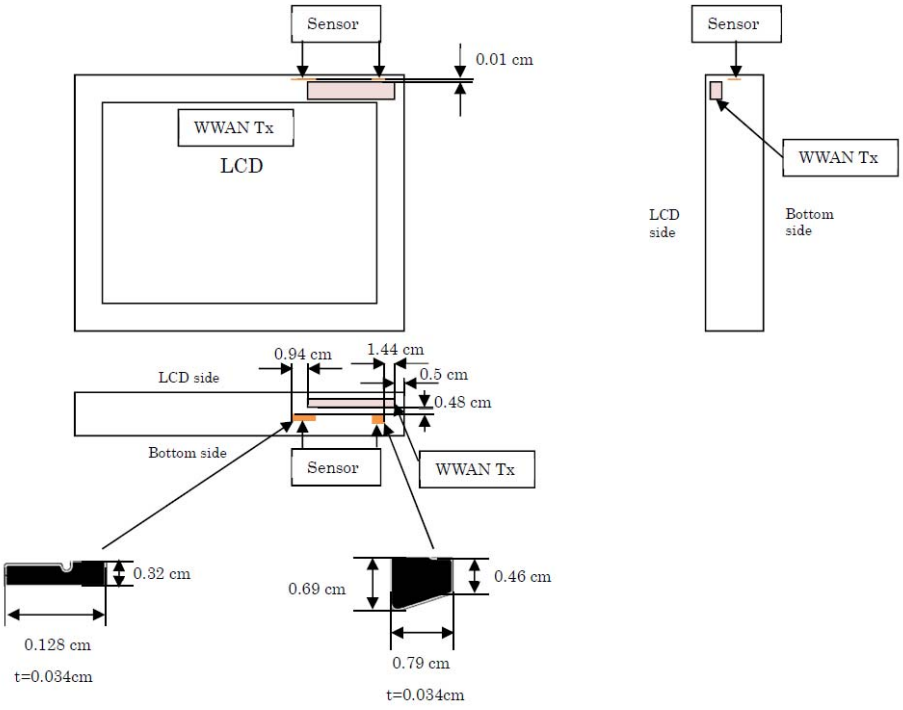
APPENDIX 5 : Details about KDB 616217 D04 application of Proximity Sensor

1. Specification of sensor

This EUT has proximity sensor for power reduction. This sensor function detect the human skin within 5 mm from the top side of EUT.

Proximity Sensor for Power reduction functions in the following modes
GSM850
PCS1900
WCDMA band V
WCDMA band II
LTE band XVII
LTE band IV

Sensor Location and Size



2. SAR test position

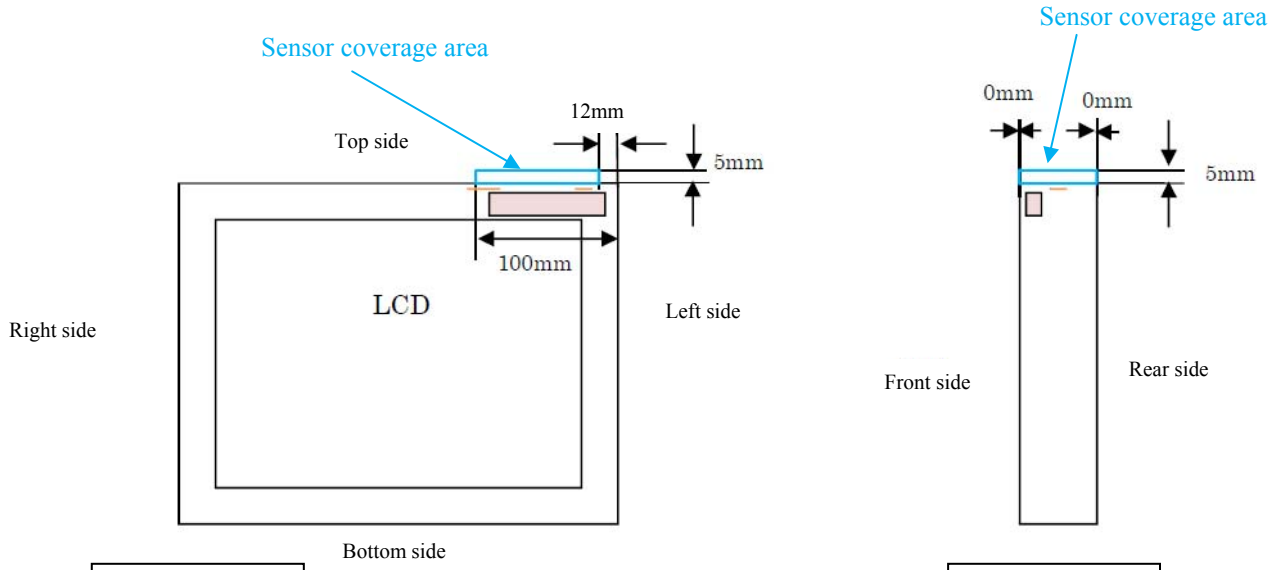
According to the KDB 616217 D04
Device dimensions (HxWxD):210 mm x 330 mm x 24.5 mm

