



SAR EVALUATION REPORT

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

For
GSM/WCDMA/LTE Phone + Bluetooth & WLAN 2.4GHz b/g/n, NFC

**FCC ID: A3LSMG388F
Model Name: SM-G388F**

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1. Attestation of Test Results

Applicant Name	SAMSUNG ELECTRONICS.,LTD.			
FCC ID	A3LSMG388F			
Model Name	SM-G388F			
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	0.857	0.292	N/A	N/A
Body-worn*	0.795	0.217		
Hotspot/Wi-Fi Direct	0.767	0.151		
Simultaneous TX	Head	0.955		
	Body-worn*	1.012		
	Hotspot/ Wi-Fi Direct	0.846		
*Note: The Body-worn minimum separation distance is 15 mm. To cover both body-worn and hotspot RF exposure conditions testing was performed at a separation distance of 10 mm.				
Date Tested	1/23/2015 to 2/3/2015			
Test Results	Pass			
UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report. Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.				
Approved & Released By:		Prepared By:		
				
JiHo Choi Operations Manager UL Korea, Ltd Suwon Laboratory		Justin Park Engineer UL Korea, Ltd Suwon Laboratory		

2. Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1093, IEEE STD 1528-2013, the following FCC Published RF exposure [KDB](#) procedures:

- 248227 D01 SAR meas for IEEE 802 11 transmitters DR01-41733I
- 447498 D01 General RF Exposure Guidance v05r02
- 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

Suwon
SAR 2 Room
SAR 3 Room

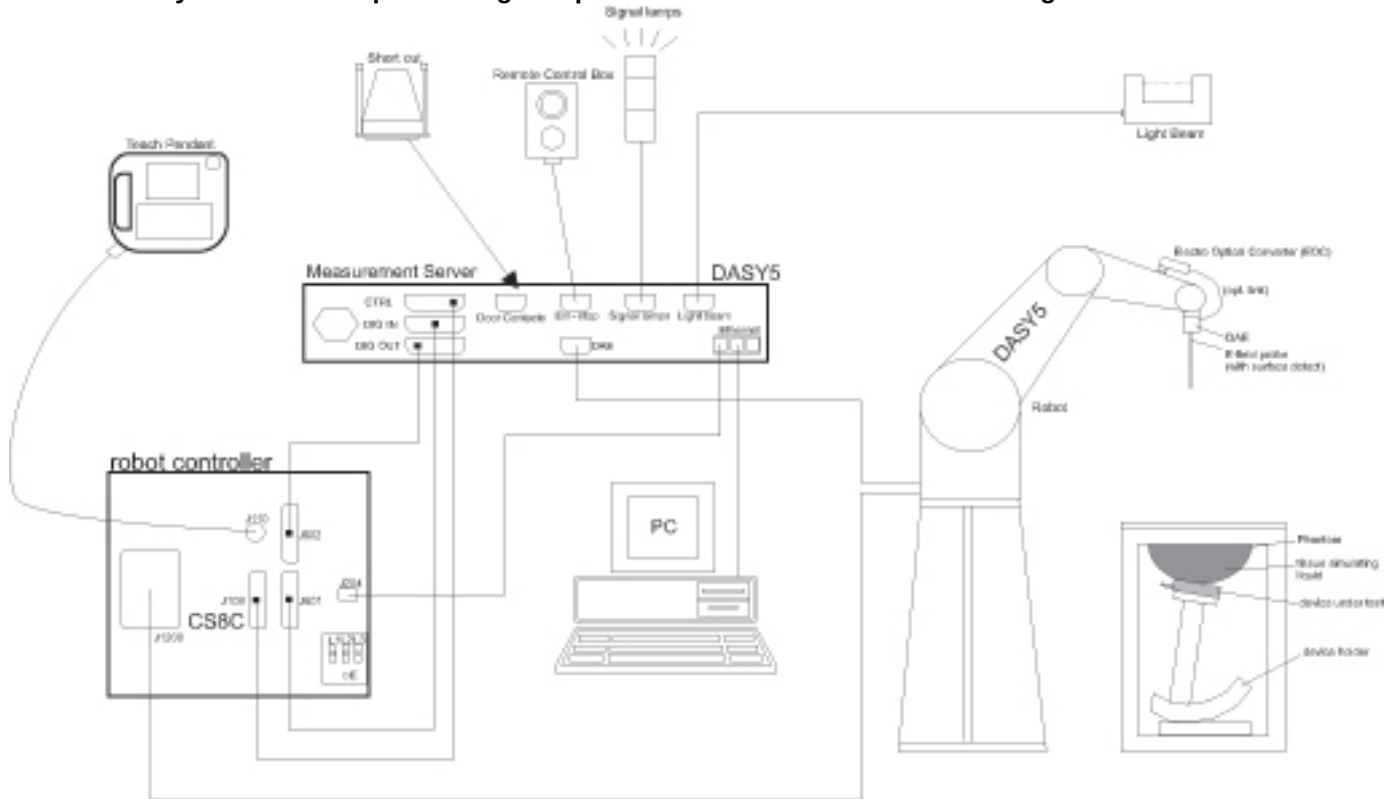
UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637.

