

## 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:

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

| Exposure Condition                 | Measure Distance             | DSI    | Ant No.                                        | EUT Flip State       | Trigger conditions |
|------------------------------------|------------------------------|--------|------------------------------------------------|----------------------|--------------------|
| Head                               | touch&tilt 15deg             | DSI 2  | All ant                                        | Flip Open            | Earpiece On        |
| Body worn                          | 5 mm                         | DSI 3  | All ant                                        | Flip Open            | Sensor On          |
| Extremity                          | 0mm                          | DSI 5  | Ant2,Ant3,Ant4,Ant5, Ant6,Ant7,Ant8            | Flip Open            | Sensor On          |
| Extremity                          | 0mm                          | DSI 6  | Ant0,Ant1,Ant2,Ant4,Ant7,Ant8                  | Flip Open            | Sensor On          |
| Hotspot                            | 5 mm                         | DSI 7  | All ant                                        | Flip Open            | Hotspot on         |
| Extremity                          | 0mm                          | DSI 9  | Ant0,Ant1                                      | Flip Open            | Sensor On          |
| Body worn                          | 5 mm                         | DSI 10 | All ant (Handheld except Ant2,Ant4,Ant7,Ant8 ) | Flip Close           | Sensor On          |
| Hotspot                            | 5 mm                         | DSI 11 | All ant                                        | Flip Close           | Hotspot on         |
| Extremity                          | 0mm                          | DSI 10 | All ant (Handheld except Ant2,Ant4,Ant7,Ant8 ) | Flip Close           | Sensor On          |
| Extremity                          | 0mm                          | DSI 12 | Ant2,Ant4,Ant7,Ant8                            | Flip Close           | Sensor On          |
| Body Worn / Extremity / Sensor Off | Sensor Trigger Distance -1mm | DSI 4  | All ant                                        | Flip Open/Flip Close | Sensor Off         |

1. 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 transmitting power states.
    - Tradition voice call for GSM/WCDMA, voice over IP CMRS operations for LTE/5G FR1
    - GSM1900 is set to GPRS 3TX slot, LTE Band 41 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.
    - <Flip Open >
      - GSM1900 is set to GPRS 3TX slot, LTE Band 41 is set at 'highest BW, 1RB, RB Offset = 0, QPSK', WCDMA II is set RMC 12.2Kbps, 5G FR1 n2 is set at highest BW, 1RB, RB offset = 1.
    - <Flip Close >
      - GSM1900 is set to GPRS 3TX slot, LTE Band 41 is set at 'highest BW, 1RB, RB Offset = 0, QPSK', WCDMA II is set RMC 12.2Kbps, 5G FR1 n2 is set at highest BW, 1RB, RB offset = 1.
  - c. Establish data connection monitor body worn power state.
    - <Flip Open >
      - GSM1900 is set to GPRS 3TX slot, LTE Band 41 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)
    - <Flip Close >
      - GSM1900 is set to GPRS 3TX slot, LTE Band 41 is set at 'highest BW, 1RB, RB Offset = 0, QPSK', WCDMA II is set RMC 12.2Kbps, 5G FR1 n41 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)
  - d. Establish data connection monitor extremity power state.
    - LTE Band 7 is set at 'highest BW, 1RB, RB Offset = 0, QPSK', 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).

2. In this power validation purpose is to demonstrate of proper functioning of the detection and triggering mechanisms to support the corresponding RF exposure conditions.
3. 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

| Ear acoustic output Status: |         | OFF            |                    | ON             |                    |
|-----------------------------|---------|----------------|--------------------|----------------|--------------------|
| Power state                 |         | WWAN DSI4      |                    | WWAN DSI2      |                    |
| Wireless technology         | Antenna | Measured (dBm) | Max. Tune-up (dBm) | Measured (dBm) | Max. Tune-up (dBm) |
| GSM1900 (GPRS 3 TX slots)   | Ant 2   | 25.02          | 25.8               | 22.31          | 23.3               |
| WCDMA II                    | Ant 2   | 23.55          | 24                 | 18.06          | 18.9               |
| LTE Band 41(PC2)            | Ant 3   | 26.05          | 27                 | 17.62          | 18.4               |
| FR1 N7                      | Ant 2   | 23.31          | 24                 | 16.35          | 17                 |

### Hotspot exposure condition

#### <Flip Open >

| Flip Open Hotspot output Status: |         | OFF            |                    | ON             |                    |
|----------------------------------|---------|----------------|--------------------|----------------|--------------------|
| Power state                      |         | WWAN DSI4      |                    | WWAN DSI7      |                    |
| Wireless technology              | Antenna | Measured (dBm) | Max. Tune-up (dBm) | Measured (dBm) | Max. Tune-up (dBm) |
| GSM1900 (GPRS 3 TX slots)        | Ant 2   | 25.02          | 25.8               | 21.78          | 23                 |
| WCDMA II                         | Ant 2   | 23.55          | 24                 | 19.11          | 19.7               |
| LTE Band 41(PC2)                 | Ant 3   | 26.05          | 27                 | 18.11          | 19.2               |
| FR1 N2                           | Ant 2   | 23.17          | 24                 | 16.61          | 17.5               |

