APPENDIX F: POWER REDUCTION VERIFICATION

Per FCC KDB Publication 616217 D04v01r02, demonstration of proper functioning of the power reduction mechanisms is required to support the corresponding SAR configurations. The verification process was divided into two parts: (1) evaluation of output power levels for individual or multiple triggering mechanisms and (2) evaluation of the triggering distances for proximity-based sensors.

F.1 Power Verification Procedure

The power verification was performed according to the following procedure:

1. A base station simulator was used to establish a conducted RF connection and the output power was monitored. The power measurements were confirmed 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. Steps 1 and 2 were repeated for all individual power reduction mechanisms and combinations thereof. For the combination cases, one mechanism was switched to a 'triggered' state at a time; powers were confirmed to be within tolerances after each additional mechanism was activated.

F.2 Distance Verification Procedure

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

1. 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.

2. 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 and FCC Guidance. Each applicable test position was evaluated. The distances were confirmed to be the same or larger (more conservative) than the minimum distances provided by the manufacturer. Triggering states within ±5 mm of the triggering distance, moving towards and away from the phantom, are tabulated below.

3. Steps 1 and 2 were repeated for all transmitting antennas controlled by the mechanism, as appropriate.

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

F.3 WIFI Verification Summary

Table F-1
Power Measurement Verification for WIFI – Antenna 1

Mechanism(s)	Mode/Band	Conducted Power (dBm)	
1st		Un-triggered (Max)	Mechanism #1 (Reduced)
Grip	802.11b	17.09	12.43
Grip	802.11g	16.86	12.15
Grip	802.11n (2.4GHz)	16.80	12.10
Grip	802.11ax (2.4GHz)	16.00	11.98
Grip	802.11a	16.71	8.29
Grip	802.11n (5GHz, 20MHz BW)	15.58	7.84
Grip	802.11n (5GHz, 40MHz BW)	15.11	8.60
Grip	802.11ac (20MHz BW)	15.66	7.98
Grip	802.11ac (40MHz BW)	15.18	8.60
Grip	802.11ac (80MHz BW)	14.67	8.14
Grip	802.11ac (160MHz BW)	13.60	7.92
Grip	802.11ax (20 MHz BW)	15.80	8.13
Grip	802.11ax (40 MHz BW)	14.75	8.57
Grip	802.11ax (80 MHz BW)	14.78	8.11
Grip	802.11ax (160MHz BW)	13.40	7.93

*Note: MIMO WIFI modes were not evaluated due to equipment limitations. All SISO powers were taken during MIMO conditions.

Table F-2
Power Measurement Verification for WIFI – Antenna 2

Mechanism(s)	Mode/Band	Conducted Power (dBm)	
1st		Un-triggered (Max)	Mechanism #1 (Reduced)
Grip	802.11b	17.00	12.68
Grip	802.11g	16.71	12.40
Grip	802.11n (2.4GHz)	16.36	12.12
Grip	802.11ax (2.4GHz)	15.43	11.54
Grip	802.11a	16.73	8.14
Grip	802.11n (5GHz, 20MHz BW)	15.41	8.01
Grip	802.11n (5GHz, 40MHz BW)	14.70	8.27
Grip	802.11ac (20MHz BW)	15.55	8.06
Grip	802.11ac (40MHz BW)	14.83	8.27
Grip	802.11ac (80MHz BW)	14.32	7.99
Grip	802.11ac (160MHz BW)	12.76	7.55
Grip	802.11ax (20 MHz BW)	15.71	7.99
Grip	802.11ax (40 MHz BW)	14.90	8.26
Grip	802.11ax (80 MHz BW)	14.47	7.92
Grip	802.11ax (160MHz BW)	12.65	7.21

*Note: MIMO WIFI modes were not evaluated due to equipment limitations. All SISO powers were taken during MIMO conditions.

Table F-3
Power Measurement Verification for Bluetooth – Antenna 1

Mechanism(s)	Mode/Band	Conducted Power (dBm)	
1st		Un-triggered (Max)	Mechanism #1 (Reduced)
Grip	Bluetooth Ant 1	18.30	9.20

Table F-4
Power Measurement Verification for Bluetooth – Antenna 2

Mechanism(s)	Mode/Band	Conducted Power (dBm)	
1st		Un-triggered (Max)	Mechanism #1 (Reduced)
Grip	Bluetooth Ant 2	19.50	10.50

Table F-5
Distance Measurement Verification for WIFI/BT – Antenna 1

Mechanism(s)	Test Condition	Distance Measurements (mm)		Minimum Distance per Manufacturer (mm)
		Moving Toward	Moving Away	
Grip	Tablet - Back Side	19	30	17
Grip	Tablet - Front Side	21	25	16
Grip	Tablet - Top Edge	25	42	21
Grip	Tablet - Right Edge	13	24	8

Table F-6
Distance Measurement Verification for WIFI/BT – Antenna 2

Mechanism(s)	Test Condition	Distance Measurements (mm)		Minimum Distance per Manufacturer (mm)
		Moving Toward	Moving Away	
Grip	Tablet - Back Side	16	32	16
Grip	Tablet - Front Side	18	22	16
Grip	Tablet - Top Edge	26	33	20
Grip	Tablet - Left Edge	10	22	10

Table F-7
Triggering States by Distance for Antenna 1 per KDB 616217 Section 6.2 – Back Side, Moving Toward Phantom

KDB 616217 6.2.i Measured Power Moving Toward Phantom [dBm]											
Distance[mm]	24	23	22	21	20	19	18	17	16	15	14
Ant1	Max	Max	Max	Max	Max	Red	Red	Red	Red	Red	Red

