



SAR EVALUATION REPORT

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

For
GSM/WCDMA/LTE Phone + Bluetooth, DTS/UNII a/b/g/n/ac, ANT+, NFC

**FCC ID: A3SMG9287
Model Name: SM-G9287**

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Revision History

Rev.	Date	Revisions	Revised By
-	7/12/2015	Initial Issue	Justin Park
A	8/10/2015	1.Sec 6.2: Wireless Technologies(Unchecked LTE CA Support) 2.Sec 10.14: Added U-NII SISO Mode SAR Result 3.Sec 12: Updated Simultaneous Transmission SAR Analysis	Justin Park

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1. Attestation of Test Results

Applicant Name		SAMSUNG ELECTRONICS CO.,LTD.		
FCC ID		A3LSMG9287		
Model Name		SM-G9287		
Applicable Standards		FCC 47 CFR § 2.1093 Published RF exposure KDB procedures IEEE Std 1528-2013		
SAR Limits (W/Kg)				
Exposure Category		Peak spatial-average(1g of tissue)		
General population / Uncontrolled exposure		1.6		
The Highest Reported SAR (W/kg)				
RF Exposure Conditions		Equipment Class		
		Licensed	DTS	U-NII
Head		0.346	0.435	0.483
`Body-worn*		1.089	0.180	0.069
Hotspot/Wi-Fi Direct		1.089	0.180	0.044
Simultaneous TX	Head	1.175	1.175	1.128
	Body-worn*	1.437	1.437	1.316
	Hotspot/ Wi-Fi Direct	1.437	1.437	1.306
Date Tested		WWAN & WLAN: 6/20/2015 to 7/11/2015		WLAN U-NII SISO mode: 8/7/2015 to 8/9/2015
Test Results		Pass		
UL Korea, Ltd. 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 Korea, Ltd. 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 Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. 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 IAS, any agency of the Federal Government, or any agency of any government.				
Approved & Released By:		Prepared By:		
				
JiHo Choi Operations Manager UL Korea, Ltd Suwon Laboratory		Justin Park Engineer UL Korea, Ltd Suwon Laboratory		

2. Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1093, 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 v05r02
- 648474 D04 Handset SAR v01r02
- 865664 D01 SAR measurement 100 MHz to 6 GHz v01r03
- 865664 D02 RF Exposure Reporting v01r01
- 941225 D01 3G SAR Procedures v03
- 941225 D05 SAR for LTE Devices v02r03
- 941225 D06 Hotspot Mode v02

3. Facilities and Accreditation

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

Suwon
SAR 1 Room
SAR 2 Room
SAR 3 Room

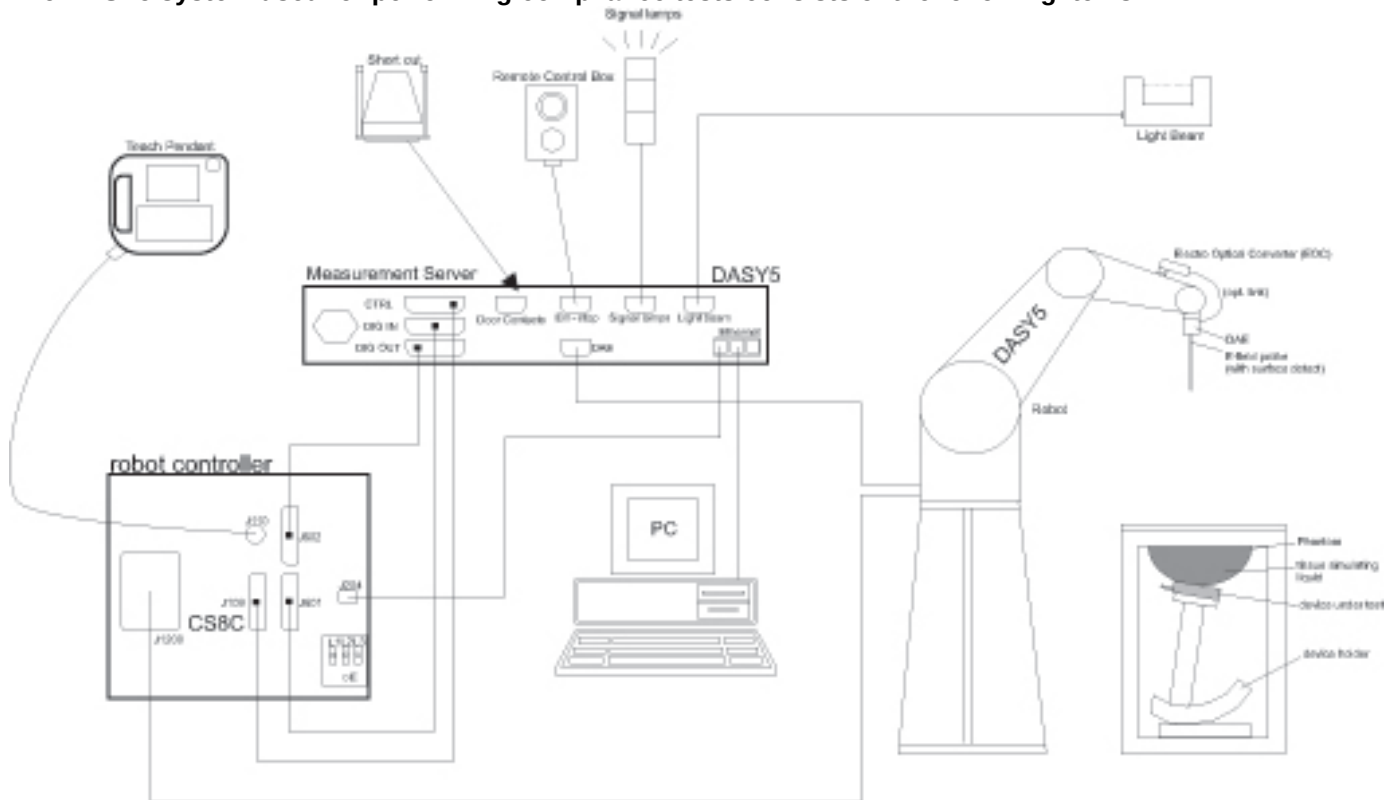
UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637.

The full scope of accreditation can be viewed at <http://www.iasonline.org/PDF/TL/TL-637.pdf>.

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 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.

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 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	$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
Maximum area scan spatial resolution: $\Delta x_{\text{Area}}, \Delta y_{\text{Area}}$	≤ 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 $\leq$ 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 SAR Measurement 100 MHz to 6 GHz

			≤ 3 GHz	> 3 GHz
Maximum zoom scan spatial resolution: $\Delta x_{\text{Zoom}}, \Delta y_{\text{Zoom}}$			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{\text{Zoom}}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{\text{Zoom}}(1)$: between 1 st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{\text{Zoom}}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{\text{Zoom}}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm
Note: δ 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 ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 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.

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.

Dielectric Property Measurements

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Network Analyzer	Agilent	E5071C	MY46522054	9-23-2015
Dielectronic Probe kit	SPEAG	DAK-3.5	1196	8-5-2015
Dielectronic Probe kit	SPEAG	DAK-3.5	1046	4-28-2016
Dielectronic Probe kit	SPEAG	DAK-3.5 Short	SM DAK 200 BA	N/A
Thermometer	LKM	DTM3000	3424	11-13-2015

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
MXG Analog Signal Generator	Agilent	N5181A	MY50145882	9-23-2015
Power Sensor	Agilent	U2000A	MY54260010	9-23-2015
Power Sensor	Agilent	U2000A	MY54260007	9-23-2015
Power Amplifier	EXODUS	1410025-AMP2027-10003	10003	11-7-2015
Directional Coupler	Agilent	772D	MY52180193	9-22-2015
Directional Coupler	Agilent	778D	MY52180432	9-22-2015
Low Pass Filter	MICROLAB	LA-15N	03943	11-4-2015
Low Pass Filter	FILTRON	L14012FL	1410003S	11-4-2015
Low Pass Filter	MICROLAB	LA-60N	03942	11-5-2015
Attenuator	Agilent	8491B/003	MY39269292	9-22-2015
Attenuator	Agilent	8491B/010	MY39269315	9-22-2015
Attenuator	Agilent	8491B/020	MY39269298	9-22-2015
E-Field Probe	SPEAG	EX3DV4	7330	2-12-2016
E-Field Probe	SPEAG	EX3DV4	7313	8-27-2015
E-Field Probe	SPEAG	EX3DV4	7314	8-27-2015
E-Field Probe	SPEAG	EX3DV4	7323	12-5-2015
Data Acquisition Electronics	SPEAG	DAE4	1468	1-12-2016
Data Acquisition Electronics	SPEAG	DAE4	1447	8-25-2015
Data Acquisition Electronics	SPEAG	DAE4	1446	8-27-2015
Data Acquisition Electronics	SPEAG	DAE4	614	10-18-2015
System Validation Dipole	SPEAG	D750V3	1122	9-13-2015
System Validation Dipole	SPEAG	D835V2	4d174	8-13-2015
System Validation Dipole	SPEAG	D1750V2	1125	8-12-2015
System Validation Dipole	SPEAG	D1900V2	5d199	2-6-2016
System Validation Dipole	SPEAG	D2450V2	939	8-11-2015
System Validation Dipole	SPEAG	D2600V2	1097	11-27-2015
System Validation Dipole	SPEAG	D5GHzV2	1184	8-22-2015
System Validation Dipole	SPEAG	D5GHzV2	1209	2-10-2016
Thermometer (SAR 1)	Lutron	MHB-382SD	AH.53049	11-18-2015
Thermometer (SAR 2)	Lutron	MHB-382SD	AH.50215	11-18-2015
Thermometer (SAR 3)	Lutron	MHB-382SD	AH.50213	11-18-2015

Others

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Base Station Simulator	R & S	CMW500	150313	8-13-2015
Base Station Simulator	R & S	CMW500	150314	8-13-2015
Bluetooth Tester	TESCOM	TC-3000C	3000C000546	11-17-2015

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

6. Device Under Test (DUT) Information

6.1. DUT Description

Device Dimension	Overall (Length x Width): 150 mm x 73 mm Overall Diagonal: 162 mm Display Diagonal: 145 mm
Back Cover	☒ The rechargeable battery is not user accessible.
Battery Options	☒ The rechargeable battery is not user accessible.
Wireless Router (Hotspot)	Wi-Fi Hotspot mode permits the device to share its cellular data connection with other Wi-Fi-enabled devices. ☒ Mobile Hotspot (Wi-Fi 2.4 GHz) ☒ Mobile Hotspot (Wi-Fi 5.8 GHz)
Wi-Fi Direct	Wi-Fi Direct enabled devices transfer data directly between each other ☒ Wi-Fi Direct (Wi-Fi 2.4 GHz) ☒ Wi-Fi Direct (Wi-Fi 5.8 GHz)

6.2. Wireless Technologies

Wireless technologies	Frequency bands	Operating mode		Duty Cycle used for SAR testing
GSM	850 1900	Voice (GMSK) GPRS (GMSK) EGPRS (8PSK)	GPRS Multi-Slot Class: ☐ Class 8 - 1 Up, 4 Down ☐ Class 10 - 2 Up, 4 Down ☐ Class 12 - 4 Up, 4 Down ☒ Class 33 - 4 Up, 5 Down	GSM Voice: 12.5% (E)GPRS: 1 Slot: 12.5% 2 Slots: 25% 3 Slots: 37.5% 4 Slots: 50%
			Does this device support DTM (Dual Transfer Mode)? ☐ Yes ☒ No	
W-CDMA (UMTS)	Band II Band V	UMTS Rel. 99 (Voice & Data) HSDPA (Rel. 5) HSUPA (Rel. 6) DC-HSDPA (Rel. 8) HSPA+ (Rel. 7)		100%
LTE	FDD Band 2 FDD Band 4 FDD Band 5 FDD Band 12 FDD Band 17 FDD Band 25 FDD Band 26 TDD Band 41	QPSK 16QAM		100% (FDD) 63.3% (TDD)
Wi-Fi	2.4 GHz	802.11b 802.11g 802.11n (HT20)		100%
	5 GHz	802.11a 802.11n (HT20) 802.11n (HT40) 802.11ac (VHT20)		100%

		802.11ac (VHT40) 802.11ac (VHT80)	
	Does this device support bands 5.60 ~ 5.65 GHz? ☒ Yes ☐ No		
	Does this device support Band gap channel(s)? ☒ Yes ☐ No		
Bluetooth	2.4 GHz	Version 4.2 LE	77.5% (DH5)

6.3. Nominal and Maximum Output Power

KDB 447498 sec.4.1.(3) at the maximum rated output power and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance limit

Upper limit (dB): -1.5 ~ 0.5		Max. RF Output Power (dBm)		Reduce RF Output Power (dBm)	
RF Air interface	Mode	Target	Max. tune-up tolerance limit	Target	Max. tune-up tolerance limit
GSM850	Voice	33.0	33.5		
	GPRS 1 slot	33.0	33.5		
	GPRS 2 slots	31.0	31.5		
	GPRS 3 slots	29.5	30.0		
	GPRS 4 slots	28.0	28.5		
	EGPRS 1 slot	27.0	27.5		
	EGPRS 2 slots	25.0	25.5		
	EGPRS 3 slots	24.0	24.5		
GSM1900	Voice	30.0	30.5		
	GPRS 1 slot	30.0	30.5		
	GPRS 2 slots	28.0	28.5		
	GPRS 3 slots	26.0	26.5		
	GPRS 4 slots	25.0	25.5		
	EGPRS 1 slot	26.0	26.5		
	EGPRS 2 slots	25.0	25.5		
	EGPRS 3 slots	23.5	24.0		
W-CDMA Band V	R99	23.0	23.5		
	HSDPA	23.0	23.5		
	HSUPA	23.0	23.5		
	DC-HSDPA	23.0	23.5		
W-CDMA Band II	R99	22.0	22.5	19.0	19.5
	HSDPA	22.0	22.5	19.0	19.5
	HSUPA	22.0	22.5	19.0	19.5
	DC-HSDPA	22.0	22.5	19.0	19.5
LTE Band 2	QPSK, 16QAM	22.0	22.5	19.0	19.5
LTE Band 4	QPSK, 16QAM	22.0	22.5	19.0	19.5
LTE Band 5	QPSK, 16QAM	23.0	23.5		
LTE Band 12	QPSK, 16QAM	23.0	23.5		
LTE Band 17	QPSK, 16QAM	23.0	23.5		
LTE Band 25	QPSK, 16QAM	22.0	22.5	19.0	19.5
LTE Band 26	QPSK, 16QAM	23.0	23.5		
LTE Band 41	QPSK, 16QAM	23.0	23.5		

Upper limit (dB): ~ 0.5		RF Output Power (dBm)	
RF Air interface	Mode	Target	Max. tune-up tolerance limit
WiFi 2.4 GHz	802.11b	15.0	15.5
	802.11g	12.0	12.5
	802.11n HT20	10.0	10.5
WiFi 5 GHz	802.11a	12.0	12.5
	802.11n HT20	11.0	11.5
	802.11n HT40	9.0	9.5
	802.11ac VHT20	11.0	11.5
	802.11ac VHT40	9.0	9.5
	802.11ac VHT80	9.0	9.5
Bluetooth		10.0	10.5
Bluetooth LE		7.5	8.0

Notes:

1. The device utilizes power reduction under portable hotspot for SAR compliance.
2. There is power reduction for W-CDMA Band II, LTE Band 2 / 4 / 25.
3. A detailed description of the hotspot power reduction is included in the technical descriptions in the FCC filing

6.4. General LTE SAR Test and Reporting Considerations

Item	Description						
Frequency range, Channel Bandwidth, Numbers and Frequencies	Band 2	Frequency range: 1850 - 1910 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	18700 /1860	18675/ 1857.5	18650/ 1855	18625/ 1852.5	18615/ 1851.5	18607/ 1850.7
	Mid	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880
	High	19100/ 1900	19125/ 1902.5	19150/ 1905	19175/ 1907.5	19185/ 1908.5	19193/ 1909.3
	Band 4	Frequency range: 1710 - 1755 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	20050/ 1720	20025/ 1717.5	20000/ 1715	19975/ 1712.5	19965/ 1711.5	19957/ 1710.7
	Mid	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5
	High	20300/ 1745	20325/ 1747.5	20350/ 1750	20375/ 1752.5	20385/ 1753.5	20393/ 1754.3
	Band 5	Frequency range: 824 - 849 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low			20450/ 829	20425/ 826.5	20415/ 825.5	20407/ 824.7
	Mid			20525/ 836.5	20525/ 836.5	20525/ 836.5	20525/ 836.5
	High			20600/ 844	20625/ 846.5	20635/ 847.5	20643/ 848.3
	Band 12	Frequency range: 699 – 716 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low			23060/ 704	23035/ 701.5	23025/ 700.5	23017/ 699.7
	Mid			23095/ 707.5	23095/ 707.5	23095/ 707.5	23095/ 707.5
	High			23130/ 711	23155/ 713.5	23165/ 714.5	23173/ 715.3

General LTE SAR Test and Reporting Considerations (Continued)

Frequency range, Channel Bandwidth, Numbers and Frequencies	Band 17	Frequency range: 704 - 716 MHz																																											
		Channel Bandwidth																																											
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz																																						
	Low			23780/ 709	23755/ 706.5																																								
	Mid			23790/ 710	23790/ 710																																								
	High			23800/ 711	23825/ 713.5																																								
	Band 25	Frequency range: 1850 - 1915 MHz																																											
		Channel Bandwidth																																											
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz																																						
	Low	26140/ 1860	26115/ 1857.5	26090/ 1855	26065/ 1852.5	26055/ 1851.5	26047/ 1850.7																																						
	Mid	26365/ 1882.5	26365/ 1882.5	26365/ 1882.5	26365/ 1882.5	26365/ 1882.5	26365/ 1882.5																																						
	High	26590/ 1905	26615/ 1907.5	26640/ 1910	26665/ 1912.5	26675/ 1913.5	26683/ 1914.3																																						
	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	26865/ 831.5																																						
	High		26965/ 841.5	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	39650/ 2496	39650/ 2496	39650/ 2496	39650/ 2496																																								
	Mid	40620/ 2593.0	40620/ 2593.0	40620/ 2593.0	40620/ 2593.0																																								
	High	41589/ 2690	41589/ 2690	41589/ 2690	41589/ 2690																																								
LTE transmitter and antenna implementation	LTE has one (1) TX/RX antennas and one (1) RX antennas Refer to Appendix A...																																												
Maximum power reduction (MPR)	Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3 <table border="1"> <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> <tr> <td>QPSK</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>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 1</td></tr> <tr> <td>64 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 2</td></tr> </table> MPR Built-in by design A-MPR (additional MPR) was disabled during SAR testing							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	64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
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																																						
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2																																						
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.																																												

6.5. LTE (TDD) Considerations

According to KDB 941225 D05 SAR for LTE Devices, 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	$13168 \cdot T_s$			-	-	-

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 $\times (T_s) \times \# \text{ of S} + \# \text{ of U}$

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

$T_s = 1/(15000 \times 2048)$ seconds

7. RF Exposure Conditions (Test Configurations)

Refer to “SAR Photos and Ant locations” Appendix for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.