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

4. SAR Measurement System & Test Equipment

4.1. SAR Measurement System

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



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP or Win7 and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

4.2. SAR Scan Procedure

Step 1: Power Reference Measurement

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

Step 2: Area Scan

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

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

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
Maximum area scan spatial resolution: Δx_{Area} , Δy_{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 <u>reported</u> SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

Step 4: Power drift measurement

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

Step 5: Z-Scan (FCC only)

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

4.3. Test Equipment

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

Dielectric Property Measurements

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Network Analyzer	Agilent	E5071C	MY46522054	2015-09-23
Dielectronic Probe kit	SPEAG	DAK-3.5	1196	2015-08-05
Dielectronic Probe kit	SPEAG	DAK-3.5 Short	SM DAK 200 BA	N/A
Thermometer	LKM	DTM3000	3424	2015-11-13

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
MXG Analog Signal Generator	Agilent	N5181A	MY50145882	2015-09-23
Power Sensor	Agilent	U2000A	MY54260010	2015-09-23
Power Sensor	Agilent	U2000A	MY54260007	2015-09-23
Power Amplifier	EXODUS	1410025-AMP2027-10003	10003	2015-11-07
Directional Coupler	Agilent	772D	MY52180193	2015-09-22
Directional Coupler	Agilent	778D	MY52180432	2015-09-22
Low Pass Filter	MICROLAB	LA-15N	03943	2015-11-04
Low Pass Filter	FILTRON	L14012FL	1410003S	2015-11-04
Low Pass Filter	MICROLAB	LA-60N	03942	2015-11-05
Attenuator	Agilent	8491B/003	MY39269292	2015-09-22
Attenuator	Agilent	8491B/010	MY39269315	2015-09-22
Attenuator	Agilent	8491B/020	MY39269298	2015-09-22
E-Field Probe (SAR 2)	SPEAG	EX3DV4	7313	2015-08-27
E-Field Probe (SAR 3)	SPEAG	EX3DV4	7314	2015-08-27
Data Acquisition Electronics (SAR 2)	SPEAG	DAE4	1447	2015-08-25
Data Acquisition Electronics (SAR 3)	SPEAG	DAE4	1446	2015-08-27
System Validation Dipole	SPEAG	D835V2	4d174	2015-08-13
System Validation Dipole	SPEAG	D1900V2	5d190	2015-08-12
System Validation Dipole	SPEAG	D2450V2	939	2015-08-11
Thermometer (SAR 2)	Lutron	MHB-382SD	AH.50215	2015-11-18
Thermometer (SAR 3)	Lutron	MHB-382SD	AH.50213	2015-11-18

Others

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Base Station Simulator	R & S	CMW500	150313	2015-08-13
Base Station Simulator	R & S	CMW500	150314	2015-08-13

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

GSM/WCDMA/LTE Phone + Bluetooth & WLAN 2.4GHz b/g/n, NFC	
Device Dimension	Overall (Length x Width): 132.8 mm x 70.1 mm Overall Diagonal: 141.7 mm Display Diagonal: 115.5 mm
Battery Back Cover	☐ Normal Battery Cover ☒ Normal Battery Cover with NFC ☐ Wireless Charger Battery Cover ☐ Wireless Charger Battery Cover with NFC ☐ The rechargeable battery is not user accessible.
Battery Options	☒ Standard – Lithium-ion battery, Rating 3.85Vdc,8.47Wh ☐ Extended (large capacity) ☐ 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)
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 GHz)
SIM Information	☒ Single SIM ☐ Dual SIM

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)	GSM Voice: 12.5%; (E)GPRS: 1 Slot: 12.5%; 2 Slots: 25%, 3 Slots: 37.5%, 4 Slots: 50%,
	GPRS Multi-Slot Class: ☐ Class 8 - One Up ☐ Class 10 - Two Up ☒ Class 12 - Four Up ☐ Class 33 - Four Up DTM (Dual Transfer Mode): Not support		
W-CDMA (UMTS)	Band II Band V	UMTS Rel. 99 (Voice & Data) HSDPA (Rel. 7) HSUPA (Rel. 6) HSPA+ (Rel. 6)	100%
LTE (FDD)	Band 5	QPSK 16QAM	100%
	Does this device SV-LTE (1xRTT-LTE)? ☐ Yes ☒ No		
Wi-Fi	2.4 GHz	802.11b 802.11g 802.11n (HT20)	100%
Bluetooth	2.4 GHz	Version 4.0 LE	N/A

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		RF Output Power (dBm)	
RF Air interface	Mode	Target	Max. tune-up tolerance limit
GSM850	Voice	33.0	33.5
	GPRS 1 slot	33.0	33.5
	GPRS 2 slots	31.2	31.7
	GPRS 3 slots	29.5	30.0
	GPRS 4 slots	27.8	28.3
	EGPRS 1 slot	27.7	28.2
	EGPRS 2 slots	26.2	26.7
	EGPRS 3 slots	24.2	24.7
	EGPRS 4 slots	22.3	22.8
GSM1900	Voice	30.3	30.8
	GPRS 1 slot	30.3	30.8
	GPRS 2 slots	28.0	28.5
	GPRS 3 slots	25.5	26.0
	GPRS 4 slots	24.3	24.8
	EGPRS 1 slot	27.5	28.0
	EGPRS 2 slots	26.0	26.5
	EGPRS 3 slots	23.8	24.3
	EGPRS 4 slots	21.7	22.2
W-CDMA Band V	R99	23.5	24.0
	HSDPA	23.5	24.0
	HSUPA	23.3	23.8
W-CDMA Band II	R99	23.0	23.5
	HSDPA	22.8	23.3
	HSUPA	22.8	23.3
LTE Band 5	QPSK	23.3	23.8

Upper limit (dB): 0.5		RF Output Power (dBm)	
RF Air interface	Mode	Target	Max. tune-up tolerance limit
WiFi 2.4 GHz	802.11b	16.0	16.5
	802.11g	13.0	13.5
	802.11n HT20	12.0	12.5
Bluetooth		9.0	9.5
Bluetooth LE		1.0	1.5

6.4. General LTE SAR Test and Reporting Considerations

Item	Description																																												
Frequency range, Channel Bandwidth, Numbers and Frequencies	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																																						
LTE transmitter and antenna implementation	LTE has one (1) TX/RX antenna and one (1) Diversity antenna Refer to Appendix A. "Photos and Antenna Locations".																																												
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	No																																												
Spectrum plots for RB configurations	A properly configured base station simulator was used for the SAR and power measurements; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.																																												

7. RF Exposure Conditions (Test Configurations)

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

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

Notes:

