

FCC ID: SR5-17101100

**EMI - TEST REPORT**

- FCC Part 15.247 -

**Test Report No. :** T36827-00-00HU

01. July 2013

Date of issue

**Type / Model Name** : Data reader**Product Description** : Floor identification system – Fidbox V.5 USB Reader**Applicant** : B&M TRICON GmbH

Address : Rautenweg 37

A – 1220 Wien

**Manufacturer** : B&M TRICON GmbH

Address : Rautenweg 37

A – 1220 Wien

**Licence holder** : B&M TRICON GmbH

Address : Rautenweg 37

A – 1220 Wien

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

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: SR5-17101100

# Contents

<b>1</b>	<b><u>TEST STANDARDS</u></b>	<b>3</b>
<b>2</b>	<b><u>SUMMARY</u></b>	<b>4</b>
<b>3</b>	<b><u>EQUIPMENT UNDER TEST</u></b>	<b>5</b>
3.1	Photo documentation of the EUT – Detailed photos see attachment A1	5
3.2	Power supply system utilised	5
3.3	Short description of the equipment under test (EUT)	5
<b>4</b>	<b><u>TEST ENVIRONMENT</u></b>	<b>6</b>
4.1	Address of the test laboratory	6
4.2	Environmental conditions	6
4.3	Statement of the measurement uncertainty	6
4.4	Measurement protocol for FCC, VCCI and AUSTEL	6
<b>5</b>	<b><u>TEST CONDITIONS AND RESULTS</u></b>	<b>7</b>
5.1	Conducted emissions	7
5.2	Emission bandwidth	13
5.3	Maximum peak conducted output power	16
5.4	Spurious emissions conducted	21
5.5	Spurious emissions	28
5.6	Power spectral density	32
5.7	Receiver radiated emissions	35
5.8	Maximum permissible exposure (MPE)	38
5.9	Antenna application - Detailed photos see attachment A1	41
<b>6</b>	<b><u>USED TEST EQUIPMENT AND ACCESSORIES</u></b>	<b>42</b>

FCC ID: SR5-17101100

## 1 TEST STANDARDS

The tests were performed according to following standards:

### **FCC Rules and Regulations Part 15, Subpart A - General (October, 2012)**

Part 15, Subpart A, Section 15.31	Measurement standards
Part 15, Subpart A, Section 15.33	Frequency range of radiated measurements
Part 15, Subpart A, Section 15.35	Measurement detector functions and bandwidths

### **FCC Rules and Regulations Part 15, Subpart C - Intentional Radiators (October, 2012)**

Part 15, Subpart C, Section 15.203	Antenna requirement
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
Part 15, Subpart C, Section 15.247	Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz

### **FCC Rules and Regulations Part 1, Subpart I - Procedures Implementing the National Environmental Policy Act of 1969**

Part 1, Subpart I, Section 1.1310	Radiofrequency radiation exposure limits
Part 1, Subpart 2, Section 2.1093	Radiofrequency radiation exposure evaluation: portable device

### **OET Bulletin 65, 65A, 65B, 65C Edition 97-01, August 1997 – Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields.**

ANSI C63.4: 2003	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
ANSI C63.10: 2009	Testing Unlicensed Wireless Devices Voltage Electrical
ANSI C95.1:1992	IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
CISPR 16-4-2: 2003	Uncertainty in EMC measurement
CISPR 22: 2005 EN 55022: 2006	Information technology equipment

FCC ID: SR5-17101100

## 2 SUMMARY

### GENERAL REMARKS:

The EuT is capable to exchange data with a PC via USB port. The EuT can also connected to an AC Adapter (sold separately).

The test was performed with an AC adapter to have no influence from a Laptop or PC.

The software of the test sample was modified, so the sample was in operation mode as soon the EuT was connected to the AC adapter.

The complete tests were performed with an original sample. The EuT has no external antenna connector. All tests were performed radiated.

The EuT works with a fixed output power.

The EuT is declared as Class B digital device.

### FINAL ASSESSMENT:

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

Date of receipt of test sample : acc. to storage records

Testing commenced on : 21. May 2013

Testing concluded on : 29. May 2013

Checked by:

Tested by:

---

Thomas Weise  
Dipl. Ing.(FH)  
Laboratory Manager

---

Markus Huber

FCC ID: SR5-17101100

### 3 EQUIPMENT UNDER TEST

#### 3.1 Photo documentation of the EUT – Detailed photos see attachment A1

#### 3.2 Power supply system utilised

Power supply voltage : 3.3 V / DC

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

The EUT is a wireless dongle. The Fidbox V.5 USB Reader allows wireless communication via PC to the Fidbox V5.0. The device can be used with an AC adapter.

Number of tested samples: 2  
Serial number: Prototype

#### EUT operation mode:

The equipment under test was operated during the measurement under the following conditions:

- TX mode at CH 1 (2426.00 MHz)

---

- RX mode at CH 1 (2426.00 MHz)

---

-

---

#### EUT configuration:

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

- Power supply - Samsung	Model : ETAOU81EBE, S/N DK1C821TS/A-E
- _____	Model : _____

FCC ID: SR5-17101100

## 4 TEST ENVIRONMENT

### 4.1 Address of the test laboratory

mikes-testingpartners gmbh  
Ohmstrasse 2-4  
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. The reader may notice that tolerances within the calibration of the equipment and facilities may cause additional uncertainty. The measurement uncertainty is calculated for all measurements listed in this test report acc. to CISPR 16-4-2 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurement“ and documented in the mikes-testingpartners gmbh quality system acc. to DIN EN ISO/IEC 17025. For all measurements shown in this report, the measurement uncertainty of the test laboratory, mikes-testingpartners 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 diversity and modifications in production process of devices may result in additional deviation. If necessary, refer to the test lab for the actual measurement uncertainty for the specific test. The manufacturer has the sole responsibility of continued compliance of the EUT.

### 4.4 Measurement protocol for FCC, VCCI and AUSTEL

#### 4.4.1 GENERAL INFORMATION

##### 4.4.1.1 Test methodology

Conducted and radiated disturbance testing is performed according to the procedures set out by the International Special Committee on Radio Interference (CISPR) Publication 22, European Standard EN 55022 as shown under section 1 of this report.

##### 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.

FCC ID: SR5-17101100

## 5 TEST CONDITIONS AND RESULTS

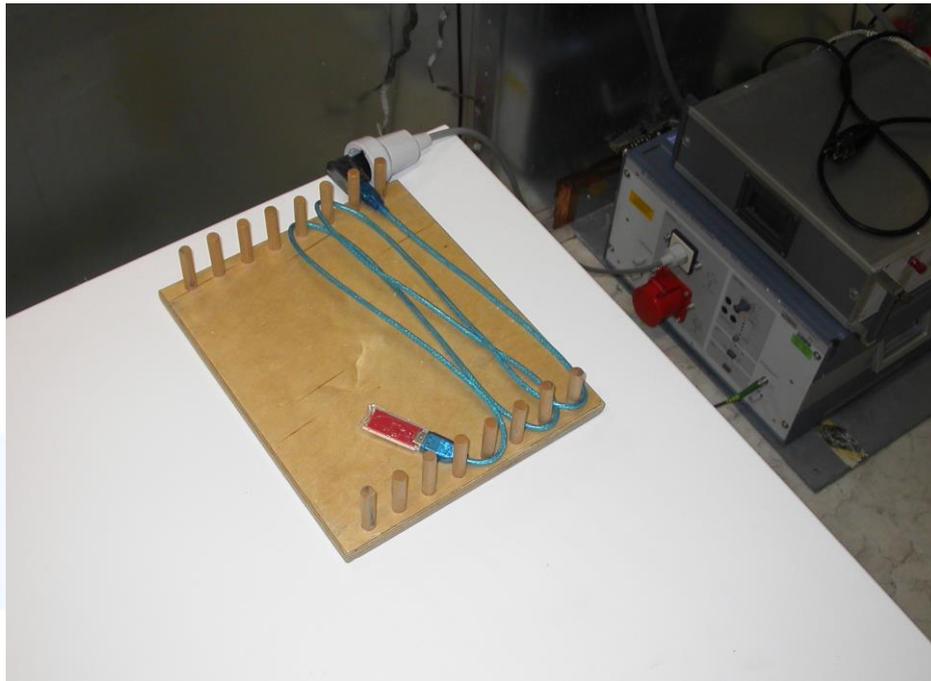
### 5.1 Conducted emissions

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

#### 5.1.1 Description of the test location

Test location:                   Shielded Room S2

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



#### 5.1.3 Applicable standard

According to FCC Part 15, Section 15.207(a):

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

#### 5.1.4 Description of Measurement

The measurements are performed following the procedures set out in ANSI C63.4 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 remeasured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

**FCC ID: SR5-17101100**

**5.1.5 Test result**

Frequency range: 0.15 MHz - 30 MHz

Min. limit margin 17.9 dB at 2.835 MHz

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

Frequency of Emission (MHz)	Conducted Limit (dB $\mu$ V)	
	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:** The test was performed with an AC adapter to have no influence from a Laptop or PC.

---

FCC ID: SR5-17101100

5.1.6 Test protocol

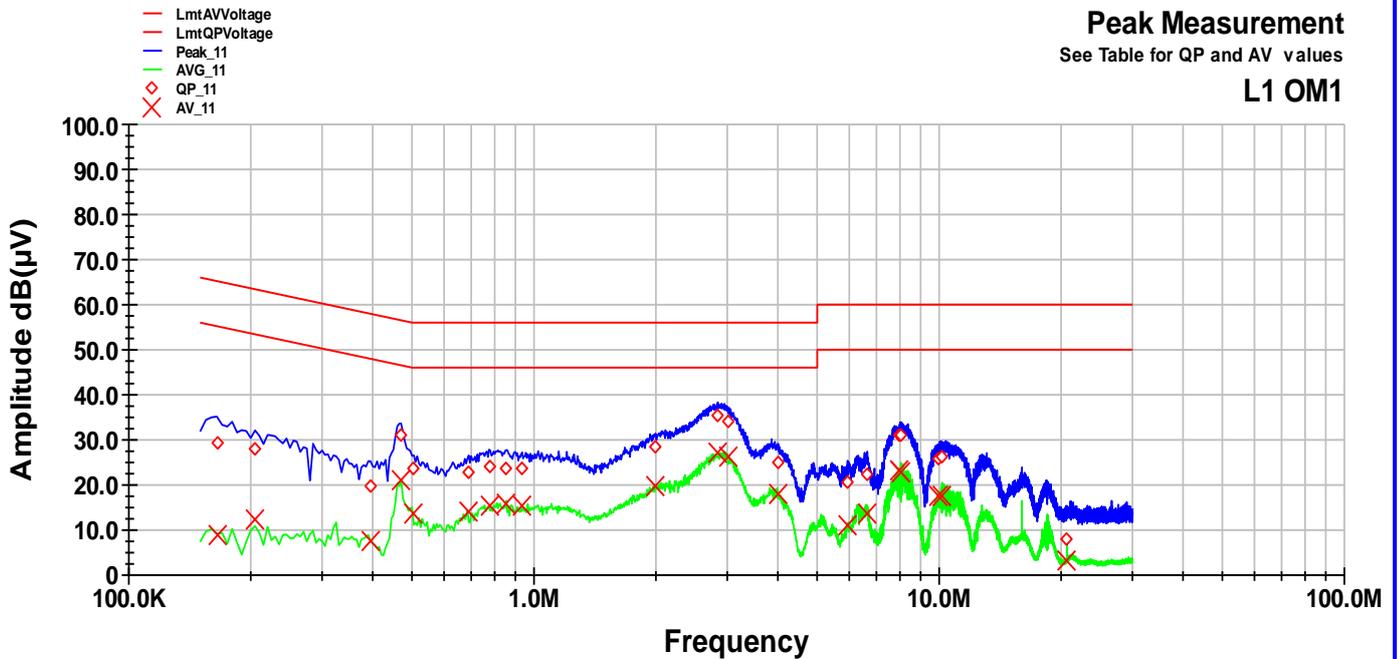
Test point: L1  
 Operation mode: Tx mode  
 Remarks:

