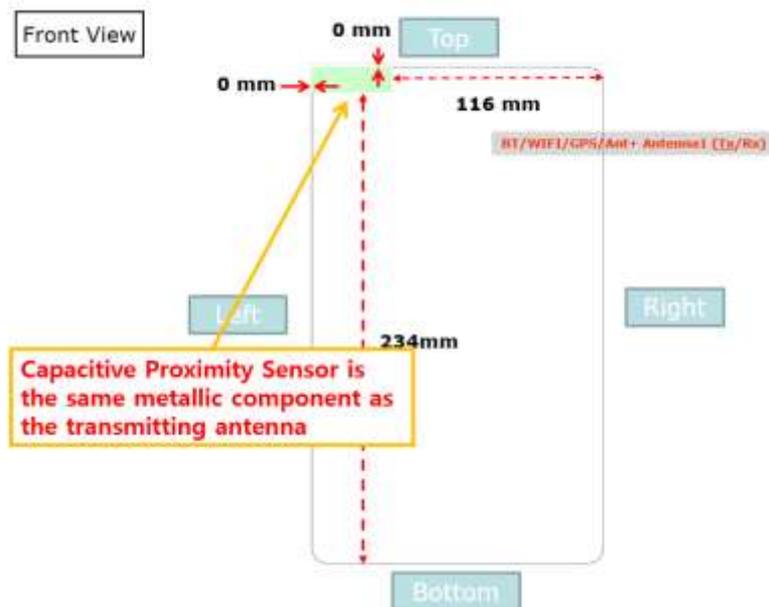


Attachment 7. – The Verification of Power Reduction

Per the May 2017 TCBC Workshop notes, demonstration of proper functioning of the power reduction mechanism is required to support the corresponding SAR Configurations. The verification process was divided into two parts:

1. Power Reduction Verification for WLAN Antenna

This device utilizes a power reduction mechanism for WLAN Antenna wireless modes for SAR compliance under some conditions when the device is being used in close proximity to the user's hand. All SAR evaluations for this device were performed at the maximum allowed output Power when Proximity Sensor is activated. FCC KDB Publication 616217D04v01r02 section 6 was used as a guideline for selection SAR test distances for this device when being used in proximity sensor used conditions. For detailed measurement conducted power results, please refer to the Section 11.



2.1 Power Verification Procedure for WLAN Ant.

The Power verification was performed according to the following procedure:

Power Reduction Verification for WLAN mode

Mechanism(s)	Mode/Band	Conducted Power (dBm)	
		Un-triggered(Max Power)	Triggered (Reduced Power)
Proximity sensor On	2.4 GHz 802.11b (1ch – 11ch)	19.63	12.65
Proximity sensor On	2.4 GHz 802.11g (1ch – 11ch)	19.24	12.76
Proximity sensor On	2.4 GHz 802.11n(2ch – 10ch)	19.08	12.14
Proximity sensor On	5 GHz 802.11a	17.79	8.96
Proximity sensor On	5 GHz 802.11n 20 MHz	17.54	8.79
Proximity sensor On	5 GHz 802.11n 40 MHz (Except 38 ch)	17.07	8.52
Proximity sensor On	5 GHz 802.11ac 20 MHz	17.12	8.56
Proximity sensor On	5 GHz 802.11ac 40 MHz (Except 38 ch)	17.18	8.77
Proximity sensor On	5 GHz 802.11ac 80 MHz (Except 42,58,106 ch)	17.12	9.10

2.2 Procedures for determining proximity sensor triggering distances

(KDB 616217 D04v01r02 §6.2)

