



SAR TEST REPORT

No. I20Z61808-SEM02

For

TCL Communication Ltd.

Mobile WiFi

Model Name: R219t

with

Hardware Version: V2.0

Software Version: R219t_ZZ_02.00_01

FCC ID: 2ACCJB142

Issued Date: 2020-11-16

Note:

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REPORT HISTORY

Report Number	Revision	Issue Date	Description
I20Z61808-SEM02	Rev.0	2020-11-16	Initial creation of test report

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1 Test Laboratory

1.1 Testing Location

Company Name:	CTTL(Shouxiang)
Address:	No. 51 Shouxiang Science Building, Xueyuan Road, Haidian District, Beijing, P. R. China100191

1.2 Testing Environment

Temperature:	18°C~25°C,
Relative humidity:	30%~ 70%
Ground system resistance:	< 0.5 Ω
Ambient noise & Reflection:	< 0.012 W/kg

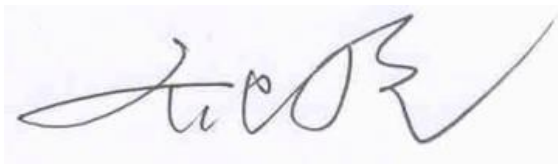
1.3 Project Data

Project Leader:	Qi Dianyuan
Test Engineer:	Lin Xiaojun
Testing Start Date:	November 7, 2020
Testing End Date:	November 8, 2020

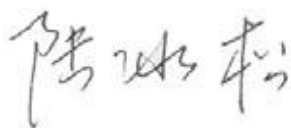
1.4 Signature



Lin Xiaojun
(Prepared this test report)



Qi Dianyuan
(Reviewed this test report)



Lu Bingsong
Deputy Director of the laboratory
(Approved this test report)

2 Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for TCL Communication Ltd. Mobile WiFi R219t are as follows:

Table 2.1: Highest Reported SAR (1g)

Exposure Configuration	Technology Band	Highest Reported SAR 1g(W/kg) Non-USB	Equipment Class
Body	LTE Band 7	1.32	PCE
	WiFi 2.4G ANT0	0.14	DTS
	WiFi 2.4G ANT1	0.14	

The SAR values found for the Mobile Phone are below the maximum recommended levels of 1.6 W/kg as averaged over any 1g tissue according to the ANSI C95.1-1992.

For body operation, this device has been tested and meets FCC RF exposure guidelines when used with any accessory that contains no metal and which provides a minimum separation distance of 10 mm between this device and the body of the user. Use of other accessories may not ensure compliance with FCC RF exposure guidelines.

The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power output.

The measurement together with the test system set-up is described in annex C of this test report. A detailed description of the equipment under test can be found in chapter 4 of this test report. The highest reported SAR value is obtained at the case of (**Table 2.1**), and the values are: **1.32 W/kg(1g)**.

Table 2.2: The sum of reported SAR values for Main antenna and WiFi-2.4G

	Position	Cellular antenna	WiFi2.4G	Sum
Highest reported SAR value for Body	Left 10mm	1.32	<0.01	1.32

According to the above tables, the highest sum of reported SAR values is **1.32 W/kg (1g)**. The detail for simultaneous transmission consideration is described in chapter 13.



3 Client Information

3.1 Applicant Information

Company Name:	TCL Communication Ltd.
Address/Post:	5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
Contact Person:	Gong Zhizhou
Contact Email:	zhizhou.gong@tcl.com
Telephone:	0086-755-36611722
Fax	TCL Communication Ltd.

3.2 Manufacturer Information

Company Name:	TCL Communication Ltd.
Address/Post:	5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
Contact Person:	Gong Zhizhou
Contact Email:	zhizhou.gong@tcl.com
Telephone:	0086-755-36611722
Fax	TCL Communication Ltd.

4 Equipment Under Test (EUT) and Ancillary Equipment (AE)

4.1 About EUT

Description:	Mobile WiFi
Model name:	R219t
Operating mode(s):	GSM900/1800 WCDMA900/2100 LTEBand1/3/7/8/20, Wi-Fi2.4G
Tx Frequency:	2502.5 – 2567.5 MHz (LTE Band 7) 2412 – 2462 MHz (Wi-Fi 2.4G)
Test device Production information:	Production unit
Device type:	Portable device
Antenna type:	Integrated antenna
Product dimension	Long 87.6mm ;Wide 59.6mm ; Diagonal 106mm

4.2 Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version
EUT1	355097460200121	V2.0	MW45_ZZ_02.00_01
EUT2	355097460200147	V2.0	MW45_ZZ_02.00_01

*EUT ID: is used to identify the test sample in the lab internally.

Note: It is performed to test SAR with the EUT1 and conducted power with the EUT2.

4.3 Internal Identification of AE used during the test

AE ID*	Description	Model	SN	Manufacturer
AE1	LI-ION Battery	TLi021F7	/	VEKEN

*AE ID: is used to identify the test sample in the lab internally.

5 TEST METHODOLOGY

5.1 Applicable Limit Regulations

ANSI C95.1–1992:IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

It specifies the maximum exposure limit of **1.6 W/kg** as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

5.2 Applicable Measurement Standards

IEEE 1528–2013: Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.

KDB447498 D01: General RF Exposure Guidance v06: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

KDB941225 D05 SAR for LTE Devices v02r05: SAR Evaluation Considerations for LTE Devices

KDB865664 D01 SAR measurement 100 MHz to 6 GHz v01r04: SAR Measurement Requirements for 100 MHz to 6 GHz.

KDB865664 D02 RF Exposure Reporting v01r02: RF Exposure Compliance Reporting and Documentation Considerations.

KDB248227 D01 802.11 Wi-Fi SAR v02r02: SAR GUIDANCE FOR IEEE 802.11 (Wi-Fi) TRANSMITTERS

6 Specific Absorption Rate (SAR)

6.1 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.

6.2 SAR Definition

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

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

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

SAR measurement can be either related to the temperature elevation in tissue by

$$SAR = c \left(\frac{\delta T}{\delta t} \right)$$

Where: C is the specific heat capacity, δT is the temperature rise and δt is the exposure duration, or related to the electrical field in the tissue by

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

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

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

7 Tissue Simulating Liquids

7.1 Targets for tissue simulating liquid

Table 7.1: Targets for tissue simulating liquid

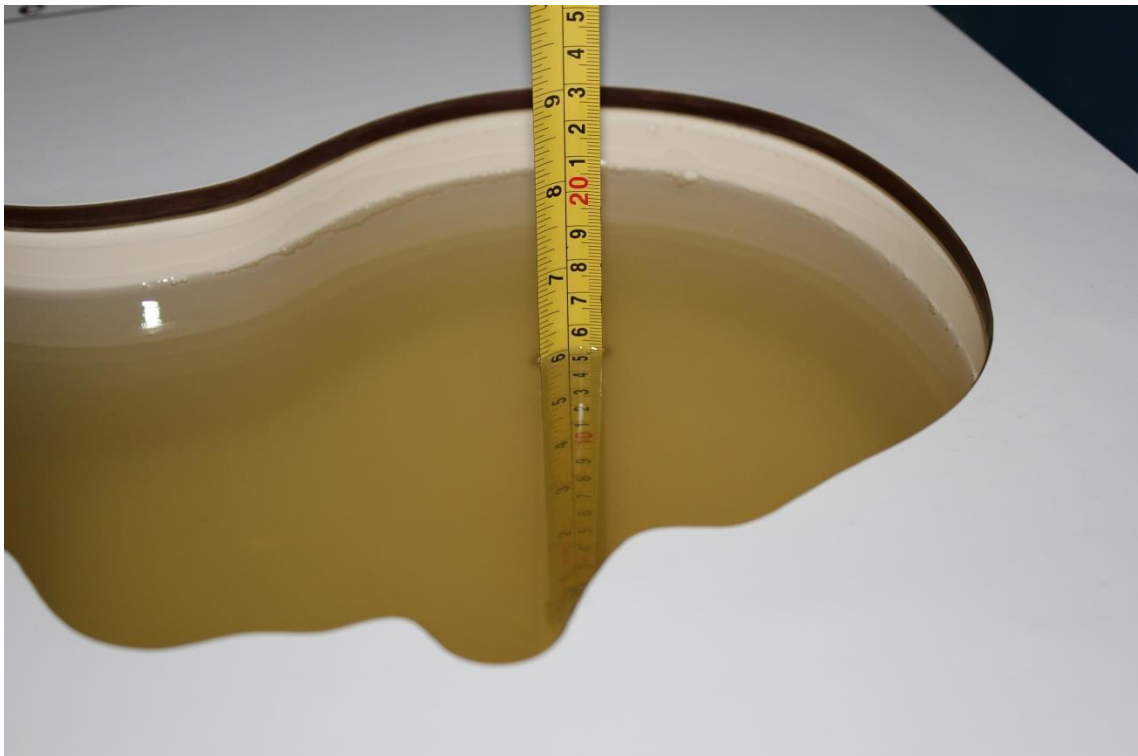
Frequency(MHz)	Liquid Type	Conductivity(σ)	$\pm 5\%$ Range	Permittivity(ϵ)	$\pm 5\%$ Range
2450	Head	1.80	1.71~1.89	39.2	37.2~41.2
2600	Head	1.96	1.86~2.06	39.01	37.1~41.0

