SAR EVALUATION REPORT

IEEE Std 1528-2013

For

GSM/WCDMA/LTE Phablet with BT/BLE, DTS/UNII a/b/g/n/ac, NFC and ANT+

FCC ID: A3LSMA715F
Model Name: SM-A715F & SM-A715F/DS

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Revision History

Rev.	Date	Revisions	Revised By
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1. Attestation of Test Results

Applicant Name		Samsung Electronics Co. Ltd			
FCC ID		A3LSMA715F			
Model Name		SM-A715F & SM-A715F/DS (Model SM-A715F/DS was used for testing)			
Applicable Standards		Published RF exposure KDB procedures IEEE Std 1528-2013			
Exposure Category		SAR Limits (W/Kg)			
		Peak spatial-average (1g of tissue)		Product Specific 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	NII	DSS
Head		0.983	0.116	0.564	0.056
Body-worn		0.901	0.159	0.369	0.020
Hotspot		0.953	0.366	0.626	0.048
Product Specific (Extremity) 10-g		1.964	N/A	1.338	N/A
Simultaneous TX	Head	1.547	1.099	1.547	1.039
	Body-worn	1.270	1.060	1.270	0.921
	Hotspot	1.579	1.319	1.579	1.001
Date Tested		11/11/2019 to 12/3/2019			
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 document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.

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

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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 April 2015; RF Exposure Procedures (Overlapping LTE Bands)
- TCB workshop October 2015; RF Exposure Procedures (KDB 941225 D05A)
- TCB workshop April 2016; RF Exposure Procedures (LTE Carrier Aggregation for DL)
- TCB workshop October 2016; RF Exposure Procedures (Bluetooth Duty Factor)
- TCB workshop May 2017; RF Exposure Procedures (Broadband Liquid Above 3 GHz)
- TCB workshop April 2018; RF Exposure Procedures (LTE DL CA SAR Test Exclusion)
- 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

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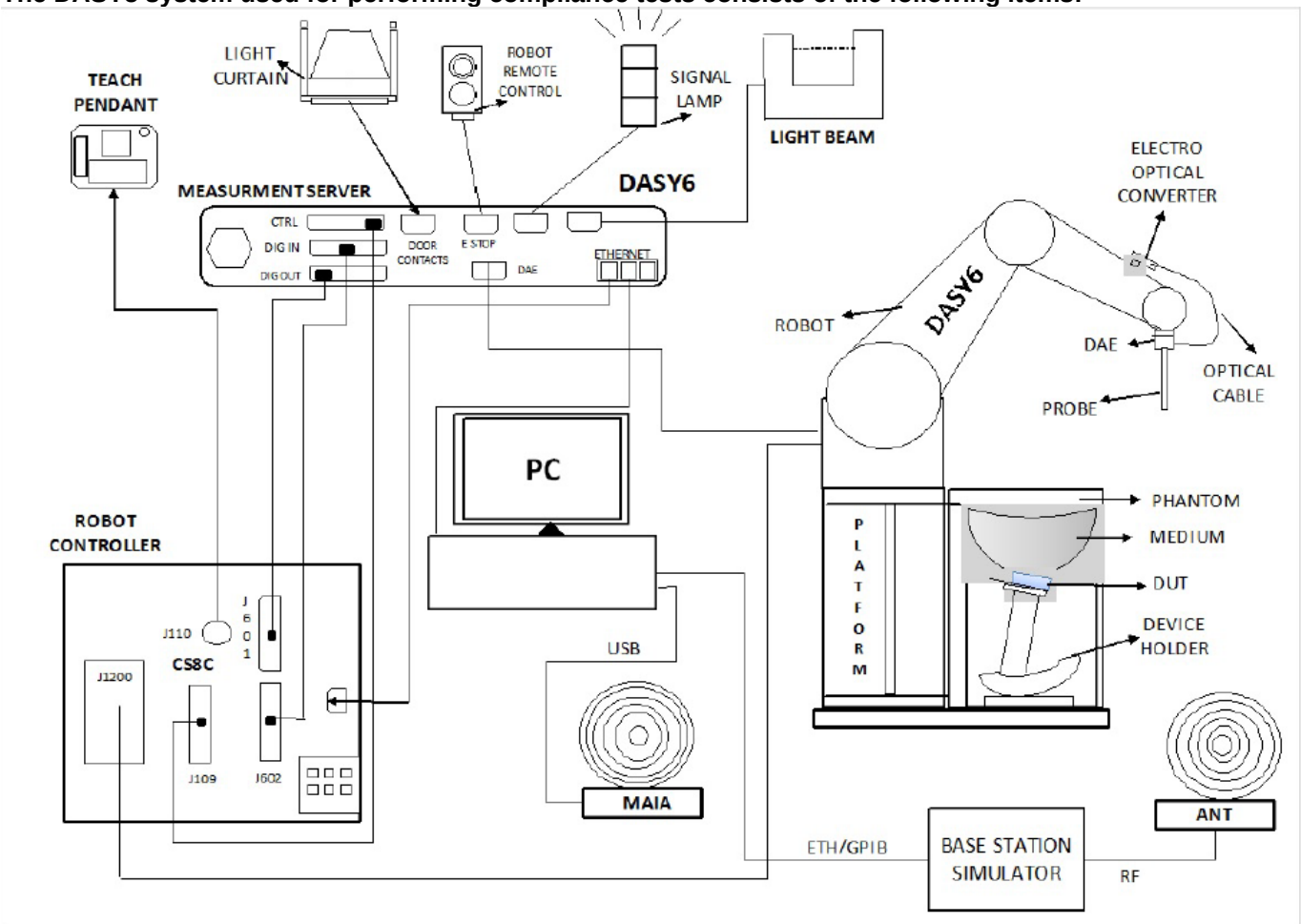
4. SAR Measurement System & Test Equipment

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.

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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.	

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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	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
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.

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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	101273-VA	4/24/2020
Dielectric Probe kit	SPEAG	DAK-3.5	1087	2/6/2020
Shorting Block	SPEAG	DAK-3.5 Short	SM DAK 200 BA	2/6/2020
Thermometer	Fisher Scientific	Traceable	181062309	2/21/2020

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Signal Generator	Rhode & Schwarz	SMB 100A	180970-zC	2/13/2020
Power Sensor	Rhode & Schwarz	NRP18A	100994-RE	2/15/2020
Signal Generator	Rhode & Schwarz	SMB 100A	180968-gX	2/14/2020
Power Sensor	Rhode & Schwarz	NRP18A	100992-iu	2/15/2020

Lab Equipment

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
E-Field Probe (SAR Lab 1)	SPEAG	EX3DV4	7501	5/21/2020
E-Field Probe (SAR Lab 2)	SPEAG	EX3DV4	7498	4/18/2020
E-Field Probe (SAR Lab 3)	SPEAG	EX3DV4	7500	4/18/2020
Data Acquisition Electronics (SAR Lab 1)	SPEAG	DAE4	1239	7/10/2020
Data Acquisition Electronics (SAR Lab 2)	SPEAG	DAE4	1359	2/15/2020
Data Acquisition Electronics (SAR Lab 3)	SPEAG	DAE4	1472	3/21/2020
System Validation Dipole	SPEAG	D750V3	1019	3/21/2020
System Validation Dipole	SPEAG	D835V2	4d117	5/15/2020
System Validation Dipole	SPEAG	D1750V2	1050	4/17/2020
System Validation Dipole	SPEAG	D1900V2	5d140	4/17/2020
System Validation Dipole	SPEAG	D2450V2	748	2/16/2020
System Validation Dipole	SPEAG	D2600V2	1006	10/14/2020
System Validation Dipole	SPEAG	D5GHzV2	1003	2/19/2020

Other

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Pow er Meter	Agilent	N1912A	MY55196004	1/30/2020
Pow er Sensor	Agilent	N1921A	MY52270022	2/6/2020
Pow er Sensor	Agilent	N1921A	MY53260010	2/6/2020
Base Station Simulator	R & S	R & S	164541-Ci	2/18/2020
Base Station Simulator	R & S	CBT Bluetooth Tester	100900-aC	2/14/2020

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.

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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.
Wireless Router (Hotspot)	Wi-Fi Hotspot mode permits the device to share its cellular data connection with other Wi-Fi-enabled devices. ☒ Mobile Hotspot (Wi-Fi 2.4 GHz) ☒ Mobile Hotspot (Wi-Fi 5.8 GHz)
Wi-Fi Direct	Wi-Fi Direct enabled devices transfer data directly between each other Wi-Fi Direct is only available in hand use configuration ☒ Wi-Fi Direct (Wi-Fi 2.4 GHz) ☒ Wi-Fi Direct (Wi-Fi 5.2/5.8 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** R38M808E4GX / 358680100042693 / Radiated R38M808E52N / 358680100042883 / Radiated R38M808E4JN / 358680100042719 / Radiated R38M808E4MB / 358680100042743 / Radiated R38M808E58R / 358680100042941 / Radiated R38M808DX1B / 358680100040234 / Radiated R38M808E4YP / 358680100042842 / Main Conducted (Licensed) R38M60J9VEN / 358680100029856 / Wi-Fi Conducted (Unlicensed)
Hardware Version	REV0.1
Software Version	A715F.001

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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 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 IV Band V	UMTS Rel. 99 (Voice & Data) HSDPA (Cat. 24) HSUPA (Cat. 6) DC-HSDPA (Cat. 24) HSPA+ (DL only)		100%
LTE	FDD Band 2 FDD Band 4 FDD Band 5 FDD Band 12 FDD Band 13 FDD Band 17 TDD Band 41 FDD Band 66	QPSK 16QAM 64QAM Rel. 12 Carrier Aggregation (1 Uplink and 3 Downlinks)		100% (FDD) 63.3% (TDD) Refer to §6.4
Wi-Fi	2.4 GHz	802.11b 802.11g 802.11n (HT20)		97.58%% (802.11b) [1]
	5 GHz	802.11a 802.11n (HT20) 802.11n (HT40) 802.11ac (VHT20) 802.11ac (VHT40) 802.11ac (VHT80)		94.67%% (802.11n HT40) [1] 84.02%% (802.11ac 80MHz BW) [1]
	Does this device support bands 5.60 ~ 5.65 GHz? ☒ Yes ☐ No			
	Does this device support Band gap channel(s)? ☒ Yes ☐ No			
Bluetooth	2.4 GHz	BR, EDR and LE		76.9%

Notes:

1. Duty cycle for Wi-Fi is referenced from the DTS and UNII report.
2. Duty cycle for Bluetooth is referenced in §9.8.

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6.3. General LTE SAR Test and Reporting Considerations

Item	Description						
Frequency range, Channel Bandwidth, Numbers and Frequencies	Band 2	Frequency range: 1850 - 1910 MHz (BW = 60 MHz)					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	**18700 /1860**	18675/ 1857.5	18650/ 1855	18625/ 1852.5	18615/ 1851.5	18607/ 1850.7
	Mid	**18900/ 1880**	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880
	High	**19100/ 1900**	19125/ 1902.5	19150/ 1905	19175/ 1907.5	19185/ 1908.5	19193/ 1909.3
	Band 4	Frequency range: 1710 - 1755 MHz (BW = 45 MHz)					
		Channel Bandwidth					
		20 MHz [1]	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	20050/ 1720	20025/ 1717.5	20000/ 1715	19975/ 1712.5	19965/ 1711.5	19957/ 1710.7
	Mid	**20175/ 1732.5**	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5
	High	20300/ 1745	20325/ 1747.5	20350/ 1750	20375/ 1752.5	20385/ 1753.5	20393/ 1754.3
	Band 5	Frequency range: 824 - 849 MHz (BW = 25 MHz)					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz [1]	5 MHz	3 MHz	1.4 MHz
	Low			20450/ 829	20425/ 826.5	20415/ 825.5	20407/ 824.7
	Mid			**20525/ 836.5**	20525/ 836.5	20525/ 836.5	20525/ 836.5
	High			20600/ 844	20625/ 846.5	20635/ 847.5	20643/ 848.3
	Band 12	Frequency range: 699 – 716 MHz (BW = 17 MHz)					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz [1]	5 MHz	3 MHz	1.4 MHz
	Low			23060/ 704	23035/ 701.5	23025/ 700.5	23017/ 699.7
	Mid			**23095/ 707.5**	23095/ 707.5	23095/ 707.5	23095/ 707.5
	High			23130/ 711	23155/ 713.5	23165/ 714.5	23173/ 715.3
	Band 13	Frequency range: 777 - 787 MHz (BW = 10 MHz)					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz [1]	5 MHz [1]	3 MHz	1.4 MHz
	Low				23205/ 779.5		
	Mid			**23230/ 782**	23230/ 782		
	High				23255/ 784.5		
	Band 17	Frequency range: 704 - 716 MHz (BW = 12 MHz)					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz [1]	5 MHz [1]	3 MHz	1.4 MHz
	Low			23780/ 709	23755/ 706.5		
	Mid			**23790/ 710**	23790/ 710		
	High			23800/ 711	23825/ 713.5		

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Band 41[2]	Frequency range: 2496 - 2690 MHz (BW = 194 MHz)					
	Channel Bandwidth					
	20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
Low	**39750 / 2506.0**					
Mid- Low	**40185 / 2549.5**					
Mid	**40620 / 2593.0**					
Mid-High	**41055 / 2636.5**					
High	**41490 / 2680.0**					

Band 66	Frequency range: 1710 - 1780 MHz (BW = 70 MHz)					
	Channel Bandwidth					
	20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
Low	**132072/ 1720**	132047/ 1717.5	132022/ 1715	131997/ 1712.5	131987/ 1711.5	131979/ 1710.7
Mid	**132322/ 1745**	132322/ 1745	132322/ 1745	132322/ 1745	132322/ 1745	132322/ 1745
High	**132572/ 1770**	132597/ 1772.5	132622/ 1775	132647/ 1777.5	132657/ 1778.5	132665/ 1779.3

LTE transmitter and antenna implementation	Refer to Appendix A.
Maximum power reduction (MPR)	**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

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

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

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).

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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.

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6.5. Power Back-off Operation

This device supports multiple power back-off modes: WWAN (Ear-jack), WWAN (Hotspot), WWAN (Grip Sensor), 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	Product Specific 10g (Extremity)
WWAN (Ear-jack)	W-CDMA B2/4 LTE B2/41/66	N/A	✓	N/A	✓
WWAN (Hotspot)	W-CDMA B2/4 LTE B2/41/66	N/A	N/A	✓	N/A
WWAN (Grip Sensor)	W-CDMA B2/4 LTE B2/41/66	N/A	N/A	N/A	✓
WLAN	Wi-Fi 2.4GHz Wi-Fi 5GHz	✓	N/A	N/A	N/A

Note(s):

Tune-Up Limits for WWAN (Hotspot) and WWAN (Grip Sensor) are both Reduced Average Powers. Please refer to §9 for all power measurements.

Product Specific 10g (Extremity) Adjusted SAR Calculation

Wireless technologies	Max Tune-up Limit (dBm)	Reduced Tune-Up Limit (dBm)	Pow er Factor	Reported SAR Limit (W/kg)
W-CDMA B2	24.5	22.5	1.58	0.757
W-CDMA B4	24.4	22.5	1.55	0.775
LTE B2	25.0	23.0	1.58	0.757
LTE B41	24.5	22.0	1.78	0.675
LTE B66	25.0	23.0	1.58	0.757

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, Product Specific 10g SAR testing is not required for these bands 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 Product Specific 10g SAR is not required.
2. LTE 50% RB is scaled up to the Max Tune-Up Limit with MPR included.

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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	Antenna-to-User Separation	Test Position	Antenna-to-edge/surface	SAR Required	Note
WWAN (Main Ant. 1)	Head	0 mm	Left Touch	N/A	Yes	
			Left Tilt (15°)	N/A	Yes	
			Right Touch	N/A	Yes	
			Right Tilt (15°)	N/A	Yes	
	Body	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	
	Product Specific 10g (Extremity)	0 mm	Rear	Refer to notes 2 & 3		
			Front			
			Edge 1 (Top)			
			Edge 2 (Right)			
			Edge 3 (Bottom)			
			Edge 4 (Left)			
WWAN (Main Ant. 2)	Head	0 mm	Left Touch	N/A	Yes	
			Left Tilt (15°)	N/A	Yes	
			Right Touch	N/A	Yes	
			Right Tilt (15°)	N/A	Yes	
	Body	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	
	Product Specific 10g (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, Product Specific 10-g 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, Product Specific 10-g SAR is required for each test position that has an adjusted SAR to maximum power that is > 1.2 W/kg.
4. WWAN Main Antenna #2 supports LTE B41.