Wireless technologies	RF Exposure Conditions	DUT-to-User Separation	Test Position	Antenna-to-edge/surface	SAR Required	Note
WWAN Antenna 1	Head	0 mm	Left Touch	N/A	Yes	
			Left Tilt (15°)	N/A	Yes	
			Right Touch	N/A	Yes	
			Right Tilt (15°)	N/A	Yes	
	Body	15 mm	Rear	N/A	Yes	2
			Front	N/A	Yes	2
	Hotspot	10 mm	Rear	< 25 mm	Yes	
			Front	< 25 mm	Yes	
			Edge 1 (Top)	> 25 mm	No	1
			Edge 2 (Right)	> 25 mm	No	1
			Edge 3 (Bottom)	< 25 mm	Yes	
			Edge 4 (Left)	> 25 mm	No	1
WWAN Antenna 2	Head	0 mm	Left Touch	N/A	Yes	
			Left Tilt (15°)	N/A	Yes	
			Right Touch	N/A	Yes	
			Right Tilt (15°)	N/A	Yes	
	Body	15 mm	Rear	N/A	Yes	2
			Front	N/A	Yes	2
	Hotspot	10 mm	Rear	< 25 mm	Yes	
			Front	< 25 mm	Yes	
			Edge 1 (Top)	> 25 mm	No	1
			Edge 2 (Right)	> 25 mm	No	1
			Edge 3 (Bottom)	< 25 mm	Yes	
			Edge 4 (Left)	< 25 mm	Yes	
WLAN (Wi-Fi Ant 1, 2)	Head	0 mm	Left Touch	N/A	Yes	
			Left Tilt (15°)	N/A	Yes	
			Right Touch	N/A	Yes	
			Right Tilt (15°)	N/A	Yes	
	Body	15 mm	Rear	N/A	Yes	2
			Front	N/A	Yes	2
	Hotspot / Wi-Fi Direct	10 mm	Rear	< 25 mm	Yes	
			Front	< 25 mm	Yes	
			Edge 1 (Top)	< 25 mm	Yes	
			Edge 2 (Right)	> 25 mm	No	1
			Edge 3 (Bottom)	> 25 mm	No	1
			Edge 4 (Left)	< 25 mm	Yes	

Notes:

- SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 941225 D06 Hot Spot SAR.
- The Body-worn minimum separation distance is 15 mm. To cover both body-worn and hotspot RF exposure conditions testing was performed at a separation distance of 10 mm.

8. Dielectric Property Measurements & System Check

8.1. 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 SAR Measurement 100 MHz to 6 GHz

Target Frequency (MHz)	Head		Body	
	ϵ_r	σ (S/m)	ϵ_r	σ (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:**SAR 1 Room**

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
6-21-2015	Body 1900	e'	52.2500	Relative Permittivity (ϵ_r):	52.25	53.30	-1.97	5
		e"	14.8300	Conductivity (σ):	1.57	1.52	3.07	5
	Body 1850	e'	52.4000	Relative Permittivity (ϵ_r):	52.40	53.30	-1.69	5
		e"	14.8700	Conductivity (σ):	1.53	1.52	0.63	5
	Body 1910	e'	52.2200	Relative Permittivity (ϵ_r):	52.22	53.30	-2.03	5
		e"	14.8400	Conductivity (σ):	1.58	1.52	3.69	5
6-23-2015	Body 2600	e'	53.1100	Relative Permittivity (ϵ_r):	53.11	52.51	1.14	5
		e"	14.6000	Conductivity (σ):	2.11	2.16	-2.32	5
	Body 2500	e'	53.4400	Relative Permittivity (ϵ_r):	53.44	52.64	1.53	5
		e"	14.3300	Conductivity (σ):	1.99	2.02	-1.40	5
	Body 2700	e'	52.7800	Relative Permittivity (ϵ_r):	52.78	52.38	0.75	5
		e"	14.8100	Conductivity (σ):	2.22	2.30	-3.39	5
6-30-2015	Body 1750	e'	54.5100	Relative Permittivity (ϵ_r):	54.51	53.44	2.00	5
		e"	14.8400	Conductivity (σ):	1.44	1.49	-2.84	5
	Body 1710	e'	54.6900	Relative Permittivity (ϵ_r):	54.69	53.54	2.14	5
		e"	14.8700	Conductivity (σ):	1.41	1.46	-3.26	5
	Body 1755	e'	54.4900	Relative Permittivity (ϵ_r):	54.49	53.43	1.99	5
		e"	14.8400	Conductivity (σ):	1.45	1.49	-2.76	5
6-30-2015	Body 1900	e'	54.1000	Relative Permittivity (ϵ_r):	54.10	53.30	1.50	5
		e"	14.8900	Conductivity (σ):	1.57	1.52	3.49	5
	Body 1850	e'	54.2300	Relative Permittivity (ϵ_r):	54.23	53.30	1.74	5
		e"	14.8600	Conductivity (σ):	1.53	1.52	0.56	5
	Body 1910	e'	54.0900	Relative Permittivity (ϵ_r):	54.09	53.30	1.48	5
		e"	14.9100	Conductivity (σ):	1.58	1.52	4.18	5
7-9-2015	Body 1900	e'	51.5100	Relative Permittivity (ϵ_r):	51.51	53.30	-3.36	5
		e"	14.9900	Conductivity (σ):	1.58	1.52	4.19	5
	Body 1850	e'	51.5800	Relative Permittivity (ϵ_r):	51.58	53.30	-3.23	5
		e"	14.9400	Conductivity (σ):	1.54	1.52	1.11	5
	Body 1910	e'	51.4800	Relative Permittivity (ϵ_r):	51.48	53.30	-3.41	5
		e"	15.0100	Conductivity (σ):	1.59	1.52	4.87	5
7-9-2015	Body 1750	e'	51.8900	Relative Permittivity (ϵ_r):	51.89	53.44	-2.90	5
		e"	14.8800	Conductivity (σ):	1.45	1.49	-2.57	5
	Body 1710	e'	52.0100	Relative Permittivity (ϵ_r):	52.01	53.54	-2.86	5
		e"	14.8300	Conductivity (σ):	1.41	1.46	-3.52	5
	Body 1755	e'	51.8800	Relative Permittivity (ϵ_r):	51.88	53.43	-2.90	5
		e"	14.8900	Conductivity (σ):	1.45	1.49	-2.43	5
7-10-2015	Head 2450	e'	38.2100	Relative Permittivity (ϵ_r):	38.21	39.20	-2.53	5
		e"	13.5900	Conductivity (σ):	1.85	1.80	2.85	5
	Head 2410	e'	38.3800	Relative Permittivity (ϵ_r):	38.38	39.28	-2.29	5
		e"	13.4900	Conductivity (σ):	1.81	1.76	2.69	5
	Head 2475	e'	38.1100	Relative Permittivity (ϵ_r):	38.11	39.17	-2.70	5
		e"	13.6700	Conductivity (σ):	1.88	1.83	2.97	5

SAR 2 Room

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
6-20-2015	Head 835	e'	40.65	Relative Permittivity (ε _r):	40.65	41.50	-2.05	5
		e''	19.56	Conductivity (σ):	0.91	0.90	0.90	5
	Head 820	e'	40.8700	Relative Permittivity (ε _r):	40.87	41.60	-1.76	5
		e''	19.6000	Conductivity (σ):	0.89	0.90	-0.54	5
	Head 850	e'	40.4800	Relative Permittivity (ε _r):	40.48	41.50	-2.46	5
		e''	19.5600	Conductivity (σ):	0.92	0.92	1.03	5
6-21-2015	Head 1750	e'	39.1700	Relative Permittivity (ε _r):	39.17	40.08	-2.28	5
		e''	13.5500	Conductivity (σ):	1.32	1.37	-3.68	5
	Head 1710	e'	39.3200	Relative Permittivity (ε _r):	39.32	40.15	-2.06	5
		e''	13.5100	Conductivity (σ):	1.28	1.35	-4.57	5
	Head 1755	e'	39.1500	Relative Permittivity (ε _r):	39.15	40.08	-2.31	5
		e''	13.5500	Conductivity (σ):	1.32	1.37	-3.56	5
6-21-2015	Head 1900	e'	38.5700	Relative Permittivity (ε _r):	38.57	40.00	-3.58	5
		e''	13.8100	Conductivity (σ):	1.46	1.40	4.21	5
	Head 1850	e'	38.8100	Relative Permittivity (ε _r):	38.81	40.00	-2.97	5
		e''	13.7300	Conductivity (σ):	1.41	1.40	0.88	5
	Head 1910	e'	38.5300	Relative Permittivity (ε _r):	38.53	40.00	-3.68	5
		e''	13.8300	Conductivity (σ):	1.47	1.40	4.91	5
6-22-2015	Body 750	e'	54.4500	Relative Permittivity (ε _r):	54.45	55.55	-1.98	5
		e''	23.2200	Conductivity (σ):	0.97	0.96	1.04	5
	Body 700	e'	54.9300	Relative Permittivity (ε _r):	54.93	55.74	-1.45	5
		e''	23.6900	Conductivity (σ):	0.92	0.96	-4.17	5
	Body 790	e'	54.0500	Relative Permittivity (ε _r):	54.05	55.39	-2.42	5
		e''	22.8600	Conductivity (σ):	1.00	0.97	3.09	5
7-2-2015	Body 5180	e'	50.9500	Relative Permittivity (ε _r):	50.95	49.05	3.88	5
		e''	18.0500	Conductivity (σ):	5.20	5.27	-1.38	5
	Body 5200	e'	50.9000	Relative Permittivity (ε _r):	50.90	49.02	3.84	5
		e''	18.0800	Conductivity (σ):	5.23	5.29	-1.27	5
	Body 5600	e'	50.1800	Relative Permittivity (ε _r):	50.18	48.48	3.51	5
		e''	18.5200	Conductivity (σ):	5.77	5.76	0.10	5
	Body 5800	e'	49.8200	Relative Permittivity (ε _r):	49.82	48.20	3.36	5
		e''	18.7500	Conductivity (σ):	6.05	6.00	0.78	5
	Body 5825	e'	49.7700	Relative Permittivity (ε _r):	49.77	48.20	3.26	5
		e''	18.7800	Conductivity (σ):	6.08	6.00	1.38	5
7-6-2015	Head 835	e'	42.1200	Relative Permittivity (ε _r):	42.12	41.50	1.49	5
		e''	19.6200	Conductivity (σ):	0.91	0.90	1.21	5
	Head 820	e'	42.2800	Relative Permittivity (ε _r):	42.28	41.60	1.63	5
		e''	19.6800	Conductivity (σ):	0.90	0.90	-0.13	5
	Head 850	e'	41.9700	Relative Permittivity (ε _r):	41.97	41.50	1.13	5
		e''	19.5500	Conductivity (σ):	0.92	0.92	0.98	5
7-9-2015	Body 1900	e'	51.9900	Relative Permittivity (ε _r):	51.99	53.30	-2.46	5
		e''	14.9500	Conductivity (σ):	1.58	1.52	3.91	5
	Body 1850	e'	52.1300	Relative Permittivity (ε _r):	52.13	53.30	-2.20	5
		e''	14.7800	Conductivity (σ):	1.52	1.52	0.02	5
	Body 1910	e'	51.9700	Relative Permittivity (ε _r):	51.97	53.30	-2.50	5
		e''	14.9900	Conductivity (σ):	1.59	1.52	4.73	5
7-10-2015	Body 2450	e'	52.2100	Relative Permittivity (ε _r):	52.21	52.70	-0.93	5
		e''	14.8800	Conductivity (σ):	2.03	1.95	3.95	5
	Body 2410	e'	52.3400	Relative Permittivity (ε _r):	52.34	52.76	-0.79	5
		e''	14.6800	Conductivity (σ):	1.97	1.91	3.13	5
	Body 2475	e'	52.1300	Relative Permittivity (ε _r):	52.13	52.67	-1.02	5
		e''	14.9700	Conductivity (σ):	2.06	1.99	3.78	5

SAR 2 Room(Continued)

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
8-6-2015	Head 5180	e'	36.3700	Relative Permittivity (ϵ_r):	36.37	36.01	0.99	5
		e''	15.9300	Conductivity (σ):	4.59	4.63	-0.91	5
	Head 5200	e'	36.3700	Relative Permittivity (ϵ_r):	36.37	35.99	1.06	5
		e''	15.9800	Conductivity (σ):	4.62	4.65	-0.66	5
	Head 5600	e'	35.7400	Relative Permittivity (ϵ_r):	35.74	35.53	0.58	5
		e''	16.0700	Conductivity (σ):	5.00	5.06	-1.11	5
	Head 5800	e'	35.5900	Relative Permittivity (ϵ_r):	35.59	35.30	0.82	5
		e''	16.2500	Conductivity (σ):	5.24	5.27	-0.56	5
	Head 5825	e'	35.4700	Relative Permittivity (ϵ_r):	35.47	35.30	0.48	5
		e''	16.1900	Conductivity (σ):	5.24	5.27	-0.50	5

SAR 3 Room

Date	Freq. (MHz)		Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)
6-20-2015	Body 835	e'	53.7500	Relative Permittivity (ϵ_r):	53.75	55.20	-2.63	5
		e"	21.8600	Conductivity (σ):	1.01	0.97	4.63	5
	Body 820	e'	53.8900	Relative Permittivity (ϵ_r):	53.89	55.28	-2.51	5
		e"	21.9400	Conductivity (σ):	1.00	0.97	3.29	5
	Body 850	e'	53.6500	Relative Permittivity (ϵ_r):	53.65	55.16	-2.73	5
		e"	21.8000	Conductivity (σ):	1.03	0.99	4.37	5
6-22-2015	Head 750	e'	42.5200	Relative Permittivity (ϵ_r):	42.52	41.96	1.33	5
		e"	21.4800	Conductivity (σ):	0.90	0.89	0.30	5
	Head 700	e'	43.0600	Relative Permittivity (ϵ_r):	43.06	42.22	1.99	5
		e"	21.8600	Conductivity (σ):	0.85	0.89	-4.32	5
	Head 790	e'	42.0600	Relative Permittivity (ϵ_r):	42.06	41.76	0.73	5
		e"	21.1700	Conductivity (σ):	0.93	0.90	3.77	5
6-23-2015	Head 2600	e'	37.8100	Relative Permittivity (ϵ_r):	37.81	39.01	-3.08	5
		e"	14.1200	Conductivity (σ):	2.04	1.96	4.03	5
	Head 2500	e'	38.1800	Relative Permittivity (ϵ_r):	38.18	39.14	-2.45	5
		e"	13.8700	Conductivity (σ):	1.93	1.85	3.99	5
	Head 2700	e'	37.4400	Relative Permittivity (ϵ_r):	37.44	38.88	-3.72	5
		e"	14.3200	Conductivity (σ):	2.15	2.07	3.84	5
7-3-2015	Body 1900	e'	54.2400	Relative Permittivity (ϵ_r):	54.24	53.30	1.76	5
		e"	14.8400	Conductivity (σ):	1.57	1.52	3.14	5
	Body 1850	e'	54.4100	Relative Permittivity (ϵ_r):	54.41	53.30	2.08	5
		e"	14.7700	Conductivity (σ):	1.52	1.52	-0.04	5
	Body 1910	e'	54.1900	Relative Permittivity (ϵ_r):	54.19	53.30	1.67	5
		e"	14.8500	Conductivity (σ):	1.58	1.52	3.76	5
7-6-2015	Head 750	e'	41.4900	Relative Permittivity (ϵ_r):	41.49	41.96	-1.12	5
		e"	21.5200	Conductivity (σ):	0.90	0.89	0.49	5
	Head 700	e'	42.2300	Relative Permittivity (ϵ_r):	42.23	42.22	0.03	5
		e"	21.8700	Conductivity (σ):	0.85	0.89	-4.27	5
	Head 790	e'	40.9600	Relative Permittivity (ϵ_r):	40.96	41.76	-1.91	5
		e"	21.3000	Conductivity (σ):	0.94	0.90	4.41	5
7-8-2015	Head 5180	e'	34.9500	Relative Permittivity (ϵ_r):	34.95	36.01	-2.95	5
		e"	15.7900	Conductivity (σ):	4.55	4.63	-1.78	5
	Head 5200	e'	34.9100	Relative Permittivity (ϵ_r):	34.91	35.99	-3.00	5
		e"	15.8000	Conductivity (σ):	4.57	4.65	-1.78	5
	Head 5600	e'	34.3700	Relative Permittivity (ϵ_r):	34.37	35.53	-3.28	5
		e"	15.9300	Conductivity (σ):	4.96	5.06	-1.98	5
	Head 5800	e'	34.1200	Relative Permittivity (ϵ_r):	34.12	35.30	-3.34	5
		e"	16.0200	Conductivity (σ):	5.17	5.27	-1.97	5
	Head 5825	e'	34.0800	Relative Permittivity (ϵ_r):	34.08	35.30	-3.46	5
		e"	16.0300	Conductivity (σ):	5.19	5.27	-1.48	5

SAR 3 Room (Continued)

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
8-6-2015	Body 5180	e'	47.3200	Relative Permittivity (ϵ_r):	47.32	49.05	-3.52	5
		e"	18.3900	Conductivity (σ):	5.30	5.27	0.48	5
	Body 5200	e'	47.2800	Relative Permittivity (ϵ_r):	47.28	49.02	-3.55	5
		e"	18.4100	Conductivity (σ):	5.32	5.29	0.53	5
	Body 5600	e'	46.6500	Relative Permittivity (ϵ_r):	46.65	48.48	-3.77	5
		e"	18.7600	Conductivity (σ):	5.84	5.76	1.40	5
	Body 5800	e'	46.3700	Relative Permittivity (ϵ_r):	46.37	48.20	-3.80	5
		e"	18.9500	Conductivity (σ):	6.11	6.00	1.86	5
	Body 5825	e'	46.3300	Relative Permittivity (ϵ_r):	46.33	48.20	-3.88	5
		e"	18.9900	Conductivity (σ):	6.15	6.00	2.51	5

8.2. 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 ± 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.

