

## 5 TEST CONDITIONS AND RESULTS

### 5.1 AC power line conducted emissions

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

#### 5.1.1 Description of the test location

Test location:                      Shielded Room 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 C63.10 described under item 4.4.3. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

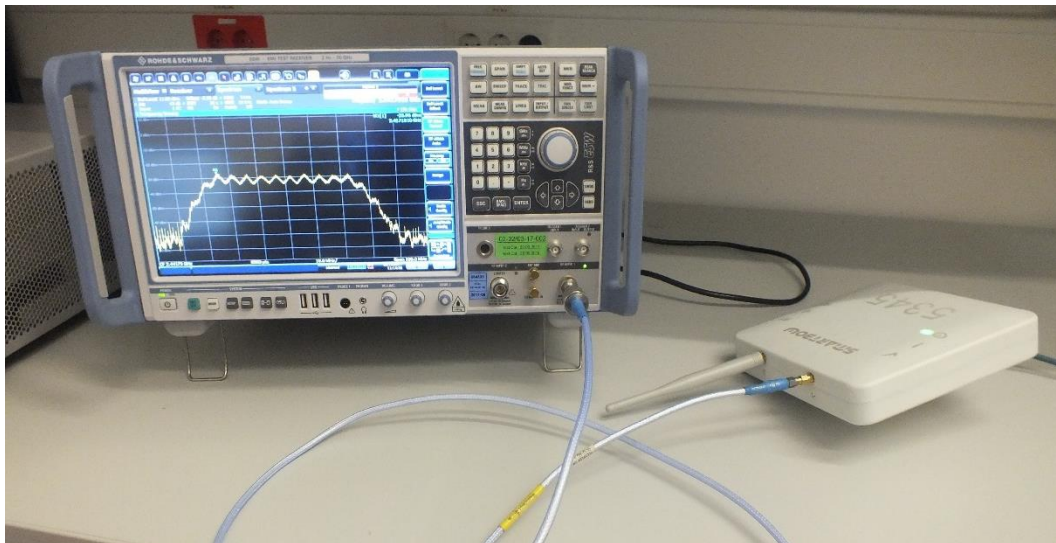
## 5.2 EBW and OBW

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 for EBW:

RBW: 100 kHz, VBW: 300 kHz, Detector: Max peak, Sweep time: 5 s, Span: 2 EBW;

Spectrum analyser settings for OBW:

RBW: 1-5% OBW, VBW: 3 RBW, Detector: Max peak, Sweep time: 5 s, Span: 2 OBW;

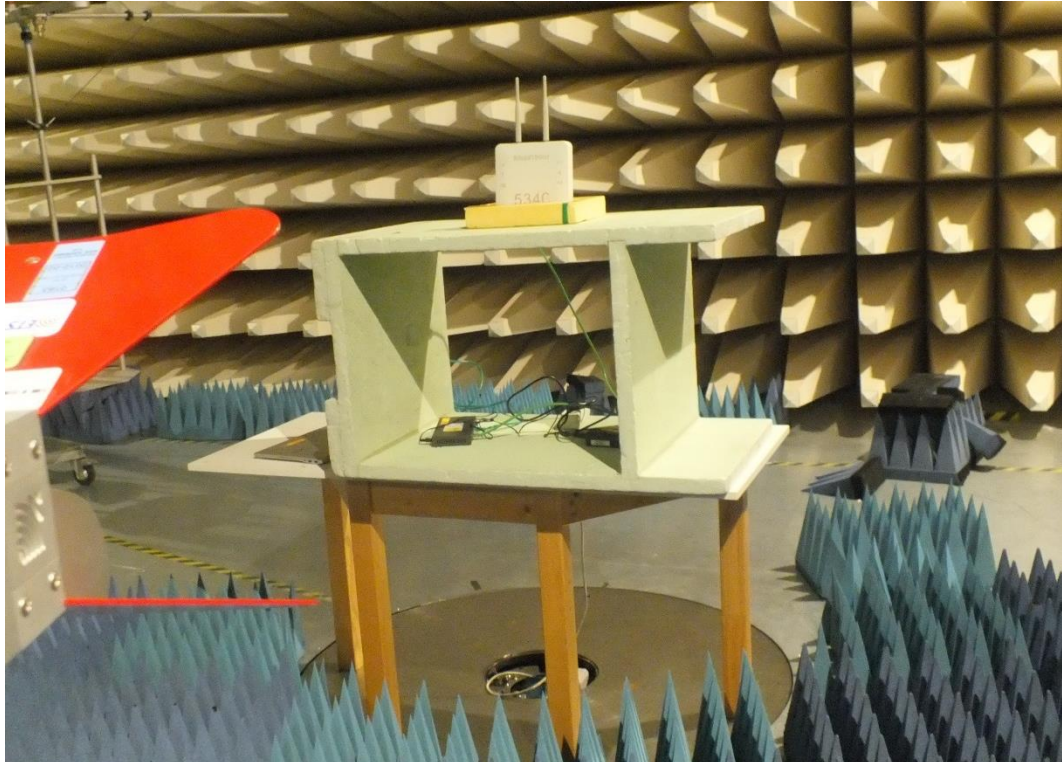
### 5.3 Maximum peak conducted output power

