

## **SAR EVALUATION REPORT**

**FCC 47 CFR § 2.1093  
IEEE Std. 1528-2013**

**For  
WisePOS Pro, 7MD**

**FCC ID: 2AB7X-WSP7V1**

**Model Name: WSP74, WSP75, WSP76**

**Report Number: 4791364876-1-SAR-1  
Issue Date: August 15, 2024**

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**Revision History**

| Rev. | Date            | Revisions     | Revised By |
|------|-----------------|---------------|------------|
| V1.0 | August 15, 2024 | Initial Issue | \          |
|      |                 |               |            |
|      |                 |               |            |

**Note:**

1. The Measurement result for the sample received is<Pass> according to < IEEE Std. 1528-2013> when < Simple Acceptance > decision rule is applied.
2. This report is only published to and used by the applicant, and it is not for evidence purpose in China.

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## 1. Attestation of Test Results

|  |   |   |            |            |
|--|---|---|------------|------------|
| Applicant Name   | BBPOS Limited   |   |            |            |
| Address  | 15F, Tower 2, Nina Tower, 8 Yeung Uk Road, Tsuen Wan, NT, HK  |   |            |            |
| Manufacturer   | BBPOS Limited   |   |            |            |
| Address  | 15F, Tower 2, Nina Tower, 8 Yeung Uk Road, Tsuen Wan, NT, HK  |   |            |            |
| EUT Name   | WisePOS Pro, 7MD  |   |            |            |
| Model  | WSP74   |   |            |            |
| Serial model   | WSP75, WSP76  |   |            |            |
| Model Difference   | WSP74 is the product without accessory, WSP75 is the product with hand strap, WSP76 is the product with pistol grip |   |            |            |
| Sample Status  | Normal  |   |            |            |
| Sample Received Date   | July 13, 2024   |   |            |            |
| Date of Tested   | July 18, 2024 ~ August 7, 2024  |   |            |            |
| Applicable Standards   | FCC 47 CFR § 2.1093<br>IEEE Std. 1528-2013<br>KDB publications  |   |            |            |
| <b>SAR Limits (W/Kg)</b>   |   |   |            |            |
| Exposure Category  | Peak spatial-average<br>(1g of tissue)  | Extremities (hands, wrists, ankles, etc.)<br>(10g of tissue)            |            |            |
| General population /<br>Uncontrolled exposure                    | 1.6   | 4   |            |            |
| Occupational / Controlled exposure                               | 8   | 20  |            |            |
| <b>The Highest Reported SAR (W/kg)</b>                           |   |   |            |            |
| <b>RF Exposure Conditions</b>                                    | <b>Equipment Class</b>  |   |            |            |
|  | <b>PCB</b>  | <b>DTS</b>  | <b>NII</b> | <b>DSS</b> |
| Body (0mm)   | 1.098   | 0.393   | 1.191      | 0.221      |
| Simultaneous Transmission (1-g)                                  | 1.443   |   |            |            |
| Test Results   | Pass  |   |            |            |
| Prepared By:<br><i>Burt Hu</i><br>Burt Hu<br>Laboratory Engineer | Reviewed By:<br><i>kebo.zhang</i><br>Kebo Zhang<br>Senior Project Engineer  | Approved By:<br><i>Stephen Guo</i><br>Stephen Guo<br>Laboratory Manager |            |            |

## 2. Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with IEEE Std.1528-2013, the following FCC Published RF exposure KDB procedures:

- 248227 D01 802.11 Wi-Fi SAR v02
- 447498 D01 General RF Exposure Guidance v06
- 690783 D01 SAR Listings on Grants v01
- 865664 D01 SAR measurement 100 MHz to 6 GHz v01
- 865664 D02 RF Exposure Reporting v01
- 941225 D01 3G SAR Procedures v03
- 941225 D05 SAR for LTE Devices v02
- 616217 D04 SAR for laptop and tablets v01r02

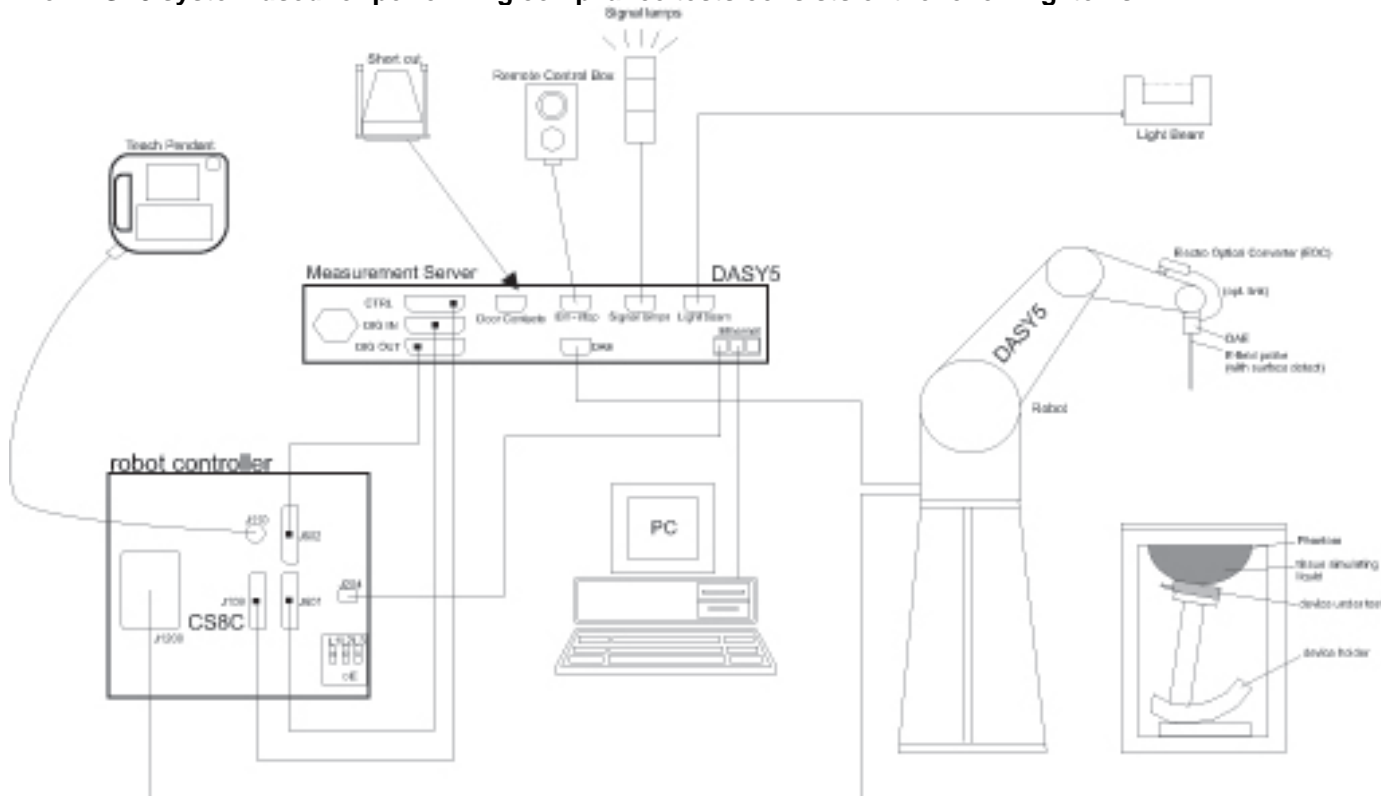
### 3. Facilities and Accreditation

|                           |   |
|---------------------------|---|
| Test Location             | UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch.   |
| Address                   | Building 10, Innovation Technology Park, Song Shan Lake Hi-tech Development Zone, Dongguan, 523808, China   |
| Accreditation Certificate | <p><b>A2LA (Certificate No.: 4102.01)</b><br/>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with A2LA.</p> <p><b>FCC (FCC Designation No.: CN1187)</b><br/>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules.</p> <p><b>ISED (Company No.: 21320)</b><br/>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been registered and fully described in a report filed with ISED. The Company Number is 21320 and the test lab Conformity Assessment Body Identifier (CABID) is CN0046.</p> <p><b>VCCI (Registration No.: G-20192, C-20153, T-20155 and R-20202)</b><br/>UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with VCCI, the Membership No. is 3793.<br/>Facility Name:<br/>Chamber D, the VCCI registration No. is G-20192 and R-20202.<br/>Shielding Room B, the VCCI registration No. is C-20153 and T-20155.</p> |
| Description               | All measurement facilities use to collect the measurement data are located at Building 10, Innovation Technology Park, Song Shan Lake Hi-tech Development Zone, Dongguan, 523808, China.  |

## 4. SAR Measurement System & Test Equipment

### 4.1. SAR Measurement System

The DASY5 system used for performing compliance tests consists of the following items:



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Win7 and the DASY52 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.



## 4.2. SAR Scan Procedures

### Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 2.1 mm. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

### Step 2: Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE Standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan). If only one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of Zoom Scans has to be increased accordingly.

Area Scan Parameters extracted from KDB 865664 D01 v01r04 SAR Measurement 100 MHz to 6 GHz

|  | $\leq 3$ GHz   | $> 3$ GHz   |
|--|--|---|
| Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface | 5 mm $\pm$ 1 mm  | $\frac{1}{2} \cdot \delta \cdot \ln(2)$ mm $\pm$ 0.5 mm |
| Maximum probe angle from probe axis to phantom surface normal at the measurement location              | 30° $\pm$ 1°   | 20° $\pm$ 1°  |
| Maximum area scan spatial resolution: $\Delta x_{\text{Area}}$ , $\Delta y_{\text{Area}}$              | $\leq 2$ GHz: $\leq 15$ mm<br>2 – 3 GHz: $\leq 12$ mm  | 3 – 4 GHz: $\leq 12$ mm<br>4 – 6 GHz: $\leq 10$ mm      |
|  | When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device. |   |

### Step 3: Zoom Scan

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures points (refer to table below) within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 g and 10 g and displays these values next to the job's label.

Zoom Scan Parameters extracted from KDB 865664 D01 v01r04 SAR Measurement 100 MHz to 6 GHz

|  |   |   |   |   |
|--|---|---|---|---|
| Maximum zoom scan spatial resolution: $\Delta x_{\text{Zoom}}, \Delta y_{\text{Zoom}}$ |   |   | $\leq 2 \text{ GHz}: \leq 8 \text{ mm}$<br>$2 - 3 \text{ GHz}: \leq 5 \text{ mm}^*$ | $3 - 4 \text{ GHz}: \leq 5 \text{ mm}^*$<br>$4 - 6 \text{ GHz}: \leq 4 \text{ mm}^*$  |
| Maximum zoom scan spatial resolution, normal to phantom surface                        | uniform grid: $\Delta z_{\text{Zoom}}(n)$ |   | $\leq 5 \text{ mm}$   | $3 - 4 \text{ GHz}: \leq 4 \text{ mm}$<br>$4 - 5 \text{ GHz}: \leq 3 \text{ mm}$<br>$5 - 6 \text{ GHz}: \leq 2 \text{ mm}$    |
|  | graded grid                               | $\Delta z_{\text{Zoom}}(1)$ : between 1 <sup>st</sup> two points closest to phantom surface | $\leq 4 \text{ mm}$   | $3 - 4 \text{ GHz}: \leq 3 \text{ mm}$<br>$4 - 5 \text{ GHz}: \leq 2.5 \text{ mm}$<br>$5 - 6 \text{ GHz}: \leq 2 \text{ mm}$  |
|  |   | $\Delta z_{\text{Zoom}}(n>1)$ : between subsequent points                                   | $\leq 1.5 \cdot \Delta z_{\text{Zoom}}(n-1) \text{ mm}$                             |   |
| Minimum zoom scan volume   | x, y, z                                   |   | $\geq 30 \text{ mm}$  | $3 - 4 \text{ GHz}: \geq 28 \text{ mm}$<br>$4 - 5 \text{ GHz}: \geq 25 \text{ mm}$<br>$5 - 6 \text{ GHz}: \geq 22 \text{ mm}$ |

### Step 4: Power drift measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

### Step 5: Z-Scan (FCC only)

The Z Scan measures points along a vertical straight line. The line runs along the Z-axis of a one-dimensional grid. In order to get a reasonable extrapolation the extrapolated distance should not be greater than the step size in Z-direction.

### 4.3. Test Equipment

The measuring equipment used to perform the tests documented in this report has been calibrated in accordance with the manufacturers' recommendations and is traceable to recognized national standards.

| Name of equipment             | Manufacturer         | Type/Model             | Serial No. | Cal. Due Date |
|-------------------------------|----------------------|------------------------|------------|---------------|
| ENA Network Analyzer          | Keysight             | E5080A                 | MY55100583 | 2024.10.11    |
| Dielectric Probe kit          | SPEAG                | SM DAK 040 SA          | 1155       | 2025.02.27    |
| DC power supply               | Keysight             | E36103A                | MY55350020 | 2024.10.11    |
| Signal Generator              | Rohde & Schwarz      | SME06                  | 837633\001 | 2024.08.06    |
| Signal Generator              | Rohde & Schwarz      | SMB100A                | 178553     | 2024.10.11    |
| BI-Directional Coupler        | KRYTAR               | 1850                   | 54733      | 2024.10.11    |
| Peak and Average Power Sensor | Keysight             | E9325A                 | MY62220002 | 2024.10.11    |
| Peak and Average Power Sensor | Keysight             | E9325A                 | MY62220003 | 2024.10.11    |
| Dual Channel PK Power Meter   | Keysight             | N1912A                 | MY55416024 | 2024.10.11    |
| Amplifier                     | CORAD TECHNOLOGY LTD | AMF-4D-00400600-50-30P | 1983561    | NCR           |
| Dosimetric E-Field Probe      | SPEAG                | EX3DV4                 | 7733       | 2025.02.20    |
| Data Acquisition Electronic   | SPEAG                | DAE4                   | 1739       | 2025.01.22    |
| Dipole Kit 750 MHz            | SPEAG                | D750V3                 | 1153       | 2024.12.14    |
| Dipole Kit 835 MHz            | SPEAG                | D835V2                 | 4d206      | 2024.12.16    |
| Dipole Kit 1800 MHz           | SPEAG                | D1800V2                | 2d212      | 2024.12.20    |
| Dipole Kit 1900 MHz           | SPEAG                | D1900V2                | 5d212      | 2024.12.19    |
| Dipole Kit 2300 MHz           | SPEAG                | D2300V2                | 1065       | 2024.12.20    |
| Dipole Kit 2450 MHz           | SPEAG                | D2450V2                | 977        | 2024.12.16    |
| Dipole Kit 2600 MHz           | SPEAG                | D2600V2                | 1117       | 2024.12.19    |
| Dipole Kit 5 GHz              | SPEAG                | D5GHzV2                | 1231       | 2024.12.15    |
| Software                      | SPEAG                | DASY52                 | N/A        | NCR           |
| Twin Phantom                  | SPEAG                | SAM 5.0                | 1805       | NCR           |
| Thermometer                   | /                    | GX-138                 | 150709653  | 2024.10.18    |
| Thermometer                   | VICTOR               | ITHX-SD-5              | 18470005   | 2024.10.18    |

**Note:**

1) Per KDB865664D01 v01r04 requirements for dipole calibration, the test laboratory has adopted three-year extended calibration interval. Each measured dipole is expected to evaluate with the following criteria at least on annual interval in Appendix C.

- There is no physical damage on the dipole;
- System check with specific dipole is within 10% of calibrated value;
- The most recent return-loss result, measured at least annually, deviates by no more than 20% from the previous measurement.
- The most recent measurement of the real or imaginary parts of the impedance, measured at least annually is within 5Ω from the previous measurement.

2) Network analyzer probe calibration against air, distilled water and a shorting block performed before measuring liquid parameters.

## 5. Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is  $< 1.5$  W/kg and the measured 10-g SAR within a frequency band is  $< 3.75$  W/kg. The expanded SAR measurement uncertainty must be  $\leq 30\%$ , for a confidence interval of  $k=2$ . If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std. 1528-2013 is not required in SAR reports submitted for equipment approval. Therefore, the measurement uncertainty is not required.

## 6. Device Under Test (DUT) Information

### 6.1. DUT Description

The DUT is a WisePOS Pro with GSM/WCDMA/LTE/IEEE 802.11a/b/g/n/ac and Bluetooth, NFC radio.

|           |  |
|-----------|--|
| Dimension | Overall (Length x Width x Height): 200 mm x 115 mm x 26 mm |
|-----------|--|

### 6.2. Wireless Technology

| Wireless technologies | Frequency bands  | Operating mode   |  |
|-----------------------|--|--|--|
| GSM                   | 850<br>1900  | <input type="checkbox"/> Voice (GMSK)<br><input checked="" type="checkbox"/> GPRS (GMSK)<br><input checked="" type="checkbox"/> EGPRS (8PSK)   | GPRS Multi-Slot Class:<br><input type="checkbox"/> Class 8 - 1 Up, 4 Down<br><input type="checkbox"/> Class 10 - 2 Up, 4 Down<br><input checked="" type="checkbox"/> Class 12 - 4 Up, 4 Down<br><input type="checkbox"/> Class 33 - 4 Up, 5 Down |
|                       |  | Does this device support DTM (Dual Transfer Mode)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No   |  |
| WCDMA (UMTS)          | Band II<br>Band IV<br>Band V   | <input checked="" type="checkbox"/> UMTS Rel. 99 (Voice & Data)<br><input checked="" type="checkbox"/> HSDPA (Rel. 5)<br><input checked="" type="checkbox"/> HSUPA (Rel. 6)<br><input type="checkbox"/> DC-HSDPA (Rel. 8)<br><input type="checkbox"/> HSPA+ (Rel. 7)   |  |
| LTE                   | FDD Band2<br>FDD Band4<br>FDD Band5<br>FDD Band7<br>FDD Band12<br>FDD Band17<br>TDD Band38<br>TDD Band40<br>TDD Band41 | QPSK<br>16QAM<br><input type="checkbox"/> Rel. 10 Does not support Carrier Aggregation (CA)<br><input checked="" type="checkbox"/> Rel. 10 Carrier Aggregation (Downlink only)<br><input type="checkbox"/> Rel. 11 Carrier Aggregation (2 Uplink and 2 Downlinks)  |  |
| Wi-Fi                 | 2.4GHz   | <input checked="" type="checkbox"/> 802.11b<br><input checked="" type="checkbox"/> 802.11g<br><input checked="" type="checkbox"/> 802.11n (HT20)<br><input checked="" type="checkbox"/> 802.11n (HT40)<br><input type="checkbox"/> 802.11ax (HE20)<br><input type="checkbox"/> 802.11ax (HE40)   |  |
| Wi-Fi                 | 5GHz   | <input checked="" type="checkbox"/> 802.11a<br><input checked="" type="checkbox"/> 802.11n (HT20)<br><input checked="" type="checkbox"/> 802.11n (HT40)<br><input checked="" type="checkbox"/> 802.11ac (VHT20)<br><input checked="" type="checkbox"/> 802.11ac (VHT40)<br><input type="checkbox"/> 802.11ac (VHT80)<br><input type="checkbox"/> 802.11ax (HE20)<br><input type="checkbox"/> 802.11ax (HE40)<br><input type="checkbox"/> 802.11ax (HE80) |  |
| BT/BLE                | 2.4GHz   | V5.0   |  |
| NFC                   | 13.56MHz   | ASK  |  |

## 7. Test Configuration

### 7.1. 3G SAR Test Reduction Procedure

According to KDB 941225D01, in the following procedures, the mode tested for SAR is referred to as the primary mode. The equivalent modes considered for SAR test reduction are denoted as secondary modes. Both primary and secondary modes must be in the same frequency band. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is  $\leq \frac{1}{4}$  dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is  $\leq 1.2$  W/kg, SAR measurement is not required for the secondary mode. This is referred to as the 3G SAR test reduction procedure in the following SAR test guidance, where the primary mode is identified in the applicable wireless mode test procedures and the secondary mode is wireless mode being considered for SAR test reduction by that procedure. When the 3G SAR test reduction procedure is not satisfied, it is identified as “otherwise” in the applicable procedures; SAR measurement is required for the secondary mode.

#### 7.1.1. GSM Test Configuration

SAR tests for GSM 850 and GSM 1900, a communication link is set up with a base station by air link. Using CMW500 the power lever is set to “5” and “0” in SAR of GSM 850 and GSM 1900. The tests in the band of GSM 850 and GSM 1900 are performed in the mode of GPRS/EGPRS function. Since the GPRS class is 12 for this EUT, it has at most 4 timeslots in uplink and at most 4 timeslots in downlink, the maximum total timeslot is 5. The EGPRS class is 12 for this EUT, it has at most 4 timeslots in uplink, and at most 4 timeslots in downlink, the maximum total timeslot is 5.

SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power specified for production units, including tune-up tolerance. The data mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested.

When SAR tests for EGPRS mode is necessary, GMSK modulation should be used to minimize SAR measurement error due to higher peak-to-average power (PAR) ratios inherent in 8-PSK.

The 3G SAR test reduction procedure is applied to 8-PSK EDGE with GMSK GPRS/EDGE as the primary mode

## 7.1.2. UMTS Test Configuration

### 1. Output Power Verification

Maximum output power is verified on the High, Middle and Low channels according to the procedures description in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC (transmit power control) set to all "1s" for WCDMA/HSDPA or applying the required inner loop power control procedure to maintain maximum output power while HSUPA is active. Result for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HSDPA, HSPA) Should be tabulated in the SAR report. All configuration that are not supported by the DUT or cannot be measured due to technical or equipment limitation should be clearly identified.

### 2. WCDMA

#### Body SAR Measurements

SAR for body-worn accessory configurations is measured using a 12.2 kbps RMC with TPC bits configured to all "1s". The 3G SAR test reduction procedure is applied to other spreading codes and multiple DPDCHn configurations supported by the handset with 12.2 kbps RMC as the primary mode.

### 3. HSDPA

SAR for body exposure configurations is measured according to the "Body SAR Measurements" procedures of 3G device. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is  $\leq \frac{1}{4}$  dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is  $\leq 1.2$  W/kg, SAR measurement is not required for the secondary mode. This is referred to as the 3G SAR test reduction procedure in the following SAR test guidance, where the primary mode is identified in the applicable wireless mode test procedures and the secondary mode is wireless mode being considered for SAR test reduction by that procedure. When the 3G SAR test reduction procedure is not satisfied, it is identified as "otherwise" in the applicable procedures; SAR measurement is required for the secondary mode.

As per KDB941225 D01, the 3G SAR test reduction procedure is applied to HSDPA body configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for HSDPA using the HSDPA body SAR procedures for the highest reported SAR body exposure configuration in 12.2 kbps RMC.

HSDPA should be configured according to UE category of a test device. The number of HS-DSCH/HS-PDSCHs, HAPRQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the H-set. To maintain a consistent test configuration and stable transmission condition, QPSK is used in the H-set for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 4ms with a CQI repetition factor of 2 to maintain a constant rate of active CQI slots. The  $\beta_c$  and  $\beta_d$  gain factors for DPCCH and DPDCH were set according to the values in the below table,  $\beta_{hs}$  for HS-DPCCH is set automatically to the correct value when  $\Delta ACK$ ,  $\Delta NACK$ ,  $\Delta CQI = 8$ . The variation of the  $\beta_c / \beta_d$  ratio causes a power reduction at sub-tests 2 - 4.

| Sub-test <sup>o</sup>   | $\beta_c$ <sup>o</sup> | $\beta_d$ <sup>o</sup> | $\beta_d$ (SF) <sup>o</sup> | $\beta_c / \beta_d$ <sup>o</sup> | $\beta_{hs} (1)$ <sup>o</sup> | CM(dB)(2) <sup>o</sup> | MPR (dB) <sup>o</sup> |
|---|------------------------|------------------------|-----------------------------|----------------------------------|-------------------------------|------------------------|-----------------------|
| 1 <sup>o</sup>  | 2/15 <sup>o</sup>      | 15/15 <sup>o</sup>     | 64 <sup>o</sup>             | 2/15 <sup>o</sup>                | 4/15 <sup>o</sup>             | 0.0 <sup>o</sup>       | 0 <sup>o</sup>        |
| 2 <sup>o</sup>  | 12/15(3) <sup>o</sup>  | 15/15(3) <sup>o</sup>  | 64 <sup>o</sup>             | 12/15(3) <sup>o</sup>            | 24/15 <sup>o</sup>            | 1.0 <sup>o</sup>       | 0 <sup>o</sup>        |
| 3 <sup>o</sup>  | 15/15 <sup>o</sup>     | 8/15 <sup>o</sup>      | 64 <sup>o</sup>             | 15/8 <sup>o</sup>                | 30/15 <sup>o</sup>            | 1.5 <sup>o</sup>       | 0.5 <sup>o</sup>      |
| 4 <sup>o</sup>  | 15/15 <sup>o</sup>     | 4/15 <sup>o</sup>      | 64 <sup>o</sup>             | 15/4 <sup>o</sup>                | 30/15 <sup>o</sup>            | 1.5 <sup>o</sup>       | 0.5 <sup>o</sup>      |
| Note 1: $\Delta ACK$ , $\Delta NACK$ and $\Delta CQI = 8$ $A_{hs} = \beta_{hs} / \beta_c = 30/15$ $\beta_{hs} = 30/15 * \beta_c$<br>Note 2 : CM=1 for $\beta_c / \beta_{hs} = 12/15$ , $\beta_{hs} / \beta_c = 24/15$ . For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.<br>Note 3 : For subtest 2 the $\beta_c / \beta_d$ ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 11/15$ and $\beta_d = 15/15$ |                        |                        |                             |                                  |                               |                        |                       |



The measurements were performed with a Fixed Reference Channel (FRC) and H-Set 1 QPSK. Settings of required H-Set 1 QPSK acc. to 3GPP 34.121

| Parameter                        | Value       |
|----------------------------------|-------------|
| Nominal average inf. bit rate    | 534 kbit/s  |
| Inter-TTI Distance               | 3 TTI"s     |
| Number of HARQ Processes         | 2 Processes |
| Information Bit Payload          | 3202 Bits   |
| MAC-d PDU size                   | 336 Bits    |
| Number Code Blocks               | 1 Block     |
| Binary Channel Bits Per TTI      | 4800 Bits   |
| Total Available SMLs in UE       | 19200 SMLs  |
| Number of SMLs per HARQ Process  | 9600 SMLs   |
| Coding Rate                      | 0.67        |
| Number of Physical Channel Codes | 5           |

#### HSDPA UE category

| HS-DSCH Category | Maximum HS-DSCH Codes Received | Minimum Inter-TTI Interval | Maximum HS-DSCH Transport Block Bits/HS-DSCH TTI | Total Soft Channel Bits |
|------------------|--------------------------------|----------------------------|--|-------------------------|
| 1                | 5                              | 3                          | 7298   | 19200                   |
| 2                | 5                              | 3                          | 7298   | 28800                   |
| 3                | 5                              | 2                          | 7298   | 28800                   |
| 4                | 5                              | 2                          | 7298   | 38400                   |
| 5                | 5                              | 1                          | 7298   | 57600                   |
| 6                | 5                              | 1                          | 7298   | 67200                   |
| 7                | 10                             | 1                          | 14411  | 115200                  |
| 8                | 10                             | 1                          | 14411  | 134400                  |
| 9                | 15                             | 1                          | 25251  | 172800                  |
| 10               | 15                             | 1                          | 27952  | 172800                  |
| 11               | 5                              | 2                          | 3630   | 14400                   |
| 12               | 5                              | 1                          | 3630   | 28800                   |
| 13               | 15                             | 1                          | 34800  | 259200                  |
| 14               | 15                             | 1                          | 42196  | 259200                  |
| 15               | 15                             | 1                          | 23370  | 345600                  |
| 16               | 15                             | 1                          | 27952  | 345600                  |

#### 4. HSUPA

SAR for body exposure configurations is measured according to the "Body SAR Measurements" procedures of 3G device. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is  $\leq \frac{1}{4}$  dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is  $\leq 1.2$  W/kg, SAR measurement is not required for the secondary mode.