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

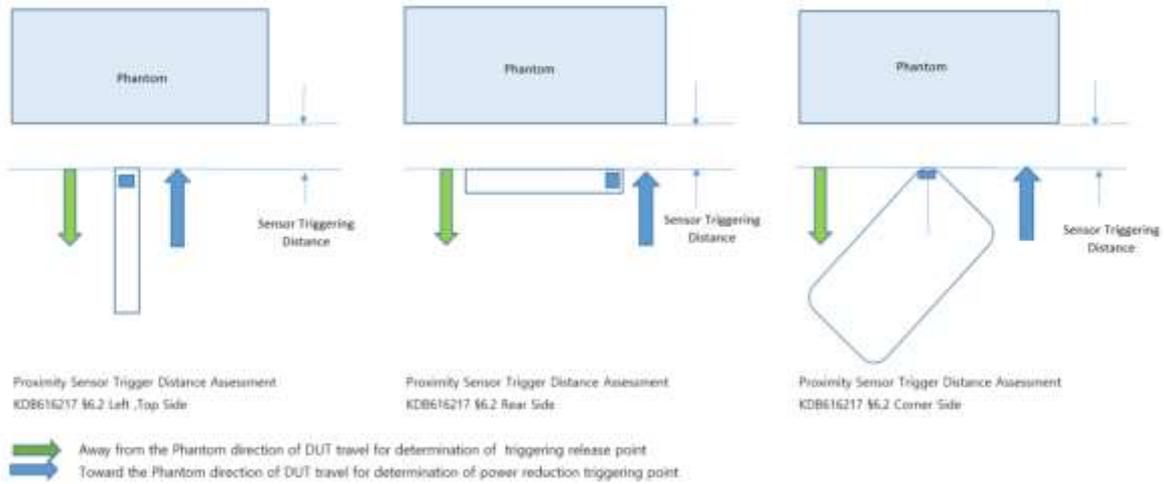
A base station simulator was used to establish an RF connection and to monitor the power levels. The device being tested was placed below the relevant section of the phantom with the relevant side or edge of the device facing toward the phantom.

The device was moved toward and away from the phantom to determine the distance at which the mechanism triggers and the output power is reduced, per KDB Publication 616217 D04v01r02 .Each applicable test position was evaluated. The distance were conformed to be the same or larger (more conservative) than the minimum distances provided by the manufacturer.

Step 1 and 2 were repeated for the relevant modes, as appropriate

Steps 1 through 3 were repeated for all distance-based power reduction mechanisms.

For detailed measurement conducted power results, please refer to the Section .9.



Tissue simulating Liquid	Trigger distance - Rear		Trigger distance - Top		Trigger distance - Left Side		Trigger distance - Left corner	
	Moving toward phantom	Moving away from phantom	Moving toward phantom	Moving away from phantom	Moving toward phantom	Moving away from phantom	Moving toward phantom	Moving away from phantom
2 450 MHz Muscle	9	15	10	15	7	8	7	9
5 000 MHz Muscle	9	15	10	15	7	8	7	9

Distance Measurement verification for Proximity sensor

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

Distance	Distance to DUT Output power (dBm)									
	14	13	12	11	10	9	8	7	6	5
2.4 GHz 802.11b (1ch – 11ch)	19.57	19.67	19.7	19.67	19.57	12.56	12.68	12.66	12.74	12.62
2.4 GHz 802.11g (1ch – 11ch)	19.28	19.3	19.2	19.14	19.32	12.67	12.85	12.86	12.82	12.8
2.4 GHz 802.11n(2ch – 10ch)	19.04	19.17	19.02	19	18.98	12.13	12.12	12.2	12.12	12.19
5 GHz 802.11a	17.77	17.8	17.74	17.89	17.73	8.89	8.9	8.99	8.89	8.97
5 GHz 802.11n 20 MHz	17.49	17.62	17.6	17.45	17.51	8.86	8.71	8.82	8.88	8.87
5 GHz 802.11n 40 MHz (Except 38 ch)	17.07	17.15	17.12	17.08	17.17	8.6	8.56	8.54	8.47	8.48
5 GHz 802.11ac 20 MHz	17.18	17.12	17.05	17.07	17.04	8.62	8.54	8.49	8.65	8.64
5 GHz 802.11ac 40 MHz (Except 38 ch)	17.09	17.13	17.28	17.26	17.26	8.74	8.71	8.86	8.74	8.76
5 GHz 802.11ac 80 MHz (Except 42,58,106 ch)	17.22	17.05	17.16	17.1	17.19	9.14	9.19	9.02	9.07	9.06

