

FCC ID: RXB-TIRU

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: RXB-TIRU

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:

EBW:	RBW: 100 kHz	VBW: 300 kHz,	Detector: Peak;
OBW:	RBW: 1 MHz	VBW: 3 MHz,	Detector: Peak;

FCC ID: RXB-TIRU

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: AREA4

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 output power is measured using a spectrum analyser according KDB558074 D01, procedure 8.2.1 Option 1. The EUT is set while measuring in TX continuous mode to max output power without MUX. Due to the duty cycle is lower 98% the alternative 1 is used to calculate to a duty cycle correction factor.

Calculation of the duty cycle correction factor:

On time / (ontime + off time) *100 % = 32.76 ms / 49,9 ms *100 % = 66.66 %;

Correction factor: DC = 10*log (1 + 0.3333) = 1.3 dB;

Spectrum analyser settings:

RBW: 1 MHz, VBW: 10 MHz,
Span: 1.5 times OBW = 15 MHz,

Detector: RMS, Trace mode: average 100 traces,
Bins = 501 (2 * 15 MHz / 1 MHz = 30);

FCC ID: RXB-TIRU

5.4 Spurious emissions conducted, in non-restricted bands

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

5.4.1 Description of the test location

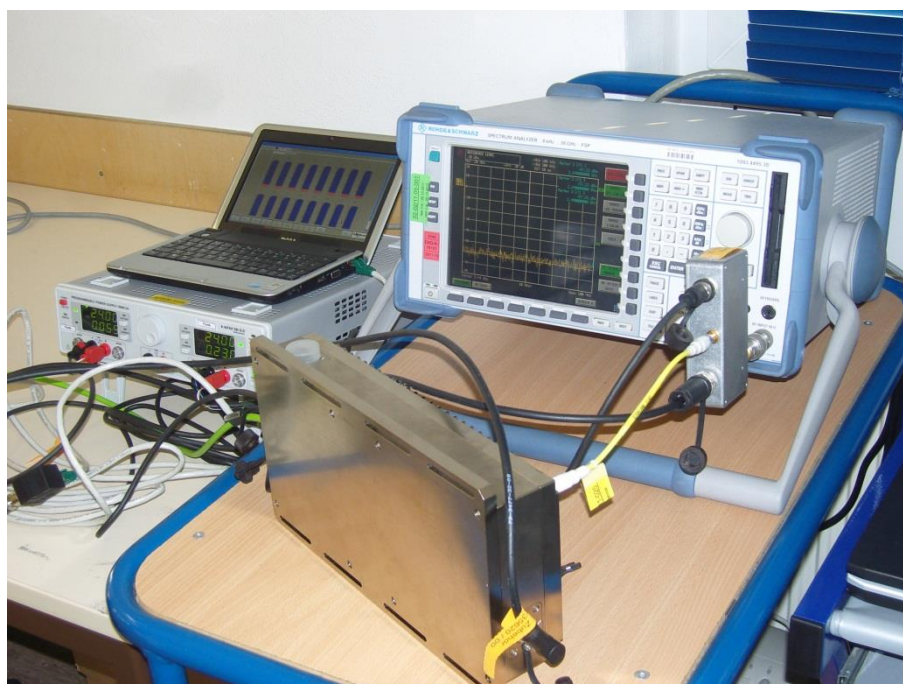
Test location: AREA4

5.4.2 Photo documentation of the test set-up

Without MUX:



With MUX:



FCC ID: RXB-TIRU

5.5 Spurious emissions conducted, in restricted bands

For test instruments and accessories used see section 6 Part SEC 1, SEC 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 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 falling in the restricted bands are measured conducted using a spectrum analyser in a test setup following the procedures set out in KDB 558074 D01 for DTS. The frequency spectrum outside from the operating frequency range (2400 - 2483.5 MHz) is scanned for emissions that exceed the limit. The conducted limit in EIRP is calculated according KDB 558074 D01, Item 10.2.2.1 from the absolute radiated limit. The measurement is performed at normal test conditions in modulated TX mode. The observed spurious emissions falling into restricted bands are measured again to show the compliance to Section 15.209(a). The MUX is not connected to the TIRU. An antenna cable, 0.2 m is used to connect to the spectrum analyser.

