SAR EVALUATION REPORT

FCC 47 CFR § 2.1093
IEEE Std 1528-2013

For
GSM/WCDMA/LTE Tablet + BT/BLE and DTS/UNII a/b/g/n/ac & ANT+

FCC ID: A3LSMT825C
Model Name: SM-T825C

Report Number: 4787821324-S1V1
Issue Date: 2/24/2017

Prepared for
SAMSUNG ELECTRONICS CO., LTD.
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,
GYEONGGI-DO, 443-742, KOREA

Prepared by
UL Korea, Ltd. Suwon Laboratory
218 Maeyeong-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 443-823, Korea
TEL: (031) 337-9902
FAX: (031) 213-5433

ACCREDITED

TL-637

Revision History

Rev.	Date	Revisions	Revised By
V1	2/24/2017	Initial Issue	Sanghwa Lee

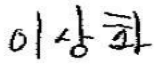
Table of Contents

1. Attestation of Test Results

Applicant Name	SAMSUNG ELECTRONICS CO.,LTD.			
FCC ID	A3LSMT825C			
Model Name	SM-T825C			
Applicable Standards	FCC 47 CFR § 2.1093 Published RF exposure KDB procedures IEEE Std 1528-2013			
Exposure Category	SAR Limits (W/Kg)			
	Peak spatial-average(1g of tissue)			
General population / Uncontrolled exposure	1.6			
RF Exposure Conditions	Equipment Class - Highest Reported SAR (W/kg)			
	Licensed	DTS	U-NII	DSS (BT)
Standalone	1.089	0.772	0.904	N/A
Simultaneous TX	1.593	1.593	1.565	
Date Tested	1/9/2017 to 2/22/2017			
Test Results	Pass			

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

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released By:	Prepared By:
	
Justin Park Senior Engineer UL Korea, Ltd Suwon Laboratory	SangHwa Lee Laboratory Technician UL Korea, Ltd Suwon Laboratory

2. Test Specification, Methods and Procedures

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

- 248227 D01 802.11 Wi-Fi SAR v02r02
- 447498 D01 General RF Exposure Guidance v06
- 616217 D04 SAR for laptop and tablets v01r02
- 690783 D01 SAR Listings on Grants v01r03
- 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- 865664 D02 RF Exposure Reporting v01r02
- 941225 D01 3G SAR Procedures v03r01
- 941225 D05 SAR for LTE Devices v02r05
- 941225 D05A LTE Rel.10 KDB Inquiry sheet v01r02
- 941225 D06 Hotspot Mode v02r01

3. Facilities and Accreditation

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

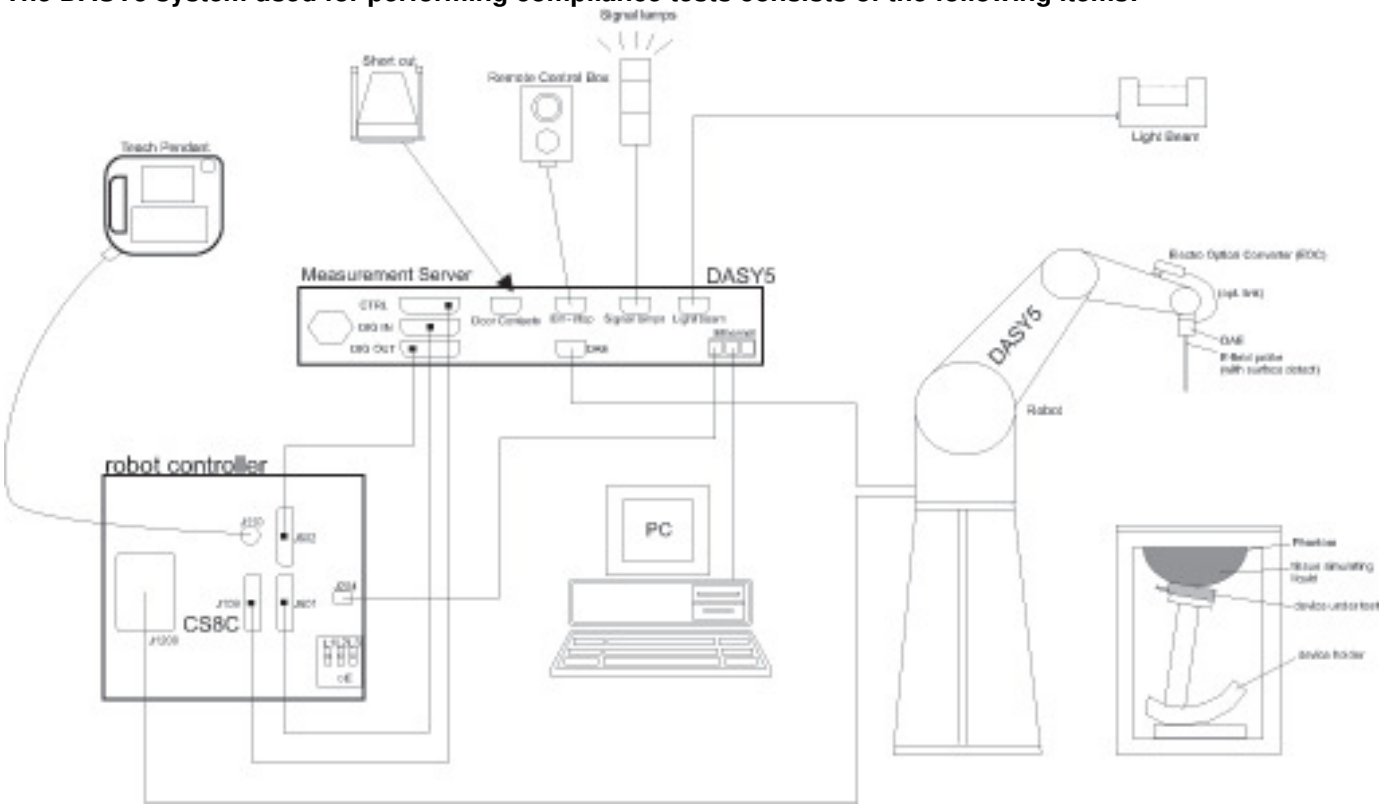
Suwon
SAR 1 Room
SAR 2 Room
SAR 3 Room

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637.
The full scope of accreditation can be viewed at http://www.iasonline.org/PDF/TL/TL-637.pdf.

4. SAR Measurement System & Test Equipment

4.1. SAR Measurement System

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



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

4.2. SAR Scan Procedures

Step 1: Power Reference Measurement

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

Step 2: Area Scan

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

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

<table>
<tr><td></td><td>≤ 3 GHz</td><td>> 3 GHz</td></tr>
<tr><td>Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 ± 1 mm</td><td>½·δ·ln(2) ± 0.5 mm</td></tr>
<tr><td>Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td rowspan="2">Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>≤ 2 GHz: ≤ 15 mm
2 – 3 GHz: ≤ 12 mm</td><td>3 – 4 GHz: ≤ 12 mm
4 – 6 GHz: ≤ 10 mm</td></tr>
<tr><td colspan="2">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.</td></tr>
</table>

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	E5071C	MY46522054	8-18-2017
Dielectric Assessment Kit	SPEAG	DAK-3.5	1196	7-26-2017
Shorting block	SPEAG	DAK-3.5 Short	SM DAK 200 BA	N/A
Thermometer	LKM	DTM3000	3424	8-17-2017
Thermometer	Lutron	MHB-382SD	AH.91478	8-10-2017

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
MXG Analog Signal Generator	Agilent	N5181A	MY50145882	8-16-2017
Power Sensor	Agilent	U2000A	MY54260010	8-17-2017
Power Sensor	Agilent	U2000A	MY54260007	8-17-2017
Power Amplifier	EXODUS	1410025-AMP2027-10003	10003	8-17-2017
Directional Coupler	Agilent	772D	MY52180193	8-17-2017
Directional Coupler	Agilent	778D	MY52180432	8-17-2017
Low Pass Filter	MICROLAB	LA-15N	03943	8-17-2017
Low Pass Filter	FILTRON	L14012FL	1410003S	8-17-2017
Low Pass Filter	MICROLAB	LA-60N	03942	8-17-2017
Attenuator	Agilent	8491B/003	MY39269292	8-17-2017
Attenuator	Agilent	8491B/010	MY39269315	8-17-2017
Attenuator	Agilent	8491B/020	MY39269298	8-17-2017
E-Field Probe (SAR1)	SPEAG	EX3DV4	7376	8-30-2017
E-Field Probe (SAR2)	SPEAG	EX3DV4	7330	2-24-2017
E-Field Probe (SAR2)	SPEAG	EX3DV4	7313	1-30-2018
E-Field Probe (SAR3)	SPEAG	EX3DV4	7314	9-27-2017
Data Acquisition Electronics (SAR1)	SPEAG	DAE4	1447	9-19-2017
Data Acquisition Electronics (SAR2)	SPEAG	DAE4	1468	9-8-2017
Data Acquisition Electronics (SAR3)	SPEAG	DAE4	1494	7-18-2017
System Validation Dipole	SPEAG	D835V2	4d194	7-20-2017
System Validation Dipole	SPEAG	D1900V2	5d199	2-19-2017
System Validation Dipole	SPEAG	D1900V2	5d190	9-28-2017
System Validation Dipole	SPEAG	D2450V2	939	9-23-2017
System Validation Dipole	SPEAG	D2600V2	1097	11-15-2017
System Validation Dipole	SPEAG	D5GHzV2	1184	9-1-2017
Thermometer (SAR1)	Lutron	MHB-382SD	AH.91463	8-10-2017
Thermometer (SAR2)	Lutron	MHB-382SD	AH.50215	8-17-2017
Thermometer (SAR3)	Lutron	MHB-382SD	AH.50213	8-17-2017

Other

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Base Station Simulator	R & S	CMW500	150313	8-16-2017
Base Station Simulator	R & S	CMW500	150314	8-16-2017

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): 237.3 mm x 169 mm Overall Diagonal: 280.2 mm Display Diagonal: 245.8 mm		
Back Cover	☒ The rechargeable battery is not user accessible.		
Battery Options	☒ The rechargeable battery is not user accessible.		
Wireless Router (Hotspot)	Wi-Fi Hotspot mode permits the device to share its cellular data connection with other Wi-Fi-enabled devices. ☒ Mobile Hotspot (Wi-Fi 2.4 GHz) ☒ Mobile Hotspot (Wi-Fi 5 GHz, Ch.149)		
Wi-Fi Direct	Wi-Fi Direct enabled devices transfer data directly between each other ☒ Wi-Fi Direct (Wi-Fi 2.4 GHz) ☒ Wi-Fi Direct (Wi-Fi 5 GHz, Ch. 36 ~ 48, Ch.149 ~165)		
Test sample information	**No.**	**S/N**	**Notes**
	1	R22HC00975D	WiFi Conduction
	2	R22HC00977L	Main Conduction
	3	R22HC00976Z	Main Conduction
	4	R22HC00979E	SAR
	5	R22HC0097AP	SAR
	6	R22HC0097EN	SAR
	7	R22HC00QNBB	SAR

6.2. Wireless Technologies

Wireless technologies	Frequency bands	Operating mode		Duty Cycle used for SAR testing
GSM	850 1900	Voice (GMSK) GPRS (GMSK) EGPRS (8PSK)	GPRS Multi-Slot Class: ☐ Class 8 - 1 Up, 4 Down ☐ Class 10 - 2 Up, 4 Down ☐ Class 12 - 4 Up, 4 Down ☒ Class 33 - 4 Up, 5 Down	GSM Voice: 12.5% (E)GPRS: 1 Slot: 12.5% 2 Slots: 25% 3 Slots: 37.5% 4 Slots: 50%
	Does this device support DTM (Dual Transfer Mode)? ☐ Yes ☒ No			
W-CDMA (UMTS)	Band II Band V	UMTS Rel. 99 (Voice & Data) HSDPA (Rel. 8) HSUPA (Rel. 6) DC-HSDPA(Rel. 9) HSPA+(Rel.9)		100%
LTE	FDD Band 5 FDD Band 41	QPSK 16QAM ☒ Rel. 10 Carrier Aggregation (1 Uplink and 2 Downlinks) LTE Band 41 is support to LTE CA configuration.		100% (FDD) 63.3% (TDD)
	Does this device support SV-LTE (1xRTT-LTE)? ☐ Yes ☒ No			
Wi-Fi	2.4 GHz	802.11b 802.11g 802.11n (HT20)		100%
	5 GHz	802.11a 802.11n (HT20) 802.11n (HT40) 802.11ac (VHT20) 802.11ac (VHT40) 802.11ac (VHT80)		100%
	Does this device support bands 5.60 ~ 5.65 GHz? ☐ Yes ☒ No			
	Does this device support Band gap channel? ☐ Yes ☒ No			
Bluetooth	2.4 GHz	Version 4.1 LE		76.88% (DH5)

6.3. Nominal and Maximum Output Power from Tune-up Procedure

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)			Reduction RF Output Power (dBm)		
RF Air interface	Mode	Target	Max. tune-up tolerance limit		Target	Max. tune-up tolerance limit	
			Burst	Frame		Burst	Frame
GSM850	Voice/GPRS (1 slot)	32.0	**32.5**	**23.5**	24.5	**25.0**	**16.0**
	GPRS 2 slots	28.5	**29.0**	**23.0**	21.5	**22.0**	**16.0**
	GPRS 3 slots	27.5	**28.0**	**23.7**	19.5	**20.0**	**15.7**
	GPRS 4 slots	26.0	**26.5**	**23.5**	18.0	**18.5**	**15.5**
	EGPRS 1 slot	26.0	**26.5**	**17.5**	18.0	**18.5**	**9.5**
	EGPRS 2 slots	25.0	**25.5**	**19.5**	16.5	**17.0**	**11.0**
	EGPRS 3 slots	23.0	**23.5**	**19.2**	14.5	**15.0**	**10.7**
	EGPRS 4 slots	23.0	**23.5**	**20.5**	13.5	**14.0**	**11.0**
GSM1900	Voice/GPRS (1 slot)	30.0	**30.5**	**21.5**	21.5	**22.0**	**13.0**
	GPRS 2 slots	30.0	**30.5**	**24.5**	20.5	**21.0**	**15.0**
	GPRS 3 slots	27.5	**28.0**	**23.7**	18.5	**19.0**	**14.7**
	GPRS 4 slots	26.5	**27.0**	**24.0**	17.0	**17.5**	**14.5**
	EGPRS 1 slot	26.5	**27.0**	**18.0**	17.0	**17.5**	**8.5**
	EGPRS 2 slots	25.5	**26.0**	**20.0**	16.0	**16.5**	**10.5**
	EGPRS 3 slots	24.0	**24.5**	**20.2**	14.5	**15.0**	**10.7**
	EGPRS 4 slots	22.0	**22.5**	**19.5**	13.0	**13.5**	**10.5**

Upper limit (dB): -1.5 ~ 0.5		Max. RF Output Power (dBm)		Reduction RF Output Power (dBm)	
RF Air interface	Mode	Target	Max. tune-up tolerance limit	Target	Max. tune-up tolerance limit
W-CDMA Band V	R99	22.0	**22.5**	16.0	**16.5**
	HSDPA	21.0	**21.5**	14.5	**15.0**
	HSUPA	21.0	**21.5**	14.5	**15.0**
	DC-HSDPA	21.0	**21.5**	14.5	**15.0**
W-CDMA Band II	R99	22.5	**23.0**	14.0	**14.5**
	HSDPA	22.5	**23.0**	13.0	**13.5**
	HSUPA	21.5	**22.0**	13.0	**13.5**
	DC-HSDPA	22.5	**23.0**	13.0	**13.5**
LTE Band 5	QPSK	22.5	**23.0**	17.0	**17.5**
LTE Band 41	QPSK	24.0	**24.5**	18.0	**18.5**

Upper limit (dB): ~ 0.5		Max. RF Output Power (dBm)	
RF Air interface	Mode	Target	Max. tune-up tolerance limit
WiFi 2.4 GHz (Ch. 1~11)	802.11b	13.5	**14.0**
	802.11g	13.5	**14.0**
	802.11n HT20	13.5	**14.0**
WiFi 5 GHz	802.11a	10.5	**11.0**
	802.11n HT20	10.5	**11.0**
	802.11n HT40	10.5	**11.0**
	802.11ac VHT20	10.5	**11.0**
	802.11ac VHT40	10.5	**11.0**
	802.11ac VHT80	10.5	**11.0**
Bluetooth		9.0	**9.5**
Bluetooth LE		1.5	**2.0**

6.4. General LTE SAR Test and Reporting Considerations

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Frequency range, Channel Bandwidth, Numbers and Frequencies</td><td>
<table>
<tr><td rowspan="2">Band 5</td><td colspan="6">Frequency range: 824 - 849 MHz</td></tr>
<tr><td colspan="6">Channel Bandwidth</td></tr>
<tr><td>20 MHz</td><td>15 MHz</td><td>10 MHz</td><td>5 MHz</td><td>3 MHz</td><td>1.4 MHz</td></tr>
<tr><td>Low</td><td></td><td></td><td>20450/ 829</td><td>20425/ 826.5</td><td>20415/ 825.5</td><td>20407/ 824.7</td></tr>
<tr><td>Mid</td><td></td><td></td><td>20525/ 836.5</td><td>20525/ 836.5</td><td>20525/ 836.5</td><td>20525/ 836.5</td></tr>
<tr><td>High</td><td></td><td></td><td>20600/ 844</td><td>20625/ 846.5</td><td>20635/ 847.5</td><td>20643/ 848.3</td></tr>
<tr><td rowspan="2">Band 41</td><td colspan="6">Frequency range: 2555 - 2655 MHz</td></tr>
<tr><td colspan="6">Channel Bandwidth</td></tr>
<tr><td>20 MHz</td><td>15 MHz</td><td>10 MHz</td><td>5 MHz</td><td></td><td></td></tr>
<tr><td>Low</td><td>40340/ 2565</td><td>40315/ 2562.5</td><td>40290/ 2560</td><td>40265/ 2557.5</td><td></td><td></td></tr>
<tr><td>Mid</td><td>40740/ 2605</td><td>40740/ 2605</td><td>40740/ 2605</td><td>40740/ 2605</td><td></td><td></td></tr>
<tr><td>High</td><td>41140/ 2645</td><td>41165/ 2647.5</td><td>41190/ 2650</td><td>41215/ 2652.5</td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>LTE transmitter and antenna implementation</td><td>LTE has 2 Main TX/RX antennas and 2 RX antennas
Refer to Appendix A...</td></tr>
<tr><td>Carrier Aggregation Combinations</td><td>
<table>
<tr><th colspan="2">Primary Channel Bandwidth (MHz)</th><th colspan="2">Secondary Channel Bandwidth (MHz)</th></tr>
<tr><td>Band 41</td><td>20</td><td>Band 41</td><td>10, 15, 20</td></tr>
<tr><td>Band 41</td><td>15</td><td>Band 41</td><td>15, 20</td></tr>
<tr><td>Band 41</td><td>10</td><td>Band 41</td><td>20</td></tr>
</table>
</td></tr>
<tr><td>Maximum power reduction (MPR)</td><td>
Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3
<table>
<tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth (RB)</th><th rowspan="2">MPR (dB)</th></tr>
<tr><th>1.4 MHz</th><th>3.0 MHz</th><th>5 MHz</th><th>10 MHz</th><th>15 MHz</th><th>20 MHz</th></tr>
<tr><td>QPSK</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 2</td></tr>
</table>
MPR Built-in by design
A-MPR (additional MPR) was disabled during SAR testing
</td></tr>
<tr><td>Power reduction</td><td>Yes</td></tr>
<tr><td>Spectrum plots for RB configurations</td><td>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.</td></tr>
</table>

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

6.6. Power Reduction by Proximity Sensing

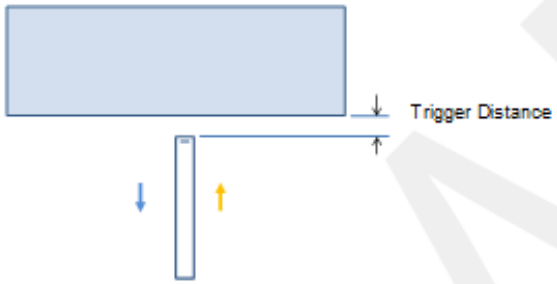
6.6.1. Proximity Sensor Triggering Distance (KDB 616217 §6.2)

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

The measurement was then repeated for the surface of Edge 1and Rear

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

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



Proximity Sensor Trigger Distance Assessment
KDB 616217 §6.2, Edge 1

Proximity Sensor Trigger Distance Assessment
KDB 616217 §6.2, Rear

LEGEND

Direction of DUT travel for determination of power reduction triggering point

Direction of DUT travel for determination of full power resumption triggering point0

