



FCC SAR TEST REPORT

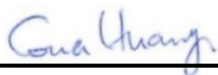
FCC ID : QYLWP7610BC03
Equipment : WWAN Module
Brand Name : Getac
Model Name : WP7610
Applicant : Getac Technology Corporation.
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Taipei City 11568, Taiwan, R.O.C.
Manufacturer : Ability Enterprise Co., Ltd.
4F., No.8, Lane7, Wuchiuan Rd, Wugu Dist., New Taipei City
24886, Taiwan, R.O.C.
Standard : FCC 47 CFR Part 2 (2.1093)
ANSI/IEEE C95.1-1992
IEEE 1528-2013

The product was installed into Body Worn Camera (Brand Name Getac, Model Name: BC-03) during test.

The product was received on Jul. 14, 2020 and testing was started from Jul. 23, 2020 and completed on Jul 23, 2020. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

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
FA9D1046-01	01	Initial issue of report	Jul. 30, 2020



1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for Getac Technology Corporation., WWAN Module, WP7610, are as follows.

Equipment Class	Frequency Band	Highest SAR Summary
		Body (Separation 0mm)
		1g SAR (W/kg)
Licensed	WCDMA II	0.20
	WCDMA IV	0.47
	WCDMA V	0.42
	LTE Band 2	0.22
	LTE Band 5	0.31
	LTE Band 12 / 17	0.33
	LTE Band 13	0.29
	LTE Band 14	0.30
	LTE Band 4 / 66	0.48
DTS	2.4GHz WLAN	0.09
NII	5GHz WLAN	0.01
Date of Testing:		2020/7/23

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190) and the FCC designation No. TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC test. 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 FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications

Reviewed by: Jason Wang
Report Producer: Wan Liu

2. Guidance Applied

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards:

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- 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 941225 D01 3G SAR Procedures v03r01
- FCC KDB 941225 D05 SAR for LTE Devices v02r05

3. Equipment Under Test (EUT) Information

3.1 General Information

Product Feature & Specification	
Equipment Name	WWAN Module
Brand Name	Getac
Model Name	WP7610
FCC ID	QYLWP7610BC03
Wireless Technology and Frequency Range	WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz WCDMA Band IV: 1712.4 MHz ~ 1752.6 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz LTE Band 2: 1850.7 MHz ~ 1909.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 12: 699.7 MHz ~ 715.3 MHz LTE Band 13: 779.5 MHz ~ 784.5 MHz LTE Band 14: 790.5 MHz ~ 795.5 MHz LTE Band 17: 706.5 MHz ~ 713.5 MHz LTE Band 66: 1710.7 MHz ~ 1779.3 MHz
Mode	RMC 12.2Kbps HSDPA HSUPA DC-HSDPA LTE: QPSK, 16QAM, 64QAM
Remark: 1. Variant report includes verification worst case found in original report, Sporton SAR Report, Report No. FA9D1046-01 (FCC ID: QYLWP7610BC03), the simultaneous transmission was not necessary, due to the worst transmit simultaneous configuration was not higher than original report.	

Host Information	
Equipment Name	Body Worn Camera
Brand Name	Getac
Model Name	BC-03
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2472 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5720 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz NFC : 13.56 MHz
Mode	WLAN: 802.11a/b/g/n/ac HT20 / HT40 / VHT20 / VHT40 / VHT80 Bluetooth BR/EDR/LE NFC:ASK
EUT Stage	Production Unit

Accessories	Brand Name	Getac	Model Name	Chest Mount
	Brand Name	Getac	Model Name	Pocket Mount
	Brand Name	Getac	Model Name	Chest Clip
	Brand Name	Getac	Model Name	Epaulette Clip
	Brand Name	Getac	Model Name	Magnetic Mount

3.2 General LTE SAR Test and Reporting Considerations

Summarized necessary items addressed in KDB 941225 D05 v02r05							
FCC ID	QYLWP7610BC03						
Equipment Name	WWAN Module						
Operating Frequency Range of each LTE transmission band	LTE Band 2: 1850.7 MHz ~ 1909.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 12: 699.7 MHz ~ 715.3 MHz LTE Band 13: 779.5 MHz ~ 784.5 MHz LTE Band 14: 790.5 MHz ~ 795.5 MHz LTE Band 17: 706.5 MHz ~ 713.5 MHz LTE Band 66: 1710.7 MHz ~ 1779.3 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 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	Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3						
	Modulation	Channel bandwidth / Transmission bandwidth (N_{RB})					MPR (dB)
		1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz
	QPSK	> 5	> 4	> 8	> 12	> 16	> 18
	16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18
	16 QAM	> 5	> 4	> 8	> 12	> 16	> 18
	64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18
	64 QAM	> 5	> 4	> 8	> 12	> 16	> 18
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)						
	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.						

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					
	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				
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5				
H	20643	848.3	20635	847.5	20625	846.5	20600	844				
LTE Band 12												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 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				
M	23095	707.5	23095	707.5	23095	707.5	23095	707.5				
H	23173	715.3	23165	714.5	23155	713.5	23130	711				
LTE Band 13												
	Bandwidth 5 MHz				Bandwidth 10 MHz							
	Channel #		Freq.(MHz)		Channel #		Freq.(MHz)					
L	23205		779.5		23230		782					
M	23230		782									
H	23255		784.5									
LTE Band 14												
	Bandwidth 5 MHz				Bandwidth 10 MHz							
	Channel #		Channel #		Channel #		Freq.(MHz)					
L	23305		790.5		23330		793					
M	23330		793									
H	23355		795.5									
LTE Band 17												
	Bandwidth 5 MHz				Bandwidth 10 MHz							
	Channel #		Freq.(MHz)		Channel #		Freq. (MHz)					
L	23755		706.5		23780		709					
M	23790		710		23790		710					
H	23825		713.5		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:

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

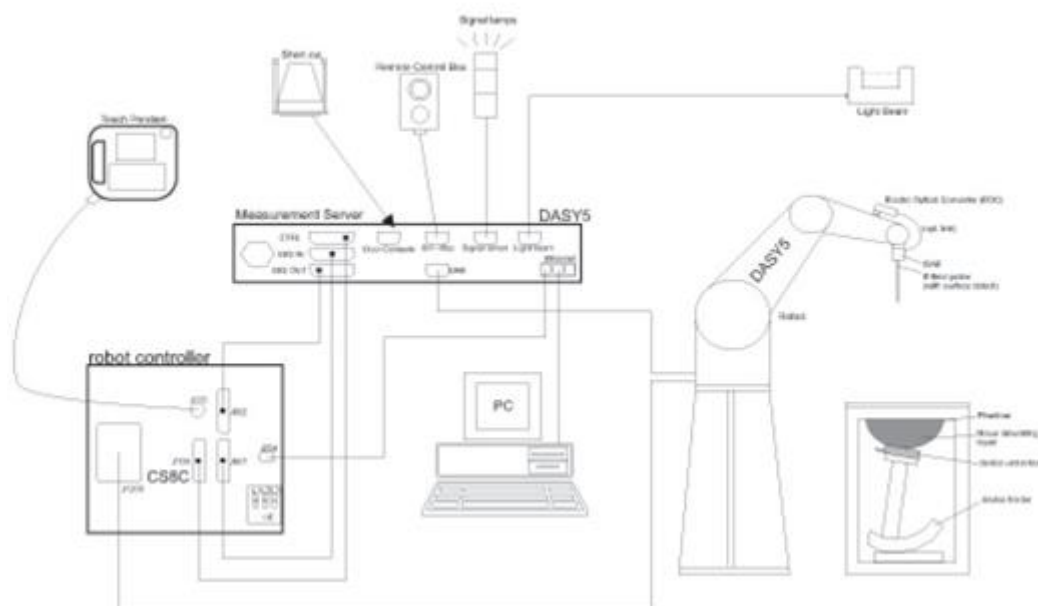
SAR is expressed in units of Watts per kilogram (W/kg)

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

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 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	

6.2 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

6.3 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.

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

Area scan parameters extracted from FCC KDB 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz.

