



## EMI - TEST REPORT

- FCC Part 15.519 -

**Type / Model Name** : A-07-12

**Product Description** : UWB Anchor

**Applicant** : Kinexon Sports & Media Inc.

Address : 22 west 38th

New York, NY 10018

**Manufacturer** : Kinexon GmbH

Address : Schellingstraße 35

80799 München

**Licence holder** : Kinexon Sports & Media Inc.

Address : 22 west 38th

New York, NY 10018

|  |                 |
|--|-----------------|
| <b>Test Result</b> according to the standards listed in clause 1 test standards: | <b>POSITIVE</b> |
|--|-----------------|

|                          |                       |
|--------------------------|-----------------------|
| <b>Test Report No. :</b> | <b>T43015-00-03GK</b> |
|--------------------------|-----------------------|

Date of issue



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

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

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## 1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15, Subpart A - General (April 2017)

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 (April 2017)

**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 15.209 Radiated emission limits, general requirements

FCC Rules and Regulations Part 15, Subpart F – Ultra Wideband Operation (April 2017)

## Part 15, Subpart F, Section 15.503 Definitions

## Part 15, Subpart F, Section 15.519 Technical requirements for indoor 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

## **2 EQUIPMENT UNDER TEST**

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

### **2.2 Equipment type**

Portable UWB device

### **2.3 Short description of the equipment under test (EUT)**

The technology is used in sports as well as industrial environments.

Kinexon Anchors communicate with each other and nearby Tags to obtain information on the Tag positions.

Additionally the EUT has an integrated WLAN /Bluetooth low energy module with one integrated antenna.

Number of tested samples: 2 (1 radiated and 1 conducted sample)

Serial number: pre-production sample

Firmware version: 2.9.0

#### **EUT configuration:**

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

### **2.4 Variants of the EUT**

### **2.5 Operation frequency and channel plan**

The operating frequency band is 3100 MHz to 10600 MHz.

Channel plan:

Channel 1: 3494.4 MHz

Channel 2: 3993.6 MHz

Channel 3: 4492.8 MHz

Channel 5: 6489.6 MHz

### **2.6 Transmit operating modes**

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

Data rate: 6.8 Mbit/s

## 2.7 Antennas

The following antenna shall be used with the EUT:

Mounted antenna with following gain: 4.15 dBi peak

## 2.8 Power supply system utilised

Power supply voltage,  $V_{nom}$  3.7 V DC Battery powered

Note: There are two variants of batteries: 3400 mAh, 12.58 Wh / 7800 mAh, 28.8 Wh

## 2.9 Peripheral devices and interface cables

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

- Laptop Model : Fujitsu E780
- Computer NUC6i5SYH Model : Supplied by the client

## 2.10 Determination of worst case conditions for final measurement

Measurements are made in all three orthogonal axes.

### 2.10.1 Test jig

None

## 2.10.2 Test software

None

### 3 TEST RESULT SUMMARY

UWB device using digital modulation:

Operating in the 3100 MHz – 10600 MHz:

| FCC Rule Part          | Description   | Result         |
|------------------------|---|----------------|
| 15.207(a)              | AC power line conducted emissions                     | not applicable |
| 15.519(b)              | UWB Bandwidth   | passed         |
| 15.209(a)<br>15.519(c) | 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)              | Peak Power radiated                                   | passed         |
| 15.519(a)              | Signal deactivation                                   | passed         |

#### 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 : 21 February 2017

Testing concluded on : 13 February 2018

Checked by:

Tested by:

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Klaus Gegenfurtner  
Teamleader Radio

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Konrad Graßl  
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%              | $\pm 3.29$ dB            |
| EBW and OBW                       | 2400 MHz to 30000 MHz  | 95%              | $\pm 2.5 \times 10^{-7}$ |
| Output power ERP, radiated        | 1000 MHz to 7000 MHz   | 95%              | $\pm 2.71$ dB            |
| Field strength of the fundamental | 1000 MHz to 7000 MHz   | 95%              | $\pm 2.71$ dB            |
| Power spectral density            | 2400 MHz to 3000 MHz   | 95%              | $\pm 0.62$ dB            |
| Spurious Emissions, conducted     | 9 kHz to 10000 MHz     | 95%              | $\pm 2.15$ dB            |
| Spurious Emissions, conducted     | 10000 MHz to 40000 MHz | 95%              | $\pm 3.47$ dB            |
| Spurious Emissions, radiated      | 9 kHz to 30 MHz        | 95%              | $\pm 3.53$ dB            |
| Spurious Emissions, radiated      | 30 MHz to 1000 MHz     | 95%              | $\pm 4.44$ dB            |
| Spurious Emissions, radiated      | 1000 MHz to 30000 MHz  | 95%              | $\pm 2.34$ dB            |
| Spurious Emissions, radiated      | 30000 MHz to 40000 MHz | 95%              | $\pm 5.13$ dB            |

## 4.4 Measurement protocol for FCC and ISED

### 4.4.1 General information

#### 4.4.1.1 Test methodology

The Open Area test site is a listed Open Site under the Canadian Test-Sites File-No:

**IC 3009A-1**

The Anechoic chamber is a listed test site under the Canadian Test-Sites File-No:

**IC 3009A-2**

In compliance with RSS 247 testing for RSS compliance may be achieved by following the procedures set out in ANSI C63.10 and applying the CISPR 22 limits.

#### 4.4.1.2 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.

#### 4.4.1.3 General Standard information

In compliance with 47 CFR Part 15 Subpart A, Section 15.38 testing for FCC compliance may be achieved by following the procedures set out in ANSI C63.10 and applying the CISPR 22 limits.

#### 4.4.1.3.1 Radiated emission (electrical field 30 MHz - 1 GHz)

##### Description of measurement

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 dB $\mu$ V/m is calculated by taking the reading from the EMI receiver (Level dB $\mu$ V) and adding the correction factors and cable loss factor (dB). The FCC or CISPR limit is subtracted from this result in order to provide the limit margin listed in the measurement protocol.

The resolution bandwidth setting:

30 MHz – 1000 MHz: RBW: 120 kHz

Example:

| Frequency<br>Delta<br>(MHz) | Level<br>(dB $\mu$ V) | + | Factor<br>(dB) | = | Level<br>(dB $\mu$ V/m) | - | CISPR Limit<br>(dB $\mu$ V/m) | = | (dB) |
|-----------------------------|-----------------------|---|----------------|---|-------------------------|---|-------------------------------|---|------|
| 719.0                       | 75.0                  | + | 32.6           | = | 107.6                   | - | 110.0                         | = | -2.4 |

**4.4.1.3.2 Radiated emission (electrical field 1 GHz - 40 GHz)**Description of measurement

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

## 5 TEST CONDITIONS AND RESULTS

### 5.1 AC power line conducted emissions

**Remarks:** Not applicable, because the EUT is battery powered.

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## 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 6

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

Please see Attachment A

### 5.2.3 Applicable standard

According to FCC Part 15, Section 15.519(b):

The UWB bandwidth of a UWB system operating under the provisions of this section must be contained between 3100 MHz and 10,600 MHz.

According to FCC Part 15, Section 15.503(d):

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

### 5.2.4 Description of Measurement

The measurement was performed conducted with the sample with a SMA connector.

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: Max peak

### 5.2.5 Test result

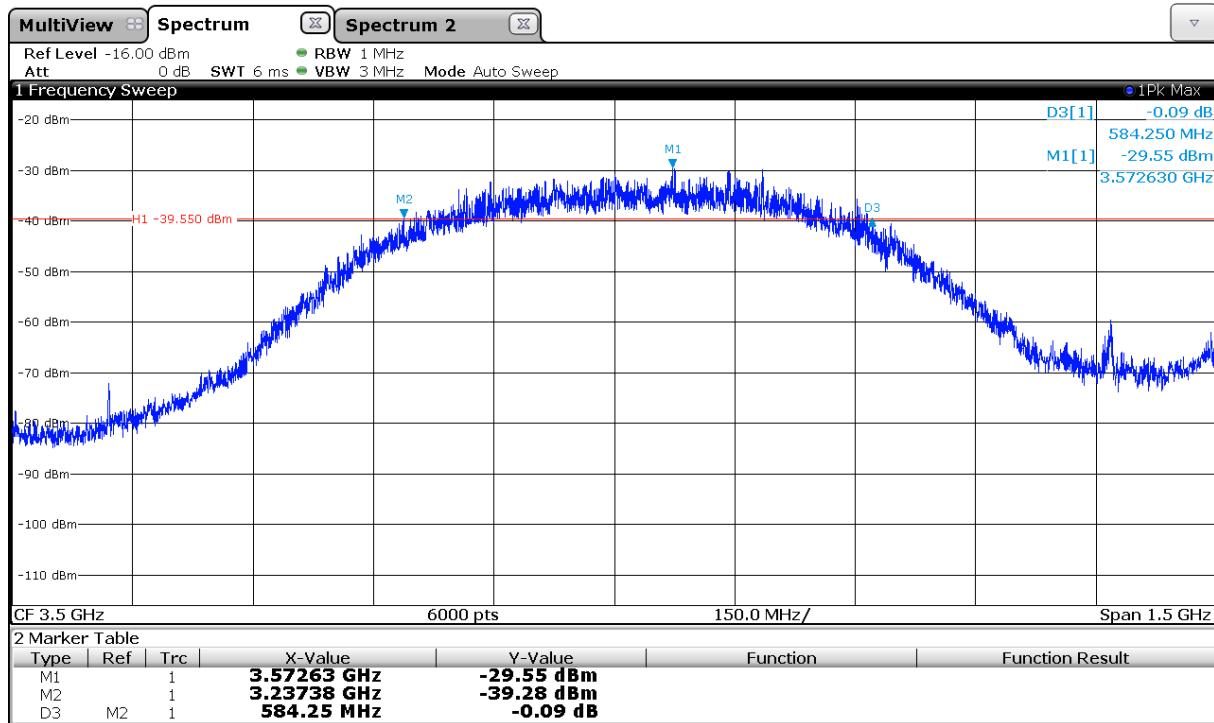
| channel | lowest frequency $f_L$ (MHz) | highest frequency $f_H$ (MHz) | permitted frequency range (GHz) | UWB bandwidth (MHz) | required UWB bandwidth (MHz) | result |
|---------|------------------------------|-------------------------------|---------------------------------|---------------------|------------------------------|--------|
| 1       | 3237.38                      | 3821.63                       | 3.1 to 10.6                     | 584.25              | > 500                        | passed |
| 2       | 3682.38                      | 4345.63                       | 3.1 to 10.6                     | 663.25              | > 500                        | passed |
| 3       | 4172.13                      | 4815.88                       | 3.1 to 10.6                     | 643.75              | > 500                        | passed |
| 5       | 6171.38                      | 6810.13                       | 3.1 to 10.6                     | 638.75              | > 500                        | passed |

The requirements are **FULFILLED**.

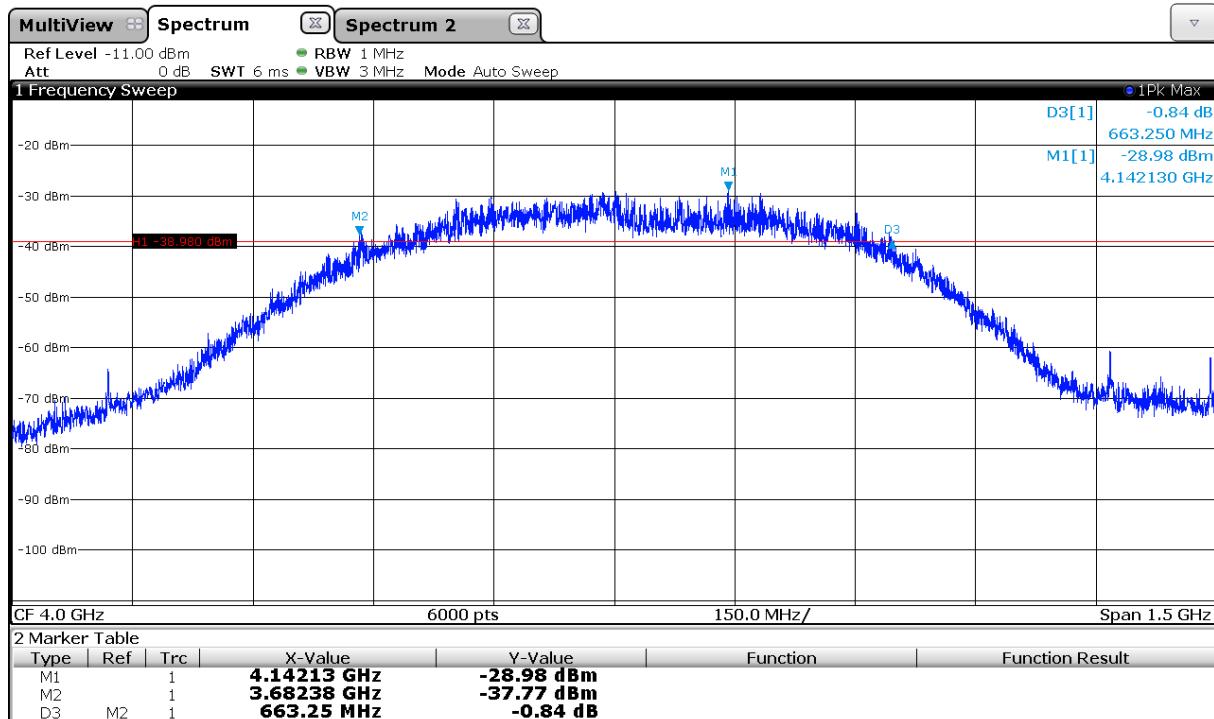
**Remarks:** For detailed test results please refer to following test protocols.

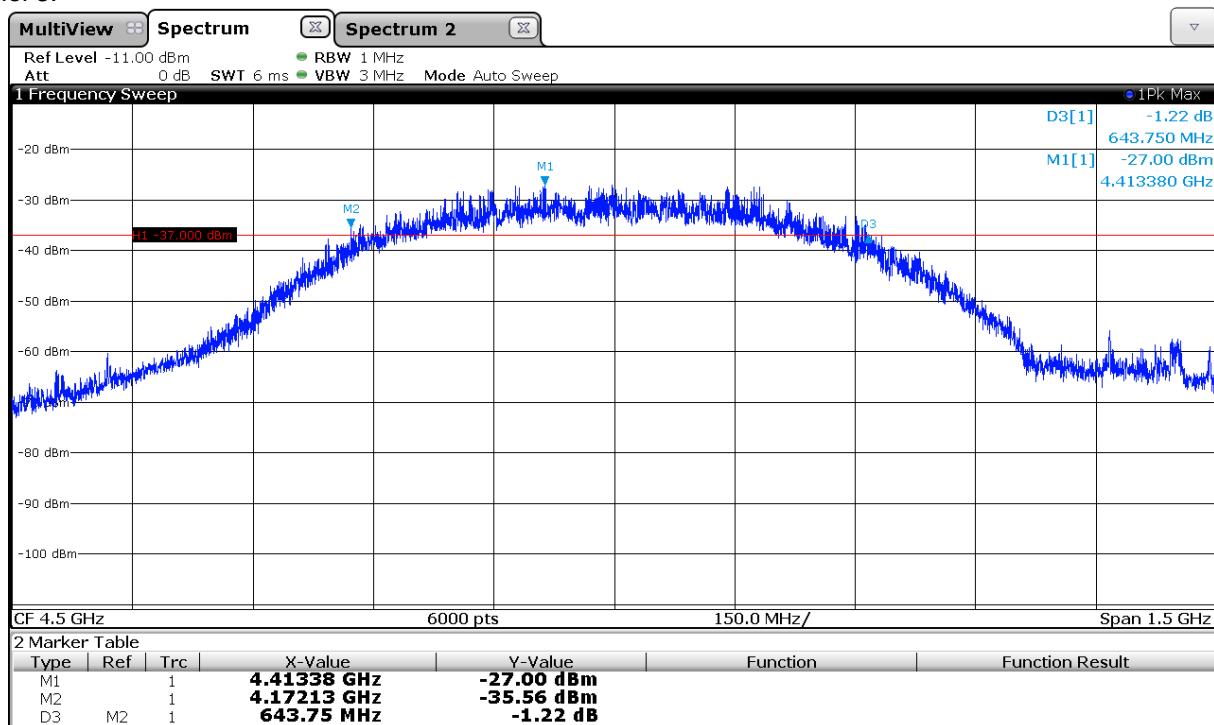
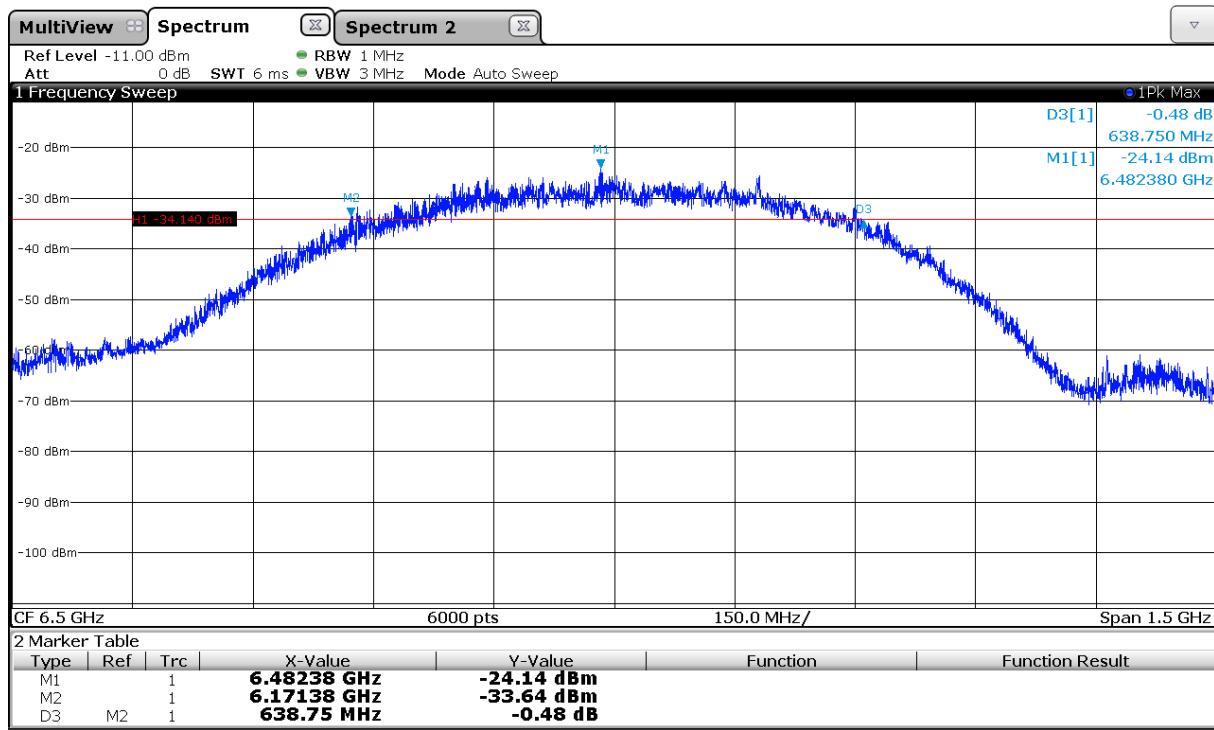
### 5.2.6 Test protocols

Channel 1:



Channel 2:



**Channel 3:**

**Channel 5:**


### 5.3 Radiated Emissions 9 kHz to 40 GHz

For test instruments and accessories used see section 6 Part **SER 2, SER3**.