As per KDB941225 D01v03, the 3G SAR test reduction procedure is applied to HSPA (HSUPA/HSDPA with RMC) body configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for HSPA using the HSPA body SAR procedures for the highest reported body exposure SAR configuration in 12.2 kbps RMC.

Due to inner loop power control requirements in HSDPA, a commercial communication test set should be used for the output power and SAR tests. The 12.2 kbps RMC, FRC H-set 1 and E-DCH configurations for HSDPA should be configured according to the values indicated below as well as other applicable procedures described in the „WCDMA Handset" and „Release 5 HSDPA Data Device" sections of 3G device.

Subtests for WCDMA Release 6 HSUPA



| Sub-test <sup>⌘</sup>  | $\beta_c$ <sup>⌘</sup>            | $\beta_d$ <sup>⌘</sup>            | $\beta_d$ (SF) <sup>⌘</sup> | $\beta_c/\beta_d$ <sup>⌘</sup>    | $\beta_{hs}^{(1)}$ <sup>⌘</sup> | $\beta_{ec}$ <sup>⌘</sup> | $\beta_{ed}$ <sup>⌘</sup>  | $\beta_{ec}$ <sup>⌘</sup> (SF) <sup>⌘</sup> | $\beta_{ed}$ <sup>⌘</sup> (code) <sup>⌘</sup> | CM <sup>(2)</sup> <sup>⌘</sup> (dB) <sup>⌘</sup> | MP R <sup>⌘</sup> (dB) <sup>⌘</sup> | AG <sup>(4)</sup> <sup>⌘</sup> Inde <sup>⌘</sup> x <sup>⌘</sup> | E-TFC I <sup>⌘</sup> |
|--|-----------------------------------|-----------------------------------|-----------------------------|-----------------------------------|---------------------------------|---------------------------|--|---|---|--|-------------------------------------|---|----------------------|
| 1 <sup>⌘</sup>   | 11/15 <sup>(3)</sup> <sup>⌘</sup> | 15/15 <sup>(3)</sup> <sup>⌘</sup> | 64 <sup>⌘</sup>             | 11/15 <sup>(3)</sup> <sup>⌘</sup> | 22/15 <sup>⌘</sup>              | 209/225 <sup>⌘</sup>      | 1039/225 <sup>⌘</sup>  | 4 <sup>⌘</sup>                              | 1 <sup>⌘</sup>                                | 1.0 <sup>⌘</sup>                                 | 0.0 <sup>⌘</sup>                    | 20 <sup>⌘</sup>   | 75 <sup>⌘</sup>      |
| 2 <sup>⌘</sup>   | 6/15 <sup>⌘</sup>                 | 15/15 <sup>⌘</sup>                | 64 <sup>⌘</sup>             | 6/15 <sup>⌘</sup>                 | 12/15 <sup>⌘</sup>              | 12/15 <sup>⌘</sup>        | 94/75 <sup>⌘</sup>   | 4 <sup>⌘</sup>                              | 1 <sup>⌘</sup>                                | 3.0 <sup>⌘</sup>                                 | 2.0 <sup>⌘</sup>                    | 12 <sup>⌘</sup>   | 67 <sup>⌘</sup>      |
| 3 <sup>⌘</sup>   | 15/15 <sup>⌘</sup>                | 9/15 <sup>⌘</sup>                 | 64 <sup>⌘</sup>             | 15/9 <sup>⌘</sup>                 | 30/15 <sup>⌘</sup>              | 30/15 <sup>⌘</sup>        | $\beta_{ed1}:47/15$ <sup>⌘</sup><br>$\beta_{ed2}:47/15$ <sup>⌘</sup> | 4 <sup>⌘</sup>                              | 2 <sup>⌘</sup>                                | 2.0 <sup>⌘</sup>                                 | 1.0 <sup>⌘</sup>                    | 15 <sup>⌘</sup>   | 92 <sup>⌘</sup>      |
| 4 <sup>⌘</sup>   | 2/15 <sup>⌘</sup>                 | 15/15 <sup>⌘</sup>                | 64 <sup>⌘</sup>             | 2/15 <sup>⌘</sup>                 | 4/15 <sup>⌘</sup>               | 2/15 <sup>⌘</sup>         | 56/75 <sup>⌘</sup>   | 4 <sup>⌘</sup>                              | 1 <sup>⌘</sup>                                | 3.0 <sup>⌘</sup>                                 | 2.0 <sup>⌘</sup>                    | 17 <sup>⌘</sup>   | 71 <sup>⌘</sup>      |
| 5 <sup>⌘</sup>   | 15/15 <sup>(4)</sup> <sup>⌘</sup> | 15/15 <sup>(4)</sup> <sup>⌘</sup> | 64 <sup>⌘</sup>             | 15/15 <sup>(4)</sup> <sup>⌘</sup> | 30/15 <sup>⌘</sup>              | 24/15 <sup>⌘</sup>        | 134/15 <sup>⌘</sup>  | 4 <sup>⌘</sup>                              | 1 <sup>⌘</sup>                                | 1.0 <sup>⌘</sup>                                 | 0.0 <sup>⌘</sup>                    | 21 <sup>⌘</sup>   | 81 <sup>⌘</sup>      |
| Note 1: $\Delta$ ACK, $\Delta$ NACK and $\Delta$ CQI = 8 $A_{hs} = \beta_{hs}/\beta_c = 30/15$ $\beta_{hs} = 30/15 * \beta_c$<br>Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$ , $\beta_{hs}/\beta_c = 24/15$ . For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.<br>Note 3 : For subtest 1 the $\beta_c/\beta_d$ ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$<br>Note 4 : For subtest 5 the $\beta_c/\beta_d$ ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 14/15$ and $\beta_d = 15/15$<br>Note 5 : Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g<br>Note 6: $\beta_{ed}$ can not be set directly; it is set by Absolute Grant Value. |                                   |                                   |                             |                                   |                                 |                           |  |   |   |  |                                     |   |                      |

#### HSUPA UE category

| UE E-DCH Category | Maximum E-DCH Codes Transmitted | Number of HARQ Processes | E-DCH TTI(ms) | Minimum Spreading Factor | Maximum E-DCH Transport Block Bits | Max Rate (Mbps) |
|-------------------|---------------------------------|--------------------------|---------------|--------------------------|------------------------------------|-----------------|
| 1                 | 1                               | 4                        | 10            | 4                        | 7110                               | 0.7296          |
| 2                 | 2                               | 8                        | 2             | 4                        | 2798                               | 1.4592          |
|                   | 2                               | 4                        | 10            | 4                        | 14484                              |                 |
| 3                 | 2                               | 4                        | 10            | 4                        | 14484                              | 1.4592          |
| 4                 | 2                               | 8                        | 2             | 2                        | 5772                               | 2.9185          |
|                   | 2                               | 4                        | 10            | 2                        | 20000                              | 2.00            |
| 5                 | 2                               | 4                        | 10            | 2                        | 20000                              | 2.00            |
| 6<br>(No DPDCH)   | 4                               | 8                        | 10            | 2SF2&2SF4                | 11484                              | 5.76            |
|                   | 4                               | 4                        | 2             |                          | 20000                              | 2.00            |
| 7<br>(No DPDCH)   | 4                               | 8                        | 2             | 2SF2&2SF4                | 22996                              | ?               |
|                   | 4                               | 4                        | 10            |                          | 20000                              | ?               |

Note:

- When 4 codes are transmitted in parallel, two codes shall be transmitted with SF2 and two with SF4. UE categories 1 to 6 support QPSK only. UE category 7 supports QPSK and 16QAM. (TS25.306-7.3.0).

## 7.2. LTE Test Configuration

Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR. The R&S CMW500 was used for LTE output power measurements and SAR testing. Max power control was used so the UE transmits with maximum output power during SAR testing. SAR must be measured with the maximum TTI (transmit time interval) supported by the device in each LTE configuration.

### 1) Spectrum Plots for RB configurations

A properly configured base station simulator was used for LTE output power measurements and SAR testing. Therefore, spectrum plots for RB configurations were not required to be included in this report.

### 2) MPR

MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3-6.2.5 under Table 6.2.3-1.

**Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3**

| Modulation | Channel bandwidth / Transmission bandwidth ( $N_{RB}$ ) |            |          |           |           |           | MPR (dB) |
|------------|---|------------|----------|-----------|-----------|-----------|----------|
|            | 1.4<br>MHz  | 3.0<br>MHz | 5<br>MHz | 10<br>MHz | 15<br>MHz | 20<br>MHz |          |
| QPSK       | > 5   | > 4        | > 8      | > 12      | > 16      | > 18      | ≤ 1      |
| 16 QAM     | ≤ 5   | ≤ 4        | ≤ 8      | ≤ 12      | ≤ 16      | ≤ 18      | ≤ 1      |
| 16 QAM     | > 5   | > 4        | > 8      | > 12      | > 16      | > 18      | ≤ 2      |

### 3) A-MPR

A-MPR (Additional MPR) has been disabled for all SAR tests by using Network Signaling Value of “NS=01” on the base station simulator.

### 4) SAR test requirements

#### A) Largest channel bandwidth standalone SAR test requirements

##### i) QPSK with 1 RB allocation

Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.

##### ii) QPSK with 50% RB allocation

The procedures required for 1 RB allocation in i) are applied to measure the SAR for QPSK with 50% RB allocation.

##### iii) QPSK with 100% RB allocation

For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported

SAR for 1 RB and 50% RB allocation in i) and ii) are  $\leq 0.8$  W/kg. Otherwise, SAR is measured for the highest output power channel and if the reported SAR is  $> 1.45$  W/kg, the remaining required test channels must also be tested.

iv) Higher order modulations

For each modulation besides QPSK e.g., 16-QAM, 64-QAM, apply the QPSK procedures in above sections to determine the QAM configurations that may need SAR measurement. For each configuration identified as required for testing, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is  $> \frac{1}{2}$  dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is  $> 1.45$  W/kg.

**B) Other channel bandwidth standalone SAR test requirements**

For the other channel bandwidths used by the device in a frequency band, apply all the procedures required for the largest channel bandwidth in section A) to determine the channels and RB configurations that need SAR testing and only measure SAR when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is  $> \frac{1}{2}$  dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the reported SAR of a configuration for the largest channel bandwidth is  $> 1.45$  W/kg.

**Table 4.2-1: Configuration of special subframe (lengths of DwPTS/GP/UpPTS)**

| Special subframe configuration | Normal cyclic prefix in downlink |                                |                                  | Extended cyclic prefix in downlink |                                |                                  |
|--------------------------------|----------------------------------|--------------------------------|----------------------------------|------------------------------------|--------------------------------|----------------------------------|
|                                | DwPTS                            | UpPTS                          |                                  | DwPTS                              | UpPTS                          |                                  |
|                                |                                  | Normal cyclic prefix in uplink | Extended cyclic prefix in uplink |                                    | Normal cyclic prefix in uplink | Extended cyclic prefix in uplink |
| 0                              | $6592 \cdot T_s$                 | $2192 \cdot T_s$               | $2560 \cdot T_s$                 | $7680 \cdot T_s$                   | $2192 \cdot T_s$               | $2560 \cdot T_s$                 |
| 1                              | $19760 \cdot T_s$                |                                |                                  | $20480 \cdot T_s$                  |                                |                                  |
| 2                              | $21952 \cdot T_s$                |                                |                                  | $23040 \cdot T_s$                  |                                |                                  |
| 3                              | $24144 \cdot T_s$                |                                |                                  | $25600 \cdot T_s$                  |                                |                                  |
| 4                              | $26336 \cdot T_s$                |                                |                                  | $7680 \cdot T_s$                   |                                |                                  |
| 5                              | $6592 \cdot T_s$                 | $4384 \cdot T_s$               | $5120 \cdot T_s$                 | $20480 \cdot T_s$                  | $4384 \cdot T_s$               | $5120 \cdot T_s$                 |
| 6                              | $19760 \cdot T_s$                |                                |                                  | $23040 \cdot T_s$                  |                                |                                  |
| 7                              | $21952 \cdot T_s$                |                                |                                  | $12800 \cdot T_s$                  |                                |                                  |
| 8                              | $24144 \cdot T_s$                |                                |                                  | -                                  | -                              | -                                |
| 9                              | $13168 \cdot T_s$                |                                |                                  | -                                  | -                              | -                                |

**Table 4.2-2: Uplink-downlink configurations**

| Uplink-downlink configuration | Downlink-to-Uplink Switch-point periodicity | Subframe number |   |   |   |   |   |   |   |   |   |
|-------------------------------|---|-----------------|---|---|---|---|---|---|---|---|---|
|                               |   | 0               | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 0                             | 5 ms  | D               | S | U | U | U | D | S | U | U | U |
| 1                             | 5 ms  | D               | S | U | U | D | D | S | U | U | D |
| 2                             | 5 ms  | D               | S | U | D | D | D | S | U | D | D |
| 3                             | 10 ms                                       | D               | S | U | U | U | D | D | D | D | D |
| 4                             | 10 ms                                       | D               | S | U | U | D | D | D | D | D | D |
| 5                             | 10 ms                                       | D               | S | U | D | D | D | D | D | D | D |
| 6                             | 5 ms  | D               | S | U | U | U | D | S | U | U | D |

According to Figure 4.2-1, one radio frame is configured by 10 subframes, which consist of Uplink-subframe, Downlink-subframe and Special subframe. For TDD-LTE, the Duty Cycle should be calculated on Uplink-subframes and Special subframes, due to Special subframe containing both Uplink transmissions. So for one radio frame, Duty Cycle can be calculated with formula as below. The count of Uplink subframes are according to Table 4.2-2:

$$\text{Duty cycle} = (30720T_s \cdot \text{Ups} + \text{Uplink Component} \cdot \text{Specials}) / (307200T_s)$$

About the uplink component of Special subframes, we can figure out by Table 4.2-1:

$$\text{Uplink Component} = \text{UpPTS}$$

In conclusion, for the TDD LTE Band, Duty Cycle can be calculated with formula as below. all these sets are ok when we test, or we can set as below.

$$\text{Duty cycle} = [(30720T_s \cdot \text{Ups}) + \text{UpPTS} \cdot \text{Specials}] / (307200T_s)$$

And we can get different Duty cycles under different configurations:

| Uplink-downlink configuration | Configuration of special subframe |   |   |                                  |                   |                                  |                   |                                    |                   |                                  |                   |
|-------------------------------|-----------------------------------|---|---|----------------------------------|-------------------|----------------------------------|-------------------|------------------------------------|-------------------|----------------------------------|-------------------|
|                               | Subframe number                   |   |   | Normal cyclic prefix in downlink |                   |                                  |                   | Extended cyclic prefix in downlink |                   |                                  |                   |
|                               |                                   |   |   | Normal cyclic prefix in uplink   |                   | Extended cyclic prefix in uplink |                   | Normal cyclic prefix in uplink     |                   | Extended cyclic prefix in uplink |                   |
|                               | D                                 | S | U | configuration 0-4                | configuration 5-9 | configuration 0-4                | configuration 5-9 | configuration 0-3                  | configuration 4-7 | configuration 0-3                | configuration 4-7 |
| 0                             | 2                                 | 2 | 6 | 61.43%                           | 62.85%            | 61.67%                           | 63.33%            | 61.43%                             | 62.85%            | 61.67%                           | 63.33%            |
| 1                             | 4                                 | 2 | 4 | 41.43%                           | 42.85%            | 41.67%                           | 43.33%            | 41.43%                             | 42.85%            | 41.67%                           | 43.33%            |
| 2                             | 6                                 | 2 | 2 | 21.43%                           | 22.85%            | 21.67%                           | 23.33%            | 21.43%                             | 22.85%            | 21.67%                           | 23.33%            |
| 3                             | 6                                 | 1 | 3 | 30.71%                           | 31.43%            | 30.83%                           | 31.67%            | 30.71%                             | 31.43%            | 30.83%                           | 31.67%            |
| 4                             | 7                                 | 1 | 2 | 20.71%                           | 21.43%            | 20.83%                           | 21.67%            | 20.71%                             | 21.43%            | 20.83%                           | 21.67%            |
| 5                             | 8                                 | 1 | 1 | 10.71%                           | 11.43%            | 10.83%                           | 11.67%            | 10.71%                             | 11.43%            | 10.83%                           | 11.67%            |
| 6                             | 3                                 | 2 | 5 | 51.43%                           | 52.85%            | 51.67%                           | 53.33%            | 51.43%                             | 52.85%            | 51.67%                           | 53.33%            |

For TDD LTE, SAR should be tested with the highest transmission duty factor (63.33%) using Uplink-downlink configuration 0 and Special subframe configuration 7 for Frame structure type 2.

**Maximum Output Power for LTE**

According to April 2015 TCB workshop, SAR test exclusion can be applied for testing overlapping LTE bands as follows:

- a) The maximum output power for the smaller band must be s the larger band to qualify for the SAR test exclusion.
- b) The channel bandwidth and other operating parameters for the smaller band must be fully supported by the larger band.

LTE Band 17 (704-716 MHz) is covered by LTE Band 12 (699-716 MHz)

### 7.3. Wi-Fi Test Configuration

For Wi-Fi SAR testing, a communication link is set up with the testing software for Wi-Fi mode test. During the test, at each test frequency channel, the EUT is operated at the RF continuous emission mode. The test procedures in KDB 248227D01 are applied.

#### 7.3.1. Initial Test Position Procedure

For exposure condition with multiple test position, such as handsets operating next to the ear, devices with hotspot mode or UMPC mini-tablet, procedures for initial test position can be applied. Using the transmission mode determined by the DSSS procedure or initial test configuration, area scans are measured for all position in an exposure condition. The test position with the highest extrapolated (peak) SAR is used as the initial test position. When reported SAR for the initial test position is  $\leq 0.4\text{W/kg}$ , no additional testing for the remaining test position is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR position until the reported SAR result is  $\leq 0.8\text{W/kg}$  or all test position are measured. For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is  $> 0.8\text{ W/kg}$ , SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is  $\leq 1.2\text{ W/kg}$  or all required channels are tested.

#### 7.3.2. Initial Test Configuration Procedure

An initial test configuration is determined for OFDM transmission modes according to the channel bandwidth, modulation and data rate combination(s) with the highest maximum output power specified for production units in each standalone and aggregated frequency band. SAR is measured using the highest measured maximum output power channel. For configurations with the same specified or measured maximum output power, additional transmission mode and test channel selection procedures are required (see section 5.3.2 of KDB 248227D01). SAR test reduction of subsequent highest output test channels is based on the reported SAR of the initial test configuration.

For next to the ear, hotspot mode and UMC mini-tablet exposure configurations where multiple test positions are required, the initial test position procedure is applied to minimize the number of test positions required for SAR measurement using the initial test configuration transmission mode. For fixed exposure conditions that do not have multiple SAR test positions, SAR is measured in the transmission mode determined by the initial test configuration. When the reported SAR of the initial test configuration is  $> 0.8\text{ W/kg}$ , SAR measurement is required for the subsequent next highest measured output power channel(s) in the initial test configuration until the reported SAR is  $\leq 1.2\text{ W/kg}$  or all required channels are tested.

#### 7.3.3. Sub Test Configuration Procedure

SAR measurement requirements for the remaining 802.11 transmission mode configurations that have not been tested in the initial test configuration are determined separately for each standalone and aggregated frequency band, in each exposure condition, according to the maximum output power specified for production units.

When the highest reported SAR for the initial test configuration, according to the initial test position or fixed exposure position requirements, is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is  $\leq 1.2\text{ W/kg}$ , SAR is not required for that subsequent test configuration.

#### 7.3.4. 2.4GHz Wi-Fi SAR Test Procedures

Separate SAR procedures are applied to DSSS and OFDM configurations in the 2.4 GHz band to simplify DSSS test requirements. For 802.11b DSSS SAR measurements, DSSS SAR procedure applies to fixed exposure test position and initial test position procedure applies to multiple exposure test positions.

##### A) 802.11b DSSS SAR Test Requirements

SAR is measured for 2.4 GHz 802.11b DSSS using either a fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following:

- 1) When the reported SAR of the highest measured maximum output power channel (section 3.1 of KDB 248227D01) for the exposure configuration is  $\leq 0.8$  W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.
- 2) When the reported SAR is  $> 0.8$  W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is  $> 1.2$  W/kg, SAR is required for the third channel i.e., all channels require testing.

### **B) 2.4GHz 802.11g/n OFDM SAR Test Exclusion Requirements**

When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, the measurement and test reduction procedures for OFDM are applied (section 5.3 of KDB 248227D01). SAR is not required for the following 2.4 GHz OFDM conditions.

- 1) When KDB Publication 447498 SAR test exclusion applies to the OFDM configuration.
- 2) When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is  $\leq 1.2$  W/kg.

### **C) SAR Test Requirements for OFDM configurations**

When SAR measurement is required for 802.11 g/n OFDM configurations, each standalone and frequency aggregated band is considered separately for SAR test reduction. In applying the initial test configuration and subsequent test configuration procedures, the 802.11 transmission configuration with the highest specified maximum output power and the channel within a test configuration with the highest measured maximum output power should be clearly distinguished to apply the procedures.

## **7.3.5. 5GHz Wi-Fi SAR Test Procedures**

### **U-NII-1 and U-NII-2A Bands**

For devices that operate in only one of the U-NII-1 and U-NII-2A bands, the normally required SAR procedures for OFDM configurations are applied. For devices that operate in both U-NII bands using the same transmitter and antenna(s), SAR test reduction is determined according to the following:

- 1) When the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. If the highest reported SAR for a test configuration is  $\leq 1.2$  W/kg, SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition); otherwise, both bands are tested independently for SAR.
- 2) When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest reported SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is  $\leq 1.2$  W/kg, SAR is not required for the band with lower maximum output power in that test configuration; otherwise, both bands are tested independently for SAR.
- 3) The two U-NII bands may be aggregated to support a 160 MHz channel on channel number 50. Without additional testing, the maximum output power for this is limited to the lower of the maximum output power certified for the two bands. When SAR measurement is required for at least one of the bands and the highest reported SAR adjusted by the ratio of specified maximum output power of aggregated to standalone band is  $> 1.2$  W/kg, SAR is required for the 160 MHz channel. This procedure does not apply to an aggregated band with maximum output higher than the standalone band(s); the aggregated band must be tested independently for SAR. SAR is not required when the 160 MHz channel is operating at a reduced maximum power and also qualifies for SAR test exclusion.

### **U-NII-2C and U-NII-3 Bands**

The frequency range covered by these bands is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. when Terminal Doppler Weather Radar (TDWR) restriction applies, all channels that operate at 5.60 – 5.65 GHz must be included to apply the SAR test reduction and measurement procedures.



When the same transmitter and antenna(s) are used for U-NII-2C band and U-NII-3 band or 5.8 GHz band of §15.247, the bands may be aggregated to enable additional channels with 20, 40 or 80 MHz bandwidth to span across the band gap, as illustrated in Appendix B. The maximum output power for the additional band gap channels is limited to the lower of those certified for the bands. Unless band gap channels are permanently disabled, they must be considered for SAR testing. The frequency range covered by these bands is 380 MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. To maintain SAR measurement accuracy and to facilitate test reduction, the channels in U-NII-2C band above 5.65 GHz may be grouped with the 5.8 GHz channels in U-NII-3 or §15.247 band to enable two SAR probe calibration frequency points to cover the bands, including the band gap channels. When band gap channels are supported and the bands are not aggregated for SAR testing, band gap channels must be considered independently in each band according to the normally required OFDM SAR measurement and probe calibration frequency points requirements.