	$\leq 3 \text{ GHz}$	$> 3 \text{ GHz}$
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	$5 \pm 1 \text{ mm}$	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5 \text{ mm}$
Maximum probe angle from probe axis to phantom surface normal at the measurement location	$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
Maximum area scan spatial resolution: $\Delta x_{\text{Area}}, \Delta y_{\text{Area}}$	$\leq 2 \text{ GHz}: \leq 15 \text{ mm}$ $2 - 3 \text{ GHz}: \leq 12 \text{ mm}$	$3 - 4 \text{ GHz}: \leq 12 \text{ mm}$ $4 - 6 \text{ GHz}: \leq 10 \text{ mm}$
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

7.4 Zoom Scan

Zoom scans are used to 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 whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the zoom scan evaluates the averaged SAR for 1 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: $\Delta x_{\text{Zoom}}, \Delta y_{\text{Zoom}}$			≤ 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: $\Delta z_{\text{Zoom}}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{\text{Zoom}}(1)$: 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
		$\Delta z_{\text{Zoom}}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{\text{Zoom}}(n-1)$	
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 to 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	5d185	Mar. 07, 2019	Mar. 05, 2021
SPEAG	2450MHz System Validation Kit	D2450V2	929	Nov. 21, 2019	Nov. 20, 2020
SPEAG	5GHz System Validation Kit	D5GHzV2	1128	Dec. 16, 2019	Dec. 15, 2020
SPEAG	Data Acquisition Electronics	DAE4	1311	Aug. 27, 2019	Aug. 26, 2020
SPEAG	Dosimetric E-Field Probe	EX3DV4	3931	Sep. 26, 2019	Sep. 25, 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
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	MY46104758	Sep. 06, 2019	Sep. 05, 2020
SPEAG	Dielectric Probe Kit	DAK-3.5	1126	Sep. 18, 2019	Sep. 17, 2020
LINE SEIKI	Digital Thermometer	DTM3000-spezial	2942	Nov. 18, 2019	Nov. 17, 2020
Anritsu	Power Meter	ML2495A	1036004	Aug. 08, 2019	Aug. 07, 2020
Anritsu	Power Sensor	MA2411B	1027253	Aug. 08, 2019	Aug. 07, 2020
Anritsu	Power Meter	ML2495A	1218006	Oct. 14, 2019	Oct. 13, 2020
Anritsu	Power Sensor	MA2411B	1207363	Oct. 14, 2019	Oct. 13, 2020
Agilent	Spectrum Analyzer	E4408B	MY44211028	Aug. 27, 2019	Aug. 26, 2020
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	ZVE-8G+	6382	Aug. 12, 2019	Aug. 11, 2020
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.

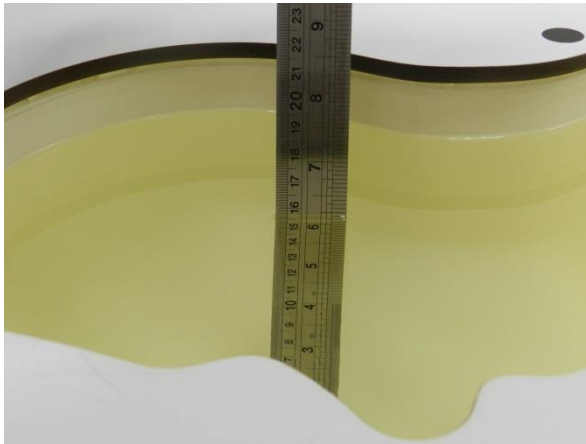


Fig 10.1 Photo of Liquid Height for Head SAR

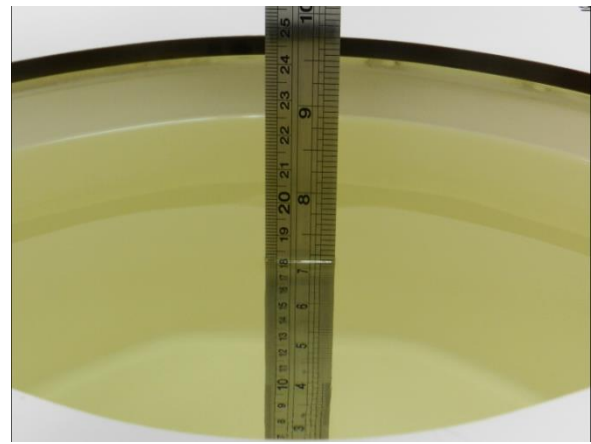


Fig 10.2 Photo of Liquid Height for Body SAR

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	22.7	0.898	43.666	0.89	41.90	0.90	4.21	±5	2020/7/23
835	22.7	0.883	42.557	0.90	41.50	-1.89	2.55	±5	2020/7/23
1750	22.7	1.369	40.623	1.37	40.10	-0.07	1.30	±5	2020/7/23
1900	22.7	1.384	40.370	1.40	40.00	-1.14	0.92	±5	2020/7/23
2450	22.6	1.830	38.675	1.80	39.20	1.67	-1.34	±5	2020/7/23
5250	22.5	4.598	35.631	4.71	35.95	-2.38	-0.89	±5	2020/7/23
5600	22.5	4.922	35.173	5.07	35.50	-2.92	-0.92	±5	2020/7/23
5750	22.5	5.106	34.987	5.22	35.35	-2.18	-1.03	±5	2020/7/23

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 (%)
2020/7/23	750	250	D750V3-1107	EX3DV4 - SN3931	DAE4 Sn1311	2.02	8.32	8.08	-2.88
2020/7/23	835	250	D835V2-4d167	EX3DV4 - SN3931	DAE4 Sn1311	2.32	9.55	9.28	-2.83
2020/7/23	1750	250	D1750V2-1112	EX3DV4 - SN3931	DAE4 Sn1311	9.40	36.70	37.6	2.45
2020/7/23	1900	250	D1900V2-5d185	EX3DV4 - SN3931	DAE4 Sn1311	9.82	39.40	39.28	-0.30
2020/7/23	2450	250	D2450V2-929	EX3DV4 - SN3931	DAE4 Sn1311	12.50	53.10	50	-5.84
2020/7/23	5250	100	D5GHzV2-1128-5250	EX3DV4 - SN3931	DAE4 Sn1311	7.72	80.00	77.2	-3.50
2020/7/23	5600	100	D5GHzV2-1128-5600	EX3DV4 - SN3931	DAE4 Sn1311	8.24	82.40	82.4	0.00
2020/7/23	5750	100	D5GHzV2-1128-5750	EX3DV4 - SN3931	DAE4 Sn1311	7.27	79.10	72.7	-8.09

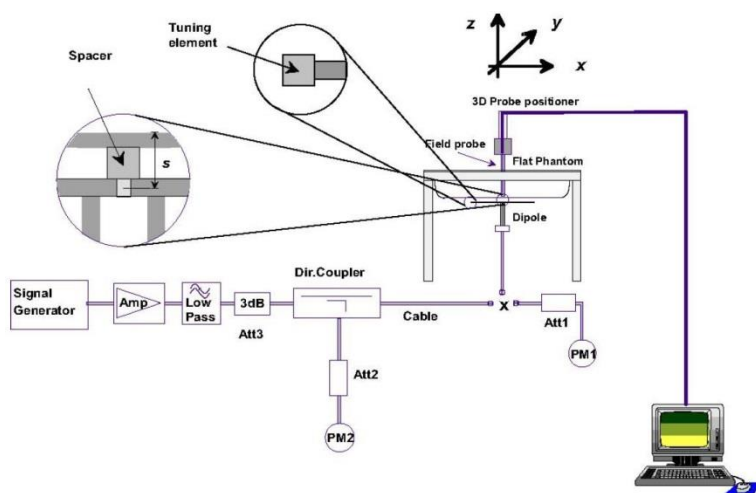


Fig 8.3.1 System Performance Check Setup



Fig 8.3.2 Setup Photo

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

<WCDMA Conducted Power>

Band		WCDMA II			Tune-up Limit (dBm)	WCDMA IV			Tune-up Limit (dBm)	WCDMA V			Tune-up Limit (dBm)
TX Channel		9262	9400	9538		1312	1413	1513		4132	4182	4233	
Rx Channel		9662	9800	9938		1537	1638	1738		4357	4407	4458	
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	22.53	22.68	22.79	23.00	22.58	22.57	22.27	23.00	21.91	21.97	21.81	23.00
3GPP Rel 6	HSDPA Subtest-1	22.22	22.44	22.48	23.00	21.98	21.67	21.80	23.00	21.79	21.39	21.74	23.00
3GPP Rel 6	HSDPA Subtest-2	21.75	21.90	21.93	23.00	21.58	21.92	22.03	23.00	21.29	20.92	21.33	23.00
3GPP Rel 6	HSDPA Subtest-3	22.37	22.49	22.27	22.50	22.04	21.82	21.85	22.50	21.83	21.40	21.71	22.50
3GPP Rel 6	HSDPA Subtest-4	22.27	22.38	22.36	22.50	21.79	22.34	21.97	22.50	21.77	21.96	21.78	22.50
3GPP Rel 8	DC-HSDPA Subtest-1	22.51	22.65	22.74	23.00	22.31	22.30	22.28	23.00	21.87	21.95	21.78	23.00
3GPP Rel 8	DC-HSDPA Subtest-2	22.49	22.64	22.73	23.00	22.29	22.57	22.27	23.00	21.76	21.35	21.71	23.00
3GPP Rel 8	DC-HSDPA Subtest-3	21.98	22.12	22.21	22.50	21.78	21.81	21.83	22.50	21.25	20.87	21.24	22.50
3GPP Rel 8	DC-HSDPA Subtest-4	21.97	22.10	22.20	22.50	21.77	21.82	21.84	22.50	21.27	20.85	21.23	22.50
3GPP Rel 6	HSUPA Subtest-1	22.40	22.07	22.22	23.00	21.75	22.43	21.59	23.00	21.78	21.31	21.32	23.00
3GPP Rel 6	HSUPA Subtest-2	20.38	20.57	20.19	21.00	20.09	20.22	20.12	21.00	20.85	20.66	20.57	21.00
3GPP Rel 6	HSUPA Subtest-3	21.26	21.46	21.16	22.00	20.87	21.05	20.86	22.00	20.97	20.90	20.83	22.00
3GPP Rel 6	HSUPA Subtest-4	20.40	20.51	20.60	21.00	20.08	20.49	20.18	21.00	20.21	20.23	20.17	21.00
3GPP Rel 6	HSUPA Subtest-5	22.69	22.72	22.51	23.00	22.04	22.24	22.06	23.00	21.95	21.86	21.91	23.00

