FCC 47 CFR § 2.1093
IEEE Std 1528-2013

SAR EVALUATION REPORT

FOR

GSM/WCDMA/LTE Phone + BT/BLE, DTS/UNII a/b/g/n and ANT+

MODEL NUMBER: SM-A600G/DS, SM-A600G

FCC ID: A3LSMA600G

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ACCREDITED
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Revision History

Rev.	Date	Revisions	Revised By
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V2	4/9/2018	Added “notes” in Sec.1	Eunji Choi

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1. Attestation of Test Results

Applicant Name		SAMSUNG ELECTRONICS CO.,LTD.			
FCC ID		A3LSMA600G			
Model Number		SM-A600G/DS and SM-A600G			
Applicable Standards		FCC 47 CFR § 2.1093 Published RF exposure KDB procedures IEEE Std 1528-2013			
SAR Limits (W/Kg)					
Exposure Category		Peak spatial-average(1g of tissue)			
General population / Uncontrolled exposure		1.6			
The Highest Reported SAR (W/kg)					
RF Exposure Conditions		**Equipment Class**			
		Licensed	**DTS**	**UNII**	**DSS(BT)**
Head		0.30	0.96	0.70	N/A
Body-worn		0.92	0.13	< 0.1	
Hotspot		1.09	0.28	0.11	
Simultaneous TX	Head	1.26	1.26	1.00	N/A
	Body-worn	1.05	1.05	1.02	
	Hotspot	1.37	1.37	1.20	
Date Tested		3/9/2018 to 4/2/2018			
Test Results		Pass			
Notes: SM-A600G/DS and SM-A600G are same hardware. Only SIM Tray is different. So SAR test is evaluated for All bands using SM-A600G/DS.					

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

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

Approved & Released By:	Prepared By:
Justin Park Lead Test Engineer UL Korea, Ltd. Suwon Laboratory	Eunji Choi Associate Test Engineer UL Korea, Ltd. Suwon Laboratory

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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
- 648474 D04 Handset SAR v01r03
- 690783 D01 SAR Listings on Grants v01r03
- 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- 865664 D02 RF Exposure Reporting v01r02
- 941225 D01 3G SAR Procedures v03r01
- 941225 D05 SAR for LTE Devices v02r05
- 941225 D06 Hotspot Mode v02r01

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

- TCB workshop October, 2014; Page 36, RF Exposure Procedures Update (Overlapping LTE Bands)
- TCB workshop October, 2014; Page 37, RF Exposure Procedures Update (Other LTE Considerations)
- TCB workshop October, 2016; Page 7, RF Exposure Procedures (Bluetooth Duty Factor)

3. Facilities and Accreditation

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

Suwon
SAR 1 Room
SAR 2 Room
SAR 3 Room

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

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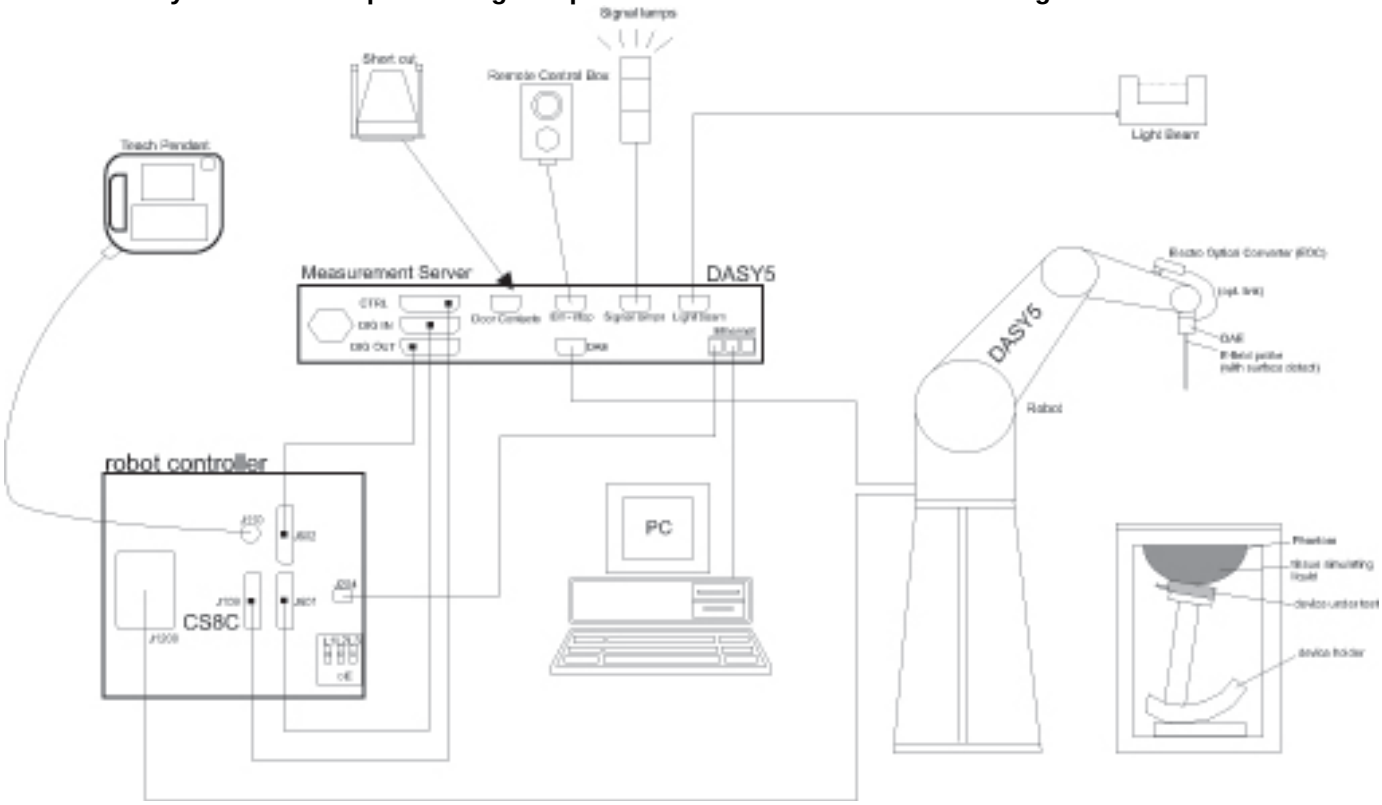
4. SAR Measurement System & Test Equipment

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.

Step 5: Z-Scan (FCC only)

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

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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
Network Analyzer	Agilent	E5071C	MY46522054	8-8-2018
Dielectric Assessment Kit	SPEAG	DAK-3.5	1196	8-2-2018
Shorting block	SPEAG	DAK-3.5 Short	SM DAK 200 BA	N/A
Thermometer	LKM	DTM3000	3424	8-11-2018
Thermometer	Lutron	MHB-382SD	AH.91478	8-10-2018

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
MXG Analog Signal Generator	Agilent	N5181A	MY50145882	8-7-2018
Power Sensor	Agilent	U2000A	MY54260010	8-8-2018
Power Sensor	Agilent	U2000A	MY54260007	8-8-2018
Power Amplifier	EXODUS	1410025-AMP2027-10003	10003	8-8-2018
Directional Coupler	Agilent	772D	MY52180193	8-7-2018
Directional Coupler	Agilent	778D	MY52180432	8-7-2018
Low Pass Filter	MICROLAB	LA-15N	03943	8-7-2018
Low Pass Filter	FILTRON	L14012FL	1410003S	8-7-2018
Low Pass Filter	MICROLAB	LA-60N	03942	8-7-2018
Attenuator	Agilent	8491B/003	MY39269292	8-7-2018
Attenuator	Agilent	8491B/010	MY39269315	8-7-2018
Attenuator	Agilent	8491B/020	MY39269298	8-7-2018
E-Field Probe (SAR1)	SPEAG	EX3DV4	7376	8-22-2018
E-Field Probe (SAR2)	SPEAG	EX3DV4	7330	1-22-2019
E-Field Probe (SAR3)	SPEAG	EX3DV4	7314	9-28-2018
Data Acquisition Electronics (SAR1)	SPEAG	DAE4	1468	8-22-2018
Data Acquisition Electronics (SAR2)	SPEAG	DAE3	479	10-23-2018
Data Acquisition Electronics (SAR3)	SPEAG	DAE4	1494	7-20-2018
System Validation Dipole	SPEAG	D750V3	1122	2-19-2019
System Validation Dipole	SPEAG	D835V2	4d194	7-19-2018
System Validation Dipole	SPEAG	D1750V2	1125	2-16-2019
System Validation Dipole	SPEAG	D1900V2	5d190	9-20-2018
System Validation Dipole	SPEAG	D2450V2	939	9-19-2018
System Validation Dipole	SPEAG	D2600V2	1097	1-17-2019
System Validation Dipole	SPEAG	D5GHzV2	1209	2-15-2019
System Validation Dipole	SPEAG	D5GHzV2	1184	8-23-2018
Thermometer (SAR1)	Lutron	MHB-382SD	AH.91463	8-10-2018
Thermometer (SAR2)	Lutron	MHB-382SD	AH.50215	2-9-2019
Thermometer (SAR3)	Lutron	MHB-382SD	AH.50213	8-16-2018

Others

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Base Station Simulator	R & S	CMW500	150313	12-08-2018
Base Station Simulator	R & S	CMW500	150314	12-05-2018

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.

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6. Device Under Test (DUT) Information

6.1. DUT Description

Device Dimension	Overall (Length x Width): 146.34 mm x 67.25 mm Overall Diagonal: 157.00 mm Display Diagonal: 142.00 mm
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 (Wi-Fi 2.4 GHz) ☒ Wi-Fi Direct (Wi-Fi 5 GHz_Ch.36 – Ch.48, Ch.149 – Ch.165)
Test Sample Information	**No.** / **S/N** / **Notes** 1 / R38K108KQJB / Wi-Fi/BT conduction 2 / R38K108KQEM / Main conduction 3 / R38K108KQKD / Main conduction 4 / R38K205B8LT / Main conduction 5 / R38K108KQ2T / SAR 6 / R38K108KQBW / SAR 7 / R38K108KQ3P / SAR 8 / R38K108KC5P / SAR

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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) EGPRS (8PSK)	GPRS Multi-Slot Class: ☐ Class 8 - 1 Up, 4 Down ☐ Class 10 - 2 Up, 4 Down ☐ Class 12 - 4 Up, 4 Down ☒ Class 33 - 4 Up, 5 Down	GSM Voice: 12.5% (E)GPRS: 1 Slot: 12.5% 2 Slots: 25% 3 Slots: 37.5% 4 Slots: 50%
	Does this device support DTM (Dual Transfer Mode)? ☐ Yes ☒ No			
W-CDMA (UMTS)	Band II Band IV Band V	UMTS Rel. 99 (Voice & Data) HSDPA (Release.5) HSUPA (Release.6) DC-HSDPA (Release 8) 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 Rel. 10 Carrier Aggregation (1 Uplink and 2 Downlinks) (Carrier Aggregation is only supported for downlink and not for uplink.)		100%(FDD) 63.3%(TDD)
	Does this device support SV-LTE (1xRTT-LTE)? ☐ Yes ☒ No			
Wi-Fi	2.4 GHz	802.11b 802.11g 802.11n (HT20)		99.5% (802.11b) 96.8% (802.11g) 96.6% (802.11n HT20)
	5 GHz	802.11a 802.11n (HT20) 802.11n (HT40)		96.8% (802.11a) 96.6% (802.11n HT20) 93.4% (802.11n HT40)
	Does this device support bands 5.60 ~ 5.65 GHz? ☒ Yes ☐ No			
	Does this device support Band gap channel? ☒ Yes ☐ No			
Bluetooth	2.4 GHz	Version 4.2 LE		76.96% (DH5)

Notes:

1. This device supports uplink-downlink configuration 0-6. The configuration with the highest duty cycle was used (Subframe Number 0 at 63.3%).
2. Duty cycle for Wi-Fi is referenced from the DTS and UNII report.

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6.3. Nominal and Maximum Output Power

KDB 447498 sec.4.1. at the maximum rated output power and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance limit.

RF Air interface	Mode	Time Slots	Max. RF Output Power (dBm)		Reduced. RF Output Power Hotspot back-off (dBm)		Reduced. RF Output Power Proximity sensor back-off (dBm)	
			Tune-up Limit	Frame Pwr	Tune-up Limit	Frame Pwr	Tune-up Limit	Frame Pwr
GSM850	Voice	1	**34.0**	**25.0**			**34.0**	**25.0**
	GPRS	1	**34.0**	**25.0**	**31.5**	**22.5**	**31.5**	**22.5**
	GPRS	2	**33.0**	**27.0**	**30.5**	**24.5**	**30.5**	**24.5**
	GPRS	3	**31.5**	**27.2**	**29.0**	**24.7**	**29.0**	**24.7**
	GPRS	4	**30.0**	**27.0**	**27.5**	**24.5**	**27.5**	**24.5**
	EGPRS	1	**28.0**	**19.0**	**28.0**	**19.0**	**28.0**	**19.0**
	EGPRS	2	**25.5**	**19.5**	**25.5**	**19.5**	**25.5**	**19.5**
	EGPRS	3	**24.5**	**20.2**	**24.5**	**20.2**	**24.5**	**20.2**
	EGPRS	4	**23.0**	**20.0**	**23.0**	**20.0**	**23.0**	**20.0**
GSM1900	Voice	1	**30.5**	**21.5**			**30.5**	**21.5**
	GPRS	1	**30.5**	**21.5**	**29.0**	**20.0**	**29.0**	**20.0**
	GPRS	2	**27.5**	**21.5**	**26.0**	**20.0**	**26.0**	**20.0**
	GPRS	3	**26.5**	**22.2**	**25.0**	**20.7**	**25.0**	**20.7**
	GPRS	4	**25.5**	**22.5**	**24.0**	**21.0**	**24.0**	**21.0**
	EGPRS	1	**26.5**	**17.5**	**26.5**	**17.5**	**26.5**	**17.5**
	EGPRS	2	**24.5**	**18.5**	**24.0**	**18.0**	**24.0**	**18.0**
	EGPRS	3	**23.0**	**18.7**	**23.0**	**18.7**	**23.0**	**18.7**
	EGPRS	4	**21.5**	**18.5**	**21.5**	**18.5**	**21.5**	**18.5**

RF Air interface	Mode	Max. RF Output Power (dBm)	Reduced. RF Output Power Hotspot back-off (dBm)	Reduced. RF Output Power Proximity sensor back-off (dBm)
W-CDMA Band II	R99	**23.0**	**21.0**	**21.0**
	HSDPA	**23.0**	**21.0**	**21.0**
	HSUPA	**23.0**	**21.0**	**21.0**
	DC-HSDPA	**23.0**	**21.0**	**21.0**
W-CDMA Band IV	R99	**23.0**	**20.5**	**20.5**
	HSDPA	**22.5**	**20.5**	**20.5**
	HSUPA	**23.0**	**20.5**	**20.5**
	DC-HSDPA	**22.5**	**20.5**	**20.5**
W-CDMA Band V	R99	**24.5**		
	HSDPA	**22.0**		
	HSUPA	**23.0**		
	DC-HSDPA	**22.0**		

RF Air interface	Mode	Max. RF Output Power (dBm)	Reduced. RF Output Power Hotspot back-off (dBm)	Reduced. RF Output Power Proximity sensor back-off (dBm)
LTE Band 2	QPSK	**24.0**	**21.0**	**21.0**
LTE Band 4*	QPSK	**24.0**	**22.0**	**22.0**
LTE Band 5	QPSK	**24.4**		
LTE Band 12	QPSK	**24.0**		
LTE Band 13	QPSK	**24.0**		
LTE Band 17*	QPSK	**24.0**		
LTE Band 41	QPSK	**24.5**		
LTE Band 66	QPSK	**24.0**	**22.0**	**22.0**

Notes:

1. The device utilizes power reduction under some portable hotspot conditions for SAR compliance. There is power reduction for GSM 850, GSM 1900, WCDMA Band II, WCDMA Band IV, LTE Band 2, LTE Band 4 and LTE Band 66. The reduced powers were confirmed via conducted power measurements the RF port. Detailed description of the hotspot power reduction mechanism is included in the operational description.
2. The Proximity sensor is implemented for GSM 850, GSM 1900, WCDMA Band II, WCDMA Band IV, LTE Band 2, LTE Band 4 and LTE Band 66. But SAR tests for body exposure conditions were performed at full power at distances at 15mm and the head exposure conditions were tested at 0mm at full power the proximity sensor details are not required in the SAR test report. Both back-off feature is not operating at the same time
3. LTE QPSK configuration has the highest maximum average output power per 3GPP standard.
4. LTE Band 4 (Frequency range: 1710-1755 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.
5. LTE Band 17 (Frequency range: 704-716 MHz) is covered by LTE Band 12 (Frequency range: 699-716 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

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RF Air interface	Mode	Max. RF Output Power (dBm)	Reduced RF Output Power (dBm)
WiFi 2.4 GHz (Ch. 1~Ch. 11)	802.11b	**18.5**	
	802.11g	**16.5**	
	802.11n HT20	**15.5**	
WiFi 2.4 GHz (Ch. 12 & Ch. 13)	802.11b	**10.5**	
	802.11g	**10.5**	
	802.11n HT20	**10.5**	
WiFi 5 GHz	802.11a	**16.5**	**13.5**
	802.11n HT20	**16.5**	**13.5**
	802.11n HT40	**14.5**	**13.5**
Bluetooth		**9.0**	
Bluetooth LE		**5.5**	

Note(s):

This device uses an independent fixed level power reduction mechanism for WLAN operations during voice or VoIP held to ear scenarios. Per FCC Guidance, the held-to-ear exposure conditions were evaluated at reduced power according to the head SAR positions described in IEEE 1528-2013. Detailed descriptions of the power reduction mechanism are included in the operational description.

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6.4. General LTE SAR Test and Reporting Considerations

Item	Description						
Frequency range, Channel Bandwidth, Numbers and Frequencies	Band 2	Frequency range: 1850 - 1910 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	18700/ 1860	18675/ 1857.5	18650/ 1855	18625/ 1852.5	18615/ 1851.5	18607/ 1850.7
	Mid	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880
	High	19100/ 1900	19125/ 1902.5	19150/ 1905	19175/ 1907.5	19185/ 1908.5	19193/ 1909.3
	Band 4	Frequency range: 1710 - 1755 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	20050/ 1720	20025/ 1717.5	20000/ 1715	19975/ 1712.5	19965/ 1711.5	19957/ 1710.7
	Mid	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5
	High	20300/ 1745	20325/ 1747.5	20350/ 1750	20375/ 1752.5	20385/ 1753.5	20393/ 1754.3
	Band 5	Frequency range: 824 - 849 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low			20450/ 829	20425/ 826.5	20415/ 825.5	20407/ 824.7
	Mid			20525/ 836.5	20525/ 836.5	20525/ 836.5	20525/ 836.5
	High			20600/ 844	20625/ 846.5	20635/ 847.5	20643/ 848.3
	Band 12	Frequency range: 699 – 716 MHz					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	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					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	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					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	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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General LTE SAR Test and Reporting Considerations (Continued)

Frequency range, Channel Bandwidth, Numbers and Frequencies

Band 41	Frequency range: 2496 - 2690 MHz					
	Channel Bandwidth					
	20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
Low	39750 / 2506.0					
Low-Mid	40185 / 2549.5					
Mid	40620 / 2593.0					
Mid-High	41055 / 2636.5					
High	41490 / 2680.0					

Band 66	Frequency range: 1710 - 1780 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. 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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6.5. LTE (TDD) Considerations

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

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	$6592 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$	$7680 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$
1	$19760 \cdot T_s$			$20480 \cdot T_s$		
2	$21952 \cdot T_s$			$23040 \cdot T_s$		
3	$24144 \cdot T_s$			$25600 \cdot T_s$		
4	$26336 \cdot T_s$			$7680 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
5	$6592 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$20480 \cdot T_s$		
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			$12800 \cdot T_s$		
8	$24144 \cdot T_s$			-	-	-
9	$13168 \cdot T_s$			-	-	-

Calculated Duty Cycle

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

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

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

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 and Special Subframe 7

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6.6. LTE Carrier Aggregation

Combination	CA configuration	BCS Configuration	Reverse Y/N	Bandwidth (MHz)												Max Aggregated BW (MHz)
				Carrier 1						Carrier 2						
				20	15	10	5	3	1.4	20	15	10	5	3	1.4	
Intra-Band contiguous	2C	(0)	Yes				√			√						40
						√				√	√					
					√					√	√	√				
				√						√	√	√	√			
	5B	(0)	Yes			√	√					√				20
						√							√			
		(1)						√					√			8
							√							√		
	41C	(0)	Yes			√				√						40
					√					√	√					
				√						√	√	√				
		(1)				√	√			√						
					√					√	√					
				√						√	√	√	√			
		(2)				√				√	√					
					√					√	√	√				
				√						√	√	√	√			
		(3)				√				√						
				√						√						
	66C	(0)	Yes				√			√						40
						√				√	√					
					√					√	√	√				
				√						√	√	√	√			
Intra-Band non-contiguous	2A-2A	(0)	Yes	√	√	√	√			√	√	√	√			40
	4A-4A	(0)	Yes	√	√	√	√			√	√	√	√			40
		(1)				√	√					√	√			20
	5A-5A	(0)	Yes			√	√					√	√			20
	41A-41A	(0)	Yes	√	√	√				√	√	√				40
		(1)		√	√	√	√			√	√	√	√			40
	66A-66A	(0)	Yes	√	√	√	√			√	√	√	√			40
Inter-Band non-contiguous	2A-5A	(0)	Yes	√	√	√	√					√	√			30
		(1)				√	√					√	√			20
	2A-12A	(0)	Yes	√	√	√	√					√	√			30
		(1)		√	√	√	√					√	√	√		30
		(2)				√	√					√	√			20
	2A-13A	(0)	Yes	√	√	√	√					√				30
		(1)				√	√					√				20
	2A-17A	(0)	Yes			√	√					√	√			20
	4A-5A	(0)	Yes			√	√					√	√			20
		(1)		√	√	√	√					√	√			30
	4A-12A	(0)	Yes			√	√	√	√			√	√			20
		(1)		√	√	√	√	√	√			√	√			30
		(2)		√	√	√	√					√	√	√		30
		(3)				√	√					√	√			20
		(4)		√	√	√	√					√	√			30
		(5)			√	√	√						√			20
	4A-13A	(0)	Yes	√	√	√	√					√				30
		(1)				√	√					√				20
	4A-17A	(0)	Yes			√	√					√	√			20
	5A-41A	(0)	No			√	√			√						30
	12A-66A	(0)	Yes			√	√					√	√	√	√	20
		(1)				√	√			√	√	√	√	√	√	30
		(2)				√	√	√		√	√	√	√			30
		(3)				√	√					√	√			20
		(4)				√	√			√	√	√	√			30
		(5)					√				√	√	√			20

Note(s):

For supported channels, please refer to §6.4

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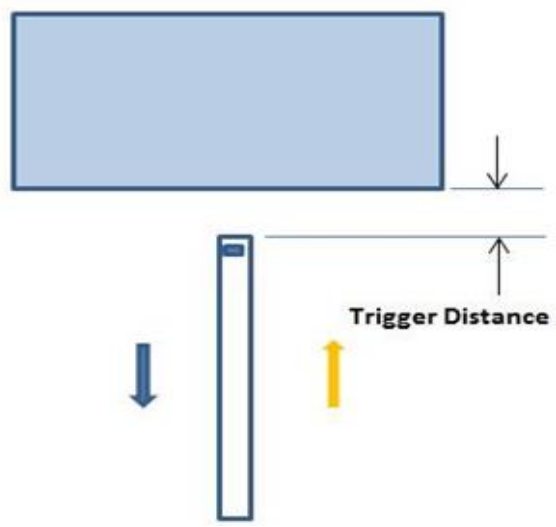
6.7. Power Reduction by Proximity Sensing

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

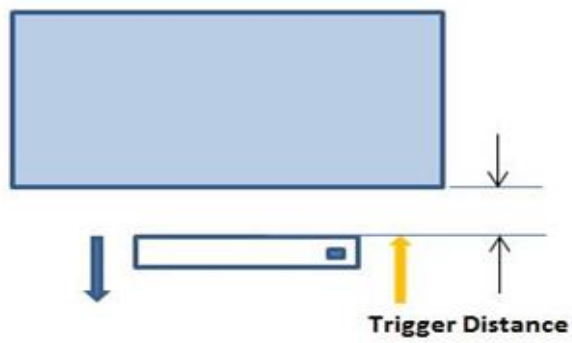
Front, Rear and Edge 3 of the DUT was placed directly below the flat phantom. The DUT was moved toward the phantom in accordance with the steps outlined in KDB 616217 §6.2 to determine the trigger distance for enabling power reduction. The DUT was moved away from the phantom to determine the trigger distance for resuming full power.