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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	Yes	
			Edge 3 (Bottom)	> 25 mm	No	1
			Edge 4 (Left)	> 25 mm	No	1
	Product Specifc 10g (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, Product Specific 10-g 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, Product Specific 10-g SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg.
4. Wi-Fi Direct only supported during Hand use conditions.

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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

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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	11/12/2019	1750	Head	1750	39.41	40.08	-1.68	1.32	1.37	-3.36
				1710	39.38	40.15	-1.91	1.30	1.35	-3.60
				1755	39.41	40.08	-1.66	1.32	1.37	-3.56
1	11/14/2019	2600	Head	2600	39.07	39.01	0.15	1.94	1.96	-1.23
				2495	39.12	39.14	-0.06	1.85	1.85	0.13
				2690	38.97	38.90	0.19	2.02	2.06	-1.96
1	11/25/2019	2450	Head	2450	38.74	39.20	-1.17	1.86	1.80	3.50
				2400	38.81	39.30	-1.24	1.82	1.75	4.07
				2480	38.67	39.16	-1.26	1.87	1.83	2.27
1	11/27/2019	1750	Head	1750	39.28	40.08	-2.01	1.33	1.37	-2.55
				1710	39.26	40.15	-2.21	1.31	1.35	-2.41
				1755	39.29	40.08	-1.96	1.34	1.37	-2.54
1	11/26/2019	5750	Head	5750	34.43	35.36	-2.64	5.06	5.21	-2.99
				5700	34.52	35.42	-2.54	5.00	5.16	-3.25
				5850	34.27	35.30	-2.92	5.16	5.27	-2.01
1	12/2/2019	5800	Head	5800	34.60	35.30	-1.98	5.28	5.27	0.17
				5700	34.80	35.42	-1.75	5.15	5.16	-0.30
				5850	34.52	35.30	-2.21	5.33	5.27	1.16
2	11/12/2019	750	Head	750	40.80	41.96	-2.77	0.89	0.89	-0.12
				660	42.55	42.42	0.30	0.86	0.89	-3.39
				800	41.69	41.71	-0.04	0.90	0.90	0.27
2	11/12/2019	835	Head	835	41.48	41.50	-0.05	0.91	0.90	0.69
				805	41.62	41.68	-0.14	0.90	0.90	0.31
				850	41.47	41.50	-0.07	0.91	0.92	-0.46
2	11/15/2019	835	Head	835	41.82	41.50	0.77	0.94	0.90	4.53
				805	41.80	41.68	0.29	0.93	0.90	3.86
				850	41.80	41.50	0.72	0.95	0.92	3.37
2	11/14/2019	750	Head	750	40.80	41.96	-2.77	0.91	0.89	2.32
				660	41.21	42.42	-2.86	0.88	0.89	-0.66
				800	40.76	41.71	-2.27	0.93	0.90	3.77
2	11/18/2019	750	Head	750	44.02	41.96	4.91	0.89	0.89	-0.09
				660	41.78	42.42	-1.52	0.86	0.89	-2.44
				800	42.34	41.71	1.52	0.91	0.90	1.66
2	11/19/2019	835	Head	835	40.66	41.50	-2.02	0.92	0.90	2.62
				805	40.69	41.68	-2.37	0.91	0.90	1.85
				850	40.61	41.50	-2.14	0.93	0.92	1.39
2	11/25/2019	5250	Head	5250	36.83	35.93	2.50	4.58	4.70	-2.70
				5150	37.00	36.05	2.64	4.47	4.60	-2.91
				5350	36.66	35.82	2.35	4.68	4.80	-2.67
2	11/25/2019	5600	Head	5600	36.25	35.53	2.02	4.92	5.06	-2.75
				5500	36.43	35.65	2.19	4.81	4.96	-3.04
				5725	36.02	35.39	1.78	5.08	5.19	-2.14
2	12/2/2019	5250	Head	5250	36.71	35.93	2.16	4.74	4.70	0.83
				5150	36.90	36.05	2.37	4.62	4.60	0.44
				5350	36.60	35.82	2.18	4.85	4.80	0.95
2	12/2/2019	5600	Head	5600	36.18	35.53	1.82	5.12	5.06	1.14
				5500	36.36	35.65	2.00	4.99	4.96	0.63
				5725	35.92	35.39	1.49	5.29	5.19	1.96
3	11/12/2019	1900	Head	1900	40.02	40.00	0.05	1.45	1.40	3.43
				1850	40.09	40.00	0.23	1.42	1.40	1.21
				1920	39.99	40.00	-0.02	1.46	1.40	4.14

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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.

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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	11/12/2019	Head	D1750V2 SN:1050	4/17/2020	3.390	33.90	35.40	**-4.24**	1.820	18.20	18.60	-2.15	1,2
1	11/14/2019	Head	D2600V2 SN:1006	10/14/2020	5.440	54.40	59.31	**-8.28**	2.450	24.50	26.43	-7.30	3,4
1	11/25/2019	Head	D2450V2 SN:748	2/16/2020	5.260	52.60	52.00	**1.15**	2.450	24.50	24.20	1.24	5,6
1	11/27/2019	Head	D1750V2 SN:1050	4/17/2020	3.540	35.40	35.40	0.00	1.890	18.90	18.60	1.61	
1	11/26/2019	Head	D5GHzV2 SN:1003 (5.75 GHz)	2/19/2020	7.590	75.90	80.70	**-5.95**	2.180	21.80	23.00	-5.22	7,8
1	12/2/2019	Head	D5GHzV2 SN:1003 (5.75 GHz)	2/19/2020	7.630	76.30	80.70	-5.45	2.160	21.60	23.00	-6.09	
2	11/12/2019	Head	D750V3 SN:1019	3/21/2020	0.754	7.54	8.29	**-9.05**	0.495	4.95	5.44	-9.01	9,10
2	11/12/2019	Head	D835V2 SN:4d117	5/15/2020	0.873	8.73	9.50	**-8.11**	0.564	5.64	6.17	-8.59	11,12
2	11/14/2019	Head	D750V3 SN:1019	3/21/2020	0.860	8.60	8.29	3.74	0.565	5.65	5.44	3.86	
2	11/15/2019	Head	D835V2 SN:4d117	5/15/2020	0.976	9.76	9.50	2.74	0.634	6.34	6.17	2.76	
2	11/18/2019	Head	D750V3 SN:1019	3/21/2020	0.837	8.37	8.29	0.97	0.548	5.48	5.44	0.74	
2	11/19/2019	Head	D835V2 SN:4d117	5/15/2020	0.954	9.54	9.50	0.42	0.620	6.20	6.17	0.49	
2	11/25/2019	Head	D5GHzV2 SN:1003 (5.25 GHz)	2/19/2020	8.000	80.00	80.80	-0.99	2.320	23.20	23.30	-0.43	
2	11/25/2019	Head	D5GHzV2 SN:1003 (5.60 GHz)	2/19/2020	8.570	85.70	82.70	3.63	2.440	24.40	23.80	2.52	
2	12/2/2019	Head	D5GHzV2 SN:1003 (5.25 GHz)	2/19/2020	7.840	78.40	80.80	**-2.97**	2.250	22.50	23.30	-3.43	13,14
2	12/2/2019	Head	D5GHzV2 SN:1003 (5.60 GHz)	2/19/2020	8.930	89.30	82.70	**7.98**	2.530	25.30	23.80	6.30	15,16
3	11/12/2019	Head	D1900V2 SN:5d140	4/17/2020	4.070	40.70	39.50	**3.04**	2.110	21.10	20.60	2.43	17,18

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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.

Maximum Output Power (Tune-up Limit) for GSM

SAR is not required for EDGE (8PSK) mode because the maximum output power and tune-up limit is ≤ 1/4dB higher than GPRS/EDGE (GMSK) or the adjusted SAR of the highest reported SAR of GPRS/EDGE (GMSK) is ≤ 1.2W/kg.

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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	33.4	24.4	34.5	**25.5**
			190	836.6	33.0	24.0		
			251	848.8	33.3	24.3		
		2	128	824.2	29.3	23.3	30.5	24.5
			190	836.6	28.9	22.9		
			251	848.8	29.1	23.1		
		3	128	824.2	27.6	23.3	29.0	24.7
			190	836.6	27.2	22.9		
			251	848.8	27.4	23.1		
		4	128	824.2	26.4	23.4	28.0	25.0
			190	836.6	26.4	23.4		
			251	848.8	26.1	23.1		
EDGE (8PSK)	MCS5	1	128	824.2	25.5	16.5	27.0	18.0
			190	836.6	25.3	16.3		
			251	848.8	25.2	16.2		
		2	128	824.2	22.5	16.5	24.0	18.0
			190	836.6	22.2	16.2		
			251	848.8	22.3	16.3		
		3	128	824.2	21.0	16.7	22.5	18.2
			190	836.6	20.6	16.3		
			251	848.8	20.5	16.2		
		4	128	824.2	19.5	16.5	21.0	18.0
			190	836.6	19.7	16.7		
			251	848.8	19.4	16.4		

Notes:

Based on the Tune-up Procedure, GPRS/EDGE (GMSK) mode with 1 time slot for Max power a have maximum frame-averaged power.

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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
GSM Voice[2]	CS1	1	512	1850.2	31.0	22.0	31.5	22.5
			661	1880.0	31.0	22.0		
			810	1909.8	31.0	22.0		
GPRS/EDGE (GMSK)	CS1	1	512	1850.2	31.3	25.3	32.0	**23.0**
			661	1880.0	31.2	25.2		
			810	1909.8	30.9	24.9		
		2	512	1850.2	27.1	21.1	28.5	22.5
			661	1880.0	27.3	21.3		
			810	1909.8	27.4	21.4		
		3	512	1850.2	25.1	20.8	26.5	22.2
			661	1880.0	25.6	21.3		
			810	1909.8	25.8	21.5		
		4	512	1850.2	23.5	20.5	25.5	22.5
			661	1880.0	24.0	21.0		
			810	1909.8	24.2	21.2		
EDGE (8PSK)	MCS5	1	512	1850.2	24.0	15.0	25.0	16.0
			661	1880.0	24.0	15.0		
			810	1909.8	23.9	14.9		
		2	512	1850.2	21.0	15.0	22.0	16.0
			661	1880.0	20.9	14.9		
			810	1909.8	20.8	14.8		
		3	512	1850.2	19.5	15.2	21.0	16.7
			661	1880.0	19.4	15.1		
			810	1909.8	19.3	15.0		
		4	512	1850.2	18.9	15.9	19.5	16.5
			661	1880.0	19.1	16.1		
			810	1909.8	19.2	16.2		

Notes:

1. Based on the Tune-up Procedure, GPRS/EDGE (GMSK) mode with 1 time slot for Max power have maximum frame-averaged power.
2. Since VoIP is supported, and PS 1 slot has a higher Frame Power than CS (GSM Voice), all testing for GSM1900 head was done using the PS domain.

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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	$\beta_{ed}1$: 47/15 $\beta_{ed}2$: 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.

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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	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.		

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

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W-CDMA Band II Measured Results

Mode		UL Ch No.	Freq. (MHz)	Maximum Average Power (dBm)			Reduced Average Power (dBm)		
				Measured Pwr	MPR	Tune-up Limit	Measured Pwr	MPR	Tune-up Limit
Release 99	Rel 99 (RMC, 12.2 kbps)	9262	1852.4	23.6	N/A	24.5	21.6	N/A	22.5
		9400	1880.0	23.3			21.3		
		9538	1907.6	23.2			21.3		
HSDPA	Subtest 1	9262	1852.4	22.4	0	23.5	21.5	0	21.5
		9400	1880.0	22.1			21.4		
		9538	1907.6	22.0			21.3		
	Subtest 2	9262	1852.4	22.5	0	23.5	21.5	0	21.5
		9400	1880.0	22.3			21.4		
		9538	1907.6	22.2			21.3		
	Subtest 3	9262	1852.4	22.0	0.5	23.0	21.5	0	21.5
		9400	1880.0	21.8			21.4		
		9538	1907.6	21.7			21.3		
	Subtest 4	9262	1852.4	22.0	0.5	23.0	21.5	0	21.5
		9400	1880.0	21.8			21.3		
		9538	1907.6	21.7			21.3		
HSUPA	Subtest 1	9262	1852.4	22.6	0	23.5	20.6	0	21.5
		9400	1880.0	22.4			20.4		
		9538	1907.6	22.3			20.2		
	Subtest 2	9262	1852.4	20.6	2	21.5	18.6	2	19.5
		9400	1880.0	20.4			18.4		
		9538	1907.6	20.2			18.4		
	Subtest 3	9262	1852.4	20.6	1	22.5	18.6	1	20.5
		9400	1880.0	20.6			18.5		
		9538	1907.6	20.5			18.6		
	Subtest 4	9262	1852.4	20.6	2	21.5	18.6	2	19.5
		9400	1880.0	20.4			18.3		
		9538	1907.6	20.2			18.3		
	Subtest 5	9262	1852.4	22.6	0	23.5	20.6	0	21.5
		9400	1880.0	22.4			20.4		
		9538	1907.6	22.3			20.3		
DC-HSDPA	Subtest 1	9262	1852.4	22.5	0	23.5	20.6	0	21.5
		9400	1880.0	22.2			20.3		
		9538	1907.6	22.2			20.3		
	Subtest 2	9262	1852.4	22.5	0	23.5	20.6	0	21.5
		9400	1880.0	22.2			20.3		
		9538	1907.6	22.2			20.3		
	Subtest 3	9262	1852.4	22.0	0.5	23.0	20.1	0.5	21.0
		9400	1880.0	21.8			19.8		
		9538	1907.6	21.7			19.8		
	Subtest 4	9262	1852.4	22.0	0.5	23.0	20.1	0.5	21.0
		9400	1880.0	21.8			19.8		
		9538	1907.6	21.7			19.8		

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W-CDMA Band IV Measured Results

Mode		UL Ch No.	Freq. (MHz)	Maximum Average Power (dBm)			Reduced Average Power (dBm)		
				Measured Pw r	MPR	Tune-up Limit	Measured Pw r	MPR	Tune-up Limit
Release 99	Rel 99 (RMC, 12.2 kbps)	1312	1712.4	23.5	N/A	24.5	21.5	N/A	22.5
		1413	1732.6	23.3			21.3		
		1513	1752.6	23.5			21.5		
HSDPA	Subtest 1	1312	1712.4	22.5	0	23.5	20.6	0	21.5
		1413	1732.6	22.3			20.3		
		1513	1752.6	22.4			20.6		
	Subtest 2	1312	1712.4	22.5	0	23.5	20.6	0	21.5
		1413	1732.6	22.3			20.3		
		1513	1752.6	22.3			20.6		
	Subtest 3	1312	1712.4	22.0	0.5	23.0	20.1	0	21.5
		1413	1732.6	21.8			19.8		
		1513	1752.6	22.0			20.0		
	Subtest 4	1312	1712.4	22.0	0.5	23.0	20.0	0	21.5
		1413	1732.6	21.7			19.8		
		1513	1752.6	21.8			20.0		
HSUPA	Subtest 1	1312	1712.4	22.5	0	23.5	20.5	0	21.5
		1413	1732.6	22.2			20.3		
		1513	1752.6	22.5			20.4		
	Subtest 2	1312	1712.4	20.6	2	21.5	18.5	2	19.5
		1413	1732.6	20.3			18.3		
		1513	1752.6	20.5			18.5		
	Subtest 3	1312	1712.4	21.6	1	22.5	19.5	1	20.5
		1413	1732.6	21.2			19.2		
		1513	1752.6	21.5			19.5		
	Subtest 4	1312	1712.4	20.6	2	21.5	18.5	2	19.5
		1413	1732.6	20.2			18.3		
		1513	1752.6	20.4			18.4		
	Subtest 5	1312	1712.4	22.5	0	23.5	20.5	0	21.5
		1413	1732.6	22.2			20.2		
		1513	1752.6	22.4			20.4		
DC-HSDPA	Subtest 1	1312	1712.4	22.5	0	23.5	20.5	0	21.5
		1413	1732.6	22.2			20.3		
		1513	1752.6	22.3			20.5		
	Subtest 2	1312	1712.4	22.5	0	23.5	20.4	0	21.5
		1413	1732.6	22.2			20.3		
		1513	1752.6	22.3			20.4		
	Subtest 3	1312	1712.4	22.0	0.5	23.0	20.0	0.5	21.0
		1413	1732.6	21.8			19.8		
		1513	1752.6	21.8			19.9		
	Subtest 4	1312	1712.4	22.0	0.5	23.0	20.0	0.5	21.0
		1413	1732.6	21.8			19.8		
		1513	1752.6	22.0			20.0		

