SAR EVALUATION REPORT

FCC 47 CFR § 2.1093
IEEE Std 1528-2013

For
GSM/WCDMA/LTE PHONE + BLUETOOTH, DTS/UNII a/b/g/n/ac & NFC

FCC ID: ZNFH791
Model Name: LG-H791, LGH791, H791

Report Number: 15I21237-S1V1
Issue Date: 9/14/2015

Prepared for
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Date	Revisions	Revised By
V1	9/14/2015	Initial Issue	--

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1. Attestation of Test Results

Applicant Name	LG ELECTRONICS MOBILECOMM USA, INC.			
FCC ID	ZNFH791			
Model Name	LG-H791, LGH791, H791			
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	1.235	0.909	0.628	0.144
Body-worn	1.188	0.267	0.285	0.045
Hotspot/Wi-Fi Direct	1.188	0.267	0.271	N/A
Simultaneous TX	1.456	1.456	1.410	
Date Tested	7/6/2015 to 7/20/2015			
Test Results	Pass			

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

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

Approved & Released By:	Prepared By:
	
Devin Chang Senior Engineer UL Verification Services Inc.	Nathan Sousa 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 802.11 Wi-Fi SAR v02
- 447498 D01 General RF Exposure Guidance v05r02
- 648474 D04 Handset SAR v01r02
- 648474 D03 Handset Wireless Chargers Battery Covers 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 D05A LTE Rel.10 KDB Inquiry Sheet v01r01
- 941225 D06 Hotspot Mode v02

In addition to the above, the following information was used:

- TCB workshop October, 2014; Page 36, RF Exposure Procedures Update

3. Facilities and Accreditation

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

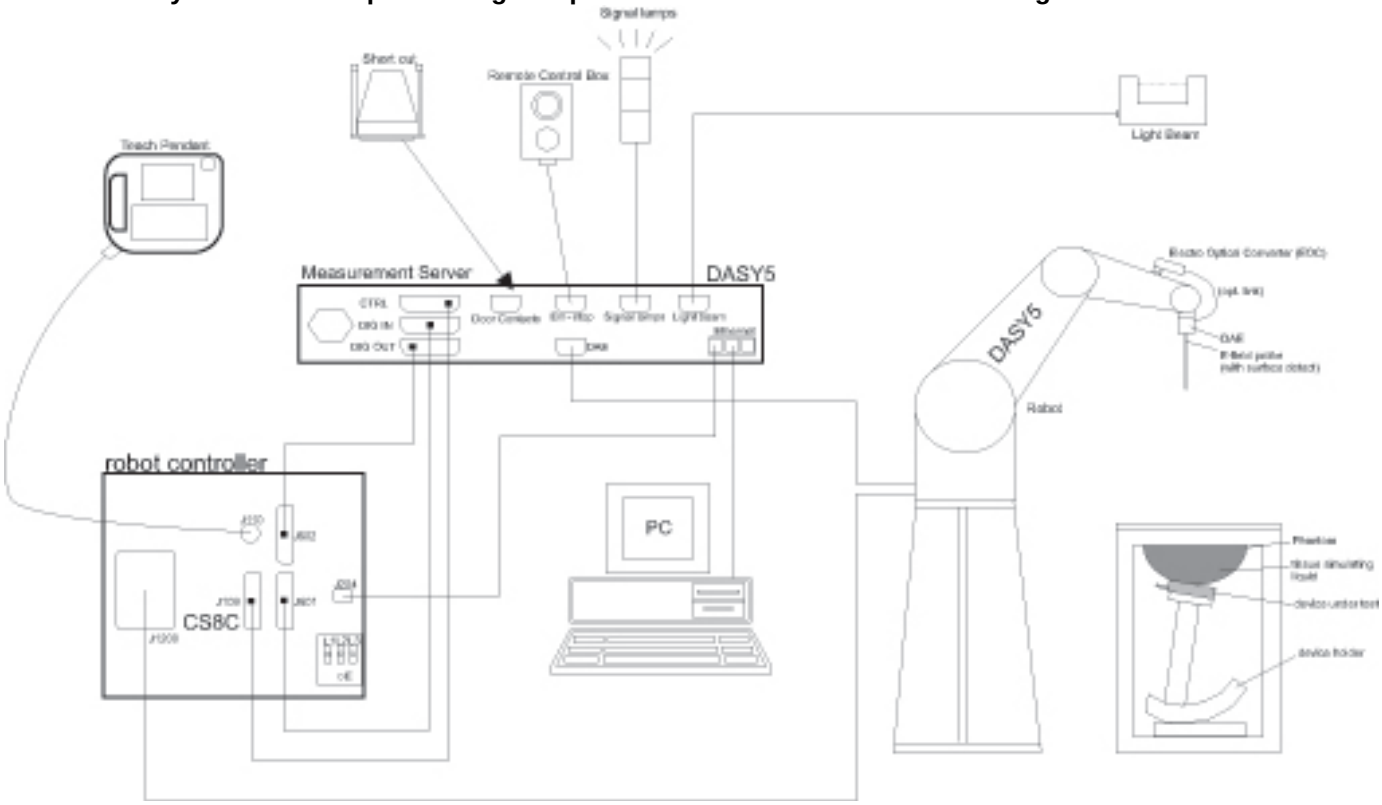
47173 Benicia Street	47266 Benicia Street
SAR Lab A	SAR Lab 1
SAR Lab B	SAR Lab 2
SAR Lab C	SAR Lab 3
SAR Lab D	SAR Lab 4
SAR Lab E	SAR Lab 5
SAR Lab F	
SAR Lab G	
SAR Lab H	

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	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: 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 ≤ 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: Δx_{Zoom}, Δy_{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: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
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 *reported* 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	E753ES	MY40000980	4/17/2016
Dielectric Probe kit	SPEAG	DAK-3.5	1082	9/16/2015
Shorting block	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
Synthesized Signal Generator	Agilent	8665B	3438A00633	8/29/2015
Power Meter	HP	437B	3125U09516	8/27/2015
Power Meter	HP	437B	3125U11347	10/6/2015
Power Sensor	HP	8481A	3318A95392	10/6/2015
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 (SAR Lab 1)	SPEAG	EX3DV4	3929	4/22/2016
E-Field Probe (SAR Lab 2)	SPEAG	EX3DV4	3990	3/18/2016
E-Field Probe (SAR Lab 3)	SPEAG	EX3DV4	3749	1/26/2016
E-Field Probe (SAR Lab 4)	SPEAG	EX3DV4	3989	3/17/2016
E-Field Probe (SAR Lab 5)	SPEAG	EX3DV4	3773	4/22/2016
Data Acquisition Electronics (SAR Lab 1)	SPEAG	DAE4	1352	11/7/2015
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	1239	4/16/2016
System Validation Dipole	SPEAG	D750V3	1071	11/13/2015
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
System Validation Dipole	SPEAG	D2450V2	706	5/11/2016
System Validation Dipole	SPEAG	D2600V2	1006	9/10/2015
System Validation Dipole	SPEAG	D2600V2	1036	3/13/2016
System Validation Dipole	SPEAG	D5GHzV2	1168	12/4/2015
Thermometer (SAR Lab 1)	EXTECH	445703	CCS-205	3/20/2016
Thermometer (SAR Lab 2)	EXTECH	445703	CCS-203	3/19/2016
Thermometer (SAR Lab 3)	EXTECH	445703	CCS-237	6/5/2016
Thermometer (SAR Lab 4)	EXTECH	445703	CCS-238	6/5/2016
Thermometer (SAR Lab 5)	EXTECH	445703	CCS-239	6/5/2016

Other

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Power Meter	Agilent	N1912A	MY53060007	9/15/2015
Power Meter	Agilent	N1912A	MY53060002	4/7/2016
Power Sensor	Agilent	N1921A	MY53260011	6/1/2016
Power Sensor	Agilent	N1921A	MY52260009	12/12/2015
Base Station Simulator	R & S	CMW500	132910	10/16/2015
Base Station Simulator	R & S	CMW500	135384	6/18/2016
Base Station Simulator	R & S	CBT	100900	6/30/2016
Base Station Simulator	Agilent	8960	MY53211024	9/19/2015

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): 146.1 mm x 72.2 mm Overall Diagonal: 150.5 mm Display Diagonal: 112 mm		
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 5.8 GHz)		
Wi-Fi Direct	Wi-Fi Direct enabled devices transfer data directly between each other ☒ Wi-Fi Direct (Wi-Fi 2.4 GHz) ☒ Wi-Fi Direct (Wi-Fi 5.2 and 5.8 GHz)		
Test sample information	**S/N**	**IMEI**	**Notes**
	1ZBRA	353627-07-000048-7	2G/3G SAR #1 (Radiated)
	1ZBR9	353627-07-000050-3	2G/3G SAR #2 (Radiated)
	1ZBRM	353627-07-000049-5	LTE SAR #1
	1ZBRB	353627-07-000047-9	LTE SAR #2
	1ZBRT	353627-07-000006-5	Wi-Fi Conducted #1
	1ZBRU	353627-07-000007-3	Wi-Fi Conducted #2
	1ZBRJ	353627-07-000040-4	Wi-Fi SAR #1
	1ZBRH	353627-07-000041-2	Wi-Fi SAR #2

6.2. Wireless Technologies

<table>
<tr><th>Wireless technologies</th><th>Frequency bands</th><th colspan="2">Operating mode</th><th>Duty Cycle used for SAR testing</th></tr>
<tr><td rowspan="2">GSM</td><td>850
1900</td><td>Voice (GMSK)
GPRS (GMSK)
EGPRS (8PSK)</td><td>GPRS Multi-Slot Class:
☐ Class 8 - 1 Up, 4 Down
☐ Class 10 - 2 Up, 4 Down
☒ Class 12 - 4 Up, 4 Down
☐ Class 33 - 4 Up, 5 Down</td><td>GSM Voice: 12.5%
(E)GPRS: 1 Slot: 12.5%
2 Slots: 25%
3 Slots: 37.5%
4 Slots: 50%</td></tr>
<tr><td colspan="4">☐ Class A = Can be connected to GPRS service and GSM service (voice, SMS), using both at the same time.
Does this device support DTM (Dual Transfer Mode)? ☐ Yes ☐ No
☒ Class B = GPRS connection interrupted during a GSM call, automatically resumed at end of call.
☐ Class C = manual GSM / GPRS mode switching.</td></tr>
<tr><td>W-CDMA (UMTS)</td><td>Band II
Band IV
Band V</td><td colspan="2">UMTS Rel. 99 (Voice & Data)
HSDPA (Rel. 5)
HSUPA (Rel. 6)
DC-HSDPA (Rel. 8)
HSPA+ (Rel. 7)</td><td>100%</td></tr>
<tr><td>LTE</td><td>FDD Band 2
FDD Band 4
FDD Band 5
FDD Band 7
FDD Band 17
FDD Band 26
TDD Band 41</td><td colspan="2">QPSK
16QAM
☐ Rel. 10 Does not support Carrier Aggregation (CA)
☒ Rel. 10 Carrier Aggregation (1 Uplink and 2 Downlinks)
☐ Rel. 11 Carrier Aggregation (2 Uplink and 2 Downlinks)</td><td>100% (FDD)
63.3% (TDD)</td></tr>
<tr><td rowspan="4">Wi-Fi</td><td>2.4 GHz</td><td colspan="2">802.11b
802.11g
802.11n (HT20)
802.11ac (VHT20)</td><td>100%</td></tr>
<tr><td>5 GHz</td><td colspan="2">802.11a
802.11n (HT20)
802.11n (HT40)
802.11ac (VHT20)
802.11ac (VHT40)
802.11ac (VHT80)</td><td>100%</td></tr>
<tr><td colspan="4">Does this device support bands 5.60 ~ 5.65 GHz? ☐ Yes ☒ No</td></tr>
<tr><td colspan="4">Does this device support Band gap channel(s)? ☒ Yes ☐ No</td></tr>
<tr><td>Bluetooth</td><td>2.4 GHz</td><td colspan="2">Version 4.2 LE</td><td>77.5% (DH5)</td></tr>
</table>

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)		
RF Air interface	Mode	Target	Max. tune-up tolerance limit	
			Burst	Frame
GSM850	Voice (1 slot)	32.7	**33.2**	**24.2**
	GPRS 1 slot	32.7	**33.2**	**24.2**
	GPRS 2 slots	30.7	**31.2**	**25.2**
	GPRS 3 slots	28.7	**29.2**	**24.9**
	GPRS 4 slots	27.7	**28.2**	**25.2**
	EGPRS 1 slot	26.7	**27.2**	**18.2**
	EGPRS 2 slots	25.7	**26.2**	**20.2**
	EGPRS 3 slots	24.7	**25.2**	**20.9**
	EGPRS 4 slots	23.7	**24.2**	**21.2**
GSM1900	Voice (1 slot)	29.2	**29.7**	**20.7**
	GPRS 1 slot	29.2	**29.7**	**20.7**
	GPRS 2 slots	27.2	**27.7**	**21.7**
	GPRS 3 slots	25.2	**25.7**	**21.4**
	GPRS 4 slots	24.2	**24.7**	**21.7**
	EGPRS 1 slot	25.2	**25.7**	**16.7**
	EGPRS 2 slots	24.2	**24.7**	**18.7**
	EGPRS 3 slots	23.2	**23.7**	**19.4**
	EGPRS 4 slots	22.2	**22.7**	**19.7**

Upper limit (dB): -1.5 ~ 0.5		Max. RF Output Power (dBm)	
RF Air interface	Mode	Target	Max. tune-up tolerance limit
W-CDMA Band V	R99	24.2	**24.7**
	HSDPA	24.2	**24.7**
	HSUPA	24.2	**24.7**
	DC-HSDPA	24.2	**24.7**
W-CDMA Band IV	R99	23.4	**23.9**
	HSDPA	23.4	**23.9**
	HSUPA	23.4	**23.9**
	DC-HSDPA	23.4	**23.9**
W-CDMA Band II	R99	23.4	**23.9**
	HSDPA	23.4	**23.9**
	HSUPA	23.4	**23.9**
	DC-HSDPA	23.4	**23.9**
LTE Band 2	QPSK	22.9	**23.4**
	16QAM	21.9	**22.4**
LTE Band 4	QPSK	22.9	**23.4**
	16QAM	21.9	**22.4**
LTE Band 5	QPSK	23.7	**24.2**
	16QAM	22.7	**23.2**
LTE Band 7	QPSK	23.2	**23.7**
	16QAM	22.2	**22.7**
LTE Band 17	QPSK	23.7	**24.2**
	16QAM	22.7	**23.2**
LTE Band 26	QPSK	23.7	**24.2**
	16QAM	22.7	**23.2**
LTE Band 41	QPSK	22.7	**23.2**
	16QAM	21.7	**22.2**

*LTE Carrier Aggregation shares identical target power and tune-up tolerance as noted above

Upper limit (dB):		1.0	Max. RF Output Power (dBm)	
RF Air interface	Mode	Ch. #	Target (Core0 and Core1)	Max. tune-up tolerance limit
WiFi 2.4 GHz	802.11b	1 ~ 11	17.0	**18.0**
	802.11g	1	14.5	**15.5**
		2 ~ 10	15.5	**16.5**
		11	14.5	**15.5**
	802.11n HT20	1	14.5	**15.5**
		2 ~ 10	15.5	**16.5**
		11	14.5	**15.5**
	802.11ac VHT20	1	14.5	**15.5**
		2 ~ 10	15.5	**16.5**
		11	14.5	**15.5**
WiFi 5 GHz	802.11a		14.0	**15.0**
	802.11n HT20		13.5	**14.5**
	802.11n HT40		11.5	**12.5**
	802.11ac VHT20		13.5	**14.5**
	802.11ac VHT40		11.5	**12.5**
	802.11ac VHT80		10.5	**11.5**
Bluetooth			8.9	**9.9**
Bluetooth LE			1.0	**2.0**

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 7	Frequency range: 2500 - 2570 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	20850 2510	20825 2507.5	20800 2505	20775 2502.5		
	Mid	21100 2535	21100 2535	21100 2535	21100 2535		
	High	21350 2560	21375 2562.5	21400 2565	21425 2567.5		
	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		
	Band 26	Frequency range: 814 - 849 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low		26765/ 821.5	26740/ 819	26715/ 816.5	26705/ 815.5	26697/ 814.7
	Mid		26865/ 831.5	26865/ 831.5	26865/ 831.5	26865/ 831.5	26865/ 831.5
	High		26965/ 841.5	26990/ 844	27015/ 846.5	27025/ 847.5	27033/ 848.3

General LTE SAR Test and Reporting Considerations (Continued)

Frequency range, Channel Bandwidth, Numbers and Frequencies

Band 41	Frequency range: 2496 - 2690 MHz					
	Channel Bandwidth					
	20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
Low	39750/ 2506.0	39725/ 2503.5	39700/ 2501	39675/ 2498.5		
Low-Mid	40185/ 2549.5	40173/ 2548.3	40160/ 2547.0	40148/ 2545.8		
Mid	40620/ 2593.0	40620/ 2593.0	40620/ 2593.0	40620/ 2593.0		
Mid-High	41055/ 2636.5	41068/ 2547.8	41080/ 2639.0	41093/ 2640.3		
High	41490/ 2680.0	41515/ 2682.5	41540/ 2685.0	41565/ 2687.5		

Carrier Aggregation Combinations (For supported channels, please refer to the tables above)

Primary Channel Bandwidth (MHz)		Secondary Channel Bandwidth (MHz)	
Band 5	10, 5, 3, 1.4	Band 7	20, 15, 10
Band 7	20, 15, 10	Band 5	10, 5, 3, 1.4
Band 7	20, 15	Band 7	20, 15
Band 41	20, 15, 10	Band 41	20, 15, 10

LTE transmitter and antenna implementation

LTE has two (2) TX/RX antennas and two (2) RX antennas

Refer to Appendix A...

