5 TEST CONDITIONS AND RESULTS

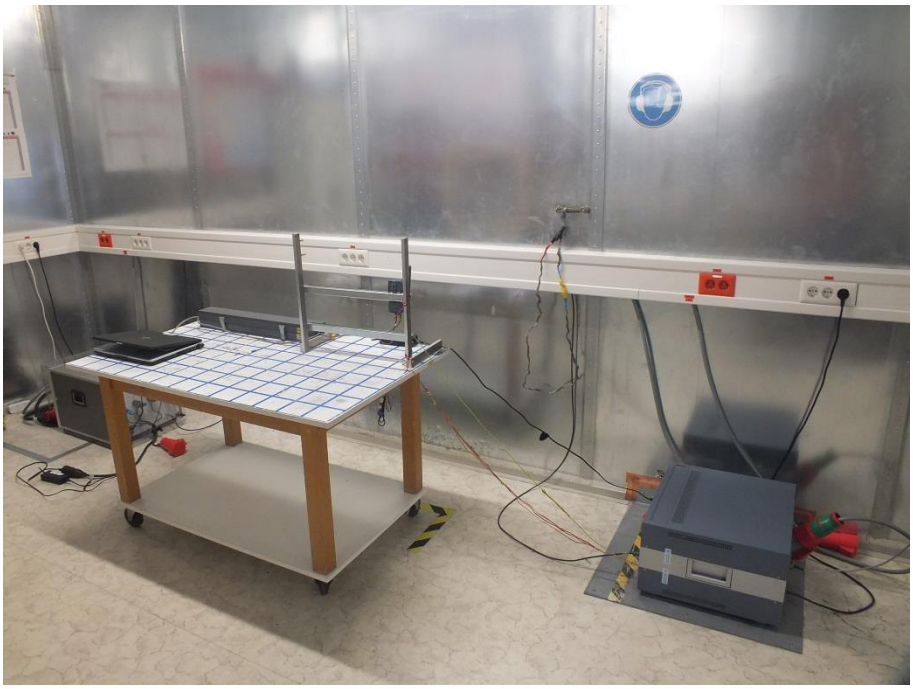
5.1 Conducted emissions

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 15C, Section 15.107(a) and 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 using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a line impedance stabilization network (LISN) with 50 Ω / 50 µH (CISPR 16) characteristics and following the procedures set out in ANSI C63.4. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver with quasi-peak and average detection and recorded.

To convert between dBµV and µV, the following conversions apply:

dBµV = 20 log µV

µV = 10^(dBµV/20)

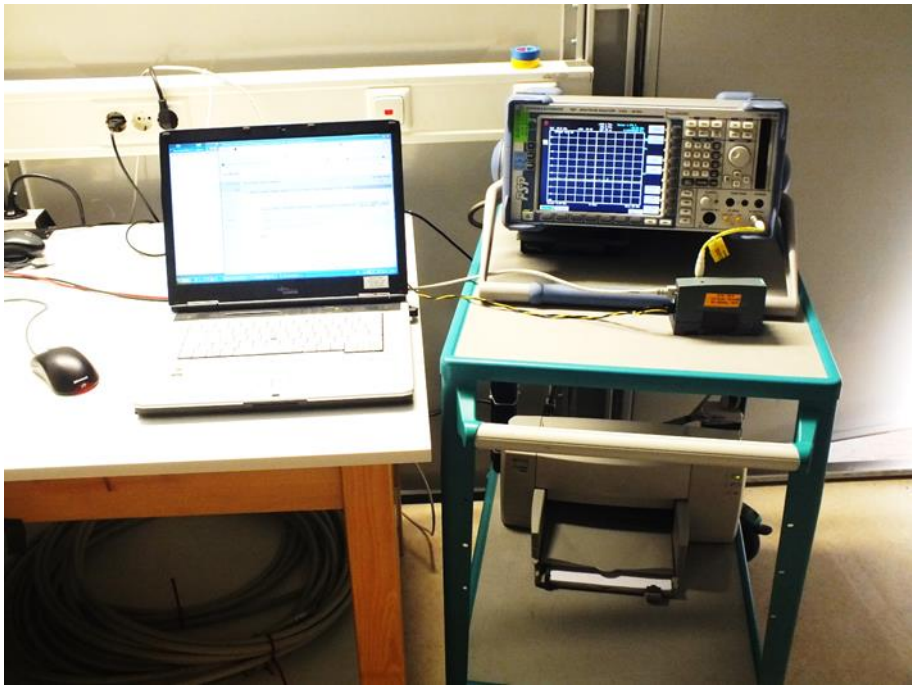
5.2 Emission bandwidth and occupied bandwidth