<LTE Conducted Power>
<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	22.03	22.14	22.04	23	0
20	QPSK	1	49	22.30	22.37	22.24		
20	QPSK	1	99	21.79	21.69	22.10		
20	QPSK	50	0	20.48	20.66	20.74	22	1
20	QPSK	50	24	20.40	20.63	20.63		
20	QPSK	50	50	20.39	20.48	20.55		
20	QPSK	100	0	20.36	20.53	20.50	22	1
20	16QAM	1	0	20.20	20.47	20.55		
20	16QAM	1	49	20.27	20.42	20.64		
20	16QAM	1	99	20.14	20.21	20.18	21	2
20	16QAM	50	0	19.48	19.65	19.87		
20	16QAM	50	24	19.40	19.76	19.74		
20	16QAM	50	50	19.34	19.63	19.56	21	2
20	16QAM	100	0	19.35	19.55	19.62		
20	64QAM	1	0	20.10	20.36	20.40		
20	64QAM	1	49	20.20	20.49	20.57	21	2
20	64QAM	1	99	19.82	20.07	19.71		
20	64QAM	50	0	19.47	19.65	19.97		
20	64QAM	50	24	19.49	19.71	19.75	20	3
20	64QAM	50	50	19.48	19.58	19.53		
20	64QAM	100	0	19.42	19.60	19.69		
Channel				18675	18900	19125		
Frequency (MHz)				1857.5	1880	1902.5		
15	QPSK	1	0	21.99	21.84	21.94	23	0
15	QPSK	1	37	22.34	21.91	22.33		
15	QPSK	1	74	21.77	21.46	21.72		
15	QPSK	36	0	20.82	20.99	21.14	22	1
15	QPSK	36	20	20.94	21.03	21.20		
15	QPSK	36	39	20.80	20.81	21.09		
15	QPSK	75	0	20.86	20.96	21.07	22	1
15	16QAM	1	0	20.68	20.89	20.74		
15	16QAM	1	37	20.80	20.81	20.85		
15	16QAM	1	74	20.62	20.52	20.82	21	2
15	16QAM	36	0	19.85	20.03	20.02		
15	16QAM	36	20	20.03	20.01	20.10		
15	16QAM	36	39	19.91	19.73	19.98	21	2
15	16QAM	75	0	19.96	19.94	20.14		
15	64QAM	1	0	20.51	20.72	20.53		
15	64QAM	1	37	20.89	20.70	21.00	21	2
15	64QAM	1	74	20.37	19.86	20.57		
15	64QAM	36	0	19.69	20.00	19.99		
15	64QAM	36	20	19.90	19.93	19.81	20	3
15	64QAM	36	39	19.88	19.80	19.85		
15	64QAM	75	0	19.76	19.93	19.90		
Channel				18650	18900	19150		
Frequency (MHz)				1855	1880	1905		
10	QPSK	1	0	21.37	21.73	21.88	23	0
10	QPSK	1	25	21.87	22.37	22.11		
10	QPSK	1	49	21.48	21.37	21.56		
10	QPSK	25	0	20.75	20.93	21.11	22	1



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10	QPSK	25	12	20.69	20.90	21.06		
10	QPSK	25	25	20.77	20.85	21.01		
10	QPSK	50	0	20.79	20.95	21.02		
10	16QAM	1	0	20.58	20.83	20.79	22	1
10	16QAM	1	25	20.68	20.80	20.94		
10	16QAM	1	49	20.68	20.64	20.68		
10	16QAM	25	0	19.78	19.92	20.17	21	2
10	16QAM	25	12	19.78	19.94	20.15		
10	16QAM	25	25	19.95	19.88	19.80		
10	16QAM	50	0	19.70	19.95	19.91	21	2
10	64QAM	1	0	20.44	20.89	20.40		
10	64QAM	1	25	20.59	20.84	20.92		
10	64QAM	1	49	20.19	20.20	20.33	20	3
10	64QAM	25	0	19.78	19.99	19.97		
10	64QAM	25	12	19.77	19.79	19.85		
10	64QAM	25	25	19.93	19.84	19.72	20	3
10	64QAM	50	0	19.68	20.00	19.71		
Channel				18625	18900	19175	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1852.5	1880	1907.5		
5	QPSK	1	0	21.49	21.72	21.47	23	0
5	QPSK	1	12	21.47	21.61	21.46		
5	QPSK	1	24	21.58	21.38	21.79		
5	QPSK	12	0	20.58	20.87	20.96	22	1
5	QPSK	12	7	20.64	20.86	20.98		
5	QPSK	12	13	20.57	20.69	20.91		
5	QPSK	25	0	20.64	20.78	20.83	22	1
5	16QAM	1	0	20.29	20.63	20.70		
5	16QAM	1	12	20.41	20.58	20.65		
5	16QAM	1	24	20.46	20.46	20.54	21	2
5	16QAM	12	0	19.61	19.85	19.71		
5	16QAM	12	7	19.59	19.57	19.69		
5	16QAM	12	13	19.62	19.53	19.95	21	2
5	16QAM	25	0	19.49	19.72	19.83		
5	64QAM	1	0	20.35	20.66	20.53		
5	64QAM	1	12	20.28	20.56	20.59	21	2
5	64QAM	1	24	20.22	20.49	20.38		
5	64QAM	12	0	19.67	19.85	19.74		
5	64QAM	12	7	19.57	19.80	19.70	20	3
5	64QAM	12	13	19.56	19.92	19.83		
5	64QAM	25	0	19.55	19.77	19.70		
Channel				18615	18900	19185	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1851.5	1880	1908.5		
3	QPSK	1	0	21.33	21.64	21.61	23	0
3	QPSK	1	8	21.16	21.66	21.57		
3	QPSK	1	14	21.20	21.55	21.54		
3	QPSK	8	0	20.37	20.57	20.73	22	1
3	QPSK	8	4	20.33	20.57	20.58		
3	QPSK	8	7	20.30	20.59	20.65		
3	QPSK	15	0	20.39	20.68	20.65	22	1
3	16QAM	1	0	20.16	20.41	20.33		
3	16QAM	1	8	20.12	20.33	20.40		
3	16QAM	1	14	20.18	20.48	20.49	21	2
3	16QAM	8	0	19.40	19.40	19.71		
3	16QAM	8	4	19.37	19.62	19.55		
3	16QAM	8	7	19.23	19.67	19.63	21	2
3	16QAM	15	0	19.06	19.74	19.58		



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3	64QAM	1	0	19.72	20.33	20.33	21	2
3	64QAM	1	8	19.85	20.36	20.31		
3	64QAM	1	14	19.62	20.37	20.14		
3	64QAM	8	0	19.25	19.58	19.44	20	3
3	64QAM	8	4	19.23	19.40	19.54		
3	64QAM	8	7	19.02	19.37	19.57		
3	64QAM	15	0	19.29	19.56	19.56		
Channel				18607	18900	19193	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1850.7	1880	1909.3		
1.4	QPSK	1	0	21.51	21.61	21.70	23	0
1.4	QPSK	1	3	21.61	21.67	21.87		
1.4	QPSK	1	5	21.54	21.52	21.77		
1.4	QPSK	3	0	21.70	21.66	21.88		
1.4	QPSK	3	1	21.66	21.90	21.97		
1.4	QPSK	3	3	21.58	21.81	21.81		
1.4	QPSK	6	0	20.49	20.79	20.91	22	1
1.4	16QAM	1	0	20.39	20.75	20.74	22	1
1.4	16QAM	1	3	20.67	20.79	20.82		
1.4	16QAM	1	5	20.30	20.51	20.55		
1.4	16QAM	3	0	20.69	20.70	20.52		
1.4	16QAM	3	1	20.52	20.69	20.94		
1.4	16QAM	3	3	20.72	20.44	20.92		
1.4	16QAM	6	0	19.61	19.62	19.88	21	2
1.4	64QAM	1	0	20.19	20.57	20.66	21	2
1.4	64QAM	1	3	20.42	20.61	20.73		
1.4	64QAM	1	5	19.90	20.45	20.52		
1.4	64QAM	3	0	20.53	20.75	20.48		
1.4	64QAM	3	1	20.63	20.89	20.84		
1.4	64QAM	3	3	20.66	20.82	20.87		
1.4	64QAM	6	0	19.58	19.65	19.85	20	3