7.2 Dielectric Performance

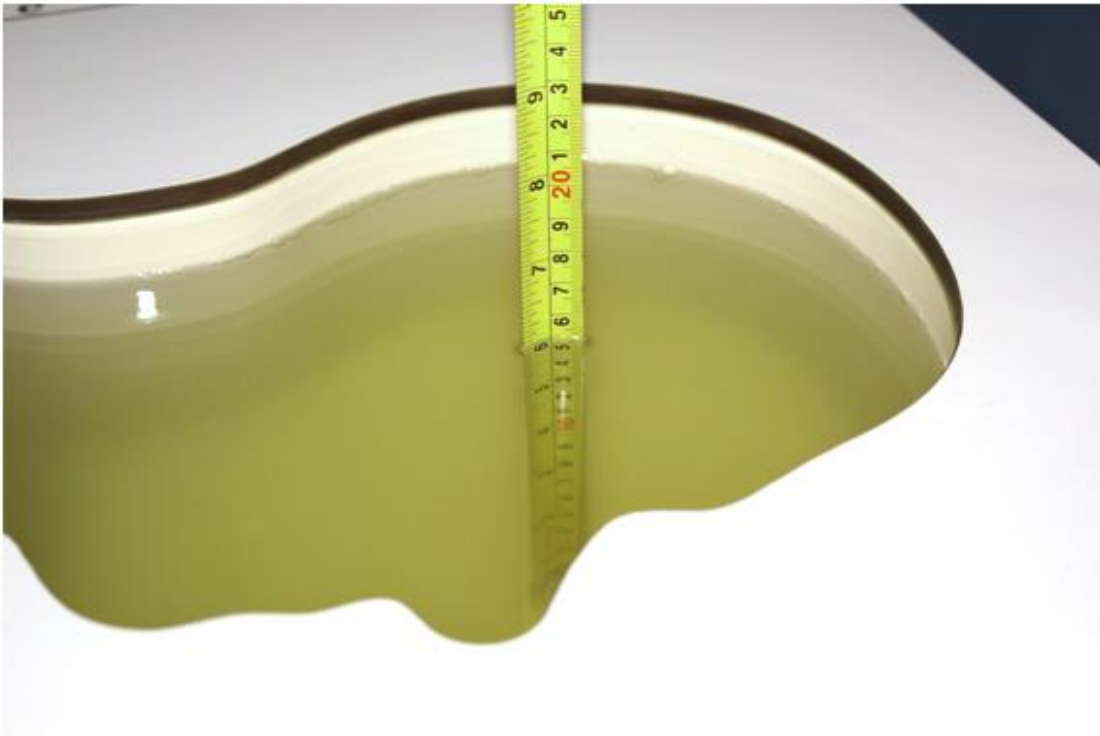
Table 7.2: Dielectric Performance of Tissue Simulating Liquid

Measurement Date (yyyy-mm-dd)	Type	Frequency	Permittivity ϵ	Drift (%)	Conductivity σ (S/m)	Drift (%)
2020/11/7	Head	2450 MHz	39.92	1.84	1.81	0.56
2020/11/8	Head	2600 MHz	39	-0.03	1.999	1.99

Note: The liquid temperature is 22.0°C



Picture 7-1 Liquid depth in the Head Phantom (2600MHz)

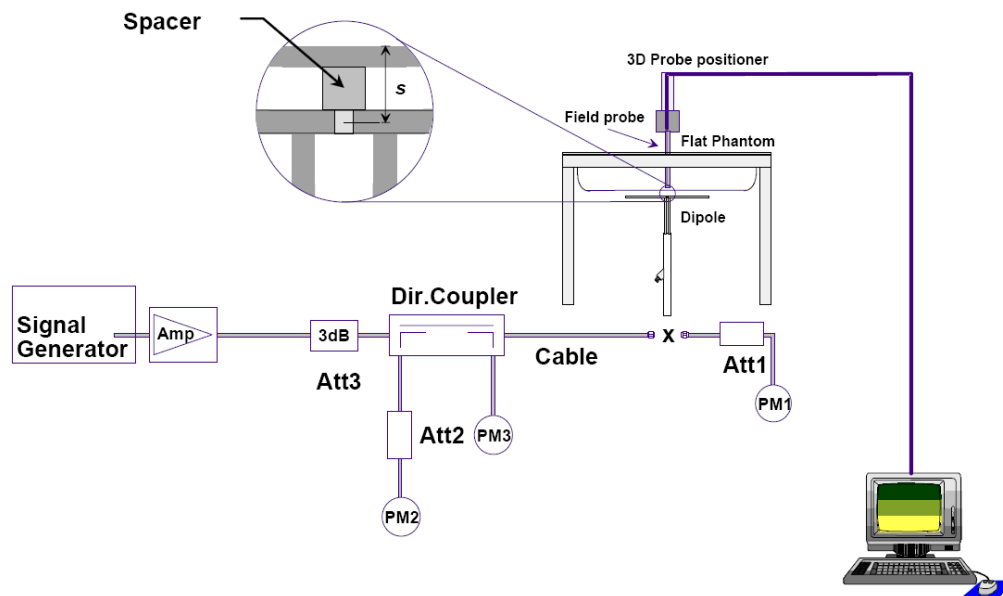


Picture 7-2 Liquid depth in the Head Phantom (2450 MHz)

8 System verification

8.1 System Setup

In the simplified setup for system evaluation, the DUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave that comes from a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The equipment setup is shown below:



Picture 8.1 System Setup for System Evaluation



Picture 8.2 Photo of Dipole Setup

8.2 System Verification

SAR system verification is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device.

The system verification results are required that the area scan estimated 1-g SAR is within 3% of the zoom scan 1-g SAR. The details are presented in annex B.

Table 8.1: System Verification of Head

Measurement Date (yyyy-mm-dd)	Frequency	Target value (W/kg)		Measured value (W/kg)		Deviation	
		10 g Average	1 g Average	10 g Average	1 g Average	10 g Average	1 g Average
2020/11/7	2450 MHz	24.5	52.5	24.52	52.6	0.08%	0.19%
2020/11/8	2600 MHz	25.3	57.0	25.68	56.96	1.50%	-0.07%

9 Measurement Procedures

9.1 Tests to be performed

In order to determine the highest value of the peak spatial-average SAR of a handset, all device positions, configurations and operational modes shall be tested for each frequency band according to steps 1 to 3 below. A flowchart of the test process is shown in picture 9.1.

