EMI – TEST REPORT

- FCC Part 15.519 -

Type / Model Name	:	FFZ-radio module; eP 2.0 Slave RL
Product Description	:	Truck anchor for distance measurements to a person tag
Applicant	:	Jungheinrich AG
Address	:	Friedrich-Ebert-Damm 129 22047 HAMBURG, GERMANY
Manufacturer	:	ACD Elektronik GmbH
Address	:	Engelberg 2 88480 ACHSTETTEN, GERMANY

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

Test Report No. : T45419-00-00FX	16. August 2022 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: 2AK6M-EP20FMSLAVERL

Contents

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1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15, Subpart A - General (September 2018)

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 2018)

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 2018)

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 portable 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

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2 EQUIPMENT UNDER TEST

2.1 Photo documentation of the EUT – Detailed photos see ATTACHMENT A1 and A2

2.2 General remarks

The technology is used in industrial environments. The person tag module communicates with the truck mounted anchors and the tag's position in relation to the forklift is obtained.

2.3 Equipment type

Part of Portable UWB Device

2.4 Short description of the equipment under test (EUT)

The EUT is one of 4 anchors, mounted on a truck. These anchors are communicating with the truck via CAN-bus and with one person tag via UWB. The operator wears the person tag on the body. After an initial pairing process between the EUT and the person tag (by NFC or UWB), the 4 anchors can localize the position of the person tag related to a truck fixed coordinate system. If there are no obstacles, the truck follows the EUT (in driving direction).

Number of tested samples:	1
Serial number:	187100000316
Firmware version:	V2.07
UWB driver version:	V2.5.9

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

2.5 Variants of the EUT

There are no variants.

2.6 Operation frequency and channel plan

The operating frequency band is 3100 MHz to 10600 MHz.

Channel plan:

Channel number	Center frequency
Channel 2	3993.6 MHz

2.7 Transmit operating modes

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

Data rate: 6.8 Mbit/s

2.8 Antenna

The EUT uses an integrated UWB antenna.

2.9 Power supply system utilised

Power supply voltage, V_{nom} : 24 V DC

2.10 Peripheral devices and interface cables

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

- CAN Dongle Model : PEAK System
- Note book Model : Fujitsu Lifebook
- Model :

2.11 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.

2.11.1 Test jig

No test jig is used.

2.11.2 Test software

Special test software provided by the manufacturer is used.

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3 TEST RESULT SUMMARY

Operating in the 3100 MHz – 10600 MHz:

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

*1: According to the applicant, the EUT has an internal 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 a system in industrial truck vehicles only. For details refer to the user manual. The EUT is no imaging system.

15.207(a) Not applicable, the EUT can not be connected to the public utility (AC) power line.

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	:	31 May 2019
Testing concluded on	:	22 September 2021

Checked by:

Klaus Gegenfurtner
I confirm the correctness and integrity of this document
2022.08.17 08:01:23 +02'00'

Klaus Gegenfurtner
Teamleader Radio

Tested by:

I am the author of this document
2022.08.16 17:00:13 +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 / 11.2003 „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 power line conducted emissions	0.15 MHz to 30 MHz	95%	± 3.29 dB
EBW and OBW	2400 MHz to 3000 MHz	95%	± 2.5 x 10^{-7}
Maximum peak conducted output power	2400 MHz to 3000 MHz	95%	± 0.62 dB
Power spectral density	2400 MHz to 3000 MHz	95%	± 0.62 dB
Conducted Spurious Emissions	9 kHz to 10000 MHz	95%	± 2.15 dB
Conducted Spurious Emissions	10000 MHz to 40000 MHz	95%	± 3.47 dB
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
Field strength of the fundamental	100 kHz to 100 MHz	95%	± 3.53 dB

4.4 Measurement protocol for FCC and ISED

4.4.1 General information

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

FCC: DE 0011
ISED: DE0009

4.4.2 General Standard information

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

4.4.2.1 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.

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

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

Example:

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

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4.4.2.3 Radiated emission (electrical field 1 GHz - 40 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 centre 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 centre 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 limit is subtracted from this result in order to provide the limit margin listed in the measurement protocol.

5 TEST CONDITIONS AND RESULTS

5.1 UWB Bandwidth

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

5.1.1 Description of the test location

Test location: Anechoic chamber 1

5.1.2 Photo documentation of the test set-up – see ATTACHMENT B

5.1.3 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 10600 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.

5.1.4 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

5.1.5 Test result

channel	lowest frequency f_L (MHz)	highest frequency f_H (MHz)	permitted frequency range (GHz)	UWB bandwidth (MHz)	required UWB bandwidth (MHz)	result
2	3647.90	4349.87	3.1 to 10.6	701.97	> 500	passed