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

Distance	Distance to DUT Output power (dBm)									
	11	12	13	14	15	16	17	18	19	20
2.4 GHz 802.11b (1ch – 11ch)	12.65	12.57	12.58	12.57	12.75	19.62	19.7	19.61	19.66	19.57
2.4 GHz 802.11g (1ch – 11ch)	12.69	12.77	12.68	12.74	12.69	19.18	19.3	19.18	19.2	19.3
2.4 GHz 802.11n(2ch – 10ch)	12.04	12.13	12.12	12.05	12.1	19.03	19.05	19.06	19.02	19.09
5 GHz 802.11a	8.95	9.01	8.89	9.05	8.87	17.8	17.79	17.74	17.81	17.84
5 GHz 802.11n 20 MHz	8.75	8.69	8.79	8.71	8.69	17.52	17.57	17.64	17.55	17.64
5 GHz 802.11n 40 MHz (Except 38 ch)	8.46	8.54	8.57	8.54	8.6	17.17	17.1	17.09	17.16	16.97
5 GHz 802.11ac 20 MHz	8.6	8.64	8.59	8.5	8.64	17.1	17.02	17.1	17.06	17.04
5 GHz 802.11ac 40 MHz (Except 38 ch)	8.82	8.8	8.7	8.77	8.71	17.26	17.09	17.17	17.27	17.09
5 GHz 802.11ac 80 MHz (Except 42,58,106 ch)	9.16	9.17	9.11	9.03	9.06	17.2	17.04	17.12	17.04	17.17

Based on the most conservative measured triggering distance of 9 mm, additional Body SAR measurements were required at 8 mm from Rear side for the above modes.

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

Distance	Distance to DUT Output power (dBm)									
	15	14	13	12	11	10	9	8	7	6
2.4 GHz 802.11b (1ch – 11ch)	19.61	19.71	19.65	19.53	19.54	12.58	12.68	12.6	12.59	12.6
2.4 GHz 802.11g (1ch – 11ch)	19.16	19.3	19.3	19.22	19.14	12.7	12.67	12.74	12.66	12.84
2.4 GHz 802.11n(2ch – 10ch)	19.13	19.06	19.06	19.01	19.12	12.11	12.24	12.12	12.14	12.2
5 GHz 802.11a	17.84	17.87	17.74	17.82	17.71	9.05	9	9.05	8.86	9.01
5 GHz 802.11n 20 MHz	17.61	17.62	17.44	17.52	17.55	8.84	8.72	8.87	8.71	8.7
5 GHz 802.11n 40 MHz (Except 38 ch)	17.06	17.13	17.14	17.17	17.06	8.45	8.43	8.52	8.55	8.46
5 GHz 802.11ac 20 MHz	17.06	17.15	17.17	17.07	17.08	8.63	8.64	8.63	8.48	8.46
5 GHz 802.11ac 40 MHz (Except 38 ch)	17.26	17.09	17.08	17.25	17.27	8.69	8.71	8.77	8.86	8.84
5 GHz 802.11ac 80 MHz (Except 42,58,106 ch)	17.21	17.2	17.08	17.07	17.08	9.02	9.18	9.09	9.17	9.11

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

Distance	Distance to DUT Output power (dBm)									
	11	12	13	14	15	16	17	18	19	20
2.4 GHz 802.11b (1ch – 11ch)	12.65	12.74	12.62	12.58	12.7	19.67	19.61	19.66	19.53	19.54
2.4 GHz 802.11g (1ch – 11ch)	12.72	12.82	12.78	12.83	12.79	19.29	19.29	19.17	19.21	19.24
2.4 GHz 802.11n(2ch – 10ch)	12.11	12.1	12.21	12.09	12.24	19.01	19.1	19	19.02	19.16
5 GHz 802.11a	9.04	9.03	8.96	8.91	9.02	17.82	17.77	17.71	17.7	17.85
5 GHz 802.11n 20 MHz	8.84	8.78	8.85	8.69	8.8	17.64	17.58	17.52	17.61	17.48
5 GHz 802.11n 40 MHz (Except 38 ch)	8.43	8.54	8.59	8.61	8.5	16.98	17.03	17.1	17.11	17.04
5 GHz 802.11ac 20 MHz	8.49	8.52	8.65	8.54	8.57	17.1	17.2	17.03	17.14	17.22
5 GHz 802.11ac 40 MHz (Except 38 ch)	8.82	8.81	8.81	8.69	8.67	17.1	17.16	17.08	17.23	17.16
5 GHz 802.11ac 80 MHz (Except 42,58,106 ch)	9.1	9	9.03	9.06	9.01	17.05	17.19	17.22	17.06	17.13