Reference Target SAR Values

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 (W/kg)		
				1g/10g	Head	Body
D750V3	1122	8-13-2014	750	1g	8.31	8.71
				10g	5.45	5.81
D835V2	4d174	8-13-2014	835	1g	9.32	9.62
				10g	6.09	6.37
D1750V2	1125	8-12-2014	1750	1g	36.60	36.70
				10g	19.50	19.70
D1900V2	5d199	2-6-2015	1900	1g	41.00	40.60
				10g	21.40	21.60
D2450V2	939	8-11-2014	2450	1g	52.10	51.40
				10g	24.20	24.00
D2600V2	1097	11-27-2014	2450	1g	56.50	57.30
				10g	25.40	25.50
D5GHzV2	1184	8-22-2014	5200	1g	79.50	77.10
				10g	22.70	21.50
			5600	1g	83.30	82.70
				10g	23.50	22.80
			5800	1g	79.20	76.90
				10g	22.40	21.30
D5GHzV2	1209	2-10-2015	5200	1g	78.20	74.00
				10g	22.20	20.60
			5600	1g	81.30	77.40
				10g	23.20	21.30
			5800	1g	79.60	74.90
				10g	22.50	20.50

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.

SAR 1 Room

Date Tested	System Dipole		T.S. Liquid	Measured Results		Target (Ref. Value)	Delta $\pm 10\%$	Plot No.
	Type	Serial #		Zoom Scan to 100 mW	Normalize to 1 W			
6-21-2015	D1900V2	5d199	Body	1g	4.25	42.50	40.6	4.68
				10g	2.25	22.50	21.60	4.17
6-23-2015	D2600V2	1097	Body	1g	5.79	57.90	57.3	1.05
				10g	2.59	25.90	25.50	1.57
6-30-2015	D1750V2	1125	Body	1g	3.65	36.50	36.70	-0.54
				10g	1.94	19.40	19.70	-1.52
6-30-2015	D1900V2	5d199	Body	1g	4.04	40.40	40.6	-0.49
				10g	2.07	20.70	21.60	-4.17
7-9-2015	D1900V2	5d199	Body	1g	4.09	79.70	40.6	1.92
				10g	2.11	23.20	21.60	4.50
7-9-2015	D1750V2	1125	Body	1g	3.51	79.70	36.70	-1.97
				10g	1.87	22.90	19.70	-1.29
7-10-2015	D2450V2	939	Head	1g	4.99	78.60	51.40	-1.26
				10g	2.32	22.70	24.00	0.89

SAR 2 Room

Date Tested	System Dipole		T.S. Liquid	Measured Results		Target (Ref. Value)	Delta $\pm 10\%$	Plot No.
	Type	Serial #		Zoom Scan to 100 mW	Normalize to 1 W			
6-20-2015	D835V2	4d174	Head	1g	1.01	10.10	9.32	8.37
				10g	0.66	6.60	6.09	8.37
6-21-2015	D1750V2	1125	Head	1g	3.56	35.60	36.60	-2.73
				10g	1.89	18.90	19.50	-3.08
6-21-2015	D1900V2	5d199	Head	1g	3.96	39.60	41	-3.41
				10g	2.02	20.20	21.40	-5.61
6-22-2015	D750V3	1122	Body	1g	0.81	8.09	8.71	-7.12
				10g	0.54	5.37	5.81	-7.57
7-2-2015	D5GhzV2 (5200)	1209	Body	1g	7.16	71.60	74	-3.24
				10g	2.06	20.60	20.6	0.00
7-2-2015	D5GhzV2 (5600)	1209	Body	1g	7.77	77.70	77.4	0.39
				10g	2.21	22.10	21.3	3.76
7-2-2015	D5GhzV2 (5800)	1209	Body	1g	6.90	69.00	74.9	-7.88
				10g	1.97	19.70	20.5	-3.90
7-6-2015	D835V2	4d174	Head	1g	1.00	10.00	9.32	7.30
				10g	0.66	6.59	6.09	8.21
7-9-2015	D1900V2	5d199	Body	1g	4.12	41.20	40.6	1.48
				10g	2.16	21.60	21.60	0.00
7-10-2015	D2450V2	939	Body	1g	5.42	54.20	51.40	5.45
				10g	2.48	24.80	24.00	3.33
8-6-2015	D5GhzV2 (5200)	1184	Head	1g	8.03	80.30	79.5	1.01
				10g	2.28	22.80	22.7	0.44
8-6-2015	D5GhzV2 (5600)	1184	Head	1g	8.16	81.60	83.3	-2.04
				10g	2.31	23.10	23.5	-1.70
8-6-2015	D5GhzV2 (5800)	1184	Head	1g	7.65	76.50	79.2	-3.41
				10g	2.17	21.70	22.4	-3.13

SAR 3 Room

Date Tested	System Dipole		T.S. Liquid	Measured Results		Target (Ref. Value)	Delta ±10 %	Plot No.
	Type	Serial #		Zoom Scan to 100 mW	Normalize to 1 W			
6-20-2015	D835V2	4d174	Body	1g	1.00	9.93	9.62	3.22
				10g	0.66	6.52	6.37	2.35
6-22-2015	D750V3	1122	Head	1g	0.79	7.91	8.31	-4.81
				10g	0.52	5.22	5.45	-4.22
6-23-2015	D2600V2	1097	Head	1g	5.69	56.90	57.3	-0.70
				10g	2.53	25.30	25.50	-0.78
7-3-2015	D1900V2	5d199	Body	1g	4.20	42.00	40.6	3.45
				10g	2.14	21.40	21.60	-0.93
7-6-2015	D750V3	1122	Head	1g	0.78	7.82	8.31	-5.90
				10g	0.52	5.16	5.45	-5.32
7-8-2015	D5GHzV2 (5200)	1184	Head	1g	7.80	78.00	79.5	-1.89
				10g	2.23	22.30	22.7	-1.76
7-8-2015	D5GHzV2 (5600)	1184	Head	1g	7.65	76.50	83.3	-8.16
				10g	2.17	21.70	23.5	-7.66
7-8-2015	D5GHzV2 (5800)	1184	Head	1g	7.66	76.60	79.2	-3.28
				10g	2.16	21.60	22.4	-3.57
8-6-2015	D5GHzV2 (5200)	1184	Body	1g	7.78	77.80	77.1	0.91
				10g	2.23	22.30	21.5	3.72
8-6-2015	D5GHzV2 (5600)	1184	Body	1g	8.47	84.70	82.7	2.42
				10g	2.40	24.00	22.8	5.26
8-6-2015	D5GHzV2 (5800)	1184	Body	1g	7.50	75.00	76.9	-2.47
				10g	2.11	21.10	21.3	-0.94

9. Conducted Output Power Measurements

9.1. GSM

GSM850 Measured Results

Band	Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Burst (dBm)	Frame (dBm)
850	GSM (Voice)	CS1	1	128	824.2	33.5	24.5
				190	836.6	33.5	24.5
				251	848.8	33.5	24.5
	GPRS (GMSK)	CS1	1	128	824.2	33.5	24.5
				190	836.6	33.5	24.5
				251	848.8	33.5	24.5
			2	128	824.2	31.2	25.2
				190	836.6	31.2	25.1
				251	848.8	31.5	25.5
			3	128	824.2	29.9	25.6
				190	836.6	29.9	25.6
				251	848.8	30.0	25.7
			4	128	824.2	28.2	25.2
				190	836.6	28.3	25.3
				251	848.8	28.2	25.2
	EGPRS (8PSK)	MCS5	1	128	824.2	26.6	17.5
				190	836.6	26.8	17.8
				251	848.8	27.0	17.9
			2	128	824.2	25.4	19.4
				190	836.6	25.5	19.5
				251	848.8	25.5	19.5
			3	128	824.2	24.0	19.7
				190	836.6	24.1	19.9
				251	848.8	24.3	20.0
			4	128	824.2	22.6	19.6
				190	836.6	22.7	19.7
				251	848.8	22.8	19.8

Notes:

The worst-case configuration and mode for SAR testing is determined to be as follows:

- Head & Body-worn: GMSK Voice Mode
- Hotspot mode: GMSK (GPRS) mode with 3 time slots, based on the output power measurements above.
- SAR is not required for EGPRS (8PSK) mode because its output power is less than that of GPRS Mode

GSM1900 Measured Results

Band	Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Burst (dBm)	Frame (dBm)
1900	GSM (Voice)	CS1	1	512	1850.2	30.5	21.5
				661	1880.0	30.4	21.4
				810	1909.8	30.3	21.3
	GPRS (GMSK)	CS1	1	512	1850.2	30.5	21.5
				661	1880.0	30.5	21.4
				810	1909.8	30.1	21.1
			2	512	1850.2	28.2	22.2
				661	1880.0	27.6	21.6
				810	1909.8	27.4	21.4
			3	512	1850.2	26.5	22.2
				661	1880.0	26.2	22.0
				810	1909.8	26.0	21.7
			4	512	1850.2	25.0	22.0
				661	1880.0	24.3	21.3
				810	1909.8	24.0	20.9
	EGPRS (8PSK)	MCS5	1	512	1850.2	26.5	17.5
				661	1880.0	26.0	17.0
				810	1909.8	25.8	16.8
			2	512	1850.2	25.2	19.2
				661	1880.0	24.8	18.8
				810	1909.8	24.4	18.3
			3	512	1850.2	24.0	19.7
				661	1880.0	23.7	19.4
				810	1909.8	23.2	19.0
			4	512	1850.2	22.7	19.7
				661	1880.0	22.1	19.1
				810	1909.8	21.8	18.8

Notes:

The worst-case configuration and mode for SAR testing is determined to be as follows:

- Head & Body-worn: GMSK Voice Mode
- Hotspot mode: GMSK (GPRS) mode with 3 time slots, based on the output power measurements above.
- SAR is not required for EGPRS (8PSK) mode because its output power is less than that of GPRS Mode

9.2. W-CDMA

Release 99 Setup Procedures used to establish the test signals

The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 specification. The DUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7).

Mode	Subtest	Rel99
WCDMA General Settings	Loopback Mode	Test Mode 2
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	β_c/β_d	8/15

HSDPA Setup Procedures used to establish the test signals

The following 4 Sub-tests were completed according to Release 5 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subtest	1	2	3	4
W-CDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set 1			
	Power Control Algorithm	Algorithm 2			
	β_c	2/15	11/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	β_c/β_d	2/15	11/15	15/8	15/4
	β_{hs}	4/15	24/15	30/15	30/15
HSDPA Specific Settings	MPR (dB)	0	0	0.5	0.5
	D_{ACK}	8			
	D_{NAK}	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	$A_{hs}=\beta_{hs}/\beta_c$	30/15			

HSPA (HSDPA & HSUPA) Setup Procedures used to establish the test signals

The following 5 Sub-tests were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

	Mode	HSPA				
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2 kbps RMC				
	HSDPA FRC	H-Set 1				
	HSUPA Test	HSPA				
	Power Control Algorithm	Algorithm 2				Algorithm 1
	β_c	11/15	6/15	15/15	2/15	15/15
	β_d	15/15	15/15	9/15	15/15	0
	β_{ec}	209/225	12/15	30/15	2/15	5/15
	β_c/β_d	11/15	6/15	15/9	2/15	15/1
	β_{hs}	22/15	12/15	30/15	4/15	5/15
	β_{ed}	1309/225	94/75	47/15	56/75	47/15
HSDPA Specific Settings	CM (dB)	1	3	2	3	1
	MPR (dB)	0	2	1	2	0
	DACK	8				0
	DNAK	8				0
	DCQI	8				0
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
HSUPA Specific Settings	CQI Repetition Factor (Table 5.2B.4)	2				
	$A_{hs} = \beta_{hs}/\beta_c$	30/15				
	E-DPDCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E-TFCIs	5	5	2	5	1
	Reference E-TFCI	11	11	11	11	67
	Reference E-TFCI PO	4	4	4	4	18
	Reference E-TFCI	67	67	92	67	67
	Reference E-TFCI PO	18	18	18	18	18
	Reference E-TFCI	71	71	71	71	71
	Reference E-TFCI PO	23	23	23	23	23
	Reference E-TFCI	75	75	75	75	75
	Reference E-TFCI PO	26	26	26	26	26
	Reference E-TFCI	81	81	81	81	81
	Reference E-TFCI PO	27	27	27	27	27
	Maximum Channelization Codes	2xSF2				SF4

DC-HSDPA Setup Procedures used to establish the test signals

The following tests were completed according to procedures in section 7.3.13 of 3GPP TS34.108 v9.5.0. A summary of these settings are illustrated below:

Downlink Physical Channels are set as per 3GPP TS34.121-1 v9.0.0 E.5.0

Table E.5.0: Levels for HSDPA connection setup

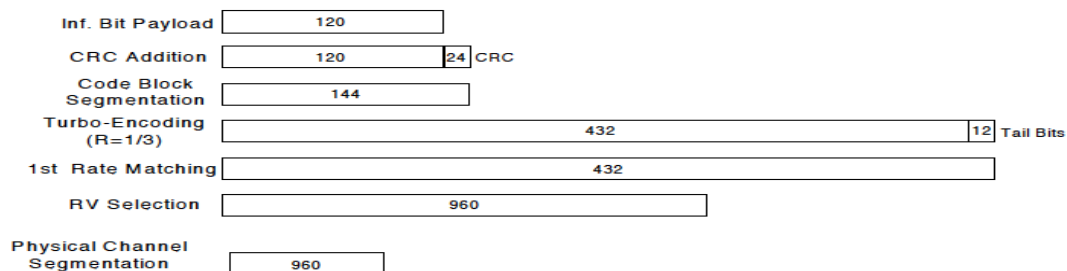
Parameter During Connection setup	Unit	Value
P-CPICH_Ec/Ior	dB	-10
P-CCPCH and SCH_Ec/Ior	dB	-12
PICH_Ec/Ior	dB	-15
HS-PDSCH	dB	off
HS-SCCH_1	dB	off
DPCH_Ec/Ior	dB	-5
OCNS_Ec/Ior	dB	-3.1

Call is set up as per 3GPP TS34.108 v9.5.0 sub clause 7.3.13

The configurations of the fixed reference channels for HSDPA RF tests are described in 3GPP TS 34.121, annex C for FDD and 3GPP TS 34.122.

Table C.8.1.12: Fixed Reference Channel H-Set 12

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	Proces ses	6
Information Bit Payload (N_{INF})	Bits	120
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	960
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	3200
Coding Rate		0.15
Number of Physical Channel Codes	Codes	1
Modulation		QPSK
Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table.		
Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.		

**Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)**

The following 4 Sub-tests for HSDPA were completed according to Release 8 procedures in section 5.2 of 3GPP TS34.121. A summary of subtest settings are illustrated below:

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set 1			
	Power Control Algorithm	Algorithm2			
	β_c	2/15	11/15	15/15	15/15
	β_d	15/15	15/15	8/15	4/15
	β_d (SF)	64			
	β_c/β_d	2/15	11/15	15/8	15/4
	β_{hs}	4/15	24/15	30/15	30/15
HSDPA Specific Settings	MPR (dB)	0	0	0.5	0.5
	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack Repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	Ahs = β_{hs}/β_c	30/15			

HSPA+

Since 16QAM is not used for uplink, the uplink Category and release is same as HSUPA, i.e., Rel. 7 Therefore, the RF conducted power is not measured.

