



SAR EVALUATION REPORT

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

The model FCC ID: A3LSMT239 shares the same enclosure and circuit board as model FCC ID: A3LSMT239M. The WLAN/Bluetooth circuitry and layout, including antenna, are almost identical between the two units. The WLAN/Bluetooth antenna and surrounding circuitry is the same between these two units, and tune up power targets are identical for WLAN and Bluetooth operations. For this reason the SAR data for the WLAN and Bluetooth operations for FCC ID: A3LSMT239 is considered representative for FCC ID: A3LSMT239M.

For
GSM/WCDMA/LTE Tablet + Bluetooth and DTS/UNII a/b/g/n

**FCC ID: A3LSMT239M
Model Name: SM-T239M**

**Report Number: 15I20013-S1C
Issue Date: 3/30/2015**

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Date	Revisions	Revised By
--	3/4/2015	Initial Issue	--
A	3/9/2015	Updated Reduced Power information for LTE and WCDMA Section 1: Updated Highest SAR Values Section 6.1/9.3: Updated Typo Section 12: Updated Sum of SAR Table	Coltyce Sanders
B	3/24/2015	Updated LTE Data with new target power Updated Appendix B and C to Revision 1	Coltyce Sanders
C	3/30/2015	Updated Appendix F to Revision 1 Section 10.6: Updated SAR Test Table	Coltyce Sanders

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1. Attestation of Test Results

Applicant Name	SAMSUNG ELECTRONICS CO., LTD.			
FCC ID	A3LSMT239M			
Model Name	SM-T239M			
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	DSS (BT)
Head	0.363	0.037	0.075	N/A
Standalone	0.792	1.098	0.982	
Simultaneous Tx	Head	0.438	0.400	
	Standalone	1.574	1.574	
Date Tested	2/16/2015 to 3/23/2015			
Test Results	Pass			
Note: The Wi-Fi (DTS/U-NII) and Bluetooth SAR measurement results from the original filling can be found in SAR test report 15I19878-S1A, FCC ID A3LSMT239. The standalone Wi-Fi and Bluetooth results from the original filling were used for Simultaneous Transmission Analysis purposes. Both models contain identical Wi-Fi/BT modules and antennas. Spot checks for 802.11a/b were performed to ensure that the SAR measurements for both devices are the same.				
UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.				
Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government (NIST Handbook 150, Annex A). This report is written to support regulatory compliance of the applicable standards stated above.				
Approved & Released By:		Prepared By:		
				
Devin Chang Senior Engineer UL Verification Services Inc.		Coltyce Sanders Laboratory Engineer UL Verification Services Inc.		

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 SAR meas for 802.11 v02
- 447498 D01 General RF Exposure Guidance v05r02
- 447498 D03 Supplement C Cross-Reference
- 616217 D04 SAR for laptop and tablets v01r01
- 648474 D04 Handset SAR v01r02
- 690783 D01 SAR Listings on Grants v01r03
- 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

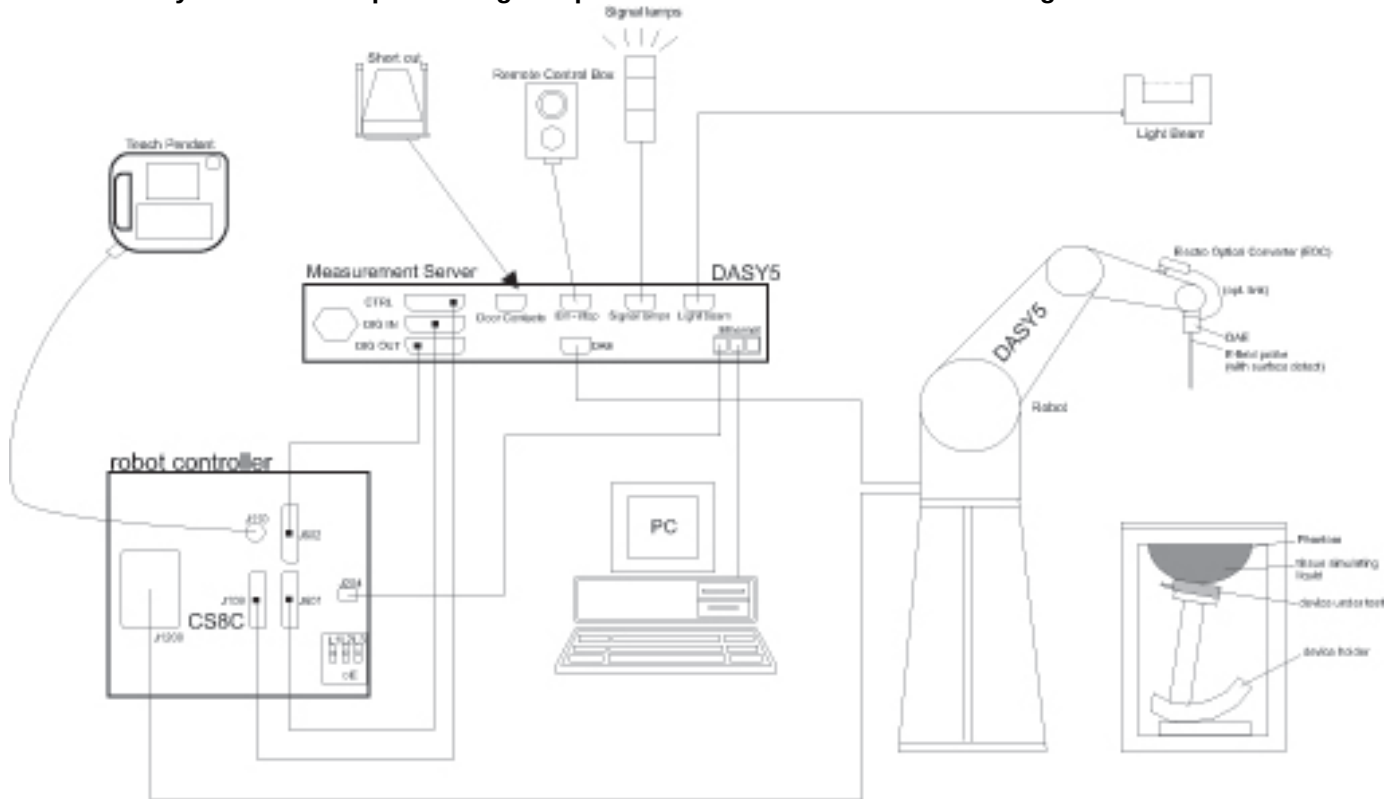
47173 Benicia Street	47266 Benicia Street
SAR Lab A	SAR Lab 1
SAR Lab B	SAR Lab 2
SAR Lab C	SAR Lab 3
SAR Lab D	SAR Lab 4
SAR Lab E	SAR Lab 5
SAR Lab F	
SAR Lab G	
SAR Lab H	

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0.

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	E753ES	MY40000980	4/7/2015
Dielectronic Probe kit	SPEAG	DAK-3.5	1082	9/16/2015
Dielectronic Probe kit	SPEAG	DAK-3.5 Short	SM DAK 200 BA	N/A
Thermometer	Control Company	Traceable	122529163	10/8/2015

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
HP Signal Generator	HP	8665B	3546A00784	6/23/2015
Power Meter	HP	437B	3125U09516	10/6/2015
Power Meter	Agilent	N1911A	MY53060016	8/7/2015
Power Sensor	Agilent	E9323A	MY53070003	5/1/2015
Power Sensor	Agilent	8481A	3318A95392	10/6/2015
Amplifier	MITEQ	AMF-4D-00400600-50-30P	1622052	N/A
Bi-directional coupler	Werlatone, Inc.	C8060-102	2711	N/A
DC Power Supply	Sorensen Ametek	XT20-3	1318A00530	N/A
Synthesized Signal Generator	Agilent	8665B	3438A00633	7/10/2015
Power Meter	HP	437B	3125U11347	8/27/2015
Power Meter	HP	437B	3125U16345	6/16/2015
Power Sensor	HP	8481A	2702A60780	6/16/2015
Power Sensor	HP	8481A	1926A16917	10/10/2015
Amplifier	MITEQ	AMF-4D-00400600-50-30P	1808938	N/A
Bi-directional coupler	Werlatone, Inc.	C8060-102	2710	N/A
DC Power Supply	HP	6296A	2841A-05955	N/A
E-Field Probe	SPEAG	EX3DV3	3991	5/16/2015
E-Field Probe	SPEAG	EX3DV4	3773	4/22/2015
E-Field Probe	SPEAG	EX3DV4	3929	5/9/2015
E-Field Probe	SPEAG	EX3DV4	3749	1/26/2016
Data Acquisition Electronics (SAR Lab 2)	SPEAG	DAE4	1259	1/14/2016
Data Acquisition Electronics (SAR Lab 3)	SPEAG	DAE4	1380	7/23/2015
Data Acquisition Electronics (SAR Lab 4)	SPEAG	DAE4	1377	8/27/2015
Data Acquisition Electronics (SAR Lab 5)	SPEAG	DAE4	1439	5/14/2015
System Validation Dipole	SPEAG	D750V3	1019	3/17/2015
System Validation Dipole	SPEAG	D750V3	1024	5/16/2015
System Validation Dipole	SPEAG	D835V2	4d142	9/9/2015
System Validation Dipole	SPEAG	D1750V2	1077	9/11/2015
System Validation Dipole	SPEAG	D1900V2	5d163	9/11/2015
Thermometer (SAR Lab 2)	EXTECH	445703	CCS-203	3/28/2015
Thermometer (SAR Lab 3)	EXTECH	445703	CCS-237	6/3/2015
Thermometer (SAR Lab 4)	EXTECH	445703	CCS-238	6/3/2015
Thermometer (SAR Lab 5)	EXTECH	445703	CCS-239	6/3/2015

Other

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Power Meter	Agilent	N1912A	MY53060016	8/7/2015
Power Sensor	Agilent	N1921A	MY52270022	12/12/2015
Base Station Simulator	R & S	CMW500	132910-cp	4/25/2015

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): 186.9 mm x 107.9 mm Overall Diagonal: 206 mm Display Diagonal: 180 mm
Battery Back Cover	☒ The rechargeable battery is not user accessible.
Battery Options	☒ The rechargeable battery is not user accessible.
Accessory	Headset
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 GHz) (FCC: Ch.149 ~ Ch.165)
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 5.2 and 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 - One Up ☐ Class 10 - Two Up ☒ Class 12 - Four Up ☐ Class 33 - Four Up	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 IV Band V	UMTS Rel. 99 (Voice & Data) HSDPA HSUPA HSPA+		100%
LTE (FDD)	Band 2 Band 4 Band 5 Band 17	QPSK 16QAM		100%
	Does this device support SV-LTE (1xRTT-LTE)? ☐ Yes ☒ No			
Wi-Fi	2.4 GHz	802.11b 802.11g 802.11n (HT20)		100%
	5 GHz	802.11a 802.11n (HT20) 802.11n (HT40)		100%
	Does this device support TDWR (Terminal Doppler Weather Radar)? ☒ Yes ☐ No			
	Does this device support Band gap channel? ☐ Yes ☒ No			
Bluetooth	2.4 GHz	Version 4.0 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	31.8	32.3	22.0	22.5
	GPRS 1 slot	31.8	32.3	22.0	22.5
	GPRS 2 slots	30.5	31.0	22.0	22.5
	GPRS 3 slots	28.9	29.4	22.0	22.5
	GPRS 4 slots	27.0	27.5	21.0	21.5
	EGPRS 1 slot	27.0	27.5	16.5	17.0
	EGPRS 2 slots	25.5	26.0	16.5	17.0
	EGPRS 3 slots	23.5	24.0	16.5	17.0
	EGPRS 4 slots	21.7	22.2	15.0	15.5
GSM1900	Voice	30.0	30.5	13.0	13.5
	GPRS 1 slot	30.0	30.5	13.0	13.5
	GPRS 2 slots	28.5	29.0	13.0	13.5
	GPRS 3 slots	26.5	27.0	13.0	13.5
	GPRS 4 slots	24.5	25.0	13.0	13.5
	EGPRS 1 slot	26.0	26.5	9.0	9.5
	EGPRS 2 slots	24.5	25.0	9.0	9.5
	EGPRS 3 slots	22.7	23.2	9.0	9.5
	EGPRS 4 slots	21.2	21.7	8.5	9.0
W-CDMA Band V	R99	22.5	23.0	18.0	18.5
	HSDPA	22.0	22.5	17.0	17.5
	HSUPA	22.5	23.0	17.0	17.5
W-CDMA Band IV	R99	22.5	23.0	12.5	13.0
	HSDPA	22.5	23.0	11.5	12.0
	HSUPA	22.5	23.0	11.5	12.0
W-CDMA Band II	R99	23.0	23.5	7.0	7.5
	HSDPA	23.0	23.5	5.5	6.0
	HSUPA	23.0	23.5	4.0	4.5
LTE Band 2	QPSK	23.0	23.5	9.0	9.5
LTE Band 4	QPSK	23.0	23.5	10.0	10.5
LTE Band 5	QPSK	23.5	24.0	17.5	18.0
LTE Band 17	QPSK	23.5	24.0	20.5	21.0

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 17	Frequency range: 704 - 716 MHz																																											
		Channel Bandwidth																																											
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz																																						
	Low				23755/706.5																																								
	Mid			23790/710	23790/710																																								
	High				23825/713.5																																								
LTE transmitter and antenna implementation	LTE has one (1) Tx/Rx antenna and one (1) Rx antenna Refer to Appendix A.																																												
Maximum power reduction (MPR)	Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3 <table> <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>16 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	16 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																																						
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2																																						
Power reduction	Yes. This device uses a capacitive grip sensor that is same metallic component as the transmitting antenna to facilitate triggering in typical user interactivity with the device.																																												
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. Power Reduction by Grip Sensing

Due to the operating configurations and exposure conditions required by tablets, grip sensors are used in this device to reduce the maximum output power in specific wireless and operating modes to ensure SAR compliance. This device uses a capacitive grip sensor that is same metallic component as the transmitting antenna to facilitate triggering in typical user interactivity with the device.

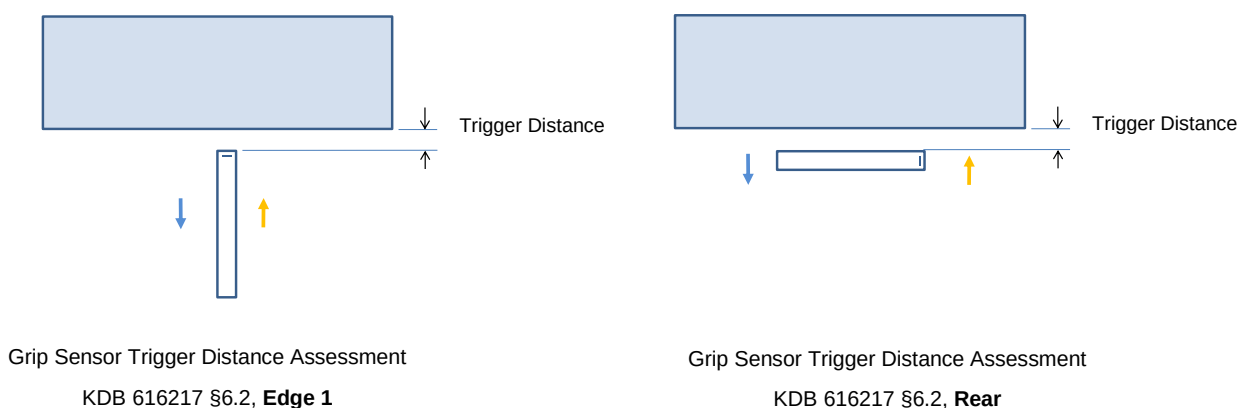
6.5.1. Grip Sensor Triggering Distance (KDB 616217 §6.2)

Rear of the DUT was placed directly below the flat phantom. The DUT was moved toward the phantom in accordance with the steps outlined in KDB 616217 §6.2 to determine the trigger distance for enabling power reduction. The DUT was moved away from the phantom to determine the trigger distance for resuming full power.

The measurement was then repeated for the surface of Edge 1.

The DUT featured a visual indicator on its display that showed the status of the Grip Sensor (Triggered or not triggered). This was used to determine the status of the sensor during the Grip Sensor assessment as monitoring the output power directly was not practical without affecting the measurement.

It was confirmed separately that the output power was altered according to the Grip Sensor status indication. This was achieved by observing the Grip Sensor status at the same time as monitoring the conducted power. Section 9 contains both the full and reduced conducted power measurements.



