



**FCC 47 CFR Parts 1 & 2  
Published RF Exposure KDB Procedures  
IEEE Std 1528-2013**

**SAR EVALUATION REPORT**

*For*  
**CDMA/LTE Phone + Bluetooth, and DTS b/g/n**

**Model: LG-LS660, LGLS660, LS660  
FCC ID: ZNFLS660**

**Report Number: 14U18147-S5  
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### 1. Attestation of Test Results

Applicant	LG ELECTRONICS MOBILECOMM U.S.A., INC.			
DUT description	CDMA/LTE Phone + Bluetooth, and DTS b/g/n			
Model	LG-LS660, LGLS660, LS660			
Test device is	An identical prototype			
Device category	Portable			
Exposure category	General Population/Uncontrolled Exposure			
Date tested	06/23/2014– 06/27/2014			
The highest reported SAR values	RF exposure condition	Licensed	DTS	UNII
	Head	0.943 W/kg	0.590 W/kg	N/A
	Body-worn Accessory	1.210 W/kg	0.209W/kg	
	Wireless Router (Hotspot)			
Simultaneous Transmission	1.419 W/kg			
Applicable Standards	FCC 47 CFR Parts 1 & 2 Published RF Exposure KDB Procedures, and TCB workshop updates IEEE Std 1528-2013			
Test Results	Pass			

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

**Note:** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government (NIST Handbook 150, Annex A). This report is written to support regulatory compliance of the applicable standards stated above.

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## 2. Test Methodology

The tests documented in this report were performed in accordance with FCC 47 CFR Parts 1 & 2, IEEE STD 1528-2013, the following FCC Published RF exposure KDB procedures, and TCB workshop updates:

- 447498 D01 General RF Exposure Guidance v05r02
- 648474 D04 Handset SAR v01r02
- 941225 D01 SAR test for 3G devices v02
- 941225 D05 SAR for LTE Devices v02r03
- 941225 D06 Hotspot Mode SAR v01r01
- 248227 D01 SAR Meas for 802 11abg v01r02
- 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r03
- 865664 D02 SAR Reporting v01r01
- 690783 D01 SAR Listings on Grants v01r03

## 3. Facilities and Accreditation

The test sites and measurement facilities used to collect data are located at

47173 Benicia Street	47266 Benicia Street
SAR Lab A	SAR Lab 1
SAR Lab B	SAR Lab 2
SAR Lab C	SAR Lab 3
SAR Lab D	SAR Lab 4
SAR Lab E	SAR Lab 5
SAR Lab F	
SAR Lab G	
SAR Lab H	

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

## 4. Calibration and Uncertainty

### 4.1. Measuring Instrument Calibration

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.

#### Tissue Dielectric Properties

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Network Analyzer	Agilent	E5071B	MY42100131	2/24/2015
Dielectronic Probe kit	SPEAG	DAK-3.5	1087	11/13/2014
Dielectronic Probe kit	SPEAG	DAK-3.5 Short	SM DAK 200 BA	N/A
Thermometer	Control Company	4242	122529163	9/19/2014
Thermometer	EXTECH	445703	CCS-200	3/24/2015

#### System Performance Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
ESG Vecto Signal Generator	Agilent	E4438C	MY47271507	6/17/2015
Power Meter	HP	438A	2822A05684	10/10/2014
Power Sensor	HP	8481A	2237A31744	10/2/2014
Power Sensor	HP	8481A	2349A36506	9/3/2014
Amplifier	MITEQ	AMF-4D-00400600-50-30P	1808939	N/A
Directional coupler	Werlatone	C8060-102	2710	N/A
DC Power Supply	AMETEK	XT15-4	1319A02778	N/A
E-Field Probe	SPEAG	EX3DV4	3902	5/19/2015
E-Field Probe	SPEAG	EX3DV3	3531	11/21/2014
E-Field Probe	SPEAG	EX3DV4	3773	4/22/2015
E-Field Probe	SPEAG	EX3DV4	3929	5/9/2015
Data Acquisition Electronics	SPEAG	DAE3	427	1/21/2015
Data Acquisition Electronics	SPEAG	DAE4	1359	2/17/2015
Data Acquisition Electronics	SPEAG	DAE4	1343	7/24/2014
Data Acquisition Electronics	SPEAG	DAE4	1352	9/11/2014
System Validation Dipole	SPEAG	D835V2	4d002	11/15/2014
System Validation Dipole	SPEAG	D1900V2	5d043	11/12/2014
System Validation Dipole	SPEAG	D2450V2	899	9/10/2014
System Validation Dipole	SPEAG	D2600V2	1006	9/11/2014
Thermometer (SAR Lab 1)	EXTECH	445703	CCS-205	3/24/2015
Thermometer (SAR Lab 2)	EXTECH	445703	CCS-203	3/28/2015
Thermometer (SAR Lab 3)	EXTECH	445703	CCS-238	6/3/2015
Thermometer (SAR Lab 4)	EXTECH	445703	CCS-238	6/3/2015

#### Others

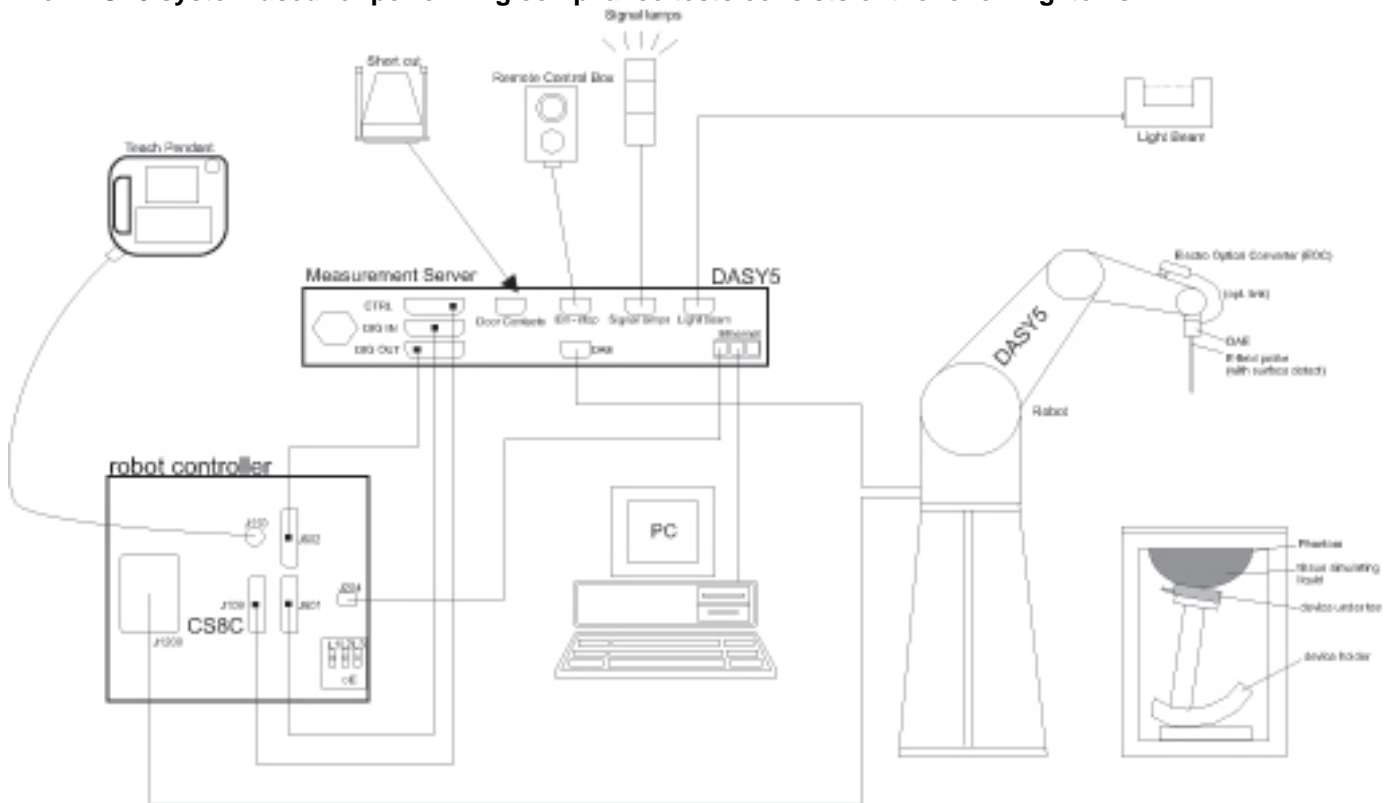
Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Power Sensor	Agilent	N1921A	MY52200012	9/25/2014
Power Meter	Agilent	N1911A	MY53060016	8/3/2014
Base Station Simulator	R & S	CMU200	16233	7/23/2014
Base Station Simulator	R & S	CMW500	15697	7/2/2014
Base Station Simulator	R & S	CMW500	20613(A2LA)	5/29/2015
Base Station Simulator	Agilent	8960	GB46160222	11/21/2014

### 4.2. 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, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval.

## 5. Measurement System Description and Setup

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 WinXP or Win7 and the DASY5 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.



## 6. SAR Measurement Procedure

### 6.1. Normal SAR Measurement Procedure

#### 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 SAR Measurement 100 MHz to 6 GHz

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: $\Delta x_{Area}$ , $\Delta y_{Area}$	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 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 ≤ 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 SAR Measurement 100 MHz to 6 GHz

		$\leq 3$ GHz	$> 3$ GHz	
Maximum zoom scan spatial resolution: $\Delta x_{Zoom}, \Delta y_{Zoom}$		$\leq 2$ GHz: $\leq 8$ mm 2 – 3 GHz: $\leq 5$ mm *	3 – 4 GHz: $\leq 5$ mm* 4 – 6 GHz: $\leq 4$ mm*	
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$	$\leq 5$ mm	3 – 4 GHz: $\leq 4$ mm 4 – 5 GHz: $\leq 3$ mm 5 – 6 GHz: $\leq 2$ mm	
	graded grid	$\Delta z_{Zoom}(1)$ : between 1 <sup>st</sup> two points closest to phantom surface	$\leq 4$ mm	3 – 4 GHz: $\leq 3$ mm 4 – 5 GHz: $\leq 2.5$ mm 5 – 6 GHz: $\leq 2$ mm
		$\Delta z_{Zoom}(n>1)$ : between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z	$\geq 30$ mm	3 – 4 GHz: $\geq 28$ mm 4 – 5 GHz: $\geq 25$ mm 5 – 6 GHz: $\geq 22$ mm	
Note: $\delta$ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details. * When zoom scan is required and the <i>reported</i> SAR from the area scan based <i>1-g SAR estimation</i> procedures of KDB 447498 is $\leq 1.4$ W/kg, $\leq 8$ mm, $\leq 7$ mm and $\leq 5$ mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

**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 larger than the step size in Z-direction.

## 6.2. Volume Scan Procedures

### Step 1: Repeat Step 1-4 in Section 6.1

### Step 2: Volume Scan

Volume Scans are used to assess peak SAR and averaged SAR measurements in largely extended 3-dimensional volumes within any phantom. This measurement does not need any previous area scan. The grid can be anchored to a user specific point or to the current probe location.

