FCC SAR TEST REPORT

FCC ID	:	**A4RG013A**
Equipment	:	**Phone**
Model Name	:	**G013A**
Applicant	:	**Google LLC** **1600 Amphitheatre Parkway,** **Mountain View, California, 94043 USA**
Standard	:	**FCC 47 CFR Part 2 (2.1093)** **ANSI/IEEE C95.1-1992** **IEEE 1528-2013**

This is Class II permissive change filing, the change is to enable LTE Band 48, and the report already covers the additional SAR and simultaneous transmission assessment related to the LTE Band 48.

The product was received on Aug. 06, 2018 and testing was started from Aug. 07, 2018 and completed on Aug. 11, 2018. 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 variant report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERTIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Cona Huang

Approved by: Cona Huang / Deputy Manager

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History of this test report

Report No.	Version	Description	Issued Date
FA820225-07	01	Initial issue of report	Nov. 09, 2018

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for Google LLC, Phone, G013A, are as follows.

Equipment Class	Frequency Band	Highest SAR Summary			Highest Simultaneous Transmission 1g SAR (W/kg)
		Head (Separation 0mm)	Body-worn (Separation 10mm)	Hotspot (Separation 10mm)	
		1g SAR (W/kg)			
Licensed	GSM850	0.59	0.27	0.27	1.59
	GSM1900	1.34	0.64	1.21	
	WCDMA II	1.32	1.16	1.31	
	WCDMA VI	1.34	1.27	1.34	
	WCDMA V	1.07	0.50	0.50	
	CDMA BC0	1.18	0.55	0.56	
	CDMA BC1	1.33	1.31	1.30	
	CDMA BC10	1.10	0.50	0.54	
	LTE Band 7	1.28	0.92	0.92	
	LTE Band 12 / 17	1.15	0.28	0.28	
	LTE Band 13	1.16	0.41	0.41	
	LTE Band 2 / 25	1.27	1.34	1.33	
	LTE Band 5 / 26	1.19	0.44	0.48	
	LTE Band 30	1.34	0.82	1.22	
	LTE Band 38 / 41	1.31	0.56	0.56	
	LTE Band 48	1.32	0.39	0.72	
	LTE Band 4 / 66	1.22	1.32	1.32	
	LTE Band 71	1.00	0.58	0.58	
DTS	2.4GHz WLAN	1.31	0.46	0.68	1.59
NII	5GHz WLAN	1.34	0.56	0.46	1.59
DSS	Bluetooth	0.77	0.11	0.22	1.59
Date of Testing:		2018/8/7 ~ 2018/8/11			

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) 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 648474 D04 SAR Evaluation Considerations for Wireless Handsets v01r03
- 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
- FCC KDB 941225 D05A Rel.10 LTE SAR Test Guidance v01r02
- FCC KDB 941225 D06 Hotspot Mode SAR v02r01

3. Equipment Under Test (EUT) Information

3.1 General Information

Product Feature & Specification	
Equipment Name	Phone
Model Name	G013A
FCC ID	A4RG013A
Wireless Technology and Frequency Range	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8 MHz 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 CDMA2000 BC0: 824.7 MHz ~ 848.31 MHz CDMA 2000 BC1: 1851.25 MHz ~ 1908.75 MHz CDMA 2000 BC10: 817.9 MHz ~ 823.1 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 7: 2502.5 MHz ~ 2567.5 MHz LTE Band 12: 699.7 MHz ~ 715.3 MHz LTE Band 13: 779.5 MHz ~ 784.5 MHz LTE Band 17: 706.5 MHz ~ 713.5 MHz LTE Band 25: 1850.7 MHz ~ 1914.3 MHz LTE Band 26: 814.7 MHz ~ 848.3 MHz LTE Band 30: 2307.5 MHz ~ 2312.5 MHz LTE Band 38: 2572.5 MHz ~ 2617.5 MHz LTE Band 41: 2498.5 MHz ~ 2687.5 MHz LTE Band 48: 3552.5 MHz ~ 3697.5 MHz LTE Band 66: 1710.7 MHz ~ 1779.3 MHz LTE Band 71: 665.5 MHz ~ 695.5 MHz 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	GSM/GPRS/EGPRS RMC/AMR 12.2Kbps HSDPA HSUPA DC-HSDPA CDMA2000: 1xRTT/1xEv-Do(Rev.0)/1xEv-Do(Rev.A) LTE: QPSK, 16QAM, 64QAM WLAN 2.4GHz : 802.11b/g/n/ac HT20/VHT20 WLAN 5GHz : 802.11a/n/ac HT20/HT40/VHT20/VHT40/VHT80 Bluetooth: BR/EDR/LE NFC: ASK
GSM / (E)GPRS Transfer mode	Class B – EUT cannot support Packet Switched and Circuit Switched Network simultaneously but can automatically switch between Packet and Circuit Switched Network.
Remark: 1. Variant report to enable LTE B48 SAR test, the other frequency test records please refer to Sporton SAR Test Report, Report No. FA820225-02 (FC ID: A4RG013A) and the WLAN testing results are used for simultaneous transmission analysis for this report.	

3.2 Maximum Tune-up Limit

General Note:

1. For each cellular band, the device has 2 antennas (LAT antenna located in the bottom, UAT antenna located in the top edge), the antenna selection is based on the connection quality condition, and only one antenna will transmit at a time.
2. The device has several power modes which are determined by the exposure conditions for head/hotspot/body-worn and also the simultaneous transmission conditions, the detailed implementation of the detection of the use cases and the power table control is illustrated in the operational description exhibit

<WWAN Power table (WLAN off)>

RF Exposure Conditions										
Power Condition	Head Power Level (dBm)					Body Worn / Hotspot Power Level (dBm)				
Transmit Antenna	UAT Antenna					UAT / LAT Antenna				
Channel	55340	55670	55830	56100	56640	55340	55670	55830	56100	56640
LTE 48	20.5	21.5	21.5	21.5	21.5	22.5	23.0	23.0	23.0	22.5
Band	LAT Antenna									
Transmit Antenna	55340	55670	55830	56100	56640					
LTE 48	22.5	23.0	23.0	23.0	22.5					

<WWAN Power table (WLAN on)>

RF Exposure Conditions										
Power Condition	Head Power Level (dBm)					Body Worn / Hotspot Power Level (dBm)				
Transmit Antenna	UAT Antenna					UAT / LAT Antenna				
Channel	55340	55670	55830	56100	56640	55340	55670	55830	56100	56640
LTE 48	20.5	21.0	21.0	21.0	21.0	22.5	23.0	23.0	23.0	22.5
Transmit Antenna	LAT Antenna									
Channel	55340	55670	55830	56100	56640					
LTE 48	22.5	23.0	23.0	23.0	22.5					

3.3 General LTE SAR Test and Reporting Considerations

Summarized necessary items addressed in KDB 941225 D05 v02r05	
FCC ID	A4RG013A
Equipment Name	Phone
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 7: 2502.5 MHz ~ 2567.5 MHz LTE Band 12: 699.7 MHz ~ 715.3 MHz LTE Band 13: 779.5 MHz ~ 784.5 MHz LTE Band 17: 706.5 MHz ~ 713.5 MHz LTE Band 25: 1850.7 MHz ~ 1914.3 MHz LTE Band 26: 814.7 MHz ~ 848.3 MHz LTE Band 30: 2307.5 MHz ~ 2312.5 MHz LTE Band 38: 2572.5 MHz ~ 2617.5 MHz LTE Band 41: 2498.5 MHz ~ 2687.5 MHz LTE Band 48: 3552.5 MHz ~ 3697.5 MHz LTE Band 66: 1710.7 MHz ~ 1779.3 MHz LTE Band 71: 665.5 MHz ~ 695.5 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 17: 5MHz, 10MHz LTE Band 25:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 26:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz LTE Band 30: 5MHz, 10MHz LTE Band 38: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 41: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 48: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 66:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 71: 5MHz, 10MHz, 15MHz, 20MHz
uplink modulations used	QPSK / 16QAM / 64QAM
LTE Voice / Data requirements	Voice and Data
LTE MPR permanently built-in by design	**Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3**
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	The device has several different power modes for head / hotspot / body-worn conditions SAR compliance; power selection is determined by the device's positioning and usage scenarios, the power selection is defined in the section3.2.
LTE Carrier Aggregation Combinations	Inter-Band and Intra-Band possible combinations and the detail power measurement please referred to original report section 10
LTE Carrier Aggregation Additional Information	This device supports maximum of 5 carriers in the downlink. Additional following LTE Release features are not supported: Relay, HetNet, Enhanced MIMO, eICI, WiFi Offloading, MDH, eMBMA, Cross-Carrier Scheduling, Enhanced SC-FDMA.

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

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

Transmission (H, M, L) channel numbers and frequencies in each LTE band												
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)				
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 7												
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)				
L	20775	2502.5	20800	2505	20825	2507.5	20850	2510				
M	21100	2535	21100	2535	21100	2535	21100	2535				
H	21425	2567.5	21400	2565	21375	2562.5	21350	2560				
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)				
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 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 25												
	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	26047	1850.7	26055	1851.5	26065	1852.5	26090	1855	26115	1857.5	26140	1860
M	26340	1880	26340	1880	26340	1880	26340	1880	26340	1880	26340	1880
H	26683	1914.3	26675	1913.5	26665	1912.5	26640	1910	26615	1907.5	26590	1905
LTE Band 26												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz			
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)		
L	26697	814.7	26705	815.5	26715	816.5	26740	819	26765	821.5		
M	26865	831.5	26865	831.5	26865	831.5	26865	831.5	26865	831.5		
H	27033	848.3	27025	847.5	27015	846.5	26990	844	26965	841.5		

Transmission (H, M, L) channel numbers and frequencies in each LTE band												
LTE Band 30												
	Bandwidth 5 MHz						Bandwidth 10 MHz					
	Channel #		Freq.(MHz)				Channel #		Freq.(MHz)			
L	27685		2307.5				27710		2310			
M	27710		2310									
H	27735		2312.5									
LTE Band 38												
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)				
L	37775	2572.5	37800	2575	37825	2577.5	37850	2580				
M	38000	2595	38000	2595	38000	2595	38000	2595				
H	38225	2617.5	38200	2615	38175	2612.5	38150	2610				
LTE Band 41												
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)				
L	39675	2498.5	39700	2501	39725	2503.5	39750	2506				
L M	40148	2545.8	40160	2547	40173	2548.3	40185	2549.5				
M	40620	2593	40620	2593	40620	2593	40620	2593				
H M	41093	2640.3	41080	2639	41068	2637.8	41055	2636.5				
H	41565	2687.5	41540	2685	41515	2682.5	41490	2680				
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
LTE Band 71												
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)				
L	133147	665.5	133172	668	133197	670.5	133222	673				
M	133247	675.5	133272	678	133297	680.5	133322	683				
H	133447	695.5	133422	693	133397	690.5	133372	688				
LTE Band 48												
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)				
L	55265	3552.5	55290	3555	55315	3557.5	55340	3560				
L M	55670	3593	55670	3593	55670	3593	55670	3593				
M	55810	3607	55815	3607.5	55820	3608	55830	3609				
H M	56170	3643	56165	3642.5	56160	3642	56100	3636				
H	56715	3697.5	56690	3695	56665	3692.5	56640	3690				

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:

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

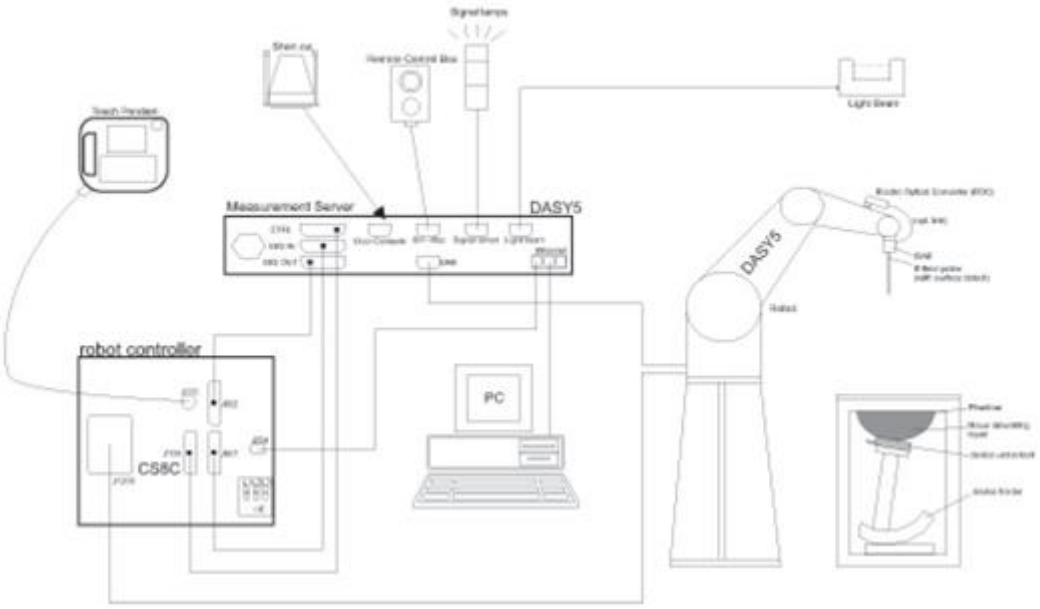
SAR is expressed in units of Watts per kilogram (W/kg)

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

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 µW/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 µW/g – >100 mW/g Linearity: ±0.2 dB (noise: typically <1 µW/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.

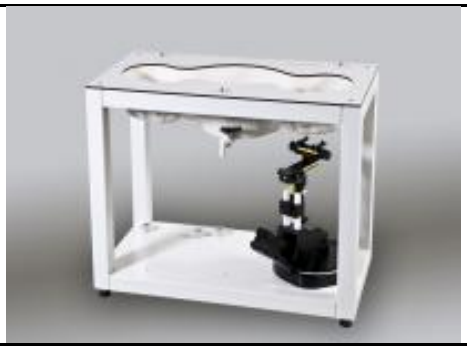
The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Fig 5.1 Photo of DAE

6.3 Phantom

<SAM Twin Phantom>

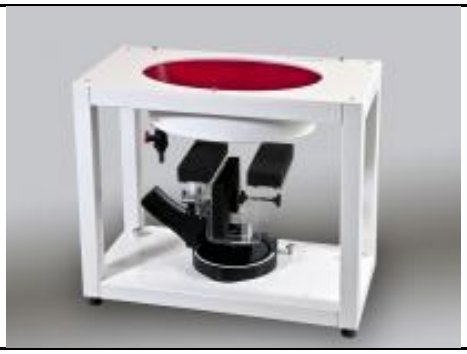
Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet
Measurement Areas	Left Hand, Right Hand, Flat Phantom



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 form 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	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

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: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

* When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

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	3500MHz System Validation Kit	D3500V2	1014	Jan. 22, 2018	Jan. 21, 2019
SPEAG	3700MHz System Validation Kit	D3700V2	1006	Mar. 02, 2018	Mar. 01, 2019
SPEAG	Data Acquisition Electronics	DAE4	1424	Jan. 18, 2018	Jan. 17, 2019
SPEAG	Data Acquisition Electronics	DAE4	917	Dec. 14, 2017	Dec. 13, 2018
SPEAG	Dosimetric E-Field Probe	EX3DV4	3976	Jan. 23, 2018	Jan. 22, 2019
SPEAG	Dosimetric E-Field Probe	EX3DV4	3820	Jun. 26, 2018	Jun. 25, 2019
RCPTWN	Thermometer	HTC-1	TM685-1	Mar. 16, 2018	Mar. 15, 2019
RCPTWN	Thermometer	HTC-1	TM281-1	Mar. 16, 2018	Mar. 15, 2019
Anritsu	Radio Communication Analyzer	MT8821C	6201341950	Apr. 17, 2018	Apr. 16, 2019
Agilent	Wireless Communication Test Set	E5515C	MY48360820	Jan. 15, 2018	Jan. 14, 2019
SPEAG	Device Holder	N/A	N/A	N/A	N/A
Anritsu	Signal Generator	MG3710A	6201502524	Dec. 07, 2017	Dec. 06, 2018
Agilent	ENA Network Analyzer	E5071C	MY46316648	Jan. 17, 2018	Jan. 16, 2019
SPEAG	Dielectric Probe Kit	DAK-3.5	1126	Sep. 26, 2017	Sep. 25, 2018
LINE SEIKI	Digital Thermometer	DTM3000-spezial	3169	Sep. 06, 2017	Sep. 05, 2018
Anritsu	Power Meter	ML2495A	1218006	Oct. 06, 2017	Oct. 05, 2018
Anritsu	Power Sensor	MA2411B	1207363	Oct. 06, 2017	Oct. 05, 2018
Agilent	Spectrum Analyzer	E4408B	MY44211028	Aug. 23, 2017	Aug. 22, 2018
Anritsu	Spectrum Analyzer	MS2830A	6201396378	Jun. 23, 2018	Jun. 22, 2019
Mini-Circuits	Power Amplifier	ZVE-8G+	D120604	Mar. 12, 2018	Mar. 11, 2019
Mini-Circuits	Power Amplifier	ZHL-42W+	QA1344002	Mar. 12, 2018	Mar. 11, 2019
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.