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

#### 5.3.1 Description of the test location

Test location: Anechoic chamber 1

#### 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 radiated output power is measured using a spectrum analyser following the procedure set out in KDB 558074, item 9.1.1. The EUT is set in TX continuous mode while measuring. The radiated measurement was performed as a field strength measurement and converted afterwards into power according to the following term:

$$E = \text{EIRP} - (20 \cdot \log_{10} 3) + 104.8$$

The conducted output power can be obtained by subtracting the antenna gain of 4.0 dBi.

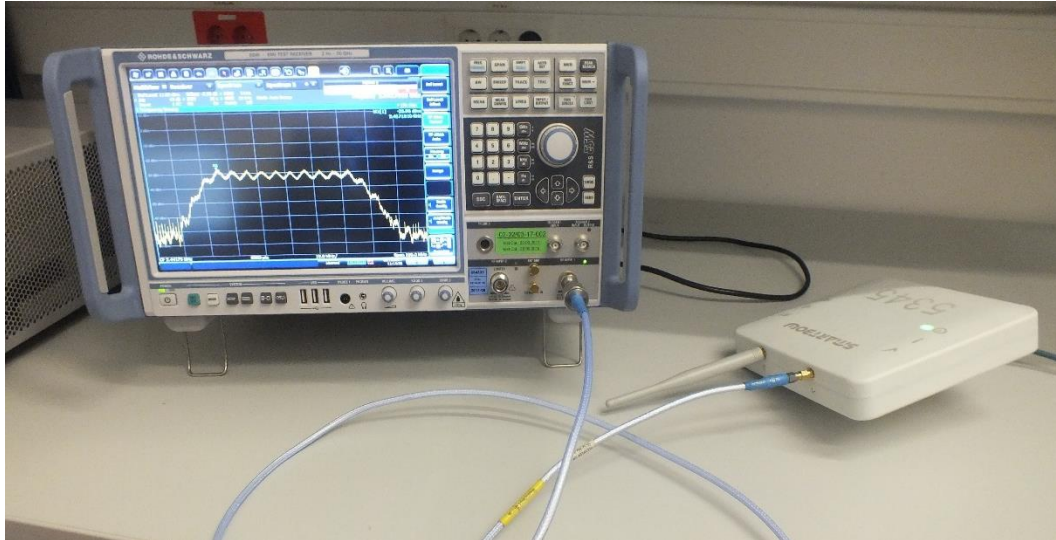
## 5.4 Power spectral density

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

### 5.4.1 Description of the test location

Test location: AREA4

### 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 10.2 set out in KDB-558074. The power measurement was done as peak power measurement. Therefore, the PKPSD is measured. The max peak was located and with the spectrum analyser and a marker set to peak.