LEGEND

- Direction of DUT travel for determination of power reduction triggering point
- Direction of DUT travel for determination of full power resumption triggering point

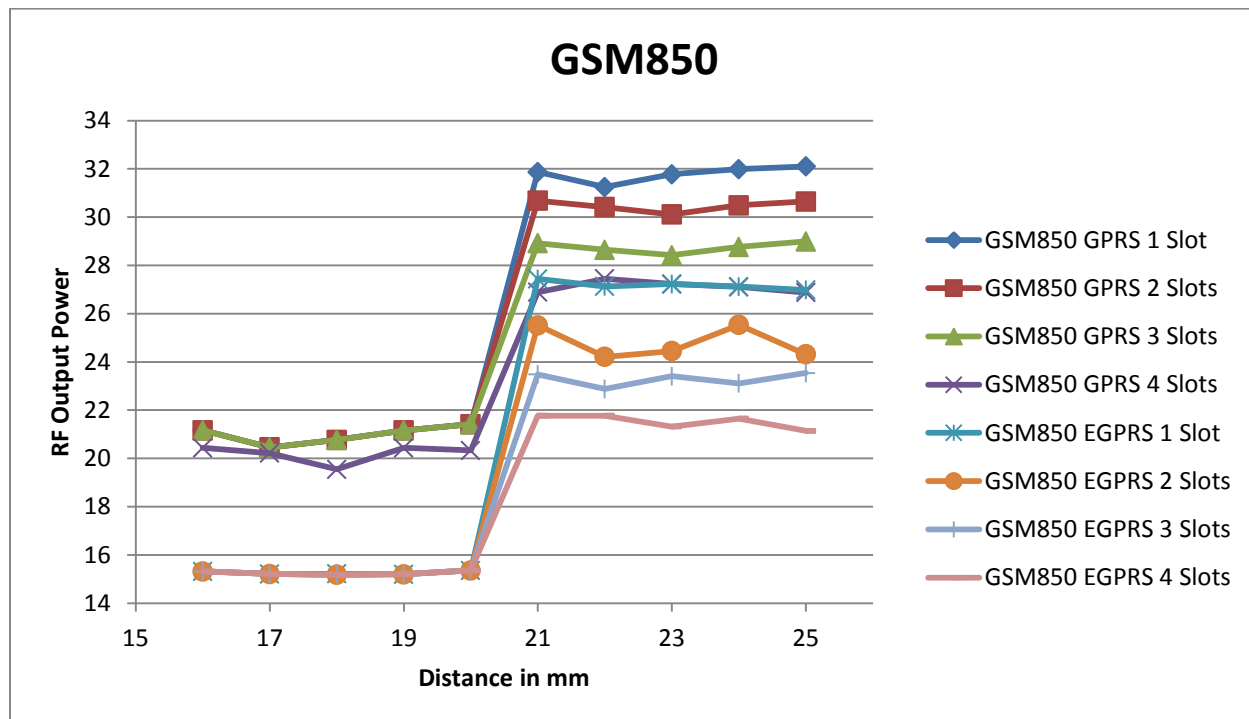
Summary of Trigger Distances

Tissue simulating liquid	Trigger distance – Edge 1		Trigger distance - Rear	
	Moving toward phantom	Moving from phantom	Moving toward phantom	Moving from phantom
750 muscle	13 mm	13 mm	20 mm	20 mm
850 muscle	13 mm	13 mm	20 mm	20 mm
1900 muscle	13 mm	13 mm	20 mm	20 mm

