

Power reduction mechanism verification

According to the May 2017 TCBC Workshop, Demonstration of proper functioning of the detection and triggering mechanisms is required 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

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.

General Note:

1. This device uses different Exposure Condition Index (ECI) to configure different time averaged power levels based on certain exposure scenarios, as the following table:

Exposure Condition	Main PA	Other PA	Other PA-1	Trigger conditions
Head SAR	ECI1	ECI1-1	ECI1-2	Earpiece On
Hotspot SAR	ECI5	ECI5-1	ECI5-2	Hotspot On
Body worn SAR	ECI4	ECI4-1	ECI4-2	Sensor Off/ receiver off
Body worn/Extremity SAR	ECI3	ECI3-1	ECI3-2	Sensor On

2. Select the bands with the largest power reduction for power verification:
 - a. Establish voice call and audio routed through the earpiece to monitor output power under head power states.
 - Tradition voice call for GSM/WCDMA, voice over IP CMRS operations for LTE/5G FR1
 - GSM850 is set to GPRS 4TX slot, LTE Band 42 is set at 'highest BW, 1RB, RB Offset = 0, QPSK', WCDMA II is set AMR 12.2Kbps, 5G FR1 n7 is set at highest BW, 1RB, RB offset = 1.
 - b. Establish data connection monitor hotspot power state.
 - GSM850 is set to GPRS 4TX slot, LTE Band 42 is set at 'highest BW, 1RB, RB Offset = 0, QPSK', WCDMA II is set RMC 12.2Kbps, 5G FR1 n7 is set at highest BW, 1RB, RB offset = 1.
 - c. Establish data connection monitor body worn/Extremity power state.
 - GSM850 is set to GPRS 4TX slot, LTE Band 7 is set at 'highest BW, 1RB, RB Offset = 0, QPSK', WCDMA II is set RMC 12.2Kbps, 5G FR1 n7 is set at highest BW, 1RB, RB offset = 1.
 - Body Detect mechanism was performed for the in-hand and on a stationary object (placed on a table)
3. In this power validation purpose is to demonstrate of proper functioning of the detection and triggering mechanisms to support the corresponding RF exposure conditions.
4. Verification performed for one technology/Band to demonstrate that the power reduction applies for same technology/band and call origination.

2. Verification output Power Results

Head exposure conditions

Head Exposure condition		Output Power for Voice Call			
Ear acoustic output Status:		ON		OFF	
Power state		WWAN ECI1		WWAN ECI4	
Wireless technology	Antenna	Measured (dBm)	Max. Tune-up (dBm)	Measured (dBm)	Max. Tune-up (dBm)
GSM850	Ant1	22.53	24.50	27.06	29.00
WCDMA II	Ant2	16.36	17.50	23.90	25.00
LTE Band 42	Ant6	15.94	16.50	25.21	26.00
FR1 n7	Ant2	17.35	17.70	25.38	25.70

Hotspot exposure condition

Hotspot exposure condition		Output Power for data connection			
Wifi Hotspot Status		ON		OFF	
Power state		WWAN ECI5		WWAN ECI4	
Wireless Technology	Antenna	Measured (dBm)	Max. Tune-up (dBm)	Measured (dBm)	Max. Tune-up (dBm)
GSM850	Ant1	22.36	24.00	27.06	29.00
WCDMA II	Ant2	16.36	17.50	23.90	25.00
LTE Band 42	Ant6	15.94	16.50	25.21	26.00
FR1 n7	Ant2	17.35	17.70	25.38	25.70

Body worn/Extremity exposure condition

Body worn exposure condition		Output Power (data connection)			
		sensor on		sensor off	
Power state		WWAN ECI3		WWAN ECI4	
Wireless Technology	Antenna	Measured (dBm)	Max. Tune-up (dBm)	Measured (dBm)	Max. Tune-up (dBm)
GSM850	Ant1	22.36	24.00	27.06	29.00
WCDMA II	Ant2	18.48	19.50	23.90	25.00
LTE Band 7	Ant2	17.79	18.20	25.08	25.70
FR1 n7	Ant2	18.35	18.70	25.38	25.70