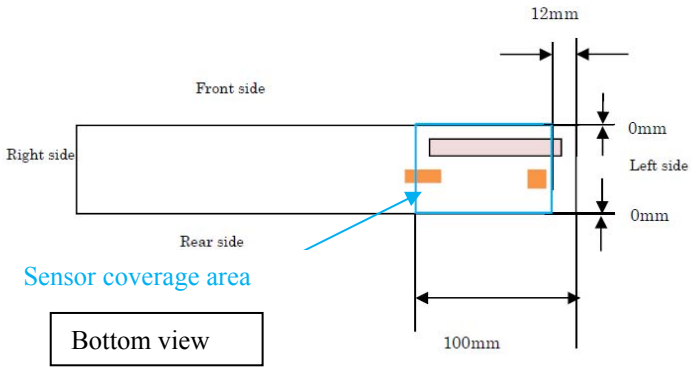
No.	Position	WWAN				
		Tested	Test distance	Proximity Sensor function on☑/off☐	Antenna	Output power condition
1	Front	☐	-	☐	Fixed	-
2	Rear	☑	0mm	☐	Fixed	Maximum power (Normal power)
3	Right side	☐	-	☐	Fixed	-
4	Left side	☑	0mm	☐	Fixed	Maximum power (Normal power)
5	Top side	☑	0mm	☑	Fixed	Reduction power
6	Top side	☑	4mm *	☐	Fixed	Maximum power (Normal power)
7	Bottom side	☐	-	☐	Fixed	-
8	Top side tilt 30 degree	☑	0mm	☐	Fixed	Maximum power (Normal power)

*Refer to KDB616217 D04 clause 6.2 11).
To ensure all production units are compliant, it is generally necessary to reduce the triggering distance determined from the triggering tests by 1 mm, or more if it is necessary, and use the smallest distance for movements to and from the phantom, minus 1 mm, as the sensor triggering distance for determining the SAR measurement distance.

3. Proximity Sensor Triggering distance and Proximity Sensor Coverage

Refer to Appendix 5 clause 4 about Measured Proximity Sensor Triggering distance and Coverage area.





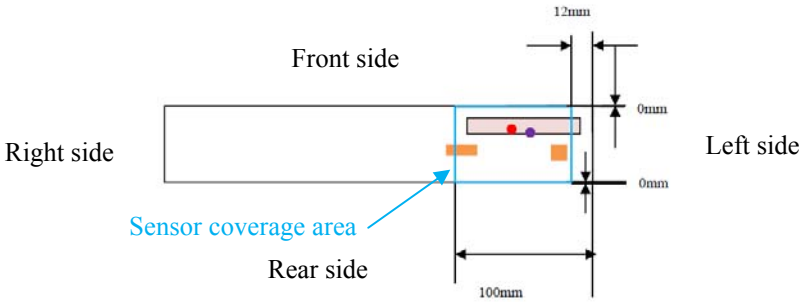
4. Hotspot position

GSM850

SAR test position Top side(Phantom to EUT: 2mm) * Hotspot in below figure: Purple point
Left side to Hotspot: 42mm, Front side to Hotspot: 5.5mm

SAR test position Top side(Phantom to EUT: 0mm) * Hotspot in below figure: Red point
Left side to Hotspot: 52mm, Front side to Hotspot: 3.5mm

Left side to sensor coverage area: 12mm, Front side to sensor coverage area: 0mm



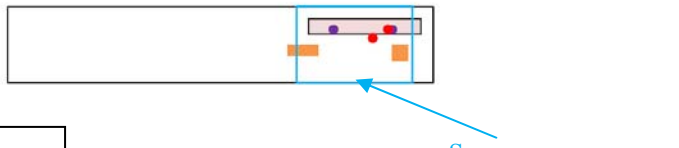
Bottom view

PCS1900

SAR test position Top side(Phantom to EUT: 4mm) * Hotspot in below figure: Purple point
Left side to Hotspot(Max peak): 28mm, Front side to Hotspot: 4mm
Left side to Hotspot(Second peak): 72.5mm, Front side to Hotspot: 4mm

SAR test position Top side(Phantom to EUT: 0mm) * Hotspot in below figure: Red point
Left side to Hotspot(Max peak): 30mm, Front side to Hotspot: 4mm
Left side to Hotspot(Second peak): 44mm, Front side to Hotspot: 7mm

Left side to sensor coverage area: 12mm, Front side to sensor coverage area: 0mm

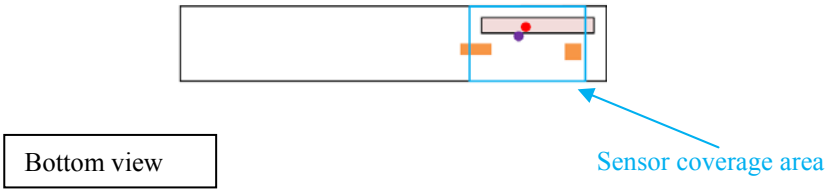


Bottom view

WCDMA V
SAR test position Top side(Phantom to EUT: 4mm) * Hotspot in below figure: Purple point
Left side to Hotspot: 57mm, Front side to Hotspot: 6.5mm

SAR test position Top side(Phantom to EUT: 0mm) * Hotspot in below figure: Red point
Left side to Hotspot: 52mm, Front side to Hotspot: 3.5mm

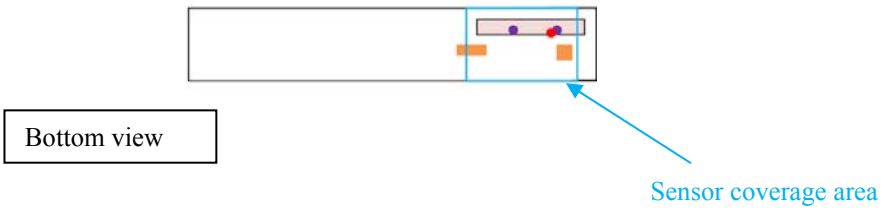
Left side to sensor coverage area: 12mm, Front side to sensor coverage area: 0mm