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

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



Proximity Sensor Trigger Distance Assessment
KDB 616217 §6.2, Edge 3



Proximity Sensor Trigger Distance Assessment
KDB 616217 §6.2, Rear, Front

LEGEND

→ Direction of DUT travel for determination of power reduction triggering point

→ Direction of DUT travel for determination of full power resumption triggering point

Summary of Trigger Distances

Tissue simulating liquid	Trigger distance - Front		Trigger distance - Rear		Trigger distance – Edge 3	
	Moving toward phantom	Moving from phantom	Moving toward phantom	Moving from phantom	Moving toward phantom	Moving from phantom
850 Body	8 mm	8 mm	16 mm	16 mm	12 mm	12 mm
1700 Body	8 mm	8 mm	16 mm	16 mm	12 mm	12 mm
1900 Body	8 mm	8 mm	16 mm	16 mm	12 mm	12 mm
2450 Head	70 mm	70 mm	N/A		N/A	
5G Head	70 mm	70 mm	N/A		N/A	

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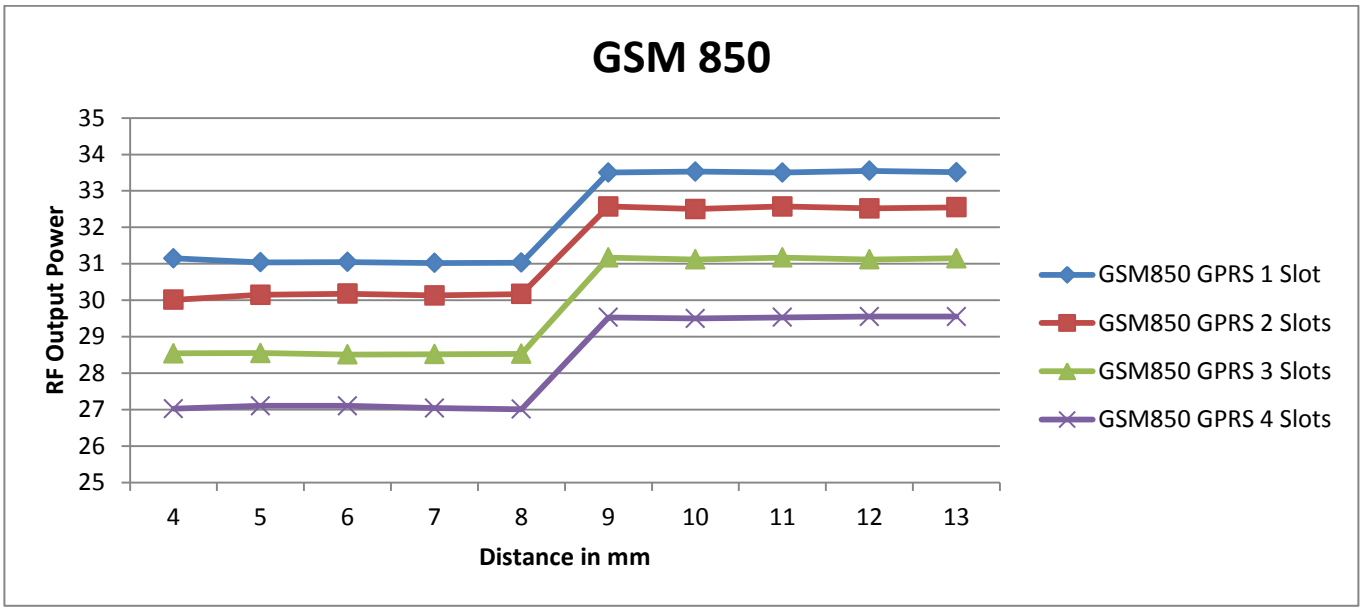
Proximity Sensor Triggering Distance Measurement Results

GSM 850

Front, DUT Moving Toward (Trigger) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	4	5	6	7	8	9	10	11	12	13
GSM850 GPRS 1 Slot	31.2	31.0	31.1	31.0	31.0	33.5	33.5	33.5	33.6	33.5
GSM850 GPRS 2 Slots	30.0	30.2	30.2	30.1	30.2	32.6	32.5	32.6	32.5	32.6
GSM850 GPRS 3 Slots	28.5	28.6	28.5	28.5	28.5	31.2	31.1	31.2	31.1	31.2
GSM850 GPRS 4 Slots	27.0	27.1	27.1	27.0	27.0	29.5	29.5	29.5	29.6	29.6



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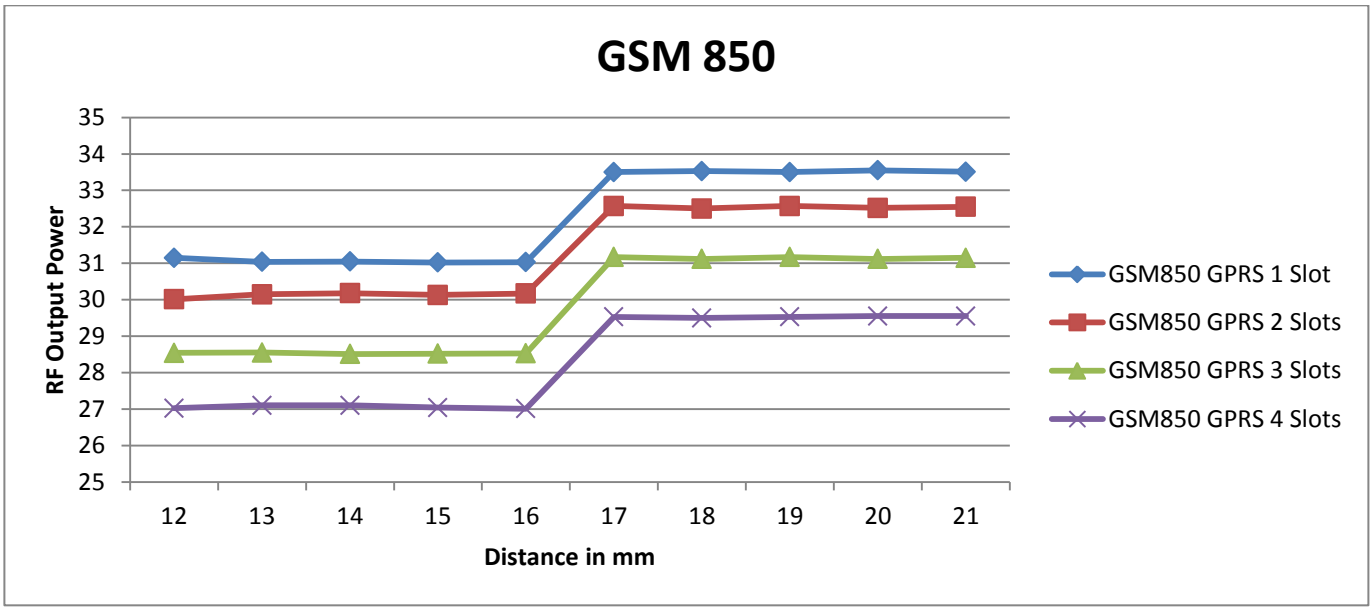
Rear, DUT Moving Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	12	13	14	15	16	17	18	19	20	21
GSM850 GPRS 1 Slot	31.2	31.0	31.1	31.0	31.0	33.5	33.5	33.5	33.6	33.5
GSM850 GPRS 2 Slots	30.0	30.2	30.2	30.1	30.2	32.6	32.5	32.6	32.5	32.6
GSM850 GPRS 3 Slots	28.5	28.6	28.5	28.5	28.5	31.2	31.1	31.2	31.1	31.2
GSM850 GPRS 4 Slots	27.0	27.1	27.1	27.0	27.0	29.5	29.5	29.5	29.6	29.6



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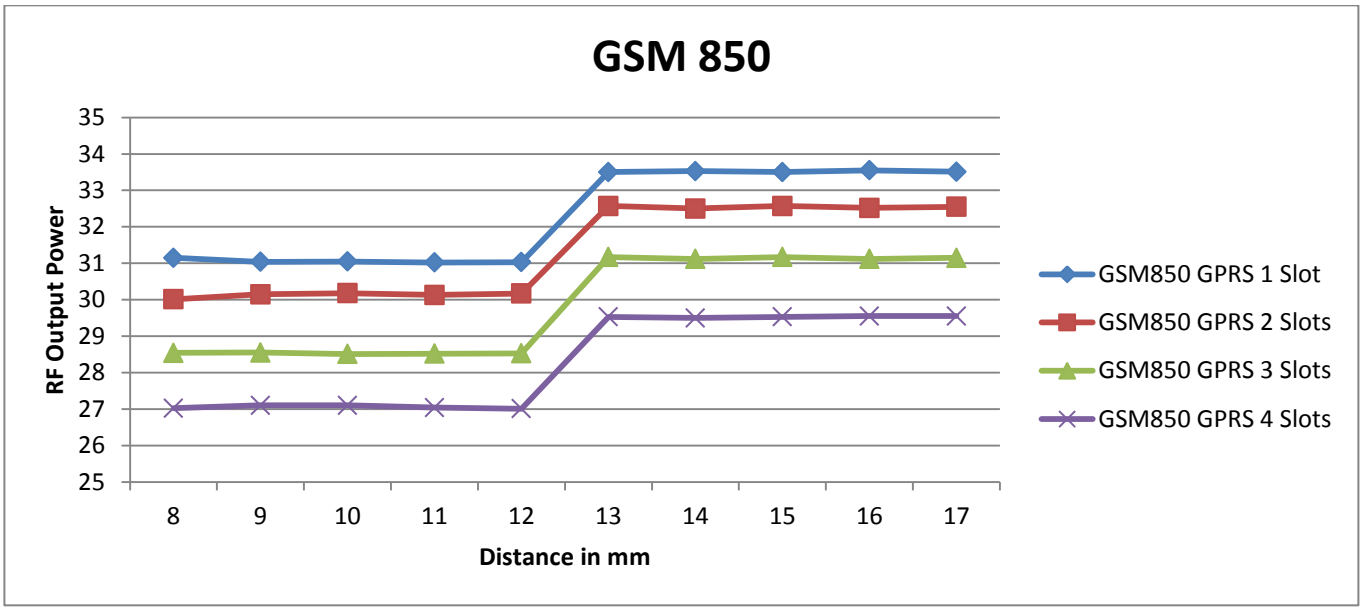
Edge 3, DUT Moving Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	8	9	10	11	12	13	14	15	16	17
GSM850 GPRS 1 Slot	31.2	31.0	31.1	31.0	31.0	33.5	33.5	33.5	33.6	33.5
GSM850 GPRS 2 Slots	30.0	30.2	30.2	30.1	30.2	32.6	32.5	32.6	32.5	32.6
GSM850 GPRS 3 Slots	28.5	28.6	28.5	28.5	28.5	31.2	31.1	31.2	31.1	31.2
GSM850 GPRS 4 Slots	27.0	27.1	27.1	27.0	27.0	29.5	29.5	29.5	29.6	29.6



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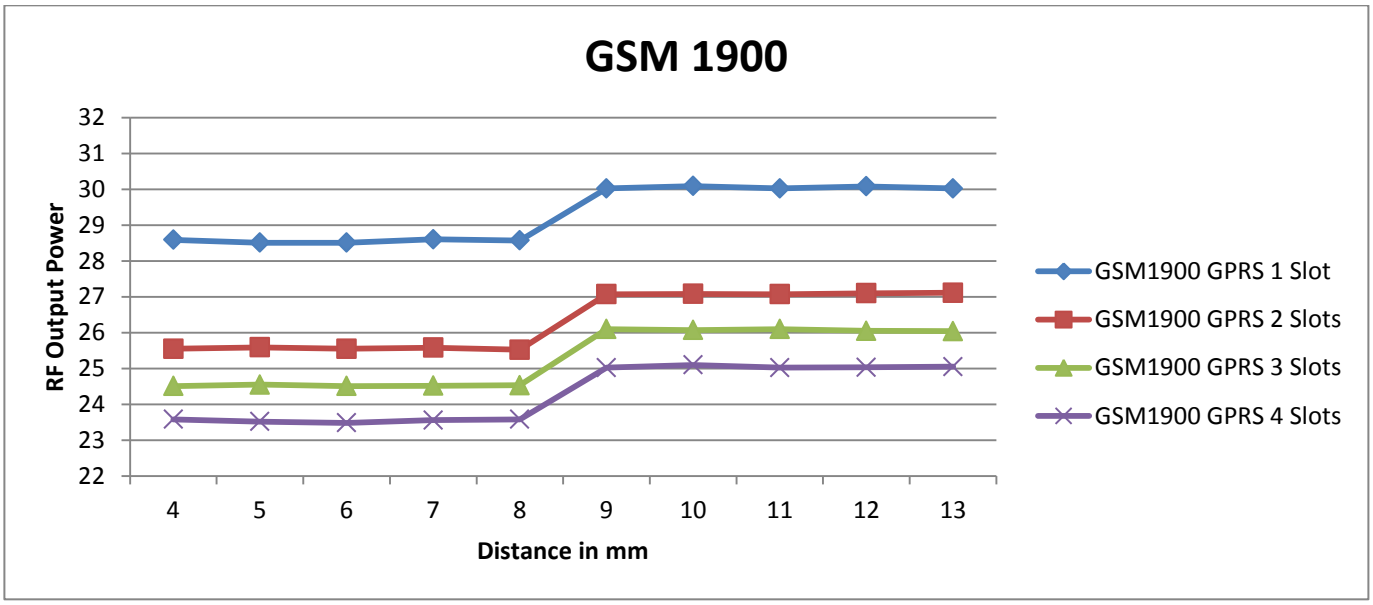
GSM 1900

Front, DUT Moving Toward (Trigger) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	4	5	6	7	8	9	10	11	12	13
GSM1900 GPRS 1 Slot	28.6	28.5	28.5	28.6	28.6	30.0	30.1	30.0	30.1	30.0
GSM1900 GPRS 2 Slots	25.6	25.6	25.6	25.6	25.5	27.1	27.1	27.1	27.1	27.1
GSM1900 GPRS 3 Slots	24.5	24.6	24.5	24.5	24.5	26.1	26.1	26.1	26.1	26.0
GSM1900 GPRS 4 Slots	23.6	23.5	23.5	23.6	23.6	25.0	25.1	25.0	25.0	25.1



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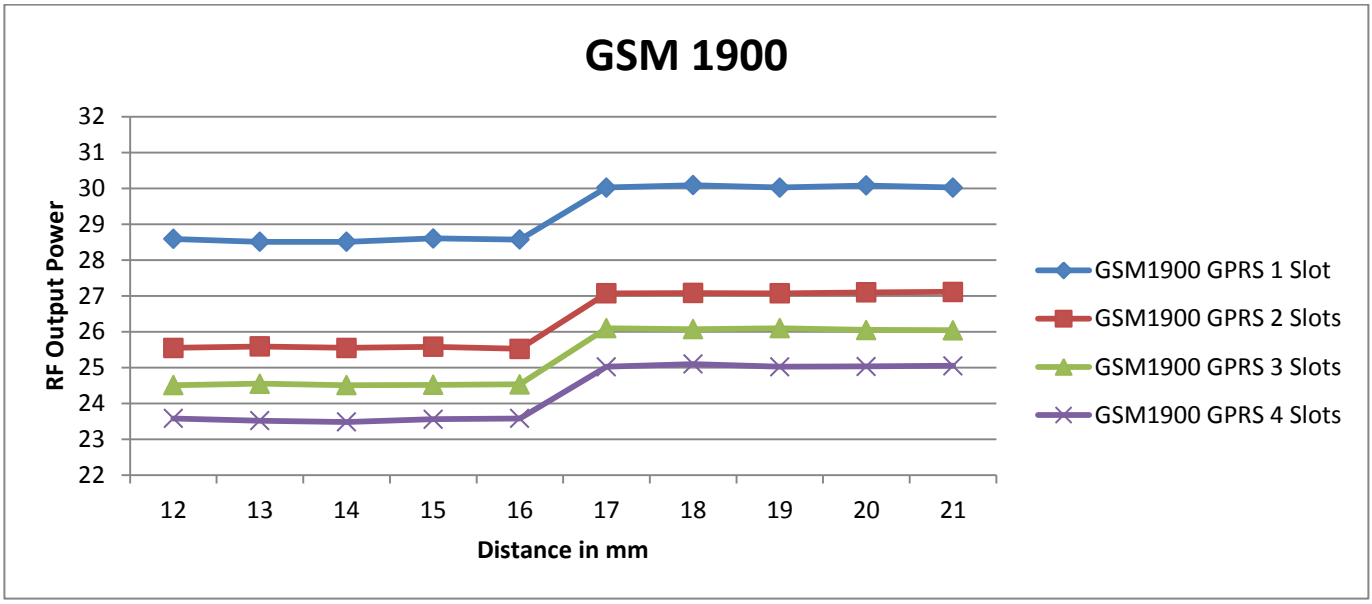
Rear, DUT Moving Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	12	13	14	15	16	17	18	19	20	21
GSM1900 GPRS 1 Slot	28.6	28.5	28.5	28.6	28.6	30.0	30.1	30.0	30.1	30.0
GSM1900 GPRS 2 Slots	25.6	25.6	25.6	25.6	25.5	27.1	27.1	27.1	27.1	27.1
GSM1900 GPRS 3 Slots	24.5	24.6	24.5	24.5	24.5	26.1	26.1	26.1	26.1	26.0
GSM1900 GPRS 4 Slots	23.6	23.5	23.5	23.6	23.6	25.0	25.1	25.0	25.0	25.1



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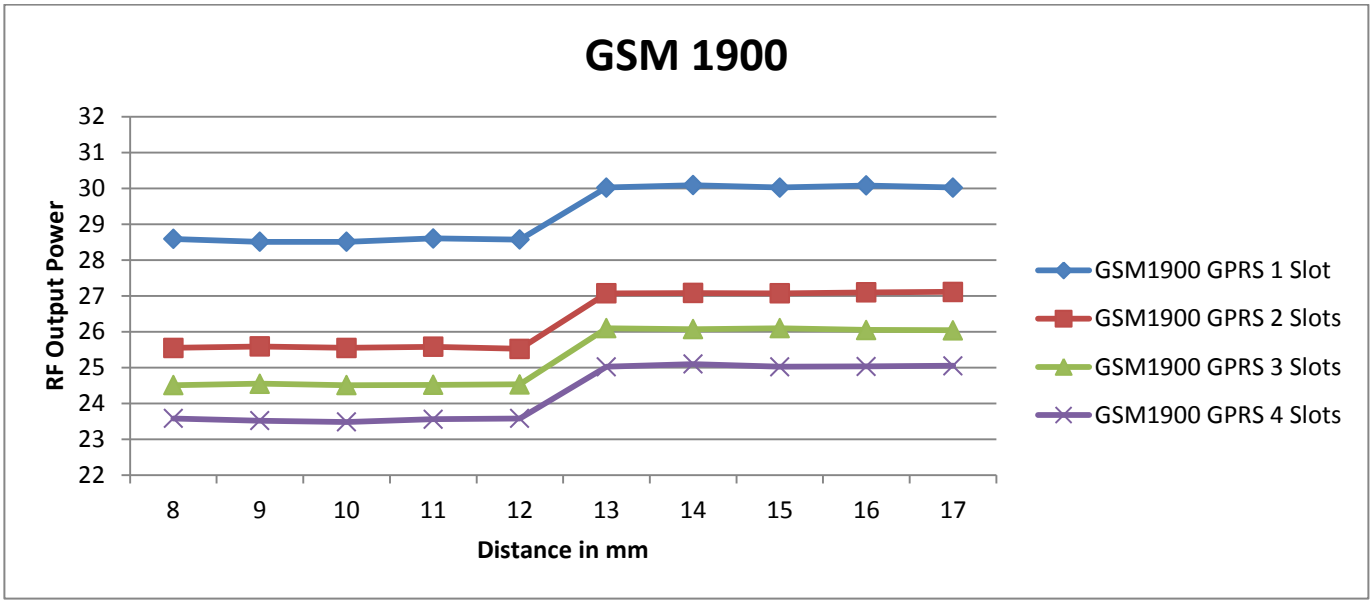
Edge 3, DUT Moving Away (Release) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	8	9	10	11	12	13	14	15	16	17
GSM1900 GPRS 1 Slot	28.6	28.5	28.5	28.6	28.6	30.0	30.1	30.0	30.1	30.0
GSM1900 GPRS 2 Slots	25.6	25.6	25.6	25.6	25.5	27.1	27.1	27.1	27.1	27.1
GSM1900 GPRS 3 Slots	24.5	24.6	24.5	24.5	24.5	26.1	26.1	26.1	26.1	26.0
GSM1900 GPRS 4 Slots	23.6	23.5	23.5	23.6	23.6	25.0	25.1	25.0	25.0	25.1



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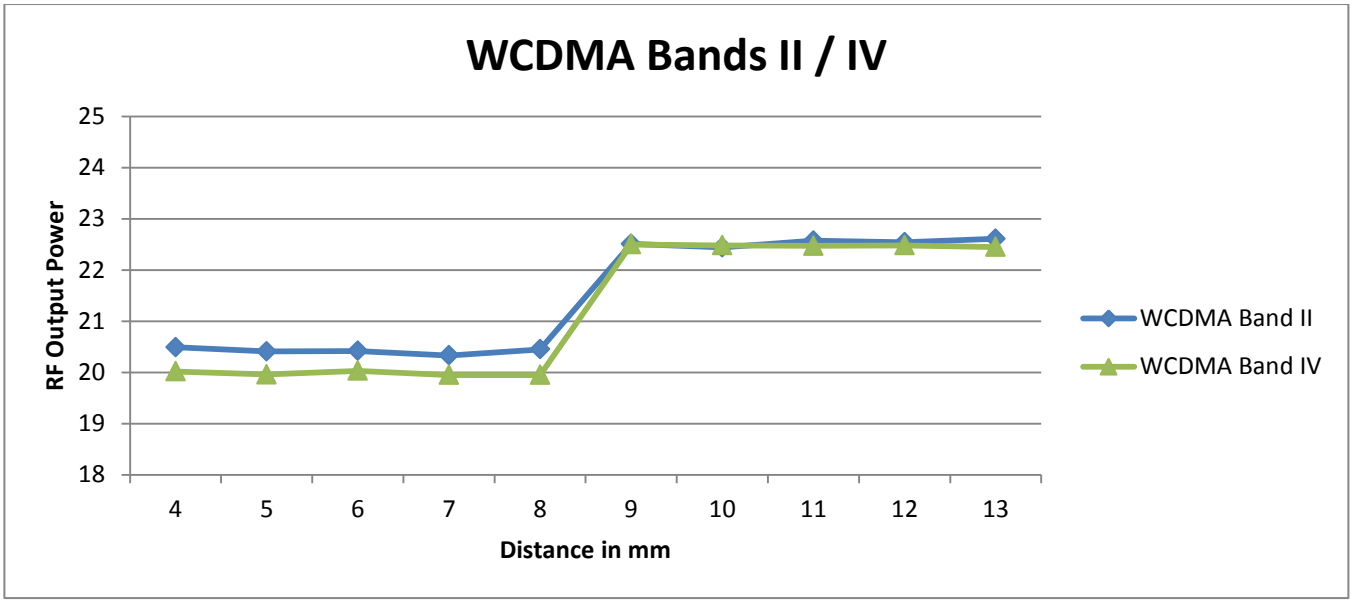
WCDMA Band II, IV

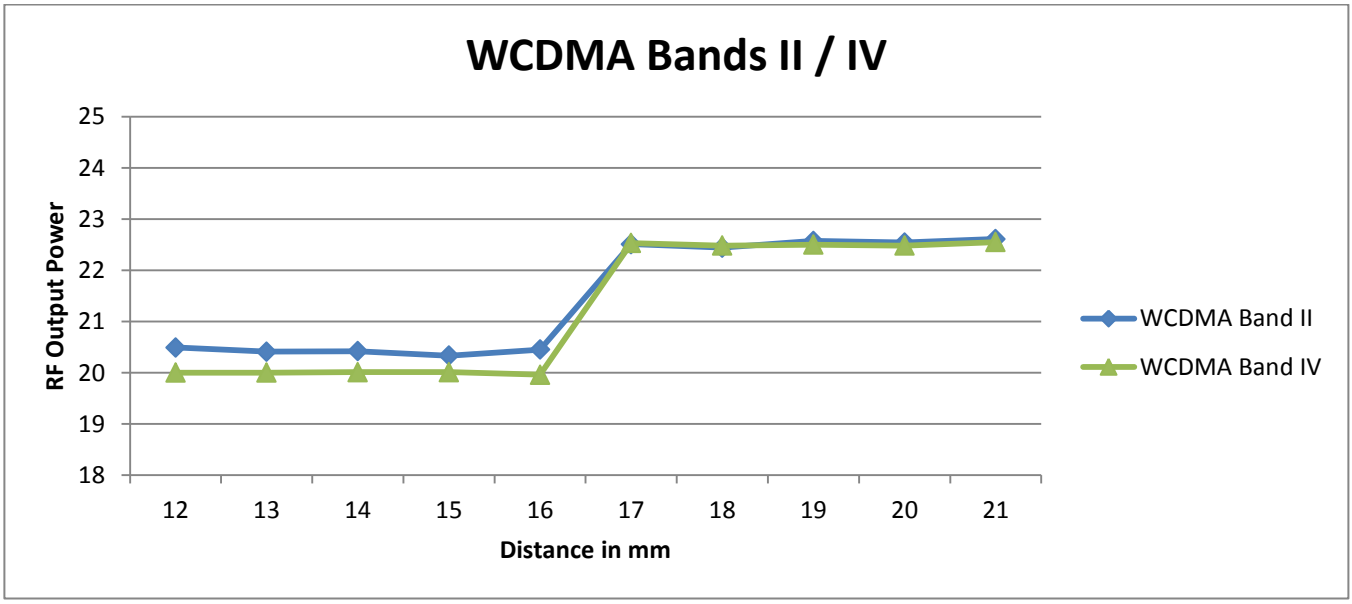
Front, DUT Moving Toward (Trigger) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	4	5	6	7	8	9	10	11	12	13
WCDMA Band II	20.5	20.4	20.4	20.3	20.5	22.5	22.4	22.6	22.5	22.6
WCDMA Band IV	20.0	20.0	20.0	20.0	20.0	22.5	22.5	22.5	22.5	22.5



Rear, DUT Moving Toward (Trigger) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	12	13	14	15	16	17	18	19	20	21
WCDMA Band II	20.5	20.4	20.4	20.3	20.5	22.5	22.4	22.6	22.5	22.6
WCDMA Band IV	20.0	20.0	20.0	20.0	20.0	22.5	22.5	22.5	22.5	22.6



