

Appendix I. – Power reduction verification

Per the May 2017 TCBC Workshop notes, demonstration of proper functioning of the power reduction mechanism is required to support the corresponding SAR Configurations.

Procedures for determining proximity sensor triggering distances

(KDB 616217 D04v01r02 §6.2)

The distance verification procedure was performed according to the following procedure:

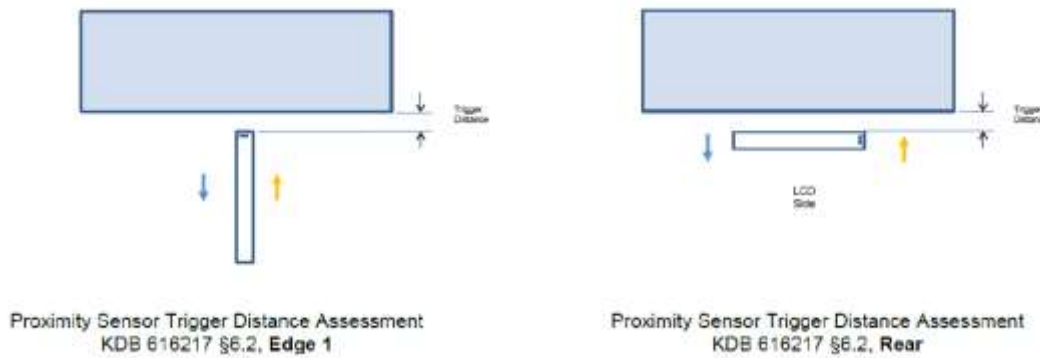
1. A base station simulator was used to establish a conducted RF connection and output power was monitored. The Power measurements were conformed to be within expected tolerances for all states before and after a power reduction mechanism was triggered.
2. Step 1 was repeated for all relevant modes and frequency bands for the mechanism being investigated.
3. Step 1 and 2 were repeated for all individual power reduction mechanism and combinations thereof. For the combination cases, one mechanism was switched to a “triggered” state at a time; powers were conformed to be within tolerance after each additional mechanism was activated.

For detailed measurement conducted power results, please refer to the Section .10

Main Antenna Verification Summary

Mechanism(s)	Mode/Band	Conducted Power (dBm)	
		Un-triggered (Max Power)	Triggered (Reduced Power)
Grip	WCDMA B2	23.29	15.57
Grip	WCDMA B4	23.76	15.17
Grip	WCDMA B5	23.83	18.42
Grip	LTE Band 2	22.85	15.81
Grip	LTE Band 4	23.07	15.50
Grip	LTE Band 5	23.15	17.84
Grip	LTE Band 7	23.19	13.44
Grip	LTE Band 12	23.28	19.36
Grip	LTE Band 13	23.26	18.10
Grip	LTE Band 14	23.18	17.67
Grip	LTE Band 25	23.17	16.38
Grip	LTE Band 26	23.27	17.98
Grip	LTE Band 42	18.00	16.06
Grip	LTE Band 48	18.30	16.23
Grip	LTE Band 66	23.31	15.77

1. Power Reduction Verification for Main 1 Ant



This device utilizes a power reduction mechanism for some wireless modes under some conditions when the device is being used in close proximity to the user’s hand for Main1 Ant

FCC KDB Publication 616217 D04v01r02 section 6 was used as a guideline for selection SAR test distances for this device when being used in Proximity use conditions.

1.1 Proximity sensor triggering Distance Verification.

Proximity Sensor Trigger Distance Assessment KDB 616217 D04 §6.2 (Rear/ Edge 1)

LEGEND

Top Side = Edge 1



Direction of DUT travel for determination of power reduction triggering point



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

Phantom

Tissue simulating liquid	Trigger distance – Edge 1		Trigger distance – Rear	
	Moving toward phantom [mm]	Moving away from phantom [mm]	Moving toward phantom [mm]	Moving away from phantom [mm]
750MHz Tissue	38	38	16	16
835MHz Tissue	38	38	16	16
1800MHz Tissue	38	38	16	16
1900MHz Tissue	38	38	16	16
2600MHz Tissue	38	38	16	16
3500MHz Tissue	38	38	16	16
3700MHz Tissue	38	38	16	16

