5.7 Maximum permissible exposure (MPE)
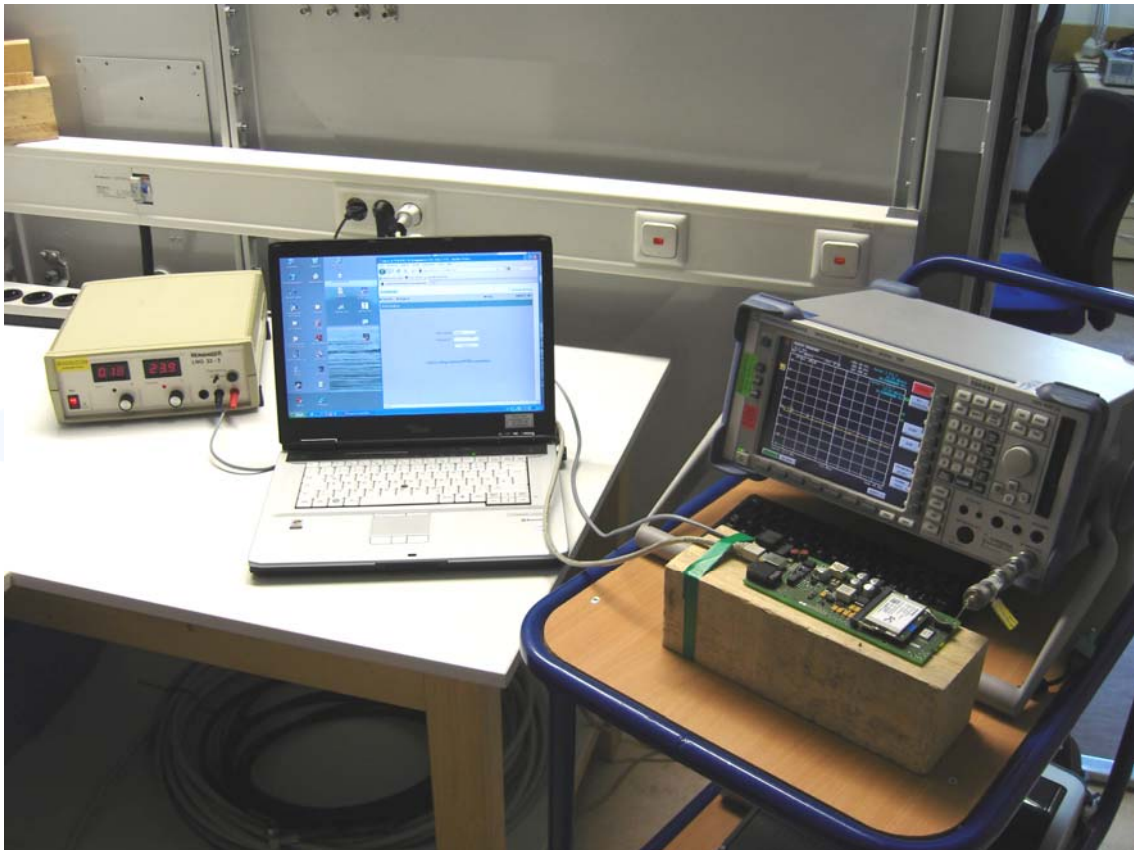
For test instruments and accessories used see section 6 Part **CPC 3**.

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 15.407(f):
U-NII devices are subject to the radio frequency radiation exposure requirements specified in Section 1.1307(b), 2.1091 and 2.1093 of this chapter, as appropriate. All equipment shall considered to operate in a "general population/uncontrolled" environment. The test methods used comply with ANSI/IEEE C95.1-1992, "IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz".

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5.7.4 Description of Measurement

The maximum total power input to the antenna has been measured conducted as described in clause 5.3 of this document. Through the Friis transmission formula, which is a far field assumption and the known maximum gain of the antenna, the maximum MPE at a defined distance away from the product, can be calculated.

Friis transmission formula: $P_d = \dfrac{P_{out} * G}{4 * \Pi * r^2}$;

where

P_d = power density in mW/cm^2
P_{out} = output power to antenna in mW
G = gain of antenna (linear scale)
r = distance between antenna and observation point (cm)

5.7.5 Test result

Channel No.	Frequency (MHz)	Max power output to Antenna (dBm)	(mW)	Antenna gain (dBi)	Power density (mW/cm^2)	Limit of power density (mW/cm^2)
52	5260	15.8	38.0	5	0.024	1.0
56	5280	15.8	38.0	5	0.024	1.0
64	5320	13.9	24.5	5	0.015	1.0
100	5500	15.4	34.7	5	0.022	1.0
120	5600	17.7	58.9	5	0.037	1.0
140	5700	14.3	26.9	5	0.017	1.0

Limits for maximum permissible exposure (MPE):

Frequency range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minutes)
(B) Limits for General Population / Uncontrolled Exposure				
0.3 – 3.0	614	1.63	100	30
3.0 – 30	824/f	2.19/f	180/ f^2	30
30 - 300	27.5	0.073	0.2	30
300-1500	---	---	f/1500	30
1500-100000	**---**	**---**	**1.0**	**30**

f = Frequency (MHz)

The requirements are **FULFILLED.**

Remarks: This test report shows the compliance with the limits for maximum permissible exposure (MPE)

specified in FCC 1.1310 and the criteria to evaluate the environmental impact of human exposure

to radio-frequency (RF) radiation as specified in FCC 1.1307(b).

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5.8 Co-location and Co-transmission

Applicable standard: ANSI/IEEE C95.1-1999, "IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz", Clause 4.1.1. e):

For mixed or broadband fields at a number of frequencies for which there are different values of the MPE, the fraction of the MPE (in terms of E, H, or power density (S)) occurred within each frequency interval should be determined and the sum of all such fractions should not exceed unity (1.0, or 100 % in terms of percentage.

1. MPE of WLAN-Module: $P_d = 0.037$ mW/cm^2
Limit: 1 mW/cm^2
Fraction of MPE: 1.5%

2. MPE of Effective Range Module: $P_d = 0.00006$ mW/cm^2
Limit: 1 mW/cm^2
Fraction of MPE: 0.006 %

The requirements are **FULFILLED.**

Remarks: For the test result of Effective Range Module please refer to Test Report T33234-03-00AA

(mikes-testingpartners gmbh).

5.9 Antenna application - Detailed photos see attachment A

5.9.1 Applicable standard

According to FCC Part 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.

5.9.2 Result

The EUT is equipped with 3 integrated antennas (2 for WLAN, 1 for RFID) and have no external antenna connectors, which meets the requirement of FCC Part 15.203 and 15.204.

The requirements are **FULFILLED.**

Remarks:

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