EMI – TEST REPORT

- FCC Part 15.517, RSS-220 -

Type / Model Name	:	Anchor 9 / A010002
Product Description	:	Anchor for UWB localization system
Applicant	:	KINEXON Inc.
Address	:	200 S Wacker Drive, Suite 3100
		CHICAGO, IL 60606, USA
Manufacturer	:	KINEXON GmbH
Address	:	Schellingstr. 35
		80799 MÜNCHEN, GERMANY

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

Test Report No. : 80236650-06 Rev_2	06. March 2025 Date of issue

Deutsche Akkreditierungsstelle D-PL-12030-01-00

CSA Group Bayern GmbH
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FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

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1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15, Subpart C - Intentional Radiators (December 2024)

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 15.207	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 (December 2024)

Part 15, Subpart F, Section 15.517	Technical requirements for indoor UWB systems
Part 15, Subpart F, Section 15.521	Technical requirements applicable to all UWB devices

Industry Canada – Radio equipment standards

RSS-Gen, Issue 5 + A1 + A2, March 2019	General Requirements for Compliance of Radio Apparatus
RSS-220, Issue 1 + A1, July 2018	Devices Using Ultra-Wideband (UWB) Technology

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 v02r01 (April 25, 2022)	Ultra-Wideband (UWB) Devices – Frequently Asked Questions

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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

UWB Device for Indoor Use

2.5 Short description of the equipment under test (EUT)

The KINEXON System is a Real-Time Location System (RTLS) based on Ultra Wideband (UWB) technology. The system operates using active Tags, a network of Receivers (Anchors), and the KINEXON Sensor Network Application.
The KINEXON Anchors are reference points for the tracking sensors that are positioned around a desired area. The Anchor 9 supports UWB channels 3, 5 and 9 with 2 UWB transceivers and antenna paths. The Anchor 9 also supports Bluetooth 5 low energy (BLE 5).

Number of tested samples:	2
Serial number:	390834 (radiated measurements) 390849 (conducted measurements)
Firmware version:	v4.7.0
UWB driver version:	v4.7.0

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 for FCC.

Channel plan FCC

Channel number	f_c (MHz)	chipset
Channel 3	4492.8	DW1000
Channel 5	6489.6	DW1000
Channel 5	6489.6	DW3000
Channel 9	7987.2	DW3000

Channel plan ISED

Channel number	f_c (MHz)	chipset
Channel 5	6489.6	DW1000
Channel 5	6489.6	DW3000
Channel 9	7987.2	DW3000

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)	Peak Gain (dBi)
1	Omni	LF Jolie	None, PCB	4.25 – 6.75	5.7
2	Omni	HF Jolie	None, PCB	6.25 – 8.25	6.5

In addition, the EUT contains two directional PCB antennas for receive-only purposes

2.10 Power supply system utilised

Power supply voltage, V_{nom} : 52 V DC (PoE, 41.1 V DC – 57.0 V DC)

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2.11 Peripheral devices and interface cables

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

- PoE Switch Model : Netgear GS110TP S/N 3R7595G0451B
- Power adaptor for PoE Switch Model : Netgear Part Number 332-10317-01
- Mini PC Model : Intel NUC Board S/N GEFN3100007A
- Power adaptor for Mini PC Model : Chicony model number A17-120P2A
- Triple socket Model : Commercially available

During radiated measurements, the peripheral devices are placed outside the measument chamber.

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.

For the final test the following power setting is selected:

chipset	channel	Power setting
DW1000	3	Tx Power Offset 0dB
DW1000	5	Tx Power Offset 0dB
DW3000	5	Tx Power Offset 0dB
DW3000	9	Tx Power Offset -2dB

2.12.1 Test jig

No test jig is used.

2.12.2 Test software

Special test software “KINEXON control center” is used for continuous transmission and free power setting.

3 TEST RESULT SUMMARY

FCC Rule Part	RSS Rule Part	Description	Result
15.207(a) 15.521(j)	RSS-Gen, 8.8	AC power line conducted emissions	passed
15.517(b) 15.521(e)	RSS-220, 2, 5.1(a)	UWB Bandwidth	passed
---	RSS-Gen, 6.6	99 % Bandwidth	passed
15.209(a) 15.517(c) 15.521(c)(d)(h)	RSS-Gen, 8.10 RSS-220, 3.4, 5.2.1(c), 5.2.1(d)	Radiated Emissions 9 kHz to 40 GHz	passed
15.517(d)	RSS-220, 5.2.1(e)	Radiated Emissions at 1164-1240 MHz and 1559-1610 MHz	passed
15.517(e) 15.521(g)	RSS-220, 5.2.1(g)	Peak Power radiated	passed
15.203 15.521(b)	---	Antenna requirement	passed *1
15.204 15.521(b)	---	External radio frequency power amplifiers and antenna modifications	passed *1
15.521(a)(f)(i)	---	Technical requirements applicable to all UWB devices	passed *2

*1 According to the applicant, the EUT has an internal PCB antenna. 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 as localisation system only. The EUT is no imaging system. For details refer to the user manual.

3.1 Revision history of test report

Test report No	Rev.	Issue Date	Changes
80236650-06	0	16 January 2025	Initial test report
80236650-06	1	19 February 2025	Section 2.12: power settings corrected
80236650-06	2	06 March 2025	Section 6: clarification of test date, equipment SER2 09-02/17-21-002

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

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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	:	12 December 2024
Testing concluded on	:	10 January 2025

Checked by:

Klaus Gegenfurtner
I confirm the correctness and integrity of this document
2025.03.10 14:44:40 +01'00'

Klaus Gegenfurtner
Teamleader Radio

Tested by:

I am the author of this document
2025.03.06 13:29:09 +01'00'

Franz-Xaver Schrettenbrunner
Radio Team

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

CSA Group Bayern GmbH
Straubinger Straße 100
94447 PLATTLING
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 on basis of the ETSI Technical Report TR 100 028 Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1 and Part 2. The results are documented in the quality system acc. to DIN EN ISO/IEC 17025. 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 applied conformity decision rule is based on ILAC G8:09/2019 clause 4.2.1 Binary Statement for Simple Acceptance Rule (w = 0).
Details can be found in the procedure CSA_B_V50_29.

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

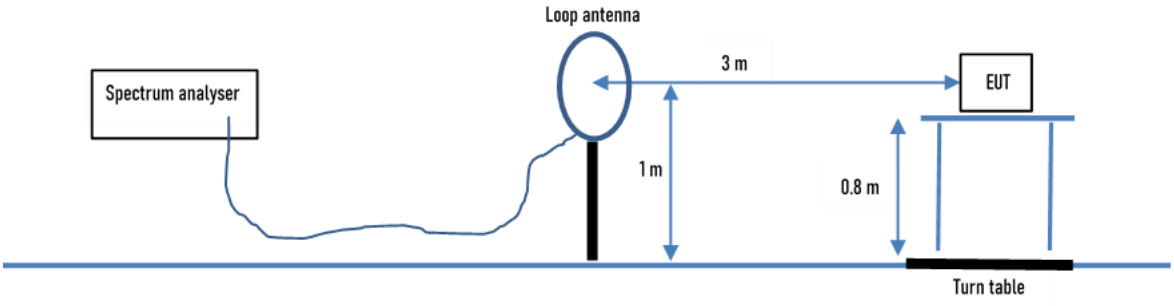
The test methods used comply with ANSI C63.10 - "Testing Unlicensed Wireless Devices".

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

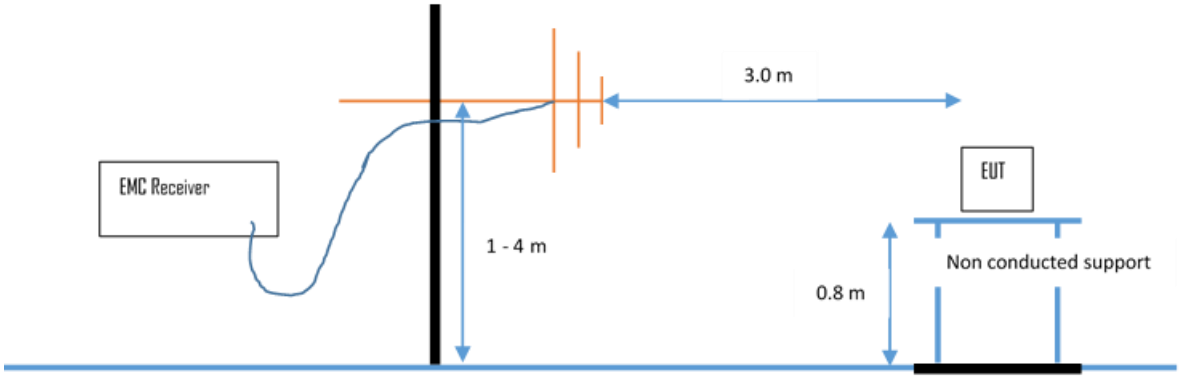
4.5.2.2.1 Anechoic chamber test site (9 kHz - 30 MHz):
Test setup according ANSI C63.10



Emissions from the EUT are measured in the frequency range of 9 MHz to 30 MHz using a tuned receiver and a calibrated loop antenna. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above 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 along the site axis and the EUT is rotated 360 degrees.

4.5.2.2.2 Anechoic chamber (30 MHz - 1 GHz):

Test setup according ANSI C63.10.



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. 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. 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 limit is subtracted from this result in order to provide the limit margin listed in the measurement protocol.

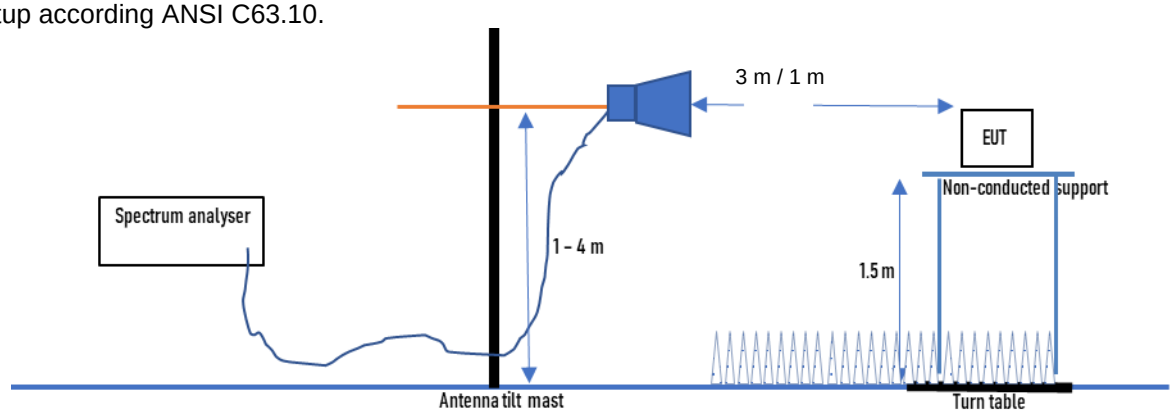
The resolution bandwidth setting:
30 MHz – 1000 MHz: RBW: 120 kHz

Example:

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

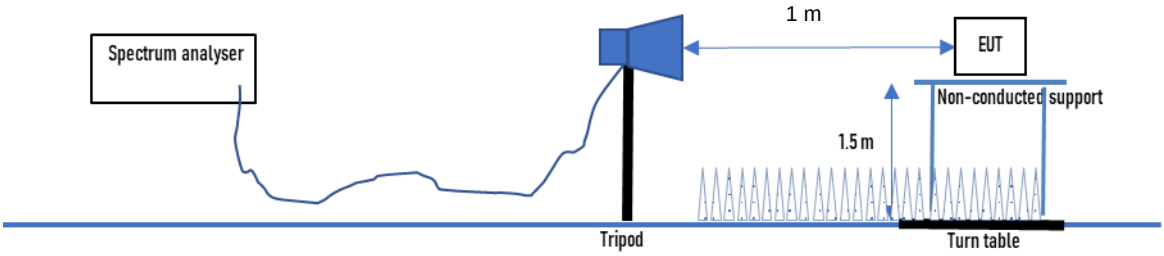
4.5.2.2.3 Anechoic chamber (1000 MHz – 18000 MHz)

Test setup according ANSI C63.10.



Radiated emissions from the EUT are measured in the frequency range 1 GHz up to 18 GHz 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 non-conducting table, 1.5 metre above the ground plane. The turntable is fully covered with the appropriate absorber (Type VHP-12). Any controlling device is positioned such that it does not significantly influence the measurement results. Interconnecting cables that hang closer than 40 cm to the ground plane are folded back and forth in the center, forming a bundle 30 cm to 40 cm long. Measurements are made in in three orientations of the EUT and the horizontal and vertical polarization planes of measurement antenna in a fully anechoic room. The measurement antenna is adjusted and the EUT orientated to permit the measurement of the maximum emission from the EUT. The conditions determined as worst-case will then be used for the final measurements.

4.5.2.2.4 Anechoic chamber (18 GHz – 40 GHz)



Emissions from the EUT are measured in the frequency range 18 GHz up to 40 GHz 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 non-conducting table, 1.5 metre above the ground plane. The turntable is fully covered with the appropriate absorber (Type VHP-12). Any controlling device is positioned such that it does not significantly influence the measurement results. Interconnecting cables that hang closer than 40 cm to the ground plane are folded back and forth in the center, forming a bundle 30 cm to 40 cm long. Measurements are made in in three orientations of the EUT and the horizontal and vertical polarization planes of measurement antenna in a fully anechoic room. The measurement antenna is adjusted and the EUT orientated to permit the measurement of the maximum emission from the EUT. The conditions determined as worst-case will then be used for the final measurements. Where appropriate, the test distance may be reduced in order to detect emissions under better uncertainty. The limit are adopted.

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 SR2

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 -15.2 dB at 17.94 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.

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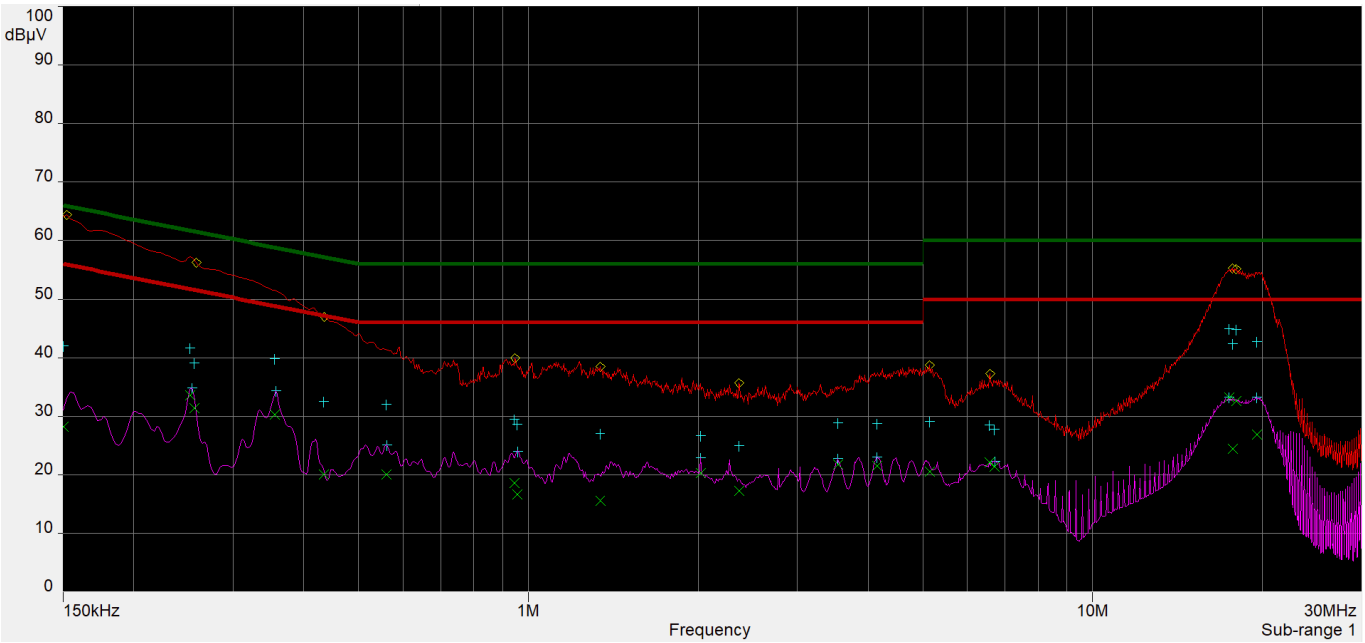
5.1.6 Test protocol

Frequency (Hz)	QuasiPeak (dBµV)	QP Margin	QP Limit (dBµV)	CISPR AV (dBµV)	CISPR AV Margin	AV Limit (dBµV)	RBW (Hz)	Meas.Time (s)	Correction (dB)
150.0036 k	42.039	-23.961	66	28.268	-27.732	56	9000	1	10.332
251.0036 k	41.698	-20.018	61.716	33.662	-18.054	51.716	9000	1	10.313
255.5036 k	39.169	-22.4	61.568	31.376	-20.192	51.568	9000	1	10.314
354.5036 k	39.833	-19.017	58.851	30.354	-18.497	48.851	9000	1	10.334
433.2536 k	32.545	-24.64	57.185	20.082	-27.104	47.185	9000	1	10.335
559.2536 k	32.066	-23.934	56	20.126	-25.874	46	9000	1	10.353
944.0036 k	29.473	-26.527	56	18.632	-27.368	46	9000	1	10.387
955.2536 k	28.693	-27.307	56	16.647	-29.353	46	9000	1	10.389
1.3400036 M	27.095	-28.905	56	15.617	-30.383	46	9000	1	10.427
2.0172536 M	26.728	-29.272	56	20.39	-25.61	46	9000	1	10.466
2.3615036 M	25.027	-30.973	56	17.339	-28.661	46	9000	1	10.49
3.5337536 M	28.927	-27.073	56	21.851	-24.149	46	9000	1	10.531
4.1412536 M	28.698	-27.302	56	21.574	-24.426	46	9000	1	10.536
5.1402536 M	29.128	-30.872	60	20.652	-29.348	50	9000	1	10.512
6.5667536 M	28.559	-31.441	60	22.229	-27.771	50	9000	1	10.454
6.7017536 M	27.762	-32.238	60	21.481	-28.519	50	9000	1	10.449
17.4230036 M	44.963	-15.037	60	33.204	-16.796	50	9000	1	10.764
17.7020036 M	42.385	-17.615	60	24.457	-25.543	50	9000	1	10.779
17.9427536 M	44.846	-15.154	60	32.632	-17.368	50	9000	1	10.791
19.5357536 M	42.763	-17.237	60	26.985	-23.015	50	9000	1	10.875



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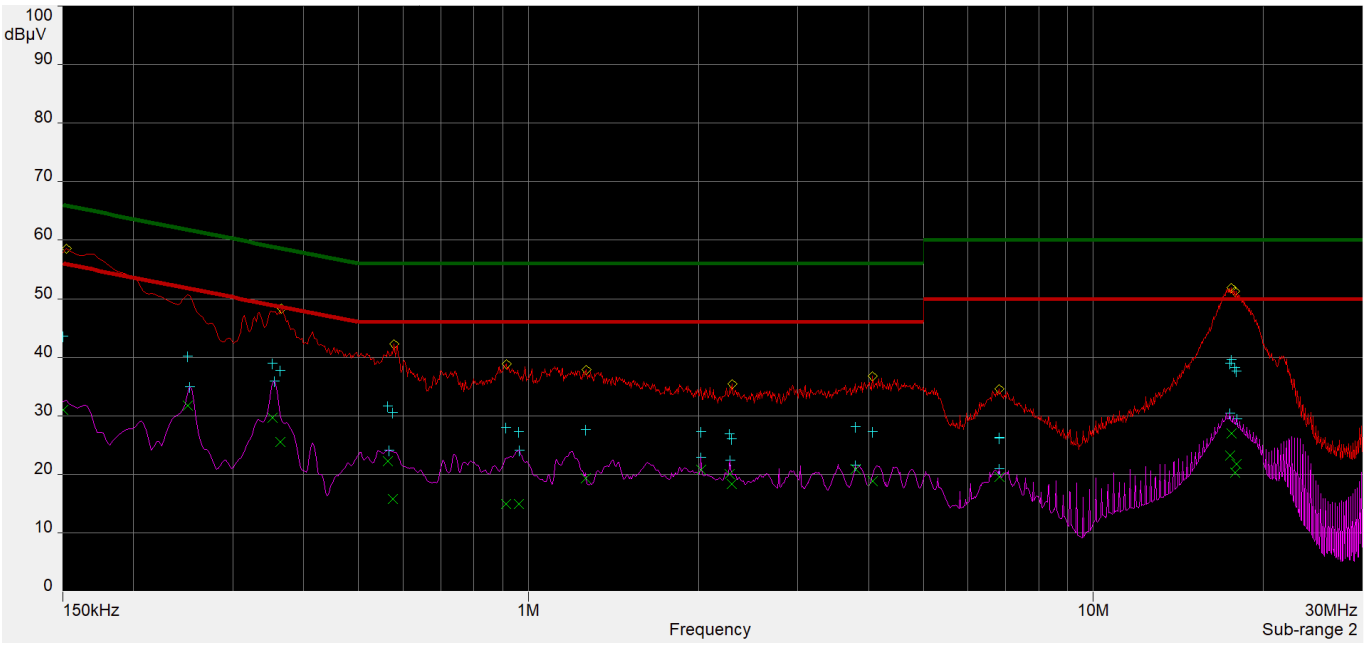
Frequency (Hz)	QuasiPeak (dBµV)	QP Margin	QP Limit (dBµV)	CISPR AV (dBµV)	CISPR AV Margin	AV Limit (dBµV)	RBW (Hz)	Meas.Time (s)	Correction (dB)
150.0036 k	43.655	-22.345	66	31.024	-24.976	56	9000	1	10.322
248.7536 k	40.246	-21.544	61.79	31.74	-20.05	51.79	9000	1	10.323
352.2536 k	38.96	-19.944	58.903	29.683	-19.22	48.903	9000	1	10.334
363.5036 k	37.707	-20.935	58.642	25.567	-23.075	48.642	9000	1	10.335
563.7536 k	31.665	-24.335	56	22.262	-23.738	46	9000	1	10.357
575.0036 k	30.642	-25.358	56	15.894	-30.106	46	9000	1	10.357
912.5036 k	28.056	-27.944	56	14.978	-31.022	46	9000	1	10.39
959.7536 k	27.345	-28.655	56	15.033	-30.967	46	9000	1	10.388
1.2635036 M	27.671	-28.329	56	19.362	-26.638	46	9000	1	10.406
2.0172536 M	27.243	-28.757	56	20.884	-25.116	46	9000	1	10.456
2.2692536 M	26.93	-29.07	56	20.086	-25.914	46	9000	1	10.484
2.2895036 M	26.118	-29.882	56	18.378	-27.622	46	9000	1	10.487
3.7857536 M	28.103	-27.897	56	20.911	-25.089	46	9000	1	10.546
4.0580036 M	27.265	-28.735	56	18.942	-27.058	46	9000	1	10.546
6.8120036 M	26.341	-33.659	60	19.571	-30.429	50	9000	1	10.454
6.8142536 M	26.253	-33.747	60	19.668	-30.332	50	9000	1	10.454
17.4207536 M	39.035	-20.965	60	23.292	-26.708	50	9000	1	10.701
17.5467536 M	39.562	-20.438	60	27.075	-22.925	50	9000	1	10.705
17.7920036 M	38.287	-21.713	60	20.298	-29.702	50	9000	1	10.712
17.9247536 M	37.604	-22.396	60	21.784	-28.216	50	9000	1	10.716



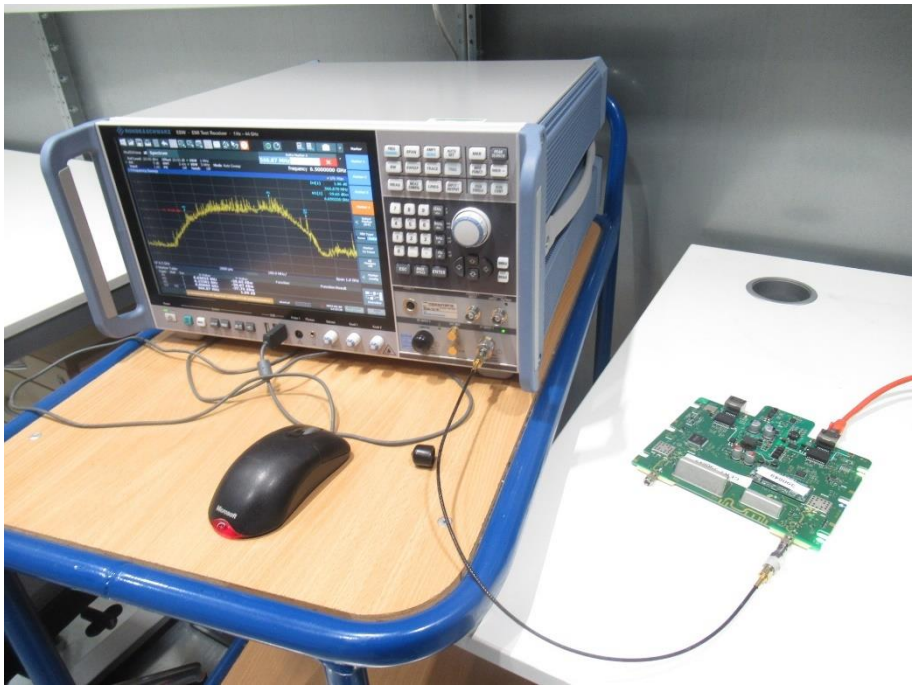
5.2 UWB Bandwidth

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

5.2.1 Description of the test location

Test location: Shielded room SR7

5.2.2 Photo documentation of the test set-up



5.2.3 Applicable standard

According to FCC Part 15, Section 15.517(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 bandwidth is measured following the procedure set out in ANSI C63-10, Item 10.1. 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. The EUT is set in TX continuous mode while measuring.