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

8. Dielectric Property Measurements & System Check

8.1. Dielectric Property Measurements

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

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

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

Tissue Dielectric Parameters

FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

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

IEEE Std 1528-2013

Refer to Table 3 within the IEEE Std 1528-2013

Dielectric Property Measurements Results:

SAR 2 Room

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
2015-01-28	Head 1900	e'	39.4000	Relative Permittivity (ϵ_r):	39.40	40.00	-1.50	5
		e''	13.7600	Conductivity (σ):	1.45	1.40	3.83	5
	Head 1850	e'	39.3000	Relative Permittivity (ϵ_r):	39.30	40.00	-1.75	5
		e''	13.6600	Conductivity (σ):	1.41	1.40	0.37	5
	Head 1910	e'	39.3600	Relative Permittivity (ϵ_r):	39.36	40.00	-1.60	5
		e''	13.7800	Conductivity (σ):	1.46	1.40	4.53	5
2015-01-28	Body 1900	e'	53.0100	Relative Permittivity (ϵ_r):	53.01	53.30	-0.54	5
		e''	14.9300	Conductivity (σ):	1.58	1.52	3.77	5
	Body 1850	e'	53.1700	Relative Permittivity (ϵ_r):	53.17	53.30	-0.24	5
		e''	14.8700	Conductivity (σ):	1.53	1.52	0.63	5
	Body 1910	e'	52.9800	Relative Permittivity (ϵ_r):	52.98	53.30	-0.60	5
		e''	14.9800	Conductivity (σ):	1.59	1.52	4.66	5
2015-01-29	Head 2450	e'	38.5100	Relative Permittivity (ϵ_r):	38.51	39.20	-1.76	5
		e''	13.6000	Conductivity (σ):	1.85	1.80	2.93	5
	Head 2410	e'	38.6400	Relative Permittivity (ϵ_r):	38.64	39.28	-1.63	5
		e''	13.5200	Conductivity (σ):	1.81	1.76	2.91	5
	Head 2475	e'	38.4200	Relative Permittivity (ϵ_r):	38.42	39.17	-1.91	5
		e''	13.6600	Conductivity (σ):	1.88	1.83	2.89	5
2015-01-23	Body 2450	e'	50.6400	Relative Permittivity (ϵ_r):	50.64	52.70	-3.91	5
		e''	14.8300	Conductivity (σ):	2.02	1.95	3.60	5
	Body 2410	e'	50.8400	Relative Permittivity (ϵ_r):	50.84	52.76	-3.64	5
		e''	14.7600	Conductivity (σ):	1.98	1.91	3.69	5
	Body 2475	e'	50.5700	Relative Permittivity (ϵ_r):	50.57	52.67	-3.98	5
		e''	14.9200	Conductivity (σ):	2.05	1.99	3.43	5
23015-02-03	Body 2450	e'	52.7900	Relative Permittivity (ϵ_r):	52.79	52.70	0.17	5
		e''	14.8600	Conductivity (σ):	2.02	1.95	3.81	5
	Body 2410	e'	52.9300	Relative Permittivity (ϵ_r):	52.93	52.76	0.32	5
		e''	14.7700	Conductivity (σ):	1.98	1.91	3.76	5
	Body 2475	e'	52.7200	Relative Permittivity (ϵ_r):	52.72	52.67	0.10	5
		e''	14.9200	Conductivity (σ):	2.05	1.99	3.43	5

SAR 3 Room

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
2015-01-28	Head 835	e'	40.1400	Relative Permittivity (ϵ_r):	40.14	41.50	-3.28	5
		e''	19.2700	Conductivity (σ):	0.89	0.90	-0.59	5
	Head 820	e'	40.3300	Relative Permittivity (ϵ_r):	40.33	41.60	-3.06	5
		e''	19.3100	Conductivity (σ):	0.88	0.90	-2.01	5
	Head 850	e'	39.9500	Relative Permittivity (ϵ_r):	39.95	41.50	-3.73	5
		e''	19.2200	Conductivity (σ):	0.91	0.92	-0.72	5
2015-01-28	Body 835	e'	53.4600	Relative Permittivity (ϵ_r):	53.46	55.20	-3.15	5
		e''	21.6700	Conductivity (σ):	1.01	0.97	3.72	5
	Body 820	e'	53.6100	Relative Permittivity (ϵ_r):	53.61	55.28	-3.02	5
		e''	21.7200	Conductivity (σ):	0.99	0.97	2.26	5
	Body 850	e'	53.3000	Relative Permittivity (ϵ_r):	53.30	55.16	-3.37	5
		e''	21.6100	Conductivity (σ):	1.02	0.99	3.46	5

8.2. System Check

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

System Performance Check Measurement Conditions:

- The measurements were performed in the flat section of the TWIN SAM or ELI phantom, shell thickness: 2.0 ±0.2 mm (bottom plate) filled with Body or Head simulating liquid of the following parameters.
- The depth of tissue-equivalent liquid in a phantom must be ≥ 15.0 cm for SAR measurements ≤ 3 GHz and ≥ 10.0 cm for measurements > 3 GHz.
- The DASY system with an E-Field Probe was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 (below 3 GHz) and/or 8x8x7 (above 3 GHz) fine cube was chosen for the cube.
- Distance between probe sensors and phantom surface was set to 3 mm.
For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.5 mm
- The dipole input power (forward power) was 100 mW.
- The results are normalized to 1 W input power.

