

## 1 Subject of Investigation

The device XYfi is a new USB stick from Option operating in the 850 MHz, 900 MHz, 1800 MHz, 1900 MHz and 2450 MHz frequency range. The device has two integrated antennas and the system concepts used are the GPRS/EDGE 850, GPRS/EDGE 900, GPRS/EDGE 1800, GPRS/EDGE 1900, WCDMA I (FDD), WCDMA II (FDD) and IEEE 802.11 b/g/n standards. The USB stick provides HSDPA and HSUPA in WCDMA.



Fig. 1: Pictures of the device under test in 90° and 180° configuration.

The objective of the measurements done by IMST was the dosimetric assessment of one device in body worn configuration in the GPRS 850 (Class 11), GPRS 1900 (Class 12), WCDMA II (FDD) and IEEE 802.11 b standards. The measurements were performed in combination with one host product (Dell Latitude X300). According to Fig. 2 the device was tested in six positions in 180° configurations with a maximum distance of 5 mm between DUT and phantom. Since the device is equipped with a swivel antenna which can be used in 180° and 90° angle, additional measurements in worst case configuration for the 90° mode has been conducted. The examinations have been carried out with the dosimetric assessment system „DASY4“ described below.

## 2 The IEEE Standard C95.1 and the FCC Exposure Criteria

In the USA the FCC exposure criteria [OET 65] are based on the withdrawn IEEE Standard C95.1-1999 [IEEE C95.1-1999]. This version was replaced by the IEEE Standard C95.1-2005 [IEEE C95.1-2005] in October, 2005.

Both IEEE standards sets limits for human exposure to radio frequency electromagnetic fields in the frequency range 3 kHz to 300 GHz. One of the major differences in the newly revised C95.1-2005 is the change in the basic restrictions for localized exposure, from 1.6 W/kg averaged over 1 g tissue to 2.0 W/kg averaged over 10 g tissue, which is now identical to the ICNIRP guidelines [ICNIRP 1998].

### 2.1 Distinction Between Exposed Population, Duration of Exposure and Frequencies

The American Standard [IEEE C95.1-1999] distinguishes between controlled and uncontrolled environment. Controlled environments are locations where there is exposure that may be incurred by persons who are aware of the potential for exposure as a

### 3.2 Test to be performed for Modules in Portable devices (PCMCIA Cards, USB Sticks)

A device may be approved for use in a single platform when all hosts within the same platform have the same operating configurations and exposure conditions, with only minor configuration and construction differences. Following KDB 447498, the applicable SAR limit for portable transmitters, approved in a single platform, is 1.2 W/kg, which is averaged over any one gram of tissue defined as a tissue volume in the shape of a cube. Furthermore for USB-dongle transmitters a separation distance  $\leq 0.5$  cm is required for USB-dongle transmitters. According to Fig. 2 devices that can be connected to a host through a cable must be tested with the device positioned in four orientations against the flat phantom.



Fig. 2: Device with all applicable orientations.

For measurements in WCDMA without HSDPA or HSUPA, the default test configuration is to establish a radio link between the DUT and a communication test set using a 12.2 kbps RMC configured Test Loop Mode 1 and TPC bits configured to all "1". The SAR will be tested for all bands using a Rel99 call configured to transmit at maximum output power per 3GPP 34.121 [3GPP 34.121]. The Rel99 parameters are summarized in Table 14.

In addition, body SAR for HSDPA is measured using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, using the highest body SAR configuration in 12.2 kbps RMC without HSDPA. Maximum output power is verified according to 3GPP 34.121 and SAR must be measured according to these maximum output conditions.

Furthermore, body SAR for HSUPA is measured with E-DCH with H-Set 1 in Sub-test 5 and QPSK for FRC and a 12.2 kbps RMC configuration in Test Loop Mode 1 using the highest body SAR configuration in 12.2 kbps RMC without HSUPA. Maximum output power is verified according to 3GPP 34.121 and SAR must be measured according to these maximum output conditions as described in KDB 941225 [KDB 941225].



Fig. 26: Position 1 (90° configuration) with the Dell Latitude X300.



Fig. 24: Position 5 with the Dell Latitude X300.

