



No.I21Z70041-SEM01



# SAR TEST REPORT

No. I21Z70041-SEM01

For

**SAMSUNG Electronics Co., Ltd.**

**Multi-band GSM/WCDMA/LTE/5GNR Phone with Bluetooth,WLAN**

**Model Name: SM-A226B/DS,SM-A226B**

with

**Hardware Version: REV1.0**

**Software Version: A226B.001**

**FCC ID: ZCASMA226B**

**Issued Date: 2021-5-7**

**Note:**

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## REPORT HISTORY

Report Number	Revision	Issue Date	Description
I21Z70041-SEM01	Rev.0	2021-4-15	Initial creation of test report
I21Z70041-SEM01	Rev.1	2021-4-22	<ol style="list-style-type: none"> <li>1. Revise Tx frequency of WiFi5G on section4.1 page9, and section11.4 page59-60.</li> <li>2. Revise applicant information on section3.1.</li> <li>3. Add some relative TCBC workshops for SAR measurement for EN-DC on section5.2.</li> <li>4. Add power results of DL CA on page58.</li> <li>5. Update the probe calibration report on ANNEX G.</li> <li>6. Revise the simultaneous process of ENDC on Table13.4 page64.</li> <li>7. Revise ENDC combination in SAR test setup photo.</li> </ol>
I21Z70041-SEM01	Rev.2	2021-4-29	<ol style="list-style-type: none"> <li>1. Add SAR results for 10-g extremity SAR on section14.6.</li> </ol>
I21Z70041-SEM01	Rev.3	2021-5-1	Update the information on Table 2.3 page 7 and Table 13.2 page 64 of test report.
I21Z70041-SEM01	Rev.4	2021-5-7	Update conductive power for DL CA on page58.

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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 $\Omega$
Ambient noise & Reflection:	< 0.012 W/kg

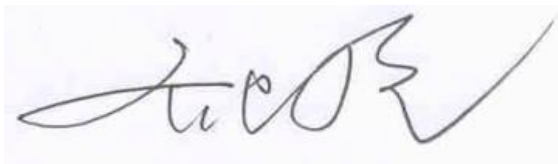
### 1.3 Project Data

Project Leader:	Qi Dianyuan
Test Engineer:	Lin Xiaojun
Testing Start Date:	April 5, 2021
Testing End Date:	April 11, 2021

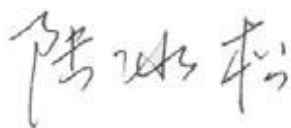
### 1.4 Signature



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 SAMSUNG Electronics Co., Ltd. Multi-band GSM/WCDMA/LTE/5GNR Phone with Bluetooth, WLAN SM-A226B/DS, SM-A226B are as follows:

**Table 2.1: Highest Reported SAR (1g)**

Technology Band	Head (Separation Distance 0mm)	Hotspot (Separation Distance 10mm)	Body-Worn (Separation Distance 15mm)	Equipment Class
GSM850	<b>0.39</b>	<b>0.93</b>	/	PCE
GSM1900	<b>0.12</b>	<b>1.00</b>	/	
WCDMA1900	<b>0.40</b>	<b>0.76</b>	<b>0.55</b>	
WCDMA 850	<b>0.37</b>	<b>0.65</b>	/	
LTE Band2	<b>0.29</b>	<b>0.98</b>	<b>0.60</b>	
LTE Band5	<b>0.29</b>	<b>0.57</b>	/	
LTE Band7-ANT0	<b>0.26</b>	<b>1.05</b>	<b>0.79</b>	
LTE Band7-ANT4	<b>0.71</b>	<b>0.66</b>	<b>0.37</b>	
LTE Band41	<b>0.10</b>	<b>0.78</b>	/	
5G NR n5	<b>0.28</b>	<b>0.45</b>	/	
WLAN 2.4GHz	<b>0.38</b>	<b>0.54</b>	/	DTS
WLAN 5GHz	<b>0.77</b>	<b>0.70</b>	/	NII

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 10/15 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: **1.05 W/kg(1g)**.