W-CDMA Band II Measured Results

Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Avg. Pwr (dBm)	Reduced Pwr (dBm)
W-CDMA Band II	Rel 99	RMC, 12.2 kbps	9262	1852.4	N/A	22.2	19.3
			9400	1880.0	N/A	22.0	19.3
			9538	1907.6	N/A	21.6	18.7
	HSDPA	Subtest 1	9262	1852.4	0	22.3	19.4
			9400	1880.0	0	22.0	19.0
			9538	1907.6	0	21.6	18.7
		Subtest 2	9262	1852.4	0	22.4	19.3
			9400	1880.0	0	22.0	19.0
			9538	1907.6	0	21.6	18.7
		Subtest 3	9262	1852.4	0	22.4	19.4
			9400	1880.0	0	22.0	19.0
			9538	1907.6	0	21.6	18.7
		Subtest 4	9262	1852.4	0	22.4	19.3
			9400	1880.0	0	22.0	19.0
			9538	1907.6	0	21.6	18.7
	HSUPA	Subtest 1	9262	1852.4	0	21.3	18.3
			9400	1880.0	0	21.0	18.0
			9538	1907.6	0	20.6	17.7
		Subtest 2	9262	1852.4	0	21.3	19.3
			9400	1880.0	0	21.0	19.0
			9538	1907.6	0	20.7	18.7
		Subtest 3	9262	1852.4	0	21.3	18.3
			9400	1880.0	0	21.0	18.0
			9538	1907.6	0	20.6	17.7
		Subtest 4	9262	1852.4	0	21.3	19.3
			9400	1880.0	0	21.0	19.0
			9538	1907.6	0	20.6	18.7
		Subtest 5	9262	1852.4	0	22.3	19.3
			9400	1880.0	0	22.0	19.0
			9538	1907.6	0	21.6	18.7
	DC-HSDPA	Subtest 1	9262	1852.4	0	22.2	19.2
			9400	1880.0	0	21.8	18.9
			9538	1907.6	0	21.6	18.6
		Subtest 2	9262	1852.4	0	22.4	19.4
			9400	1880.0	0	22.0	19.0
			9538	1907.6	0	21.6	18.7
		Subtest 3	9262	1852.4	0	22.3	19.3
			9400	1880.0	0	22.0	19.0
			9538	1907.6	0	21.6	18.7
		Subtest 4	9262	1852.4	0	22.3	19.3
			9400	1880.0	0	22.0	19.0
			9538	1907.6	0	21.6	18.7

Notes:

1. MPR is permanently implemented for HSDPA and HSUPA mode. For WCDMA Band II, the MPR is applied to 0.

W-CDMA Band V Measured Results

Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Avg. Pwr (dBm)
W-CDMA Band V	Rel 99	RMC, 12.2 kbps	4132	826.4	N/A	23.0
			4183	836.6	N/A	23.0
			4233	846.6	N/A	23.1
	HSDPA	Subtest 1	4132	826.4	0	23.1
			4183	836.6	0	23.0
			4233	846.6	0	23.0
		Subtest 2	4132	826.4	0	23.2
			4183	836.6	0	23.1
			4233	846.6	0	23.1
		Subtest 3	4132	826.4	0.5	22.3
			4183	836.6	0.5	23.0
			4233	846.6	0.5	23.0
		Subtest 4	4132	826.4	0.5	22.1
			4183	836.6	0.5	22.1
			4233	846.6	0.5	22.1
	HSUPA	Subtest 1	4132	826.4	0	22.0
			4183	836.6	0	22.0
			4233	846.6	0	22.0
		Subtest 2	4132	826.4	2	21.0
			4183	836.6	2	21.0
			4233	846.6	2	21.0
		Subtest 3	4132	826.4	1	22.0
			4183	836.6	1	22.0
			4233	846.6	1	22.1
		Subtest 4	4132	826.4	2	21.0
			4183	836.6	2	21.1
			4233	846.6	2	21.1
		Subtest 5	4132	826.4	0	23.0
			4183	836.6	0	23.0
			4233	846.6	0	23.0
	DC-HSDPA	Subtest 1	4132	826.4	0	22.9
			4183	836.6	0	22.9
			4233	846.6	0	22.9
		Subtest 2	4132	826.4	0	23.1
			4183	836.6	0	23.0
			4233	846.6	0	23.0
		Subtest 3	4132	826.4	0.5	22.3
			4183	836.6	0.5	23.0
			4233	846.6	0.5	23.0
		Subtest 4	4132	826.4	0.5	22.1
			4183	836.6	0.5	22.0
			4233	846.6	0.5	22.0

9.3. LTE

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
64 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 ¹	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 2 Measured Results

SAR for LTE Band 2 is covered by LTE Band 25 due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

LTE Band 4 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduce Avg Pwr (dBm)		
						1720 MHz	1732.5 MHz	1745 MHz		1720 MHz	1732.5 MHz	1745 MHz
LTE Band 4	20	QPSK	1	0	0	22.2	22.1	22.0	0	19.2	19.2	18.9
			1	49	0	22.2	22.2	21.9	0	19.3	19.2	18.9
			1	99	0	22.4	22.2	22.1	0	19.2	19.2	19.0
			50	0	1	21.1	20.9	20.9	0	19.1	19.0	18.9
			50	24	1	21.1	20.9	20.8	0	19.1	19.2	18.9
			50	50	1	21.1	20.9	20.8	0	19.2	18.8	18.9
			100	0	1	21.1	20.8	20.8	0	19.1	18.9	18.9
		16QAM	1	0	1	21.3	21.1	21.1	0	19.4	18.9	19.2
			1	49	1	21.2	21.0	21.0	0	19.3	19.0	19.1
			1	99	1	21.3	21.0	21.1	0	19.4	18.9	19.3
			50	0	2	20.1	19.9	19.8	0	19.1	18.8	18.9
			50	24	2	20.1	19.9	19.7	0	19.2	18.9	18.8
			50	50	2	20.1	19.8	19.8	0	19.2	18.8	18.8
			100	0	2	20.0	19.8	19.8	0	19.1	18.9	18.9
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduce Avg Pwr (dBm)		
						1717.5 MHz	1732.5 MHz	1747.5 MHz		1717.5 MHz	1732.5 MHz	1747.5 MHz
LTE Band 4	15	QPSK	1	0	0	22.3	22.0	22.0	0	19.3	18.9	19.0
			1	37	0	22.3	22.0	22.0	0	19.2	19.0	18.9
			1	74	0	22.2	21.9	22.1	0	19.3	19.0	19.1
			36	0	1	21.1	20.9	20.9	0	19.2	19.0	18.9
			36	20	1	21.2	20.9	20.8	0	19.2	19.0	18.9
			36	39	1	21.1	20.9	20.8	0	19.2	18.9	19.0
			75	0	1	21.1	20.8	20.8	0	19.2	18.9	19.0
		16QAM	1	0	1	21.1	21.1	20.8	0	19.2	19.2	18.9
			1	37	1	21.1	21.1	20.8	0	19.3	19.2	18.9
			1	74	1	21.2	21.0	20.8	0	19.3	19.1	19.0
			36	0	2	20.0	19.9	19.8	0	19.2	18.9	18.9
			36	20	2	20.1	19.9	19.8	0	19.3	19.0	18.8
			36	39	2	20.1	19.8	19.7	0	19.2	18.9	18.9
			75	0	2	20.0	19.7	19.8	0	19.2	18.8	18.9
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduce Avg Pwr (dBm)		
						1715 MHz	1732.5 MHz	1750 MHz		1715 MHz	1732.5 MHz	1750 MHz
LTE Band 4	10	QPSK	1	0	0	22.2	22.1	22.1	0	19.4	19.0	19.2
			1	25	0	22.3	22.0	22.1	0	19.3	19.0	19.1
			1	49	0	22.3	22.0	22.2	0	19.3	19.1	19.2
			25	0	1	21.1	20.9	20.9	0	19.2	18.9	19.0
			25	12	1	21.2	20.9	21.0	0	19.2	18.9	18.9
			25	25	1	21.2	20.9	21.0	0	19.3	18.9	18.9
			50	0	1	21.2	20.9	20.9	0	19.2	18.9	19.0
		16QAM	1	0	1	21.3	21.2	21.2	0	19.4	19.1	19.3
			1	25	1	21.3	21.1	21.2	0	19.4	19.1	19.4
			1	49	1	21.3	21.1	21.3	0	19.4	19.1	19.4
			25	0	2	20.1	19.9	19.8	0	19.2	18.8	18.9
			25	12	2	20.1	19.9	19.9	0	19.2	18.9	18.9
			25	25	2	20.1	19.8	19.9	0	19.3	18.8	19.0
			50	0	2	20.0	19.8	19.8	0	19.2	18.9	18.9

LTE Band 4 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduce Avg Pwr (dBm)		
						1712.5 MHz	1732.5 MHz	1752.5 MHz		1712.5 MHz	1732.5 MHz	1752.5 MHz
LTE Band 4	5	QPSK	1	0	0	22.2	22.1	22.0	0	19.2	19.1	19.0
			1	12	0	22.2	22.2	22.0	0	19.1	19.1	18.9
			1	24	0	22.3	22.1	22.1	0	19.2	19.1	19.0
			12	0	1	21.0	20.9	20.9	0	19.1	18.8	18.8
			12	7	1	21.0	20.9	20.9	0	19.1	18.9	18.9
			12	13	1	21.1	20.8	20.9	0	19.0	18.9	18.9
			25	0	1	21.0	20.8	20.8	0	19.0	18.8	18.9
		16QAM	1	0	1	21.3	20.8	20.7	0	19.3	19.2	18.9
			1	12	1	21.2	20.8	20.9	0	19.3	19.0	18.9
			1	24	1	21.3	20.8	21.0	0	19.3	19.1	18.9
			12	0	2	19.9	19.7	19.7	0	19.1	18.9	18.8
			12	7	2	19.9	19.7	19.8	0	19.1	18.9	18.9
			12	13	2	19.9	19.7	19.8	0	19.1	18.9	18.9
			25	0	2	20.0	19.7	19.9	0	19.0	18.8	18.9
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduce Avg Pwr (dBm)		
						1711.5 MHz	1732.5 MHz	1753.5 MHz		1711.5 MHz	1732.5 MHz	1753.5 MHz
LTE Band 4	3	QPSK	1	0	0	22.3	22.0	22.2	0	19.2	19.0	19.0
			1	8	0	22.3	22.0	22.1	0	19.3	19.0	19.0
			1	14	0	22.2	22.0	22.2	0	19.2	19.0	19.1
			8	0	1	21.1	20.8	20.8	0	19.1	18.9	19.0
			8	4	1	21.1	20.8	20.9	0	19.1	18.9	19.0
			8	7	1	21.1	20.8	20.9	0	19.1	18.9	19.0
			15	0	1	21.1	20.8	20.9	0	19.1	18.9	19.0
		16QAM	1	0	1	21.2	21.3	21.2	0	19.2	19.2	19.2
			1	8	1	21.1	21.1	21.2	0	19.1	19.2	19.2
			1	14	1	21.1	21.2	21.3	0	19.2	19.0	19.2
			8	0	2	20.0	19.8	19.7	0	18.9	18.7	18.9
			8	4	2	20.0	19.8	19.7	0	18.9	18.7	18.9
			8	7	2	20.0	19.6	19.8	0	19.0	18.7	19.0
			15	0	2	19.9	19.7	19.8	0	19.0	18.9	18.8
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduce Avg Pwr (dBm)		
						1710.7 MHz	1732.5 MHz	1754.3 MHz		1710.7 MHz	1732.5 MHz	1754.3 MHz
LTE Band 4	1.4	QPSK	1	0	0	22.3	22.0	22.2	0	19.2	19.0	19.1
			1	3	0	22.3	22.0	22.1	0	19.1	18.9	19.1
			1	5	0	22.3	22.1	22.2	0	19.1	18.9	19.1
			3	0	0	22.2	22.0	21.9	0	19.1	18.9	19.0
			3	1	0	22.2	21.9	22.0	0	19.0	18.9	19.0
			3	3	0	22.2	21.9	22.0	0	19.0	18.9	19.0
			6	0	1	21.0	20.8	20.9	0	19.0	18.9	19.0
		16QAM	1	0	1	21.5	21.2	21.4	0	19.2	19.1	19.4
			1	3	1	21.3	21.1	21.3	0	19.2	19.1	19.4
			1	5	1	21.4	21.2	21.4	0	19.2	19.1	19.5
			3	0	1	20.9	20.8	20.8	0	19.1	18.8	18.9
			3	1	1	21.0	20.8	20.9	0	19.0	18.7	18.9
			3	3	1	20.9	20.7	21.0	0	19.0	18.7	18.9
			6	0	2	19.9	19.6	19.7	0	19.0	18.8	18.8

LTE Band 5 Measured Results

SAR for LTE Band 5 is covered by LTE Band 26 due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

LTE Band 12 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						704 MHz	707.5 MHz	711 MHz
LTE Band 12	10	QPSK	1	0	0	23.2	23.1	23.2
			1	25	0	23.1	23.0	23.2
			1	49	0	23.0	23.0	23.1
			25	0	1	21.9	21.9	22.0
			25	12	1	22.0	21.8	21.9
			25	25	1	21.9	21.8	21.8
			50	0	1	21.8	21.8	21.9
		16QAM	1	0	1	22.1	22.4	22.5
			1	25	1	22.1	22.4	22.3
			1	49	1	22.0	22.3	22.3
			25	0	2	20.9	20.8	20.9
			25	12	2	20.9	20.9	20.9
			25	25	2	20.9	20.8	20.8
			50	0	2	20.8	20.8	20.8
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						701.5 MHz	707.5 MHz	713.5 MHz
LTE Band 12	5	QPSK	1	0	0	23.2	23.2	23.0
			1	12	0	23.2	23.3	22.9
			1	24	0	23.1	23.3	22.9
			12	0	1	21.9	21.9	21.8
			12	7	1	21.9	21.8	21.7
			12	13	1	21.8	21.8	21.7
			25	0	1	22.0	21.8	21.8
		16QAM	1	0	1	22.5	22.2	22.0
			1	12	1	22.4	22.1	21.8
			1	24	1	22.5	22.2	22.0
			12	0	2	20.9	20.8	20.6
			12	7	2	20.8	20.7	20.6
			12	13	2	20.8	20.7	20.6
			25	0	2	20.9	20.8	20.6
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						700.5 MHz	707.5 MHz	714.5 MHz
LTE Band 12	3	QPSK	1	0	0	23.3	23.2	23.0
			1	8	0	23.1	23.2	22.9
			1	14	0	23.2	23.2	22.9
			8	0	1	21.9	21.9	21.8
			8	4	1	21.9	21.8	21.7
			8	7	1	21.8	21.8	21.7
			15	0	1	21.9	21.8	21.7
		16QAM	1	0	1	22.2	22.3	22.3
			1	8	1	22.0	22.3	22.3
			1	14	1	22.1	22.3	22.3
			8	0	2	21.0	20.7	20.7
			8	4	2	20.9	20.8	20.6
			8	7	2	20.9	20.7	20.6
			15	0	2	20.9	20.8	20.7

LTE Band 12 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						699.7 MHz	707.5 MHz	715.3 MHz
LTE Band 12	1.4	QPSK	1	0	0	23.2	23.1	23.0
			1	3	0	23.2	23.2	23.1
			1	5	0	23.2	23.2	23.2
			3	0	0	23.2	23.0	22.9
			3	1	0	23.2	23.0	22.9
			3	3	0	23.1	23.0	23.0
			6	0	1	22.0	22.0	21.8
		16QAM	1	0	1	22.4	22.3	22.5
			1	3	1	22.3	22.3	22.5
			1	5	1	22.3	22.3	22.5
			3	0	1	22.0	21.9	21.9
			3	1	1	22.0	21.8	21.9
			3	3	1	21.9	21.9	21.9
			6	0	2	20.9	20.8	20.7

LTE Band 17 Measured Results

SAR for LTE Band 17 is covered by LTE Band 12 due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

LTE Band 25 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduce Avg Pwr (dBm)		
						1860 MHz	1882.5 MHz	1905 MHz		1860 MHz	1882.5 MHz	1905 MHz
LTE Band 25	20	QPSK	1	0	0	22.5	22.2	21.7	0	19.2	19.1	18.6
			1	49	0	22.4	22.2	21.8	0	19.2	19.1	18.5
			1	99	0	22.4	22.2	21.9	0	19.2	19.0	18.6
			50	0	1	21.1	20.9	20.6	0	19.0	18.8	18.5
			50	24	1	21.2	20.9	20.6	0	19.1	18.8	18.5
			50	50	1	21.1	20.9	20.6	0	19.0	18.7	18.5
			100	0	1	21.1	20.9	20.6	0	19.0	18.7	18.5
		16QAM	1	0	1	21.5	20.9	20.8	0	19.3	19.0	18.8
			1	49	1	21.4	20.9	20.7	0	19.2	18.9	18.9
			1	99	1	21.4	20.9	20.7	0	19.2	18.9	18.8
			50	0	2	20.1	19.9	19.6	0	19.1	18.8	18.4
			50	24	2	20.1	19.8	19.5	0	19.1	18.8	18.5
			50	50	2	20.0	19.9	19.5	0	19.1	18.8	18.5
			100	0	2	20.1	19.8	19.5	0	19.0	18.7	18.5
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduce Avg Pwr (dBm)		
						1857.5 MHz	1882.5 MHz	1907.5 MHz		1857.5 MHz	1882.5 MHz	1907.5 MHz
LTE Band 25	15	QPSK	1	0	0	22.3	22.0	21.7	0	19.3	18.8	18.6
			1	37	0	22.3	22.0	21.8	0	19.1	18.9	18.7
			1	74	0	22.3	21.9	21.9	0	19.1	18.8	18.6
			36	0	1	21.2	20.9	20.7	0	19.1	18.7	18.6
			36	20	1	21.2	20.9	20.6	0	19.1	18.8	18.6
			36	39	1	21.2	20.8	20.6	0	19.2	18.8	18.5
			75	0	1	21.1	20.8	20.6	0	19.1	18.8	18.6
		16QAM	1	0	1	21.1	21.0	20.7	0	19.1	19.0	18.5
			1	37	1	21.4	21.0	20.7	0	19.3	18.9	18.5
			1	74	1	21.2	21.0	20.6	0	19.1	19.0	18.5
			36	0	2	20.1	19.9	19.6	0	19.1	18.8	18.6
			36	20	2	20.1	19.8	19.5	0	19.2	18.8	18.5
			36	39	2	20.2	19.8	19.5	0	19.1	18.8	18.5
			75	0	2	20.0	19.8	19.6	0	19.1	18.7	18.6
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduce Avg Pwr (dBm)		
						1855 MHz	1882.5 MHz	1910 MHz		1855 MHz	1882.5 MHz	1910 MHz
LTE Band 25	10	QPSK	1	0	0	22.4	22.0	21.8	0	19.4	18.8	18.8
			1	25	0	22.4	22.0	21.7	0	19.3	18.9	18.7
			1	49	0	22.5	22.0	21.8	0	19.3	18.8	18.8
			25	0	1	21.2	20.8	20.7	0	19.2	18.8	18.6
			25	12	1	21.2	20.8	20.6	0	19.3	18.7	18.5
			25	25	1	21.3	20.8	20.6	0	19.2	18.7	18.6
			50	0	1	21.2	20.8	20.7	0	19.2	18.8	18.6
		16QAM	1	0	1	21.1	21.1	21.2	0	19.3	19.0	18.8
			1	25	1	21.4	21.2	20.8	0	19.4	19.0	18.7
			1	49	1	21.5	21.1	20.9	0	19.5	18.9	18.7
			25	0	2	20.3	19.9	20.0	0	19.2	18.8	18.6
			25	12	2	20.5	20.0	19.7	0	19.2	18.7	18.6
			25	25	2	20.5	20.0	19.5	0	19.3	18.7	18.6
			50	0	2	20.4	19.9	19.5	0	19.2	18.7	18.6