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

5.2.5 Test result

channel	chipset	lowest frequency f_L (MHz)	highest frequency f_H (MHz)	permitted frequency range (GHz)	UWB bandwidth (MHz)	required UWB bandwidth (MHz)	result
3	DW1000	4299.8	4802.8	3.1 – 10.6	503.0	> 500	passed
5	DW1000	6241.4	6753.3	3.1 – 10.6	511.9	> 500	passed
5	DW3000	6234.3	6800.7	3.1 – 10.6	566.4	> 500	passed
9	DW3000	7676.0	8238.6	3.1 – 10.6	562.6	> 500	passed

The requirements are **FULFILLED.**

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

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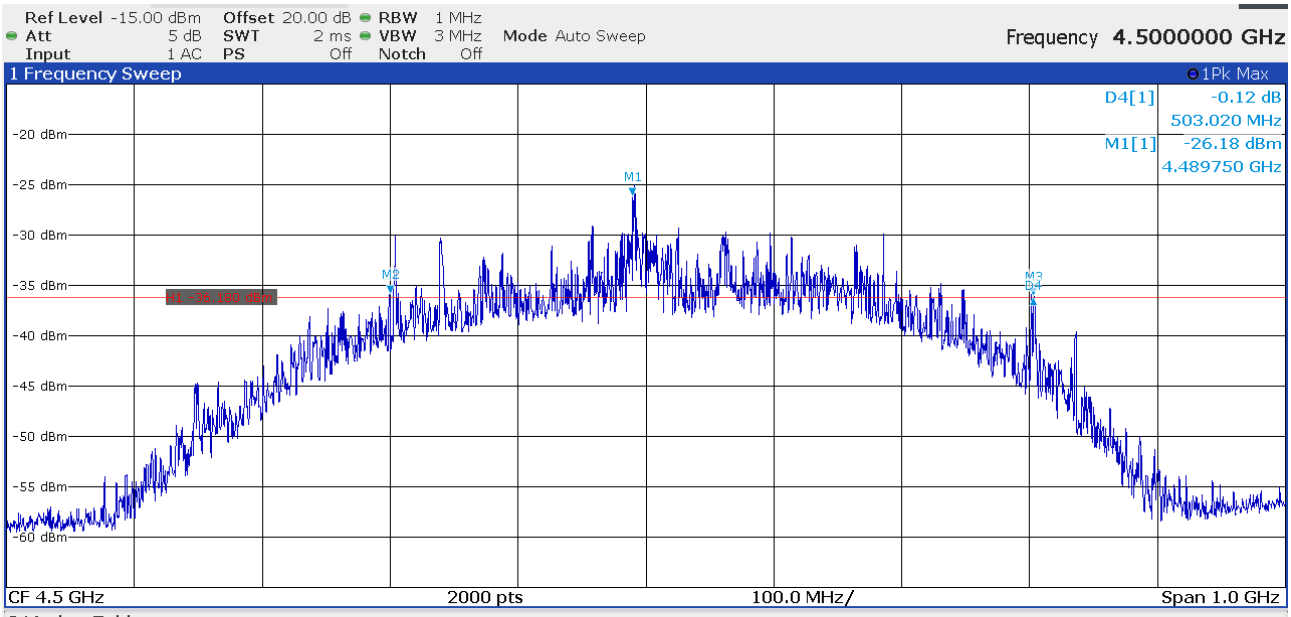
5.2.6 Test protocols EBW

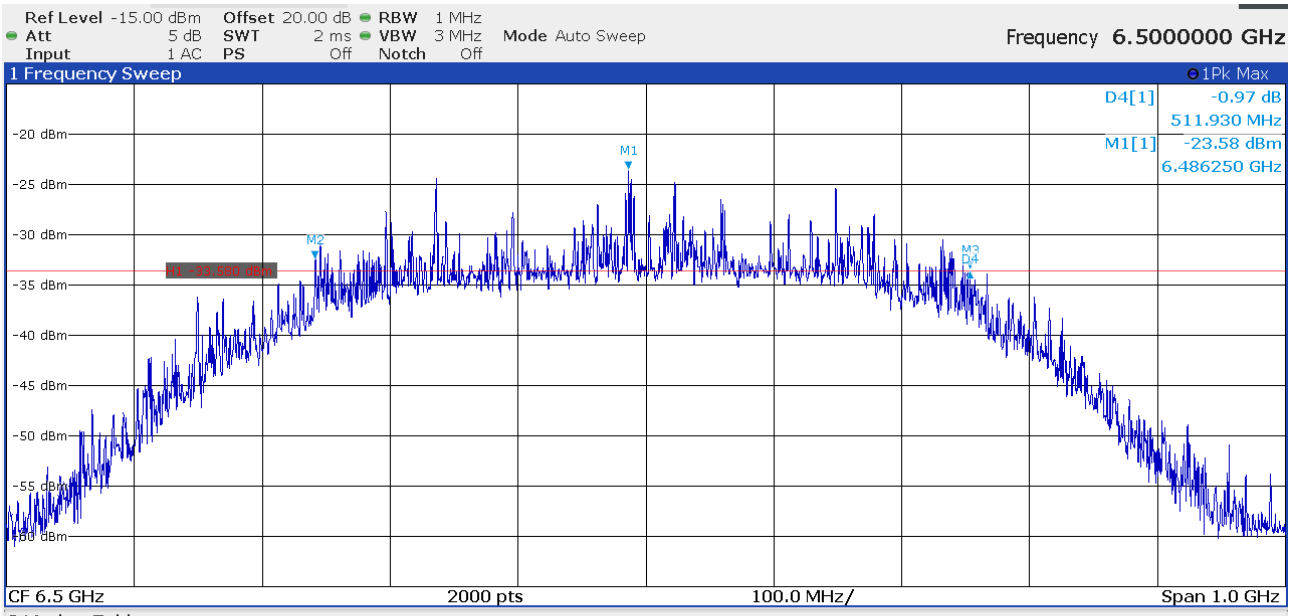
Channel 3 DW1000



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	4.48975 GHz	-26.18 dBm		
M2		1	4.29976 GHz	-35.94 dBm		
M3		1	4.80278 GHz	-36.06 dBm		
D4	M2	1	503.02 MHz	-0.12 dB		

Channel 5 DW1000

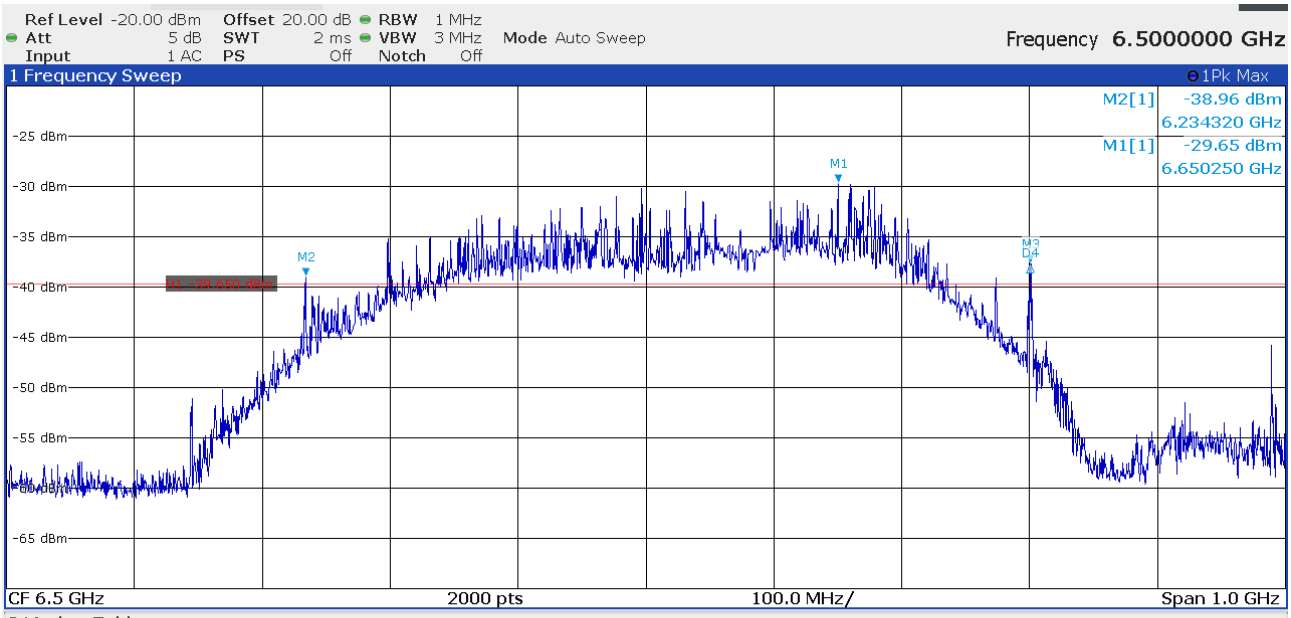


2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	6.48625 GHz	-23.58 dBm		
M2		1	6.24136 GHz	-32.54 dBm		
M3		1	6.75329 GHz	-33.51 dBm		
D4	M2	1	511.93 MHz	-0.97 dB		

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

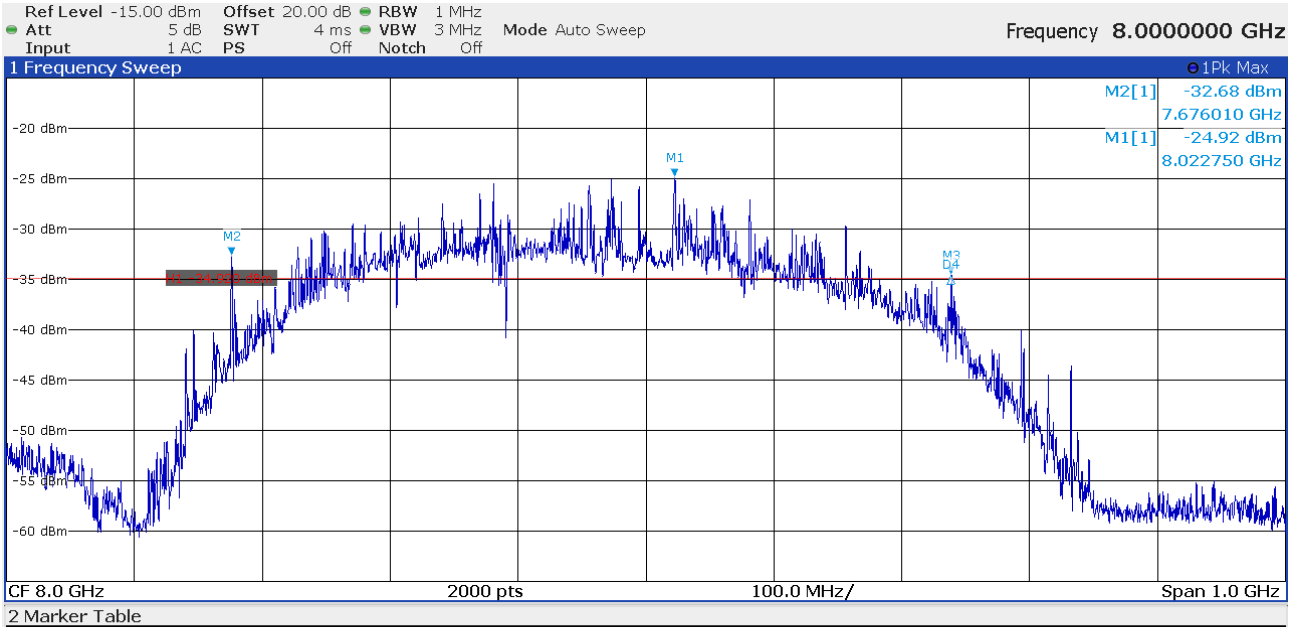
Channel 5 DW3000



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	6.65025 GHz	-29.65 dBm		
M2		1	6.23432 GHz	-38.96 dBm		
M3		1	6.80069 GHz	-37.70 dBm		
D4	M2	1	566.37 MHz	1.26 dB		

Channel 9 DW3000



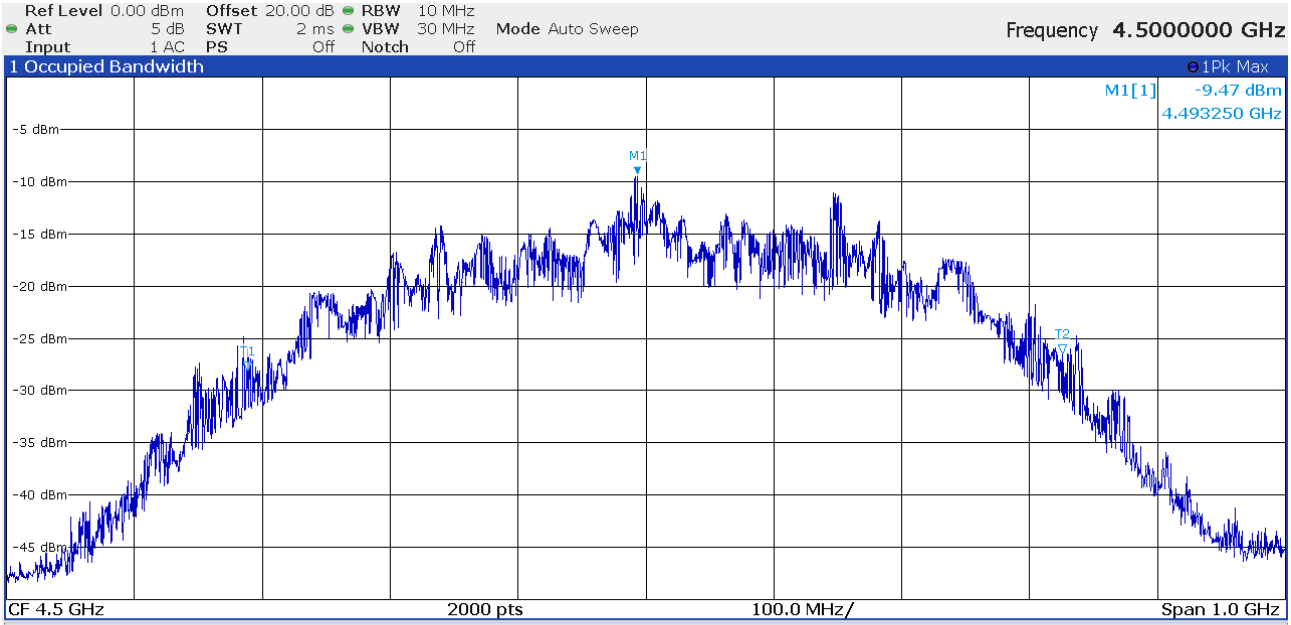
2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	8.02275 GHz	-24.92 dBm		
M2		1	7.67601 GHz	-32.68 dBm		
M3		1	8.23857 GHz	-34.61 dBm		
D4	M2	1	562.55 MHz	-1.93 dB		

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

5.2.7 Test protocols OBW

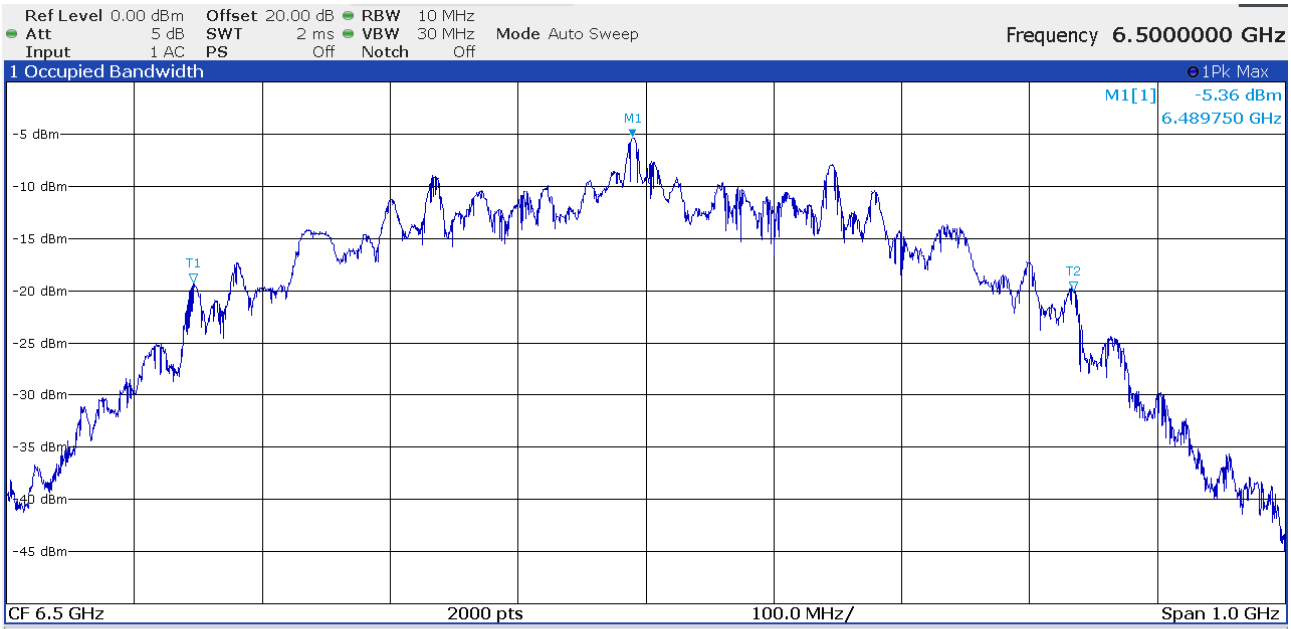
Channel 3 DW1000



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**4.49325 GHz**	**-9.47 dBm**	Occ Bw	**637.38231059 MHz**
T1		1	4.188491 GHz	-28.09 dBm	Occ Bw Centroid	4.507182513 GHz
T2		1	4.825874 GHz	-26.48 dBm	Occ Bw Freq Offset	7.182513279 MHz

Channel 5 DW1000

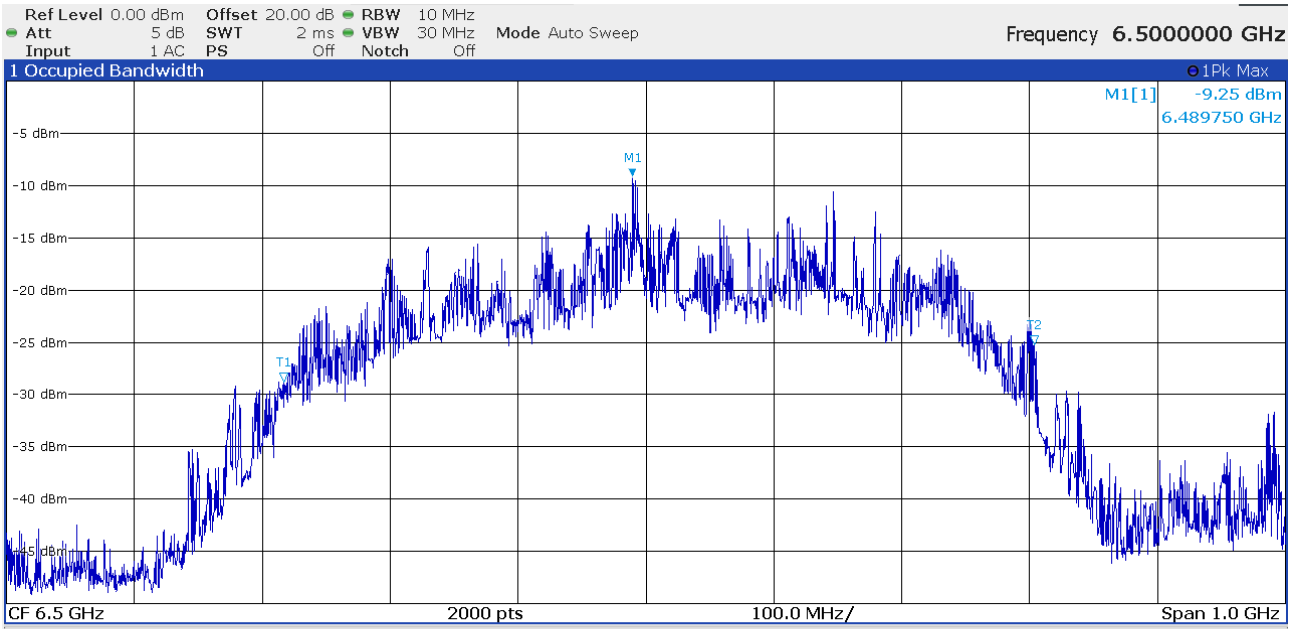


2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**6.48975 GHz**	**-5.36 dBm**	Occ Bw	**688.069216994 MHz**
T1		1	6.146019 GHz	-19.31 dBm	Occ Bw Centroid	6.490053742 GHz
T2		1	6.834088 GHz	-20.03 dBm	Occ Bw Freq Offset	-9.946257946 MHz

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

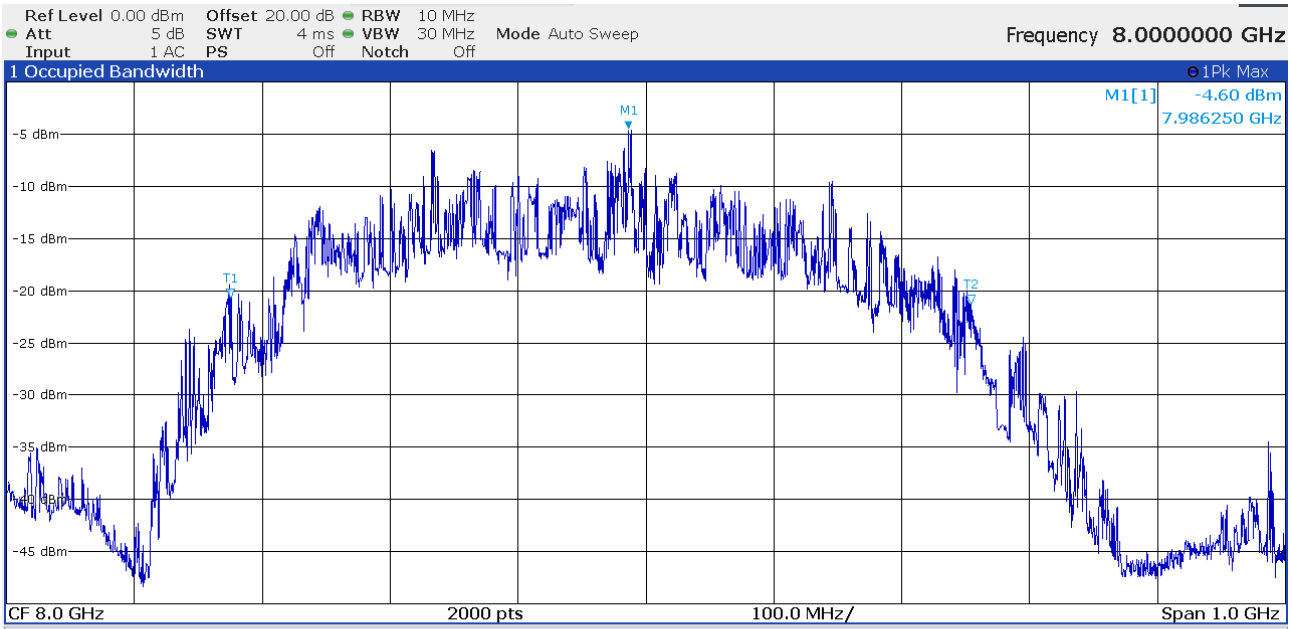
Channel 5 DW3000



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**6.48975 GHz**	**-9.25 dBm**	Occ Bw	**586.564449749 MHz**
T1		1	6.217196 GHz	-28.82 dBm	Occ Bw Centroid	6.510477731 GHz
T2		1	6.80376 GHz	-25.21 dBm	Occ Bw Freq Offset	10.477731346 MHz

Channel 9 DW3000



2 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**7.98625 GHz**	**-4.60 dBm**	Occ Bw	**578.814350985 MHz**
T1		1	7.675218 GHz	-20.67 dBm	Occ Bw Centroid	7.964625405 GHz
T2		1	8.254033 GHz	-21.31 dBm	Occ Bw Freq Offset	-35.374594859 MHz

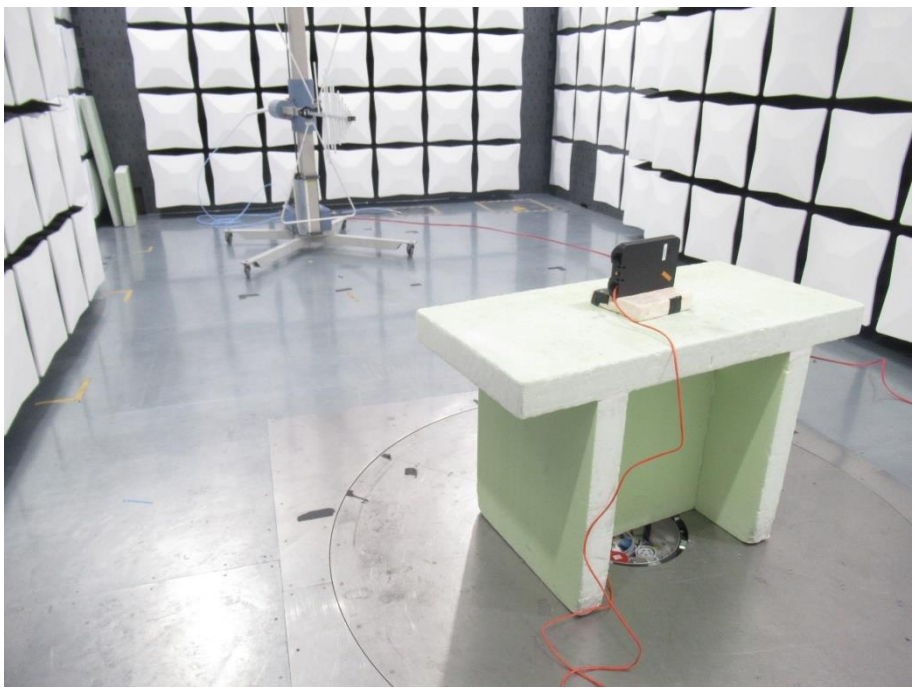
5.3 Radiated Emissions 9 kHz to 40 GHz

For test instruments and accessories used see section 6 Part **SER 1, SER 2,** and **SER 3**.

5.3.1 Description of the test location

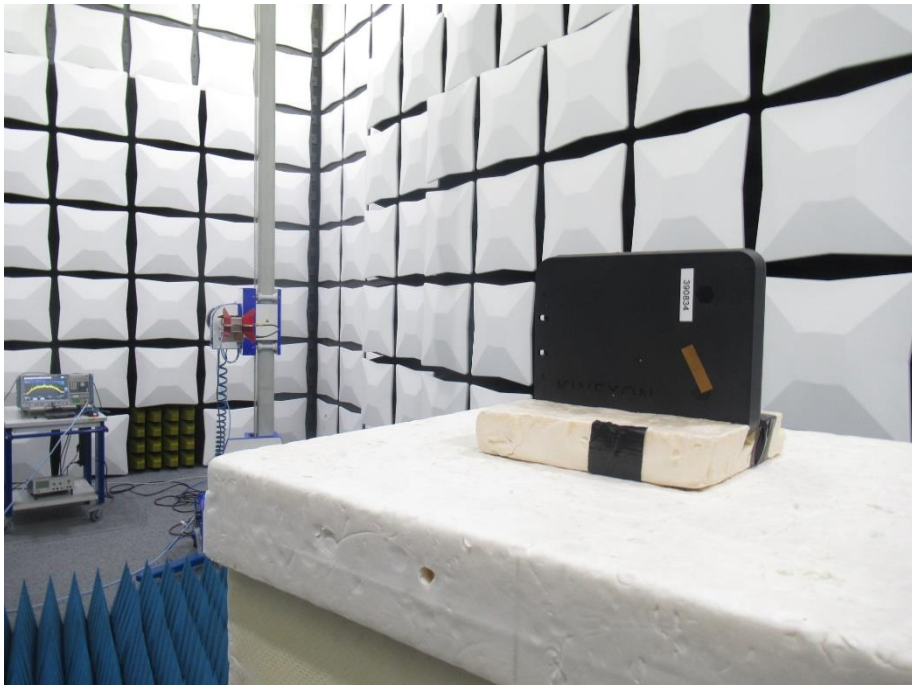
Test location: Semianechoic chamber SAC2
Test location: Fully anechoic chamber FAR1

5.3.2 Photo documentation of the test set-up

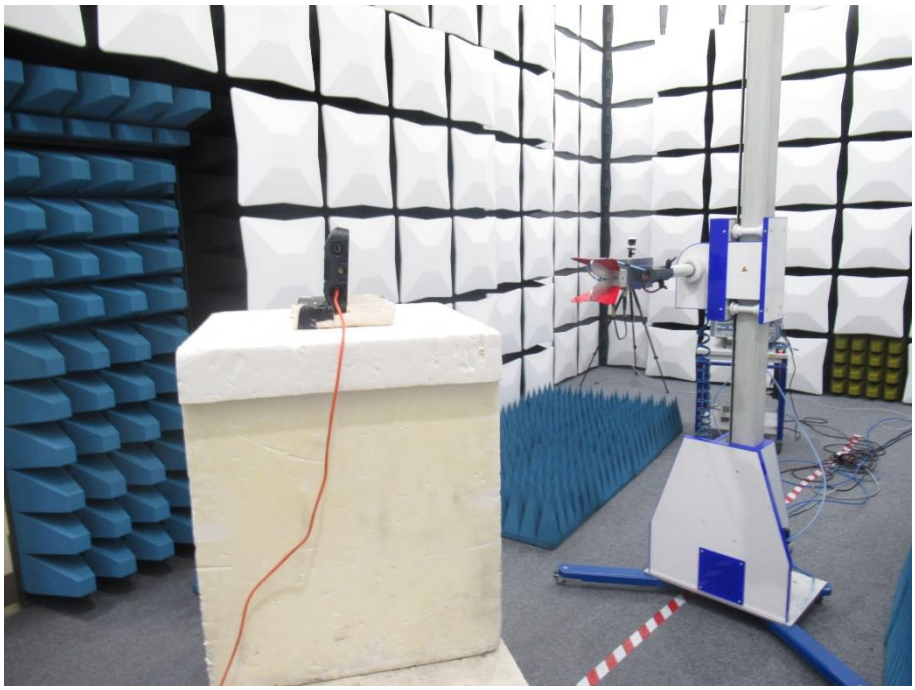


FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

1 – 18 GHz 3 m



1 – 18 GHz 1 m



18 – 40 GHz

5.3.3 Applicable standard

According to FCC Part 15, Section 15.517(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 Description of Measurement

The maximum emission is measured following the procedure set out in ANSI C63-10, item 10.2. The EUT is set in TX continuous mode while measuring.