### Step 3: 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.

## 7. Device Under Test

### 7.1. General Information

Operating Configuration(s)	Held to head, Body-worn (Voice call)
Mobile Hotspot	Wi-Fi Hotspot mode permits the device to share its cellular data connection with other Wi-Fi -enabled devices. <input checked="" type="checkbox"/> Mobile Hotspot (Wi-Fi 2.4 GHz) <input type="checkbox"/> Mobile Hotspot (Wi-Fi 5 GHz)
Wi-Fi Direct	Wi-Fi Direct enabled devices transfer data directly between each other <input checked="" type="checkbox"/> Wi-Fi Direct (Wi-Fi 2.4 GHz) <input type="checkbox"/> Wi-Fi Direct (Wi-Fi 5 GHz)
Device dimension	Overall (Length x Width): 127 mm x 67 mm Overall Diagonal: 136mm Display Diagonal: 115mm
Back Cover	<input checked="" type="checkbox"/> Normal Battery Cover <input type="checkbox"/> Normal Battery Cover with NFC <input type="checkbox"/> Wireless Charger Battery Cover <input type="checkbox"/> Wireless Charger Battery Cover with NFC
Accessory	<input checked="" type="checkbox"/> Headset
Battery Options	<input checked="" type="checkbox"/> Standard – Lithium-ion battery, Rating 3.8Vdc, 8.0Wh <input type="checkbox"/> Extended (large capacity)

### 7.2. Wireless Technologies

Wireless Technology and Frequency Bands	CDMA BC 0 / 1 / 10 LTE Band 25 / 26 / 41 Wi-Fi : 2.4 GHz Bluetooth: 2.4 GHz.
Mode	CDMA2000 <ul style="list-style-type: none"> <li>- <input checked="" type="checkbox"/> 1xRTT (Voice &amp; Data)</li> <li>- <input checked="" type="checkbox"/> 1xEVDO Rel. 0</li> <li>- <input checked="" type="checkbox"/> 1xEVDO Rev. A</li> <li>- <input checked="" type="checkbox"/> 1xAdvanced</li> </ul> LTE <ul style="list-style-type: none"> <li>- <input checked="" type="checkbox"/> QPSK</li> <li>- <input checked="" type="checkbox"/> 16QAM</li> </ul> Wi-Fi 2.4GHz (802.11b/g/n) <ul style="list-style-type: none"> <li>- <input checked="" type="checkbox"/> 802.11b</li> <li>- <input checked="" type="checkbox"/> 802.11g</li> <li>- <input checked="" type="checkbox"/> 802.11n (HT20)</li> </ul> Bluetooth <ul style="list-style-type: none"> <li>- <input checked="" type="checkbox"/> Version 4.0 LE</li> </ul>
Duty Cycle	CDMA: 100% LTE (TDD): 63.33% Duty Cycle LTE (FDD): 100% Duty Cycle Wi-Fi 802.11b/g/n: 100%
SV-LTE & SV-DO	<input type="checkbox"/> Supported

### 7.3. RF Output Power Tolerance

Upper limit (dB): 0.5 ~ -1.5		RF Output Power (dBm)	
RF Air interface	Mode	Target	Max. tune-up tolerance limit
CDMA BC0	1xRTT	24.7	25.2
	1xAdvanced	24.7	25.2
	1xEVDO Rel. 0	24.7	25.2
	1xEVDO Rev. A	24.7	25.2
CDMA BC1	1xRTT	24.0	24.5
	1xAdvanced	24.0	24.5
	1xEVDO Rel. 0	24.0	24.5
	1xEVDO Rev. A	24.0	24.5
CDMA BC10	1xRTT	24.7	25.2
	1xAdvanced	24.7	25.2
	1xEVDO Rel. 0	24.7	25.2
	1xEVDO Rev. A	24.7	25.2
LTE Band 25	QPSK	23.2	23.7
LTE Band 26	QPSK	23.2	23.7
LTE Band 41	QPSK	23.2	23.7

Upper limit (dB): 1.0 ~		RF Output Power (dBm)	
RF Air interface	Mode	Target	Max. tune-up tolerance limit
WiFi 2.4 GHz	802.11b	16.0	17.0
	802.11g	13.0	14.0
	802.11n HT20	12.0	13.0

Upper limit (dB): 1.5 ~		RF Output Power (dBm)	
RF Air interface	Mode	Target	Max. tune-up tolerance limit
Bluetooth		8.5	10.0

Upper limit (dB): 1.5 ~		RF Output Power (dBm)	
RF Air interface	Mode	Target	Max. tune-up tolerance limit
Bluetooth LE		0.0	1.5

### 7.4. Simultaneous Transmission Condition

Item	Capable Transmit Configurations	RF Exposure Condition			Notes
		Head	Body-worn Accessory	Wireless Router (Hotspot) & Wi-Fi Direct	
1	CDMA BC0/1/10 voice + Wi-Fi 2.4GHz	v	v		
2	CDMA BC0/1/10 data + Wi-Fi 2.4GHz	v	v	v	
3	LTE B25/26/41 + Wi-Fi 2.4GHz	v	v	v	
4	CDMA BC0/1/10 voice + Bluetooth		v		
5	CDMA BC0/1/10 data + Bluetooth		v		
6	LTE B25/26/41 + Bluetooth		v		

**Notes:**

1. Wi-Fi 2.4GHz supports Hotspot and Wi-Fi Direct.
2. CDMA and LTE support Hotspot.
3. VoIP is support in CDMA and LTE.
4. Wi-Fi 2.4 GHz Radio cannot transmit simultaneously with Bluetooth Radio.

### 7.5. General LTE SAR Test and Reporting Considerations

Item	Description																																																																																																																																						
Frequency range, Channel Bandwidth, Numbers and Frequencies	<table border="1"> <thead> <tr> <th rowspan="3">Band 25</th> <th colspan="6">Frequency range: 1850 - 1915 MHz</th> </tr> <tr> <th colspan="6">Channel Bandwidth</th> </tr> <tr> <th>20 MHz</th> <th>15 MHz</th> <th>10 MHz</th> <th>5 MHz</th> <th>3 MHz</th> <th>1.4 MHz</th> </tr> </thead> <tbody> <tr> <td>Low</td> <td></td> <td></td> <td>26090/ 1855</td> <td>26065/ 1852.5</td> <td>26055/ 1851.5</td> <td></td> </tr> <tr> <td>Mid</td> <td></td> <td></td> <td>26365/ 1882.5</td> <td>26365/ 1882.5</td> <td>26365/ 1882.5</td> <td></td> </tr> <tr> <td>High</td> <td></td> <td></td> <td>26640/ 1910</td> <td>26665/ 1912.5</td> <td>26675/ 1913.5</td> <td></td> </tr> <tr> <th rowspan="3">Band 26</th> <th colspan="6">Frequency range: 814 - 849 MHz</th> </tr> <tr> <th colspan="6">Channel Bandwidth</th> </tr> <tr> <th>20 MHz</th> <th>15 MHz</th> <th>10 MHz</th> <th>5 MHz</th> <th>3 MHz</th> <th>1.4 MHz</th> </tr> <tr> <td>Low</td> <td></td> <td></td> <td>26740/ 819</td> <td>26715/ 816.5</td> <td>26705/ 815.5</td> <td>26697/ 814.7</td> </tr> <tr> <td>Mid</td> <td></td> <td></td> <td>26865/ 831.5</td> <td>26865/ 831.5</td> <td>26865/ 831.5</td> <td>26865/ 831.5</td> </tr> <tr> <td>High</td> <td></td> <td></td> <td>26990/ 844</td> <td>27015/ 846.5</td> <td>27025/ 847.5</td> <td>27033/ 848.3</td> </tr> <tr> <th rowspan="3">Band 41</th> <th colspan="6">Frequency range: 2496 - 2690 MHz</th> </tr> <tr> <th colspan="6">Channel Bandwidth</th> </tr> <tr> <th>20 MHz</th> <th>15 MHz</th> <th>10 MHz</th> <th>5 MHz</th> <th>3 MHz</th> <th>1.4 MHz</th> </tr> <tr> <td>Low</td> <td>39750/ 2506.0</td> <td>39725/ 2503.5</td> <td>39700/ 2501</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Low-Mid</td> <td>40185/ 2549.5</td> <td>40173/ 2548.3</td> <td>40160/ 2547.0</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Mid</td> <td>40620/ 2593.0</td> <td>40620/ 2593.0</td> <td>40620/ 2593.0</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Mid-High</td> <td>41055/ 2636.5</td> <td>41068/ 2547.8</td> <td>41080/ 2639.0</td> <td></td> <td></td> <td></td> </tr> <tr> <td>High</td> <td>41490/ 2680.0</td> <td>41515/ 2682.5</td> <td>41540/ 2685.0</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Band 25	Frequency range: 1850 - 1915 MHz						Channel Bandwidth						20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz	Low			26090/ 1855	26065/ 1852.5	26055/ 1851.5		Mid			26365/ 1882.5	26365/ 1882.5	26365/ 1882.5		High			26640/ 1910	26665/ 1912.5	26675/ 1913.5		Band 26	Frequency range: 814 - 849 MHz						Channel Bandwidth						20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz	Low			26740/ 819	26715/ 816.5	26705/ 815.5	26697/ 814.7	Mid			26865/ 831.5	26865/ 831.5	26865/ 831.5	26865/ 831.5	High			26990/ 844	27015/ 846.5	27025/ 847.5	27033/ 848.3	Band 41	Frequency range: 2496 - 2690 MHz						Channel Bandwidth						20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz	Low	39750/ 2506.0	39725/ 2503.5	39700/ 2501				Low-Mid	40185/ 2549.5	40173/ 2548.3	40160/ 2547.0				Mid	40620/ 2593.0	40620/ 2593.0	40620/ 2593.0				Mid-High	41055/ 2636.5	41068/ 2547.8	41080/ 2639.0				High	41490/ 2680.0	41515/ 2682.5	41540/ 2685.0			
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LTE transmitter and antenna implementation	LTE has one (1) TX/RX antennas and two (2) RX antennas Refer to Appendix 15.1. Photos and Antenna Locations.																																																																																																																																						
Maximum power reduction (MPR)	<p align="center"><b>Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3</b></p> <table border="1"> <thead> <tr> <th rowspan="2">Modulation</th> <th colspan="6">Channel bandwidth / Transmission bandwidth (RB)</th> <th rowspan="2">MPR (dB)</th> </tr> <tr> <th>1.4 MHz</th> <th>3.0 MHz</th> <th>5 MHz</th> <th>10 MHz</th> <th>15 MHz</th> <th>20 MHz</th> </tr> </thead> <tbody> <tr> <td>QPSK</td> <td>&gt; 5</td> <td>&gt; 4</td> <td>&gt; 8</td> <td>&gt; 12</td> <td>&gt; 16</td> <td>&gt; 18</td> <td>≤ 1</td> </tr> <tr> <td>16 QAM</td> <td>≤ 5</td> <td>≤ 4</td> <td>≤ 8</td> <td>≤ 12</td> <td>≤ 16</td> <td>≤ 18</td> <td>≤ 1</td> </tr> <tr> <td>16 QAM</td> <td>&gt; 5</td> <td>&gt; 4</td> <td>&gt; 8</td> <td>&gt; 12</td> <td>&gt; 16</td> <td>&gt; 18</td> <td>≤ 2</td> </tr> </tbody> </table> <p>MPR Built-in by design                      A-MPR (additional MPR) was disabled during SAR testing</p>	Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 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																																																																																																
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Power reduction	No																																																																																																																																						
Spectrum plots for RB configurations	A properly configured base station simulator was used for the SAR and power measurements; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.																																																																																																																																						

### 7.5.1. TDD LTE Considerations

According to KDB 941225 D05 SAR for LTE Devices v02r02, for Time-Division Duplex (TDD) systems, SAR must be tested using a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by the defined 3GPP LTE TDD configurations.