The requirements are **FULFILLED.**

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

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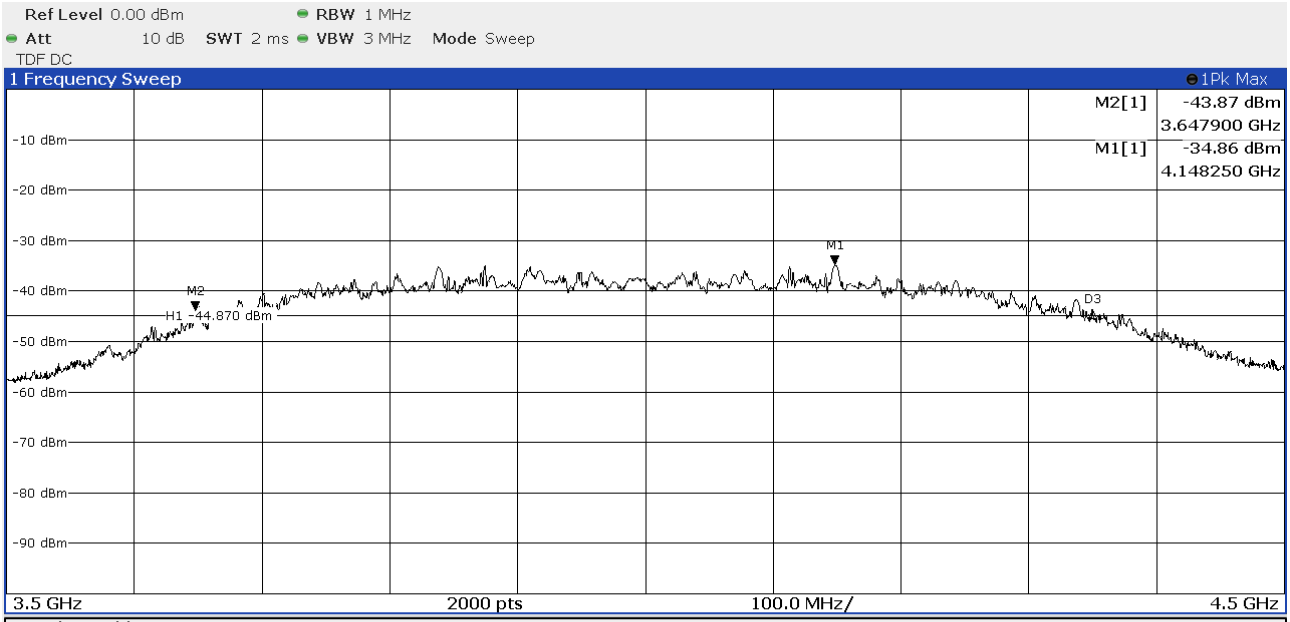
5.1.6 Test protocols EBW

Channel 2 (3993.6 MHz)



3 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**4.14825 GHz**	**-34.86 dBm**		
M2		1	**3.6479 GHz**	**-43.87 dBm**		
D3	M2	1	**701.97 MHz**	**0.24 dB**		

5.2 Radiated Emissions 9 kHz to 40 GHz

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

5.2.1 Description of the test location

Test location: OATS 1
Test location: Anechoic chamber 1

5.2.2 Photo documentation of the test set-up – see ATTACHMENT B

5.2.3 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 average limits when measured using a resolution bandwidth of 1 MHz.

5.2.4 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

5.2.5 Test result

5.2.5.1 Measurement 9 kHz to 30 MHz

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

5.2.5.2 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)
47.34	11.3	5.6	15.2	14.1	26.5	19.7	40.0	-13.5
144.00	5.2	9.4	13.6	14.4	18.8	23.8	43.5	-19.7
277.34	5.4	4.7	15.5	15.4	20.9	20.1	46.0	-25.1
417.20	5.2	8.5	20.3	20.0	25.5	28.5	46.0	-17.5
655.00	-2.7	-0.3	26.3	25.9	23.6	25.6	46.0	-20.4
918.00	-1.4	-1.8	31.3	30.9	29.9	29.1	46.0	-16.1

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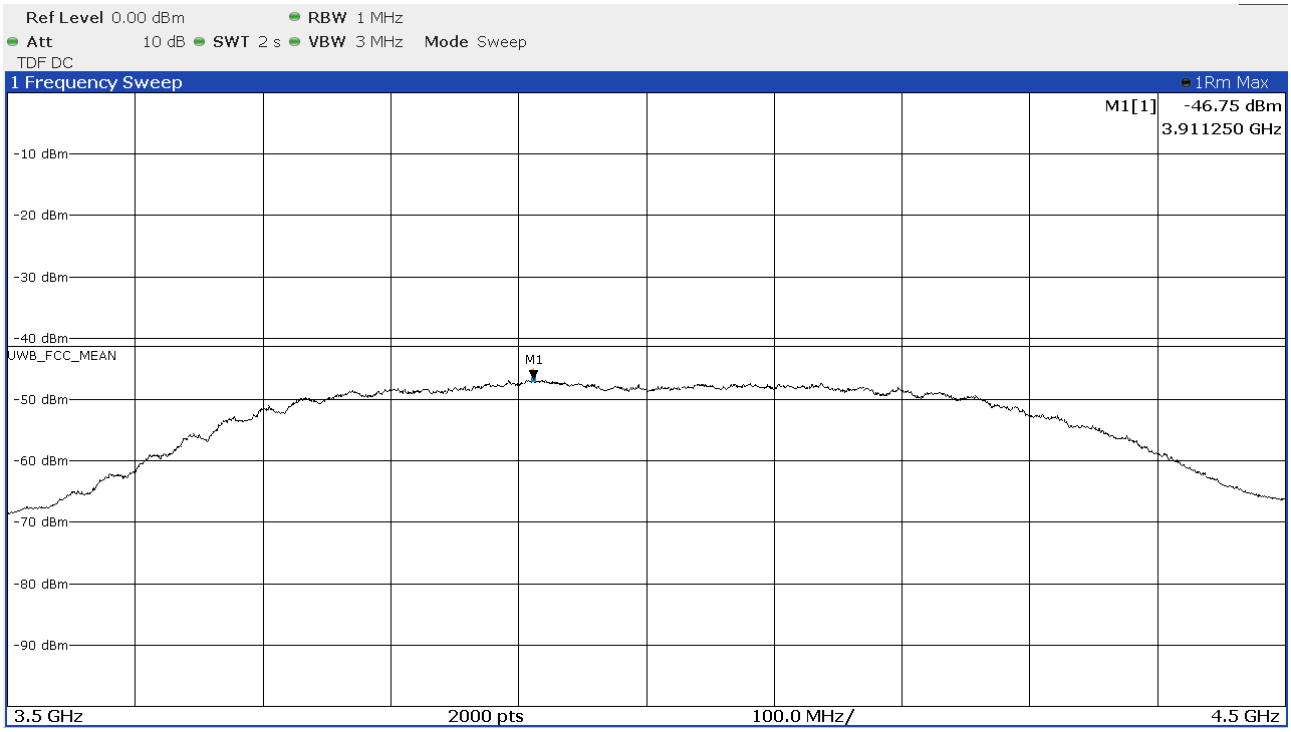
5.2.5.3 Measurement 960 MHz to 40 GHz

