Calculation:
General SAR test exclusion for the Flue Gas Analyzer

Type identification: A 450
FCC ID: 2ANWR-A450

Subject of Investigation

According to 47CFR §2.1093 the hand-held Flue Gas Analyzer (FCC ID: 2ANWR-A450) from Wöhler Technik GmbH is defined as a portable device.
The antenna is mounted on the PCB inside the device with fixed separation distance of 6mm to the plastic housing and to the device user accordingly.The General SAR test exclusion guidance in document 447498 D01 General RF Exposure Guidance v06 states that for 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

$$\frac{P_{max},mW}{d_{min},mm} \cdot \sqrt{f,GHz} < 3.0\,(1 - g\,SAR)$$

P_{max},mw   is the maximum conducted conducted output power, including tune-up tolerance in mW

d_{min}, mm   is the minimum separation distance between antenna or radiating structures to any part of the body or extremity of a user or bystander in mm

f, GHz   is the RF channel transmit frequency in GHz

1-g SAR   standalone 1-g head or body SAR evaluation for general population exposure conditions

10-g SAR   standalone 10-g extremity SAR evaluation for general population exposure conditions

When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 4.1 f) KDB447498 D01 General RF Exposure Guidance v06 is applied to determine SAR test exclusion.

General SAR test exclusion calculation

In accordance to the **447498 D01 General RF Exposure Guidance v06**:

P: -0.2 dBm* = 0.96 mW (Maximum output power EIRP*[2])

T: +/- 4 dB = +/- 2.5 (tune-up range as declared by the applicant)

d: 6 mm (see photographs and user documentation below)

f: 2412 MHz* (frequency of the worst case emission)

*Value is taken from test report F170475E1 from Phoenix Testlab. Value is the maximum average output power transmitted by the EUT.
*[2]The EUT has only an internal antenna which cannot be removed. This concludes, that the EIRP measurement is the only sensible case for testing.
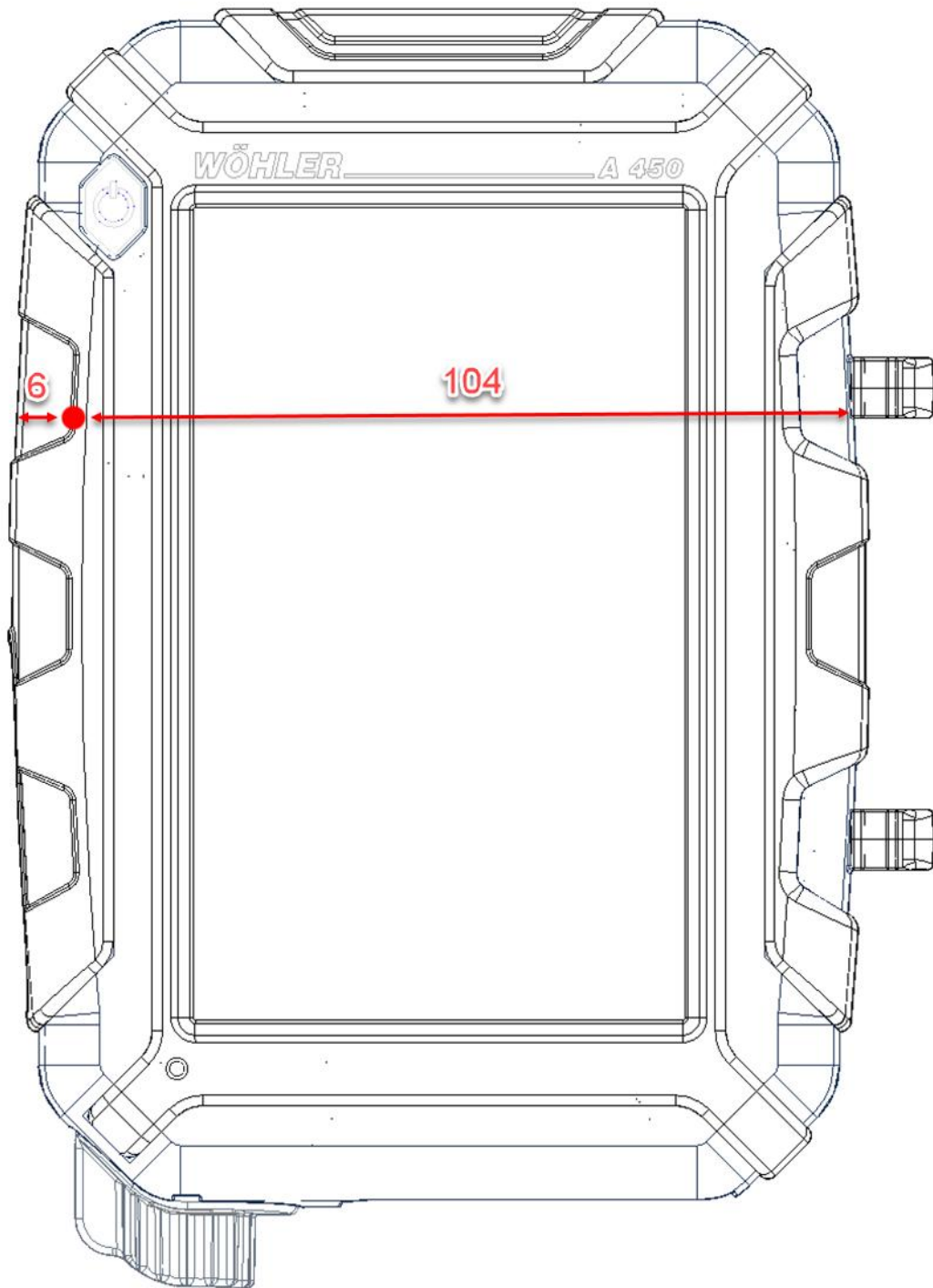
$$\frac{0.96\, mW \cdot 2.5}{6mm} \cdot \sqrt{2.412 GHz} = 0.621 < 3.0$$