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

for § 15.521(c) additionally:

960 MHz – 40 GHz	RBW: 1 MHz	VBW3: MHz	Detector: Peak/Av	Sweeptime: 100 ms

5.3.5 Test result

5.3.5.1 Measurement 9 kHz to 30 MHz

FCC

f (MHz)	Level QP@3m (dBµV)	Ant. factor (dB/m)	Field strength QP@3m dB(µV/m)	Distance corr. 3m to 30/300m (dB)	Corrected level QP@30/300m dB(µV/m)	Limit QP dB(µV/m)
0.322	-2.5	20.0	17.5	-80.0	-62.5	17.4
1.99	-3.2	20.0	16.8	-40.0	-23.2	29.5
6.98	-9.2	20.0	10.8	-40.0	-29.2	29.5
13.54	-14.1	20.0	5.9	-40.0	-34.1	29.5
21.00	-14.4	20.0	5.6	-40.0	-34.4	29.5
28.72	-12.9	20.0	7.1	-40.0	-32.9	29.5

ISED

f (MHz)	Level QP@3m (dBµV)	Ant. factor (dB/m)	Field strength QP@3m dB(µA/m)	Distance corr. 3m to 30/300m (dB)	Corrected level QP@30/300m dB(µA/m)	Limit QP dB(µA/m)
0.322	-2.5	20.0	-34.0	-80.0	-114.0	-34.1
1.99	-3.2	20.0	-34.7	-40.0	-74.7	-22.0
6.98	-9.2	20.0	-40.7	-40.0	-80.7	-22.0
13.54	-14.1	20.0	-45.6	-40.0	-85.6	-22.0
21.00	-14.4	20.0	-45.9	-40.0	-85.9	-22.0
28.72	-12.9	20.0	-44.4	-40.0	-84.4	-22.0

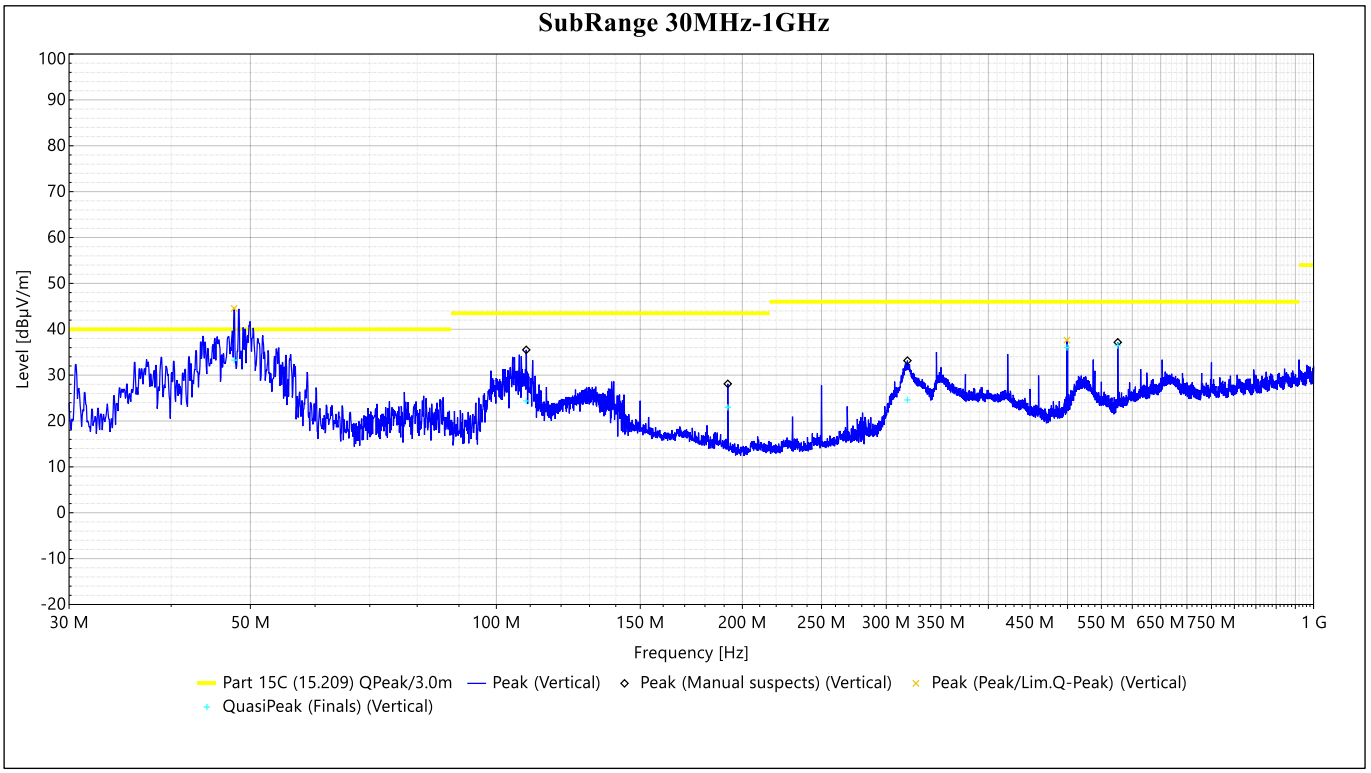
Note: Pre-measurements have shown, there are no detectable emissions in this frequency range.

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

5.3.5.2 Measurement 30 MHz to 960 MHz

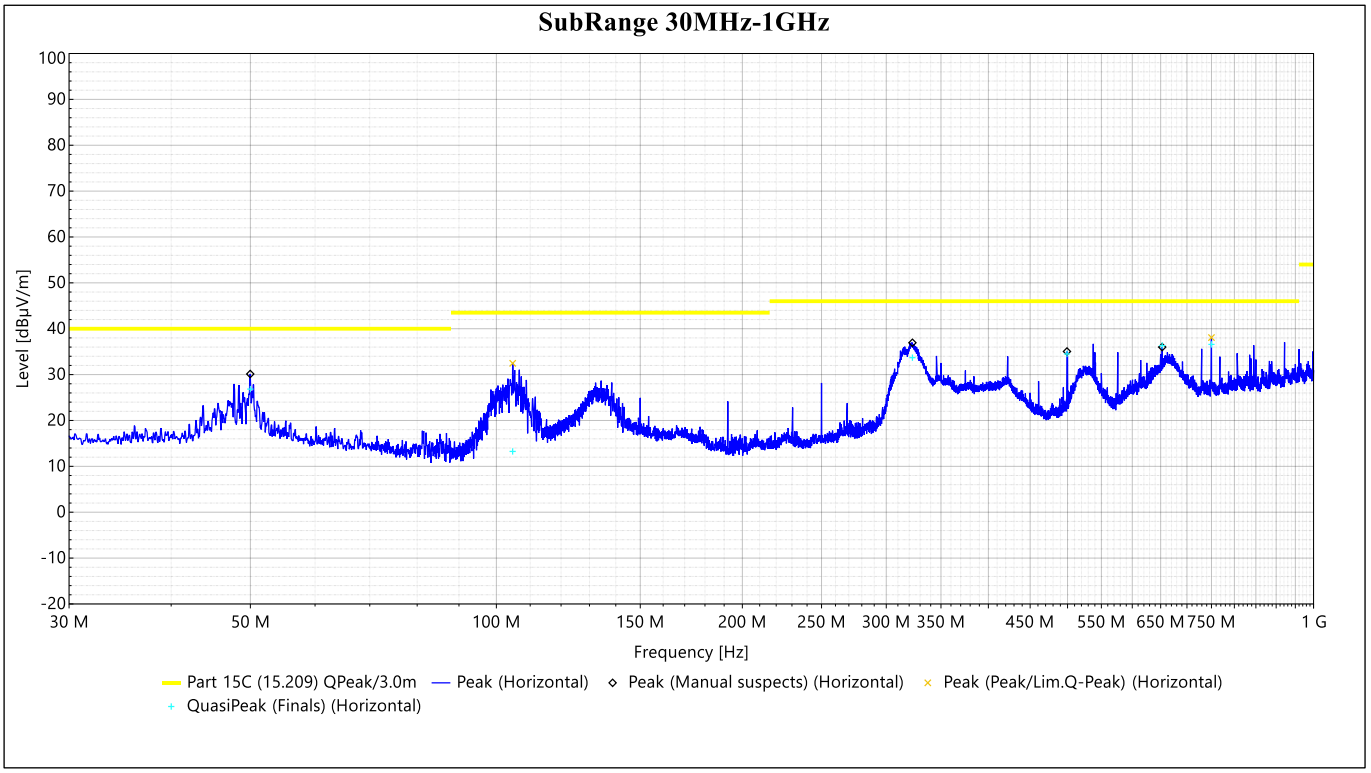
vertical

Frequency (Hz)	QuasiPeak (dBµV/m)	QP Margin	QP Limit (dBµV/m)	angle	height	polarization	RBW (Hz)	Meas.Time (s)	Correction (dB)
47.7868233 M	33.267	-6.733	40	252	1	Vertical	120000	0.01	-10.886
108.7988787 M	24.382	-19.118	43.5	118	1.16	Vertical	120000	0.01	-12.572
191.9816923 M	22.999	-20.501	43.5	324	1	Vertical	120000	0.01	-11.991
318.4673526 M	24.588	-21.412	46	162	1.26	Vertical	120000	0.01	-8.922
499.2016989 M	36.019	-9.981	46	349	1.02	Vertical	120000	0.01	-4.647
575.9938605 M	36.464	-9.536	46	285	1	Vertical	120000	0.01	-2.947



FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

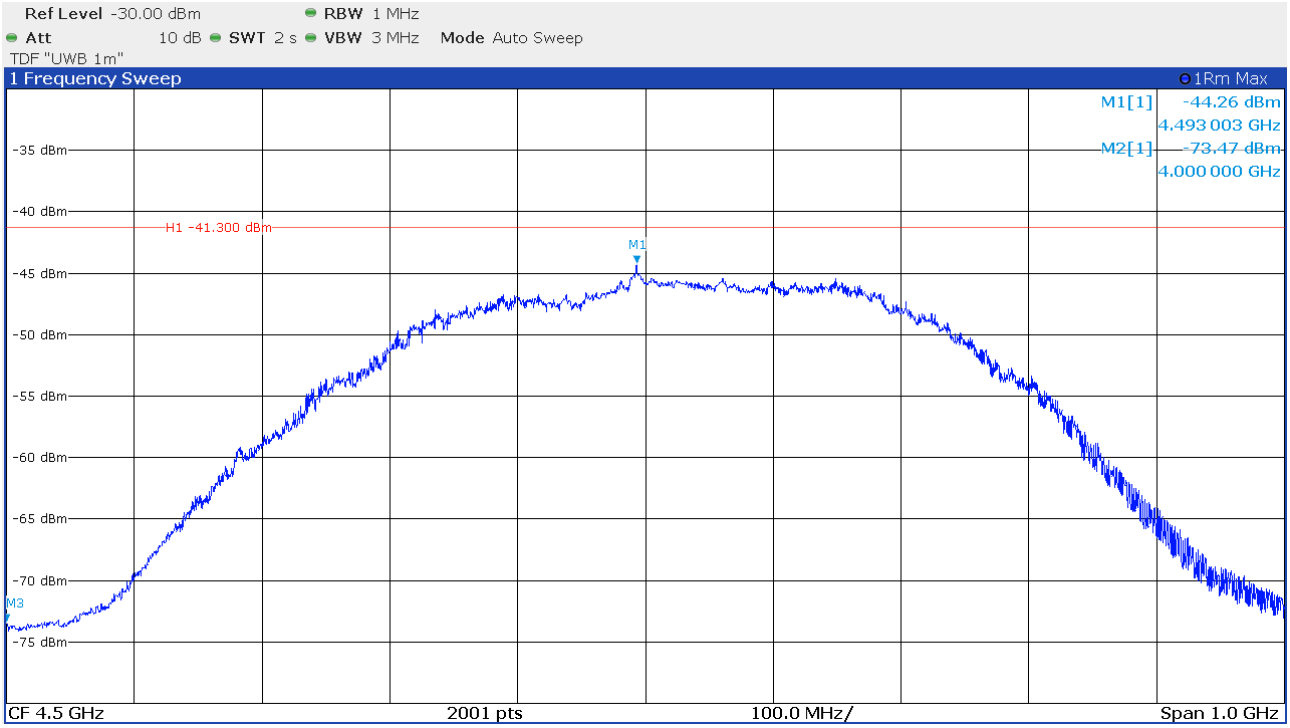
Frequency (Hz)	QuasiPeak (dBµV/m)	QP Margin	QP Limit (dBµV/m)	angle	height	polarization	RBW (Hz)	Meas.Time (s)	Correction (dB)
49.9968642 M	26.842	-13.158	40	46	3.47	Horizontal	120000	0.01	-9.62
104.6975877 M	13.248	-30.252	43.5	280	1.63	Horizontal	120000	0.01	-13.883
322.956075 M	33.69	-12.31	46	197	1	Horizontal	120000	0.01	-8.529
499.2009535 M	34.51	-11.49	46	191	1.55	Horizontal	120000	0.01	-4.341
652.7967886 M	36.315	-9.685	46	183	1.17	Horizontal	120000	0.01	-1.248
750.0077828 M	36.575	-9.425	46	10	1.02	Horizontal	120000	0.01	0.912



5.3.5.3 Measurement 960 MHz to 40 GHz

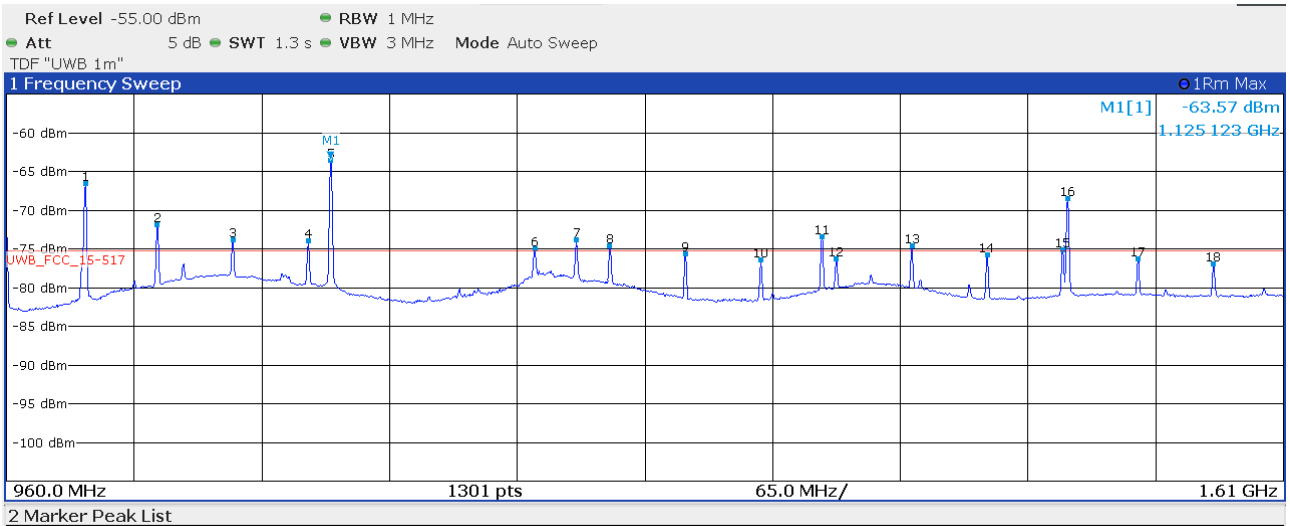
Channel 3 DW1000

Mean Power



960 MHz to 18 GHz

UWB ON

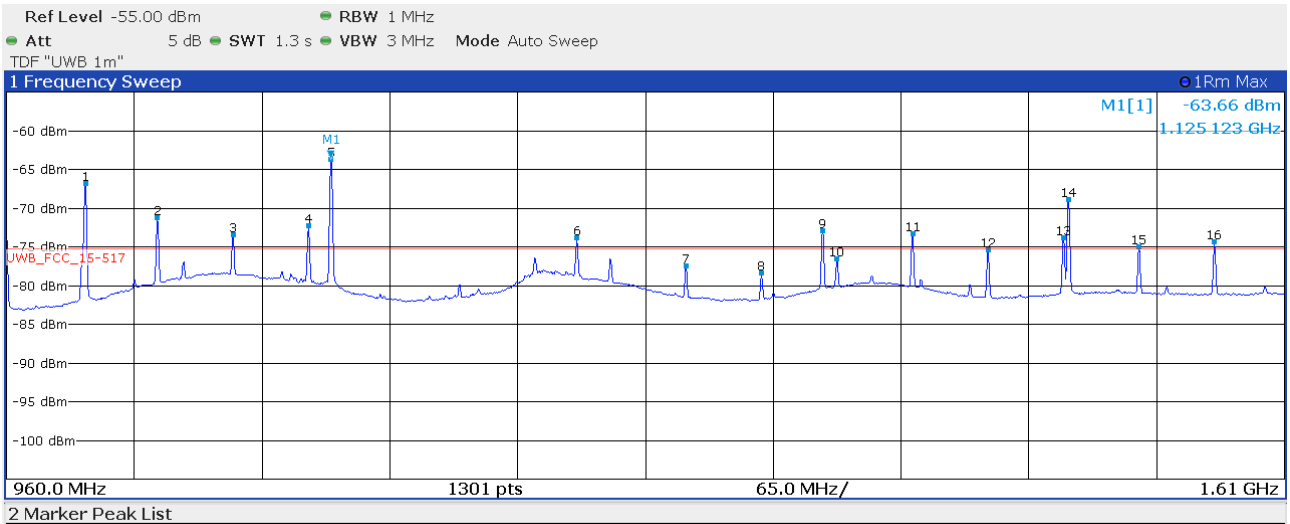


2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.000 220 GHz	-66.594 dBm	10	1.343 950 GHz	-76.440 dBm
2	1.036 690 GHz	-71.839 dBm	11	1.374 930 GHz	-73.457 dBm
3	1.075 160 GHz	-73.889 dBm	12	1.382 430 GHz	-76.246 dBm
4	1.113 630 GHz	-73.977 dBm	13	1.420 900 GHz	-74.575 dBm
5	1.125 120 GHz	-63.572 dBm	14	1.459 370 GHz	-75.832 dBm
6	1.229 040 GHz	-75.059 dBm	15	1.497 840 GHz	-75.177 dBm
7	1.250 030 GHz	-73.872 dBm	16	1.500 330 GHz	-68.538 dBm
8	1.267 010 GHz	-74.578 dBm	17	1.535 810 GHz	-76.347 dBm
9	1.305 480 GHz	-75.675 dBm	18	1.574 280 GHz	-76.975 dBm

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

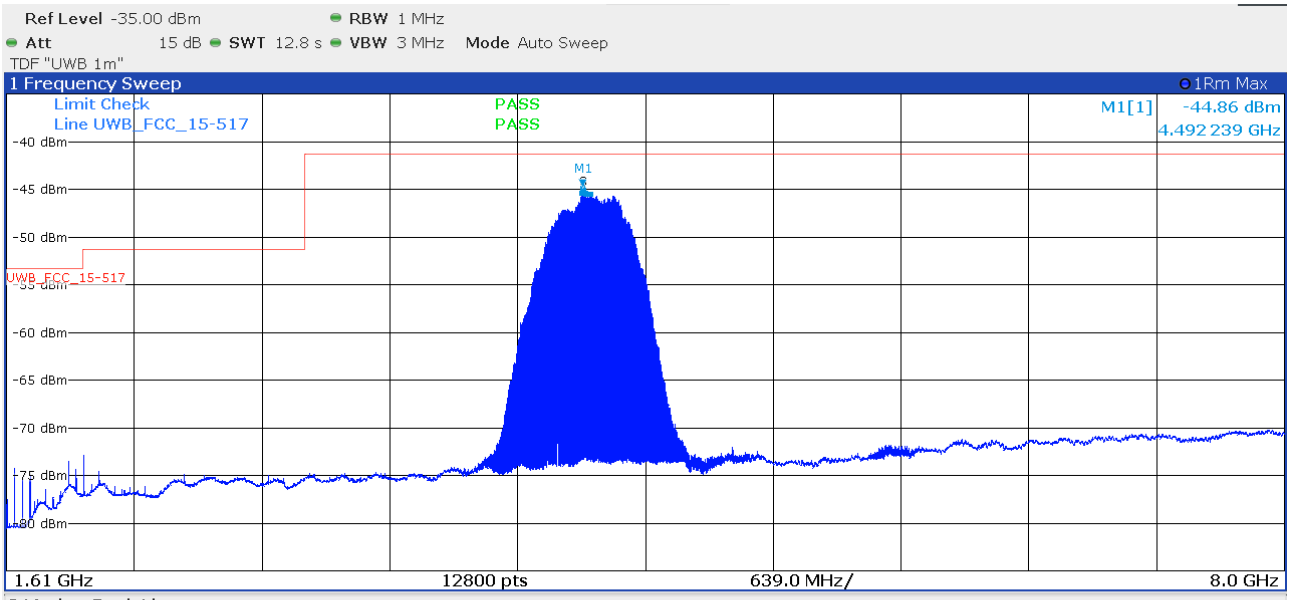
UWB OFF



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.000 220 GHz	-66.778 dBm	9	1.374 930 GHz	-72.898 dBm
2	1.036 690 GHz	-71.268 dBm	10	1.382 430 GHz	-76.602 dBm
3	1.075 160 GHz	-73.474 dBm	11	1.420 900 GHz	-73.361 dBm
4	1.113 630 GHz	-72.308 dBm	12	1.459 370 GHz	-75.387 dBm
5	1.125 120 GHz	-63.659 dBm	13	1.497 840 GHz	-73.894 dBm
6	1.250 030 GHz	-73.836 dBm	14	1.500 330 GHz	-68.896 dBm
7	1.305 480 GHz	-77.503 dBm	15	1.535 810 GHz	-75.031 dBm
8	1.343 950 GHz	-78.428 dBm	16	1.574 280 GHz	-74.404 dBm

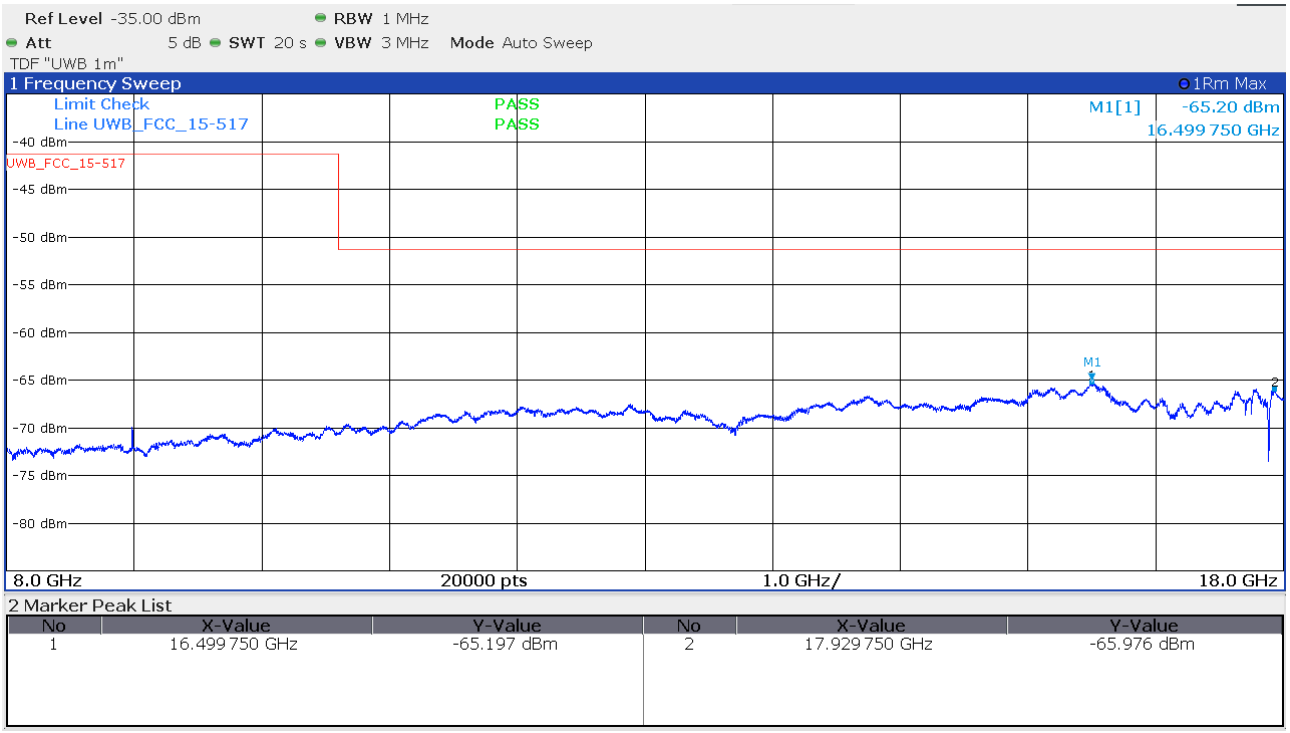
Note: Comparison between UWB ON and UWB OFF plots in this specific frequency range show, that digital circuitries cause the limit exceedings and not UWB transmitter. According to §15.521(c), these points must be evaluated according to §15.109, see test report 80236650-04 of accredited test laboratory CSA Group Bayern GmbH, Straubinger Straße 100, 94447 Platling, Germany.



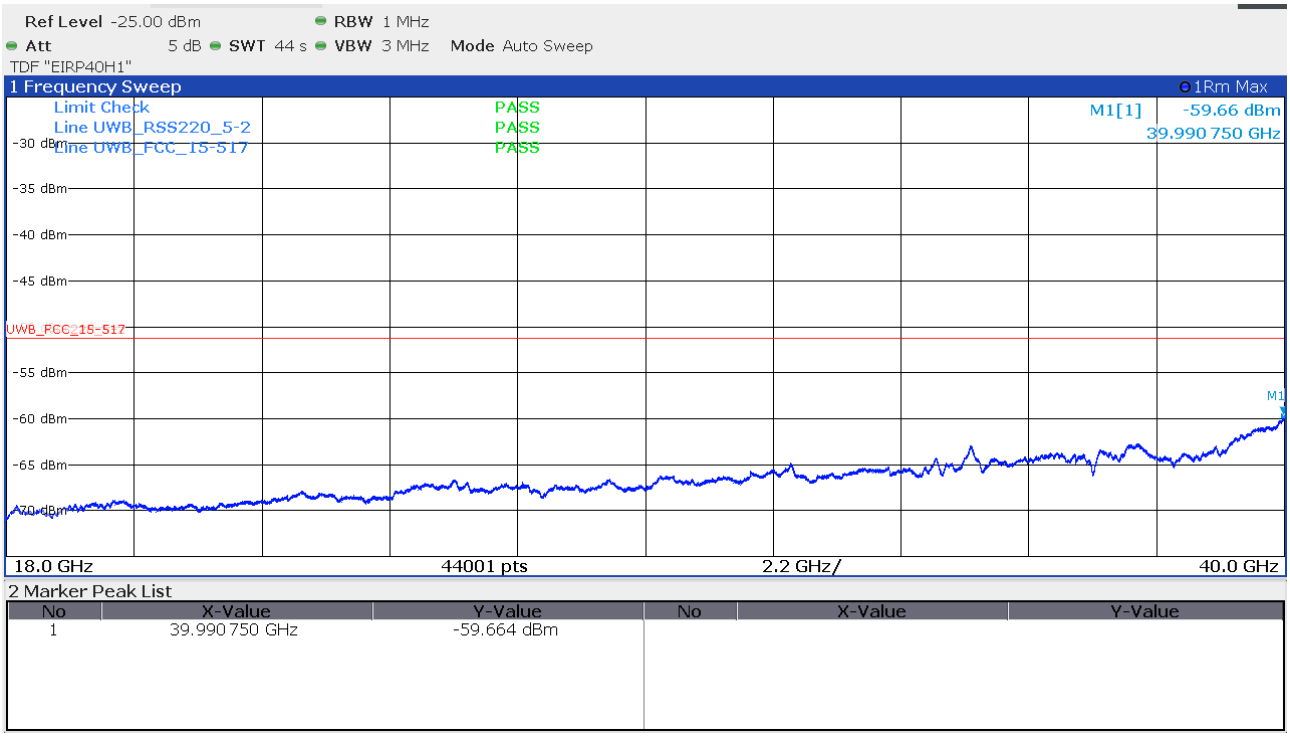
2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	4.488 740 GHz	-45.453 dBm	6	4.504 220 GHz	-45.570 dBm
2	4.490 740 GHz	-45.153 dBm	7	4.505 720 GHz	-45.414 dBm
3	4.492 240 GHz	-44.860 dBm	8	4.524 190 GHz	-45.523 dBm
4	4.494 240 GHz	-45.329 dBm	9	4.525 190 GHz	-45.563 dBm
5	4.495 730 GHz	-45.151 dBm	10	4.532 180 GHz	-45.560 dBm