6.5.2. Grip Sensor Triggering Distance Measurement Results

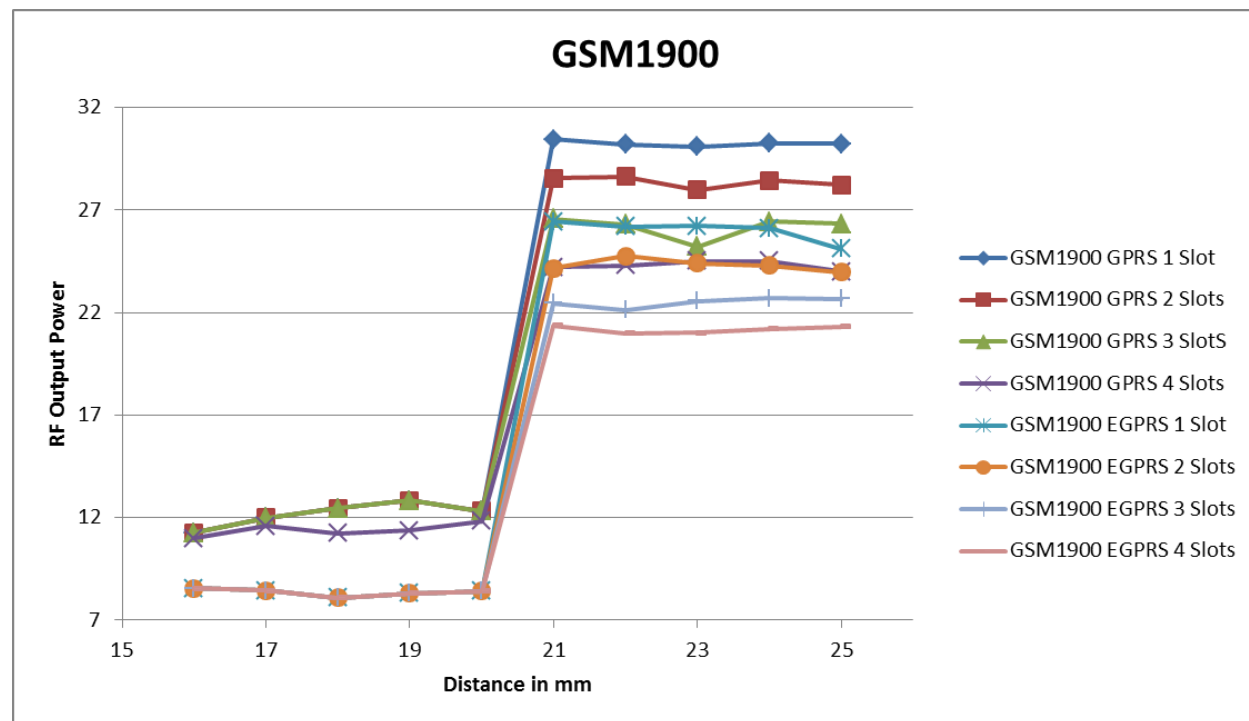
GSM850

Rear, DUT Moving Toward (Trigger) and Away (Release) from the Phantom



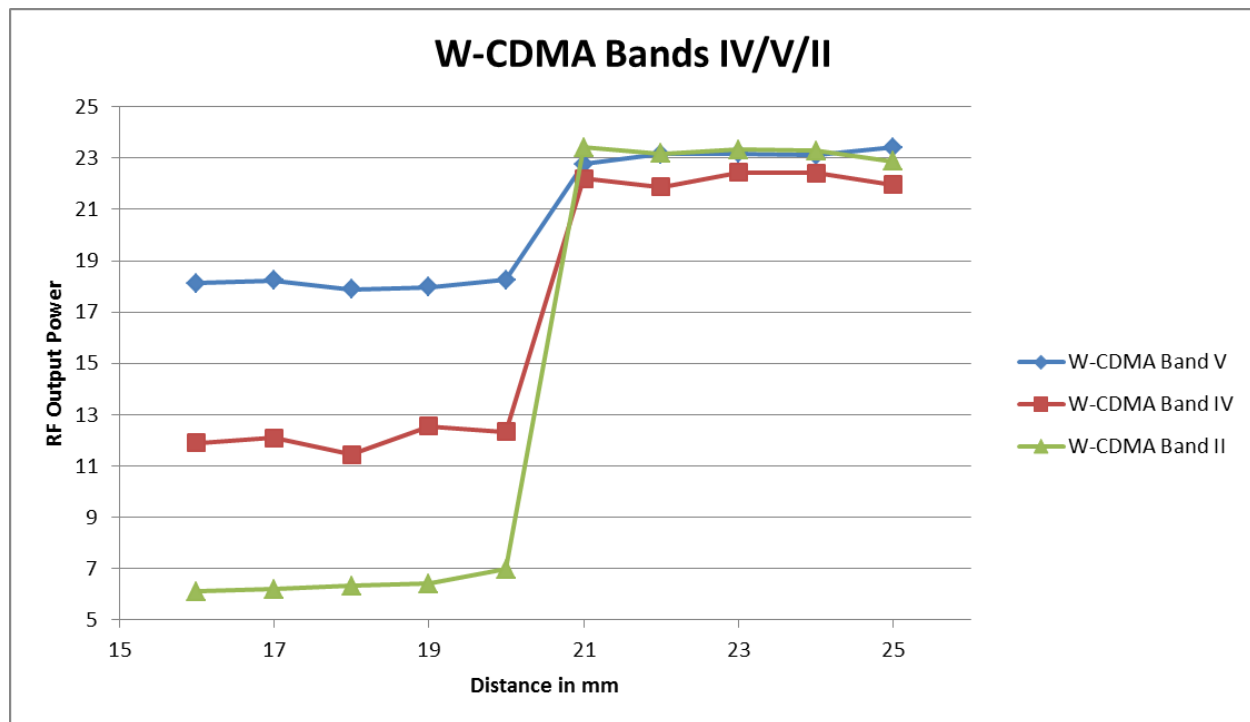
GSM1900

Rear, DUT Moving Toward (Trigger) and Away (Release) from the Phantom



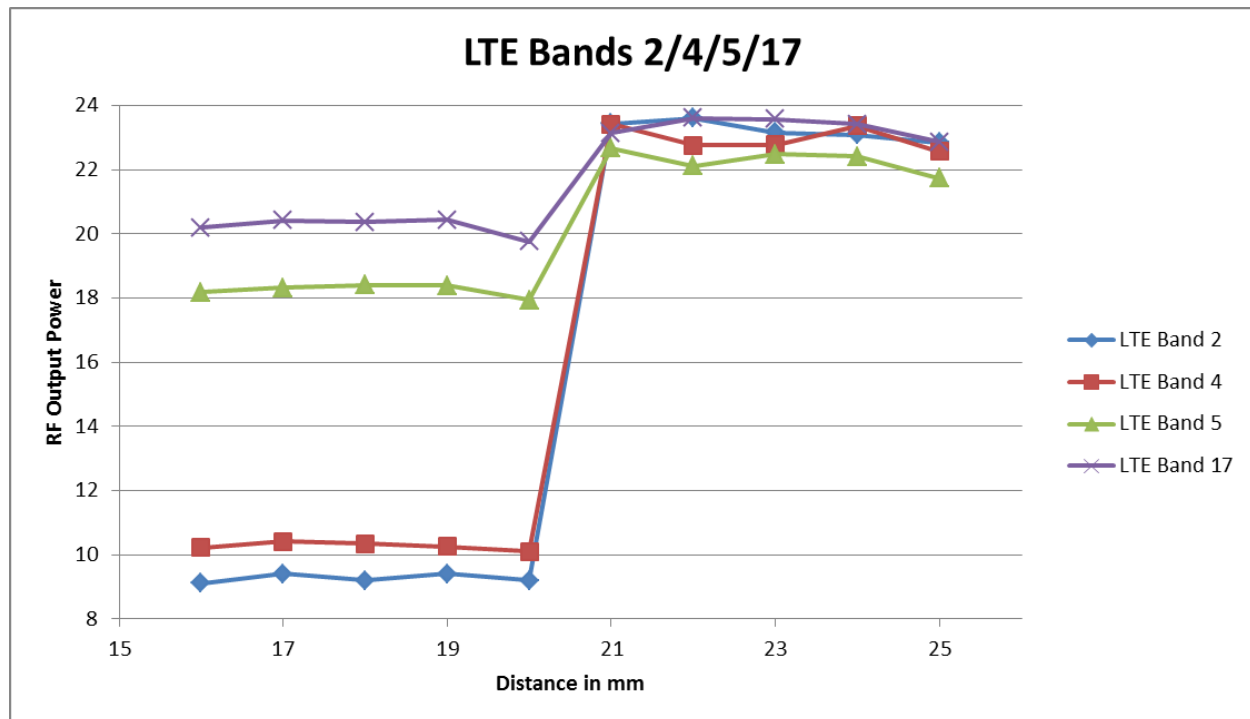
W-CDMA Bands V, IV & II

Rear, DUT Moving Toward (Trigger) and Away (Release) from the Phantom



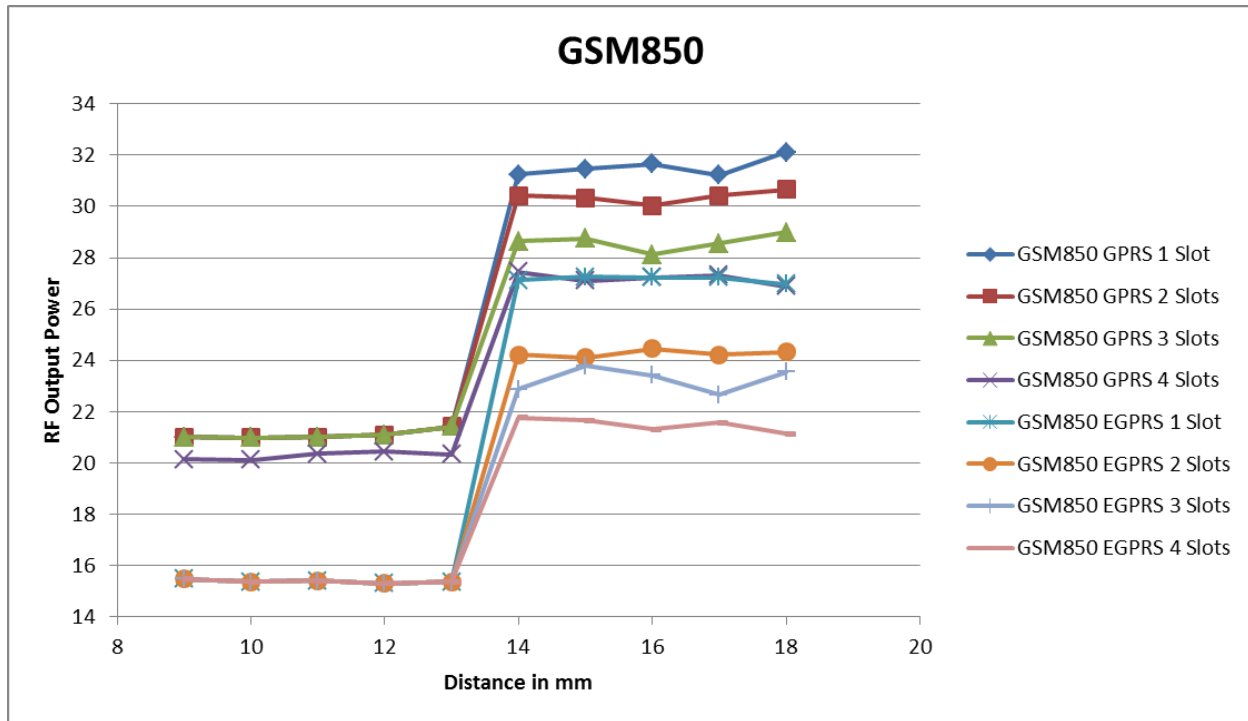
LTE Bands 2 / 4 / 5 / 17

Rear, DUT Moving Toward (Trigger) and Away (Release) from the Phantom



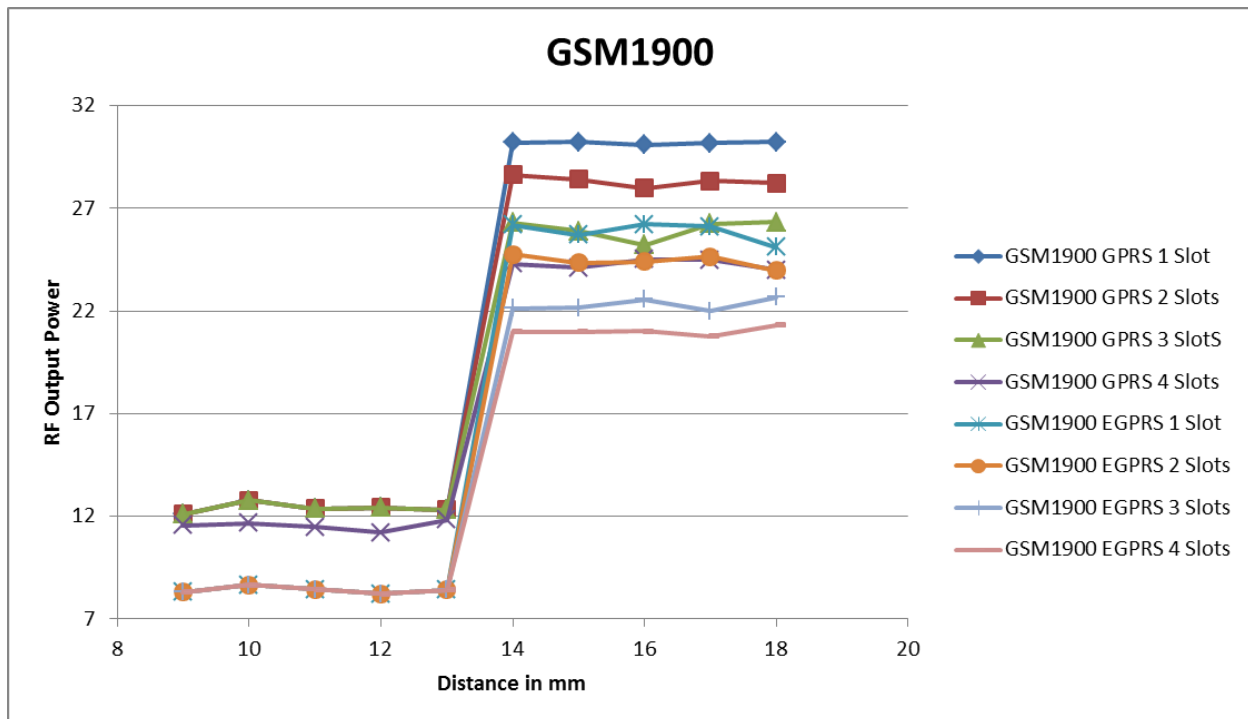
GSM850

Edge 1, DUT Moving Toward (Trigger) and Away (Release) from the Phantom



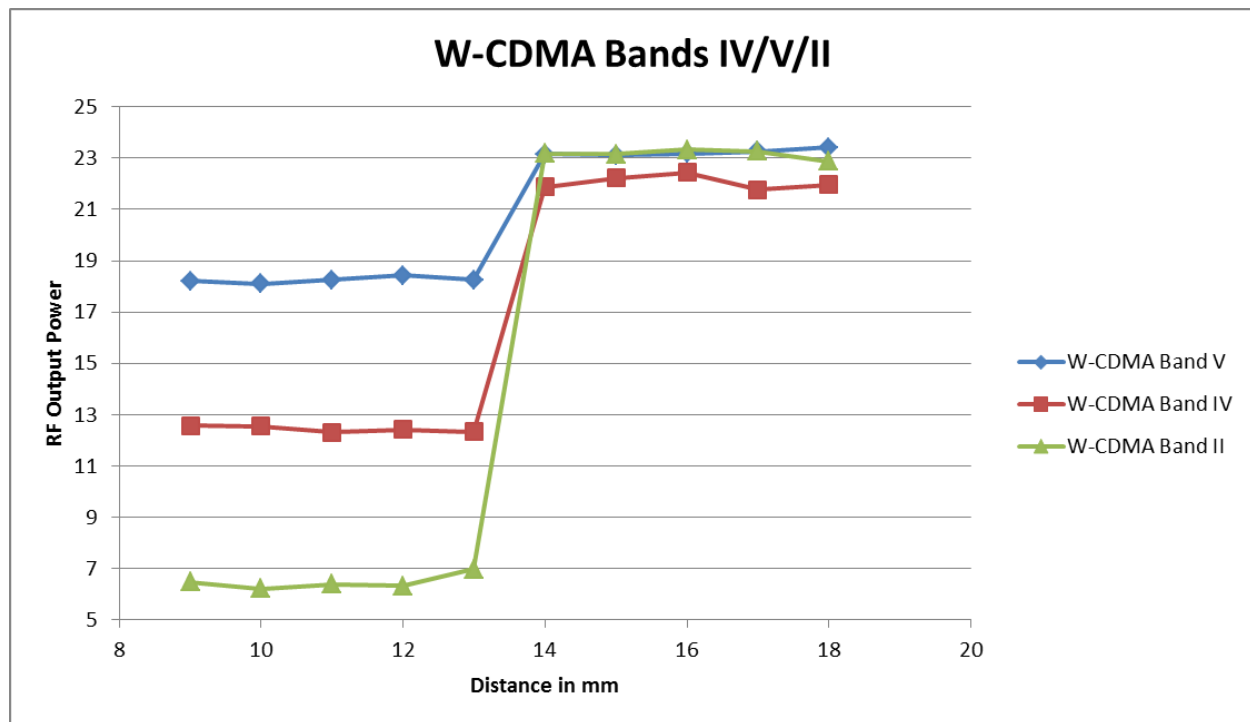
GSM1900

Edge 1, DUT Moving Toward (Trigger) and Away (Release) from the Phantom



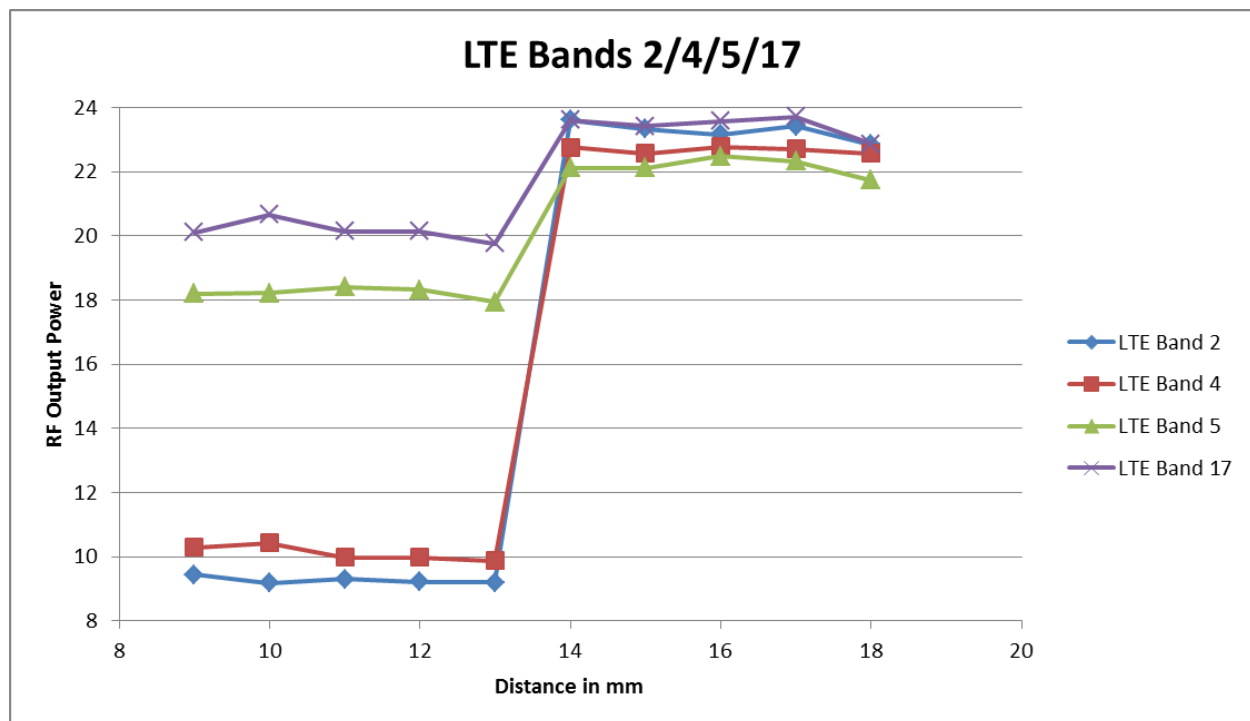
W-CDMA Bands V, IV & II

Edge 1, DUT Moving Toward (Trigger) and Away (Release) from the Phantom



LTE Bands 2 / 4 / 5 / 17

Edge 1, DUT Moving Toward (Trigger) and Away (Release) from the Phantom



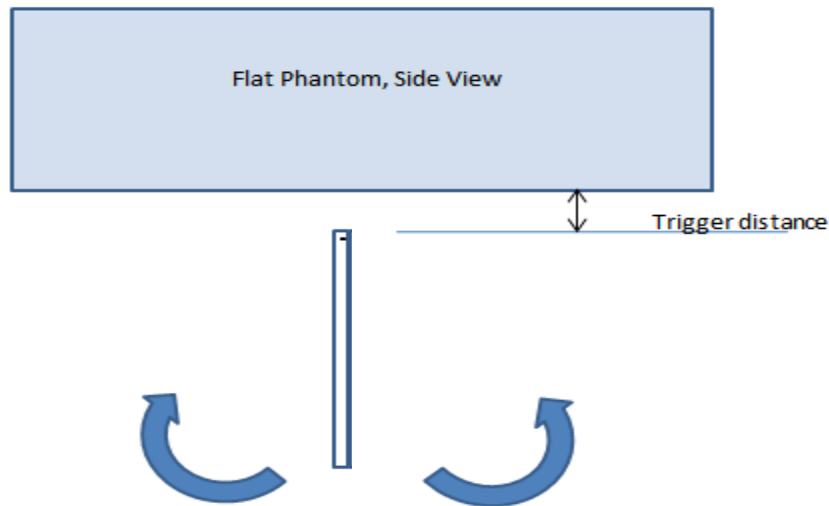
6.5.3. Grip Sensor Coverage (KDB 616217 §6.3)

As there is no spatial offset between the antenna and the Grip Sensor element, Grip Sensor coverage did not need to be assessed.

6.5.4. Grip Sensor Tilt Angle Assessment (KDB 616217 §6.4)

The DUT was positioned directly below the flat phantom at the minimum measured trigger distance with Edge 1 parallel to the base of the flat phantom for each band.

The EUT was rotated about Edge 1 for angles up to $\pm 45^\circ$. If the output power increased during the rotation the DUT was moved 1mm toward the phantom and the rotation repeated. This procedure was repeated until the power remained reduced for all angles up to $\pm 45^\circ$.



Grip sensor tilt angle assessment (Edge 1) KDB 616217 §6.4

Summary of Tablet Tilt Angle Influence to Proximity Sensor Triggering

Band (MHz)	Minimum trigger distance measured according to KDB 616217 §6.2	Minimum distance at which power reduction was maintained over $\pm 45^\circ$	Power reduction status										
			-45°	-40°	-30°	-20°	-10°	0°	10°	20°	30°	40°	45°
750	13 mm	13 mm	On	On	On	On	On	On	On	On	On	On	On
850	13 mm	13 mm	On	On	On	On	On	On	On	On	On	On	On
1900	13 mm	13 mm	On	On	On	On	On	On	On	On	On	On	On

6.5.1. Resulting test positions for SAR measurements

Wireless technologies	Position	§6.2 Triggering Distance	§6.3 Coverage	§6.4 Tilt Angle	Worst case distance for SAR
WWAN	Rear	20 mm	N/A	N/A	19 mm
	Edge 1	13 mm	N/A	13 mm	12 mm

7. RF Exposure Conditions (Test Configurations)

This product is a phone supporting next to ear operations with diagonal dimensions greater than 20 cm. As such, it is categorized as a phablet and requires testing in accordance with the phablet procedures described in both KDB 648474 and 616217 in order to, respectively, demonstrate compliance for head SAR and body SAR exposure conditions. The usual body-worn accessory and hotspot mode testing required for phones are however not performed as they are effectively covered by the more conservative test procedures for tablets.

7.1. Head SAR Test Exclusion Considerations

Wireless technologies	RF Exposure Conditions	DUT-to-User Separation	Test Position	Antenna-to-edge/surface	SAR Required	Note
WWAN	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	

7.2. Standalone SAR Test Exclusion Considerations

Since the *Dedicated Host Approach* is applied, the standalone SAR test exclusion procedure in KDB 447498 § 4.3.1 is applied in conjunction with KDB 616217 § 4.3 to determine the minimum test separation distance:

- When the separation distance from the antenna to an adjacent edge is ≤ 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.
- When the separation distance from the antenna to an adjacent edge is > 5 mm, the actual antenna-to-edge separation distance is applied to determine SAR test exclusion.

SAR Test Exclusion Calculations for WLAN

Though this device is capable of simultaneous transmission between WLAN and WWAN, standalone SAR test exclusion is, along with the associated SAR Estimation, only considered for the WWAN antenna in the body of this report, with WLAN-related considerations and test results being leveraged from SAR report 15I19878-S1A, submitted under **FCC ID A3LSMT239**.

SAR Test Exclusion Calculations for WWAN

Antennas < 50mm to adjacent edges

Antenna	Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
			dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
Full Power, Proximity Sensor Off																
Cellular	GPRS 3 Slots	848.8	29.40	327	0	4.1	49	172	3.5		60.3 -MEASURE-	60.3 -MEASURE-	6.1 -MEASURE-	> 50 mm	60.3 -MEASURE-	
Cellular	GPRS 2 Slots	1909.8	29.00	199	0	4.1	49	172	3.5		55 -MEASURE-	55 -MEASURE-	5.6 -MEASURE-	> 50 mm	55 -MEASURE-	
Cellular	W-CDMA 2	1907.6	23.50	224	0	4.1	49	172	3.5		619 -MEASURE-	619 -MEASURE-	6.3 -MEASURE-	> 50 mm	619 -MEASURE-	
Cellular	W-CDMA 4	1752.6	23.00	200	0	4.1	49	172	3.5		53 -MEASURE-	53 -MEASURE-	5.4 -MEASURE-	> 50 mm	53 -MEASURE-	
Cellular	W-CDMA 5	846.6	23.00	200	0	4.1	49	172	3.5		36.8 -MEASURE-	36.8 -MEASURE-	3.8 -MEASURE-	> 50 mm	36.8 -MEASURE-	
Cellular	LTE Band 2	1900	23.50	224	0	4.1	49	172	3.5		618 -MEASURE-	618 -MEASURE-	6.3 -MEASURE-	> 50 mm	618 -MEASURE-	
Cellular	LTE Band 4	1754.3	23.50	224	0	4.1	49	172	3.5		59.3 -MEASURE-	59.3 -MEASURE-	6.1 -MEASURE-	> 50 mm	59.3 -MEASURE-	
Cellular	LTE Band 5	844	24.00	251	0	4.1	49	172	3.5		46.1 -MEASURE-	46.1 -MEASURE-	4.7 -MEASURE-	> 50 mm	46.1 -MEASURE-	
Cellular	LTE Band 17	710	24.00	251	0	4.1	49	172	3.5		42.3 -MEASURE-	42.3 -MEASURE-	4.3 -MEASURE-	> 50 mm	42.3 -MEASURE-	
Power Back-off, Proximity Sensor On																
Cellular	GPRS 4 Slots	848.8	21.50	71	0	4.1	49	172	3.5		13.1 -MEASURE-	13.1 -MEASURE-	1 -EXEMPT-	> 50 mm	13.1 -MEASURE-	
Cellular	GPRS 4 Slots	1909.8	13.50	11	0	4.1	49	172	3.5		3 -MEASURE-	3 -MEASURE-	0 -EXEMPT-	> 50 mm	3 -MEASURE-	
Cellular	W-CDMA 2	1907.6	7.50	6	0	4.1	49	172	3.5		2 -EXEMPT-	2 -EXEMPT-	0 -EXEMPT-	> 50 mm	2 -EXEMPT-	
Cellular	W-CDMA 4	1752.6	13.00	20	0	4.1	49	172	3.5		5.3 -MEASURE-	5.3 -MEASURE-	1 -EXEMPT-	> 50 mm	5.3 -MEASURE-	
Cellular	W-CDMA 5	846.6	18.50	71	0	4.1	49	172	3.5		13.1 -MEASURE-	13.1 -MEASURE-	1 -EXEMPT-	> 50 mm	13.1 -MEASURE-	
Cellular	LTE Band 2	1900	9.50	9	0	4.1	49	172	3.5		2 -EXEMPT-	2 -EXEMPT-	0 -EXEMPT-	> 50 mm	2 -EXEMPT-	
Cellular	LTE Band 4	1754.3	10.50	11	0	4.1	49	172	3.5		3 -EXEMPT-	3 -EXEMPT-	0 -EXEMPT-	> 50 mm	3 -EXEMPT-	
Cellular	LTE Band 5	844	18.00	63	0	4.1	49	172	3.5		116 -MEASURE-	116 -MEASURE-	1 -EXEMPT-	> 50 mm	116 -MEASURE-	
Cellular	LTE Band 17	710	21.00	126	0	4.1	49	172	3.5		212 -MEASURE-	212 -MEASURE-	2 -EXEMPT-	> 50 mm	212 -MEASURE-	

Antennas > 50mm to adjacent edges

Antenna	Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
			dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
Full Power, Proximity Sensor Off																
Cellular	GPRS 3 Slots	848.8	29.40	327	0	4.1	49	172	3.5		< 50 mm	< 50 mm	< 50 mm	853.2 mW -EXEMPT-	< 50 mm	
Cellular	GPRS 2 Slots	1909.8	29.00	199	0	4.1	49	172	3.5		< 50 mm	< 50 mm	< 50 mm	1328.5 mW -EXEMPT-	< 50 mm	
Cellular	W-CDMA 2	1907.6	23.50	224	0	4.1	49	172	3.5		< 50 mm	< 50 mm	< 50 mm	1328.6 mW -EXEMPT-	< 50 mm	
Cellular	W-CDMA 4	1752.6	23.00	200	0	4.1	49	172	3.5		< 50 mm	< 50 mm	< 50 mm	1333.3 mW -EXEMPT-	< 50 mm	
Cellular	W-CDMA 5	846.6	23.00	200	0	4.1	49	172	3.5		< 50 mm	< 50 mm	< 50 mm	8516 mW -EXEMPT-	< 50 mm	
Cellular	LTE Band 2	1900	23.50	224	0	4.1	49	172	3.5		< 50 mm	< 50 mm	< 50 mm	1328.8 mW -EXEMPT-	< 50 mm	
Cellular	LTE Band 4	1754.3	23.50	224	0	4.1	49	172	3.5		< 50 mm	< 50 mm	< 50 mm	1333.3 mW -EXEMPT-	< 50 mm	
Cellular	LTE Band 5	844	24.00	251	0	4.1	49	172	3.5		< 50 mm	< 50 mm	< 50 mm	849.7 mW -EXEMPT-	< 50 mm	
Cellular	LTE Band 17	710	24.00	251	0	4.1	49	172	3.5		< 50 mm	< 50 mm	< 50 mm	755.5 mW -EXEMPT-	< 50 mm	
Power Back-off, Proximity Sensor On																
Cellular	GPRS 4 Slots	848.8	21.50	71	0	4.1	49	172	3.5		< 50 mm	< 50 mm	< 50 mm	853.2 mW -EXEMPT-	< 50 mm	
Cellular	GPRS 4 Slots	1909.8	13.50	11	0	4.1	49	172	3.5		< 50 mm	< 50 mm	< 50 mm	1328.5 mW -EXEMPT-	< 50 mm	
Cellular	W-CDMA 2	1907.6	7.50	6	0	4.1	49	172	3.5		< 50 mm	< 50 mm	< 50 mm	1328.6 mW -EXEMPT-	< 50 mm	
Cellular	W-CDMA 4	1752.6	13.00	20	0	4.1	49	172	3.5		< 50 mm	< 50 mm	< 50 mm	1333.3 mW -EXEMPT-	< 50 mm	
Cellular	W-CDMA 5	846.6	18.50	71	0	4.1	49	172	3.5		< 50 mm	< 50 mm	< 50 mm	8516 mW -EXEMPT-	< 50 mm	
Cellular	LTE Band 2	1900	9.50	9	0	4.1	49	172	3.5		< 50 mm	< 50 mm	< 50 mm	1328.8 mW -EXEMPT-	< 50 mm	
Cellular	LTE Band 4	1754.3	10.50	11	0	4.1	49	172	3.5		< 50 mm	< 50 mm	< 50 mm	1333.3 mW -EXEMPT-	< 50 mm	
Cellular	LTE Band 5	844	18.00	63	0	4.1	49	172	3.5		< 50 mm	< 50 mm	< 50 mm	849.7 mW -EXEMPT-	< 50 mm	
Cellular	LTE Band 17	710	21.00	126	0	4.1	49	172	3.5		< 50 mm	< 50 mm	< 50 mm	755.5 mW -EXEMPT-	< 50 mm	

Note(s):

1. According to KDB 447498, if the calculated Power threshold is less than the output power then SAR testing is required.

