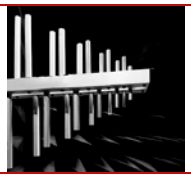
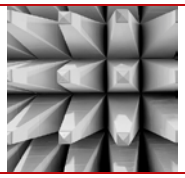




CETECOM ICT Services
consulting - testing - certification

Annex E Proximity sensor data

Appendix to Test Report No.: 1-6965/13-11-21-B

DAkkS Deutsche Akkreditierungsstelle D-PL-12076-01-01

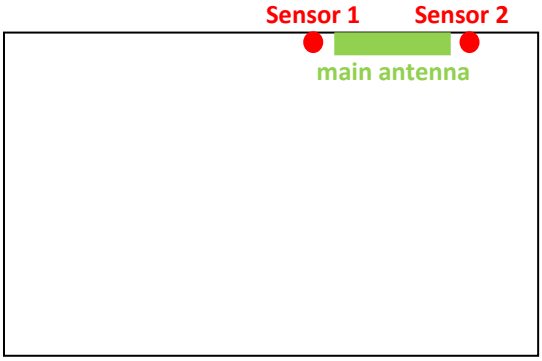
Testing Laboratory

CETECOM ICT Services GmbH
Untertürkheimer Straße 6 – 10
66117 Saarbrücken/Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: http://www.cetecom.com
e-mail: ict@cetecom.com

Accredited Test Laboratory:
The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2005) by the Deutsche Akkreditierungsstelle GmbH (DAkkS)
The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number: D-PL-12076-01-01

1 Proximity sensor

The DUT is equipped with two proximity sensors to reduce the output power if a person is close to the main antenna. The position of the sensors and antenna are as shown in the graphic.



According to KDB 616217 D04 SAR for laptop and tablets v01r01 the functionality of the sensors has to be approved for different aspects:

- Triggering distances
- Sensor coverage of the relevant area
- Sensor functionality in tilted positions
- Safety mechanisms in case of sensor Malfunction
- Material dependency of the triggering distances

1.1 Power reduction:

When one of the sensors is triggered the power will be reduced according to the following table:

Operating mode	Power reduction [dB]
GSM 850	>4.6
GSM 1900	>5.5
UMTS FDD V	>5.6

More detailed information can be seen in **CONDUCTED MEASUREMENTS RESULTS.**

1.2 Resulting test positions for SAR measurements.

The smallest separation distance determined during triggering distance, sensor coverage and tilt angle test is selected for SAR measurements. Final verdict of safety distance:

position	triggering distance	coverage	tilting	resulting measurement distance for SAR
top edge	15	16	16	**15 mm**
rear	19	20	---	**19 mm**

1.3 Safety measures in case of sensor malfunctions

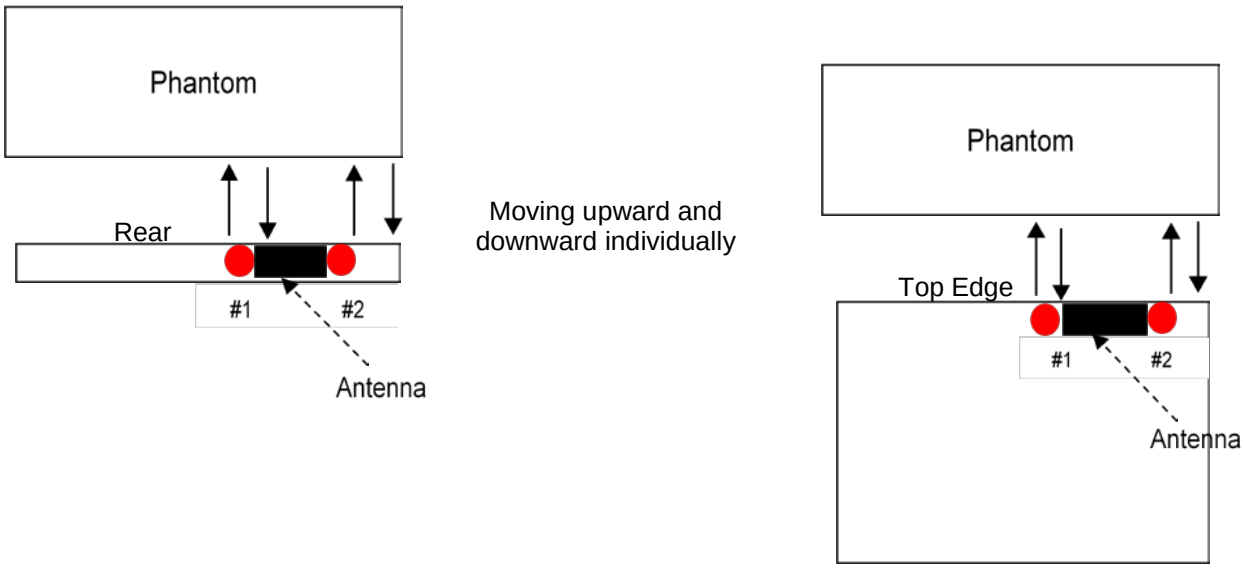
The operational description contains information explaining how the device remains compliant in the event of a sensor malfunction.