<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	21.94	21.98	21.88		
20	QPSK	1	49	22.36	22.44	22.40	23	0
20	QPSK	1	99	21.89	21.81	22.15		
20	QPSK	50	0	21.23	21.31	21.26		
20	QPSK	50	24	21.13	21.16	21.26	22	1
20	QPSK	50	50	21.17	21.10	21.20		
20	QPSK	100	0	21.20	21.33	21.31		
20	16QAM	1	0	20.75	20.89	20.94	22	1
20	16QAM	1	49	20.91	20.94	20.96		
20	16QAM	1	99	20.66	20.85	20.99		
20	16QAM	50	0	20.24	20.17	20.32	21	2
20	16QAM	50	24	20.06	20.02	20.29		
20	16QAM	50	50	20.19	20.15	20.16		
20	16QAM	100	0	20.21	20.03	20.18	21	2
20	64QAM	1	0	20.81	20.70	20.85		
20	64QAM	1	49	20.77	20.79	20.69		
20	64QAM	1	99	20.57	20.40	20.71	21	2
20	64QAM	50	0	19.72	19.80	19.66		
20	64QAM	50	24	19.82	19.62	19.87		
20	64QAM	50	50	19.80	19.88	19.97	20	3
20	64QAM	50	50	19.80	19.88	19.97		
20	64QAM	100	0	19.86	19.82	19.69		
Channel				20025	20175	20325	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1717.5	1732.5	1747.5		
15	QPSK	1	0	21.87	21.95	22.24		
15	QPSK	1	37	22.39	22.21	22.41	23	0
15	QPSK	1	74	21.97	21.64	21.98		
15	QPSK	36	0	21.21	21.07	21.22		
15	QPSK	36	20	21.10	21.12	21.17	22	1
15	QPSK	36	39	21.13	21.05	21.15		
15	QPSK	75	0	21.11	21.07	21.09		
15	16QAM	1	0	20.89	20.84	21.17	22	1
15	16QAM	1	37	21.00	20.98	20.90		
15	16QAM	1	74	20.81	20.73	21.00		
15	16QAM	36	0	20.15	20.06	20.15	21	2
15	16QAM	36	20	20.06	20.04	20.08		
15	16QAM	36	39	20.11	20.04	20.08		
15	16QAM	75	0	20.16	20.16	20.20	21	2
15	64QAM	1	0	20.52	20.82	20.97		
15	64QAM	1	37	20.90	21.00	20.99		
15	64QAM	1	74	20.59	20.43	20.76	21	2
15	64QAM	36	0	19.77	19.90	19.67		
15	64QAM	36	20	19.76	19.69	19.91		
15	64QAM	36	39	20.00	19.86	20.00	20	3
15	64QAM	36	39	20.00	19.86	20.00		
15	64QAM	75	0	19.92	19.81	19.70		
Channel				20000	20175	20350	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1715	1732.5	1750		
10	QPSK	1	0	21.73	21.69	21.79		
10	QPSK	1	25	22.22	22.19	22.24	23	0
10	QPSK	1	49	21.90	21.55	22.19		
10	QPSK	25	0	21.20	21.11	21.17		
10	QPSK	25	12	21.25	21.11	21.14	22	1



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10	QPSK	25	25	21.15	21.07	21.10		
10	QPSK	50	0	21.22	21.14	21.16		
10	16QAM	1	0	20.74	20.68	20.80		
10	16QAM	1	25	21.15	21.04	20.88	22	1
10	16QAM	1	49	20.70	20.62	20.88		
10	16QAM	25	0	20.16	20.03	20.12		
10	16QAM	25	12	20.29	20.13	20.17	21	2
10	16QAM	25	25	19.92	19.86	20.20		
10	16QAM	50	0	20.28	20.15	20.18		
10	64QAM	1	0	20.61	20.37	20.72	21	2
10	64QAM	1	25	20.97	20.92	20.81		
10	64QAM	1	49	20.22	20.51	20.53		
10	64QAM	25	0	19.66	19.73	19.57	20	3
10	64QAM	25	12	19.65	19.57	19.78		
10	64QAM	25	25	19.89	19.76	19.86		
10	64QAM	50	0	19.79	19.74	19.60		
Channel				19975	20175	20375	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1712.5	1732.5	1752.5		
5	QPSK	1	0	21.92	22.00	22.00	23	0
5	QPSK	1	12	21.92	21.98	22.11		
5	QPSK	1	24	22.29	22.13	22.11		
5	QPSK	12	0	21.19	21.23	21.28	22	1
5	QPSK	12	7	21.12	21.16	21.24		
5	QPSK	12	13	21.27	21.22	21.17		
5	QPSK	25	0	21.11	21.19	21.15	22	1
5	16QAM	1	0	20.85	20.85	21.05		
5	16QAM	1	12	20.83	20.92	20.96		
5	16QAM	1	24	21.00	20.98	20.88	21	2
5	16QAM	12	0	20.22	20.21	19.97		
5	16QAM	12	7	20.32	20.19	20.22		
5	16QAM	12	13	20.30	19.84	20.24	21	2
5	16QAM	25	0	20.16	20.16	20.18		
5	64QAM	1	0	20.69	20.71	20.76		
5	64QAM	1	12	20.74	20.72	20.70	21	2
5	64QAM	1	24	20.72	20.95	20.82		
5	64QAM	12	0	19.67	19.72	19.49		
5	64QAM	12	7	19.62	19.49	19.75	20	3
5	64QAM	12	13	19.91	19.68	19.81		
5	64QAM	25	0	19.74	19.68	19.59		
Channel				19965	20175	20385	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1732.5	1753.5		
3	QPSK	1	0	21.43	21.32	21.20	23	0
3	QPSK	1	8	21.44	21.36	21.57		
3	QPSK	1	14	21.63	21.36	21.64		
3	QPSK	8	0	20.56	20.63	20.62	22	1
3	QPSK	8	4	20.66	20.69	20.69		
3	QPSK	8	7	20.59	20.66	20.62		
3	QPSK	15	0	20.59	20.67	20.66	22	1
3	16QAM	1	0	20.31	20.34	20.27		
3	16QAM	1	8	20.21	20.36	20.55		
3	16QAM	1	14	20.49	20.33	20.51	21	2
3	16QAM	8	0	19.64	19.70	19.66		
3	16QAM	8	4	19.59	19.47	19.55		
3	16QAM	8	7	19.76	19.58	19.77	21	2
3	16QAM	15	0	19.61	19.70	19.51		
3	64QAM	1	0	20.16	20.34	20.30	21	2



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3	64QAM	1	8	20.29	20.29	20.45	20	3
3	64QAM	1	14	20.24	20.25	20.35		
3	64QAM	8	0	19.47	19.55	19.38		
3	64QAM	8	4	19.48	19.35	19.60		
3	64QAM	8	7	19.74	19.54	19.68		
3	64QAM	15	0	19.58	19.52	19.41		
Channel				19957	20175	20393	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1732.5	1754.3		
1.4	QPSK	1	0	22.04	21.90	22.02	23	0
1.4	QPSK	1	3	22.06	21.95	21.97		
1.4	QPSK	1	5	22.10	21.83	22.14		
1.4	QPSK	3	0	22.06	22.33	22.13		
1.4	QPSK	3	1	22.06	22.42	22.25		
1.4	QPSK	3	3	22.17	22.36	22.19		
1.4	QPSK	6	0	21.18	21.03	21.16	22	1
1.4	16QAM	1	0	20.92	20.98	21.11	22	1
1.4	16QAM	1	3	21.04	21.13	21.23		
1.4	16QAM	1	5	21.26	20.95	21.02		
1.4	16QAM	3	0	21.28	21.13	21.06		
1.4	16QAM	3	1	21.31	21.17	21.09		
1.4	16QAM	3	3	21.40	21.16	21.00		
1.4	16QAM	6	0	20.04	19.82	20.05	21	2
1.4	64QAM	1	0	19.93	19.99	20.16	21	2
1.4	64QAM	1	3	20.09	20.21	20.23		
1.4	64QAM	1	5	20.28	20.00	20.09		
1.4	64QAM	3	0	20.37	20.18	20.07		
1.4	64QAM	3	1	20.31	20.26	20.19		
1.4	64QAM	3	3	20.41	20.18	20.03		
1.4	64QAM	6	0	19.40	19.21	19.08	20	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		
Frequency (MHz)				829	836.5	844		
10	QPSK	1	0	21.32	21.49	21.43	23	0
10	QPSK	1	25	21.59	21.62	21.54		
10	QPSK	1	49	21.04	21.31	21.32		
10	QPSK	25	0	20.53	20.60	20.55	22	1
10	QPSK	25	12	20.61	20.66	20.61		
10	QPSK	25	25	20.46	20.50	20.32		
10	QPSK	50	0	20.53	20.62	20.50	22	1
10	16QAM	1	0	20.18	20.82	20.19		
10	16QAM	1	25	20.45	20.54	20.47		
10	16QAM	1	49	20.24	20.21	20.09	21	2
10	16QAM	25	0	19.65	19.58	19.60		
10	16QAM	25	12	19.66	19.61	19.59		
10	16QAM	25	25	19.51	19.45	19.46	21	2
10	16QAM	50	0	19.49	19.58	19.64		
10	64QAM	1	0	19.98	20.41	20.10		
10	64QAM	1	25	20.48	20.34	20.50	21	2
10	64QAM	1	49	20.34	20.46	19.84		
10	64QAM	25	0	19.68	19.58	19.57		
10	64QAM	25	12	19.66	19.61	19.68	20	3
10	64QAM	25	25	19.61	19.54	19.46		
10	64QAM	50	0	19.67	19.57	19.63		
Channel				20425	20525	20625	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				826.5	836.5	846.5		
5	QPSK	1	0	21.35	21.38	21.32	23	0
5	QPSK	1	12	21.09	21.21	21.25		
5	QPSK	1	24	21.20	21.22	21.24		
5	QPSK	12	0	20.39	20.44	20.44	22	1
5	QPSK	12	7	20.48	20.43	20.33		
5	QPSK	12	13	20.41	20.35	20.32		
5	QPSK	25	0	20.37	20.41	20.30	22	1
5	16QAM	1	0	20.23	20.23	20.06		
5	16QAM	1	12	20.05	20.16	20.13		
5	16QAM	1	24	20.16	20.13	20.20	21	2
5	16QAM	12	0	19.51	19.10	19.60		
5	16QAM	12	7	19.51	19.63	19.59		
5	16QAM	12	13	19.59	19.55	19.48	21	2
5	16QAM	25	0	19.53	19.58	19.41		
5	64QAM	1	0	20.07	20.17	19.99		
5	64QAM	1	12	20.07	20.16	20.14	21	2
5	64QAM	1	24	20.01	20.01	20.11		
5	64QAM	12	0	19.49	19.62	19.49		
5	64QAM	12	7	19.47	19.57	19.30	20	3
5	64QAM	12	13	19.31	19.40	19.30		
5	64QAM	25	0	19.53	19.56	19.35		
Channel				20415	20525	20635	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				825.5	836.5	847.5		
3	QPSK	1	0	21.25	21.24	21.31	23	0
3	QPSK	1	8	21.01	21.19	21.15		
3	QPSK	1	14	21.10	21.14	21.16		
3	QPSK	8	0	20.30	20.38	20.42	22	1
3	QPSK	8	4	20.41	20.39	20.26		



