


FCC SAR TEST REPORT

FCC ID : UZ7MC27AK
Equipment : Mobile computer
Brand Name : Zebra
Model Name : MC27AK
Applicant : Zebra Technologies Corporation
1 Zebra Plaza, Holtsville, NY 11742
Manufacturer : Zebra Technologies Corporation
1 Zebra Plaza, Holtsville, NY 11742
Standard : FCC 47 CFR Part 2 (2.1093)

The product was received on Aug. 12, 2020 and testing was started from Aug. 16, 2020 and completed on Sep. 05, 2020. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample provide by manufacturer and the test data has been evaluated in accordance with the test procedures given in 47 CFR Part 2.1093 and FCC KDB and has been pass the FCC requirement.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.



Approved by: Cona Huang / Deputy Manager

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History of this test report

Report No.	Version	Description	Issued Date
FA052917-01	01	Initial issue of report	Oct. 15, 2020



1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Zebra Technologies Corporation, Mobile computer, MC27AK**, are as follows.

Equipment Class	Frequency Band		Highest SAR Summary			Highest Simultaneous Transmission 1g SAR (W/kg)	Highest Simultaneous Transmission 10g SAR (W/kg)
			Hotspot (Separation 10mm)	Body-worn (Separation 0mm)	Hand (Separation 0mm)		
			1g SAR (W/kg)		10g SAR (W/kg)		
Licensed	WCDMA	WCDMA II	1.37	0.86	0.85	1.38	1.44
		WCDMA IV	1.38	0.94	0.58		
		WCDMA V	0.99	0.42	1.16		
	LTE	LTE Band 2	1.24	0.67	0.92		
		LTE Band 5	0.83	0.44	0.68		
		LTE Band 7	0.74	0.46	0.16		
		LTE Band 12 / 17	0.41	0.45	0.36		
		LTE Band 13	0.68	0.18	0.48		
		LTE Band 14	0.59	0.35	0.77		
		LTE Band 4 / 66	1.05	0.91	0.63		
DTS	WLAN	2.4GHz WLAN	0.34	0.19	0.14	1.38	1.29
NII		5GHz WLAN	1.31	0.74	0.29	1.38	1.44
DSS	2.4GHz Band	Bluetooth	0.01	< 0.01	< 0.01	1.38	1.16
Date of Testing:			2020/8/16 ~ 2020/9/5				

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190). The ISED Assigned Code is 4086B. This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg for Partial-Body 1g SAR, 4.0 W/kg for Product Specific 10g SAR) specified in ISED RSS-102 Issue 5, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and IEC 62209-2 (2010).

Reviewed by: Jason Wang
Report Producer: Daisy Peng



2. Guidance Applied

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards, if the KDB standards were not list within TAF approval, because it is include in the FCC KDB 447498.

- ISED RSS-102 Issue 5
- IEC 62209-2 (2010)
- IEEE 1528-2013
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB 865664 D02 SAR Reporting v01r02
- FCC KDB 447498 D01 General RF Exposure Guidance v06
- FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r02
- FCC KDB 648474 D04 Handset SAR v01r03
- FCC KDB 941225 D01 3G SAR Procedures v03r01
- FCC KDB 941225 D05 SAR for LTE Devices v02r05
- FCC KDB 941225 D06 Hotspot Mode SAR v02r01



3. Equipment Under Test (EUT) Information

3.1 General Information

Product Feature & Specification	
Equipment Name	Mobile computer
Brand Name	Zebra
Model Name	MC27AK
FCC ID	UZ7MC27AK
IMEI Code	353263810001666
Wireless Technology and Frequency Range	WCDMA Band II: 1850 MHz ~ 1910 MHz WCDMA Band IV: 1710 MHz ~ 1755 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 14: 788 MHz ~ 798 MHz LTE Band 17: 704 MHz ~ 716 MHz LTE Band 66: 1710 MHz ~ 1780 MHz WLAN 2.4GHz Band: 2400 MHz ~ 2483.5 MHz WLAN 5.2GHz Band: 5150 MHz ~ 5250 MHz WLAN 5.3GHz Band: 5250 MHz ~ 5350 MHz WLAN 5.6GHz Band: 5470 MHz ~ 5725 MHz WLAN 5.8GHz Band: 5725 MHz ~ 5825 MHz Bluetooth: 2400 MHz ~ 2483.5 MHz NFC : 13.56 MHz
Mode	RMC/AMR 12.2Kbps HSDPA HSUPA DC-HSDPA LTE: QPSK, 16QAM, 64QAM WLAN: 802.11a/b/g/n/ac HT20/HT40/VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE NFC:ASK
HW Version	EV
SW Version	10-11-31.00-QG-U00-PRD-HEL-04
OS Version	Android 10
MFD	23JUN20
EUT Stage	Engineering sample

Specification of Accessories				
AC Adapter	Brand Name	Zebra	Part Number	PWR-WUA5V12W0US
Battery	Brand Name	Zebra	Part Number	BT-000418-10
USB Cable (TypeA plug to TypeC plug)	Brand Name	Zebra	Part Number	CBL-TC2X-USBC-01
Trigger Handle	Brand Name	Zebra	Part Number	TRG-MC2X-SNP1-01
Holster	Brand Name	Zebra	Part Number	11-69293-01R
Holster	Brand Name	Zebra	Part Number	SG-MC3021212-01R



3.2 General LTE SAR Test and Reporting Considerations

Summarized necessary items addressed in KDB 941225 D05 v02r05																																																															
FCC ID	UZ7MC27AK																																																														
Equipment Name	Mobile computer																																																														
Operating Frequency Range of each LTE transmission band	LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 14: 788 MHz ~ 798 MHz LTE Band 17: 704 MHz ~ 716 MHz LTE Band 66: 1710 MHz ~ 1780 MHz																																																														
Channel Bandwidth	LTE Band 02: 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 04: 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 05: 1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 07: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 12: 1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 13: 5MHz, 10MHz LTE Band 14: 5MHz, 10MHz LTE Band 17: 5MHz, 10MHz LTE Band 66: 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz																																																														
uplink modulations used	QPSK / 16QAM / 64QAM																																																														
LTE Voice / Data requirements	Data only																																																														
LTE MPR permanently built-in by design	<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>	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)																																																								
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256 QAM	≥ 1						≤ 5																																																								
LTE A-MPR	In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing and the LTE SAR tests was transmitting on all TTI frames (Maximum TTI)																																																														
Spectrum plots for RB configuration	A properly configured base station simulator was used for the SAR and power measurement; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.																																																														
Power reduction applied to satisfy SAR compliance	Yes, when operating in hotspot mode that LTE B2 / B4 / B66 power reduction applied to satisfy SAR compliance.																																																														



Transmission (H, M, L) channel numbers and frequencies in each LTE band																
LTE Band 2																
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)				
L	18607	1850.7	18615	1851.5	18625	1852.5	18650	1855	18675	1857.5	18700	1860				
M	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880				
H	19193	1909.3	19185	1908.5	19175	1907.5	19150	1905	19125	1902.5	19100	1900				
LTE Band 4																
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)				
L	19957	1710.7	19965	1711.5	19975	1712.5	20000	1715	20025	1717.5	20050	1720				
M	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5				
H	20393	1754.3	20385	1753.5	20375	1752.5	20350	1750	20325	1747.5	20300	1745				
LTE Band 5																
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)				
L	20407	824.7	20415	825.5	20425	826.5	20450	829	20450	829	20450	829				
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5	20525	836.5	20525	836.5				
H	20643	848.3	20635	847.5	20625	846.5	20600	844	20600	844	20600	844				
LTE Band 7																
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)				
L	20775	2502.5	20800	2505	20825	2507.5	20850	2510	20850	2510	20850	2510				
M	21100	2535	21100	2535	21100	2535	21100	2535	21100	2535	21100	2535				
H	21425	2567.5	21400	2565	21375	2562.5	21350	2560	21350	2560	21350	2560				
LTE Band 12																
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)				
L	23017	699.7	23025	700.5	23035	701.5	23060	704	23060	704	23060	704				
M	23095	707.5	23095	707.5	23095	707.5	23095	707.5	23095	707.5	23095	707.5				
H	23173	715.3	23165	714.5	23155	713.5	23130	711	23130	711	23130	711				
LTE Band 13																
	Bandwidth 5 MHz				Bandwidth 10 MHz				Bandwidth 15 MHz				Bandwidth 20 MHz			
	Channel #		Freq.(MHz)		Channel #		Freq.(MHz)		Channel #		Freq.(MHz)		Channel #		Freq.(MHz)	
L	23205		779.5		23230		782		23230		782		23230		782	
M	23230		782		23230		782		23230		782		23230		782	
H	23255		784.5		23230		782		23230		782		23230		782	
LTE Band 14																
	Bandwidth 5 MHz				Bandwidth 10 MHz				Bandwidth 15 MHz				Bandwidth 20 MHz			
	Channel #		Channel #		Channel #		Freq.(MHz)		Channel #		Freq.(MHz)		Channel #		Freq.(MHz)	
L	23305		790.5		23330		793		23330		793		23330		793	
M	23330		793		23330		793		23330		793		23330		793	
H	23355		795.5		23330		793		23330		793		23330		793	
LTE Band 17																
	Bandwidth 5 MHz				Bandwidth 10 MHz				Bandwidth 15 MHz				Bandwidth 20 MHz			
	Channel #		Freq.(MHz)		Channel #		Freq. (MHz)		Channel #		Freq. (MHz)		Channel #		Freq. (MHz)	
L	23755		706.5		23780		709		23780		709		23780		709	
M	23790		710		23790		710		23790		710		23790		710	
H	23825		713.5		23800		711		23800		711		23800		711	
LTE Band 66																
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)				
L	131979	1710.7	131987	1711.5	131997	1712.5	132022	1715	132047	1717.5	132072	1720				
M	132322	1745	132322	1745	132322	1745	132322	1745	132322	1745	132322	1745				
H	132665	1779.3	132657	1778.5	132647	1777.5	132622	1775	132597	1772.5	132572	1770				



4. RF Exposure Limits

4.1 Uncontrolled Environment

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

4.2 Controlled Environment

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. The exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	20.0

Limits for General Population/Uncontrolled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	1.6	4.0

1. Whole-Body SAR is averaged over the entire body, partial-body SAR is averaged over any 1gram of tissue defined as a tissue volume in the shape of a cube. SAR for hands, wrists, feet and ankles is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

5. Specific Absorption Rate (SAR)

5.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

5.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

$$SAR = \frac{d}{dt} \left(\frac{dW}{dm} \right) = \frac{d}{dt} \left(\frac{dW}{\rho dv} \right)$$

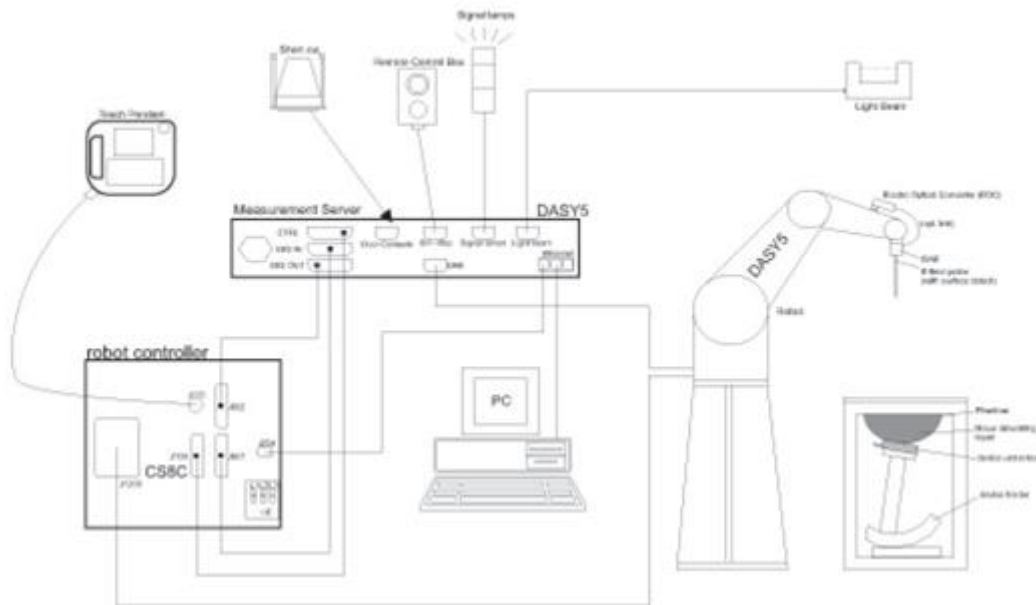
SAR is expressed in units of Watts per kilogram (W/kg)

$$SAR = \frac{\sigma |E|^2}{\rho}$$

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength.

6. System Description and Setup

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 WinXP or Win7 and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

6.1 Test Site Location


Sporton Lab and below test site location are accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190 and 0007) and the FCC designation No. TW1190 and TW0007 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC test.

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory			
Test Site Location	TW1190 No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, CHINESE TAIPEI		TW0007 No. 58, Aly. 75, Ln. 564, Wehnuia 3rd, Rd., Guishan Dist., Taoyuan City, CHINESE TAIPEI	
	SAR01-HY	SAR03-HY	SAR08-HY	SAR09-HY
Test Site No.	SAR04-HY	SAR05-HY	SAR11-HY	SAR12-HY
	SAR06-HY	SAR10-HY		


6.2 E-Field Probe

The SAR measurement is conducted with the dosimetric probe (manufactured by SPEAG). The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. This probe has a built in optical surface detection system to prevent from collision with phantom.

<ES3DV3 Probe>

Construction	Symmetric design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	10 MHz – 4 GHz; Linearity: ± 0.2 dB (30 MHz – 4 GHz)	
Directivity	± 0.2 dB in TSL (rotation around probe axis) ± 0.3 dB in TSL (rotation normal to probe axis)	
Dynamic Range	5 μ W/g – >100 mW/g; Linearity: ± 0.2 dB	
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 3.9 mm (body: 12 mm) Distance from probe tip to dipole centers: 3.0 mm	

<EX3DV4 Probe>

Construction	Symmetric design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	10 MHz – >6 GHz Linearity: ± 0.2 dB (30 MHz – 6 GHz)	
Directivity	± 0.3 dB in TSL (rotation around probe axis) ± 0.5 dB in TSL (rotation normal to probe axis)	
Dynamic Range	10 μ W/g – >100 mW/g Linearity: ± 0.2 dB (noise: typically <1 μ W/g)	
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 2.5 mm (body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	

6.3 Data Acquisition Electronics (DAE)

The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.


The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.



Fig 5.1 Photo of DAE


6.4 Phantom

<SAM Twin Phantom>

Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm	
Filling Volume	Approx. 25 liters	
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet	
Measurement Areas	Left Hand, Right Hand, Flat Phantom	

The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

<ELI Phantom>

Shell Thickness	2 ± 0.2 mm (sagging: <1%)	
Filling Volume	Approx. 30 liters	
Dimensions	Major ellipse axis: 600 mm Minor axis: 400 mm	

The ELI phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with standard and all known tissue simulating liquids.

6.5 Device Holder

<Mounting Device for Hand-Held Transmitter>

In combination with the Twin SAM V5.0/V5.0c or ELI phantoms, the Mounting Device for Hand-Held Transmitters enables rotation of the mounted transmitter device to specified spherical coordinates. At the heads, the rotation axis is at the ear opening. Transmitter devices can be easily and accurately positioned according to IEC 62209-1, IEEE 1528, FCC, or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat). And upgrade kit to Mounting Device to enable easy mounting of wider devices like big smart-phones, e-books, small tablets, etc. It holds devices with width up to 140 mm.



Mounting Device for Hand-Held Transmitters



Mounting Device Adaptor for Wide-Phones

<Mounting Device for Laptops and other Body-Worn Transmitters>

The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the mounting device in place of the phone positioned. The extension is fully compatible with the SAM Twin and ELI phantoms.



Mounting Device for Laptops



7. Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

- (a) For WWAN power measurement, use base station simulator to configure EUT WWAN transmission in conducted connection with RF cable, at maximum power in each supported wireless interface and frequency band.
- (b) Read the WWAN RF power level from the base station simulator.
- (c) For WLAN/BT power measurement, use engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power in each supported wireless interface and frequency band
- (d) Connect EUT RF port through RF cable to the power meter, and measure WLAN/BT output power

<SAR measurement>

- (a) Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power, in the highest power channel.
- (b) Place the EUT in the positions as Appendix D demonstrates.
- (c) Set scan area, grid size and other setting on the DASY software.
- (d) Measure SAR results for the highest power channel on each testing position.
- (e) Find out the largest SAR result on these testing positions of each band
- (f) Measure SAR results for other channels in worst SAR testing position if the reported SAR of highest power channel is larger than 0.8 W/kg

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

- (a) Power reference measurement
- (b) Area scan
- (c) Zoom scan
- (d) Power drift measurement

7.1 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

The entire evaluation of the spatial peak values is performed within the post-processing engine (SEMCAD). The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

- (a) Extraction of the measured data (grid and values) from the Zoom Scan
- (b) Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
- (c) Generation of a high-resolution mesh within the measured volume
- (d) Interpolation of all measured values from the measurement grid to the high-resolution grid
- (e) Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
- (f) Calculation of the averaged SAR within masses of 1g and 10g

7.2 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. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

7.3 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 found in the scanned area, within a range of the global maximum. The range (in dB0 is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan), if only one zoom scan follows the area scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of zoom scans has to be increased accordingly.

Area scan parameters extracted from FCC KDB 865664 D01v01r04 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° ± 1°	20° ± 1°
Maximum area scan spatial resolution: $\Delta x_{Area}, \Delta y_{Area}$	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

7.4 Zoom Scan

Zoom scans are used assess the peak spatial SAR values within a cubic averaging volume containing 1 gram and 10 gram of simulated tissue. The zoom scan measures points (refer to table below) within a cube shoes 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 gram and 10 gram and displays these values next to the job's label.

Zoom scan parameters extracted from FCC KDB 865664 D01v01r04 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.				

7.5 Volume Scan Procedures

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

7.6 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In DASy measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drifts more than 5%, the SAR will be retested.



8. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit ⁽²⁾	D750V3	1107	Mar. 08, 2019	Mar. 06, 2021
SPEAG	835MHz System Validation Kit	D835V2	4d167	Nov. 25, 2019	Nov. 24, 2020
SPEAG	1750MHz System Validation Kit ⁽²⁾	D1750V2	1112	Mar. 07, 2019	Mar. 05, 2021
SPEAG	1900MHz System Validation Kit ⁽²⁾	D1900V2	5d041	Sep. 11, 2018	Sep. 09, 2020
SPEAG	2450MHz System Validation Kit	D2450V2	929	Nov. 21, 2019	Nov. 20, 2020
SPEAG	2600MHz System Validation Kit ⁽²⁾	D2600V2	1078	Mar. 06, 2019	Mar. 04, 2021
SPEAG	5GHz System Validation Kit ⁽²⁾	D5GHzV2	1006	Sep. 27, 2018	Sep. 25, 2020
SPEAG	Data Acquisition Electronics	DAE4	316	Dec. 20, 2019	Dec. 19, 2020
SPEAG	Data Acquisition Electronics	DAE3	495	Jul. 21, 2020	Jul. 20, 2021
SPEAG	Data Acquisition Electronics	DAE4	1424	Jan. 24, 2020	Jan. 23, 2021
SPEAG	Dosimetric E-Field Probe	ES3DV3	3124	Dec. 18, 2019	Dec. 17, 2020
SPEAG	Dosimetric E-Field Probe	EX3DV4	7306	Jul. 24, 2020	Jul. 23, 2021
RCPTWN	Thermometer	HTC-1	TM685-1	Nov. 12, 2019	Nov. 11, 2020
RCPTWN	Thermometer	HTC-1	TM560-2	Nov. 12, 2019	Nov. 11, 2020
Anritsu	Radio Communication Analyzer	MT8821C	6201341950	Oct. 31, 2019	Oct. 30, 2020
Agilent	Wireless Communication Test Set	E5515C	MY50267236	Mar. 18, 2020	Mar. 17, 2021
R&S	BT Base Station	CBT	100815	Feb. 15, 2020	Feb. 14, 2021
SPEAG	Device Holder	N/A	N/A	N/A	N/A
Anritsu	Signal Generator	MG3710A	6201502524	Nov. 20, 2019	Nov. 19, 2020
Agilent	ENA Network Analyzer	E5071C	MY46101588	Jun. 10, 2020	Jun. 09, 2021
SPEAG	Dielectric Probe Kit	DAK-3.5	1146	Jul. 22, 2020	Jul. 21, 2021
LINE SEIKI	Digital Thermometer	DTM3000-spezial	2942	Nov. 18, 2019	Nov. 17, 2020
Anritsu	Power Meter	ML2495A	0932001	Oct. 03, 2019	Oct. 02, 2020
Anritsu	Power Sensor	MA2411B	0846202	Oct. 03, 2019	Oct. 02, 2020
Anritsu	Power Meter	ML2495A	1218006	Oct. 14, 2019	Oct. 13, 2020
Anritsu	Power Sensor	MA2411B	1207363	Oct. 14, 2019	Oct. 13, 2020
Anritsu	Spectrum Analyzer	MS2830A	6201396378	Jun. 30, 2020	Jun. 29, 2021
Anritsu	Spectrum Analyzer	N9010A	MY53470118	Mar. 12, 2020	Mar. 11, 2021
Mini-Circuits	Power Amplifier	ZVE-8G+	6418	Oct. 16, 2019	Oct. 15, 2020
Mini-Circuits	Power Amplifier	ZHL-42W+	321501827	Aug. 06, 2020	Aug. 05, 2021
ATM	Dual Directional Coupler	C122H-10	P610410z-02	Note 1	
Woken	Attenuator 1	WK0602-XX	N/A	Note 1	
PE	Attenuator 2	PE7005-10	N/A	Note 1	
PE	Attenuator 3	PE7005-3	N/A	Note 1	

General Note:

1. Prior to system verification and validation, the path loss from the signal generator to the system check source and the power meter, which includes the amplifier, cable, attenuator and directional coupler, was measured by the network analyzer. The reading of the power meter was offset by the path loss difference between the path to the power meter and the path to the system check source to monitor the actual power level fed to the system check source.
2. The dipole calibration interval can be extended to 3 years with justification according to KDB 865664 D01. The dipoles are also not physically damaged, or repaired during the interval. The justification data in appendix C can be found which the return loss is < -20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration for each dipole.

9. System Verification

9.1 Tissue Simulating Liquids

For the measurement of the field distribution inside the SAM phantom with DASY, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 10.1. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 10.2.

