

Appendix F. WLAN Power reduction mechanism verification

Demonstration of proper functioning of the detection and triggering mechanisms to support the corresponding RF exposure conditions. The verification is through a base station simulator is used to establish a conducted RF connection and monitor output power under different operating conditions related to the power reduction mechanisms. Detail of power reduction mechanisms referring to Operational Description

1. Power verification procedure

- Establish voice call and audio routed through the earpiece to monitor output power under head exposure condition
- Establish data connection monitor body worn power state.
 - Body Detect mechanism was performed for the in-hand and on a stationary object (placed on a table)
- In this power validation purpose is to demonstrate of proper functioning of the detection and triggering mechanisms to support the corresponding RF exposure conditions.
- Verification performed for each technology to demonstrate that the power reduction applies for both technology and call origination.

2. Test setup for measuring power



Figure 1

3. Verification output Power Results

Head exposure condition

Head exposure condition		Output Power	
Wireless technology	Antenna	Measured	Target power(dBm)
		(dBm)	
802.11b 1Mbps CH6	(Ant6+7)Ant 6	18.0	17.0 ±1.5
	(Ant6+7)Ant 7	17.9	17.0 ±1.5

Head exposure condition		Output Power	
Wireless technology	Antenna	Measured	Target power(dBm)
		(dBm)	
802.11a 6Mbps CH56	(Ant6+7)Ant 6	17.5	17.5 ±1.5
	(Ant6+7)Ant 7	17.0	17.5 ±1.5

Head exposure condition		Output Power	
Wireless technology	Antenna	Measured	Target power(dBm)
		(dBm)	
802.11ax20 MCS0 CH1	(Ant6+7)Ant 6	15.2	14.5 ±1.5
	(Ant6+7)Ant 7	15.1	14.5 ±1.5

Body worn exposure condition

Display on

Body exposure condition		Output Power (data connection)			
		G-Sensor status			
Power state		Sensor Off		Sensor On	
Wireless technology	Antenna	Measured	Target power(dBm)	Measured	Target power(dBm)
		(dBm)		(dBm)	
802.11a 6Mbp CH56	(Ant6+7)Ant 6	17.4	18.0 ±1.5	16.3	16.0±1.5
	(Ant6+7)Ant 7	16.8	18.0 ±1.5	15.7	16.0±1.5

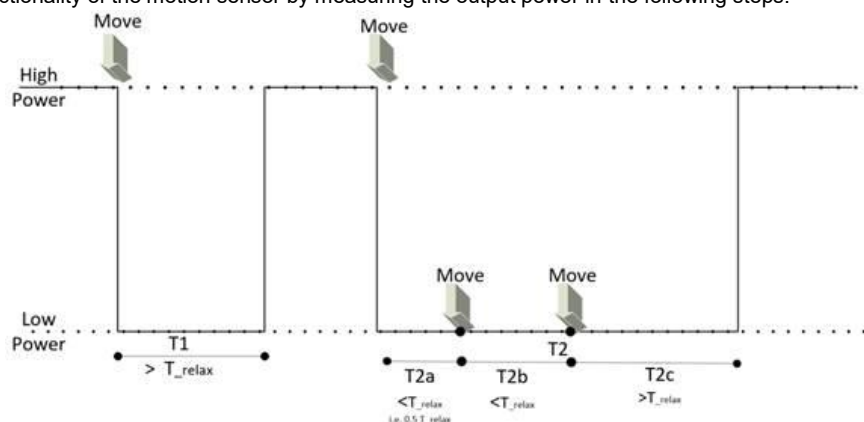
Display on to off:

Body exposure condition		Output Power (data connection)			
		G-Sensor status			
Power state		Sensor Off		Sensor On	
Wireless technology	Antenna	Measured	Target power(dBm)	Measured	Target power(dBm)
		(dBm)		(dBm)	
802.11ax20 MCS0 CH1	(Ant6+7)Ant 6	14.7	16.0 ±1.5	11.8	11.5±1.5
	(Ant6+7)Ant 7	14.5	16.0 ±1.5	11.1	11.5±1.5

Note: When the Display is off, the power will remain at the reduce power level.

Body detect validation

- 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

The device is embedded with motion sensors only, no proximity sensors are installed.

- 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} : 60 sec

Monitor period, T_1 : 70 sec, T_{2a} : 30 sec, T_{2b} : 30 sec, T_{2c} : 70 sec

Exposure Condition		Output Power (data connection) (dBm)											
		Stationary Placed on a table		In hand		Stationary Placed on a table		In hand				Stationary Placed on a table	
Power state		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
802.11a 6Mbps CH56	(Ant6+7) Ant 6	17.1	18±1.5	16.3	16±1.5	17.3	18 ±1.5	16.1	16±1.5	16.1	16 ±1.5	17.1	18 ±1.5
	(Ant6+7) Ant 7	16.7	18 ±1.5	15.7	16±1.5	16.8	18 ±1.5	15.8	16±1.5	15.8	16 ±1.5	16.8	18 ±1.5

Appendix F. Supplemental SAR Tests Results

SAR test result

1. The test data is selected according to the worst case SAR configuration per each technology.
2. The test data is to demonstrate the device is in compliance with FCC requirements at 25mm when all power reduction mechanisms are OFF. The worst case body SAR at 10mm was used for simultaneous transmission SAR analysis since they are more conservative than the 25mm SAR.

Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Sample for 文件	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-Up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
WLAN2.4GHz	802.11b 1Mbps	Top Edge	25mm	Ant 6	Power Table CTL	1	2412	Sample 1	18.98	19.00	1.005	98.21	1.018	0.01	0.069	0.071
WLAN2.4GHz	802.11b 1Mbps	Back	25mm	Ant 7	Power Table CTL	11	2462	Sample 1	18.98	19.00	1.005	98.06	1.02	-0.03	0.053	0.054
WLAN2.4GHz	802.11b 1Mbps	Top Edge	25mm	Ant MIMO(6)	Power Table CTL	6	2437	Sample 1	18.76	19.00	1.057	98.05	1.02	-0.01	0.182	0.196
WLAN5GHz	802.11n-HT20 MCS0	Back	25mm	Ant MIMO(6)	Power Table CTL	52	5260	Sample 1	19.62	20.00	1.091	99.76	1.002	0.05	0.307	0.336
WLAN5GHz	802.11n-HT40 MCS0	Left Edge	25mm	Ant MIMO(7)	Power Table CTL	142	5710	Sample 1	20.48	21.00	1.127	99.39	1.006	-0.01	0.370	0.419
WLAN5GHz	802.11n-HT40 MCS0	Left Edge	25mm	Ant MIMO(7)	Power Table CTL	159	5795	Sample 1	20.62	21.00	1.091	99.75	1.003	0.02	0.397	0.434
WLAN6GHz	802.11ax-HE160 MCS0	Left Edge	25mm	Ant MIMO(7)	Power Table CTL	15	6025	Sample 1	17.12	17.50	1.091	99.76	1.002	-0.10	0.119	0.130
Bluetooth	3Mbps	Back	25mm	Ant 6	Power Table 1	0	2402	Sample 1	5.47	6.00	1.13	76.96	1.082	0.01	0.001	0.001
Bluetooth	2Mbps	Back	25mm	Ant 7	Power Table 1	39	2441	Sample 1	5.46	6.00	1.132	76.93	1.083	0.01	0.001	0.001