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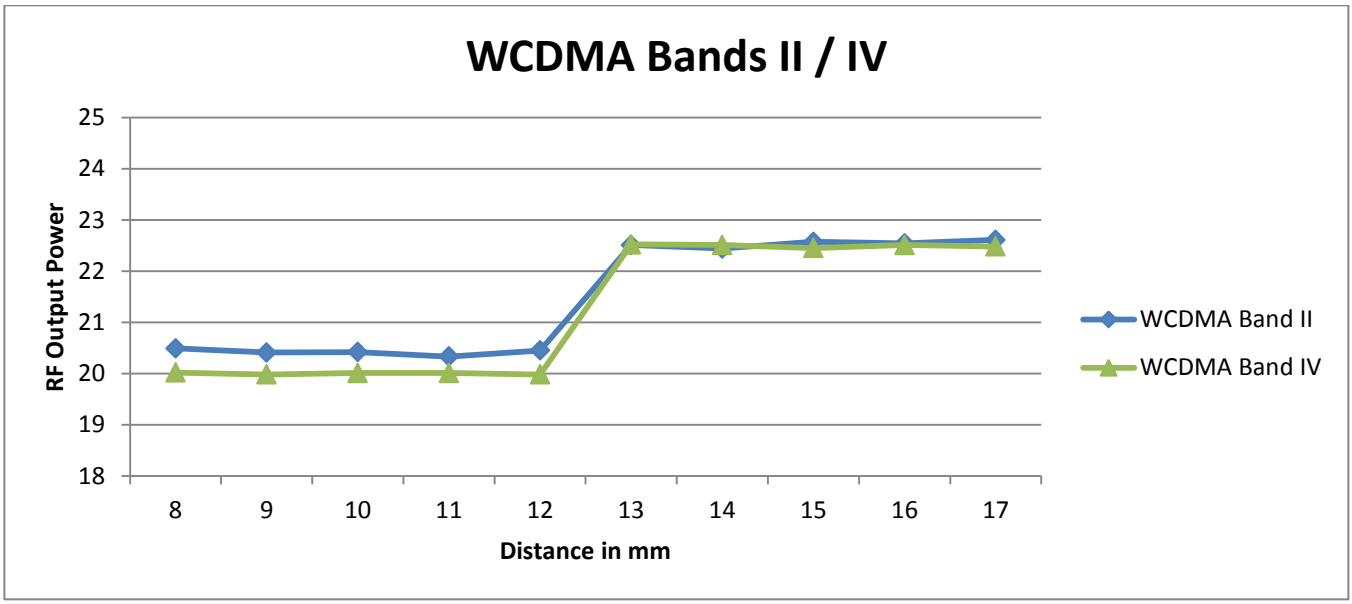
Edge 3, DUT Moving Toward (Trigger) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	8	9	10	11	12	13	14	15	16	17
WCDMA Band II	20.5	20.4	20.4	20.3	20.5	22.5	22.4	22.6	22.5	22.6
WCDMA Band IV	20.0	20.0	20.0	20.0	20.0	22.5	22.5	22.5	22.5	22.5



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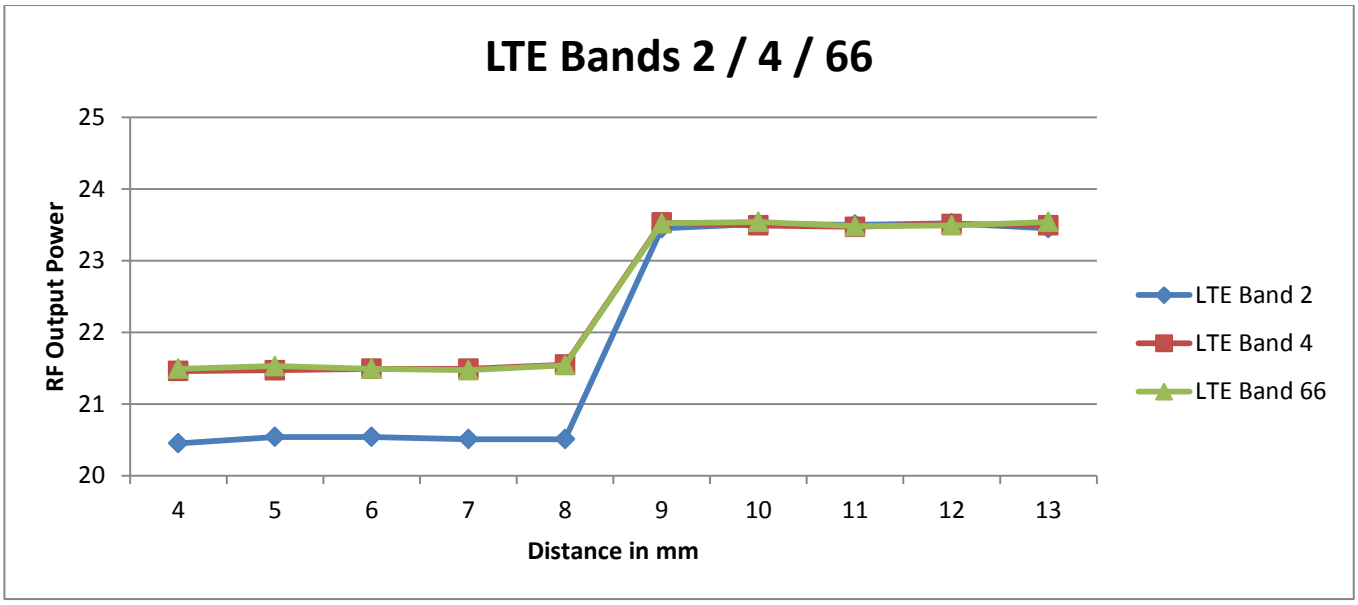
LTE Band 2, 4, 66

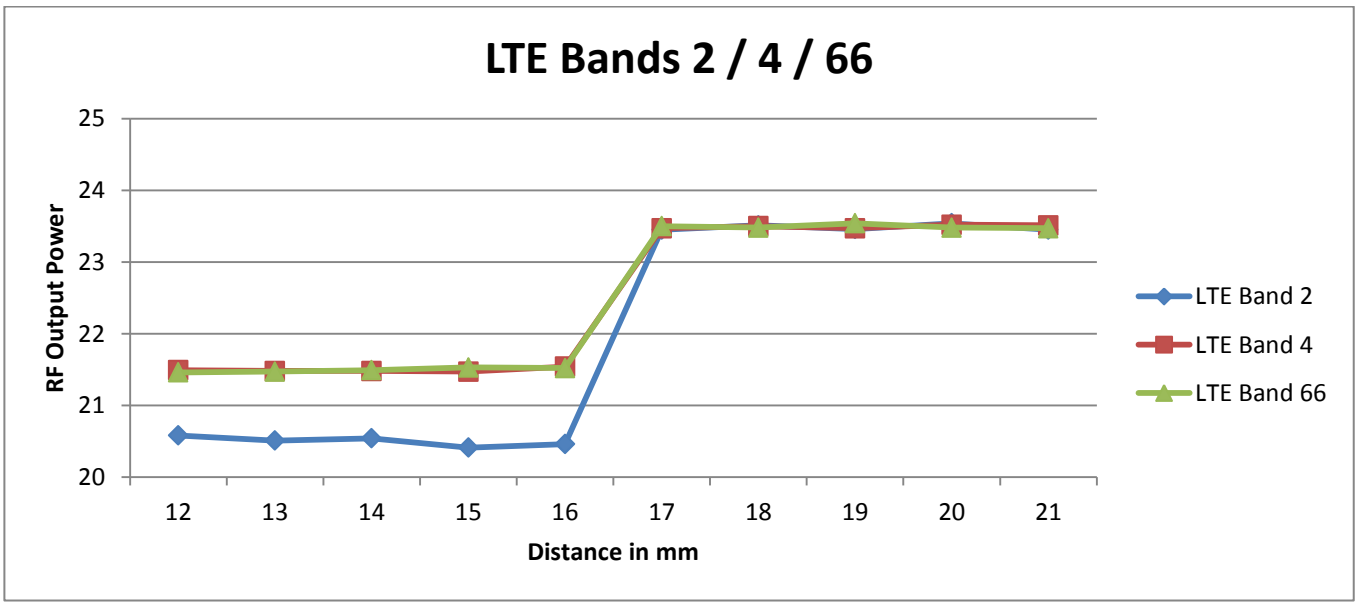
Front, DUT Moving Toward (Trigger) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	4	5	6	7	8	9	10	11	12	13
LTE Band 2	20.45	20.54	20.54	20.51	20.51	23.45	23.51	23.50	23.52	23.45
LTE Band 4	21.46	21.47	21.49	21.49	21.55	23.53	23.49	23.47	23.51	23.49
LTE Band 66	21.49	21.53	21.49	21.47	21.54	23.52	23.54	23.48	23.49	23.54



Rear, DUT Moving Toward (Trigger) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	12	13	14	15	16	17	18	19	20	21
LTE Band 2	20.58	20.51	20.54	20.41	20.46	23.45	23.51	23.46	23.54	23.45
LTE Band 4	21.49	21.48	21.48	21.47	21.54	23.47	23.50	23.47	23.52	23.51
LTE Band 66	21.46	21.47	21.49	21.53	21.52	23.50	23.48	23.54	23.48	23.47



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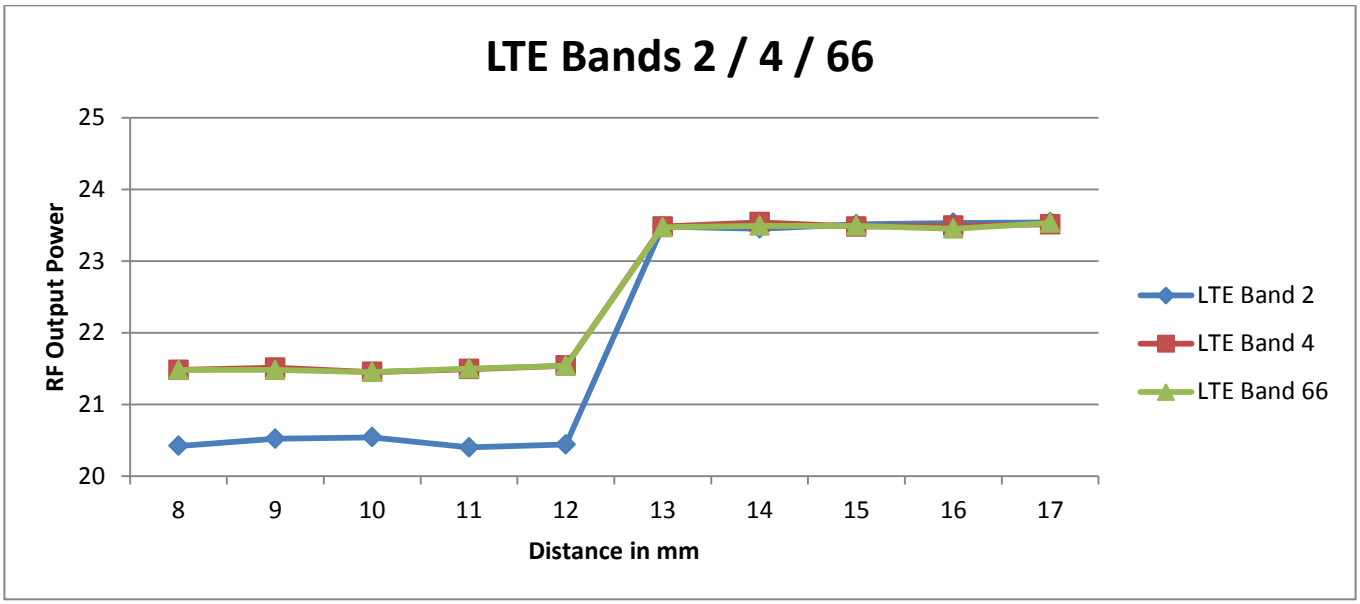
Edge 3, DUT Moving Toward (Trigger) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance (mm)	8	9	10	11	12	13	14	15	16	17
LTE Band 2	20.42	20.52	20.54	20.40	20.44	23.48	23.45	23.51	23.53	23.54
LTE Band 4	21.48	21.51	21.45	21.49	21.54	23.48	23.54	23.48	23.49	23.51
LTE Band 66	21.48	21.48	21.45	21.50	21.54	23.47	23.49	23.49	23.45	23.53



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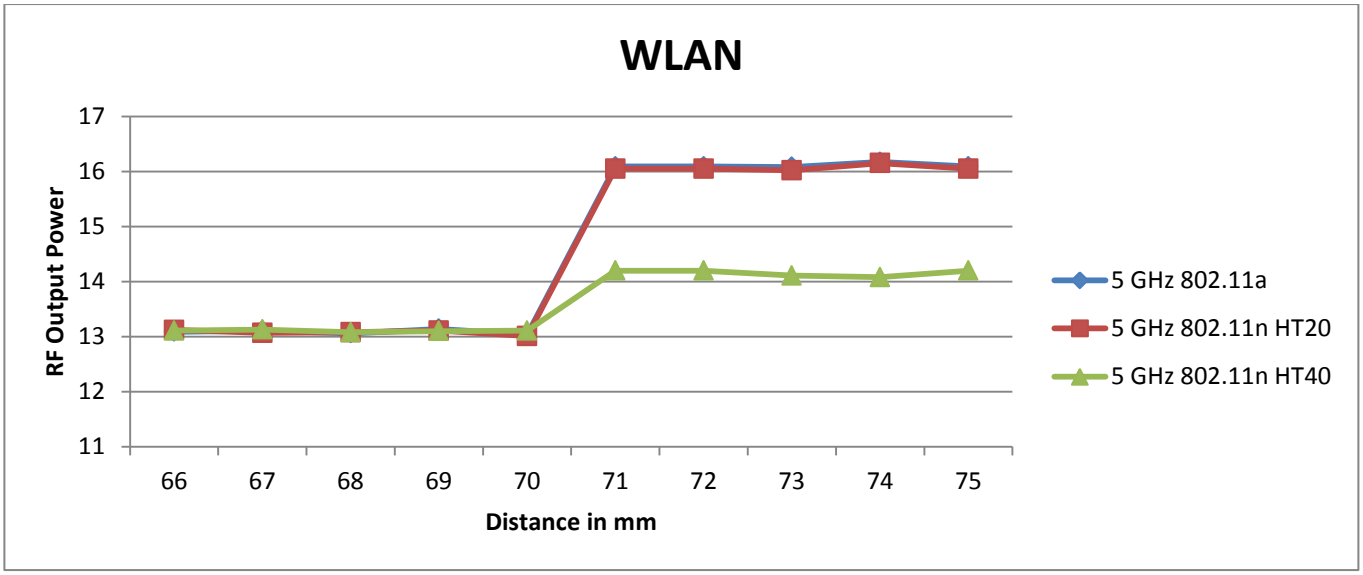
WLAN

Front, DUT Moving Toward (Trigger) from the Phantom

Distance to DUT vs. Output Power in dBm										
Distance	66	67	68	69	70	71	72	73	74	75
5 GHz 802.11a	13.1	13.1	13.1	13.1	13.0	16.1	16.1	16.1	16.2	16.1
5 GHz 802.11n HT20	13.1	13.1	13.1	13.1	13.0	16.1	16.1	16.0	16.2	16.1
5 GHz 802.11n HT40	13.1	13.1	13.1	13.1	13.1	14.2	14.2	14.1	14.1	14.2



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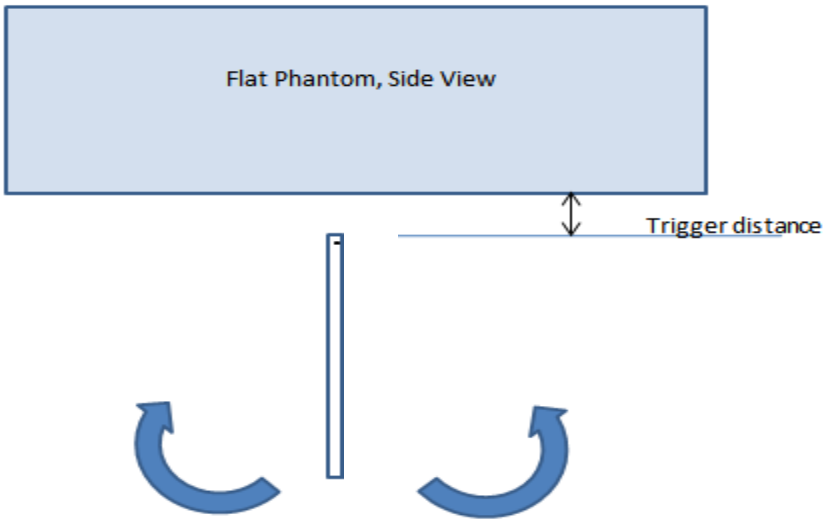
6.7.2. Proximity Sensor Coverage (KDB 616217 §6.3)

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

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

The DUT was positioned directly below the flat phantom at the minimum measured trigger distance with Edge 3 parallel to the base of the flat phantom for each band.

The EUT was rotated about Edge 3 for angles up to +/- 45°. If the output power increased during the rotation the DUT was moved 1mm toward the phantom and the rotation repeated. This procedure was repeated until the power remained reduced for all angles up to +/- 45°.



Proximity sensor tilt angle assessment (Edge 3) KDB 616217 §6.4

Summary of Tablet Tilt Angle Influence to Proximity Sensor Triggering (Edge 3)

Band (MHz)	Minimum trigger distance measured according to KDB 616217 §6.2	Minimum distance at which power reduction was maintained over +/-45°	Power reduction status										
			-45°	-40°	-30°	-20°	-10°	0°	10°	20°	30°	40°	45°
850	12 mm	12 mm	On	On	On	On	On	On	On	On	On	On	On
1700	12 mm	12 mm	On	On	On	On	On	On	On	On	On	On	On
1900	12 mm	12 mm	On	On	On	On	On	On	On	On	On	On	On

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6.7.4. Resulting test positions for SAR measurements

Wireless technologies	DUT Position	§6.2 Triggering Distance	§6.3 Coverage	§6.4 Tilt Angle	Worst case distance for SAR
WWAN	Front	8 mm	N/A	N/A	7 mm
	Rear	16 mm	N/A	N/A	15 mm
	Edge 3	12 mm	N/A	12 mm	11 mm
WLAN	Front	70 mm	N/A	70 mm	69 mm

Notes:

1. Worst case distance for SAR is not considered for body exposure condition. Because Power reduction is applied only voice or VoIP held to ear scenarios.
2. This proximity sensor is only operating in Head exposure condition. So tilt (15 degree) position of Head exposure was additional verified.

7. RF Exposure Conditions (Test Configurations)

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

Wireless technologies	RF Exposure Conditions	DUT-to-User Separation	Test Position	Antenna-to-edge/surface	SAR Required	Note
WWAN	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	
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 / Wi-Fi Direct	10 mm	Rear	< 25 mm	Yes	
			Front	< 25 mm	Yes	
			Edge 1 (Top)	< 25 mm	Yes	
			Edge 2 (Right)	> 25 mm	No	1
			Edge 3 (Bottom)	> 25 mm	No	1
			Edge 4 (Left)	< 25 mm	Yes	

Notes:

1. SAR is not required because the distance from the antenna to the edge is > 25 mm as per KDB 941225 D06 Hotspot SAR.

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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.

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 1 Room

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
03-09-2018	Body 1900	e'	53.7700	Relative Permittivity (ε_r):	53.77	53.30	0.88	5
		e"	14.9100	Conductivity (σ):	1.58	1.52	3.63	5
	Body 1850	e'	53.9100	Relative Permittivity (ε_r):	53.91	53.30	1.14	5
		e"	14.9100	Conductivity (σ):	1.53	1.52	0.90	5
	Body 1910	e'	53.7400	Relative Permittivity (ε_r):	53.74	53.30	0.83	5
		e"	14.9100	Conductivity (σ):	1.58	1.52	4.18	5
03-11-2018	Body 750	e'	54.1600	Relative Permittivity (ε_r):	54.16	55.55	-2.50	5
		e"	23.2100	Conductivity (σ):	0.97	0.96	0.50	5
	Body 700	e'	54.7000	Relative Permittivity (ε_r):	54.70	55.74	-1.86	5
		e"	23.6100	Conductivity (σ):	0.92	0.96	-4.20	5
	Body 790	e'	53.7200	Relative Permittivity (ε_r):	53.72	55.39	-3.02	5
		e"	22.9200	Conductivity (σ):	1.01	0.97	4.21	5
03-12-2018	Head 2450	e'	37.8400	Relative Permittivity (ε_r):	37.84	39.20	-3.47	5
		e"	12.9900	Conductivity (σ):	1.77	1.80	-1.69	5
	Head 2410	e'	37.9900	Relative Permittivity (ε_r):	37.99	39.28	-3.28	5
		e"	12.8800	Conductivity (σ):	1.73	1.76	-1.96	5
	Head 2475	e'	37.7300	Relative Permittivity (ε_r):	37.73	39.17	-3.67	5
		e"	13.0800	Conductivity (σ):	1.80	1.83	-1.48	5
03-20-2018	Head 5180	e'	37.1700	Relative Permittivity (ε_r):	37.17	36.01	3.21	5
		e"	15.7400	Conductivity (σ):	4.53	4.63	-2.10	5
	Head 5300	e'	36.9900	Relative Permittivity (ε_r):	36.99	35.88	3.10	5
		e"	15.8000	Conductivity (σ):	4.66	4.75	-2.04	5
	Head 5600	e'	36.5600	Relative Permittivity (ε_r):	36.56	35.53	2.89	5
		e"	15.9500	Conductivity (σ):	4.97	5.06	-1.85	5
	Head 5800	e'	36.2900	Relative Permittivity (ε_r):	36.29	35.30	2.80	5
		e"	16.0700	Conductivity (σ):	5.18	5.27	-1.66	5
	Head 5825	e'	36.2500	Relative Permittivity (ε_r):	36.25	35.30	2.69	5
		e"	16.0800	Conductivity (σ):	5.21	5.27	-1.17	5
03-25-2018	Body 1750	e'	53.5700	Relative Permittivity (ε_r):	53.57	53.44	0.24	5
		e"	14.7800	Conductivity (σ):	1.44	1.49	-3.23	5
	Body 1710	e'	53.7100	Relative Permittivity (ε_r):	53.71	53.54	0.31	5
		e"	14.8000	Conductivity (σ):	1.41	1.46	-3.72	5
	Body 1755	e'	53.5600	Relative Permittivity (ε_r):	53.56	53.43	0.25	5
		e"	14.7800	Conductivity (σ):	1.44	1.49	-3.15	5
03-25-2018	Body 1900	e'	53.3000	Relative Permittivity (ε_r):	53.30	53.30	0.00	5
		e"	14.9800	Conductivity (σ):	1.58	1.52	4.12	5
	Body 1850	e'	53.4400	Relative Permittivity (ε_r):	53.44	53.30	0.26	5
		e"	14.9100	Conductivity (σ):	1.53	1.52	0.90	5
	Body 1910	e'	53.2800	Relative Permittivity (ε_r):	53.28	53.30	-0.04	5
		e"	14.9900	Conductivity (σ):	1.59	1.52	4.73	5
03-28-2018	Body 1750	e'	51.2300	Relative Permittivity (ε_r):	51.23	53.44	-4.14	5
		e"	14.6900	Conductivity (σ):	1.43	1.49	-3.82	5
	Body 1710	e'	51.3100	Relative Permittivity (ε_r):	51.31	53.54	-4.17	5
		e"	14.7000	Conductivity (σ):	1.40	1.46	-4.37	5
	Body 1755	e'	51.2300	Relative Permittivity (ε_r):	51.23	53.43	-4.11	5
		e"	14.6800	Conductivity (σ):	1.43	1.49	-3.81	5
03-28-2018	Body 1900	e'	50.9000	Relative Permittivity (ε_r):	50.90	53.30	-4.50	5
		e"	14.9000	Conductivity (σ):	1.57	1.52	3.56	5
	Body 1850	e'	51.0400	Relative Permittivity (ε_r):	51.04	53.30	-4.24	5
		e"	14.7900	Conductivity (σ):	1.52	1.52	0.09	5
	Body 1910	e'	50.8700	Relative Permittivity (ε_r):	50.87	53.30	-4.56	5
		e"	14.9200	Conductivity (σ):	1.58	1.52	4.25	5
04-02-2018	Body 1900	e'	52.3000	Relative Permittivity (ε_r):	52.30	53.30	-1.88	5
		e"	14.8700	Conductivity (σ):	1.57	1.52	3.35	5
	Body 1850	e'	52.4500	Relative Permittivity (ε_r):	52.45	53.30	-1.59	5
		e"	14.8500	Conductivity (σ):	1.53	1.52	0.50	5
	Body 1910	e'	52.2600	Relative Permittivity (ε_r):	52.26	53.30	-1.95	5
		e"	14.8800	Conductivity (σ):	1.58	1.52	3.97	5

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SAR 2 Room

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
03-09-2018	Head 835	e'	41.3200	Relative Permittivity (ε_r):	41.32	41.50	-0.43	5
		e''	19.5800	Conductivity (σ):	0.91	0.90	1.01	5
	Head 820	e'	41.4800	Relative Permittivity (ε_r):	41.48	41.60	-0.29	5
		e''	19.6100	Conductivity (σ):	0.89	0.90	-0.48	5
	Head 850	e'	41.0600	Relative Permittivity (ε_r):	41.06	41.50	-1.06	5
		e''	19.5500	Conductivity (σ):	0.92	0.92	0.98	5
03-09-2018	Body 835	e'	53.2900	Relative Permittivity (ε_r):	53.29	55.20	-3.46	5
		e''	21.4700	Conductivity (σ):	1.00	0.97	2.77	5
	Body 820	e'	53.4400	Relative Permittivity (ε_r):	53.44	55.28	-3.32	5
		e''	21.5400	Conductivity (σ):	0.98	0.97	1.41	5
	Body 850	e'	53.1500	Relative Permittivity (ε_r):	53.15	55.16	-3.64	5
		e''	21.4200	Conductivity (σ):	1.01	0.99	2.56	5
03-13-2018	Head 2600	e'	39.2200	Relative Permittivity (ε_r):	39.22	39.01	0.54	5
		e''	13.9900	Conductivity (σ):	2.02	1.96	3.08	5
	Head 2500	e'	39.4700	Relative Permittivity (ε_r):	39.47	39.14	0.85	5
		e''	13.7200	Conductivity (σ):	1.91	1.85	2.87	5
	Head 2700	e'	38.9500	Relative Permittivity (ε_r):	38.95	38.88	0.17	5
		e''	14.2500	Conductivity (σ):	2.14	2.07	3.34	5
03-23-2018	Head 835	e'	42.0000	Relative Permittivity (ε_r):	42.00	41.50	1.20	5
		e''	19.6600	Conductivity (σ):	0.91	0.90	1.42	5
	Head 820	e'	42.1600	Relative Permittivity (ε_r):	42.16	41.60	1.34	5
		e''	19.6800	Conductivity (σ):	0.90	0.90	-0.13	5
	Head 850	e'	41.8100	Relative Permittivity (ε_r):	41.81	41.50	0.75	5
		e''	19.6600	Conductivity (σ):	0.93	0.92	1.55	5
03-23-2018	Body 835	e'	53.1900	Relative Permittivity (ε_r):	53.19	55.20	-3.64	5
		e''	21.2200	Conductivity (σ):	0.99	0.97	1.57	5
	Body 820	e'	53.3100	Relative Permittivity (ε_r):	53.31	55.28	-3.56	5
		e''	21.2500	Conductivity (σ):	0.97	0.97	0.04	5
	Body 850	e'	53.0400	Relative Permittivity (ε_r):	53.04	55.16	-3.84	5
		e''	21.2100	Conductivity (σ):	1.00	0.99	1.55	5