Spectrum analyser setting:

9 kHz < f < 150 kHz:	RBW: 300 Hz,	VBW: 1 kHz,	Detector: Max peak,	Trace Mode: Max hold
150 kHz < f < 30 MHz:	RBW: 10 kHz,	VBW: 30 kHz,	Detector: Max peak,	Trace Mode: Max hold
30 MHz < f < 1000 MHz:	RBW: 100 kHz,	VBW: 300 kHz,	Detector: Max peak,	Trace Mode: Max hold
f > 1000 MHz:	RBW: 1 MHz,	VBW: 3 MHz,	Detector: Max peak,	Trace Mode: Max hold

FCC ID: RXB-TIRU

5.1 Spurious emissions radiated, cabinet radiation

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

5.1.1 Description of the test location

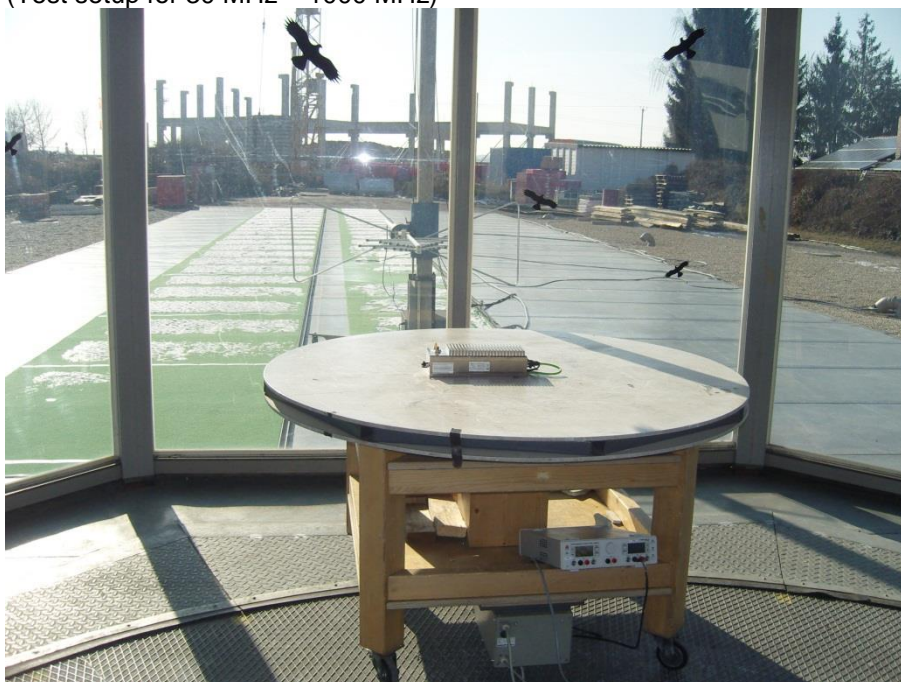
Test location: OATS 1
 Test location: Anechoic chamber 2
 Test distance: 3 m

5.1.2 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)



FCC ID: RXB-TIRU

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



Anechoic chamber (Test setup for 18 GHz – 25 GHz)



5.1.3 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)).

FCC ID: RXB-TIRU

5.2 Power spectral density

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

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(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.

5.2.4 Description of Measurement

The measurement is performed using the procedure set out in KDB-558074 D01. The power measurement is done using the procedure 9.1 Option 2, without MUX. Due to the duty cycle is lower 98% the alternative 1 is used to calculate to 100 %.

Calculation of the duty cycle correction:

On time / (ontime + off time) * 100 % = 32.76 ms / 49,9 ms * 100 % = 66.66 %;

Correction factor: DC = $10 \cdot \log(1 + 0.3333) = 1.3$ dB;

Spectrum analyser settings:

RBW: 10 kHz, VBW: 100 kHz,
Span: 1.5 times OBW = 15 MHz,

Detector: RMS, Trace mode: average 100 traces,
Bins = 8000 ($2 \cdot 15000 \text{ kHz} / 10 \text{ kHz} = 3000$);