

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 keyboard angle on power reduction.

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 Unlicensed 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 time-averaged output power. The motion detection operation was verified for on-body condition to represent conservative use cases for the device. The verification results are below.

This device uses different Device State Indices (DSI) to configure different time averaged power levels based on certain exposure scenarios. For this device DSI = 3 represents the case where the device detects no motion and DSI = 6 is configured when the device detects motion.

Table F-1
Power Measurement Verification

Mechanism(s)	Mode/Band	Device State Index (DSI)	
1st		No Motion (Max)	Motion (Reduced)
Motion	Low Band Ant 2	3	6
Motion	Mid Band Ant 6	3	6
Motion	High Band Ant 1	3	6
Motion	High Band Ant 6	3	6
Motion	Ultra High Band Ant 1	3	6
Motion	Ultra High Band Ant 6	3	6
Motion	Ultra High Band Ant 7	3	6
Motion	Ultra High Band Ant 8	3	6

Note:

1. Low band refers to: UMTS B5, LTE B71/12/13/14/5/26, NR n71/12/14/26/5; Mid band refers to: UMTS B4/2, LTE B66/4/25/2, NR n66/25/2; High band refers to: LTE B30/41, NR n30/41; Ultra High band refers to: LTE B48, NR n48/77

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F.4 Angle Verification

Table F-2
Angle Detection with Keyboard Accessory

Mechanism(s)	Angle Measurements (°)				Angle (°) Range per Manufacturer
	Opening (0 to 270)	Opening Posture Readout	Closing (270 to 0)	Closing Posture Readout	
Keyboard Angle	0	Reduced	270	Reduced	210°
	10	Reduced	260	Reduced	
	20	Reduced	250	Reduced	
	30	Reduced	230	Reduced	
	39	Reduced	220	Reduced	
	40	Reduced	215	Reduced	
	41	Reduced	214	Reduced	
	42	Reduced	213	Reduced	
	43	Reduced	212	Reduced	
	44	Reduced	211	Reduced	
	45	Max	210	Max	
	46	Max	209	Max	
	47	Max	208	Max	
	48	Max	207	Max	
	49	Max	206	Max	
	50	Max	205	Max	
	60	Max	204	Max	
	70	Max	200	Max	
	80	Max	190	Max	
	90	Max	180	Max	
	100	Max	170	Max	
	110	Max	160	Max	
	120	Max	150	Max	
	130	Max	140	Max	
	140	Max	130	Max	
	150	Max	120	Max	
	160	Max	110	Max	
	170	Max	100	Max	
	180	Max	90	Max	
	190	Max	80	Max	
	200	Max	70	Max	
	205	Max	60	Max	
	206	Max	50	Max	
	207	Max	47	Max	
	208	Max	46	Max	
	209	Max	45	Max	
	210	Reduced	44	Max	
	211	Reduced	43	Max	
	212	Reduced	42	Reduced	
	213	Reduced	41	Reduced	
	214	Reduced	40	Reduced	
	220	Reduced	39	Reduced	
	230	Reduced	38	Reduced	
	240	Reduced	30	Reduced	
	250	Reduced	20	Reduced	
	260	Reduced	10	Reduced	
	270	Reduced	0	Reduced	

Per manufacturer, when the keyboard is attached and positioned within the 0-50 degree angle range for opening/closing configurations, the RF output power may be set to a low output power. This adjustment ensures a more conservative power output for this non-typical use case.

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