### 7.3.6. OFDM Transmission Mode and SAR Test Channel Selection

When the same maximum output power was specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration with the largest channel bandwidth, lowest order modulation and lowest data rate. When the maximum output power of a channel is the same for equivalent OFDM configurations; for example, 802.11a, 802.11n and 802.11ac or 802.11g and 802.11n with the same channel bandwidth, modulation and data rate etc., the lower order 802.11 mode i.e., 802.11a, then 802.11n and 802.11ac or 802.11g then 802.11n, is used for SAR measurement. When the maximum output power are the same for multiple test channels, either according to the default or additional power measurement requirements, SAR is measured using the channel closest to the middle of the frequency band or aggregated band. When there are multiple channels with the same maximum output power, SAR is measured using the higher number channel.

### 7.3.7. 2.4GHz BT/BLE SAR Test Requirements

2.4GHz BT operating modes are tested independently according to the service requirements in each frequency band for each antenna. DH5 / 3DH5 / 1M SISO modes are tested on the maximum average output power mode.

### 7.3.8. Repeated measurements

Repeated measurements are required only when the measured SAR is  $\geq 0.80$  W/kg.<sup>18</sup> If the measured SAR value of the initial repeated measurement is  $< 1.45$  W/kg with  $\leq 20\%$  variation, only one repeated measurement is required to reaffirm that the results are not expected to have substantial variations, which may introduce significant compliance concerns. A second repeated measurement is required only if the measured result for the initial repeated measurement is within 10% of the SAR limit and vary by more than 20%, which are often related to device and measurement setup difficulties. The following procedures are applied to determine if repeated measurements are required. The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.<sup>19</sup> The repeated measurement results must be clearly identified in the SAR report. All measured SAR, including the repeated results, must be considered to determine compliance and for reporting according to KDB Publication 690783.

- 1) Repeated measurement is not required when the original highest measured SAR is  $< 0.80$  W/kg; steps 2) through 4) do not apply.
- 2) When the original highest measured SAR is  $\geq 0.80$  W/kg, repeat that measurement once.
- 3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is  $> 1.20$  or when the original or repeated measurement is  $\geq 1.45$  W/kg ( $\sim 10\%$  from the 1-g SAR limit).
- 4) Perform a third repeated measurement only if the original, first or second repeated measurement is  $\geq 1.5$  W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is  $> 1.20$ .



## 8. Conducted Output Power Measurement and tune-up tolerance

### 8.1. GSM850

| GSM850            |             | Channel | Channel | Channel | Tune-up Limit (dBm) | Division Factor | Channel | Channel | Channel | Tune-up Limit (dBm) |
|-------------------|-------------|---------|---------|---------|---------------------|-----------------|---------|---------|---------|---------------------|
|                   |             | 128     | 190     | 251     |                     |                 | 128     | 190     | 251     |                     |
| GPRS/EGPRS (GMSK) | 1 TimeSlot  | 26.22   | 26.30   | 26.32   | 26.5                | -9.03           | 17.19   | 17.27   | 17.29   | 17.5                |
|                   | 2 TimeSlots | 25.99   | 26.07   | 26.06   | 26.5                | -6.02           | 19.97   | 20.05   | 20.04   | 20.5                |
|                   | 3 TimeSlots | 25.28   | 25.33   | 25.27   | 25.5                | -4.26           | 21.02   | 21.07   | 21.01   | 21.2                |
|                   | 4 TimeSlots | 24.77   | 24.77   | 24.74   | 25.0                | -3.01           | 21.76   | 21.76   | 21.73   | <b>22.0</b>         |
| EGPRS (8PSK)      | 1 TimeSlot  | 26.72   | 26.60   | 26.59   | 27.0                | -9.03           | 17.69   | 17.57   | 17.56   | 18.0                |
|                   | 2 TimeSlots | 25.65   | 25.66   | 25.57   | 26.0                | -6.02           | 19.63   | 19.64   | 19.55   | 20.0                |
|                   | 3 TimeSlots | 23.63   | 23.61   | 23.65   | 24.0                | -4.26           | 19.37   | 19.35   | 19.39   | 19.7                |
|                   | 4 TimeSlots | 22.36   | 22.47   | 22.40   | 22.5                | -3.01           | 19.35   | 19.46   | 19.39   | 19.5                |

## 8.2. GSM1900

| GSM1900              |             | Channel | Channel | Channel | Tune-up<br>Limit<br>(dBm) | Division<br>Factor | Channel | Channel | Channel | Tune-up<br>Limit<br>(dBm) |
|----------------------|-------------|---------|---------|---------|---------------------------|--------------------|---------|---------|---------|---------------------------|
|                      |             | 512     | 661     | 810     |                           |                    | 512     | 661     | 810     |                           |
| GPRS/EGPRS<br>(GMSK) | 1 TimeSlot  | 21.74   | 21.54   | 21.31   | 22.0                      | -9.03              | 12.71   | 12.51   | 12.28   | 13.0                      |
|                      | 2 TimeSlots | 21.01   | 20.77   | 20.59   | 21.5                      | -6.02              | 14.99   | 14.75   | 14.57   | 15.5                      |
|                      | 3 TimeSlots | 19.76   | 19.49   | 19.32   | 20.0                      | -4.26              | 15.50   | 15.23   | 15.06   | 15.7                      |
|                      | 4 TimeSlots | 19.20   | 18.94   | 18.65   | 19.5                      | -3.01              | 16.19   | 15.93   | 15.64   | <b>16.5</b>               |
| EGPRS<br>(8PSK)      | 1 TimeSlot  | 24.88   | 24.31   | 23.81   | 25.0                      | -9.03              | 15.85   | 15.28   | 14.78   | 16.0                      |
|                      | 2 TimeSlots | 23.73   | 23.00   | 22.69   | 24.0                      | -6.02              | 17.71   | 16.98   | 16.67   | <b>18.0</b>               |
|                      | 3 TimeSlots | 21.58   | 21.02   | 20.67   | 22.0                      | -4.26              | 17.32   | 16.76   | 16.41   | 17.7                      |
|                      | 4 TimeSlots | 20.40   | 19.63   | 19.43   | 20.5                      | -3.01              | 17.39   | 16.62   | 16.42   | 17.5                      |

### 8.3. WCDMA Band 2

| Band 2 |              | Average Power (dBm) |        |        | Tune-up Limit (dBm) |
|--------|--------------|---------------------|--------|--------|---------------------|
|        |              | 9262CH              | 9400CH | 9538CH |                     |
| WCDMA  | 12.2kbps RMC | 14.52               | 14.54  | 14.44  | 15.0                |
| HSDPA  | Subtest 1    | 13.65               | 13.68  | 13.64  | 14.0                |
|        | Subtest 2    | 13.41               | 13.44  | 13.44  | 13.5                |
|        | Subtest 3    | 13.02               | 13.05  | 13.01  | 13.5                |
|        | Subtest 4    | 13.01               | 13.04  | 12.98  | 13.5                |
| HSUPA  | Subtest 1    | 12.90               | 12.93  | 12.88  | 13.0                |
|        | Subtest 2    | 13.59               | 13.64  | 13.59  | 14.0                |
|        | Subtest 3    | 12.54               | 12.56  | 12.53  | 13.0                |
|        | Subtest 4    | 13.64               | 13.66  | 13.60  | 14.0                |
|        | Subtest 5    | 12.52               | 12.56  | 12.52  | 13.0                |

## 8.4. WCDMA Band 4

| Band 4 |              | Average Power (dBm) |        |        | Tune-up Limit (dBm) |
|--------|--------------|---------------------|--------|--------|---------------------|
|        |              | 1312CH              | 1413CH | 1513CH |                     |
| WCDMA  | 12.2kbps RMC | 14.01               | 14.02  | 13.99  | 14.5                |
| HSDPA  | Subtest 1    | 13.10               | 13.11  | 13.14  | 13.5                |
|        | Subtest 2    | 12.88               | 12.89  | 12.94  | 13.0                |
|        | Subtest 3    | 12.49               | 12.48  | 12.54  | 13.0                |
|        | Subtest 4    | 12.46               | 12.45  | 12.53  | 13.0                |
| HSUPA  | Subtest 1    | 12.41               | 12.38  | 12.47  | 12.5                |
|        | Subtest 2    | 13.03               | 13.06  | 13.11  | 13.5                |
|        | Subtest 3    | 11.99               | 12.01  | 12.13  | 12.5                |
|        | Subtest 4    | 13.09               | 13.11  | 13.14  | 13.5                |
|        | Subtest 5    | 11.99               | 12.00  | 12.10  | 12.5                |

## 8.5. WCDMA Band 5

| Band 5 |                 | Average Power (dBm) |        |        | Tune-up<br>Limit<br>(dBm) |
|--------|-----------------|---------------------|--------|--------|---------------------------|
|        |                 | 4132CH              | 4182CH | 4233CH |                           |
| WCDMA  | 12.2kbps<br>RMC | 21.63               | 21.71  | 21.79  | 22.0                      |
| HSDPA  | Subtest 1       | 20.80               | 20.87  | 20.95  | 21.0                      |
|        | Subtest 2       | 20.59               | 20.68  | 20.74  | 21.0                      |
|        | Subtest 3       | 20.21               | 20.29  | 20.37  | 20.5                      |
|        | Subtest 4       | 20.19               | 20.28  | 20.36  | 20.5                      |
| HSUPA  | Subtest 1       | 20.10               | 20.19  | 20.26  | 20.5                      |
|        | Subtest 2       | 20.75               | 20.81  | 20.91  | 21.0                      |
|        | Subtest 3       | 19.72               | 19.80  | 19.88  | 20.0                      |
|        | Subtest 4       | 20.79               | 20.85  | 20.93  | 21.0                      |
|        | Subtest 5       | 19.71               | 19.78  | 19.86  | 20.0                      |

## 8.6. LTE Band 2

| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|-----------|------------|---------|-----------|--------------|--------------|--------------|---------------------|
|           |            |         |           | 18607        | 18900        | 19193        |                     |
| 1.4MHz    | QPSK       | 1       | 0         | 16.52        | 16.67        | 16.56        | 17.0                |
|           |            | 1       | 2         | <b>16.68</b> | <b>16.67</b> | <b>16.87</b> |                     |
|           |            | 1       | 5         | 16.53        | 16.53        | 16.37        |                     |
|           |            | 3       | 0         | 16.61        | 16.53        | 16.53        | 17.0                |
|           |            | 3       | 1         | <b>16.77</b> | <b>16.67</b> | <b>16.96</b> |                     |
|           |            | 3       | 3         | 16.50        | 16.57        | 16.50        |                     |
|           | 16QAM      | 6       | 0         | 15.77        | <b>15.86</b> | 15.70        | 16.0                |
|           |            | 1       | 0         | 15.62        | 15.70        | 15.75        | 16.0                |
|           |            | 1       | 2         | 15.68        | 15.85        | 15.63        |                     |
|           |            | 1       | 5         | 15.60        | 15.74        | 15.87        |                     |
|           |            | 3       | 0         | 15.49        | 15.80        | 15.72        | 16.0                |
|           |            | 3       | 1         | 15.49        | 15.81        | 15.73        |                     |
|           |            | 3       | 3         | 15.62        | 15.70        | 15.82        |                     |
|           |            | 6       | 0         | 14.51        | 14.87        | 14.61        | 15.0                |
| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|           |            |         |           | 18615        | 18900        | 19185        |                     |
| 3MHz      | QPSK       | 1       | 0         | <b>16.74</b> | 16.54        | 16.62        | 17.0                |
|           |            | 1       | 8         | <b>16.79</b> | 16.70        | <b>16.77</b> |                     |
|           |            | 1       | 14        | 16.42        | <b>16.83</b> | 16.35        |                     |
|           |            | 8       | 0         | 15.43        | <b>15.66</b> | 15.68        | 16.0                |
|           |            | 8       | 4         | <b>15.55</b> | 15.63        | 15.76        |                     |
|           |            | 8       | 7         | 15.27        | 15.60        | <b>15.83</b> |                     |
|           | 16QAM      | 15      | 0         | 15.74        | 15.51        | <b>15.98</b> | 16.0                |
|           |            | 1       | 0         | 15.71        | 16.27        | 16.03        | 16.5                |
|           |            | 1       | 8         | 15.93        | 16.32        | 16.48        |                     |
|           |            | 1       | 14        | 15.96        | 15.67        | 15.72        |                     |
|           |            | 8       | 0         | 14.95        | 14.74        | 14.86        | 15.0                |
|           |            | 8       | 4         | 14.76        | 14.73        | 14.76        |                     |
|           |            | 8       | 7         | 14.54        | 14.97        | 14.49        |                     |
|           |            | 15      | 0         | 14.51        | 14.72        | 14.60        | 15.0                |
| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|           |            |         |           | 18625        | 18900        | 19175        |                     |
| 5MHz      | QPSK       | 1       | 0         | <b>16.60</b> | 16.50        | 16.47        | 17.0                |
|           |            | 1       | 12        | <b>16.75</b> | <b>16.72</b> | <b>16.86</b> |                     |
|           |            | 1       | 24        | 16.36        | 16.71        | 16.42        |                     |
|           |            | 12      | 0         | <b>15.53</b> | 15.65        | 15.57        | 16.0                |
|           |            | 12      | 6         | 15.52        | <b>15.69</b> | 15.82        |                     |
|           |            | 12      | 13        | 15.37        | 15.61        | <b>15.88</b> |                     |
|           | 16QAM      | 25      | 0         | 15.72        | 15.61        | <b>15.84</b> | 16.0                |
|           |            | 1       | 0         | 15.78        | 16.22        | 16.03        | 16.5                |
|           |            | 1       | 12        | 16.00        | 16.42        | 16.43        |                     |
|           |            | 1       | 24        | 15.96        | 15.80        | 15.84        |                     |
|           |            | 12      | 0         | 14.83        | 14.76        | 14.89        | 15.0                |
|           |            | 12      | 6         | 14.78        | 14.78        | 14.77        |                     |
|           |            | 12      | 13        | 14.55        | 14.91        | 14.50        |                     |
|           |            | 25      | 0         | 14.64        | 14.80        | 14.55        | 15.0                |
| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|           |            |         |           | 18650        | 18900        | 19150        |                     |
| 10MHz     | QPSK       | 1       | 0         | <b>16.59</b> | 16.46        | 16.45        | 17.0                |
|           |            | 1       | 24        | <b>16.75</b> | <b>16.80</b> | <b>16.94</b> |                     |
|           |            | 1       | 49        | 16.44        | 16.56        | 16.51        |                     |
|           |            | 25      | 0         | <b>15.63</b> | 15.67        | 15.50        | 16.0                |

|           |            |         |           |              |              |              |                     |
|-----------|------------|---------|-----------|--------------|--------------|--------------|---------------------|
|           |            | 25      | 12        | 15.54        | 15.60        | 15.78        |                     |
|           |            | 25      | 25        | 15.44        | <b>15.70</b> | <b>15.82</b> |                     |
|           |            | 50      | 0         | 15.69        | <b>15.75</b> | 15.74        |                     |
|           | 16QAM      | 1       | 0         | 15.74        | 16.18        | 15.99        | 16.5                |
|           |            | 1       | 24        | 15.86        | 16.43        | 16.42        |                     |
|           |            | 1       | 49        | 15.96        | 15.76        | 15.99        |                     |
|           |            | 25      | 0         | 14.81        | 14.67        | 14.97        |                     |
|           |            | 25      | 12        | 14.74        | 14.75        | 14.66        | 15.0                |
|           |            | 25      | 25        | 14.57        | 14.94        | 14.53        |                     |
|           |            | 50      | 0         | 14.71        | 14.85        | 14.61        | 15.0                |
|           |            |         |           |              |              |              |                     |
| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|           |            |         |           | 18675        | 18900        | 19125        |                     |
| 15MHz     | QPSK       | 1       | 0         | 16.55        | <b>16.56</b> | 16.50        | 17.0                |
|           |            | 1       | 38        | <b>16.71</b> | <b>16.76</b> | <b>16.81</b> |                     |
|           |            | 1       | 74        | 16.38        | 16.61        | 16.41        |                     |
|           |            | 36      | 0         | <b>15.68</b> | 15.71        | 15.58        | 16.0                |
|           |            | 36      | 18        | 15.59        | <b>15.72</b> | 15.66        |                     |
|           |            | 36      | 37        | 15.55        | 15.59        | <b>15.72</b> |                     |
|           |            | 75      | 0         | 15.72        | <b>15.76</b> | 15.70        | 16.0                |
|           | 16QAM      | 1       | 0         | 15.67        | 16.07        | 16.07        | 16.5                |
|           |            | 1       | 38        | 15.99        | 16.39        | 16.40        |                     |
|           |            | 1       | 74        | 15.82        | 15.81        | 16.09        |                     |
|           |            | 36      | 0         | 14.71        | 14.72        | 14.85        | 15.0                |
|           |            | 36      | 18        | 14.70        | 14.89        | 14.75        |                     |
|           |            | 36      | 37        | 14.68        | 14.90        | 14.68        |                     |
|           |            | 75      | 0         | 14.65        | 14.81        | 14.75        | 15.0                |
| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|           |            |         |           | 18700        | 18900        | 19100        |                     |
| 20MHz     | QPSK       | 1       | 0         | 16.53        | 16.65        | 16.59        | 17.0                |
|           |            | 1       | 49        | <b>16.68</b> | <b>16.80</b> | <b>16.83</b> |                     |
|           |            | 1       | 99        | 16.47        | 16.58        | 16.52        |                     |
|           |            | 50      | 0         | <b>15.63</b> | <b>15.74</b> | 15.72        | 16.0                |
|           |            | 50      | 25        | 15.62        | 15.70        | 15.69        |                     |
|           |            | 50      | 50        | <b>15.63</b> | 15.73        | <b>15.74</b> |                     |
|           |            | 100     | 0         | 15.61        | <b>15.70</b> | 15.64        | 16.0                |
|           | 16QAM      | 1       | 0         | 15.76        | 16.02        | 16.20        | 16.5                |
|           |            | 1       | 49        | 15.94        | 16.24        | 16.36        |                     |
|           |            | 1       | 99        | 15.70        | 15.96        | 16.13        |                     |
|           |            | 50      | 0         | 14.67        | 14.77        | 14.73        | 15.0                |
|           |            | 50      | 25        | 14.67        | 14.77        | 14.70        |                     |
|           |            | 50      | 50        | 14.66        | 14.76        | 14.73        |                     |
|           |            | 100     | 0         | 14.61        | 14.76        | 14.62        | 15.0                |

## 8.7. LTE Band 4

| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|-----------|------------|---------|-----------|--------------|--------------|--------------|---------------------|
|           |            |         |           | 19957        | 20175        | 20393        |                     |
| 1.4MHz    | QPSK       | 1       | 0         | 14.51        | <b>14.54</b> | 14.42        | 15.0                |
|           |            | 1       | 2         | <b>14.54</b> | <b>14.87</b> | <b>14.96</b> |                     |
|           |            | 1       | 5         | 14.45        | 14.57        | 14.64        |                     |
|           |            | 3       | 0         | 14.41        | 14.49        | 14.47        | 15.0                |
|           |            | 3       | 1         | <b>14.73</b> | <b>14.75</b> | <b>14.71</b> |                     |
|           |            | 3       | 3         | 14.36        | 14.44        | 14.61        |                     |
|           | 16QAM      | 6       | 0         | 13.51        | 13.45        | <b>13.62</b> | 14.0                |
|           |            | 1       | 0         | 13.50        | 13.48        | 13.39        | 14.0                |
|           |            | 1       | 2         | 13.73        | 13.55        | 13.37        |                     |
|           |            | 1       | 5         | 13.53        | 13.70        | 13.47        |                     |
|           |            | 3       | 0         | 13.60        | 13.52        | 13.64        | 14.0                |
|           |            | 3       | 1         | 13.76        | 13.60        | 13.42        |                     |
|           |            | 3       | 3         | 13.76        | 13.60        | 13.42        |                     |
|           |            | 6       | 0         | 12.69        | 12.79        | 12.34        | 13.0                |
| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|           |            |         |           | 19965        | 20175        | 20385        |                     |
| 3MHz      | QPSK       | 1       | 0         | 14.28        | 14.46        | 14.38        | 15.0                |
|           |            | 1       | 8         | <b>14.59</b> | <b>14.64</b> | <b>14.95</b> |                     |
|           |            | 1       | 14        | 14.35        | 14.56        | 14.61        |                     |
|           |            | 8       | 0         | <b>13.67</b> | 13.55        | <b>13.54</b> | 14.0                |
|           |            | 8       | 4         | 13.51        | 13.51        | 13.38        |                     |
|           |            | 8       | 7         | 13.63        | <b>13.73</b> | 13.35        |                     |
|           | 16QAM      | 15      | 0         | <b>13.48</b> | 13.46        | 13.36        | 14.0                |
|           |            | 1       | 0         | 13.23        | 13.96        | 13.62        | 14.5                |
|           |            | 1       | 8         | 13.40        | 14.21        | 14.12        |                     |
|           |            | 1       | 14        | 13.42        | 13.67        | 13.59        |                     |
|           |            | 8       | 0         | 12.69        | 12.51        | 12.50        | 13.0                |
|           |            | 8       | 4         | 12.63        | 12.57        | 12.62        |                     |
|           |            | 8       | 7         | 12.73        | 12.76        | 12.75        |                     |
|           |            | 15      | 0         | 12.47        | 12.80        | 12.58        | 13.0                |
| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|           |            |         |           | 19975        | 20175        | 20375        |                     |
| 5MHz      | QPSK       | 1       | 0         | 14.40        | 14.49        | 14.42        | 15.0                |
|           |            | 1       | 12        | <b>14.61</b> | <b>14.85</b> | <b>14.83</b> |                     |
|           |            | 1       | 24        | 14.40        | 14.66        | 14.52        |                     |
|           |            | 12      | 0         | 13.66        | 13.41        | 13.37        | 14.0                |
|           |            | 12      | 6         | <b>13.80</b> | <b>13.70</b> | <b>13.67</b> |                     |
|           |            | 12      | 13        | 13.60        | 13.60        | 13.56        |                     |
|           | 16QAM      | 25      | 0         | 13.46        | <b>13.67</b> | 13.40        | 14.0                |
|           |            | 1       | 0         | 13.39        | 13.99        | 13.69        | 14.5                |
|           |            | 1       | 12        | 13.40        | 14.29        | 13.92        |                     |
|           |            | 1       | 24        | 13.30        | 13.81        | 13.60        |                     |
|           |            | 12      | 0         | 12.60        | 12.54        | 12.53        | 13.0                |
|           |            | 12      | 6         | 12.82        | 12.64        | 12.63        |                     |
|           |            | 12      | 13        | 12.82        | 12.75        | 12.59        |                     |
|           |            | 25      | 0         | 12.48        | 12.79        | 12.50        | 13.0                |
| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|           |            |         |           | 20000        | 20175        | 20350        |                     |
| 10MHz     | QPSK       | 1       | 0         | 14.28        | <b>14.64</b> | 14.39        | 15.0                |
|           |            | 1       | 24        | 14.59        | <b>14.80</b> | <b>14.69</b> |                     |
|           |            | 1       | 49        | 14.52        | 14.47        | 14.51        |                     |
|           |            | 25      | 0         | 13.68        | <b>13.66</b> | <b>13.60</b> | 14.0                |



|           |            |         |           |                  |                  |                  |                           |
|-----------|------------|---------|-----------|------------------|------------------|------------------|---------------------------|
|           |            | 25      | 12        | <b>13.75</b>     | 13.42            | 13.50            |                           |
|           |            | 25      | 25        | 13.54            | 13.51            | 13.51            |                           |
|           |            | 50      | 0         | 13.53            | 13.50            | <b>13.56</b>     |                           |
|           | 16QAM      | 1       | 0         | 13.29            | 13.92            | 13.75            | 14.5                      |
|           |            | 1       | 24        | 13.42            | 14.15            | 14.02            |                           |
|           |            | 1       | 49        | 13.17            | 13.77            | 13.63            |                           |
|           |            | 25      | 0         | 12.72            | 12.55            | 12.54            | 13.0                      |
|           |            | 25      | 12        | 12.83            | 12.62            | 12.78            |                           |
|           |            | 25      | 25        | 12.81            | 12.52            | 12.46            |                           |
|           |            | 50      | 0         | 12.52            | 12.75            | 12.35            | 13.0                      |
|           |            |         |           |                  |                  |                  |                           |
|           |            |         |           |                  |                  |                  |                           |
| Bandwidth | Modulation | RB size | RB offset | Channel<br>20025 | Channel<br>20175 | Channel<br>20325 | Tune-up<br>Limit<br>(dBm) |
| 15MHz     | QPSK       | 1       | 0         | 14.40            | 14.67            | 14.52            | 15.0                      |
|           |            | 1       | 38        | <b>14.72</b>     | <b>14.78</b>     | <b>14.94</b>     |                           |
|           |            | 1       | 74        | 14.44            | 14.50            | 14.66            |                           |
|           |            | 36      | 0         | 13.58            | 13.57            | 13.52            | 14.0                      |
|           |            | 36      | 18        | <b>13.77</b>     | 13.45            | <b>13.60</b>     |                           |
|           |            | 36      | 37        | 13.65            | <b>13.61</b>     | 13.53            |                           |
|           |            | 75      | 0         | 13.55            | 13.58            | <b>13.61</b>     | 14.0                      |
|           | 16QAM      | 1       | 0         | 13.24            | 14.00            | 13.65            | 14.5                      |
|           |            | 1       | 38        | 13.49            | 14.06            | 13.88            |                           |
|           |            | 1       | 74        | 13.36            | 13.95            | 13.72            |                           |
|           |            | 36      | 0         | 12.89            | 12.75            | 12.56            | 13.0                      |
|           |            | 36      | 18        | 12.91            | 12.50            | 12.75            |                           |
|           |            | 36      | 37        | 12.67            | 12.62            | 12.54            |                           |
|           |            | 75      | 0         | 12.65            | 12.53            | 12.55            | 13.0                      |
| Bandwidth | Modulation | RB size | RB offset | Channel<br>20050 | Channel<br>20175 | Channel<br>20300 | Tune-up<br>Limit<br>(dBm) |
| 20MHz     | QPSK       | 1       | 0         | 14.43            | 14.57            | 14.50            | 15.0                      |
|           |            | 1       | 49        | <b>14.66</b>     | <b>14.73</b>     | <b>14.83</b>     |                           |
|           |            | 1       | 99        | 14.42            | 14.56            | 14.52            |                           |
|           |            | 50      | 0         | 13.62            | 13.55            | <b>13.52</b>     | 14.0                      |
|           |            | 50      | 25        | <b>13.66</b>     | 13.57            | <b>13.52</b>     |                           |
|           |            | 50      | 50        | 13.62            | <b>13.58</b>     | 13.49            |                           |
|           |            | 100     | 0         | <b>13.60</b>     | 13.59            | 13.46            | 14.0                      |
|           | 16QAM      | 1       | 0         | 13.35            | 13.85            | 13.70            | 14.5                      |
|           |            | 1       | 49        | 13.52            | 14.14            | 13.99            |                           |
|           |            | 1       | 99        | 13.31            | 13.82            | 13.66            |                           |
|           |            | 50      | 0         | 12.75            | 12.65            | 12.61            | 13.0                      |
|           |            | 50      | 25        | 12.78            | 12.65            | 12.66            |                           |
|           |            | 50      | 50        | 12.78            | 12.64            | 12.61            |                           |
|           |            | 100     | 0         | 12.62            | 12.66            | 12.49            | 13.0                      |