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W-CDMA Band V Measured Results

Mode		UL Ch No.	Freq. (MHz)	Maximum Average Power (dBm)		
				Measured Pwr	MPR	Tune-up Limit
Release 99	Rel 99 (RMC, 12.2 kbps)	4132	826.4	23.6	N/A	24.5
		4183	836.6	23.5		
		4233	846.6	23.3		
HSDPA	Subtest 1	4132	826.4	22.6	0	23.5
		4183	836.6	22.4		
		4233	846.6	22.4		
	Subtest 2	4132	826.4	22.7	0	23.5
		4183	836.6	22.5		
		4233	846.6	22.4		
	Subtest 3	4132	826.4	22.1	0.5	23.0
		4183	836.6	21.9		
		4233	846.6	21.9		
	Subtest 4	4132	826.4	22.1	0.5	23.0
		4183	836.6	22.0		
		4233	846.6	21.9		
HSUPA	Subtest 1	4132	826.4	22.6	0	23.5
		4183	836.6	22.5		
		4233	846.6	22.5		
	Subtest 2	4132	826.4	20.6	2	21.5
		4183	836.6	20.5		
		4233	846.6	20.4		
	Subtest 3	4132	826.4	21.7	1	22.5
		4183	836.6	21.5		
		4233	846.6	21.2		
	Subtest 4	4132	826.4	20.6	2	21.5
		4183	836.6	20.5		
		4233	846.6	20.4		
	Subtest 5	4132	826.4	22.6	0	23.5
		4183	836.6	22.5		
		4233	846.6	22.5		
DC-HSDPA	Subtest 1	4132	826.4	22.6	0	23.5
		4183	836.6	22.4		
		4233	846.6	22.4		
	Subtest 2	4132	826.4	22.7	0	23.5
		4183	836.6	22.5		
		4233	846.6	22.4		
	Subtest 3	4132	826.4	22.1	0.5	23.0
		4183	836.6	21.9		
		4233	846.6	21.9		
	Subtest 4	4132	826.4	22.1	0.5	23.0
		4183	836.6	22.0		
		4233	846.6	21.9		

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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

<u>Maximum Output Power (Tune-up Limit) for LTE</u>

According to April 2015 TCB workshop, SAR test exclusion can be applied for testing overlapping LTE bands as follows:

a) The maximum output power, including tolerance, for the smaller band must be ≤ the larger band to qualify for the SAR test exclusion.
b) The channel bandwidth and other operating parameters for the smaller band must be fully supported by the larger band.
   - LTE Band 4 (1710-1755 MHz) is covered by LTE Band 66 (1710-1780 MHz)
   - LTE Band 17 (704-716 MHz) is covered by LTE Band 12 (699-716 MHz)

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 and 64QAM. When the highest maximum output power for 16QAM and 64QAM 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.

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LTE Band 2 Measured Results

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					Reduced Average Power (dBm)				
				18700	18900	19100	MPR	Tune-up Limit	18700	18900	19100	MPR	Tune-up Limit
				1860 MHz	1880 MHz	1900 MHz			1860 MHz	1880 MHz	1900 MHz		
20 MHz	QPSK	1	0	23.8	23.6	23.2	0	25	21.8	21.7	21.3	0	23
		1	49	23.7	23.6	23.3	0	25	21.8	21.7	21.4	0	23
		1	99	23.6	23.5	23.3	0	25	21.7	21.6	21.3	0	23
		50	0	22.7	22.6	22.4	1	24	21.8	21.7	21.5	0	23
		50	24	22.7	22.7	22.5	1	24	21.7	21.8	21.6	0	23
		50	50	22.7	22.7	22.4	1	24	21.7	21.8	21.5	0	23
		100	0	22.6	22.6	22.4	1	24	21.7	21.7	21.5	0	23
	16QAM	1	0	23.2	23.2	22.8	1	24	22.3	22.3	21.9	0	23
		1	49	23.3	23.2	22.8	1	24	22.3	22.3	21.9	0	23
		1	99	23.2	23.2	22.6	1	24	22.2	22.3	21.8	0	23
		50	0	21.8	21.7	21.6	2	23	21.9	21.8	21.6	0	23
		50	24	21.8	21.8	21.6	2	23	21.9	21.9	21.7	0	23
		50	50	21.8	21.8	21.5	2	23	21.9	21.9	21.6	0	23
		100	0	21.8	21.8	21.6	2	23	21.8	21.8	21.6	0	23
	64QAM	1	0	22.7	22.8	22.0	2	23	22.3	22.3	22.2	0	23
		1	49	22.7	22.7	21.9	2	23	22.3	22.2	22.2	0	23
		1	99	22.6	22.7	21.8	2	23	22.2	22.2	22.0	0	23
		50	0	21.3	21.1	20.9	3	22	21.1	21.0	21.0	0	23
		50	24	21.2	21.2	20.9	3	22	21.0	21.0	21.0	0	23
		50	50	21.3	21.1	20.8	3	22	21.0	21.0	21.0	0	23
		100	0	21.2	21.0	20.9	3	22	21.0	21.0	21.0	0	23

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					Reduced Average Power (dBm)				
				18675	18900	19125	MPR	Tune-up Limit	18675	18900	19125	MPR	Tune-up Limit
				1857.5 MHz	1880 MHz	1902.5 MHz			1857.5 MHz	1880 MHz	1902.5 MHz		
15 MHz	QPSK	1	0	23.8	23.6	23.4	0	25	21.8	21.7	21.5	0	23
		1	37	23.7	23.6	23.3	0	25	21.8	21.7	21.4	0	23
		1	74	23.6	23.5	23.3	0	25	21.7	21.5	21.3	0	23
		36	0	22.7	22.6	22.4	1	24	21.7	21.7	21.5	0	23
		36	20	22.7	22.6	22.4	1	24	21.8	21.7	21.4	0	23
		36	39	22.6	22.6	22.4	1	24	21.6	21.7	21.5	0	23
		75	0	22.7	22.6	22.4	1	24	21.7	21.6	21.5	0	23
	16QAM	1	0	23.2	22.6	22.8	1	24	22.3	21.7	21.9	0	23
		1	37	23.2	22.6	22.8	1	24	22.3	21.7	21.8	0	23
		1	74	23.1	22.5	22.6	1	24	22.2	21.6	21.7	0	23
		36	0	21.8	21.7	21.6	2	23	21.8	21.7	21.7	0	23
		36	20	21.8	21.8	21.5	2	23	21.9	21.8	21.6	0	23
		36	39	21.7	21.8	21.5	2	23	21.8	21.8	21.6	0	23
		75	0	21.8	21.7	21.5	2	23	21.9	21.8	21.5	0	23
	64QAM	1	0	22.7	22.3	21.9	2	23	22.6	22.2	21.8	0	23
		1	37	22.7	22.3	21.8	2	23	22.6	22.2	21.7	0	23
		1	74	22.6	22.2	21.7	2	23	22.5	22.1	21.6	0	23
		36	0	21.1	21.0	20.8	3	22	21.0	21.0	21.0	0	23
		36	20	21.1	21.1	20.8	3	22	21.0	21.0	21.0	0	23
		36	39	21.0	21.1	20.8	3	22	21.0	21.0	21.0	0	23
		75	0	21.1	21.0	20.7	3	22	21.1	21.0	21.0	0	23

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					Reduced Average Power (dBm)				
				18650	18900	19150	MPR	Tune-up Limit	18650	18900	19150	MPR	Tune-up Limit
				1855 MHz	1880 MHz	1905 MHz			1855 MHz	1880 MHz	1905 MHz		
10 MHz	QPSK	1	0	23.8	23.7	23.3	0	25	21.9	21.8	21.4	0	23
		1	25	23.7	23.6	23.3	0	25	21.8	21.7	21.3	0	23
		1	49	23.7	23.6	23.4	0	25	21.8	21.7	21.3	0	23
		25	0	22.3	22.1	22.0	1	24	21.8	21.7	21.4	0	23
		25	12	22.3	22.2	22.0	1	24	21.8	21.7	21.5	0	23
		25	25	22.3	22.2	22.0	1	24	21.8	21.7	21.4	0	23
		50	0	22.3	22.1	22.0	1	24	21.8	21.8	21.5	0	23
	16QAM	1	0	22.9	22.8	22.8	1	24	22.0	21.8	21.8	0	23
		1	25	22.9	22.6	22.7	1	24	22.0	21.7	21.7	0	23
		1	49	22.9	22.6	22.6	1	24	22.0	21.7	21.7	0	23
		25	0	22.5	22.2	22.0	2	23	22.0	21.8	21.6	0	23
		25	12	22.5	22.3	22.0	2	23	22.0	21.8	21.6	0	23
		25	25	22.4	22.3	21.9	2	23	22.0	21.8	21.5	0	23
		50	0	22.4	22.3	22.0	2	23	21.9	21.8	21.6	0	23
	64QAM	1	0	22.4	22.4	21.8	2	23	22.3	22.4	21.7	0	23
		1	25	22.3	22.3	21.7	2	23	22.3	22.2	21.6	0	23
		1	49	22.3	22.2	21.7	2	23	22.3	22.2	21.7	0	23
		25	0	21.2	21.0	20.7	3	22	21.2	21.0	21.0	0	23
		25	12	21.2	21.1	20.8	3	22	21.2	21.0	21.0	0	23
		25	25	21.2	21.0	20.7	3	22	21.2	21.0	21.0	0	23
		50	0	21.0	21.0	20.8	3	22	21.0	21.0	21.0	0	23

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LTE Band 2 Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					Reduced Average Power (dBm)				
				18625	18900	19175	MPR	Tune-up Limit	18625	18900	19175	MPR	Tune-up Limit
				1852.5 MHz	1880 MHz	1907.5 MHz			1852.5 MHz	1880 MHz	1907.5 MHz		
5 MHz	QPSK	1	0	23.8	23.7	23.3	0	25	21.8	21.8	21.3	0	23
		1	12	23.8	23.7	23.3	0	25	21.9	21.8	21.3	0	23
		1	24	23.8	23.7	23.3	0	25	21.9	21.8	21.3	0	23
		12	0	22.8	22.6	22.3	1	24	21.8	21.7	21.4	0	23
		12	7	22.8	22.6	22.4	1	24	21.9	21.7	21.4	0	23
		12	13	22.9	22.7	22.3	1	24	21.9	21.7	21.4	0	23
		25	0	22.4	22.2	22.0	1	24	21.9	21.7	21.4	0	23
	16QAM	1	0	22.9	22.8	22.8	1	24	22.0	21.9	21.9	0	23
		1	12	23.0	22.9	22.8	1	24	22.0	21.9	21.9	0	23
		1	24	23.0	22.8	22.8	1	24	22.1	21.9	21.9	0	23
		12	0	22.0	21.8	21.5	2	23	22.0	21.9	21.6	0	23
		12	7	22.0	21.9	21.6	2	23	22.0	21.9	21.6	0	23
		12	13	22.0	21.8	21.6	2	23	22.0	21.9	21.6	0	23
		25	0	21.9	21.8	21.5	2	23	21.9	21.8	21.5	0	23
	64QAM	1	0	22.3	21.8	21.8	2	23	22.3	21.8	21.8	0	23
		1	12	22.3	21.9	21.9	2	23	22.3	21.9	21.9	0	23
		1	24	22.4	21.9	21.8	2	23	22.3	21.9	21.8	0	23
		12	0	21.2	21.0	20.6	3	22	21.2	21.0	21.0	0	23
		12	7	21.2	21.0	20.7	3	22	21.2	21.0	21.0	0	23
		12	13	21.2	21.0	20.6	3	22	21.2	21.0	21.0	0	23
		25	0	21.2	20.9	20.6	3	22	21.2	21.0	21.0	0	23

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					Reduced Average Power (dBm)				
				18615	18900	19185	MPR	Tune-up Limit	18615	18900	19185	MPR	Tune-up Limit
				1851.5 MHz	1880 MHz	1908.5 MHz			1851.5 MHz	1880 MHz	1908.5 MHz		
3 MHz	QPSK	1	0	23.7	23.5	23.3	0	25	21.8	21.6	21.3	0	23
		1	8	23.9	23.7	23.4	0	25	21.9	21.8	21.4	0	23
		1	14	23.7	23.6	23.3	0	25	21.8	21.7	21.3	0	23
		8	0	22.8	22.7	22.3	1	24	21.8	21.7	21.3	0	23
		8	4	22.8	22.6	22.4	1	24	21.9	21.7	21.4	0	23
		8	7	22.8	22.7	22.3	1	24	21.9	21.7	21.4	0	23
		15	0	22.8	22.6	22.3	1	24	21.9	21.7	21.4	0	23
	16QAM	1	0	22.9	22.6	22.6	1	24	21.9	21.7	21.7	0	23
		1	8	23.0	22.7	22.7	1	24	22.1	21.8	21.8	0	23
		1	14	22.9	22.6	22.6	1	24	22.0	21.6	21.8	0	23
		8	0	21.9	21.8	21.4	2	23	22.0	21.9	21.5	0	23
		8	4	22.0	21.9	21.5	2	23	22.0	21.9	21.5	0	23
		8	7	22.0	21.9	21.5	2	23	22.0	21.9	21.5	0	23
		15	0	21.9	21.8	21.5	2	23	21.9	21.8	21.5	0	23
	64QAM	1	0	22.3	22.2	21.6	2	23	22.3	22.1	21.6	0	23
		1	8	22.4	22.3	21.7	2	23	22.3	22.3	21.7	0	23
		1	14	22.2	22.2	21.6	2	23	22.2	22.2	21.6	0	23
		8	0	21.0	21.0	20.6	3	22	21.0	21.0	21.0	0	23
		8	4	21.1	21.0	20.7	3	22	21.1	21.0	21.0	0	23
		8	7	21.1	21.0	20.7	3	22	21.1	21.0	21.0	0	23
		15	0	21.1	20.9	20.7	3	22	21.1	21.0	21.0	0	23

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					Reduced Average Power (dBm)				
				18607	18900	19193	MPR	Tune-up Limit	18607	18900	19193	MPR	Tune-up Limit
				1850.7 MHz	1880 MHz	1909.3 MHz			1850.7 MHz	1880 MHz	1909.3 MHz		
1.4 MHz	QPSK	1	0	23.7	23.5	23.3	0	25	21.7	21.6	21.2	0	23
		1	3	23.8	23.6	23.3	0	25	21.8	21.7	21.3	0	23
		1	5	23.7	23.5	23.3	0	25	21.7	21.7	21.2	0	23
		3	0	23.8	23.5	23.1	0	25	21.8	21.6	21.3	0	23
		3	1	23.8	23.7	23.3	0	25	21.8	21.7	21.3	0	23
		3	3	23.8	23.6	23.3	0	25	21.8	21.7	21.4	0	23
		6	0	22.7	22.5	22.2	1	24	21.7	21.6	21.3	0	23
	16QAM	1	0	23.1	22.6	22.3	1	24	21.9	21.8	21.7	0	23
		1	3	23.2	22.7	22.3	1	24	21.9	21.9	21.7	0	23
		1	5	23.1	22.7	22.3	1	24	21.9	21.9	21.7	0	23
		3	0	23.1	22.9	22.3	1	24	22.1	21.8	21.6	0	23
		3	1	23.1	22.9	22.4	1	24	22.1	21.8	21.6	0	23
		3	3	23.1	22.9	22.4	1	24	22.1	21.8	21.7	0	23
		6	0	21.7	21.9	21.4	2	23	22.0	21.9	21.3	0	23
	64QAM	1	0	22.1	22.0	21.8	2	23	22.2	22.2	21.5	0	23
		1	3	22.2	22.1	21.9	2	23	22.2	22.3	21.6	0	23
		1	5	22.1	22.0	21.8	2	23	22.2	22.2	21.6	0	23
		3	0	22.2	21.8	21.8	2	23	22.0	22.2	21.6	0	23
		3	1	22.3	21.9	21.9	2	23	22.1	22.2	21.7	0	23
		3	3	22.3	21.9	21.9	2	23	22.1	22.2	21.7	0	23
		6	0	21.3	20.9	20.5	3	22	21.1	21.0	21.0	0	23

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LTE Band 5 Measured Results

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				[redacted]	20525	[redacted]		
					836.5 MHz			
10 MHz	QPSK	1	0		24.0		0	25.5
		1	25		23.9		0	25.5
		1	49		23.9		0	25.5
		25	0		23.0		1	24.5
		25	12		23.0		1	24.5
		25	25		23.0		1	24.5
		50	0		23.0		1	24.5
	16QAM	1	0		22.9		1	24.5
		1	25		22.9		1	24.5
		1	49		22.9		1	24.5
		25	0		21.5		2	23.5
		25	12		21.6		2	23.5
		25	25		21.5		2	23.5
		50	0		21.5		2	23.5
	64QAM	1	0		22.3		2	23.5
		1	25		22.3		2	23.5
		1	49		22.2		2	23.5
		25	0		21.7		3	22.5
		25	12		21.7		3	22.5
		25	25		21.7		3	22.5
		50	0		21.6		3	22.5

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				20425	20525	20625		
				826.5 MHz	836.5 MHz	846.5 MHz		
5 MHz	QPSK	1	0	24.3	24.0	23.9	0	25.5
		1	12	24.2	23.9	23.8	0	25.5
		1	24	24.2	23.9	23.8	0	25.5
		12	0	23.2	23.0	22.8	1	24.5
		12	7	23.2	23.0	22.8	1	24.5
		12	13	23.2	23.0	22.8	1	24.5
		25	0	23.2	23.0	22.8	1	24.5
	16QAM	1	0	23.3	23.5	22.9	1	24.5
		1	12	23.3	23.5	22.9	1	24.5
		1	24	23.3	23.5	22.9	1	24.5
		12	0	22.3	22.2	21.9	2	23.5
		12	7	22.3	22.2	21.9	2	23.5
		12	13	22.3	22.2	21.9	2	23.5
		25	0	22.3	22.1	21.8	2	23.5
	64QAM	1	0	22.5	22.0	22.2	2	23.5
		1	12	22.5	22.0	22.1	2	23.5
		1	24	22.5	22.0	22.1	2	23.5
		12	0	21.4	21.2	20.9	3	22.5
		12	7	21.4	21.2	20.9	3	22.5
		12	13	21.3	21.2	20.8	3	22.5
		25	0	21.3	21.1	20.9	3	22.5

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LTE Band 5 Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				20415	20525	20635		
				825.5 MHz	836.5 MHz	847.5 MHz		
3 MHz	QPSK	1	0	24.2	24.0	23.8	0	25.5
		1	8	24.2	24.0	23.9	0	25.5
		1	14	24.1	24.0	23.8	0	25.5
		8	0	23.2	23.0	22.8	1	24.5
		8	4	23.2	23.0	22.8	1	24.5
		8	7	23.2	23.0	22.8	1	24.5
		15	0	23.2	23.0	22.7	1	24.5
	16QAM	1	0	23.2	22.9	23.2	1	24.5
		1	8	23.3	23.0	23.2	1	24.5
		1	14	23.2	22.9	23.1	1	24.5
		8	0	22.2	22.1	21.9	2	23.5
		8	4	22.3	22.2	21.9	2	23.5
		8	7	22.3	22.2	21.9	2	23.5
		15	0	22.1	22.1	21.9	2	23.5
	64QAM	1	0	22.4	22.4	21.9	2	23.5
		1	8	22.5	22.4	22.0	2	23.5
		1	14	22.4	22.3	21.9	2	23.5
		8	0	21.2	21.1	20.9	3	22.5
		8	4	21.2	21.2	20.9	3	22.5
		8	7	21.2	21.1	20.9	3	22.5
		15	0	21.3	21.0	20.9	3	22.5

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				20407	20525	20643		
				824.7 MHz	836.5 MHz	848.3 MHz		
1.4 MHz	QPSK	1	0	24.1	23.8	23.7	0	25.5
		1	3	24.1	23.9	23.8	0	25.5
		1	5	24.1	23.8	23.7	0	25.5
		3	0	24.0	23.8	23.6	0	25.5
		3	1	24.1	23.9	23.6	0	25.5
		3	3	24.1	23.9	23.7	0	25.5
		6	0	23.1	22.9	22.7	1	24.5
	16QAM	1	0	23.5	22.9	22.8	1	24.5
		1	3	23.5	23.0	22.8	1	24.5
		1	5	23.5	23.0	22.8	1	24.5
		3	0	23.3	23.1	22.7	1	24.5
		3	1	23.3	23.1	22.8	1	24.5
		3	3	23.3	23.1	22.8	1	24.5
		6	0	22.1	22.1	21.9	2	23.5
	64QAM	1	0	22.5	22.1	21.9	2	23.5
		1	3	22.6	22.2	21.9	2	23.5
		1	5	22.5	22.1	21.9	2	23.5
		3	0	22.4	22.1	21.6	2	23.5
		3	1	22.5	22.2	21.7	2	23.5
		3	3	22.5	22.1	21.7	2	23.5
		6	0	21.2	21.3	20.9	3	22.5

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LTE Band 12 Measured Results

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				[redacted]	23095	[redacted]		
					707.5 MHz			
10 MHz	QPSK	1	0		23.5		0	25
		1	25		23.4		0	25
		1	49		23.4		0	25
		25	0		22.5		1	24
		25	12		22.5		1	24
		25	25		22.4		1	24
		50	0		22.5		1	24
	16QAM	1	0		22.4		1	24
		1	25		22.4		1	24
		1	49		22.4		1	24
		25	0		21.5		2	23
		25	12		21.6		2	23
		25	25		21.5		2	23
		50	0		21.5		2	23
	64QAM	1	0		21.8		2	23
		1	25		21.8		2	23
		1	49		21.8		2	23
		25	0		20.6		3	22
		25	12		20.6		3	22
		25	25		20.6		3	22
		50	0		20.6		3	22

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				23035	23095	23155		
				701.5 MHz	707.5 MHz	713.5 MHz		
5 MHz	QPSK	1	0	23.6	23.6	23.3	0	25
		1	12	23.6	23.5	23.4	0	25
		1	24	23.5	23.5	23.4	0	25
		12	0	22.5	22.5	22.3	1	24
		12	7	22.6	22.4	22.4	1	24
		12	13	22.6	22.4	22.4	1	24
		25	0	22.6	22.5	22.3	1	24
	16QAM	1	0	22.7	22.6	22.8	1	24
		1	12	22.7	22.6	22.9	1	24
		1	24	22.6	22.6	22.9	1	24
		12	0	21.6	21.6	21.5	2	23
		12	7	21.7	21.6	21.6	2	23
		12	13	21.7	21.6	21.6	2	23
		25	0	21.5	21.6	21.4	2	23
	64QAM	1	0	21.9	21.4	21.7	2	23
		1	12	21.8	21.4	21.7	2	23
		1	24	21.8	21.4	21.7	2	23
		12	0	20.6	20.6	20.3	3	22
		12	7	20.7	20.6	20.5	3	22
		12	13	20.6	20.6	20.4	3	22
		25	0	20.6	20.5	20.3	3	22

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LTE Band 12 Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				23025	23095	23165		
				700.5 MHz	707.5 MHz	714.5 MHz		
3 MHz	QPSK	1	0	23.5	23.4	23.4	0	25
		1	8	23.6	23.5	23.5	0	25
		1	14	23.5	23.5	23.4	0	25
		8	0	22.5	22.4	22.4	1	24
		8	4	22.5	22.5	22.4	1	24
		8	7	22.6	22.5	22.4	1	24
		15	0	22.5	22.4	22.4	1	24
	16QAM	1	0	22.7	22.4	22.8	1	24
		1	8	22.7	22.5	22.9	1	24
		1	14	22.6	22.4	22.7	1	24
		8	0	21.6	21.6	21.5	2	23
		8	4	21.7	21.7	21.6	2	23
		8	7	21.7	21.7	21.5	2	23
		15	0	21.5	21.5	21.5	2	23
	64QAM	1	0	21.8	21.8	21.5	2	23
		1	8	21.8	21.9	21.6	2	23
		1	14	21.7	21.7	21.5	2	23
		8	0	20.6	20.5	20.5	3	22
		8	4	20.6	20.6	20.5	3	22
		8	7	20.6	20.6	20.5	3	22
		15	0	20.6	20.5	20.5	3	22

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				23017	23095	23173		
				699.7 MHz	707.5 MHz	715.3 MHz		
1.4 MHz	QPSK	1	0	23.6	23.4	23.3	0	25
		1	3	23.6	23.5	23.4	0	25
		1	5	23.5	23.4	23.3	0	25
		3	0	23.4	23.4	23.2	0	25
		3	1	23.5	23.4	23.3	0	25
		3	3	23.5	23.4	23.3	0	25
		6	0	22.5	22.3	22.3	1	24
	16QAM	1	0	22.6	22.8	22.3	1	24
		1	3	22.7	22.9	22.4	1	24
		1	5	22.6	22.8	22.4	1	24
		3	0	22.5	22.6	22.5	1	24
		3	1	22.6	22.6	22.5	1	24
		3	3	22.6	22.6	22.5	1	24
		6	0	21.7	21.3	21.5	2	23
	64QAM	1	0	21.9	21.5	21.5	2	23
		1	3	22.0	21.6	21.5	2	23
		1	5	21.8	21.5	21.5	2	23
		3	0	21.8	21.5	21.3	2	23
		3	1	21.9	21.6	21.4	2	23
		3	3	21.9	21.6	21.3	2	23
		6	0	20.5	20.8	20.4	3	22

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LTE Band 13 Measured Results

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				[redacted]	23230 782 MHz	[redacted]		
10 MHz	QPSK	1	0	[redacted]	23.7	[redacted]	0	25
		1	25	[redacted]	23.8	[redacted]	0	25
		1	49	[redacted]	23.8	[redacted]	0	25
		25	0	[redacted]	22.8	[redacted]	1	24
		25	12	[redacted]	22.9	[redacted]	1	24
		25	25	[redacted]	22.8	[redacted]	1	24
		50	0	[redacted]	22.8	[redacted]	1	24
	16QAM	1	0	[redacted]	22.8	[redacted]	1	24
		1	25	[redacted]	22.8	[redacted]	1	24
		1	49	[redacted]	22.8	[redacted]	1	24
		25	0	[redacted]	22.0	[redacted]	2	23
		25	12	[redacted]	22.0	[redacted]	2	23
		25	25	[redacted]	22.0	[redacted]	2	23
		50	0	[redacted]	21.9	[redacted]	2	23
	64QAM	1	0	[redacted]	21.9	[redacted]	2	23
		1	25	[redacted]	22.0	[redacted]	2	23
		1	49	[redacted]	22.0	[redacted]	2	23
		25	0	[redacted]	21.0	[redacted]	3	22
		25	12	[redacted]	21.0	[redacted]	3	22
		25	25	[redacted]	21.0	[redacted]	3	22
		50	0	[redacted]	20.9	[redacted]	3	22

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)			MPR	Tune-up Limit
				[redacted]	23230 782 MHz	[redacted]		
5 MHz	QPSK	1	0	[redacted]	23.9	[redacted]	0	25
		1	12	[redacted]	23.9	[redacted]	0	25
		1	24	[redacted]	23.9	[redacted]	0	25
		12	0	[redacted]	22.8	[redacted]	1	24
		12	7	[redacted]	22.8	[redacted]	1	24
		12	13	[redacted]	22.8	[redacted]	1	24
		25	0	[redacted]	22.8	[redacted]	1	24
	16QAM	1	0	[redacted]	23.0	[redacted]	1	24
		1	12	[redacted]	23.0	[redacted]	1	24
		1	24	[redacted]	23.0	[redacted]	1	24
		12	0	[redacted]	21.9	[redacted]	2	23
		12	7	[redacted]	22.0	[redacted]	2	23
		12	13	[redacted]	21.9	[redacted]	2	23
		25	0	[redacted]	21.9	[redacted]	2	23
	64QAM	1	0	[redacted]	21.8	[redacted]	2	23
		1	12	[redacted]	21.7	[redacted]	2	23
		1	24	[redacted]	21.7	[redacted]	2	23
		12	0	[redacted]	20.9	[redacted]	3	22
		12	7	[redacted]	20.9	[redacted]	3	22
		12	13	[redacted]	20.9	[redacted]	3	22
		25	0	[redacted]	20.8	[redacted]	3	22

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LTE Band 41 Measured Results

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					MPR	Tune-up Limit	Reduced Average Power (dBm)					MPR	Tune-up Limit
				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		
20 MHz	QPSK	1	0	23.6	23.3	23.2	23.2	23.2	0	24.5	21.2	20.8	20.7	20.8	20.8	0	22
		1	49	23.4	23.2	23.2	23.1	23.2	0	24.5	21.0	20.7	20.6	20.6	20.7	0	22
		1	99	23.4	23.1	23.1	23.1	23.3	0	24.5	20.9	20.7	20.6	20.6	20.7	0	22
		50	0	22.6	22.3	22.3	22.2	22.3	1	23.5	21.1	20.7	20.8	20.7	20.7	0	22
		50	24	22.5	22.3	22.3	22.2	22.2	1	23.5	21.0	20.8	20.8	20.7	20.7	0	22
		50	50	22.6	22.3	22.2	22.1	22.3	1	23.5	21.1	20.8	20.7	20.6	20.8	0	22
		100	0	22.5	22.4	22.2	22.1	22.3	1	23.5	21.1	20.8	20.7	20.7	20.7	0	22
	16QAM	1	0	22.8	22.3	22.1	22.3	22.2	1	23.5	21.4	20.7	20.8	20.9	20.6	0	22
		1	49	22.6	22.2	22.1	22.2	22.2	1	23.5	21.2	20.6	20.7	20.8	20.6	0	22
		1	99	22.6	22.2	22.0	22.3	22.2	1	23.5	21.1	20.6	20.7	20.8	20.6	0	22
		50	0	21.8	21.3	21.4	21.3	21.4	2	22.5	21.3	20.9	20.9	20.9	20.8	0	22
		50	24	21.6	21.4	21.4	21.3	21.4	2	22.5	21.2	20.9	20.9	20.9	20.8	0	22
		50	50	21.6	21.3	21.3	21.3	21.4	2	22.5	21.2	20.9	20.8	20.8	20.9	0	22
		100	0	21.6	21.4	21.4	21.3	21.3	2	22.5	21.2	20.9	20.9	20.8	20.8	0	22
	64QAM	1	0	20.9	21.0	21.1	21.4	21.0	2	22.5	20.3	20.7	20.8	21.2	20.8	0	22
		1	49	21.7	20.9	21.1	21.3	21.0	2	22.5	21.1	20.6	20.8	21.1	20.8	0	22
		1	99	21.6	21.0	21.0	21.4	21.0	2	22.5	21.0	20.6	20.8	21.1	20.7	0	22
		50	0	21.0	20.6	20.7	20.6	20.7	3	21.5	20.4	20.3	20.5	20.3	20.5	0	22
		50	24	20.8	20.7	20.7	20.6	20.7	3	21.5	20.4	20.4	20.4	20.3	20.4	0	22
		50	50	20.8	20.6	20.6	20.5	20.7	3	21.5	20.3	20.3	20.4	20.2	20.5	0	22
		100	0	20.9	20.6	20.7	20.5	20.6	3	21.5	20.3	20.3	20.4	20.3	20.4	0	22

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					MPR	Tune-up Limit	Reduced Average Power (dBm)					MPR	Tune-up Limit
				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		
15 MHz	QPSK	1	0	23.6	23.2	23.1	23.2	23.2	0	24.5	21.1	20.8	20.6	20.6	20.7	0	22
		1	37	23.4	23.0	23.2	23.0	23.2	0	24.5	20.9	20.6	20.6	20.5	20.7	0	22
		1	74	23.4	23.1	23.1	23.1	23.3	0	24.5	20.9	20.7	20.6	20.5	20.7	0	22
		36	0	22.5	22.2	22.2	22.1	22.2	1	23.5	21.0	20.7	20.7	20.6	20.6	0	22
		36	20	22.4	22.2	22.2	22.1	22.2	1	23.5	21.0	20.8	20.7	20.6	20.7	0	22
		36	39	22.4	22.2	22.1	22.0	22.2	1	23.5	21.0	20.7	20.6	20.5	20.7	0	22
		75	0	22.5	22.2	22.1	22.1	22.1	1	23.5	21.1	20.7	20.6	20.5	20.6	0	22
	16QAM	1	0	22.6	22.3	22.2	22.3	22.1	1	23.5	21.1	20.9	20.8	20.7	20.9	0	22
		1	37	22.5	22.1	22.2	22.2	22.2	1	23.5	20.9	20.8	20.8	20.6	20.9	0	22
		1	74	22.5	22.2	22.1	22.2	22.1	1	23.5	21.0	20.8	20.8	20.7	20.8	0	22
		36	0	21.6	21.2	21.3	21.2	21.3	2	22.5	21.1	20.8	20.9	20.7	20.8	0	22
		36	20	21.6	21.3	21.2	21.2	21.3	2	22.5	21.1	20.9	20.8	20.7	20.9	0	22
		36	39	21.6	21.3	21.2	21.1	21.4	2	22.5	21.1	20.8	20.7	20.6	20.8	0	22
		75	0	21.6	21.3	21.3	21.1	21.2	2	22.5	21.2	20.8	20.8	20.7	20.7	0	22
	64QAM	1	0	21.0	21.4	20.9	20.5	21.3	2	22.5	21.0	20.4	21.0	20.6	20.4	0	22
		1	37	20.9	21.2	20.9	20.5	21.3	2	22.5	20.8	20.2	21.0	20.5	20.4	0	22
		1	74	20.8	21.3	20.8	20.6	21.3	2	22.5	20.8	20.3	21.0	20.5	20.4	0	22
		36	0	20.9	20.6	20.5	20.4	20.6	3	21.5	20.5	20.3	20.3	20.1	20.3	0	22
		36	20	20.9	20.7	20.5	20.4	20.7	3	21.5	20.5	20.4	20.4	20.2	20.4	0	22
		36	39	20.9	20.7	20.5	20.4	20.7	3	21.5	20.5	20.4	20.3	20.1	20.4	0	22
		75	0	20.8	20.6	20.5	20.4	20.5	3	21.5	20.6	20.3	20.3	20.1	20.3	0	22

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					MPR	Tune-up Limit	Reduced Average Power (dBm)					MPR	Tune-up Limit
				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		
10 MHz	QPSK	1	0	23.5	23.2	23.1	23.1	23.2	0	24.5	21.0	20.7	20.6	20.6	20.6	0	22
		1	25	23.4	23.1	23.2	23.1	23.3	0	24.5	21.0	20.6	20.6	20.5	20.6	0	22
		1	49	23.3	23.1	23.1	23.0	23.3	0	24.5	20.9	20.7	20.6	20.5	20.6	0	22
		25	0	22.0	21.7	21.8	21.6	21.7	1	23.5	21.1	20.7	20.7	20.6	20.6	0	22
		25	12	22.0	21.8	21.8	21.7	21.8	1	23.5	21.0	20.8	20.8	20.7	20.8	0	22
		25	25	22.0	21.8	21.8	21.6	21.8	1	23.5	21.0	20.8	20.7	20.6	20.7	0	22
		50	0	22.0	21.8	21.8	21.6	21.8	1	23.5	21.0	20.8	20.7	20.7	20.7	0	22
	16QAM	1	0	22.7	22.3	22.1	22.3	22.2	1	23.5	21.2	20.8	20.8	20.7	20.7	0	22
		1	25	22.6	22.2	22.2	22.3	22.2	1	23.5	21.1	20.7	20.9	20.7	20.7	0	22
		1	49	22.5	22.2	22.1	22.3	22.2	1	23.5	21.0	20.8	20.9	20.6	20.7	0	22
		25	0	21.6	21.3	21.4	21.3	21.3	2	22.5	21.1	20.8	20.9	20.8	20.8	0	22
		25	12	21.6	21.4	21.4	21.3	21.4	2	22.5	21.1	20.9	20.9	20.8	20.9	0	22
		25	25	21.5	21.3	21.3	21.2	21.4	2	22.5	21.1	20.9	20.9	20.7	20.8	0	22
		50	0	21.7	21.4	21.4	21.3	21.3	2	22.5	21.1	20.9	20.9	20.8	20.8	0	22
	64QAM	1	0	21.5	20.6	21.3	21.0	20.7	2	22.5	21.2	20.3	21.0	20.8	20.3	0	22
		1	25	21.4	20.6	21.3	21.0	20.6	2	22.5	21.1	20.3	21.0	20.7	20.3	0	22
		1	49	21.3	20.7	21.3	21.0	20.7	2	22.5	21.0	20.4	21.0	20.7	20.4	0	22
		25	0	20.9	20.6	20.6	20.4	20.7	3	21.5	20.6	20.3	20.3	20.2	20.3	0	22
		25	12	20.8	20.6	20.6	20.4	20.7	3	21.5	20.5	20.4	20.3	20.2	20.4	0	22
		25	25	20.8	20.6	20.6	20.4	20.7	3	21.5	20.4	20.4	20.3	20.2	20.4	0	22
		50	0	20.9	20.6	20.6	20.5	20.7	3	21.5	20.5	20.3	20.3	20.2	20.3	0	22

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LTE Band 41 Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)							Reduced Average Power (dBm)						
				39750	40185	40620	41055	41490	MPR	Tune-up Limit	39750	40185	40620	41055	41490	MPR	Tune-up Limit
				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	23.4	23.1	23.2	23.0	23.2	0	24.5	20.9	20.6	20.7	20.5	20.7	0	22
		1	12	23.3	23.0	23.1	23.1	23.2	0	24.5	20.9	20.6	20.6	20.5	20.6	0	22
		1	24	23.3	23.2	23.1	23.0	23.2	0	24.5	20.8	20.7	20.6	20.5	20.6	0	22
		12	0	22.6	22.2	22.2	22.1	22.2	1	23.5	21.0	20.7	20.7	20.6	20.8	0	22
		12	7	22.5	22.3	22.2	22.1	22.3	1	23.5	21.0	20.8	20.7	20.6	20.7	0	22
		12	13	22.5	22.3	22.1	22.1	22.2	1	23.5	21.0	20.8	20.8	20.6	20.7	0	22
		25	0	22.5	22.3	22.2	22.1	22.2	1	23.5	21.0	20.7	20.7	20.6	20.7	0	22
	16QAM	1	0	22.6	22.2	22.2	22.2	22.2	1	23.5	21.0	20.9	20.7	20.6	20.8	0	22
		1	12	22.6	22.2	22.2	22.2	22.2	1	23.5	20.9	20.8	20.7	20.5	20.8	0	22
		1	24	22.6	22.2	22.1	22.2	22.1	1	23.5	20.9	20.9	20.7	20.6	20.8	0	22
		12	0	21.7	21.3	21.2	21.3	21.3	2	22.5	21.1	20.9	20.8	20.8	20.9	0	22
		12	7	21.7	21.4	21.3	21.3	21.4	2	22.5	21.1	21.0	20.8	20.7	21.0	0	22
		12	13	21.6	21.4	21.2	21.2	21.3	2	22.5	21.1	20.9	20.8	20.7	20.9	0	22
		25	0	21.6	21.4	21.3	21.2	21.3	2	22.5	21.1	20.9	20.9	20.7	20.9	0	22
	64QAM	1	0	21.5	20.7	21.4	21.0	20.7	2	22.5	21.2	20.4	21.1	20.8	20.5	0	22
		1	12	21.5	20.7	21.4	21.0	20.8	2	22.5	21.1	20.4	21.1	20.7	20.5	0	22
		1	24	21.4	20.7	21.4	21.1	20.7	2	22.5	21.1	20.5	21.1	20.7	20.5	0	22
		12	0	20.9	20.5	20.7	20.4	20.6	3	21.5	20.5	20.3	20.4	20.2	20.3	0	22
		12	7	20.9	20.6	20.7	20.4	20.6	3	21.5	20.5	20.4	20.5	20.2	20.4	0	22
		12	13	20.9	20.5	20.7	20.3	20.6	3	21.5	20.5	20.3	20.4	20.1	20.3	0	22
		25	0	20.8	20.5	20.6	20.3	20.7	3	21.5	20.5	20.4	20.3	20.2	20.4	0	22

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LTE Band 66 Measured Results

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					Reduced Average Power (dBm)				
				132072	132322	132572	MPR	Tune-up Limit	132072	132322	132572	MPR	Tune-up Limit
				1720 MHz	1745 MHz	1770 MHz			1720 MHz	1745 MHz	1770 MHz		
20 MHz	QPSK	1	0	23.8	23.6	23.6	0	25	21.7	21.6	21.6	0	23
		1	49	23.6	23.4	23.5	0	25	21.5	21.5	21.5	0	23
		1	99	23.5	23.5	23.5	0	25	21.5	21.5	21.5	0	23
		50	0	22.7	22.5	22.6	1	24	21.7	21.6	21.6	0	23
		50	24	22.7	22.5	22.6	1	24	21.7	21.5	21.6	0	23
		50	50	22.6	22.6	22.6	1	24	21.6	21.5	21.6	0	23
		100	0	22.7	22.6	22.6	1	24	21.7	21.5	21.5	0	23
	16QAM	1	0	23.1	23.2	23.0	1	24	22.1	22.1	22.1	0	23
		1	49	22.9	23.0	22.9	1	24	22.0	21.9	22.0	0	23
		1	99	22.9	23.1	23.0	1	24	22.1	21.9	22.2	0	23
		50	0	21.7	21.7	21.7	2	23	21.7	21.6	21.6	0	23
		50	24	21.7	21.7	21.7	2	23	21.7	21.6	21.6	0	23
		50	50	21.7	21.6	21.7	2	23	21.7	21.6	21.7	0	23
		100	0	21.7	21.7	21.7	2	23	21.7	21.6	21.7	0	23
	64QAM	1	0	22.0	22.0	22.2	2	23	21.9	22.0	22.1	0	23
		1	49	21.9	21.8	22.1	2	23	21.8	21.8	22.1	0	23
		1	99	21.8	21.9	22.2	2	23	21.8	21.8	22.2	0	23
		50	0	20.8	20.7	20.7	3	22	21.8	21.7	21.7	0	23
		50	24	20.8	20.7	20.7	3	22	21.8	21.7	21.7	0	23
		50	50	20.7	20.7	20.7	3	22	21.7	21.6	21.7	0	23
		100	0	20.8	20.7	20.7	3	22	21.8	21.6	21.6	0	23

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					Reduced Average Power (dBm)				
				132047	132322	132597	MPR	Tune-up Limit	132047	132322	132597	MPR	Tune-up Limit
				1717.5 MHz	1745 MHz	1772.5 MHz			1717.5 MHz	1745 MHz	1772.5 MHz		
15 MHz	QPSK	1	0	23.9	23.6	23.6	0	25	21.8	21.6	21.6	0	23
		1	37	23.7	23.4	23.5	0	25	21.6	21.4	21.5	0	23
		1	74	23.7	23.5	23.6	0	25	21.6	21.5	21.6	0	23
		36	0	22.7	22.5	22.6	1	24	21.7	21.5	21.6	0	23
		36	20	22.7	22.5	22.6	1	24	21.7	21.5	21.6	0	23
		36	39	22.6	22.5	22.6	1	24	21.6	21.5	21.6	0	23
		75	0	22.6	22.5	22.6	1	24	21.6	21.5	21.6	0	23
	16QAM	1	0	23.1	22.6	22.9	1	24	22.1	21.6	22.0	0	23
		1	37	22.9	22.4	22.9	1	24	21.9	21.4	21.9	0	23
		1	74	23.0	22.4	22.9	1	24	22.1	21.5	22.0	0	23
		36	0	21.7	21.6	21.7	2	23	21.7	21.6	21.7	0	23
		36	20	21.7	21.6	21.7	2	23	21.7	21.6	21.7	0	23
		36	39	21.7	21.6	21.7	2	23	21.7	21.6	21.7	0	23
		75	0	21.7	21.6	21.7	2	23	21.7	21.6	21.7	0	23
	64QAM	1	0	22.3	22.0	21.8	2	23	22.3	22.0	21.7	0	23
		1	37	22.2	21.8	21.6	2	23	22.2	21.8	21.6	0	23
		1	74	22.3	21.9	21.7	2	23	22.3	21.8	21.7	0	23
		36	0	20.7	20.7	20.8	3	22	21.7	21.6	21.7	0	23
		36	20	20.7	20.7	20.8	3	22	21.7	21.7	21.8	0	23
		36	39	20.7	20.7	20.8	3	22	21.7	21.6	21.7	0	23
		75	0	20.8	20.6	20.7	3	22	21.8	21.7	21.7	0	23

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					Reduced Average Power (dBm)				
				132022	132322	132622	MPR	Tune-up Limit	132022	132322	132622	MPR	Tune-up Limit
				1715 MHz	1745 MHz	1775 MHz			1715 MHz	1745 MHz	1775 MHz		
10 MHz	QPSK	1	0	23.7	23.4	23.6	0	25	21.7	21.4	21.5	0	23
		1	25	23.6	23.4	23.5	0	25	21.6	21.4	21.5	0	23
		1	49	23.6	23.5	23.5	0	25	21.5	21.5	21.6	0	23
		25	0	22.7	22.5	22.6	1	24	21.7	21.5	21.6	0	23
		25	12	22.6	22.6	22.6	1	24	21.6	21.5	21.6	0	23
		25	25	22.6	22.5	22.6	1	24	21.6	21.5	21.5	0	23
		50	0	22.6	22.5	22.6	1	24	21.6	21.5	21.6	0	23
	16QAM	1	0	22.7	22.5	22.9	1	24	21.7	21.5	21.9	0	23
		1	25	22.7	22.4	22.8	1	24	21.7	21.5	21.9	0	23
		1	49	22.6	22.4	22.9	1	24	21.6	21.5	21.9	0	23
		25	0	21.9	21.7	21.7	2	23	21.8	21.6	21.7	0	23
		25	12	21.8	21.6	21.7	2	23	21.8	21.6	21.6	0	23
		25	25	21.8	21.7	21.7	2	23	21.7	21.6	21.7	0	23
		50	0	21.7	21.7	21.7	2	23	21.7	21.6	21.6	0	23
	64QAM	1	0	21.9	21.9	21.7	2	23	21.8	21.9	21.7	0	23
		1	25	21.9	21.8	21.6	2	23	21.8	21.8	21.7	0	23
		1	49	21.8	21.8	21.7	2	23	21.8	21.8	21.7	0	23
		25	0	20.9	20.6	20.8	3	22	21.9	21.6	21.7	0	23
		25	12	20.8	20.7	20.8	3	22	21.8	21.7	21.7	0	23
		25	25	20.8	20.6	20.7	3	22	21.8	21.6	21.7	0	23
		50	0	20.7	20.6	20.7	3	22	21.7	21.6	21.7	0	23

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LTE Band 66 Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					Reduced Average Power (dBm)				
				131997	132322	132647	MPR	Tune-up Limit	131997	132322	132647	MPR	Tune-up Limit
				1712.5 MHz	1745 MHz	1777.5 MHz			1712.5 MHz	1745 MHz	1777.5 MHz		
5 MHz	QPSK	1	0	23.8	23.6	23.5	0	25	21.8	21.5	21.5	0	23
		1	12	23.7	23.6	23.5	0	25	21.7	21.5	21.5	0	23
		1	24	23.8	23.6	23.5	0	25	21.7	21.6	21.5	0	23
		12	0	22.7	22.5	22.6	1	24	21.7	21.5	21.6	0	23
		12	7	22.7	22.5	22.6	1	24	21.7	21.5	21.6	0	23
		12	13	22.7	22.5	22.6	1	24	21.7	21.5	21.6	0	23
		25	0	22.7	22.5	22.6	1	24	21.7	21.5	21.6	0	23
	16QAM	1	0	22.8	22.7	23.0	1	24	21.8	21.7	22.1	0	23
		1	12	22.8	22.6	23.0	1	24	21.7	21.7	22.1	0	23
		1	24	22.8	22.7	23.1	1	24	21.8	21.7	22.1	0	23
		12	0	21.8	21.7	21.8	2	23	21.8	21.6	21.8	0	23
		12	7	21.8	21.7	21.8	2	23	21.8	21.6	21.8	0	23
		12	13	21.8	21.7	21.8	2	23	21.8	21.6	21.7	0	23
		25	0	21.7	21.7	21.7	2	23	21.7	21.6	21.7	0	23
	64QAM	1	0	22.0	21.5	21.9	2	23	21.9	21.5	21.8	0	23
		1	12	21.9	21.4	21.8	2	23	21.9	21.4	21.8	0	23
		1	24	22.0	21.5	21.9	2	23	21.9	21.5	21.8	0	23
		12	0	20.8	20.6	20.6	3	22	21.8	21.7	21.6	0	23
		12	7	20.9	20.7	20.6	3	22	21.8	21.6	21.6	0	23
		12	13	20.8	20.6	20.6	3	22	21.8	21.6	21.6	0	23
		25	0	20.8	20.6	20.6	3	22	21.7	21.5	21.6	0	23