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3	QPSK	8	7	20.36	20.27	20.28		
3	QPSK	15	0	20.31	20.40	20.28		
3	16QAM	1	0	20.21	20.17	20.07		
3	16QAM	1	8	20.06	20.07	20.04	22	1
3	16QAM	1	14	20.13	20.11	20.14		
3	16QAM	8	0	19.42	19.05	19.56		
3	16QAM	8	4	19.46	19.57	19.57	21	2
3	16QAM	8	7	19.49	19.49	19.41		
3	16QAM	15	0	19.43	19.51	19.34		
3	64QAM	1	0	20.05	20.16	19.97	21	2
3	64QAM	1	8	19.97	20.14	20.13		
3	64QAM	1	14	19.93	19.99	20.09		
3	64QAM	8	0	19.49	19.53	19.46	20	3
3	64QAM	8	4	19.40	19.51	19.20		
3	64QAM	8	7	19.27	19.39	19.23		
3	64QAM	15	0	19.47	19.50	19.32		
Channel				20407	20525	20643	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				824.7	836.5	848.3		
1.4	QPSK	1	0	21.30	21.22	21.22	23	0
1.4	QPSK	1	3	21.07	21.12	21.20		
1.4	QPSK	1	5	21.17	21.19	21.21		
1.4	QPSK	3	0	21.26	21.20	21.22		
1.4	QPSK	3	1	21.04	21.10	21.23		
1.4	QPSK	3	3	21.13	21.18	21.20		
1.4	QPSK	6	0	20.09	20.12	20.12	22	1
1.4	16QAM	1	0	20.16	20.10	20.00	22	1
1.4	16QAM	1	3	20.02	20.06	20.02		
1.4	16QAM	1	5	20.12	20.10	20.09		
1.4	16QAM	3	0	20.44	20.10	20.10		
1.4	16QAM	3	1	20.32	20.11	20.25		
1.4	16QAM	3	3	20.37	20.04	20.16		
1.4	16QAM	6	0	19.20	19.01	19.12	21	2
1.4	64QAM	1	0	19.69	19.73	19.58	21	2
1.4	64QAM	1	3	19.87	19.89	19.44		
1.4	64QAM	1	5	19.64	19.62	19.41		
1.4	64QAM	3	0	20.31	19.98	20.38		
1.4	64QAM	3	1	20.35	20.20	20.32		
1.4	64QAM	3	3	20.35	20.17	20.04		
1.4	64QAM	6	0	19.00	19.20	18.93	20	3

<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	23	0
Frequency (MHz)				704	707.5	711		
10	QPSK	1	0	22.06	22.26	21.99		
10	QPSK	1	25	22.56	22.57	22.46	22	1
10	QPSK	1	49	22.19	21.98	22.06		
10	QPSK	25	0	21.41	21.22	21.13		
10	QPSK	25	12	21.33	21.17	21.35	22	1
10	QPSK	25	25	21.31	21.25	21.36		
10	QPSK	50	0	21.43	21.17	21.39		
10	16QAM	1	0	20.43	21.18	20.98	22	1
10	16QAM	1	25	21.48	20.73	21.30		
10	16QAM	1	49	20.49	21.04	21.06		
10	16QAM	25	0	20.58	20.35	20.58	21.5	1.5
10	16QAM	25	12	20.69	20.24	20.60		
10	16QAM	25	25	20.27	20.24	20.34		
10	16QAM	50	0	20.51	20.31	20.32	21.5	1.5
10	64QAM	1	0	20.50	20.31	20.54		
10	64QAM	1	25	20.66	20.17	20.55		
10	64QAM	1	49	20.24	20.17	20.28	21	2
10	64QAM	25	0	19.58	19.28	19.56		
10	64QAM	25	12	19.60	19.18	19.52		
10	64QAM	25	25	19.20	19.23	19.33	21	2
10	64QAM	25	25	19.20	19.23	19.33		
10	64QAM	50	0	19.44	19.31	19.32		
Channel				23035	23095	23155	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				701.5	707.5	713.5		
5	QPSK	1	0	22.35	22.27	22.42	23	0
5	QPSK	1	12	22.49	22.10	22.19		
5	QPSK	1	24	22.31	22.26	22.05		
5	QPSK	12	0	21.32	21.19	21.39	22	1
5	QPSK	12	7	21.34	21.26	21.31		
5	QPSK	12	13	21.47	21.16	21.28		
5	QPSK	25	0	21.37	21.12	21.39	22	1
5	16QAM	1	0	20.91	20.92	21.20		
5	16QAM	1	12	21.07	21.05	21.12		
5	16QAM	1	24	21.01	20.98	20.60	21.5	1.5
5	16QAM	12	0	19.96	20.23	20.37		
5	16QAM	12	7	20.48	20.28	20.56		
5	16QAM	12	13	20.58	20.16	20.37	21.5	1.5
5	16QAM	25	0	20.35	20.19	20.44		
5	64QAM	1	0	20.82	20.88	21.12		
5	64QAM	1	12	20.95	20.86	21.05	21.5	1.5
5	64QAM	1	24	20.92	20.82	20.99		
5	64QAM	12	0	19.58	19.26	19.56		
5	64QAM	12	7	19.68	19.23	19.57	21	2
5	64QAM	12	13	19.27	19.20	19.33		
5	64QAM	25	0	19.42	19.27	19.28		
Channel				23025	23095	23165	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				700.5	707.5	714.5		
3	QPSK	1	0	22.42	22.28	22.40	23	0
3	QPSK	1	8	21.98	22.14	22.30		
3	QPSK	1	14	22.52	22.26	22.03		
3	QPSK	8	0	21.53	21.26	21.41	22	1
3	QPSK	8	4	21.36	21.18	21.31		



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3	QPSK	8	7	21.29	21.15	21.30		
3	QPSK	15	0	21.38	21.23	21.32		
3	16QAM	1	0	21.02	21.33	21.06		
3	16QAM	1	8	21.16	21.40	21.11	22	1
3	16QAM	1	14	21.24	21.27	21.20		
3	16QAM	8	0	20.06	20.34	20.47		
3	16QAM	8	4	20.49	20.29	20.58	21.5	1.5
3	16QAM	8	7	20.42	20.26	20.23		
3	16QAM	15	0	20.49	20.22	20.45		
3	64QAM	1	0	20.95	20.96	20.92	21.5	1.5
3	64QAM	1	8	21.00	21.02	20.96		
3	64QAM	1	14	21.04	20.91	20.96		
3	64QAM	8	0	19.56	19.32	19.57	21	2
3	64QAM	8	4	19.68	19.20	19.54		
3	64QAM	8	7	19.27	19.20	19.29		
3	64QAM	15	0	19.43	19.21	19.32		
Channel				23017	23095	23173	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				699.7	707.5	715.3		
1.4	QPSK	1	0	22.37	22.20	22.25	23	0
1.4	QPSK	1	3	22.22	22.15	22.21		
1.4	QPSK	1	5	22.34	22.34	22.06		
1.4	QPSK	3	0	22.46	22.20	22.31		
1.4	QPSK	3	1	22.41	22.35	22.20		
1.4	QPSK	3	3	22.38	22.28	22.23		
1.4	QPSK	6	0	21.37	20.98	21.17	22	1
1.4	16QAM	1	0	20.82	21.26	21.11	22	1
1.4	16QAM	1	3	21.25	21.27	21.24		
1.4	16QAM	1	5	21.06	21.04	21.15		
1.4	16QAM	3	0	20.81	21.24	21.50		
1.4	16QAM	3	1	21.36	21.27	21.31		
1.4	16QAM	3	3	21.29	21.15	21.16		
1.4	16QAM	6	0	19.84	20.11	20.22	21.5	1.5
1.4	64QAM	1	0	20.92	20.93	21.16	21.5	1.5
1.4	64QAM	1	3	21.16	21.19	21.07		
1.4	64QAM	1	5	20.31	21.15	20.70		
1.4	64QAM	3	0	21.46	21.20	21.36		
1.4	64QAM	3	1	21.50	21.30	21.27		
1.4	64QAM	3	3	21.30	21.21	21.21		
1.4	64QAM	6	0	20.56	20.61	20.42	21	2