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91



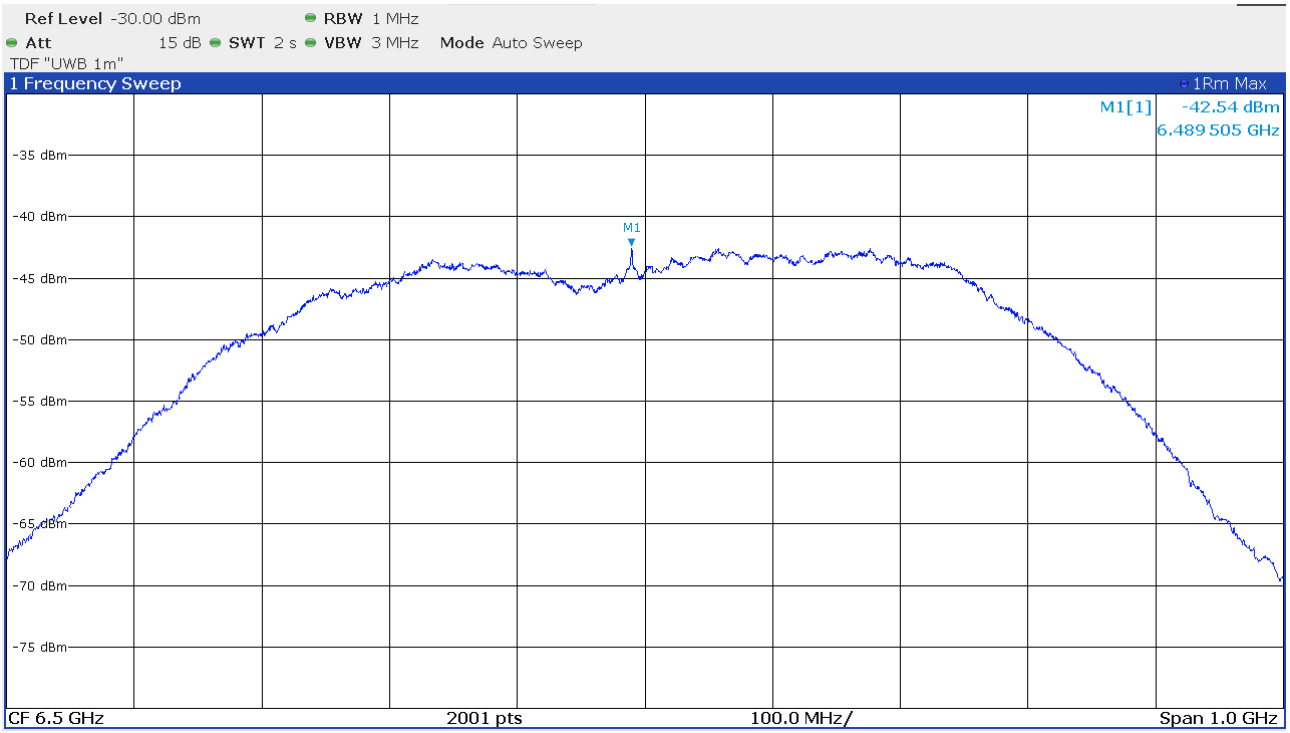
18 GHz to 40 GHz



FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

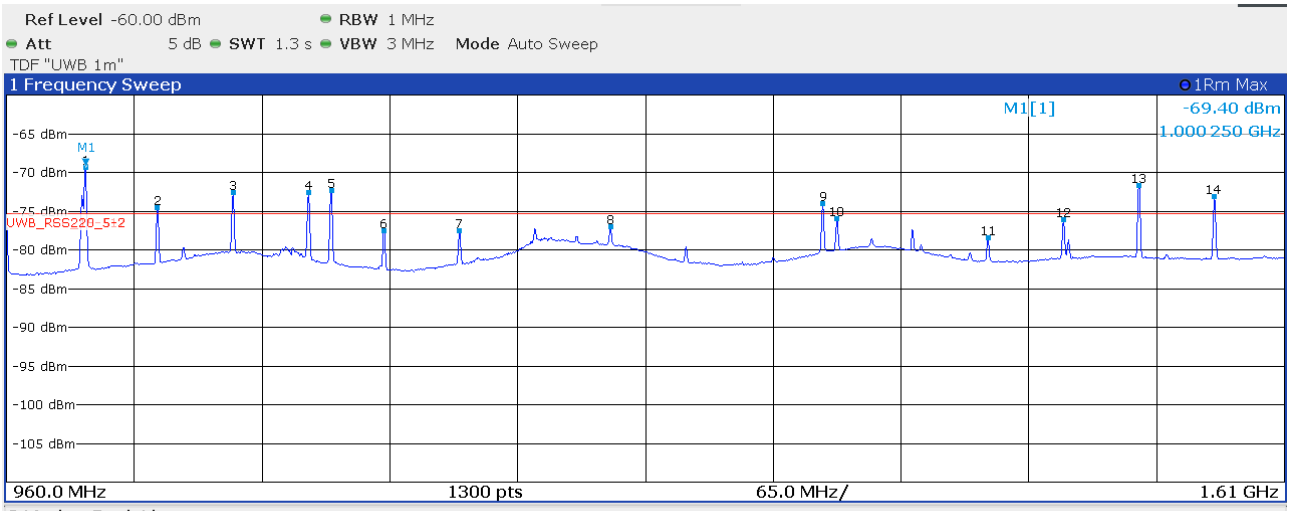
Channel 5 DW1000

Mean Power



960 MHz to 18 GHz

UWB ON

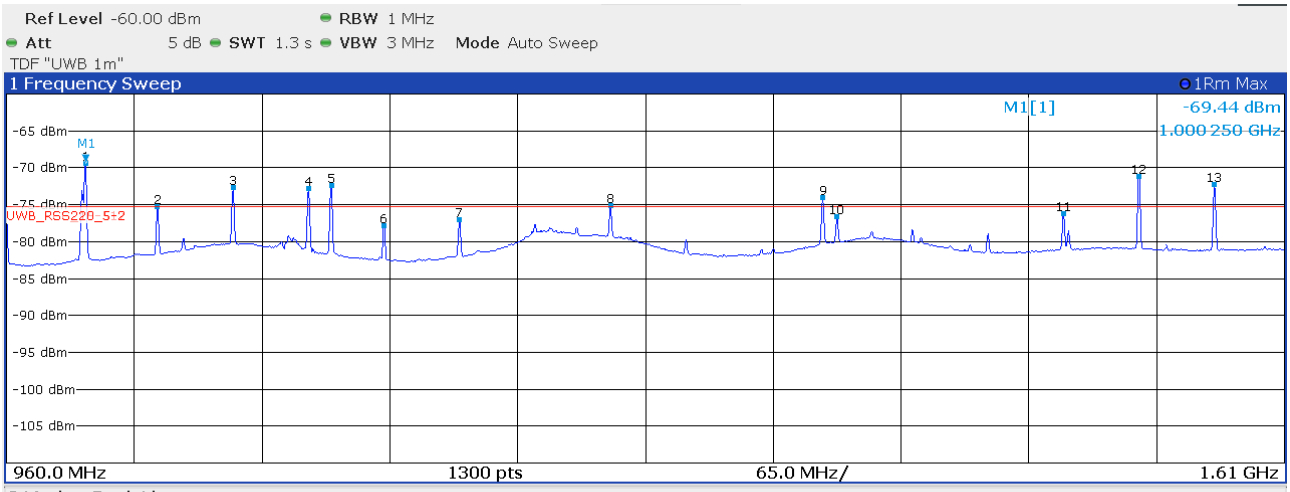


2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.000 250 GHz	-69.400 dBm	8	1.267 250 GHz	-76.993 dBm
2	1.036 750 GHz	-74.501 dBm	9	1.375 250 GHz	-74.087 dBm
3	1.075 250 GHz	-72.659 dBm	10	1.382 250 GHz	-75.982 dBm
4	1.113 750 GHz	-72.558 dBm	11	1.459 250 GHz	-78.439 dBm
5	1.125 250 GHz	-72.399 dBm	12	1.497 750 GHz	-76.146 dBm
6	1.151 750 GHz	-77.513 dBm	13	1.535 750 GHz	-71.735 dBm
7	1.190 250 GHz	-77.551 dBm	14	1.574 250 GHz	-73.098 dBm

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

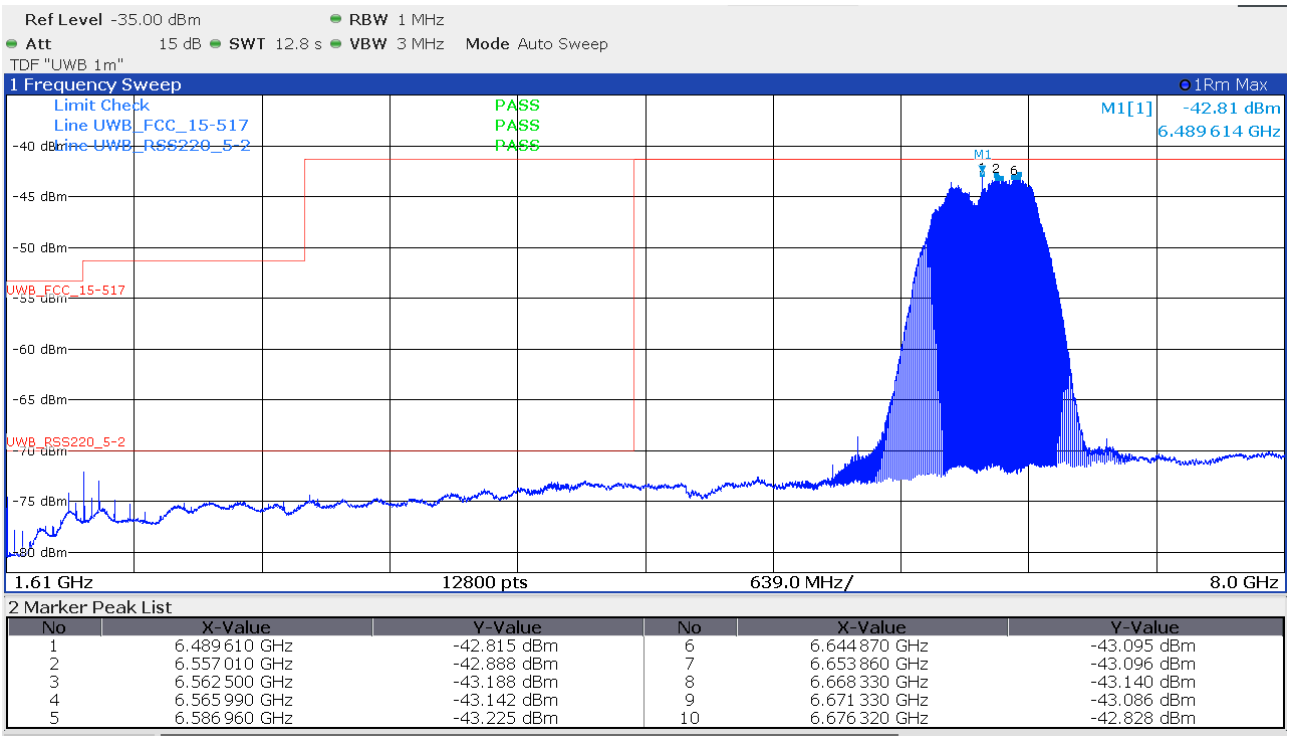
UWB OFF



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.000 250 GHz	-69.438 dBm	8	1.267 250 GHz	-75.125 dBm
2	1.036 750 GHz	-75.270 dBm	9	1.375 250 GHz	-74.073 dBm
3	1.075 250 GHz	-72.694 dBm	10	1.382 250 GHz	-76.647 dBm
4	1.113 750 GHz	-72.773 dBm	11	1.497 750 GHz	-76.147 dBm
5	1.125 250 GHz	-72.438 dBm	12	1.535 750 GHz	-71.144 dBm
6	1.151 750 GHz	-77.852 dBm	13	1.574 250 GHz	-72.200 dBm
7	1.190 250 GHz	-76.970 dBm			

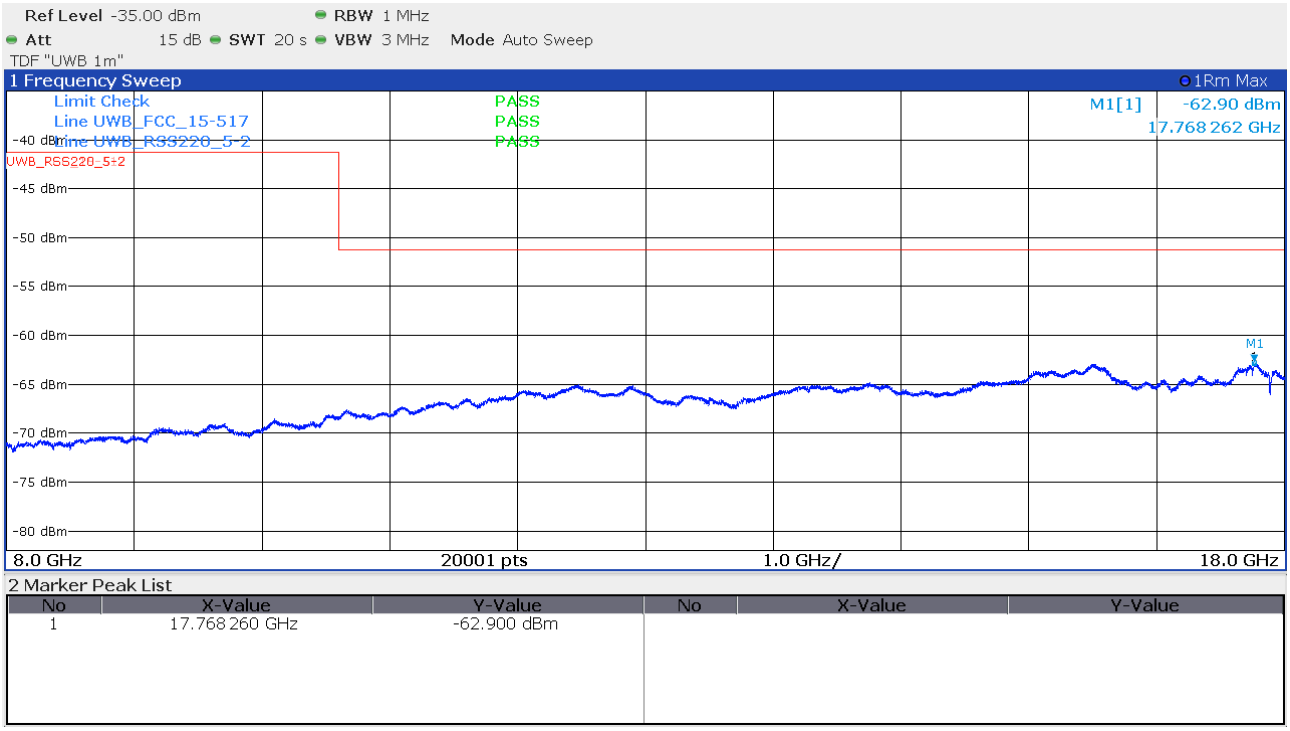
Note: Comparison between UWB ON and UWB OFF plots in this specific frequency range show, that digital circuitries cause the limit exceedings and not UWB transmitter. According to §15.521(c), these points must be evaluated according to §15.109, see test report 80236650-04 of accredited test laboratory CSA Group Bayern GmbH, Straubinger Straße 100, 94447 Platling, Germany.



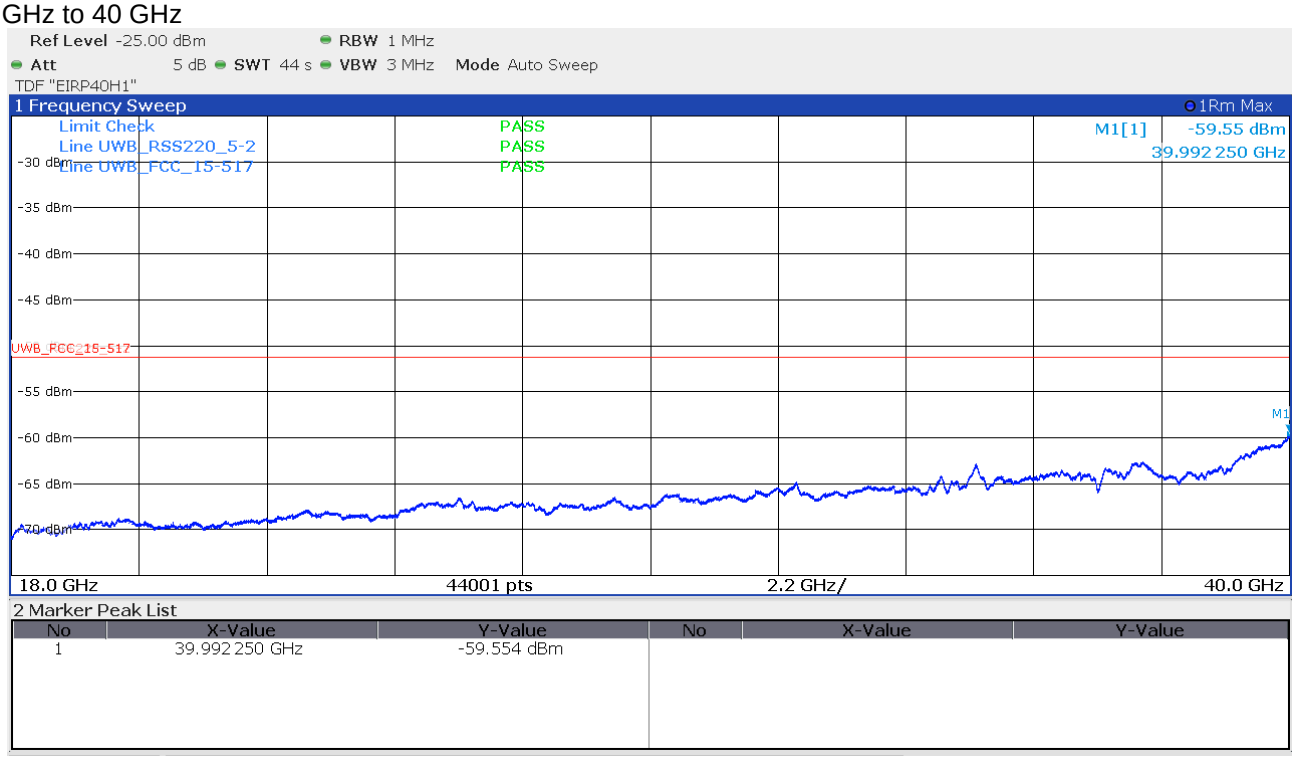
2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	6.489 610 GHz	-42.815 dBm	6	6.644 870 GHz	-43.095 dBm
2	6.557 010 GHz	-42.888 dBm	7	6.653 860 GHz	-43.096 dBm
3	6.562 500 GHz	-43.188 dBm	8	6.668 330 GHz	-43.140 dBm
4	6.565 990 GHz	-43.142 dBm	9	6.671 330 GHz	-43.086 dBm
5	6.586 960 GHz	-43.225 dBm	10	6.676 320 GHz	-42.828 dBm

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91



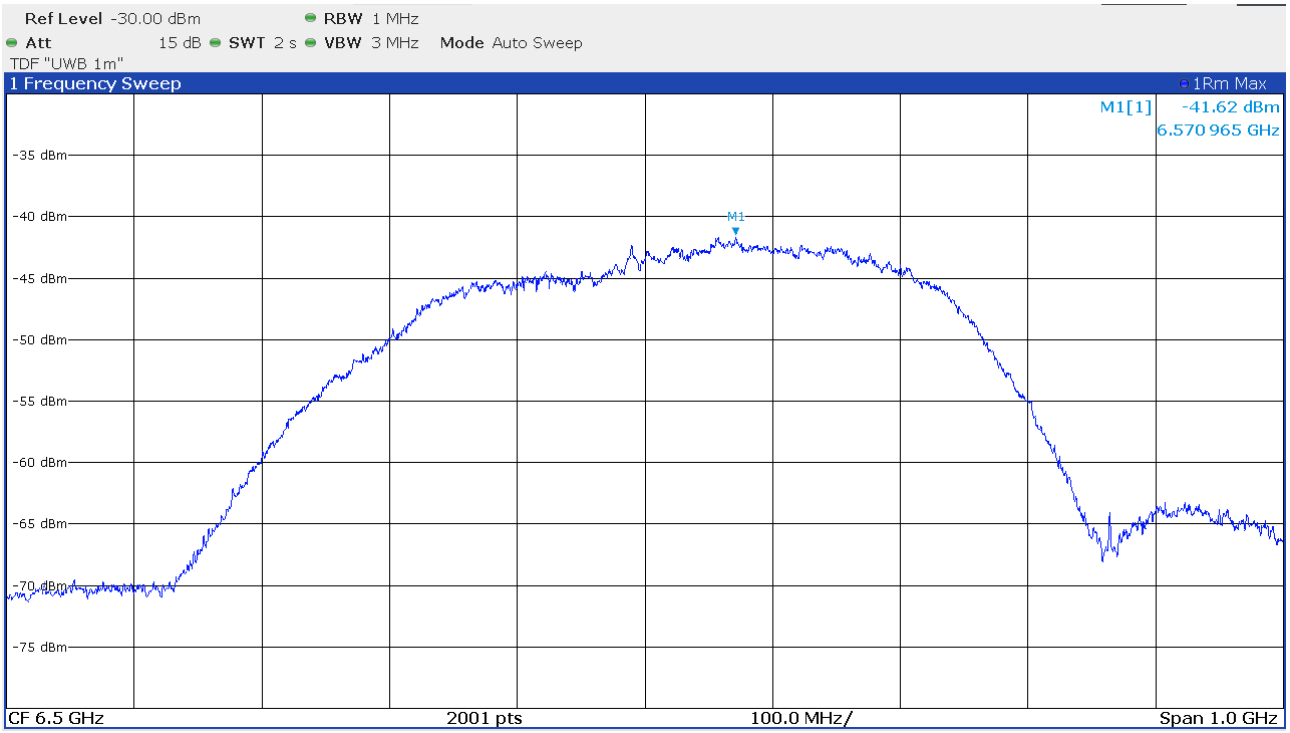
18 GHz to 40 GHz



FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

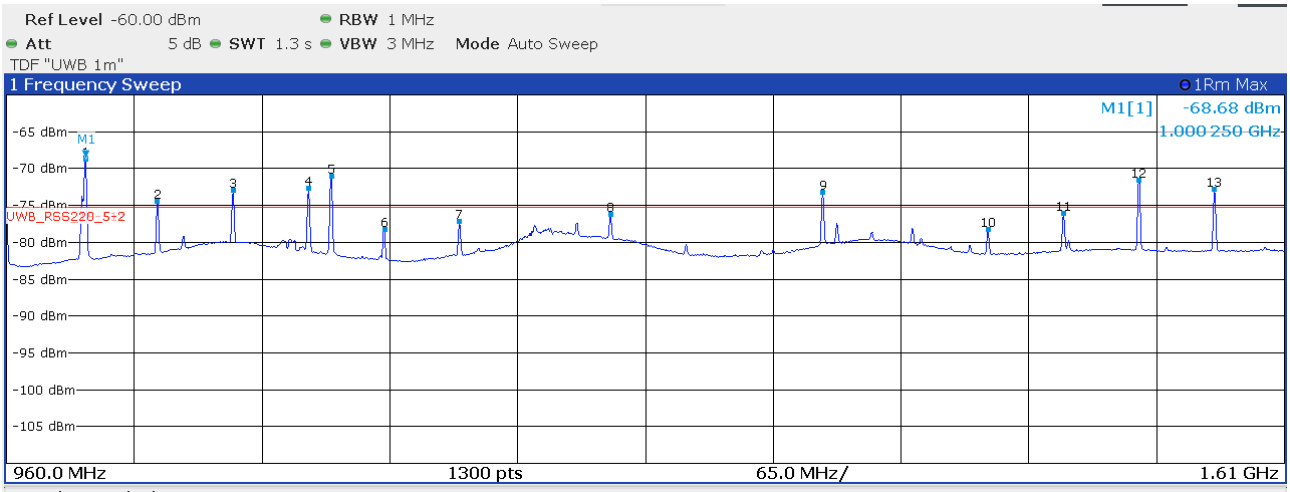
Channel 5 DW3000

Mean Power



960 MHz to 18 GHz

UWB ON

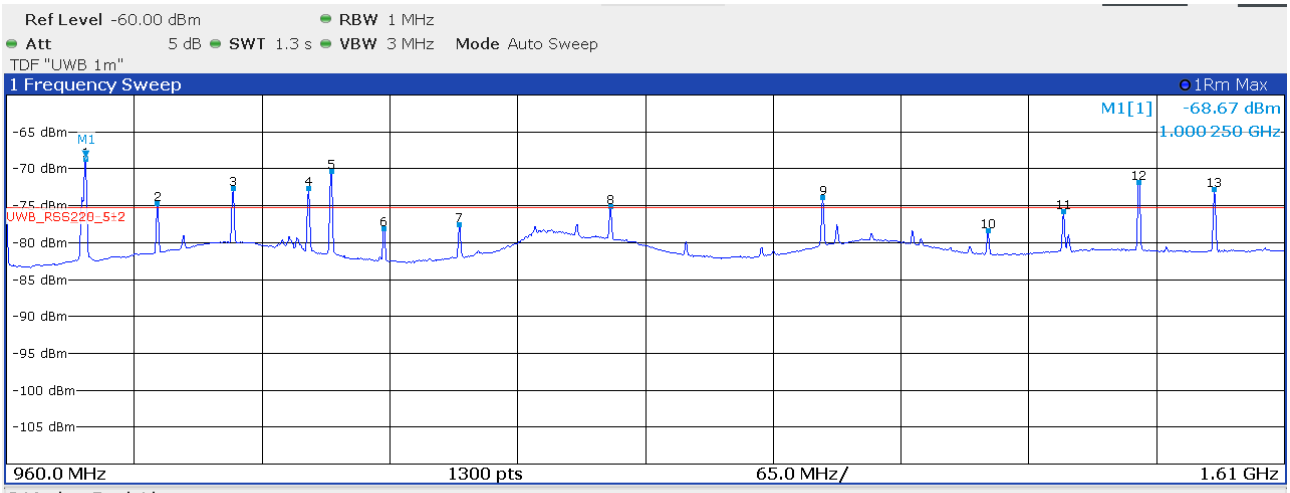


2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.000 250 GHz	-68.677 dBm	8	1.267 250 GHz	-76.186 dBm
2	1.036 750 GHz	-74.442 dBm	9	1.375 250 GHz	-73.156 dBm
3	1.075 250 GHz	-73.006 dBm	10	1.459 250 GHz	-78.290 dBm
4	1.113 750 GHz	-72.725 dBm	11	1.497 750 GHz	-76.100 dBm
5	1.125 250 GHz	-71.013 dBm	12	1.535 750 GHz	-71.632 dBm
6	1.152 250 GHz	-78.194 dBm	13	1.574 250 GHz	-72.825 dBm
7	1.190 250 GHz	-77.218 dBm			

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

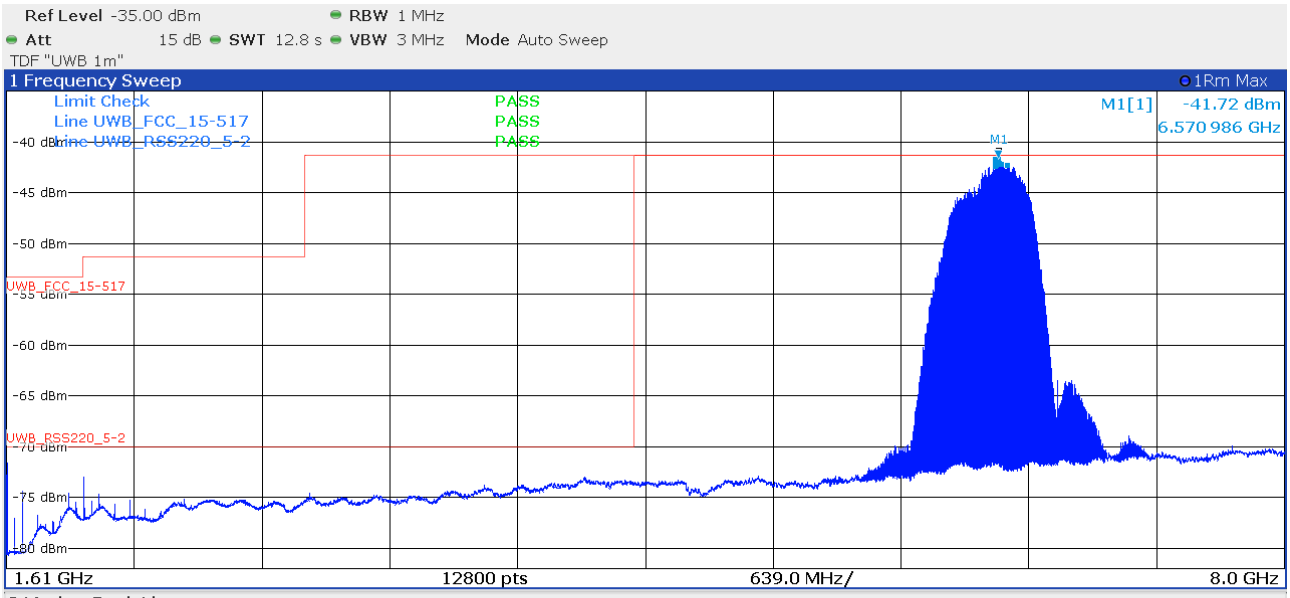
UWB OFF



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.000 250 GHz	-68.671 dBm	8	1.267 250 GHz	-75.164 dBm
2	1.036 750 GHz	-74.753 dBm	9	1.375 250 GHz	-73.897 dBm
3	1.075 250 GHz	-72.698 dBm	10	1.459 250 GHz	-78.393 dBm
4	1.113 750 GHz	-72.726 dBm	11	1.497 750 GHz	-75.838 dBm
5	1.125 250 GHz	-70.378 dBm	12	1.535 750 GHz	-71.848 dBm
6	1.151 750 GHz	-78.058 dBm	13	1.574 250 GHz	-72.862 dBm
7	1.190 250 GHz	-77.523 dBm			

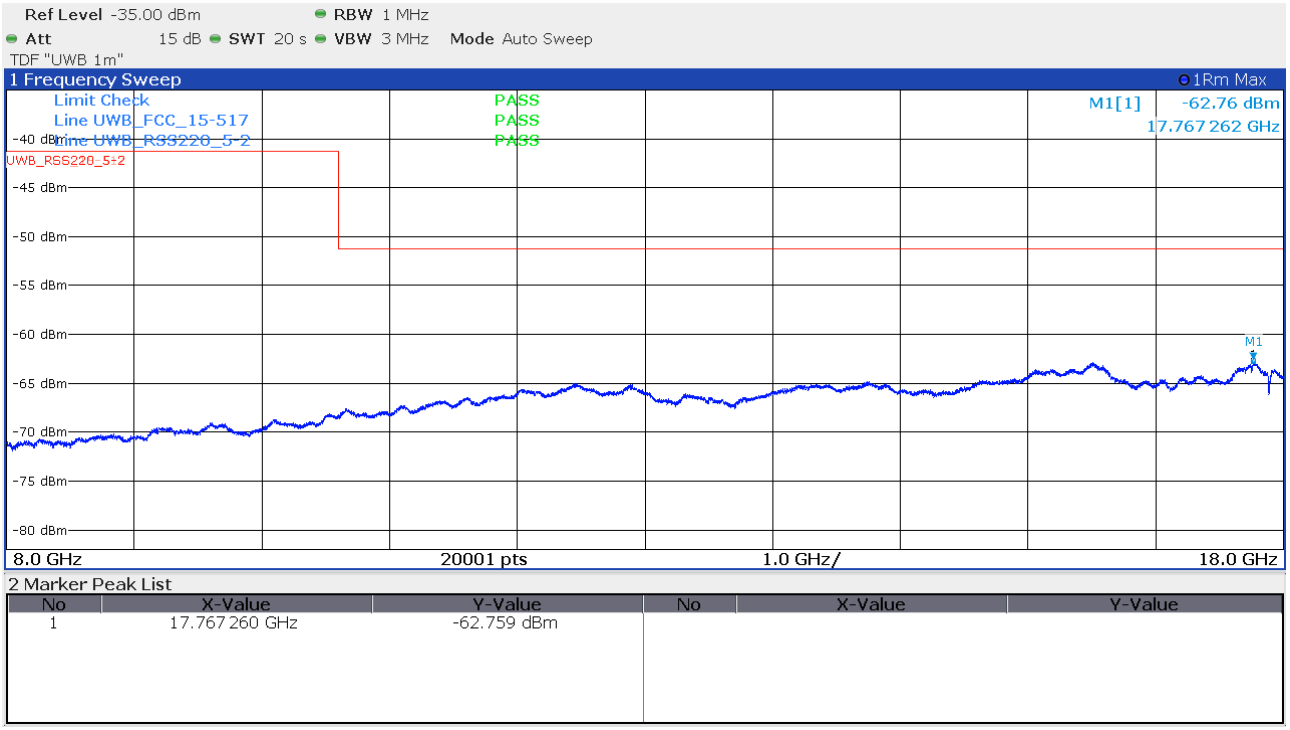
Note: Comparison between UWB ON and UWB OFF plots in this specific frequency range show, that digital circuitries cause the limit exceedings and not UWB transmitter. According to §15.521(c), these points must be evaluated according to §15.109, see test report 80236650-04 of accredited test laboratory CSA Group Bayern GmbH, Straubinger Straße 100, 94447 Platling, Germany.



