Draft KDB 616217

SAR Evaluation Considerations for Laptop, Notebook, Netbook & Tablet Computers

Submitted by UL

A. Modular approach

When the highest measured SAR for a host platform is ⩽ 0.8 W/kg, with respect to the procedures in this document and KDB 447498, testing in representative hosts is optional. When the highest measured SAR for a host platform is > 0.8 W/kg and ⩽ 1.2 W/kg, testing in a representative host is required to enable higher SAR configurations to qualify under the modular approach for which some basic platform test requirements may not be fully satisfied.

> The following is extracted from Draft KDB 447498:
> (ii) When the highest measured 1-g SAR is > 0.4 and ≤ 0.8 W/kg, transmitters and modules may be approved for use in multiple host platforms according to the operating configurations and exposure conditions of the host family attributes and requirements.
> (a) Typical platforms may include certain handheld devices, laptop/notebook/netbook and tablet computers etc.
>
> (b) Each host platform must be tested independently for SAR compliance.
>
> (c) When specific test requirements are unavailable in the *published KDB procedures*, the most conservative exposure conditions must be tested for each host platform, according to the operating and exposure characteristics of the host family attributes.[25]

Question: by cross reference to draft KDB 447498, if the highest measured 1-g SAR is >0.4 and ≤ 0.8 W/kg, each host platform must be tested independently. Draft KDB 616217 indicates testing in representative hosts is optional. Please help to clarify the differences.

III. Host platforms

A. Laptop host platform test requirements

When the *modular approach* is applied, transmitters and modules must have been tested without using a representative host and approved to operate in the display and/or keyboard of qualified laptop computers for standalone operations with the following minimum user test separation distance and antenna installation requirements:

一. ≤ 25 mm between the antenna and user for incorporation in the display screen

一. ≤ 5 mm between the keyboard and user, for incorporation in the keyboard compartment, for bottom and edge exposure conditions

一. the antennas used must have been tested for equipment approval, and

一. the antenna polarization, physical orientation, rotation and installation configurations used must have been tested for compliance

一. when the SAR Exclusion Threshold in KDB 447498 applies, a minimum separation distance of 25 mm is required for to determine test exclusion for the display, and 5 mm for the keyboard compartment

Question:

For a module requires to be tested in host platform, the standalone (without using representative host in the initial assessment) SAR value is generally greater than 0.8 W/kg.

As required by Draft KDB 447498, such module must be tested in the representative host. As indicated above, when the module is installed in representative Laptop host platform, looks like the module manufacturer has to provide two laptops: one with antenna installed in the display section with less than 25 mm ANT-to-user separation distance AND one with antenna installed in the keyboard compartment with less than 5 mm separation distance.

1. Full SAR evaluation must be evaluated and the highest SAR must be less than 1.6 W/kg. Is our understanding correct?

2. Is there any separation distance limitation during initial assessment (standalone)?

3. What if the most conservative distance established during the initial assessment is 2 mm with SAR value less than 1.2 W/kg, can only the highest SAR configuration be tested in the laptop platform without full tests?

4. Require the same antenna to be used, I do believe it is difficult to find an antenna design to be able installed in display section and in the keyboard compartment without some kind of modification. Please do consider this possible alteration on the antenna.

IV. Modular Approach SAR Test Setup Considerations

A. **Standalone SAR testing**

(i) The same type of antenna cable specified in the installation requirements must be used to connect the antenna to the transmitter for testing.
(a) The shortest antenna cable required by the host platform(s) must be used in the SAR tests.
(i) The antenna must be at least 10 cm away from the host computer and other supporting equipment in the SAR measurement setup.

(ii) When the shortest cable cannot be used in the SAR setup, the measured SAR must be scaled up to account for cable loss differences.

Question: Cable type and cable loss based upon length and frequency band are now required to be documented in the SAR test report to match with OEM installation instruction and antenna specification. Since the length of cable/loss may be frequently changed by host integrator, what is guideline to trigger the permissive change filing requirements?