<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			23	0
Frequency (MHz)				782				
10	QPSK	1	0		22.49		23	0
10	QPSK	1	25		22.65			
10	QPSK	1	49		22.43			
10	QPSK	25	0		21.34		22	1
10	QPSK	25	12		21.38			
10	QPSK	25	25		21.39			
10	QPSK	50	0		21.46		22	1
10	16QAM	1	0		21.33			
10	16QAM	1	25		21.39			
10	16QAM	1	49		20.99		21.5	1.5
10	16QAM	25	0		20.42			
10	16QAM	25	12		20.36			
10	16QAM	25	25		20.37		21.5	1.5
10	16QAM	50	0		20.39			
10	64QAM	1	0		21.22			
10	64QAM	1	25		20.96		21.5	1.5
10	64QAM	1	49		20.74			
10	64QAM	25	0		20.47			
10	64QAM	25	12		20.47		21	2
10	64QAM	25	25		20.48			
10	64QAM	50	0		20.56			
Channel				23205	23230	23255	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				779.5	782	784.5	23	0
5	QPSK	1	0	22.30	22.43	22.10		
5	QPSK	1	12	22.61	22.63	22.20		
5	QPSK	1	24	22.11	22.11	22.17	22	1
5	QPSK	12	0	21.27	21.30	21.34		
5	QPSK	12	7	21.30	21.28	21.22		
5	QPSK	12	13	21.25	21.24	21.15	22	1
5	QPSK	25	0	21.28	21.28	21.27		
5	16QAM	1	0	21.22	21.03	20.93		
5	16QAM	1	12	21.11	21.44	20.76	22	1
5	16QAM	1	24	20.91	21.03	20.94		
5	16QAM	12	0	20.32	20.23	20.28		
5	16QAM	12	7	20.45	20.52	19.99	21.5	1.5
5	16QAM	12	13	20.31	20.32	20.22		
5	16QAM	25	0	20.32	20.38	20.13		
5	64QAM	1	0	21.25	20.90	20.97	21.5	1.5
5	64QAM	1	12	21.10	21.14	20.91		
5	64QAM	1	24	20.60	20.89	20.27		
5	64QAM	12	0	20.20	20.23	20.18	21	2
5	64QAM	12	7	20.34	20.14	19.98		
5	64QAM	12	13	20.17	20.34	20.04		
5	64QAM	25	0	20.39	20.43	20.06	21	2

<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			23	0
Frequency (MHz)				793				
10	QPSK	1	0		21.50		23	0
10	QPSK	1	25		22.65			
10	QPSK	1	49		22.18			
10	QPSK	25	0		21.50		22	1
10	QPSK	25	12		21.38			
10	QPSK	25	25		21.41			
10	QPSK	50	0		21.51		22	1
10	16QAM	1	0		20.87			
10	16QAM	1	25		21.49			
10	16QAM	1	49		21.15		21	2
10	16QAM	25	0		20.68			
10	16QAM	25	12		20.58			
10	16QAM	25	25		20.58		21	2
10	16QAM	50	0		20.56			
10	64QAM	1	0		20.79			
10	64QAM	1	25		20.96		21	2
10	64QAM	1	49		20.94			
10	64QAM	25	0		20.66			
10	64QAM	25	12		20.58		21	2
10	64QAM	25	25		20.57			
10	64QAM	50	0		20.71			
Channel				23305	23330	23355	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				790.5	793	795.5	23	0
5	QPSK	1	0	21.70	22.13	22.33		
5	QPSK	1	12	22.56	22.54	22.53		
5	QPSK	1	24	22.29	21.97	21.96	22	1
5	QPSK	12	0	21.33	21.43	21.29		
5	QPSK	12	7	21.36	21.31	21.21		
5	QPSK	12	13	21.44	21.26	21.17	22	1
5	QPSK	25	0	21.34	21.32	21.32		
5	16QAM	1	0	20.94	21.06	21.10		
5	16QAM	1	12	21.03	21.00	21.00	21	2
5	16QAM	1	24	21.00	20.92	20.89		
5	16QAM	12	0	20.16	20.60	20.30		
5	16QAM	12	7	20.55	20.63	20.19	21	2
5	16QAM	12	13	20.55	20.20	20.12		
5	16QAM	25	0	20.63	20.25	20.29		
5	64QAM	1	0	20.94	20.92	20.26	21	2
5	64QAM	1	12	20.99	20.87	20.26		
5	64QAM	1	24	21.00	20.92	20.33		
5	64QAM	12	0	20.25	20.40	20.46	21	2
5	64QAM	12	7	20.42	20.38	20.18		
5	64QAM	12	13	20.38	20.12	20.04		
5	64QAM	25	0	20.52	20.35	20.31		



<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	22.32	22.48	22.22		
10	QPSK	1	25	22.48	22.56	22.43	23	0
10	QPSK	1	49	22.35	22.46	22.37		
10	QPSK	25	0	21.26	21.28	21.23		
10	QPSK	25	12	21.30	21.23	21.21	22	1
10	QPSK	25	25	21.34	21.34	21.32		
10	QPSK	50	0	21.27	21.29	21.14		
10	16QAM	1	0	21.18	21.10	21.09	22	1
10	16QAM	1	25	21.22	21.22	21.34		
10	16QAM	1	49	21.26	21.22	21.15		
10	16QAM	25	0	20.39	20.36	20.53	21	2
10	16QAM	25	12	20.23	20.35	20.52		
10	16QAM	25	25	20.52	20.47	20.38		
10	16QAM	50	0	20.44	20.37	20.39	21	2
10	64QAM	1	0	20.94	20.65	20.75		
10	64QAM	1	25	20.69	21.00	20.66		
10	64QAM	1	49	20.89	20.50	20.87	20	3
10	64QAM	25	0	19.82	19.80	19.94		
10	64QAM	25	12	19.78	19.93	19.88		
10	64QAM	25	25	19.94	20.00	19.97	20	3
10	64QAM	50	0	19.78	19.87	19.81		
Channel				23755	23790	23825	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				706.5	710	713.5		
5	QPSK	1	0	22.34	21.97	21.85		
5	QPSK	1	12	22.20	22.54	22.48	23	0
5	QPSK	1	24	21.95	22.07	22.32		
5	QPSK	12	0	21.25	21.17	21.36		
5	QPSK	12	7	21.15	21.28	21.40	22	1
5	QPSK	12	13	21.17	21.33	21.32		
5	QPSK	25	0	21.24	21.17	21.21		
5	16QAM	1	0	21.09	20.88	21.01	22	1
5	16QAM	1	12	20.83	21.05	21.13		
5	16QAM	1	24	20.83	21.09	21.02		
5	16QAM	12	0	20.29	20.19	20.53	21	2
5	16QAM	12	7	20.11	20.49	20.56		
5	16QAM	12	13	20.12	20.37	20.49		
5	16QAM	25	0	20.25	20.28	20.39	21	2
5	64QAM	1	0	20.89	20.65	20.66		
5	64QAM	1	12	20.61	20.97	20.60		
5	64QAM	1	24	20.79	20.49	20.78	20	3
5	64QAM	12	0	19.79	19.71	19.85		
5	64QAM	12	7	19.73	19.90	19.83		
5	64QAM	12	13	19.89	20.00	19.97	20	3
5	64QAM	25	0	19.73	19.84	19.71		