7.3.Required Test Configurations

The table below identifies the standalone test configurations required for this device according to the findings in Section 7.2:

Test Configurations	Rear	Edge 1	Edge 2	Edge 3	Edge 4
		(Top Edge)	(Right Edge)	(Bottom Edge)	(Left Edge)
GSM850 Full Pow er	Yes	Yes	Yes	No	Yes
GSM850 w / Pow er Reduction	Yes	Yes	No	No	Yes
GSM1900 Full Pow er	Yes	Yes	Yes	No	Yes
GSM1900 w / Pow er Reduction	Yes	Yes	No	No	Yes
W-CDMA Band 2 Full Pow er	Yes	Yes	Yes	No	Yes
W-CDMA Band 2 w / Pow er Reduction	No	No	No	No	No
W-CDMA Band 4 Full Pow er	Yes	Yes	Yes	No	Yes
W-CDMA Band 4 w / Pow er Reduction	Yes	Yes	No	No	Yes
W-CDMA Band 5 Full Pow er	Yes	Yes	Yes	No	Yes
W-CDMA Band 5 w / Pow er Reduction	Yes	Yes	No	No	Yes
LTE Band 2 Full Pow er	Yes	Yes	Yes	No	Yes
LTE Band 2 w / Pow er Reduction	No	No	No	No	No
LTE Band 4 Full Pow er	Yes	Yes	Yes	No	Yes
LTE Band 4 w / Pow er Reduction	No	No	No	No	No
LTE Band 5 Full Pow er	Yes	Yes	Yes	No	Yes
LTE Band 5 w / Pow er Reduction	Yes	Yes	No	No	Yes
LTE Band 17 Full Pow er	Yes	Yes	Yes	No	Yes
LTE Band 17 w / Pow er Reduction	Yes	Yes	No	No	Yes

Note(s):

1. Yes = Testing is required.
2. No = Testing is not required.

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 Lab 2

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
2/24/2015	Head 750	e'	42.4100	Relative Permittivity (ϵ_r):	42.41	41.96	1.07	5
		e"	22.4300	Conductivity (σ):	0.94	0.89	4.74	5
	Head 700	e'	43.0400	Relative Permittivity (ϵ_r):	43.04	42.22	1.95	5
		e"	23.0400	Conductivity (σ):	0.90	0.89	0.85	5
	Head 710	e'	42.7700	Relative Permittivity (ϵ_r):	42.77	42.17	1.43	5
		e"	22.9400	Conductivity (σ):	0.91	0.89	1.76	5
2/24/2015	Body 750	e'	53.7600	Relative Permittivity (ϵ_r):	53.76	55.55	-3.22	5
		e"	23.1300	Conductivity (σ):	0.96	0.96	0.16	5
	Body 700	e'	54.2500	Relative Permittivity (ϵ_r):	54.25	55.74	-2.67	5
		e"	23.6200	Conductivity (σ):	0.92	0.96	-4.16	5
	Body 710	e'	54.0700	Relative Permittivity (ϵ_r):	54.07	55.70	-2.93	5
		e"	23.4900	Conductivity (σ):	0.93	0.96	-3.40	5

SAR Lab 3

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
2/16/2015	Head 835	e'	42.0500	Relative Permittivity (ϵ_r):	42.05	41.50	1.33	5
		e''	19.8800	Conductivity (σ):	0.92	0.90	2.56	5
	Head 820	e'	42.2100	Relative Permittivity (ϵ_r):	42.21	41.60	1.46	5
		e''	19.9900	Conductivity (σ):	0.91	0.90	1.44	5
	Head 850	e'	41.8200	Relative Permittivity (ϵ_r):	41.82	41.50	0.77	5
		e''	19.8700	Conductivity (σ):	0.94	0.92	2.63	5
2/16/2015	Body 835	e'	54.5800	Relative Permittivity (ϵ_r):	54.58	55.20	-1.12	5
		e''	21.8600	Conductivity (σ):	1.01	0.97	4.63	5
	Body 820	e'	54.6900	Relative Permittivity (ϵ_r):	54.69	55.28	-1.06	5
		e''	22.0500	Conductivity (σ):	1.01	0.97	3.81	5
	Body 850	e'	54.3900	Relative Permittivity (ϵ_r):	54.39	55.16	-1.39	5
		e''	21.8400	Conductivity (σ):	1.03	0.99	4.57	5
2/19/2015	Head 835	e'	40.5000	Relative Permittivity (ϵ_r):	40.50	41.50	-2.41	5
		e''	19.2000	Conductivity (σ):	0.89	0.90	-0.95	5
	Head 820	e'	40.7000	Relative Permittivity (ϵ_r):	40.70	41.60	-2.17	5
		e''	19.2800	Conductivity (σ):	0.88	0.90	-2.16	5
	Head 850	e'	40.2200	Relative Permittivity (ϵ_r):	40.22	41.50	-3.08	5
		e''	19.1800	Conductivity (σ):	0.91	0.92	-0.93	5
2/19/2015	Body 835	e'	53.1000	Relative Permittivity (ϵ_r):	53.10	55.20	-3.80	5
		e''	21.4500	Conductivity (σ):	1.00	0.97	2.67	5
	Body 820	e'	53.2200	Relative Permittivity (ϵ_r):	53.22	55.28	-3.72	5
		e''	21.5600	Conductivity (σ):	0.98	0.97	1.50	5
	Body 850	e'	52.9300	Relative Permittivity (ϵ_r):	52.93	55.16	-4.04	5
		e''	21.4800	Conductivity (σ):	1.02	0.99	2.84	5

SAR Lab 4

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
2/16/2015	Head 1900	e'	38.2700	Relative Permittivity (ϵ_r):	38.27	40.00	-4.32	5
		e''	13.1400	Conductivity (σ):	1.39	1.40	-0.84	5
	Head 1850	e'	38.4500	Relative Permittivity (ϵ_r):	38.45	40.00	-3.87	5
		e''	12.9500	Conductivity (σ):	1.33	1.40	-4.85	5
	Head 1910	e'	38.1600	Relative Permittivity (ϵ_r):	38.16	40.00	-4.60	5
		e''	13.1800	Conductivity (σ):	1.40	1.40	-0.02	5
2/16/2015	Body 1900	e'	51.2600	Relative Permittivity (ϵ_r):	51.26	53.30	-3.83	5
		e''	14.5600	Conductivity (σ):	1.54	1.52	1.20	5
	Body 1850	e'	51.3800	Relative Permittivity (ϵ_r):	51.38	53.30	-3.60	5
		e''	14.3900	Conductivity (σ):	1.48	1.52	-2.62	5
	Body 1910	e'	51.1700	Relative Permittivity (ϵ_r):	51.17	53.30	-4.00	5
		e''	14.5500	Conductivity (σ):	1.55	1.52	1.66	5
2/26/2015	Body 1900	e'	51.5000	Relative Permittivity (ϵ_r):	51.50	53.30	-3.38	5
		e''	14.7000	Conductivity (σ):	1.55	1.52	2.17	5
	Body 1850	e'	51.6900	Relative Permittivity (ϵ_r):	51.69	53.30	-3.02	5
		e''	14.6300	Conductivity (σ):	1.50	1.52	-0.99	5
	Body 1910	e'	51.4900	Relative Permittivity (ϵ_r):	51.49	53.30	-3.40	5
		e''	14.7700	Conductivity (σ):	1.57	1.52	3.20	5

SAR Lab 5

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
2/23/2015	Head 1750	e'	39.2400	Relative Permittivity (ϵ_r):	39.24	40.08	-2.11	5
		e"	14.3700	Conductivity (σ):	1.40	1.37	2.14	5
	Head 1710	e'	39.4900	Relative Permittivity (ϵ_r):	39.49	40.15	-1.63	5
		e"	14.1400	Conductivity (σ):	1.34	1.35	-0.15	5
	Head 1755	e'	39.3500	Relative Permittivity (ϵ_r):	39.35	40.08	-1.81	5
		e"	14.3700	Conductivity (σ):	1.40	1.37	2.22	5
2/23/2015	Body 1750	e'	51.6500	Relative Permittivity (ϵ_r):	51.65	53.44	-3.35	5
		e"	15.6900	Conductivity (σ):	1.53	1.49	2.73	5
	Body 1710	e'	51.8400	Relative Permittivity (ϵ_r):	51.84	53.54	-3.18	5
		e"	15.4800	Conductivity (σ):	1.47	1.46	0.71	5
	Body 1755	e'	51.7500	Relative Permittivity (ϵ_r):	51.75	53.43	-3.14	5
		e"	15.6000	Conductivity (σ):	1.52	1.49	2.22	5
3/16/2015	Body 1900	e'	51.3700	Relative Permittivity (ϵ_r):	51.37	53.30	-3.62	5
		e"	14.2500	Conductivity (σ):	1.51	1.52	-0.96	5
	Body 1850	e'	51.5600	Relative Permittivity (ϵ_r):	51.56	53.30	-3.26	5
		e"	14.1400	Conductivity (σ):	1.45	1.52	-4.31	5
	Body 1910	e'	51.3100	Relative Permittivity (ϵ_r):	51.31	53.30	-3.73	5
		e"	14.2800	Conductivity (σ):	1.52	1.52	-0.23	5
3/16/2015	Body 1750	e'	51.2900	Relative Permittivity (ϵ_r):	51.29	53.44	-4.03	5
		e"	15.0900	Conductivity (σ):	1.47	1.49	-1.20	5
	Body 1710	e'	51.4400	Relative Permittivity (ϵ_r):	51.44	53.54	-3.93	5
		e"	15.0200	Conductivity (σ):	1.43	1.46	-2.29	5
	Body 1755	e'	51.3300	Relative Permittivity (ϵ_r):	51.33	53.43	-3.93	5
		e"	15.1500	Conductivity (σ):	1.48	1.49	-0.73	5

SAR Lab 5 (continued)

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
3/17/2015	Body 835	e'	53.9700	Relative Permittivity (ε _r):	53.97	55.20	-2.23	5
		e"	21.1600	Conductivity (σ):	0.98	0.97	1.28	5
	Body 820	e'	54.0100	Relative Permittivity (ε _r):	54.01	55.28	-2.29	5
		e"	21.3600	Conductivity (σ):	0.97	0.97	0.56	5
	Body 850	e'	53.6000	Relative Permittivity (ε _r):	53.60	55.16	-2.82	5
		e"	21.1700	Conductivity (σ):	1.00	0.99	1.36	5
3/17/2015	Body 750	e'	53.4100	Relative Permittivity (ε _r):	53.41	55.55	-3.85	5
		e"	23.0300	Conductivity (σ):	0.96	0.96	-0.28	5
	Body 700	e'	53.9300	Relative Permittivity (ε _r):	53.93	55.74	-3.24	5
		e"	23.6000	Conductivity (σ):	0.92	0.96	-4.24	5
	Body 725	e'	53.6400	Relative Permittivity (ε _r):	53.64	55.64	-3.60	5
		e"	23.3200	Conductivity (σ):	0.94	0.96	-2.19	5
3/19/2015	Head 835	e'	41.6400	Relative Permittivity (ε _r):	41.64	41.50	0.34	5
		e"	19.6000	Conductivity (σ):	0.91	0.90	1.11	5
	Head 820	e'	41.7600	Relative Permittivity (ε _r):	41.76	41.60	0.38	5
		e"	19.6000	Conductivity (σ):	0.89	0.90	-0.54	5
	Head 850	e'	41.2800	Relative Permittivity (ε _r):	41.28	41.50	-0.53	5
		e"	19.5400	Conductivity (σ):	0.92	0.92	0.93	5
3/19/2015	Body 835	e'	52.5300	Relative Permittivity (ε _r):	52.53	55.20	-4.84	5
		e"	21.2600	Conductivity (σ):	0.99	0.97	1.76	5
	Body 820	e'	52.7400	Relative Permittivity (ε _r):	52.74	55.28	-4.59	5
		e"	21.4000	Conductivity (σ):	0.98	0.97	0.75	5
	Body 850	e'	52.4100	Relative Permittivity (ε _r):	52.41	55.16	-4.98	5
		e"	21.2400	Conductivity (σ):	1.00	0.99	1.69	5
3/23/2015	Head 750	e'	40.2700	Relative Permittivity (ε _r):	40.27	41.96	-4.03	5
		e"	21.3300	Conductivity (σ):	0.89	0.89	-0.40	5
	Head 700	e'	40.9600	Relative Permittivity (ε _r):	40.96	42.22	-2.98	5
		e"	21.7800	Conductivity (σ):	0.85	0.89	-4.67	5
	Head 725	e'	40.7100	Relative Permittivity (ε _r):	40.71	42.09	-3.28	5
		e"	21.5700	Conductivity (σ):	0.87	0.89	-2.43	5
3/23/2015	Body 750	e'	53.5000	Relative Permittivity (ε _r):	53.50	55.55	-3.68	5
		e"	22.9900	Conductivity (σ):	0.96	0.96	-0.45	5
	Body 700	e'	53.9600	Relative Permittivity (ε _r):	53.96	55.74	-3.19	5
		e"	23.5200	Conductivity (σ):	0.92	0.96	-4.56	5
	Body 725	e'	53.7800	Relative Permittivity (ε _r):	53.78	55.64	-3.35	5
		e"	23.2400	Conductivity (σ):	0.94	0.96	-2.53	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 $\pm$ 0.2 mm (bottom plate) filled with Body or Head simulating liquid of the following parameters.
- The depth of tissue-equivalent liquid in a phantom must be $\geq$ 15.0 cm for SAR measurements $\leq$ 3 GHz and $\geq$ 10.0 cm for measurements $>$ 3 GHz.
- The DASY system with an E-Field Probe was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 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	1019	3/17/2014	750	1g	8.21	8.64
				10g	5.38	5.69
D750V3	1024	5/16/2014	750	1g	8.12	8.77
				10g	5.26	5.79
D835V2	4d142	9/9/2014	835	1g	8.91	9.22
				10g	5.77	6.05
D1750V2	1077	9/11/2014	1750	1g	36.5	36.9
				10g	19.4	19.8
D1900V2	5d163	9/11/2014	1900	1g	40.8	40.6
				10g	21.2	21.4

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 Lab 2

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			
2/24/2015	D750V3	1019	Head	1g	0.85	8.5	8.21	3.29	1,2
				10g	0.55	5.5	5.38	2.60	
2/24/2015	D750V3	1019	Body	1g	0.90	9.0	8.64	4.40	
				10g	0.60	6.0	5.69	5.62	

SAR Lab 3

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			
2/16/2015	D835V2	4d142	Head	1g	0.95	9.5	8.91	6.51	3,4
				10g	0.62	6.2	5.77	7.63	
2/16/2015	D835V2	4d142	Body	1g	0.98	9.8	9.22	5.75	
				10g	0.64	6.4	6.05	6.12	
2/19/2015	D835V2	4d142	Head	1g	0.89	8.9	8.91	0.34	
				10g	0.58	5.8	5.77	1.21	
2/19/2015	D835V2	4d142	Body	1g	0.89	8.9	9.22	-4.01	
				10g	0.58	5.8	6.05	-4.13	

SAR Lab 4

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			
2/16/2015	1900	5d163	Head	1g	3.87	38.7	40.8	-5.15	
				10g	1.99	19.9	21.2	-6.13	
2/16/2015	1900	5d163	Body	1g	3.79	37.9	40.60	-6.65	5,6
				10g	1.96	19.6	21.4	-8.41	
2/26/2015	1900	5d163	Body	1g	3.81	38.1	40.60	-6.16	
				10g	1.98	19.8	21.40	-7.48	

SAR Lab 5

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			
2/23/2015	D1750V2	1077	Head	1g	3.56	35.6	-2.47	
				10g	1.89	18.9	-2.58	
2/23/2015	D1750V2	1077	Body	1g	3.77	37.7	2.17	
				10g	2.01	20.1	1.52	
3/16/2015	D1900V2	5d163	Body	1g	4.27	42.7	5.17	7,8
				10g	2.23	22.3	4.21	
3/16/2015	D1750V2	1077	Body	1g	3.40	34.0	-7.86	9,10
				10g	1.82	18.2	-8.08	
3/17/2015	D835V2	4d142	Body	1g	0.91	9.1	-0.98	
				10g	0.60	6.0	-0.50	
3/17/2015	D750V3	1024	Body	1g	0.85	8.5	-3.19	
				10g	0.57	5.7	-2.25	
3/19/2015	D835V2	4d142	Head	1g	0.93	9.3	4.04	
				10g	0.61	6.1	5.55	
3/19/2015	D835V2	4d142	Body	1g	0.99	9.9	7.05	11,12
				10g	0.65	6.5	7.77	
3/23/2015	D750V3	1024	Head	1g	0.78	7.8	-3.45	13,14
				10g	0.51	5.1	-2.47	
3/23/2015	D750V3	1024	Body	1g	0.87	8.7	-0.91	
				10g	0.58	5.8	0.00	