LTE Band 25 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduce Avg Pwr (dBm)		
						1852.5 MHz	1882.5 MHz	1912.5 MHz		1852.5 MHz	1882.5 MHz	1912.5 MHz
LTE Band 25	5	QPSK	1	0	0	22.5	22.1	21.6	0	19.2	19.0	18.5
			1	12	0	22.3	22.1	21.5	0	19.3	19.0	18.5
			1	24	0	22.4	22.2	21.6	0	19.3	19.0	18.5
			12	0	1	21.2	20.8	20.6	0	19.2	18.7	18.6
			12	7	1	21.3	20.8	20.5	0	19.3	18.7	18.5
			12	13	1	21.3	20.9	20.5	0	19.2	18.8	18.5
			25	0	1	21.2	20.8	20.5	0	19.2	18.7	18.5
		16QAM	1	0	1	21.5	21.2	20.8	0	19.0	18.6	18.7
			1	12	1	21.5	21.1	20.4	0	18.9	18.6	18.6
			1	24	1	21.5	21.2	20.5	0	19.0	18.6	18.7
			12	0	2	20.2	19.7	19.4	0	19.1	18.7	18.4
			12	7	2	20.2	19.7	19.3	0	19.1	18.7	18.5
			12	13	2	20.2	19.8	19.3	0	19.1	18.7	18.4
			25	0	2	20.1	19.7	19.3	0	19.2	18.7	18.5
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduce Avg Pwr (dBm)		
						1851.5 MHz	1882.5 MHz	1913.5 MHz		1851.5 MHz	1882.5 MHz	1913.5 MHz
LTE Band 25	3	QPSK	1	0	0	22.5	21.9	21.8	0	19.3	18.8	18.8
			1	8	0	22.5	21.9	21.7	0	19.3	18.8	18.7
			1	14	0	22.5	22.0	21.8	0	19.4	18.9	18.8
			8	0	1	21.2	20.8	20.5	0	19.3	18.7	18.6
			8	4	1	21.3	20.7	20.5	0	19.2	18.7	18.5
			8	7	1	21.3	20.8	20.5	0	19.3	18.7	18.5
			15	0	1	21.2	20.8	20.5	0	19.2	18.7	18.6
		16QAM	1	0	1	21.3	21.1	20.8	0	19.5	19.1	19.1
			1	8	1	21.3	21.1	20.8	0	19.4	19.0	18.9
			1	14	1	21.4	21.1	20.9	0	19.5	19.1	19.0
			8	0	2	20.1	19.6	19.4	0	19.2	18.6	18.4
			8	4	2	20.2	19.6	19.4	0	19.2	18.6	18.4
			8	7	2	20.1	19.6	19.3	0	19.2	18.6	18.4
			15	0	2	20.1	19.6	19.4	0	19.2	18.8	18.5
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduce Avg Pwr (dBm)		
						1850.7 MHz	1882.5 MHz	1914.3 MHz		1850.7 MHz	1882.5 MHz	1914.3 MHz
LTE Band 25	1.4	QPSK	1	0	0	22.1	22.1	21.8	0	19.5	18.9	18.8
			1	3	0	22.1	22.2	21.8	0	19.4	19.0	18.8
			1	5	0	22.1	22.1	21.9	0	19.5	19.0	18.8
			3	0	0	21.8	21.9	21.6	0	19.2	18.8	18.7
			3	1	0	21.9	21.9	21.6	0	19.3	18.8	18.6
			3	3	0	21.9	21.9	21.6	0	19.3	18.9	18.7
			6	0	1	21.5	21.5	21.5	0	19.2	18.7	18.6
		16QAM	1	0	1	21.2	21.2	21.0	0	19.5	19.2	19.2
			1	3	1	21.2	21.2	20.9	0	19.5	19.2	19.1
			1	5	1	21.1	21.2	20.9	0	19.5	19.3	19.2
			3	0	1	20.5	20.6	20.4	0	19.2	18.6	18.7
			3	1	1	20.5	20.7	20.4	0	19.3	18.6	18.7
			3	3	1	20.6	20.7	20.5	0	19.3	18.5	18.7
			6	0	2	20.5	20.5	20.5	0	19.1	18.6	18.5

LTE Band 26 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						821.5 MHz	831.5 MHz	841.5 MHz
LTE Band 26	15	QPSK	1	0	0	23.2	23.2	23.4
			1	37	0	23.2	23.3	23.4
			1	74	0	23.1	23.2	23.3
			36	0	1	21.9	22.0	22.2
			36	20	1	21.9	22.0	22.1
			36	39	1	21.9	22.0	22.0
			75	0	1	21.7	21.9	22.2
		16QAM	1	0	1	22.1	22.5	22.4
			1	37	1	22.0	22.4	22.3
			1	74	1	22.0	22.3	22.3
			36	0	2	20.9	20.8	21.1
			36	20	2	20.8	20.9	21.0
			36	39	2	20.9	20.8	20.9
			75	0	2	20.8	20.9	21.1
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						819 MHz	831.5 MHz	844 MHz
LTE Band 26	10	QPSK	1	0	0	23.2	23.2	23.5
			1	25	0	23.1	23.2	23.4
			1	49	0	23.0	23.2	23.4
			25	0	1	21.8	21.9	22.2
			25	12	1	21.8	21.9	22.2
			25	25	1	21.8	21.9	22.2
			50	0	1	21.8	21.9	22.2
		16QAM	1	0	1	22.3	22.5	22.5
			1	25	1	22.2	22.5	22.5
			1	49	1	22.2	22.5	22.5
			25	0	2	20.8	20.9	21.1
			25	12	2	20.9	21.0	21.0
			25	25	2	20.8	20.9	21.0
			50	0	2	20.7	20.8	21.1
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						816.5 MHz	831.5 MHz	846.5 MHz
LTE Band 26	5	QPSK	1	0	0	23.1	23.3	23.5
			1	12	0	23.1	23.3	23.5
			1	24	0	23.1	23.3	23.5
			12	0	1	21.8	21.9	22.1
			12	7	1	21.9	21.9	22.2
			12	13	1	21.8	21.9	22.1
			25	0	1	21.8	21.9	22.1
		16QAM	1	0	1	22.4	22.2	22.3
			1	12	1	22.4	22.2	22.3
			1	24	1	22.4	22.2	22.3
			12	0	2	20.7	20.8	21.0
			12	7	2	20.7	20.9	21.1
			12	13	2	20.7	20.8	21.0
			25	0	2	20.7	20.8	21.1

LTE Band 26 Measured Results (continued)

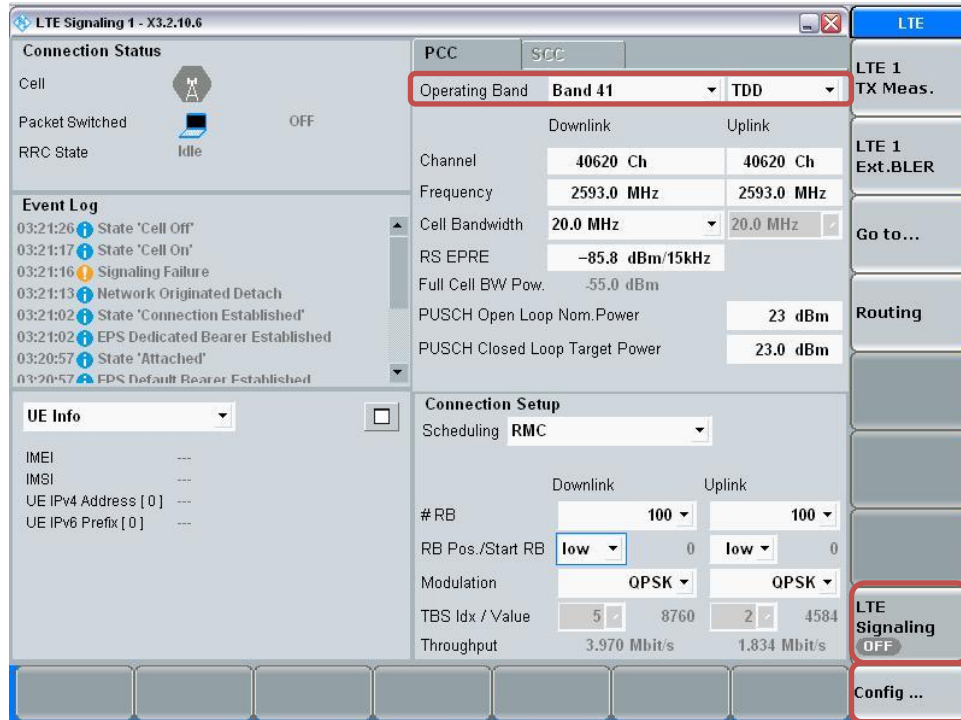
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						815.5 MHz	831.5 MHz	847.5 MHz
LTE Band 26	3	QPSK	1	0	0	23.1	23.2	23.3
			1	8	0	23.1	23.2	23.3
			1	14	0	23.1	23.2	23.4
			8	0	1	21.8	21.9	22.1
			8	4	1	21.9	21.9	22.1
			8	7	1	21.9	21.9	22.1
			15	0	1	21.8	21.9	22.0
		16QAM	1	0	1	22.4	22.5	22.5
			1	8	1	22.4	22.4	22.4
			1	14	1	22.4	22.3	22.4
			8	0	2	20.7	20.9	21.0
			8	4	2	20.8	20.8	21.0
			8	7	2	20.8	20.8	21.0
			15	0	2	20.8	20.8	21.0
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						814.7 MHz	831.5 MHz	848.3 MHz
LTE Band 26	1.4	QPSK	1	0	0	23.1	23.2	23.4
			1	3	0	23.0	23.2	23.4
			1	5	0	23.1	23.1	23.3
			3	0	0	22.8	23.0	23.2
			3	1	0	22.9	23.1	23.2
			3	3	0	22.9	23.0	23.1
			6	0	1	21.8	21.9	22.0
		16QAM	1	0	1	22.1	22.1	22.5
			1	3	1	22.2	22.1	22.5
			1	5	1	22.2	22.0	22.5
			3	0	1	21.6	21.9	22.1
			3	1	1	21.7	22.0	22.2
			3	3	1	21.7	22.0	22.1
			6	0	2	20.7	20.8	20.9

LTE Band 41 Measured Results

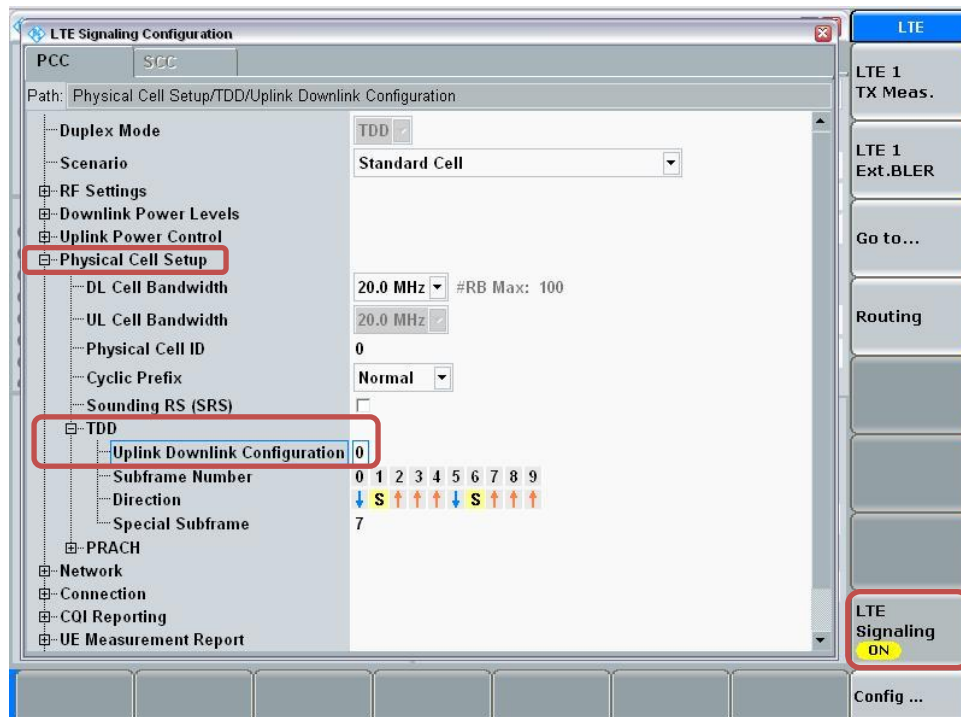
Procedure used to establish SAR test signal for LTE TDD Band 41

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...."

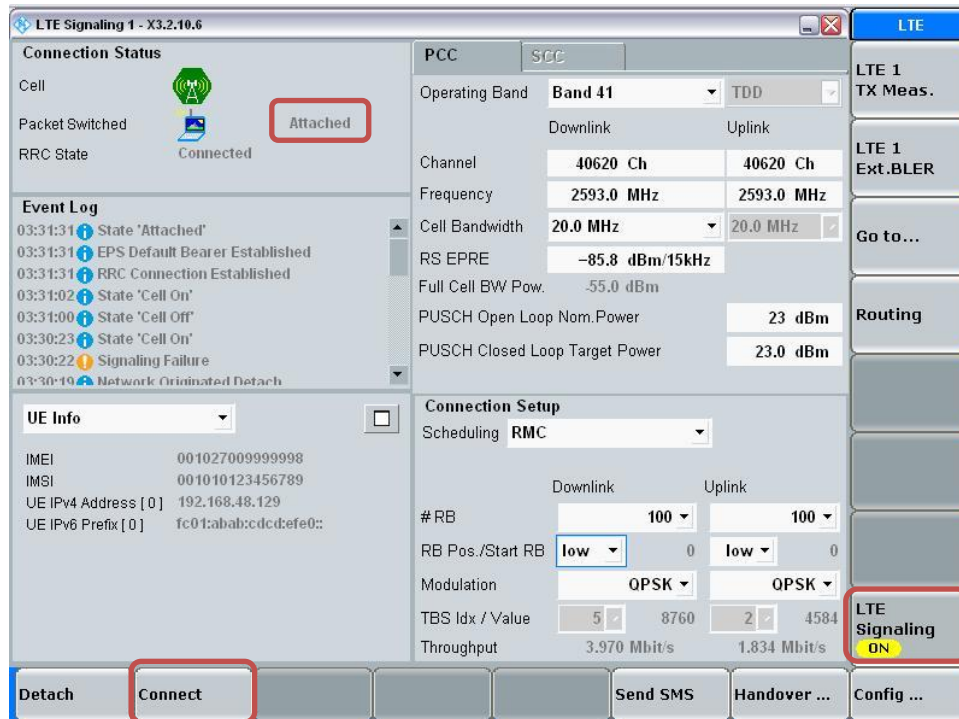


- Go to "Physical Cell Setup"
- Select "TDD" and Set "Uplink Downlink Configuration" to "0"
- Turn the cell on using "ON | OFF" key

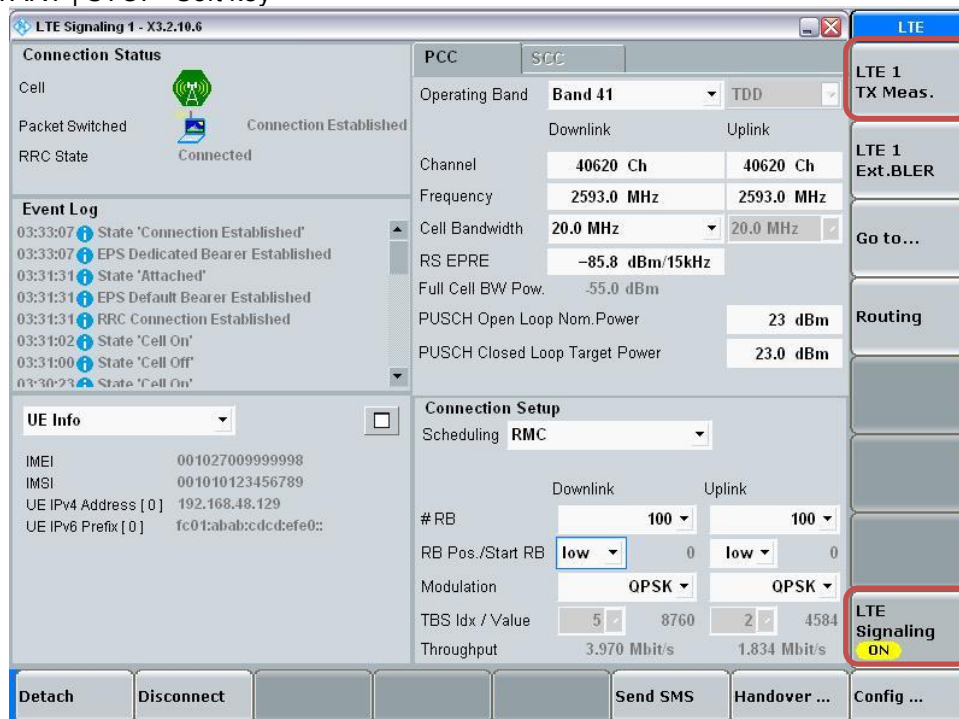


Connect to EUT

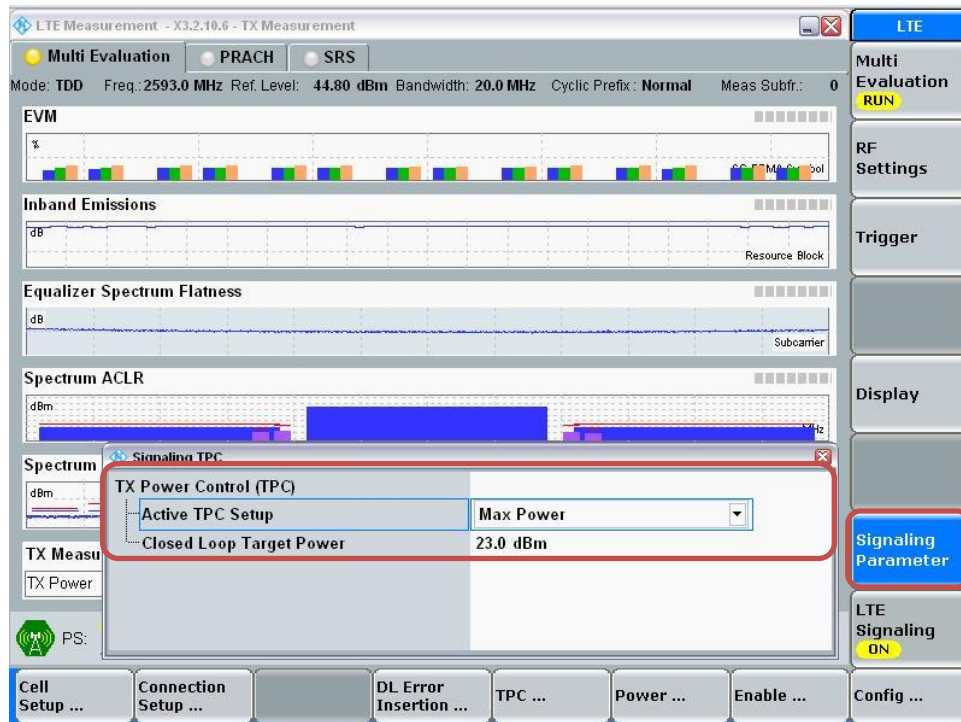
- Turn the cell on using “ON | OFF” key
- After EUT is Attached
- Select “Connect”