## 8.8. LTE Band 5

| 0         | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|-----------|------------|---------|-----------|--------------|--------------|--------------|---------------------|
|           |            |         |           | 20407        | 20525        | 20643        |                     |
| 1.4MHz    | QPSK       | 1       | 0         | 23.57        | 23.82        | <b>24.04</b> | 24.5                |
|           |            | 1       | 2         | <b>23.91</b> | 23.92        | 24.00        |                     |
|           |            | 1       | 5         | 23.88        | <b>24.03</b> | 23.91        |                     |
|           |            | 3       | 0         | 23.65        | 23.76        | 23.97        | 24.5                |
|           |            | 3       | 1         | <b>23.96</b> | <b>23.98</b> | <b>24.08</b> |                     |
|           |            | 3       | 3         | 23.70        | 23.92        | 23.94        |                     |
|           | 16QAM      | 6       | 0         | 22.87        | 23.17        | <b>23.21</b> | 23.5                |
|           |            | 1       | 0         | 23.03        | 23.21        | 23.26        | 23.5                |
|           |            | 1       | 2         | 22.82        | 23.05        | 23.04        |                     |
|           |            | 1       | 5         | 23.03        | 23.26        | 23.12        |                     |
|           |            | 3       | 0         | 22.94        | 22.76        | 22.82        | 23.5                |
|           |            | 3       | 1         | 23.05        | 23.25        | 23.17        |                     |
|           |            | 3       | 3         | 22.69        | 22.94        | 23.03        |                     |
|           |            | 6       | 0         | 21.89        | 22.00        | 22.15        | 22.5                |
| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|           |            |         |           | 20415        | 20525        | 20635        |                     |
| 3MHz      | QPSK       | 1       | 0         | 23.51        | 23.80        | 24.10        | 24.5                |
|           |            | 1       | 8         | <b>23.98</b> | <b>24.16</b> | <b>24.12</b> |                     |
|           |            | 1       | 14        | 23.69        | 24.06        | 24.01        |                     |
|           |            | 8       | 0         | 22.66        | 23.12        | 23.09        | 23.5                |
|           |            | 8       | 4         | 22.79        | <b>23.17</b> | <b>23.22</b> |                     |
|           |            | 8       | 7         | <b>22.86</b> | 23.11        | 23.14        |                     |
|           | 16QAM      | 15      | 0         | 22.88        | 23.00        | <b>23.20</b> | 23.5                |
|           |            | 1       | 0         | 22.86        | 22.81        | 22.85        | 23.5                |
|           |            | 1       | 8         | 23.02        | 23.21        | 23.10        |                     |
|           |            | 1       | 14        | 22.86        | 23.16        | 22.92        |                     |
|           |            | 8       | 0         | 21.67        | 22.10        | 22.16        | 22.5                |
|           |            | 8       | 4         | 21.92        | 22.22        | 22.09        |                     |
|           |            | 8       | 7         | 22.02        | 22.06        | 21.99        |                     |
|           |            | 15      | 0         | 21.78        | 22.05        | 22.32        | 22.5                |
| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|           |            |         |           | 20425        | 20525        | 20625        |                     |
| 5MHz      | QPSK       | 1       | 0         | 23.64        | 23.85        | 24.04        | 24.5                |
|           |            | 1       | 12        | <b>23.96</b> | 23.90        | <b>24.24</b> |                     |
|           |            | 1       | 24        | 23.75        | <b>23.99</b> | 24.10        |                     |
|           |            | 12      | 0         | 22.76        | 22.93        | 22.99        | 23.5                |
|           |            | 12      | 6         | 22.89        | 23.00        | 23.14        |                     |
|           |            | 12      | 13        | <b>22.92</b> | <b>23.04</b> | <b>23.23</b> |                     |
|           | 16QAM      | 25      | 0         | 22.91        | <b>23.21</b> | 23.06        | 23.5                |
|           |            | 1       | 0         | 22.85        | 22.66        | 22.91        | 23.5                |
|           |            | 1       | 12        | 22.93        | 23.20        | 23.30        |                     |
|           |            | 1       | 24        | 22.81        | 23.04        | 22.89        |                     |
|           |            | 12      | 0         | 21.81        | 22.01        | 22.17        | 22.5                |
|           |            | 12      | 6         | 21.79        | 22.10        | 22.37        |                     |
|           |            | 12      | 13        | 21.92        | 21.97        | 22.07        |                     |
|           |            | 25      | 0         | 21.83        | 22.14        | 22.16        | 22.5                |
| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|           |            |         |           | 20450        | 20525        | 20600        |                     |
| 10MHz     | QPSK       | 1       | 0         | 23.64        | 23.79        | 23.96        | 24.5                |
|           |            | 1       | 24        | <b>23.91</b> | <b>24.03</b> | <b>24.14</b> |                     |
|           |            | 1       | 49        | 23.77        | 23.94        | 24.01        |                     |
|           |            | 25      | 0         | 22.76        | 23.02        | 23.10        | 23.5                |

|  |       |    |    |              |              |              |      |
|--|-------|----|----|--------------|--------------|--------------|------|
|  |       | 25 | 12 | 22.89        | 23.07        | <b>23.13</b> |      |
|  |       | 25 | 25 | <b>22.94</b> | <b>23.11</b> | 23.12        |      |
|  |       | 50 | 0  | 22.90        | <b>23.12</b> | <b>23.12</b> |      |
|  | 16QAM | 1  | 0  | 22.79        | 22.79        | 22.96        | 23.5 |
|  |       | 1  | 24 | 23.04        | 23.14        | 23.25        |      |
|  |       | 1  | 49 | 22.83        | 23.01        | 23.00        |      |
|  |       | 25 | 0  | 21.81        | 22.13        | 22.21        | 22.5 |
|  |       | 25 | 12 | 21.93        | 22.12        | 22.23        |      |
|  |       | 25 | 25 | 21.95        | 22.12        | 22.13        |      |
|  |       | 50 | 0  | 21.90        | 22.06        | 22.19        |      |
|  |       |    |    |              |              |              |      |

## 8.9. LTE Band 7

| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|-----------|------------|---------|-----------|--------------|--------------|--------------|---------------------|
|           |            |         |           | 20775        | 21100        | 21425        |                     |
| 5MHz      | QPSK       | 1       | 0         | 16.92        | <b>16.99</b> | 16.92        | 17.5                |
|           |            | 1       | 12        | <b>16.99</b> | 16.98        | <b>17.24</b> |                     |
|           |            | 1       | 24        | 16.79        | 16.71        | 16.85        |                     |
|           |            | 12      | 0         | <b>16.13</b> | <b>15.89</b> | 15.74        | <b>16.5</b>         |
|           |            | 12      | 6         | 16.06        | 15.70        | 15.95        |                     |
|           |            | 12      | 13        | 16.07        | 15.85        | <b>15.96</b> |                     |
|           | 16QAM      | 25      | 0         | 15.98        | 15.76        | <b>16.02</b> | 16.5                |
|           |            | 1       | 0         | 15.83        | 16.23        | 16.40        | 16.5                |
|           |            | 1       | 12        | 16.33        | 16.42        | 16.49        |                     |
|           |            | 1       | 24        | 15.85        | 16.23        | 16.40        |                     |
|           |            | 12      | 0         | 15.08        | 14.97        | 14.94        | 15.5                |
|           |            | 12      | 6         | 14.95        | 15.06        | 14.89        |                     |
|           |            | 12      | 13        | 14.96        | 14.94        | 15.05        |                     |
|           |            | 25      | 0         | 15.05        | 15.01        | 14.87        | 15.5                |
| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|           |            |         |           | 20800        | 21100        | 21400        |                     |
| 10MHz     | QPSK       | 1       | 0         | 16.69        | <b>17.02</b> | 16.85        | 17.5                |
|           |            | 1       | 24        | 16.99        | <b>17.06</b> | <b>17.23</b> |                     |
|           |            | 1       | 49        | 16.85        | 16.87        | 16.91        |                     |
|           |            | 25      | 0         | <b>16.08</b> | 15.87        | 15.89        | <b>16.5</b>         |
|           |            | 25      | 12        | 16.05        | 15.88        | 15.85        |                     |
|           |            | 25      | 25        | 16.01        | <b>15.92</b> | <b>16.01</b> |                     |
|           | 16QAM      | 50      | 0         | 15.87        | 16.00        | <b>16.01</b> | 16.5                |
|           |            | 1       | 0         | 15.90        | 16.43        | 16.29        | 16.5                |
|           |            | 1       | 24        | 16.13        | 16.43        | 16.36        |                     |
|           |            | 1       | 49        | 16.06        | 16.20        | 16.33        |                     |
|           |            | 25      | 0         | 15.05        | 15.01        | 15.01        | 15.5                |
|           |            | 25      | 12        | 15.05        | 14.98        | 14.92        |                     |
|           |            | 25      | 25        | 15.06        | 14.85        | 14.91        |                     |
|           |            | 50      | 0         | 14.89        | 14.96        | 14.86        | 15.5                |
| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|           |            |         |           | 20825        | 21100        | 21375        |                     |
| 15MHz     | QPSK       | 1       | 0         | 16.70        | 16.88        | 16.89        | 17.5                |
|           |            | 1       | 38        | <b>17.17</b> | <b>17.08</b> | <b>17.33</b> |                     |
|           |            | 1       | 74        | 16.74        | 16.70        | 16.91        |                     |
|           |            | 36      | 0         | <b>16.12</b> | 15.88        | 15.74        | <b>16.5</b>         |
|           |            | 36      | 18        | 15.83        | 15.71        | <b>15.97</b> |                     |
|           |            | 36      | 37        | 15.97        | <b>15.90</b> | 15.87        |                     |
|           | 16QAM      | 75      | 0         | 15.79        | 15.93        | <b>16.03</b> | 16.5                |
|           |            | 1       | 0         | 15.84        | 16.40        | 16.45        | 16.5                |
|           |            | 1       | 38        | 16.13        | 16.45        | 16.45        |                     |
|           |            | 1       | 74        | 16.02        | 16.07        | 16.25        |                     |
|           |            | 36      | 0         | 14.88        | 14.81        | 15.02        | 15.5                |
|           |            | 36      | 18        | 14.97        | 14.98        | 14.80        |                     |
|           |            | 36      | 37        | 14.91        | 14.81        | 15.04        |                     |
|           |            | 75      | 0         | 14.93        | 14.87        | 14.91        | 15.5                |
| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|           |            |         |           | 20850        | 21100        | 21350        |                     |
| 20MHz     | QPSK       | 1       | 0         | 16.78        | 16.92        | 16.81        | 17.5                |
|           |            | 1       | 49        | <b>17.07</b> | <b>16.96</b> | <b>17.19</b> |                     |
|           |            | 1       | 99        | 16.75        | 16.78        | 16.77        |                     |
|           |            | 50      | 0         | <b>15.99</b> | <b>15.86</b> | 15.87        | <b>16.5</b>         |

|  |       |     |    |              |       |              |      |
|--|-------|-----|----|--------------|-------|--------------|------|
|  |       | 50  | 25 | 15.97        | 15.85 | <b>15.91</b> | 16.5 |
|  |       | 50  | 50 | 15.98        | 15.84 | 15.88        |      |
|  |       | 100 | 0  | <b>15.91</b> | 15.90 | 15.89        |      |
|  | 16QAM | 1   | 0  | 15.95        | 16.28 | 16.32        | 16.5 |
|  |       | 1   | 49 | 16.23        | 16.48 | 16.49        |      |
|  |       | 1   | 99 | 15.91        | 16.15 | 16.26        |      |
|  |       | 50  | 0  | 15.02        | 14.91 | 14.93        | 15.5 |
|  |       | 50  | 25 | 15.02        | 14.94 | 14.93        |      |
|  |       | 50  | 50 | 15.03        | 14.91 | 14.91        |      |
|  |       | 100 | 0  | 14.95        | 14.94 | 14.92        |      |

## 8.10. LTE Band 12

| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|-----------|------------|---------|-----------|--------------|--------------|--------------|---------------------|
|           |            |         |           | 23017        | 23095        | 23173        |                     |
| 1.4MHz    | QPSK       | 1       | 0         | 23.88        | 23.63        | 23.79        | 24.5                |
|           |            | 1       | 2         | <b>23.95</b> | <b>23.95</b> | 23.94        |                     |
|           |            | 1       | 5         | 23.79        | 23.89        | <b>24.10</b> |                     |
|           |            | 3       | 0         | <b>23.99</b> | 23.93        | 23.80        | 24.5                |
|           |            | 3       | 1         | 23.88        | <b>24.02</b> | <b>24.00</b> |                     |
|           |            | 3       | 3         | 23.92        | 23.92        | 23.91        |                     |
|           | 16QAM      | 6       | 0         | 22.96        | <b>23.11</b> | 22.96        | 23.5                |
|           |            | 1       | 0         | 22.98        | 23.08        | 22.99        | 23.5                |
|           |            | 1       | 2         | 22.76        | 23.24        | 23.03        |                     |
|           |            | 1       | 5         | 22.91        | 23.10        | 22.89        |                     |
|           |            | 3       | 0         | 22.84        | 22.80        | 22.65        | 23.5                |
|           |            | 3       | 1         | 22.74        | 23.28        | 22.85        |                     |
|           |            | 3       | 3         | 22.62        | 22.94        | 22.73        |                     |
|           |            | 6       | 0         | 21.89        | 22.11        | 22.02        | 22.5                |
| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|           |            |         |           | 23025        | 23095        | 23165        |                     |
| 3MHz      | QPSK       | 1       | 0         | 23.80        | 23.83        | 23.76        | 24.5                |
|           |            | 1       | 8         | <b>24.04</b> | <b>24.12</b> | 23.88        |                     |
|           |            | 1       | 14        | 23.93        | 23.92        | <b>24.12</b> |                     |
|           |            | 8       | 0         | <b>22.95</b> | 22.85        | 22.79        | 23.5                |
|           |            | 8       | 4         | 22.76        | 22.96        | 22.78        |                     |
|           |            | 8       | 7         | 22.93        | <b>23.18</b> | <b>23.07</b> |                     |
|           | 16QAM      | 15      | 0         | 22.78        | <b>23.12</b> | 22.78        | 23.5                |
|           |            | 1       | 0         | 22.75        | 22.74        | 22.70        | 23.5                |
|           |            | 1       | 8         | 22.80        | 23.09        | 23.01        |                     |
|           |            | 1       | 14        | 22.85        | 23.04        | 22.91        |                     |
|           |            | 8       | 0         | 21.81        | 22.07        | 22.05        | 22.5                |
|           |            | 8       | 4         | 21.82        | 21.99        | 22.10        |                     |
|           |            | 8       | 7         | 21.87        | 22.12        | 21.91        |                     |
|           |            | 15      | 0         | 21.88        | 22.27        | 22.02        | 22.5                |
| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|           |            |         |           | 23035        | 23095        | 23155        |                     |
| 5MHz      | QPSK       | 1       | 0         | <b>23.99</b> | 23.72        | 23.87        | 24.5                |
|           |            | 1       | 12        | 23.88        | 23.85        | <b>24.18</b> |                     |
|           |            | 1       | 24        | 23.78        | <b>23.88</b> | 24.11        |                     |
|           |            | 12      | 0         | 22.82        | 22.94        | 22.82        | 23.5                |
|           |            | 12      | 6         | 22.78        | <b>23.08</b> | 22.92        |                     |
|           |            | 12      | 13        | <b>22.92</b> | 23.02        | <b>22.94</b> |                     |
|           | 16QAM      | 25      | 0         | 22.85        | 23.02        | <b>23.07</b> | 23.5                |
|           |            | 1       | 0         | 22.54        | 22.98        | 22.85        | 23.5                |
|           |            | 1       | 12        | 22.89        | 23.11        | 22.85        |                     |
|           |            | 1       | 24        | 22.86        | 22.92        | 22.77        |                     |
|           |            | 12      | 0         | 21.76        | 22.16        | 22.09        | 22.5                |
|           |            | 12      | 6         | 22.09        | 22.05        | 22.10        |                     |
|           |            | 12      | 13        | 22.02        | 22.08        | 21.95        |                     |
|           |            | 25      | 0         | 21.99        | 22.11        | 22.08        | 22.5                |
| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|           |            |         |           | 23060        | 23095        | 23130        |                     |
| 10MHz     | QPSK       | 1       | 0         | 23.85        | 23.78        | 23.82        | 24.5                |
|           |            | 1       | 24        | <b>23.93</b> | <b>24.00</b> | <b>24.03</b> |                     |
|           |            | 1       | 49        | 23.78        | 23.84        | 24.01        |                     |
|           |            | 25      | 0         | 22.85        | 22.97        | 22.90        | 23.5                |

|  |       |    |    |              |              |              |      |
|--|-------|----|----|--------------|--------------|--------------|------|
|  |       | 25 | 12 | <b>22.86</b> | 22.93        | 22.91        |      |
|  |       | 25 | 25 | 22.80        | <b>23.14</b> | <b>22.97</b> |      |
|  |       | 50 | 0  | 22.91        | <b>23.12</b> | 22.93        |      |
|  | 16QAM | 1  | 0  | 22.69        | 22.85        | 22.73        | 23.5 |
|  |       | 1  | 24 | 22.86        | 23.16        | 22.97        |      |
|  |       | 1  | 49 | 22.72        | 22.98        | 22.77        |      |
|  |       | 25 | 0  | 21.86        | 22.08        | 22.02        | 22.5 |
|  |       | 25 | 12 | 21.94        | 22.03        | 21.99        |      |
|  |       | 25 | 25 | 21.89        | 22.21        | 21.96        |      |
|  |       | 50 | 0  | 21.93        | 22.24        | 21.97        |      |
|  |       |    |    |              |              |              |      |

## 8.11. LTE Band 17

| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|-----------|------------|---------|-----------|--------------|--------------|--------------|---------------------|
|           |            |         |           | 23755        | 23790        | 23825        |                     |
| 5MHz      | QPSK       | 1       | 0         | 23.68        | 23.73        | 23.94        | 24.5                |
|           |            | 1       | 12        | <b>24.01</b> | <b>24.19</b> | <b>24.11</b> |                     |
|           |            | 1       | 24        | 23.85        | 23.85        | 24.06        |                     |
|           |            | 12      | 0         | 23.19        | 23.12        | 22.96        | 23.5                |
|           |            | 12      | 6         | 23.15        | 23.05        | <b>23.07</b> |                     |
|           |            | 12      | 13        | <b>23.26</b> | <b>23.15</b> | 22.88        |                     |
|           | 16QAM      | 25      | 0         | <b>23.22</b> | 23.03        | 22.88        | 23.5                |
|           |            | 1       | 0         | 22.72        | 22.89        | 22.82        | 23.5                |
|           |            | 1       | 12        | 23.21        | 22.86        | 23.14        |                     |
|           |            | 1       | 24        | 22.79        | 22.99        | 22.88        |                     |
|           |            | 12      | 0         | 22.00        | 22.00        | 22.01        | 22.5                |
|           |            | 12      | 6         | 22.16        | 21.97        | 22.12        |                     |
|           |            | 12      | 13        | 22.19        | 21.95        | 21.98        |                     |
|           |            | 25      | 0         | 22.03        | 22.14        | 22.13        | 22.5                |
| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|           |            |         |           | 23780        | 23790        | 23800        |                     |
| 10MHz     | QPSK       | 1       | 0         | 23.81        | 23.83        | 23.89        | 24.5                |
|           |            | 1       | 24        | <b>24.01</b> | <b>24.05</b> | <b>24.07</b> |                     |
|           |            | 1       | 49        | 23.95        | 23.95        | 24.00        |                     |
|           |            | 25      | 0         | 23.05        | 22.97        | 22.94        | 23.5                |
|           |            | 25      | 12        | 23.02        | 23.02        | 22.96        |                     |
|           |            | 25      | 25        | <b>23.19</b> | <b>23.14</b> | <b>23.00</b> |                     |
|           | 16QAM      | 50      | 0         | <b>23.09</b> | 23.02        | 22.97        | 23.5                |
|           |            | 1       | 0         | 22.72        | 22.76        | 22.96        | 23.5                |
|           |            | 1       | 24        | 23.06        | 22.98        | 23.18        |                     |
|           |            | 1       | 49        | 22.79        | 22.84        | 22.96        |                     |
|           |            | 25      | 0         | 22.11        | 22.04        | 22.04        | 22.5                |
|           |            | 25      | 12        | 22.02        | 22.02        | 21.98        |                     |
|           |            | 25      | 25        | 22.18        | 22.10        | 22.02        |                     |
|           |            | 50      | 0         | 22.14        | 22.08        | 22.06        | 22.5                |



## 8.12. LTE Band 38

| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|-----------|------------|---------|-----------|--------------|--------------|--------------|---------------------|
|           |            |         |           | 37775        | 38000        | 38225        |                     |
| 5MHz      | QPSK       | 1       | 0         | 21.78        | 21.70        | 21.50        | 22.5                |
|           |            | 1       | 12        | <b>22.15</b> | <b>21.73</b> | <b>21.84</b> |                     |
|           |            | 1       | 24        | 21.59        | 21.39        | 21.82        |                     |
|           |            | 12      | 0         | 20.88        | 20.66        | 20.64        | 21.0                |
|           |            | 12      | 6         | <b>20.95</b> | <b>20.76</b> | <b>20.79</b> |                     |
|           |            | 12      | 13        | 20.70        | 20.61        | 20.59        |                     |
|           | 16QAM      | 25      | 0         | <b>20.85</b> | 20.80        | 20.69        | 21.0                |
|           |            | 1       | 0         | 20.85        | 20.45        | 20.56        | 21.0                |
|           |            | 1       | 12        | 20.84        | 20.58        | 20.64        |                     |
|           |            | 1       | 24        | 20.44        | 20.60        | 20.52        |                     |
|           |            | 12      | 0         | 19.68        | 19.82        | 19.57        | 20.0                |
|           |            | 12      | 6         | 19.81        | 19.45        | 19.82        |                     |
|           |            | 12      | 13        | 19.81        | 19.65        | 19.84        |                     |
|           |            | 25      | 0         | 19.89        | 19.76        | 19.69        | 20.0                |
| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|           |            |         |           | 37800        | 38000        | 38200        |                     |
| 10MHz     | QPSK       | 1       | 0         | 21.82        | 21.52        | 21.59        | 22.5                |
|           |            | 1       | 24        | <b>21.88</b> | <b>21.91</b> | <b>21.73</b> |                     |
|           |            | 1       | 49        | 21.54        | 21.49        | 21.61        |                     |
|           |            | 25      | 0         | 20.70        | 20.62        | 20.77        | 21.0                |
|           |            | 25      | 12        | <b>20.71</b> | <b>20.73</b> | 20.58        |                     |
|           |            | 25      | 25        | 20.70        | 20.49        | <b>20.78</b> |                     |
|           | 16QAM      | 50      | 0         | <b>20.80</b> | 20.65        | 20.67        | 21.0                |
|           |            | 1       | 0         | 20.87        | 20.68        | 20.37        | 21.0                |
|           |            | 1       | 24        | 20.80        | 20.63        | 20.81        |                     |
|           |            | 1       | 49        | 20.46        | 20.57        | 20.41        |                     |
|           |            | 25      | 0         | 19.73        | 19.59        | 19.60        | 20.0                |
|           |            | 25      | 12        | 19.87        | 19.65        | 19.80        |                     |
|           |            | 25      | 25        | 19.90        | 19.60        | 19.74        |                     |
|           |            | 50      | 0         | 19.77        | 19.72        | 19.81        | 20.0                |
| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|           |            |         |           | 37825        | 38000        | 38175        |                     |
| 15MHz     | QPSK       | 1       | 0         | 21.73        | 21.81        | 21.56        | 22.5                |
|           |            | 1       | 38        | <b>22.17</b> | <b>21.87</b> | <b>21.82</b> |                     |
|           |            | 1       | 74        | 21.69        | 21.44        | 21.77        |                     |
|           |            | 36      | 0         | <b>20.89</b> | <b>20.78</b> | 20.48        | 21.0                |
|           |            | 36      | 18        | 20.85        | 20.72        | 20.65        |                     |
|           |            | 36      | 37        | 20.84        | 20.48        | <b>20.75</b> |                     |
|           | 16QAM      | 75      | 0         | <b>20.78</b> | 20.71        | 20.72        | 21.0                |
|           |            | 1       | 0         | 20.75        | 20.57        | 20.38        | 21.0                |
|           |            | 1       | 38        | 20.88        | 20.75        | 20.75        |                     |
|           |            | 1       | 74        | 20.43        | 20.32        | 20.61        |                     |
|           |            | 36      | 0         | 19.75        | 19.82        | 19.61        | 20.0                |
|           |            | 36      | 18        | 19.97        | 19.45        | 19.72        |                     |
|           |            | 36      | 37        | 19.77        | 19.46        | 19.64        |                     |
|           |            | 75      | 0         | 19.90        | 19.60        | 19.78        | 20.0                |
| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|           |            |         |           | 37850        | 38000        | 38150        |                     |
| 20MHz     | QPSK       | 1       | 0         | 21.84        | 21.66        | 21.53        | 22.5                |
|           |            | 1       | 49        | <b>22.03</b> | <b>21.76</b> | <b>21.87</b> |                     |
|           |            | 1       | 99        | 21.61        | 21.52        | 21.67        |                     |
|           |            | 50      | 0         | <b>20.82</b> | <b>20.68</b> | 20.63        | 21.0                |

|  |       |     |    |              |       |              |      |
|--|-------|-----|----|--------------|-------|--------------|------|
|  |       | 50  | 25 | <b>20.82</b> | 20.64 | <b>20.72</b> |      |
|  |       | 50  | 50 | 20.76        | 20.59 | 20.65        |      |
|  |       | 100 | 0  | <b>20.80</b> | 20.65 | 20.65        |      |
|  | 16QAM | 1   | 0  | 20.76        | 20.60 | 20.43        | 21.0 |
|  |       | 1   | 49 | 20.91        | 20.71 | 20.75        |      |
|  |       | 1   | 99 | 20.52        | 20.46 | 20.54        |      |
|  |       | 50  | 0  | 19.83        | 19.67 | 19.72        | 20.0 |
|  |       | 50  | 25 | 19.86        | 19.57 | 19.74        |      |
|  |       | 50  | 50 | 19.77        | 19.56 | 19.73        |      |
|  |       | 100 | 0  | 19.78        | 19.65 | 19.70        | 20.0 |