WCDMA II
SAR test position Top side(Phantom to EUT: 4mm) * Hotspot in below figure: Purple point
Left side to Hotspot(Max peak): 26mm, Front side to Hotspot: 4mm
Left side to Hotspot(Second peak): 57mm, Front side to Hotspot: 4mm

SAR test position Top side(Phantom to EUT: 0mm) * Hotspot in below figure: Red point
Left side to Hotspot: 30mm, Front side to Hotspot: 4.5mm

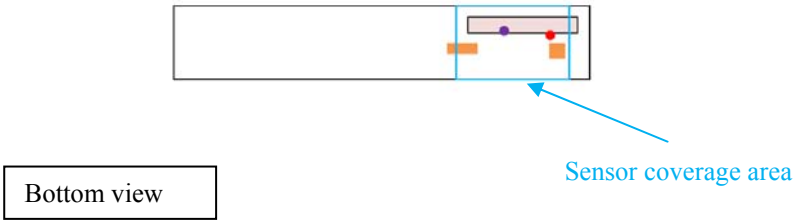
Left side to sensor coverage area: 12mm, Front side to sensor coverage area: 0mm



LTE band IV
SAR test position Top side(Phantom to EUT: 4mm) * Hotspot in below figure: Purple point
Left side to Hotspot: 57mm, Front side to Hotspot: 4mm

SAR test position Top side(Phantom to EUT: 0mm) * Hotspot in below figure: Red point
Left side to Hotspot: 26mm, Front side to Hotspot: 5.5mm

Left side to sensor coverage area: 12mm, Front side to sensor coverage area: 0mm



LTE band XVII
SAR test position Top side(Phantom to EUT: 4mm) * Hotspot in below figure: Purple point
Left side to Hotspot: 81.5mm, Front side to Hotspot: 4mm

SAR test position Top side(Phantom to EUT: 0mm) * Hotspot in below figure: Red point
Left side to Hotspot: 59mm, Front side to Hotspot: 5mm

Left side to sensor coverage area: 12mm, Front side to sensor coverage area: 0mm

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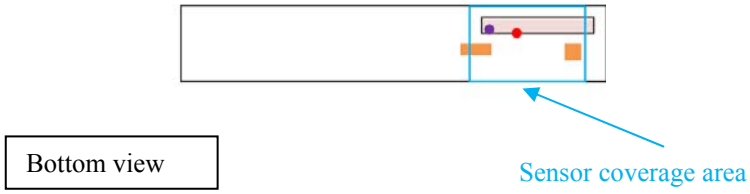


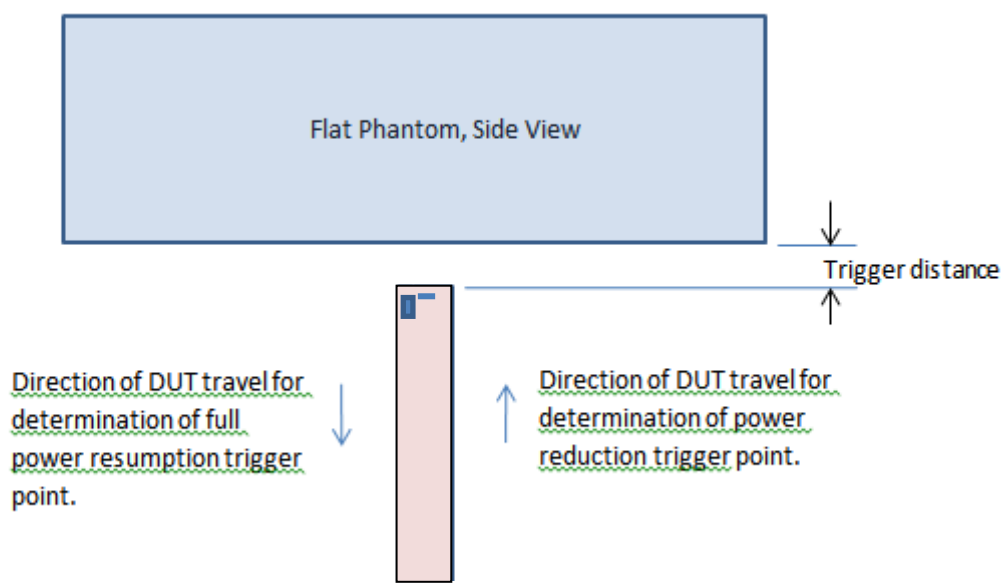
5. Measured Proximity Sensor Triggering distance and Coverage area

Test procedure
KDB616217D04

Liquid information
The following liquids were used.
MSL750(650MHz to 850MHz covered)
MSL900 (800MHz to 1000MHz covered)
MSL1800 (1700MHz to 1900MHz covered)

Test result
Proximity Sensor Triggering distance
Tablet edge was positioned perpendicularly to the flat phantom.

Top side

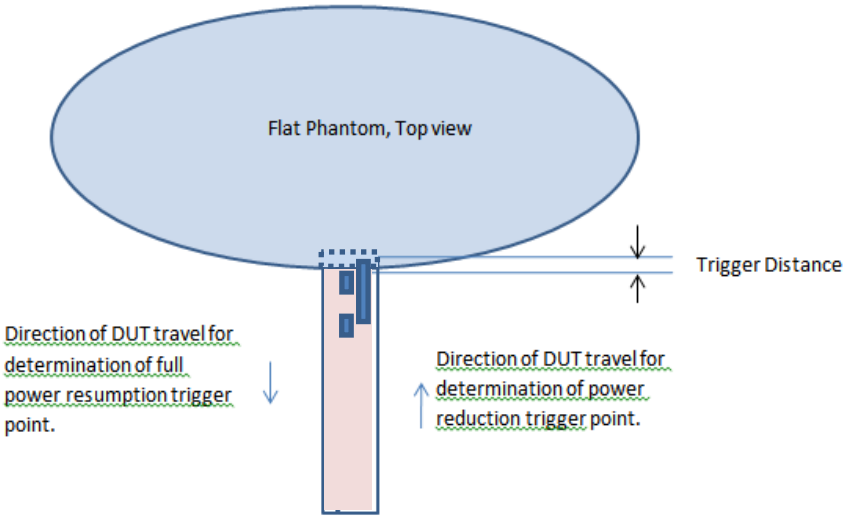


Summary of triggering distances.