Result: passed

Peak Measurement

See Table for QP and AV values

L1 0M1



Frequency MHz	QP Level dB(µV)	QP Margin dB	QP Limit dB	AV Level dB(µV)	AV Margin dB	AV Limit dB
0.165	29.4	-35.8	65.2	8.9	-46.3	55.2
0.205	28.2	-35.2	63.4	12.2	-41.2	53.4
0.395	19.9	-38.1	58.0	7.8	-40.2	48.0
0.47	31.2	-25.3	56.5	21.1	-25.5	46.5
0.505	23.5	-32.5	56.0	13.7	-32.3	46.0
0.69	22.8	-33.2	56.0	14.0	-32.0	46.0
0.775	24.0	-32.0	56.0	15.4	-30.6	46.0
0.855	23.9	-32.2	56.0	15.8	-30.2	46.0
0.935	23.7	-32.3	56.0	15.3	-30.7	46.0
1.995	28.3	-27.7	56.0	19.7	-26.3	46.0
2.84	35.3	-20.8	56.0	27.1	-18.9	46.0
3.005	34.2	-21.8	56.0	26.3	-19.7	46.0
4.005	25.1	-30.9	56.0	17.9	-28.1	46.0
5.94	20.8	-39.2	60.0	11.1	-38.9	50.0
6.645	22.5	-37.5	60.0	13.5	-36.5	50.0
8	31.2	-28.8	60.0	23.2	-26.8	50.0
8.045	31.1	-28.9	60.0	22.8	-27.3	50.0
9.955	26.0	-34.0	60.0	17.8	-32.2	50.0
10.165	26.1	-33.9	60.0	17.7	-32.3	50.0
20.65	7.9	-52.1	60.0	3.4	-46.6	50.0

FCC ID: SR5-17101100

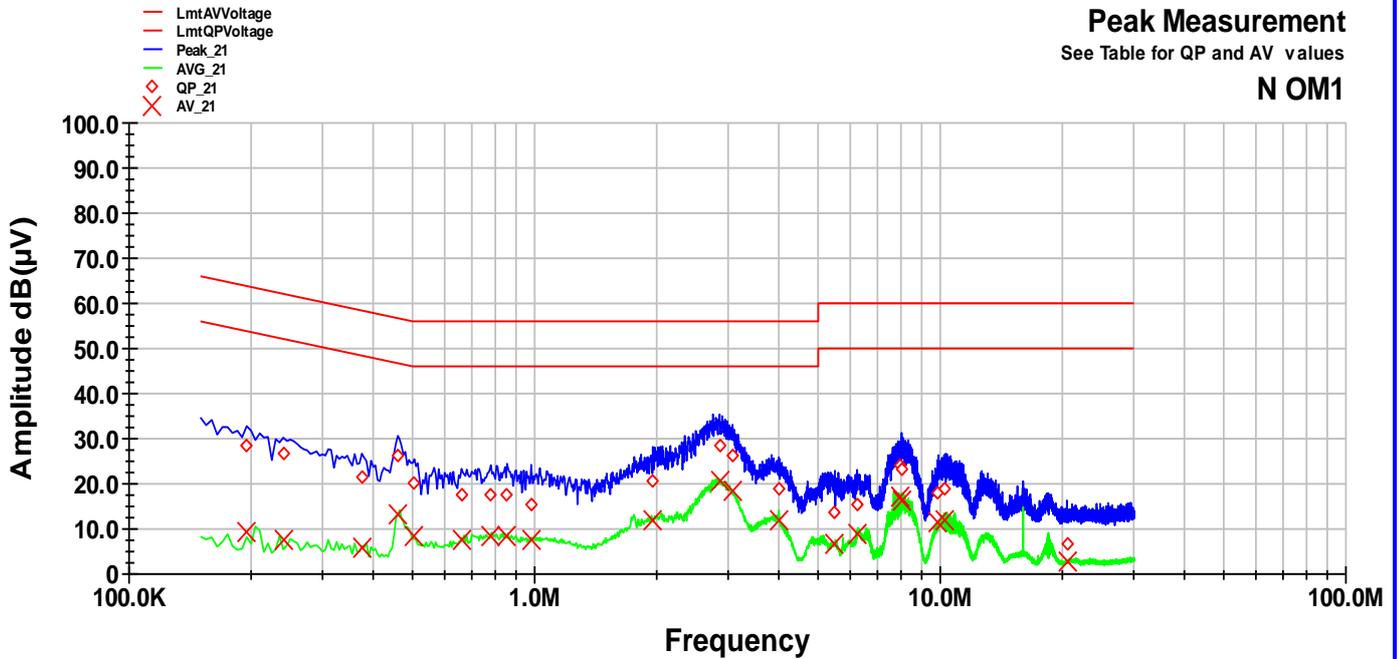
Test point: N  
 Operation mode: Tx mode  
 Remarks:

Result: passed

Peak Measurement

See Table for QP and AV values

N OM1

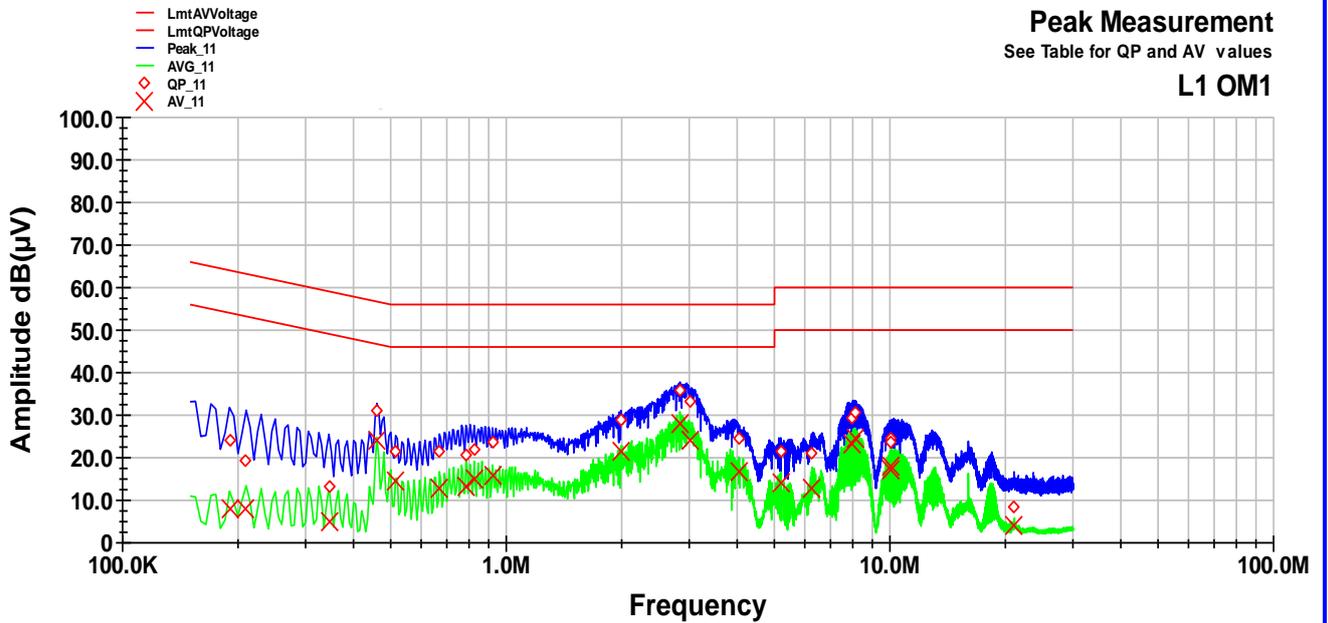


Frequency MHz	QP Level dB(µV)	QP Margin dB	QP Limit dB	AV Level dB(µV)	AV Margin dB	AV Limit dB
0.195	28.5	-35.4	63.8	9.2	-44.6	53.8
0.24	26.8	-35.3	62.1	7.6	-44.5	52.1
0.375	21.5	-36.9	58.4	5.8	-42.6	48.4
0.46	26.1	-30.5	56.7	13.0	-33.7	46.7
0.505	20.3	-35.7	56.0	8.3	-37.7	46.0
0.66	17.4	-38.6	56.0	7.4	-38.6	46.0
0.78	17.6	-38.4	56.0	8.4	-37.6	46.0
0.855	17.6	-38.4	56.0	8.4	-37.6	46.0
0.98	15.3	-40.7	56.0	7.5	-38.5	46.0
1.955	20.5	-35.5	56.0	11.9	-34.1	46.0
2.855	28.5	-27.5	56.0	20.5	-25.5	46.0
3.075	26.1	-29.9	56.0	18.3	-27.7	46.0
4.01	18.9	-37.1	56.0	11.8	-34.3	46.0
5.495	13.6	-46.4	60.0	6.5	-43.5	50.0
6.235	15.2	-44.8	60.0	8.9	-41.2	50.0
8	24.0	-36.0	60.0	17.2	-32.8	50.0
8.025	23.0	-37.0	60.0	16.4	-33.6	50.0
9.895	18.0	-42.0	60.0	11.4	-38.6	50.0
10.3	18.9	-41.1	60.0	11.9	-38.1	50.0
20.5	6.9	-53.1	60.0	2.7	-47.3	50.0

FCC ID: SR5-17101100

Test point: L1  
 Operation mode: Rx mode  
 Remarks:

Result: passed



Frequency MHz	QP Level dB(µV)	QP Margin dB	QP Limit dB	AV Level dB(µV)	AV Margin dB	AV Limit dB
0.19	24.2	-39.8	64.0	8.0	-46.0	54.0
0.21	19.3	-43.9	63.2	7.8	-45.4	53.2
0.345	13.1	-45.9	59.1	4.7	-44.4	49.1
0.46	31.1	-25.6	56.7	24.0	-22.7	46.7
0.515	21.4	-34.6	56.0	14.3	-31.7	46.0
0.67	21.3	-34.7	56.0	12.8	-33.2	46.0
0.785	20.7	-35.3	56.0	13.0	-33.0	46.0
0.825	22.0	-34.0	56.0	15.1	-30.9	46.0
0.92	23.8	-32.2	56.0	15.8	-30.2	46.0
1.99	29.0	-27.0	56.0	21.6	-24.4	46.0
2.835	36.0	-20.0	56.0	28.1	-17.9	46.0
3.01	33.4	-22.6	56.0	24.1	-21.9	46.0
4.03	24.4	-31.6	56.0	16.6	-29.4	46.0
5.19	21.6	-38.4	60.0	14.1	-36.0	50.0
6.265	21.1	-38.9	60.0	12.7	-37.3	50.0
8	29.4	-30.6	60.0	23.2	-26.8	50.0
8.095	30.5	-29.5	60.0	24.6	-25.4	50.0
10	24.5	-35.5	60.0	17.9	-32.1	50.0
10.095	23.7	-36.3	60.0	17.3	-32.7	50.0
21.06	8.6	-51.5	60.0	3.9	-46.1	50.0

FCC ID: SR5-17101100

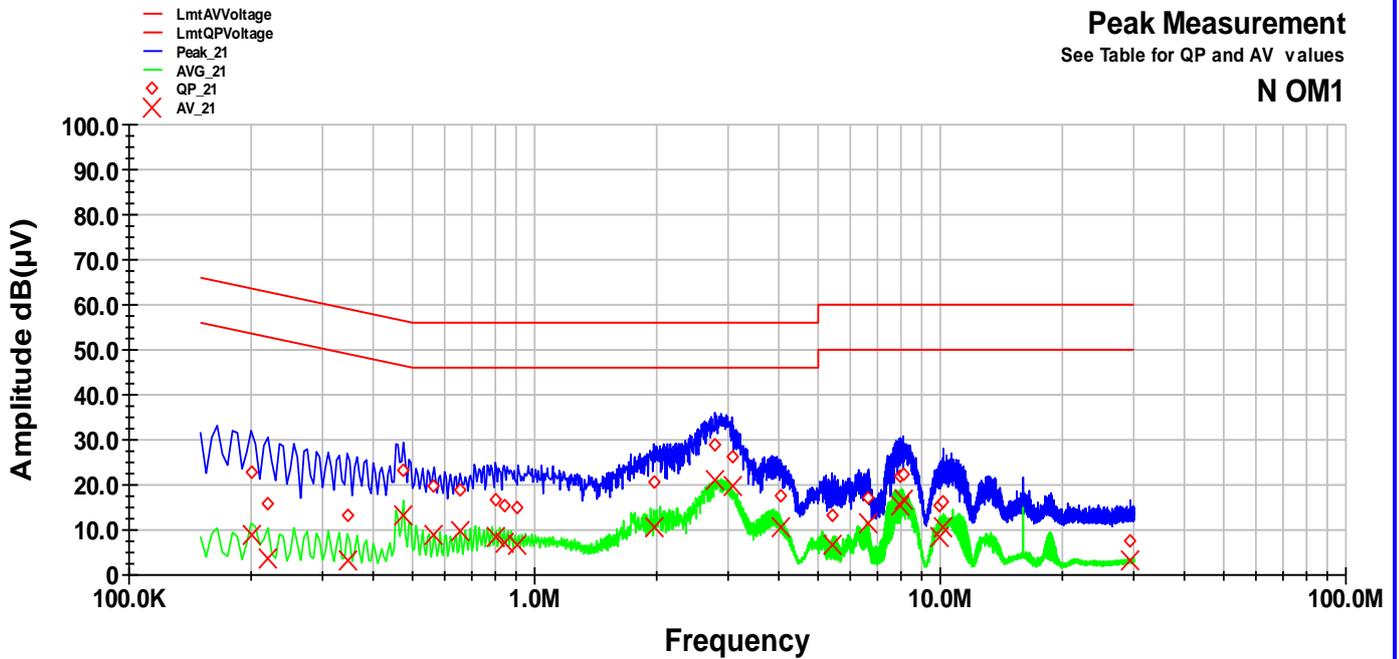
Test point: N  
 Operation mode: Rx mode  
 Remarks:

Result: passed

Peak Measurement

See Table for QP and AV values

N OM1



Frequency MHz	QP Level dB(µV)	QP Margin dB	QP Limit dB	AV Level dB(µV)	AV Margin dB	AV Limit dB
0.2	22.9	-40.7	63.6	8.8	-44.8	53.6
0.22	15.9	-46.9	62.8	3.8	-49.0	52.8
0.345	13.2	-45.8	59.1	3.2	-45.9	49.1
0.475	23.2	-33.2	56.4	13.1	-33.3	46.4
0.565	19.9	-36.1	56.0	9.1	-36.9	46.0
0.655	19.0	-37.0	56.0	9.6	-36.4	46.0
0.8	16.6	-39.4	56.0	8.5	-37.5	46.0
0.84	15.3	-40.8	56.0	6.9	-39.1	46.0
0.91	14.8	-41.2	56.0	6.7	-39.3	46.0
1.965	20.8	-35.2	56.0	10.8	-35.3	46.0
2.78	29.1	-26.9	56.0	21.0	-25.0	46.0
3.065	26.3	-29.7	56.0	19.7	-26.3	46.0
4.03	17.6	-38.4	56.0	10.8	-35.2	46.0
5.405	13.4	-46.6	60.0	6.8	-43.2	50.0
6.65	17.2	-42.8	60.0	11.6	-38.4	50.0
7.975	21.7	-38.3	60.0	15.6	-34.4	50.0
8.095	22.4	-37.6	60.0	16.9	-33.1	50.0
9.95	15.5	-44.5	60.0	8.6	-41.5	50.0
10.17	16.3	-43.7	60.0	10.4	-39.5	50.0
29.415	7.6	-52.4	60.0	3.1	-46.9	50.0

FCC ID: SR5-17101100

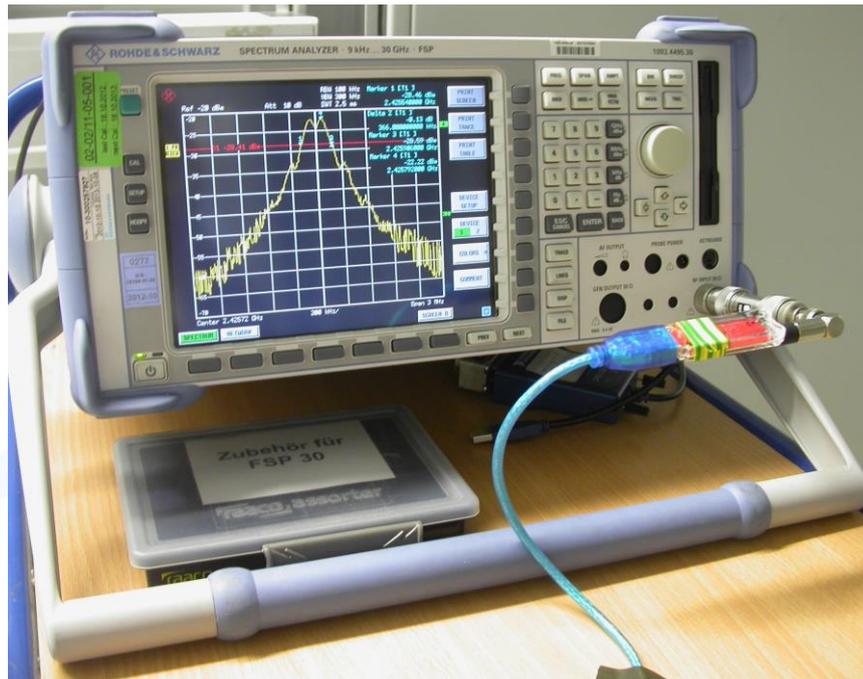
## 5.2 Emission bandwidth

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

### 5.2.1 Description of the test location

Test location:                   Shielded Room S4

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



### 5.2.3 Applicable standard

According to FCC Part 15, Section 15.247(a)(2):

Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 – 2483.5 MHz and 5725 – 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

### 5.2.4 Description of Measurement

The bandwidth was measured at an amplitude level reduced from the reference level of a modulated channel by a ratio of -6 dB. The reference level is the level of the highest signal amplitude observed at the transmitter at either the fundamental frequency or the first order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical. An alternative is to use the bandwidth measurement of the analyzer.

## FCC ID: SR5-17101100

The table below shows the settings according to ANSI C63.4:

Fundamental frequency	Minimum resolution bandwidth
9 kHz to 30 MHz	1kHz
30 to 1000 MHz	10 kHz
1000 MHz to 40 GHz	100 kHz

### 5.2.5 Test result

Channel number	Fundamental frequency (MHz)	6 dB Bandwidth (kHz)	Minimum limit (kHz)
1	2426.0	564	500

The requirements are **FULFILLED**.

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

---



---

FCC ID: SR5-17101100

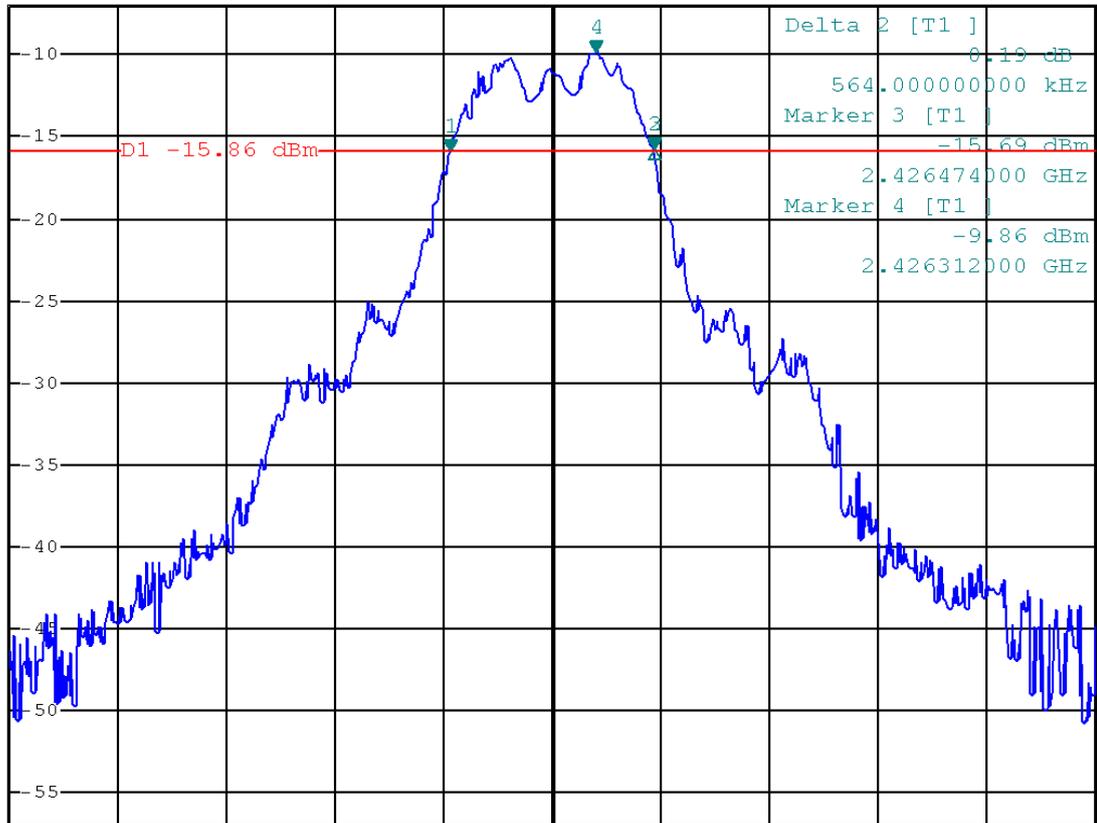
5.2.6 Test protocols

Channel 1



Ref -7 dBm Att 30 dB RBW 100 kHz Marker 1 [T1 ] -15.88 dBm  
 VBW 300 kHz  
 SWT 2.5 ms 2.425910000 GHz

1 PK VIEW



Center 2.426192 GHz 300 kHz/ Span 3 MHz

## FCC ID: SR5-17101100

### 5.3 Radiated emission of the fundamental wave

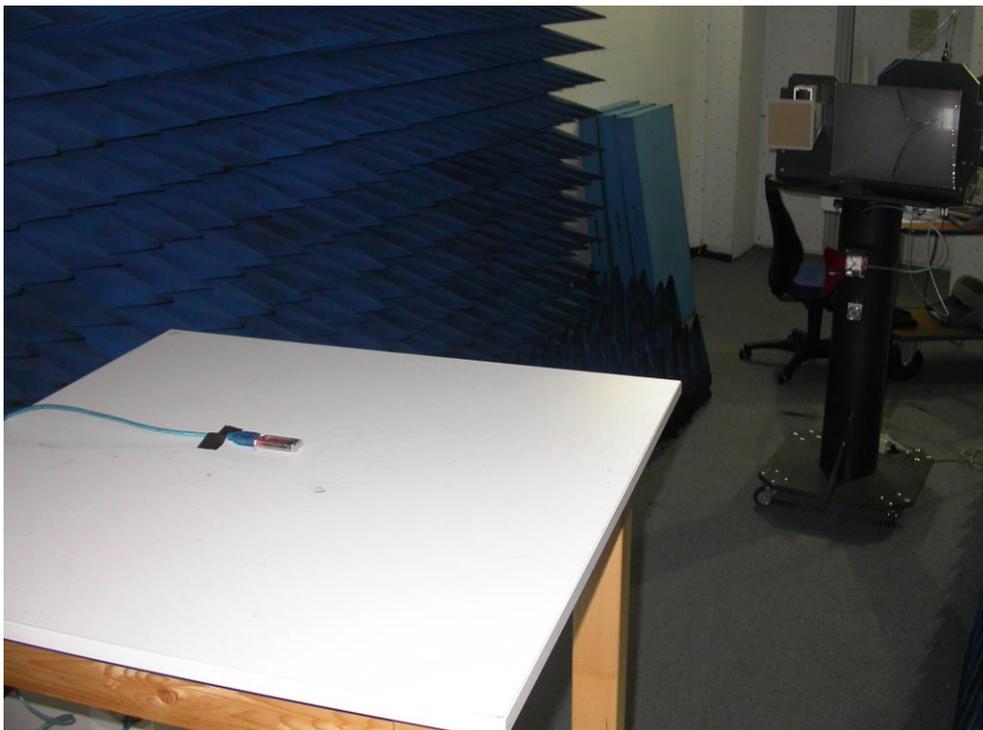
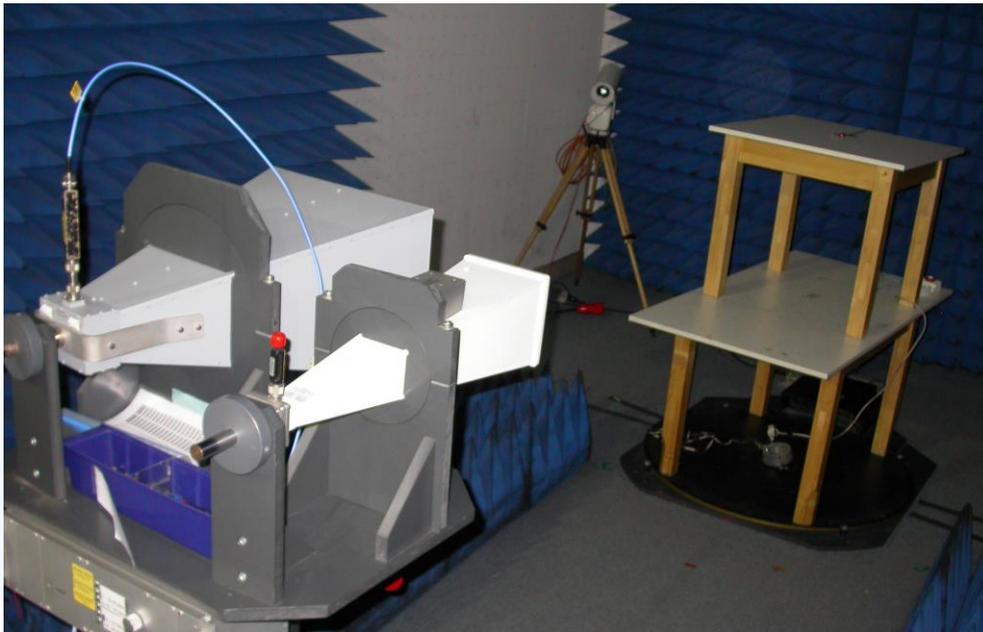
For test instruments and accessories used see section 6 Part CPR 3.