### 8.13. LTE Band 40

| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|-----------|------------|---------|-----------|--------------|--------------|--------------|---------------------|
|           |            |         |           | 38675        | 39150        | 39625        |                     |
| 5MHz      | QPSK       | 1       | 0         | 21.95        | 21.48        | 21.45        | 22.5                |
|           |            | 1       | 12        | <b>22.28</b> | <b>22.02</b> | <b>21.54</b> |                     |
|           |            | 1       | 24        | 21.94        | 21.54        | 21.30        |                     |
|           |            | 12      | 0         | 20.81        | 20.63        | 20.33        | 21.0                |
|           |            | 12      | 6         | <b>20.96</b> | 20.51        | <b>20.49</b> |                     |
|           |            | 12      | 13        | 20.75        | <b>20.73</b> | 20.37        |                     |
|           | 16QAM      | 25      | 0         | <b>20.76</b> | 20.69        | 20.33        | 21.0                |
|           |            | 1       | 0         | 20.70        | 20.44        | 20.27        | 21.5                |
|           |            | 1       | 12        | 21.13        | 20.80        | 20.61        |                     |
|           |            | 1       | 24        | 20.57        | 20.28        | 20.30        |                     |
|           |            | 12      | 0         | 19.97        | 19.43        | 19.30        | 20.0                |
|           |            | 12      | 6         | 19.99        | 19.55        | 19.29        |                     |
|           |            | 12      | 13        | 19.82        | 19.56        | 19.40        |                     |
|           |            | 25      | 0         | 19.93        | 19.72        | 19.41        | 20.0                |
| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|           |            |         |           | 38700        | 39150        | 39600        |                     |
| 10MHz     | QPSK       | 1       | 0         | 22.01        | 21.62        | 21.37        | 22.5                |
|           |            | 1       | 24        | <b>22.18</b> | <b>21.87</b> | <b>21.52</b> |                     |
|           |            | 1       | 49        | 21.80        | 21.48        | 21.30        |                     |
|           |            | 25      | 0         | <b>20.90</b> | 20.55        | <b>20.42</b> | 21.0                |
|           |            | 25      | 12        | <b>20.90</b> | 20.59        | 20.41        |                     |
|           |            | 25      | 25        | 20.85        | <b>20.61</b> | 20.30        |                     |
|           | 16QAM      | 50      | 0         | <b>20.85</b> | 20.55        | 20.33        | 21.0                |
|           |            | 1       | 0         | 20.85        | 20.55        | 20.20        | 21.5                |
|           |            | 1       | 24        | 21.06        | 20.77        | 20.51        |                     |
|           |            | 1       | 49        | 20.70        | 20.39        | 20.16        |                     |
|           |            | 25      | 0         | 19.86        | 19.57        | 19.43        | 20.0                |
|           |            | 25      | 12        | 19.88        | 19.56        | 19.39        |                     |
|           |            | 25      | 25        | 19.84        | 19.58        | 19.27        |                     |
|           |            | 50      | 0         | 19.78        | 19.63        | 19.29        | 20.0                |

## 8.14. LTE Band 41

| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|-----------|------------|---------|-----------|--------------|--------------|--------------|---------------------|
|           |            |         |           | 40315        | 40740        | 41165        |                     |
| 5MHz      | QPSK       | 1       | 0         | 21.77        | 21.66        | 21.78        | 22.0                |
|           |            | 1       | 12        | <b>21.92</b> | 21.69        | <b>21.79</b> |                     |
|           |            | 1       | 24        | 21.63        | <b>21.70</b> | 21.51        |                     |
|           |            | 12      | 0         | 20.69        | <b>20.86</b> | <b>20.81</b> | 21.0                |
|           |            | 12      | 6         | 20.79        | 20.67        | 20.62        |                     |
|           |            | 12      | 13        | <b>20.89</b> | 20.72        | 20.66        |                     |
|           |            | 25      | 0         | <b>20.75</b> | <b>20.75</b> | 20.70        | 21.0                |
|           | 16QAM      | 1       | 0         | 20.59        | 20.56        | 20.60        | 21.0                |
|           |            | 1       | 12        | 20.97        | 20.85        | 20.80        |                     |
|           |            | 1       | 24        | 20.61        | 20.60        | 20.49        |                     |
|           |            | 12      | 0         | 19.58        | 19.90        | 19.67        | 20.0                |
|           |            | 12      | 6         | 19.68        | 19.87        | 19.64        |                     |
|           |            | 12      | 13        | 19.74        | 19.73        | 19.61        |                     |
|           |            | 25      | 0         | 19.65        | 19.64        | 19.65        | 20.0                |
|           |            |         |           |              |              |              |                     |
| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|           |            |         |           | 40340        | 40740        | 41140        |                     |
| 10MHz     | QPSK       | 1       | 0         | 21.64        | 21.61        | 21.67        | 22.0                |
|           |            | 1       | 24        | <b>21.84</b> | <b>21.78</b> | <b>21.98</b> |                     |
|           |            | 1       | 49        | 21.82        | 21.44        | 21.62        |                     |
|           |            | 25      | 0         | 20.56        | <b>20.76</b> | <b>20.86</b> | 21.0                |
|           |            | 25      | 12        | 20.82        | 20.76        | 20.58        |                     |
|           |            | 25      | 25        | <b>20.90</b> | 20.71        | 20.48        |                     |
|           |            | 50      | 0         | 20.61        | 20.57        | <b>20.73</b> | 21.0                |
|           | 16QAM      | 1       | 0         | 20.46        | 20.66        | 20.77        | 21.0                |
|           |            | 1       | 24        | 20.94        | 20.85        | 20.69        |                     |
|           |            | 1       | 49        | 20.74        | 20.52        | 20.41        |                     |
|           |            | 25      | 0         | 19.81        | 19.75        | 19.70        | 20.0                |
|           |            | 25      | 12        | 19.79        | 19.89        | 19.77        |                     |
|           |            | 25      | 25        | 19.74        | 19.83        | 19.41        |                     |
|           |            | 50      | 0         | 19.70        | 19.73        | 19.55        | 20.0                |
|           |            |         |           |              |              |              |                     |
| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|           |            |         |           | 40365        | 40740        | 41115        |                     |
| 15MHz     | QPSK       | 1       | 0         | 21.81        | 21.52        | 21.51        | 22.0                |
|           |            | 1       | 38        | <b>21.96</b> | <b>21.93</b> | <b>21.74</b> |                     |
|           |            | 1       | 74        | 21.66        | 21.70        | 21.58        |                     |
|           |            | 36      | 0         | 20.54        | 20.77        | <b>20.67</b> | 21.0                |
|           |            | 36      | 18        | <b>20.78</b> | 20.64        | 20.64        |                     |
|           |            | 36      | 37        | 20.74        | <b>20.80</b> | 20.65        |                     |
|           |            | 75      | 0         | <b>20.84</b> | 20.63        | 20.78        | 21.0                |
|           | 16QAM      | 1       | 0         | 20.70        | 20.51        | 20.72        | 21.0                |
|           |            | 1       | 38        | 20.89        | 20.61        | 20.89        |                     |
|           |            | 1       | 74        | 20.83        | 20.40        | 20.35        |                     |
|           |            | 36      | 0         | 19.81        | 19.86        | 19.79        | 20.0                |
|           |            | 36      | 18        | 19.74        | 19.85        | 19.79        |                     |
|           |            | 36      | 37        | 19.89        | 19.69        | 19.70        |                     |
|           |            | 75      | 0         | 19.65        | 19.89        | 19.69        | 20.0                |
|           |            |         |           |              |              |              |                     |
| Bandwidth | Modulation | RB size | RB offset | Channel      | Channel      | Channel      | Tune-up Limit (dBm) |
|           |            |         |           | 40390        | 40740        | 41090        |                     |
| 20MHz     | QPSK       | 1       | 0         | 21.67        | 21.57        | 21.63        | 22.0                |
|           |            | 1       | 49        | <b>21.94</b> | <b>21.82</b> | <b>21.84</b> |                     |
|           |            | 1       | 99        | 21.76        | 21.59        | 21.52        |                     |
|           |            | 50      | 0         | 20.65        | 20.73        | <b>20.77</b> | 21.0                |

|  |       |     |    |              |              |       |      |
|--|-------|-----|----|--------------|--------------|-------|------|
|  |       | 50  | 25 | <b>20.81</b> | <b>20.74</b> | 20.70 |      |
|  |       | 50  | 50 | 20.78        | 20.73        | 20.57 |      |
|  |       | 100 | 0  | <b>20.74</b> | 20.69        | 20.65 |      |
|  | 16QAM | 1   | 0  | 20.56        | 20.55        | 20.62 | 21.0 |
|  |       | 1   | 49 | 20.88        | 20.75        | 20.75 |      |
|  |       | 1   | 99 | 20.73        | 20.52        | 20.46 |      |
|  |       | 50  | 0  | 19.67        | 19.78        | 19.75 | 20.0 |
|  |       | 50  | 25 | 19.81        | 19.80        | 19.71 |      |
|  |       | 50  | 50 | 19.82        | 19.80        | 19.56 |      |
|  |       | 100 | 0  | 19.73        | 19.78        | 19.67 | 20.0 |

Body 1-g (0 mm)

**8.15. Power measurement result of 2.4GHz Wi-Fi.**

| Test Mode | Frequency[MHz] | AV Power (dBm) | Tune-up Limit (dBm) |
|-----------|----------------|----------------|---------------------|
| 802.11b   | 2412           | 13.17          | 14.0                |
|           | 2437           | 13.59          | 14.0                |
|           | 2462           | 13.57          | 14.0                |
| 802.11g   | 2412           | 14.51          | 15.0                |
|           | 2437           | 14.94          | 15.0                |
|           | 2462           | 13.80          | 15.0                |
| 802.11n20 | 2412           | 14.26          | 15.0                |
|           | 2437           | 14.93          | 15.0                |
|           | 2462           | 14.99          | 15.0                |
| 802.11n40 | 2422           | 12.58          | 13.0                |
|           | 2437           | 12.88          | 13.0                |
|           | 2452           | 12.97          | 13.0                |

## 8.16. Power measurement result of 5GHz Wi-Fi

| Test Mode  | Antenna | Frequency[MHz] | AV Power (dBm) | Tune-up Limit (dBm) |
|------------|---------|----------------|----------------|---------------------|
| 11A        | Ant1    | 5180           | 11.76          | 12.0                |
|            |         | 5200           | 11.77          | 12.0                |
|            |         | 5240           | 11.66          | 12.0                |
|            |         | 5260           | 12.15          | 12.5                |
|            |         | 5280           | 12.12          | 12.5                |
|            |         | 5320           | 12.16          | 12.5                |
|            |         | 5500           | 10.93          | 11.0                |
|            |         | 5580           | 10.97          | 11.0                |
|            |         | 5700           | 10.86          | 11.0                |
|            |         | 5720_UNII-2C   | 10.88          | 11.0                |
|            |         | 5720_UNII-3    | 3.20           | 4.0                 |
|            |         | 5745           | 12.25          | 12.5                |
|            |         | 5785           | 12.11          | 12.5                |
|            |         | 5825           | 12.27          | 12.5                |
| 11N20SISO  | Ant1    | 5180           | 11.60          | 12.0                |
|            |         | 5200           | 11.67          | 12.0                |
|            |         | 5240           | 11.58          | 12.0                |
|            |         | 5260           | 11.53          | 12.0                |
|            |         | 5280           | 11.65          | 12.0                |
|            |         | 5320           | 11.50          | 12.0                |
|            |         | 5500           | 10.75          | 11.0                |
|            |         | 5580           | 10.83          | 11.0                |
|            |         | 5700           | 10.92          | 11.0                |
|            |         | 5720_UNII-2C   | 10.95          | 11.0                |
|            |         | 5720_UNII-3    | 3.42           | 4.0                 |
|            |         | 5745           | 11.81          | 12.0                |
|            |         | 5785           | 11.61          | 12.0                |
|            |         | 5825           | 11.65          | 12.0                |
| 11AC20SISO | Ant1    | 5180           | 11.58          | 12.0                |
|            |         | 5200           | 11.60          | 12.0                |
|            |         | 5240           | 11.49          | 12.0                |
|            |         | 5260           | 11.54          | 12.0                |
|            |         | 5280           | 11.61          | 12.0                |
|            |         | 5320           | 11.59          | 12.0                |
|            |         | 5500           | 10.82          | 11.0                |
|            |         | 5580           | 10.85          | 11.0                |
|            |         | 5700           | 10.96          | 11.0                |
|            |         | 5720_UNII-2C   | 10.86          | 11.0                |
|            |         | 5720_UNII-3    | 3.34           | 4.0                 |
|            |         | 5745           | 11.88          | 12.0                |
|            |         | 5785           | 11.70          | 12.0                |
|            |         | 5825           | 11.69          | 12.0                |
| 11N40SISO  | Ant1    | 5190           | 11.88          | 12.0                |
|            |         | 5230           | 11.71          | 12.0                |
|            |         | 5270           | 11.68          | 12.0                |
|            |         | 5310           | 11.70          | 12.0                |
|            |         | 5510           | 11.46          | 11.5                |
|            |         | 5550           | 11.48          | 11.5                |
|            |         | 5670           | 11.14          | 11.5                |
|            |         | 5710_UNII-2C   | 10.77          | 11.0                |
|            |         | 5710_UNII-3    | -1.92          | -1.0                |
|            |         | 5755           | 11.68          | 12.0                |
| 11AC40SISO | Ant1    | 5795           | 11.70          | 12.0                |
|            |         | 5190           | 11.96          | 12.0                |
|            |         | 5230           | 11.77          | 12.0                |
|            |         | 5270           | 11.78          | 12.0                |
|            |         | 5310           | 11.76          | 12.0                |

|  |  |              |       |      |
|--|--|--------------|-------|------|
|  |  | 5510         | 11.50 | 11.5 |
|  |  | 5550         | 11.47 | 11.5 |
|  |  | 5670         | 11.09 | 11.5 |
|  |  | 5710_UNII-2C | 10.86 | 11.0 |
|  |  | 5710_UNII-3  | -1.91 | -1.0 |
|  |  | 5755         | 11.76 | 12.0 |
|  |  | 5795         | 11.65 | 12.0 |



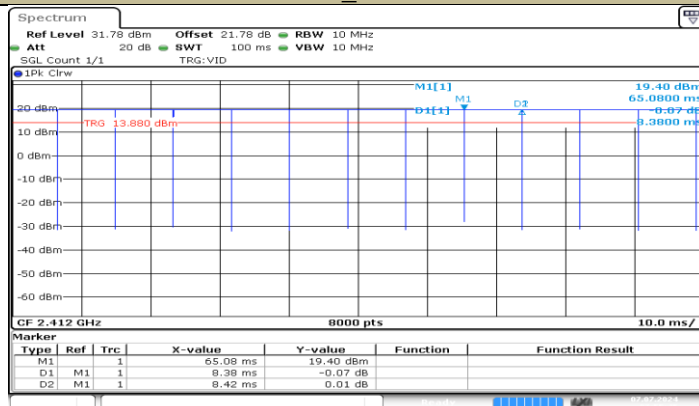
### 8.17. Power measurement result Bluetooth

| Test Mode | Frequency[MHz] | AV Power (dBm) | Tune-up Limit (dBm) |
|-----------|----------------|----------------|---------------------|
| DH5       | 2402           | 11.34          | 12.0                |
|           | 2441           | 11.25          |                     |
|           | 2480           | 11.03          |                     |
| 2DH5      | 2402           | 9.32           | 9.5                 |
|           | 2441           | 9.18           |                     |
|           | 2480           | 9.45           |                     |
| BLE_1M    | 2402           | 7.04           | 8.0                 |
|           | 2440           | 7.6            |                     |
|           | 2480           | 6.63           |                     |

## 8.18. Duty Cycle

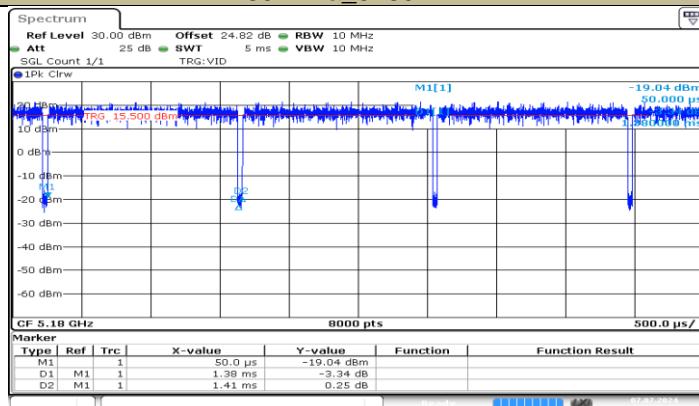
| Test Mode | Duty Cycle (%) |
|-----------|----------------|
| 802.11b   | 99.52          |
| 802.11a   | 97.87          |
| 802.11n40 | 94.12          |
| DH5       | 76.74          |

### 802.11b\_2412MHz



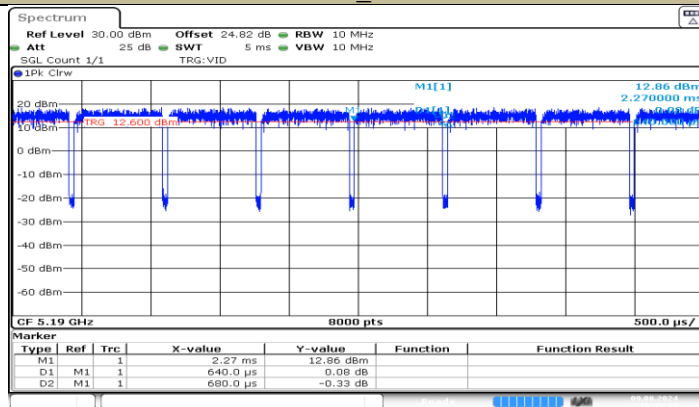
Date: 7 JUL 2024 07:55:45

### 802.11a\_5180MHz



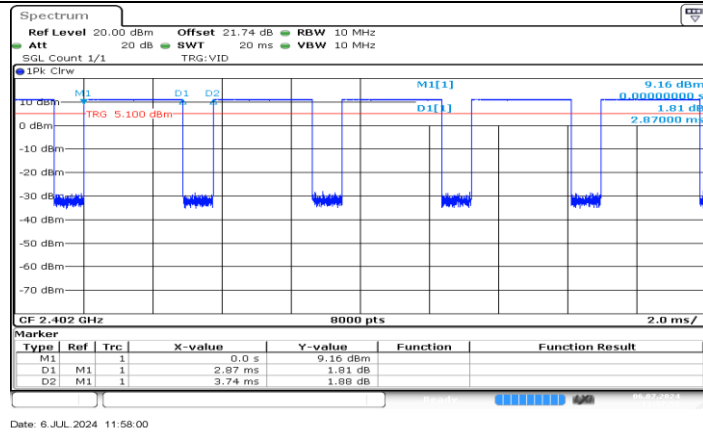
Date: 7 JUL 2024 10:49:57

### 802.11n40\_5190MHz



Date: 9 AUG 2024 10:49:13

### BT DH5\_2402MHz



## 9. RF Exposure Conditions

Details of antenna to edge distance can be found in attachment 4791364876-1-SAR-1\_App A Photo

### Per FCC KDB 616217 D04

The overall diagonal dimension of the display section of a tablet is > 20cm, the bottom surface and edges of the tablet should be selected for SAR evaluation at a 0mm separation distance, Exposures from antennas through the front surface of the display section of a full-size tablet, away from the edges, are generally limited to the user's hands. Exposures to hands for typical consumer transmitters used in tablets are not expected to exceed the extremity SAR limit; therefore, SAR evaluation for the front surface of tablet display screens are generally not necessary, except for tablets that are designed to require continuous operations with the hand(s) next to the antenna(s)

### Per FCC KDB 447498 D01:

1. The 1-g SAR and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances  $\leq 50$  mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$  for 1-g SAR and  $\leq 7.5$  for product specific 10-g SAR, where:

- $f(\text{GHz})$  is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

2. The SAR exclusion threshold for distances >50mm is defined by the following equation, as illustrated in KDB 447498 D01 Appendix B:

a) at 100 MHz to 1500 MHz

[Power allowed at numeric threshold for 50 mm in step 1) + (test separation distance - 50 mm) · (  $f(\text{MHz})/150$ )] mW

b) at > 1500 MHz and  $\leq 6$  GHz

[Power allowed at numeric Threshold at 50 mm in step 1) + (test separation distance - 50 mm) · 10] mW

3. The test separation distances required for a device to demonstrate SAR or MPE compliance must be sufficiently conservative to support the operational separation distances required by the device and its antennas and radiating structures. For devices such as tablets and transmitters embedded in keyboard sections of laptop computers that are typically used in close proximity to users, the test separation distance is determined by the smallest distance between the outer surface of the device and the user. For larger devices, as the antenna operational separation distance increases to where the SAR characteristics of the device and its antennas are not directly influenced by the user, such as antennas along the top and upper side edges of laptop computer displays or opposite and adjacent edges of tablets, the test separation distance is normally determined by the closest separation between the antenna and the user.

For GSM 850 1-g SAR (antenna to edges separation distance less than 50mm)

| Position     | Frequency (MHz) | Power (dBm) | Power (mW) | Separation Distance (mm) | Calculation Result | Threshold | SAR Test |
|--------------|-----------------|-------------|------------|--------------------------|--------------------|-----------|----------|
| Back surface | 836.6           | 25.00       | 316.23     | 5.00                     | 57.8               | 3.0       | Required |
| Left edge    | 836.6           | 25.00       | 316.23     | 42.00                    | 6.9                | 3.0       | Required |
| Right edge   | 836.6           | 25.00       | 316.23     | 5.00                     | 57.8               | 3.0       | Required |
| Bottom edge  | 836.6           | 25.00       | 316.23     | 6.00                     | 48.2               | 3.0       | Required |

For GSM 850 1-g SAR (antenna to edges separation distance greater than 50mm)

| Position | Frequency (MHz) | Power (dBm) | Power (mW) | Power allowed at 50mm | Separation Distance (mm) | Calculation Result (mW) | SAR Test |
|----------|-----------------|-------------|------------|-----------------------|--------------------------|-------------------------|----------|
| Top edge | 836.6           | 25.00       | 316.23     | 164.00                | 180                      | 889.05                  | Excluded |

Note:

- 1) Because the power in mW is less than the calculation result, so SAR evaluation for corresponding position is not required.

For GSM 1900 1-g SAR (antenna to edges separation distance less than 50mm)

| Position     | Frequency (MHz) | Power (dBm) | Power (mW) | Separation Distance (mm) | Calculation Result | Threshold | SAR Test |
|--------------|-----------------|-------------|------------|--------------------------|--------------------|-----------|----------|
| Back surface | 1880            | 19.50       | 89.13      | 5.00                     | 24.4               | 3.0       | Required |
| Left edge    | 1880            | 19.50       | 89.13      | 42.00                    | 2.9                | 3.0       | Excluded |
| Right edge   | 1880            | 19.50       | 89.13      | 5.00                     | 24.4               | 3.0       | Required |
| Bottom edge  | 1880            | 19.50       | 89.13      | 6.00                     | 20.4               | 3.0       | Required |

For GSM 1900 1-g SAR (antenna to edges separation distance greater than 50mm)

| Position | Frequency (MHz) | Power (dBm) | Power (mW) | Power allowed at 50mm | Separation Distance (mm) | Calculation Result (mW) | SAR Test |
|----------|-----------------|-------------|------------|-----------------------|--------------------------|-------------------------|----------|
| Top edge | 1880            | 19.50       | 89.13      | 109.40                | 180.00                   | 1409.40                 | Excluded |

Note:

- 1) Because the power in mW is less than the calculation result, so SAR evaluation for corresponding position is not required.