Spectrum analyser settings:

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

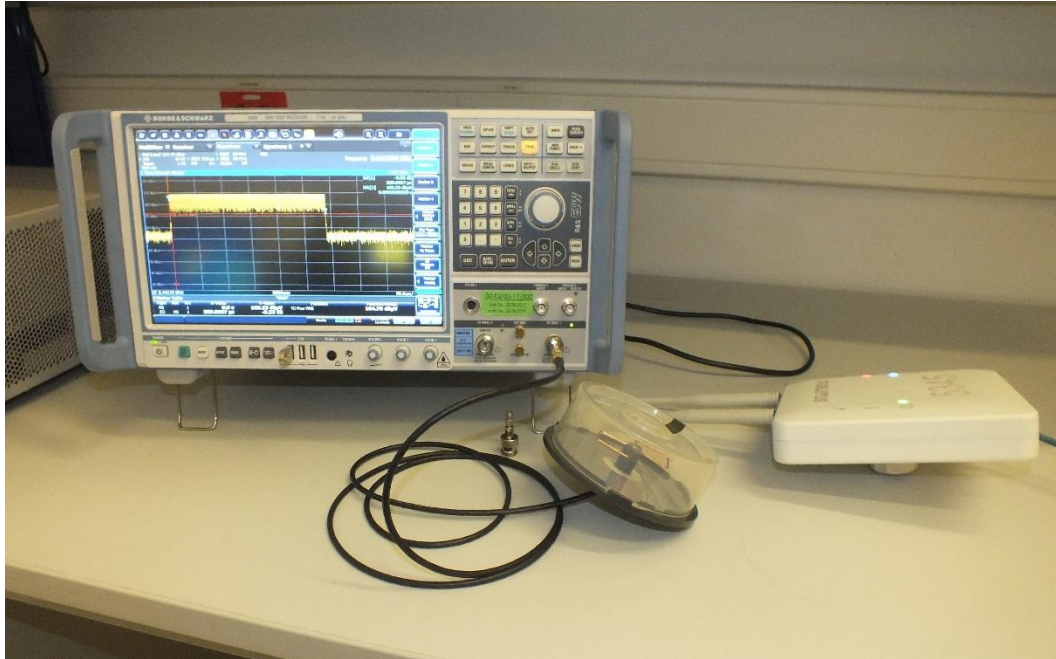
## 5.5 Correction for pulse operation (duty cycle)

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

### 5.5.1 Description of the test location

Test location: AREA4

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



### 5.5.1 Applicable standard

According to FCC Part 15A, Section 15.35(c):

When the radiated emission limits are expressed in terms of average value and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete puls train, including blanking intervals, as long as the pulse train does not exceed 0.1s. In cases where the puls train exceeds 0.1s, the measured field strength shall be determined from the average absolute voltage during a 0.1s interval during which the field strength is at its maximum. The exact method of calculating the average field strength shall be submitted.