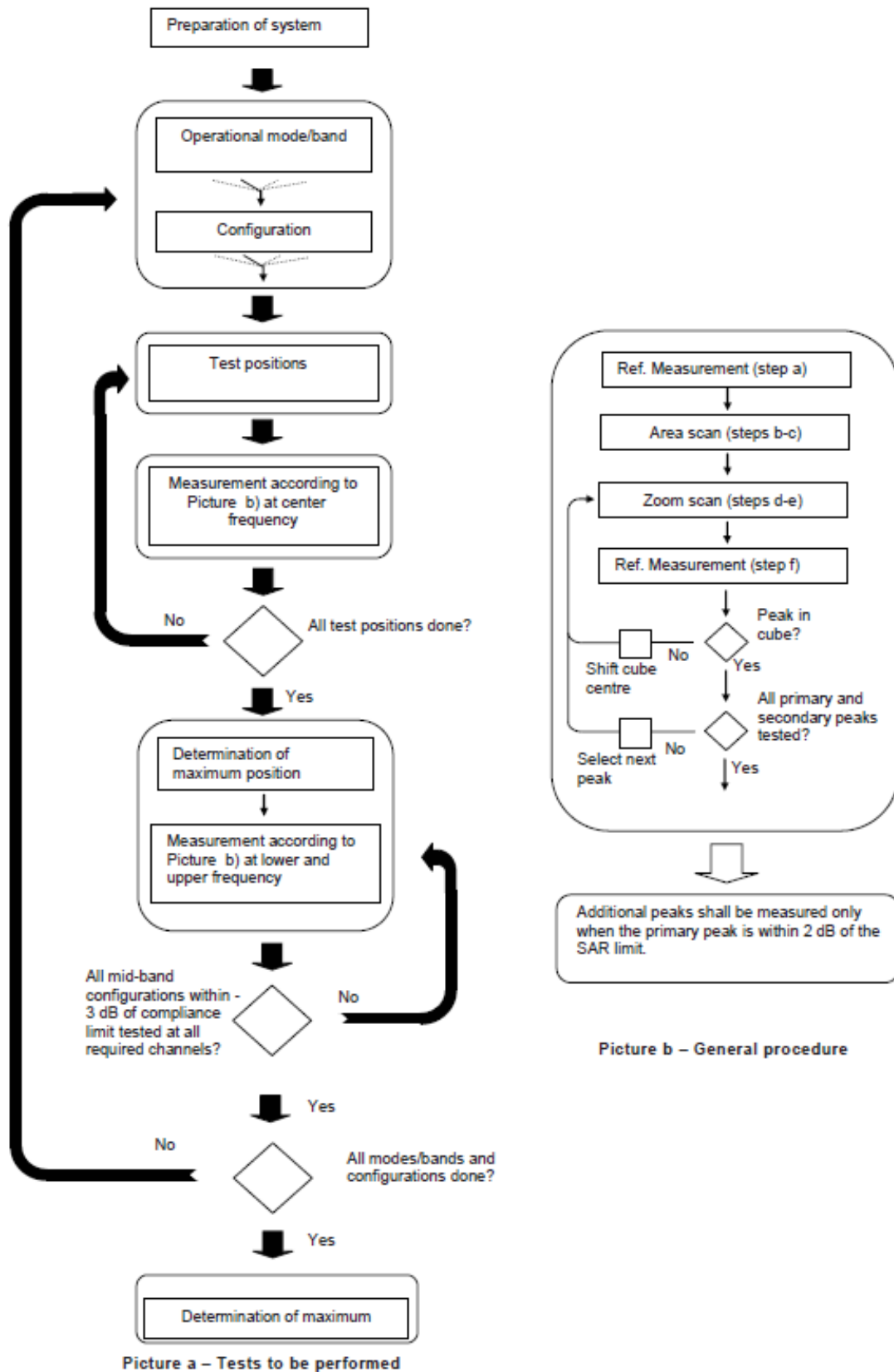
Step 1: The tests described in 9.2 shall be performed at the channel that is closest to the centre of the transmit frequency band (•) for:

- a) all device positions (cheek and tilt, for both left and right sides of the SAM phantom, as described in annex D),
- b) all configurations for each device position in a), e.g., antenna extended and retracted, and
- c) all operational modes, e.g., analogue and digital, for each device position in a) and configuration in b) in each frequency band.

If more than three frequencies need to be tested according to 11.1 (i.e., $N_c > 3$), then all frequencies, configurations and modes shall be tested for all of the above test conditions.

Step 2: For the condition providing highest peak spatial-average SAR determined in Step 1, perform all tests described in 9.2 at all other test frequencies, i.e., lowest and highest frequencies. In addition, for all other conditions (device position, configuration and operational mode) where the peak spatial-average SAR value determined in Step 1 is within 3 dB of the applicable SAR limit, it is recommended that all other test frequencies shall be tested as well.

Step 3: Examine all data to determine the highest value of the peak spatial-average SAR found in Steps 1 to 2.



Picture 9.1 Block diagram of the tests to be performed

9.2 General Measurement Procedure

The area and zoom scan resolutions specified in the table below must be applied to the SAR measurements and fully documented in SAR reports to qualify for TCB approval. Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Both the probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1-g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in IEEE Std 1528-2003. The results should be documented as part of the system validation records and may be requested to support test results when all the measurement parameters in the following table are not satisfied.

		≤ 3 GHz	> 3 GHz	
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface		5 ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm	
Maximum probe angle from probe axis to phantom surface normal at the measurement location		$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$	
Maximum area scan spatial resolution: Δx_{Area} , Δy_{Area}		≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm	
		When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be \leq the corresponding x or y dimension of the test device with at least one measurement point on the test device.		
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 1 st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z	≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm	
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details. * When zoom scan is required and the <i>reported</i> SAR from the 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.				

9.3 SAR Measurement for LTE

SAR tests for LTE are performed with a base station simulator, Rohde & Schwarz CMW500. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. All powers were measured with the CMW 500.

It is performed for conducted power and SAR based on the KDB941225 D05.

SAR is evaluated separately according to the following procedures for the different test positions in each exposure condition – head, body, body-worn accessories and other use conditions. The procedures in the following subsections are applied separately to test each LTE frequency band.

1) QPSK with 1 RB allocation

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 among RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.

2) QPSK with 50% RB allocation

The procedures required for 1 RB allocation in 1) are applied to measure the SAR for QPSK with 50% RB allocation.

3) QPSK with 100% RB allocation

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 in 1) and 2) 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.

9.4 Power Drift

To control the output power stability during the SAR test, DASY4 system calculates the power drift by measuring the E-field at the same location at the beginning and at the end of the measurement for each test position. These drift values can be found in section 14 labeled as: (Power Drift [dB]). This ensures that the power drift during one measurement is within 5%.

10 Area Scan Based 1-g SAR

10.1 Requirement of KDB

According to the KDB447498 D01, when the implementation is based the specific polynomial fit algorithm as presented at the 29th Bioelectromagnetics Society meeting (2007) and the estimated 1-gSAR is ≤ 1.2 W/kg, a zoom scan measurement is not required provided it is also not needed for any other purpose; for example, if the peak SAR location required for simultaneous transmission SAR test exclusion can be determined accurately by the SAR system or manually to discriminate between distinctive peaks and scattered noisy SAR distributions from area scans.

There must not be any warning or alert messages due to various measurement concerns identified by the SAR system; for example, noise in measurements, peaks too close to scan boundary, peaks are too sharp, spatial resolution and uncertainty issues etc. The SAR system verification must also demonstrate that the area scan estimated 1-g SAR is within 3% of the zoom scan 1-g SAR (See Annex B). When all the SAR results for each exposure condition in a frequency band and wireless mode are based on estimated 1-g SAR, the 1-g SAR for the highest SAR configuration must be determined by a zoom scan.

10.2 Fast SAR Algorithms

The approach is based on the area scan measurement applying a frequency dependent attenuation parameter. This attenuation parameter was empirically determined by analyzing a large number of phones. The MOTOROLA FAST SAR was developed and validated by the MOTOROLA Research Group in Ft. Lauderdale.

In the initial study, an approximation algorithm based on Linear fit was developed. The accuracy of the algorithm has been demonstrated across a broad frequency range (136-2450 MHz) and for both 1- and 10-g averaged SAR using a sample of 264 SAR measurements from 55 wireless handsets. For the sample size studied, the root-mean-squared errors of the algorithm are 1.2% and 5.8% for 1- and 10-g averaged SAR, respectively. The paper describing the algorithm in detail is expected to be published in August 2004 within the Special Issue of Transactions on MTT.

In the second step, the same research group optimized the fitting algorithm to an Polynomial fit whereby the frequency validity was extended to cover the range 30-6000MHz. Details of this study can be found in the BEMS 2007 Proceedings.

Both algorithms are implemented in DASY software.

