

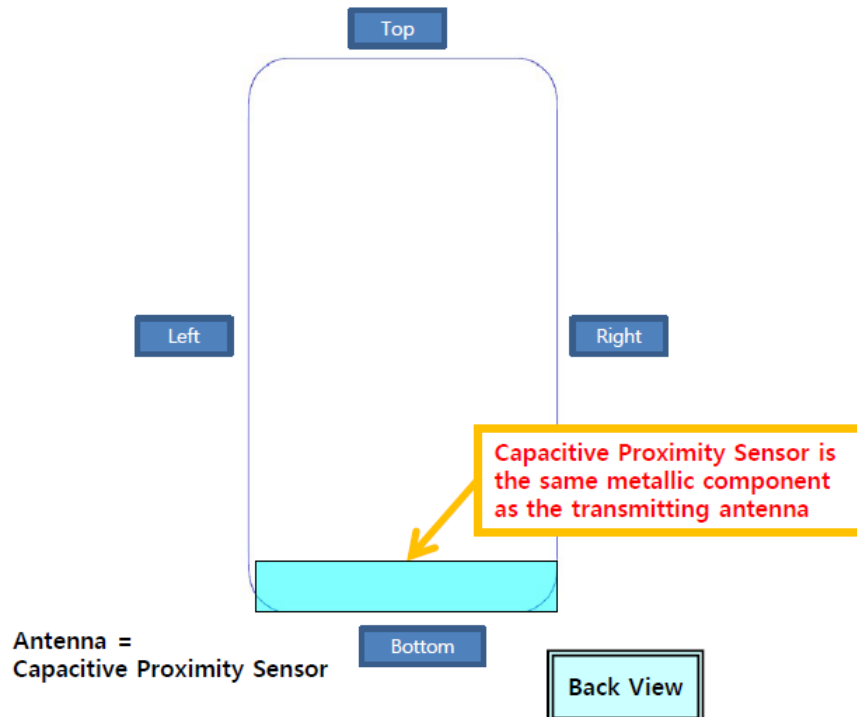
Proximity Sensor Triggering Distance, Sensor Coverage, and Tilt Angle Assessment

The following verification tests for the proximity sensor triggering, sensor coverage and Tilt Angle Assessment were performed by Samsung and results are presented here to support test distances used for SAR measurements.

Power Reduction by Proximity Sensing

According to FCC KDB 616217 6.3, if the proximity sensors are not designed to cover the entire rear surface of the DUT, the sensing regions are limited and are spatially offset from the antenna.

However, this device uses a capacitive proximity sensor that is same metallic component as the transmitting antenna to facilitate triggering in any conditions the user may use the device in proximity of the antenna in the device. Therefore, no further sensor coverage assessments were required according to KDB 616217 D04.



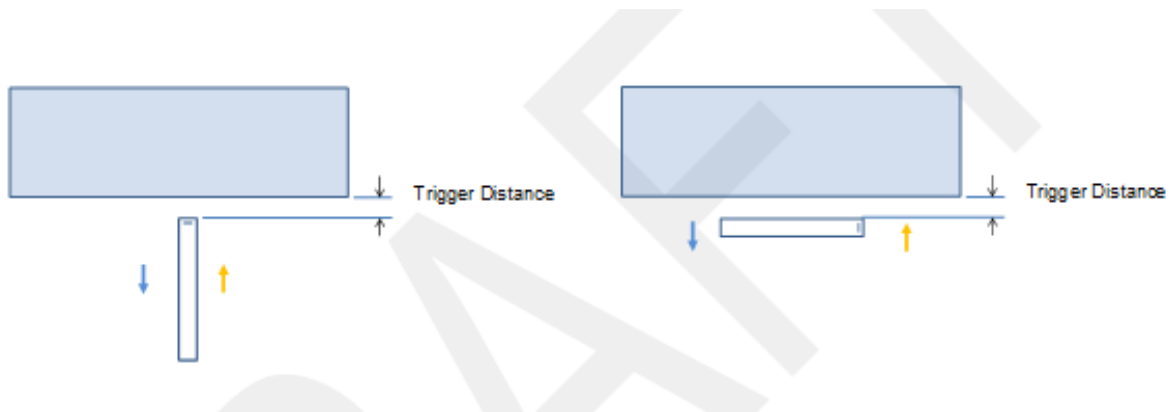
1. Proximity Sensor Triggering Distance (KDB 616217 §6.2)

Rear (Back Side) of the DUT was placed directly below the flat phantom. The DUT was moved toward the phantom in accordance with the steps outlined in KDB 616217 §6.2 to determine the trigger distance for enabling power reduction. The DUT was moved away from the phantom to determine the trigger distance for resuming full power.

The measurement was then repeated for the surface of Edge 3 (Bottom) and Front (Front Side).

The DUT featured a visual indicator on its display that showed the status of the proximity sensor (Triggered or not triggered). This was used to determine the status of the sensor during the proximity sensor assessment as monitoring the output power directly was not practical without affecting the measurement.

