### 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:

- 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. The influence of table tilt angles to proximity sensor triggering was also evaluated at the smallest sensor triggering distance by rotating the device the edge next to the phantom in 10 degree increments between +- 45 degrees.
- 3. Steps 1 and 2 were repeated for low, mid, high, and ultra-high bands, as appropriate (see first note under section F.3 for more details).
- 4. Steps 1 through 3 were repeated for all distance-based power reduction mechanisms.

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## F.3 Main Antenna Verification Summary

- Low band refers to: GSM850, UMTS B5, LTE B5/12/13/14/26/71, NR 5/12/26/71; Mid band refers to: GSM1900, UMTS B2/4, LTE B2/4/25/66, NR n25/66/70; High band refers to: LTE B7/30/38/41; Ultra High Band refers to: LTE B48, NR n48/77
- This device uses different Exposure Condition Indices (ECI) to configure different time averaged power levels based on certain exposure scenarios. For this device ECI = 0 is configured when the device's grip sensors are not triggered. ECI = 1 represents the case where the device grip sensors are triggered. ECI = 2 represents the case where grip sensor #3 is triggered for antenna M1.
- Note: Antennas S1 and S3 were not evaluated due to equipment limitations.

Table F-1
Power Measurement Verification for Main Antenna M1

Mechanism(s)			Exposure Condition Index (ECI)		
1st	2nd	Mode/Band	Free Space	Mechanism #1 (Grip #2)	Mechanism #2 (Grip #3)
Grip		Low Band Ant M1	0	1	
Grip	Grip	Mid Band Ant M1	0	1	2
Grip	Grip	High Band Ant M1	0	1	2

Table F-2
Power Measurement Verification for Main Antenna M2

Mechanism(s)		Exposure Condi	tion Index (ECI)
1st	Mode/Band	Free Space	Mechanism #1 (Grip #6)
Grip	Ultra High Band Ant M2	0	1

Table F-3
Power Measurement Verification for Sub Antenna S2

Mechanism(s)		Exposure Condi	tion Index (ECI)
1st	Mode/Band	Free Space	Mechanism #1 (Grip #5)
Grip	Mid Band Ant S2	0	1
Grip	High Band Ant S2	0	1

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Table F-4
Power Measurement Verification for Sub Antenna S4

Mechanism(s)		Exposure Condition Index (ECI)	
1st	Mode/Band	Free Space	Mechanism #1 (Grip #5)
Grip	Ultra High Band Ant S4	0	1

## F.4 WIFI Verification Summary

Table F-5
Power Measurement Verification WIFI – Antenna WIFI 0

Power Measurement Vernication WiFi - Antenna WiFi U				
Mechanism(s)		Conducte	d Powers	
1st	Mode/Band	Un-triggered (Max)	Mechanism #1 (Grip Sensor #1 Active)	
Grip	802.11b	18.25	10.88	
Grip	802.11g	17.21	11.36	
Grip	802.11n (2.4GHz)	17.17	10.92	
Grip	802.11ax (2.4GHz)	14.72	11.40	
Grip	802.11a	15.51	6.10	
Grip	802.11n (5GHz, 20MHz BW)	15.35	6.21	
Grip	802.11n (5GHz, 40MHz BW)	15.64	6.55	
Grip	802.11ac (20MHz BW)	15.36	6.31	
Grip	802.11ac (40MHz BW)	14.88	6.43	
Grip	802.11ac (80MHz BW)	12.39	6.30	
Grip	802.11ac (160MHz BW)	11.01	5.99	
Grip	802.11ax (20MHz BW)	9.21	6.83	
Grip	802.11ax (40MHz BW)	9.32	6.77	
Grip	802.11ax (80MHz BW)	9.53	6.68	
Grip	802.11ax (160MHz BW)	9.90	6.52	

\*Note: MIMO WIFI modes were not evaluated due to equipment limitations.