11 Conducted Output Power

11.1 LTE Measurement result

Table 11.1-1: Maximum Power Reduction (MPR) for LTE

Modulation	Channel bandwidth / Transmission bandwidth configuration [RB]						MPR (dB)
	1.4 MHz	3 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

Table 11.1-2: The tune up for LTE

Band	Tune up
LTE Band 7	22

Table 11.1-3: The conducted Power for LTE

Band 7				
Bandwidth (MHz)	RB allocation	Frequency (MHz)	Actual output power (dBm)	
	RB offset		QPSK	16QAM
5MHz	1RB_High	2567.5	20.77	19.46
		2535	20.76	19.99
		2502.5	20.95	19.71
	1RB_Middle	2567.5	20.80	19.77
		2535	20.74	19.87
		2502.5	20.96	19.23
	1RB_Low	2567.5	20.70	19.80
		2535	20.93	19.96
		2502.5	20.91	19.16
	12RB_High	2567.5	19.87	18.72
		2535	19.98	18.96
		2502.5	20.04	18.68
	12RB_Middle	2567.5	19.93	19.00
		2535	20.05	19.08
		2502.5	20.00	18.96
	12RB_Low	2567.5	19.94	19.05
		2535	20.17	19.16
		2502.5	20.03	19.09
	25RB	2567.5	19.87	19.10
		2535	20.06	19.27
		2502.5	20.08	18.72
10MHz	1RB_High	2565	20.94	19.65
		2535	21.03	20.05
		2505	20.90	20.03
	1RB_Middle	2565	20.96	19.98
		2535	20.97	20.21
		2505	20.95	20.08
	1RB_Low	2565	20.87	19.91
		2535	20.92	20.09
		2505	20.82	19.95
	25RB_High	2565	19.96	18.93
		2535	19.96	19.16
		2505	20.01	19.08
	25RB_Middle	2565	19.90	19.02
		2535	19.95	19.08
		2505	19.99	18.93
	25RB_Low	2565	19.91	19.02
		2535	20.04	19.04
		2505	20.00	19.08
50RB	2565	19.86	18.96	
	2535	20.02	19.04	

		2505	19.93	18.93
15MHz	1RB_High	2562.5	21.27	19.93
		2535	21.25	20.06
		2507.5	21.07	20.62
	1RB_Middle	2562.5	21.24	19.97
		2535	21.10	19.98
		2507.5	21.04	20.57
	1RB_Low	2562.5	21.36	20.14
		2535	21.13	20.07
		2507.5	21.07	20.56
	36RB_High	2562.5	19.92	18.83
		2535	20.08	19.02
		2507.5	19.95	19.06
	36RB_Middle	2562.5	19.86	18.80
		2535	20.05	19.01
		2507.5	19.89	19.03
	36RB_Low	2562.5	20.12	19.03
		2535	20.08	19.15
		2507.5	19.93	18.99
75RB	2562.5	20.02	18.98	
	2535	20.06	19.10	
	2507.5	19.94	18.99	
20MHz	1RB_High	2560	20.90	19.95
		2535	20.75	19.65
		2510	20.62	19.89
	1RB_Middle	2560	21.43	19.83
		2535	21.18	19.79
		2510	21.08	19.64
	1RB_Low	2560	21.27	19.69
		2535	20.73	19.54
		2510	20.57	19.52
	50RB_High	2560	20.04	19.02
		2535	20.05	18.92
		2510	19.99	19.01
	50RB_Middle	2560	20.15	19.12
		2535	20.13	19.00
		2510	20.14	19.10
	50RB_Low	2560	20.03	19.16
		2535	20.00	18.87
		2510	20.07	19.03
100RB	2560	20.09	19.07	
	2535	19.95	18.97	
	2510	20.02	18.91	

11.2 Wi-Fi Measurement result

The power for WiFi is as following:

802.11b(ANT0)	
Channel\data rate	1Mbps
11(2462MHz)	14.69
6(2437(MHz)	15.42
1(2412MHz)	15.02
Tune up	15.50
802.11g(ANT0)	
Channel\data rate	6Mbps
11(2462MHz)	12.90
6(2437(MHz)	12.74
1(2412MHz)	12.98
Tune up	13.00
802.11n-20MHz(ANT0)	
Channel\data rate	MCS0
11(2462MHz)	10.48
6(2437(MHz)	10.87
1(2412MHz)	10.60
Tune up	11.00
802.11n-40MHz(ANT0)	
Channel\data rate	MCS0
9(2452MHz)	10.85
6(2437MHz)	10.92
3(2422MHz)	10.77
Tune up	11.00

802.11b(ANT1)	
Channel\data rate	1Mbps
11(2462MHz)	15.08
6(2437(MHz)	14.70
1(2412MHz)	15.03
Tune up	15.50
802.11g(ANT1)	
Channel\data rate	6Mbps
11(2462MHz)	12.36
6(2437(MHz)	12.24
1(2412MHz)	12.37
Tune up	13.00
802.11n-20MHz(ANT1)	
Channel\data rate	MCS0
11(2462MHz)	10.85
6(2437(MHz)	11.04
1(2412MHz)	11.10
Tune up	12.00
802.11n-40MHz(ANT1)	
Channel\data rate	MCS0
9(2452MHz)	10.92
6(2437MHz)	10.86
3(2422MHz)	10.94
Tune up	12.00

802.11n-20MHz(ANT0+ANT1)	
Channel\data rate	MCS0
11(2462MHz)	13.78
6(2437(MHz)	13.50
1(2412MHz)	13.02
Tune up	14.30
802.11n-40MHz(ANT0+ANT1)	
Channel\data rate	MCS0
9(2452MHz)	13.76
6(2437MHz)	13.82
3(2422MHz)	13.58
Tune up	14.30

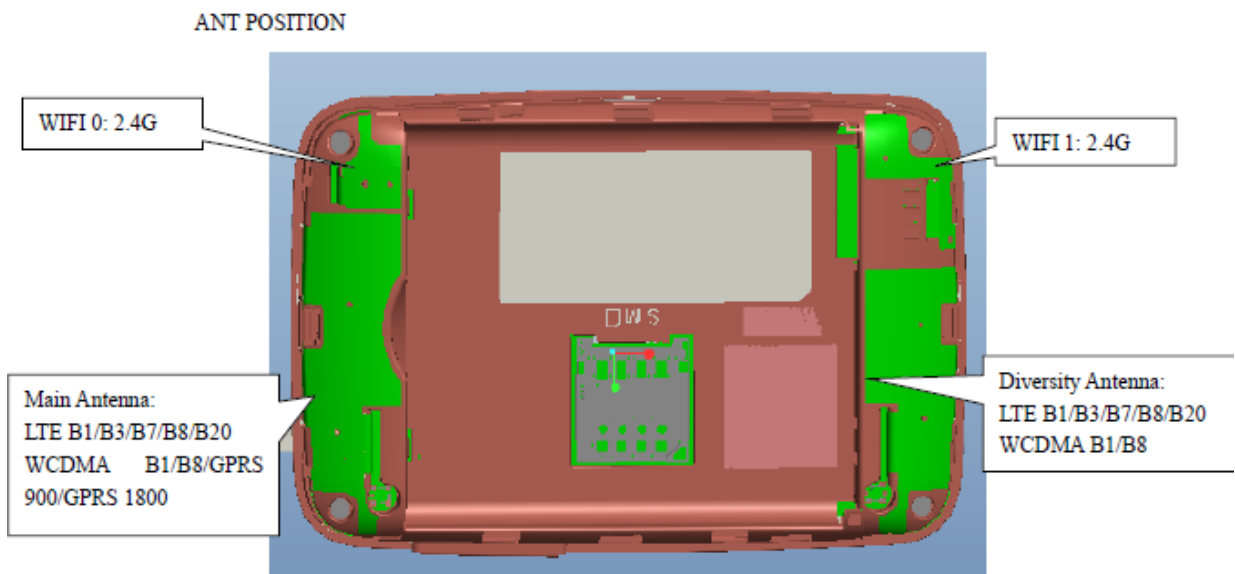
12 Transmit Antenna Position and Size

12.1 Introduction

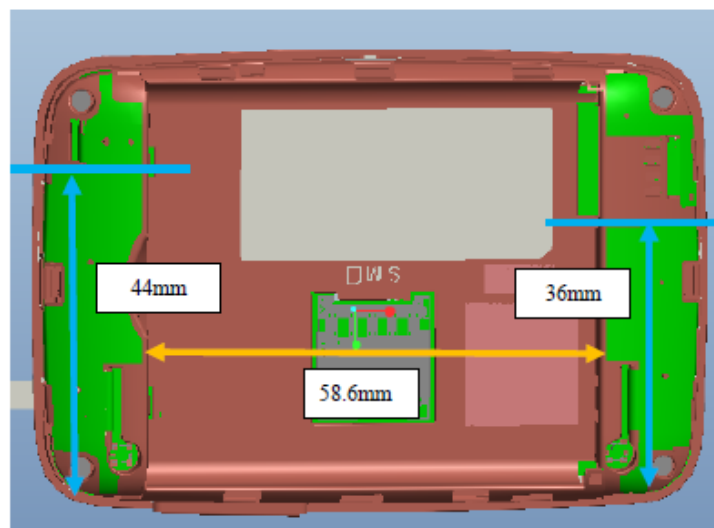
The following procedures adopted from “FCC SAR Considerations for Cell Phones with Multiple Transmitters” are applicable to handsets with built-in unlicensed transmitters such as 802.11 a/b/g and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

For this device, the Wi-Fi can transmit simultaneous with other transmitters.

12.2 Transmit Antenna Separation Distances



SIZE:
DEVICE SIZE L*W*H: 87.6MM*59.6MM*12.9MM



Picture 12.1 Antenna Position and size

12.3 SAR Measurement Positions

According to the KDB941225 D06 Hot Spot SAR v01, the edges with less than 2.5 cm distance to the antennas need to be tested for SAR.

SAR measurement positions						
Mode	Front	Rear	Left edge	Right edge	Top edge	Bottom edge
Main antenna	Yes	Yes	Yes	No	Yes	Yes
WLAN antenna-ANT0	Yes	Yes	Yes	No	No	Yes
WLAN antenna-ANT1	Yes	Yes	No	Yes	No	Yes

12.4 Standalone SAR Test Exclusion Considerations

Standalone 1-g head or body SAR evaluation by measurement or numerical simulation is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied. The 1-g SAR test exclusion threshold for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR, where

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

Table 12.1: Standalone SAR test exclusion considerations

Band/Mode	F(GHz)	Position	SAR test exclusion threshold(mW)	RF output power		SAR test exclusion
				dBm	mW	
2.4GHz WLAN	2.45	Body	19.17	15.5	35.5	No

13 Evaluation of Simultaneous

Table 13.1: The sum of reported SAR values for Main antenna and WiFi-2.4G

	Position	Cellular antenna	WiFi2.4G	Sum
Highest reported SAR value for Body	Left 10mm	1.32	<0.01	1.32

Conclusion:

According to the above tables, the sum of reported SAR values is <1.6W/kg. So the simultaneous transmission SAR with volume scans is not required.

14 SAR Test Result

It is determined by user manual for the distance between the EUT and the phantom bottom.
The distance is 10mm and just applied to the condition of body worn accessory.

It is performed for all SAR measurements with area scan based 1-g SAR estimation (Fast SAR). A zoom scan measurement is added when the estimated 1-g SAR is the highest measured SAR in each exposure configuration, wireless mode and frequency band combination or more than 1.2W/kg.

The calculated SAR is obtained by the following formula:

$$\text{Reported SAR} = \text{Measured SAR} \times 10^{(P_{\text{Target}} - P_{\text{Measured}})/10}$$

Where P_{Target} is the power of manufacturing upper limit;

P_{Measured} is the measured power in chapter 11.

Table 13.1: Duty Cycle

Mode	Duty Cycle
LTE FDD	1:1

14.1 SAR results for Fast SAR

Table 14.1: SAR Values (LTE Band 7-Body)

Frequency		Mode	Test Position	Figure No./ Note	Ambient Temperature: 22.2 °C		Liquid Temperature: 22 °C		Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz				Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)			
21350	2560	1RB-Mid	Front	/	21.43	22	0.431	0.49	0.869	0.99	-0.13
21100	2535	1RB-Mid	Front	/	21.18	22	0.425	0.51	0.807	0.97	0.09
20850	2510	1RB-Mid	Front	/	21.08	22	0.419	0.52	0.794	0.98	-0.03
21350	2560	100RB	Front	/	20.09	21	0.343	0.42	0.651	0.80	0.12
21350	2560	1RB-Mid	Rear	/	21.43	22	0.459	0.52	0.928	1.06	0.03
21100	2535	1RB-Mid	Rear	/	21.18	22	0.422	0.51	0.864	1.04	-0.09
20850	2510	1RB-Mid	Rear	/	21.08	22	0.389	0.48	0.825	1.02	0.12
21350	2560	100RB	Rear	/	20.09	21	0.355	0.44	0.748	0.92	-0.14
21350	2560	1RB-Mid	Left	Fig A.1	21.43	22	0.562	0.64	1.160	1.32	-0.19
21100	2535	1RB-Mid	Left	/	21.18	22	0.503	0.61	1.050	1.27	0.09
20850	2510	1RB-Mid	Left	/	21.08	22	0.437	0.54	0.918	1.13	-0.04
21350	2560	100RB	Left	/	20.09	21	0.428	0.53	0.911	1.12	0.12
21350	2560	1RB-Mid	Bottom	/	21.43	22	<0.01	<0.01	<0.01	<0.01	/
21350	2560	1RB-Mid	Top	/	21.43	22	0.174	0.20	0.328	0.37	0.15
21350	2560	50RB-Mid	Front	/	20.15	21	0.342	0.42	0.691	0.84	-0.07
21100	2535	50RB-Mid	Front	/	20.13	21	0.357	0.44	0.678	0.83	0.07
20850	2510	50RB-Mid	Front	/	20.14	21	0.326	0.40	0.623	0.76	0.06
21350	2560	50RB-Mid	Rear	/	20.15	21	0.323	0.39	0.705	0.86	-0.18
21100	2535	50RB-Mid	Rear	/	20.13	21	0.404	0.49	0.809	0.99	0.13
20850	2510	50RB-Mid	Rear	/	20.14	21	0.384	0.47	0.760	0.93	0.08
21100	2535	100RB	Rear	/	19.95	21	0.412	0.52	0.823	1.05	-0.06
21350	2560	50RB-Mid	Left	/	20.15	21	0.439	0.53	0.926	1.13	0.08
21100	2535	50RB-Mid	Left	/	20.13	21	0.447	0.55	0.912	1.11	-0.13
20850	2510	50RB-Mid	Left	/	20.14	21	0.394	0.48	0.798	0.97	0.09
21350	2560	50RB-Mid	Bottom	/	20.15	21	<0.01	<0.01	<0.01	<0.01	/
21350	2560	50RB-Mid	Top	/	20.15	21	0.149	0.18	0.278	0.34	-0.16

Note1: The distance between the EUT and the phantom bottom is 10mm

Note2: The LTE mode is QPSK_20MHz.

14.2 SAR results for Standard procedure

There is zoom scan measurement to be added for the highest measured SAR in each exposure configuration/band.

Table 14.2: SAR Values (LTE Band 7-Body)

Frequency		Mode	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
21350	2560	1RB-Mid	Left	Fig A.1	21.43	22	0.562	0.64	1.160	1.32	-0.19

Note1: The distance between the EUT and the phantom bottom is 10mm

Note2: The LTE mode is QPSK_20MHz.

14.3 WLAN Evaluation for 2.4G

According to the KDB248227 D01, SAR is measured for 2.4GHz 802.11b DSSS using the initial test position procedure.

Body Evaluation

Table 14.3-1: SAR Values (WLAN - Body)– 802.11b (Fast SAR) – ANT0

Frequency		Test Position	Figure No.	Ambient Temperature: 22.9 °C		Liquid Temperature: 22.5°C				Power Drift (dB)
MHz	Ch.			Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g)(W/kg)	
2437	6	Front	/	15.42	16	0.047	0.05	0.095	0.11	0.02
2437	6	Rear	/	15.42	16	0.063	0.07	0.120	0.14	0.08
2437	6	Left	/	15.42	16	0.000	0.00	0.000	0.00	/
2437	6	Bottom	/	15.42	16	0.055	0.06	0.104	0.12	-0.09

Note1: The distance between the EUT and the phantom bottom is 10mm

As shown above table, the initial test position for body is “Rear”. So the body SAR of WLAN is presented as below:

Table 14.3-2: SAR Values (WLAN - Body)– 802.11b (Full SAR) – ANT0

Frequency		Test Position	Figure No.	Ambient Temperature: 22.9 °C		Liquid Temperature: 22.5°C				Power Drift (dB)
MHz	Ch.			Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g)(W/kg)	
2437	6	Rear	Fig A.2	15.42	16	0.067	0.08	0.122	0.14	0.08

Note1: When the reported SAR of the initial test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position using subsequent highest estimated 1-g SAR conditions determined by area scans, on the highest maximum output power channel, until the reported SAR is \leq 0.8 W/kg.

Note2: For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel until the reported SAR is \leq 1.2 W/kg or all required channels are tested.

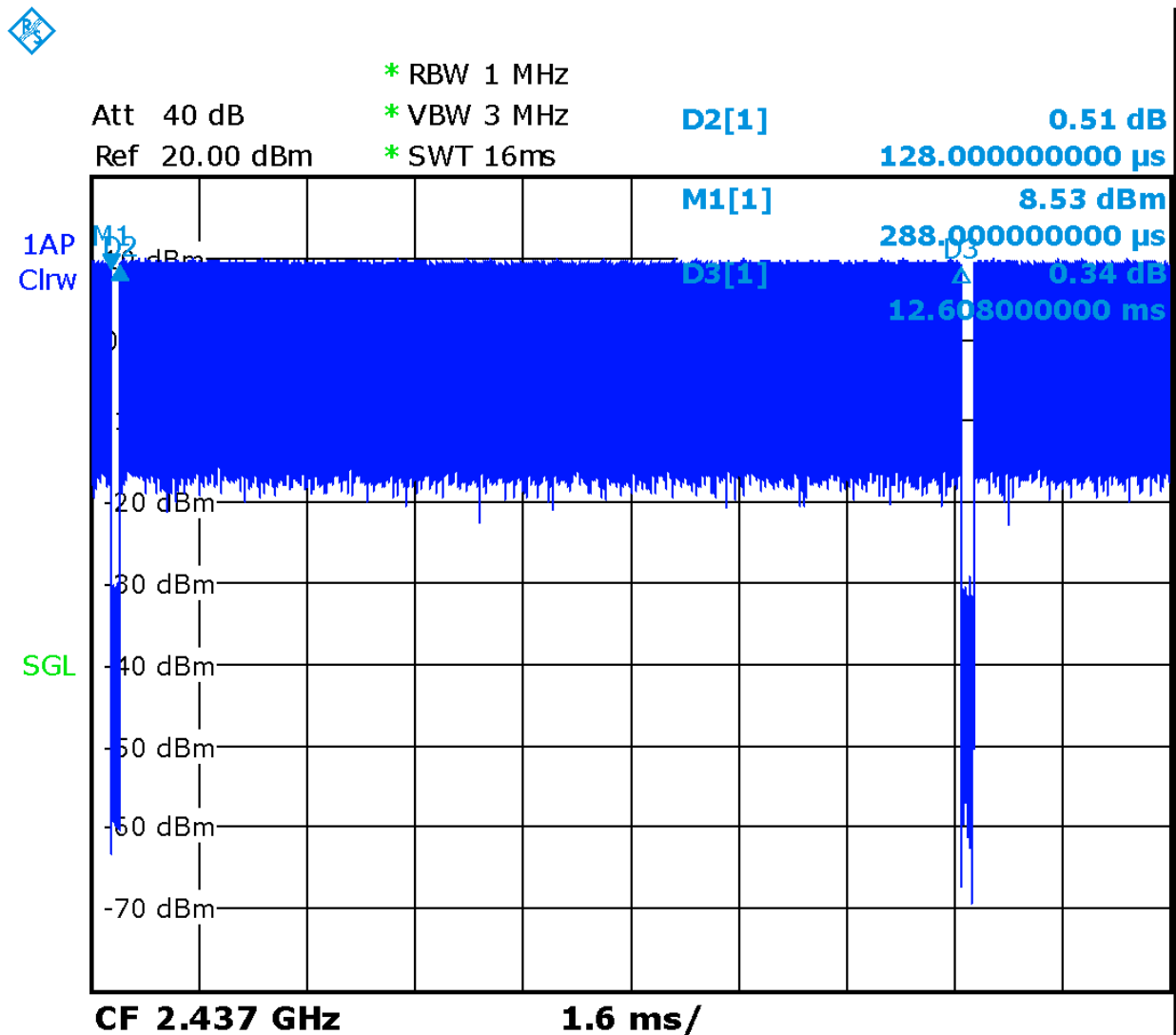
Note3: The distance between the EUT and the phantom bottom is 10mm

According to the KDB248227 D01, The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. The scaled reported SAR is presented as below.

Table 14.3-3: SAR Values (WLAN - Body) – 802.11b (Scaled Reported SAR) – ANT0

Frequency		Test Position	Actual duty factor	maximum duty factor	Reported SAR (1g)(W/kg)	Scaled reported SAR (1g)(W/kg)
MHz	Ch.					
2412	1	Rear 10mm	99%	100%	0.14	0.14

SAR is not required for OFDM because the 802.11b adjusted SAR ≤ 1.2 W/kg.



Picture 14.1 Duty factor plot

Table 14.3-4: SAR Values (WLAN - Body)– 802.11b (Fast SAR) – ANT1

Frequency		Test Position	Figure No.	Ambient Temperature: 22.9 °C		Liquid Temperature: 22.5°C				Power Drift (dB)
MHz	Ch.			Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g)(W/kg)	
2462	11	Front	/	15.08	16	0.053	0.07	0.104	0.13	0.07
2462	11	Rear	/	15.08	16	0.055	0.07	0.11	0.14	0.13
2462	11	Right	/	15.08	16	<0.01	<0.01	<0.01	<0.01	/
2462	11	Bottom	/	15.08	16	0.053	0.07	0.105	0.13	-0.09

As shown above table, the initial test position for body is “Rear”. So the body SAR of WLAN is presented as below:

Table 14.3-5: SAR Values (WLAN - Body)– 802.11b (Full SAR) – ANT1

Frequency		Test Position	Figure No.	Ambient Temperature: 22.9 °C		Liquid Temperature: 22.5°C				Power Drift (dB)
MHz	Ch.			Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g)(W/kg)	
2462	11	Rear	Fig A.3	15.08	16	0.058	0.07	0.111	0.14	0.13

Note1: When the reported SAR of the initial test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position using subsequent highest estimated 1-g SAR conditions determined by area scans, on the highest maximum output power channel, until the reported SAR is \leq 0.8 W/kg.

Note2: For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel until the reported SAR is \leq 1.2 W/kg or all required channels are tested.

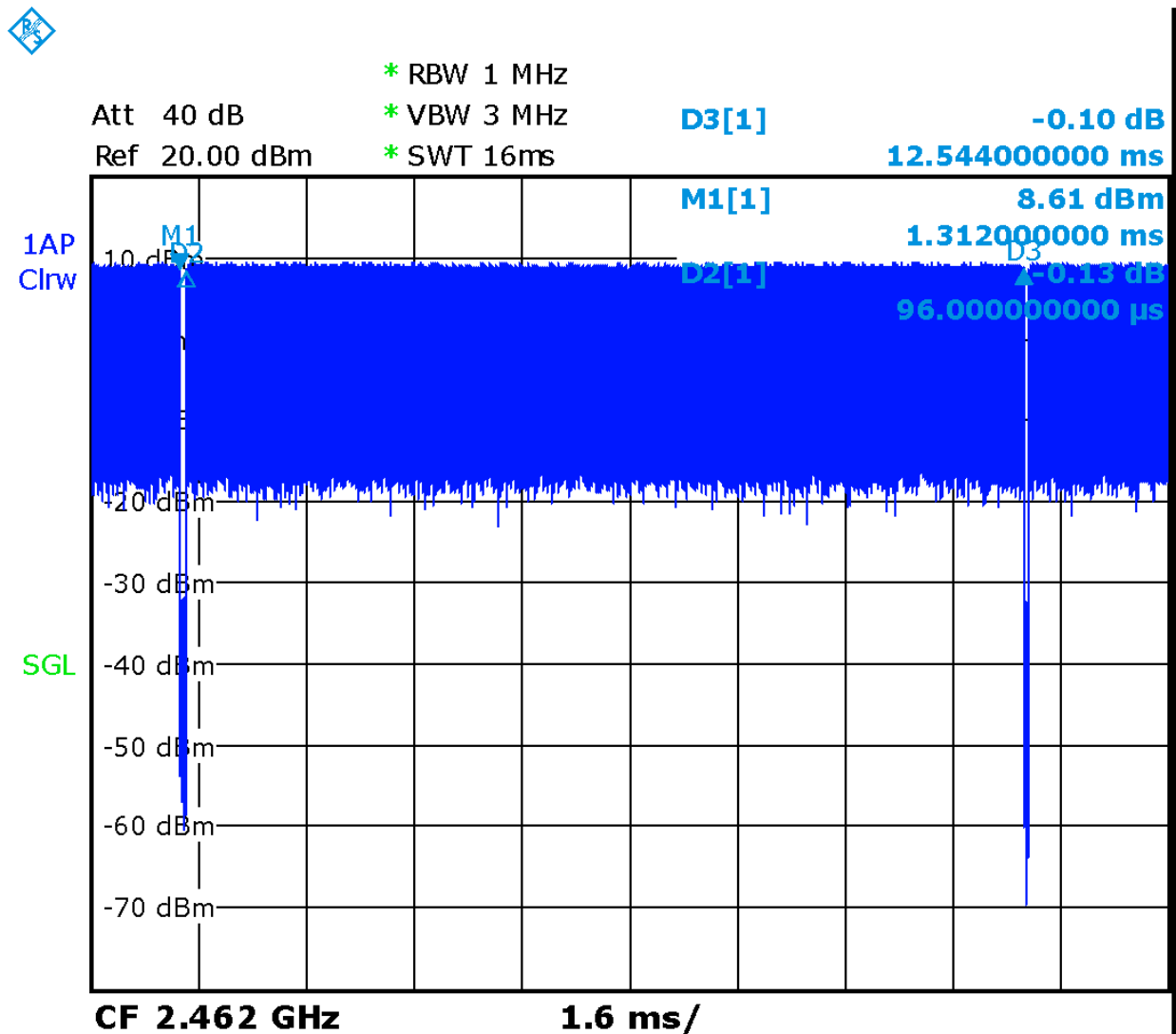
Note3: The distance between the EUT and the phantom bottom is 10mm

According to the KDB248227 D01, The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. The scaled reported SAR is presented as below.