V. Proximity Sensor Considerations

In this section, FCC provides a very detail procedure in determining the trigger distance and coverage area.

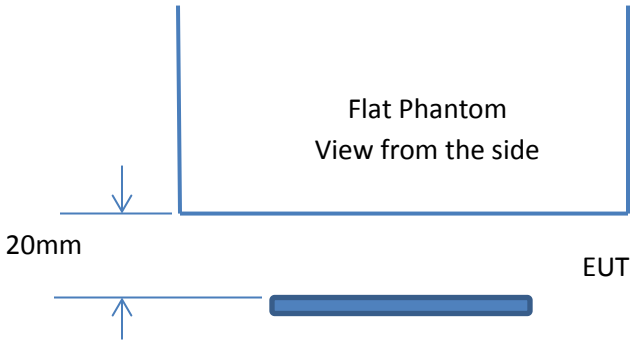
Question: Shall SAR test report be documented with exact procedures that were used so TCB can review the procedures against the requirements?

Can you please confirm our understanding of the procedures for proximity sesnor evaluation as described in the attached document.

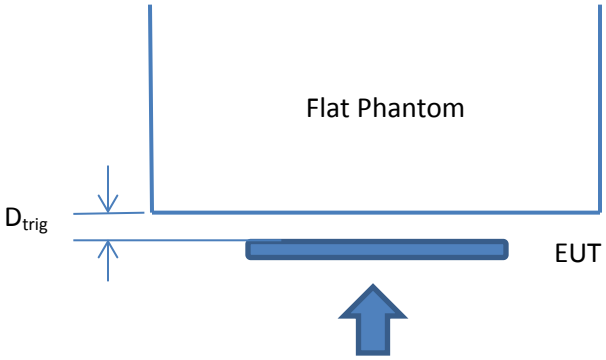
KDB 616217: Proximity Sensor Considerations: An interpretation

This document attempts to graphically represent the procedures contained in Draft KDB 616217 D04 part V sections A and B.

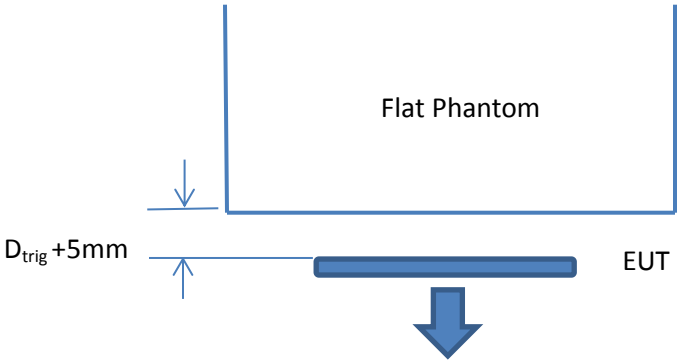
A. Procedures for determining trigger distance.



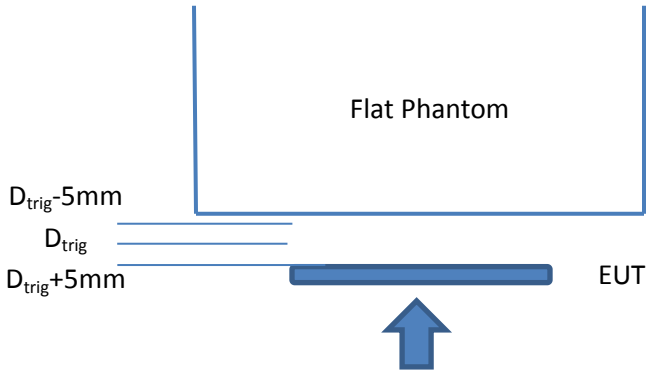
A.2 Initial position with the EUT's surface- or edge-under-test directly below and parallel to the phantom