Distance Measurement verification for Proximity sensor

Rear side – EUT Moving toward (trigger) to the Phantom

Mode	Distance to DUT Output power (dBm)									
	21[mm]	20[mm]	19[mm]	18[mm]	17[mm]	16[mm]	15[mm]	14[mm]	13[mm]	12[mm]
WCDMA B2	23.27	23.24	23.24	23.26	23.22	15.52	15.50	15.54	15.52	15.50
WCDMA B4	23.74	23.73	23.71	23.70	23.76	15.10	15.09	15.15	15.12	15.12
WCDMA B5	23.80	23.78	23.80	23.78	23.79	18.35	18.34	18.36	18.37	18.37
LTE Band 2	22.77	22.80	22.82	22.84	22.80	16.09	16.09	16.08	16.09	16.04
LTE Band 4	23.05	23.00	23.00	23.00	23.00	15.86	15.81	15.83	15.87	15.82
LTE Band 5	23.13	23.10	23.11	23.13	23.08	18.05	18.12	18.07	18.07	18.09
LTE Band 7	23.13	23.15	23.16	23.12	23.14	13.60	13.63	13.66	13.63	13.61
LTE Band 12	23.26	23.23	23.20	23.25	23.22	19.62	19.63	19.59	19.61	19.63
LTE Band 13	23.23	23.25	23.22	23.22	23.24	18.37	18.38	18.36	18.37	18.37
LTE Band 14	23.11	23.14	23.16	23.13	23.13	17.94	17.93	17.90	17.89	17.91
LTE Band 25	23.09	23.12	23.15	23.16	23.17	16.64	16.59	16.62	16.67	16.67
LTE Band 26	23.24	23.22	23.21	23.21	23.23	18.23	18.20	18.20	18.17	18.19
LTE Band 42	17.97	17.92	17.95	17.95	17.96	16.02	16.01	16.03	16.01	16.03
LTE Band 48	18.26	18.28	18.29	18.24	18.28	16.20	16.20	16.16	16.16	16.16
LTE Band 66	23.23	23.23	23.29	23.23	23.31	16.16	16.10	16.12	16.10	16.14

Rear side – EUT Moving away (Release) from the Phantom

Mode	Distance to DUT Output power (dBm)									
	12[mm]	13[mm]	14[mm]	15[mm]	16[mm]	17[mm]	18[mm]	19[mm]	20[mm]	21[mm]
WCDMA B2	15.56	15.52	15.50	15.55	15.50	23.21	23.24	23.27	23.29	23.26
WCDMA B4	15.15	15.14	15.12	15.15	15.13	23.74	23.69	23.71	23.73	23.74
WCDMA B5	18.35	18.34	18.38	18.39	18.42	23.81	23.83	23.76	23.79	23.81
LTE Band 2	16.05	16.04	16.04	16.08	16.09	22.84	22.81	22.79	22.77	22.81
LTE Band 4	15.84	15.88	15.84	15.83	15.85	23.04	23.02	23.05	23.02	23.00
LTE Band 5	18.04	18.07	18.04	18.05	18.07	23.10	23.12	23.15	23.08	23.09
LTE Band 7	13.66	13.59	13.66	13.65	13.64	23.19	23.17	23.13	23.15	23.12
LTE Band 12	19.58	19.63	19.63	19.58	19.57	23.24	23.21	23.24	23.24	23.27
LTE Band 13	18.39	18.37	18.32	18.36	18.35	23.23	23.22	23.22	23.22	23.19
LTE Band 14	17.89	17.88	17.91	17.86	17.88	23.13	23.15	23.16	23.10	23.12
LTE Band 25	16.64	16.61	16.61	16.60	16.65	23.15	23.10	23.15	23.12	23.11
LTE Band 26	18.19	18.20	18.22	18.21	18.22	23.23	23.27	23.26	23.23	23.23
LTE Band 42	16.02	15.99	16.03	15.99	16.00	17.96	17.97	17.95	17.95	18.00
LTE Band 48	16.17	16.19	16.16	16.17	16.23	18.26	18.27	18.29	18.22	18.22
LTE Band 66	16.14	16.13	16.10	16.14	16.15	23.27	23.30	23.23	23.28	23.28

Based on the most conservative measured triggering distance of 16mm, additional SAR measurements were required at 15mm from rear side for the above modes.