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					Reduced Average Power (dBm)				
				131987	132322	132657	MPR	Tune-up Limit	131987	132322	132657	MPR	Tune-up Limit
				1711.5 MHz	1745 MHz	1778.5 MHz			1711.5 MHz	1745 MHz	1778.5 MHz		
3 MHz	QPSK	1	0	23.7	23.4	23.6	0	25	21.6	21.4	21.5	0	23
		1	8	23.7	23.5	23.6	0	25	21.7	21.5	21.6	0	23
		1	14	23.7	23.5	23.5	0	25	21.6	21.5	21.5	0	23
		8	0	22.7	22.5	22.6	1	24	21.7	21.4	21.5	0	23
		8	4	22.7	22.5	22.6	1	24	21.7	21.5	21.6	0	23
		8	7	22.7	22.5	22.6	1	24	21.7	21.5	21.5	0	23
		15	0	22.7	22.5	22.5	1	24	21.7	21.5	21.5	0	23
	16QAM	1	0	22.7	22.4	22.9	1	24	21.7	21.4	21.9	0	23
		1	8	22.7	22.5	23.0	1	24	21.7	21.5	22.0	0	23
		1	14	22.7	22.4	22.9	1	24	21.6	21.4	22.0	0	23
		8	0	21.7	21.7	21.7	2	23	21.7	21.6	21.7	0	23
		8	4	21.8	21.7	21.7	2	23	21.8	21.7	21.7	0	23
		8	7	21.8	21.7	21.7	2	23	21.8	21.7	21.7	0	23
		15	0	21.7	21.6	21.7	2	23	21.6	21.6	21.7	0	23
	64QAM	1	0	21.9	21.8	21.6	2	23	21.8	21.8	21.6	0	23
		1	8	22.0	21.9	21.7	2	23	21.9	21.9	21.8	0	23
		1	14	21.9	21.8	21.7	2	23	21.8	21.8	21.7	0	23
		8	0	20.7	20.6	20.7	3	22	21.6	21.6	21.7	0	23
		8	4	20.8	20.7	20.7	3	22	21.7	21.6	21.7	0	23
		8	7	20.7	20.6	20.7	3	22	21.7	21.7	21.7	0	23
		15	0	20.8	20.6	20.7	3	22	21.7	21.6	21.7	0	23

BW (MHz)	Mode	RB Allocation	RB offset	Maximum Average Power (dBm)					Reduced Average Power (dBm)				
				131979	132322	132665	MPR	Tune-up Limit	131979	132322	132665	MPR	Tune-up Limit
				1710.7 MHz	1745 MHz	1779.3 MHz			1710.7 MHz	1745 MHz	1779.3 MHz		
1.4 MHz	QPSK	1	0	23.6	23.3	23.5	0	25	21.6	21.3	21.5	0	23
		1	3	23.7	23.4	23.6	0	25	21.6	21.4	21.5	0	23
		1	5	23.6	23.3	23.5	0	25	21.6	21.4	21.5	0	23
		3	0	23.6	23.4	23.4	0	25	21.6	21.4	21.5	0	23
		3	1	23.6	23.4	23.5	0	25	21.6	21.4	21.6	0	23
		3	3	23.7	23.4	23.5	0	25	21.6	21.4	21.5	0	23
		6	0	22.6	22.4	22.5	1	24	21.6	21.4	21.5	0	23
	16QAM	1	0	22.9	22.4	22.6	1	24	21.9	21.5	21.6	0	23
		1	3	23.0	22.5	22.6	1	24	21.9	21.6	21.7	0	23
		1	5	22.9	22.4	22.6	1	24	21.9	21.5	21.7	0	23
		3	0	22.8	22.6	22.6	1	24	21.7	21.6	21.7	0	23
		3	1	22.9	22.7	22.7	1	24	21.8	21.7	21.7	0	23
		3	3	22.8	22.7	22.7	1	24	21.8	21.7	21.7	0	23
		6	0	21.6	21.6	21.7	2	23	21.6	21.6	21.7	0	23
	64QAM	1	0	21.7	21.6	21.9	2	23	21.9	21.6	21.6	0	23
		1	3	21.8	21.7	22.0	2	23	22.0	21.6	21.7	0	23
		1	5	21.7	21.6	21.9	2	23	21.9	21.5	21.7	0	23
		3	0	21.7	21.4	21.8	2	23	21.8	21.6	21.5	0	23
		3	1	21.9	21.5	21.9	2	23	21.9	21.7	21.6	0	23
		3	3	21.8	21.5	21.9	2	23	21.9	21.7	21.6	0	23
		6	0	21.0	20.6	20.6	3	22	21.6	21.8	21.7	0	23

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9.4. LTE Carrier Aggregation

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

For inter-band carrier aggregation with uplink assigned to one E-UTRA band (Table 5.6A-1), the requirements in subclause 6.2.3 apply.

For inter-band carrier aggregation with one component carrier per operating band and the uplink active in two E-UTRA bands, the requirements in subclause 6.2.3 apply for each uplink component carrier.

For intra-band contiguous carrier aggregation the allowed Maximum Power Reduction (MPR) for the maximum output power applicable to the DUT in table below. In case the modulation format is different on different component carriers then the MPR is determined by the rules applied to higher order of those modulations.

Modulation	CA bandwidth Class B and C / Smallest Component Carrier Transmission Bandwidth Configuration				MPR (dB)
	25 RB	50 RB	75 RB	100 RB	
QPSK	> 8 and ≤ 25	> 12 and ≤ 50	> 16 and ≤ 75	> 18 and ≤ 100	≤ 1
QPSK	> 25	> 50	> 75	> 100	≤ 2
16 QAM	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 8 and ≤ 25	> 12 and ≤ 50	> 16 and ≤ 75	> 18 and ≤ 100	≤ 2
16 QAM	> 25	> 50	> 75	> 100	≤ 3
64 QAM	≤ 8 and allocation wholly contained within a single CC	≤ 12 and allocation wholly contained within a single CC	≤ 16 and allocation wholly contained within a single CC	≤ 18 and allocation wholly contained within a single CC	≤ 2
64 QAM	> 8 or allocation extends across two CC's	> 12 or allocation extends across two CC's	> 16 or allocation extends across two CC's	> 18 or allocation extends across two CC's	≤ 3

For PUCCH and SRS transmissions, the allowed MPR is according to that specified for PUSCH WPDK modulation for the corresponding transmission bandwidth.

For intra-band contiguous carrier aggregation bandwidth class C with non-contiguous resource allocation, the allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2A-1 is specified as follows

$$MPR = CEIL\ \{\min(M_A, M_{IM5}), 0.5\}$$

Where M_A is defined as follows

$$M_A = \begin{cases} 8.2 & ;0 \le A < 0.025 \\ 9.2 - 40A & ;0.025 \le A < 0.05 \\ 8 - 16A & ;0.05 \le A < 0.25 \\ 4.83 - 3.33A & ;0.25 \le A \le 0.4 \end{cases}$$

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$$3.83 - 0.83A \qquad ;0.4 \le A \le 1$$

and M_{IM5} is defined as follows

$$M_{IM5} = \begin{cases} 4.5 & ; \Delta_{IM5} < 1.5 * BW_{Channel_CA} \\ 6.0 & ; 1.5 * BW_{Channel_CA} \le \Delta_{IM5} < BW_{Channel_CA}/2 + \Delta f_{ooB} \\ M_A & ; \Delta_{IM5} \ge BW_{Channel_CA}/2 + \Delta f_{ooB} \end{cases}$$

Where

$A = N_{RB_alloc} / N_{RB_agg}$

$\Delta_{IM5} = \max(\left| F_{C_agg} - (3*F_{agg_alloc_low} - 2*F_{agg_alloc_high}) \right|, \left| F_{C_agg} - (3*F_{agg_alloc_high} - 2*F_{agg_alloc_low}) \right|)$

CEIL{M_A, 0.5} means rounding upwards to closest 0.5dB, i.e. MPR ∈ [3.0, 3.5, 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5, 8.0, 8.5]

For intra-band carrier aggregation, the MPR is evaluated per slot and given by the maximum value taken over the transmission(s) on all component carriers within the slot; the maximum MPR over the two slots is then applied for the entire subframe.

For intra-band non-contiguous carrier aggregation with one uplink carrier on the PCC, the requirements in the subclause 6.2.3 apply. For intra-band non-contiguous aggregation with two uplink carriers the MPR is defined tfor those E-UTRA bands where maximum possible $W_{GAP} \le 42.2$ MHz as follows

$$MPR = CEIL\{M_A, 0.5\}$$

Where M_N is defined as follows

$$M_N = \begin{cases} -0.125N + 18.25 & ; 2 \le N \le 50 \\ -0.0333\,N + 13.67 & ; 50 < N \le 200 \end{cases}$$

Where $N = N_{RB_alloc}$ is the number of allocated resource blocks.

For the UE maximum output power modified by MPR, the power limits specified in subclause 6.2.5A apply.

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9.5. LTE Down-Link Carrier Aggregation

The tables below show the supported frequency bands of the device for DL Inter-band and DL Intra-band combinations.

Power measurements were performed on the channel with the highest maximum output power from Tune-up Procedure on Main2 antenna.

When carrier aggregation is limited to downlink only, uplink maximum output power (single carrier) is measured for the supported combinations of downlink carrier aggregation listed in the table below. In applying the power measurement procedures of KDB 941225 D05A and April 2018 TCB workshop for DL CA to qualify for UL SAR test exclusion, power measurement is required only for the subset in each row with the largest combination of frequency bands and CCs (far right most configuration highlighted in the table below).

Index	2CC	Restriction	Completely Covered by Measurement Superset
2CC # 1	CA_2C		No
2CC # 2	CA_2A-2A		No
2CC # 3	CA_2A-5A		No
2CC # 4	CA_2A-12A		No
2CC # 5	CA_2A-13A		No
2CC # 6	CA_2A-17A		No
2CC # 7	CA_4A-4A		No
2CC # 8	CA_4A-5A		No
2CC # 9	CA_4A-12A		3CC # 1
2CC # 10	CA_4A-13A		No
2CC # 11	CA_4A-17A		No
2CC # 12	CA_5B		No
2CC # 13	CA_5A-5A		No
2CC # 14	CA_5A-41A		No
2CC # 15	CA_12B		No
2CC # 16	CA_12A-12A		No
2CC # 17	CA_12A-66A		No
2CC # 18	CA_66B		No
2CC # 19	CA_66C		No
2CC # 20	CA_66A-66A		No
2CC # 21	CA_66A-12A		No

Index	3CC	Restriction	Completely Covered by Measurement Superset
3CC # 1	CA_4A-12A-12A		No
3CC # 2	CA_41C-41A		No
3CC # 3	CA_41A-41C		No
3CC # 4	CA_41D		No

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In applying the power measurement procedures of KDB 941225 D05A for DL CA to qualify for UL SAR test exclusion, power measurement is required only for the CA configuration with the largest aggregated DL CA BW in each frequency band, independently for contiguous and non-contiguous CA; however, if the same frequency band is used for both contiguous and non-contiguous CA, power measurement was performed using the configuration with the largest aggregated BW and maximum output power among contiguous and non-contiguous CA.

2CC DL CA Measured Results

E-UTRA CA configuration	CC1 (UL)					CC2 (DL)			Aggregated BW	CA Inactive (dBm)	CA Active (dBm)	Delta	2CC #
	Mode	BW (MHz)	Channel	Freq (MHz)	RB,Offset	BW (MHz)	Channel	Freq (MHz)					
CA_2C	QPSK	20	18801	1870.1	1,0	20	999	1969.9	40	23.71	23.62	-0.09	1
CA_2A-2A	QPSK	20	18700	1860	1,0	20	1100	1980	40	23.70	23.75	0.05	2
CA_2A-5A	QPSK	20	18900	1880	1,0	10	2600	889	30	23.59	23.54	-0.05	3
CA_2A-12A	QPSK	20	18900	1880	1,0	10	5095	737.5	30	23.59	23.53	-0.06	4
CA_2A-13A	QPSK	20	18900	1880	1,0	10	5230	751	30	23.59	23.56	-0.03	5
CA_2A-17A	QPSK	10	18900	1880	1,0	10	5790	740	20	23.63	23.72	0.09	6
CA_4A-4A	QPSK	20	20050	1720	1,0	20	2300	2145	40	23.72	23.70	-0.02	7
CA_4A-5A	QPSK	20	20175	1732.5	1,0	10	2525	881.5	30	23.61	23.58	-0.03	8
CA_4A-13A	QPSK	20	20175	1732.5	1,0	10	5230	751	30	23.61	23.56	-0.05	9
CA_4A-17A	QPSK	10	20175	1732.5	1,0	10	5790	740	20	23.07	23.18	0.11	10
CA_5B	QPSK	10	20450	829	1,0	10	2549	883.9	20	24.16	24.17	0.01	11
CA_5A-5A	QPSK	10	20450	829	1,0	10	2600	889	20	24.16	24.17	0.01	12
CA_5A-41A	QPSK	10	20525	836.5	1,0	20	41490	2680	30	24.03	23.97	-0.06	13
CA_12B	QPSK	5	23048	702.8	1,0	10	5120	740	15	23.57	23.66	0.09	14
CA_12A-12A	QPSK	5	23035	701.5	1,0	5	5155	743.5	10	23.61	23.54	-0.07	15
CA_12A-66A	QPSK	10	23095	707.5	1,0	20	66886	2155	30	23.56	23.50	-0.06	16
CA_66B	QPSK	10	132022	1715	1,0	10	66585	2124.9	20	23.63	23.60	-0.03	17
CA_66C	QPSK	20	132072	1720	1,0	20	66734	2139.8	40	23.70	23.62	-0.08	18
CA_66A-12A	QPSK	20	132322	1745	1,0	10	5095	737.5	30	23.58	23.47	-0.11	19
CA_66A-66A	QPSK	20	132072	1720	1,0	20	67236	2190	40	23.70	23.65	-0.05	20

3CC DL CA Measured Results

E-UTRA CA configuration	CC1 (UL)					CC2 (DL)			CC3 (DL)			Aggregated BW	CA Inactive (dBm)	CA Active (dBm)	Delta	3CC #
	Mode	BW (MHz)	Channel	Freq (MHz)	RB,Offset	BW (MHz)	Channel	Freq (MHz)	BW (MHz)	Channel	Freq (MHz)					
CA_4A-12A-12A	QPSK	20	20175	1732.5	1,0	5	5095	737.5	5	5035	731.5	30	23.76	23.73	-0.03	1
CA_41C-41A	QPSK	20	39750	2506	1,0	20	39948	2525.8	20	41490	2680	60	23.16	23.11	-0.05	2
CA_41A-41C	QPSK	20	39750	2506	1,0	20	41292	2660.2	20	41490	2680	60	23.16	23.05	-0.11	1
CA_41D	QPSK	20	40422	2573.2	1,0	20	40620	2593	20	40818	2612.8	60	20.21	20.13	-0.08	4

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9.6. 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

Maximum Conducted Power

Band	Mode	Ch #	Freq. (MHz)	Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)
DSSS 2.4 GHz	802.11b	1	2412	18.3	19.0	Yes
		6	2437	18.4	19.0	
		11	2462	17.9	19.0	
		12	2467	15.3	16.5	
		13	2472	14.6	16.5	
OFDM 2.4 GHz	802.11g	1	2412		18.0	No
		6	2437		18.0	
		11	2462		15.5	
		12	2467		15.0	
		13	2472		8.5	
	802.11n (HT20)	1	2412		17.0	No
		6	2437		18.0	
		11	2462		15.5	
		12	2467		15.0	
		13	2472		9.5	

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

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Reduced Conducted Power (Receiver + Proximity Sensor Active)

Band	Mode	Ch #	Freq. (MHz)	Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)
DSSS 2.4 GHz	802.11b	1	2412	12.0	12.0	Yes
		6	2437	12.0	12.0	
		11	2462	11.7	12.0	
		12	2467	11.9	12.0	
		13	2472	12.0	12.0	
OFDM 2.4 GHz	802.11g	1	2412		12.0	No
		6	2437		12.0	
		11	2462		12.0	
		12	2467		12.0	
		13	2472		8.5	
	802.11n (HT20)	1	2412		12.0	No
		6	2437		12.0	
		11	2462		12.0	
		12	2467		12.0	
		13	2472		9.5	

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

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

Maximum Output Power (Tune-up Limit) for Wi-Fi 5 GHz

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 transmission mode is selected.

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 802.11a/g/n/ac 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.

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.