#### <Flip Close >

| Flip Close Hotspot output Status: |         | OFF            |                    | ON             |                    |
|-----------------------------------|---------|----------------|--------------------|----------------|--------------------|
| Power state                       |         | WWAN DSI4      |                    | WWAN DSI11     |                    |
| Wireless technology               | Antenna | Measured (dBm) | Max. Tune-up (dBm) | Measured (dBm) | Max. Tune-up (dBm) |
| GSM1900 (GPRS 3 TX slots)         | Ant 2   | 25.02          | 25.8               | 22.09          | 23.1               |
| WCDMA II                          | Ant 2   | 23.55          | 24                 | 18.72          | 19.5               |
| LTE Band 41                       | Ant 3   | 26.05          | 27                 | 19.43          | 20.5               |
| FR1 N2                            | Ant 2   | 23.17          | 24                 | 16.61          | 17.5               |

## Body worn exposure condition

<Flip Open >

| Flip Open Sensor output Status: |         | OFF            |                    | ON             |                    |
|---------------------------------|---------|----------------|--------------------|----------------|--------------------|
| Power state                     |         | WWAN DSI4      |                    | WWAN DSI3      |                    |
| Wireless technology             | Antenna | Measured (dBm) | Max. Tune-up (dBm) | Measured (dBm) | Max. Tune-up (dBm) |
| GSM1900 (GPRS 3 TX slots)       | Ant 2   | 25.02          | 25.8               | 24.15          | 25.3               |
| WCDMA II                        | Ant 2   | 23.55          | 24                 | 21.23          | 22.1               |
| LTE Band 41(PC2)                | Ant 3   | 26.05          | 27                 | 21.5           | 22.4               |
| FR1 N7                          | Ant 3   | 22.87          | 24                 | 18.43          | 19.5               |

<Flip Close >

| Flip Close Sensor output Status: |         | OFF            |                    | ON             |                    |
|----------------------------------|---------|----------------|--------------------|----------------|--------------------|
| Power state                      |         | WWAN DSI4      |                    | WWAN DSI10     |                    |
| Wireless technology              | Antenna | Measured (dBm) | Max. Tune-up (dBm) | Measured (dBm) | Max. Tune-up (dBm) |
| WCDMA II                         | Ant 2   | 23.55          | 24                 | 22.05          | 22.5               |
| LTE Band 41(PC2)                 | Ant 3   | 26.05          | 27                 | 22.55          | 23.6               |
| FR1 N41(PC3)                     | Ant 2   | 26.16          | 27                 | 19.36          | 20                 |

## Extremity exposure condition

<Flip Open >

| Flip Open Sensor output Status: |         | OFF            |                    | ON             |                    |
|---------------------------------|---------|----------------|--------------------|----------------|--------------------|
| Power state                     |         | WWAN DSI4      |                    | WWAN DSI5      |                    |
| Wireless technology             | Antenna | Measured (dBm) | Max. Tune-up (dBm) | Measured (dBm) | Max. Tune-up (dBm) |
| LTE Band 7                      | Ant 3   | 22.87          | 24                 | 19.04          | 20.5               |
| FR1 N7                          | Ant 3   | 22.87          | 24                 | 20.45          | 21.5               |

| Flip Open Sensor output Status: |         | OFF            |                    | ON             |                    |
|---------------------------------|---------|----------------|--------------------|----------------|--------------------|
| Power state                     |         | WWAN DSI4      |                    | WWAN DSI6      |                    |
| Wireless technology             | Antenna | Measured (dBm) | Max. Tune-up (dBm) | Measured (dBm) | Max. Tune-up (dBm) |
| LTE Band 7                      | Ant 2   | 23.3           | 24                 | 22.02          | 22.7               |
| FR1 N7                          | Ant 1   | 23.18          | 24                 | 22.7           | 23.5               |

| Flip Open Sensor output Status: |         | OFF            |                    | ON             |                    |
|---------------------------------|---------|----------------|--------------------|----------------|--------------------|
| Power state                     |         | WWAN DSI4      |                    | WWAN DSI9      |                    |
| Wireless technology             | Antenna | Measured (dBm) | Max. Tune-up (dBm) | Measured (dBm) | Max. Tune-up (dBm) |
| LTE Band 7                      | Ant 1   | 23.15          | 24                 | 22.07          | 23.1               |
| FR1 N7                          | Ant 1   | 23.18          | 24                 | 22.7           | 23.5               |



### 3. Angle Verification Results

The angle verification procedure was performed according to the following procedure:

1. For licensed 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 Hall sensor mechanism triggers, per the FCC TCB Workshop Slides from November 2019. The triggering conditions of the angles were sufficient such that all possible user scenarios with the device in open/closed condition are in the different power state, the angle Verification data as following tables.

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