**Max Power Setting**

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

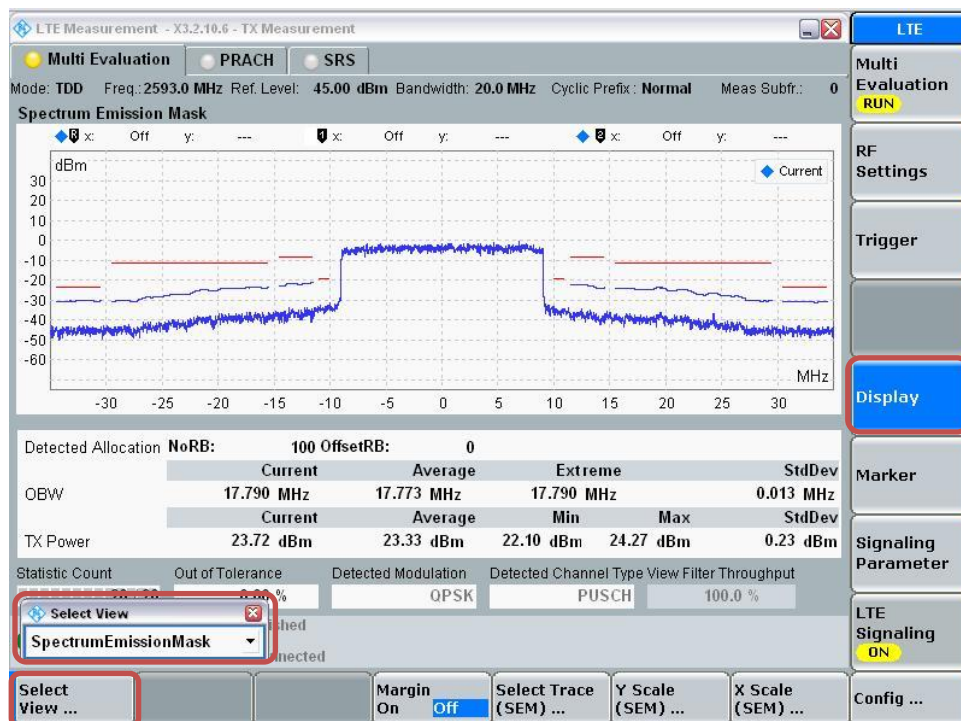


- Select “Signaling Parameter”
- Select “TX Power Control (TPC)” > Select “Active TPC Setup” to “Max Power” > Set “Closed Loop Target Power” to “23 dBm”



View TX Power

- Go to “Display”
- Select “Select View...”
- Select “Spectrum Emission Mask”



LTE Band 41 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)				
						2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz
LTE Band 41	20	QPSK	1	0	0	23.1	22.7	22.9	23.1	22.9
			1	49	0	23.1	22.7	22.8	23.2	23.1
			1	99	0	23.1	22.7	22.9	23.2	22.9
			50	0	1	21.9	21.6	21.7	22.0	21.9
			50	24	1	22.0	21.6	21.7	22.0	21.9
			50	50	1	21.8	21.5	21.7	22.0	21.9
			100	0	1	21.8	21.5	21.7	22.1	22.0
		16QAM	1	0	1	22.4	21.7	21.9	22.0	22.2
			1	49	1	22.4	21.7	21.9	22.4	22.2
			1	99	1	22.1	21.4	21.7	22.3	22.1
			50	0	2	20.9	20.6	20.7	20.9	20.9
			50	24	2	20.8	20.5	20.7	20.9	20.9
			50	50	2	20.8	20.5	20.6	20.9	20.9
			100	0	2	20.8	20.5	20.7	21.0	20.9
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)				
						2503.5 MHz	2548.3 MHz	2593 MHz	2637.8 MHz	2682.5 MHz
LTE Band 41	15	QPSK	1	0	0	23.0	22.8	22.8	23.1	22.9
			1	37	0	23.0	22.7	22.9	23.1	21.8
			1	74	0	22.9	22.7	22.8	23.1	23.0
			36	0	1	21.9	21.6	21.7	22.0	21.9
			36	20	1	21.9	21.6	21.7	22.0	21.8
			36	39	1	21.9	21.5	21.6	22.0	21.8
			75	0	1	21.9	21.5	21.7	22.0	21.9
		16QAM	1	0	1	21.7	21.6	21.9	22.1	21.6
			1	37	1	21.5	21.7	21.7	22.5	21.6
			1	74	1	21.6	21.7	21.5	22.5	21.8
			36	0	2	20.9	20.7	20.7	21.0	20.8
			36	20	2	20.9	20.6	20.8	21.1	20.8
			36	39	2	20.9	20.4	20.6	21.0	20.8
			75	0	2	20.9	20.5	20.6	21.0	20.8
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)				
						2501 MHz	2547 MHz	2593 MHz	2639 MHz	2685 MHz
LTE Band 41	10	QPSK	1	0	0	23.1	22.7	22.9	23.1	22.8
			1	25	0	23.1	22.7	22.8	23.1	22.9
			1	49	0	23.1	22.7	22.9	23.1	22.9
			25	0	1	21.9	21.6	21.8	21.9	21.8
			25	12	1	22.0	21.7	21.8	22.1	21.8
			25	25	1	21.9	21.6	21.7	22.0	21.8
			50	0	1	21.9	21.6	21.7	22.0	21.9
		16QAM	1	0	1	22.0	21.6	21.8	22.0	22.0
			1	25	1	21.9	21.5	21.8	22.0	21.8
			1	49	1	21.9	21.6	21.9	22.1	21.9
			25	0	2	20.9	20.6	20.7	20.9	20.9
			25	12	2	21.0	20.6	20.8	21.0	20.9
			25	25	2	20.9	20.6	20.7	21.0	20.8
			50	0	2	20.9	20.6	20.8	21.0	20.8

LTE Band 41 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)				
						2498.5 MHz	2545.8 MHz	2593 MHz	2640.3 MHz	2687.5 MHz
LTE Band 41	5	QPSK	1	0	0	23.3	22.7	22.8	23.1	22.9
			1	12	0	23.1	22.7	22.8	23.1	22.8
			1	24	0	23.2	22.7	22.7	23.1	23.0
			12	0	1	22.0	21.6	21.7	22.0	21.8
			12	7	1	22.0	21.7	21.7	22.0	21.8
			12	13	1	22.0	21.6	21.6	22.0	21.7
			25	0	1	21.9	21.6	21.6	22.0	21.8
		16QAM	1	0	1	22.0	21.9	22.1	22.3	22.2
			1	12	1	21.9	22.0	21.9	22.2	22.2
			1	24	1	21.9	21.8	22.0	22.4	22.3
			12	0	2	20.8	20.5	20.6	20.9	20.8
			12	7	2	20.8	20.6	20.7	20.9	20.7
			12	13	2	20.9	20.5	20.6	20.9	20.7
			25	0	2	20.9	20.6	20.6	20.8	20.8

9.4. Wi-Fi 2.4GHz (DTS Band)

SISO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Chain 0	Chain 1	Max Output Power (dBm)	SAR Test (Yes/No)
					Avg Pwr (dBm) (dBm)	Avg Pwr (dBm) (dBm)		
2.4	802.11b	1 Mbps	1	2412	15.1	15.0	15.5	Yes
			6	2437	15.1	15.0		
			11	2462	15.1	15.0		
	802.11g	6 Mbps	1	2412	Not Required	Not Required	12.5	No
			6	2437				
			11	2462				
	802.11n (HT20)	6.5 Mbps	1	2412			10.5	No
			6	2437				
			11	2462				

MIMO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Chain 0	Chain 1	Chain 0 + Chain 1	Max Output Power (dBm)	SAR Test (Yes/No)
					Avg Pwr (dBm)	Avg Pwr (dBm)	Avg Pwr MIMO (dBm)		
2.4	802.11n (HT20)	6.5 Mbps	1	2412	10.3	10.5	13.4	13.5	No
			6	2437	9.7	10.3	13.0		
			11	2462	9.8	9.5	12.7		

Note(s):

- Output Power and SAR is not required for 802.11g/n HT20 channels 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 ≤ 1.2 W/kg.

9.5. Wi-Fi 5GHz (U-NII Bands)

SISO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Chain 0	Chain 1	Max Output Power (dBm)	SAR Test (Yes/No)
					Avg Pwr (dBm)	Avg Pwr (dBm)		
5.2 (U-NII 1)	802.11a	6 Mbps	36	5180	12.0	11.8	12.5	No
			40	5200	12.0	11.8		
			44	5220	12.0	11.9		
			48	5240	12.0	11.9		
	802.11n (HT20)	6.5 Mbps	36 ~ 48	5180 ~ 5240	Not Required	Not Required	11.5	No
	802.11n (HT40)	13.5 Mbps	38 ~ 46	5190 ~ 5230			9.5	No
	802.11ac (VHT20)	6.5 Mbps	36 ~ 48	5180 ~ 5240			11.5	No
	802.11ac (VHT40)	13.5 Mbps	38 ~ 46	5190 ~ 5230			9.5	No
	802.11ac (VHT80)	29.3 Mbps	42	5210			9.5	No
5.3 UNII-2A	802.11a	6 Mbps	52	5260	12.2	12.0	12.5	No
			56	5280	12.0	12.0		
			60	5300	12.0	12.0		
			64	5320	12.0	12.0		
	802.11n (HT20)	6.5 Mbps	52 ~ 64	5260 ~ 5320	Not Required	Not Required	11.5	No
	802.11n (HT40)	13.5 Mbps	54 ~ 62	5270 ~ 5310			9.5	No
	802.11ac (VHT20)	6.5 Mbps	52 ~ 64	5260 ~ 5320			11.5	No
	802.11ac (VHT40)	13.5 Mbps	54 ~ 62	5270 ~ 5310			9.5	No
	802.11ac (VHT80)	29.3 Mbps	58	5290			9.5	No
5.5 UNII-2C	802.11a	6 Mbps	100	5500	12.0	12.3	12.5	No
			104	5520	12.0	11.7		
			108	5540	12.0	11.8		
			112	5560	12.0	12.0		
			116	5580	11.7	12.0		
			120	5600	11.6	12.1		
			124	5620	11.5	11.7		
			128	5640	12.5	12.0		
			132	5660	12.3	12.0		
			136	5680	12.2	12.0		
			140	5700	12.4	12.2		
	802.11n (HT20)	6.5 Mbps	100 ~ 144	5500 ~ 5720	Not Required	Not Required	11.5	No
	802.11n (HT40)	13.5 Mbps	102 ~ 142	5510 ~ 5710			9.5	No
	802.11ac (VHT20)	6.5 Mbps	100 ~ 144	5500 ~ 5720			11.5	No
	802.11ac (VHT40)	13.5 Mbps	102 ~ 142	5510 ~ 5710			9.5	No
	802.11ac (VHT80)	29.3 Mbps	106 ~ 138	5530 ~ 5690			9.5	No

Wi-Fi 5GHz SISO Measured Results (continued)

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Chain 0	Chain 1	Max Output Power (dBm)	SAR Test (Yes/No)
					Avg Pwr (dBm)	Avg Pwr (dBm)		
5.8 UNII-3 or §15.247	802.11a	6 Mbps	149	5745	12.4	12.3	12.5	No
			153	5765	12.3	12.2		
			157	5785	12.2	12.1		
			161	5805	12.1	12.0		
			165	5825	12.1	11.9		
	802.11n (HT20)	6.5 Mbps	149 ~ 165	5745 ~ 5825	Not Required	Not Required	11.5	No
	802.11n (HT40)	13.5 Mbps	151 ~ 159	5755 ~ 5795			9.5	No
	802.11ac (VHT20)	6.5 Mbps	149 ~ 165	5745 ~ 5825			11.5	No
	802.11ac (VHT40)	13.5 Mbps	151 ~ 159	5755 ~ 5795			9.5	No
	802.11ac (VHT80)	29.3 Mbps	155	5775			9.5	No

MIMO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Chain 0	Chain 1	Chain 0 + Chain 1	Max Output Power (dBm)	SAR Test (Yes/No)
					Avg Pwr (dBm)	Avg Pwr (dBm)	Avg Pwr (dBm)		
5.2 (U-NII 1)	802.11n (HT20)	6.5 Mbps	36	5180	11.2	10.8	14.0	14.5	Yes
			40	5200	11.2	11.0	14.1		
			44	5220	11.0	11.1	14.0		
			48	5240	11.0	11.3	14.1		
	802.11n (HT40)	13.5 Mbps	38 ~ 46	5190 ~ 5230	Not Required	Not Required	Not Required	12.5	No
	802.11ac (VHT20)	6.5 Mbps	36 ~ 48	5180 ~ 5240				14.5	No
	802.11ac (VHT40)	13.5 Mbps	38 ~ 46	5190 ~ 5230				12.5	No
	802.11ac (VHT80)	29.3 Mbps	42	5210				12.5	No
5.3 UNII-2A	802.11n (HT20)	6.5 Mbps	52	5260	11.3	11.3	14.3	14.5	Yes
			56	5280	11.3	11.1	14.2		
			60	5300	11.2	11.0	14.1		
			64	5320	11.1	11.4	14.2		
	802.11n (HT40)	13.5 Mbps	54 ~ 62	5270 ~ 5310	Not Required	Not Required	Not Required	12.5	No
	802.11ac (VHT20)	6.5 Mbps	52 ~ 64	5260 ~ 5320				14.5	No
	802.11ac (VHT40)	13.5 Mbps	54 ~ 62	5270 ~ 5310				12.5	No
	802.11ac (VHT80)	29.3 Mbps	58	5290				12.5	No
5.5 UNII-2C	802.11n (HT20)	6.5 Mbps	100	5500	11.5	11.0	14.2	14.5	Yes
			104	5520	11.5	10.8	14.2		
			108	5540	11.2	10.9	14.1		
			112	5560	11.2	10.8	14.0		
			116	5580	11.2	10.8	14.0		
			120	5600	11.0	10.7	13.9		
			124	5620	11.0	10.7	13.9		
			128	5640	11.1	10.8	13.9		
			132	5660	11.0	10.7	13.8		
			136	5680	10.9	10.7	13.8		
			140	5700	10.8	10.6	13.7		
	802.11n (HT40)	13.5 Mbps	102 ~ 142	5510 ~ 5710	Not Required	Not Required	Not Required	12.5	No
	802.11ac (VHT20)	6.5 Mbps	100 ~ 144	5500 ~ 5720				14.5	No
	802.11ac (VHT40)	13.5 Mbps	102 ~ 142	5510 ~ 5710				12.5	No
	802.11ac (VHT80)	29.3 Mbps	106 ~ 138	5530 ~ 5690				12.5	No
5.8 UNII-3C or S15.247	802.11n (HT20)	6.5 Mbps	149	5745	11.1	10.5	13.8	14.5	Yes
			153	5765	11.1	10.2	13.7		
			157	5785	10.7	10.3	13.5		
			161	5805	10.9	10.3	13.6		
			165	5825	10.4	10.0	13.2		
	802.11n (HT40)	13.5 Mbps	151 ~ 159	5755 ~ 5795	Not Required	Not Required	Not Required	12.5	No
	802.11ac (VHT20)	6.5 Mbps	149 ~ 165	5745 ~ 5825				14.5	No
	802.11ac (VHT40)	13.5 Mbps	151 ~ 159	5755 ~ 5795				12.5	No
	802.11ac (VHT80)	29.3 Mbps	155	5775				12.5	No

Note(s):

- Output Power and SAR measurement is not required for 802.11n HT20/HT40/HT80 channels when the specified tune-up tolerances for 802.11n HT20/HT40/HT80 are lower than 802.11a by more than ½ dB and the measured SAR is ≤ 1.2 W/Kg.
- When the same transmission mode configurations have the same maximum output power on the same channel for the 802.11 a/g/n/ac modes, the channel in the lower order/sequence 802.11 mode (i.e. a, g, n then ac) is selected.
- When the specified maximum output power is the same for both UNII band I and UNII band 2A, begin SAR measurement in UNII band 2A; and if the highest reported SAR for UNII band 2A is
 - ≤ 1.2 W/kg, SAR is not required for UNII band I
 - > 1.2 W/kg, both bands should be tested independently for SAR.
- The worst-case configuration and mode for SAR testing is determined to be as follows : MIMO Mode

9.6. Bluetooth

Maximum tune-up tolerance limit is 10.5 dBm from the rated nominal maximum output power. This power level qualifies for exclusion of SAR testing.

10. Measured and Reported (Scaled) SAR 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:

- ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
- ≤ 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
- ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 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.

Additional 1-g SAR testing at 5 mm is not required. For hotspot mode, 10-g extremity SAR is not required for the surfaces and edges since all 1-g reported SAR < 1.2 W/kg. (for Phablet only)

KDB 941225 D01 SAR test for 3G devices:

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 ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode

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 meas for 802.11 v02:

SAR test reduction for 802.11 Wi-Fi transmission mode configurations are considered separately for DSSS and OFDM. An initial test position is determined to reduce the number of tests required for certain exposure configurations with multiple test positions. An initial test configuration is determined for each frequency band and aggregated band according to maximum output power, channel bandwidth, wireless mode configurations and other operating parameters to streamline the measurement requirements. For 2.4 GHz DSSS, either the initial test position or DSSS procedure is applied to reduce the number of SAR tests; these are mutually exclusive. For OFDM, an initial test position is only applicable to next to the ear, UMPC mini-tablet and hotspot mode configurations, which is tested using the initial test configuration to facilitate test reduction. For other exposure conditions with a fixed test position, SAR test reduction is determined using only the initial test configuration.

The multiple test positions require SAR measurements in head, hotspot mode or UMPC mini-tablet configurations may be reduced according to the highest reported SAR determined using the initial test position(s) by applying the DSSS or OFDM SAR measurement procedures in the required wireless mode test configuration(s). The initial test position(s) is measured using the highest measured maximum output power channel in the required wireless mode test configuration(s). When the reported SAR for the initial test position is:

- ≤ 0.4 W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and wireless mode combination within the frequency band or aggregated band. DSSS and OFDM configurations are considered separately according to the required SAR procedures.