#### 5.3.1 Description of the test location

Test location: Anechoic Chamber A2

Test distance: 3 metres

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





FCC ID: SR5-17101100

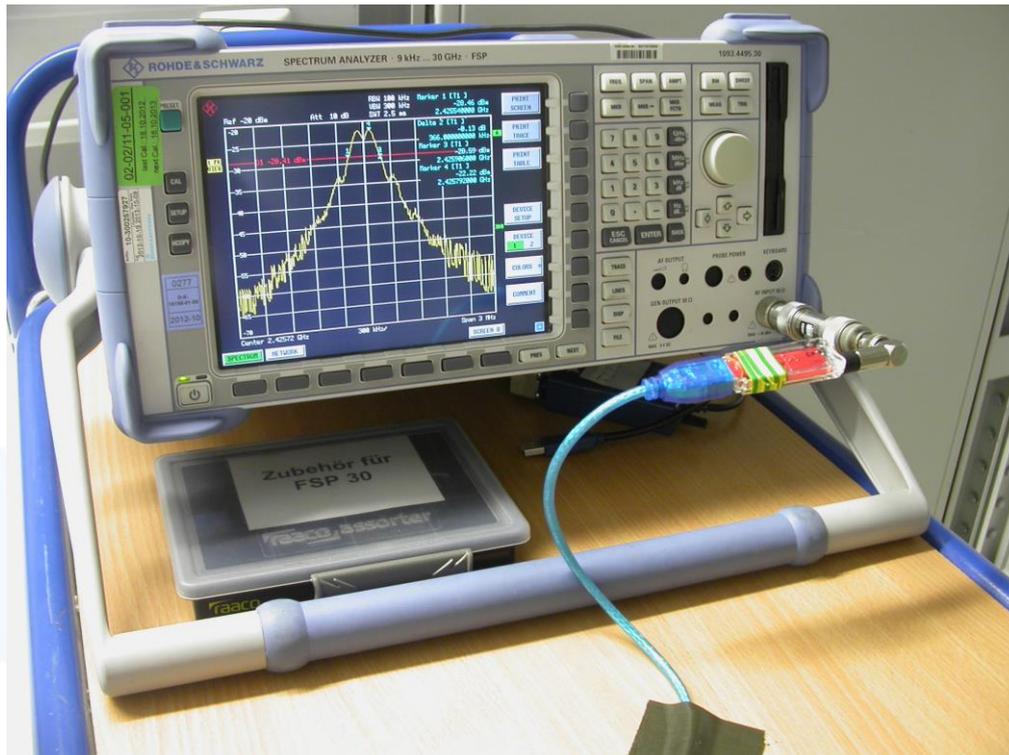
## 5.4 Maximum peak conducted output power

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

### 5.4.1 Description of the test location

Test location:                   Shielded Room S4

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



### 5.4.3 Applicable standard

According to FCC Part 15, Section 15.247(b)(3):

For systems using digital modulation in the 2400-2483.5 MHz and 5725 – 5850 MHz bands, the maximum peak output power of the transmitter shall not exceed 1 Watt. The limit is based on transmitting antennas of directional gain that do not exceed 6 dBi.

### 5.4.4 Description of Measurement

The EuT was fixed mounted on the receiving antenna of the spectrum analyzer to find out the maximum power. An analyzer offset was tried to see the compliance to the measured radiated value.

The transmitter output was directly connected to the spectrum analyzer. The center frequency of the spectrum analyzer is set to the fundamental frequency. The span of the spectrum analyzer should be larger than the emission bandwidth (EBW). The channel bandwidth has been set to EBW. With peak detector and power mode "Max Hold" the result is the summed maximum output power of the EBW.

**FCC ID: SR5-17101100**

**5.4.5 Test result**

Channel	Frequency (MHz)	Measured power (dBm)	Peak power limit (dBm)	Delta (dB)
1	2426.0	-10.9	30	-40.9

Peak Power Limit according to FCC Part 15, Section 15.247(b)(3):

Frequency (MHz)	Peak Power Limit	
	(dBm)	(Watt)
902-928	30	1.0
<b>2400-2483.5</b>	<b>30</b>	<b>1.0</b>
5725-5850	30	1.0

The requirements are **FULFILLED**.

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

---

FCC ID: SR5-17101100

Channel 1

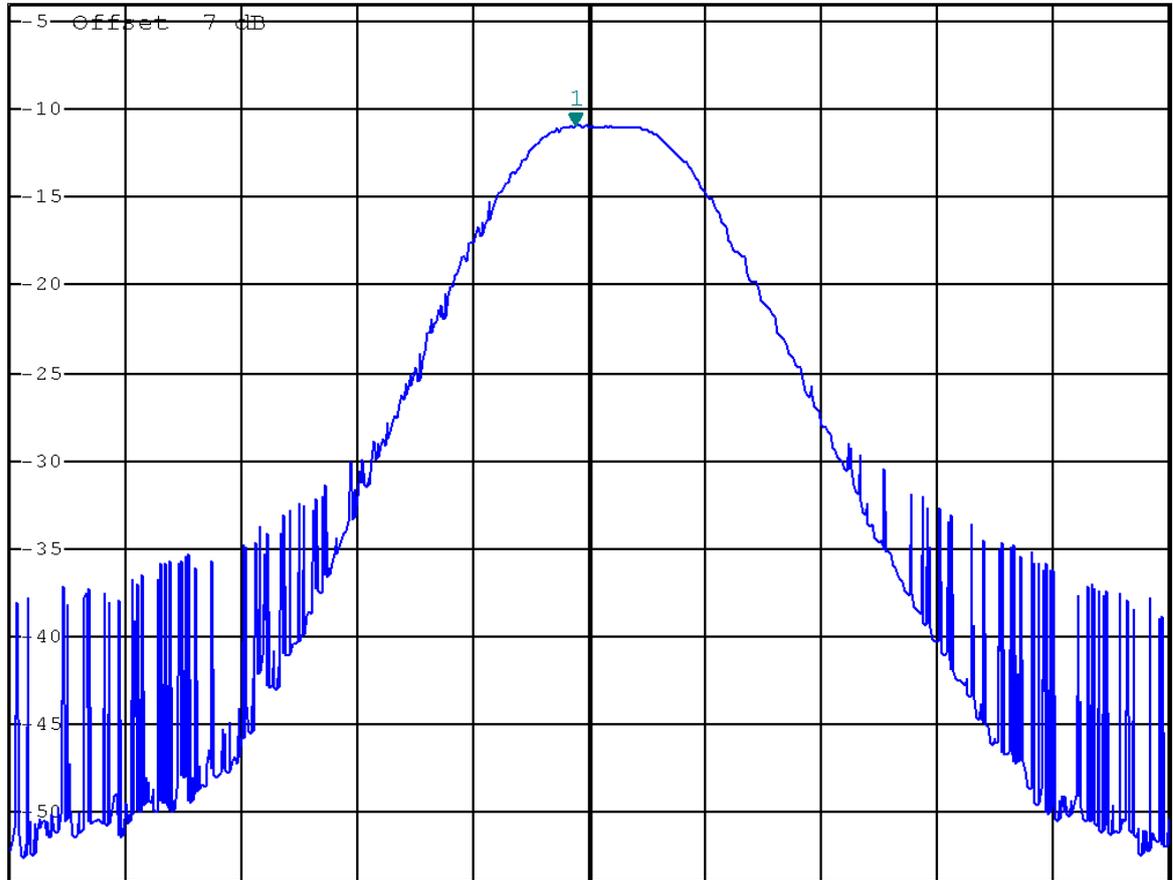


\*RBW 1 MHz      Marker 1 [T1 ]  
 \*VBW 1 MHz      -10.90 dBm  
 SWT 2.5 ms      2.425980000 GHz

Ref -4 dBm

Att 20 dB

1 PK  
VIEW



Center 2.4261 GHz

1 MHz/

Span 10 MHz

## FCC ID: SR5-17101100

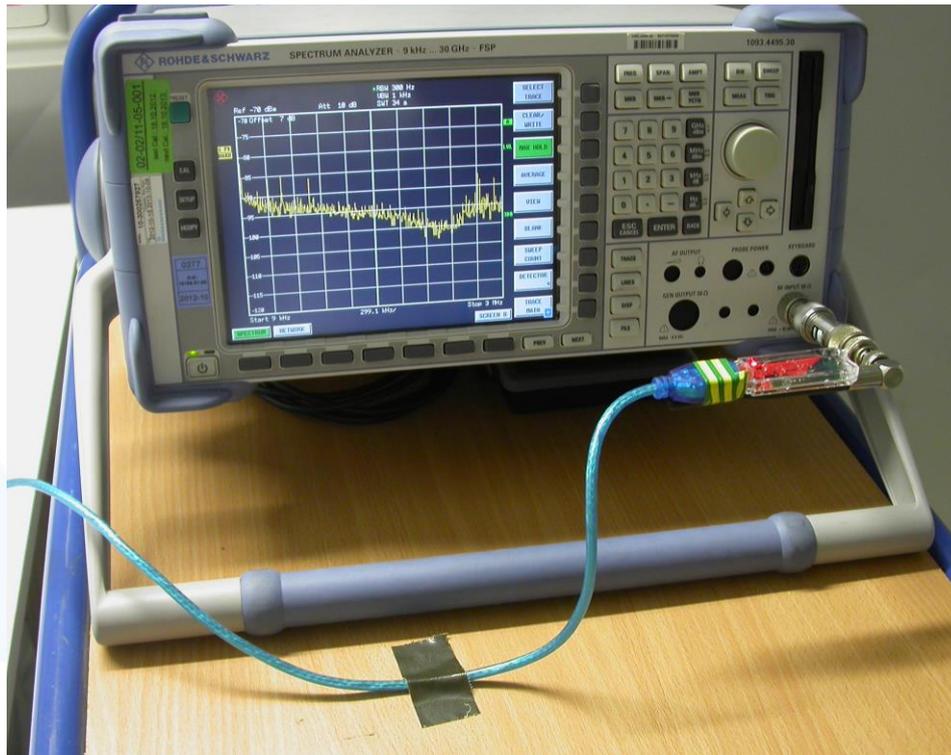
### 5.5 Spurious emissions conducted

For test instruments and accessories used see section 6 Part SEC1, SEC2 and SEC3.

#### 5.5.1 Description of the test location

Test location:                   Shielded Room S4

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



#### 5.5.3 Applicable standard

According to FCC Part 15C, Section 15.247(d):

In any 100 kHz bandwidth outside the frequency band 902 to 928 MHz, the digitally modulated radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or an radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required.

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limit specified in Section 15.209(a).

#### 5.5.4 Description of measurement

A spectrum analyzer is connected to the output of the transmitter while EUT was operating in transmit mode at the assigned frequency.

**FCC ID: SR5-17101100**

**5.5.5 Test result**

Signal levels which are located in restricted band.

Tx mode @ CH1, max. level -11.87 dBm			
Frequency (MHz)	Peak power * (dBm)	Limit (-20 dB) (dBm)	Delta (dB)
119.24	-67.90	-31.87	-36.0
165.80	-72.17	-31.87	-40.3
260.86	-64.10	-31.87	-32.2
276.38	-73.67	-31.87	-41.8
404.42	-70.74	-31.87	-38.9
4842.0	-71.63	-31.87	-39.8
7439.0	-68.50	-31.87	-36.6

The requirements are **FULFILLED**.