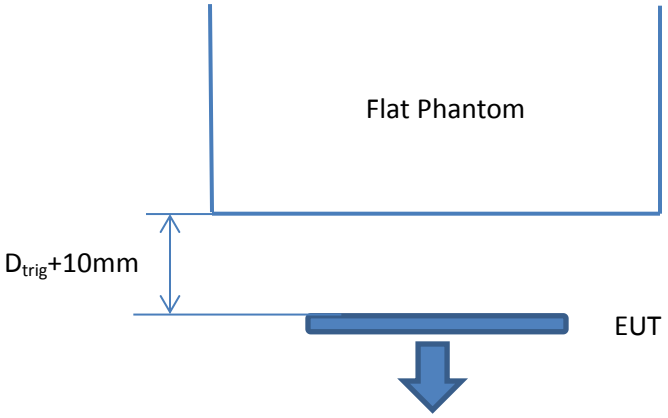
A.4 Move EUT upward toward phantom in 3mm steps until sensor triggers (power reduces). Note distance D_{trig} .



A.5 Move EUT away from phantom by at least 5mm. Confirm power returns to maximum. If the power does not return to maximum increase the distance until it does.



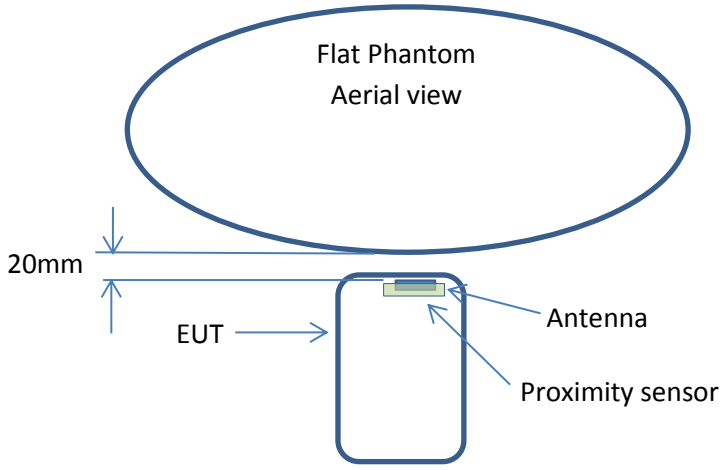
A.6/7 Move EUT toward phantom in 1mm steps from D_{trig} +5mm to D_{trig} -5mm or until contact is made with the phantom.
Note the power level and distance at each step.
If contact with the phantom is not made continue at 3mm steps until contact is made. Confirm the power stays reduced beyond D_{trig}

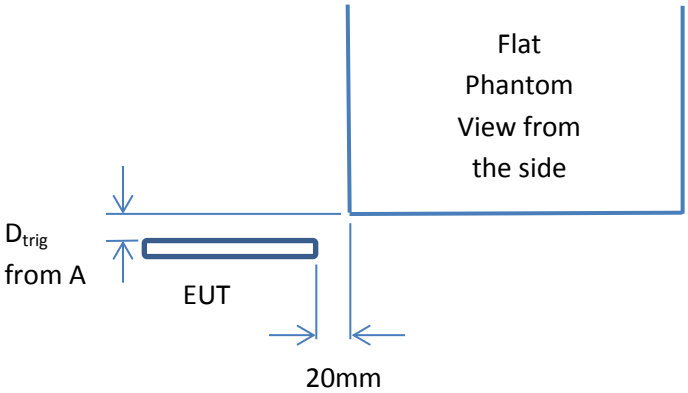


A.8 With the EUT initially touching the phantom move it away in 1mm increments. Note the power level and distance at each increment. Continue until the EUT is 10mm beyond D_{trig}
The power versus distance results shall be tabulated in the SAR report.
Full power SAR testing shall be performed at the closest distance measured that triggering occurs in A.6/7 or A.8 less 1mm (A.10).