## 5.6 Unwanted emissions in restricted bands, radiated

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

### 5.6.1 Description of the test location

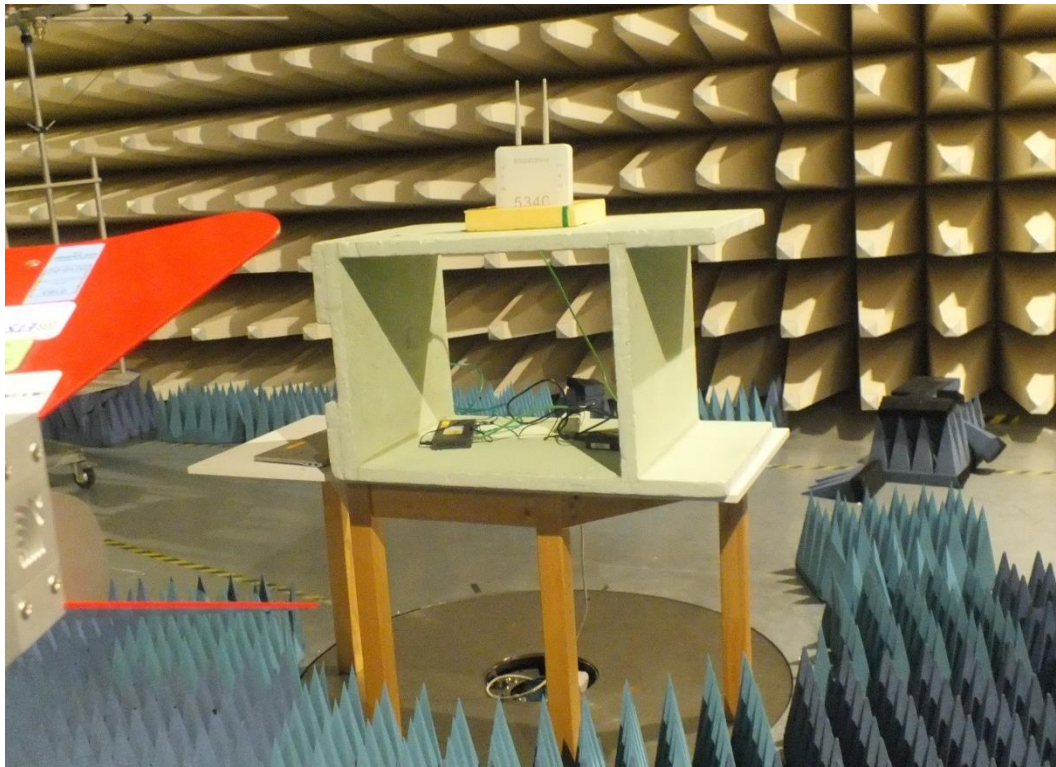
Test location: OATS 1  
Test location: Anechoic chamber 1  
Test distance: 3 m

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

Open area test site



Anechoic chamber



According to FCC Part 15, Section 15.205(a):

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).

### 5.6.3 Description of Measurement

The restricted bands are measured radiated. The span of the spectrum analyser is set wide enough to capture the restricted band and measure the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation. The restricted bands are measured falling emissions into it and the nearest restricted band are checked for emissions also the restricted band for the harmonics of the carrier. 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 in average mode again and reported.

Spectrum analyser settings:

|                    |                                                              |
|--------------------|--------------------------------------------------------------|
| 30 MHz – 1000 MHz: | RBW: 120 kHz                                                 |
| 1000 MHz – 25 GHz: | RBW: 1 MHz, VBW: 3 MHz, Sweep: Auto, Detector function: Peak |