Maximum power reduction (MPR)

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

MPR Built-in by design

A-MPR (additional MPR) was disabled during SAR testing

Power reduction

No

Spectrum plots for RB configurations

A properly configured base station simulator was used for the SAR and power measurements; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.

6.5. LTE (TDD) Considerations

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

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

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

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

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

Calculated Duty Cycle

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

Calculated Duty Cycle = Extended cyclic prefix in uplink x (T_s) x # of S + # of U

Example for Calculated Duty Cycle for Uplink-Downlink Configuration 0:
Calculated Duty Cycle = 5120 x [1/(15000 x 2048)] x 2 + 6 ms = 63.33%
where
T_s = 1/(15000 x 2048) seconds

7. RF Exposure Conditions (Test Configurations)

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

Wireless technologies	RF Exposure Conditions	DUT-to-User Separation	Test Position	Antenna-to-edge/surface	SAR Required	Note
WWAN ①	Head	0 mm	Left Touch	N/A	Yes	
			Left Tilt (15°)	N/A	Yes	
			Right Touch	N/A	Yes	
			Right Tilt (15°)	N/A	Yes	
	Body	10 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	No	1
WWAN ②	Head	0 mm	Left Touch	N/A	Yes	
			Left Tilt (15°)	N/A	Yes	
			Right Touch	N/A	Yes	
			Right Tilt (15°)	N/A	Yes	
	Body	10 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 ③ & ④	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	10 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:

1. SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 941225 D06 Hot Spot SAR.
2. 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 ± 2°C of the temperature when the tissue parameters are characterized.

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

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

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 1

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
7/8/2015	Body 2450	e'	52.2300	Relative Permittivity (ϵ_r):	52.23	52.70	-0.89	5
		e''	14.8300	Conductivity (σ):	2.02	1.95	3.60	5
	Body 2410	e'	52.3900	Relative Permittivity (ϵ_r):	52.39	52.76	-0.70	5
		e''	14.7500	Conductivity (σ):	1.98	1.91	3.62	5
	Body 2475	e'	52.1600	Relative Permittivity (ϵ_r):	52.16	52.67	-0.97	5
		e''	15.0300	Conductivity (σ):	2.07	1.99	4.19	5
7/8/2015	Body 2600	e'	51.8500	Relative Permittivity (ϵ_r):	51.85	52.51	-1.26	5
		e''	15.2900	Conductivity (σ):	2.21	2.16	2.30	5
	Body 2500	e'	52.0700	Relative Permittivity (ϵ_r):	52.07	52.64	-1.08	5
		e''	14.9800	Conductivity (σ):	2.08	2.02	3.07	5
	Body 2700	e'	51.5500	Relative Permittivity (ϵ_r):	51.55	52.38	-1.59	5
		e''	15.5500	Conductivity (σ):	2.33	2.30	1.44	5
7/8/2015	Head 2600	e'	38.6400	Relative Permittivity (ϵ_r):	38.64	39.01	-0.95	5
		e''	14.0100	Conductivity (σ):	2.03	1.96	3.22	5
	Head 2500	e'	38.9800	Relative Permittivity (ϵ_r):	38.98	39.14	-0.40	5
		e''	13.7700	Conductivity (σ):	1.91	1.85	3.24	5
	Head 2700	e'	38.2900	Relative Permittivity (ϵ_r):	38.29	38.88	-1.53	5
		e''	14.2800	Conductivity (σ):	2.14	2.07	3.55	5
7/8/2015	Head 2450	e'	39.1400	Relative Permittivity (ϵ_r):	39.14	39.20	-0.15	5
		e''	13.6200	Conductivity (σ):	1.86	1.80	3.08	5
	Head 2410	e'	39.3300	Relative Permittivity (ϵ_r):	39.33	39.28	0.13	5
		e''	13.5200	Conductivity (σ):	1.81	1.76	2.91	5
	Head 2475	e'	39.0400	Relative Permittivity (ϵ_r):	39.04	39.17	-0.33	5
		e''	13.7800	Conductivity (σ):	1.90	1.83	3.80	5

SAR Lab 2

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
7/6/2015	Head 835	e'	42.1000	Relative Permittivity (ϵ_r):	42.10	41.50	1.45	5
		e''	19.6700	Conductivity (σ):	0.91	0.90	1.47	5
	Head 820	e'	42.3600	Relative Permittivity (ϵ_r):	42.36	41.60	1.82	5
		e''	19.6200	Conductivity (σ):	0.89	0.90	-0.43	5
	Head 850	e'	42.0100	Relative Permittivity (ϵ_r):	42.01	41.50	1.23	5
		e''	19.3800	Conductivity (σ):	0.92	0.92	0.10	5
7/6/2015	Body 835	e'	52.8700	Relative Permittivity (ϵ_r):	52.87	55.20	-4.22	5
		e''	21.4100	Conductivity (σ):	0.99	0.97	2.48	5
	Body 820	e'	52.9000	Relative Permittivity (ϵ_r):	52.90	55.28	-4.30	5
		e''	21.5000	Conductivity (σ):	0.98	0.97	1.22	5
	Body 850	e'	52.6100	Relative Permittivity (ϵ_r):	52.61	55.16	-4.62	5
		e''	21.1900	Conductivity (σ):	1.00	0.99	1.45	5
7/10/2015	Head 835	e'	42.4900	Relative Permittivity (ϵ_r):	42.49	41.50	2.39	5
		e''	19.4500	Conductivity (σ):	0.90	0.90	0.34	5
	Head 820	e'	42.7100	Relative Permittivity (ϵ_r):	42.71	41.60	2.66	5
		e''	19.5600	Conductivity (σ):	0.89	0.90	-0.74	5
	Head 850	e'	42.3900	Relative Permittivity (ϵ_r):	42.39	41.50	2.14	5
		e''	19.5100	Conductivity (σ):	0.92	0.92	0.78	5
7/10/2015	Body 835	e'	54.3300	Relative Permittivity (ϵ_r):	54.33	55.20	-1.58	5
		e''	21.5500	Conductivity (σ):	1.00	0.97	3.15	5
	Body 820	e'	54.4200	Relative Permittivity (ϵ_r):	54.42	55.28	-1.55	5
		e''	21.6800	Conductivity (σ):	0.99	0.97	2.07	5
	Body 850	e'	54.1900	Relative Permittivity (ϵ_r):	54.19	55.16	-1.75	5
		e''	21.5500	Conductivity (σ):	1.02	0.99	3.18	5
7/11/2015	Head 1750	e'	38.9400	Relative Permittivity (ϵ_r):	38.94	40.08	-2.86	5
		e''	13.9000	Conductivity (σ):	1.35	1.37	-1.20	5
	Head 1710	e'	39.1700	Relative Permittivity (ϵ_r):	39.17	40.15	-2.43	5
		e''	13.7700	Conductivity (σ):	1.31	1.35	-2.76	5
	Head 1755	e'	38.9300	Relative Permittivity (ϵ_r):	38.93	40.08	-2.86	5
		e''	13.9600	Conductivity (σ):	1.36	1.37	-0.69	5
7/11/2015	Body 1750	e'	51.4500	Relative Permittivity (ϵ_r):	51.45	53.44	-3.73	5
		e''	15.2100	Conductivity (σ):	1.48	1.49	-0.41	5
	Body 1710	e'	51.6800	Relative Permittivity (ϵ_r):	51.68	53.54	-3.48	5
		e''	15.0500	Conductivity (σ):	1.43	1.46	-2.09	5
	Body 1755	e'	51.4900	Relative Permittivity (ϵ_r):	51.49	53.43	-3.63	5
		e''	15.2100	Conductivity (σ):	1.48	1.49	-0.33	5

SAR Lab 3

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
7/10/2015	Body 1900	e'	51.1100	Relative Permittivity (ϵ_r):	51.11	53.30	-4.11	5
		e''	14.5000	Conductivity (σ):	1.53	1.52	0.78	5
	Body 1850	e'	51.2100	Relative Permittivity (ϵ_r):	51.21	53.30	-3.92	5
		e''	14.3300	Conductivity (σ):	1.47	1.52	-3.02	5
	Body 1910	e'	51.1200	Relative Permittivity (ϵ_r):	51.12	53.30	-4.09	5
		e''	14.4000	Conductivity (σ):	1.53	1.52	0.61	5
7/10/2015	Head 1900	e'	38.1200	Relative Permittivity (ϵ_r):	38.12	40.00	-4.70	5
		e''	13.5500	Conductivity (σ):	1.43	1.40	2.25	5
	Head 1850	e'	38.1000	Relative Permittivity (ϵ_r):	38.10	40.00	-4.75	5
		e''	13.4200	Conductivity (σ):	1.38	1.40	-1.40	5
	Head 1910	e'	38.1100	Relative Permittivity (ϵ_r):	38.11	40.00	-4.73	5
		e''	13.4300	Conductivity (σ):	1.43	1.40	1.88	5

SAR Lab 4

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
7/10/2015	Head 5180	e'	35.4200	Relative Permittivity (ε_r):	35.42	36.01	-1.65	5
		e''	15.5300	Conductivity (σ):	4.47	4.63	-3.40	5
	Head 5200	e'	35.2400	Relative Permittivity (ε_r):	35.24	35.99	-2.08	5
		e''	15.4800	Conductivity (σ):	4.48	4.65	-3.77	5
	Head 5600	e'	34.5800	Relative Permittivity (ε_r):	34.58	35.53	-2.68	5
		e''	15.6300	Conductivity (σ):	4.87	5.06	-3.82	5
	Head 5800	e'	34.0500	Relative Permittivity (ε_r):	34.05	35.30	-3.54	5
		e''	15.6300	Conductivity (σ):	5.04	5.27	-4.35	5
	Head 5825	e'	34.0400	Relative Permittivity (ε_r):	34.04	35.30	-3.57	5
		e''	15.6800	Conductivity (σ):	5.08	5.27	-3.63	5
7/10/2015	Body 5180	e'	49.7900	Relative Permittivity (ε_r):	49.79	49.05	1.52	5
		e''	18.5100	Conductivity (σ):	5.33	5.27	1.14	5
	Body 5200	e'	49.7900	Relative Permittivity (ε_r):	49.79	49.02	1.57	5
		e''	18.8000	Conductivity (σ):	5.44	5.29	2.66	5
	Body 5600	e'	48.8300	Relative Permittivity (ε_r):	48.83	48.48	0.73	5
		e''	19.0800	Conductivity (σ):	5.94	5.76	3.13	5
	Body 5800	e'	48.2300	Relative Permittivity (ε_r):	48.23	48.20	0.06	5
		e''	19.1200	Conductivity (σ):	6.17	6.00	2.77	5
	Body 5825	e'	48.1700	Relative Permittivity (ε_r):	48.17	48.20	-0.06	5
		e''	19.2200	Conductivity (σ):	6.23	6.00	3.75	5
7/20/2015	Head 2450	e'	38.2900	Relative Permittivity (ε_r):	38.29	39.20	-2.32	5
		e''	13.6200	Conductivity (σ):	1.86	1.80	3.08	5
	Head 2410	e'	38.4900	Relative Permittivity (ε_r):	38.49	39.28	-2.01	5
		e''	13.5000	Conductivity (σ):	1.81	1.76	2.76	5
	Head 2475	e'	38.2500	Relative Permittivity (ε_r):	38.25	39.17	-2.34	5
		e''	13.7200	Conductivity (σ):	1.89	1.83	3.34	5

SAR Lab 5

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
7/13/2015	Head 750	e'	40.7700	Relative Permittivity (ϵ_r):	40.77	41.96	-2.84	5
		e''	21.4200	Conductivity (σ):	0.89	0.89	0.02	5
	Head 700	e'	41.4000	Relative Permittivity (ϵ_r):	41.40	42.22	-1.94	5
		e''	21.8200	Conductivity (σ):	0.85	0.89	-4.49	5
	Head 790	e'	40.3000	Relative Permittivity (ϵ_r):	40.30	41.76	-3.49	5
		e''	21.1300	Conductivity (σ):	0.93	0.90	3.57	5
7/13/2015	Body 750	e'	53.9700	Relative Permittivity (ϵ_r):	53.97	55.55	-2.84	5
		e''	23.2400	Conductivity (σ):	0.97	0.96	0.63	5
	Body 700	e'	54.3300	Relative Permittivity (ϵ_r):	54.33	55.74	-2.53	5
		e''	23.6400	Conductivity (σ):	0.92	0.96	-4.08	5
	Body 790	e'	53.5300	Relative Permittivity (ϵ_r):	53.53	55.39	-3.36	5
		e''	22.8200	Conductivity (σ):	1.00	0.97	3.75	5
7/16/2015	Head 2600	e'	37.5200	Relative Permittivity (ϵ_r):	37.52	39.01	-3.82	5
		e''	13.6700	Conductivity (σ):	1.98	1.96	0.72	5
	Head 2500	e'	37.8400	Relative Permittivity (ϵ_r):	37.84	39.14	-3.31	5
		e''	13.5300	Conductivity (σ):	1.88	1.85	1.44	5
	Head 2700	e'	36.9700	Relative Permittivity (ϵ_r):	36.97	38.88	-4.92	5
		e''	14.0300	Conductivity (σ):	2.11	2.07	1.74	5
7/16/2015	Body 2600	e'	50.2700	Relative Permittivity (ϵ_r):	50.27	52.51	-4.27	5
		e''	15.6100	Conductivity (σ):	2.26	2.16	4.44	5
	Body 2500	e'	50.4500	Relative Permittivity (ϵ_r):	50.45	52.64	-4.15	5
		e''	15.1700	Conductivity (σ):	2.11	2.02	4.38	5
	Body 2700	e'	49.8400	Relative Permittivity (ϵ_r):	49.84	52.38	-4.86	5
		e''	15.6600	Conductivity (σ):	2.35	2.30	2.16	5
7/20/2015	Body 2600	e'	50.8300	Relative Permittivity (ϵ_r):	50.83	52.51	-3.20	5
		e''	14.5700	Conductivity (σ):	2.11	2.16	-2.52	5
	Body 2500	e'	50.9500	Relative Permittivity (ϵ_r):	50.95	52.64	-3.20	5
		e''	14.3200	Conductivity (σ):	1.99	2.02	-1.47	5
	Body 2700	e'	50.4200	Relative Permittivity (ϵ_r):	50.42	52.38	-3.75	5
		e''	14.9000	Conductivity (σ):	2.24	2.30	-2.80	5

8.2. System Check

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

System Performance Check Measurement Conditions:

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

Reference Target SAR Values

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

System Dipole	Serial No.	Cal. Date	Freq. (MHz)	Target SAR Values (W/kg)		
				1g/10g	Head	Body
D750V3	1071	11/13/2014	750	1g	8.22	8.52
				10g	5.39	5.64
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
D2450V2	706	5/11/2015	2450	1g	52.6	51.3
				10g	24.6	24.0
D2600V2	1006	9/10/2014	2600	1g	58.6	56.3
				10g	26.1	25.1
D2600V2	1036	3/13/2015	2600	1g	56.1	56.2
				10g	25.0	25.0
D5GHzV2	1168	12/4/2014	5200	1g	79.3	76.0
				10g	22.5	21.1
			5600	1g	81.7	82.0
				10g	23.2	22.7
			5800	1g	78.0	76.2
				10g	22.1	21.0

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 1

Date Tested	System Dipole		T.S. Liquid		Measured Results		Target (Ref. Value)	Delta ±10 %	Plot No.
	Type	Serial #			Zoom Scan to 100 mW	Normalize to 1 W			
7/8/2015	D2450V2	706	Body	1g	5.03	50.3	51.30	-1.95	
				10g	2.33	23.3	24.00	-2.92	
7/8/2015	D2600V2	1036	Body	1g	5.62	56.2	56.20	0.00	
				10g	2.46	24.6	25.00	-1.60	
7/8/2015	D2600V2	1036	Head	1g	6.08	60.8	56.10	8.38	1,2
				10g	2.66	26.6	25.00	6.40	
7/8/2015	D2450V2	706	Head	1g	5.46	54.6	52.60	3.80	3,4
				10g	2.49	24.9	24.60	1.22	

SAR Lab 2

Date Tested	System Dipole		T.S. Liquid		Measured Results		Target (Ref. Value)	Delta ±10 %	Plot No.
	Type	Serial #			Zoom Scan to 100 mW	Normalize to 1 W			
7/6/2015	D835V2	4d142	Head	1g	0.91	9.1	8.91	1.91	
				10g	0.60	6.0	5.77	3.29	
7/6/2015	D835V2	4d142	Body	1g	0.88	8.8	9.22	-4.99	
				10g	0.58	5.8	6.05	-4.96	
7/10/2015	D835V2	4d142	Head	1g	0.94	9.4	8.91	5.27	5,6
				10g	0.62	6.2	5.77	6.59	
7/10/2015	D835V2	4d142	Body	1g	0.94	9.4	9.22	2.39	
				10g	0.62	6.2	6.05	2.48	
7/11/2015	D1750V2	1077	Head	1g	3.67	36.7	36.50	0.55	
				10g	1.94	19.4	19.40	0.00	
7/11/2015	D1750V2	1077	Body	1g	3.93	39.3	36.90	6.50	7,8
				10g	2.11	21.1	19.8	6.57	

SAR Lab 3

Date Tested	System Dipole		T.S. Liquid		Measured Results		Target (Ref. Value)	Delta ±10 %	Plot No.
	Type	Serial #			Zoom Scan to 100 mW	Normalize to 1 W			
7/10/2015	D1900V2	5d163	Body	1g	4.04	40.4	40.6	-0.49	9, 10
				10g	2.11	21.1	21.4	-1.40	
7/10/2015	D1900V2	5d163	Head	1g	4.10	41.0	40.8	0.49	
				10g	2.12	21.2	21.2	0.00	