Summary of Trigger Distances

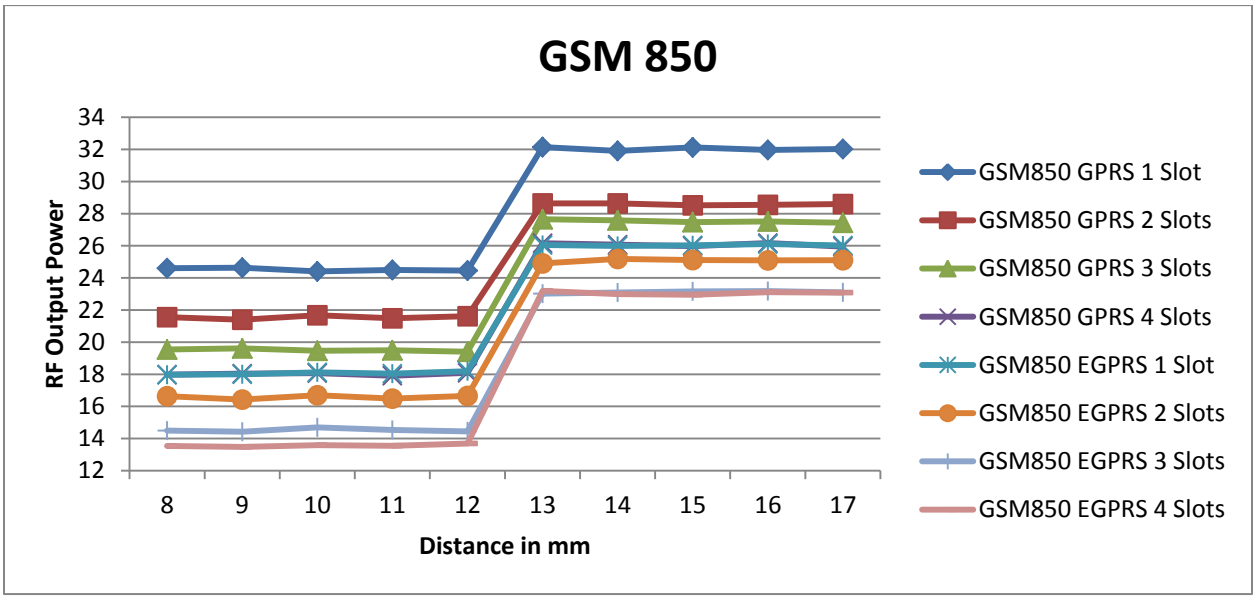
Tissue simulating liquid	Trigger distance - Edge 1		Trigger distance - Rear	
	Moving toward phantom	Moving from phantom	Moving toward phantom	Moving from phantom
850 muscle	12 mm	12 mm	12 mm	12 mm
1900 muscle	12 mm	12 mm	12 mm	12 mm
2600 muscle	12 mm	12 mm	12 mm	12 mm

Proximity Sensor Triggering Distance Measurement Results

GSM850

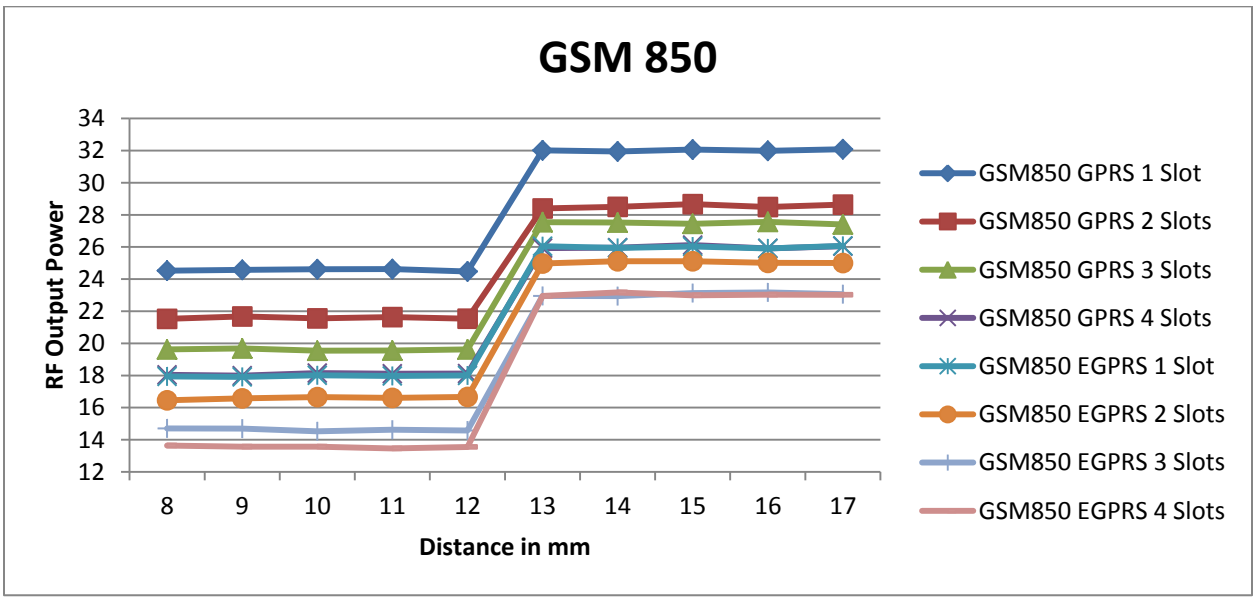
Rear, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

Distance (mm)	8	9	10	11	12	13	14	15	16	17
GSM850 GPRS 1 Slot	24.6	24.6	24.4	24.5	24.5	32.2	31.9	32.1	32.0	32.0
GSM850 GPRS 2 Slots	21.6	21.4	21.7	21.5	21.6	28.6	28.6	28.5	28.6	28.6
GSM850 GPRS 3 Slots	19.5	19.6	19.5	19.5	19.4	27.7	27.6	27.5	27.5	27.4
GSM850 GPRS 4 Slots	18.0	18.0	18.1	17.9	18.1	26.2	26.1	26.0	26.2	26.0
GSM850 EGPRS 1 Slot	18.0	18.0	18.1	18.0	18.2	26.1	26.0	26.0	26.1	26.0
GSM850 EGPRS 2 Slots	16.6	16.4	16.7	16.5	16.7	24.9	25.2	25.1	25.1	25.1
GSM850 EGPRS 3 Slots	14.5	14.4	14.7	14.5	14.4	23.0	23.1	23.2	23.2	23.1
GSM850 EGPRS 4 Slots	13.5	13.5	13.6	13.6	13.7	23.2	23.0	23.0	23.1	23.1



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

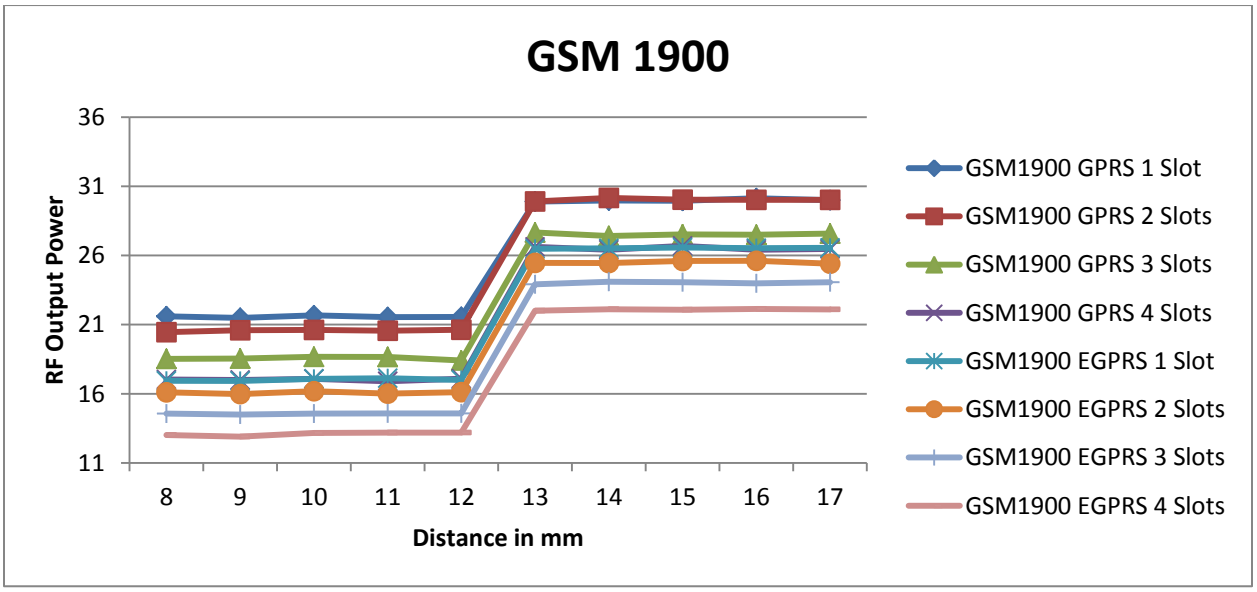
Distance to DUT vs. Output Power in dBm										
Distance (mm)	8	9	10	11	12	13	14	15	16	17
GSM850 GPRS 1 Slot	24.5	24.6	24.6	24.6	24.5	32.0	32.0	32.1	32.0	32.1
GSM850 GPRS 2 Slots	21.5	21.7	21.6	21.6	21.5	28.4	28.5	28.7	28.5	28.6
GSM850 GPRS 3 Slots	19.6	19.7	19.5	19.6	19.6	27.5	27.5	27.4	27.6	27.4
GSM850 GPRS 4 Slots	18.0	18.0	18.2	18.1	18.1	25.9	26.0	26.1	25.9	26.1
GSM850 EGPRS 1 Slot	17.9	17.9	18.0	18.0	18.0	26.1	25.9	26.0	25.9	26.1
GSM850 EGPRS 2 Slots	16.5	16.6	16.7	16.6	16.7	25.0	25.1	25.1	25.0	25.0
GSM850 EGPRS 3 Slots	14.7	14.7	14.5	14.6	14.6	23.0	22.9	23.1	23.2	23.1
GSM850 EGPRS 4 Slots	13.6	13.6	13.6	13.5	13.6	23.0	23.2	23.0	23.0	23.0



GSM1900

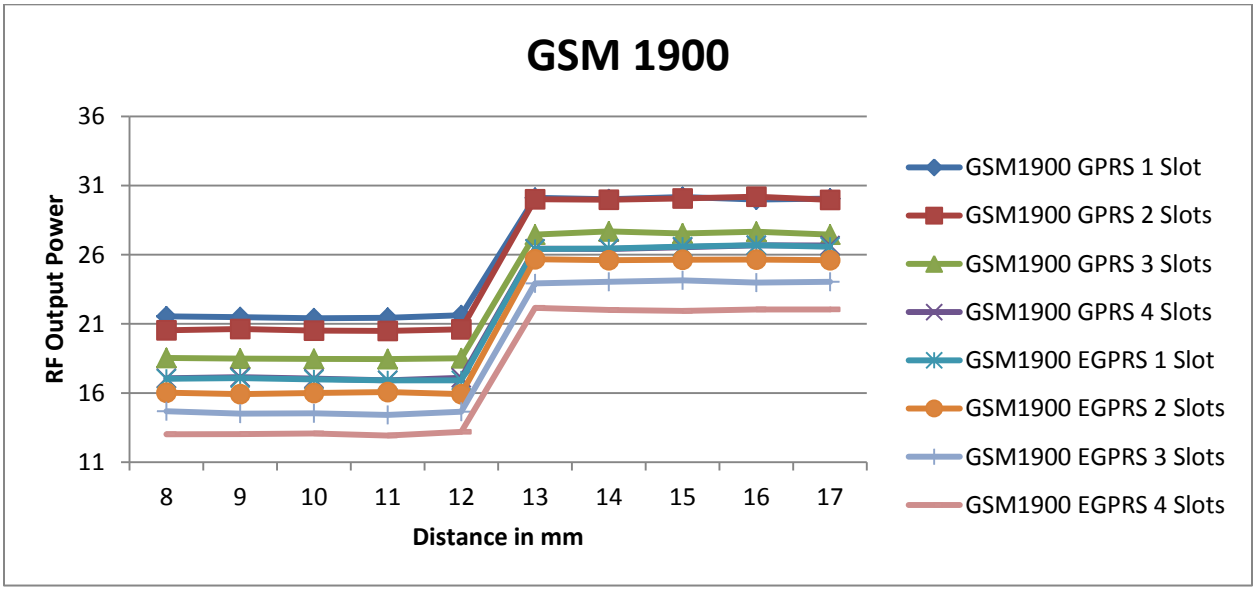
Rear, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	8	9	10	11	12	13	14	15	16	17
GSM1900 GPRS 1 Slot	21.6	21.5	21.7	21.5	21.6	29.9	30.0	30.0	30.1	30.0
GSM1900 GPRS 2 Slots	20.5	20.6	20.6	20.6	20.6	29.9	30.2	30.0	30.0	30.0
GSM1900 GPRS 3 Slots	18.5	18.6	18.7	18.7	18.4	27.7	27.4	27.5	27.5	27.6
GSM1900 GPRS 4 Slots	17.0	17.0	17.1	16.9	17.1	26.6	26.4	26.7	26.4	26.5
GSM1900 EGPRS 1 Slot	16.9	16.9	17.1	17.1	17.0	26.5	26.5	26.6	26.5	26.6
GSM1900 EGPRS 2 Slots	16.1	16.0	16.2	16.0	16.1	25.5	25.5	25.6	25.6	25.4
GSM1900 EGPRS 3 Slots	14.6	14.5	14.6	14.6	14.6	23.9	24.1	24.1	24.0	24.1
GSM1900 EGPRS 4 Slots	13.0	12.9	13.2	13.2	13.2	22.0	22.1	22.1	22.1	22.1



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

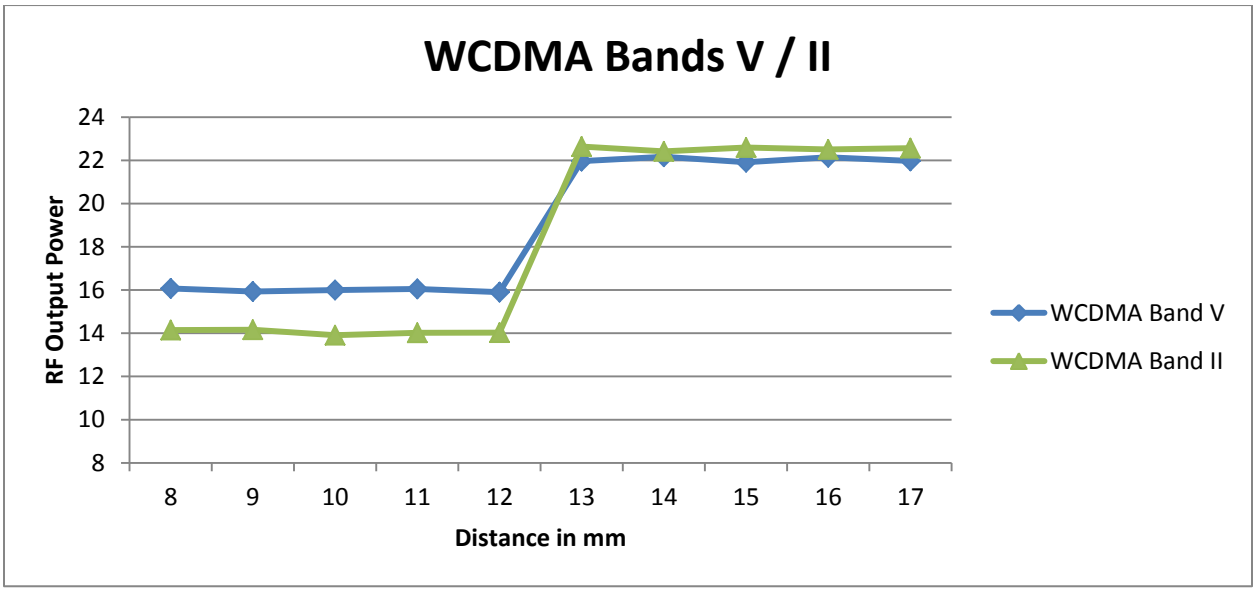
Distance to DUT vs. Output Power in dBm										
Distance (mm)	8	9	10	11	12	13	14	15	16	17
GSM1900 GPRS 1 Slot	21.5	21.5	21.4	21.4	21.6	30.1	30.0	30.2	30.0	30.1
GSM1900 GPRS 2 Slots	20.5	20.6	20.5	20.5	20.6	30.0	30.0	30.1	30.2	30.0
GSM1900 GPRS 3 Slots	18.5	18.5	18.5	18.5	18.5	27.5	27.7	27.5	27.7	27.5
GSM1900 GPRS 4 Slots	17.1	17.1	17.0	16.9	17.1	26.4	26.4	26.5	26.7	26.7
GSM1900 EGPRS 1 Slot	17.0	17.1	17.0	16.9	16.9	26.4	26.5	26.6	26.7	26.6
GSM1900 EGPRS 2 Slots	16.0	15.9	16.0	16.1	15.9	25.7	25.6	25.6	25.7	25.6
GSM1900 EGPRS 3 Slots	14.7	14.5	14.5	14.4	14.7	23.9	24.0	24.2	24.0	24.0
GSM1900 EGPRS 4 Slots	13.0	13.0	13.1	12.9	13.2	22.2	22.0	21.9	22.0	22.0



WCDMA Bands V & II

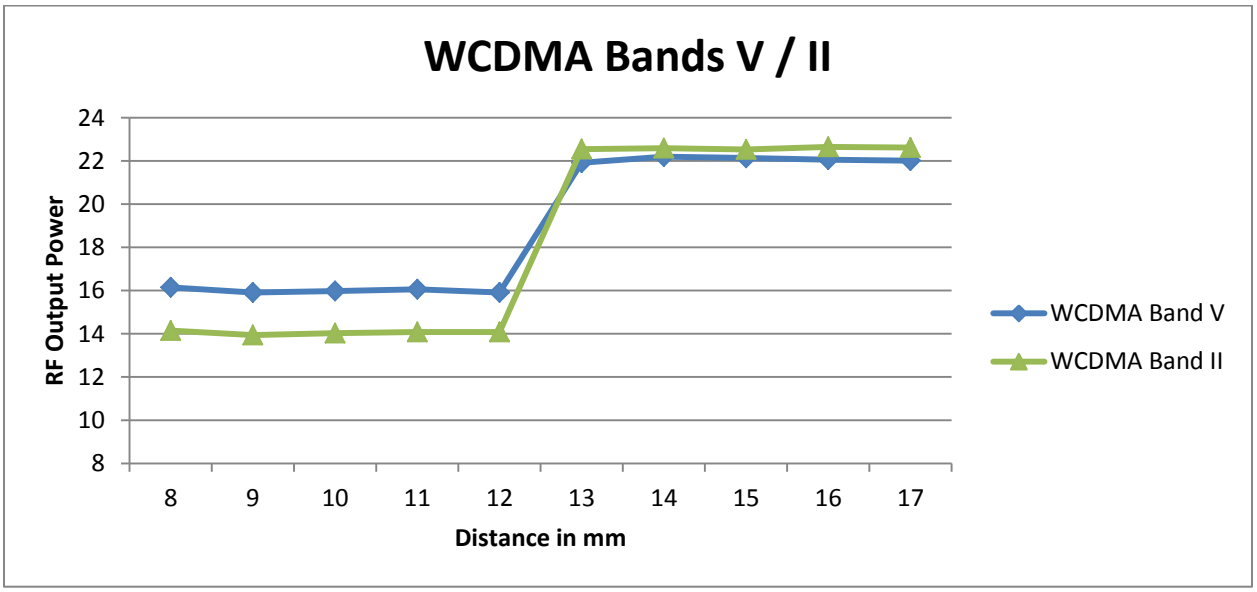
Rear, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	8	9	10	11	12	13	14	15	16	17
WCDMA Band V	16.1	15.9	16.0	16.1	15.9	22.0	22.2	21.9	22.2	22.0
WCDMA Band II	14.2	14.2	13.9	14.0	14.0	22.6	22.4	22.6	22.5	22.6



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

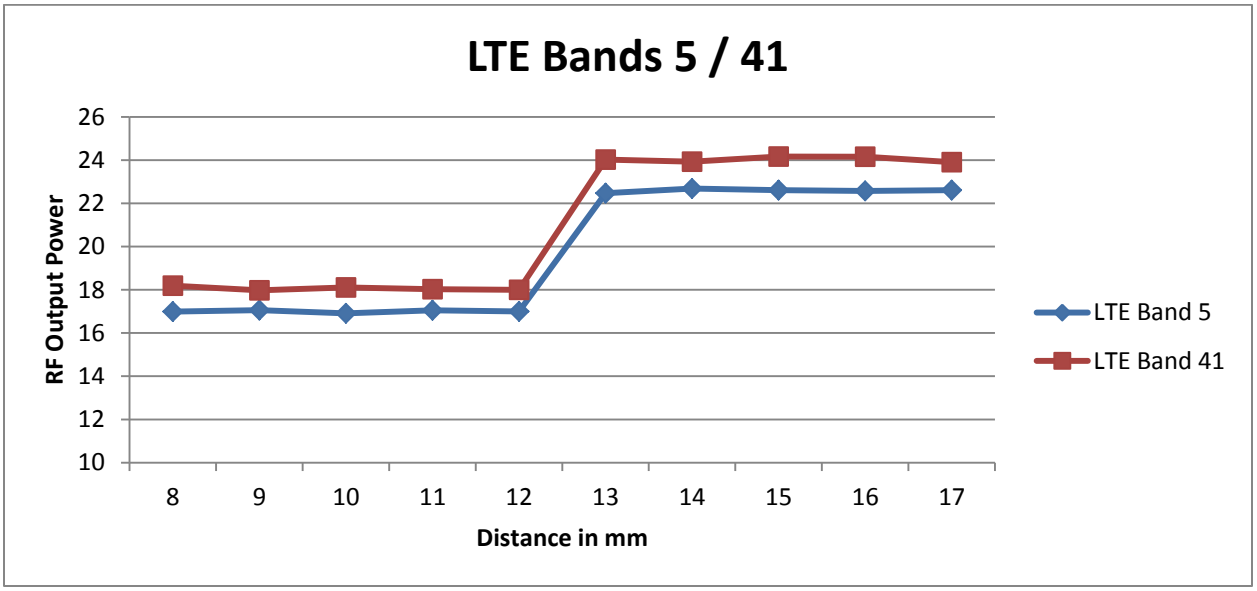
Distance to DUT vs. Output Power in dBm										
Distance (mm)	8	9	10	11	12	13	14	15	16	17
WCDMA Band V	16.2	15.9	16.0	16.1	15.9	21.9	22.2	22.1	22.1	22.0
WCDMA Band II	14.2	13.9	14.0	14.1	14.1	22.6	22.6	22.5	22.7	22.6



LTE Bands 5 / 41

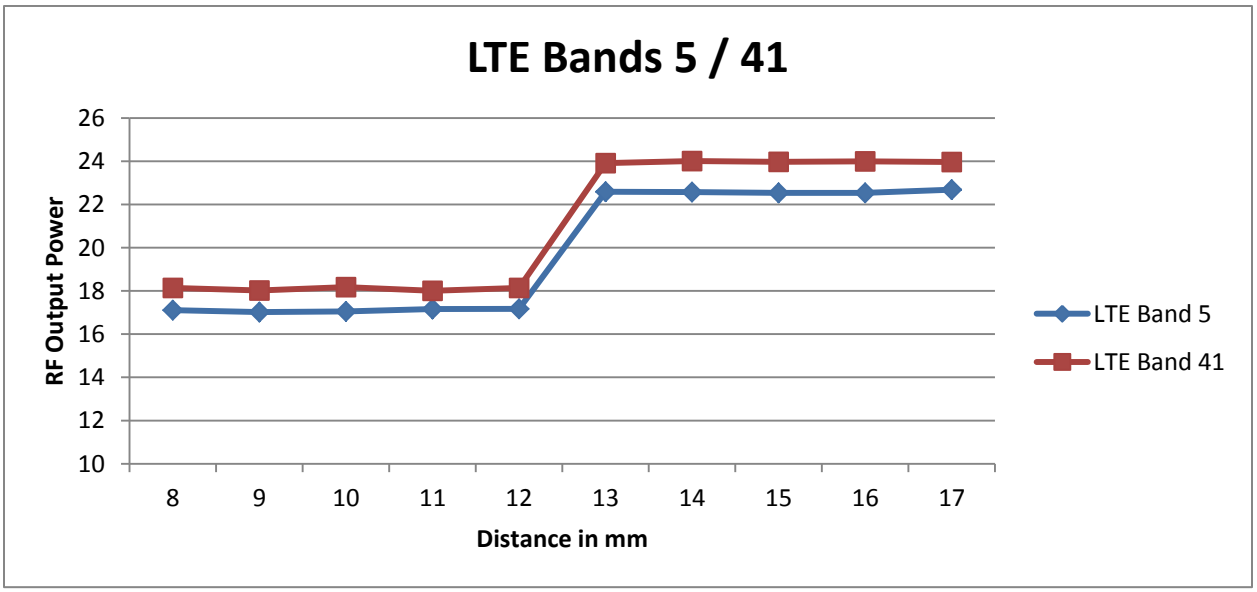
Rear, DUT Moving Toward (Trigger) and Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	8	9	10	11	12	13	14	15	16	17
LTE Band 5	17.0	17.1	16.9	17.1	17.0	22.5	22.7	22.6	22.6	22.6
LTE Band 41	18.2	18.0	18.1	18.0	18.0	24.0	23.9	24.2	24.2	23.9



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

Distance to DUT vs. Output Power in dBm										
Distance (mm)	8	9	10	11	12	13	14	15	16	17
LTE Band 5	17.1	17.0	17.1	17.2	17.2	22.6	22.6	22.5	22.5	22.7
LTE Band 41	18.1	18.0	18.2	18.0	18.1	23.9	24.0	24.0	24.0	24.0



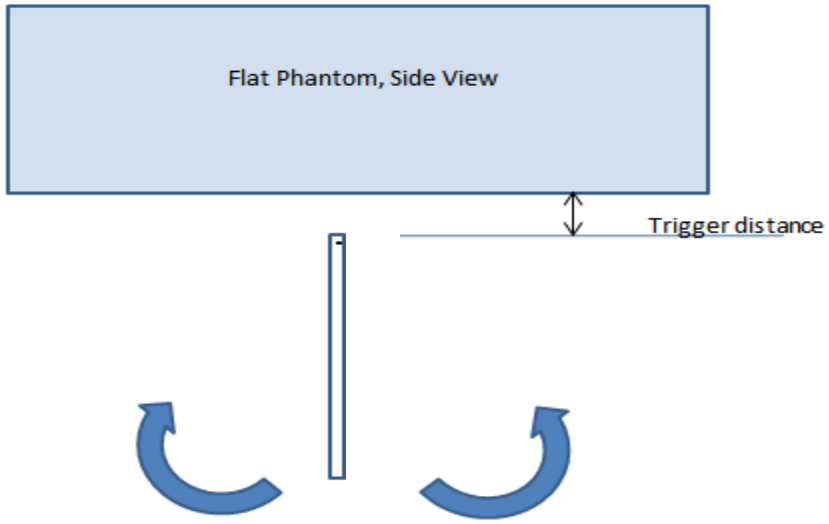
6.6.2. Proximity Sensor Coverage (KDB 616217 §6.3)

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

6.6.3. Proximity Sensor Tilt Angle Assessment (KDB 616217 §6.4)

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

The EUT was rotated about Edge 1 for angles up to +/- 45°. If the output power increased during the rotation the DUT was moved 1mm toward the phantom and the rotation repeated. This procedure was repeated until the power remained reduced for all angles up to +/- 45°.



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

Summary of Tablet Tilt Angle Influence to Proximity Sensor Triggering

Band (MHz)	Minimum trigger distance measured according to KDB 616217 §6.2	Minimum distance at which power reduction was maintained over +/-45°	Power reduction status										
			-45°	-40°	-30°	-20°	-10°	0°	10°	20°	30°	40°	45°
850	12 mm	12 mm	On	On	On	On	On	On	On	On	On	On	On
1900	12 mm	12 mm	On	On	On	On	On	On	On	On	On	On	On
2600	12 mm	12 mm	On	On	On	On	On	On	On	On	On	On	On

6.6.1. Resulting test positions for SAR measurements

Wireless technologies	Position	§6.2 Triggering Distance	§6.3 Coverage	§6.4 Tilt Angle	Worst case distance for SAR
WWAN	Rear	12 mm	N/A	N/A	11 mm
	Edge 1	12 mm	N/A	12 mm	11 mm

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.

7.1. Standalone SAR Test Exclusion Considerations

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

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

SAR Test Exclusion Calculations for WWAN

Antennas < 50mm to adjacent edges

Antenna	Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
			dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
Full Power, Proximity Sensor Off																
Cellular	GPRS 3 Slots	848.8	28.00	237	0	0	45	235	45		43.7 -MEASURE-	43.7 -MEASURE-	4.9 -MEASURE-	> 50 mm	4.9 -MEASURE-	
Cellular	GPRS 2 Slots	1909.8	30.50	281	0	0	45	235	45		77.7 -MEASURE-	77.7 -MEASURE-	8.6 -MEASURE-	> 50 mm	8.6 -MEASURE-	
Cellular	W-CDMA 5	846.6	22.50	178	0	0	45	235	45		32.8 -MEASURE-	32.8 -MEASURE-	3.6 -MEASURE-	> 50 mm	3.6 -MEASURE-	
Cellular	W-CDMA 2	1907.6	23.00	200	0	0	45	235	45		55.2 -MEASURE-	55.2 -MEASURE-	6.1 -MEASURE-	> 50 mm	6.1 -MEASURE-	
Cellular	LTE Band 5	844	23.00	200	0	0	45	235	45		36.7 -MEASURE-	36.7 -MEASURE-	4.1 -MEASURE-	> 50 mm	4.1 -MEASURE-	
Cellular	LTE Band 41	2655	24.50	282	0	0	120	235	0		91.9 -MEASURE-	91.9 -MEASURE-	> 50 mm	> 50 mm	91.9 -MEASURE-	
Power Back-off, Proximity Sensor On																
Cellular	GPRS 2 Slots	848.8	22.00	40	0	0					7.4 -MEASURE-	7.4 -MEASURE-				
Cellular	GPRS 2 Slots	1909.8	21.00	31	0	0					8.6 -MEASURE-	8.6 -MEASURE-				
Cellular	W-CDMA 5	846.6	16.50	45	0	0					8.3 -MEASURE-	8.3 -MEASURE-				
Cellular	W-CDMA 2	1907.6	14.50	28	0	0					7.7 -MEASURE-	7.7 -MEASURE-				
Cellular	LTE Band 5	844	17.50	56	0	0					10.3 -MEASURE-	10.3 -MEASURE-				
Cellular	LTE Band 41	2655	18.50	71	0	0					23.1 -MEASURE-	23.1 -MEASURE-				

Note(s):

According to KDB 447498, if the calculated threshold value is >3 then SAR testing is required.

Antennas > 50mm to adjacent edges

Antenna	Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
			dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
Full Power, Proximity Sensor Off																
Cellular	GPRS 3 Slots	848.8	28.00	237	0	0	45	235	45		< 50 mm	< 50 mm	< 50 mm	1209.7 mW -EXEMPT-	< 50 mm	
Cellular	GPRS 2 Slots	1909.8	30.50	281	0	0	45	235	45		< 50 mm	< 50 mm	< 50 mm	1958.5 mW -EXEMPT-	< 50 mm	
Cellular	W-CDMA 5	846.6	22.50	178	0	0	45	235	45		< 50 mm	< 50 mm	< 50 mm	1207.2 mW -EXEMPT-	< 50 mm	
Cellular	W-CDMA 2	1907.6	23.00	200	0	0	45	235	45		< 50 mm	< 50 mm	< 50 mm	1958.6 mW -EXEMPT-	< 50 mm	
Cellular	LTE Band 5	844	23.00	200	0	0	45	235	45		< 50 mm	< 50 mm	< 50 mm	1204.2 mW -EXEMPT-	< 50 mm	
Cellular	LTE Band 41	2655	24.50	282	0	0	120	235	0		< 50 mm	< 50 mm	792.1 mW -EXEMPT-	1942.1 mW -EXEMPT-	< 50 mm	
Power Back-off, Proximity Sensor On																
Cellular	GPRS 2 Slots	848.8	22.00	40	0	0					< 50 mm	< 50 mm				
Cellular	GPRS 2 Slots	1909.8	21.00	31	0	0					< 50 mm	< 50 mm				
Cellular	W-CDMA 5	846.6	16.50	45	0	0					< 50 mm	< 50 mm				
Cellular	W-CDMA 2	1907.6	14.50	28	0	0					< 50 mm	< 50 mm				
Cellular	LTE Band 5	844	17.50	56	0	0					< 50 mm	< 50 mm				
Cellular	LTE Band 41	2655	18.50	71	0	0					< 50 mm	< 50 mm				

Note(s):

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

SAR Test Exclusion Calculations for WLAN

Main Antenna < 50mm to adjacent edges

Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
		dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
Wi-Fi Main Antenna Max Power															
Wi-Fi 2.4 GHz	2462	14.00	25	0	235	0	0	120		7.8 -MEASURE-	> 50 mm	7.8 -MEASURE-	7.8 -MEASURE-	> 50 mm	
Wi-Fi 5.3 GHz	5320	11.00	13	0	235	0	0	120		6 -MEASURE-	> 50 mm	6 -MEASURE-	6 -MEASURE-	> 50 mm	
Wi-Fi 5.5 GHz	5700	11.00	13	0	235	0	0	120		6.2 -MEASURE-	> 50 mm	6.2 -MEASURE-	6.2 -MEASURE-	> 50 mm	
Wi-Fi 5.8 GHz	5825	11.00	13	0	235	0	0	120		6.3 -MEASURE-	> 50 mm	6.3 -MEASURE-	6.3 -MEASURE-	> 50 mm	
Bluetooth	2480	9.50	9	0	235	0	0	120		2.8 -EXEMPT-	> 50 mm	2.8 -EXEMPT-	2.8 -EXEMPT-	> 50 mm	

Sub Antenna < 50mm to adjacent edges

Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
		dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
Wi-Fi Sub Antenna Max Power															
Wi-Fi 2.4 GHz	2462	14.00	25	0	235	120	0	0		7.8 -MEASURE-	> 50 mm	> 50 mm	7.8 -MEASURE-	7.8 -MEASURE-	
Wi-Fi 5.3 GHz	5320	11.00	13	0	235	120	0	0		6 -MEASURE-	> 50 mm	> 50 mm	6 -MEASURE-	6 -MEASURE-	
Wi-Fi 5.5 GHz	5700	11.00	13	0	235	120	0	0		6.2 -MEASURE-	> 50 mm	> 50 mm	6.2 -MEASURE-	6.2 -MEASURE-	
Wi-Fi 5.8 GHz	5825	11.00	13	0	235	120	0	0		6.3 -MEASURE-	> 50 mm	> 50 mm	6.3 -MEASURE-	6.3 -MEASURE-	

Note(s):

According to KDB 447498, if the calculated threshold value is >3 then SAR testing is required.

Main Antennas > 50mm to adjacent edges

Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
		dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
Wi-Fi Main Antenna Max Power															
Wi-Fi 2.4 GHz	2462	14.00	25	0	235	0	0	120		< 50 mm	1945.6 mW -EXEMPT-	< 50 mm	< 50 mm	795.6 mW -EXEMPT-	
Wi-Fi 5.3 GHz	5320	11.00	13	0	235	0	0	120		< 50 mm	1915 mW -EXEMPT-	< 50 mm	< 50 mm	765 mW -EXEMPT-	
Wi-Fi 5.5 GHz	5700	11.00	13	0	235	0	0	120		< 50 mm	1912.8 mW -EXEMPT-	< 50 mm	< 50 mm	762.8 mW -EXEMPT-	
Wi-Fi 5.8 GHz	5825	11.00	13	0	235	0	0	120		< 50 mm	1912.2 mW -EXEMPT-	< 50 mm	< 50 mm	762.2 mW -EXEMPT-	
Bluetooth	2480	9.50	9	0	235	0	0	120		< 50 mm	1945.3 mW -EXEMPT-	< 50 mm	< 50 mm	795.3 mW -EXEMPT-	

Sub Antennas > 50mm to adjacent edges

Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Calculated Threshold Value					
		dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
Wi-Fi Sub Antenna Max Power															
Wi-Fi 2.4 GHz	2462	14.00	25	0	235	120	0	0		< 50 mm	1945.6 mW -EXEMPT-	795.6 mW -EXEMPT-	< 50 mm	< 50 mm	
Wi-Fi 5.3 GHz	5320	11.00	13	0	235	120	0	0		< 50 mm	1915 mW -EXEMPT-	765 mW -EXEMPT-	< 50 mm	< 50 mm	
Wi-Fi 5.5 GHz	5700	11.00	13	0	235	120	0	0		< 50 mm	1912.8 mW -EXEMPT-	762.8 mW -EXEMPT-	< 50 mm	< 50 mm	
Wi-Fi 5.8 GHz	5825	11.00	13	0	235	120	0	0		< 50 mm	1912.2 mW -EXEMPT-	762.2 mW -EXEMPT-	< 50 mm	< 50 mm	

Note(s):

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

7.2. Required Test Configurations

The table below identifies the standalone test configurations required for this device according to the findings in Section 7.1:

Test Configurations	Pwr Back-off	Rear	Edge 1 (Top Edge)	Edge 2 (Right Edge)	Edge 3 (Bottom Edge)	Edge 4 (Left Edge)
GSM850	Off	Yes	Yes	Yes	No	Yes
	On	Yes	Yes	No	No	No
GSM1900	Off	Yes	Yes	Yes	No	Yes
	On	Yes	Yes	No	No	No
WCDMA Band II	Off	Yes	Yes	Yes	No	Yes
	On	Yes	Yes	No	No	No
WCDMA Band V	Off	Yes	Yes	Yes	No	Yes
	On	Yes	Yes	No	No	No
LTE Band 5	Off	Yes	Yes	Yes	No	Yes
	On	Yes	Yes	No	No	No
LTE Band 41	Off	Yes	Yes	No	No	Yes
	On	Yes	Yes	No	No	No
Wi-Fi 2.4 GHz (Main Antenna)	Off	Yes	No	Yes	Yes	No
Wi-Fi 2.4 GHz (Sub Antenna)	Off	Yes	No	No	Yes	Yes
Wi-Fi 5 GHz (Main Antenna)	Off	Yes	No	Yes	Yes	No
Wi-Fi 5 GHz (Sub Antenna)	Off	Yes	No	No	Yes	Yes
Bluetooth	Off	No	No	No	No	No

Note(s):

Yes = Testing is required.

No = Testing is not required.

8. Dielectric Property Measurements & System Check

8.1. Dielectric Property Measurements

The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within ± 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 1 Room

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
1-12-2017	Body 835	e'	54.1800	Relative Permittivity (ϵ_r):	54.18	55.20	-1.85	5
		e"	21.3500	Conductivity (σ):	0.99	0.97	2.19	5
	Body 820	e'	54.3000	Relative Permittivity (ϵ_r):	54.30	55.28	-1.77	5
		e"	21.4200	Conductivity (σ):	0.98	0.97	0.84	5
	Body 850	e'	54.0400	Relative Permittivity (ϵ_r):	54.04	55.16	-2.03	5
		e"	21.2900	Conductivity (σ):	1.01	0.99	1.93	5
1-16-2017	Body 835	e'	54.5700	Relative Permittivity (ϵ_r):	54.57	55.20	-1.14	5
		e"	20.7200	Conductivity (σ):	0.96	0.97	-0.82	5
	Body 820	e'	54.7100	Relative Permittivity (ϵ_r):	54.71	55.28	-1.03	5
		e"	20.7800	Conductivity (σ):	0.95	0.97	-2.17	5
	Body 850	e'	54.4300	Relative Permittivity (ϵ_r):	54.43	55.16	-1.32	5
		e"	20.6500	Conductivity (σ):	0.98	0.99	-1.13	5
1-19-2017	Body 1900	e'	53.7800	Relative Permittivity (ϵ_r):	53.78	53.30	0.90	5
		e"	14.3700	Conductivity (σ):	1.52	1.52	-0.12	5
	Body 1850	e'	53.9200	Relative Permittivity (ϵ_r):	53.92	53.30	1.16	5
		e"	14.1500	Conductivity (σ):	1.46	1.52	-4.24	5
	Body 1910	e'	53.7400	Relative Permittivity (ϵ_r):	53.74	53.30	0.83	5
		e"	14.4200	Conductivity (σ):	1.53	1.52	0.75	5
2-12-2017	Body 2450	e'	51.8300	Relative Permittivity (ϵ_r):	51.83	52.70	-1.65	5
		e"	14.7800	Conductivity (σ):	2.01	1.95	3.25	5
	Body 2410	e'	51.9300	Relative Permittivity (ϵ_r):	51.93	52.76	-1.57	5
		e"	14.6800	Conductivity (σ):	1.97	1.91	3.13	5
	Body 2475	e'	51.7800	Relative Permittivity (ϵ_r):	51.78	52.67	-1.69	5
		e"	14.8500	Conductivity (σ):	2.04	1.99	2.95	5
2-12-2017	Body 2600	e'	51.4100	Relative Permittivity (ϵ_r):	51.41	52.51	-2.10	5
		e"	15.2000	Conductivity (σ):	2.20	2.16	1.69	5
	Body 2500	e'	51.7100	Relative Permittivity (ϵ_r):	51.71	52.64	-1.76	5
		e"	14.9200	Conductivity (σ):	2.07	2.02	2.66	5
	Body 2700	e'	51.0400	Relative Permittivity (ϵ_r):	51.04	52.38	-2.57	5
		e"	15.4300	Conductivity (σ):	2.32	2.30	0.66	5
2-22-2017	Body 2600	e'	52.5400	Relative Permittivity (ϵ_r):	52.54	52.51	0.06	5
		e"	15.1400	Conductivity (σ):	2.19	2.16	1.29	5
	Body 2500	e'	52.8600	Relative Permittivity (ϵ_r):	52.86	52.64	0.42	5
		e"	14.8900	Conductivity (σ):	2.07	2.02	2.45	5
	Body 2700	e'	52.2200	Relative Permittivity (ϵ_r):	52.22	52.38	-0.31	5
		e"	15.3500	Conductivity (σ):	2.30	2.30	0.14	5

SAR 2 Room

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
1-16-2017	Body 2600	e'	52.2300	Relative Permittivity (ε_r):	52.23	52.51	-0.53	5
		e"	14.5700	Conductivity (σ):	2.11	2.16	-2.52	5
	Body 2500	e'	52.5100	Relative Permittivity (ε_r):	52.51	52.64	-0.24	5
		e"	14.4100	Conductivity (σ):	2.00	2.02	-0.85	5
	Body 2700	e'	52.0000	Relative Permittivity (ε_r):	52.00	52.38	-0.73	5
		e"	14.7600	Conductivity (σ):	2.22	2.30	-3.71	5
2-15-2017	Body 835	e'	53.6300	Relative Permittivity (ε_r):	53.63	55.20	-2.84	5
		e"	21.5000	Conductivity (σ):	1.00	0.97	2.91	5
	Body 820	e'	53.7400	Relative Permittivity (ε_r):	53.74	55.28	-2.78	5
		e"	21.5500	Conductivity (σ):	0.98	0.97	1.46	5
	Body 850	e'	53.4900	Relative Permittivity (ε_r):	53.49	55.16	-3.02	5
		e"	21.4700	Conductivity (σ):	1.01	0.99	2.79	5
2-21-2017	Body 835	e'	54.8100	Relative Permittivity (ε_r):	54.81	55.20	-0.71	5
		e"	21.1900	Conductivity (σ):	0.98	0.97	1.42	5
	Body 820	e'	54.9600	Relative Permittivity (ε_r):	54.96	55.28	-0.57	5
		e"	21.2600	Conductivity (σ):	0.97	0.97	0.09	5
	Body 850	e'	54.6800	Relative Permittivity (ε_r):	54.68	55.16	-0.87	5
		e"	21.1300	Conductivity (σ):	1.00	0.99	1.17	5

SAR 3 Room

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
2-11-2017	Body 5180	e'	48.2800	Relative Permittivity (ε_r):	48.28	49.05	-1.56	5
		e"	18.1400	Conductivity (σ):	5.22	5.27	-0.88	5
	Body 5300	e'	48.0800	Relative Permittivity (ε_r):	48.08	48.88	-1.64	5
		e"	18.2600	Conductivity (σ):	5.38	5.41	-0.56	5
	Body 5600	e'	47.6100	Relative Permittivity (ε_r):	47.61	48.48	-1.79	5
		e"	18.5700	Conductivity (σ):	5.78	5.76	0.37	5
	Body 5800	e'	47.3000	Relative Permittivity (ε_r):	47.30	48.20	-1.87	5
		e"	18.7900	Conductivity (σ):	6.06	6.00	1.00	5
	Body 5825	e'	47.2500	Relative Permittivity (ε_r):	47.25	48.20	-1.97	5
		e"	18.8300	Conductivity (σ):	6.10	6.00	1.65	5
2-14-2017	Body 5180	e'	47.6100	Relative Permittivity (ε_r):	47.61	49.05	-2.93	5
		e"	18.0900	Conductivity (σ):	5.21	5.27	-1.16	5
	Body 5300	e'	47.4000	Relative Permittivity (ε_r):	47.40	48.88	-3.04	5
		e"	18.2000	Conductivity (σ):	5.36	5.41	-0.88	5
	Body 5600	e'	46.9000	Relative Permittivity (ε_r):	46.90	48.48	-3.25	5
		e"	18.4800	Conductivity (σ):	5.75	5.76	-0.12	5
	Body 5800	e'	46.6200	Relative Permittivity (ε_r):	46.62	48.20	-3.28	5
		e"	18.6600	Conductivity (σ):	6.02	6.00	0.30	5
	Body 5825	e'	46.5600	Relative Permittivity (ε_r):	46.56	48.20	-3.40	5
		e"	18.6900	Conductivity (σ):	6.05	6.00	0.89	5
2-20-2017	Body 1900	e'	54.2200	Relative Permittivity (ε_r):	54.22	53.30	1.73	5
		e"	14.7700	Conductivity (σ):	1.56	1.52	2.66	5
	Body 1850	e'	54.3300	Relative Permittivity (ε_r):	54.33	53.30	1.93	5
		e"	14.7600	Conductivity (σ):	1.52	1.52	-0.11	5
	Body 1910	e'	54.2000	Relative Permittivity (ε_r):	54.20	53.30	1.69	5
		e"	14.7700	Conductivity (σ):	1.57	1.52	3.20	5

8.2. System Check

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

System Performance Check Measurement Conditions:

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

Reference Target SAR Values

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

System Dipole	Serial No.	Cal. Date	Freq. (MHz)	Target SAR Values (W/kg)		
				1g/10g	Head	Body
D835V2	4d194	7-20-2016	835	1g	9.52	9.65
				10g	6.22	6.28
D1900V2	5d190	9-28-2016	1900	1g	40.0	38.8
				10g	21.0	20.6
D1900V2	5d199	2-19-2016	1900	1g	39.8	39.5
				10g	20.7	20.9
D2450V2	939	9-23-2016	2450	1g	52.1	49.9
				10g	24.4	23.7
D2600V2	1097	11-15-2016	2600	1g	55.8	54.9
				10g	25.0	24.6
D5GHzV2	1184	9-1-2016	5300	1g	82.2	75.9
				10g	23.5	21.4
D5GHzV2	1184	9-1-2016	5600	1g	81.8	78.1
				10g	23.3	21.9
D5GHzV2	1184	9-1-2016	5800	1g	78.3	75.6
				10g	22.3	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 1 Room

Date Tested	System Dipole		T.S. Liquid		Measured Results		Target (Ref. Value)	Delta ±10 %	Plot No.
	Type	Serial #			Zoom Scan to 100 mW	Normalize to 1 W			
1-12-2017	D835V2	4d194	Body	1g	1.00	10.00	9.65	3.63	
				10g	0.66	6.58	6.28	4.78	
1-16-2017	D835V2	4d194	Body	1g	0.98	9.81	9.65	1.66	
				10g	0.65	6.45	6.28	2.71	
1-19-2017	D1900V2	5d199	Body	1g	4.22	42.20	39.50	6.84	1, 2
				10g	2.18	21.80	20.90	4.31	
2-12-2017	D2450V2	939	Body	1g	5.05	50.50	49.90	1.20	3, 4
				10g	2.31	23.10	23.70	-2.53	
2-12-2017	D2600V2	1097	Body	1g	5.69	56.90	54.90	3.64	5, 6
				10g	2.47	24.70	24.60	0.41	
2-22-2017	D2600V2	1097	Body	1g	5.47	54.70	54.90	-0.36	
				10g	2.40	24.00	24.60	-2.44	

SAR 2 Room

Date Tested	System Dipole		T.S. Liquid		Measured Results		Target (Ref. Value)	Delta ±10 %	Plot No.
	Type	Serial #			Zoom Scan to 100 mW	Normalize to 1 W			
1-16-2017	D2600V2	1097	Body	1g	5.51	55.10	54.90	0.36	
				10g	2.38	23.80	24.60	-3.25	
2-15-2017	D835V2	4d194	Body	1g	1.04	10.40	9.65	7.77	7, 8
				10g	0.68	6.81	6.28	8.44	
2-21-2017	D835V2	4d194	Body	1g	1.03	10.30	9.65	6.74	
				10g	0.67	6.73	6.28	7.17	

SAR 3 Room

Date Tested	System Dipole		T.S. Liquid		Measured Results		Target (Ref. Value)	Delta ±10 %	Plot No.
	Type	Serial #			Zoom Scan to 100 mW	Normalize to 1 W			
2-11-2017	D5GHzV2 (5300)	1184	Body	1g	7.45	74.50	75.90	-1.84	
				10g	2.06	20.60	21.40	-3.74	
2-11-2017	D5GHzV2 (5600)	1184	Body	1g	8.24	82.40	78.10	5.51	
				10g	2.28	22.80	21.90	4.11	
2-11-2017	D5GHzV2 (5800)	1184	Body	1g	7.21	72.10	75.60	-4.63	
				10g	1.98	19.80	21.00	-5.71	
2-14-2017	D5GHzV2 (5300)	1184	Body	1g	7.75	77.50	75.90	2.11	
				10g	2.14	21.40	21.40	0.00	
2-14-2017	D5GHzV2 (5600)	1184	Body	1g	8.41	84.10	78.10	7.68	9, 10
				10g	2.31	23.10	21.90	5.48	
2-14-2017	D5GHzV2 (5800)	1184	Body	1g	7.57	75.70	75.60	0.13	
				10g	2.09	20.90	21.00	-0.48	
2-20-2017	D1900V2	5d190	Body	1g	3.98	39.80	38.80	2.58	
				10g	2.05	20.50	20.60	-0.49	

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			Reduction Pwr		
						Burst (dBm)	Frame (dBm)	Frame Pwr Maximum	Burst (dBm)	Frame (dBm)	Frame Pwr Maximum
850	GSM (Voice)	CS1	1	128	824.2	32.5	23.5	23.5	24.5	15.4	16.0
				190	836.6	32.5	23.5		24.5	15.5	
				251	848.8	32.5	23.4		24.2	15.1	
	GPRS (GMSK)	CS1	1	128	824.2	32.5	23.4	23.5	24.5	15.5	16.0
				190	836.6	32.5	23.5		24.5	15.5	
				251	848.8	32.5	23.5		24.2	15.1	
			2	128	824.2	28.4	22.4	23.0	21.7	15.7	16.0
				190	836.6	28.3	22.3		21.8	15.7	
				251	848.8	28.2	22.2		21.8	15.8	
			3	128	824.2	27.9	23.6	23.7	19.9	15.6	15.7
				190	836.6	27.8	23.6		19.8	15.6	
				251	848.8	27.6	23.4		19.6	15.3	
			4	128	824.2	25.9	22.9	23.5	18.0	15.0	15.5
				190	836.6	25.9	22.9		18.0	14.9	
				251	848.8	26.0	22.9		17.8	14.8	
	EGPRS (8PSK)	MCS5	1	128	824.2	26.1	17.0	17.5	18.4	9.3	9.5
				190	836.6	26.0	17.0		18.3	9.2	
				251	848.8	26.0	16.9		18.1	9.1	
			2	128	824.2	24.8	18.8	19.5	16.6	10.6	11.0
				190	836.6	24.8	18.8		16.7	10.7	
				251	848.8	24.8	18.8		16.6	10.5	
			3	128	824.2	22.9	18.7	19.2	15.0	10.7	10.7
				190	836.6	22.9	18.6		14.9	10.6	
				251	848.8	22.8	18.6		14.8	10.5	
			4	128	824.2	23.0	20.0	20.5	14.0	11.0	11.0
				190	836.6	22.6	19.6		13.9	10.9	
				251	848.8	22.6	19.6		13.9	10.9	

Notes:

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

- Standalone: GMSK (GPRS) mode with 3 time slots for Max power and 2 time slots for Reduced power, based on the output power measurements above
- SAR is not required for EGPRS (8PSK) mode because its output power is less than that of GPRS Mode

GSM1900 Measured Results

Band	Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Max. Pwr			Reduction Pwr		
						Burst (dBm)	Frame (dBm)	Frame Pwr Maximum	Burst (dBm)	Frame (dBm)	Frame Pwr Maximum
1900	GSM (Voice)	CS1	1	512	1850.2	30.4	21.4	21.5	22.0	12.9	13.0
				661	1880.0	30.4	21.3		21.8	12.8	
				810	1909.8	30.3	21.2		21.7	12.6	
	GPRS (GMSK)	CS1	1	512	1850.2	30.4	21.4	21.5	22.0	13.0	13.0
				661	1880.0	30.4	21.4		21.9	12.8	
				810	1909.8	30.3	21.3		21.7	12.7	
			2	512	1850.2	30.3	24.2	24.5	21.0	15.0	15.0
				661	1880.0	30.2	24.2		20.9	14.9	
				810	1909.8	30.1	24.0		20.6	14.6	
			3	512	1850.2	27.6	23.3	23.7	18.6	14.3	14.7
				661	1880.0	27.7	23.4		18.6	14.3	
				810	1909.8	27.5	23.3		18.4	14.1	
			4	512	1850.2	26.5	23.5	24.0	17.3	14.3	14.5
				661	1880.0	26.6	23.6		17.3	14.3	
				810	1909.8	26.5	23.5		17.0	14.0	
	EGPRS (8PSK)	MCS5	1	512	1850.2	26.6	17.6	18.0	17.3	8.3	8.5
				661	1880.0	26.5	17.5		17.3	8.3	
				810	1909.8	26.4	17.4		17.1	8.1	
			2	512	1850.2	25.6	19.5	20.0	16.2	10.2	10.5
				661	1880.0	25.4	19.4		16.3	10.2	
				810	1909.8	25.3	19.3		16.2	10.1	
			3	512	1850.2	23.6	19.4	20.2	14.7	10.5	10.7
				661	1880.0	23.5	19.2		14.6	10.3	
				810	1909.8	23.5	19.2		14.5	10.3	
			4	512	1850.2	22.3	19.3	19.5	13.4	10.4	10.5
				661	1880.0	22.1	19.1		13.4	10.4	
				810	1909.8	22.0	19.0		13.3	10.3	

Notes:

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

- Standalone: GMSK (GPRS) mode with 2 time slots for Max power and 2 time slots for Reduced power, based on the output power measurements above
- SAR is not required for EGPRS (8PSK) mode because its output power is less than that of GPRS Mode

9.2. W-CDMA

Release 99 Setup Procedures used to establish the test signals

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

Mode	Subtest	Rel99
WCDMA General Settings	Loopback Mode	Test Mode 2
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	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 Channelization Codes	2xSF2				SF4

DC-HSDPA Setup Procedures used to establish the test signals

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

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

Table E.5.0: Levels for HSDPA connection setup

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

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

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

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

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	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.		

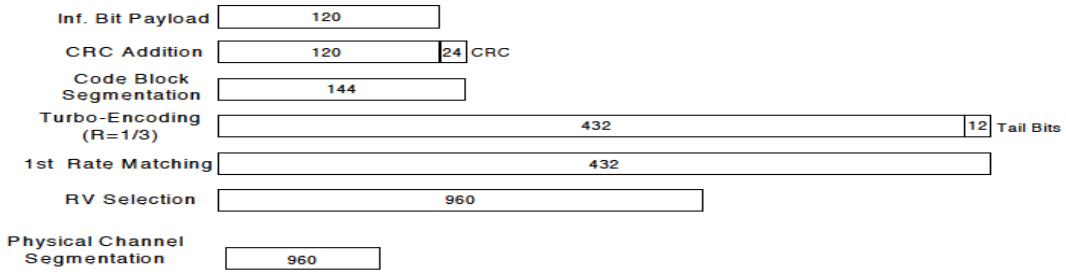


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

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)	Reduction Pwr (dBm)
W-CDMA Band II	Rel 99	RMC, 12.2 kbps	9262	1852.4	N/A	23.0	14.1
			9400	1880.0	N/A	22.2	13.2
			9538	1907.6	N/A	22.5	13.6
	HSDPA	Subtest 1	9262	1852.4	0	22.0	13.2
			9400	1880.0	0	22.2	12.2
			9538	1907.6	0	22.5	12.5
		Subtest 2	9262	1852.4	0	21.6	12.8
			9400	1880.0	0	22.2	11.8
			9538	1907.6	0	22.5	12.1
		Subtest 3	9262	1852.4	0.5	21.5	12.6
			9400	1880.0	0.5	22.1	11.7
			9538	1907.6	0.5	22.5	12.1
		Subtest 4	9262	1852.4	0.5	21.5	12.7
			9400	1880.0	0.5	22.1	11.7
			9538	1907.6	0.5	22.5	12.1
	HSUPA	Subtest 1	9262	1852.4	0	22.0	13.1
			9400	1880.0	0	21.1	12.2
			9538	1907.6	0	21.4	12.5
		Subtest 2	9262	1852.4	2	20.0	11.1
			9400	1880.0	2	19.1	10.2
			9538	1907.6	2	19.4	10.5
		Subtest 3	9262	1852.4	1	21.0	12.0
			9400	1880.0	1	20.1	11.2
			9538	1907.6	1	20.4	11.5
		Subtest 4	9262	1852.4	2	20.0	11.1
			9400	1880.0	2	19.0	10.1
			9538	1907.6	2	19.4	10.5
		Subtest 5	9262	1852.4	0	22.0	13.1
			9400	1880.0	0	21.1	12.2
			9538	1907.6	0	21.4	12.5
	DC-HSDPA	Subtest 1	9262	1852.4	0	21.9	13.0
			9400	1880.0	0	22.2	12.1
			9538	1907.6	0	22.5	12.5
		Subtest 2	9262	1852.4	0	21.6	12.7
			9400	1880.0	0	22.2	11.8
			9538	1907.6	0	22.5	12.1
		Subtest 3	9262	1852.4	0.5	21.5	12.6
			9400	1880.0	0.5	22.1	11.7
			9538	1907.6	0.5	22.5	12.1
		Subtest 4	9262	1852.4	0.5	21.5	12.6
			9400	1880.0	0.5	22.2	11.7
			9538	1907.6	0.5	22.5	12.0

W-CDMA Band V Measured Results

Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Max. Pwr (dBm)	Reduction Pwr (dBm)
W-CDMA Band V	Rel 99	RMC, 12.2 kbps	4132	826.4	N/A	22.3	16.2
			4183	836.6	N/A	22.3	16.2
			4233	846.6	N/A	22.2	16.2
	HSDPA	Subtest 1	4132	826.4	0	20.6	14.6
			4183	836.6	0	20.8	14.6
			4233	846.6	0	20.7	14.6
		Subtest 2	4132	826.4	0	20.3	14.2
			4183	836.6	0	20.5	14.3
			4233	846.6	0	20.3	14.2
		Subtest 3	4132	826.4	0.5	20.3	14.1
			4183	836.6	0.5	20.4	14.2
			4233	846.6	0.5	20.3	14.2
		Subtest 4	4132	826.4	0.5	20.3	14.0
			4183	836.6	0.5	20.4	14.1
			4233	846.6	0.5	20.3	14.1
	HSUPA	Subtest 1	4132	826.4	0	20.8	14.6
			4183	836.6	0	20.4	14.6
			4233	846.6	0	20.7	14.6
		Subtest 2	4132	826.4	2	18.8	12.6
			4183	836.6	2	18.8	12.6
			4233	846.6	2	18.7	12.6
		Subtest 3	4132	826.4	1	19.7	13.6
			4183	836.6	1	19.8	13.6
			4233	846.6	1	19.7	13.6
		Subtest 4	4132	826.4	2	18.8	12.6
			4183	836.6	2	18.8	12.6
			4233	846.6	2	18.7	12.6
		Subtest 5	4132	826.4	0	20.8	14.6
			4183	836.6	0	20.8	14.6
			4233	846.6	0	20.7	14.6
	DC-HSDPA	Subtest 1	4132	826.4	0	20.6	14.5
			4183	836.6	0	20.7	14.5
			4233	846.6	0	20.6	14.5
		Subtest 2	4132	826.4	0	20.3	14.2
			4183	836.6	0	20.5	14.2
			4233	846.6	0	20.3	14.2
		Subtest 3	4132	826.4	0.5	20.2	14.1
			4183	836.6	0.5	20.3	14.1
			4233	846.6	0.5	20.2	14.1
		Subtest 4	4132	826.4	0.5	20.2	14.1
			4183	836.6	0.5	20.3	14.1
			4233	846.6	0.5	20.2	14.1

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 Signaling Value of “NS_01”.

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

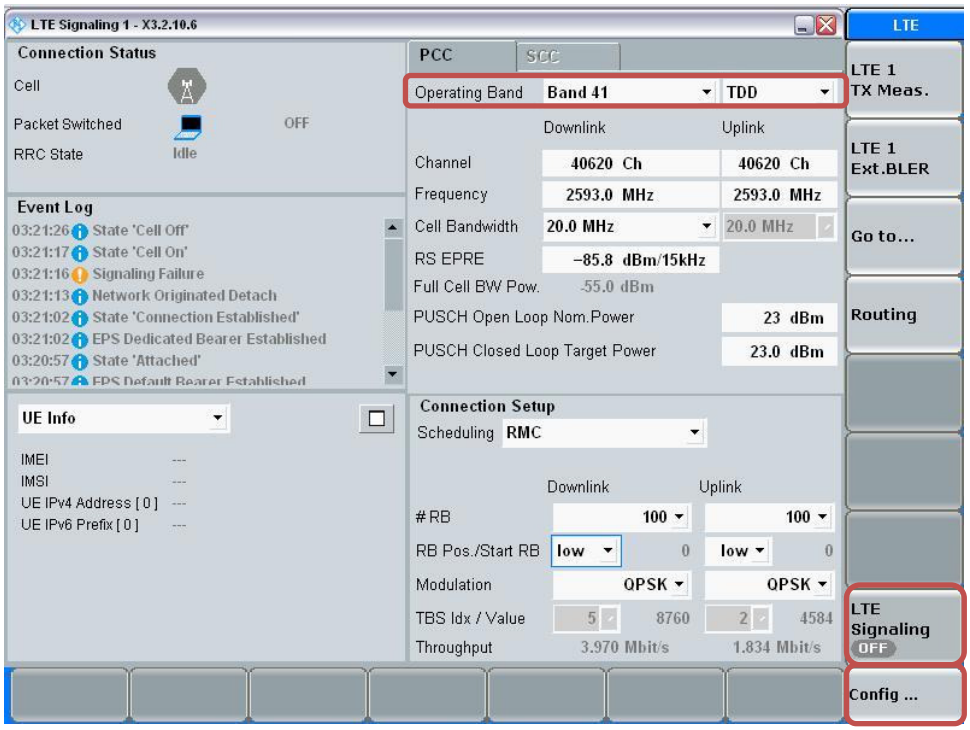
Network Signalling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	NA
NS_03	6.6.2.2.1	2, 4,10, 23, 25, 35, 36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2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

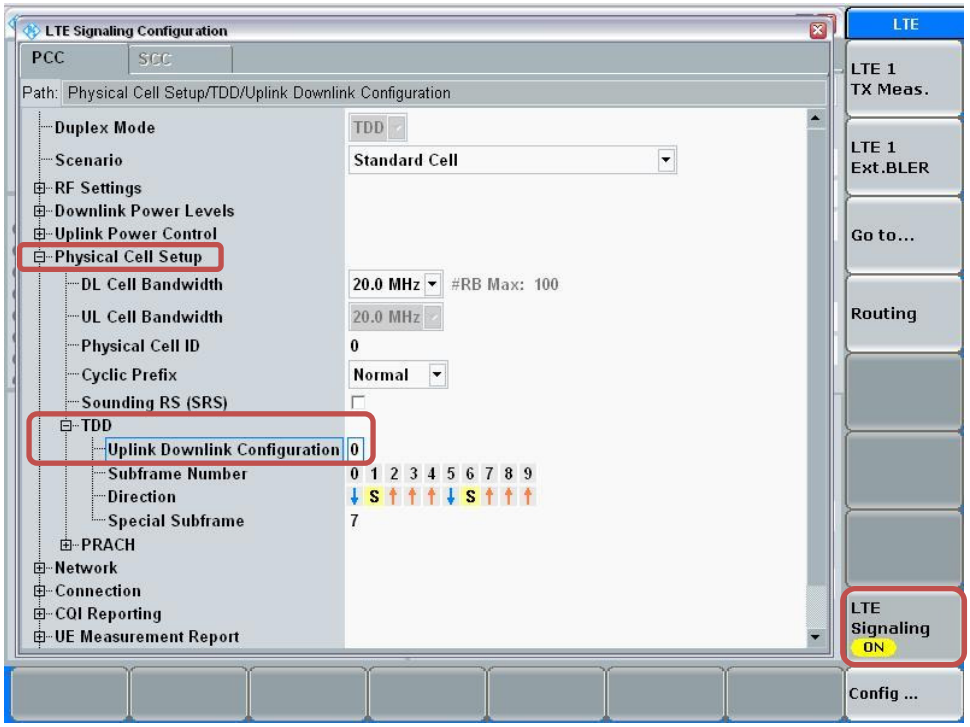
Procedure used to establish SAR test signal for LTE TDD Band 41

Set to CMW-500 with following parameters:

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

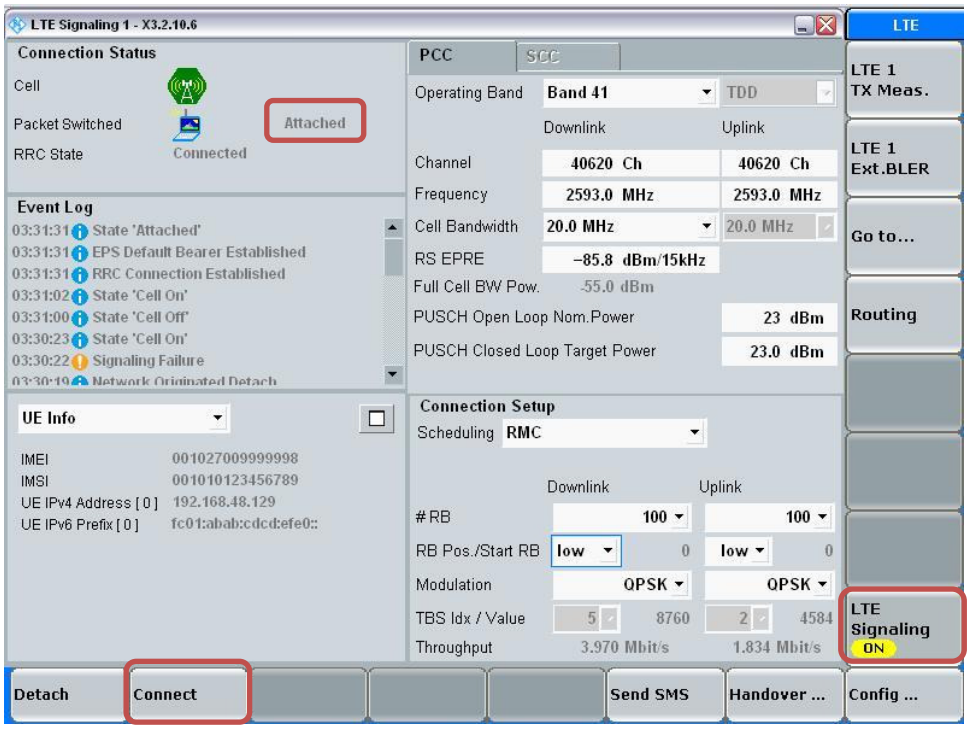


- Go to “Physical Cell Setup”
- Select “TDD” and Set “Uplink Downlink Configuration” to “0”
- Turn the cell on using “ON | OFF” key



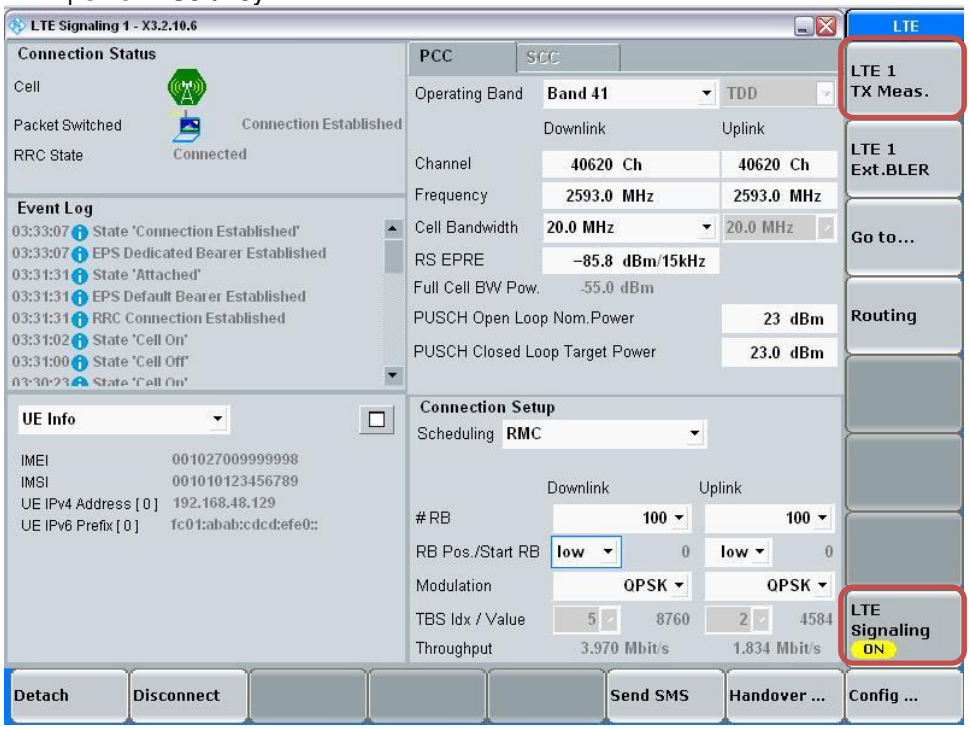
Connect to EUT

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

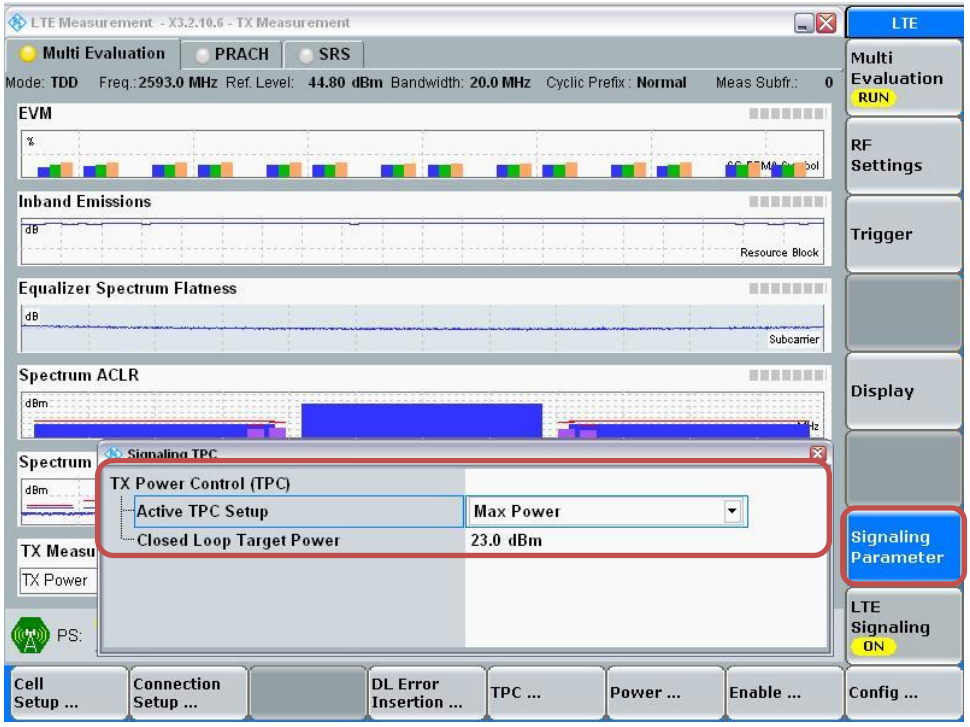


Max Power Setting

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

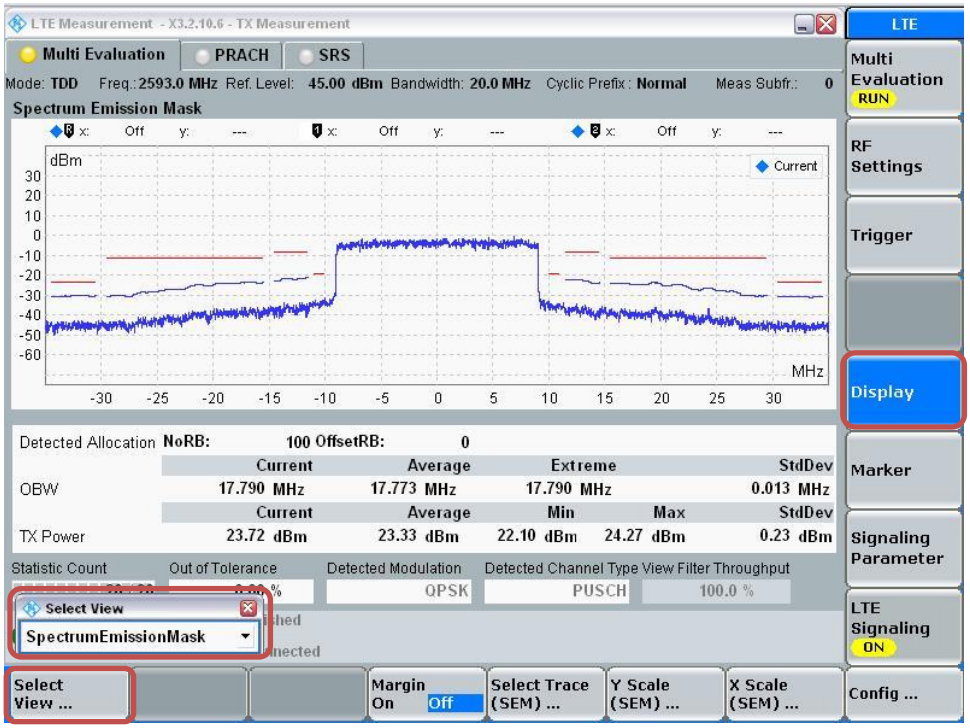


- Select “Signaling Parameter”
- Select “TX Power Control (TPC)” > Select “Active TPC Setup” to “Max Power” > Set “Closed Loop Target Power” to “23 dBm”



View TX Power

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



LTE Band 5 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduction Avg Pwr (dBm)		
						829 MHz	836.5 MHz	844 MHz		829 MHz	836.5 MHz	844 MHz
LTE Band 5	10	QPSK	1	0	0		22.7		0		17.2	
			1	25	0		22.7		0		17.1	
			1	49	0		22.6		0		17.0	
			25	0	1		21.8		0		17.3	
			25	12	1		21.8		0		17.2	
			25	25	1		21.8		0		17.2	
			50	0	1		21.8		0		17.3	
		16QAM	1	0	1		21.9		0		17.2	
			1	25	1		21.8		0		17.2	
			1	49	1		21.8		0		17.2	
			25	0	2		20.7		0		17.2	
			25	12	2		20.8		0		17.2	
			25	25	2		20.8		0		17.2	
			50	0	2		20.7		0		17.1	

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduction Avg Pwr (dBm)		
						826.5 MHz	836.5 MHz	846.5 MHz		826.5 MHz	836.5 MHz	846.5 MHz
LTE Band 5	5	QPSK	1	0	0	22.8	22.7	22.8	0	17.1	17.2	17.2
			1	12	0	22.8	22.7	22.9	0	17.2	17.2	17.3
			1	24	0	22.7	22.7	22.7	0	17.1	17.2	17.1
			12	0	1	21.7	21.8	21.8	0	17.1	17.2	17.2
			12	6	1	21.8	21.8	21.9	0	17.2	17.2	17.3
			12	11	1	21.8	21.8	21.8	0	17.2	17.3	17.3
			25	0	1	21.8	21.7	21.9	0	17.2	17.2	17.3
		16QAM	1	0	1	21.9	21.8	21.9	0	17.4	17.4	17.4
			1	12	1	21.9	21.9	21.9	0	17.4	17.3	17.4
			1	24	1	21.9	21.8	21.8	0	17.4	17.4	17.3
			12	0	2	20.8	20.9	20.8	0	17.2	17.4	17.3
			12	6	2	20.9	20.9	20.9	0	17.3	17.4	17.4
			12	11	2	20.9	21.0	20.9	0	17.3	17.3	17.3
			25	0	2	20.8	20.8	20.8	0	17.2	17.3	17.3

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduction Avg Pwr (dBm)		
						825.5 MHz	836.5 MHz	847.5 MHz		825.5 MHz	836.5 MHz	847.5 MHz
LTE Band 5	3	QPSK	1	0	0	22.7	22.7	22.7	0	17.1	17.1	17.1
			1	7	0	22.7	22.8	22.8	0	17.1	17.2	17.3
			1	14	0	22.6	22.6	22.6	0	17.1	17.1	17.1
			8	0	1	21.8	21.8	21.9	0	17.2	17.2	17.4
			8	4	1	21.7	21.8	21.9	0	17.2	17.2	17.3
			8	7	1	21.8	21.8	21.9	0	17.2	17.2	17.4
			15	0	1	21.7	21.7	21.8	0	17.1	17.2	17.3
		16QAM	1	0	1	21.6	21.8	21.6	0	17.1	17.2	17.1
			1	7	1	21.6	21.8	21.8	0	17.1	17.2	17.3
			1	14	1	21.6	21.8	21.6	0	17.0	17.2	17.1
			8	0	2	20.8	20.6	21.0	0	17.3	17.1	17.5
			8	4	2	20.8	20.6	21.0	0	17.2	17.1	17.2
			8	7	2	20.8	20.6	21.0	0	17.3	17.1	17.1
			15	0	2	20.7	20.7	20.7	0	17.2	17.2	17.2

LTE Band 5 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduction Avg Pwr (dBm)		
						824.7 MHz	836.5 MHz	848.3 MHz		824.7 MHz	836.5 MHz	848.3 MHz
LTE Band 5	1.4	QPSK	1	0	0	22.6	22.5	22.6	0	17.0	17.0	17.1
			1	2	0	22.6	22.6	22.7	0	17.1	17.0	17.2
			1	5	0	22.5	22.6	22.6	0	16.9	17.1	17.1
			3	0	0	22.7	22.6	22.7	0	17.1	17.1	17.1
			3	1	0	22.7	22.6	22.7	0	17.1	17.1	17.2
			3	2	0	22.7	22.6	22.7	0	17.1	17.1	17.2
			6	0	1	21.7	21.6	21.7	0	17.1	17.1	17.2
		16QAM	1	0	1	21.7	22.0	21.7	0	17.2	17.3	17.2
			1	2	1	21.8	21.9	21.8	0	17.2	17.2	17.2
			1	5	1	21.7	21.8	21.7	0	17.1	17.2	17.2
			3	0	1	21.7	21.8	21.9	0	17.2	17.3	17.5
			3	1	1	21.8	21.8	22.0	0	17.2	17.3	17.4
			3	2	1	21.8	21.8	22.0	0	17.2	17.3	17.5
			6	0	2	20.8	20.6	20.9	0	17.3	17.0	17.4

Note(s):

10 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 41 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduction. Avg Pwr (dBm)		
						2565 MHz	2605 MHz	2645 MHz		2565 MHz	2605 MHz	2645 MHz
LTE Band 41	20	QPSK	1	0	0	24.5	24.3	24.0	0	18.5	18.5	18.2
			1	49	0	23.6	23.6	23.2	0	17.6	17.7	17.3
			1	99	0	23.9	23.7	23.5	0	17.9	17.9	17.6
			50	0	1	23.0	22.8	22.5	0	18.1	18.1	17.7
			50	24	1	22.6	22.6	22.2	0	17.7	17.8	17.3
			50	50	1	22.7	22.5	22.2	0	17.7	17.7	17.3
			100	0	1	22.8	22.6	22.4	0	17.8	17.8	17.5
		16QAM	1	0	1	23.3	23.2	22.8	0	18.2	18.4	18.1
			1	49	1	22.6	22.4	22.0	0	17.4	17.6	17.3
			1	99	1	22.8	22.6	22.3	0	17.7	17.8	17.6
			50	0	2	21.5	21.3	20.9	0	18.1	18.0	17.6
			50	24	2	21.1	21.1	20.7	0	17.8	17.8	17.4
			50	50	2	21.1	21.0	20.6	0	17.8	17.7	17.4
			100	0	2	21.3	21.1	20.9	0	17.9	17.8	17.5
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduction. Avg Pwr (dBm)		
						2562.5 MHz	2605 MHz	2647.5 MHz		2562.5 MHz	2605 MHz	2647.5 MHz
LTE Band 41	15	QPSK	1	0	0	24.2	24.1	23.6	0	18.4	18.2	17.7
			1	37	0	23.3	23.3	22.8	0	17.8	17.3	17.1
			1	74	0	23.7	23.7	23.3	0	17.9	17.7	17.5
			36	0	1	22.8	22.8	22.4	0	18.0	17.9	17.5
			36	20	1	22.7	22.6	22.3	0	17.9	17.6	17.3
			36	39	1	22.5	22.5	22.3	0	17.7	17.6	17.3
			75	0	1	22.7	22.6	22.3	0	17.9	17.6	17.3
		16QAM	1	0	1	23.0	23.0	22.5	0	18.2	18.1	17.7
			1	37	1	22.7	22.5	22.1	0	17.8	17.6	17.4
			1	74	1	22.6	22.5	22.2	0	17.8	17.6	17.5
			36	0	2	21.2	21.2	20.7	0	17.9	17.8	17.5
			36	20	2	21.1	20.9	20.6	0	17.8	17.5	17.3
			36	39	2	21.0	20.9	20.7	0	17.7	17.6	17.3
			75	0	2	21.2	21.0	20.7	0	17.8	17.6	17.4
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduction. Avg Pwr (dBm)		
						2560 MHz	2605 MHz	2650 Mhz		2560 MHz	2605 MHz	2650 Mhz
LTE Band 41	10	QPSK	1	0	0	23.7	23.7	23.5	0	17.8	17.6	17.6
			1	25	0	23.4	23.3	23.4	0	17.5	17.3	17.5
			1	49	0	23.3	23.3	23.4	0	17.3	17.3	17.5
			25	0	1	22.5	22.3	22.4	0	17.6	17.5	17.5
			25	12	1	22.4	22.2	22.3	0	17.5	17.4	17.5
			25	25	1	22.3	22.2	22.4	0	17.4	17.4	17.5
			50	0	1	22.4	22.3	22.4	0	17.5	17.4	17.5
		16QAM	1	0	1	22.5	22.5	22.3	0	17.6	17.6	17.7
			1	25	1	22.3	22.3	22.2	0	17.5	17.2	17.6
			1	49	1	22.2	22.2	22.2	0	17.3	17.3	17.6
			25	0	2	20.9	20.7	20.8	0	17.6	17.4	17.5
			25	12	2	20.9	20.7	20.8	0	17.6	17.3	17.5
			25	25	2	20.8	20.7	20.8	0	17.4	17.3	17.5
			50	0	2	20.9	20.7	20.8	0	17.6	17.4	17.6

LTE Band 41 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Max. Avg Pwr (dBm)			Target MPR	Reduction. Avg Pwr (dBm)		
						2557.5 MHz	2605 MHz	2652.5 Mhz		2557.5 MHz	2605 MHz	2652.5 Mhz
LTE Band 41	5	QPSK	1	0	0	23.5	23.4	23.4	0	17.6	17.3	17.6
			1	12	0	23.5	23.4	23.4	0	17.5	17.3	17.5
			1	24	0	23.3	23.2	23.3	0	17.5	17.2	17.5
			12	0	1	22.4	22.2	22.4	0	17.5	17.3	17.5
			12	7	1	22.4	22.2	22.3	0	17.5	17.3	17.5
			12	13	1	22.3	22.1	22.2	0	17.5	17.3	17.5
			25	0	1	22.3	22.2	22.2	0	17.5	17.3	17.5
		16QAM	1	0	1	22.4	22.2	22.5	0	17.6	17.3	17.4
			1	12	1	22.4	22.2	22.5	0	17.6	17.2	17.4
			1	24	1	22.3	22.0	22.4	0	17.5	17.2	17.4
			12	0	2	20.8	20.6	20.8	0	17.6	17.4	17.6
			12	7	2	20.9	20.6	20.9	0	17.6	17.4	17.6
			12	13	2	20.8	20.6	20.8	0	17.5	17.3	17.5
			25	0	2	20.9	20.7	20.7	0	17.5	17.3	17.5

9.3.1. LTE Rel. 10 Carrier Aggregation

LTE Release 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.

1) Max power Measured Results

LTE CA combinations			PCC (UL)					SCC (DL)			LTE Rel 8 Tx. Max. Power [dBm]	LTE Rel 10 Tx. Max. Power [dBm]
PCC	+	SCC	Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	RB / Offset	Bandwidth (MHz)	Channel	Frequency (MHz)		
B41 (PCC)	+	B41 (SCC)	QPSK	20	40340	2565.0	1 / 0	20	40538	2584.8	24.46	23.90

2) Reduction power Measured Results

LTE CA combinations			PCC (UL)					SCC (DL)			LTE Rel 8 Tx. Max. Power [dBm]	LTE Rel 10 Tx. Max. Power [dBm]
PCC	+	SCC	Mode	Bandwidth (MHz)	Channel	Frequency (MHz)	RB / Offset	Bandwidth (MHz)	Channel	Frequency (MHz)		
B41 (PCC)	+	B41 (SCC)	QPSK	20	40740	2605.0	50 / 0	20	40938	2624.8	18.50	18.38

Note:

SAR is excluded for Carrier Aggregation when measured power does not exceed LTE Release 8 by more than a 1/4 dB. And When the specified maximum output power and tune-up tolerance are the same for the different channel bandwidth, RB and modulation configurations, maximum output power for the uplink with downlink carrier aggregation active may be measured using the highest maximum output power configuration for uplink with downlink carrier aggregation inactive measured among the channel bandwidth, modulation and RB combinations in each frequency band.

9.4. Wi-Fi 2.4Ghz (DTS Band)

Measured Results

Antenna	Mode	Data Rate	Ch #	Freq. (MHz)	Max Pwr.			Note(s)
					Avg Pwr (dBm)	Max Output Power (dBm)	SAR Test (Yes/No)	
SISO Main	802.11b	1 Mbps	1	2412	13.1	14	Yes	
			6	2437	13.1			
			11	2462	13.9			
	802.11g	6 Mbps	1	2412	13.8	14	No	1
			6	2437	13.8			
			11	2462	13.5			
	802.11n (HT20)	6.5 Mbps	1	2412	13.6	14	No	1
			6	2437	13.6			
			11	2462	13.4			
SISO Sub	802.11b	1 Mbps	1	2412	14.0	14	Yes	
			6	2437	13.7			
			11	2462	14.0			
	802.11g	6 Mbps	1	2412	13.7	14	No	1
			6	2437	13.4			
			11	2462	13.7			
	802.11n (HT20)	6.5 Mbps	1	2412	13.5	14	No	1
			6	2437	13.3			
			11	2462	13.5			

Note(s):

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

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

Measured Results

Antenna	Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Max Pwr.		
						Avg Pwr (dBm)	Max Output Power (dBm)	SAR Test (Yes/No)
SISO Main	5.3 (U-NII 2A)	802.11a	6 Mbps	52	5260	Not Required	11	No
				56	5280			
				60	5300			
				64	5320			
		802.11n (HT20)	6.5 Mbps	52	5260		11	No
				56	5280			
				60	5300			
				64	5320			
		802.11n (HT40)	13.5 Mbps	54	5270		11	No
				62	5310			
		802.11ac (VHT20)	6.5 Mbps	52	5260		11	No
				56	5280			
				60	5300			
				64	5320			
		802.11ac (VHT40)	13.5 Mbps	54	5270		11	No
				62	5310			
		802.11ac (VHT80)	29.3 Mbps	58	5290	10.2	11	Yes
	5.5 (U-NII 2C)	802.11a	6 Mbps	100	5500	Not Required	11	No
				112	5560			
				116	5580			
				132	5660			
				140	5700			
		802.11n (HT20)	6.5 Mbps	100	5500		11	No
				112	5560			
				116	5580			
				132	5660			
				140	5700			
		802.11n (HT40)	13.5 Mbps	102	5510		11	No
				110	5550			
				134	5670			
		802.11ac (VHT20)	6.5 Mbps	100	5500		11	No
				112	5560			
				116	5580			
				132	5660			
				140	5700			
		802.11ac (VHT40)	13.5 Mbps	102	5510		11	No
				110	5550			
				134	5670			
		802.11ac (VHT80)	29.3 Mbps	106	5530	10.8	11	Yes
	5.8 (U-NII 3)	802.11a	6 Mbps	149	5745	Not Required	11	No
				157	5785			
				165	5825			
		802.11n (HT20)	6.5 Mbps	149	5745		11	No
				157	5785			
				165	5825			
		802.11n (HT40)	13.5 Mbps	151	5755		11	No
				159	5795			
		802.11ac (VHT20)	6.5 Mbps	149	5745		11	No
				157	5785			
				165	5825			
		802.11ac (VHT40)	13.5 Mbps	151	5755		11	No
				159	5795			
		802.11ac (VHT80)	29.3 Mbps	155	5775	10.7	11	Yes

Measured Results (continued)

Antenna	Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Max Pwr.		
						Avg Pwr (dBm)	Max Output Power (dBm)	SAR Test (Yes/No)
SISO Sub	5.3 (U-NII 2A)	802.11a	6 Mbps	52	5260	Not Required	11	No
				56	5280			
				60	5300			
				64	5320			
		802.11n (HT20)	6.5 Mbps	52	5260		11	No
				56	5280			
				60	5300			
				64	5320			
		802.11n (HT40)	13.5 Mbps	54	5270		11	No
				62	5310			
		802.11ac (VHT20)	6.5 Mbps	52	5260		11	No
				56	5280			
				60	5300			
				64	5320			
		802.11ac (VHT40)	13.5 Mbps	54	5270		11	No
				62	5310			
		802.11ac (VHT80)	29.3 Mbps	58	5290	10.2	11	Yes
	5.5 (U-NII 2C)	802.11a	6 Mbps	100	5500	Not Required	11	No
				112	5560			
				116	5580			
				132	5660			
				140	5700			
		802.11n (HT20)	6.5 Mbps	100	5500		11	No
				112	5560			
				116	5580			
				132	5660			
				140	5700			
		802.11n (HT40)	13.5 Mbps	102	5510		11	No
				110	5550			
				134	5670			
		802.11ac (VHT20)	6.5 Mbps	100	5500		11	No
				112	5560			
				116	5580			
				132	5660			
				140	5700			
		802.11ac (VHT40)	13.5 Mbps	102	5510		11	No
				110	5550			
				134	5670			
		802.11ac (VHT80)	29.3 Mbps	106	5530	10.6	11	Yes
	5.8 (U-NII 3)	802.11a	6 Mbps	149	5745	Not Required	11	No
				157	5785			
				165	5825			
		802.11n (HT20)	6.5 Mbps	149	5745		11	No
				157	5785			
				165	5825			
		802.11n (HT40)	13.5 Mbps	151	5755		11	No
				159	5795			
		802.11ac (VHT20)	6.5 Mbps	149	5745		11	No
				157	5785			
				165	5825			
		802.11ac (VHT40)	13.5 Mbps	151	5755		11	No
				159	5795			
		802.11ac (VHT80)	29.3 Mbps	155	5775	10.8	11	Yes

Note(s):

1. Output Power measurement is required for multiple configurations of same channel bandwidth that have the same specified maximum output power according to Appendix C in KDB 248227.
2. When the same transmission mode configurations have the same maximum output power on the same channel for the 802.11 a/g/n/ac modes, the channel in the lower order/sequence 802.11 mode (i.e. a, g, n then ac) is selected.
3. 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

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

10. Measured and Reported (Scaled) SAR Results

SAR Test Reduction criteria are as follows:

KDB 447498 D01 General RF Exposure Guidance:
Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:

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

KDB 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 must be measured with the maximum TTI(transmit time interval) supported by the device in each LTE configuration.
SAR test reduction is applied using the following criteria:

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

KDB 248227 D01 SAR meas for 802.11 v02r02:
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

Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
GPRS 2 Slots	ON	0	Rear	190	836.6	22.0	21.8	0.572	0.603	
			Edge 1	190	836.6	22.0	21.8	0.635	0.670	
GPRS 3 Slots	OFF	11	Rear	128	824.2	28.0	27.9	0.775	0.802	
				190	836.6	28.0	27.8	0.879	0.912	
				251	848.8	28.0	27.6	0.906	0.989	1
			Edge 1	128	824.2	28.0	27.9	0.838	0.867	
				190	836.6	28.0	27.8	0.870	0.903	
				251	848.8	28.0	27.6	0.872	0.952	
		0	Edge 2	190	836.6	28.0	27.8	0.116	0.120	
			Edge 3	190	836.6	28.0	27.8	0.039	0.040	
			Edge 4	190	836.6	28.0	27.8	0.162	0.168	

10.2. GSM1900

Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
GPRS 2 Slots	ON	0	Rear	661	1880.0	21.0	20.9	0.781	0.799	2
			Edge 1	661	1880.0	21.0	20.9	0.427	0.437	
GPRS 2 Slots	OFF	11	Rear	661	1880.0	30.5	30.2	0.702	0.756	
			Edge 1	661	1880.0	30.5	30.2	0.565	0.608	
		0	Edge 2	661	1880.0	30.5	30.2	0.034	0.037	
			Edge 3	661	1880.0	30.5	30.2	0.042	0.045	
			Edge 4	661	1880.0	30.5	30.2	0.701	0.755	

10.3. W-CDMA Band II

Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
Rel 99 RMC	ON	0	Rear	9262	1852.4	14.5	14.1	0.879	0.964	
				9400	1880.0	14.5	13.2	0.726	0.970	3
				9538	1907.6	14.5	13.6	0.749	0.926	
			Edge 1	9262	1852.4	14.5	14.1	0.505	0.554	
Rel 99 RMC	OFF	11	Rear	9262	1852.4	23.0	23.0	0.897	0.897	
				9400	1880.0	23.0	22.2	0.732	0.887	
				9538	1907.6	23.0	22.5	0.736	0.833	
			Edge 1	9262	1852.4	23.0	23.0	0.692	0.692	
		0	Edge 2	9262	1852.4	23.0	23.0	0.082	0.082	
			Edge 3	9262	1852.4	23.0	23.0	0.034	0.034	
			Edge 4	9262	1852.4	23.0	23.0	0.722	0.722	

10.4. W-CDMA Band V

Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
						Tune-up limit	Meas.	Meas.	Scaled	
Rel 99 RMC	ON	0	Rear	4183	836.6	16.5	16.2	0.689	0.739	
			Edge 1	4183	836.6	16.5	16.2	0.744	0.798	
Rel 99 RMC	OFF	11	Rear	4132	826.4	22.5	22.3	0.837	0.881	
				4183	836.6	22.5	22.3	0.867	0.899	
				4233	846.6	22.5	22.2	0.880	0.934	
			Edge 1	4132	826.4	22.5	22.3	0.886	0.933	
				4183	836.6	22.5	22.3	0.912	0.945	
				4233	846.6	22.5	22.2	0.891	0.945	4
		0	Edge 2	4183	836.6	22.5	22.3	0.112	0.116	
			Edge 3	4183	836.6	22.5	22.3	0.024	0.025	
			Edge 4	4183	836.6	22.5	22.3	0.156	0.162	

10.5. LTE Band 5 (10MHz Bandwidth)

Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
QPSK	ON	0	Rear	20525	836.5	1	0	17.5	17.2	0.880	0.954	
						25	0	17.5	17.3	0.897	0.950	
						50	0	17.5	17.3	0.874	0.907	
			Edge 1	20525	836.5	1	0	17.5	17.2	0.941	1.020	
						25	0	17.5	17.3	0.953	1.009	
						50	0	17.5	17.3	1.050	1.089	5
QPSK	OFF	11	Rear	20525	836.5	1	0	23.0	22.7	0.907	0.976	
						25	0	22.0	21.8	0.740	0.775	
			Edge 1	20525	836.5	1	0	23.0	22.7	0.970	1.044	
						25	0	22.0	21.8	0.834	0.873	
						50	0	22.0	21.8	0.833	0.878	
		0	Edge 2	20525	836.5	1	0	23.0	22.7	0.122	0.131	
						25	0	22.0	21.8	0.092	0.096	
			Edge 3	20525	836.5	1	0	23.0	22.7	0.035	0.037	
						25	0	22.0	21.8	0.025	0.026	
			Edge 4	20525	836.5	1	0	23.0	22.7	0.168	0.181	
						25	0	22.0	21.8	0.134	0.140	

10.6. LTE Band 41 (20MHz Bandwidth)

Mode	Pwr Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up limit	Meas.	Meas.	Scaled	
QPSK	ON	0	Rear	40740	2605.0	1	0	18.5	18.5	0.750	0.750	
						50	0	18.5	18.1	0.689	0.761	6
			Edge 1	40740	2605.0	1	0	18.5	18.5	0.432	0.432	
						50	0	18.5	18.1	0.384	0.424	
QPSK	OFF	11	Rear	40740	2605.0	1	0	24.5	24.3	0.419	0.435	
						50	0	23.5	22.8	0.297	0.347	
			Edge 1	40740	2605.0	1	0	24.5	24.3	0.252	0.261	
						50	0	23.5	22.8	0.183	0.214	
		0	Edge 2	40740	2605.0	1	0	24.5	24.3	0.016	0.016	
						50	0	23.5	22.8	0.013	0.015	
			Edge 3	40740	2605.0	1	0	24.5	24.3	0.070	0.072	
						50	0	23.5	22.8	0.047	0.055	
			Edge 4	40740	2605.0	1	0	24.5	24.3	0.715	0.742	
						50	0	23.5	22.8	0.519	0.606	

10.7. Wi-Fi (DTS Band)

Mode	Dist. (mm)	Antenna	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		Note	Plot No.
							Tune-up limit	Meas.	Meas.	Scaled		
802.11b 1 Mbps	0	SISO Main	Rear	11	2462.0	1.039	14.0	13.9	0.751	0.772		7
			Edge 2	11	2462.0	0.145	14.0	13.9				
			Edge 3	11	2462.0	0.519	14.0	13.9	0.428	0.440	2	
		SISO Sub	Rear	1	2412.0	0.805	14.0	14.0	0.622	0.623		
			Edge 1	1	2412.0	0.010	14.0	14.0	0.008	0.008	4	
			Edge 3	1	2412.0	0.311	14.0	14.0	0.272	0.273	2	
			Edge 4	1	2412.0	0.057	14.0	14.0	0.051	0.051	4	

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 this 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.

10.8. Wi-Fi (U-NII Band)

Frequency Band	Mode	Dist. (mm)	Antenna	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		Note	Plot No.
								Tune-up limit	Meas.	Meas.	Scaled		
5.3 GHz U-NII 2A	802.11ac (VHT80) 29.3 Mbps	0	SISO Main	Rear	58	5290.0	1.644	11.0	10.2	0.746	0.897		8
				Edge 2	58	5290.0	0.252	11.0	10.2				
				Edge 3	58	5290.0	1.018	11.0	10.2	0.375	0.451	2	
			SISO Sub	Rear	58	5290.0	1.486	11.0	10.2	0.527	0.641	2	
				Edge 1	58	5290.0	0.001	11.0	10.2	<0.001	<0.001	4	
				Edge 3	58	5290.0	2.166	11.0	10.2	0.634	0.771		
				Edge 4	58	5290.0	0.177	11.0	10.2	0.084	0.103	4	
Frequency Band	Mode	Dist. (mm)	Antenna	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		Note	Plot No.
								Tune-up limit	Meas.	Meas.	Scaled		
5.5 GHz U-NII 2C	802.11ac (VHT80) 29.3 Mbps	0	SISO Main	Rear	106	5530.0	2.543	11.0	10.8	0.861	0.904		9
				Edge 2	106	5530.0	0.326	11.0	10.8				
				Edge 3	106	5530.0	0.485	11.0	10.8	0.204	0.214		
			SISO Sub	Rear	106	5530.0	1.110	11.0	10.3	0.686	0.804	2	
				Edge 1	106	5530.0	0.001	11.0	10.3	<0.001	<0.001	4	
				Edge 3	106	5530.0	2.617	11.0	10.3	0.701	0.822		
				Edge 4	106	5530.0	0.116	11.0	10.3	0.070	0.081	2	
Frequency Band	Mode	Dist. (mm)	Antenna	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		Note	Plot No.
								Tune-up limit	Meas.	Meas.	Scaled		
5.8 GHz U-NII-3	802.11ac (VHT80) 29.3 Mbps	0	SISO Main	Rear	155	5775.0	1.882	11.0	10.7	0.485	0.521		
				Edge 2	155	5775.0	0.177	11.0	10.7				
				Edge 3	155	5775.0	1.272	11.0	10.7	0.339	0.364	2	
			SISO Sub	Rear	155	5775.0	1.107	11.0	10.8	0.437	0.463	2	
				Edge 1	155	5775.0	0.000	11.0	10.8	<0.001	<0.001	4	
				Edge 3	155	5775.0	2.863	11.0	10.8	0.780	0.826		10
				Edge 4	155	5775.0	0.103	11.0	10.8	0.066	0.069	4	

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 this 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.

10.9. Bluetooth

Maximum tune-up tolerance limit is 9.5 dBm from the rated nominal maximum output power. This power level qualifies for exclusion of SAR testing. And Estimated SAR is calculated for Simultaneous Transmission SAR Analysis. Please refer to Estimated SAR in Sec.12

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)	First Repeated	
						Measured SAR (W/kg)	Largest to Smallest SAR Ratio
850	GSM 850	Standalone	Rear	No	0.906	N/A	N/A
	WCDMA Band V	Standalone	Edge 1	No	0.912	N/A	N/A
	LTE Band 5	Standalone	Edge 1	Yes	1.050	1.080	1.03
1900	GSM 1900	Standalone	Rear	No	0.781	N/A	N/A
	WCDMA Band II	Standalone	Rear	Yes	0.897	0.891	1.01
2400	Wi-Fi 802.11b/g/n	Standalone	Rear	No	0.751	N/A	N/A
2600	LTE Band 41	Standalone	Rear	No	0.750	N/A	N/A
5300	Wi-Fi 802.11a/n/ac	Standalone	Rear	No	0.746	N/A	N/A
5500	Wi-Fi 802.11a/n/ac	Standalone	Rear	Yes	0.861	0.859	1.00
5800	Wi-Fi 802.11a/n/ac	Standalone	Edge 3	No	0.78	N/A	N/A

Note(s):

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

12. Simultaneous Transmission SAR Analysis

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

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

Where:

SAR_1 is the highest measured or estimated SAR for the first of a pair of simultaneous transmitting antennas, in a specific test operating mode and exposure condition

SAR_2 is the highest measured or estimated SAR for the second of a pair of simultaneous transmitting antennas, in the same test operating mode and exposure condition as the first

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

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

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

Simultaneous Transmission Condition

RF Exposure Condition	Item	Capable Transmit Configurations		
Standalone	1	GSM(GPRS/EDGE)	+	DTS
	2	GSM(GPRS/EDGE)	+	U-NII
	3	GSM(GPRS/EDGE)	+	BT
	4	W-CDMA	+	DTS
	5	W-CDMA	+	U-NII
	6	W-CDMA	+	BT
	7	LTE	+	DTS
	8	LTE	+	U-NII
	9	LTE	+	BT

Notes:

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

Estimated SAR for Simultaneous Transmission SAR Analysis

Considerations for SAR estimation

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

Estimated SAR for WWAN

Antenna	Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Estimated 1-g SAR Value (W/kg)					
			dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
Full Power, Proximity Sensor Off																
Cellular	GPRS 3 slots	848.8	28.00	237	0	0	45	235	45		-MEASURE-	-MEASURE-	-MEASURE-	0.400	-MEASURE-	
Cellular	GPRS 2 slots	1909.8	30.50	281	0	0	45	235	45		-MEASURE-	-MEASURE-	-MEASURE-	0.400	-MEASURE-	
Cellular	W-CDMA 5	846.6	22.50	178	0	0	45	235	45		-MEASURE-	-MEASURE-	-MEASURE-	0.400	-MEASURE-	
Cellular	W-CDMA 2	1907.6	23.00	200	0	0	45	235	45		-MEASURE-	-MEASURE-	-MEASURE-	0.400	-MEASURE-	
Cellular	LTE Band 5	844	23.00	200	0	0	45	235	45		-MEASURE-	-MEASURE-	-MEASURE-	0.400	-MEASURE-	
Cellular	LTE Band 41	2655	24.50	282	0	0	120	235	0		-MEASURE-	-MEASURE-	0.400	0.400	-MEASURE-	
Power Back-off, Proximity Sensor On																
Cellular	GPRS 3 slots	848.8	22.00	59	0	0					-MEASURE-	-MEASURE-				
Cellular	GPRS 2 slots	1909.8	21.00	31	0	0					-MEASURE-	-MEASURE-				
Cellular	W-CDMA 5	846.6	16.50	45	0	0					-MEASURE-	-MEASURE-				
Cellular	W-CDMA 2	1907.6	14.50	28	0	0					-MEASURE-	-MEASURE-				
Cellular	LTE Band 5	844	17.50	56	0	0					-MEASURE-	-MEASURE-				
Cellular	LTE Band 41	2655	18.50	71	0	0					-MEASURE-	-MEASURE-				

Estimated SAR for WLAN

Main Antenna

Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Estimated 1-g SAR Value (W/kg)					
		dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
Wi-Fi Main Antenna.															
Wi-Fi 2.4 GHz	2462	14.00	25	0	235	0	0	120		-MEASURE-	0.400	-MEASURE-	-MEASURE-	0.400	
Wi-Fi 5.3 GHz	5320	11.00	13	0	235	0	0	120		-MEASURE-	0.400	-MEASURE-	-MEASURE-	0.400	
Wi-Fi 5.5 GHz	5700	11.00	13	0	235	0	0	120		-MEASURE-	0.400	-MEASURE-	-MEASURE-	0.400	
Wi-Fi 5.8 GHz	5825	11.00	13	0	235	0	0	120		-MEASURE-	0.400	-MEASURE-	-MEASURE-	0.400	
Bluetooth	2480	9.50	9	0	235	0	0	120		0.378	0.400	0.378	0.378	0.400	

Sub Antenna

Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)						Estimated 1-g SAR Value (W/kg)					
		dBm	mW	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front	Rear	Edge 1	Edge 2	Edge 3	Edge 4	Front
Wi-Fi Sub Antenna.															
Wi-Fi 2.4 GHz	2462	14.00	25	0	235	120	0	0		-MEASURE-	0.400	0.400	-MEASURE-	-MEASURE-	
Wi-Fi 5.3 GHz	5320	11.00	13	0	235	120	0	0		-MEASURE-	0.400	0.400	-MEASURE-	-MEASURE-	
Wi-Fi 5.5 GHz	5700	11.00	13	0	235	120	0	0		-MEASURE-	0.400	0.400	-MEASURE-	-MEASURE-	
Wi-Fi 5.8 GHz	5825	11.00	13	0	235	120	0	0		-MEASURE-	0.400	0.400	-MEASURE-	-MEASURE-	

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

Test Position	Standalone SAR (W/kg)				∑ 1-g SAR (W/kg)							
	WWAN ①	DTS Main ②	DTS Sub ③	BT ④	① + ② WWAN + DTS Main		① + ③ WWAN + DTS Sub		① + ② + ③ WWAN + DTS(Main & Sub)		① + ④ WWAN + 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)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Rear	0.989	0.772	0.623	0.378	1.761	Yes	1.612	Yes	2.384	Yes	1.367	No
Edge 1	0.952	0.400	0.008	0.400	1.352	No	0.960	No	1.360	No	1.352	No
Edge 2	0.120	0.772	0.400	0.378	0.892	No	0.520	No	1.292	No	0.498	No
Edge 3	0.040	0.440	0.273	0.378	0.480	No	0.313	No	0.753	No	0.418	No
Edge 4	0.168	0.400	0.051	0.400	0.568	No	0.219	No	0.619	No	0.568	No

Test Position	Standalone SAR (W/kg)			∑ 1-g SAR (W/kg)					
	WWAN ①	U-NII Main ②	U-NII Sub ③	① + ② WWAN + U-Nii Main		① + ③ WWAN + U-NII Sub		① + ② + ③ WWAN + U-NII(Main & Sub)	
				∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Rear	0.989	0.904	0.804	1.893	Yes	1.793	Yes	2.697	Yes
Edge 1	0.952	0.400	0.001	1.352	No	0.953	No	1.353	No
Edge 2	0.120	0.904	0.400	1.024	No	0.520	No	1.424	No
Edge 3	0.040	0.451	0.826	0.491	No	0.866	No	1.317	No
Edge 4	0.168	0.400	0.103	0.568	No	0.271	No	0.671	No

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Standalone SAR (W/kg)			∑ 1-g SAR (W/kg)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	② DTS Main	③ DTS Sub						
Rear	0.989	0.772	0.623	① + ② + ③	2.384				1
	0.989	0.772		① + ②	1.761	228.7	0.01	No	
	0.989		0.623	① + ③	1.612	233.1	0.01	No	
		0.772	0.623	② + ③	1.395	77.7	0.02	No	

Test Position	Standalone SAR (W/kg)			∑ 1-g SAR (W/kg)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	② U-NII Main	③ U-NII Sub						
Rear	0.989	0.904	0.804	① + ② + ③	2.697				2
	0.989	0.904		① + ②	1.893	234.7	0.01	No	
	0.989		0.804	① + ③	1.793	233.0	0.01	No	
		0.904	0.804	② + ③	1.708	78.2	0.03	No	

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

Test Position	Standalone SAR (W/kg)				∑ 1-g SAR (W/kg)							
	WWAN ①	DTS Main ②	DTS Sub ③	BT ④	① + ② WWAN + DTS Main		① + ③ WWAN + DTS Sub		① + ② + ③ WWAN + DTS(Main & Sub)		① + ④ WWAN + 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)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Rear	0.799	0.772	0.623	0.378	1.571	No	1.422	No	2.194	Yes	1.177	No
Edge 1	0.608	0.400	0.008	0.400	1.008	No	0.616	No	1.016	No	1.008	No
Edge 2	0.037	0.772	0.400	0.378	0.809	No	0.437	No	1.209	No	0.415	No
Edge 3	0.045	0.440	0.273	0.378	0.485	No	0.318	No	0.758	No	0.423	No
Edge 4	0.755	0.400	0.051	0.400	1.155	No	0.806	No	1.206	No	1.155	No

Test Position	Standalone SAR (W/kg)			∑ 1-g SAR (W/kg)					
	WWAN ①	U-NII Main ②	U-NII Sub ③	① + ② WWAN + U-Nii Main		① + ③ WWAN + U-NII Sub		① + ② + ③ WWAN + U-NII(Main & Sub)	
				∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Rear	0.799	0.904	0.804	1.703	Yes	1.603	Yes	2.507	Yes
Edge 1	0.608	0.400	0.001	1.008	No	0.609	No	1.009	No
Edge 2	0.037	0.904	0.400	0.941	No	0.437	No	1.341	No
Edge 3	0.045	0.451	0.826	0.496	No	0.871	No	1.322	No
Edge 4	0.755	0.400	0.103	1.155	No	0.858	No	1.258	No

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Standalone SAR (W/kg)			∑ 1-g SAR (W/kg)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	② DTS Main	③ DTS Sub						
Rear	0.799	0.772	0.623	① + ② + ③	2.194				3
	0.799	0.772		① + ②	1.571	228.3	0.01	No	
	0.799		0.623	① + ③	1.422	224.4	0.01	No	
		0.772	0.623	② + ③	1.395	77.7	0.02	No	

Test Position	Standalone SAR (W/kg)			∑ 1-g SAR (W/kg)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	② U-NII Main	③ U-NII Sub						
Rear	0.799	0.904	0.804	① + ② + ③	2.507				4
	0.799	0.904		① + ②	1.703	234.5	0.01	No	
	0.799		0.804	① + ③	1.603	224.6	0.01	No	
		0.904	0.804	② + ③	1.708	78.2	0.03	No	

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

Test Position	Standalone SAR (W/kg)				∑ 1-g SAR (W/kg)							
	WWAN ①	DTS Main ②	DTS Sub ③	BT ④	① + ② WWAN + DTS Main		① + ③ WWAN + DTS Sub		① + ② + ③ WWAN + DTS(Main & Sub)		① + ④ WWAN + 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)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Rear	0.970	0.772	0.623	0.378	1.742	Yes	1.593	No	2.365	Yes	1.348	No
Edge 1	0.692	0.400	0.008	0.400	1.092	No	0.700	No	1.100	No	1.092	No
Edge 2	0.082	0.772	0.400	0.378	0.854	No	0.482	No	1.254	No	0.460	No
Edge 3	0.034	0.440	0.273	0.378	0.474	No	0.307	No	0.747	No	0.412	No
Edge 4	0.722	0.400	0.051	0.400	1.122	No	0.773	No	1.173	No	1.122	No

Test Position	Standalone SAR (W/kg)			∑ 1-g SAR (W/kg)					
	WWAN ①	U-NII Main ②	U-NII Sub ③	① + ② WWAN + U-Nii Main		① + ③ WWAN + U-NII Sub		① + ② + ③ WWAN + U-NII(Main & Sub)	
				∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Rear	0.970	0.904	0.804	1.874	Yes	1.774	Yes	2.678	Yes
Edge 1	0.692	0.400	0.001	1.092	No	0.693	No	1.093	No
Edge 2	0.082	0.904	0.400	0.986	No	0.482	No	1.386	No
Edge 3	0.034	0.451	0.826	0.485	No	0.860	No	1.311	No
Edge 4	0.722	0.400	0.103	1.122	No	0.825	No	1.225	No

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Standalone SAR (W/kg)			∑ 1-g SAR (W/kg)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	② DTS Main	③ DTS Sub						
Rear	0.970	0.772	0.623	① + ② + ③	2.365				5
	0.970	0.772		① + ②	1.742	227.7	0.01	No	
	0.970		0.623	① + ③	1.593	222.8	0.01	No	
		0.772	0.623	② + ③	1.395	77.7	0.02	No	

Test Position	Standalone SAR (W/kg)			∑ 1-g SAR (W/kg)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	② U-NII Main	③ U-NII Sub						
Rear	0.970	0.904	0.804	① + ② + ③	2.678				6
	0.970	0.904		① + ②	1.874	233.8	0.01	No	
	0.970		0.804	① + ③	1.774	222.9	0.01	No	
		0.904	0.804	② + ③	1.708	78.2	0.03	No	

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

Test Position	Standalone SAR (W/kg)				∑ 1-g SAR (W/kg)							
	WWAN ①	DTS Main ②	DTS Sub ③	BT ④	① + ② WWAN + DTS Main		① + ③ WWAN + DTS Sub		① + ② + ③ WWAN + DTS(Main & Sub)		① + ④ WWAN + 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)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Rear	0.934	0.772	0.623	0.378	1.706	Yes	1.557	No	2.329	Yes	1.312	No
Edge 1	0.945	0.400	0.008	0.400	1.345	No	0.953	No	1.353	No	1.345	No
Edge 2	0.116	0.772	0.400	0.378	0.888	No	0.516	No	1.288	No	0.494	No
Edge 3	0.025	0.440	0.273	0.378	0.465	No	0.298	No	0.738	No	0.403	No
Edge 4	0.162	0.400	0.051	0.400	0.562	No	0.213	No	0.613	No	0.562	No

Test Position	Standalone SAR (W/kg)			∑ 1-g SAR (W/kg)					
	WWAN ①	U-NII Main ②	U-NII Sub ③	① + ② WWAN + U-Nii Main		① + ③ WWAN + U-NII Sub		① + ② + ③ WWAN + U-NII(Main & Sub)	
				∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Rear	0.934	0.904	0.804	1.838	Yes	1.738	Yes	2.642	Yes
Edge 1	0.945	0.400	0.001	1.345	No	0.946	No	1.346	No
Edge 2	0.116	0.904	0.400	1.020	No	0.516	No	1.420	No
Edge 3	0.025	0.451	0.826	0.476	No	0.851	No	1.302	No
Edge 4	0.162	0.400	0.103	0.562	No	0.265	No	0.665	No

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Standalone SAR (W/kg)			∑ 1-g SAR (W/kg)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	② DTS Main	③ DTS Sub						
Rear	0.934	0.772	0.623	① + ② + ③	2.329				7
	0.934	0.772		① + ②	1.706	231.6	0.01	No	
	0.934		0.623	① + ③	1.557	235.5	0.01	No	
		0.772	0.623	② + ③	1.395	77.7	0.02	No	

Test Position	Standalone SAR (W/kg)			∑ 1-g SAR (W/kg)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	② U-NII Main	③ U-NII Sub						
Rear	0.934	0.904	0.804	① + ② + ③	2.642				8
	0.934	0.904		① + ②	1.838	237.3	0.01	No	
	0.934		0.804	① + ③	1.738	235.7	0.01	No	
		0.904	0.804	② + ③	1.708	78.2	0.03	No	

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

Test Position	Standalone SAR (W/kg)				∑ 1-g SAR (W/kg)							
	WWAN ①	DTS Main ②	DTS Sub ③	BT ④	① + ② WWAN + DTS Main		① + ③ WWAN + DTS Sub		① + ② + ③ WWAN + DTS(Main & Sub)		① + ④ WWAN + 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)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Rear	0.976	0.772	0.623	0.378	1.748	Yes	1.599	No	2.371	Yes	1.354	No
Edge 1	1.089	0.400	0.008	0.400	1.489	No	1.097	No	1.497	No	1.489	No
Edge 2	0.131	0.772	0.400	0.378	0.903	No	0.531	No	1.303	No	0.509	No
Edge 3	0.037	0.440	0.273	0.378	0.477	No	0.310	No	0.750	No	0.415	No
Edge 4	0.181	0.400	0.051	0.400	0.581	No	0.232	No	0.632	No	0.581	No

Test Position	Standalone SAR (W/kg)			∑ 1-g SAR (W/kg)					
	WWAN ①	U-NII Main ②	U-NII Sub ③	① + ② WWAN + U-Nii Main		① + ③ WWAN + U-NII Sub		① + ② + ③ WWAN + U-NII(Main & Sub)	
				∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Rear	0.976	0.904	0.804	1.880	Yes	1.780	Yes	2.684	Yes
Edge 1	1.089	0.400	0.001	1.489	No	1.090	No	1.490	No
Edge 2	0.131	0.904	0.400	1.035	No	0.531	No	1.435	No
Edge 3	0.037	0.451	0.826	0.488	No	0.863	No	1.314	No
Edge 4	0.181	0.400	0.103	0.581	No	0.284	No	0.684	No

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	Standalone SAR (W/kg)			∑ 1-g SAR (W/kg)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	② DTS Main	③ DTS Sub						
Rear	0.976	0.772	0.623	① + ② + ③	2.371				9
	0.976	0.772		① + ②	1.748	232.8	0.01	No	
	0.976		0.623	① + ③	1.599	237.1	0.01	No	
		0.772	0.623	② + ③	1.395	77.7	0.02	No	

Test Position	Standalone SAR (W/kg)			∑ 1-g SAR (W/kg)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	② U-NII Main	③ U-NII Sub						
Rear	0.976	0.904	0.804	① + ② + ③	2.684				10
	0.976	0.904		① + ②	1.880	238.7	0.01	No	
	0.976		0.804	① + ③	1.780	237.0	0.01	No	
		0.904	0.804	② + ③	1.708	78.2	0.03	No	

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

Test Position	Standalone SAR (W/kg)				∑ 1-g SAR (W/kg)							
	WWAN ①	DTS Main ②	DTS Sub ③	BT ④	① + ② WWAN + DTS Main		① + ③ WWAN + DTS Sub		① + ② + ③ WWAN + DTS(Main & Sub)		① + ④ WWAN + 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)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Rear	0.761	0.772	0.623	0.378	1.533	No	1.384	No	2.156	Yes	1.139	No
Edge 1	0.432	0.400	0.008	0.400	0.832	No	0.440	No	0.840	No	0.832	No
Edge 2	0.016	0.772	0.400	0.378	0.788	No	0.416	No	1.188	No	0.394	No
Edge 3	0.072	0.440	0.273	0.378	0.512	No	0.345	No	0.785	No	0.450	No
Edge 4	0.742	0.400	0.051	0.400	1.142	No	0.793	No	1.193	No	1.142	No

Test Position	Standalone SAR (W/kg)			∑ 1-g SAR (W/kg)					
	WWAN ①	U-NII Main ②	U-NII Sub ③	① + ② WWAN + U-Nii Main		① + ③ WWAN + U-NII Sub		① + ② + ③ WWAN + U-NII(Main & Sub)	
				∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Rear	0.761	0.904	0.804	1.665	Yes	1.565	No	2.469	Yes
Edge 1	0.432	0.400	0.001	0.832	No	0.433	No	0.833	No
Edge 2	0.016	0.904	0.400	0.920	No	0.416	No	1.320	No
Edge 3	0.072	0.451	0.826	0.523	No	0.898	No	1.349	No
Edge 4	0.742	0.400	0.103	1.142	No	0.845	No	1.245	No

SAR to Peak Location Separation Ratio (SPLSR)

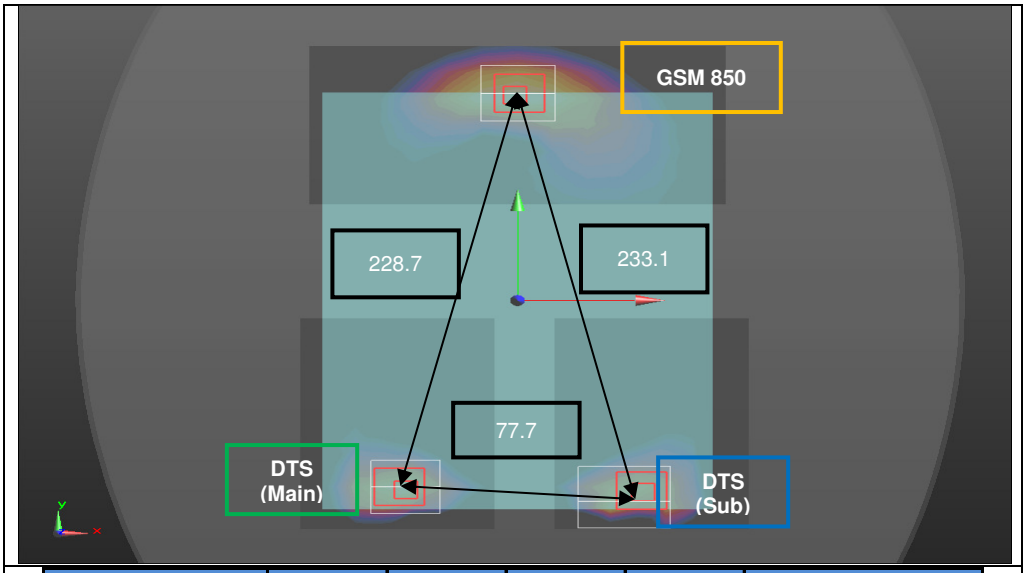
Test Position	Standalone SAR (W/kg)			∑ 1-g SAR (W/kg)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	② DTS Main	③ DTS Sub						
Rear	0.761	0.772	0.623	① + ② + ③	2.156				11
	0.761	0.772		① + ②	1.533	234.8	0.01	No	
	0.761		0.623	① + ③	1.384	224.2	0.01	No	
		0.772	0.623	② + ③	1.395	77.7	0.02	No	

Test Position	Standalone SAR (W/kg)			∑ 1-g SAR (W/kg)		Calculated distance (mm)	SPLSR (≤ 0.04)	Volume Scan (Yes/ No)	Figure
	① WWAN	② U-NII Main	③ U-NII Sub						
Rear	0.761	0.904	0.804	① + ② + ③	2.469				12
	0.761	0.904		① + ②	1.665	241.0	0.01	No	
	0.761		0.804	① + ③	1.565	224.5	0.01	No	
		0.904	0.804	② + ③	1.708	78.2	0.03	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.

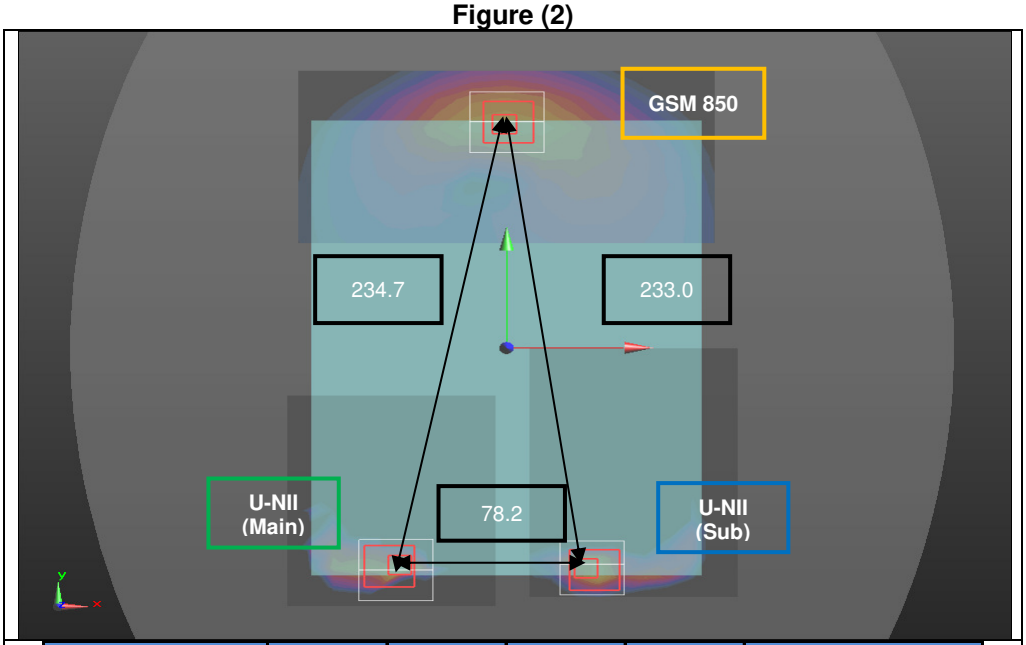
Figure (1)



Mode		SAR	X	Y	Z	d: Calculated distance (mm)	
		W/kg	m	m	m		
GSM 850	①	0.989	-0.0016	0.1164	-0.0043	① + ②	228.7
DTS Main	②	0.772	-0.0404	-0.109	-0.0008	① + ③	233.1
DTS Sub	③	0.623	0.0372	-0.1134	-0.0009	② + ③	77.7

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

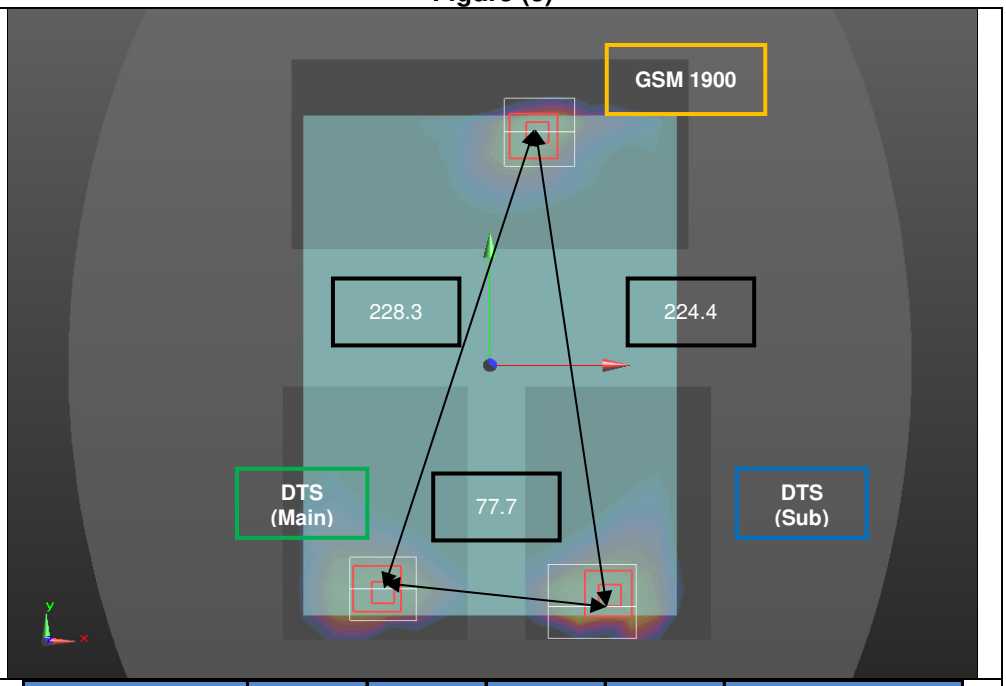
Figure (2)



Mode		SAR	X	Y	Z	d: Calculated distance (mm)	
		W/kg	m	m	m		
GSM 850	①	0.989	-0.0016	0.1164	-0.0043	① + ②	234.7
U-NII Main	②	0.904	-0.044	-0.1144	-0.0027	① + ③	233.0
U-NII Sub	③	0.804	0.0342	-0.1138	-0.0026	② + ③	78.2

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

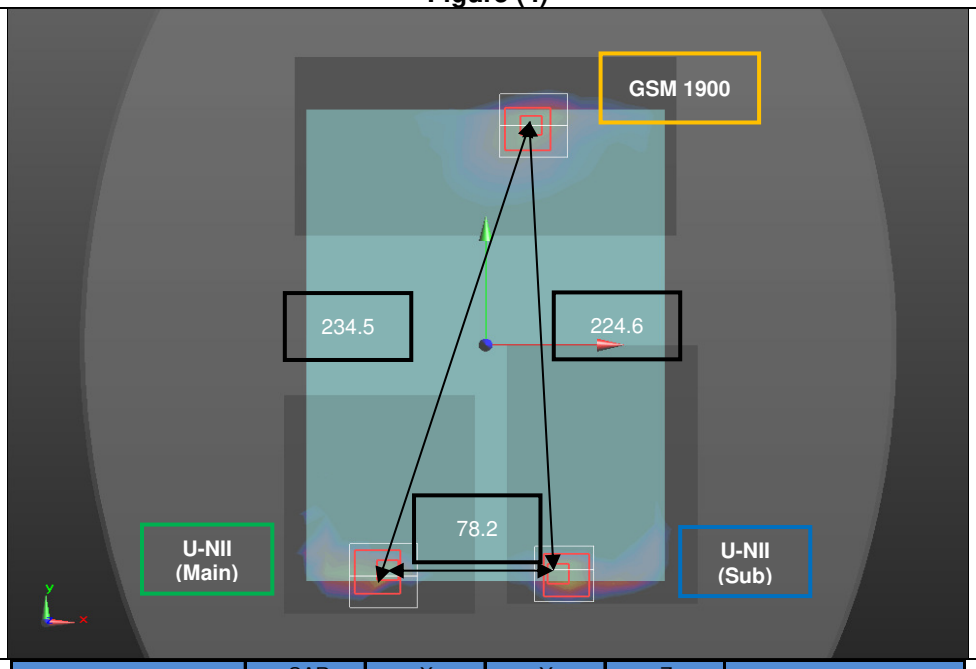
Figure (3)



Mode		SAR	X	Y	Z	d: Calculated distance (mm)	
		W/kg	m	m	m		
GSM 1900	①	0.799	0.0225	0.1105	-0.0012	① + ②	228.3
DTS Main	②	0.772	-0.0404	-0.109	-0.0008	① + ③	224.4
DTS Sub	③	0.623	0.0372	-0.1134	-0.0009	② + ③	77.7

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

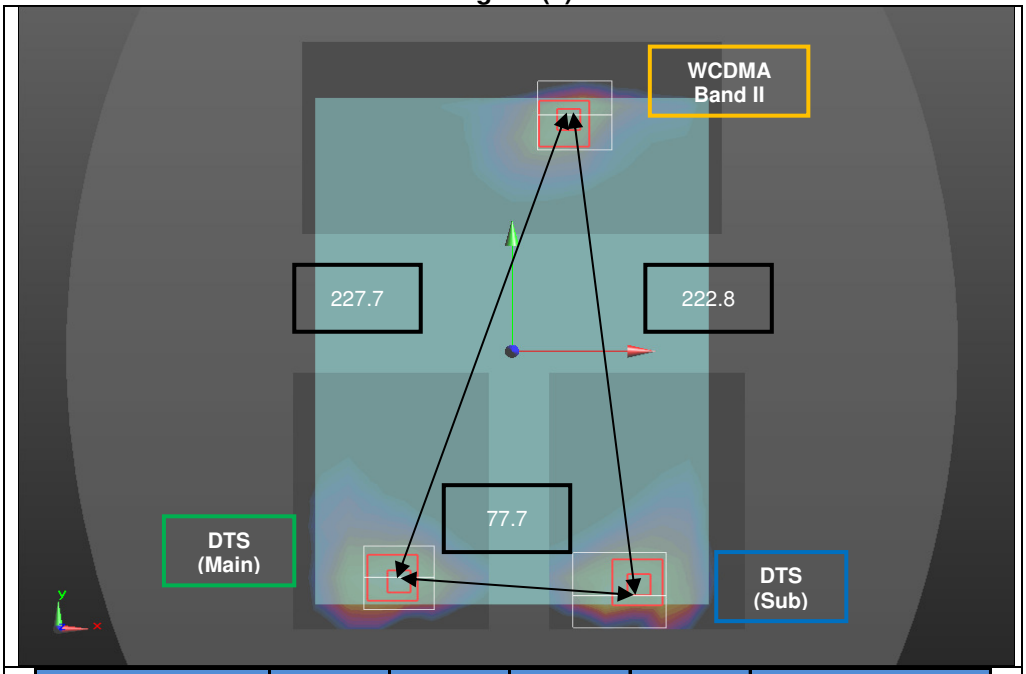
Figure (4)



Mode		SAR	X	Y	Z	d: Calculated distance (mm)	
		W/kg	m	m	m		
GSM 1900	①	0.799	0.0225	0.1105	-0.0012	① + ②	234.5
U-NII Main	②	0.904	-0.044	-0.1144	-0.0027	① + ③	224.6
U-NII Sub	③	0.804	0.0342	-0.1138	-0.0026	② + ③	78.2

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

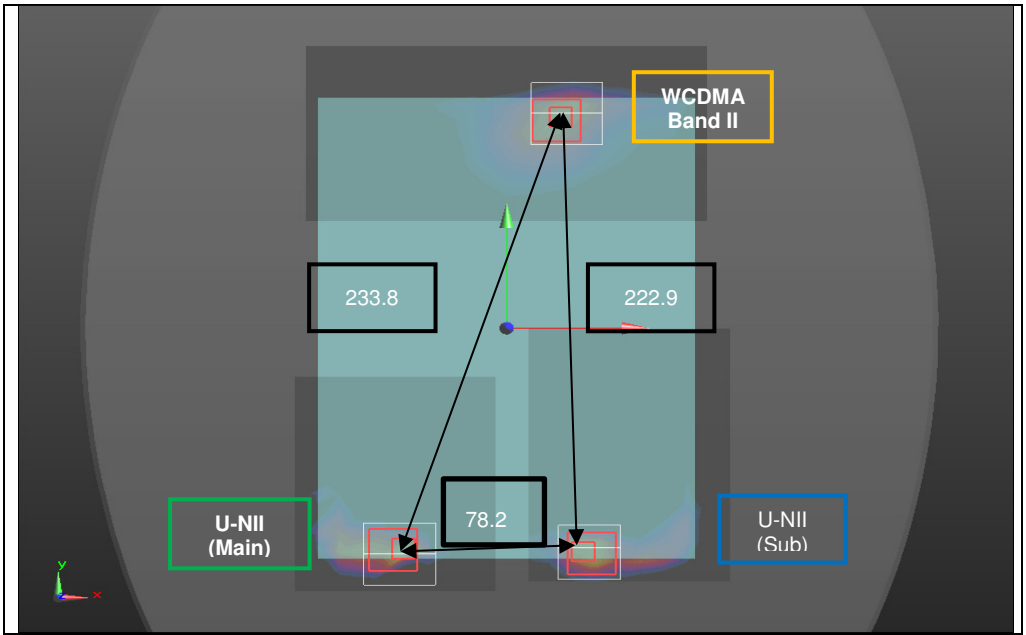
Figure (5)



Mode		SAR	X	Y	Z	d: Calculated distance (mm)	
		W/kg	m	m	m		
WCDMA Band II	①	0.97	0.0254	0.1089	-0.0011	① + ②	227.7
DTS Main	②	0.772	-0.0404	-0.109	-0.008	① + ③	222.8
DTS Sub	③	0.623	0.0372	-0.1134	-0.009	② + ③	77.7

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

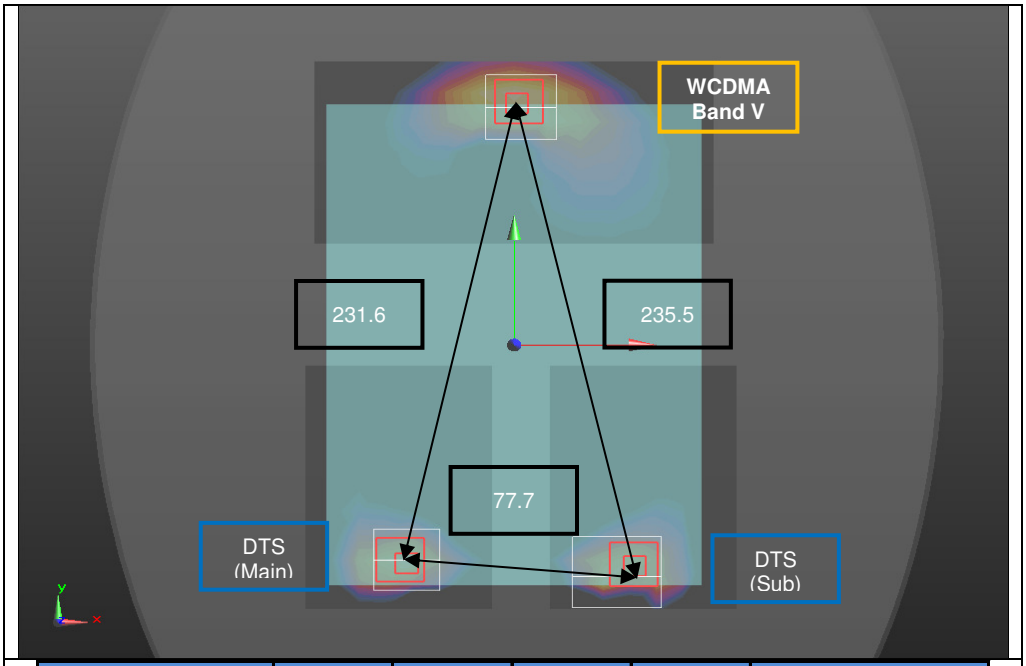
Figure (6)



Mode		SAR	X	Y	Z	d: Calculated distance (mm)	
		W/kg	m	m	m		
WCDMA Band II	①	0.97	0.0254	0.1089	-0.0011	① + ②	233.8
U-NII Main	②	0.904	-0.044	-0.1144	-0.0027	① + ③	222.9
U-NII Sub	③	0.804	0.0342	-0.1138	-0.0026	② + ③	78.2

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

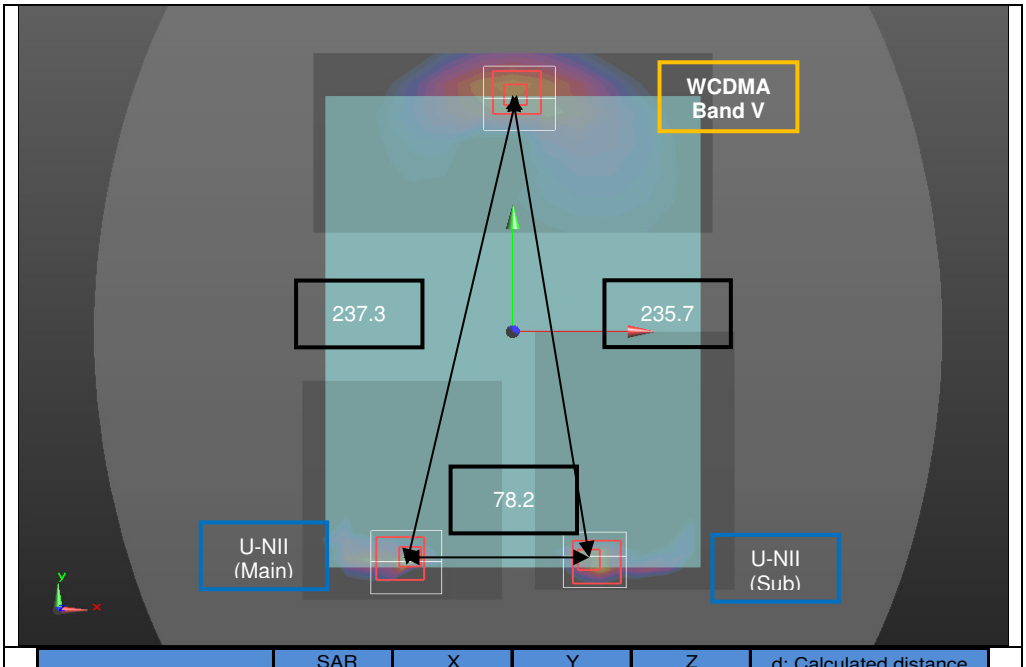
Figure (7)



Mode		SAR	X	Y	Z	d: Calculated distance (mm)	
		W/kg	m	m	m		
WCDMA Band V	①	0.934	-0.0002	0.1191	-0.0043	① + ②	231.6
DTS Main	②	0.772	-0.0404	-0.109	-0.008	① + ③	235.5
DTS Sub	③	0.623	0.0372	-0.1134	-0.009	② + ③	77.7

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

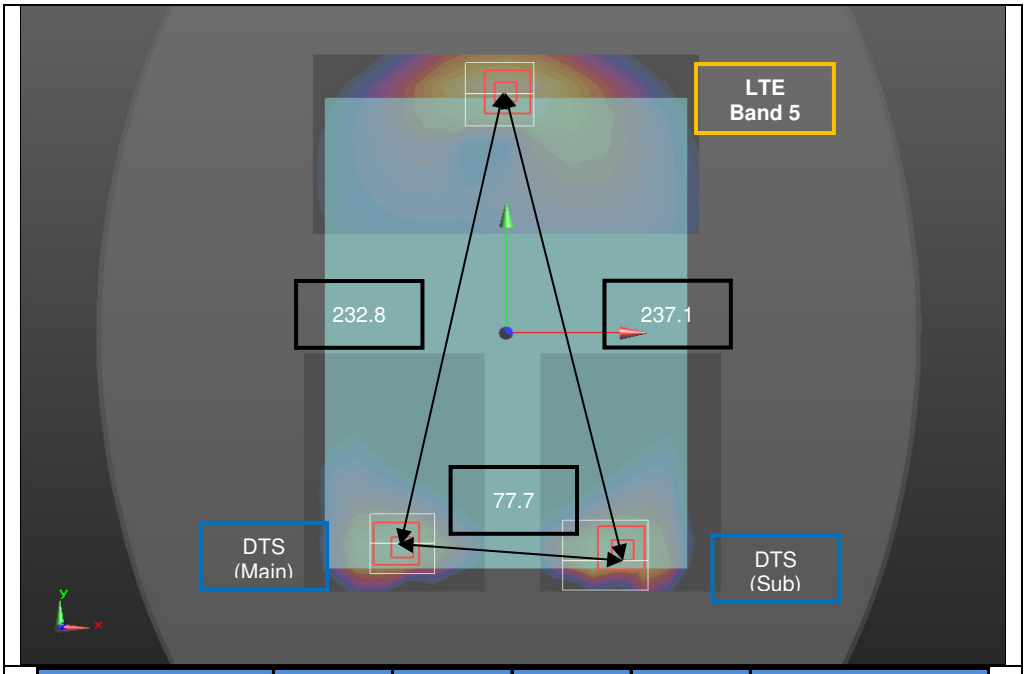
Figure (8)



Mode		SAR	X	Y	Z	d: Calculated distance (mm)	
		W/kg	m	m	m		
WCDMA Band V	①	0.934	-0.002	0.1191	-0.0043	① + ②	237.3
U-NII Main	②	0.904	-0.044	-0.1144	-0.0027	① + ③	235.7
U-NII Sub	③	0.804	0.0342	-0.1138	-0.0026	② + ③	78.2

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

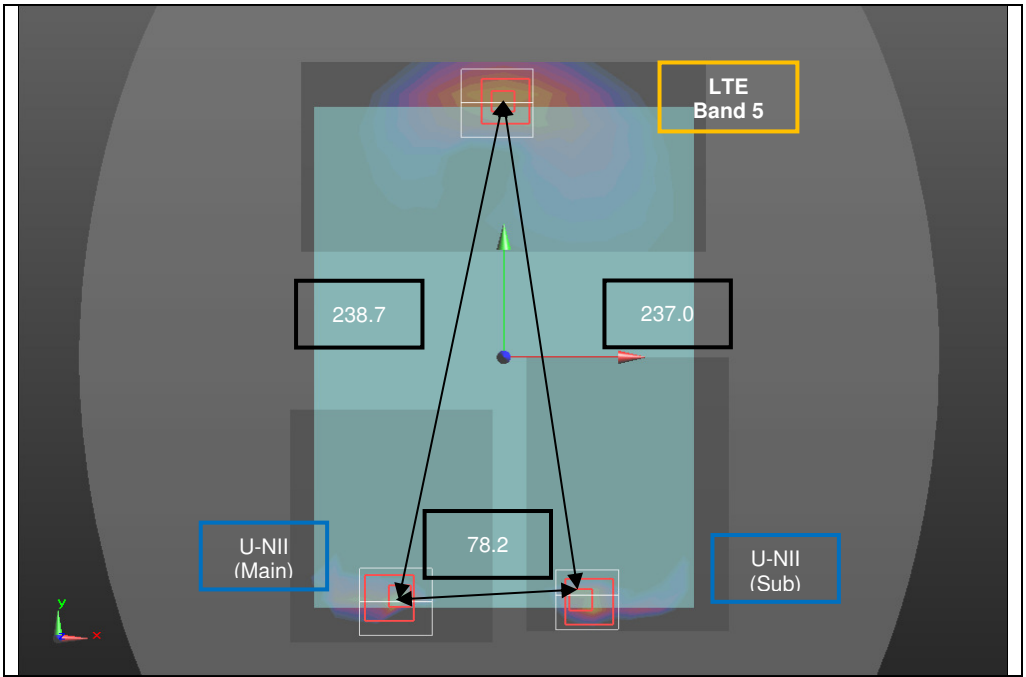
Figure (9)



Mode		SAR	X	Y	Z	d: Calculated distance (mm)	
		W/kg	m	m	m		
LTE Band 5	①	0.976	-0.0014	0.1205	-0.0042	① + ②	232.8
DTS Main	②	0.772	-0.0404	-0.109	-0.008	① + ③	237.1
DTS Sub	③	0.623	0.0372	-0.1134	-0.009	② + ③	77.7

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

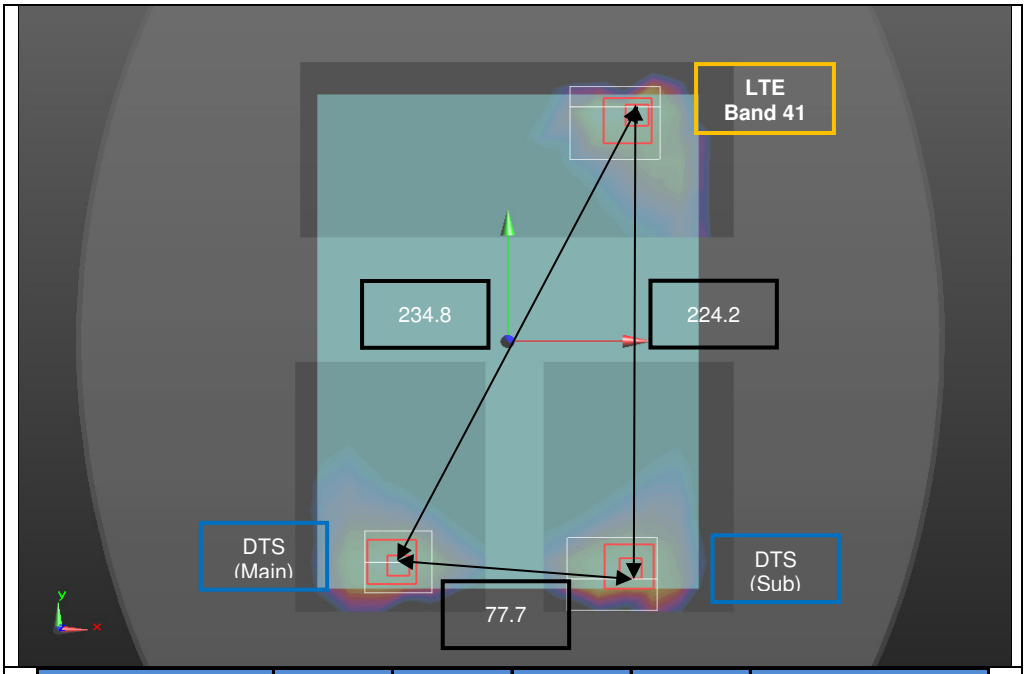
Figure (10)



Mode		SAR	X	Y	Z	d: Calculated distance (mm)	
		W/kg	m	m	m		
LTE Band 5	①	0.976	-0.0014	0.1205	-0.0042	① + ②	238.7
U-NII Main	②	0.904	-0.044	-0.1144	-0.0027	① + ③	237.0
U-NII Sub	③	0.804	0.0342	-0.1138	-0.0026	② + ③	78.2

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

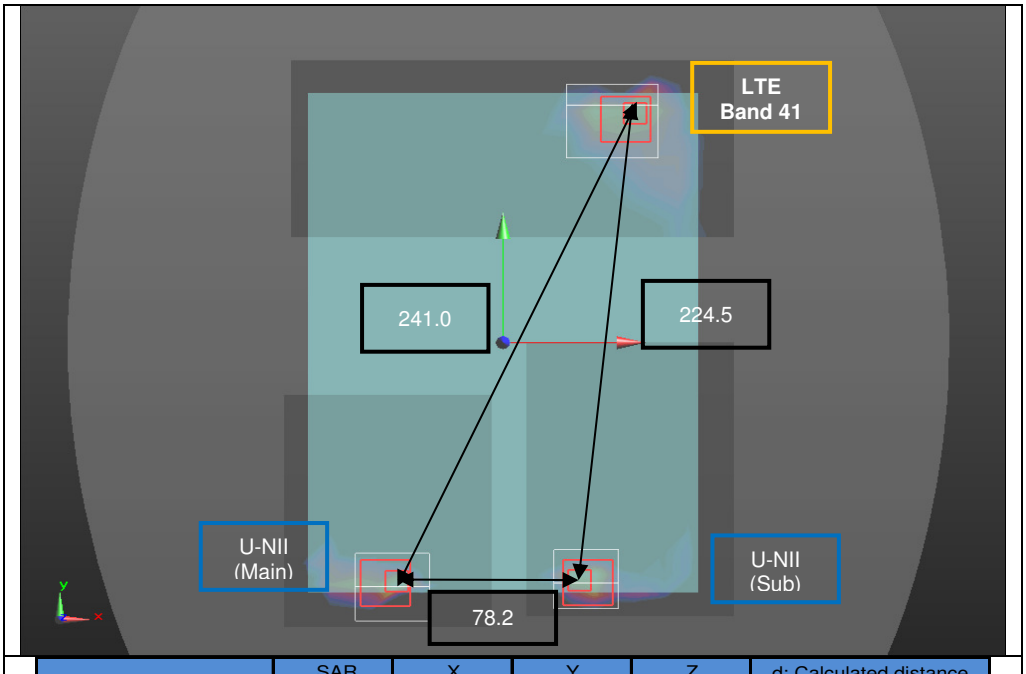
Figure (11)



Mode		SAR	X	Y	Z	d: Calculated distance (mm)	
		W/kg	m	m	m		
LTE Band 41	①	0.761	0.0424	0.1106	-0.0025	① + ②	234.8
DTS Main	②	0.772	-0.0404	-0.109	-0.008	① + ③	224.2
DTS Sub	③	0.623	0.0372	-0.1134	-0.009	② + ③	77.7

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

Figure (12)



Mode		SAR	X	Y	Z	d: Calculated distance (mm)	
		W/kg	m	m	m		
LTE Band 41	①	0.761	0.0424	0.1106	-0.0025	① + ②	241.0
U-NII Main	②	0.904	-0.044	-0.1144	-0.0027	① + ③	224.5
U-NII Sub	③	0.804	0.0342	-0.1138	-0.0026	② + ③	78.2

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

Appendixes

Refer to separated files for the following appendixes.

4787821324-S1V1 FCC Report SAR_App A_Photos & Ant. Locations

4787821324-S1V1 FCC Report SAR_App B_Highest SAR Test Plots

4787821324-S1V1 FCC Report SAR_App C_System Check Plots

4787821324-S1V1 FCC Report SAR_App D_SAR Tissue Ingredients

4787821324-S1V1 FCC Report SAR_App E_Probe Cal. Certificates

4787821324-S1V1 FCC Report SAR_App F_Dipole Cal. Certificates

END OF REPORT