Based on the most conservative measured triggering distance of 10 mm, additional Body SAR measurements were required at 9 mm from Rear side for the above modes.

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

Distance	Distance to DUT Output power (dBm)									
	12	11	10	9	8	7	6	5	4	3
2.4 GHz 802.11b (1ch – 11ch)	19.72	19.64	19.63	19.61	19.65	12.6	12.68	12.67	12.61	12.62
2.4 GHz 802.11g (1ch – 11ch)	19.25	19.26	19.24	19.24	19.16	12.7	12.72	12.75	12.86	12.76
2.4 GHz 802.11n(2ch – 10ch)	19.06	19.18	18.99	19.16	19.01	12.05	12.14	12.16	12.21	12.24
5 GHz 802.11a	17.89	17.71	17.83	17.82	17.74	8.92	9	8.98	8.92	8.95
5 GHz 802.11n 20 MHz	17.48	17.6	17.51	17.56	17.45	8.7	8.76	8.88	8.74	8.84
5 GHz 802.11n 40 MHz (Except 38 ch)	16.98	17.16	17.02	17.11	17.12	8.6	8.47	8.54	8.5	8.59
5 GHz 802.11ac 20 MHz	17.16	17.16	17.13	17.03	17.13	8.63	8.61	8.53	8.66	8.48
5 GHz 802.11ac 40 MHz (Except 38 ch)	17.2	17.24	17.17	17.12	17.17	8.77	8.67	8.73	8.78	8.82
5 GHz 802.11ac 80 MHz (Except 42,58,106 ch)	17.18	17.2	17.07	17.07	17.07	9	9.03	9.08	9.05	9.06

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

Distance	Distance to DUT Output power (dBm)									
	4	5	6	7	8	9	10	11	12	13
2.4 GHz 802.11b (1ch – 11ch)	12.67	12.73	12.72	12.62	12.68	19.59	19.57	19.61	19.65	19.55
2.4 GHz 802.11g (1ch – 11ch)	12.86	12.8	12.76	12.7	12.85	19.18	19.25	19.24	19.18	19.21
2.4 GHz 802.11n(2ch – 10ch)	12.21	12.16	12.18	12.2	12.18	19.12	19.04	19.01	19.05	19.04
5 GHz 802.11a	9.04	8.97	8.87	9.03	8.99	17.71	17.75	17.75	17.78	17.69
5 GHz 802.11n 20 MHz	8.8	8.76	8.86	8.69	8.71	17.64	17.52	17.56	17.54	17.53
5 GHz 802.11n 40 MHz (Except 38 ch)	8.57	8.57	8.5	8.51	8.46	17.03	17.09	17.04	17.13	17.07
5 GHz 802.11ac 20 MHz	8.64	8.49	8.47	8.54	8.52	17.16	17.19	17.16	17.14	17.05
5 GHz 802.11ac 40 MHz (Except 38 ch)	8.82	8.81	8.82	8.77	8.79	17.24	17.2	17.24	17.26	17.09
5 GHz 802.11ac 80 MHz (Except 42,58,106 ch)	9.03	9.2	9.01	9.15	9.16	17.16	17.02	17.14	17.11	17.12

Based on the most conservative measured triggering distance of 7 mm, additional Body SAR measurements were required at 6 mm from Rear side for the above modes.