Table 14.3-6: SAR Values (WLAN - Body) – 802.11b (Scaled Reported SAR) – ANT1

Frequency		Test Position	Actual duty factor	maximum duty factor	Reported SAR (1g)(W/kg)	Scaled reported SAR (1g)(W/kg)
MHz	Ch.					
2462	11	Rear 0mm	99.2%	100%	0.14	0.14

SAR is not required for OFDM because the 802.11b adjusted SAR ≤ 1.2 W/kg.



Picture 14.2 Duty factor plot

15 SAR Measurement Variability

SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium.

The following procedures are applied to determine if repeated measurements are required.

- 1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.
- 2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
- 3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg ($\sim 10\%$ from the 1-g SAR limit).
- 4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20

Table 15.1: SAR Measurement Variability for Body LTE Band7 (1g)

Frequency		Mode	Test Position	Spacing (mm)	Original SAR (W/kg)	First Repeated SAR (W/kg)	The Ratio	Second Repeated SAR (W/kg)
Ch.	MHz							
21350	2560	1RB-Middle	Front	10	0.869	0.854	1.02	/
21350	2560	1RB-Middle	Rear	10	0.928	0.89	1.04	/
21350	2560	1RB-Middle	Left	10	1.16	1.09	1.06	/

16 Measurement Uncertainty

16.1 Measurement Uncertainty for Normal SAR Tests (300MHz~3GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	6.0	N	1	1	1	6.0	6.0	∞
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	N	1	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	∞
10	RF ambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	∞
11	Probe positioned mech. restrictions	B	0.4	R	$\sqrt{3}$	1	1	0.2	0.2	∞
12	Probe positioning with respect to phantom shell	B	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
13	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Test sample related										
14	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
15	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
16	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
17	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
18	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
19	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
20	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
21	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521

Combined standard uncertainty	$u_c' = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$							9.55	9.43	257
Expanded uncertainty (confidence interval of 95 %)	$u_e = 2u_c$							19.1	18.9	

16.2 Measurement Uncertainty for Normal SAR Tests (3~6GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	6.55	N	1	1	1	6.55	6.55	∞
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	2.0	R	$\sqrt{3}$	1	1	1.2	1.2	∞
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	∞
10	RFambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	∞
11	Probe positioned mech. restrictions	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
12	Probe positioning with respect to phantom shell	B	6.7	R	$\sqrt{3}$	1	1	3.9	3.9	∞
13	Post-processing	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
Test sample related										
14	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
15	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
16	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
17	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
18	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
19	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
20	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞

21	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521
Combined standard uncertainty		$u_c = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$						10.7	10.6	257
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						21.4	21.1	

16.3 Measurement Uncertainty for Fast SAR Tests (300MHz~3GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	6.0	N	1	1	1	6.0	6.0	∞
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	∞
10	RF ambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	∞
11	Probe positioned mech. Restrictions	B	0.4	R	$\sqrt{3}$	1	1	0.2	0.2	∞
12	Probe positioning with respect to phantom shell	B	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
13	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
14	Fast SAR z-Approximation	B	7.0	R	$\sqrt{3}$	1	1	4.0	4.0	∞
Test sample related										
15	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
16	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
17	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
18	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
19	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞

20	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
21	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
22	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521
Combined standard uncertainty		$u_c = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$						10.4	10.3	257
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						20.8	20.6	

16.4 Measurement Uncertainty for Fast SAR Tests (3~6GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	6.55	N	1	1	1	6.55	6.55	∞
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	2.0	R	$\sqrt{3}$	1	1	1.2	1.2	∞
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	∞
10	RFambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	∞
11	Probe positioned mech. Restrictions	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
12	Probe positioning with respect to phantom shell	B	6.7	R	$\sqrt{3}$	1	1	3.9	3.9	∞
13	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
14	Fast SAR z-Approximation	B	14.0	R	$\sqrt{3}$	1	1	8.1	8.1	∞
Test sample related										
15	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
16	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
17	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞

Phantom and set-up										
18	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
19	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
20	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
21	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
22	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521
Combined standard uncertainty		$u_c = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$						13.5	13.4	257
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						27.0	26.8	

17 MAIN TEST INSTRUMENTS

Table 16.1: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	N5239A	MY46110673	January 24, 2020	One year
02	Power meter	NRP2	101919	May 12, 2020	One year
03	Power sensor	NRP-Z91	101547		
04	Signal Generator	E4438C	MY49070393	January 4, 2020	One Year
05	Amplifier	60S1G4	0331848	No Calibration Requested	
06	BTS	CMW500	129942	February 10, 2020	One year
07	E-field Probe	SPEAG EX3DV4	3617	Jan 30, 2020	One year
08	DAE	SPEAG DAE4	777	January 8, 2020	One year
09	Dipole Validation Kit	SPEAG D2450V2	853	July 21,2020	One year
10	Dipole Validation Kit	SPEAG D2600V2	1012	July 21,2020	One year

END OF REPORT BODY

ANNEX A Graph Results

LTE2500-FDD7_CH21350 Left 10mm

Date: 11/8/2020

Electronics: DAE4 Sn777

Medium: head 2600 MHz

Medium parameters used: $f = 2560$ MHz; $\sigma = 1.961$ mho/m; $\epsilon_r = 39.05$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: LTE2500-FDD7 2560 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN3617 ConvF(7.52,7.52,7.52)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 1.63 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 25.77 V/m; Power Drift = -0.19 dB

Peak SAR (extrapolated) = 2.36 W/kg

SAR(1 g) = 1.16 W/kg; SAR(10 g) = 0.562 W/kg

Maximum value of SAR (measured) = 1.92 W/kg

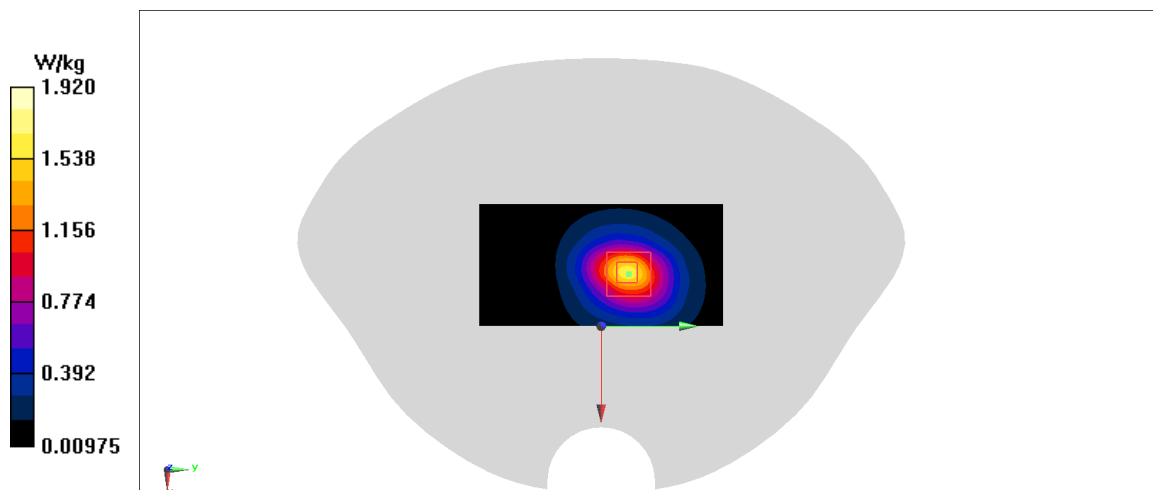


Fig A.1

WLAN2450_CH6 Rear 10mm-ANT0

Date: 11/7/2020

Electronics: DAE4 Sn777

Medium: head 2450 MHz

Medium parameters used: $f = 2437$; $\sigma = 1.798$ mho/m; $\epsilon_r = 39.94$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: WLAN2450 2437 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN3617 ConvF(7.65,7.65,7.65)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.197 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 10.09 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 0.231 W/kg