Reference Target SAR Values

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

System Dipole	Serial No.	Cal. Date	Freq. (MHz)	Target SAR Values (W/kg)		
				1g/10g	Head	Body
D835V2	4d174	2014-08-12	835	1g	9.32	9.62
				10g	6.09	6.37
D1900V2	5d190	2014-08-12	1900	1g	40.20	40.40
				10g	21.00	21.30
D2450V2	939	2014-08-11	2450	1g	52.10	51.40
				10g	24.20	24.00

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 2 Room

Date Tested	System Dipole		T.S. Liquid	Measured Results		Target (Ref. Value)	Delta $\pm 10\%$	Plot No.
	Type	Serial #		Zoom Scan to 100 mW	Normalize to 1 W			
2015-01-28	D1900V2	5d190	Head	1g	3.97	39.70	40.20	-1.24
				10g	2.05	20.50	21.00	-2.38
2015-01-28	D1900V2	5d190	Body	1g	3.90	39.00	40.40	-3.47
				10g	2.06	20.60	21.30	-3.29
2015-01-29	D2450V2	939	Head	1g	5.34	53.40	52.10	2.50
				10g	2.43	24.30	24.20	0.41
2015-01-23	D2450V2	939	Body	1g	5.35	53.50	51.40	4.09
				10g	2.48	24.80	24.00	3.33
2015-02-03	D2450V2	939	Body	1g	5.12	51.2	51.40	-0.39
				10g	2.330	23.3	24.00	-2.92

SAR 3 Room

Date Tested	System Dipole		T.S. Liquid	Measured Results		Target (Ref. Value)	Delta $\pm 10\%$	Plot No.
	Type	Serial #		Zoom Scan to 100 mW	Normalize to 1 W			
2015-01-28	D835V2	4d174	Head	1g	0.91	9.10	9.32	-2.36
				10g	0.60	5.97	6.09	-1.97
2015-01-28	D835V2	4d174	Body	1g	0.91	9.13	9.62	-5.09
				10g	0.60	6.00	6.37	-5.81

9. Conducted Output Power Measurements

9.1. GSM

GSM850 Measured Results

Band	Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Burst Pwr (dBm)	Frame Pwr (dBm)
850	GSM (Voice)	CS1	1	128	824.2	33.2	24.2
				190	836.6	33.2	24.1
				251	848.8	33.5	24.5
	GPRS (GMSK)	CS1	1	128	824.2	33.2	24.1
				190	836.6	33.1	24.1
				251	848.8	33.5	24.5
			2	128	824.2	30.8	24.8
				190	836.6	30.8	24.7
				251	848.8	31.1	25.1
			3	128	824.2	28.9	24.6
				190	836.6	28.8	24.5
				251	848.8	29.2	24.9
			4	128	824.2	26.9	23.9
				190	836.6	26.9	23.9
				251	848.8	27.2	24.2
	EGPRS (8PSK)	MCS5	1	128	824.2	27.0	17.9
				190	836.6	26.7	17.7
				251	848.8	27.4	18.3
			2	128	824.2	25.3	19.3
				190	836.6	25.2	19.1
				251	848.8	25.7	19.6
			3	128	824.2	23.4	19.2
				190	836.6	23.2	18.9
				251	848.8	23.8	19.6
			4	128	824.2	21.4	18.4
				190	836.6	21.1	18.0
				251	848.8	21.8	18.8

Notes:

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

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

GSM1900 Measured Results

Band	Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Burst Pwr (dBm)	Frame Pwr (dBm)
1900	GSM (Voice)	CS1	1	512	1850.2	29.7	20.7
				661	1880.0	29.7	20.7
				810	1909.8	29.7	20.7
	GPRS (GMSK)	CS1	1	512	1850.2	29.7	20.6
				661	1880.0	29.7	20.7
				810	1909.8	29.7	20.7
			2	512	1850.2	27.8	21.8
				661	1880.0	27.8	21.8
				810	1909.8	27.8	21.8
			3	512	1850.2	25.8	21.6
				661	1880.0	25.9	21.7
				810	1909.8	25.9	21.6
			4	512	1850.2	23.9	20.9
				661	1880.0	24.0	21.0
				810	1909.8	23.9	20.9
	EGPRS (8PSK)	MCS5	1	512	1850.2	26.7	17.7
				661	1880.0	27.0	18.0
				810	1909.8	27.0	17.9
			2	512	1850.2	25.2	19.2
				661	1880.0	25.5	19.5
				810	1909.8	25.4	19.4
			3	512	1850.2	23.0	18.7
				661	1880.0	23.3	19.0
				810	1909.8	23.3	19.0
			4	512	1850.2	20.9	17.8
				661	1880.0	21.1	18.1
				810	1909.8	21.0	18.0

Notes:

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

- Head & Body-worn Accessory: GMSK Voice Mode
- Hotspot mode: GMSK (GPRS) mode with 2 time slots, based on the output power measurements above
- SAR is not required for EGPRS (8PSK) mode because its output power is less than that of GPRS Mode

9.2. W-CDMA

Release 99 Setup Procedures used to establish the test signals

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

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

HSDPA Setup Procedures used to establish the test signals

The following 4 Sub-tests were completed according to Release 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			
	$A_{hs}=\beta_{hs}/\beta_c$	30/15			