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Wi-Fi 5 GHz Measured Results

Maximum Conducted Power

Band	Mode	Ch #	Freq. (MHz)	Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)
UNII-1 5.2 GHz	802.11a	36	5180	15.7	16.0	Yes
		40	5200	15.7	16.0	
		44	5220	15.8	16.0	
		48	5240	15.6	16.0	
	802.11n (HT20)	36	5180		16.0	No
		40	5200		16.0	
		44	5220		16.0	
		48	5240		16.0	
	802.11ac (VHT20)	36	5180		15.0	No
		40	5200		15.0	
		44	5220		15.0	
		48	5240		15.0	
	802.11n (HT40)	38	5190		15.0	No
		46	5230		15.0	
	802.11ac (VHT40)	38	5190		15.0	No
		46	5230		15.0	
	802.11ac (VHT80)	42	5210		13.0	No

Band	Mode	Ch #	Freq. (MHz)	Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)
UNII-2A 5.3 GHz	802.11a	52	5260		16.0	No
		56	5280		16.0	
		60	5300		16.0	
		64	5320		16.0	
	802.11n (HT20)	52	5260		16.0	No
		56	5280		16.0	
		60	5300		16.0	
		64	5320		16.0	
	802.11ac (VHT20)	52	5260		15.0	No
		56	5280		15.0	
		60	5300		15.0	
		64	5320		15.0	
	802.11n (HT40)	54	5270	15.7	16.0	Yes
		62	5310	15.6	16.0	
	802.11ac (VHT40)	54	5270		15.0	No
		62	5310		15.0	
	802.11ac (VHT80)	58	5290		14.0	No

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Maximum Conducted Power (Continued)

Band	Mode	Ch #	Freq. (MHz)	Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)
UNII-2C 5.5 GHz	802.11a	100	5500		16.0	No
		116	5580		16.0	
		124	5620		16.0	
		144	5720		16.0	
	802.11n (HT20)	100	5500		16.0	No
		116	5580		16.0	
		124	5620		16.0	
		144	5720		16.0	
	802.11ac (VHT20)	100	5500		15.0	No
		116	5580		15.0	
		124	5620		15.0	
		144	5720		15.0	
	802.11n (HT40)	102	5510	15.9	16.0	Yes
		118	5590	15.6	16.0	
		126	5630	16.0	16.0	
		142	5710	15.6	16.0	
	802.11ac (VHT40)	102	5510		15.0	No
		118	5590		15.0	
		126	5630		15.0	
		142	5710		15.0	
	802.11ac (VHT80)	106	5530		14.0	No
		122	5610		14.0	
		138	5690		14.0	

Band	Mode	Ch #	Freq. (MHz)	Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)
UNII-3 5.8 GHz	802.11a	149	5745		16.0	No
		157	5785		16.0	
		165	5825		16.0	
	802.11n (HT20)	149	5745		16.0	No
		157	5785		16.0	
		165	5825		16.0	
	802.11ac (VHT20)	149	5745		15.0	No
		157	5785		15.0	
		165	5825		15.0	
	802.11n (HT40)	151	5755	15.8	16.0	Yes
		159	5795	15.7	16.0	
	802.11ac (VHT40)	151	5755		15.0	No
		159	5795		15.0	
	802.11ac (VHT80)	155	5775		14.0	No

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Reduced Conducted Power (Receiver + Proximity Sensor Active)

Band	Mode	Ch #	Freq. (MHz)	Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)
UNII-1 5.2 GHz	802.11a	36	5180		12.0	No
		40	5200		12.0	
		44	5220		12.0	
		48	5240		12.0	
	802.11n (HT20)	36	5180		12.0	No
		40	5200		12.0	
		44	5220		12.0	
		48	5240		12.0	
	802.11ac (VHT20)	36	5180		12.0	No
		40	5200		12.0	
		44	5220		12.0	
		48	5240		12.0	
	802.11n (HT40)	38	5190		12.0	No
		46	5230		12.0	
	802.11ac (VHT40)	38	5190		12.0	No
		46	5230		12.0	
	802.11ac (VHT80)	42	5210	11.9	12.0	Yes

Band	Mode	Ch #	Freq. (MHz)	Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)
UNII-2A 5.3 GHz	802.11a	52	5260		12.0	No
		56	5280		12.0	
		60	5300		12.0	
		64	5320		12.0	
	802.11n (HT20)	52	5260		12.0	No
		56	5280		12.0	
		60	5300		12.0	
		64	5320		12.0	
	802.11ac (VHT20)	52	5260		12.0	No
		56	5280		12.0	
		60	5300		12.0	
		64	5320		12.0	
	802.11n (HT40)	54	5270		12.0	No
		62	5310		12.0	
	802.11ac (VHT40)	54	5270		12.0	No
		62	5310		12.0	
	802.11ac (VHT80)	58	5290	12.0	12.0	Yes

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Reduced Conducted Power (Receiver + Proximity Sensor Active) (Continued)

Band	Mode	Ch #	Freq. (MHz)	Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)
UNII-2C 5.5 GHz	802.11a	100	5500		12.0	No
		116	5580		12.0	
		124	5620		12.0	
		144	5720		12.0	
	802.11n (HT20)	100	5500		12.0	No
		116	5580		12.0	
		124	5620		12.0	
		144	5720		12.0	
	802.11ac (VHT20)	100	5500		12.0	No
		116	5580		12.0	
		124	5620		12.0	
		144	5720		12.0	
	802.11n (HT40)	102	5510		12.0	No
		118	5590		12.0	
		126	5630		12.0	
		142	5710		12.0	
	802.11ac (VHT40)	102	5510		12.0	No
		118	5590		12.0	
		126	5630		12.0	
		142	5710		12.0	
	802.11ac (VHT80)	106	5530	11.8	12.0	Yes
		122	5610	12.0	12.0	
		138	5690	12.0	12.0	
Band	Mode	Ch #	Freq. (MHz)	Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)
UNII-3 5.8 GHz	802.11a	149	5745		12.0	No
		157	5785		12.0	
		165	5825		12.0	
	802.11n (HT20)	149	5745		12.0	No
		157	5785		12.0	
		165	5825		12.0	
	802.11ac (VHT20)	149	5745		12.0	No
		157	5785		12.0	
		165	5825		12.0	
	802.11n (HT40)	151	5755		12.0	No
		159	5795		12.0	
	802.11ac (VHT40)	151	5755		12.0	No
		159	5795		12.0	
	802.11ac (VHT80)	155	5775	11.6	12.0	Yes

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9.8. 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)	Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)
2.4	BR GFSK	0	2402	9.0	11.0	Yes
		39	2441	9.4	11.0	
		78	2480	9.4	11.0	

Duty Factor Measured Results

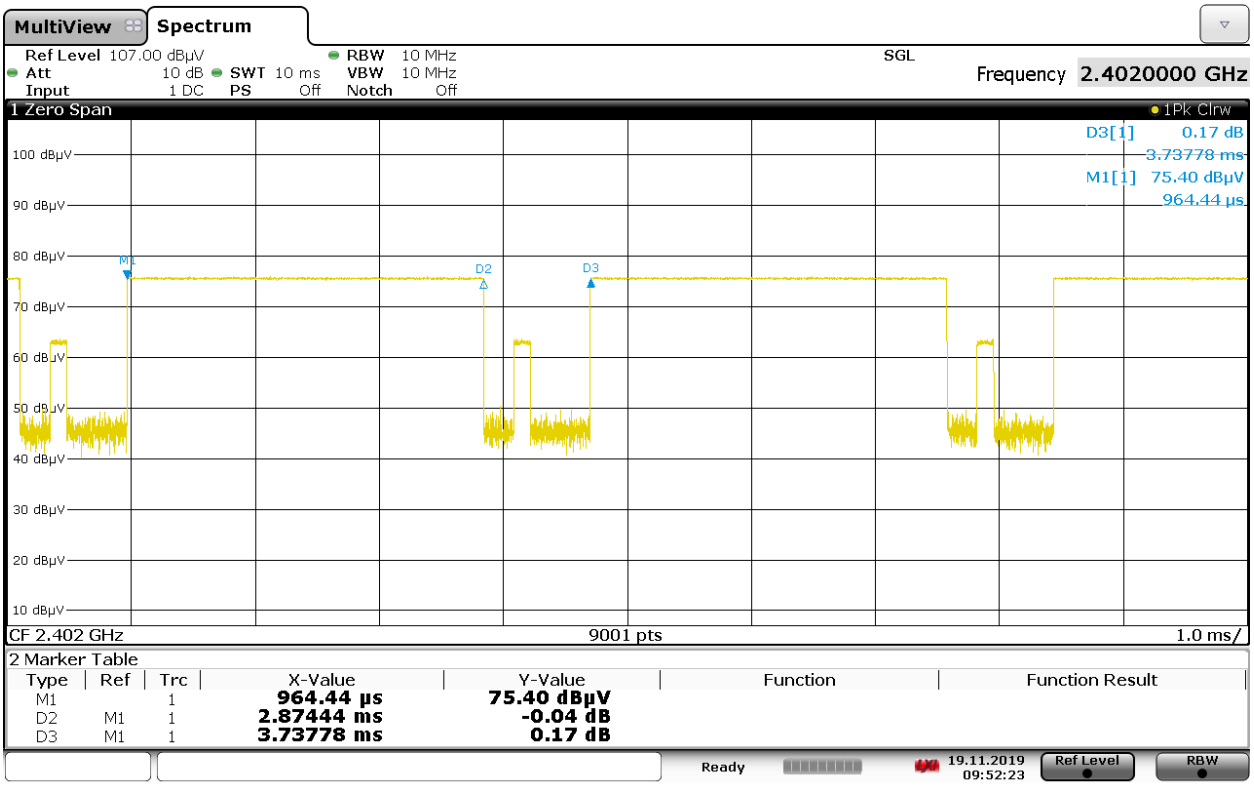
Mode	Type	T on (ms)	Period (ms)	Duty Cycle	Crest Factor (1/duty cycle)
GFSK	DH5	2.87444	3.73778	76.90%	1.30

Note(s):

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

Duty Cycle plots

GFSK



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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.

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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*.

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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 1 slot	N/A	0	Left Touch	190	836.6	34.5	33.0	0.185	0.261	
				Left Tilt	190	836.6	34.5	33.0	0.106	0.150	
				Right Touch	190	836.6	34.5	33.0	0.214	**0.302**	1
				Right Tilt	190	836.6	34.5	33.0	0.118	0.167	
Body-worn	GPRS 1 slot	N/A	15	Rear	190	836.6	34.5	33.0	0.239	**0.338**	2
				Front	190	836.6	34.5	33.0	0.150	0.212	
Hotspot	GPRS 1 slot	N/A	10	Rear	190	836.6	34.5	33.0	0.093	0.131	
				Front	190	836.6	34.5	33.0	0.155	0.219	
				Edge 2	190	836.6	34.5	33.0	0.216	0.305	
				Edge 3	190	836.6	34.5	33.0	0.222	**0.314**	3
				Edge 4	190	836.6	34.5	33.0	0.075	0.106	

10.2. GSM1900

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 1 slot	N/A	0	Left Touch	661	1880.0	32.0	31.2	0.135	**0.162**	4
				Left Tilt	661	1880.0	32.0	31.2	0.074	0.089	
				Right Touch	661	1880.0	32.0	31.2	0.087	0.105	
				Right Tilt	661	1880.0	32.0	31.2	0.070	0.084	
Body-worn	GPRS 1 slot	N/A	15	Rear	661	1880.0	32.0	31.2	0.223	**0.268**	5
				Front	661	1880.0	32.0	31.2	0.132	0.159	
Hotspot	GPRS 1 slot	N/A	10	Rear	661	1880.0	32.0	31.2	0.347	**0.417**	6
				Front	661	1880.0	32.0	31.2	0.252	0.303	
				Edge 2	661	1880.0	32.0	31.2	0.043	0.052	
				Edge 3	661	1880.0	32.0	31.2	0.283	0.340	
				Edge 4	661	1880.0	32.0	31.2	0.209	0.251	

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10.3. W-CDMA Band II

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	Rel 99 RMC 12.2 kbps	N/A	0	Left Touch	9400	1880.0	24.5	23.3	0.143	0.189	
				Left Tilt	9400	1880.0	24.5	23.3	0.166	**0.219**	7
				Right Touch	9400	1880.0	24.5	23.3	0.162	0.214	
				Right Tilt	9400	1880.0	24.5	23.3	0.115	0.152	
Body-worn	Rel 99 RMC 12.2 kbps	N/A	15	Rear	9400	1880.0	24.5	23.3	0.205	0.270	
				Front	9400	1880.0	24.5	23.3	0.249	**0.328**	8
Hotspot	Rel 99 RMC 12.2 kbps	ON	10	Rear	9400	1880.0	22.5	21.3	0.400	0.527	
				Front	9400	1880.0	22.5	21.3	0.449	**0.592**	9
				Edge 2	9400	1880.0	22.5	21.3	0.064	0.084	
				Edge 3	9400	1880.0	22.5	21.3	0.284	0.374	
				Edge 4	9400	1880.0	22.5	21.3	0.232	0.306	

10.4. W-CDMA Band IV

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	Rel 99 RMC 12.2 kbps	N/A	0	Left Touch	1413	1732.6	24.5	23.3	0.230	**0.302**	10
				Left Tilt	1413	1732.6	24.5	23.3	0.156	0.205	
				Right Touch	1413	1732.6	24.5	23.3	0.159	0.209	
				Right Tilt	1413	1732.6	24.5	23.3	0.112	0.147	
Body-worn	Rel 99 RMC 12.2 kbps	N/A	15	Rear	1413	1732.6	24.5	23.3	0.141	0.185	
				Front	1413	1732.6	24.5	23.3	0.271	**0.356**	11
Hotspot	Rel 99 RMC 12.2 kbps	ON	10	Rear	1413	1732.6	22.5	21.3	0.289	0.379	
				Front	1413	1732.6	22.5	21.3	0.432	0.567	
				Edge 2	1413	1732.6	22.5	21.3	0.093	0.122	
				Edge 3	1413	1732.6	22.5	21.3	0.493	**0.647**	12
				Edge 4	1413	1732.6	22.5	21.3	0.282	0.370	

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10.5. W-CDMA Band V

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	Rel 99 RMC 12.2 kbps	N/A	0	Left Touch	4183	836.6	24.5	23.5	0.179	0.225	
				Left Tilt	4183	836.6	24.5	23.5	0.111	0.140	
				Right Touch	4183	836.6	24.5	23.5	0.207	**0.261**	13
				Right Tilt	4183	836.6	24.5	23.5	0.106	0.133	
Body-worn	Rel 99 RMC 12.2 kbps	N/A	15	Rear	4183	836.6	24.5	23.5	0.262	**0.330**	14
				Front	4183	836.6	24.5	23.5	0.155	0.195	
Hotspot	Rel 99 RMC 12.2 kbps	N/A	10	Rear	4183	836.6	24.5	23.5	0.119	0.150	
				Front	4183	836.6	24.5	23.5	0.160	0.201	
				Edge 2	4183	836.6	24.5	23.5	0.226	**0.285**	15
				Edge 3	4183	836.6	24.5	23.5	0.030	0.038	
				Edge 4	4183	836.6	24.5	23.5	0.079	0.099	

10.6. LTE Band 2 (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	N/A	0	Left Touch	18900	1880.0	1	0	25.0	23.6	0.251	**0.346**	16
							50	24	24.0	22.7	0.212	0.286	
				Left Tilt	18900	1880.0	1	0	25.0	23.6	0.151	0.208	
							50	24	24.0	22.7	0.128	0.173	
				Right Touch	18900	1880.0	1	0	25.0	23.6	0.155	0.214	
							50	24	24.0	22.7	0.134	0.181	
				Right Tilt	18900	1880.0	1	0	25.0	23.6	0.116	0.160	
							50	24	24.0	22.7	0.106	0.143	
Body-worn	QPSK	N/A	15	Rear	18900	1880.0	1	0	25.0	23.6	0.212	0.293	
							50	24	24.0	22.7	0.203	0.274	
				Front	18900	1880.0	1	0	25.0	23.6	0.242	**0.334**	17
							50	24	24.0	22.7	0.198	0.267	
Hotspot	QPSK	ON	10	Rear	18900	1880.0	1	0	23.0	21.7	0.452	**0.610**	18
							50	24	23.0	21.8	0.461	0.608	
				Front	18900	1880.0	1	0	23.0	21.7	0.412	0.556	
							50	24	23.0	21.8	0.410	0.540	
				Edge 2	18900	1880.0	1	0	23.0	21.7	0.077	0.104	
							50	24	23.0	21.8	0.076	0.100	
				Edge 3	18900	1880.0	1	0	23.0	21.7	0.290	0.391	
							50	24	23.0	21.8	0.292	0.385	
				Edge 4	18900	1880.0	1	0	23.0	21.7	0.223	0.301	
							50	24	23.0	21.8	0.242	0.319	