B. Procedures for determining antenna and sensor coverage.

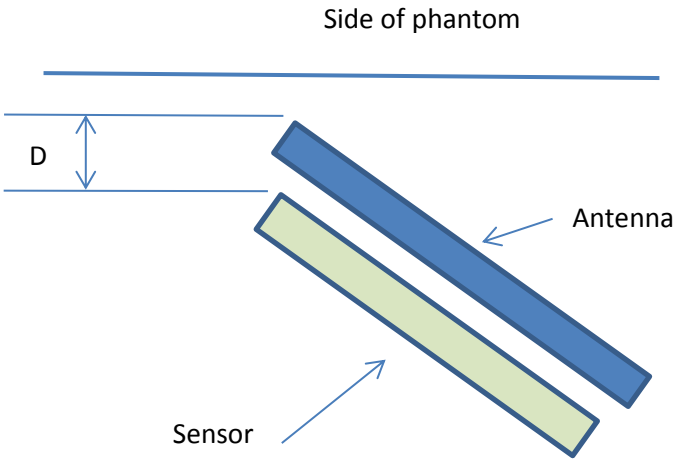
Required if a sensor is spatially offset from the antenna. I.E. sensor is further from the user than the antenna.





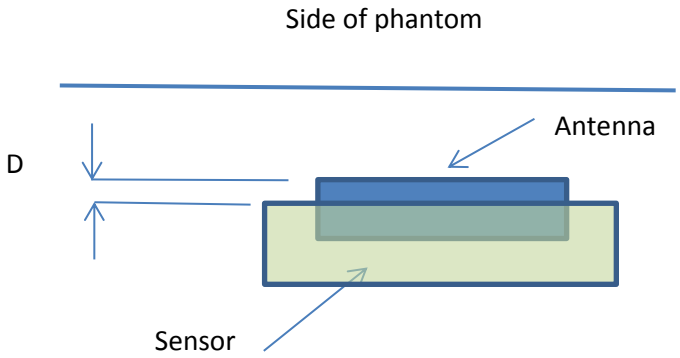
B.1 Initial position with the EUT's surface or edge under test parallel to the bottom of the phantom. The 20mm lateral distance shall be measured from the side of the phantom to the antenna or sensor – whichever is closer. The EUT vertical displacement from the phantom shall be the trigger distance measured in accordance with section A of the KDB.

The EUT shall be positioned so that the antenna and proximity sensor are oriented along the direction of the maximum antenna and sensor offset. See the following examples for guidance.

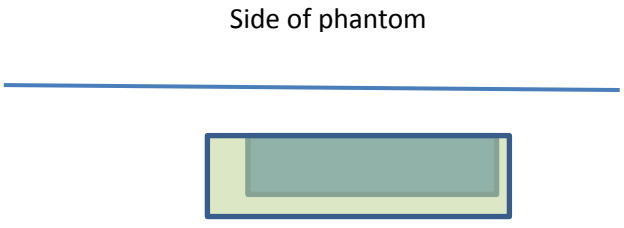


Example 1: There is no sensor and antenna overlap

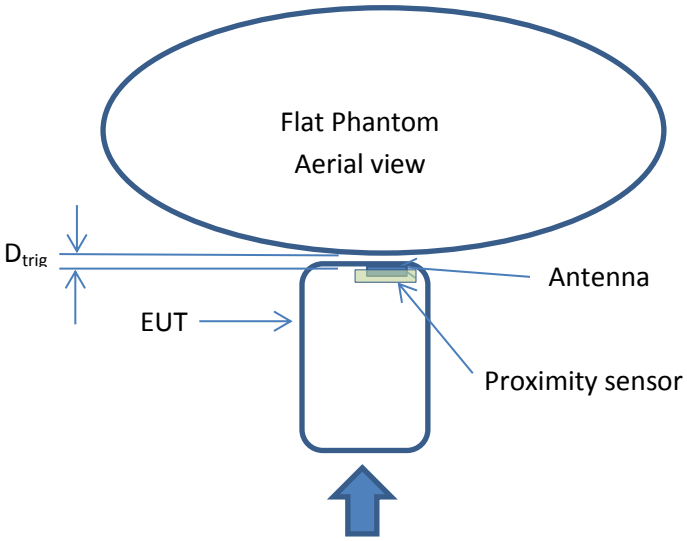
As shown the antenna to sensor offset or separation distance (D) is at a maximum with respect to the side of the phantom. (Outline of EUT is omitted) Rotating the EUT in either direction about the highest point of the antenna would bring the sensor closer to the phantom.