**Remarks:** All spurious emissions falling in restricted bands have been measured radiated.

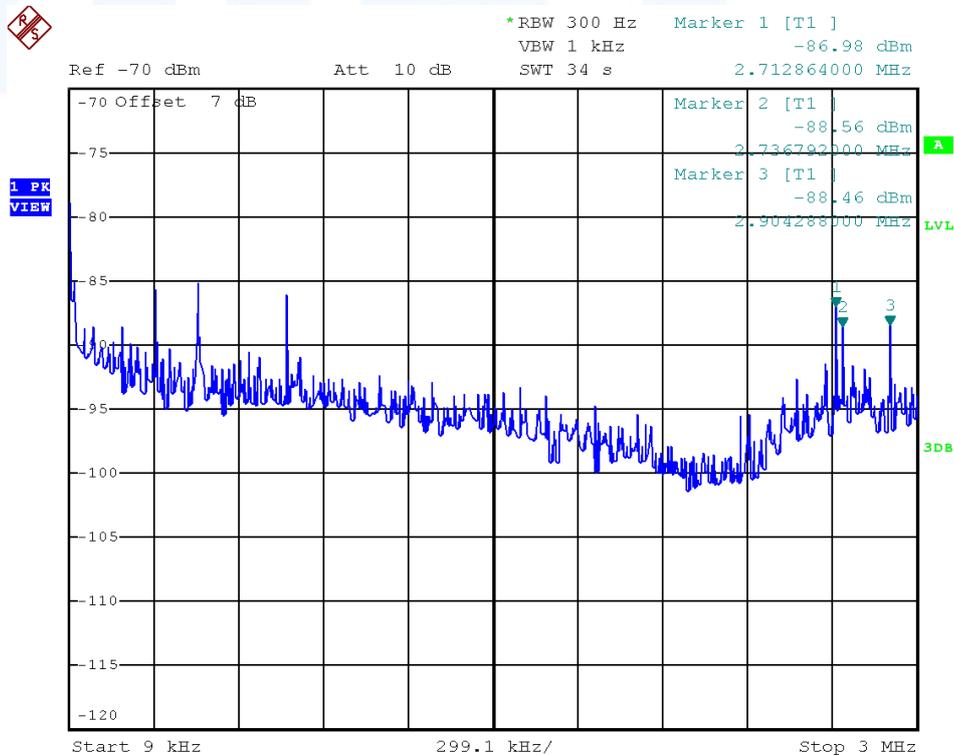
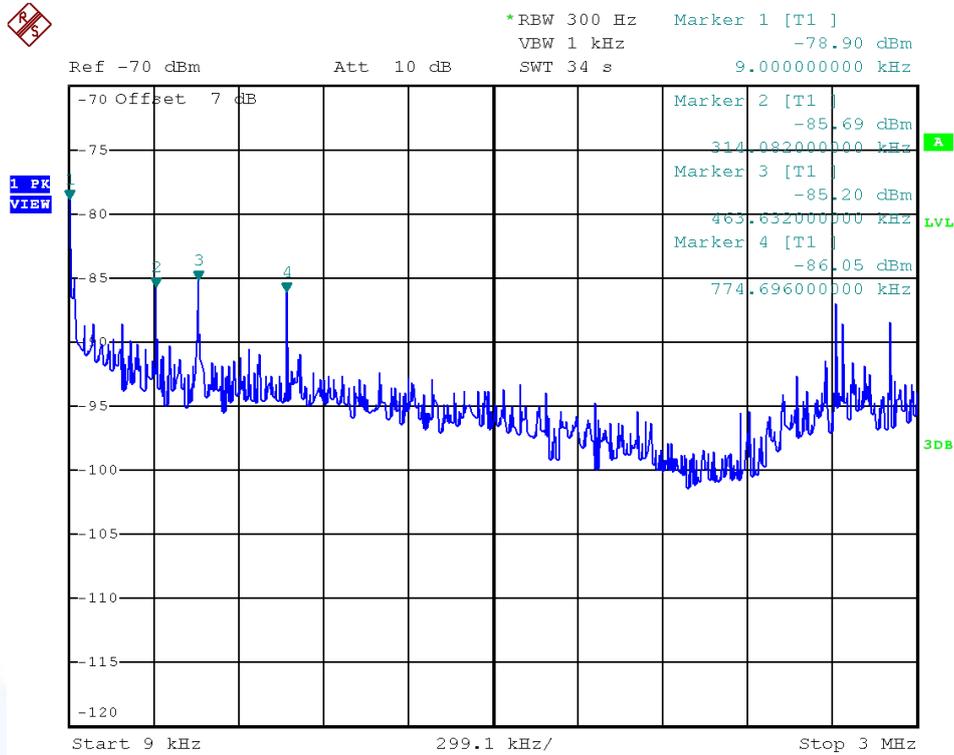
For detailed results please refer to following test protocol.

In the frequency range from 10 GHz up to 25 GHz no emissions could be measured.

FCC ID: SR5-17101100

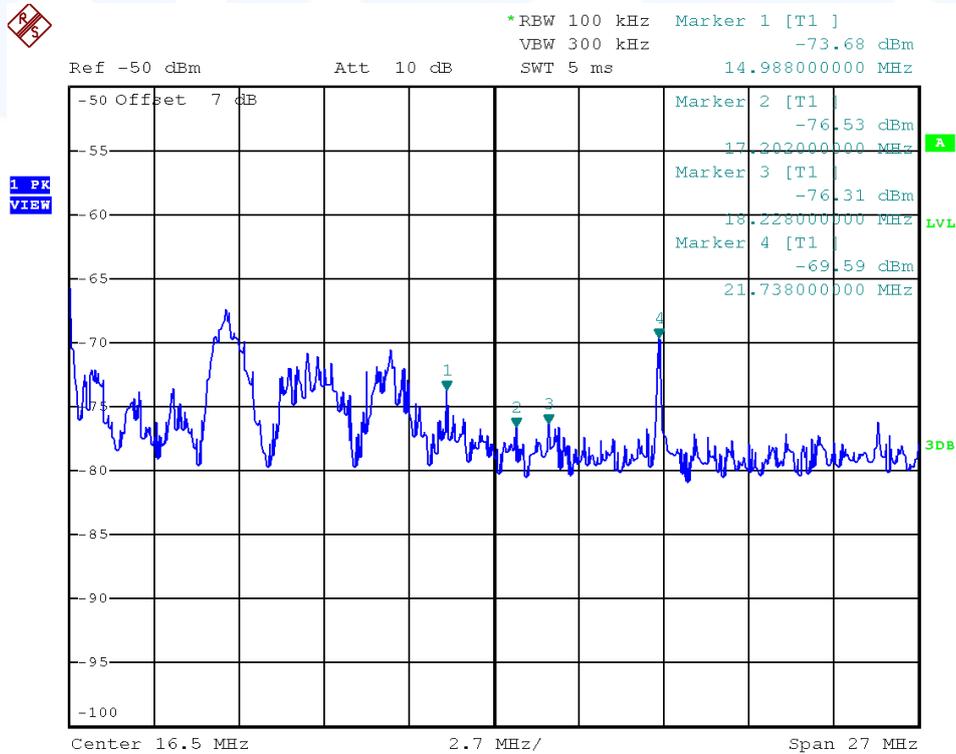
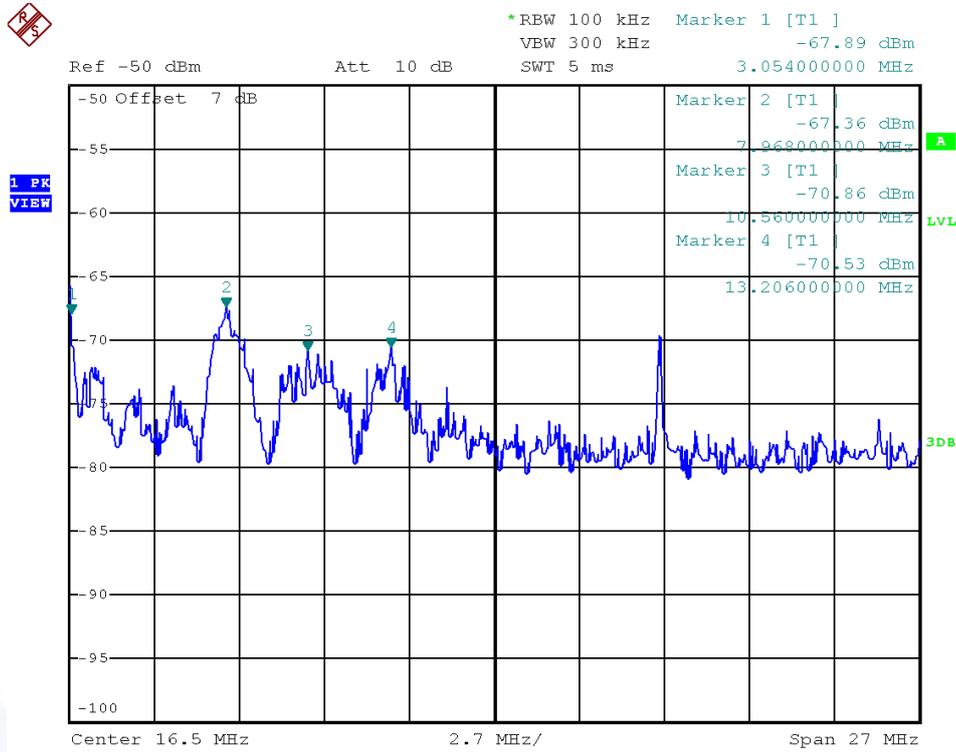
5.5.6 Test protocols

Conducted RF emission from 9 kHz to 30 MHz



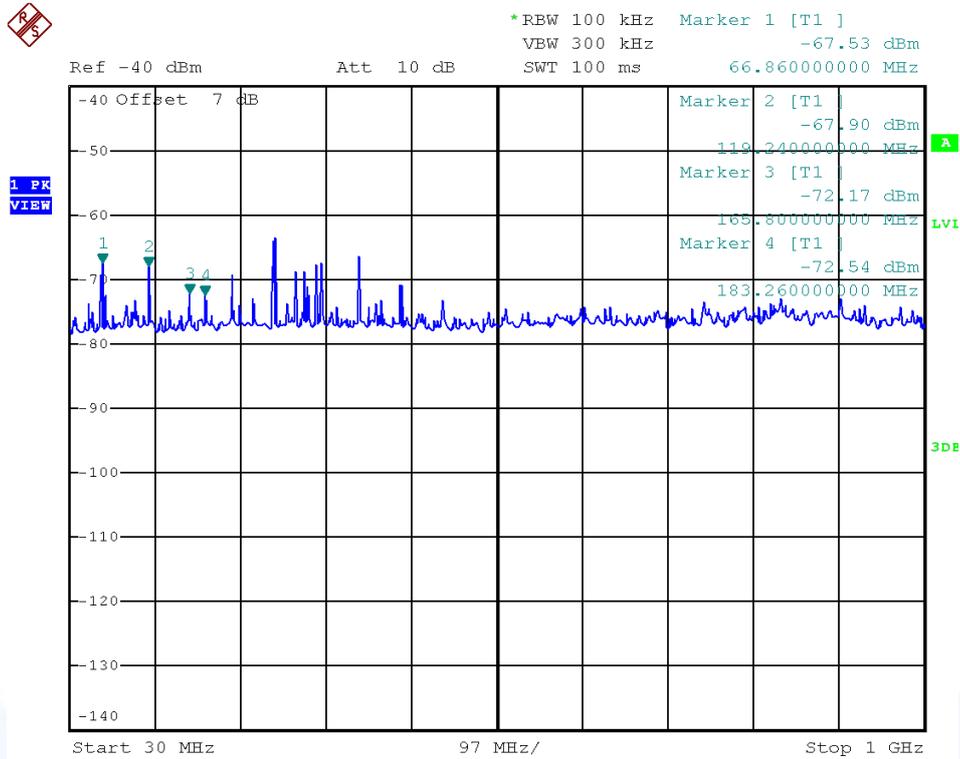
FCC ID: SR5-17101100

Conducted RF emission from 3 to 30 MHz

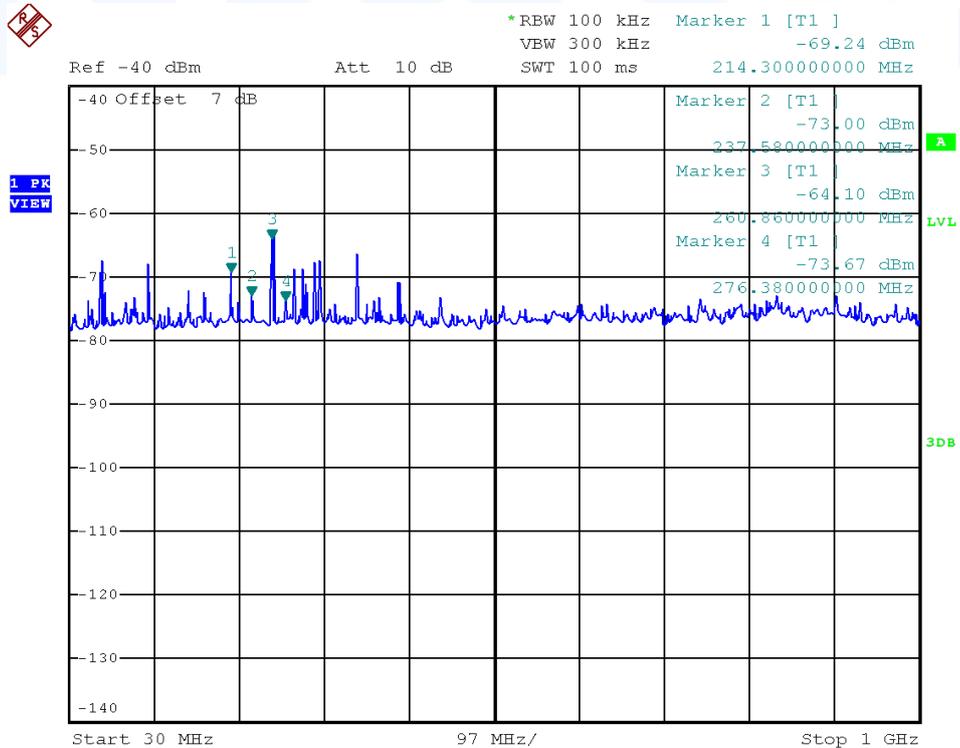


FCC ID: SR5-17101100

Conducted RF emission from 30 to 1000 MHz



Note: Signal level no. 2 and no. 3 are located in restricted band.