Therefore the EUT meets the stand-alone SAR Test Exclusion of KDB447498 D01.

Explanation of test distances

The following drawings were provided by the applicant to specify the distance between the radiating internal antenna and the user or bystander.
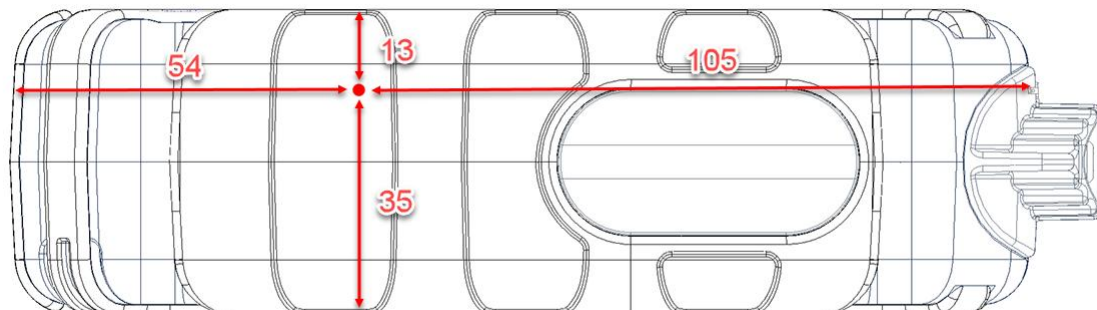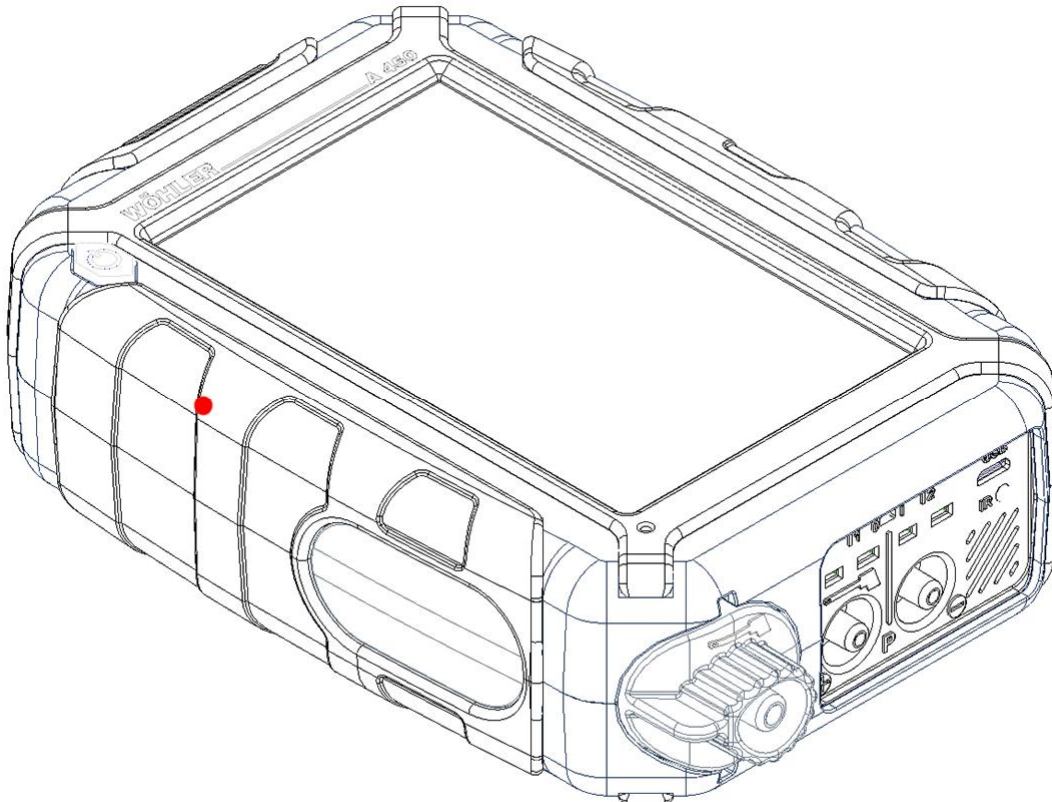
The following photograph was taken during the tests, and shows the position of the antenna pad and the housing of the EUT.

Antenna Pad