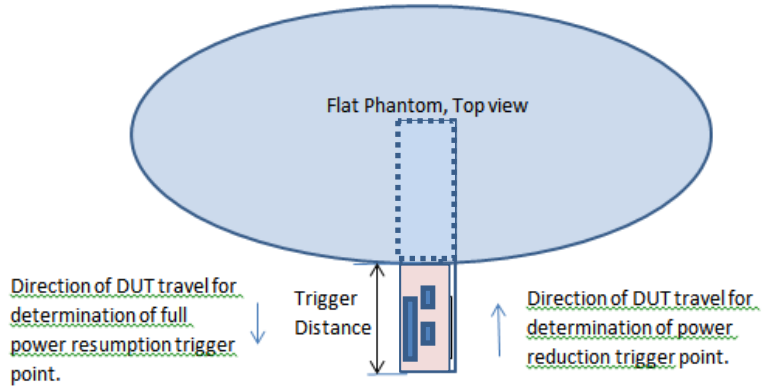
Tissue simulating liquid	Trigger distance - Top side	
	Moving toward phantom	Moving from phantom
750 muscle	5mm	6mm
850 muscle	5mm	6mm
1750 muscle	5mm	6mm
1900 muscle	5mm	6mm

Proximity Sensor Coverage
Tablet edge was positioned perpendicularly to the flat phantom.
The distance of the top side of the tablet and the flat phantom is 5 mm.

Top side(Insert Left side)



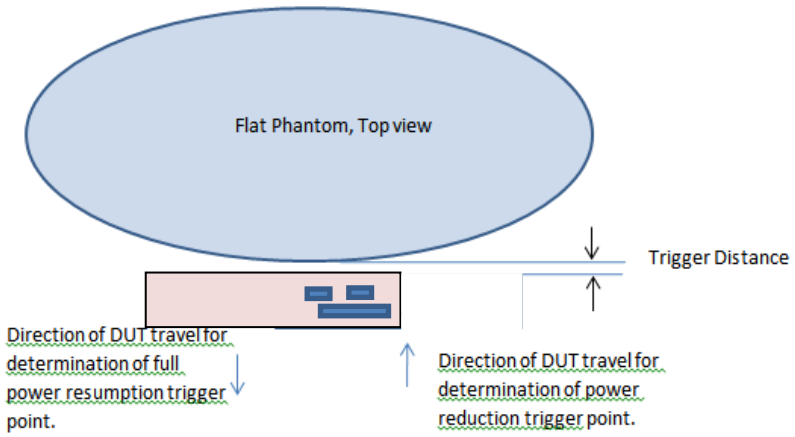
Top side(Reverse/ Insert Right side)



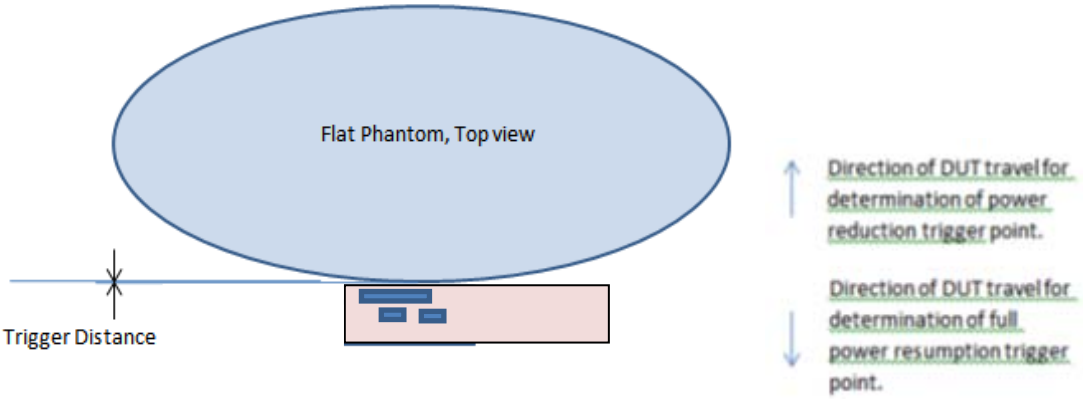
Summary of proximity sensor coverage distances.

Tissue simulating liquid	Trigger distance Top side		Trigger distance Top side(Reverse)	
	Moving toward phantom	Moving from phantom	Moving toward phantom	Moving from phantom
750 muscle	-10mm	1mm	104mm	105mm
850 muscle	-12mm	0mm	100mm	103mm
1750 muscle	-11mm	1mm	108mm	110mm
1900 muscle	-11mm	1mm	108mm	110mm