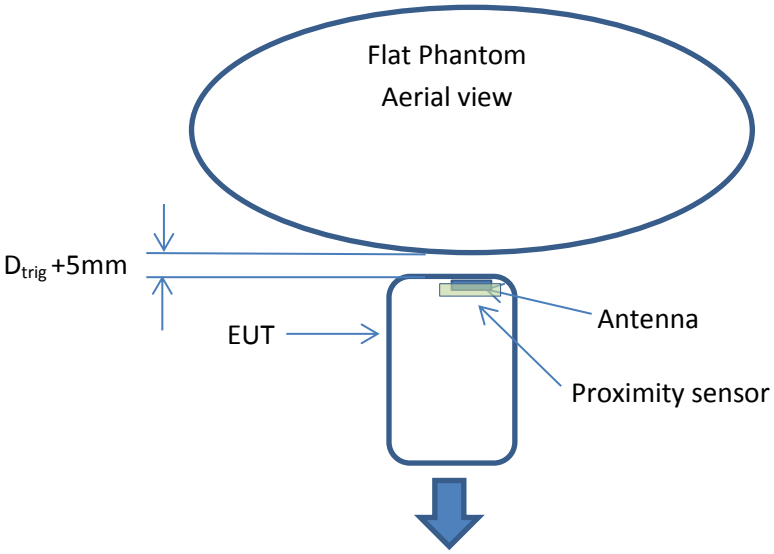
Example 2: The sensor partially overlaps the antenna.
Rotating the EUT about the top edge of the antenna in either direction would bring the sensor closer to the phantom.



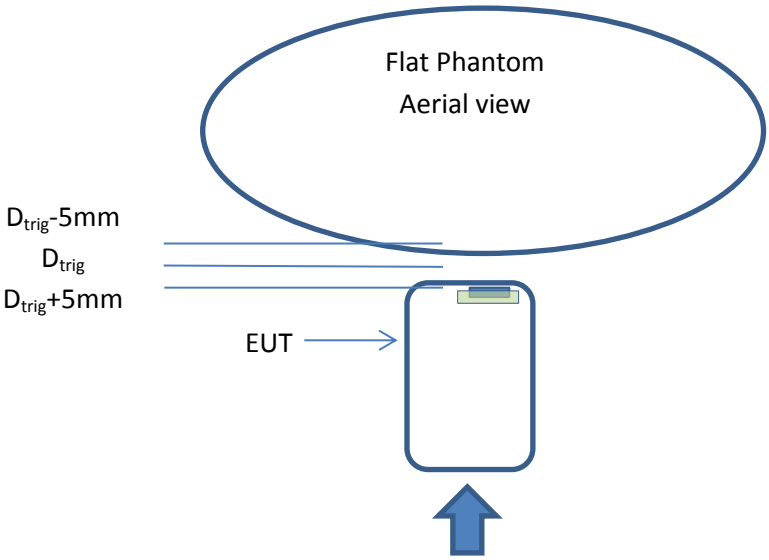
Example 3: The sensor completely covers the antenna. The antenna will never be closer to the user than the sensor.
Coverage assessment is not required.



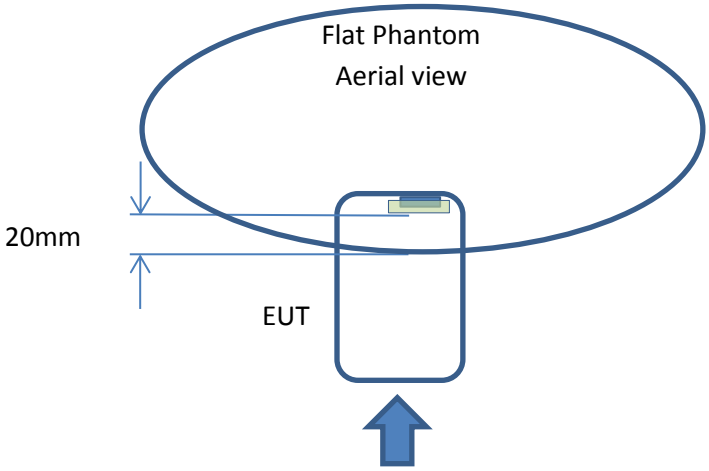
B.2 Move EUT toward phantom in 3mm steps until sensor triggers (power reduces).
Note distance D_{trig}