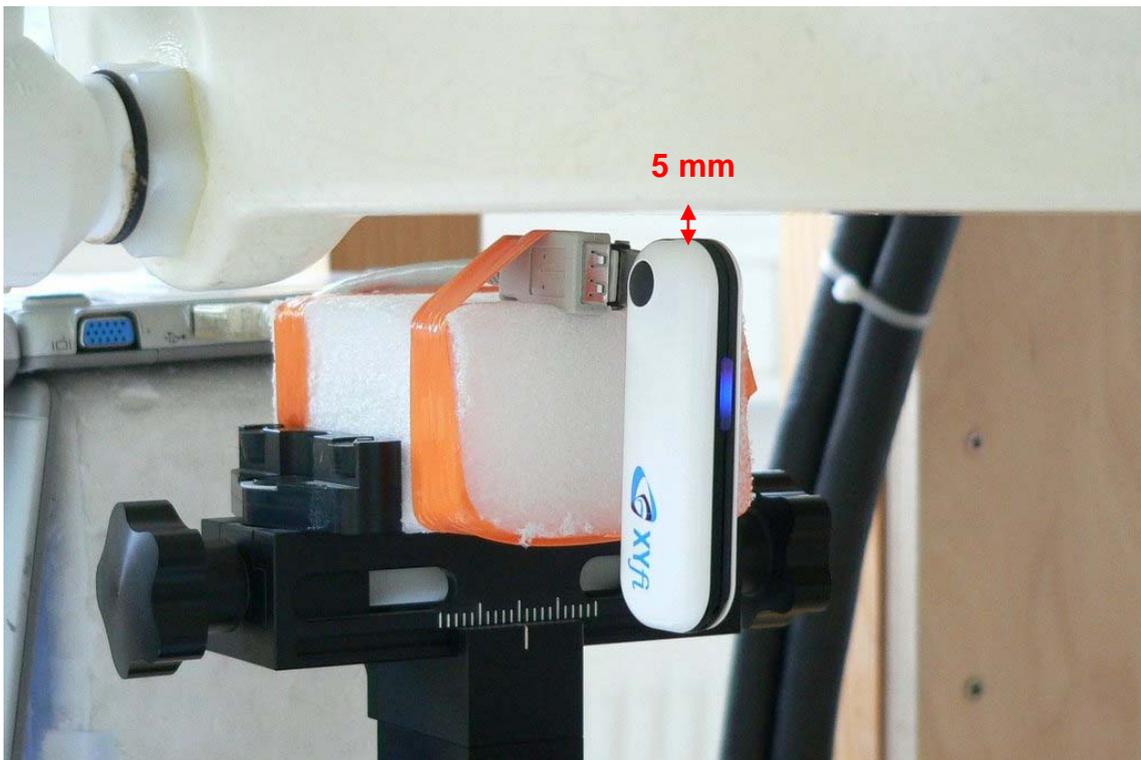


Fig. 25: Position 6 (Bottom Tip configuration) with the Dell Latitude X300.



Fig. 22: Position 3 with the Dell Latitude X300.