SAR was tested with the highest transmission duty factor (63.33%) using Uplink-downlink configuration 0 and Special subframe configuration 7.

LTE TDD Band 41 supports 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations and Table 4.2-1 for Special subframe configurations.

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	$26336 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$7680 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
5	$6592 \cdot T_s$			$20480 \cdot T_s$		
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

#### Calculated Duty Cycle

Uplink-Downlink Configuration	Downlink-to-Uplink Switch-point Periodicity	Subframe Number										Calculated Duty Cycle (%)
		0	1	2	3	4	5	6	7	8	9	
0	5 ms	D	S	U	U	U	D	S	U	U	U	63.33
1	5 ms	D	S	U	U	D	D	S	U	U	D	43.33
2	5 ms	D	S	U	D	D	D	S	U	D	D	23.33
3	10 ms	D	S	U	U	U	D	D	D	D	D	31.67
4	10 ms	D	S	U	U	D	D	D	D	D	D	21.67
5	10 ms	D	S	U	D	D	D	D	D	D	D	11.67
6	5 ms	D	S	U	U	U	D	S	U	U	D	53.33

Calculated Duty Cycle = Extended cyclic prefix in uplink x (T<sub>s</sub>) x # of S + # of U

Example for Calculated Duty Cycle for Uplink-Downlink Configuration 0:  
 Calculated Duty Cycle =  $5120 \times [1/(15000 \times 2048)] \times 2 + 6 \text{ ms} = 63.33\%$   
 where  
 T<sub>s</sub> = 1/(15000 x 2048) seconds

## 8. RF Exposure Conditions

Refer to Appendix “Antenna Locations and Separation Distances” for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.

### 8.1. Head Exposure Conditions

#### For WWAN, LTE and Wi-Fi

Test Configurations	SAR Required	Note
Left Touch	Yes	
Left Tilt (15°)	Yes	
Right Touch	Yes	
Right Tilt (15°)	Yes	

### 8.2. Body-worn Accessory Exposure Conditions

#### For WWAN and LTE

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	<25 mm	Yes	
Front	<25 mm	Yes	

#### For Wi-Fi

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	<25 mm	Yes	
Front	<25 mm	Yes	

### 8.3. Hotspot Exposure Conditions and Wi-Fi Direct

#### For WWAN and LTE

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	0 mm	Yes	
Front	4.5 mm	Yes	
Edge 1 (Top)	100.5 mm	No	SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 941225 D06 Hot Spot SAR
Edge 2 (Right)	1 mm	Yes	
Edge 3 (Bottom)	1 mm	Yes	
Edge 4 (Left)	1 mm	Yes	

#### For Wi-Fi

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	0 mm	Yes	
Front	6.5 mm	Yes	
Edge 1 (Top)	11.4 mm	Yes	
Edge 2 (Right)	58.25 mm	No	SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 648474 D04 Handset SAR
Edge 3 (Bottom)	103.6 mm	No	SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 648474 D04 Handset SAR
Edge 4 (Left)	2.25 mm	Yes	



## 9. RF Output Power Measurement

### 9.1. CDMA

#### 1xRTT Measured Results

Band	Mode	Ch	Freq. (MHz)	Avg Pwr (dBm)
BC 0	RC1 SO55 (Loopback)	1013	824.70	25.2
		384	836.52	25.2
		777	848.31	25.0
	RC3 SO55 (Loopback)	1013	824.70	25.1
		384	836.52	25.1
		777	848.31	25.0
	RC3 SO32 (+F-SCH)	1013	824.70	25.2
		384	836.52	25.2
		777	848.31	25.0
BC 1	RC1 SO55 (Loopback)	25	1851.25	24.3
		600	1880.00	24.3
		1175	1908.75	24.3
	RC3 SO55 (Loopback)	25	1851.25	24.3
		600	1880.00	24.4
		1175	1908.75	24.4
	RC3 SO32 (+F-SCH)	25	1851.25	24.2
		600	1880.00	24.2
		1175	1908.75	24.2
BC 10	RC1 SO55 (Loopback)	476	817.9	25.0
		580	820.5	25.1
		684	823.1	25.0
	RC3 SO55 (Loopback)	476	817.9	25.0
		580	820.5	25.1
		684	823.1	25.0
	RC3 SO32 (+F-SCH)	476	817.9	25.1
		580	820.5	25.2
		684	823.1	25.1

**1x Advanced**

**Call box setup procedure**

- Protocol Rev > 6 (IS-2000-0)
- System ID: 331; NID: 65535, Reg. Ch. #.:
- Radio Config (RC) > Fwd11,Rvs8
- Service Option (SO) Setup > SO75 (Loopback)
- Traffic Data Rate > Full
- Rvs Power Ctrl > All Up bits (Maximum TxPout)
- Reverse Power Control Mode: 00-200 to 400 bps
- Smart blanking was disabled.

**Measured Results**

Band	Mode	Ch	Freq. (MHz)	Avg Pwr (dBm)
BC 0	Fwd11/Rvs8 SO75 (Loopback)	1013	824.70	25.2
		384	836.52	25.2
		777	848.31	25.0
BC 1	Fwd11/Rvs8 SO75 (Loopback)	25	1851.25	24.4
		600	1880.00	24.4
		1175	1908.75	24.4
BC 10	Fwd11/Rvs8 SO75 (Loopback)	476	817.9	25.0
		580	820.5	25.1
		684	823.1	25.0

**1xEv-Do Rel. 0 Measured Results**

Band	FTAP Rate	RTAP Rate	Channel	Freq. (MHz)	Avg Pwr (dBm)
BC 0	307.2 kbps (2 slot, QPSK)	153.6 kbps	1013	824.70	25.2
			384	836.52	25.2
			777	848.31	25.1
BC1	307.2 kbps (2 slot, QPSK)	153.6 kbps	25	1851.25	24.4
			600	1880.00	24.4
			1175	1908.75	24.4
BC10	307.2 kbps (2 slot, QPSK)	153.6 kbps	476	817.9	25.1
			580	820.5	25.2
			684	823.1	25.1

**1xEv-Do Rev. A Measured Results**

Band	FETAP Traffic Format	RETAP Data Payload Size	Channel	Freq. (MHz)	Avg Pwr (dBm)
BC 0	307.2k, QPSK/ ACK channel is transmitted at all the slots	4096	1013	824.70	25.2
			384	836.52	25.2
			777	848.31	25.1
BC1	307.2k, QPSK/ ACK channel is transmitted at all the slots	4096	25	1851.25	24.4
			600	1880.00	24.4
			1175	1908.75	24.4
BC10	307.2k, QPSK/ ACK channel is transmitted at all the slots	4096	476	817.9	25.1
			580	820.5	25.2
			684	823.1	25.1

## 9.2. LTE Band

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

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

Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 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

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signalling Value of "NS\_01".

**Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)**

Network Signalling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks ( $N_{RB}$ )	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	NA
NS_03	6.6.2.2.1	2, 4, 10, 23, 25, 35, 36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2	41	5	>6	≤ 1
			10, 15, 20	See Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10,15,20	≥ 50	≤ 1
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	n/a
NS_07	6.6.2.2.3	13	10	Table 6.2.4-2	Table 6.2.4-2
	6.6.3.3.2				
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23 <sup>1</sup>	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
..					
NS_32	-	-	-	-	-

Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.

**LTE Band 25 Measured Results**

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						26090	26365	26640
						1855 MHz	1882.5 MHz	1910 MHz
LTE Band 25	10	QPSK	1	0	0	23.54	23.61	23.50
			1	25	0	23.44	23.51	23.38
			1	49	0	23.42	23.52	23.18
			25	0	1	22.53	22.68	22.67
			25	12	1	22.50	22.65	22.52
			25	25	1	22.39	22.59	22.49
		16QAM	50	0	1	22.43	22.64	22.52
			1	0	1	22.45	22.70	22.48
			1	25	1	22.26	22.70	22.34
			1	49	1	22.25	22.70	22.18
			25	0	2	21.57	21.69	21.69
			25	12	2	21.54	21.70	21.59
			25	25	2	21.40	21.57	21.50
			50	0	2	21.53	21.62	21.64
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						26065	26365	26665
						1852.5 MHz	1882.5 MHz	1912.5 MHz
LTE Band 25	5	QPSK	1	0	0	23.70	23.55	23.44
			1	12	0	23.57	23.59	23.40
			1	24	0	23.45	23.62	23.20
			12	0	1	22.59	22.67	22.61
			12	7	1	22.53	22.69	22.52
			12	13	1	22.51	22.57	22.50
		16QAM	25	0	1	22.58	22.65	22.57
			1	0	1	22.70	22.69	22.41
			1	12	1	22.70	22.54	22.30
			1	24	1	22.70	22.59	22.23
			12	0	2	21.63	21.70	21.68
			12	7	2	21.58	21.69	21.65
			12	13	2	21.53	21.62	21.64
			25	0	2	21.63	21.64	21.70
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						26055	26365	26675
						1851.5 MHz	1882.5 MHz	1913.5 MHz
LTE Band 25	3	QPSK	1	0	0	23.62	23.58	23.54
			1	8	0	23.50	23.41	23.48
			1	14	0	23.56	23.46	23.38
			8	0	1	22.63	22.68	22.55
			8	4	1	22.62	22.70	22.60
			8	7	1	22.70	22.61	22.48
		16QAM	15	0	1	22.61	22.70	22.62
			1	0	1	22.70	22.51	22.70
			1	8	1	22.70	22.36	22.70
			1	14	1	22.70	22.41	22.57
			8	0	2	21.70	21.70	21.66
			8	4	2	21.66	21.70	21.63
			8	7	2	21.70	21.62	21.60
			15	0	2	21.65	21.70	21.70

