

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 Angle Verification Procedure

The angle 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. For licensed modes, the device state index on the device UI was monitored to determine the triggering state.
2. The device was opened and closed to determine the angle at which the mechanism triggers and the output power is reduced, per the FCC TCB Workshop Slides from November 2019. The triggering conditions of the angles was sufficient such that all possible user scenarios with the device in open condition are in the reduced power state.

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F.3 Main Antenna Verification Summary

Note: The device supports manufacturer’s proprietary mechanism which can detect the motion of the device and then configure the DSI during portable use scenarios. Details of this mechanism can be found in the Operational Description. When the device is being used near the user, the device will detect motion and reduce the timeaveraged output power. The motion detection operation was verified for on-body condition to represent conservative use cases for a tablet device. The verification results are above.

**Table F-1
Power Measurement Verification – Antenna 1**

Mechanism(s)	Mode/Band	Device State Index (DSI)	
		No Motion (Max)	Motion + Tablet (Reduced)
1st			
Motion	UMTS 1900	3	6
Motion	LTE Band 4	3	6
Motion	LTE Band 66	3	6
Motion	LTE Band 2	3	6
Motion	LTE Band 25	3	6
Motion	LTE Band 30	3	6
Motion	LTE Band 7	3	6
Motion	LTE Band 41	3	6
Motion	LTE Band 41 PC2	3	6
Motion	NR FDD Band n66	3	6
Motion	NR FDD Band n2	3	6
Motion	NR FDD Band n25	3	6
Motion	NR FDD Band n41	3	6

**Table F-2
Power Measurement Verification – Antenna 2**

Mechanism(s)	Mode/Band	Device State Index (DSI)	
		No Motion (Max)	Motion + Tablet (Reduced)
1st			
Motion	LTE Band 48	3	6
Motion	NR TDD Band n77	3	6

**Table F-3
Power Measurement Verification – Antenna 3**

Mechanism(s)	Mode/Band	Device State Index (DSI)	
1st		No Motion (Max)	Motion + Tablet (Reduced)
Motion	NR TDD Band n77	3	6

**Table F-4
Power Measurement Verification – Antenna 4**

Mechanism(s)	Mode/Band	Device State Index (DSI)	
1st		No Motion (Max)	Motion + Tablet (Reduced)
Motion	UMTS 850	3	6
Motion	LTE Band 71	3	6
Motion	LTE Band 12	3	6
Motion	LTE Band 13	3	6
Motion	LTE Band 14	3	6
Motion	LTE Band 5	3	6
Motion	LTE Band 26	3	6
Motion	NR FDD Band n71	3	6
Motion	NR FDD Band n5	3	6
Motion	NR FDD Band n66	3	6
Motion	NR FDD Band n2	3	6
Motion	NR FDD Band n25	3	6
Motion	NR TDD Band n41	3	6

**Table F-5
Power Measurement Verification – Antenna 5**

Mechanism(s)	Mode/Band	Device State Index (DSI)	
1st		No Motion (Max)	Motion + Tablet (Reduced)
Motion	NR TDD Band n41	3	6
Motion	NR TDD Band n77	3	6

**Table F-6
Power Measurement Verification – Antenna 8**

Mechanism(s)	Mode/Band	Device State Index (DSI)	
1st		No Motion (Max)	Motion + Tablet (Reduced)
Motion	NR TDD Band n41	3	6
Motion	NR TDD Band n77	3	6

F.4 WIFI Verification Summary

Note: 2.4 GHz 40MHz BW, 802.11ax, and MIMO WIFI modes were not evaluated due to equipment limitations. The device supports manufacturer’s proprietary mechanism which can detect the motion of the device and then configure the power during portable use scenarios. Details of this mechanism can be found in the Operational Description. When the device is being used near the user, the device will detect motion and reduce the time-averaged output power. The motion detection operation was verified for on-body condition to represent conservative use cases for a tablet device. The verification results are in the tables below.

**Table F-7
Power Measurement Verification WIFI – Antenna 1**

Chain 0						
Mechanism(s)			Mode/Band	Conducted Powers (dBm)		
1st	2nd	3rd		Mechanism #1	Mechanism #2	Mechanism #3
No Motion	Motion + Tablet	Motion + Licensed + Tablet	802.11b	17.92	10.04	5.83
No Motion	Motion + Tablet	Motion + Licensed + Tablet	802.11g	17.96	10.30	5.85
No Motion	Motion + Tablet	Motion + Licensed + Tablet	802.11n (2.4 GHz 20 MHz)	17.37	10.21	6.08
No Motion	Motion + Tablet	Motion + Licensed + Tablet	802.11a	17.41	6.16	1.11
No Motion	Motion + Tablet	Motion + Licensed + Tablet	802.11n 20 MHz	17.48	6.22	1.20
No Motion	Motion + Tablet	Motion + Licensed + Tablet	802.11n 40 MHz	15.95	6.51	1.33
No Motion	Motion + Tablet	Motion + Licensed + Tablet	802.11ac 20 MHz	17.64	6.28	1.32
No Motion	Motion + Tablet	Motion + Licensed + Tablet	802.11ac 40 MHz	16.51	6.15	1.35
No Motion	Motion + Tablet	Motion + Licensed + Tablet	802.11ac 80 MHz	15.35	6.02	1.36
No Motion	Motion + Tablet	Motion + Licensed + Tablet	802.11ac 160 MHz	12.93	8.36	2.26

**Table F-8
Power Measurement Verification WIFI – Antenna 2**

Chain 1						
Mechanism(s)			Mode/Band	Conducted Powers (dBm)		
1st	2nd	3rd		Mechanism #1	Mechanism #2	Mechanism #3
No Motion	Motion + Tablet	Motion + Licensed + Tablet	802.11b	17.67	10.21	5.05
No Motion	Motion + Tablet	Motion + Licensed + Tablet	802.11g	17.93	10.42	5.22
No Motion	Motion + Tablet	Motion + Licensed + Tablet	802.11n (2.4 GHz 20 MHz)	18.05	10.49	5.81
No Motion	Motion + Tablet	Motion + Licensed + Tablet	802.11a	18.19	7.01	3.09
No Motion	Motion + Tablet	Motion + Licensed + Tablet	802.11n 20 MHz	18.43	7.29	3.34
No Motion	Motion + Tablet	Motion + Licensed + Tablet	802.11n 40 MHz	15.95	7.44	3.28
No Motion	Motion + Tablet	Motion + Licensed + Tablet	802.11ac 20 MHz	18.29	7.40	3.25
No Motion	Motion + Tablet	Motion + Licensed + Tablet	802.11ac 40 MHz	16.92	7.41	3.37
No Motion	Motion + Tablet	Motion + Licensed + Tablet	802.11ac 80 MHz	16.02	7.34	3.24
No Motion	Motion + Tablet	Motion + Licensed + Tablet	802.11ac 160 MHz	14.80	9.09	4.84

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F.5 Angle Verification

**Table F-9
Angle Detection with Keyboard Accessory**

Mechanism(s)	Angle Measurements (°)		Angle (°) Range per Manufacturer
	Closing (360 to 0)	Opening (0 to 360)	
Keyboard Angle	205	205	210