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

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

	Mode	HSPA				
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2 kbps RMC				
	HSDPA FRC	H-Set 1				
	HSUPA Test	HSPA				
	Power Control Algorithm	Algorithm 2				Algorithm 1
	β_c	11/15	6/15	15/15	2/15	15/15
	β_d	15/15	15/15	9/15	15/15	0
	β_{ec}	209/225	12/15	30/15	2/15	5/15
	β_c/β_d	11/15	6/15	15/9	2/15	15/1
	β_{hs}	22/15	12/15	30/15	4/15	5/15
	β_{ed}	1309/225	94/75	47/15	56/75	47/15
HSDPA Specific Settings	CM (dB)	1	3	2	3	1
	MPR (dB)	0	2	1	2	0
	DACK	8				0
	DNAK	8				0
	DCQI	8				0
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
HSUPA Specific Settings	CQI Repetition Factor (Table 5.2B.4)	2				
	$A_{hs} = \beta_{hs}/\beta_c$	30/15				
	E-DPDCCCH	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 Channelisation 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)
W-CDMA Band II	Rel 99	RMC, 12.2 kbps	9262	1852.4	N/A	22.5
			9400	1880.0	N/A	22.4
			9538	1907.6	N/A	22.6
	HSDPA	Subtest 1	9262	1852.4	0	22.2
			9400	1880.0	0	22.1
			9538	1907.6	0	22.0
		Subtest 2	9262	1852.4	0	22.6
			9400	1880.0	0	22.5
			9538	1907.6	0	22.6
		Subtest 3	9262	1852.4	0.5	22.2
			9400	1880.0	0.5	22.2
			9538	1907.6	0.5	22.3
		Subtest 4	9262	1852.4	0.5	22.3
			9400	1880.0	0.5	22.2
			9538	1907.6	0.5	22.3
	HSUPA	Subtest 1	9262	1852.4	0	22.3
			9400	1880.0	0	22.2
			9538	1907.6	0	22.3
		Subtest 2	9262	1852.4	2	20.5
			9400	1880.0	2	20.4
			9538	1907.6	2	20.7
		Subtest 3	9262	1852.4	1	21.1
			9400	1880.0	1	20.9
			9538	1907.6	1	21.0
		Subtest 4	9262	1852.4	2	20.4
			9400	1880.0	2	20.2
			9538	1907.6	2	20.4
		Subtest 5	9262	1852.4	0	22.4
			9400	1880.0	0	22.4
			9538	1907.6	0	22.4

Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Avg Pwr (dBm)
W-CDMA Band V	Rel 99	RMC, 12.2 kbps	4132	826.4	N/A	23.0
			4183	836.6	N/A	23.0
			4233	846.6	N/A	23.0
	HSDPA	Subtest 1	4132	826.4	0	23.0
			4183	836.6	0	22.9
			4233	846.6	0	22.8
		Subtest 2	4132	826.4	0	23.3
			4183	836.6	0	23.2
			4233	846.6	0	23.2
		Subtest 3	4132	826.4	0.5	22.9
			4183	836.6	0.5	23.0
			4233	846.6	0.5	23.0
		Subtest 4	4132	826.4	0.5	23.0
			4183	836.6	0.5	23.0
			4233	846.6	0.5	23.0
	HSUPA	Subtest 1	4132	826.4	0	22.3
			4183	836.6	0	22.8
			4233	846.6	0	22.8
		Subtest 2	4132	826.4	2	21.4
			4183	836.6	2	21.3
			4233	846.6	2	21.3
		Subtest 3	4132	826.4	1	21.9
			4183	836.6	1	21.7
			4233	846.6	1	21.7
		Subtest 4	4132	826.4	2	21.4
			4183	836.6	2	21.4
			4233	846.6	2	21.3
		Subtest 5	4132	826.4	0	23.3
			4183	836.6	0	23.3
			4233	846.6	0	23.3

9.3. LTE Band 5

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

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

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

Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signalling Value of "NS_01".

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

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

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Meas. MPR	Avg Pwr (dBm)		
							829 MHz	836.5 MHz	844 MHz
LTE Band 5	10	QPSK	1	0	0	0	23.0	23.1	23.0
			1	25	0	0	23.0	23.1	22.9
			1	49	0	0	23.0	23.1	23.0
			25	0	1	1	22.1	22.0	22.0
			25	12	1	1	22.1	22.0	21.9
			25	25	1	1	22.0	22.0	21.9
			50	0	1	1	22.1	22.0	21.9
		16QAM	1	0	1	0	22.2	22.7	22.3
			1	25	1	1	22.2	22.6	22.2
			1	49	1	1	22.2	22.6	22.2
			25	0	2	2	21.2	21.1	21.2
			25	12	2	2	21.2	21.2	21.2
			25	25	2	2	21.2	21.2	21.2
			50	0	2	2	21.2	21.2	21.1
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Meas. MPR	Avg Pwr (dBm)		
							826.5 MHz	836.5 MHz	846.5 MHz
LTE Band 5	5	QPSK	1	0	0	0	22.9	23.1	23.0
			1	12	0	0	23.0	23.1	23.0
			1	24	0	0	23.0	23.1	23.0
			12	0	1	1	22.0	22.0	22.0
			12	6	1	1	22.1	22.0	22.0
			12	11	1	1	22.1	22.1	22.0
			25	0	1	1	22.0	22.0	21.9
		16QAM	1	0	1	0	22.1	22.5	22.7
			1	12	1	0	22.2	22.5	22.7
			1	24	1	0	22.3	22.6	22.7
			12	0	2	2	21.2	21.2	21.1
			12	6	2	2	21.2	21.3	21.1
			12	11	2	2	21.2	21.3	21.2
			25	0	2	2	21.2	21.1	21.0
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Meas. MPR	Avg Pwr (dBm)		
							825.5 MHz	836.5 MHz	847.5 MHz
LTE Band 5	3	QPSK	1	0	0	0	22.9	23.0	22.8
			1	7	0	0	22.9	23.0	22.9
			1	14	0	0	23.0	23.0	22.9
			8	0	1	1	22.0	22.1	22.0
			8	4	1	1	22.0	22.1	22.0
			8	7	1	1	22.1	22.1	22.0
			15	0	1	1	22.0	22.0	21.9
		16QAM	1	0	1	0	22.1	22.6	22.1
			1	7	1	0	22.1	22.6	22.1
			1	14	1	1	22.1	22.5	22.1
			8	0	2	2	21.2	21.1	21.4
			8	4	2	2	21.2	21.1	21.4
			8	7	2	2	21.2	21.1	21.4
			15	0	2	2	21.1	21.2	21.0

LTE Band 5 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Meas. MPR	Avg Pwr (dBm)		
							824.7 MHz	836.5 MHz	848.3 MHz
LTE Band 5	1.4	QPSK	1	0	0	0	23.0	23.0	22.9
			1	2	0	0	23.0	23.1	22.9
			1	5	0	0	23.1	23.1	22.9
			3	0	0	0	23.1	23.2	23.1
			3	1	0	0	23.1	23.2	23.1
			3	2	0	0	23.1	23.2	23.1
			6	0	1	1	22.2	22.2	22.1
		16QAM	1	0	1	1	22.4	22.6	22.1
			1	2	1	1	22.4	22.6	22.2
			1	5	1	1	22.4	22.6	22.1
			3	0	1	1	22.1	22.2	22.3
			3	1	1	1	22.2	22.2	22.3
			3	2	1	1	22.2	22.3	22.3
			6	0	2	2	21.4	21.2	21.4

