

APPENDIX F: POWER REDUCTION VERIFICATION

Per the May 2017 TCBC Workshop Notes, 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.
3. Steps 1 and 2 were repeated for low, mid, and high bands, as appropriate (see note below for more details).
4. Steps 1 through 3 were repeated for all distance-based power reduction mechanisms.

FCC ID A3LSMX736B	RF Exposure Part 1 Test Report	Approved by: Technical Manager
DUT Type: Portable Computing Device		APPENDIX F: Page 1 of 6

F.3 Main Antenna Verification Summary

-Note: Low band refers to: GSM850, UMTS B5, LTE 5/12/13/17/26, NR n5; Mid band refers to: GSM1900, UMTS B2/4, LTE B2/4/25/66, NR n2/25/66; High band refers to: LTE B41, NR n41; Ultra High band refers to: NR n77

-Note: 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 = 1/2/3/4/5 represent the cases where the Grip sensor 1/2/3/4/5 grip sensors are triggered for Main and Sub Antennas.

Table F-1
Power Measurement Verification

Mechanism(s)					Mode/Band	Exposure Condition Index (ECI)					
1st	2nd	3rd	4th	5th		Free Space	Mechanism #1 (Grip #1)	Mechanism #2 (Grip #2)	Mechanism #3 (Grip #3)	Mechanism #4 (Grip #4)	Mechanism #5 (Grip #5)
	Grip				Low Band	0		2			
	Grip	Grip			Mid Band	0		2	3		
Grip	Grip	Grip	Grip	Grip	Mid Band Sub 3 Ant	0	1	2	3	4	5
	Grip	Grip			High Band Main 1	0		2	3		
				Grip	High Band Sub 1	0					5
Grip	Grip	Grip	Grip	Grip	High Band Sub 2	0	1	2	3	4	5
Grip	Grip	Grip	Grip	Grip	High Band Sub 3	0	1	2	3	4	5
		Grip			Ultra High Band Main 4				3		
Grip	Grip		Grip	Grip	Ultra High Band Sub 2	0	1	2	3	4	5
Grip	Grip	Grip	Grip	Grip	Ultra High Band Sub 3	0	1	2	3	4	5
			Grip		Ultra High Band Sub 4					4	

F.4 WIFI Verification Summary

Table F-2
Power Measurement Verification WIFI 0

Mechanism(s)		Conducted Power (dBm)	
1st	Mode/Band	Un-triggered	Mechanism #1 (Grip Sensor #1 Active)
Grip	802.11b	18.11	11.87
Grip	802.11g	16.97	11.77
Grip	802.11n (2.4GHz)	16.90	11.43
Grip	802.11ax (2.4GHz)	14.34	11.75
Grip	802.11a	16.81	7.24
Grip	802.11n (5GHz, 20MHz BW)	17.29	7.38
Grip	802.11ac (20MHz BW)	16.10	6.82
Grip	802.11n (5GHz, 40MHz BW)	15.90	6.83
Grip	802.11ac (40MHz BW)	16.24	6.81
Grip	802.11ac (80MHz BW)	15.18	7.26
Grip	802.11ac (160MHz BW)	14.09	6.97
Grip	802.11ax (20MHz BW)	9.83	6.83
Grip	802.11ax (40MHz BW)	10.26	6.87
Grip	802.11ax (80MHz BW)	10.19	7.00
Grip	802.11ax (160MHz BW)	10.19	6.98
Grip	802.11a (6Ghz 20MHz)	9.72	6.05
Grip	802.11ax (6Ghz, 20MHz)	10.11	6.32
Grip	802.11ax (6Ghz, 40MHz)	12.23	6.27
Grip	802.11ax (6Ghz, 80MHz)	12.95	6.41
Grip	802.11ax (6Ghz, 160MHz)	11.97	6.12

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

FCC ID A3LSMX736B	RF Exposure Part 1 Test Report	Approved by: Technical Manager
DUT Type: Portable Computing Device		APPENDIX F: Page 2 of 6

