

Appendix E. 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



3. Verification output Power Results

Head exposure condition

Head exposure condition		Output Power for data connection	
Wireless Technology	Antenna	Measured (dBm)	Max. Tune-up (dBm)
LTE Band 42	Ant 9	22.85	23.3
FR1 n41	Ant 1	23.18	23.8

Head exposure condition		Output Power	
Wireless technology	Antenna	WWAN Off (Power Table 0)	
		Measured (dBm)	Target power(dBm) (Power Table 1)
802.11b 1Mbps CH6 (2.4G)	(Ant6+7)Ant 6	17.13	17.0 ±1.5
	(Ant6+7)Ant 7	17.14	17.0 ±1.5

Head exposure condition		Output Power	
Wireless technology	Antenna	WWAN Off (Power Table 0)	
		Measured (dBm)	Target power(dBm) (Power Table 1)
802.11a 6Mbps CH56 (5.3G)	(Ant6+7)Ant 6	15.56	17.0 ±1.5
	(Ant6+7)Ant 7	15.52	17.0 ±1.5

Head exposure condition		Output Power	
Wireless technology	Antenna	WWAN Off (Power Table 0)	
		Measured (dBm)	Target power(dBm) (Power Table 1)
802.11ax 40M CH3 (6G)	(Ant6+7)Ant 6	12.77	11.5 ±1.5
	(Ant6+7)Ant 7	12.75	11.5 ±1.5

Hotspot exposure condition

Hotspot exposure condition		Output Power for data connection	
Wireless Technology	Antenna	Measured (dBm)	Max. Tune-up (dBm) (DS1 3)
GSM1900 GPRS4TX Ch661	Ant 8	18.29	19.7
WCDMA II Ch9400	Ant 8	15.75	17.0
LTE Band 25 Ch26340	Ant 8	16.29	17.9
NR SA n25	Ant 8	16.79	18.2
FR1 n77 (27Q) PC3	Ant 9	10.82	12.8

Hotspot exposure condition		Output Power	
Wireless technology	Antenna	WWAN Off (Power Table 1)	
		Measured (dBm)	Target power(dBm) (Power Table 1)
802.11b 1Mbps CH6 (2.4G)	(Ant6+7)Ant 6	15.3	15.5 ±1.5
	(Ant6+7)Ant 7	15.4	15.5 ±1.5

Hotspot exposure condition		Output Power	
Wireless technology	Antenna	WWAN Off (Power Table 1)	
		Measured (dBm)	Target power(dBm) (Power Table 1)
802.11a 6Mbps CH40 (5.2G)	(Ant6+7)Ant 6	11.9	13.0 ±1.5
	(Ant6+7)Ant 7	12.0	13.0 ±1.5

Body worn exposure condition
Display on:

Body worn exposure condition		Output Power for data connection			
Sensor status		ON (DS11)		OFF (DS10)	
Wireless Technology	Antenna	Measured (dBm)	Max. Tune-up (dBm)	Measured (dBm)	Max. Tune-up (dBm)
GSM1900 GPRS4TX	Ant 8	25.78	27.3	29.18	30.0
WCDMA II	Ant 8	21.05	22.2	23.79	25.0
LTE Band 66 Ch132322	Ant 8	21.31	22.9	23.34	25.0
NR SA n25	Ant 8	20.92	22.3	23.67	25.0
FR1 n77 (27Q) PC3	Ant 9	15.07	17.0	22.42	24.3