Note: Signal level no. 3 and no. 4 are located in restricted band.

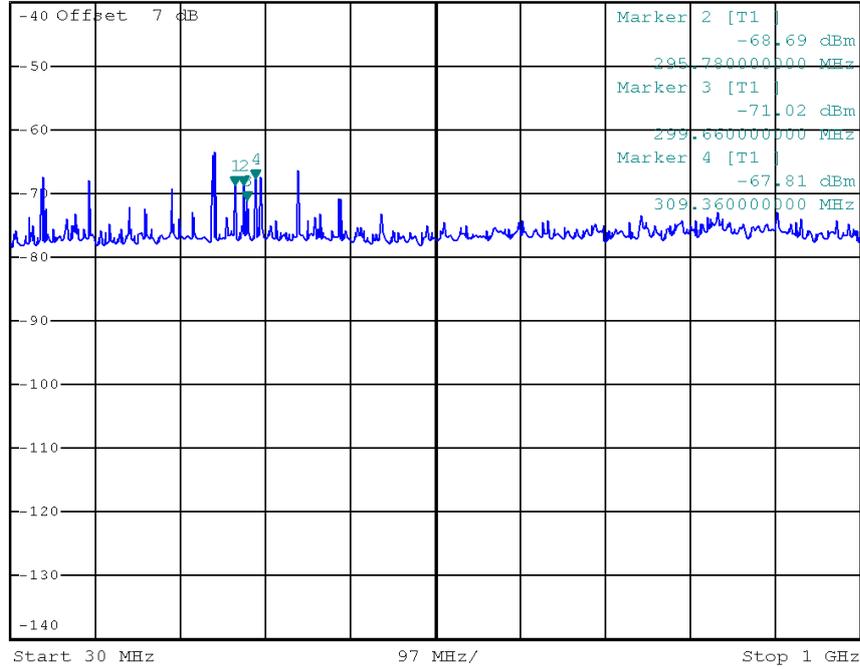
FCC ID: SR5-17101100

Conducted RF emission from 30 to 1000 MHz



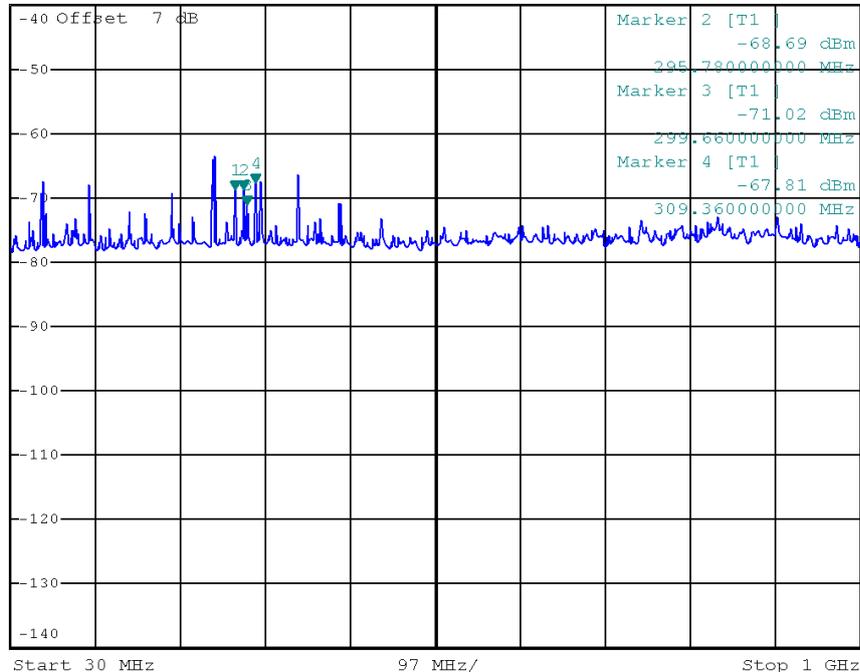
Ref -40 dBm Att 10 dB \*RBW 100 kHz Marker 1 [T1 ]  
 VBW 300 kHz -68.80 dBm  
 SWT 100 ms 286.080000000 MHz

1 PK VIEW



Ref -40 dBm Att 10 dB \*RBW 100 kHz Marker 1 [T1 ]  
 VBW 300 kHz -68.80 dBm  
 SWT 100 ms 286.080000000 MHz

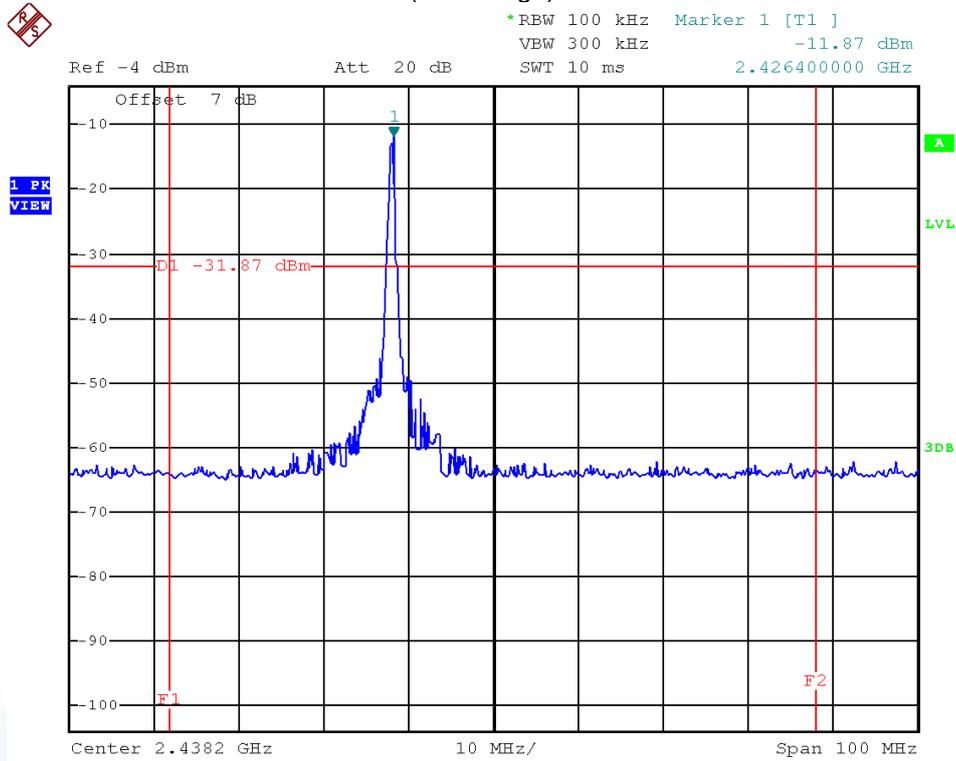
1 PK VIEW



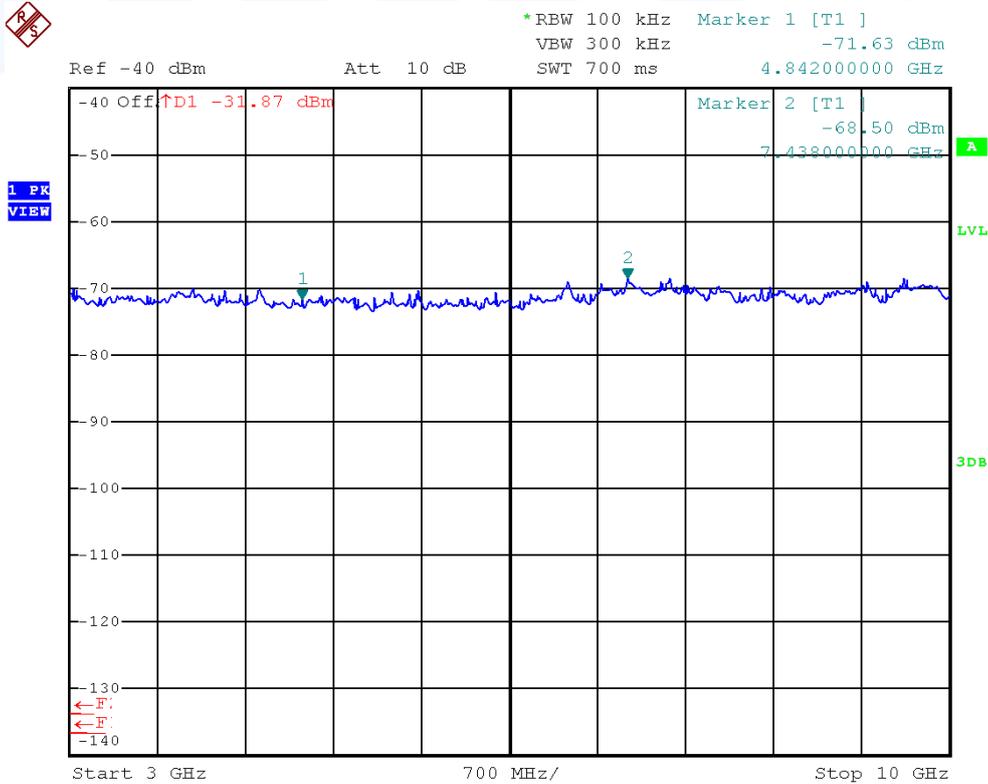
Note: Signal level no. 4 are located in restricted band.

FCC ID: SR5-17101100

Conducted RF emission from 2000 to 2490 MHz  
(Band edge)



Conducted RF emission from 3 to 10 GHz



Note: Signal level no. 1 and no. 2 are located in restricted band.

FCC ID: SR5-17101100

## 5.6 Spurious emissions

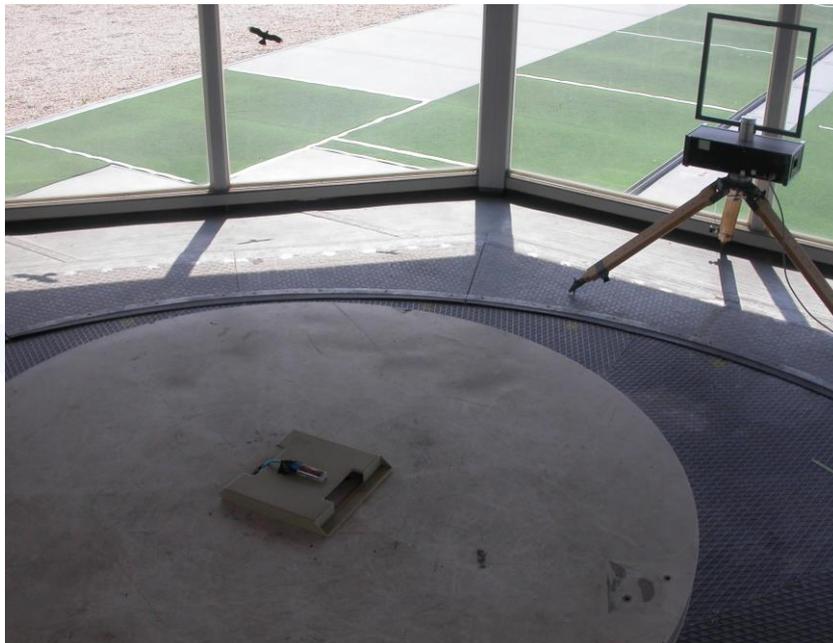
For test instruments and accessories used see section 6 Part SER 1, SER 2, SER 3.