Table F-8
Triggering States by Distance for Antenna 1 per KDB 616217 Section 6.2 – Back Side, Moving Away from Phantom

KDB 616217 6.2.i Measured Power Moving Away From Phantom [dBm]											
Distance[mm]	25	26	27	28	29	30	31	32	33	34	35
Ant1	Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	Max

Table F-9
Triggering States by Distance for Antenna 2 per KDB 616217 Section 6.2 – Back Side, Moving Toward Phantom

KDB 616217 6.2.i Measured Power Moving Toward Phantom [dBm]											
Distance[mm]	21	20	19	18	17	16	15	14	13	12	11
Ant2	Max	Max	Max	Max	Max	Red	Red	Red	Red	Red	Red

Table F-10
Triggering States by Distance for Antenna 2 per KDB 616217 Section 6.2 – Back Side, Moving Away from Phantom

KDB 616217 6.2.i Measured Power Moving Away From Phantom [dBm]											
Distance[mm]	27	28	29	30	31	32	33	34	35	36	37
Ant2	Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	Max

Table F-11
Triggering States by Distance for Antenna 1 per KDB 616217 Section 6.2 – Front Side, Moving Toward Phantom

KDB 616217 6.2.i Measured Power Moving Toward Phantom [dBm]											
Distance[mm]	26	25	24	23	22	21	20	19	18	17	16
Ant1	Max	Max	Max	Max	Max	Red	Red	Red	Red	Red	Red

Table F-12
Triggering States by Distance for Antenna 1 per KDB 616217 Section 6.2 – Front Side, Moving Away from Phantom

KDB 616217 6.2.i Measured Power Moving Away From Phantom [dBm]											
Distance[mm]	20	21	22	23	24	25	26	27	28	29	30
Ant1	Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	Max

Table F-13
Triggering States by Distance for Antenna 2 per KDB 616217 Section 6.2 – Front Side, Moving Toward Phantom

KDB 616217 6.2.i Measured Power Moving Toward Phantom [dBm]											
Distance[mm]	23	22	21	20	19	18	17	16	15	14	13
Ant2	Max	Max	Max	Max	Max	Red	Red	Red	Red	Red	Red

Table F-14
Triggering States by Distance for Antenna 2 per KDB 616217 Section 6.2 – Front Side, Moving Away from Phantom

KDB 616217 6.2.i Measured Power Moving Away From Phantom [dBm]											
Distance[mm]	17	18	19	20	21	22	23	24	25	26	27
Ant2	Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	Max

Table F-15
Triggering States by Distance for Antenna 1 per KDB 616217 Section 6.2 – Top Edge, Moving Toward Phantom

KDB 616217 6.2.i Measured Power Moving Toward Phantom [dBm]											
Distance[mm]	30	29	28	27	26	25	24	23	22	21	20
Ant1	Max	Max	Max	Max	Max	Red	Red	Red	Red	Red	Red

Table F-16
Triggering States by Distance for Antenna 1 per KDB 616217 Section 6.2 – Top Edge, Moving Away from Phantom

KDB 616217 6.2.i Measured Power Moving Away From Phantom [dBm]											
Distance[mm]	37	38	39	40	41	42	43	44	45	46	47
Ant1	Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	Max

Table F-17
Triggering States by Distance for Antenna 2 per KDB 616217 Section 6.2 – Top Edge, Moving Toward Phantom

KDB 616217 6.2.i Measured Power Moving Toward Phantom [dBm]											
Distance[mm]	31	30	29	28	27	26	25	24	23	22	21
Ant2	Max	Max	Max	Max	Max	Red	Red	Red	Red	Red	Red

Table F-18
Triggering States by Distance for Antenna 2 per KDB 616217 Section 6.2 – Top Edge, Moving Away from Phantom

KDB 616217 6.2.i Measured Power Moving Away From Phantom [dBm]											
Distance[mm]	28	29	30	31	32	33	34	35	36	37	38
Ant2	Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	Max

Table F-19
Triggering States by Distance for Antenna 1 per KDB 616217 Section 6.2 – Right Edge, Moving Toward Phantom

KDB 616217 6.2.i Measured Power Moving Toward Phantom [dBm]											
Distance[mm]	18	17	16	15	14	13	12	11	10	9	8
Ant1	Max	Max	Max	Max	Max	Red	Red	Red	Red	Red	Red

Table F-20
Triggering States by Distance for Antenna 1 per KDB 616217 Section 6.2 – Right Edge, Moving Away from Phantom

KDB 616217 6.2.i Measured Power Moving Away From Phantom [dBm]											
Distance[mm]	19	20	21	22	23	24	25	26	27	28	29
Ant1	Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	Max

Table F-21
Triggering States by Distance for Antenna 2 per KDB 616217 Section 6.2 – Left Edge, Moving Toward Phantom

KDB 616217 6.2.i Measured Power Moving Toward Phantom [dBm]											
Distance[mm]	15	14	13	12	11	10	9	8	7	6	5
Ant2	Max	Max	Max	Max	Max	Red	Red	Red	Red	Red	Red

Table F-22
Triggering States by Distance for Antenna 2 per KDB 616217 Section 6.2 – Left Edge, Moving Away from Phantom

KDB 616217 6.2.i Measured Power Moving Away From Phantom [dBm]											
Distance[mm]	17	18	19	20	21	22	23	24	25	26	27
Ant2	Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	Max

According to FCC KDB 616217 D04 v01r02 6.2, to ensure all production units are compliant, SAR testing should be performed 1mm closer than the smallest distance determined from the triggering tests at the reduced and maximum power.