**Table 2.2: The sum of SAR values for Main antenna + WiFi-2.4G**

	Position	Main antenna	WiFi-2.4G	Sum
<b>Highest SAR value for Head</b>	Right head, Tilt (ENDC 7A-n5A)	0.86	0.13	<b>0.99</b>
<b>Highest SAR value for Body</b>	Rear 10mm (LTE Band2)	0.98	0.54	<b>1.52</b>

**Table 2.3: The sum of SAR values for Main antenna + WiFi-5G**

	Position	Main antenna	WiFi-5G	Sum
<b>Highest SAR value for Head</b>	Left head, Tilt (ENDC 7A-n5A)	0.83	0.76	<b>1.22</b>
<b>Highest SAR value for Body</b>	Rear 10mm (LTE Band2)	0.98	0.41	<b>1.39</b>

**Table 2.4: The sum of reported SAR values for main antenna and BT**

	Position	Main antenna	BT	Sum
<b>Maximum reported SAR value for Head</b>	Right head, Tilt (ENDC 7A-n5A)	0.86	<0.01	<b>0.86</b>
<b>Maximum reported SAR value for Body</b>	Bottom 10mm (LTE Band7)	1.05	<0.01	<b>1.05</b>

According to the above tables, the highest sum of reported SAR values is **1.52 W/kg (1g)**. The detail for simultaneous transmission consideration is described in chapter 13.

According to the KDB648474 D04, the UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna located at  $\leq 25$  mm from that surface or edge, in direct contact with a flat phantom, for 10-g extremity SAR according to the body-equivalent tissue dielectric parameters in KDB Publication 865664 D01 to address interactive hand use exposure conditions. When hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg

**Table 2.5: 0mm Reported SAR for phablet**

Exposure Configuration	Technology Band	Highest Reported SAR 10g(W/kg)	Limited SAR 10g(W/kg)
10-g extremity SAR (Separation Distance 0mm)	WCDMA1900	3.20	4.0
	LTE Band2	3.29	
	LTE Band7-ANT0	2.40	
	LTE Band7-ANT4	0.36	
	WIFI2450	1.45	
	WIFI5G	1.05	



### 3 Client Information

#### 3.1 Applicant Information

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#### 3.2 Manufacturer Information

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Contact Email:	ggobi.cho@samsung.com
Telephone:	+82-10-2722-4159



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

### 4.1 About EUT

Description:	Multi-band GSM/WCDMA/LTE/5GNR Phone with Bluetooth, WLAN
Model name:	SM-A226B/DS, SM-A226B
Operating mode(s):	GSM850/900/1800/1900, WCDMA850/900/1900/2100 LTE Band 1/2/3/5/7/8/20/28/38/40/41 BT, Wi-Fi(2.4G/5G),NR 5G
Tested Tx Frequency:	824 – 849 MHz (GSM 850)
	1850 – 1910 MHz (GSM 1900)
	824 – 849 MHz (WCDMA 850 Band V)
	1850 – 1910 MHz (WCDMA1900 Band II)
	1850.7 – 1909.3 MHz (LTE Band 2)
	824.7 – 848.3 MHz (LTE Band 5)
	2502.5 – 2567.5 MHz (LTE Band 7)
	2542.5 –2637.5 MHz (LTE Band 41)
	824 – 849 MHz (n5)
	2412 – 2462 MHz (Wi-Fi 2.4G)
	5180 – 5240 MHz (Wi-Fi 5.2G)
	5260 – 5320 MHz (Wi-Fi 5.3G)
	5500 – 5700 MHz (Wi-Fi 5.5G)
	5745 – 5825 MHz (Wi-Fi 5.8G)
2400 – 2483.5 MHz (Bluetooth)	
GPRS/EGPRS Multislot Class:	12
Test device Production information:	Production unit
Device type:	Portable device
Antenna type:	Integrated antenna
Hotspot mode:	Support

#### 4.2 Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version
EUT1	70042UT12a	REV1.0	A226B.001
EUT2	70042UT17a	REV1.0	A226B.001
EUT3	70042UT10a	REV1.0	A226B.001
EUT4	70042UT29a	REV1.0	A226B.001
EUT5	70042UT31a	REV1.0	A226B.001
EUT6	70042UT06a	REV1.0	A226B.001
EUT7	70042UT09a	REV1.0	A226B.001
EUT8	70042UT05a	REV1.0	A226B.001
EUT9	70042UT16a	REV1.0	A226B.001
EUT10	70042UT08a	REV1.0	A226B.001

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

**Note:** It is performed to test SAR with the EUT1-5 and conducted power with the EUT6-10

#### 4.3 Internal Identification of AE used during the test

AE ID*	Description	Model	SN	Manufacturer
AE1	Battery	SCUD-WT-W1	/	SCUD(Fujian) Electronic Co.,Ltd.
AE2	Headset	EHS61ASFWE	/	WATA ELECTRONICS CO., LTD
AE3	Headset	EHS61ASFWE	/	Dongguan Yongbao Electronics Co. , Ltd.

\*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.