Body exposure condition		Output Power (data connection)			
		G-Sensor status			
Power state		Sensor On (Power Table 2)		Sensor Off (CTL)	
Wireless technology	Antenna	Measured (dBm)	Target power(dBm)	Measured (dBm)	Target power(dBm)
802.11b 1Mbps CH6	(Ant6+7)Ant 6	15.2	15.5 ±1.5	17.12	17.5 ±1.5
	(Ant6+7)Ant 7	15.3	15.5 ±1.5	17.15	17.5 ±1.5
802.11a 6Mbps CH56	(Ant6+7)Ant 6	11.87	13.0 ±1.5	17.01	18.5 ±1.5
	(Ant6+7)Ant 7	11.96	13.0 ±1.5	17.05	18.5 ±1.5
802.11ax 40M CH3	(Ant6+7)Ant 6	5.56	7.0 ±1.5	14.05	15.5 ±1.5
	(Ant6+7)Ant 7	5.52	7.0 ±1.5	14.02	15.5 ±1.5

Display on to off:

Body worn exposure condition		Output Power for data connection			
Sensor status		ON (DS11)		OFF (DS11)	
Wireless Technology	Antenna	Measured (dBm)	Max. Tune-up (dBm)	Measured (dBm)	Max. Tune-up (dBm)
GSM1900 GPRS4TX	Ant 8	25.78	27.3	25.67	27.3
WCDMA II	Ant 8	21.02	22.2	21.06	22.2
LTE Band 66	Ant 8	21.30	22.9	21.34	22.9
NR SA n25	Ant 8	20.95	22.3	20.91	22.3
FR1 n77 (27Q) PC3	Ant 9	15.02	17.0	15.05	17.0

Body exposure condition		Output Power (data connection)			
		G-Sensor status			
Power state		Sensor On (Power Table 2)		Sensor Off (Power Table 2)	
Wireless technology	Antenna	Measured (dBm)	Target power(dBm)	Measured (dBm)	Target power(dBm)
802.11b 1Mbps CH6	(Ant6+7)Ant 6	15.3	15.5 ±1.5	15.3	15.5 ±1.5
	(Ant6+7)Ant 7	15.4	15.5 ±1.5	15.2	15.5 ±1.5
802.11a 6Mbps CH56	(Ant6+7)Ant 6	11.82	13.0 ±1.5	11.80	13.0 ±1.5
	(Ant6+7)Ant 7	11.98	13.0 ±1.5	11.92	13.0 ±1.5
802.11ax 40M CH3	(Ant6+7)Ant 6	5.51	7.0 ±1.5	5.55	7.0 ±1.5
	(Ant6+7)Ant 7	5.52	7.0 ±1.5	5.54	7.0 ±1.5