SAR Lab 4

Date Tested	System Dipole		T.S. Liquid		Measured Results		Target (Ref. Value)	Delta ±10 %	Plot No.
	Type	Serial #			Zoom Scan to 100 mW	Normalize to 1 W			
7/10/2015	D5GHzV2 (5.2GHz)	1168	Head	1g	8.46	84.6	79.30	6.68	11,12
				10g	2.43	24.3	22.50	8.00	
7/10/2015	D5GHzV2 (5.6GHz)	1168	Head	1g	8.50	85.0	81.70	4.04	
				10g	2.44	24.4	23.20	5.17	
7/10/2015	D5GHzV2 (5.8GHz)	1168	Head	1g	7.98	79.8	78.00	2.31	
				10g	2.28	22.8	22.10	3.17	
7/10/2015	D5GHzV2 (5.2GHz)	1168	Body	1g	7.98	79.8	76.00	5.00	
				10g	2.25	22.5	21.10	6.64	
7/10/2015	D5GHzV2 (5.6GHz)	1168	Body	1g	8.65	86.5	82.00	5.49	
				10g	2.41	24.1	22.70	6.17	
7/10/2015	D5GHzV2 (5.8GHz)	1168	Body	1g	7.76	77.6	76.20	1.84	
				10g	2.16	21.6	21.00	2.86	
7/20/2015	D2450V2	706	Head	1g	5.60	56.00	51.3	9.16	13,14
				10g	2.53	25.30	24.0	5.42	

SAR Lab 5

Date Tested	System Dipole		T.S. Liquid		Measured Results		Target (Ref. Value)	Delta ±10 %	Plot No.
	Type	Serial #			Zoom Scan to 100 mW	Normalize to 1 W			
7/13/2015	D750V3	1071	Head	1g	0.79	7.9	8.22	-4.26	15,16
				10g	0.52	5.2	5.39	-4.27	
7/13/2015	D750V3	1071	Body	1g	0.86	8.6	8.52	1.06	
				10g	0.58	5.8	5.64	1.95	
7/16/2015	D2600V2	1036	Head	1g	5.65	56.5	56.1	0.71	
				10g	2.47	24.7	25.0	-1.20	
7/16/2015	D2600V2	1036	Body	1g	5.83	58.3	56.2	3.74	17,18
				10g	2.57	25.7	25	2.80	
7/20/2015	D2600V2	1006	Body	1g	5.47	54.7	56.3	-2.84	
				10g	2.42	24.2	25.1	-3.59	

9. Conducted Output Power Measurements

9.1. GSM

Per KDB 941225 D01 3G SAR Procedures:

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

GSM850 Measured Results

Band	Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Max. Pwr	
						Burst (dBm)	Frame (dBm)
850	GSM (Voice)	CS1	1	128	824.2	33.1	24.1
				190	836.6	33.1	24.1
				251	848.8	33.2	24.1
	GPRS (GMSK)	CS1	1	128	824.2	33.0	24.0
				190	836.6	33.0	24.0
				251	848.8	33.1	24.0
			2	128	824.2	31.2	25.1
				190	836.6	31.1	25.0
				251	848.8	31.2	25.2
			3	128	824.2	29.2	24.9
				190	836.6	29.1	24.8
				251	848.8	29.2	24.9
			4	128	824.2	27.7	24.7
				190	836.6	27.7	24.7
				251	848.8	28.2	25.1
	EGPRS (8PSK)	MCS5	1	128	824.2	27.1	18.0
				190	836.6	27.0	18.0
				251	848.8	27.1	18.0
			2	128	824.2	26.0	20.0
				190	836.6	25.8	19.8
				251	848.8	26.0	20.0
			3	128	824.2	24.9	20.6
				190	836.6	24.7	20.4
				251	848.8	24.8	20.6
			4	128	824.2	24.2	21.1
				190	836.6	24.0	21.0
				251	848.8	24.1	21.1

Notes:

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

- Head & Body-worn: GMSK Voice Mode
- Hotspot mode: GMSK (GPRS) mode with 4 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)	Max. Pwr	
						Burst (dBm)	Frame (dBm)
1900	GSM (Voice)	CS1	1	512	1850.2	29.5	20.5
				661	1880.0	29.5	20.5
				810	1909.8	29.5	20.5
	GPRS (GMSK)	CS1	1	512	1850.2	29.6	20.6
				661	1880.0	29.6	20.5
				810	1909.8	29.5	20.5
			2	512	1850.2	27.4	21.4
				661	1880.0	27.5	21.4
				810	1909.8	27.4	21.4
			3	512	1850.2	25.2	20.9
				661	1880.0	25.2	20.9
				810	1909.8	25.3	21.0
			4	512	1850.2	24.4	21.3
				661	1880.0	24.4	21.4
				810	1909.8	24.5	21.4
	EGPRS (8PSK)	MCS5	1	512	1850.2	25.6	16.5
				661	1880.0	25.5	16.5
				810	1909.8	25.7	16.7
			2	512	1850.2	24.3	18.3
				661	1880.0	24.2	18.2
				810	1909.8	24.4	18.4
			3	512	1850.2	23.4	19.2
				661	1880.0	23.4	19.1
				810	1909.8	23.5	19.3
			4	512	1850.2	22.5	19.4
				661	1880.0	22.5	19.4
				810	1909.8	22.6	19.6

Notes:

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

- Head & Body-worn: GMSK Voice Mode
- Hotspot mode: GMSK (GPRS) mode with 4 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
	βc/βd	8/15

HSDPA Setup Procedures used to establish the test signals

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

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subtest	1	2	3	4
W-CDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set 1			
	Power Control Algorithm	Algorithm 2			
	βc	2/15	11/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	βc/βd	2/15	11/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR (dB)	0	0	0.5	0.5
HSDPA Specific Settings	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			
	Ahs=βhs/βc	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
	βc	11/15	6/15	15/15	2/15	15/15
	βd	15/15	15/15	9/15	15/15	0
	βec	209/225	12/15	30/15	2/15	5/15
	βc/βd	11/15	6/15	15/9	2/15	15/1
	βhs	22/15	12/15	30/15	4/15	5/15
	βed	1309/225	94/75	47/15	56/75	47/15
	CM (dB)	1	3	2	3	1
	MPR (dB)	0	2	1	2	0
HSDPA Specific Settings	DACK	8				0
	DNAK	8				0
	DCQI	8				0
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
	CQI Repetition Factor (Table 5.2B.4)	2				
	Ahs = βhs/βc	30/15				
HSUPA Specific Settings	E-DPDCCH	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

DC-HSDPA Setup Procedures used to establish the test signals

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

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

Table E.5.0: Levels for HSDPA connection setup

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

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

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

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

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

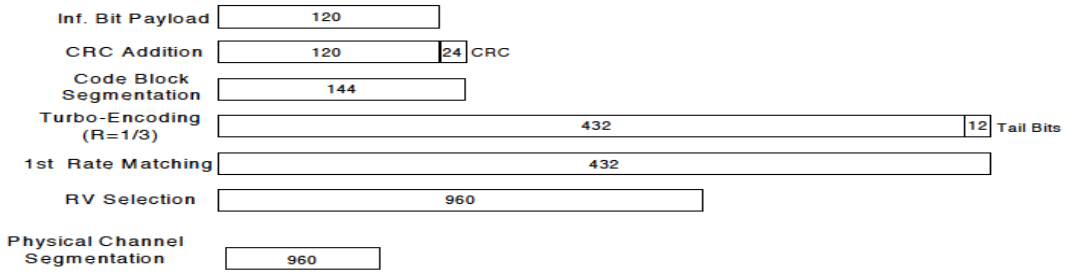


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

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

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

HSPA+

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

W-CDMA Band II Measured Results

Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Max. Pwr (dBm)
W-CDMA Band II	Rel 99	RMC, 12.2 kbps	9262	1852.4	N/A	23.9
			9400	1880.0	N/A	23.7
			9538	1907.6	N/A	23.8
	HSDPA	Subtest 1	9262	1852.4	0	23.8
			9400	1880.0	0	23.8
			9538	1907.6	0	23.9
		Subtest 2	9262	1852.4	0	23.8
			9400	1880.0	0	23.7
			9538	1907.6	0	23.8
		Subtest 3	9262	1852.4	0.5	23.3
			9400	1880.0	0.5	23.2
			9538	1907.6	0.5	23.3
		Subtest 4	9262	1852.4	0.5	23.3
			9400	1880.0	0.5	23.2
			9538	1907.6	0.5	23.3
	HSUPA	Subtest 1	9262	1852.4	0	22.3
			9400	1880.0	0	22.8
			9538	1907.6	0	22.2
		Subtest 2	9262	1852.4	2	21.9
			9400	1880.0	2	21.9
			9538	1907.6	2	21.9
		Subtest 3	9262	1852.4	1	21.7
			9400	1880.0	1	22.3
			9538	1907.6	1	21.8
		Subtest 4	9262	1852.4	2	21.9
			9400	1880.0	2	21.9
			9538	1907.6	2	21.9
		Subtest 5	9262	1852.4	0	23.9
			9400	1880.0	0	23.8
			9538	1907.6	0	23.8
	DC-HSDPA	Subtest 1	9262	1852.4	0	23.8
			9400	1880.0	0	23.8
			9538	1907.6	0	23.9
		Subtest 2	9262	1852.4	0	23.8
			9400	1880.0	0	23.8
			9538	1907.6	0	23.9
		Subtest 3	9262	1852.4	0.5	23.3
			9400	1880.0	0.5	23.2
			9538	1907.6	0.5	23.4
		Subtest 4	9262	1852.4	0.5	23.2
			9400	1880.0	0.5	23.3
			9538	1907.6	0.5	23.4

W-CDMA Band IV Measured Results

Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Max. Pwr (dBm)
W-CDMA Band IV	Rel 99	RMC, 12.2 kbps	1312	1712.4	N/A	23.7
			1413	1732.6	N/A	23.8
			1513	1752.6	N/A	23.6
	HSDPA	Subtest 1	1312	1712.4	0	23.7
			1413	1732.6	0	23.8
			1513	1752.6	0	23.7
		Subtest 2	1312	1712.4	0	23.7
			1413	1732.6	0	23.8
			1513	1752.6	0	23.7
		Subtest 3	1312	1712.4	0.5	23.2
			1413	1732.6	0.5	23.3
			1513	1752.6	0.5	23.2
		Subtest 4	1312	1712.4	0.5	23.2
			1413	1732.6	0.5	23.3
			1513	1752.6	0.5	23.1
	HSUPA	Subtest 1	1312	1712.4	0	22.4
			1413	1732.6	0	22.8
			1513	1752.6	0	22.7
		Subtest 2	1312	1712.4	2	21.3
			1413	1732.6	2	21.4
			1513	1752.6	2	21.3
		Subtest 3	1312	1712.4	1	21.8
			1413	1732.6	1	22.1
			1513	1752.6	1	22.0
		Subtest 4	1312	1712.4	2	21.9
			1413	1732.6	2	21.9
			1513	1752.6	2	21.9
		Subtest 5	1312	1712.4	0	23.6
			1413	1732.6	0	23.8
			1513	1752.6	0	23.6
	DC-HSDPA	Subtest 1	1312	1712.4	0	23.7
			1413	1732.6	0	23.8
			1513	1752.6	0	23.6
		Subtest 2	1312	1712.4	0	23.7
			1413	1732.6	0	23.8
			1513	1752.6	0	23.7
		Subtest 3	1312	1712.4	0.5	23.2
			1413	1732.6	0.5	23.3
			1513	1752.6	0.5	23.1
		Subtest 4	1312	1712.4	0.5	23.2
			1413	1732.6	0.5	23.3
			1513	1752.6	0.5	23.2

W-CDMA Band V Measured Results

Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Max. Pwr (dBm)
W-CDMA Band V	Rel 99	RMC, 12.2 kbps	4132	826.4	N/A	24.5
			4183	836.6	N/A	24.5
			4233	846.6	N/A	24.6
	HSDPA	Subtest 1	4132	826.4	0	24.5
			4183	836.6	0	24.5
			4233	846.6	0	24.5
		Subtest 2	4132	826.4	0	24.3
			4183	836.6	0	24.2
			4233	846.6	0	24.2
		Subtest 3	4132	826.4	0.5	24.0
			4183	836.6	0.5	24.1
			4233	846.6	0.5	24.1
		Subtest 4	4132	826.4	0.5	24.1
			4183	836.6	0.5	24.1
			4233	846.6	0.5	24.1
	HSUPA	Subtest 1	4132	826.4	0	23.1
			4183	836.6	0	23.1
			4233	846.6	0	23.5
		Subtest 2	4132	826.4	2	22.7
			4183	836.6	2	22.7
			4233	846.6	2	22.7
		Subtest 3	4132	826.4	1	22.9
			4183	836.6	1	22.9
			4233	846.6	1	22.9
		Subtest 4	4132	826.4	2	22.7
			4183	836.6	2	22.7
			4233	846.6	2	22.7
		Subtest 5	4132	826.4	0	24.6
			4183	836.6	0	24.6
			4233	846.6	0	24.5
	DC-HSDPA	Subtest 1	4132	826.4	0	24.5
			4183	836.6	0	24.5
			4233	846.6	0	24.5
		Subtest 2	4132	826.4	0	24.5
			4183	836.6	0	24.6
			4233	846.6	0	24.5
		Subtest 3	4132	826.4	0.5	24.0
			4183	836.6	0.5	24.1
			4233	846.6	0.5	24.1
		Subtest 4	4132	826.4	0.5	24.0
			4183	836.6	0.5	24.1
			4233	846.6	0.5	24.0

9.3. LTE

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

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

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

Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
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 6.6.3.3.2	13	10	Table 6.2.4-2	Table 6.2.4-2
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)		
						1860 MHz	1880 MHz	1900 MHz
LTE Band 2	20	QPSK	1	0	0	23.4	23.4	23.4
			1	50	0	23.3	23.2	23.3
			1	99	0	23.1	23.0	23.3
			50	0	1	22.3	22.1	22.1
			50	25	1	22.3	22.1	22.0
			50	50	1	22.2	22.0	22.1
			100	0	1	22.2	22.1	22.2
		16QAM	1	0	1	22.1	22.3	22.1
			1	50	1	22.0	22.1	22.1
			1	99	1	21.8	22.0	22.0
			50	0	2	21.2	21.0	21.1
			50	25	2	21.2	21.0	21.0
			50	50	2	21.1	20.9	21.0
			100	0	2	21.2	21.0	21.1

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						1857.5 MHz	1880 MHz	1902.5 MHz
LTE Band 2	15	QPSK	1	0	0	23.4	23.4	23.4
			1	36	0	23.3	23.2	23.3
			1	74	0	23.3	23.1	23.2
			36	0	1	22.1	22.0	22.1
			36	18	1	22.2	22.1	22.2
			36	37	1	22.2	22.0	22.1
			75	0	1	22.2	22.0	22.1
		16QAM	1	0	1	22.2	21.8	22.0
			1	36	1	22.2	21.7	21.9
			1	74	1	22.0	21.6	21.9
			36	0	2	21.0	20.9	21.1
			36	18	2	21.1	20.9	21.1
			36	37	2	21.1	20.9	21.0
			75	0	2	21.1	20.9	20.9

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						1855 MHz	1880 MHz	1905 MHz
LTE Band 2	10	QPSK	1	0	0	23.3	23.3	23.4
			1	25	0	23.4	23.1	23.3
			1	49	0	23.4	23.2	23.3
			25	0	1	22.1	21.9	22.0
			25	12	1	22.0	22.0	22.0
			25	25	1	22.0	22.0	22.1
			50	0	1	22.1	22.0	22.0
		16QAM	1	0	1	22.1	22.1	21.9
			1	25	1	22.0	21.6	21.9
			1	49	1	22.0	22.1	21.9
			25	0	2	21.0	20.7	20.9
			25	12	2	21.0	21.0	20.9
			25	25	2	21.0	21.0	20.9
			50	0	2	20.9	21.0	20.8

LTE Band 2 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						1852.5 MHz	1880 MHz	1907.5 MHz
LTE Band 2	5	QPSK	1	0	0	23.3	23.4	23.4
			1	12	0	23.2	23.3	23.1
			1	24	0	23.3	23.4	23.4
			12	0	1	22.1	22.0	22.0
			12	6	1	22.1	22.1	22.2
			12	11	1	22.1	22.0	22.2
			25	0	1	22.1	22.1	22.1
		16QAM	1	0	1	22.0	22.2	22.0
			1	12	1	21.8	21.8	22.0
			1	24	1	21.9	22.1	22.1
			12	0	2	21.0	20.9	21.0
			12	6	2	21.0	21.0	21.1
			12	11	2	21.0	20.9	21.0
			25	0	2	21.1	21.0	21.0
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						1851.5 MHz	1880 MHz	1908.5 MHz
LTE Band 2	3	QPSK	1	0	0	23.2	23.2	23.3
			1	7	0	23.4	23.4	23.3
			1	14	0	23.2	23.2	23.4
			8	0	1	22.0	22.1	22.1
			8	4	1	22.1	22.1	22.2
			8	7	1	22.1	22.1	22.1
			15	0	1	22.1	22.0	22.1
		16QAM	1	0	1	22.1	21.7	22.3
			1	7	1	22.3	21.9	22.1
			1	14	1	22.2	21.8	22.4
			8	0	2	21.0	21.0	20.9
			8	4	2	21.0	21.0	20.9
			8	7	2	21.0	20.9	20.9
			15	0	2	21.0	20.9	21.0
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						1850.7 MHz	1880 MHz	1909.3 MHz
LTE Band 2	1.4	QPSK	1	0	0	23.4	23.3	23.3
			1	2	0	23.4	23.2	23.4
			1	5	0	23.4	23.3	23.3
			3	0	0	23.2	23.2	23.0
			3	1	0	23.2	23.3	23.1
			3	2	0	23.2	23.2	23.1
			6	0	1	22.0	22.0	22.0
		16QAM	1	0	1	22.1	21.7	22.1
			1	2	1	22.1	21.9	22.1
			1	5	1	22.2	21.6	21.9
			3	0	1	21.8	21.8	21.8
			3	1	1	21.8	21.8	21.8
			3	2	1	21.8	21.8	21.9
			6	0	2	21.0	21.0	20.9