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.

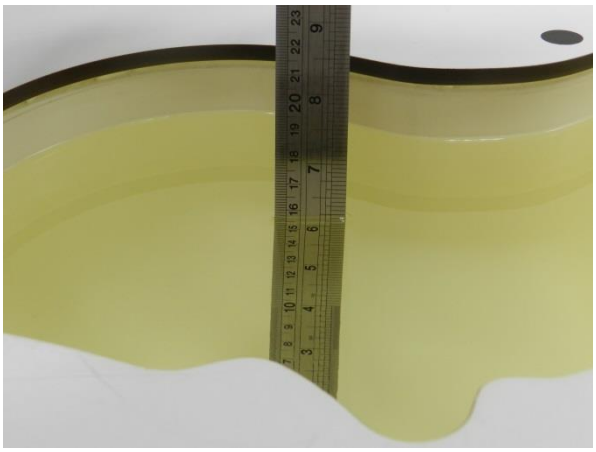


Fig 10.1Photo of Liquid Height for Head SAR

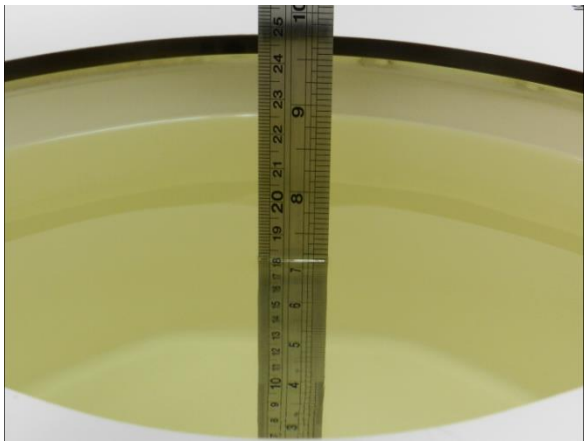


Fig 10.2 Photo of Liquid Height for Body SAR

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 (εr)
For Head								
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
For Body								
750	51.7	47.2	0	0.9	0.1	0	0.96	55.5
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
900	50.8	48.2	0	0.9	0.1	0	1.05	55.0
1800, 1900, 2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0	0	31.4	1.95	52.7
2600	68.1	0	0	0.1	0	31.8	2.16	52.5

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)	Tissue Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
3600	HSL	22.5	2.974	39.309	2.91	37.90	2.20	3.72	±5	2018/8/8
3600	MSL	22.5	3.322	51.023	3.31	51.30	0.36	-0.54	±5	2018/8/7
3600	HSL	22.5	3.218	38.674	3.12	37.70	3.14	2.58	±5	2018/8/8
3600	HSL	22.3	3.201	38.574	3.12	37.70	2.60	2.32	±5	2018/8/11
3600	MSL	22.5	3.722	51.030	3.55	51.00	4.85	0.06	±5	2018/8/7

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)	Tissue Type	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 (%)
2018/8/8	3600	HSL	250	D3500V2-1014	EX3DV4 - SN3820	DAE4 Sn1424	17.20	65.60	68.8	4.88
2018/8/7	3600	MSL	250	D3500V2-1014	EX3DV4 - SN3820	DAE4 Sn917	14.60	63.90	58.4	-8.61
2018/8/8	3600	HSL	250	D3700V2-1006	EX3DV4 - SN3976	DAE4 Sn1424	16.30	69.50	65.2	-6.19
2018/8/11	3600	HSL	250	D3700V2-1006	EX3DV4 - SN3976	DAE4 Sn1424	16.20	69.50	64.8	-6.76
2018/8/7	3600	MSL	250	D3700V2-1006	EX3DV4 - SN3976	DAE4 Sn1424	16.40	64.70	65.6	1.39

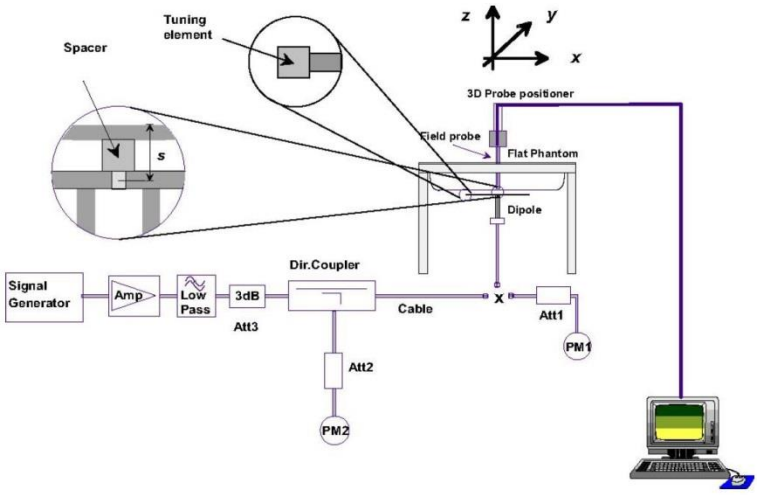


Fig 8.3.1 System Performance Check Setup

Fig 8.3.2 Setup Photo

10. RF Exposure Positions

10.1 Ear and handset reference point

Figure 9.1.1 shows the front, back, and side views of the SAM phantom. The center-of-mouth reference point is labeled “M,” the left ear reference point (ERP) is marked “LE,” and the right ERP is marked “RE.” Each ERP is 15 mm along the B-M (back-mouth) line behind the entrance-to-ear-canal (EEC) point, as shown in Figure 9.1.2 The Reference Plane is defined as passing through the two ear reference points and point M. The line N-F (neck-front), also called the reference pivoting line, is normal to the Reference Plane and perpendicular to both a line passing through RE and LE and the B-M line (see Figure 9.1.3). Both N-F and B-M lines should be marked on the exterior of the phantom shell to facilitate handset positioning. Posterior to the N-F line the ear shape is a flat surface with 6 mm thickness at each ERP, and forward of the N-F line the ear is truncated, as illustrated in Figure 9.1.2. The ear truncation is introduced to preclude the ear lobe from interfering with handset tilt, which could lead to unstable positioning at the cheek.

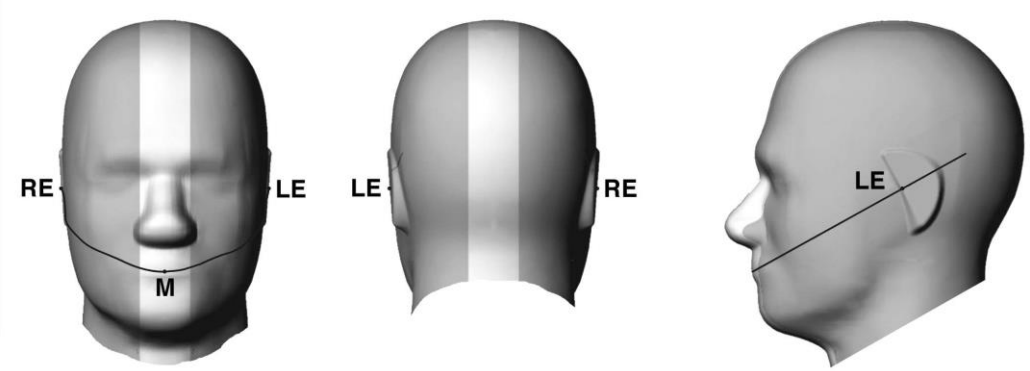


Fig 9.1.1 Front, back, and side views of SAM twin phantom

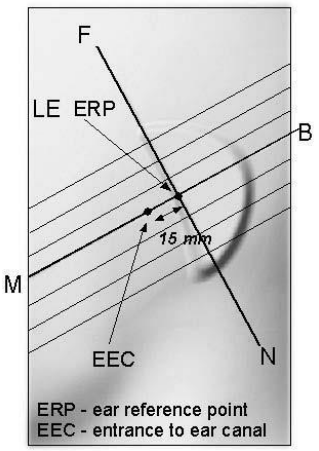


Fig 9.1.2 Close-up side view of phantom showing the ear region.

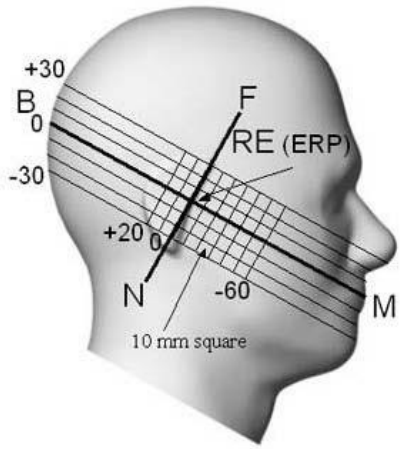


Fig 9.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

10.2 Definition of the cheek position

1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. Define two imaginary lines on the handset—the vertical centerline and the horizontal line. The vertical centerline passes through two points on the front side of the handset—the midpoint of the width wt of the handset at the level of the acoustic output (point A in Figure 9.2.1 and Figure 9.2.2), and the midpoint of the width wb of the bottom of the handset (point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output (see Figure 9.2.1). The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset (see Figure 9.2.2), especially for clamshell handsets, handsets with flip covers, and other irregularly-shaped handsets.
3. Position the handset close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 9.2.3), such that the plane defined by the vertical centerline and the horizontal line of the handset is approximately parallel to the sagittal plane of the phantom.
4. Translate the handset towards the phantom along the line passing through RE and LE until handset point A touches the pinna at the ERP.
5. While maintaining the handset in this plane, rotate it around the LE-RE line until the vertical centerline is in the plane normal to the plane containing B-M and N-F lines, i.e., the Reference Plane.
6. Rotate the handset around the vertical centerline until the handset (horizontal line) is parallel to the N-F line.
7. While maintaining the vertical centerline in the Reference Plane, keeping point A on the line passing through RE and LE, and maintaining the handset contact with the pinna, rotate the handset about the N-F line until any point on the handset is in contact with a phantom point below the pinna on the cheek. See Figure 9.2.3. The actual rotation angles should be documented in the test report.

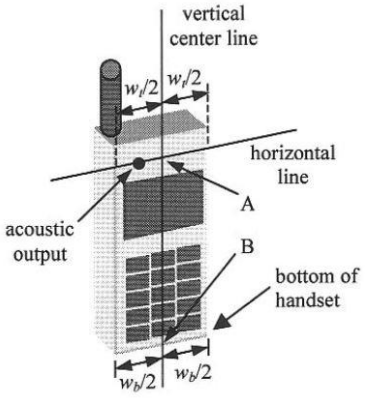


Fig 9.2.1 Handset vertical and horizontal reference lines—"fixed case

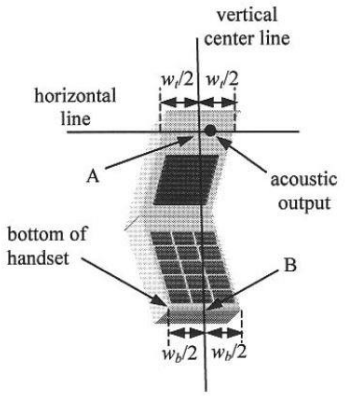


Fig 9.2.2 Handset vertical and horizontal reference lines—"clam-shell case"

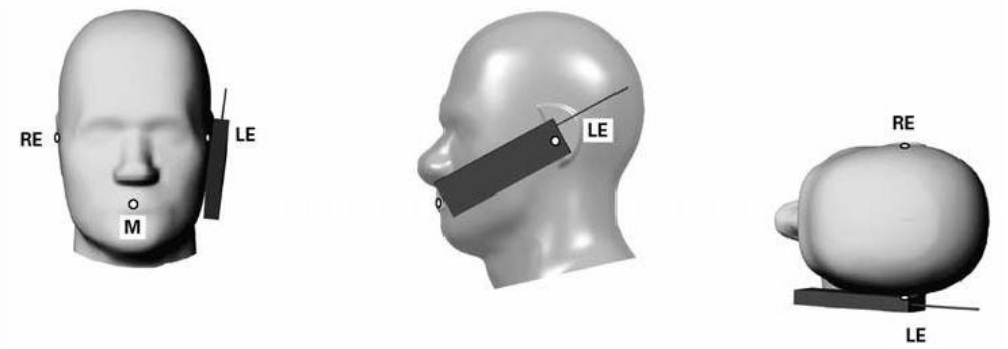


Fig 9.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

10.3 Definition of the tilt position

1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. While maintaining the orientation of the handset, move the handset away from the pinna along the line passing through RE and LE far enough to allow a rotation of the handset away from the cheek by 15°.
3. Rotate the handset around the horizontal line by 15°.
4. While maintaining the orientation of the handset, move the handset towards the phantom on the line passing through RE and LE until any part of the handset touches the ear. The tilt position is obtained when the contact point is on the pinna. See Figure 9.3.1. If contact occurs at any location other than the pinna, e.g., the antenna at the back of the phantom head, the angle of the handset should be reduced. In this case, the tilt position is obtained if any point on the handset is in contact with the pinna and a second point

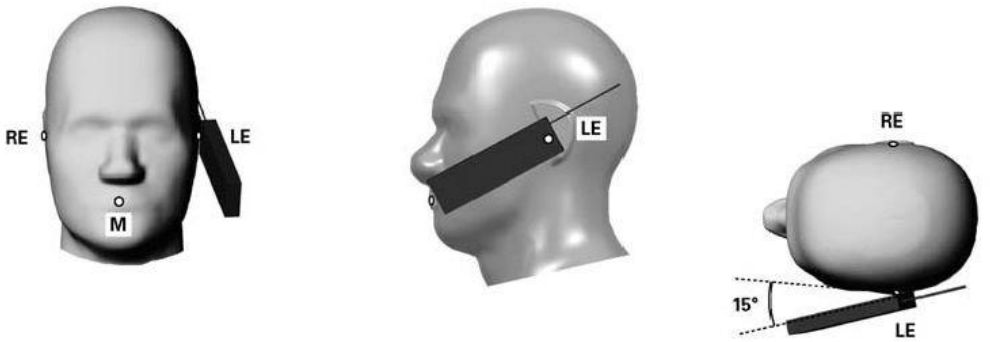


Fig 9.3.1 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.

10.4 Body Worn Accessory

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 9.4). Per KDB648474 D04v01r03, body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB 447498 D01v06 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for body-worn accessory, measured without a headset connected to the handset is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a handset attached to the handset.

Accessories for body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are test with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-chip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

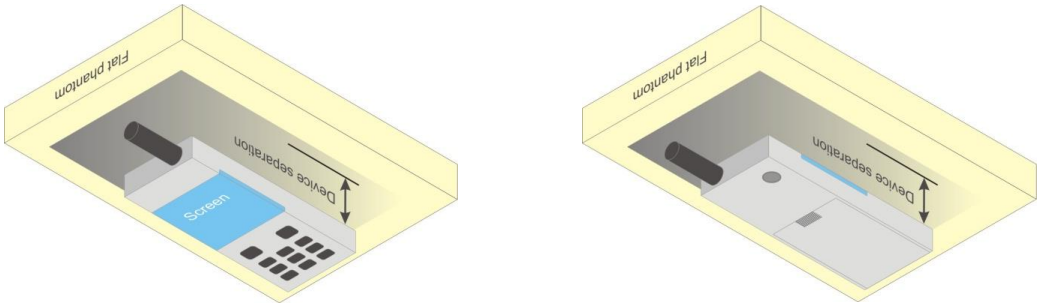


Fig 9.4 Body Worn Position

10.5 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 form 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.