**LTE Band 26 Measured Results**

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						26740	26865	26990
						819 MHz	831.5 MHz	844 MHz
LTE Band 26	10	QPSK	1	0	0	23.56	23.70	23.63
			1	25	0	23.52	23.62	23.52
			1	49	0	23.62	23.66	23.48
			25	0	1	22.57	22.67	22.62
			25	12	1	22.57	22.54	22.70
			25	25	1	22.62	22.52	22.69
		16QAM	50	0	1	22.61	22.63	22.70
			1	0	1	22.51	22.70	22.53
			1	25	1	22.41	22.70	22.45
			1	49	1	22.51	22.70	22.47
			25	0	2	21.66	21.61	21.60
			25	12	2	21.66	21.48	21.67
			25	25	2	21.70	21.52	21.70
			50	0	2	21.58	21.52	21.70
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						26715	26865	27015
						816.5 MHz	831.5 MHz	846.5 MHz
LTE Band 26	5	QPSK	1	0	0	23.53	23.60	23.66
			1	12	0	23.44	23.55	23.70
			1	24	0	23.55	23.50	23.66
			12	0	1	22.56	22.64	22.70
			12	7	1	22.48	22.55	22.67
			12	13	1	22.55	22.44	22.67
		16QAM	25	0	1	22.59	22.48	22.65
			1	0	1	22.40	22.40	22.70
			1	12	1	22.32	22.41	22.70
			1	24	1	22.44	22.32	22.60
			12	0	2	21.66	21.60	21.70
			12	7	2	21.56	21.48	21.68
			12	13	2	21.64	21.51	21.68
			25	0	2	21.70	21.55	21.66
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)		
						26705	26865	27025
						815.5 MHz	831.5 MHz	847.5 MHz
LTE Band 26	3	QPSK	1	0	0	23.58	23.70	23.67
			1	8	0	23.45	23.70	23.58
			1	14	0	23.50	23.60	23.58
			8	0	1	22.63	22.68	22.70
			8	4	1	22.53	22.55	22.70
			8	7	1	22.50	22.58	22.70
		16QAM	15	0	1	22.54	22.57	22.70
			1	0	1	22.43	22.70	22.61
			1	8	1	22.40	22.70	22.51
			1	14	1	22.41	22.70	22.58
			8	0	2	21.69	21.69	21.70
			8	4	2	21.58	21.60	21.70
			8	7	2	21.55	21.58	21.70
			15	0	2	21.56	21.60	21.70

**LTE Band 41 Measured Results**

**Procedure used to establish SAR test signal for LTE TDD Band 41**

Set to CMW-500 with following parameters:

- Turn the LTE Signaling off using “ON | OFF” key
- Operating Band: Select Band 41 and TDD
- Go to “Config...”

**LTE Signaling 1 - X3.2.10.6**

**Connection Status**

Cell: **OFF**

Packet Switched: **OFF**

RRC State: **Idle**

**Event Log**

- 03:21:26 State 'Cell Off'
- 03:21:17 State 'Cell On'
- 03:21:16 Signaling Failure
- 03:21:13 Network Originated Detach
- 03:21:02 State 'Connection Established'
- 03:21:02 EPS Dedicated Bearer Established
- 03:20:57 State 'Attached'
- 03:20:57 EPS Default Bearer Established

**UE Info**

IMEI: ---

IMSI: ---

UE IPv4 Address [0]: ---

UE IPv6 Prefix [0]: ---

**Connection Setup**

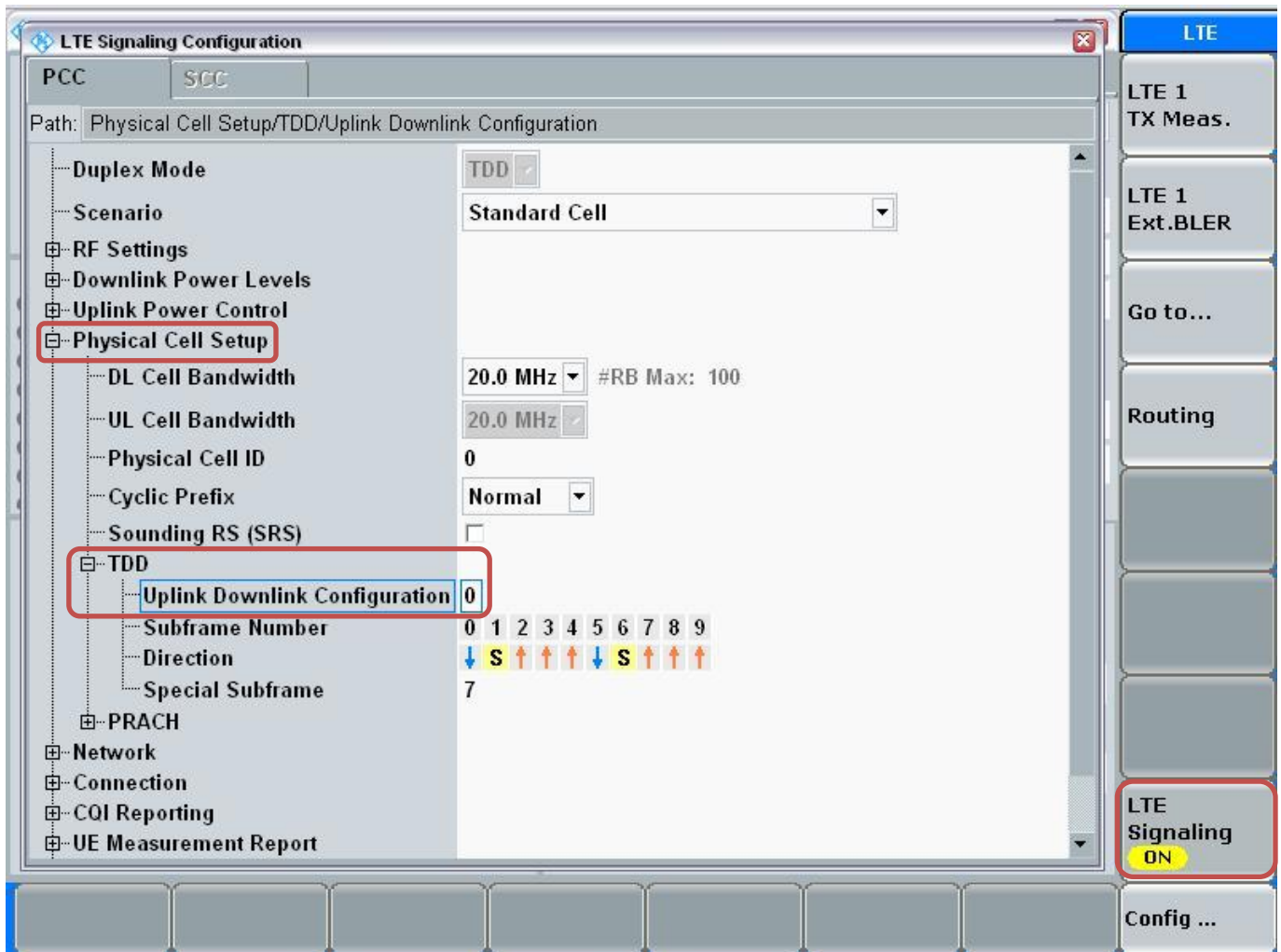
Scheduling: **RMC**

	Downlink	Uplink
Operating Band	<b>Band 41</b>	<b>TDD</b>
Channel	40620 Ch	40620 Ch
Frequency	2593.0 MHz	2593.0 MHz
Cell Bandwidth	20.0 MHz	20.0 MHz
RS EPRE	-85.8 dBm/15kHz	
Full Cell BW Pow.	-55.0 dBm	
PUSCH Open Loop Nom.Power		23 dBm
PUSCH Closed Loop Target Power		23.0 dBm
# RB	100	100
RB Pos./Start RB	low 0	low 0
Modulation	QPSK	QPSK
TBS Idx / Value	5 8760	2 4584
Throughput	3.970 Mbit/s	1.834 Mbit/s

**LTE Signaling OFF**

**Config ...**

- Go to "Physical Cell Setup"
- Select "TDD" and Set "Uplink Downlink Configuration" to "0"
- Turn the cell on using "ON | OFF" key



**Connect to EUT**

- Turn the cell on using “ON | OFF” key
- After EUT is Attached
- Select “Connect”

The screenshot displays the 'LTE Signaling 1 - X3.2.10.6' software interface. The main window is divided into several sections:

- Connection Status:** Shows 'Cell' with a signal icon, 'Packet Switched' with a laptop icon, and 'RRC State' as 'Connected'. A red box highlights the 'Attached' status.
- Event Log:** Lists system events such as 'State 'Attached'', 'EPS Default Bearer Established', and 'RRC Connection Established'.
- UE Info:** Displays identifiers like IMEI (001027009999998), IMSI (001010123456789), and IP addresses.
- Connection Setup:** Configures parameters for PCC and SCC bearers, including Operating Band (Band 41), Frequency (2593.0 MHz), and Power levels.
- Buttons:** A row of control buttons at the bottom includes 'Detach', 'Connect' (highlighted with a red box), 'Send SMS', 'Handover ...', and 'Config ...'.
- Right Panel:** A vertical sidebar contains buttons for 'LTE', 'LTE 1 TX Meas.', 'LTE 1 Ext.BLER', 'Go to...', 'Routing', and 'LTE Signaling ON' (highlighted with a red box).



**Max Power Setting**

- Select "LTE 1 TX Meas."
- Press "RESTART | STOP" Soft key

The screenshot displays the 'LTE Signaling 1 - X3.2.10.6' interface. On the left, the 'Connection Status' shows 'Connection Established' and 'RRC State Connected'. Below it is an 'Event Log' with several entries. The 'UE Info' section lists IMEI, IMSI, and IP addresses. The main area is divided into 'PCC' and 'SCC' tabs, showing 'Operating Band Band 41', 'Channel 40620 Ch', and 'Frequency 2593.0 MHz'. The 'Connection Setup' section shows 'Scheduling RMC', '# RB 100', and 'Modulation QPSK'. On the right, a vertical menu includes 'LTE 1 TX Meas.' (highlighted with a red box), 'LTE 1 Ext.BLER', 'Go to...', 'Routing', and 'LTE Signaling ON' (highlighted with a red box). At the bottom, there are buttons for 'Detach', 'Disconnect', 'Send SMS', 'Handover ...', and 'Config ...'.

- Select "Signaling Parameter"
- Select "TX Power Control (TPC)" > Select "Active TPC Setup" to "Max Power" > Set "Closed Loop Target Power" to "23 dBm"

The screenshot displays the 'LTE Measurement - X3.2.10.6 - TX Measurement' software interface. The main window shows various measurement plots: EVM, Inband Emissions, Equalizer Spectrum Flatness, and Spectrum ACLR. A 'Signaling TPC' dialog box is open, showing the 'TX Power Control (TPC)' settings. The 'Active TPC Setup' is set to 'Max Power' and the 'Closed Loop Target Power' is set to '23.0 dBm'. The 'Signaling Parameter' button on the right sidebar is highlighted with a red box. The 'Multi Evaluation' button is set to 'RUN' and 'LTE Signaling' is 'ON'. The bottom of the interface has a navigation bar with buttons for 'Cell Setup ...', 'Connection Setup ...', 'DL Error Insertion ...', 'TPC ...', 'Power ...', 'Enable ...', and 'Config ...'.

### View TX Power

- Go to "Display"
- Select "Select View..."
- Select "Spectrum Emission Mask"

LTE Measurement - X3.2.10.6 - TX Measurement

Mode: TDD Freq.: 2593.0 MHz Ref. Level: 45.00 dBm Bandwidth: 20.0 MHz Cyclic Prefix: Normal Meas Subfr.: 0

**Spectrum Emission Mask**

dBm

MHz

Detected Allocation	NoRB:	100	OffsetRB:	0						
OBW	Current	17.790 MHz	Average	17.773 MHz	Extreme	17.790 MHz	StdDev	0.013 MHz		
TX Power	Current	23.72 dBm	Average	23.33 dBm	Min	22.10 dBm	Max	24.27 dBm	StdDev	0.23 dBm

Statistic Count: 20 / 20 Out of Tolerance: 0.00 % Detected Modulation: QPSK Detected Channel Type: PUSCH View Filter: 100.0 %

Select View: SpectrumEmissionMask

Select View ... Margin On Off Select Trace (SEM) ... Y Scale (SEM) ... X Scale (SEM) ...