Edge1 side – EUT Moving toward (trigger) to the Phantom

Mode	Distance to DUT Output power (dBm)									
	43[mm]	42[mm]	41[mm]	40[mm]	39[mm]	38[mm]	37[mm]	36[mm]	35[mm]	34[mm]
WCDMA B2	23.28	23.25	23.25	23.22	23.23	15.52	15.49	15.54	15.52	15.56
WCDMA B4	23.73	23.75	23.71	23.72	23.72	15.10	15.11	15.11	15.10	15.11
WCDMA B5	23.78	23.77	23.76	23.79	23.79	18.40	18.40	18.36	18.35	18.39
LTE Band 2	22.82	22.81	22.81	22.84	22.83	16.09	16.05	16.09	16.08	16.06
LTE Band 4	23.05	23.02	23.02	23.00	23.05	15.81	15.87	15.81	15.86	15.84
LTE Band 5	23.15	23.08	23.13	23.10	23.08	18.12	18.08	18.10	18.05	18.11
LTE Band 7	23.15	23.17	23.17	23.15	23.12	13.65	13.61	13.66	13.65	13.59
LTE Band 12	23.22	23.26	23.23	23.21	23.23	19.60	19.57	19.58	19.64	19.59
LTE Band 13	23.26	23.24	23.19	23.25	23.23	18.39	18.38	18.35	18.35	18.33
LTE Band 14	23.10	23.17	23.11	23.15	23.16	17.90	17.88	17.90	17.90	17.89
LTE Band 25	23.13	23.14	23.12	23.12	23.17	16.63	16.60	16.62	16.67	16.61
LTE Band 26	23.24	23.24	23.22	23.21	23.20	18.24	18.20	18.22	18.18	18.17
LTE Band 42	17.96	17.94	17.98	17.95	17.96	16.06	15.99	15.99	16.05	15.99
LTE Band 48	18.28	18.29	18.23	18.27	18.25	16.19	16.19	16.20	16.15	16.22
LTE Band 66	23.25	23.29	23.26	23.24	23.31	16.11	16.10	16.08	16.12	16.10

Edge1 side – EUT Moving away (Release) from the Phantom

Mode	Distance to DUT Output power (dBm)									
	34[mm]	35[mm]	36[mm]	37[mm]	38[mm]	39[mm]	40[mm]	41[mm]	42[mm]	43[mm]
WCDMA B2	15.56	15.52	15.50	15.55	15.50	23.21	23.24	23.27	23.29	23.26
WCDMA B4	15.15	15.14	15.12	15.15	15.13	23.74	23.69	23.71	23.73	23.74
WCDMA B5	18.35	18.34	18.38	18.39	18.42	23.81	23.83	23.76	23.79	23.81
LTE Band 2	16.05	16.04	16.04	16.08	16.09	22.84	22.81	22.79	22.77	22.81
LTE Band 4	15.84	15.88	15.84	15.83	15.85	23.04	23.02	23.05	23.02	23.00
LTE Band 5	18.04	18.07	18.04	18.05	18.07	23.10	23.12	23.15	23.08	23.09
LTE Band 7	13.66	13.59	13.66	13.65	13.64	23.19	23.17	23.13	23.15	23.12
LTE Band 12	19.58	19.63	19.63	19.58	19.57	23.24	23.21	23.24	23.24	23.27
LTE Band 13	18.39	18.37	18.32	18.36	18.35	23.23	23.22	23.22	23.22	23.19
LTE Band 14	17.89	17.88	17.91	17.86	17.88	23.13	23.15	23.16	23.10	23.12
LTE Band 25	16.64	16.61	16.61	16.60	16.65	23.15	23.10	23.15	23.12	23.11
LTE Band 26	18.19	18.20	18.22	18.21	18.22	23.23	23.27	23.26	23.23	23.23
LTE Band 42	15.98	16.05	16.01	16.00	16.02	17.96	17.94	17.99	17.97	17.92
LTE Band 48	16.21	16.20	16.20	16.16	16.22	18.26	18.29	18.29	18.22	18.30
LTE Band 66	16.14	16.13	16.10	16.14	16.15	23.27	23.30	23.23	23.28	23.28