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

9.4. Wi-Fi DTS (2.4 GHz) Band

Required Test Channels per KDB 248227 D01

Measured Results

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Avg Pwr (dBm)	SAR Test (Yes/No)
2.4 (DTS)	802.11b	1 Mbps	1	2412	15.8	Yes
			6	2437	16.0	
			11	2462	15.3	
	802.11g	6 Mbps	1	2412	12.6	No
			6	2437	12.9	
			11	2462	12.8	
	802.11n (HT20)	MCS0	1	2412	11.6	No
			6	2437	11.9	
			11	2462	11.7	

Note(s):

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

Power measurements to determine worst-case data rates

Mode	Ch #	Freq. (MHz)	Data Rate	Avg Pwr (dBm)	SAR test (Yes/No)
802.11b	6	2437	1 Mbps	16.0	Yes
			2 Mbps	16.0	No
			5.5 Mbps	15.9	No
			11 Mbps	15.8	No

Note(s):

- Per KDB 248227 D01,
 - Testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is < ¼ dB higher than those measured at the lowest data rate.
 - Each channel should be tested at the lowest data rate in each a-b/g mode channel BW configuration.

9.5. Bluetooth

Maximum tune-up tolerance limit is 9.5 dBm. from the rated nominal maximum output power. This power level qualifies for exclusion of SAR testing.

10. Measured and Reported (Scaled) SAR Results

SAR Test Reduction criteria are as follows:

KDB 447498 D01 General RF Exposure Guidance:

Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:

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

KDB 648474 D04 Handset SAR:

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

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 Measurements Procedures for 802.11 a/b/g Transmitters v01r02 (pg.6):

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

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

10.1. GSM850

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
Head	Voice	0	Left Touch	190	836.6	33.5	33.2	0.327	0.350	1
			Left Tilt	190	836.6	33.5	33.2	0.226	0.242	
			Right Touch	190	836.6	33.5	33.2	0.327	0.350	
			Right Tilt	190	836.6	33.5	33.2	0.253	0.271	
Head VoIP	GPRS 3 Slots	0	Left Touch	190	836.6	30.0	28.8	0.384	0.506	2
			Left Tilt	190	836.6	30.0	28.8	0.272	0.359	
			Right Touch	190	836.6	30.0	28.8	0.348	0.459	
			Right Tilt	190	836.6	30.0	28.8	0.276	0.364	
Body-worn	Voice	10	Rear	190	836.6	33.5	33.2	0.564	0.604	3
			Front	190	836.6	33.5	33.2	0.404	0.433	
Body-worn(VoIP) & Hotspot	GPRS 3 Slots	10	Rear	190	836.6	30.0	28.8	0.603	0.795	4
Front			190	836.6	30.0	28.8	0.485	0.625		
Hotspot			Edge 2	190	836.6	30.0	28.8	0.299	0.394	
			Edge 3	190	836.6	30.0	28.8	0.091	0.120	
			Edge 4	190	836.6	30.0	28.8	0.527	0.695	

10.2. GSM1900

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
Head	Voice	0	Left Touch	661	1880.0	30.8	29.7	0.394	0.508	5
			Left Tilt	661	1880.0	30.8	29.7	0.108	0.139	
			Right Touch	661	1880.0	30.8	29.7	0.244	0.314	
			Right Tilt	661	1880.0	30.8	29.7	0.141	0.182	
Head VoIP	GPRS 2 Slots	0	Left Touch	661	1880.0	28.5	27.8	0.574	0.674	6
			Left Tilt	661	1880.0	28.5	27.8	0.157	0.184	
			Right Touch	661	1880.0	28.5	27.8	0.284	0.334	
			Right Tilt	661	1880.0	28.5	27.8	0.169	0.199	
Body-worn	Voice	10	Rear	661	1880.0	30.8	29.7	0.380	0.490	7
			Front	661	1880.0	30.8	29.7	0.342	0.441	
Body-worn(VoIP) & Hotspot	GPRS 2 Slots	10	Rear	661	1880.0	28.5	27.8	0.503	0.591	
Front			661	1880.0	28.5	27.8	0.448	0.526		
Hotspot			Edge 2	661	1880.0	28.5	27.8	0.042	0.049	
			Edge 3	661	1880.0	28.5	27.8	0.561	0.659	8
			Edge 4	661	1880.0	28.5	27.8	0.302	0.355	

10.3. W-CDMA Band V

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
Head	Rel 99 RMC	0	Left Touch	4183	836.6	24.0	23.0	0.234	0.295	9
			Left Tilt	4183	836.6	24.0	23.0	0.191	0.240	
			Right Touch	4183	836.6	24.0	23.0	0.199	0.251	
			Right Tilt	4183	836.6	24.0	23.0	0.160	0.201	
Body-worn & Hptspot	Rel 99 RMC	10	Rear	4183	836.6	24.0	23.0	0.412	0.519	10
			Front	4183	836.6	24.0	23.0	0.303	0.381	
Hptspot	Rel 99 RMC	10	Edge 2	4183	836.6	24.0	23.0	0.227	0.286	
			Edge 3	4183	836.6	24.0	23.0	0.064	0.081	
			Edge 4	4183	836.6	24.0	23.0	0.291	0.366	11