**LTE Band 41 Measured Results (continued)**

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)				
						39750	40185	40620	41055	41490
						2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz
LTE Band 41	20	QPSK	1	0	0	23.50	23.33	23.48	23.43	23.55
			1	49	0	23.69	23.61	23.33	23.34	23.69
			1	99	0	23.61	23.52	23.16	23.19	23.20
			50	0	1	22.50	22.50	22.50	22.21	22.61
			50	24	1	22.52	22.61	22.37	22.16	22.70
			50	50	1	22.54	22.53	22.34	22.11	22.46
			100	0	1	22.53	22.54	22.37	22.11	22.60
		16QAM	1	0	1	21.78	22.35	22.06	22.20	22.70
			1	49	1	21.93	22.56	21.88	22.15	22.70
			1	99	1	21.87	22.50	21.72	21.95	22.65
			50	0	2	21.47	21.50	21.51	21.15	21.67
			50	24	2	21.55	21.60	21.33	21.14	21.70
			50	50	2	21.53	21.49	21.30	21.02	21.62
			100	0	2	21.47	21.50	21.32	21.11	21.61
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)				
						39725	40173	40620	41068	41515
						2503.5 MHz	2548.3 MHz	2593 MHz	2637.8 MHz	2682.5 MHz
LTE Band 41	15	QPSK	1	0	0	23.50	23.25	23.62	23.25	23.70
			1	37	0	23.61	23.41	23.50	23.21	23.67
			1	74	0	23.65	23.30	23.31	23.00	23.21
			36	0	1	22.42	22.55	22.47	22.15	22.54
			36	20	1	22.50	22.62	22.37	22.20	22.66
			36	39	1	22.56	22.64	22.33	22.17	22.30
			75	0	1	22.51	22.63	22.36	22.18	22.53
		16QAM	1	0	1	22.25	22.70	22.51	22.18	22.70
			1	37	1	22.49	22.70	22.41	22.12	22.70
			1	74	1	22.57	22.70	22.17	21.92	22.28
			36	0	2	21.36	21.45	21.47	21.03	21.67
			36	20	2	21.42	21.51	21.36	21.00	21.58
			36	39	2	21.47	21.55	21.34	21.02	21.35
			75	0	2	21.53	21.58	21.40	21.13	21.66
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Avg Pwr (dBm)				
						39700	40160	40620	41080	41540
						2501 MHz	2547 MHz	2593 MHz	2639 MHz	2685 MHz
LTE Band 41	10	QPSK	1	0	0	23.38	23.55	23.32	23.13	23.47
			1	25	0	23.47	23.70	23.24	23.10	23.36
			1	49	0	23.54	23.65	23.06	23.02	22.88
			25	0	1	22.44	22.44	22.44	22.20	22.56
			25	12	1	22.49	22.59	22.32	22.15	22.50
			25	25	1	22.55	22.66	22.35	22.13	22.25
			50	0	1	22.46	22.54	22.31	22.15	22.40
		16QAM	1	0	1	22.57	22.46	22.70	22.32	22.57
			1	25	1	22.68	22.60	22.70	22.32	22.45
			1	49	1	22.70	22.58	22.70	22.30	21.95
			25	0	2	21.44	21.46	21.36	21.09	21.61
			25	12	2	21.53	21.51	21.32	21.06	21.54
			25	25	2	21.52	21.57	21.32	21.01	21.26
			50	0	2	21.40	21.63	21.43	21.00	21.47

### 9.3. Wi-Fi (2.4 GHz Band)

Required Test Channels per KDB 248227 D01

Mode	Band	GHz	Channel	"Default Test Channels"	
				802.11b	802.11g
802.11b/g	2.4 GHz	2.412	1 <sup>#</sup>	√	∇
		2.437	6	√	∇
		2.462	11 <sup>#</sup>	√	∇

**Notes:**  
 √ = "default test channels"  
 ∇ = possible 802.11g channels with maximum average output ¼ dB ≥ the "default test channels"  
<sup>#</sup> = when output power is reduced for channel 1 and /or 11 to meet restricted band requirements the highest output channels closest to each of these channels should be tested.

#### Measured Results

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Avg Pwr (dBm)	SAR Test (Yes/No)
2.4 (DTS)	802.11b	1 Mbps	1	2412	15.8	Yes
			6	2437	15.9	
			11	2462	15.9	
	802.11g	6 Mbps	1	2412	12.4	No
			6	2437	12.6	
			11	2462	12.7	
	802.11n (HT20)	MCS0	1	2412	11.6	No
			6	2437	11.7	
			11	2462	11.8	

#### Note(s):

Per KDB 248227 D01, SAR is not required for 802.11g/HT20 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.

#### Power measurements to determine worst-case data rates

Mode	Ch #	Freq. (MHz)	Data Rate	Avg Pwr (dBm)	SAR test (Yes/No)
802.11b	6	2437	1 Mbps	15.9	Yes
			2 Mbps	15.7	No
			5.5 Mbps	15.7	No
			11 Mbps	15.5	No

### 9.4. Bluetooth

Maximum tune-up tolerance limit is 10.0 dBm from the rated nominal maximum output power. This power level qualifies for exclusion of SAR testing.

Refer to Standalone SAR Test Exclusion Considerations Section.

## 10. Tissue Dielectric Properties

### IEEE Std 1528-2013

Target Frequency (MHz)	Head	
	$\epsilon_r$	$\sigma$ (S/m)
300	45.3	0.87
450	43.5	0.87
750	41.9	0.89
835	41.5	0.90
900	41.5	0.97
1450	40.5	1.20
1500	40.4	1.23
1640	40.2	1.31
1750	40.1	1.37
1800	40.0	1.40
1900	40.0	1.40
2000	40.0	1.40
2100	39.8	1.49
2300	39.5	1.67
2450	39.2	1.80
2600	39.0	1.96
3000	38.5	2.40
3500	37.9	2.91
4000	37.4	3.43
4500	36.8	3.94
5000	36.2	4.45
5200	36.0	4.66
5400	35.8	4.86
5600	35.5	5.07
5800	35.3	5.27
6000	35.1	5.48

NOTE—For convenience, permittivity and conductivity values at some frequencies that are not part of the original data from Drossos et al. [B60] or the extension to 5800 MHz are provided (i.e., the values shown in italics). These values were linearly interpolated between the values in this table that are immediately above and below these values, except the values at 6000 MHz that were linearly extrapolated from the values at 3000 MHz and 5800 MHz.

### FCC KDB 865664 D01 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



## 10.2. Tissue Dielectric Parameter Check Results

The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within ± 2°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.

### SAR Lab 1

	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
6/23/2014	Head 1900	e'	38.8900	Relative Permittivity ( $\epsilon_r$ ):	38.89	40.00	-2.78	5
		e"	13.4700	Conductivity ( $\sigma$ ):	1.42	1.40	1.65	5
	Head 1850	e'	39.1000	Relative Permittivity ( $\epsilon_r$ ):	39.10	40.00	-2.25	5
		e"	13.3400	Conductivity ( $\sigma$ ):	1.37	1.40	-1.98	5
	Head 1910	e'	38.8500	Relative Permittivity ( $\epsilon_r$ ):	38.85	40.00	-2.88	5
		e"	13.4900	Conductivity ( $\sigma$ ):	1.43	1.40	2.33	5
6/23/2014	Body 1900	e'	50.9800	Relative Permittivity ( $\epsilon_r$ ):	50.98	53.30	-4.35	5
		e"	14.6900	Conductivity ( $\sigma$ ):	1.55	1.52	2.10	5
	Body 1850	e'	51.1500	Relative Permittivity ( $\epsilon_r$ ):	51.15	53.30	-4.03	5
		e"	14.5200	Conductivity ( $\sigma$ ):	1.49	1.52	-1.74	5
	Body 1910	e'	50.9500	Relative Permittivity ( $\epsilon_r$ ):	50.95	53.30	-4.41	5
		e"	14.7200	Conductivity ( $\sigma$ ):	1.56	1.52	2.85	5
6/26/2014	Head 1900	e'	41.0300	Relative Permittivity ( $\epsilon_r$ ):	41.03	40.00	2.58	5
		e"	13.1200	Conductivity ( $\sigma$ ):	1.39	1.40	-0.99	5
	Head 1850	e'	41.2400	Relative Permittivity ( $\epsilon_r$ ):	41.24	40.00	3.10	5
		e"	13.0200	Conductivity ( $\sigma$ ):	1.34	1.40	-4.33	5
	Head 1910	e'	40.9800	Relative Permittivity ( $\epsilon_r$ ):	40.98	40.00	2.45	5
		e"	13.1400	Conductivity ( $\sigma$ ):	1.40	1.40	-0.32	5
6/26/2014	Body 1900	e'	51.5900	Relative Permittivity ( $\epsilon_r$ ):	51.59	53.30	-3.21	5
		e"	14.9600	Conductivity ( $\sigma$ ):	1.58	1.52	3.98	5
	Body 1850	e'	51.8200	Relative Permittivity ( $\epsilon_r$ ):	51.82	53.30	-2.78	5
		e"	14.8700	Conductivity ( $\sigma$ ):	1.53	1.52	0.63	5
	Body 1910	e'	51.5400	Relative Permittivity ( $\epsilon_r$ ):	51.54	53.30	-3.30	5
		e"	14.9800	Conductivity ( $\sigma$ ):	1.59	1.52	4.66	5

### SAR Lab 2

	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
6/25/2014	Head 2600	e'	38.3100	Relative Permittivity ( $\epsilon_r$ ):	38.31	39.01	-1.80	5
		e"	13.1800	Conductivity ( $\sigma$ ):	1.91	1.96	-2.89	5
	Head 2500	e'	38.7200	Relative Permittivity ( $\epsilon_r$ ):	38.72	39.14	-1.07	5
		e"	12.9000	Conductivity ( $\sigma$ ):	1.79	1.85	-3.28	5
	Head 2700	e'	37.9500	Relative Permittivity ( $\epsilon_r$ ):	37.95	38.88	-2.40	5
		e"	13.4400	Conductivity ( $\sigma$ ):	2.02	2.07	-2.54	5
6/25/2014	Body 2600	e'	50.1800	Relative Permittivity ( $\epsilon_r$ ):	50.18	52.51	-4.44	5
		e"	15.3600	Conductivity ( $\sigma$ ):	2.22	2.16	2.77	5
	Body 2500	e'	50.5200	Relative Permittivity ( $\epsilon_r$ ):	50.52	52.64	-4.02	5
		e"	15.1400	Conductivity ( $\sigma$ ):	2.10	2.02	4.17	5
	Body 2700	e'	49.8800	Relative Permittivity ( $\epsilon_r$ ):	49.88	52.38	-4.78	5
		e"	15.5700	Conductivity ( $\sigma$ ):	2.34	2.30	1.57	5