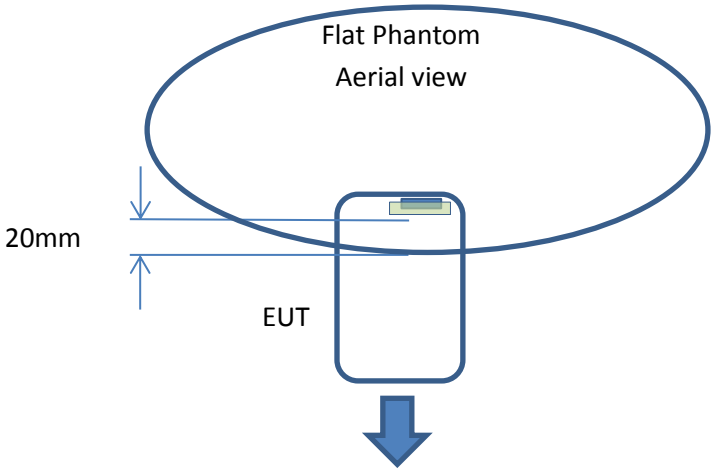
B.2 Move EUT away from the phantom by at least 5mm. Confirm power returns to maximum. If the power does not return to maximum increase the distance until it does.



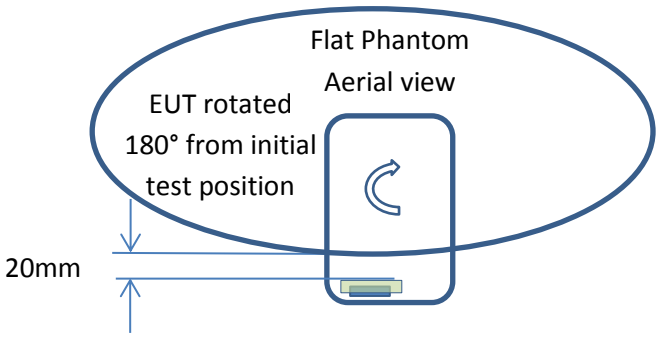
B.2 Move EUT toward phantom in 1mm steps from D_{trig} +5mm to D_{trig} -5mm.
Note the power level and distance at each increment.



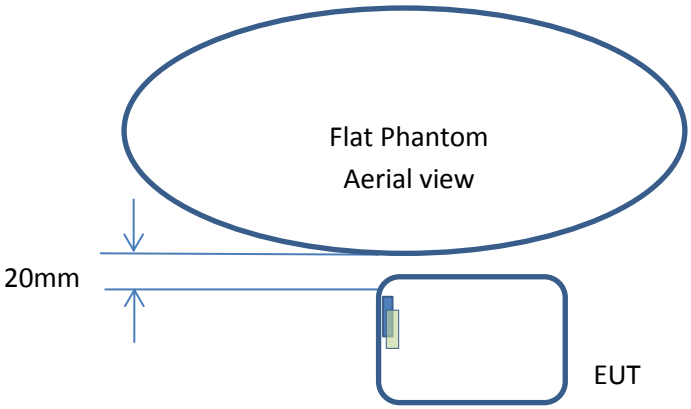
B.3 Continue moving the EUT under the phantom in 1(3?)mm steps until the antenna or sensor are at least 20mm past the edge. Confirm the power stays reduced



B.2/3 Move the EUT back toward the edge of the phantom in 1mm steps. Note the power level and distance at each step. Continue until the EUT is 10mm beyond D_{trig}