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10.7. LTE Band 5 (10MHz 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	N/A	0	Left Touch	20525	836.5	1	0	25.5	24.0	0.189	0.267	
							25	0	24.5	23.0	0.156	0.220	
				Left Tilt	20525	836.5	1	0	25.5	24.0	0.131	0.185	
							25	0	24.5	23.0	0.122	0.172	
				Right Touch	20525	836.5	1	0	25.5	24.0	0.229	**0.323**	19
							25	0	24.5	23.0	0.187	0.264	
				Right Tilt	20525	836.5	1	0	25.5	24.0	0.109	0.154	
							25	0	24.5	23.0	0.088	0.124	
Body-worn	QPSK	N/A	15	Rear	20525	836.5	1	0	25.5	24.0	0.102	0.144	
							25	0	24.5	23.0	0.079	0.112	
				Front	20525	836.5	1	0	25.5	24.0	0.168	**0.237**	20
							25	0	24.5	23.0	0.134	0.189	
Hotspot	QPSK	N/A	10	Rear	20525	836.5	1	0	25.5	24.0	0.129	0.182	
							25	0	24.5	23.0	0.101	0.143	
				Front	20525	836.5	1	0	25.5	24.0	0.175	0.247	
							25	0	24.5	23.0	0.144	0.203	
				Edge 2	20525	836.5	1	0	25.5	24.0	0.265	**0.374**	21
							25	0	24.5	23.0	0.219	0.309	
				Edge 3	20525	836.5	1	0	25.5	24.0	0.031	0.044	
							25	0	24.5	23.0	0.026	0.036	
				Edge 4	20525	836.5	1	0	25.5	24.0	0.094	0.133	
							25	0	24.5	23.0	0.075	0.106	

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10.8. LTE Band 12 (10MHz 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	N/A	0	Left Touch	23095	707.5	1	0	25.0	23.5	0.105	0.148	
							25	0	24.0	22.5	0.086	0.121	
				Left Tilt	23095	707.5	1	0	25.0	23.5	0.057	0.081	
							25	0	24.0	22.5	0.048	0.068	
				Right Touch	23095	707.5	1	0	25.0	23.5	0.117	**0.165**	22
							25	0	24.0	22.5	0.098	0.138	
				Right Tilt	23095	707.5	1	0	25.0	23.5	0.056	0.079	
							25	0	24.0	22.5	0.047	0.066	
Body-worn	QPSK	N/A	15	Rear	23095	707.5	1	0	25.0	23.5	0.294	**0.415**	23
							25	0	24.0	22.5	0.245	0.346	
				Front	23095	707.5	1	0	25.0	23.5	0.180	0.254	
							25	0	24.0	22.5	0.146	0.206	
Hotspot	QPSK	N/A	10	Rear	23095	707.5	1	0	25.0	23.5	0.311	**0.439**	
							25	0	24.0	22.5	0.258	0.364	
				Front	23095	707.5	1	0	25.0	23.5	0.147	0.208	
							25	0	24.0	22.5	0.118	0.167	
				Edge 2	23095	707.5	1	0	25.0	23.5	0.311	**0.439**	24
							25	0	24.0	22.5	0.259	0.366	
				Edge 3	23095	707.5	1	0	25.0	23.5	0.059	0.083	
							25	0	24.0	22.5	0.050	0.071	
				Edge 4	23095	707.5	1	0	25.0	23.5	0.209	0.295	
							25	0	24.0	22.5	0.171	0.242	

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10.9. LTE Band 13 (10MHz 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	N/A	0	Left Touch	23230	782.0	1	25	25.0	23.8	0.090	0.119	
							25	12	24.0	22.9	0.072	0.092	
				Left Tilt	23230	782.0	1	25	25.0	23.8	0.061	0.080	
							25	12	24.0	22.9	0.049	0.063	
				Right Touch	23230	782.0	1	25	25.0	23.8	0.104	**0.137**	25
							25	12	24.0	22.9	0.084	0.108	
				Right Tilt	23230	782.0	1	25	25.0	23.8	0.063	0.083	
							25	12	24.0	22.9	0.050	0.064	
Body-worn	QPSK	N/A	15	Rear	23230	782.0	1	25	25.0	23.8	0.172	**0.227**	26
							25	12	24.0	22.9	0.139	0.179	
				Front	23230	782.0	1	25	25.0	23.8	0.107	0.141	
							25	12	24.0	22.9	0.086	0.111	
Hotspot	QPSK	N/A	10	Rear	23230	782.0	1	25	25.0	23.8	0.281	**0.370**	27
							25	12	24.0	22.9	0.226	0.291	
				Front	23230	782.0	1	25	25.0	23.8	0.099	0.131	
							25	12	24.0	22.9	0.079	0.102	
				Edge 2	23230	782.0	1	25	25.0	23.8	0.174	0.229	
							25	12	24.0	22.9	0.140	0.180	
				Edge 3	23230	782.0	1	25	25.0	23.8	0.104	0.137	
							25	12	24.0	22.9	0.084	0.108	
				Edge 4	23230	782.0	1	25	25.0	23.8	0.060	0.079	
							25	12	24.0	22.9	0.048	0.062	

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10.10. LTE Band 41 (20MHz Bandwidth)

RF Exposure Conditions	Power Back Off	Mode	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB offest	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	N/A	QPSK	0	Left Touch	40620	2593.0	1	0	24.5	23.2	0.435	0.587	
							50	0	23.5	22.3	0.340	0.448	
				Left Tilt	40620	2593.0	1	0	24.5	23.2	0.343	0.463	
							50	0	23.5	22.3	0.266	0.351	
				Right Touch	39750	2506.0	1	0	24.5	23.6	0.723	0.889	
					40185	2549.5	1	0	24.5	23.3	0.746	**0.983**	28
					40620	2593.0	1	0	24.5	23.2	0.680	0.917	
							50	0	23.5	22.3	0.578	0.762	
					41055	2636.5	1	0	24.5	23.2	0.608	0.820	
					41490	2680.0	1	99	24.5	23.3	0.734	0.968	
				Right Tilt	40620	2593.0	1	0	24.5	23.2	0.542	0.731	
							50	0	23.5	22.3	0.425	0.560	
Body-worn	N/A	QPSK	15	Rear	39750	2506.0	1	0	24.5	23.6	0.444	0.546	
					40185	2549.5	1	0	24.5	23.3	0.581	0.766	
					40620	2593.0	1	0	24.5	23.2	0.668	**0.901**	29
							50	0	23.5	22.3	0.524	0.691	
					41055	2636.5	1	0	24.5	23.2	0.348	0.469	
					41490	2680.0	1	99	24.5	23.3	0.598	0.788	
				Front	40620	2593.0	1	0	24.5	23.2	0.123	0.166	
							50	0	23.5	22.3	0.107	0.141	
Hotspot	ON	QPSK	10	Rear	39750	2506.0	1	0	22.0	21.2	0.523	0.629	
							50	0	22.0	21.1	0.571	0.702	
							100	0	22.0	21.1	0.584	0.718	
					40185	2549.5	1	0	22.0	20.8	0.705	0.929	
							50	24	22.0	20.8	0.715	0.943	
					40620	2593.0	1	0	22.0	20.7	0.603	0.813	
							50	0	22.0	20.8	0.622	0.820	
					41055	2636.5	1	0	22.0	20.8	0.482	0.635	
							50	0	22.0	20.7	0.519	0.700	
					41490	2680.0	1	0	22.0	20.8	0.708	0.933	
							50	50	22.0	20.8	0.723	**0.953**	30
				Front	40620	2593.0	1	0	22.0	20.7	0.276	0.372	
							50	0	22.0	20.8	0.229	0.302	
				Edge 1	40620	2593.0	1	0	22.0	20.7	0.092	0.124	
							50	0	22.0	20.8	0.092	0.121	
				Edge 4	40620	2593.0	1	0	22.0	20.7	0.495	0.668	
							50	0	22.0	20.8	0.499	0.658	

RF Exposure Conditions	Power Back Off	Mode	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	
Product Specific (Extremity)	N/A	QPSK	7	Rear	41490	2680.0	1	99	24.5	23.3	1.230	1.621	
							50	0	23.5	22.3	0.985	1.298	
Product Specific (Extremity)	ON	QPSK	0	Rear	41490	2680.0	1	0	22.0	20.8	1.490	**1.964**	31
							50	50	22.0	20.8	1.490	1.964	

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10.11. LTE Band 66 (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	N/A	0	Left Touch	132322	1745.0	1	0	25.0	23.6	0.194	0.268	
							50	50	24.0	22.6	0.159	0.219	
				Left Tilt	132322	1745.0	1	0	25.0	23.6	0.147	0.203	
							50	50	24.0	22.6	0.100	0.138	
				Right Touch	132322	1745.0	1	0	25.0	23.6	0.268	**0.370**	32
							50	50	24.0	22.6	0.207	0.286	
				Right Tilt	132322	1745.0	1	0	25.0	23.6	0.125	0.173	
							50	50	24.0	22.6	0.096	0.133	
Body-worn	QPSK	N/A	15	Rear	132322	1745.0	1	0	25.0	23.6	0.333	**0.460**	33
							50	50	24.0	22.6	0.273	0.377	
				Front	132322	1745.0	1	0	25.0	23.6	0.253	0.349	
							50	50	24.0	22.6	0.205	0.283	
Hotspot	QPSK	ON	10	Rear	132322	1745.0	1	0	23.0	21.6	0.313	0.432	
							50	0	23.0	21.6	0.314	0.433	
				Front	132322	1745.0	1	0	23.0	21.6	0.383	**0.529**	34
							50	0	23.0	21.6	0.367	0.507	
				Edge 2	132322	1745.0	1	0	23.0	21.6	0.112	0.155	
							50	0	23.0	21.6	0.110	0.152	
				Edge 3	132322	1745.0	1	0	23.0	21.6	0.233	0.322	
							50	0	23.0	21.6	0.231	0.319	
				Edge 4	132322	1745.0	1	0	23.0	21.6	0.247	0.341	
							50	0	23.0	21.6	0.245	0.338	

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10.12. 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)	Duty Cycle	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	802.11b 1 Mbps	ON	0	Left Touch	6	2437	97.58%	0.101	12.0	12.0			
				Left Tilt	6	2437	97.58%	**0.154**	12.0	12.0	0.113	**0.116**	35
				Right Touch	6	2437	97.58%	0.084	12.0	12.0			
				Right Tilt	6	2437	97.58%	0.081	12.0	12.0			
Body-worn	802.11b 1 Mbps	N/A	15	Rear	6	2437	97.58%	**0.216**	19.0	18.4	0.136	**0.159**	36
				Front	6	2437	97.58%	0.048	19.0	18.4			
Hotspot	802.11b 1 Mbps	N/A	10	Rear	6	2437	97.58%	**0.494**	19.0	18.4	0.313	**0.366**	37
				Front	6	2437	97.58%	0.096	19.0	18.4			
				Edge 1	6	2437	97.58%	0.227	19.0	18.4			
				Edge 2	6	2437	97.58%	0.034	19.0	18.4			

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10.13. Wi-Fi (U-NII Band)

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.

UNII-2A

RF Exposure Conditions	Mode	Power Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Duty Cycle	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	802.11ac VHT80	ON	0	Left Touch	58	5290	84.02%	0.307	12.0	12.0			
				Left Tilt	58	5290	84.02%	**0.423**	12.0	12.0	0.178	**0.212**	38
				Right Touch	58	5290	84.02%	0.276	12.0	12.0			
				Right Tilt	58	5290	84.02%	0.367	12.0	12.0			
Body-worn	802.11n HT40	N/A	15	Rear	54	5270	94.67%	**0.699**	16.0	15.7	0.326	**0.369**	39
				Front	54	5270	94.67%	0.079	16.0	15.7			
RF Exposure Conditions	Mode	Power Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Duty Cycle	Area Scan Max. SAR (W/kg)	Power (dBm)		10-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Product Specific (Extremity)	802.11n HT40	N/A	0	Rear	54	5270	94.67%	**18.600**	16.0	15.7	1.190	**1.338**	40
				Front	54	5270	94.67%	1.510	16.0	15.7			
				Edge 1	54	5270	94.67%	13.200	16.0	15.7	0.099	0.111	
				Edge 2	54	5270	94.67%	0.094	16.0	15.7			

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RF Exposure Conditions	Mode	Power Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Duty Cycle	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	802.11ac VHT80	ON	0	Left Touch	122	5610	84.02%	0.827	12.0	12.0			
				Left Tilt	122	5610	84.02%	1.030	12.0	12.0	0.452	0.538	
				Right Touch	122	5610	84.02%	0.851	12.0	12.0			
				Right Tilt	122	5610	84.02%	**1.094**	12.0	12.0	0.474	**0.564**	41
Body-worn	802.11n HT40	N/A	15	Rear	126	5630	94.67%	**0.652**	16.0	16.0	0.282	**0.301**	42
				Front	126	5630	94.67%	0.165	16.0	16.0			
RF Exposure Conditions	Mode	Power Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Duty Cycle	Area Scan Max. SAR (W/kg)	Power (dBm)		10-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Product Specific (Extremity)	802.11n HT40	N/A	0	Rear	126	5630	94.67%	**17.100**	16.0	16.0	1.250	**1.333**	43
				Front	126	5630	94.67%	1.490	16.0	16.0			
				Edge 1	126	5630	94.67%	16.500	16.0	16.0	0.962	1.026	
				Edge 2	126	5630	94.67%	0.439	16.0	16.0			

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RF Exposure Conditions	Mode	Power Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Duty Cycle	Area Scan Max. SAR (W/kg)	Power (dBm)		1-g SAR (W/kg)		Plot No.
									Tune-up Limit	Meas.	Meas.	Scaled	
Head	802.11ac VHT80	ON	0	Left Touch	155	5775	84.02%	0.474	12.0	11.6			
				Left Tilt	155	5775	84.02%	0.569	12.0	11.6			
				Right Touch	155	5775	84.02%	0.460	12.0	11.6			
				Right Tilt	155	5775	84.02%	**0.609**	12.0	11.6	0.264	**0.345**	44
Body-worn	802.11n HT40	N/A	15	Rear	151	5755	94.67%	**0.585**	16.0	15.8	0.288	**0.320**	45
				Front	151	5755	94.67%	0.159	16.0	15.8			
Hotspot	802.11n HT40	N/A	10	Rear	151	5755	94.67%	1.170	16.0	15.8	0.521	0.579	
				Front	151	5755	94.67%	0.242	16.0	15.8			
				Edge 1	151	5755	94.67%	**1.340**	16.0	15.8	0.563	**0.626**	46
				Edge 2	151	5755	94.67%	0.056	16.0	15.8			

10.14. Bluetooth

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	GFSK	OFF	0	Left Touch	39	2441	11.0	9.4	0.035	0.051	
				Left Tilt	39	2441	11.0	9.4	0.039	**0.056**	47
				Right Touch	39	2441	11.0	9.4	0.019	0.027	
				Right Tilt	39	2441	11.0	9.4	0.023	0.033	
Body-worn	GFSK	OFF	15	Rear	39	2441	11.0	9.4	0.014	**0.020**	48
				Front	39	2441	11.0	9.4	0.003	0.005	
Hotspot	GFSK	OFF	10	Rear	39	2441	11.0	9.4	0.033	**0.048**	49
				Front	39	2441	11.0	9.4	0.005	0.007	
				Edge 1	39	2441	11.0	9.4	0.018	0.026	
				Edge 4	39	2441	11.0	9.4	0.001	0.002	

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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.

Note(s):

Repeated measurement is not required since the original highest measured SAR is <0.8 W/kg (1-g) or 2 W/kg (10-g) .

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12. Simultaneous Transmission Conditions

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

Notes:
1. DTS & UNII (5.2 GHz & 5.8GHz) supports Hotspot.
2. GPRS/EDGE, W-CDMA, and LTE support Hotspot.
3. DTS Radio cannot transmit simultaneously with Bluetooth Radio.
4. U-NII Radio cannot transmit simultaneously with Bluetooth Radio.

Note(s):

Product Specific (Extremity) 10 SAR is not required for simultaneous transmission.

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.

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	4	1+2	1+3	1+4
	WWAN	Wi-Fi 2.4G	Wi-Fi 5G	BT			
Head	0.983	0.116	0.564	0.056	**1.099**	**1.547**	**1.039**
Body-worn	0.901	0.159	0.369	0.020	**1.060**	**1.270**	**0.921**
Hotspot	0.953	0.366	0.626	0.048	**1.319**	**1.579**	**1.001**

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.

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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

END OF REPORT

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