10.4. W-CDMA Band II

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
Head	Rel 99 RMC	0	Left Touch	9262	1852.4	23.5	22.5	0.643	0.809	12
				9400	1880.0	23.5	22.4	0.665	0.857	
				9538	1907.6	23.5	22.6	0.670	0.824	
			Left Tilt	9400	1880.0	23.5	22.4	0.174	0.224	
			Right Touch	9400	1880.0	23.5	22.4	0.338	0.435	
Body-worn & Hptspot	Rel 99 RMC	10	Rear	9400	1880.0	23.5	22.4	0.614	0.791	13
			Front	9400	1880.0	23.5	22.4	0.536	0.691	
Hptspot	Rel 99 RMC	10	Edge 2	9400	1880.0	23.5	22.4	0.042	0.054	14
			Edge 3	9400	1880.0	23.5	22.4	0.595	0.767	
			Edge 4	9400	1880.0	23.5	22.4	0.371	0.478	

10.5. LTE Band 5 (10MHz Bandwidth)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
Head	QPSK	0	Left Touch	20525	836.5	1	0.0	23.8	23.1	0.202	0.237	15
						25	0.0	23.8	22.0	0.145	0.219	
			Left Tilt	20525	836.5	1	0.0	23.8	23.1	0.159	0.187	
						25	0.0	23.8	22.0	0.119	0.180	
			Right Touch	20525	836.5	1	0.0	23.8	23.1	0.167	0.196	
						25	0.0	23.8	22.0	0.131	0.198	
			Right Tilt	20525	836.5	1	0.0	23.8	23.1	0.074	0.087	
						25	0.0	23.8	22.0	0.055	0.084	
Body-worn & Hotspot	QPSK	10	Rear	20525	836.5	1	0.0	23.8	23.1	0.384	0.451	16
						25	0.0	23.8	22.0	0.294	0.445	
			Front	20525	836.5	1	0.0	23.8	23.1	0.289	0.340	
						25	0.0	23.8	22.0	0.222	0.336	
Hotspot	QPSK	10	Edge 2	20525	836.5	1	0.0	23.8	23.1	0.188	0.221	
						25	0.0	23.8	22.0	0.143	0.216	
			Edge 3	20525	836.5	1	0.0	23.8	23.1	0.058	0.068	
						25	0.0	23.8	22.0	0.046	0.070	
			Edge 4	20525	836.5	1	0.0	23.8	23.1	0.235	0.276	17
						25	0.0	23.8	22.0	0.190	0.288	

10.6. Wi-Fi (DTS Band)

Frequency Band	RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up limit	Meas.	Meas.	Scaled	
2.4 GHz	Head	802.11b 1 Mbps	0	Left Touch	6	2437.0	16.5	16.0	0.087	0.098	18
				Left Tilt	6	2437.0	16.5	16.0	0.052	0.059	
				Right Touch	6	2437.0	16.5	16.0	0.260	0.292	
				Right Tilt	6	2437.0	16.5	16.0	0.079	0.089	
	Body-worn & Hotspot	802.11b 1 Mbps	10	Rear	6	2437.0	16.5	16.0	0.193	0.217	19
				Front	6	2437.0	16.5	16.0	0.035	0.039	
	Hotspot	802.11b 1 Mbps	10	Edge 1	6	2437.0	16.5	16.0	0.018	0.020	
				Edge 4	6	2437.0	16.5	16.0	0.135	0.151	

10.7. Bluetooth

Standalone SAR Test Exclusion Considerations & Estimated SAR

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

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

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

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

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

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

Body-worn Accessory Exposure Conditions

Max. tune-up tolerance limit		Min. test separation distance (mm)	Frequency (GHz)	SAR test exclusion Result*	Test Configuration	Estimated 1-g SAR (W/kg)
(dBm)	(mW)					
9.5	9	10	2.480	1.4	Rear/Front	0.187

Conclusion:

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

11. SAR Measurement Variability

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

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

Frequency Band	Air Interface	RF Exposure Conditions	Test Position	Repeated SAR	Highest Measured SAR	Repeated Measured SAR	Largest to Smallest
850	GSM 850	Body & Hotspot	Rear	No	0.603	N/A	N/A
	WCDMA Band V	Body & Hotspot	Rear	No	0.412	N/A	N/A
	LTE Band 5	Body & Hotspot	Rear	No	0.384	N/A	N/A
1900	GSM 1900	Head VoIP	Rear	No	0.574	N/A	N/A
	WCDMA Band II	Head	Left Touch	No	0.665	N/A	N/A
2400	Wi-Fi 802.11b/g/n	Head	Right Touch	No	0.26	N/A	N/A

Note(s):

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

12. Simultaneous Transmission SAR Analysis

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

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

Where:

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

SAR₂ is the highest measured or estimated SAR for the second of a pair of simultaneous transmitting antennas, in the same test operating mode and exposure condition as the first

Ri is the separation distance between the pair of simultaneous transmitting antennas. When the SAR is measured, for both antennas in the pair, it is determined by the actual x, y and z coordinates in the 1-g SAR for each SAR peak location, based on the extrapolated and interpolated result in the zoom scan measurement, using the formula of $[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$

In order for a pair of simultaneous transmitting antennas with the sum of 1-g SAR > 1.6 W/kg to qualify for exemption from Simultaneous Transmission SAR measurements, it has to satisfy the condition of:

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

Simultaneous Transmission Condition

RF Exposure Condition	Item	Capable Transmit Configurations		
Head	1	GSM(Voice)	+	Wi-Fi 2.4 GHz
	2	GSM(GPRS/EDGE)	+	Wi-Fi 2.4 GHz
	3	W-CDMA	+	Wi-Fi 2.4 GHz
	4	LTE	+	Wi-Fi 2.4 GHz
Body-worn	1	GSM(Voice)	+	Wi-Fi 2.4 GHz
	2	GSM(Voice)	+	BT
	3	GSM(GPRS/EDGE)	+	Wi-Fi 2.4 GHz
	4	GSM(GPRS/EDGE)	+	BT
	5	W-CDMA	+	Wi-Fi 2.4 GHz
	6	W-CDMA	+	BT
	7	LTE	+	Wi-Fi 2.4 GHz
	8	LTE	+	BT
Hotspot & Wi-Fi Direct	1	GSM(GPRS/EDGE)	+	Wi-Fi 2.4 GHz
	2	W-CDMA	+	Wi-Fi 2.4 GHz
	3	LTE	+	Wi-Fi 2.4 GHz
Notes:				
1. Wi-Fi only 2.4GHz supports Hotspot.				
2. GPRS/EDGE, W-CDMA and LTE support Hotspot.				
3. VoIP is supported in GPRS/EDGE, W-CDMA and LTE.				
4. Wi-Fi 2.4 GHz Radio cannot transmit simultaneously with Bluetooth Radio.				