9. Conducted Output Power Measurements

9.1. GSM

GSM850 Measured Results

Band	Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Max. Power		with Pwr Back-off	
						Burst Pwr (dBm)	Frame Pwr (dBm)	Burst Pwr (dBm)	Frame Pwr (dBm)
850	GSM (Voice)	CS1	1	128	824.2	32.3	23.3	22.3	13.3
				190	836.6	32.2	23.2	22.3	13.3
				251	848.8	32.3	23.3	22.5	13.5
	GPRS (GMSK)	CS1	1	128	824.2	32.3	23.3	22.3	13.3
				190	836.6	32.2	23.2	22.3	13.3
				251	848.8	32.3	23.3	22.5	13.5
			2	128	824.2	30.4	24.4	22.3	16.3
				190	836.6	30.4	24.4	22.4	16.4
				251	848.8	30.3	24.3	22.5	16.5
			3	128	824.2	28.6	24.3	22.3	18.0
				190	836.6	28.6	24.3	22.4	18.1
				251	848.8	28.7	24.4	22.5	18.2
			4	128	824.2	26.4	23.4	21.3	18.3
				190	836.6	26.4	23.4	21.5	18.5
				251	848.8	26.5	23.5	21.5	18.5
	EGPRS (8PSK)	MCS5	1	128	824.2	27.2	18.2	16.5	7.5
				190	836.6	27.0	18.0	16.4	7.4
				251	848.8	27.5	18.5	17.0	8.0
			2	128	824.2	25.6	19.6	16.4	10.4
				190	836.6	25.2	19.2	16.2	10.2
				251	848.8	26.0	20.0	16.8	10.8
			3	128	824.2	23.4	19.1	16.2	11.9
				190	836.6	23.0	18.7	16.1	11.8
				251	848.8	23.7	19.4	16.7	12.4
			4	128	824.2	21.1	18.1	15.0	12.0
				190	836.6	20.8	17.8	14.8	11.8
				251	848.8	21.5	18.5	15.4	12.4

Notes:

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

- Head: GMSK Voice Mode
- Standalone: GMSK (GPRS) mode with 3 time slots for Maximum power and 4 time slots for Reduced, power 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)	Max. Power		with Pwr Back-off	
						Burst Pwr (dBm)	Frame Pwr (dBm)	Burst Pwr (dBm)	Frame Pwr (dBm)
1900	GSM (Voice)	CS1	1	512	1850.2	30.4	21.4	13.3	4.3
				661	1880.0	30.4	21.4	13.3	4.3
				810	1909.8	30.5	21.5	13.0	4.0
	GPRS (GMSK)	CS1	1	512	1850.2	30.4	21.4	13.3	4.3
				661	1880.0	30.4	21.4	13.3	4.3
				810	1909.8	30.5	21.5	13.0	4.0
			2	512	1850.2	28.9	22.9	13.2	7.2
				661	1880.0	28.9	22.9	13.3	7.3
				810	1909.8	29.0	23.0	13.0	7.0
			3	512	1850.2	27.0	22.7	13.2	8.9
				661	1880.0	26.9	22.6	13.2	8.9
				810	1909.8	27.0	22.7	13.0	8.7
			4	512	1850.2	24.9	21.9	13.2	10.2
				661	1880.0	24.8	21.8	13.2	10.2
				810	1909.8	24.8	21.8	12.9	9.9
	EGPRS (8PSK)	MCS5	1	512	1850.2	26.2	17.2	9.3	0.3
				661	1880.0	26.2	17.2	9.2	0.2
				810	1909.8	26.3	17.3	9.3	0.3
			2	512	1850.2	24.7	18.7	9.3	3.3
				661	1880.0	24.4	18.4	9.1	3.1
				810	1909.8	24.5	18.5	9.2	3.2
			3	512	1850.2	22.3	18.0	9.1	4.8
				661	1880.0	22.2	17.9	8.9	4.6
				810	1909.8	22.3	18.0	9.0	4.7
			4	512	1850.2	20.1	17.1	8.9	5.9
				661	1880.0	20.0	17.0	8.7	5.7
				810	1909.8	20.2	17.2	8.8	5.8

Notes:

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

- Head: GMSK Voice Mode
- Standalone: GMSK (GPRS) mode with 2 time slots for Maximum power and 4 time slots for Reduced, power 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 7 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	12/15	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} = β_{hs}/β_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

HSPA+

Since 16QAM is not used for uplink, the uplink Category and release is same as HSUPA, i.e., CAT 6 Rel 6. Therefore, the RF conducted power is not measured.

Measured Results

Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Avg Pwr (dBm)	
						Max	Pwr Back-off
W-CDMA Band II	Rel 99	RMC, 12.2 kbps	9262	1852.4	N/A	23.2	Reduce power qualifies for SAR Exclusion. Please refer to Section 7.2
			9400	1880.0	N/A	23.1	
			9538	1907.6	N/A	23.4	
	HSDPA	Subtest 1	9262	1852.4	0	23.1	
			9400	1880.0	0	23.0	
			9538	1907.6	0	23.3	
		Subtest 2	9262	1852.4	0	23.0	
			9400	1880.0	0	22.8	
			9538	1907.6	0	22.7	
		Subtest 3	9262	1852.4	0.5	22.6	
			9400	1880.0	0.5	22.4	
			9538	1907.6	0.5	22.4	
		Subtest 4	9262	1852.4	0.5	22.6	
			9400	1880.0	0.5	22.4	
			9538	1907.6	0.5	22.4	
	HSUPA	Subtest 1	9262	1852.4	0	23.1	
			9400	1880.0	0	22.9	
			9538	1907.6	0	23.2	
		Subtest 2	9262	1852.4	2	21.5	
			9400	1880.0	2	21.5	
			9538	1907.6	2	21.5	
		Subtest 3	9262	1852.4	1	22.4	
			9400	1880.0	1	22.3	
			9538	1907.6	1	22.5	
		Subtest 4	9262	1852.4	2	21.5	
			9400	1880.0	2	21.5	
			9538	1907.6	2	21.5	
		Subtest 5	9262	1852.4	0	23.2	
			9400	1880.0	0	23.1	
			9538	1907.6	0	23.4	

Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Avg Pwr (dBm)	
						Max	Pwr Back-off
W-CDMA Band IV	Rel 99	RMC, 12.2 kbps	1312	1712.4	N/A	22.4	13.0
			1413	1732.6	N/A	22.4	12.8
			1513	1752.6	N/A	22.3	12.8
	HSDPA	Subtest 1	1312	1712.4	0	22.4	12.0
			1413	1732.6	0	22.4	11.9
			1513	1752.6	0	22.3	12.0
		Subtest 2	1312	1712.4	0	22.1	12.1
			1413	1732.6	0	22.1	11.9
			1513	1752.6	0	21.9	12.0
		Subtest 3	1312	1712.4	0.5	21.6	11.5
			1413	1732.6	0.5	21.6	11.4
			1513	1752.6	0.5	21.4	11.5
		Subtest 4	1312	1712.4	0.5	21.6	11.5
			1413	1732.6	0.5	21.6	11.4
			1513	1752.6	0.5	21.4	11.5
	HSUPA	Subtest 1	1312	1712.4	0	22.4	10.8
			1413	1732.6	0	22.4	11.0
			1513	1752.6	0	22.3	11.1
		Subtest 2	1312	1712.4	2	21.0	9.5
			1413	1732.6	2	21.0	9.1
			1513	1752.6	2	21.0	9.2
		Subtest 3	1312	1712.4	1	21.9	9.8
			1413	1732.6	1	21.8	9.6
			1513	1752.6	1	21.7	9.9
		Subtest 4	1312	1712.4	2	21.0	9.5
			1413	1732.6	2	21.0	9.1
			1513	1752.6	2	21.0	9.2
		Subtest 5	1312	1712.4	0	22.4	10.8
			1413	1732.6	0	22.4	11.0
			1513	1752.6	0	22.3	11.1

Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Avg Pwr (dBm)	
						Max	Pwr Back-off
W-CDMA Band V	Rel 99	RMC, 12.2 kbps	4132	826.4	N/A	22.5	18.3
			4183	836.6	N/A	22.4	18.3
			4233	846.6	N/A	22.4	18.2
	HSDPA	Subtest 1	4132	826.4	0	22.3	17.3
			4183	836.6	0	22.3	17.3
			4233	846.6	0	22.3	17.2
		Subtest 2	4132	826.4	0	22.1	17.3
			4183	836.6	0	22.2	17.3
			4233	846.6	0	22.2	17.1
		Subtest 3	4132	826.4	0.5	21.7	16.7
			4183	836.6	0.5	22.0	16.8
			4233	846.6	0.5	21.9	16.6
		Subtest 4	4132	826.4	0.5	21.8	16.8
			4183	836.6	0.5	22.0	16.8
			4233	846.6	0.5	21.8	16.6
	HSUPA	Subtest 1	4132	826.4	0	22.4	16.3
			4183	836.6	0	22.3	16.0
			4233	846.6	0	21.7	16.0
		Subtest 2	4132	826.4	2	21.0	13.7
			4183	836.6	2	21.0	13.8
			4233	846.6	2	21.0	13.7
		Subtest 3	4132	826.4	1	21.7	14.8
			4183	836.6	1	21.6	15.0
			4233	846.6	1	21.6	14.9
		Subtest 4	4132	826.4	2	21.0	13.7
			4183	836.6	2	21.0	13.8
			4233	846.6	2	21.0	13.7
		Subtest 5	4132	826.4	0	22.5	16.6
			4183	836.6	0	22.4	16.5
			4233	846.6	0	22.4	16.5

9.4. 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
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

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

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Pwr Back-off Avg Pwr (dBm)		
						1860 MHz	1880 MHz	1900 MHz		1860 MHz	1880 MHz	1900 MHz
LTE Band 2	20	QPSK	1	0	0	23.1	23.3	23.3	Reduce power qualifies for SAR Exclusion. Please refer to Section 7.2			
			1	49	0	23.2	23.2	23.2				
			1	99	0	23.2	23.3	23.3				
			50	0	1	22.3	22.4	22.4				
			50	24	1	22.3	22.4	22.4				
			50	50	1	22.3	22.3	22.4				
		16QAM	100	0	1	22.3	22.4	22.4				
			1	0	1	22.5	22.5	22.5				
			1	49	1	22.5	22.5	22.5				
			1	99	1	22.5	22.5	22.5				
			50	0	2	21.4	21.4	21.4				
			50	24	2	21.4	21.4	21.4				
			50	50	2	21.4	21.4	21.4				
			100	0	2	21.4	21.3	21.4				
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Pwr Back-off Avg Pwr (dBm)		
						1857.5 MHz	1880 MHz	1902.5 MHz		1857.5 MHz	1880 MHz	1902.5 MHz
LTE Band 2	15	QPSK	1	0	0	23.0	23.2	23.1	Reduce power qualifies for SAR Exclusion. Please refer to Section 7.2			
			1	37	0	23.0	23.1	23.0				
			1	74	0	23.0	23.1	23.1				
			36	0	1	22.3	22.4	22.4				
			36	20	1	22.3	22.3	22.4				
			36	39	1	22.3	22.4	22.4				
		16QAM	75	0	1	22.3	22.4	22.4				
			1	0	1	22.4	22.5	22.5				
			1	37	1	22.5	22.5	22.5				
			1	74	1	22.5	22.5	22.5				
			36	0	2	21.2	21.4	21.3				
			36	20	2	21.3	21.4	21.3				
			36	39	2	21.3	21.4	21.3				
			75	0	2	21.3	21.4	21.4				
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Pwr Back-off Avg Pwr (dBm)		
						1855 MHz	1880 MHz	1905 MHz		1855 MHz	1880 MHz	1905 MHz
LTE Band 2	10	QPSK	1	0	0	22.9	23.1	23.1	Reduce power qualifies for SAR Exclusion. Please refer to Section 7.2			
			1	25	0	23.0	23.1	23.1				
			1	49	0	23.1	23.1	23.2				
			25	0	1	22.2	22.3	22.4				
			25	12	1	22.2	22.3	22.4				
			25	25	1	22.3	22.3	22.5				
		16QAM	50	0	1	22.2	22.3	22.4				
			1	0	1	22.4	22.5	22.5				
			1	25	1	22.5	22.5	22.5				
			1	49	1	22.5	22.5	22.5				
			25	0	2	21.2	21.3	21.5				
			25	12	2	21.3	21.3	21.5				
			25	25	2	21.3	21.3	21.5				
			50	0	2	21.2	21.3	21.5				

LTE Band 2 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Pwr Back-off Avg Pwr (dBm)		
						1852.5 MHz	1880 MHz	1907.5 MHz		1852.5 MHz	1880 MHz	1907.5 MHz
LTE Band 2	5	QPSK	1	0	0	23.0	23.1	23.0	Reduce power qualifies for SAR Exclusion. Please refer to Section 7.2			
			1	12	0	23.1	23.1	23.0				
			1	24	0	23.1	23.1	23.1				
			12	0	1	22.2	22.3	22.4				
			12	7	1	22.2	22.3	22.4				
			12	13	1	22.2	22.3	22.4				
		16QAM	25	0	1	22.2	22.3	22.4				
			1	0	1	22.5	22.5	22.5				
			1	12	1	22.5	22.5	22.5				
			1	24	1	22.5	22.5	22.5				
			12	0	2	21.3	21.3	21.4				
			12	7	2	21.3	21.3	21.4				
			12	13	2	21.3	21.3	21.4				
			25	0	2	21.1	21.2	21.5				
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Pwr Back-off Avg Pwr (dBm)		
						1851.5 MHz	1880 MHz	1908.5 MHz		1851.5 MHz	1880 MHz	1908.5 MHz
LTE Band 2	3	QPSK	1	0	0	23.0	23.1	23.0	Reduce power qualifies for SAR Exclusion. Please refer to Section 7.2			
			1	8	0	23.1	23.1	23.0				
			1	14	0	23.1	23.1	23.1				
			8	0	1	22.2	22.3	22.4				
			8	4	1	22.2	22.3	22.4				
			8	7	1	22.2	22.3	22.4				
		16QAM	15	0	1	22.2	22.3	22.4				
			1	0	1	22.5	22.5	22.5				
			1	8	1	22.5	22.5	22.5				
			1	14	1	22.5	22.5	22.5				
			8	0	2	21.3	21.3	21.4				
			8	4	2	21.3	21.3	21.4				
			8	7	2	21.3	21.3	21.4				
			15	0	2	21.1	21.2	21.5				
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Pwr Back-off Avg Pwr (dBm)		
						1850.7 MHz	1880 MHz	1909.3 MHz		1850.7 MHz	1880 MHz	1909.3 MHz
LTE Band 2	1.4	QPSK	1	0	0	22.9	23.0	23.1	Reduce power qualifies for SAR Exclusion. Please refer to Section 7.2			
			1	3	0	22.9	23.1	23.1				
			1	5	0	22.9	23.1	23.1				
			3	0	0	23.0	23.2	23.3				
			3	1	0	23.0	23.2	23.3				
			3	3	0	23.0	23.2	23.3				
		16QAM	6	0	1	22.3	22.5	22.5				
			1	0	1	22.5	22.5	22.5				
			1	3	1	22.5	22.5	22.5				
			1	5	1	22.5	22.5	22.5				
			3	0	1	22.3	22.5	22.5				
			3	1	1	22.3	22.5	22.5				
			3	3	1	22.3	22.5	22.5				
			6	0	2	21.4	21.2	21.5				

LTE Band 4 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Pwr Back-off 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	23.4	23.3	23.2	Reduce power qualifies for SAR Exclusion. Please refer to Section 7.2			
			1	49	0	23.3	23.1	23.1				
			1	99	0	23.1	23.3	23.0				
			50	0	1	21.7	21.5	21.6				
			50	24	1	21.7	21.5	21.5				
			50	50	1	21.6	21.5	21.5				
		16QAM	100	0	1	21.7	21.5	21.5				
			1	0	1	22.5	22.5	22.5				
			1	49	1	22.5	22.5	22.5				
			1	99	1	22.5	22.5	22.5				
			50	0	2	20.9	20.7	20.8				
			50	24	2	20.9	20.7	20.7				
			50	50	2	20.7	20.8	20.6				
			100	0	2	20.9	20.7	20.8				
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Pwr Back-off 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	23.1	23.0	23.0	Reduce power qualifies for SAR Exclusion. Please refer to Section 7.2			
			1	37	0	23.0	22.9	22.7				
			1	74	0	22.9	23.0	22.7				
			36	0	1	21.5	21.5	21.5				
			36	20	1	21.6	21.5	21.5				
			36	39	1	21.5	21.5	21.5				
		16QAM	75	0	1	21.6	21.5	21.5				
			1	0	1	22.4	22.5	22.5				
			1	37	1	22.3	22.5	22.5				
			1	74	1	22.2	22.5	22.5				
			36	0	2	20.8	20.6	20.5				
			36	20	2	20.8	20.6	21.5				
			36	39	2	20.8	20.6	21.5				
			75	0	2	20.8	20.6	20.5				
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Pwr Back-off 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	23.2	23.1	23.0	Reduce power qualifies for SAR Exclusion. Please refer to Section 7.2			
			1	25	0	23.2	23.0	22.8				
			1	49	0	23.2	23.1	22.8				
			25	0	1	21.6	21.5	21.5				
			25	12	1	21.6	21.5	21.5				
			25	25	1	21.6	21.5	21.5				
		16QAM	50	0	1	21.6	21.5	21.5				
			1	0	1	22.5	22.5	22.3				
			1	25	1	22.5	22.5	22.2				
			1	49	1	22.5	22.5	22.2				
			25	0	2	20.9	20.6	20.7				
			25	12	2	20.9	20.7	20.7				
			25	25	2	20.9	20.7	20.7				
			50	0	2	20.8	20.6	20.6				