#### 5.3.1 Description of the test location

Test location: OATS 1  
 Test location: Anechoic chamber 1

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

Please see Attachment A

#### 5.3.3 Applicable standard

According to FCC Part 15, Section 15.519(c):

The radiated emissions at or below 960 MHz from a device operating under the provisions of this section shall not exceed the emission levels in §15.209. The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz.

#### 5.3.4 Analyser settings

30 MHz – 960 MHz      RBW: 120 kHz      Detector: QP

960 MHz – 40 GHz      RBW: 1 MHz      VBW: 3 MHz      Detector: RMS      Sweeptime: 1ms per MHz

#### 5.3.5 Test result

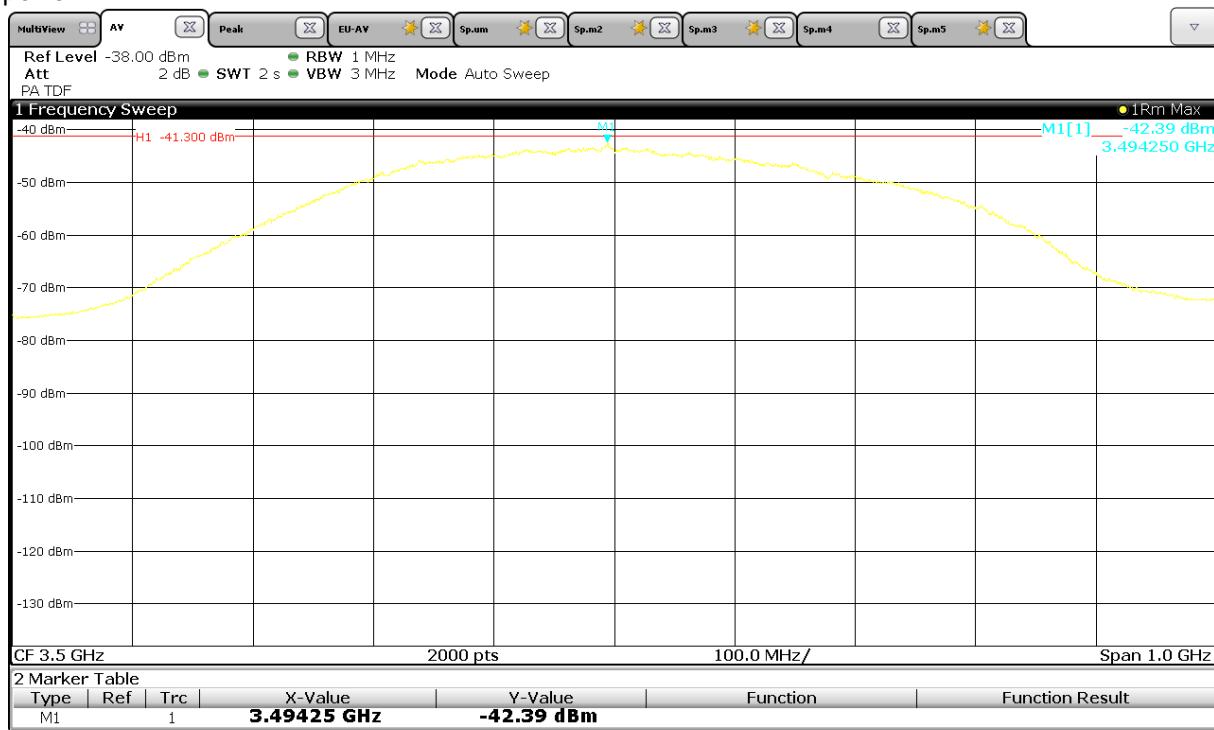
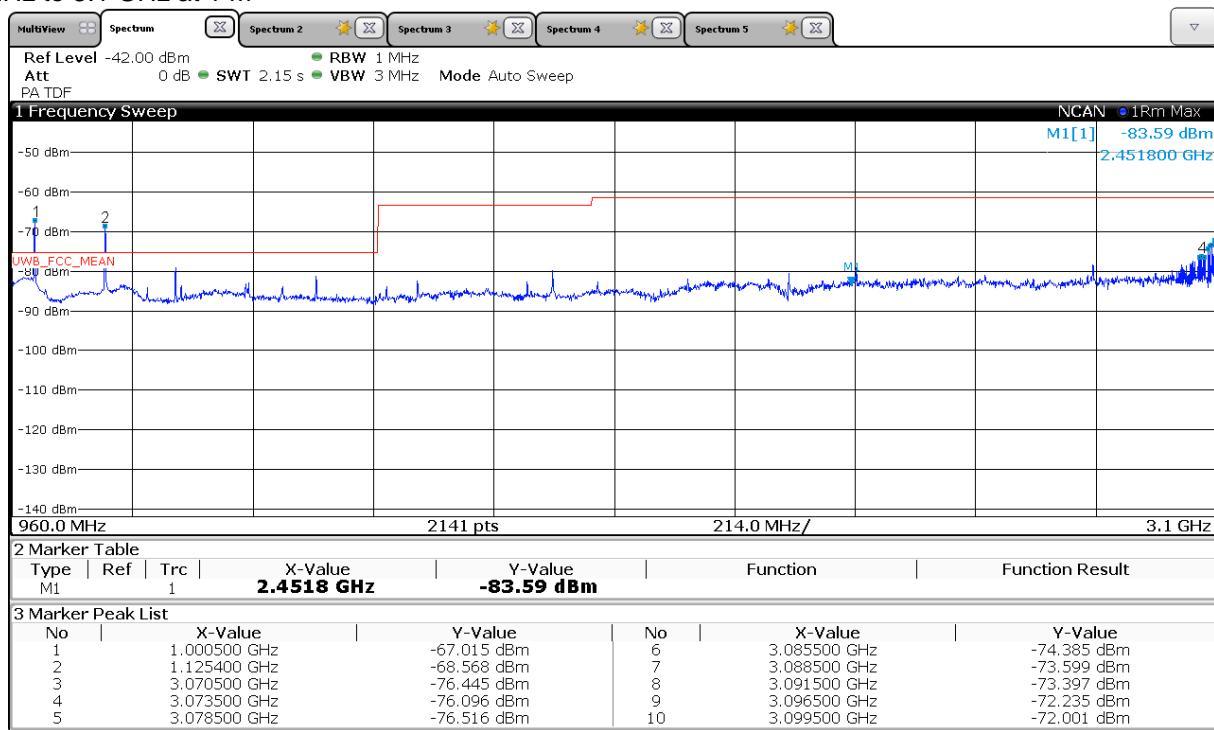
##### Measurement 9 kHz to 30 MHz:

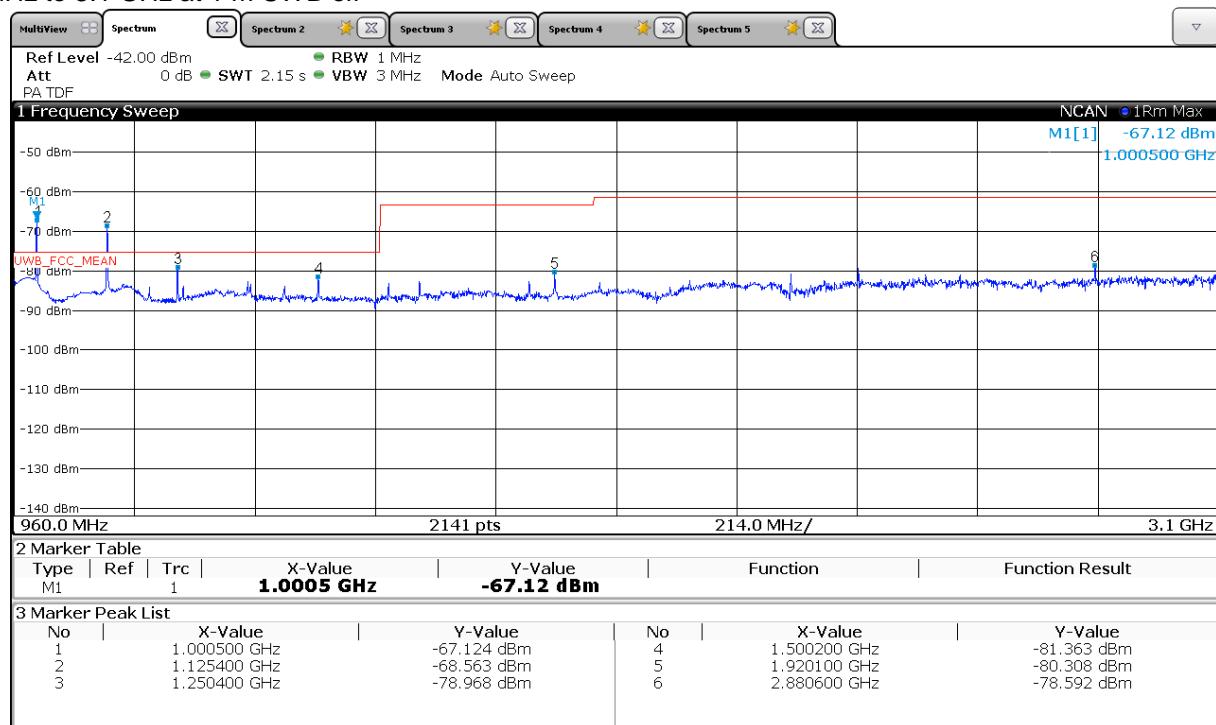
Note: Pre-measurements have shown, there are no detectable emissions in this frequency range.

##### Measurement 30 MHz to 960 MHz:

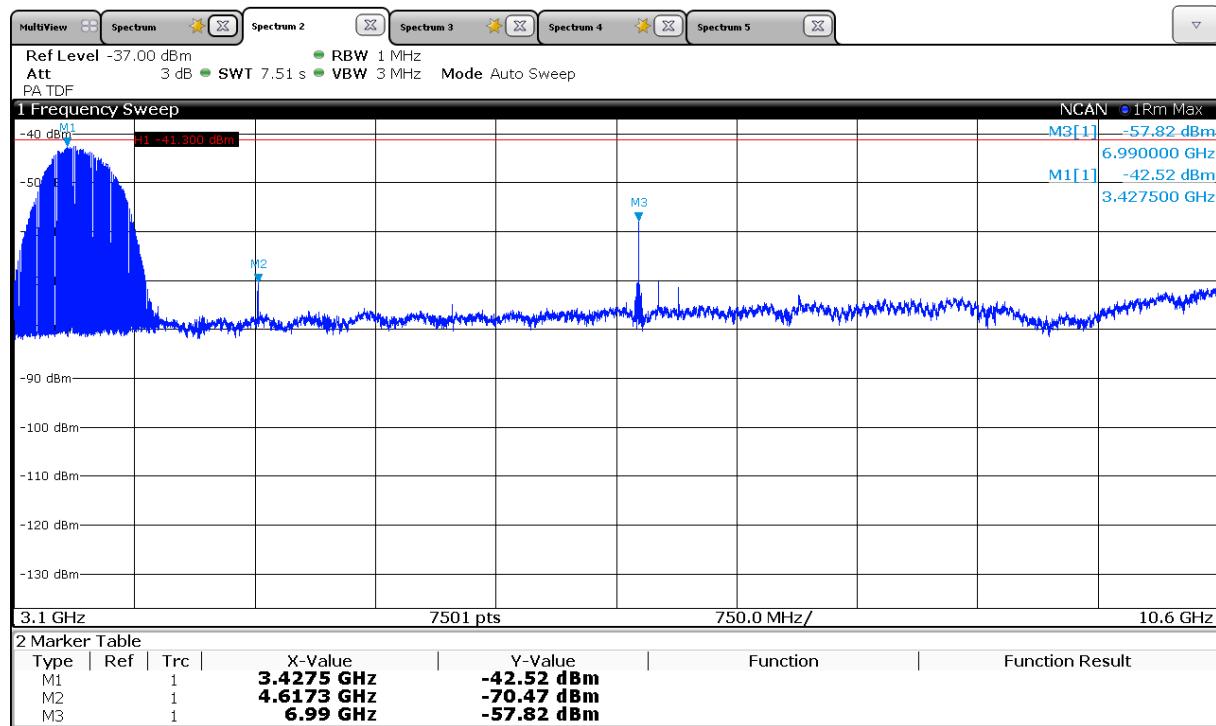
| Frequency (MHz) | Reading Vert. (dB $\mu$ V) | Reading Hor. (dB $\mu$ V) | Correct. Vert. (dB) | Correct. Hor. (dB) | Level Vert. (dB $\mu$ V/m) | Level Hor. (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Dlimit (dB) |
|-----------------|----------------------------|---------------------------|---------------------|--------------------|----------------------------|---------------------------|----------------------|-------------|
| 666.95          | -11.5                      | -11.6                     | 26.5                | 26.1               | 15.0                       | 14.5                      | 46.0                 | -31.0       |
| 739.99          | -6.9                       | -8.1                      | 28.0                | 27.5               | 21.1                       | 19.4                      | 46.0                 | -24.9       |
| 834.76          | -11.4                      | -11.2                     | 30.1                | 29.6               | 18.7                       | 18.4                      | 46.0                 | -27.3       |
| 859.98          | -10.0                      | 4.5                       | 30.5                | 30.0               | 20.5                       | 34.5                      | 46.0                 | -11.5       |
| 899.95          | -11.5                      | -11.2                     | 31.1                | 30.7               | 19.6                       | 19.5                      | 46.0                 | -26.4       |

Note: Pre-measurements have shown, there is no difference of the emissions between the different channels.

**Measurement 960 MHz to 40 GHz:**
**Channel 1:**
**Mean power:**

**960 MHz to 3.1 GHz at 1 m**


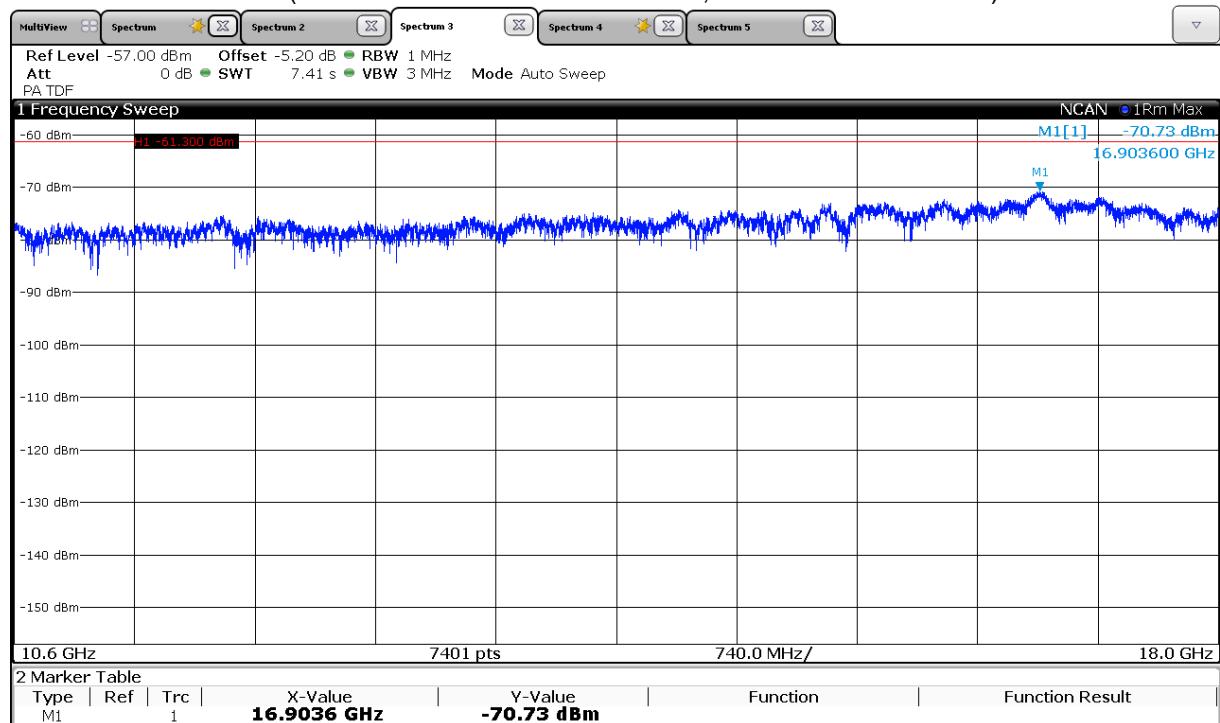
**960 MHz to 3.1 GHz at 1 m UWB off**


Note: The values above the limit line are not belonging to the UWB technology. These values are considered in the test report T43015-00-01GK of the test laboratory CSA Group Bayern GmbH.