It was confirmed separately that the output power was altered according to the proximity sensor status indication. This was achieved by observing the proximity sensor status at the same time as monitoring the conducted power. Section 9 contains both the full and reduced conducted power measurements.



Proximity Sensor Trigger Distance Assessment
KDB 616219 §6.2, Edge 3 (Bottom) and 4 (Left)

Proximity Sensor Trigger Distance Assessment
KDB 616219 §6.2, Rear

LEGEND

- Direction of DUT travel for determination of power reduction triggering point
- Direction of DUT travel for determination of full power resumption triggering point

Summary of Trigger Distances

Tissue simulating liquid	Trigger distance - Rear		Trigger distance - Edge 3 (Bottom)		Trigger distance - Front	
	Moving toward phantom	Moving from phantom	Moving toward phantom	Moving from phantom	Moving toward phantom	Moving from phantom
Broadband 1750 MHz	10 mm	10 mm	15 mm	15 mm	6 mm	6 mm
Broadband 1900 MHz	10 mm	10 mm	15 mm	15 mm	6 mm	6 mm

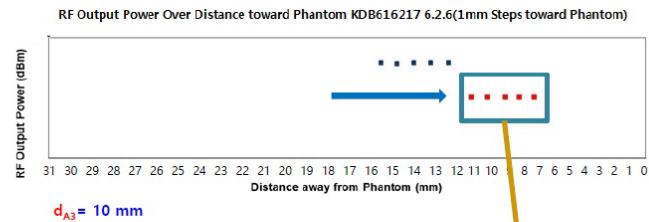
Summary of SAR Test Distances

Per KDB 616217, the SAR Test Distance is the Trigger Distance -1 mm.

Frequency Band	Test Position		
	Rear	Edge 3 (Bottom)	Front
1750 MHz	9 mm	14 mm	5 mm
1900 MHz	9 mm	14 mm	5 mm

Proximity Sensor Triggering Distance Measurement Results

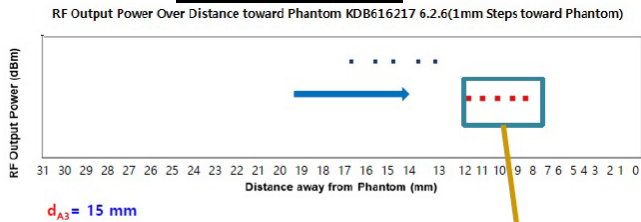
Rear



KDB 616217 D04 6.2.f											
Measured Power [dBm]											
Distance[mm]	15	14	13	12	11	10	9	8	7	6	5
GSM 1900	29.6	29.4	29.5	29.5	29.4	28	28.1	28.2	28.1	28.0	28.1
WCDMA B2	23.5	23.4	23.4	23.5	23.5	22.5	22.4	22.4	22.5	22.5	22.5
WCDMA B4	23.6	23.5	23.5	23.6	23.5	22.5	22.4	22.5	22.3	22.4	22.4
LTE 2	23.2	23.1	23.1	23.2	23.1	22.3	22.4	22.5	22.5	22.4	22.4
LTE 4	23.5	23.5	23.6	23.5	23.5	22.5	22.6	22.7	22.5	22.4	22.4
LTE 66	24.0	24.3	24	24.1	24.1	22.5	22.4	22.4	22.4	22.5	22.5
N66	23.6	23.5	23.4	23.4	23.4	22.5	22.4	22.4	22.4	22.4	22.5

Reduced Power

Edge 3 (Bottom)

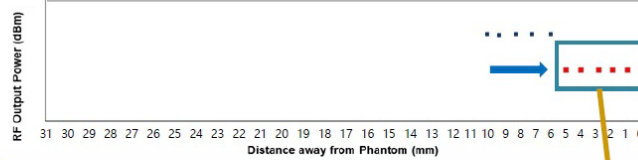


KDB 616217 D04 6.2.f													
Measured Power [dBm]													
Distance[mm]	20	19	18	17	16	15	14	13	12	11	10		
GSM 1900	29.6	29.4	29.5	29.5	29.4	28	28.1	28.2	28.1	28	28.1		
WCDMA B2	23.5	23.4	23.4	23.5	23.5	22.4	22.5	22.4	22.5	22.5	22.5		
WCDMA B4	24.1	24.0	24.1	24.2	23.9	22.5	22.5	22.4	22.5	22.4	22.5		
LTE 2	23.2	23.1	23	23	23.2	22.5	22.4	22.5	22.4	22.5	22.4		
LTE 4	23.5	23.5	23.5	23.4	23.5	22.4	22.5	22.4	22.5	22.5	22.5		
LTE 66	24	24.3	24	24.1	24.1	22.4	22.5	22.5	22.4	22.4	22.4		
N66	23.6	23.5	23.5	23.5	23.5	22.5	22.4	22.5	22.6	22.5	22.5		

