SAR EVALUATION REPORT

IEEE Std 1528-2013

For
GSM/WCDMA/LTE Phablet with BT/BLE, and DTS b/g/n

FCC ID: A3LSMM127G
Model Name: SM-M127G/DS

Report Number: 13708019-S1V2
Issue Date: 3/17/2021

Prepared for
Samsung Electronics Co. Ltd
129 Samsung-Ro, Yeongtong-Gu,
Suwon-Si, Gyeonggi-Do, 16677, Korea

Prepared by
UL VERIFICATION SERVICES INC.
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 319-4000
FAX: (510) 661-0888

NVLAP LAB CODE 200065-0

Revision History

Rev.	Date	Revisions	Revised By
V1	3/3/2021	Initial Issue	--
V2	3/17/2021	Updated DUT description; Updated section 8	Lloyd Villanueva

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1 Attestation of Test Results

Applicant Name		Samsung Electronics Co. Ltd		
FCC ID		A3LSMM127G		
Model Name		SM-M127G/DS		
Applicable Standards		Published RF exposure KDB proceduresIEEE Std 1528-2013		
Exposure Category		SAR Limits (W/Kg)		
		Peak spatial-average (1g of tissue)	Extremities (hands, wrists, ankles, etc.) (10g of tissue)	
General population / Uncontrolled exposure		1.6	4	
RF Exposure Conditions		Equipment Class - Highest Reported SAR (W/kg)		
		PCE	DTS	DSS
Head		1.148	0.222	0.027
Body-worn		1.198	0.109	<0.01
Hotspot		1.245	0.264	<0.01
Extremities		2.162	N/A	N/A
Simultaneous TX	Head	1.370	1.370	1.175
	Body-worn	1.307	1.307	1.198
	Hotspot	1.509	1.509	1.245
Date Tested		2/19/2021 to 2/26/2021		
Test Results		Pass		

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc. is only responsible for the validity of results after the integration of the data provided by the customer.

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Approved & Released By:	Prepared By:
	
Devin Chang Senior Test Engineer UL Verification Services Inc.	Lloyd-Edward Villanueva Laboratory Technician UL Verification Services Inc.

2 Test Specification, Methods and Procedures

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

- 248227 D01 802.11 Wi-Fi SAR v02r02
- 447498 D01 General RF Exposure Guidance v06
- 447498 D03 Supplement C Cross-Reference v01
- 648474 D04 Handset SAR 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
- 941225 D07 UMPC Mini Tablet v01r02

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

- TCB workshop October 2014; RF Exposure Procedures (Other LTE Considerations)
- TCB workshop October 2015; RF Exposure Procedures (KDB 941225 D05A)
- TCB workshop October 2016; RF Exposure Procedures (Bluetooth Duty Factor)
- TCB workshop October 2016; RF Exposure Procedures (DUT Holder Perturbations)
- TCB workshop May 2017; RF Exposure Procedures (Broadband Liquid Above 3 GHz)
- TCB workshop April 2019; RF Exposure Procedures (Tissue Simulating Liquids (TSL))

3 Facilities and Accreditation

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

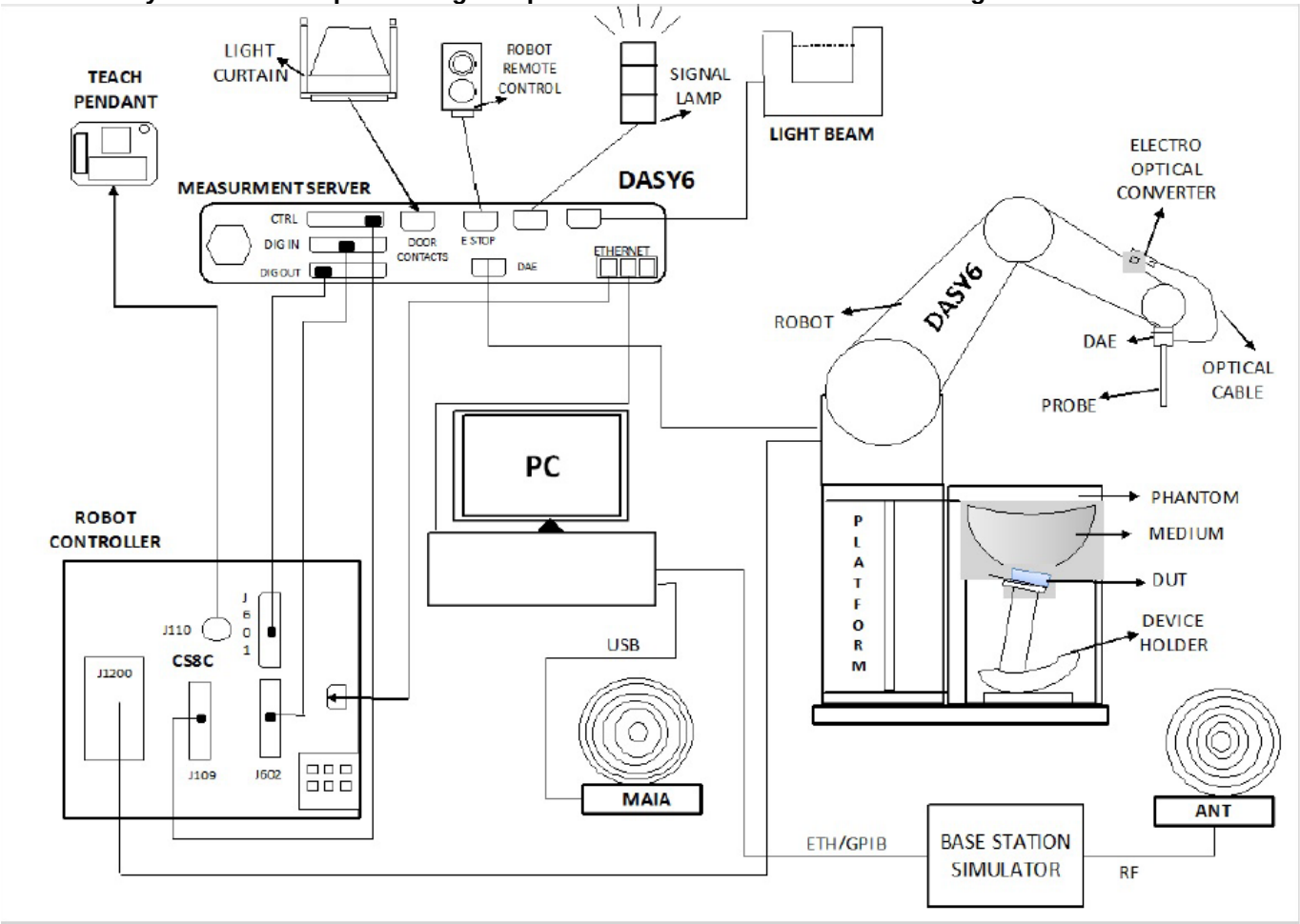
47173 Benicia Street	47266 Benicia Street
SAR Lab A	SAR Lab 1
SAR Lab B	SAR Lab 2
SAR Lab C	SAR Lab 3
SAR Lab D	SAR Lab 4
SAR Lab E	SAR Lab 5
SAR Lab F	SAR Lab 6
SAR Lab G	SAR Lab 7
SAR Lab H	SAR Lab 8

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

4 SAR Measurement System & Test Equipment

4.1 SAR Measurement System

The DASY 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 Win7, Win10 and the DASY52[1] and DASY6[2] 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.

[1] DASY52 software used: DASY52.10.4 & S 14.6.14 and older generations.

[2] DASY6 software used: DASY6.14 & S 14.6.14 and older generations.

4.2 SAR Scan Procedures

Step 1: Power Reference Measurement

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

Step 2: Area Scan

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

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

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

Step 3: Zoom Scan

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures points (refer to table below) within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 g and 10 g and displays these values next to the job's label.

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

			≤ 3 GHz	> 3 GHz
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

* When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

Step 4: Power drift measurement

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

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
S-Parameter Network Analyzer*	R&S	ZNLE6	5000-01683-0063	2/26/2021
S-Parameter Network Analyzer	R&S	ZNLE6	5000-02359-0014	2/26/2022
Dielectric Probe kit	SPEAG	DAK-3.5	1087	11/12/2021
Shorting Block	SPEAG	DAK-3.5 Short	SM DAK 200 DA	11/12/2021

Note(s):

*Equipment not used past calibration due date.

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
MXG Analog Signal Generator	Agilent	N5181A	MY50140610	1/22/2022
Power Sensor	Agilent	N1921A	MY52270022	1/28/2022
Power Meter	Agilent	N1912A	MY55196007	1/21/2022
Regulated DC Power Supply	HP	6296A	2841A-05955	N/A

Lab Equipment

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
E-Field Probe (SAR Lab 1)	SPEAG	EX3DV4	7463	7/24/2021
E-Field Probe (SAR Lab 2)	SPEAG	EX3DV4	7501	5/15/2021
Data Acquisition Electronics (SAR Lab 1)	SPEAG	DAE4	1352	11/17/2021
Data Acquisition Electronics (SAR Lab 2)	SPEAG	DAE4	1377	9/10/2021
System Validation Dipole	SPEAG	D835V2	4d117	5/29/2021
System Validation Dipole	SPEAG	D1900V2	5d163	10/22/2021
System Validation Dipole	SPEAG	D2450V2	899	4/17/2021
System Validation Dipole	SPEAG	D2600V2	1036	4/17/2021
Thermometer (SAR Lab 1)	KEYSIGHT	14-650-118	181163664	3/11/2021

Other

Name of Equipment	Manufacturer	Type/Model	T Number	Serial No.	Cal. Due Date
Base Station Simulator	Rohde & Schwarz	CMW 500	T953	124594-hx	2/19/2022
Base Station Simulator	Rohde & Schwarz	CMW 500	T268	124593-ss	1/4/2022
Bluetooth Tester*	Rohde & Schwarz	CBT	T258	100900-ac	2/22/2021
Lab Thermometer	Keysight	Traceable	1819	170024401	3/11/2021

Note(s):

*Equipment not used past calibration due date.

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 and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be ≤ 30%, for a confidence interval of k = 2. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval.

Therefore, the measurement uncertainty is not required.

6 Device Under Test (DUT) Information

6.1 DUT Description

Device Dimension	Refer to Appendix A		
Back Cover	The Back Cover is not removable		
Battery Options	The rechargeable battery is not user accessible.		
Accessory	Headset		
Wireless Router (Hotspot)	Wi-Fi Hotspot mode permits the device to share its cellular data connection with other Wi-Fi-enabled devices. ☒ Mobile Hotspot (Wi-Fi 2.4 GHz)		
Wi-Fi Direct	Wi-Fi Direct enabled devices transfer data directly between each other ☒ Wi-Fi Direct (Wi-Fi 2.4 GHz)		
Bluetooth Tethering (Hotspot)	BT Tethering mode permits the device to share its cellular data connection with other devices. ☒ BT Tethering (Bluetooth 2.4 GHz)		
Test sample information	**S/N**	**IMEI**	**Notes**
	R38NA00TJXV	356352440004997	Conducted
	R38NA00TK6R	356352440005085	Conducted
	R38NB01863H	358451320020897	Conducted
	R38NB0188LV	358451320021721	WWAN Radiated
	R38NB0185ZW	358451320020855	WWAN Radiated
	R38NB0189GF	358451320022018	WLAN Radiated
	R38NB0188VH	358451320021804	WLAN Radiated
Hardware Version	REV0.3		
Software Version	M127GDDU1ATL9		

6.2 Wireless Technologies

Wireless technologies	Frequency bands	Operating mode		Duty Cycle used for SAR testing
GSM	850 1900	Voice (GMSK) GPRS (GMSK) EDGE (8PSK)	GSM Class : B Multi-Slot Class: Class 12 - 4 Up, 4 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 V	UMTS Rel. 99 (Voice & Data) HSDPA (Rel. 5) HSUPA (Rel. 6) DC-HSDPA (Rel. 8)		100%
LTE	FDD Band 5 TDD Band 41	QPSK 16QAM Rel. 10 Does not support Carrier Aggregation (CA)		100% (FDD) 63.3% (TDD)
Wi-Fi	2.4 GHz	802.11b 802.11g 802.11n (HT20)		98.9% (802.11b)[1]
Bluetooth	2.4 GHz	BR, EDR, LE		31.94% (LE 2M, GFSK)

Note(s):

1. Duty Cycle was measured manually.

6.3 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="3">Band 5</td><td colspan="6">Frequency range: 824 - 849 MHz (BW = 25 MHz)</td></tr>
<tr><td colspan="6">Channel Bandwidth</td></tr>
<tr><td>20 MHz</td><td>15 MHz</td><td>10 MHz [1]</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="3">Band 41[2]</td><td colspan="6">Frequency range: 2496 - 2690 MHz (BW = 194 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 colspan="4">39750 / 2506.0</td><td></td><td></td></tr>
<tr><td>Mid- Low</td><td colspan="4">40185 / 2549.5</td><td></td><td></td></tr>
<tr><td>Mid</td><td colspan="4">40620 / 2593.0</td><td></td><td></td></tr>
<tr><td>Mid-High</td><td colspan="4">41055 / 2636.5</td><td></td><td></td></tr>
<tr><td>High</td><td colspan="4">41490 / 2680.0</td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>LTE transmitter and antenna implementation</td><td>Refer to Appendix A.</td></tr>
<tr><td>Maximum power reduction (MPR)</td><td>
Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3
<table>
<tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth (N_{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>
<tr><td>64 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 2</td></tr>
<tr><td>64 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 3</td></tr>
<tr><td>256 QAM</td><td colspan="6">≥ 1</td><td>≤ 5</td></tr>
</table>
MPR Built-in by design
The manufacturer MPR values are always within the 3GPP maximum MPR allowance but may not follow the default MPR values.
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>

Notes:

1. Maximum bandwidth does not support at least three non-overlapping channels in certain channel bandwidths. When a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing per KDB 941225 D05 SAR for LTE Devices.
2. LTE band 41 test channels in accordance with October 2014 TCB workshop for all channels bandwidths.
3. SAR Testing for LTE was performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).

6.4 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.

LTE TDD Bands support 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	$6592 \cdot T_s$	$(1+X) \cdot 2192 \cdot T_s$	$(1+X) \cdot 2560 \cdot T_s$	$7680 \cdot T_s$	$(1+X) \cdot 2192 \cdot T_s$	$(1+X) \cdot 2560 \cdot T_s$
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	$26336 \cdot T_s$			$7680 \cdot T_s$	$(2+X) \cdot 2192 \cdot T_s$	$(2+X) \cdot 2560 \cdot T_s$
5	$6592 \cdot T_s$	$(2+X) \cdot 2192 \cdot T_s$	$(2+X) \cdot 2560 \cdot T_s$	$20480 \cdot T_s$		
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			$12800 \cdot T_s$		
8	$24144 \cdot T_s$			-	-	-
9	$13168 \cdot T_s$			-	-	-
10	$13168 \cdot T_s$	$13152 \cdot T_s$	$12800 \cdot T_s$	-	-	-

Table 4.2-2: Uplink-downlink configurations & 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	63.3%
1	5 ms	D	S	U	U	D	D	S	U	U	D	43.3%
2	5 ms	D	S	U	D	D	D	S	U	D	D	23.3%
3	10 ms	D	S	U	U	U	D	D	D	D	D	31.7%
4	10 ms	D	S	U	U	D	D	D	D	D	D	21.7%
5	10 ms	D	S	U	D	D	D	D	D	D	D	11.7%
6	5 ms	D	S	U	U	U	D	S	U	U	D	53.3%

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

Note(s):

This device supports uplink-downlink configurations 0-6. The configuration with highest duty cycle was used for SAR Testing: configuration 0 at 63.3% duty cycle.

6.5 Power Back-off Operation

This device supports multiple power back-off modes: WWAN (Ear-jack), WWAN (Hotspot), WWAN (Grip Sensor), WWAN (RCV), and WLAN. Each of the power back-off operates within specific exposure conditions for certain technologies. For full details on how each power back-off mode operates, refer to the Operational Description.

Power Back-off mode	Technologies Supported	Exposure Conditions Active			
		Head	Body-worn	Hotspot	Extremity
WWAN (Ear-jack)[1]	LTE B41	N/A	✓	N/A	N/A
WWAN (Hotspot)[1]	LTE B41[4]	N/A	N/A	✓	N/A
WWAN (Grip Sensor)[1]	LTE B5/41[4]	N/A	N/A	N/A	✓
WWAN (RCV)[1]	W-CDMA BV LTE B41[4]	✓	N/A	N/A	N/A
WLAN	Wi-Fi 2.4GHz	✓	N/A	N/A	N/A

Note(s):

1. Tune-Up Limits for WWAN (Ear-jack), WWAN (Hotspot), WWAN (Grip Sensor), and WWAN (RCV) are all Reduced Average Powers. Please refer to §9 for all conducted power measurements.
2. Back-off priority: RCV → Ear-jack → Grip Sensor → Hotspot
3. Body-worn SAR with ear-jack connected at reduced power is tested when Body-worn measured at max power is > 1.2 W/kg.

Product Specific 10g (Extremity) Adjusted SAR Calculation

Wireless technologies	Max Tune-up Limit (dBm)	Reduced (Hotspot) Tune-Up Limit (dBm)	Power Factor	Reported SAR Limit (W/kg)
LTE B5	25.0	23.0	1.58	0.757
LTE B41	23.5	19.5	2.51	0.478

Note(s):

1. Hotspot mode supports power reduction. When the measured SAR is scaled to the maximum tune-up limit, the adjusted SAR is < 1.2 W/kg. Therefore, Extremity SAR testing is not required for this band in accordance with KDB 648474 §2.5 b. Refer to §10 for Reported SAR results. If the Reported SAR 1g value in §10 is less than the Reported SAR Limit listed above, then Extremity SAR is not required.
2. LTE 50% RB is scaled up to the Max Tune-Up Limit with MPR included.

7 RF Exposure Conditions (Test Configurations)

Refer to Appendix A for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.

Wireless technologies	RF Exposure Conditions	DUT-to-User Separation	Test Position	Antenna-to-edge/surface		SAR Required	Note
WWAN Main 1 ANT (GSM850/1900 W-CDMA B5 LTE B5)	Head	0 mm	Left Touch		N/A	Yes	
			Left Tilt (15°)		N/A	Yes	
			Right Touch		N/A	Yes	
			Right Tilt (15°)		N/A	Yes	
	Body	15 mm	Rear		N/A	Yes	
			Front		N/A	Yes	
	Hotspot	10 mm	Rear	≤	25 mm	Yes	
			Front	≤	25 mm	Yes	
			Edge 1 (Top)	>	25 mm	No	1
			Edge 2 (Right)	≤	25 mm	Yes	
			Edge 3 (Bottom)	≤	25 mm	Yes	
			Edge 4 (Left)	≤	25 mm	Yes	
	Extremity	0 mm	Rear	Refer to notes 2 & 3			
			Front				
			Edge 1 (Top)				
			Edge 2 (Right)				
			Edge 3 (Bottom)				
			Edge 4 (Left)				
WWAN Main 2 ANT (LTE B41)	Head	0 mm	Left Touch		N/A	Yes	
			Left Tilt (15°)		N/A	Yes	
			Right Touch		N/A	Yes	
			Right Tilt (15°)		N/A	Yes	
	Body	15 mm	Rear		N/A	Yes	
			Front		N/A	Yes	
	Hotspot	10 mm	Rear	≤	25 mm	Yes	
			Front	≤	25 mm	Yes	
			Edge 1 (Top)	≤	25 mm	Yes	
			Edge 2 (Right)	>	25 mm	No	1
			Edge 3 (Bottom)	>	25 mm	No	1
			Edge 4 (Left)	≤	25 mm	Yes	
	Extremity	0 mm	Rear	Refer to notes 2 & 3			
			Front				
			Edge 1 (Top)				
			Edge 2 (Right)				
			Edge 3 (Bottom)				
			Edge 4 (Left)				

Notes:

1. SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 941225 D06 Hot Spot SAR.
2. For Phablet devices: when hotspot mode applies, Extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg.
3. For Phablet devices: when hotspot mode applies and power reduction applies to hotspot mode, Extremity SAR is required for each test position that has an adjusted SAR to maximum power that is > 1.2 W/kg.

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

Notes:

1. SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 941225 D06 Hot Spot SAR.
2. For Phablet devices: when Hotspot Mode is not supported, Extremity SAR is required for all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge in direct contact with a flat phantom, to address interactive hand use exposure conditions.
3. For Phablet devices: when hotspot mode applies, Extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg.
4. Wi-Fi Direct is only available in Hand use configuration.

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.
The dielectric constant (εr) and conductivity (σ) of typical tissue-equivalent media recipes are expected to be within ± 5% of the required target values; but for SAR measurement systems that have implemented the SAR error compensation algorithms documented in IEEE Std 1528-2013, to automatically compensate the measured SAR results for deviations between the measured and required tissue dielectric parameters, the tolerance for εr and σ may be relaxed to ± 10%. This is limited to frequencies ≤ 3 GHz.

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

IEC 62209-1

Refer to Table A.3 within the IEC 62209-1

Dielectric Property Measurements Results:

SAR Lab	Date	Band (MHz)	Tissue Type	Frequency (MHz)	Relative Permittivity (εr)			Conductivity (σ)		
					Measured	Target	Delta (%)	Measured	Target	Delta (%)
1	2/19/2021	1900	Head	1900	38.91	40.00	-2.73	1.42	1.40	1.43
				1850	39.00	40.00	-2.50	1.40	1.40	0.00
				1920	38.90	40.00	-2.75	1.43	1.40	2.14
1	2/19/2021	2450	Head	2450	38.05	39.20	-2.93	1.80	1.80	0.00
				2400	38.12	39.30	-3.00	1.76	1.75	0.57
				2480	38.03	39.16	-2.89	1.82	1.83	-0.55
1	2/22/2021	1900	Head	1900	38.32	40.00	-4.21	1.43	1.40	2.30
				1850	38.40	40.00	-3.99	1.40	1.40	-0.15
				1920	38.28	40.00	-4.29	1.44	1.40	2.98
1	2/22/2021	2450	Head	2450	37.41	39.20	-4.56	1.82	1.80	0.97
				2400	37.48	39.30	-4.64	1.77	1.75	1.39
				2480	37.39	39.16	-4.51	1.83	1.83	0.07
1	2/22/2021	2600	Head	2600	37.15	39.01	-4.77	1.95	1.96	-0.63
				2495	37.33	39.14	-4.64	1.85	1.85	0.13
				2690	36.96	38.90	-4.99	2.02	2.06	-1.84
1	2/26/2021	2600	Head	2600	37.89	39.01	-2.87	1.97	1.96	0.25
				2495	38.04	39.14	-2.82	1.87	1.85	0.99
				2690	37.68	38.90	-3.13	2.04	2.06	-0.75
2	2/19/2021	835	Head	835	40.40	41.50	-2.65	0.91	0.90	1.11
				805	42.46	41.68	1.87	0.90	0.90	0.20
				850	40.39	41.50	-2.67	0.91	0.92	-1.09
2	2/22/2021	835	Head	835	42.42	41.50	2.21	0.91	0.90	1.44
				805	42.46	41.68	1.87	0.90	0.90	0.20
				850	42.37	41.50	2.10	0.92	0.92	-0.29

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.

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. Refer to Appendix B for the SAR System Check Plots.

SAR Lab	Date	Tissue Type	Dipole Type Serial #	Dipole Cal. Due Data	Measured Results for 1g SAR				Measured Results for 10g SAR				Plot No.
					Zoom Scan to 100 mW	Normalize to 1 W	Target (Ref. Value)	Delta ±10 %	Zoom Scan to 100 mW	Normalize to 1 W	Target (Ref. Value)	Delta ±10 %	
1	2/19/2021	Head	D1900V2 SN:5d163	10/22/2021	3.880	38.80	39.81	-2.54	2.010	20.10	20.70	-2.90	
1	2/19/2021	Head	D2450V2 SN:899	4/17/2021	5.420	54.20	51.75	4.73	2.530	25.30	24.12	4.89	1,2
1	2/23/2021	Head	D1900V2 SN:5d163	10/22/2021	4.110	41.10	39.81	3.24	2.120	21.20	20.70	2.42	3,4
1	2/23/2021	Head	D2600V2 SN:1036	4/17/2021	6.060	60.60	56.53	7.20	2.720	27.20	25.23	7.81	5,6
1	2/26/2021	Head	D2600V2 SN:1036	4/17/2021	5.260	60.60	56.53	-6.95	2.360	27.20	25.23	-6.46	
2	2/19/2021	Head	D835V2 SN:4d117	5/29/2021	0.970	9.70	9.71	-0.10	0.626	6.26	6.32	-0.95	
2	2/23/2021	Head	D835V2 SN:4d117	5/29/2021	0.989	9 89	9.71	1.85	0.642	6.42	6.32	1.58	7,8

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.

When different maximum output power applies to GSM voice or GPRS/EDGE time slots, GSM voice and GPRS/EDGE time slots should be tested separately to determine compliance by summing the corresponding reported SAR.

The GMSK EDGE configurations are grouped with GPRS and considered with respect to time-averaged maximum output power to determine compliance

Per October 2013 TCB Workshop:
When the maximum frame-averaged powers levels are within 0.25 dB of each other, test the configuration with the most number of time slots.

GSM850 Measured Results

Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Maximum Average Power (dBm)			
					Measured		Tune-up Limit	
					Burst Pwr	Frame Pwr	Burst Pwr	Frame Pwr
GPRS/EDGE (GMSK)	CS1	1	128	824.2	32.5	23.5	34.0	25.0
			190	836.6	32.8	23.7		
			251	848.8	32.8	23.8		
		2	128	824.2	30.5	24.4	31.5	25.5
			190	836.6	30.6	24.5		
			251	848.8	30.5	24.5		
		3	128	824.2	29.1	24.9	30.0	**25.7**
			190	836.6	29.2	24.9		
			251	848.8	29.2	24.9		
		4	128	824.2	27.7	24.7	28.5	25.5
			190	836.6	27.8	24.8		
			251	848.8	27.8	24.8		
EDGE (8PSK)	MCS5	1	128	824.2	26.3	17.3	27.5	18.5
			190	836.6	26.5	17.5		
			251	848.8	26.5	17.5		
		2	128	824.2	24.5	18.5	25.5	19.5
			190	836.6	24.7	18.6		
			251	848.8	24.6	18.6		
		3	128	824.2	23.2	18.9	24.0	19.7
			190	836.6	23.6	19.3		
			251	848.8	23.2	18.9		
		4	128	824.2	22.0	18.9	22.5	19.5
			190	836.6	22.2	19.1		
			251	848.8	22.1	19.0		

GSM1900 Measured Results

Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Maximum Average Power (dBm)			
					Measured		Tune-up Limit	
					Burst Pwr	Frame Pwr	Burst Pwr	Frame Pwr
GPRS/EDGE (GMSK)	CS1	1	512	1850.2	29.2	20.2	31.0	22.0
			661	1880.0	29.2	20.2		
			810	1909.8	29.5	20.4		
		2	512	1850.2	26.6	20.6	28.0	**22.0**
			661	1880.0	26.4	20.3		
			810	1909.8	27.0	20.9		
		3	512	1850.2	25.0	20.7	26.0	21.7
			661	1880.0	24.7	20.5		
			810	1909.8	25.2	20.9		
		4	512	1850.2	23.2	20.2	24.0	21.0
			661	1880.0	23.2	20.2		
			810	1909.8	23.6	20.5		
EDGE (8PSK)	MCS5	1	512	1850.2	25.4	16.4	26.5	17.5
			661	1880.0	25.4	16.4		
			810	1909.8	25.6	16.6		
		2	512	1850.2	23.4	17.4	24.5	18.5
			661	1880.0	23.2	17.1		
			810	1909.8	23.3	17.3		
		3	512	1850.2	21.8	17.6	23.0	18.7
			661	1880.0	21.8	17.5		
			810	1909.8	22.0	17.7		
		4	512	1850.2	20.7	17.6	21.5	18.5
			661	1880.0	20.7	17.7		
			810	1909.8	20.8	17.8		

9.2 W-CDMA

Per KDB 941225 D01 3G SAR Procedures for W-CDMA:

Maximum output power is verified on the high, middle and low channels and using the appropriate 12.2 kbps RMC with TPC (transmit power control) set to all "1's"

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. A summary of these settings is illustrated below:

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 procedures in table C.10.1.4 of 3GPP TS 34.121-1
A summary of these settings is illustrated below:

Table C.10.1.4: β values for transmitter characteristics tests with HS-DPCCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c.

Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and Δ_{NACK} = 30/15 with β_{hs} = 30/15 * β_c, and Δ_{CQI} = 24/15 with β_{hs} = 24/15 * β_c.

Note 3: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 11/15 and β_d = 15/15.

HSUPA Setup Procedures used to establish the test signals

The following 5 Sub-tests were completed according to procedures in table C.11.1.3 of 3GPP TS 34.121-1. A summary of these settings is illustrated below:

Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (Note 4) (Note 5)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2) (Note 6)	AG Index (Note 5)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed}1: 47/15 β_{ed}2: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	0	-	-	5/15	5/15	47/15	4	1	1.0	0.0	12	67

Note 1: For sub-test 1 to 4, Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c. For sub-test 5, Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 5/15 with β_{hs} = 5/15 * β_c.

Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.

Note 4: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.

Note 5: β_{ed} can not be set directly; it is set by Absolute Grant Value.

Note 6: For subtests 2, 3 and 4, UE may perform E-DPDCH power scaling at max power which could results in slightly smaller MPR values.

DC-HSDPA Setup Procedures used to establish the test signals

The following 4 Sub-tests for DC-HSDPA were completed according to procedures in table C08.1.12 of 3GPP TS 34.121-1. A summary of subtest settings is illustrated below:

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

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

DUT supports HSPA+ DL only. Therefore, conducted power measurements is not required.

Maximum Output Power (Tune-up Limit) for W-CDMA

SAR measurement is not required for the HSDPA, HSUPA, and DC-HSDPA. When primary mode and the adjusted SAR is ≤ 1.2 W/kg and secondary mode is ≤ ¼ dB higher than the primary mode

RF Air interface	Mode	Tune-up Pow erLimit (dBm)	
		Maximum	RCV
W-CDMA Band 5	R99	25.5	23.5
	HSDPA	22.5	22.0
	HSUPA	22.5	22.5
	DC-HSDPA	22.5	22.5

W-CDMA Band V Measured Results

Mode		UL Ch No.	Freq. (MHz)	Maximum Average Power (dBm)			Receiver Average Power (dBm)		
				Measured Pwr	MPR	Tune-up Limit	Measured Pwr	MPR	Tune-up Limit
Release 99	Rel 99 (RMC, 12.2 kbps)	4132	826.4	24.3	N/A	25.5	21.8	N/A	23.5
		4183	836.6	24.2			21.8		
		4233	846.6	24.0			21.8		
HSDPA	Subtest 1	4132	826.4	22.2	0	22.5	21.1	0	22.0
		4183	836.6	22.1			20.6		
		4233	846.6	22.2			20.3		
	Subtest 2	4132	826.4	21.9	0	22.5	20.8	0	22.0
		4183	836.6	22.1			21.0		
		4233	846.6	21.7			20.7		
	Subtest 3	4132	826.4	22.0	0.5	22.0	21.2	0.5	21.5
		4183	836.6	21.8			21.2		
		4233	846.6	21.4			21.1		
	Subtest 4	4132	826.4	22.0	0.5	22.0	21.0	0.5	21.5
		4183	836.6	21.5			21.1		
		4233	846.6	22.0			21.0		
HSUPA	Subtest 1	4132	826.4	21.5	0	22.5	21.2	0	22.5
		4183	836.6	21.5			21.2		
		4233	846.6	21.4			21.0		
	Subtest 2	4132	826.4	19.6	2	20.5	19.6	2	20.5
		4183	836.6	19.6			19.6		
		4233	846.6	19.4			19.5		
	Subtest 3	4132	826.4	20.7	1	21.5	20.7	1	21.5
		4183	836.6	20.7			20.6		
		4233	846.6	20.5			20.5		
	Subtest 4	4132	826.4	19.8	2	20.5	19.7	2	20.5
		4183	836.6	19.6			19.6		
		4233	846.6	19.5			19.5		
	Subtest 5	4132	826.4	21.4	0	22.5	21.5	0	22.5
		4183	836.6	21.4			21.5		
		4233	846.6	21.3			21.4		
DC-HSDPA	Subtest 1	4132	826.4	21.9	0	22.5	22.0	0	22.5
		4183	836.6	21.8			22.0		
		4233	846.6	21.8			21.6		
	Subtest 2	4132	826.4	22.0	0	22.5	21.9	0	22.5
		4183	836.6	21.9			21.9		
		4233	846.6	21.8			21.7		
	Subtest 3	4132	826.4	20.7	0.5	22.0	20.6	0.5	22.0
		4183	836.6	20.7			20.5		
		4233	846.6	20.5			20.3		
	Subtest 4	4132	826.4	21.4	0.5	22.0	21.2	0.5	22.0
		4183	836.6	21.3			21.3		
		4233	846.6	21.3			21.0		

Notes:

It is expected by the manufacturer that MPR for some HSPA subtests may be up to 3dB more than specified by 3GPP, but also as low as 0dB according to the chipset implementation in this model.

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 1, 2 and 3

Modulation	Channel bandwidth / Transmission bandwidth (N_{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
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3
256 QAM	≥ 1						≤ 5

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 (subclause)	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	N/A

Maximum Output Power (Tune-up Limit) for LTE

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

LTE QPSK configuration has the highest maximum average output power per 3GPP standard.

SAR measurement is not required for the 16QAM. When the highest maximum output power for 16QAM, is ≤ ½ dB higher than the QPSK or when the reported SAR for the QPSK configuration is ≤ 1.45 W/kg.

Please refer to section 6.3. for LTE detail test channels.

RF Air interface	Mode	Tune-up Power Limit (dBm)				
		Maximum	Grip Sensor	Ear-jack	Hotspot	RCV
LTE Band 5	QPSK	25.0	23.0			
LTE Band 41	QPSK	23.5	19.5	19.5	19.5	20.5

LTE Band 5 Measured Results

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)				Grip Sensor Average Power (dBm)			
				[redacted]	20525	[redacted]	MPR	Tune-up Limit	[redacted]	20525	[redacted]	MPR	Tune-up Limit
					836.5 MHz					836 5 MHz			
10 MHz	QPSK	1	0		23 9		0	25		21.7		0	23
		1	25		23 8		0	25		21.7		0	23
		1	49		23 9		0	25		21.7		0	23
		25	0		22 6		1	24		21 8		0	23
		25	12		22 6		1	24		21.7		0	23
		25	25		22 6		1	24		21.7		0	23
		50	0		22.7		1	24		21.7		0	23
	16QAM	1	0		22 6		1	24		21 8		0	23
		1	25		22 6		1	24		21.7		0	23
		1	49		22 6		1	24		21.7		0	23
		25	0		21.7		2	23		21 8		0	23
		25	12		21.7		2	23		21 8		0	23
		25	25		21 8		2	23		21 8		0	23
		50	0		21.7		2	23		21 8		0	23

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					Grip Sensor Average Power (dBm)				
				20425	20525	20625	MPR	Tune-up Limit	20425	20525	20625	MPR	Tune-up Limit
				826.5 MHz	836.5 MHz	846 5 MHz			826 5 MHz	836 5 MHz	846 5 MHz		
5 MHz	QPSK	1	0	23 8	23 8	23 8	0	25	21.7	21.7	21.7	0	23
		1	12	23 8	23 8	23.7	0	25	21.7	21.7	21.7	0	23
		1	24	23.7	23 8	23.7	0	25	21.7	21.7	21.6	0	23
		12	0	22 6	22 6	22 5	1	24	21.7	21.7	21.6	0	23
		12	7	22 6	22 6	22 5	1	24	21.7	21.7	21.6	0	23
		12	13	22 6	22 6	22 5	1	24	21.7	21.7	21.6	0	23
		25	0	22 6	22 6	22 5	1	24	21.7	21.7	21.6	0	23
	16QAM	1	0	22 8	22.4	22 5	1	24	21 6	21.7	21.8	0	23
		1	12	22.7	22.4	22.4	1	24	21 6	21.7	21.8	0	23
		1	24	22.7	22 5	22.4	1	24	21.7	21.7	21.7	0	23
		12	0	21.7	21 6	21 6	2	23	21 8	21.7	21.7	0	23
		12	7	21.7	21 6	21 6	2	23	21.7	21.7	21.7	0	23
		12	13	21 6	21 6	21 6	2	23	21.7	21.7	21.7	0	23
		25	0	21.7	21.7	21 6	2	23	21 8	21 8	21.6	0	23

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					Grip Sensor Average Power (dBm)				
				20415	20525	20635	MPR	Tune-up Limit	20415	20525	20635	MPR	Tune-up Limit
				825.5 MHz	836.5 MHz	847 5 MHz			825 5 MHz	836 5 MHz	847 5 MHz		
3 MHz	QPSK	1	0	23 8	23 8	23.7	0	25	21 8	21.7	21.6	0	23
		1	8	23 8	23 8	23.7	0	25	21 8	21.7	21.6	0	23
		1	14	23.7	23 8	23 6	0	25	21.7	21.7	21.5	0	23
		8	0	22 6	22 6	22.4	1	24	21.7	21.7	21.5	0	23
		8	4	22 6	22 6	22.4	1	24	21.7	21.7	21.5	0	23
		8	7	22 6	22 6	22.4	1	24	21.7	21.7	21.5	0	23
		15	0	22 6	22 6	22.4	1	24	21.7	21.7	21.5	0	23
	16QAM	1	0	22 3	22 5	22.4	1	24	21 5	21 5	21.6	0	23
		1	8	22 2	22 6	22.4	1	24	21.4	21 5	21.5	0	23
		1	14	22 3	22 6	22.4	1	24	21.4	21 5	21.4	0	23
		8	0	21 6	21.7	21 5	2	23	21.7	21 8	21.6	0	23
		8	4	21 6	21.7	21 5	2	23	21.7	21 8	21.5	0	23
		8	7	21 6	21.7	21 5	2	23	21.7	21 8	21.5	0	23
		15	0	21.7	21.7	21 5	2	23	21.7	21.7	21.6	0	23

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					Grip Sensor Average Power (dBm)				
				20407	20525	20643	MPR	Tune-up Limit	20407	20525	20643	MPR	Tune-up Limit
				824.7 MHz	836.5 MHz	848 3 MHz			824.7 MHz	836 5 MHz	848 3 MHz		
1.4 MHz	QPSK	1	0	23 8	23 9	23.7	0	25	21 9	21 9	21.5	0	23
		1	3	23 8	23 9	23.7	0	25	21 9	21 8	21.5	0	23
		1	5	23 8	23 9	23.7	0	25	21 9	21 9	21.5	0	23
		3	0	23 8	23 8	23 5	0	25	21 8	21.7	21.5	0	23
		3	1	23 8	23 8	23 5	0	25	21 8	21.7	21.5	0	23
		3	3	23 8	23 8	23 5	0	25	21 8	21.7	21.5	0	23
		6	0	22 6	22 6	22.4	1	24	21 8	21.7	21.5	0	23
	16QAM	1	0	22 6	22.7	22 5	1	24	21.7	21 8	21.6	0	23
		1	3	22.7	22 6	22 2	1	24	21 8	21 6	21.7	0	23
		1	5	22 6	22.7	22 3	1	24	21 9	21 6	21.6	0	23
		3	0	22 6	22 5	22.4	1	24	21 8	21 8	21.5	0	23
		3	1	22 6	22 5	22.4	1	24	21 8	21 8	21.5	0	23
		3	3	22 6	22 5	22.4	1	24	21 8	21 8	21.5	0	23
		6	0	21 5	21.7	21 5	2	23	21.7	21 8	21.4	0	23

LTE Band 41 Measured Results

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					MPR	Tune-up Limit	Receiver Average Power (dBm)					MPR	Tune-up Limit	Earjack / Grip sensor / Hotspot Average Power (dBm)					MPR	Tune-up Limit
				39750	40185	40620	41055	41490			39750	40185	40620	41055	41490			39750	40185	40620	41055	41490		
				2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz			2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz			2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz		
20 MHz	QPSK	1	0	22.5	22.3	23.1	22.8	22.7	0	23.5	19.4	19.3	19.8	19.7	19.6	0	20.5	18.4	18.3	18.9	18.8	18.7	0	19.5
		1	49	22.4	22.2	23.0	22.8	22.6	0	23.5	19.3	19.3	19.8	19.7	19.6	0	20.5	18.4	18.3	18.9	18.8	18.7	0	19.5
		1	99	22.3	22.2	23.0	22.7	22.5	0	23.5	19.3	19.1	19.7	19.6	19.4	0	20.5	18.3	18.2	18.8	18.8	18.6	0	19.5
		50	0	21.8	21.6	22.0	22.0	21.8	1	22.5	19.8	19.6	20.1	20.1	19.9	0	20.5	18.8	18.6	19.2	19.1	19.0	0	19.5
		50	24	21.8	21.6	22.0	22.0	21.8	1	22.5	19.8	19.6	20.1	20.1	19.8	0	20.5	18.8	18.6	19.1	19.1	19.0	0	19.5
		50	50	21.7	21.6	22.0	22.0	21.8	1	22.5	19.8	19.6	20.1	20.0	19.8	0	20.5	18.8	18.6	19.1	19.1	19.0	0	19.5
		100	0	21.7	21.6	22.0	22.0	21.8	1	22.5	19.8	19.6	20.1	20.0	19.8	0	20.5	18.8	18.6	19.1	19.1	19.0	0	19.5
	16QAM	1	0	21.8	21.6	22.1	22.0	21.8	1	22.5	19.5	19.3	19.5	19.9	19.9	0	20.5	18.3	18.1	18.9	18.8	18.9	0	19.5
		1	49	21.7	21.6	22.0	22.0	21.8	1	22.5	19.5	19.3	19.5	19.5	19.3	0	20.5	18.6	18.0	18.9	18.6	18.7	0	19.5
		1	99	21.7	21.2	22.2	22.1	21.7	1	22.5	19.3	19.1	19.5	19.5	19.1	0	20.5	18.4	18.2	19.1	18.5	18.8	0	19.5
		50	0	20.8	20.7	21.0	21.0	20.8	2	21.5	19.8	19.7	20.1	20.1	19.9	0	20.5	18.9	18.7	19.3	19.3	19.1	0	19.5
		50	24	20.8	20.7	21.0	21.1	20.8	2	21.5	19.8	19.6	20.1	20.0	19.8	0	20.5	18.9	18.7	19.2	19.2	19.1	0	19.5
		50	50	20.8	20.6	21.0	21.0	20.8	2	21.5	19.8	19.6	20.1	20.0	19.8	0	20.5	18.9	18.7	19.2	19.2	19.1	0	19.5
		100	0	20.8	20.6	21.0	21.0	20.8	2	21.5	19.7	19.7	20.1	20.1	19.9	0	20.5	18.8	18.7	19.3	19.2	19.1	0	19.5

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					MPR	Tune-up Limit	Receiver Average Power (dBm)					MPR	Tune-up Limit	Earjack / Grip sensor / Hotspot Average Power (dBm)					MPR	Tune-up Limit
				39750	40185	40620	41055	41490			39750	40185	40620	41055	41490			39750	40185	40620	41055	41490		
				2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz			2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz			2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz		
15 MHz	QPSK	1	0	22.5	22.3	22.8	22.7	22.6	0	23.5	19.4	19.3	19.7	19.8	19.6	0	20.5	18.4	18.3	18.8	18.8	18.8	0	19.5
		1	37	22.4	22.3	22.8	22.6	22.6	0	23.5	19.3	19.3	19.7	19.8	19.5	0	20.5	18.4	18.3	18.8	18.7	18.7	0	19.5
		1	74	22.5	22.3	22.8	22.7	22.4	0	23.5	19.4	19.2	19.6	19.7	19.5	0	20.5	18.4	18.3	18.8	18.7	18.8	0	19.5
		36	0	21.8	21.7	22.1	22.1	21.8	1	22.5	19.8	19.6	20.1	20.1	19.9	0	20.5	18.9	18.7	19.3	19.2	19.1	0	19.5
		36	20	21.8	21.6	22.1	22.1	21.8	1	22.5	19.8	19.6	20.1	20.1	19.8	0	20.5	18.9	18.7	19.3	19.2	19.0	0	19.5
		36	39	21.7	21.6	22.1	22.1	21.8	1	22.5	19.8	19.6	20.1	20.1	19.8	0	20.5	18.9	18.7	19.3	19.2	19.0	0	19.5
		75	0	21.7	21.6	22.1	22.1	21.8	1	22.5	19.8	19.6	20.1	20.1	19.8	0	20.5	18.9	18.7	19.3	19.2	19.1	0	19.5
	16QAM	1	0	21.6	21.3	21.8	21.6	21.6	1	22.5	19.0	19.2	19.6	20.0	19.4	0	20.5	18.5	18.7	18.6	18.7	18.3	0	19.5
		1	37	21.8	21.2	21.8	21.6	21.6	1	22.5	19.5	18.9	19.6	19.7	19.1	0	20.5	18.5	18.4	18.9	18.4	18.3	0	19.5
		1	74	21.8	21.6	21.6	21.8	21.6	1	22.5	18.9	18.7	19.5	19.9	19.3	0	20.5	18.2	18.1	18.7	18.4	18.7	0	19.5
		36	0	20.9	20.6	21.1	21.1	20.8	2	21.5	19.9	19.7	20.2	20.2	19.8	0	20.5	19.0	18.8	19.4	19.3	19.1	0	19.5
		36	20	20.9	20.6	21.1	21.1	20.8	2	21.5	19.9	19.6	20.1	20.1	19.8	0	20.5	19.0	18.8	19.4	19.3	19.2	0	19.5
		36	39	20.8	20.6	21.0	21.1	20.7	2	21.5	19.8	19.6	20.2	20.2	19.8	0	20.5	19.0	18.8	19.4	19.3	19.1	0	19.5
		75	0	20.8	20.7	21.0	21.1	20.8	2	21.5	19.8	19.6	20.1	20.1	19.9	0	20.5	19.0	18.8	19.3	19.3	19.2	0	19.5

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					MPR	Tune-up Limit	Receiver Average Power (dBm)					MPR	Tune-up Limit	Earjack / Grip sensor / Hotspot Average Power (dBm)					MPR	Tune-up Limit
				39750	40185	40620	41055	41490			39750	40185	40620	41055	41490			39750	40185	40620	41055	41490		
				2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz			2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz			2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz		
10 MHz	QPSK	1	0	22.5	22.3	22.7	22.7	22.5	0	23.5	19.4	19.3	19.7	19.8	19.5	0	20.5	18.4	18.3	18.8	18.9	18.7	0	19.5
		1	25	22.5	22.3	22.7	22.7	22.5	0	23.5	19.4	19.3	19.7	19.8	19.5	0	20.5	18.4	18.3	18.8	18.9	18.7	0	19.5
		1	49	22.4	22.3	22.7	22.7	22.5	0	23.5	19.3	19.2	19.7	19.8	19.5	0	20.5	18.4	18.3	18.8	18.9	18.7	0	19.5
		25	0	21.7	21.6	22.1	22.0	21.8	1	22.5	19.7	19.6	20.1	20.1	19.8	0	20.5	18.8	18.7	19.2	19.2	19.0	0	19.5
		25	12	21.7	21.6	22.0	22.0	21.8	1	22.5	19.7	19.6	20.1	20.1	19.8	0	20.5	18.8	18.6	19.2	19.1	19.0	0	19.5
		25	25	21.7	21.6	22.0	22.0	21.8	1	22.5	19.7	19.6	20.1	20.1	19.8	0	20.5	18.8	18.6	19.2	19.1	19.0	0	19.5
		50	0	21.7	21.6	22.0	22.0	21.7	1	22.5	19.7	19.6	20.1	20.1	19.8	0	20.5	18.8	18.6	19.1	19.1	19.0	0	19.5
	16QAM	1	0	21.7	21.6	21.7	21.7	21.6	1	22.5	19.3	19.1	19.4	19.8	19.2	0	20.5	18.4	18.4	18.6	18.7	18.6	0	19.5
		1	25	21.7	21.6	21.7	21.7	21.6	1	22.5	19.3	19.0	19.4	19.8	19.1	0	20.5	18.4	18.4	18.6	18.7	18.5	0	19.5
		1	49	21.7	21.6	21.7	21.7	21.5	1	22.5	19.3	19.1	19.4	19.7	19.1	0	20.5	18.4	18.4	18.6	18.6	18.5	0	19.5
		25	0	20.8	20.6	21.0	21.0	20.7	2	21.5	19.8	19.6	20.1	20.1	19.8	0	20.5	18.9	18.8	19.3	19.3	19.1	0	19.5
		25	12	20.7	20.6	21.0	21.0	20.7	2	21.5	19.8	19.6	20.1	20.1	19.8	0	20.5	18.9	18.8	19.3	19.3	19.1	0	19.5
		25	25	20.8	20.6	21.0	21.0	20.7	2	21.5	19.8	19.6	20.1	20.1	19.8	0	20.5	18.9	18.8	19.3	19.2	19.0	0	19.5
		50	0	20.7	20.6	21.0	21.0	20.7	2	21.5	19.8	19.6	20.1	20.1	19.8	0	20.5	18.9	18.7	19.2	19.2	19.0	0	19.5

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					MPR	Tune-up Limit	Receiver Average Power (dBm)					MPR	Tune-up Limit	Earjack / Grip sensor / Hotspot Average Power (dBm)					MPR	Tune-up Limit
				39750	40185	40620	41055	41490			39750	40185	40620	41055	41490			39750	40185	40620	41055	41490		
				2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz			2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz			2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz		
5 MHz	QPSK	1	0	22.4	22.3	22.8	22.7	22.5	0	23.5	19.4	19.3	19.8	19.7	19.5	0	20.5	18.5	18.3	18.9	18.9	18.7	0	19.5
		1	12	22.4	22.3	22.7	22.7	22.5	0	23.5	19.4	19.3	19.8	19.7	19.5	0	20.5	18.5	18.4	18.9	18.9	18.6	0	19.5
		1	24	22.4	22.3	22.7	22.7	22.4	0	23.5	19.3	19.3	19.7	19.7	19.4	0	20.5	18.5	18.3	18.9	18.9	18.7	0	19.5
		12	0	21.8	21.6	22.1	22.0	21.8	1	22.5	19.8	19.6	20.1	20.1	19.8	0	20.5	18.9	18.7	19.3	19.2	19.0	0	19.5
		12	7	21.8	21.6	22.1	22.0	21.8	1	22.5	19.8	19.6	20.1	20.1	19.7	0	20.5	18.9	18.7	19.3	19.2	19.0	0	19.5
		12	13	21.8	21.6	22.1	22.0	21.8	1	22.5	19.8	19.6	20.1	20.1	19.7	0	20.5	18.9	18.7	19.2	19.2	19.0	0	19.5
		25	0	21.8	21.6	22.1	22.0	21.8	1	22.5	19.8	19.6	20.1	20.1	19.7	0	20.5	18.8	18.7	19.2	19.2	18.9	0	19.5
	16QAM	1	0	21.5	21.2	22.1	21.7	21.5	1	22.5	19.1	19.2	19.8	19.2	19.3	0	20.5	18.2	18.0	18.9	19.0	18.5	0	19.5
		1	12	21.5	21.2	22.1	21.7	21.5	1	22.5	19.1	19.2	19.8	19.3	19.3	0	20.5	18.2	18.0	18.9	19.0	18.5	0	19.5
		1	24	21.5	21.2	22.1	21.7	21.5	1	22.5	19.1	19.2	19.8	19.2	19.3	0	20.5	18.1	18.0	18.9	19.0	18.5	0	19.5
		12	0	20.7	20.7	21.0	21.0	20.8	2	21.5	19.7	19.6	20.0	20.0	19.8	0	20.5	18.9	18.7	19.3	19.3	19.1	0	19.5
		12	7	20.7	20.7	21.0	21.0	20.8	2	21.5	19.7	19.6	20.0	20.0	19.8	0	20.5	18.9	18.7	19.3	19.2	19.1	0	19.5
		12	13	20.7	20.7	21.0	21.0	20.8	2	21.5	19.7	19.6	20.0	20.0	19.8	0	20.5	18.9	18.7	19.3	19.2	19.1	0	19.5
		25	0	20.8	20.6	21.1	21.0	20.7	2	21.5	19.8	19.6	20.1	20.1	19.8	0	20.5	18.9	18.8	19.3	19.3	19.1	0	19.5

9.4 Wi-Fi 2.4GHz (DTS Band)

Maximum Output Power (Tune-up Limit) for Wi-Fi 2.4 GHz

The maximum output power specified for production units are determined for all applicable 802.11 transmission modes in each standalone and aggregated frequency band. Maximum output power is measured for the highest maximum output power configuration(s) in each frequency band according to the default power measurement procedures.

For “Not required”, SAR Test reduction was applied from KDB 248227 guidance, Sec. 2.1, b), 1) when the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11b/g/n mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band. Additional output power measurements were not deemed necessary.

SAR testing is not required for OFDM mode(s) 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.

Wi-Fi 2.4GHz Measured Results

Band	Mode	Ch #	Freq. (MHz)	Maximum Average Power (dBm)			Reduced Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)	Meas Pwr	Tune-up	SAR Test (Yes/No)
DSSS 2.4 GHz	802.11b	1	2412	17.5	19.5	Yes	12.9	13.0	Yes
		6	2437	17.8	19.5		13.0	13.0	
		11	2462	18.1	19.5		12.8	13.0	
		12	2467	6.8	7.0		6.5	7.0	
		13	2472	7.0	7.0		6.5	7.0	
OFDM 2.4 GHz	802.11g	1	2412		17.0	No		13.0	No
		6	2437		17.0			13.0	
		11	2462		17.0			13.0	
		12	2467		5.0			5.0	
		13	2472		5.0			5.0	
	802.11n (HT20)	1	2412		17.0	No		13.0	No
		6	2437		17.0			13.0	
		11	2462		17.0			13.0	
		12	2467		5.0			5.0	
		13	2472		5.0			5.0	

Note(s):

SAR is not required for channel 12 and 13 because the tune-up limit and the measured output power for these two channels are not greater than those for the default test channels. Refer to KDB 248227 D01 section 3.1

9.5 Bluetooth

Maximum Output Power (Tune-up Limit) for Bluetooth

SAR measurement is not required for the EDR and LE. When the secondary mode is ≤ ¼ dB higher than the primary mode.

Bluetooth Measured Results

Band	Mode	Ch #	Freq. (MHz)	Maximum Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)
2.4	BR GFSK	0	2402	8.3	9.0	No
		39	2441	8.2	9.0	
		78	2480	8.0	9.0	
	EDR, π/4 DQPSK	0	2402	6.8	7.0	No
		39	2441	6.9	7.0	
		78	2480	6.8	7.0	
	EDR, 8-DPSK	0	2402	6.7	7.0	No
		39	2441	6.8	7.0	
		78	2480	6.7	7.0	
	LE 1M, GFSK	0	2402	4.2	5.5	No
		19	2440	4.2	5.5	
		39	2480	4.2	5.5	
	LE 2M, GFSK	0	2402	8.0	9.5	Yes
		19	2440	8.0	9.5	
		39	2480	7.9	9.5	

Duty Factor Measured Results

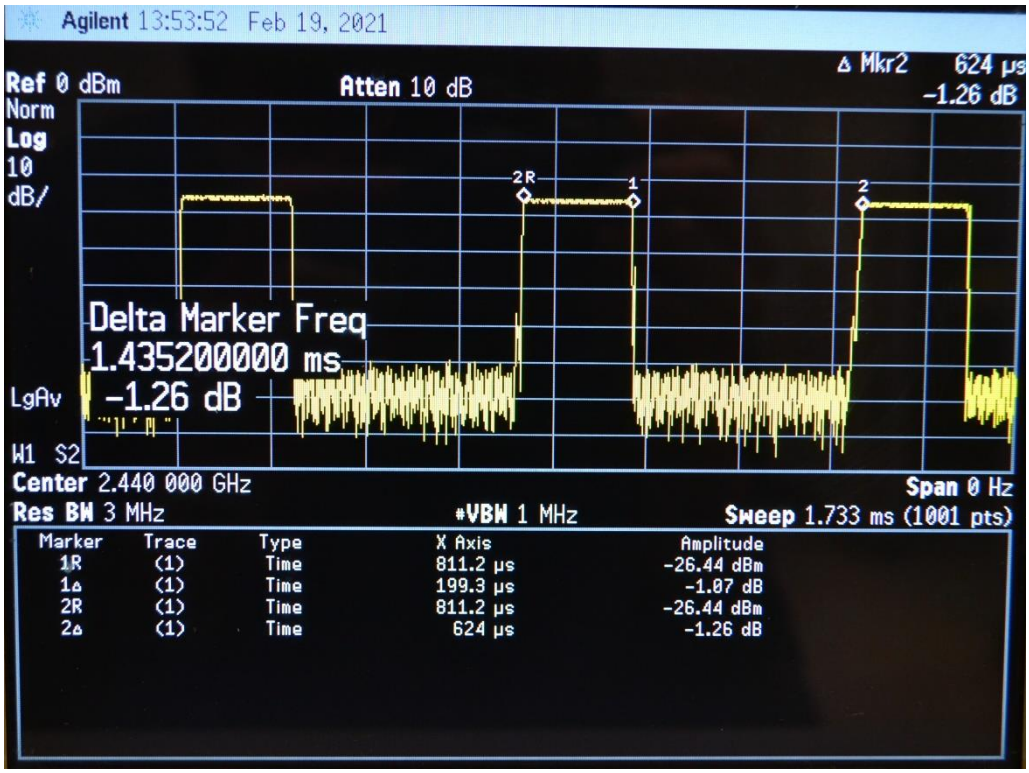
Mode	Type	T on (ms)	Period (ms)	Duty Cycle	Crest Factor (1/duty cycle)
GFSK	LE 2M	199.3	624	31.94%	3.13

Note(s):

Duty Cycle = (T on / period) * 100%

Duty Cycle plots

LE 2M



10 Measured and Reported (Scaled) SAR Results

SAR Test Reduction criteria are as follows:

- Reported SAR(W/kg) for WWAN and Bluetooth = Measured SAR *Tune-up Scaling Factor
- Reported SAR(W/kg) for Wi-Fi = Measured SAR * Tune-up scaling factor * Duty Cycle scaling factor
- Duty Cycle scaling factor = 1 / Duty cycle (%)

KDB 447498 D01 General RF Exposure Guidance:

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

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

KDB 648474 D04 Handset SAR:

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

KDB 648474 D04 Handset SAR (Phablet Only):

For smart phones, with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm.
When hotspot mode does not apply, 10-g Extremity SAR is required for all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge in direct contact with a flat phantom, to address interactive hand use exposure conditions. When hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg; however, when power reduction applies to hotspot mode the measured SAR must be scaled to the maximum output power, including tolerance, allowed for phablet modes to compare with the 1.2 W/kg SAR test reduction threshold.

KDB 941225 D01 SAR test for 3G devices:

When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.

KDB 941225 D05 SAR for LTE Devices:

SAR test reduction is applied using the following criteria:

- Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB, and 50% RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle and lower edge of each required test channel.
- When the reported SAR is > 0.8 W/kg, testing for other Channels is performed at the highest output power level for 1RB, and 50% RB configuration for that channel.
- Testing for 100% RB configuration is performed at the highest output power level for 100% RB configuration across the Low, Mid and High Channel when the highest reported SAR for 1 RB and 50% RB are > 0.8 W/kg. Testing for the remaining required channels is not needed because the reported SAR for 100% RB Allocation < 1.45 W/kg.
- Testing for 16-QAM modulation is not required because the reported SAR for QPSK is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of QPSK.
- Testing for the other channel bandwidths is not required because the reported SAR for the highest channel bandwidth is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.
- For LTE bands that do not support at least three non-overlapping channels in certain channel bandwidths, test the available non-overlapping channels instead. When a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing; therefore, the requirement for H, M and L channels may not fully apply.

KDB 248227 D01 SAR meas for 802.11:

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

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

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

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

10.1 GSM850

RF Exposure Conditions	Mode	Power Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up Limit	Meas.	Meas.	Scaled	
Head	GPRS 3 Slots	N/A	0	Left Touch	190	836.6	30.0	29.2	0.214	0 258	
				Left Titl	190	836.6	30.0	29.2	0.118	0.142	
				Right Touch	190	836.6	30.0	29.2	0.251	**0.302**	1
				Right Tilt	190	836.6	30.0	29.2	0.123	0.148	
Body-Worn	GPRS 3 Slots	N/A	15	Rear	190	836.6	30.0	29.2	0.325	**0.392**	2
				Front	190	836.6	30.0	29.2	0.230	0 277	
Hotspot	GPRS 3 Slots	N/A	10	Rear	190	836.6	30.0	29.2	0.453	**0.546**	3
				Front	190	836.6	30.0	29.2	0.237	0 286	
				Edge 2	190	836.6	30.0	29.2	0.287	0 346	
				Edge 3	190	836.6	30.0	29.2	0.125	0.151	
				Edge 4	190	836.6	30.0	29.2	0.159	0.192	

10.2 GSM1900

RF Exposure Condi ions	Mode	Power Back-off	Dist. (mm)	Test Posi ion	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up Limit	Meas.	Meas.	Scaled	
Head	GPRS 2 slots	N/A	0	Left Touch	810	1909.8	28.0	27.0	0.024	**0.030**	4
				Left Tilt	810	1909.8	28.0	27.0	0.009	0.011	
				Right Touch	810	1909.8	28.0	27.0	0.010	0.013	
				Right Tilt	810	1909.8	28.0	27.0	0.012	0.015	
Body-Worn	GPRS 2 Slots	N/A	15	Rear	810	1909.8	28.0	27.0	0.016	0.020	
				Front	810	1909.8	28.0	27.0	0.021	**0.026**	5
Hotspot	GPRS 2 Slots	N/A	10	Rear	810	1909.8	28.0	27.0	0.032	0.041	
				Front	810	1909.8	28.0	27.0	0.034	**0.043**	6
				Edge 2	810	1909.8	28.0	27.0	0.019	0.024	
				Edge 3	810	1909.8	28.0	27.0	0.059	0.076	
				Edge 4	810	1909.8	28.0	27.0	0.032	0.041	

10.3 W-CDMA Band V

RF Exposure Condi ions	Mode	Power Back Off	Dist. (mm)	Test Posi ion	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up Limit	Meas.	Meas.	Scaled	
Head	Rel 99 RMC 12.2 kbps	ON	0	Left Touch	4183	836.6	23.5	21.8	0.152	0.226	
				Left Tilt	4183	836.6	23.5	21.8	0.079	0.118	
				Right Touch	4183	836.6	23.5	21.8	0.188	**0.280**	7
				Right Tilt	4183	836.6	23.5	21.8	0.087	0.130	
Body-Worn	Rel 99 RMC 12.2 kbps	N/A	15	Rear	4183	836.6	25.5	24.2	0.365	**0.490**	8
				Front	4183	836.6	25.5	24.2	0.215	0.289	
Hotspot	Rel 99 RMC 12.2 kbps	N/A	10	Rear	4183	836.6	25.5	24.2	0.516	**0.693**	9
				Front	4183	836.6	25.5	24.2	0.215	0.289	
				Edge 2	4183	836.6	25.5	24.2	0.280	0.376	
				Edge 3	4183	836.6	25.5	24.2	0.160	0.215	
				Edge 4	4183	836.6	25.5	24.2	0.140	0.188	

10.4 LTE Band 5 (10MHz Bandwidth)

RF Exposure Condi ions	Mode	Power back-off	Dist. (mm)	Test Posi ion	Ch #.	Freq. (MHz)	RB Allocation	RB offest	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	QPSK	N/A	0	Left Touch	20525	836.5	1	0	25.0	23.9	0.138	0.179	
							25	0	24.0	22.6	0.137	0.187	
				Left Tilt (15°)	20525	836.5	1	0	25.0	23.9	0 071	0.092	
							25	0	24.0	22.6	0 070	0.096	
				Right Touch	20525	836.5	1	0	25.0	23.9	0.161	0.209	
							25	0	24.0	22.6	0 211	**0.289**	10
				Right Tilt (15°)	20525	836.5	1	0	25.0	23.9	0.140	0.182	
							25	0	24.0	22.6	0.110	0.150	
Body-worn	QPSK	N/A	15	Rear	20525	836.5	1	0	25.0	23.9	0 220	0.286	
							25	0	24.0	22.6	0 211	**0.289**	11
				Front	20525	836.5	1	0	25.0	23.9	0 219	0.285	
							25	0	24.0	22.6	0.168	0.230	
Hotspot	QPSK	N/A	10	Rear	20525	836.5	1	0	25.0	23.9	0 280	0.364	
							25	0	24.0	22.6	0 284	**0.388**	12
				Front	20525	836.5	1	0	25.0	23.9	0 212	0.276	
							25	0	24.0	22.6	0.162	0.222	
				Edge 2	20525	836.5	1	0	25.0	23.9	0 287	0.373	
							25	0	24.0	22.6	0 223	0.305	
				Edge 3	20525	836.5	1	0	25.0	23.9	0.135	0.176	
							25	0	24.0	22.6	0.110	0.150	
				Edge 4	20525	836.5	1	0	25.0	23.9	0 096	0.124	
							25	0	24.0	22.6	0 092	0.126	