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

5.2.1 Description of the test location

Test location: AREA4

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 analyser.

Spectrum analyser settings:

B, g, n-HT20 mode: RBW: 100 kHz	VBW: 300 kHz,	Detector: Peak
HT40 mode: RBW: 1 MHz	VBW: 3 MHz,	Detector: Peak

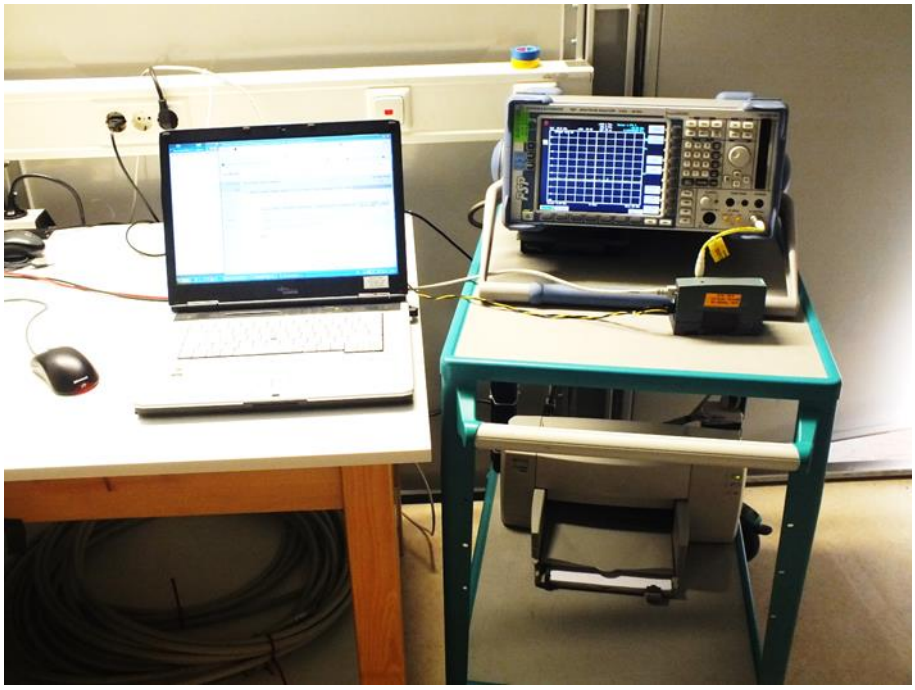
5.3 Maximum peak conducted output power

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

5.3.1 Description of the test location

Test location: AREA 4

5.3.2 Photo documentation of the test set-up



5.3.3 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.

5.3.4 Description of Measurement

The maximum peak conducted output power is measured using a spectrum analyser with the function “integrated bandpower measurement” following the procedure set out in OET 558074, item 9.1.2. The EUT is set in TX continuous mode while measuring.

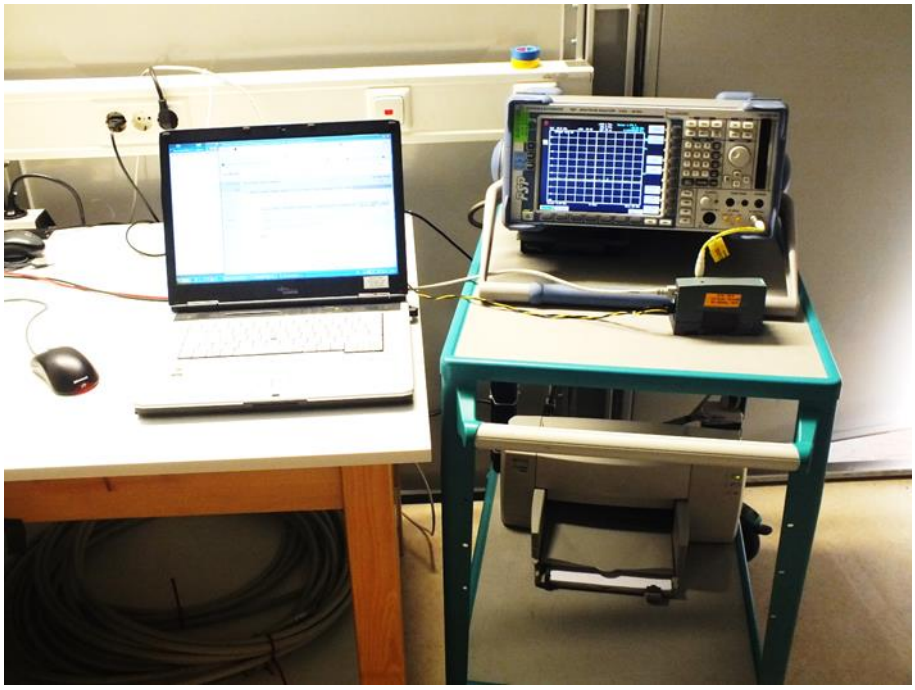
5.4 Power spectral density

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

5.4.1 Description of the test location

Test location: AREA 4

5.4.2 Photo documentation of the test set-up



5.4.3 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.

5.4.4 Description of Measurement

The measurement is performed using the procedure set out in KDB-558074. The power measurement was done using a power meter, option 1. Therefore the PSD is measured with PSD option 1. The max peak was located and zoomed in with the spectrum analyser. The zoom is done with the following settings. The cable loss of 1.6 dB @ 5.8 GHz is taken into account with an amplitude offset. For this MIMO transmitter the antenna output 1 is measured and the output 2 is taken into account with the formula according OET 662911, 10 log (N), where N is the number of outputs. The total sum is calculated to add a correction factor of 3 dB (10 log 2) to the analyser reading of each antenna output.

Spectrum analyser settings:
RBW: 3 kHz, VBW: 10 kHz, Detector: Peak, Sweep time: 10 s,