Reduced Power

Front

RF Output Power Over Distance toward Phantom KDB616217 6.2.6(1mm Steps toward Phantom)



d _{A3} = 6 mm KDB 616217 D04 6.2.f										
Measured Power [dBm]										
Distance[mm]	10	9	8	7	6	5	4	3	2	1
GSM 1900	29.5	29.6	29.4	29.5	28	28.1	28	28.1	28.2	28.2
WCDMA B2	23.4	23.5	23.4	23.4	22.5	22.4	22.4	22.4	22.5	22.5
WCDMA B4	23.5	23.5	23.4	23.5	22.5	22.4	22.4	22.5	22.5	22.5
LTE 2	23.1	23.1	23.2	23.1	22.5	22.5	22.4	22.5	22.5	22.6
LTE 4	23.5	23.4	23.5	23.5	22.5	22.4	22.5	22.5	22.4	22.4
LTE 66	24	24.0	24.3	24	22.4	22.4	22.4	22.4	22.5	22.5
N66	23.5	23.5	23.4	23.5	22.5	22.4	22.5	22.4	22.5	22.5

Reduced Power

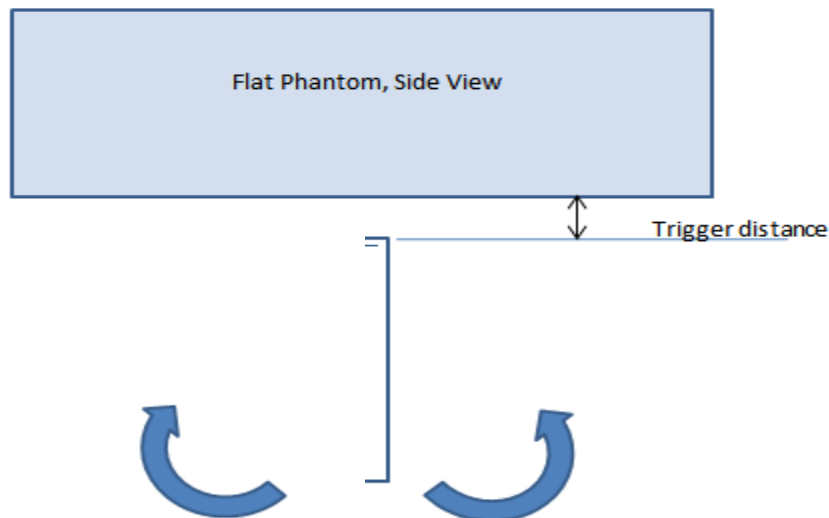
2. Proximity Sensor Coverage (KDB 616217 §6.3)

This device uses a capacitive proximity sensor that is same metallic component as the transmitting antenna to facilitate triggering in any conditions the user may use the device in proximity of the antenna in the device. Therefore, no further sensor coverage assessments were required according to KDB 616217 D04

3. Proximity Sensor Tilt Angle Assessment (KDB 616217 §6.4)

The DUT was positioned directly below the flat phantom at the minimum measured trigger distance with Edge 3 (Bottom) parallel to the base of the flat phantom for each band.

The EUT was rotated about the Edges for angles up to +/- 45°. If the output power increased during the rotation the DUT was moved 1mm toward the phantom and the rotation repeated. This procedure was repeated until the power remained reduced for all angles up to +/- 45°.



Proximity sensor tilt angle assessment (Edge 3) KDB 616217 §6.4

Summary of Tablet Tilt Angle Influence to Proximity Sensor Triggering

Tilt Angle[°]	Measured Power [dBm]									
	-45	-35	-25	-15	-5	5	15	25	35	45
GSM 1900	29.5	29.6	29.4	29.5	29.5	29.4	29.5	29.4	29.5	29.5
WCDMA B2	23.3	23.5	23.4	23.4	23.5	23.5	23.4	23.4	23.4	23.5
WCDMA B4	23.4	23.5	23.5	23.5	23.5	23.6	23.5	23.5	23.4	23.5
LTE 2	23.2	23.2	23.3	23.2	23.1	23.2	23.2	23.1	23.1	23.1
LTE 4	23.5	23.5	23.6	23.5	23.4	23.5	23.5	23.5	23.4	23.5
LTE 66	24.1	24.0	24.3	24	24.1	24.1	24.2	24.3	24	24.1
N66	23.5	23.6	23.5	23.5	23.4	23.5	23.5	23.5	23.5	23.5

Band (MHz)	Minimum trigger distance measured according to KDB 616217 §6.2	Minimum distance at which power reduction was maintained over +/-45°	Power reduction status										
			-45°	-40°	-30°	-20°	-10°	0°	10°	20°	30°	40°	45°
1750	6 mm	5 mm	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
1900	6 mm	5 mm	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off

Summary of Resulting test positions for SAR measurement

Wireless technologies	Position	§6.2 Triggering Distance (mm)	§6.3 Sensor Coverage	§6.4 Tilt Angle	SAR Test Distance (mm)
WWAN 1750/1900 MHz	Rear	10	N/A	N/A	9
	Edge 3	15	N/A	N/A	14
	Front	6	N/A	N/A	5

Notes:

- Per KDB 616217, the SAR Test Distance is the Trigger Distance -1 mm.
- For Phablet devices: when hotspot mode applies, Proximity Sensor SAR testing is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg.