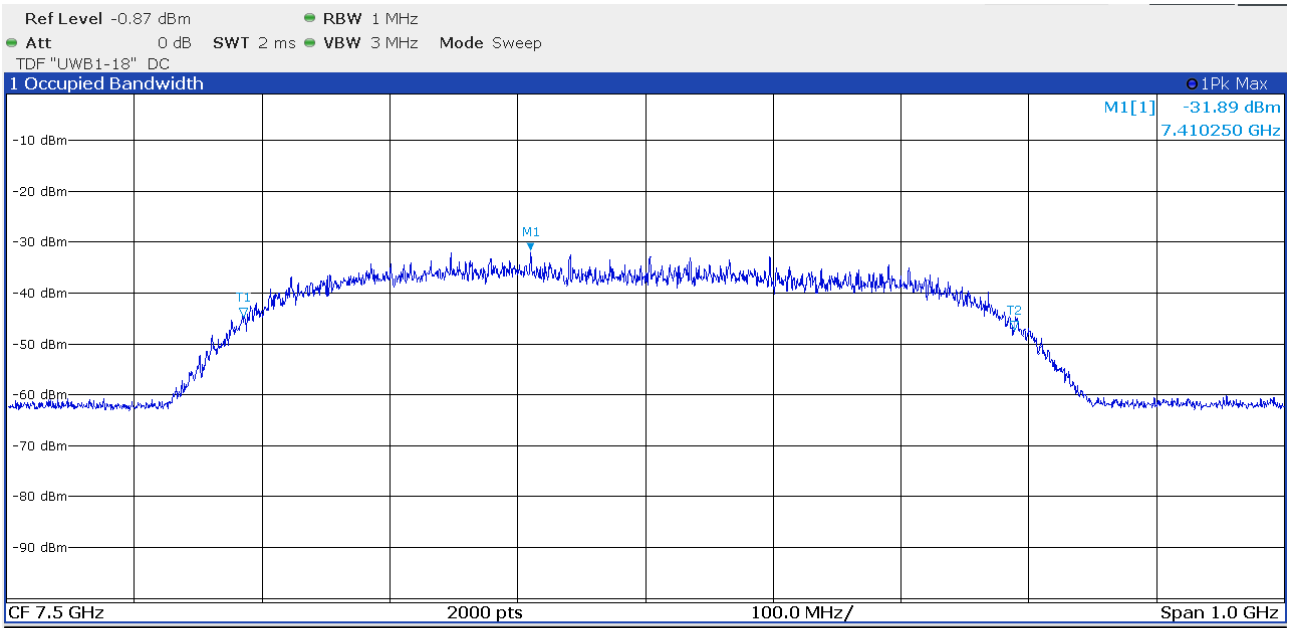


2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**7.19075 GHz**	**-24.69 dBm**	Occ Bw	**598.066329652 MHz**
T1		1	6.687971 GHz	-38.29 dBm	Occ Bw Centroid	6.987003944 GHz
T2		1	7.286037 GHz	-37.73 dBm	Occ Bw Freq Offset	-12.996056233 MHz

FCC ID: KR5FBD5S IC: 7812D-FBD5S

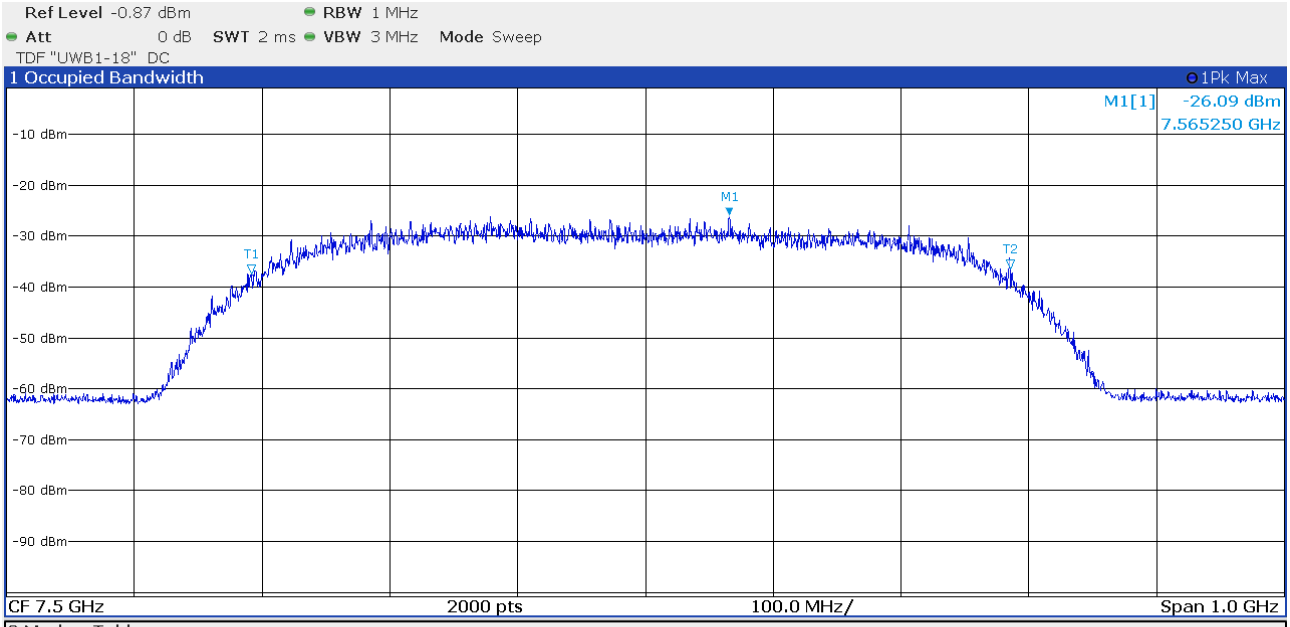
Channel 8 antenna 1



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**7.41025 GHz**	**-31.89 dBm**	Occ Bw	**602.666016471 MHz**
T1		1	7.185747 GHz	-44.65 dBm	Occ Bw Centroid	7.487080171 GHz
T2		1	7.788413 GHz	-47.33 dBm	Occ Bw Freq Offset	-12.919829265 MHz

Channel 8 antenna 2

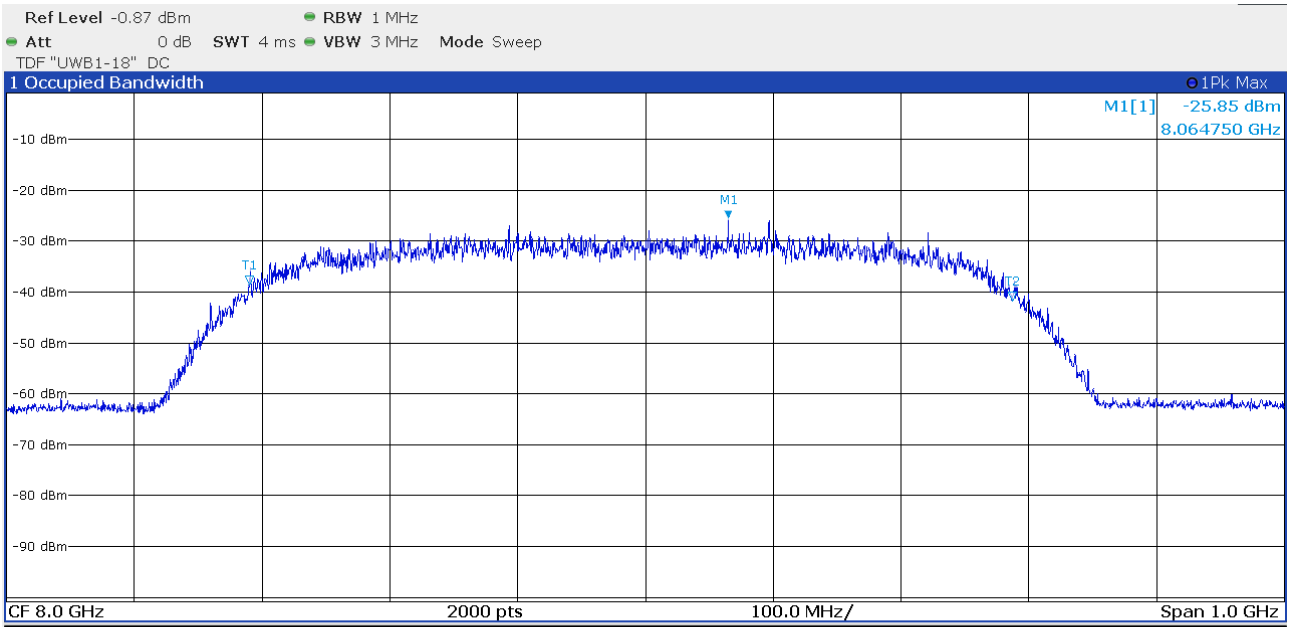


2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**7.56525 GHz**	**-26.09 dBm**	Occ Bw	**593.790933303 MHz**
T1		1	7.191654 GHz	-37.49 dBm	Occ Bw Centroid	7.488549868 GHz
T2		1	7.785445 GHz	-36.44 dBm	Occ Bw Freq Offset	-11.450131979 MHz

FCC ID: KR5FBD5S IC: 7812D-FBD5S

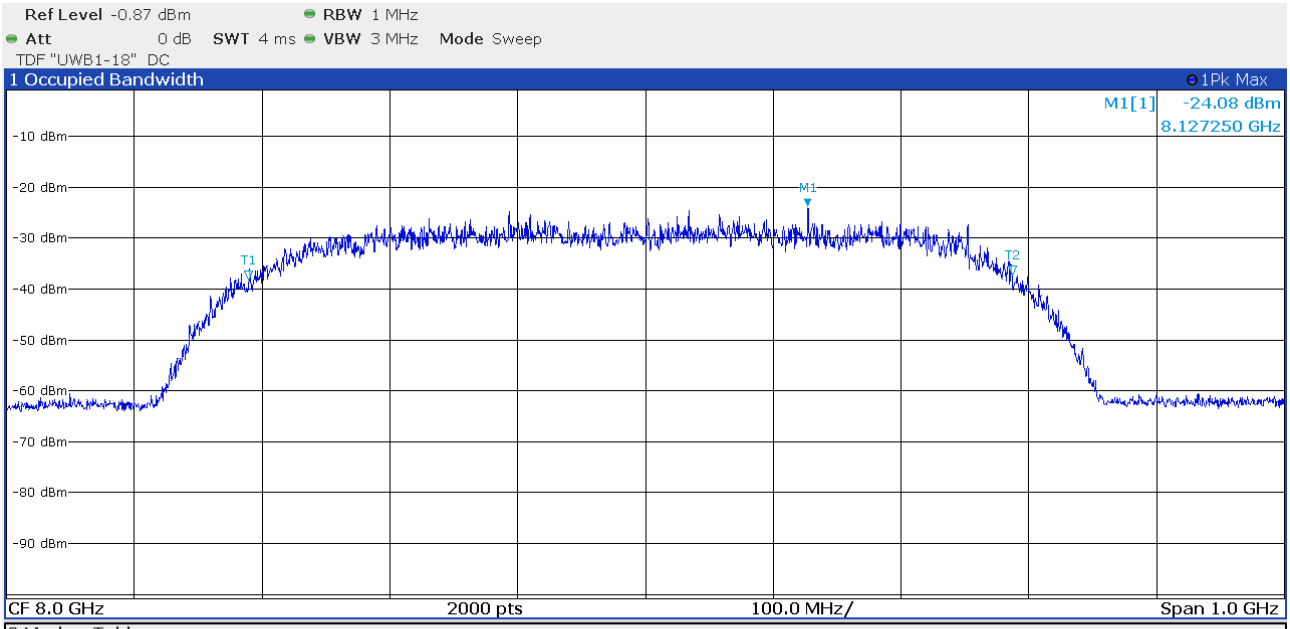
Channel 9 antenna 1



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**8.06475 GHz**	**-25.85 dBm**	Occ Bw	**597.118734146 MHz**
T1		1	7.68988 GHz	-38.70 dBm	Occ Bw Centroid	7.988438987 GHz
T2		1	8.286998 GHz	-41.76 dBm	Occ Bw Freq Offset	-11.56101285 MHz

Channel 9 antenna 2



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**8.12725 GHz**	**-24.08 dBm**	Occ Bw	**597.159382085 MHz**
T1		1	7.689631 GHz	-38.26 dBm	Occ Bw Centroid	7.988210482 GHz
T2		1	8.28679 GHz	-37.31 dBm	Occ Bw Freq Offset	-11.789518358 MHz

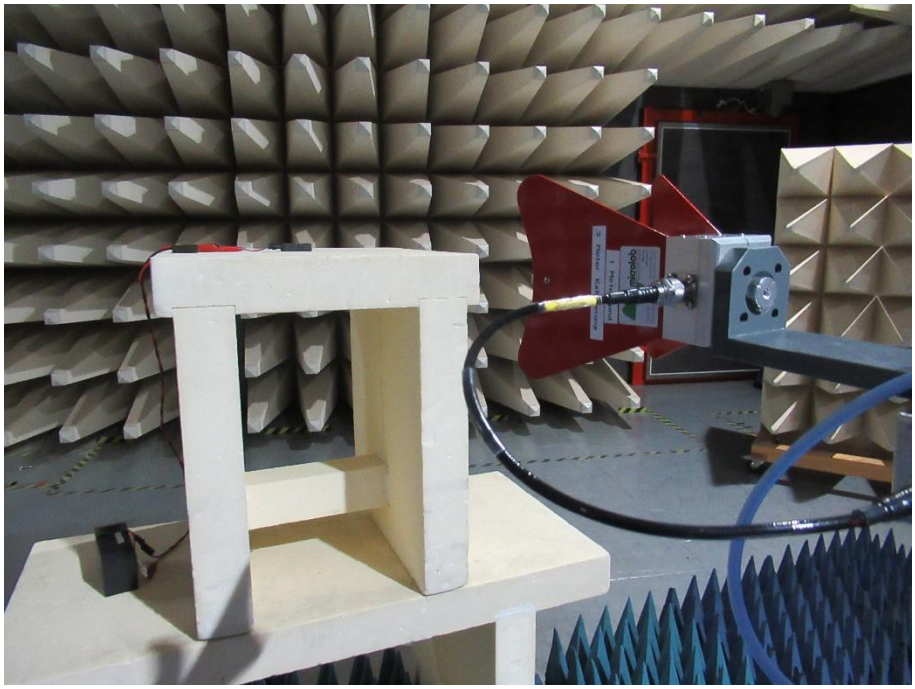
5.3 Radiated Emissions 9 kHz to 40 GHz

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.

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

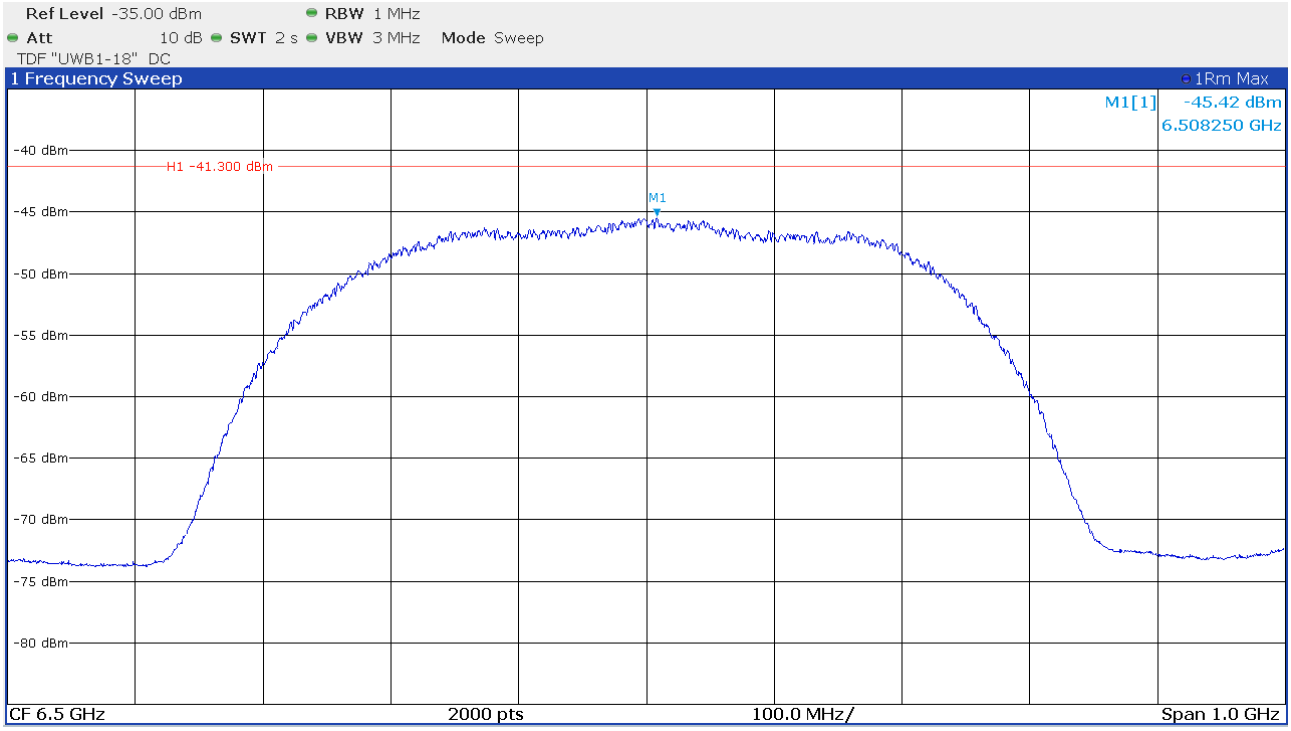
Frequency (MHz)	Reading Vert. (dBµV)	Reading Hor. (dBµV)	Correct. Vert. (dB)	Correct. Hor. (dB)	Level Vert. (dBµV/m)	Level Hor. (dBµV/m)	Limit (dBµV/m)	Dlimit (dB)
80,00	4,4	3,9	11,1	10,8	15,5	14,7	40,0	-24,5
157,40	2,2	0,1	14,4	15,2	16,6	15,3	43,5	-26,9
305,00	-1,1	0,3	17,0	16,6	15,9	16,9	46,0	-29,1
500,00	-2,9	-0,1	22,5	22,3	19,6	22,2	46,0	-23,8
700,00	-3,7	-3,9	27,0	26,5	23,3	22,6	46,0	-22,7

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. All emissions at not listed frequencies are 30 dB under the limit.