10.5 LTE Band 41 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Power Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offest	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	QPSK	ON	0	Left Touch	40620	2593.0	1	0	20.5	19.8	0.254	0.298	
							50	0	20.5	20.1	0.213	0.234	
				Left Tilt	40620	2593.0	1	0	20.5	19.8	0.118	0.139	
							50	0	20.5	20.1	0.114	0.125	
				Right Touch	39750	2506.0	1	0	20.5	19.4	0.554	0.714	
							50	0	20.5	19.8	0.639	0.751	
					40185	2549.5	1	0	20.5	19.3	0.840	1.107	
							50	0	20.5	19.6	0.858	1.056	
					40620	2593.0	1	0	20.5	19.8	0.933	1.096	
							50	0	20.5	20.1	0.925	1.014	
							100	0	20.5	20.1	0.915	1.003	
					41055	2636.5	1	0	20.5	19.7	0.906	1.089	
							50	0	20.5	20.1	0.909	0.997	
					41490	2680.0	1	0	20.5	19.6	0.879	1.081	
							50	0	20.5	19.9	1.000	**1.148**	13
				Right Tilt	40620	2593.0	1	0	20.5	19.8	0.419	0.492	
							50	0	20.5	20.1	0.414	0.454	
Body-worn	QPSK	N/A	15	Rear	39750	2506.0	1	0	23.5	22.5	0.514	0.647	
							50	0	22.5	21.8	0.479	0.563	
					40185	2549.5	1	0	23.5	22.3	0.866	1.142	
							50	0	22.5	21.6	0.698	0.859	
					40620	2593.0	1	0	23.5	23.1	1.100	**1.198**	14
							50	0	22.5	22.0	0.876	0.983	
							100	0	22.5	22.0	0.841	0.944	
					41055	2636.5	1	0	23.5	22.8	0.983	1.155	
							50	0	22.5	22.0	0.783	0.879	
					41490	2680.0	1	0	23.5	22.7	0.853	1.026	
							50	0	22.5	21.8	0.700	0.822	
				Front	40620	2593.0	1	0	23.5	23.1	0.284	0.309	
							50	0	22.5	22.0	0.224	0.251	
Hotspot	QPSK	ON	10	Rear	39750	2506.0	1	0	19.5	18.4	0.521	0.671	
							50	0	19.5	18.8	0.586	0.688	
					40185	2549.5	1	0	19.5	18.3	0.750	0.989	
							50	0	19.5	18.6	0.763	0.939	
					40620	2593.0	1	0	19.5	18.9	0.937	1.076	
							50	0	19.5	19.2	0.922	0.988	
							100	0	19.5	19.1	0.878	0.963	
					41055	2636.5	1	0	19.5	18.8	0.879	1.033	
							50	0	19.5	19.1	0.879	0.964	
					41490	2680.0	1	0	19.5	18.7	0.582	0.700	
							50	0	19.5	19.0	0.656	0.736	
				Front	40620	2593.0	1	0	19.5	18.9	0.313	0.359	
							50	0	19.5	19.2	0.304	0.326	
				Edge 1	40620	2593.0	1	0	19.5	18.9	0.095	0.109	
							50	0	19.5	19.2	0.094	0.101	
				Edge 4	39750	2506.0	1	0	19.5	18.4	0.663	0.854	
							50	0	19.5	18.8	0.624	0.733	
					40185	2549.5	1	0	19.5	18.3	0.798	1.052	
							50	0	19.5	18.6	0.826	1.016	
					40620	2593.0	1	0	19.5	18.9	1.040	1.194	
							50	0	19.5	19.2	1.040	1.114	
							100	0	19.5	19.1	1.020	1.118	
					41055	2636.5	1	0	19.5	18.8	1.060	**1.245**	15
							50	0	19.5	19.1	1.070	1.173	
					41490	2680.0	1	0	19.5	18.7	0.944	1.135	
							50	0	19.5	19.0	1.020	1.144	

RF Exposure Conditions	Mode	Power Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offest	Power (dBm)		10-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Extremity	QPSK	OFF	12	Rear	40620	2593.0	1	0	23.5	22.7	0.863	**1.038**	16
							50	0	22.5	22.0	0.680	0.763	
				Edge 4	40620	2593.0	1	0	23.5	22.7	0.341	0.410	
							50	0	22.5	22.0	0.345	0.387	
	QPSK	ON	0	Rear	40620	2593.0	1	0	19.5	18.9	1.320	1.516	
							50	0	19.5	19.2	1.330	1.425	
				Edge 4	39750	2506.0	1	0	19.5	18.4	1.590	2.048	
					40185	2549.5	1	0	19.5	18.3	1.640	**2.162**	17
					40620	2593.0	1	0	19.5	18.9	1.760	2.021	
							50	0	19.5	19.2	1.660	1.779	
					41055	2636.5	1	0	19.5	18.8	1.480	1.739	
					41490	2680.0	1	0	19.5	18.7	1.300	1.563	

10.6 Wi-Fi (DTS Band)

When the 802.11b reported SAR of the highest measured maximum output power channel is ≤ 0.8 W/kg, no further SAR testing is required. If SAR is > 0.8 W/kg and ≤ 1.2 W/kg, SAR is required for the next highest measured output power channel. Finally, if SAR is > 1.2 W/kg, SAR is required for the third channel.

SAR testing is not required for OFDM mode(s) 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.

RF Exposure Conditions	Mode	Power Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Duty Cycle	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	802.11b	ON	0	Left Touch	6	2437	0.121	98.9%	13.0	13 0			
				Left Tilt	6	2437	0.121	98.9%	13.0	13 0			
				Right Touch	6	2437	0 324	98.9%	13.0	13 0	0.217	**0.222**	18
				Right Tilt	6	2437	0 231	98.9%	13.0	13 0			
Body-worn	802.11b	N/A	15	Rear	11	2462	0.110	98.9%	19.5	18.1	0 078	**0.109**	19
				Front	11	2462	0.109	98.9%	19.5	18.1			
Hotspot	802.11b	N/A	10	Rear	11	2462	0 316	98.9%	19.5	18.1	0.189	**0.264**	20
				Front	11	2462	0 203	98.9%	19.5	18.1			
				Edge 1	11	2462	0.164	98.9%	19.5	18.1			
				Edge 4	11	2462	0 038	98.9%	19.5	18.1			

10.7 Bluetooth

RF Exposure Condi ions	Mode	Power Back-off	Dist. (mm)	Test Posi ion	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up Limit	Meas.	Meas.	Scaled	
Head	LE 2M GFSK	N/A	0	Left Touch	19	2440	9.5	8 0	0.009	0.013	
				Left Tilt	19	2440	9.5	8 0	-	-	
				Right Touch	19	2440	9.5	8 0	0.019	**0.027**	21
				Right Tilt	19	2440	9.5	8 0	-	-	
Body-worn	LE 2M GFSK	N/A	15	Rear	19	2440	9.5	8 0	-	**-**	
				Front	19	2440	9.5	8 0	-	-	22
Hotspot	LE 2M GFSK	N/A	10	Rear	19	2440	9.5	8 0	-	**-**	
				Front	19	2440	9.5	8 0	-	-	
				Edge 1	19	2440	9.5	8 0	-	-	
				Edge 4	19	2440	9.5	8 0	-	-	23

Note(s):

1. For results listed with "-", the SAR result is less than 0.01 W/kg.

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 < 0.8 or 2 W/kg (1-g or 10-g respectively); steps 2) through 4) do not apply.
2) When the original highest measured SAR is ≥ 0.8 or 2 W/kg (1-g or 10-g respectively), 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 or 3.6 W/kg (~ 10% from the 1-g or 10-g respective SAR limit).
4) Perform a third repeated measurement only if the original, first, or second repeated measurement is ≥ 1.5 or 3.75 W/kg (1-g or 10-g respectively) and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

1-g Measurement Variability

Frequency Band (MHz)	Air Interface	RF Exposure Conditions	Test Position	Repeated SAR (Yes/No)	Highest Measured SAR (W/kg)	First Repeated		Second Repeated		Third Repeated
						Measured SAR (W/kg)	Largest to Smallest SAR Ratio	Measured SAR (W/kg)	Largest to Smallest SAR Ratio	Measured SAR (W/kg)
2600	LTE Band 41	Body	Rear	Yes	1.100	1 070	1 03	N/A	N/A	N/A

12 Simultaneous Transmission Conditions

RF Exposure Condition	Item	Capable Transmit Configurations		
Head Body-worn Hotspot	1	GSM(Voice)	+	DTS
	2	GSM(Voice)	+	BT
	3	GSM(GPRS/EDGE)	+	DTS
	4	GSM(GPRS/EDGE)	+	BT
	5	W-CDMA	+	DTS
	6	W-CDMA	+	BT
	7	LTE	+	DTS
	8	LTE	+	BT

Notes:

1. DTS supports Hotspot.
2. GPRS/EDGE, W-CDMA, and LTE support Hotspot.
3. DTS Radio cannot transmit simultaneously with Bluetooth Radio.

12.1 Simultaneous transmission SAR test exclusion considerations

KDB 447498 D01 General RF Exposure Guidance provides two procedures for determining simultaneous transmission SAR test exclusion: Sum of SAR and SAR to Peak Location Ratio (SPLSR)

12.1.1 Sum of SAR

To qualify for simultaneous transmission SAR test exclusion based upon Sum of SAR the sum of the reported standalone SARs for all simultaneously transmitting antennas shall be below the applicable standalone SAR limit. If the sum of the SARs is above the applicable limit then simultaneous transmission SAR test exclusion may still apply if the requirements of the SAR to Peak Location Ratio (SPLSR) evaluation are met.

Power Scaling Factor is used to allow the volume scans to be scaled by a value other than "1", this is important when the results need to be scaled to different maximum power levels. The Power Scaling Factor is applied to each individual point of the scan. When power scaling is used in multi-band combinations the scaling factor is applied to each individual point of the first scan, the second factor is then applied to each individual point of the second scan and so on. The scans are then combined.

12.2 Sum of the SAR for WWAN & Wi-Fi & BT

RF Exposure conditions	Standalone SAR (W/kg)			∑ 1-g SAR (W/kg)	
	1	2	3	1+2	1+3
	WWAN	Wi-Fi 2.4G	BT		
Head	1.148	0.222	0.027	**1.370**	**1.175**
Body-worn	1.198	0.109	0.000	**1.307**	**1.198**
Hotspot	1.245	0.264	0.000	**1.509**	**1.245**

Conclusion:

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

Appendixes

Refer to separated files for the following appendixes.

Appendix A: SAR Setup Photos

Appendix B: SAR System Check Plots

Appendix C: SAR Highest Test Plots

Appendix D: SAR Tissue Ingredients

Appendix E: SAR Probe Certificates

Appendix F: SAR Dipole Certificates

Appendix G: SAR Proximity Sensor

END OF REPORT