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

Mean Power:



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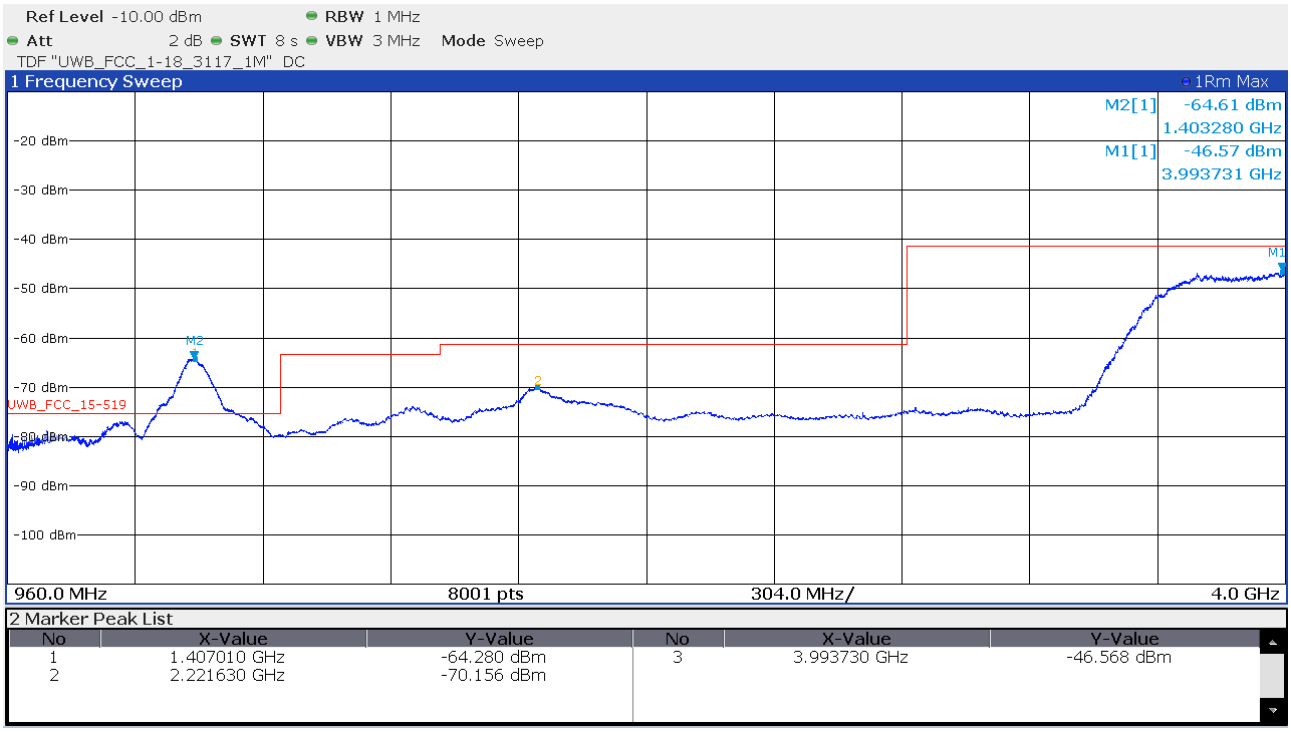
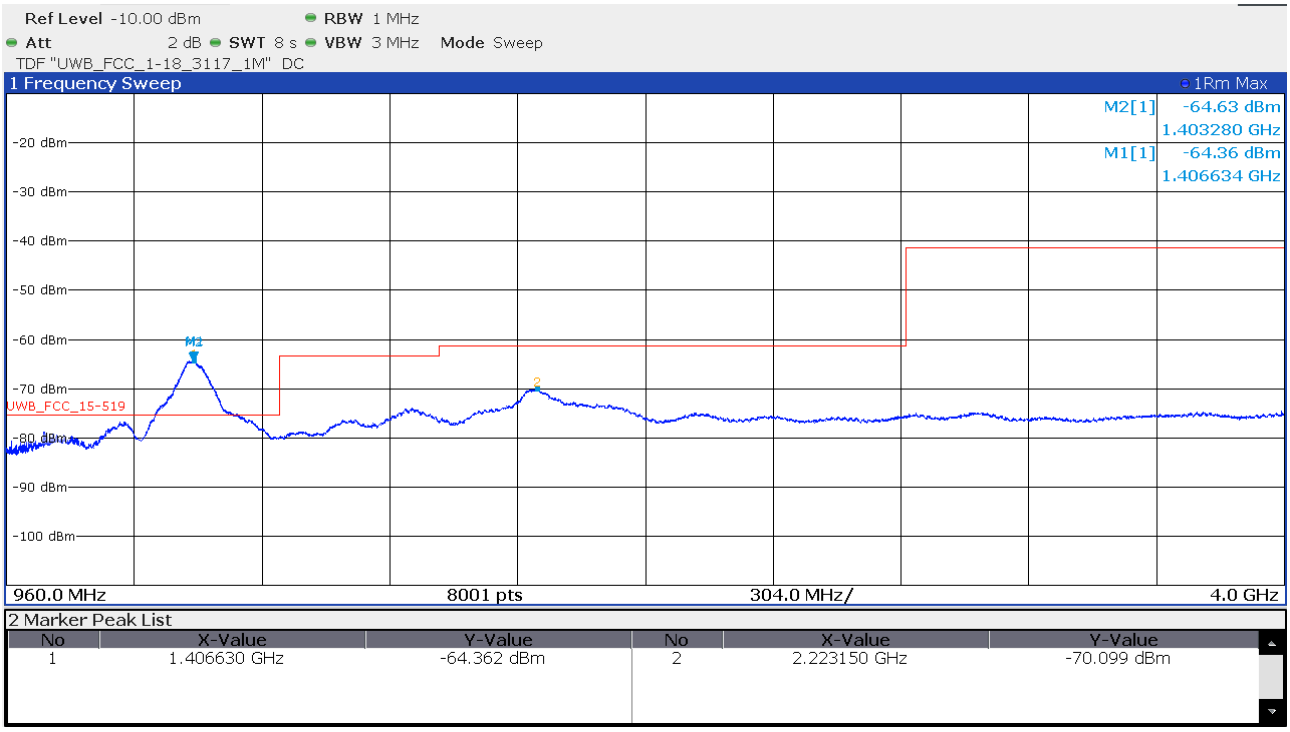
960 MHz to 4 GHz



