

Appendix F. Power reduction mechanism verification

1. Power verification introduction

- This device supports the manufacturer's proprietary power reduction mechanisms for Wi-Fi transmitters. Further details of the specific mechanisms for the power reduction mechanism can be found in the Operational Description
- Demonstration of proper functioning of the detection and triggering mechanisms to support the corresponding RF exposure conditions, the verification plan consists of measuring the power levels of the cellular and Wi-Fi transmitters at each wireless technology under different operating conditions related to the power reduction mechanisms.
- For testing purposes, the device was measured against each Index supported for the Wi-Fi technologies. The target power level and measured power levels are detailed in the following table and clearly shows that each power reduction mechanism operates as expected.

2. Power verification procedure

- The verification is through a base station simulator is used to establish a conducted RF connection and record output power under different operating conditions related to the power reduction mechanisms.
- Verification of power reduction levels for Wi-Fi is performed with cellular transmitters on and off, for cellular is performed with Wi-Fi transmitters on and off.
- Verification of RCV mechanism is via establish voice call and audio routed through the earpiece to record output power under head power states.
- Verification of Hotspot power reduction is via establish data connection and enable hotspot feature to record output power under hotspot power state.
- Verification of Body Detector mechanism is via establish data connection to record output power under body worn power state.
 - On a stationary object (placed on a table)
 - In-hand or on knee
 - For Main Ant and Aux Ant body detection is also conjunction with proximity sensor detector mechanism, the condition for triggering the power reduction mechanism is when Body Detector mechanism and Proximity Sensor Detector are triggered simultaneously.
 - Proximity sensor Detect mechanism was performed is in-hand to trigger body detector mechanism and hand close to the Main Ant and Aux Ant to trigger proximity sensor detector mechanism.
- Verification of Body Detector mechanism is via establish data connection to record output power under body worn power state.
 - On a stationary object (placed on a table)
 - In-hand or on knee
 - Body detect and monitor period validation

3. Test setup for conducted power measurement



Figure 1

4. Verification output Power Results

- Body Detect mechanism will be performed for the in-hand and on a stationary object (placed on a table).
- Verify the functionality of the motion sensor by measuring the output power in the following steps.