### 5.6.1 Description of the test location

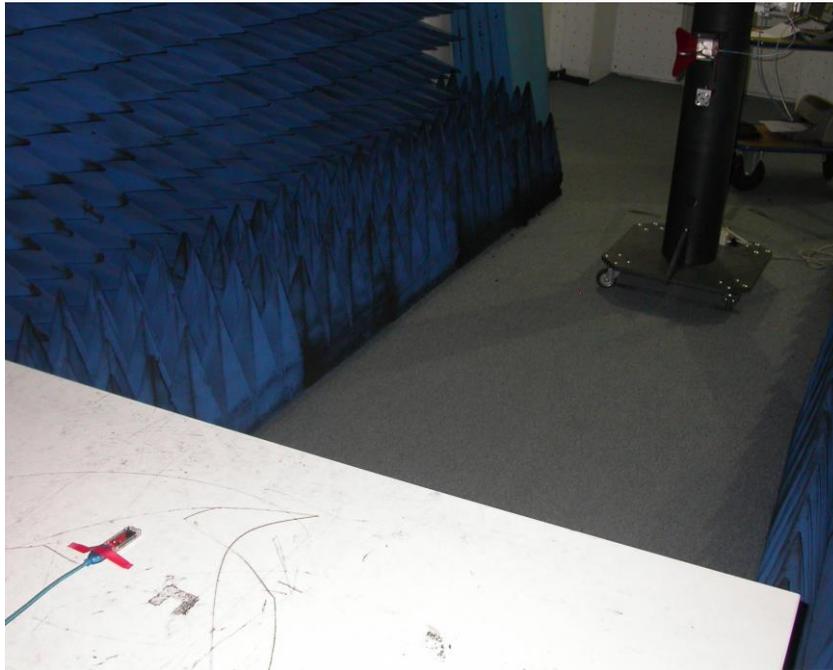
Test location: OATS1  
Test distance: 3 metres

Test location: Anechoic Chamber A2  
Test distance: 3 metres

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



FCC ID: SR5-17101100



### 5.6.3 Applicable standard

According to FCC Part 15, Section 15.247(d):

In any 100 kHz bandwidth outside the frequency bands 2400 – 2483.50 MHz and 5725 – 5850 MHz, the digitally modulated radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or an radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limit specified in Section 15.209(a) (see Section 15.205(c)).

### 5.6.4 Description of Measurement

The radiated power of the spurious emission from the EUT is measured in a test setup following the procedures set out in ANSI C63.4. If the emission level of the EUT in peak mode complies with the average limit is 20 dB lower, then testing will be stopped and peak values of the EUT will be reported, otherwise the emission will be measured in average mode again and reported.

**FCC ID: SR5-17101100**
**5.6.4.1 Radiated emission test  $f < 1$  GHz**

Frequency [kHz]	L: QP [dB $\mu$ V]	L: AV [dB $\mu$ V]	Bandwidth [kHz]	Correct. [dB]	L: QP [dB $\mu$ V/m]	L: AV [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Delta [dB]
536.8	24.1	19.7	9.0	20	44.1	39.7	73.0	-33.3
1073.6	23.4	18.0	9.0	20	43.4	38.0	67.0	-29.0
1342.0	21.6	15.9	9.0	20	41.6	35.9	65.0	-29.1

Frequency [MHz]	L: QP [dB $\mu$ V]	Correct. [dB]	L: QP [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Delta [dB]
33.78	3.7	13.4	17.1	40.0	-22.9
118.54	9.3	12.9	22.2	43.5	-21.3
517.43	4.8	21.9	26.7	46.0	-19.3

In both frequency ranges only ambient noises could be detected.

**5.6.4.2 Radiated emission test  $f > 1$ GHz**

Tx mode @ CH1

Frequency (GHz)	L: PK (dB $\mu$ V)	L: AV (dB $\mu$ V)	Bandwidth (kHz)	Correct. (dB)	L: PK dB( $\mu$ V/m)	L: AV dB( $\mu$ V/m)	Limit AV dB( $\mu$ V/m)	Delta (dB)
4842.0	53.18	44.63	1000	3.7	56.9	48.3	54.0	-5.7
7439.0	46.47	35.21	1000	7.3	53.8	42.5	54.0	-11.5

**FCC ID: SR5-17101100**

Radiated limits according to FCC Part 15 Section 15.209(a) for spurious emissions which fall in restricted bands:

Frequency (MHz)	Field strength of spurious emissions		Measurement distance (metres)
	( $\mu$ V/m)	dB( $\mu$ V/m)	
0.009-0.490	2400/F (kHz)		300
0.490-1.705	24000/F (kHz)		30
1.705-30	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

**Restricted bands of operation:**

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	399.9 – 410	4.5 – 5.15
0.495 – 0.505	16.69475 – 16.69525	608 – 614	5.35 – 5.46
2.1735 – 2.1905	16.80425 – 16.80475	960 – 1240	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1300 – 1427	8.025 – 8.5
4.17725 – 4.17775	37.5 – 38.25	1435 – 1626.5	9.0 – 9.2
4.20725 – 4.20775	73 – 74.6	1645.5 – 1646.5	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1660 – 1710	10.6 – 12.7
6.26775 – 6.26825	108 – 121.94	1718.8 – 1722.2	13.25 – 13.4
6.31175 – 6.31225	123 – 138	2200 – 2300	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2310 – 2390	15.35 – 16.2
8.362 – 8.366	156.52475 – 156.52525	2483.5 – 2500	17.7 – 21.4
8.37625 – 8.38675	156.7 – 156.9	2690 – 2900	22.01 – 23.12
8.41425 – 8.41475	162.0125 – 167.17	3260 – 3267	23.6 – 24.0
12.29 – 12.293	167.72 – 173.2	3332 – 3339	31.2 – 31.8
12.51975 – 12.52025	240 – 285	3345.8 – 3358	36.43 – 36.5
12.57675 – 12.57725	322 – 335.4	3600 – 4400	Above 38.6

The requirements are **FULFILLED**.

**Remarks:**     The measurement was performed up to 25 GHz. All emissions not reported in this test  
                           report are more than 20 dB below the specified limit.

FCC ID: SR5-17101100

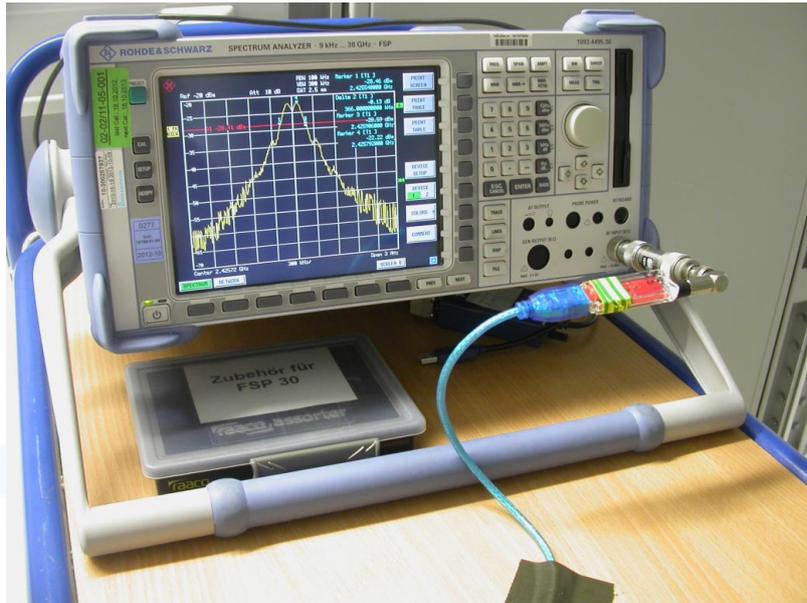
## 5.7 Power spectral density

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

### 5.7.1 Description of the test location

Test location:                   Shielded Room S4

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



### 5.7.3 Applicable standard

According to FCC Part 15, Section 15.247(e):

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

### 5.7.4 Description of Measurement

The EUT was connected to the spectrum analyser with a suitable attenuator. The bandwidth of the fundamental frequency was measured with the spectrum analyser, set sweep time equal to span/3 kHz. The power spectral density was measured using the analyser function "Channel Power" in dBm/Hz. The result is calculated by adding -15.2 dB (10 log 3 kHz/100 kHz) as bandwidth correction factor to the analyser reading.

Spectrum analyzer settings:  
see attached plots

FCC ID: SR5-17101100

5.7.5 Test result

Channel	Frequency (MHz)	Reading (dBm/Hz)	Correction to 3 kHz (dB)	PSD (dBm)	Limit (dBm)
1	2426.0	-11.91	-15.2	-25.1	8

Power spectral density limit according to FCC Part 15, Section 15.247(e):

Frequency (MHz)	Power spectral density limit
	(dBm/3kHz)
2400 - 2483.5	8

The requirements are **FULFILLED**.

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

---



---

mikes

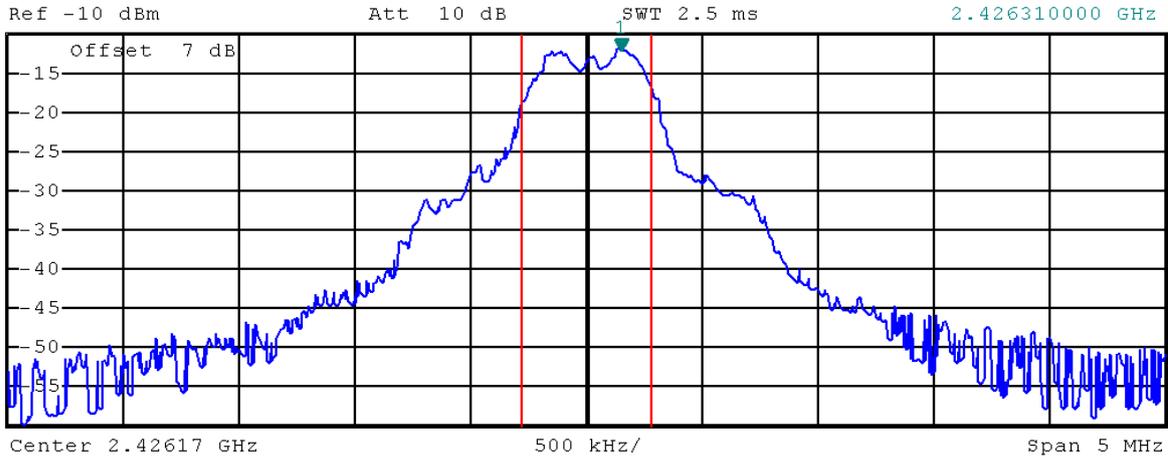
FCC ID: SR5-17101100

Power spectral density plots

Channel 1



\*RBW 100 kHz  
 VBW 300 kHz  
 SWT 2.5 ms  
 Marker 1 [T1 ]  
 -11.91 dBm  
 2.426310000 GHz



1 PK  
VIEW

A  
LVL  
3DB

Tx Channel  
 Bandwidth                      564 kHz      Power                      -63.89 dBm/Hz



FCC ID: SR5-17101100

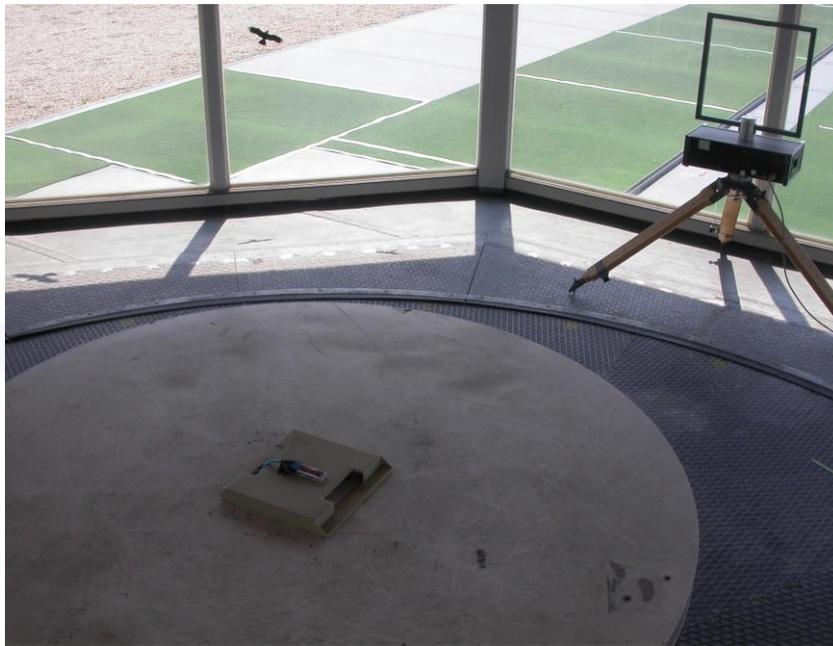
## 5.8 Receiver radiated emissions

For test instruments and accessories used see section 6 Part **SER1**, **SER2** and **SER3**.