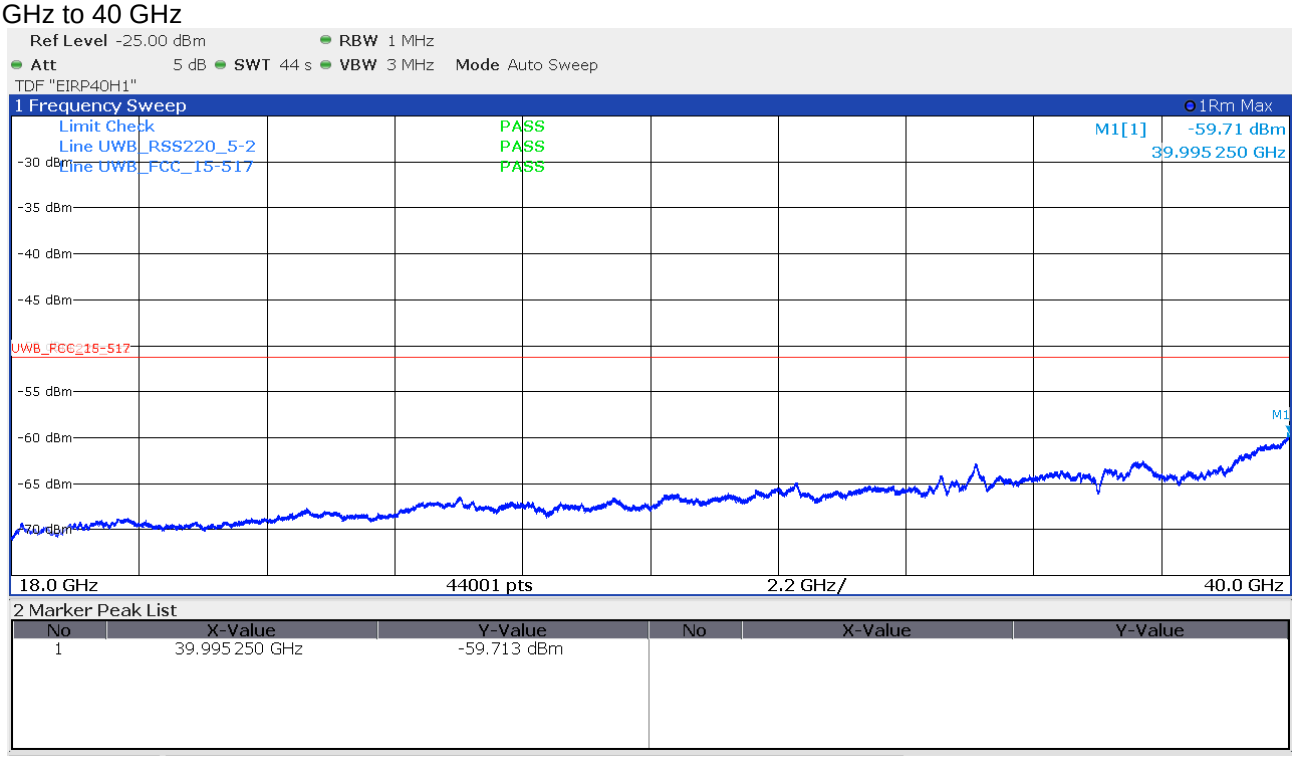
2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	6.552 020 GHz	-42.195 dBm	6	6.565 490 GHz	-42.042 dBm
2	6.554 510 GHz	-42.379 dBm	7	6.570 990 GHz	-41.721 dBm
3	6.555 510 GHz	-41.751 dBm	8	6.571 980 GHz	-42.171 dBm
4	6.560 500 GHz	-42.358 dBm	9	6.581 970 GHz	-42.250 dBm
5	6.564 500 GHz	-42.181 dBm	10	6.614 420 GHz	-42.357 dBm

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91



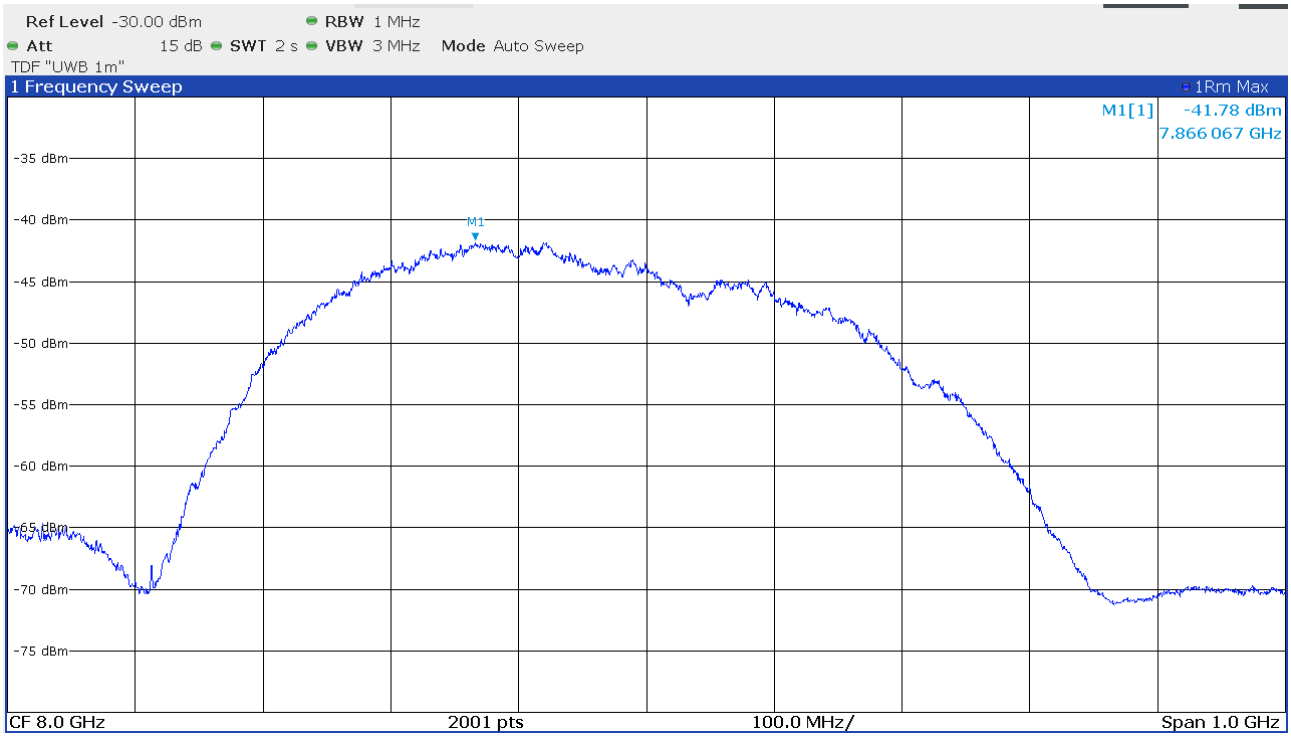
18 GHz to 40 GHz



FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

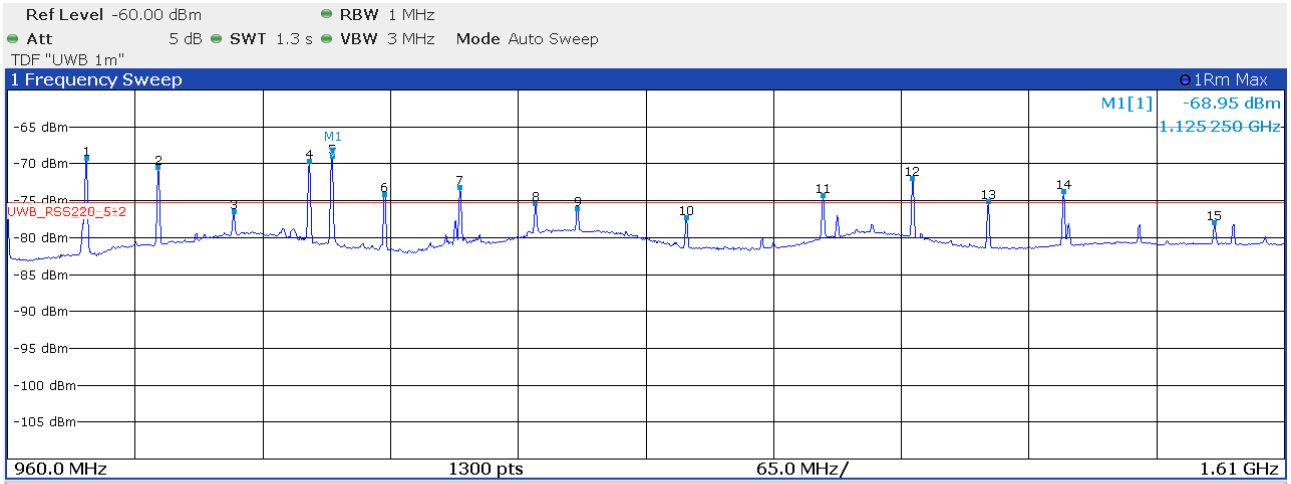
Channel 9 DW3000

Mean Power



960 MHz to 18 GHz

UWB ON

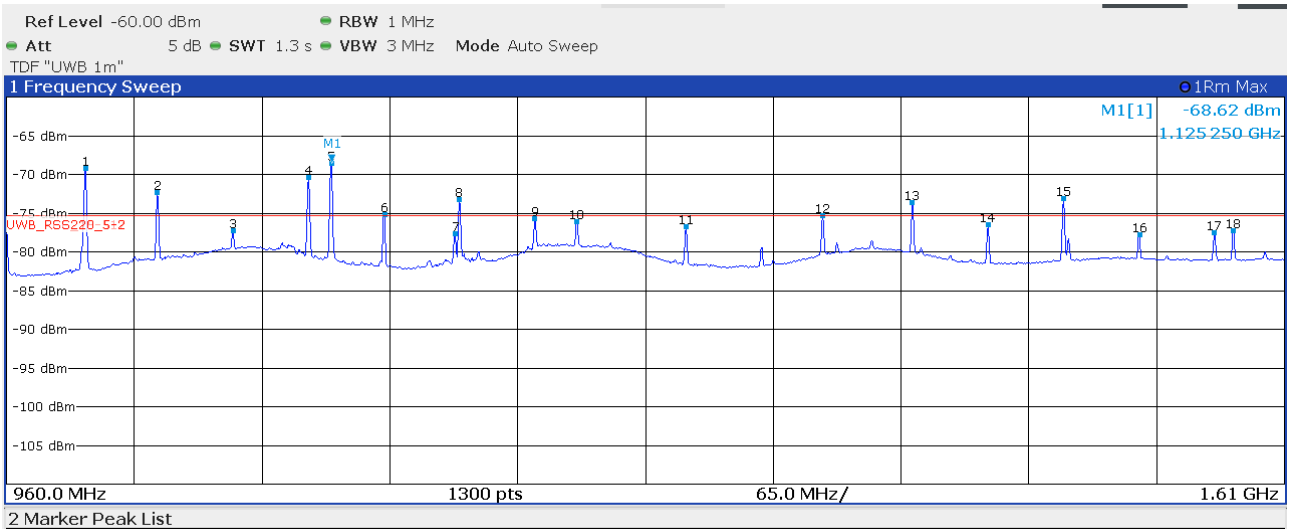


2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.000 250 GHz	-69.203 dBm	9	1.250 250 GHz	-76.064 dBm
2	1.036 750 GHz	-70.512 dBm	10	1.305 750 GHz	-77.281 dBm
3	1.075 250 GHz	-76.471 dBm	11	1.375 250 GHz	-74.255 dBm
4	1.113 750 GHz	-69.669 dBm	12	1.420 750 GHz	-71.974 dBm
5	1.125 250 GHz	-68.945 dBm	13	1.459 250 GHz	-75.115 dBm
6	1.151 750 GHz	-74.222 dBm	14	1.497 750 GHz	-73.730 dBm
7	1.190 250 GHz	-73.202 dBm	15	1.574 250 GHz	-77.991 dBm
8	1.228 750 GHz	-75.358 dBm			

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

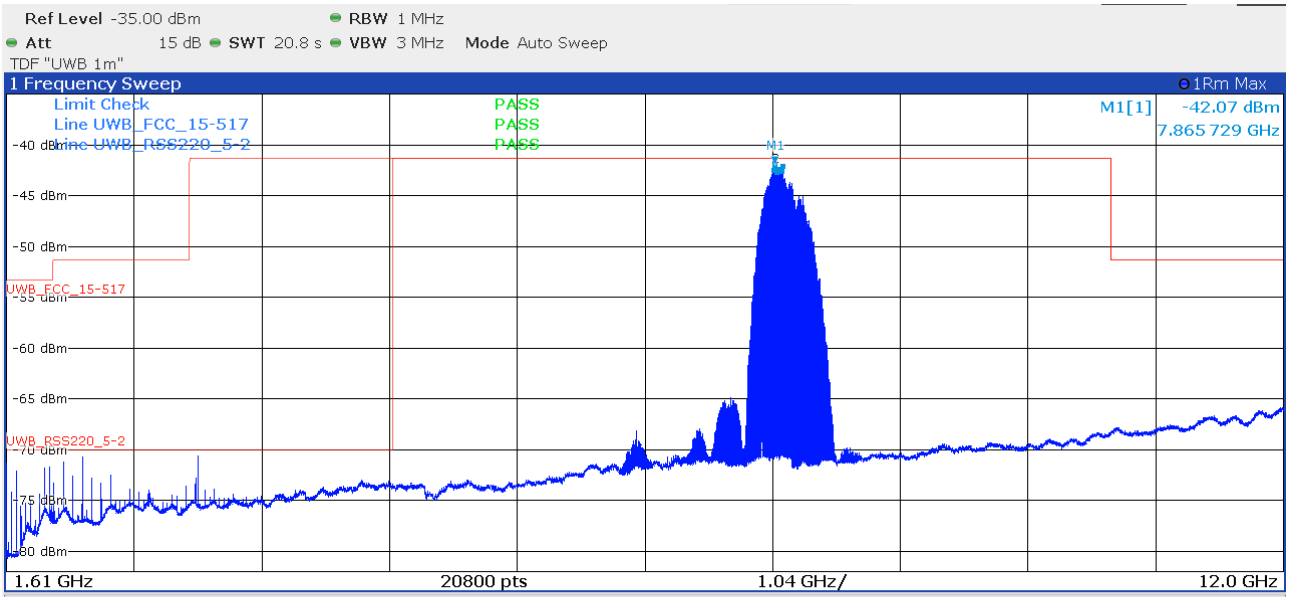
UWB OFF



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.000 250 GHz	-69.200 dBm	10	1.250 250 GHz	-76.063 dBm
2	1.036 750 GHz	-72.395 dBm	11	1.305 750 GHz	-76.733 dBm
3	1.075 250 GHz	-77.313 dBm	12	1.375 250 GHz	-75.298 dBm
4	1.113 750 GHz	-70.349 dBm	13	1.420 750 GHz	-73.598 dBm
5	1.125 250 GHz	-68.624 dBm	14	1.459 250 GHz	-76.547 dBm
6	1.152 250 GHz	-75.244 dBm	15	1.497 750 GHz	-73.161 dBm
7	1.188 250 GHz	-77.678 dBm	16	1.536 250 GHz	-77.828 dBm
8	1.190 250 GHz	-73.248 dBm	17	1.574 250 GHz	-77.515 dBm
9	1.228 750 GHz	-75.766 dBm	18	1.583 750 GHz	-77.290 dBm

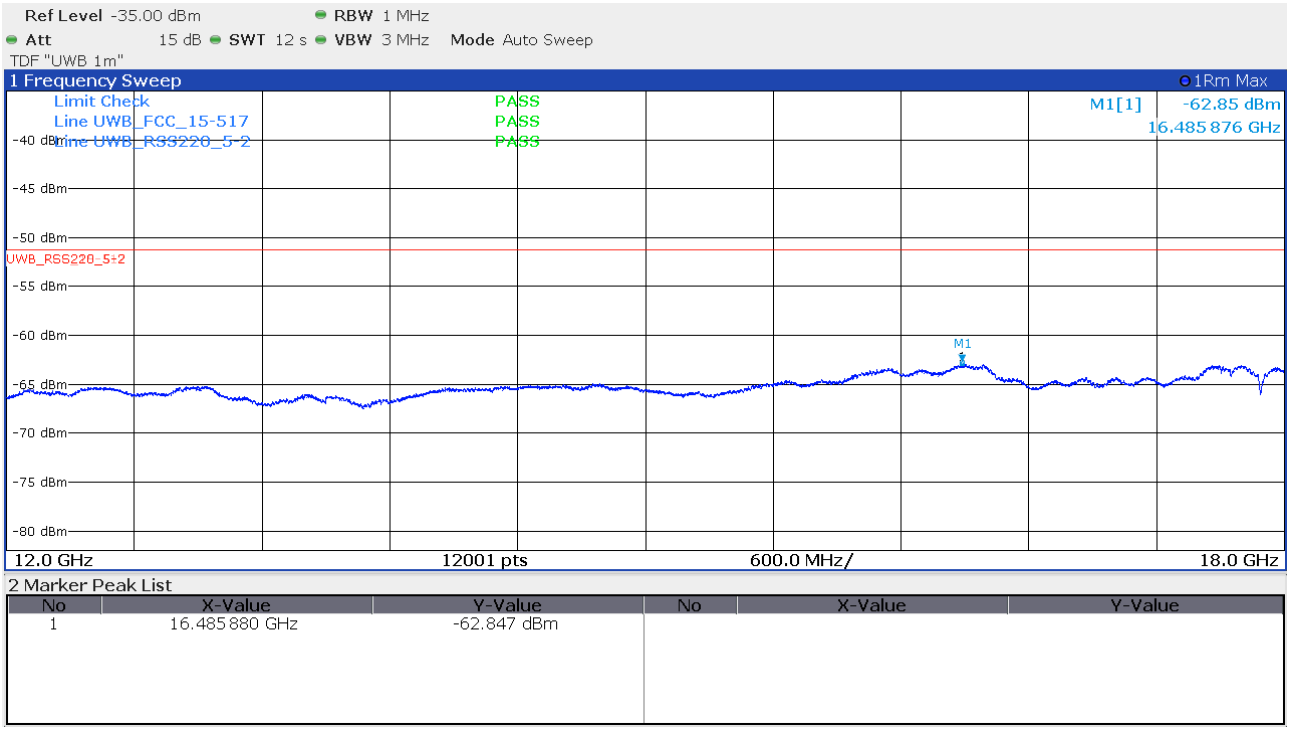
Note: Comparison between UWB ON and UWB OFF plots in this specific frequency range show, that digital circuitries cause the limit exceedings and not UWB transmitter. According to §15.521(c), these points must be evaluated according to §15.109, see test report 80236650-04 of accredited test laboratory CSA Group Bayern GmbH, Straubinger Straße 100, 94447 Platling, Germany.



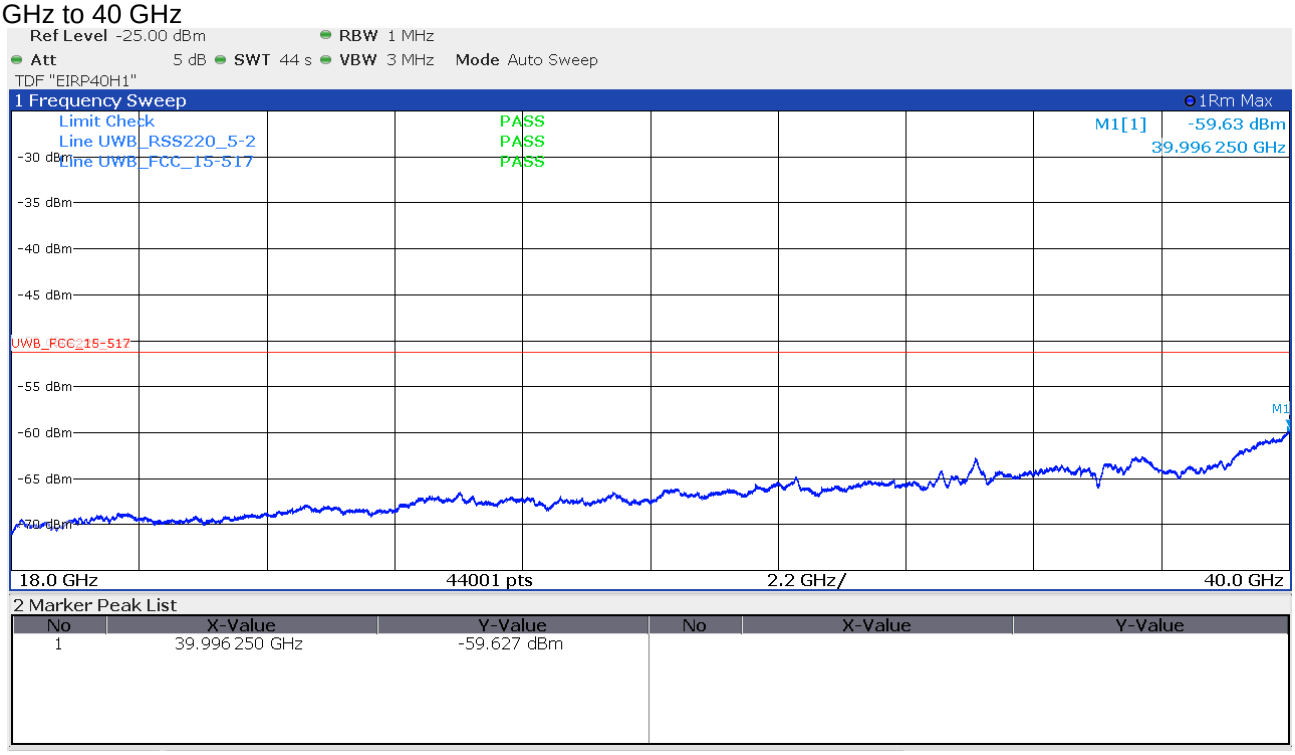
2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	7.855 740 GHz	-42.563 dBm	6	7.889 710 GHz	-42.402 dBm
2	7.865 730 GHz	-42.068 dBm	7	7.905 690 GHz	-42.585 dBm
3	7.875 720 GHz	-42.391 dBm	8	7.915 680 GHz	-42.573 dBm
4	7.879 720 GHz	-42.743 dBm	9	7.919 680 GHz	-42.614 dBm
5	7.885 710 GHz	-42.486 dBm	10	7.925 670 GHz	-42.162 dBm

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91



18 GHz to 40 GHz



FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

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 §15.517(c) in the frequency range 960 MHz to 40 GHz:

Frequency in MHz	EIRP in dBm
960-1610	−75.3
1610-1990	−53.3
1990-3100	−51.3
3100-10600	−41.3
Above 10600	−51.3

Limit according RSS-220 5.2.1 (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	−51.3

The requirements are **FULFILLED.**

Remarks: None.

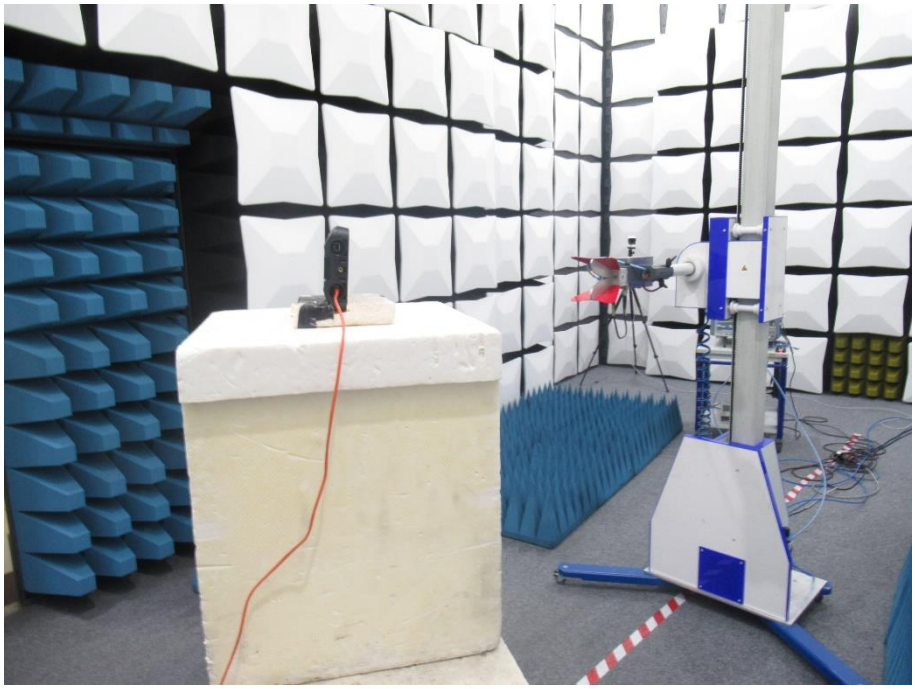
5.4 Radiated Emissions at 1164-1240 MHz and 1559-1610 MHz

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

5.4.1 Description of the test location

Test location: Fully anechoic chamber FAR1

5.4.2 Photo documentation of the test set-up



5.4.3 Applicable standard

According to FCC Part 15, Section 15.517(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 Description of Measurement

The spectral line is measured following the procedure set out in ANSI C63-10, item 10.3.10. The EUT is set in TX continuous mode while measuring.