For WCDMA B2 1-g SAR (antenna to edges separation distance less than 50mm)

| Position     | Frequency (MHz) | Power (dBm) | Power (mW) | Separation Distance (mm) | Calculation Result | Threshold | SAR Test |
|--------------|-----------------|-------------|------------|--------------------------|--------------------|-----------|----------|
| Back surface | 1880            | 15.00       | 31.62      | 5.00                     | 8.7                | 3.0       | Required |
| Left edge    | 1880            | 15.00       | 31.62      | 42.00                    | 1.0                | 3.0       | Excluded |
| Right edge   | 1880            | 15.00       | 31.62      | 5.00                     | 8.7                | 3.0       | Required |
| Bottom edge  | 1880            | 15.00       | 31.62      | 6.00                     | 7.2                | 3.0       | Required |

For WCDMA B2 1-g SAR (antenna to edges separation distance greater than 50mm)

| Position | Frequency (MHz) | Power (dBm) | Power (mW) | Power allowed at 50mm | Separation Distance (mm) | Calculation Result (mW) | SAR Test |
|----------|-----------------|-------------|------------|-----------------------|--------------------------|-------------------------|----------|
| Top edge | 1880            | 15.00       | 31.62      | 109.40                | 180.00                   | 1409.40                 | Excluded |

Note:

- 1) Because the power in mW is less than the calculation result, so SAR evaluation for corresponding position is not required.

For WCDMA B4 1-g SAR (antenna to edges separation distance less than 50mm)

| Position     | Frequency (MHz) | Power (dBm) | Power (mW) | Separation Distance (mm) | Calculation Result | Threshold | SAR Test |
|--------------|-----------------|-------------|------------|--------------------------|--------------------|-----------|----------|
| Back surface | 1732.5          | 14.50       | 28.18      | 5.00                     | 7.4                | 3.0       | Required |
| Left edge    | 1732.5          | 14.50       | 28.18      | 42.00                    | 0.9                | 3.0       | Excluded |
| Right edge   | 1732.5          | 14.50       | 28.18      | 5.00                     | 7.4                | 3.0       | Required |
| Bottom edge  | 1732.5          | 14.50       | 28.18      | 6.00                     | 6.2                | 3.0       | Required |

For WCDMA B4 1-g SAR (antenna to edges separation distance greater than 50mm)

| Position | Frequency (MHz) | Power (dBm) | Power (mW) | Power allowed at 50mm | Separation Distance (mm) | Calculation Result (mW) | SAR Test |
|----------|-----------------|-------------|------------|-----------------------|--------------------------|-------------------------|----------|
| Top edge | 1732.5          | 14.5        | 28.18      | 113.96                | 180.00                   | 1413.96                 | Excluded |

Note:

- 1) Because the power in mW is less than the calculation result, so SAR evaluation for corresponding position is not required.

For WCDMA B5 1-g SAR (antenna to edges separation distance less than 50mm)

| Position     | Frequency (MHz) | Power (dBm) | Power (mW) | Separation Distance (mm) | Calculation Result | Threshold | SAR Test |
|--------------|-----------------|-------------|------------|--------------------------|--------------------|-----------|----------|
| Back surface | 836.4           | 22.00       | 158.49     | 5.00                     | 29.0               | 3.0       | Required |
| Left edge    | 836.4           | 22.00       | 158.49     | 42.00                    | 3.5                | 3.0       | Required |
| Right edge   | 836.4           | 22.00       | 158.49     | 5.00                     | 29.0               | 3.0       | Required |
| Bottom edge  | 836.4           | 22.00       | 158.49     | 6.00                     | 24.2               | 3.0       | Required |

For WCDMA B5 1-g SAR (antenna to edges separation distance greater than 50mm)

| Position | Frequency (MHz) | Power (dBm) | Power (mW) | Power allowed at 50mm | Separation Distance (mm) | Calculation Result (mW) | SAR Test |
|----------|-----------------|-------------|------------|-----------------------|--------------------------|-------------------------|----------|
| Top edge | 836.4           | 22.00       | 158.49     | 164.02                | 180                      | 888.90                  | Excluded |

Note:

- 1) Because the power in mW is less than the calculation result, so SAR evaluation for corresponding position is not required.

For LTE B2 1-g SAR (antenna to edges separation distance less than 50mm)

| Position     | Frequency (MHz) | Power (dBm) | Power (mW) | Separation Distance (mm) | Calculation Result | Threshold | SAR Test |
|--------------|-----------------|-------------|------------|--------------------------|--------------------|-----------|----------|
| Back surface | 1900            | 17.00       | 50.12      | 5.00                     | 13.8               | 3.0       | Required |
| Left edge    | 1900            | 17.00       | 50.12      | 42.00                    | 1.6                | 3.0       | Excluded |
| Right edge   | 1900            | 17.00       | 50.12      | 5.00                     | 13.8               | 3.0       | Required |
| Bottom edge  | 1900            | 17.00       | 50.12      | 6.00                     | 11.5               | 3.0       | Required |

For LTE B2 1-g SAR (antenna to edges separation distance greater than 50mm)

| Position | Frequency (MHz) | Power (dBm) | Power (mW) | Power allowed at 50mm | Separation Distance (mm) | Calculation Result (mW) | SAR Test |
|----------|-----------------|-------------|------------|-----------------------|--------------------------|-------------------------|----------|
| Top edge | 1900            | 17.00       | 50.12      | 108.82                | 180.00                   | 1408.82                 | Excluded |

Note:

- 1) Because the power in mW is less than the calculation result, so SAR evaluation for corresponding position is not required.

For LTE B4 1-g SAR (antenna to edges separation distance less than 50mm)

| Position     | Frequency (MHz) | Power (dBm) | Power (mW) | Separation Distance (mm) | Calculation Result | Threshold | SAR Test |
|--------------|-----------------|-------------|------------|--------------------------|--------------------|-----------|----------|
| Back surface | 1745            | 15.00       | 31.62      | 5.00                     | 8.4                | 3.0       | Required |
| Left edge    | 1745            | 15.00       | 31.62      | 42.00                    | 1.0                | 3.0       | Excluded |
| Right edge   | 1745            | 15.00       | 31.62      | 5.00                     | 8.4                | 3.0       | Required |
| Bottom edge  | 1745            | 15.00       | 31.62      | 6.00                     | 7.0                | 3.0       | Required |

For LTE B4 1-g SAR (antenna to edges separation distance greater than 50mm)

| Position | Frequency (MHz) | Power (dBm) | Power (mW) | Power allowed at 50mm | Separation Distance (mm) | Calculation Result (mW) | SAR Test |
|----------|-----------------|-------------|------------|-----------------------|--------------------------|-------------------------|----------|
| Top edge | 1745            | 15.00       | 31.62      | 113.55                | 180.00                   | 1413.55                 | Excluded |

Note:

- 1) Because the power in mW is less than the calculation result, so SAR evaluation for corresponding position is not required.

For LTE B5 1-g SAR (antenna to edges separation distance less than 50mm)

| Position     | Frequency (MHz) | Power (dBm) | Power (mW) | Separation Distance (mm) | Calculation Result | Threshold | SAR Test |
|--------------|-----------------|-------------|------------|--------------------------|--------------------|-----------|----------|
| Back surface | 844             | 24.50       | 281.84     | 5.00                     | 51.8               | 3.0       | Required |
| Left edge    | 844             | 24.50       | 281.84     | 42.00                    | 6.2                | 3.0       | Required |
| Right edge   | 844             | 24.50       | 281.84     | 5.00                     | 51.8               | 3.0       | Required |
| Bottom edge  | 844             | 24.50       | 281.84     | 6.00                     | 43.2               | 3.0       | Required |

For LTE B5 1-g SAR (antenna to edges separation distance greater than 50mm)

| Position | Frequency (MHz) | Power (dBm) | Power (mW) | Power allowed at 50mm | Separation Distance (mm) | Calculation Result (mW) | SAR Test |
|----------|-----------------|-------------|------------|-----------------------|--------------------------|-------------------------|----------|
| Top edge | 844             | 24.50       | 281.84     | 163.28                | 180                      | 894.74                  | Excluded |

Note:

- 1) Because the power in mW is less than the calculation result, so SAR evaluation for corresponding position is not required.



For LTE B7 1-g SAR (antenna to edges separation distance less than 50mm)

| Position     | Frequency (MHz) | Power (dBm) | Power (mW) | Separation Distance (mm) | Calculation Result | Threshold | SAR Test |
|--------------|-----------------|-------------|------------|--------------------------|--------------------|-----------|----------|
| Back surface | 2560            | 17.50       | 56.23      | 5.00                     | 18.0               | 3.0       | Required |
| Left edge    | 2560            | 17.50       | 56.23      | 42.00                    | 2.1                | 3.0       | Excluded |
| Right edge   | 2560            | 17.50       | 56.23      | 5.00                     | 18.0               | 3.0       | Required |
| Bottom edge  | 2560            | 17.50       | 56.23      | 6.00                     | 15.0               | 3.0       | Required |

For LTE B7 1-g SAR (antenna to edges separation distance greater than 50mm)

| Position | Frequency (MHz) | Power (dBm) | Power (mW) | Power allowed at 50mm | Separation Distance (mm) | Calculation Result (mW) | SAR Test |
|----------|-----------------|-------------|------------|-----------------------|--------------------------|-------------------------|----------|
| Top edge | 2560            | 17.50       | 56.23      | 93.75                 | 180.00                   | 1393.75                 | Excluded |

Note:

- 1) Because the power in mW is less than the calculation result, so SAR evaluation for corresponding position is not required.

For LTE B12 1-g SAR (antenna to edges separation distance less than 50mm)

| Position     | Frequency (MHz) | Power (dBm) | Power (mW) | Separation Distance (mm) | Calculation Result | Threshold | SAR Test |
|--------------|-----------------|-------------|------------|--------------------------|--------------------|-----------|----------|
| Back surface | 711             | 24.50       | 281.84     | 5.00                     | 47.5               | 3.0       | Required |
| Left edge    | 711             | 24.50       | 281.84     | 42.00                    | 5.7                | 3.0       | Required |
| Right edge   | 711             | 24.50       | 281.84     | 5.00                     | 47.5               | 3.0       | Required |
| Bottom edge  | 711             | 24.50       | 281.84     | 6.00                     | 39.6               | 3.0       | Required |

For LTE B12 1-g SAR (antenna to edges separation distance greater than 50mm)

| Position | Frequency (MHz) | Power (dBm) | Power (mW) | Power allowed at 50mm | Separation Distance (mm) | Calculation Result (mW) | SAR Test |
|----------|-----------------|-------------|------------|-----------------------|--------------------------|-------------------------|----------|
| Top edge | 711             | 24.50       | 281.84     | 177.89                | 180                      | 794.09                  | Excluded |

Note:

- 1) Because the power in mW is less than the calculation result, so SAR evaluation for corresponding position is not required.

For LTE B38 1-g SAR (antenna to edges separation distance less than 50mm)

| Position     | Frequency (MHz) | Power (dBm) | Power (mW) | Separation Distance (mm) | Calculation Result | Threshold | SAR Test |
|--------------|-----------------|-------------|------------|--------------------------|--------------------|-----------|----------|
| Back surface | 2580            | 22.50       | 177.83     | 5.00                     | 57.1               | 3.0       | Required |
| Left edge    | 2580            | 22.50       | 177.83     | 42.00                    | 6.8                | 3.0       | Required |
| Right edge   | 2580            | 22.50       | 177.83     | 5.00                     | 57.1               | 3.0       | Required |
| Bottom edge  | 2580            | 22.50       | 177.83     | 6.00                     | 47.6               | 3.0       | Required |

For LTE B38 1-g SAR (antenna to edges separation distance greater than 50mm)

| Position | Frequency (MHz) | Power (dBm) | Power (mW) | Power allowed at 50mm | Separation Distance (mm) | Calculation Result (mW) | SAR Test |
|----------|-----------------|-------------|------------|-----------------------|--------------------------|-------------------------|----------|
| Top edge | 2580            | 22.50       | 177.83     | 93.39                 | 180.00                   | 1393.39                 | Excluded |

Note:

- 1) Because the power in mW is less than the calculation result, so SAR evaluation for corresponding position is not required.

For LTE B40 1-g SAR (antenna to edges separation distance less than 50mm)

| Position     | Frequency (MHz) | Power (dBm) | Power (mW) | Separation Distance (mm) | Calculation Result | Threshold | SAR Test |
|--------------|-----------------|-------------|------------|--------------------------|--------------------|-----------|----------|
| Back surface | 2310            | 22.50       | 177.83     | 5.00                     | 54.1               | 3.0       | Required |
| Left edge    | 2310            | 22.50       | 177.83     | 42.00                    | 6.4                | 3.0       | Required |
| Right edge   | 2310            | 22.50       | 177.83     | 5.00                     | 54.1               | 3.0       | Required |
| Bottom edge  | 2310            | 22.50       | 177.83     | 6.00                     | 45.0               | 3.0       | Required |

For LTE B40 1-g SAR (antenna to edges separation distance greater than 50mm)

| Position | Frequency (MHz) | Power (dBm) | Power (mW) | Power allowed at 50mm | Separation Distance (mm) | Calculation Result (mW) | SAR Test |
|----------|-----------------|-------------|------------|-----------------------|--------------------------|-------------------------|----------|
| Top edge | 2310            | 22.50       | 177.83     | 98.69                 | 180.00                   | 1398.69                 | Excluded |

Note:

- 1) Because the power in mW is less than the calculation result, so SAR evaluation for corresponding position is not required.

For LTE B41 1-g SAR (antenna to edges separation distance less than 50mm)

| Position     | Frequency (MHz) | Power (dBm) | Power (mW) | Separation Distance (mm) | Calculation Result | Threshold | SAR Test |
|--------------|-----------------|-------------|------------|--------------------------|--------------------|-----------|----------|
| Back surface | 2570            | 22.00       | 158.49     | 5.00                     | 50.8               | 3.0       | Required |
| Left edge    | 2570            | 22.00       | 158.49     | 42.00                    | 6.0                | 3.0       | Required |
| Right edge   | 2570            | 22.00       | 158.49     | 5.00                     | 50.8               | 3.0       | Required |
| Bottom edge  | 2570            | 22.00       | 158.49     | 6.00                     | 42.3               | 3.0       | Required |

For LTE B41 1-g SAR (antenna to edges separation distance greater than 50mm)

| Position | Frequency (MHz) | Power (dBm) | Power (mW) | Power allowed at 50mm | Separation Distance (mm) | Calculation Result (mW) | SAR Test |
|----------|-----------------|-------------|------------|-----------------------|--------------------------|-------------------------|----------|
| Top edge | 2570            | 22.00       | 158.49     | 93.57                 | 180.00                   | 1393.57                 | Excluded |

Note:

- 1) Because the power in mW is less than the calculation result, so SAR evaluation for corresponding position is not required.

For 2.4G Wi-Fi 1-g SAR (antenna to edges separation distance less than 50mm)

| Position     | Frequency (MHz) | Power (dBm) | Power (mW) | Separation Distance (mm) | Calculation Result | Threshold | SAR Test |
|--------------|-----------------|-------------|------------|--------------------------|--------------------|-----------|----------|
| Back surface | 2437            | 14.00       | 25.12      | 7.00                     | 5.6                | 3.0       | Required |
| Left edge    | 2437            | 14.00       | 25.12      | 8.00                     | 4.9                | 3.0       | Required |
| Bottom edge  | 2437            | 14.00       | 25.12      | 21.00                    | 1.9                | 3.0       | Excluded |

For 2.4G Wi-Fi 1-g SAR (antenna to edges separation distance greater than 50mm)

| Position   | Frequency (MHz) | Power (dBm) | Power (mW) | Power allowed at 50mm | Separation Distance (mm) | Calculation Result (mW) | SAR Test |
|------------|-----------------|-------------|------------|-----------------------|--------------------------|-------------------------|----------|
| Right edge | 2437            | 14.00       | 25.12      | 96.09                 | 107                      | 666.09                  | Excluded |
| Top edge   | 2437            | 14.00       | 25.12      | 96.09                 | 145.00                   | 1046.09                 | Excluded |

Note:

- 1) Because the power in mW is less than the calculation result, so SAR evaluation for corresponding position is not required.

For U-NII-2A 1-g SAR (antenna to edges separation distance less than 50mm)

| Position     | Frequency (MHz) | Power (dBm) | Power (mW) | Separation Distance (mm) | Calculation Result | Threshold | SAR Test |
|--------------|-----------------|-------------|------------|--------------------------|--------------------|-----------|----------|
| Back surface | 5320            | 12.50       | 17.78      | 7.00                     | 5.9                | 3.0       | Required |
| Left edge    | 5320            | 12.50       | 17.78      | 8.00                     | 5.1                | 3.0       | Required |
| Bottom edge  | 5320            | 12.50       | 17.78      | 21.00                    | 2.0                | 3.0       | Excluded |

For U-NII-2A 1-g SAR (antenna to edges separation distance greater than 50mm)

| Position   | Frequency (MHz) | Power (dBm) | Power (mW) | Power allowed at 50mm | Separation Distance (mm) | Calculation Result (mW) | SAR Test |
|------------|-----------------|-------------|------------|-----------------------|--------------------------|-------------------------|----------|
| Right edge | 5320            | 12.50       | 17.78      | 65.03                 | 107                      | 635.03                  | Excluded |
| Top edge   | 5320            | 12.50       | 17.78      | 65.03                 | 145.00                   | 1015.03                 | Excluded |

Note:

- 1) Because the power in mW is less than the calculation result, so SAR evaluation for corresponding position is not required.

For U-NII-2C 1-g SAR (antenna to edges separation distance less than 50mm)

| Position     | Frequency (MHz) | Power (dBm) | Power (mW) | Separation Distance (mm) | Calculation Result | Threshold | SAR Test |
|--------------|-----------------|-------------|------------|--------------------------|--------------------|-----------|----------|
| Back surface | 5500            | 11.50       | 14.13      | 7.00                     | 4.7                | 3.0       | Required |
| Left edge    | 5500            | 11.50       | 14.13      | 8.00                     | 4.1                | 3.0       | Required |
| Bottom edge  | 5500            | 11.50       | 14.13      | 21.00                    | 1.6                | 3.0       | Excluded |

For U-NII-2C 1-g SAR (antenna to edges separation distance greater than 50mm)

| Position   | Frequency (MHz) | Power (dBm) | Power (mW) | Power allowed at 50mm | Separation Distance (mm) | Calculation Result (mW) | SAR Test |
|------------|-----------------|-------------|------------|-----------------------|--------------------------|-------------------------|----------|
| Right edge | 5500            | 11.50       | 14.13      | 63.96                 | 107                      | 633.96                  | Excluded |
| Top edge   | 5500            | 11.50       | 14.13      | 63.96                 | 145.00                   | 1013.96                 | Excluded |

Note:

- 1) Because the power in mW is less than the calculation result, so SAR evaluation for corresponding position is not required.

For U-NII-3 1-g SAR (antenna to edges separation distance less than 50mm)

| Position     | Frequency (MHz) | Power (dBm) | Power (mW) | Separation Distance (mm) | Calculation Result | Threshold | SAR Test |
|--------------|-----------------|-------------|------------|--------------------------|--------------------|-----------|----------|
| Back surface | 5825            | 12.50       | 17.78      | 7.00                     | 6.1                | 3.0       | Required |
| Left edge    | 5825            | 12.50       | 17.78      | 8.00                     | 5.4                | 3.0       | Required |
| Bottom edge  | 5825            | 12.50       | 17.78      | 21.00                    | 2.0                | 3.0       | Excluded |

For U-NII-3 1-g SAR (antenna to edges separation distance greater than 50mm)

| Position   | Frequency (MHz) | Power (dBm) | Power (mW) | Power allowed at 50mm | Separation Distance (mm) | Calculation Result (mW) | SAR Test |
|------------|-----------------|-------------|------------|-----------------------|--------------------------|-------------------------|----------|
| Right edge | 5825            | 12.50       | 17.78      | 62.15                 | 107                      | 632.15                  | Excluded |
| Top edge   | 5825            | 12.50       | 17.78      | 62.15                 | 145.00                   | 1012.15                 | Excluded |

Note:

- 1) Because the power in mW is less than the calculation result, so SAR evaluation for corresponding position is not required.

For BT 1-g SAR (antenna to edges separation distance less than 50mm)

| Position     | Frequency (MHz) | Power (dBm) | Power (mW) | Separation Distance (mm) | Calculation Result | Threshold | SAR Test |
|--------------|-----------------|-------------|------------|--------------------------|--------------------|-----------|----------|
| Back surface | 2402            | 12.00       | 15.85      | 7.00                     | 3.5                | 3.0       | Required |
| Left edge    | 2402            | 12.00       | 15.85      | 8.00                     | 3.1                | 3.0       | Required |
| Bottom edge  | 2402            | 12.00       | 15.85      | 21.00                    | 1.2                | 3.0       | Excluded |

For BT 1-g SAR (antenna to edges separation distance greater than 50mm)

| Position   | Frequency (MHz) | Power (dBm) | Power (mW) | Power allowed at 50mm | Separation Distance (mm) | Calculation Result (mW) | SAR Test |
|------------|-----------------|-------------|------------|-----------------------|--------------------------|-------------------------|----------|
| Right edge | 2402            | 12.00       | 15.85      | 96.78                 | 107.00                   | 666.78                  | Excluded |
| Top edge   | 2402            | 12.00       | 15.85      | 96.78                 | 145                      | 1046.78                 | Excluded |

Note:

- 1) Because the power in mW is less than the calculation result, so SAR evaluation for corresponding position is not required.

## 10. SAR exclusion evaluation for NFC

As per KDB447498 D01, For frequencies below 100 MHz, the following may be considered for SAR test exclusion (also illustrated in Appendix C):

### Appendix C

#### *SAR Test Exclusion Thresholds for < 100 MHz and < 200 mm*

Approximate SAR test exclusion power thresholds at selected frequencies and test separation distances are illustrated in the following table. The equation and threshold in 4.3.1 must be applied to determine SAR test exclusion.

| MHz  | < 50 | 50   | 60   | 70   | 80   | 90   | 100  | 110  | 120  | 130  | 140  | 150  | 160  | 170  | 180  | 190  | mm |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|----|
| 100  | 237  | 474  | 481  | 487  | 494  | 501  | 507  | 514  | 521  | 527  | 534  | 541  | 547  | 554  | 561  | 567  | mW |
| 50   | 308  | 617  | 625  | 634  | 643  | 651  | 660  | 669  | 677  | 686  | 695  | 703  | 712  | 721  | 729  | 738  |    |
| 10   | 474  | 948  | 961  | 975  | 988  | 1001 | 1015 | 1028 | 1041 | 1055 | 1068 | 1081 | 1095 | 1108 | 1121 | 1135 |    |
| 1    | 711  | 1422 | 1442 | 1462 | 1482 | 1502 | 1522 | 1542 | 1562 | 1582 | 1602 | 1622 | 1642 | 1662 | 1682 | 1702 |    |
| 0.1  | 948  | 1896 | 1923 | 1949 | 1976 | 2003 | 2029 | 2056 | 2083 | 2109 | 2136 | 2163 | 2189 | 2216 | 2243 | 2269 |    |
| 0.05 | 1019 | 2039 | 2067 | 2096 | 2125 | 2153 | 2182 | 2211 | 2239 | 2268 | 2297 | 2325 | 2354 | 2383 | 2411 | 2440 |    |
| 0.01 | 1185 | 2370 | 2403 | 2437 | 2470 | 2503 | 2537 | 2570 | 2603 | 2637 | 2670 | 2703 | 2737 | 2770 | 2803 | 2837 |    |

For 13.56MHz NFC 1-g SAR

| Frequency (MHz) | (dBμV/m) | Power (dBm) |
|-----------------|----------|-------------|
| 13.56           | -3.57    | -98.87      |

| Frequency (MHz) | Power (dBm) | Power (mW) | Separation Distance (mm) | Calculation Result (mW) | SAR Test |
|-----------------|-------------|------------|--------------------------|-------------------------|----------|
| 13.56           | -98.87      | 0.0        | 5.00                     | 459.23                  | Excluded |

Note:

- 1) NFC antenna guide edge distance is evaluated with the worst case.
- 2) The threshold of 13.56MHz is calculated in a linear manner based on the values in Appendix C, Calculation Result (mW)=474-(10-50)/(474-308)\*(13.56-10)

## 11. Dielectric Property Measurements & System Check

### 11.1. Dielectric Property Measurements

The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within  $\pm 2^\circ\text{C}$  of the temperature when the tissue parameters are characterized.

The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after each 3 – 4 days of use; or earlier if the dielectric parameters can become out of tolerance; for example, when the parameters are marginal at the beginning of the measurement series.

Tissue dielectric parameters were measured at the low, middle and high frequency of each operating frequency range of the test device.