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

Body detect validation

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

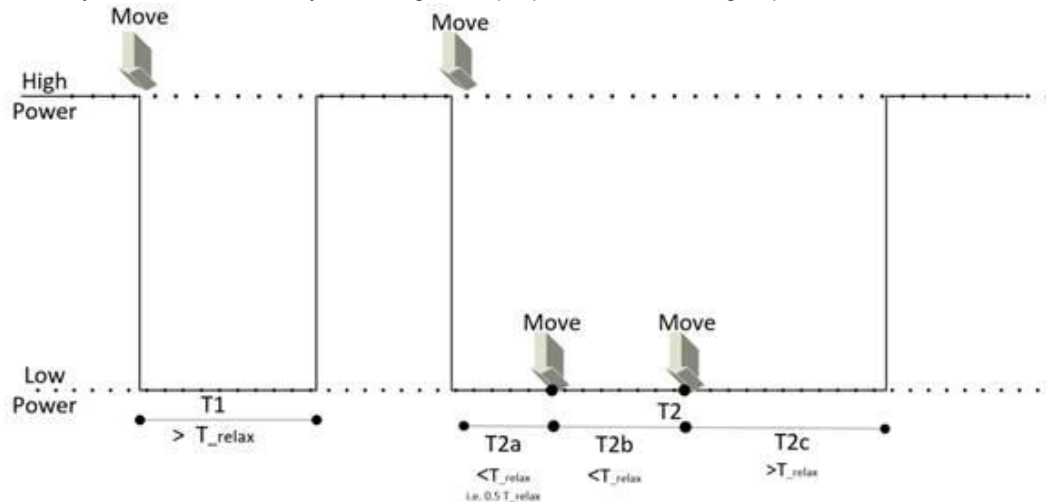


Figure 1 Illustration of the procedure for the validation of the power reduction

1. **Placed on a table:** Make the DUT transmit with the maximum output power by using a base station simulator.
 - a) 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.
 - b) Record P_{step1} (high power)
2. **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.
 - c) Record P_{step2} (low power)
3. For the validation of T_{relax} , wait a time period $T_1 > T_{relax}$ and confirm DUT restores to high power (P_{step1}).
4. Move the DUT to trigger the motion sensor.
5. 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		Stationary Placed on a table	
Power state		Full Power P_{step1}		Low Power P_{step2}		Full Power $P_{\text{step1}} \& T_1 > T_{\text{relax}}$		Low Power $P_{\text{step2}} \& T_{2a} < T_{\text{relax}}$		Low Power $P_{\text{step2}} \& T_{2b} < T_{\text{relax}}$		Full Power $P_{\text{step1}} \& T_{2c} > T_{\text{relax}}$	
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
GSM1900 4TX	Ant 8	29.17	30.0	25.76	27.3	29.15	30.0	25.74	27.3	25.69	27.3	29.13	30.0
WCDMA II	Ant 8	23.82	25.0	21.05	22.2	23.79	25.0	21.02	22.2	21.06	22.2	23.76	25.0
LTE Band 66	Ant 8	23.35	25.0	21.32	22.9	23.24	25.0	21.37	22.9	21.38	22.9	23.27	25.0
NR SA n25	Ant 8	23.57	25.0	20.95	22.3	23.67	25.0	20.92	22.3	20.94	22.3	23.56	25.0
FR1 n77 (27Q) PC3	Ant 9	22.43	24.3	15.02	17.0	22.42	24.3	15.07	17.0	15.04	17.0	22.43	24.3

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		Stationary Placed on a table	
Power state		Full Power P_{step1}		Low Power P_{step2}		Full Power $P_{\text{step1}} \& T_1 > T_{\text{relax}}$		Low Power $P_{\text{step2}} \& T_{2a} < T_{\text{relax}}$		Low Power $P_{\text{step2}} \& T_{2b} < T_{\text{relax}}$		Full Power $P_{\text{step1}} \& T_{2c} > T_{\text{relax}}$	
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 CH57	(Ant6+7) Ant 6	17.11	17.5 ±1.5	15.3	15.5 ±1.5	17.15	17.5 ±1.5	15.37	15.5 ±1.5	15.32	15.5 ±1.5	17.12	17.5 ±1.5
	(Ant6+7) Ant 7	17.32	17.5 ±1.5	15.4	15.5 ±1.5	17.44	17.5 ±1.5	15.41	15.5 ±1.5	15.42	15.5 ±1.5	17.5	17.5 ±1.5
802.11a 6Mbps CH57	(Ant6+7) Ant 6	17.05	18.5 ±1.5	11.80	13.0 ±1.5	17.04	18.5 ±1.5	11.82	13.0 ±1.5	11.81	13.0 ±1.5	17.02	18.5 ±1.5
	(Ant6+7) Ant 7	17.05	18.5 ±1.5	11.92	13.0 ±1.5	17.05	18.5 ±1.5	11.98	13.0 ±1.5	11.98	13.0 ±1.5	17.06	18.5 ±1.5
802.11a 6Mbps CH57	(Ant6+7) Ant 6	14.06	15.5 ±1.5	5.56	7.0 ±1.5	14.05	15.5 ±1.5	5.51	7.0 ±1.5	5.51	7.0 ±1.5	14.02	15.5 ±1.5
	(Ant6+7) Ant 7	14.02	15.5 ±1.5	5.51	7.0 ±1.5	14.02	15.5 ±1.5	5.54	7.0 ±1.5	5.53	7.0 ±1.5	14.08	15.5 ±1.5