Table F-3
Power Measurement Verification WIFI 1

Mechanism(s)	Mode/Band	Conducted Power (dBm)	
1st		Un-triggered	Mechanism #1 (Grip Sensor #3 Active)
Grip	802.11b	17.82	11.66
Grip	802.11g	17.38	11.77
Grip	802.11n (2.4GHz)	16.96	11.71
Grip	802.11ax (2.4GHz)	14.02	11.78
Grip	802.11a	17.16	7.30
Grip	802.11n (5GHz, 20MHz BW)	17.15	7.20
Grip	802.11ac (20MHz BW)	16.24	7.22
Grip	802.11n (5GHz, 40MHz BW)	16.33	7.00
Grip	802.11ac (40MHz BW)	16.28	6.83
Grip	802.11ac (80MHz BW)	15.04	7.03
Grip	802.11ac (160MHz BW)	14.33	7.26
Grip	802.11ax (20MHz BW)	10.11	6.85
Grip	802.11ax (40MHz BW)	10.24	6.72
Grip	802.11ax (80MHz BW)	9.85	7.00
Grip	802.11ax (160MHz BW)	10.31	6.94
Grip	802.11a (6Ghz 20MHz)	9.20	5.92
Grip	802.11ax (6Ghz, 20MHz)	9.75	6.01
Grip	802.11ax (6Ghz, 40MHz)	12.05	6.12
Grip	802.11ax (6Ghz, 80MHz)	12.42	6.25
Grip	802.11ax (6Ghz, 160MHz)	11.77	5.99

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

Table F-4
Power Measurement Verification BT

Mechanism(s)	Mode/Band	Conducted Power (dBm)	
1st		Un-triggered (Max)	Mechanism #1 (Reduced)
Grip	Bluetooth WIFI 0	14.43	9.32
Grip	Bluetooth WIFI 1	14.66	8.35

Table F-5
Distance Measurement Verification for Grip #1

GRIP #1				
Test Position	Activation	Distance[Open] (mm)	Moving towards	Moving away
<i>Back</i>	O	20	20	28
<i>Top</i>	O	20	23	29
<i>Left</i>	O	12	14	18

FCC ID A3LSMX736B	RF Exposure Part 1 Test Report	Approved by: Technical Manager
DUT Type: Portable Computing Device		APPENDIX F: Page 3 of 6

Table F-6
Distance Measurement Verification for Grip #2

GRIP #2				
Test Position	Activation	Distance[Open] (mm)	Moving towards	Moving away
<i>Back</i>	O	20	20	28
<i>Top</i>	O	20	24	29

Table F-7
Distance Measurement Verification for Grip #3

GRIP #3				
Test Position	Activation	Distance[Open] (mm)	Moving towards	Moving away
<i>Back</i>	O	20	20	28
<i>Top</i>	O	20	23	29
<i>Right</i>	O	12	13	16

Table F-8
Distance Measurement Verification for Grip #4

GRIP #4				
Test Position	Activation	Distance[Open] (mm)	Moving towards	Moving away
<i>Back</i>	O	20	20	27
<i>Bottom</i>	O	20	22	30
<i>Right</i>	O	12	12	16

Table F-9
Distance Measurement Verification for Grip #5

GRIP #5				
Test Position	Activation	Distance[Open] (mm)	Moving towards	Moving away
<i>Back</i>	O	20	20	27
<i>Bottom</i>	O	20	22	30
<i>Left</i>	O	12	13	18

Table F-10
Back Side, Moving Toward Phantom

KDB 616217 Section 6.2 Measured Power Moving Toward Phantom [dBm]										
Distance [mm]	25	24	23	22	21	20	19	18	17	16
Grip #1	Max	Max	Max	Max	Max	Red	Red	Red	Red	Red
Grip #2	Max	Max	Max	Max	Max	Red	Red	Red	Red	Red
Grip #3	Max	Max	Max	Max	Max	Red	Red	Red	Red	Red
Grip #4	Max	Max	Max	Max	Max	Red	Red	Red	Red	Red
Grip #5	Max	Max	Max	Max	Max	Red	Red	Red	Red	Red

FCC ID A3LSMX736B	RF Exposure Part 1 Test Report	Approved by: Technical Manager
DUT Type: Portable Computing Device		APPENDIX F: Page 4 of 6