- > 0.4 W/kg, SAR is repeated using the same wireless mode test configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position, on the highest maximum output power channel, until the reported SAR is ≤ 0.8 W/kg or all required test positions are tested.
 - For subsequent test positions with equivalent test separation distance or when exposure is dominated by coupling conditions, the position for maximum coupling condition should be tested.
 - When it is unclear, all equivalent conditions must be tested.
- For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is > 0.8 W/kg, measure the SAR for these positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required test channels are considered.
 - The additional power measurements required for this step should be limited to those necessary for identifying subsequent highest output power channels to apply the test reduction.
- When the specified maximum output power is the same for both UNII 1 and UNII 2A, begin SAR measurements in UNII 2A with the channel with the highest measured output power. If the reported SAR for UNII 2A is ≤ 1.2 W/kg, SAR is not required for UNII 1; otherwise treat the remaining bands separately and test them independently for SAR.
- When the specified maximum output power is different between UNII 1 and UNII 2A, begin SAR with the band that has the higher specified maximum output. If the highest reported SAR for the band with the highest specified power is ≤ 1.2 W/kg, testing for the band with the lower specified output power is not required; otherwise test the remaining bands independently for SAR.

To determine the initial test position, Area Scans were performed to determine the position with the *Maximum Value of SAR (measured)*. The position that produced the highest *Maximum Value of SAR* is considered the worst case position; thus used as the initial test position.

10.1. GSM850

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	Voice	0	Left Touch	190	836.6	33.5	33.5	0.181	0.181	
			Left Tilt	190	836.6	33.5	33.5	0.115	0.115	
			Right Touch	190	836.6	33.5	33.5	0.242	0.242	
			Right Tilt	190	836.6	33.5	33.5	0.118	0.118	
Head VoIP	GPRS 3 Slots	0	Left Touch	190	836.6	30.0	29.9	0.227	0.235	
			Left Tilt	190	836.6	30.0	29.9	0.130	0.134	
			Right Touch	190	836.6	30.0	29.9	0.335	0.346	1
			Right Tilt	190	836.6	30.0	29.9	0.154	0.159	
Body-worn	Voice	10	Rear	190	836.6	33.5	33.5	0.626	0.627	
			Front	190	836.6	33.5	33.5	0.579	0.580	
Body-worn(VoIP) & Hotspot	GPRS 3 Slots	10	Rear	128	824.2	30.0	29.9	0.756	0.773	
				190	836.6	30.0	29.9	0.814	0.841	2
				251	848.8	30.0	30.0	0.808	0.812	
			Front	190	836.6	30.0	29.9	0.780	0.806	
Hotspot			Edge 3	190	836.6	30.0	29.9	0.430	0.444	

10.2. GSM1900

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	Voice	0	Left Touch	661	1880.0	30.5	30.4	0.060	0.061	
			Left Tilt	661	1880.0	30.5	30.4	0.024	0.025	
			Right Touch	661	1880.0	30.5	30.4	0.034	0.035	
			Right Tilt	661	1880.0	30.5	30.4	0.025	0.025	
Head VoIP	GPRS 3 Slots	0	Left Touch	661	1880.0	26.5	26.2	0.069	0.073	3
			Left Tilt	661	1880.0	26.5	26.2	0.024	0.026	
			Right Touch	661	1880.0	26.5	26.2	0.037	0.039	
			Right Tilt	661	1880.0	26.5	26.2	0.026	0.028	
Body-worn	Voice	10	Rear	512	1850.2	30.5	30.5	0.970	0.970	
				661	1880.0	30.5	30.4	1.050	1.077	
				810	1909.8	30.5	30.3	1.040	1.089	4
			Front	512	1850.2	30.5	30.5	0.890	0.890	
				661	1880.0	30.5	30.4	0.968	0.993	
				810	1909.8	30.5	30.3	1.020	1.068	
Body-worn(VoIP) & Hotspot	GPRS 3 Slots	10	Rear	661	1880.0	26.5	26.2	0.700	0.747	
			Front	512	1850.2	26.5	26.5	0.837	0.837	
				661	1880.0	26.5	26.2	0.803	0.857	
				810	1909.8	26.5	26.0	0.971	1.089	
Hotspot			Edge 3	661	1880.0	26.5	26.2	0.658	0.702	

10.3. W-CDMA Band V

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	Rel 99 RMC	0	Left Touch	4183	836.6	23.5	23.0	0.138	0.154	
			Left Tilt	4183	836.6	23.5	23.0	0.114	0.127	
			Right Touch	4183	836.6	23.5	23.0	0.208	0.232	5
			Right Tilt	4183	836.6	23.5	23.0	0.104	0.116	
Body-worn & Hptspot	Rel 99 RMC	10	Rear	4183	836.6	23.5	23.0	0.541	0.602	6
			Front	4183	836.6	23.5	23.0	0.519	0.578	
Hotspot	Rel 99 RMC	10	Edge 3	4183	836.6	23.5	23.0	0.272	0.303	

10.4. W-CDMA Band II

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	Rel 99 RMC	0	Left Touch	9400	1880.0	22.5	22.0	0.117	0.132	7
			Left Tilt	9400	1880.0	22.5	22.0	0.046	0.051	
			Right Touch	9400	1880.0	22.5	22.0	0.058	0.066	
			Right Tilt	9400	1880.0	22.5	22.0	0.046	0.052	
Body-worn	Rel 99 RMC	15	Rear	9400	1880.0	22.5	22.0	0.384	0.434	
			Front	9400	1880.0	22.5	22.0	0.422	0.477	
Hotspot	Rel 99 RMC	10	Rear	9400	1880.0	19.5	19.3	0.543	0.563	8
			Front	9400	1880.0	19.5	19.3	0.499	0.518	
			Edge 3	9400	1880.0	19.5	19.3	0.416	0.432	

10.5. LTE Band 2 (20MHz Bandwidth)

SAR for LTE Band 2 is covered by LTE Band 25 due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

10.6. LTE Band 4 (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	20175	1732.5	1	49	22.5	22.2	0.116	0.124	9
						50	24	21.5	20.9	0.095	0.109	
			Left Tilt	20175	1732.5	1	49	22.5	22.2	0.063	0.068	
						50	24	21.5	20.9	0.047	0.054	
			Right Touch	20175	1732.5	1	49	22.5	22.2	0.100	0.107	
						50	24	21.5	20.9	0.076	0.087	
Body-worn	QPSK	15	Rear	20175	1732.5	1	49	22.5	22.2	0.413	0.443	
						50	24	21.5	20.9	0.313	0.359	
			Front	20175	1732.5	1	49	22.5	22.2	0.390	0.418	
						50	24	21.5	20.9	0.299	0.343	
Hotspot	QPSK	10	Rear	20175	1732.5	1	49	19.5	19.5	0.748	0.755	10
						50	24	19.5	19.4	0.743	0.756	
			Front	20175	1732.5	1	49	19.5	19.5	0.583	0.589	
						50	24	19.5	19.4	0.586	0.596	
			Edge 3	20175	1732.5	1	49	19.5	19.5	0.531	0.536	
						50	24	19.5	19.4	0.525	0.534	

10.7. LTE Band 5 (10MHz Bandwidth)

SAR for LTE Band 5 is covered by LTE Band 26 due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

10.8. LTE Band 12 (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	23095	707.5	1	0	23.5	23.1	0.075	0.082	
						25	0	22.5	21.9	0.057	0.065	
			Left Tilt	23095	707.5	1	0	23.5	23.1	0.068	0.074	
						25	0	22.5	21.9	0.050	0.057	
			Right Touch	23095	707.5	1	0	23.5	23.1	0.105	0.115	11
						25	0	22.5	21.9	0.081	0.094	
Body-worn & Hotspot	QPSK	10	Rear	23095	707.5	1	0	23.5	23.1	0.467	0.509	
						25	0	22.5	21.9	0.359	0.413	
			Front	23095	707.5	1	0	23.5	23.1	0.472	0.515	12
						25	0	22.5	21.9	0.364	0.419	
Hotspot	QPSK	10	Edge 3	23095	707.5	1	0	23.5	23.1	0.213	0.232	
						25	0	22.5	21.9	0.162	0.186	

10.9. LTE Band 17 (10MHz Bandwidth)

SAR for LTE Band 17 is covered by LTE Band 12 due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

10.10. LTE Band 25 (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	26365	1882.5	1	49	22.5	22.2	0.156	0.166	13
						50	24	21.5	20.9	0.127	0.146	
			Left Tilt	26365	1882.5	1	49	22.5	22.2	0.064	0.068	
						50	24	21.5	20.9	0.052	0.060	
			Right Touch	26365	1882.5	1	49	22.5	22.2	0.117	0.124	
						50	24	21.5	20.9	0.079	0.091	
			Right Tilt	26365	1882.5	1	49	22.5	22.2	0.070	0.074	
						50	24	21.5	20.9	0.053	0.062	
Body-worn	QPSK	15	Rear	26365	1882.5	1	49	22.5	22.2	0.388	0.412	
						50	24	21.5	20.9	0.303	0.349	
			Front	26365	1882.5	1	49	22.5	22.2	0.415	0.441	
						50	24	21.5	20.9	0.319	0.368	
Hotspot	QPSK	10	Rear	26365	1882.5	1	49	19.5	19.2	0.606	0.649	14
						50	24	19.5	19.0	0.575	0.639	
			Front	26365	1882.5	1	49	19.5	19.2	0.546	0.585	
						50	24	19.5	19.0	0.536	0.596	
			Edge 3	26365	1882.5	1	49	19.5	19.2	0.439	0.470	
						50	24	19.5	19.0	0.422	0.469	

10.11. LTE Band 26 (15MHz 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	23.5	23.2	0.170	0.181	15
						36	0	22.5	22.0	0.123	0.138	
			Left Tilt	26865	831.5	1	0	23.5	23.2	0.113	0.120	
						36	0	22.5	22.0	0.081	0.090	
			Right Touch	26865	831.5	1	0	23.5	23.2	0.287	0.305	
						36	0	22.5	22.0	0.206	0.231	
			Right Tilt	26865	831.5	1	0	23.5	23.2	0.026	0.027	
						36	0	22.5	22.0	0.017	0.019	
Body-worn & Hotspot	QPSK	10	Rear	26865	831.5	1	0	23.5	23.2	0.538	0.572	16
						36	0	22.5	22.0	0.402	0.451	
			Front	26865	831.5	1	0	23.5	23.2	0.542	0.577	
						36	0	22.5	22.0	0.399	0.448	
Hotspot	QPSK	10	Edge 3	26865	831.5	1	0	23.5	23.2	0.275	0.293	
						36	0	23.5	22.0	0.207	0.292	

10.12. 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	99	23.5	22.9	0.042	0.048	17
						50	24	22.5	21.7	0.033	0.039	
			Left Tilt	40620	2593.0	1	99	23.5	22.9	0.017	0.020	
						50	24	22.5	21.7	0.014	0.016	
			Right Touch	40620	2593.0	1	99	23.5	22.9	0.026	0.029	
						50	24	22.5	21.7	0.020	0.024	
Body-worn & Hotspot	QPSK	10	Rear	40620	2593.0	1	99	23.5	22.9	0.272	0.309	
						50	24	22.5	21.7	0.219	0.261	
			Front	40620	2593.0	1	99	23.5	22.9	0.283	0.322	
						50	24	22.5	21.7	0.228	0.272	
Hotspot	QPSK	10	Edge 3	40620	2593.0	1	99	23.5	22.9	0.525	0.597	18
						50	24	22.5	21.7	0.435	0.519	
			Edge 4	40620	2593.0	1	99	23.5	22.9	0.137	0.156	
						50	24	22.5	21.7	0.113	0.135	

10.13. Wi-Fi (DTS Band)

SISO Chain 0 Measured Results

Mode	RF Exposure Conditions	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up limit	Meas.	Meas.	Scaled	
802.11b 1 Mbps	Head	0	Left Touch	6	2437.0	0.318	15.5	14.9			
			Left Tilt	6	2437.0	0.291	15.5	14.9			
			Right Touch	6	2437.0	0.481	15.5	14.9	0.345	0.394	
			Right Tilt	6	2437.0	0.346	15.5	14.9			
	Body-worn & Hotspot & Wi-Fi Direct	10	Rear	6	2437.0	0.180	15.5	14.9			
			Front	6	2437.0	0.195	15.5	14.9	0.147	0.168	
			Edge 1	6	2437.0	0.089	15.5	14.9			
			Edge 4	6	2437.0	0.084	15.5	14.9			

SISO Chain 1 Measured Results

Mode	RF Exposure Conditions	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up limit	Meas.	Meas.	Scaled	
802.11b 1 Mbps	Head	0	Left Touch	6	2437.0	0.316	15.5	15.0	0.258	0.290	
			Left Tilt	6	2437.0	0.291	15.5	15.0			
			Right Touch	6	2437.0	0.584	15.5	15.0	0.381	0.428	
			Right Tilt	6	2437.0	0.645	15.5	15.0	0.387	0.435	19
	Body-worn & Hotspot & Wi-Fi Direct	10	Rear	6	2437.0	0.179	15.5	15.0	0.160	0.180	20
			Front	6	2437.0	0.136	15.5	15.0			
			Edge 1	6	2437.0	0.083	15.5	15.0			
			Edge 4	6	2437.0	0.105	15.5	15.0			

Note(s):

1. Highest reported SAR is ≤ 0.4 W/kg. Therefore, further SAR measurements within this exposure condition are not required.
2. Highest reported SAR is > 0.4 W/kg. Due to the highest reported SAR for this test position, other test positions in Head exposure condition were evaluated until a SAR ≤ 0.8 W/kg was reported.
3. Testing for a second channel was required because the reported SAR for this test position was > 0.8 W/kg.
4. Additional testing required in order satisfying FCC simultaneous transmission limit criteria.

10.14. Wi-Fi (U-NII Band)

SISO Measured Results

Frequency Band	Mode	RF Exposure Conditions	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Chain 0						Chain 1						Plot No.
							Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)				
								Tune-up limit	Meas.	Meas.	Scaled		Tune-up limit	Meas.	Meas.	Scaled			
5.3 GHz U-NII 2A	802.11n 6.5 Mbps	Head	0	Left Touch	52	5260.0	0.017	12.5	12.2			0.313	12.5	12.0					
				Left Tilt	52	5260.0	0.015	12.5	12.2			0.366	12.5	12.0					
				Right Touch	52	5260.0	0.067	12.5	12.2	0.050	0.054	0.628	12.5	12.0	0.346	0.388	21		
				Right Tilt	52	5260.0	0.061	12.5	12.2			0.624	12.5	12.0					
		Body-worn	10	Rear	52	5260.0	0.004	12.5	12.2			0.044	12.5	12.0					
				Front	52	5260.0	0.002	12.5	12.2	<0.001	<0.001	0.091	12.5	12.0	0.045	0.050	22		
Frequency Band	Mode	RF Exposure Conditions	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Chain 0				Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Chain 1		Plot No.		
								Tune-up limit	Meas.	Meas.	Scaled				Tune-up limit	Meas.		Meas.	Scaled
5.5 GHz U-NII 2C	802.11n 6.5 Mbps	Head	0	Left Touch	128	5640.0	0.004	12.5	12.5			100	5500.0	0.357	12.5	12.3			
				Left Tilt	128	5640.0	0.007	12.5	12.5	<0.001	<0.001	100	5500.0	0.317	12.5	12.3			
				Right Touch	128	5640.0	0.007	12.5	12.5			100	5500.0	0.585	12.5	12.3	0.309	0.324	23
				Right Tilt	128	5640.0	0.004	12.5	12.5			100	5500.0	0.548	12.5	12.3			
		Body-worn	10	Rear	128	5640.0	0.001	12.5	12.5			100	5500.0	0.047	12.5	12.3			
				Front	128	5640.0	0.003	12.5	12.5	<0.001	<0.001	100	5500.0	0.149	12.5	12.3	0.056	0.059	24
Frequency Band	Mode	RF Exposure Conditions	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Chain 0				Area Scan Max. SAR (W/kg)	Chain 1		Plot No.				
								Tune-up limit	Meas.	Meas.	Scaled		Tune-up limit	Meas.		Meas.	Scaled		
5.8 GHz U-NII 3	802.11n 13.5 Mbps	Head	0	Left Touch	149	5745.0	0.005	12.5	12.4			0.250	12.5	12.3					
				Left Tilt	149	5745.0	0.007	12.5	12.42	<0.001	<0.001	0.257	12.5	12.3					
				Right Touch	149	5745.0	0.005	12.5	12.42			0.519	12.5	12.3	0.364	0.386	25		
				Right Tilt	149	5745.0	0.004	12.5	12.42			0.466	12.5	12.3					
		Body-worn & Hotspot & Wi-Fi Direct	10	Rear	149	5745.0	0.001	12.5	12.42			0.017	12.5	12.3					
				Front	149	5745.0	0.002	12.5	12.42			0.103	12.5	12.3	0.046	0.049	26		
				Edge 1	149	5745.0	0.000	12.5	12.42			0.067	12.5	12.3					
				Edge 4	149	5745.0	0.004	12.5	12.42	<0.001	<0.001	0.005	12.5	12.3					