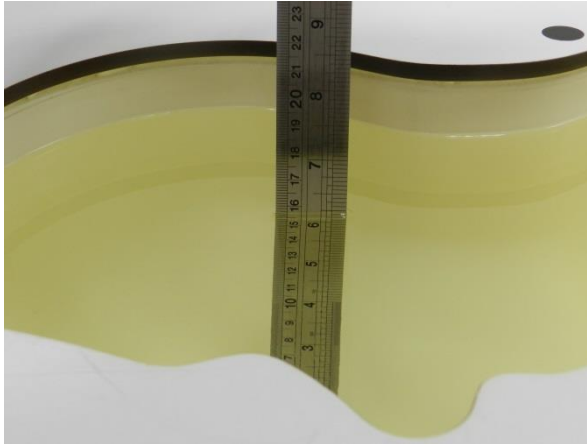


Fig 10.1 Photo of Liquid Height for Head SAR

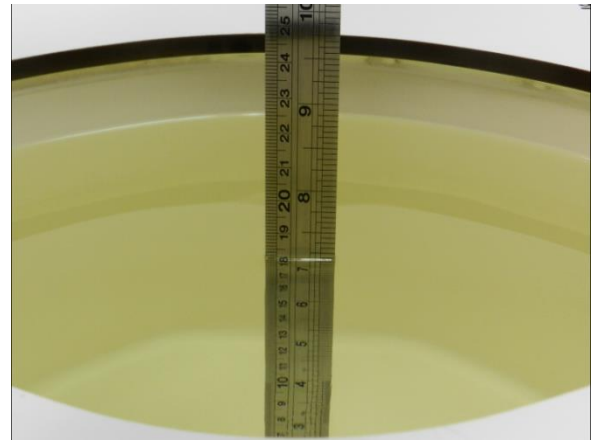


Fig 10.2 Photo of Liquid Height for Body SAR

9.2 Tissue Verification

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (ϵ_r)
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
900	40.3	57.9	0.2	1.4	0.2	0	0.97	41.5
1800, 1900, 2000	55.2	0	0	0.3	0	44.5	1.40	40.0
2450	55.0	0	0	0	0	45.0	1.80	39.2
2600	54.8	0	0	0.1	0	45.1	1.96	39.0

Simulating Liquid for 5GHz, Manufactured by SPEAG

Ingredients	(% by weight)
Water	64~78%
Mineral oil	11~18%
Emulsifiers	9~15%
Additives and Salt	2~3%

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Liquid Temp. (°C)	Conductivity (σ)	Permittivity (ϵ_r)	Conductivity Target (σ)	Permittivity Target (ϵ_r)	Delta (σ) (%)	Delta (ϵ_r) (%)	Limit (%)	Date
750	22.2	0.893	42.549	0.89	41.90	0.34	1.55	±5	2020/8/16
750	22.4	0.897	42.698	0.89	41.90	0.79	1.90	±5	2020/9/2
835	22.4	0.871	41.809	0.90	41.50	-3.22	0.74	±5	2020/8/17
835	22.4	0.877	41.946	0.90	41.50	-2.56	1.07	±5	2020/9/3
1750	22.4	1.360	40.072	1.37	40.10	-0.73	-0.07	±5	2020/9/1
1900	22.4	1.453	39.427	1.40	40.00	3.79	-1.43	±5	2020/9/1
2450	22.6	1.819	38.702	1.80	39.20	1.06	-1.27	±5	2020/9/5
2600	22.5	1.958	39.151	1.96	39.00	-0.10	0.39	±5	2020/8/18
2600	22.4	2.003	39.158	1.96	39.00	2.19	0.41	±5	2020/9/4
5250	22.4	4.592	36.603	4.71	35.95	-2.51	1.82	±5	2020/9/5
5600	22.4	4.976	36.223	5.07	35.50	-1.85	2.04	±5	2020/9/5
5750	22.4	5.195	35.898	5.22	35.35	-0.48	1.55	±5	2020/9/5

9.3 System Performance Check Results

Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10 %. Below table shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance check can meet the variation criterion and the plots can be referred to Appendix A of this report.

Date	Frequency (MHz)	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)
2020/8/16	750	250	D750V3-1107	EX3DV4 - SN7306	DAE4 Sn1424	2.22	8.32	8.88	6.73
2020/9/2	750	250	D750V3-1107	ES3DV3 - SN3124	DAE4 Sn316	2.05	8.32	8.2	-1.44
2020/8/17	835	250	D835V2-4d167	EX3DV4 - SN7306	DAE4 Sn1424	2.47	9.55	9.88	3.46
2020/9/3	835	250	D835V2-4d167	ES3DV3 - SN3124	DAE4 Sn316	2.27	9.55	9.08	-4.92
2020/9/1	1750	250	D1750V2-1112	ES3DV3 - SN3124	DAE4 Sn316	8.89	36.70	35.56	-3.11
2020/9/1	1900	250	D1900V2-5d041	ES3DV3 - SN3124	DAE4 Sn316	9.87	40.20	39.48	-1.79
2020/9/5	2450	250	D2450V2-929	ES3DV3 - SN3124	DAE4 Sn316	12.80	53.10	51.2	-3.58
2020/8/18	2600	250	D2600V2-1078	EX3DV4 - SN7306	DAE4 Sn1424	14.70	57.60	58.8	2.08
2020/9/4	2600	250	D2600V2-1078	ES3DV3 - SN3124	DAE4 Sn316	13.60	57.60	54.4	-5.56
2020/9/5	5250	100	D5GHzV2-1006-5250	EX3DV4 - SN7306	DAE3 Sn495	7.88	80.70	78.8	-2.35
2020/9/5	5600	100	D5GHzV2-1006-5600	EX3DV4 - SN7306	DAE3 Sn495	8.91	83.30	89.1	6.96
2020/9/5	5750	100	D5GHzV2-1006-5750	EX3DV4 - SN7306	DAE3 Sn495	8.25	80.40	82.5	2.61

Date	Frequency (MHz)	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 10g SAR (W/kg)	Targeted 10g SAR (W/kg)	Normalized 10g SAR (W/kg)	Deviation (%)
2020/8/16	750	250	D750V3-1107	EX3DV4 - SN7306	DAE4 Sn1424	1.49	5.61	5.96	6.24
2020/9/2	750	250	D750V3-1107	ES3DV3 - SN3124	DAE4 Sn316	1.38	5.61	5.52	-1.60
2020/8/17	835	250	D835V2-4d167	EX3DV4 - SN7306	DAE4 Sn1424	1.63	6.21	6.52	4.99
2020/9/3	835	250	D835V2-4d167	ES3DV3 - SN3124	DAE4 Sn316	1.50	6.21	6	-3.38
2020/9/1	1750	250	D1750V2-1112	ES3DV3 - SN3124	DAE4 Sn316	4.79	19.40	19.16	-1.24
2020/9/1	1900	250	D1900V2-5d041	ES3DV3 - SN3124	DAE4 Sn316	5.11	21.20	20.44	-3.58
2020/9/5	2450	250	D2450V2-929	ES3DV3 - SN3124	DAE4 Sn316	5.84	24.70	23.36	-5.43
2020/8/18	2600	250	D2600V2-1078	EX3DV4 - SN7306	DAE4 Sn1424	6.41	25.50	25.64	0.55
2020/9/4	2600	250	D2600V2-1078	ES3DV3 - SN3124	DAE4 Sn316	6.36	25.50	25.44	-0.24
2020/9/5	5250	100	D5GHzV2-1006-5250	EX3DV4 - SN7306	DAE3 Sn495	2.24	23.20	22.4	-3.45
2020/9/5	5600	100	D5GHzV2-1006-5600	EX3DV4 - SN7306	DAE3 Sn495	2.51	23.80	25.1	5.46
2020/9/5	5750	100	D5GHzV2-1006-5750	EX3DV4 - SN7306	DAE3 Sn495	2.33	22.90	23.3	1.75

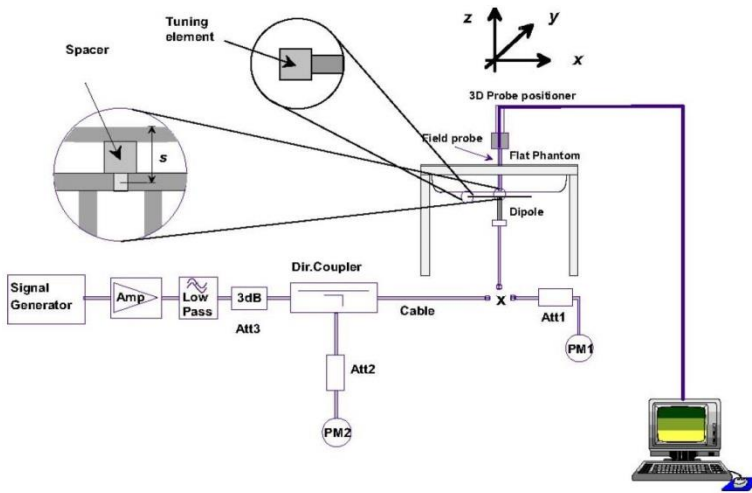


Fig 8.3.1 System Performance Check Setup



Fig 8.3.2 Setup Photo



10. RF Exposure Positions

10.1 Hand Exposure

For smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm that provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets that support voice calls next to the ear, According to KDB648474 D04v01r03, the following phablet procedures should be applied to evaluate SAR compliance for each applicable wireless modes and frequency band. Devices marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance

1. The normally required head and body-worn accessory SAR test procedures for handsets, including hotspot mode, must be applied.
2. The UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge, in direct contact with a flat phantom, for 10-g extremity SAR according to the body-equivalent tissue dielectric parameters in KDB 865664 to address interactive hand use exposure conditions.6 The UMPC mini-tablet 1-g SAR at 5 mm is not required. When hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg.

10.2 Wireless Router

Some battery-operated handsets have the capability to transmit and receive user through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06 v02r01 where SAR test considerations for handsets (L x W ≥ 9 cm x 5 cm) are based on a composite test separation distance of 10mm from the front, back and edges of the device containing transmitting antennas within 2.5cm of their edges, determined from general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions due to the limitations of the SAR assessment probes. Therefore, SAR must be evaluated for each frequency transmission and mode separately and spatially summed with the WIFI transmitter according to FCC KDB Publication 447498 D01v06 publication procedures. The "Portable Hotspot" feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.

11. UMTS/LTE Output Power (Unit: dBm)

<WCDMA Conducted Power>

1. The following tests were conducted according to the test requirements outlines in 3GPP TS 34.121 specification.
2. The procedures in KDB 941225 D01v03r01 are applied for 3GPP Rel. 6 HSPA to configure the device in the required sub-test mode(s) to determine SAR test exclusion.
3. For DC-HSDPA, the device was configured according to the H-Set 12, Fixed Reference Channel (FRC) configuration in Table C.8.1.12 of 3GPP TS 34.121-1, with the primary and the secondary serving HS-DSCH Cell enabled during the power measurement.

A summary of these settings are illustrated below:

HSDPA Setup Configuration:

- a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
- b. The RF path losses were compensated into the measurements.
- c. A call was established between EUT and Base Station with following setting:
 - i. Set Gain Factors (β_c and β_d) and parameters were set according to each
 - ii. Specific sub-test in the following table, C10.1.4, quoted from the TS 34.121
 - iii. Set RMC 12.2Kbps + HSDPA mode.
 - iv. Set Cell Power = -86 dBm
 - v. Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)
 - vi. Select HSDPA Uplink Parameters
 - vii. Set Delta ACK, Delta NACK and Delta CQI = 8
 - viii. Set Ack-Nack Repetition Factor to 3
 - ix. Set CQI Feedback Cycle (k) to 4 ms
 - x. Set CQI Repetition Factor to 2
 - xi. Power Ctrl Mode = All Up bits
- d. The transmitted maximum output power was recorded.

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: $\Delta_{ACK}, \Delta_{NACK}$ 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 $\beta_d = 15/15$.

Setup Configuration

HSUPA Setup Configuration:

- a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
- b. The RF path losses were compensated into the measurements.
- c. A call was established between EUT and Base Station with following setting * :
 - i. Call Configs = 5.2B, 5.9B, 5.10B, and 5.13.2B with QPSK
 - ii. Set the Gain Factors (β_c and β_d) and parameters (AG Index) were set according to each specific sub-test in the following table, C11.1.3, quoted from the TS 34.121
 - iii. Set Cell Power = -86 dBm
 - iv. Set Channel Type = 12.2k + HSPA
 - v. Set UE Target Power
 - vi. Power Ctrl Mode= Alternating bits
 - vii. Set and observe the E-TFCl
 - viii. Confirm that E-TFCl is equal to the target E-TFCl of 75 for sub-test 1, and other subtest's E-TFCl
- d. The transmitted maximum output power was recorded.

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

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (Note 4) (Note 5)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2) (Note 6)	AG Index (Note 5)	E-TFCl
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	$\beta_{ed1}: 47/15$ $\beta_{ed2}: 47/15$	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 results in slightly smaller MPR values.

Setup Configuration

DC-HSDPA 3GPP release 8 Setup Configuration:

- a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration below
- b. The RF path losses were compensated into the measurements.
- c. A call was established between EUT and Base Station with following setting:
 - i. Set RMC 12.2Kbps + HSDPA mode.
 - ii. Set Cell Power = -25 dBm
 - iii. Set HS-DSCH Configuration Type to FRC (H-set 12, QPSK)
 - iv. Select HSDPA Uplink Parameters
 - v. Set Gain Factors (β_c and β_d) and parameters were set according to each Specific sub-test in the following table, C10.1.4, quoted from the TS 34.121
 - a). Subtest 1: $\beta_c/\beta_d=2/15$
 - b). Subtest 2: $\beta_c/\beta_d=12/15$
 - c). Subtest 3: $\beta_c/\beta_d=15/8$
 - d). Subtest 4: $\beta_c/\beta_d=15/4$
 - vi. Set Delta ACK, Delta NACK and Delta CQI = 8
 - vii. Set Ack-Nack Repetition Factor to 3
 - viii. Set CQI Feedback Cycle (k) to 4 ms
 - ix. Set CQI Repetition Factor to 2
 - x. Power Ctrl Mode = All Up bits
- d. The transmitted maximum output power was recorded.

The following tests were conducted according to the test requirements outlines in 3GPP TS 34.121 specification. A summary of these settings are illustrated below:

C.8.1.12 Fixed Reference Channel Definition H-Set 12

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

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

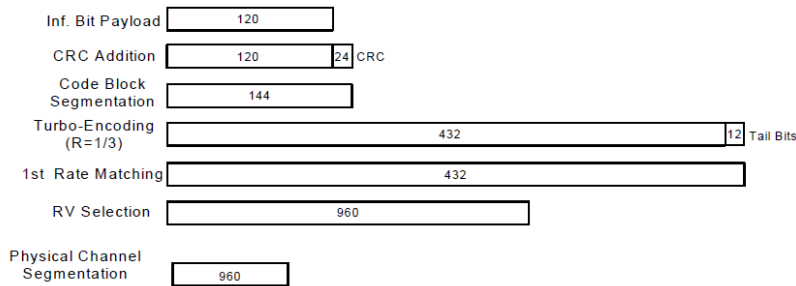


Figure C.8.19: Coding rate for Fixed reference Channel H-Set 12 (QPSK)

Setup Configuration



<WCDMA Conducted Power>

General Note:

1. Per KDB 941225 D01v03r01, for SAR testing is measured using a 12.2 kbps RMC with TPC bits configured to all "1's".
2. Per KDB 941225 D01v03r01, RMC 12.2kbps setting is used to evaluate SAR. The maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA / DC-HSDPA is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA, and according to the following RF output power, the output power results of the secondary modes (HSUPA, HSDPA, DC-HSDPA) are less than ¼ dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA.

Default Power Mode

Band		WCDMA II			Tune-up Limit (dBm)	WCDMA IV			Tune-up Limit (dBm)	WCDMA V			Tune-up Limit (dBm)
TX Channel	Rx Channel	9262	9400	9538		1312	1413	1513		4132	4182	4233	
Frequency (MHz)		1852.4	1880	1907.6		1712.4	1732.6	1752.6		826.4	836.4	846.6	
3GPP Rel 99	RMC 12.2Kbps	24.40	24.67	24.58	25.50	24.34	24.46	24.44	25.50	24.44	24.40	24.42	25.50
3GPP Rel 6	HSDPA Subtest-1	23.42	23.74	23.57	24.50	23.35	23.47	23.50	24.50	23.49	23.39	23.53	24.50
3GPP Rel 6	HSDPA Subtest-2	23.45	23.70	23.60	24.50	23.36	23.42	23.50	24.50	23.50	23.40	23.57	24.50
3GPP Rel 6	HSDPA Subtest-3	22.98	23.28	23.04	24.00	22.85	22.98	22.96	24.00	23.00	22.94	23.06	24.00
3GPP Rel 6	HSDPA Subtest-4	22.95	23.27	23.05	24.00	22.87	22.96	23.00	24.00	23.00	22.94	23.06	24.00
3GPP Rel 8	DC-HSDPA Subtest-1	23.34	23.66	23.50	24.50	23.34	23.66	23.50	24.50	23.34	23.66	23.50	24.50
3GPP Rel 8	DC-HSDPA Subtest-2	23.37	23.60	23.57	24.50	23.37	23.60	23.57	24.50	23.37	23.60	23.57	24.50
3GPP Rel 8	DC-HSDPA Subtest-3	22.93	23.19	22.97	24.00	22.93	23.19	22.97	24.00	22.93	23.19	22.97	24.00
3GPP Rel 8	DC-HSDPA Subtest-4	22.93	23.23	22.99	24.00	22.93	23.23	22.99	24.00	22.93	23.23	22.99	24.00
3GPP Rel 6	HSUPA Subtest-1	23.33	23.69	23.56	24.50	23.34	23.45	23.44	24.50	23.52	23.41	23.53	24.50
3GPP Rel 6	HSUPA Subtest-2	21.30	21.61	21.52	22.50	21.35	21.42	21.41	22.50	21.48	21.42	21.47	22.50
3GPP Rel 6	HSUPA Subtest-3	22.35	22.70	22.53	23.50	22.18	22.50	22.49	23.50	22.45	22.35	22.51	23.50
3GPP Rel 6	HSUPA Subtest-4	21.38	21.72	21.58	22.50	21.33	21.46	21.46	22.50	21.48	21.36	21.55	22.50
3GPP Rel 6	HSUPA Subtest-5	23.30	23.80	23.60	24.50	23.40	23.50	23.50	24.50	23.40	23.40	23.60	24.50

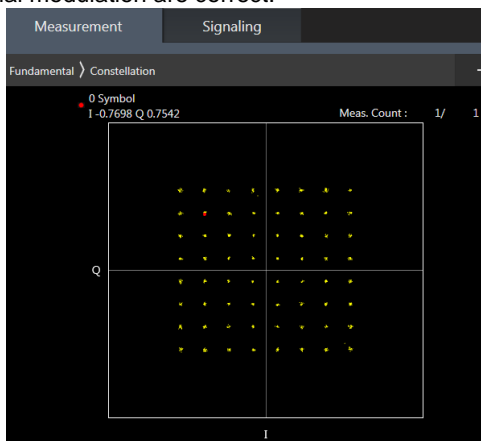
Reduced Power Mode

Band		WCDMA II			Tune-up Limit (dBm)	WCDMA IV			Tune-up Limit (dBm)
TX Channel	Rx Channel	9262	9400	9538		1312	1413	1513	
Frequency (MHz)		1852.4	1880	1907.6		1712.4	1732.6	1752.6	
3GPP Rel 99	RMC 12.2Kbps	23.56	23.77	23.61	24.50	23.51	23.67	23.64	24.50
3GPP Rel 6	HSDPA Subtest-1	22.49	22.71	22.61	23.50	22.31	22.54	22.43	23.50
3GPP Rel 6	HSDPA Subtest-2	22.45	22.77	22.55	23.50	22.42	22.43	22.43	23.50
3GPP Rel 6	HSDPA Subtest-3	21.93	22.18	22.02	23.00	21.89	22.01	21.90	23.00
3GPP Rel 6	HSDPA Subtest-4	21.88	22.37	22.04	23.00	21.80	21.89	22.05	23.00
3GPP Rel 8	DC-HSDPA Subtest-1	22.25	22.73	22.50	23.50	22.41	22.65	22.52	23.50
3GPP Rel 8	DC-HSDPA Subtest-2	22.34	22.52	22.61	23.50	22.44	22.63	22.48	23.50
3GPP Rel 8	DC-HSDPA Subtest-3	22.00	22.13	21.90	23.00	22.00	22.23	21.98	23.00
3GPP Rel 8	DC-HSDPA Subtest-4	21.89	22.14	21.98	23.00	21.90	22.19	22.02	23.00
3GPP Rel 6	HSUPA Subtest-1	22.27	22.65	22.47	23.50	22.36	22.50	22.53	23.50
3GPP Rel 6	HSUPA Subtest-2	20.38	20.60	20.52	21.50	20.34	20.36	20.51	21.50
3GPP Rel 6	HSUPA Subtest-3	21.30	21.75	21.59	22.50	21.24	21.51	21.56	22.50
3GPP Rel 6	HSUPA Subtest-4	20.31	20.77	20.60	21.50	20.23	20.41	20.53	21.50
3GPP Rel 6	HSUPA Subtest-5	22.38	22.75	22.57	23.50	22.32	22.48	22.59	23.50

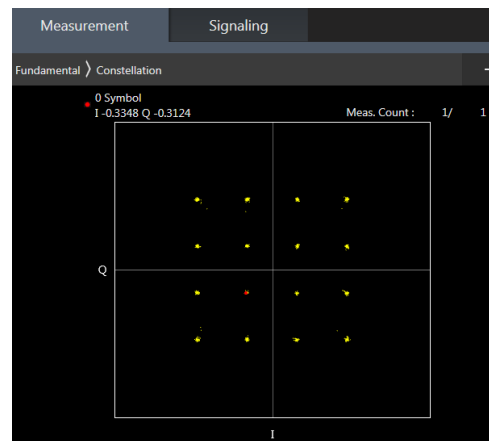
<LTE Conducted Power>

General Note:

1. Anritsu MT8820C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r05, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
6. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is $>$ not $\frac{1}{2}$ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is $>$ not $\frac{1}{2}$ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
8. For LTE B4/B5/B12/B17 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, 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.
9. LTE band 4/17 SAR test was covered by Band 66/12; according to April 2015 TCB workshop, SAR test for overlapping LTE bands can be reduced if
 - a. the maximum output power, including tolerance, for the smaller band is \leq the larger band to qualify for the SAR test exclusion
 - b. the channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band
10. According to 2017 TCB workshop, for 64 QAM and 16 QAM should be verified by checking the signal constellation with a call box to avoid incorrect maximum power levels due to MPR and other requirements associated with signal modulation, and the following figure is taken from the "Fundamental Measurement >> Modulation Analysis >> constellation" mode of the device connect to the MT8821C base station, therefore, the device 64QAM and 16QAM signal modulation are correct.



64QAM



16QAM



Default Power Mode

<LTE Band 2>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				18700	18900	19100		
Frequency (MHz)				1860	1880	1900		
20	QPSK	1	0	24.15	24.48	24.32	25	0
20	QPSK	1	49	24.11	24.26	24.26		
20	QPSK	1	99	24.06	24.30	24.25		
20	QPSK	50	0	23.24	23.37	23.36	24	1
20	QPSK	50	24	23.19	23.35	23.34		
20	QPSK	50	50	23.15	23.29	23.28		
20	QPSK	100	0	23.19	23.32	23.31	24	1
20	16QAM	1	0	23.34	23.41	23.50		
20	16QAM	1	49	23.45	23.46	23.50		
20	16QAM	1	99	23.41	23.50	23.41	23	2
20	16QAM	50	0	22.17	22.40	22.41		
20	16QAM	50	24	22.22	22.41	22.39		
20	16QAM	50	50	22.24	22.33	22.37	23	2
20	16QAM	100	0	22.11	22.40	22.39		
20	64QAM	1	0	22.25	22.45	22.44		
20	64QAM	1	49	22.32	22.42	22.47	23	2
20	64QAM	1	99	22.33	22.47	22.42		
20	64QAM	50	0	21.20	21.44	21.46		
20	64QAM	50	24	21.25	21.46	21.44	22	3
20	64QAM	50	50	21.22	21.40	21.38		
20	64QAM	100	0	21.15	21.38	21.38		
Channel				18675	18900	19125	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1857.5	1880	1902.5		
15	QPSK	1	0	24.06	24.46	24.22	25	0
15	QPSK	1	37	24.06	24.19	24.18		
15	QPSK	1	74	24.03	24.25	24.25		
15	QPSK	36	0	23.19	23.34	23.35	24	1
15	QPSK	36	20	23.16	23.31	23.27		
15	QPSK	36	39	23.11	23.28	23.21		
15	QPSK	75	0	23.17	23.22	23.31	24	1
15	16QAM	1	0	23.26	23.36	23.42		
15	16QAM	1	37	23.43	23.46	23.43		
15	16QAM	1	74	23.37	23.48	23.40	23	2
15	16QAM	36	0	22.15	22.32	22.34		
15	16QAM	36	20	22.18	22.41	22.30		
15	16QAM	36	39	22.15	22.28	22.34	23	2
15	16QAM	75	0	22.11	22.38	22.29		
15	64QAM	1	0	22.23	22.36	22.37		
15	64QAM	1	37	22.24	22.37	22.43	23	2
15	64QAM	1	74	22.32	22.47	22.34		
15	64QAM	36	0	21.11	21.35	21.46		
15	64QAM	36	20	21.22	21.37	21.41	22	3
15	64QAM	36	39	21.16	21.31	21.31		
15	64QAM	75	0	21.06	21.38	21.31		
Channel				18650	18900	19150	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1855	1880	1905		
10	QPSK	1	0	24.09	24.47	24.29	25	0
10	QPSK	1	25	24.10	24.20	24.21		
10	QPSK	1	49	23.96	24.29	24.21		



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10	QPSK	25	0	23.14	23.26	23.36	24	1
10	QPSK	25	12	23.19	23.28	23.30		
10	QPSK	25	25	23.13	23.23	23.18		
10	QPSK	50	0	23.14	23.27	23.22	24	1
10	16QAM	1	0	23.32	23.34	23.41		
10	16QAM	1	25	23.37	23.46	23.42		
10	16QAM	1	49	23.36	23.44	23.36	23	2
10	16QAM	25	0	22.16	22.37	22.36		
10	16QAM	25	12	22.14	22.33	22.36		
10	16QAM	25	25	22.17	22.27	22.27	23	2
10	16QAM	50	0	22.07	22.38	22.29		
10	64QAM	1	0	22.25	22.36	22.40		
10	64QAM	1	25	22.25	22.36	22.44	22	3
10	64QAM	1	49	22.26	22.37	22.42		
10	64QAM	25	0	21.16	21.42	21.46		
10	64QAM	25	12	21.19	21.43	21.37	22	3
10	64QAM	25	25	21.14	21.33	21.33		
10	64QAM	50	0	21.11	21.38	21.29		
Channel				18625	18900	19175	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1852.5	1880	1907.5		
5	QPSK	1	0	24.05	24.44	24.26	25	0
5	QPSK	1	12	24.06	24.25	24.23		
5	QPSK	1	24	23.97	24.29	24.20		
5	QPSK	12	0	23.20	23.30	23.36	24	1
5	QPSK	12	7	23.12	23.25	23.28		
5	QPSK	12	13	23.13	23.25	23.21		
5	QPSK	25	0	23.13	23.25	23.25	24	1
5	16QAM	1	0	23.28	23.34	23.41		
5	16QAM	1	12	23.36	23.43	23.40		
5	16QAM	1	24	23.36	23.40	23.36	23	2
5	16QAM	12	0	22.16	22.39	22.41		
5	16QAM	12	7	22.16	22.41	22.37		
5	16QAM	12	13	22.21	22.29	22.30	23	2
5	16QAM	25	0	22.07	22.33	22.33		
5	64QAM	1	0	22.16	22.38	22.35		
5	64QAM	1	12	22.27	22.33	22.37	23	2
5	64QAM	1	24	22.24	22.40	22.35		
5	64QAM	12	0	21.20	21.41	21.46		
5	64QAM	12	7	21.18	21.43	21.44	22	3
5	64QAM	12	13	21.20	21.36	21.34		
5	64QAM	25	0	21.11	21.36	21.29		
Channel				18615	18900	19185	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1851.5	1880	1908.5		
3	QPSK	1	0	24.06	24.38	24.25	25	0
3	QPSK	1	8	24.09	24.21	24.25		
3	QPSK	1	14	24.02	24.22	24.17		
3	QPSK	8	0	23.18	23.26	23.28	24	1
3	QPSK	8	4	23.14	23.30	23.24		
3	QPSK	8	7	23.06	23.22	23.23		
3	QPSK	15	0	23.13	23.30	23.29	24	1
3	16QAM	1	0	23.27	23.32	23.41		
3	16QAM	1	8	23.42	23.43	23.48		
3	16QAM	1	14	23.40	23.45	23.32	23	2
3	16QAM	8	0	22.12	22.33	22.33		
3	16QAM	8	4	22.20	22.40	22.34		
3	16QAM	8	7	22.16	22.24	22.34		



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3	16QAM	15	0	22.09	22.37	22.38		
3	64QAM	1	0	22.23	22.45	22.35	23	2
3	64QAM	1	8	22.26	22.33	22.43		
3	64QAM	1	14	22.29	22.47	22.34		
3	64QAM	8	0	21.16	21.44	21.37	22	3
3	64QAM	8	4	21.22	21.42	21.34		
3	64QAM	8	7	21.14	21.31	21.33		
3	64QAM	15	0	21.05	21.33	21.33		
Channel				18607	18900	19193	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1850.7	1880	1909.3		
1.4	QPSK	1	0	24.10	24.43	24.32	25	0
1.4	QPSK	1	3	24.02	24.24	24.22		
1.4	QPSK	1	5	23.98	24.28	24.23		
1.4	QPSK	3	0	24.07	24.47	24.26		
1.4	QPSK	3	1	24.01	24.18	24.18		
1.4	QPSK	3	3	24.05	24.20	24.24		
1.4	QPSK	6	0	23.16	23.25	23.25	24	1
1.4	16QAM	1	0	23.25	23.33	23.43	24	1
1.4	16QAM	1	3	23.40	23.43	23.49		
1.4	16QAM	1	5	23.31	23.45	23.35		
1.4	16QAM	3	0	23.26	23.38	23.47		
1.4	16QAM	3	1	23.41	23.46	23.44		
1.4	16QAM	3	3	23.33	23.50	23.33		
1.4	16QAM	6	0	22.05	22.35	22.36	23	2
1.4	64QAM	1	0	22.18	22.43	22.35	23	2
1.4	64QAM	1	3	22.31	22.41	22.47		
1.4	64QAM	1	5	22.23	22.46	22.32		
1.4	64QAM	3	0	22.24	22.37	22.36		
1.4	64QAM	3	1	22.23	22.42	22.40		
1.4	64QAM	3	3	22.30	22.38	22.35		
1.4	64QAM	6	0	21.10	21.31	21.33		



<LTE Band 4>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20050	20175	20300		
Frequency (MHz)				1720	1732.5	1745		
20	QPSK	1	0	23.78	24.11	24.10	25	0
20	QPSK	1	49	23.85	24.09	24.07		
20	QPSK	1	99	23.91	23.99	23.93		
20	QPSK	50	0	22.91	23.22	23.15	24	1
20	QPSK	50	24	23.00	23.20	23.13		
20	QPSK	50	50	23.08	23.21	23.16		
20	QPSK	100	0	22.99	23.16	23.06		
20	16QAM	1	0	23.06	23.37	23.44	24	1
20	16QAM	1	49	23.20	23.44	23.43		
20	16QAM	1	99	23.28	23.34	23.31		
20	16QAM	50	0	22.01	22.24	22.20	23	2
20	16QAM	50	24	22.11	22.26	22.22		
20	16QAM	50	50	22.15	22.18	22.13		
20	16QAM	100	0	22.05	22.21	22.14		
20	64QAM	1	0	22.01	22.28	22.35	23	2
20	64QAM	1	49	22.14	22.35	22.34		
20	64QAM	1	99	22.19	22.22	22.22		
20	64QAM	50	0	21.03	21.24	21.21	22	3
20	64QAM	50	24	21.15	21.26	21.22		
20	64QAM	50	50	21.14	21.18	21.13		
20	64QAM	100	0	21.04	21.21	21.19		
Channel				20025	20175	20325	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1717.5	1732.5	1747.5		
15	QPSK	1	0	23.70	24.03	24.10	25	0
15	QPSK	1	37	23.79	24.09	23.97		
15	QPSK	1	74	23.84	23.90	23.85		
15	QPSK	36	0	22.84	23.19	23.13	24	1
15	QPSK	36	20	22.92	23.18	23.04		
15	QPSK	36	39	23.03	23.17	23.13		
15	QPSK	75	0	22.97	23.14	23.06		
15	16QAM	1	0	23.05	23.35	23.44	24	1
15	16QAM	1	37	23.12	23.44	23.33		
15	16QAM	1	74	23.20	23.34	23.28		
15	16QAM	36	0	21.97	22.14	22.20	23	2
15	16QAM	36	20	22.03	22.20	22.19		
15	16QAM	36	39	22.14	22.09	22.08		
15	16QAM	75	0	22.04	22.19	22.11		
15	64QAM	1	0	21.95	22.22	22.26	23	2
15	64QAM	1	37	22.12	22.35	22.31		
15	64QAM	1	74	22.10	22.15	22.17		
15	64QAM	36	0	21.01	21.18	21.15	22	3
15	64QAM	36	20	21.11	21.17	21.21		
15	64QAM	36	39	21.10	21.09	21.03		
15	64QAM	75	0	21.01	21.12	21.13		
Channel				20000	20175	20350	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1715	1732.5	1750		
10	QPSK	1	0	23.69	24.01	24.00	25	0
10	QPSK	1	25	23.85	24.09	23.98		
10	QPSK	1	49	23.91	23.92	23.90		
10	QPSK	25	0	22.89	23.18	23.09	24	1
10	QPSK	25	12	22.90	23.16	23.04		



10	QPSK	25	25	23.00	23.17	23.06		
10	QPSK	50	0	22.92	23.07	22.96		
10	16QAM	1	0	22.99	23.36	23.44	24	1
10	16QAM	1	25	23.10	23.44	23.39		
10	16QAM	1	49	23.27	23.28	23.30		
10	16QAM	25	0	21.97	22.18	22.20	23	2
10	16QAM	25	12	22.05	22.16	22.16		
10	16QAM	25	25	22.12	22.17	22.05		
10	16QAM	50	0	22.00	22.12	22.06	23	2
10	64QAM	1	0	21.96	22.24	22.26		
10	64QAM	1	25	22.13	22.28	22.25		
10	64QAM	1	49	22.17	22.22	22.12	22	3
10	64QAM	25	0	20.95	21.20	21.20		
10	64QAM	25	12	21.15	21.17	21.15		
10	64QAM	25	25	21.14	21.18	21.12	22	3
10	64QAM	50	0	20.99	21.17	21.09		
Channel				19975	20175	20375		
Frequency (MHz)				1712.5	1732.5	1752.5		
5	QPSK	1	0	23.72	24.07	24.02	25	0
5	QPSK	1	12	23.80	24.03	24.03		
5	QPSK	1	24	23.90	23.93	23.86		
5	QPSK	12	0	22.87	23.11	23.07	24	1
5	QPSK	12	7	22.91	23.14	23.10		
5	QPSK	12	13	23.05	23.21	23.12		
5	QPSK	25	0	22.96	23.06	23.05	24	1
5	16QAM	1	0	23.01	23.28	23.41		
5	16QAM	1	12	23.16	23.34	23.42		
5	16QAM	1	24	23.23	23.26	23.21	23	2
5	16QAM	12	0	21.96	22.19	22.15		
5	16QAM	12	7	22.02	22.22	22.13		
5	16QAM	12	13	22.07	22.12	22.08	23	2
5	16QAM	25	0	21.97	22.19	22.07		
5	64QAM	1	0	21.97	22.19	22.31		
5	64QAM	1	12	22.05	22.28	22.32	23	2
5	64QAM	1	24	22.18	22.16	22.16		
5	64QAM	12	0	20.94	21.23	21.12		
5	64QAM	12	7	21.08	21.24	21.21	22	3
5	64QAM	12	13	21.10	21.12	21.06		
5	64QAM	25	0	20.99	21.11	21.12		
Channel				19965	20175	20385	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1732.5	1753.5		
3	QPSK	1	0	23.70	24.05	24.08	25	0
3	QPSK	1	8	23.84	24.02	23.98		
3	QPSK	1	14	23.83	23.94	23.90		
3	QPSK	8	0	22.81	23.18	23.13	24	1
3	QPSK	8	4	23.00	23.14	23.06		
3	QPSK	8	7	23.04	23.21	23.12		
3	QPSK	15	0	22.97	23.06	23.04	24	1
3	16QAM	1	0	23.04	23.28	23.42		
3	16QAM	1	8	23.17	23.40	23.43		
3	16QAM	1	14	23.18	23.32	23.27	23	2
3	16QAM	8	0	21.98	22.15	22.20		
3	16QAM	8	4	22.10	22.25	22.17		
3	16QAM	8	7	22.11	22.15	22.13	23	2
3	16QAM	15	0	22.04	22.21	22.09		
3	64QAM	1	0	21.96	22.19	22.26	23	2



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3	64QAM	1	8	22.07	22.31	22.34	22	3
3	64QAM	1	14	22.13	22.14	22.14		
3	64QAM	8	0	21.01	21.20	21.14		
3	64QAM	8	4	21.15	21.19	21.18		
3	64QAM	8	7	21.07	21.13	21.13		
3	64QAM	15	0	21.04	21.16	21.12		
Channel				19957	20175	20393	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1732.5	1754.3		
1.4	QPSK	1	0	23.70	24.09	24.04	25	0
1.4	QPSK	1	3	23.85	24.02	24.04		
1.4	QPSK	1	5	23.85	23.97	23.86		
1.4	QPSK	3	0	23.71	24.10	24.09		
1.4	QPSK	3	1	23.84	24.01	24.01		
1.4	QPSK	3	3	23.88	23.91	23.85		
1.4	QPSK	6	0	22.93	23.14	22.99	24	1
1.4	16QAM	1	0	22.99	23.30	23.34	24	1
1.4	16QAM	1	3	23.16	23.35	23.37		
1.4	16QAM	1	5	23.27	23.31	23.26		
1.4	16QAM	3	0	23.05	23.33	23.34		
1.4	16QAM	3	1	23.15	23.37	23.38		
1.4	16QAM	3	3	23.21	23.25	23.28		
1.4	16QAM	6	0	22.01	22.13	22.13	23	2
1.4	64QAM	1	0	21.91	22.18	22.33	23	2
1.4	64QAM	1	3	22.12	22.27	22.27		
1.4	64QAM	1	5	22.15	22.15	22.15		
1.4	64QAM	3	0	21.93	22.23	22.28		
1.4	64QAM	3	1	22.10	22.35	22.32		
1.4	64QAM	3	3	22.13	22.16	22.14		
1.4	64QAM	6	0	20.99	21.16	21.10	22	3



<LTE Band 5>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20450	20525	20600		0
Frequency (MHz)				829	836.5	844		
10	QPSK	1	0	23.61	23.64	23.40		
10	QPSK	1	25	23.60	23.46	23.39	24.5	0
10	QPSK	1	49	23.59	23.38	23.31		
10	QPSK	25	0	22.72	22.73	22.48		
10	QPSK	25	12	22.72	22.51	22.47	23.5	1
10	QPSK	25	25	22.66	22.67	22.39		
10	QPSK	50	0	22.69	22.50	22.44		
10	16QAM	1	0	22.90	22.80	22.71	23.5	1
10	16QAM	1	25	22.93	22.75	22.70		
10	16QAM	1	49	22.89	22.68	22.64		
10	16QAM	25	0	21.76	21.59	21.51	22.5	2
10	16QAM	25	12	21.78	21.57	21.56		
10	16QAM	25	25	21.72	21.52	21.47		
10	16QAM	50	0	21.74	21.59	21.54	22.5	2
10	64QAM	1	0	21.83	21.73	21.62		
10	64QAM	1	25	21.90	21.69	21.63		
10	64QAM	1	49	21.81	21.60	21.59	21.5	3
10	64QAM	25	0	20.79	20.59	20.52		
10	64QAM	25	12	20.80	20.58	20.57		
10	64QAM	25	25	20.75	20.54	20.48	21.5	3
10	64QAM	50	0	20.75	20.59	20.54		
Channel				20425	20525	20625		
Frequency (MHz)				826.5	836.5	846.5		
5	QPSK	1	0	23.53	23.63	23.35	24.5	0
5	QPSK	1	12	23.56	23.37	23.37		
5	QPSK	1	24	23.58	23.34	23.31		
5	QPSK	12	0	22.70	22.72	22.48	23.5	1
5	QPSK	12	7	22.63	22.49	22.38		
5	QPSK	12	13	22.66	22.60	22.29		
5	QPSK	25	0	22.62	22.44	22.41	23.5	1
5	16QAM	1	0	22.85	22.80	22.71		
5	16QAM	1	12	22.91	22.72	22.62		
5	16QAM	1	24	22.85	22.64	22.54	22.5	2
5	16QAM	12	0	21.76	21.58	21.47		
5	16QAM	12	7	21.74	21.55	21.46		
5	16QAM	12	13	21.64	21.44	21.43	22.5	2
5	16QAM	25	0	21.74	21.49	21.53		
5	64QAM	1	0	21.79	21.73	21.52		
5	64QAM	1	12	21.87	21.64	21.54	22.5	2
5	64QAM	1	24	21.71	21.56	21.53		
5	64QAM	12	0	20.79	20.51	20.46		
5	64QAM	12	7	20.72	20.52	20.57	21.5	3
5	64QAM	12	13	20.65	20.49	20.48		
5	64QAM	25	0	20.72	20.52	20.49		
Channel				20415	20525	20635	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				825.5	836.5	847.5		
3	QPSK	1	0	23.61	23.63	23.38		
3	QPSK	1	8	23.53	23.39	23.33		
3	QPSK	1	14	23.58	23.30	23.21		
3	QPSK	8	0	22.69	22.65	22.39	23.5	1
3	QPSK	8	4	22.70	22.46	22.47		



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3	QPSK	8	7	22.58	22.66	22.33		
3	QPSK	15	0	22.69	22.42	22.44		
3	16QAM	1	0	22.85	22.80	22.67	23.5	1
3	16QAM	1	8	22.87	22.70	22.67		
3	16QAM	1	14	22.88	22.66	22.56		
3	16QAM	8	0	21.75	21.55	21.49	22.5	2
3	16QAM	8	4	21.77	21.54	21.51		
3	16QAM	8	7	21.71	21.51	21.47		
3	16QAM	15	0	21.73	21.57	21.52		
3	64QAM	1	0	21.79	21.65	21.52	22.5	2
3	64QAM	1	8	21.85	21.62	21.55		
3	64QAM	1	14	21.77	21.51	21.52		
3	64QAM	8	0	20.73	20.58	20.52	21.5	3
3	64QAM	8	4	20.74	20.49	20.51		
3	64QAM	8	7	20.68	20.45	20.43		
3	64QAM	15	0	20.71	20.52	20.53		
Channel				20407	20525	20643	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				824.7	836.5	848.3		
1.4	QPSK	1	0	23.58	23.54	23.32	24.5	0
1.4	QPSK	1	3	23.55	23.42	23.39		
1.4	QPSK	1	5	23.51	23.34	23.30		
1.4	QPSK	3	0	23.60	23.63	23.36		
1.4	QPSK	3	1	23.56	23.39	23.38		
1.4	QPSK	3	3	23.58	23.33	23.27		
1.4	QPSK	6	0	22.66	22.50	22.39	23.5	1
1.4	16QAM	1	0	22.81	22.75	22.64	23.5	1
1.4	16QAM	1	3	22.91	22.68	22.62		
1.4	16QAM	1	5	22.85	22.60	22.54		
1.4	16QAM	3	0	22.81	22.71	22.64		
1.4	16QAM	3	1	22.91	22.74	22.64		
1.4	16QAM	3	3	22.84	22.66	22.62		
1.4	16QAM	6	0	21.69	21.56	21.49	22.5	2
1.4	64QAM	1	0	21.83	21.67	21.55	22.5	2
1.4	64QAM	1	3	21.90	21.65	21.61		
1.4	64QAM	1	5	21.78	21.54	21.55		
1.4	64QAM	3	0	21.76	21.65	21.54		
1.4	64QAM	3	1	21.87	21.68	21.57		
1.4	64QAM	3	3	21.75	21.54	21.57		
1.4	64QAM	6	0	20.65	20.50	20.48	21.5	3



<LTE Band 7>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20850	21100	21350		
Frequency (MHz)				2510	2535	2560		
20	QPSK	1	0	23.73	23.77	23.61		
20	QPSK	1	49	23.59	23.65	23.53		
20	QPSK	1	99	23.68	23.72	23.60		
20	QPSK	50	0	22.79	22.84	22.52		
20	QPSK	50	24	22.80	22.83	22.63		
20	QPSK	50	50	22.73	22.75	22.62		
20	QPSK	100	0	22.72	22.73	22.61		
20	16QAM	1	0	22.99	22.94	22.84		
20	16QAM	1	49	23.10	23.06	22.93		
20	16QAM	1	99	23.06	23.09	22.94		
20	16QAM	50	0	21.87	21.80	21.68		
20	16QAM	50	24	21.93	21.81	21.73		
20	16QAM	50	50	21.84	21.85	21.73		
20	16QAM	100	0	21.77	21.81	21.68		
20	64QAM	1	0	21.92	21.89	21.75		
20	64QAM	1	49	22.04	21.91	21.84		
20	64QAM	1	99	21.97	21.97	21.86		
20	64QAM	50	0	20.87	20.79	20.67		
20	64QAM	50	24	20.93	20.80	20.71		
20	64QAM	50	50	20.84	20.87	20.76		
20	64QAM	100	0	20.81	20.81	20.72		
Channel				20825	21100	21375		
Frequency (MHz)				2507.5	2535	2562.5		
15	QPSK	1	0	23.66	23.69	23.59		
15	QPSK	1	37	23.58	23.56	23.45		
15	QPSK	1	74	23.66	23.66	23.52		
15	QPSK	36	0	22.77	22.58	22.45		
15	QPSK	36	20	22.70	22.73	22.58		
15	QPSK	36	39	22.72	22.68	22.57		
15	QPSK	75	0	22.68	22.65	22.58		
15	16QAM	1	0	22.98	22.94	22.76		
15	16QAM	1	37	23.05	23.00	22.89		
15	16QAM	1	74	22.96	23.03	22.92		
15	16QAM	36	0	21.79	21.74	21.65		
15	16QAM	36	20	21.87	21.73	21.70		
15	16QAM	36	39	21.76	21.76	21.64		
15	16QAM	75	0	21.69	21.80	21.63		
15	64QAM	1	0	21.83	21.83	21.67		
15	64QAM	1	37	21.98	21.81	21.75		
15	64QAM	1	74	21.93	21.91	21.83		
15	64QAM	36	0	20.84	20.78	20.60		
15	64QAM	36	20	20.88	20.76	20.64		
15	64QAM	36	39	20.77	20.85	20.66		
15	64QAM	75	0	20.78	20.75	20.72		
Channel				20800	21100	21400	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2505	2535	2565		
10	QPSK	1	0	23.73	23.69	23.55		
10	QPSK	1	25	23.51	23.59	23.43		
10	QPSK	1	49	23.63	23.72	23.57		
10	QPSK	25	0	22.73	22.64	22.43		
10	QPSK	25	12	22.78	22.74	22.62		



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10	QPSK	25	25	22.65	22.75	22.59		
10	QPSK	50	0	22.62	22.69	22.53		
10	16QAM	1	0	22.99	22.92	22.82	23.5	1
10	16QAM	1	25	23.10	23.00	22.86		
10	16QAM	1	49	22.98	23.05	22.86		
10	16QAM	25	0	21.87	21.75	21.64	22.5	2
10	16QAM	25	12	21.86	21.77	21.64		
10	16QAM	25	25	21.80	21.75	21.70		
10	16QAM	50	0	21.77	21.75	21.59		
10	64QAM	1	0	21.83	21.82	21.74	22.5	2
10	64QAM	1	25	21.98	21.86	21.74		
10	64QAM	1	49	21.94	21.96	21.84		
10	64QAM	25	0	20.83	20.78	20.61	21.5	3
10	64QAM	25	12	20.86	20.70	20.64		
10	64QAM	25	25	20.82	20.83	20.73		
10	64QAM	50	0	20.79	20.81	20.71		
Channel				20775	21100	21425	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2502.5	2535	2567.5		
5	QPSK	1	0	23.68	23.76	23.58	24.5	0
5	QPSK	1	12	23.59	23.63	23.43		
5	QPSK	1	24	23.60	23.69	23.60		
5	QPSK	12	0	22.69	22.65	22.52	23.5	1
5	QPSK	12	7	22.71	22.78	22.63		
5	QPSK	12	13	22.73	22.65	22.62		
5	QPSK	25	0	22.67	22.72	22.52		
5	16QAM	1	0	22.99	22.91	22.76	23.5	1
5	16QAM	1	12	23.09	23.01	22.83		
5	16QAM	1	24	23.03	23.03	22.89		
5	16QAM	12	0	21.85	21.75	21.60	22.5	2
5	16QAM	12	7	21.91	21.81	21.67		
5	16QAM	12	13	21.79	21.85	21.73		
5	16QAM	25	0	21.68	21.72	21.64		
5	64QAM	1	0	21.89	21.89	21.70	22.5	2
5	64QAM	1	12	22.03	21.90	21.75		
5	64QAM	1	24	21.90	21.87	21.78		
5	64QAM	12	0	20.79	20.77	20.60	21.5	3
5	64QAM	12	7	20.87	20.75	20.65		
5	64QAM	12	13	20.81	20.87	20.71		
5	64QAM	25	0	20.71	20.76	20.64		



<LTE Band 12>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				23060	23095	23130		
Frequency (MHz)				704	707.5	711		
10	QPSK	1	0	23.03	23.12	23.10		
10	QPSK	1	25	22.92	22.97	23.03	24.5	0
10	QPSK	1	49	22.99	23.04	22.98		
10	QPSK	25	0	22.08	22.11	22.01		
10	QPSK	25	12	22.09	22.10	22.09	23.5	1
10	QPSK	25	25	22.06	22.05	22.08		
10	QPSK	50	0	22.04	22.05	22.00		
10	16QAM	1	0	22.25	22.24	22.27	23.5	1
10	16QAM	1	25	22.44	22.31	22.35		
10	16QAM	1	49	22.34	22.36	22.45		
10	16QAM	25	0	21.18	21.13	21.07	22.5	2
10	16QAM	25	12	21.21	21.13	21.08		
10	16QAM	25	25	21.14	21.08	21.18		
10	16QAM	50	0	21.18	21.11	21.11	22.5	2
10	64QAM	1	0	21.21	21.20	21.24		
10	64QAM	1	25	21.35	21.26	21.32		
10	64QAM	1	49	21.27	21.30	21.38	21.5	3
10	64QAM	25	0	20.19	20.17	20.07		
10	64QAM	25	12	20.23	20.16	20.10		
10	64QAM	25	25	20.18	20.10	20.18	21.5	3
10	64QAM	50	0	20.19	20.11	20.11		
Channel				23035	23095	23155		
Frequency (MHz)				701.5	707.5	713.5		
5	QPSK	1	0	22.95	23.02	23.06	24.5	0
5	QPSK	1	12	22.86	22.88	22.99		
5	QPSK	1	24	22.96	23.04	22.94		
5	QPSK	12	0	22.04	22.01	21.95	23.5	1
5	QPSK	12	7	22.08	22.04	22.04		
5	QPSK	12	13	22.03	21.88	22.05		
5	QPSK	25	0	21.97	21.99	21.93	23.5	1
5	16QAM	1	0	22.16	22.22	22.23		
5	16QAM	1	12	22.36	22.22	22.29		
5	16QAM	1	24	22.33	22.30	22.36	22.5	2
5	16QAM	12	0	21.17	21.11	21.02		
5	16QAM	12	7	21.16	21.11	21.00		
5	16QAM	12	13	21.11	21.04	21.16	22.5	2
5	16QAM	25	0	21.17	21.03	21.03		
5	64QAM	1	0	21.13	21.13	21.23		
5	64QAM	1	12	21.32	21.19	21.23	22.5	2
5	64QAM	1	24	21.17	21.26	21.32		
5	64QAM	12	0	20.17	20.13	19.97		
5	64QAM	12	7	20.19	20.08	20.08	21.5	3
5	64QAM	12	13	20.14	20.09	20.18		
5	64QAM	25	0	20.10	20.06	20.02		
Channel				23025	23095	23165	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				700.5	707.5	714.5		
3	QPSK	1	0	23.03	23.11	23.08	24.5	0
3	QPSK	1	8	22.85	22.88	22.97		
3	QPSK	1	14	22.90	23.03	22.92		
3	QPSK	8	0	22.05	21.94	21.89	23.5	1
3	QPSK	8	4	22.06	22.00	22.02		



3	QPSK	8	7	21.96	21.94	22.05		
3	QPSK	15	0	21.98	22.02	21.94		
3	16QAM	1	0	22.25	22.17	22.19	23.5	1
3	16QAM	1	8	22.37	22.31	22.33		
3	16QAM	1	14	22.32	22.28	22.39		
3	16QAM	8	0	21.16	21.08	20.99	22.5	2
3	16QAM	8	4	21.14	21.07	20.99		
3	16QAM	8	7	21.14	21.05	21.10		
3	16QAM	15	0	21.08	21.01	21.02		
3	64QAM	1	0	21.17	21.18	21.18	22.5	2
3	64QAM	1	8	21.34	21.17	21.32		
3	64QAM	1	14	21.22	21.20	21.34		
3	64QAM	8	0	20.09	20.09	20.07	21.5	3
3	64QAM	8	4	20.17	20.16	20.04		
3	64QAM	8	7	20.16	20.06	20.17		
3	64QAM	15	0	20.15	20.05	20.10		
Channel				23017	23095	23173	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				699.7	707.5	715.3		
1.4	QPSK	1	0	22.94	23.10	23.05	24.5	0
1.4	QPSK	1	3	22.88	22.88	22.93		
1.4	QPSK	1	5	22.94	23.01	22.98		
1.4	QPSK	3	0	23.02	23.02	23.07		
1.4	QPSK	3	1	22.85	22.88	22.99		
1.4	QPSK	3	3	22.99	23.02	22.89		
1.4	QPSK	6	0	21.96	22.00	21.92	23.5	1
1.4	16QAM	1	0	22.21	22.20	22.27	23.5	1
1.4	16QAM	1	3	22.38	22.30	22.34		
1.4	16QAM	1	5	22.29	22.26	22.37		
1.4	16QAM	3	0	22.24	22.15	22.21		
1.4	16QAM	3	1	22.42	22.26	22.34		
1.4	16QAM	3	3	22.27	22.29	22.40		
1.4	16QAM	6	0	21.09	21.11	21.04	22.5	2
1.4	64QAM	1	0	21.16	21.15	21.17	22.5	2
1.4	64QAM	1	3	21.28	21.22	21.30		
1.4	64QAM	1	5	21.19	21.20	21.31		
1.4	64QAM	3	0	21.19	21.12	21.19		
1.4	64QAM	3	1	21.28	21.26	21.32		
1.4	64QAM	3	3	21.18	21.23	21.28		
1.4	64QAM	6	0	20.12	20.07	20.02	21.5	3



<LTE Band 13>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				23230				
Frequency (MHz)				782				
10	QPSK	1	0		23.46		24.5	0
10	QPSK	1	25		23.32			
10	QPSK	1	49		23.45			
10	QPSK	25	0		22.46		23.5	1
10	QPSK	25	12		22.35			
10	QPSK	25	25		22.45			
10	QPSK	50	0		22.34		23.5	1
10	16QAM	1	0		22.50			
10	16QAM	1	25		22.62			
10	16QAM	1	49		22.80		22.5	2
10	16QAM	25	0		21.45			
10	16QAM	25	12		21.49			
10	16QAM	25	25		21.52		22.5	2
10	16QAM	50	0		21.46			
10	64QAM	1	0		21.47			
10	64QAM	1	25		21.57		22.5	2
10	64QAM	1	49		21.74			
10	64QAM	25	0		20.51			
10	64QAM	25	12		20.48		21.5	3
10	64QAM	25	25		20.55			
10	64QAM	50	0		20.46			
Channel				23205	23230	23255	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				779.5	782	784.5		
5	QPSK	1	0	23.42	23.45	23.39	24.5	0
5	QPSK	1	12	23.16	23.25	23.08		
5	QPSK	1	24	23.36	23.36	23.31		
5	QPSK	12	0	22.28	22.31	22.26	23.5	1
5	QPSK	12	7	22.19	22.28	22.11		
5	QPSK	12	13	22.36	22.45	22.27		
5	QPSK	25	0	22.28	22.28	22.20	23.5	1
5	16QAM	1	0	22.32	22.42	22.24		
5	16QAM	1	12	22.53	22.58	22.53		
5	16QAM	1	24	22.68	22.77	22.66	22.5	2
5	16QAM	12	0	21.36	21.45	21.36		
5	16QAM	12	7	21.36	21.40	21.31		
5	16QAM	12	13	21.37	21.45	21.29	22.5	2
5	16QAM	25	0	21.31	21.37	21.30		
5	64QAM	1	0	21.31	21.41	21.31		
5	64QAM	1	12	21.47	21.52	21.42	22.5	2
5	64QAM	1	24	21.66	21.70	21.63		
5	64QAM	12	0	20.48	20.49	20.39		
5	64QAM	12	7	20.35	20.44	20.35	21.5	3
5	64QAM	12	13	20.43	20.52	20.39		
5	64QAM	25	0	20.37	20.46	20.27		



<LTE Band 14>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				23330			24.5	0
Frequency (MHz)				793				
10	QPSK	1	0		23.53		24.5	0
10	QPSK	1	25		23.52			
10	QPSK	1	49		23.43			
10	QPSK	25	0		22.57		23.5	1
10	QPSK	25	12		22.56			
10	QPSK	25	25		22.52			
10	QPSK	50	0		22.56		23.5	1
10	16QAM	1	0		22.78			
10	16QAM	1	25		22.85			
10	16QAM	1	49		22.78		22.5	2
10	16QAM	25	0		21.68			
10	16QAM	25	12		21.70			
10	16QAM	25	25		21.62		22.5	2
10	16QAM	50	0		21.67			
10	64QAM	1	0		21.70			
10	64QAM	1	25		21.81		22.5	2
10	64QAM	1	49		21.75			
10	64QAM	25	0		20.69			
10	64QAM	25	12		20.68		21.5	3
10	64QAM	25	25		20.62			
10	64QAM	50	0		20.66			
Channel				23305	23330	23355	24.5	0
Frequency (MHz)				790.5	793	795.5		
5	QPSK	1	0	23.52	23.52	23.50	24.5	0
5	QPSK	1	12	23.40	23.50	23.36		
5	QPSK	1	24	23.34	23.43	23.33		
5	QPSK	12	0	22.47	22.55	22.39	23.5	1
5	QPSK	12	7	22.39	22.46	22.35		
5	QPSK	12	13	22.35	22.44	22.27		
5	QPSK	25	0	22.47	22.51	22.38	23.5	1
5	16QAM	1	0	22.61	22.68	22.60		
5	16QAM	1	12	22.71	22.81	22.65		
5	16QAM	1	24	22.67	22.73	22.66	22.5	2
5	16QAM	12	0	21.58	21.62	21.52		
5	16QAM	12	7	21.56	21.60	21.51		
5	16QAM	12	13	21.49	21.55	21.39	22.5	2
5	16QAM	25	0	21.53	21.59	21.50		
5	64QAM	1	0	21.55	21.62	21.53		
5	64QAM	1	12	21.78	21.79	21.73	22.5	2
5	64QAM	1	24	21.69	21.71	21.63		
5	64QAM	12	0	20.58	20.64	20.51		
5	64QAM	12	7	20.67	20.68	20.58	21.5	3
5	64QAM	12	13	20.49	20.54	20.46		
5	64QAM	25	0	20.53	20.56	20.50		



<LTE Band 17>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				23780	23790	23800		
Frequency (MHz)				709	710	711		
10	QPSK	1	0	23.02	23.07	23.04	24.5	0
10	QPSK	1	25	23.00	23.00	22.98		
10	QPSK	1	49	22.88	23.05	23.03		
10	QPSK	25	0	22.05	22.10	22.06	23.5	1
10	QPSK	25	12	22.09	22.03	22.05		
10	QPSK	25	25	22.04	22.01	22.00		
10	QPSK	50	0	22.07	22.08	22.01		
10	16QAM	1	0	22.25	22.26	22.33	23.5	1
10	16QAM	1	25	22.32	22.30	22.34		
10	16QAM	1	49	22.41	22.40	22.40		
10	16QAM	25	0	21.18	21.12	21.14	22.5	2
10	16QAM	25	12	21.17	21.12	21.16		
10	16QAM	25	25	21.12	21.12	21.12		
10	16QAM	50	0	21.17	21.15	21.12		
10	64QAM	1	0	21.21	21.19	21.27	22.5	2
10	64QAM	1	25	21.28	21.25	21.25		
10	64QAM	1	49	21.37	21.34	21.35		
10	64QAM	25	0	20.15	20.14	20.14	21.5	3
10	64QAM	25	12	20.16	20.14	20.17		
10	64QAM	25	25	20.11	20.12	20.12		
10	64QAM	50	0	20.16	20.15	20.12		
Channel				23755	23790	23825		
Frequency (MHz)				706.5	710	713.5		
5	QPSK	1	0	22.92	23.06	22.97	24.5	0
5	QPSK	1	12	22.91	22.91	22.89		
5	QPSK	1	24	22.80	23.05	22.99		
5	QPSK	12	0	22.05	22.06	22.05	23.5	1
5	QPSK	12	7	22.05	22.00	22.04		
5	QPSK	12	13	22.01	21.94	21.90		
5	QPSK	25	0	22.04	22.08	21.95		
5	16QAM	1	0	22.24	22.24	22.27	23.5	1
5	16QAM	1	12	22.29	22.29	22.32		
5	16QAM	1	24	22.31	22.32	22.37		
5	16QAM	12	0	21.08	21.10	21.04	22.5	2
5	16QAM	12	7	21.10	21.06	21.08		
5	16QAM	12	13	21.11	21.07	21.05		
5	16QAM	25	0	21.17	21.06	21.03		
5	64QAM	1	0	21.13	21.15	21.21	22.5	2
5	64QAM	1	12	21.23	21.16	21.22		
5	64QAM	1	24	21.35	21.30	21.35		
5	64QAM	12	0	20.10	20.06	20.14	21.5	3
5	64QAM	12	7	20.15	20.10	20.17		
5	64QAM	12	13	20.04	20.02	20.03		
5	64QAM	25	0	20.09	20.14	20.07		



<LTE Band 66>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				132072	132322	132572		0
Frequency (MHz)				1720	1745	1770		
20	QPSK	1	0	23.99	24.06	24.05		
20	QPSK	1	49	23.93	24.02	24.04	25	0
20	QPSK	1	99	23.88	23.96	23.78		
20	QPSK	50	0	22.98	23.08	22.98		
20	QPSK	50	24	22.97	23.01	22.92	24	1
20	QPSK	50	50	22.89	23.01	22.87		
20	QPSK	100	0	22.97	23.02	22.94		
20	16QAM	1	0	23.23	23.38	23.34	24	1
20	16QAM	1	49	23.28	23.50	23.27		
20	16QAM	1	99	23.20	23.31	23.01		
20	16QAM	50	0	21.98	22.16	22.05	23	2
20	16QAM	50	24	22.05	22.13	22.00		
20	16QAM	50	50	22.01	22.09	21.94		
20	16QAM	100	0	22.02	22.12	21.97	23	2
20	64QAM	1	0	22.18	22.34	22.31		
20	64QAM	1	49	22.24	22.44	22.24		
20	64QAM	1	99	22.15	22.24	21.99	22	3
20	64QAM	50	0	21.00	21.17	21.06		
20	64QAM	50	24	21.04	21.14	21.01		
20	64QAM	50	50	21.01	21.12	20.93	22	3
20	64QAM	100	0	21.03	21.15	21.00		
Channel				132047	132322	132597		
Frequency (MHz)				1717.5	1745	1772.5		
15	QPSK	1	0	23.93	24.01	23.96	25	0
15	QPSK	1	37	23.99	24.01	24.03		
15	QPSK	1	74	23.78	23.93	23.69		
15	QPSK	36	0	22.93	23.08	22.98	24	1
15	QPSK	36	20	22.89	22.95	22.92		
15	QPSK	36	39	22.89	22.95	22.83		
15	QPSK	75	0	22.91	22.96	22.89	24	1
15	16QAM	1	0	23.20	23.32	23.30		
15	16QAM	1	37	23.23	23.42	23.26		
15	16QAM	1	74	23.17	23.22	22.99	23	2
15	16QAM	36	0	21.96	22.08	22.00		
15	16QAM	36	20	22.04	22.07	21.92		
15	16QAM	36	39	21.99	21.99	21.92	23	2
15	16QAM	75	0	21.95	22.06	21.87		
15	64QAM	1	0	22.09	22.30	22.30		
15	64QAM	1	37	22.24	22.42	22.20	23	2
15	64QAM	1	74	22.07	22.18	21.98		
15	64QAM	36	0	20.94	21.07	21.02		
15	64QAM	36	20	21.03	21.11	21.01	22	3
15	64QAM	36	39	20.95	21.10	20.83		
15	64QAM	75	0	20.99	21.14	20.95		
Channel				132022	132322	132622		
Frequency (MHz)				1715	1745	1775		
10	QPSK	1	0	23.84	24.03	24.01		
10	QPSK	1	25	23.96	24.00	24.01		
10	QPSK	1	49	23.78	23.87	23.76		
10	QPSK	25	0	22.92	23.02	22.89	24	1
10	QPSK	25	12	22.91	23.01	22.91		



10	QPSK	25	25	22.89	22.98	22.86		
10	QPSK	50	0	22.91	23.02	22.93		
10	16QAM	1	0	23.19	23.28	23.29	24	1
10	16QAM	1	25	23.25	23.43	23.17		
10	16QAM	1	49	23.14	23.21	22.92		
10	16QAM	25	0	21.95	22.08	21.99	23	2
10	16QAM	25	12	22.05	22.07	21.92		
10	16QAM	25	25	22.01	22.00	21.89		
10	16QAM	50	0	21.93	22.03	21.90	23	2
10	64QAM	1	0	22.14	22.30	22.28		
10	64QAM	1	25	22.23	22.38	22.14		
10	64QAM	1	49	22.06	22.22	21.95	22	3
10	64QAM	25	0	20.96	21.11	20.98		
10	64QAM	25	12	20.98	21.06	20.95		
10	64QAM	25	25	20.97	21.07	20.89	22	3
10	64QAM	50	0	20.99	21.05	20.98		
Channel				131997	132322	132647		
Frequency (MHz)				1712.5	1745	1777.5		
5	QPSK	1	0	23.85	23.97	23.97	25	0
5	QPSK	1	12	23.97	23.90	24.03		
5	QPSK	1	24	23.78	23.86	23.70		
5	QPSK	12	0	22.95	23.01	22.93	24	1
5	QPSK	12	7	22.88	22.93	22.84		
5	QPSK	12	13	22.85	22.98	22.86		
5	QPSK	25	0	22.91	23.02	22.85	24	1
5	16QAM	1	0	23.19	23.37	23.29		
5	16QAM	1	12	23.21	23.47	23.18		
5	16QAM	1	24	23.18	23.31	22.95	23	2
5	16QAM	12	0	21.93	22.08	22.00		
5	16QAM	12	7	22.00	22.11	21.95		
5	16QAM	12	13	21.93	22.06	21.84	23	2
5	16QAM	25	0	21.94	22.07	21.89		
5	64QAM	1	0	22.10	22.27	22.22		
5	64QAM	1	12	22.16	22.39	22.21	23	2
5	64QAM	1	24	22.08	22.16	21.94		
5	64QAM	12	0	20.95	21.15	21.06		
5	64QAM	12	7	20.99	21.08	20.94	22	3
5	64QAM	12	13	20.98	21.07	20.85		
5	64QAM	25	0	20.98	21.09	20.98		
Channel				131987	132322	132657	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1745	1778.5		
3	QPSK	1	0	23.83	23.97	24.03	25	0
3	QPSK	1	8	23.91	23.89	23.96		
3	QPSK	1	14	23.83	23.87	23.70		
3	QPSK	8	0	22.92	22.98	22.98	24	1
3	QPSK	8	4	22.97	23.00	22.84		
3	QPSK	8	7	22.85	22.97	22.79		
3	QPSK	15	0	22.94	23.02	22.92	24	1
3	16QAM	1	0	23.17	23.29	23.28		
3	16QAM	1	8	23.27	23.48	23.24		
3	16QAM	1	14	23.14	23.31	23.01	23	2
3	16QAM	8	0	21.93	22.13	22.03		
3	16QAM	8	4	22.05	22.10	21.97		
3	16QAM	8	7	21.99	21.99	21.88	23	2
3	16QAM	15	0	21.92	22.02	21.91		
3	64QAM	1	0	22.16	22.34	22.29	23	2



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3	64QAM	1	8	22.14	22.39	22.21	22	3
3	64QAM	1	14	22.06	22.23	21.95		
3	64QAM	8	0	20.98	21.16	20.97		
3	64QAM	8	4	21.04	21.10	20.92		
3	64QAM	8	7	20.95	21.04	20.92		
3	64QAM	15	0	21.00	21.08	20.99		
Channel				131979	132322	132665	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1745	1779.3		
1.4	QPSK	1	0	23.87	24.02	23.94	25	0
1.4	QPSK	1	3	23.98	23.95	24.00		
1.4	QPSK	1	5	23.81	23.86	23.75		
1.4	QPSK	3	0	23.93	24.03	24.02		
1.4	QPSK	3	1	23.99	23.91	23.97		
1.4	QPSK	3	3	23.78	23.89	23.73		
1.4	QPSK	6	0	22.89	22.97	22.87	24	1
1.4	16QAM	1	0	23.14	23.36	23.25	24	1
1.4	16QAM	1	3	23.18	23.47	23.20		
1.4	16QAM	1	5	23.20	23.27	22.93		
1.4	16QAM	3	0	23.14	23.30	23.31		
1.4	16QAM	3	1	23.20	23.49	23.17		
1.4	16QAM	3	3	23.19	23.21	22.91		
1.4	16QAM	6	0	21.96	22.06	21.97	23	2
1.4	64QAM	1	0	22.09	22.30	22.31	23	2
1.4	64QAM	1	3	22.19	22.44	22.20		
1.4	64QAM	1	5	22.07	22.15	21.93		
1.4	64QAM	3	0	22.18	22.27	22.30		
1.4	64QAM	3	1	22.19	22.37	22.24		
1.4	64QAM	3	3	22.09	22.15	21.98		
1.4	64QAM	6	0	21.01	21.13	20.90	22	3



Reduced Power Mode

<LTE Band 2>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				18700	18900	19100		
Frequency (MHz)				1860	1880	1900		
20	QPSK	1	0	23.21	23.36	23.35	24.0	0
20	QPSK	1	49	23.17	23.14	23.29		
20	QPSK	1	99	23.12	23.18	23.28		
20	QPSK	50	0	22.30	22.39	22.29	23.0	1
20	QPSK	50	24	22.25	22.23	22.37		
20	QPSK	50	50	22.21	22.17	22.31		
20	QPSK	100	0	22.25	22.34	22.34	23.0	1
20	16QAM	1	0	22.40	22.29	22.48		
20	16QAM	1	49	22.49	22.34	22.45		
20	16QAM	1	99	22.47	22.38	22.44	23.0	1
20	16QAM	50	0	21.23	21.28	21.44		
20	16QAM	50	24	21.28	21.29	21.42		
20	16QAM	50	50	21.30	21.21	21.40	22.0	2
20	16QAM	100	0	21.17	21.28	21.42		
20	64QAM	1	0	21.31	21.33	21.47		
20	64QAM	1	49	21.38	21.30	21.50	22.0	2
20	64QAM	1	99	21.39	21.35	21.45		
20	64QAM	50	0	20.26	20.32	20.49		
20	64QAM	50	24	20.31	20.34	20.47	21.0	3
20	64QAM	50	50	20.28	20.28	20.41		
20	64QAM	100	0	20.21	20.26	20.41		
Channel				18675	18900	19125		
Frequency (MHz)				1857.5	1880	1902.5		
15	QPSK	1	0	23.12	23.34	23.25	24.0	0
15	QPSK	1	37	23.12	23.07	23.21		
15	QPSK	1	74	23.09	23.13	23.28		
15	QPSK	36	0	22.25	22.22	22.38	23.0	1
15	QPSK	36	20	22.22	22.19	22.30		
15	QPSK	36	39	22.17	22.16	22.24		
15	QPSK	75	0	22.23	22.10	22.34	23.0	1
15	16QAM	1	0	22.32	22.24	22.45		
15	16QAM	1	37	22.49	22.34	22.46		
15	16QAM	1	74	22.43	22.36	22.43	23.0	1
15	16QAM	36	0	21.21	21.20	21.37		
15	16QAM	36	20	21.24	21.29	21.33		
15	16QAM	36	39	21.21	21.16	21.37	22.0	2
15	16QAM	75	0	21.17	21.26	21.32		
15	16QAM	75	0	21.17	21.26	21.32		
15	64QAM	1	0	21.29	21.24	21.40	22.0	2
15	64QAM	1	37	21.30	21.25	21.46		
15	64QAM	1	74	21.38	21.35	21.37		
15	64QAM	36	0	20.17	20.23	20.49	21.0	3
15	64QAM	36	20	20.28	20.25	20.44		
15	64QAM	36	39	20.22	20.19	20.34		
15	64QAM	75	0	20.12	20.26	20.34	21.0	3
15	64QAM	75	0	20.12	20.26	20.34		
15	64QAM	75	0	20.12	20.26	20.34		
Channel				18650	18900	19150		
Frequency (MHz)				1855	1880	1905		
10	QPSK	1	0	23.15	23.35	23.32	24.0	0
10	QPSK	1	25	23.16	23.08	23.24		
10	QPSK	1	49	23.02	23.17	23.24		



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10	QPSK	25	0	22.20	22.14	22.39	23.0	1
10	QPSK	25	12	22.25	22.16	22.33		
10	QPSK	25	25	22.19	22.11	22.21		
10	QPSK	50	0	22.20	22.15	22.25	23.0	1
10	16QAM	1	0	22.38	22.22	22.44		
10	16QAM	1	25	22.43	22.34	22.45		
10	16QAM	1	49	22.42	22.32	22.39	22.0	2
10	16QAM	25	0	21.22	21.25	21.39		
10	16QAM	25	12	21.20	21.21	21.39		
10	16QAM	25	25	21.23	21.15	21.30	22.0	2
10	16QAM	50	0	21.13	21.26	21.32		
10	64QAM	1	0	21.31	21.24	21.43		
10	64QAM	1	25	21.31	21.24	21.47	21.0	3
10	64QAM	1	49	21.32	21.25	21.45		
10	64QAM	25	0	20.22	20.30	20.49		
10	64QAM	25	12	20.25	20.31	20.40	21.0	3
10	64QAM	25	25	20.20	20.21	20.36		
10	64QAM	50	0	20.17	20.26	20.32		
Channel				18625	18900	19175	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1852.5	1880	1907.5		
5	QPSK	1	0	23.11	23.32	23.29	24.0	0
5	QPSK	1	12	23.12	23.13	23.26		
5	QPSK	1	24	23.03	23.17	23.23		
5	QPSK	12	0	22.26	22.18	22.39	23.0	1
5	QPSK	12	7	22.18	22.13	22.31		
5	QPSK	12	13	22.19	22.13	22.24		
5	QPSK	25	0	22.19	22.13	22.28	23.0	1
5	16QAM	1	0	22.34	22.22	22.44		
5	16QAM	1	12	22.42	22.31	22.43		
5	16QAM	1	24	22.42	22.28	22.39	22.0	2
5	16QAM	12	0	21.22	21.27	21.44		
5	16QAM	12	7	21.22	21.29	21.40		
5	16QAM	12	13	21.27	21.17	21.33	22.0	2
5	16QAM	25	0	21.13	21.21	21.36		
5	64QAM	1	0	21.22	21.26	21.38		
5	64QAM	1	12	21.33	21.21	21.40	21.0	3
5	64QAM	1	24	21.30	21.28	21.38		
5	64QAM	12	0	20.26	20.29	20.49		
5	64QAM	12	7	20.24	20.31	20.47	21.0	3
5	64QAM	12	13	20.26	20.24	20.37		
5	64QAM	25	0	20.17	20.24	20.32		
Channel				18615	18900	19185	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1851.5	1880	1908.5		
3	QPSK	1	0	23.12	23.26	23.28	24.0	0
3	QPSK	1	8	23.15	23.09	23.28		
3	QPSK	1	14	23.08	23.10	23.20		
3	QPSK	8	0	22.24	22.14	22.31	23.0	1
3	QPSK	8	4	22.20	22.18	22.27		
3	QPSK	8	7	22.12	22.10	22.26		
3	QPSK	15	0	22.19	22.18	22.32	23.0	1
3	16QAM	1	0	22.33	22.20	22.44		
3	16QAM	1	8	22.48	22.31	22.48		
3	16QAM	1	14	22.46	22.33	22.35	22.0	2
3	16QAM	8	0	21.18	21.21	21.36		
3	16QAM	8	4	21.26	21.28	21.37		
3	16QAM	8	7	21.22	21.12	21.37	22.0	2



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3	16QAM	15	0	21.15	21.25	21.41		
3	64QAM	1	0	21.29	21.33	21.38	22.0	2
3	64QAM	1	8	21.32	21.21	21.46		
3	64QAM	1	14	21.35	21.35	21.37		
3	64QAM	8	0	20.22	20.32	20.40	21.0	3
3	64QAM	8	4	20.28	20.30	20.37		
3	64QAM	8	7	20.20	20.19	20.36		
3	64QAM	15	0	20.11	20.21	20.36		
Channel				18607	18900	19193	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1850.7	1880	1909.3		
1.4	QPSK	1	0	23.16	23.31	23.35	24.0	0
1.4	QPSK	1	3	23.08	23.12	23.25		
1.4	QPSK	1	5	23.04	23.16	23.26		
1.4	QPSK	3	0	23.13	23.35	23.29		
1.4	QPSK	3	1	23.07	23.06	23.21		
1.4	QPSK	3	3	23.11	23.08	23.27		
1.4	QPSK	6	0	22.22	22.13	22.28	23.0	1
1.4	16QAM	1	0	22.31	22.21	22.46	23.0	1
1.4	16QAM	1	3	22.46	22.31	22.47		
1.4	16QAM	1	5	22.37	22.33	22.38		
1.4	16QAM	3	0	22.32	22.26	22.50		
1.4	16QAM	3	1	22.47	22.34	22.47		
1.4	16QAM	3	3	22.39	22.38	22.36		
1.4	16QAM	6	0	21.11	21.23	21.39	22.0	2
1.4	64QAM	1	0	21.24	21.31	21.38	22.0	2
1.4	64QAM	1	3	21.37	21.29	21.50		
1.4	64QAM	1	5	21.29	21.34	21.35		
1.4	64QAM	3	0	21.30	21.25	21.39		
1.4	64QAM	3	1	21.29	21.30	21.43		
1.4	64QAM	3	3	21.36	21.26	21.38		
1.4	64QAM	6	0	20.16	20.19	20.36		



<LTE Band 4>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20050	20175	20300		
Frequency (MHz)				1720	1732.5	1745		
20	QPSK	1	0	23.26	23.34	23.29		
20	QPSK	1	49	23.15	23.17	23.16	23.0	1
20	QPSK	1	99	23.21	23.07	23.02		
20	QPSK	50	0	22.21	22.38	22.24		
20	QPSK	50	24	22.30	22.28	22.22	23.0	1
20	QPSK	50	50	22.29	22.30	22.25		
20	QPSK	100	0	22.29	22.24	22.15		
20	16QAM	1	0	22.36	22.45	22.45	23.0	1
20	16QAM	1	49	22.50	22.43	22.33		
20	16QAM	1	99	22.37	22.42	22.40		
20	16QAM	50	0	21.31	21.32	21.29	22.0	2
20	16QAM	50	24	21.41	21.34	21.31		
20	16QAM	50	50	21.45	21.26	21.22		
20	16QAM	100	0	21.35	21.29	21.23	22.0	2
20	64QAM	1	0	21.31	21.36	21.44		
20	64QAM	1	49	21.44	21.43	21.43		
20	64QAM	1	99	21.49	21.30	21.31	21.0	3
20	64QAM	50	0	20.33	20.32	20.30		
20	64QAM	50	24	20.45	20.34	20.31		
20	64QAM	50	50	20.44	20.26	20.22	21.0	3
20	64QAM	100	0	20.34	20.29	20.28		
Channel				20025	20175	20325		
Frequency (MHz)				1717.5	1732.5	1747.5		
15	QPSK	1	0	23.00	23.11	23.19	24.0	0
15	QPSK	1	37	23.09	23.17	23.06	23.0	1
15	QPSK	1	74	23.14	22.98	22.94		
15	QPSK	36	0	22.14	22.27	22.22		
15	QPSK	36	20	22.22	22.26	22.13	23.0	1
15	QPSK	36	39	22.33	22.25	22.22		
15	QPSK	75	0	22.27	22.22	22.15		
15	16QAM	1	0	22.35	22.43	22.31	23.0	1
15	16QAM	1	37	22.42	22.46	22.42		
15	16QAM	1	74	22.50	22.42	22.37		
15	16QAM	36	0	21.27	21.22	21.29	22.0	2
15	16QAM	36	20	21.33	21.28	21.28		
15	16QAM	36	39	21.44	21.17	21.17		
15	16QAM	75	0	21.34	21.27	21.20	22.0	2
15	64QAM	1	0	21.25	21.30	21.35		
15	64QAM	1	37	21.42	21.43	21.40		
15	64QAM	1	74	21.40	21.23	21.26	21.0	3
15	64QAM	36	0	20.31	20.26	20.24		
15	64QAM	36	20	20.41	20.25	20.30		
15	64QAM	36	39	20.40	20.17	20.12	21.0	3
15	64QAM	75	0	20.31	20.20	20.22		
Channel				20000	20175	20350		
Frequency (MHz)				1715	1732.5	1750		
10	QPSK	1	0	22.99	23.09	23.09	24.0	0
10	QPSK	1	25	23.15	23.17	23.07	23.0	1
10	QPSK	1	49	23.21	23.00	22.99		
10	QPSK	25	0	22.19	22.26	22.18		
10	QPSK	25	12	22.20	22.24	22.13		



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10	QPSK	25	25	22.30	22.25	22.15		
10	QPSK	50	0	22.22	22.15	22.05		
10	16QAM	1	0	22.29	22.44	22.38	23.0	1
10	16QAM	1	25	22.40	22.43	22.48		
10	16QAM	1	49	22.38	22.36	22.39		
10	16QAM	25	0	21.27	21.26	21.29	22.0	2
10	16QAM	25	12	21.35	21.24	21.25		
10	16QAM	25	25	21.42	21.25	21.14		
10	16QAM	50	0	21.30	21.20	21.15	22.0	2
10	64QAM	1	0	21.26	21.32	21.35		
10	64QAM	1	25	21.43	21.36	21.34		
10	64QAM	1	49	21.47	21.30	21.21	21.0	3
10	64QAM	25	0	20.25	20.28	20.29		
10	64QAM	25	12	20.45	20.25	20.24		
10	64QAM	25	25	20.44	20.26	20.21	21.0	3
10	64QAM	50	0	20.29	20.25	20.18		
Channel				19975	20175	20375		
Frequency (MHz)				1712.5	1732.5	1752.5		
5	QPSK	1	0	23.02	23.15	23.11	24.0	0
5	QPSK	1	12	23.10	23.11	23.12		
5	QPSK	1	24	23.20	23.01	22.95		
5	QPSK	12	0	22.17	22.19	22.16	23.0	1
5	QPSK	12	7	22.21	22.22	22.19		
5	QPSK	12	13	22.35	22.29	22.21		
5	QPSK	25	0	22.26	22.14	22.14	23.0	1
5	16QAM	1	0	22.31	22.36	22.50		
5	16QAM	1	12	22.46	22.42	22.39		
5	16QAM	1	24	22.45	22.34	22.30	22.0	2
5	16QAM	12	0	21.26	21.27	21.24		
5	16QAM	12	7	21.32	21.30	21.22		
5	16QAM	12	13	21.37	21.20	21.17	22.0	2
5	16QAM	25	0	21.27	21.27	21.16		
5	64QAM	1	0	21.27	21.27	21.40		
5	64QAM	1	12	21.35	21.36	21.41	22.0	2
5	64QAM	1	24	21.48	21.24	21.25		
5	64QAM	12	0	20.24	20.31	20.21		
5	64QAM	12	7	20.38	20.32	20.30	21.0	3
5	64QAM	12	13	20.40	20.20	20.15		
5	64QAM	25	0	20.29	20.19	20.21		
Channel				19965	20175	20385	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1732.5	1753.5		
3	QPSK	1	0	23.00	23.13	23.17	24.0	0
3	QPSK	1	8	23.14	23.10	23.07		
3	QPSK	1	14	23.13	23.02	22.99		
3	QPSK	8	0	22.11	22.26	22.22	23.0	1
3	QPSK	8	4	22.30	22.22	22.15		
3	QPSK	8	7	22.34	22.29	22.21		
3	QPSK	15	0	22.27	22.14	22.13	23.0	1
3	16QAM	1	0	22.34	22.36	22.47		
3	16QAM	1	8	22.47	22.48	22.41		
3	16QAM	1	14	22.48	22.40	22.36	22.0	2
3	16QAM	8	0	21.28	21.23	21.29		
3	16QAM	8	4	21.40	21.33	21.26		
3	16QAM	8	7	21.41	21.23	21.22	22.0	2
3	16QAM	15	0	21.34	21.29	21.18		
3	64QAM	1	0	21.26	21.27	21.35		



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3	64QAM	1	8	21.37	21.39	21.43	21.0	3
3	64QAM	1	14	21.43	21.22	21.23		
3	64QAM	8	0	20.31	20.28	20.23		
3	64QAM	8	4	20.45	20.27	20.27		
3	64QAM	8	7	20.37	20.21	20.22		
3	64QAM	15	0	20.34	20.24	20.21		
Channel				19957	20175	20393	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1732.5	1754.3		
1.4	QPSK	1	0	23.00	23.17	23.13	24.0	0
1.4	QPSK	1	3	23.15	23.10	23.13		
1.4	QPSK	1	5	23.15	23.05	22.95		
1.4	QPSK	3	0	23.01	23.18	23.18		
1.4	QPSK	3	1	23.14	23.09	23.10		
1.4	QPSK	3	3	23.18	22.99	22.94		
1.4	QPSK	6	0	22.23	22.22	22.08	23.0	1
1.4	16QAM	1	0	22.29	22.38	22.43	23.0	1
1.4	16QAM	1	3	22.46	22.43	22.46		
1.4	16QAM	1	5	22.47	22.39	22.35		
1.4	16QAM	3	0	22.35	22.41	22.43		
1.4	16QAM	3	1	22.45	22.45	22.47		
1.4	16QAM	3	3	22.48	22.33	22.37		
1.4	16QAM	6	0	21.31	21.21	21.22	22.0	2
1.4	64QAM	1	0	21.21	21.26	21.42	22.0	2
1.4	64QAM	1	3	21.42	21.35	21.36		
1.4	64QAM	1	5	21.45	21.23	21.24		
1.4	64QAM	3	0	21.23	21.31	21.37		
1.4	64QAM	3	1	21.40	21.43	21.41		
1.4	64QAM	3	3	21.43	21.24	21.23		
1.4	64QAM	6	0	20.29	20.24	20.19	21.0	3



<LTE Band 66>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				132072	132322	132572		0
Frequency (MHz)				1720	1745	1770		
20	QPSK	1	0	23.31	23.42	23.24		
20	QPSK	1	49	23.25	23.38	23.23	24.0	0
20	QPSK	1	99	23.20	23.32	22.97		
20	QPSK	50	0	22.30	22.44	22.17		
20	QPSK	50	24	22.29	22.37	22.11	23.0	1
20	QPSK	50	50	22.21	22.37	22.06		
20	QPSK	100	0	22.29	22.38	22.13		
20	16QAM	1	0	22.41	22.42	22.45	23.0	1
20	16QAM	1	49	22.38	22.39	22.46		
20	16QAM	1	99	22.31	22.27	22.20		
20	16QAM	50	0	21.30	21.38	21.24	22.0	2
20	16QAM	50	24	21.37	21.49	21.19		
20	16QAM	50	50	21.33	21.45	21.13		
20	16QAM	100	0	21.34	21.48	21.16	22.0	2
20	64QAM	1	0	21.50	21.42	21.50		
20	64QAM	1	49	21.48	21.32	21.43		
20	64QAM	1	99	21.47	21.21	21.18	21.0	3
20	64QAM	50	0	20.32	20.45	20.25		
20	64QAM	50	24	20.36	20.50	20.20		
20	64QAM	50	50	20.33	20.48	20.12	21.0	3
20	64QAM	100	0	20.35	20.23	20.19		
Channel				132047	132322	132597		
Frequency (MHz)				1717.5	1745	1772.5		
15	QPSK	1	0	23.25	23.37	23.15	24.0	0
15	QPSK	1	37	23.31	23.37	23.22		
15	QPSK	1	74	23.10	23.29	22.88		
15	QPSK	36	0	22.25	22.44	22.17	23.0	1
15	QPSK	36	20	22.21	22.31	22.11		
15	QPSK	36	39	22.21	22.31	22.02		
15	QPSK	75	0	22.23	22.32	22.08	23.0	1
15	16QAM	1	0	22.47	22.50	22.49		
15	16QAM	1	37	22.39	22.46	22.45		
15	16QAM	1	74	22.49	22.21	22.18	22.0	2
15	16QAM	36	0	21.28	21.44	21.19		
15	16QAM	36	20	21.36	21.43	21.11		
15	16QAM	36	39	21.31	21.35	21.11	22.0	2
15	16QAM	75	0	21.27	21.42	21.06		
15	64QAM	1	0	21.41	21.42	21.49		
15	64QAM	1	37	21.38	21.34	21.39	22.0	2
15	64QAM	1	74	21.39	21.21	21.17		
15	64QAM	36	0	20.26	20.43	20.21		
15	64QAM	36	20	20.35	20.47	20.20	21.0	3
15	64QAM	36	39	20.27	20.46	20.02		
15	64QAM	75	0	20.31	20.50	20.14		
Channel				132022	132322	132622		
Frequency (MHz)				1715	1745	1775		
10	QPSK	1	0	23.16	23.39	23.20		
10	QPSK	1	25	23.28	23.36	23.20		
10	QPSK	1	49	23.10	23.23	22.95		
10	QPSK	25	0	22.24	22.38	22.08	23.0	1
10	QPSK	25	12	22.23	22.37	22.10		



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10	QPSK	25	25	22.21	22.34	22.05		
10	QPSK	50	0	22.23	22.38	22.12		
10	16QAM	1	0	22.43	22.47	22.48	23.0	1
10	16QAM	1	25	22.41	22.37	22.36		
10	16QAM	1	49	22.46	22.32	22.11		
10	16QAM	25	0	21.27	21.44	21.18	22.0	2
10	16QAM	25	12	21.37	21.43	21.11		
10	16QAM	25	25	21.33	21.36	21.08		
10	16QAM	50	0	21.25	21.39	21.09	22.0	2
10	64QAM	1	0	21.46	21.42	21.47		
10	64QAM	1	25	21.32	21.41	21.33		
10	64QAM	1	49	21.38	21.25	21.14	21.0	3
10	64QAM	25	0	20.28	20.47	20.17		
10	64QAM	25	12	20.30	20.42	20.14		
10	64QAM	25	25	20.29	20.43	20.08	21.0	3
10	64QAM	50	0	20.31	20.41	20.17		
Channel				131997	132322	132647		
Frequency (MHz)				1712.5	1745	1777.5		
5	QPSK	1	0	23.17	23.33	23.16	24.0	0
5	QPSK	1	12	23.29	23.26	23.22		
5	QPSK	1	24	23.10	23.22	22.89		
5	QPSK	12	0	22.27	22.37	22.12	23.0	1
5	QPSK	12	7	22.20	22.29	22.03		
5	QPSK	12	13	22.17	22.34	22.05		
5	QPSK	25	0	22.23	22.38	22.04	23.0	1
5	16QAM	1	0	22.43	22.41	22.48		
5	16QAM	1	12	22.38	22.43	22.37		
5	16QAM	1	24	22.50	22.27	22.14	22.0	2
5	16QAM	12	0	21.25	21.44	21.19		
5	16QAM	12	7	21.32	21.47	21.14		
5	16QAM	12	13	21.25	21.42	21.03	22.0	2
5	16QAM	25	0	21.26	21.43	21.08		
5	64QAM	1	0	21.42	21.23	21.41		
5	64QAM	1	12	21.48	21.35	21.40	22.0	2
5	64QAM	1	24	21.40	21.12	21.13		
5	64QAM	12	0	20.27	20.11	20.25		
5	64QAM	12	7	20.31	20.04	20.13	21.0	3
5	64QAM	12	13	20.30	20.43	20.04		
5	64QAM	25	0	20.30	20.45	20.17		
Channel				131987	132322	132657	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1745	1778.5		
3	QPSK	1	0	23.15	23.33	23.22	24.0	0
3	QPSK	1	8	23.23	23.25	23.15		
3	QPSK	1	14	23.15	23.23	22.89		
3	QPSK	8	0	22.24	22.34	22.17	23.0	1
3	QPSK	8	4	22.29	22.36	22.03		
3	QPSK	8	7	22.17	22.33	21.98		
3	QPSK	15	0	22.26	22.38	22.11	23.0	1
3	16QAM	1	0	22.49	22.50	22.47		
3	16QAM	1	8	22.41	22.31	22.43		
3	16QAM	1	14	22.46	22.32	22.20	22.0	2
3	16QAM	8	0	21.25	21.49	21.22		
3	16QAM	8	4	21.37	21.46	21.16		
3	16QAM	8	7	21.31	21.35	21.07	22.0	2
3	16QAM	15	0	21.24	21.38	21.10		
3	64QAM	1	0	21.48	21.50	21.48		



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3	64QAM	1	8	21.46	21.45	21.40	21.0	3
3	64QAM	1	14	21.38	21.48	21.14		
3	64QAM	8	0	20.30	20.45	20.16		
3	64QAM	8	4	20.36	20.46	20.11		
3	64QAM	8	7	20.27	20.40	20.11		
3	64QAM	15	0	20.32	20.44	20.18		
Channel				131979	132322	132665	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1745	1779.3		
1.4	QPSK	1	0	23.19	23.38	23.13	24.0	0
1.4	QPSK	1	3	23.30	23.31	23.19		
1.4	QPSK	1	5	23.13	23.22	22.94		
1.4	QPSK	3	0	23.25	23.39	23.21		
1.4	QPSK	3	1	23.31	23.27	23.16		
1.4	QPSK	3	3	23.10	23.25	22.92		
1.4	QPSK	6	0	22.21	22.33	22.06	23.0	1
1.4	16QAM	1	0	22.46	22.47	22.44	23.0	1
1.4	16QAM	1	3	22.50	22.45	22.39		
1.4	16QAM	1	5	22.41	22.32	22.12		
1.4	16QAM	3	0	22.46	22.43	22.50		
1.4	16QAM	3	1	22.25	22.41	22.36		
1.4	16QAM	3	3	22.21	22.35	22.10		
1.4	16QAM	6	0	21.28	21.42	21.16	22.0	2
1.4	64QAM	1	0	21.41	21.45	21.50	22.0	2
1.4	64QAM	1	3	21.42	21.41	21.39		
1.4	64QAM	1	5	21.39	21.42	21.12		
1.4	64QAM	3	0	21.50	21.32	21.49		
1.4	64QAM	3	1	21.48	21.42	21.43		
1.4	64QAM	3	3	21.41	21.38	21.17		
1.4	64QAM	6	0	20.33	20.49	20.09	21.0	3



12. WiFi/Bluetooth Output Power (Unit: dBm)

General Note:

1. Per KDB 248227 D01v02r02, SAR test reduction is determined according to 802.11 transmission mode configurations and certain exposure conditions with multiple test positions. In the 2.4 GHz band, separate SAR procedures are applied to DSSS and OFDM configurations to simplify DSSS test requirements. For OFDM, in both 2.4 and 5 GHz bands, an initial test configuration must be determined for each standalone and aggregated frequency band, according to the transmission mode configuration with the highest maximum output power specified for production units to perform SAR measurements. If the same highest maximum output power applies to different combinations of channel bandwidths, modulations and data rates, additional procedures are applied to determine which test configurations require SAR measurement. When applicable, an initial test position may be applied to reduce the number of SAR measurements required for next to the ear, UMPC mini-tablet or hotspot mode configurations with multiple test positions.
2. For 2.4 GHz 802.11b DSSS, either the initial test position procedure for multiple exposure test positions or the DSSS procedure for fixed exposure position is applied; these are mutually exclusive. For 2.4 GHz and 5 GHz OFDM configurations, the initial test configuration is applied to measure SAR using either the initial test position procedure for multiple exposure test position configurations or the initial test configuration procedures for fixed exposure test conditions. Based on the reported SAR of the measured configurations and maximum output power of the transmission mode configurations that are not included in the initial test configuration, the subsequent test configuration and initial test position procedures are applied to determine if SAR measurements are required for the remaining OFDM transmission configurations. In general, the number of test channels that require SAR measurement is minimized based on maximum output power measured for the test sample(s).
3. For OFDM transmission configurations in the 2.4 GHz and 5 GHz bands, When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel for each frequency band.
4. DSSS and OFDM configurations are considered separately according to the required SAR procedures. SAR is measured in the initial test position using the 802.11 transmission mode configuration required by the DSSS procedure or initial test configuration and subsequent test configuration(s) according to the OFDM procedures.18 The initial test position procedure is described in the following:
 - a. When the reported SAR of 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 802.11 transmission mode combinations within the frequency band or aggregated band.
 - b. When the reported SAR of the test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode 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 report SAR is ≤ 0.8 W/kg or all required test position are tested.
 - c. For all positions/configurations, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.



<2.4GHz WLAN>

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
2.4GHz WLAN	802.11b 1Mbps	1	2412	21.30	21.50	99.28
		6	2437	21.20	21.50	
		11	2462	21.40	21.50	
	802.11g 6Mbps	1	2412	18.50	19.00	98.33
		6	2437	21.30	21.50	
		11	2462	18.70	19.00	
	802.11n-HT20 MCS0	1	2412	17.20	18.00	98.21
		6	2437	21.10	21.50	
		11	2462	17.90	18.00	
	802.11n-HT40 MCS0	3	2422	14.70	15.00	94.50
		6	2437	16.90	17.00	
		9	2452	16.50	17.00	

<5GHz WLAN >

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.2GHz WLAN	802.11a 6Mbps	36	5180	18.80	19.50	98.57
		40	5200	18.80	19.50	
		44	5220	18.70	19.50	
		48	5240	19.00	19.50	
	802.11n-HT20 MCS0	36	5180	18.60	19.50	97.96
		40	5200	18.60	19.50	
		44	5220	18.50	19.50	
		48	5240	18.80	19.50	
	802.11n-HT40 MCS0	38	5190	17.80	18.00	96.43
		46	5230	18.90	19.50	
	802.11ac-VHT20 MCS0	36	5180	18.70	19.50	97.98
		40	5200	18.70	19.50	
		44	5220	18.60	19.50	
		48	5240	18.90	19.50	
	802.11ac-VHT40 MCS0	38	5190	17.90	18.00	96.96
		46	5230	19.00	19.50	
802.11ac-VHT80 MCS0	42	5210	17.70	18.00	92.22	



	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.3GHz WLAN	802.11a 6Mbps	52	5260	19.20	20.00	98.57
		56	5280	19.30	20.00	
		60	5300	19.30	20.00	
		64	5320	19.20	20.00	
	802.11n-HT20 MCS0	52	5260	19.00	20.00	97.96
		56	5280	19.10	20.00	
		60	5300	19.10	20.00	
		64	5320	19.20	20.00	
	802.11n-HT40 MCS0	54	5270	19.30	20.00	96.43
		62	5310	15.60	16.00	
	802.11ac-VHT20 MCS0	52	5260	19.10	20.00	97.98
		56	5280	19.20	20.00	
		60	5300	19.20	20.00	
		64	5320	19.30	20.00	
	802.11ac-VHT40 MCS0	54	5270	19.40	20.00	96.96
		62	5310	15.60	16.00	
802.11ac-VHT80 MCS0	58	5290	15.80	16.00	98.22	



	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.5GHz WLAN	802.11a 6Mbps	100	5500	19.90	20.50	98.57
		116	5580	20.00	20.50	
		124	5620	20.00	20.50	
		132	5660	19.60	20.50	
		144	5720	20.00	20.50	
	802.11n-HT20 MCS0	100	5500	19.70	20.50	97.96
		116	5580	19.80	20.50	
		124	5620	19.80	20.50	
		132	5660	19.90	20.50	
		144	5720	19.80	20.50	
	802.11n-HT40 MCS0	102	5510	19.30	20.50	96.43
		110	5550	19.60	20.50	
		126	5630	19.60	20.50	
		134	5670	19.50	20.50	
		142	5710	19.90	20.50	
	802.11ac-VHT20 MCS0	100	5500	19.80	20.50	97.98
		116	5580	19.90	20.50	
		124	5620	19.90	20.50	
		132	5660	20.00	20.50	
		144	5720	19.90	20.50	
802.11ac-VHT40 MCS0	102	5510	19.40	20.50	96.96	
	110	5550	19.70	20.50		
	126	5630	19.70	20.50		
	134	5670	19.60	20.50		
	142	5710	20.00	20.50		
802.11ac-VHT80 MCS0	106	5530	17.60	18.00	92.22	
	122	5610	19.70	20.50		
	138	5690	20.00	20.50		

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.8GHz WLAN	802.11a 6Mbps	149	5745	17.60	18.00	98.57
		157	5785	17.80	18.00	
		165	5825	17.60	18.00	
	802.11n-HT20 MCS0	149	5745	17.80	18.00	97.96
		157	5785	17.60	18.00	
		165	5825	17.90	18.00	
	802.11n-HT40 MCS0	151	5755	17.60	18.00	96.43
		159	5795	17.50	18.00	
	802.11ac-VHT20 MCS0	149	5745	17.90	18.00	97.98
		157	5785	17.70	18.00	
		165	5825	18.00	18.00	
	802.11ac-VHT40 MCS0	151	5755	17.70	18.00	96.96
		159	5795	17.60	18.00	
802.11ac-VHT80 MCS0	155	5775	17.70	18.00	92.22	



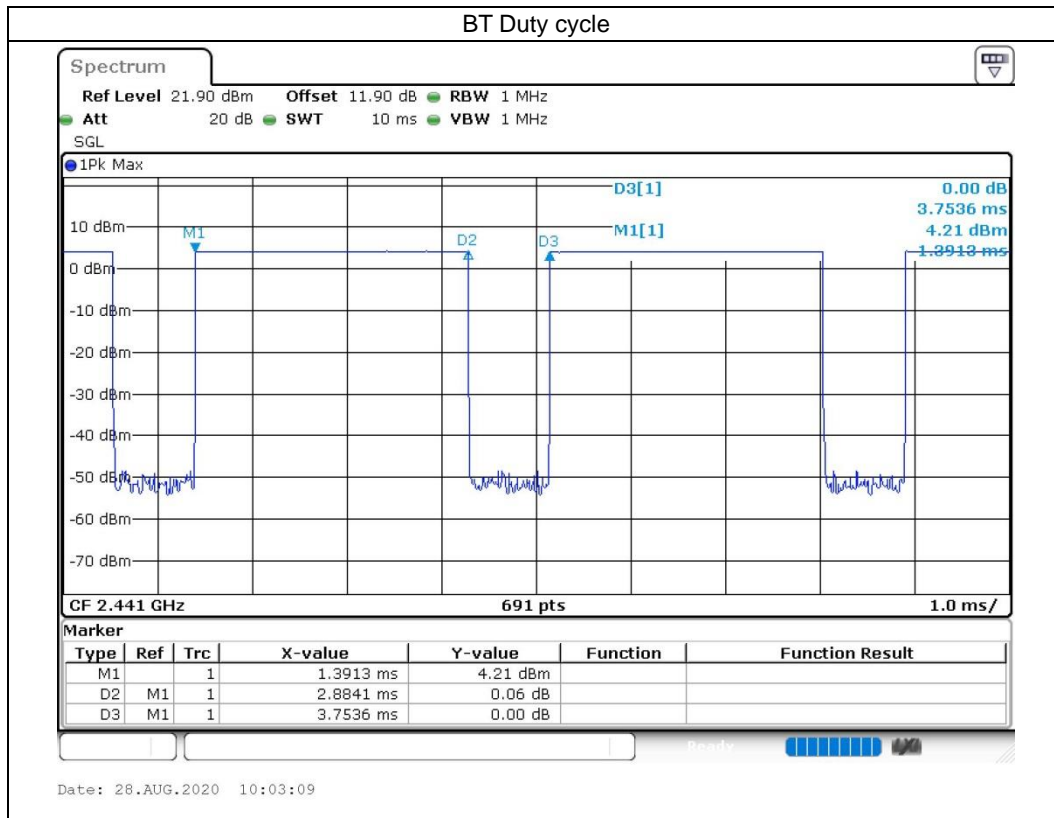
<2.4GHz Bluetooth>

Mode	Channel	Frequency (MHz)	Average power (dBm)		
			1Mbps	2Mbps	3Mbps
BR / EDR	CH 00	2402	3.81	3.42	3.42
	CH 39	2441	4.21	3.84	3.86
	CH 78	2480	4.63	4.28	4.29
Tune-up Limit			5.00	4.50	4.50

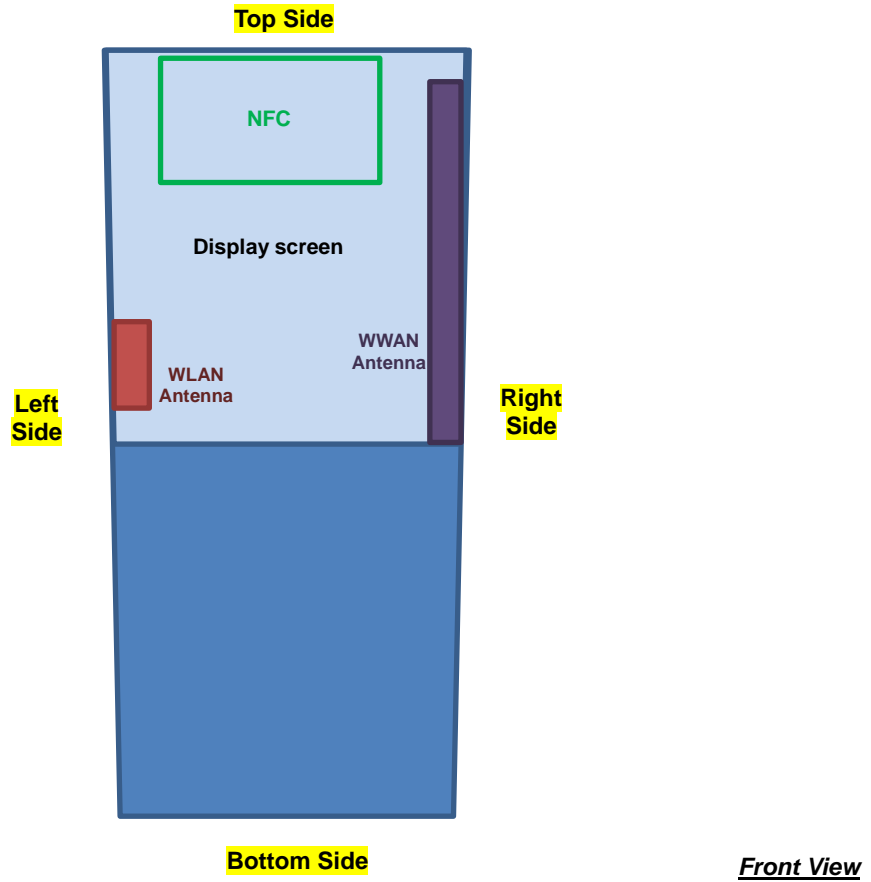
Mode	Channel	Frequency (MHz)	Average power (dBm)	
			1Mbps	2Mbps
LE	CH 00	2402	6.70	6.60
	CH 19	2440	7.10	7.10
	CH 39	2480	7.60	7.50
Tune-up Limit			8.00	8.00

General Note:

- For 2.4GHz Bluetooth SAR testing was selected 1Mbps due to its highest average power and duty cycle is 62.3% considered in SAR testing, and the duty cycle would be scaled to theoretical 83.3% in reported SAR calculation.



13. Antenna Location



Distance of the Antenna to the EUT surface/edge						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
WWAN Main	≤ 25mm	≤ 25mm	≤ 25mm	>25mm	≤ 25mm	>25mm
BT&WLAN	≤ 25mm	≤ 25mm	>25mm	>25mm	>25mm	≤ 25mm

Positions for SAR tests; Hotspot mode						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
WWAN Main	Yes	Yes	Yes	No	Yes	No
BT&WLAN	Yes	Yes	No	No	No	Yes

General Note:

- Referring to KDB 941225 D06 v02r01, when the overall device length and width are ≥ 9cm*5cm, the test distance is 10 mm. SAR must be measured for all sides and surfaces with a transmitting antenna located within 25mm from that surface or edge



14. SAR Test Results

General Note:

- Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
 - Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
 - For SAR testing of WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)"
 - For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
 - For WLAN/Bluetooth: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor
- Per KDB 447498 D01v06, for each exposure position, 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
- Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
- The power reduction is active for hotspot SAR compliance of UMTS B2/B4 and LTE B2/B4/B66.

UMTS Note:

- Per KDB 941225 D01v03r01, for SAR testing is measured using a 12.2 kbps RMC with TPC bits configured to all "1's".
- Per KDB 941225 D01v03r01, RMC 12.2kbps setting is used to evaluate SAR. The maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA / DC-HSDPA is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / DC-HSDPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA, and according to the following RF output power, the output power results of the secondary modes (HSUPA, HSDPA, DC-HSDPA) are less than ¼ dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA / DC-HSDPA.

LTE Note:

- Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
- Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
- Per KDB 941225 D05v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
- Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
- Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
- For LTE B4/B5/B12/B17 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, 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.
- LTE band 4/17 SAR test was covered by Band 66/12; according to TCB workshop, SAR test for overlapping LTE bands can be reduced if
 - The maximum output power, including tolerance, for the smaller band is ≤ the larger band to qualify for the SAR test exclusion.
 - The channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band.



WLAN Note:

1. Per KDB 248227 D01v02r02, for 2.4GHz 802.11g/n SAR testing is not required 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.
2. Per KDB 248227 D01v02r02, U-NII-1 SAR testing is not required when the U-NII-2A band highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band.
3. When the reported SAR of the test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode 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 report SAR is ≤ 0.8 W/kg or all required test position are tested.
4. For all positions / configurations, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions / configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.
5. During SAR testing the WLAN transmission was verified using a spectrum analyzer.



14.1 Hotspot SAR

<WCDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WCDMA II	RMC 12.2Kbps	Front	10mm	ON	9400	1880	23.77	24.50	1.183	0.03	0.277	0.328
	WCDMA II	RMC 12.2Kbps	Back	10mm	ON	9400	1880	23.77	24.50	1.183	-0.01	0.599	0.709
	WCDMA II	RMC 12.2Kbps	Right Side	10mm	ON	9400	1880	23.77	24.50	1.183	0.02	0.984	1.164
01	WCDMA II	RMC 12.2Kbps	Right Side	10mm	ON	9262	1852.4	23.56	24.50	1.242	-0.12	1.100	1.366
	WCDMA II	RMC 12.2Kbps	Right Side	10mm	ON	9538	1907.6	23.61	24.50	1.227	0.01	0.901	1.106
	WCDMA II	RMC 12.2Kbps	Top Side	10mm	ON	9400	1880	23.77	24.50	1.183	0.01	0.168	0.199
	WCDMA IV	RMC 12.2Kbps	Front	10mm	ON	1413	1732.6	23.67	24.50	1.211	-0.19	0.397	0.481
	WCDMA IV	RMC 12.2Kbps	Back	10mm	ON	1413	1732.6	23.67	24.50	1.211	0.01	0.348	0.421
	WCDMA IV	RMC 12.2Kbps	Right Side	10mm	ON	1413	1732.6	23.67	24.50	1.211	-0.06	0.998	1.208
	WCDMA IV	RMC 12.2Kbps	Right Side	10mm	ON	1312	1712.4	23.51	24.50	1.256	-0.16	0.848	1.065
02	WCDMA IV	RMC 12.2Kbps	Right Side	10mm	ON	1513	1752.6	23.64	24.50	1.219	0.01	1.130	1.377
	WCDMA IV	RMC 12.2Kbps	Top Side	10mm	ON	1413	1732.6	23.67	24.50	1.211	0.08	0.346	0.419
	WCDMA V	RMC 12.2Kbps	Front	10mm	OFF	4132	826.4	24.44	25.50	1.276	-0.19	0.315	0.402
	WCDMA V	RMC 12.2Kbps	Back	10mm	OFF	4132	826.4	24.44	25.50	1.276	0.15	0.479	0.612
	WCDMA V	RMC 12.2Kbps	Right Side	10mm	OFF	4132	826.4	24.44	25.50	1.276	-0.08	0.705	0.900
	WCDMA V	RMC 12.2Kbps	Right Side	10mm	OFF	4182	836.4	24.40	25.50	1.288	-0.19	0.726	0.936
03	WCDMA V	RMC 12.2Kbps	Right Side	10mm	OFF	4233	846.6	24.42	25.50	1.282	0.19	0.771	0.989
	WCDMA V	RMC 12.2Kbps	Top Side	10mm	OFF	4132	826.4	24.44	25.50	1.276	-0.19	0.148	0.189



<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 2	20M	QPSK	1	0	Front	10mm	ON	18900	1880	23.36	24.00	1.159	-0.15	0.220	0.255
	LTE Band 2	20M	QPSK	50	0	Front	10mm	ON	18900	1880	22.39	23.00	1.151	-0.07	0.180	0.207
	LTE Band 2	20M	QPSK	1	0	Back	10mm	ON	18900	1880	23.36	24.00	1.159	0.03	0.493	0.571
	LTE Band 2	20M	QPSK	50	0	Back	10mm	ON	18900	1880	22.39	23.00	1.151	-0.14	0.455	0.524
	LTE Band 2	20M	QPSK	1	0	Right Side	10mm	ON	18900	1880	23.36	24.00	1.159	-0.05	0.822	0.953
04	LTE Band 2	20M	QPSK	1	0	Right Side	10mm	ON	18700	1860	23.21	24.00	1.199	-0.08	1.030	1.235
	LTE Band 2	20M	QPSK	1	0	Right Side	10mm	ON	19100	1900	23.35	24.00	1.161	-0.02	0.811	0.942
	LTE Band 2	20M	QPSK	50	0	Right Side	10mm	ON	18900	1880	22.39	23.00	1.151	0.05	0.674	0.776
	LTE Band 2	20M	QPSK	50	0	Right Side	10mm	ON	18700	1860	22.30	24.00	1.479	0.16	0.672	0.994
	LTE Band 2	20M	QPSK	50	0	Right Side	10mm	ON	19100	1900	22.29	24.00	1.483	0.01	0.667	0.989
	LTE Band 2	20M	QPSK	100	0	Right Side	10mm	ON	18900	1880	22.34	24.00	1.466	0.07	0.589	0.863
	LTE Band 2	20M	QPSK	1	0	Top Side	10mm	ON	18900	1880	23.36	24.00	1.159	-0.15	0.164	0.190
	LTE Band 2	20M	QPSK	50	0	Top Side	10mm	ON	18900	1880	22.39	23.00	1.151	-0.07	0.156	0.180
	LTE Band 5	10M	QPSK	1	0	Front	10mm	OFF	20525	836.5	23.64	24.50	1.219	-0.06	0.300	0.366
	LTE Band 5	10M	QPSK	25	0	Front	10mm	OFF	20525	836.5	22.73	23.50	1.194	-0.06	0.233	0.278
	LTE Band 5	10M	QPSK	1	0	Back	10mm	OFF	20525	836.5	23.64	24.50	1.219	0.07	0.455	0.555
	LTE Band 5	10M	QPSK	25	0	Back	10mm	OFF	20525	836.5	22.73	23.50	1.194	0.01	0.366	0.437
05	LTE Band 5	10M	QPSK	1	0	Right Side	10mm	OFF	20525	836.5	23.64	24.50	1.219	-0.06	0.681	0.830
	LTE Band 5	10M	QPSK	25	0	Right Side	10mm	OFF	20525	836.5	22.73	23.50	1.194	-0.04	0.512	0.611
	LTE Band 5	10M	QPSK	50	0	Right Side	10mm	OFF	20525	836.5	22.50	23.50	1.259	-0.04	0.498	0.627
	LTE Band 5	10M	QPSK	1	0	Top Side	10mm	OFF	20525	836.5	23.64	24.50	1.219	0.05	0.118	0.144
	LTE Band 5	10M	QPSK	25	0	Top Side	10mm	OFF	20525	836.5	22.73	23.50	1.194	0.05	0.092	0.110
	LTE Band 7	20M	QPSK	1	0	Front	10mm	OFF	21100	2535	23.77	24.50	1.183	0.09	0.136	0.161
	LTE Band 7	20M	QPSK	50	0	Front	10mm	OFF	21100	2535	22.84	23.50	1.164	0.01	0.103	0.119
	LTE Band 7	20M	QPSK	1	0	Back	10mm	OFF	21100	2535	23.77	24.50	1.183	-0.09	0.162	0.191
	LTE Band 7	20M	QPSK	50	0	Back	10mm	OFF	21100	2535	22.84	23.50	1.164	0.05	0.130	0.152
	LTE Band 7	20M	QPSK	1	0	Right Side	10mm	OFF	21100	2535	23.77	24.50	1.183	0.09	0.580	0.686
	LTE Band 7	20M	QPSK	1	0	Right Side	10mm	OFF	20850	2510	23.73	24.50	1.194	-0.06	0.522	0.623
06	LTE Band 7	20M	QPSK	1	0	Right Side	10mm	OFF	21350	2560	23.61	24.50	1.227	-0.03	0.606	0.744
	LTE Band 7	20M	QPSK	50	0	Right Side	10mm	OFF	21100	2535	22.84	23.50	1.164	0.02	0.431	0.502
	LTE Band 7	20M	QPSK	1	0	Top Side	10mm	OFF	21100	2535	23.77	24.50	1.183	0.09	0.122	0.144
	LTE Band 7	20M	QPSK	50	0	Top Side	10mm	OFF	21100	2535	22.84	23.50	1.164	0.01	0.095	0.111
	LTE Band 12	10M	QPSK	1	0	Front	10mm	OFF	23095	707.5	23.12	24.50	1.374	0.16	0.139	0.192
	LTE Band 12	10M	QPSK	25	0	Front	10mm	OFF	23095	707.5	22.11	23.50	1.377	-0.08	0.121	0.167
	LTE Band 12	10M	QPSK	1	0	Back	10mm	OFF	23095	707.5	23.12	24.50	1.374	0.05	0.193	0.265
	LTE Band 12	10M	QPSK	25	0	Back	10mm	OFF	23095	707.5	22.11	23.50	1.377	0.02	0.166	0.229
07	LTE Band 12	10M	QPSK	1	0	Right Side	10mm	OFF	23095	707.5	23.12	24.50	1.374	0.14	0.299	0.411
	LTE Band 12	10M	QPSK	25	0	Right Side	10mm	OFF	23095	707.5	22.11	23.50	1.377	0.01	0.255	0.352
	LTE Band 12	10M	QPSK	1	0	Top Side	10mm	OFF	23095	707.5	23.12	24.50	1.374	0.16	0.061	0.084
	LTE Band 12	10M	QPSK	25	0	Top Side	10mm	OFF	23095	707.5	22.11	23.50	1.377	-0.08	0.055	0.076
	LTE Band 13	10M	QPSK	1	0	Front	10mm	OFF	23230	782	23.46	24.50	1.271	0.12	0.245	0.312
	LTE Band 13	10M	QPSK	25	0	Front	10mm	OFF	23230	782	22.46	23.50	1.271	-0.15	0.183	0.232
	LTE Band 13	10M	QPSK	1	0	Back	10mm	OFF	23230	782	23.46	24.50	1.271	-0.05	0.345	0.438
	LTE Band 13	10M	QPSK	25	0	Back	10mm	OFF	23230	782	22.46	23.50	1.271	-0.09	0.278	0.353
08	LTE Band 13	10M	QPSK	1	0	Right Side	10mm	OFF	23230	782	23.46	24.50	1.271	0.13	0.532	0.676
	LTE Band 13	10M	QPSK	25	0	Right Side	10mm	OFF	23230	782	22.46	23.50	1.271	-0.06	0.453	0.575
	LTE Band 13	10M	QPSK	1	0	Top Side	10mm	OFF	23230	782	23.46	24.50	1.271	0.12	0.090	0.114
	LTE Band 13	10M	QPSK	25	0	Top Side	10mm	OFF	23230	782	22.46	23.50	1.271	-0.15	0.068	0.086



Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 14	10M	QPSK	1	0	Front	10mm	OFF	23330	793	23.53	24.50	1.250	-0.05	0.170	0.212
	LTE Band 14	10M	QPSK	25	0	Front	10mm	OFF	23330	793	22.57	23.50	1.239	0.05	0.127	0.158
	LTE Band 14	10M	QPSK	1	0	Back	10mm	OFF	23330	793	23.53	24.50	1.250	-0.07	0.300	0.374
	LTE Band 14	10M	QPSK	25	0	Back	10mm	OFF	23330	793	22.57	23.50	1.239	0.02	0.236	0.293
09	LTE Band 14	10M	QPSK	1	0	Right Side	10mm	OFF	23330	793	23.53	24.50	1.250	0.01	0.468	0.585
	LTE Band 14	10M	QPSK	25	0	Right Side	10mm	OFF	23330	793	22.57	23.50	1.239	-0.02	0.374	0.464
	LTE Band 14	10M	QPSK	1	0	Top Side	10mm	OFF	23330	793	23.53	24.50	1.250	-0.05	0.073	0.091
	LTE Band 14	10M	QPSK	25	0	Top Side	10mm	OFF	23330	793	22.57	23.50	1.239	0.05	0.060	0.074
	LTE Band 66	20M	QPSK	1	0	Front	10mm	ON	132322	1745	23.42	24.00	1.143	0.11	0.325	0.371
	LTE Band 66	20M	QPSK	50	0	Front	10mm	ON	132322	1745	22.44	23.00	1.138	0.05	0.261	0.297
	LTE Band 66	20M	QPSK	1	0	Back	10mm	ON	132322	1745	23.42	24.00	1.143	0.11	0.316	0.361
	LTE Band 66	20M	QPSK	50	0	Back	10mm	ON	132322	1745	22.44	23.00	1.138	0.04	0.251	0.286
	LTE Band 66	20M	QPSK	1	0	Right Side	10mm	ON	132322	1745	23.42	24.00	1.143	0.06	0.747	0.854
	LTE Band 66	20M	QPSK	1	0	Right Side	10mm	ON	132072	1720	23.31	24.00	1.172	0.04	0.686	0.804
10	LTE Band 66	20M	QPSK	1	0	Right Side	10mm	ON	132572	1770	23.24	24.00	1.191	-0.15	0.878	1.046
	LTE Band 66	20M	QPSK	50	0	Right Side	10mm	ON	132322	1745	22.44	23.00	1.138	0.06	0.677	0.770
	LTE Band 66	20M	QPSK	100	0	Right Side	10mm	ON	132322	1745	22.38	23.00	1.153	0.09	0.674	0.777
	LTE Band 66	20M	QPSK	1	0	Top Side	10mm	ON	132322	1745	23.42	24.00	1.143	0.11	0.308	0.352
	LTE Band 66	20M	QPSK	50	0	Top Side	10mm	ON	132322	1745	22.44	23.00	1.138	0.05	0.284	0.323

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN2.4GHz	802.11b 1Mbps	Front	10mm	11	2462	21.40	21.50	1.023	99.28	1.007	0.02	0.141	0.145
	WLAN2.4GHz	802.11b 1Mbps	Back	10mm	11	2462	21.40	21.50	1.023	99.28	1.007	-0.01	0.213	0.219
11	WLAN2.4GHz	802.11b 1Mbps	Left Side	10mm	11	2462	21.40	21.50	1.023	99.28	1.007	0.12	0.329	0.339
	WLAN2.4GHz	802.11b 1Mbps	Left Side	10mm	1	2412	21.30	21.50	1.047	99.28	1.007	-0.18	0.294	0.310
	WLAN2.4GHz	802.11b 1Mbps	Left Side	10mm	6	2437	21.20	21.50	1.072	99.28	1.007	0.07	0.298	0.322
	WLAN5GHz	802.11n-HT40 MCS0	Front	10mm	46	5230	18.90	19.50	1.148	96.43	1.037	0.08	0.184	0.219
	WLAN5GHz	802.11n-HT40 MCS0	Back	10mm	46	5230	18.90	19.50	1.148	96.43	1.037	-0.11	0.274	0.326
12	WLAN5GHz	802.11n-HT40 MCS0	Left Side	10mm	46	5230	18.90	19.50	1.148	96.43	1.037	-0.07	1.090	1.298
	WLAN5GHz	802.11n-HT40 MCS0	Left Side	10mm	38	5190	17.80	18.00	1.047	96.43	1.037	0.09	0.724	0.786
	WLAN5GHz	802.11a 6Mbps	Left Side	10mm	48	5240	19.00	19.50	1.122	98.57	1.015	0.03	1.010	1.150
	WLAN5GHz	802.11ac-VHT80 MCS0	Front	10mm	155	5775	17.70	18.00	1.072	92.22	1.084	0.02	0.210	0.244
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	10mm	155	5775	17.70	18.00	1.072	92.22	1.084	0.09	0.497	0.577
13	WLAN5GHz	802.11ac-VHT80 MCS0	Left Side	10mm	155	5775	17.70	18.00	1.072	92.22	1.084	-0.13	1.130	1.313
	WLAN5GHz	802.11n-HT40 MCS0	Left Side	10mm	151	5755	17.60	18.00	1.096	96.43	1.037	0.15	0.993	1.129

<Bluetooth SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	Bluetooth	LE-1Mbps	Front	10mm	39	2480	7.60	8.00	1.096	62.3	1.337	0.12	0.001	0.001
	Bluetooth	LE-1Mbps	Back	10mm	39	2480	7.60	8.00	1.096	62.3	1.337	0.02	0.003	0.004
14	Bluetooth	LE-1Mbps	Left Side	10mm	39	2480	7.60	8.00	1.096	62.3	1.337	0.11	0.008	0.012
	Bluetooth	LE-1Mbps	Left Side	10mm	00	2402	6.70	8.00	1.349	62.3	1.337	-0.04	0.001	0.002
	Bluetooth	LE-1Mbps	Left Side	10mm	19	2440	7.10	8.00	1.230	62.3	1.337	0.08	0.001	0.002



14.2 Body Worn Accessory SAR

<WCDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Accessories	Holster	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WCDMA II	RMC 12.2Kbps	Front	0mm	-	Holster 1	OFF	9400	1880	24.67	25.50	1.211	-0.16	0.135	0.163
	WCDMA II	RMC 12.2Kbps	Back	0mm	-	Holster 1	OFF	9400	1880	24.67	25.50	1.211	-0.03	0.468	0.567
	WCDMA II	RMC 12.2Kbps	Right Side	0mm	Trigger handle	Holster 2	OFF	9400	1880	24.67	25.50	1.211	0.03	0.680	0.823
	WCDMA II	RMC 12.2Kbps	Right Side	0mm	Trigger handle	Holster 2	OFF	9262	1852.4	24.40	25.50	1.288	-0.06	0.661	0.852
15	WCDMA II	RMC 12.2Kbps	Right Side	0mm	Trigger handle	Holster 2	OFF	9538	1907.6	24.58	25.50	1.236	0.09	0.699	0.864
	WCDMA IV	RMC 12.2Kbps	Front	0mm	-	Holster 1	OFF	1413	1732.6	24.46	25.50	1.271	-0.04	0.263	0.334
	WCDMA IV	RMC 12.2Kbps	Back	0mm	-	Holster 1	OFF	1413	1732.6	24.46	25.50	1.271	0.01	0.339	0.431
16	WCDMA IV	RMC 12.2Kbps	Right Side	0mm	Trigger handle	Holster 2	OFF	1413	1732.6	24.46	25.50	1.271	-0.16	0.740	0.940
	WCDMA IV	RMC 12.2Kbps	Right Side	0mm	Trigger handle	Holster 2	OFF	1312	1712.4	24.34	25.50	1.306	-0.08	0.661	0.863
	WCDMA IV	RMC 12.2Kbps	Right Side	0mm	Trigger handle	Holster 2	OFF	1513	1752.6	24.44	25.50	1.276	-0.08	0.719	0.918
	WCDMA V	RMC 12.2Kbps	Front	0mm	-	Holster 1	OFF	4132	826.4	24.44	25.50	1.276	0.09	0.081	0.103
	WCDMA V	RMC 12.2Kbps	Back	0mm	-	Holster 1	OFF	4132	826.4	24.44	25.50	1.276	-0.05	0.133	0.170
17	WCDMA V	RMC 12.2Kbps	Right Side	0mm	Trigger handle	Holster 2	OFF	4132	826.4	24.44	25.50	1.276	-0.02	0.325	0.415
	WCDMA V	RMC 12.2Kbps	Right Side	0mm	Trigger handle	Holster 2	OFF	4182	836.4	24.40	25.50	1.288	0.02	0.255	0.329
	WCDMA V	RMC 12.2Kbps	Right Side	0mm	Trigger handle	Holster 2	OFF	4233	846.6	24.42	25.50	1.282	0.02	0.261	0.335



<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Accessories	Holster	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 2	20M	QPSK	1	0	Front	0mm	-	Holster 1	OFF	18900	1880	24.48	25.00	1.127	0.05	0.118	0.133
	LTE Band 2	20M	QPSK	50	0	Front	0mm	-	Holster 1	OFF	18900	1880	23.37	24.00	1.156	-0.02	0.085	0.098
	LTE Band 2	20M	QPSK	1	0	Back	0mm	-	Holster 1	OFF	18900	1880	24.48	25.00	1.127	-0.07	0.483	0.544
	LTE Band 2	20M	QPSK	50	0	Back	0mm	-	Holster 1	OFF	18900	1880	23.37	24.00	1.156	0.05	0.353	0.408
	LTE Band 2	20M	QPSK	1	0	Right Side	0mm	Trigger handle	Holster 2	OFF	18900	1880	24.48	25.00	1.127	0.07	0.567	0.639
	LTE Band 2	20M	QPSK	1	0	Right Side	0mm	Trigger handle	Holster 2	OFF	18700	1860	24.15	25.00	1.216	-0.07	0.525	0.638
18	LTE Band 2	20M	QPSK	1	0	Right Side	0mm	Trigger handle	Holster 2	OFF	19100	1900	24.32	25.00	1.169	-0.07	0.574	0.671
	LTE Band 2	20M	QPSK	50	0	Right Side	0mm	Trigger handle	Holster 2	OFF	18900	1880	23.37	24.00	1.156	0.02	0.527	0.609
	LTE Band 5	10M	QPSK	1	0	Front	0mm	-	Holster 1	OFF	20525	836.5	23.64	24.50	1.219	-0.03	0.104	0.127
	LTE Band 5	10M	QPSK	25	0	Front	0mm	-	Holster 1	OFF	20525	836.5	22.73	23.50	1.194	0.09	0.072	0.086
	LTE Band 5	10M	QPSK	1	0	Back	0mm	-	Holster 1	OFF	20525	836.5	23.64	24.50	1.219	-0.05	0.158	0.193
	LTE Band 5	10M	QPSK	25	0	Back	0mm	-	Holster 1	OFF	20525	836.5	22.73	23.50	1.194	0.03	0.133	0.158
19	LTE Band 5	10M	QPSK	1	0	Right Side	0mm	Trigger handle	Holster 2	OFF	20525	836.5	23.64	24.50	1.219	0.07	0.362	0.441
	LTE Band 5	10M	QPSK	25	0	Right Side	0mm	Trigger handle	Holster 2	OFF	20525	836.5	22.73	23.50	1.194	-0.01	0.329	0.392
	LTE Band 7	20M	QPSK	1	0	Front	0mm	-	Holster 1	OFF	21100	2535	23.77	24.50	1.183	0.17	0.076	0.090
	LTE Band 7	20M	QPSK	50	0	Front	0mm	-	Holster 1	OFF	21100	2535	22.84	23.50	1.164	0.08	0.063	0.073
	LTE Band 7	20M	QPSK	1	0	Back	0mm	-	Holster 1	OFF	21100	2535	23.77	24.50	1.183	0.01	0.154	0.182
	LTE Band 7	20M	QPSK	50	0	Back	0mm	-	Holster 1	OFF	21100	2535	22.84	23.50	1.164	0.15	0.123	0.143
	LTE Band 7	20M	QPSK	1	0	Right Side	0mm	Trigger handle	Holster 2	OFF	21100	2535	23.77	24.50	1.183	-0.11	0.351	0.415
	LTE Band 7	20M	QPSK	1	0	Right Side	0mm	Trigger handle	Holster 2	OFF	20850	2510	23.73	24.50	1.194	0.02	0.292	0.348
20	LTE Band 7	20M	QPSK	1	0	Right Side	0mm	Trigger handle	Holster 2	OFF	21350	2560	23.61	24.50	1.227	0.19	0.376	0.462
	LTE Band 7	20M	QPSK	50	0	Right Side	0mm	Trigger handle	Holster 2	OFF	21100	2535	22.84	23.50	1.164	0.06	0.328	0.382
	LTE Band 12	10M	QPSK	1	0	Front	0mm	-	Holster 1	OFF	23095	707.5	23.12	24.50	1.374	-0.02	0.067	0.092
	LTE Band 12	10M	QPSK	25	0	Front	0mm	-	Holster 1	OFF	23095	707.5	22.11	23.50	1.377	0.16	0.040	0.054
	LTE Band 12	10M	QPSK	1	0	Back	0mm	-	Holster 1	OFF	23095	707.5	23.12	24.50	1.374	-0.05	0.097	0.133
	LTE Band 12	10M	QPSK	25	0	Back	0mm	-	Holster 1	OFF	23095	707.5	22.11	23.50	1.377	0.05	0.073	0.101
21	LTE Band 12	10M	QPSK	1	0	Right Side	0mm	Trigger handle	Holster 2	OFF	23095	707.5	23.12	24.50	1.374	-0.07	0.328	0.451
	LTE Band 12	10M	QPSK	25	0	Right Side	0mm	Trigger handle	Holster 2	OFF	23095	707.5	22.11	23.50	1.377	-0.02	0.292	0.402
	LTE Band 13	10M	QPSK	1	0	Front	0mm	-	Holster 1	OFF	23230	782	23.46	24.50	1.271	0.07	0.028	0.036
	LTE Band 13	10M	QPSK	25	0	Front	0mm	-	Holster 1	OFF	23230	782	22.46	23.50	1.271	-0.01	0.016	0.020
	LTE Band 13	10M	QPSK	1	0	Back	0mm	-	Holster 1	OFF	23230	782	23.46	24.50	1.271	-0.04	0.050	0.064
	LTE Band 13	10M	QPSK	25	0	Back	0mm	-	Holster 1	OFF	23230	782	22.46	23.50	1.271	0.02	0.036	0.046
22	LTE Band 13	10M	QPSK	1	0	Right Side	0mm	Trigger handle	Holster 2	OFF	23230	782	23.46	24.50	1.271	-0.01	0.145	0.184
	LTE Band 13	10M	QPSK	25	0	Right Side	0mm	Trigger handle	Holster 2	OFF	23230	782	22.46	23.50	1.271	-0.07	0.128	0.163
	LTE Band 14	10M	QPSK	1	0	Front	0mm	-	Holster 1	OFF	23330	793	23.53	24.50	1.250	-0.04	0.059	0.074
	LTE Band 14	10M	QPSK	25	0	Front	0mm	-	Holster 1	OFF	23330	793	22.57	23.50	1.239	-0.01	0.048	0.059
	LTE Band 14	10M	QPSK	1	0	Back	0mm	-	Holster 1	OFF	23330	793	23.53	24.50	1.250	-0.09	0.105	0.131
	LTE Band 14	10M	QPSK	25	0	Back	0mm	-	Holster 1	OFF	23330	793	22.57	23.50	1.239	0	0.078	0.097
23	LTE Band 14	10M	QPSK	1	0	Right Side	0mm	Trigger handle	Holster 2	OFF	23330	793	23.53	24.50	1.250	-0.07	0.279	0.349
	LTE Band 14	10M	QPSK	25	0	Right Side	0mm	Trigger handle	Holster 2	OFF	23330	793	22.57	23.50	1.239	-0.02	0.252	0.312
	LTE Band 66	20M	QPSK	1	0	Front	0mm	-	Holster 1	OFF	132322	1745	24.06	25.00	1.242	0.01	0.349	0.433
	LTE Band 66	20M	QPSK	50	0	Front	0mm	-	Holster 1	OFF	132322	1745	23.08	24.00	1.236	0.06	0.252	0.311
	LTE Band 66	20M	QPSK	1	0	Back	0mm	-	Holster 1	OFF	132322	1745	24.06	25.00	1.242	0.03	0.552	0.685
	LTE Band 66	20M	QPSK	50	0	Back	0mm	-	Holster 1	OFF	132322	1745	23.08	24.00	1.236	0.07	0.504	0.623
	LTE Band 66	20M	QPSK	1	0	Right Side	0mm	Trigger handle	Holster 2	OFF	132322	1745	24.06	25.00	1.242	0.07	0.716	0.889
	LTE Band 66	20M	QPSK	1	0	Right Side	0mm	Trigger handle	Holster 2	OFF	132072	1720	23.99	25.00	1.262	0.05	0.694	0.876
24	LTE Band 66	20M	QPSK	1	0	Right Side	0mm	Trigger handle	Holster 2	OFF	132572	1770	24.05	25.00	1.245	0.07	0.731	0.910
	LTE Band 66	20M	QPSK	50	0	Right Side	0mm	Trigger handle	Holster 2	OFF	132322	1745	23.08	24.00	1.236	0.12	0.594	0.734
	LTE Band 66	20M	QPSK	100	0	Right Side	0mm	Trigger handle	Holster 2	OFF	132322	1745	23.02	24.00	1.253	-0.05	0.581	0.728



<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Accessories	Holster	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN2.4GHz	802.11b 1Mbps	Front	0mm	-	Holster 1	11	2462	21.40	21.50	1.023	99.28	1.007	-0.01	0.072	0.074
	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	-	Holster 1	11	2462	21.40	21.50	1.023	99.28	1.007	0.14	0.147	0.151
25	WLAN2.4GHz	802.11b 1Mbps	Left Side	0mm	Trigger handle	Holster 2	11	2462	21.40	21.50	1.023	99.28	1.007	-0.03	0.183	0.189
	WLAN2.4GHz	802.11b 1Mbps	Left Side	0mm	Trigger handle	Holster 2	1	2412	21.30	21.50	1.047	99.28	1.007	0.13	0.176	0.186
	WLAN2.4GHz	802.11b 1Mbps	Left Side	0mm	Trigger handle	Holster 2	6	2437	21.20	21.50	1.072	99.28	1.007	-0.08	0.169	0.182
	WLAN5GHz	802.11n-HT40 MCS0	Front	0mm	-	Holster 1	54	5270	19.30	20.00	1.175	96.43	1.037	0.06	0.196	0.239
	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	-	Holster 1	54	5270	19.30	20.00	1.175	96.43	1.037	-0.08	0.267	0.325
26	WLAN5GHz	802.11n-HT40 MCS0	Left Side	0mm	Trigger handle	Holster 2	54	5270	19.30	20.00	1.175	96.43	1.037	-0.15	0.984	1.199
	WLAN5GHz	802.11n-HT40 MCS0	Left Side	0mm	Trigger handle	Holster 2	62	5310	15.60	16.00	1.096	96.43	1.037	-0.11	0.511	0.581
	WLAN5GHz	802.11a 6Mbps	Left Side	0mm	Trigger handle	Holster 2	60	5300	19.30	20.00	1.175	98.57	1.015	0.05	0.852	1.016
	WLAN5GHz	802.11ac-VHT80 MCS0	Front	0mm	-	Holster 1	138	5690	20.00	20.50	1.122	92.22	1.084	0.02	0.073	0.089
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	-	Holster 1	138	5690	20.00	20.50	1.122	92.22	1.084	-0.13	0.197	0.240
27	WLAN5GHz	802.11ac-VHT80 MCS0	Left Side	0mm	Trigger handle	Holster 2	138	5690	20.00	20.50	1.122	92.22	1.084	-0.09	1.030	1.253
	WLAN5GHz	802.11ac-VHT80 MCS0	Left Side	0mm	Trigger handle	Holster 2	122	5610	19.70	20.50	1.202	92.22	1.084	-0.06	0.954	1.243
	WLAN5GHz	802.11ac-VHT80 MCS0	Left Side	0mm	Trigger handle	Holster 2	106	5530	17.60	18.00	1.096	92.22	1.084	-0.09	0.606	0.720
	WLAN5GHz	802.11n-HT40 MCS0	Left Side	0mm	Trigger handle	Holster 2	110	5550	19.60	20.50	1.230	96.43	1.037	0.03	0.922	1.176
	WLAN5GHz	802.11ac-VHT80 MCS0	Front	0mm	-	Holster 1	155	5775	17.70	18.00	1.072	92.22	1.084	0.09	0.150	0.174
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	-	Holster 1	155	5775	17.70	18.00	1.072	92.22	1.084	0.03	0.215	0.250
28	WLAN5GHz	802.11ac-VHT80 MCS0	Left Side	0mm	Trigger handle	Holster 2	155	5775	17.70	18.00	1.072	92.22	1.084	-0.17	0.638	0.741
	WLAN5GHz	802.11n-HT40 MCS0	Left Side	0mm	Trigger handle	Holster 2	151	5755	17.60	18.00	1.096	96.43	1.037	0.02	0.614	0.698