1.4 Material dependency of triggering distances

The triggering variations and hysteresis effect must be evaluated separately according to the tissue-equivalent medium required for each frequency band, to identify the proper SAR test separation distances. As the sensors in the DUT trigger with different sensitivity for different mediums, it is necessary to perform all measurements in all specific Bands with the corresponding signalization. For GSM and UMTS bands a Rhode & Schwarz CMU200 was used to connect the device. For the LTE bands the communication was made with a Rhode & Schwarz CMW500.

1.5 Triggering distances

The DUT is placed under a flat phantom with a tissue simulating liquid and moved in mm steps upwards and downwards to find the exact triggering distances in each measurement position. The trigger distances of the device form a sort of hysteresis with an upwards triggering and downwards triggering point. The measurement is repeated several times to ensure that the repeatability of the found positions is less than ±1mm. The graphics show the measurement of the triggering distances of the positions top edge and rear for the DUT. The testing of the remaining sides and boarders is not necessary as the SAR measurements were performed with 0mm distance and no power back-off.



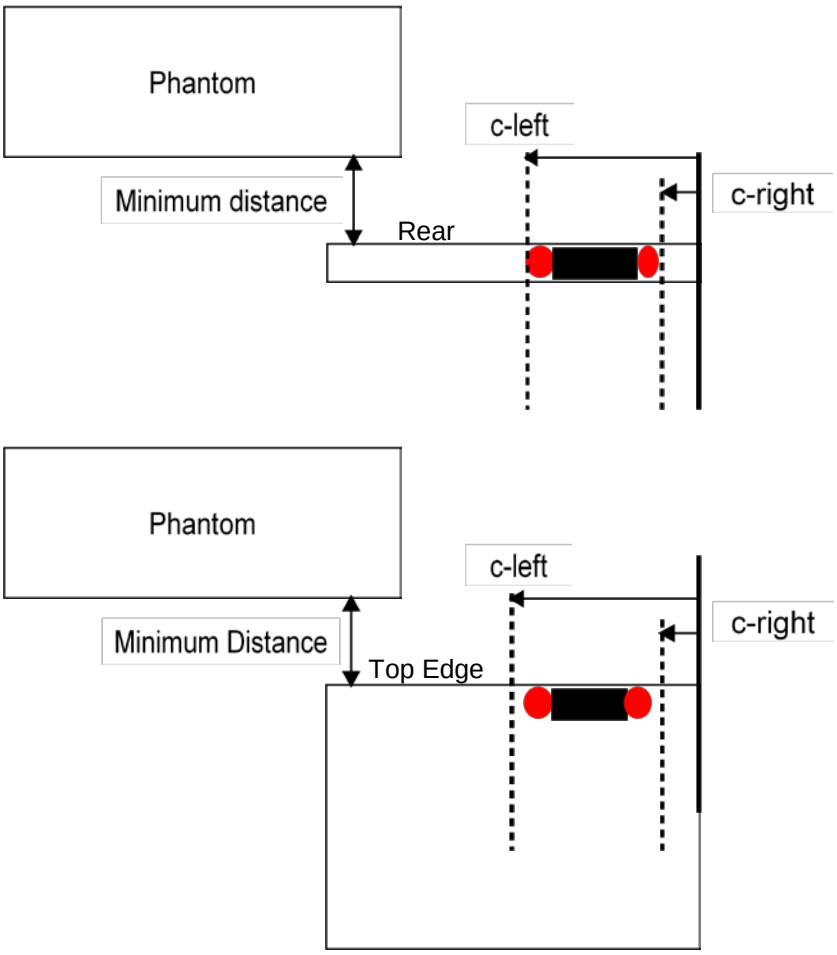
The following measurements were performed with different active sensor settings. The values in the table below show the distances found for the triggering points of the different settings in upwards and downwards direction:

		Rear				Top Edge			
		#1 active		#2 active		#1 active		#2 active	
		up	down	up	down	up	down	up	down
UMTS	V	23	26	21	22	20	20	**16**	18
GSM	1900	25	26	**20**	21	18	20	17	21
	850	23	25	21	23	19	20	**16**	18
triggering distance *)		**19 mm**				**15 mm**			

*)According to KDB 616217 D04 the smallest distance for movements to and from the phantom, minus 1mm is used as the sensor triggering distance for determining the SAR measurement distance.

1.6 Coverage distances

The back surface or edge of the DUT is positioned at a test separation distance less than or equal to the distance required for back surface or edge triggering, with both the antenna and sensor pad located at least 20 mm laterally outside the edge (boundary) of the phantom, along the direction of maximum antenna and sensor offset. For the back surface, if the direction of maximum offset is not aligned with the tablet coordinates (physical edges) the tablet test position would not be aligned with the phantom coordinates (orientations). Each applicable tablet edge should be positioned perpendicularly to the phantom to determine sensor coverage. For antennas and/or sensors located near the corner of a tablet, both adjacent edges must be considered. The following graphics show the testing positions and movements:



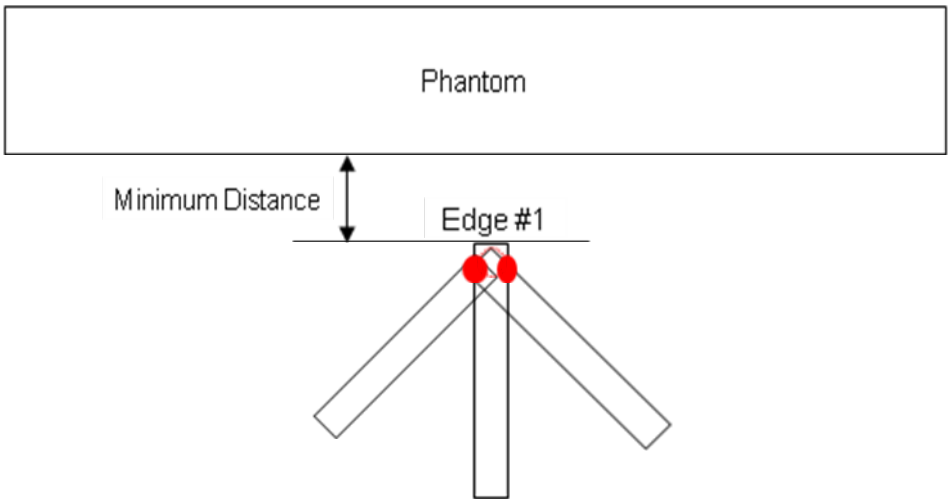
The measurements were performed with different active sensor settings. The values in the table below show the distances in which the sensors were triggered:

		Rear		Minimum Distance (mm)		Edge #1		Minimum Distance (mm)	
		#1	#2			#1	#2		
		c-right	c-left	#1	#2	c-right	c-left	#1	#2
UMTS	V	15	106	23	21	15	106	20	**16**
GSM	1900	15	105	25	**20**	15	105	18	17
	850	15	106	23	21	15	106	19	16

Detailed results for LTE bandwidths, triggering sensors and movements describing the exact behaviour of the hysteresis are attached in paragraph 5.

1.7 Coverage at tilted positions

The edge of the DUT is positioned at a test separation distance less than or equal to the distance required for triggering, with both the antenna and sensor pad located at least 20 mm laterally. Then it is rotated in 10° increments until +/-45° from the vertical position at 0° tilt angle. If sensor triggering is released and normal maximum output power is restored with the +/-45° range the procedure above is repeated with DUT-to-phantom-separation-distance reduced by 1 mm until the proximity sensor no longer releases triggering and maximum output power remains in reduced mode. The smallest separation distance determined in the steps above – minus 1 mm – is the sensor triggering distance for tablet tilt coverage.



		Minimum Distance (mm)	
		#1	#2
UMTS	V	20	**16**
GSM	1900	18	17
	850	19	**16**