<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		
Frequency (MHz)				1720	1745	1770		
20	QPSK	1	0	21.93	22.01	21.83		
20	QPSK	1	49	22.16	22.40	22.01	23	0
20	QPSK	1	99	21.86	21.88	21.65		
20	QPSK	50	0	20.95	21.22	21.05		
20	QPSK	50	24	20.86	20.97	20.92	22	1
20	QPSK	50	50	20.92	20.95	20.86		
20	QPSK	100	0	20.93	21.09	21.02		
20	16QAM	1	0	20.67	20.83	20.82	22	1
20	16QAM	1	49	20.89	20.97	20.78		
20	16QAM	1	99	20.71	20.75	20.53		
20	16QAM	50	0	19.97	20.22	20.02	21	2
20	16QAM	50	24	19.71	20.04	19.96		
20	16QAM	50	50	19.94	19.96	19.84		
20	16QAM	100	0	20.03	20.06	19.89	21	2
20	64QAM	1	0	20.35	20.37	20.66		
20	64QAM	1	49	20.55	20.63	20.60		
20	64QAM	1	99	20.16	20.42	20.31	20	3
20	64QAM	50	0	19.91	19.92	19.98		
20	64QAM	50	24	19.87	19.94	19.92		
20	64QAM	50	50	19.88	19.93	19.89	20	3
20	64QAM	50	50	19.88	19.93	19.89		
20	64QAM	100	0	19.85	20.00	19.88		
Channel				132047	132322	132597	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1717.5	1745	1772.5		
15	QPSK	1	0	22.08	22.14	21.90		
15	QPSK	1	37	22.28	22.34	22.30	23	0
15	QPSK	1	74	22.05	21.97	21.74		
15	QPSK	36	0	21.09	21.26	21.11	22	1
15	QPSK	36	20	21.07	21.14	21.13		
15	QPSK	36	39	21.00	21.10	21.02		
15	QPSK	75	0	21.08	21.24	21.06	22	1
15	16QAM	1	0	21.02	21.05	20.88		
15	16QAM	1	37	20.94	20.91	21.05		
15	16QAM	1	74	20.88	20.89	20.70	21	2
15	16QAM	36	0	20.04	20.28	20.10		
15	16QAM	36	20	19.94	20.07	20.04		
15	16QAM	36	39	19.98	20.05	19.98	21	2
15	16QAM	75	0	20.04	20.14	20.07		
15	64QAM	1	0	20.92	20.89	20.84		
15	64QAM	1	37	20.90	20.99	20.72	21	2
15	64QAM	1	74	20.62	20.40	20.78		
15	64QAM	36	0	19.90	19.96	19.88		
15	64QAM	36	20	19.89	19.89	19.80	20	3
15	64QAM	36	39	19.87	19.95	19.74		
15	64QAM	75	0	19.83	19.86	19.74		
Channel				132022	132322	132622	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1715	1745	1775		
10	QPSK	1	0	21.90	22.21	21.72		
10	QPSK	1	25	22.01	22.00	22.15	23	0
10	QPSK	1	49	21.82	22.06	21.43		
10	QPSK	25	0	21.02	21.24	21.10	22	1
10	QPSK	25	12	21.05	21.13	20.98		



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10	QPSK	25	25	20.97	21.12	20.94		
10	QPSK	50	0	20.95	21.15	20.86		
10	16QAM	1	0	20.81	20.90	20.85		
10	16QAM	1	25	20.96	20.86	21.09	22	1
10	16QAM	1	49	20.69	20.81	20.61		
10	16QAM	25	0	19.97	20.19	20.00		
10	16QAM	25	12	20.14	20.08	19.79	21	2
10	16QAM	25	25	20.02	20.18	19.82		
10	16QAM	50	0	20.00	20.09	19.90		
10	64QAM	1	0	20.49	20.49	20.64	21	2
10	64QAM	1	25	20.85	20.83	20.96		
10	64QAM	1	49	20.49	20.72	20.47		
10	64QAM	25	0	19.98	19.99	19.88	20	3
10	64QAM	25	12	19.96	19.94	19.83		
10	64QAM	25	25	19.93	19.99	19.81		
10	64QAM	50	0	19.88	19.92	19.79		
Channel				131997	132322	132647	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1712.5	1745	1777.5		
5	QPSK	1	0	21.31	21.54	21.42	23	0
5	QPSK	1	12	21.88	21.55	21.53		
5	QPSK	1	24	21.23	21.47	21.21		
5	QPSK	12	0	20.62	20.61	20.64	22	1
5	QPSK	12	7	20.67	20.74	20.51		
5	QPSK	12	13	20.49	20.69	20.52		
5	QPSK	25	0	20.51	20.68	20.56		
5	16QAM	1	0	20.23	20.33	20.46	22	1
5	16QAM	1	12	20.19	20.08	20.25		
5	16QAM	1	24	20.28	20.28	20.21		
5	16QAM	12	0	19.44	19.71	19.45	21	2
5	16QAM	12	7	19.50	19.72	19.71		
5	16QAM	12	13	19.46	19.70	19.47		
5	16QAM	25	0	19.47	19.73	19.52		
5	64QAM	1	0	19.95	20.06	20.35	21	2
5	64QAM	1	12	20.25	20.27	20.29		
5	64QAM	1	24	19.74	20.20	19.71		
5	64QAM	12	0	19.47	19.69	19.36	20	3
5	64QAM	12	7	19.33	19.41	19.61		
5	64QAM	12	13	19.34	19.54	19.37		
5	64QAM	25	0	19.47	19.71	19.62		
Channel				131987	132322	132657	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1745	1778.5		
3	QPSK	1	0	21.94	22.05	21.90	23	0
3	QPSK	1	8	21.96	21.96	21.78		
3	QPSK	1	14	21.91	21.97	21.50		
3	QPSK	8	0	21.06	21.15	21.09	22	1
3	QPSK	8	4	21.04	21.08	20.98		
3	QPSK	8	7	20.98	21.10	20.88		
3	QPSK	15	0	21.11	21.04	20.97		
3	16QAM	1	0	20.83	20.84	20.84	22	1
3	16QAM	1	8	20.80	20.77	20.72		
3	16QAM	1	14	20.82	20.72	20.35		
3	16QAM	8	0	20.13	20.15	20.23	21	2
3	16QAM	8	4	20.03	20.09	19.95		
3	16QAM	8	7	20.05	20.19	19.98		
3	16QAM	15	0	20.07	20.08	19.80		
3	64QAM	1	0	20.68	20.90	20.77	21	2



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3	64QAM	1	8	20.50	20.73	20.73	20	3
3	64QAM	1	14	20.62	20.66	20.29		
3	64QAM	8	0	19.40	19.59	19.34		
3	64QAM	8	4	19.33	19.33	19.56		
3	64QAM	8	7	19.26	19.44	19.36		
3	64QAM	15	0	19.39	19.71	19.57		
Channel				131979	132322	132665	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1745	1779.3		
1.4	QPSK	1	0	21.93	22.03	21.86	23	0
1.4	QPSK	1	3	22.02	22.14	21.74		
1.4	QPSK	1	5	21.87	22.11	21.77		
1.4	QPSK	3	0	22.21	22.08	22.02		
1.4	QPSK	3	1	22.31	22.23	21.95		
1.4	QPSK	3	3	22.33	22.22	21.89		
1.4	QPSK	6	0	21.08	21.20	21.01	22	1
1.4	16QAM	1	0	20.89	20.95	20.99	22	1
1.4	16QAM	1	3	20.96	21.07	20.98		
1.4	16QAM	1	5	20.82	20.86	20.81		
1.4	16QAM	3	0	20.97	21.00	21.05		
1.4	16QAM	3	1	21.04	21.11	20.94		
1.4	16QAM	3	3	21.05	21.08	20.81		
1.4	16QAM	6	0	19.59	20.07	20.04	21	2
1.4	64QAM	1	0	20.67	20.66	20.59	21	2
1.4	64QAM	1	3	20.60	20.70	20.77		
1.4	64QAM	1	5	20.64	20.60	20.66		
1.4	64QAM	3	0	20.63	20.64	20.57		
1.4	64QAM	3	1	20.60	20.64	20.70		
1.4	64QAM	3	3	20.59	20.50	20.58		
1.4	64QAM	6	0	19.63	19.65	19.68	20	3

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

<2.4GHz WLAN ANT 1>

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
2.4GHz WLAN	802.11b 1Mbps	1	2412	14.30	14.50	98.94
		6	2437	14.70	15.00	
		11	2462	15.10	15.50	
		12	2467	15.50	15.50	
		13	2472	15.90	16.00	
	802.11g 6Mbps	1	2412	12.80	13.00	92.38
		6	2437	13.30	13.50	
		11	2462	13.80	14.00	
		12	2467	14.30	14.50	
		13	2472	14.80	15.00	
	802.11n-HT20 MCS0	1	2412	12.50	13.00	92.58
		6	2437	13.00	13.50	
		11	2462	13.50	14.00	
		12	2467	14.00	14.50	
		13	2472	14.50	15.00	
	802.11ac-VHT20 MCS0	1	2412	12.40	13.00	92.58
		6	2437	12.90	13.50	
		11	2462	13.40	14.00	
		12	2467	13.90	14.50	
		13	2472	14.40	15.00	