Left Corner side – EUT Moving toward (trigger) to the Phantom

Distance	Distance to DUT Output power (dBm)									
	12	11	10	9	8	7	6	5	4	3
2.4 GHz 802.11b (1ch – 11ch)	19.57	19.68	19.73	19.55	19.63	12.6	12.65	12.62	12.71	12.74
2.4 GHz 802.11g (1ch – 11ch)	19.32	19.13	19.17	19.27	19.3	12.73	12.69	12.66	12.71	12.73
2.4 GHz 802.11n(2ch – 10ch)	19.09	19.07	19.11	19.04	19.16	12.22	12.07	12.04	12.13	12.19
5 GHz 802.11a	17.83	17.8	17.72	17.82	17.87	9.04	8.88	9.01	9.05	9.03
5 GHz 802.11n 20 MHz	17.48	17.57	17.48	17.44	17.45	8.77	8.72	8.78	8.76	8.73
5 GHz 802.11n 40 MHz (Except 38 ch)	17.02	16.97	17.13	17.1	16.97	8.47	8.6	8.6	8.51	8.46
5 GHz 802.11ac 20 MHz	17.04	17.03	17.03	17.16	17.22	8.59	8.51	8.54	8.59	8.64
5 GHz 802.11ac 40 MHz (Except 38 ch)	17.25	17.25	17.09	17.15	17.08	8.87	8.78	8.72	8.72	8.77
5 GHz 802.11ac 80 MHz (Except 42,58,106 ch)	17.02	17.08	17.07	17.09	17.04	9.08	9.1	9.1	9.04	9.2

Left Corner side – EUT Moving away (Release) from the Phantom

Distance	Distance to DUT Output power (dBm)									
	5	6	7	8	9	10	11	12	13	14
2.4 GHz 802.11b (1ch – 11ch)	12.7	12.72	12.68	12.69	12.67	19.67	19.55	19.57	19.63	19.56
2.4 GHz 802.11g (1ch – 11ch)	12.76	12.85	12.66	12.86	12.73	19.18	19.19	19.22	19.17	19.28
2.4 GHz 802.11n(2ch – 10ch)	12.15	12.14	12.24	12.04	12.07	19.14	19.02	19.05	19.14	19.11
5 GHz 802.11a	9.05	8.91	8.97	8.95	8.98	17.7	17.75	17.87	17.81	17.81
5 GHz 802.11n 20 MHz	8.75	8.86	8.83	8.73	8.81	17.49	17.63	17.5	17.6	17.52
5 GHz 802.11n 40 MHz (Except 38 ch)	8.49	8.58	8.62	8.53	8.43	17.03	17.02	17	17.11	17.05
5 GHz 802.11ac 20 MHz	8.52	8.6	8.54	8.63	8.66	17.13	17.11	17.09	17.21	17.2
5 GHz 802.11ac 40 MHz (Except 38 ch)	8.85	8.68	8.67	8.73	8.67	17.2	17.25	17.25	17.15	17.08
5 GHz 802.11ac 80 MHz (Except 42,58,106 ch)	9.04	9.12	9.13	9.17	9.18	17.14	17.03	17.04	17.15	17.04

Based on the most conservative measured triggering distance of 7 mm, additional Body SAR measurements were required at 6 mm from Rear side for the above modes.

2.3 Proximity Sensor Coverage for SAR measurements

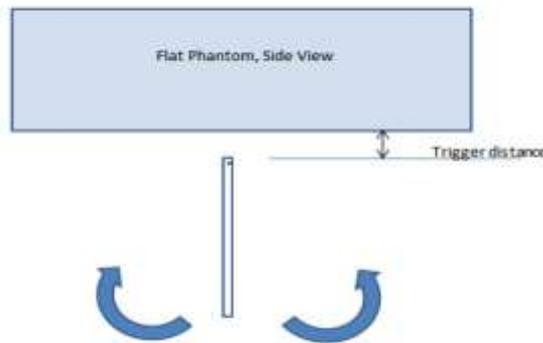
(KDB 616217 D04v01r02 §6.3)

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

2.4 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 Top/Left 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 to $\pm 45^\circ$.