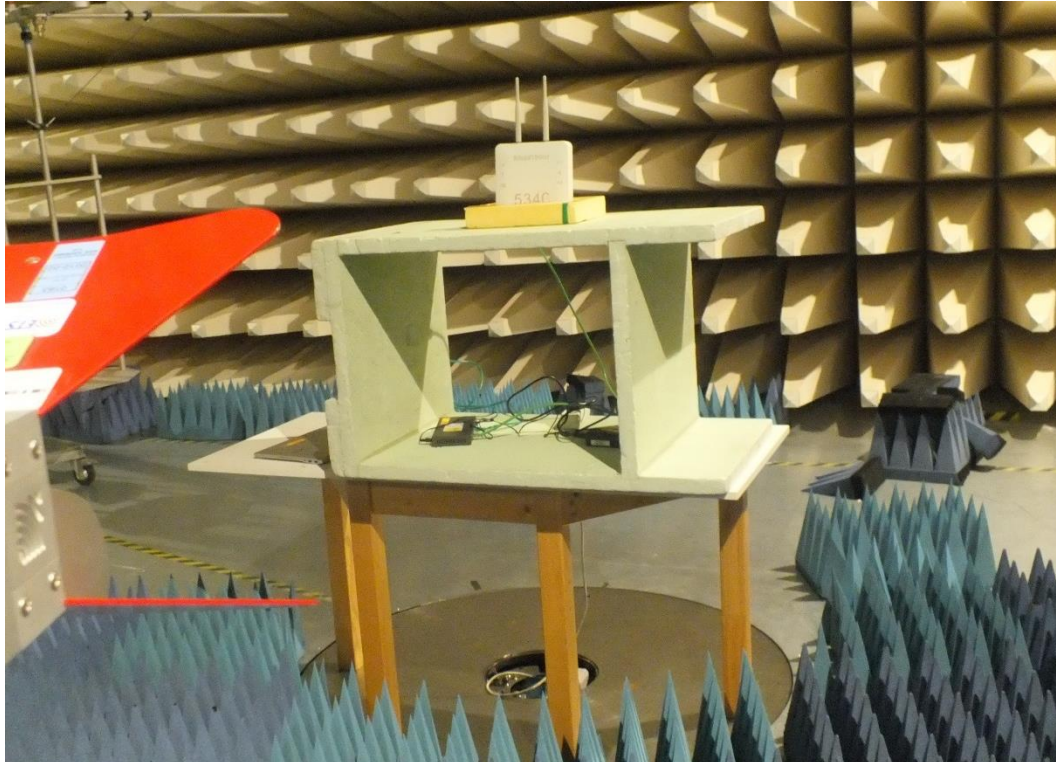
## 5.7 Unwanted emissions, radiated

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

### 5.7.1 Description of the test location

Test location: Anechoic chamber 1

### 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 a 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)).

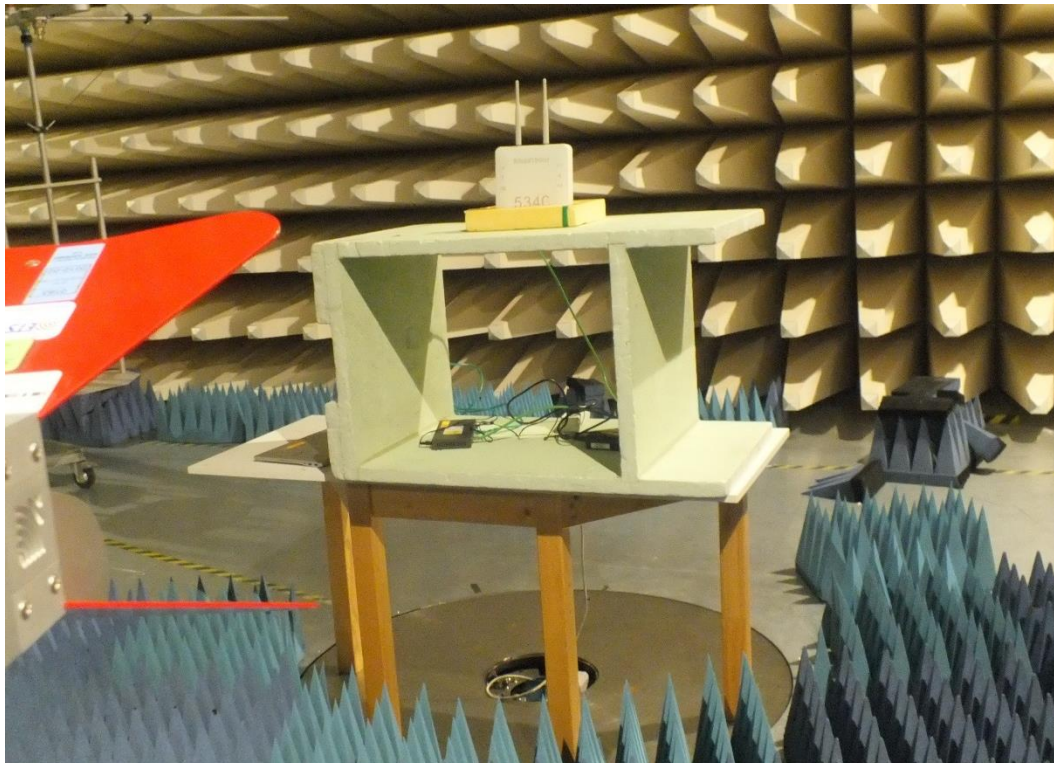
## 5.8 Band edge compliance

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

### 5.8.1 Description of the test location

Test location: Anechoic chamber 1

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



### 5.8.3 Applicable standard

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

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

### 5.8.4 Description of Measurement

A spectrum analyser is connected to the output of the transmitter via a suitable attenuator while EUT was operating in transmit mode at the assigned frequency according to OET 558074, 4/5/2017.

Spectrum analyser settings:

RBW: 100 kHz,      VBW: 300 kHz,      Detector: Max peak,      Trace: Max hold,      Sweep: auto