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.407010 GHz	-64.280 dBm	3	3.993730 GHz	-46.568 dBm
2	2.221630 GHz	-70.156 dBm			

960 MHz to 4 GHz UWB OFF



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.406630 GHz	-64.362 dBm	2	2.223150 GHz	-70.099 dBm

Note: The emissions exceeding the limit of -75.3 dBm are not part of the UWB technology and can not be reviewed according to 15.519(c). They do not exceed the general limit of § 15.209, which is 500 µV/m at 3m distance respectively -41.3 dBm (see equation (34) in section 10.3.9 of ANSI C63.10).

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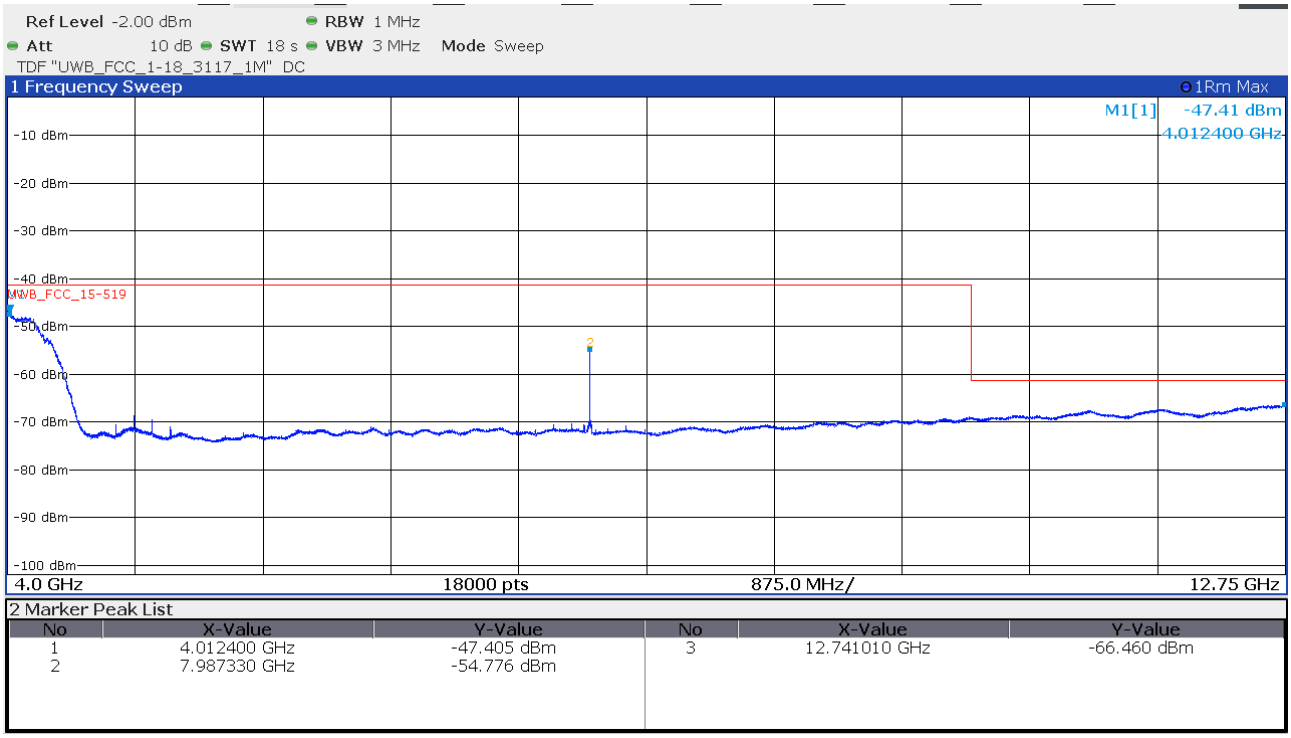
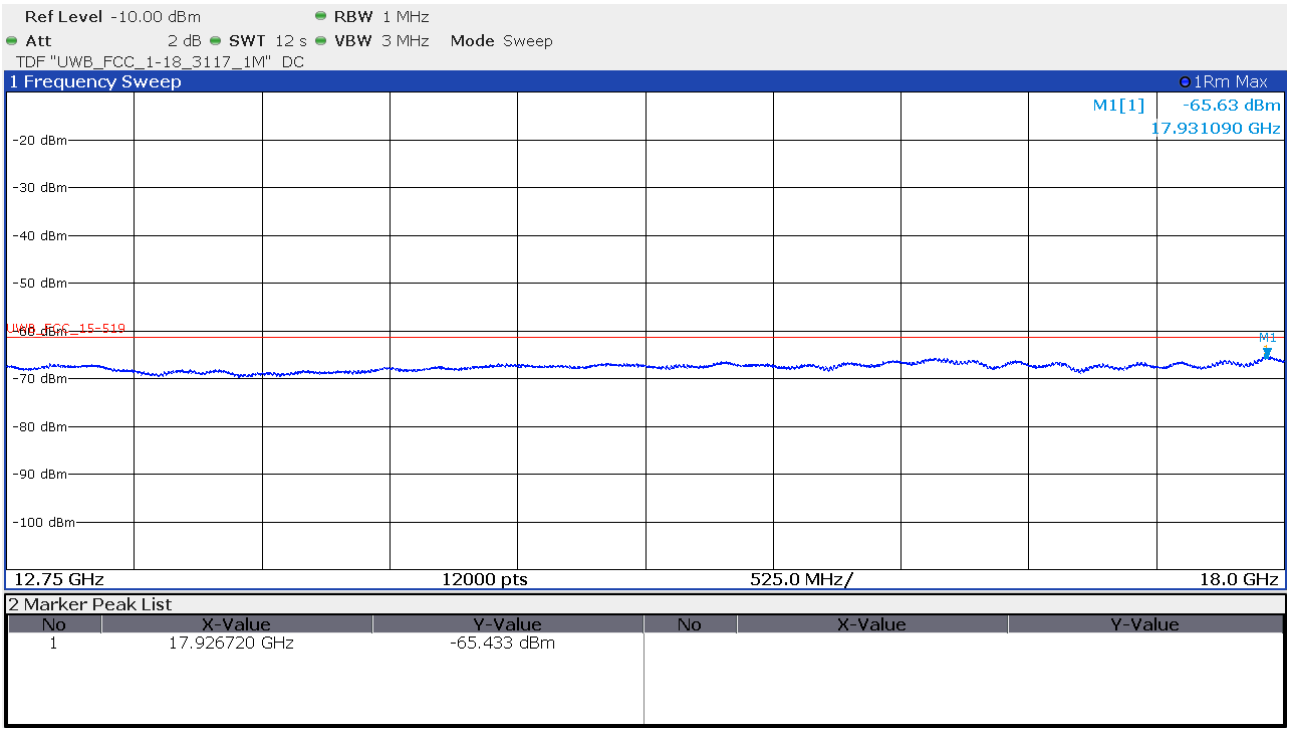
4 GHz to 12.75 GHz