LTE Band 4 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)
						1732.5 MHz
LTE Band 4	20	QPSK	1	0	0	23.4
			1	50	0	23.0
			1	99	0	23.1
			50	0	1	22.2
			50	25	1	22.2
			50	50	1	22.0
			100	0	1	22.1
		16QAM	1	0	1	22.1
			1	50	1	21.9
			1	99	1	21.9
			50	0	2	21.1
			50	25	2	21.2
			50	50	2	21.0
			100	0	2	21.2

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						1717.5 MHz	1732.5 MHz	1747.5 MHz
LTE Band 4	15	QPSK	1	0	0	23.4	23.4	23.4
			1	36	0	23.2	23.2	23.3
			1	74	0	23.1	23.0	23.4
			36	0	1	22.2	22.1	22.2
			36	18	1	22.2	22.1	22.2
			36	37	1	22.1	22.1	22.2
			75	0	1	22.2	22.2	22.2
		16QAM	1	0	1	22.4	21.8	22.1
			1	36	1	22.1	21.6	22.0
			1	74	1	21.9	21.6	22.1
			36	0	2	21.2	21.1	21.3
			36	18	2	21.2	21.1	21.2
			36	37	2	21.1	21.0	21.3
			75	0	2	21.1	21.2	21.2

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						1715 MHz	1732.5 MHz	1750 MHz
LTE Band 4	10	QPSK	1	0	0	23.4	23.4	23.3
			1	25	0	23.4	23.1	23.4
			1	49	0	23.3	23.1	23.4
			25	0	1	22.3	22.1	22.3
			25	12	1	22.2	22.1	22.3
			25	25	1	22.2	22.0	22.3
			50	0	1	22.2	22.0	22.2
		16QAM	1	0	1	22.4	22.3	22.2
			1	25	1	22.2	21.6	22.2
			1	49	1	22.2	21.8	22.4
			25	0	2	21.3	21.0	21.3
			25	12	2	21.3	21.1	21.4
			25	25	2	21.2	20.9	21.4
			50	0	2	21.2	21.0	21.2

LTE Band 4 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						1712.5 MHz	1732.5 MHz	1752.5 MHz
LTE Band 4	5	QPSK	1	0	0	23.4	23.3	23.4
			1	12	0	23.0	23.1	23.3
			1	24	0	23.4	23.2	23.4
			12	0	1	22.3	22.0	22.2
			12	6	1	22.2	22.0	22.3
			12	11	1	22.2	21.9	22.2
			25	0	1	22.2	22.0	22.3
		16QAM	1	0	1	22.2	22.1	22.0
			1	12	1	22.1	21.8	22.1
			1	24	1	22.2	22.0	22.2
			12	0	2	21.2	21.0	21.3
			12	6	2	21.2	21.0	21.3
			12	11	2	21.2	21.0	21.3
			25	0	2	21.2	21.0	21.3

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						1711.5 MHz	1732.5 MHz	1753.5 MHz
LTE Band 4	3	QPSK	1	0	0	23.2	23.1	23.4
			1	7	0	23.4	23.2	23.4
			1	14	0	23.3	23.0	23.4
			8	0	1	22.2	21.9	22.3
			8	4	1	22.2	22.0	22.3
			8	7	1	22.1	22.0	22.2
			15	0	1	22.1	22.0	22.3
		16QAM	1	0	1	22.3	21.5	22.4
			1	7	1	22.3	21.7	22.3
			1	14	1	22.3	21.4	22.4
			8	0	2	21.2	20.9	21.2
			8	4	2	21.2	21.0	21.2
			8	7	2	21.2	21.0	21.1
			15	0	2	21.1	20.9	21.2

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						1710.7 MHz	1732.5 MHz	1754.3 MHz
LTE Band 4	1.4	QPSK	1	0	0	23.4	23.0	23.3
			1	2	0	23.4	23.0	23.4
			1	5	0	23.4	23.0	23.4
			3	0	0	23.3	23.0	23.2
			3	1	0	23.3	23.0	23.4
			3	2	0	23.3	23.0	23.3
			6	0	1	22.2	21.9	22.3
		16QAM	1	0	1	22.4	21.6	22.2
			1	2	1	22.2	21.7	22.4
			1	5	1	22.3	21.8	22.2
			3	0	1	21.9	21.4	22.0
			3	1	1	21.9	21.5	22.1
			3	2	1	22.0	21.7	22.0
			6	0	2	21.1	20.9	21.3

Note(s):

20 MHz Bandwidth 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

LTE Band 5 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)
						836.5 MHz
LTE Band 5	10	QPSK	1	0	0	23.9
			1	25	0	24.1
			1	49	0	24.0
			25	0	1	22.7
			25	12	1	22.7
			25	25	1	22.7
			50	0	1	22.7
		16QAM	1	0	1	22.8
			1	25	1	22.8
			1	49	1	22.9
			25	0	2	21.7
			25	12	2	21.7
			25	25	2	21.6
			50	0	2	21.6

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						826.5 MHz	836.5 MHz	846.5 MHz
LTE Band 5	5	QPSK	1	0	0	23.9	24.1	23.9
			1	12	0	23.9	24.0	23.7
			1	24	0	24.0	24.1	23.9
			12	0	1	22.7	22.7	22.6
			12	6	1	22.7	22.7	22.7
			12	11	1	22.7	22.7	22.6
			25	0	1	22.7	22.7	22.6
		16QAM	1	0	1	22.7	23.0	22.7
			1	12	1	22.7	22.5	22.7
			1	24	1	22.7	23.0	22.5
			12	0	2	21.6	21.6	21.6
			12	6	2	21.7	21.7	21.6
			12	11	2	21.7	21.6	21.5
			25	0	2	21.7	21.6	21.5

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						825.5 MHz	836.5 MHz	847.5 MHz
LTE Band 5	3	QPSK	1	0	0	23.9	23.8	23.8
			1	7	0	24.1	24.0	24.2
			1	14	0	24.0	23.8	23.8
			8	0	1	22.7	22.8	22.6
			8	4	1	22.8	22.8	22.6
			8	7	1	22.7	22.8	22.6
			15	0	1	22.8	22.7	22.6
		16QAM	1	0	1	23.0	22.6	23.2
			1	7	1	23.1	22.8	22.7
			1	14	1	23.1	22.6	23.1
			8	0	2	21.6	21.6	21.4
			8	4	2	21.7	21.7	21.4
			8	7	2	21.7	21.7	21.4
			15	0	2	21.8	21.6	21.5

LTE Band 5 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						824.7 MHz	836.5 MHz	848.3 MHz
LTE Band 5	1.4	QPSK	1	0	0	24.1	23.8	23.8
			1	2	0	24.0	23.8	23.9
			1	5	0	24.2	23.9	23.9
			3	0	0	23.9	23.9	23.7
			3	1	0	23.9	24.0	23.7
			3	2	0	24.0	23.9	23.7
			6	0	1	22.7	22.7	22.6
		16QAM	1	0	1	23.1	22.5	22.7
			1	2	1	23.1	23.0	23.1
			1	5	1	23.2	22.5	22.7
			3	0	1	22.6	22.6	22.5
			3	1	1	22.5	22.6	22.4
			3	2	1	22.6	22.7	22.5
			6	0	2	21.6	21.7	21.5

Note(s):

10 MHz Bandwidth 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

LTE Band 7 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						2510 MHz	2535 MHz	2560 MHz
LTE Band 7	20	QPSK	1	0	0	23.7	23.7	23.7
			1	49	0	23.6	23.7	23.4
			1	99	0	23.5	23.5	23.5
			50	0	1	22.5	22.7	22.6
			50	24	1	22.7	22.5	22.6
			50	50	1	22.5	22.5	22.6
			100	0	1	22.6	22.5	22.6
		16QAM	1	0	1	22.7	22.7	22.5
			1	49	1	22.6	22.7	22.5
			1	99	1	22.4	22.6	22.2
			50	0	2	21.5	21.5	21.6
			50	24	2	21.5	21.4	21.5
			50	50	2	21.4	21.3	21.5
			100	0	2	21.5	21.4	21.5
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						2507.5 MHz	2535 MHz	2562.5 MHz
LTE Band 7	15	QPSK	1	0	0	23.7	23.7	23.7
			1	37	0	23.6	23.7	23.7
			1	74	0	23.3	23.4	23.6
			36	0	1	22.5	22.4	22.6
			36	20	1	22.6	22.5	22.6
			36	39	1	22.5	22.5	22.5
			75	0	1	22.4	22.4	22.5
		16QAM	1	0	1	22.4	22.3	22.7
			1	37	1	22.3	22.3	22.7
			1	74	1	22.1	22.1	22.6
			36	0	2	21.5	21.4	21.5
			36	20	2	21.4	21.4	21.5
			36	39	2	21.4	21.4	21.4
			75	0	2	21.4	21.3	21.5
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						2505 MHz	2535 MHz	2565 MHz
LTE Band 7	10	QPSK	1	0	0	23.3	23.5	23.7
			1	25	0	23.6	23.5	23.6
			1	49	0	23.4	23.4	23.5
			25	0	1	22.2	22.5	22.3
			25	12	1	22.3	22.4	22.4
			25	25	1	22.2	22.5	22.3
			50	0	1	22.3	22.4	22.3
		16QAM	1	0	1	22.5	22.7	22.3
			1	25	1	22.4	22.2	22.1
			1	49	1	22.4	22.6	22.2
			25	0	2	21.2	21.3	21.3
			25	12	2	21.2	21.3	21.4
			25	25	2	21.1	21.4	21.3
			50	0	2	21.0	21.2	21.1

LTE Band 7 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						2502.5 MHz	2535 MHz	2567.5 MHz
LTE Band 7	5	QPSK	1	0	0	23.5	23.7	23.7
			1	12	0	23.4	23.5	23.2
			1	24	0	23.4	23.7	23.3
			12	0	1	22.3	22.4	22.4
			12	7	1	22.2	22.4	22.4
			12	13	1	22.2	22.4	22.3
			25	0	1	22.2	22.3	22.3
		16QAM	1	0	1	22.3	22.7	22.3
			1	12	1	22.0	22.1	22.3
			1	24	1	22.4	22.6	22.2
			12	0	2	21.1	21.3	21.3
			12	7	2	21.2	21.3	21.3
			12	13	2	21.2	21.3	21.2
			25	0	2	21.2	21.3	21.3

LTE Band 17 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)
						710 MHz
LTE Band 17	10	QPSK	1	0	0	23.9
			1	25	0	24.1
			1	49	0	23.9
			25	0	1	22.6
			25	12	1	22.7
			25	25	1	22.6
			50	0	1	22.6
		16QAM	1	0	1	22.8
			1	25	1	22.8
			1	49	1	23.0
			25	0	2	21.6
			25	12	2	21.7
			25	25	2	21.6
			50	0	2	21.5

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)
						710 MHz
LTE Band 17	5	QPSK	1	0	0	23.9
			1	12	0	23.7
			1	24	0	24.0
			12	0	1	22.5
			12	6	1	22.6
			12	11	1	22.6
			25	0	1	22.7
		16QAM	1	0	1	22.8
			1	12	1	22.6
			1	24	1	22.8
			12	0	2	21.5
			12	6	2	21.6
			12	11	2	21.6
			25	0	2	21.7

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

LTE Band 26 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
							831.5 MHz	
LTE Band 26	15	QPSK	1	0	0		23.9	
			1	36	0		24.2	
			1	74	0		23.8	
			36	0	1		22.8	
			36	18	1		22.8	
			36	37	1		22.7	
			75	0	1		22.8	
		16QAM	1	0	1		22.4	
			1	36	1		22.7	
			1	74	1		22.5	
			36	0	2		21.6	
			36	18	2		21.7	
			36	37	2		21.5	
			75	0	2		21.6	

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						819 MHz	831.5 MHz	844 MHz
LTE Band 26	10	QPSK	1	0	0	24.0	24.0	24.1
			1	25	0	24.1	24.0	24.0
			1	49	0	24.0	24.0	24.0
			25	0	1	22.9	22.9	22.8
			25	12	1	22.9	22.9	22.9
			25	25	1	22.7	22.8	22.8
			50	0	1	22.8	22.7	22.8
		16QAM	1	0	1	22.7	23.0	22.8
			1	25	1	22.7	22.5	22.7
			1	49	1	22.7	22.9	22.7
			25	0	2	21.7	21.7	21.8
			25	12	2	21.8	21.8	21.9
			25	25	2	21.6	21.6	21.8
			50	0	2	21.6	21.6	21.7

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						816.5 MHz	831.5 MHz	846.5 MHz
LTE Band 26	5	QPSK	1	0	0	24.0	24.1	24.1
			1	12	0	24.0	24.0	23.8
			1	24	0	24.1	24.2	24.0
			12	0	1	22.9	22.8	22.9
			12	6	1	22.9	22.8	22.9
			12	11	1	22.7	22.8	22.8
			25	0	1	22.8	22.9	22.8
		16QAM	1	0	1	22.8	23.0	22.8
			1	12	1	22.5	22.6	22.8
			1	24	1	22.9	22.8	22.6
			12	0	2	21.8	21.8	21.8
			12	6	2	21.8	21.8	21.8
			12	11	2	21.6	21.7	21.7
			25	0	2	21.8	21.7	21.7

LTE Band 26 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						815.5 MHz	831.5 MHz	847.5 MHz
LTE Band 26	3	QPSK	1	0	0	24.1	24.0	24.1
			1	7	0	24.1	23.9	24.1
			1	14	0	24.0	23.9	24.0
			8	0	1	22.7	22.9	22.8
			8	4	1	22.8	22.9	22.8
			8	7	1	22.7	22.9	22.8
			15	0	1	22.8	22.8	22.8
		16QAM	1	0	1	23.0	22.7	23.1
			1	7	1	23.2	22.8	22.8
			1	14	1	22.8	22.6	22.8
			8	0	2	21.7	21.8	21.6
			8	4	2	21.6	21.8	21.6
			8	7	2	21.7	21.8	21.6
			15	0	2	21.7	21.6	21.8

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)		
						814.7 MHz	831.5 MHz	848.3 MHz
LTE Band 26	1.4	QPSK	1	0	0	24.0	24.1	24.0
			1	2	0	23.9	23.9	24.0
			1	5	0	24.1	24.0	23.9
			3	0	0	23.9	24.1	23.8
			3	1	0	23.9	24.0	23.9
			3	2	0	23.9	24.0	23.8
			6	0	1	22.9	22.8	22.8
		16QAM	1	0	1	23.2	22.5	22.8
			1	2	1	22.9	22.9	22.9
			1	5	1	23.2	22.5	22.7
			3	0	1	22.5	22.6	22.6
			3	1	1	22.4	22.6	22.7
			3	2	1	22.4	22.6	22.6
			6	0	2	21.6	21.7	21.8

Note(s):

15 MHz Bandwidth 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

LTE Band 41 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)				
						2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz
LTE Band 41	20	QPSK	1	0	0	22.8	22.9	23.1	23.2	22.9
			1	50	0	22.8	22.7	22.9	22.8	22.5
			1	99	0	22.8	22.7	22.6	22.8	22.5
			50	0	1	21.5	21.3	21.6	21.3	21.4
			50	25	1	21.5	21.3	21.6	21.3	21.4
			50	50	1	21.5	21.2	21.5	21.2	21.3
			100	0	1	21.5	21.3	21.6	21.3	21.4
		16QAM	1	0	1	21.7	21.8	22.0	21.6	22.0
			1	50	1	21.6	21.7	22.0	21.4	21.8
			1	99	1	21.5	21.6	21.7	21.3	21.6
			50	0	2	20.5	20.3	20.6	20.4	20.4
			50	25	2	20.5	20.4	20.7	20.3	20.3
			50	50	2	20.4	20.2	20.5	20.2	20.4
			100	0	2	20.5	20.5	20.7	20.4	20.4

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)				
						2503.5 MHz	2548.3 MHz	2593 MHz	2637.8 MHz	2682.5 MHz
LTE Band 41	15	QPSK	1	0	0	22.8	22.9	22.8	22.8	22.9
			1	36	0	22.8	22.8	22.7	22.7	22.6
			1	74	0	22.7	22.7	22.6	22.4	22.6
			36	0	1	21.7	21.7	21.7	21.6	21.6
			36	18	1	21.7	21.5	21.7	21.4	21.6
			36	37	1	21.7	21.5	21.6	21.4	21.6
			75	0	1	21.6	21.4	21.7	21.4	21.6
		16QAM	1	0	1	21.9	21.5	21.5	21.9	21.6
			1	36	1	21.8	21.4	21.6	21.6	21.4
			1	74	1	21.5	21.6	21.4	21.6	21.3
			36	0	2	20.6	20.6	20.8	20.5	20.6
			36	18	2	20.7	20.6	20.7	20.6	20.5
			36	37	2	20.6	20.4	20.6	20.4	20.5
			75	0	2	20.6	20.5	20.6	20.3	20.6

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)				
						2501 MHz	2547 MHz	2593 MHz	2639 MHz	2685 MHz
LTE Band 41	10	QPSK	1	0	0	22.7	23.1	23.2	22.7	23.0
			1	25	0	22.8	22.9	23.1	22.8	22.9
			1	49	0	22.7	23.0	23.1	22.7	22.9
			25	0	1	21.6	21.8	21.9	21.6	21.6
			25	12	1	21.6	21.8	22.1	21.5	21.6
			25	25	1	21.7	21.8	21.9	21.6	21.5
			50	0	1	21.5	21.8	22.0	21.6	21.5
		16QAM	1	0	1	21.7	21.8	22.1	21.8	21.5
			1	25	1	21.7	21.6	22.2	22.0	21.3
			1	49	1	21.6	21.8	22.0	21.8	21.5
			25	0	2	20.6	20.8	21.1	20.5	20.5
			25	12	2	20.6	20.9	21.2	20.6	20.6
			25	25	2	20.7	20.8	21.0	20.6	20.4
			50	0	2	20.6	20.8	21.0	20.5	20.6

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)				
						2498.5 MHz	2545.8 MHz	2593 MHz	2640.3 MHz	2687.5 MHz
LTE Band 41	5	QPSK	1	0	0	22.9	23.1	23.0	23.0	23.0
			1	12	0	22.4	23.0	23.1	22.7	22.7
			1	24	0	22.8	23.1	23.2	22.8	22.8
			12	0	1	21.6	21.7	21.9	21.7	21.6
			12	7	1	21.5	21.8	22.0	21.6	21.7
			12	13	1	21.6	21.8	22.0	21.6	21.6
			25	0	1	21.5	21.8	22.0	21.6	21.6
		16QAM	1	0	1	21.4	21.9	22.0	21.4	21.9
			1	12	1	21.2	21.8	22.1	21.3	21.7
			1	24	1	21.5	21.9	22.0	21.5	21.8
			12	0	2	20.5	20.8	21.0	20.6	20.6
			12	7	2	20.6	20.9	21.1	20.7	20.7
			12	13	2	20.6	20.8	20.9	20.6	20.6
			25	0	2	20.6	20.8	21.0	20.7	20.7

LTE Rel. 10 Carrier Aggregation

The following power measurements were performed with a single carrier uplink; CA for this particular project only supports one (1) uplink and two (2) downlinks.