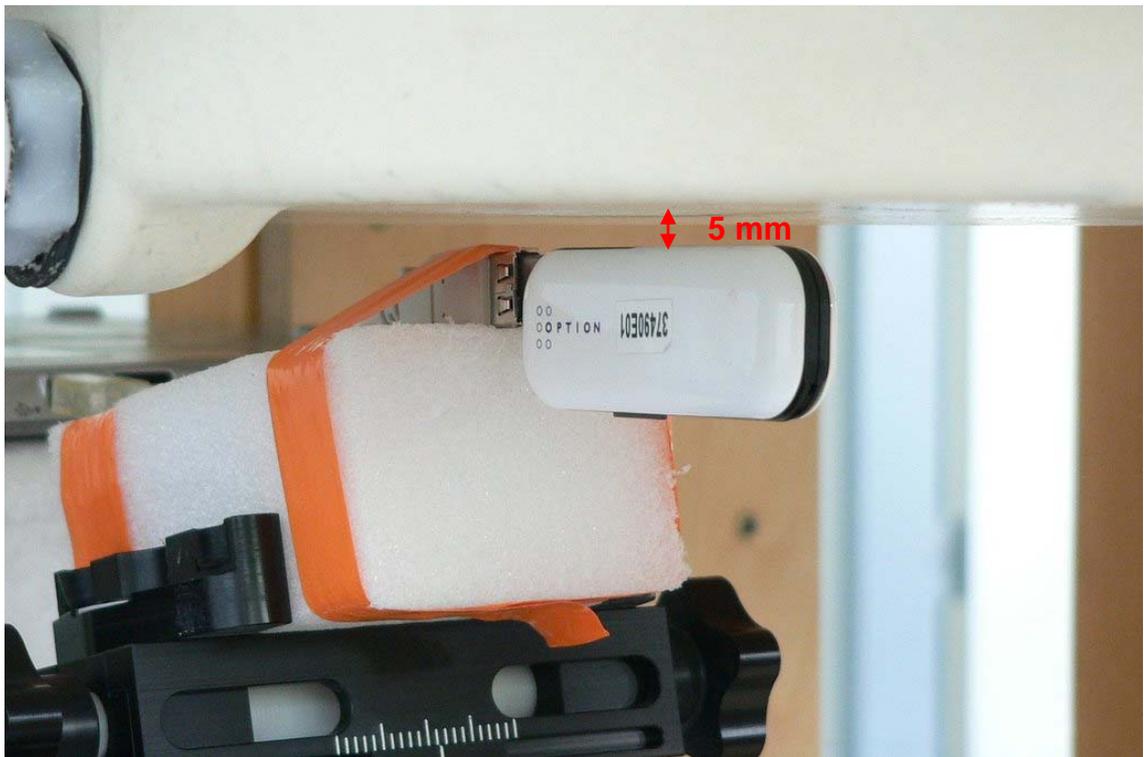


Fig. 23: Position 4 with the Dell Latitude X300.

### 9.10 Test Positions for the Device under Test

Fig. 20 – Fig. 26 show the test positions for the SAR measurements.

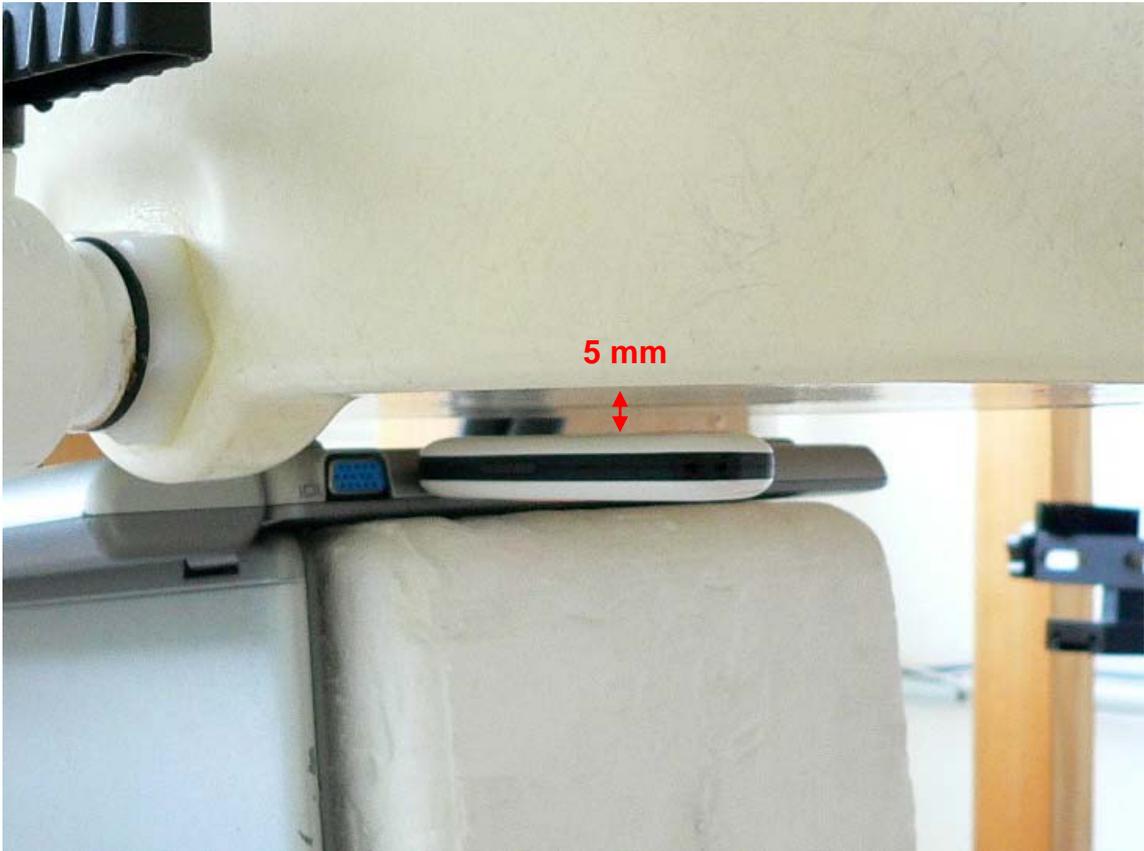


Fig. 20: Position 1 with the Dell Latitude X300.