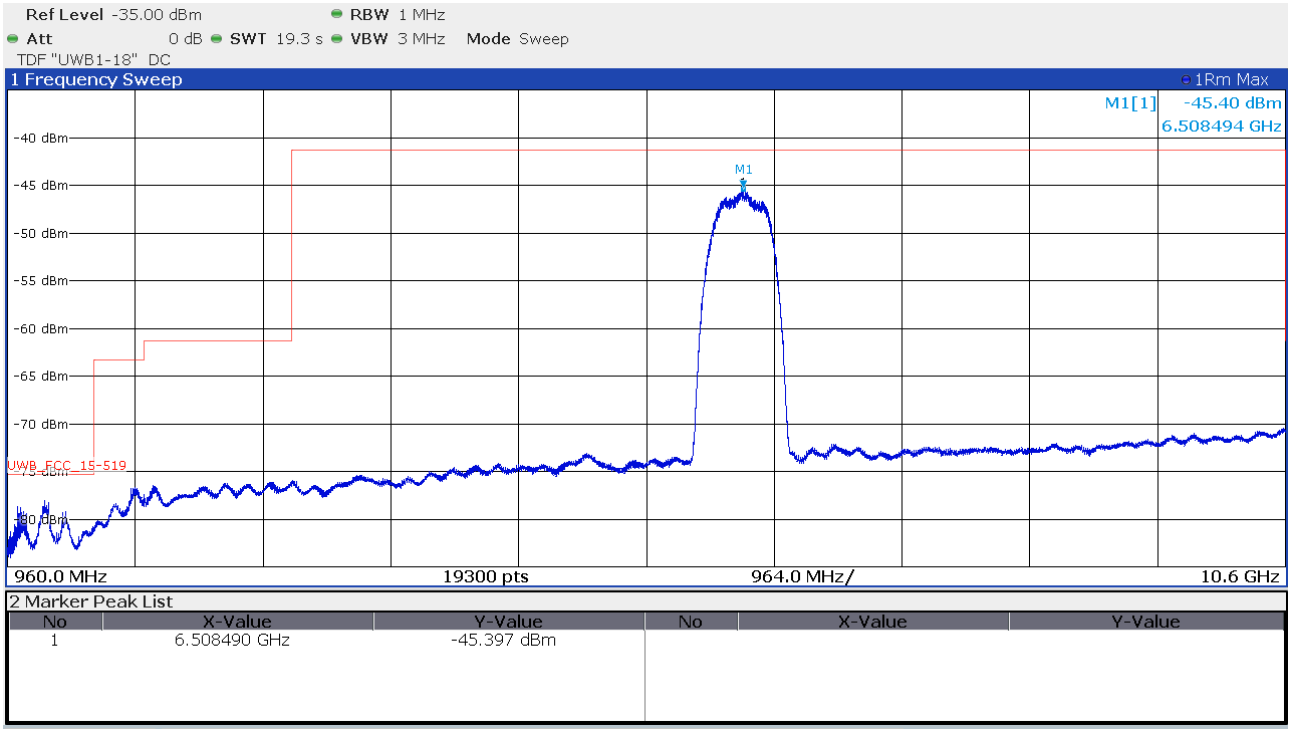
5.3.5.3 Measurement 960 MHz to 40 GHz

Channel 5 antenna 1

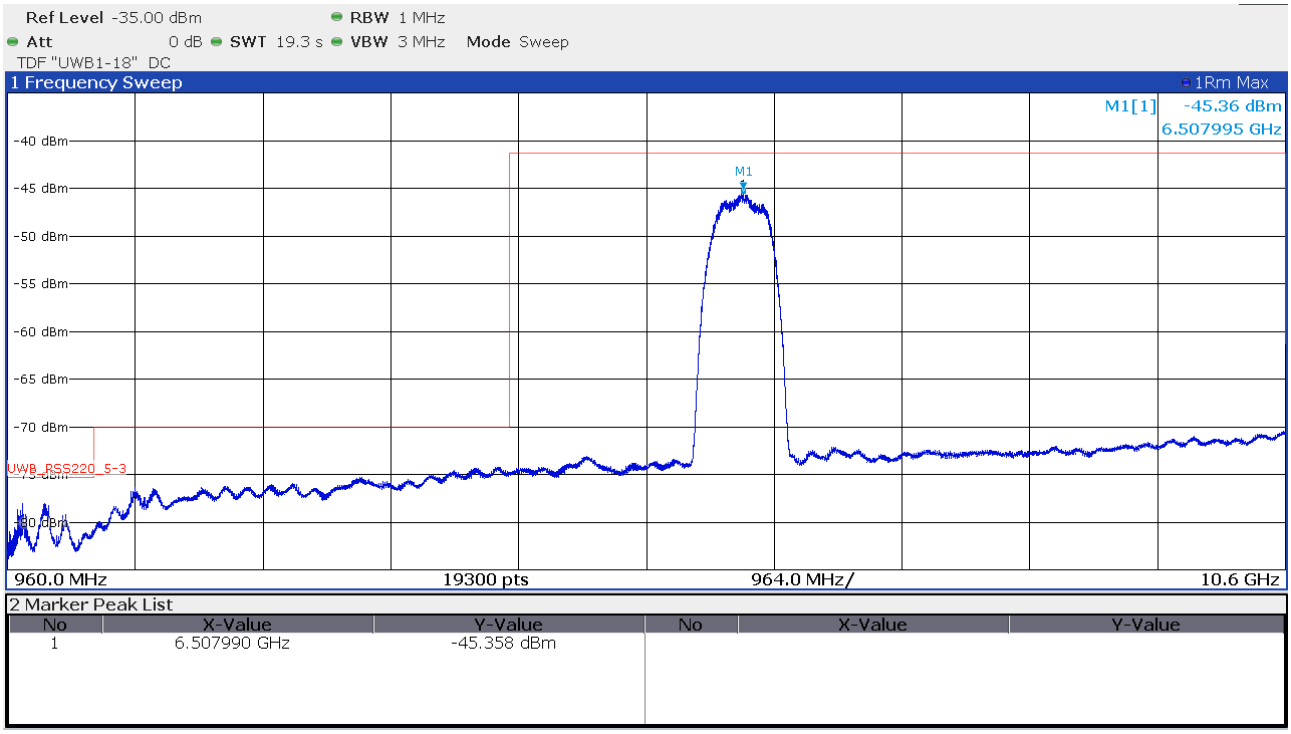
Mean Power

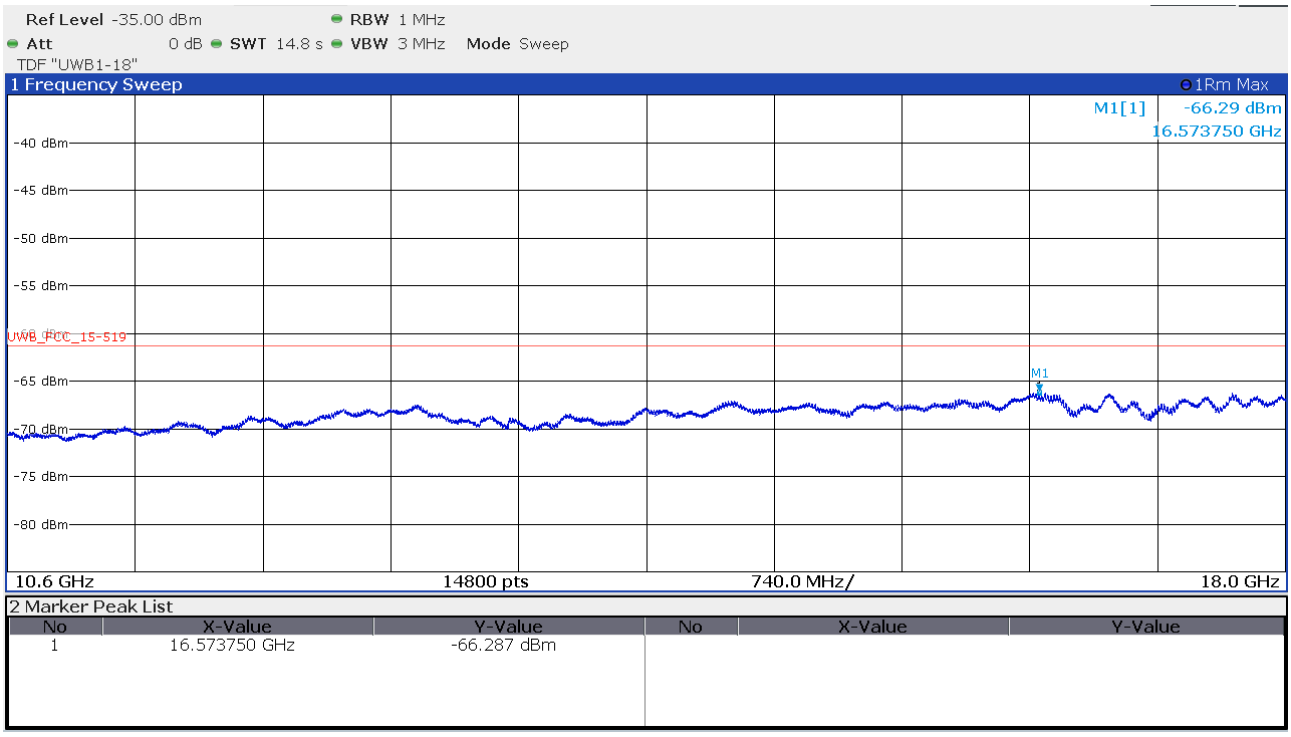


960 MHz to 18 GHz



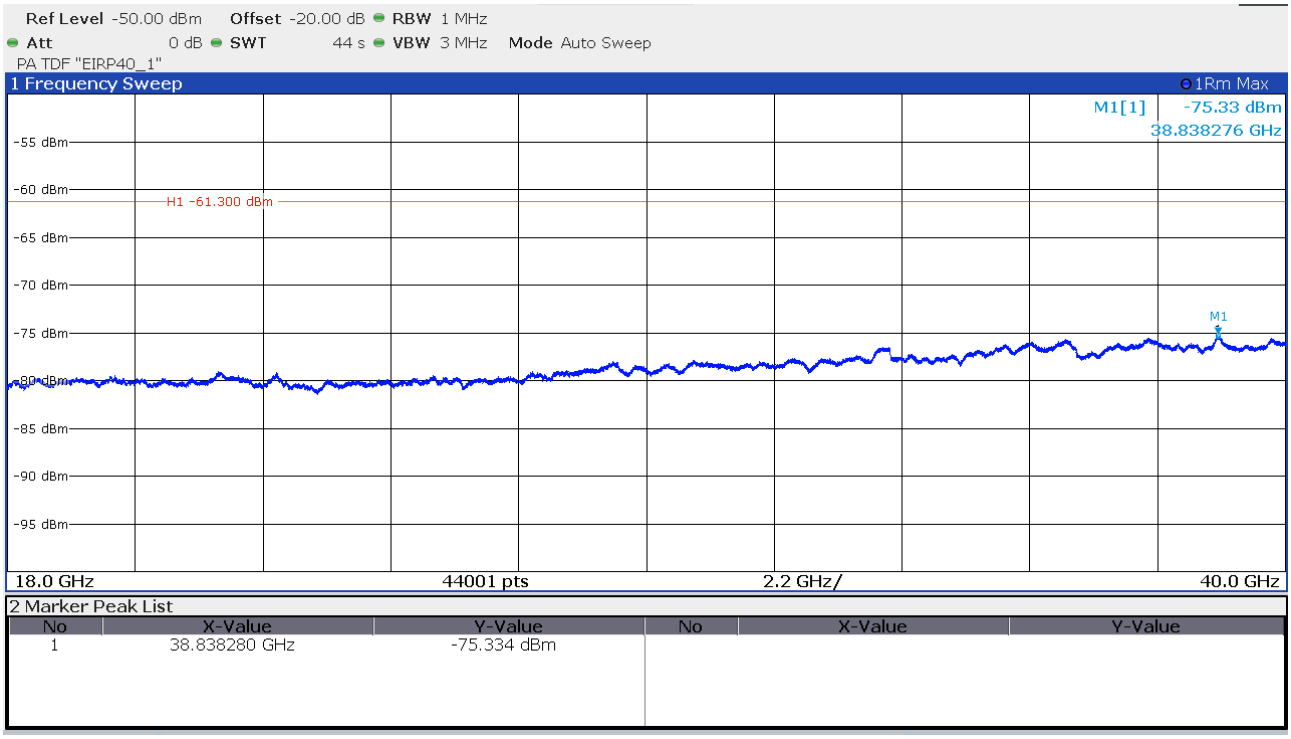
FCC ID: KR5FBD5S IC: 7812D-FBD5S





FCC ID: KR5FBD5S IC: 7812D-FBD5S

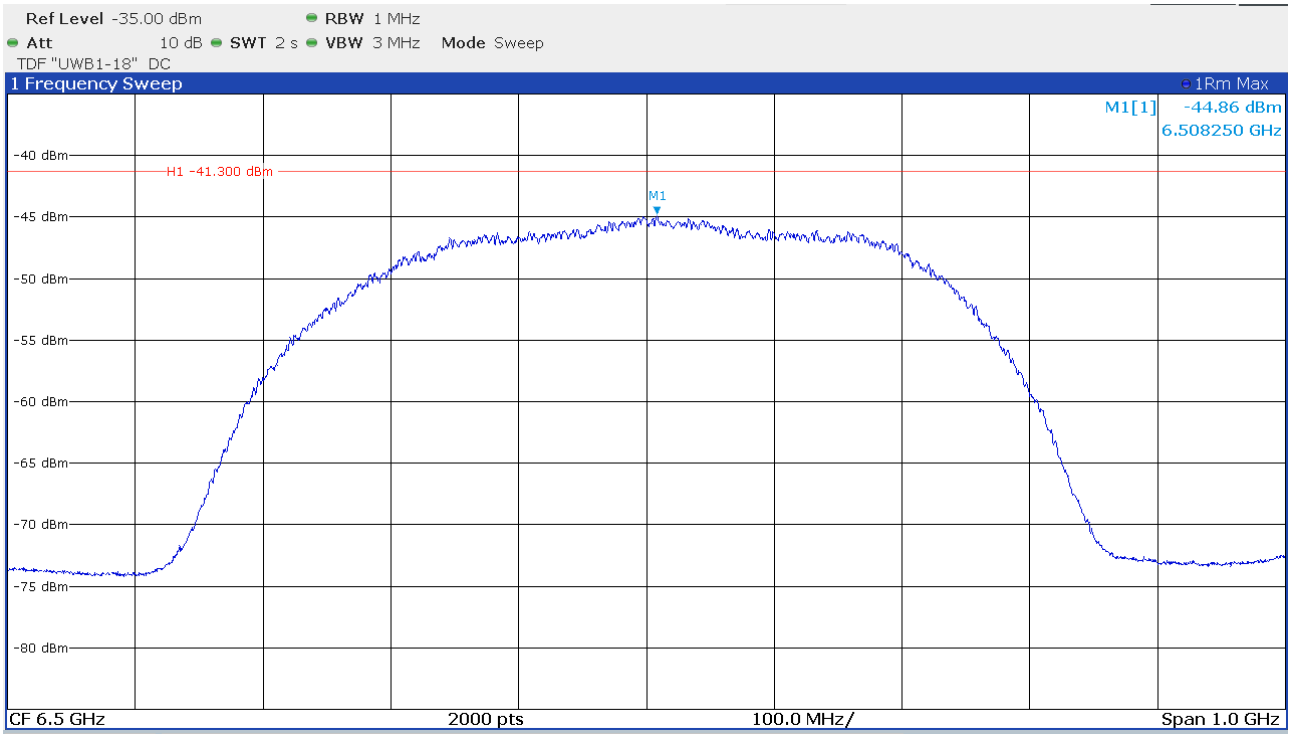
18 GHz to 40 GHz at 10 cm distance



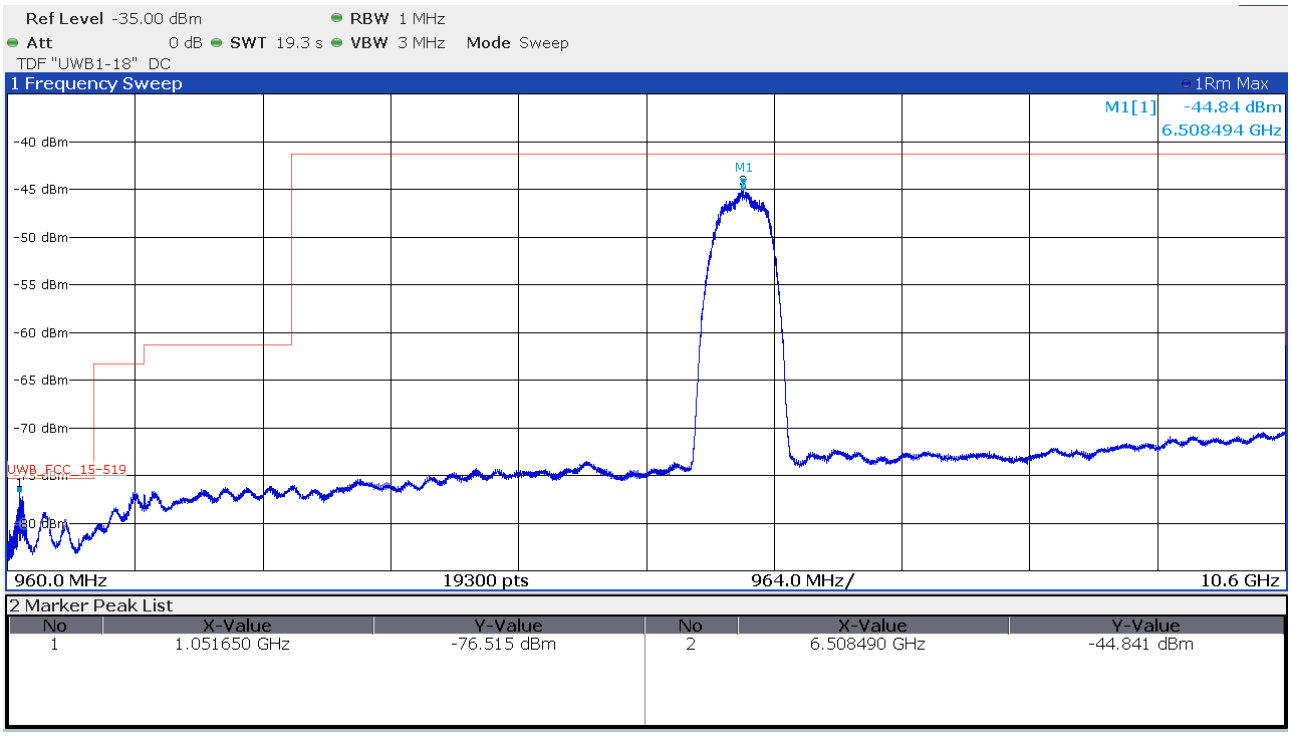
FCC ID: KR5FBD5S IC: 7812D-FBD5S

Channel 5 antenna 2

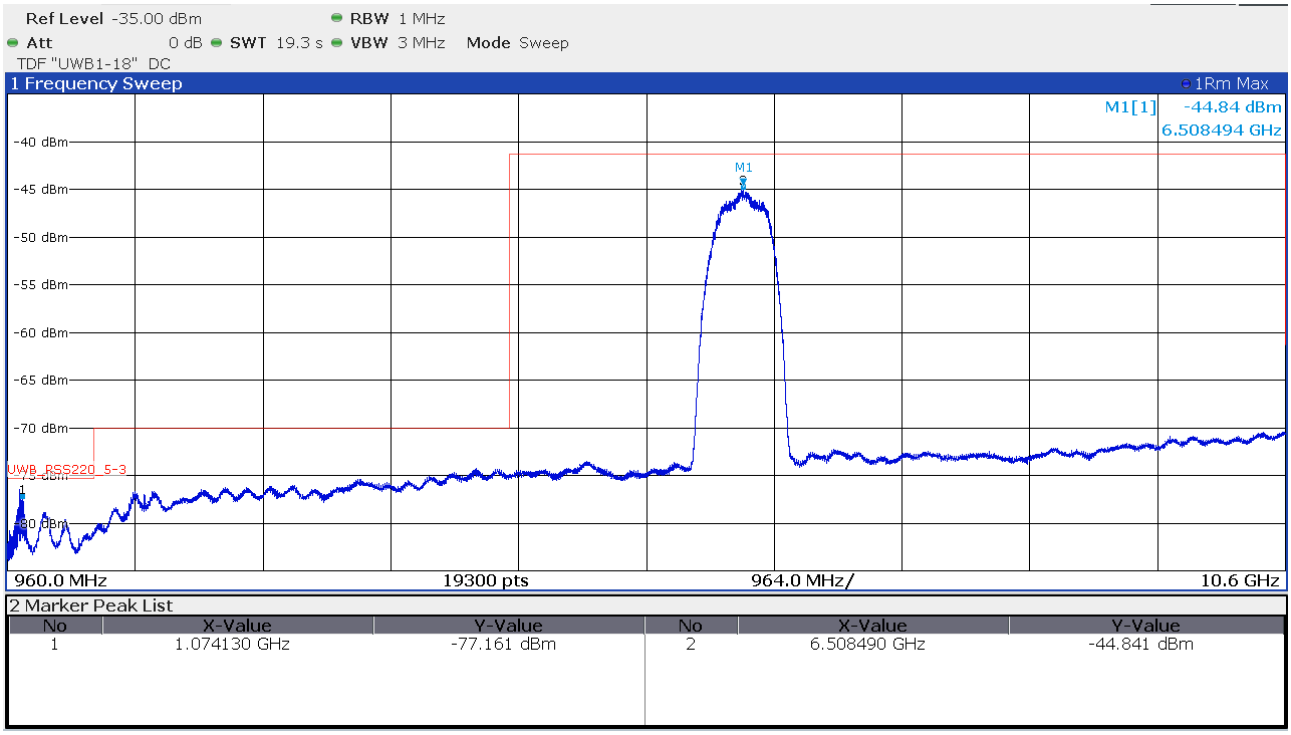
Mean Power

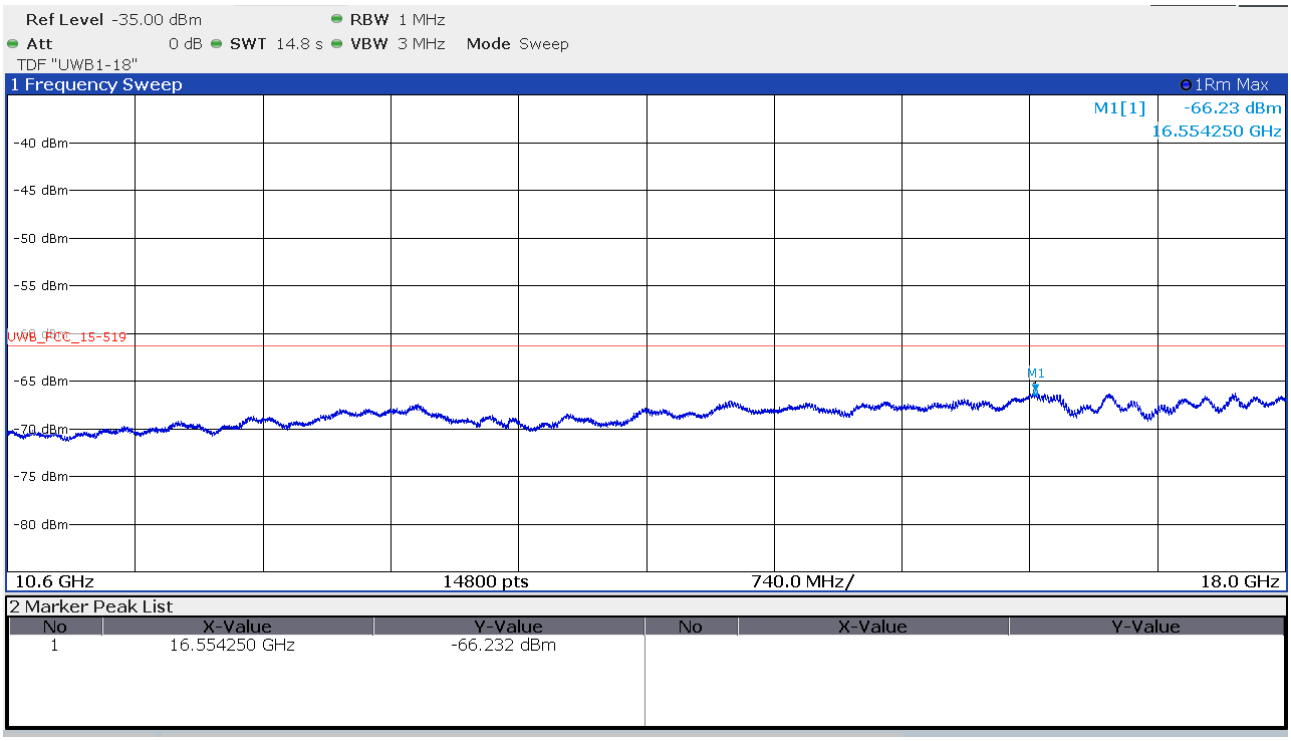


960 MHz to 18 GHz



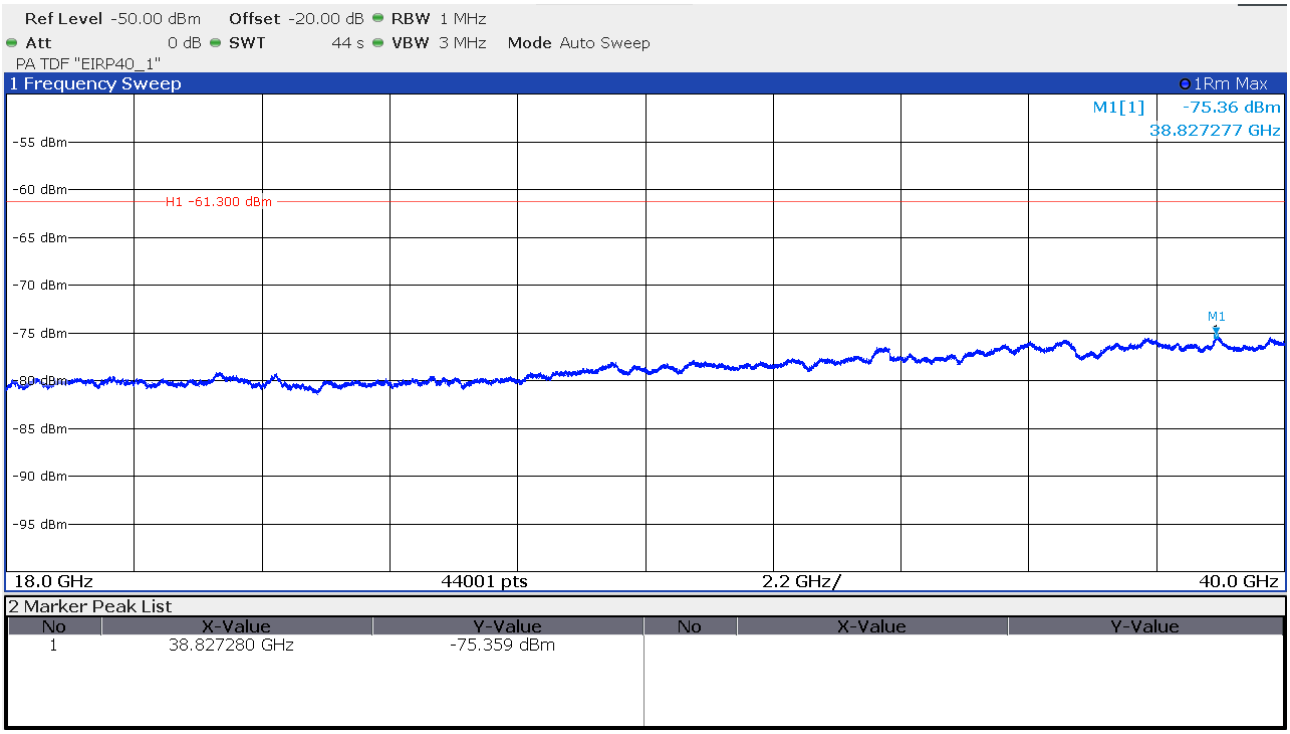
FCC ID: KR5FBD5S IC: 7812D-FBD5S





FCC ID: KR5FBD5S IC: 7812D-FBD5S

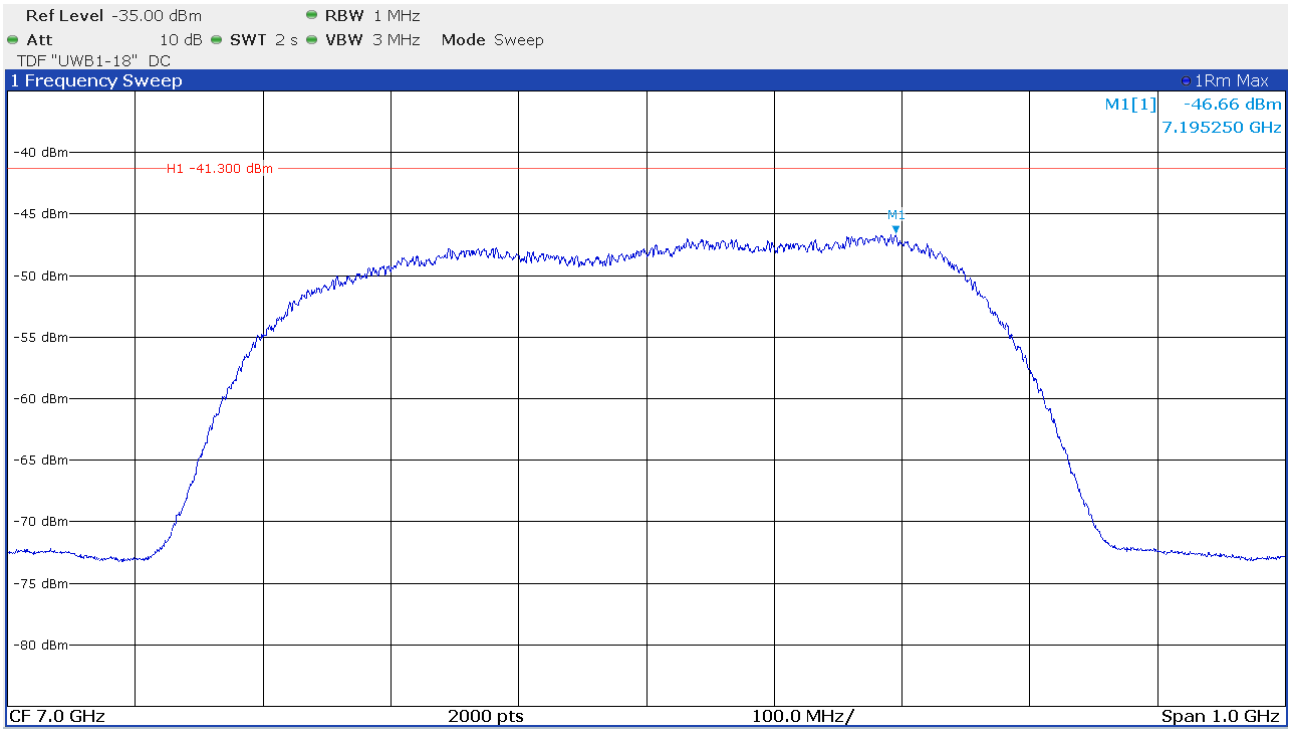
18 GHz to 40 GHz at 10 cm distance



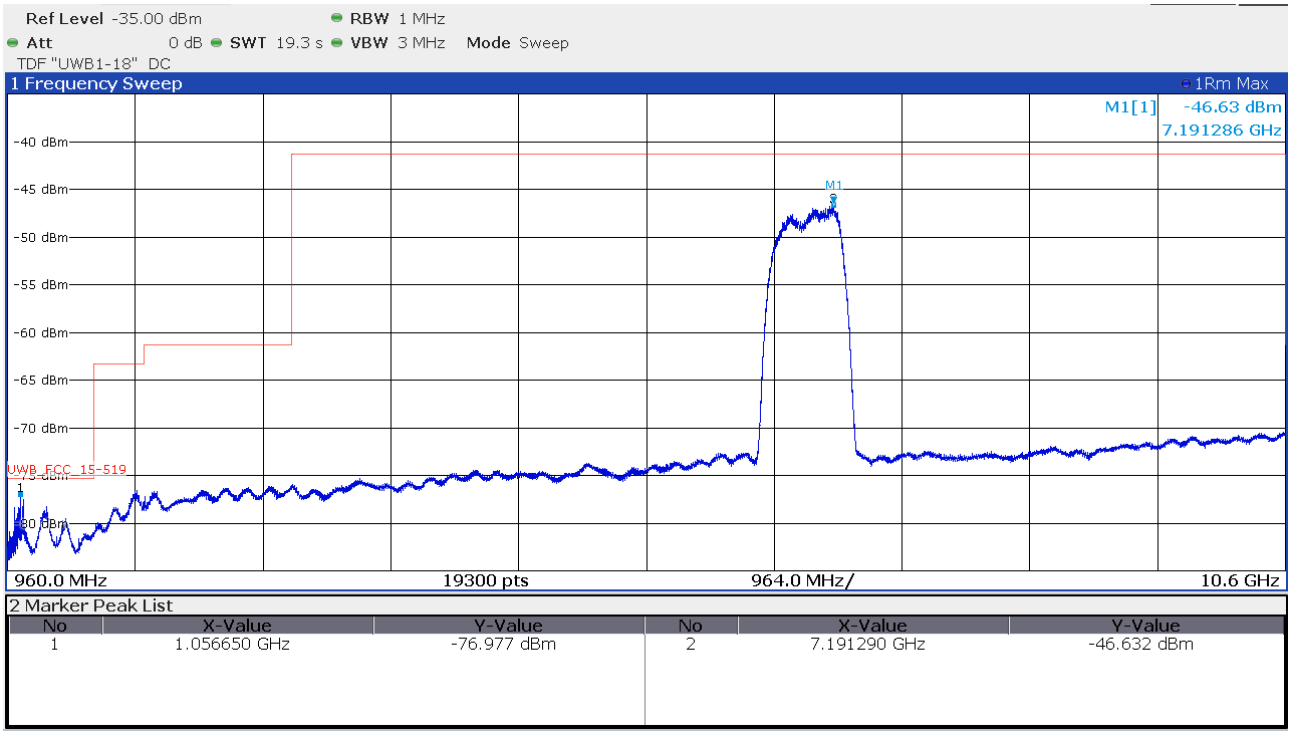
FCC ID: KR5FBD5S IC: 7812D-FBD5S

Channel 6 antenna 1

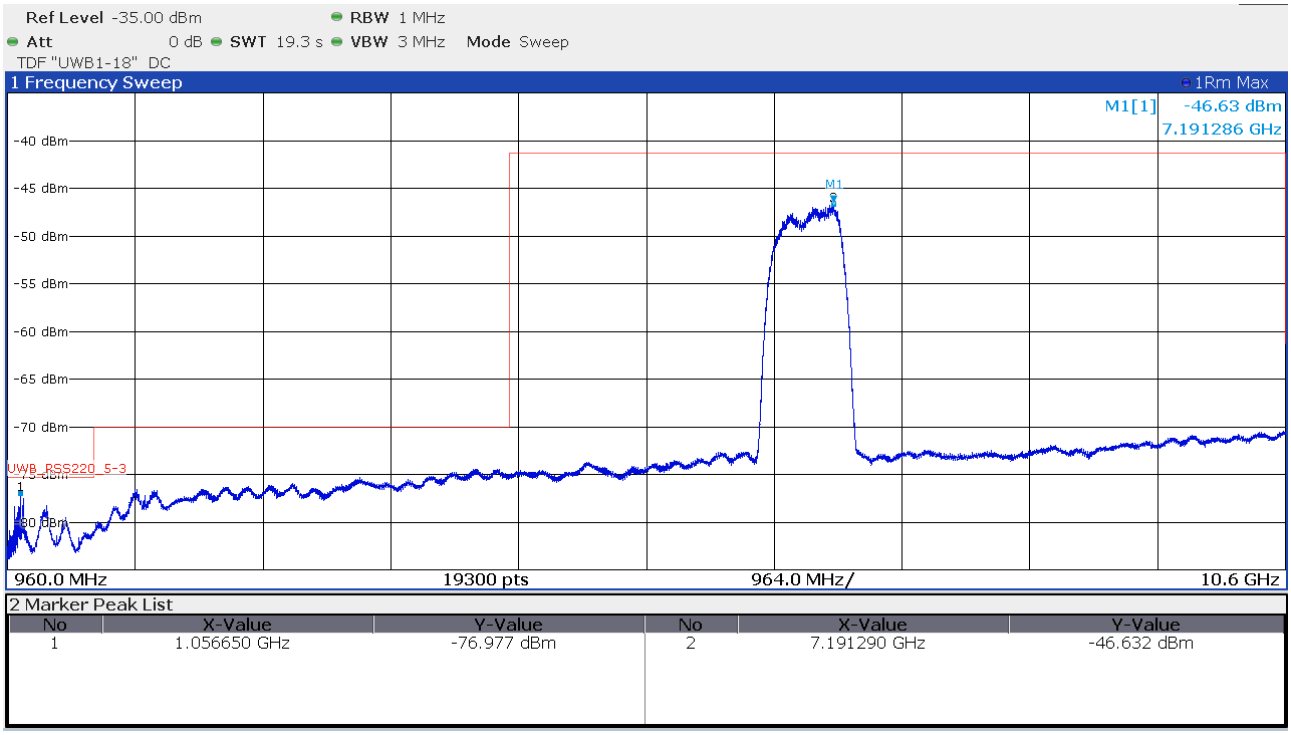
Mean Power

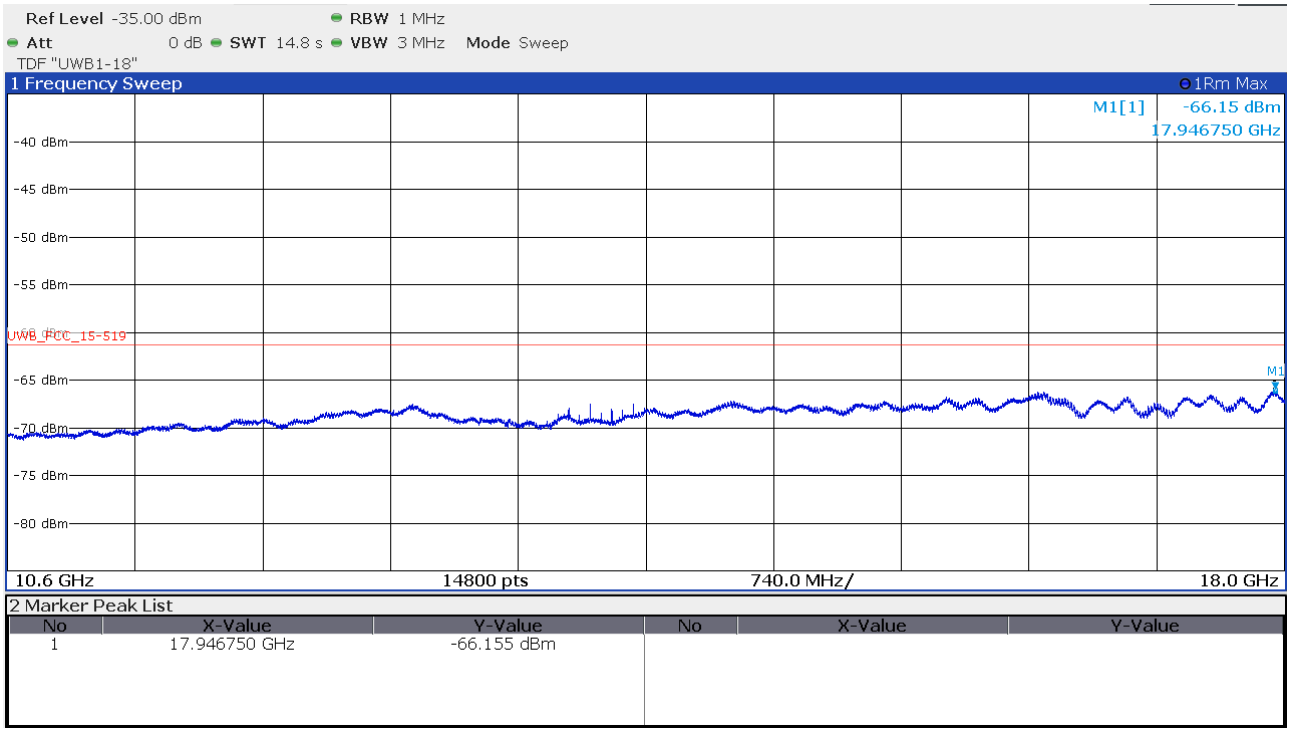


960 MHz to 18 GHz



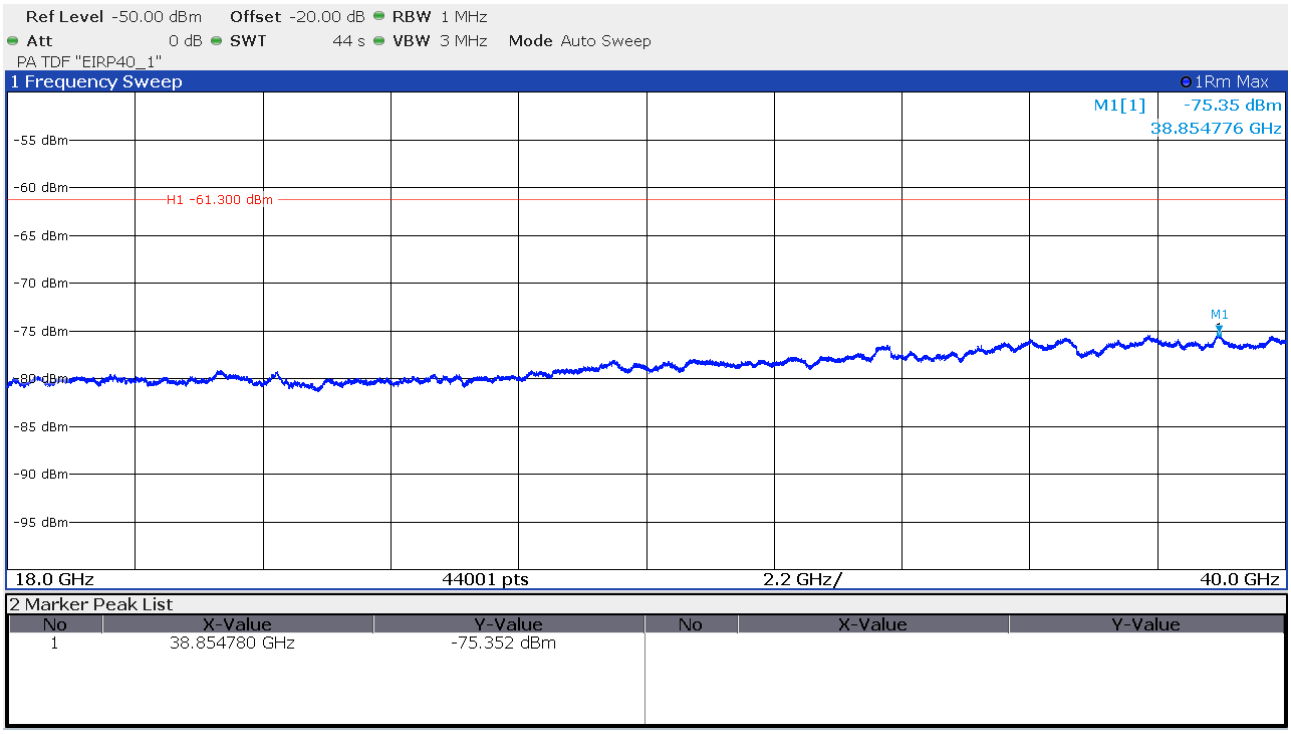
FCC ID: KR5FBD5S IC: 7812D-FBD5S





FCC ID: KR5FBD5S IC: 7812D-FBD5S

18 GHz to 40 GHz at 10 cm distance



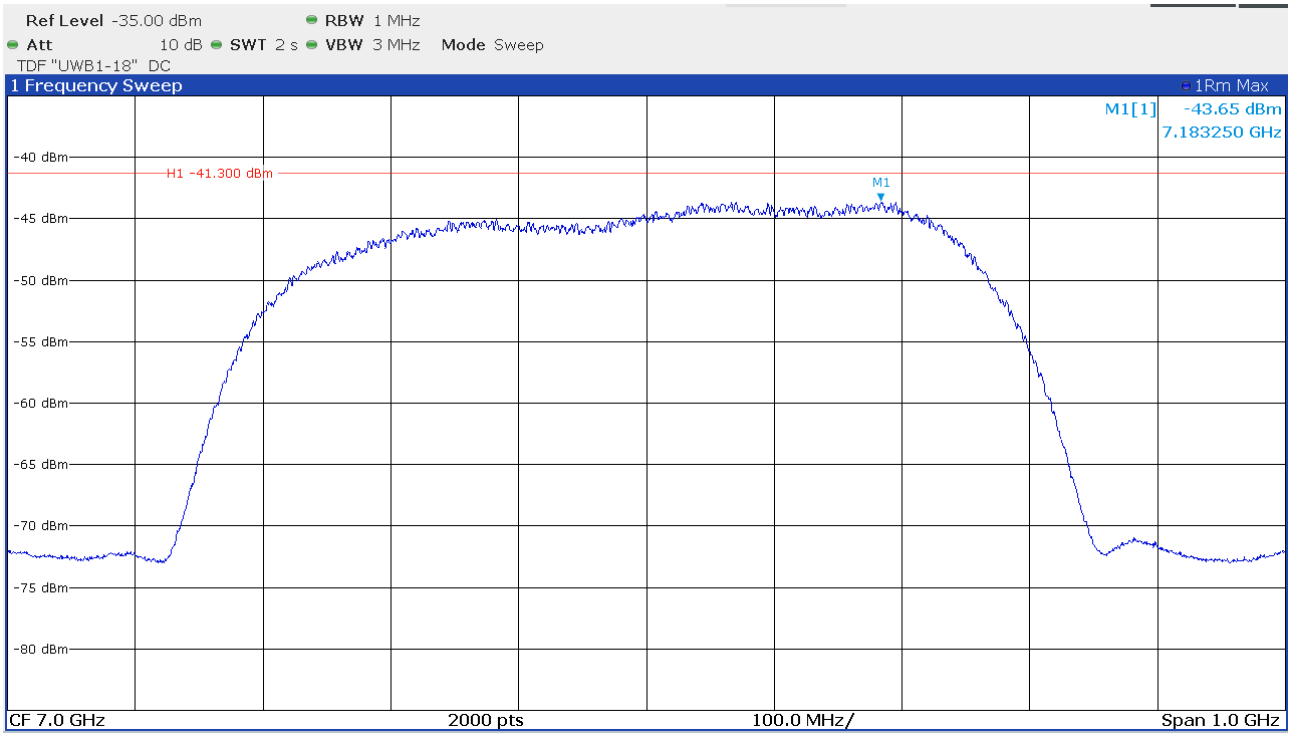
2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	38.854780 GHz	-75.352 dBm			