Rear



Front



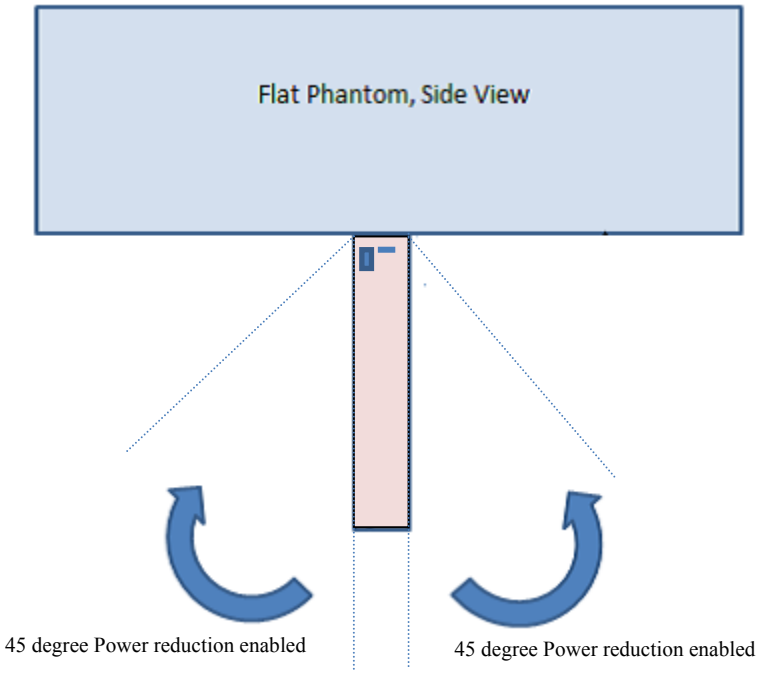
Summary of proximity sensor coverage distances.

Tissue simulating liquid	Trigger distance Rear		Trigger distance Front	
	Moving toward phantom	Moving from phantom	Moving toward phantom	Moving from phantom
750 muscle	1mm	6mm	0mm	7mm
850 muscle	0mm	7mm	0mm	6mm
1750 muscle	2mm	6mm	0mm	6mm
1900 muscle	2mm	6mm	0mm	6mm

Proximity Sensor Tilt Angle

The proximity sensor remained triggered with the DUT positioned 0mm from the phantom for all angles up to 45 degree.

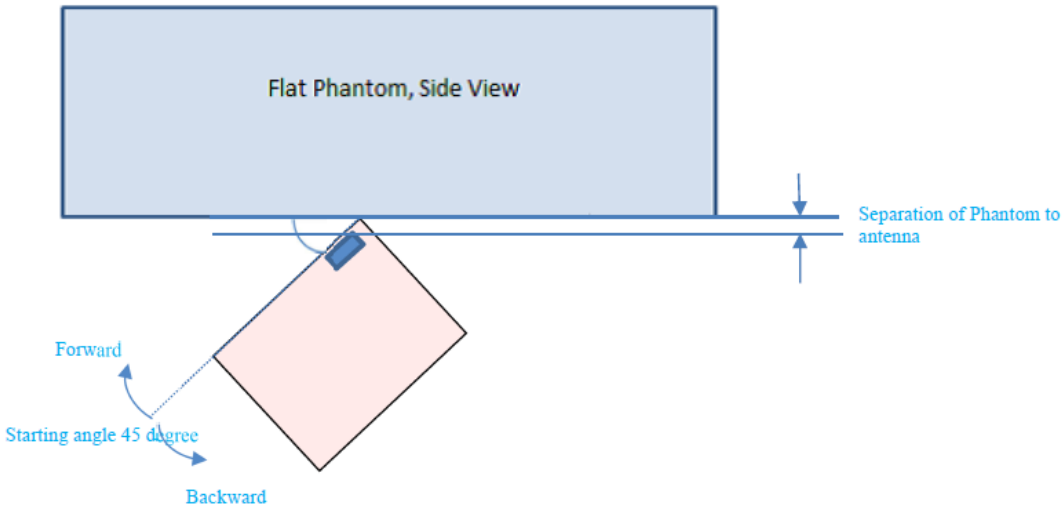
Top side



Summary of proximity sensor coverage angle.

Tissue simulating liquid	Trigger angle	
	Moving forward Retarn to Normal mode	Moving backward Return to Normal mode
750 muscle	>45 degree	>45 degree
850 muscle	>45 degree	>45 degree
1750 muscle	>45 degree	>45 degree
1900 muscle	>45 degree	>45 degree

Top side



Summary of proximity sensor coverage angle.

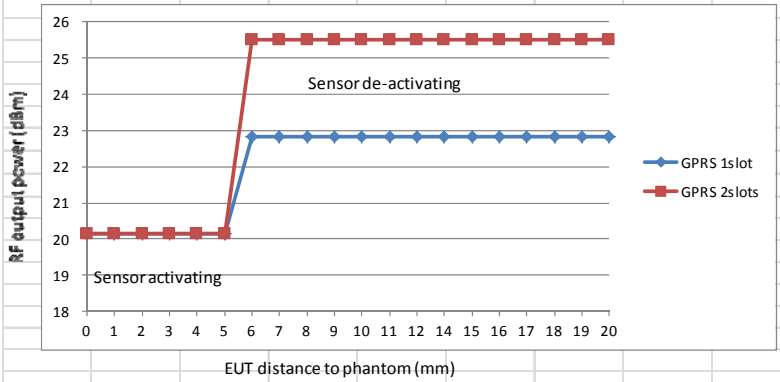
Tissue simulating liquid	Moving forward Reduction mode enabled		Moving backward Normal mode enabled	
	Trigger Angle	Separation pf phantom to antenna [mm]	Trigger Angle	Separation pf phantom to antenna [mm]
750 muscle	35 degree	5.33	≥ 45 degree	≥ 5.66
850 muscle	30 degree	5.10	≥ 45 degree	≥ 5.66
1750 muscle	40 degree	5.51	≥ 45 degree	≥ 5.66
1900 muscle	40 degree	5.51	≥ 45 degree	≥ 5.66