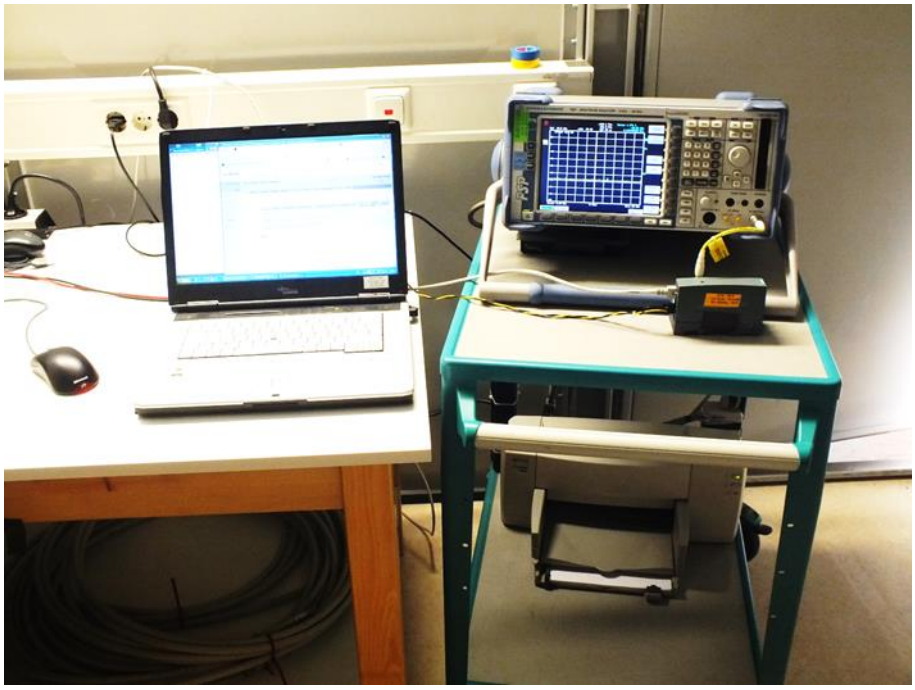
5.5 Spurious emissions conducted

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

5.5.1 Description of the test location

Test location: AREA4

5.5.2 Photo documentation of the test set-up



5.5.3 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)).

5.5.4 Description of measurement

The spurious emissions are measured conducted using a spectrum analyser in a test setup following the procedures set out in KDB 558074 for DTS. The transmitter is set to the lowest operating frequency (CH1)(CH149), the middle (CH6)(CH157) and to the highest operating frequency (CH11)(CH165). The frequency spectrum outside from the operating frequency range (2400 - 2483.5 MHz or 5725 – 5850 MHz) is scanned for emissions that exceed the defined limit. The measurement is performed at normal test conditions in modulated TX continuous mode.

Spectrum analyser search setting:
RBW: 100 kHz, VBW: 300 kHz, Detector: Max peak, Trace Mode: Max hold, Sweep time: 1 s

5.6 Spurious emissions cabinet radiation

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

5.6.1 Description of the test location

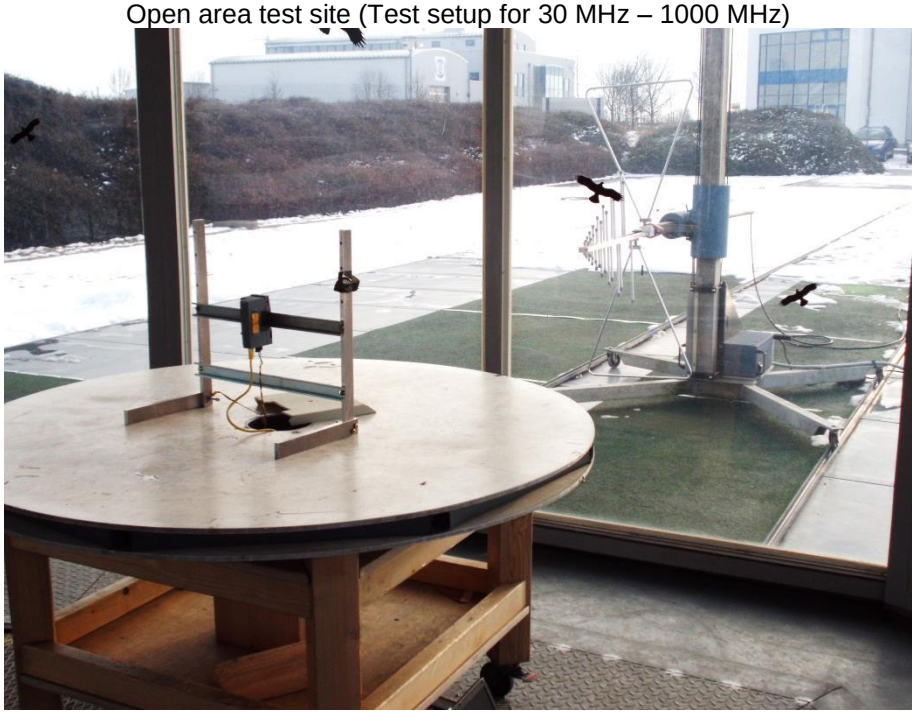
Test location: OATS 1
Test location: Anechoic chamber 2