12.75 GHz to 18 GHz



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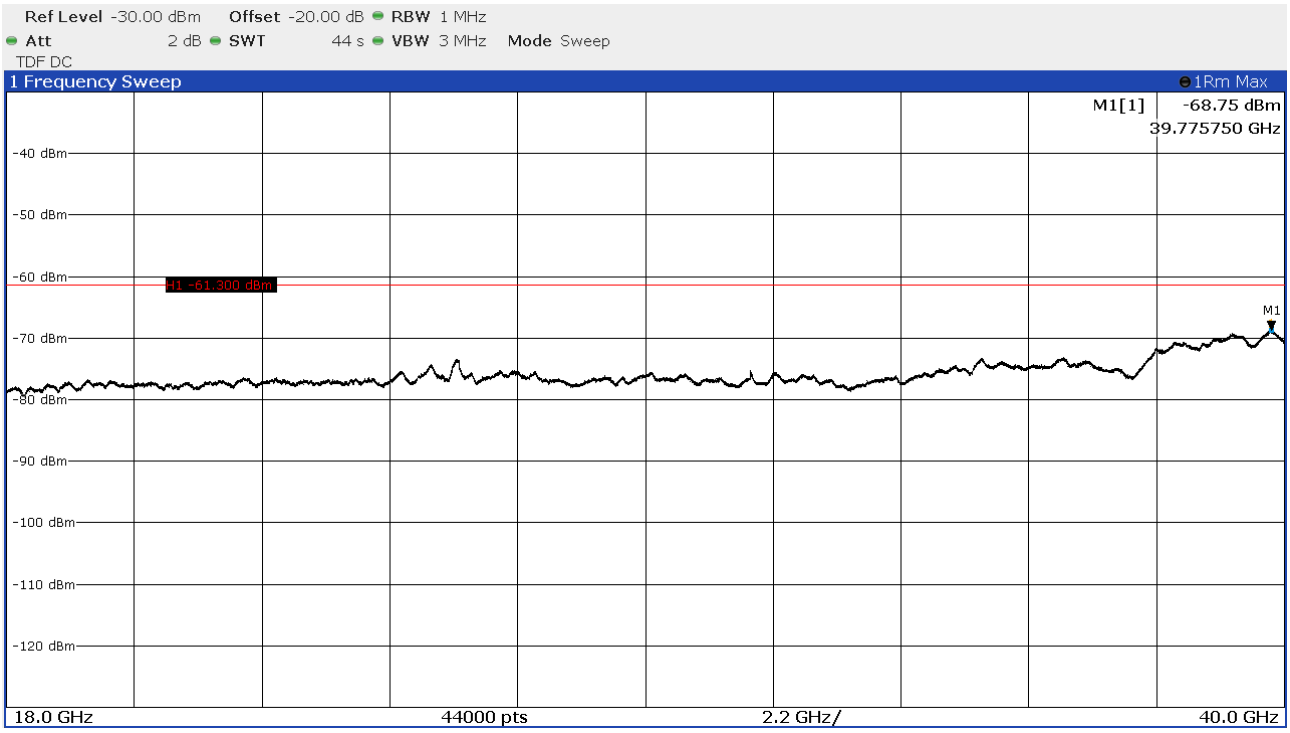
18 GHz to 40 GHz at 30 cm distance



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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

The requirements are **FULFILLED.**

Remarks: None.