6. Power reduction

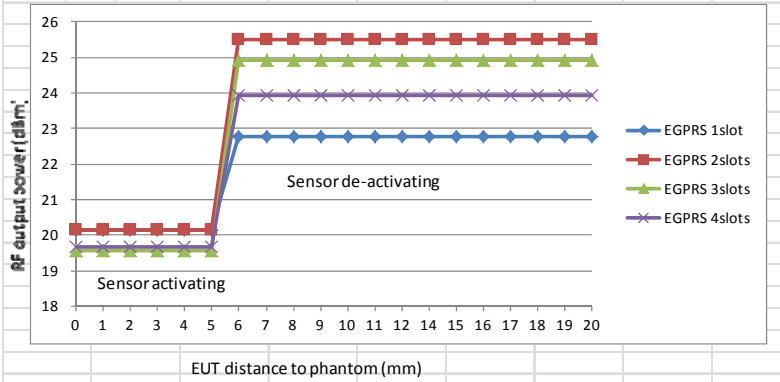
A sensor functions only a Top side position.
Change of power was checked at the time of the check of Proximity Sensor Triggering distance.
The power reduction chart in each mode is as follows.

GSM850

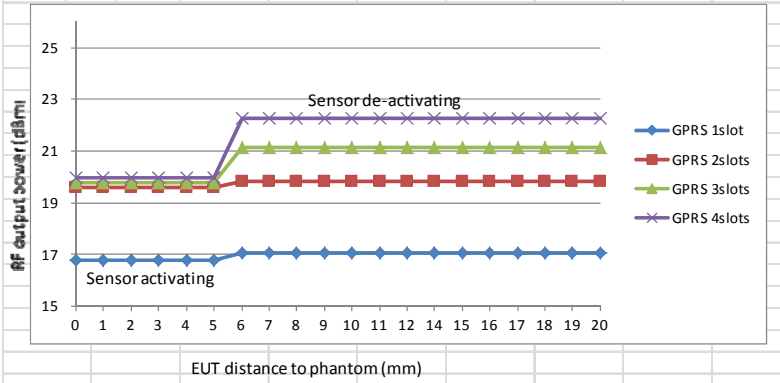
GPRS



EGPRS(MCS1)

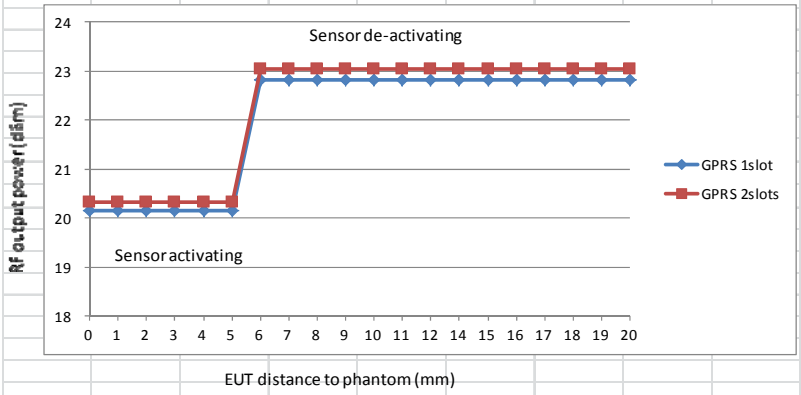


EGPRS(MCS5)