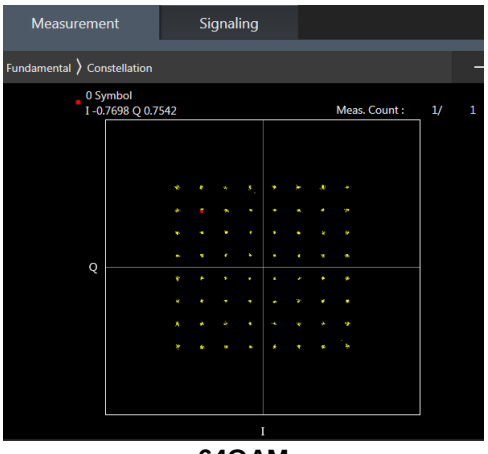
When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for 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. Conducted RF Output Power (Unit: dBm)

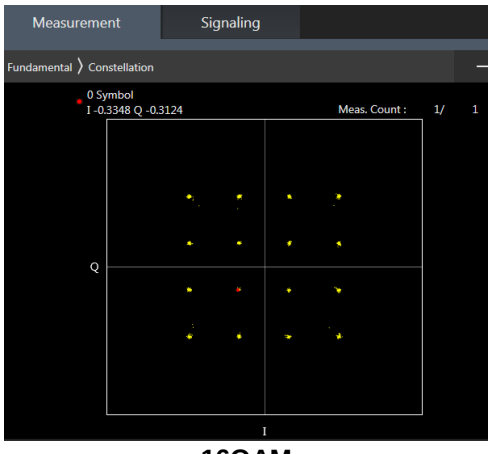
<LTE Conducted Power>

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 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.
7. 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.
8. 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

<TDD LTE SAR Measurement>

TDD LTE configuration setup for SAR measurement

SAR was tested with a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by 3GPP.

a. 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations
b. "special subframe S" contains both uplink and downlink transmissions, it has been taken into consideration to determine the transmission duty factor according to the worst case uplink and downlink cyclic prefix requirements for UpPTS
c. Establishing connections with base station simulators ensure a consistent means for testing SAR and recommended for evaluating SAR. The Anritsu MT8820C (firmware: #22.52#004) was used for LTE output power measurements and SAR testing.

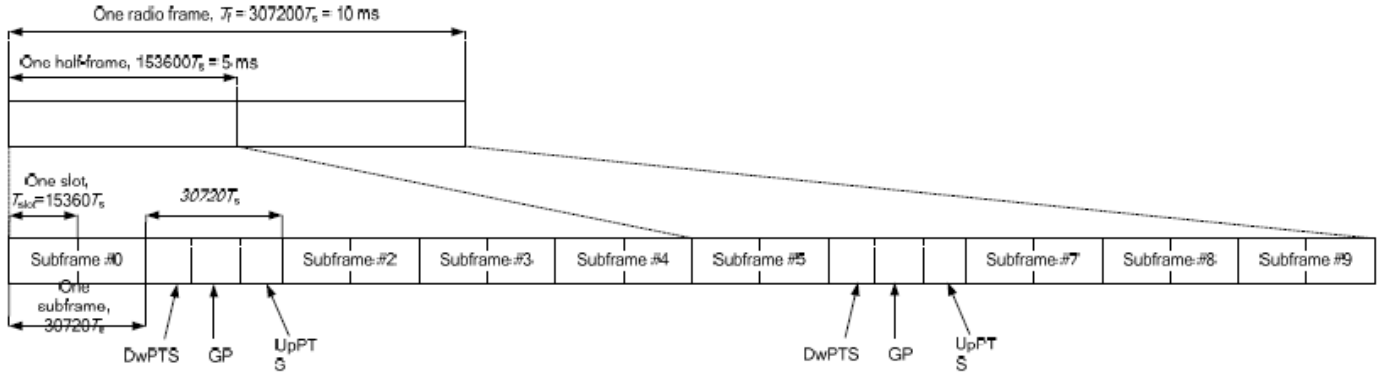


Figure 4.2-1: Frame structure type 2 (for 5 ms switch-point periodicity).

Table 4.2-2: Uplink-downlink configurations.

Uplink-downlink configuration	Downlink-to-Uplink Switch-point periodicity	Subframe number									
		0	1	2	3	4	5	6	7	8	9
0	5 ms	D	S	U	U	U	D	S	U	U	U
1	5 ms	D	S	U	U	D	D	S	U	U	D
2	5 ms	D	S	U	D	D	D	S	U	D	D
3	10 ms	D	S	U	U	U	D	D	D	D	D
4	10 ms	D	S	U	U	D	D	D	D	D	D
5	10 ms	D	S	U	D	D	D	D	D	D	D
6	5 ms	D	S	U	U	U	D	S	U	U	D

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

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	$6592 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$	$7680 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$
1	$19760 \cdot T_s$			$20480 \cdot T_s$		
2	$21952 \cdot T_s$			$23040 \cdot T_s$		
3	$24144 \cdot T_s$			$25600 \cdot T_s$		
4	$26336 \cdot T_s$			$7680 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
5	$6592 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$20480 \cdot T_s$		
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			$12800 \cdot T_s$		
8	$24144 \cdot T_s$			-	-	-
9	$13168 \cdot T_s$			-	-	-

Special subframe (30720·T_s): Normal cyclic prefix in downlink (UpPTS)			
	Special subframe configuration	**Normal cyclic prefix in uplink**	**Extended cyclic prefix in uplink**
Uplink duty factor in one special subframe	**0~4**	7.13%	8.33%
	5~9	14.3%	16.7%

Special subframe(30720·T_s): Extended cyclic prefix in downlink (UpPTS)			
	Special subframe configuration	**Normal cyclic prefix in uplink**	**Extended cyclic prefix in uplink**
Uplink duty factor in one special subframe	**0~3**	7.13%	8.33%
	4~7	14.3%	16.7%

The highest duty factor is resulted from:

i. Uplink-downlink configuration: 0. In a half-frame consisted of 5 subfames, uplink operation is in 3 uplink subframes and 1 special subframe.

ii. special subframe configuration: 5-9 for normal cyclic prefix in downlink, 4-7 for extended cyclic prefix in downlink

iii. for special subframe with extended cyclic prefix in uplink, the total uplink duty factor in one half-frame is: (3+0.167)/5 = 63.3%

iv. for special subframe with normal cyclic prefix in uplink, the total uplink duty factor in one half-frame is: (3+0.143)/5 = 62.9%

v. For TDD LTE SAR measurement, the duty cycle 1:1.59 (62.9 %) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix 63.3%/62.9% = 1.006 is applied to scale-up the measured SAR result. The scaled TDD LTE SAR = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.

<LTE Band 48>

<WiFi off>

Power Selection				Head									
Transmit Antenna				UAT					LAT				
Max. Power				20.5	21.5	21.5	21.5	21.5	22.5	23.0	23.0	23.0	22.5
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Low Middle Ch. / Freq.	Power Middle Ch. / Freq.	Power High Middle Ch. / Freq.	Power High Ch. / Freq.	Power Low Ch. / Freq.	Power Low Middle Ch. / Freq.	Power Middle Ch. / Freq.	Power High Middle Ch. / Freq.	Power High Ch. / Freq.
Channel				55340	55670	55830	56100	56640	55340	55670	55830	56100	56640
Frequency (MHz)				3560	3593	3609	3636	3690	3560	3593	3609	3636	3690
20	QPSK	1	0	20.28	20.99	20.84	21.00	19.97	21.01	22.81	22.87	22.67	21.52
20	QPSK	1	49	19.95	20.63	20.62	20.66	19.59	20.69	22.57	22.55	22.33	21.24
20	QPSK	1	99	20.09	20.63	20.62	20.65	19.56	20.79	22.55	22.52	22.35	21.26
20	QPSK	50	0	19.20	19.87	19.85	19.90	18.83	19.94	21.75	21.80	21.52	20.43
20	QPSK	50	24	19.18	19.75	19.73	19.77	18.70	19.88	21.61	21.65	21.42	20.31
20	QPSK	50	50	19.10	19.72	19.66	19.71	18.58	19.89	21.55	21.55	21.35	20.36
20	QPSK	100	0	19.19	19.76	19.77	19.80	18.50	20.30	21.64	21.65	21.42	20.34
20	16QAM	1	0	19.41	19.98	19.92	20.11	19.11	20.31	21.96	21.99	21.82	20.79
20	16QAM	1	49	19.10	19.75	19.74	19.77	18.73	20.03	21.69	21.66	21.44	20.55
20	16QAM	1	99	19.23	19.73	19.72	19.74	18.68	20.15	21.65	21.61	21.47	20.56
20	16QAM	50	0	18.26	18.96	18.90	18.97	17.90	19.06	20.83	20.86	20.61	19.57
20	16QAM	50	24	18.27	18.85	18.79	18.89	17.77	18.99	20.69	20.73	20.51	19.46
20	16QAM	50	50	18.24	18.76	18.77	18.79	17.70	19.02	20.64	20.66	20.44	19.47
20	16QAM	100	0	18.30	18.84	18.84	18.87	17.80	19.08	20.73	20.76	20.51	19.56
20	64QAM	1	0	19.15	18.62	18.56	18.75	17.72	19.11	20.53	21.69	20.41	19.58
20	64QAM	1	49	18.84	18.37	18.34	18.39	17.55	18.81	20.29	21.41	20.04	19.36
20	64QAM	1	99	18.92	18.38	18.36	18.37	17.50	18.92	20.26	21.36	20.06	19.37
20	64QAM	50	0	18.24	17.95	17.91	17.96	16.92	18.04	19.81	20.82	19.68	18.53
20	64QAM	50	24	18.21	17.83	17.79	17.87	16.77	17.98	19.74	20.69	19.50	18.42
20	64QAM	50	50	18.19	17.76	17.75	17.77	16.68	17.99	19.65	20.61	19.43	18.47
20	64QAM	100	0	18.33	17.86	17.82	17.87	16.80	18.07	19.72	20.77	19.51	18.44
Channel				55315	55670	55820	56160	56665	55315	55670	55820	56160	56665
Frequency (MHz)				3557.5	3593	3608	3642	3692.5	3557.5	3593	3608	3642	3692.5
15	QPSK	1	0	20.23	20.74	20.78	19.92	19.79	20.88	22.81	22.81	21.64	21.54
15	QPSK	1	37	20.00	20.56	20.63	19.62	19.50	20.67	22.64	22.60	21.41	21.34
15	QPSK	1	74	20.11	20.59	20.66	19.63	19.51	20.69	22.62	22.56	21.44	21.36
15	QPSK	36	0	19.11	19.70	19.78	18.74	18.61	19.91	21.75	21.71	20.53	20.46
15	QPSK	36	20	19.03	19.62	19.67	18.65	18.55	19.85	21.69	21.62	20.48	20.49
15	QPSK	36	39	19.06	19.55	19.61	18.58	18.55	19.79	21.60	21.57	20.42	20.41
15	QPSK	75	0	19.14	19.63	19.73	18.67	18.57	19.86	21.69	21.64	20.54	20.39
15	16QAM	1	0	19.33	19.82	19.84	18.99	18.88	20.23	21.92	21.91	20.66	20.79
15	16QAM	1	37	19.13	19.65	19.72	18.72	18.62	19.99	21.75	21.72	20.43	20.61
15	16QAM	1	74	19.20	19.66	19.74	18.70	18.58	20.05	21.73	21.68	20.46	20.59
15	16QAM	36	0	18.15	18.71	18.79	17.78	17.67	18.97	20.79	20.75	19.61	19.52
15	16QAM	36	20	18.07	18.66	18.71	17.71	17.60	18.91	20.74	20.66	19.49	19.51
15	16QAM	36	39	18.12	18.59	18.66	17.64	17.51	18.88	20.62	20.58	19.44	19.46
15	16QAM	75	0	18.25	18.71	18.80	17.78	17.63	18.95	20.72	20.72	19.60	19.45
15	64QAM	1	0	17.97	18.46	18.50	17.64	17.52	19.04	20.44	20.50	19.32	19.62
15	64QAM	1	37	17.71	18.30	18.37	17.35	17.55	18.79	20.27	20.31	19.08	19.44
15	64QAM	1	74	17.82	18.30	18.38	17.34	17.52	18.85	20.24	20.29	19.12	19.39
15	64QAM	36	0	17.20	17.78	17.85	16.84	16.73	17.99	19.72	19.76	18.60	18.56
15	64QAM	36	20	17.13	17.71	17.76	16.77	16.62	17.93	19.63	19.68	18.55	18.57
15	64QAM	36	39	17.18	17.65	17.71	16.68	16.55	17.89	19.57	19.61	18.50	18.49
15	64QAM	75	0	17.27	17.75	17.82	16.80	16.69	17.97	19.67	19.75	18.60	18.46
Channel				55290	55670	55815	56165	56690	55290	55670	55815	56165	56690
Frequency (MHz)				3555	3593	3607.5	3642.5	3695	3555	3593	3607.5	3642.5	3695
10	QPSK	1	0	20.49	20.60	20.67	20.27	19.81	21.68	22.61	22.68	22.12	21.99
10	QPSK	1	25	20.49	20.55	20.62	20.09	19.65	21.56	22.53	22.61	21.92	21.84
10	QPSK	1	49	20.44	20.56	20.64	20.11	19.63	21.54	22.54	22.60	21.94	21.82
10	QPSK	25	0	19.59	19.66	19.73	19.21	18.72	20.68	21.61	21.70	21.05	20.99
10	QPSK	25	12	19.57	19.60	19.69	19.16	18.67	20.66	21.57	21.65	21.00	20.94
10	QPSK	25	25	19.50	19.58	19.64	19.11	18.61	20.52	21.52	21.56	20.99	20.86
10	QPSK	50	0	19.57	19.66	19.72	19.18	18.68	20.66	21.59	21.65	21.02	20.96
10	16QAM	1	0	19.69	19.72	19.79	19.39	18.96	21.01	21.78	21.80	21.26	21.35
10	16QAM	1	25	19.56	19.64	19.72	19.21	18.76	20.81	21.67	21.72	21.04	21.16
10	16QAM	1	49	19.56	19.65	19.72	19.17	18.75	20.85	21.63	21.67	21.08	21.15
10	16QAM	25	0	18.67	18.71	18.80	18.27	17.80	19.74	20.68	20.78	20.13	20.07
10	16QAM	25	12	18.68	18.68	18.74	18.26	17.76	19.71	20.64	20.74	20.09	20.02

10	16QAM	25	25	18.57	18.61	18.72	18.18	17.71	19.69	20.61	20.63	20.04	19.96
10	16QAM	50	0	18.72	18.72	18.78	18.28	17.79	19.73	20.66	20.75	20.10	20.07
10	64QAM	1	0	18.28	18.35	18.43	18.01	17.56	19.76	20.34	20.42	19.81	20.11
10	64QAM	1	25	18.26	18.28	18.36	17.84	17.55	19.63	20.25	20.31	19.66	19.91
10	64QAM	1	49	18.29	18.29	18.37	17.81	17.56	19.71	20.25	20.32	19.69	19.91
10	64QAM	25	0	17.75	17.77	17.83	17.33	16.87	18.79	19.75	19.83	19.17	19.12
10	64QAM	25	12	17.73	17.73	17.81	17.29	16.82	18.75	19.70	19.77	19.13	19.09
10	64QAM	25	25	17.65	17.69	17.76	17.22	16.78	18.73	19.64	19.70	19.08	18.99
10	64QAM	50	0	17.68	17.71	17.78	17.27	16.78	18.77	19.65	19.71	19.10	19.05
Channel				55265	55670	55810	56170	56715	55265	55670	55810	56170	56715
Frequency (MHz)				3552.5	3593	3607	3643	3697.5	3552.5	3593	3607	3643	3697.5
5	QPSK	1	0	20.41	20.62	20.71	20.69	20.05	22.11	22.63	22.71	22.55	22.46
5	QPSK	1	12	20.40	20.53	20.63	20.59	19.93	22.09	22.54	22.62	22.45	22.39
5	QPSK	1	24	20.41	20.54	20.60	20.55	19.93	22.05	22.52	22.59	22.45	22.36
5	QPSK	12	0	19.53	19.61	19.71	19.65	19.05	21.11	21.59	21.63	21.50	21.41
5	QPSK	12	7	19.41	19.59	19.66	19.66	18.99	21.12	21.54	21.63	21.48	21.39
5	QPSK	12	13	19.42	19.58	19.66	19.59	18.98	21.04	21.49	21.62	21.47	21.36
5	QPSK	25	0	19.42	19.59	19.64	19.62	18.97	21.09	21.52	21.59	21.48	21.38
5	16QAM	1	0	19.66	19.73	19.78	19.77	19.14	21.49	21.74	21.84	21.65	21.77
5	16QAM	1	12	19.56	19.63	19.72	19.66	19.04	21.35	21.65	21.73	21.57	21.65
5	16QAM	1	24	19.53	19.67	19.74	19.69	19.07	21.39	21.67	21.73	21.59	21.68
5	16QAM	12	0	18.53	18.62	18.71	18.67	18.05	20.21	20.60	20.68	20.49	20.55
5	16QAM	12	7	18.44	18.62	18.66	18.67	18.02	20.23	20.53	20.65	20.52	20.51
5	16QAM	12	13	18.39	18.56	18.66	18.62	17.98	20.19	20.54	20.59	20.48	20.49
5	16QAM	25	0	18.52	18.65	18.73	18.69	18.07	20.22	20.62	20.69	20.52	20.53
5	64QAM	1	0	18.28	18.37	18.43	18.42	17.78	20.23	20.35	20.42	20.26	20.52
5	64QAM	1	12	18.14	18.27	18.34	18.31	17.66	20.13	20.27	20.33	20.17	20.41
5	64QAM	1	24	18.18	18.30	18.39	18.34	17.70	20.17	20.28	20.36	20.21	20.49
5	64QAM	12	0	17.60	17.71	17.78	17.75	17.14	19.24	19.65	19.74	19.59	19.56
5	64QAM	12	7	17.57	17.70	17.76	17.75	17.11	19.21	19.68	19.75	19.55	19.59
5	64QAM	12	13	17.53	17.66	17.74	17.71	17.09	19.19	19.61	19.70	19.58	19.51
5	64QAM	25	0	17.57	17.71	17.76	17.76	17.11	19.23	19.67	19.76	19.60	19.52

Power Selection				Hotspot / Body-worn									
Transmit Antenna				UAT					LAT				
Max. Power				22.5	23.0	23.0	23.0	22.5	22.5	23.0	23.0	23.0	22.5
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Low Middle Ch. / Freq.	Power Middle Ch. / Freq.	Power High Middle Ch. / Freq.	Power High Ch. / Freq.	Power Low Ch. / Freq.	Power Low Middle Ch. / Freq.	Power Middle Ch. / Freq.	Power High Middle Ch. / Freq.	Power High Ch. / Freq.
Channel				55340	55670	55830	56100	56640	55340	55670	55830	56100	56640
Frequency (MHz)				3560	3593	3609	3636	3690	3560	3593	3609	3636	3690
20	QPSK	1	0	21.01	22.81	22.87	22.67	21.52	21.01	22.81	22.87	22.67	21.52
20	QPSK	1	49	20.69	22.57	22.55	22.33	21.24	20.69	22.57	22.55	22.33	21.24
20	QPSK	1	99	20.79	22.55	22.52	22.35	21.26	20.79	22.55	22.52	22.35	21.26
20	QPSK	50	0	19.94	21.75	21.80	21.52	20.43	19.94	21.75	21.80	21.52	20.43
20	QPSK	50	24	19.88	21.61	21.65	21.42	20.31	19.88	21.61	21.65	21.42	20.31
20	QPSK	50	50	19.89	21.55	21.55	21.35	20.36	19.89	21.55	21.55	21.35	20.36
20	QPSK	100	0	20.30	21.64	21.65	21.42	20.34	20.30	21.64	21.65	21.42	20.34
20	16QAM	1	0	20.31	21.96	21.99	21.82	20.79	20.31	21.96	21.99	21.82	20.79
20	16QAM	1	49	20.03	21.69	21.66	21.44	20.55	20.03	21.69	21.66	21.44	20.55
20	16QAM	1	99	20.15	21.65	21.61	21.47	20.56	20.15	21.65	21.61	21.47	20.56
20	16QAM	50	0	19.06	20.83	20.86	20.61	19.57	19.06	20.83	20.86	20.61	19.57
20	16QAM	50	24	18.99	20.69	20.73	20.51	19.46	18.99	20.69	20.73	20.51	19.46
20	16QAM	50	50	19.02	20.64	20.66	20.44	19.47	19.02	20.64	20.66	20.44	19.47
20	16QAM	100	0	19.08	20.73	20.76	20.51	19.56	19.08	20.73	20.76	20.51	19.56
20	64QAM	1	0	19.11	20.53	21.69	20.41	19.58	19.11	20.53	21.69	20.41	19.58
20	64QAM	1	49	18.81	20.29	21.41	20.04	19.36	18.81	20.29	21.41	20.04	19.36
20	64QAM	1	99	18.92	20.26	21.36	20.06	19.37	18.92	20.26	21.36	20.06	19.37
20	64QAM	50	0	18.04	19.81	20.82	19.68	18.53	18.04	19.81	20.82	19.68	18.53
20	64QAM	50	24	17.98	19.74	20.69	19.50	18.42	17.98	19.74	20.69	19.50	18.42
20	64QAM	50	50	17.99	19.65	20.61	19.43	18.47	17.99	19.65	20.61	19.43	18.47
20	64QAM	100	0	18.07	19.72	20.77	19.51	18.44	18.07	19.72	20.77	19.51	18.44
Channel				55315	55670	55820	56160	56665	55315	55670	55820	56160	56665
Frequency (MHz)				3557.5	3593	3608	3642	3692.5	3557.5	3593	3608	3642	3692.5
15	QPSK	1	0	20.88	22.81	22.81	21.64	21.54	20.88	22.81	22.81	21.64	21.54
15	QPSK	1	37	20.67	22.64	22.60	21.41	21.34	20.67	22.64	22.60	21.41	21.34
15	QPSK	1	74	20.69	22.62	22.56	21.44	21.36	20.69	22.62	22.56	21.44	21.36
15	QPSK	36	0	19.91	21.75	21.71	20.53	20.46	19.91	21.75	21.71	20.53	20.46
15	QPSK	36	20	19.85	21.69	21.62	20.48	20.49	19.85	21.69	21.62	20.48	20.49

15	QPSK	36	39	19.79	21.60	21.57	20.42	20.41	19.79	21.60	21.57	20.42	20.41
15	QPSK	75	0	19.86	21.69	21.64	20.54	20.39	19.86	21.69	21.64	20.54	20.39
15	16QAM	1	0	20.23	21.92	21.91	20.66	20.79	20.23	21.92	21.91	20.66	20.79
15	16QAM	1	37	19.99	21.75	21.72	20.43	20.61	19.99	21.75	21.72	20.43	20.61
15	16QAM	1	74	20.05	21.73	21.68	20.46	20.59	20.05	21.73	21.68	20.46	20.59
15	16QAM	36	0	18.97	20.79	20.75	19.61	19.52	18.97	20.79	20.75	19.61	19.52
15	16QAM	36	20	18.91	20.74	20.66	19.49	19.51	18.91	20.74	20.66	19.49	19.51
15	16QAM	36	39	18.88	20.62	20.58	19.44	19.46	18.88	20.62	20.58	19.44	19.46
15	16QAM	75	0	18.95	20.72	20.72	19.60	19.45	18.95	20.72	20.72	19.60	19.45
15	64QAM	1	0	19.04	20.44	20.50	19.32	19.62	19.04	20.44	20.50	19.32	19.62
15	64QAM	1	37	18.79	20.27	20.31	19.08	19.44	18.79	20.27	20.31	19.08	19.44
15	64QAM	1	74	18.85	20.24	20.29	19.12	19.39	18.85	20.24	20.29	19.12	19.39
15	64QAM	36	0	17.99	19.72	19.76	18.60	18.56	17.99	19.72	19.76	18.60	18.56
15	64QAM	36	20	17.93	19.63	19.68	18.55	18.57	17.93	19.63	19.68	18.55	18.57
15	64QAM	36	39	17.89	19.57	19.61	18.50	18.49	17.89	19.57	19.61	18.50	18.49
15	64QAM	75	0	17.97	19.67	19.75	18.60	18.46	17.97	19.67	19.75	18.60	18.46
Channel				55290	55670	55815	56165	56690	55290	55670	55815	56165	56690
Frequency (MHz)				3555	3593	3607.5	3642.5	3695	3555	3593	3607.5	3642.5	3695
10	QPSK	1	0	21.68	22.61	22.68	22.12	21.99	21.68	22.61	22.68	22.12	21.99
10	QPSK	1	25	21.56	22.53	22.61	21.92	21.84	21.56	22.53	22.61	21.92	21.84
10	QPSK	1	49	21.54	22.54	22.60	21.94	21.82	21.54	22.54	22.60	21.94	21.82
10	QPSK	25	0	20.68	21.61	21.70	21.05	20.99	20.68	21.61	21.70	21.05	20.99
10	QPSK	25	12	20.66	21.57	21.65	21.00	20.94	20.66	21.57	21.65	21.00	20.94
10	QPSK	25	25	20.52	21.52	21.56	20.99	20.86	20.52	21.52	21.56	20.99	20.86
10	QPSK	50	0	20.66	21.59	21.65	21.02	20.96	20.66	21.59	21.65	21.02	20.96
10	16QAM	1	0	21.01	21.78	21.80	21.26	21.35	21.01	21.78	21.80	21.26	21.35
10	16QAM	1	25	20.81	21.67	21.72	21.04	21.16	20.81	21.67	21.72	21.04	21.16
10	16QAM	1	49	20.85	21.63	21.67	21.08	21.15	20.85	21.63	21.67	21.08	21.15
10	16QAM	25	0	19.74	20.68	20.78	20.13	20.07	19.74	20.68	20.78	20.13	20.07
10	16QAM	25	12	19.71	20.64	20.74	20.09	20.02	19.71	20.64	20.74	20.09	20.02
10	16QAM	25	25	19.69	20.61	20.63	20.04	19.96	19.69	20.61	20.63	20.04	19.96
10	16QAM	50	0	19.73	20.66	20.75	20.10	20.07	19.73	20.66	20.75	20.10	20.07
10	64QAM	1	0	19.76	20.34	20.42	19.81	20.11	19.76	20.34	20.42	19.81	20.11
10	64QAM	1	25	19.63	20.25	20.31	19.66	19.91	19.63	20.25	20.31	19.66	19.91
10	64QAM	1	49	19.71	20.25	20.32	19.69	19.91	19.71	20.25	20.32	19.69	19.91
10	64QAM	25	0	18.79	19.75	19.83	19.17	19.12	18.79	19.75	19.83	19.17	19.12
10	64QAM	25	12	18.75	19.70	19.77	19.13	19.09	18.75	19.70	19.77	19.13	19.09
10	64QAM	25	25	18.73	19.64	19.70	19.08	18.99	18.73	19.64	19.70	19.08	18.99
10	64QAM	50	0	18.77	19.65	19.71	19.10	19.05	18.77	19.65	19.71	19.10	19.05
Channel				55265	55670	55810	56170	56715	55265	55670	55810	56170	56715
Frequency (MHz)				3552.5	3593	3607	3643	3697.5	3552.5	3593	3607	3643	3697.5
5	QPSK	1	0	22.11	22.63	22.71	22.55	22.46	22.11	22.63	22.71	22.55	22.46
5	QPSK	1	12	22.09	22.54	22.62	22.45	22.39	22.09	22.54	22.62	22.45	22.39
5	QPSK	1	24	22.05	22.52	22.59	22.45	22.36	22.05	22.52	22.59	22.45	22.36
5	QPSK	12	0	21.11	21.59	21.63	21.50	21.41	21.11	21.59	21.63	21.50	21.41
5	QPSK	12	7	21.12	21.54	21.63	21.48	21.39	21.12	21.54	21.63	21.48	21.39
5	QPSK	12	13	21.04	21.49	21.62	21.47	21.36	21.04	21.49	21.62	21.47	21.36
5	QPSK	25	0	21.09	21.52	21.59	21.48	21.38	21.09	21.52	21.59	21.48	21.38
5	16QAM	1	0	21.49	21.74	21.84	21.65	21.77	21.49	21.74	21.84	21.65	21.77
5	16QAM	1	12	21.35	21.65	21.73	21.57	21.65	21.35	21.65	21.73	21.57	21.65
5	16QAM	1	24	21.39	21.67	21.73	21.59	21.68	21.39	21.67	21.73	21.59	21.68
5	16QAM	12	0	20.21	20.60	20.68	20.49	20.55	20.21	20.60	20.68	20.49	20.55
5	16QAM	12	7	20.23	20.53	20.65	20.52	20.51	20.23	20.53	20.65	20.52	20.51
5	16QAM	12	13	20.19	20.54	20.59	20.48	20.49	20.19	20.54	20.59	20.48	20.49
5	16QAM	25	0	20.22	20.62	20.69	20.52	20.53	20.22	20.62	20.69	20.52	20.53
5	64QAM	1	0	20.23	20.35	20.42	20.26	20.52	20.23	20.35	20.42	20.26	20.52
5	64QAM	1	12	20.13	20.27	20.33	20.17	20.41	20.13	20.27	20.33	20.17	20.41
5	64QAM	1	24	20.17	20.28	20.36	20.21	20.49	20.17	20.28	20.36	20.21	20.49
5	64QAM	12	0	19.24	19.65	19.74	19.59	19.56	19.24	19.65	19.74	19.59	19.56
5	64QAM	12	7	19.21	19.68	19.75	19.55	19.59	19.21	19.68	19.75	19.55	19.59
5	64QAM	12	13	19.19	19.61	19.70	19.58	19.51	19.19	19.61	19.70	19.58	19.51
5	64QAM	25	0	19.23	19.67	19.76	19.60	19.52	19.23	19.67	19.76	19.60	19.52