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

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

5.3.1 Description of the test location

Test location: Anechoic chamber 1

5.3.2 Photo documentation of the test set-up – see ATTACHMENT B

5.3.3 Applicable standard

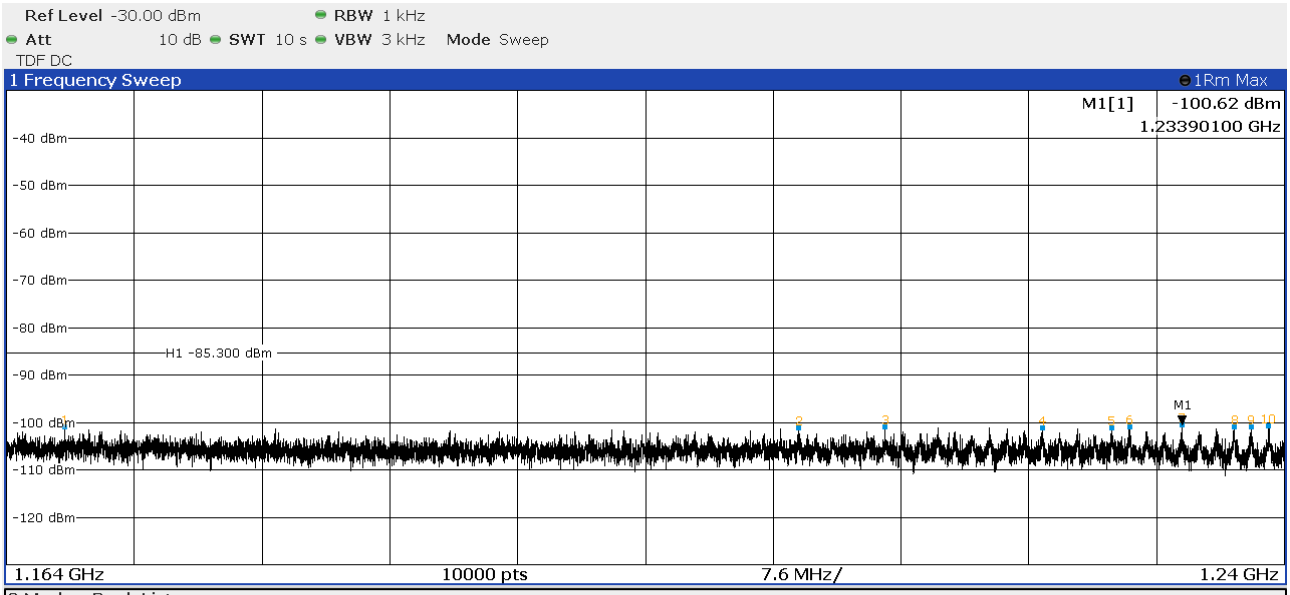
According to FCC Part 15, Section 15.519(d):
In addition to the radiated emission limits specified in the table in paragraph (c) of this section, UWB transmitters operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of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

5.3.4 Analyser settings

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

5.3.5 Test result

1164 MHz to 1240 MHz



2 Marker Peak List

No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.167485 GHz	-101.048 dBm	6	1.230777 GHz	-101.008 dBm
2	1.211131 GHz	-101.062 dBm	7	1.233901 GHz	-100.617 dBm
3	1.216254 GHz	-101.008 dBm	8	1.237017 GHz	-101.028 dBm
4	1.225609 GHz	-101.153 dBm	9	1.238028 GHz	-100.946 dBm
5	1.229706 GHz	-101.096 dBm	10	1.239069 GHz	-100.680 dBm

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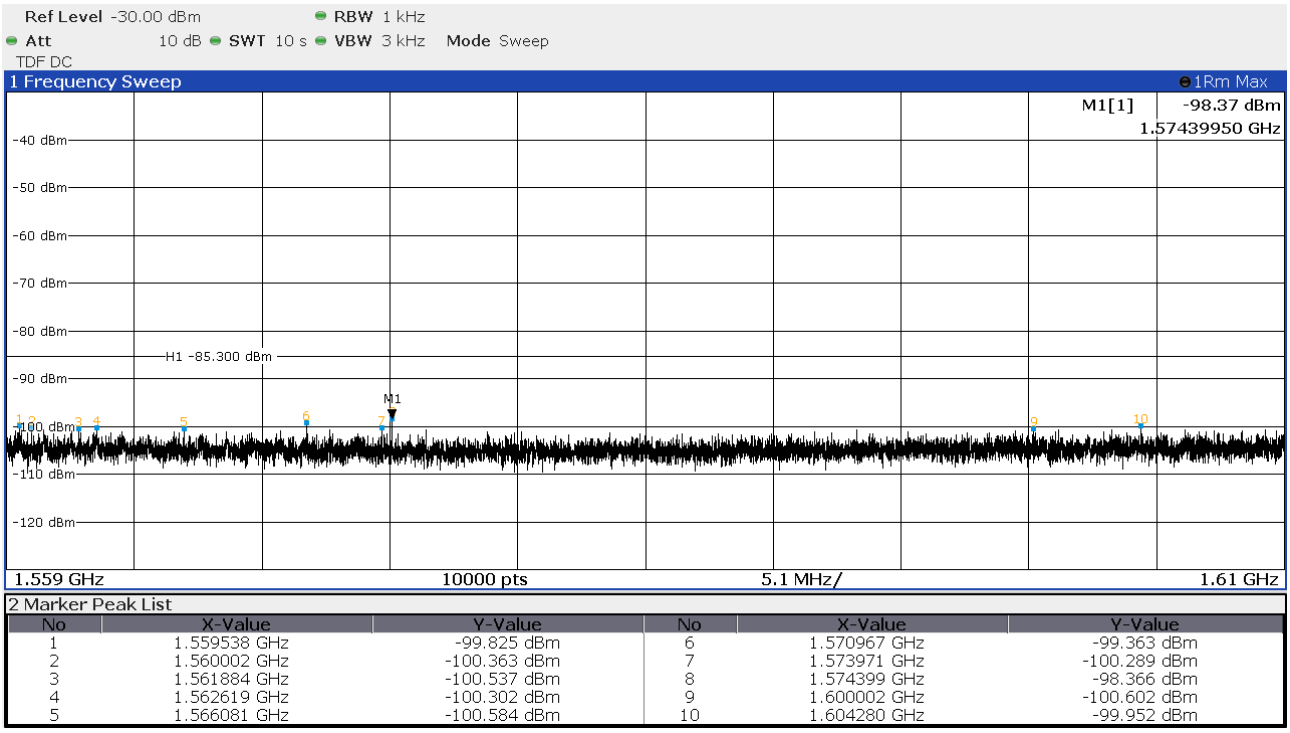
1559 MHz to 1610 MHz