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Table F-6
Power Measurement Verification for WIFI – Antenna WIFI 1

Mechanism(s)		Conducte	d Powers
1st	Mode/Band	Un-triggered (Max)	Mechanism #1 (Grip Sensor #3 Active)
Grip	802.11b	18.91	11.78
Grip	802.11g	17.48	11.52
Grip	802.11n (2.4GHz)	17.50	11.48
Grip	802.11ax (2.4GHz)	14.55	11.52
Grip	802.11a 15.88		6.89
Grip	802.11n (5GHz, 20MHz BW)	15.79	6.90
Grip	802.11n (5GHz, 40MHz BW)	15.15	6.33
Grip	802.11ac (20MHz BW)	15.63	6.69
Grip	802.11ac (40MHz BW)	13.46	7.02
Grip	802.11ac (80MHz BW)	11.52	7.20
Grip	802.11ac (160MHz BW)	11.50 7.15	
Grip	802.11ax (20MHz BW)	20MHz BW) 9.72 7.06	
Grip	802.11ax (40MHz BW)	10.36	7.34
Grip	802.11ax (80MHz BW)	10.21	7.13
Grip	802.11ax (160MHz BW)	10.25 7.25	

<sup>\*</sup>Note: MIMO WIFI modes were not evaluated due to equipment limitations.

## F.5 Distance Verification Summary

Table F-7
Distance Measurement Verification for Grip #1

	GRIP #1				
Test Position	Activation	Distance[Open] (mm)	Moving towards	Moving away	
Back	0	23	23	34	
Тор	0	25	25	31	
Left	0	16	16	23	

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Table F-8
Distance Measurement Verification for Grip Sensor #2

	GRIP #2			
Test Position	Activation	Distance[Open] (mm)	Moving towards	Moving away
Back	0	22	22	25
Тор	0	26	26	31

Table F-9
Distance Measurement Verification for Grip Sensor #3

		GRIP #3	}	
Test Position	Activation	Distance[Open] (mm)	Moving towards	Moving away
Back	0	23	23	34
Тор	0	26	26	33
Right	0	16	16	23

Table F-10
Distance Measurement Verification for Grip Sensor #4

Dist	unoc measa	Territorit Vermoe	thorrion only oci	1501 #4
		GRIP #4		
Test	Activation	Distance[Open]	Moving towards	Moving away
Position	710010011011	(mm)	morning contained	guilly
Back	0	26	26	33
Bottom	0	28	28	31
Right	0	16	16	23

Table F-11
Distance Measurement Verification for Grip Sensor #5

		GRIP #5		
Test Position	Activation	Distance[Open] (mm)	Moving towards	Moving away
Back	0	26	26	30
Bottom	0	28	28	32

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Table F-12
Distance Measurement Verification for Grip Sensor #6

		GRIP#6	·	
Test Position	Activation	Distance[Open] (mm)	Moving towards	Moving away
Back	0	26	26	33
Bottom	0	28	28	32
Left	0	16	16	23

Table F-13
Back Side, Moving Toward Phantom

	, ,																
	KDB 616217 Section 6.2 Measured Power Moving Toward Phantom [dBm]																
Distance [mm]	31	30	29	28	27	26	25		24	23	22	21	. 20	)	19	18	17
Grip #1				Max	Max	Max	Max	Max	Red	d	Red	Red	Red	Red	Red		
Grip #2					Max	Max	Max	Max	Ma	X	Red	Red	Red	Red	Red		Red
Grip #3				Max	Max	Max	Max	Max	Red	d	Red	Red	Red	Red	Red		
Grip #4	Max	Max	Max	Max	Max	Red	Red	Red	Red	d	Red	Red					
Grip #5	Max	Max	Max	Max	Max	Red	Red	Red	Red	d	Red	Red					
Grip #6	Max	Max	Max	Max	Max	Red	Red	Red	Red	d	Red	Red					

Table F-14
Back Side, Moving Away From Phantom

	KDB 616217 Section 6.2 Measured Power Moving Away From Phantom [dBm]																			
Distance [mm]	20	21	22	23	24	25	26	27	28	29	30	3:	1 32	2 3	34	35	36	37	7 38	39
Grip #1										Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	Max
Grip #2	Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	Max									
Grip #3										Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	Max
Grip #4									Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	Max	
Grip #5						Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	Max				
Grip #6									Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	Max	

Table F-15
Top Edge, Moving Toward Phantom

		KE	B 616217 S	ection 6.2	Measured	Power Mo	ving Towa	rd Phanton	n [dBm]			
Distance [mm]	31	30	29	28	27	26	25	24	23	22	21	20
Grip #1		Max	Max	Max	Max	Max	Red	Red	Red	Red	Red	Red
Grip #2	Max	Max	Max	Max	Max	Red	Red	Red	Red	Red	Red	
Grip #3		Max	Max	Max	Max	Max	Red	Red	Red	Red	Red	Red