#### Tissue Dielectric Parameters

FCC KDB 865664 D01 v01r04 SAR Measurement 100 MHz to 6 GHz

| Target Frequency (MHz) | Head         |                | Body         |                |
|------------------------|--------------|----------------|--------------|----------------|
|                        | $\epsilon_r$ | $\sigma$ (S/m) | $\epsilon_r$ | $\sigma$ (S/m) |
| 150                    | 52.3         | 0.76           | 61.9         | 0.80           |
| 300                    | 45.3         | 0.87           | 58.2         | 0.92           |
| 450                    | 43.5         | 0.87           | 56.7         | 0.94           |
| 835                    | 41.5         | 0.90           | 55.2         | 0.97           |
| 900                    | 41.5         | 0.97           | 55.0         | 1.05           |
| 915                    | 41.5         | 0.98           | 55.0         | 1.06           |
| 1450                   | 40.5         | 1.20           | 54.0         | 1.30           |
| 1610                   | 40.3         | 1.29           | 53.8         | 1.40           |
| 1800 – 2000            | 40.0         | 1.40           | 53.3         | 1.52           |
| 2450                   | 39.2         | 1.80           | 52.7         | 1.95           |
| 3000                   | 38.5         | 2.40           | 52.0         | 2.73           |
| 5000                   | 36.2         | 4.45           | 49.3         | 5.07           |
| 5100                   | 36.1         | 4.55           | 49.1         | 5.18           |
| 5200                   | 36.0         | 4.66           | 49.0         | 5.30           |
| 5300                   | 35.9         | 4.76           | 48.9         | 5.42           |
| 5400                   | 35.8         | 4.86           | 48.7         | 5.53           |
| 5500                   | 35.6         | 4.96           | 48.6         | 5.65           |
| 5600                   | 35.5         | 5.07           | 48.5         | 5.77           |
| 5700                   | 35.4         | 5.17           | 48.3         | 5.88           |
| 5800                   | 35.3         | 5.27           | 48.2         | 6.00           |

**IEEE Std 1528-2013**

Refer to Table 3 within the IEEE Std 1528-2013 Dielectric Property Measurements Results:

| Liquid    | Freq. | Liquid Parameters |       |                |      | Deviation(%)   |       | Limit (%) | Temp. (°C) | Test Date      |
|-----------|-------|-------------------|-------|----------------|------|----------------|-------|-----------|------------|----------------|
|           |       | Measured          |       | Target         |      |                |       |           |            |                |
|           |       | ϵ <sub>r</sub>    | σ     | ϵ <sub>r</sub> | σ    | ϵ <sub>r</sub> | σ     |           |            |                |
| Head 750  | 695   | 42.610            | 0.865 | 42.23          | 0.89 | 0.90           | -2.81 | ±5        | 21.3       | July 18, 2024  |
|           | 750   | 41.940            | 0.892 | 41.94          | 0.89 | 0.00           | 0.22  |           |            |                |
|           | 790   | 41.350            | 0.928 | 41.73          | 0.90 | -0.91          | 3.11  |           |            |                |
| Head 835  | 805   | 40.190            | 0.876 | 41.66          | 0.90 | -3.53          | -2.67 | ±5        | 21.3       | August 7, 2024 |
|           | 835   | 40.100            | 0.883 | 41.50          | 0.90 | -3.37          | -1.89 |           |            |                |
|           | 905   | 40.120            | 0.931 | 41.50          | 0.97 | -3.33          | -4.02 |           |            |                |
| Head 1800 | 1720  | 40.650            | 1.349 | 40.13          | 1.35 | 1.30           | -0.07 | ±5        | 22.7       | July 30, 2024  |
|           | 1800  | 39.940            | 1.425 | 40.00          | 1.40 | -0.15          | 1.79  |           |            |                |
|           | 1890  | 39.500            | 1.462 | 40.00          | 1.40 | -1.25          | 4.43  |           |            |                |
| Head 1900 | 1850  | 41.510            | 1.336 | 40.00          | 1.40 | 3.78           | -4.57 | ±5        | 22.7       | July 30, 2024  |
|           | 1900  | 41.230            | 1.350 | 40.00          | 1.40 | 3.07           | -3.57 |           |            |                |
|           | 1920  | 41.150            | 1.367 | 40.00          | 1.40 | 2.88           | -2.36 |           |            |                |
| Head 2300 | 2210  | 39.220            | 1.588 | 39.63          | 1.59 | -1.03          | -0.13 | ±5        | 22.7       | July 19, 2024  |
|           | 2300  | 38.930            | 1.683 | 39.47          | 1.67 | -1.37          | 0.78  |           |            |                |
|           | 2390  | 38.600            | 1.776 | 39.31          | 1.75 | -1.81          | 1.49  |           |            |                |
| Head 2450 | 2400  | 37.860            | 1.698 | 39.29          | 1.76 | -3.64          | -3.52 | ±5        | 22.3       | August 7, 2024 |
|           | 2450  | 37.880            | 1.748 | 39.20          | 1.80 | -3.37          | -2.89 |           |            |                |
|           | 2480  | 37.800            | 1.765 | 39.16          | 1.83 | -3.47          | -3.55 |           |            |                |
| Head 2600 | 2500  | 38.010            | 1.879 | 39.14          | 1.85 | -2.89          | 1.57  | ±5        | 22.7       | July 19, 2024  |
|           | 2600  | 37.700            | 1.983 | 39.01          | 1.96 | -3.36          | 1.17  |           |            |                |
|           | 2700  | 37.410            | 2.090 | 38.88          | 2.07 | -3.78          | 0.97  |           |            |                |
| Head 2600 | 2500  | 37.950            | 1.871 | 39.14          | 1.85 | -3.04          | 1.14  | ±5        | 22.7       | July 30, 2024  |
|           | 2600  | 37.640            | 1.975 | 39.01          | 1.96 | -3.51          | 0.77  |           |            |                |
|           | 2700  | 37.350            | 2.082 | 38.88          | 2.07 | -3.94          | 0.58  |           |            |                |
| Head 5250 | 5160  | 34.650            | 4.477 | 36.03          | 4.61 | -3.83          | -2.89 | ±5        | 22.3       | August 7, 2024 |
|           | 5250  | 34.500            | 4.675 | 35.93          | 4.71 | -3.98          | -0.74 |           |            |                |
|           | 5340  | 34.380            | 4.650 | 35.83          | 4.80 | -4.05          | -3.12 |           |            |                |
| Head 5600 | 5500  | 34.120            | 4.796 | 35.64          | 4.96 | -4.26          | -3.31 | ±5        | 22.3       | August 7, 2024 |
|           | 5600  | 33.990            | 5.092 | 35.53          | 5.07 | -4.33          | 0.43  |           |            |                |
|           | 5700  | 33.810            | 5.249 | 35.41          | 5.17 | -4.52          | 1.53  |           |            |                |
| Head 5750 | 5660  | 33.810            | 5.007 | 35.46          | 5.13 | -4.65          | -2.40 | ±5        | 22.3       | August 7, 2024 |
|           | 5750  | 33.720            | 5.240 | 35.36          | 5.22 | -4.64          | 0.38  |           |            |                |
|           | 5840  | 33.580            | 5.423 | 35.27          | 5.30 | -4.79          | 2.32  |           |            |                |



## 11.2. System Check

SAR system verification is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device. The same SAR probe(s) and tissue-equivalent media combinations used with each specific SAR system for system verification must be used for device testing. When multiple probe calibration points are required to cover substantially large transmission bands, independent system verifications are required for each probe calibration point. A system verification must be performed before each series of SAR measurements using the same probe calibration point and tissue-equivalent medium. Additional system verification should be considered according to the conditions of the tissue-equivalent medium and measured tissue dielectric parameters, typically every three to four days when the liquid parameters are re-measured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

### System Performance Check Measurement Conditions:

- The measurements were performed in the flat section of the TWIN SAM or ELI phantom, shell thickness:  $2.0 \pm 0.2$  mm (bottom plate) filled with Body or Head simulating liquid of the following parameters.
- The depth of tissue-equivalent liquid in a phantom must be  $\geq 15.0$  cm for SAR measurements  $\leq 3$  GHz and  $\geq 10.0$  cm for measurements  $> 3$  GHz.
- The DASY system with an E-Field Probe was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10mm (above 1GHz) and 15mm (below 1GHz) from dipole center to the simulating liquid surface.
- For area scan, standard grid spacing for head measurements is 15 mm in x- and y- dimension ( $\leq 2$ GHz), 12 mm in x- and y-dimension (2-4 GHz) and 10mm in x- and y- dimension (4-6GHz).
- For zoom scan,  $\Delta x_{\text{zoom}}, \Delta y_{\text{zoom}} \leq 2$ GHz -  $\leq 8$ mm, 2-4GHz -  $\leq 5$  mm and 4-6 GHz -  $\leq 4$ mm;  $\Delta z_{\text{zoom}} \leq 3$ GHz -  $\leq 5$  mm, 3-4 GHz -  $\leq 4$ mm and 4-6GHz -  $\leq 2$ mm.
- Distance between probe sensors and phantom surface was set to 3 mm except for 5 GHz band. For 5GHz band, Distance between probe sensors and phantom surface was set to 2.5 mm
- The dipole input power (forward power) was set to 100 mW or 250 mW depend on the certificate of the dipoles.
- The results are normalized to 1 W input power.

### System Check Results

The 1-g and 10-g SAR measured with a reference dipole, using the required tissue-equivalent medium at the test frequency, must be within 10% of the manufacturer calibrated dipole SAR target.

| T.S. Liquid |      | Measured Results                              |                                 | Target<br>(Ref. value) | Delta<br>(%) | Limit<br>(%) | Temp.<br>(°C) | Test Date      |
|-------------|------|---|---------------------------------|------------------------|--------------|--------------|---------------|----------------|
|             |      | Result of<br>0.1W<br>input<br>power<br>(W/Kg) | Normalize<br>to<br>1W<br>(W/Kg) |                        |              |              |               |                |
| Head 750    | 1-g  | 0.917   | 9.17                            | 8.50                   | 7.88         | ±10          | 21.3          | July 18, 2024  |
|             | 10-g | 0.596   | 5.96                            | 5.61                   | 6.24         |              |               |                |
| Head 835    | 1-g  | 1.020   | 10.20                           | 9.64                   | 5.81         | ±10          | 22.3          | August 7, 2024 |
|             | 10-g | 0.659   | 6.59                            | 6.26                   | 5.27         |              |               |                |
| Head 1800   | 1-g  | 3.890   | 38.90                           | 38.70                  | 0.52         | ±10          | 22.7          | July 30, 2024  |
|             | 10-g | 2.040   | 20.40                           | 19.90                  | 2.51         |              |               |                |
| Head 1800   | 1-g  | 3.820   | 38.20                           | 38.70                  | -1.29        | ±10          | 22            | July 31, 2024  |
|             | 10-g | 2.010   | 20.10                           | 19.90                  | 1.01         |              |               |                |
| Head 1900   | 1-g  | 3.670   | 36.70                           | 39.60                  | -7.32        | ±10          | 22.7          | July 30, 2024  |
|             | 10-g | 1.880   | 18.80                           | 20.20                  | -6.93        |              |               |                |
| Head 2300   | 1-g  | 5.000   | 50.00                           | 47.80                  | 4.60         | ±10          | 22.7          | July 19, 2024  |
|             | 10-g | 2.360   | 23.60                           | 22.40                  | 5.36         |              |               |                |
| Head 2450   | 1-g  | 5.000   | 50.00                           | 53.20                  | -6.02        | ±10          | 22.3          | August 7, 2024 |
|             | 10-g | 2.340   | 23.40                           | 24.20                  | -3.31        |              |               |                |
| Head 2600   | 1-g  | 5.830   | 58.30                           | 55.40                  | 5.23         | ±10          | 22.7          | July 19, 2024  |
|             | 10-g | 2.520   | 25.20                           | 24.50                  | 2.86         |              |               |                |
| Head 2600   | 1-g  | 5.650   | 56.50                           | 55.40                  | 1.99         | ±10          | 22.7          | July 30, 2024  |
|             | 10-g | 2.490   | 24.90                           | 24.50                  | 1.63         |              |               |                |
| Head 5250   | 1-g  | 8.300   | 83.00                           | 77.90                  | 6.55         | ±10          | 22.3          | August 7, 2024 |
|             | 10-g | 2.370   | 23.70                           | 22.60                  | 4.87         |              |               |                |
| Head 5600   | 1-g  | 8.450   | 84.50                           | 80.90                  | 4.45         | ±10          | 22.3          | August 7, 2024 |
|             | 10-g | 2.380   | 23.80                           | 23.30                  | 2.15         |              |               |                |
| Head 5750   | 1-g  | 7.920   | 79.20                           | 78.30                  | 1.15         | ±10          | 22.3          | August 7, 2024 |
|             | 10-g | 2.240   | 22.40                           | 22.40                  | 0.00         |              |               |                |

## 12. Measured and Reported (Scaled) SAR Results

### General Notes:

- 1) As per KDB447498 D01, all SAR measurement results are scaled to the maximum tune-up tolerance limit to demonstrate SAR compliance.
- 2) As per KDB447498 D01, testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:
  - $\leq 0.8 \text{ W/kg}$  for 1-g or  $2.0 \text{ W/kg}$  for 10-g respectively, when the transmission band is  $\leq 100 \text{ MHz}$ .
  - $\leq 0.6 \text{ W/kg}$  or  $1.5 \text{ W/kg}$ , for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz.
  - $\leq 0.4 \text{ W/kg}$  or  $1.0 \text{ W/kg}$ , for 1-g or 10-g respectively, when the transmission band is  $\geq 200 \text{ MHz}$ .When the maximum output power variation across the required test channels is  $> \frac{1}{2} \text{ dB}$ , instead of the middle channel, the highest output power channel must be used.
- 3) As per KDB865664 D01 for each frequency band, repeated SAR measurement is required only when the measured SAR is  $\geq 0.8 \text{ W/Kg}$ ; if the deviation among the repeated measurement is  $\leq 20\%$ , and the measured SAR  $< 1.45 \text{ W/Kg}$ , only one repeated measurement is required.
- 4) As per KDB865664 D02, SAR plot is only required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination; Plots are also required when the measured SAR is  $> 1.5 \text{ W/kg}$ , or  $> 7.0 \text{ W/kg}$  for occupational exposure. The published RF exposure KDB procedures may require additional plots; for example, to support SAR to peak location separation ratio test exclusion and/or volume scan post-processing (Refer to appendix B for detailed SAR plots).
- 5) Additional SAR tests in simultaneous transmission fixed power reduction scenario are also tested in some frequency bands and required test positions for the SAR worst case, which are only used to ensure simultaneous transmission SAR test exclusion. The standalone SAR compliance still uses the SAR results tested at the maximum output power level.

## 12.1. SAR Test Results of GSM850

| RF Exposure Condition | Test Mode    | Test Position | Dist. (mm) | Channel | Pwr. (dBm)    |       | Measured   | Pwr. Drift | Scaled (W/Kg) |
|-----------------------|--------------|---------------|------------|---------|---------------|-------|------------|------------|---------------|
|                       |              |               |            |         | Tune-up Limit | Meas. | 1-g (W/Kg) |            |               |
| Body                  | GPRS 4 Slots | Back Surface  | 0          | 190     | 25.0          | 24.77 | 0.772      | -0.16      | 0.814         |
| Body                  | GPRS 4 Slots | Back Surface  | 0          | 128     | 25.0          | 24.77 | 0.559      | -0.14      | 0.589         |
| Body                  | GPRS 4 Slots | Back Surface  | 0          | 251     | 25.0          | 24.74 | 0.736      | 0.01       | 0.782         |
| Body                  | GPRS 4 Slots | Left Edge     | 0          | 190     | 25.0          | 24.74 | 0.126      | 0.07       | 0.134         |
| Body                  | GPRS 4 Slots | Right Edge    | 0          | 190     | 25.0          | 24.77 | 0.553      | 0.06       | 0.583         |
| Body                  | GPRS 4 Slots | Bottom Edge   | 0          | 190     | 25.0          | 24.77 | 0.810      | 0.02       | 0.854         |
| Body                  | GPRS 4 Slots | Bottom Edge   | 0          | 128     | 25.0          | 24.77 | 0.763      | 0.04       | 0.804         |
| Body                  | GPRS 4 Slots | Bottom Edge   | 0          | 251     | 25.0          | 24.74 | 0.724      | 0.03       | 0.769         |
| Worst mode retest     |              |               |            |         |               |       |            |            |               |
| Body                  | GPRS 4 Slots | Bottom Edge   | 0          | 190     | 25.0          | 24.77 | 0.802      | -0.09      | 0.846         |

Note:

- 1) Due to  $0.810/0.802 = 1.01 < 1.20$ , and SAR value of original and repeated measurement is  $\leq 1.45$  W/kg, so only one repeated measurement is required.

## 12.2. SAR Test Results of GSM1900

| RF Exposure Condition | Test Mode    | Test Position | Dist. (mm) | Channel | Pwr. (dBm)    |       | Measured   | Pwr. Drift | Scaled (W/Kg) |
|-----------------------|--------------|---------------|------------|---------|---------------|-------|------------|------------|---------------|
|                       |              |               |            |         | Tune-up Limit | Meas. | 1-g (W/Kg) |            |               |
| Body                  | GPRS 4 Slots | Back Surface  | 0          | 661     | 19.5          | 18.94 | 0.705      | -0.11      | 0.802         |
| Body                  | GPRS 4 Slots | Back Surface  | 0          | 512     | 19.5          | 19.20 | 0.765      | -0.02      | 0.820         |
| Body                  | GPRS 4 Slots | Back Surface  | 0          | 810     | 19.5          | 18.65 | 0.655      | 0.00       | 0.796         |
| Body                  | GPRS 4 Slots | Right Edge    | 0          | 661     | 19.5          | 18.94 | 0.289      | -0.16      | 0.329         |
| Body                  | GPRS 4 Slots | Bottom Edge   | 0          | 661     | 19.5          | 18.94 | 0.373      | -0.04      | 0.424         |

### 12.3. SAR Test Results of WCDMA B2

| RF Exposure Condition | Test Mode    | Test Position | Dist. (mm) | Channel | Pwr. (dBm)    |       | Measured   | Pwr. Drift | Scaled (W/Kg) |
|-----------------------|--------------|---------------|------------|---------|---------------|-------|------------|------------|---------------|
|                       |              |               |            |         | Tune-up Limit | Meas. | 1-g (W/Kg) |            |               |
| Body                  | RMC 12.2kbps | Back Surface  | 0          | 9400    | 15.0          | 14.54 | 0.530      | -0.06      | 0.590         |
| Body                  | RMC 12.2kbps | Back Surface  | 0          | 9262    | 15.0          | 14.52 | 0.589      | 0.10       | 0.658         |
| Body                  | RMC 12.2kbps | Back Surface  | 0          | 9538    | 15.0          | 14.44 | 0.422      | 0.00       | 0.480         |
| Body                  | RMC 12.2kbps | Right Edge    | 0          | 9400    | 15.0          | 14.54 | 0.237      | -0.01      | 0.263         |
| Body                  | RMC 12.2kbps | Bottom Edge   | 0          | 9400    | 15.0          | 14.54 | 0.261      | -0.08      | 0.290         |

## 12.4. SAR Test Results of WCDMA B4

| RF Exposure Condition | Test Mode    | Test Position | Dist. (mm) | Channel | Pwr. (dBm)    |       | Measured   | Pwr. Drift | Scaled (W/Kg) |
|-----------------------|--------------|---------------|------------|---------|---------------|-------|------------|------------|---------------|
|                       |              |               |            |         | Tune-up Limit | Meas. | 1-g (W/Kg) |            |               |
| Body                  | RMC 12.2kbps | Back Surface  | 0          | 1413    | 14.5          | 14.02 | 0.581      | 0.11       | 0.649         |
| Body                  | RMC 12.2kbps | Back Surface  | 0          | 1312    | 14.5          | 14.01 | 0.654      | -0.06      | 0.732         |
| Body                  | RMC 12.2kbps | Back Surface  | 0          | 1513    | 14.5          | 13.99 | 0.632      | -0.05      | 0.711         |
| Body                  | RMC 12.2kbps | Right Edge    | 0          | 1413    | 14.5          | 14.02 | 0.213      | -0.05      | 0.238         |
| Body                  | RMC 12.2kbps | Bottom Edge   | 0          | 1413    | 14.5          | 14.02 | 0.634      | -0.14      | 0.708         |

## 12.5. SAR Test Results of WCDMA B5

| RF Exposure Condition | Test Mode    | Test Position | Dist. (mm) | Channel | Pwr. (dBm)    |       | Measured   | Pwr. Drift | Scaled (W/Kg) |
|-----------------------|--------------|---------------|------------|---------|---------------|-------|------------|------------|---------------|
|                       |              |               |            |         | Tune-up Limit | Meas. | 1-g (W/Kg) |            |               |
| Body                  | RMC 12.2kbps | Back Surface  | 0          | 4182    | 22.0          | 21.71 | 0.447      | -0.16      | 0.478         |
| Body                  | RMC 12.2kbps | Back Surface  | 0          | 4132    | 22.0          | 21.63 | 0.426      | 0.09       | 0.464         |
| Body                  | RMC 12.2kbps | Back Surface  | 0          | 4233    | 22.0          | 21.79 | 0.437      | -0.14      | 0.459         |
| Body                  | RMC 12.2kbps | Left Edge     | 0          | 4182    | 22.0          | 21.71 | 0.102      | -0.15      | 0.109         |
| Body                  | RMC 12.2kbps | Right Edge    | 0          | 4182    | 22.0          | 21.71 | 0.344      | -0.09      | 0.368         |
| Body                  | RMC 12.2kbps | Bottom Edge   | 0          | 4182    | 22.0          | 21.71 | 0.413      | -0.09      | 0.442         |



## 12.6. SAR Test Results of LTE B2

| RF Exposure Condition | Test Mode        | Test Position | Dist. (mm) | Channel | Pwr. (dBm)    |       | Measured   | Pwr. Drift | Scaled (W/Kg) |
|-----------------------|------------------|---------------|------------|---------|---------------|-------|------------|------------|---------------|
|                       |                  |               |            |         | Tune-up Limit | Meas. | 1-g (W/Kg) |            |               |
| Body                  | 20M QPSK 1RB#49  | Back Surface  | 0          | 19100   | 17.0          | 16.83 | 0.877      | 0.03       | 0.912         |
| Body                  | 20M QPSK 1RB#49  | Back Surface  | 0          | 18700   | 17.0          | 16.68 | 0.815      | -0.13      | 0.877         |
| Body                  | 20M QPSK 1RB#49  | Back Surface  | 0          | 18900   | 17.0          | 16.80 | 0.794      | -0.04      | 0.832         |
| Body                  | 20M QPSK 50RB#0  | Back Surface  | 0          | 18900   | 16.0          | 15.74 | 0.610      | -0.16      | 0.647         |
| Body                  | 20M QPSK 50RB#0  | Back Surface  | 0          | 18700   | 16.0          | 16.53 | 0.666      | 0.11       | 0.590         |
| Body                  | 20M QPSK 50RB#0  | Back Surface  | 0          | 19100   | 16.0          | 15.74 | 0.598      | 0.01       | 0.635         |
| Body                  | 20M QPSK 100RB#0 | Back Surface  | 0          | 19100   | 16.0          | 15.70 | 0.604      | 0.00       | 0.647         |
| Body                  | 20M QPSK 1RB#49  | Right Edge    | 0          | 19100   | 17.0          | 16.83 | 0.240      | -0.11      | 0.250         |
| Body                  | 20M QPSK 50RB#0  | Right Edge    | 0          | 18900   | 16.0          | 15.74 | 0.200      | -0.02      | 0.212         |
| Body                  | 20M QPSK 1RB#49  | Bottom Edge   | 0          | 19100   | 17.0          | 16.83 | 0.336      | -0.12      | 0.350         |
| Body                  | 20M QPSK 50RB#0  | Bottom Edge   | 0          | 18900   | 16.0          | 15.74 | 0.303      | -0.01      | 0.322         |
| Worst mode retest     |                  |               |            |         |               |       |            |            |               |
| Body                  | 20M QPSK 1RB#49  | Back Surface  | 0          | 19100   | 17.0          | 16.83 | 0.872      | -0.02      | 0.907         |

Note:

- 1) Due to  $0.877/0.872 = 1.01 < 1.20$ , and SAR value of original and repeated measurement is  $\leq 1.45$  W/kg, so only one repeated measurement is required.