**Tissue Dielectric Parameter Check Results (continued)**

**SAR Lab 3**

	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
6/24/2014	Body 835	e'	53.5600	Relative Permittivity ( $\epsilon_r$ ):	53.56	55.20	-2.97	5
		e"	21.7100	Conductivity ( $\sigma$ ):	1.01	0.97	3.91	5
	Body 820	e'	53.6300	Relative Permittivity ( $\epsilon_r$ ):	53.63	55.28	-2.98	5
		e"	21.7400	Conductivity ( $\sigma$ ):	0.99	0.97	2.35	5
	Body 850	e'	53.4300	Relative Permittivity ( $\epsilon_r$ ):	53.43	55.16	-3.13	5
		e"	21.7000	Conductivity ( $\sigma$ ):	1.03	0.99	3.90	5
6/24/2014	Head 835	e'	40.3300	Relative Permittivity ( $\epsilon_r$ ):	40.33	41.50	-2.82	5
		e"	19.2700	Conductivity ( $\sigma$ ):	0.89	0.90	-0.59	5
	Head 820	e'	40.4600	Relative Permittivity ( $\epsilon_r$ ):	40.46	41.60	-2.75	5
		e"	19.2800	Conductivity ( $\sigma$ ):	0.88	0.90	-2.16	5
	Head 850	e'	40.1700	Relative Permittivity ( $\epsilon_r$ ):	40.17	41.50	-3.20	5
		e"	19.2700	Conductivity ( $\sigma$ ):	0.91	0.92	-0.46	5

**SAR Lab 4**

	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
6/24/2014	Head 2450	e'	38.4000	Relative Permittivity ( $\epsilon_r$ ):	38.40	39.20	-2.04	5
		e"	13.8700	Conductivity ( $\sigma$ ):	1.89	1.80	4.97	5
	Head 2410	e'	38.5900	Relative Permittivity ( $\epsilon_r$ ):	38.59	39.28	-1.75	5
		e"	13.7800	Conductivity ( $\sigma$ ):	1.85	1.76	4.89	5
	Head 2475	e'	38.3000	Relative Permittivity ( $\epsilon_r$ ):	38.30	39.17	-2.22	5
		e"	13.9300	Conductivity ( $\sigma$ ):	1.92	1.83	4.93	5
6/24/2014	Body 2450	e'	50.5700	Relative Permittivity ( $\epsilon_r$ ):	50.57	52.70	-4.04	5
		e"	15.0200	Conductivity ( $\sigma$ ):	2.05	1.95	4.93	5
	Body 2410	e'	50.7300	Relative Permittivity ( $\epsilon_r$ ):	50.73	52.76	-3.85	5
		e"	14.9300	Conductivity ( $\sigma$ ):	2.00	1.91	4.89	5
	Body 2475	e'	50.4900	Relative Permittivity ( $\epsilon_r$ ):	50.49	52.67	-4.14	5
		e"	15.0700	Conductivity ( $\sigma$ ):	2.07	1.99	4.47	5

## 11. System Performance 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 remeasured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

### 11.1. System Performance Check Measurement Conditions

- The measurements were performed in the flat section of the TWIN SAM or ELI phantom, shell thickness: 2.0 ±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 ≥ 15.0 cm for SAR measurements ≤ 3 GHz and ≥ 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 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.  
 For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 (below 3 GHz) and/or 8x8x7 (above 3 GHz) fine cube was chosen for the cube.
- Distance between probe sensors and phantom surface was set to 3 mm.  
 For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.5 mm
- The dipole input power (forward power) was 100 mW.
- The results are normalized to 1 W input power.

### 11.2. Reference SAR Values for System Performance Check

The reference SAR values can be obtained from the calibration certificate of system validation dipoles

System Dipole	Serial No.	Cal. Date	Freq. (MHz)	Target SAR Values (mW/g)		
				1g/10g	Head	Body
D835V2	4d002	11/15/2013	835	1g	9.49	9.43
				10g	6.18	6.21
D1900V2	5d043	11/12/2013	1900	1g	40.1	39.0
				10g	21.1	20.8
D2450V2	899	9/10/2013	2450	1g	51.3	49.7
				10g	23.9	23.3
D2600V2	1006	9/11/2013	2600	1g	56.5	55.7
				10g	25.2	24.8

### 11.3. System Performance 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.

#### SAR Room 1

Date Tested	System Dipole		T.S. Liquid	Measured Results			Target (Ref. Value)	Delta ±10 %	Est./Zoom Ratio	Plot No.	
	Type	Serial #		Area Scan	Zoom Scan	Normalize to 1 W					
6/23/2014	D1900V2	5d043	Head	1g	4.21	4.06	40.6	40.10	1.25	3.56	
				10g	2.160	2.090	20.9	21.10	-0.95		
6/23/2014	D1900V2	5d043	Body	1g	4.06	4.03	40.3	39.00	3.33	0.74	
				10g	2.060	2.120	21.2	20.80	1.92		
6/26/2014	D1900V2	5d043	Head	1g	4.12	4.03	40.3	40.1	0.50	2.18	
				10g	2.110	2.08	20.8	21.1	-1.42		
6/26/2014	D1900V2	5d043	Body	1g	4.12	4.05	40.5	39.00	3.85	1.70	1,2
				10g	2.080	2.130	21.3	20.80	2.40		

#### SAR Room 2

Date Tested	System Dipole		T.S. Liquid	Measured Results			Target (Ref. Value)	Delta ±10 %	Est./Zoom Ratio	Plot No.	
	Type	Serial #		Area Scan	Zoom Scan	Normalize to 1 W					
6/25/2014	D2600V2	1006	Head	1g	5.48	5.28	52.8	56.50	-6.55	3.65	
				10g	2.400	2.320	23.2	25.20	-7.94		
6/25/2014	D2600V2	1006	Body	1g	6.12	5.95	59.5	55.70	6.82	2.78	3,4
				10g	2.670	2.660	26.6	24.80	7.26		

#### SAR Room 3

Date Tested	System Dipole		T.S. Liquid	Measured Results			Target (Ref. Value)	Delta ±10 %	Est./Zoom Ratio	Plot No.	
	Type	Serial #		Area Scan	Zoom Scan	Normalize to 1 W					
6/24/2014	D835V2	4d002	Head	1g	0.97	0.96	9.6	9.49	0.74	1.65	
				10g	0.656	0.625	6.3	6.18	1.13		
6/24/2014	D835V2	4d002	Body	1g	1.07	1.03	10.3	9.43	9.23	3.74	5,6
				10g	0.714	0.682	6.8	6.21	9.82		

#### SAR Room 4

Date Tested	System Dipole		T.S. Liquid	Measured Results			Target (Ref. Value)	Delta ±10 %	Est./Zoom Ratio	Plot No.	
	Type	Serial #		Area Scan	Zoom Scan	Normalize to 1 W					
6/24/2013	2450V2	899	Body	1g	5.25	5.42	54.2	49.70	9.05	-3.24	7,8
				10g	2.200	2.510	25.1	23.30	7.73		
6/24/2013	2450V2	899	Head	1g	5.39	5.47	54.7	51.30	6.63	-1.48	
				10g	2.330	2.530	25.3	23.90	5.86		

## 12. SAR Test Results

SAR Test Reduction criteria are as follows:

### **KDB 447498 D01 General RF Exposure Guidance:**

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:

- $\leq 0.8$  W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is  $\leq 100$  MHz
- $\leq 0.6$  W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
- $\leq 0.4$  W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is  $\geq 200$  MHz

### **KDB 648474 D04 Handset SAR:**

With headset attached, when the reported SAR for body-worn accessory, measured without a headset connected to the handset, is  $> 1.2$  W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

### **KDB 941225 D05 SAR for LTE Devices:**

SAR test reduction is applied using the following criteria:

- Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB, and 50% RB allocation, using the RB offset and required test channel combination with the highest maximum output power among 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 for other Channels is performed at the highest output power level for 1RB, and 50% RB configuration for that channel.
- Testing for 100% RB configuration is performed at the highest output power level for 100% RB configuration across the Low, Mid and High Channel when the highest reported SAR for 1 RB and 50% RB are  $> 0.8$  W/kg. Testing for the remaining required channels is not needed because the reported SAR for 100% RB Allocation  $< 1.45$  W/kg.
- Testing for 16-QAM modulation is not required because the reported SAR for QPSK is  $< 1.45$  W/Kg and its output power is not more than 0.5 dB higher than that of QPSK.
- Testing for the other channel bandwidths is not required because the reported SAR for the highest channel bandwidth is  $< 1.45$  W/Kg and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.

### **KDB 248227 D01 SAR Measurements Procedures for 802.11 a/b/g Transmitters v01r02 (pg.6):**

Each channel should be tested at the lowest data rate in each a-b/g mode or 4.9 GHz channel BW configuration.

When the extrapolated maximum peak SAR for the maximum output channel is  $\leq 1.6$  W/kg and the 1-g averaged SAR is  $\leq 0.8$  W/kg, testing of other channels in the "default test channels" or "required test channels" configuration is optional.

### 12.1. CDMA BC0

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot	
						Tune-up limit	Meas.	Meas.	Scaled		
Head	1xRTT (RC3 SO55)	0	Left Touch	1013	824.70	25.2	25.1	0.682	0.693		
				384	836.52	25.2	25.1	0.818	0.829		
				777	848.31	25.2	25.0	0.855	0.895		
			Left Tilt	384	836.52	25.2	25.1	0.458	0.464		
				Right Touch	384	836.52	25.2	25.1	0.671	0.680	
					384	836.52	25.2	25.1	0.437	0.443	
	1xEVDO (Rel. 0)		Left Touch	1013	824.70	25.2	25.2	0.675	0.678		
				384	836.52	25.2	25.2	0.854	0.854		
				777	848.31	25.2	25.1	0.915	0.943	1	
			Left Tilt	384	836.52	25.2	25.2	0.420	0.420		
				Right Touch	384	836.52	25.2	25.2	0.647	0.647	
			384		836.52	25.2	25.2	0.400	0.400		
Body	1xRTT (RC3 SO32)	10	Rear	1013	824.70	25.2	25.2	1.130	1.130		
				384	836.52	25.2	25.2	1.070	1.070		
				777	848.31	25.2	25.0	0.972	1.018		
			Front	1013	824.70	25.2	25.2	0.792	0.792		
				384	836.52	25.2	25.2	0.910	0.910		
				777	848.31	25.2	25.0	0.840	0.880		
	1xEVDO (Rel. 0)		Rear	1013	824.70	25.2	25.2	0.933	0.937		
				384	836.52	25.2	25.2	0.819	0.819		
				777	848.31	25.2	25.1	0.838	0.863		
			Front	384	836.52	25.2	25.2	0.727	0.727		
				Edge 2	1013	824.70	25.2	25.2	0.758	0.758	
					384	836.52	25.2	25.2	0.812	0.812	
777	848.31	25.2	25.0		0.626	0.656					
Hotspot	1xRTT (RC3 SO32)	10	Edge 3	1013	824.70	25.2	25.2	0.342	0.342		
				384	836.52	25.2	25.2	0.465	0.465		
				777	848.31	25.2	25.0	0.461	0.483		
			Edge 4	1013	824.70	25.2	25.2	1.190	1.190	2	
				384	836.52	25.2	25.2	1.070	1.070		
				777	848.31	25.2	25.0	0.931	0.975		
	1xEVDO (Rel. 0)		Edge 2	384	836.52	25.2	25.2	0.416	0.416		
				Edge 3	384	836.52	25.2	25.2	0.369	0.369	
					Edge 4	1013	824.70	25.2	25.2	1.130	1.135
			384			836.52	25.2	25.2	1.060	1.060	
			777	848.31		25.2	25.1	0.923	0.951		