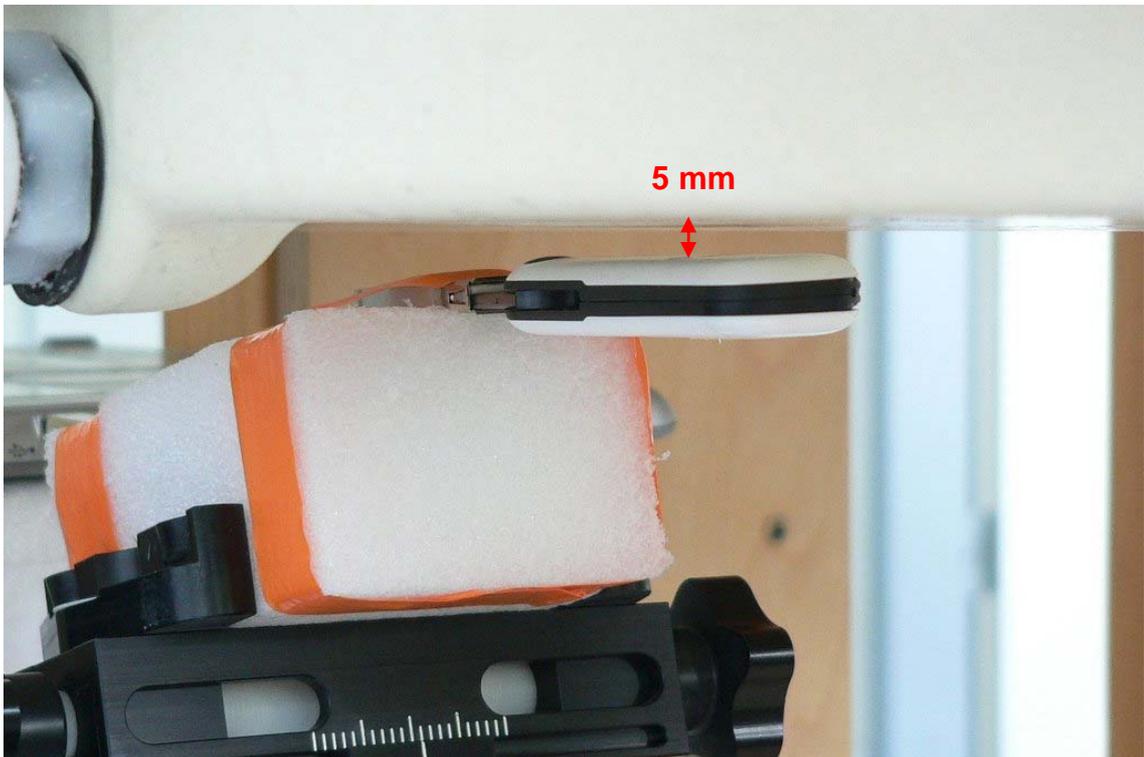


Fig. 21: Position 2 with the Dell Latitude X300.