## 12.7. SAR Test Results of LTE B4

| RF Exposure Condition | Test Mode        | Test Position | Dist. (mm) | Channel | Pwr. (dBm)    |       | Measured   | Pwr. Drift | Scaled (W/Kg) |
|-----------------------|------------------|---------------|------------|---------|---------------|-------|------------|------------|---------------|
|                       |                  |               |            |         | Tune-up Limit | Meas. | 1-g (W/Kg) |            |               |
| Body                  | 20M QPSK 1RB#49  | Back Surface  | 0          | 20300   | 15.0          | 14.83 | 0.779      | 0.01       | 0.810         |
| Body                  | 20M QPSK 1RB#49  | Back Surface  | 0          | 20050   | 15.0          | 14.66 | 0.657      | 0.10       | 0.711         |
| Body                  | 20M QPSK 1RB#49  | Back Surface  | 0          | 20175   | 15.0          | 14.73 | 0.624      | 0.06       | 0.664         |
| Body                  | 20M QPSK 50RB#0  | Back Surface  | 0          | 20300   | 14.0          | 13.66 | 0.468      | -0.13      | 0.506         |
| Body                  | 20M QPSK 50RB#25 | Back Surface  | 0          | 20050   | 14.0          | 13.58 | 0.493      | -0.12      | 0.544         |
| Body                  | 20M QPSK 50RB#0  | Back Surface  | 0          | 20175   | 14.0          | 13.52 | 0.475      | -0.14      | 0.530         |
| Body                  | 20M QPSK 100RB#0 | Back Surface  | 0          | 20050   | 14.0          | 13.60 | 0.455      | 0.05       | 0.498         |
| Body                  | 20M QPSK 1RB#49  | Right Edge    | 0          | 20300   | 15.0          | 14.83 | 0.222      | 0.06       | 0.231         |
| Body                  | 20M QPSK 50RB#0  | Right Edge    | 0          | 20300   | 14.0          | 13.66 | 0.166      | -0.10      | 0.180         |
| Body                  | 20M QPSK 1RB#49  | Bottom Edge   | 0          | 20300   | 15.0          | 14.83 | 0.753      | -0.16      | 0.783         |
| Body                  | 20M QPSK 50RB#0  | Bottom Edge   | 0          | 20300   | 14.0          | 13.66 | 0.583      | 0.04       | 0.630         |

## 12.8. SAR Test Results of LTE B5

| RF Exposure Condition | Test Mode        | Test Position | Dist. (mm) | Channel | Pwr. (dBm)    |       | Measured   | Pwr. Drift | Scaled (W/Kg) |
|-----------------------|------------------|---------------|------------|---------|---------------|-------|------------|------------|---------------|
|                       |                  |               |            |         | Tune-up Limit | Meas. | 1-g (W/Kg) |            |               |
| Body                  | 20M QPSK 1RB#24  | Back Surface  | 0          | 20600   | 24.5          | 24.14 | 0.721      | 0.11       | 0.783         |
| Body                  | 20M QPSK 25RB#12 | Back Surface  | 0          | 20600   | 23.5          | 23.13 | 0.576      | -0.16      | 0.627         |
| Body                  | 20M QPSK 1RB#24  | Left Edge     | 0          | 20600   | 24.5          | 24.14 | 0.232      | -0.03      | 0.252         |
| Body                  | 20M QPSK 25RB#12 | Left Edge     | 0          | 20600   | 23.5          | 23.13 | 0.201      | 0.02       | 0.219         |
| Body                  | 20M QPSK 1RB#24  | Right Edge    | 0          | 20600   | 24.5          | 24.14 | 0.701      | -0.11      | 0.762         |
| Body                  | 20M QPSK 25RB#12 | Right Edge    | 0          | 20600   | 23.5          | 23.13 | 0.624      | 0.02       | 0.679         |
| Body                  | 20M QPSK 1RB#24  | Bottom Edge   | 0          | 20600   | 24.5          | 24.14 | 0.839      | 0.01       | 0.912         |
| Body                  | 20M QPSK 1RB#24  | Bottom Edge   | 0          | 20450   | 24.5          | 23.91 | 0.786      | -0.14      | 0.900         |
| Body                  | 20M QPSK 1RB#24  | Bottom Edge   | 0          | 20525   | 24.5          | 24.03 | 0.774      | -0.14      | 0.862         |
| Body                  | 20M QPSK 25RB#12 | Bottom Edge   | 0          | 20600   | 23.5          | 23.13 | 0.763      | 0.08       | 0.831         |
| Body                  | 20M QPSK 25RB#25 | Bottom Edge   | 0          | 20450   | 23.5          | 22.94 | 0.724      | 0.08       | 0.824         |
| Body                  | 20M QPSK 25RB#25 | Bottom Edge   | 0          | 20525   | 23.5          | 23.11 | 0.714      | -0.15      | 0.781         |
| Body                  | 20M QPSK 50RB#0  | Bottom Edge   | 0          | 20525   | 23.5          | 23.12 | 0.733      | 0.09       | 0.800         |
| Worst mode retest     |                  |               |            |         |               |       |            |            |               |
| Body                  | 20M QPSK 1RB#24  | Bottom Edge   | 0          | 20600   | 24.5          | 24.14 | 0.801      | -0.01      | 0.870         |

Note:

- 1) Due to  $0.839/0.801 = 1.05 < 1.20$ , and SAR value of original and repeated measurement is  $\leq 1.45$  W/kg, so only one repeated measurement is required.

## 12.9. SAR Test Results of LTE B7

| RF Exposure Condition | Test Mode        | Test Position | Dist. (mm) | Channel | Pwr. (dBm)    |       | Measured   | Pwr. Drift | Scaled (W/Kg) |
|-----------------------|------------------|---------------|------------|---------|---------------|-------|------------|------------|---------------|
|                       |                  |               |            |         | Tune-up Limit | Meas. | 1-g (W/Kg) |            |               |
| Body                  | 20M QPSK 1RB#49  | Back Surface  | 0          | 21350   | 17.5          | 17.19 | 0.576      | 0.00       | 0.619         |
| Body                  | 20M QPSK 1RB#49  | Back Surface  | 0          | 20850   | 17.5          | 17.07 | 0.479      | 0.06       | 0.528         |
| Body                  | 20M QPSK 1RB#49  | Back Surface  | 0          | 21100   | 17.5          | 16.96 | 0.508      | 0.00       | 0.576         |
| Body                  | 20M QPSK 50RB#0  | Back Surface  | 0          | 20850   | 16.0          | 15.99 | 0.382      | -0.15      | 0.383         |
| Body                  | 20M QPSK 50RB#0  | Back Surface  | 0          | 21100   | 16.0          | 15.86 | 0.358      | -0.07      | 0.370         |
| Body                  | 20M QPSK 50RB#25 | Back Surface  | 0          | 21350   | 16.0          | 15.91 | 0.398      | 0.08       | 0.406         |
| Body                  | 20M QPSK 1RB#49  | Right Edge    | 0          | 21350   | 17.5          | 17.19 | 0.344      | 0.04       | 0.369         |
| Body                  | 20M QPSK 50RB#50 | Right Edge    | 0          | 23150   | 16.0          | 15.99 | 0.260      | -0.13      | 0.261         |
| Body                  | 20M QPSK 1RB#49  | Bottom Edge   | 0          | 21350   | 17.5          | 17.19 | 0.205      | 0.01       | 0.220         |
| Body                  | 20M QPSK 50RB#50 | Bottom Edge   | 0          | 23150   | 16.0          | 15.99 | 0.163      | -0.04      | 0.164         |

## 12.10. SAR Test Results of LTE B12

| RF Exposure Condition | Test Mode        | Test Position | Dist. (mm) | Channel | Pwr. (dBm)    |       | Measured   | Pwr. Drift | Scaled (W/Kg) |
|-----------------------|------------------|---------------|------------|---------|---------------|-------|------------|------------|---------------|
|                       |                  |               |            |         | Tune-up Limit | Meas. | 1-g (W/Kg) |            |               |
| Body                  | 20M QPSK 1RB#24  | Back Surface  | 0          | 23130   | 24.5          | 24.03 | 0.946      | -0.01      | 1.054         |
| Body                  | 20M QPSK 1RB#24  | Back Surface  | 0          | 23060   | 24.5          | 23.93 | 0.963      | 0.03       | 1.098         |
| Body                  | 20M QPSK 1RB#24  | Back Surface  | 0          | 23095   | 24.5          | 24.00 | 0.975      | -0.04      | 1.094         |
| Body                  | 20M QPSK 25RB#25 | Back Surface  | 0          | 23095   | 23.5          | 23.14 | 0.861      | -0.16      | 0.936         |
| Body                  | 20M QPSK 25RB#12 | Back Surface  | 0          | 23060   | 23.5          | 22.86 | 0.872      | 0.08       | 1.010         |
| Body                  | 20M QPSK 25RB#25 | Back Surface  | 0          | 23130   | 23.5          | 22.97 | 0.795      | 0.11       | 0.898         |
| Body                  | 20M QPSK 50RB#0  | Back Surface  | 0          | 23095   | 23.5          | 23.12 | 0.795      | 0.11       | 0.868         |
| Body                  | 20M QPSK 1RB#24  | Left Edge     | 0          | 23130   | 24.5          | 24.03 | 0.161      | 0.09       | 0.179         |
| Body                  | 20M QPSK 25RB#25 | Left Edge     | 0          | 23095   | 23.5          | 23.14 | 0.138      | -0.13      | 0.150         |
| Body                  | 20M QPSK 1RB#24  | Right Edge    | 0          | 23130   | 24.5          | 24.03 | 0.170      | -0.14      | 0.190         |
| Body                  | 20M QPSK 25RB#25 | Right Edge    | 0          | 23095   | 23.5          | 23.14 | 0.131      | 0.03       | 0.142         |
| Body                  | 20M QPSK 1RB#24  | Bottom Edge   | 0          | 23130   | 24.5          | 24.03 | 0.515      | -0.02      | 0.573         |
| Body                  | 20M QPSK 25RB#25 | Bottom Edge   | 0          | 23095   | 23.5          | 23.14 | 0.413      | 0.08       | 0.448         |
| Worst mode retest     |                  |               |            |         |               |       |            |            |               |
| Body                  | 20M QPSK 1RB#24  | Back Surface  | 0          | 23095   | 24.5          | 24.00 | 0.969      | 0.03       | 1.087         |

Note:

- 1) Due to  $0.975/0.869 = 1.01 < 1.20$ , and SAR value of original and repeated measurement is  $\leq 1.45$  W/kg, so only one repeated measurement is required.

## 12.11. SAR Test Results of LTE B38

| RF Exposure Condition | Test Mode        | Test Position | Dist. (mm) | Channel | Pwr. (dBm)    |       | Measured   | Pwr. Drift | Scaled (W/Kg) |
|-----------------------|------------------|---------------|------------|---------|---------------|-------|------------|------------|---------------|
|                       |                  |               |            |         | Tune-up Limit | Meas. | 1-g (W/Kg) |            |               |
| Body                  | 20M QPSK 1RB#49  | Back Surface  | 0          | 37850   | 22.5          | 22.03 | 0.655      | -0.01      | 0.730         |
| Body                  | 20M QPSK 1RB#49  | Back Surface  | 0          | 38000   | 22.5          | 21.76 | 0.719      | -0.09      | 0.853         |
| Body                  | 20M QPSK 1RB#49  | Back Surface  | 0          | 38150   | 22.5          | 21.87 | 0.760      | 0.03       | 0.879         |
| Body                  | 20M QPSK 50RB#0  | Back Surface  | 0          | 37850   | 21.0          | 20.82 | 0.485      | 0.02       | 0.506         |
| Body                  | 20M QPSK 50RB#0  | Back Surface  | 0          | 38000   | 21.0          | 20.68 | 0.553      | -0.16      | 0.595         |
| Body                  | 20M QPSK 50RB#25 | Back Surface  | 0          | 38150   | 21.0          | 20.72 | 0.567      | 0.11       | 0.605         |
| Body                  | 20M QPSK 100RB#0 | Back Surface  | 0          | 37850   | 21.0          | 20.80 | 0.534      | -0.15      | 0.559         |
| Body                  | 20M QPSK 1RB#49  | Left Edge     | 0          | 37850   | 22.5          | 22.03 | 0.063      | 0.11       | 0.070         |
| Body                  | 20M QPSK 50RB#0  | Left Edge     | 0          | 37850   | 21.0          | 20.82 | 0.052      | 0.01       | 0.054         |
| Body                  | 20M QPSK 1RB#49  | Right Edge    | 0          | 37850   | 22.5          | 22.03 | 0.469      | -0.05      | 0.522         |
| Body                  | 20M QPSK 50RB#0  | Right Edge    | 0          | 37850   | 21.0          | 20.82 | 0.352      | 0.09       | 0.367         |
| Body                  | 20M QPSK 1RB#49  | Bottom Edge   | 0          | 37850   | 22.5          | 22.03 | 0.274      | -0.06      | 0.305         |
| Body                  | 20M QPSK 50RB#0  | Bottom Edge   | 0          | 37850   | 21.0          | 20.82 | 0.207      | -0.08      | 0.216         |

## 12.12. SAR Test Results of LTE B40

| RF Exposure Condition | Test Mode        | Test Position | Dist. (mm) | Channel | Pwr. (dBm)    |       | Measured   | Pwr. Drift | Scaled (W/Kg) |
|-----------------------|------------------|---------------|------------|---------|---------------|-------|------------|------------|---------------|
|                       |                  |               |            |         | Tune-up Limit | Meas. | 1-g (W/Kg) |            |               |
| Body                  | 10M QPSK 1RB#24  | Back Surface  | 0          | 38700   | 22.5          | 22.18 | 0.733      | 0.01       | 0.789         |
| Body                  | 10M QPSK 1RB#24  | Back Surface  | 0          | 39150   | 22.5          | 21.87 | 0.699      | -0.05      | 0.808         |
| Body                  | 10M QPSK 1RB#24  | Back Surface  | 0          | 39600   | 22.5          | 21.52 | 0.670      | -0.07      | 0.839         |
| Body                  | 10M QPSK 25RB#0  | Back Surface  | 0          | 38700   | 21.0          | 20.90 | 0.655      | -0.14      | 0.670         |
| Body                  | 10M QPSK 25RB#25 | Back Surface  | 0          | 39150   | 21.0          | 20.61 | 0.549      | -0.06      | 0.600         |
| Body                  | 10M QPSK 25RB#0  | Back Surface  | 0          | 39600   | 21.0          | 20.42 | 0.521      | -0.01      | 0.596         |
| Body                  | 10M QPSK 50RB#0  | Back Surface  | 0          | 38700   | 21.0          | 20.85 | 0.509      | 0.09       | 0.527         |
| Body                  | 10M QPSK 1RB#24  | Left Edge     | 0          | 38700   | 22.5          | 22.18 | 0.059      | -0.08      | 0.064         |
| Body                  | 10M QPSK 25RB#0  | Left Edge     | 0          | 38700   | 21.0          | 20.90 | 0.046      | 0.08       | 0.047         |
| Body                  | 10M QPSK 1RB#24  | Right Edge    | 0          | 38700   | 22.5          | 22.18 | 0.731      | -0.06      | 0.787         |
| Body                  | 10M QPSK 25RB#0  | Right Edge    | 0          | 38700   | 21.0          | 20.90 | 0.606      | 0.09       | 0.621         |
| Body                  | 10M QPSK 1RB#24  | Bottom Edge   | 0          | 38700   | 22.5          | 22.18 | 0.420      | -0.04      | 0.452         |
| Body                  | 10M QPSK 25RB#0  | Bottom Edge   | 0          | 38700   | 21.0          | 20.90 | 0.329      | -0.11      | 0.337         |

### 12.13. SAR Test Results of LTE B41

| RF Exposure Condition | Test Mode        | Test Position | Dist. (mm) | Channel | Pwr. (dBm)    |       | Measured   | Pwr. Drift | Scaled (W/Kg) |
|-----------------------|------------------|---------------|------------|---------|---------------|-------|------------|------------|---------------|
|                       |                  |               |            |         | Tune-up Limit | Meas. | 1-g (W/Kg) |            |               |
| Body                  | 20M QPSK 1RB#49  | Back Surface  | 0          | 40390   | 22.0          | 21.94 | 0.682      | -0.05      | 0.691         |
| Body                  | 20M QPSK 1RB#49  | Back Surface  | 0          | 40740   | 22.0          | 21.82 | 0.769      | -0.08      | 0.801         |
| Body                  | 20M QPSK 1RB#49  | Back Surface  | 0          | 41090   | 22.0          | 21.84 | 0.868      | 0.00       | 0.901         |
| Body                  | 20M QPSK 50RB#25 | Back Surface  | 0          | 40390   | 21.0          | 20.81 | 0.501      | 0.01       | 0.524         |
| Body                  | 20M QPSK 50RB#25 | Back Surface  | 0          | 40740   | 21.0          | 20.74 | 0.595      | -0.12      | 0.632         |
| Body                  | 20M QPSK 50RB#0  | Back Surface  | 0          | 41090   | 21.0          | 20.77 | 0.661      | 0.11       | 0.697         |
| Body                  | 20M QPSK 100RB#0 | Back Surface  | 0          | 40390   | 21.0          | 20.74 | 0.625      | 0.03       | 0.664         |
| Body                  | 20M QPSK 1RB#49  | Left Edge     | 0          | 40390   | 22.0          | 21.94 | 0.018      | -0.06      | 0.018         |
| Body                  | 20M QPSK 50RB#25 | Left Edge     | 0          | 40390   | 21.0          | 20.81 | 0.015      | 0.02       | 0.016         |
| Body                  | 20M QPSK 1RB#49  | Right Edge    | 0          | 40390   | 22.0          | 21.94 | 0.481      | -0.16      | 0.488         |
| Body                  | 20M QPSK 50RB#25 | Right Edge    | 0          | 40390   | 21.0          | 20.81 | 0.352      | -0.16      | 0.367         |
| Body                  | 20M QPSK 1RB#49  | Bottom Edge   | 0          | 40390   | 22.0          | 21.94 | 0.290      | -0.12      | 0.294         |
| Body                  | 20M QPSK 50RB#25 | Bottom Edge   | 0          | 40390   | 21.0          | 20.81 | 0.210      | -0.15      | 0.219         |
| Worst mode retest     |                  |               |            |         |               |       |            |            |               |
| Body                  | 20M QPSK 1RB#49  | Back Surface  | 0          | 41090   | 22.0          | 21.84 | 0.831      | -0.03      | 0.862         |

Note:

- 1) Due to  $0.868/0.831 = 1.04 < 1.20$ , and SAR value of original and repeated measurement is  $\leq 1.45$  W/kg, so only one repeated measurement is required.



## 12.14. SAR Test Results of 2.4G Wi-Fi

| RF Exposure Condition | Test Mode | Test Position | Dist. (mm) | Channel | Pwr. (dBm) |       | DC. (%) | Measured 1-g (W/Kg) | Pwr. Drift | Scaled (W/Kg) |
|-----------------------|-----------|---------------|------------|---------|------------|-------|---------|---------------------|------------|---------------|
|                       |           |               |            |         | Tune-up    | Meas. |         |                     |            |               |
| Body                  | 802.11 b  | Back Surface  | 0          | 6       | 14.0       | 13.59 | 99.52   | 0.116               | -0.04      | 0.128         |
| Body                  | 802.11 b  | Left Edge     | 0          | 6       | 14.0       | 13.59 | 99.52   | 0.335               | -0.07      | 0.370         |
| Body                  | 802.11 b  | Left Edge     | 0          | 1       | 14.0       | 13.17 | 99.52   | 0.300               | 0.01       | 0.365         |
| Body                  | 802.11 b  | Left Edge     | 0          | 11      | 14.0       | 13.57 | 99.52   | 0.354               | 0.00       | 0.393         |

### OFDM mode SAR evaluation exclusion analysis

| Mode      | Tune-up (dBm) | Tune-up (mW) | Highest Reported SAR (W/Kg) | Adjusted SAR (W/Kg) | SAR Test |
|-----------|---------------|--------------|-----------------------------|---------------------|----------|
| 802.11b   | 14            | 25.12        | 0.393                       | \                   | \        |
| 802.11g   | 15            | 31.62        | \                           | 0.495               | Excluded |
| 802.11n20 | 15            | 31.62        | \                           | 0.495               | Excluded |
| 802.11n40 | 13            | 19.95        | \                           | 0.312               | Excluded |

Note:

- 1) The highest reported SAR for DSSS adjusted by the ratio of OFDM 802.11g/n to DSSS specified maximum output power and the adjusted SAR is  $\leq 1.2$  W/kg, so SAR evaluation for 802.11g/n is not required.

## 12.15. SAR Test Results of U-NII-2A

| RF Exposure Condition | Test Mode | Test Position | Dist. (mm) | Channel | Pwr. (dBm) |       | DC. (%) | Measured   | Pwr. Drift | Scaled (W/Kg) |
|-----------------------|-----------|---------------|------------|---------|------------|-------|---------|------------|------------|---------------|
|                       |           |               |            |         | Tune-up    | Meas. |         | 1-g (W/Kg) |            |               |
| Body                  | 11a       | Back Surface  | 0          | 64      | 12.5       | 12.16 | 97.87   | 0.252      | -0.01      | 0.278         |
| Body                  | 11a       | Left Edge     | 0          | 64      | 12.5       | 12.16 | 97.87   | 1.010      | 0.03       | 1.116         |
| Body                  | 11a       | Left Edge     | 0          | 52      | 12.5       | 12.01 | 97.87   | 0.927      | 0.04       | 1.060         |
| Body                  | 11a       | Left Edge     | 0          | 56      | 12.5       | 12.16 | 97.87   | 0.996      | -0.12      | 1.101         |
| Worst mode retest     |           |               |            |         |            |       |         |            |            |               |
| Body                  | 11a       | Left Edge     | 0          | 64      | 12.5       | 12.16 | 97.87   | 0.953      | 0.03       | 1.053         |

Note:

- 1) Due to  $1.010/0.953 = 1.06 < 1.20$ , and SAR value of original and repeated measurement is  $\leq 1.45$  W/kg, so only one repeated measurement is required.

## 12.16. SAR Test Results of U-NII-2C

| RF Exposure Condition | Test Mode    | Test Position | Dist. (mm) | Channel | Pwr. (dBm) |       | DC. (%) | Measured   | Pwr. Drift | Scaled (W/Kg) |
|-----------------------|--------------|---------------|------------|---------|------------|-------|---------|------------|------------|---------------|
|                       |              |               |            |         | Tune-up    | Meas. |         | 1-g (W/Kg) |            |               |
| Body                  | 802.11 n 40M | Back Surface  | 0          | 110     | 11.5       | 11.48 | 94.12   | 0.265      | -0.06      | 0.283         |
| Body                  | 802.11 n 40M | Left Edge     | 0          | 110     | 11.5       | 11.48 | 94.12   | 0.969      | -0.17      | 1.034         |
| Body                  | 802.11 n 40M | Left Edge     | 0          | 102     | 11.5       | 11.46 | 94.12   | 1.110      | -0.03      | 1.190         |
| Body                  | 802.11 n 40M | Left Edge     | 0          | 134     | 11.5       | 11.14 | 94.12   | 0.938      | -0.01      | 1.083         |
| Worst mode retest     |              |               |            |         |            |       |         |            |            |               |
| Body                  | 802.11 n 40M | Left Edge     | 0          | 102     | 11.5       | 11.46 | 94.12   | 1.020      | -0.03      | 1.094         |

Note:

- 1) Due to  $1.110/1.020 = 1.09 < 1.20$ , and SAR value of original and repeated measurement is  $\leq 1.45$  W/kg, so only one repeated measurement is required.

## 12.17. SAR Test Results of U-NII-3

| RF Exposure Condition | Test Mode | Test Position | Dist. (mm) | Channel | Pwr. (dBm) |       | DC. (%) | Measured   | Pwr. Drift | Scaled (W/Kg) |
|-----------------------|-----------|---------------|------------|---------|------------|-------|---------|------------|------------|---------------|
|                       |           |               |            |         | Tune-up    | Meas. |         | 1-g (W/Kg) |            |               |
| Body                  | 11a       | Back Surface  | 0          | 165     | 12.5       | 12.27 | 97.87   | 0.223      | -0.01      | 0.240         |
| Body                  | 11a       | Left Edge     | 0          | 165     | 12.5       | 12.27 | 97.87   | 0.929      | -0.06      | 1.001         |
| Body                  | 11a       | Left Edge     | 0          | 149     | 12.5       | 12.25 | 97.87   | 1.100      | 0.07       | 1.191         |
| Body                  | 11a       | Left Edge     | 0          | 157     | 12.5       | 12.11 | 97.87   | 1.060      | -0.04      | 1.185         |
| Accessory             |           |               |            |         |            |       |         |            |            |               |
| Body                  | 11a       | Left Edge     | 0          | 149     | 12.5       | 12.25 | 97.87   | 1.030      | 0.01       | 1.115         |
| Worst mode retest     |           |               |            |         |            |       |         |            |            |               |
| Body                  | 11a       | Left Edge     | 0          | 149     | 12.5       | 12.25 | 97.87   | 1.010      | 0.07       | 1.093         |

Note:

- 1) Due to  $1.100/1.010 = 1.09 < 1.20$ , and SAR value of original and repeated measurement is  $\leq 1.45$  W/kg, so only one repeated measurement is required.

**12.18. SAR Test Results of BT**

| RF Exposure Condition | Test Mode | Test Position | Dist. (mm) | Channel | Pwr. (dBm) |       | DC. (%) | Measured   | Pwr. Drift | Scaled (W/Kg) |
|-----------------------|-----------|---------------|------------|---------|------------|-------|---------|------------|------------|---------------|
|                       |           |               |            |         | Tune-up    | Meas. |         | 1-g (W/Kg) |            |               |
| Body                  | DH5       | Back Surface  | 0          | 0       | 12.0       | 11.34 | 76.74   | 0.101      | 0.03       | 0.153         |
| Body                  | DH5       | Left Edge     | 0          | 0       | 12.0       | 11.34 | 76.74   | 0.146      | 0.15       | 0.221         |
| Body                  | DH5       | Left Edge     | 0          | 39      | 12.0       | 11.25 | 76.74   | 0.113      | 0.04       | 0.175         |
| Body                  | DH5       | Left Edge     | 0          | 78      | 12.0       | 11.03 | 76.74   | 0.107      | -0.07      | 0.174         |

### 13. Simultaneous Transmission SAR Analysis

| Simultaneous transmission possibilities |                             |            |
|---|-----------------------------|------------|
| NO                                      | Simultaneous TX Combination | Body- worn |
| 1                                       | WWAN+BT                     | Y          |
| 2                                       | WWAN+2.4GHz WiFi            | Y          |
| 3                                       | WWAN+5GHz WiFi              | Y          |

#### 13.1. Analysis for WWAN & Wi-Fi & BT

| RF Exposure Condition | Test Position | WWAN Max | U-NII Max | 2.4G WiFi | BT    | WWAN Max+U-NII Max | WWAN Max+2.4G WiFi | WWAN Max+BT |
|-----------------------|---------------|----------|-----------|-----------|-------|--------------------|--------------------|-------------|
| Body                  | Back Surface  | 1.098    | 0.283     | 0.128     | 0.153 | 1.381              | 1.226              | 1.251       |
|                       | Left Edge     | 0.252    | 1.191     | 0.393     | 0.221 | 1.443              | 0.645              | 0.473       |
|                       | Right Edge    | 0.787    | /         | /         | /     | 0.787              | 0.787              | 0.787       |
|                       | Bottom Edge   | 0.912    | /         | /         | /     | 0.912              | 0.912              | 0.912       |

## **Appendixes**

**Refer to separated files for the following appendixes.**

**4791364876-1-SAR-1\_App A Photo**

**4791364876-1-SAR-1\_App B System Check Plots**

**4791364876-1-SAR-1\_App C Highest Test Plots**

**4791364876-1-SAR-1\_App D Cal. Certificates**

-----End of Report-----