**KDB648474 D04 Handset SAR v01r03:** SAR Evaluation Considerations for Wireless Handsets.

**KDB941225 D01 SAR test for 3G devices v03r01:** SAR Measurement Procedures for 3G Devices

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

**KDB941225 D06 Hotspot Mode SAR v02r01:** SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities

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

**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

**TCB Workshop Nov 2017:** RF Exposure Procedures (Carrier Aggregation SAR)

**TCB Workshop Nov 2019:** RF Exposure Policy Updates (5G NR NSA Sub 6G SAR)

## 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 ( $\rho$ ). 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,  $\delta T$  is the temperature rise and  $\delta t$  is the exposure duration, or related to the electrical field in the tissue by

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

Where:  $\sigma$  is the conductivity of the tissue,  $\rho$  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**

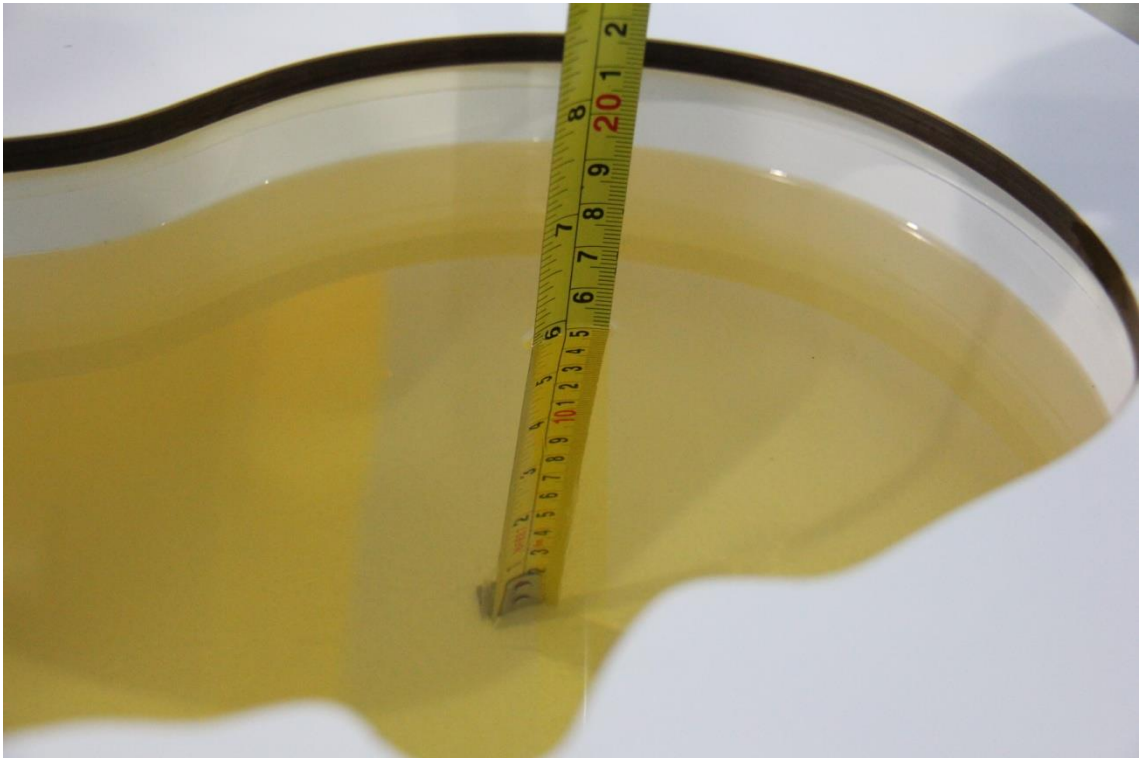
Frequency(MHz)	Liquid Type	Conductivity( $\sigma$ )	$\pm 5\%$ Range	Permittivity( $\epsilon$ )	$\pm 5\%$ Range
835	Head	0.90	0.86~0.95	41.5	39.4~43.6
1900	Head	1.40	1.33~1.47	40.0	38.0~42.0
2450	Head	1.67	1.59~1.75	39.47	37.5~41.4
2600	Head	1.96	1.86~2.06	39.01	37.1~41.0