Test distance: 3 m

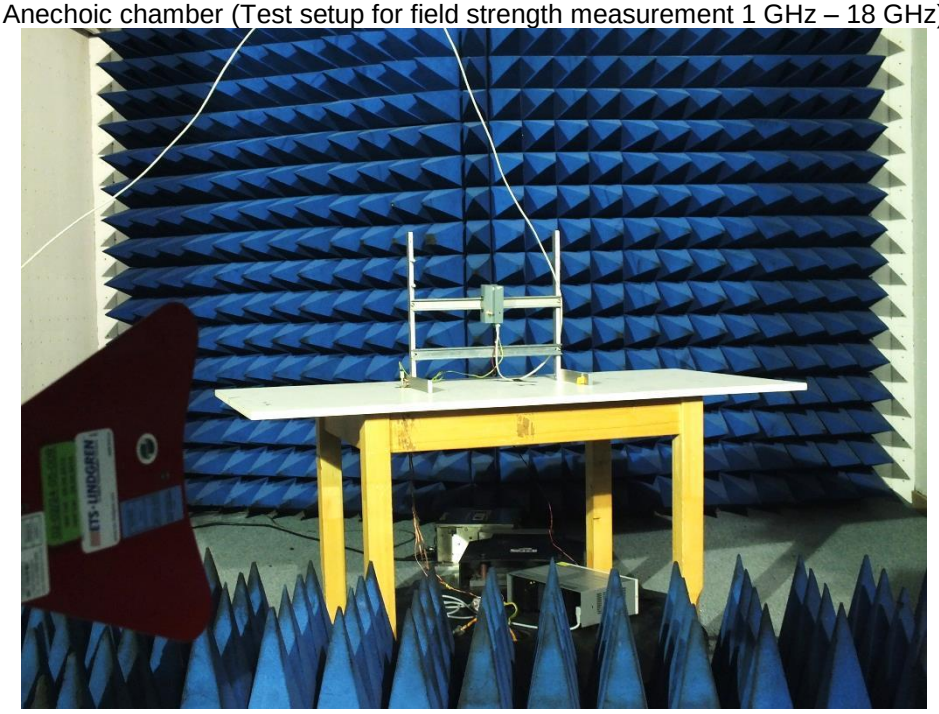
5.6.2 Photo documentation of the test set-up

Open area test site (Test setup for 9 kHz – 30 MHz)

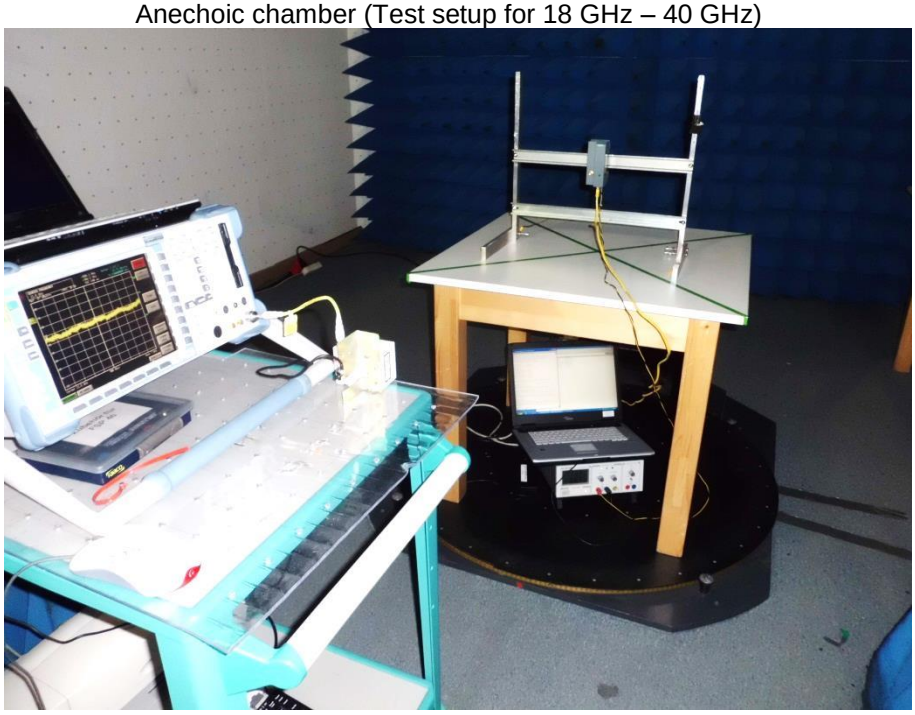
Open area test site (Test setup for 30 MHz – 1000 MHz)