LTE CA combinations			PCC (UL)				SCC (DL)			LTE Rel 10 Tx. Power [dBm]
PCC	+	SCC	Bandwidth (MHz)	Frequency (MHz)	Channel	RB/Offset	Bandwidth (MHz)	Frequency (MHz)	Channel	
5	+	7	10	836.5	20525	1/25	20	2655	3100	24.19
7	+	5	20	2535	21100	1/0	10	881.5	2525	23.61
7	+	7	20	2535	21100	1/0	20	2560	21350	23.55
41	+	41	20	2636.5	41055	1/0	20	2593	40620	23.11

Note:

SAR is excluded for Carrier Aggregation when measured power does not exceed LTE Release 8 by more than a $^{1}/_{4}$ dB.

9.4. Wi-Fi 2.4GHz (DTS Band)

Measured Results

Antenna	Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Avg Pwr (dBm)	Max Output Power (dBm)	SAR Test (Yes/No)	Note(s)
Core0	2.4	802.11b	1 Mbps	1	2412	17.9	18.0	Yes	
				6	2437	17.5			
				11	2462	17.4			
		802.11g	6 Mbps	1	2412	Not Required	15.5	No	1
				6	2437		16.5		
				11	2462		15.5		
		802.11n (HT20)	6.5 Mbps	1	2412		15.5	No	1
				6	2437		16.5		
				11	2462		15.5		
		802.11ac (VHT20)	6.5 Mbps	1	2412		15.5	No	1
				6	2437		16.5		
				11	2462		15.5		
Core1	2.4	802.11b	1 Mbps	1	2412	17.7	18.0	Yes	
				6	2437	17.5			
				11	2462	17.8			
		802.11g	6 Mbps	1	2412	Not Required	15.5	No	1
				6	2437		16.5		
				11	2462		15.5		
		802.11n (HT20)	6.5 Mbps	1	2412		15.5	No	1
				6	2437		16.5		
				11	2462		15.5		
		802.11ac (VHT20)	6.5 Mbps	1	2412		15.5	No	1
				6	2437		16.5		
				11	2462		15.5		

Note(s):

1. Output Power and SAR is not required for 802.11g/n HT20/ac VHT20 channels when the highest *reported* SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

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

Measured Results

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Avg Pwr (dBm)		Max Output Power (dBm)	SAR Test (Yes/No)	Note(s)
					Core 0	Core 1			
5.3 UNII-2A	802.11a	6 Mbps	52	5260	13.9	13.8	15.0	Yes	2
			56	5280	14.0	14.0			
			60	5300	14.0	14.0			
			64	5320	14.0	14.0			
	802.11n/ac (HT20/VHT20)	6.5 Mbps	52	5260	Not Required	Not Required	14.5	No	1
			56	5280					
			60	5300					
			64	5320					
	802.11n/ac (HT40/VHT40)	13.5 Mbps	54	5270			12.5	No	1
			62	5310					
	802.11ac (VHT80)	29.3 Mbps	58	5290			11.5	No	1
5.5 UNII-2C	802.11a	6 Mbps	100	5500	14.9	14.9	15.0	Yes	
			104	5520	14.9	15.0			
			108	5540	14.6	14.6			
			112	5560	14.6	14.6			
			116	5580	14.6	14.5			
	802.11n/ac (HT20/VHT20)	6.5 Mbps	100	5500	Not Required	Not Required	14.5	No	1
			116	5580					
	802.11n/ac (HT40/VHT40)	13.5 Mbps	102	5510			12.5	No	1
			110	5550					
	802.11ac (VHT80)	29.3 Mbps	106	5530			11.5	No	1
5.8 UNII-3	802.11a	6 Mbps	132	5660	14.7	14.8	15.0	Yes	
			136	5680	14.6	14.7			
			140	5700	14.7	14.8			
			144	5720	14.7	14.7			
			149	5745	14.7	14.8			
			153	5765	14.7	14.8			
			157	5785	14.9	15.0			
			161	5805	14.8	14.9			
			165	5825	14.6	14.8			
	802.11n/ac (HT20/VHT20)	6.5 Mbps	132	5660	Not Required	Not Required	14.5	No	1
			136	5680					
			140	5700					
			144	5720					
			149	5745					
			157	5785					
			161	5805					
			165	5825					
	802.11n/ac (HT40/VHT40)	13.5 Mbps	134	5670			12.5	No	1
			142	5710					
			151	5755					
			159	5795					
	802.11ac (VHT80)	29.3 Mbps	138	5690			11.5	No	1
			155	5775					

Note(s):

1. Output Power and SAR measurement is not required for 802.11n HT20/HT40/ac VHT20/VHT40/VHT80 channels when the specified tune-up tolerances for 802.11n HT20/HT40/ac VHT20/VHT40/VHT80 are lower than 802.11a by more than ½ dB and the measured SAR is ≤ 1.2 W/Kg.
2. When the specified maximum output power is the same for both UNII band I and UNII band 2A, begin SAR measurement in UNII band 2A; and if the highest *reported* SAR for UNII band 2A is
   - ≤ 1.2 W/kg, SAR is not required for UNII band I
   - > 1.2 W/kg, both bands should be tested independently for SAR.

9.6. Bluetooth

Band (GHz)	Mode	Ch #	Freq. (MHz)	Avg Pwr (dBm)	Avg Pwr (mW)
2.4	V3.0 + EDR, GFSK	0	2402	6.9	4.9
		39	2441	9.3	8.5
		78	2480	7.7	5.9
	V3.0 + EDR, π/4 DQPSK	0	2402	3.4	2.2
		39	2441	5.8	3.8
		78	2480	4.2	2.6
	V3.0 + EDR, 8-DPSK	0	2402	3.3	2.1
		39	2441	5.8	3.8
		78	2480	4.2	2.6
	V4.0 LE, GFSK	0	2402	-1.0	0.8
		19	2440	1.4	1.4
		39	2480	0.2	1.0

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 ≤ ¼ 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.
- For LTE bands that do not support at least three non-overlapping channels in certain channel bandwidths, test the available non-overlapping channels instead. 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; therefore, the requirement for H, M and L channels may not fully apply.

KDB 248227 D01 SAR meas for 802.11 v02:

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

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

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

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

10.1. GSM850

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
Head	Voice	0	Left Touch	190	836.6	33.2	33.0	0.449	**0.470**	1
			Left Tilt	190	836.6	33.2	33.0	0.275	0.288	
			Right Touch	190	836.6	33.2	33.0	0.408	0.427	
			Right Tilt	190	836.6	33.2	33.0	0.315	0.330	
Head VoIP	GPRS 4 Slots	0	Left Touch	190	836.6	28.2	28.0	0.621	**0.650**	2
			Left Tilt	190	836.6	28.2	28.0	0.484	0.507	
			Right Touch	190	836.6	28.2	28.0	0.501	0.525	
			Right Tilt	190	836.6	28.2	28.0	0.324	0.339	
Body-worn	Voice	10	Rear	190	836.6	33.2	33.0	0.449	**0.470**	3
			Front	190	836.6	33.2	33.0	0.368	0.385	
Body-worn(VoIP) & Hotspot	GPRS 4 Slots	10	Rear	190	836.6	28.2	28.0	0.631	**0.661**	4
			Front	190	836.6	28.2	28.0	0.525	0.550	
Hotspot			Edge 2	190	836.6	28.2	28.0	0.289	0.303	
			Edge 3	190	836.6	28.2	28.0	0.635	0.665	
			Edge 4	190	836.6	28.2	28.0	0.737	**0.772**	5

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	29.7	29.5	0.245	0.255	
			Left Tilt	661	1880.0	29.7	29.5	0.152	0.158	
			Right Touch	661	1880.0	29.7	29.5	0.462	**0.482**	6
			Right Tilt	661	1880.0	29.7	29.5	0.167	0.174	
Head VoIP	GPRS 4 Slots	0	Left Touch	661	1880.0	24.7	24.4	0.282	0.304	
			Left Tilt	661	1880.0	24.7	24.4	0.184	0.199	
			Right Touch	661	1880.0	24.7	24.4	0.507	**0.547**	7
			Right Tilt	661	1880.0	24.7	24.4	0.199	0.215	
Body-worn	Voice	10	Rear	661	1880.0	29.7	29.5	0.562	0.586	
			Front	661	1880.0	29.7	29.5	0.489	0.510	
Body-worn(VoIP) & Hotspot	GPRS 4 Slots	10	Rear	661	1880.0	24.7	24.4	0.576	0.621	
			Front	661	1880.0	24.7	24.4	0.647	**0.698**	8
Hotspot			Edge 2	661	1880.0	24.7	24.4	0.667	**0.720**	9
			Edge 3	661	1880.0	24.7	24.4	0.450	0.486	

10.4. W-CDMA Band II

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
Head	Rel 99 RMC	0	Left Touch	9400	1880.0	23.9	23.7	0.616	0.639	
			Left Tilt	9400	1880.0	23.9	23.7	0.392	0.407	
			Right Touch	9262	1852.4	23.9	23.9	1.220	1.228	
				9400	1880.0	23.9	23.7	1.190	**1.235**	10
				9538	1907.6	23.9	23.8	1.100	1.120	
			Right Tilt	9400	1880.0	23.9	23.7	0.434	0.450	
Body-worn & Hotspot	Rel 99 RMC	10	Rear	9262	1852.4	23.9	23.9	0.991	0.998	
				9400	1880.0	23.9	23.7	0.902	0.936	
				9538	1907.6	23.9	23.8	0.846	0.862	
			Front	9262	1852.4	23.9	23.9	1.180	**1.188**	11
				9400	1880.0	23.9	23.7	1.100	1.141	
				9538	1907.6	23.9	23.8	1.030	1.049	
Hotspot	Rel 99 RMC	10	Edge 2	9262	1852.4	23.9	23.9	1.020	1.027	
				9400	1880.0	23.9	23.7	1.010	1.048	
				9538	1907.6	23.9	23.8	1.010	1.029	
			Edge 3	9400	1880.0	23.9	23.7	0.699	0.725	

10.5. W-CDMA Band IV

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	1413	1732.6	23.9	23.8	0.437	0.448	
			Left Tilt	1413	1732.6	23.9	23.8	0.277	0.284	
			Right Touch	1413	1732.6	23.9	23.8	0.758	**0.777**	12
			Right Tilt	1413	1732.6	23.9	23.8	0.289	0.296	
Body-worn & Hotspot	Rel 99 RMC	10	Rear	1312	1712.4	23.9	23.7	0.868	0.919	
				1413	1732.6	23.9	23.8	0.882	0.905	
				1513	1752.6	23.9	23.6	0.920	**0.981**	13
			Front	1413	1732.6	23.9	23.8	0.761	0.781	
Hotspot	Rel 99 RMC	10	Edge 2	1413	1732.6	23.9	23.8	0.632	0.648	
			Edge 3	1413	1732.6	23.9	23.8	0.593	0.608	

10.6. 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	24.7	24.5	0.622	**0.651**	14
			Left Tilt	4183	836.6	24.7	24.5	0.362	0.379	
			Right Touch	4183	836.6	24.7	24.5	0.486	0.509	
			Right Tilt	4183	836.6	24.7	24.5	0.367	0.384	
Body-worn & Hotspot	Rel 99 RMC	10	Rear	4183	836.6	24.7	24.5	0.691	**0.724**	15
			Front	4183	836.6	24.7	24.5	0.639	0.669	
Hotspot	Rel 99 RMC	10	Edge 2	4183	836.6	24.7	24.5	0.280	0.293	
			Edge 3	4183	836.6	24.7	24.5	0.515	0.539	
			Edge 4	4183	836.6	24.7	24.5	0.653	0.684	

10.7. LTE Band 2 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offest	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
Head	QPSK	0	Left Touch	18900	1880.0	1	0	23.4	23.4	0.485	0.485	
						50	24	22.4	22.1	0.407	0.436	
			Left Tilt	18900	1880.0	1	0	23.4	23.4	0.266	0.266	
						50	24	22.4	22.1	0.224	0.240	
			Right Touch	18700	1860.0	1	0	23.4	23.4	1.040	1.040	
						50	24	22.4	22.3	0.897	0.918	
				18900	1880.0	1	0	23.4	23.4	1.040	1.040	
						50	24	22.4	22.1	0.849	0.910	
						100	0	22.4	22.1	0.865	0.927	
				19100	1900.0	1	0	23.4	23.4	1.010	1.010	
						50	0	22.4	22.1	0.995	**1.066**	16
			Right Tilt	18900	1880.0	1	0	23.4	23.9	0.329	0.293	
						50	24	22.4	22.6	0.263	0.251	
Body-worn & Hotspot	QPSK	10	Rear	18700	1860.0	1	0	23.4	23.4	0.885	0.885	
				18900	1880.0	1	0	23.4	23.4	0.807	0.807	
						50	24	22.4	22.1	0.709	0.760	
				19100	1900.0	1	0	23.4	23.4	0.768	0.768	
			Front	18700	1860.0	1	0	23.4	23.4	0.961	**0.961**	17
				18900	1880.0	1	0	23.4	23.4	0.883	0.883	
						50	24	22.4	22.1	0.737	0.790	
				19100	1900.0	1	0	23.4	23.4	0.838	0.838	
Hotspot	QPSK	10	Edge 2	18700	1860.0	1	0	23.4	23.4	0.906	0.906	
						50	24	22.4	22.3	0.793	0.811	
				18900	1880.0	1	0	23.4	23.4	0.878	0.878	
						50	24	22.4	22.1	0.773	0.828	
						100	0	22.4	22.1	0.757	0.811	
				19100	1900.0	1	0	23.4	23.4	0.890	0.890	
						50	0	22.4	22.1	0.771	0.826	
			Edge 3	18900	1880.0	1	0	23.4	23.4	0.583	0.583	
						50	24	22.4	22.1	0.505	0.541	

10.8. LTE Band 4 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offest	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
Head	QPSK	0	Left Touch	20175	1732.5	1	0	23.4	23.4	0.475	0.475	
						50	0	22.4	22.2	0.384	0.402	
			Left Tilt	20175	1732.5	1	0	23.4	23.4	0.325	0.325	
						50	0	22.4	22.2	0.246	0.258	
			Right Touch	20025	1717.5	1	0	23.4	23.4	0.866	0.866	
						36	0	22.4	22.2	0.803	0.841	
				20175	1732.5	1	0	23.4	23.4	0.976	0.976	
						50	0	22.4	22.2	0.752	0.787	
						100	0	22.4	22.1	0.881	0.944	
				20325	1747.5	1	0	23.4	23.4	1.010	**1.010**	18
						36	0	22.4	22.2	0.960	1.005	
			Right Tilt	20175	1732.5	1	0	23.4	23.4	0.437	0.437	
						50	0	22.4	22.2	0.339	0.355	
Body-worn & Hotspot	QPSK	10	Rear	20025	1717.5	1	0	23.4	23.8	0.830	0.757	
						36	0	22.4	22.7	0.771	0.720	
				20175	1732.5	1	0	23.4	23.4	1.080	1.080	
						50	0	22.4	22.2	0.831	0.870	
						100	0	22.4	22.1	0.798	0.855	
				20325	1747.5	1	0	23.4	23.9	0.920	0.820	
						36	0	22.4	22.8	0.855	0.780	
			Front	20025	1717.5	1	0	23.4	23.8	0.915	0.834	
						36	0	22.4	22.7	0.865	0.807	
				20175	1732.5	1	0	23.4	23.4	1.100	**1.100**	19
						50	0	22.4	22.2	0.836	0.875	
						100	0	22.4	22.1	0.757	0.811	
				20325	1747.5	1	0	23.4	23.9	1.130	1.007	
						36	0	22.4	22.8	1.060	0.967	
Hotspot	QPSK	10	Edge 2	20175	1732.5	1	0	23.4	23.4	0.756	0.756	
						50	0	22.4	22.2	0.577	0.604	
			Edge 3	20175	1732.5	1	0	23.4	23.4	0.694	0.694	
						50	0	22.4	22.2	0.533	0.558	

10.9. LTE Band 5 (10MHz Bandwidth)

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

10.10. LTE Band 7 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offest	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
Head	QPSK	0	Left Touch	21100	2535.0	1	0	23.7	23.7	0.484	**0.484**	20
						50	0	22.7	22.7	0.391	0.391	
			Left Tilt	21100	2535.0	1	0	23.7	23.7	0.157	0.157	
						50	0	22.7	22.7	0.133	0.133	
			Right Touch	21100	2535.0	1	0	23.7	23.7	0.211	0.211	
						50	0	22.7	22.7	0.171	0.171	
			Right Tilt	21100	2535.0	1	0	23.7	23.7	0.180	0.180	
						50	0	22.7	22.7	0.146	0.146	
Body-worn & Hotspot	QPSK	10	Rear	21100	2535.0	1	0	23.7	23.7	0.440	0.440	
						50	0	22.7	22.7	0.344	0.344	
			Front	21100	2535.0	1	0	23.7	23.7	0.691	**0.691**	21
						50	0	22.7	22.7	0.560	0.560	
Hotspot	QPSK	10	Edge 2	21100	2535.0	1	0	23.7	23.7	0.061	0.061	
						50	0	22.7	22.7	0.051	0.051	
			Edge 3	21100	2535.0	1	0	23.7	23.7	0.612	0.612	
						50	0	22.7	22.7	0.490	0.490	