<Wifi on>

Power Selection				Head									
Transmit Antenna				UAT					LAT				
Max. Power				20.5	21.0	21.0	21.0	21.0	22.5	23.0	23.0	23.0	22.5
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Low Middle Ch. / Freq.	Power Middle Ch. / Freq.	Power High Middle Ch. / Freq.	Power High Ch. / Freq.	Power Low Ch. / Freq.	Power Low Middle Ch. / Freq.	Power Middle Ch. / Freq.	Power High Middle Ch. / Freq.	Power High Ch. / Freq.
Channel				55340	55670	55830	56100	56640	55340	55670	55830	56100	56640
Frequency (MHz)				3560	3593	3609	3636	3690	3560	3593	3609	3636	3690
20	QPSK	1	0	20.28	20.99	20.84	21.00	19.97	21.01	22.81	22.87	22.67	21.52
20	QPSK	1	49	19.95	20.63	20.62	20.66	19.59	20.69	22.57	22.55	22.33	21.24
20	QPSK	1	99	20.09	20.63	20.62	20.65	19.56	20.79	22.55	22.52	22.35	21.26
20	QPSK	50	0	19.20	19.87	19.85	19.90	18.83	19.94	21.75	21.80	21.52	20.43
20	QPSK	50	24	19.18	19.75	19.73	19.77	18.70	19.88	21.61	21.65	21.42	20.31
20	QPSK	50	50	19.10	19.72	19.66	19.71	18.58	19.89	21.55	21.55	21.35	20.36
20	QPSK	100	0	19.19	19.76	19.77	19.80	18.50	20.30	21.64	21.65	21.42	20.34
20	16QAM	1	0	19.41	19.98	19.92	20.00	19.11	20.31	21.96	21.99	21.82	20.79
20	16QAM	1	49	19.10	19.75	19.74	19.77	18.73	20.03	21.69	21.66	21.44	20.55
20	16QAM	1	99	19.23	19.73	19.72	19.74	18.68	20.15	21.65	21.61	21.47	20.56
20	16QAM	50	0	18.26	18.96	18.90	18.97	17.90	19.06	20.83	20.86	20.61	19.57
20	16QAM	50	24	18.27	18.85	18.79	18.89	17.77	18.99	20.69	20.73	20.51	19.46
20	16QAM	50	50	18.24	18.76	18.77	18.79	17.70	19.02	20.64	20.66	20.44	19.47
20	16QAM	100	0	18.30	18.84	18.84	18.87	17.80	19.08	20.73	20.76	20.51	19.56
20	64QAM	1	0	18.45	18.62	18.56	18.75	17.72	19.11	20.53	21.69	20.41	19.58
20	64QAM	1	49	18.14	18.37	18.34	18.39	17.55	18.81	20.29	21.41	20.04	19.36
20	64QAM	1	99	18.22	18.38	18.36	18.37	17.50	18.92	20.26	21.36	20.06	19.37
20	64QAM	50	0	17.50	17.95	17.91	17.96	16.92	18.04	19.81	20.82	19.68	18.53
20	64QAM	50	24	17.48	17.83	17.79	17.87	16.77	17.98	19.74	20.69	19.50	18.42
20	64QAM	50	50	17.40	17.76	17.75	17.77	16.68	17.99	19.65	20.61	19.43	18.47
20	64QAM	100	0	17.47	17.86	17.82	17.87	16.80	18.07	19.72	20.77	19.51	18.44
Channel				55315	55670	55820	56160	56665	55315	55670	55820	56160	56665
Frequency (MHz)				3557.5	3593	3608	3642	3692.5	3557.5	3593	3608	3642	3692.5
15	QPSK	1	0	20.23	20.74	20.78	19.92	19.79	20.88	22.81	22.81	21.64	21.54
15	QPSK	1	37	20.00	20.56	20.63	19.62	19.50	20.67	22.64	22.60	21.41	21.34
15	QPSK	1	74	20.11	20.59	20.66	19.63	19.51	20.69	22.62	22.56	21.44	21.36
15	QPSK	36	0	19.11	19.70	19.78	18.74	18.61	19.91	21.75	21.71	20.53	20.46
15	QPSK	36	20	19.03	19.62	19.67	18.65	18.55	19.85	21.69	21.62	20.48	20.49
15	QPSK	36	39	19.06	19.55	19.61	18.58	18.55	19.79	21.60	21.57	20.42	20.41
15	QPSK	75	0	19.14	19.63	19.73	18.67	18.57	19.86	21.69	21.64	20.54	20.39
15	16QAM	1	0	19.33	19.82	19.84	18.99	18.88	20.23	21.92	21.91	20.66	20.79
15	16QAM	1	37	19.13	19.65	19.72	18.72	18.62	19.99	21.75	21.72	20.43	20.61
15	16QAM	1	74	19.20	19.66	19.74	18.70	18.58	20.05	21.73	21.68	20.46	20.59
15	16QAM	36	0	18.15	18.71	18.79	17.78	17.67	18.97	20.79	20.75	19.61	19.52
15	16QAM	36	20	18.07	18.66	18.71	17.71	17.60	18.91	20.74	20.66	19.49	19.51
15	16QAM	36	39	18.12	18.59	18.66	17.64	17.51	18.88	20.62	20.58	19.44	19.46
15	16QAM	75	0	18.25	18.71	18.80	17.78	17.63	18.95	20.72	20.72	19.60	19.45
15	64QAM	1	0	17.97	18.46	18.50	17.64	17.52	19.04	20.44	20.50	19.32	19.62
15	64QAM	1	37	17.71	18.30	18.37	17.35	17.55	18.79	20.27	20.31	19.08	19.44
15	64QAM	1	74	17.82	18.30	18.38	17.34	17.52	18.85	20.24	20.29	19.12	19.39
15	64QAM	36	0	17.20	17.78	17.85	16.84	16.73	17.99	19.72	19.76	18.60	18.56
15	64QAM	36	20	17.13	17.71	17.76	16.77	16.62	17.93	19.63	19.68	18.55	18.57
15	64QAM	36	39	17.18	17.65	17.71	16.68	16.55	17.89	19.57	19.61	18.50	18.49
15	64QAM	75	0	17.27	17.75	17.82	16.80	16.69	17.97	19.67	19.75	18.60	18.46
Channel				55290	55670	55815	56165	56690	55290	55670	55815	56165	56690
Frequency (MHz)				3555	3593	3607.5	3642.5	3695	3555	3593	3607.5	3642.5	3695
10	QPSK	1	0	20.49	20.60	20.67	20.27	19.81	21.68	22.61	22.68	22.12	21.99
10	QPSK	1	25	20.49	20.55	20.62	20.09	19.65	21.56	22.53	22.61	21.92	21.84
10	QPSK	1	49	20.44	20.56	20.64	20.11	19.63	21.54	22.54	22.60	21.94	21.82
10	QPSK	25	0	19.59	19.66	19.73	19.21	18.72	20.68	21.61	21.70	21.05	20.99
10	QPSK	25	12	19.57	19.60	19.69	19.16	18.67	20.66	21.57	21.65	21.00	20.94
10	QPSK	25	25	19.50	19.58	19.64	19.11	18.61	20.52	21.52	21.56	20.99	20.86
10	QPSK	50	0	19.57	19.66	19.72	19.18	18.68	20.66	21.59	21.65	21.02	20.96
10	16QAM	1	0	19.69	19.72	19.79	19.39	18.96	21.01	21.78	21.80	21.26	21.35
10	16QAM	1	25	19.56	19.64	19.72	19.21	18.76	20.81	21.67	21.72	21.04	21.16
10	16QAM	1	49	19.56	19.65	19.72	19.17	18.75	20.85	21.63	21.67	21.08	21.15
10	16QAM	25	0	18.67	18.71	18.80	18.27	17.80	19.74	20.68	20.78	20.13	20.07
10	16QAM	25	12	18.68	18.68	18.74	18.26	17.76	19.71	20.64	20.74	20.09	20.02
10	16QAM	25	25	18.57	18.61	18.72	18.18	17.71	19.69	20.61	20.63	20.04	19.96
10	16QAM	50	0	18.72	18.72	18.78	18.28	17.79	19.73	20.66	20.75	20.10	20.07

10	64QAM	1	0	18.28	18.35	18.43	18.01	17.56	19.76	20.34	20.42	19.81	20.11
10	64QAM	1	25	18.26	18.28	18.36	17.84	17.55	19.63	20.25	20.31	19.66	19.91
10	64QAM	1	49	18.29	18.29	18.37	17.81	17.56	19.71	20.25	20.32	19.69	19.91
10	64QAM	25	0	17.75	17.77	17.83	17.33	16.87	18.79	19.75	19.83	19.17	19.12
10	64QAM	25	12	17.73	17.73	17.81	17.29	16.82	18.75	19.70	19.77	19.13	19.09
10	64QAM	25	25	17.65	17.69	17.76	17.22	16.78	18.73	19.64	19.70	19.08	18.99
10	64QAM	50	0	17.68	17.71	17.78	17.27	16.78	18.77	19.65	19.71	19.10	19.05
Channel				55265	55670	55810	56170	56715	55265	55670	55810	56170	56715
Frequency (MHz)				3552.5	3593	3607	3643	3697.5	3552.5	3593	3607	3643	3697.5
5	QPSK	1	0	20.41	20.62	20.71	20.69	20.05	22.11	22.63	22.71	22.55	22.46
5	QPSK	1	12	20.40	20.53	20.63	20.59	19.93	22.09	22.54	22.62	22.45	22.39
5	QPSK	1	24	20.41	20.54	20.60	20.55	19.93	22.05	22.52	22.59	22.45	22.36
5	QPSK	12	0	19.53	19.61	19.71	19.65	19.05	21.11	21.59	21.63	21.50	21.41
5	QPSK	12	7	19.41	19.59	19.66	19.66	18.99	21.12	21.54	21.63	21.48	21.39
5	QPSK	12	13	19.42	19.58	19.66	19.59	18.98	21.04	21.49	21.62	21.47	21.36
5	QPSK	25	0	19.42	19.59	19.64	19.62	18.97	21.09	21.52	21.59	21.48	21.38
5	16QAM	1	0	19.66	19.73	19.78	19.77	19.14	21.49	21.74	21.84	21.65	21.77
5	16QAM	1	12	19.56	19.63	19.72	19.66	19.04	21.35	21.65	21.73	21.57	21.65
5	16QAM	1	24	19.53	19.67	19.74	19.69	19.07	21.39	21.67	21.73	21.59	21.68
5	16QAM	12	0	18.53	18.62	18.71	18.67	18.05	20.21	20.60	20.68	20.49	20.55
5	16QAM	12	7	18.44	18.62	18.66	18.67	18.02	20.23	20.53	20.65	20.52	20.51
5	16QAM	12	13	18.39	18.56	18.66	18.62	17.98	20.19	20.54	20.59	20.48	20.49
5	16QAM	25	0	18.52	18.65	18.73	18.69	18.07	20.22	20.62	20.69	20.52	20.53
5	64QAM	1	0	18.28	18.37	18.43	18.42	17.78	20.23	20.35	20.42	20.26	20.52
5	64QAM	1	12	18.14	18.27	18.34	18.31	17.66	20.13	20.27	20.33	20.17	20.41
5	64QAM	1	24	18.18	18.30	18.39	18.34	17.70	20.17	20.28	20.36	20.21	20.49
5	64QAM	12	0	17.60	17.71	17.78	17.75	17.14	19.24	19.65	19.74	19.59	19.56
5	64QAM	12	7	17.57	17.70	17.76	17.75	17.11	19.21	19.68	19.75	19.55	19.59
5	64QAM	12	13	17.53	17.66	17.74	17.71	17.09	19.19	19.61	19.70	19.58	19.51
5	64QAM	25	0	17.57	17.71	17.76	17.76	17.11	19.23	19.67	19.76	19.60	19.52

Power Selection				Hotspot / Body-worn									
Transmit Antenna				UAT					LAT				
Max. Power				22.5	23.0	23.0	23.0	22.5	22.5	23.0	23.0	23.0	22.5
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Low Middle Ch. / Freq.	Power Middle Ch. / Freq.	Power High Middle Ch. / Freq.	Power High Ch. / Freq.	Power Low Ch. / Freq.	Power Low Middle Ch. / Freq.	Power Middle Ch. / Freq.	Power High Middle Ch. / Freq.	Power High Ch. / Freq.
Channel				55340	55670	55830	56100	56640	55340	55670	55830	56100	56640
Frequency (MHz)				3560	3593	3609	3636	3690	3560	3593	3609	3636	3690
20	QPSK	1	0	21.01	22.81	22.87	22.67	21.52	21.01	22.81	22.87	22.67	21.52
20	QPSK	1	49	20.69	22.57	22.55	22.33	21.24	20.69	22.57	22.55	22.33	21.24
20	QPSK	1	99	20.79	22.55	22.52	22.35	21.26	20.79	22.55	22.52	22.35	21.26
20	QPSK	50	0	19.94	21.75	21.80	21.52	20.43	19.94	21.75	21.80	21.52	20.43
20	QPSK	50	24	19.88	21.61	21.65	21.42	20.31	19.88	21.61	21.65	21.42	20.31
20	QPSK	50	50	19.89	21.55	21.55	21.35	20.36	19.89	21.55	21.55	21.35	20.36
20	QPSK	100	0	20.30	21.64	21.65	21.42	20.34	20.30	21.64	21.65	21.42	20.34
20	16QAM	1	0	20.31	21.96	21.99	21.82	20.79	20.31	21.96	21.99	21.82	20.79
20	16QAM	1	49	20.03	21.69	21.66	21.44	20.55	20.03	21.69	21.66	21.44	20.55
20	16QAM	1	99	20.15	21.65	21.61	21.47	20.56	20.15	21.65	21.61	21.47	20.56
20	16QAM	50	0	19.06	20.83	20.86	20.61	19.57	19.06	20.83	20.86	20.61	19.57
20	16QAM	50	24	18.99	20.69	20.73	20.51	19.46	18.99	20.69	20.73	20.51	19.46
20	16QAM	50	50	19.02	20.64	20.66	20.44	19.47	19.02	20.64	20.66	20.44	19.47
20	16QAM	100	0	19.08	20.73	20.76	20.51	19.56	19.08	20.73	20.76	20.51	19.56
20	64QAM	1	0	19.11	20.53	21.69	20.41	19.58	19.11	20.53	21.69	20.41	19.58
20	64QAM	1	49	18.81	20.29	21.41	20.04	19.36	18.81	20.29	21.41	20.04	19.36
20	64QAM	1	99	18.92	20.26	21.36	20.06	19.37	18.92	20.26	21.36	20.06	19.37
20	64QAM	50	0	18.04	19.81	20.82	19.68	18.53	18.04	19.81	20.82	19.68	18.53
20	64QAM	50	24	17.98	19.74	20.69	19.50	18.42	17.98	19.74	20.69	19.50	18.42
20	64QAM	50	50	17.99	19.65	20.61	19.43	18.47	17.99	19.65	20.61	19.43	18.47
20	64QAM	100	0	18.07	19.72	20.77	19.51	18.44	18.07	19.72	20.77	19.51	18.44
Channel				55315	55670	55820	56160	56665	55315	55670	55820	56160	56665
Frequency (MHz)				3557.5	3593	3608	3642	3692.5	3557.5	3593	3608	3642	3692.5
15	QPSK	1	0	20.88	22.81	22.81	21.64	21.54	20.88	22.81	22.81	21.64	21.54
15	QPSK	1	37	20.67	22.64	22.60	21.41	21.34	20.67	22.64	22.60	21.41	21.34
15	QPSK	1	74	20.69	22.62	22.56	21.44	21.36	20.69	22.62	22.56	21.44	21.36
15	QPSK	36	0	19.91	21.75	21.71	20.53	20.46	19.91	21.75	21.71	20.53	20.46
15	QPSK	36	20	19.85	21.69	21.62	20.48	20.49	19.85	21.69	21.62	20.48	20.49
15	QPSK	36	39	19.79	21.60	21.57	20.42	20.41	19.79	21.60	21.57	20.42	20.41
15	QPSK	75	0	19.86	21.69	21.64	20.54	20.39	19.86	21.69	21.64	20.54	20.39