SAR 3 Room

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
03-09-2018	Head 1750	e'	38.8800	Relative Permittivity (ε_r):	38.88	40.08	-3.01	5
		e''	13.5400	Conductivity (σ):	1.32	1.37	-3.76	5
	Head 1710	e'	39.0200	Relative Permittivity (ε_r):	39.02	40.15	-2.81	5
		e''	13.5100	Conductivity (σ):	1.28	1.35	-4.59	5
	Head 1755	e'	38.8600	Relative Permittivity (ε_r):	38.86	40.08	-3.04	5
		e''	13.5400	Conductivity (σ):	1.32	1.37	-3.68	5
03-09-2018	Head 1900	e'	38.3900	Relative Permittivity (ε_r):	38.39	40.00	-4.03	5
		e''	13.7700	Conductivity (σ):	1.45	1.40	3.91	5
	Head 1850	e'	38.5800	Relative Permittivity (ε_r):	38.58	40.00	-3.55	5
		e''	13.6700	Conductivity (σ):	1.41	1.40	0.44	5
	Head 1910	e'	38.3400	Relative Permittivity (ε_r):	38.34	40.00	-4.15	5
		e''	13.7900	Conductivity (σ):	1.46	1.40	4.61	5
03-11-2018	Head 750	e'	41.4000	Relative Permittivity (ε_r):	41.40	41.96	-1.34	5
		e''	21.3900	Conductivity (σ):	0.89	0.89	-0.12	5
	Head 700	e'	42.1000	Relative Permittivity (ε_r):	42.10	42.22	-0.28	5
		e''	21.7200	Conductivity (σ):	0.85	0.89	-4.93	5
	Head 790	e'	40.8600	Relative Permittivity (ε_r):	40.86	41.76	-2.15	5
		e''	21.1300	Conductivity (σ):	0.93	0.90	3.57	5
03-12-2018	Body 2450	e'	50.9700	Relative Permittivity (ε_r):	50.97	52.70	-3.28	5
		e''	14.7300	Conductivity (σ):	2.01	1.95	2.90	5
	Body 2400	e'	51.0700	Relative Permittivity (ε_r):	51.07	52.77	-3.23	5
		e''	14.6100	Conductivity (σ):	1.95	1.90	2.72	5
	Body 2480	e'	50.8800	Relative Permittivity (ε_r):	50.88	52.66	-3.38	5
		e''	14.8100	Conductivity (σ):	2.04	1.99	2.51	5

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SAR 3 Room (Continued)

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
03-12-2018	Body 2600	e'	50.5300	Relative Permittivity (ε_r):	50.53	52.51	-3.77	5
		e"	15.1200	Conductivity (σ):	2.19	2.16	1.16	5
	Body 2500	e'	50.8200	Relative Permittivity (ε_r):	50.82	52.64	-3.45	5
		e"	14.8600	Conductivity (σ):	2.07	2.02	2.25	5
	Body 2700	e'	50.2200	Relative Permittivity (ε_r):	50.22	52.38	-4.13	5
		e"	15.3600	Conductivity (σ):	2.31	2.30	0.20	5
03-15-2018	Body 5250	e'	49.0600	Relative Permittivity (ε_r):	49.06	48.95	0.22	5
		e"	18.7600	Conductivity (σ):	5.48	5.35	2.30	5
	Body 5260	e'	49.0400	Relative Permittivity (ε_r):	49.04	48.94	0.21	5
		e"	18.7800	Conductivity (σ):	5.49	5.36	2.39	5
	Body 5600	e'	48.4800	Relative Permittivity (ε_r):	48.48	48.48	0.00	5
		e"	19.1000	Conductivity (σ):	5.95	5.76	3.23	5
	Body 5750	e'	48.2400	Relative Permittivity (ε_r):	48.24	48.27	-0.07	5
		e"	19.2500	Conductivity (σ):	6.15	5.94	3.68	5
	Body 5825	e'	48.1100	Relative Permittivity (ε_r):	48.11	48.20	-0.19	5
		e"	19.3500	Conductivity (σ):	6.27	6.00	4.45	5
03-21-2018	Head 1900	e'	38.5400	Relative Permittivity (ε_r):	38.54	40.00	-3.65	5
		e"	13.5600	Conductivity (σ):	1.43	1.40	2.33	5
	Head 1850	e'	38.7400	Relative Permittivity (ε_r):	38.74	40.00	-3.15	5
		e"	13.5000	Conductivity (σ):	1.39	1.40	-0.81	5
	Head 1910	e'	38.5100	Relative Permittivity (ε_r):	38.51	40.00	-3.73	5
		e"	13.5800	Conductivity (σ):	1.44	1.40	3.02	5
03-27-2018	Body 750	e'	54.9100	Relative Permittivity (ε_r):	54.91	55.55	-1.15	5
		e"	23.3000	Conductivity (σ):	0.97	0.96	0.89	5
	Body 700	e'	55.4200	Relative Permittivity (ε_r):	55.42	55.74	-0.57	5
		e"	23.7600	Conductivity (σ):	0.92	0.96	-3.59	5
	Body 790	e'	54.4900	Relative Permittivity (ε_r):	54.49	55.39	-1.63	5
		e"	22.9500	Conductivity (σ):	1.01	0.97	4.34	5
03-29-2018	Head 1750	e'	39.4700	Relative Permittivity (ε_r):	39.47	40.08	-1.53	5
		e"	13.5200	Conductivity (σ):	1.32	1.37	-3.90	5
	Head 1710	e'	39.6800	Relative Permittivity (ε_r):	39.68	40.15	-1.16	5
		e"	13.4800	Conductivity (σ):	1.28	1.35	-4.81	5
	Head 1755	e'	39.4500	Relative Permittivity (ε_r):	39.45	40.08	-1.56	5
		e"	13.5200	Conductivity (σ):	1.32	1.37	-3.82	5
03-29-2018	Head 1900	e'	39.0100	Relative Permittivity (ε_r):	39.01	40.00	-2.48	5
		e"	13.7100	Conductivity (σ):	1.45	1.40	3.46	5
	Head 1850	e'	39.1500	Relative Permittivity (ε_r):	39.15	40.00	-2.13	5
		e"	13.6200	Conductivity (σ):	1.40	1.40	0.07	5
	Head 1910	e'	38.9800	Relative Permittivity (ε_r):	38.98	40.00	-2.55	5
		e"	13.7300	Conductivity (σ):	1.46	1.40	4.15	5
03-30-2018	Head 750	e'	41.8400	Relative Permittivity (ε_r):	41.84	41.96	-0.29	5
		e"	21.5200	Conductivity (σ):	0.90	0.89	0.49	5
	Head 700	e'	42.5400	Relative Permittivity (ε_r):	42.54	42.22	0.76	5
		e"	21.8700	Conductivity (σ):	0.85	0.89	-4.27	5
	Head 790	e'	41.3000	Relative Permittivity (ε_r):	41.30	41.76	-1.09	5
		e"	21.2300	Conductivity (σ):	0.93	0.90	4.06	5

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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 2.5 mm.
  For 5 GHz band - Distance between probe sensors and phantom surface was set to 1.4 mm
- The dipole input power (forward power) was 100 mW.
- The results are normalized to 1 W input power.

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Reference Target SAR Values

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

System Dipole	Serial No.	Cal. Date	Freq. (MHz)	Target SAR Values (W/kg)		
				1g/10g	Head	Body
D750V3	1122	2-19-2018	750	1g	8.22	8.63
				10g	5.35	5.72
D835V2	4d194	7-19-2017	835	1g	9.33	9.30
				10g	6.03	6.09
D1750V2	1125	2-16-2018	1750	1g	36.50	36.80
				10g	19.30	19.50
D1900V2	5d190	9-20-2017	1900	1g	38.30	40.00
				10g	20.10	21.10
D2450V2	939	9-19-2017	2450	1g	52.30	50.70
				10g	24.60	23.90
D2600V2	1097	1-17-2018	2600	1g	56.40	54.40
				10g	25.30	24.20
D5GHzV2	1184	8-23-2017	5300	1g	81.30	76.40
				10g	23.20	21.30
			5500	1g	80.60	77.10
				10g	22.90	21.30
			5600	1g	82.30	79.20
				10g	23.40	22.20
			5800	1g	78.10	76.40
				10g	22.20	21.20
D5GHzV2	1209	2-15-2018	5250	1g	80.80	75.70
				10g	23.10	21.00
			5600	1g	83.40	79.00
				10g	23.80	21.90
			5750	1g	80.70	75.60
				10g	22.90	20.80

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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.

SAR 1 Room

Date Tested	System Dipole		T.S. Liquid		Measured Results		Target (Ref. Value)	Delta ±10 %	Plot No.
	Type	Serial #			Zoom Scan to 100 mW	Normalize to 1 W			
3-9-2018	D1900V2	5d190	Body	1g	4.03	40.30	40.00	0.75	
				10g	2.06	20.60	21.10	-2.37	
3-11-2018	D750V3	1122	Body	1g	0.88	8.83	8.63	2.32	
				10g	0.59	5.89	5.72	2.97	
3-12-2018	D2450V2	939	Head	1g	5.37	53.70	52.30	2.68	
				10g	2.44	24.40	24.60	-0.81	
3-20-2018	D5GHzV2 (5300)	1184	Head	1g	7.58	75.80	81.30	-6.77	1, 2
				10g	2.13	21.30	23.20	-8.19	
3-20-2018	D5GHzV2 (5500)	1184	Head	1g	7.70	77.00	80.60	-4.47	
				10g	2.19	21.90	22.90	-4.37	
3-20-2018	D5GHzV2 (5600)	1184	Head	1g	7.84	78.40	82.30	-4.74	
				10g	2.20	22.00	23.40	-5.98	
3-20-2018	D5GHzV2 (5800)	1184	Head	1g	7.62	76.20	78.10	-2.43	
				10g	2.16	21.60	22.20	-2.70	
3-25-2018	D1750V2	1125	Body	1g	3.77	37.70	36.80	2.45	
				10g	1.99	19.90	19.50	2.05	
3-25-2018	D1900V2	5d190	Body	1g	4.19	41.90	40.00	4.75	
				10g	2.14	21.40	21.10	1.42	
3-28-2018	D1750V2	1125	Body	1g	3.65	36.50	36.80	-0.82	
				10g	1.90	19.00	19.50	-2.56	
3-28-2018	D1900V2	5d190	Body	1g	4.08	40.80	40.00	2.00	
				10g	2.08	20.80	21.10	-1.42	
4-2-2018	D1900V2	5d190	Body	1g	4.09	40.90	40.00	2.25	
				10g	2.08	20.80	21.10	-1.42	

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SAR 2 Room

Date Tested	System Dipole		T.S. Liquid		Measured Results		Target (Ref. Value)	Delta ±10 %	Plot No.
	Type	Serial #			Zoom Scan to 100 mW	Normalize to 1 W			
3-9-2018	D835V2	4d194	Head	1g	0.99	9.87	9.33	5.79	
				10g	0.65	6.49	6.03	7.63	
3-9-2018	D835V2	4d194	Body	1g	1.00	9.97	9.30	7.20	3, 4
				10g	0.66	6.55	6.09	7.55	
3-13-2018	D2600V2	1097	Head	1g	5.51	55.10	56.40	-2.30	
				10g	2.44	24.40	25.30	-3.56	
3-23-2018	D835V2	4d194	Head	1g	0.94	9.39	9.33	0.64	
				10g	0.62	6.18	6.03	2.49	
3-23-2018	D835V2	4d194	Body	1g	0.95	9.48	9.30	1.94	
				10g	0.62	6.21	6.09	1.97	

SAR 3 Room

Date Tested	System Dipole		T.S. Liquid		Measured Results		Target (Ref. Value)	Delta ±10 %	Plot No.
	Type	Serial #			Zoom Scan to 100 mW	Normalize to 1 W			
3-9-2018	D1750V2	1125	Head	1g	3.55	35.50	36.50	-2.74	
				10g	1.88	18.80	19.30	-2.59	
3-9-2018	D1900V2	5d190	Head	1g	4.10	41.00	38.30	7.05	
				10g	2.09	20.90	20.10	3.98	
3-11-2018	D750V3	1122	Head	1g	0.81	8.08	8.22	-1.70	
				10g	0.53	5.34	5.35	-0.19	
3-12-2018	D2450V2	939	Body	1g	4.89	48.90	50.70	-3.55	5, 6
				10g	2.23	22.30	23.90	-6.69	
3-12-2018	D2600V2	1097	Body	1g	5.06	50.60	54.40	-6.99	7, 8
				10g	2.20	22.00	24.20	-9.09	
3-18-2018	D5GHzV2 (5250 MHz)	1209	Body	1g	7.07	70.70	75.70	-6.61	9, 10
				10g	1.99	19.90	21.00	-5.24	
3-18-2018	D5GHzV2 (5600 MHz)	1209	Body	1g	7.81	78.10	79.00	-1.14	
				10g	2.19	21.90	21.90	0.00	
3-18-2018	D5GHzV2 (5750 MHz)	1209	Body	1g	7.20	72.00	75.60	-4.76	
				10g	2.01	20.10	20.80	-3.37	
3-21-2018	D1900V2	5d190	Head	1g	4.10	41.00	38.30	7.05	
				10g	2.08	20.80	20.10	3.48	
3-27-2018	D750V3	1122	Body	1g	0.86	8.61	8.63	-0.23	
				10g	0.57	5.72	5.72	0.00	
3-29-2018	D1750V2	1125	Head	1g	3.54	35.40	36.50	-3.01	11, 12
				10g	1.87	18.70	19.30	-3.11	
3-29-2018	D1900V2	5d190	Head	1g	4.12	41.20	38.30	7.57	13, 14
				10g	2.10	21.00	20.10	4.48	
3-30-2018	D750V3	1122	Head	1g	0.80	8.02	8.22	-2.43	15, 16
				10g	0.53	5.32	5.35	-0.56	

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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.

GSM850 Measured Results

					Full Power			Reduced Power Hotspot back-off			Reduced Power Proximity Sensor back-off		
Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Burst Pwr (dBm)	Frame Pwr (dBm)	Max. Frame Pwr (dBm)	Burst Pwr (dBm)	Frame Pwr (dBm)	Max. Frame Pwr (dBm)	Burst Pwr (dBm)	Frame Pwr (dBm)	Max. Frame Pwr (dBm)
GSM (Voice)	CS1	1	128	824.4	33.0	24.0	25.0	33.0	24.0	25.0	33.0	23.9	25.0
			190	836.6	33.0	24.0		33.0	24.0		33.0	23.9	
			251	848.8	33.1	24.1		33.1	24.0		33.1	24.0	
GPRS (GMSK)	CS1	1	128	824.4	33.0	24.0	25.0	30.5	21.4	22.5	30.4	21.4	22.5
			190	836.6	33.2	24.1		30.6	21.6		30.6	21.5	
			251	848.8	33.1	24.1		30.7	21.7		30.7	21.6	
		2	128	824.4	32.2	26.2	27.0	29.6	23.6	24.5	29.5	23.5	24.5
			190	836.6	32.4	26.4		29.8	23.8		29.7	23.7	
			251	848.8	32.4	26.4		29.7	23.7		29.8	23.8	
		3	128	824.4	31.2	26.9	**27.2**	28.6	24.3	**24.7**	28.5	24.3	**24.7**
			190	836.6	31.2	27.0		28.6	24.4		28.6	24.3	
			251	848.8	31.3	27.0		28.8	24.5		28.7	24.4	
		4	128	824.4	29.9	26.9	27.0	27.3	24.2	24.5	27.2	24.2	24.5
			190	836.6	29.9	26.9		27.3	24.3		27.2	24.2	
			251	848.8	30.0	27.0		27.4	24.4		27.4	24.3	
EGPRS (8PSK)	MCS5	1	128	824.4	27.6	18.5	19.0	26.9	17.8	19.0	27.5	18.5	19.0
			190	836.6	26.9	17.9		26.9	17.8		27.0	18.0	
			251	848.8	27.0	18.0		27.0	18.0		27.1	18.1	
		2	128	824.4	25.5	19.5	19.5	25.0	18.9	19.5	24.9	18.8	19.5
			190	836.6	25.0	19.0		25.0	19.0		24.9	18.8	
			251	848.8	25.1	19.1		25.1	19.1		25.0	19.0	
		3	128	824.4	24.0	19.7	20.2	23.7	19.5	20.2	23.9	19.6	20.2
			190	836.6	23.8	19.5		23.7	19.5		23.8	19.5	
			251	848.8	23.9	19.6		23.9	19.6		23.9	19.7	
		4	128	824.4	22.8	19.8	20.0	22.7	19.6	20.0	22.6	19.6	20.0
			190	836.6	22.8	19.8		22.7	19.7		22.6	19.6	
			251	848.8	22.9	19.9		22.8	19.8		22.7	19.6	

Notes:

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

- GMSK (GPRS) mode with 3 time slots for Max power and 3 time slots for reduced power, based on the Tune-up Procedure. Refer to §6.3.
- SAR is not required for EGPRS (8PSK) mode because the maximum output power and tune-up limit is ≤ 1/4dB higher than GMSK GPRS or the adjusted SAR of the highest reported SAR of GMSK GPRS is ≤ 1.2W/kg.

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GSM1900 Measured Results

					Full Power			Reduced Power Hotspot back-off			Reduced Power Proximity Sensor back-off		
Mode	Coding Scheme	Time Slots	Ch No.	Freq. (MHz)	Burst Pwr (dBm)	Frame Pwr (dBm)	Max. Frame Pwr (dBm)	Burst Pwr (dBm)	Frame Pwr (dBm)	Max. Frame Pwr (dBm)	Burst Pwr (dBm)	Frame Pwr (dBm)	Max. Frame Pwr (dBm)
GSM (Voice)	CS1	1	512	1850.2	29.9	20.8	21.5	29.8	20.7	21.5	29.7	20.7	21.5
			661	1880.0	29.9	20.9		29.8	20.8		29.8	20.7	
			810	1909.8	29.6	20.5		29.5	20.5		29.5	20.4	
GPRS (GMSK)	CS1	1	512	1850.2	29.8	20.8	21.5	28.0	19.0	20.0	28.0	18.9	20.0
			661	1880.0	29.9	20.9		28.2	19.2		28.2	19.1	
			810	1909.8	29.6	20.6		27.9	18.8		27.8	18.8	
		2	512	1850.2	26.9	20.9	21.5	24.9	18.9	20.0	24.9	18.9	20.0
			661	1880.0	26.9	20.9		25.1	19.0		25.1	19.0	
			810	1909.8	26.6	20.6		24.8	18.7		24.7	18.7	
		3	512	1850.2	26.0	21.8	22.2	24.1	19.8	20.7	24.1	19.8	20.7
			661	1880.0	26.1	21.8		24.2	19.9		24.2	19.9	
			810	1909.8	25.8	21.5		24.0	19.7		24.0	19.7	
		4	512	1850.2	25.4	22.4	**22.5**	23.5	20.5	**21.0**	23.5	20.5	**21.0**
			661	1880.0	25.4	22.4		23.6	20.6		23.6	20.6	
			810	1909.8	25.2	22.2		23.4	20.4		23.4	20.4	
EGPRS (8PSK)	MCS5	1	512	1850.2	25.9	16.8	17.5	25.8	16.8	17.5	25.8	16.8	17.5
			661	1880.0	25.9	16.8		25.8	16.8		25.8	16.8	
			810	1909.8	25.9	16.8		25.8	16.8		25.8	16.8	
		2	512	1850.2	23.9	17.9	18.5	23.8	17.8	18.0	23.8	17.8	18.0
			661	1880.0	23.7	17.7		23.6	17.6		23.6	17.6	
			810	1909.8	23.5	17.5		23.5	17.4		23.5	17.4	
		3	512	1850.2	22.5	18.2	18.7	22.4	18.1	18.7	22.4	18.1	18.7
			661	1880.0	22.6	18.4		22.5	18.3		22.5	18.3	
			810	1909.8	22.3	18.0		22.4	18.1		22.2	17.9	
		4	512	1850.2	21.2	18.2	18.5	21.1	18.1	18.5	21.1	18.1	18.5
			661	1880.0	21.2	18.2		21.1	18.1		21.1	18.1	
			810	1909.8	20.9	17.9		20.9	17.8		20.8	17.8	

Notes:

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

- GMSK (GPRS) mode with 4 time slots for Max power and 4 time slots for reduced power, based on the Tune-up Procedure. Refer to §6.3.
- SAR is not required for EGPRS (8PSK) mode because the maximum output power and tune-up limit is ≤ 1/4dB higher than GMSK GPRS or the adjusted SAR of the highest reported SAR of GMSK GPRS is ≤ 1.2W/kg.

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9.2. W-CDMA

Release 99 Setup Procedures used to establish the test signals

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

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

HSDPA Setup Procedures used to establish the test signals

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

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subtest	1	2	3	4
W-CDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set 1			
	Power Control Algorithm	Algorithm 2			
	βc	2/15	11/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	βc/βd	2/15	11/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR (dB)	0	0	0.5	0.5
HSDPA Specific Settings	D_{ACK}	8			
	D_{NAK}	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	Ahs=βhs/βc	30/15			

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

The following 5 Sub-tests were completed according to Release 6 procedures in table C,11.1.3 of 3GPP TS 34.121-1 v13.
A summary of these settings are illustrated below:

	Mode	HSPA				
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2 kbps RMC				
	HSDPA FRC	H-Set 1				
	HSUPA Test	HSPA				
	Power Control Algorithm	Algorithm 2				Algorithm 1
	βc	11/15	6/15	15/15	2/15	15/15
	βd	15/15	15/15	9/15	15/15	0
	βec	209/225	12/15	30/15	2/15	5/15
	βc/βd	11/15	6/15	15/9	2/15	-
	βhs	22/15	12/15	30/15	4/15	5/15
	βed	1309/225	94/75	47/15	56/75	47/15
	CM (dB)	1	3	2	3	1
	MPR (dB)	0	2	1	2	0
HSDPA Specific Settings	DACK	8				0
	DNAK	8				0
	DCQI	8				0
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
	CQI Repetition Factor (Table 5.2B.4)	2				
	Ahs = βhs/βc	30/15				
HSUPA Specific Settings	E-DPDCCH	6	8	8	5	0
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	12
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	67
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E-TFCIs	5	5	2	5	1
	Reference E-TFCI	11	11	11	11	67
	Reference E-TFCI PO	4	4	4	4	18
	Reference E-TFCI	67	67	92	67	67
	Reference E-TFCI PO	18	18	18	18	18
	Reference E-TFCI	71	71	71	71	71
	Reference E-TFCI PO	23	23	23	23	23
	Reference E-TFCI	75	75	75	75	75
	Reference E-TFCI PO	26	26	26	26	26
	Reference E-TFCI	81	81	81	81	81
	Reference E-TFCI PO	27	27	27	27	27
	Maximum Channelization Codes	2xSF2				SF4

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DC-HSDPA Setup Procedures used to establish the test signals

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

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

Table E.5.0: Levels for HSDPA connection setup

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

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

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

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

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

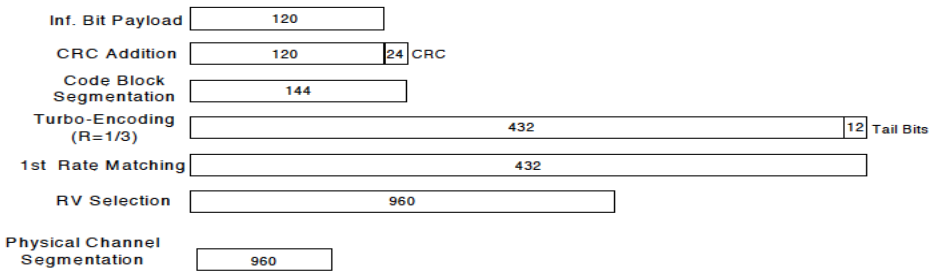

Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

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

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set 12			
	Power Control Algorithm	Algorithm2			
	βc	2/15	11/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	βd (SF)	64			
	βc/βd	2/15	11/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR (dB)	0	0	0.5	0.5
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack Repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	Ahs = βhs/ βc	30/15			

HSPA+

HSPA+ mode is only support to Downlink.