LTE Band 4 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Pwr Back-off 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	23.3	23.2	23.0	Reduce power qualifies for SAR Exclusion. Please refer to Section 7.2			
			1	12	0	23.2	23.2	23.0				
			1	24	0	23.3	23.2	23.0				
			12	0	1	21.7	21.5	21.5				
			12	7	1	21.7	21.6	21.5				
			12	13	1	21.7	21.6	21.5				
		16QAM	25	0	1	21.7	21.5	21.5				
			1	0	1	22.5	22.5	22.5				
			1	12	1	22.5	22.5	22.5				
			1	24	1	22.5	22.5	22.5				
			12	0	2	21.0	20.9	20.7				
			12	7	2	21.0	20.9	20.8				
			12	13	2	21.0	20.9	20.8				
			25	0	2	21.1	20.7	20.6				
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Pwr Back-off 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	23.2	23.1	22.9	Reduce power qualifies for SAR Exclusion. Please refer to Section 7.2			
			1	7	0	23.2	23.1	22.9				
			1	14	0	23.3	23.1	22.9				
			8	0	1	21.8	21.6	21.5				
			8	4	1	21.8	21.6	21.5				
			8	7	1	21.8	21.7	21.5				
		16QAM	15	0	1	21.7	21.5	21.5				
			1	0	1	22.5	22.5	22.3				
			1	7	1	22.5	22.5	22.3				
			1	14	1	22.5	22.5	22.3				
			8	0	2	21.2	20.7	21.0				
			8	4	2	21.1	20.7	21.0				
			8	7	2	21.1	20.7	21.0				
			15	0	2	21.0	20.8	20.6				
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Pwr Back-off 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	23.3	23.1	23.0	Reduce power qualifies for SAR Exclusion. Please refer to Section 7.2			
			1	3	0	23.2	23.1	23.0				
			1	5	0	23.2	23.0	22.9				
			3	0	0	23.3	23.2	23.1				
			3	1	0	23.3	23.2	23.1				
			3	3	0	23.3	23.2	23.1				
		16QAM	6	0	1	21.9	21.7	21.5				
			1	0	1	22.5	22.5	22.3				
			1	3	1	22.5	22.5	22.3				
			1	5	1	22.5	22.5	22.3				
			3	0	1	22.5	22.3	22.4				
			3	1	1	22.5	22.3	22.4				
			3	3	1	22.5	22.4	22.4				
			6	0	2	21.2	20.7	21.0				

LTE Band 5 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Pwr Back-off Avg Pwr (dBm)		
						829 MHz	836.5 MHz	844 MHz		829 MHz	836.5 MHz	844 MHz
LTE Band 5	10	QPSK	1	0	0	23.9	24.0	24.0	0	16.9	17.0	16.8
			1	25	0	24.0	24.0	23.9	0	16.9	16.9	16.8
			1	49	0	24.0	24.0	23.9	0	16.7	16.7	16.7
			25	0	1	22.9	23.0	23.0	0	16.7	16.9	16.8
			25	12	1	23.0	23.0	23.0	0	16.8	17.0	16.8
			25	25	1	23.0	23.0	23.0	0	16.9	16.9	16.7
			50	0	1	23.0	23.0	23.0	0	16.8	16.9	16.8
		16QAM	1	0	1	23.0	23.0	23.0	0	17.1	16.8	17.2
			1	25	1	23.0	23.0	23.0	0	17.3	16.8	17.2
			1	49	1	23.0	23.0	23.0	0	17.3	16.6	17.2
			25	0	2	22.0	22.0	22.0	0	16.7	17.0	16.9
			25	12	2	22.0	22.0	22.0	0	16.9	17.1	16.9
			25	25	2	22.0	22.0	22.0	0	17.0	17.0	16.8
			50	0	2	22.0	22.0	22.0	0	16.9	17.0	16.9
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Pwr Back-off Avg Pwr (dBm)		
						826.5 MHz	836.5 MHz	846.5 MHz		826.5 MHz	836.5 MHz	846.5 MHz
LTE Band 5	5	QPSK	1	0	0	23.8	24.0	24.0	0	16.8	16.9	16.8
			1	12	0	23.9	24.0	24.0	0	16.7	16.9	16.7
			1	24	0	24.0	24.0	24.0	0	16.9	16.9	16.8
			12	0	1	22.9	23.0	23.0	0	16.6	17.0	16.7
			12	7	1	22.9	23.0	23.0	0	16.6	17.0	16.7
			12	13	1	23.0	23.0	23.0	0	16.7	16.9	16.8
			25	0	1	22.9	23.0	23.0	0	16.6	17.0	16.7
		16QAM	1	0	1	23.0	23.0	23.0	0	17.0	17.6	16.7
			1	12	1	23.0	23.0	23.0	0	16.8	17.6	16.7
			1	24	1	23.0	23.0	23.0	0	17.0	17.6	16.7
			12	0	2	22.0	22.0	22.0	0	16.7	17.1	16.7
			12	7	2	22.0	22.0	22.0	0	16.7	17.0	16.8
			12	13	2	22.0	22.0	22.0	0	16.8	17.0	16.7
			25	0	2	22.0	22.0	22.0	0	16.7	17.0	16.9
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Pwr Back-off Avg Pwr (dBm)		
						825.5 MHz	836.5 MHz	847.5 MHz		825.5 MHz	836.5 MHz	847.5 MHz
LTE Band 5	3	QPSK	1	0	0	23.8	24.0	23.9	0	16.8	16.9	16.8
			1	8	0	23.8	24.0	23.9	0	16.7	16.9	16.7
			1	14	0	23.9	24.0	23.9	0	16.9	16.9	16.8
			8	0	1	23.0	23.0	23.0	0	16.6	17.0	16.7
			8	4	1	23.0	23.0	23.0	0	16.6	17.0	16.7
			8	7	1	23.0	23.0	23.0	0	16.7	16.9	16.8
			15	0	1	22.9	23.0	23.0	0	16.6	17.0	16.7
		16QAM	1	0	1	23.0	23.0	23.0	0	17.0	17.6	16.7
			1	8	1	23.0	23.0	23.0	0	16.8	17.6	16.7
			1	14	1	23.0	23.0	23.0	0	17.0	17.6	16.7
			8	0	2	22.0	22.0	22.0	0	16.7	17.1	16.7
			8	4	2	22.0	22.0	22.0	0	16.7	17.0	16.8
			8	7	2	22.0	22.0	22.0	0	16.8	17.0	16.7
			15	0	2	22.0	22.0	22.0	0	16.7	17.0	16.9

LTE Band 5 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Full Avg Pwr (dBm)			Target MPR	Reduce Avg Pwr (dBm)		
						824.7 MHz	836.5 MHz	848.3 MHz		824.7 MHz	836.5 MHz	848.3 MHz
LTE Band 5	1.4	QPSK	1	0	0	23.9	23.9	23.9	0	16.6	16.9	16.8
			1	3	0	23.9	24.0	23.9	0	16.5	16.9	16.8
			1	5	0	23.9	24.0	23.9	0	16.6	16.9	16.8
			3	0	0	23.8	24.0	24.0	0	16.7	16.9	16.8
			3	1	0	23.9	24.0	24.0	0	16.7	17.0	16.8
			3	3	0	23.9	24.0	24.0	0	16.6	16.9	16.8
			6	0	1	23.0	23.0	23.0	0	16.7	16.9	16.7
		16QAM	1	0	1	23.0	23.0	23.0	0	16.5	17.4	16.6
			1	3	1	23.0	23.0	23.0	0	16.5	17.4	16.6
			1	5	1	23.0	23.0	23.0	0	16.5	17.3	16.6
			3	0	1	23.0	23.0	23.0	0	16.9	17.3	17.0
			3	1	1	23.0	23.0	23.0	0	16.9	17.3	17.0
			3	3	1	23.0	23.0	23.0	0	16.8	17.3	16.9
			6	0	2	22.0	22.0	22.0	0	16.9	16.9	17.0

LTE Band 17 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Full Avg Pwr (dBm)	Target MPR	Reduce Avg Pwr (dBm)
						710 MHz		710 MHz
LTE Band 17	10	QPSK	1	0	0	23.3	0	20.0
			1	25	0	23.3	0	20.0
			1	49	0	23.3	0	20.0
			25	0	1	22.3	0	20.1
			25	12	1	22.3	0	20.1
			25	25	1	22.3	0	20.1
			50	0	1	22.4	0	20.1
		16QAM	1	0	1	22.6	0	20.3
			1	25	1	22.6	0	20.3
			1	49	1	22.5	0	20.3
			25	0	2	21.6	0	20.3
			25	12	2	21.6	0	20.3
			25	25	2	21.5	0	20.3
			50	0	2	21.5	0	20.2
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Full Avg Pwr (dBm)	Target MPR	Reduce Avg Pwr (dBm)
						710 MHz		710 MHz
LTE Band 17	5	QPSK	1	0	0	23.3	0	20.3
			1	12	0	23.3	0	20.3
			1	24	0	23.3	0	20.3
			12	0	1	22.4	0	20.2
			12	6	1	22.4	0	20.1
			12	11	1	22.3	0	20.1
			25	0	1	22.3	0	20.1
		16QAM	1	0	1	22.6	0	20.1
			1	12	1	22.7	0	20.1
			1	24	1	22.7	0	20.4
			12	0	2	21.7	0	20.4
			12	6	2	21.6	0	20.3
			12	11	2	21.6	0	20.3
			25	0	2	21.6	0	20.3

Note(s):

10/5 MHz Bandwidths does not support at least three non-overlapping channels in certain channel bandwidths. When a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing per KDB 941225 D05 SAR for LTE Devices

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.

The normal tablet procedures in KDB 616217 are required when the over diagonal dimension of the device is > 20.0 cm. Hotspot mode SAR is not required when normal tablet procedures are applied. Extremity 10-g SAR is also not required for the front (top) surface of large form factor full size tablets. The more conservative tablet SAR results can be used to support the 10-g extremity SAR for phablet mode.

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	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up limit	Meas.	Meas.	Scaled	
Head	Voice	ON	0	Left Touch	190	836.6	22.5	22.3	0.053	0.055	1
				Left Tilt	190	836.6	22.5	22.3	0.034	0.036	
				Right Touch	190	836.6	22.5	22.3	0.065	0.068	
				Right Tilt	190	836.6	22.5	22.3	0.059	0.062	
Head VoIP	GPRS 4 Slots	ON	0	Left Touch	190	836.6	21.5	21.5	0.165	0.165	2
				Left Tilt	190	836.6	21.5	21.5	0.117	0.117	
				Right Touch	190	836.6	21.5	21.5	0.240	0.240	
				Right Tilt	190	836.6	21.5	21.5	0.184	0.184	
Body (Standalone)	GPRS 4 Slots	ON	0	Rear	190	836.6	21.5	21.5	0.476	0.476	3
				Edge 1	190	836.6	21.5	21.5	0.378	0.378	
				Edge 4	190	836.6	21.5	21.5	0.085	0.085	
	GPRS 3 Slots	OFF	19	Rear	190	836.6	29.4	28.6	0.138	0.166	
			12	Edge 1	190	836.6	29.4	28.6	0.245	0.295	
			0	Edge 2	190	836.6	29.4	28.6	0.144	0.173	
			0	Edge 4	190	836.6	29.4	28.6	0.243	0.292	

10.2. GSM1900

RF Exposure Conditions	Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up limit	Meas.	Meas.	Scaled	
Head	Voice	ON	0	Left Touch	661	1880.0	13.5	13.3	0.013	0.014	4
				Left Tilt	661	1880.0	13.5	13.3	0.009	0.009	
				Right Touch	661	1880.0	13.5	13.3	0.034	0.036	
				Right Tilt	661	1880.0	13.5	13.3	0.033	0.035	
Head VoIP	GPRS 4 Slots	ON	0	Left Touch	661	1880.0	13.5	13.2	0.045	0.048	5
				Left Tilt	661	1880.0	13.5	13.2	0.039	0.042	
				Right Touch	661	1880.0	13.5	13.2	0.148	0.159	
				Right Tilt	661	1880.0	13.5	13.2	0.127	0.136	
Body (Standalone)	GPRS 4 Slots	ON	0	Rear	661	1880.0	13.5	13.2	0.186	0.199	
				Edge 1	661	1880.0	13.5	13.2	0.165	0.177	
				Edge 4	661	1880.0	13.5	13.2	0.015	0.016	
	GPRS 2 Slots	OFF	19	Rear	661	1880.0	29.0	28.9	0.045	0.046	6
			12	Edge 1	661	1880.0	29.0	28.9	0.025	0.026	
			0	Edge 2	661	1880.0	29.0	28.9	0.019	0.019	
			0	Edge 4	661	1880.0	29.0	28.9	0.241	0.247	

10.3. W-CDMA Band V

RF Exposure Conditions	Mode	Pwr Back-off	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 12.2 kbps	ON	0	Left Touch	4183	836.6	18.5	18.3	0.170	0.178	7
				Left Tilt	4183	836.6	18.5	18.3	0.130	0.136	
				Right Touch	4183	836.6	18.5	18.3	0.243	0.254	
				Right Tilt	4183	836.6	18.5	18.3	0.193	0.202	
Body (Standalone)	Rel 99 RMC	ON	0	Rear	4183	836.6	18.5	18.3	0.445	0.466	8
				Edge 1	4183	836.6	18.5	18.3	0.361	0.378	
				Edge 4	4183	836.6	18.5	18.3	0.080	0.084	
	Rel 99 RMC	OFF	19	Rear	4183	836.6	23.0	22.4	0.056	0.064	
			12	Edge 1	4183	836.6	23.0	22.4	0.119	0.137	
			0	Edge 2	4183	836.6	23.0	22.4	0.054	0.062	
			0	Edge 4	4183	836.6	23.0	22.4	0.131	0.150	

10.4. W-CDMA Band IV

RF Exposure Conditions	Mode	Pwr Back-off	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 12.2 kbps	ON	0	Left Touch	1413	1732.6	13.0	12.8	0.062	0.065	9
				Left Tilt	1413	1732.6	13.0	12.8	0.053	0.055	
				Right Touch	1413	1732.6	13.0	12.8	0.115	0.120	
				Right Tilt	1413	1732.6	13.0	12.8	0.100	0.105	
Body (Standalone)	Rel 99 RMC	ON	0	Rear	1413	1732.6	13.0	12.8	0.252	0.264	10
				Edge 1	1413	1732.6	13.0	12.8	0.194	0.203	
				Edge 4	1413	1732.6	13.0	12.8	0.012	0.013	
	Rel 99 RMC	OFF	19	Rear	1413	1732.6	23.0	22.4	0.015	0.017	
			12	Edge 1	1413	1732.6	23.0	22.4	0.024	0.028	
			0	Edge 2	1413	1732.6	23.0	22.4	0.015	0.017	
			0	Edge 4	1413	1732.6	23.0	22.4	0.044	0.051	

10.5. W-CDMA Band II

RF Exposure Conditions	Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up limit	Meas.	Meas.	Scaled	
Body (Standalone)	Rel 99 RMC	OFF	19	Rear	9400	1880.0	23.5	23.1	0.059	0.064	11
			12	Edge 1	9400	1880.0	23.5	23.1	0.037	0.040	
			0	Edge 2	9400	1880.0	23.5	23.1	0.300	0.329	
			0	Edge 4	9400	1880.0	23.5	23.1	0.361	0.396	

Note(s):

Due to the output power and antenna location for W-CDMA Band II Reduced power, SAR measurements are not required. Please refer to Section 7.2 "Standalone SAR Test Exclusion Considerations" for further guidance on SAR Exclusion for Reduced power W-CDMA Band II.

10.6. LTE Band 2 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Pwr Back-off	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	
Body (Standalone)	QPSK	OFF	19	Rear	18900	1880.0	1	99	23.5	23.3	0.455	0.476	12
							50	24	22.5	22.4	0.350	0.358	
			12	Edge 1	18900	1880.0	1	99	23.5	23.3	0.756	0.792	
							50	24	22.5	22.4	0.580	0.594	
			0	Edge 2	18900	1880.0	1	99	23.5	23.3	0.133	0.139	
							50	24	22.5	22.4	0.093	0.095	
			0	Edge 4	18900	1880.0	1	99	23.5	23.3	0.307	0.321	
							50	24	22.5	22.4	0.200	0.205	

Note(s):

Due to the output power and antenna location for LTE Band 2 Reduced power, SAR measurements are not required. Please refer to Section 7.2 "Standalone SAR Test Exclusion Considerations" for further guidance on SAR Exclusion for Reduced power LTE Band 2.

