



SAR EVALUATION REPORT

IEEE Std 1528-2013

For
Wearable Communication Device

FCC ID: 2BAFM-HU123
Model Name: HU0123

Report Number: R14722187-S1V3
Issue Date: 7/25/2023

Prepared for
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Revision History

Rev.	Date	Revisions	Revised By
V1	7/13/2023	Initial Issue	--
V2	7/19/2023	Updated §4.3 to include newest calibration date for the PowerSource1 (S/N 4278). Corrected §8.2 table to include 2B 6/12/2023 system checks. Adjusted header of plot 9 in Appendix B.	Lindsay Ryan
V3	7/25/2023	Added LTE Band 17 and Band 38 in §6.2 and §6.3. In §9.2, a note was added stating that LTE Band 17 and Band 38 are covered bands and the tune-up was updated. §9.6 tune-up was also updated.	Lindsay Ryan

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1. Attestation of Test Results

Applicant Name	Humane, Inc.			
FCC ID	2BAFM-HU123			
Model Name	HU0123			
Applicable Standards	Published RF exposure KDB procedures IEEE Std 1528-2013			
Exposure Category	SAR Limits (W/Kg)			
	Peak spatial-average (1g of tissue)		Extremities (hands, wrists, ankles, etc.) (10g of tissue)	
General population / Uncontrolled exposure	1.6		4	
RF Exposure Conditions	Equipment Class - Highest Reported SAR (W/kg)			
	PCE	DTS	NII	DSS
Body-worn*	1.447	0.703	1.293	0.101
Simultaneous TX	1.548	0.804	1.394	1.548
Date Tested	5/10/2023 to 7/11/2023			
Test Results	Pass			
<p>*Note: The body-worn minimum separation distance is 0 mm for all HU0123 + accessory component configurations. The body-worn separation distance for HU0123 standalone is 5 mm.</p> <p>The DUT accessory HU0223 includes WPT, which present simultaneous considerations with the DUT's transmitters. The client provided the reported SAR of 0.000026 W/kg referenced from report HU0223-06072023-12VL (FCC ID: 2BAFM-HU223). UL LLC does not claim responsibility for the data from accessory HU0223.</p> <p>UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.</p> <p>This report contains data provided by the customer which can impact the validity of results. UL LLC is only responsible for the validity of results after the integration of the data provided by the customer.</p> <p>The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.</p> <p>This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC 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 A2LA, NIST, or any agency of the U.S. Government, or any agency of the U.S. government.</p>				
Approved & Released By:		Prepared By:		
				
Devin Chang Senior Test Engineer UL Verification Services Inc.		Richard Jankovics Operations Leader UL LLC		

2. Test Specification, Methods and Procedures

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

- 248227 D01 802.11 Wi-Fi SAR v02r02
- 447498 D01 General RF Exposure Guidance v06
- 447498 D03 Supplement C Cross-Reference v01
- 447498 D04 Interim General RF Exposure Guidance v01
- 648474 D03 Wireless Chargers Battery Covers v01r04
- 648474 D04 Handset SAR v01r03
- 680106 D01 RF Exposure Wireless Charging Apps v03r01
- 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- 865664 D02 RF Exposure Reporting v01r02
- 941225 D01 3G SAR Procedures v03r01
- 941225 D05 SAR for LTE Devices v02r05
- 941225 D05A LTE Rel.10 KDB Inquiry Sheet v01r02

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

- [TCB Workshop](#) October 2014; RF Exposure Procedures (Other LTE Considerations)
- [TCB Workshop](#) April 2015; RF Exposure Procedures (Overlapping LTE Bands)
- [TCB Workshop](#) October 2015; RF Exposure Procedures (KDB 941225 D05A)
- [TC Workshop](#) October 2016; RF Exposure Procedures (Bluetooth Duty Factor)
- [TCB Workshop](#) October 2016; RF Exposure Procedures (DUT Holder Perturbations)
- [TCB Workshop](#) May 2017; RF Exposure Procedures (Broadband Liquid Above 3 GHz)
- [TCB Workshop](#) May 2017; RF Exposure Procedures (LTE Band 41 Power Class 2)
- [TCB Workshop](#) April 2019; RF Exposure Procedures (Tissue Simulating Liquids (TSL))

3. Facilities and Accreditation

UL LLC is accredited by A2LA, cert. # 0751.06 for all testing performed within the scope of this report. Testing was performed at the locations noted below.

The test sites and measurement facilities used to collect data are located at 2800 Perimeter Park Dr, Morrisville, NC, USA.

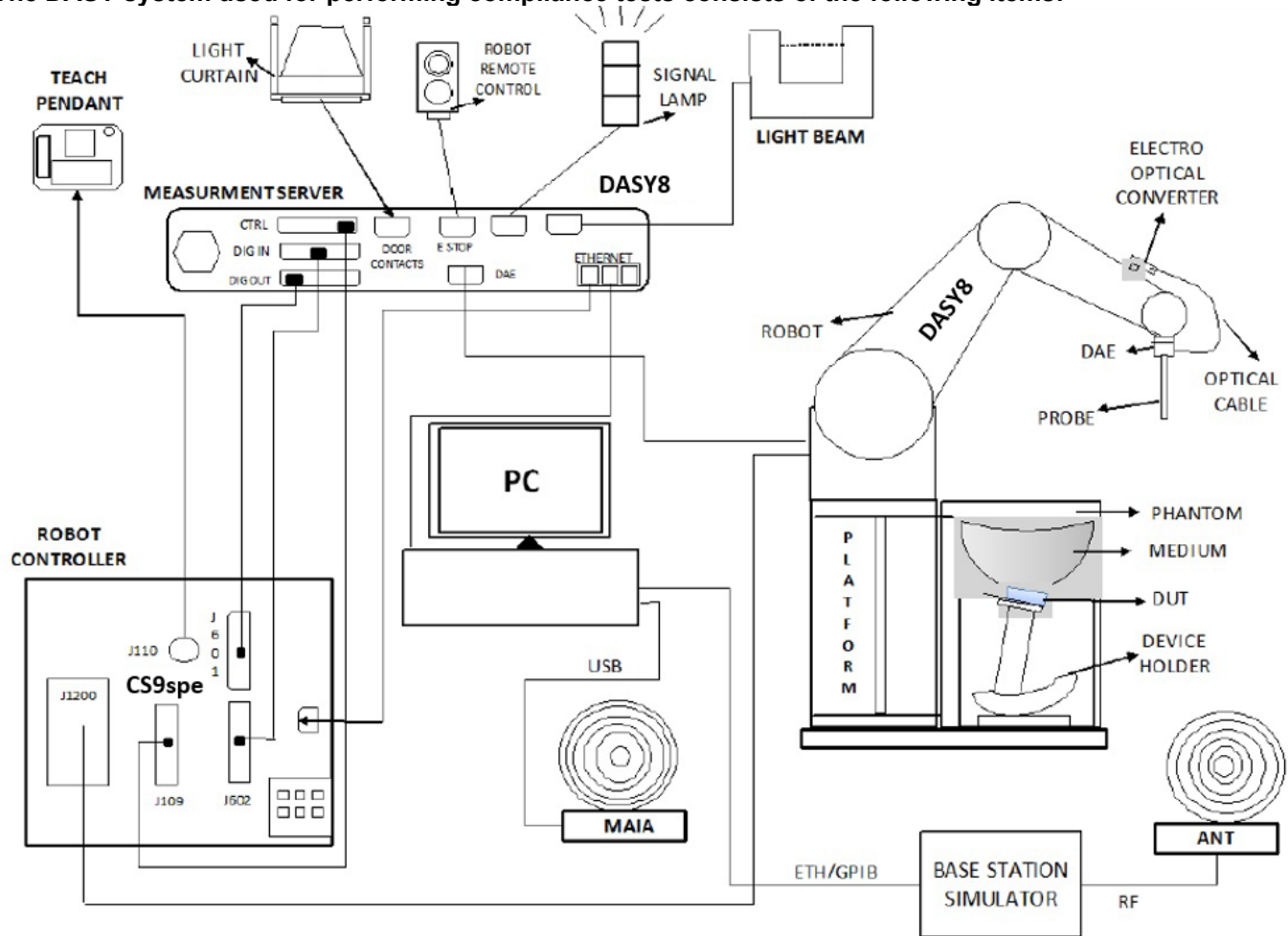
- SAR Lab 1A
- SAR Lab 2A
- SAR Lab 2B

	Address	ISED CABID	ISED Company Number	FCC Registration
<input type="checkbox"/>	Building: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	825374
<input checked="" type="checkbox"/>	Building: 2800 Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A	US0067	27265	825374

4. SAR Measurement System & Test Equipment

4.1. SAR Measurement System

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



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Win10 and the DASY8¹ software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

¹ DASY8 software used: DASY16.0.2.83 and older generations.

4.2. SAR Scan Procedures

Step 1: Power Reference Measurement

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

Step 2: Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEC/IEEE 62209-1528, 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	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
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 \leq the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

Step 3: Zoom Scan

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

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

		≤ 3 GHz	> 3 GHz	
Maximum zoom scan spatial resolution: $\Delta x_{Zoom}, \Delta y_{Zoom}$		≤ 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 1 st 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 <i>reported</i> SAR from the <i>area scan based 1-g SAR estimation</i> procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

Step 4: Power drift measurement

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

4.3. Test Equipment

The measuring equipment used to perform the tests documented in this report has been calibrated in accordance with the manufacturers' recommendations, and is traceable to recognized national standards.

Dielectric Property Measurements

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Network Analyzer	Keysight	E5063A	MY54100681	9/30/2023
Dielectric Probe	SPEAG	DAKS-3.5	1051	10/17/2023
Shorting Block	SPEAG	DAK-3.5 Short	SM DAK 200 DA	10/17/2023
Thermometer	Fisher Scientific	15-078-181	1817705017	3/30/2024

System Check

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
Signal Generator	Keysight	N5181A	MY50140788	1/31/2024
Power Meter	Keysight	N1912A	MY55116004	9/02/2024
Power Sensor	Keysight	E9323A	MY55110007	6/14/2023
Power Sensor	Keysight	N1921A	MY55090047	2/02/2024
3-Path Diode Power Sensor ¹	Rohde & Schwarz	NRP8S	112236	5/31/2023
3-Path Diode Power Sensor ¹	Rohde & Schwarz	NRP8S	112237	5/31/2023
Amplifier	MITEQ	AMF-4D-00400600-50-30P	N/A	N/A
Directional coupler	Mini-Circuits	ZUDC10-183+	1438	N/A
DC Power Supply	Miteq	PS 15V1	1990186	N/A
RF Power Source ¹	Speag	PowerSource1	4278	6/21/2023
RF Power Source ²	Speag	PowerSource1	4278	6/13/2024

Note(s):

- Equipment not used for calibrated measurements past calibration due date.
- Equipment re-calibrated during the course of testing.

Lab Equipment

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
E-Field Probe	SPEAG	EX3DV4	7709	12/12/2023
E-Field Probe	SPEAG	EX3DV4	7710	2/3/2024
E-Field Probe	SPEAG	EX3DV4	7711	3/29/2024
Data Acquisition Electronics	SPEAG	DAE4	1714	11/23/2023
Data Acquisition Electronics	SPEAG	DAE4	1715	1/23/2024
Data Acquisition Electronics	SPEAG	DAE4	1716	3/16/2024
System Validation Dipole	SPEAG	D750V3	1139	10/12/2023
System Validation Dipole	SPEAG	D900V2	1d180	10/12/2023
System Validation Dipole	SPEAG	D1750V2	1136	10/17/2023
System Validation Dipole	SPEAG	D1900V2	5d202	10/12/2023
System Validation Dipole	SPEAG	D2450V2	963	10/18/2023
System Validation Dipole	SPEAG	D2600V2	1104	10/21/2023
System Validation Dipole	SPEAG	D5GHzV2	1213	10/11/2023
Environmental Indicator	Control Company	06-662-4	200037610	2/24/2024
Environmental Indicator	Control Company	06-662-4	200037635	2/24/2024

Other

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due Date
3-Path Diode Power Sensor ¹	Rohde & Schwarz	NRP8S	112236	5/31/2023
3-Path Diode Power Sensor ¹	Rohde & Schwarz	NRP8S	112237	5/31/2023
RF Power Meter	Keysight	N1911a	MY55116001	7/07/2023
RF Power Meter	Keysight	N1911a	MY55116002	9/10/2023
RF Power Meter	Keysight	N1912a	MY55116004	9/2/2023
RF Power Sensor	Keysight	N1921a	MY55090025	9/27/2023
RF Power Sensor	Keysight	N1921a	MY55090030	6/15/2023
RF Power Sensor	Keysight	E9323A	MY55110006	6/15/2023
Base Station Simulator	R & S	CMW 500	170733	12/14/2023
Base Station Simulator	R & S	CMW 500	170732	12/8/2023
Base Station Simulator ¹	R & S	CMW 500	170193	1/6/2024
Base Station Simulator ¹	R & S	CMW 500	170194	6/6/2024
Base Station Simulator ¹	Anritsu	MT8821C	6262116751	6/5/2024
Base Station Simulator ¹	Anritsu	MT8000A	6272354129	6/9/2024

Note(s):

1. Equipment not used for calibrated measurements past calibration due date.

5. Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be $\leq 30\%$, for a confidence interval of $k = 2$. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval.

Therefore, the measurement uncertainty is not required.

6. Device Under Test (DUT) Information

6.1. DUT Description

Device Dimension	Overall (Length x Width x Thickness): 44.50 mm x 47.47 mm x 8.25 mm Overall Diagonal: 55.0 mm This is a wearable communication device.																																							
Back Cover	The Back Cover is not removable																																							
Battery Options	The rechargeable battery is not user accessible.																																							
Accessory	Bases HU0223, HU0823, and HU0923 and charging case HU0623																																							
Wireless Router (Hotspot)	Wi-Fi Hotspot mode permits the device to share its cellular data connection with other Wi-Fi-enabled devices. <input type="checkbox"/> Mobile Hotspot (Wi-Fi 2.4 GHz) <input type="checkbox"/> Mobile Hotspot (Wi-Fi 5 GHz)																																							
Wi-Fi Direct	Wi-Fi Direct enabled devices transfer data directly between each other Wi-Fi Direct is only available in hand use configuration <input type="checkbox"/> Wi-Fi Direct (Wi-Fi 2.4 GHz) <input type="checkbox"/> Wi-Fi Direct (Wi-Fi 5 GHz)																																							
Bluetooth Tethering (Hotspot)	BT Tethering mode permits the device to share its cellular data connection with other devices. <input type="checkbox"/> BT Tethering (Bluetooth 2.4 GHz)																																							
Test sample information	<table border="1"> <thead> <tr> <th>S/N</th> <th>IMEI</th> <th>Notes</th> </tr> </thead> <tbody> <tr><td>S1</td><td>351094760035749</td><td>Radiated</td></tr> <tr><td>S3</td><td>351094760035046</td><td>Radiated</td></tr> <tr><td>S4</td><td>351094760035087</td><td>Radiated</td></tr> <tr><td>S6</td><td>351094760036135</td><td>Radiated</td></tr> <tr><td>S8</td><td>351094760036606</td><td>Radiated</td></tr> <tr><td>S9</td><td>351094760036846</td><td>Radiated</td></tr> <tr><td>S11</td><td>351094760034775</td><td>Radiated</td></tr> <tr><td>S12</td><td>351094760034874</td><td>Radiated</td></tr> <tr><td>S13</td><td>351094760036697</td><td>Radiated</td></tr> <tr><td>SAF3</td><td>N/A</td><td>Conducted</td></tr> <tr><td>SM1</td><td>N/A</td><td>Conducted</td></tr> <tr><td>SM3</td><td>N/A</td><td>Conducted</td></tr> </tbody> </table>	S/N	IMEI	Notes	S1	351094760035749	Radiated	S3	351094760035046	Radiated	S4	351094760035087	Radiated	S6	351094760036135	Radiated	S8	351094760036606	Radiated	S9	351094760036846	Radiated	S11	351094760034775	Radiated	S12	351094760034874	Radiated	S13	351094760036697	Radiated	SAF3	N/A	Conducted	SM1	N/A	Conducted	SM3	N/A	Conducted
S/N	IMEI	Notes																																						
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S3	351094760035046	Radiated																																						
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S6	351094760036135	Radiated																																						
S8	351094760036606	Radiated																																						
S9	351094760036846	Radiated																																						
S11	351094760034775	Radiated																																						
S12	351094760034874	Radiated																																						
S13	351094760036697	Radiated																																						
SAF3	N/A	Conducted																																						
SM1	N/A	Conducted																																						
SM3	N/A	Conducted																																						
Hardware Version	1.0																																							
Software Version	V00.05.08																																							

6.2. Wireless Technologies

Wireless technologies	Frequency bands	Operating mode	Duty Cycle used for SAR testing
W-CDMA (UMTS)	Band II Band IV Band V	UMTS Rel. 99 (Voice & Data) HSDPA (Rel. 5) HSUPA (Rel. 6) DC-HSDPA (Rel. 9) HSPA+ (Rel. 7)	100%
LTE	FDD Band 2 FDD Band 5 FDD Band 7 FDD Band 12 FDD Band 17 FDD Band 26 TDD Band 38 TDD Band 41 ² FDD Band 66 FDD Band 71	QPSK 16QAM 64QAM Rel. 14 Carrier Aggregation (2 Uplinks and 3 Downlinks)	100% (FDD) 63.3% (TDD) ^{Power Class 3} 43.3% (TDD) ^{Power Class 2} Refer to §6.4
Wi-Fi	2.4 GHz	802.11b/g/n/ac	99.2% ^{(802.11b) 1}
	5 GHz	802.11a/n/ac	98.2% ^{(802.11a) 1}
	Does this device support bands 5.60 ~ 5.65 GHz? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
	Does this device support Band gap channel(s)? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Bluetooth	2.4 GHz	BR, EDR, LE	100% ^{(GFSK) 1}

Notes:

- Duty cycle is referenced from § 9
- This device supports Power Class 2 and Power Class 3 for LTE Band 41.

6.3. General LTE SAR Test and Reporting Considerations

Item	Description						
Frequency range, Channel Bandwidth, Numbers and Frequencies	Band 2	Frequency range: 1850 - 1910 MHz (BW = 60 MHz)					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	18700 /1860	18675/ 1857.5	18650/ 1855	18625/ 1852.5	18615/ 1851.5	18607/ 1850.7
	Mid	18900 1880	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880	18900/ 1880
	High	19100 1900	19125/ 1902.5	19150/ 1905	19175/ 1907.5	19185/ 1908.5	19193/ 1909.3
	Band 5	Frequency range: 824 - 849 MHz (BW = 25 MHz)					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz ¹	5 MHz	3 MHz	1.4 MHz
	Low			20450/ 829	20425/ 826.5	20415/ 825.5	20407/ 824.7
	Mid			20525 836.5	20525/ 836.5	20525/ 836.5	20525/ 836.5
	High			20600/ 844	20625/ 846.5	20635/ 847.5	20643/ 848.3
	Band 7	Frequency range: 2500 - 2570 MHz (BW = 70 MHz)					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz
	Low	20850 2510	20825 2507.5	20800 2505	20775 2502.5		
	Mid	21100 2535	21100 2535	21100 2535	21100 2535		
	High	21350 2560	21375 2562.5	21400 2565	21425 2567.5		
	Band 12	Frequency range: 699 – 716 MHz (BW = 17 MHz)					
		Channel Bandwidth					
		20 MHz	15 MHz	10 MHz ¹	5 MHz	3 MHz	1.4 MHz
Low			23060/ 704	23035/ 701.5	23025/ 700.5	23017/ 699.7	
Mid			23095 707.5	23095/ 707.5	23095/ 707.5	23095/ 707.5	
High			23130/ 711	23155/ 713.5	23165/ 714.5	23173/ 715.3	
Band 17	Frequency range: 704 - 716 MHz (BW = 12 MHz)						
	Channel Bandwidth						
	20 MHz	15 MHz	10 MHz ¹	5 MHz ¹	3 MHz	1.4 MHz	
Low			23780/ 709	23755/ 706.5			
Mid			23790 710	23790/ 710			
High			23800/ 711	23825/ 713.5			
Band 26	Frequency range: 814 - 849 MHz (BW = 35 MHz)						
	Channel Bandwidth						
	20 MHz	15 MHz ¹	10 MHz	5 MHz	3 MHz	1.4 MHz	
Low		26765/ 821.5	26740/ 819	26715/ 816.5	26705/ 815.5	26697/ 814.7	
Mid		26865 831.5	26865/ 831.5	26865/ 831.5	26865/ 831.5	26865/ 831.5	
High		26965/ 841.5	26990/ 844	27015/ 846.5	27025/ 847.5	27033/ 848.3	
Band 38	Frequency range: 2570 - 2620 MHz (BW = 50 MHz)						
	Channel Bandwidth						
	20 MHz ¹	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz	
Low	37850/ 2580	37825/ 2577.5	37800/ 2575	37775/ 2572.5			
Mid	38000 2595	38000/ 2595	38000/ 2595	38000/ 2595			
High	38150	38175/ 38200	38200/ 38225	38225/ 38250			

		2610	2612.5	2615	2617.5																																																																
	Band 41 ²	Frequency range: 2496 - 2690 MHz (BW = 194 MHz)																																																																			
		Channel Bandwidth																																																																			
		20 MHz	15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz																																																														
	Low	39750 / 2506.0																																																																			
	Mid- Low	40185 / 2549.5																																																																			
	Mid	40620 / 2593.0																																																																			
	Mid-High	41055 / 2636.5																																																																			
	High	41490 / 2680.0																																																																			
		Band 66	Frequency range: 1710 - 1780 MHz (BW = 70 MHz)																																																																		
			Channel Bandwidth																																																																		
20 MHz			15 MHz	10 MHz	5 MHz	3 MHz	1.4 MHz																																																														
Low		132072/ 1720	132047/ 1717.5	132022/ 1715	131997/ 1712.5	131987/ 1711.5	131979/ 1710.7																																																														
Mid		132322/ 1745	132322/ 1745	132322/ 1745	132322/ 1745	132322/ 1745	132322/ 1745																																																														
High		132572/ 1770	132597/ 1772.5	132622/ 1775	132647/ 1777.5	132657/ 1778.5	132665/ 1779.3																																																														
Band 71		Frequency range: 663 - 698 MHz (BW = 35 MHz)																																																																			
		Channel Bandwidth																																																																			
		20 MHz ¹	15 MHz ¹	10 MHz	5 MHz	3 MHz	1.4 MHz																																																														
		Low	133222/ 673	133197/ 670.5	133172/ 668	133147/ 665.5																																																															
	Mid	133297/ 680.5	133297/ 680.5	133297/ 680.5	133297/ 680.5																																																																
	High	133372/ 688	133397/ 690.5	133422/ 693	133447/ 695.5																																																																
LTE transmitter and antenna implementation	Refer to Appendix A.																																																																				
Maximum power reduction (MPR)	<p>Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3</p> <table border="1"> <thead> <tr> <th rowspan="2">Modulation</th> <th colspan="6">Channel bandwidth / Transmission bandwidth (N_{RB})</th> <th rowspan="2">MPR (dB)</th> </tr> <tr> <th>1.4 MHz</th> <th>3.0 MHz</th> <th>5 MHz</th> <th>10 MHz</th> <th>15 MHz</th> <th>20 MHz</th> </tr> </thead> <tbody> <tr> <td>QPSK</td> <td>> 5</td> <td>> 4</td> <td>> 8</td> <td>> 12</td> <td>> 16</td> <td>> 18</td> <td>≤ 1</td> </tr> <tr> <td>16 QAM</td> <td>≤ 5</td> <td>≤ 4</td> <td>≤ 8</td> <td>≤ 12</td> <td>≤ 16</td> <td>≤ 18</td> <td>≤ 1</td> </tr> <tr> <td>16 QAM</td> <td>> 5</td> <td>> 4</td> <td>> 8</td> <td>> 12</td> <td>> 16</td> <td>> 18</td> <td>≤ 2</td> </tr> <tr> <td>64 QAM</td> <td>≤ 5</td> <td>≤ 4</td> <td>≤ 8</td> <td>≤ 12</td> <td>≤ 16</td> <td>≤ 18</td> <td>≤ 2</td> </tr> <tr> <td>64 QAM</td> <td>> 5</td> <td>> 4</td> <td>> 8</td> <td>> 12</td> <td>> 16</td> <td>> 18</td> <td>≤ 3</td> </tr> <tr> <td>256 QAM</td> <td colspan="6">≥ 1</td> <td>≤ 5</td> </tr> </tbody> </table> <p>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</p>							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
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																																																														
Power reduction	No																																																																				
Spectrum plots for RB configurations	A properly configured base station simulator was used for the SAR and power measurements; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.																																																																				

Notes:

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

6.4. LTE (TDD) Considerations

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

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

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

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	$6592 \cdot T_s$	$(1+X) \cdot 2192 \cdot T_s$	$(1+X) \cdot 2560 \cdot T_s$	$7680 \cdot T_s$	$(1+X) \cdot 2192 \cdot T_s$	$(1+X) \cdot 2560 \cdot T_s$
1	$19760 \cdot T_s$			$20480 \cdot T_s$		
2	$21952 \cdot T_s$			$23040 \cdot T_s$		
3	$24144 \cdot T_s$			$25600 \cdot T_s$		
4	$26336 \cdot T_s$			$7680 \cdot T_s$		
5	$6592 \cdot T_s$	$(2+X) \cdot 2192 \cdot T_s$	$(2+X) \cdot 2560 \cdot T_s$	$20480 \cdot T_s$	$(2+X) \cdot 2192 \cdot T_s$	$(2+X) \cdot 2560 \cdot T_s$
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			$12800 \cdot T_s$		
8	$24144 \cdot T_s$			-		
9	$13168 \cdot T_s$			-		
10	$13168 \cdot T_s$	$13152 \cdot T_s$	$12800 \cdot T_s$	-	-	-

Table 4.2-2: Uplink-downlink configurations & Calculated Duty Cycle

Uplink-Downlink Configuration	Downlink-to-Uplink Switch-point Periodicity	Subframe Number										Calculated Duty Cycle (%)
		0	1	2	3	4	5	6	7	8	9	
0	5 ms	D	S	U	U	U	D	S	U	U	U	63.3%
1	5 ms	D	S	U	U	D	D	S	U	U	D	43.3%
2	5 ms	D	S	U	D	D	D	S	U	D	D	23.3%
3	10 ms	D	S	U	U	U	D	D	D	D	D	31.7%
4	10 ms	D	S	U	U	D	D	D	D	D	D	21.7%
5	10 ms	D	S	U	D	D	D	D	D	D	D	11.7%
6	5 ms	D	S	U	U	U	D	S	U	U	D	53.3%

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

Note(s):

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

7. RF Exposure Conditions (Test Configurations)

7.1. Standalone SAR Test Exclusion Considerations

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

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

SAR Test Exclusion Calculations for WWAN

Antennas < 50mm to adjacent edges

Antenna	Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)		Calculated Threshold Value	
			dBm	mW	Rear	Front	Rear	Front
Antenna 1	W-CDMA 2	1900	24.40	275	5	5	75.8 -MEASURE-	75.8 -MEASURE-
	W-CDMA 4	1750	24.40	275	5	5	72.8 -MEASURE-	72.8 -MEASURE-
	W-CDMA 5	850	24.50	282	5	5	52 -MEASURE-	52 -MEASURE-
	LTE Band 2	1900	24.80	302	5	5	83.3 -MEASURE-	83.3 -MEASURE-
	LTE Band 7	2600	24.80	302	5	5	97.4 -MEASURE-	97.4 -MEASURE-
	LTE Band 12	750	24.60	288	5	5	49.9 -MEASURE-	49.9 -MEASURE-
	LTE Band 26	900	24.80	302	5	5	57.3 -MEASURE-	57.3 -MEASURE-
	LTE Band 41	2600	26.90	490	5	5	158 -MEASURE-	158 -MEASURE-
	LTE Band 66	1750	24.30	269	5	5	71.2 -MEASURE-	71.2 -MEASURE-
LTE Band 71	750	24.80	302	5	5	52.3 -MEASURE-	52.3 -MEASURE-	

Note(s):

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

SAR Test Exclusion Calculations for WLAN

Antennas < 50mm to adjacent edges

Antenna	Tx Interface	Frequency (MHz)	Output Power		Separation Distances (mm)		Calculated Threshold Value	
			dBm	mW	Rear	Front	Rear	Front
Antenna 2	Wi-Fi 2.4 GHz	2450	20.50	112	5	5	35.1 -MEASURE-	35.1 -MEASURE-
	Wi-Fi 5.2 GHz	5200	18.00	63	5	5	28.7 -MEASURE-	28.7 -MEASURE-
	Wi-Fi 5.3 GHz	5300	18.00	63	5	5	29 -MEASURE-	29 -MEASURE-
	Wi-Fi 5.5 GHz	5600	18.00	63	5	5	29.8 -MEASURE-	29.8 -MEASURE-
	Wi-Fi 5.8 GHz	5800	18.00	63	5	5	30.3 -MEASURE-	30.3 -MEASURE-
	Bluetooth	2450	12.50	18	5	5	5.6 -MEASURE-	5.6 -MEASURE-

Note(s):

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

Testing Rationale

The data covered in this report is comprised of the transmitter HU0123 (FCC ID: 2BAFM-HU123) and four pieces of accessory equipment: HU0223, HU0823, HU0923, and HU0623. The HU0123 transmitter can be body worn on its own with a separation distance of 5 mm; other configurations include HU0123 paired with HU0223 at 0 mm, HU0123 paired with HU0823 separated by a piece of clothing at 0 mm, HU0123 paired with HU0923 belt clip, or HU0123 paired with HU0223 inside of a charging case HU0623 at 0 mm.

In accordance with these realistic use cases of the product, SAR values were measured of HU0123 individually, as well as the four other combinations described above.

7.2. Required Test Configurations

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

Antenna	Test Configurations	Back	Front
HU0123			
Antenna 1	W-CDMA Band 2 Full Power	Yes	Yes
	W-CDMA Band 4 Full Power	Yes	Yes
	W-CDMA Band 5 Full Power	Yes	Yes
	LTE Band 2 Full Power	Yes	Yes
	LTE Band 7 Full Power	Yes	Yes
	LTE Band 12 Full Power	Yes	Yes
	LTE Band 26 Full Power	Yes	Yes
	LTE Band 41 Full Power	Yes	Yes
	LTE Band 66 Full Power	Yes	Yes
	LTE Band 71 Full Power	Yes	Yes
Antenna 2	Wi-Fi 2.4 GHz	Yes	Yes
	Wi-Fi 5 GHz	Yes	Yes
	Bluetooth	Yes	Yes
HU0123 + HU0223			
Antenna 1	W-CDMA Band 2 Full Power	Yes	No
	W-CDMA Band 4 Full Power	Yes	No
	W-CDMA Band 5 Full Power	Yes	No
	LTE Band 2 Full Power	Yes	No
	LTE Band 7 Full Power	Yes	No
	LTE Band 12 Full Power	Yes	No
	LTE Band 26 Full Power	Yes	No
	LTE Band 41 Full Power	Yes	No
	LTE Band 66 Full Power	Yes	No
	LTE Band 71 Full Power	Yes	No
Antenna 2	Wi-Fi 2.4 GHz	Yes	No
	Wi-Fi 5 GHz	Yes	No
	Bluetooth	Yes	No
HU0123 + Cloth + HU0823			
Antenna 1	W-CDMA Band 2 Full Power	Yes	No
	W-CDMA Band 4 Full Power	Yes	No
	W-CDMA Band 5 Full Power	Yes	No
	LTE Band 2 Full Power	Yes	No
	LTE Band 7 Full Power	Yes	No
	LTE Band 12 Full Power	Yes	No
	LTE Band 26 Full Power	Yes	No
	LTE Band 41 Full Power	Yes	No
	LTE Band 66 Full Power	Yes	No
	LTE Band 71 Full Power	Yes	No
Antenna 2	Wi-Fi 2.4 GHz	Yes	No
	Wi-Fi 5 GHz	Yes	No
	Bluetooth	Yes	No

Note(s):

Yes = Testing is required.

No = Testing is not required.

Antenna	Test Configurations	Back	Front
HU0123 + HU0923			
Antenna 1	W-CDMA Band 2 Full Power	Yes	No
	W-CDMA Band 4 Full Power	Yes	No
	W-CDMA Band 5 Full Power	Yes	No
	LTE Band 2 Full Power	Yes	No
	LTE Band 7 Full Power	Yes	No
	LTE Band 12 Full Power	Yes	No
	LTE Band 26 Full Power	Yes	No
	LTE Band 41 Full Power	Yes	No
	LTE Band 66 Full Power	Yes	No
	LTE Band 71 Full Power	Yes	No
Antenna 2	Wi-Fi 2.4 GHz	Yes	No
	Wi-Fi 5 GHz	Yes	No
	Bluetooth	Yes	No
HU0123 + HU0223 + HU0623			
Antenna 1	W-CDMA Band 2 Full Power	Yes	Yes
	W-CDMA Band 4 Full Power	Yes	Yes
	W-CDMA Band 5 Full Power	Yes	Yes
	LTE Band 2 Full Power	Yes	Yes
	LTE Band 7 Full Power	Yes	Yes
	LTE Band 12 Full Power	Yes	Yes
	LTE Band 26 Full Power	Yes	Yes
	LTE Band 41 Full Power	Yes	Yes
	LTE Band 66 Full Power	Yes	Yes
	LTE Band 71 Full Power	Yes	Yes
Antenna 2	Wi-Fi 2.4 GHz	Yes	Yes
	Wi-Fi 5 GHz	Yes	Yes
	Bluetooth	Yes	Yes

Note(s):

Yes = Testing is required.

No = Testing is not required.

8. Dielectric Property Measurements & System Check

8.1. Dielectric Property Measurements

The temperature of the tissue-equivalent medium used during measurement must also be within 18° C to 25° C and within $\pm 2^\circ$ C of the temperature when the tissue parameters are characterized.

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

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

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

Tissue Dielectric Parameters

FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

Target Frequency (MHz)	Head		Body	
	ϵ_r	σ (S/m)	ϵ_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5000	36.2	4.45	49.3	5.07
5100	36.1	4.55	49.1	5.18
5200	36.0	4.66	49.0	5.30
5300	35.9	4.76	48.9	5.42
5400	35.8	4.86	48.7	5.53
5500	35.6	4.96	48.6	5.65
5600	35.5	5.07	48.5	5.77
5700	35.4	5.17	48.3	5.88
5800	35.3	5.27	48.2	6.00

Dielectric Property Measurements Results:

SAR Lab	Date	Band (MHz)	Tissue Type	Frequency (MHz)	Relative Permittivity (ϵ_r)			Conductivity (σ)		
					Measured	Target	Delta (%)	Measured	Target	Delta (%)
1A	5/10/2023	2450	Head	2450	40.24	39.20	2.65	1.87	1.80	4.11
				2400	40.32	39.30	2.60	1.83	1.75	4.42
				2480	40.20	39.16	2.65	1.90	1.83	3.47
1A	5/15/2023	2450	Head	2450	39.86	39.20	1.68	1.81	1.80	0.33
				2400	39.93	39.30	1.61	1.77	1.75	0.76
				2480	39.84	39.16	1.73	1.83	1.83	-0.35
1A	5/15/2023	5250	Head	5250	35.15	35.93	-2.18	4.54	4.70	-3.36
				5150	35.33	36.05	-1.99	4.43	4.60	-3.69
				5350	34.96	35.82	-2.40	4.66	4.80	-3.11
1A	5/26/2023	5250	Head	5250	35.13	35.93	-2.24	4.58	4.70	-2.70
				5150	35.31	36.05	-2.05	4.46	4.60	-2.95
				5350	34.94	35.82	-2.45	4.69	4.80	-2.47
1A	5/30/2023	5250	Head	5250	34.92	35.93	-2.82	4.54	4.70	-3.47
				5150	35.10	36.05	-2.63	4.43	4.60	-3.74
				5350	34.73	35.82	-3.04	4.65	4.80	-3.26
1A	5/30/2023	2600	Head	2600	39.35	39.01	0.87	1.95	1.96	-0.42
				2495	39.48	39.14	0.86	1.87	1.85	1.05
				2690	39.20	38.90	0.78	2.03	2.06	-1.38
1A	6/5/2023	1900	Head	1900	38.99	40.00	-2.53	1.45	1.40	3.50
				1850	39.09	40.00	-2.27	1.42	1.40	1.14
				1920	38.97	40.00	-2.58	1.46	1.40	4.36
1A	7/10/2023	750	Head	750	41.15	41.96	-1.93	0.92	0.89	2.76
				660	41.43	42.42	-2.34	0.89	0.89	0.11
				845	40.87	41.5	-1.52	0.95	0.91	4.53
2A	5/16/2023	5600	Head	5600	34.7	35.53	-2.35	4.95	5.06	-2.26
				5500	34.88	35.65	-2.15	4.83	4.96	-2.54
				5725	34.45	35.39	-2.66	5.1	5.19	-1.76
2A	5/16/2023	5750	Head	5750	34.43	35.36	-2.64	5.13	5.21	-1.64
				5700	34.51	35.42	-2.57	5.06	5.16	-1.97
				5850	34.26	35.3	-2.95	5.24	5.32	-1.52
2A	5/16/2023	5850	Head	5850	34.26	35.3	-2.95	5.24	5.32	-1.52
				5900	34.15	35.2	-2.98	5.3	5.38	-1.58
				5925	34.12	35.2	-3.07	5.33	5.4	-1.37
2A	5/22/2023	2450	Head	2450	38.21	39.20	-2.53	1.81	1.80	0.78
				2400	38.29	39.30	-2.56	1.77	1.75	1.28
				2480	38.18	39.16	-2.51	1.83	1.83	0.05
2A	5/26/2023	1750	Head	1750	39.01	40.08	-2.68	1.32	1.37	-3.94
				1710	39.05	40.15	-2.73	1.29	1.35	-4.19
				1790	39.90	40.02	-0.31	1.37	1.39	-1.76
2A	5/31/2023	1900	Head	1900	38.18	40.00	-4.55	1.41	1.40	0.50
				1850	38.25	40.00	-4.38	1.38	1.40	-1.43
				1920	38.17	40.00	-4.58	1.42	1.40	1.43
2A	6/5/2023	2600	Head	2600	38.79	39.01	-0.57	1.90	1.96	-3.07
				2495	38.93	39.14	-0.54	1.82	1.85	-1.66
				2690	38.62	38.90	-0.71	1.97	2.06	-4.30
2A	6/14/2023	2600	Head	2600	40.46	39.01	3.71	1.97	1.96	0.30
				2495	40.64	39.14	3.82	1.88	1.85	1.59
				2690	40.31	38.90	3.63	2.04	2.06	-0.94
2A	7/7/2023	1900	Head	1900	38.92	40.00	-2.7	1.43	1.40	2.36
				1850	39.03	40.00	-2.43	1.40	1.40	0.21
				1920	38.91	40.00	-2.73	1.45	1.40	3.21
2A	7/10/2023	2600	Head	2600	37.81	39.01	-3.08	1.92	1.96	-2.10
				2495	37.98	39.14	-2.97	1.84	1.85	-0.58
				2690	37.66	38.90	-3.18	1.99	2.06	-3.32

SAR Lab	Date	Band (MHz)	Tissue Type	Frequency (MHz)	Relative Permittivity (ϵ_r)			Conductivity (σ)		
					Measured	Target	Delta (%)	Measured	Target	Delta (%)
2B	5/18/2023	5250	Head	5250	34.57	35.93	-3.79	4.55	4.70	-3.24
				5150	34.77	36.05	-3.54	4.44	4.60	-3.43
				5350	34.37	35.82	-4.05	4.66	4.80	-3.03
2B	5/19/2023	5600	Head	5600	34.01	35.53	-4.29	4.95	5.06	-2.24
				5500	34.19	35.65	-4.09	4.83	4.96	-2.50
				5725	33.76	35.39	-4.61	5.10	5.19	-1.80
2B	5/23/2023	5250	Head	5250	36.04	35.93	0.30	4.67	4.70	-0.62
				5150	36.24	36.05	0.53	4.56	4.60	-0.93
				5350	35.84	35.82	0.06	4.79	4.80	-0.28
2B	5/23/2023	5600	Head	5600	35.40	35.53	-0.38	5.08	5.06	0.39
				5500	35.59	35.65	-0.16	4.96	4.96	0.04
				5725	35.15	35.39	-0.68	5.24	5.19	0.96
2B	5/25/2023	5250	Head	5250	36.00	35.93	0.19	4.69	4.70	-0.24
				5150	36.20	36.05	0.42	4.58	4.60	-0.52
				5350	35.80	35.82	-0.05	4.81	4.80	0.05
2B	5/25/2023	5750	Head	5750	35.07	35.36	-0.83	5.28	5.21	1.27
				5700	35.15	35.42	-0.76	5.22	5.16	1.02
				5850	34.89	35.30	-1.16	5.40	5.32	1.43
2B	5/30/2023	5250	Head	5250	36.66	35.93	2.02	4.72	4.70	0.32
				5150	36.85	36.05	2.23	4.60	4.60	0.00
				5350	36.46	35.82	1.79	4.83	4.80	0.57
2B	5/31/2023	750	Head	750	42.57	41.96	1.45	0.92	0.89	2.78
				660	42.87	42.42	1.05	0.89	0.89	0.16
				850	42.30	41.50	1.93	0.95	0.92	4.34
2B	5/31/2023	1750	Head	1750	40.52	40.08	1.09	1.39	1.37	1.24
				1710	40.58	40.15	1.08	1.36	1.35	1.16
				1755	40.52	40.08	1.11	1.39	1.37	1.18
2B	6/5/2023	750	Head	750	43.16	41.96	2.86	0.92	0.89	2.87
				660	43.39	42.42	2.28	0.89	0.89	0.28
				850	42.89	41.50	3.35	0.95	0.92	4.20
2B	6/7/2023	1750	Head	1750	40.13	40.08	0.11	1.37	1.37	-0.22
				1710	40.17	40.15	0.06	1.34	1.35	-0.33
				1780	40.05	40.04	0.03	1.38	1.39	-0.43
2B	6/7/2023	1900	Head	1900	39.89	40.00	-0.27	1.45	1.40	3.86
				1850	39.98	40.00	-0.05	1.42	1.40	1.43
				1920	39.88	40.00	-0.30	1.47	1.40	4.79
2B	6/12/2023	1900	Head	1900	38.33	40.00	-4.18	1.47	1.40	4.71
				1850	38.44	40.00	-3.90	1.43	1.40	2.43
				1920	38.32	40.00	-4.20	1.48	1.40	5.57
2B	6/12/2023	2600	Head	2600	37.32	39.01	-4.33	1.95	1.96	-0.82
				2495	37.48	39.14	-4.25	1.86	1.85	0.83
				2690	37.19	38.90	-4.39	2.02	2.06	-2.06

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 \pm 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 \geq 15.0 cm for SAR measurements \leq 3 GHz and \geq 10.0 cm for measurements $>$ 3 GHz.
- The DASY system with an E-Field Probe was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 (below 3 GHz) and/or 8x8x7 (above 3 GHz) fine cube was chosen for the cube.
- Distance between probe sensors and phantom surface was set to 3 mm.
For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.5 mm
- The dipole input power (forward power) was 50 mW.
- The results are normalized to 1 W input power.

System Check Results

The 1-g and 10-g SAR measured with a reference dipole, using the required tissue-equivalent medium at the test frequency, must be within $\pm 10\%$ of the manufacturer calibrated dipole SAR target. Refer to Appendix B for the SAR System Check Plots.

SAR Lab	Date	Tissue Type	Dipole Type_Serial #	Dipole Cal. Due Data	Dipole Power (dBm)	Measured Results for 1g SAR				Measured Results for 10g SAR				Plot No.
						Zoom Scan	Normalize to 1 W	Target (Ref. Value)	Delta $\pm 10\%$	Zoom Scan	Normalize to 1 W	Target (Ref. Value)	Delta $\pm 10\%$	
1A	5/10/2023	Head	D2450V2 SN: 963	10/18/2023	17.00	2.820	56.27	52.40	7.38	1.320	26.34	24.50	7.50	1
1A	5/15/2023	Head	D2450V2 SN: 963	10/18/2023	17.00	2.730	54.47	52.40	3.95	1.280	25.54	24.50	4.24	
1A	5/15/2023	Head	D5GHzV2 SN: 1213 (5.25 GHz)	10/11/2023	17.00	4.120	82.20	79.40	3.53	1.180	23.54	22.70	3.72	2
1A	5/26/2023	Head	D5GHzV2 SN: 1213 (5.25 GHz)	10/11/2023	17.00	3.930	78.41	79.40	-1.24	1.130	22.55	22.70	-0.68	
1A	5/30/2023	Head	D5GHzV2 SN: 1213 (5.25 GHz)	10/11/2023	17.00	3.930	78.41	79.40	-1.24	1.120	22.35	22.70	-1.56	
1A	5/30/2023	Head	D2600V2 SN: 1104	10/21/2023	17.00	2.680	53.47	56.70	-5.69	1.210	24.14	25.30	-4.57	3
1A	6/5/2023	Head	D1900V2 SN: 5d202	10/12/2023	17.00	1.930	38.51	39.20	-1.76	1.010	20.15	20.40	-1.21	4
1A	7/10/2023	Head	D750V3 SN: 1139	10/12/2023	17.00	0.430	8.58	8.51	0.82	0.281	5.61	5.58	0.48	5
2A	5/16/2023	Head	D5GHzV2 SN: 1213 (5.60 GHz)	10/11/2023	17.00	4.120	82.20	82.40	-0.24	1.170	23.34	23.50	-0.66	6
2A	5/16/2023	Head	D5GHzV2 SN: 1213 (5.75 GHz)	10/11/2023	17.00	3.600	71.83	78.80	-8.85	1.020	20.35	22.40	-9.14	7
2A	5/16/2023	Head	D5GHzV2 SN: 1213 (5.85 GHz)	10/11/2023	17.00	3.860	77.02	81.40	-5.38	1.080	21.55	23.10	-6.72	8
2A	5/22/2023	Head	D2450V2 SN: 963	10/18/2023	17.00	2.620	52.28	52.40	-0.24	1.220	24.34	24.50	-0.64	9
2A	5/26/2023	Head	D1750V2 SN: 1136	10/17/2023	17.00	1.760	35.12	36.10	-2.72	0.935	18.66	19.10	-2.33	10
2A	5/31/2023	Head	D1900V2 SN: 5d202	10/12/2023	17.00	1.980	39.51	39.20	0.78	1.030	20.55	20.40	0.74	
2A	6/5/2023	Head	D2600V2 SN: 1104	10/21/2023	17.00	2.660	53.07	56.70	-6.40	1.210	24.14	25.30	-4.57	11
2A	6/14/2023	Head	D2600V2 SN: 1104	10/21/2023	17.00	2.860	57.06	56.70	0.64	1.300	25.94	25.30	2.52	
2A	7/7/2023	Head	D1900V2 SN: 5d202	10/12/2023	17.00	2.050	40.90	39.2	4.34	1.07	21.35	20.4	4.65	12
2A	7/10/2023	Head	D2600V2 SN: 1104	10/21/2023	17.00	2.800	55.87	56.7	-1.47	1.27	25.34	25.3	0.16	
2B	5/18/2023	Head	D5GHzV2 SN: 1213 (5.25 GHz)	10/11/2023	17.00	3.820	76.22	79.40	-4.01	1.100	21.95	22.70	-3.31	
2B	5/19/2023	Head	D5GHzV2 SN: 1213 (5.60 GHz)	10/11/2023	17.00	4.250	84.80	82.40	2.91	1.200	23.94	23.50	1.89	
2B	5/23/2023	Head	D5GHzV2 SN: 1213 (5.25 GHz)	10/11/2023	17.00	3.600	71.83	79.40	-9.53	1.030	20.55	22.70	-9.47	13
2B	5/23/2023	Head	D5GHzV2 SN: 1213 (5.60 GHz)	10/11/2023	17.00	4.040	80.61	82.40	-2.17	1.140	22.75	23.50	-3.21	14
2B	5/25/2023	Head	D5GHzV2 SN: 1213 (5.25 GHz)	10/11/2023	17.00	3.770	75.22	79.40	-5.26	1.080	21.55	22.70	-5.07	
2B	5/25/2023	Head	D5GHzV2 SN: 1213 (5.75 GHz)	10/11/2023	17.00	3.640	72.63	78.80	-7.83	1.030	20.55	22.40	-8.25	15
2B	5/30/2023	Head	D5GHzV2 SN: 1213 (5.25 GHz)	10/11/2023	17.00	3.740	74.62	79.40	-6.02	1.070	21.35	22.70	-5.95	
2B	5/31/2023	Head	D750V3 SN: 1139	10/12/2023	17.00	0.423	8.44	8.51	-0.82	0.276	5.51	5.58	-1.31	
2B	5/31/2023	Head	D1750V2 SN: 1136	10/17/2023	17.00	1.750	34.92	36.10	-3.28	0.931	18.58	19.10	-2.74	16
2B	6/5/2023	Head	D750V3 SN: 1139	10/12/2023	17.00	0.415	8.28	8.51	-2.70	0.271	5.41	5.58	-3.10	17
2B	6/7/2023	Head	D1750V2 SN: 1136	10/17/2023	17.00	1.770	35.32	36.10	-2.17	0.936	18.68	19.10	-2.22	
2B	6/7/2023	Head	D1900V2 SN: 5d202	10/12/2023	17.00	1.990	39.71	39.20	1.29	1.020	20.35	20.40	-0.24	
2B	6/12/2023	Head	D1900V2 SN: 5d202	10/12/2023	17.00	2.050	40.90	39.20	4.34	1.050	20.95	20.40	2.70	18
2B	6/12/2023	Head	D2600V2 SN: 1104	10/21/2023	17.00	2.780	55.47	56.70	-2.17	1.240	24.74	25.30	-2.21	19

9. Conducted Output Power Measurements

Tune-Up Power Limits provided by the manufacturer are used to scale measured SAR values.

9.1. W-CDMA

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

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

Release 99 Setup Procedures used to establish the test signals

The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1. A summary of these settings is illustrated below:

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

HSDPA Setup Procedures used to establish the test signals

The following 4 Sub-tests were completed according to procedures in table C.10.1.4 of 3GPP TS 34.121-1. A summary of these settings is illustrated below:

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

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

Note 1: Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 30/15$ with $\beta_{HS} = 30/15 * \beta_c$.

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

Note 3: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{HS}/\beta_c = 24/15$. For all other combinations of DPDCCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

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

HSUPA Setup Procedures used to establish the test signals

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

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

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note 1)	β_{ec}	β_{ed} (Note 4) (Note 5)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2) (Note 6)	AG Index (Note 5)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/25	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1} : 47/15 β_{ed2} : 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	0	-	-	5/15	5/15	47/15	4	1	1.0	0.0	12	67

Note 1: For sub-test 1 to 4, Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 30/15$ with $\beta_{HS} = 30/15 * \beta_c$. For sub-test 5, Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 5/15$ with $\beta_{HS} = 5/15 * \beta_c$.

Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{HS}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

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

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

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

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

DC-HSDPA Setup Procedures used to establish the test signals

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

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

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

HSPA+ Setup Procedures used to establish the test signals

The following 1 Sub-test was completed according to procedures in table C.11.1.4 of 3GPP TS34.121. A summary of these settings is illustrated below:

Table C.11.1.4: β values for transmitter characteristics tests with HS-DPCCH and E-DCH with 16QAM

Sub-test	β_c (Note 3)	β_d	β_{HS} (Note 1)	β_{ec}	β_{ed} (2xSF2) (Note 4)	β_{ed} (2xSF4) (Note 4)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 4)	E-TFCI (Note 5)	E-TFCI (boost)
1	1	0	30/15	30/15	β_{ed1} : 30/15 β_{ed2} : 30/15	β_{ed3} : 24/15 β_{ed4} : 24/15	3.5	2.5	14	105	105

Note 1: Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 30/15$ with $\beta_{HS} = 30/15 * \beta_c$.

Note 2: CM = 3.5 and the MPR is based on the relative CM difference, $MPR = \text{MAX}(CM-1,0)$.

Note 3: DPDCH is not configured, therefore the β_c is set to 1 and $\beta_d = 0$ by default.

Note 4: β_{ed} can not be set directly; it is set by Absolute Grant Value.

Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signalled to use the extrapolation algorithm.

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

SAR measurement is not required for the HSDPA, HSUPA, DC-HSDPA and HSPA+. When primary mode and the adjusted SAR is ≤ 1.2 W/kg and secondary mode is $\leq \frac{1}{4}$ dB higher than the primary mode

Mode	Band	Bandwidth	Tx Frequency	Max Tolerance (dBm)
	B5	All Supported	826.4 MHz	24.5
	B5	All Supported	836.6 MHz	24.5
	B5	All Supported	846.6 MHz	24.5
	B2	All Supported	1852.4 MHz	24.3
	B2	All Supported	1880 MHz	24.4
	B2	All Supported	1907.6 MHz	24.4
FDD HB	B4	All Supported	1712.4 MHz	24.3
	B4	All Supported	1732.6 MHz	24.4
	B4	All Supported	1752.6 MHz	24.4

W-CDMA Band II Measured Results

Mode		UL Ch No.	Freq. (MHz)	Maximum Average Power (dBm)		
				Measured Power	MPR	Tune-up Limit
Release 99	Rel 99 (RMC, 12.2 kbps)	9262	1852.4	23.3	N/A	24.3
		9400	1880.0	23.8	N/A	24.4
		9538	1907.6	23.3	N/A	24.4
HSDPA	Subtest 1	9262	1852.4	22.3	0	23.3
		9400	1880.0	22.8	0	23.5
		9538	1907.6	22.3	0	23.5
	Subtest 2	9262	1852.4	22.3	0	23.3
		9400	1880.0	22.8	0	23.5
		9538	1907.6	22.3	0	23.5
	Subtest 3	9262	1852.4	21.8	0.5	22.8
		9400	1880.0	22.3	0.5	23.0
		9538	1907.6	21.8	0.5	23.0
	Subtest 4	9262	1852.4	21.8	0.5	22.8
		9400	1880.0	22.3	0.5	23.0
		9538	1907.6	21.8	0.5	23.0
HSUPA	Subtest 1	9262	1852.4	22.4	0	23.3
		9400	1880.0	22.9	0	23.5
		9538	1907.6	22.3	0	23.5
	Subtest 2	9262	1852.4	20.4	2	21.3
		9400	1880.0	20.9	2	21.5
		9538	1907.6	20.4	2	21.5
	Subtest 3	9262	1852.4	21.3	1	22.3
		9400	1880.0	21.9	1	22.5
		9538	1907.6	21.3	1	22.5
	Subtest 4	9262	1852.4	20.4	2	21.3
		9400	1880.0	20.3	2	21.5
		9538	1907.6	20.2	2	21.5
	Subtest 5	9262	1852.4	22.3	0	23.3
		9400	1880.0	22.8	0	23.5
		9538	1907.6	22.2	0	23.5
DC-HSDPA	Subtest 1	9262	1852.4	22.3	0	23.3
		9400	1880.0	22.9	0	23.5
		9538	1907.6	22.3	0	23.5
	Subtest 2	9262	1852.4	22.4	0	23.3
		9400	1880.0	22.9	0	23.5
		9538	1907.6	22.3	0	23.5
	Subtest 3	9262	1852.4	21.9	0.5	22.8
		9400	1880.0	22.4	0.5	23.0
		9538	1907.6	21.8	0.5	23.0
	Subtest 4	9262	1852.4	21.8	0.5	22.8
		9400	1880.0	22.3	0.5	23.0
		9538	1907.6	21.8	0.5	23.0
HSPA+	Subtest 1	9262	1852.4	20.4	2.5	20.8
		9400	1880.0	20.9	2.5	21.0
		9538	1907.6	20.4	2.5	21.0

W-CDMA Band IV Measured Results

Mode		UL Ch No.	Freq. (MHz)	Maximum Average Power (dBm)		
				Measured Power	MPR	Tune-up Limit
Release 99	Rel 99 (RMC, 12.2 kbps)	1312	1712.4	23.7	N/A	24.3
		1413	1732.6	23.7	N/A	24.4
		1513	1752.6	23.3	N/A	24.4
HSDPA	Subtest 1	1312	1712.4	22.7	0	23.3
		1413	1732.6	22.6	0	23.4
		1513	1752.6	22.3	0	23.4
	Subtest 2	1312	1712.4	22.7	0	23.3
		1413	1732.6	22.6	0	23.4
		1513	1752.6	22.3	0	23.4
	Subtest 3	1312	1712.4	22.2	0.5	22.8
		1413	1732.6	22.1	0.5	22.9
		1513	1752.6	21.8	0.5	22.9
	Subtest 4	1312	1712.4	22.2	0.5	22.8
		1413	1732.6	22.1	0.5	22.9
		1513	1752.6	21.8	0.5	22.9
HSUPA	Subtest 1	1312	1712.4	22.6	0	23.3
		1413	1732.6	22.6	0	23.4
		1513	1752.6	22.3	0	23.4
	Subtest 2	1312	1712.4	20.8	2	21.3
		1413	1732.6	20.7	2	21.4
		1513	1752.6	20.4	2	21.4
	Subtest 3	1312	1712.4	21.8	1	22.3
		1413	1732.6	21.7	1	22.4
		1513	1752.6	21.4	1	22.4
	Subtest 4	1312	1712.4	20.8	2	21.3
		1413	1732.6	20.8	2	21.4
		1513	1752.6	20.4	2	21.4
	Subtest 5	1312	1712.4	22.8	0	23.3
		1413	1732.6	22.7	0	23.4
		1513	1752.6	22.4	0	23.4
DC-HSDPA	Subtest 1	1312	1712.4	22.7	0	23.3
		1413	1732.6	22.6	0	23.4
		1513	1752.6	22.3	0	23.4
	Subtest 2	1312	1712.4	22.7	0	23.3
		1413	1732.6	22.6	0	23.4
		1513	1752.6	22.3	0	23.4
	Subtest 3	1312	1712.4	22.2	0.5	22.8
		1413	1732.6	22.1	0.5	22.9
		1513	1752.6	21.8	0.5	22.9
	Subtest 4	1312	1712.4	22.1	0.5	22.8
		1413	1732.6	22.1	0.5	22.9
		1513	1752.6	21.8	0.5	22.9
HSPA+	Subtest 1	1312	1712.4	20.7	2.5	20.8
		1413	1732.6	20.7	2.5	20.9
		1513	1752.6	20.3	2.5	20.9

W-CDMA Band V Measured Results

Mode		UL Ch No.	Freq. (MHz)	Maximum Average Power (dBm)		
				Measured Power	MPR	Tune-up Limit
Release 99	Rel 99 (RMC, 12.2 kbps)	4132	826.4	22.6	N/A	24.5
		4183	836.6	23.2	N/A	24.5
		4233	846.6	23.2	N/A	24.5
HSDPA	Subtest 1	4132	826.4	21.7	0	23.5
		4183	836.6	22.2	0	23.5
		4233	846.6	22.2	0	23.5
	Subtest 2	4132	826.4	21.6	0	23.5
		4183	836.6	22.1	0	23.5
		4233	846.6	22.2	0	23.5
	Subtest 3	4132	826.4	21.2	0.5	23.0
		4183	836.6	21.7	0.5	23.0
		4233	846.6	21.7	0.5	23.0
	Subtest 4	4132	826.4	21.2	0.5	23.0
		4183	836.6	21.7	0.5	23.0
		4233	846.6	21.7	0.5	23.0
HSUPA	Subtest 1	4132	826.4	21.7	0	23.5
		4183	836.6	22.2	0	23.5
		4233	846.6	22.2	0	23.5
	Subtest 2	4132	826.4	19.6	2	21.5
		4183	836.6	20.2	2	21.5
		4233	846.6	20.2	2	21.5
	Subtest 3	4132	826.4	20.7	1	22.5
		4183	836.6	21.2	1	22.5
		4233	846.6	21.2	1	22.5
	Subtest 4	4132	826.4	19.7	2	21.5
		4183	836.6	20.2	2	21.5
		4233	846.6	20.2	2	21.5
	Subtest 5	4132	826.4	21.7	0	23.5
		4183	836.6	22.2	0	23.5
		4233	846.6	22.2	0	23.5
DC-HSDPA	Subtest 1	4132	826.4	21.7	0	23.5
		4183	836.6	22.2	0	23.5
		4233	846.6	22.2	0	23.5
	Subtest 2	4132	826.4	21.7	0	23.5
		4183	836.6	22.2	0	23.5
		4233	846.6	22.2	0	23.5
	Subtest 3	4132	826.4	21.2	0.5	23.0
		4183	836.6	21.7	0.5	23.0
		4233	846.6	21.7	0.5	23.0
	Subtest 4	4132	826.4	21.2	0.5	23.0
		4183	836.6	21.7	0.5	23.0
		4233	846.6	21.7	0.5	23.0
HSPA+	Subtest 1	4132	826.4	19.6	2.5	21.0
		4183	836.6	20.1	2.5	21.0
		4233	846.6	20.2	2.5	21.0

9.2. LTE

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

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

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3

Modulation	Channel bandwidth / Transmission bandwidth (N _{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3
256 QAM	≥ 1						≤ 5

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS_01".

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

Network Signalling value	Requirements (subclause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N _{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	N/A

Maximum Output Power (Tune-up Limit) for LTE

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

- a) The maximum output power, including tolerance, for the smaller band must be ≤ the larger band to qualify for the SAR test exclusion.
- b) The channel bandwidth and other operating parameters for the smaller band must be fully supported by the larger band.
 - LTE Band 5 (824-849 MHz) is covered by LTE Band 26 (814-849 MHz)
 - LTE Band 17 (704-716 MHz) is covered by LTE Band 12 (699-716 MHz)
 - LTE Band 38 (2570 MHz – 2620 MHz) is covered by LTE Band 41 (2506 MHz – 2680 MHz)

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

SAR measurement is not required for the 16QAM or 64QAM. When the highest maximum output power for 16QAM, 64QAM, and 256QAM is ≤ ½ dB higher than the QPSK or when the reported SAR for the QPSK configuration is ≤ 1.45 W/kg.

Mode	Band	Bandwidth	Tx Frequency	Max Tolerance (dBm)
FDD LB	B71	All Supported	665.5 MHz	24.3
	B71	All Supported	680.5 MHz	24.5
	B71	All Supported	695.5 MHz	24.8
	B12	All Supported	699.7 MHz	24.6
	B12	All Supported	707.5 MHz	24.3
	B12	All Supported	715.3 MHz	24.5
	B17	All Supported	706.5 MHz	24.6
	B17	All Supported	710 MHz	24.6
	B17	All Supported	713.5 MHz	24.6
	B5/26	All Supported	814.7 MHz	24.2
	B5/26	All Supported	831.5 MHz	24.4
	B5/26	All Supported	848.3 MHz	24.8
FDD MB	B66	All Supported	1710.7 MHz	24.3
	B66	All Supported	1745 MHz	24.2
	B66	All Supported	1779.3 MHz	24.3
	B2	All Supported	1850.7 MHz	24.8
	B2	All Supported	1880 MHz	24.6
	B2	All Supported	1909.3 MHz	24.8
FDD HB	B7	All Supported	2502.5 MHz	24.7
	B7	All Supported	2535 MHz	24.8
	B7	All Supported	2567.5 MHz	24.2
TDD HB	B38	All Supported	2502.5 MHz	24.4
	B38	All Supported	2535 MHz	24.4
	B38	All Supported	2567.5 MHz	24.6
TDD MB/IB (PC3)	B41	20 MHz	2506 MHz	24.0
	B41	All Other BW	2506 MHz	24.5
	B41	All Supported	2549.5 MHz	24.5
	B41	All Supported	2593 MHz	24.5
	B41	All Supported	2636.5 MHz	24.5
	B41	All Supported	2680 MHz	25.0
TDD MB/IB	B41	20 MHz	2506 MHz	25.9
	B41	All Other BW	2506 MHz	26.7
	B41	All Supported	2549.5 MHz	26.3
(PC2) HPUE	B41	All Supported	2593 MHz	26.3
	B41	All Supported	2636.5 MHz	26.3
	B41	All Supported	2680 MHz	26.9

LTE Band 2 Measured Results

BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)						MPR
				18700		18900		19100		
				1860 MHz		1880 MHz		1900 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
20 MHz	QPSK	1	0	23.8	24.8	24.2	24.6	24.2	24.8	0
		1	49	24.0	24.8	24.3	24.6	24.0	24.8	0
		1	99	24.2	24.8	24.2	24.6	23.9	24.8	0
		50	0	23.1	23.8	23.3	23.6	23.1	23.8	1
		50	24	23.1	23.8	23.4	23.6	23.0	23.8	1
		50	50	23.2	23.8	23.4	23.6	23.0	23.8	1
		100	0	23.1	23.8	23.3	23.6	23.0	23.8	1
	16QAM	1	0	23.4	23.8	23.6	23.6	23.4	23.8	1
		1	49	23.6	23.8	23.6	23.6	23.3	23.8	1
		1	99	23.8	23.8	23.6	23.6	23.2	23.8	1
		50	0	22.2	22.8	22.4	22.6	22.1	22.8	2
		50	24	22.3	22.8	22.5	22.6	22.1	22.8	2
		50	50	22.3	22.8	22.5	22.6	22.0	22.8	2
		100	0	22.2	22.8	22.4	22.6	22.1	22.8	2
	64QAM	1	0	22.3	22.8	22.6	22.6	22.7	22.8	2
		1	49	22.4	22.8	22.5	22.6	22.6	22.8	2
		1	99	22.7	22.8	22.6	22.6	22.5	22.8	2
		50	0	21.2	22.8	21.5	22.6	21.2	22.8	2
		50	24	21.3	22.8	21.6	22.6	21.2	22.8	2
		50	50	21.4	22.8	21.6	22.6	21.1	22.8	2
		100	0	21.2	21.8	21.5	21.6	21.1	21.8	3
BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)						MPR
				18675		18900		19125		
				1857.5 MHz		1880 MHz		1902.5 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
15 MHz	QPSK	1	0	23.9	24.8	24.3	24.6	24.0	24.8	0
		1	37	24.1	24.8	24.5	24.6	24.0	24.8	0
		1	74	24.2	24.8	24.4	24.6	23.9	24.8	0
		36	0	23.1	23.8	23.3	23.6	23.0	23.8	1
		36	20	23.1	23.8	23.4	23.6	23.0	23.8	1
		36	39	23.1	23.8	23.4	23.6	23.0	23.8	1
		75	0	23.1	23.8	23.4	23.6	23.0	23.8	1
	16QAM	1	0	23.2	23.8	23.6	23.6	23.3	23.8	1
		1	37	23.4	23.8	23.6	23.6	23.3	23.8	1
		1	74	23.5	23.8	23.2	23.6	23.1	23.8	1
		36	0	22.1	22.8	22.4	22.6	22.0	22.8	2
		36	20	22.1	22.8	22.4	22.6	22.1	22.8	2
		36	39	22.2	22.8	22.5	22.6	22.0	22.8	2
		75	0	22.2	22.8	22.5	22.6	22.1	22.8	2
	64QAM	1	0	22.1	22.8	22.5	22.6	22.1	22.8	2
		1	37	22.2	22.8	22.5	22.6	22.1	22.8	2
		1	74	22.3	22.8	22.5	22.6	22.0	22.8	2
		36	0	21.2	21.8	21.4	21.6	21.1	21.8	3
		36	20	21.3	21.8	21.5	21.6	21.2	21.8	3
		36	39	21.4	21.8	21.5	21.6	21.1	21.8	3
		75	0	21.3	21.8	21.5	21.6	21.1	21.8	3

LTE Band 2 Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)						MPR
				18650		18900		19150		
				1855 MHz		1880 MHz		1905 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
10 MHz	QPSK	1	0	23.9	24.8	24.3	24.6	24.0	24.8	0
		1	25	23.9	24.8	24.3	24.6	23.9	24.8	0
		1	49	24.1	24.8	24.3	24.6	23.9	24.8	0
		25	0	23.0	23.8	23.3	23.6	23.1	23.8	1
		25	12	23.2	23.8	23.4	23.6	23.0	23.8	1
		25	25	23.1	23.8	23.4	23.6	23.0	23.8	1
	16QAM	50	0	23.1	23.8	23.4	23.6	23.0	23.8	1
		1	0	23.0	23.8	23.4	23.6	23.0	23.8	1
		1	25	23.0	23.8	23.4	23.6	23.0	23.8	1
		1	49	23.1	23.8	23.4	23.6	22.8	23.8	1
		25	0	22.2	22.8	22.6	22.6	22.2	22.8	2
		25	12	22.3	22.8	22.6	22.6	22.2	22.8	2
	64QAM	25	25	22.3	22.8	22.6	22.6	22.2	22.8	2
		50	0	22.2	22.8	22.6	22.6	22.1	22.8	2
		1	0	22.1	22.8	22.5	22.6	22.4	22.8	2
		1	25	22.1	22.8	22.6	22.6	22.3	22.8	2
		1	49	22.3	22.8	22.6	22.6	22.2	22.8	2
		25	0	21.2	21.8	21.6	21.6	21.2	21.8	3
5 MHz	QPSK	25	12	21.3	21.8	21.5	21.6	21.2	21.8	3
		25	25	21.3	21.8	21.5	21.6	21.2	21.8	3
		50	0	21.3	21.8	21.6	21.6	21.1	21.8	3
		1	0	23.9	24.8	24.4	24.6	23.9	24.8	0
		1	12	24.0	24.8	24.5	24.6	23.9	24.8	0
		1	24	24.0	24.8	24.4	24.6	23.8	24.8	0
	16QAM	12	0	23.0	23.8	23.4	23.6	22.8	23.8	1
		12	7	23.0	23.8	23.4	23.6	22.9	23.8	1
		12	13	23.0	23.8	23.4	23.6	22.8	23.8	1
		25	0	23.0	23.8	23.4	23.6	22.8	23.8	1
		1	0	23.0	23.8	23.5	23.6	22.8	23.8	1
		1	12	23.0	23.8	23.5	23.6	22.9	23.8	1
	64QAM	1	24	23.1	23.8	23.5	23.6	22.8	23.8	1
		12	0	22.1	22.8	22.5	22.6	22.0	22.8	2
		12	7	22.1	22.8	22.6	22.6	22.0	22.8	2
		12	13	22.1	22.8	22.6	22.6	22.0	22.8	2
		25	0	22.0	22.8	22.4	22.6	21.9	22.8	2
		1	0	22.3	22.8	22.4	22.6	22.1	22.8	2
64QAM	1	12	22.3	22.8	22.4	22.6	22.2	22.8	2	
	1	24	22.3	22.8	22.5	22.6	22.1	22.8	2	
	12	0	21.0	21.8	21.6	21.6	21.1	21.8	3	
	12	7	21.1	21.8	21.6	21.6	21.1	21.8	3	
	12	13	21.1	21.8	21.6	21.6	21.1	21.8	3	
	25	0	21.1	21.8	21.6	21.6	21.1	21.8	3	

LTE Band 2 Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)						MPR
				18615		18900		19185		
				1851.5 MHz		1880 MHz		1908.5 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
3 MHz	QPSK	1	0	23.9	24.8	24.3	24.6	23.8	24.8	0
		1	8	24.0	24.8	24.3	24.6	23.9	24.8	0
		1	14	23.9	24.8	24.2	24.6	23.8	24.8	0
		8	0	23.0	23.8	23.3	23.6	22.8	23.8	1
		8	4	23.0	23.8	23.3	23.6	22.9	23.8	1
		8	7	23.0	23.8	23.4	23.6	22.9	23.8	1
		15	0	22.9	23.8	23.4	23.6	22.9	23.8	1
	16QAM	1	0	23.0	23.8	23.4	23.6	22.8	23.8	1
		1	8	23.0	23.8	23.5	23.6	22.9	23.8	1
		1	14	23.0	23.8	23.4	23.6	22.8	23.8	1
		8	0	22.0	22.8	22.5	22.6	22.0	22.8	2
		8	4	22.1	22.8	22.5	22.6	22.0	22.8	2
		8	7	22.1	22.8	22.5	22.6	22.0	22.8	2
		15	0	22.0	22.8	22.4	22.6	21.9	22.8	2
	64QAM	1	0	22.2	22.8	22.6	22.6	22.0	22.8	2
		1	8	22.3	22.8	22.5	22.6	22.1	22.8	2
		1	14	22.2	22.8	22.6	22.6	22.0	22.8	2
		8	0	21.0	21.8	21.4	21.6	21.0	21.8	3
		8	4	21.0	21.8	21.4	21.6	21.1	21.8	3
		8	7	21.1	21.8	21.5	21.6	21.0	21.8	3
		15	0	21.1	21.8	21.5	21.6	21.0	21.8	3
BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)						MPR
				18607		18900		19193		
				1850.7 MHz		1880 MHz		1909.3 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
1.4 MHz	QPSK	1	0	23.8	24.8	24.2	24.6	23.8	24.8	0
		1	3	23.8	24.8	24.3	24.6	23.8	24.8	0
		1	5	23.8	24.8	24.3	24.6	23.7	24.8	0
		3	0	23.8	24.8	24.3	24.6	23.6	24.8	0
		3	1	23.9	24.8	24.4	24.6	23.8	24.8	0
		3	3	23.9	24.8	24.4	24.6	23.7	24.8	0
		6	0	22.9	23.8	23.3	23.6	22.8	23.8	1
	16QAM	1	0	22.9	23.8	23.3	23.6	22.7	23.8	1
		1	3	22.9	23.8	23.4	23.6	22.8	23.8	1
		1	5	22.9	23.8	23.4	23.6	22.7	23.8	1
		3	0	23.1	23.8	23.6	23.6	22.9	23.8	1
		3	1	23.2	23.8	23.6	23.6	23.0	23.8	1
		3	3	23.2	23.8	23.3	23.6	23.0	23.8	1
		6	0	22.2	22.8	22.6	22.6	22.0	22.8	2
	64QAM	1	0	22.1	22.8	22.5	22.6	21.9	22.8	2
		1	3	22.2	22.8	22.6	22.6	22.0	22.8	2
		1	5	22.1	22.8	22.6	22.6	21.9	22.8	2
		3	0	22.0	22.8	22.4	22.6	21.8	22.8	2
		3	1	22.0	22.8	22.5	22.6	21.9	22.8	2
		3	3	22.0	22.8	22.5	22.6	21.9	22.8	2
		6	0	21.1	21.8	21.5	21.6	20.9	21.8	3

LTE Band 7 Measured Results

BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)						MPR
				20850		21100		21350		
				2510 MHz		2535 MHz		2560 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
20 MHz	QPSK	1	0	24.2	24.7	24.0	24.8	23.7	24.2	0
		1	49	24.2	24.7	23.8	24.8	23.7	24.2	0
		1	99	24.1	24.7	23.8	24.8	23.7	24.2	0
		50	0	23.2	23.7	22.7	23.8	22.7	23.2	1
		50	24	23.0	23.7	22.8	23.8	22.7	23.2	1
		50	50	22.9	23.7	22.8	23.8	22.7	23.2	1
		100	0	23.0	23.7	22.8	23.8	22.7	23.2	1
	16QAM	1	0	23.5	23.7	23.2	23.8	23.0	23.2	1
		1	49	23.4	23.7	23.1	23.8	23.0	23.2	1
		1	99	23.3	23.7	23.1	23.8	23.0	23.2	1
		50	0	22.2	22.7	21.7	22.8	21.7	22.2	2
		50	24	22.1	22.7	21.8	22.8	21.8	22.2	2
		50	50	21.9	22.7	21.8	22.8	21.7	22.2	2
		100	0	22.1	22.7	21.8	22.8	21.8	22.2	2
	64QAM	1	0	22.5	22.7	22.2	22.8	21.9	22.2	2
		1	49	22.4	22.7	22.1	22.8	21.9	22.2	2
		1	99	22.2	22.7	22.2	22.8	21.9	22.2	2
		50	0	21.3	21.7	20.9	21.8	20.7	21.2	3
		50	24	21.3	21.7	21.0	21.8	20.8	21.2	3
		50	50	21.1	21.7	20.9	21.8	20.8	21.2	3
		100	0	21.2	21.7	20.9	21.8	20.7	21.2	3
BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)						MPR
				20825		21100		21375		
				2507.5 MHz		2535 MHz		2562.5 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
15 MHz	QPSK	1	0	24.1	24.7	23.9	24.8	23.7	24.2	0
		1	37	24.1	24.7	23.8	24.8	23.7	24.2	0
		1	74	24.1	24.7	23.8	24.8	23.8	24.2	0
		36	0	23.1	23.7	22.8	23.8	22.7	23.2	1
		36	20	23.1	23.7	22.8	23.8	22.7	23.2	1
		36	39	23.0	23.7	22.8	23.8	22.7	23.2	1
		75	0	23.0	23.7	22.7	23.8	22.7	23.2	1
	16QAM	1	0	23.4	23.7	23.2	23.8	23.0	23.2	1
		1	37	23.3	23.7	23.1	23.8	23.0	23.2	1
		1	74	23.3	23.7	23.1	23.8	23.0	23.2	1
		36	0	22.1	22.7	21.8	22.8	21.7	22.2	2
		36	20	22.1	22.7	21.8	22.8	21.7	22.2	2
		36	39	22.0	22.7	21.8	22.8	21.7	22.2	2
		75	0	22.0	22.7	21.8	22.8	21.7	22.2	2
	64QAM	1	0	22.4	22.7	22.4	22.8	21.9	22.2	2
		1	37	22.4	22.7	22.3	22.8	21.9	22.2	2
		1	74	22.3	22.7	22.4	22.8	21.9	22.2	2
		36	0	21.1	21.7	20.8	21.8	20.8	21.2	3
		36	20	21.2	21.7	20.8	21.8	20.8	21.2	3
		36	39	21.1	21.7	20.9	21.8	20.8	21.2	3
		75	0	21.0	21.7	20.9	21.8	20.8	21.2	3

LTE Band 7 Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)						MPR
				20800		21100		21400		
				2505 MHz		2535 MHz		2565 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
10 MHz	QPSK	1	0	24.3	24.7	24.0	24.8	23.6	24.2	0
		1	25	24.1	24.7	23.7	24.8	23.6	24.2	0
		1	49	24.2	24.7	23.7	24.8	23.7	24.2	0
		25	0	23.0	23.7	22.8	23.8	22.7	23.2	1
		25	12	23.1	23.7	22.8	23.8	22.7	23.2	1
		25	25	23.1	23.7	22.8	23.8	22.7	23.2	1
		50	0	23.0	23.7	22.8	23.8	22.6	23.2	1
	16QAM	1	0	23.2	23.7	22.9	23.8	22.7	23.2	1
		1	25	23.1	23.7	22.8	23.8	22.6	23.2	1
		1	49	23.1	23.7	22.8	23.8	22.6	23.2	1
		25	0	22.2	22.7	21.9	22.8	21.8	22.2	2
		25	12	22.2	22.7	21.9	22.8	21.8	22.2	2
		25	25	22.2	22.7	21.9	22.8	21.8	22.2	2
		50	0	22.2	22.7	21.8	22.8	21.8	22.2	2
	64QAM	1	0	22.4	22.7	22.3	22.8	21.9	22.2	2
		1	25	22.3	22.7	22.1	22.8	21.8	22.2	2
		1	49	22.3	22.7	22.0	22.8	21.8	22.2	2
		25	0	21.3	21.7	20.9	21.8	20.8	21.2	3
		25	12	21.3	21.7	21.0	21.8	20.8	21.2	3
		25	25	21.3	21.7	21.0	21.8	20.8	21.2	3
		50	0	21.3	21.7	20.9	21.8	20.7	21.2	3
BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)						MPR
				20775		21100		21425		
				2502.5 MHz		2535 MHz		2567.5 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
5 MHz	QPSK	1	0	24.4	24.7	23.9	24.8	23.7	24.2	0
		1	12	24.3	24.7	23.9	24.8	23.7	24.2	0
		1	24	24.2	24.7	23.8	24.8	23.7	24.2	0
		12	0	23.2	23.7	22.8	23.8	22.7	23.2	1
		12	7	23.3	23.7	22.8	23.8	22.7	23.2	1
		12	13	23.2	23.7	22.8	23.8	22.7	23.2	1
		25	0	23.0	23.7	22.8	23.8	22.7	23.2	1
	16QAM	1	0	23.3	23.7	22.9	23.8	22.8	23.2	1
		1	12	23.3	23.7	22.9	23.8	22.7	23.2	1
		1	24	23.2	23.7	22.9	23.8	22.8	23.2	1
		12	0	22.3	22.7	21.8	22.8	21.8	22.2	2
		12	7	22.3	22.7	21.9	22.8	21.8	22.2	2
		12	13	22.2	22.7	21.9	22.8	21.7	22.2	2
		25	0	22.1	22.7	21.9	22.8	21.7	22.2	2
	64QAM	1	0	22.5	22.7	22.0	22.8	21.9	22.2	2
		1	12	22.5	22.7	21.8	22.8	22.0	22.2	2
		1	24	22.4	22.7	21.8	22.8	21.9	22.2	2
		12	0	21.4	21.7	20.9	21.8	20.8	21.2	3
		12	7	21.4	21.7	20.9	21.8	20.8	21.2	3
		12	13	21.3	21.7	21.0	21.8	20.8	21.2	3
		25	0	21.2	21.7	20.9	21.8	20.7	21.2	3

LTE Band 12 Measured Results

BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)						MPR
				23060		23095		23130		
				704 MHz		707.5 MHz		711 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
10 MHz	QPSK	1	0	23.3	24.6	23.4	24.3	23.4	24.5	0
		1	25	23.4	24.6	23.5	24.3	23.5	24.5	0
		1	49	23.6	24.6	23.6	24.3	23.7	24.5	0
		25	0	22.4	23.6	22.5	23.3	22.5	23.5	1
		25	12	22.5	23.6	22.6	23.3	22.6	23.5	1
		25	25	22.6	23.6	22.5	23.3	22.5	23.5	1
		50	0	22.5	23.6	22.6	23.3	22.6	23.5	1
	16QAM	1	0	22.3	23.6	22.4	23.3	22.4	23.5	1
		1	25	22.3	23.6	22.5	23.3	22.6	23.5	1
		1	49	22.4	23.6	22.6	23.3	22.7	23.5	1
		25	0	21.5	22.6	21.5	22.3	21.6	22.5	2
		25	12	21.6	22.6	21.7	22.3	21.7	22.5	2
		25	25	21.6	22.6	21.6	22.3	21.7	22.5	2
		50	0	21.5	22.6	21.6	22.3	21.6	22.5	2
	64QAM	1	0	21.6	22.6	21.6	22.3	21.6	22.5	2
		1	25	21.6	22.6	21.7	22.3	21.8	22.5	2
		1	49	21.7	22.6	21.8	22.3	21.9	22.5	2
		25	0	20.6	21.6	20.6	21.3	20.7	21.5	3
		25	12	20.6	21.6	20.7	21.3	20.8	21.5	3
		25	25	20.7	21.6	20.7	21.3	20.7	21.5	3
		50	0	20.5	21.6	20.6	21.3	20.7	21.5	3
BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)						MPR
				23035		23095		23155		
				701.5 MHz		707.5 MHz		713.5 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
5 MHz	QPSK	1	0	23.3	24.6	23.5	24.3	23.6	24.5	0
		1	12	23.3	24.6	23.6	24.3	23.7	24.5	0
		1	24	23.5	24.6	23.7	24.3	23.8	24.5	0
		12	0	22.3	23.6	22.6	23.3	22.6	23.5	1
		12	7	22.5	23.6	22.6	23.3	22.7	23.5	1
		12	13	22.4	23.6	22.6	23.3	22.7	23.5	1
		25	0	22.4	23.6	22.5	23.3	22.7	23.5	1
	16QAM	1	0	22.5	23.6	22.6	23.3	22.8	23.5	1
		1	12	22.5	23.6	22.6	23.3	22.8	23.5	1
		1	24	22.5	23.6	22.8	23.3	22.9	23.5	1
		12	0	21.4	22.6	21.6	22.3	21.7	22.5	2
		12	7	21.5	22.6	21.7	22.3	21.8	22.5	2
		12	13	21.5	22.6	21.6	22.3	21.8	22.5	2
		25	0	21.4	22.6	21.5	22.3	21.7	22.5	2
	64QAM	1	0	21.6	22.6	21.7	22.3	21.9	22.5	2
		1	12	21.7	22.6	21.8	22.3	22.0	22.5	2
		1	24	21.7	22.6	21.9	22.3	22.0	22.5	2
		12	0	20.5	21.6	20.7	21.3	20.7	21.5	3
		12	7	20.6	21.6	20.7	21.3	20.8	21.5	3
		12	13	20.6	21.6	20.7	21.3	20.8	21.5	3
		25	0	20.5	21.6	20.6	21.3	20.8	21.5	3

LTE Band 12 Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)						MPR
				23025		23095		23165		
				700.5 MHz		707.5 MHz		714.5 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
3 MHz	QPSK	1	0	23.3	24.6	23.5	24.3	23.6	24.5	0
		1	8	23.4	24.6	23.7	24.3	23.7	24.5	0
		1	14	23.3	24.6	23.5	24.3	23.7	24.5	0
		8	0	22.4	23.6	22.6	23.3	22.7	23.5	1
		8	4	22.4	23.6	22.6	23.3	22.7	23.5	1
		8	7	22.4	23.6	22.6	23.3	22.7	23.5	1
	16QAM	15	0	22.3	23.6	22.6	23.3	22.7	23.5	1
		1	0	22.3	23.6	22.5	23.3	22.8	23.5	1
		1	8	22.4	23.6	22.6	23.3	22.8	23.5	1
		1	14	22.3	23.6	22.5	23.3	22.8	23.5	1
		8	0	21.5	22.6	21.6	22.3	21.7	22.5	2
		8	4	21.6	22.6	21.7	22.3	21.8	22.5	2
	64QAM	8	7	21.5	22.6	21.7	22.3	21.8	22.5	2
		15	0	21.5	22.6	21.5	22.3	21.7	22.5	2
		1	0	21.6	22.6	21.7	22.3	22.0	22.5	2
		1	8	21.7	22.6	21.8	22.3	22.0	22.5	2
		1	14	21.6	22.6	21.7	22.3	21.9	22.5	2
		8	0	20.4	21.6	20.6	21.3	20.7	21.5	3
1.4 MHz	QPSK	8	4	20.5	21.6	20.6	21.3	20.7	21.5	3
		8	7	20.4	21.6	20.6	21.3	20.7	21.5	3
		8	7	20.4	21.6	20.6	21.3	20.7	21.5	3
		15	0	20.5	21.6	20.7	21.3	20.7	21.5	3
		1	0	23.2	24.6	23.5	24.3	23.8	24.5	0
		1	3	23.2	24.6	23.6	24.3	23.8	24.5	0
	16QAM	1	5	23.3	24.6	23.5	24.3	23.7	24.5	0
		3	0	23.2	24.6	23.4	24.3	23.6	24.5	0
		3	1	23.2	24.6	23.5	24.3	23.7	24.5	0
		3	3	23.2	24.6	23.5	24.3	23.7	24.5	0
		6	0	22.3	23.6	22.6	23.3	22.7	23.5	1
		1	0	22.3	23.6	22.8	23.3	22.8	23.5	1
	64QAM	1	3	22.3	23.6	22.8	23.3	22.8	23.5	1
		1	5	22.4	23.6	22.8	23.3	22.8	23.5	1
		3	0	22.4	23.6	22.6	23.3	22.7	23.5	1
		3	1	22.5	23.6	22.7	23.3	22.8	23.5	1
		3	3	22.5	23.6	22.7	23.3	22.8	23.5	1
		6	0	21.5	22.6	21.5	22.3	21.8	22.5	2
64QAM	1	0	21.5	22.6	21.6	22.3	21.9	22.5	2	
	1	3	21.6	22.6	21.7	22.3	22.0	22.5	2	
	1	5	21.6	22.6	21.6	22.3	21.9	22.5	2	
	3	0	21.3	22.6	21.6	22.3	21.7	22.5	2	
	3	1	21.3	22.6	21.7	22.3	21.7	22.5	2	
	3	3	21.3	22.6	21.7	22.3	21.7	22.5	2	
6	0	20.5	21.6	20.9	21.3	20.9	21.5	3		

LTE Band 26 Measured Results

BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)						MPR
				26765		26865		26965		
				821.5 MHz		831.5 MHz		841.5 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
15 MHz	QPSK	1	0	23.0	24.2	23.2	24.4	23.3	24.8	0
		1	37	23.2	24.2	23.4	24.4	23.4	24.8	0
		1	74	23.4	24.2	23.4	24.4	23.4	24.8	0
		36	0	22.0	23.2	22.3	23.4	22.2	23.8	1
		36	20	22.1	23.2	22.3	23.4	22.3	23.8	1
		36	39	22.2	23.2	22.3	23.4	22.3	23.8	1
		75	0	22.1	23.2	22.3	23.4	22.2	23.8	1
	16QAM	1	0	22.4	23.2	22.5	23.4	22.8	23.8	1
		1	37	22.5	23.2	22.7	23.4	22.6	23.8	1
		1	74	22.6	23.2	22.9	23.4	22.9	23.8	1
		36	0	21.1	22.2	21.3	22.4	21.3	22.8	2
		36	20	21.2	22.2	21.4	22.4	21.4	22.8	2
		36	39	21.2	22.2	21.4	22.4	21.4	22.8	2
		75	0	21.2	22.2	21.4	22.4	21.4	22.8	2
	64QAM	1	0	21.6	22.2	21.3	22.4	21.7	22.8	2
		1	37	21.8	22.2	21.5	22.4	21.6	22.8	2
		1	74	21.9	22.2	21.6	22.4	21.8	22.8	2
		36	0	20.2	21.2	20.4	21.4	20.4	21.8	3
		36	20	20.2	21.2	20.5	21.4	20.4	21.8	3
		36	39	20.3	21.2	20.5	21.4	20.4	21.8	3
		75	0	20.3	21.2	20.4	21.4	20.3	21.8	3
BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)						MPR
				26740		26865		26990		
				819 MHz		831.5 MHz		844 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
10 MHz	QPSK	1	0	22.9	24.2	23.3	24.4	23.3	24.8	0
		1	25	23.0	24.2	23.3	24.4	23.4	24.8	0
		1	49	23.1	24.2	23.3	24.4	23.3	24.8	0
		25	0	22.1	23.2	22.3	23.4	22.3	23.8	1
		25	12	22.1	23.2	22.3	23.4	22.3	23.8	1
		25	25	22.1	23.2	22.3	23.4	22.4	23.8	1
		50	0	22.0	23.2	22.3	23.4	22.3	23.8	1
	16QAM	1	0	22.0	23.2	22.2	23.4	22.4	23.8	1
		1	25	22.1	23.2	22.4	23.4	22.4	23.8	1
		1	49	22.1	23.2	22.5	23.4	22.4	23.8	1
		25	0	21.2	22.2	21.5	22.4	21.4	22.8	2
		25	12	21.2	22.2	21.5	22.4	21.5	22.8	2
		25	25	21.3	22.2	21.5	22.4	21.5	22.8	2
		50	0	21.2	22.2	21.5	22.4	21.4	22.8	2
	64QAM	1	0	21.2	22.2	21.4	22.4	21.6	22.8	2
		1	25	21.3	22.2	21.5	22.4	21.5	22.8	2
		1	49	21.3	22.2	21.6	22.4	21.6	22.8	2
		25	0	20.3	21.2	20.5	21.4	20.5	21.8	3
		25	12	20.2	21.2	20.5	21.4	20.5	21.8	3
		25	25	20.3	21.2	20.5	21.4	20.6	21.8	3
		50	0	20.1	21.2	20.5	21.4	20.5	21.8	3

LTE Band 26 Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)						MPR
				26715		26865		27015		
				816.5 MHz		831.5 MHz		846.5 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
5 MHz	QPSK	1	0	23.0	24.2	23.3	24.4	23.5	24.8	0
		1	12	23.0	24.2	23.4	24.4	23.4	24.8	0
		1	24	23.1	24.2	23.4	24.4	23.4	24.8	0
		12	0	22.0	23.2	22.4	23.4	22.4	23.8	1
		12	7	22.0	23.2	22.4	23.4	22.4	23.8	1
		12	13	22.1	23.2	22.3	23.4	22.4	23.8	1
	16QAM	25	0	22.1	23.2	22.3	23.4	22.4	23.8	1
		1	0	22.1	23.2	22.4	23.4	22.5	23.8	1
		1	12	22.2	23.2	22.4	23.4	22.5	23.8	1
		1	24	22.3	23.2	22.5	23.4	22.6	23.8	1
		12	0	21.1	22.2	21.4	22.4	21.5	22.8	2
		12	7	21.1	22.2	21.4	22.4	21.6	22.8	2
	64QAM	12	13	21.2	22.2	21.4	22.4	21.5	22.8	2
		25	0	21.1	22.2	21.3	22.4	21.4	22.8	2
		1	0	21.3	22.2	21.5	22.4	21.7	22.8	2
		1	12	21.3	22.2	21.6	22.4	21.7	22.8	2
		1	24	21.4	22.2	21.6	22.4	21.7	22.8	2
		12	0	20.2	21.2	20.5	21.4	20.6	21.8	3
3 MHz	QPSK	12	7	20.2	21.2	20.5	21.4	20.6	21.8	3
		12	13	20.3	21.2	20.5	21.4	20.6	21.8	3
		25	0	20.2	21.2	20.5	21.4	20.5	21.8	3
		1	0	22.9	24.2	23.3	24.4	23.4	24.8	0
		1	8	23.0	24.2	23.4	24.4	23.4	24.8	0
		1	14	22.9	24.2	23.3	24.4	23.3	24.8	0
	16QAM	8	0	22.0	23.2	22.3	23.4	22.4	23.8	1
		8	4	22.0	23.2	22.4	23.4	22.4	23.8	1
		8	7	22.0	23.2	22.3	23.4	22.4	23.8	1
		15	0	22.0	23.2	22.3	23.4	22.4	23.8	1
		1	0	22.0	23.2	22.4	23.4	22.4	23.8	1
		1	8	22.1	23.2	22.4	23.4	22.5	23.8	1
	64QAM	1	14	22.0	23.2	22.4	23.4	22.5	23.8	1
		8	0	21.1	22.2	21.4	22.4	21.5	22.8	2
		8	4	21.1	22.2	21.5	22.4	21.5	22.8	2
		8	7	21.1	22.2	21.4	22.4	21.5	22.8	2
		15	0	21.0	22.2	21.3	22.4	21.4	22.8	2
		1	0	21.2	22.2	21.6	22.4	21.6	22.8	2
64QAM	1	8	21.3	22.2	21.6	22.4	21.7	22.8	2	
	1	14	21.2	22.2	21.6	22.4	21.6	22.8	2	
	8	0	20.0	21.2	20.4	21.4	20.4	21.8	3	
	8	4	20.1	21.2	20.4	21.4	20.5	21.8	3	
	8	7	20.1	21.2	20.4	21.4	20.5	21.8	3	
	15	0	20.1	21.2	20.5	21.4	20.5	21.8	3	

LTE Band 26 Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)						MPR
				26697		26865		27033		
				814.7 MHz		831.5 MHz		848.3 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
1.4 MHz	QPSK	1	0	23.0	24.2	23.3	24.4	23.4	24.8	0
		1	3	23.0	24.2	23.3	24.4	23.4	24.8	0
		1	5	22.9	24.2	23.3	24.4	23.3	24.8	0
		3	0	22.9	24.2	23.3	24.4	23.4	24.8	0
		3	1	22.9	24.2	23.3	24.4	23.4	24.8	0
		3	3	23.0	24.2	23.3	24.4	23.4	24.8	0
		6	0	21.9	23.2	22.2	23.4	22.2	23.8	1
	16QAM	1	0	22.0	23.2	22.7	23.4	22.8	23.8	1
		1	3	22.1	23.2	22.7	23.4	22.8	23.8	1
		1	5	22.0	23.2	22.7	23.4	22.8	23.8	1
		3	0	22.0	23.2	22.5	23.4	22.6	23.8	1
		3	1	22.1	23.2	22.5	23.4	22.7	23.8	1
		3	3	22.1	23.2	22.5	23.4	22.7	23.8	1
		6	0	21.1	22.2	21.3	22.4	21.3	22.8	2
	64QAM	1	0	21.1	22.2	21.5	22.4	21.6	22.8	2
		1	3	21.2	22.2	21.6	22.4	21.7	22.8	2
		1	5	21.1	22.2	21.6	22.4	21.6	22.8	2
		3	0	21.2	22.2	21.3	22.4	21.4	22.8	2
		3	1	21.2	22.2	21.4	22.4	21.5	22.8	2
		3	3	21.2	22.2	21.4	22.4	21.5	22.8	2
		6	0	20.3	21.2	20.4	21.4	20.5	21.8	3

LTE Band 41 (PC2) Measured Results

BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)										MFR		
				39750		40185		40620		41055		41490				
				2506 MHz		2549.5 MHz		2593 MHz		2636.5 MHz		2680 MHz				
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit			
20 MHz	QPSK	1	0	25.1	25.9	25.9	26.3	25.2	26.3	24.6	26.3	25.4	26.9	0		
		1	49	25.1	25.9	25.8	26.3	25.1	26.3	24.5	26.3	25.5	26.9	0		
		1	99	25.2	25.9	25.7	26.3	25.1	26.3	24.5	26.3	25.4	26.9	0		
		50	0	23.0	24.9	24.8	25.3	24.2	25.3	23.5	25.3	24.4	25.9	1		
		50	24	23.0	24.9	24.7	25.3	24.2	25.3	23.6	25.3	24.3	25.9	1		
		50	50	22.9	24.9	24.7	25.3	24.2	25.3	23.6	25.3	24.7	25.9	1		
	16QAM	100	0	23.0	24.9	24.7	25.3	24.1	25.3	23.5	25.3	24.4	25.9	1		
		1	0	23.5	24.9	25.2	25.3	24.7	25.3	23.9	25.3	24.2	25.9	1		
		1	49	23.4	24.9	25.0	25.3	24.6	25.3	23.9	25.3	24.2	25.9	1		
		1	99	23.3	24.9	25.0	25.3	24.6	25.3	24.1	25.3	24.2	25.9	1		
		50	0	23.0	23.9	23.8	24.3	23.4	24.3	22.6	24.3	23.0	24.9	2		
		50	24	23.0	23.9	23.8	24.3	23.3	24.3	22.7	24.3	22.9	24.9	2		
	64QAM	50	50	22.9	23.9	23.8	24.3	23.4	24.3	22.7	24.3	23.1	24.9	2		
		100	0	23.0	23.9	23.7	24.3	23.2	24.3	22.7	24.3	23.0	24.9	2		
		1	0	23.0	23.9	24.3	24.3	23.6	24.3	23.1	24.3	23.4	24.9	2		
		1	49	22.8	23.9	24.2	24.3	23.6	24.3	23.1	24.3	23.2	24.9	2		
		1	99	22.8	23.9	24.1	24.3	23.6	24.3	23.1	24.3	23.3	24.9	2		
		50	0	22.5	22.9	22.9	23.3	22.4	23.3	21.8	23.3	22.1	23.9	3		
20 MHz	64QAM	50	24	22.6	22.9	22.8	23.3	22.3	23.3	21.9	23.3	22.0	23.9	3		
		50	50	22.5	22.9	22.8	23.3	22.4	23.3	21.9	23.3	22.1	23.9	3		
		100	0	22.6	22.9	22.8	23.3	22.3	23.3	21.9	23.3	22.1	23.9	3		
		15 MHz	QPSK	1	0	25.2	25.9	25.8	26.3	25.1	26.3	24.6	26.3	24.9	26.9	0
				1	37	25.2	25.9	25.9	26.3	25.1	26.3	24.5	26.3	25.0	26.9	0
				1	74	25.3	25.9	25.7	26.3	25.1	26.3	24.5	26.3	25.0	26.9	0
36	0			24.2	24.9	24.8	25.3	24.2	25.3	23.4	25.3	23.9	25.9	1		
36	20			24.2	24.9	24.7	25.3	24.1	25.3	23.5	25.3	24.2	25.9	1		
36	39			24.3	24.9	24.7	25.3	24.1	25.3	23.5	25.3	23.9	25.9	1		
16QAM	75		0	24.3	24.9	24.7	25.3	24.1	25.3	23.5	25.3	23.9	25.9	1		
	1		0	24.4	24.9	24.9	25.3	24.5	25.3	23.7	25.3	24.1	25.9	1		
	1		37	24.4	24.9	25.0	25.3	24.5	25.3	23.9	25.3	24.2	25.9	1		
	1		74	24.5	24.9	24.9	25.3	24.5	25.3	23.9	25.3	24.1	25.9	1		
	36		0	23.2	23.9	23.9	24.3	23.3	24.3	22.6	24.3	23.0	24.9	2		
	36		20	23.2	23.9	23.8	24.3	23.2	24.3	22.7	24.3	23.1	24.9	2		
64QAM	36		39	23.4	23.9	23.8	24.3	23.2	24.3	22.8	24.3	23.0	24.9	2		
	75		0	23.3	23.9	23.8	24.3	23.2	24.3	22.7	24.3	23.0	24.9	2		
	1		0	23.2	23.9	23.4	24.3	23.3	24.3	22.4	24.3	22.9	24.9	2		
	1		37	23.1	23.9	23.5	24.3	23.3	24.3	22.5	24.3	23.0	24.9	2		
	1		74	23.3	23.9	23.4	24.3	23.3	24.3	22.5	24.3	23.1	24.9	2		
	36		0	22.1	22.9	22.9	23.3	22.2	23.3	21.7	23.3	22.2	23.9	3		
15 MHz	64QAM	36	20	22.1	22.9	22.8	23.3	22.1	23.3	21.8	23.3	22.2	23.9	3		
		36	39	22.2	22.9	22.8	23.3	22.2	23.3	21.9	23.3	22.2	23.9	3		
		75	0	22.3	22.9	22.8	23.3	22.2	23.3	21.8	23.3	22.1	23.9	3		

LTE Band 41 (PC2) Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)										MPR
				39750		40185		40620		41055		41490		
				2506 MHz		2549.5 MHz		2593 MHz		2636.5 MHz		2680 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
10 MHz	QPSK	1	0	25.1	25.9	25.8	26.3	25.1	26.3	24.6	26.3	25.0	26.9	0
		1	25	25.0	25.9	25.8	26.3	25.1	26.3	24.5	26.3	25.1	26.9	0
		1	49	25.1	25.9	25.7	26.3	25.1	26.3	24.5	26.3	25.0	26.9	0
		25	0	24.1	24.9	24.7	25.3	24.2	25.3	23.4	25.3	23.9	25.9	1
		25	12	24.1	24.9	24.7	25.3	24.1	25.3	23.6	25.3	23.9	25.9	1
		25	25	24.1	24.9	24.7	25.3	24.1	25.3	23.6	25.3	23.9	25.9	1
	16QAM	50	0	24.0	24.9	24.6	25.3	24.1	25.3	23.5	25.3	24.1	25.9	1
		1	0	24.3	24.9	25.0	25.3	24.6	25.3	23.8	25.3	24.2	25.9	1
		1	25	24.3	24.9	25.0	25.3	24.6	25.3	23.9	25.3	24.2	25.9	1
		1	49	24.4	24.9	24.9	25.3	24.5	25.3	24.0	25.3	24.1	25.9	1
		25	0	23.1	23.9	23.7	24.3	23.3	24.3	22.7	24.3	22.9	24.9	2
		25	12	23.1	23.9	23.7	24.3	23.3	24.3	22.7	24.3	22.9	24.9	2
	64QAM	25	25	23.0	23.9	23.7	24.3	23.3	24.3	22.7	24.3	23.0	24.9	2
		50	0	23.0	23.9	23.7	24.3	23.3	24.3	22.8	24.3	22.9	24.9	2
		1	0	23.2	23.9	23.5	24.3	23.5	24.3	23.0	24.3	23.3	24.9	2
		1	25	23.2	23.9	23.5	24.3	23.5	24.3	23.0	24.3	23.3	24.9	2
		1	49	23.2	23.9	23.4	24.3	23.4	24.3	23.0	24.3	23.2	24.9	2
		25	0	21.9	22.9	22.8	23.3	22.3	23.3	21.7	23.3	22.1	23.9	3
		25	12	21.9	22.9	22.7	23.3	22.2	23.3	21.8	23.3	22.0	23.9	3
		25	25	21.9	22.9	22.7	23.3	22.2	23.3	21.9	23.3	22.0	23.9	3
50	0	21.9	22.9	22.7	23.3	22.3	23.3	21.8	23.3	22.0	23.9	3		
BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)										MPR
				39750		40185		40620		41055		41490		
				2506 MHz		2549.5 MHz		2593 MHz		2636.5 MHz		2680 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
5 MHz	QPSK	1	0	25.0	25.9	25.6	26.3	25.1	26.3	24.6	26.3	24.9	26.9	0
		1	12	25.0	25.9	25.6	26.3	25.1	26.3	24.5	26.3	24.9	26.9	0
		1	24	25.0	25.9	25.6	26.3	25.0	26.3	24.4	26.3	24.9	26.9	0
		12	0	24.0	24.9	24.7	25.3	24.2	25.3	23.4	25.3	23.9	25.9	1
		12	7	24.1	24.9	24.6	25.3	24.2	25.3	23.4	25.3	23.9	25.9	1
		12	13	24.0	24.9	24.6	25.3	24.1	25.3	23.4	25.3	23.9	25.9	1
	16QAM	25	0	24.0	24.9	24.5	25.3	24.0	25.3	23.4	25.3	23.9	25.9	1
		1	0	24.2	24.9	24.8	25.3	24.5	25.3	23.8	25.3	24.2	25.9	1
		1	12	24.2	24.9	24.9	25.3	24.6	25.3	23.9	25.3	24.2	25.9	1
		1	24	24.2	24.9	24.8	25.3	24.5	25.3	23.9	25.3	24.2	25.9	1
		12	0	23.0	23.9	23.7	24.3	23.4	24.3	22.6	24.3	23.0	24.9	2
		12	7	23.0	23.9	23.6	24.3	23.4	24.3	22.7	24.3	23.1	24.9	2
	64QAM	12	13	23.0	23.9	23.6	24.3	23.3	24.3	22.6	24.3	23.0	24.9	2
		25	0	23.0	23.9	23.6	24.3	23.2	24.3	22.6	24.3	23.0	24.9	2
		1	0	23.2	23.9	23.9	24.3	23.5	24.3	22.7	24.3	23.1	24.9	2
		1	12	23.2	23.9	24.0	24.3	23.5	24.3	22.8	24.3	23.1	24.9	2
		1	24	23.2	23.9	23.8	24.3	23.5	24.3	22.7	24.3	22.9	24.9	2
		12	0	21.9	22.9	22.7	23.3	22.2	23.3	21.6	23.3	22.0	23.9	3
		12	7	21.9	22.9	22.6	23.3	22.2	23.3	21.7	23.3	22.0	23.9	3
		12	13	21.9	22.9	22.6	23.3	22.2	23.3	21.7	23.3	22.0	23.9	3
25	0	21.9	22.9	22.6	23.3	22.1	23.3	21.7	23.3	22.0	23.9	3		

LTE Band 41 (PC3) Measured Results

BW (MHz)	Mode	RB Allocation	RB Offset	HU0123 + HU0223 Maximum Average Power (dBm)									
				39750		40185		40620		41055		41490	
				2506 MHz		2549.5 MHz		2593 MHz		2636.5 MHz		2680 MHz	
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit
20 MHz	QPSK	1	0	23.1	24.0	23.9	24.5	23.3	24.5	22.5	24.5	23.5	25.0
		1	49	23.2	24.0	23.8	24.5	23.2	24.5	22.6	24.5	23.3	25.0
		1	99	23.3	24.0	23.8	24.5	23.2	24.5	22.5	24.5	23.3	25.0
		50	0	21.1	23.0	22.9	23.5	22.3	23.5	21.6	23.5	22.4	24.0
		50	24	21.1	23.0	22.8	23.5	22.2	23.5	21.6	23.5	22.3	24.0
		50	50	21.0	23.0	22.8	23.5	22.2	23.5	21.5	23.5	22.4	24.0
	16QAM	100	0	21.1	23.0	22.8	23.5	22.2	23.5	21.6	23.5	22.4	24.0
		1	0	21.3	23.0	23.1	23.5	22.4	23.5	21.5	23.5	22.0	24.0
		1	49	21.1	23.0	22.9	23.5	22.5	23.5	21.5	23.5	22.0	24.0
		1	99	21.1	23.0	22.9	23.5	22.4	23.5	21.7	23.5	22.1	24.0
		50	0	21.1	22.0	22.0	22.5	21.4	22.5	20.5	22.5	21.4	23.0
		50	24	21.1	22.0	22.0	22.5	21.3	22.5	20.6	22.5	21.5	23.0
	64QAM	50	50	21.0	22.0	21.9	22.5	21.4	22.5	20.6	22.5	21.5	23.0
		100	0	21.1	22.0	21.8	22.5	21.3	22.5	20.5	22.5	21.4	23.0
		1	0	21.0	22.0	22.3	22.5	21.3	22.5	21.2	22.5	21.9	23.0
		1	49	20.8	22.0	22.1	22.5	21.4	22.5	21.1	22.5	21.8	23.0
		1	99	20.8	22.0	22.2	22.5	21.3	22.5	21.2	22.5	21.8	23.0
		50	0	20.6	21.0	20.9	21.5	20.4	21.5	19.7	21.5	20.4	22.0
		50	24	20.6	21.0	20.9	21.5	20.3	21.5	19.8	21.5	20.4	22.0
		50	50	20.5	21.0	20.9	21.5	20.3	21.5	19.8	21.5	20.5	22.0
100	0	20.6	21.0	20.9	21.5	20.3	21.5	19.6	21.5	20.6	22.0		
BW (MHz)	Mode	RB Allocation	RB Offset	HU0123 + HU0223 Maximum Average Power (dBm)									
				39750		40185		40620		41055		41490	
				2506 MHz		2549.5 MHz		2593 MHz		2636.5 MHz		2680 MHz	
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit
15 MHz	QPSK	1	0	23.1	24.0	23.8	24.5	23.2	24.5	23.1	24.5	23.3	25.0
		1	37	23.1	24.0	23.9	24.5	23.2	24.5	23.4	24.5	23.3	25.0
		1	74	23.2	24.0	23.7	24.5	23.2	24.5	23.4	24.5	23.3	25.0
		36	0	22.1	23.0	22.8	23.5	22.2	23.5	22.2	23.5	22.3	24.0
		36	20	22.2	23.0	22.8	23.5	22.1	23.5	22.6	23.5	22.3	24.0
		36	39	22.2	23.0	22.8	23.5	22.1	23.5	22.5	23.5	22.4	24.0
		75	0	22.2	23.0	22.8	23.5	22.1	23.5	22.4	23.5	22.4	24.0
	16QAM	1	0	22.2	23.0	22.8	23.5	22.4	23.5	22.4	23.5	22.3	24.0
		1	37	22.1	23.0	22.9	23.5	22.4	23.5	22.3	23.5	22.5	24.0
		1	74	22.3	23.0	22.9	23.5	22.3	23.5	22.2	23.5	22.1	24.0
		36	0	21.2	22.0	21.9	22.5	21.3	22.5	21.5	22.5	21.4	23.0
		36	20	21.2	22.0	21.9	22.5	21.2	22.5	21.4	22.5	21.4	23.0
		36	39	21.3	22.0	21.8	22.5	21.2	22.5	21.7	22.5	21.4	23.0
	64QAM	75	0	21.2	22.0	21.9	22.5	21.3	22.5	21.5	22.5	21.3	23.0
		1	0	21.0	22.0	21.6	22.5	20.8	22.5	21.2	22.5	21.1	23.0
		1	37	20.9	22.0	21.7	22.5	20.9	22.5	21.3	22.5	21.1	23.0
		1	74	21.0	22.0	21.6	22.5	20.9	22.5	21.3	22.5	21.3	23.0
		36	0	20.1	21.0	20.8	21.5	20.4	21.5	20.7	21.5	20.4	22.0
		36	20	20.2	21.0	20.8	21.5	20.3	21.5	20.5	21.5	20.5	22.0
		36	39	20.2	21.0	20.7	21.5	20.3	21.5	20.6	21.5	20.5	22.0
75	0	20.3	21.0	20.8	21.5	20.2	21.5	20.7	21.5	20.3	22.0		

LTE Band 41 (PC3) Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB Offset	HU0123 + HU0223 Maximum Average Power (dBm)										
				39750		40185		40620		41055		41490		
				2506 MHz		2549.5 MHz		2593 MHz		2636.5 MHz		2680 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
10 MHz	QPSK	1	0	23.1	24.0	23.8	24.5	23.2	24.5	23.4	24.5	23.4	25.0	
		1	25	23.1	24.0	23.8	24.5	23.2	24.5	23.4	24.5	23.3	25.0	
		1	49	23.1	24.0	23.7	24.5	23.1	24.5	23.3	24.5	23.2	25.0	
		25	0	22.1	23.0	22.8	23.5	22.3	23.5	22.1	23.5	22.3	24.0	
		25	12	22.1	23.0	22.8	23.5	22.2	23.5	22.3	23.5	22.3	24.0	
		25	25	22.1	23.0	22.8	23.5	22.2	23.5	22.4	23.5	22.4	24.0	
	16QAM	1	0	22.2	23.0	22.9	23.5	22.4	23.5	22.4	23.5	22.4	24.0	
		1	25	22.2	23.0	23.0	23.5	22.4	23.5	22.3	23.5	22.4	24.0	
		1	49	22.2	23.0	22.9	23.5	22.4	23.5	22.4	23.5	22.3	24.0	
		25	0	21.1	22.0	21.9	22.5	21.4	22.5	21.2	22.5	21.4	23.0	
		25	12	21.1	22.0	21.9	22.5	21.3	22.5	21.2	22.5	21.4	23.0	
		25	25	21.1	22.0	21.9	22.5	21.3	22.5	21.6	22.5	21.4	23.0	
	64QAM	1	0	21.1	22.0	21.9	22.5	21.3	22.5	21.5	22.5	21.3	23.0	
		1	25	21.0	22.0	21.8	22.5	20.8	22.5	21.2	22.5	21.3	23.0	
		1	49	21.0	22.0	21.9	22.5	20.9	22.5	21.3	22.5	21.1	23.0	
		25	0	20.0	21.0	20.8	21.5	20.4	21.5	20.5	21.5	20.4	22.0	
		25	12	20.0	21.0	20.8	21.5	20.3	21.5	20.6	21.5	20.2	22.0	
		25	25	19.9	21.0	20.8	21.5	20.3	21.5	20.4	21.5	20.4	22.0	
	5 MHz	QPSK	1	0	23.0	24.0	23.6	24.5	23.1	24.5	23.5	24.5	23.2	25.0
			1	12	23.0	24.0	23.7	24.5	23.1	24.5	23.3	24.5	23.2	25.0
1			24	23.1	24.0	23.7	24.5	23.1	24.5	23.3	24.5	23.2	25.0	
12			0	22.1	23.0	22.8	23.5	22.3	23.5	22.43	23.5	22.2	24.0	
12			7	22.1	23.0	22.7	23.5	22.3	23.5	22.4	23.5	22.4	24.0	
12			13	22.1	23.0	22.7	23.5	22.1	23.5	22.5	23.5	22.4	24.0	
16QAM		25	0	22.1	23.0	22.6	23.5	22.1	23.5	22.5	23.5	22.3	24.0	
		1	0	22.1	23.0	22.9	23.5	22.4	23.5	22.0	23.5	22.1	24.0	
		1	12	22.1	23.0	22.9	23.5	22.4	23.5	22.1	23.5	22.1	24.0	
		1	24	22.1	23.0	22.8	23.5	22.3	23.5	22.1	23.5	22.0	24.0	
		12	0	21.1	22.0	22.0	22.5	21.4	22.5	21.6	22.5	21.3	23.0	
		12	7	21.1	22.0	21.9	22.5	21.4	22.5	21.4	22.5	21.3	23.0	
64QAM		12	13	21.1	22.0	21.9	22.5	21.3	22.5	21.7	22.5	21.3	23.0	
		25	0	21.0	22.0	21.8	22.5	21.2	22.5	21.7	22.5	21.4	23.0	
		1	0	21.1	22.0	21.6	22.5	21.4	22.5	21.2	22.5	21.9	23.0	
		1	12	21.1	22.0	21.6	22.5	21.4	22.5	21.1	22.5	21.9	23.0	
		1	24	21.1	22.0	21.5	22.5	21.4	22.5	21.1	22.5	21.7	23.0	
		12	0	20.0	21.0	20.9	21.5	20.3	21.5	20.5	21.5	20.3	22.0	
		12	7	20.0	21.0	20.9	21.5	20.3	21.5	20.6	21.5	20.3	22.0	
		12	13	20.0	21.0	20.8	21.5	20.1	21.5	20.7	21.5	20.3	22.0	
25	0	20.0	21.0	20.8	21.5	20.1	21.5	20.4	21.5	20.3	22.0			

LTE Band 66 Measured Results

BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)						MPR
				132072		132322		132572		
				1720 MHz		1745 MHz		1770 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
20 MHz	QPSK	1	0	23.7	24.3	23.5	24.2	23.5	24.3	0
		1	49	23.7	24.3	23.3	24.2	23.4	24.3	0
		1	99	23.6	24.3	23.5	24.2	23.6	24.3	0
		50	0	22.7	23.3	22.4	23.2	22.3	23.3	1
		50	24	22.8	23.3	22.4	23.2	22.4	23.3	1
		50	50	22.7	23.3	22.4	23.2	22.4	23.3	1
		100	0	22.7	23.3	22.4	23.2	22.4	23.3	1
	16QAM	1	0	23.2	23.3	22.9	23.2	22.5	23.3	1
		1	49	23.1	23.3	22.8	23.2	22.7	23.3	1
		1	99	22.9	23.3	22.8	23.2	22.7	23.3	1
		50	0	21.8	22.3	21.5	22.2	21.5	22.3	2
		50	24	21.9	22.3	21.6	22.2	21.5	22.3	2
		50	50	21.9	22.3	21.5	22.2	21.6	22.3	2
		100	0	21.9	22.3	21.4	22.2	21.5	22.3	2
	64QAM	1	0	22.3	22.3	22.1	22.2	21.7	22.3	2
		1	49	22.2	22.3	21.9	22.2	21.8	22.3	2
		1	99	22.0	22.3	21.9	22.2	21.7	22.3	2
		50	0	21.1	21.3	20.7	21.2	20.6	21.3	3
		50	24	21.1	21.3	20.8	21.2	20.6	21.3	3
		50	50	20.9	21.3	20.7	21.2	20.7	21.3	3
		100	0	21.0	21.3	20.6	21.2	20.6	21.3	3
BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)						MPR
				132047		132322		132597		
				1717.5 MHz		1745 MHz		1772.5 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
15 MHz	QPSK	1	0	23.7	24.3	23.4	24.2	23.6	24.3	0
		1	37	23.7	24.3	23.3	24.2	23.5	24.3	0
		1	74	23.7	24.3	23.4	24.2	23.6	24.3	0
		36	0	22.8	23.3	22.3	23.2	22.4	23.3	1
		36	20	22.7	23.3	22.3	23.2	22.4	23.3	1
		36	39	22.8	23.3	22.4	23.2	22.5	23.3	1
		75	0	22.7	23.3	22.3	23.2	22.4	23.3	1
	16QAM	1	0	23.2	23.3	22.8	23.2	22.5	23.3	1
		1	37	23.2	23.3	22.7	23.2	22.7	23.3	1
		1	74	23.0	23.3	22.7	23.2	22.6	23.3	1
		36	0	21.8	22.3	21.4	22.2	21.4	22.3	2
		36	20	21.8	22.3	21.4	22.2	21.5	22.3	2
		36	39	21.8	22.3	21.4	22.2	21.4	22.3	2
		75	0	21.8	22.3	21.4	22.2	21.4	22.3	2
	64QAM	1	0	22.3	22.3	22.0	22.2	21.9	22.3	2
		1	37	22.3	22.3	21.8	22.2	21.8	22.3	2
		1	74	22.1	22.3	21.9	22.2	21.8	22.3	2
		36	0	21.0	21.3	20.6	21.2	20.6	21.3	3
		36	20	20.8	21.3	20.7	21.2	20.7	21.3	3
		36	39	21.0	21.3	20.6	21.2	20.6	21.3	3
		75	0	20.9	21.3	20.6	21.2	20.6	21.3	3

LTE Band 66 Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)						MPR
				132022		132322		132622		
				1715 MHz		1745 MHz		1775 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
10 MHz	QPSK	1	0	23.7	24.3	23.5	24.2	23.4	24.3	0
		1	25	23.7	24.3	23.3	24.2	23.4	24.3	0
		1	49	23.7	24.3	23.3	24.2	23.5	24.3	0
		25	0	22.8	23.3	22.4	23.2	22.4	23.3	1
		25	12	22.8	23.3	22.4	23.2	22.4	23.3	1
		25	25	22.7	23.3	22.4	23.2	22.4	23.3	1
	16QAM	1	0	22.8	23.3	22.5	23.2	22.3	23.3	1
		1	25	22.8	23.3	22.4	23.2	22.4	23.3	1
		1	49	22.7	23.3	22.4	23.2	22.3	23.3	1
		25	0	22.0	22.3	21.6	22.2	21.5	22.3	2
		25	12	22.0	22.3	21.6	22.2	21.5	22.3	2
		25	25	22.0	22.3	21.6	22.2	21.5	22.3	2
	64QAM	1	0	22.2	22.3	22.0	22.2	22.0	22.3	2
		1	25	22.2	22.3	21.9	22.2	21.8	22.3	2
		1	49	22.0	22.3	21.9	22.2	21.7	22.3	2
		25	0	21.2	21.3	20.7	21.2	20.6	21.3	3
		25	12	21.2	21.3	20.7	21.2	20.6	21.3	3
		25	25	21.1	21.3	20.7	21.2	20.6	21.3	3
5 MHz	QPSK	1	0	24.1	24.3	23.3	24.2	23.5	24.3	0
		1	12	24.1	24.3	23.5	24.2	23.6	24.3	0
		1	24	23.9	24.3	23.4	24.2	23.6	24.3	0
		12	0	22.8	23.3	22.4	23.2	22.4	23.3	1
		12	7	22.8	23.3	22.4	23.2	22.4	23.3	1
		12	13	22.8	23.3	22.4	23.2	22.4	23.3	1
	16QAM	25	0	22.8	23.3	22.4	23.2	22.4	23.3	1
		1	0	22.9	23.3	22.5	23.2	22.5	23.3	1
		1	12	23.0	23.3	22.6	23.2	22.5	23.3	1
		1	24	22.9	23.3	22.5	23.2	22.5	23.3	1
		12	0	22.0	22.3	21.5	22.2	21.5	22.3	2
		12	7	22.0	22.3	21.6	22.2	21.6	22.3	2
	64QAM	12	13	22.0	22.3	21.6	22.2	21.6	22.3	2
		25	0	21.9	22.3	21.4	22.2	21.5	22.3	2
		1	0	22.2	22.3	21.7	22.2	21.8	22.3	2
		1	12	22.3	22.3	21.6	22.2	21.8	22.3	2
		1	24	22.2	22.3	21.5	22.2	21.7	22.3	2
		12	0	21.1	21.3	20.7	21.2	20.7	21.3	3
64QAM	12	7	21.2	21.3	20.7	21.2	20.7	21.3	3	
	12	13	21.2	21.3	20.7	21.2	20.7	21.3	3	
	25	0	21.1	21.3	20.6	21.2	20.7	21.3	3	

LTE Band 66 Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)						MPR
				131987		132322		132657		
				1711.5 MHz		1745 MHz		1778.5 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
3 MHz	QPSK	1	0	23.9	24.3	23.2	24.2	23.4	24.3	0
		1	8	23.9	24.3	23.3	24.2	23.6	24.3	0
		1	14	23.6	24.3	23.2	24.2	23.5	24.3	0
		8	0	22.7	23.3	22.3	23.2	22.4	23.3	1
		8	4	22.7	23.3	22.3	23.2	22.4	23.3	1
		8	7	22.7	23.3	22.3	23.2	22.5	23.3	1
	16QAM	15	0	22.7	23.3	22.3	23.2	22.4	23.3	1
		1	0	22.8	23.3	22.4	23.2	22.3	23.3	1
		1	8	22.9	23.3	22.5	23.2	22.4	23.3	1
		1	14	22.8	23.3	22.4	23.2	22.2	23.3	1
		8	0	21.9	22.3	21.4	22.2	21.4	22.3	2
		8	4	21.9	22.3	21.5	22.2	21.4	22.3	2
	64QAM	8	7	21.9	22.3	21.5	22.2	21.5	22.3	2
		15	0	21.8	22.3	21.4	22.2	21.3	22.3	2
		1	0	22.2	22.3	21.7	22.2	21.7	22.3	2
		1	8	22.2	22.3	21.7	22.2	21.9	22.3	2
		1	14	22.1	22.3	21.5	22.2	21.7	22.3	2
		8	0	20.9	21.3	20.4	21.2	20.6	21.3	3
1.4 MHz	QPSK	8	4	21.0	21.3	20.4	21.2	20.6	21.3	3
		8	7	21.0	21.3	20.4	21.2	20.6	21.3	3
		15	0	20.9	21.3	20.5	21.2	20.5	21.3	3
		1	0	24.0	24.3	23.3	24.2	23.4	24.3	0
		1	3	23.9	24.3	23.3	24.2	23.5	24.3	0
		1	5	23.7	24.3	23.2	24.2	23.5	24.3	0
	16QAM	3	0	23.8	24.3	23.3	24.2	23.2	24.3	0
		3	1	23.7	24.3	23.4	24.2	23.2	24.3	0
		3	3	23.7	24.3	23.4	24.2	23.2	24.3	0
		6	0	22.5	23.3	22.2	23.2	22.5	23.3	1
		1	0	22.8	23.3	22.7	23.2	22.5	23.3	1
		1	3	22.8	23.3	22.7	23.2	22.3	23.3	1
	64QAM	1	5	22.8	23.3	22.7	23.2	22.2	23.3	1
		3	0	22.9	23.3	22.6	23.2	22.1	23.3	1
		3	1	23.0	23.3	22.7	23.2	22.2	23.3	1
		3	3	23.0	23.3	22.7	23.2	22.2	23.3	1
		6	0	21.9	22.3	21.2	22.2	21.5	22.3	2
		1	0	22.1	22.3	21.8	22.2	21.6	22.3	2
64QAM	1	3	22.1	22.3	21.9	22.2	21.6	22.3	2	
	1	5	21.9	22.3	21.8	22.2	21.5	22.3	2	
	3	0	22.1	22.3	21.8	22.2	21.3	22.3	2	
	3	1	22.2	22.3	21.8	22.2	21.3	22.3	2	
	3	3	22.2	22.3	21.8	22.2	21.3	22.3	2	
	6	0	21.2	21.3	20.3	21.2	20.5	21.3	3	

LTE Band 71 Measured Results

BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)						MPR
				133222		133297		133372		
				673 MHz		680.5 MHz		688 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
20 MHz	QPSK	1	0	23.1	24.3	23.5	24.5	23.6	24.8	0
		1	49	23.4	24.3	23.8	24.5	23.9	24.8	0
		1	99	23.8	24.3	24.2	24.5	24.1	24.8	0
		50	0	22.2	23.3	22.8	23.5	22.8	23.8	1
		50	24	22.5	23.3	22.8	23.5	22.9	23.8	1
		50	50	22.7	23.3	22.9	23.5	23.0	23.8	1
		100	0	22.5	23.3	22.9	23.5	22.9	23.8	1
	16QAM	1	0	22.5	23.3	22.8	23.5	23.0	23.8	1
		1	49	22.7	23.3	23.2	23.5	23.3	23.8	1
		1	99	23.2	23.3	23.5	23.5	23.5	23.8	1
		50	0	21.3	22.3	21.7	22.5	21.8	22.8	2
		50	24	21.6	22.3	21.9	22.5	22.0	22.8	2
		50	50	21.7	22.3	21.9	22.5	22.0	22.8	2
		100	0	21.6	22.3	21.9	22.5	22.0	22.8	2
	64QAM	1	0	21.3	22.3	21.7	22.5	21.9	22.8	2
		1	49	21.6	22.3	22.1	22.5	22.1	22.8	2
		1	99	22.0	22.3	22.4	22.5	22.3	22.8	2
		50	0	20.3	21.3	20.8	21.5	20.9	21.8	3
		50	24	20.6	21.3	21.0	21.5	21.0	21.8	3
		50	50	20.7	21.3	21.0	21.5	21.0	21.8	3
		100	0	20.6	21.3	21.0	21.5	21.0	21.8	3
BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)						MPR
				133197		133297		133397		
				670.5 MHz		680.5 MHz		690.5 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
15 MHz	QPSK	1	0	23.2	24.3	23.7	24.5	23.8	24.8	0
		1	37	23.4	24.3	23.9	24.5	24.1	24.8	0
		1	74	23.6	24.3	24.1	24.5	24.2	24.8	0
		36	0	22.2	23.3	22.8	23.5	22.8	23.8	1
		36	20	22.4	23.3	22.9	23.5	23.0	23.8	1
		36	39	22.5	23.3	22.9	23.5	23.1	23.8	1
		75	0	22.3	23.3	22.9	23.5	23.0	23.8	1
	16QAM	1	0	22.5	23.3	22.9	23.5	23.1	23.8	1
		1	37	22.6	23.3	23.2	23.5	23.3	23.8	1
		1	74	23.0	23.3	23.4	23.5	23.5	23.8	1
		36	0	21.2	22.3	21.8	22.5	21.9	22.8	2
		36	20	21.4	22.3	21.9	22.5	22.1	22.8	2
		36	39	21.6	22.3	22.0	22.5	22.1	22.8	2
		75	0	21.4	22.3	21.9	22.5	22.0	22.8	2
	64QAM	1	0	21.7	22.3	22.2	22.5	22.4	22.8	2
		1	37	21.9	22.3	22.5	22.5	22.6	22.8	2
		1	74	22.2	22.3	22.2	22.5	22.7	22.8	2
		36	0	20.2	21.3	20.9	21.5	20.9	21.8	3
		36	20	20.4	21.3	20.9	21.5	21.1	21.8	3
		36	39	20.6	21.3	21.0	21.5	21.2	21.8	3
		75	0	20.5	21.3	20.9	21.5	21.1	21.8	3

LTE Band 71 Measured Results (continued)

BW (MHz)	Mode	RB Allocation	RB Offset	Maximum Average Power (dBm)						MPR
				133172		133297		133422		
				668 MHz		680.5 MHz		693 MHz		
				Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	Measured Power	Tune-up Limit	
10 MHz	QPSK	1	0	23.3	24.3	23.7	24.5	24.0	24.8	0
		1	25	23.3	24.3	23.8	24.5	24.2	24.8	0
		1	49	23.6	24.3	24.0	24.5	24.2	24.8	0
		25	0	22.3	23.3	22.8	23.5	23.1	23.8	1
		25	12	22.4	23.3	22.9	23.5	23.2	23.8	1
		25	25	22.5	23.3	22.8	23.5	23.2	23.8	1
	16QAM	1	0	22.6	23.3	22.7	23.5	23.0	23.8	1
		1	25	22.7	23.3	22.9	23.5	23.1	23.8	1
		1	49	22.9	23.3	23.0	23.5	23.2	23.8	1
		25	0	21.4	22.3	21.9	22.5	22.2	22.8	2
		25	12	21.5	22.3	22.0	22.5	22.3	22.8	2
		25	25	21.6	22.3	22.0	22.5	22.3	22.8	2
	64QAM	1	0	21.5	22.3	21.9	22.5	22.4	22.8	2
		1	25	21.5	22.3	22.1	22.5	22.5	22.8	2
		1	49	21.7	22.3	22.2	22.5	22.6	22.8	2
		25	0	20.5	21.3	20.9	21.5	21.2	21.8	3
		25	12	20.6	21.3	21.1	21.5	21.3	21.8	3
		25	25	20.6	21.3	20.9	21.5	21.3	21.8	3
5 MHz	QPSK	1	0	23.4	24.3	23.8	24.5	24.2	24.8	0
		1	12	23.4	24.3	23.9	24.5	24.3	24.8	0
		1	24	23.4	24.3	23.9	24.5	24.2	24.8	0
		12	0	22.3	23.3	22.9	23.5	23.2	23.8	1
		12	7	22.4	23.3	22.9	23.5	23.3	23.8	1
		12	13	22.4	23.3	22.9	23.5	23.3	23.8	1
	16QAM	25	0	22.4	23.3	22.9	23.5	23.2	23.8	1
		1	0	22.5	23.3	22.9	23.5	23.3	23.8	1
		1	12	22.5	23.3	23.0	23.5	23.3	23.8	1
		1	24	22.5	23.3	23.0	23.5	23.3	23.8	1
		12	0	21.4	22.3	22.0	22.5	22.2	22.8	2
		12	7	21.5	22.3	22.0	22.5	22.4	22.8	2
	64QAM	12	13	21.5	22.3	22.0	22.5	22.3	22.8	2
		25	0	21.4	22.3	21.9	22.5	22.2	22.8	2
		1	0	21.5	22.3	22.1	22.5	22.4	22.8	2
		1	12	21.6	22.3	22.1	22.5	22.5	22.8	2
		1	24	21.6	22.3	22.2	22.5	22.5	22.8	2
		12	0	20.4	21.3	21.0	21.5	21.3	21.8	3
64QAM	12	7	20.5	21.3	21.0	21.5	21.4	21.8	3	
	12	13	20.5	21.3	21.0	21.5	21.4	21.8	3	
	25	0	20.4	21.3	21.0	21.5	21.2	21.8	3	

9.3. LTE Up-Link Carrier Aggregation

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

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

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

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

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

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

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

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

Where M_A is defined as follows

$$\begin{aligned} M_A &= 8.2 && ; 0 \leq A < 0.025 \\ &9.2 - 40A && ; 0.025 \leq A < 0.05 \\ &8 - 16A && ; 0.05 \leq A < 0.25 \\ &4.83 - 3.33A && ; 0.25 \leq A \leq 0.4 \\ &3.83 - 0.83A && ; 0.4 \leq A \leq 1 \end{aligned}$$

and M_{IM5} is defined as follows

$$\begin{aligned} M_{IM5} &= 4.5 && ; \Delta_{IM5} < 1.5 * \text{BW}_{\text{Channel_CA}} \\ &6.0 && ; 1.5 * \text{BW}_{\text{Channel_CA}} \leq \Delta_{IM5} < \text{BW}_{\text{Channel_CA}}/2 + \Delta f_{\text{ooB}} \\ M_A &&& ; \Delta_{IM5} \geq \text{BW}_{\text{Channel_CA}}/2 + \Delta f_{\text{ooB}} \end{aligned}$$

Where

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

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

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

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

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

$$\text{MPR} = \text{CEIL}\{M_N, 0.5\}$$

Where M_N is defined as follows

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

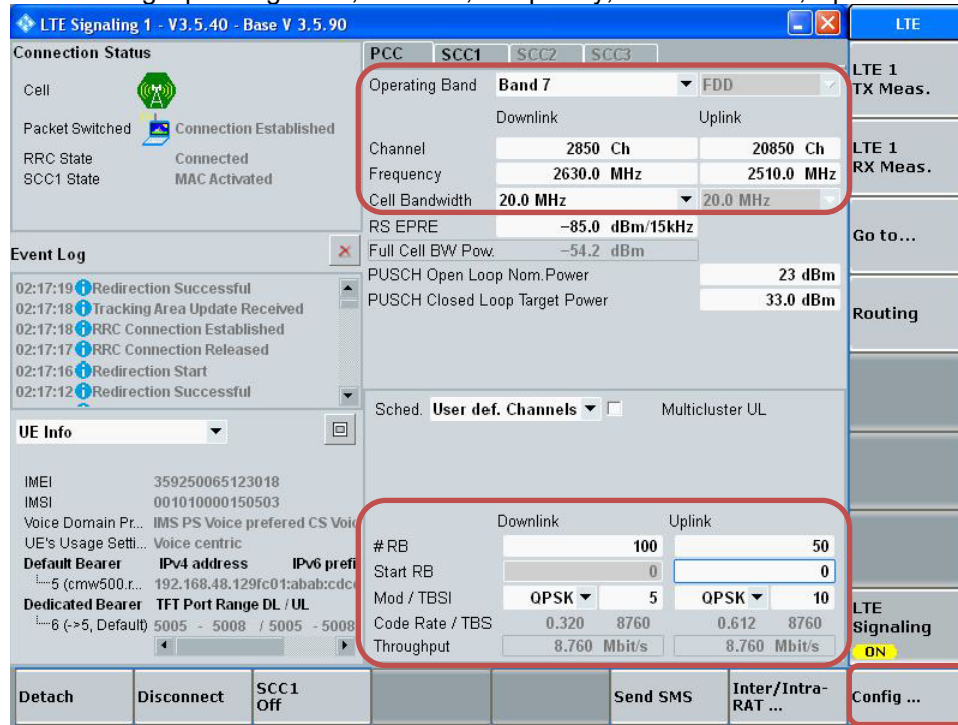
Where $N = N_{\text{RB_alloc}}$ is the number of allocated resource blocks.

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

LTE Carrier Aggregation Test Signal Set-up Procedure
 (Use normal LTE set-up procedure in addition with the following steps)

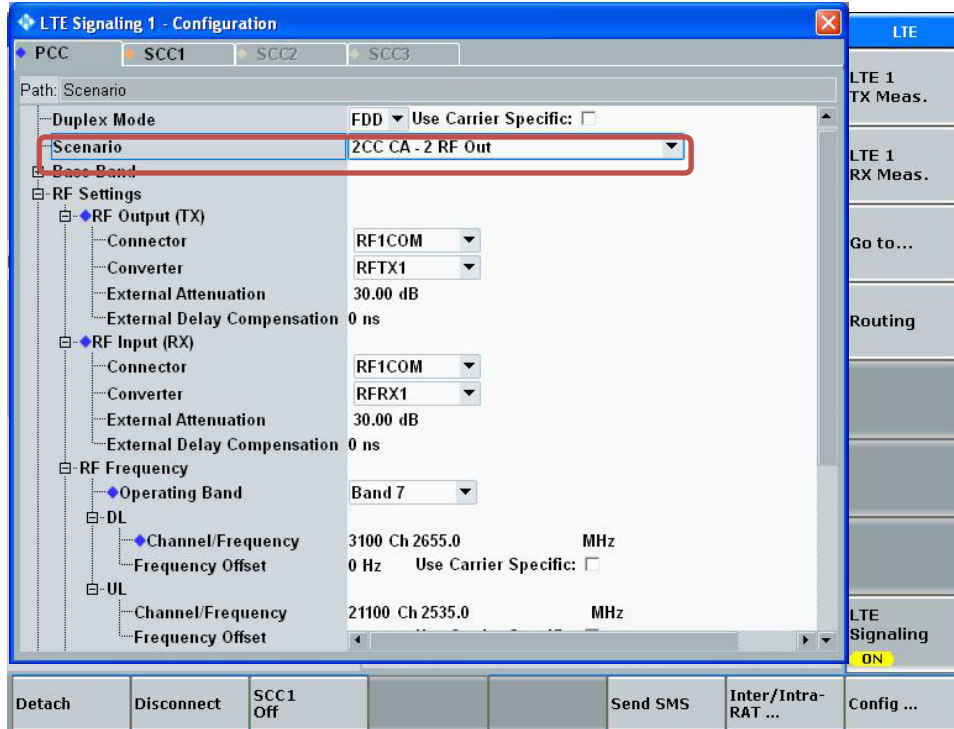
Set to CMW-500 with following parameters:

- PCC tab:
 - Select the testing Operating Band, Channel, Frequency, Cell Bandwidth, Uplink RBs

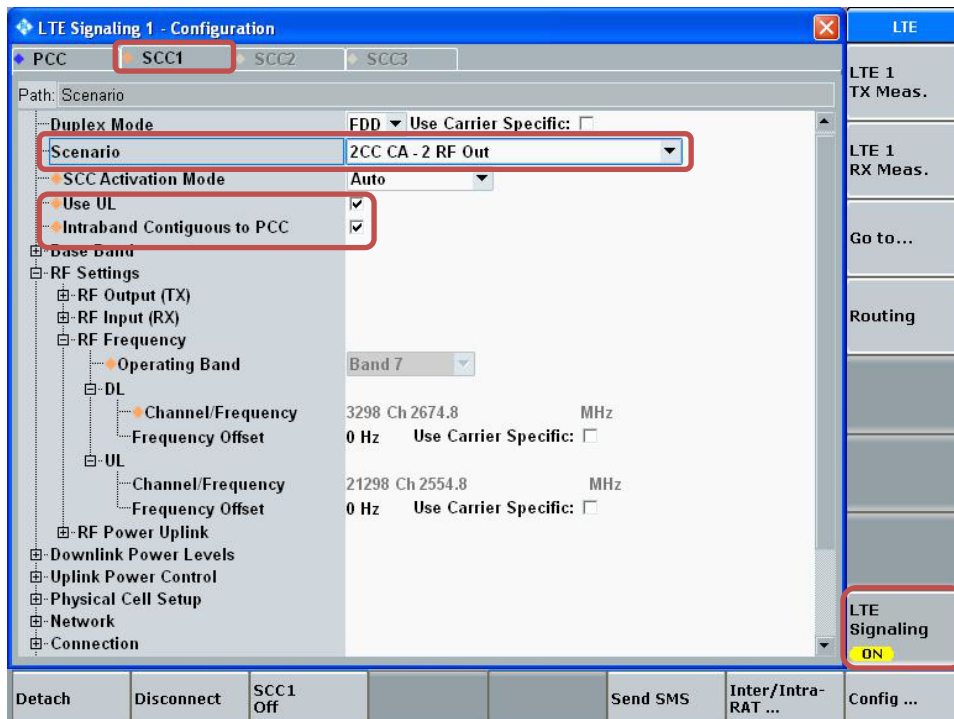


- Go to "Config...."

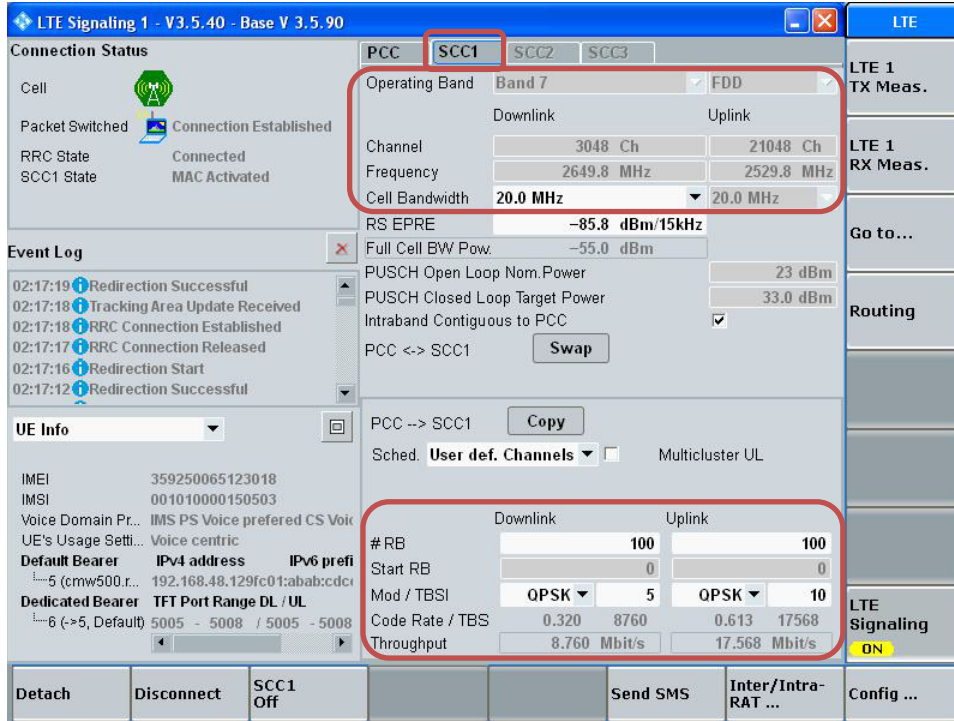
- Go to “Scenario”
- Set to “2CC CA – 2 RF Out”



- Select “SCC1” tab
- Go to “Scenario”
- Set to “2CC CA – 2 RF Out”
- Enable “Use UL”
- Enable “Intraband Contiguous to PCC”
- Select “LTE Signaling” button

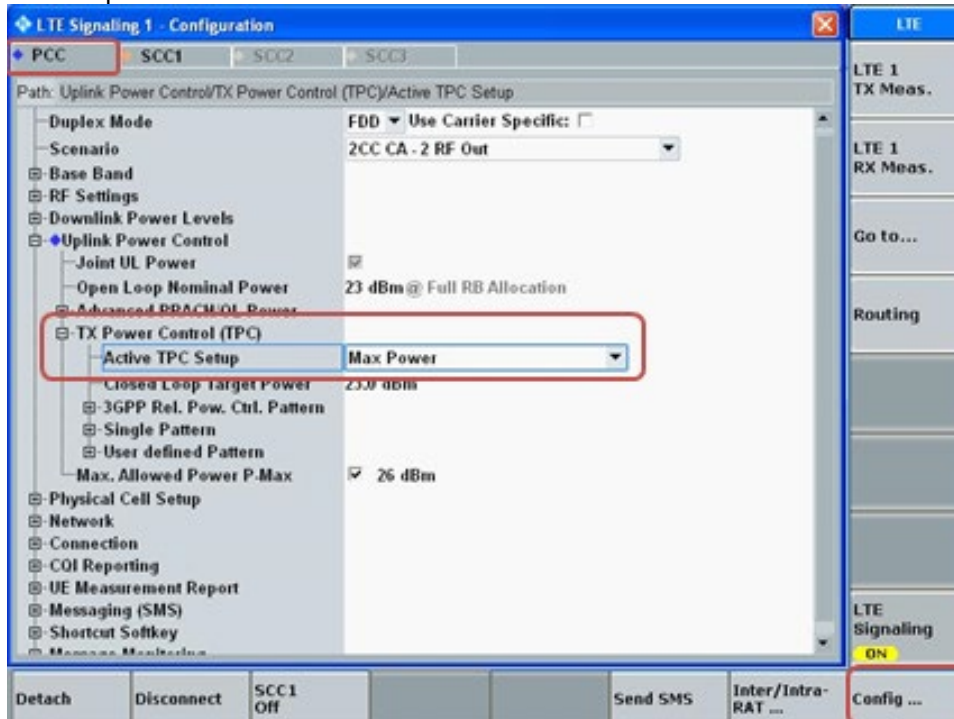


- Select “SCC1” tab
 - Select the testing Cell Bandwidth, Uplink RBs

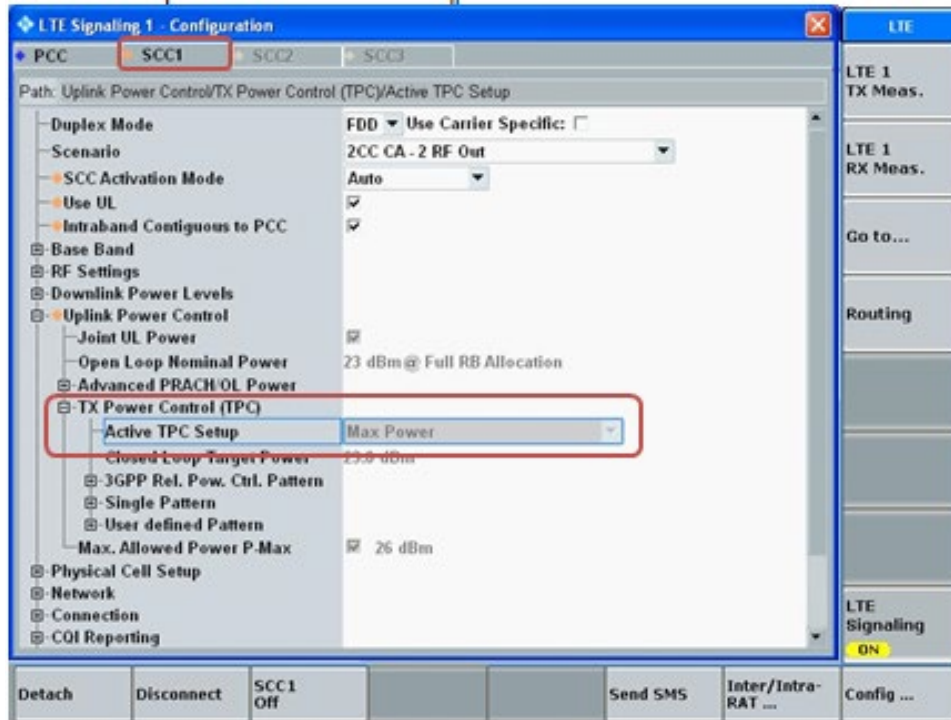


Max Power Setting

- Select “Config ...” button
- Select PCC tab
- Set “Active TPC Setup” to “Max Power”



- Select SCC1 tab
- Verify that “Active TPC Setup” is set to “Max Power”



View TX Power

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



LTE Intra-Band Contiguous Carrier Aggregation

UL CA shall be tested based on the worst-case SAR configuration determined from non-CA SAR testing result. The channel BW, channel number, RB allocation, etc. would be selected to allow contiguous CA of PCC and SCC. Uplink output power for UL CA is the total power measured across the PCC and SCC.

UL CA power measurements were performed with QPSK modulation based on the worst-case standalone SAR.

The UL CA mode power measurements represent the total power across both carriers. Measurements were made for all supported PCC bandwidths using the channel/RB combination resulting in the highest standalone output power at the least MPR (0 dB). SCCs were set to use configurations similar to the PCC to establish conservative or worst case equivalent SAR test conditions (highest maximum power with MPR of 0 dB and RB allocation setting).

The standalone power measurement is the power for the PCC in the non-CA mode (i.e. single carrier power). In all cases the UL CA power is less than or equal to the standalone power, which is in accordance with the tune-up limits in table below.

According to November 2017 TCB workshop, Uplink CA SAR Test Guidance as follows:

- a) When the maximum output for UL CA is ≤ standalone LTE mode (without CA)
 - PCC is configured according to the highest standalone SAR configuration tested
 - SCC and subsequent CCs are configured according to procedures used for power measurement and parameters (BW, RB etc.) similar to that used for the PCC
- b) When the Reported SAR for UL CA configuration, described above, is > 1.2 W/kg, UL CA SAR is also required for all required test channels(PCC based)
- c) UL CA SAR is also required for standalone SAR configurations > 1.2 W/kg when they are scaled to the UL CA power level

LTE CA 7C Measured Results

UL CA Combination	Antenna	Power Mode	Modulation	PCC				SCC				Standalone Power		(PCC + SCC) UL CA Power			Worst case positions at standalone
				BW (MHz)	Freq	RB	Offset	BW (MHz)	Freq	RB	Offset	Tune-Up Limit (dBm)	UL CA Inactive (dBm)	Tune-Up Limit (dBm)	UL CA active (dBm)	Delta	
CA_7C	Antenna 1	Normal	QPSK	20	2510	1	99	20	2529.8	1	0	24.70	23.46	24.80	23.23	-0.2	H4 + Cloth + B1 / Back

Note(s):

PCC RB allocation setting for UL CA has been adjusted based on the worst-case power.

LTE CA 41C Measured Results

UL CA Combination	Antenna	Power Mode	Modulation	PCC				SCC				Standalone Power		(PCC + SCC) UL CA Power			Worst case positions at standalone
				BW (MHz)	Freq	RB	Offset	BW (MHz)	Freq	RB	Offset	Tune-Up Limit (dBm)	UL CA Inactive (dBm)	Tune-Up Limit (dBm)	UL CA active (dBm)	Delta	
CA_41C	Antenna 1	Normal	QPSK	20	2660.2	1	99	20	2680	1	0	25.00	23.23	25.00	23.19	0.0	H4 / Back

Note(s):

PCC RB allocation setting for UL CA has been adjusted based on the worst-case power.

9.4. LTE Down-Link Carrier Aggregation

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

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

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

Index	2CC	Restriction	Completely Covered by Measurement Superset	Index	3CC	Restriction	Completely Covered by Measurement Superset
2CC # 1	CA_2C		3CC #12	3CC # 1	CA_41A-41C		No
2CC # 2	CA_7B		No	3CC # 2	CA_66A-66B		No
2CC # 3	CA_7C		No	3CC # 3	CA_66A-66C		No
2CC # 4	CA_41C		3CC #1	3CC # 4	CA_2A-2A-12A		No
2CC # 5	CA_66B		3CC #2	3CC # 5	CA_2A-2A-66A		No
2CC # 6	CA_66C		3CC #3	3CC # 6	CA_2A-2A-71A		No
2CC # 7	CA_2A-2A		3CC #4	3CC # 7	CA_2A-12A-12A		No
2CC # 8	CA_7A-7A		No	3CC # 8	CA_2A-12B		No
2CC # 9	CA_41A-41A		No	3CC # 9	CA_2A-66A-66A		No
2CC # 10	CA_66A-66A		3CC #9	3CC # 10	CA_2A-66B		No
2CC # 11	CA_2A-12A		3CC #4	3CC # 11	CA_2A-66C		No
2CC # 12	CA_2A-66A		3CC #9	3CC # 12	CA_2C-12A		No
2CC # 13	CA_2A-71A		3CC #6	3CC # 13	CA_2C-66A		No
2CC # 14	CA_7A-12A		No	3CC # 14	CA_12A-66A-66A		No
2CC # 15	CA_12A-12A		3CC #7	3CC # 15	CA_12A-66C		No
2CC # 16	CA_12A-66A		3CC #14	3CC # 16	CA_66A-66A-71A		No
2CC # 23	CA_66A-71A		3CC #16	3CC # 17	CA_66C-71A		No
				3CC # 18	CA_66D		No
				3CC # 19	CA_2A-5A-66A		No
				3CC # 20	CA_2A-12A-66A		No
				3CC # 21	CA_2A-66A-71A		No
				3CC # 22	CA_12A-66B		No
				3CC # 23	CA_41D		No

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

2CC DL CA Measured Results

E-UTRA CA configuration	CC1 (UL)					CC1 (DL)			CC2 (DL)			Aggregated BW	CA Inactive (dBm)	CA Active (dBm)	Delta	2CC #
	Mode	BW (MHz)	Channel	Freq (MHz)	RB,Offset	BW (MHz)	Channel	Freq (MHz)	BW (MHz)	Channel	Freq (MHz)					
CA_41A-41A	QPSK	20	39750	2506	50,0	20	39750	2506	20	41490	2680	40	20.94	21.00	0.06	9
CA_7A-12A	QPSK	20	21100	2535	50,0	20	3100	2655	10	5130	741	30	22.86	22.73	-0.13	14
CA_7A-7A	QPSK	20	20850	2510	50,0	20	2850	2630	20	3350	2680	40	23.36	23.22	-0.14	8
CA_7B	QPSK	15	21076	2532.6	1,0	15	3079	2652.6	5	3169	2661.9	20	23.98	23.96	-0.02	2
CA_7C	QPSK	20	21001	2525.1	1,0	20	3001	2645.1	20	3199	2664.9	40	24.11	24.12	0.01	3

3CC DL CA Measured Results

E-UTRA CA configuration	CC1 (UL)					CC1 (DL)			CC2 (DL)			CC3 (DL)			Aggregated BW	CA Inactive (dBm)	CA Active (dBm)	Delta	3CC #
	Mode	BW (MHz)	Channel	Freq (MHz)	RB,Offset	BW (MHz)	Channel	Freq (MHz)	BW (MHz)	Channel	Freq (MHz)	BW (MHz)	Channel	Freq (MHz)					
CA_12A-66A-66A	QPSK	10	23095	707.5	50,0	10	5095	737.5	20	66536	2120	20	67236	2190	50	22.73	22.76	0.03	14
CA_12A-66B	QPSK	10	23095	707.5	50,0	10	5095	737.5	10	66837	2150.1	10	66936	2160	30	22.79	22.75	-0.04	22
CA_12A-66C	QPSK	10	23095	707.5	50,0	10	5095	737.5	20	66787	2145.1	20	66985	2164.9	50	22.81	22.78	-0.03	15
CA_2A-12A-12A	QPSK	20	18900	1880	1,0	20	900	1960	5	5035	731.5	5	5155	743.5	30	24.28	24.34	0.06	7
CA_2A-12A-66A	QPSK	20	18900	1880	1,0	20	900	1960	10	5095	737.5	20	66886	2155	50	24.29	24.31	0.02	20
CA_2A-2A-66A	QPSK	20	18700	1860	1,0	20	700	1940	20	1100	1980	20	66886	2155	60	23.89	23.93	0.04	5
CA_2A-12B	QPSK	20	18900	1880	1,0	20	900	1960	5	5035	731.5	10	5110	739	35	24.32	24.35	0.03	8
CA_2A-2A-12A	QPSK	20	18700	1860	1,0	20	700	1940	20	1100	1980	10	5130	741	50	23.94	23.99	0.05	4
CA_2A-2A-71A	QPSK	20	18900	1880	1,0	20	700	1940	20	1100	1980	20	68761	634.5	60	24.26	24.32	0.06	6
CA_2A-66A-66A	QPSK	20	18900	1880	1,0	20	900	1960	20	66536	2120	20	67236	2190	60	24.01	24.07	0.06	9
CA_2A-66A-71A	QPSK	20	18900	1880	1,0	20	900	1960	20	66536	2120	20	68761	634.5	60	24.26	24.21	-0.05	21
CA_2A-66B	QPSK	20	18900	1880	1,0	20	900	1960	10	66837	2150.1	10	66936	2160	40	24.04	24.13	0.09	10
CA_2A-66C	QPSK	20	18900	1880	1,0	20	900	1960	20	66787	2145.1	20	66985	2164.9	60	24.03	24.13	0.10	11
CA_2C-12A	QPSK	20	18801	1870	1,0	20	801	1950.1	20	999	1969.9	10	5095	737.5	50	23.88	23.96	0.08	12
CA_2A-5A-66A	QPSK	20	18900	1880	1,0	20	900	1960	10	2525	881.5	20	66886	2155	50	24.23	24.30	0.07	19
CA_2C-66A	QPSK	20	18801	1870.1	1,0	20	801	1950.1	20	999	1969.9	20	66886	2155	60	24.22	24.23	0.01	13
CA_41A-41C	QPSK	20	39750	2506	1,0	20	39750	2506	20	41292	2660.2	20	41490	2680	60	23.03	23.11	0.08	1
CA_41D	QPSK	20	41090	2640.2	1,0	20	41090	2640.2	20	41292	2660.2	20	41490	2680	60	22.00	22.10	0.10	23
CA_66A-66A-71A	QPSK	20	132072	1720	1,0	20	66536	2120	20	67236	2190	20	68761	634.5	60	23.67	23.69	0.02	16
CA_66A-66B	QPSK	20	132072	1720	1,0	20	66536	2120	10	67187	2185.1	10	67286	2195	40	23.75	23.66	-0.09	2
CA_66A-66C	QPSK	20	132072	1720	1,0	20	66536	2120	20	67038	2170.2	20	67236	2190	60	23.72	23.61	-0.11	3
CA_66C-71A	QPSK	20	132323	1745.1	1,0	20	66787	2145.1	20	66985	2164.9	20	68761	634.5	60	23.67	23.58	-0.09	17
CA_66D	QPSK	20	132224	1735.2	1,0	20	66688	2135.2	20	66886	2155	20	67084	2174.8	60	23.73	23.71	-0.02	18

9.5. Wi-Fi 2.4GHz (DTS Band)

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

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

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

SAR testing is not required for OFDM mode(s) when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

Mode	Bandwidth	Tx Frequency	Max Tolerance (dBm)
802.11b	20 MHz	2412 MHz	20.5
	20 MHz	2437 MHz	20.5
	20 MHz	2462 MHz	20.5
802.11g/n	20 MHz	2412 MHz	19.0
	20 MHz	2437 MHz	19.0
	20 MHz	2462 MHz	19.0
802.11n/ac	40 MHz	2422 MHz	18.5
	40 MHz	2437 MHz	18.5
	40 MHz	2452 MHz	18.5

Wi-Fi 2.4GHz Measured Results

Band	Mode	Ch #	Freq. (MHz)	Antenna 2 Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test
						(Yes/No)
DSSS 2.4 GHz	802.11b	1	2412	20.1	20.5	Yes
		6	2437	20.5	20.5	
		11	2462	20.5	20.5	

Duty Factor Measured Results

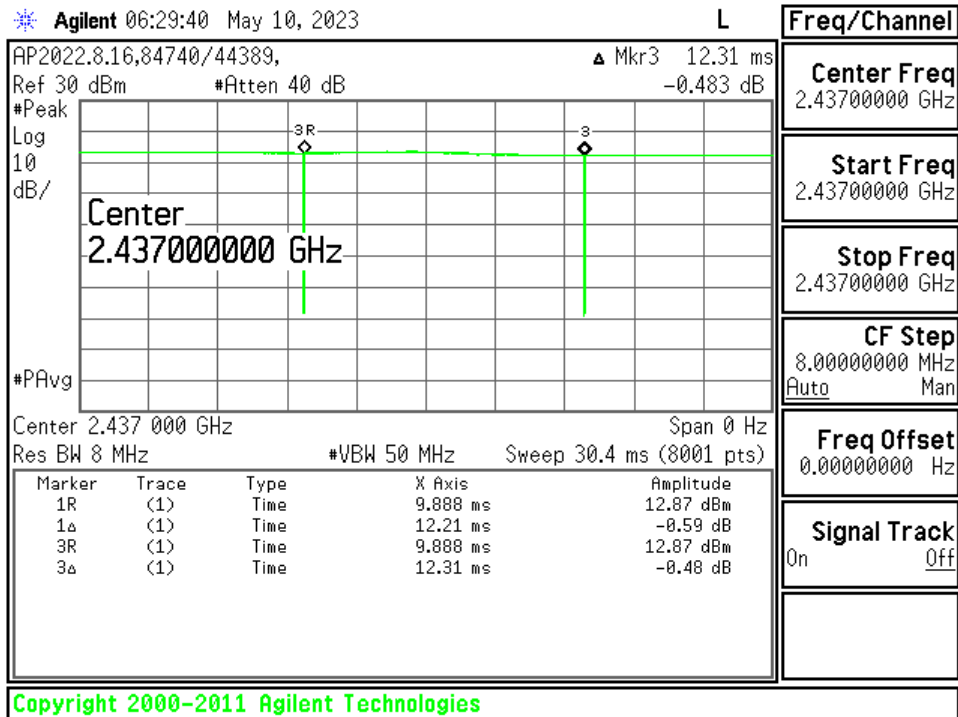
Band	Mode	T on (ms)	Period (ms)	Duty Cycle	Crest Factor (1/duty cycle)
2.4 GHz	802.11b	12.21	12.31	99.19%	1.01

Note(s):

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

Duty Cycle plots

2.4 GHz 802.11b



9.6. Wi-Fi 5GHz (U-NII Band)

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

When the same transmission mode configurations have the same maximum output power on the same channel for the 802.11 a/g/n/ac/ax modes, the channel in the lower order/sequence 802.11 transmission mode is selected.

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

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

When the specified maximum output power is the same for both UNII 1 and UNII 2A, begin SAR measurements in UNII 2A with the channel with the highest measured output power. If the reported SAR for UNII 2A is ≤ 1.2 W/kg, SAR is not required for UNII 1; otherwise treat the remaining bands separately and test them independently for SAR.

Mode	Bandwidth	Tx Frequency	Max Tolerance (dBm)
U-NII-1 5.2 GHz	802.11 a/n/ac 20 MHz	5180 MHz	18.0
		5200 MHz	18.0
		5220 MHz	18.0
		5240 MHz	18.0
	802.11n/ac 40 MHz	5190 MHz	15.3
		5230 MHz	17.5
U-NII-2A 5.3 GHz	802.11 a/n/ac 20 MHz	5260 MHz	18.0
		5280 MHz	18.0
		5300 MHz	18.0
		5320 MHz	18.0
	802.11n/ac 40 MHz	5270 MHz	17.5
		5310 MHz	16.0
U-NII-2C 5.5 GHz	802.11 a/n/ac 20 MHz	5500 MHz	18.0
		5580 MHz	18.0
		5620 MHz	18.0
		5510 MHz	14.6
	802.11n/ac 40 MHz	5590 MHz	17.5
		5630 MHz	17.5
802.11ac 80 MHz	5530 MHz	15.5	
	5610 MHz	17.0	
U-NII-3 5.8 GHz	802.11 a/n/ac 20 MHz	5690 MHz	17.0
		5745 MHz	18.0
		5785 MHz	18.0
		5825 MHz	18.0
	802.11n/ac 40 MHz	5755 MHz	17.5
		5795 MHz	17.5
802.11ac 80 MHz	5775 MHz	17.0	

Wi-Fi 5 GHz Measured Results

Band	Mode	Ch #	Freq. (MHz)	Antenna 2 Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)
UNII-1 5.2 GHz	802.11a	36	5180	18.0	18.0	Yes
		40	5200	17.9	18.0	
		44	5220	17.9	18.0	
		48	5240	17.7	18.0	
Band	Mode	Ch #	Freq. (MHz)	Antenna 2 Average Power (dBm)		
UNII-2A 5.3 GHz	802.11a	52	5260	17.7	18.0	Yes
		56	5280	17.8	18.0	
		60	5300	17.8	18.0	
		64	5320	18.0	18.0	
Band	Mode	Ch #	Freq. (MHz)	Antenna 2 Average Power (dBm)		
UNII-2C 5.5 GHz	802.11a	100	5500	17.9	18.0	Yes
		116	5580	17.9	18.0	
		124	5620	17.7	18.0	
		144	5720	17.7	18.0	
Band	Mode	Ch #	Freq. (MHz)	Antenna 2 Average Power (dBm)		
UNII-3 5.8 GHz	802.11a	149	5745	18.0	18.0	Yes
		157	5785	17.9	18.0	
		165	5825	17.7	18.0	

Duty Factor Measured Results

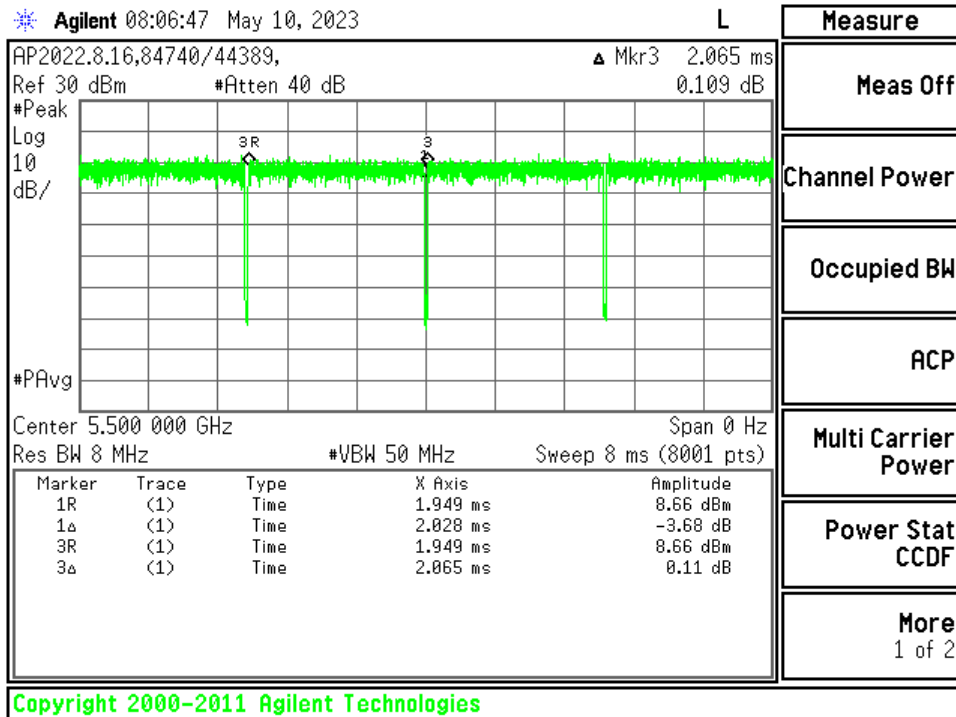
Band	Mode	T on (ms)	Period (ms)	Duty Cycle	Crest Factor (1/duty cycle)
UNII-1	802.11a	2.028	2.065	98.21%	1.02

Note(s):

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

Duty Cycle plots

5GHz 801.11a



9.7. Bluetooth

Maximum Output Power (Tune-up Limit) for Bluetooth

SAR measurement is not required for the EDR and LE. When the secondary mode is $\leq \frac{1}{4}$ dB higher than the primary mode.

Mode	Data Rate	Max Tolerance (dBm)
BR	1-DH5 (GFSK 1 Mbps)	11.5
EDR	2-DH5 ($\pi/4$ -DQPSK 2 Mbps)	9.5
	3-DH5 (8-DPSK 3 Mbps)	9.5
LE	1-LE (GFSK 1 Ms/s)	12.5
	2-LE (GFSK 2 Ms/s)	12.5
	Long Range S=2 (500 kbps)	12
	Long Range S=8 (125 kbps)	12

Bluetooth Measured Results

Band	Mode	Ch #	Freq. (MHz)	Antenna 2 Average Power (dBm)		
				Meas Pwr	Tune-up	SAR Test (Yes/No)
2.4	LE, GFSK	0	2402	10.7	12.5	Yes
		19	2440	11.8	12.5	
		39	2480	10.7	12.5	

Duty Factor Measured Results

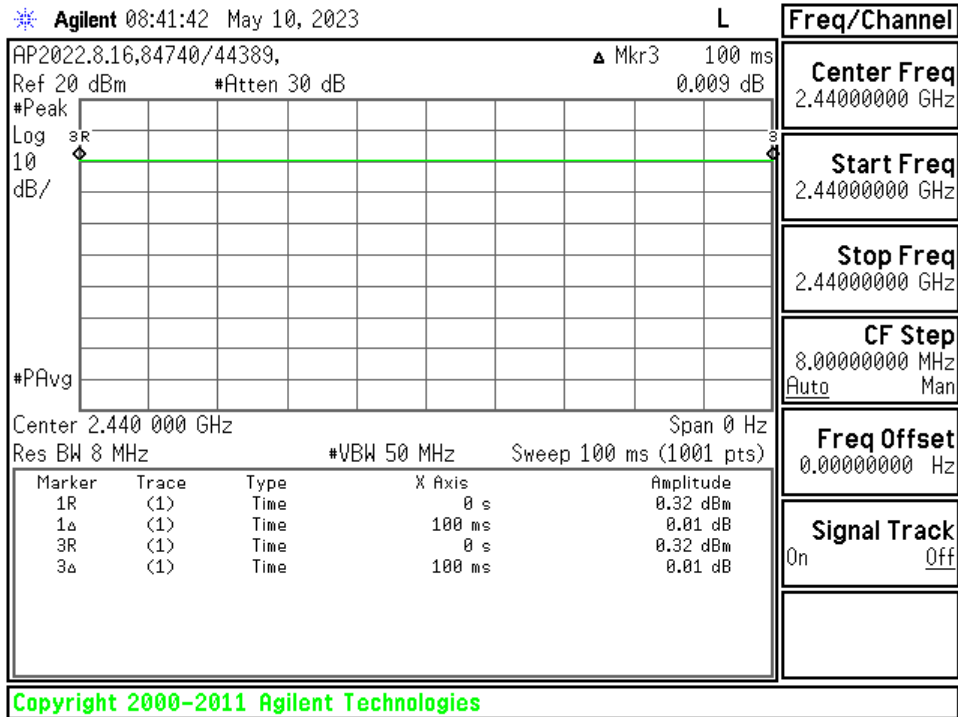
Mode	T on (ms)	Period (ms)	Duty Cycle	Crest Factor (1/duty cycle)
GFSK	100	100	100.00%	1.00

Note(s):

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

Duty Cycle plots

GFSK



10. Measured and Reported (Scaled) SAR Results

SAR Test Reduction criteria are as follows:

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

KDB 447498 D01 General RF Exposure Guidance:

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

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

KDB 648474 D04 Handset SAR:

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

KDB 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 $\leq \frac{1}{4}$ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.

KDB 941225 D05 SAR for LTE Devices:

SAR test reduction is applied using the following criteria:

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

KDB 248227 D01 SAR meas for 802.11:

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

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

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

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

10.1. WCDMA II

RF Exposure Conditions	Mode	Antenna	Device Configuration	Dist. (mm)	Test Position	Ch #	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.			
								Tune-up Limit	Meas.	Meas.	Scaled				
Body-w orn	Rel. 99 RMC 12.2 kbps	Antenna 1	HU0123	5	Back	9262	1852.4	24.3	23.3	0.886	1.115				
						9400	1880.0	24.4	23.8	0.886	1.017				
						9538	1907.6	24.4	23.3	0.834	1.074				
					Front	9262	1852.4	24.3	23.3	1.100	1.385				
						9400	1880.0	24.4	23.8	1.070	1.229				
						9538	1907.6	24.4	23.3	1.100	1.417	1			
			HU0123 + HU0223	0	Back	9400	1880.0	24.4	23.8	0.270	0.310				
						HU0123 + Cloth + HU0823	0	Back	9262	1852.4	24.3	23.3	0.997	1.255	
									9400	1880.0	24.4	23.8	0.761	0.874	
									9538	1907.6	24.4	23.3	0.912	1.175	
						HU0123 + HU0923	0	Back	9538	1907.6	24.4	23.3	0.181	0.233	
									HU0123 + HU0223 + HU0623	0	Back	9538	1907.6	24.4	23.3
Front	9538	1907.6	24.4	23.3	0.192	0.247									

Note(s):
Channels for device configurations HU0123 + HU0923 and HU0123 + HU0223 + HU0623 were spot-checks chosen based off worst-case measurements within the exposure condition.

10.2. WCDMA IV

RF Exposure Conditions	Mode	Antenna	Device Configuration	Dist. (mm)	Test Position	Ch #	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up Limit	Meas.	Meas.	Scaled	
Body-worn	Rel. 99 RMC 12.2 kbps	Antenna 1	HU0123	5	Back	1413	1733	24.4	23.7	0.573	0.673	2
					Front	1413	1733	24.4	23.7	0.461	0.542	
			HU0123 + HU0223	0	Back	1413	1733	24.4	23.7	0.236	0.277	
						HU0123 + Cloth + HU0823	0	Back	1413	1733	24.4	23.7
			HU0123 + HU0923	0	Back				1413	1733	24.4	23.7
						HU0123 + HU0223 + HU0623	0	Back	1413	1733	24.4	23.7
			Front	1413	1733				24.4	23.7	0.344	0.404

Note(s):
Channels for device configurations HU0123 + HU0923 and HU0123 + HU0223 + HU0623 were spot-checks chosen based off worst-case measurements within the exposure condition.

10.3. WCDMA V

RF Exposure Conditions	Mode	Antenna	Device Configuration	Dist. (mm)	Test Position	Ch #	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
								Tune-up Limit	Meas.	Meas.	Scaled	
Body-worn	Rel. 99 RMC 12.2 kbps	Antenna 1	HU0123	5	Back	4183	837	24.5	23.2	0.177	0.239	
					Front	4183	837	24.5	23.2	0.171	0.231	
			HU0123 + HU0223	0	Back	4183	837	24.5	23.2	0.122	0.165	
						HU0123 + Cloth + HU0823	0	Back	4183	837	24.5	23.2
			HU0123 + HU0923	0	Back				4183	837	24.5	23.2
						HU0123 + HU0223 + HU0623	0	Back	4183	837	24.5	23.2
			Front	4183	837				24.5	23.2	0.147	0.198

Note(s):
Channels for device configurations HU0123 + HU0923 and HU0123 + HU0223 + HU0623 were spot-checks chosen based off worst-case measurements within the exposure condition.

10.4. LTE Band 2 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Antenna	Device Configuration	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB Offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
										Tune-up Limit	Meas.	Meas.	Scaled	
Body-worn	QPSK	Antenna 1	HU0123	5	Back	18700	1860.0	1	99	24.8	24.2	0.954	1.095	
								50	50	23.8	23.2	0.788	0.905	
								100	0	23.8	23.1	0.745	0.875	
						18900	1880.0	1	49	24.6	24.3	1.050	1.125	
								50	24	23.6	23.4	0.843	0.883	
								1	0	24.8	24.2	1.000	1.148	
				19100	1900	50	0	23.8	23.1	0.925	1.087			
						1	99	24.8	24.2	1.260	1.447	4		
						50	50	23.8	23.2	1.000	1.148			
				Front	18700	1860.0	100	0	23.8	23.1	0.816	0.959		
							1	49	24.6	24.3	1.090	1.168		
							50	24	23.6	23.4	0.857	0.897		
			18900		1880.0	1	0	24.8	24.2	1.160	1.332			
						50	0	23.8	23.1	0.930	1.093			
						1	99	24.8	24.2	0.487	0.559			
			HU0123 + HU0223	0	Back	18700	1860	1	99	24.8	24.2	0.487	0.559	
								50	50	23.8	23.2	0.391	0.449	
								1	99	24.8	24.2	0.980	1.125	
						18700	1860.0	50	50	23.8	23.2	0.779	0.894	
								100	0	23.8	23.1	0.695	0.817	
								1	49	24.6	24.3	1.130	1.211	
				18900	1880.0	50	24	23.6	23.4	0.906	0.949			
						1	0	24.8	24.2	1.210	1.389			
						50	0	23.8	23.1	1.130	1.328			
HU0123 + HU0923	0	Back		18700	1860	1	99	24.8	24.2	0.139	0.160			
						1	99	24.8	24.2	0.353	0.405			
						1	99	24.8	24.2	0.246	0.282			
	Front	18700	1860	1	99	24.8	24.2	0.353	0.405					
				1	99	24.8	24.2	0.246	0.282					
				1	99	24.8	24.2	0.246	0.282					

Note(s):
Channels for device configurations HU0123 + HU0923 and HU0123 + HU0223 + HU0623 were spot-checks chosen based off worst-case measurements within the exposure condition.

10.5. LTE Band 7 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Antenna	Device Configuration	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB Offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
										Tune-up Limit	Meas.	Meas.	Scaled	
Body-worn	QPSK	Antenna 1	HU0123	5	Back	20850	2510.0	1	0	24.7	24.2	0.967	1.085	
								50	0	23.7	23.2	0.559	0.627	
								1	0	24.8	24.0	0.813	0.977	
						21100	2535.0	50	24	23.8	22.8	0.590	0.743	
								100	0	23.8	22.8	0.814	1.025	
								1	0	24.2	23.7	1.270	1.425	
						21350	2560.0	50	0	23.2	22.7	1.080	1.212	
								1	0	24.7	24.2	0.543	0.609	
								50	0	23.7	23.2	0.574	0.644	
				Front	20850	2510.0	1	0	24.8	24.0	0.673	0.809		
							50	0	23.7	23.2	0.658	0.828		
							100	0	23.8	22.8	0.452	0.569		
					21100	2535.0	1	0	24.2	23.7	0.595	0.668		
							50	0	23.2	22.7	0.546	0.613		
							1	0	24.8	24.0	0.256	0.308		
					21350	2560.0	50	24	23.8	22.8	0.197	0.248		
							1	0	24.7	24.2	1.290	1.447	5	
							50	0	23.7	23.2	1.050	1.178		
			HU0123 + HU0223	0	Back	21100	2535.0	1	0	24.8	24.0	1.170	1.407	
								50	24	23.8	22.8	0.655	0.825	
								100	0	23.8	22.8	1.080	1.360	
				21350	2560.0	1	0	24.2	23.7	0.818	0.918			
						50	0	23.2	22.7	0.760	0.853			
						1	0	24.7	24.2	0.054	0.061			
			HU0123 + HU0923	0	Back	20850	2510.0	1	0	24.7	24.2	0.352	0.395	
								1	0	24.7	24.2	0.352	0.395	
								1	0	24.7	24.2	0.352	0.395	
			HU0123 + HU0223 + HU0623	0	Back	20850	2510.0	1	0	24.7	24.2	0.352	0.395	
								1	0	24.7	24.2	0.352	0.395	
								1	0	24.7	24.2	0.352	0.395	
Front	20850	2510.0	1	0	24.7	24.2	0.564	0.633						
			1	0	24.7	24.2	0.564	0.633						
			1	0	24.7	24.2	0.564	0.633						

Note(s):
Channels for device configurations HU0123 + HU0923 and HU0123 + HU0223 + HU0623 were spot-checks chosen based off worst-case measurements within the exposure condition.

10.6. LTE Band 12 (10MHz Bandwidth)

RF Exposure Conditions	Mode	Antenna	Device Configuration	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB Offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
										Tune-up Limit	Meas.	Meas.	Scaled	
Body-w orn	QPSK	Antenna 1	HU0123	5	Back	23060	704.0	1	49	24.3	23.6	0.345	0.405	
					Front	23060	704.0	25	25	23.3	22.6	0.271	0.318	
				0	Back	23060	704.0	1	49	24.3	23.6	0.313	0.368	
					Front	23060	704.0	25	25	23.3	22.6	0.254	0.298	
			0	Back	23060	704.0	1	49	24.3	23.6	0.181	0.213	6	
				Front	23060	704.0	25	25	23.3	22.6	0.148	0.174		
			0	Back	23060	704.0	1	49	24.3	23.6	0.405	0.476		
				Front	23060	704.0	25	25	23.3	22.6	0.332	0.390		
			0	Back	23060	704.0	1	49	24.3	23.6	0.026	0.031		
				Front	23060	704.0	1	49	24.3	23.6	0.052	0.061		
			0	Back	23060	704.0	1	49	24.3	23.6	0.160	0.188		
				Front	23060	704.0	1	49	24.3	23.6	0.160	0.188		

Note(s):

Channels for device configurations HU0123 + HU0923 and HU0123 + HU0223 + HU0623 were spot-checks chosen based off worst-case measurements within the exposure condition.

10.7. LTE Band 26 (15MHz Bandwidth)

RF Exposure Conditions	Mode	Antenna	Device Configuration	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB Offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
										Tune-up Limit	Meas.	Meas.	Scaled	
Body-w orn	QPSK	Antenna 1	HU0123	5	Back	26965	841.5	1	37	24.8	23.4	0.301	0.415	
					Front	26965	841.5	36	20	23.8	22.3	0.239	0.338	
				0	Back	26965	841.5	1	37	24.8	23.4	0.260	0.359	
					Front	26965	841.5	36	20	23.8	22.3	0.215	0.304	
			0	Back	26965	841.5	1	37	24.8	23.4	0.164	0.226	7	
				Front	26965	841.5	36	20	23.8	22.3	0.128	0.181		
			0	Back	26965	841.5	1	37	24.8	23.4	0.403	0.556		
				Front	26965	841.5	36	20	23.8	22.3	0.287	0.405		
			0	Back	26965	841.5	1	37	24.8	23.4	0.051	0.070		
				Front	26965	841.5	1	37	24.8	23.4	0.073	0.101		
			0	Back	26965	841.5	1	37	24.8	23.4	0.073	0.101		
				Front	26965	841.5	1	37	24.8	23.4	0.221	0.305		

Note(s):

Channels for device configurations HU0123 + HU0923 and HU0123 + HU0223 + HU0623 were spot-checks chosen based off worst-case measurements within the exposure condition.

10.8. LTE Band 41 PC3 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Antenna	Device Configuration	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB Offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
										Tune-up Limit	Meas.	Meas.	Scaled	
Body-w orn	QPSK	Antenna 1	HU0123	5	Back	41490	2680.0	1	0	25.0	23.5	0.458	0.647	
					Front	41490	2680.0	50	0	24.0	22.4	0.408	0.590	
				0	Back	41490	2680.0	1	0	25.0	23.5	0.348	0.492	
					Front	41490	2680.0	50	0	24.0	22.4	0.356	0.515	
			0	Back	41490	2680.0	1	0	25.0	23.5	0.242	0.342	8	
				Front	41490	2680.0	50	0	24.0	22.4	0.214	0.309		
			0	Back	41490	2680.0	1	0	25.0	23.5	0.550	0.777		
				Front	41490	2680.0	50	0	24.0	22.4	0.531	0.768		
			0	Back	41490	2680	1	0	25	23.5	0.041	0.058		
				Front	41490	2680	1	0	25	23.5	0.108	0.153		
			0	Back	41490	2680	1	0	25	23.5	0.108	0.153		
				Front	41490	2680	1	0	25	23.5	0.120	0.170		

Note(s):

Channels for device configurations HU0123 + HU0923 and HU0123 + HU0223 + HU0623 were spot-checks chosen based off worst-case measurements within the exposure condition.

10.9. LTE Band 66 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Antenna	Device Configuration	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB Offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
										Tune-up Limit	Meas.	Meas.	Scaled	
Body-worn	QPSK	Antenna 1	HU0123	5	Back	132072	1720.0	1	0	24.3	23.7	0.482	0.553	9
					Front	132072	1720.0	50	24	23.3	22.8	0.414	0.465	
					Back	132072	1720.0	1	0	24.3	23.7	0.557	0.640	
					Front	132072	1720.0	50	24	23.3	22.8	0.532	0.597	
			Back	132072	1720.0	1	0	24.3	23.7	0.229	0.263			
			Front	132072	1720.0	50	24	23.3	22.8	0.176	0.197			
			Back	132072	1720.0	1	0	24.3	23.7	0.573	0.658			
			Front	132072	1720.0	50	24	23.3	22.8	0.574	0.644			
			Back	132072	1720.0	1	0	24.3	23.7	0.100	0.115			
			Front	132072	1720.0	1	0	24.3	23.7	0.124	0.142			
Back	132072	1720.0	1	0	24.3	23.7	0.313	0.359						

Note(s):

Channels for device configurations HU0123 + HU0923 and HU0123 + HU0223 + HU0623 were spot-checks chosen based off worst-case measurements within the exposure condition.

10.10. LTE Band 71 (20MHz Bandwidth)

RF Exposure Conditions	Mode	Antenna	Device Configuration	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	RB Allocation	RB Offset	Power (dBm)		1-g SAR (W/kg)		Plot No.
										Tune-up Limit	Meas.	Meas.	Scaled	
Body-worn	QPSK	Antenna 1	HU0123	5	Back	133372	688.0	1	99	24.8	24.1	0.444	0.522	10
					Front	133372	688.0	50	50	23.8	23.0	0.355	0.427	
					Back	133372	688.0	1	99	24.8	24.1	0.410	0.482	
					Front	133372	688.0	50	50	23.8	23.0	0.199	0.239	
			Back	133372	688.0	1	99	24.8	24.1	0.173	0.203			
			Front	133372	688.0	50	50	23.8	23.0	0.175	0.210			
			Back	133372	688.0	1	99	24.8	24.1	0.390	0.458			
			Front	133372	688.0	50	50	23.8	23.0	0.313	0.376			
			Back	133372	688.0	1	99	24.8	24.1	0.022	0.026			
			Front	133372	688.0	1	99	24.8	24.1	0.049	0.058			
Back	133372	688.0	1	99	24.8	24.1	0.137	0.161						

Note(s):

Channels for device configurations HU0123 + HU0923 and HU0123 + HU0223 + HU0623 were spot-checks chosen based off worst-case measurements within the exposure condition.

10.11. Wi-Fi (DTS Band)

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

SAR testing is not required for OFDM mode(s) when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

RF Exposure Conditions	Mode	Antenna	Device Configuration	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Duty Cycle	Power (dBm)		1-g SAR (W/kg)		Plot No.
										Tune-up Limit	Meas.	Meas.	Scaled	
Body-worn	802.11b	Antenna 2	HU0123	5	Back	6	2437	0.515	99.2%	20.5	20.5	0.501	0.505	
					Front	6	2437	0.408	99.2%	20.5	20.5	0.415	0.418	
			HU0123 + HU0223	0	Back	6	2437	0.453	99.2%	20.5	20.5	0.393	0.396	
			HU0123 + HU0823	0	Back	6	2437	0.695	99.2%	20.5	20.5	0.697	0.703	11
			HU0123 + HU0923	0	Back	6	2437	0.056	99.2%	20.5	20.5	0.059	0.059	
			HU0123 + HU0223 + HU0623	0	Back	6	2437	0.087	99.2%	20.5	20.5	0.114	0.115	
					Front	6	2437	0.218	99.2%	20.5	20.5	0.216	0.218	

Note(s):

Channels for device configurations HU0123 + HU0923 and HU0123 + HU0223 + HU0623 were spot-checks chosen based off worst-case measurements within the exposure condition.

10.12. Wi-Fi (U-NII Band)

When the specified maximum output power is the same for both UNII band I and UNII band 2A, begin SAR measurement in UNII band 2A; and if the highest reported SAR for UNII band 2A is

- ≤ 1.2 W/kg, SAR is not required for UNII band I
- > 1.2 W/kg, both bands should be tested independently for SAR.

UNII-1

RF Exposure Conditions	Mode	Antenna	Device Configuration	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Duty Cycle	Power (dBm)		1-g SAR (W/kg)		Plot No.											
										Tune-up Limit	Meas.	Meas.	Scaled												
Body-worn	802.11a	Antenna 2	HU0123	5	Back	36	5180	0.450	98.2%	18.0	18.0	0.468	0.477												
					Front	36	5180	0.432	98.2%	18.0	18.0	0.452	0.460												
			HU0123 + HU0223	0	Back	36	5180	0.238	98.2%	18.0	18.0	0.246	0.251												
														HU0123 + Cloth + HU0823	0	Back	36	5180	0.873	98.2%	18.0	18.0	0.948	0.965	12
																	40	5200	0.886	98.2%	18.0	17.9	0.887	0.924	
			48	5240	0.680	98.2%	18.0	17.7	0.708	0.773															
			HU0123 + HU0923	0	Back	36	5180	0.065	98.2%	18.0	18.0	0.051	0.052												
			HU0123 + HU0223 + HU0623	0	Back	36	5180	0.070	98.2%	18.0	18.0	0.065	0.066												
														Front	36	5180	0.105	98.2%	18.0	18.0	0.140	0.143			

Note(s):

Channels for device configurations HU0123 + HU0923 and HU0123 + HU0223 + HU0623 were spot-checks chosen based off worst-case measurements within the exposure condition.

UNII-2A

RF Exposure Conditions	Mode	Antenna	Device Configuration	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Duty Cycle	Power (dBm)		1-g SAR (W/kg)		Plot No.											
										Tune-up Limit	Meas.	Meas.	Scaled												
Body-worn	802.11a	Antenna 2	HU0123	5	Back	64	5320	0.557	98.2%	18.0	18.0	0.633	0.645												
					Front	64	5320	0.448	98.2%	18.0	18.0	0.516	0.525												
			HU0123 + HU0223	0	Back	64	5320	0.275	98.2%	18.0	18.0	0.334	0.340												
														HU0123 + Cloth + HU0823	0	Back	52	5260	1.090	98.2%	18.0	17.7	1.120	1.222	
																	60	5300	1.030	98.2%	18.0	17.8	1.060	1.130	
			64	5320	1.160	98.2%	18.0	18.0	1.270	1.293	13														
			HU0123 + HU0923	0	Back	64	5320	0.099	98.2%	18.0	18.0	0.075	0.076												
			HU0123 + HU0223 + HU0623	0	Back	64	5320	0.117	98.2%	18.0	18.0	0.133	0.135												
														Front	64	5320	0.174	98.2%	18.0	18.0	0.145	0.148			

Note(s):

Channels for device configurations HU0123 + HU0923 and HU0123 + HU0223 + HU0623 were spot-checks chosen based off worst-case measurements within the exposure condition.

UNII-2C

RF Exposure Conditions	Mode	Antenna	Device Configuration	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Duty Cycle	Power (dBm)		1-g SAR (W/kg)		Plot No.											
										Tune-up Limit	Meas.	Meas.	Scaled												
Body-worn	802.11a	Antenna 2	HU0123	5	Back	116	5580	0.495	98.2%	18.0	17.9	0.598	0.623												
					Front	116	5580	0.413	98.2%	18.0	17.9	0.517	0.539												
			HU0123 + HU0223	0	Back	116	5580	0.250	98.2%	18.0	17.9	0.268	0.279												
														HU0123 + Cloth + HU0823	0	Back	100	5500	0.967	98.2%	18.0	17.9	1.060	1.105	
																	116	5580	1.080	98.2%	18.0	17.9	1.060	1.105	14
			144	5720	0.447	98.2%	18.0	17.7	0.490	0.535															
			HU0123 + HU0923	0	Back	116	5580	0.035	98.2%	18.0	17.9	0.035	0.036												
			HU0123 + HU0223 + HU0623	0	Back	116	5580	0.114	98.2%	18.0	17.9	0.090	0.094												
														Front	116	5580	0.191	98.2%	18.0	17.9	0.184	0.192			

Note(s):

Channels for device configurations HU0123 + HU0923 and HU0123 + HU0223 + HU0623 were spot-checks chosen based off worst-case measurements within the exposure condition.

UNII-3

RF Exposure Conditions	Mode	Antenna	Device Configuration	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Area Scan Max. SAR (W/kg)	Duty Cycle	Power (dBm)		1-g SAR (W/kg)		Plot No.											
										Tune-up Limit	Meas.	Meas.	Scaled												
Body-worn	802.11a	Antenna 2	HU0123	5	Back	149	5745	0.443	98.2%	18.0	18.0	0.433	0.441												
					Front	149	5745	0.257	98.2%	18.0	18.0	0.279	0.284												
			HU0123 + HU0223	0	Back	149	5745	0.267	98.2%	18.0	18.0	0.281	0.286												
														HU0123 + Cloth + HU0823	0	Back	149	5745	0.440	98.2%	18.0	18.0	0.476	0.485	15
			HU0123 + HU0223 + HU0623	0	Back	149	5745	0.136	98.2%	18.0	18.0	0.145	0.148												
														Front	149	5745	0.220	98.2%	18.0	18.0	0.224	0.228			

Note(s):

Channels for device configurations HU0123 + HU0923 and HU0123 + HU0223 + HU0623 were spot-checks chosen based off worst-case measurements within the exposure condition.

10.13. Bluetooth

RF Exposure Conditions	Mode	Antenna	Device Configuration	Dist. (mm)	Test Position	Ch #.	Freq. (MHz)	Duty Cycle	Power (dBm)		1-g SAR (W/kg)		Plot No.										
									Tune-up Limit	Meas.	Meas.	Scaled											
Body-worn	LE GFSK	Antenna 2	HU0123	5	Back	19	2440	100.0%	12.5	11.8	0.081	0.095											
					Front	19	2440	100.0%	12.5	11.8	0.051	0.060											
			HU0123 + HU0223	0	Back	19	2440	100.0%	12.5	11.8	0.049	0.058											
													HU0123 + Cloth + HU0823	0	Back	19	2440	100.0%	12.5	11.8	0.086	0.101	16
			HU0123 + HU0223 + HU0623	0	Back	19	2440	100.0%	12.5	11.8	0.020	0.023											
													Front	19	2440	100.0%	12.5	11.8	0.020	0.023			

Note(s):

Channels for device configurations HU0123 + HU0923 and HU0123 + HU0223 + HU0623 were spot-checks chosen based off worst-case measurements within the exposure condition.

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 ($\sim 10\%$ 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 .

Frequency Band (MHz)	Air Interface	RF Exposure Conditions	Test Position	Repeated SAR (Yes/No)	Highest Measured SAR (W/kg)	First Repeated		Second Repeated		Third Repeated
						Measured SAR (W/kg)	Largest to Smallest SAR Ratio	Measured SAR (W/kg)	Largest to Smallest SAR Ratio	Measured SAR (W/kg)
700	LTE Band 12	Body	Rear	No	0.405	N/A	N/A	N/A	N/A	N/A
	LTE Band 71	Body	Rear	No	0.444	N/A	N/A	N/A	N/A	N/A
900	WCDMA Band V	Body	Rear	No	0.383	N/A	N/A	N/A	N/A	N/A
	LTE Band 26	Body	Rear	No	0.403	N/A	N/A	N/A	N/A	N/A
1700	WCDMA Band IV	Body	Rear	No	0.573	N/A	N/A	N/A	N/A	N/A
	LTE Band 66	Body	Front	No	0.787	N/A	N/A	N/A	N/A	N/A
1900	WCDMA Band II	Body	Front	Yes	1.100	1.080	1.02	N/A	N/A	N/A
	LTE Band 2	Body	Front	Yes	1.260	1.250	1.01	N/A	N/A	N/A
2400	Wi-Fi 802.11b	Body	Rear	No	0.697	N/A	N/A	N/A	N/A	N/A
	BT	Body	Rear	No	0.086	N/A	N/A	N/A	N/A	N/A
2500	LTE Band 7	Body	Rear	Yes	1.290	1.250	1.03	N/A	N/A	N/A
2600	LTE Band 41	Body	Rear	No	0.550	N/A	N/A	N/A	N/A	N/A
5200	Wi-Fi 802.11a	Body	Rear	Yes	0.948	0.984	1.04	N/A	N/A	N/A
5300	Wi-Fi 802.11a	Body	Rear	Yes	1.270	1.26	1.01	N/A	N/A	N/A
5500	Wi-Fi 802.11a	Body	Rear	Yes	1.060	1.05	1.01	N/A	N/A	N/A
5800	Wi-Fi 802.11a	Body	Rear	No	0.658	N/A	N/A	N/A	N/A	N/A

Note(s):

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

12. Simultaneous Transmission Conditions

RF Exposure Condition	Item	Capable Transmit Configurations			
Body-Worn	1	PCE	+	BT	+ WPT
	2	DTS	+	BT	+ WPT
	3	UNII	+	BT	+ WPT

12.1. Simultaneous transmission SAR test exclusion considerations

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

The DUT accessory HU0223 includes WPT, which present simultaneous considerations with the DUT's transmitters. The client provided the reported SAR of 0.000026 W/kg referenced from report HU0223-06072023-12VL. The contribution to the Sum of SAR for this transmitter is included below to ensure continued compliance with RF Exposure when HU0223 is installed.

Sum of SAR

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

12.2. Sum of the SAR for LTE B7 & BT

RF Exposure Conditions	Standalone SAR (W/kg)			Σ 1-g SAR (W/kg)
	WWAN	BT	WPT	WWAN + BT
	Antenna 1 ①	Antenna 2 ②	HU0223 WPT ③	① + ②
Body	1.447	0.101	0.000	1.548

12.3. Sum of the SAR for DTS & BT

RF Exposure Conditions	Standalone SAR (W/kg)			Σ 1-g SAR (W/kg)
	DTS	BT	WPT	WWAN + BT
	Antenna 2 ①	Antenna 2 ②	HU0223 WPT ③	① + ②
Body	0.703	0.101	0.000	0.804

12.4. Sum of the SAR for UNII & BT

RF Exposure Conditions	Standalone SAR (W/kg)			Σ 1-g SAR (W/kg)
	UNII	BT	WPT	WWAN + BT
	Antenna 2 ①	Antenna 2 ②	HU0223 WPT ③	① + ②
Body	1.293	0.101	0.000	1.394

Appendixes

Refer to separated files for the following appendixes.

Appendix A: SAR Setup Photos

Appendix B: SAR System Check Plots

Appendix C: SAR Highest Test Plots

Appendix D: SAR Tissue Ingredients

Appendix E: SAR Probe Certificates

Appendix F: SAR Dipole Certificates

END OF REPORT