15	16QAM	1	0	20.23	21.92	21.91	20.66	20.79	20.23	21.92	21.91	20.66	20.79
15	16QAM	1	37	19.99	21.75	21.72	20.43	20.61	19.99	21.75	21.72	20.43	20.61
15	16QAM	1	74	20.05	21.73	21.68	20.46	20.59	20.05	21.73	21.68	20.46	20.59
15	16QAM	36	0	18.97	20.79	20.75	19.61	19.52	18.97	20.79	20.75	19.61	19.52
15	16QAM	36	20	18.91	20.74	20.66	19.49	19.51	18.91	20.74	20.66	19.49	19.51
15	16QAM	36	39	18.88	20.62	20.58	19.44	19.46	18.88	20.62	20.58	19.44	19.46
15	16QAM	75	0	18.95	20.72	20.72	19.60	19.45	18.95	20.72	20.72	19.60	19.45
15	64QAM	1	0	19.04	20.44	20.50	19.32	19.62	19.04	20.44	20.50	19.32	19.62
15	64QAM	1	37	18.79	20.27	20.31	19.08	19.44	18.79	20.27	20.31	19.08	19.44
15	64QAM	1	74	18.85	20.24	20.29	19.12	19.39	18.85	20.24	20.29	19.12	19.39
15	64QAM	36	0	17.99	19.72	19.76	18.60	18.56	17.99	19.72	19.76	18.60	18.56
15	64QAM	36	20	17.93	19.63	19.68	18.55	18.57	17.93	19.63	19.68	18.55	18.57
15	64QAM	36	39	17.89	19.57	19.61	18.50	18.49	17.89	19.57	19.61	18.50	18.49
15	64QAM	75	0	17.97	19.67	19.75	18.60	18.46	17.97	19.67	19.75	18.60	18.46
Channel				55290	55670	55815	56165	56690	55290	55670	55815	56165	56690
Frequency (MHz)				3555	3593	3607.5	3642.5	3695	3555	3593	3607.5	3642.5	3695
10	QPSK	1	0	21.68	22.61	22.68	22.12	21.99	21.68	22.61	22.68	22.12	21.99
10	QPSK	1	25	21.56	22.53	22.61	21.92	21.84	21.56	22.53	22.61	21.92	21.84
10	QPSK	1	49	21.54	22.54	22.60	21.94	21.82	21.54	22.54	22.60	21.94	21.82
10	QPSK	25	0	20.68	21.61	21.70	21.05	20.99	20.68	21.61	21.70	21.05	20.99
10	QPSK	25	12	20.66	21.57	21.65	21.00	20.94	20.66	21.57	21.65	21.00	20.94
10	QPSK	25	25	20.52	21.52	21.56	20.99	20.86	20.52	21.52	21.56	20.99	20.86
10	QPSK	50	0	20.66	21.59	21.65	21.02	20.96	20.66	21.59	21.65	21.02	20.96
10	16QAM	1	0	21.01	21.78	21.80	21.26	21.35	21.01	21.78	21.80	21.26	21.35
10	16QAM	1	25	20.81	21.67	21.72	21.04	21.16	20.81	21.67	21.72	21.04	21.16
10	16QAM	1	49	20.85	21.63	21.67	21.08	21.15	20.85	21.63	21.67	21.08	21.15
10	16QAM	25	0	19.74	20.68	20.78	20.13	20.07	19.74	20.68	20.78	20.13	20.07
10	16QAM	25	12	19.71	20.64	20.74	20.09	20.02	19.71	20.64	20.74	20.09	20.02
10	16QAM	25	25	19.69	20.61	20.63	20.04	19.96	19.69	20.61	20.63	20.04	19.96
10	16QAM	50	0	19.73	20.66	20.75	20.10	20.07	19.73	20.66	20.75	20.10	20.07
10	64QAM	1	0	19.76	20.34	20.42	19.81	20.11	19.76	20.34	20.42	19.81	20.11
10	64QAM	1	25	19.63	20.25	20.31	19.66	19.91	19.63	20.25	20.31	19.66	19.91
10	64QAM	1	49	19.71	20.25	20.32	19.69	19.91	19.71	20.25	20.32	19.69	19.91
10	64QAM	25	0	18.79	19.75	19.83	19.17	19.12	18.79	19.75	19.83	19.17	19.12
10	64QAM	25	12	18.75	19.70	19.77	19.13	19.09	18.75	19.70	19.77	19.13	19.09
10	64QAM	25	25	18.73	19.64	19.70	19.08	18.99	18.73	19.64	19.70	19.08	18.99
10	64QAM	50	0	18.77	19.65	19.71	19.10	19.05	18.77	19.65	19.71	19.10	19.05
Channel				55265	55670	55810	56170	56715	55265	55670	55810	56170	56715
Frequency (MHz)				3552.5	3593	3607	3643	3697.5	3552.5	3593	3607	3643	3697.5
5	QPSK	1	0	22.11	22.63	22.71	22.55	22.46	22.11	22.63	22.71	22.55	22.46
5	QPSK	1	12	22.09	22.54	22.62	22.45	22.39	22.09	22.54	22.62	22.45	22.39
5	QPSK	1	24	22.05	22.52	22.59	22.45	22.36	22.05	22.52	22.59	22.45	22.36
5	QPSK	12	0	21.11	21.59	21.63	21.50	21.41	21.11	21.59	21.63	21.50	21.41
5	QPSK	12	7	21.12	21.54	21.63	21.48	21.39	21.12	21.54	21.63	21.48	21.39
5	QPSK	12	13	21.04	21.49	21.62	21.47	21.36	21.04	21.49	21.62	21.47	21.36
5	QPSK	25	0	21.09	21.52	21.59	21.48	21.38	21.09	21.52	21.59	21.48	21.38
5	16QAM	1	0	21.49	21.74	21.84	21.65	21.77	21.49	21.74	21.84	21.65	21.77
5	16QAM	1	12	21.35	21.65	21.73	21.57	21.65	21.35	21.65	21.73	21.57	21.65
5	16QAM	1	24	21.39	21.67	21.73	21.59	21.68	21.39	21.67	21.73	21.59	21.68
5	16QAM	12	0	20.21	20.60	20.68	20.49	20.55	20.21	20.60	20.68	20.49	20.55
5	16QAM	12	7	20.23	20.53	20.65	20.52	20.51	20.23	20.53	20.65	20.52	20.51
5	16QAM	12	13	20.19	20.54	20.59	20.48	20.49	20.19	20.54	20.59	20.48	20.49
5	16QAM	25	0	20.22	20.62	20.69	20.52	20.53	20.22	20.62	20.69	20.52	20.53
5	64QAM	1	0	20.23	20.35	20.42	20.26	20.52	20.23	20.35	20.42	20.26	20.52
5	64QAM	1	12	20.13	20.27	20.33	20.17	20.41	20.13	20.27	20.33	20.17	20.41
5	64QAM	1	24	20.17	20.28	20.36	20.21	20.49	20.17	20.28	20.36	20.21	20.49
5	64QAM	12	0	19.24	19.65	19.74	19.59	19.56	19.24	19.65	19.74	19.59	19.56
5	64QAM	12	7	19.21	19.68	19.75	19.55	19.59	19.21	19.68	19.75	19.55	19.59
5	64QAM	12	13	19.19	19.61	19.70	19.58	19.51	19.19	19.61	19.70	19.58	19.51
5	64QAM	25	0	19.23	19.67	19.76	19.60	19.52	19.23	19.67	19.76	19.60	19.52

12. SAR Test Results

General Note:

1. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. 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.
   b. 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)"
   c. For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
   d. For TDD LTE SAR measurement, the duty cycle 1:1.59 (62.9 %) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix 63.3%/62.9% = 1.006 is applied to scale-up the measured SAR result. The Reported TDD LTE SAR = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.
2. 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
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
4. Per KDB 648474 D04v01r03, when the reported SAR for a body-worn accessory measured without a headset connected to the handset is ≤ 1.2 W/kg, SAR testing with a headset connected to the handset is not required.

LTE Note:

1. 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.
2. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
3. 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.
4. 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.
5. 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.

12.1 Head SAR

<FDD LTE B48>

WiFi on / WiFi off																	
Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	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)
	LTE Band 48_LAT	20M	QPSK	1	0	Right Cheek	0mm	55830	3609	22.87	23.00	1.030	62.9	1.006	-0.18	0.038	0.039
	LTE Band 48_LAT	20M	QPSK	50	0	Right Cheek	0mm	55830	3609	21.80	22.00	1.047	62.9	1.006	0.16	0.029	0.031
	LTE Band 48_LAT	20M	QPSK	1	0	Right Tilted	0mm	55830	3609	22.87	23.00	1.030	62.9	1.006	-0.15	0.041	0.042
	LTE Band 48_LAT	20M	QPSK	50	0	Right Tilted	0mm	55830	3609	21.80	22.00	1.047	62.9	1.006	0.13	0.030	0.032
	LTE Band 48_LAT	20M	QPSK	1	0	Left Cheek	0mm	55830	3609	22.87	23.00	1.030	62.9	1.006	0.15	0.095	0.098
	LTE Band 48_LAT	20M	QPSK	1	0	Left Cheek	0mm	55340	3560	21.01	21.50	1.119	62.9	1.006	0.13	0.058	0.065
	LTE Band 48_LAT	20M	QPSK	1	0	Left Cheek	0mm	55670	3593	22.81	23.00	1.045	62.9	1.006	0.16	0.120	0.126
	LTE Band 48_LAT	20M	QPSK	1	0	Left Cheek	0mm	56100	3636	22.67	23.00	1.079	62.9	1.006	0.13	0.125	0.136
	LTE Band 48_LAT	20M	QPSK	1	0	Left Cheek	0mm	56640	3690	21.52	21.50	0.995	62.9	1.006	0.13	0.097	0.097
	LTE Band 48_LAT	20M	QPSK	50	0	Left Cheek	0mm	55830	3609	21.80	22.00	1.047	62.9	1.006	0.19	0.075	0.079
	LTE Band 48_LAT	20M	QPSK	1	0	Left Tilted	0mm	55830	3609	22.87	23.00	1.030	62.9	1.006	0.12	0.036	0.037
	LTE Band 48_LAT	20M	QPSK	50	0	Left Tilted	0mm	55830	3609	21.80	22.00	1.047	62.9	1.006	0.11	0.026	0.027
WiFi off																	
Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	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)
	LTE Band 48_UAT	20M	QPSK	1	0	Right Cheek	0mm	56100	3636	21.00	21.50	1.122	62.9	1.006	-0.09	0.833	0.940
	LTE Band 48_UAT	20M	QPSK	1	0	Right Cheek	0mm	55340	3560	20.28	20.50	1.052	62.9	1.006	-0.09	0.975	1.032
	LTE Band 48_UAT	20M	QPSK	1	0	Right Cheek	0mm	55670	3593	20.99	21.50	1.125	62.9	1.006	-0.02	1.000	1.131
	LTE Band 48_UAT	20M	QPSK	1	0	Right Cheek	0mm	55830	3609	20.84	21.50	1.164	62.9	1.006	-0.04	0.867	1.015
	LTE Band 48_UAT	20M	QPSK	1	0	Right Cheek	0mm	56640	3690	19.97	21.50	1.422	62.9	1.006	0.01	0.530	0.758
	LTE Band 48_UAT	20M	QPSK	50	0	Right Cheek	0mm	56100	3636	19.90	20.50	1.148	62.9	1.006	0.03	0.665	0.768
	LTE Band 48_UAT	20M	QPSK	50	0	Right Cheek	0mm	55340	3560	19.20	19.50	1.072	62.9	1.006	-0.11	0.736	0.793
	LTE Band 48_UAT	20M	QPSK	50	0	Right Cheek	0mm	55670	3593	19.87	20.50	1.156	62.9	1.006	-0.14	0.803	0.934
	LTE Band 48_UAT	20M	QPSK	50	0	Right Cheek	0mm	55830	3609	19.85	20.50	1.161	62.9	1.006	0.03	0.695	0.812
	LTE Band 48_UAT	20M	QPSK	50	0	Right Cheek	0mm	56640	3690	18.83	20.50	1.469	62.9	1.006	-0.05	0.427	0.631
	LTE Band 48_UAT	20M	QPSK	100	0	Right Cheek	0mm	56100	3636	19.80	20.50	1.175	62.9	1.006	-0.03	0.653	0.772
	LTE Band 48_UAT	20M	QPSK	1	0	Right Tilted	0mm	56100	3636	21.00	21.50	1.122	62.9	1.006	-0.01	1.090	1.230
	LTE Band 48_UAT	20M	QPSK	1	0	Right Tilted	0mm	55340	3560	20.28	20.50	1.052	62.9	1.006	0.02	1.110	1.175
	LTE Band 48_UAT	20M	QPSK	1	0	Right Tilted	0mm	55670	3593	20.99	21.50	1.125	62.9	1.006	0.19	1.160	1.312
01	LTE Band 48_UAT	20M	QPSK	1	0	Right Tilted	0mm	55830	3609	20.84	21.50	1.164	62.9	1.006	0.15	1.130	1.323
	LTE Band 48_UAT	20M	QPSK	1	0	Right Tilted	0mm	56640	3690	19.97	21.50	1.422	62.9	1.006	-0.07	0.600	0.859
	LTE Band 48_UAT	20M	QPSK	50	0	Right Tilted	0mm	56100	3636	19.90	20.50	1.148	62.9	1.006	-0.09	0.751	0.867
	LTE Band 48_UAT	20M	QPSK	50	0	Right Tilted	0mm	55340	3560	19.20	19.50	1.072	62.9	1.006	-0.06	0.831	0.896
	LTE Band 48_UAT	20M	QPSK	50	0	Right Tilted	0mm	55670	3593	19.87	20.50	1.156	62.9	1.006	0.09	0.880	1.023
	LTE Band 48_UAT	20M	QPSK	50	0	Right Tilted	0mm	55830	3609	19.85	20.50	1.161	62.9	1.006	0.05	0.786	0.918
	LTE Band 48_UAT	20M	QPSK	50	0	Right Tilted	0mm	56640	3690	18.83	20.50	1.469	62.9	1.006	0.05	0.489	0.723
	LTE Band 48_UAT	20M	QPSK	100	0	Right Tilted	0mm	56100	3636	19.80	20.50	1.175	62.9	1.006	0.07	0.723	0.855
	LTE Band 48_UAT	20M	QPSK	1	0	Left Cheek	0mm	56100	3636	21.00	21.50	1.122	62.9	1.006	-0.14	0.883	0.997
	LTE Band 48_UAT	20M	QPSK	1	0	Left Cheek	0mm	55340	3560	20.28	20.50	1.052	62.9	1.006	0.03	0.966	1.022
	LTE Band 48_UAT	20M	QPSK	1	0	Left Cheek	0mm	55670	3593	20.99	21.50	1.125	62.9	1.006	0.08	1.000	1.131
	LTE Band 48_UAT	20M	QPSK	1	0	Left Cheek	0mm	55830	3609	20.84	21.50	1.164	62.9	1.006	-0.09	0.887	1.039
	LTE Band 48_UAT	20M	QPSK	1	0	Left Cheek	0mm	56640	3690	19.97	21.50	1.422	62.9	1.006	0.03	0.569	0.814
	LTE Band 48_UAT	20M	QPSK	50	0	Left Cheek	0mm	56100	3636	19.90	20.50	1.148	62.9	1.006	0.01	0.662	0.765
	LTE Band 48_UAT	20M	QPSK	50	0	Left Cheek	0mm	55340	3560	19.20	19.50	1.072	62.9	1.006	-0.06	0.738	0.796
	LTE Band 48_UAT	20M	QPSK	50	0	Left Cheek	0mm	55670	3593	19.87	20.50	1.156	62.9	1.006	0.01	0.857	0.997
	LTE Band 48_UAT	20M	QPSK	50	0	Left Cheek	0mm	55830	3609	19.85	20.50	1.161	62.9	1.006	-0.11	0.713	0.833
	LTE Band 48_UAT	20M	QPSK	50	0	Left Cheek	0mm	56640	3690	18.83	20.50	1.469	62.9	1.006	-0.1	0.401	0.593
	LTE Band 48_UAT	20M	QPSK	100	0	Left Cheek	0mm	56100	3636	19.80	20.50	1.175	62.9	1.006	0.02	0.637	0.753