### 7.2 Dielectric Performance

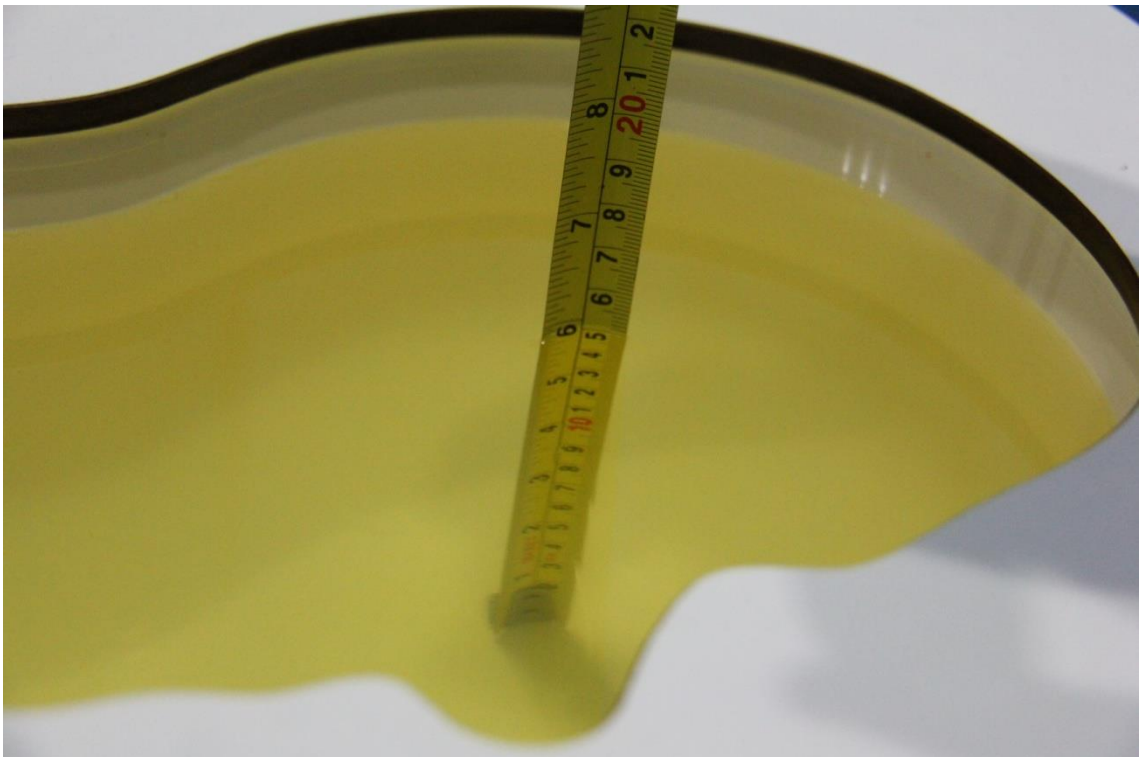
**Table 7.2: Dielectric Performance of Tissue Simulating Liquid**

Measurement Date (yyyy-mm-dd)	Type	Frequency	Permittivity $\epsilon$	Drift (%)	Conductivity $\sigma$ (S/m)	Drift (%)
2021-4-5	Head	835 MHz	6.25	9.60	6.24	9.72
2021-4-6	Head	1900 MHz	20.6	39.6	20.44	39.76
2021-4-7	Head	2450 MHz	24.5	52.5	24.28	52.52
2021-4-8	Head	2600 MHz	25.3	57.0	24.84	57.44
2021-4-9	Head	5250 MHz	22.9	80.5	22.5	81.2
2021-4-10	Head	5600 MHz	23.6	83.3	23.4	83.0
2021-4-11	Head	5750 MHz	22.7	80.4	22.5	80.1

Note: The liquid temperature is 22.0°C



Picture 7-1 Liquid depth in the Head Phantom (835 MHz)



Picture 7-2 Liquid depth in the Head Phantom (1900 MHz)



Picture 7-3 Liquid depth in the Head Phantom (2450MHz)



Picture 7-4 Liquid depth in the Head Phantom (2600 MHz)



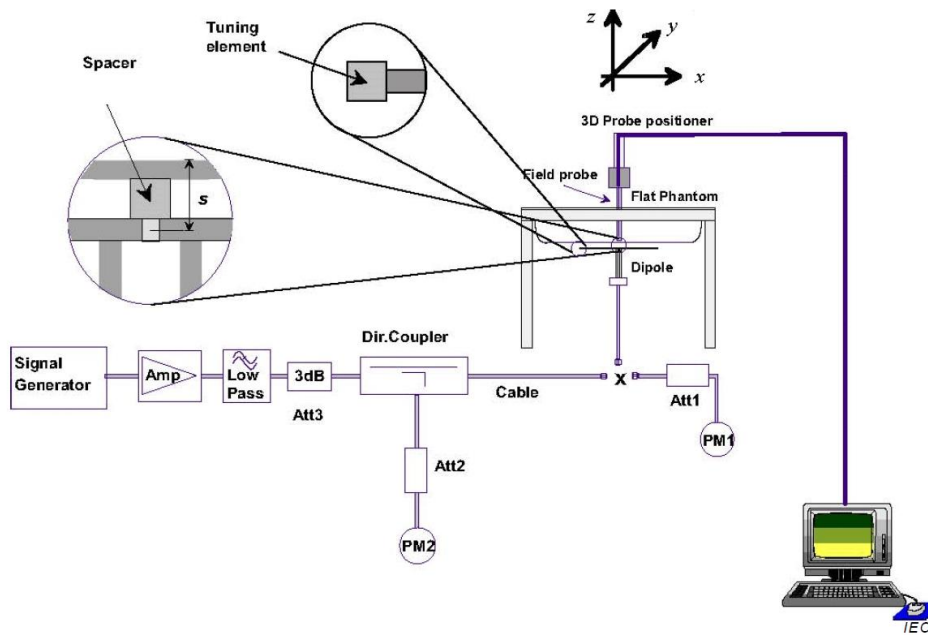
Picture 7-5 Liquid depth in the Head Phantom (5GHz)



## 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
2021-4-5	835 MHz	6.25	9.60	6.24	9.72	-0.16%	1.25%
2021-4-6	1900 MHz	20.6	39.6	20.44	39.76	-0.78%	0.40%
2021-4-7	2450 MHz	24.5	52.5	24.28	52.52	-0.90%	0.04%
2021-4-8	2600 MHz	25.3	57.0	24.84	57.44	-1.82%	0.77%
2021-4-9	5250 MHz	22.9	80.5	22.5	81.2	-1.83%	0.82%
2021-4-10	5600 MHz	23.6	83.3	23.4	83.0	-0.85%	-0.41%
2021-4-11	5750 MHz	22.7	80.4	22.5	80.1	-0.97%	-0.40%

## 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.

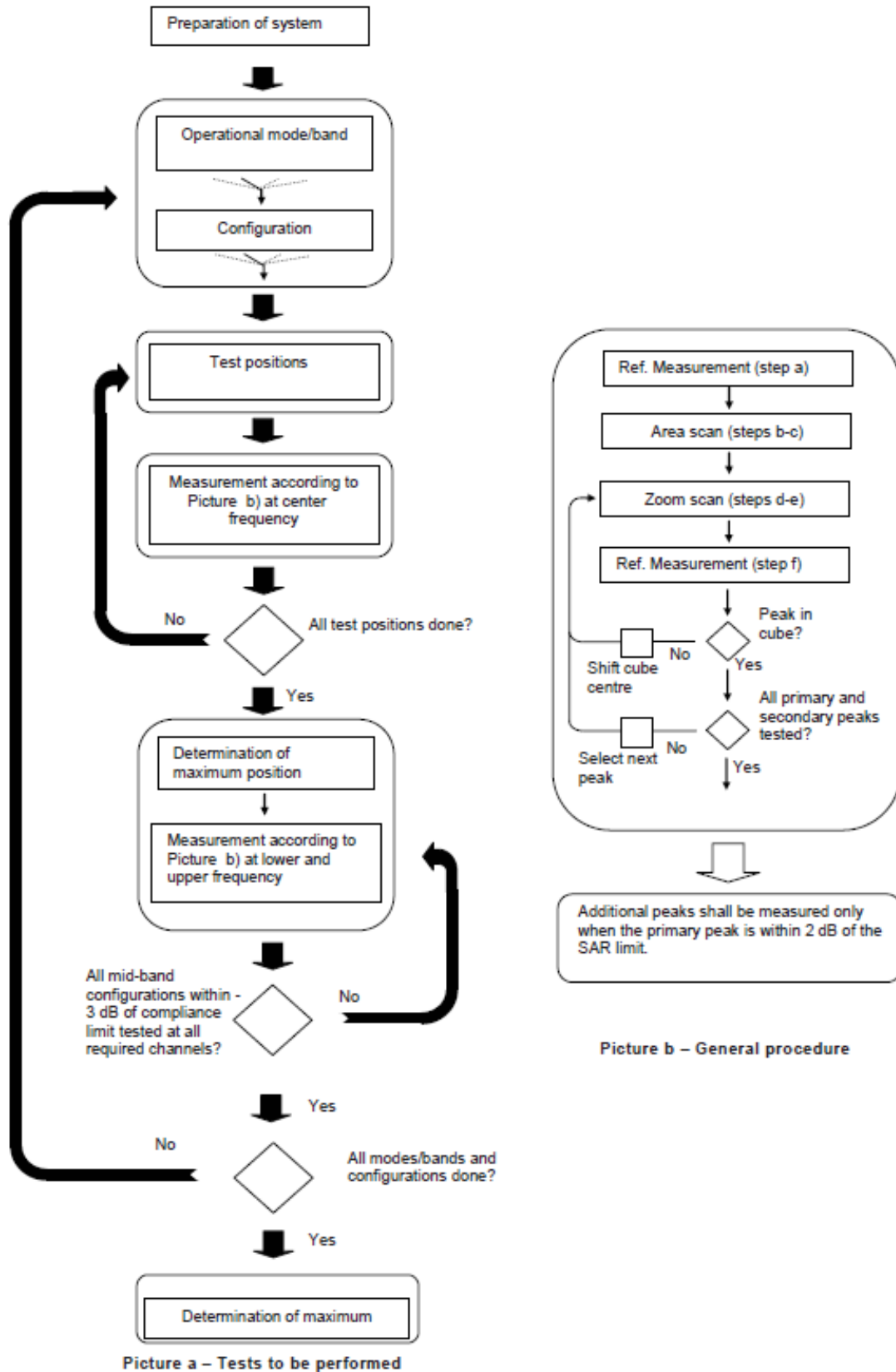
**Step 1:** The tests described in 9.2 shall be performed at the channel that is closest to the centre of the transmit frequency band ( $f_c$ ) for:

- 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.

		$\leq 3$ GHz	$> 3$ GHz	
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface		$5 \pm 1$ 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: $\Delta x_{Area}, \Delta y_{Area}$		$\leq 2$ GHz: $\leq 15$ mm 2 – 3 GHz: $\leq 12$ mm	3 – 4 GHz: $\leq 12$ mm 4 – 6 GHz: $\leq 10$ 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: $\Delta x_{Zoom}, \Delta y_{Zoom}$		$\leq 2$ GHz: $\leq 8$ mm 2 – 3 GHz: $\leq 5$ mm*	3 – 4 GHz: $\leq 5$ mm* 4 – 6 GHz: $\leq 4$ mm*	
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$	$\leq 5$ mm	3 – 4 GHz: $\leq 4$ mm 4 – 5 GHz: $\leq 3$ mm 5 – 6 GHz: $\leq 2$ mm	
	graded grid	$\Delta z_{Zoom}(1)$ : between 1 <sup>st</sup> two points closest to phantom surface	$\leq 4$ mm	3 – 4 GHz: $\leq 3$ mm 4 – 5 GHz: $\leq 2.5$ mm 5 – 6 GHz: $\leq 2$ 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	$\geq 30$ mm	3 – 4 GHz: $\geq 28$ mm 4 – 5 GHz: $\geq 25$ mm 5 – 6 GHz: $\geq 22$ mm	
Note: $\delta$ 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 $\leq 1.4$ W/kg, $\leq 8$ mm, $\leq 7$ mm and $\leq 5$ 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 WCDMA Measurement Procedures for SAR

The following procedures are applicable to WCDMA handsets operating under 3GPP Release99, Release 5 and Release 6. The default test configuration is to measure SAR with an established radio link between the DUT and a communication test set using a 12.2kbps RMC (reference measurement channel) configured in Test Loop Mode 1. SAR is selectively confirmed for other physical channel configurations (DPCCH & DPDCH<sub>n</sub>), HSDPA and HSPA (HSUPA/HSDPA) modes according to output power, exposure conditions and device operating capabilities. Both uplink and downlink should be configured with the same RMC or AMR, when required. SAR for Release 5 HSDPA and Release 6 HSPA are measured using the applicable FRC (fixed reference channel) and E-DCH reference channel configurations. Maximum output power is verified according to applicable versions of 3GPP TS 34.121 and SAR must be measured according to these maximum output conditions. When Maximum Power Reduction (MPR) is not implemented according to Cubic Metric (CM) requirements for Release 6 HSPA, the following procedures do not apply.

#### For Release 5 HSDPA Data Devices:

Sub-test	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c / \beta_d$	$\beta_{hs}$	CM/dB
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15	15/15	64	12/15	24/25	1.0
3	15/15	8/15	64	15/8	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5

#### For Release 6 HSPA Data Devices

Sub-test	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c / \beta_d$	$\beta_{hs}$	$\beta_{ec}$	$\beta_{ed}$	$\beta_{ed}$ (SF)	$\beta_{ed}$ (codes)	CM (dB)	MPR (dB)	AG Index	E-TFCI
1	11/15	15/15	64	11/15	22/15	209/225	1039/225	4	1	1.5	1.5	20	75
2	6/15	15/15	64	6/15	12/15	12/15	12/15	4	1	1.5	1.5	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed1} : 47/15$ $\beta_{ed2} : 47/15$	4	2	1.5	1.5	15	92
4	2/15	15/15	64	2/15	4/15	4/15	56/75	4	1	1.5	1.5	17	71
5	15/15	15/15	64	15/15	24/15	30/15	134/15	4	1	1.5	1.5	21	81

#### Rel.8 DC-HSDPA (Cat 24)

SAR test exclusion for Rel.8 DC-HSDPA must satisfy the SAR test exclusion requirements of Rel.5 HSDPA. SAR test exclusion for DC-HSDPA devices is determined by power measurements according to the H-Set 12, Fixed Reference Channel (FRC) configuration in Table C.8.1.12 of 3GPP TS 34.121-1. A primary and a secondary serving HS-DSCH Cell are required to perform the power measurement and for the results to qualify for SAR test exclusion.