10.12. LTE Band 17 (10MHz Bandwidth)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offest	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
Head	QPSK	0	Left Touch	23790	710.0	1	25	24.2	24.1	0.164	**0.168**	22
						25	12	23.2	22.7	0.101	0.113	
			Left Tilt	23790	710.0	1	25	24.2	24.1	0.158	0.162	
						25	12	23.2	22.7	0.096	0.107	
			Right Touch	23790	710.0	1	25	24.2	24.1	0.146	0.149	
						25	12	23.2	22.7	0.139	0.156	
			Right Tilt	23790	710.0	1	25	24.2	24.1	0.091	0.093	
						25	12	23.2	22.7	0.087	0.098	
Body-worn & Hotspot	QPSK	10	Rear	23790	710.0	1	25	24.2	24.1	0.335	0.343	
						25	12	23.2	22.7	0.322	**0.361**	23
			Front	23790	710.0	1	25	24.2	24.1	0.281	0.288	
						25	12	23.2	22.7	0.270	0.303	
Hotspot	QPSK	10	Edge 2	23790	710.0	1	25	24.2	24.1	0.226	0.231	
						25	12	23.2	22.7	0.216	0.242	
			Edge 3	23790	710.0	1	25	24.2	24.1	0.143	0.146	
						25	12	23.2	22.7	0.138	0.155	
			Edge 4	23790	710.0	1	25	24.2	24.1	0.411	0.421	
						25	12	23.2	22.7	0.393	**0.441**	24

10.13. LTE Band 26 (15MHz Bandwidth)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offest	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
Head	QPSK	0	Left Touch	26865	831.5	1	37	24.2	24.2	0.426	**0.426**	25
						36	20	23.2	22.8	0.369	0.405	
			Left Tilt	26865	831.5	1	37	24.2	24.2	0.245	0.245	
						36	20	23.2	22.8	0.211	0.231	
			Right Touch	26865	831.5	1	37	24.2	24.2	0.354	0.354	
						36	20	23.2	22.8	0.294	0.322	
			Right Tilt	26865	831.5	1	37	24.2	24.2	0.244	0.244	
						36	20	23.2	22.8	0.201	0.220	
Body-worn & Hotspot	QPSK	10	Rear	26865	831.5	1	37	24.2	24.2	0.540	**0.540**	26
						36	20	23.2	22.8	0.450	0.493	
			Front	26865	831.5	1	37	24.2	24.2	0.509	0.509	
						36	20	23.2	22.8	0.444	0.487	
Hotspot	QPSK	10	Edge 2	26865	831.5	1	37	24.2	24.2	0.210	0.210	
						36	20	23.2	22.8	0.182	0.200	
			Edge 3	26865	831.5	1	37	24.2	24.2	0.381	0.381	
						36	20	23.2	22.8	0.320	0.351	
			Edge 4	26865	831.5	1	37	24.2	24.2	0.505	0.505	
						36	20	23.2	22.8	0.424	0.465	

10.14. LTE Band 41 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offest	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
Head	QPSK	0	Left Touch	40620	2593.0	1	0	23.2	23.1	0.187	**0.191**	27
						50	0	22.2	21.6	0.144	0.165	
			Left Tilt	40620	2593.0	1	0	23.2	23.1	0.040	0.041	
						50	0	22.2	21.6	0.032	0.037	
			Right Touch	40620	2593.0	1	0	23.2	23.1	0.082	0.083	
						50	0	22.2	21.6	0.061	0.070	
			Right Tilt	40620	2593.0	1	0	23.2	23.1	0.063	0.065	
						50	0	22.2	21.6	0.049	0.056	
Body-worn & Hotspot	QPSK	10	Rear	40620	2593.0	1	0	23.2	23.1	0.153	0.157	
						50	0	22.2	21.6	0.120	0.138	
			Front	40620	2593.0	1	0	23.2	23.1	0.277	**0.283**	28
						50	0	22.2	21.6	0.229	0.263	
Hotspot	QPSK	10	Edge 2	40620	2593.0	1	0	23.2	23.1	0.029	0.030	
						50	0	22.2	21.6	0.013	0.015	
			Edge 3	40620	2593.0	1	0	23.2	23.1	0.227	0.232	
						50	0	22.2	21.6	0.180	0.207	

10.15. Wi-Fi (DTS Band)

Frequency Band	Mode	RF Exposure Conditions	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		Notes	Plot No.
								Tune-up limit	Meas.	Meas.	Scaled		
2.4GHz (Core0)	802.11b 1 Mbps	Head	0	Left Touch	1	2412.0	0.291	18.0	17.9				
				Left Tilt	1	2412.0	0.215	18.0	18.0				
				Right Touch	1	2412.0	0.855	18.0	17.9	0.888	**0.909**	2, 3	29
					6	2437.0		18.0	17.5	0.784	0.880	2	
				Right Tilt	1	2412.0	0.607	18.0	17.9	0.580	0.594	2	
		Body-worn & Hotspot & Wi-Fi Direct	10	Rear	1	2412.0	0.266	18.0	17.9	0.261	**0.267**	1	30
				Front	1	2412.0	0.141	18.0	17.9				
				Edge 1	1	2412.0	0.151	18.0	17.9				
				Edge 4	1	2412.0	0.170	18.0	17.9				
2.4GHz (Core1)	802.11b 1 Mbps	Head	0	Left Touch	11	2462.0	0.009	18.0	17.8				
				Left Tilt	11	2462.0	0.003	18.0	17.8				
				Right Touch	11	2462.0	0.063	18.0	17.8	0.041	0.043	1	
				Right Tilt	11	2462.0	0.037	18.0	17.8				
		Body-worn & Hotspot & Wi-Fi Direct	10	Rear	11	2462.0	0.066	18.0	17.8	0.067	0.070	1	
				Front	11	2462.0	0.018	18.0	17.8				
				Edge 1	11	2462.0	0.006	18.0	17.8				
				Edge 4	11	2462.0	0.033	18.0	17.8				

Note(s):

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

10.16. Wi-Fi (U-NII Band)

Frequency Band	Mode	RF Exposure Conditions	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm) Core0		Power (dBm) Core1		1-g SAR (W/kg) Core0		1-g SAR (W/kg) Core1		Notes	Plot No.
								Tune-up limit	Meas.	Tune-up limit	Meas.	Meas.	Scaled	Meas.	Scaled		
5.3 GHz U-NII 2A (MIMO)	802.11a 6 Mbps	Head	0	Left Touch	64	5320.0	0.274	15.0	14.0	15.0	14.0						
				Left Tilt	64	5320.0	0.257	15.0	14.0	15.0	14.0						
				Right Touch	64	5320.0	0.963	15.0	14.0	15.0	14.0	0.499	**0.628**			2, 4	31
				Right Tilt	64	5320.0	0.651	15.0	14.0	15.0	14.0	0.412	0.519			2, 4	
		Body-worn	10	Rear	64	5320.0	0.446	15.0	14.0	15.0	14.0	0.226	**0.285**	0.078	0.098	1	32
				Front	64	5320.0	0.164	15.0	14.0	15.0	14.0						
Frequency Band	Mode	RF Exposure Conditions	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm) Core0		Power (dBm) Core1		1-g SAR (W/kg) Core0		1-g SAR (W/kg) Core1		Notes	Plot No.
								Tune-up limit	Meas.	Tune-up limit	Meas.	Meas.	Scaled	Meas.	Scaled		
5.5 GHz U-NII 2C (MIMO)	802.11a 6 Mbps	Head	0	Left Touch	100	5500.0	0.338	15.0	14.4	15.0	14.4						
				Left Tilt	100	5500.0	0.338	15.0	14.4	15.0	14.4						
				Right Touch	100	5500.0	0.338	15.0	14.4	15.0	14.4	0.422	**0.485**			2, 4	33
				Right Tilt	100	5500.0	0.338	15.0	14.4	15.0	14.4	0.297	0.341			2, 4	
		Body-worn	10	Rear	100	5500.0	0.338	15.0	14.4	15.0	14.4	0.213	**0.245**	0.062	0.071	1	34
				Front	100	5500.0	0.338	15.0	14.4	15.0	14.4						
Frequency Band	Mode	RF Exposure Conditions	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm) Core0		Power (dBm) Core1		1-g SAR (W/kg) Core0		1-g SAR (W/kg) Core1		Notes	Plot No.
								Tune-up limit	Meas.	Tune-up limit	Meas.	Meas.	Scaled	Meas.	Scaled		
5.8 GHz U-NII 3 (MIMO)	802.11a 6 Mbps	Head	0	Left Touch	149	5745.0	0.422	15.0	14.3	15.0	14.2						
				Left Tilt	149	5745.0	0.422	15.0	14.3	15.0	14.2						
				Right Touch	149	5745.0	0.422	15.0	14.3	15.0	14.2	0.396	**0.465**			2, 4	35
				Right Tilt	149	5745.0	0.422	15.0	14.3	15.0	14.2	0.290	0.341			2, 4	
		Body-worn & Hotspot & Wi-Fi Direct	10	Rear	149	5745.0	0.422	15.0	14.3	15.0	14.2	0.231	**0.271**	0.051	0.061	1	36
				Front	149	5745.0	0.422	15.0	14.3	15.0	14.2						
				Edge 1	149	5745	0.422	15	14.3	15	14.2						
				Edge 4	149	5745	0.422	15	14.3	15	14.2						

Note(s):

1. Highest *reported* SAR is ≤ 0.4 W/kg. Therefore, further SAR measurements within this exposure condition are not required.
2. Highest *reported* SAR is > 0.4 W/kg. Due to the highest *reported* SAR for this test position, other test positions in Head exposure condition were evaluated until a SAR ≤ 0.8 W/kg was *reported*.
3. Testing for a second channel was required because the *reported* SAR for this test position was >0.8 W/kg.
4. No SAR could be measured for Core1 during MIMO.
5. Additional testing required in order satisfying FCC simultaneous transmission limit criteria.

10.17. Bluetooth

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	GFSK	0	Left Touch	39	2441	9.9	9.3	0.047	0.054	
				Left Tilt	39	2441	9.9	9.3	0.031	0.035	
				Right Touch	39	2441	9.9	9.3	0.125	**0.144**	37
				Right Tilt	39	2441	9.9	9.3	0.091	0.104	
	Body-worn	GFSK	10	Rear	39	2441.0	9.9	9.3	0.040	**0.045**	38
				Front	39	2441.0	9.9	9.3	0.019	0.021	

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	Hotspot	Edge 4	No	0.411	N/A	N/A
850	GSM 850	Hotspot	Edge 4	No	0.737	N/A	N/A
	WCDMA Band V	Body & Hotspot	Rear	No	0.691	N/A	N/A
	LTE Band 26	Body & Hotspot	Rear	No	0.540	N/A	N/A
1900	GSM 1900	Hotspot	Edge 2	No	0.667	N/A	N/A
	WCDMA Band II	Head	Right Touch	Yes	1.220	1.220	1.00
	LTE Band 2	Head	Right Touch	No	1.040	N/A	N/A
1700	LTE Band 4	Body & Hotspot	Front	Yes	1.130	1.130	1.00
	WCDMA Band IV	Body & Hotspot	Rear	No	0.920	N/A	N/A
2400	Wi-Fi 802.11b/g/n/ac	Head	Right Touch	No	0.888	0.888	1.00
	BT	Head	Right Touch	No	0.125	N/A	N/A
2600	LTE Band 7	Body & Hotspot	Front	No	0.691	N/A	N/A
	LTE Band 41	Body & Hotspot	Front	No	0.277	N/A	N/A
5300	Wi-Fi 802.11a/n/ac	Head	Right Touch	No	0.499	N/A	N/A
5500	Wi-Fi 802.11a/n/ac	Head	Right Touch	No	0.422	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 & Body-worn	1	GSM(Voice)	+	DTS		
	2	GSM(Voice)	+	U-NII		
	3	GSM(Voice)	+	BT		
	4	GSM(Voice)	+	U-NII	+	BT
	5	GSM(GPRS/EDGE)	+	DTS		
	6	GSM(GPRS/EDGE)	+	U-NII		
	7	GSM(GPRS/EDGE)	+	BT		
	8	GSM(GPRS/EDGE)	+	U-NII	+	BT
	9	W-CDMA	+	DTS		
	10	W-CDMA	+	U-NII		
	11	W-CDMA	+	BT		
	12	W-CDMA	+	U-NII	+	BT
	13	LTE	+	DTS		
	14	LTE	+	U-NII		
	15	LTE	+	BT		
	16	LTE	+	U-NII	+	BT
Hotspot & Wi-Fi Direct	17	GSM(GPRS/EDGE)	+	DTS		
	18	GSM(GPRS/EDGE)	+	U-NII		
	19	W-CDMA	+	DTS		
	20	W-CDMA	+	U-NII		
	21	LTE	+	DTS		
	22	LTE	+	U-NII		

Notes:

1. DTS and UNII-3 bands support Hotspot.
2. DTS, UNII-1, and UNII-3 bands support WI-Fi Direct.
3. VoIP is supported in GPRS/EDGE, W-CDMA, and LTE.
4. DTS Radio cannot transmit simultaneously with Bluetooth Radio.
5. U-NII Radio can transmit simultaneously with Bluetooth Radio.

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

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN +DTS		①+③ WWAN + U-NII		①+③+④ WWAN +U-NII +BT	
						∑1-g SAR (mW/g)	SPLSR (Yes/ No)	∑1-g SAR (mW/g)	SPLSR (Yes/ No)	∑1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.650	0.909	0.178	0.054	1.559	No	0.828	No	0.882	No
	Left Tilt	0.507	0.909	0.628	0.035	1.415	No	1.135	No	1.170	No
	Right Touch	0.525	0.909	0.628	0.144	1.433	No	1.153	No	1.296	No
	Right Tilt	0.339	0.594	0.519	0.104	0.933	No	0.858	No	0.962	No
Body-worn & Hotspot	Rear	0.661	0.267	0.285	0.045	0.928	No	0.945	No	0.991	No
	Front	0.550	0.267	0.285	0.021	0.817	No	0.834	No	0.856	No
Hotspot	Edge 1		0.267	0.285		0.267	No	0.285	No		
	Edge 2	0.303				0.303	No	0.303	No		
	Edge 3	0.665				0.665	No	0.665	No		
	Edge 4	0.772	0.267	0.285		1.039	No	1.056	No		

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

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN +DTS		①+③ WWAN + U-NII		①+③+④ WWAN +U-NII +BT	
						∑1-g SAR (mW/g)	SPLSR (Yes/ No)	∑1-g SAR (mW/g)	SPLSR (Yes/ No)	∑1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.304	0.909	0.178	0.054	1.213	No	0.482	No	0.536	No
	Left Tilt	0.199	0.909	0.628	0.035	1.107	No	0.827	No	0.862	No
	Right Touch	0.547	0.909	0.628	0.144	**1.456**	No	1.175	No	1.319	No
	Right Tilt	0.215	0.594	0.519	0.104	0.808	No	0.733	No	0.837	No
Body-worn & Hotspot	Rear	0.621	0.267	0.285	0.045	0.889	No	0.906	No	0.951	No
	Front	0.698	0.267	0.285	0.021	0.965	No	0.983	No	1.004	No
Hotspot	Edge 1		0.267	0.285		0.267	No	0.285	No		
	Edge 2	0.720				0.720	No	0.720	No		
	Edge 3	0.486				0.486	No	0.486	No		
	Edge 4		0.267	0.285		0.267	No	0.285	No		

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

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN +DTS		①+③ WWAN + U-NII		①+③+④ WWAN +U-NII +BT	
						∑1-g SAR (mW/g)	SPLSR (Yes/ No)	∑1-g SAR (mW/g)	SPLSR (Yes/ No)	∑1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.639	0.909	0.178	0.054	1.548	No	0.817	No	0.871	No
	Left Tilt	0.407	0.909	0.628	0.035	1.315	No	1.035	No	1.070	No
	Right Touch	1.235	0.909	0.628	0.144	2.143	**Yes**	1.863	**Yes**	2.006	**Yes**
	Right Tilt	0.450	0.594	0.519	0.104	1.044	No	0.969	No	1.073	No
Body-worn & Hotspot	Rear	0.998	0.267	0.285	0.045	1.265	No	1.282	No	1.328	No
	Front	1.188	0.267	0.285	0.021	1.455	No	1.473	No	1.494	No
Hotspot	Edge 1		0.267	0.285		0.267	No	0.285	No		
	Edge 2	1.048				1.048	No	1.048	No		
	Edge 3	0.725				0.725	No	0.725	No		
	Edge 4		0.267	0.285		0.267	No	0.285	No		

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Worst-case combination				∑ 1-g SAR (mW/g)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	② DTS	③ U-NII	④ BT						
Rear	1.235	0.909			① + ②	2.144	84.0	0.04	No	1
	1.235		0.628		① + ③	1.863	91.2	0.03	No	2
	1.235		0.628	0.144	① + ③ + ④	2.006	90.3	0.03	No	3

Conclusion:

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

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

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN +DTS		①+③ WWAN + U-NII		①+③+④ WWAN +U-NII +BT	
						∑1-g SAR (mW/g)	SPLSR (Yes/ No)	∑1-g SAR (mW/g)	SPLSR (Yes/ No)	∑1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.448	0.909	0.178	0.054	1.357	No	0.626	No	0.680	No
	Left Tilt	0.284	0.909	0.628	0.035	1.193	No	0.912	No	0.948	No
	Right Touch	0.777	0.909	0.628	0.144	1.686	Yes	1.406	No	1.549	No
	Right Tilt	0.296	0.594	0.519	0.104	0.890	No	0.815	No	0.919	No
Body-worn & Hotspot	Rear	0.981	0.267	0.285	0.045	1.248	No	1.266	No	1.311	No
	Front	0.781	0.267	0.285	0.021	1.048	No	1.065	No	1.086	No
Hotspot	Edge 1		0.267	0.285		0.267	No	0.285	No		
	Edge 2	0.648				0.648	No	0.648	No		
	Edge 3	0.608				0.608	No	0.608	No		
	Edge 4		0.267	0.285		0.267	No	0.285	No		

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Worst-case combination				∑ 1-g SAR (mW/g)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	② DTS	③ U-NII	④ BT						
Rear	0.777	0.909			① + ②	1.686	78.6	0.03	No	4

Conclusion:

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

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

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN +DTS		①+③ WWAN + U-NII		①+③+④ WWAN +U-NII +BT	
						∑1-g SAR (mW/g)	SPLSR (Yes/ No)	∑1-g SAR (mW/g)	SPLSR (Yes/ No)	∑1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.651	0.909	0.178	0.054	1.560	No	0.829	No	0.883	No
	Left Tilt	0.379	0.909	0.628	0.035	1.288	No	1.007	No	1.043	No
	Right Touch	0.509	0.909	0.628	0.144	1.418	No	1.137	No	1.281	No
	Right Tilt	0.384	0.594	0.519	0.104	0.978	No	0.903	No	1.007	No
Body-worn & Hotspot	Rear	0.724	0.267	0.285	0.045	0.991	No	1.008	No	1.053	No
	Front	0.669	0.267	0.285	0.021	0.936	No	0.954	No	0.975	No
Hotspot	Edge 1		0.267	0.285		0.267	No	0.285	No		
	Edge 2	0.293				0.293	No	0.293	No		
	Edge 3	0.539				0.539	No	0.539	No		
	Edge 4	0.684	0.267	0.285		0.951	No	0.968	No		

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

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN +DTS		①+③ WWAN + U-NII		①+③+④ WWAN +U-NII +BT	
						∑1-g SAR (mW/g)	SPLSR (Yes/ No)	∑1-g SAR (mW/g)	SPLSR (Yes/ No)	∑1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.485	0.909	0.178	0.054	1.394	No	0.663	No	0.717	No
	Left Tilt	0.266	0.909	0.628	0.035	1.175	No	0.894	No	0.930	No
	Right Touch	1.066	0.909	0.628	0.144	1.975	Yes	1.694	Yes	1.838	Yes
	Right Tilt	0.293	0.594	0.519	0.104	0.887	No	0.812	No	0.916	No
Body-worn & Hotspot	Rear	0.885	0.267	0.285	0.045	1.152	No	1.170	No	1.215	No
	Front	0.961	0.267	0.285	0.021	1.228	No	1.246	No	1.267	No
Hotspot	Edge 1		0.267	0.285		0.267	No	0.285	No		
	Edge 2	0.906				0.906	No	0.906	No		
	Edge 3	0.583				0.583	No	0.583	No		
	Edge 4		0.267	0.285		0.267	No	0.285	No		

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Worst-case combination				∑ 1-g SAR (mW/g)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	② DTS	③ U-NII	④ BT						
Rear	1.066	0.909			① + ②	1.975	85.9	0.03	No	5
	1.066		0.628		① + ③	1.694	93.0	0.02	No	6
	1.066		0.628	0.144	① + ③ + ④	1.838	92.3	0.03	No	7

Conclusion:

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

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

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN +DTS		①+③ WWAN + U-NII		①+③+④ WWAN +U-NII +BT	
						∑1-g SAR (mW/g)	SPLSR (Yes/ No)	∑1-g SAR (mW/g)	SPLSR (Yes/ No)	∑1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.475	0.909	0.178	0.054	1.384	No	0.653	No	0.707	No
	Left Tilt	0.325	0.909	0.628	0.035	1.234	No	0.953	No	0.989	No
	Right Touch	1.010	0.909	0.628	0.144	1.919	Yes	1.638	Yes	1.782	Yes
	Right Tilt	0.437	0.594	0.519	0.104	1.031	No	0.956	No	1.060	No
Body-worn & Hotspot	Rear	1.080	0.267	0.285	0.045	1.347	No	1.365	No	1.410	No
	Front	1.100	0.267	0.285	0.021	1.367	No	1.385	No	1.406	No
Hotspot	Edge 1		0.267	0.285		0.267	No	0.285	No		
	Edge 2	0.756				0.756	No	0.756	No		
	Edge 3	0.694				0.694	No	0.694	No		
	Edge 4		0.267	0.285		0.267	No	0.285	No		

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Worst-case combination				∑ 1-g SAR (mW/g)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	② DTS	③ U-NII	④ BT						
Rear	1.010	0.909			① + ②	1.919	84.1	0.03	No	8
	1.010		0.628		① + ③	1.638	91.2	0.02	No	9
	1.010		0.628	0.144	① + ③ + ④	1.782	90.4	0.03	No	10

Conclusion:

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

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

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

12.9. Sum of the SAR for LTE Band 7 & Wi-Fi & BT

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN +DTS		①+③ WWAN + U-NII		①+③+④ WWAN +U-NII +BT	
						∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.484	0.909	0.178	0.054	1.393	No	0.662	No	0.716	No
	Left Tilt	0.157	0.909	0.628	0.035	1.066	No	0.785	No	0.821	No
	Right Touch	0.211	0.909	0.628	0.144	1.120	No	0.839	No	0.983	No
	Right Tilt	0.180	0.594	0.519	0.104	0.774	No	0.699	No	0.803	No
Body-worn & Hotspot	Rear	0.440	0.267	0.285	0.045	0.707	No	0.725	No	0.770	No
	Front	0.691	0.267	0.285	0.021	0.958	No	0.976	No	0.997	No
Hotspot	Edge 1		0.267	0.285		0.267	No	0.285	No		
	Edge 2	0.061				0.061	No	0.061	No		
	Edge 3	0.612				0.612	No	0.612	No		
	Edge 4		0.267	0.285		0.267	No	0.285	No		

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

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN +DTS		①+③ WWAN + U-NII		①+③+④ WWAN +U-NII +BT	
						∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.177	0.909	0.178	0.054	1.086	No	0.355	No	0.409	No
	Left Tilt	0.325	0.909	0.628	0.035	1.234	No	0.953	No	0.989	No
	Right Touch	0.156	0.909	0.628	0.144	1.065	No	0.784	No	0.928	No
	Right Tilt	0.098	0.594	0.519	0.104	0.691	No	0.617	No	0.721	No
Body-worn & Hotspot	Rear	0.361	0.267	0.285	0.045	0.628	No	0.646	No	0.691	No
	Front	0.303	0.267	0.285	0.021	0.570	No	0.587	No	0.609	No
Hotspot	Edge 1		0.267	0.285		0.267	No	0.285	No		
	Edge 2	0.242				0.242	No	0.242	No		
	Edge 3	0.155				0.155	No	0.155	No		
	Edge 4	0.444	0.267	0.285		0.711	No	0.729	No		

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

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN +DTS		①+③ WWAN + U-NII		①+③+④ WWAN +U-NII +BT	
						∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.426	0.909	0.178	0.054	1.335	No	0.604	No	0.658	No
	Left Tilt	0.245	0.909	0.628	0.035	1.154	No	0.873	No	0.909	No
	Right Touch	0.354	0.909	0.628	0.144	1.263	No	0.982	No	1.126	No
	Right Tilt	0.244	0.594	0.519	0.104	0.838	No	0.763	No	0.867	No
Body-worn & Hotspot	Rear	0.540	0.267	0.285	0.045	0.807	No	0.825	No	0.870	No
	Front	0.509	0.267	0.285	0.021	0.776	No	0.794	No	0.815	No
Hotspot	Edge 1		0.267	0.285		0.267	No	0.285	No		
	Edge 2	0.210				0.210	No	0.210	No		
	Edge 3	0.381				0.381	No	0.381	No		
	Edge 4	0.505	0.267	0.285		0.772	No	0.790	No		

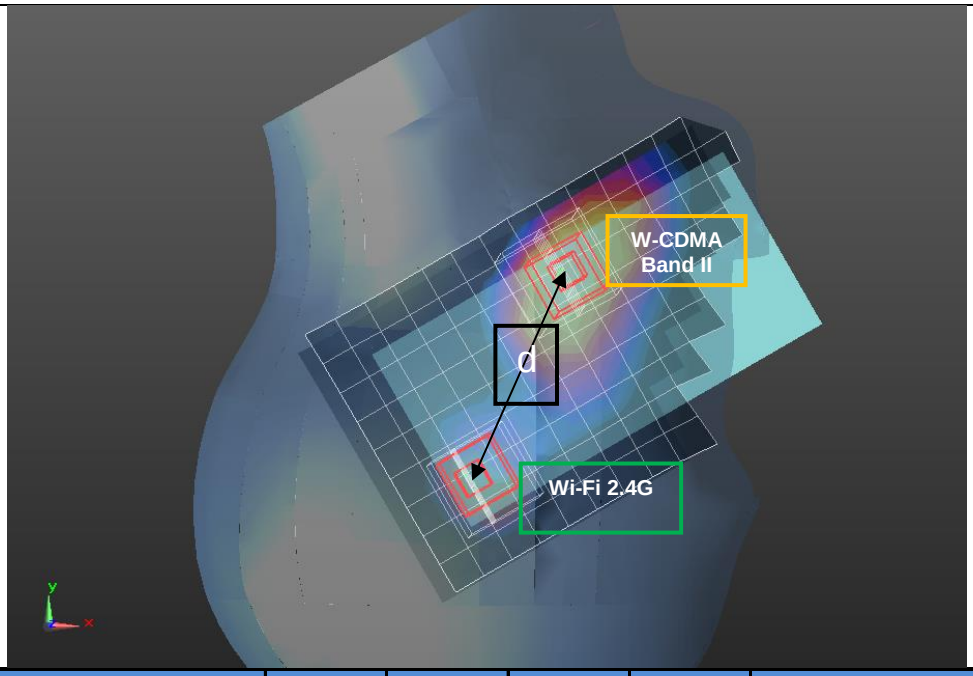
12.12. Sum of the SAR for LTE Band 41 & Wi-Fi & BT

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	①+② WWAN +DTS		①+③ WWAN + U-NII		①+③+④ WWAN +U-NII +BT	
						∑1-g SAR (mW/g)	SPLSR (Yes/ No)	∑1-g SAR (mW/g)	SPLSR (Yes/ No)	∑1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	Left Touch	0.191	0.909	0.178	0.054	1.100	No	0.369	No	0.423	No
	Left Tilt	0.041	0.909	0.628	0.035	0.950	No	0.669	No	0.705	No
	Right Touch	0.083	0.909	0.628	0.144	0.992	No	0.712	No	0.855	No
	Right Tilt	0.065	0.594	0.519	0.104	0.658	No	0.583	No	0.687	No
Body-worn & Hotspot	Rear	0.157	0.267	0.285	0.045	0.424	No	0.441	No	0.486	No
	Front	0.283	0.267	0.285	0.021	0.551	No	0.568	No	0.589	No
Hotspot	Edge 1		0.267	0.285		0.267	No	0.285	No		
	Edge 2	0.030				0.030	No	0.030	No		
	Edge 3	0.232				0.232	No	0.232	No		
	Edge 4		0.267	0.285		0.267	No	0.285	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.

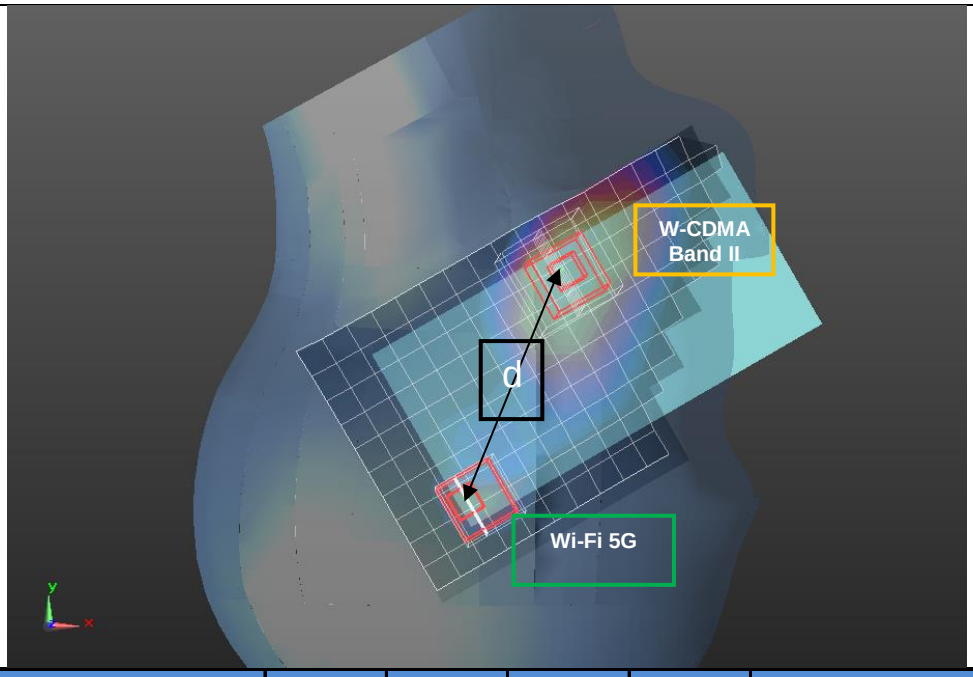
Figure (1)



Mode		Peak SAR	X	Y	Z	d: Calculated distance (mm)	
		mW/g	m	m	m		
W-CDMA Band II	①	1.47	0.0601	-0.249	-0.172	① + ②	84.0
Wi-Fi 1 (2.4G)	②	1.2	0.0244	-0.325	-0.172		

The Peak Location Separation Distance is computed by using the formula below:
SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

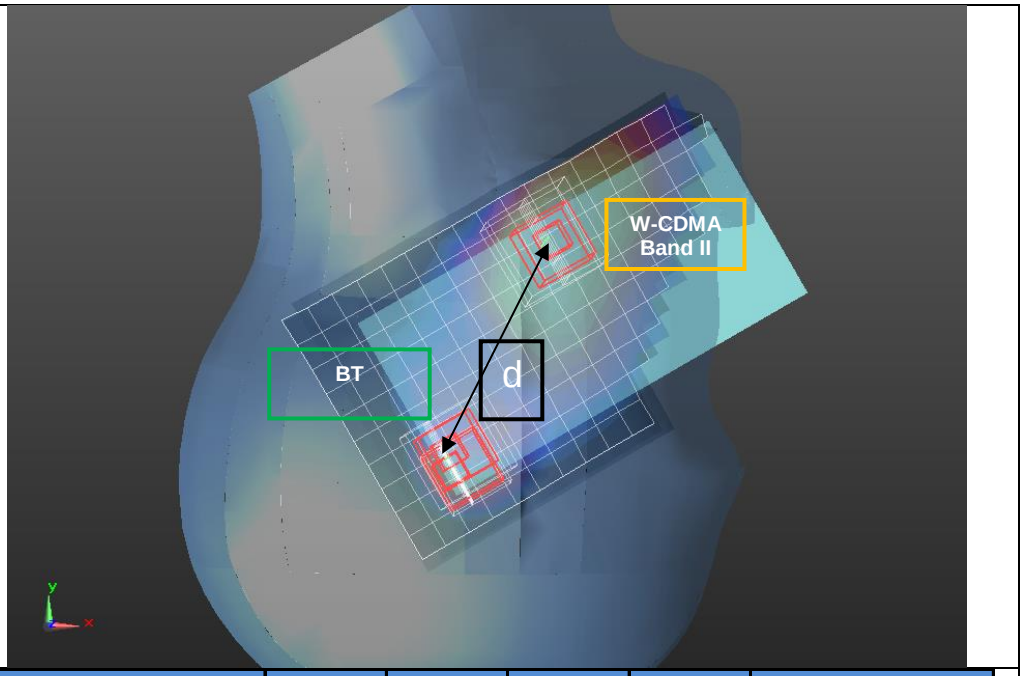
Figure (2)



Mode		Peak SAR	X	Y	Z	d: Calculated distance (mm)	
		mW/g	m	m	m		
W-CDMA Band II	①	1.47	0.0601	-0.249	-0.172	① + ③	91.2
Wi-Fi 1 (5G)	③	1.06	0.0246	-0.333	-0.171		

The Peak Location Separation Distance is computed by using the formula below:
SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

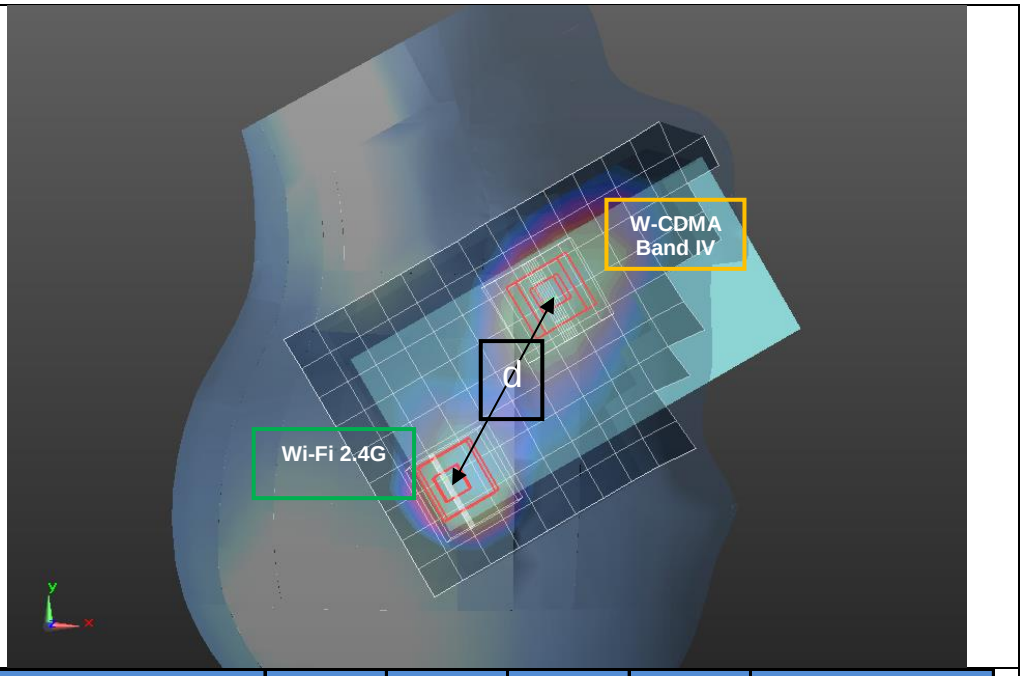
Figure (3)



Mode		Peak SAR	X	Y	Z	d: Calculated distance (mm)	
		mW/g	m	m	m		
W-CDMA Band II	①	1.47	0.0601	-0.249	-0.172	① + ④	90.3
BT	④	0.172	0.0222	-0.331	-0.171		

The Peak Location Separation Distance is computed by using the formula below:
SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

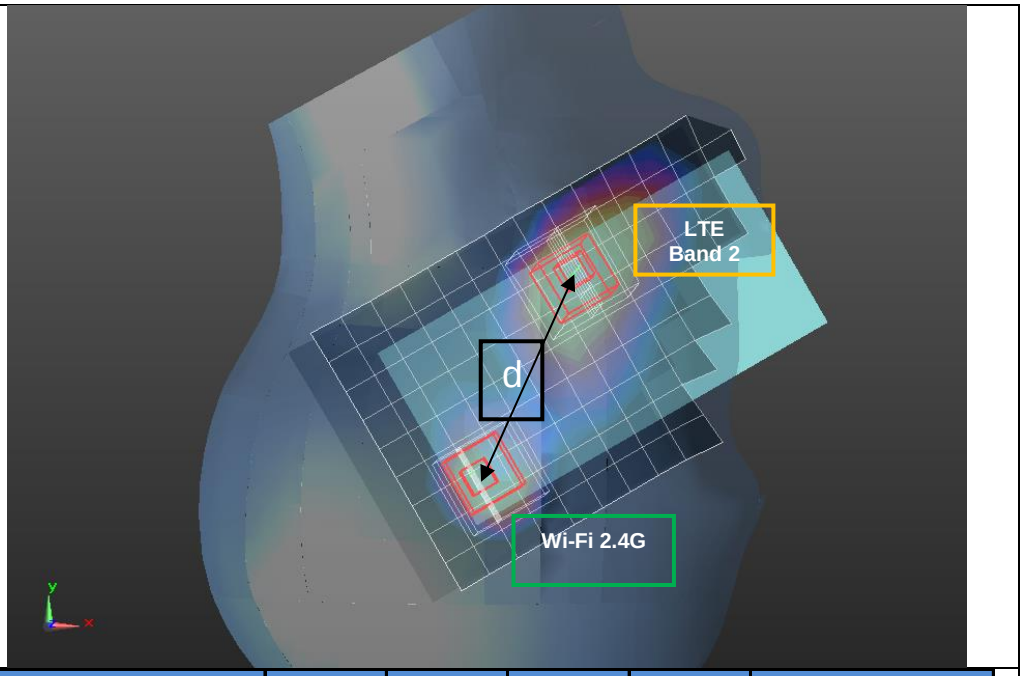
Figure (4)



Mode		Peak SAR	X	Y	Z	d: Calculated distance (mm)	
		mW/g	m	m	m		
W-CDMA Band IV	①	0.905	0.0654	-0.258	-0.171	① + ②	78.6
Wi-Fi 1 (2.4G)	②	1.2	0.0244	-0.325	-0.172		

The Peak Location Separation Distance is computed by using the formula below:
SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

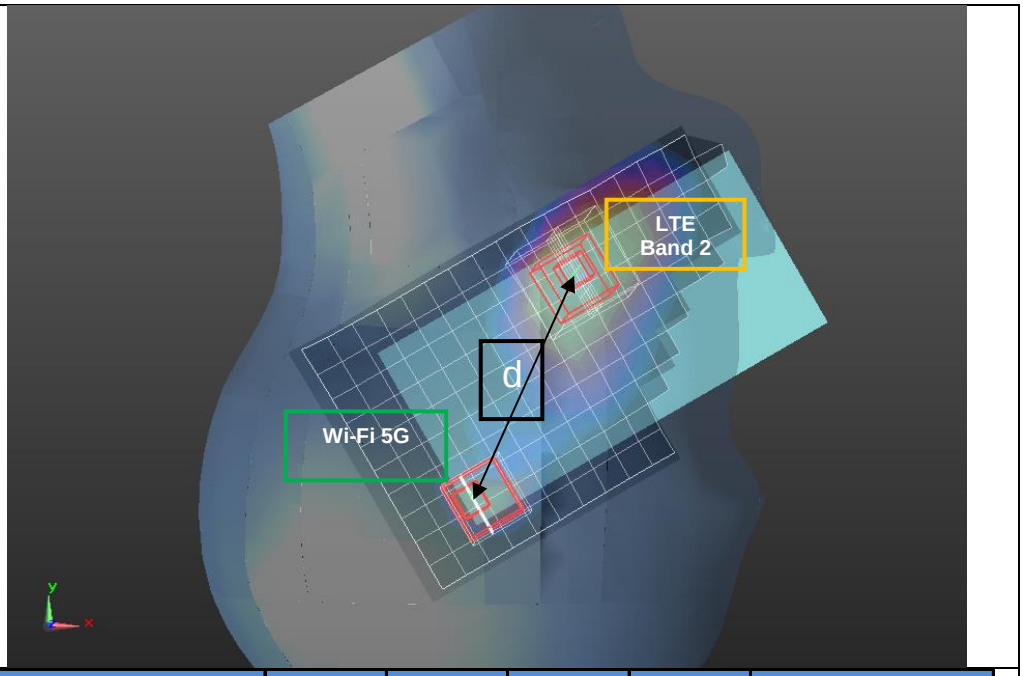
Figure (5)



Mode		Peak SAR	X	Y	Z	d: Calculated distance (mm)	
		mW/g	m	m	m		
LTE Band 2	①	1.24	0.0645	-0.249	-0.172	① + ②	85.9
Wi-Fi 1 (2.4G)	②	1.2	0.0244	-0.325	-0.172		

The Peak Location Separation Distance is computed by using the formula below:
SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

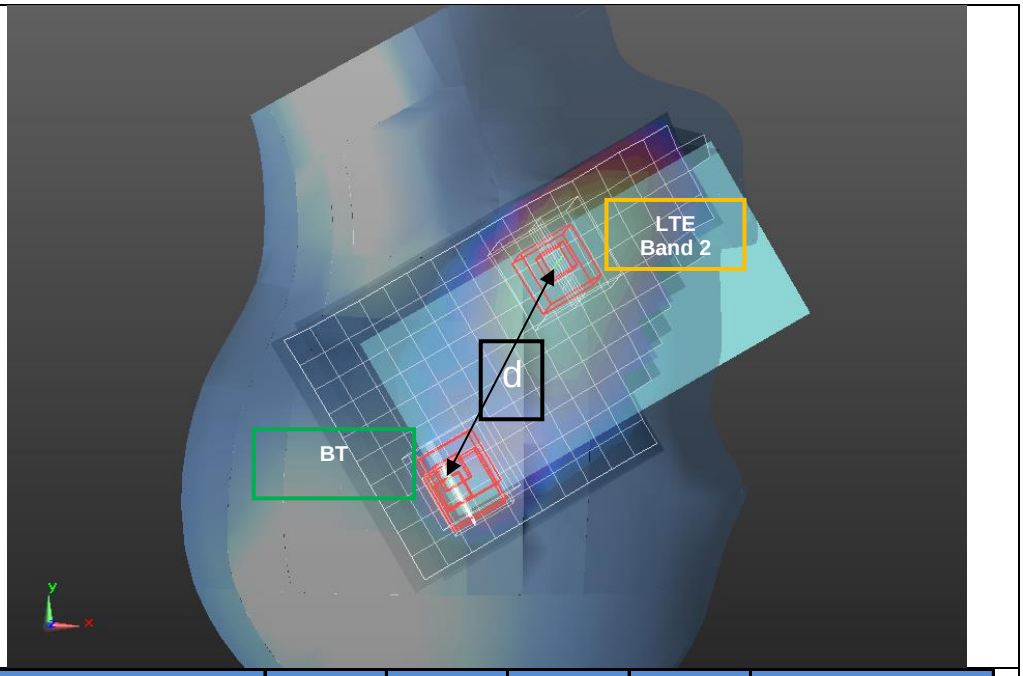
Figure (6)



Mode		Peak SAR	X	Y	Z	d: Calculated distance (mm)	
		mW/g	m	m	m		
LTE Band 2	①	1.24	0.0645	-0.249	-0.172	① + ③	93.0
Wi-Fi 1 (5G)	③	1.06	0.0246	-0.333	-0.171		

The Peak Location Separation Distance is computed by using the formula below:
SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

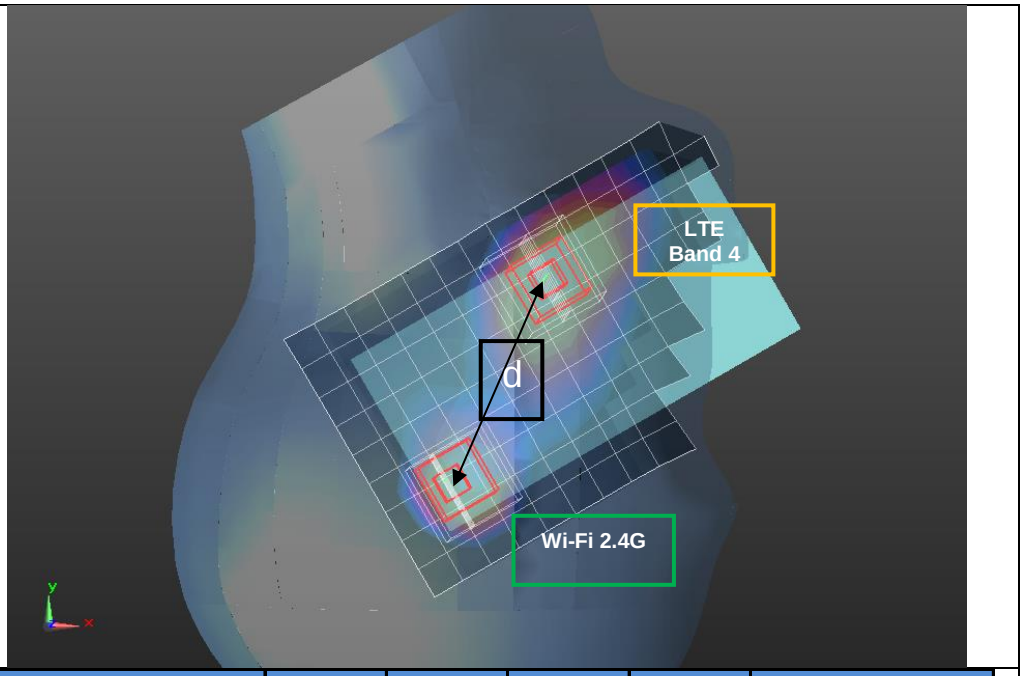
Figure (7)



Mode		Peak SAR	X	Y	Z	d: Calculated distance (mm)	
		mW/g	m	m	m		
LTE Band 2	①	1.24	0.0645	-0.249	-0.172	① + ④	92.3
BT	④	0.172	0.0222	-0.331	-0.171		

The Peak Location Separation Distance is computed by using the formula below:
SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

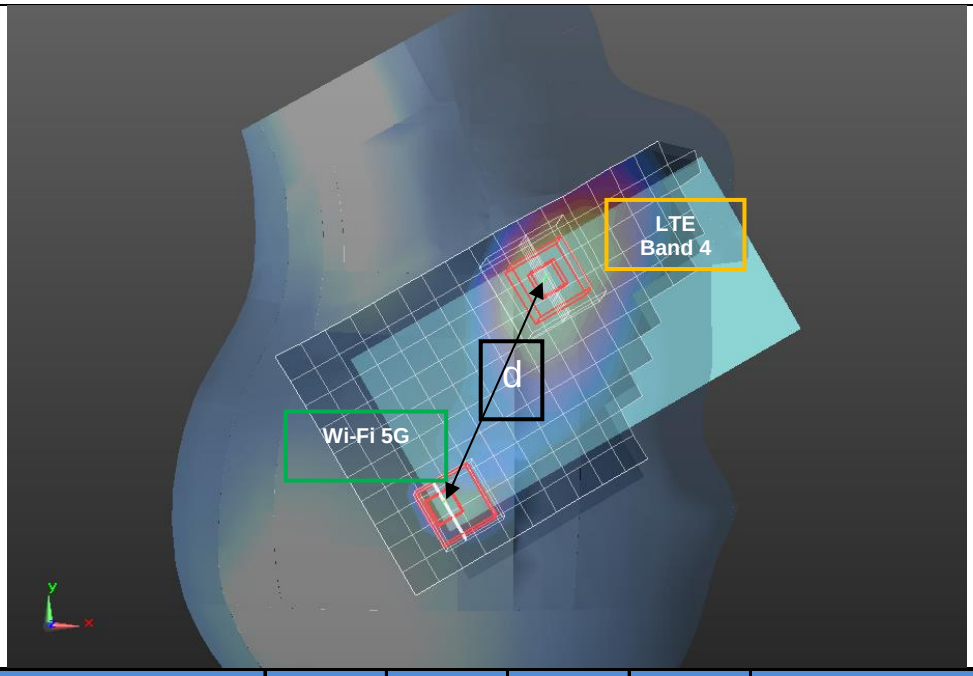
Figure (8)



Mode		Peak SAR	X	Y	Z	d: Calculated distance (mm)	
		mW/g	m	m	m		
LTE Band 4	①	1.18	0.0624	-0.25	-0.171	① + ②	84.1
Wi-Fi 1 (2.4G)	②	1.2	0.0244	-0.325	-0.172		

The Peak Location Separation Distance is computed by using the formula below:
SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

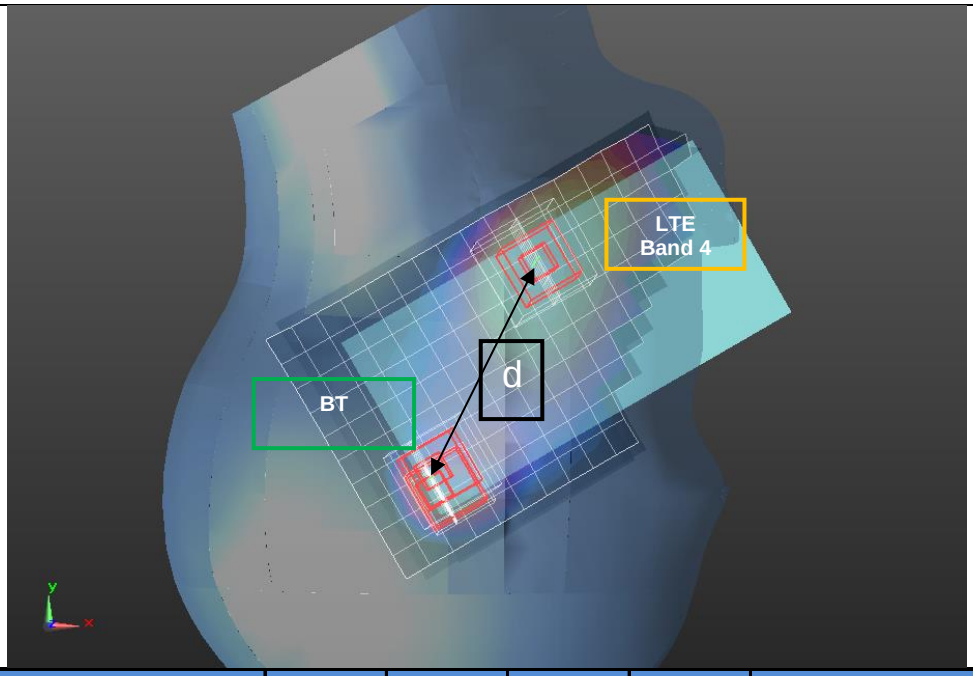
Figure (9)



Mode		Peak SAR	X	Y	Z	d: Calculated distance (mm)	
		mW/g	m	m	m		
LTE Band 4	①	1.18	0.0624	-0.25	-0.171	① + ③	91.2
Wi-Fi 1 (5G)	③	1.06	0.0246	-0.333	-0.171		

The Peak Location Separation Distance is computed by using the formula below:
SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

Figure (10)



Mode		Peak SAR	X	Y	Z	d: Calculated distance (mm)	
		mW/g	m	m	m		
LTE Band 4	①	1.18	0.0624	-0.25	-0.171	① + ④	90.4
BT	④	0.172	0.0222	-0.331	-0.171		

The Peak Location Separation Distance is computed by using the formula below:
SQRT((X1-X2)^2+(Y1-Y2)^2+(Z1-Z2)^2)

Appendixes

Refer to separated files for the following appendixes.

15I21237-S1V1 SAR_App A Photos & Ant. Locations

15I21237-S1V1 SAR_App B System Check Plots

15I21237-S1V1 SAR_App C Highest Test Plots

15I21237-S1V1 SAR_App D Tissue Ingredients

15I21237-S1V1 SAR_App E Probe Cal. Certificates

15I21237-S1V1 SAR_App F Dipole Cal. Certificates

END OF REPORT