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W-CDMA Band II Measured Results

Band	Mode		UL Ch No.	Freq. (MHz)	Max. RF output power (dBm)		Reduced RF output power Hotspot back-off (dBm)		Reduced RF output power Proximity sensor back-off (dBm)	
					MPR (dB)	Meas. Avg Pwr	MPR (dB)	Meas. Avg Pwr	MPR (dB)	Meas. Avg Pwr
W-CDMA Band II	Rel 99	RMC, 12.2 kbps	9262	1852.4	N/A	22.9	N/A	21.0	N/A	21.0
			9400	1880.0	N/A	22.7	N/A	20.9	N/A	21.0
			9538	1907.6	N/A	22.4	N/A	20.6	N/A	20.6
	HSDPA	Subtest 1	9262	1852.4	0	22.8	0	20.9	0	21.0
			9400	1880.0	0	22.7	0	20.9	0	20.9
			9538	1907.6	0	22.4	0	20.6	0	20.6
		Subtest 2	9262	1852.4	0	22.3	0	21.0	0	21.0
			9400	1880.0	0	22.2	0	20.9	0	20.9
			9538	1907.6	0	21.9	0	20.6	0	20.6
		Subtest 3	9262	1852.4	0.5	21.5	0	21.0	0	21.0
			9400	1880.0	0.5	21.3	0	20.9	0	20.9
			9538	1907.6	0.5	21.0	0	20.6	0	20.6
		Subtest 4	9262	1852.4	0.5	21.9	0	21.0	0	21.0
			9400	1880.0	0.5	21.8	0	20.9	0	20.9
			9538	1907.6	0.5	21.6	0	20.7	0	20.6
	HSUPA	Subtest 1	9262	1852.4	2	20.5	1	19.9	1	19.9
			9400	1880.0	2	20.3	1	19.8	1	19.9
			9538	1907.6	2	20.0	1	19.5	1	19.5
		Subtest 2	9262	1852.4	3	19.4	1	19.4	1	19.5
			9400	1880.0	3	19.3	1	19.2	1	19.2
			9538	1907.6	3	18.9	1	18.9	1	19.0
		Subtest 3	9262	1852.4	1	21.5	1	19.9	1	19.9
			9400	1880.0	1	21.3	1	19.8	1	19.7
			9538	1907.6	1	21.1	1	19.5	1	19.5
		Subtest 4	9262	1852.4	3	18.9	1	18.9	1	19.0
			9400	1880.0	3	18.9	1	18.9	1	18.9
			9538	1907.6	3	18.6	1	18.6	1	18.6
		Subtest 5	9262	1852.4	0	22.9	0	21.0	0	21.0
			9400	1880.0	0	22.7	0	21.0	0	20.9
			9538	1907.6	0	22.4	0	20.6	0	20.6
	DC-HSDPA	Subtest 1	9262	1852.4	0	22.8	0	20.9	0	21.0
			9400	1880.0	0	22.7	0	20.8	0	20.8
			9538	1907.6	0	22.3	0	20.5	0	20.5
		Subtest 2	9262	1852.4	0	22.4	0	21.0	0	21.0
			9400	1880.0	0	22.2	0	20.9	0	20.8
			9538	1907.6	0	21.8	0	20.5	0	20.5
		Subtest 3	9262	1852.4	0.5	21.0	0	21.0	0	21.0
			9400	1880.0	0.5	20.8	0	20.9	0	20.8
			9538	1907.6	0.5	20.5	0	20.5	0	20.5
		Subtest 4	9262	1852.4	0.5	21.9	0	21.0	0	21.0
			9400	1880.0	0.5	21.9	0	21.0	0	20.8
			9538	1907.6	0.5	21.5	0	20.6	0	20.5

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W-CDMA Band IV Measured Results

Band	Mode		UL Ch No.	Freq. (MHz)	Max. RF output power (dBm)		Reduced RF output power Hotspot back-off (dBm)		Reduced RF output power Proximity sensor back-off (dBm)	
					MPR (dB)	Meas. Avg Pwr	MPR (dB)	Meas. Avg Pwr	MPR (dB)	Meas. Avg Pwr
W-CDMA Band IV	Rel 99	RMC, 12.2 kbps	1312	1712.4	N/A	22.9	N/A	19.9	N/A	19.7
			1413	1732.6	N/A	22.4	N/A	19.4	N/A	19.8
			1513	1752.6	N/A	22.5	N/A	19.5	N/A	19.4
	HSDPA	Subtest 1	1312	1712.4	0	22.1	0	19.9	0	19.7
			1413	1732.6	0	21.5	0	19.4	0	19.7
			1513	1752.6	0	21.6	0	19.5	0	19.5
		Subtest 2	1312	1712.4	0	21.5	0	19.9	0	19.8
			1413	1732.6	0	21.1	0	19.4	0	19.8
			1513	1752.6	0	21.1	0	19.5	0	19.5
		Subtest 3	1312	1712.4	0.5	21.6	0	20.0	0	19.8
			1413	1732.6	0.5	21.0	0	19.5	0	19.8
			1513	1752.6	0.5	21.1	0	19.5	0	19.6
		Subtest 4	1312	1712.4	0.5	21.0	0	20.0	0	19.8
			1413	1732.6	0.5	20.5	0	19.5	0	19.9
			1513	1752.6	0.5	20.5	0	19.5	0	19.6
	HSUPA	Subtest 1	1312	1712.4	2	20.5	1	19.0	1	18.9
			1413	1732.6	2	19.9	1	18.4	1	18.8
			1513	1752.6	2	19.8	1	18.5	1	18.4
		Subtest 2	1312	1712.4	3	19.1	1	19.0	1	18.7
			1413	1732.6	3	18.5	1	18.6	1	18.8
			1513	1752.6	3	18.5	1	18.5	1	18.5
		Subtest 3	1312	1712.4	1	22.0	1	19.0	1	18.7
			1413	1732.6	1	21.5	1	18.5	1	18.8
			1513	1752.6	1	21.6	1	18.5	1	18.4
		Subtest 4	1312	1712.4	2	20.5	1	19.0	1	18.7
			1413	1732.6	2	19.9	1	18.4	1	18.8
			1513	1752.6	2	20.0	1	18.5	1	18.4
		Subtest 5	1312	1712.4	0	22.9	0	20.0	0	19.7
			1413	1732.6	0	22.4	0	19.5	0	19.7
			1513	1752.6	0	22.5	0	19.5	0	19.4
	DC-HSDPA	Subtest 1	1312	1712.4	0	22.0	0	19.9	0	19.7
			1413	1732.6	0	21.5	0	19.4	0	19.8
			1513	1752.6	0	21.5	0	19.4	0	19.5
		Subtest 2	1312	1712.4	0	21.5	0	19.9	0	19.7
			1413	1732.6	0	20.9	0	19.4	0	19.8
			1513	1752.6	0	20.9	0	19.3	0	19.5
		Subtest 3	1312	1712.4	0.5	20.5	0	19.9	0	19.7
			1413	1732.6	0.5	20.0	0	19.4	0	19.9
			1513	1752.6	0.5	20.0	0	19.4	0	19.5
		Subtest 4	1312	1712.4	0.5	20.9	0	19.9	0	19.7
			1413	1732.6	0.5	20.5	0	19.4	0	19.9
			1513	1752.6	0.5	20.3	0	19.3	0	19.6

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W-CDMA Band V Measured Results

Band	Mode		UL Ch No.	Freq. (MHz)	MPR (dB)	Max. Meas. Avg Pwr (dBm)
W-CDMA Band V	Rel 99	RMC, 12.2 kbps	4132	826.4	N/A	24.1
			4183	836.6	N/A	24.0
			4233	846.6	N/A	24.1
	HSDPA	Subtest 1	4132	826.4	0	21.5
			4183	836.6	0	21.4
			4233	846.6	0	21.5
		Subtest 2	4132	826.4	0	21.6
			4183	836.6	0	21.5
			4233	846.6	0	21.6
		Subtest 3	4132	826.4	0.5	21.1
			4183	836.6	0.5	21.0
			4233	846.6	0.5	21.1
		Subtest 4	4132	826.4	0.5	21.1
			4183	836.6	0.5	21.0
			4233	846.6	0.5	21.1
	HSUPA	Subtest 1	4132	826.4	2	19.7
			4183	836.6	2	19.6
			4233	846.6	2	19.7
		Subtest 2	4132	826.4	4	17.7
			4183	836.6	4	17.8
			4233	846.6	4	17.9
		Subtest 3	4132	826.4	1	21.2
			4183	836.6	1	21.2
			4233	846.6	1	21.2
		Subtest 4	4132	826.4	4	17.8
			4183	836.6	4	17.7
			4233	846.6	4	17.8
		Subtest 5	4132	826.4	0	23.0
			4183	836.6	0	23.0
			4233	846.6	0	23.0
	DC-HSDPA	Subtest 1	4132	826.4	0	21.6
			4183	836.6	0	21.5
			4233	846.6	0	21.6
		Subtest 2	4132	826.4	0	21.6
			4183	836.6	0	21.5
			4233	846.6	0	21.5
		Subtest 3	4132	826.4	0.5	20.1
			4183	836.6	0.5	20.0
			4233	846.6	0.5	20.0
		Subtest 4	4132	826.4	0.5	21.0
			4183	836.6	0.5	21.0
			4233	846.6	0.5	21.0

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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
NS_03	6.6.2.2.1	2, 4,10, 23, 25, 35, 36, 66, 70	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2, 6.6.3.3.19	41	5, 10, 15, 20	Table 6.2.4-4, Table 6.2.4-4a	
NS_05	6.6.3.3.1	1	10,15,20	≥ 50 (NOTE1)	≤ 1 (NOTE1)
			15, 20	Table 6.2.4-18 (NOTE2)	
		65 (NOTE 3)	10,15,20	≥ 50	≤ 1 (NOTE 1)
			15,20	Table 6.2.4-18 (NOTE 2)	
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	N/A
NS_07	6.6.2.2.3 6.6.3.3.2	13	10	Table 6.2.4-2	
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	
NS_11	6.6.2.2.1 6.6.3.3.13	23	1.4, 3, 5, 10, 15, 20	Table 6.2.4-5	
NS_12	6.6.3.3.5	26	1.4, 3, 5, 10, 15	Table 6.2.4-6	
NS_13	6.6.3.3.6	26	5	Table 6.2.4-7	
NS_14	6.6.3.3.7	26	10, 15	Table 6.2.4-8	
NS_15	6.6.3.3.8	26	1.4, 3, 5, 10, 15	Table 6.2.4-9 Table 6.2.4-10	
NS_16	6.6.3.3.9	27	3, 5, 10	Table 6.2.4-11, Table 6.2.4-12, Table 6.2.4-13	
NS_17	6.6.3.3.10	28	5, 10	Table 5.6-1	N/A
NS_18	6.6.3.3.11	28	5	≥ 2	≤ 1
			10, 15, 20	≥ 1	≤ 4
NS_19	6.6.3.3.12	44	10, 15, 20	Table 6.2.4-14	
NS_20	6.2.2 6.6.2.2.1 6.6.3.3.14	23	5, 10, 15, 20	Table 6.2.4-15	
NS_21	6.6.2.2.1 6.6.3.3.15	30	5, 10	Table 6.2.4-16	
NS_22	6.6.3.3.16	42, 43	5, 10, 15, 20	Table 6.2.4-17	
NS_23	6.6.3.3.17	42, 43	5, 10, 15, 20	N/A	
NS_24	6.6.3.3.20	65 (NOTE 4)	5, 10, 15, 20	Table 6.2.4-19	
NS_25	6.6.3.3.21	65 (NOTE 4)	5, 10, 15, 20	Table 6.2.4-20	
NS_26	6.6.3.3.22	68	10, 15	Table 6.2.4-21	
NS_27	6.6.2.2.5, 6.6.3.3.23	48	5, 10, 15, 20	Table 6.2.4-22	
NS_28	6.2.2A, 6.6.3.3.24	46 (NOTE 5)	20	Table 6.2.4-23	
NS_29	6.2.2A, 6.6.2.3.1a, 6.6.3.3.25	46 (NOTE 5)	20	Table 6.2.4-24	
NS_30	6.2.2A, 6.6.3.3.26	46 (NOTE 5)	20	Table 6.2.4-25	
NS_31	6.2.2A, 6.6.3.3.27	46 (NOTE 5)	20	Table 6.2.4-26	
NS_32	-	-	-	-	-
NOTE 1: Applicable when the lower edge of the assigned E-UTRA UL channel bandwidth frequency is larger than or equal to the upper edge of PHS band (1915.7 MHz) + 4 MHz + the channel BW assigned, where channel BW is as defined in subclause 5.6. A-MPR for					

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Max power Results

LTE Band 2 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)			
					MPR	1860 MHz	1880 MHz	1900 MHz
LTE Band 2	20	QPSK	1	0	0	23.2	23.1	23.6
			1	49	0	23.2	23.1	23.4
			1	99	0	23.2	23.0	22.6
			50	0	2	21.1	21.1	21.3
			50	24	2	21.1	21.0	21.3
			50	50	2	21.1	21.0	21.2
			100	0	2	21.1	21.0	21.3
		16QAM	1	0	2	21.0	21.1	21.4
			1	49	2	21.0	21.1	21.3
			1	99	2	21.0	21.0	21.2
			50	0	3	20.2	20.0	20.4
			50	24	3	20.1	20.0	20.4
			50	50	3	20.1	20.0	20.3
			100	0	3	20.2	20.1	20.3

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)			
					MPR	1857.5 MHz	1880 MHz	1902.5 MHz
LTE Band 2	15	QPSK	1	0	0	23.3	23.2	23.4
			1	37	0	23.3	23.2	23.4
			1	74	0	23.2	23.1	23.2
			36	0	2	21.1	21.1	21.4
			36	20	2	21.1	21.1	21.3
			36	39	2	21.1	21.1	21.3
			75	0	2	21.1	21.1	21.3
		16QAM	1	0	2	20.9	21.1	21.4
			1	37	2	20.9	21.1	21.3
			1	74	2	20.9	21.0	21.2
			36	0	3	20.1	20.1	20.4
			36	20	3	20.1	20.1	20.3
			36	39	3	20.1	20.1	20.3
			75	0	3	20.1	20.1	20.3

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)			
					MPR	1855 MHz	1880 MHz	1905 MHz
LTE Band 2	10	QPSK	1	0	0	23.3	23.3	23.5
			1	25	0	23.3	23.2	23.4
			1	49	0	23.3	23.2	23.2
			25	0	2	21.1	21.1	21.4
			25	12	2	21.1	21.0	21.3
			25	25	2	21.1	21.0	21.3
			50	0	2	21.1	21.0	21.3
		16QAM	1	0	2	21.0	20.9	21.5
			1	25	2	21.0	20.8	21.4
			1	49	2	21.0	20.8	21.3
			25	0	3	20.1	20.1	20.4
			25	12	3	20.1	20.0	20.3
			25	25	3	20.1	20.0	20.3
			50	0	3	20.2	20.0	20.3

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LTE Band 2 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)			
					MPR	1852.5 MHz	1880 MHz	1907.5 MHz
LTE Band 2	5	QPSK	1	0	0	23.1	23.0	23.6
			1	12	0	23.1	23.0	23.3
			1	24	0	23.1	23.0	23.3
			12	0	2	21.1	21.1	21.4
			12	7	2	21.1	21.1	21.4
			12	13	2	21.1	21.0	21.4
			25	0	2	21.1	21.1	21.4
		16QAM	1	0	2	21.0	21.0	21.3
			1	12	2	21.0	21.0	21.3
			1	24	2	21.0	21.0	21.3
			12	0	3	20.1	20.1	20.4
			12	7	3	20.1	20.0	20.4
			12	13	3	20.1	20.0	20.4
			25	0	3	20.1	20.0	20.4

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)			
					MPR	1851.5 MHz	1880 MHz	1908.5 MHz
LTE Band 2	3	QPSK	1	0	0	23.1	23.1	23.3
			1	8	0	23.1	23.1	23.3
			1	14	0	23.1	23.1	23.2
			8	0	2	21.1	21.1	21.4
			8	4	2	21.1	21.1	21.4
			8	7	2	21.1	21.0	21.4
			15	0	2	21.1	21.0	21.4
		16QAM	1	0	2	20.7	21.0	21.6
			1	8	2	20.8	21.1	21.5
			1	14	2	20.8	21.1	21.5
			8	0	3	20.1	20.0	20.5
			8	4	3	20.1	20.0	20.5
			8	7	3	20.1	20.0	20.5
			15	0	3	20.1	20.0	20.4

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)			
					MPR	1850.7 MHz	1880 MHz	1909.3 MHz
LTE Band 2	1.4	QPSK	1	0	0	23.2	23.2	23.7
			1	3	0	23.2	23.2	23.2
			1	5	0	23.2	23.2	23.2
			3	0	0	23.2	23.2	23.2
			3	1	0	23.2	23.2	23.2
			3	3	0	23.2	23.2	23.2
			6	0	2	21.1	21.1	21.5
		16QAM	1	0	2	21.0	21.0	21.1
			1	3	2	21.1	21.1	21.1
			1	5	2	21.1	21.1	21.0
			3	0	2	21.1	20.9	20.9
			3	1	2	21.0	20.9	20.9
			3	3	2	21.0	20.9	20.9
			6	0	3	21.0	21.0	21.0

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LTE Band 4 Measured Results

SAR for LTE Band 4 (Frequency range: 1710-1755 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

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LTE Band 5 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)			
					MPR	829 MHz	836.5 MHz	844 MHz
LTE Band 5	10	QPSK	1	0	0		24.1	
			1	25	0		24.1	
			1	49	0		24.0	
			25	0	2		21.5	
			25	12	2		21.5	
			25	25	2		21.4	
			50	0	2		21.5	
		16QAM	1	0	2		21.6	
			1	25	2		21.5	
			1	49	2		21.5	
			25	0	3		20.5	
			25	12	3		20.5	
			25	25	3		20.4	
			50	0	3		20.5	

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)			
					MPR	826.5 MHz	836.5 MHz	846.5 MHz
LTE Band 5	5	QPSK	1	0	0	24.2	24.0	24.2
			1	12	0	24.1	24.0	24.2
			1	24	0	24.1	24.0	24.2
			12	0	2	21.6	21.5	21.6
			12	7	2	21.6	21.5	21.6
			12	13	2	21.6	21.5	21.6
			25	0	2	21.6	21.5	21.6
		16QAM	1	0	2	21.4	21.3	21.6
			1	12	2	21.3	21.2	21.6
			1	24	2	21.3	21.3	21.7
			12	0	3	20.7	20.3	20.6
			12	7	3	20.5	20.4	20.6
			12	13	3	20.6	20.3	20.6
			25	0	3	20.6	20.5	20.6

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)			
					MPR	825.5 MHz	836.5 MHz	847.5 MHz
LTE Band 5	3	QPSK	1	0	0	24.3	24.2	24.4
			1	8	0	24.4	24.2	24.3
			1	14	0	24.3	24.2	24.4
			8	0	2	21.6	21.5	21.6
			8	4	2	21.6	21.5	21.6
			8	7	2	21.7	21.5	21.6
			15	0	2	21.7	21.5	21.6
		16QAM	1	0	2	21.9	21.9	22.1
			1	8	2	21.7	21.8	21.8
			1	14	2	21.7	21.7	21.8
			8	0	3	20.6	20.4	20.6
			8	4	3	20.6	20.4	20.6
			8	7	3	20.6	20.4	20.6
			15	0	3	20.6	20.5	20.6

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LTE Band 5 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)			
					MPR	824.7 MHz	836.5 MHz	848.3 MHz
LTE Band 5	1.4 MHz	QPSK	1	0	0	24.3	24.1	24.1
			1	3	0	24.2	24.1	24.0
			1	5	0	24.2	24.1	24.1
			3	0	0	24.2	24.2	24.2
			3	1	0	24.2	24.1	24.1
			3	3	0	24.2	24.1	24.1
			6	0	2	21.6	21.4	21.5
		16QAM	1	0	2	21.7	21.1	21.1
			1	3	2	21.7	21.1	21.0
			1	5	2	21.7	21.1	21.1
			3	0	2	21.6	21.4	21.4
			3	1	2	21.6	21.4	21.4
			3	3	2	21.6	21.3	21.4
			6	0	3	20.6	21.4	20.6

Note(s):

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

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LTE Band 12 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)			
					MPR	704 MHz	707.5 MHz	711 MHz
LTE Band 12	10	QPSK	1	0	0		23.4	
			1	25	0		23.3	
			1	49	0		23.3	
			25	0	2		21.2	
			25	12	2		21.2	
			25	25	2		21.1	
			50	0	2		21.2	
		16QAM	1	0	2		21.1	
			1	25	2		21.0	
			1	49	2		21.0	
			25	0	3		20.1	
			25	12	3		20.1	
			25	25	3		20.0	
			50	0	3		20.1	

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)			
					MPR	701.5 MHz	707.5 MHz	713.5 MHz
LTE Band 12	5	QPSK	1	0	0	23.7	23.2	23.0
			1	12	0	23.6	23.2	23.0
			1	24	0	23.6	23.2	23.0
			12	0	2	21.6	21.2	20.9
			12	7	2	21.6	21.2	20.9
			12	13	2	21.6	21.2	20.9
			25	0	2	21.6	21.2	20.9
		16QAM	1	0	2	21.7	21.1	21.1
			1	12	2	21.6	21.0	21.0
			1	24	2	21.6	21.0	21.1
			12	0	3	20.3	20.0	19.8
			12	7	3	20.3	20.0	19.8
			12	13	3	20.3	20.0	19.8
			25	0	3	20.4	20.0	19.8

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)			
					MPR	700.5 MHz	707.5 MHz	714.5 MHz
LTE Band 12	3	QPSK	1	0	0	23.7	23.4	23.1
			1	8	0	23.7	23.4	23.0
			1	14	0	23.7	23.3	23.1
			8	0	2	21.6	21.1	20.9
			8	4	2	21.6	21.2	20.9
			8	7	2	21.6	21.1	20.9
			15	0	2	21.6	21.2	20.9
		16QAM	1	0	2	21.8	21.2	21.2
			1	8	2	21.6	21.0	21.1
			1	14	2	21.5	21.0	21.3
			8	0	3	20.4	20.0	19.8
			8	4	3	20.4	20.0	19.7
			8	7	3	20.4	20.0	19.8
			15	0	3	20.4	20.1	19.8

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LTE Band 12 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)			
					MPR	699.7 MHz	707.5 MHz	715.3 MHz
LTE Band 12	1.4 MHz	QPSK	1	0	0	23.8	23.3	23.0
			1	3	0	23.7	23.2	22.9
			1	5	0	23.8	23.3	23.0
			3	0	0	23.7	23.3	23.0
			3	1	0	23.7	23.3	23.0
			3	3	0	23.7	23.2	23.0
			6	0	2	21.6	21.1	20.9
		16QAM	1	0	2	21.9	21.6	21.2
			1	3	2	21.7	21.5	21.2
			1	5	2	22.0	21.5	21.2
			3	0	2	21.7	21.2	20.8
			3	1	2	21.7	21.1	20.8
			3	3	2	21.7	21.1	20.8
			6	0	3	20.5	19.9	19.8

Note(s):

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

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LTE Band 13 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)	
					MPR	782 MHz
LTE Band 13	10	QPSK	1	0	0	23.8
			1	25	0	23.7
			1	49	0	23.6
			25	0	2	21.6
			25	12	2	21.6
			25	25	2	21.5
			50	0	2	21.6
		16QAM	1	0	2	21.6
			1	25	2	21.5
			1	49	2	21.5
			25	0	3	20.5
			25	12	3	20.4
			25	25	3	20.4
			50	0	3	20.5
Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)	
					MPR	782 MHz
LTE Band 13	5	QPSK	1	0	0	23.7
			1	12	0	23.6
			1	24	0	23.6
			12	0	2	21.6
			12	7	2	21.6
			12	13	2	21.6
			25	0	2	21.6
		16QAM	1	0	2	21.6
			1	12	2	21.5
			1	24	2	21.4
			12	0	3	20.3
			12	7	3	20.3
			12	13	3	20.3
			25	0	3	20.5

Note(s):

10/5 MHz Bandwidths does not support at least three non-overlapping channels in certain channel bandwidths. When a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing per KDB 941225 D05 SAR for LTE Devices

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LTE Band 17 Measured Results

SAR for LTE Band 17 (Frequency range: 704-716 MHz) is covered by LTE Band 12 (Frequency range: 699-716 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

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LTE Band 66 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)			
					MPR	1720 MHz	1745 MHz	1770 MHz
LTE Band 66	20	QPSK	1	0	0	23.5	23.1	23.2
			1	49	0	23.4	23.1	23.2
			1	99	0	23.3	23.0	23.2
			50	0	2	21.5	21.2	21.2
			50	24	2	21.5	21.1	21.2
			50	50	2	21.4	21.1	21.2
			100	0	2	21.5	21.1	21.2
		16QAM	1	0	2	21.5	21.2	21.1
			1	49	2	21.3	21.1	21.1
			1	99	2	21.3	21.1	21.1
			50	0	3	20.5	20.1	20.2
			50	24	3	20.5	20.1	20.2
			50	50	3	20.4	20.0	20.2
			100	0	3	20.5	20.1	20.2

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)			
					MPR	1717.5 MHz	1745 MHz	1772.5 MHz
LTE Band 66	15	QPSK	1	0	0	23.6	23.1	23.2
			1	37	0	23.5	23.0	23.2
			1	74	0	23.4	23.0	23.2
			36	0	2	21.5	21.2	21.2
			36	20	2	21.5	21.1	21.2
			36	39	2	21.4	21.1	21.2
			75	0	2	21.4	21.1	21.2
		16QAM	1	0	2	21.2	21.2	21.3
			1	37	2	21.1	21.2	21.3
			1	74	2	21.0	21.1	21.3
			36	0	3	20.5	20.1	20.2
			36	20	3	20.4	20.1	20.2
			36	39	3	20.4	20.1	20.2
			75	0	3	20.4	20.2	20.2

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)			
					MPR	1715 MHz	1745 MHz	1775 MHz
LTE Band 66	10	QPSK	1	0	0	23.8	23.2	23.2
			1	25	0	23.6	23.2	23.2
			1	49	0	23.6	23.2	23.2
			25	0	2	21.6	21.1	21.2
			25	12	2	21.6	21.1	21.1
			25	25	2	21.5	21.1	21.1
			50	0	2	21.6	21.1	21.2
		16QAM	1	0	2	21.5	21.1	21.2
			1	25	2	21.4	21.0	21.2
			1	49	2	21.3	21.1	21.2
			25	0	3	20.6	20.2	20.1
			25	12	3	20.6	20.2	20.1
			25	25	3	20.6	20.2	20.2
			50	0	3	20.6	20.2	20.1