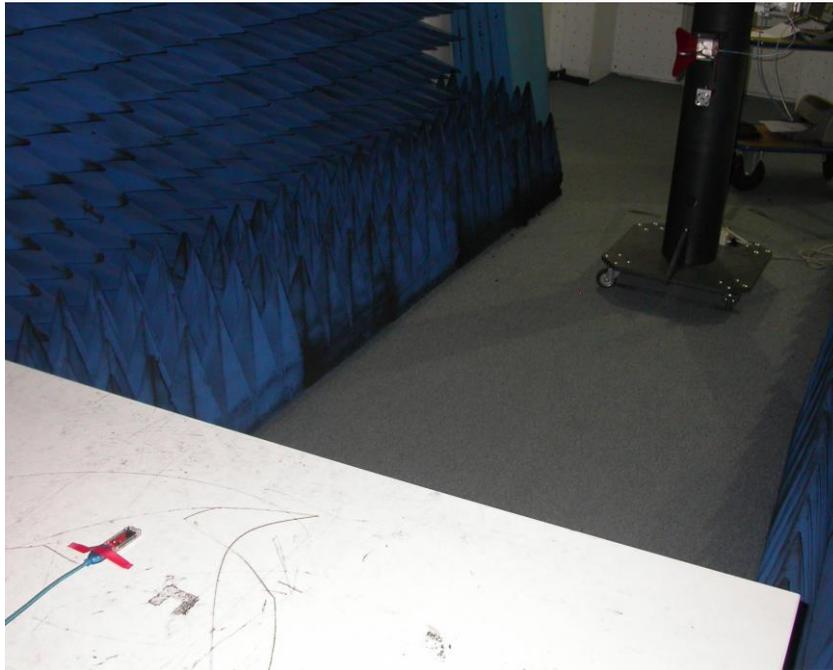
### 5.8.1 Description of the test location

Test location: OATS 1  
Test location: Anechoic Chamber A2  
Test distance: 3 metres

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



FCC ID: SR5-17101100



### 5.8.3 Applicable standard

According to FCC Part 15, Section 15.109 (a):  
Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 m shall not exceed the given limit.

### 5.8.4 Description of Measurement

The radiated power of the spurious emission from the EUT is measured in a test setup following the procedures set out in ANSI C63.4. If the emission level of the EUT in peak mode complies with the average limit is 20 dB lower, then testing will be stopped and peak values of the EUT will be reported, otherwise the emission will be measured in average mode again and reported.

FCC ID: SR5-17101100

5.8.5 Test result

5.8.5.1 f < 1 GHz)

Frequency [kHz]	L: QP [dBµV]	L: AV [dBµV]	Bandwidth [kHz]	Correct. [dB]	L: QP [dBµV/m]	L: AV [dBµV/m]	Limit [dBµV/m]	Delta [dB]
536.8	24.1	19.7	9.0	20	44.1	39.7	73.0	-33.3
1073.6	23.4	18.0	9.0	20	43.4	38.0	67.0	-29.0
1342.0	21.6	15.9	9.0	20	41.6	35.9	65.0	-29.1

Frequency [MHz]	L: QP [dBµV]	Correct. [dB]	L: QP [dBµV/m]	Limit [dBµV/m]	Delta [dB]
33.78	3.7	13.4	17.1	40.0	-22.9
118.54	9.3	12.9	22.2	43.5	-21.3
517.43	4.8	21.9	26.7	46.0	-19.3

In both frequency ranges only ambient noises could be detected.

5.8.5.2 f > 1GHz

Tx mode @ CH1

Frequency (GHz)	L: PK (dBµV)	L: AV (dBµV)	Bandwidth (kHz)	Correct. (dB)	L: PK dB(µV/m)	L: AV dB(µV/m)	Limit AV dB(µV/m)	Delta (dB)
3761.0	26.2		1000	3.3	29.5		54.0	-24.5
8536.0	23.2		1000	7.5	30.7		54.0	-23.3

In the frequency range from 1 GHz up to 25 GHz only ambient noises could be detected.

Limit according to FCC Section 15.109(a)

Frequency of emission (MHz)	Field strength limit (µV/m)	Field strength limit dB(µV/m)
0.009-0.490	2400/F(kHz)	
0.490-1.705	24000/F (kHz)	
1.705-30.0	30	
30-88	100	40
88-216	150	44
216-960	200	46
Above 960	500	54

The requirements are **FULFILLED**.

Remarks: During the test, the EUT was set into continuous receiving mode.

---



---



---

FCC ID: SR5-17101100

## 5.9 Maximum permissible exposure (MPE)

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

### 5.9.1 Description of the test location

Test location: NONE

### 5.9.2 Applicable standard

According to KDB 447498 D01 General Exposure Guidance v05r01:

- Section 4.3. General SAR test reduction and exclusion guidance
- Section 4.3.1. Standalone SAR test exclusion considerations

### 5.9.3 Description of Measurement

- 1) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances*  $\leq 50$  mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f_{(\text{GHz})}}] \leq 3.0$  for 1-g SAR and  $\leq 7.5$  for 10-g extremity SAR,<sup>24</sup> where

- $f_{(\text{GHz})}$  is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation<sup>25</sup>
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum *test separation distance* is  $\leq 50$  mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum *test separation distance* is  $< 5$  mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion.

- 2) At 100 MHz to 6 GHz and for *test separation distances*  $> 50$  mm, the SAR test exclusion threshold is determined according to the following, and as illustrated in Appendix B:<sup>26</sup>
  - a)  $[\text{Power allowed at numeric threshold for 50 mm in step 1}) + (\text{test separation distance} - 50 \text{ mm}) \cdot (f_{(\text{MHz})} / 150)]$  mW, at 100 MHz to 1500 MHz
  - b)  $[\text{Power allowed at numeric threshold for 50 mm in step 1}) + (\text{test separation distance} - 50 \text{ mm}) \cdot 10]$  mW at  $> 1500$  MHz and  $\leq 6$  GHz

**FCC ID: SR5-17101100**
**5.9.4 Test result**

Channel No.	Frequency	Max power output to antenna		Test separation Distance accd. Annex A	SAR Test Exclusion Threshold
	(MHz)	(dBm)	(mW)	(mm)	(mW)
1	2426.0	-10.9	0.081	5.0	10

Limits for maximum permissible exposure (MPE), KDB 447498, Annex A:

**SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and ≤ 50 mm**

Approximate SAR Test Exclusion Power Thresholds at Selected Frequencies and Test Separation Distances are illustrated in the following Table. The equation and threshold in section 4.3.1 must be applied to determine SAR test exclusion.

MHz	5	10	15	20	25	mm	
150	39	77	116	155	194	SAR Test Exclusion Threshold (mW)	
300	27	55	82	110	137		
450	22	45	67	89	112		
835	16	33	49	66	82		
900	16	32	47	63	79		
1500	12	24	37	49	61		
1900	11	22	33	44	54		
2450	10	19	29	38	48		
3600	8	16	24	32	40		
5200	7	13	20	26	33		
5400	6	13	19	26	32		
5800	6	12	19	25	31		
MHz	30	35	40	45	50		mm
150	232	271	310	349	387		SAR Test Exclusion Threshold (mW)
300	164	192	219	246	274		
450	134	157	179	201	224		
835	98	115	131	148	164		
900	95	111	126	142	158		
1500	73	86	98	110	122		
1900	65	76	87	98	109		
2450	57	67	77	86	96		
3600	47	55	63	71	79		
5200	39	46	53	59	66		
5400	39	45	52	58	65		
5800	37	44	50	56	62		

**Note:** 10-g Extremity SAR Test Exclusion Power Thresholds are 2.5 times higher than the 1-g SAR Test Exclusion Thresholds indicated above. These thresholds do not apply, by extrapolation or other means, to occupational exposure limits.

### FCC ID: SR5-17101100

Limits for maximum permissible exposure (MPE), KDB 447498, Annex B:

#### SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and > 50 mm

Approximate SAR test exclusion power thresholds at selected frequencies and test separation distances are illustrated in the following table. The equation and threshold in section 4.3.1 must be applied to determine SAR test exclusion.

MHz	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	mm
100	474	481	487	494	501	507	514	521	527	534	541	547	554	561	567	mW
150	387	397	407	417	427	437	447	457	467	477	487	497	507	517	527	
300	274	294	314	334	354	374	394	414	434	454	474	494	514	534	554	
450	224	254	284	314	344	374	404	434	464	494	524	554	584	614	644	
835	164	220	275	331	387	442	498	554	609	665	721	776	832	888	943	
900	158	218	278	338	398	458	518	578	638	698	758	818	878	938	998	
1500	122	222	322	422	522	622	722	822	922	1022	1122	1222	1322	1422	1522	
1900	109	209	309	409	509	609	709	809	909	1009	1109	1209	1309	1409	1509	
2450	96	196	296	396	496	596	696	796	896	996	1096	1196	1296	1396	1496	
3600	79	179	279	379	479	579	679	779	879	979	1079	1179	1279	1379	1479	
5200	66	166	266	366	466	566	666	766	866	966	1066	1166	1266	1366	1466	
5400	65	165	265	365	465	565	665	765	865	965	1065	1165	1265	1365	1465	
5800	62	162	262	362	462	562	662	762	862	962	1062	1162	1262	1362	1462	

The requirements are **FULFILLED**.

Remarks:

---



---



---



---



---



---

**FCC ID: SR5-17101100****5.10 Antenna application - Detailed photos see attachment A1****5.10.1 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 a PCB antenna and can not be replaced by the user.  
This type of antenna meet the requirements of part 15.203 and 15.204.

**5.10.2 Antenna requirements**

According to FCC Part 15C, Section 15.247(b)(4):

The conducted output power limit specified in paragraph (b) of 15.247 is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from intentional radiator shall be reduced below the stated values in paragraph (b)(1), (b)(2) and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The gain of the used PCB antenna is  $\leq 6.0$  dBi.

FCC ID: SR5-17101100

**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	ESHS 30	02-02/03-05-002	11/07/2013	11/07/2012		
	NNLK 8129	02-02/20-05-001			22/07/2013	22/01/2013
	ESH 2 - Z 5	02-02/20-05-004	12/05/2013	12/05/2011	23/07/2013	23/01/2013
	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			05/10/2013	05/04/2013
	SP 103 /3.5-60	02-02/50-05-182				
CPC 3	FSP 30	02-02/11-05-001	18/10/2013	18/10/2012		
	RF Antenna	02-02/24-05-032				
CPR 3	FSP 30	02-02/11-05-001	18/10/2013	18/10/2012		
	BBHA 9120 E 251	02-02/24-05-006	17/05/2014	17/05/2013	17/11/2013	17/05/2013
	Sucoflex N-2000-SMA	02-02/50-05-075				
	Multiflex 141-SMA-N-1500	02-02/50-09-016				
MB	FSP 30	02-02/11-05-001	18/10/2013	18/10/2012		
	RF Antenna	02-02/24-05-032				
SEC 1-3	FSP 30	02-02/11-05-001	18/10/2013	18/10/2012		
	RF Antenna	02-02/24-05-032				
SER 1	FMZB 1516	01-02/24-01-018			14/02/2014	14/02/2013
	ESCI	02-02/03-05-005	03/12/2013	03/12/2012		
	S10162-B	02-02/50-05-031				
	KK-EF393-21N-16	02-02/50-05-033				
	NW-2000-NB	02-02/50-05-113				
SER 2	ESVS 30	02-02/03-05-006	26/06/2013	26/06/2012		
	VULB 9168	02-02/24-05-005	11/04/2014	11/04/2013	11/10/2013	11/04/2013
	S10162-B	02-02/50-05-031				
	NW-2000-NB	02-02/50-05-113				
	KK-EF393/U-16N-21N20 m	02-02/50-12-018				
SER 3	FSP 30	02-02/11-05-001	18/10/2013	18/10/2012		
	AMF-4F-04001200-15-10P	02-02/17-05-004				
	AFS5-12001800-18-10P-6	02-02/17-06-002				
	3117	02-02/24-05-009	04/04/2014	04/04/2013		
	Sucoflex N-1600-SMA	02-02/50-05-073				
	Sucoflex N-2000-SMA	02-02/50-05-075				