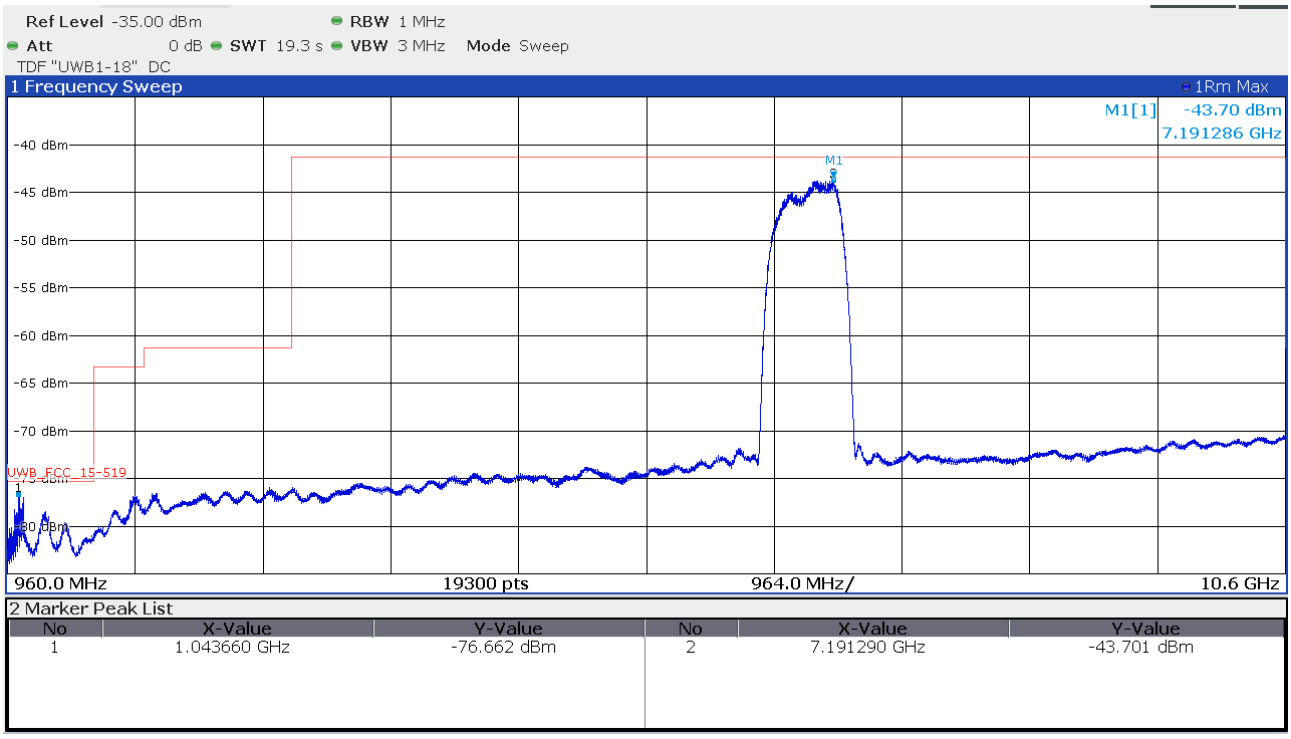
FCC ID: KR5FBD5S IC: 7812D-FBD5S

Channel 6 antenna 2

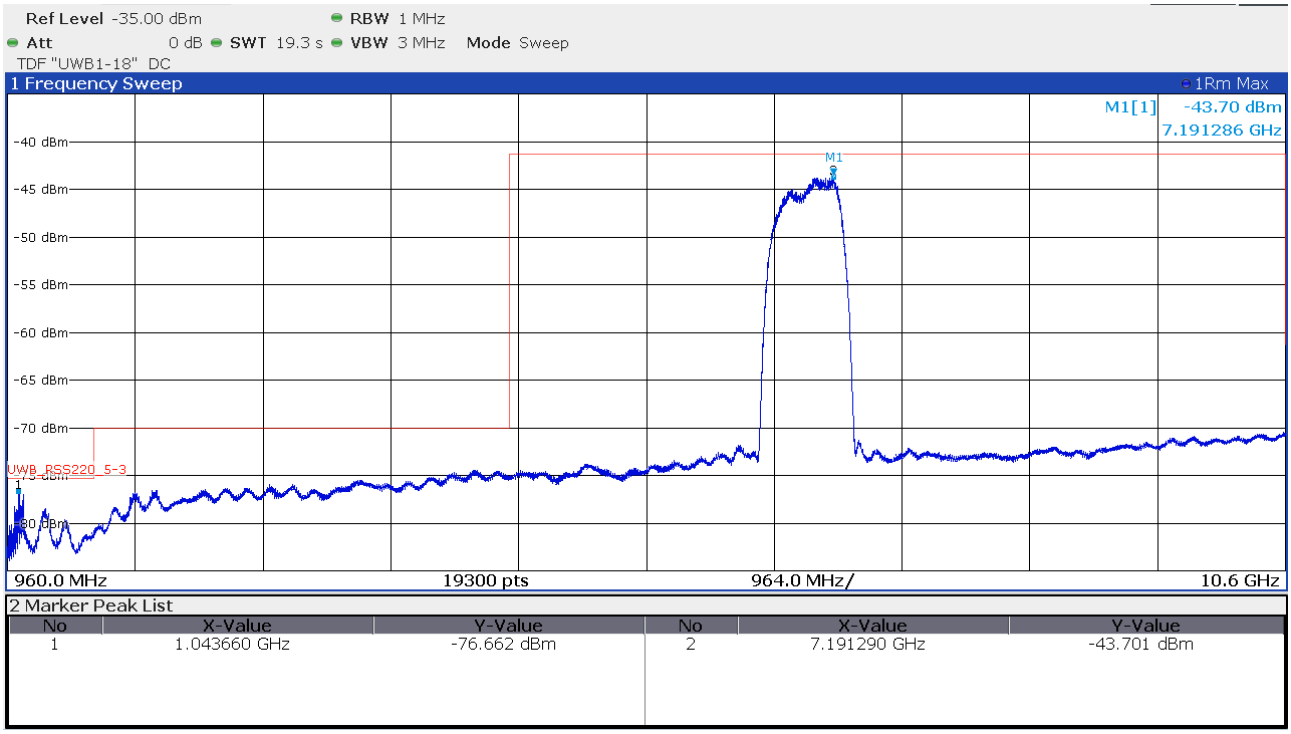
Mean Power

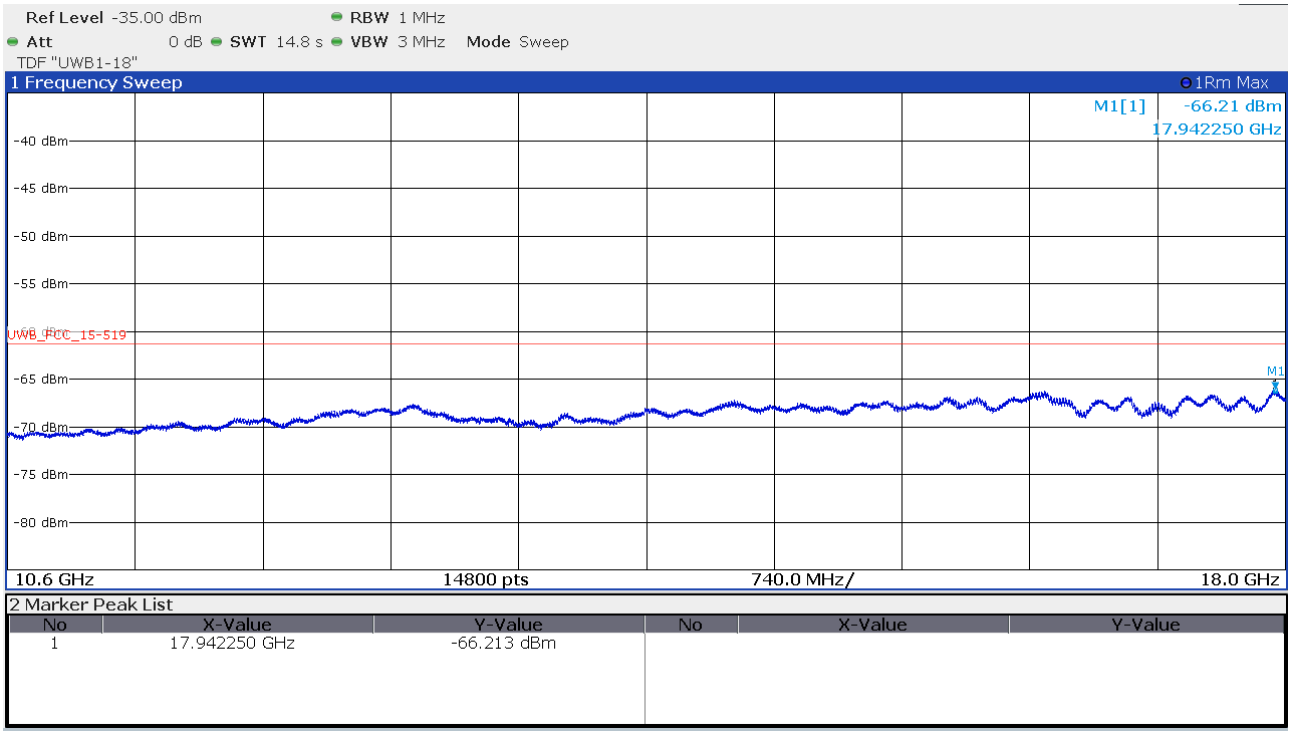


960 MHz to 18 GHz



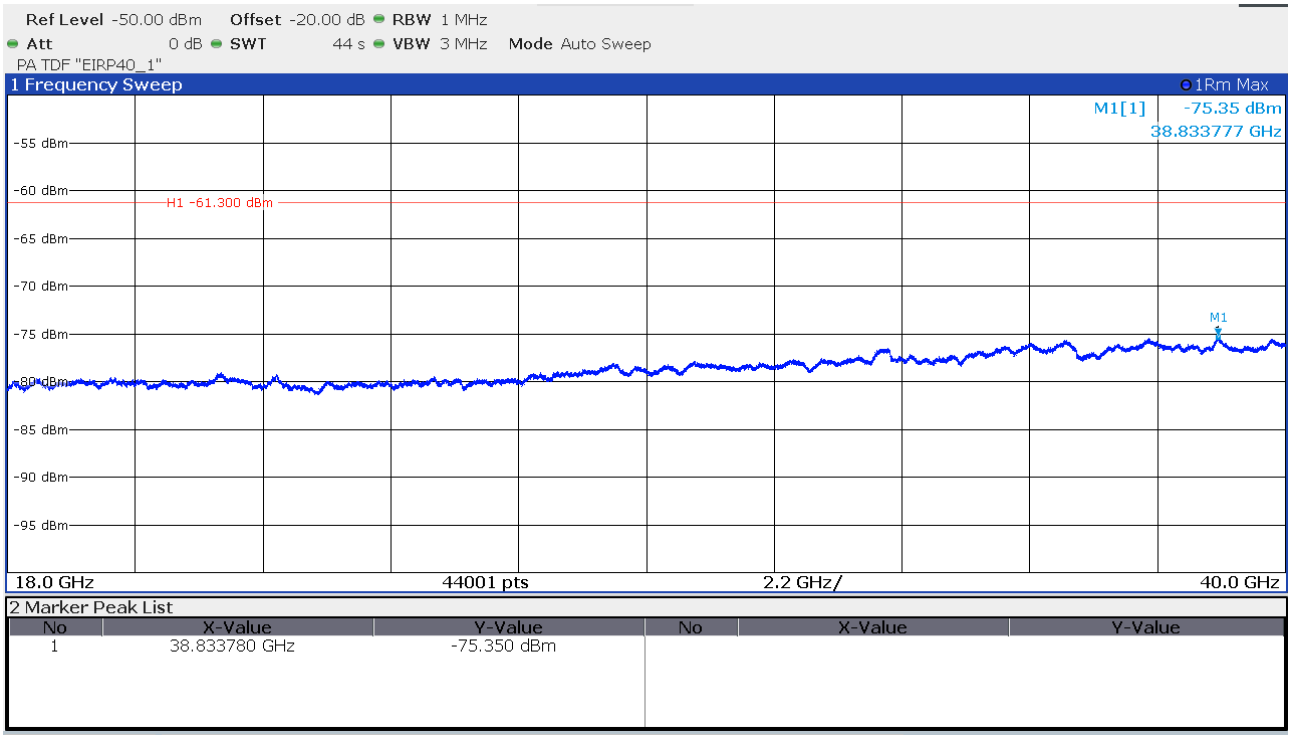
FCC ID: KR5FBD5S IC: 7812D-FBD5S





FCC ID: KR5FBD5S IC: 7812D-FBD5S

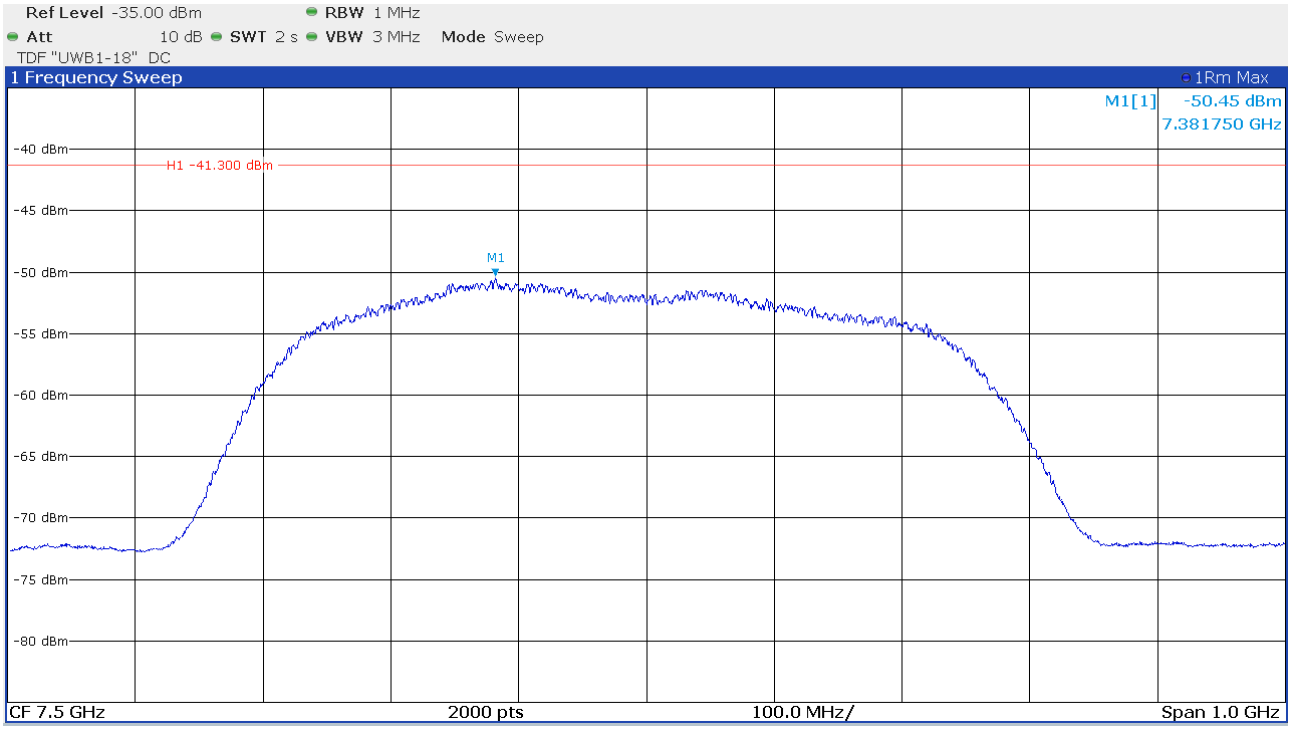
18 GHz to 40 GHz at 10 cm distance



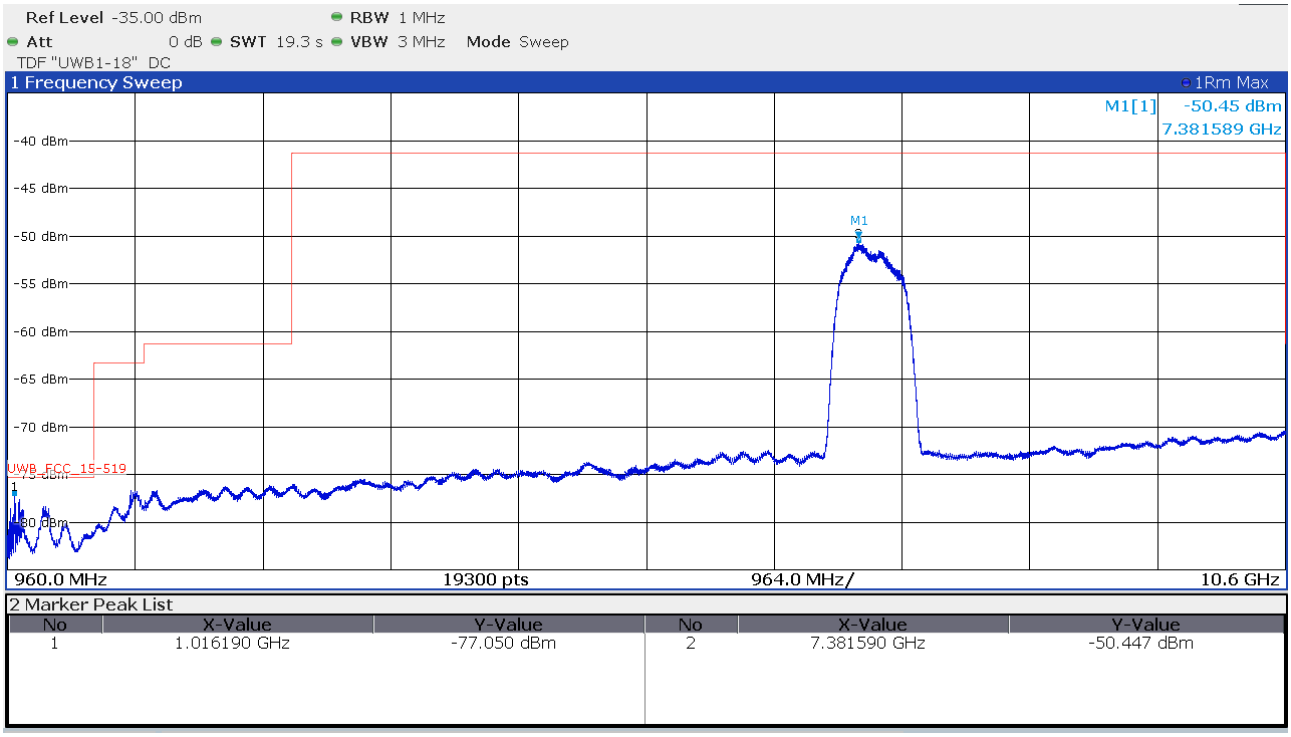
FCC ID: KR5FBD5S IC: 7812D-FBD5S

Channel 8 antenna 1

Mean Power



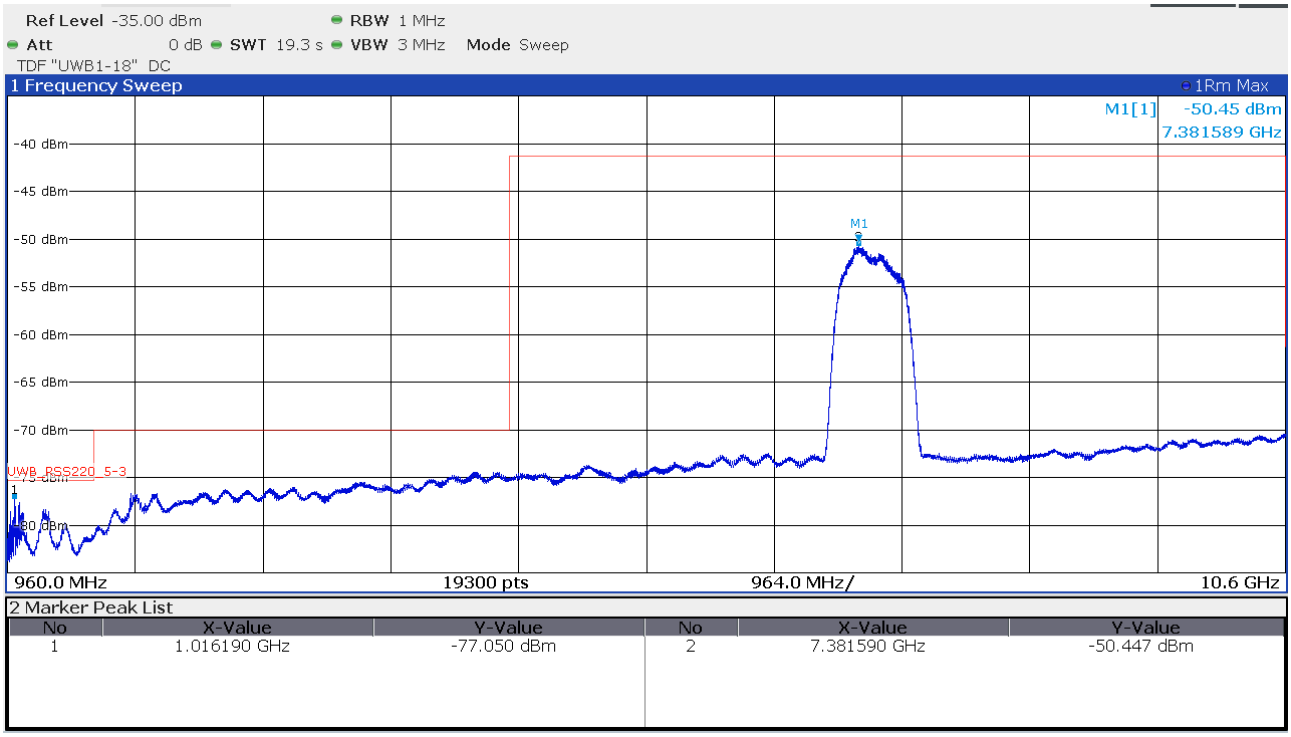
960 MHz to 18 GHz

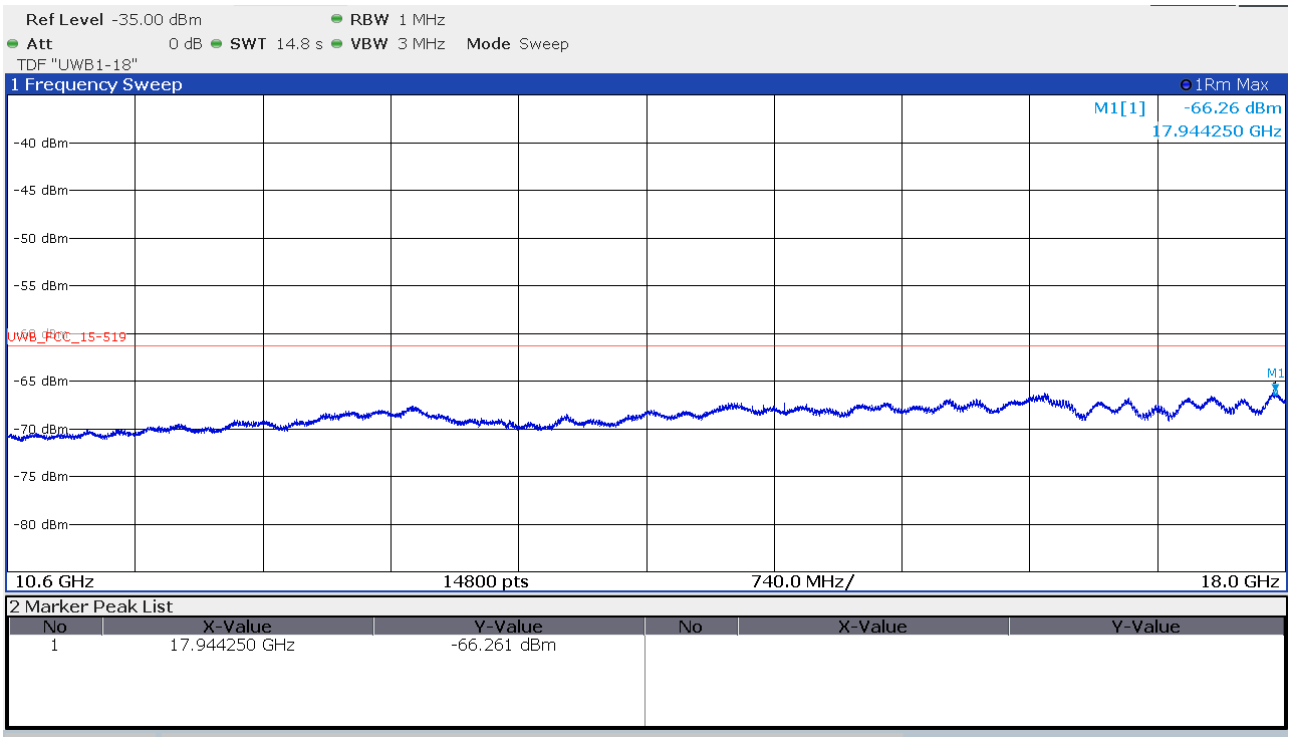


2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.016190 GHz	-77.050 dBm	2	7.381590 GHz	-50.447 dBm