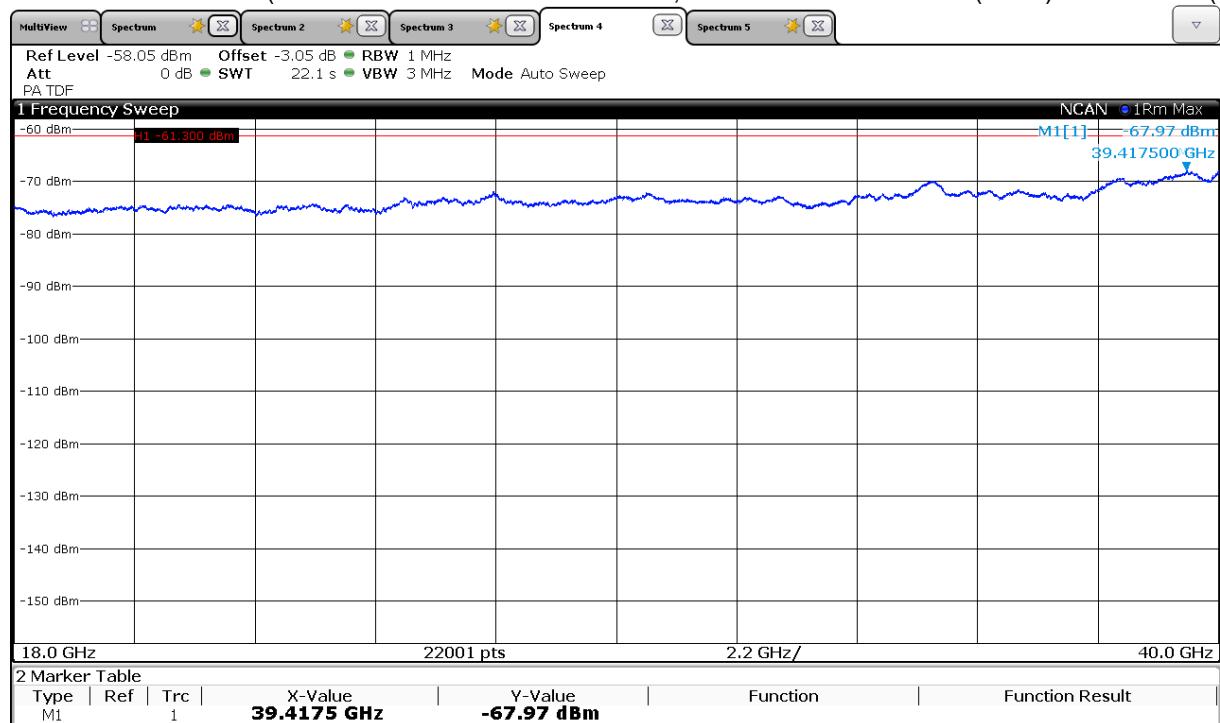
**3.1 GHz to 10.6 GHz at 1 m**


**FCC ID: 2ALC5-KNX-HREC1**

10.6 GHz to 18 GHz at 30 cm (EIRP transducer for 1 m was used, therefore offset -5.2 dB)

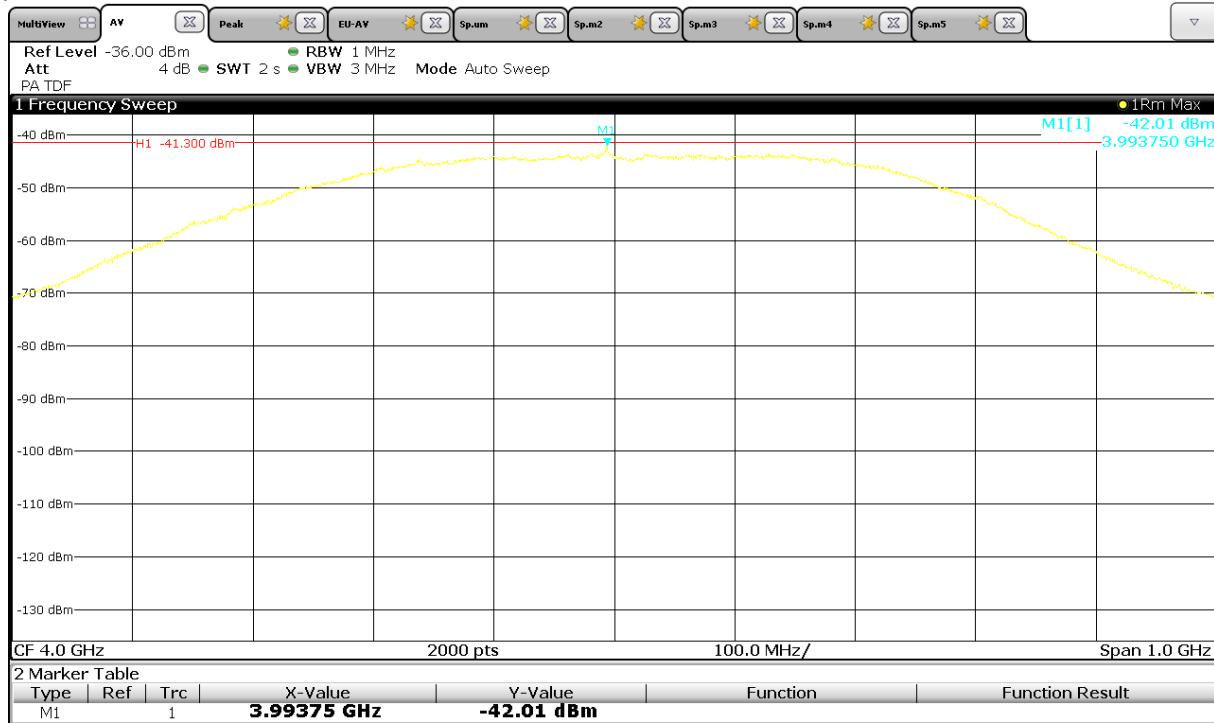


18 GHz to 40 GHz at 30 cm (ERP transducer for 1 m was used, therefore offset 2.15 dB (EIRP) and -5.2 dB (30 cm)

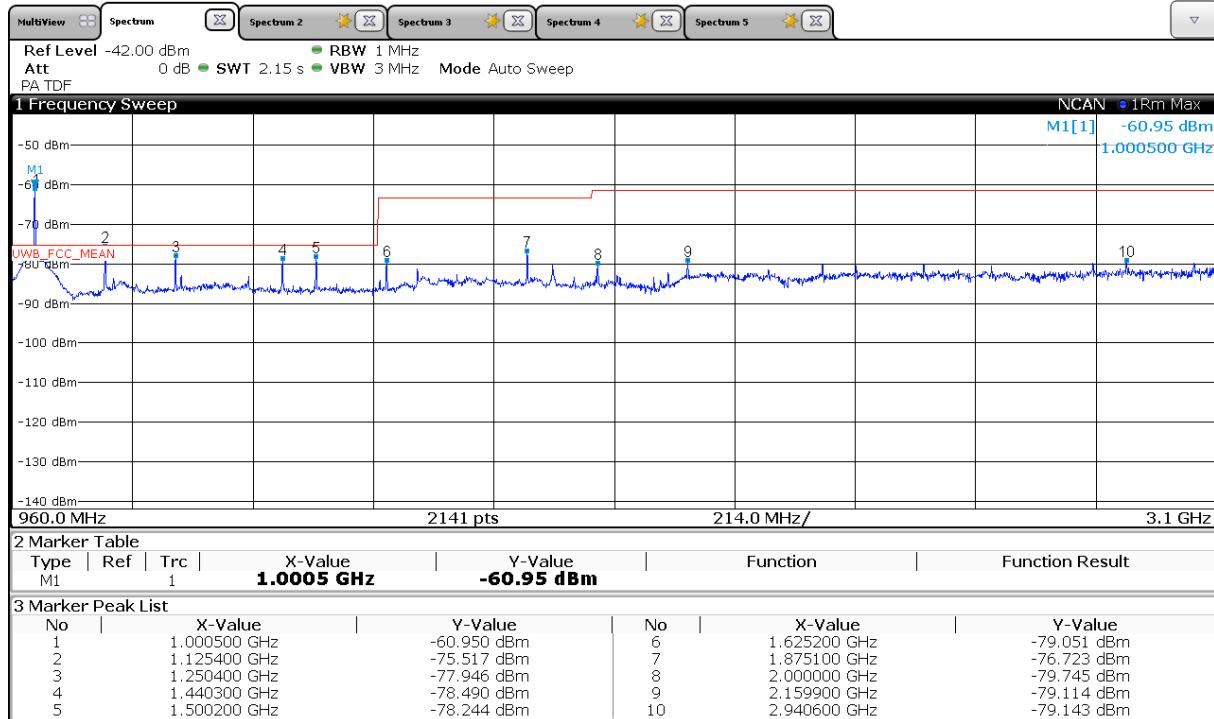


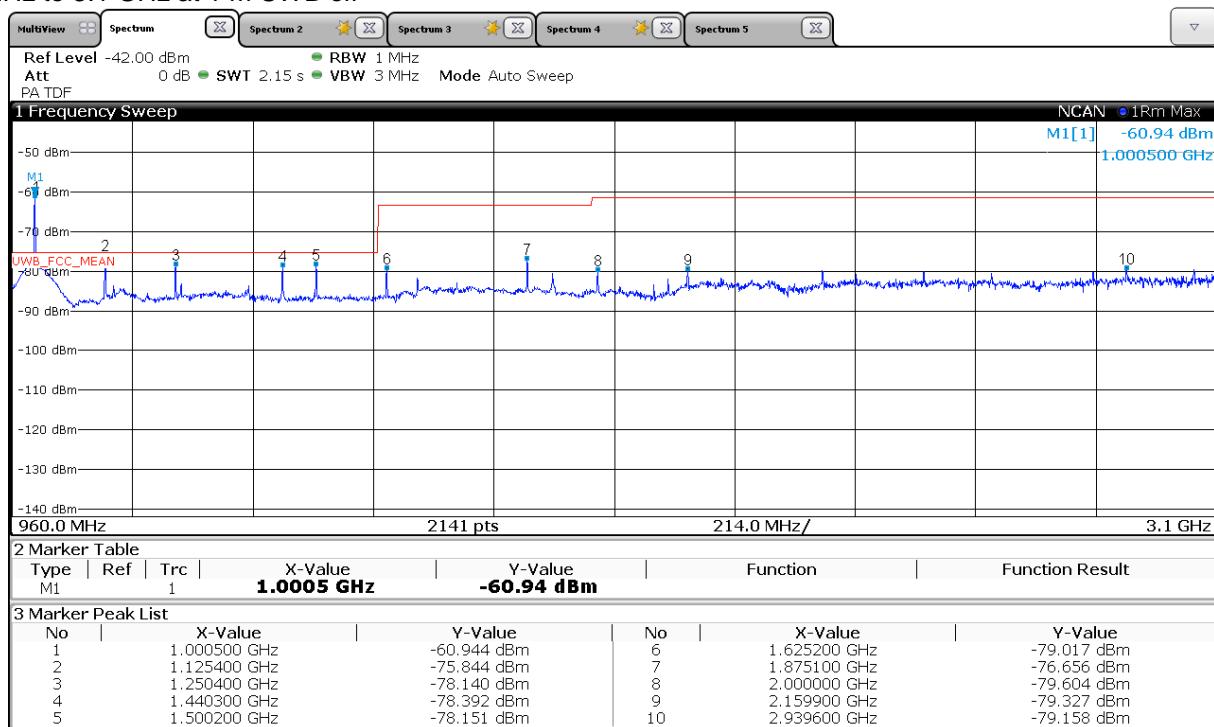
**Channel 2:**

Mean power:

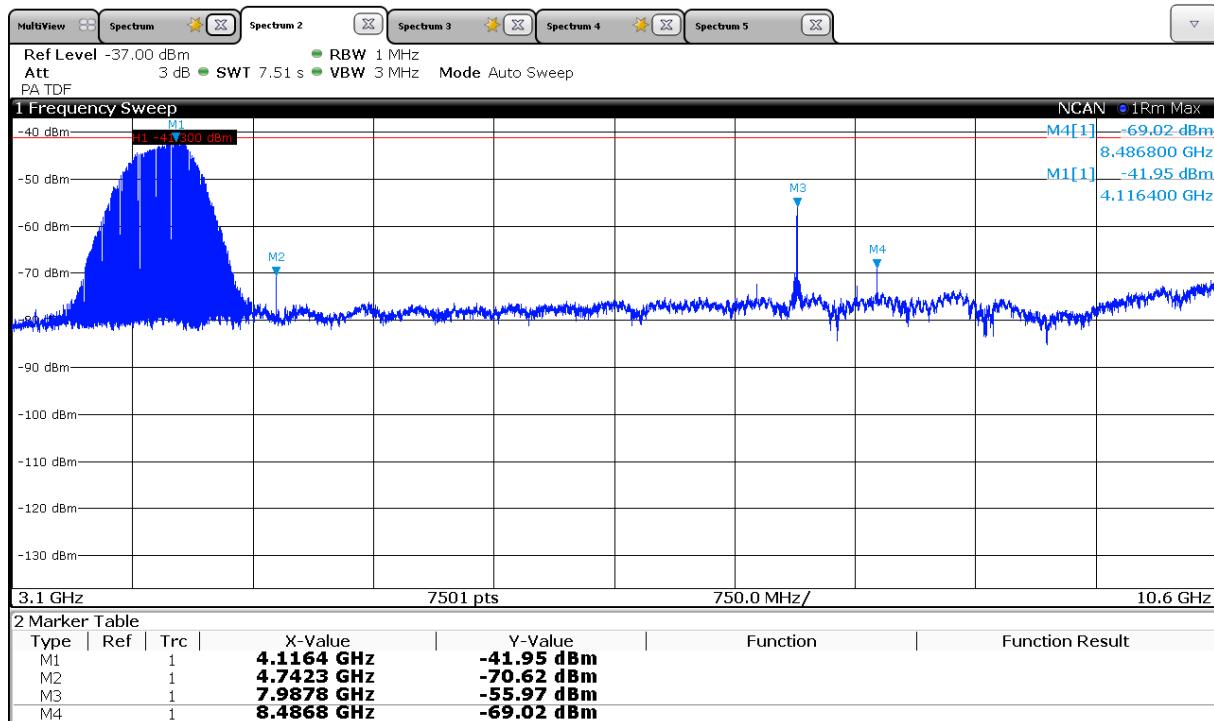


960 MHz to 3.1 GHz at 1 m



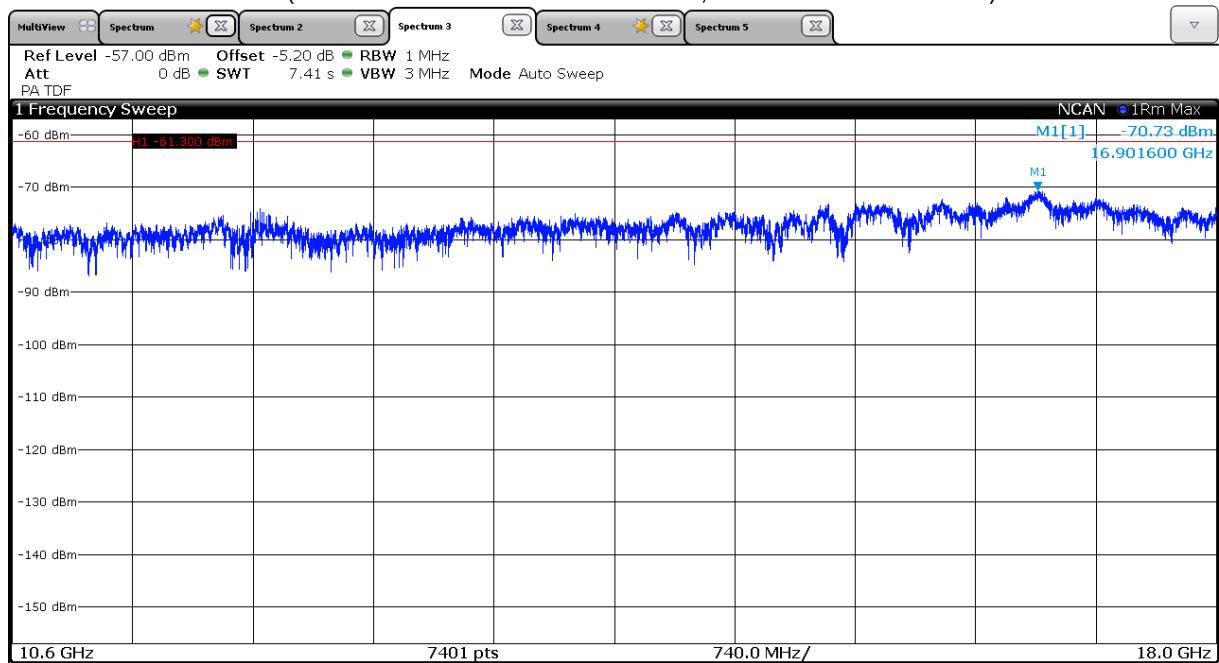
**960 MHz to 3.1 GHz at 1 m UWB off**


Note: The values above the limit line are not belonging to the UWB technology. These values are considered in the test report T43015-00-01GK of the test laboratory CSA Group Bayern GmbH.