Anechoic chamber (Test setup for field strength measurement 1 GHz – 18 GHz)



Anechoic chamber (Test setup for 18 GHz – 40 GHz)



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)).

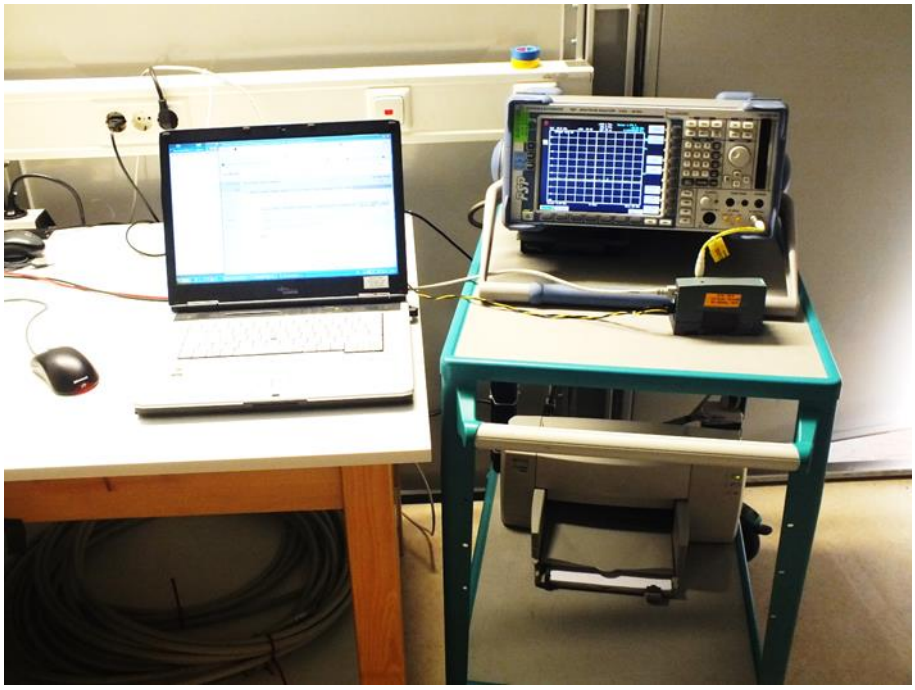
5.7 Spurious emissions conducted in restricted bands

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

5.7.1 Description of the test location

Test location: AREA4

5.7.2 Photo documentation of the test set-up



5.7.3 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)).

5.7.4 Description of measurement

The spurious emissions are measured conducted using a spectrum analyser in a test setup following the procedures set out in KDB 558074 for DTS. The transmitter is set to the lowest operating frequency (CH1), the middle (CH6) and to the highest operating frequency (CH11). The frequency spectrum outside from the operating frequency range (2400 - 2483.5 MHz and 5725 – 5850 MHz) is scanned for emissions that exceed the defined limit. The measurement is performed at normal test conditions in modulated TX continuous mode. The emission is measured in dBm and converted in dBµV/m using the formula E = EIRP – 20log D + 104.8;
Spectrum analyser search setting:
Peak-measurement:
RBW: 1 MHz, VBW: 3 MHz, Detector: Max peak, Trace Mode: Max hold, Sweep time: auto;
AV-measurement according 558074 D01 DTS, Item 12.2.5.3:
RBW: 1 MHz, VBW: ≥ 1/T, Detector: Max peak, Trace Mode: Max hold, Sweep time: auto;
For 801.11b: VBW = 100 Hz, for 801.11g, n HT20: VBW = 1 kHz, for 801.11g, n HT40: VBW = 3 kHz;