Table F-11
Back Side, Moving Away From Phantom

KDB 616217 Section 6.2 Measured Power Moving Away From Phantom [dBm]											
Distance [mm]	23	24	25	26	27	28	29	30	31	32	33
Grip #1		Red	Red	Red	Red	Red	Max	Max	Max	Max	Max
Grip #2		Red	Red	Red	Red	Red	Max	Max	Max	Max	Max
Grip #3		Red	Red	Red	Red	Red	Max	Max	Max	Max	Max
Grip #4	Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	
Grip #5	Red	Red	Red	Red	Red	Max	Max	Max	Max	Max	

Table F-12
Top Edge, Moving Toward Phantom

KDB 616217 Section 6.2 Measured Power Moving Toward Phantom [dBm]										
Distance [mm]	30	29	28	27	26	25	24	23	22	21
Grip #1	Max	Max	Max	Max	Max	Red	Red	Red	Red	Red
Grip #2	Max	Max	Max	Max	Red	Red	Red	Red	Red	
Grip #3	Max	Max	Max	Max	Red	Red	Red	Red	Red	

Table F-13
Top Edge, Moving Away From Phantom

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

Table F-14
Bottom Edge, Moving Toward Phantom

KDB 616217 Section 6.2 Measured Power Moving Toward Phantom [dBm]										
Distance [mm]	27	26	25	24	23	22	21	20	19	18
Grip #4	Max	Max	Max	Max	Max	Red	Red	Red	Red	Red
Grip #5	Max	Max	Max	Max	Max	Red	Red	Red	Red	Red

Table F-15
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
Grip #4	Red	Red	Red	Red	Red	Max	Max	Max	Max	Max
Grip #5	Red	Red	Red	Red	Red	Max	Max	Max	Max	Max

Table F-16
Left Edge, Moving Toward Phantom

KDB 616217 Section 6.2 Measured Power Moving Toward Phantom [dBm]													
Distance [mm]	23	22	21	20	19	18	17	16	15	14	13	12	11
Grip #1					Max	Max	Max	Max	Max	Red	Red	Red	Red
Grip #5	Max	Max	Max	Max	Max	Red	Red	Red	Red	Red			

FCC ID A3LSMX736B	RF Exposure Part 1 Test Report	Approved by: Technical Manager
DUT Type: Portable Computing Device		APPENDIX F: Page 5 of 6

Table F-17
Left Edge, Moving Away From Phantom

KDB 616217 Section 6.2 Measured Power Moving Away From Phantom [dBm]										
Distance [mm]	14	15	16	17	18	19	20	21	22	23
Grip #1	Red	Red	Red	Red	Red	Max	Max	Max	Max	Max
Grip #5	Red	Red	Red	Red	Red	Max	Max	Max	Max	Max

Table F-18
Right Edge, Moving Toward Phantom

KDB 616217 Section 6.2 Measured Power Moving Toward Phantom [dBm]										
Distance [mm]	18	17	16	15	14	13	12	11	10	9
Grip #3	Max	Max	Max	Max	Max	Red	Red	Red	Red	Red
Grip #4	Max	Max	Max	Max	Max	Max	Red	Red	Red	Red

Table F-19
Right Edge, Moving Away From Phantom

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

Table F-20
Triggering States by Tilt Angle for each Sensor per KDB 616217 Section 6.4 – Top Edge

KDB 616217 Section 6.4 Measured Tilt Angle										
Tilt Angle	-45	-35	-25	-15	-5	0	5	15	25	35
Grip #1	23	23	23	23	23	23	23	23	23	23
Grip #2	24	24	24	24	24	24	24	24	24	24
Grip #3	23	23	23	23	23	23	23	23	23	23

Table F-21
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
Grip #4	22	22	22	22	22	22	22	22	22	22
Grip #5	22	22	22	22	22	22	22	22	22	22

Table F-22
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
Grip #1	14	14	14	14	14	14	14	14	14	14
Grip #5	13	13	13	13	13	13	13	13	13	13

Table F-23
Triggering States by Tilt Angle for each Sensor per KDB 616217 Section 6.4 – Right Edge

KDB 616217 Section 6.4 Measured Tilt Angle										
Tilt Angle	-45	-35	-25	-15	-5	0	5	15	25	35
Grip #3	13	13	13	13	13	13	13	13	13	13
Grip #4	12	12	12	12	12	12	12	12	12	12

FCC ID A3LSMX736B	RF Exposure Part 1 Test Report	Approved by: Technical Manager
DUT Type: Portable Computing Device		APPENDIX F: Page 6 of 6