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

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

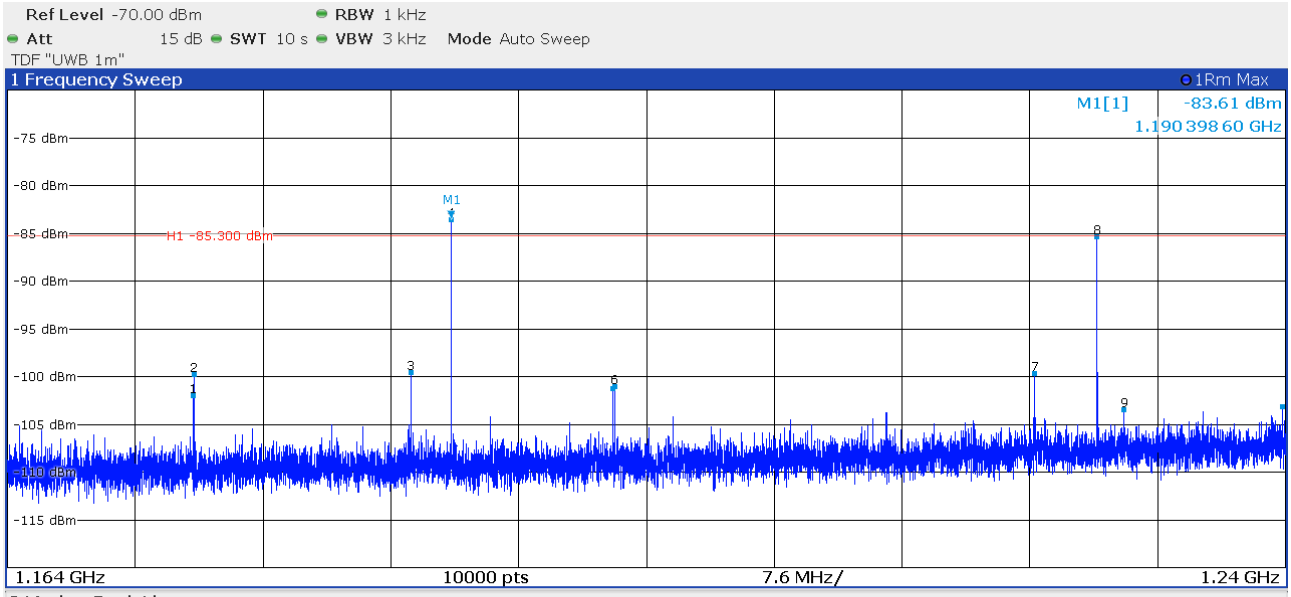
5.4.5 Test result

Note: Comparison between all UWB ON and UWB OFF plots in this section show, that digital circuitries cause the limit exceedings and not UWB transmitter. According to §15.521(c), these points must be evaluated according to §15.109, see test report 80236650-04 of accredited test laboratory CSA Group Bayern GmbH, Straubinger Straße 100, 94447 Platling, Germany.

Channel 3 DW 1000

1164 MHz to 1240 MHz horizontal

UWB ON

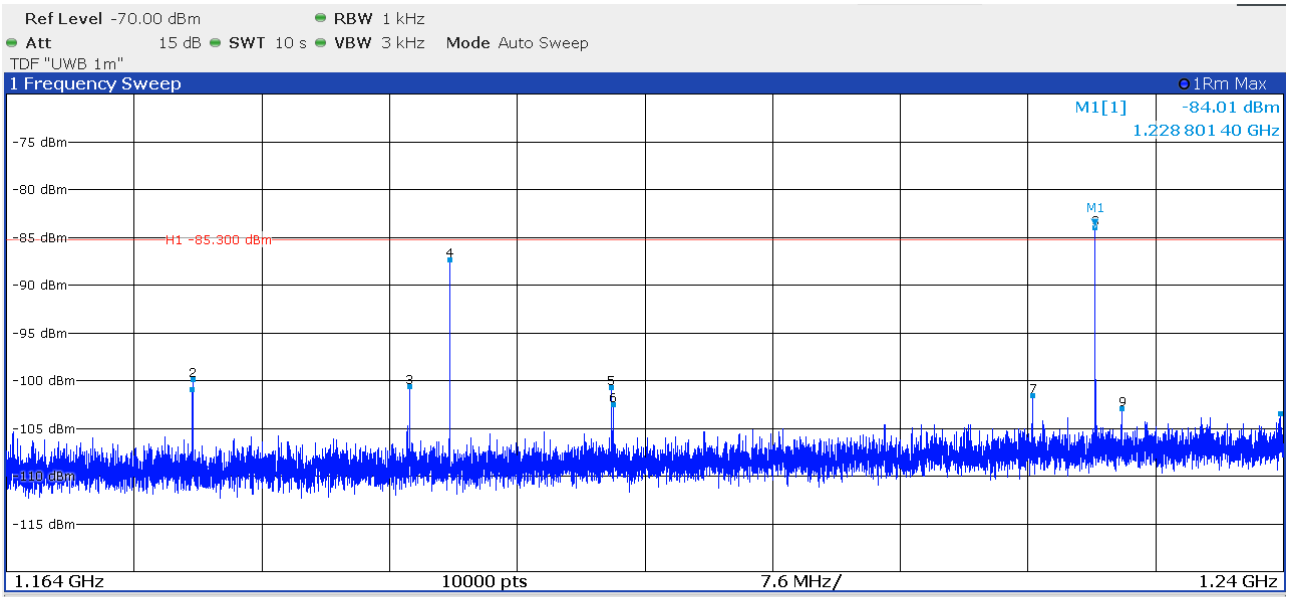


2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.175 039 GHz	-102.026 dBm	6	1.200 104 GHz	-101.057 dBm
2	1.175 100 GHz	-99.774 dBm	7	1.225 100 GHz	-99.683 dBm
3	1.187 982 GHz	-99.603 dBm	8	1.228 801 GHz	-85.358 dBm
4	1.190 399 GHz	-83.608 dBm	9	1.230 413 GHz	-103.510 dBm
5	1.199 982 GHz	-101.290 dBm	10	1.239 844 GHz	-103.187 dBm

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

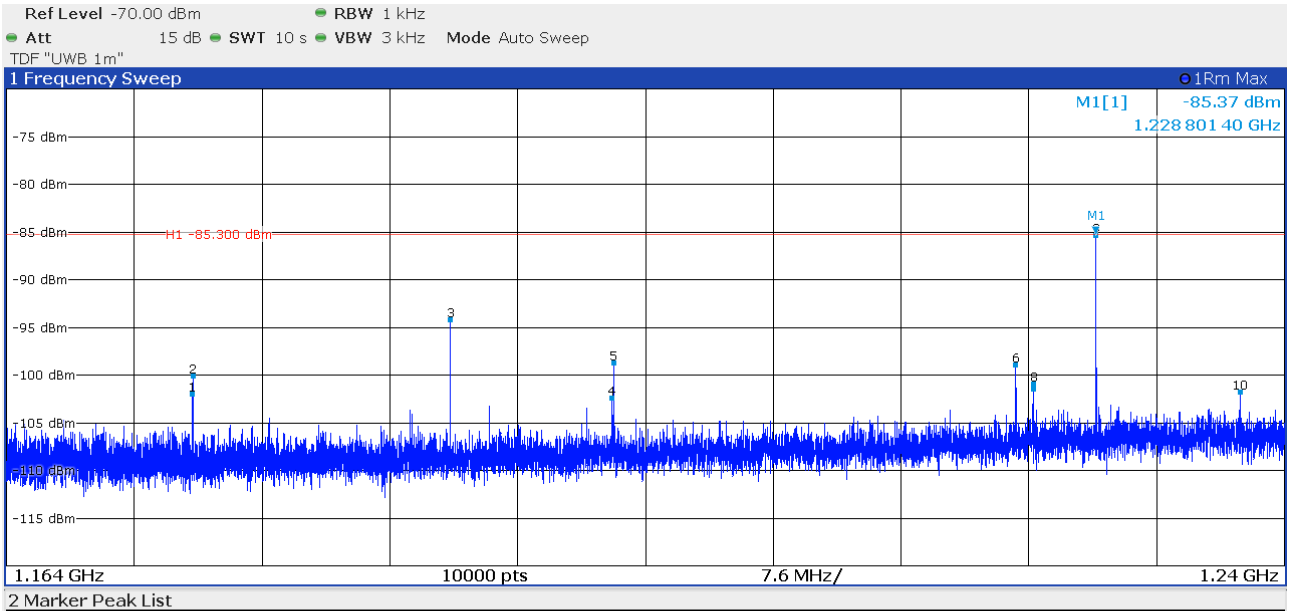
UWB OFF



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.175 039 GHz	-100.984 dBm	6	1.200 104 GHz	-102.538 dBm
2	1.175 100 GHz	-99.849 dBm	7	1.225 100 GHz	-101.535 dBm
3	1.187 982 GHz	-100.611 dBm	8	1.228 801 GHz	-84.011 dBm
4	1.190 399 GHz	-87.339 dBm	9	1.230 413 GHz	-102.958 dBm
5	1.199 982 GHz	-100.776 dBm	10	1.239 844 GHz	-103.433 dBm

1164 MHz to 1240 MHz vertical

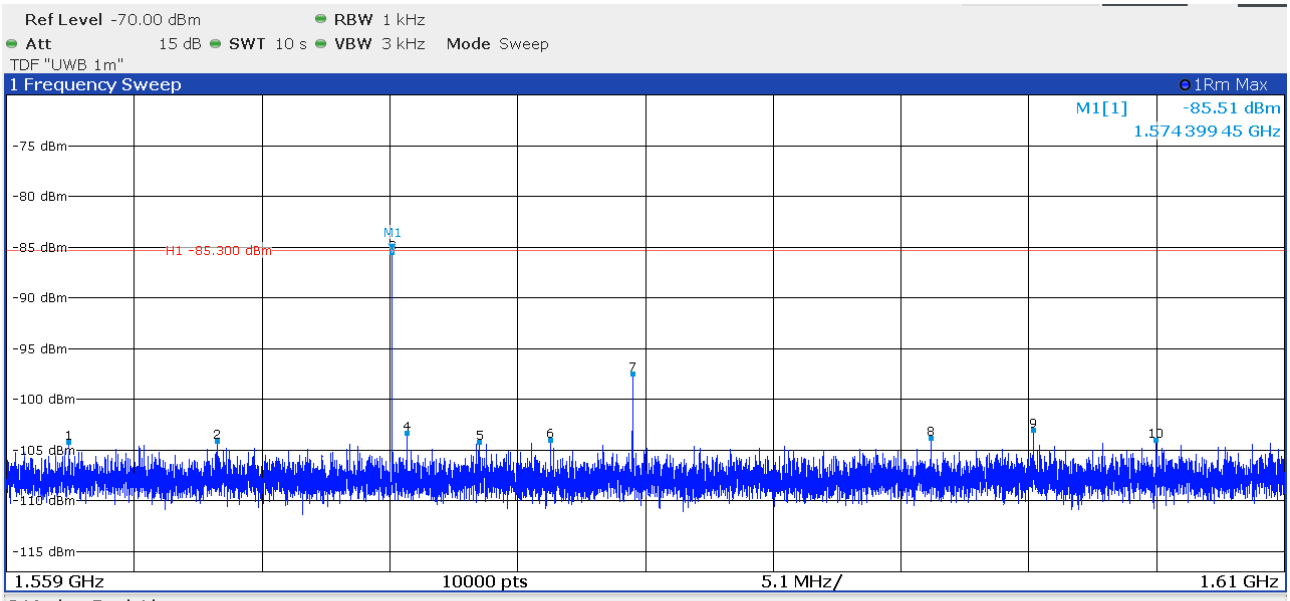


2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.175 039 GHz	-101.996 dBm	6	1.224 029 GHz	-98.925 dBm
2	1.175 100 GHz	-100.129 dBm	7	1.225 047 GHz	-101.443 dBm
3	1.190 399 GHz	-94.255 dBm	8	1.225 100 GHz	-100.927 dBm
4	1.199 982 GHz	-102.413 dBm	9	1.228 801 GHz	-85.374 dBm
5	1.200 104 GHz	-98.753 dBm	10	1.237 374 GHz	-101.811 dBm

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

1559 MHz to 1610 MHz horizontal

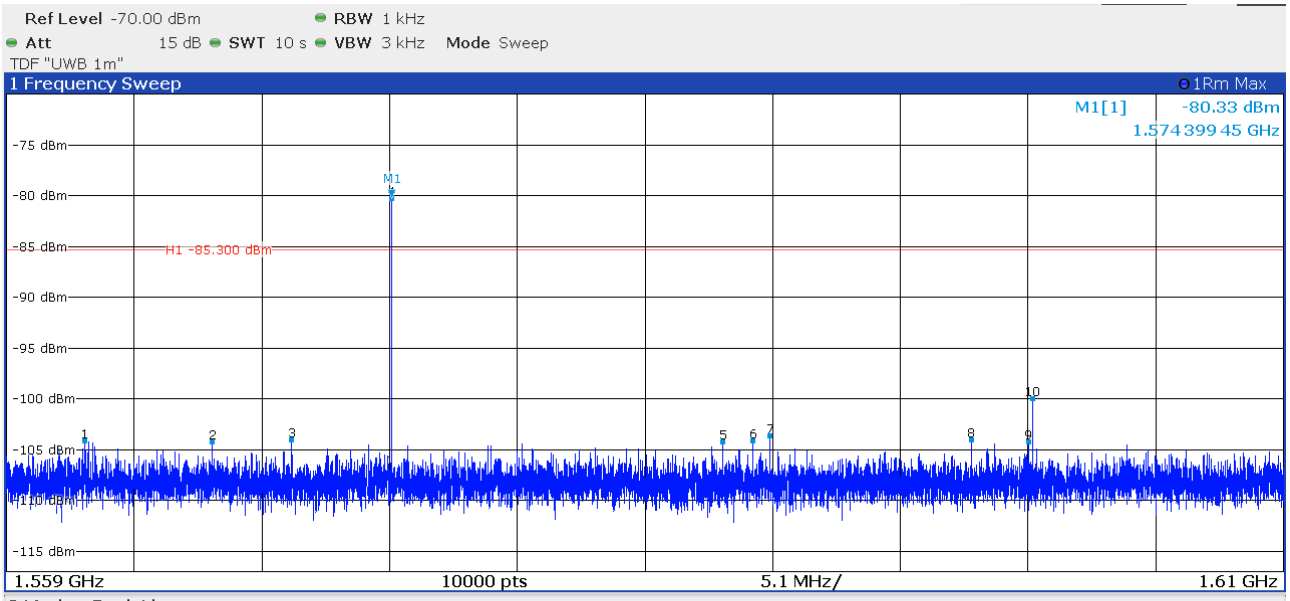


2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.561 471 GHz	-104.246 dBm	6	1.580 698 GHz	-104.016 dBm
2	1.567 407 GHz	-104.092 dBm	7	1.583 982 GHz	-97.532 dBm
3	1.574 399 GHz	-85.512 dBm	8	1.595 881 GHz	-103.824 dBm
4	1.574 991 GHz	-103.297 dBm	9	1.599 981 GHz	-103.059 dBm
5	1.577 888 GHz	-104.267 dBm	10	1.604 857 GHz	-104.028 dBm

1559 MHz to 1610 MHz vertical

UWB ON

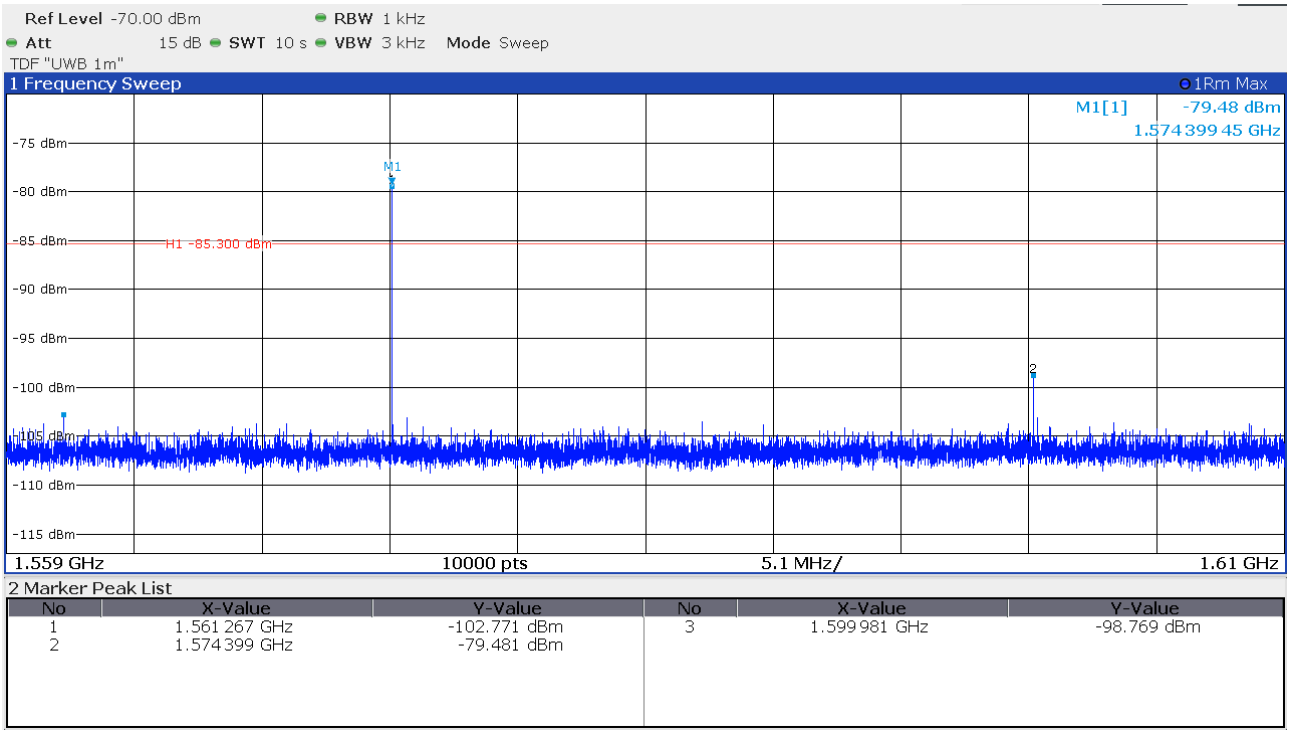


2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.562 144 GHz	-104.166 dBm	6	1.588 807 GHz	-104.185 dBm
2	1.567 229 GHz	-104.242 dBm	7	1.589 490 GHz	-103.633 dBm
3	1.570 396 GHz	-104.013 dBm	8	1.597 528 GHz	-104.075 dBm
4	1.574 399 GHz	-80.329 dBm	9	1.599 818 GHz	-104.221 dBm
5	1.587 619 GHz	-104.217 dBm	10	1.599 981 GHz	-99.988 dBm

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

UWB OFF



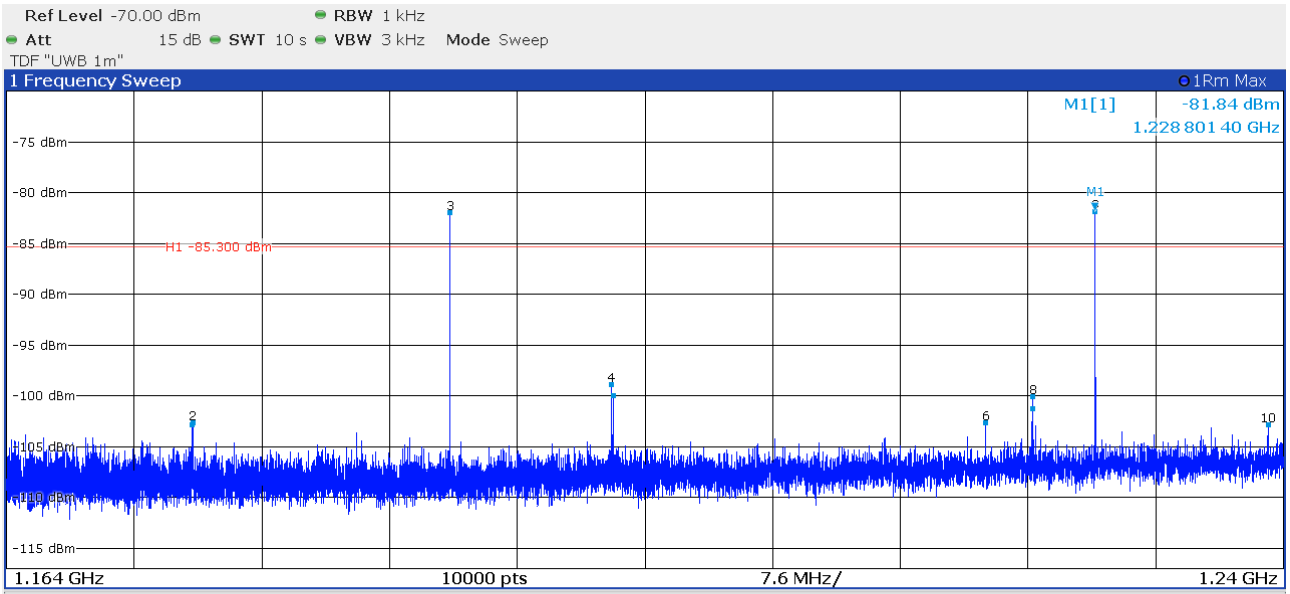
2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.561 267 GHz	-102.771 dBm	3	1.599 981 GHz	-98.769 dBm
2	1.574 399 GHz	-79.481 dBm			

Channel 5 DW 1000

1164 MHz to 1240 MHz horizontal

UWB ON

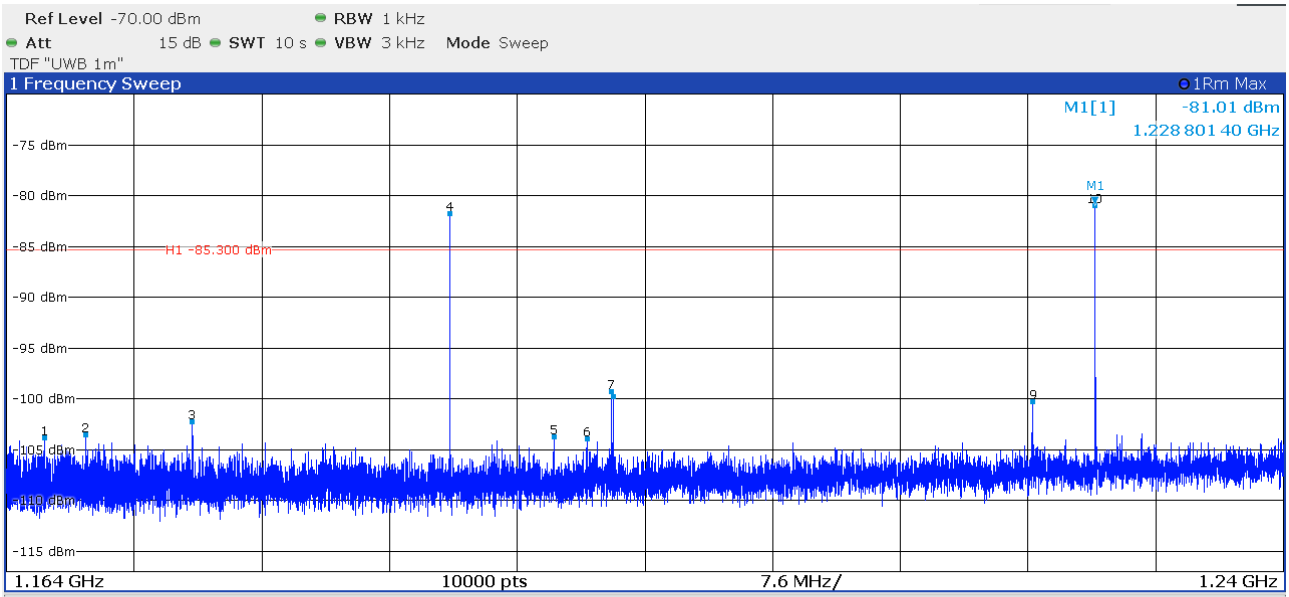


2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.175 039 GHz	-102.814 dBm	6	1.222 288 GHz	-102.655 dBm
2	1.175 100 GHz	-102.693 dBm	7	1.225 047 GHz	-101.249 dBm
3	1.190 399 GHz	-81.970 dBm	8	1.225 100 GHz	-100.069 dBm
4	1.199 982 GHz	-98.942 dBm	9	1.228 801 GHz	-81.836 dBm
5	1.200 104 GHz	-100.024 dBm	10	1.239 077 GHz	-102.895 dBm

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

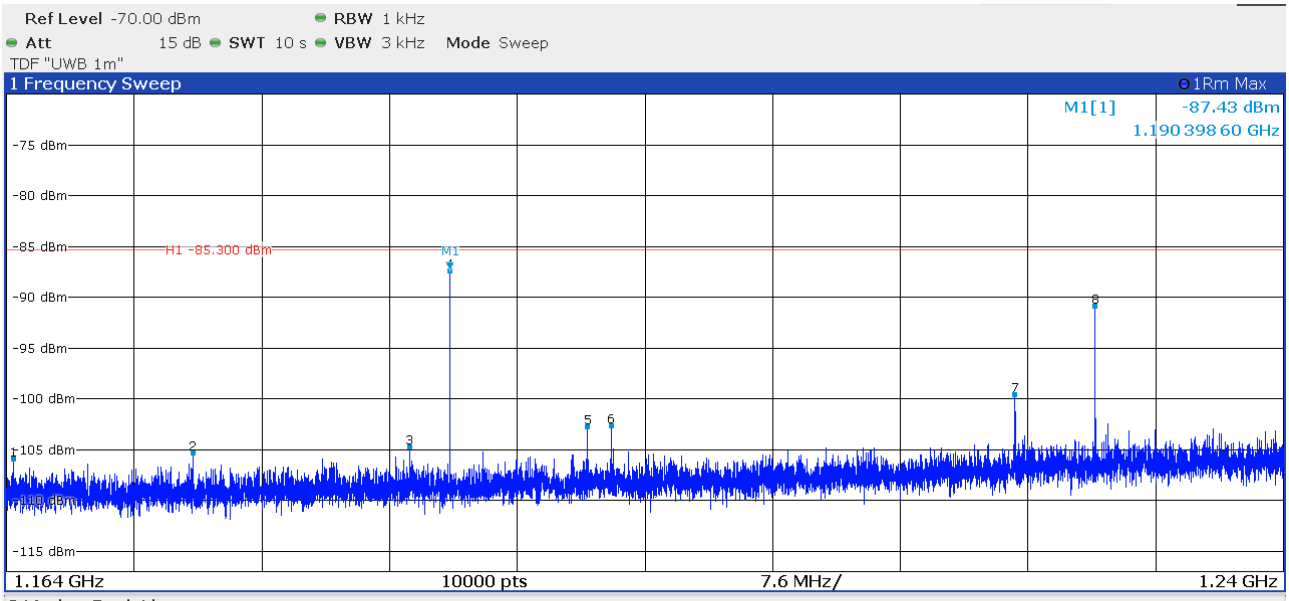
UWB OFF



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.166 253 GHz	-103.843 dBm	6	1.198 561 GHz	-103.949 dBm
2	1.168 701 GHz	-103.496 dBm	7	1.199 982 GHz	-99.305 dBm
3	1.175 039 GHz	-102.279 dBm	8	1.200 104 GHz	-99.741 dBm
4	1.190 399 GHz	-81.729 dBm	9	1.225 100 GHz	-100.282 dBm
5	1.196 577 GHz	-103.781 dBm	10	1.228 801 GHz	-81.009 dBm