## 12.2. CDMA BC1

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot
						Tune-up limit	Meas.	Meas.	Scaled	
Head	1xRTT (RC3 SO55)	0	Left Touch	600	1880.00	24.5	24.4	0.393	0.406	3
			Left Tilt	600	1880.00	24.5	24.4	0.238	0.246	
			Right Touch	600	1880.00	24.5	24.4	0.736	0.760	
	1xEVDO (Rel. 0)		Right Tilt	600	1880.00	24.5	24.4	0.280	0.289	
			Left Touch	600	1880.00	24.5	24.4	0.332	0.341	
			Left Tilt	600	1880.00	24.5	24.4	0.255	0.262	
			Right Touch	600	1880.00	24.5	24.4	0.723	0.742	
Right Tilt	600	1880.00	24.5	24.4	0.289	0.296				
Body	1xRTT (RC3 SO32)	10	Rear	25	1851.25	24.5	24.2	0.837	0.897	
				600	1880.00	24.5	24.2	0.857	0.918	
				1175	1908.75	24.5	24.2	0.795	0.852	
			Front	25	1851.25	24.5	24.2	0.821	0.880	
				600	1880.00	24.5	24.2	0.835	0.895	
				1175	1908.75	24.5	24.2	0.911	0.976	
	1xEVDO (Rel. 0)		Rear	25	1851.25	24.5	24.4	0.863	0.887	
				600	1880.00	24.5	24.4	0.851	0.873	
				1175	1908.75	24.5	24.4	0.803	0.818	
			Front	25	1851.25	24.5	24.4	0.876	0.901	
				600	1880.00	24.5	24.4	0.877	0.899	
				1175	1908.75	24.5	24.4	0.807	0.822	
Hotspot	1xRTT (RC3 SO32)	10	Edge 2	600	1880.00	24.5	24.2	0.242	0.259	
			Edge 3	600	1880.00	24.5	24.2	0.639	0.685	
			Edge 4	600	1880.00	24.5	24.2	0.114	0.122	
	1xEVDO (Rel. 0)		Edge 2	600	1880.00	24.5	24.4	0.309	0.317	
			Edge 3	600	1880.00	24.5	24.4	0.594	0.609	
			Edge 4	600	1880.00	24.5	24.4	0.112	0.115	

### Repeated SAR

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot
						Tune-up limit	Meas.	Meas.	Scaled	
Body	1xRTT (RC3 SO32)	10	Front	1175	1908.75	24.5	24.2	0.917	0.983	4

### 12.3. CDMA BC10

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
Head	1xRTT (RC3 SO55)	0	Left Touch	580	820.5	25.2	25.1	0.661	0.676	5
			Left Tilt	580	820.5	25.2	25.1	0.432	0.442	
			Right Touch	580	820.5	25.2	25.1	0.470	0.481	
			Right Tilt	580	820.5	25.2	25.1	0.334	0.342	
	1xEVDO (Rel. 0)		Left Touch	580	820.5	25.2	25.2	0.650	0.653	
			Left Tilt	580	820.5	25.2	25.2	0.364	0.366	
			Right Touch	580	820.5	25.2	25.2	0.507	0.509	
			Right Tilt	580	820.5	25.2	25.2	0.378	0.380	
Body	1xRTT (RC3 SO32)	10	Rear	476	817.9	25.2	25.1	1.010	1.034	6
				580	820.5	25.2	25.2	0.995	0.995	
				684	823.1	25.2	25.1	0.924	0.939	
			Front	580	820.5	25.2	25.2	0.685	0.685	
			Rear	476	817.9	25.2	25.1	1.050	1.074	
				580	820.5	25.2	25.2	0.992	0.997	
	684			823.1	25.2	25.1	0.948	0.975		
	Front		476	817.9	25.2	25.1	0.849	0.869		
			580	820.5	25.2	25.2	0.816	0.820		
			684	823.1	25.2	25.1	0.789	0.811		
Hotspot	1xRTT (RC3 SO32)	10	Edge 2	580	820.5	25.2	25.2	0.440	0.440	
			Edge 3	580	820.5	25.2	25.2	0.328	0.328	
			Edge 4	580	820.5	25.2	25.2	0.752	0.752	
			Edge 2	580	820.5	25.2	25.2	0.646	0.649	
	Edge 3		580	820.5	25.2	25.2	0.339	0.341		
			476	817.9	25.2	25.1	0.906	0.927		
			580	820.5	25.2	25.2	0.885	0.889		
	Edge 4		684	823.1	25.2	25.1	0.849	0.873		

### 12.4. LTE Band 25 (10MHz Bandwidth)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.				
								Tune-up limit	Meas.	Meas.	Scaled					
Head	QPSK	0	Left Touch	26365	1882.5	1	0	23.7	23.6	0.324	0.331	7				
						25	0	22.7	22.7	0.270	0.271					
			Left Tilt	26365	1882.5	1	0	23.7	23.6	0.184	0.188					
						25	0	22.7	22.7	0.152	0.153					
			Right Touch	26365	1882.5	1	0	23.7	23.6	0.615	0.628					
						25	0	22.7	22.7	0.498	0.500					
			Right Tilt	26365	1882.5	1	0	23.7	23.6	0.232	0.237					
						25	0	22.7	22.7	0.182	0.183					
			Body & Hotspot	QPSK	10	Rear	26365	1882.5	1	0	23.7		23.6	0.649	0.663	8
									25	0	22.7		22.7	0.532	0.534	
Front	26365	1882.5				1	0	23.7	23.6	0.630	0.643					
						25	0	22.7	22.7	0.530	0.532					
Hotspot	QPSK	10				Edge 2	26365	1882.5	1	0	23.7	23.6	0.200	0.204		
									25	0	22.7	22.7	0.160	0.161		
			Edge 3	26365	1882.5	1	0	23.7	23.6	0.483	0.493					
						25	0	22.7	22.7	0.385	0.387					
Edge 4	26365	1882.5	1	0	23.7	23.6	0.150	0.153								
			25	0	22.7	22.7	0.123	0.124								

### 12.5. LTE Band 26 (10MHz Bandwidth)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
Head	QPSK	0	Left Touch	26865	831.5	1	0	23.7	23.7	0.390	0.390	9
						25	0	22.7	22.7	0.311	0.313	
			Left Tilt	26865	831.5	1	0	23.7	23.7	0.249	0.249	
						25	0	22.7	22.7	0.181	0.182	
			Right Touch	26865	831.5	1	0	23.7	23.7	0.305	0.305	
						25	0	22.7	22.7	0.247	0.249	
			Right Tilt	26865	831.5	1	0	23.7	23.7	0.216	0.216	
						25	0	22.7	22.7	0.178	0.179	
Body & Hotspot	QPSK	10	Rear	26865	831.5	1	0	23.7	23.7	0.654	0.654	10
						25	0	22.7	22.7	0.532	0.536	
			Front	26865	831.5	1	0	23.7	23.7	0.495	0.495	
						25	0	22.7	22.7	0.409	0.412	
Hotspot	QPSK	10	Edge 2	26865	831.5	1	0	23.7	23.7	0.259	0.259	
						25	0	22.7	22.7	0.215	0.216	
			Edge 3	26865	831.5	1	0	23.7	23.7	0.205	0.205	
						25	0	22.7	22.7	0.168	0.169	
			Edge 4	26865	831.5	1	0	23.7	23.7	0.388	0.388	
						25	0	22.7	22.7	0.306	0.308	

### 12.6. LTE Band 41 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
Head	QPSK	0	Left Touch	40620	2593.0	1	0	23.7	23.5	0.326	0.343	
						50	0	22.7	22.5	0.263	0.275	
			Left Tilt	40620	2593.0	1	0	23.7	23.5	0.203	0.214	
						50	0	22.7	22.5	0.161	0.169	
			Right Touch	40620	2593.0	1	0	23.7	23.5	0.749	0.788	11
						50	0	22.7	22.5	0.592	0.620	
			Right Tilt	40620	2593.0	1	0	23.7	23.5	0.165	0.174	
						50	0	22.7	22.5	0.129	0.135	
Body & Hotspot	QPSK	10	Rear	39750	2506.0	1	49	23.7	23.7	0.927	0.929	
						50	50	22.7	22.5	0.745	0.773	
				40185	2549.5	1	49	23.7	23.6	1.020	1.041	
						50	24	22.7	22.6	0.928	0.947	
				40620	2593.0	1	0	23.7	23.5	1.150	<b>1.210</b>	12
						50	0	22.7	22.5	0.983	1.029	
			41055	2636.5	1	0	23.7	23.4	1.020	1.085		
					50	0	22.7	22.2	1.020	1.142		
			41490	2680.0	1	49	23.7	23.7	1.020	1.022		
					50	24	22.7	22.7	0.936	0.936		
					100	0	22.7	22.6	0.836	0.855		
			Front	40620	2593.0	1	0	23.7	23.5	0.614	0.646	
50	0	22.7				22.5	0.473	0.495				
Hotspot	QPSK	10	Edge 2	40620	2593.0	1	0	23.7	23.5	0.333	0.350	
						50	0	22.7	22.5	0.266	0.279	
			Edge 3	39750	2506.0	1	49	23.7	23.7	0.736	0.738	
						40185	2549.5	1	49	23.7	23.6	
				40620	2593.0	1	0	23.7	23.5	0.911	0.958	
						50	0	22.7	22.5	0.712	0.746	
			41055	2636.5	1	0	23.7	23.4	0.986	1.049		
					41490	2680.0	1	49	23.7	23.7		0.988
			Edge 4	40620	2593.0	1	0	23.7	23.5	0.076	0.079	
						50	0	22.7	22.5	0.056	0.059	



## 12.7. Wi-Fi (DTS Band)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
Head	802.11b 1 Mbps	0	Left Touch	6	2437.0	17.0	15.9	0.220	0.283	
			Left Tilt	6	2437.0	17.0	15.9	0.156	0.201	
			Right Touch	6	2437.0	17.0	15.9	0.458	<b>0.590</b>	13
			Right Tilt	6	2437.0	17.0	15.9	0.247	0.318	
Body-worn & Hotspot	802.11b 1 Mbps	10	Rear	6	2437.0	17.0	15.9	0.162	<b>0.209</b>	14
			Front	6	2437.0	17.0	15.9	0.107	0.138	
Hotspot	802.11b 1 Mbps	10	Edge 1	6	2437.0	17.0	15.9	0.120	0.155	
			Edge 4	6	2437.0	17.0	15.9	0.064	0.082	

## 12.8. Bluetooth

### 12.8.1. Standalone SAR Test Exclusion Considerations

The 1-g 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 10-g extremity 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

The test exclusions are applicable only when the minimum test separation distance is  $\leq 50$  mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is  $< 5$  mm, a distance of 5 mm is applied to determine SAR test exclusion.