10.7. LTE Band 4 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Pwr Back-off	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	
Body (Standalone)	QPSK	OFF	19	Rear	20175	1732.5	1	99	23.5	23.3	0.283	0.296	13
							50	50	22.5	21.5	0.187	0.235	
			12	Edge 1	20175	1732.5	1	99	23.5	23.3	0.586	0.614	
							50	50	22.5	21.5	0.395	0.497	
			0	Edge 2	20175	1732.5	1	99	23.5	23.3	0.208	0.218	
							50	50	22.5	21.5	0.136	0.171	
			0	Edge 4	20175	1732.5	1	99	23.5	23.3	0.292	0.306	
							50	50	22.5	21.5	0.190	0.239	

Note(s):

Due to the output power and antenna location for LTE Band 4 Reduced power, SAR measurements are not required. Please refer to Section 7.2 "Standalone SAR Test Exclusion Considerations" for further guidance on SAR Exclusion for Reduced power LTE Band 4.

10.8. LTE Band 5 (10MHz Bandwidth)

RF Exposure Conditions	Mode	Pwr Back-off	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	ON	0	Left Touch	20525	836.6	1	0	18.0	17.0	0.206	0.259	14
							25	12	18.0	17.0	0.174	0.219	
				Left Tilt	20525	836.6	1	0	18.0	17.0	0.149	0.188	
							25	12	18.0	17.0	0.130	0.164	
				Right Touch	20525	836.6	1	0	18.0	17.0	0.288	0.363	
							25	12	18.0	17.0	0.268	0.337	
				Right Tilt	20525	836.6	1	0	18.0	17.0	0.196	0.247	
							25	12	18.0	17.0	0.177	0.223	
Head	16QAM	ON	0	Left Touch	20525	836.6	1	25	18.0	17.3	0.172	0.202	
							25	25	18.0	17.0	0.187	0.235	
				Left Tilt	20525	836.6	1	25	18.0	17.3	0.128	0.150	
							25	25	18.0	17.0	0.142	0.179	
				Right Touch	20525	836.6	1	25	18.0	17.3	0.257	0.302	
							25	25	18.0	17.0	0.273	0.344	
				Right Tilt	20525	836.6	1	25	18.0	17.3	0.172	0.202	
							25	25	18.0	17.0	0.191	0.240	
Body (Standalone)	QPSK	ON	0	Rear	20525	836.6	1	0	18.0	17.0	0.422	0.531	15
							25	12	18.0	17.0	0.529	0.666	
				Edge 1	20525	836.6	1	0	18.0	17.0	0.264	0.332	
							25	12	18.0	17.0	0.360	0.453	
				Edge 4	20525	836.6	1	0	18.0	17.0	0.101	0.127	
							25	12	18.0	17.0	0.078	0.098	
				Rear	20525	836.6	1	25	18.0	17.3	0.412	0.484	
							25	25	18.0	17.0	0.417	0.525	
Body (Standalone)	16QAM	ON	0	Edge 1	20525	836.6	1	25	18.0	17.3	0.239	0.281	
							25	25	18.0	17.0	0.254	0.320	
				Edge 4	20525	836.6	1	25	18.0	17.3	0.074	0.087	
							25	25	18.0	17.0	0.086	0.108	
				Rear	20525	836.6	1	49	24.0	24.0	0.108	0.108	
							25	25	23.0	23.0	0.076	0.076	
				Edge 1	20525	836.6	1	49	24.0	24.0	0.199	0.199	
							25	25	23.0	23.0	0.143	0.143	
Body (Standalone)	QPSK	OFF	19	Edge 2	20525	836.6	1	49	24.0	24.0	0.093	0.093	
							25	25	23.0	23.0	0.067	0.067	
			0	Edge 4	20525	836.6	1	49	24.0	24.0	0.303	0.303	
							25	25	23.0	23.0	0.217	0.217	
			0	Edge 4	20525	836.6	1	49	24.0	24.0	0.303	0.303	
							25	25	23.0	23.0	0.217	0.217	
			0	Edge 4	20525	836.6	1	49	24.0	24.0	0.303	0.303	
							25	25	23.0	23.0	0.217	0.217	

10.9. LTE Band 17 (10MHz Bandwidth)

RF Exposure Conditions	Mode	Pwr Back-off	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	ON	0	Left Touch	23790	710.0	1	0	21.0	20.0	0.145	0.183	
							25	0	21.0	20.1	0.138	0.170	
				Left Tilt	23790	710.0	1	0	21.0	20.0	0.103	0.130	
							25	0	21.0	20.1	0.099	0.122	
				Right Touch	23790	710.0	1	0	21.0	20.0	0.237	0.298	
							25	0	21.0	20.1	0.231	0.284	
				Right Tilt	23790	710.0	1	0	21.0	20.0	0.170	0.214	
							25	0	21.0	20.1	0.164	0.202	
Head	16QAM	ON	0	Left Touch	23790	710.0	1	0	21.0	20.3	0.159	0.187	
							25	0	21.0	20.3	0.144	0.169	
				Left Tilt	23790	710.0	1	0	21.0	20.3	0.113	0.133	
							25	0	21.0	20.3	0.102	0.120	
				Right Touch	23790	710.0	1	0	21.0	20.3	0.263	0.309	16
							25	0	21.0	20.3	0.239	0.281	
				Right Tilt	23790	710.0	1	0	21.0	20.3	0.187	0.220	
							25	0	21.0	20.3	0.169	0.199	
Body (Standalone)	QPSK	ON	0	Rear	23790	710.0	1	0	21.0	20.0	0.510	0.642	
							25	0	21.0	20.1	0.490	0.603	
				Edge 1	23790	710.0	1	0	21.0	20.0	0.389	0.490	
							25	0	21.0	20.1	0.377	0.464	
				Edge 4	23790	710.0	1	0	21.0	20.0	0.064	0.081	
							25	0	21.0	20.1	0.061	0.075	
Body (Standalone)	16QAM	ON	0	Rear	23790	710.0	1	0	21.0	20.3	0.558	0.656	17
							25	0	21.0	20.3	0.512	0.602	
				Edge 1	23790	710.0	1	0	21.0	20.3	0.427	0.502	
							25	0	21.0	20.3	0.391	0.459	
				Edge 4	23790	710.0	1	0	21.0	20.3	0.075	0.088	
							25	0	21.0	20.3	0.067	0.079	
Body (Standalone)	QPSK	OFF	19	Rear	23790	710.0	1	49	24.0	23.3	0.077	0.090	
							25	25	23.0	22.3	0.077	0.090	
			12	Edge 1	23790	710.0	1	49	24.0	23.3	0.111	0.130	
							25	25	23.0	22.3	0.076	0.089	
			0	Edge 2	23790	710.0	1	49	24.0	23.3	0.101	0.119	
							25	25	23.0	22.3	0.083	0.098	
			0	Edge 4	23790	710.0	1	49	24.0	23.3	0.079	0.093	
							25	25	23.0	22.3	0.078	0.092	

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 17	Standalone	Rear	No	0.558	N/A	N/A
850	GSM 850	Standalone	Rear	No	0.476	N/A	N/A
	WCDMA Band V	Standalone	Rear	No	0.445	N/A	N/A
	LTE Band 5	Standalone	Rear	No	0.529	N/A	N/A
1900	GSM 1900	Standalone	Edge 4	No	0.241	N/A	N/A
	WCDMA Band II	Standalone	Edge 4	No	0.361	N/A	N/A
	LTE Band 2	Standalone	Edge 1	No	0.756	N/A	N/A
1700	LTE Band 4	Standalone	Edge 1	No	0.586	N/A	N/A
	WCDMA Band IV	Standalone	Rear	No	0.252	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

Simultaneous Transmission Condition

RF Exposure Condition	Item	Capable Transmit Configurations		
Head	1	GSM(Voice)	+	DTS
	2	GSM(Voice)	+	U-NII
	3	GSM(GPRS/EDGE)	+	DTS
	4	GSM(GPRS/EDGE)	+	U-NII
	5	W-CDMA	+	DTS
	6	W-CDMA	+	U-NII
	7	LTE	+	DTS
	8	LTE	+	U-NII
Body (Standalone)	9	GSM(GPRS/EDGE)	+	DTS
	10	GSM(GPRS/EDGE)	+	U-NII
	11	GSM(GPRS/EDGE)	+	BT
	12	W-CDMA	+	DTS
	13	W-CDMA	+	U-NII
	14	W-CDMA	+	BT
	15	LTE	+	DTS
	16	LTE	+	U-NII
	17	LTE	+	BT
Notes: 1. DTS and UNII-3 (5.8 GHz) supports Hotspot and Wi-Fi Direct 2. UNII-1 (5.2 GHz) supports Wi-Fi Direct 3. GPRS/EDGE, W-CDMA and LTE support Hotspot. 4. VoIP is supported in GPRS/EDGE, W-CDMA and LTE. 5. DTS Radio cannot transmit simultaneously with Bluetooth Radio. 6. U-NII Radio cannot transmit simultaneously with Bluetooth Radio.				

Estimated SAR for Simultaneous Transmission SAR Analysis

Considerations for SAR estimation

- When standalone SAR test exclusion applies, standalone SAR must also be estimated to determine simultaneous transmission SAR test exclusion.
- Dedicated Host Approach criteria for SAR test exclusion is likewise applied to SAR estimation, with certain distinctions between test exclusion and SAR estimation:
 - When the separation distance from the antenna to an adjacent edge is ≤ 5 mm, a distance of 5 mm is applied for SAR estimation; this is the same between test exclusion and SAR estimation calculations.
 - When the separation distance from the antenna to an adjacent edge is > 5 mm but ≤ 50 mm, the actual antenna-to-edge separation distance is applied for SAR estimation.
 - When the minimum test separation distance is > 50 mm, the estimated SAR value is 0.4 W/kg
- Please refer to Estimated SAR Tables to see which test positions are inherently compliant as they consist of only estimated SAR values for all applicable transmitters and consequently will always have sum of SAR values < 1.2 W/kg. Simultaneous transmission SAR analysis was therefore not performed for these test positions.

Estimated SAR for WWAN

Antenna	Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Estimated 1-g SAR Value (W/kg)					
			dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
Full Power, Proximity Sensor Off																
Cellular	GPRS 3 Slots	848.8	29.40	327	0	4.1	49	172	3.5		-MEASURE	-MEASURE	-MEASURE	0.400	-MEASURE	
Cellular	GPRS 2 Slots	1909.8	29.00	199	0	4.1	49	172	3.5		-MEASURE	-MEASURE	-MEASURE	0.400	-MEASURE	
Cellular	W-CDMA 2	1907.6	23.50	224	0	4.1	49	172	3.5		-MEASURE	-MEASURE	-MEASURE	0.400	-MEASURE	
Cellular	W-CDMA 4	1752.6	23.00	200	0	4.1	49	172	3.5		-MEASURE	-MEASURE	-MEASURE	0.400	-MEASURE	
Cellular	W-CDMA 5	846.6	23.00	200	0	4.1	49	172	3.5		-MEASURE	-MEASURE	-MEASURE	0.400	-MEASURE	
Cellular	LTE Band 2	1900	23.50	224	0	4.1	49	172	3.5		-MEASURE	-MEASURE	-MEASURE	0.400	-MEASURE	
Cellular	LTE Band 4	1754.3	23.50	224	0	4.1	49	172	3.5		-MEASURE	-MEASURE	-MEASURE	0.400	-MEASURE	
Cellular	LTE Band 5	844	24.00	251	0	4.1	49	172	3.5		-MEASURE	-MEASURE	-MEASURE	0.400	-MEASURE	
Cellular	LTE Band 17	710	24.00	251	0	4.1	49	172	3.5		-MEASURE	-MEASURE	-MEASURE	0.400	-MEASURE	
Second Stage Power Back-off, Proximity Sensor On																
Cellular	GPRS 4 Slots	848.8	21.50	71	0	4.1	49	172	3.5		-MEASURE	-MEASURE	0.178	0.400	-MEASURE	
Cellular	GPRS 4 Slots	1909.8	13.50	11	0	4.1	49	172	3.5		-MEASURE	-MEASURE	0.041	0.400	-MEASURE	
Cellular	W-CDMA 2	1907.6	7.50	6	0	4.1	49	172	3.5		0.221	0.221	0.023	0.400	0.221	
Cellular	W-CDMA 4	1752.6	13.00	20	0	4.1	49	172	3.5		-MEASURE	-MEASURE	0.072	0.400	-MEASURE	
Cellular	W-CDMA 5	846.6	18.50	71	0	4.1	49	172	3.5		-MEASURE	-MEASURE	0.178	0.400	-MEASURE	
Cellular	LTE Band 2	1900	9.50	9	0	4.1	49	172	3.5		0.331	0.331	0.034	0.400	0.331	
Cellular	LTE Band 4	1754.3	10.50	11	0	4.1	49	172	3.5		0.389	0.389	0.040	0.400	0.389	
Cellular	LTE Band 5	844	18.00	63	0	4.1	49	172	3.5		-MEASURE	-MEASURE	0.157	0.400	-MEASURE	
Cellular	LTE Band 17	710	21.00	126	0	4.1	49	172	3.5		-MEASURE	-MEASURE	0.289	0.400	-MEASURE	

Estimated SAR for WLAN

All Wi-Fi and Bluetooth SAR values- measured or estimated- used in this report were taken from SAR report 15I19878-S1A, submitted under FCC ID A3LSMT239.

12.1. Sum of the SAR for GSM 850, Wi-Fi & BT

RF Exposure conditions	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	
						Σ 1g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.165	0.037	0.075		0.202	No	0.240	No		
	Left Tilt	0.117	0.037	0.075		0.154	No	0.192	No		
	Right Touch	0.240	0.037	0.075		0.277	No	0.315	No		
	Right Tilt	0.184	0.037	0.075		0.221	No	0.259	No		
Body (Standalone)	Rear	0.476	1098	0.982	0.252	1574	No	1458	No	0.728	No
	Edge 1	0.396	0.400	0.400	0.400	0.796	No	0.796	No	0.796	No
	Edge 2	0.173	0.400	0.400	0.400	0.573	No	0.573	No	0.573	No
	Edge 3	0.400	0.708	0.349	0.252	1108	No	0.749	No	0.652	No
	Edge 4	0.292	1098	0.982	0.252	1390	No	1274	No	0.544	No

Note(s):

All Wi-Fi and Bluetooth SAR values (measured or estimated) used in this report were taken from SAR report 15I19878-S1A, submitted under FCC ID A3LSMT239

12.2. Sum of the SAR for GSM 1900, Wi-Fi & BT

RF Exposure conditions	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	
						Σ 1g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.048	0.037	0.075		0.085	No	0.123	No		
	Left Tilt	0.041	0.037	0.075		0.078	No	0.116	No		
	Right Touch	0.159	0.037	0.075		0.196	No	0.234	No		
	Right Tilt	0.136	0.037	0.075		0.173	No	0.211	No		
Body (Standalone)	Rear	0.199	1098	0.982	0.252	1297	No	1181	No	0.451	No
	Edge 1	0.177	0.400	0.400	0.400	0.577	No	0.577	No	0.577	No
	Edge 2	0.019	0.400	0.400	0.400	0.419	No	0.419	No	0.419	No
	Edge 3	0.400	0.708	0.349	0.252	1108	No	0.749	No	0.652	No
	Edge 4	0.247	1098	0.982	0.252	1345	No	1229	No	0.499	No

Note(s):

All Wi-Fi and Bluetooth SAR values (measured or estimated) used in this report were taken from SAR report 15I19878-S1A, submitted under FCC ID A3LSMT239

12.3. Sum of the SAR for W-CDMA Band V, Wi-Fi & BT

RF Exposure conditions	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	
						Σ 1g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.178	0.037	0.075		0.215	No	0.253	No		
	Left Tilt	0.136	0.037	0.075		0.173	No	0.211	No		
	Right Touch	0.254	0.037	0.075		0.291	No	0.329	No		
	Right Tilt	0.202	0.037	0.075		0.239	No	0.277	No		
Body (Standalone)	Rear	0.466	1098	0.982	0.252	1564	No	1448	No	0.718	No
	Edge 1	0.378	0.400	0.400	0.400	0.778	No	0.778	No	0.778	No
	Edge 2	0.062	0.400	0.400	0.400	0.462	No	0.462	No	0.462	No
	Edge 3	0.400	0.708	0.349	0.252	1108	No	0.749	No	0.652	No
	Edge 4	0.150	1098	0.982	0.252	1248	No	1132	No	0.402	No

Note(s):

All Wi-Fi and Bluetooth SAR values (measured or estimated) used in this report were taken from SAR report 15I19878-S1A, submitted under FCC ID A3LSMT239

12.4. Sum of the SAR for W-CDMA Band II, Wi-Fi & BT

RF Exposure conditions	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	
						Σ 1g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1g SAR (mW/g)	SPLSR (Yes/ No)
Body (Standalone)	Rear	0.064	1098	0.982	0.252	1162	No	1046	No	0.316	No
	Edge 1	0.040	0.400	0.400	0.400	0.440	No	0.440	No	0.440	No
	Edge 2	0.329	0.400	0.400	0.400	0.729	No	0.729	No	0.729	No
	Edge 3	0.400	0.708	0.349	0.252	1108	No	0.749	No	0.652	No
	Edge 4	0.396	1098	0.982	0.252	1494	No	1378	No	0.648	No

Note(s):

All Wi-Fi and Bluetooth SAR values (measured or estimated) used in this report were taken from SAR report 15I19878-S1A, submitted under FCC ID A3LSMT239