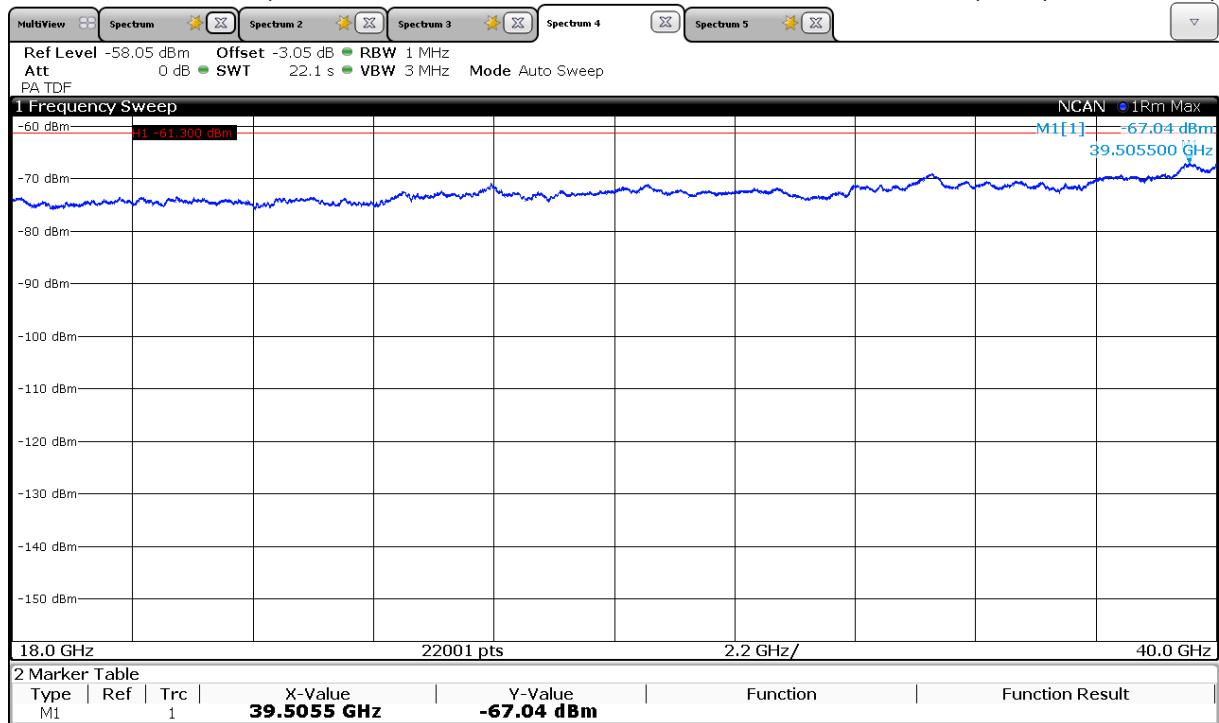
**3.1 GHz to 10.6 GHz at 1 m**


**FCC ID: 2ALC5-KNX-HREC1**

10.6 GHz to 18 GHz at 30 cm (EIRP transducer for 1 m was used, therefore offset -5.2 dB)

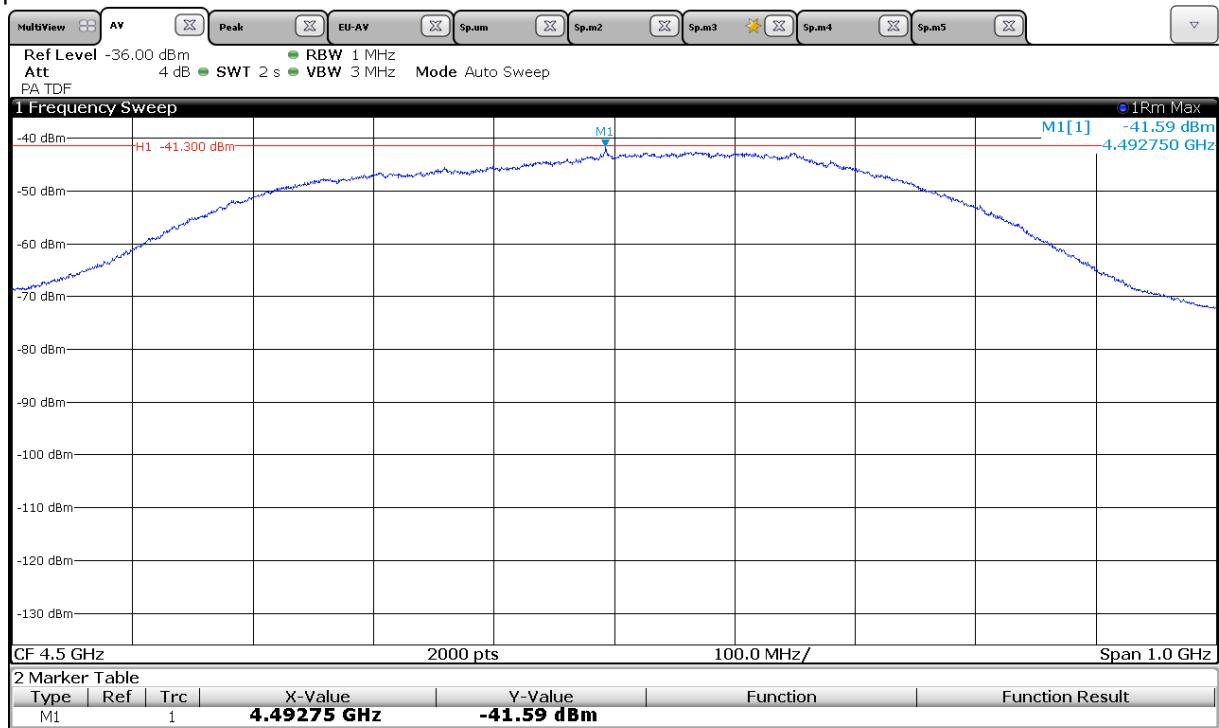


18 GHz to 40 GHz at 30 cm (ERP transducer for 1 m was used, therefore offset 2.15 dB (EIRP) and -5.2 dB (30 cm)

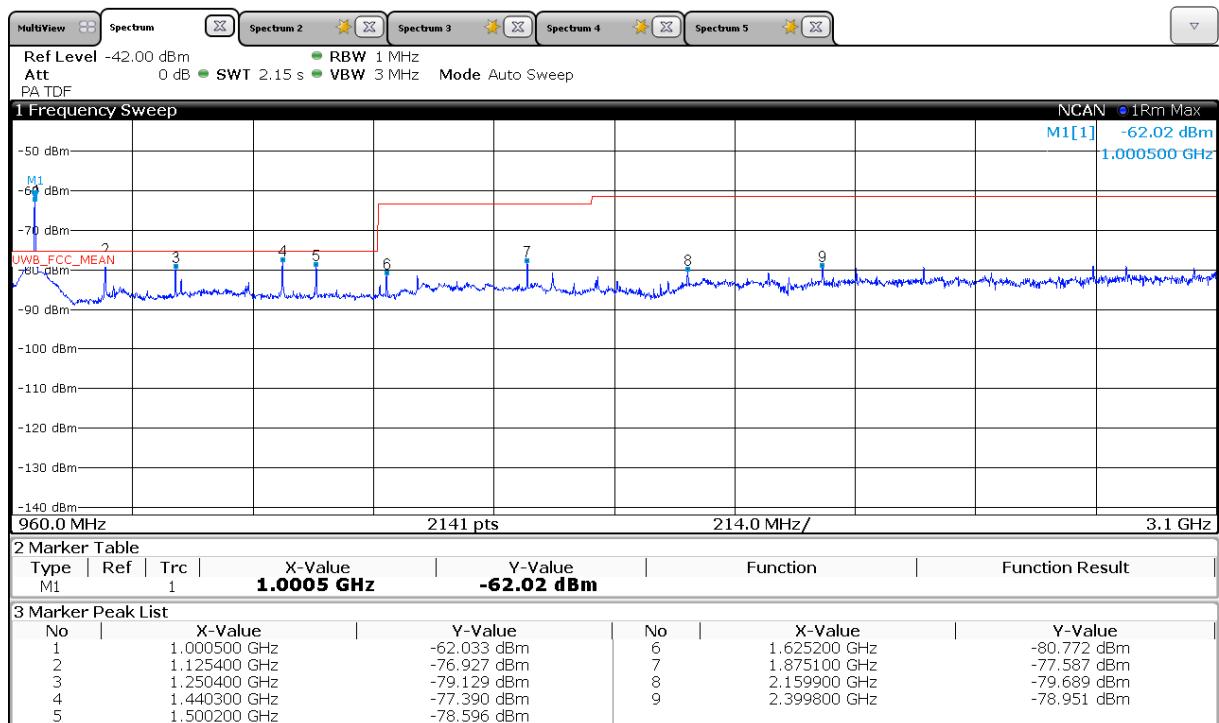


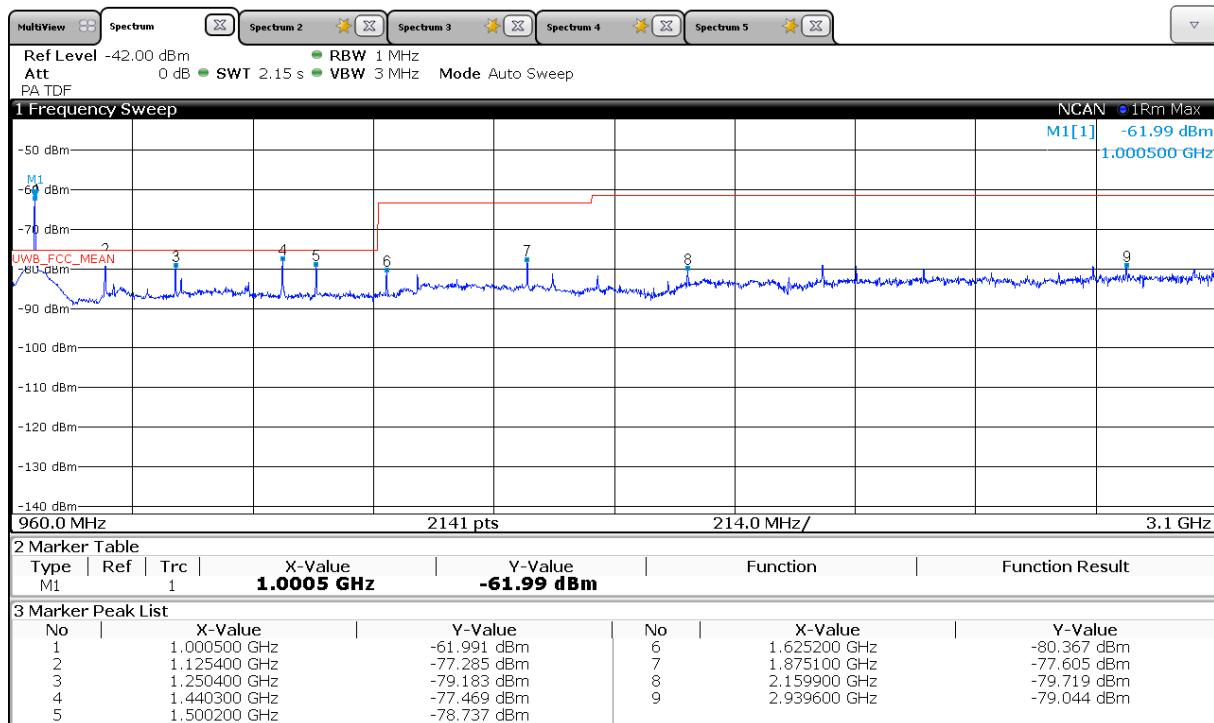
**Channel 3:**

Mean power:

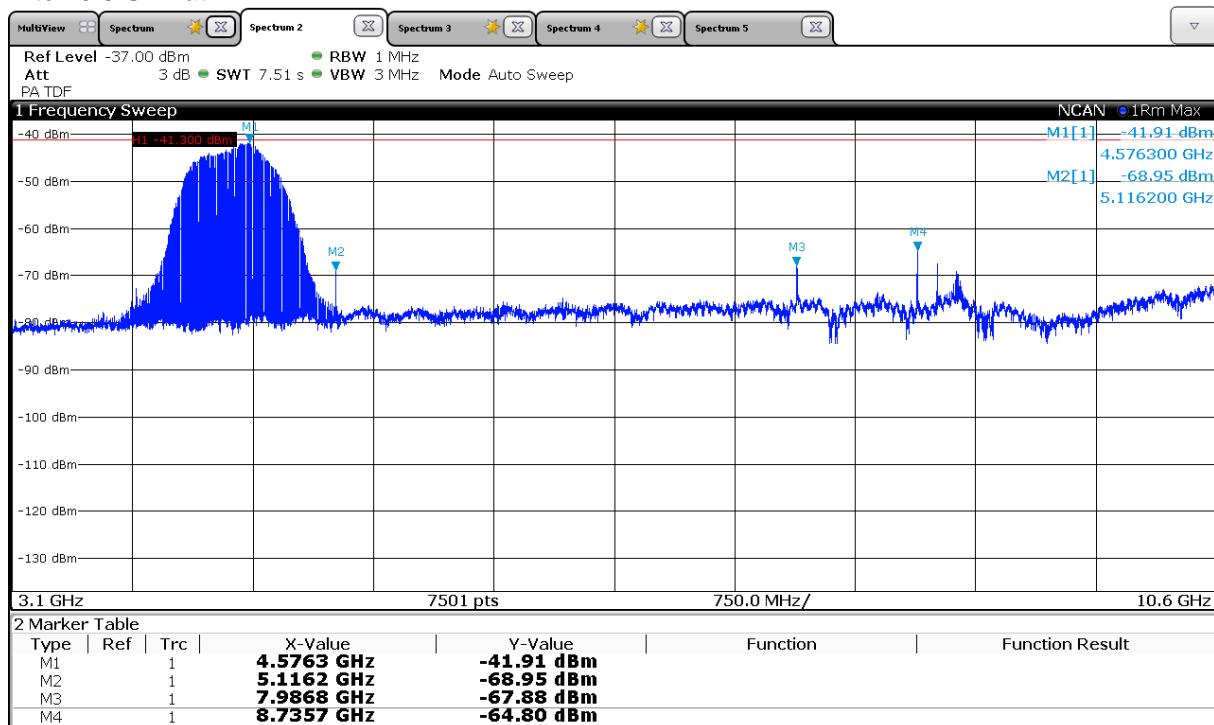


960 MHz to 3.1 GHz at 1 m



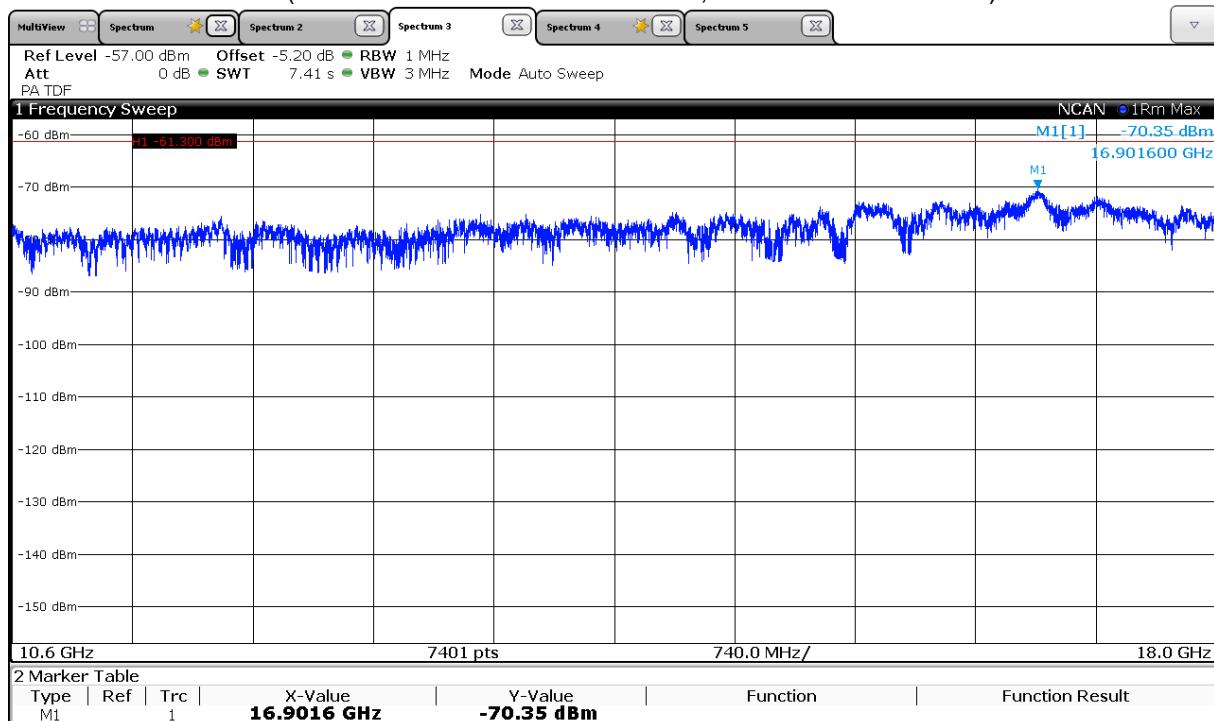
**FCC ID: 2ALC5-KNX-HREC1**
**960 MHz to 3.1 GHz at 1 m UWB off**


Note: The values above the limit line are not belonging to the UWB technology. These values are considered in the test report T43015-00-01GK of the test laboratory CSA Group Bayern GmbH.