### Body-worn Accessory Exposure Conditions

Max. tune-up tolerance limit		Min. test separation distance (mm)	Frequency (GHz)	Result
(dBm)	(mW)			
10.0	10	10	2.480	1.6

### Conclusion:

The computed value is  $< 3$ ; therefore, Bluetooth qualifies for Standalone SAR test exclusion.

### 12.8.2. Estimated SAR

When the standalone SAR test exclusion is applied to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

- $(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f_{(\text{GHz})}/x}]$  W/kg for test separation distances  $\leq 50$  mm; where  $x = 7.5$  for 1-g SAR, and  $x = 18.75$  for 10-g SAR.
- 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distances is  $> 50$  mm.

### Estimated SAR Result for Body-worn Accessory Conditions:

Test Configuration	Max. tune-up tolerance limit (mW)	Min. test separation distance (mm)	Frequency (GHz)	Estimated 1-g SAR (W/kg)
Rear/Front	10	10	2.480	<b>0.210</b>

### 13. SAR Measurement Variability

In accordance with published RF Exposure KDB procedure 865664 D01 SAR measurement 100 MHz to 6 GHz. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

- 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 ≥ 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 ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
- 4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

#### 13.1. The Highest Measured SAR Configuration in Each Frequency Band

Frequency Band (MHz)	Air Interface	Head (W/kg)	Body-worn Accessory (W/kg)	Hotspot/Wi-Fi Direct (W/kg)	Repeated SAR (Yes/No)
850	CDMA BC0			1.19	Yes
	CDMA BC10				
	LTE Band 26				
1900	CDMA BC1		0.911		Yes
	LTE Band 25				
2400	Wi-Fi 802.11b/g/n	0.458			No
2600	LTE Band 41		1.15		Yes

#### 13.2. Repeated Measurement Results

##### Head Exposure Condition

Not Applicable.

##### Body-worn Accessory Exposure Condition

Frequency band	Test Position	Mode	Ch #.	Freq. (MHz)	Meas. SAR (W/kg)		Largest to Smallest SAR Ratio	Note
					Original	Repeated		
LTE Band 41	Rear	QPSK	40620	2593.0	1.150	1.070	1.07	1
CDMA BC1	Front	1xRTT (RC3 SO32)	1175	1908.8	0.911	0.917	1.01	1

##### Hotspot Mode Exposure Conditions

Frequency band	Test Position	Mode	Ch #.	Freq. (MHz)	Meas. SAR (W/kg)		Largest to Smallest SAR Ratio	Note
					Original	Repeated		
CDMA BC0	Edge 4	1xRTT (RC3 SO32)	1013	824.7	1.190	1.180	1.01	1

##### Note(s):

1. Second Repeated Measurement is not required since the ratio of the largest to smallest SAR for the original and first repeated measurement is not > 1.20.

## 14. Simultaneous Transmission SAR Analysis

KDB 447498 D01 General RF Exposure Guidance introduces a new formula for calculating the SAR to Peak Location Ratio (SPLSR) between pairs of simultaneously transmitting antennas:

$$SPLSR = (SAR_1 + SAR_2)^{1.5} / Ri$$

Where:

**SAR<sub>1</sub>** is the highest reported or estimated SAR for the first of a pair of simultaneous transmitting antennas, in a specific test operating mode and exposure condition

**SAR<sub>2</sub>** is the highest reported or estimated SAR for the second of a pair of simultaneous transmitting antennas, in the same test operating mode and exposure condition as the first

**Ri** is the separation distance between the pair of simultaneous transmitting antennas. When the SAR is measured for both antennas in the pair, it is determined by the actual x, y, and z coordinates in the 1-g SAR for each SAR Peak Location; based on the extrapolated and interpolated result in the zoom scan measurement using the formula:

$$[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$$

A new threshold of 0.04 is also introduced in the KDB 447498. Thus, in order for a pair of simultaneously transmitting antennas, with the sum of 1-g SAR > 1.6 W/kg, to qualify for exemption from Simultaneous Transmission SAR measurements, it has to satisfy the condition of:

$$(SAR_1 + SAR_2)^{1.5} / Ri < 0.04$$

### 14.1. Sum of the SAR for CDMA BC0 & Wi-Fi & BT

RF Exposure conditions	Test Position		Simultaneous Transmission Scenario			Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
			① CDMA BC0	② Wi-Fi(DTS)	③ Bluetooth		
Head	Left Touch	① + ②	0.943	0.283		1.226	No
	Left Tilt	① + ②	0.464	0.201		0.665	No
	Right Touch	① + ②	0.680	0.590		1.270	No
	Right Tilt	① + ②	0.443	0.318		0.761	No
Body-worn Accessory & Hotspot	Rear	① + ②	1.130	0.209		1.339	No
		① + ③	1.130		0.210	1.340	No
	Front	① + ②	0.910	0.138		1.048	No
		① + ③	0.910		0.210	1.120	No
Hotspot	Edge 1	① + ②		0.155		0.155	No
	Edge 2	① + ②	0.812			0.812	No
	Edge 3	① + ②	0.483			0.483	No
	Edge 4	① + ②	1.190	0.082		1.272	No

#### SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

### 14.2. Sum of the SAR for CDMA BC1 & Wi-Fi & BT

RF Exposure conditions	Test Position		Simultaneous Transmission Scenario			Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
			① CDMA BC1	② Wi-Fi(DTS)	③ Bluetooth		
Head	Left Touch	① + ②	0.406	0.283		0.689	No
	Left Tilt	① + ②	0.262	0.201		0.463	No
	Right Touch	① + ②	0.760	0.590		1.350	No
	Right Tilt	① + ②	0.296	0.318		0.615	No
Body-worn Accessory & Hotspot	Rear	① + ②	0.918	0.209		1.127	No
		① + ③	0.918		0.210	1.128	No
	Front	① + ②	0.983	0.138		1.121	No
		① + ③	0.983		0.210	1.193	No
Hotspot	Edge 1	① + ②		0.155		0.155	No
	Edge 2	① + ②	0.317			0.317	No
	Edge 3	① + ②	0.685			0.685	No
	Edge 4	① + ②	0.122	0.082		0.204	No

#### SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

### 14.3. Sum of the SAR for CDMA BC10 & Wi-Fi & BT

RF Exposure conditions	Test Position		Simultaneous Transmission Scenario			Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
			① CDMA BC10	② Wi-Fi(DTS)	③ Bluetooth		
Head	Left Touch	① + ②	0.676	0.283		0.959	No
	Left Tilt	① + ②	0.442	0.201		0.643	No
	Right Touch	① + ②	0.509	0.590		1.099	No
	Right Tilt	① + ②	0.380	0.318		0.698	No
Body-worn Accessory & Hotspot	Rear	① + ②	1.074	0.209		1.283	No
		① + ③	1.074		0.210	1.284	No
	Front	① + ②	0.869	0.138		1.007	No
		① + ③	0.869		0.210	1.079	No
Hotspot	Edge 1	① + ②		0.155		0.155	No
	Edge 2	① + ②	0.649			0.649	No
	Edge 3	① + ②	0.341			0.341	No
	Edge 4	① + ②	0.927	0.082		1.009	No

#### SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

### 14.4. Sum of the SAR for LTE Band 25 & Wi-Fi & BT

RF Exposure conditions	Test Position		Simultaneous Transmission Scenario			Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
			① LTE B25	② Wi-Fi(DTS)	③ Bluetooth		
Head	Left Touch	① + ②	0.331	0.283		0.614	No
	Left Tilt	① + ②	0.188	0.201		0.389	No
	Right Touch	① + ②	0.628	0.590		1.218	No
	Right Tilt	① + ②	0.237	0.318		0.555	No
Body-worn Accessory & Hotspot	Rear	① + ②	0.663	0.209		0.872	No
		① + ③	0.663		0.210	0.873	No
	Front	① + ②	0.643	0.138		0.781	No
		① + ③	0.643		0.210	0.853	No
Hotspot	Edge 1	① + ②		0.155		0.155	No
	Edge 2	① + ②	0.204			0.204	No
	Edge 3	① + ②	0.493			0.493	No
	Edge 4	① + ②	0.153	0.082		0.235	No

#### SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

### 14.5. Sum of the SAR for LTE Band 26 & Wi-Fi & BT

RF Exposure conditions	Test Position		Simultaneous Transmission Scenario			Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
			① LTE B26	② Wi-Fi(DTS)	③ Bluetooth		
Head	Left Touch	① + ②	0.390	0.283		0.673	No
	Left Tilt	① + ②	0.249	0.201		0.450	No
	Right Touch	① + ②	0.305	0.590		0.895	No
	Right Tilt	① + ②	0.216	0.318		0.534	No
Body-worn Accessory & Hotspot	Rear	① + ②	0.654	0.209		0.863	No
		① + ③	0.654		0.210	0.864	No
	Front	① + ②	0.495	0.138		0.633	No
		① + ③	0.495		0.210	0.705	No
Hotspot	Edge 1	① + ②		0.155		0.155	No
	Edge 2	① + ②	0.259			0.259	No
	Edge 3	① + ②	0.205			0.205	No
	Edge 4	① + ②	0.388	0.082		0.470	No

#### SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

### 14.6. Sum of the SAR for LTE Band 41 & Wi-Fi & BT

RF Exposure conditions	Test Position		Simultaneous Transmission Scenario			Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
			① LTE B41	② Wi-Fi(DTS)	③ Bluetooth		
Head	Left Touch	① + ②	0.343	0.283		0.626	No
	Left Tilt	① + ②	0.214	0.201		0.415	No
	Right Touch	① + ②	0.788	0.590		1.378	No
	Right Tilt	① + ②	0.174	0.318		0.492	No
Body-worn Accessory & Hotspot	Rear	① + ②	1.210	0.209		1.419	No
		① + ③	1.210		0.210	1.420	No
	Front	① + ②	0.646	0.138		0.784	No
		① + ③	0.646		0.210	0.856	No
Hotspot	Edge 1	① + ②		0.155		0.155	No
	Edge 2	① + ②	0.350			0.350	No
	Edge 3	① + ②	1.049			1.049	No
	Edge 4	① + ②	0.079	0.082		0.161	No

#### SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required.

## **15. Appendixes**

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

- 15.1. Photos and Antenna Locations**
- 15.2. System Performance Check Plots**
- 15.3. Highest SAR Test Plots**
- 15.4. Calibration Certificate for E-Field Probe EX3DV4 - SN 3902**
- 15.5. Calibration Certificate for E-Field Probe EX3DV3 - SN 3531**
- 15.6. Calibration Certificate for E-Field Probe EX3DV4 - SN 3773**
- 15.7. Calibration Certificate for E-Field Probe EX3DV4 - SN 3929**
- 15.8. Calibration Certificate for D835V2 - SN 4d002**
- 15.9. Calibration Certificate for D1900V2- SN 5d043**
- 15.10. Calibration Certificate for D2450V2 - SN 899**
- 15.11. Calibration Certificate for D2600V2 - SN 1006**

**END OF REPORT**