	LTE Band 48_UAT	20M	QPSK	1	0	Left Tilted	0mm	56100	3636	21.00	21.50	1.122	62.9	1.006	-0.13	0.930	1.050
	LTE Band 48_UAT	20M	QPSK	1	0	Left Tilted	0mm	55340	3560	20.28	20.50	1.052	62.9	1.006	0.11	0.815	0.862
	LTE Band 48_UAT	20M	QPSK	1	0	Left Tilted	0mm	55670	3593	20.99	21.50	1.125	62.9	1.006	0.05	0.950	1.075
	LTE Band 48_UAT	20M	QPSK	1	0	Left Tilted	0mm	55830	3609	20.84	21.50	1.164	62.9	1.006	-0.19	0.890	1.042
	LTE Band 48_UAT	20M	QPSK	1	0	Left Tilted	0mm	56640	3690	19.97	21.50	1.422	62.9	1.006	-0.04	0.524	0.750
	LTE Band 48_UAT	20M	QPSK	50	0	Left Tilted	0mm	56100	3636	19.90	20.50	1.148	62.9	1.006	-0.05	0.632	0.730
	LTE Band 48_UAT	20M	QPSK	50	0	Left Tilted	0mm	55340	3560	19.20	19.50	1.072	62.9	1.006	0.06	0.590	0.636
	LTE Band 48_UAT	20M	QPSK	50	0	Left Tilted	0mm	55670	3593	19.87	20.50	1.156	62.9	1.006	0.09	0.732	0.851
	LTE Band 48_UAT	20M	QPSK	50	0	Left Tilted	0mm	55830	3609	19.85	20.50	1.161	62.9	1.006	-0.14	0.677	0.791
	LTE Band 48_UAT	20M	QPSK	50	0	Left Tilted	0mm	56640	3690	18.83	20.50	1.469	62.9	1.006	-0.09	0.374	0.553
	LTE Band 48_UAT	20M	QPSK	100	0	Left Tilted	0mm	56100	3636	19.80	20.50	1.175	62.9	1.006	0.03	0.606	0.716
WiFi on																	
Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	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)
	LTE Band 48_UAT	20M	QPSK	1	0	Right Cheek	0mm	56100	3636	21.00	21.00	1.000	62.9	1.006	-0.09	0.833	0.838
	LTE Band 48_UAT	20M	QPSK	1	0	Right Cheek	0mm	55340	3560	20.28	20.50	1.052	62.9	1.006	-0.09	0.975	1.032
	LTE Band 48_UAT	20M	QPSK	1	0	Right Cheek	0mm	55670	3593	20.99	21.00	1.002	62.9	1.006	-0.02	1.000	1.008
	LTE Band 48_UAT	20M	QPSK	1	0	Right Cheek	0mm	55830	3609	20.84	21.00	1.038	62.9	1.006	-0.04	0.867	0.905
	LTE Band 48_UAT	20M	QPSK	1	0	Right Cheek	0mm	56640	3690	19.97	21.00	1.268	62.9	1.006	0.01	0.530	0.676
	LTE Band 48_UAT	20M	QPSK	50	0	Right Cheek	0mm	56100	3636	19.90	20.50	1.148	62.9	1.006	0.03	0.665	0.768
	LTE Band 48_UAT	20M	QPSK	50	0	Right Cheek	0mm	55340	3560	19.20	19.50	1.072	62.9	1.006	-0.11	0.736	0.793
	LTE Band 48_UAT	20M	QPSK	50	0	Right Cheek	0mm	55670	3593	19.87	20.50	1.156	62.9	1.006	-0.14	0.803	0.934
	LTE Band 48_UAT	20M	QPSK	50	0	Right Cheek	0mm	55830	3609	19.85	20.50	1.161	62.9	1.006	0.03	0.695	0.812
	LTE Band 48_UAT	20M	QPSK	50	0	Right Cheek	0mm	56640	3690	18.83	20.50	1.469	62.9	1.006	-0.05	0.427	0.631
	LTE Band 48_UAT	20M	QPSK	100	0	Right Cheek	0mm	56100	3636	19.80	20.50	1.175	62.9	1.006	-0.03	0.653	0.772
	LTE Band 48_UAT	20M	QPSK	1	0	Right Tilted	0mm	56100	3636	21.00	21.00	1.000	62.9	1.006	-0.01	1.090	1.097
	LTE Band 48_UAT	20M	QPSK	1	0	Right Tilted	0mm	55340	3560	20.28	20.50	1.052	62.9	1.006	0.02	1.110	1.175
	LTE Band 48_UAT	20M	QPSK	1	0	Right Tilted	0mm	55670	3593	20.99	21.00	1.002	62.9	1.006	0.19	1.160	1.170
	LTE Band 48_UAT	20M	QPSK	1	0	Right Tilted	0mm	55830	3609	20.84	21.00	1.038	62.9	1.006	0.15	1.130	1.179
	LTE Band 48_UAT	20M	QPSK	1	0	Right Tilted	0mm	56640	3690	19.97	21.00	1.268	62.9	1.006	-0.07	0.600	0.765
	LTE Band 48_UAT	20M	QPSK	50	0	Right Tilted	0mm	56100	3636	19.90	20.50	1.148	62.9	1.006	-0.09	0.751	0.867
	LTE Band 48_UAT	20M	QPSK	50	0	Right Tilted	0mm	55340	3560	19.20	19.50	1.072	62.9	1.006	-0.06	0.831	0.896
	LTE Band 48_UAT	20M	QPSK	50	0	Right Tilted	0mm	55670	3593	19.87	20.50	1.156	62.9	1.006	0.09	0.880	1.023
	LTE Band 48_UAT	20M	QPSK	50	0	Right Tilted	0mm	55830	3609	19.85	20.50	1.161	62.9	1.006	0.05	0.786	0.918
	LTE Band 48_UAT	20M	QPSK	50	0	Right Tilted	0mm	56640	3690	18.83	20.50	1.469	62.9	1.006	0.05	0.489	0.723
	LTE Band 48_UAT	20M	QPSK	100	0	Right Tilted	0mm	56100	3636	19.80	20.50	1.175	62.9	1.006	0.07	0.723	0.855
	LTE Band 48_UAT	20M	QPSK	1	0	Left Cheek	0mm	56100	3636	21.00	21.00	1.000	62.9	1.006	-0.14	0.883	0.888
	LTE Band 48_UAT	20M	QPSK	1	0	Left Cheek	0mm	55340	3560	20.28	20.50	1.052	62.9	1.006	0.03	0.966	1.022
	LTE Band 48_UAT	20M	QPSK	1	0	Left Cheek	0mm	55670	3593	20.99	21.00	1.002	62.9	1.006	0.08	1.000	1.008
	LTE Band 48_UAT	20M	QPSK	1	0	Left Cheek	0mm	55830	3609	20.84	21.00	1.038	62.9	1.006	-0.09	0.887	0.926
	LTE Band 48_UAT	20M	QPSK	1	0	Left Cheek	0mm	56640	3690	19.97	21.00	1.268	62.9	1.006	0.03	0.569	0.726
	LTE Band 48_UAT	20M	QPSK	50	0	Left Cheek	0mm	56100	3636	19.90	20.50	1.148	62.9	1.006	0.01	0.662	0.765
	LTE Band 48_UAT	20M	QPSK	50	0	Left Cheek	0mm	55340	3560	19.20	19.50	1.072	62.9	1.006	-0.06	0.738	0.796
	LTE Band 48_UAT	20M	QPSK	50	0	Left Cheek	0mm	55670	3593	19.87	20.50	1.156	62.9	1.006	0.01	0.857	0.997
	LTE Band 48_UAT	20M	QPSK	50	0	Left Cheek	0mm	55830	3609	19.85	20.50	1.161	62.9	1.006	-0.11	0.713	0.833
	LTE Band 48_UAT	20M	QPSK	50	0	Left Cheek	0mm	56640	3690	18.83	20.50	1.469	62.9	1.006	-0.1	0.401	0.593
	LTE Band 48_UAT	20M	QPSK	100	0	Left Cheek	0mm	56100	3636	19.80	20.50	1.175	62.9	1.006	0.02	0.637	0.753
	LTE Band 48_UAT	20M	QPSK	1	0	Left Tilted	0mm	56100	3636	21.00	21.00	1.000	62.9	1.006	-0.13	0.930	0.936
	LTE Band 48_UAT	20M	QPSK	1	0	Left Tilted	0mm	55340	3560	20.28	20.50	1.052	62.9	1.006	0.11	0.815	0.862
	LTE Band 48_UAT	20M	QPSK	1	0	Left Tilted	0mm	55670	3593	20.99	21.00	1.002	62.9	1.006	0.05	0.950	0.958
	LTE Band 48_UAT	20M	QPSK	1	0	Left Tilted	0mm	55830	3609	20.84	21.00	1.038	62.9	1.006	-0.19	0.890	0.929
	LTE Band 48_UAT	20M	QPSK	1	0	Left Tilted	0mm	56640	3690	19.97	21.00	1.268	62.9	1.006	-0.04	0.524	0.668
	LTE Band 48_UAT	20M	QPSK	50	0	Left Tilted	0mm	56100	3636	19.90	20.50	1.148	62.9	1.006	-0.05	0.632	0.730
	LTE Band 48_UAT	20M	QPSK	50	0	Left Tilted	0mm	55340	3560	19.20	19.50	1.072	62.9	1.006	0.06	0.590	0.636
	LTE Band 48_UAT	20M	QPSK	50	0	Left Tilted	0mm	55670	3593	19.87	20.50	1.156	62.9	1.006	0.09	0.732	0.851

	LTE Band 48_UAT	20M	QPSK	50	0	Left Tilted	0mm	55830	3609	19.85	20.50	1.161	62.9	1.006	-0.14	0.677	0.791
	LTE Band 48_UAT	20M	QPSK	50	0	Left Tilted	0mm	56640	3690	18.83	20.50	1.469	62.9	1.006	-0.09	0.374	0.553
	LTE Band 48_UAT	20M	QPSK	100	0	Left Tilted	0mm	56100	3636	19.80	20.50	1.175	62.9	1.006	0.03	0.606	0.716

12.2 Hotspot SAR

<FDD LTE B48>

WiFi on / WiFi off																	
Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	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)
	LTE Band 48_LAT	20M	QPSK	1	0	Front	10mm	55830	3609	22.87	23.00	1.030	62.9	1.006	0.03	0.156	0.162
	LTE Band 48_LAT	20M	QPSK	1	0	Front	10mm	55340	3560	21.01	22.50	1.409	62.9	1.006	0.03	0.051	0.072
	LTE Band 48_LAT	20M	QPSK	1	0	Front	10mm	56640	3690	21.52	22.50	1.253	62.9	1.006	0.04	0.098	0.124
	LTE Band 48_LAT	20M	QPSK	1	0	Front	10mm	55670	3593	22.81	23.00	1.045	62.9	1.006	-0.07	0.137	0.144
	LTE Band 48_LAT	20M	QPSK	1	0	Front	10mm	56100	3636	22.67	23.00	1.079	62.9	1.006	0.17	0.148	0.161
	LTE Band 48_LAT	20M	QPSK	50	0	Front	10mm	55830	3609	21.80	22.00	1.047	62.9	1.006	0.01	0.122	0.129
	LTE Band 48_LAT	20M	QPSK	1	0	Back	10mm	55830	3609	22.87	23.00	1.030	62.9	1.006	0.01	0.130	0.135
	LTE Band 48_LAT	20M	QPSK	50	0	Back	10mm	55830	3609	21.80	22.00	1.047	62.9	1.006	-0.19	0.103	0.109
	LTE Band 48_LAT	20M	QPSK	1	0	Left Side	10mm	55830	3609	22.87	23.00	1.030	62.9	1.006	0.16	0.029	0.030
	LTE Band 48_LAT	20M	QPSK	50	0	Left Side	10mm	55830	3609	21.80	22.00	1.047	62.9	1.006	-0.18	0.020	0.021
	LTE Band 48_LAT	20M	QPSK	1	0	Right Side	10mm	55830	3609	22.87	23.00	1.030	62.9	1.006	-0.11	0.004	0.004
	LTE Band 48_LAT	20M	QPSK	50	0	Right Side	10mm	55830	3609	21.80	22.00	1.047	62.9	1.006	-0.15	0.004	0.004
	LTE Band 48_LAT	20M	QPSK	1	0	Bottom Side	10mm	55830	3609	22.87	23.00	1.030	62.9	1.006	0.01	0.120	0.124
	LTE Band 48_LAT	20M	QPSK	50	0	Bottom Side	10mm	55830	3609	21.80	22.00	1.047	62.9	1.006	-0.06	0.090	0.095
	LTE Band 48_UAT	20M	QPSK	1	0	Front	10mm	55830	3609	22.87	23.00	1.030	62.9	1.006	-0.04	0.299	0.310
	LTE Band 48_UAT	20M	QPSK	50	0	Front	10mm	55830	3609	21.80	22.00	1.047	62.9	1.006	0.09	0.234	0.246
	LTE Band 48_UAT	20M	QPSK	1	0	Back	10mm	55830	3609	22.87	23.00	1.030	62.9	1.006	0.05	0.373	0.387
	LTE Band 48_UAT	20M	QPSK	1	0	Back	10mm	55340	3560	21.01	22.50	1.409	62.9	1.006	-0.13	0.183	0.259
	LTE Band 48_UAT	20M	QPSK	1	0	Back	10mm	55670	3593	22.81	23.00	1.045	62.9	1.006	0.07	0.330	0.347
	LTE Band 48_UAT	20M	QPSK	1	0	Back	10mm	56100	3636	22.67	23.00	1.079	62.9	1.006	0.06	0.338	0.367
	LTE Band 48_UAT	20M	QPSK	1	0	Back	10mm	56640	3690	21.52	22.50	1.253	62.9	1.006	0.06	0.241	0.304
	LTE Band 48_UAT	20M	QPSK	50	0	Back	10mm	55830	3609	21.80	22.00	1.047	62.9	1.006	-0.01	0.289	0.304
	LTE Band 48_UAT	20M	QPSK	1	0	Left Side	10mm	55830	3609	22.87	23.00	1.030	62.9	1.006	-0.18	0.005	0.005
	LTE Band 48_UAT	20M	QPSK	50	0	Left Side	10mm	55830	3609	21.80	22.00	1.047	62.9	1.006	-0.15	0.003	0.003
	LTE Band 48_UAT	20M	QPSK	1	0	Right Side	10mm	55830	3609	22.87	23.00	1.030	62.9	1.006	0.14	0.028	0.029
	LTE Band 48_UAT	20M	QPSK	50	0	Right Side	10mm	55830	3609	21.80	22.00	1.047	62.9	1.006	-0.16	0.027	0.028
	LTE Band 48_UAT	20M	QPSK	1	0	Top Side	10mm	55830	3609	22.87	23.00	1.030	62.9	1.006	0.13	0.646	0.670
	LTE Band 48_UAT	20M	QPSK	1	0	Top Side	10mm	55340	3560	21.01	22.50	1.409	62.9	1.006	-0.12	0.368	0.522
02	LTE Band 48_UAT	20M	QPSK	1	0	Top Side	10mm	55670	3593	22.81	23.00	1.045	62.9	1.006	0.11	0.688	0.723
	LTE Band 48_UAT	20M	QPSK	1	0	Top Side	10mm	56100	3636	22.67	23.00	1.079	62.9	1.006	0.16	0.643	0.698
	LTE Band 48_UAT	20M	QPSK	1	0	Top Side	10mm	56640	3690	21.52	22.50	1.253	62.9	1.006	-0.17	0.403	0.508
	LTE Band 48_UAT	20M	QPSK	50	0	Top Side	10mm	55830	3609	21.80	22.00	1.047	62.9	1.006	-0.19	0.509	0.536

12.3 Body Worn Accessory SAR

<FDD LTE B48>

WiFi on / WiFi off																	
Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	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)
	LTE Band 48_LAT	20M	QPSK	1	0	Front	10mm	55830	3609	22.87	23.00	1.030	62.9	1.006	0.03	0.156	0.162
	LTE Band 48_LAT	20M	QPSK	1	0	Front	10mm	55340	3560	21.01	22.50	1.409	62.9	1.006	0.03	0.051	0.072
	LTE Band 48_LAT	20M	QPSK	1	0	Front	10mm	56640	3690	21.52	22.50	1.253	62.9	1.006	0.04	0.098	0.124
	LTE Band 48_LAT	20M	QPSK	1	0	Front	10mm	55670	3593	22.81	23.00	1.045	62.9	1.006	-0.07	0.137	0.144
	LTE Band 48_LAT	20M	QPSK	1	0	Front	10mm	56100	3636	22.67	23.00	1.079	62.9	1.006	0.17	0.148	0.161
	LTE Band 48_LAT	20M	QPSK	50	0	Front	10mm	55830	3609	21.80	22.00	1.047	62.9	1.006	0.01	0.122	0.129
	LTE Band 48_LAT	20M	QPSK	1	0	Back	10mm	55830	3609	22.87	23.00	1.030	62.9	1.006	0.01	0.130	0.135
	LTE Band 48_LAT	20M	QPSK	50	0	Back	10mm	55830	3609	21.80	22.00	1.047	62.9	1.006	-0.19	0.103	0.109
	LTE Band 48_UAT	20M	QPSK	1	0	Front	10mm	55830	3609	22.87	23.00	1.030	62.9	1.006	-0.04	0.299	0.310
	LTE Band 48_UAT	20M	QPSK	50	0	Front	10mm	55830	3609	21.80	22.00	1.047	62.9	1.006	0.09	0.234	0.246
03	LTE Band 48_UAT	20M	QPSK	1	0	Back	10mm	55830	3609	22.87	23.00	1.030	62.9	1.006	0.05	0.373	0.387
	LTE Band 48_UAT	20M	QPSK	1	0	Back	10mm	55340	3560	21.01	22.50	1.409	62.9	1.006	-0.13	0.183	0.259
	LTE Band 48_UAT	20M	QPSK	1	0	Back	10mm	55670	3593	22.81	23.00	1.045	62.9	1.006	0.07	0.330	0.347
	LTE Band 48_UAT	20M	QPSK	1	0	Back	10mm	56100	3636	22.67	23.00	1.079	62.9	1.006	0.06	0.338	0.367
	LTE Band 48_UAT	20M	QPSK	1	0	Back	10mm	56640	3690	21.52	22.50	1.253	62.9	1.006	0.06	0.241	0.304
	LTE Band 48_UAT	20M	QPSK	50	0	Back	10mm	55830	3609	21.80	22.00	1.047	62.9	1.006	-0.01	0.289	0.304

12.4 Repeated SAR Measurement

No.	Band	BW (MHz)	Modulation	RB Size	RB offset	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)	Ratio	Reported 1g SAR (W/kg)
1st	LTE Band 48_UAT	20M	QPSK	1	0	Right Tilted	0mm	55670	3593	20.99	21.50	1.125	62.9	1.006	0.19	1.160	-	1.312
2nd	LTE Band 48_UAT	20M	QPSK	1	0	Right Tilted	0mm	55670	3593	20.99	21.50	1.125	62.9	1.006	0.01	1.100	1.05	1.244

General Note:

1. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
2. Per KDB 865664 D01v01r04, if the ratio among the repeated measurement is ≤ 1.2 and the measured SAR <1.45W/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.