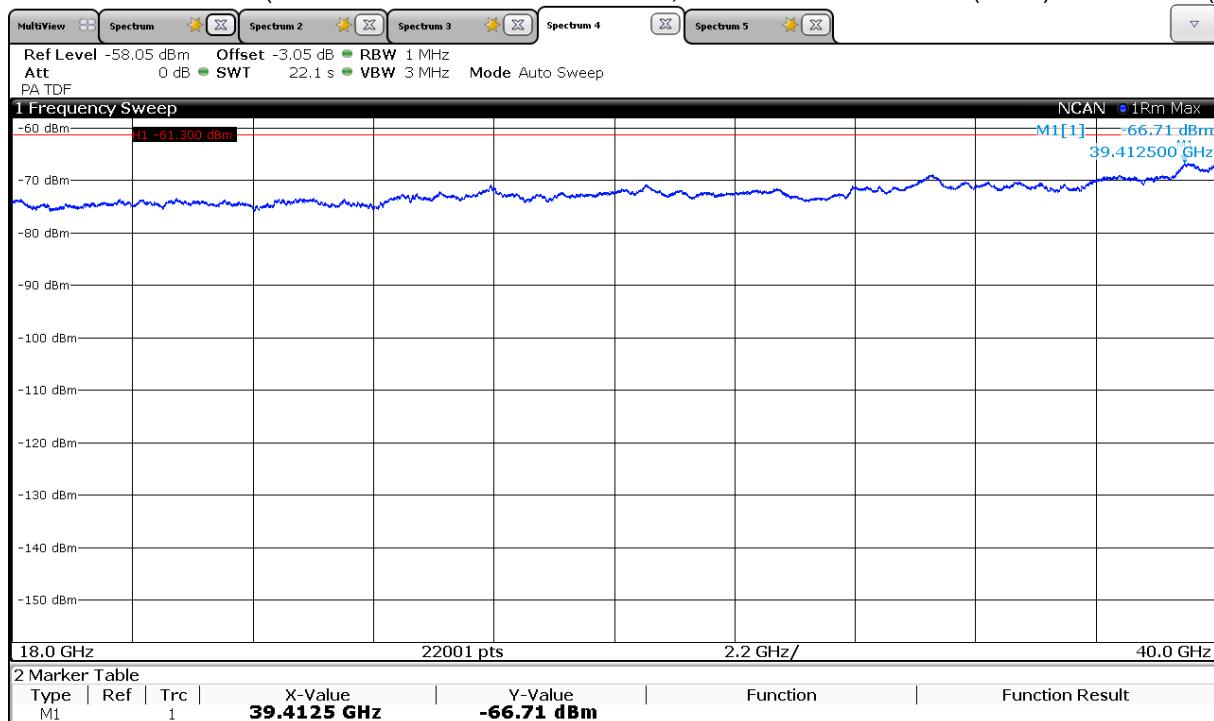
**3.1 GHz to 10.6 GHz at 1 m**


**FCC ID: 2ALC5-KNX-HREC1**

10.6 GHz to 18 GHz at 30 cm (EIRP transducer for 1 m was used, therefore offset -5.2 dB)

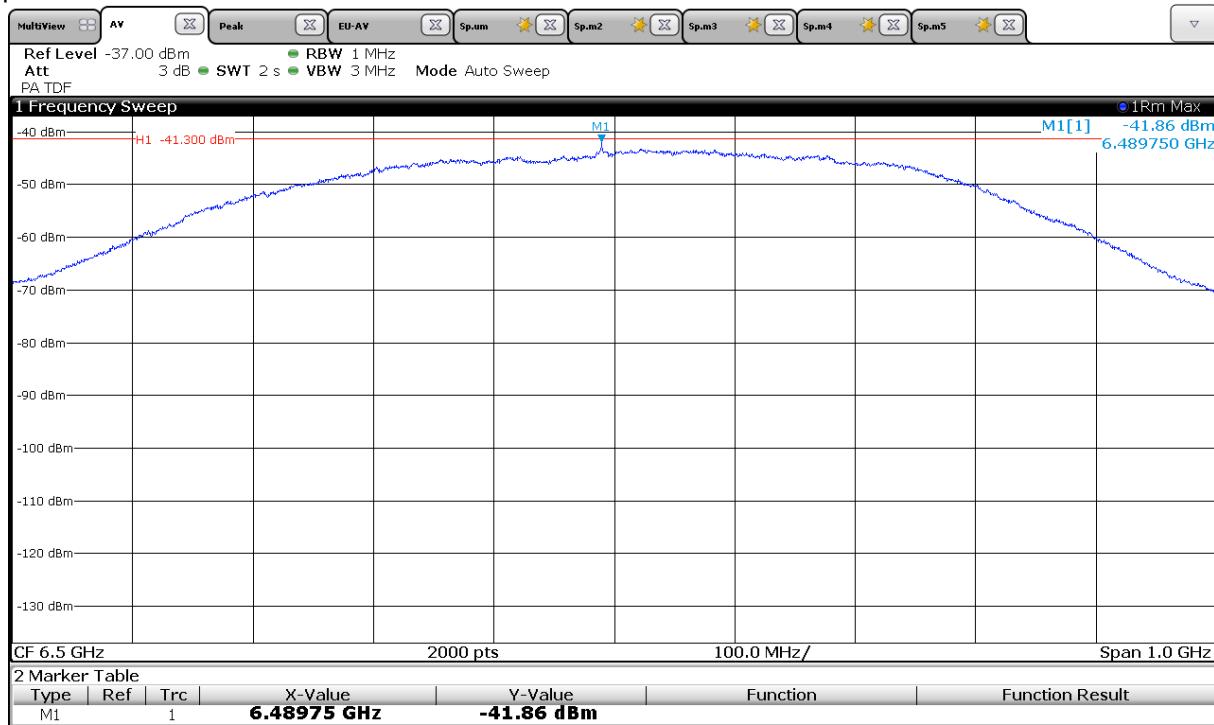


18 GHz to 40 GHz at 30 cm (ERP transducer for 1 m was used, therefore offset 2.15 dB (EIRP) and -5.2 dB (30 cm)

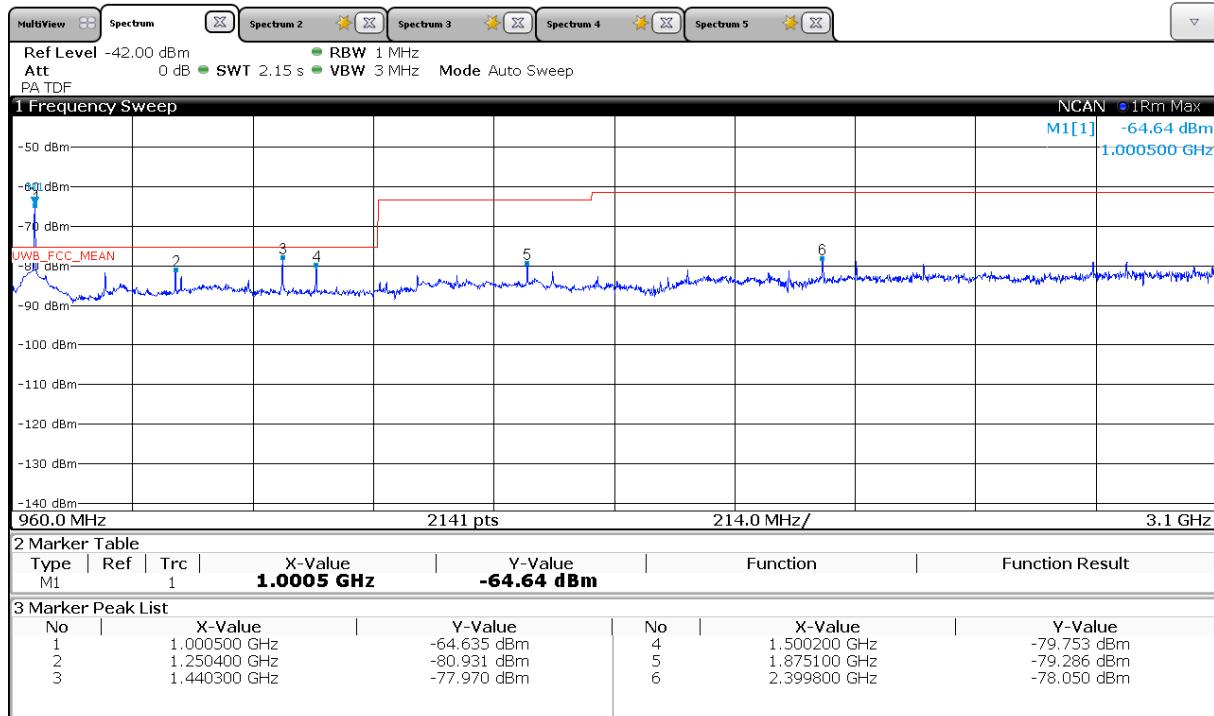


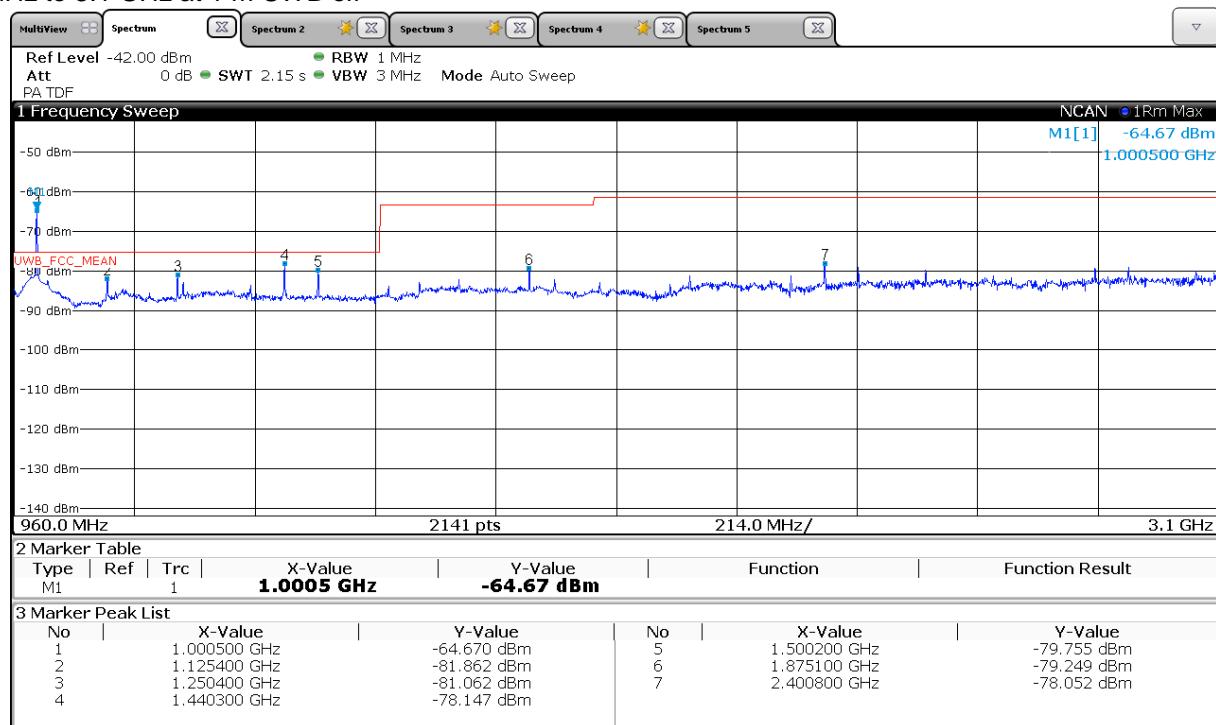
**Channel 5:**

Mean power:

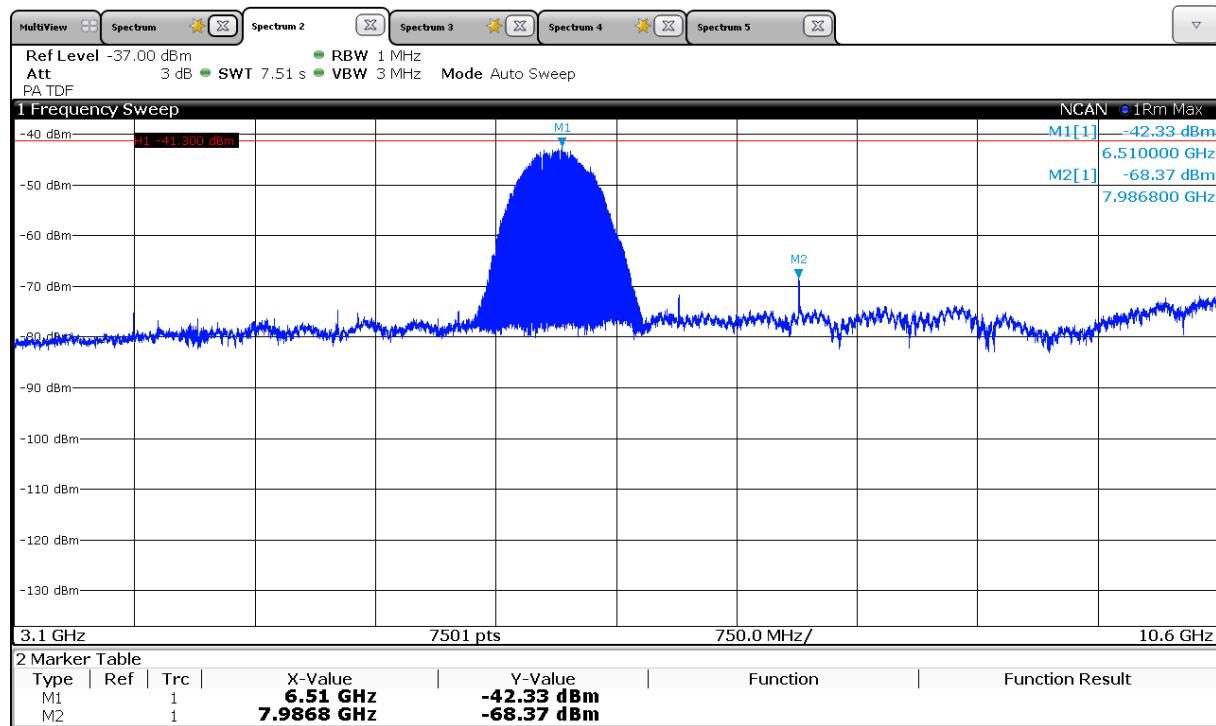


960 MHz to 3.1 GHz at 1 m



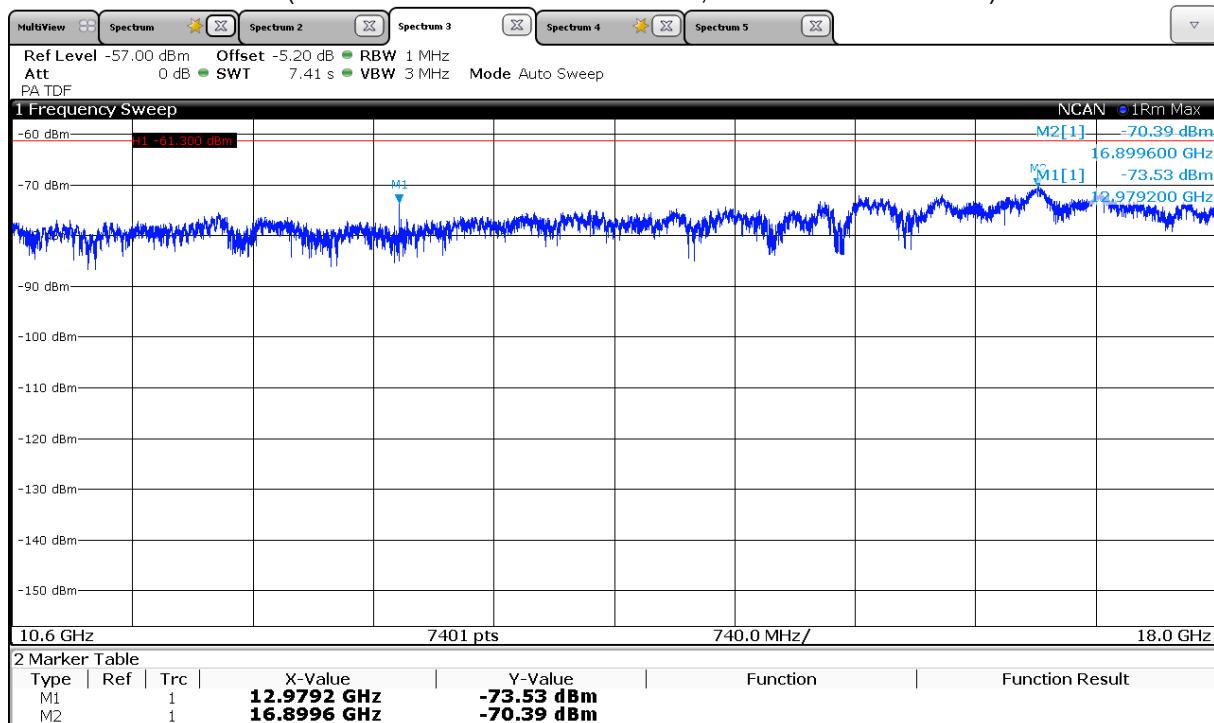
**960 MHz to 3.1 GHz at 1 m UWB off**


Note: The values above the limit line are not belonging to the UWB technology. These values are considered in the test report T43015-00-01GK of the test laboratory CSA Group Bayern GmbH.