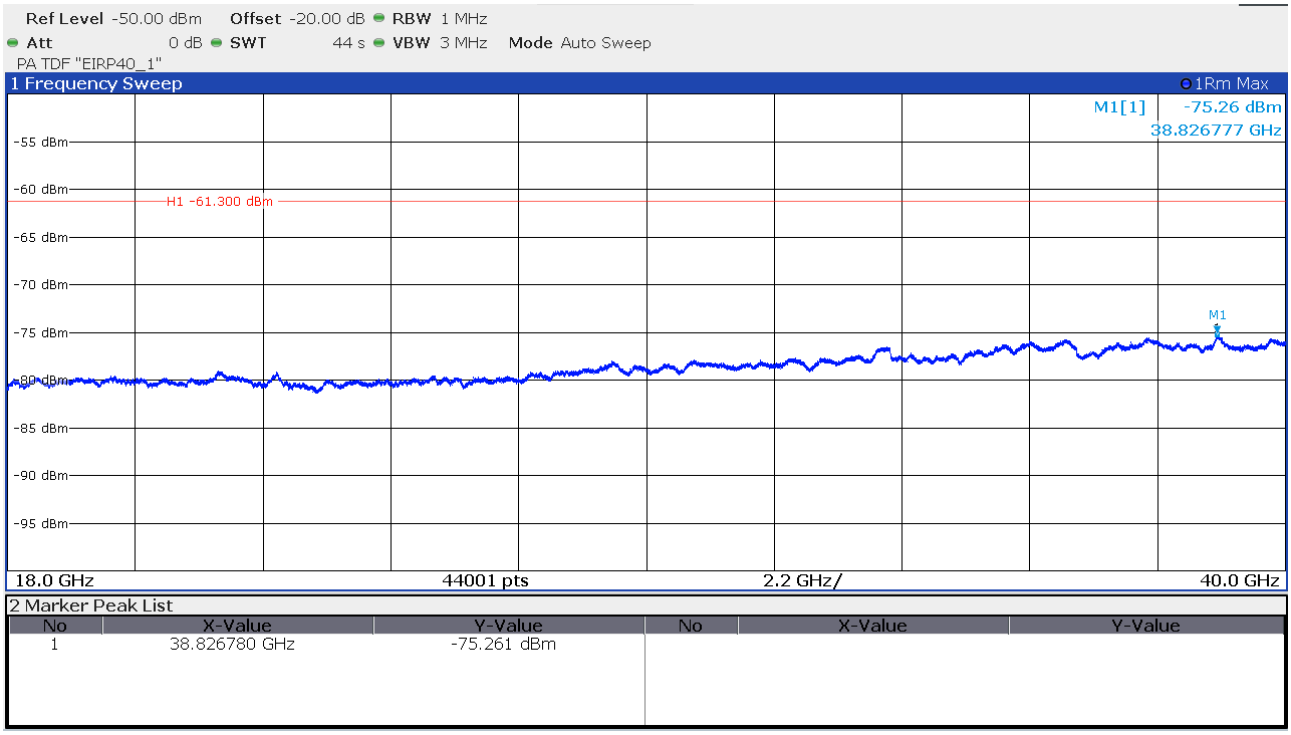
FCC ID: KR5FBD5S IC: 7812D-FBD5S





FCC ID: KR5FBD5S IC: 7812D-FBD5S

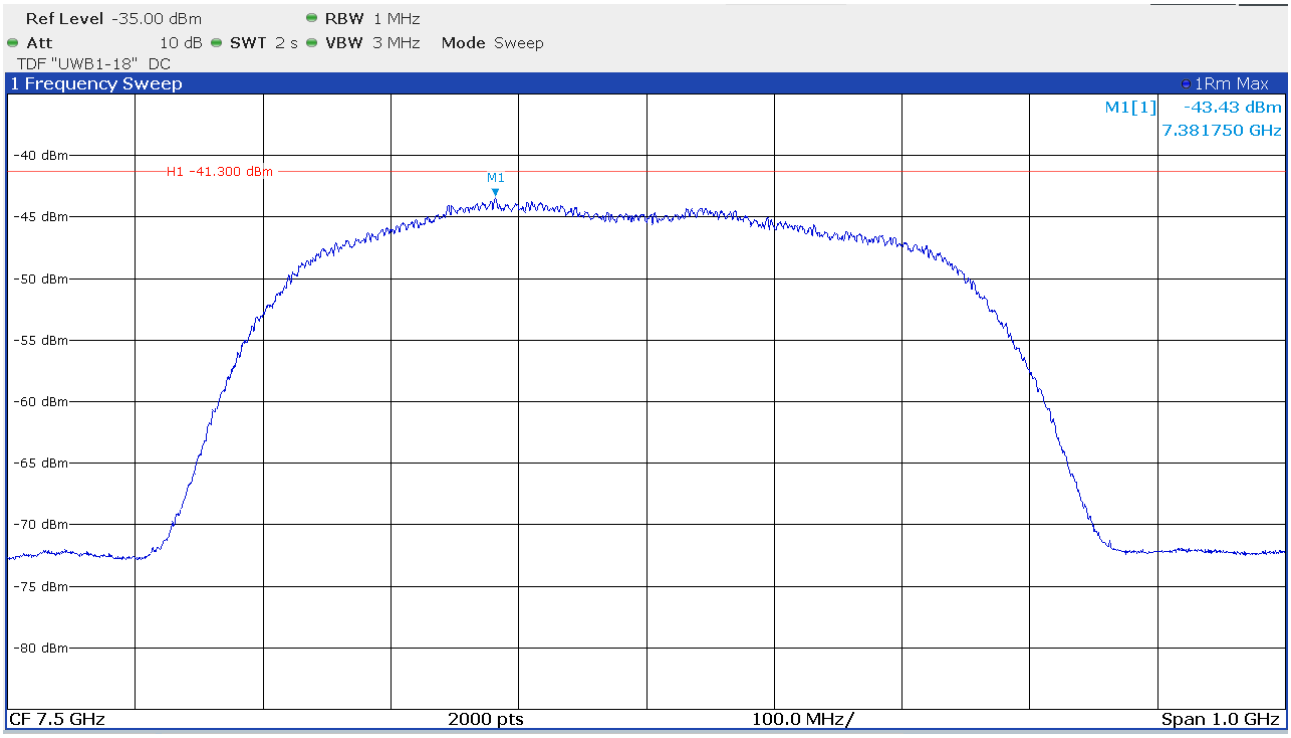
18 GHz to 40 GHz at 10 cm distance



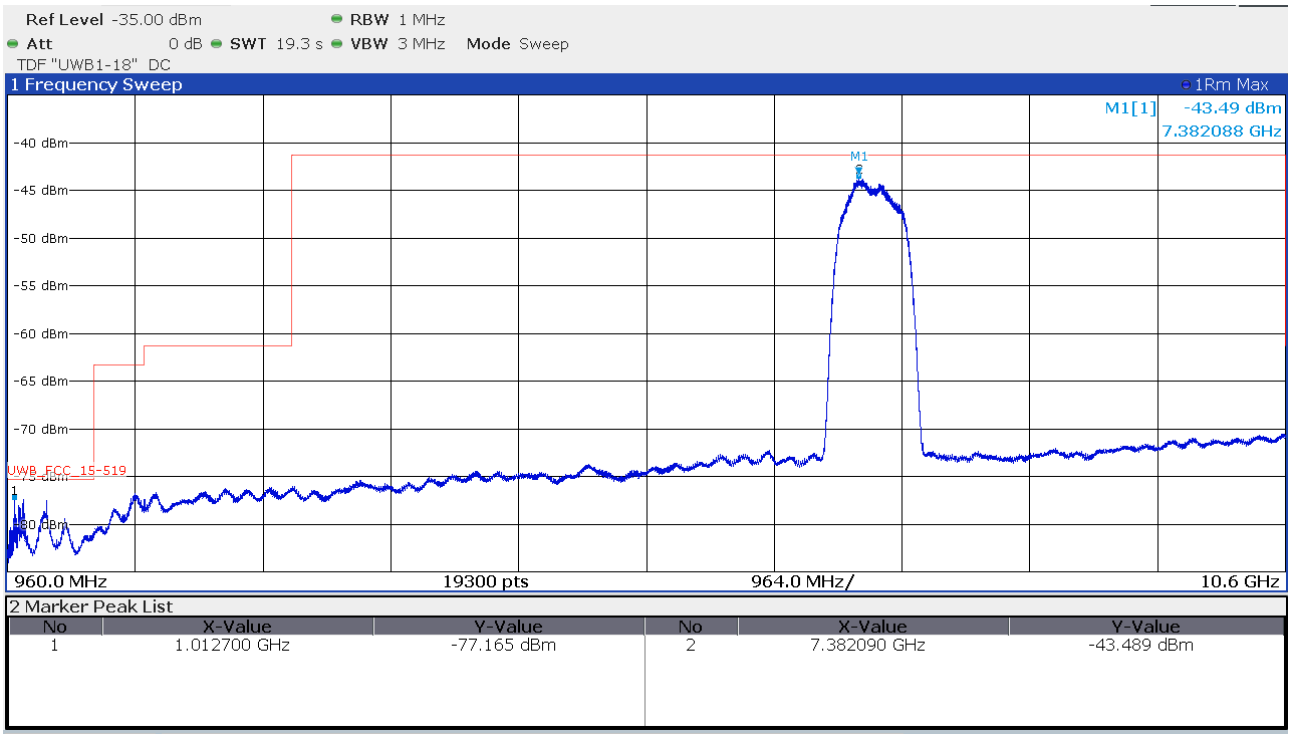
FCC ID: KR5FBD5S IC: 7812D-FBD5S

Channel 8 antenna 2

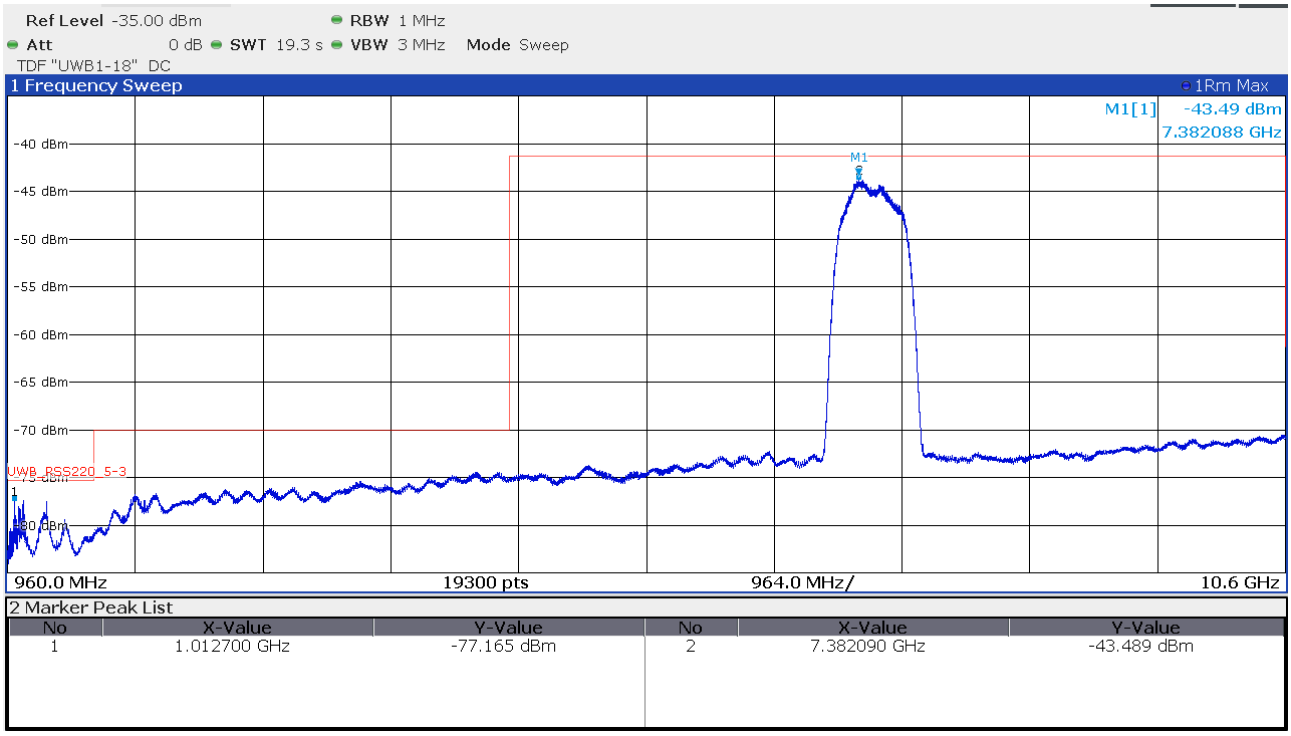
Mean Power

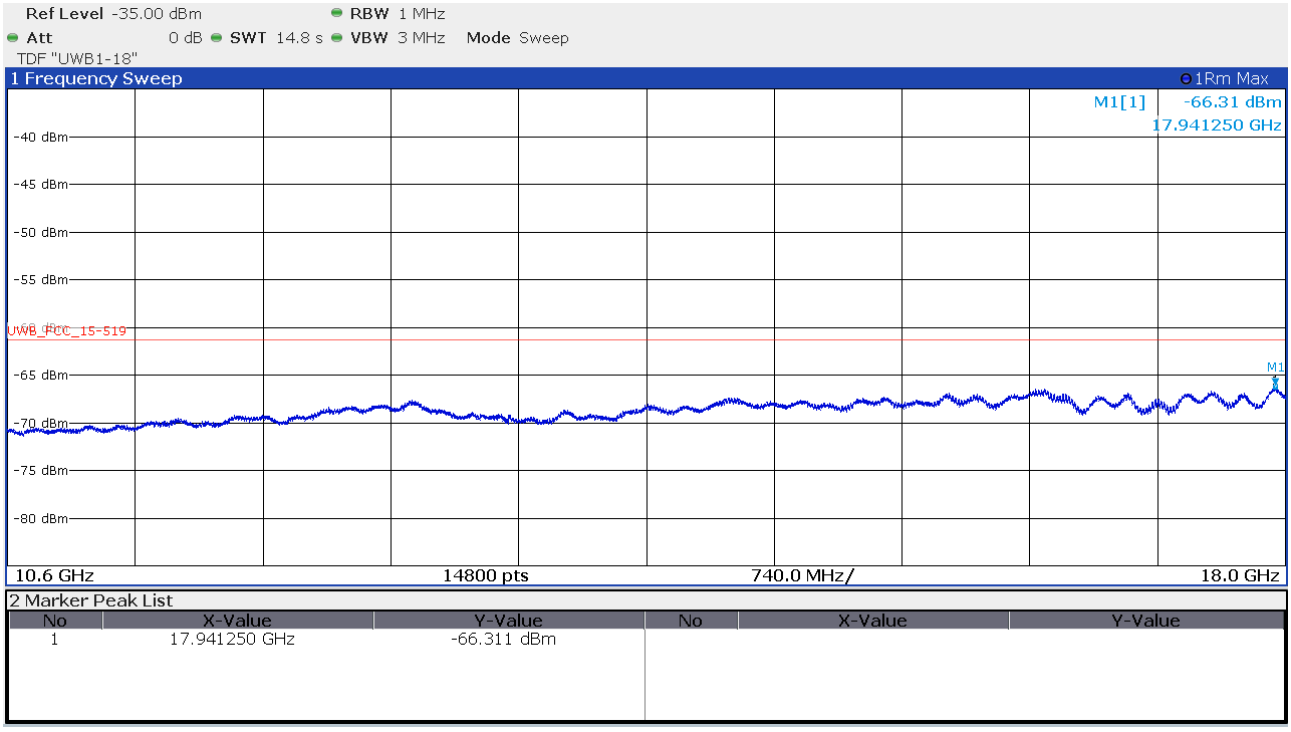


960 MHz to 18 GHz



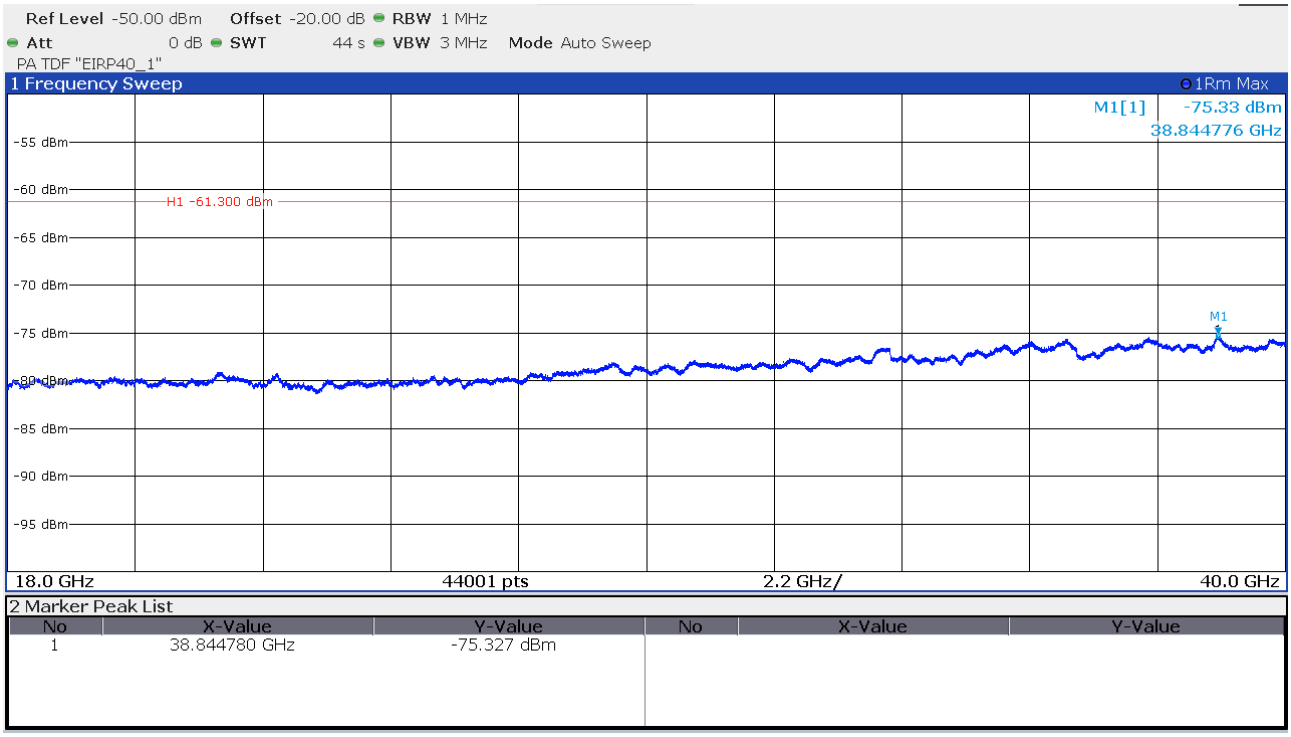
FCC ID: KR5FBD5S IC: 7812D-FBD5S





FCC ID: KR5FBD5S IC: 7812D-FBD5S

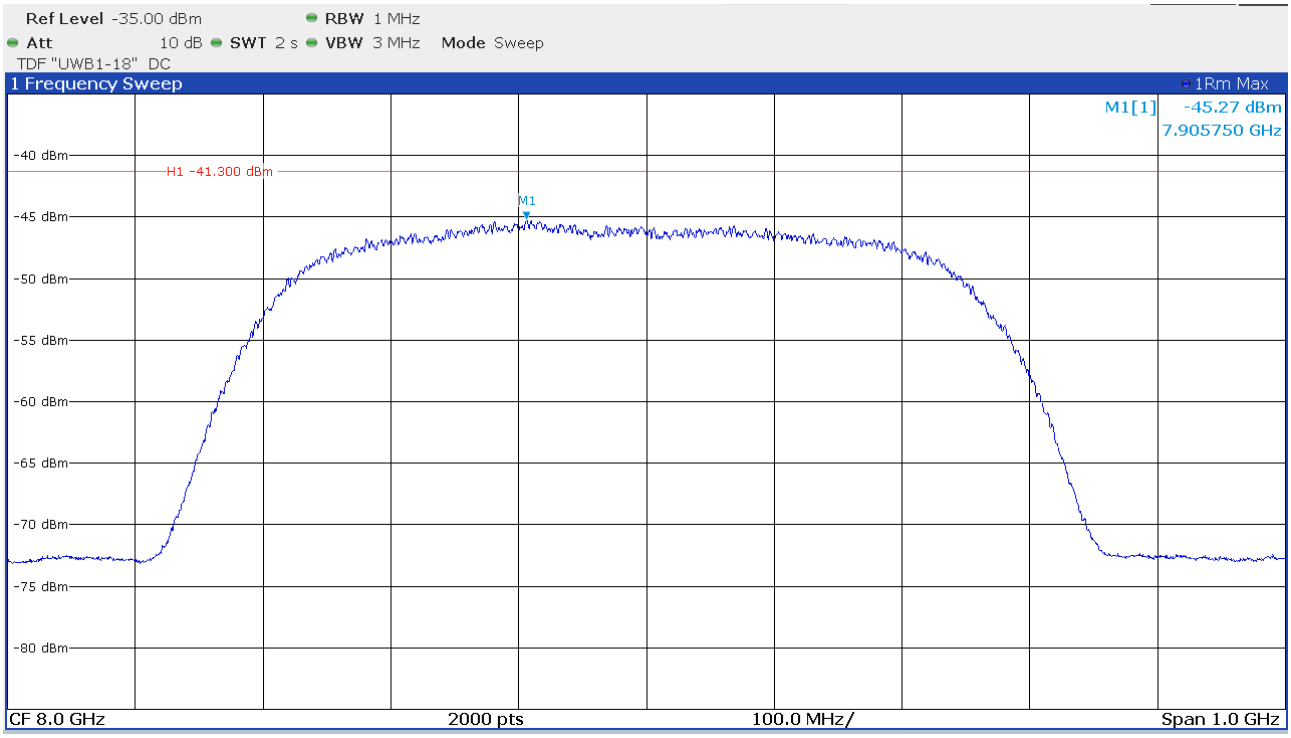
18 GHz to 40 GHz at 10 cm distance



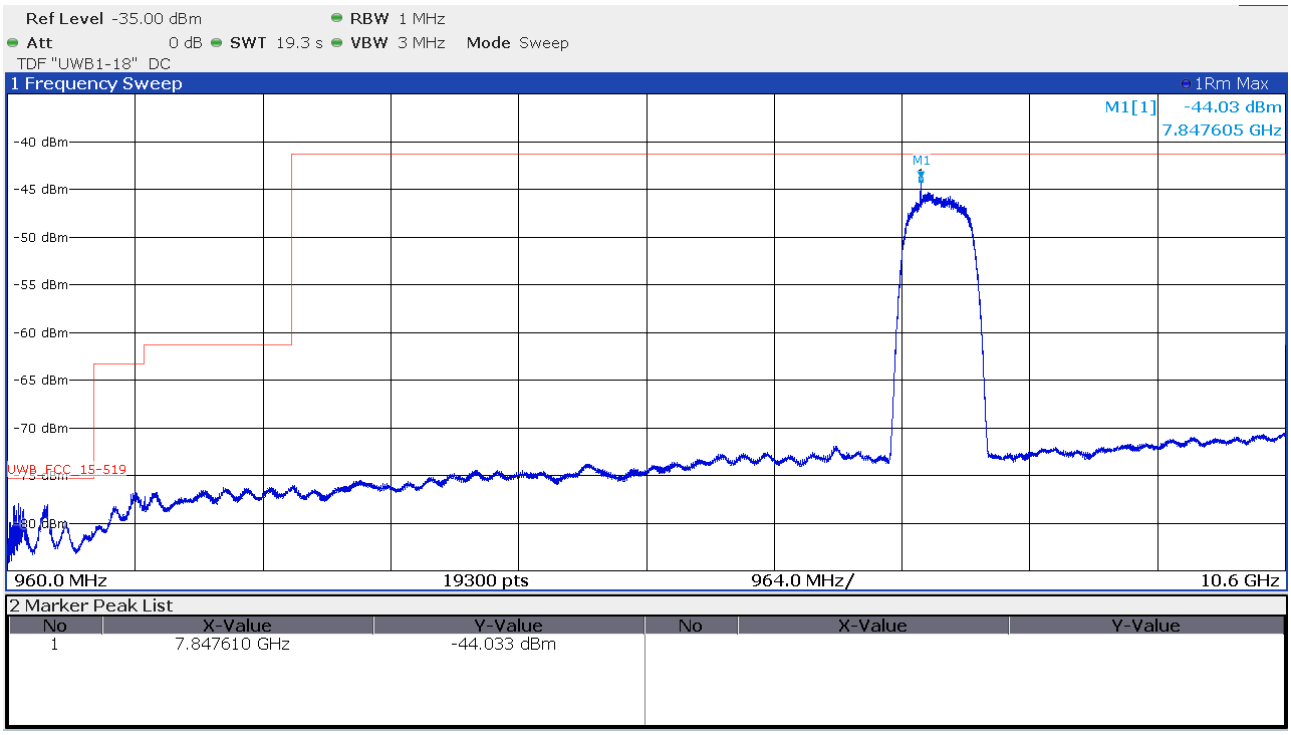
FCC ID: KR5FBD5S IC: 7812D-FBD5S

Channel 9 antenna 1

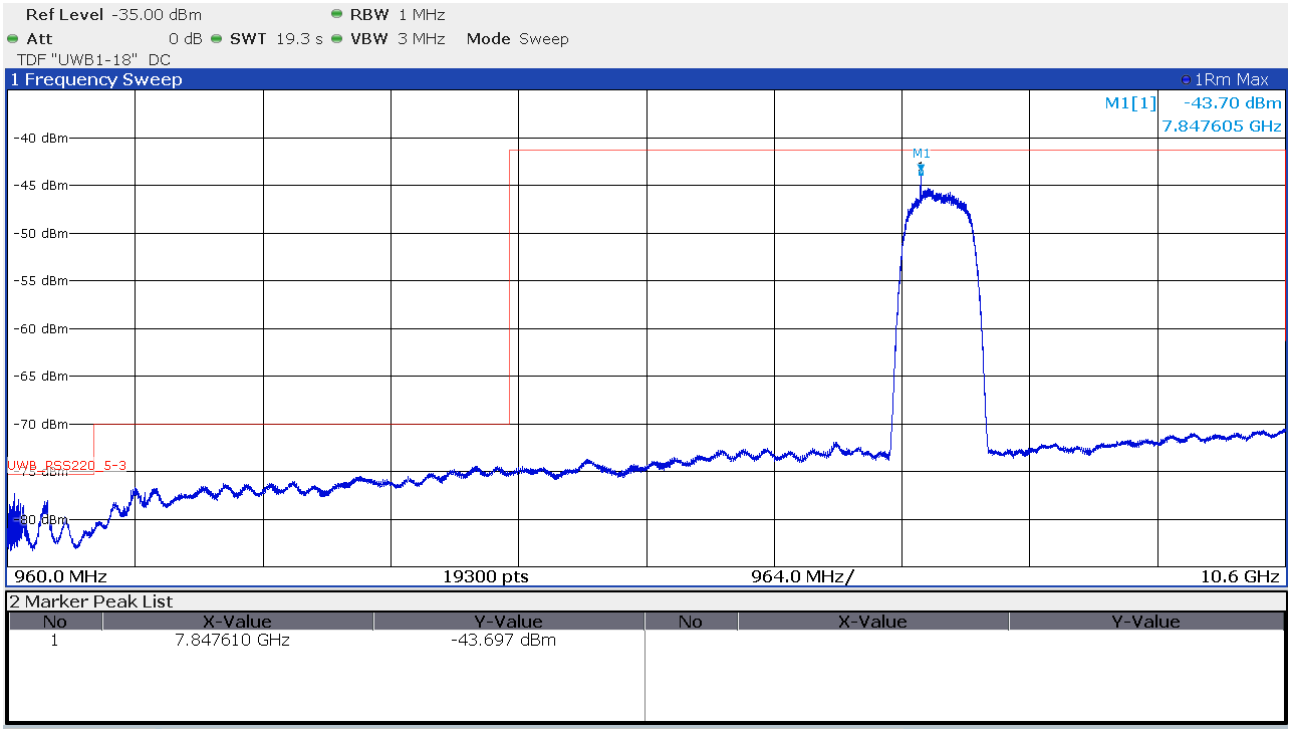
Mean Power

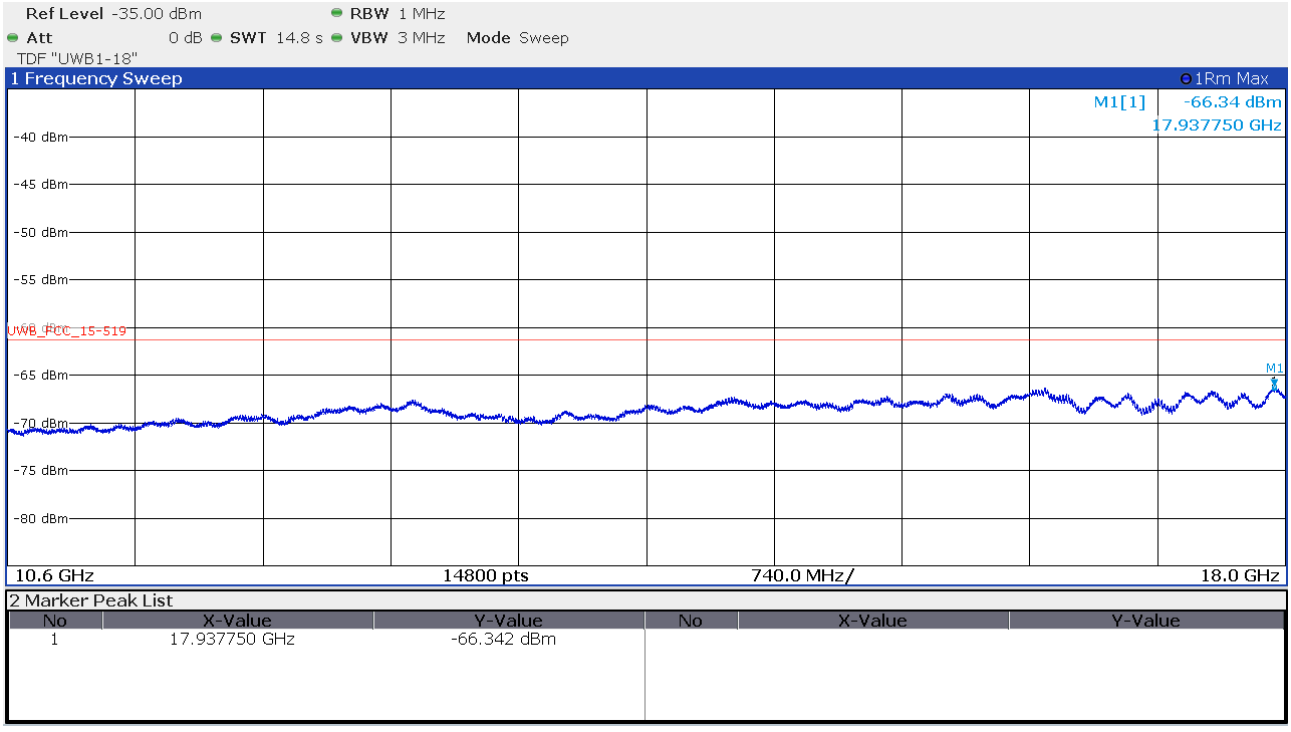