1164 MHz to 1240 MHz vertical

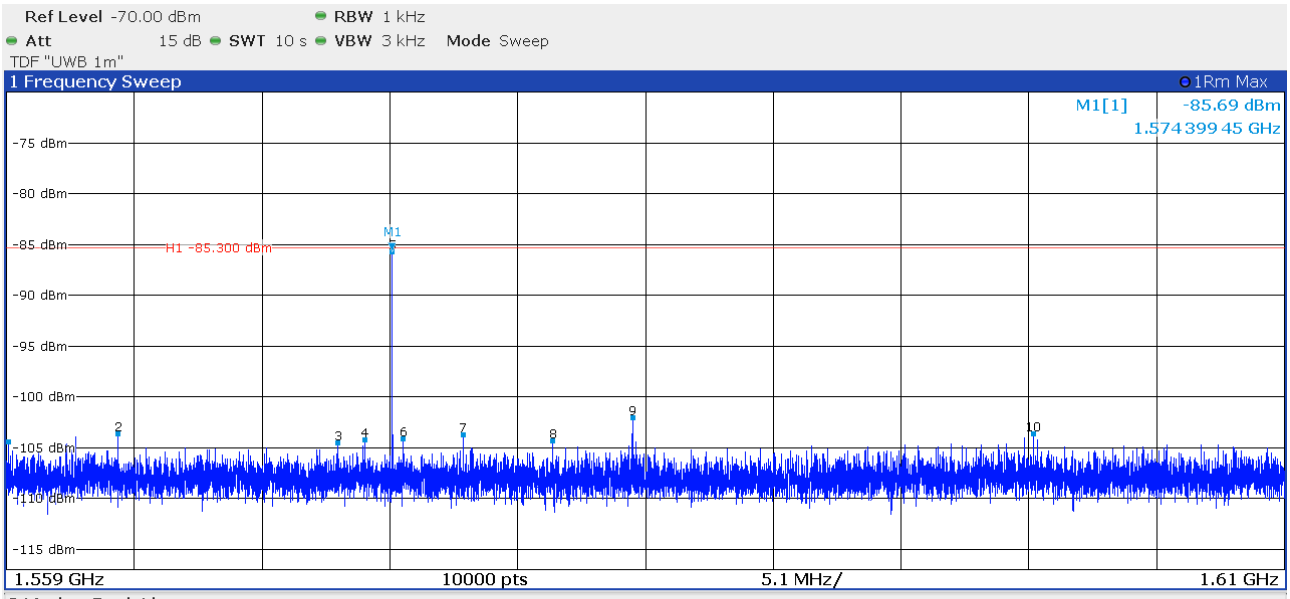


2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.164 414 GHz	-105.877 dBm	5	1.198 569 GHz	-102.732 dBm
2	1.175 100 GHz	-105.284 dBm	6	1.199 982 GHz	-102.620 dBm
3	1.187 982 GHz	-104.756 dBm	7	1.224 029 GHz	-99.558 dBm
4	1.190 399 GHz	-87.432 dBm	8	1.228 801 GHz	-90.866 dBm

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

1559 MHz to 1610 MHz horizontal

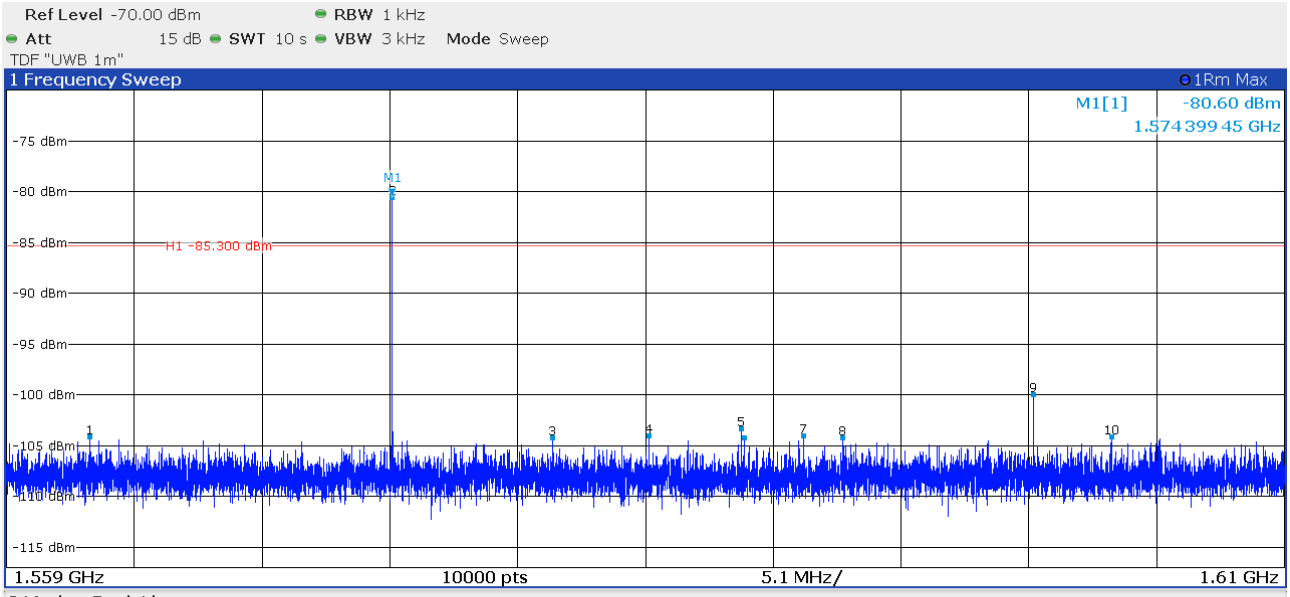


2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.559 074 GHz	-104.445 dBm	6	1.574 843 GHz	-104.114 dBm
2	1.563 450 GHz	-103.625 dBm	7	1.577 215 GHz	-103.783 dBm
3	1.572 222 GHz	-104.533 dBm	8	1.580 795 GHz	-104.319 dBm
4	1.573 308 GHz	-104.245 dBm	9	1.583 982 GHz	-102.099 dBm
5	1.574 399 GHz	-85.688 dBm	10	1.599 981 GHz	-103.623 dBm

1559 MHz to 1610 MHz vertical

UWB ON

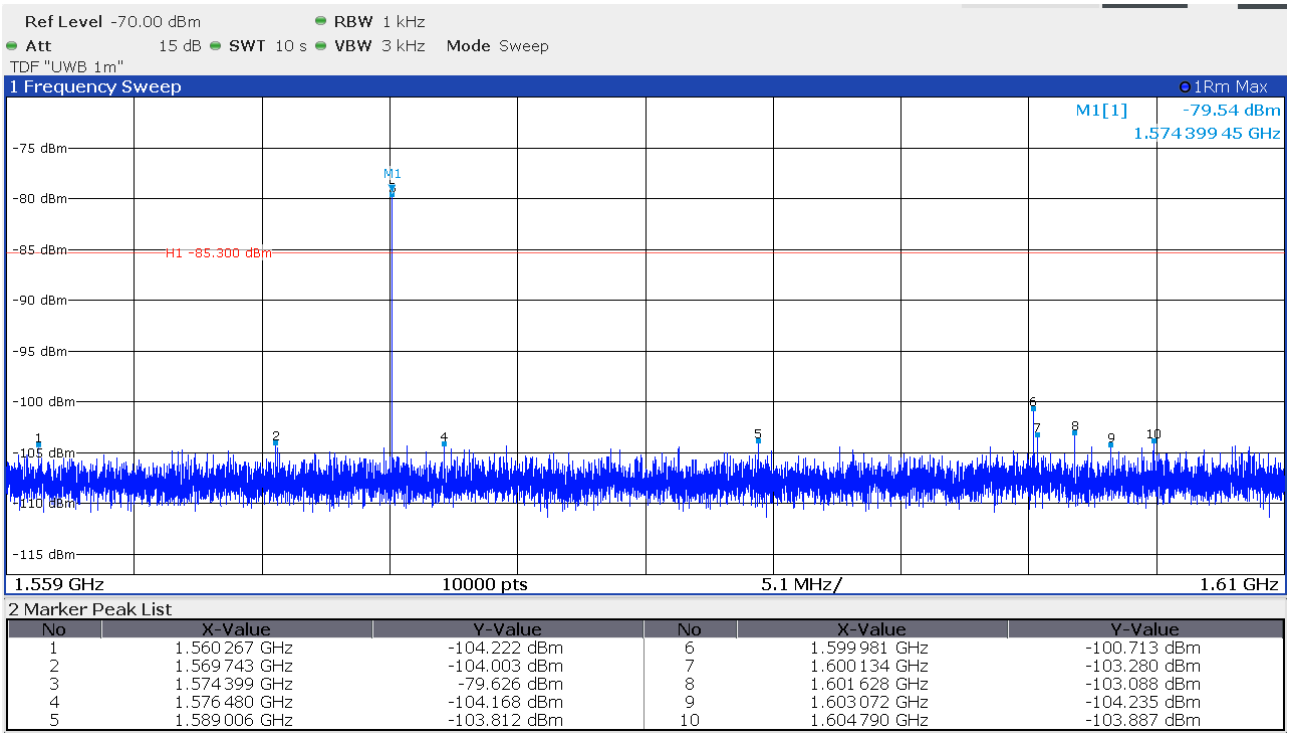


2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.562 333 GHz	-104.133 dBm	6	1.588 445 GHz	-104.260 dBm
2	1.574 399 GHz	-80.601 dBm	7	1.590 806 GHz	-104.002 dBm
3	1.580 780 GHz	-104.243 dBm	8	1.592 362 GHz	-104.209 dBm
4	1.584 635 GHz	-103.992 dBm	9	1.599 981 GHz	-99.950 dBm
5	1.588 323 GHz	-103.320 dBm	10	1.603 092 GHz	-104.129 dBm

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

UWB OFF



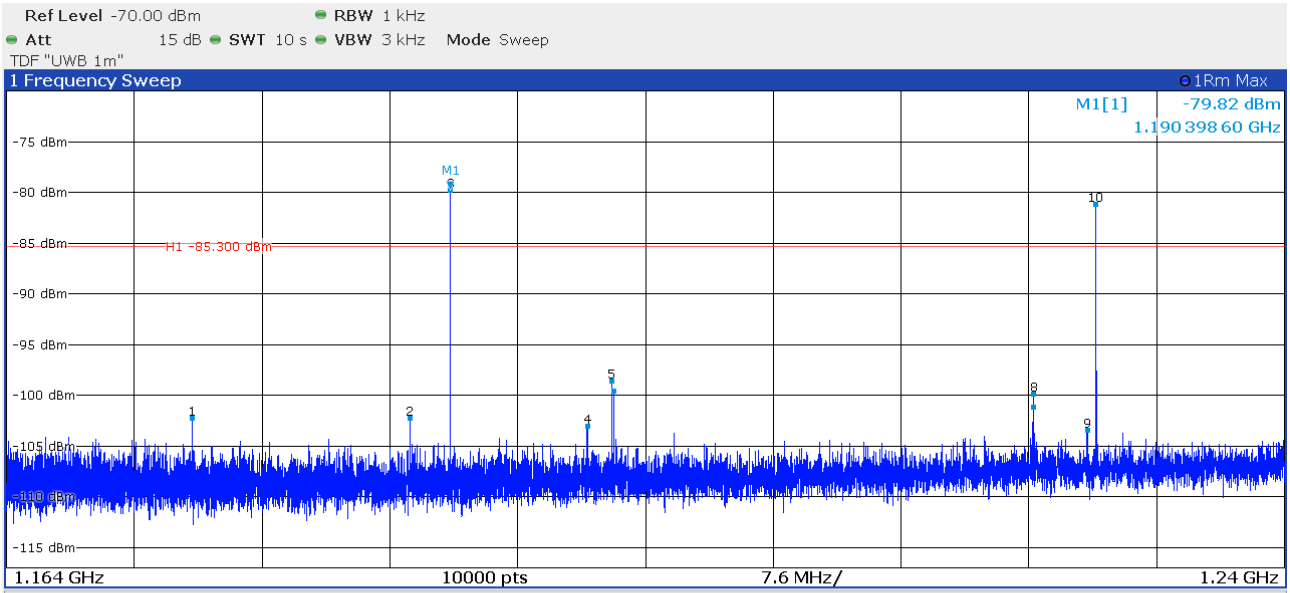
2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.560 267 GHz	-104.222 dBm	6	1.599 981 GHz	-100.713 dBm
2	1.569 743 GHz	-104.003 dBm	7	1.600 134 GHz	-103.280 dBm
3	1.574 399 GHz	-79.626 dBm	8	1.601 628 GHz	-103.088 dBm
4	1.576 480 GHz	-104.168 dBm	9	1.603 072 GHz	-104.235 dBm
5	1.589 006 GHz	-103.812 dBm	10	1.604 790 GHz	-103.887 dBm

Channel 5 DW 3000

1164 MHz to 1240 MHz horizontal

UWB ON

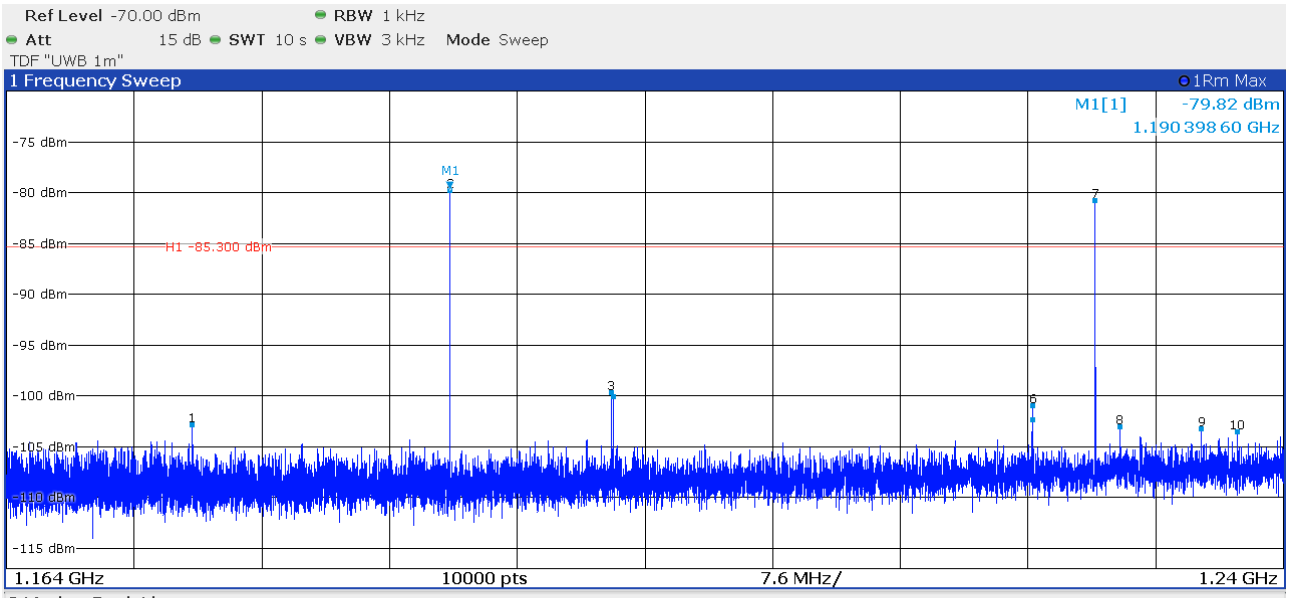


2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.175 039 GHz	-102.291 dBm	6	1.200 096 GHz	-99.632 dBm
2	1.187 982 GHz	-102.280 dBm	7	1.225 047 GHz	-101.152 dBm
3	1.190 399 GHz	-79.817 dBm	8	1.225 100 GHz	-99.835 dBm
4	1.198 538 GHz	-103.032 dBm	9	1.228 269 GHz	-103.473 dBm
5	1.199 982 GHz	-98.605 dBm	10	1.228 801 GHz	-81.196 dBm

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

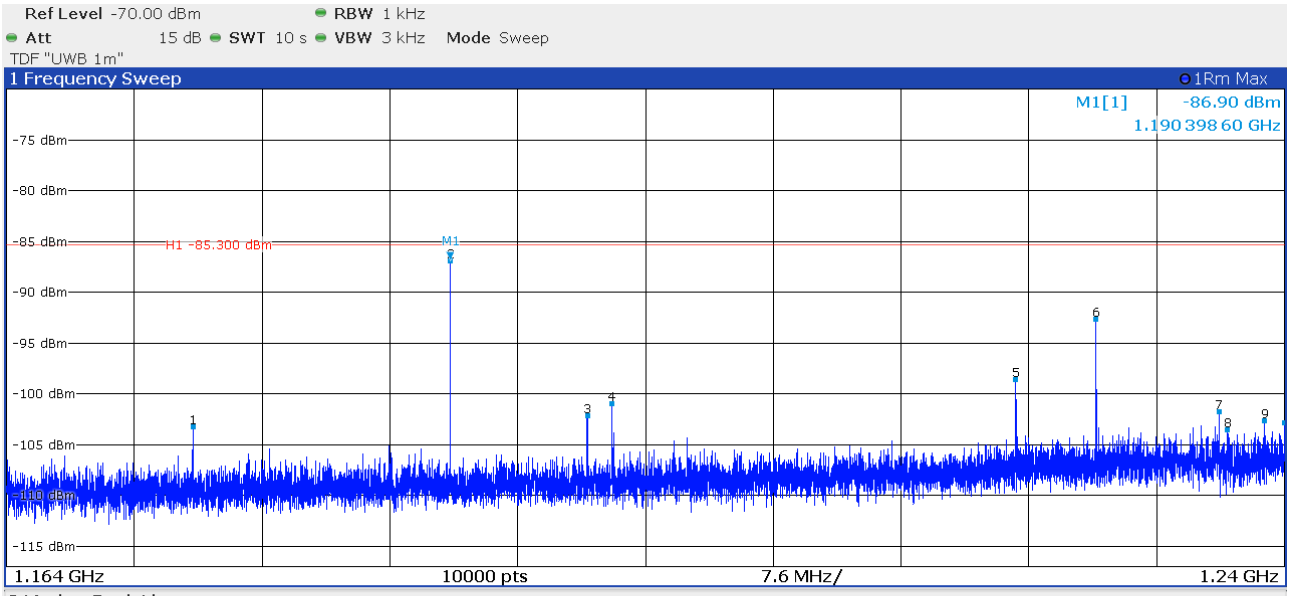
UWB OFF



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.175 039 GHz	-102.816 dBm	6	1.225 100 GHz	-101.016 dBm
2	1.190 399 GHz	-79.815 dBm	7	1.228 801 GHz	-80.780 dBm
3	1.199 982 GHz	-99.665 dBm	8	1.230 253 GHz	-103.004 dBm
4	1.200 096 GHz	-100.108 dBm	9	1.235 125 GHz	-103.240 dBm
5	1.225 047 GHz	-102.315 dBm	10	1.237 245 GHz	-103.503 dBm

1164 MHz to 1240 MHz vertical

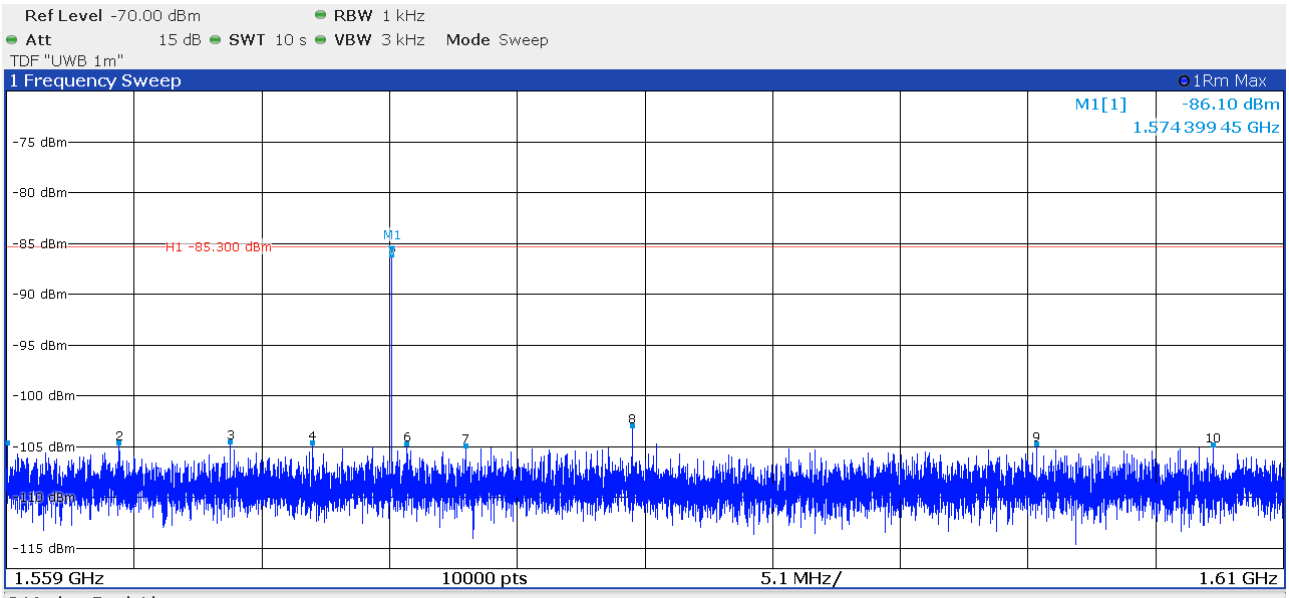


2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.175 100 GHz	-103.226 dBm	6	1.228 801 GHz	-92.616 dBm
2	1.190 399 GHz	-86.902 dBm	7	1.236 105 GHz	-101.801 dBm
3	1.198 538 GHz	-102.202 dBm	8	1.236 599 GHz	-103.574 dBm
4	1.199 982 GHz	-101.011 dBm	9	1.238 833 GHz	-102.618 dBm
5	1.224 029 GHz	-98.599 dBm	10	1.239 989 GHz	-102.853 dBm

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

1559 MHz to 1610 MHz horizontal

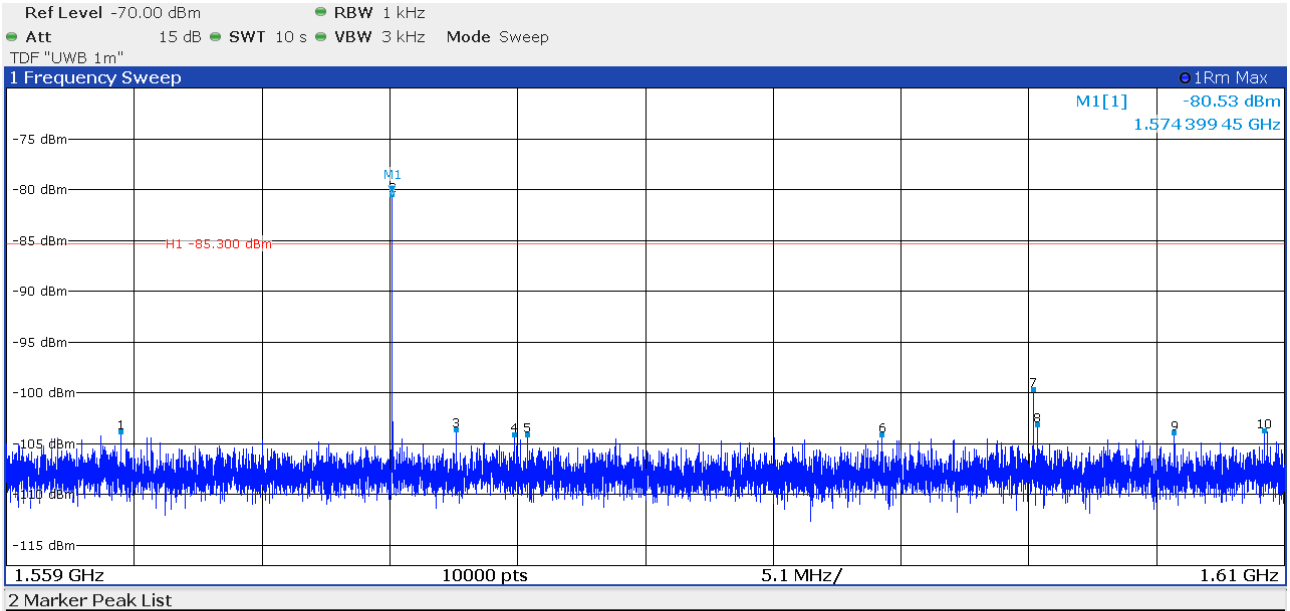


2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.559 023 GHz	-104.657 dBm	6	1.574 991 GHz	-104.683 dBm
2	1.563 506 GHz	-104.673 dBm	7	1.577 332 GHz	-104.961 dBm
3	1.567 938 GHz	-104.492 dBm	8	1.583 982 GHz	-102.974 dBm
4	1.571 207 GHz	-104.590 dBm	9	1.600 134 GHz	-104.764 dBm
5	1.574 399 GHz	-86.100 dBm	10	1.607 213 GHz	-104.836 dBm

1559 MHz to 1610 MHz vertical

UWB ON

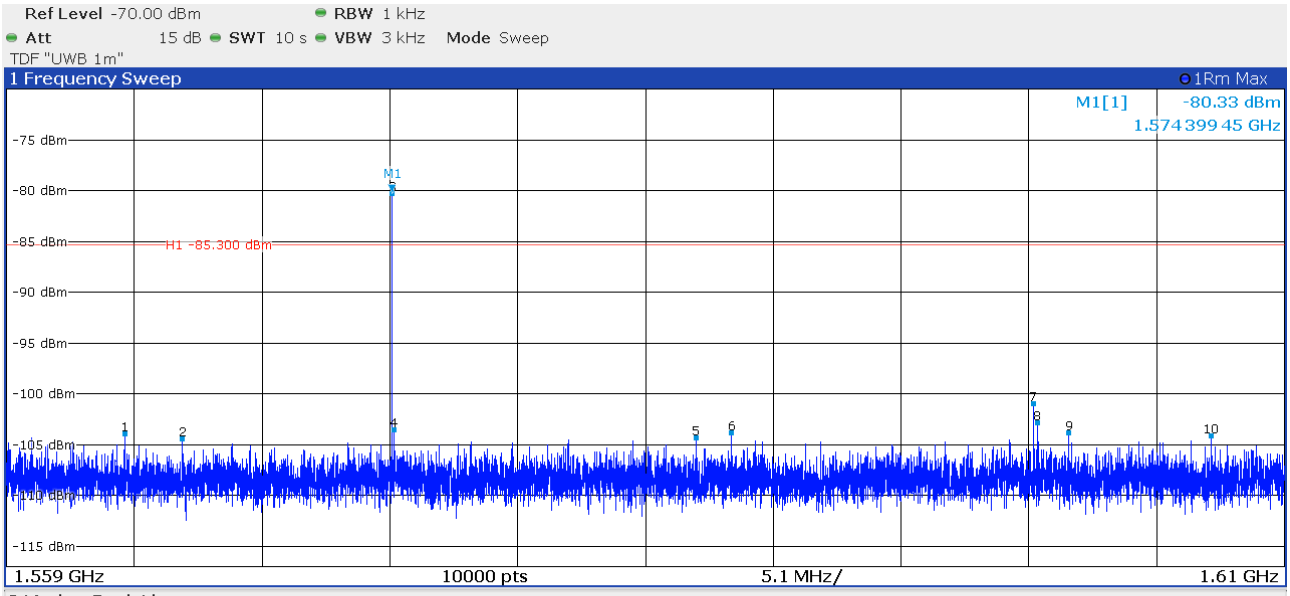


2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.563 577 GHz	-103.864 dBm	6	1.593 943 GHz	-104.179 dBm
2	1.574 399 GHz	-80.530 dBm	7	1.599 981 GHz	-99.723 dBm
3	1.576 944 GHz	-103.675 dBm	8	1.600 134 GHz	-103.119 dBm
4	1.579 255 GHz	-104.169 dBm	9	1.605 611 GHz	-103.933 dBm
5	1.579 790 GHz	-104.115 dBm	10	1.609 187 GHz	-103.766 dBm

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

UWB OFF



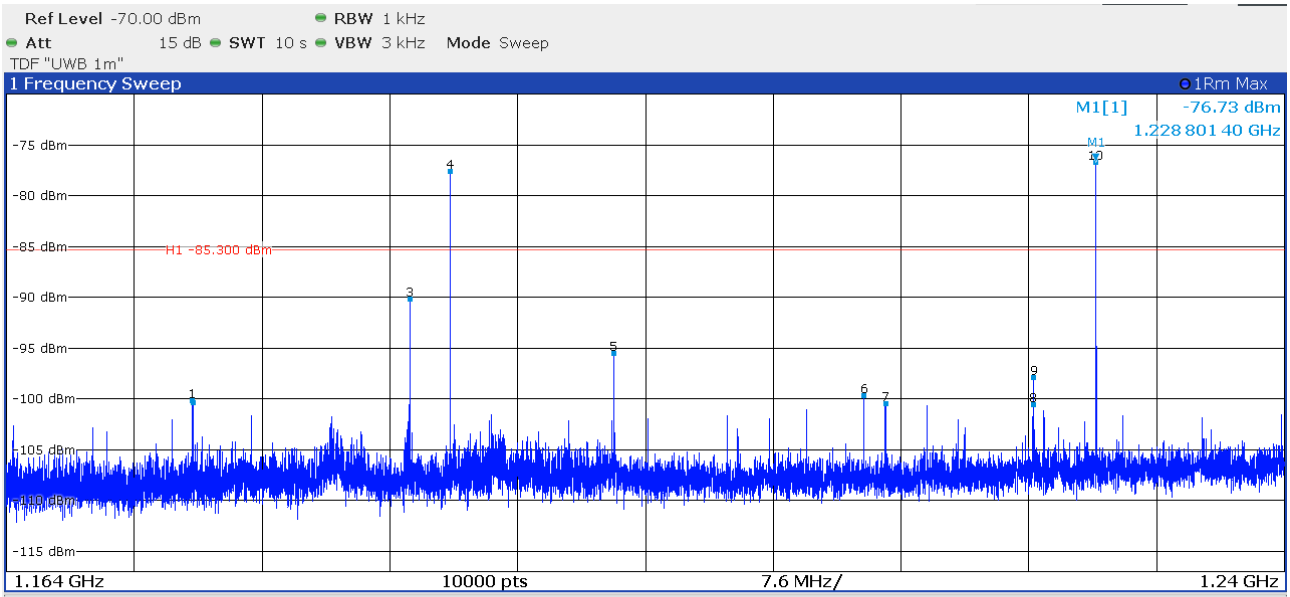
2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.563 710 GHz	-103.968 dBm	6	1.587 935 GHz	-103.880 dBm
2	1.566 015 GHz	-104.386 dBm	7	1.599 981 GHz	-100.926 dBm
3	1.574 399 GHz	-80.333 dBm	8	1.600 134 GHz	-102.808 dBm
4	1.574 471 GHz	-103.523 dBm	9	1.601 394 GHz	-103.845 dBm
5	1.586 512 GHz	-104.288 dBm	10	1.607 080 GHz	-104.095 dBm