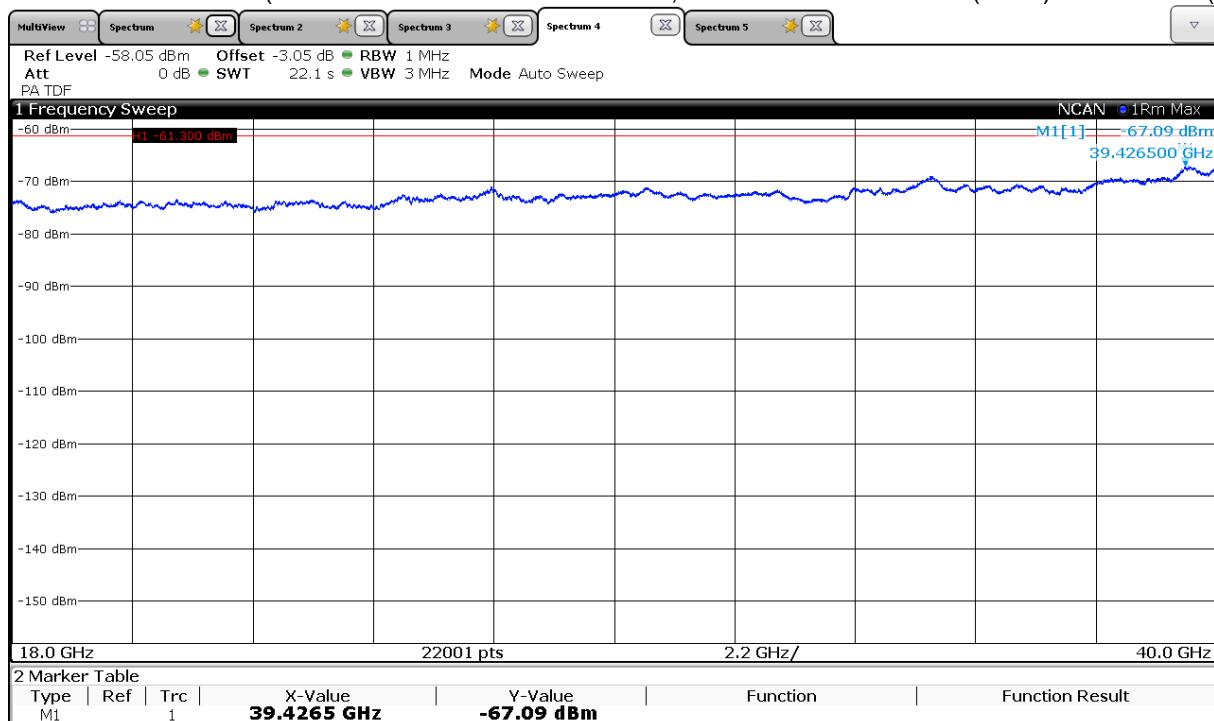
**3.1 GHz to 10.6 GHz at 1 m**


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10.6 GHz to 18 GHz at 30 cm (EIRP transducer for 1 m was used, therefore offset -5.2 dB)



18 GHz to 40 GHz at 30 cm (ERP transducer for 1 m was used, therefore offset 2.15 dB (EIRP) and -5.2 dB (30 cm))



**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:**

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

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

**5.4.1 Description of the test location**

Test location: Anechoic chamber 1

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

Please see Attachment A.

**5.4.3 Applicable standard**

According to FCC Part 15, Section 15.519(d):

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

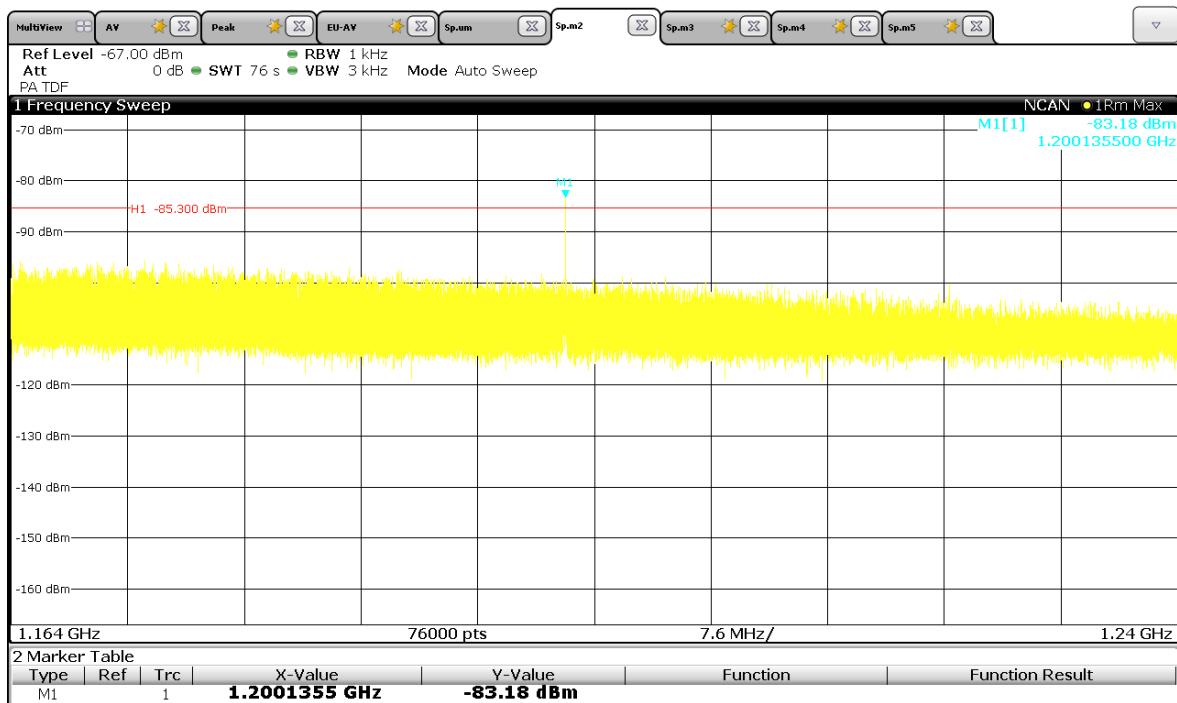
**5.4.4 Analyser settings**

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

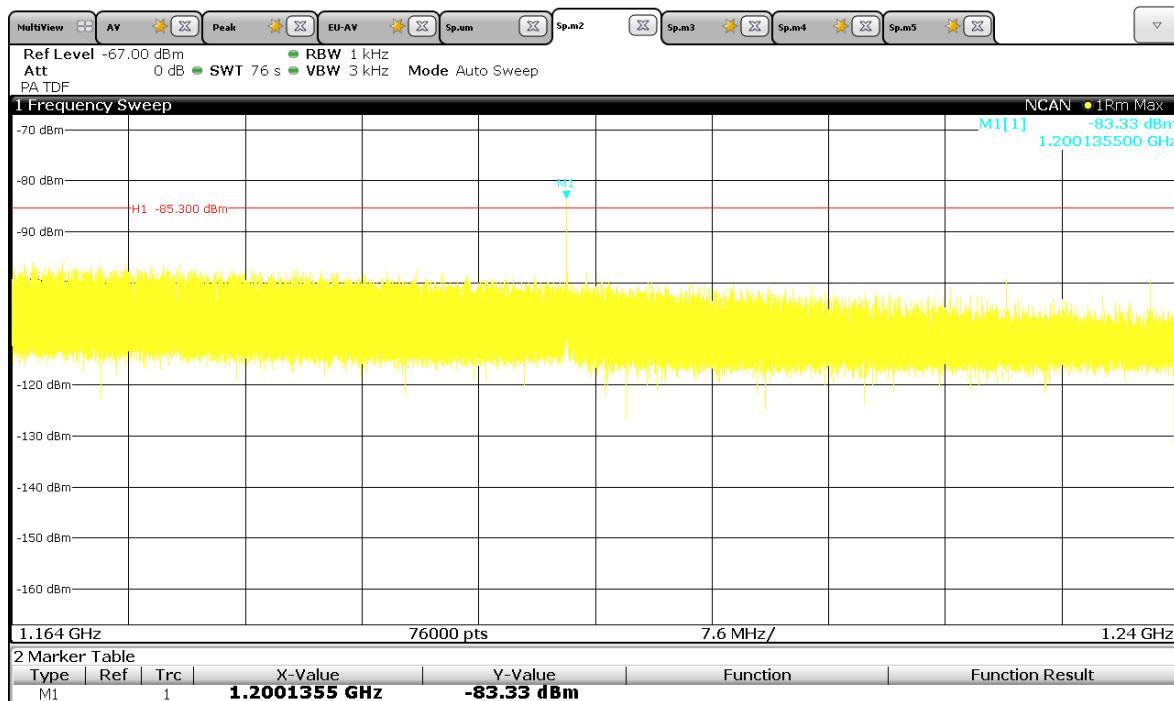
### 5.4.5 Test result

#### Channel 1:

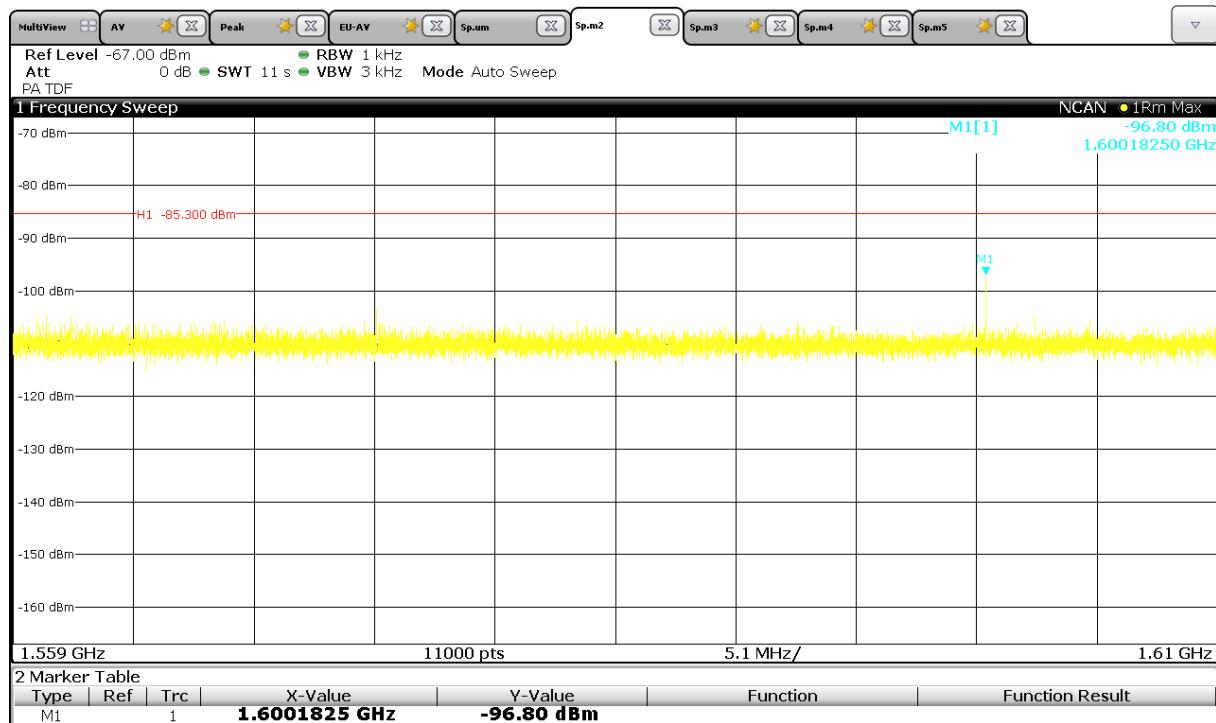
1164 MHz to 1240 MHz



1164 MHz to 1240 MHz UWB off

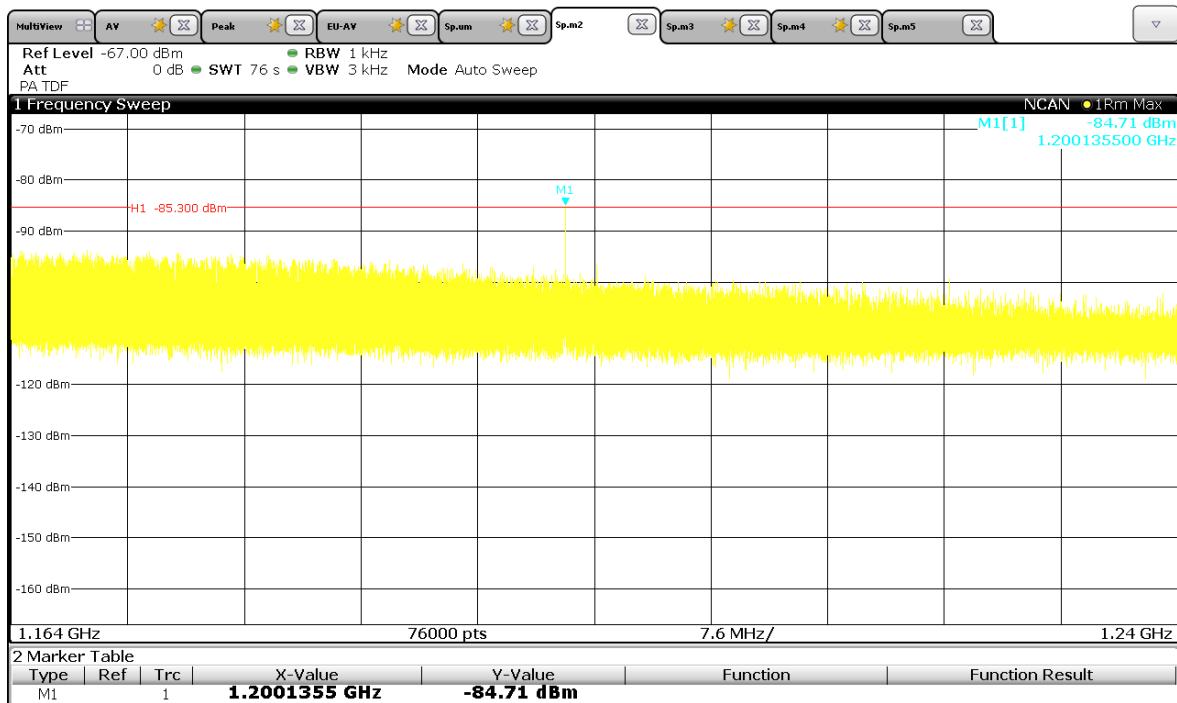


Note: The value above the limit line is not belonging to the UWB technology. This value is considered in the test report T43015-00-01GK of the test laboratory CSA Group Bayern GmbH.