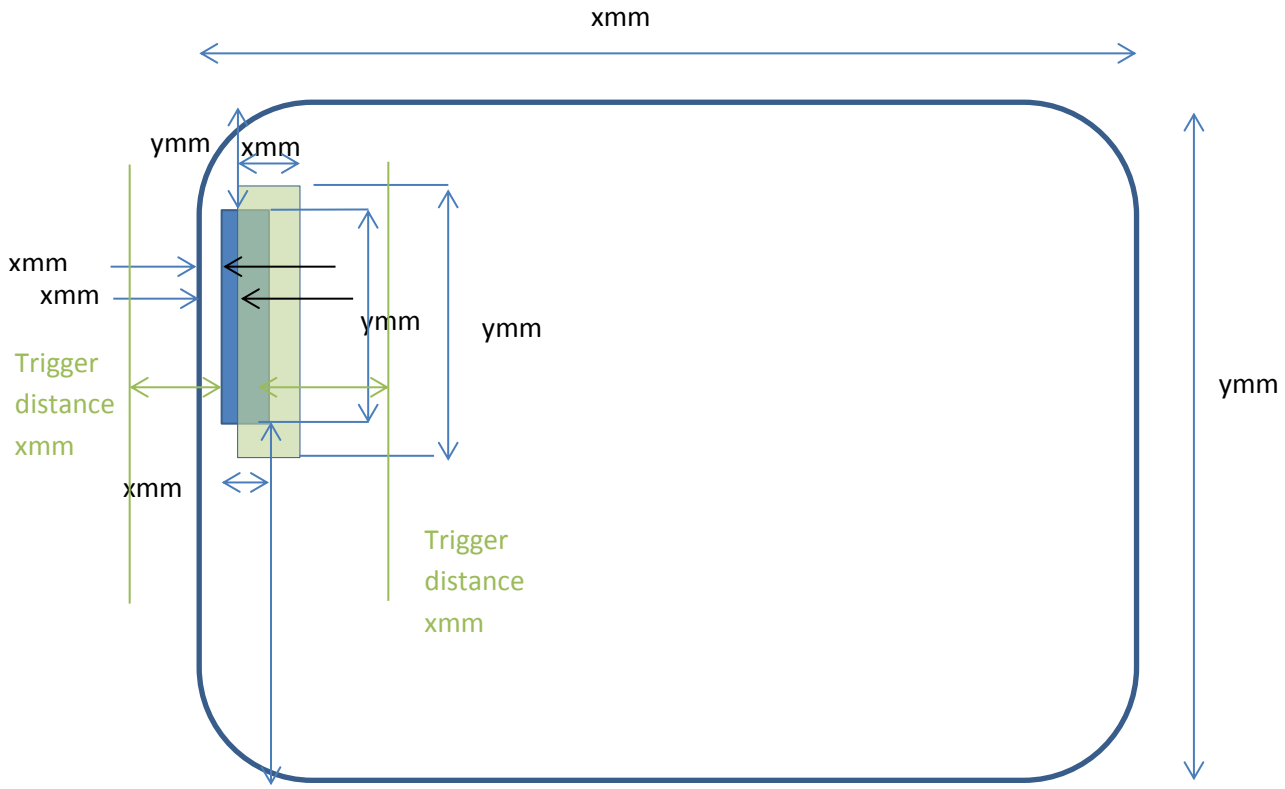
B.4 Rotate the EUT 180° and repeat the procedure from the beginning (B.2)



B.5 For bottom surface sensors that are laterally offset in more than one direction the whole procedure shall be repeated with the EUT rotated 90° to the original orientation.

The previous diagrams depict bottom sensors. The procedure for edge sensors is the same. If the edge sensor is located at the corner of the EUT then both edges shall be assessed (B.7).

B.6 Produce a diagram of the EUT showing the sensor(s) antenna(s) and all relevant dimensions and triggering distances.



B.8 The peak SAR location should be compared to the trigger locations. If the peak SAR location falls outside the triggering points then a KDB enquiry must be made.