960 MHz to 18 GHz



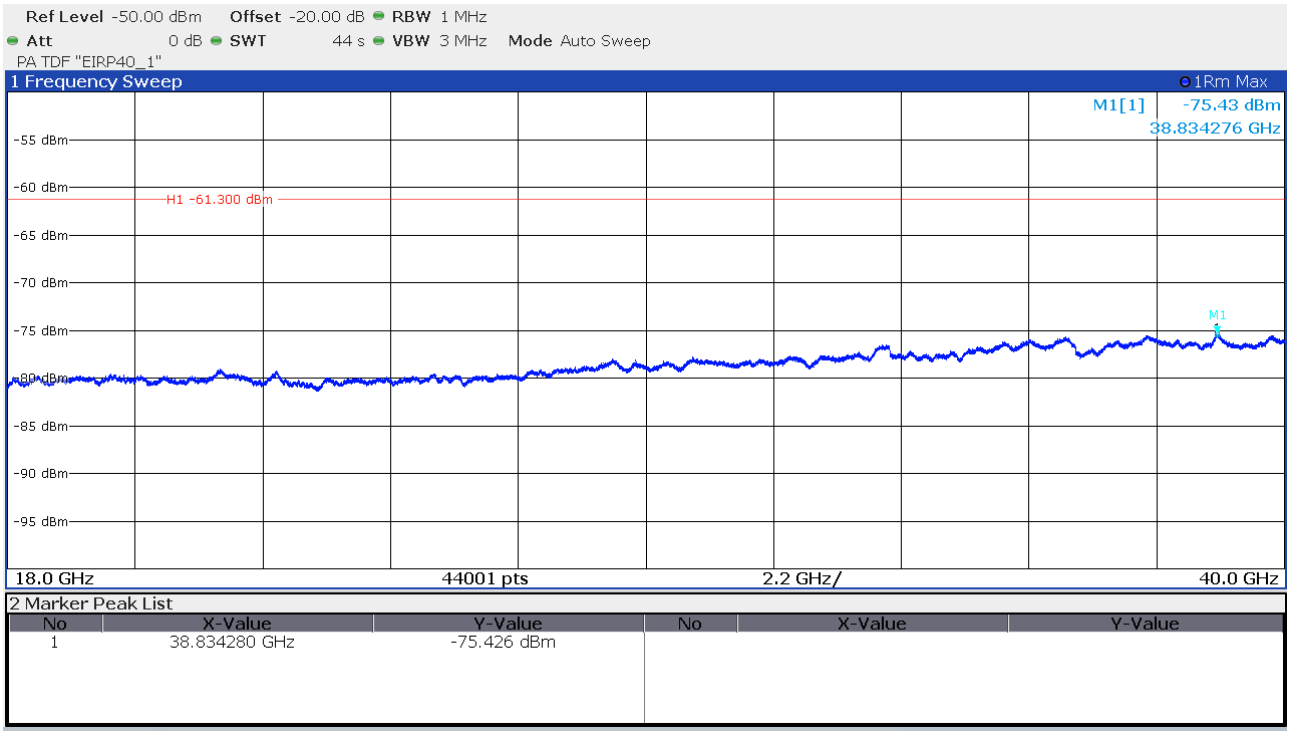
FCC ID: KR5FBD5S IC: 7812D-FBD5S





FCC ID: KR5FBD5S IC: 7812D-FBD5S

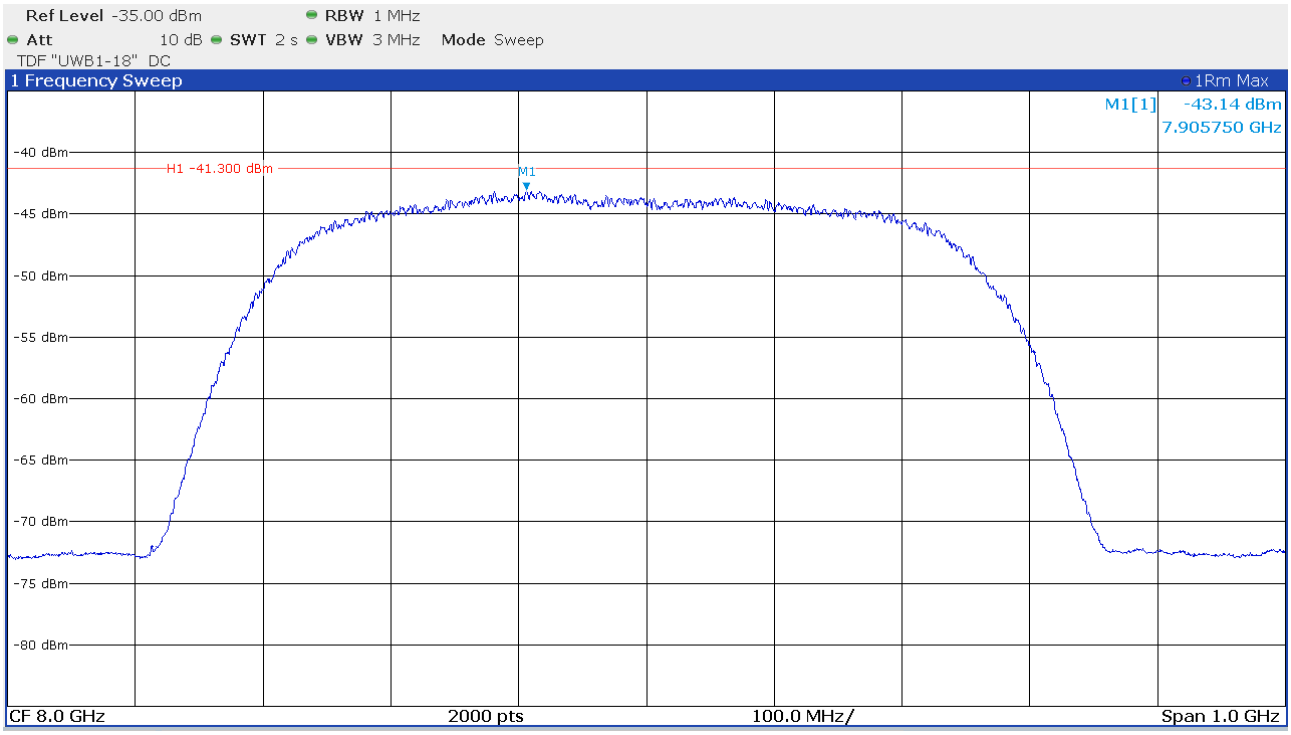
18 GHz to 40 GHz at 10 cm distance



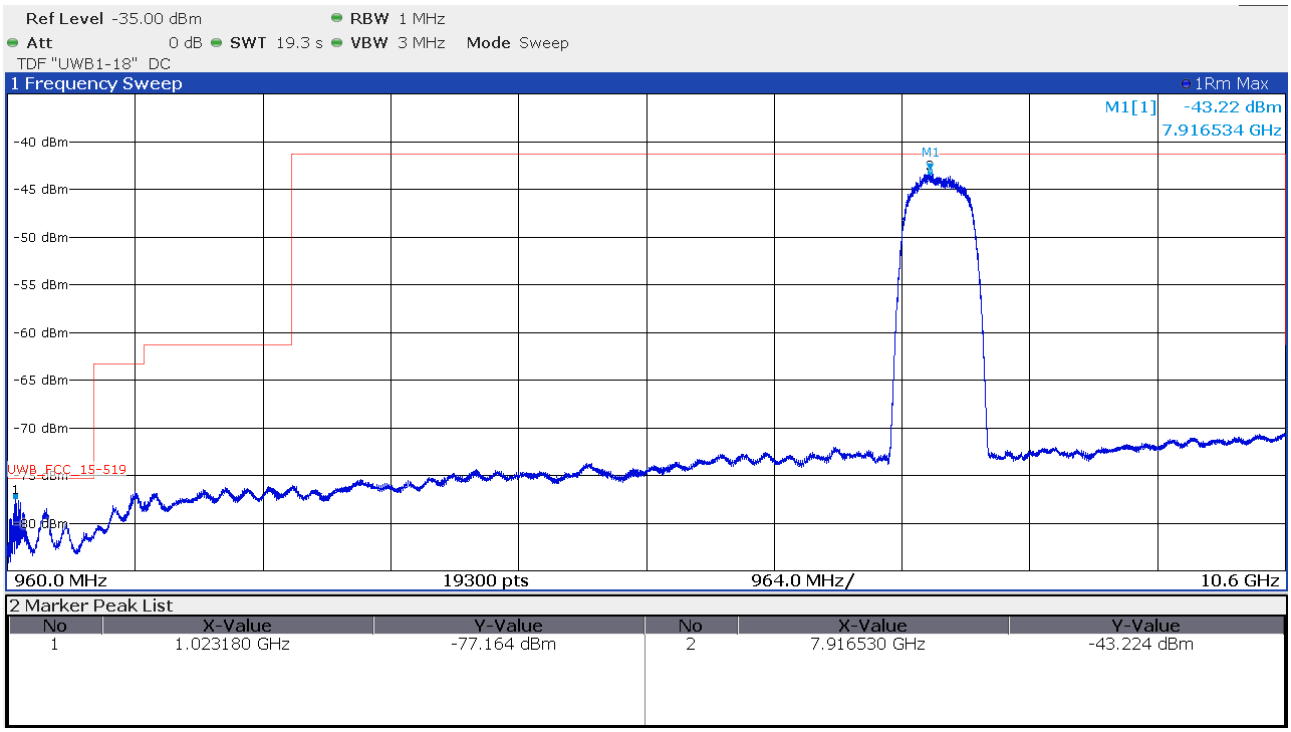
FCC ID: KR5FBD5S IC: 7812D-FBD5S

Channel 9 antenna 2

Mean Power



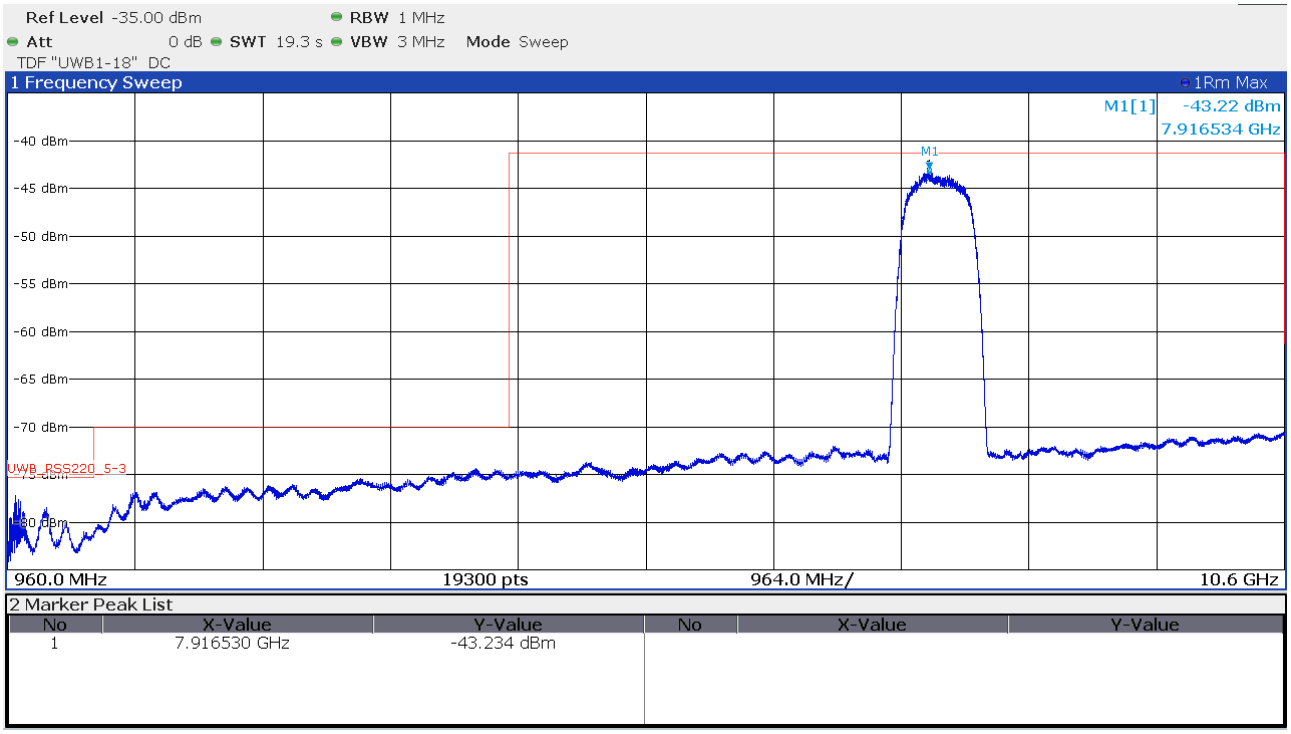
960 MHz to 18 GHz

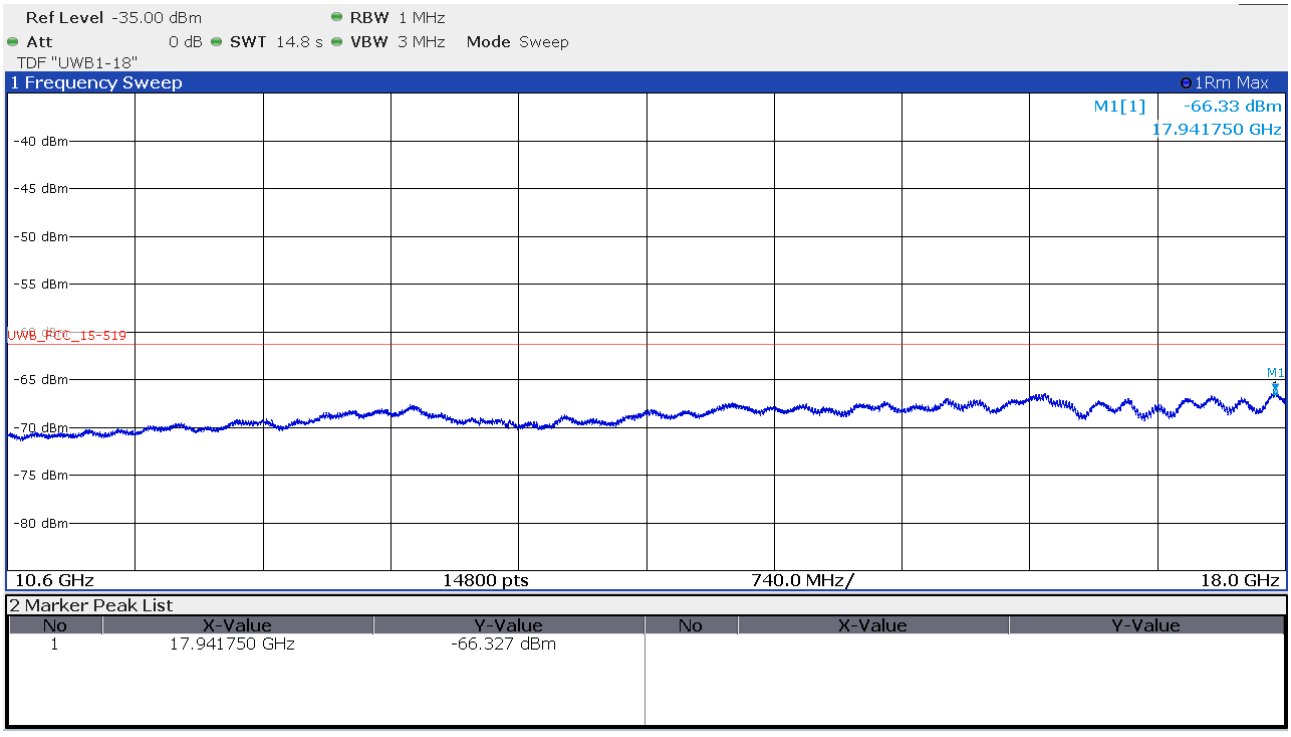


2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.023180 GHz	-77.164 dBm	2	7.916530 GHz	-43.224 dBm

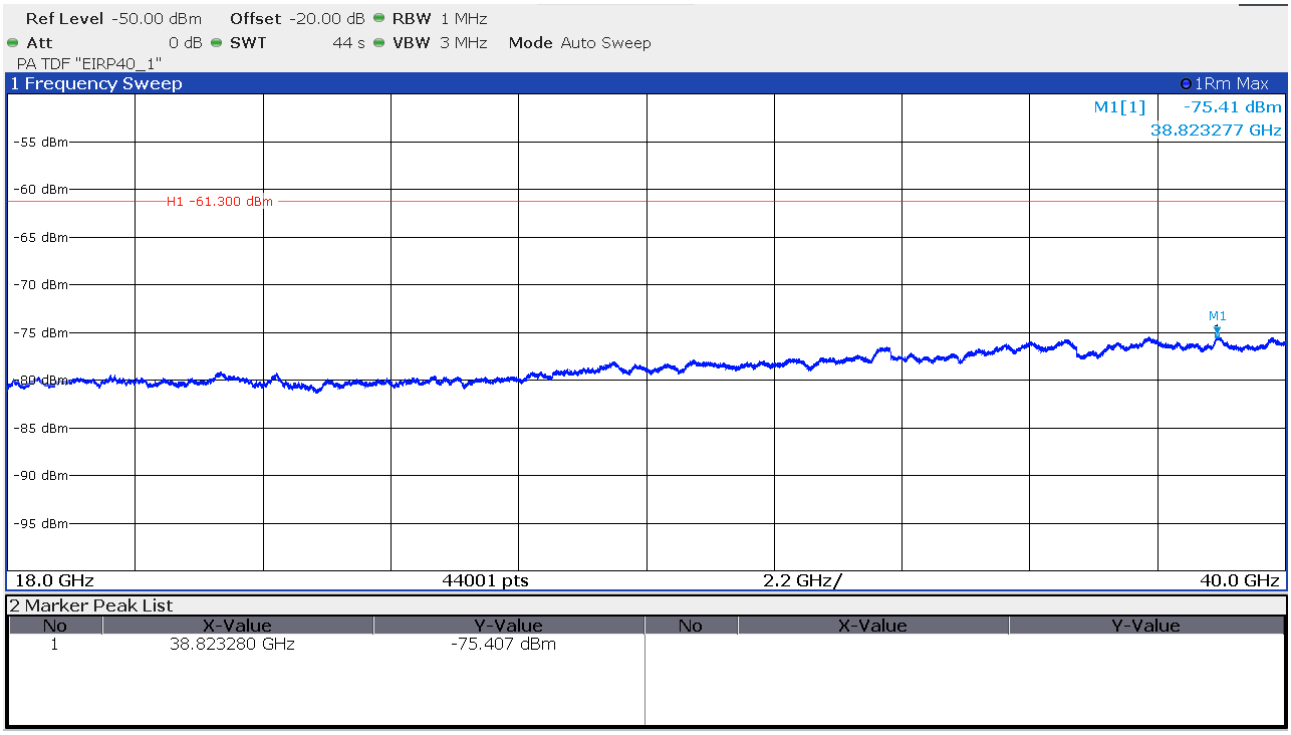
FCC ID: KR5FBD5S IC: 7812D-FBD5S





FCC ID: KR5FBD5S IC: 7812D-FBD5S

18 GHz to 40 GHz at 10 cm distance



FCC ID: KR5FBD5S IC: 7812D-FBD5S

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: None.