Table F-16
Top Edge, Moving Away From Phantom

	KDB 616217 Section 6.2 Measured Power Moving Away From Phantom [dBm]													
Distance [mm]	26	27	7 28	29	30	31	32	33	34	35	36	37	38	
Grip #1	Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	Max			
Grip #2	Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	Max			
Grip #3			Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	Max	

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## Table F-17 Bottom Edge, Moving Toward Phantom

				- 3	,										
	KDB 616217 Section 6.2 Measured Power Moving Toward Phantom [dBm]														
Distance [mm]	33	32	31	30	29	28	27	26	25	24	23				
Grip #4	Max	Max	Max	Max	Max	Red	Red	Red	Red	Red	Red				
Grip #5	Max	Max	Max	Max	Max	Red	Red	Red	Red	Red	Red				
Grip #6	Max	Max	Max	Max	Max	Red	Red	Red	Red	Red	Red				

# Table F-18 Bottom Edge, Moving Away From Phantom

	KDB 616217 Section 6.2 Measured Power Moving Away From Phantom [dBm]													
Distance [mm]	26	27	28	29	30	31	32	33	34	35	36	37		
Grip #4	Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	Max			
Grip #5		Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	Max		
Grip #6		Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	Max		

Table F-19 Left Edge, Moving Toward Phantom

	KDB 616217 Section 6.2 Measured Power Moving Toward Phantom [dBm]											
Distance [mm]	21	1 2	.0	19	18	17	16	15	14	13	12	1
Grip #1	Max	Max	Max		Max	Max	Red	Red	Red	Red	Red	Red
Grip #6	Max	Max	Max		Max	Max	Red	Red	Red	Red	Red	Red

Table F-20 Left Edge, Moving Away From Phantom

	KDB 616217 Section 6.2 Measured Power Moving Away From Phantom [dBm]											
Distance [mm]	17	18	19	20	21	22	23	24	25	26	27	28
Grip #1	Red	Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	Max
Grip #6	Red	Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	Max

# Table F-21 Right Edge, Moving Toward Phantom

	KDB 616217 Section 6.2 Measured Power Moving Toward Phantom [dBm]										
Distance [mm]	21	20	19	18	17	16	15	14	13	12	11
Grip #3	Max	Max	Max	Max	Max	Red	Red	Red	Red	Red	Red
Grip #4	Max	Max	Max	Max	Max	Red	Red	Red	Red	Red	Red

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Table F-22
Right Edge, Moving Away From Phantom

	KDB 616217 Section 6.2 Measured Power Moving Away From Phantom [dBm]											
Distance [mm]	17	18	19	20	21	22	23	24	25	26	27	28
Grip #3	Red	Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	Max
Grip #4	Red	Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	Max

Table F-23

Triggering States by Tilt Angle for each Sensor per KDB 616217 Section 6.4 – Top Edge

										<u> </u>	
			K	DB 616217	Section 6.	4 Measure	d Tilt Angle	9			
Tilt Angle	-45	-35	-25	-15	-5	0	5	15	25	35	45
Grip #1	25	25	25	25	25	25	25	25	25	25	25
Grip #2	26	26	26	26	26	26	26	26	26	26	26
Grip #3	26	26	26	26	26	26	26	26	26	26	26

Table F-24
Triggering States by Tilt Angle for each Sensor per KDB 616217 Section 6.4 – Bottom Edge

	KDB 616217 Section 6.4 Measured Tilt Angle											
Tilt Angle	-45	-35	-25	-15	-5	0	5	15	25	35	45	
Grip #4	28	28	28	28	28	28	28	28	28	28	28	
Grip #5	28	28	28	28	28	28	28	28	28	28	28	
Grip #6	28	28	28	28	28	28	28	28	28	28	28	

Table F-25
Triggering States by Tilt Angle for each Sensor per KDB 616217 Section 6.4 – Left Edge

	KDB 616217 Section 6.4 Measured Tilt Angle											
Tilt Angle	-45	-35	-25	-15	-5	0	5	15	25	35	45	
Grip #1	16	16	16	16	16	16	16	16	16	16	16	
Grip #6	16	16	16	16	16	16	16	16	16	16	16	

Table F-26
Triggering States by Tilt Angle for each Sensor per KDB 616217 Section 6.4 – Right Edge

		_	-	_		-					
				KDB 61621	7 Section 6	4 Measure	d Tilt Angle				
Tilt Angle	-45	-35	-25	-15	-5	0	5	15	25	35	45
Grip #3	16	16	16	16	16	16	16	16	16	16	16
Grip #4	16	16	16	16	16	16	16	16	16	16	16

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