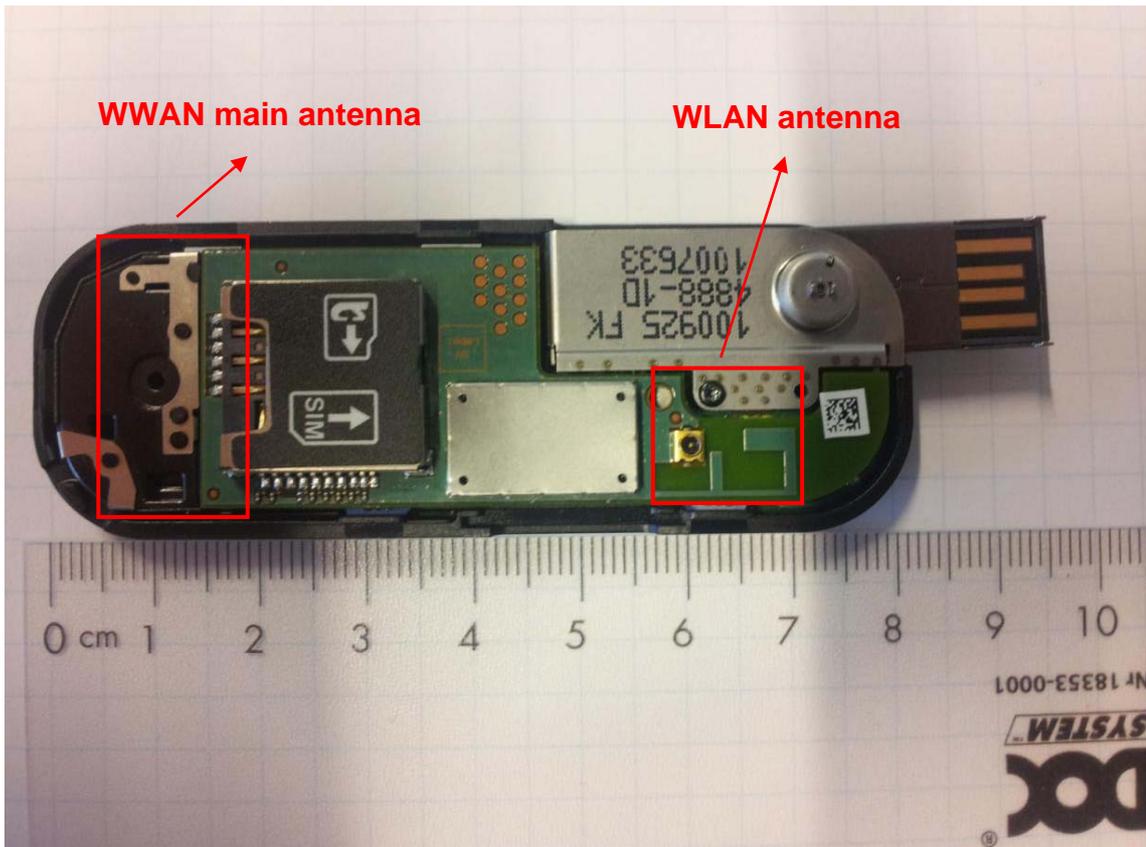


Fig. 18: Device under test. top view.

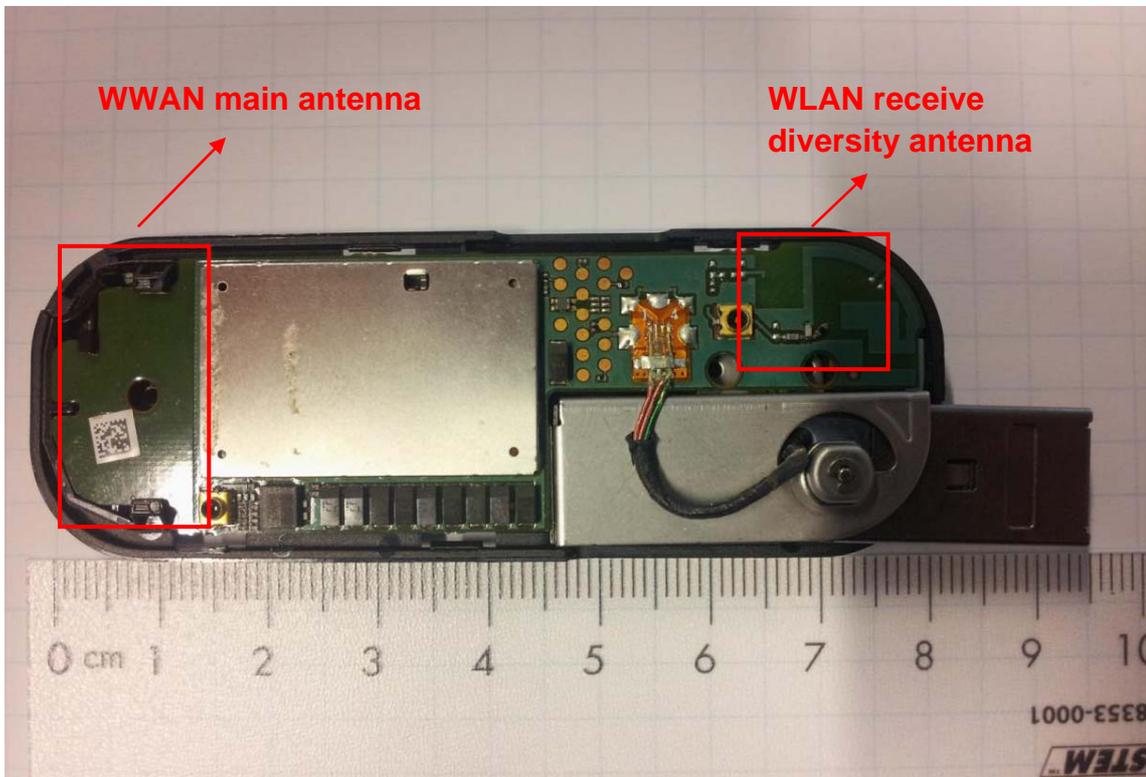


Fig. 19: Device under test. bottom view.

### 9.9 Pictures of the Device under Test

Fig. 16 - 19 show the device under test.



Fig. 16: Front view of the host device Dell Latitude X300.



Fig. 17: Device under test.