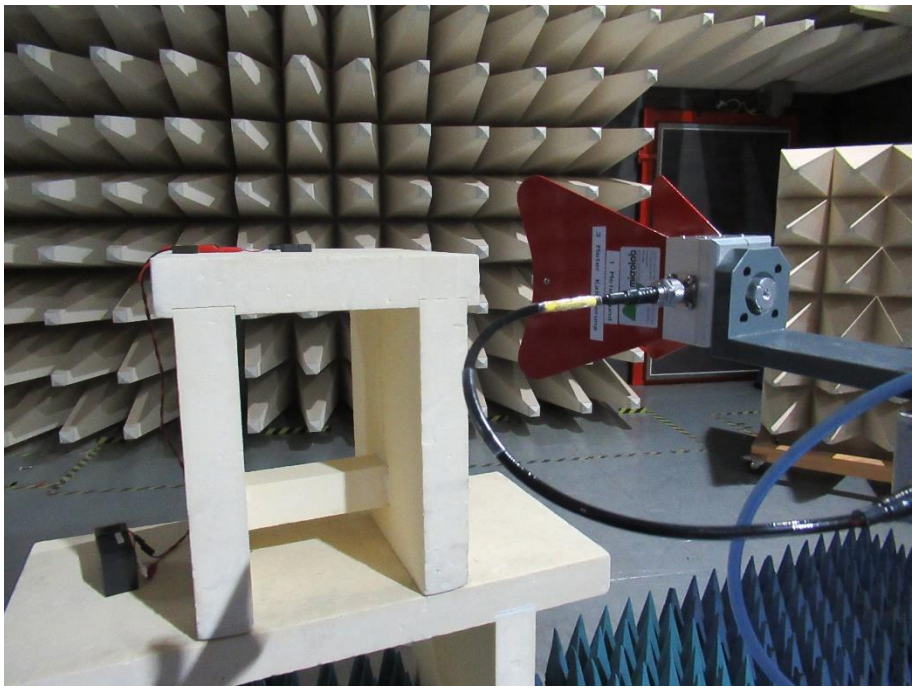
5.4 Radiated Emissions at 1164-1240 MHz and 1559-1610 MHz

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

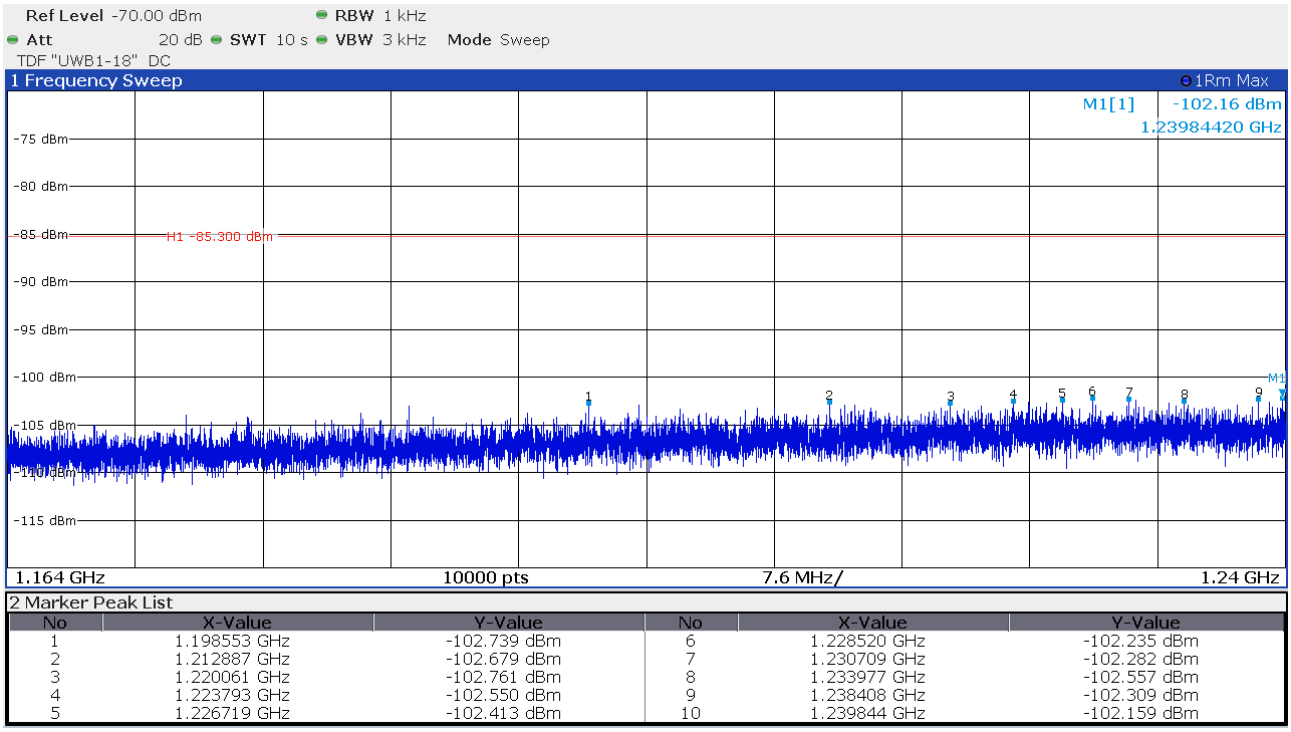
RBW: 1 kHz, VBW: 3 kHz, Detector: RMS, Sweep time: 1 ms/1kHz,

FCC ID: KR5FBD5S IC: 7812D-FBD5S

5.4.5 Test result

Channel 5 antenna 1

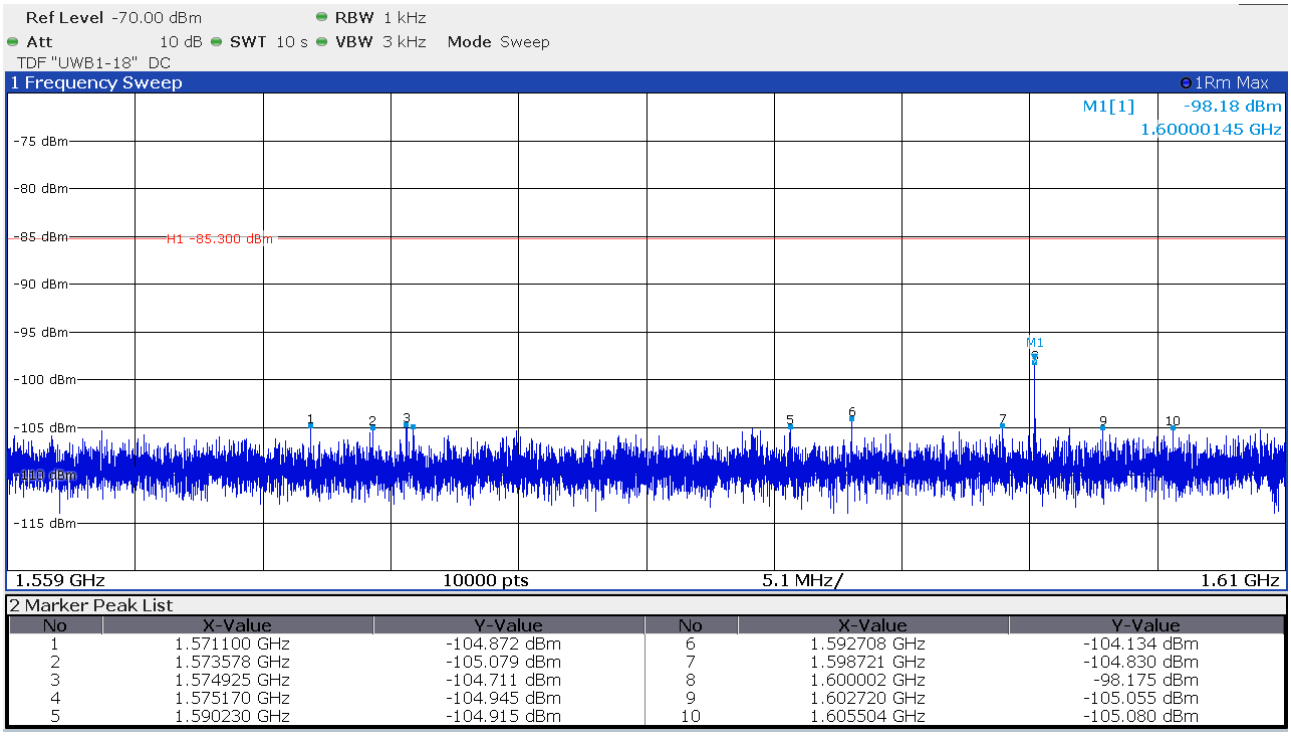
1164 MHz to 1240 MHz



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.198553 GHz	-102.739 dBm	6	1.228520 GHz	-102.235 dBm
2	1.212887 GHz	-102.679 dBm	7	1.230709 GHz	-102.282 dBm
3	1.220061 GHz	-102.761 dBm	8	1.233977 GHz	-102.557 dBm
4	1.223793 GHz	-102.550 dBm	9	1.238408 GHz	-102.309 dBm
5	1.226719 GHz	-102.413 dBm	10	1.239844 GHz	-102.159 dBm

1559 MHz to 1610 MHz



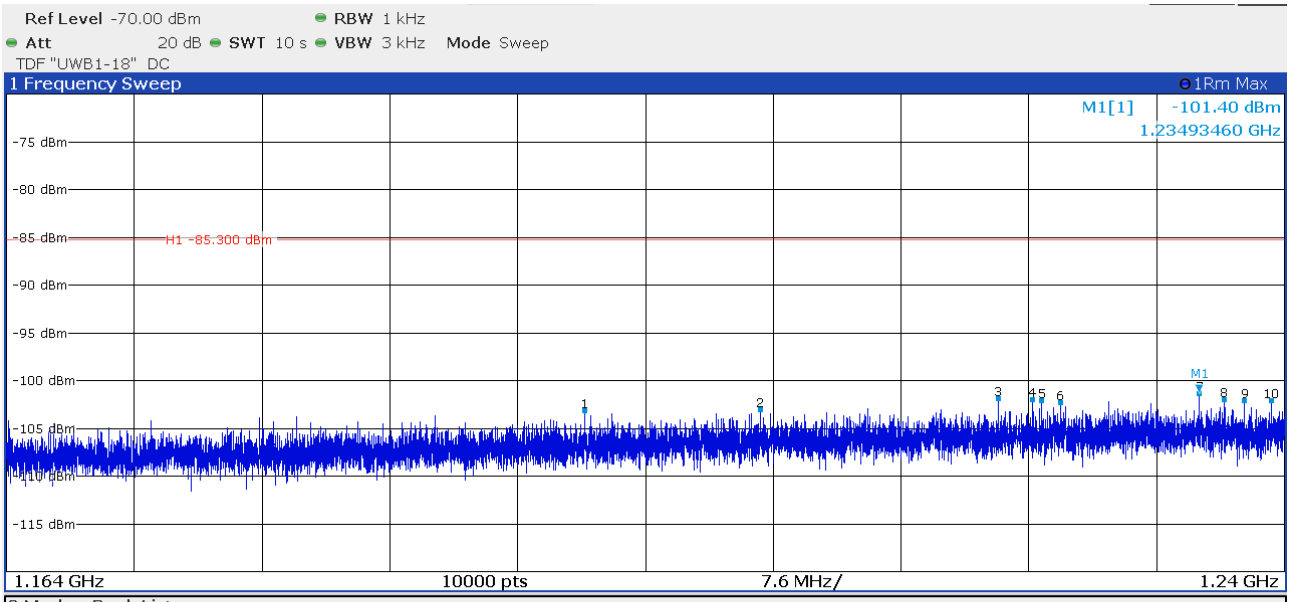
2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.571100 GHz	-104.872 dBm	6	1.592708 GHz	-104.134 dBm
2	1.573578 GHz	-105.079 dBm	7	1.598721 GHz	-104.830 dBm
3	1.574925 GHz	-104.711 dBm	8	1.600002 GHz	-98.175 dBm
4	1.575170 GHz	-104.945 dBm	9	1.602720 GHz	-105.055 dBm
5	1.590230 GHz	-104.915 dBm	10	1.605504 GHz	-105.080 dBm

FCC ID: KR5FBD5S IC: 7812D-FBD5S

Channel 5 antenna 2

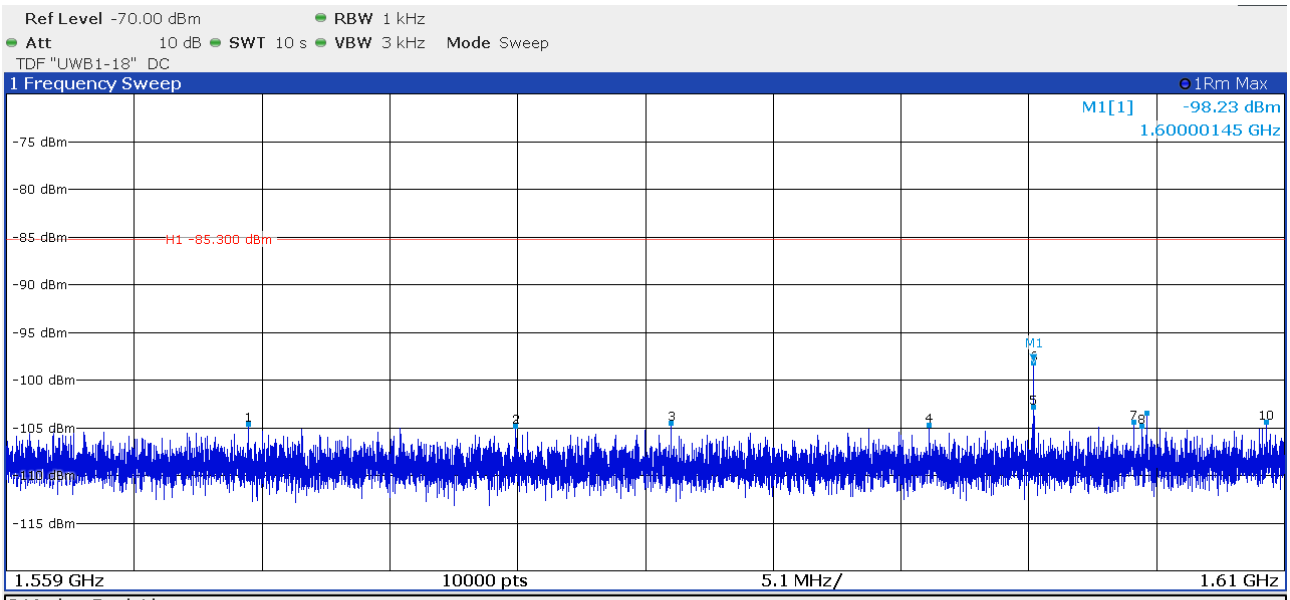
1164 MHz to 1240 MHz



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.198379 GHz	-103.138 dBm	6	1.226666 GHz	-102.341 dBm
2	1.208813 GHz	-103.086 dBm	7	1.234935 GHz	-101.397 dBm
3	1.222965 GHz	-101.930 dBm	8	1.236394 GHz	-102.026 dBm
4	1.225024 GHz	-101.972 dBm	9	1.237617 GHz	-102.059 dBm
5	1.225564 GHz	-102.083 dBm	10	1.239229 GHz	-102.114 dBm

1559 MHz to 1610 MHz



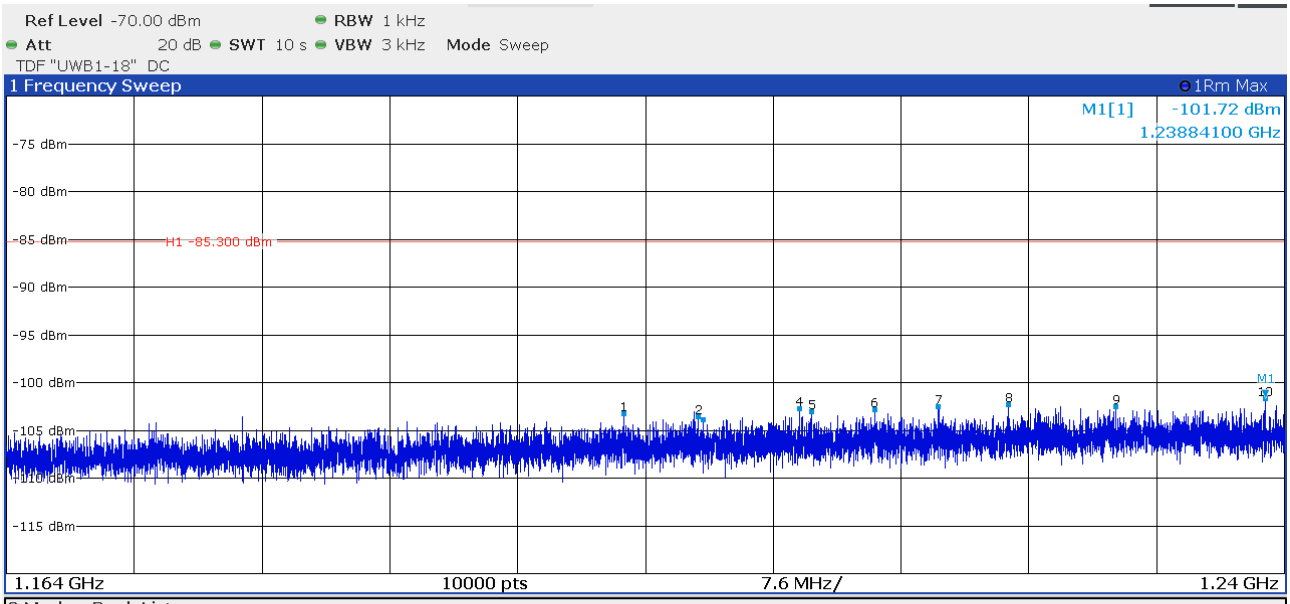
2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.568662 GHz	-104.589 dBm	6	1.600002 GHz	-98.235 dBm
2	1.579331 GHz	-104.883 dBm	7	1.603974 GHz	-104.463 dBm
3	1.585528 GHz	-104.512 dBm	8	1.604311 GHz	-104.807 dBm
4	1.595835 GHz	-104.758 dBm	9	1.604500 GHz	-103.483 dBm
5	1.599966 GHz	-102.816 dBm	10	1.609263 GHz	-104.393 dBm

FCC ID: KR5FBD5S IC: 7812D-FBD5S

Channel 6 antenna 1

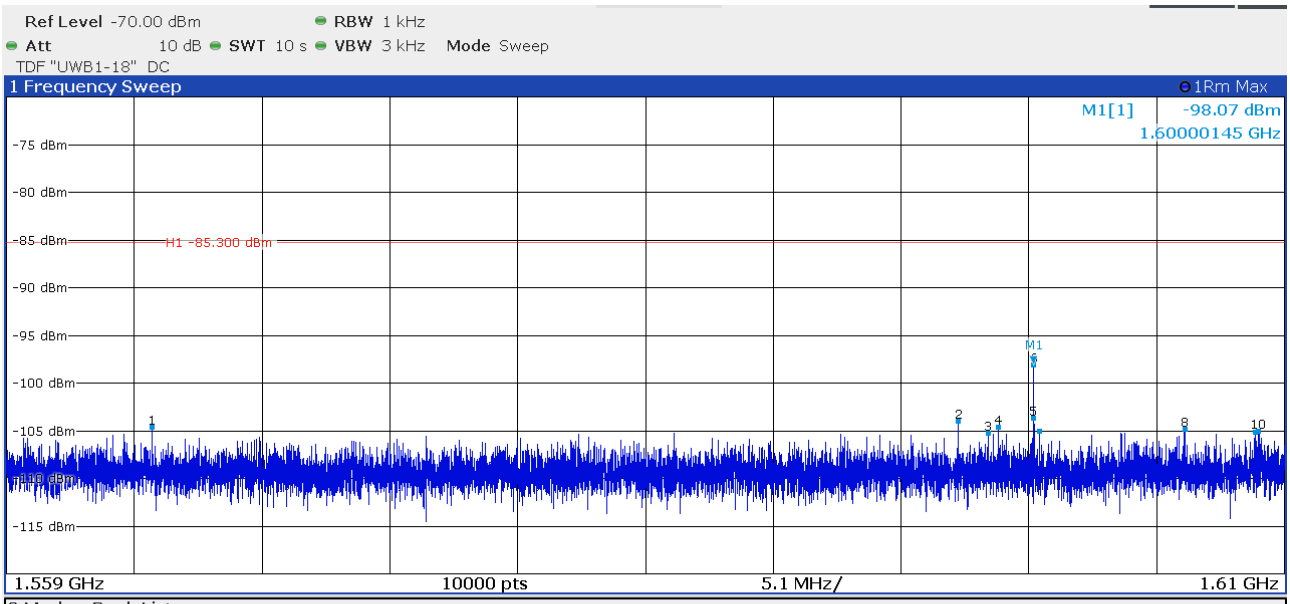
1164 MHz to 1240 MHz



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.200697 GHz	-103.296 dBm	6	1.215638 GHz	-102.793 dBm
2	1.205143 GHz	-103.594 dBm	7	1.219431 GHz	-102.504 dBm
3	1.205431 GHz	-103.869 dBm	8	1.223603 GHz	-102.367 dBm
4	1.211162 GHz	-102.737 dBm	9	1.229987 GHz	-102.506 dBm
5	1.211891 GHz	-103.020 dBm	10	1.238841 GHz	-101.720 dBm

1559 MHz to 1610 MHz



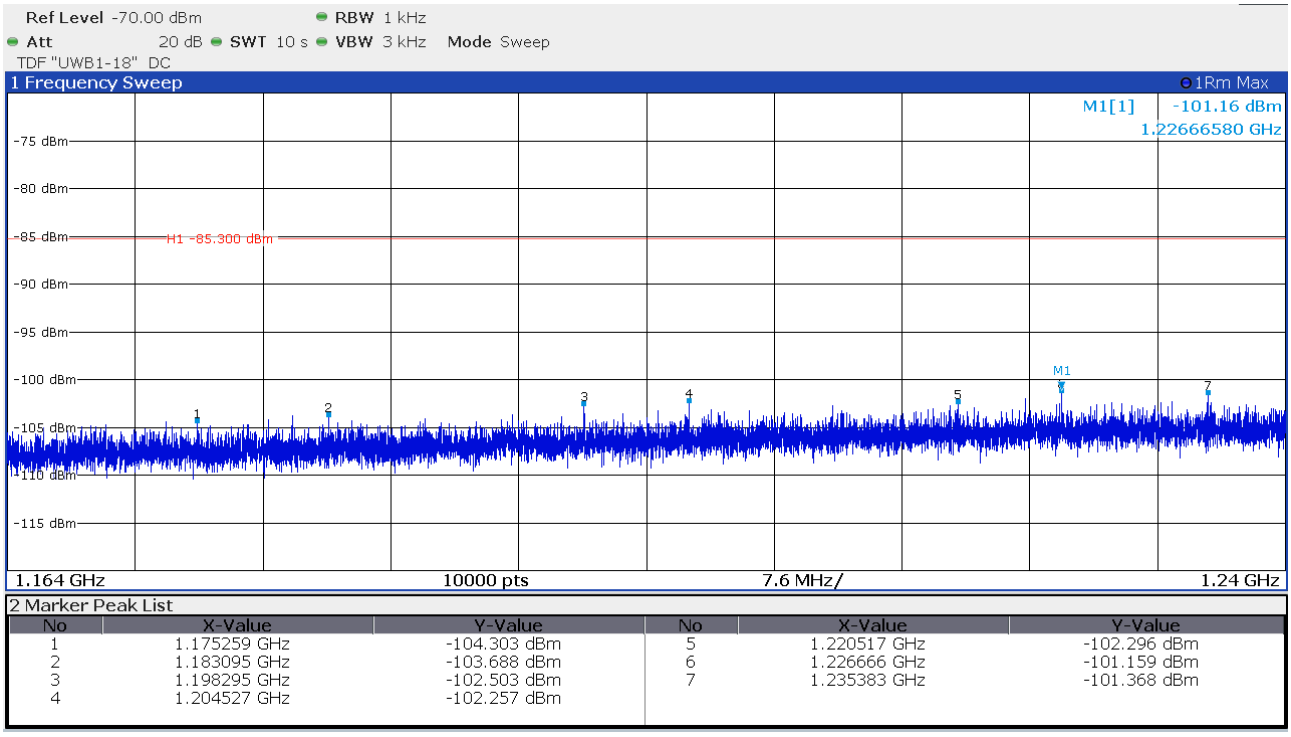
2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.564806 GHz	-104.589 dBm	6	1.600002 GHz	-98.071 dBm
2	1.596993 GHz	-103.984 dBm	7	1.600211 GHz	-105.016 dBm
3	1.598171 GHz	-105.230 dBm	8	1.606014 GHz	-104.846 dBm
4	1.598568 GHz	-104.681 dBm	9	1.608819 GHz	-105.125 dBm
5	1.599966 GHz	-103.708 dBm	10	1.608947 GHz	-105.091 dBm

FCC ID: KR5FBD5S IC: 7812D-FBD5S

Channel 6 antenna 2

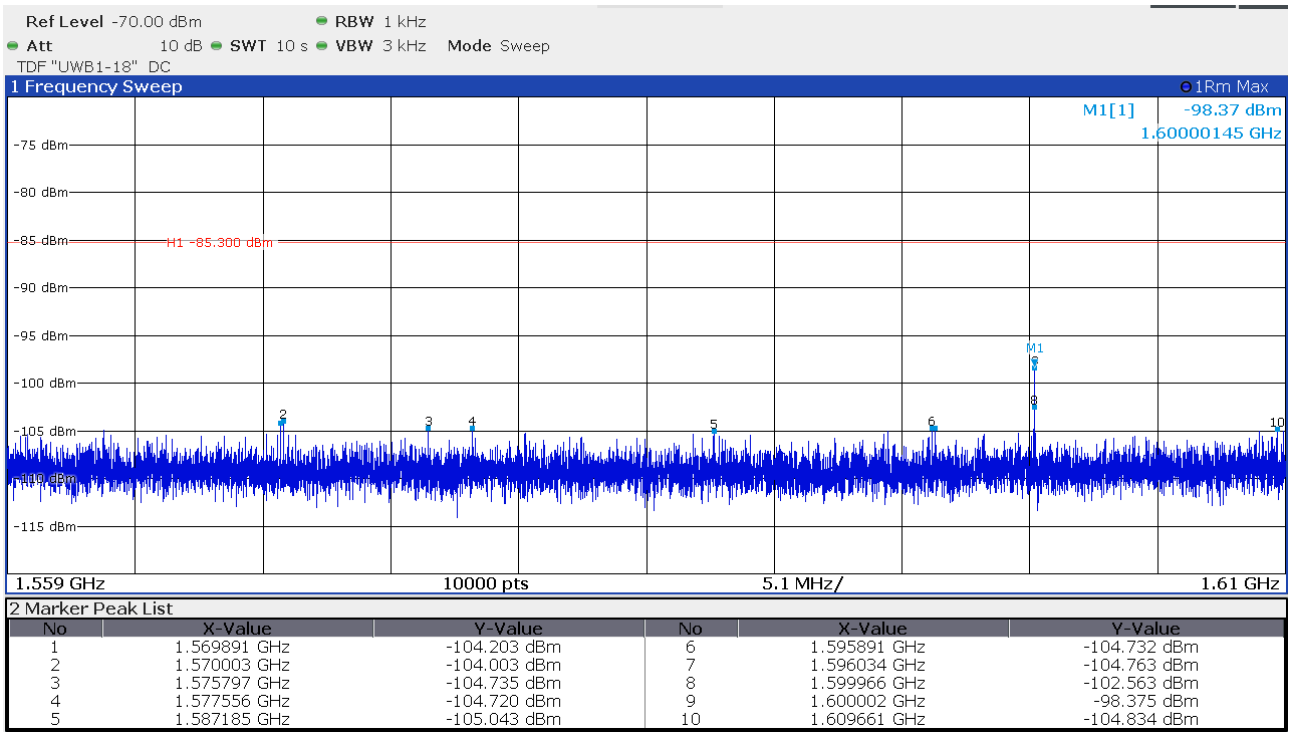
1164 MHz to 1240 MHz



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.175259 GHz	-104.303 dBm	5	1.220517 GHz	-102.296 dBm
2	1.183095 GHz	-103.688 dBm	6	1.226666 GHz	-101.159 dBm
3	1.198295 GHz	-102.503 dBm	7	1.235383 GHz	-101.368 dBm
4	1.204527 GHz	-102.257 dBm			

1559 MHz to 1610 MHz



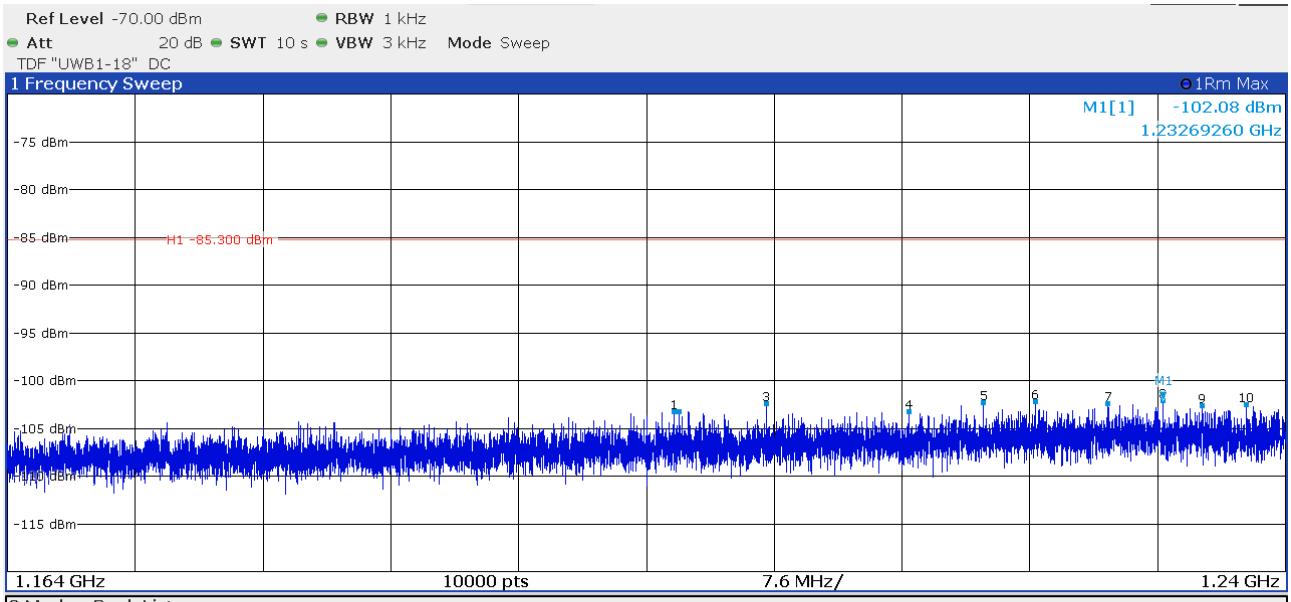
2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.569891 GHz	-104.203 dBm	6	1.595891 GHz	-104.732 dBm
2	1.570003 GHz	-104.003 dBm	7	1.596034 GHz	-104.763 dBm
3	1.575797 GHz	-104.735 dBm	8	1.599966 GHz	-102.563 dBm
4	1.577556 GHz	-104.720 dBm	9	1.600002 GHz	-98.375 dBm
5	1.587185 GHz	-105.043 dBm	10	1.609661 GHz	-104.834 dBm