No	X-Value	Y-Value	No	X-Value	Y-Value
1	1.559538 GHz	-99.825 dBm	6	1.570967 GHz	-99.363 dBm
2	1.560002 GHz	-100.363 dBm	7	1.573971 GHz	-100.289 dBm
3	1.561884 GHz	-100.537 dBm	8	1.574399 GHz	-98.366 dBm
4	1.562619 GHz	-100.302 dBm	9	1.600002 GHz	-100.602 dBm
5	1.566081 GHz	-100.584 dBm	10	1.604280 GHz	-99.952 dBm

Limit according §15.519(d) in the frequency

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

The requirements are **FULFILLED.**

Remarks: Tests were performed with vertical and horizontal antenna.

The plots show the worst case scenario.

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5.4 Peak Power radiated

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

5.4.1 Description of the test location

Test location: Anechoic chamber 1

5.4.2 Photo documentation of the test set-up – see ATTACHMENT B

5.4.3 Applicable standard

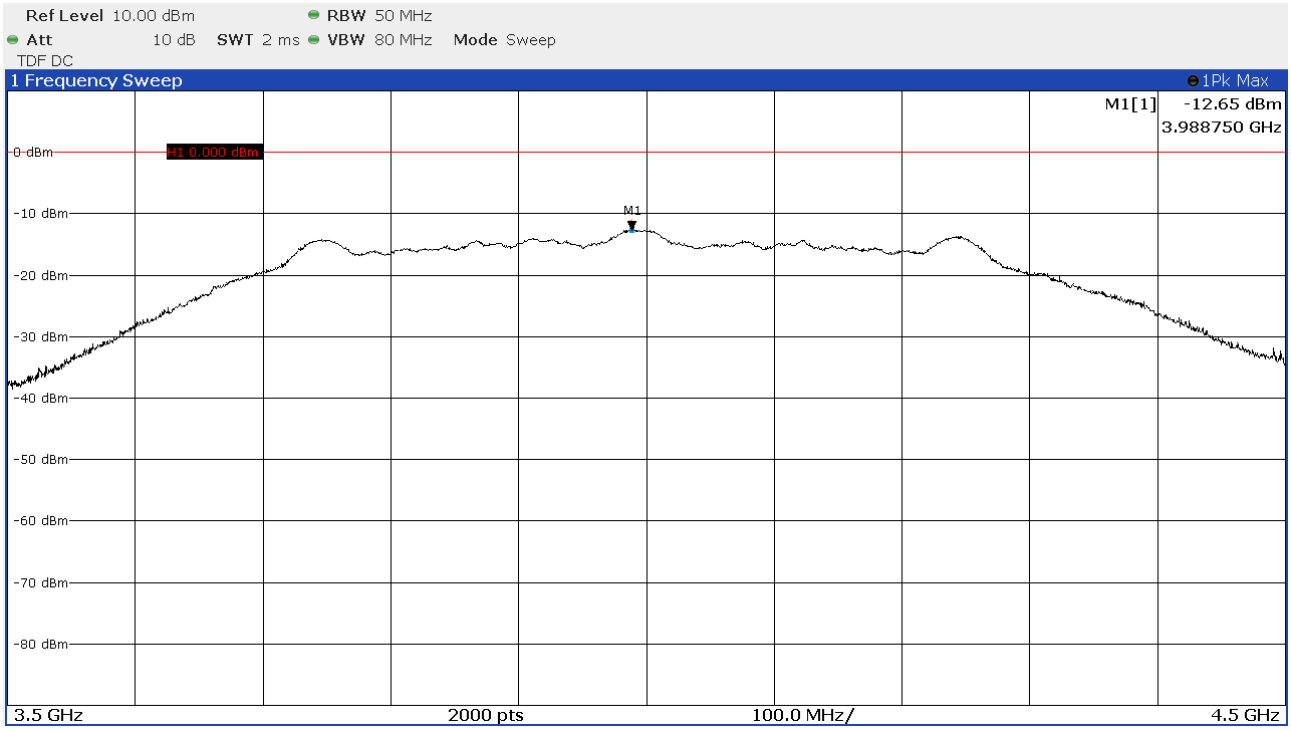
According to FCC Part 15, Section 15.519(e):
There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs, f_M. That limit is 0 dBm EIRP. It is acceptable to employ a different resolution bandwidth, and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

5.4.4 Analyser settings

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

5.4.5 Test result

CH1



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Min. limit margin: 12.65 dBm at 3.989 GHz

The requirements are **FULFILLED.**

Remarks: None.