Based on the most conservative measured triggering distance of 38mm, additional SAR measurements were required at 37mm from Edge 1 side for the above modes.

1.3 Proximity Sensor Coverage for SAR measurements

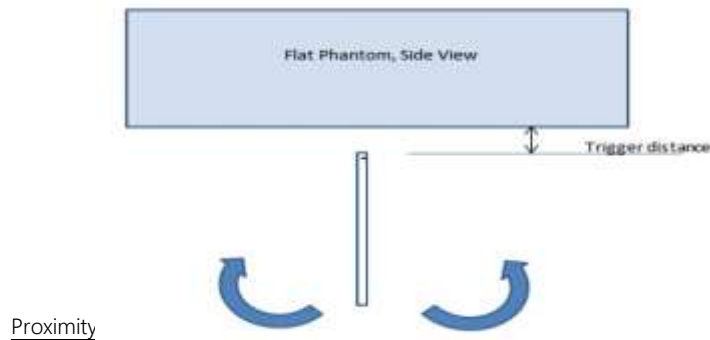
(KDB 616217 D04v01r02§6.3)

As there is no spatial offset between the antenna and the proximity sensor element, proximity sensor coverage did not need to be assessed.

1.4 Proximity Sensor Tilt Angle Assessment

(KDB 616217 D04v01r02 §6.4)

The DUT was positioned directly below the flat phantom at the minimum measured trigger distance with Bottom side parallel to the base of the flat phantom for each band. The EUT was rotated about Bottom side for angles up to $\pm 45^\circ$. 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 $\pm 45^\circ$.



Summary of Tablet Tilt Angle influence to Proximity Sensor Triggering (Edge1 side)

Tissue	Minimum distance At which power reduction was maintained over- 45°	Power reduction status											
		-45°	-40°	-30°	-20°	-10°	0°	10°	20°	30°	40°	45°	
750MHz Tissue	38 mm	On	On	On	On	On	On	On	On	On	On	On	On
835MHz Tissue	38 mm	On	On	On	On	On	On	On	On	On	On	On	On
1800MHz Tissue	38 mm	On	On	On	On	On	On	On	On	On	On	On	On
1900MHz Tissue	38 mm	On	On	On	On	On	On	On	On	On	On	On	On
2600MHz Tissue	38 mm	On	On	On	On	On	On	On	On	On	On	On	On
3500MHz Tissue	38 mm	On	On	On	On	On	On	On	On	On	On	On	On
3700MHz Tissue	38 mm	On	On	On	On	On	On	On	On	On	On	On	On

1.5 Resulting test positions for Tablet SAR measurements

Wireless technologies	Position	§6.2 Triggering Distance [mm]	§6.3 Coverage	§6.4 Tilt Angle	Worst case distance for Tablet SAR [mm]
WWAN (WCDMA B2/B4/B5 /LTEB2/B4/B5/B7/B12/ B13/B14/B17/B25/B26/ /B66)	Rear	16	N/A	N/A	15
	Edge 1	38	N/A	N/A	37
	Edge 2	N/A	N/A	N/A	N/A
	Edge 3	N/A	N/A	N/A	N/A
	Edge 4	N/A	N/A	N/A	N/A

Note: FCC KDB Publication 616217 D04v01r02 Section 6 was used as a guideline for selecting SAR test distances for this device when being used in Tablet use conditions.