FCC ID: KR5FBD5S IC: 7812D-FBD5S

Channel 8 antenna 1

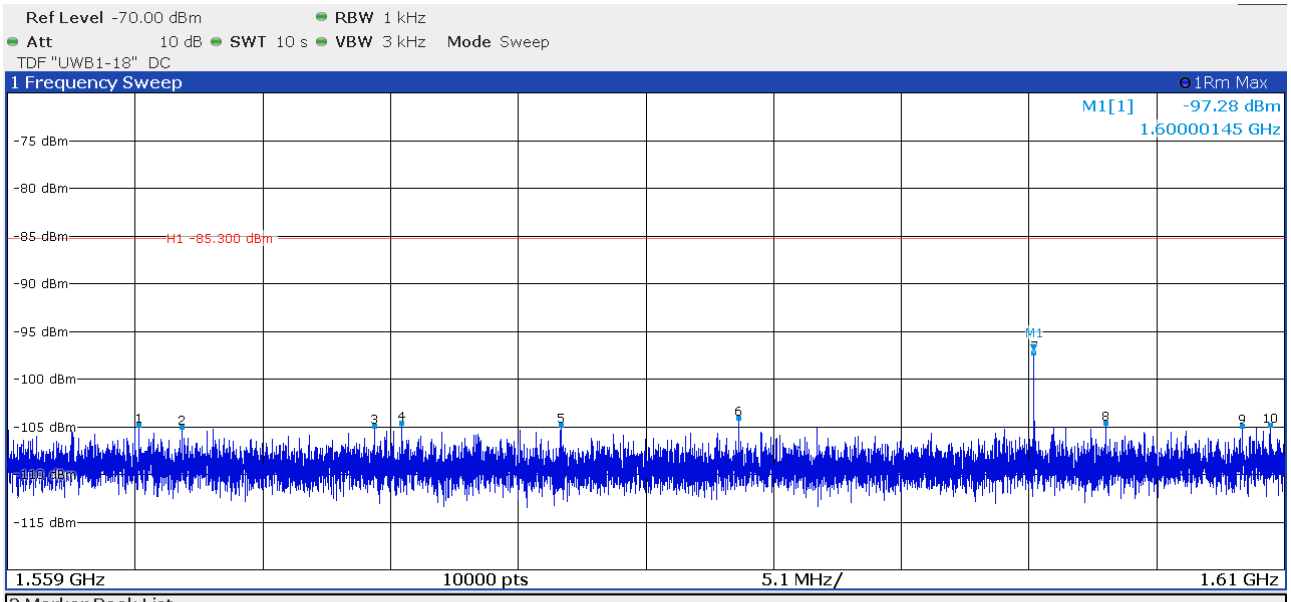
1164 MHz to 1240 MHz



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.203653 GHz	-103.310 dBm	6	1.225108 GHz	-102.190 dBm
2	1.203942 GHz	-103.273 dBm	7	1.229463 GHz	-102.385 dBm
3	1.209117 GHz	-102.411 dBm	8	1.232693 GHz	-102.081 dBm
4	1.217629 GHz	-103.311 dBm	9	1.235026 GHz	-102.646 dBm
5	1.222037 GHz	-102.269 dBm	10	1.237671 GHz	-102.505 dBm

1559 MHz to 1610 MHz



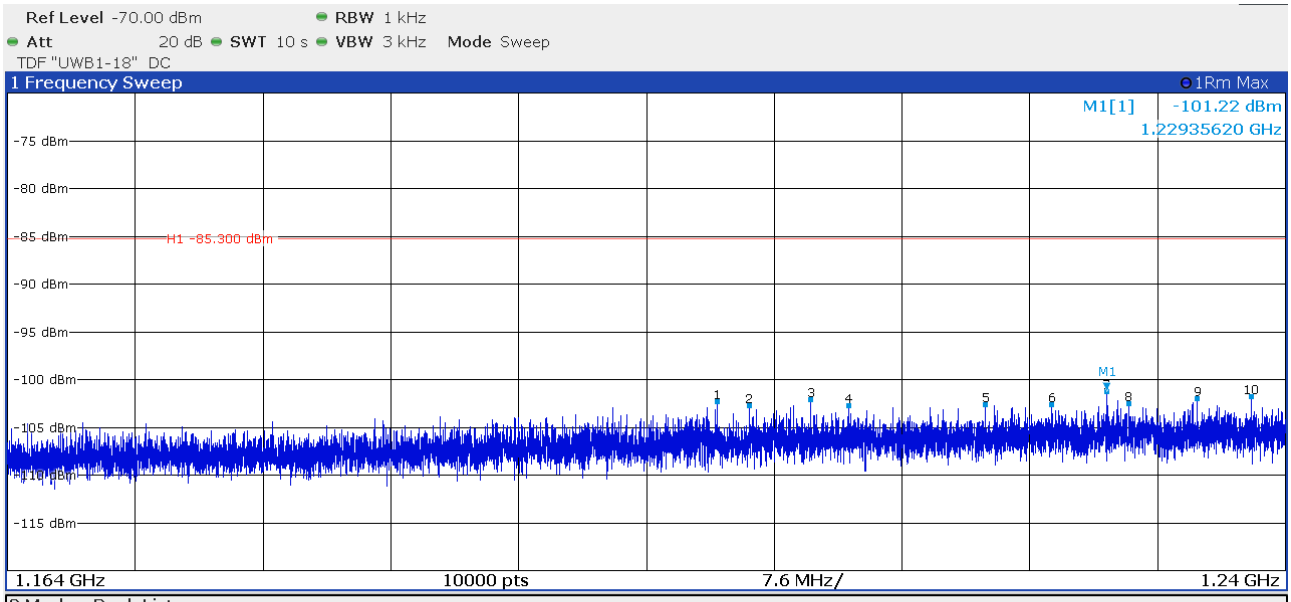
2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.564251 GHz	-104.848 dBm	6	1.588200 GHz	-104.128 dBm
2	1.565959 GHz	-105.021 dBm	7	1.600002 GHz	-97.283 dBm
3	1.573650 GHz	-104.932 dBm	8	1.602863 GHz	-104.642 dBm
4	1.574736 GHz	-104.679 dBm	9	1.608314 GHz	-104.903 dBm
5	1.581096 GHz	-104.894 dBm	10	1.609436 GHz	-104.811 dBm

FCC ID: KR5FBD5S IC: 7812D-FBD5S

Channel 8 antenna 2

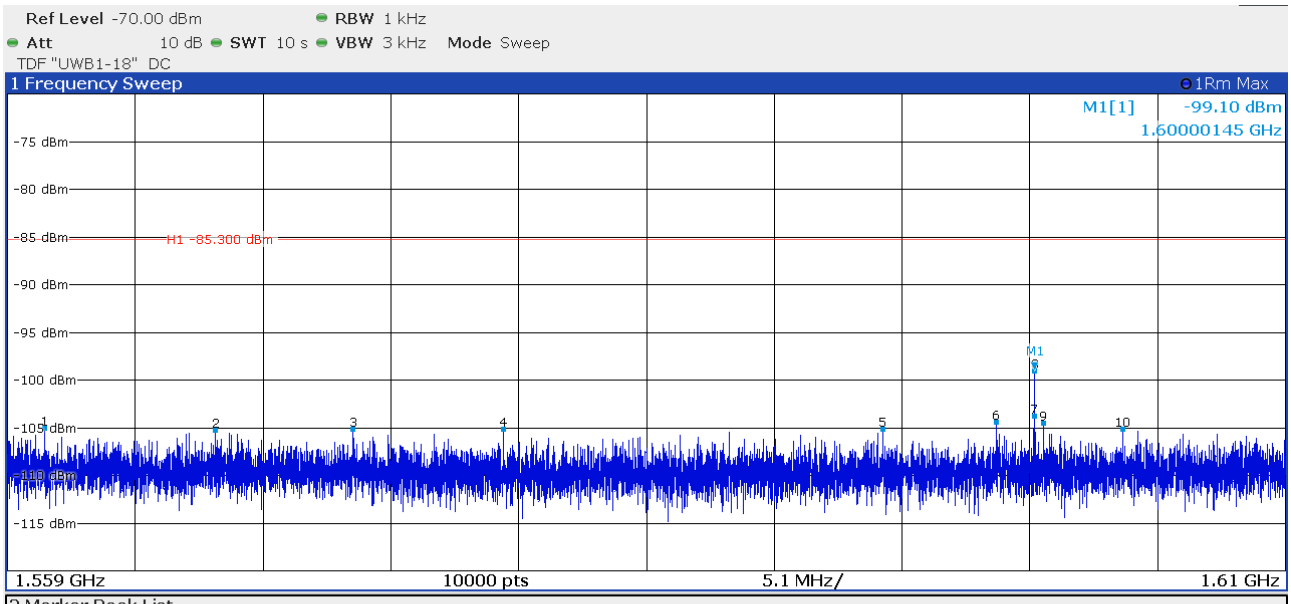
1164 MHz to 1240 MHz



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.206199 GHz	-102.307 dBm	6	1.226096 GHz	-102.583 dBm
2	1.208099 GHz	-102.710 dBm	7	1.229356 GHz	-101.220 dBm
3	1.211785 GHz	-102.142 dBm	8	1.230686 GHz	-102.577 dBm
4	1.214012 GHz	-102.762 dBm	9	1.234767 GHz	-101.983 dBm
5	1.222167 GHz	-102.679 dBm	10	1.237990 GHz	-101.752 dBm

1559 MHz to 1610 MHz



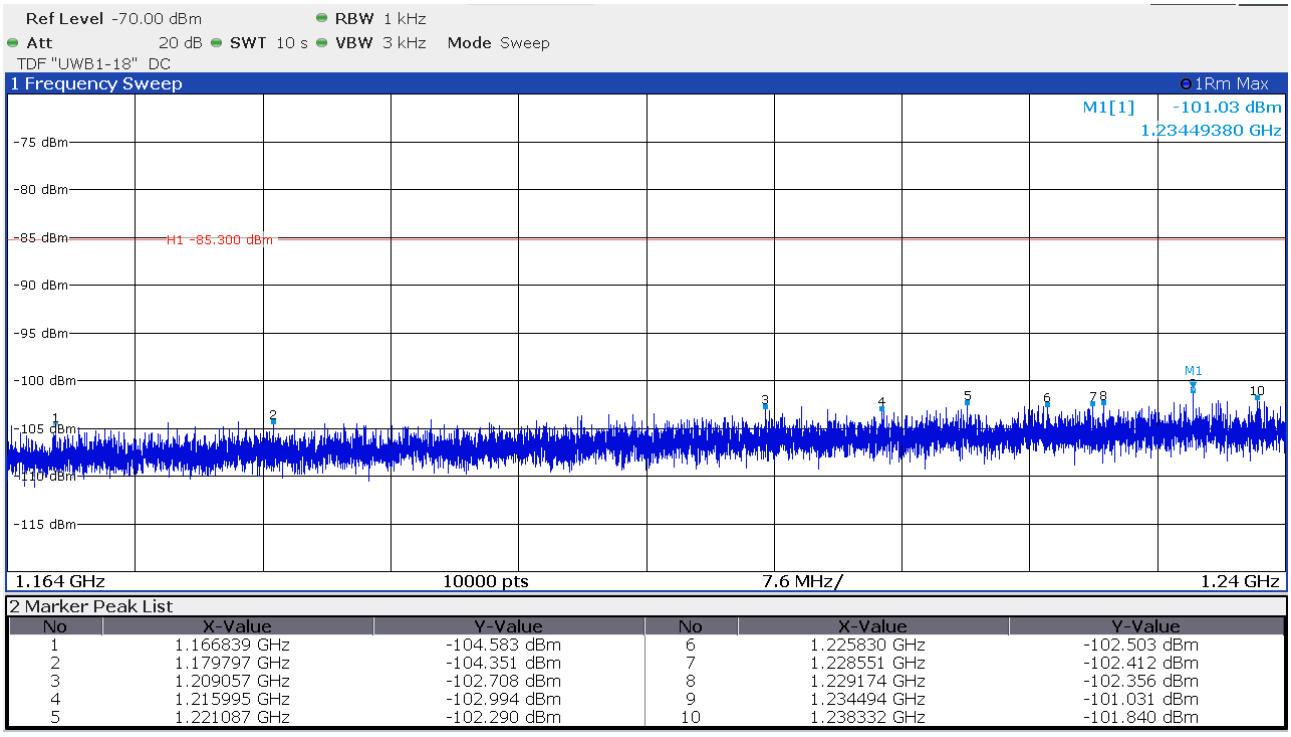
2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.560497 GHz	-105.051 dBm	6	1.598446 GHz	-104.469 dBm
2	1.567300 GHz	-105.312 dBm	7	1.599966 GHz	-103.774 dBm
3	1.572793 GHz	-105.150 dBm	8	1.600002 GHz	-99.103 dBm
4	1.578780 GHz	-105.168 dBm	9	1.600338 GHz	-104.572 dBm
5	1.593932 GHz	-105.179 dBm	10	1.603526 GHz	-105.107 dBm

FCC ID: KR5FBD5S IC: 7812D-FBD5S

Channel 9 antenna 1

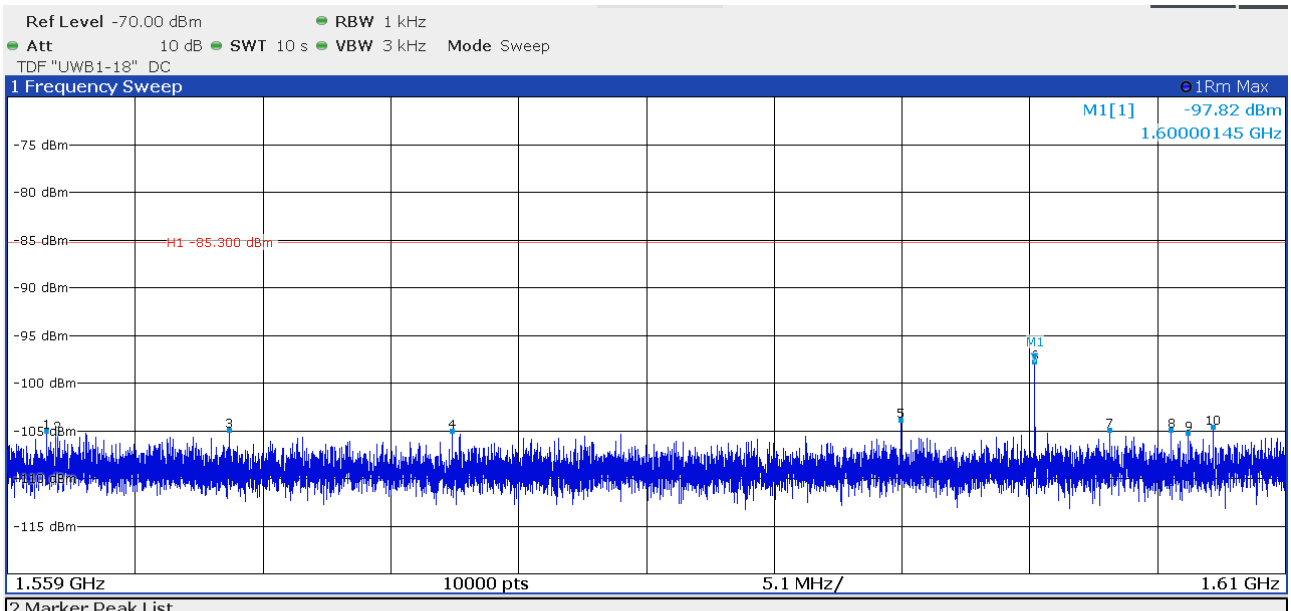
1164 MHz to 1240 MHz



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.166839 GHz	-104.583 dBm	6	1.225830 GHz	-102.503 dBm
2	1.179797 GHz	-104.351 dBm	7	1.228551 GHz	-102.412 dBm
3	1.209057 GHz	-102.708 dBm	8	1.229174 GHz	-102.356 dBm
4	1.215995 GHz	-102.994 dBm	9	1.234494 GHz	-101.031 dBm
5	1.221087 GHz	-102.290 dBm	10	1.238332 GHz	-101.840 dBm

1559 MHz to 1610 MHz



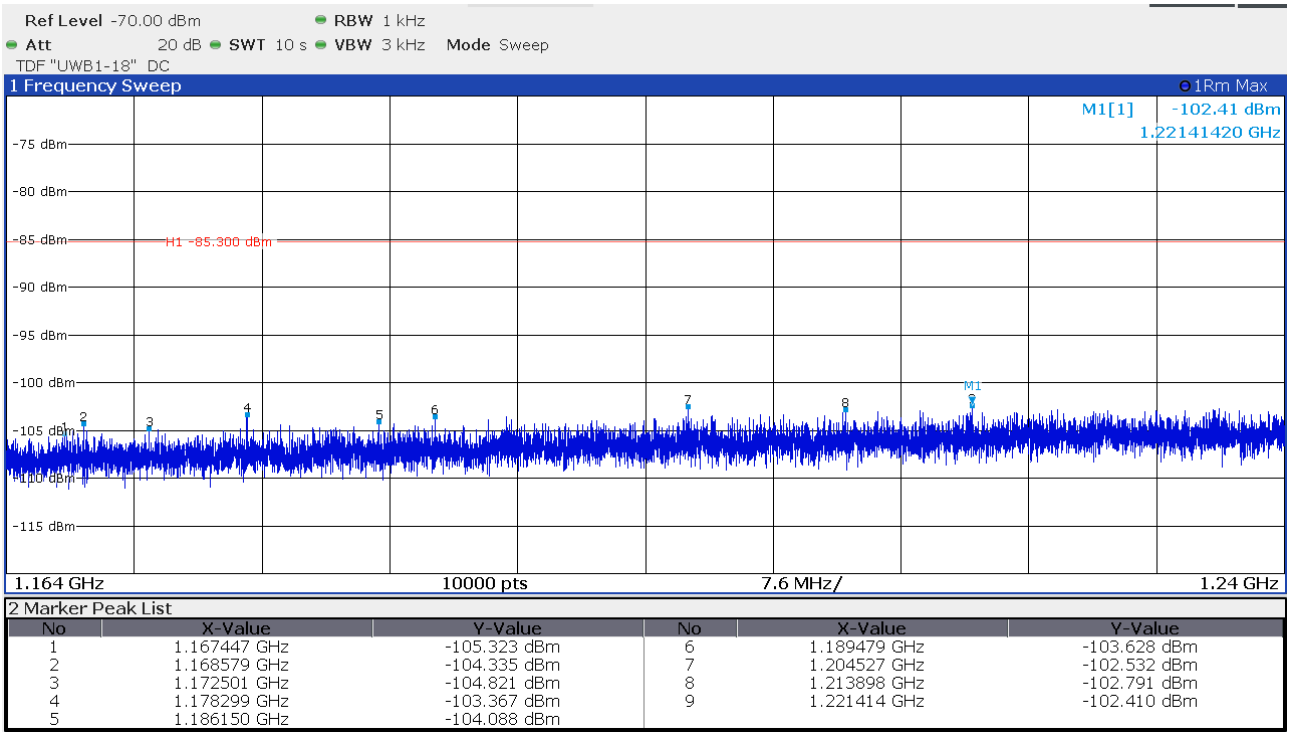
2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.560573 GHz	-105.067 dBm	6	1.600002 GHz	-97.822 dBm
2	1.560997 GHz	-105.247 dBm	7	1.602975 GHz	-105.000 dBm
3	1.567836 GHz	-104.952 dBm	8	1.605438 GHz	-104.932 dBm
4	1.576740 GHz	-105.073 dBm	9	1.606127 GHz	-105.255 dBm
5	1.594647 GHz	-103.908 dBm	10	1.607121 GHz	-104.650 dBm

FCC ID: KR5FBD5S IC: 7812D-FBD5S

Channel 9 antenna 2

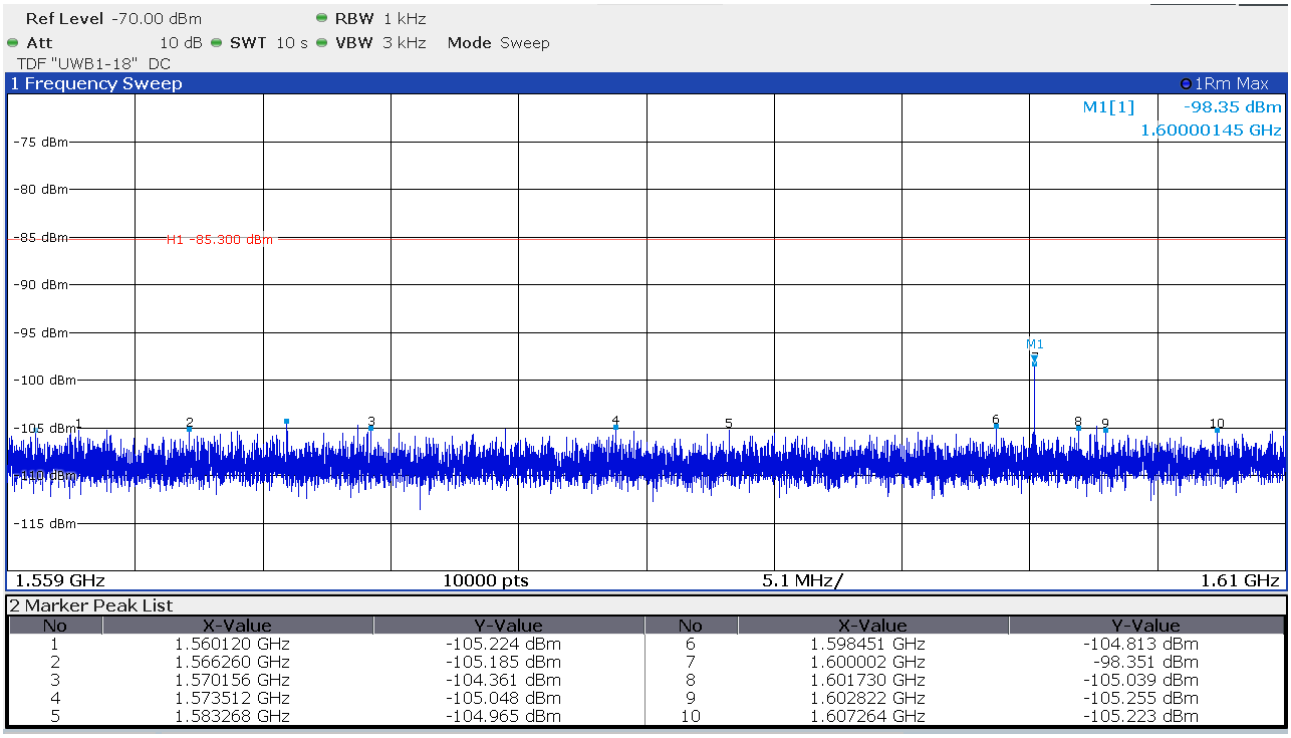
1164 MHz to 1240 MHz



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.167447 GHz	-105.323 dBm	6	1.189479 GHz	-103.628 dBm
2	1.168579 GHz	-104.335 dBm	7	1.204527 GHz	-102.532 dBm
3	1.172501 GHz	-104.821 dBm	8	1.213898 GHz	-102.791 dBm
4	1.178299 GHz	-103.367 dBm	9	1.221414 GHz	-102.410 dBm
5	1.186150 GHz	-104.088 dBm			

1559 MHz to 1610 MHz



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.560120 GHz	-105.224 dBm	6	1.598451 GHz	-104.813 dBm
2	1.566260 GHz	-105.185 dBm	7	1.600002 GHz	-98.351 dBm
3	1.570156 GHz	-104.361 dBm	8	1.601730 GHz	-105.039 dBm
4	1.573512 GHz	-105.048 dBm	9	1.602822 GHz	-105.255 dBm
5	1.583268 GHz	-104.965 dBm	10	1.607264 GHz	-105.223 dBm

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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: The test graphs show the polarisation with the lowest margin to the limit (horizontal polarisation).

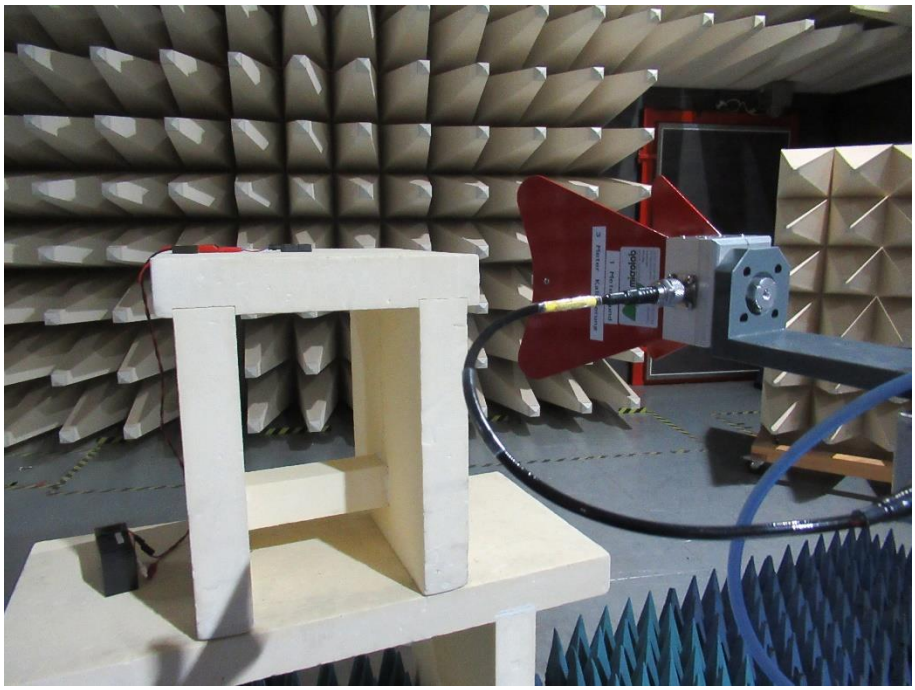
5.5 Peak Power radiated

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

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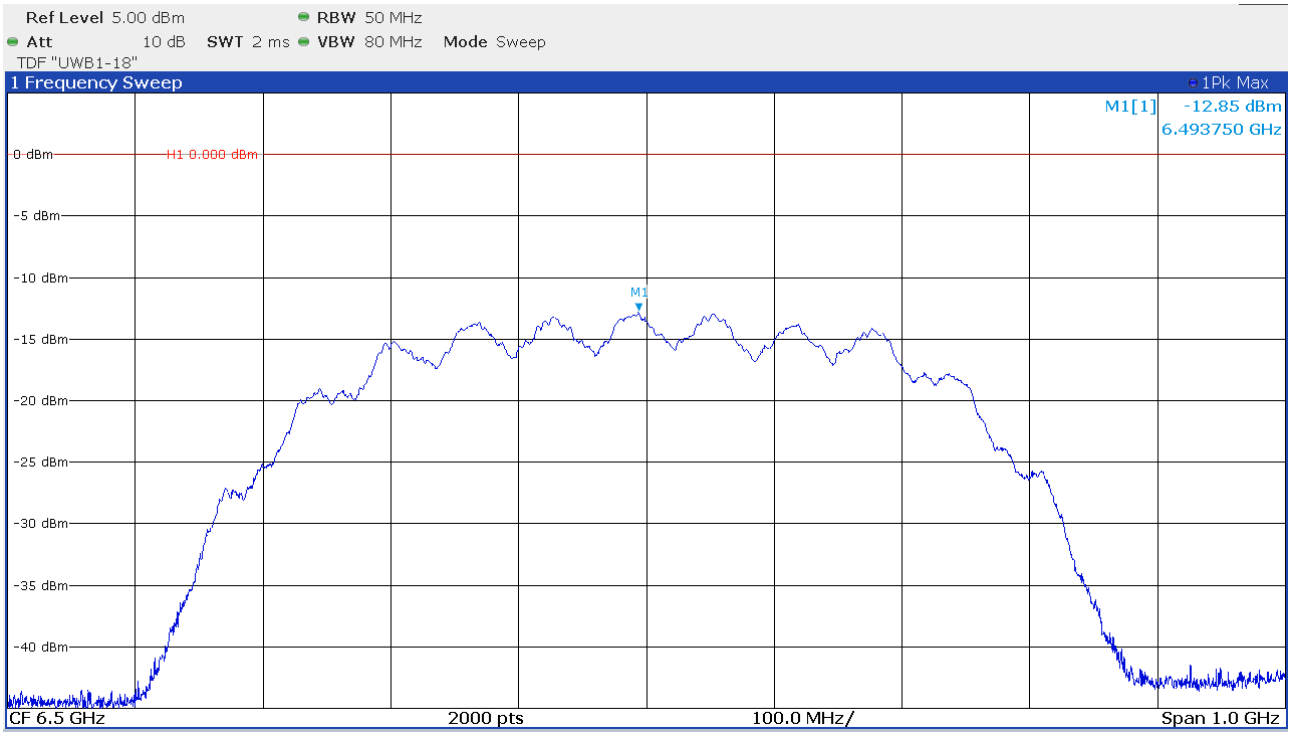
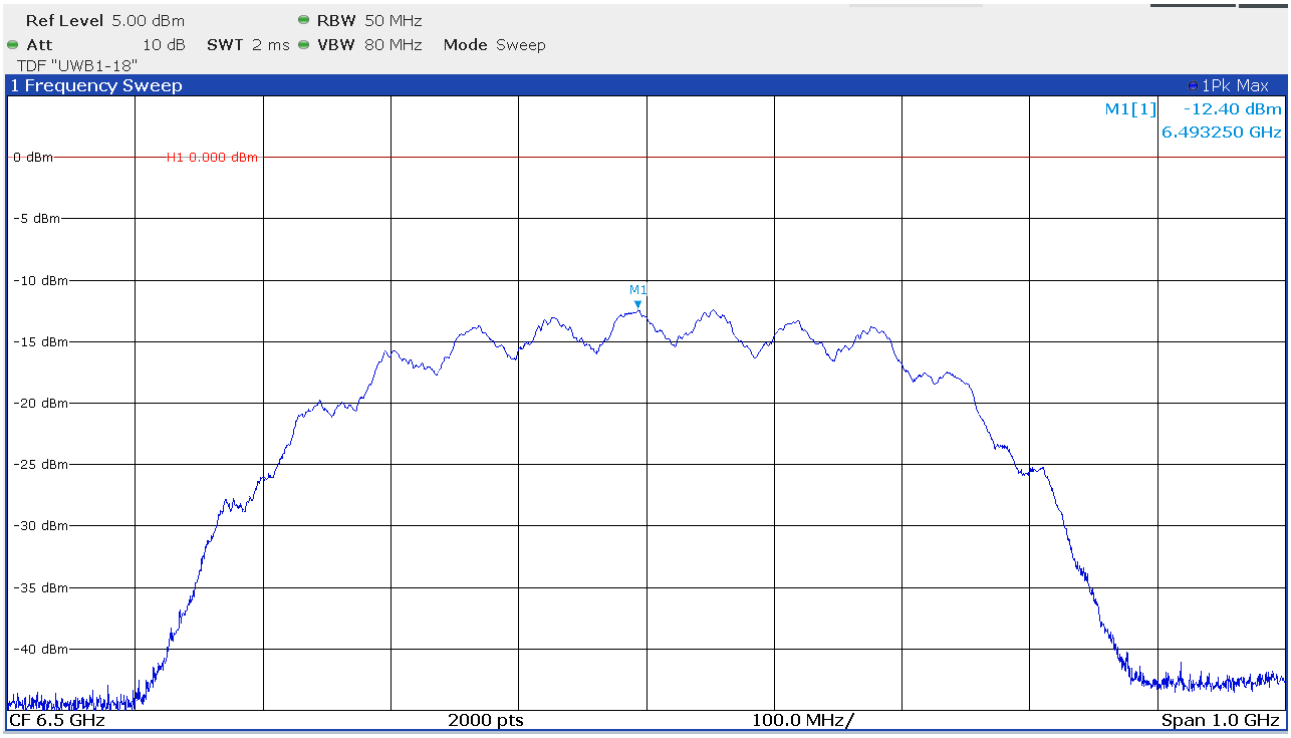
5.5.5 Test result