5.5 Signal deactivation

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

5.5.1 Description of the test location

Test location: Shielded room S6

5.5.2 Photo documentation of the test set-up – see ATTACHMENT B

5.5.3 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.

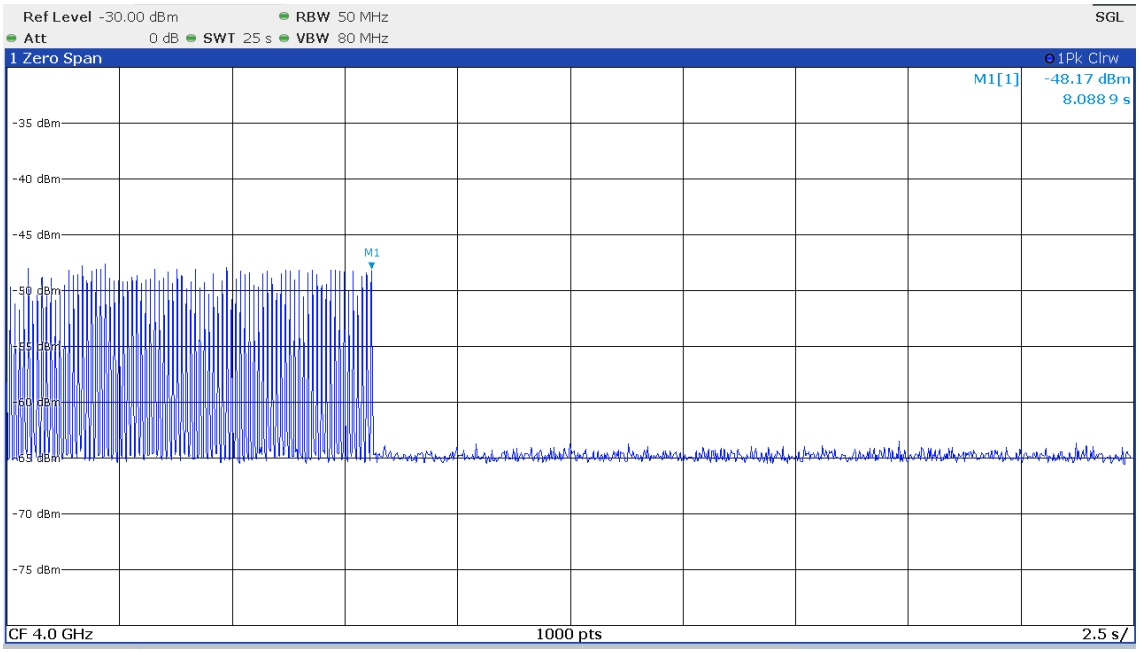
5.5.4 Description of Measurement

The measurement was performed radiated.

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

FCC ID: 2AK6M-EP20FMSLAVERL

5.5.5 Test result



Explanation:

At the time M1 the companion device was powered off. The EUT immediately stops transmission.

According to the manufacturer, The EUT does not transmit when the power is switched on. Only a receive mode is active. The EUT is only sending information and ranging data, if it is addressed by a radio control unit. When the radio control unit stops, the EUT stops transmitting information or ranging data. UWB can not be switched on by a user.

This behaviour is in accordance with the applicable standards.

The requirements are **FULFILLED.**

Remarks: None.

5.6 Antenna application

5.6.1 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 an integrated antenna. 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.
CPR 3	FSW43	02-02/11-15-001	08/04/2020	08/04/2019		
	AMF-6D-01002000-22-10P	02-02/17-15-004				
	LOBB 18	02-02/24-05-026	26/02/2020	26/02/2019		
	18N-20	02-02/50-17-003				
	NMS111-GL200SC01-NMS11	02-02/50-17-012				
	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				
SER 2	ESVS 30	02-02/03-05-006	06/06/2019	06/06/2018		
	VULB 9168	02-02/24-05-005	18/04/2020	28/07/2018		
	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	08/04/2020	08/04/2019		
	JS4-18004000-30-5A	02-02/17-05-017				
	AFS5-12001800-18-10P-6	02-02/17-06-002				
	AFS4-01000400-10-10P-4	02-02/17-13-002				
	AMF-4F-04001200-15-10P	02-02/17-13-003				
	AMF-6D-01002000-22-10P	02-02/17-15-004				
	BBHA 9120 E 251	02-02/24-05-006	07/05/2019	07/05/2018	11/07/2019	11/01/2019
	BBHA 9170	02-02/24-05-014	12/06/2021	12/06/2018	12/12/2019	12/12/2018
	LOBB 18	02-02/24-05-026	26/02/2020	26/02/2019		
	WBH2-18NHG	02-02/24-08-002	07/05/2019	07/05/2018	11/07/2019	11/01/2019
	Sucoflex N-2000-SMA	02-02/50-05-075				
	WHK 3.0/18G-10EF	02-02/50-05-180				
	KMS102-0.2 m	02-02/50-11-020				
	SF104/11SMA/11N/2000MM	02-02/50-15-003				
	SF104/11SMA/11N/2000MM	02-02/50-15-004				
	18N-20	02-02/50-17-003				
	NMS111-GL200SC01-NMS11	02-02/50-17-012				
	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				
MB	FSW43	02-02/11-15-001	06/04/2022	06/04/2021		

CPR 3, SER 2 and SER 3 measurements were performed between 31st May and 14th June 2019.
SER 2 measurements were performed on 3rd June 2019.
MB measurements were performed on 22nd September 2021