Channel 9 DW 3000

1164 MHz to 1240 MHz horizontal

UWB ON

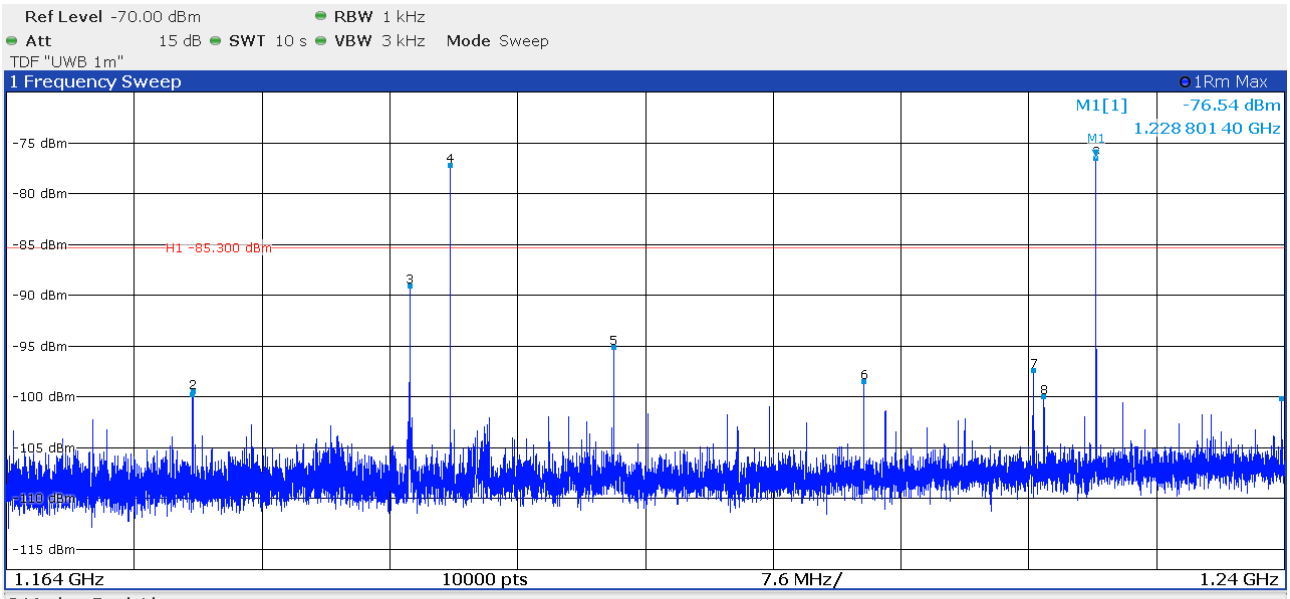


2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.175 039 GHz	-100.154 dBm	6	1.214 992 GHz	-99.693 dBm
2	1.175 100 GHz	-100.408 dBm	7	1.216 269 GHz	-100.489 dBm
3	1.187 982 GHz	-90.143 dBm	8	1.225 047 GHz	-100.558 dBm
4	1.190 399 GHz	-77.605 dBm	9	1.225 100 GHz	-97.885 dBm
5	1.200 104 GHz	-95.542 dBm	10	1.228 801 GHz	-76.730 dBm

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

UWB OFF

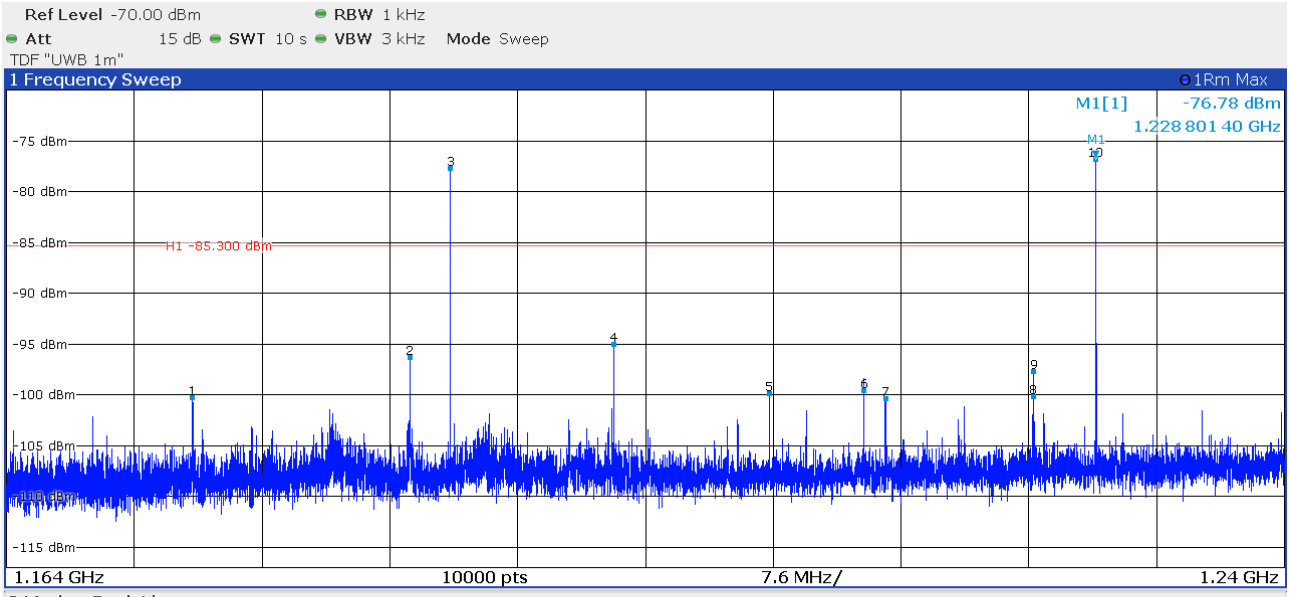


2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.175 039 GHz	-99.803 dBm	6	1.214 992 GHz	-98.526 dBm
2	1.175 100 GHz	-99.534 dBm	7	1.225 100 GHz	-97.448 dBm
3	1.187 989 GHz	-89.048 dBm	8	1.225 701 GHz	-100.026 dBm
4	1.190 399 GHz	-77.204 dBm	9	1.228 801 GHz	-76.539 dBm
5	1.200 104 GHz	-95.147 dBm	10	1.239 844 GHz	-100.130 dBm

1164 MHz to 1240 MHz vertical

UWB ON

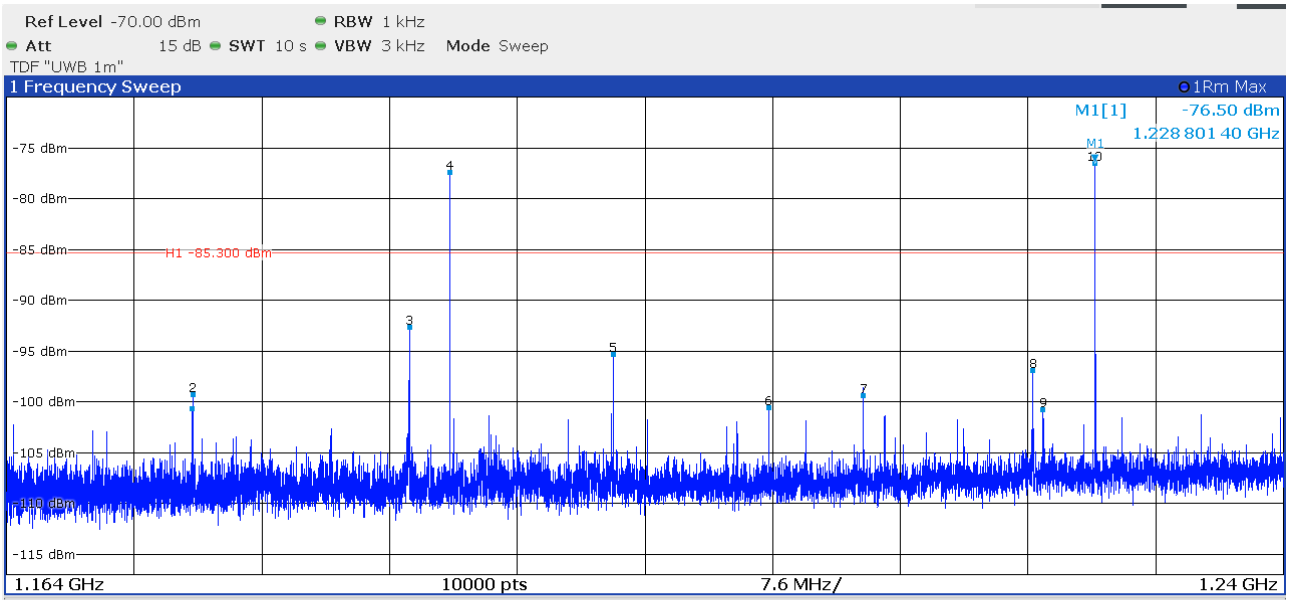


2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.175 039 GHz	-100.241 dBm	6	1.214 992 GHz	-99.587 dBm
2	1.187 982 GHz	-96.353 dBm	7	1.216 269 GHz	-100.358 dBm
3	1.190 399 GHz	-77.710 dBm	8	1.225 047 GHz	-100.200 dBm
4	1.200 096 GHz	-95.009 dBm	9	1.225 100 GHz	-97.698 dBm
5	1.209 368 GHz	-99.834 dBm	10	1.228 801 GHz	-76.780 dBm

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

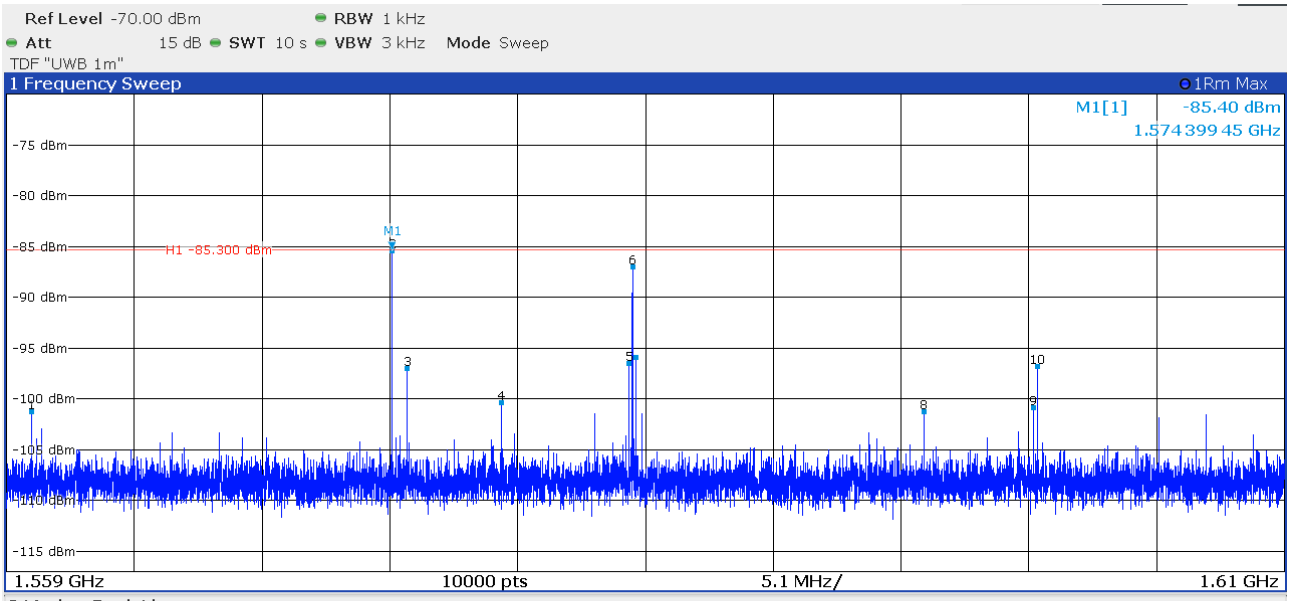
UWB OFF



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.175 039 GHz	-100.678 dBm	6	1.209 368 GHz	-100.546 dBm
2	1.175 100 GHz	-99.267 dBm	7	1.214 992 GHz	-99.357 dBm
3	1.187 982 GHz	-92.625 dBm	8	1.225 100 GHz	-96.882 dBm
4	1.190 399 GHz	-77.380 dBm	9	1.225 701 GHz	-100.745 dBm
5	1.200 096 GHz	-95.303 dBm	10	1.228 801 GHz	-76.504 dBm

1559 MHz to 1610 MHz horizontal

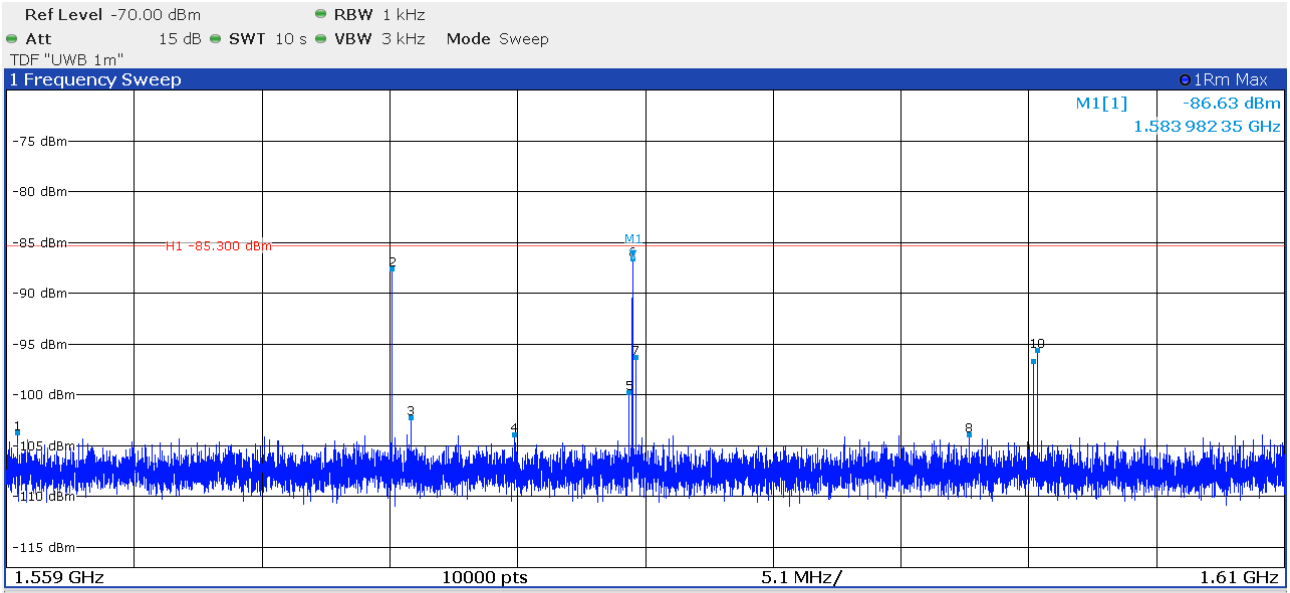


2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.559 992 GHz	-101.263 dBm	6	1.583 982 GHz	-87.023 dBm
2	1.574 399 GHz	-85.405 dBm	7	1.584 110 GHz	-95.909 dBm
3	1.574 991 GHz	-96.972 dBm	8	1.595 616 GHz	-101.234 dBm
4	1.578 740 GHz	-100.424 dBm	9	1.599 981 GHz	-100.875 dBm
5	1.583 850 GHz	-96.560 dBm	10	1.600 134 GHz	-96.845 dBm

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

1559 MHz to 1610 MHz vertical



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.559 451 GHz	-103.788 dBm	6	1.583 982 GHz	-86.633 dBm
2	1.574 399 GHz	-87.604 dBm	7	1.584 110 GHz	-96.308 dBm
3	1.575 134 GHz	-102.276 dBm	8	1.597 406 GHz	-103.913 dBm
4	1.579 265 GHz	-103.910 dBm	9	1.599 981 GHz	-96.711 dBm
5	1.583 850 GHz	-99.804 dBm	10	1.600 134 GHz	-95.638 dBm

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: None.

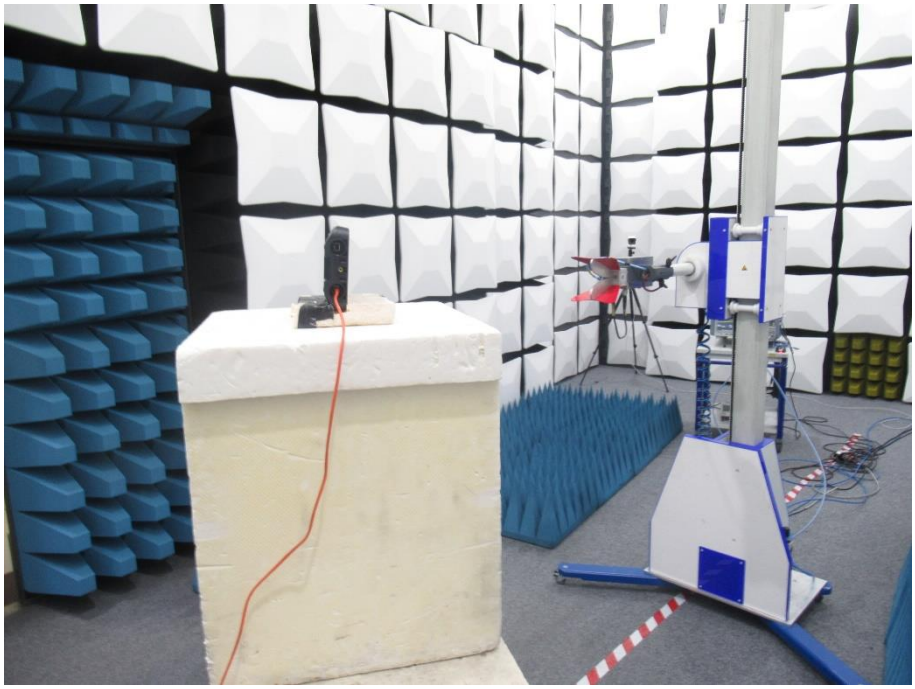
5.5 Peak Power radiated

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

5.5.1 Description of the test location

Test location: Fully anechoic room FAR1

5.5.2 Photo documentation of the test set-up



5.5.3 Applicable standard

According to FCC Part 15, Section 15.517(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 Description of Measurement

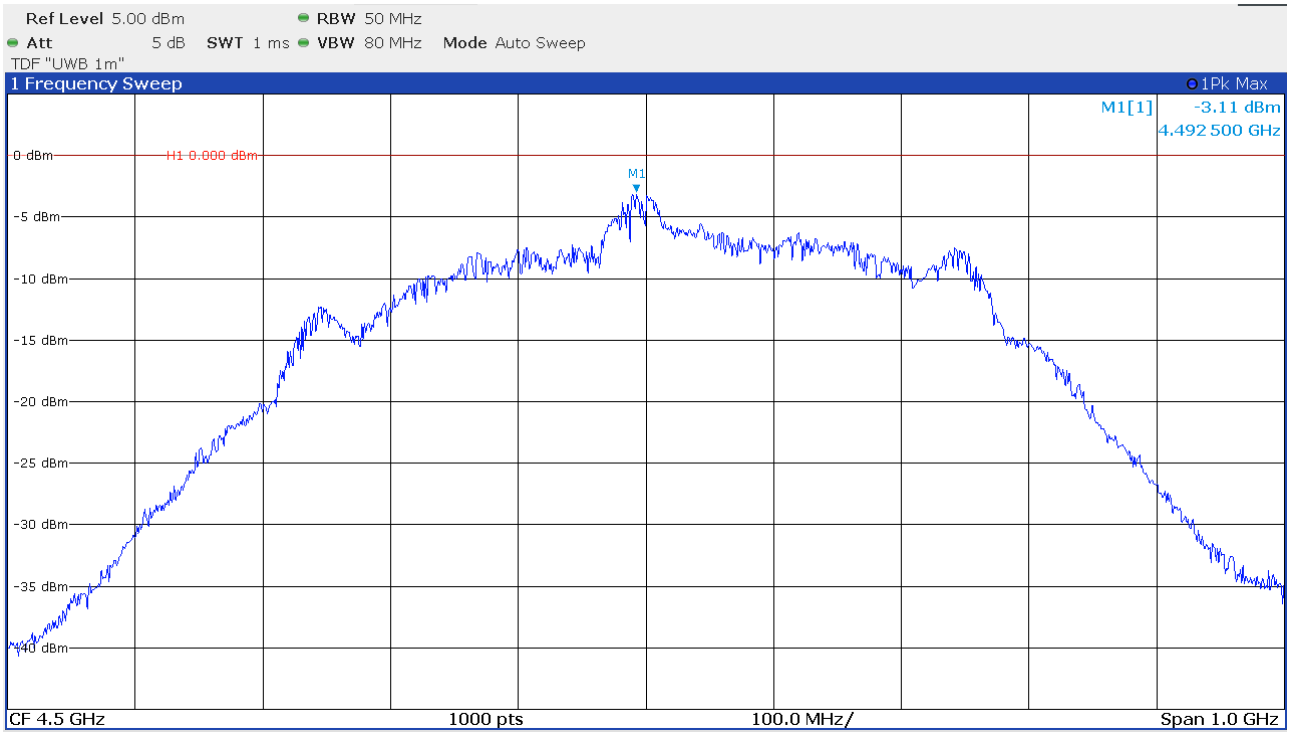
The peak power is measured following the procedure set out in ANSI C63-10, item 10.3.5. The EUT is set in TX continuous mode while measuring.

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

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

5.5.5 Test result

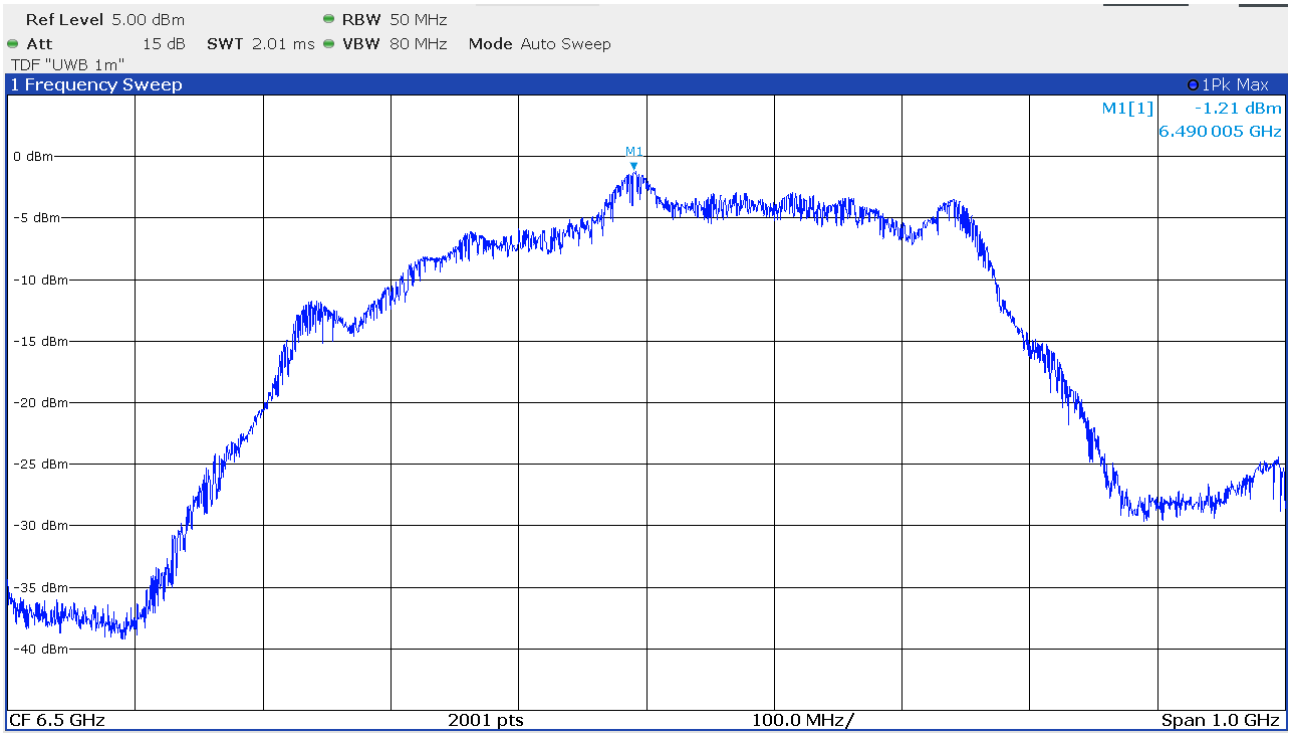
Channel 3 DW1000



Channel 5 DW1000

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

Channel 5 DW3000



Channel 9 DW3000

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

Min. limit margin: -1.2 dB at 6490 MHz

The requirements are **FULFILLED.**

Remarks: None.

FCC ID: 2ALC5-KNX-A9-1 IC: 25557-KNXA91

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	ESR3	09-02/03-21-001	03/07/2025	03/07/2024		
	ESW44	09-02/03-21-003	29/08/2025	29/08/2024		
	ENV432	09-02/20-21-001	02/09/2026	02/09/2024	02/09/2025	02/09/2024
	KK-SPU195FR01-2X11N-3,	09-02/50-21-037				
	KK-SPU195FR01-2X11N-2M	09-02/50-21-040				
	CDB-10K-18-50V-NMF-I	09-02/50-22-033	17/07/2025	17/07/2024		
	BAT-EMC 2023.0.8.0	09-02/68-21-002				
	61605	09-07/20-21-011	21/03/2025	21/03/2022		
CPR 3	AMF-6D-01002000-22-10P	02-02/17-15-004				
	3117	02-02/24-05-009	23/07/2025	23/07/2024		
	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 2023.0.8.0	02-02/68-13-001				
MB	ESW44	09-02/03-21-003	29/08/2025	29/08/2024		
SER 1	ESR7	09-02/03-21-004	05/08/2025	05/08/2024		
	HFH2-Z2E	09-02/24-21-001	05/08/2025	05/08/2024		
	KK-7.8F-2XNM_4.0M	09-02/50-21-018				
	KK-7.8F-2XNM_4.5M	09-02/50-21-023				
	KK-7.8F-2XNM_9.5M	09-02/50-21-025				
SER 2	ESR7	09-02/03-21-004	05/08/2025	05/08/2024		
	BBV 9743 B	09-02/17-21-002	17/12/2025	17/12/2024 ***1)**		
	VULB9168	09-02/24-22-003	06/08/2025	06/08/2024	12/08/2025	12/08/2024
	KK-7.8F-2XNM_4.0M	09-02/50-21-018				
	KK-7.8F-2XNM_4.5M	09-02/50-21-023				
	KK-7.8F-2XNM_9.5M	09-02/50-21-025				
	50F-003 N 3dB	09-02/50-22-002				
	CDB-10K-18-50V-NMF-I	09-02/50-22-031	17/07/2025	17/07/2024		
	BAT-EMC 2023.0.8.0	09-02/68-21-002				
SER 3	ESW26	02-02/03-17-002	16/04/2025	16/04/2024		
	FSW43	02-02/11-15-001	19/08/2025	19/08/2024		
	FSW43	02-02/11-21-001	26/08/2025	26/08/2024		
	AMF-6D-01002000-22-10P	02-02/17-15-004				
	LNA-40-18004000-33-5P	02-02/17-20-002				
	BBHA 9170	02-02/24-05-013	21/03/2026	21/03/2023		
	3117	02-02/24-20-007	20/11/2025	20/11/2024		
	WHK 3.0/18G-10EF	02-02/50-05-180				
	BAM 4.5-P	02-02/50-17-024				
	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				
	0_5 Meter DC-18GHz	09-16/50-23-003				

***1) SER 2 tests were performed on 09th January 2025**