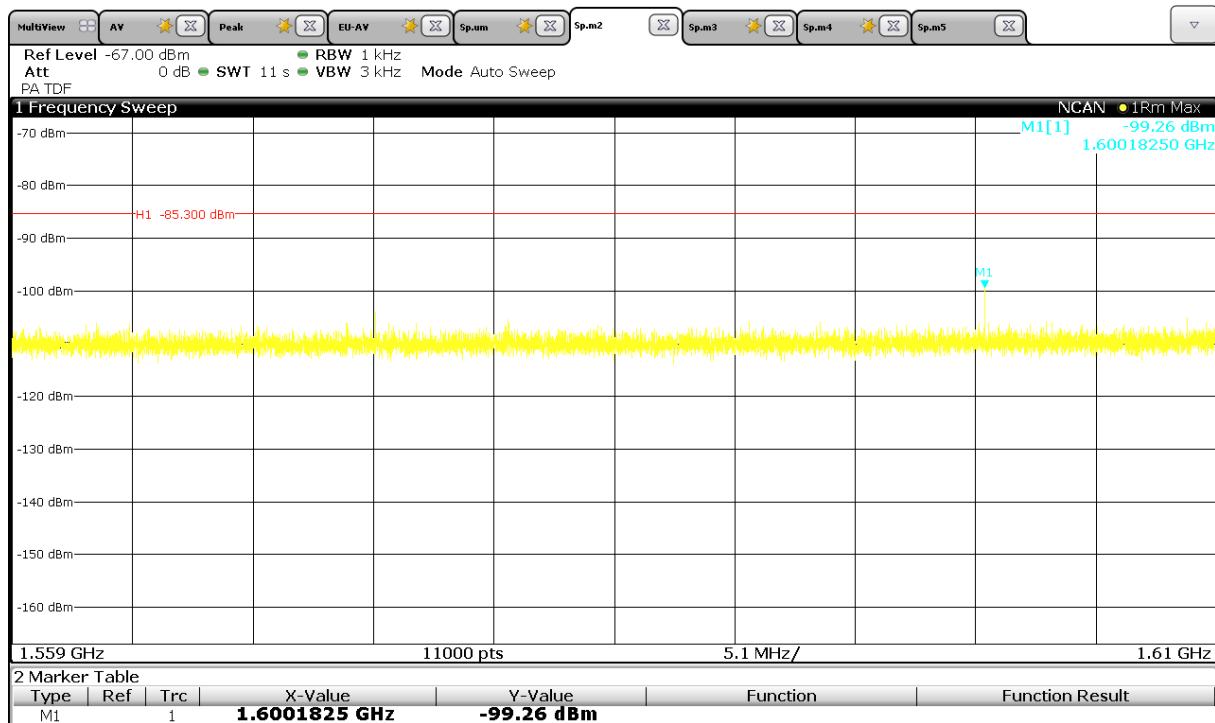
**1559 MHz to 1610 MHz**


**Channel 2:**

1164 MHz to 1240 MHz

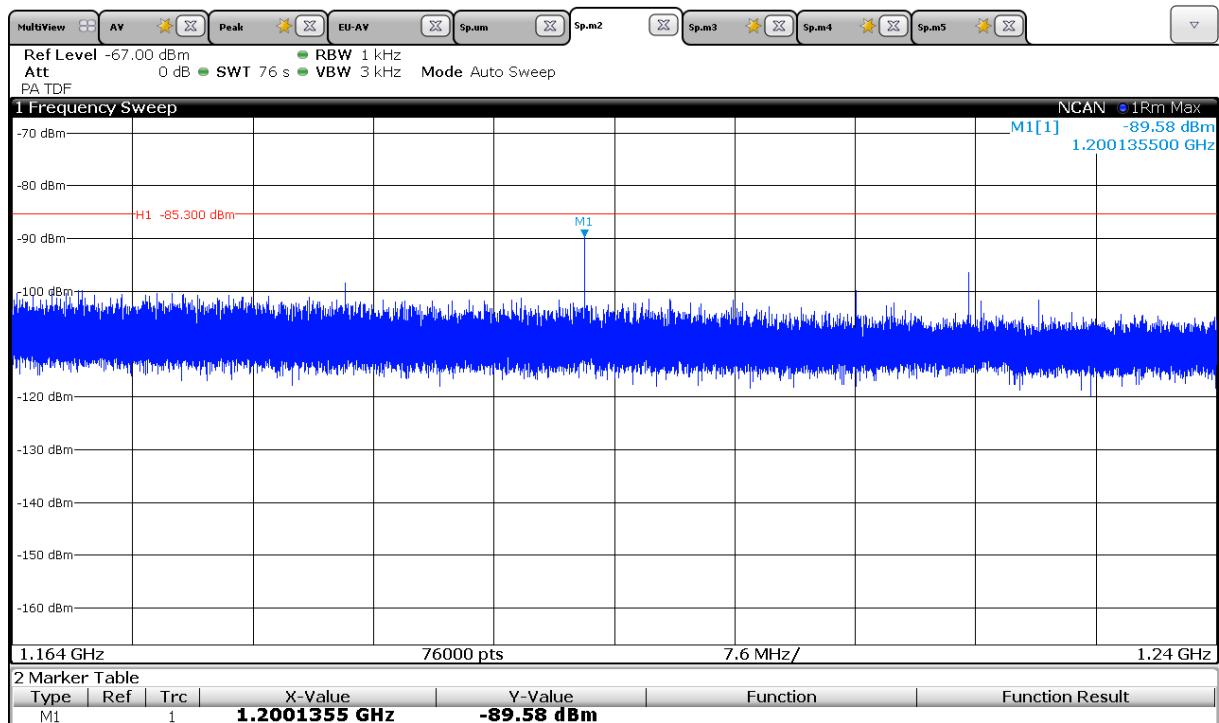


Note: The value above the limit line is not belonging to the UWB technology. This value is considered in the test report T43015-00-01GK of the test laboratory CSA Group Bayern GmbH.

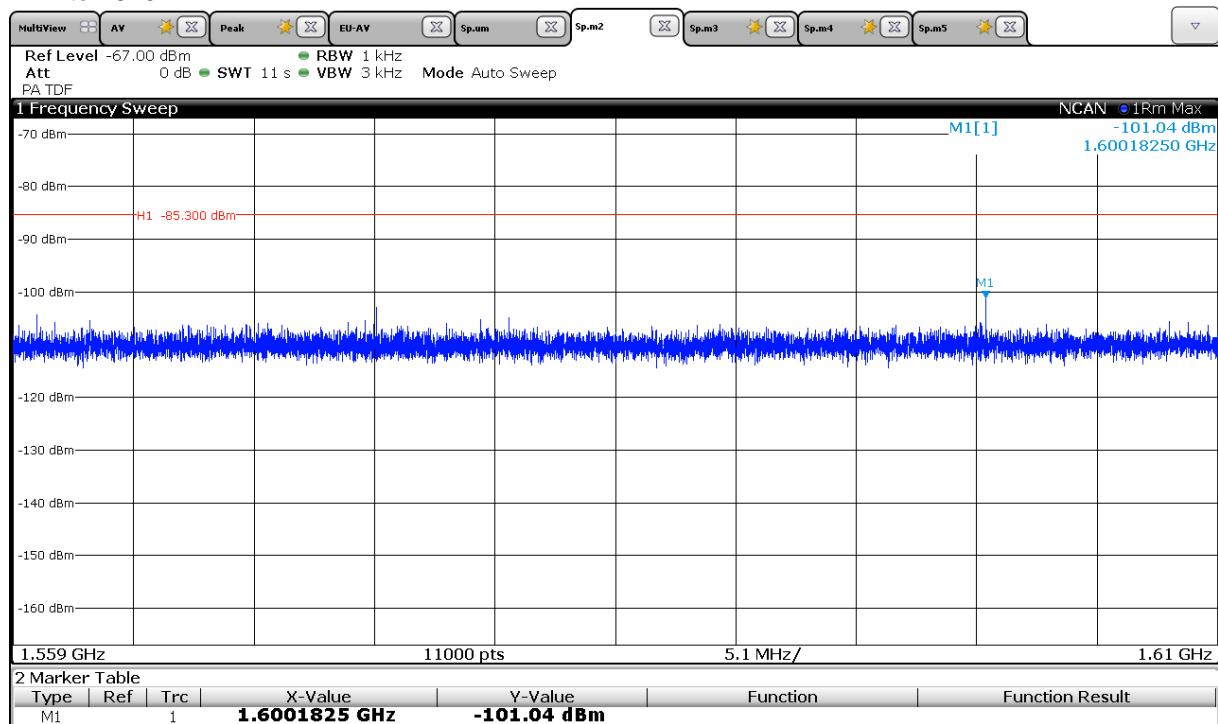
**1559 MHz to 1610 MHz**


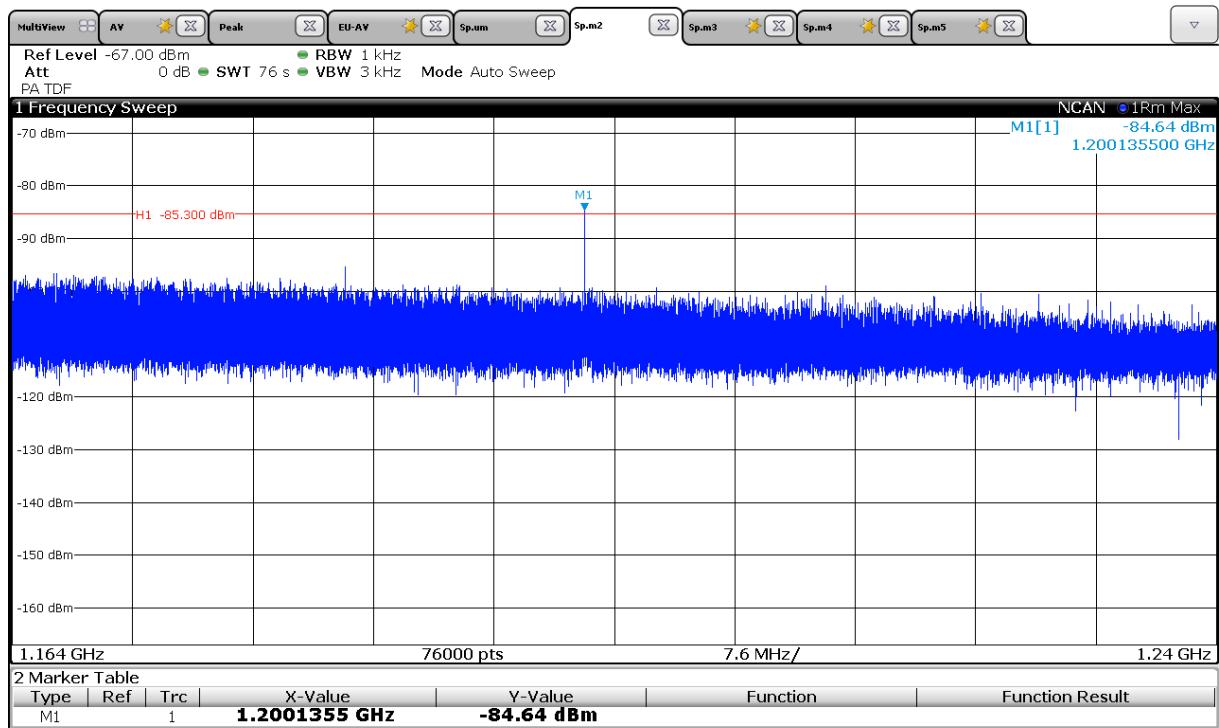
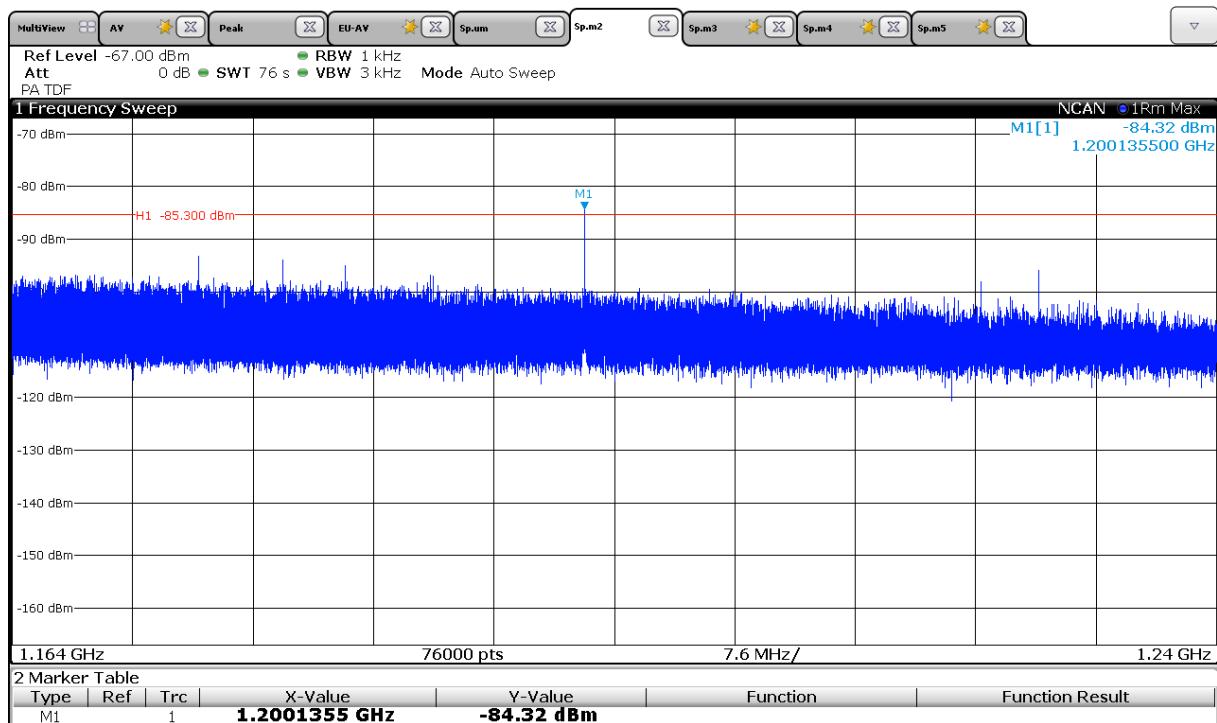
**Channel 3:**

1164 MHz to 1240 MHz



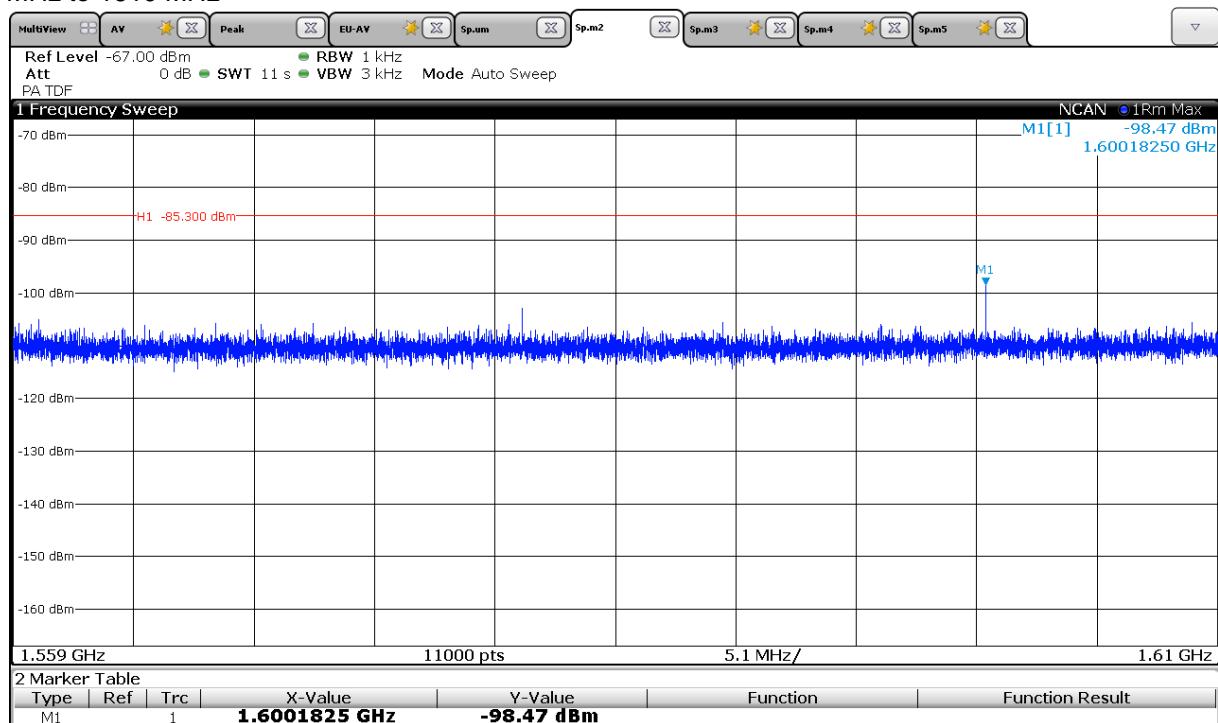
1559 MHz to 1610 MHz



**Channel 5:**
**1164 MHz to 1240 MHz**

**1164 MHz to 1240 MHz UWB off**


Note: The value above the limit line is not belonging to the UWB technology. This value is considered in the test report T43015-00-01GK of the test laboratory CSA Group Bayern GmbH.

1559 MHz to 1610 MHz



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Limit according §15.519(c) in the frequency

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

The requirements are **FULFILLED**.

**Remarks:**

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## 5.5 Peak Power radiated

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

### 5.5.1 Description of the test location

Test location: Anechoic chamber 1

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

Please see Attachment A

### 5.5.3 Applicable standard

According to FCC Part 15, Section 15.519(e):

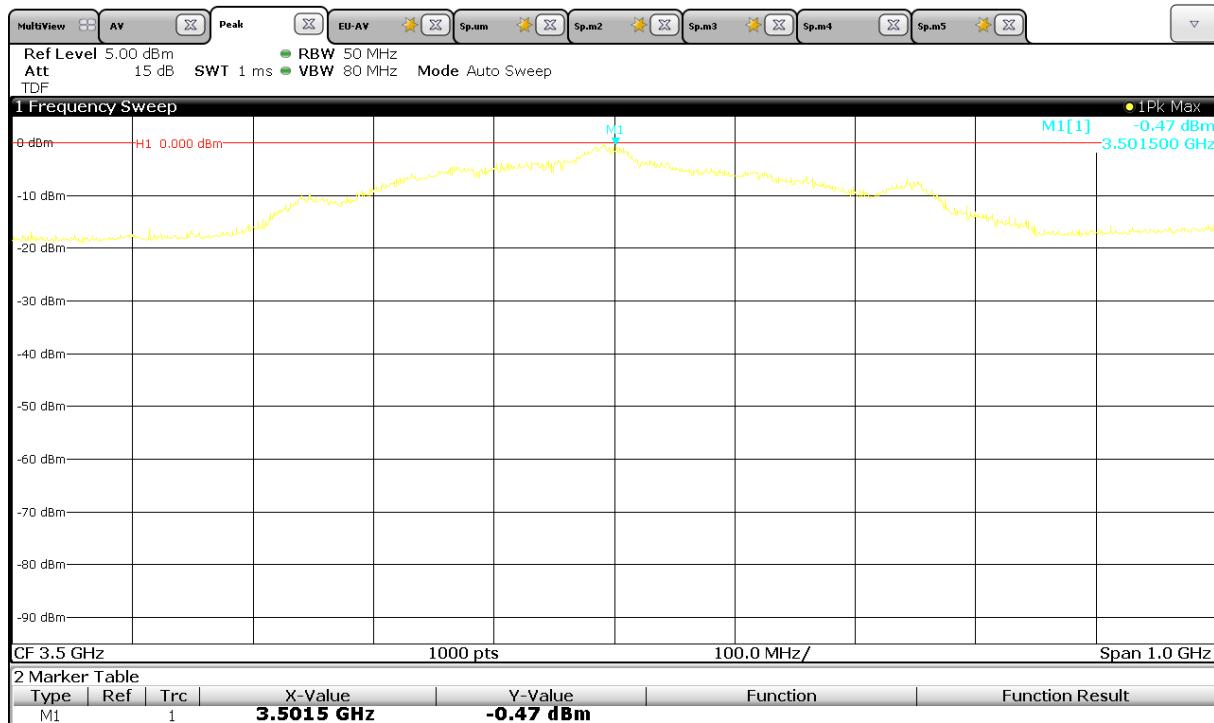
There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs,  $f_m$ . That limit is 0 dBm EIRP. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures described in §15.521.