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LTE Band 66 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)			
					MPR	1712.5 MHz	1745 MHz	1777.5 MHz
LTE Band 66	5	QPSK	1	0	0	23.7	23.1	23.1
			1	12	0	23.7	23.1	23.1
			1	24	0	23.7	23.1	23.1
			12	0	2	21.6	21.1	21.1
			12	7	2	21.6	21.1	21.1
			12	13	2	21.6	21.1	21.1
			25	0	2	21.6	21.1	21.1
		16QAM	1	0	2	21.7	20.9	20.8
			1	12	2	21.7	20.9	20.8
			1	24	2	21.7	20.9	20.8
			12	0	3	20.6	20.0	20.1
			12	7	3	20.6	20.0	20.0
			12	13	3	20.6	20.0	20.1
			25	0	3	20.6	20.1	20.1
Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)			
					MPR	1711.5 MHz	1745 MHz	1778.5 MHz
LTE Band 66	3	QPSK	1	0	0	23.7	23.2	23.2
			1	8	0	23.7	23.2	23.2
			1	14	0	23.6	23.3	23.3
			8	0	2	21.6	21.1	21.1
			8	4	2	21.6	21.1	21.1
			8	7	2	21.6	21.1	21.1
			15	0	2	21.6	21.1	21.1
		16QAM	1	0	2	21.6	21.1	21.1
			1	8	2	21.7	21.1	21.2
			1	14	2	21.8	21.3	21.5
			8	0	3	20.6	20.1	20.0
			8	4	3	20.6	20.1	20.0
			8	7	3	20.6	20.1	20.1
			15	0	3	20.6	20.1	20.1
Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)			
					MPR	1710.7 MHz	1745 MHz	1779.3 MHz
LTE Band 66	1.4	QPSK	1	0	0	22.7	23.2	23.1
			1	3	0	23.0	23.2	23.2
			1	5	0	23.5	23.2	23.2
			3	0	0	22.7	23.2	23.2
			3	1	0	22.9	23.2	23.2
			3	3	0	23.1	23.2	23.2
			6	0	2	21.5	21.1	21.1
		16QAM	1	0	2	21.5	20.9	20.9
			1	3	2	21.6	20.9	20.9
			1	5	2	21.5	20.9	20.9
			3	0	2	21.5	20.9	20.9
			3	1	2	21.5	20.9	20.9
			3	3	2	21.5	20.9	20.9
			6	0	3	20.5	21.0	21.0

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Reduced power Results

LTE Band 2 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Reduced Meas. Avg Pwr Hotspot back-off (dBm)			Reduced Meas. Avg Pwr Proximity sensor back-off (dBm)		
						1860 MHz	1880 MHz	1900 MHz	1860 MHz	1880 MHz	1900 MHz
LTE Band 2	20	QPSK	1	0	0	19.6	19.6	20.0	19.7	19.6	20.1
			1	49	0	19.6	19.5	19.9	19.6	19.6	20.0
			1	99	0	19.5	19.4	19.8	19.6	19.5	19.9
			50	0	2	17.6	17.5	17.9	17.7	17.6	17.9
			50	24	2	17.6	17.5	17.8	17.7	17.6	17.8
			50	50	2	17.6	17.4	17.8	17.7	17.5	17.8
			100	0	2	17.6	17.5	17.8	17.7	17.6	17.8
		16QAM	1	0	2	17.6	17.8	17.9	17.7	17.8	18.1
			1	49	2	17.5	17.7	17.7	17.6	17.7	18.0
			1	99	2	17.5	17.6	17.7	17.5	17.6	17.9
			50	0	3	16.7	16.6	16.8	16.7	16.6	16.9
			50	24	3	16.7	16.6	16.8	16.7	16.6	16.8
			50	50	3	16.6	16.5	16.7	16.7	16.6	16.8
			100	0	3	16.7	16.6	16.8	16.7	16.7	16.9
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Reduced Meas. Avg Pwr Hotspot back-off (dBm)			Reduced Meas. Avg Pwr Proximity sensor back-off (dBm)		
						1857.5 MHz	1880 MHz	1902.5 MHz	1857.5 MHz	1880 MHz	1902.5 MHz
LTE Band 2	15	QPSK	1	0	0	19.8	19.6	20.0	19.8	19.6	20.1
			1	37	0	19.7	19.5	19.8	19.8	19.5	19.9
			1	74	0	19.7	19.4	19.8	19.7	19.5	19.8
			36	0	2	17.6	17.6	17.8	17.6	17.5	17.9
			36	20	2	17.6	17.6	17.8	17.6	17.5	17.8
			36	39	2	17.6	17.5	17.8	17.6	17.5	17.8
			75	0	2	17.5	17.5	17.8	17.6	17.5	17.8
		16QAM	1	0	2	17.4	17.7	17.9	17.7	17.7	18.0
			1	37	2	17.4	17.6	17.8	17.7	17.7	17.9
			1	74	2	17.4	17.6	17.7	17.7	17.7	17.8
			36	0	3	16.6	16.6	16.9	16.6	16.6	16.9
			36	20	3	16.6	16.6	16.9	16.6	16.6	16.9
			36	39	3	16.6	16.5	16.8	16.6	16.6	16.8
			75	0	3	16.6	16.6	16.8	16.7	16.6	16.8
Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Reduced Meas. Avg Pwr Hotspot back-off (dBm)			Reduced Meas. Avg Pwr Proximity sensor back-off (dBm)		
						1855 MHz	1880 MHz	1905 MHz	1855 MHz	1880 MHz	1905 MHz
LTE Band 2	10	QPSK	1	0	0	19.8	19.8	20.0	19.7	19.8	20.0
			1	25	0	19.7	19.8	19.9	19.7	19.7	19.9
			1	49	0	19.7	19.7	19.8	19.7	19.7	19.8
			25	0	2	17.5	17.5	17.9	17.5	17.5	17.9
			25	12	2	17.5	17.5	17.8	17.5	17.5	17.8
			25	25	2	17.5	17.5	17.8	17.5	17.5	17.8
			50	0	2	17.5	17.5	17.8	17.5	17.5	17.8
		16QAM	1	0	2	17.4	17.4	18.1	17.5	17.5	18.1
			1	25	2	17.4	17.3	18.0	17.5	17.4	18.0
			1	49	2	17.4	17.3	18.0	17.6	17.4	18.0
			25	0	3	16.6	16.6	16.8	16.6	16.6	16.9
			25	12	3	16.6	16.6	16.8	16.6	16.6	16.8
			25	25	3	16.6	16.6	16.8	16.6	16.6	16.8
			50	0	3	16.6	16.6	16.8	16.6	16.6	16.9

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LTE Band 2 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Reduced Meas. Avg Pwr Hotspot back-off (dBm)			Reduced Meas. Avg Pwr Proximity sensor back-off (dBm)		
						1852.5 MHz	1880 MHz	1907.5 MHz	1852.5 MHz	1880 MHz	1907.5 MHz
LTE Band 2	5	QPSK	1	0	0	19.6	19.5	20.0	19.7	19.5	20.1
			1	12	0	19.5	19.5	20.0	19.7	19.5	19.9
			1	24	0	19.5	19.5	19.9	19.7	19.5	19.9
			12	0	2	17.5	17.5	17.9	17.5	17.5	17.9
			12	7	2	17.5	17.6	17.8	17.6	17.5	17.9
			12	13	2	17.5	17.6	17.8	17.5	17.6	17.8
			25	0	2	17.5	17.5	17.8	17.6	17.5	17.9
		16QAM	1	0	2	17.5	17.6	18.0	17.5	17.6	18.2
			1	12	2	17.4	17.5	18.0	17.5	17.5	18.1
			1	24	2	17.5	17.5	18.0	17.6	17.5	18.0
			12	0	3	16.7	16.5	17.0	16.6	16.6	16.9
			12	7	3	16.6	16.5	16.8	16.6	16.6	16.9
			12	13	3	16.5	16.6	16.8	16.7	16.6	16.9
			25	0	3	16.6	16.6	16.9	16.6	16.6	16.9

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Reduced Meas. Avg Pwr Hotspot back-off (dBm)			Reduced Meas. Avg Pwr Proximity sensor back-off (dBm)		
						1851.5 MHz	1880 MHz	1908.5 MHz	1851.5 MHz	1880 MHz	1908.5 MHz
LTE Band 2	3	QPSK	1	0	0	19.8	19.7	20.0	19.8	19.9	20.1
			1	8	0	19.8	19.8	20.0	19.8	19.9	20.0
			1	14	0	19.8	19.8	20.0	19.7	19.8	20.1
			8	0	2	17.5	17.5	17.9	17.6	17.5	17.9
			8	4	2	17.6	17.5	17.9	17.6	17.5	17.8
			8	7	2	17.6	17.5	17.9	17.6	17.5	17.9
			15	0	2	17.6	17.5	17.9	17.6	17.5	17.9
		16QAM	1	0	2	17.6	17.8	18.2	17.5	18.0	18.3
			1	8	2	17.8	17.9	18.1	17.5	17.7	18.3
			1	14	2	17.6	17.8	18.4	17.5	17.9	18.1
			8	0	3	16.6	16.5	16.9	16.6	16.5	16.8
			8	4	3	16.6	16.5	16.9	16.6	16.6	16.8
			8	7	3	16.6	16.5	16.8	16.6	16.5	16.8
			15	0	3	16.6	16.5	16.9	16.6	16.6	16.9

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Reduced Meas. Avg Pwr Hotspot back-off (dBm)			Reduced Meas. Avg Pwr Proximity sensor back-off (dBm)		
						1850.7 MHz	1880 MHz	1909.3 MHz	1850.7 MHz	1880 MHz	1909.3 MHz
LTE Band 2	1.4	QPSK	1	0	0	19.8	19.7	20.1	19.7	19.7	20.1
			1	3	0	19.8	19.7	20.1	19.6	19.6	20.0
			1	5	0	19.8	19.7	20.2	19.6	19.6	20.0
			3	0	0	19.7	19.7	20.1	19.7	19.7	20.1
			3	1	0	19.7	19.7	20.1	19.8	19.6	20.1
			3	3	0	19.7	19.7	20.1	19.7	19.7	20.1
			6	0	2	17.5	17.5	17.9	17.5	17.5	17.9
		16QAM	1	0	2	17.5	17.9	18.0	17.6	17.4	17.9
			1	3	2	17.6	17.9	17.9	17.7	17.5	18.0
			1	5	2	17.7	17.9	18.0	17.7	17.5	18.0
			3	0	2	17.7	17.5	18.1	17.6	17.5	18.0
			3	1	2	17.6	17.6	18.1	17.6	17.5	18.0
			3	3	2	17.6	17.5	18.1	17.6	17.6	18.0
			6	0	3	16.7	16.5	17.0	16.5	16.6	17.0

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LTE Band 4 Measured Results

SAR for LTE Band 4 (Frequency range: 1710-1755 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

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LTE Band 66 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Reduced Meas. Avg Pwr Hotspot back-off (dBm)			Reduced Meas. Avg Pwr Proximity sensor back-off (dBm)		
						1720 MHz	1745 MHz	1770 MHz	1720 MHz	1745 MHz	1770 MHz
LTE Band 66	20	QPSK	1	0	0	21.0	20.7	20.7	20.9	20.7	20.6
			1	49	0	20.9	20.7	20.7	20.8	20.7	20.6
			1	99	0	20.8	20.7	20.7	20.7	20.7	20.6
			50	0	2	18.9	18.8	18.5	18.8	18.8	18.5
			50	24	2	18.8	18.8	18.5	18.8	18.8	18.5
			50	50	2	18.8	18.7	18.5	18.8	18.8	18.5
			100	0	2	18.8	18.8	18.6	18.8	18.8	18.5
		16QAM	1	0	2	18.8	18.9	18.7	18.9	18.8	18.5
			1	49	2	18.7	18.8	18.7	18.8	18.8	18.5
			1	99	2	18.8	18.8	18.7	18.8	18.8	18.5
			50	0	3	17.7	17.6	17.4	17.7	17.6	17.3
			50	24	3	17.7	17.6	17.3	17.6	17.6	17.3
			50	50	3	17.6	17.5	17.3	17.6	17.6	17.3
			100	0	3	17.7	17.6	17.4	17.7	17.6	17.3

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Reduced Meas. Avg Pwr Hotspot back-off (dBm)			Reduced Meas. Avg Pwr Proximity sensor back-off (dBm)		
						1717.5 MHz	1745 MHz	1772.5 MHz	1717.5 MHz	1745 MHz	1772.5 MHz
LTE Band 66	15	QPSK	1	0	0	21.0	20.8	20.6	20.9	20.8	20.7
			1	37	0	20.8	20.8	20.6	20.8	20.7	20.6
			1	74	0	20.8	20.7	20.5	20.8	20.7	20.6
			36	0	2	18.9	18.8	18.6	18.9	18.8	18.6
			36	20	2	18.8	18.8	18.6	18.8	18.8	18.6
			36	39	2	18.8	18.8	18.5	18.8	18.8	18.5
			75	0	2	18.8	18.8	18.5	18.8	18.8	18.5
		16QAM	1	0	2	19.0	18.9	18.5	18.7	18.9	18.4
			1	37	2	18.9	18.9	18.5	18.6	18.9	18.4
			1	74	2	18.8	18.9	18.5	18.5	18.8	18.4
			36	0	3	17.7	17.6	17.3	17.7	17.6	17.4
			36	20	3	17.7	17.6	17.3	17.6	17.6	17.3
			36	39	3	17.6	17.6	17.3	17.6	17.6	17.3
			75	0	3	17.7	17.7	17.3	17.6	17.6	17.3

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Reduced Meas. Avg Pwr Hotspot back-off (dBm)			Reduced Meas. Avg Pwr Proximity sensor back-off (dBm)		
						1715 MHz	1745 MHz	1775 MHz	1715 MHz	1745 MHz	1775 MHz
LTE Band 66	10	QPSK	1	0	0	21.1	20.9	20.6	21.1	20.9	20.7
			1	25	0	20.9	20.9	20.5	20.9	20.8	20.7
			1	49	0	20.9	20.9	20.5	20.9	20.9	20.7
			25	0	2	18.8	18.8	18.6	18.8	18.8	18.6
			25	12	2	18.8	18.8	18.6	18.8	18.8	18.6
			25	25	2	18.8	18.8	18.5	18.8	18.8	18.6
			50	0	2	18.8	18.8	18.5	18.8	18.8	18.6
		16QAM	1	0	2	18.8	18.5	18.7	18.7	18.6	18.6
			1	25	2	18.6	18.5	18.7	18.6	18.5	18.6
			1	49	2	18.6	18.5	18.7	18.6	18.5	18.6
			25	0	3	17.6	17.7	17.4	17.6	17.6	17.3
			25	12	3	17.5	17.6	17.3	17.6	17.6	17.3
			25	25	3	17.5	17.6	17.3	17.6	17.6	17.3
			50	0	3	17.6	17.6	17.3	17.6	17.7	17.3

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LTE Band 66 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Reduced Meas. Avg Pwr Hotspot back-off (dBm)			Reduced Meas. Avg Pwr Proximity sensor back-off (dBm)		
						1712.5 MHz	1745 MHz	1777.5 MHz	1712.5 MHz	1745 MHz	1777.5 MHz
LTE Band 66	5	QPSK	1	0	0	20.8	20.7	20.7	20.8	20.7	20.8
			1	12	0	20.8	20.7	20.7	20.8	20.7	20.7
			1	24	0	20.7	20.7	20.7	20.8	20.7	20.8
			12	0	2	18.8	18.8	18.6	18.9	18.8	18.6
			12	7	2	18.7	18.8	18.6	18.9	18.8	18.6
			12	13	2	18.8	18.8	18.6	18.8	18.8	18.6
			25	0	2	18.8	18.8	18.6	18.8	18.8	18.6
		16QAM	1	0	2	18.8	18.7	18.7	18.9	18.7	18.6
			1	12	2	18.7	18.7	18.7	18.8	18.7	18.6
			1	24	2	18.8	18.8	18.7	18.8	18.7	18.6
			12	0	3	17.6	17.6	17.3	17.6	17.5	17.4
			12	7	3	17.5	17.5	17.4	17.5	17.6	17.4
			12	13	3	17.6	17.5	17.3	17.6	17.6	17.4
			25	0	3	17.7	17.6	17.5	17.6	17.7	17.4

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Reduced Meas. Avg Pwr Hotspot back-off (dBm)			Reduced Meas. Avg Pwr Proximity sensor back-off (dBm)		
						1711.5 MHz	1745 MHz	1778.5 MHz	1711.5 MHz	1745 MHz	1778.5 MHz
LTE Band 66	3	QPSK	1	0	0	21.0	21.1	20.8	21.0	20.9	20.7
			1	8	0	20.9	21.0	20.7	20.9	20.9	20.7
			1	14	0	21.0	21.0	20.7	21.0	20.9	20.7
			8	0	2	18.8	18.7	18.6	18.8	18.8	18.7
			8	4	2	18.8	18.8	18.6	18.9	18.8	18.7
			8	7	2	18.8	18.8	18.6	18.8	18.9	18.7
			15	0	2	18.8	18.8	18.6	18.8	18.8	18.7
		16QAM	1	0	2	18.8	19.2	19.1	18.5	19.0	19.1
			1	8	2	18.9	19.0	19.0	18.5	18.9	18.9
			1	14	2	19.1	19.0	19.0	18.4	18.8	18.8
			8	0	3	17.6	17.6	17.3	17.5	17.5	17.4
			8	4	3	17.6	17.6	17.3	17.6	17.6	17.4
			8	7	3	17.5	17.6	17.3	17.6	17.6	17.3
			15	0	3	17.5	17.6	17.5	17.6	17.6	17.4

Band	BW (MHz)	Mode	RB Allocation	RB offset	Target MPR	Reduced Meas. Avg Pwr Hotspot back-off (dBm)			Reduced Meas. Avg Pwr Proximity sensor back-off (dBm)		
						1710.7 MHz	1745 MHz	1779.3 MHz	1710.7 MHz	1745 MHz	1779.3 MHz
LTE Band 66	1.4	QPSK	1	0	0	21.0	20.9	20.7	21.0	20.9	20.8
			1	3	0	21.1	20.8	20.7	21.0	20.9	20.8
			1	5	0	21.1	20.9	20.7	21.0	20.9	20.8
			3	0	0	20.9	20.9	20.7	20.9	20.9	20.7
			3	1	0	20.9	20.8	20.7	20.9	20.9	20.7
			3	3	0	20.9	20.9	20.8	20.9	20.9	20.7
			6	0	2	18.7	18.8	18.6	18.8	18.8	18.6
		16QAM	1	0	2	19.1	19.2	18.6	19.0	19.2	18.8
			1	3	2	19.1	19.2	18.5	19.0	19.3	18.8
			1	5	2	18.9	19.2	18.6	19.0	19.3	18.8
			3	0	2	18.9	18.8	18.7	18.7	18.8	18.6
			3	1	2	18.9	18.8	18.7	18.7	18.8	18.5
			3	3	2	18.9	18.9	18.7	18.7	18.8	18.6
			6	0	3	17.5	17.5	17.5	17.6	17.5	17.5

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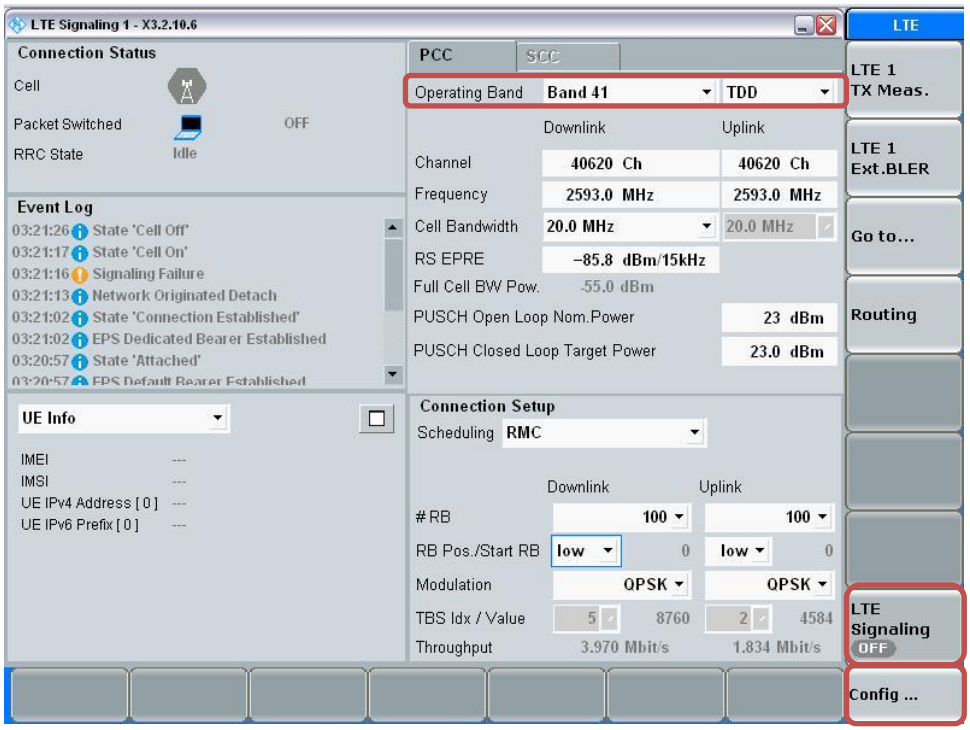
LTE Band TDD Measured Results

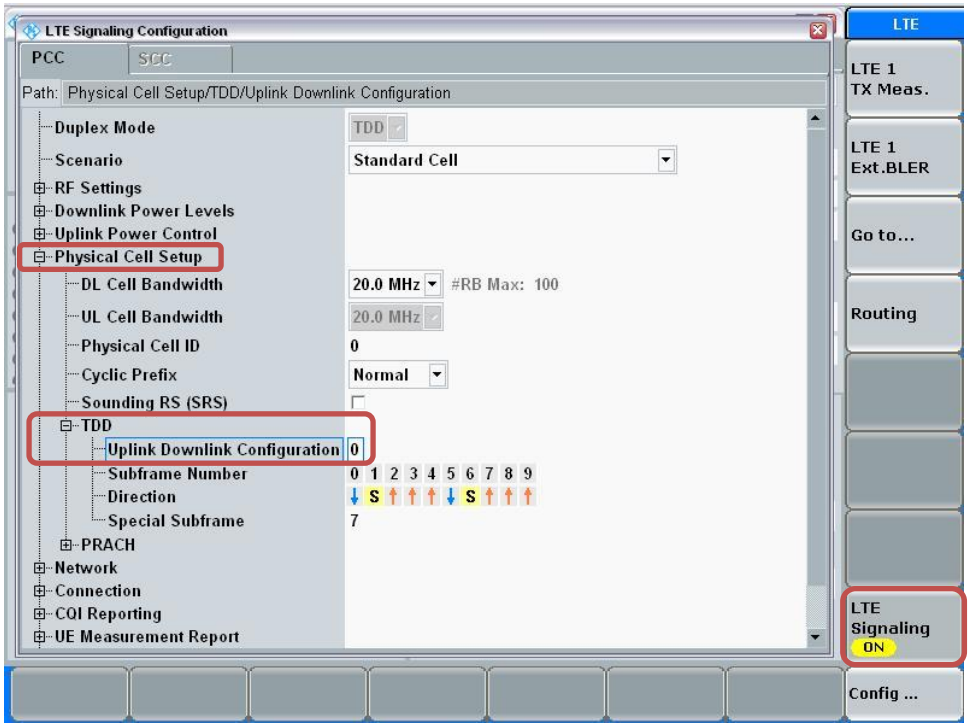
Procedure used to establish SAR test signal for LTE TDD Band

Set to CMW-500 with following parameters:

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



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



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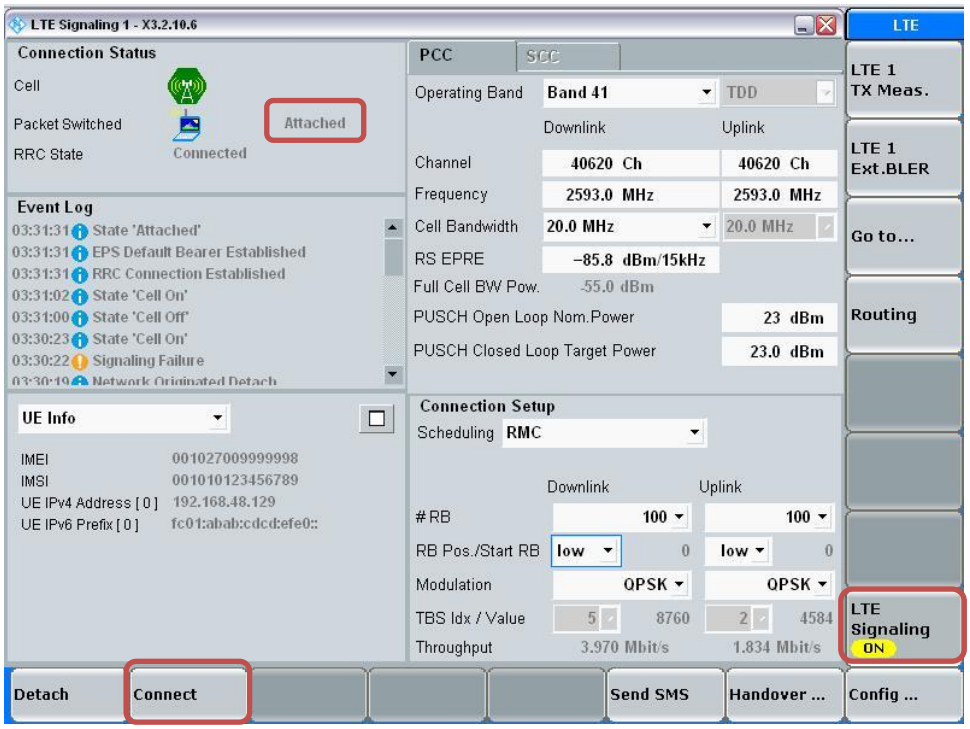
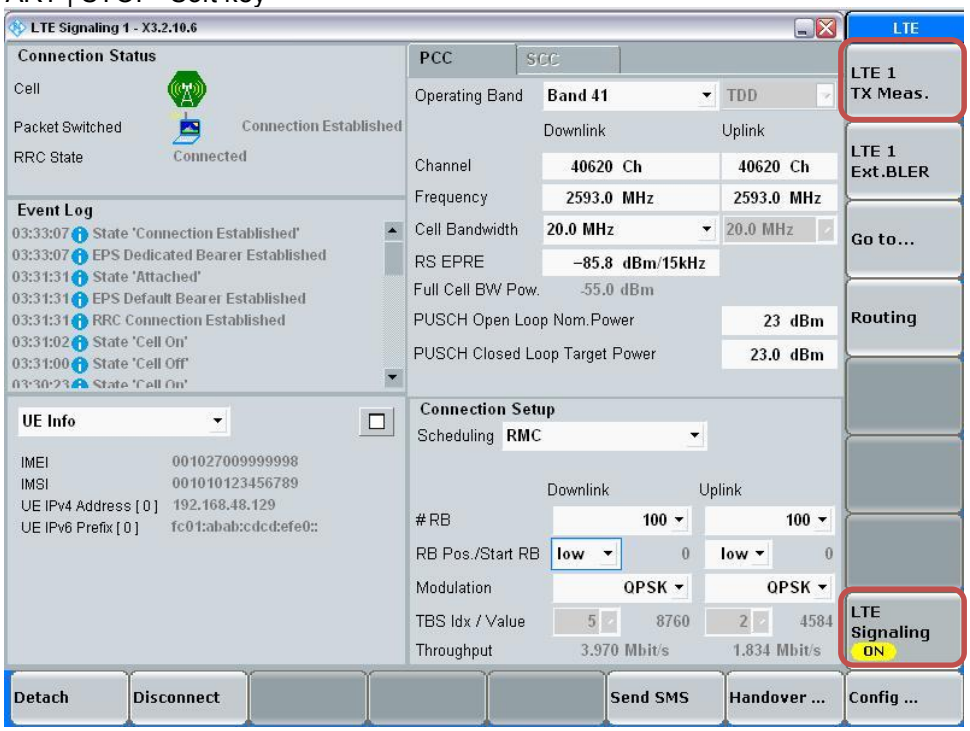
Connect to EUT

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



Max Power Setting

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



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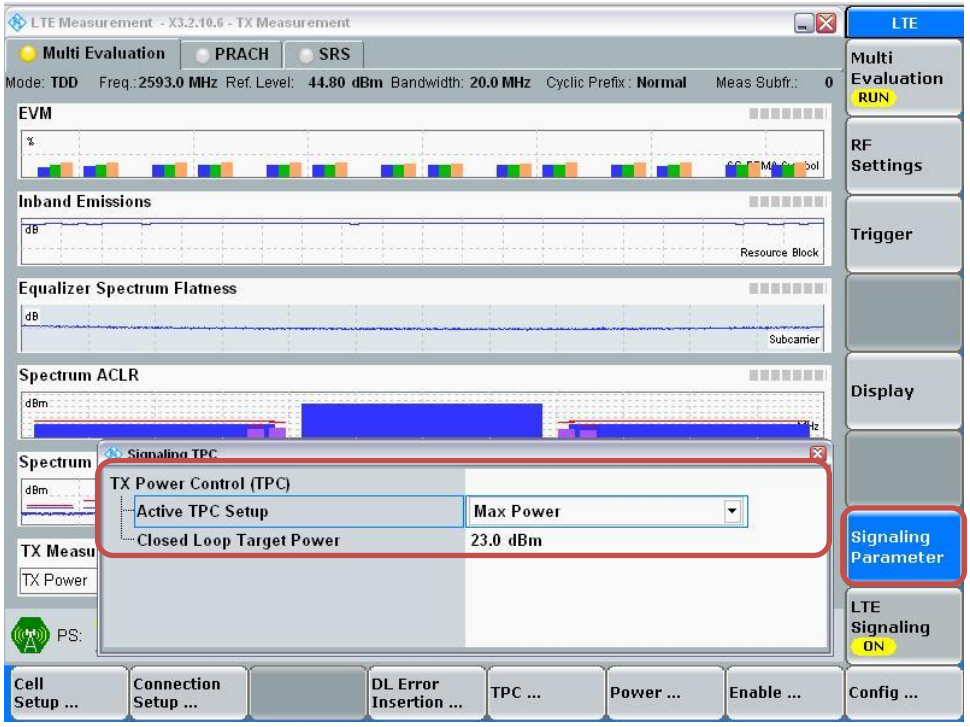
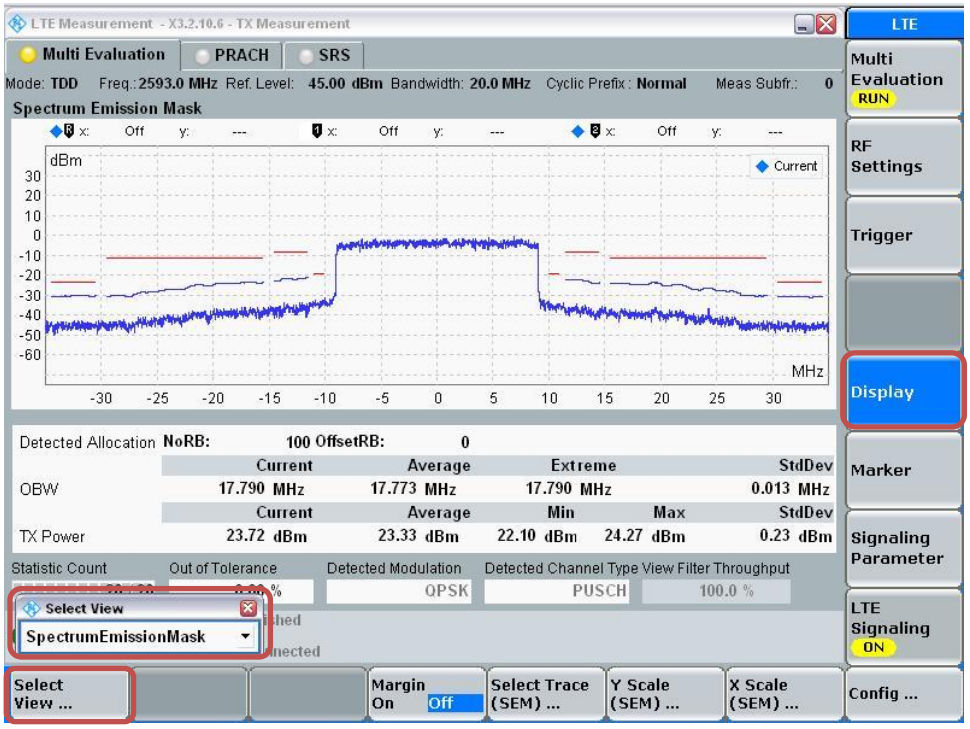
- Select “Signaling Parameter”
- Select “TX Power Control (TPC)” > Select “Active TPC Setup” to “Max Power” > Set “Closed Loop Target Power” to “23 dBm”



View TX Power

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



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LTE Band 41 Measured Results

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)					
					MPR	2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz
LTE Band 41	20	QPSK	1	0	0	23.6	23.4	23.9	23.7	23.8
			1	49	0	23.7	23.5	23.9	23.7	23.9
			1	99	0	23.8	23.6	24.1	23.8	23.9
			50	0	2	21.7	21.6	21.9	21.6	21.8
			50	24	2	21.7	21.6	22.0	21.7	21.8
			50	50	2	21.7	21.6	22.0	21.7	21.8
			100	0	2	21.7	21.6	22.0	21.7	21.8
		16QAM	1	0	2	21.4	21.7	21.9	21.4	21.6
			1	49	2	21.6	21.9	22.1	21.8	21.9
			1	99	2	21.6	21.8	22.0	21.8	22.1
			50	0	3	20.6	20.5	20.8	20.6	20.7
			50	24	3	20.6	20.5	20.9	20.7	20.8
			50	50	3	20.6	20.6	20.9	20.7	20.8
			100	0	3	20.6	20.5	20.8	20.7	20.8
Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)					
					MPR	2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz
LTE Band 41	15	QPSK	1	0	0	23.6	23.5	24.0	23.7	23.8
			1	37	0	23.7	23.6	24.1	23.8	23.8
			1	74	0	23.7	23.7	24.1	23.8	23.8
			36	0	2	21.7	21.6	22.0	21.7	21.8
			36	20	2	21.7	21.6	22.0	21.7	21.8
			36	39	2	21.7	21.6	22.0	21.7	21.8
			75	0	2	21.7	21.6	22.0	21.7	21.8
		16QAM	1	0	2	21.1	21.4	21.7	21.5	21.5
			1	37	2	21.7	21.4	21.4	21.2	21.7
			1	74	2	21.4	21.6	21.7	21.4	21.7
			36	0	3	20.6	20.5	20.9	20.6	20.8
			36	20	3	20.6	20.5	20.9	20.7	20.7
			36	39	3	20.6	20.6	21.0	20.7	20.8
			75	0	3	20.6	20.5	20.9	20.7	20.8
Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)					
					MPR	2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz
LTE Band 41	10	QPSK	1	0	0	23.7	23.6	23.9	23.8	23.8
			1	25	0	23.8	23.6	24.0	23.8	23.9
			1	49	0	23.8	23.7	24.0	23.8	23.9
			25	0	2	21.7	21.6	21.9	21.7	21.8
			25	12	2	21.7	21.6	21.9	21.7	21.8
			25	25	2	21.7	21.6	21.9	21.7	21.8
			50	0	2	21.7	21.6	21.9	21.7	21.8
		16QAM	1	0	2	21.5	21.9	21.8	21.5	22.0
			1	25	2	21.5	21.8	21.8	21.5	22.1
			1	49	2	21.6	21.9	21.8	21.5	22.1
			25	0	3	20.6	20.5	20.9	20.7	20.7
			25	12	3	20.6	20.5	20.9	20.7	20.8
			25	25	3	20.6	20.6	20.9	20.7	20.8
			50	0	3	20.6	20.5	20.9	20.7	20.8

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LTE Band 41 Measured Results (continued)

Band	BW (MHz)	Mode	RB Allocation	RB offset	Max. Meas. Avg Pwr (dBm)					
					MPR	2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz
LTE Band 41	5	QPSK	1	0	0	23.7	23.6	24.0	23.7	23.8
			1	12	0	23.7	23.6	24.0	23.7	23.8
			1	24	0	23.7	23.6	24.0	23.8	23.8
			12	0	2	21.7	21.6	21.9	21.7	21.8
			12	7	2	21.7	21.6	22.0	21.7	21.8
			12	13	2	21.7	21.6	22.0	21.7	21.8
			25	0	2	21.7	21.6	21.9	21.7	21.8
		16QAM	1	0	2	21.4	21.6	21.8	21.4	21.7
			1	12	2	21.4	21.6	21.8	21.4	21.7
			1	24	2	21.5	21.6	21.8	21.4	21.8
			12	0	3	20.6	20.5	20.9	20.6	20.7
			12	7	3	20.6	20.5	20.9	20.6	20.7
			12	13	3	20.6	20.5	20.9	20.6	20.7
			25	0	3	20.7	20.5	20.9	20.7	20.7

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9.3.1. LTE Rel. 10 Carrier Aggregation

LTE Release 10 Carrier Aggregation

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

1) Max power results

Type	LTE CA combinations			PCC (UL)					SCC (DL)			LTE Rel 8 Tx. Power [dBm]	LTE Rel 10 Tx. Power [dBm]	Delta
	PCC	+	SCC	Mode	BW (MHz)	Channel	Freq. (MHz)	RB/Offset	BW (MHz)	Channel	Freq. (MHz)			
Intra Contiguous	2C			QPSK	5	19175	1907.5	1/0	20	1058	1975.8	23.65	23.66	0.01
	5B (0), (1)			QPSK	5	20625	846.5	1/24	10	2553	884.3	24.20	24.23	0.03
	41C (0), (1), (2), (3)			QPSK	20	40620	2593.0	1/99	20	40818	2612.8	24.12	24.13	0.01
	66C			QPSK	10	132022	1715.0	1/0	15	66606	2127.0	23.77	23.71	-0.06
Intra Non-Contiguous	2A	+	2A	QPSK	5	19175	1907.5	1/0	5	625	1932.5	23.65	23.68	0.03
	4A	+	4A (0), (1)	QPSK	10	20175	1732.5	1/0	10	2350	2150.0	23.75	23.70	-0.05
	5A	+	5A	QPSK	5	20625	846.5	1/24	5	2425	871.5	24.20	24.25	0.05
	41A	+	41A (0), (1)	QPSK	20	40620	2593.0	1/99	20	41490	2680.0	24.12	24.01	-0.11
	66A	+	66A	QPSK	10	132022	1715.0	1/0	10	67086	2175.0	23.77	23.81	0.04
Inter Non-Contiguous	2A	+	5A (0), (1)	QPSK	5	19175	1907.5	1/0	10	2525	881.5	23.65	23.61	-0.04
	2A	+	12A (0), (1), (2	QPSK	5	19175	1907.5	1/0	10	5095	737.5	23.65	23.63	-0.02
	2A	+	13A (0), (1)	QPSK	5	19175	1907.5	1/0	10	5230	751.0	23.65	23.66	0.01
	2A	+	17A	QPSK	5	19175	1907.5	1/0	10	5790	740.0	23.65	23.64	-0.01
	4A	+	5A (0), (1)	QPSK	10	20175	1732.5	1/0	10	2525	881.5	23.75	23.79	0.04
	4A	+	12A (0), (1), (2), (3), (4), (5)	QPSK	10	20175	1732.5	1/0	10	5095	737.5	23.75	23.76	0.01
	4A	+	13A (0), (1)	QPSK	10	20175	1732.5	1/0	10	5230	751.0	23.75	23.78	0.03
	4A	+	17A	QPSK	10	20175	1732.5	1/0	10	5790	740.0	23.75	23.77	0.02
	5A	+	2A (0), (1)	QPSK	5	20625	846.5	1/24	20	900	1960.0	24.20	24.25	0.05
	5A	+	4A (0), (1)	QPSK	5	20625	846.5	1/24	20	2175	2132.5	24.20	24.23	0.03
	5A	+	41A	QPSK	5	20625	846.5	1/24	20	40620	2593.0	24.20	24.18	-0.02
	12A	+	2A (0), (1), (2	QPSK	5	23035	701.5	1/0	20	900	1960.0	23.73	23.77	0.04
	12A	+	4A (0), (1), (2), (3), (4), (5)	QPSK	5	23035	701.5	1/0	20	2175	2132.5	23.73	23.75	0.02
	12A	+	66A (0), (1), (2), (3), (4), (5)	QPSK	5	23035	701.5	1/0	20	66786	2145.0	23.73	23.75	0.02
	13A	+	2A (0), (1)	QPSK	10	23230	782.0	1/0	20	900	1960.0	23.77	23.82	0.05
	13A	+	4A (0), (1)	QPSK	10	23230	782.0	1/0	20	2175	2132.5	23.77	23.80	0.03
	17A	+	2A	QPSK	10	23790	710.0	1/0	10	900	1960.0	23.65	23.64	-0.01
	17A	+	4A	QPSK	10	23790	710.0	1/0	10	2175	2132.5	23.65	23.62	-0.03
	66A	+	12A (0), (1), (2), (3), (4), (5)	QPSK	10	132022	1715.0	1/0	10	5095	737.5	23.77	23.79	0.02

Note(s):

1. Per KDB 941225 D05A LTE Rel. 10 KDB inquiry Sheet: SAR is excluded for Carrier Aggregation when measured power doesn't exceed LTE Release 8 by more than a 1/4 dBm.
2. When the same frequency band is used for both contiguous and non-contiguous in DL CA Intra band, power was measured using the configuration with the largest aggregated bandwidth and maximum output power among the contiguous and non-contiguous in DL CA Intra band configurations.

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2) Reduction power results of Hotspot back-off

Type	LTE CA combinations			PCC (UL)					SCC (DL)			LTE Rel 8 Tx. Power [dBm]	LTE Rel 10 Tx. Power [dBm]	Delta
	PCC	+	SCC	Mode	BW (MHz)	Channel	Freq. (MHz)	RB/Offset	BW (MHz)	Channel	Freq. (MHz)			
Intra Contiguous	2C			QPSK	5	19175	1907.5	1/0	20	1058	1975.8	20.03	20.05	0.02
	66C			QPSK	10	132022	1715.0	1/0	15	66606	2127.0	21.07	21.03	-0.04
Intra Non-Contiguous	2A	+	2A	QPSK	5	19175	1907.5	1/0	5	625	1932.5	20.03	20.00	-0.03
	4A	+	4A (0), (1)	QPSK	10	20175	1732.5	1/0	10	2350	2150.0	21.73	21.77	0.04
	66A	+	66A	QPSK	10	132022	1715.0	1/0	10	67086	2175.0	21.07	21.01	-0.06
Inter Non-Contiguous	2A	+	5A (0), (1)	QPSK	5	19175	1907.5	1/0	10	2525	881.5	20.03	20.06	0.03
	2A	+	12A (0), (1), (2	QPSK	5	19175	1907.5	1/0	10	5095	737.5	20.03	20.05	0.02
	2A	+	13A (0), (1)	QPSK	5	19175	1907.5	1/0	10	5230	751.0	20.03	20.03	0.00
	2A	+	17A	QPSK	5	19175	1907.5	1/0	10	5790	740.0	20.03	20.01	-0.02
	4A	+	5A (0), (1)	QPSK	10	20175	1732.5	1/0	10	2525	881.5	21.73	21.69	-0.04
	4A	+	12A (0), (1), (2), (3), (4), (5)	QPSK	10	20175	1732.5	1/0	10	5095	737.5	21.73	21.68	-0.05
	4A	+	13A (0), (1)	QPSK	10	20175	1732.5	1/0	10	5230	751.0	21.73	21.75	0.02
	4A	+	17A	QPSK	10	20175	1732.5	1/0	10	5790	740.0	21.73	21.61	-0.12
	66A	+	12A (0), (1), (2), (3), (4), (5)	QPSK	10	132022	1715.0	1/0	10	5095	737.5	21.07	21.11	0.04

3) Reduction power results of Proximity sensor back-off

Type	LTE CA combinations			PCC (UL)					SCC (DL)			LTE Rel 8 Tx. Power [dBm]	LTE Rel 10 Tx. Power [dBm]	Delta
	PCC	+	SCC	Mode	BW (MHz)	Channel	Freq. (MHz)	RB/Offset	BW (MHz)	Channel	Freq. (MHz)			
Intra Contiguous	2C			QPSK	10	18900	1880.0	1/0	15	1020	1972.0	20.09	20.06	-0.03
	66C			QPSK	10	132022	1715.0	1/0	15	66606	2127.0	21.13	21.05	-0.08
Intra Non-Contiguous	2A	+	2A	QPSK	10	18900	1880.0	1/0	10	1150	1985.0	20.09	20.04	-0.05
	4A	+	4A (0), (1)	QPSK	10	20175	1732.5	1/0	10	2350	2150.0	21.76	21.77	0.01
	66A	+	66A	QPSK	10	132022	1715.0	1/0	10	67086	2175.0	21.13	21.19	0.06
Inter Non-Contiguous	2A	+	5A (0), (1)	QPSK	10	18900	1880.0	1/0	10	2525	881.5	20.09	20.06	-0.03
	2A	+	12A (0), (1), (2	QPSK	10	18900	1880.0	1/0	10	5095	737.5	20.09	20.05	-0.04
	2A	+	13A (0), (1)	QPSK	10	18900	1880.0	1/0	10	5230	751.0	20.09	20.10	0.01
	2A	+	17A	QPSK	10	18900	1880.0	1/0	10	5790	740.0	20.09	20.13	0.04
	4A	+	5A (0), (1)	QPSK	10	20175	1732.5	1/0	10	2525	881.5	21.76	21.77	0.01
	4A	+	12A (0), (1), (2), (3), (4), (5)	QPSK	10	20175	1732.5	1/0	10	5095	737.5	21.76	21.73	-0.03
	4A	+	13A (0), (1)	QPSK	10	20175	1732.5	1/0	10	5230	751.0	21.76	21.75	-0.01
	4A	+	17A	QPSK	10	20175	1732.5	1/0	10	5790	740.0	21.76	21.59	-0.17
	66A	+	12A (0), (1), (2), (3), (4), (5)	QPSK	10	132022	1715.0	1/0	10	5095	737.5	21.13	21.11	-0.02

Note(s):

3. Per KDB 941225 D05A LTE Rel. 10 KDB inquiry Sheet: SAR is excluded for Carrier Aggregation when measured power doesn't exceed LTE Release 8 by more than a 1/4 dBm.
4. When the same frequency band is used for both contiguous and non-contiguous in DL CA Intra band, power was measured using the configuration with the largest aggregated bandwidth and maximum output power among the contiguous and non-contiguous in DL CA Intra band configurations.

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9.4. Wi-Fi 2.4 GHz (DTS Band)

Measured Results

Mode	Data Rate	Ch #	Freq. (MHz)	Meas. Avg Pwr (dBm)	Max Output Power (dBm)	SAR Test (Yes/No)
802.11b	1 Mbps	1	2412	17.7	18.5	Yes
		6	2437	17.7		
		11	2462	17.8		
		12	2467	9.6	10.5	No
		13	2472	9.4		
802.11g	6 Mbps	1	2412	Not Require	16.5	No
		6	2437			
		11	2462			
		12	2467		10.5	
		13	2472			
802.11n (HT20)	6.5 Mbps	1	2412	Not Require	15.5	No
		6	2437			
		11	2462			
		12	2467		10.5	
		13	2472			

Note(s):

5. SAR is not required for 802.11g/n modes when the adjusted SAR for 802.11b is < 1.2 W/kg.
6. 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.
7. Additionally, SAR is not required for Channels 12 and 13 because the tune-up limit and the measured output power for these two channels are no greater than those for the default test channels. Refer to §6.3.

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

Measured Results

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Max Pwr.			Reduction Pwr		
					Avg Pwr (dBm)	Max Output Power (dBm)	SAR Test (Yes/No)	Avg Pwr (dBm)	Max Output Power (dBm)	SAR Test (Yes/No)
5.3 (U-NII 2A)	802.11a	6 Mbps	52	5260	15.9	16.5	Yes	Not Required	13.5	No
			56	5280	15.8					
			60	5300	15.8					
			64	5320	15.7					
	802.11n (HT20)	6.5 Mbps	52	5260	16.5	16.5	No		13.5	No
			56	5280	16.4					
			60	5300	16.4					
			64	5320	16.3					
	802.11n (HT40)	13.5 Mbps	54	5270	Not Required	14.5	No	13.5	13.5	Yes
			62	5310				13.4		
5.5 (U-NII 2C)	802.11a	6 Mbps	100	5500	15.9	16.5	Yes	Not Required	13.5	No
			120	5600	15.8					
			124	5620	15.6					
			144	5720	15.6					
	802.11n (HT20)	6.5 Mbps	100	5500	15.6	16.5	No		13.5	No
			120	5600	16.5					
			124	5620	16.4					
			144	5720	16.4					
	802.11n (HT40)	13.5 Mbps	102	5510	Not Required	14.5	No	13.5	13.5	Yes
			118	5590				13.3		
			126	5630				13.4		
			142	5710				13.3		
5.8 (U-NII 3)	802.11a	6 Mbps	149	5745	15.7	16.5	Yes	Not Required	13.5	No
			157	5785	15.6					
			165	5825	15.6					
	802.11n (HT20)	6.5 Mbps	149	5745	16.5	16.5	No		13.5	No
			157	5785	16.4					
			165	5825	16.3					
	802.11n (HT40)	13.5 Mbps	151	5755	Not Required	14.5	No	13.5	13.5	Yes
			159	5795				13.3		

Note(s):

1. 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.
2. When the same transmission mode configurations have the same maximum output power on the same channel for the 802.11 a/g/n/ac modes, the channel in the lower order/sequence 802.11 mode (i.e. a, g, n then ac) is selected.
3. When the specified maximum output power is the same for both UNII band I and UNII band 2A, begin SAR measurement in UNII band 2A; and if the highest *reported* SAR for UNII band 2A is
   - ≤ 1.2 W/kg, SAR is not required for UNII band I
   - > 1.2 W/kg, both bands should be tested independently for SAR.

9.6. Bluetooth

Maximum tune-up tolerance limit is 9.0 dBm. This power level qualifies for exclusion of SAR testing.