13. Simultaneous Transmission Analysis

RF Exposure Conditions	Item	Simultaneous Transmission Configurations		Remark
Head / Body-worn / Hotspot	1	WWAN off (Cellular off)	(Ant 5)WIFI 5G SISO +(Ant 4) Bluetooth	
	2		(Ant 6)WIFI 5G SISO+(Ant 4) Bluetooth	
	3		WIFI 5G MIMO+(Ant 4) Bluetooth	
	4		(Ant 5)WIFI 5G SISO	
	5		(Ant 6)WIFI 5G SISO	
	6		WIFI 5G MIMO	
	7		(Ant 4) WIFI 2.4G SISO	
	8		(Ant 5) WIFI 2.4G SISO +(Ant 4) Bluetooth	
	9		WIFI 2.4G MIMO	
	10		(Ant 5) WIFI 5G SISO+(Ant 4) WIFI 2.4G SISO	
	11	WWAN on (Cellular on)	+(Ant 5) WIFI 5G SISO +(Ant 4) Bluetooth	
	12		+(Ant 6) WIFI 5G SISO+(Ant 4) Bluetooth	
	13		+WIFI 5G MIMO+(Ant 4) Bluetooth	
	14		+(Ant 5) WIFI 5G SISO	
	15		+(Ant 6) WIFI 5G SISO	
	16		+WIFI 5G MIMO	
	17		+(Ant 4) WIFI 2.4G SISO	
	18		+(Ant 5) WIFI 2.4G SISO +(Ant 4) Bluetooth	
	19		+WIFI 2.4G MIMO	
	20		+(Ant 5) WIFI 5G SISO+ (Ant 4) WIFI 2.4G SISO	
	21		+(Ant 4) Bluetooth	

General Note:

1. This is a variant report to add LTE B48 SAR test, the other frequency test records please refer to Sporton SAR Test Report, Report No. FA820225-02 (FCC ID: A4RG013A) and the WLAN testing results are used for simultaneous transmission analysis for this report.
2. This device WLAN 2.4GHz / 5.2GHz / 5.8GHz supports Hotspot operation and Bluetooth support tethering applications.
3. The worst case WLAN reported SAR for each configuration was used for SAR summation, regardless of whether the WLAN channel has WiFi Direct and Hotspot capability. Therefore, the following summations represent the absolute worst cases for simultaneous transmission with WLAN.
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 / (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 ≤ 0.04 for 1g SAR, if SPLSR < 0.1 for 10g SAR, simultaneously transmission SAR measurement is not necessary.
   iv) Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg.
   v) For each cellular band, the device has 2 antennas (LAT antenna located in the bottom, UAT antenna located in the top edge), the antenna selection is based on the connection quality condition, and only one antenna will transmit at a time. The device has several power modes which are determined by the exposure conditions for head/hotspot/body-worn and also the simultaneous transmission conditions, the detailed implementation of the detection of the use cases and the power table control is illustrated in the operational description exhibit

13.1 Head Exposure Conditions

<WWAN on with WiFi on and Bluetooth Power >

WWAN Band	Exposure Position	1	2	3	4	5	6	7	8	1+5+6 Summed 1g SAR (W/kg)	1+4+6 Summed 1g SAR (W/kg)	1+6+8 Summed 1g SAR (W/kg)	1+4 Summed 1g SAR (W/kg)	1+5 Summed 1g SAR (W/kg)	1+8 Summed 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)	1+3+6 Summed 1g SAR (W/kg)	1+7 Summed 1g SAR (W/kg)	1+2+5 Summed 1g SAR (W/kg)	1+6 Summed 1g SAR (W/kg)
		WWAN	2.4GHz WLAN Ant 4	2.4GHz WLAN Ant 5	5GHz WLAN Ant 6	5GHz WLAN Ant 5	Bluetooth Ant 4	2.4GHz WLAN Ant 4+5	5GHz WLAN Ant 6+5											
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)											
LTE Band 48_UAT	Right Cheek	1.032	0.066	0.096	0.321	0.040	0.054	0.157	0.302	**1.126**	**1.407**	**1.388**	**1.353**	**1.072**	**1.334**	**1.098**	**1.182**	**1.189**	**1.138**	**1.086**
	Right Tilted	1.179	0.069	0.043	0.319	0.011	0.055	0.160	0.342	**1.245**	**1.553**	**1.576**	**1.498**	**1.190**	**1.521**	**1.248**	**1.277**	**1.339**	**1.259**	**1.234**
	Left Cheek	1.022	0.165	0.367	0.362	0.186	0.122	0.376	0.380	**1.330**	**1.506**	**1.524**	**1.384**	**1.208**	**1.402**	**1.187**	**1.511**	**1.398**	**1.373**	**1.144**
	Left Tilted	0.958	0.187	0.068	0.371	0.032	0.225	0.418	0.361	**1.215**	**1.554**	**1.544**	**1.329**	**0.990**	**1.319**	**1.145**	**1.251**	**1.376**	**1.177**	**1.183**
LTE Band 48_LAT	Right Cheek	0.039	0.066	0.096	0.321	0.040	0.054	0.157	0.302	**0.133**	**0.414**	**0.395**	**0.360**	**0.079**	**0.341**	**0.105**	**0.189**	**0.196**	**0.145**	**0.093**
	Right Tilted	0.042	0.069	0.043	0.319	0.011	0.055	0.160	0.342	**0.108**	**0.416**	**0.439**	**0.361**	**0.053**	**0.384**	**0.111**	**0.140**	**0.202**	**0.122**	**0.097**
	Left Cheek	0.136	0.165	0.367	0.362	0.186	0.122	0.376	0.380	**0.444**	**0.620**	**0.638**	**0.498**	**0.322**	**0.516**	**0.301**	**0.625**	**0.512**	**0.487**	**0.258**
	Left Tilted	0.037	0.187	0.068	0.371	0.032	0.225	0.418	0.361	**0.294**	**0.633**	**0.623**	**0.408**	**0.069**	**0.398**	**0.224**	**0.330**	**0.455**	**0.256**	**0.262**

<Bluetooth Power with WiFi off>

WWAN Band	Exposure Position	1	6	1+6 Summed 1g SAR (W/kg)
		WWAN	Bluetooth Ant 4	
		1g SAR (W/kg)	1g SAR (W/kg)	
LTE Band 48_UAT	Right Cheek	1.131	0.054	**1.185**
	Right Tilted	1.323	0.055	**1.378**
	Left Cheek	1.131	0.122	**1.253**
	Left Tilted	1.075	0.225	**1.300**
LTE Band 48_LAT	Right Cheek	0.039	0.054	**0.093**
	Right Tilted	0.042	0.055	**0.097**
	Left Cheek	0.136	0.122	**0.258**
	Left Tilted	0.037	0.225	**0.262**

13.2 Hotspot Exposure Conditions

<WWAN on with WiFi on and Bluetooth Power >

WWAN Band	Exposure Position	1	2	3	4	5	6	7	8	1+5+6 Summed 1g SAR (W/kg)	1+4+6 Summed 1g SAR (W/kg)	1+6+8 Summed 1g SAR (W/kg)	1+4 Summed 1g SAR (W/kg)	1+5 Summed 1g SAR (W/kg)	1+8 Summed 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)	1+3+6 Summed 1g SAR (W/kg)	1+7 Summed 1g SAR (W/kg)	1+2+5 Summed 1g SAR (W/kg)	1+6 Summed 1g SAR (W/kg)
		WWAN	2.4GHz WLAN Ant 4	2.4GHz WLAN Ant 5	5GHz WLAN Ant 6	5GHz WLAN Ant 5	Bluetooth Ant 4	2.4GHz WLAN Ant 4+5	5GHz WLAN Ant 6+5											
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)											
LTE Band 48_UAT	Front	0.310	0.096	0.105	0.354	0.214	0.028	0.338	0.358	**0.552**	**0.692**	**0.696**	**0.664**	**0.524**	**0.668**	**0.406**	**0.443**	**0.648**	**0.620**	**0.338**
	Back	0.387	0.129	0.167	0.347	0.219	0.038	0.375	0.351	**0.644**	**0.772**	**0.776**	**0.734**	**0.606**	**0.738**	**0.516**	**0.592**	**0.762**	**0.735**	**0.425**
	Left side	0.005								**0.005**	**0.005**	**0.005**	**0.005**	**0.005**	**0.005**	**0.005**	**0.005**	**0.005**	**0.005**	**0.005**
	Right side	0.029	0.022	0.041	0.116	0.161	0.007	0.112	0.357	**0.197**	**0.152**	**0.393**	**0.145**	**0.190**	**0.386**	**0.051**	**0.077**	**0.141**	**0.212**	**0.036**
	Top side	0.723	0.151	0.024	0.376	0.059	0.045	0.396	0.375	**0.827**	**1.144**	**1.143**	**1.099**	**0.782**	**1.098**	**0.874**	**0.792**	**1.119**	**0.933**	**0.768**
LTE Band 48_LAT	Front	0.162	0.096	0.105	0.354	0.214	0.028	0.338	0.358	**0.404**	**0.544**	**0.548**	**0.516**	**0.376**	**0.520**	**0.258**	**0.295**	**0.500**	**0.472**	**0.190**
	Back	0.135	0.129	0.167	0.347	0.219	0.038	0.375	0.351	**0.392**	**0.520**	**0.524**	**0.482**	**0.354**	**0.486**	**0.264**	**0.340**	**0.510**	**0.483**	**0.173**
	Left side	0.030								**0.030**	**0.030**	**0.030**	**0.030**	**0.030**	**0.030**	**0.030**	**0.030**	**0.030**	**0.030**	**0.030**
	Right side	0.004	0.022	0.041	0.116	0.161	0.007	0.112	0.357	**0.172**	**0.127**	**0.368**	**0.120**	**0.165**	**0.361**	**0.026**	**0.052**	**0.116**	**0.187**	**0.011**
	Top side		0.151	0.024	0.376	0.059	0.045	0.396	0.375	**0.104**	**0.421**	**0.420**	**0.376**	**0.059**	**0.375**	**0.151**	**0.069**	**0.396**	**0.210**	**0.045**
	Bottom side	0.124								**0.124**	**0.124**	**0.124**	**0.124**	**0.124**	**0.124**	**0.124**	**0.124**	**0.124**	**0.124**	**0.124**

<Bluetooth Power with WiFi off>

WWAN Band	Exposure Position	1	6	1+2+3 Summed 1g SAR (W/kg)
		WWAN	Bluetooth Ant 4	
		1g SAR (W/kg)	1g SAR (W/kg)	
LTE Band 48_UAT	Front	0.310	0.028	**0.338**
	Back	0.387	0.038	**0.425**
	Left side	0.005		**0.005**
	Right side	0.029	0.007	**0.036**
	Top side	0.723	0.045	**0.768**
LTE Band 48_LAT	Front	0.162	0.028	**0.190**
	Back	0.135	0.038	**0.173**
	Left side	0.030		**0.030**
	Right side	0.004	0.007	**0.011**
	Top side		0.045	**0.045**
	Bottom side	0.124		**0.124**

13.3 Body-Worn Accessory Exposure Conditions

<WWAN on with WiFi on and Bluetooth Power >

WWAN Band	Exposure Position	1	2	3	4	5	6	7	8	1+5+6 Summed 1g SAR (W/kg)	1+4+6 Summed 1g SAR (W/kg)	1+6+8 Summed 1g SAR (W/kg)	1+4 Summed 1g SAR (W/kg)	1+5 Summed 1g SAR (W/kg)	1+8 Summed 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)	1+3+6 Summed 1g SAR (W/kg)	1+7 Summed 1g SAR (W/kg)	1+2+5 Summed 1g SAR (W/kg)	1+6 Summed 1g SAR (W/kg)
		WWAN	2.4GHz WLAN Ant 4	2.4GHz WLAN Ant 5	5GHz WLAN Ant 6	5GHz WLAN Ant 5	Bluetooth Ant 4	2.4GHz WLAN Ant 4+5	5GHz WLAN Ant 6+5											
		1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)											
LTE Band 48_UAT	Front	0.310	0.096	0.105	0.364	0.214	0.028	0.338	0.385	**0.552**	**0.702**	**0.723**	**0.674**	**0.524**	**0.695**	**0.406**	**0.443**	**0.648**	**0.620**	**0.338**
	Back	0.387	0.129	0.167	0.375	0.219	0.038	0.375	0.371	**0.644**	**0.800**	**0.796**	**0.762**	**0.606**	**0.758**	**0.516**	**0.592**	**0.762**	**0.735**	**0.425**
LTE Band 48_LAT	Front	0.162	0.096	0.105	0.364	0.214	0.028	0.338	0.385	**0.404**	**0.554**	**0.575**	**0.526**	**0.376**	**0.547**	**0.258**	**0.295**	**0.500**	**0.472**	**0.190**
	Back	0.135	0.129	0.167	0.375	0.219	0.038	0.375	0.371	**0.392**	**0.548**	**0.544**	**0.510**	**0.354**	**0.506**	**0.264**	**0.340**	**0.510**	**0.483**	**0.173**

<Bluetooth Power with WiFi off>

WWAN Band	Exposure Position	1	6	1+6 Summed 1g SAR (W/kg)
		WWAN	Bluetooth Ant 4	
		1g SAR (W/kg)	1g SAR (W/kg)	
LTE Band 48_UAT	Front	0.310	0.028	**0.338**
	Back	0.387	0.038	**0.425**
LTE Band 48_LAT	Front	0.162	0.028	**0.190**
	Back	0.135	0.038	**0.173**

Test Engineer： Tom Jiang, Tommy Chen, Steve Chang, Bevis Chang and Galan Chang

14. 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 ≤ 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.

15. 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 D04 v01r03, “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 D05A v01r02, “Rel. 10 LTE SAR Test Guidance and KDB Inquiries”, Oct 2015

[11] FCC KDB 941225 D06 v02r01, "SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities", Oct 2015.

[12] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.

[13] FCC KDB 865664 D02 v01r02, “RF Exposure Compliance Reporting and Documentation Considerations” Oct 2015.