5.8 Radiated emissions in restricted bands

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

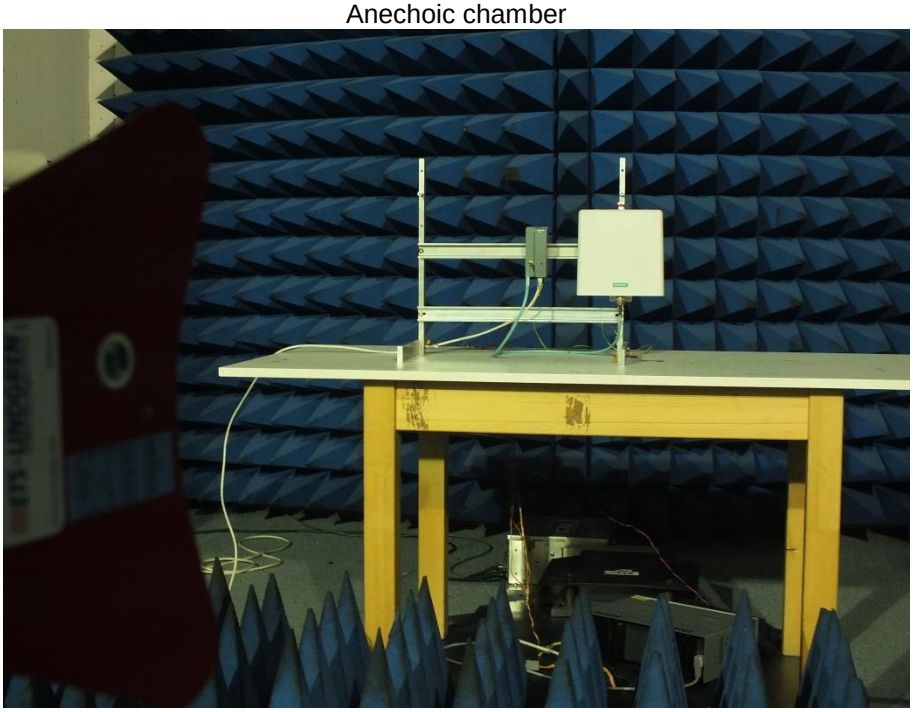
5.8.1 Description of the test location

Test location: Anechoic chamber 2

Test distance: 3 m

5.8.2 Photo documentation of the test set-up

Anechoic chamber



5.8.3 Applicable standard

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

5.8.4 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 and KDB 558074 for DTS. If the emission level of the EUT in peak mode complies with the average limit then testing will be stopped and peak values of the EUT will be reported, otherwise the emission will be measured again in average mode and reported.

Peak-measurement:

9 - 150 kHz:	RBW: 300 Hz,	VBW: 1 kHz,	Detector: Max peak,	Trace Mode: Max hold;
0.15 - 30 MHz:	RBW: 10 kHz,	VBW: 30 kHz,	Detector: Max peak,	Trace Mode: Max hold;
30 – 1000 MHz:	RBW: 100 kHz,	VBW: 300 kHz,	Detector: Max peak,	Trace Mode: Max hold;
1 – 40 GHz:	RBW: 1 MHz,	VBW: 3 MHz,	Detector: Max peak,	Trace Mode: Max hold;

AV-measurement according 558074 D01 DTS, Item 12.2.5.3:
RBW: 1 MHz, VBW: ≥ 1/T, Detector: Max peak, Trace Mode: Max hold, Sweep time: auto;
For 802.11b: VBW = 300 Hz, for 802.11a, g, n HT20: VBW = 1 kHz, for 802.11n, HT40: VBW = 3 kHz;