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

RF Exposure conditions	Test Position		Simultaneous Transmission Scenario			Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
			① GSM850	② Wi-Fi(DTS)	③ Bluetooth		
Head	Left Touch	① + ②	0.506	0.098		0.604	No
	Left Tilt	① + ②	0.359	0.059		0.418	No
	Right Touch	① + ②	0.459	0.292		0.751	No
	Right Tilt	① + ②	0.364	0.089		0.453	No
Body-worn Accessory & Hotspot	Rear	① + ②	0.795	0.217		1.012	No
		① + ③	0.795		0.187	0.982	No
	Front	① + ②	0.625	0.039		0.664	No
		① + ③	0.625		0.187	0.812	No
Hotspot	Edge 1	① + ②		0.020		0.020	No
	Edge 2	① + ②	0.394			0.394	No
	Edge 3	① + ②	0.120			0.120	No
	Edge 4	① + ②	0.695	0.151		0.846	No

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

RF Exposure conditions	Test Position		Simultaneous Transmission Scenario			Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
			① GSM1900	② Wi-Fi(DTS)	③ Bluetooth		
Head	Left Touch	① + ②	0.674	0.098		0.772	No
	Left Tilt	① + ②	0.184	0.059		0.243	No
	Right Touch	① + ②	0.334	0.292		0.626	No
	Right Tilt	① + ②	0.199	0.089		0.288	No
Body-worn Accessory & Hotspot	Rear	① + ②	0.591	0.217		0.808	No
		① + ③	0.591		0.187	0.778	No
	Front	① + ②	0.526	0.039		0.565	No
		① + ③	0.526		0.187	0.713	No
Hotspot	Edge 1	① + ②		0.020		0.020	No
	Edge 2	① + ②	0.049			0.049	No
	Edge 3	① + ②	0.659			0.659	No
	Edge 4	① + ②	0.355	0.151		0.506	No

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

RF Exposure conditions	Test Position		Simultaneous Transmission Scenario			Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
			① W-CDMA Band V	② Wi-Fi(DTS)	③ Bluetooth		
Head	Left Touch	① + ②	0.295	0.098		0.393	No
	Left Tilt	① + ②	0.240	0.059		0.299	No
	Right Touch	① + ②	0.251	0.292		0.543	No
	Right Tilt	① + ②	0.201	0.089		0.290	No
Body-worn Accessory & Hotspot	Rear	① + ②	0.519	0.217		0.736	No
		① + ③	0.519		0.187	0.706	No
	Front	① + ②	0.381	0.039		0.420	No
		① + ③	0.381		0.187	0.568	No
Hotspot	Edge 1	① + ②		0.020		0.020	No
	Edge 2	① + ②	0.286			0.286	No
	Edge 3	① + ②	0.081			0.081	No
	Edge 4	① + ②	0.366	0.151		0.517	No

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

RF Exposure conditions	Test Position		Simultaneous Transmission Scenario			Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
			① W-CDMA Band II	② Wi-Fi(DTS)	③ Bluetooth		
Head	Left Touch	① + ②	0.857	0.098		0.955	No
	Left Tilt	① + ②	0.224	0.059		0.283	No
	Right Touch	① + ②	0.435	0.292		0.727	No
	Right Tilt	① + ②	0.245	0.089		0.334	No
Body-w orn Accessory & Hotspot	Rear	① + ②	0.791	0.217		1.008	No
		① + ③	0.791		0.187	0.978	No
	Front	① + ②	0.691	0.039		0.730	No
		① + ③	0.691		0.187	0.878	No
Hotspot	Edge 1	① + ②		0.020		0.020	No
	Edge 2	① + ②	0.054			0.054	No
	Edge 3	① + ②	0.767			0.767	No
	Edge 4	① + ②	0.478	0.151		0.629	No

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

RF Exposure conditions	Test Position		Simultaneous Transmission Scenario			Σ 1-g SAR (mW/g)	SPLSR (Yes/ No)
			① W-CDMA Band V	② Wi-Fi(DTS)	③ Bluetooth		
Head	Left Touch	① + ②	0.237	0.098		0.335	No
	Left Tilt	① + ②	0.187	0.059		0.246	No
	Right Touch	① + ②	0.198	0.292		0.490	No
	Right Tilt	① + ②	0.087	0.089		0.176	No
Body-w orn Accessory & Hotspot	Rear	① + ②	0.451	0.217		0.668	No
		① + ③	0.451		0.187	0.638	No
	Front	① + ②	0.340	0.039		0.379	No
		① + ③	0.340		0.187	0.527	No
Hotspot	Edge 1	① + ②		0.020		0.020	No
	Edge 2	① + ②	0.221			0.221	No
	Edge 3	① + ②	0.070			0.070	No
	Edge 4	① + ②	0.288	0.151		0.439	No

Conclusion:

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

Appendixes

Refer to separated files for the following appendixes.

A_15K19845-S1 SAR Photos & Ant. Locations

B_15K19845-S1 SAR Highest Test Plots

C_15K19845-S1 SAR System Check Plots

D_15K19845-S1 SAR Tissue Ingredients

E_15K19845-S1 SAR Probe Cal. Certificates

F_15K19845-S1 SAR Dipole Cal. Certificates

END OF REPORT