Channel 5 antenna 1

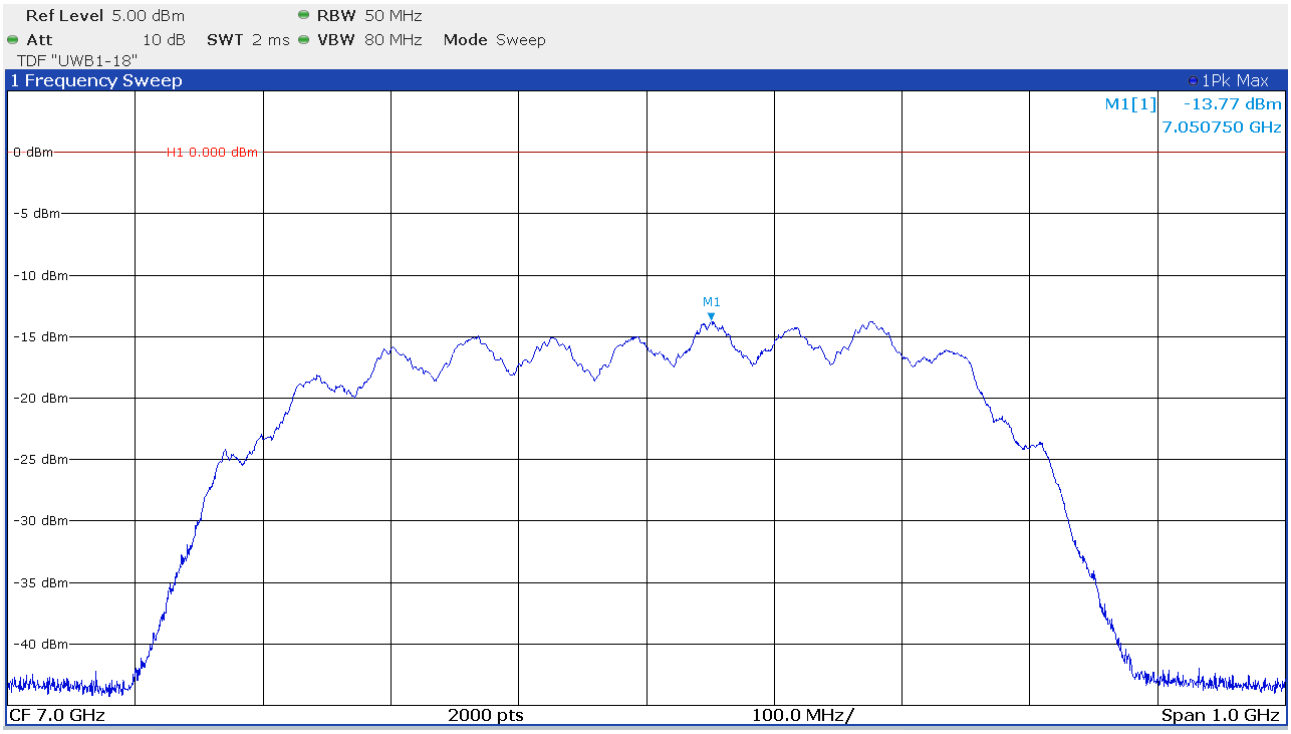


Channel 5 antenna 2

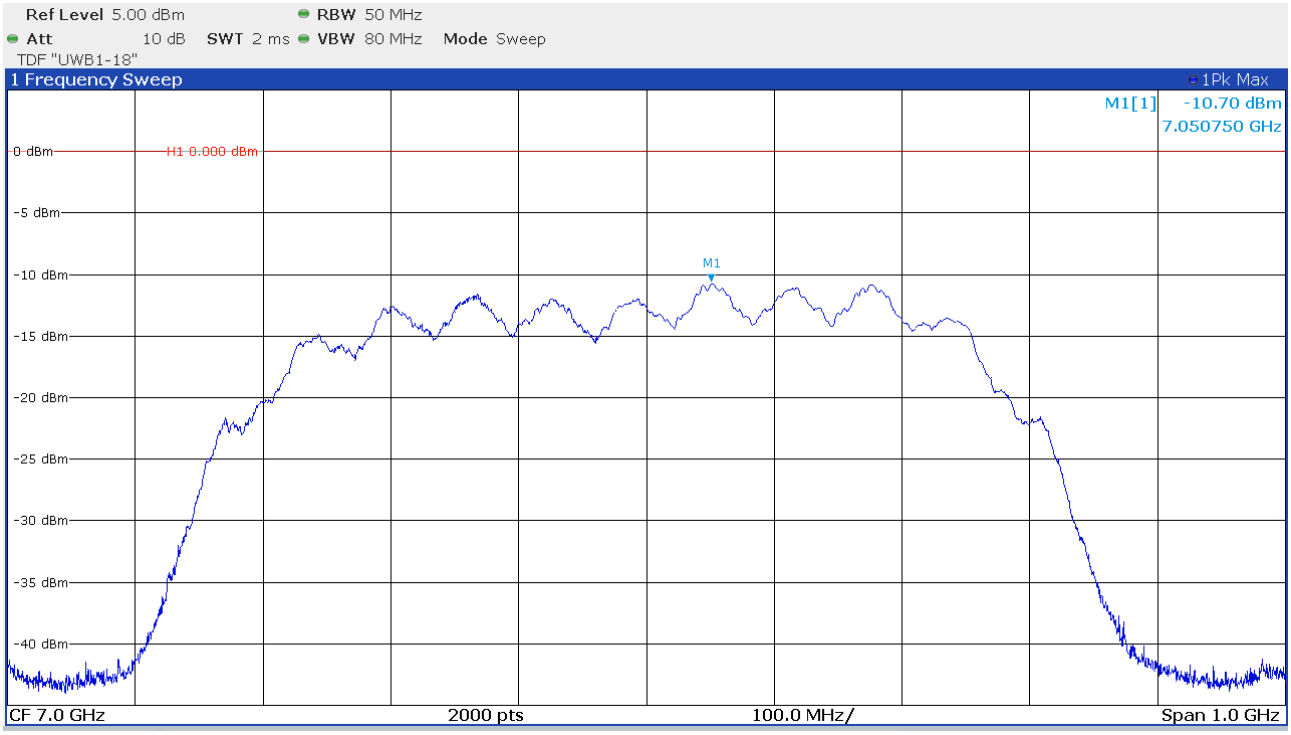


FCC ID: KR5FBD5S IC: 7812D-FBD5S

Channel 6 antenna 1

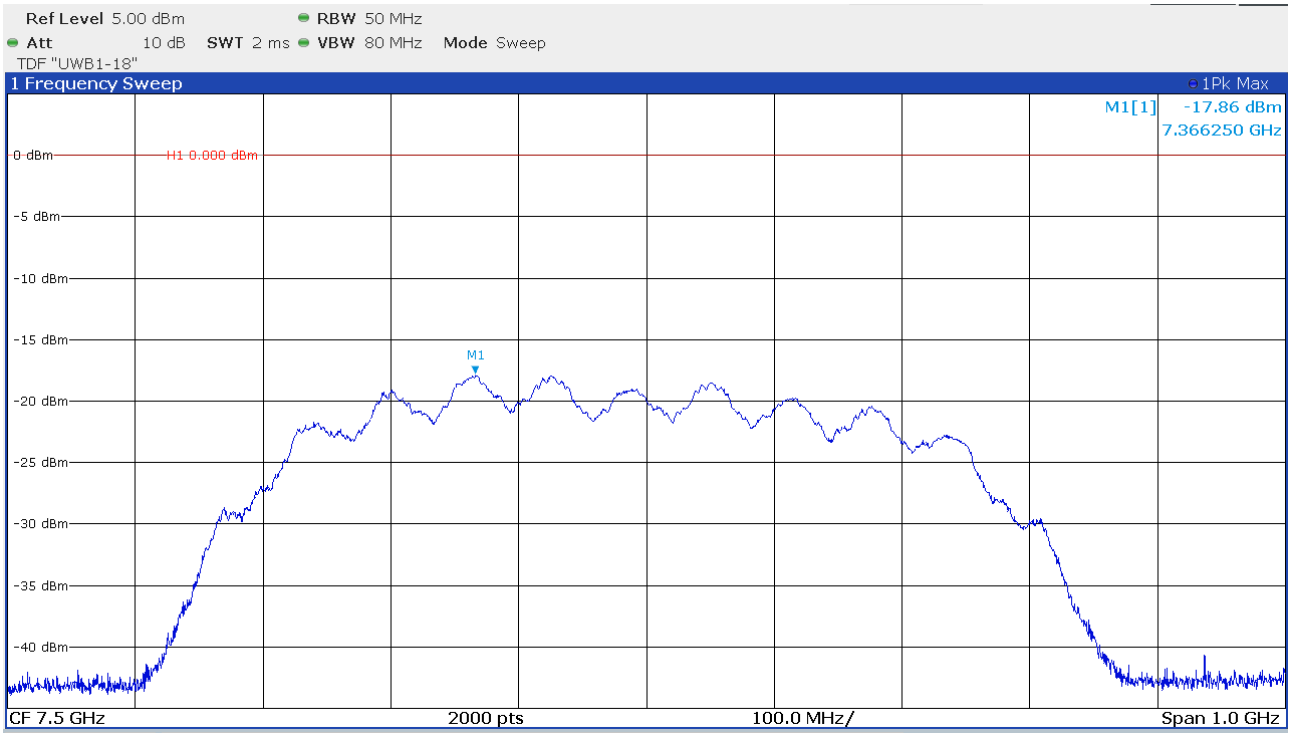


Channel 6 antenna 2

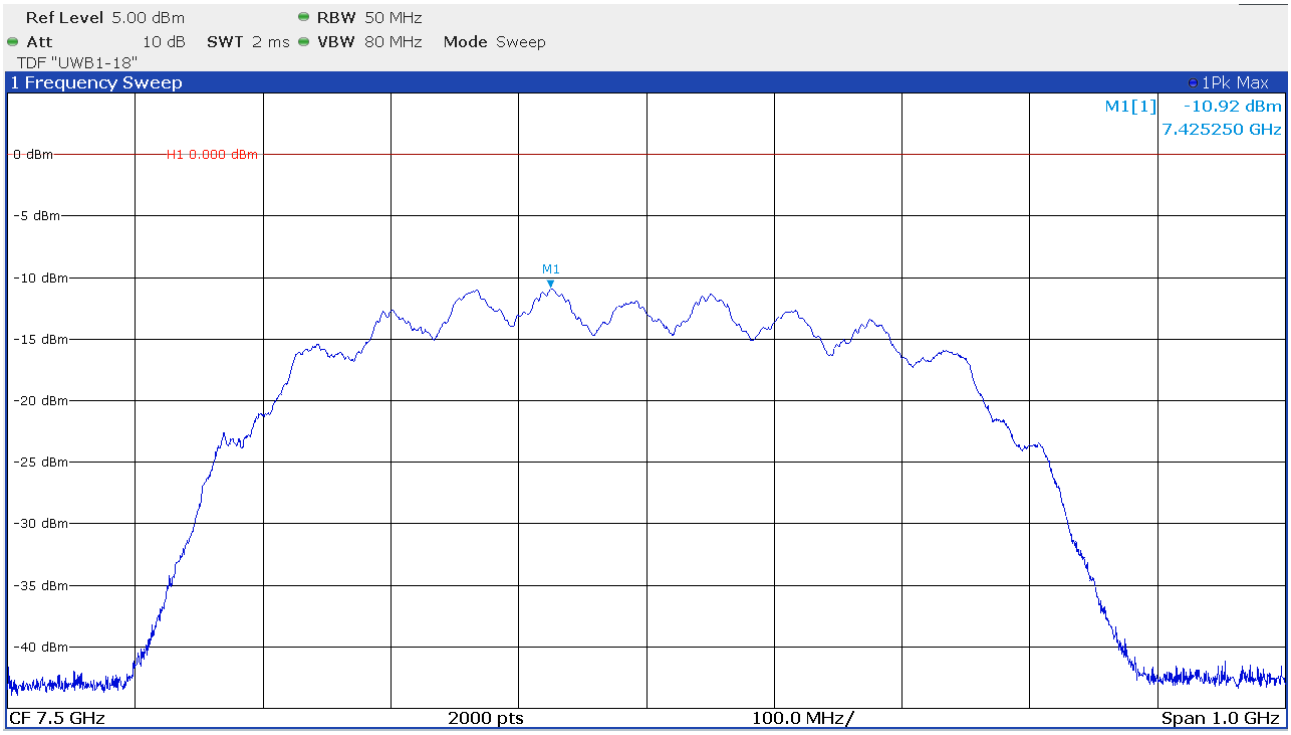


FCC ID: KR5FBD5S IC: 7812D-FBD5S

Channel 8 antenna 1

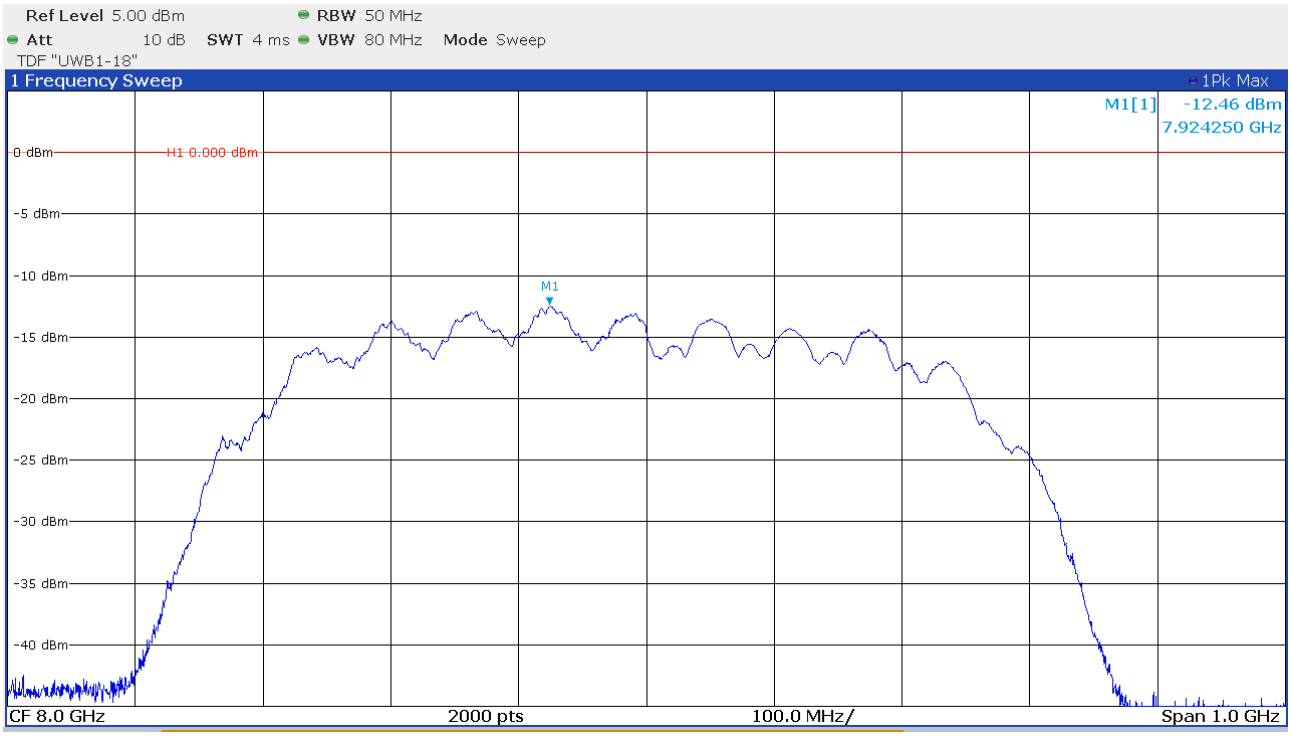


Channel 8 antenna 2

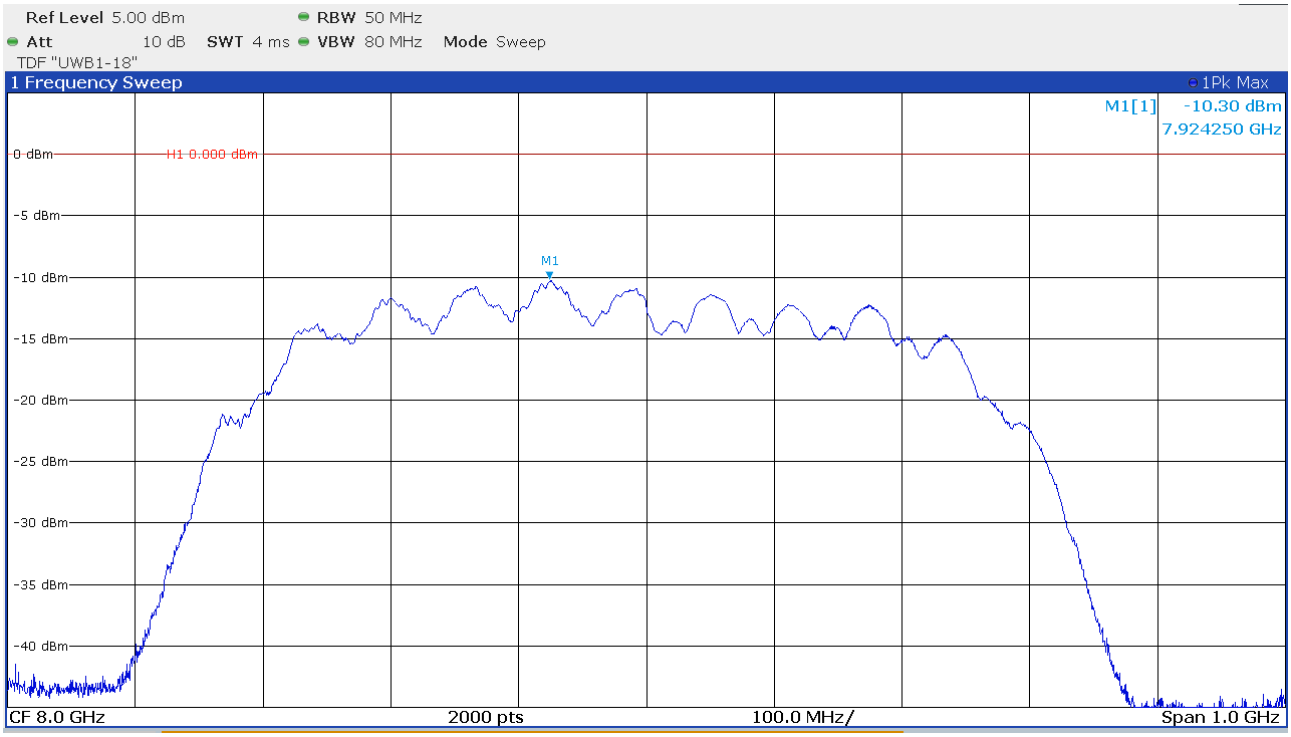


FCC ID: KR5FBD5S IC: 7812D-FBD5S

Channel 9 antenna 1



Channel 9 antenna 2



FCC ID: KR5FBD5S IC: 7812D-FBD5S

Min. limit margin: -10.3 dB at 7924.25 MHz

The requirements are **FULFILLED.**

Remarks: None.

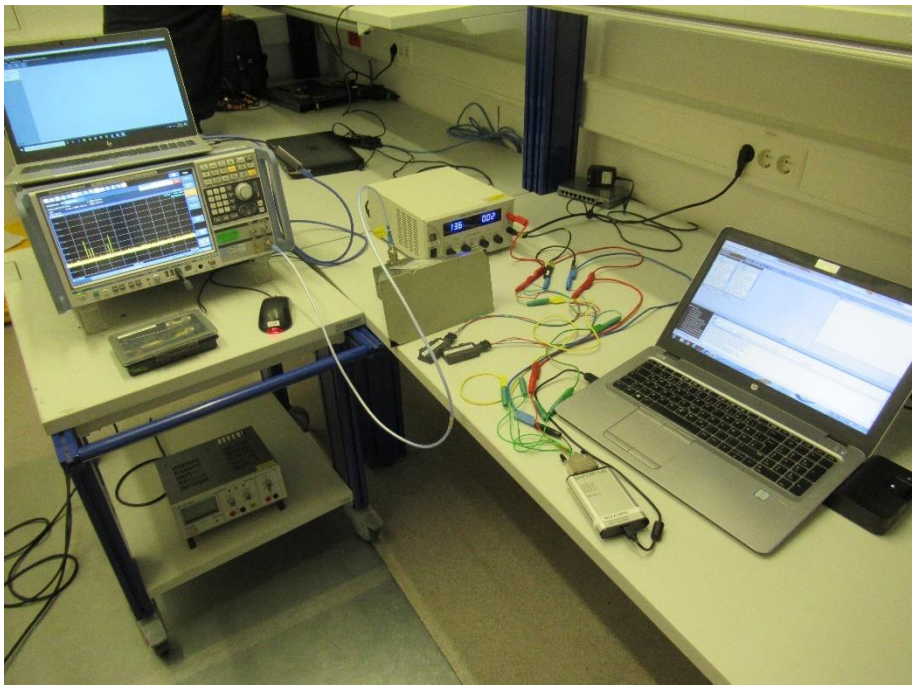
5.6 Signal deactivation

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.

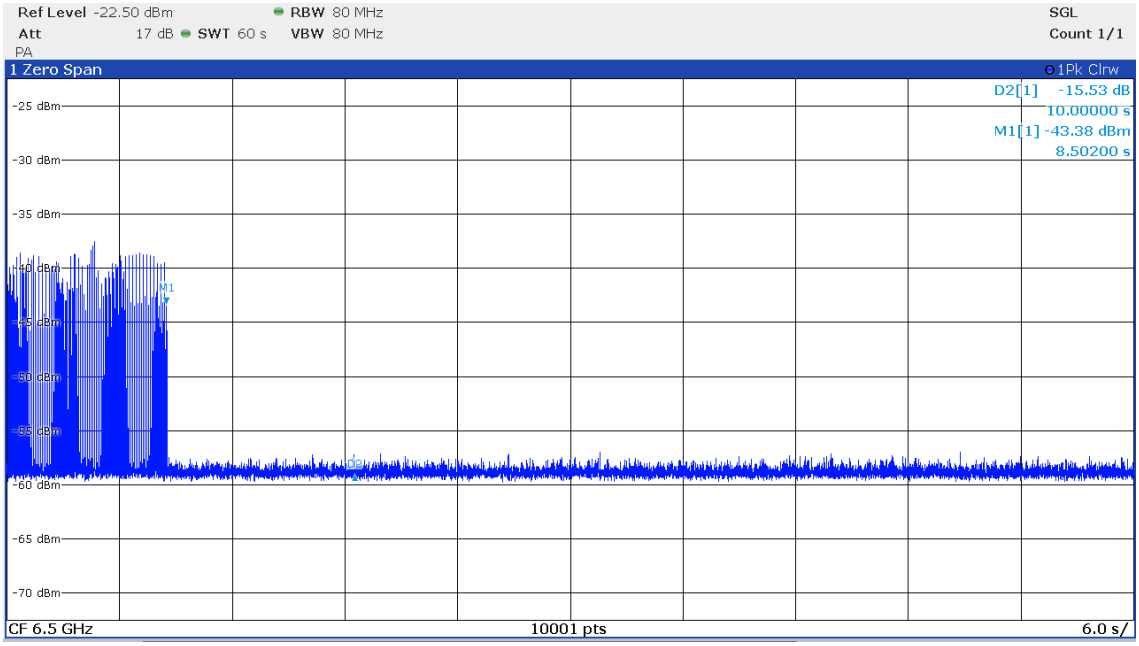
According to KDB 393764 D01 UWB FAQ v02 section 4:
An acknowledgement of reception must continue to be received by the UWB device at least once every 10 seconds, or else the device shall cease transmission of any information other than periodic signals for use in the establishment or re-establishment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

5.6.4 Description of Measurement

The measurement was performed radiated.

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

5.6.5 Test result



Explanation:

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

At the time 8.502 s (Marker M1) the companion device was powered off. The EUT stops its transmissions immediately.

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 3.19.1.24	01-02/68-13-001				
	ESCI	02-02/03-15-001	24/06/2021	24/06/2020		
	ESH 2 - Z 5	02-02/20-05-004	31/10/2021	31/10/2019	04/11/2020	04/05/2020
	N-4000-BNC	02-02/50-05-138				
	N-1500-N	02-02/50-05-140				
	ESH 3 - Z 2	02-02/50-05-155	13/11/2022	13/11/2019	12/11/2020	12/05/2020
CPR 3	FSW43	02-02/11-15-001	02/04/2021	02/04/2020		
	AMF-6D-01002000-22-10P	02-02/17-15-004				
	3117	02-02/24-05-009	18/06/2021	18/06/2020		
	18N-20	02-02/50-17-003				
	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 3.19.1.24	02-02/68-13-001				
MB	FSW43	02-02/11-15-001	02/04/2021	02/04/2020		
	KK-SF104-11SMA-11N-2M	02-02/50-14-003				
SER 2	ESVS 30	02-02/03-05-006	15/07/2021	15/07/2020		
	VULB 9168	02-02/24-05-005	19/09/2020	19/07/2019		
	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				
SER 3	FSW43	02-02/11-15-001	02/04/2021	02/04/2020		
	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	18/06/2021	18/06/2020		
	BBHA 9170	02-02/24-05-013	19/05/2023	19/05/2020	14/01/2021	14/01/2020
	WHKX 7.5/18G-8SS	02-02/50-07-010				
	18N-20	02-02/50-17-003				
	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 3.19.1.24	02-02/68-13-001				