12.5. Sum of the SAR for W-CDMA Band IV, Wi-Fi & BT

RF Exposure conditions	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	
						Σ 1g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.065	0.037	0.075		0.102	No	0.140	No		
	Left Tilt	0.055	0.037	0.075		0.092	No	0.130	No		
	Right Touch	0.120	0.037	0.075		0.157	No	0.195	No		
	Right Tilt	0.105	0.037	0.075		0.142	No	0.180	No		
Body (Standalone)	Rear	0.264	1098	0.982	0.252	1362	No	1246	No	0.516	No
	Edge 1	0.203	0.400	0.400	0.400	0.603	No	0.603	No	0.603	No
	Edge 2	0.017	0.400	0.400	0.400	0.417	No	0.417	No	0.417	No
	Edge 3	0.400	0.708	0.349	0.252	1108	No	0.749	No	0.652	No
	Edge 4	0.051	1098	0.982	0.252	1149	No	1033	No	0.303	No

Note(s):

All Wi-Fi and Bluetooth SAR values (measured or estimated) used in this report were taken from SAR report 15I19878-S1A, submitted under FCC ID A3LSMT239

12.6. Sum of the SAR for LTE Band 2, Wi-Fi & BT

RF Exposure conditions	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	
						Σ 1g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1g SAR (mW/g)	SPLSR (Yes/ No)
Body (Standalone)	Rear	0.476	1098	0.982	0.252	1574	No	1458	No	0.728	No
	Edge 1	0.792	0.400	0.400	0.400	1192	No	1192	No	1192	No
	Edge 2	0.139	0.400	0.400	0.400	0.539	No	0.539	No	0.539	No
	Edge 3	0.400	0.708	0.349	0.252	1108	No	0.749	No	0.652	No
	Edge 4	0.321	1098	0.982	0.252	1419	No	1303	No	0.573	No

Note(s):

All Wi-Fi and Bluetooth SAR values (measured or estimated) used in this report were taken from SAR report 15I19878-S1A, submitted under FCC ID A3LSMT239

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

RF Exposure conditions	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	
						Σ 1g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1g SAR (mW/g)	SPLSR (Yes/ No)	Σ 1g SAR (mW/g)	SPLSR (Yes/ No)
Body (Standalone)	Rear	0.296	1098	0.982	0.252	1394	No	1278	No	0.548	No
	Edge 1	0.614	0.400	0.400	0.400	1014	No	1014	No	1014	No
	Edge 2	0.213	0.400	0.400	0.400	0.613	No	0.613	No	0.613	No
	Edge 3	0.400	0.708	0.349	0.252	1108	No	0.749	No	0.652	No
	Edge 4	0.306	1098	0.982	0.252	1404	No	1288	No	0.558	No

Note(s):

All Wi-Fi and Bluetooth SAR values (measured or estimated) used in this report were taken from SAR report 15I19878-S1A, submitted under FCC ID A3LSMT239

12.8. Sum of the SAR for LTE Band 5, Wi-Fi & BT

RF Exposure conditions	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	
						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	Left Touch	0.259	0.037	0.075		0.296	No	0.334	No		
	Left Tilt	0.188	0.037	0.075		0.225	No	0.263	No		
	Right Touch	0.363	0.037	0.075		0.400	No	0.438	No		
	Right Tilt	0.247	0.037	0.075		0.284	No	0.322	No		
Body (Standalone)	Rear	0.666	1.098	0.982	0.252	1.764	Yes	1.648	Yes	0.938	No
	Edge 1	0.453	0.400	0.400	0.400	0.853	No	0.853	No	0.853	No
	Edge 2	0.093	0.400	0.400	0.400	0.493	No	0.493	No	0.493	No
	Edge 3	0.400	0.708	0.349	0.252	1.108	No	0.749	No	0.652	No
	Edge 4	0.303	1.098	0.982	0.252	1.401	No	1.285	No	0.555	No

Note(s):

All Wi-Fi and Bluetooth SAR values (measured or estimated) used in this report were taken from SAR report 15I19878-S1A, submitted under FCC ID A3LSMT239

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Worst-case combination		Σ 1-g SAR (mW/g)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	② DTS						
Rear	0.666	1.098	① + ②	1.764	166.9	0.014	No	1
Test Position	Worst-case combination		Σ 1-g SAR (mW/g)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	③ U-NII						
Rear	0.666	0.982	① + ③	1.648	171.1	0.012	No	2

Conclusion:

Simultaneous transmission SAR measurement (Volume Scan) is not required because the SPLSR is < 0.04 for all circumstances that require SPLSR calculation.

Figure (1)

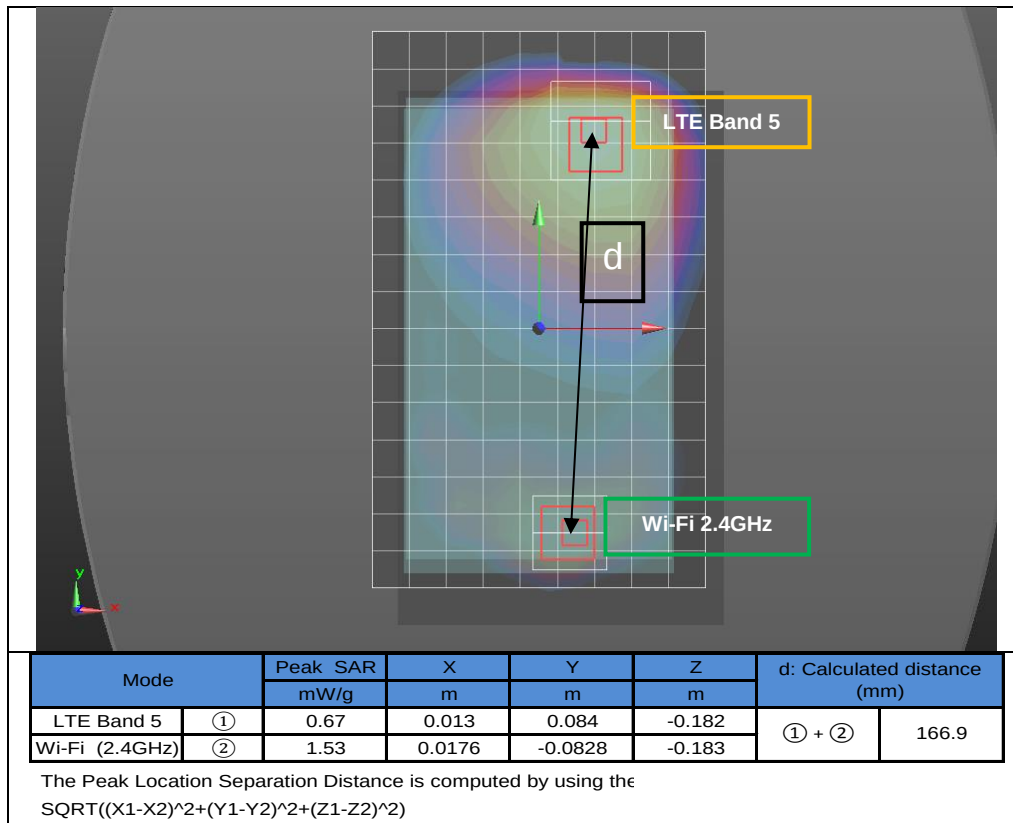
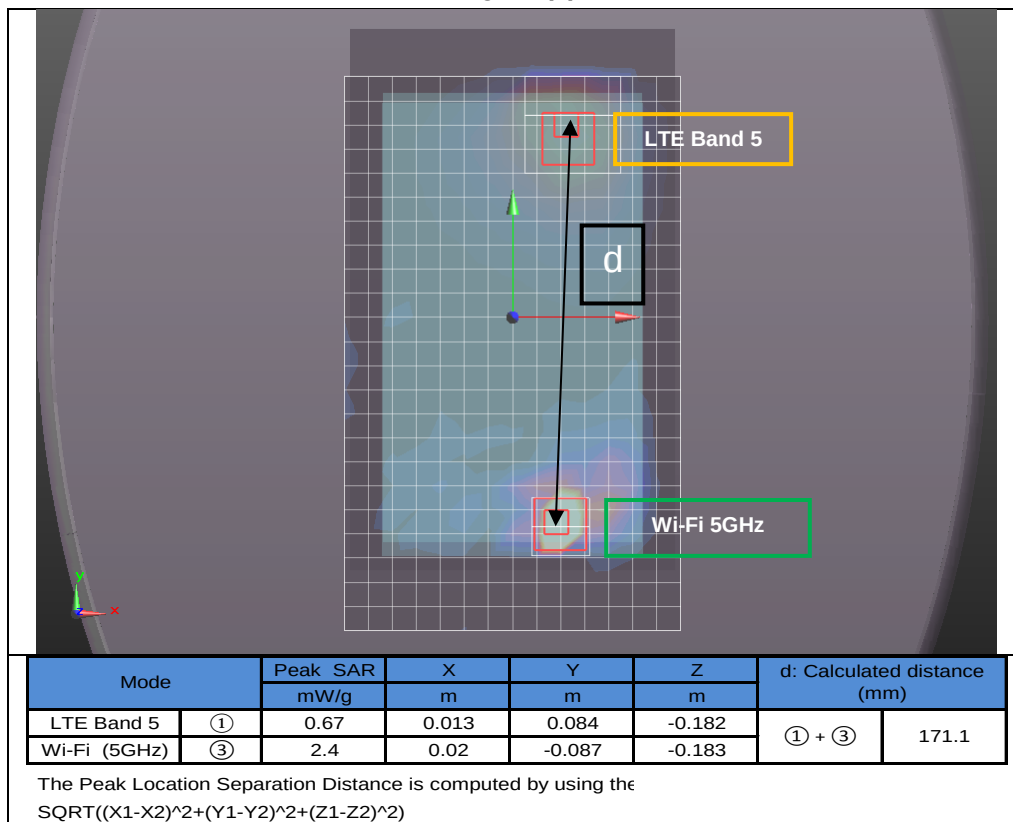


Figure (2)



12.9. Sum of the SAR for LTE Band 17, Wi-Fi & BT

RF Exposure conditions	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	
						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	Left Touch	0.187	0.037	0.075		0.224	No	0.262	No		
	Left Tilt	0.133	0.037	0.075		0.170	No	0.208	No		
	Right Touch	0.309	0.037	0.075		0.346	No	0.384	No		
	Right Tilt	0.220	0.037	0.075		0.257	No	0.295	No		
Body (Standalone)	Rear	0.656	1.098	0.982	0.252	1.754	Yes	1.638	Yes	0.908	No
	Edge 1	0.502	0.400	0.400	0.400	0.902	No	0.902	No	0.902	No
	Edge 2	0.119	0.400	0.400	0.400	0.519	No	0.519	No	0.519	No
	Edge 3	0.400	0.708	0.349	0.252	1.108	No	0.749	No	0.652	No
	Edge 4	0.093	1.098	0.982	0.252	1.191	No	1.075	No	0.345	No

Note(s):

All Wi-Fi and Bluetooth SAR values (measured or estimated) used in this report were taken from SAR report 15I19878-S1A, submitted under FCC ID A3LSMT239

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Worst-case combination		Σ 1-g SAR (mW/g)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	② DTS						
Rear	0.656	1.098	① + ②	1.754	164.9	0.014	No	3
Test Position	Worst-case combination		Σ 1-g SAR (mW/g)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	③ U-NII						
Rear	0.656	0.982	① + ③	1.638	169.2	0.012	No	4

Conclusion:

Simultaneous transmission SAR measurement (Volume Scan) is not required because the SPLSR is < 0.04 for all circumstances that require SPLSR calculation.

Figure (3)

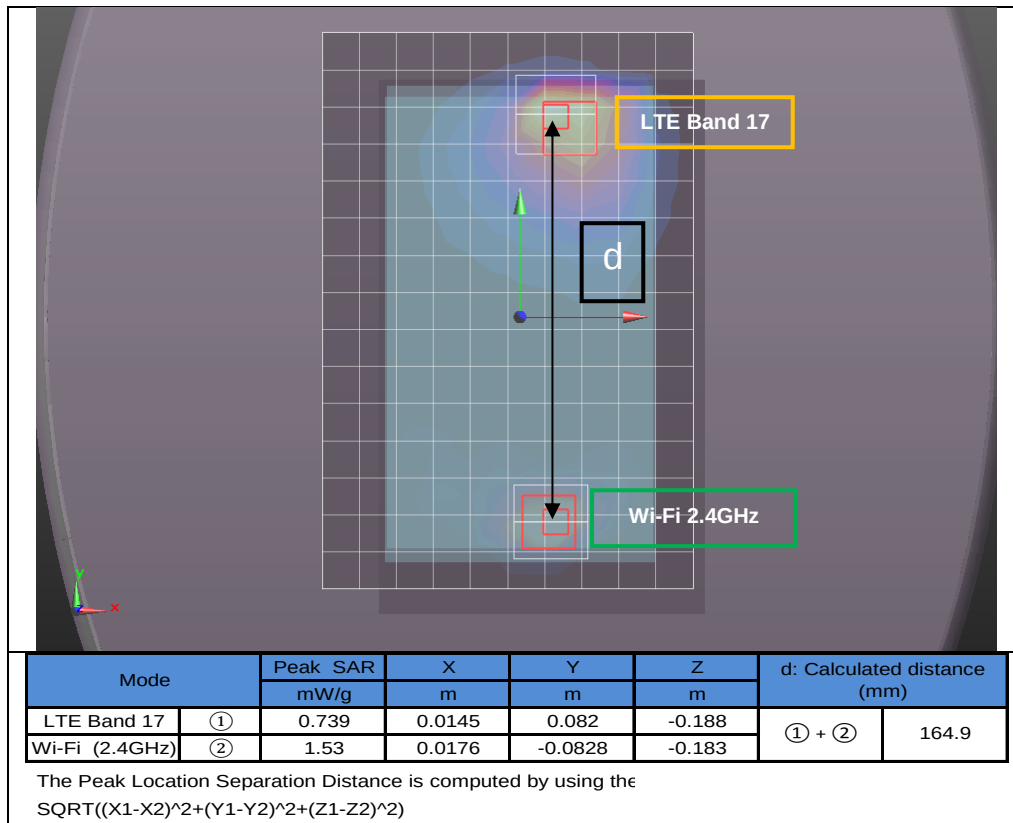
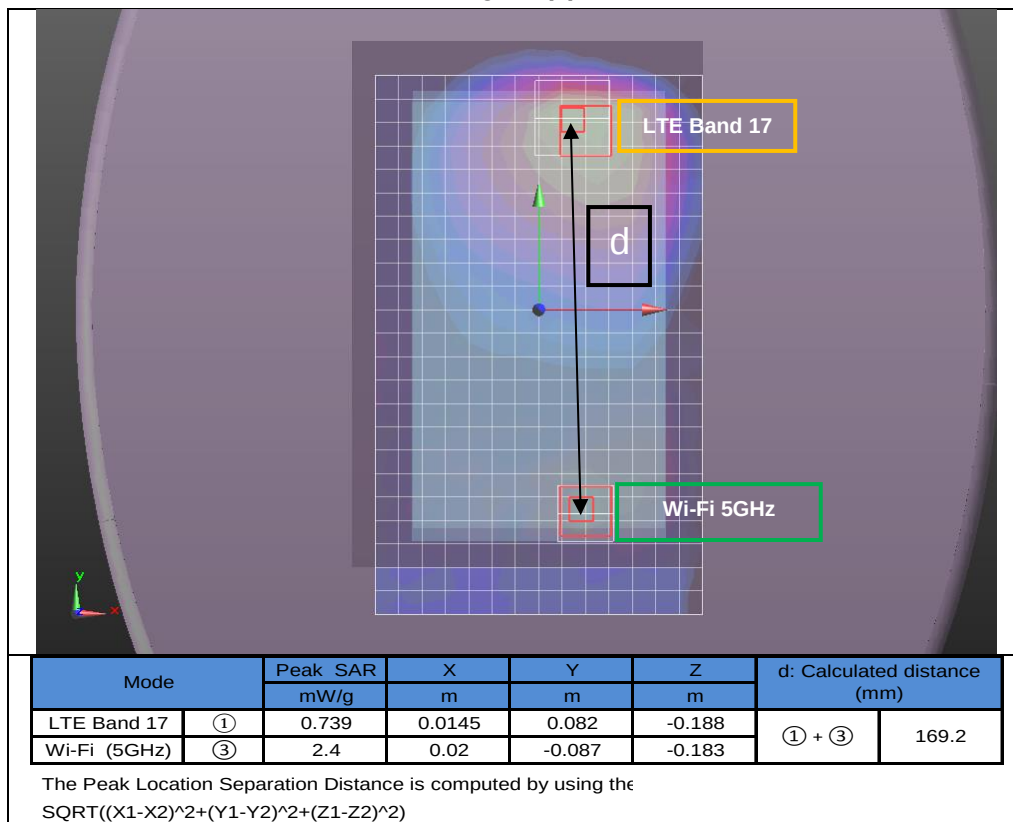


Figure (4)



Appendixes

Refer to separated files for the following appendixes.

A_15I20013v0 SAR Photos & Ant. Locations

B_15I20013v1 SAR System Check Plots

C_15I20013v1 SAR Highest Test Plots

D_15I20013v0 SAR Tissue Ingredients

E_15I20013v0 SAR Probe Cal. Certificates

F_15I20013v1 SAR Dipole Cal. Certificates

END OF REPORT