MIMO Measured Results

Frequency Band	Mode	RF Exposure Conditions	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		Chain 0		Power (dBm)		Chain 1		Plot No.
								Tune-up limit	Meas.	1-g SAR (W/kg)		Tune-up limit	Meas.	1-g SAR (W/kg)		
										Meas.	Scaled			Meas.	Scaled	
5.3 GHz U-NII 2A	802.11n 6.5 Mbps	Head	0	Left Touch	52	5260.0	0.362	11.5	11.3			11.5	11.3			
				Left Tilt	52	5260.0	0.286	11.5	11.3			11.5	11.3			
				Right Touch	52	5260.0	0.613	11.5	11.3	0.377	0.395	11.5	11.3	0.377	0.392	27
				Right Tilt	52	5260.0	0.487	11.5	11.3			11.5	11.3			
		Body-worn	10	Rear	52	5260.0	0.028	11.5	11.3			11.5	11.3			
				Front	52	5260.0	0.075	11.5	11.3	0.027	0.028	11.5	11.3	0.027	0.028	28
Frequency Band	Mode	RF Exposure Conditions	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		Chain 0		Power (dBm)		Chain 1		Plot No.
								Tune-up limit	Meas.	1-g SAR (W/kg)		Tune-up limit	Meas.	1-g SAR (W/kg)		
										Meas.	Scaled			Meas.	Scaled	
5.5 GHz U-NII 2C	802.11n 6.5 Mbps	Head	0	Left Touch	100	5500.0	0.303	11.5	11.5			11.5	11.0			
				Left Tilt	100	5500.0	0.284	11.5	11.5			11.5	11.0			
				Right Touch	100	5500.0	0.470	11.5	11.5	0.251	0.254	11.5	11.0	0.251	0.284	29
				Right Tilt	100	5500.0	0.456	11.5	11.5			11.5	11.0			
		Body-worn	10	Rear	100	5500.0	0.075	11.5	11.5			11.5	11.0			
				Front	100	5500.0	0.164	11.5	11.5	0.061	0.062	11.5	11.0	0.061	0.069	30
Frequency Band	Mode	RF Exposure Conditions	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		Chain 0		Power (dBm)		Chain 1		Plot No.
								Tune-up limit	Meas.	1-g SAR (W/kg)		Tune-up limit	Meas.	1-g SAR (W/kg)		
										Meas.	Scaled			Meas.	Scaled	
5.8 GHz U-NII 3	802.11n 13.5 Mbps	Head	0	Left Touch	149	5745.0	0.474	11.5	11.1	0.278	0.305	11.5	10.5	0.278	0.350	
				Left Tilt	149	5745.0	0.456	11.5	11.1			11.5	10.5			
				Right Touch	149	5745.0	0.632	11.5	11.1	0.384	0.421	11.5	10.5	0.384	0.483	31
				Right Tilt	149	5745.0	0.621	11.5	11.1	0.332	0.364	11.5	10.5	0.332	0.418	
		Body-worn & Hotspot & Wi-Fi Direct	10	Rear	151	5755.0	0.017	11.5	11.1			11.5	10.5			
				Front	151	5755.0	0.073	11.5	11.1	0.035	0.038	11.5	10.5	0.035	0.044	32
				Edge 1	151	5755.0	0.025	11.5	11.1			11.5	10.5			
				Edge 4	151	5755.0	0.011	11.5	11.1			11.5	10.5			

Note(s):

1. Highest reported SAR is ≤ 0.4 W/kg. Therefore, further SAR measurements within this exposure condition are not required.
2. Highest reported SAR is > 0.4 W/kg. Due to the highest reported SAR for this test position, other test positions in Head exposure condition were evaluated until a SAR ≤ 0.8 W/kg was reported.
3. Testing for a second channel was required because the reported SAR for this test position was > 0.8 W/kg.
4. Additional testing required in order satisfying FCC simultaneous transmission limit criteria.

10.15. Bluetooth

Standalone SAR Test Exclusion Considerations & Estimated SAR

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 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 ≤ 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 ≤ 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.

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:

- $(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm}) \cdot [\sqrt{f_{(\text{GHz})}/x}] \text{ W/kg}$ for test separation distances ≤ 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.

Body-worn Accessory Exposure Conditions

Max. tune-up tolerance limit		Min. test separation distance (mm)	Frequency (GHz)	SAR test exclusion Result*	Test Configuration	Estimated 1-g SAR (W/kg)
(dBm)	(mW)					
10.5	11	10	2.480	1.7	Rear/Front	0.231

Conclusion:

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

11. SAR Measurement Variability

In accordance with published RF Exposure KDB 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 .

Frequency Band (MHz)	Air Interface	RF Exposure Conditions	Test Position	Repeated SAR (Yes/No)	Highest Measured SAR (W/kg)	Repeated Measured SAR (W/kg)	Largest to Smallest SAR Ratio
700	LTE Band 12	Body & Hotspot	Front	No	0.472	N/A	N/A
850	GSM 850	Body & Hotspot	Rear	Yes	0.814	0.843	1.04
	WCDMA Band V	Body & Hotspot	Rear	No	0.541	N/A	N/A
	LTE Band 26	Body & Hotspot	Front	No	0.542	N/A	N/A
1900	GSM 1900	Body	Rear	Yes	1.05	1.03	1.02
	WCDMA Band II	Hotspot	Rear	No	0.543	N/A	N/A
	LTE Band 25	Hotspot	Rear	No	0.606	N/A	N/A
1700	LTE Band 4	Hotspot	Rear	No	0.748	N/A	N/A
2400	Wi-Fi 802.11b/g/n	Head	Right Tilt	No	0.387	N/A	N/A
2600	LTE Band 41	Hotspot	Edge 3	No	0.525	N/A	N/A
5300	Wi-Fi 802.11a/n/ac	Head	Right Touch	No	0.377	N/A	N/A
5500	Wi-Fi 802.11a/n/ac	Head	Right Touch	No	0.251	N/A	N/A
5800	Wi-Fi 802.11a/n/ac	Head	Right Touch	No	0.384	N/A	N/A

Note(s):

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 .

12. 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:

SAR₁ is the highest measured or estimated SAR for the first of a pair of simultaneous transmitting antennas, in a specific test operating mode and exposure condition

SAR₂ is the highest measured 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 of $[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$

In order for a pair of simultaneous 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:

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

Simultaneous Transmission Condition

RF Exposure Condition	Item	Capable Transmit Configurations			
Head	1	GSM(Voice)	+	DTS	
	2	GSM(Voice)	+	U-NII	
	3	GSM(Voice)	+	DTS	+
	4	GSM(GPRS/EDGE)	+	DTS	
	5	GSM(GPRS/EDGE)	+	U-NII	
	6	GSM(GPRS/EDGE)	+	DTS	+
	7	W-CDMA	+	DTS	
	8	W-CDMA	+	U-NII	
	9	W-CDMA	+	DTS	+
	10	LTE	+	DTS	
	11	LTE	+	U-NII	
	12	LTE	+	DTS	+
Body-worn	13	GSM(Voice)	+	DTS	
	14	GSM(Voice)	+	U-NII	
	15	GSM(Voice)	+	BT	
	16	GSM(Voice)	+	DTS	+
	17	GSM(GPRS/EDGE)	+	DTS	
	18	GSM(GPRS/EDGE)	+	U-NII	
	19	GSM(GPRS/EDGE)	+	BT	
	20	GSM(GPRS/EDGE)	+	DTS	+
	21	W-CDMA	+	DTS	
	22	W-CDMA	+	U-NII	
	23	W-CDMA	+	BT	
	24	W-CDMA	+	DTS	+
	25	LTE	+	DTS	
	26	LTE	+	U-NII	
	27	LTE	+	BT	
	28	LTE	+	DTS	+
Hotspot & Wi-Fi Direct	29	GSM(GPRS/EDGE)	+	DTS	
	30	GSM(GPRS/EDGE)	+	U-NII	
	31	GSM(GPRS/EDGE)	+	DTS	+
	32	W-CDMA	+	DTS	
	33	W-CDMA	+	U-NII	
	34	W-CDMA	+	DTS	+
	35	LTE	+	DTS	
	36	LTE	+	U-NII	
	37	LTE	+	DTS	+

Notes:

1. DTS, U-NII supports Hotspot.
2. GPRS/EDGE, W-CDMA, LTE support Hotspot.
3. VoIP is supported in GPRS/EDGE, W-CDMA, LTE.
4. DTS Radio cannot transmit simultaneously with Bluetooth Radio.
5. U-NII Radio cannot transmit simultaneously with Bluetooth Radio.

12.1. Sum of the SAR for GSM850 & Wi-Fi & BT

SISO

RF Exposure conditions	① WWAN	② DTS		③ U-NII		④ BT	① + ② WWAN + DTS		① + ③ WWAN + U-NII		① + ④ WWAN + BT		① + ② + ③ WWAN + DTS + U-NII	
		Chain 0	Chain 1	Chain 0	Chain 1		Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	0.346	0.394	0.435	0.054	0.388		0.781	No	0.400	No			1.128	No
Body-worn	0.841	0.168	0.180	0.001	0.059	0.273	1.021	No	0.842	No	1.114	No	1.068	No
Hotspot	0.841	0.168	0.180	0.001	0.049		1.021	No	0.842	No			1.058	No

MIMO

RF Exposure conditions	① WWAN	② DTS		③ U-NII	① + ② WWAN + DTS MIMO		① + ③ WWAN + U-NII MIMO	
		Chain 0	Chain 1		Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	0.346	0.394	0.435	0.483	1.175	No	0.829	No
Body-worn	0.841	0.168	0.180	0.069	1.189	No	0.910	No
Hotspot	0.841	0.168	0.180	0.044	1.189	No	0.885	No

12.2. Sum of the SAR for GSM1900 & Wi-Fi & BT

SISO

RF Exposure conditions	① WWAN	② DTS		③ U-NII		④ BT	① + ② WWAN + DTS		① + ③ WWAN + U-NII		① + ④ WWAN + BT		① + ② + ③ WWAN + DTS + U-NII	
		Chain 0	Chain 1	Chain 0	Chain 1		Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	0.073	0.394	0.435	0.054	0.388		0.508	No	0.127	No			0.855	No
Body-worn	1.089	0.168	0.180	0.001	0.059	0.273	1.269	No	1.090	No	1.362	No	1.316	No
Hotspot	1.089	0.168	0.180	0.001	0.049		1.269	No	1.090	No			1.306	No

MIMO

RF Exposure conditions	① WWAN	② DTS		③ U-NII	① + ② WWAN + DTS MIMO		① + ③ WWAN + U-NII MIMO	
		Chain 0	Chain 1		Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	0.073	0.394	0.435	0.483	0.902	No	0.556	No
Body-worn	1.089	0.168	0.180	0.069	1.437	No	1.158	No
Hotspot	1.089	0.168	0.180	0.044	1.437	No	1.133	No

12.3. Sum of the SAR for WCDMA Band V & Wi-Fi & BT

SISO

RF Exposure conditions	① WWAN	② DTS		③ U-NII		④ BT	① + ② WWAN + DTS		① + ③ WWAN + U-NII		① + ④ WWAN + BT		① + ② + ③ WWAN + DTS + U-NII	
		Chain 0	Chain 1	Chain 0	Chain 1		Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	0.232	0.394	0.435	0.054	0.388		0.667	No	0.286	No			1.014	No
Body-worn	0.602	0.168	0.180	0.001	0.059	0.273	0.782	No	0.603	No	0.875	No	0.829	No
Hotspot	0.602	0.168	0.180	0.001	0.049		0.782	No	0.603	No			0.819	No

MIMO

RF Exposure conditions	① WWAN	② DTS		③ U-NII	① + ② WWAN + DTS MIMO		① + ③ WWAN + U-NII MIMO	
		Chain 0	Chain 1		Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	0.232	0.394	0.435	0.483	1.061	No	0.715	No
Body-worn	0.602	0.168	0.180	0.069	0.950	No	0.671	No
Hotspot	0.602	0.168	0.180	0.044	0.950	No	0.646	No

12.4. Sum of the SAR for WCDMA Band II & Wi-Fi & BT

SISO

RF Exposure conditions	① WWAN	② DTS		③ U-NII		④ BT	① + ② WWAN + DTS		① + ③ WWAN + U-NII		① + ④ WWAN + BT		① + ② + ③ WWAN + DTS + U-NII	
		Chain 0	Chain 1	Chain 0	Chain 1		Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	0.132	0.394	0.435	0.054	0.388		0.567	No	0.186	No			0.914	No
Body-worn	0.563	0.168	0.180	0.001	0.059	0.273	0.743	No	0.564	No	0.836	No	0.790	No
Hotspot	0.563	0.168	0.180	0.001	0.049		0.743	No	0.564	No			0.780	No

MIMO

RF Exposure conditions	① WWAN	② DTS		③ U-NII	① + ② WWAN + DTS MIMO		① + ③ WWAN + U-NII MIMO	
		Chain 0	Chain 1		Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	0.132	0.394	0.435	0.483	0.961	No	0.615	No
Body-worn	0.563	0.168	0.180	0.069	0.911	No	0.632	No
Hotspot	0.563	0.168	0.180	0.044	0.911	No	0.607	No

12.5. Sum of the SAR for LTE Band 4 & Wi-Fi & BT

SISO

RF Exposure conditions	① WWAN	② DTS		③ U-NII		④ BT	① + ② WWAN + DTS		① + ③ WWAN + U-NII		① + ④ WWAN + BT		① + ② + ③ WWAN + DTS + U-NII	
		Chain 0	Chain 1	Chain 0	Chain 1		∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	0.124	0.394	0.435	0.054	0.388		0.559	No	0.178	No			0.906	No
Body-worn	0.443	0.168	0.180	0.001	0.059	0.273	0.623	No	0.444	No	0.716	No	0.670	No
Hotspot	0.756	0.168	0.180	0.001	0.049		0.936	No	0.757	No			0.973	No

MIMO

RF Exposure conditions	① WWAN	② DTS		③ U-NII	① + ② WWAN + DTS MIMO		① + ③ WWAN + U-NII MIMO	
		Chain 0	Chain 1		∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	0.124	0.394	0.435	0.483	0.953	No	0.607	No
Body-worn	0.443	0.168	0.180	0.069	0.791	No	0.512	No
Hotspot	0.756	0.168	0.180	0.044	1.104	No	0.800	No

12.6. Sum of the SAR for LTE Band 12 & Wi-Fi & BT

SISO

RF Exposure conditions	① WWAN	② DTS		③ U-NII		④ BT	① + ② WWAN + DTS		① + ③ WWAN + U-NII		① + ④ WWAN + BT		① + ② + ③ WWAN + DTS + U-NII	
		Chain 0	Chain 1	Chain 0	Chain 1		∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	0.115	0.394	0.435	0.054	0.388		0.550	No	0.169	No			0.897	No
Body-worn	0.515	0.168	0.180	0.001	0.059	0.273	0.695	No	0.516	No	0.788	No	0.742	No
Hotspot	0.515	0.168	0.180	0.001	0.049		0.695	No	0.516	No			0.732	No

MIMO

RF Exposure conditions	① WWAN	② DTS		③ U-NII	① + ② WWAN + DTS MIMO		① + ③ WWAN + U-NII MIMO	
		Chain 0	Chain 1		∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	0.115	0.394	0.435	0.483	0.944	No	0.598	No
Body-worn	0.515	0.168	0.180	0.069	0.863	No	0.584	No
Hotspot	0.515	0.168	0.180	0.044	0.863	No	0.559	No

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

SISO

RF Exposure conditions	① WWAN	② DTS		③ U-NII		④ BT	① + ② WWAN + DTS		① + ③ WWAN + U-NII		① + ④ WWAN + BT		① + ② + ③ WWAN + DTS + U-NII	
		Chain 0	Chain 1	Chain 0	Chain 1		Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	0.166	0.394	0.435	0.054	0.388		0.601	No	0.220	No			0.948	No
Body-worn	0.441	0.168	0.180	0.001	0.059	0.273	0.621	No	0.442	No	0.714	No	0.668	No
Hotspot	0.649	0.168	0.180	0.001	0.049		0.829	No	0.650	No			0.866	No

MIMO

RF Exposure conditions	① WWAN	② DTS		③ U-NII	① + ② WWAN + DTS MIMO		① + ③ WWAN + U-NII MIMO	
		Chain 0	Chain 1		Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	0.166	0.394	0.435	0.483	0.995	No	0.649	No
Body-worn	0.441	0.168	0.180	0.069	0.789	No	0.510	No
Hotspot	0.649	0.168	0.180	0.044	0.997	No	0.693	No

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

SISO

RF Exposure conditions	① WWAN	② DTS		③ U-NII		④ BT	① + ② WWAN + DTS		① + ③ WWAN + U-NII		① + ④ WWAN + BT		① + ② + ③ WWAN + DTS + U-NII	
		Chain 0	Chain 1	Chain 0	Chain 1		Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	0.305	0.394	0.435	0.054	0.388		0.740	No	0.359	No			1.087	No
Body-worn	0.577	0.168	0.180	0.001	0.059	0.273	0.757	No	0.578	No	0.850	No	0.804	No
Hotspot	0.577	0.168	0.180	0.001	0.049		0.757	No	0.578	No			0.794	No

MIMO

RF Exposure conditions	① WWAN	② DTS		③ U-NII	① + ② WWAN + DTS MIMO		① + ③ WWAN + U-NII MIMO	
		Chain 0	Chain 1		Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	0.305	0.394	0.435	0.483	1.134	No	0.788	No
Body-worn	0.577	0.168	0.180	0.069	0.925	No	0.646	No
Hotspot	0.577	0.168	0.180	0.044	0.925	No	0.621	No

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

SISO

RF Exposure conditions	① WWAN	② DTS		③ U-NII		④ BT	① + ② WWAN + DTS		① + ③ WWAN + U-NII		① + ④ WWAN + BT		① + ② + ③ WWAN + DTS + U-NII	
		Chain 0	Chain 1	Chain 0	Chain 1		Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	0.048	0.394	0.435	0.054	0.388		0.483	No	0.102	No			0.830	No
Body-worn	0.597	0.168	0.180	0.001	0.059	0.273	0.777	No	0.598	No	0.870	No	0.824	No
Hotspot	0.597	0.168	0.180	0.001	0.049		0.777	No	0.598	No			0.814	No

MIMO

RF Exposure conditions	① WWAN	② DTS		③ U-NII	① + ② WWAN + DTS MIMO		① + ③ WWAN + U-NII MIMO	
		Chain 0	Chain 1		Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	0.048	0.394	0.435	0.483	0.877	No	0.531	No
Body-worn	0.597	0.168	0.180	0.069	0.945	No	0.666	No
Hotspot	0.597	0.168	0.180	0.044	0.945	No	0.641	No

Conclusion:

Simultaneous transmission SAR measurement (Volume Scan) is not required because either the sum of the 1-g SAR is < 1.6 W/kg or the SPLSR is < 0.04 for all circumstances that require SPLSR calculation.

Appendixes

Refer to separated files for the following appendixes.

A_15K21156 SAR Photos & Ant. Locations

B_15K21156 SAR Highest Test Plots

C_15K21156 SAR System Check Plots

D_15K21156 SAR Tissue Ingredients

E_15K21156 SAR Probe Cal. Certificates

F_15K21156 SAR Dipole Cal. Certificates

END OF REPORT