<5GHz WLAN ANT 1>

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.2GHz WLAN	802.11a 6Mbps	36	5180	4.10	4.50	92.69
		40	5200	4.30	4.50	
		44	5220	4.50	4.50	
		48	5240	4.30	4.50	
	802.11n-HT20 MCS0	36	5180	3.60	4.00	94.84
		40	5200	4.00	4.50	
		44	5220	4.40	4.50	
		48	5240	4.20	4.50	
	802.11n-HT40 MCS0	38	5190	2.90	3.00	89.71
		46	5230	3.90	4.00	
	802.11ac-VHT20 MCS0	36	5180	3.50	4.00	94.84
		40	5200	3.90	4.50	
		44	5220	4.30	4.50	
		48	5240	4.10	4.50	
	802.11ac-VHT40 MCS0	38	5190	2.80	3.00	89.71
		46	5230	3.80	4.00	
	802.11ac-VHT80 MCS0	42	5210	3.40	3.50	81.56

5.3GHz WLAN	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
	802.11a 6Mbps	52	5260	5.00	5.00	92.69
		56	5280	5.10	5.50	
		60	5300	5.10	5.50	
		64	5320	5.20	5.50	
	802.11n-HT20 MCS0	52	5260	4.00	4.00	94.84
		56	5280	4.40	4.50	
		60	5300	4.70	5.00	
		64	5320	4.80	5.00	
	802.11n-HT40 MCS0	54	5270	4.30	5.00	89.71
		62	5310	4.60	5.00	
	802.11ac-VHT20 MCS0	52	5260	3.90	4.00	94.84
		56	5280	4.30	4.50	
		60	5300	4.60	5.00	
		64	5320	4.70	5.00	
	802.11ac-VHT40 MCS0	54	5270	4.20	5.00	89.71
		62	5310	4.50	5.00	
	802.11ac-VHT80 MCS0	58	5290	4.10	4.50	81.56

5.5GHz WLAN	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
	802.11a 6Mbps	100	5500	6.50	6.50	92.69
		116	5580	6.70	7.00	
		124	5620	7.40	7.50	
		132	5660	7.70	8.00	
		144	5720	8.10	8.50	
	802.11n-HT20 MCS0	100	5500	6.00	6.50	94.84
		116	5580	6.70	7.00	
		124	5620	7.10	7.50	
		132	5660	7.30	7.50	
		144	5720	7.50	7.50	
	802.11n-HT40 MCS0	102	5510	5.70	6.00	89.71
		110	5550	5.70	6.00	
		126	5630	6.30	6.50	
		134	5670	6.90	7.00	
		142	5710	7.10	7.50	
	802.11ac-VHT20 MCS0	100	5500	5.90	6.50	94.84
		116	5580	6.60	7.00	
		124	5620	7.00	7.50	
		132	5660	7.20	7.50	
		144	5720	7.40	7.50	
	802.11ac-VHT40 MCS0	102	5510	5.60	6.00	89.71
		110	5550	5.60	6.00	
		126	5630	6.20	6.50	
		134	5670	6.80	7.00	
		142	5710	7.00	7.50	
	802.11ac-VHT80 MCS0	106	5530	5.40	5.50	81.56
		122	5610	5.60	6.00	
		138	5690	6.50	6.50	

5.8GHz WLAN	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
	802.11a 6Mbps	149	5745	7.30	7.50	92.69
		157	5785	7.00	7.50	
		165	5825	6.80	7.00	
	802.11n-HT20 MCS0	149	5745	7.10	7.50	94.84
		157	5785	6.90	7.00	
		165	5825	6.50	6.50	
	802.11n-HT40 MCS0	151	5755	7.10	7.50	89.71
		159	5795	6.20	6.50	
	802.11ac-VHT20 MCS0	149	5745	7.00	7.50	94.84
		157	5785	6.80	7.00	
		165	5825	6.40	6.50	
	802.11ac-VHT40 MCS0	151	5755	7.00	7.50	89.71
		159	5795	6.10	6.50	
	802.11ac-VHT80 MCS0	155	5775	6.30	6.50	81.56

12. Bluetooth Exclusions Applied

Mode Band	Max Average power(dBm)	
	BR/EDR	LE
2.4GHz Bluetooth	6.0	6.0

Note:

- Per KDB 447498 D01v06, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:

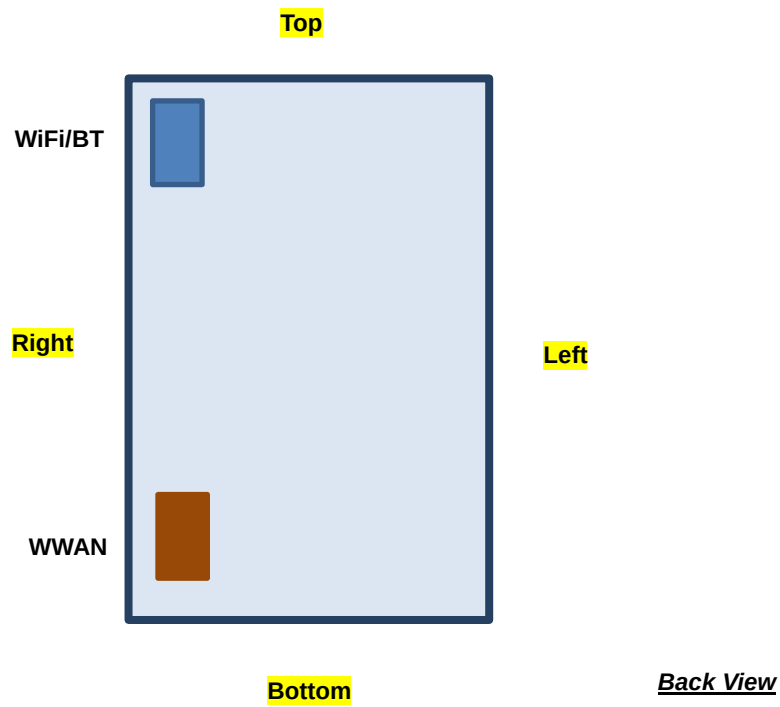
$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$$
for 1-g SAR and ≤ 7.5 for 10-g extremity SAR
 - f(GHz) is the RF channel transmit frequency in GHz
 - Power and distance are rounded to the nearest mW and mm before calculation
 - The result is rounded to one decimal place for comparison

Bluetooth Max Power (dBm)	Separation Distance (mm)	Frequency (GHz)	exclusion thresholds
6.0	< 5	2.48	1.25

Note:

Per KDB 447498 D01v06, when the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion. The test exclusion threshold is 2.52 which is ≤ 3 , SAR testing is not required.

13. Antenna Location



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: 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.

14.1 Body SAR

<WCDMA SAR>

Plot No.	Band	Mode	Test Position	Accessory	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)
01	WCDMA II	RMC 12.2Kbps	Back	Magnetic Mount	9262	1852.4	22.53	23.00	1.114	-0.05	0.181	0.202
02	WCDMA IV	RMC 12.2Kbps	Back	Magnetic Mount	1513	1752.6	22.27	23.00	1.183	-0.12	0.401	0.474
03	WCDMA V	RMC 12.2Kbps	Back	Chest Clip	4132	826.4	21.91	23.00	1.285	-0.19	0.327	0.420

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Accessory	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)
04	LTE Band 2	20M	QPSK	1	49	Back	Magnetic Mount	18700	1860	22.30	23.00	1.175	-0.19	0.183	0.215
05	LTE Band 5	10M	QPSK	1	25	Back	Magnetic Mount	20525	836.5	21.62	23.00	1.374	-0.15	0.227	0.312
06	LTE Band 12	10M	QPSK	1	25	Back	Magnetic Mount	23095	707.5	22.57	23.00	1.104	0.04	0.295	0.326
07	LTE Band 13	10M	QPSK	1	25	Back	Chest Clip	23230	782	22.65	23.00	1.084	-0.19	0.266	0.288
08	LTE Band 14	10M	QPSK	1	25	Back	Chest Clip	23330	793	22.65	23.00	1.084	-0.12	0.278	0.301
09	LTE Band 66	20M	QPSK	1	49	Back	Magnetic Mount	132572	1770	22.01	23.00	1.256	-0.1	0.382	0.480

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Accessory	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)
10	WLAN2.4GHz	802.11b 1Mbps	Back	Chest Clip	13	2472	15.90	16.00	1.023	98.94	1.011	-0.02	0.091	0.094
11	WLAN5GHz	802.11a 6Mbps	Back	Chest Clip	64	5320	5.20	5.50	1.072	92.69	1.079	0.12	0.011	0.013
12	WLAN5GHz	802.11a 6Mbps	Back	Chest Clip	144	5720	8.10	8.50	1.096	92.69	1.079	0	< 0.001	< 0.001
13	WLAN5GHz	802.11n-HT40 MCS0	Back	Chest Clip	151	5755	7.10	7.50	1.096	89.71	1.115	0	< 0.001	< 0.001

Test Engineer : Randy Lin and Penny Liu

15. 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. Therefore, the measurement uncertainty table is not required in this report.

16. 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 941225 D01 v03r01, "3G SAR MEAUREMENT PROCEDURES", Oct 2015
- [8] FCC KDB 941225 D05 v02r05, "SAR Evaluation Considerations for LTE Devices", Dec 2015
- [9] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.
- [10] FCC KDB 865664 D02 v01r02, "RF Exposure Compliance Reporting and Documentation Considerations" Oct 2015.