<Bluetooth SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Accessories	Holster	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	Bluetooth	LE-1Mbps	Front	0mm	-	Holster 1	39	2480	7.60	8.00	1.096	62.3	1.337	0.02	0.001	0.001
	Bluetooth	LE-1Mbps	Back	0mm	-	Holster 1	39	2480	7.60	8.00	1.096	62.3	1.337	-0.01	0.001	0.001
29	Bluetooth	LE-1Mbps	Left Side	0mm	Trigger handle	Holster 2	39	2480	7.60	8.00	1.096	62.3	1.337	0.04	0.002	0.003
	Bluetooth	LE-1Mbps	Left Side	0mm	Trigger handle	Holster 2	00	2402	6.70	8.00	1.349	62.3	1.337	0.03	0.001	0.002
	Bluetooth	LE-1Mbps	Left Side	0mm	Trigger handle	Holster 2	19	2440	7.10	8.00	1.230	62.3	1.337	-0.08	0.001	0.002

14.3 Hand SAR

<WCDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
30	WCDMA II	RMC 12.2Kbps	Back	0mm	OFF	9400	1880	24.67	25.50	1.211	0.02	0.702	0.850
	WCDMA II	RMC 12.2Kbps	Back	0mm	OFF	9262	1852.4	24.40	25.50	1.288	-0.01	0.588	0.757
	WCDMA II	RMC 12.2Kbps	Back	0mm	OFF	9538	1907.6	24.58	25.50	1.236	-0.06	0.642	0.793
31	WCDMA IV	RMC 12.2Kbps	Back	0mm	OFF	1413	1732.6	24.46	25.50	1.271	0.17	0.457	0.581
	WCDMA IV	RMC 12.2Kbps	Back	0mm	OFF	1312	1712.4	24.34	25.50	1.306	0.14	0.389	0.508
	WCDMA IV	RMC 12.2Kbps	Back	0mm	OFF	1513	1752.6	24.44	25.50	1.276	0.17	0.417	0.532
32	WCDMA V	RMC 12.2Kbps	Back	0mm	OFF	4132	826.4	24.44	25.50	1.276	-0.05	0.905	1.155
	WCDMA V	RMC 12.2Kbps	Back	0mm	OFF	4182	836.4	24.40	25.50	1.288	-0.09	0.849	1.094
	WCDMA V	RMC 12.2Kbps	Back	0mm	OFF	4233	846.6	24.42	25.50	1.282	-0.07	0.821	1.053

<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	LTE Band 2	20M	QPSK	1	0	Back	0mm	OFF	18900	1880	24.48	25.00	1.127	0.05	0.774	0.872
	LTE Band 2	20M	QPSK	1	0	Back	0mm	OFF	18700	1860	24.15	25.00	1.216	0.05	0.660	0.803
33	LTE Band 2	20M	QPSK	1	0	Back	0mm	OFF	19100	1900	24.32	25.00	1.169	-0.01	0.785	0.918
	LTE Band 2	20M	QPSK	50	0	Back	0mm	OFF	18900	1880	23.37	24.00	1.156	0.01	0.639	0.739
34	LTE Band 5	10M	QPSK	1	0	Back	0mm	OFF	20525	836.5	23.64	24.50	1.219	0.01	0.554	0.675
	LTE Band 5	10M	QPSK	25	0	Back	0mm	OFF	20525	836.5	22.73	23.50	1.194	-0.03	0.478	0.571
35	LTE Band 7	20M	QPSK	1	0	Back	0mm	OFF	21100	2535	23.77	24.50	1.183	0.05	0.133	0.157
	LTE Band 7	20M	QPSK	1	0	Back	0mm	OFF	20850	2510	23.73	24.50	1.194	0.15	0.101	0.121
	LTE Band 7	20M	QPSK	1	0	Back	0mm	OFF	21350	2560	23.61	24.50	1.227	0.05	0.112	0.137
	LTE Band 7	20M	QPSK	50	0	Back	0mm	OFF	21100	2535	22.84	23.50	1.164	0.05	0.079	0.092
36	LTE Band 12	10M	QPSK	1	0	Back	0mm	OFF	23095	707.5	23.12	24.50	1.374	-0.02	0.260	0.357
	LTE Band 12	10M	QPSK	25	0	Back	0mm	OFF	23095	707.5	22.11	23.50	1.377	-0.04	0.242	0.333
37	LTE Band 13	10M	QPSK	1	0	Back	0mm	OFF	23230	782	23.46	24.50	1.271	0.17	0.379	0.482
	LTE Band 13	10M	QPSK	25	0	Back	0mm	OFF	23230	782	22.46	23.50	1.271	0.15	0.345	0.438
38	LTE Band 14	10M	QPSK	1	0	Back	0mm	OFF	23330	793	23.53	24.50	1.250	-0.08	0.619	0.774
	LTE Band 14	10M	QPSK	25	0	Back	0mm	OFF	23330	793	22.57	23.50	1.239	-0.09	0.524	0.649
39	LTE Band 66	20M	QPSK	1	0	Back	0mm	OFF	132322	1745	24.06	25.00	1.242	-0.06	0.508	0.631
	LTE Band 66	20M	QPSK	1	0	Back	0mm	OFF	132072	1720	23.99	25.00	1.262	0.18	0.405	0.511
	LTE Band 66	20M	QPSK	1	0	Back	0mm	OFF	132572	1770	24.05	25.00	1.245	0.12	0.483	0.601
	LTE Band 66	20M	QPSK	50	0	Back	0mm	OFF	132322	1745	23.08	24.00	1.236	0.15	0.458	0.566



<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
40	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	11	2462	21.40	21.50	1.023	99.28	1.007	0.03	0.135	0.139
	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	1	2412	21.30	21.50	1.047	99.28	1.007	0.01	0.123	0.130
	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	6	2437	21.20	21.50	1.072	99.28	1.007	-0.05	0.128	0.138
41	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	54	5270	19.30	20.00	1.175	96.43	1.037	-0.03	0.198	0.241
	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	62	5310	15.60	16.00	1.096	96.43	1.037	-0.14	0.127	0.144
42	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	138	5690	20.00	20.50	1.122	92.22	1.084	-0.05	0.235	0.286
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	122	5610	19.70	20.50	1.202	92.22	1.084	-0.08	0.193	0.252
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	106	5530	17.60	18.00	1.096	92.22	1.084	0.17	0.140	0.166
43	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	155	5775	17.70	18.00	1.072	92.22	1.084	-0.11	0.159	0.185

<Bluetooth SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
44	Bluetooth	LE-1Mbps	Back	0mm	39	2480	7.60	8.00	1.096	62.3	1.337	0.03	0.002	0.003
	Bluetooth	LE-1Mbps	Back	0mm	00	2402	6.70	8.00	1.349	62.3	1.337	0.02	0.001	0.002
	Bluetooth	LE-1Mbps	Back	0mm	19	2440	7.10	8.00	1.230	62.3	1.337	0.03	0.001	0.001

14.4 Repeated SAR Measurement

No.	Band	Mode	Test Position	Gap (mm)	Accessories	Holster	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	WCDMA II	RMC 12.2Kbps	Right Side	10mm	-	-	9262	1852.4	23.56	24.50	1.242	-	1.000	-0.12	1.100	-	1.366
2nd	WCDMA II	RMC 12.2Kbps	Right Side	10mm	-	-	9262	1852.4	23.56	24.50	1.242	-	1.000	-0.09	1.070	1.03	1.329
1st	WCDMA IV	RMC 12.2Kbps	Right Side	10mm	-	-	1513	1752.6	23.64	24.50	1.219	-	1.000	0.01	1.130	-	1.377
2nd	WCDMA IV	RMC 12.2Kbps	Right Side	10mm	-	-	1513	1752.6	23.64	24.50	1.219	-	1.000	-0.01	1.070	1.06	1.304
1st	WLAN5GHz	802.11n-HT40 MCS0	Left Side	10mm	-	-	46	5230	18.90	19.50	1.148	96.43	1.037	-0.07	1.090	-	1.298
2nd	WLAN5GHz	802.11n-HT40 MCS0	Left Side	10mm	-	-	46	5230	18.90	19.50	1.148	96.43	1.037	-0.02	1.080	1.01	1.286
1st	WLAN5GHz	802.11ac-VHT80 MCS0	Left Side	10mm	-	-	155	5775	17.70	18.00	1.072	92.22	1.084	-0.13	1.130	-	1.313
2nd	WLAN5GHz	802.11ac-VHT80 MCS0	Left Side	10mm	-	-	155	5775	17.70	18.00	1.072	92.22	1.084	0.12	1.100	1.03	1.278
1st	WLAN5GHz	802.11n-HT40 MCS0	Left Side	0mm	Trigger handle	Holster 2	54	5270	19.30	20.00	1.175	96.43	1.037	-0.15	0.984	-	1.199
2nd	WLAN5GHz	802.11n-HT40 MCS0	Left Side	0mm	Trigger handle	Holster 2	54	5270	19.30	20.00	1.175	96.43	1.037	-0.04	0.844	1.17	1.028
1st	WLAN5GHz	802.11ac-VHT80 MCS0	Left Side	0mm	Trigger handle	Holster 2	138	5690	20.00	20.50	1.122	92.22	1.084	-0.09	1.030	-	1.253
2nd	WLAN5GHz	802.11ac-VHT80 MCS0	Left Side	0mm	Trigger handle	Holster 2	138	5690	20.00	20.50	1.122	92.22	1.084	-0.06	1.010	1.02	1.228

General Note:

1. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥ 0.8 W/kg.
2. Per KDB 865664 D01v01r04, if the ratio among the repeated measurement is ≤ 1.2 and the measured SAR < 1.45 W/kg, only one repeated measurement is required.
3. The ratio is the difference in percentage between original and repeated *measured SAR*.
4. All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.



15. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Body-worn	Hotspot	Hand
1.	WWAN + WLAN2.4GHz	Yes	Yes	Yes
2.	WWAN + WLAN5GHz	Yes	Yes	Yes
3.	WWAN + Bluetooth	Yes	Yes	Yes

General Note:

1. WLAN and Bluetooth share the same antenna, and cannot transmit simultaneously.
2. All licensed modes share the same antenna part and cannot transmit simultaneously
3. EUT will choose either WLAN 2.4GHz or WLAN 5GHz according to the network signal condition; therefore, 2.4GHz WLAN and 5GHz WLAN will not operate simultaneously at any moment.
4. The Scaled SAR summation is calculated based on the same configuration and test position.
5. Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
 - i) Scalar SAR summation < 1.6W/kg.
 - ii) $SPLSR = (SAR1 + SAR2)^{1.5} / (\text{min. separation distance, mm})$, and the peak separation distance is determined from the square root of $[(x1-x2)^2 + (y1-y2)^2 + (z1-z2)^2]$, where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the extrapolated peak SAR locations in the zoom scan.
 - iii) If $SPLSR \leq 0.04$, simultaneously transmission SAR measurement is not necessary.
 - iv) Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg.

15.1 Hotspot Exposure Conditions

WWAN Band	Exposure Position	1	2	3	4	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)	1+4 Summed 1g SAR (W/kg)
		WWAN	2.4GHz WLAN	5GHz WLAN	Bluetooth			
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)			
WCDMA II	Front at 10mm	0.328	0.145	0.244	0.001	0.473	0.572	0.329
	Back at 10mm	0.709	0.219	0.577	0.004	0.928	1.286	0.713
	Left side at 10mm		0.339	1.313	0.012	0.339	1.313	0.012
	Right side at 10mm	1.366				1.366	1.366	1.366
	Top side	0.199				0.199	0.199	0.199
WCDMA IV	Front at 10mm	0.481	0.145	0.244	0.001	0.626	0.725	0.482
	Back at 10mm	0.421	0.219	0.577	0.004	0.640	0.998	0.425
	Left side at 10mm		0.339	1.313	0.012	0.339	1.313	0.012
	Right side at 10mm	1.377				1.377	1.377	1.377
	Top side	0.419				0.419	0.419	0.419
WCDMA V	Front at 10mm	0.402	0.145	0.244	0.001	0.547	0.646	0.403
	Back at 10mm	0.612	0.219	0.577	0.004	0.831	1.189	0.616
	Left side at 10mm		0.339	1.313	0.012	0.339	1.313	0.012
	Right side at 10mm	0.989				0.989	0.989	0.989
	Top side	0.189				0.189	0.189	0.189
LTE Band 2	Front at 10mm	0.255	0.145	0.244	0.001	0.400	0.499	0.256
	Back at 10mm	0.571	0.219	0.577	0.004	0.790	1.148	0.575
	Left side at 10mm		0.339	1.313	0.012	0.339	1.313	0.012
	Right side at 10mm	1.235				1.235	1.235	1.235
	Top side	0.190				0.190	0.190	0.190
LTE Band 5	Front at 10mm	0.366	0.145	0.244	0.001	0.511	0.610	0.367
	Back at 10mm	0.555	0.219	0.577	0.004	0.774	1.132	0.559
	Left side at 10mm		0.339	1.313	0.012	0.339	1.313	0.012
	Right side at 10mm	0.830				0.830	0.830	0.830
	Top side	0.144				0.144	0.144	0.144
LTE Band 7	Front at 10mm	0.161	0.145	0.244	0.001	0.306	0.405	0.162
	Back at 10mm	0.191	0.219	0.577	0.004	0.410	0.768	0.195
	Left side at 10mm		0.339	1.313	0.012	0.339	1.313	0.012
	Right side at 10mm	0.744				0.744	0.744	0.744
	Top side	0.144				0.144	0.144	0.144
LTE Band 12	Front at 10mm	0.192	0.145	0.244	0.001	0.337	0.436	0.193
	Back at 10mm	0.265	0.219	0.577	0.004	0.484	0.842	0.269
	Left side at 10mm		0.339	1.313	0.012	0.339	1.313	0.012
	Right side at 10mm	0.411				0.411	0.411	0.411
	Top side	0.084				0.084	0.084	0.084
LTE Band 13	Front at 10mm	0.312	0.145	0.244	0.001	0.457	0.556	0.313
	Back at 10mm	0.438	0.219	0.577	0.004	0.657	1.015	0.442
	Left side at 10mm		0.339	1.313	0.012	0.339	1.313	0.012
	Right side at 10mm	0.676				0.676	0.676	0.676
	Top side	0.114				0.114	0.114	0.114
LTE Band 14	Front at 10mm	0.212	0.145	0.244	0.001	0.357	0.456	0.213
	Back at 10mm	0.374	0.219	0.577	0.004	0.593	0.951	0.378
	Left side at 10mm		0.339	1.313	0.012	0.339	1.313	0.012
	Right side at 10mm	0.585				0.585	0.585	0.585
	Top side	0.091				0.091	0.091	0.091
LTE Band 66	Front at 10mm	0.371	0.145	0.244	0.001	0.516	0.615	0.372
	Back at 10mm	0.361	0.219	0.577	0.004	0.580	0.938	0.365
	Left side at 10mm		0.339	1.313	0.012	0.339	1.313	0.012
	Right side at 10mm	1.046				1.046	1.046	1.046
	Top side	0.352				0.352	0.352	0.352



15.2 Body Worn Exposure Conditions

WWAN Band	Exposure Position	1	2	3	4	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)	1+4 Summed 1g SAR (W/kg)
		WWAN 1g SAR (W/kg)	2.4GHz WLAN 1g SAR (W/kg)	5GHz WLAN 1g SAR (W/kg)	Bluetooth 1g SAR (W/kg)			
WCDMA II	Front at 0mm	0.163	0.074	0.239	0.001	0.237	0.402	0.164
	Back at 0mm	0.567	0.151	0.325	0.001	0.718	0.892	0.568
	Left side at 0mm		0.189	0.741	0.003	0.189	0.741	0.003
	Right side at 0mm	0.864				0.864	0.864	0.864
WCDMA IV	Front at 0mm	0.334	0.074	0.239	0.001	0.408	0.573	0.335
	Back at 0mm	0.431	0.151	0.325	0.001	0.582	0.756	0.432
	Left side at 0mm		0.189	0.741	0.003	0.189	0.741	0.003
	Right side at 0mm	0.940				0.940	0.940	0.940
WCDMA V	Front at 0mm	0.103	0.074	0.239	0.001	0.177	0.342	0.104
	Back at 0mm	0.170	0.151	0.325	0.001	0.321	0.495	0.171
	Left side at 0mm		0.189	0.741	0.003	0.189	0.741	0.003
	Right side at 0mm	0.415				0.415	0.415	0.415
LTE Band 2	Front at 0mm	0.133	0.074	0.239	0.001	0.207	0.372	0.134
	Back at 0mm	0.544	0.151	0.325	0.001	0.695	0.869	0.545
	Left side at 0mm		0.189	0.741	0.003	0.189	0.741	0.003
	Right side at 0mm	0.671				0.671	0.671	0.671
LTE Band 5	Front at 0mm	0.127	0.074	0.239	0.001	0.201	0.366	0.128
	Back at 0mm	0.193	0.151	0.325	0.001	0.344	0.518	0.194
	Left side at 0mm		0.189	0.741	0.003	0.189	0.741	0.003
	Right side at 0mm	0.441				0.441	0.441	0.441
LTE Band 7	Front at 0mm	0.090	0.074	0.239	0.001	0.164	0.329	0.091
	Back at 0mm	0.182	0.151	0.325	0.001	0.333	0.507	0.183
	Left side at 0mm		0.189	0.741	0.003	0.189	0.741	0.003
	Right side at 0mm	0.462				0.462	0.462	0.462
LTE Band 12	Front at 0mm	0.092	0.074	0.239	0.001	0.166	0.331	0.093
	Back at 0mm	0.133	0.151	0.325	0.001	0.284	0.458	0.134
	Left side at 0mm		0.189	0.741	0.003	0.189	0.741	0.003
	Right side at 0mm	0.451				0.451	0.451	0.451
LTE Band 13	Front at 0mm	0.036	0.074	0.239	0.001	0.110	0.275	0.037
	Back at 0mm	0.064	0.151	0.325	0.001	0.215	0.389	0.065
	Left side at 0mm		0.189	0.741	0.003	0.189	0.741	0.003
	Right side at 0mm	0.184				0.184	0.184	0.184
LTE Band 14	Front at 0mm	0.074	0.074	0.239	0.001	0.148	0.313	0.075
	Back at 0mm	0.131	0.151	0.325	0.001	0.282	0.456	0.132
	Left side at 0mm		0.189	0.741	0.003	0.189	0.741	0.003
	Right side at 0mm	0.349				0.349	0.349	0.349
LTE Band 66	Front at 0mm	0.433	0.074	0.239	0.001	0.507	0.672	0.434
	Back at 0mm	0.685	0.151	0.325	0.001	0.836	1.010	0.686
	Left side at 0mm		0.189	0.741	0.003	0.189	0.741	0.003
	Right side at 0mm	0.910				0.910	0.910	0.910



15.3 Hand Exposure Conditions

WWAN Band	Exposure Position	1	2	3	4	1+2 Summed 10g SAR (W/kg)	1+3 Summed 10g SAR (W/kg)	1+4 Summed 10g SAR (W/kg)
		WWAN	2.4GHz WLAN	5GHz WLAN	Bluetooth			
		10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)			
WCDMA II	Back at 0mm	0.850	0.139	0.286	0.003	0.989	1.136	0.853
WCDMA IV	Back at 0mm	0.581	0.139	0.286	0.003	0.720	0.867	0.584
WCDMA V	Back at 0mm	1.155	0.139	0.286	0.003	1.294	1.441	1.158
LTE Band 2	Back at 0mm	0.918	0.139	0.286	0.003	1.057	1.204	0.921
LTE Band 5	Back at 0mm	0.675	0.139	0.286	0.003	0.814	0.961	0.678
LTE Band 7	Back at 0mm	0.157	0.139	0.286	0.003	0.296	0.443	0.160
LTE Band 12	Back at 0mm	0.357	0.139	0.286	0.003	0.496	0.643	0.360
LTE Band 13	Back at 0mm	0.482	0.139	0.286	0.003	0.621	0.768	0.485
LTE Band 14	Back at 0mm	0.774	0.139	0.286	0.003	0.913	1.060	0.777
LTE Band 66	Back at 0mm	0.631	0.139	0.286	0.003	0.770	0.917	0.634

Test Engineer : Randy Lin, Ken Lin, Bevis Chang, Sing Lim, Jimmy Lu and Thomas Wang



16. Uncertainty Assessment

Per KDB 865664 D01 SAR measurement 100MHz to 6GHz, 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. For this device, the highest measured 1-g SAR is less 1.5W/kg and highest measured 10-g SAR is less 3.75W/kg. Therefore, the measurement uncertainty table is not required in this report.

Declaration of Conformity:

The test results with all measurement uncertainty excluded is presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

17. References

- [1] FCC 47 CFR Part 2 "Frequency Allocations and Radio Treaty Matters; General Rules and Regulations"
- [2] ANSI/IEEE Std. C95.1-1992, "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz", September 1992
- [3] IEEE Std. 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", Sep 2013
- [4] SPEAG DASY System Handbook
- [5] FCC KDB 248227 D01 v02r02, "SAR Guidance for IEEE 802.11 (WiFi) Transmitters", Oct 2015.
- [6] FCC KDB 447498 D01 v06, "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies", Oct 2015
- [7] FCC KDB 648474 D04v01r03, "SAR EVALUATION CONSIDERATIONS FOR WIRELESS HANDSETS" Oct. 2015
- [8] FCC KDB 941225 D01 v03r01, "3G SAR MEAUREMENT PROCEDURES", Oct 2015
- [9] FCC KDB 941225 D05 v02r05, "SAR Evaluation Considerations for LTE Devices", Dec 2015
- [10] FCC KDB 941225 D06 v02r01, "SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities", Oct 2015.
- [11] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.
- [12] FCC KDB 865664 D02 v01r02, "RF Exposure Compliance Reporting and Documentation Considerations" Oct 2015.