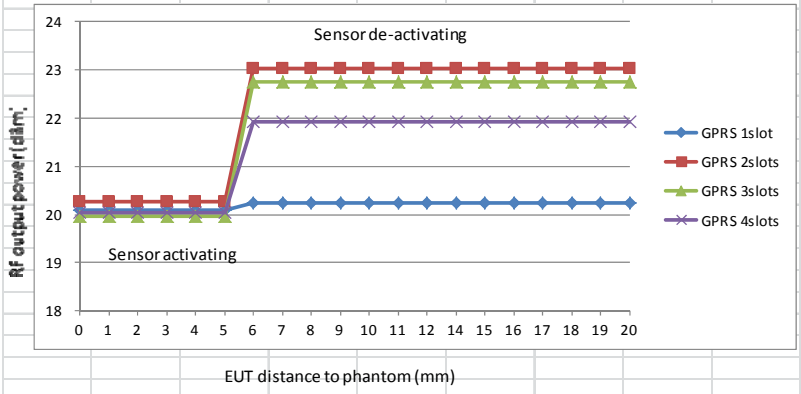


PCS1900

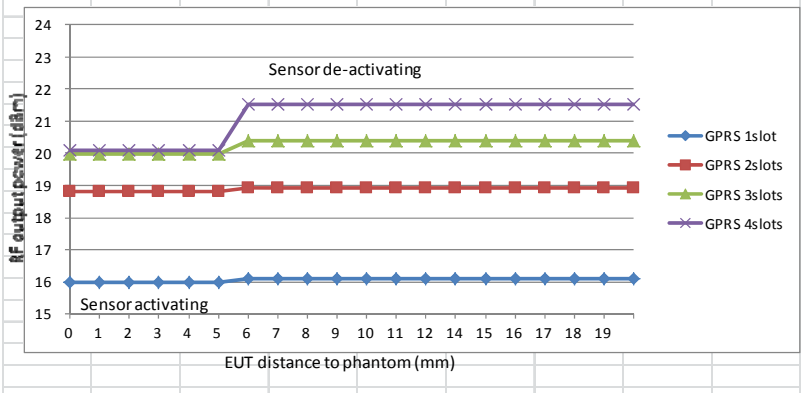
GPRS



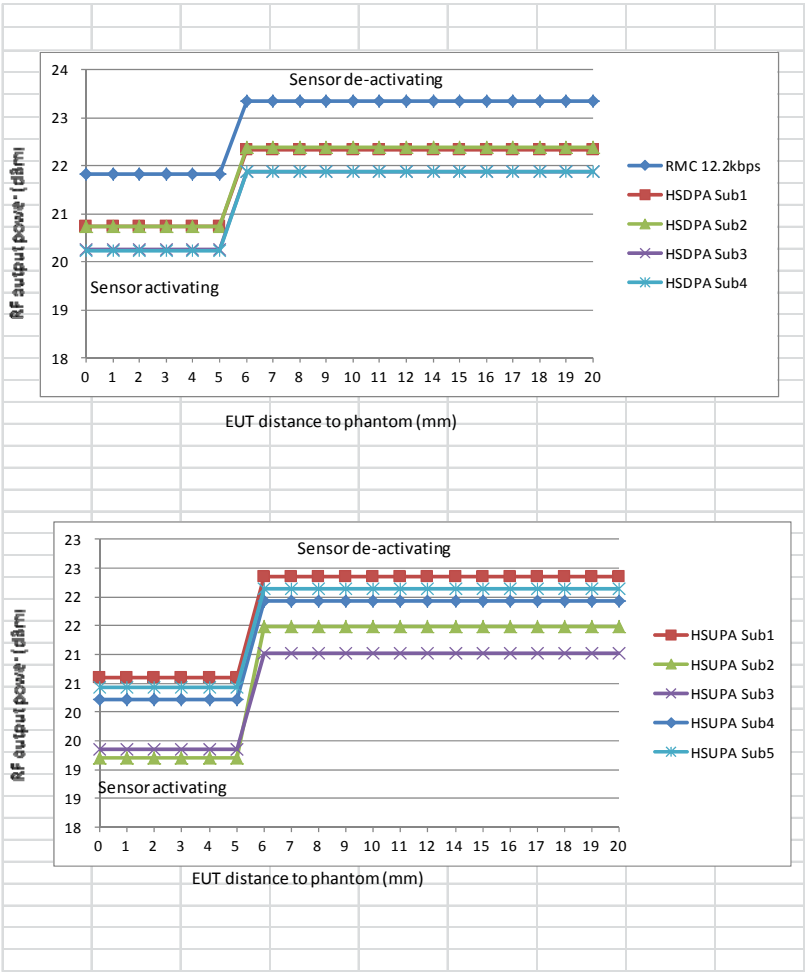
EGPRS(MCS1)



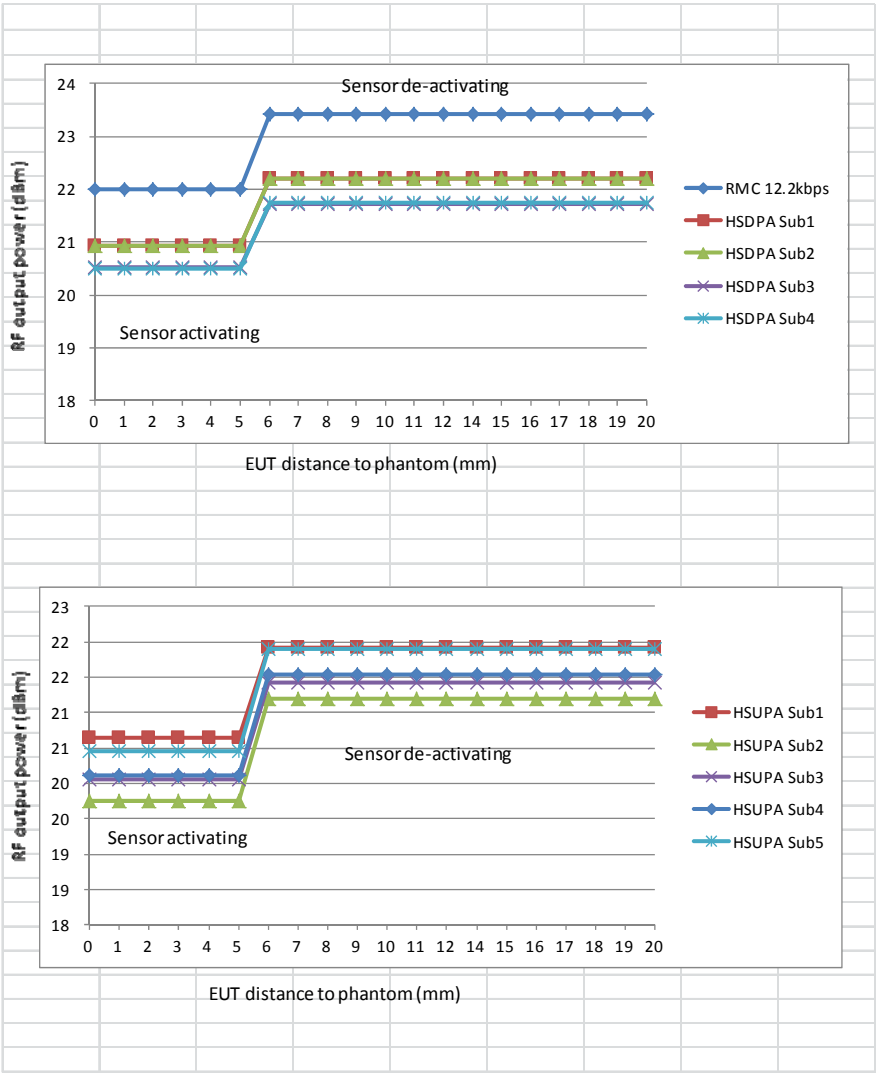
EGPRS(MCS5)