SAR(1 g) = 0.122 W/kg; SAR(10 g) = 0.067 W/kg

Maximum value of SAR (measured) = 0.187 W/kg

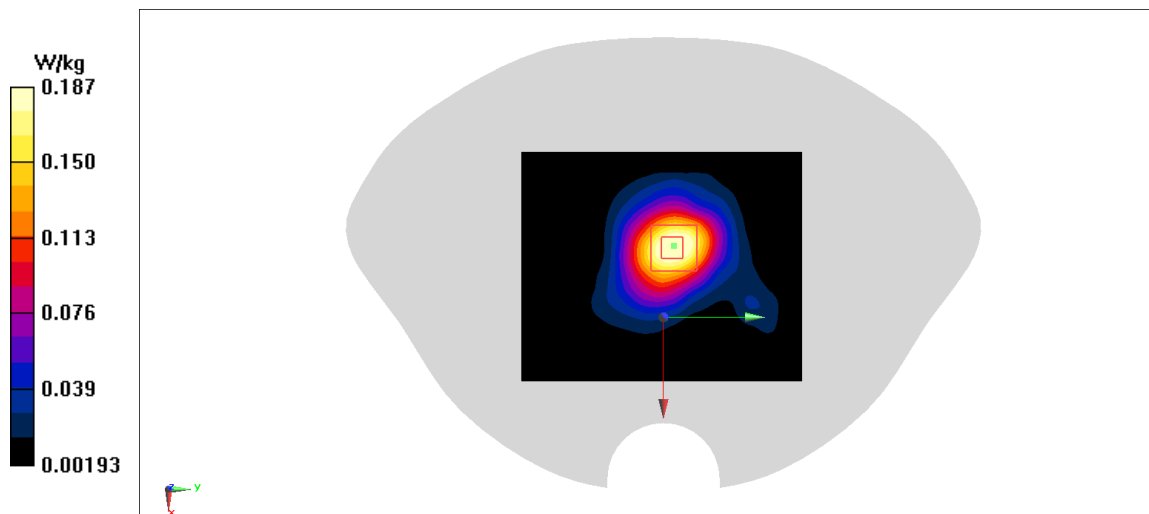


Fig A.2

WLAN2450_CH11 Rear 10mm-ANT1

Date: 11/7/2020

Electronics: DAE4 Sn777

Medium: head 2450 MHz

Medium parameters used: $f = 2462$; $\sigma = 1.821$ mho/m; $\epsilon_r = 39.91$; $\rho = 1000$ kg/m³

Ambient Temperature: 22.5°C, Liquid Temperature: 22.3°C

Communication System: WLAN2450 2462 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN3617 ConvF(7.65,7.65,7.65)

Area Scan (71x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.179 W/kg

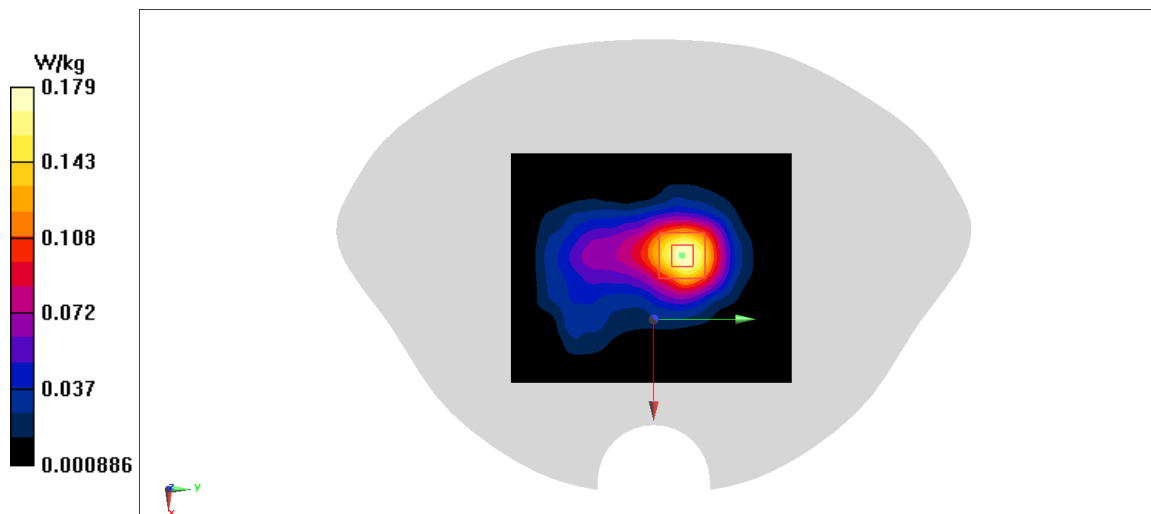
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

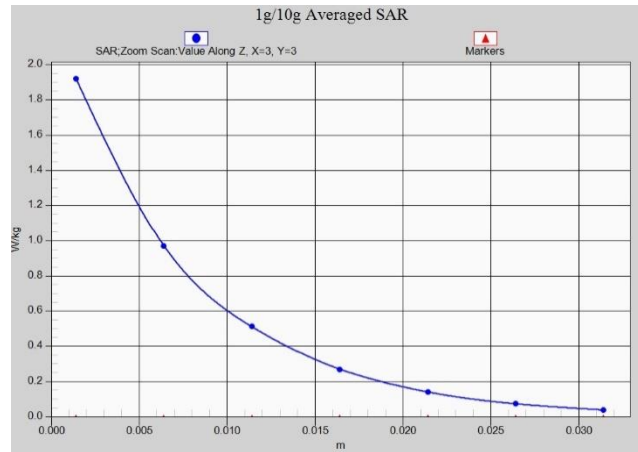
Reference Value = 7.851 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 0.22 W/kg

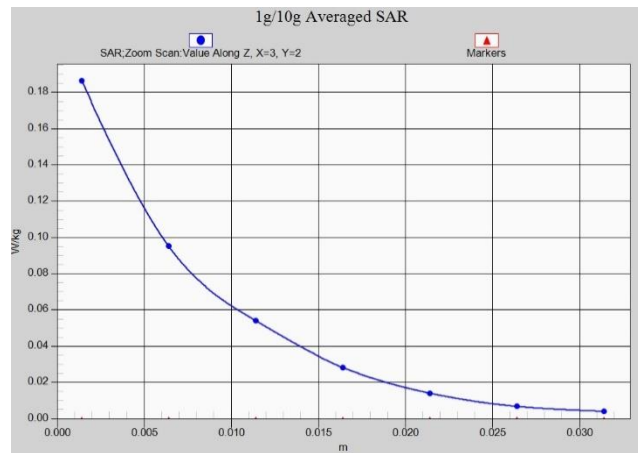
SAR(1 g) = 0.111 W/kg; SAR(10 g) = 0.058 W/kg

Maximum value of SAR (measured) = 0.179 W/kg

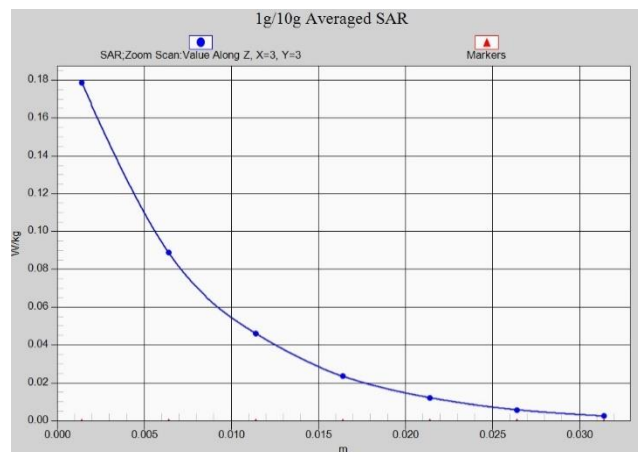
**Fig A.3**



Z-Scan at power reference point (LTE B7 Body)



Z-Scan at power reference point (WLAN2.4G Body – ANT0)



Z-Scan at power reference point (WLAN2.4G Body – ANT1)