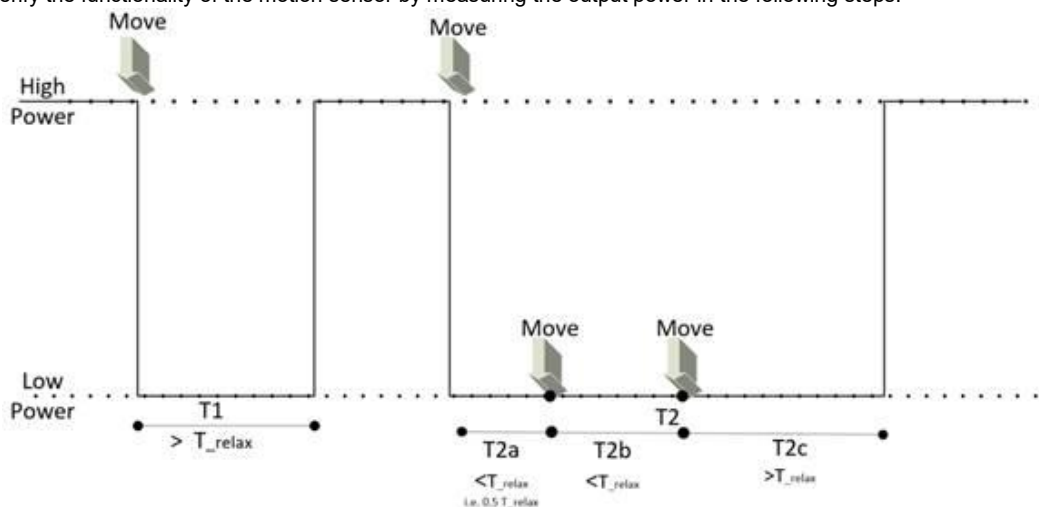


Figure 1 Illustration of the procedure for the validation of the power reduction

- Placed on a table:** Make the DUT transmit with the maximum output power by using a base station simulator.
 - Confirm that motion sensor is not triggered by letting the DUT remain stationary with no movements for the period T_{relax} for the motion sensor to reach stationary state.
 - Record P_{step1} (high power)
- In-hand:** Move the DUT to trigger the motion sensor. Apply the motion of the DUT with respect to movements in intended and reasonably foreseeable use conditions of the DUT.
 - Record P_{step2} (low power)
- For the validation of T_{relax} , wait a time period $T_1 > T_{relax}$ and confirm DUT restores to high power (P_{step1}).
- Move the DUT to trigger the motion sensor.
- Move DUT within T_{relax} to ensure T_{relax} resets when DUT is in motion.
DUT can be moved once or twice within T_{relax} , (after time periods T_{2a} and T_{2b} in Figure 1.) followed by waiting for a time period greater than T_{relax} (time period T_{2c} in Figure 1.) for DUT to restore high power. The total time duration of this step is T_2 , and the power during the whole period T_2 shall be reduced (low power – P_{step2}).

T_{relax} : 18 sec

Monitor period, T1: 20 sec, T2a: 15 sec, T2b: 15 sec, T2c: 20 sec

		Output Power (data connection) (dBm)											
		Stationary Placed on a table		In hand		Stationary Placed on a table		In hand				Stationary Placed on a table	
WLAN		Full Power P_{step1}		Low Power P_{step2}		Full Power $P_{step1} \& T_1 > T_{relax}$		Low Power $P_{step2} \& T_{2a} < T_{relax}$		Low Power $P_{step2} \& T_{2b} < T_{relax}$		Full Power $P_{step1} \& T_{2c} > T_{relax}$	
Wireless technology	Antenna	Measured	Max. Tune-up	Measured	Max. Tune-up	Measured	Max. Tune-up	Measured	Max. Tune-up	Measured	Max. Tune-up	Measured	Max. Tune-up
WLAN5G 802.11a ch 157	Main	20.67	22.50	17.09	18.00	20.7	22.50	17.21	18.00	17.29	18.00	20.77	22.50
	Aux	20.59	22.50	17.51	18.00	20.66	22.50	17.32	18.00	17.44	18.00	20.6	22.50

**Appendix F. Supplemental SAR Results**

Band	Mode	Test Position	Gap (mm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-Up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Measured APD (W/m^2)	Reported APD (W/m^2)
WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Side	25mm	Main	138	5690	20.49	20.5	1.002	97.9	1.021	0.158	0.162		
WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Side	25mm	Aux	122	5610	19.93	20	1.016	97.9	1.021	0.085	0.088		
WLAN5GHz	802.11a 6Mbps	Bottom Side	25mm	Main	149	5745	22.48	22.5	1.005	97.7	1.024	0.208	0.214		
WLAN5GHz	802.11a 6Mbps	Bottom Side	25mm	Aux	165	5825	22.48	22.5	1.005	97.7	1.024	0.357	0.367		
WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Side	25mm	Main	171	5855	19.47	19.5	1.007	97.9	1.021	0.149	0.153		
WLAN5GHz	802.11ac-VHT80 MCS0	Bottom Side	25mm	Aux	171	5855	19.19	19.5	1.074	97.9	1.021	0.226	0.248		
WLAN6GHz	802.11ax-HE40 MCS0	Bottom Side	25mm	Main	3	5965	20.45	20.5	1.012	99.1	1.009	0.215	0.22	1.61	1.644
WLAN6GHz	802.11ax-HE40 MCS0	Bottom Side	25mm	Aux	59	6245	20.33	20.5	1.040	99.1	1.009	0.124	0.13	1.34	1.406