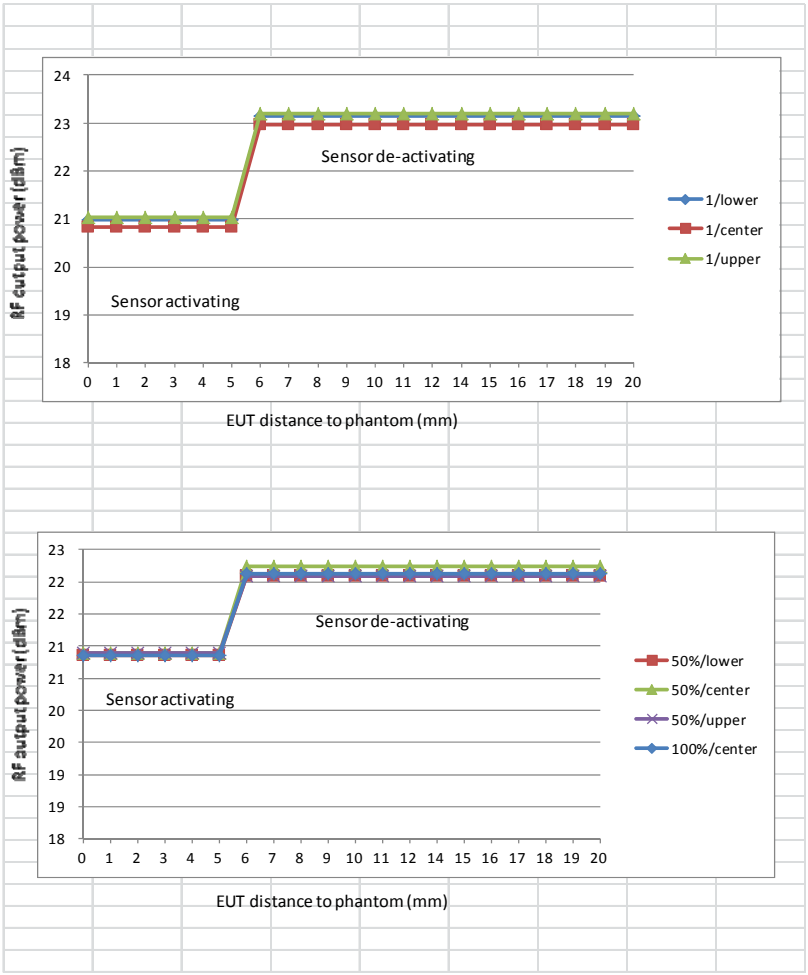
WCDMA band V


Sensor de-activating
Sensor activating
RF output power (dBm)
EUT distance to phantom (mm)
RMC 12.2kbps
HSDPA Sub1
HSDPA Sub2
HSDPA Sub3
HSDPA Sub4
Sensor de-activating
Sensor activating
RF output power (dBm)
EUT distance to phantom (mm)
HSUPA Sub1
HSUPA Sub2
HSUPA Sub3
HSUPA Sub4
HSUPA Sub5

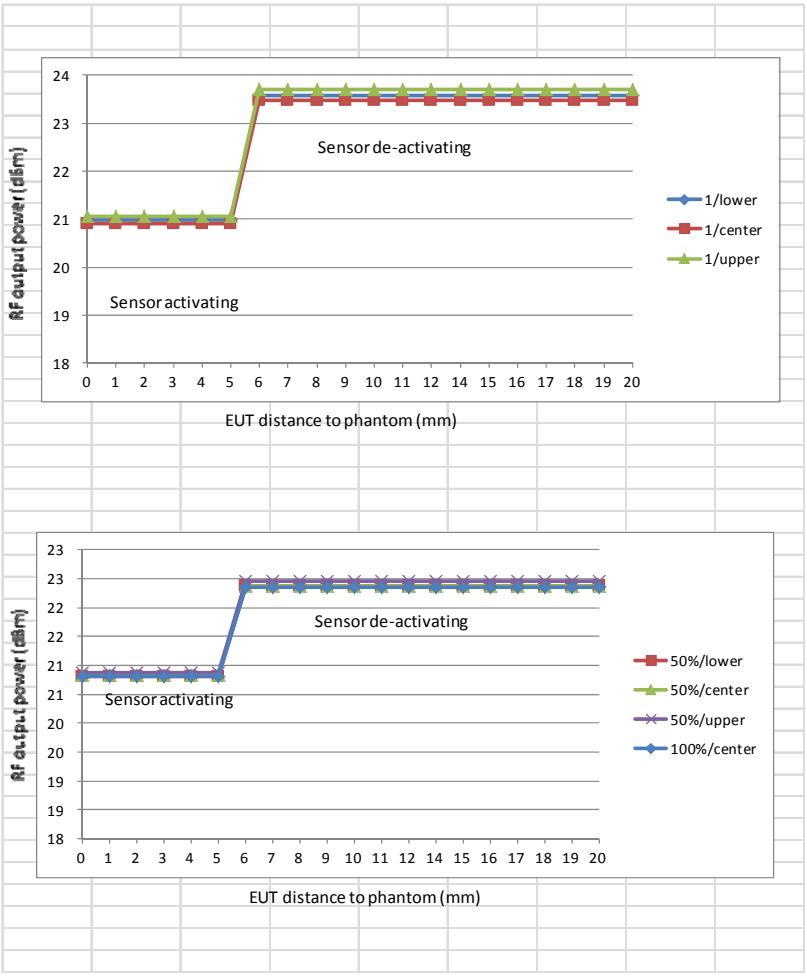
WCDMA band II



LTE band XVII



LTE band IV



End of Report