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10. Measured and Reported (Scaled) SAR Results

SAR Test Reduction criteria are as follows:

Reported SAR(W/kg) for WWAN= Measured SAR *Tune-up Scaling Factor

Reported SAR(W/kg) for Wi-Fi and Bluetooth= Measured SAR * Tune-up scaling factor * Duty Cycle scaling factor

KDB 447498 D01 General RF Exposure Guidance:

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

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

KDB 648474 D04 Handset SAR:

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

KDB 941225 D01 SAR test for 3G devices:

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

KDB 941225 D05 SAR for LTE Devices:

SAR test reduction is applied using the following criteria:

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

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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. GSM 850

RF Exposure Conditions	Mode	PWR Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up limit	Meas.	Meas.	Scaled	
Head (VoIP)	GPRS 3 Slot	Off	0	Left Touch	190	836.6	31.5	31.2	0.186	0.198	
				Left Tilt	190	836.6	31.5	31.2	0.132	0.141	
				Right Touch	190	836.6	31.5	31.2	0.281	0.300	1
				Right Tilt	190	836.6	31.5	31.2	0.125	0.133	
Body-worn	GPRS 3 Slot	Off	15	Rear	190	836.6	31.5	31.2	0.708	0.755	2
				Front	190	836.6	31.5	31.2	0.445	0.475	
Hotspot	GPRS 3 Slot	On	10	Rear	128	824.2	29.0	28.6	0.699	0.769	
					190	836.6	29.0	28.6	0.742	0.810	3
					251	848.8	29.0	28.8	0.703	0.744	
				Front	190	836.6	29.0	28.6	0.332	0.362	
				Edge 2	190	836.6	29.0	28.6	0.277	0.302	
				Edge 3	190	836.6	29.0	28.6	0.269	0.294	
				Edge 4	190	836.6	29.0	28.6	0.044	0.048	

10.2. GSM1900

RF Exposure Conditions	Mode	PWR Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up limit	Meas.	Meas.	Scaled	
Head (VoIP)	GPRS 4 Slot	Off	0	Left Touch	661	1880.0	25.5	25.4	0.064	0.065	4
				Left Tilt	661	1880.0	25.5	25.4	0.020	0.020	
				Right Touch	661	1880.0	25.5	25.4	0.042	0.043	
				Right Tilt	661	1880.0	25.5	25.4	0.032	0.033	
Body-worn	GPRS 4 Slot	Off	15	Rear	661	1880.0	25.5	25.4	0.540	0.546	5
				Front	661	1880.0	25.5	25.4	0.246	0.249	
Hotspot	GPRS 4 Slot	On	10	Rear	661	1880.0	24.0	23.6	0.655	0.721	6
				Front	661	1880.0	24.0	23.6	0.317	0.349	
				Edge 2	661	1880.0	24.0	23.6	0.055	0.060	
				Edge 3	661	1880.0	24.0	23.6	0.609	0.670	
				Edge 4	661	1880.0	24.0	23.6	0.084	0.092	

10.3. W-CDMA Band II

RF Exposure Conditions	Mode	PWR Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up limit	Meas.	Meas.	Scaled	
Head	Rel 99 RMC	Off	0	Left Touch	9400	1880.0	23.0	22.7	0.100	0.107	7
				Left Tilt	9400	1880.0	23.0	22.7	0.044	0.047	
				Right Touch	9400	1880.0	23.0	22.7	0.075	0.080	
				Rightt Tilt	9400	1880.0	23.0	22.7	0.053	0.057	
Bod-worn	Rel 99 RMC	Off	15	Rear	9400	1880.0	23.0	22.7	0.743	0.796	8
				Front	9400	1880.0	23.0	22.7	0.331	0.355	
Hotspot	Rel 99 RMC	On	10	Rear	9262	1852.4	21.0	21.0	0.888	0.888	
					9400	1880.0	21.0	20.9	0.942	0.962	
					9538	1907.6	21.0	20.6	0.770	0.846	
				Front	9400	1880.0	21.0	20.9	0.451	0.460	
				Edge 2	9400	1880.0	21.0	20.9	0.071	0.072	
				Edge 3	9262	1852.4	21.0	21.0	0.941	0.941	
					9400	1880.0	21.0	20.9	0.955	0.975	9
					9538	1907.6	21.0	20.6	0.746	0.820	
				Edge 4	9400	1880.0	21.0	20.9	0.116	0.118	

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10.4. W-CDMA Band IV

RF Exposure Conditions	Mode	PWR Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up limit	Meas.	Meas.	Scaled	
Head	Rel 99 RMC	Off	0	Left Touch	1312	1712.4	23.0	22.9	0.136	0.139	10
				Left Tilt	1312	1712.4	23.0	22.9	0.052	0.053	
				Right Touch	1312	1712.4	23.0	22.9	0.110	0.113	
				Rightt Tilt	1312	1712.4	23.0	22.9	0.055	0.056	
Bod-worn	Rel 99 RMC	Off	15	Rear	1312	1712.4	23.0	22.9	0.656	0.673	11
				Front	1312	1712.4	23.0	22.9	0.351	0.360	
Hotspot	Rel 99 RMC	On	10	Rear	1312	1712.4	20.5	19.9	0.618	0.705	12
				Front	1312	1712.4	20.5	19.9	0.322	0.367	
				Edge 2	1312	1712.4	20.5	19.9	0.048	0.055	
				Edge 3	1312	1712.4	20.5	19.9	0.507	0.578	
				Edge 4	1312	1712.4	20.5	19.9	0.094	0.107	

10.5. W-CDMA Band V

RF Exposure Conditions	Mode	PWR Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
							Tune-up limit	Meas.	Meas.	Scaled	
Head	Rel 99 RMC	N/A	0	Left Touch	4183	836.6	24.5	24.0	0.120	0.136	
				Left Tilt	4183	836.6	24.5	24.0	0.084	0.095	
				Right Touch	4183	836.6	24.5	24.0	0.182	0.206	13
				Rightt Tilt	4183	836.6	24.5	24.0	0.090	0.102	
Body-worn	Rel 99 RMC		15	Rear	4183	836.6	24.5	24.0	0.471	0.532	14
				Front	4183	836.6	24.5	24.0	0.288	0.325	
Hotspot	Rel 99 RMC		10	Rear	4132	826.4	24.5	24.1	0.951	1.055	
					4183	836.6	24.5	24.0	0.767	0.867	
					4233	846.6	24.5	24.1	0.996	1.082	15
				Front	4183	836.6	24.5	24.0	0.425	0.480	
				Edge 2	4183	836.6	24.5	24.0	0.348	0.393	
				Edge 3	4183	836.6	24.5	24.0	0.281	0.317	
				Edge 4	4183	836.6	24.5	24.0	0.043	0.049	

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10.6. LTE Band 2 (20MHz Bandwidth)

RF Exposure Conditions	Mode	PWR 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	Off	0	Left Touch	19100	1900.0	1	0	24.0	23.6	0.110	0.122	16
							50	0	22.0	21.3	0.061	0.071	
				Left Tilt	19100	1900.0	1	0	24.0	23.6	0.032	0.035	
							50	0	22.0	21.3	0.017	0.020	
				Right Touch	19100	1900.0	1	0	24.0	23.6	0.085	0.094	
							50	0	22.0	21.3	0.051	0.059	
				Right Tilt	19100	1900.0	1	0	24.0	23.6	0.066	0.073	
							50	0	22.0	21.3	0.038	0.044	
Body-worn	QPSK	Off	15	Rear	18700	1860.0	1	0	24.0	23.2	0.763	0.922	17
					18900	1880.0	1	0	24.0	23.1	0.752	0.919	
					19100	1900.0	1	0	24.0	23.6	0.792	0.878	
							50	0	22.0	21.3	0.482	0.561	
				Front	19100	1900.0	1	0	24.0	23.6	0.354	0.392	
							50	0	22.0	21.3	0.219	0.255	
Hotspot	QPSK	On	10	Rear	18700	1860.0	1	0	21.0	19.6	0.723	1.002	18
					18900	1880.0	1	0	21.0	19.6	0.717	0.993	
					19100	1900.0	1	0	21.0	20.0	0.780	0.984	
							50	0	19.0	17.9	0.471	0.612	
				Front	19100	1900.0	1	0	21.0	20.0	0.372	0.469	
							50	0	19.0	17.9	0.221	0.287	
				Edge 2	19100	1900.0	1	0	21.0	20.0	0.065	0.082	
							50	0	19.0	17.9	0.040	0.052	
				Edge 3	18700	1860.0	1	0	21.0	19.6	0.570	0.790	
					18900	1880.0	1	0	21.0	19.6	0.571	0.790	
					19100	1900.0	1	0	21.0	20.0	0.643	0.811	
							50	0	19.0	17.9	0.395	0.513	
				Edge 4	19100	1900.0	1	0	21.0	20.0	0.110	0.139	
							50	0	19.0	17.9	0.063	0.082	

10.7. LTE Band 4 (20MHz Bandwidth)

SAR for LTE Band 4 (Frequency range: 1710-1755 MHz) is covered by LTE Band 66 (Frequency range: 1710-1780 MHz) due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

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10.8. LTE Band 5 (10MHz Bandwidth)

RF Exposure Conditions	Mode	PWR 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	24.4	24.1	0.122	0.130	
							25	0	22.4	21.5	0.061	0.075	
				Left Tilt	20525	836.5	1	0	24.4	24.1	0.081	0.086	
							25	0	22.4	21.5	0.042	0.052	
				Right Touch	20525	836.5	1	0	24.4	24.1	0.167	0.178	19
							25	0	22.4	21.5	0.084	0.103	
				Right Tilt	20525	836.5	1	0	24.4	24.1	0.083	0.089	
							25	0	22.4	21.5	0.043	0.053	
Body-worn	QPSK		15	Rear	20525	836.5	1	0	24.4	24.1	0.450	0.480	20
							25	0	22.4	21.5	0.242	0.299	
				Front	20525	836.5	1	0	24.4	24.1	0.272	0.290	
							25	0	22.4	21.5	0.148	0.183	
Hotspot	QPSK		10	Rear	20525	836.5	1	0	24.4	24.1	0.736	0.785	21
							25	0	22.4	21.5	0.402	0.497	
				Front	20525	836.5	1	0	24.4	24.1	0.371	0.396	
							25	0	22.4	21.5	0.203	0.251	
				Edge 2	20525	836.5	1	0	24.4	24.1	0.345	0.368	
							25	0	22.4	21.5	0.183	0.226	
				Edge 3	20525	836.5	1	0	24.4	24.1	0.261	0.278	
							25	0	22.4	21.5	0.145	0.179	
				Edge 4	20525	836.5	1	0	24.4	24.1	0.069	0.074	
							25	0	22.4	21.5	0.034	0.042	

10.9. LTE Band 12 (10MHz Bandwidth)

RF Exposure Conditions	Mode	PWR 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	24.0	23.4	0.065	0.074	
							25	0	22.0	21.2	0.040	0.047	
				Left Tilt	23095	707.5	1	0	24.0	23.4	0.043	0.050	
							25	0	22.0	21.2	0.027	0.032	
				Right Touch	23095	707.5	1	0	24.0	23.4	0.071	0.081	22
							25	0	22.0	21.2	0.042	0.050	
				Right Tilt	23095	707.5	1	0	24.0	23.4	0.048	0.056	
							25	0	22.0	21.2	0.030	0.036	
Body-worn	QPSK		15	Rear	23095	707.5	1	0	24.0	23.4	0.166	0.191	23
							25	0	22.0	21.2	0.105	0.126	
				Front	23095	707.5	1	0	24.0	23.4	0.101	0.116	
							25	0	22.0	21.2	0.063	0.076	
Hotspot	QPSK		10	Rear	23095	707.5	1	0	24.0	23.4	0.265	0.305	24
							25	0	22.0	21.2	0.168	0.201	
				Front	23095	707.5	1	0	24.0	23.4	0.139	0.160	
							25	0	22.0	21.2	0.089	0.107	
				Edge 2	23095	707.5	1	0	24.0	23.4	0.084	0.097	
							25	0	22.0	21.2	0.051	0.061	
				Edge 3	23095	707.5	1	0	24.0	23.4	0.066	0.076	
							25	0	22.0	21.2	0.041	0.048	
				Edge 4	23095	707.5	1	0	24.0	23.4	0.071	0.082	
							25	0	22.0	21.2	0.045	0.054	

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10.10. LTE Band 13 (10MHz Bandwidth)

RF Exposure Conditions	Mode	PWR 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	0	24.0	23.8	0.061	0.064	
							25	0	22.0	21.6	0.036	0.039	
				Left Tilt	23230	782.0	1	0	24.0	23.8	0.041	0.044	
							25	0	22.0	21.6	0.024	0.026	
				Right Touch	23230	782.0	1	0	24.0	23.8	0.073	0.077	25
							25	0	22.0	21.6	0.042	0.045	
				Right Tilt	23230	782.0	1	0	24.0	23.8	0.045	0.047	
							25	0	22.0	21.6	0.026	0.028	
Body-worn	QPSK		15	Rear	23230	782.0	1	0	24.0	23.8	0.190	0.201	26
							25	0	22.0	21.6	0.114	0.124	
				Front	23230	782.0	1	0	24.0	23.8	0.144	0.152	
							25	0	22.0	21.6	0.086	0.094	
Hotspot	QPSK		10	Rear	23230	782.0	1	0	24.0	23.8	0.219	0.231	27
							25	0	22.0	21.6	0.132	0.144	
				Front	23230	782.0	1	0	24.0	23.8	0.135	0.143	
							25	0	22.0	21.6	0.081	0.088	
				Edge 2	23230	782.0	1	0	24.0	23.8	0.218	0.230	
							25	0	22.0	21.6	0.131	0.143	
				Edge 3	23230	782.0	1	0	24.0	23.8	0.055	0.058	
							25	0	22.0	21.6	0.033	0.035	
				Edge 4	23230	782.0	1	0	24.0	23.8	0.140	0.148	
							25	0	22.0	21.6	0.080	0.087	

10.11. LTE Band 17 (10MHz Bandwidth)

SAR for LTE Band 17 (Frequency Range: 704-716 MHz) is covered by LTE Band 12 (Frequency Range: 699-716 MHz) due to overlapping frequency range, same maximum tune-up limit and same channel bandwidth.

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10.12. LTE Band 41 (20MHz Bandwidth)

RF Exposure Conditions	Mode	PWR 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	40620	2593.0	1	99	24.5	24.1	0.039	0.042	28
							50	50	22.5	22.0	0.023	0.025	
				Left Tilt	40620	2593.0	1	99	24.5	24.1	0.023	0.025	
							50	50	22.5	22.0	0.010	0.011	
				Right Touch	40620	2593.0	1	99	24.5	24.1	0.034	0.037	
							50	50	22.5	22.0	0.015	0.016	
				Right Tilt	40620	2593.0	1	99	24.5	24.1	0.035	0.038	
							50	50	22.5	22.0	0.018	0.020	
Body-worn	QPSK		15	Rear	40620	2593.0	1	99	24.5	24.1	0.224	0.244	29
							50	50	22.5	22.0	0.133	0.149	
				Front	40620	2593.0	1	99	24.5	24.1	0.141	0.154	
							50	50	22.5	22.0	0.084	0.094	
Hotspot	QPSK		10	Rear	40620	2593.0	1	99	24.5	24.1	0.472	0.515	
							50	50	22.5	22.0	0.286	0.320	
				Front	40620	2593.0	1	99	24.5	24.1	0.280	0.306	
							50	50	22.5	22.0	0.171	0.192	
				Edge 2	40620	2593.0	1	99	24.5	24.1	0.048	0.052	
							50	50	22.5	22.0	0.028	0.032	
				Edge 3	39750	2506.0	1	99	24.5	23.8	0.549	0.651	
					40185	2549.5	1	99	24.5	23.6	0.624	0.761	
					40620	2593.0	1	99	24.5	24.1	0.724	0.790	
							50	50	22.5	22.0	0.375	0.420	
					41055	2636.5	1	99	24.5	23.8	0.843	0.986	30
					41490	2680.0	1	99	24.5	23.9	0.851	0.985	
				Edge 4	40620	2593.0	1	99	24.5	24.1	0.035	0.038	
							50	50	22.5	22.0	0.022	0.024	

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10.13. LTE Band 66 (20MHz Bandwidth)

RF Exposure Conditions	Mode	PWR 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	Off	0	Left Touch	132072	1720.0	1	0	24.0	23.5	0.134	0.150	31
							50	0	22.0	21.5	0.080	0.089	
				Left Tilt	132072	1720.0	1	0	24.0	23.5	0.089	0.100	
							50	0	22.0	21.5	0.052	0.059	
				Right Touch	132072	1720.0	1	0	24.0	23.5	0.117	0.131	
							50	0	22.0	21.5	0.067	0.075	
				Right Tilt	132072	1720.0	1	0	24.0	23.5	0.074	0.083	
							50	0	22.0	21.5	0.042	0.047	
Body-worn	QPSK	Off	15	Rear	132072	1720.0	1	0	24.0	23.5	0.682	0.765	32
							50	0	22.0	21.5	0.415	0.465	
				Front	132072	1720.0	1	0	24.0	23.5	0.373	0.418	
							50	0	22.0	21.5	0.225	0.252	
Hotspot	QPSK	On	10	Rear	132072	1720.0	1	0	22.0	21.0	0.807	1.022	
							50	0	20.0	18.9	0.469	0.610	
					132322	1745.0	1	0	22.0	20.7	0.815	1.087	33
					132572	1770.0	1	0	22.0	20.7	0.793	1.075	
				Front	132072	1720.0	1	0	22.0	21.0	0.465	0.589	
							50	0	20.0	18.9	0.275	0.358	
				Edge 2	132072	1720.0	1	0	22.0	21.0	0.068	0.086	
							50	0	20.0	18.9	0.038	0.049	
				Edge 3	132072	1720.0	1	0	22.0	21.0	0.658	0.833	
							50	0	20.0	18.9	0.383	0.498	
					132322	1745.0	1	0	22.0	20.7	0.640	0.854	
					132572	1770.0	1	0	22.0	20.7	0.675	0.915	
				Edge 4	132072	1720.0	1	0	22.0	21.0	0.134	0.170	
							50	0	20.0	18.9	0.080	0.104	

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10.14. Wi-Fi (DTS Band)

Frequency Band	Mode	RF Exposure Conditions	PWR Back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		Duty Cycle (%)	1-g SAR (W/kg)		Plot No.
									Tune-up limit	Meas.		Meas.	Scaled	
2.4GHz	802.11b 1 Mbps	Head	Off	0	Left Touch	11	2462.0	0.684	18.5	17.8				
					Left Tilt	11	2462.0	0.804	18.5	17.8	99.5%	0.629	0.751	
					Right Touch	11	2462.0	0.691	18.5	17.8				
					Rightt Tilt	1	2412.0	0.878	18.5	17.7	99.5%	0.722	0.868	
						11	2462.0	1.055	18.5	17.8	99.5%	0.807	0.964	34
		Body-worn	Off	15	Rear	11	2462.0	0.135	18.5	17.8	99.5%	0.110	0.131	35
					Front	11	2462.0	0.113	18.5	17.8				
		Hotspot & Wi-Fi Direct	Off	10	Rear	11	2462.0	0.283	18.5	17.8	99.5%	0.237	0.283	36
					Front	11	2462.0	0.195	18.5	17.8				
					Edge 1	11	2462.0	0.278	18.5	17.8				
					Edge 4	11	2462.0	0.083	18.5	17.8				

Note(s):

1. 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.
2. 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.

10.15. Wi-Fi (U-NII Bands)

Frequency Band	Mode	RF Exposure Conditions	PWR back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		Duty Cycle	1-g SAR (W/kg)		Plot No.
									Tune-up limit	Meas.		Meas.	Scaled	
5.3 GHz U-NII 2A	802.11n HT 40 13.5 Mbps	Head	On	0	Left Touch	54	5270.0	0.604	13.5	13.5	93.4%			
					Left Tilt	54	5270.0	0.742	13.5	13.5	93.4%			
					Right Touch	54	5270.0	1.808	13.5	13.5	93.4%	0.652	0.703	37
					Right Tilt	54	5270.0	1.095	13.5	13.5	93.4%	0.615	0.663	
	802.11a 6 Mbps	Body-worn	Off	15	Rear	52	5260.0	0.061	16.5	15.9	96.8%			
					Front	52	5260.0	0.159	16.5	15.9	96.8%	0.073	0.088	38

Frequency Band	Mode	RF Exposure Conditions	PWR back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		Duty Cycle	1-g SAR (W/kg)		Plot No.
									Tune-up limit	Meas.		Meas.	Scaled	
5.5 GHz U-NII 2C	802.11n HT 40 13.5 Mbps	Head	On	0	Left Touch	102	5510.0	0.507	13.5	13.5	93.4%			
					Left Tilt	102	5510.0	0.655	13.5	13.5	93.4%			
					Right Touch	102	5510.0	1.846	13.5	13.5	93.4%	0.635	0.681	39
					Right Tilt	102	5510.0	1.077	13.5	13.5	93.4%	0.605	0.649	
	802.11a 6 Mbps	Body-worn	Off	15	Rear	100	5500.0	0.081	16.5	15.9	96.8%			
					Front	100	5500.0	0.185	16.5	15.9	96.8%	0.078	0.093	40

Frequency Band	Mode	RF Exposure Conditions	PWR back-off	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Power (dBm)		Duty Cycle	1-g SAR (W/kg)		Plot No.
									Tune-up limit	Meas.		Meas.	Scaled	
5.8 GHz U-NII 3	802.11n HT 40 13.5 Mbps	Head	On	0	Left Touch	151	5755.0	0.451	13.5	13.5	93.4%			
					Left Tilt	151	5755.0	0.467	13.5	13.5	93.4%			
					Right Touch	151	5755.0	1.008	13.5	13.5	93.4%	0.367	0.393	41
					Right Tilt	151	5755.0	0.761	13.5	13.5	93.4%			
	802.11a 6 Mbps	Body-worn	Off	15	Rear	149	5745.0	0.081	16.5	15.7	96.8%			
					Front	149	5745.0	0.185	16.5	15.7	96.8%	0.037	0.047	42
		Hotspot	Off	10	Rear	149	5745.0	0.081	16.5	15.7	96.8%			
					Front	149	5745.0	0.185	16.5	15.7	96.8%	0.089	0.112	43
					Edge 1	149	5745.0	0.081	16.5	15.7	96.8%			
					Edge 4	149	5745.0	0.185	16.5	15.7	96.8%			

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10.16. Bluetooth

Standalone SAR Test Exclusion Considerations & Estimated SAR

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

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)]·[√f(GHz)] ≤ 3.0, for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

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

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

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

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

RF Air interface	RF Exposure Conditions	Frequency (GHz)	Max. tune-up tolerance Power		Min. test separation distance (mm)	SAR test exclusion Result*	Estimated 1-g SAR (W/kg)
			(dBm)	(mW)			
Bluetooth	Head	2.480	9.0	8	5	2.5	0.336
	Body-worn	2.480	9.0	8	15	0.8	0.112
	Hotspot	2.480	9.0	8	10	1.3	0.168

Conclusion:

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

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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.

Peak spatial-average (1g of tissue)

Frequency Band (MHz)	Air Interface	RF Exposure Conditions	Test Position	Repeated SAR (Yes/No)	Highest Measured SAR (W/kg)	Repeated Measured SAR (W/kg)	Largest to Smallest SAR Ratio
700	LTE Band 12	Hotspot	Rear	No	0.265	N/A	N/A
	LTE Band 13	Hotspot	Rear	No	0.219	N/A	N/A
835	GSM 850	Hotspot	Rear	No	0.742	N/A	N/A
	WCDMA Band V	Hotspot	Rear	Yes	0.996	0.978	1.02
	LTE Band 5	Hotspot	Rear	No	0.736	N/A	N/A
1700	WCDMA Band IV	Body	Rear	No	0.656	N/A	N/A
	LTE Band 66	Hotspot	Rear	Yes	0.815	0.812	1.00
1900	GSM 1900	Hotspot	Rear	No	0.655	N/A	N/A
	WCDMA Band II	Hotspot	Edge 3	Yes	0.955	0.951	1.00
	LTE Band 2	Body	Rear	No	0.792	N/A	N/A
2400	Wi-Fi 802.11b/g/n	Head	Right Tilt	Yes	0.807	0.774	1.04
2600	LTE Band 41	Hotspot	Edge 3	Yes	0.851	0.844	1.01
5300	Wi-Fi 802.11a/n	Head	Right Touch	No	0.652	N/A	N/A
5500	Wi-Fi 802.11a/n	Head	Right Touch	No	0.635	N/A	N/A
5800	Wi-Fi 802.11a/n	Head	Right Touch	No	0.367	N/A	N/A

Note(s):

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

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12. Simultaneous Transmission SAR Analysis

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

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

Where:

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

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

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

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

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

Simultaneous Transmission Condition

RF Exposure Condition	Item	Capable Transmit Configurations		
Head	1	GSM(Voice/GPRS)	+	DTS
	2	GSM(Voice/GPRS)	+	BT
	3	GSM(Voice/GPRS)	+	U-NII
	4	W-CDMA	+	DTS
	5	W-CDMA	+	BT
	6	W-CDMA	+	U-NII
	7	LTE	+	DTS
	8	LTE	+	BT
	9	LTE	+	U-NII
Body-w orn	10	GSM(Voice/GPRS)	+	DTS
	11	GSM(Voice/GPRS)	+	BT
	12	GSM(Voice/GPRS)	+	U-NII
	13	W-CDMA	+	DTS
	14	W-CDMA	+	BT
	15	W-CDMA	+	U-NII
	16	LTE	+	DTS
	17	LTE	+	BT
	18	LTE	+	U-NII
Hotspot	19	GSM(GPRS)	+	DTS
	20	GSM(GPRS)	+	BT
	21	GSM(GPRS)	+	U-NII
	22	WCDMA	+	DTS
	23	WCDMA	+	BT
	24	WCDMA	+	U-NII
	25	LTE	+	DTS
	26	LTE	+	BT
	27	LTE	+	U-NII

Notes:
1. DTS supports Wi-Fi Direct, Hotspot and VoIP.
2. U-NII Wi-Fi Direct, Hotspot and VoIP.
3. GPRS, W-CDMA, LTE supports Hotspot and VoIP.
4. DTS and U-NII Radio cannot transmit simultaneously w ith Bluetooth Radio.
5. U-NII Radio cannot transmit simultaneously w ith DTS Radio.
6. BT tethering is consider about each RF exposure conditions

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

RF Exposure conditions	Test Position	① WWAN	② DTS	③ U-NII	④ BT	① + ② WWAN + DTS		① + ③ WWAN + U-NII		① + ④ WWAN + BT	
						∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)	∑ 1-g SAR (mW/g)	SPLSR (Yes/ No)
Head	All Position	0.300	0.964	0.703	0.336	1.264	No	1.003	No	0.636	No
Body-worn	All Position	0.922	0.131	0.093	0.112	1.053	No	1.015	No	1.034	No
Hotspot	All Position	1.087	0.283	0.112	0.168	1.370	No	1.199	No	1.255	No

Conclusion:

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

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Appendixes

Refer to separated files for the following appendixes.

4788371671-S1V2 FCC Report SAR_App A_Photos & Ant. Locations

4788371671-S1V2 FCC Report SAR_App B_Highest SAR Test Plots

4788371671-S1V2 FCC Report SAR_App C_System Check Plots

4788371671-S1V2 FCC Report SAR_App D_SAR Tissue Ingredients

4788371671-S1V2 FCC Report SAR_App E_Probe Cal. Certificates

4788371671-S1V2 FCC Report SAR_App F_Dipole Cal. Certificates

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