### 5.5.4 Analyser settings

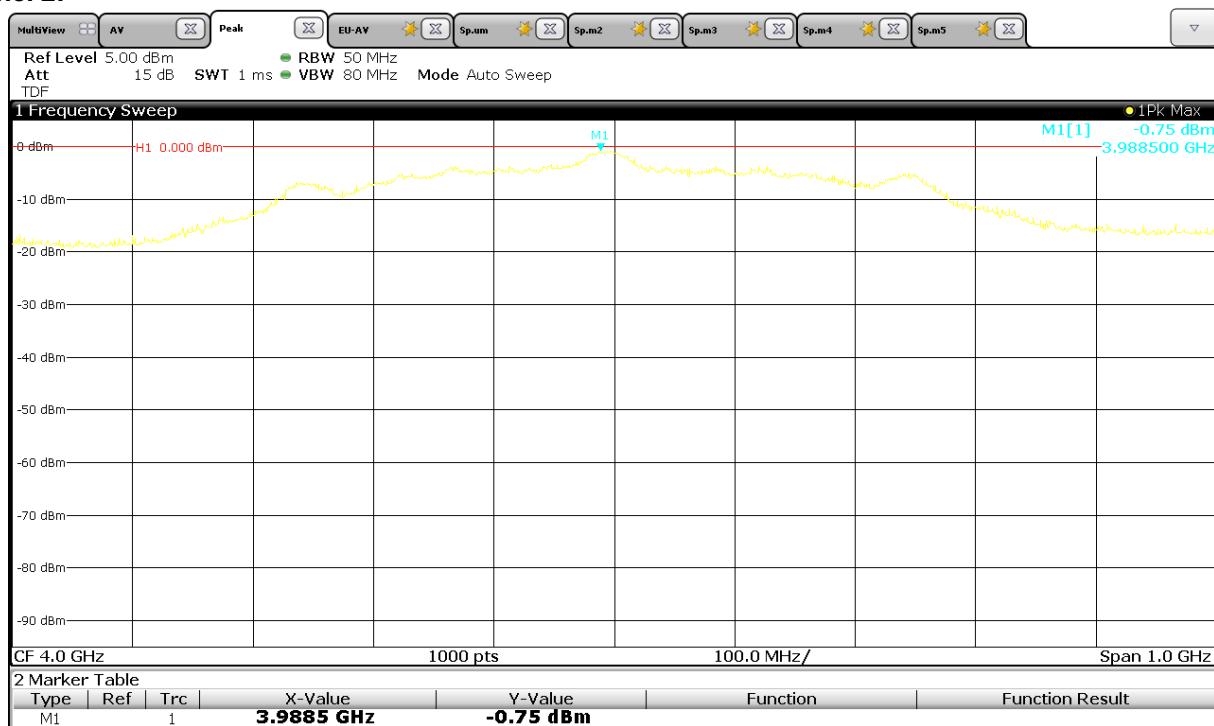
RBW: 50 MHz, VBW: 80 MHz, Detector: Peak, Trace Mode: Max hold

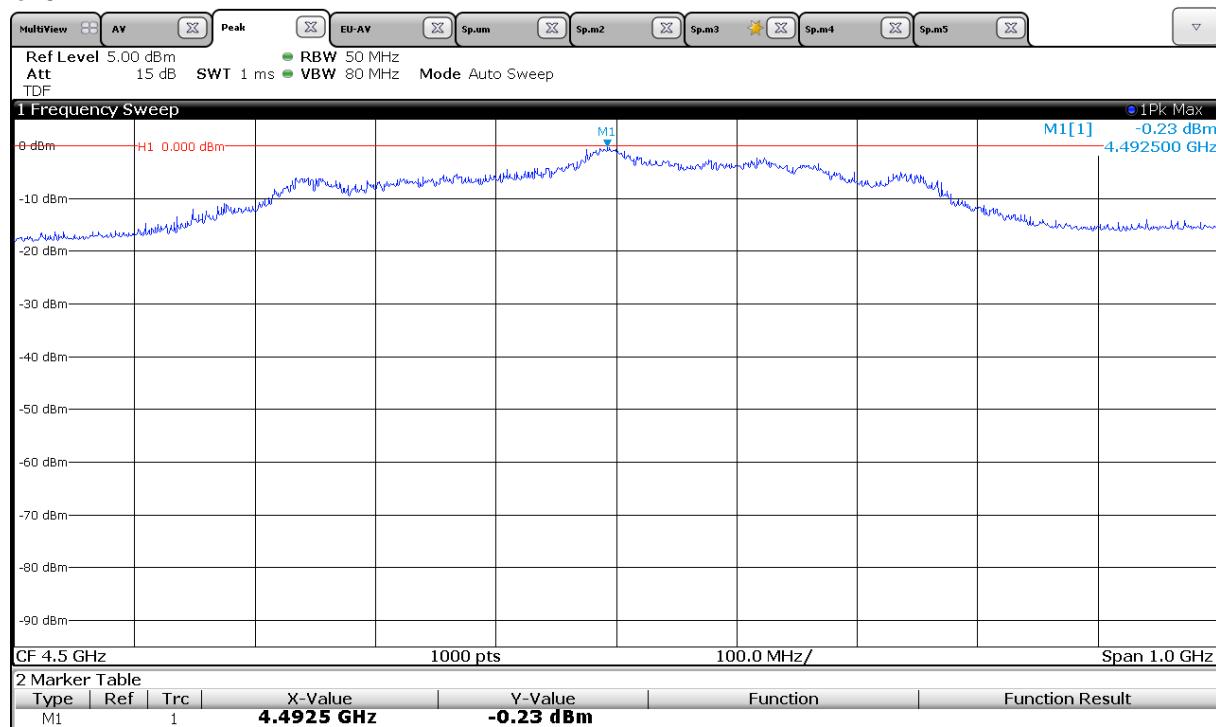
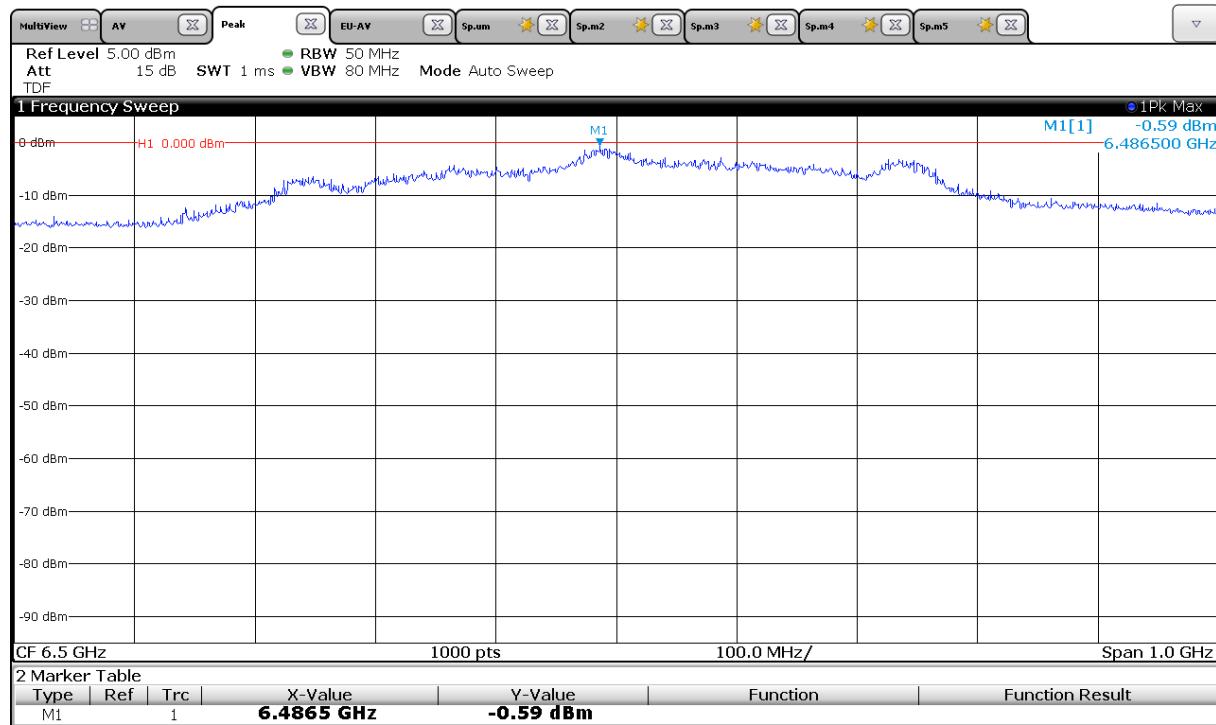
### 5.5.5 Test result

#### Channel 1:



#### Channel 2:



**Channel 3:**

**Channel 5:**


**FCC ID: 2ALC5-KNX-HREC1**

Limit 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.

The requirements are **FULFILLED**.

**Remarks:**

## **5.6 Signal deactivation**

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

### **5.6.1 Description of the test location**

Test location: Shielded room 6

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

Please see Attachment A

### **5.6.3 Applicable standard**

According to FCC Part 15, Section 15.519(a)(1):

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

### **5.6.4 Description of Measurement**

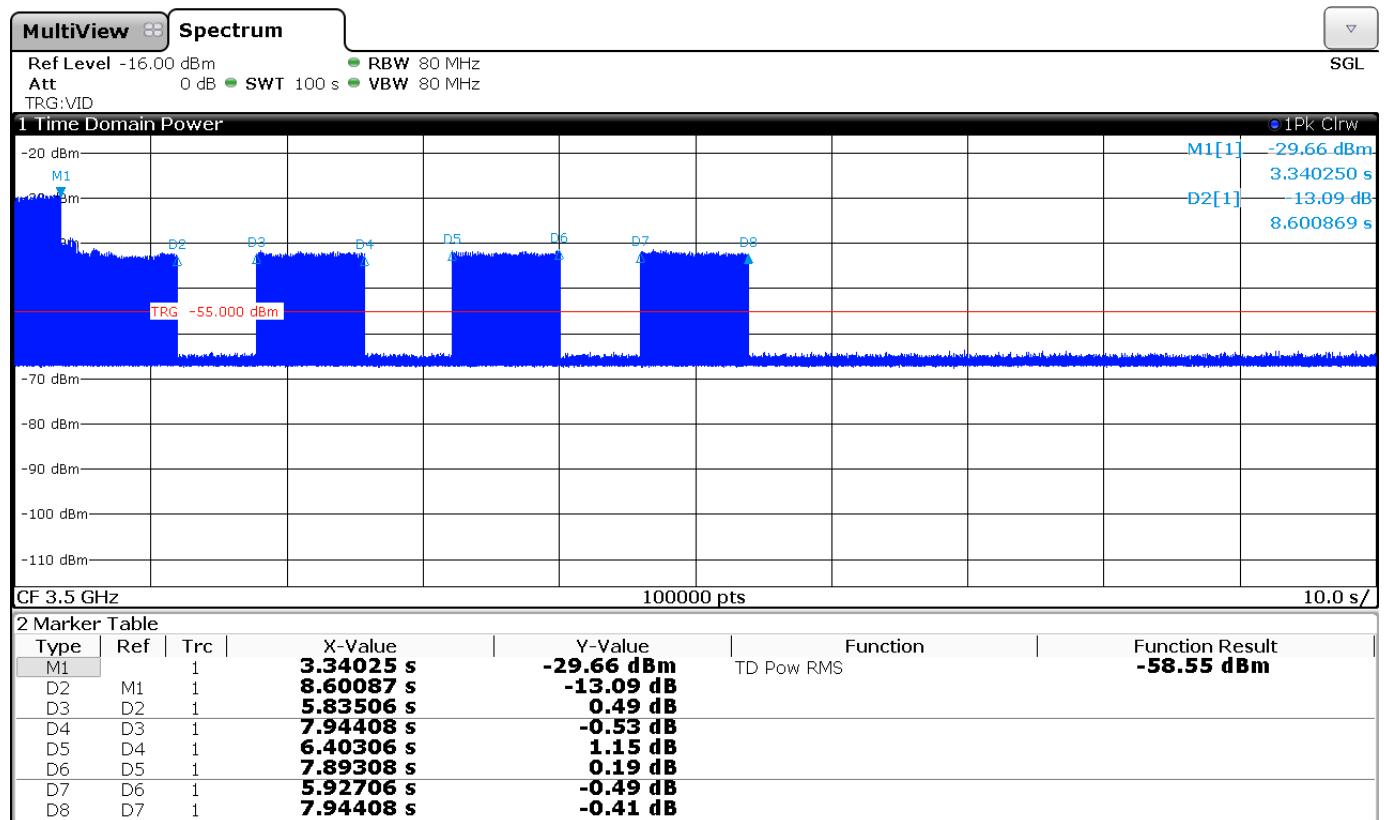
The measurement was performed radiated.

Spectrum analyser settings:

RBW: 80 MHz, VBW: 80 MHz, Detector: peak, zero span

### 5.6.5 Test result

Anchor communicates with another anchor (companion device)



Note: The higher emissions are belonging to the companion device, the lower emissions are the transmissions of the EUT.

Explanation:

At the time M1 the companion device was powered off. After 8.6 s the EUT stopped transmissions and after 5.8 s retried to get a connection to a companion device. The EUT made two additional attempts to get a connection, then all transmissions stopped.

## FCC ID: 2ALC5-KNX-HREC1

\*FCC response on 11/17/2017\*

Adherence to the comparable requirements of RSS-220 is sufficient to demonstrate compliance to the 15.519(a)(1) UWB requirements.

Limit 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.

The requirements are **FULFILLED**.

**Remarks:** \_\_\_\_\_

\_\_\_\_\_

## 5.7 Antenna application

### 5.7.1 Applicable standard

According to FCC Part 15C, Section 15.203:

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

The EUT has two mounted antennas, Reverse Polarity SMA connectors are used.

The supplied antenna meets the requirements of part 15.203 and 15.204.

**Remarks:**

## **6 USED TEST EQUIPMENT AND ACCESSORIES**

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

| <b>Test ID</b> | <b>Model Type</b>      | <b>Equipment No.</b> | <b>Next Calib.</b> | <b>Last Calib.</b> | <b>Next Verif.</b> | <b>Last Verif.</b> |
|----------------|------------------------|----------------------|--------------------|--------------------|--------------------|--------------------|
| A 4            | ESCI                   | 02-02/03-15-001      | 31/05/2018         | 31/05/2017         |                    |                    |
|                | ESH 2 - Z 5            | 02-02/20-05-004      | 25/10/2019         | 25/10/2017         | 25/04/2018         | 25/10/2017         |
|                | N-4000-BNC             | 02-02/50-05-138      |                    |                    |                    |                    |
|                | N-1500-N               | 02-02/50-05-140      |                    |                    |                    |                    |
|                | ESH 3 - Z 2            | 02-02/50-05-155      | 18/11/2019         | 18/11/2016         | 06/05/2018         | 06/11/2017         |
| CPR 3          | FSW43                  | 02-02/11-15-001      | 07/04/2018         | 07/04/2017         |                    |                    |
|                | BBHA 9120 E 251        | 02-02/24-05-006      | 27/04/2018         | 27/04/2017         | 27/01/2018         | 27/07/2017         |
|                | WBH2-18NHG             | 02-02/24-08-002      | 27/04/2018         | 27/04/2017         | 27/01/2018         | 27/07/2017         |
|                | WHJS 1000-10EE         | 02-02/50-05-070      |                    |                    |                    |                    |
|                | SR104/11SMA/11N/2000MM | 02-02/50-15-002      |                    |                    |                    |                    |
| DC             | FSW43                  | 02-02/11-15-001      | 07/04/2018         | 07/04/2017         |                    |                    |
|                | 3117                   | 02-02/24-05-009      | 10/05/2018         | 10/05/2017         |                    |                    |
|                | SF104/11N/11N/1500MM   | 02-02/50-17-008      |                    |                    |                    |                    |
| MB             | FSW43                  | 02-02/11-15-001      | 07/04/2018         | 07/04/2017         |                    |                    |
|                | KK-SF104-11SMA-11N-2M  | 02-02/50-14-006      |                    |                    |                    |                    |
| SER 2          | ESR 3                  | 01-02/03-13-001      | 29/08/2018         | 29/08/2017         |                    |                    |
|                | VULB 9168              | 02-02/24-05-005      | 12/04/2018         | 12/04/2017         | 28/03/2018         | 28/09/2017         |
|                | 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      | 07/04/2018         | 07/04/2017         |                    |                    |
|                | JS4-18004000-30-5A     | 02-02/17-05-017      |                    |                    |                    |                    |
|                | BBHA 9120 E 251        | 02-02/24-05-006      | 27/04/2018         | 27/04/2017         | 27/01/2018         | 27/07/2017         |
|                | BBHA 9170              | 02-02/24-05-014      | 02/06/2018         | 02/06/2015         | 26/10/2018         | 26/10/2017         |
|                | WBH2-18NHG             | 02-02/24-08-002      | 27/04/2018         | 27/04/2017         | 27/01/2018         | 27/07/2017         |
|                | WHJS 1000-10EE         | 02-02/50-05-070      |                    |                    |                    |                    |
|                | KMS102-0.2 m           | 02-02/50-11-020      |                    |                    |                    |                    |
|                | SR104/11SMA/11N/2000MM | 02-02/50-15-002      |                    |                    |                    |                    |