## 9.4 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  $\leq 0.8$  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

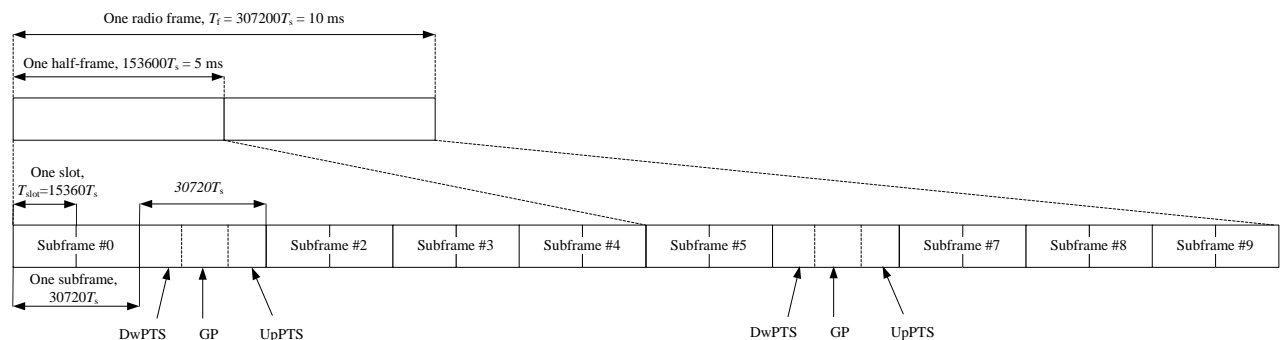
The procedures required for 1 RB allocation in 1) are applied to measure the SAR for QPSK with 50% RB allocation.

### 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  $\leq 0.8$  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.

## TDD test:

TDD testing is performed using guidance from FCC KDB 941225 D05 and the SAR test guidance provided in April 2013 TCB works hop notes. TDD is tested at the highest duty factor using UL-DL configuration 0 with special subframe configuration 6 and applying the FDD LTE procedures in KDB 941225 D05. SAR testing is performed using the extended cyclic prefix listed in 3GPP TS 36.211.



**Figure 9.2: Frame structure type 2 (for 5 ms switch-point periodicity)**

**Table 9.1: 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	$26336 \cdot T_s$			$7680 \cdot T_s$		
5	$6592 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$20480 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			$12800 \cdot T_s$		
8	$24144 \cdot T_s$			-		
9	$13168 \cdot T_s$			-		

**Table 9.2: 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

Duty factor is calculated by:

Duty factor = uplink frame\*6+UpPTS\*2/one frame length

$$= (30720 \cdot T_s * 6 + 5120 \cdot T_s * 2) / 307200 \cdot T_s$$

$$= 0.633$$



## 9.5 Bluetooth & Wi-Fi Measurement Procedures for SAR

Normal network operating configurations are not suitable for measuring the SAR of 802.11 transmitters in general. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure that the results are consistent and reliable.

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in a test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters. The test frequencies should correspond to actual channel frequencies defined for domestic use. SAR for devices with switched diversity should be measured with only one antenna transmitting at a time during each SAR measurement, according to a fixed modulation and data rate. The same data pattern should be used for all measurements.

## 9.6 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  $\leq 1.2$  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

**Table11: Summary of Receiver detection mechanism**

<b>Antenna</b>	<b>Receiver on (head scenario)</b>	<b>Receiver off + Hotspot off (Body scenario)</b>	<b>Receiver off + Hotspot on (Hotspot scenario)</b>
Main Antenna/ Wifi Antenna	Power Level A1	Power Level B1	Power Level C1

For WWAN, When the phone hotspot worked, then power reduction will be implemented immediately at WCDMA B2 and LTEB2/B7. When SAR sensor triggered, then power reduction will be implemented immediately at LTEB7.

For WiFi, when the phone is in head mode and receiver off, then power reduction will be implemented immediately at WiFi2.4G/WiFi5G.

## 11.1 GSM Measurement result

During the process of testing, the EUT was controlled via Agilent Digital Radio Communication tester (E5515C) to ensure the maximum power transmission and proper modulation. This result contains conducted output power for the EUT. In all cases, the measured peak output power should be greater and within 5% than EMI measurement.