Proximity sensor tilt angle assessment (Bottom side) KDB 616217 §6.4

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

Band (MHz)	Minimum distance at which power reduction was maintained over $\pm 45^\circ$	Power reduction status										
		-45°	-40°	-30°	-20°	-10°	0°	10°	20°	30°	40°	45°
2.4 GHz 802.11b (1ch – 11ch)	10 mm	12.62	12.72	12.72	12.56	12.72	12.7	12.7	12.57	12.61	12.58	12.74
2.4 GHz 802.11g (1ch – 11ch)	10 mm	12.71	12.7	12.77	12.86	12.74	12.71	12.79	12.76	12.76	12.72	12.67
2.4 GHz 802.11n(2ch – 10ch)	10 mm	12.08	12.23	12.23	12.16	12.05	12.14	12.09	12.07	12.21	12.06	12.06
5 GHz 802.11a	10 mm	9.01	8.96	9.01	8.94	8.89	8.87	9.05	8.93	9.04	8.97	9.03
5 GHz 802.11n 20 MHz	10 mm	8.79	8.85	8.73	8.89	8.77	8.86	8.72	8.89	8.81	8.74	8.84
5 GHz 802.11n 40 MHz (Except 38 ch)	10 mm	8.42	8.57	8.51	8.46	8.58	8.49	8.49	8.62	8.5	8.48	8.42
5 GHz 802.11ac 20 MHz	10 mm	8.47	8.66	8.48	8.65	8.56	8.55	8.51	8.65	8.47	8.59	8.51
5 GHz 802.11ac 40 MHz (Except 38 ch)	10 mm	8.76	8.75	8.77	8.7	8.79	8.87	8.87	8.8	8.67	8.72	8.68
5 GHz 802.11ac 80 MHz (Except 42,58,106 ch)	10 mm	9.11	9.09	9	9.07	9.19	9.2	9.16	9.05	9.09	9.01	9.18

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

Band (MHz)	Minimum distance at which power reduction was maintained over-45°	Power reduction status										
		-45°	-40°	-30°	-20°	-10°	0°	10°	20°	30°	40°	45°
2.4 GHz 802.11b (1ch – 11ch)	7 mm	12.66	12.7	12.57	12.69	12.64	12.66	12.66	12.62	12.68	12.67	12.71
2.4 GHz 802.11g (1ch – 11ch)	7 mm	12.68	12.78	12.83	12.72	12.7	12.79	12.66	12.81	12.66	12.76	12.84
2.4 GHz 802.11n (2ch – 10ch)	7 mm	12.22	12.08	12.12	12.07	12.07	12.22	12.18	12.14	12.22	12.07	12.06
5 GHz 802.11a	7 mm	8.94	8.96	8.91	8.98	8.86	8.97	9	8.91	8.99	8.93	8.91
5 GHz 802.11n 20 MHz	7 mm	8.84	8.79	8.74	8.7	8.88	8.84	8.72	8.76	8.75	8.69	8.69
5 GHz 802.11n 40 MHz (Except 38 ch)	7 mm	8.6	8.51	8.55	8.46	8.62	8.53	8.45	8.6	8.62	8.56	8.42
5 GHz 802.11ac 20 MHz	7 mm	8.56	8.66	8.66	8.64	8.66	8.47	8.63	8.55	8.65	8.46	8.55
5 GHz 802.11ac 40 MHz (Except 38 ch)	7 mm	8.81	8.72	8.79	8.71	8.79	8.74	8.78	8.83	8.87	8.7	8.81
5 GHz 802.11ac 80 MHz (Except 42,58,106 ch)	7 mm	9.18	9.06	9.1	9.15	9.06	9.14	9.15	9.03	9.1	9.04	9.01

2.5 Resulting test positions for Tablet SAR measurements

Wireless technologies	Position	§6.2 Triggering Distance	§6.3 Coverage	§6.4 Tilt Angle	Worst case distance for Tablet SAR
WLAN 2.4 GHz/ 5 GHz	Rear	9	N/A	N/A	8
	Top Side	10	N/A	10	9
	Left Side	7	N/A	N/A	6
	Left Conner	7	N/A	N/A	6

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 proximity use conditions.