**Table 11.1-1: The conducted power measurement results-Power Level A1/B1/C1**

GSM 850 Speech (GMSK)	Measured Power (dBm)			Tune up	calculation	Averaged Power (dBm)		
	251	190	128			251	190	128
1 Txslot	31.97	31.99	31.89	33.50	/	/	/	/
GSM 850 GPRS (GMSK)	Measured Power (dBm)				calculation	Averaged Power (dBm)		
	251	190	128			251	190	128
1 Txslot	32.05	32.06	31.95	33.50	-9.03	23.02	23.03	22.92
2 Txslots	31.26	31.26	31.14	32.00	-6.02	25.24	25.24	25.12
3 Txslots	29.47	29.44	29.31	31.00	-4.26	25.21	25.18	25.05
<b>4 Txslots</b>	<b>28.33</b>	<b>28.29</b>	<b>28.23</b>	<b>30.00</b>	<b>-3.01</b>	<b>25.32</b>	<b>25.28</b>	<b>25.22</b>
GSM 850 EGPRS (GMSK)	Measured Power (dBm)				calculation	Averaged Power (dBm)		
	251	190	128			251	190	128
1 Txslot	32.18	32.15	32.05	33.50	-9.03	23.15	23.12	23.02
2 Txslots	31.40	31.36	31.25	32.00	-6.02	25.38	25.34	25.23
3 Txslots	29.61	29.55	29.43	31.00	-4.26	25.35	25.29	25.17
<b>4 Txslots</b>	<b>28.48</b>	<b>28.40</b>	<b>28.26</b>	<b>30.00</b>	<b>-3.01</b>	<b>25.47</b>	<b>25.39</b>	<b>25.25</b>
GSM 850 EGPRS (8PSK)	Measured Power (dBm)				calculation	Averaged Power (dBm)		
	251	190	128			251	190	128
1 Txslot	26.77	26.93	26.98	27.00	-9.03	17.74	17.90	17.95
2 Txslots	25.69	25.80	25.73	26.00	-6.02	19.67	19.78	19.71
3Txslots	24.14	23.72	23.63	25.00	-4.26	19.88	19.46	19.37
4 Txslots	22.45	22.31	23.37	24.00	-3.01	19.44	19.30	20.36
PCS1900 Speech (GMSK)	Measured Power (dBm)			Tune up	calculation	Averaged Power (dBm)		
	810	661	512			810	661	512
1 Txslot	28.84	28.85	28.93	30.50	/	/	/	/
PCS1900 GPRS (GMSK)	Measured Power (dBm)				calculation	Averaged Power (dBm)		
	810	661	512			810	661	512
1 Txslot	29.13	29.17	29.23	30.50	-9.03	20.10	20.14	20.20
2 Txslots	28.37	28.40	28.44	29.50	-6.02	22.35	22.38	22.42
3 Txslots	26.63	26.66	26.68	28.50	-4.26	22.37	22.40	22.42
<b>4 Txslots</b>	<b>25.50</b>	<b>25.53</b>	<b>25.51</b>	<b>27.50</b>	<b>-3.01</b>	<b>22.49</b>	<b>22.52</b>	<b>22.50</b>
PCS1900 EGPRS (GMSK)	Measured Power (dBm)				calculation	Averaged Power (dBm)		
	810	661	512			810	661	512
1 Txslot	29.15	29.18	29.23	30.50	-9.03	20.12	20.15	20.20
2 Txslots	28.40	28.40	28.44	29.50	-6.02	22.38	22.38	22.42
3 Txslots	26.65	26.66	26.69	28.50	-4.26	22.39	22.40	22.43

<b>4 Txslots</b>	25.52	25.54	25.52	27.50	-3.01	22.51	22.53	22.51
PCS1900	Measured Power (dBm)				calculation	Averaged Power (dBm)		
EGPRS (8PSK)	810	661	512			810	661	512
1 Txslot	25.98	25.96	25.97	26.00	-9.03	16.95	16.93	16.94
2 Txslots	24.98	24.95	24.91	25.00	-6.02	18.96	18.93	18.89
3Txslots	23.09	23.33	23.08	24.00	-4.26	18.83	19.07	18.82
4 Txslots	22.27	21.77	21.53	23.00	-3.01	19.26	18.76	18.52

## NOTES:

## 1) Division Factors

To average the power, the division factor is as follows:

1TX-slot = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB

2TX-slots = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB

3TX-slots = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB

4TX-slots = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB

**According to the conducted power as above, the body measurements are performed with 4Txslots for GSM850 and GSM1900.**

**11.2 WCDMA Measurement result**
**Table 11.2-1: The conducted Power for WCDMA-Power Level A1/B1**

WCDMA850	FDDV result (dBm)			Tune up
	4233/4458	4183/4408	4132/4357	
	(846.6MHz)	(836.6MHz)	(826.4MHz)	
	23.83	23.85	23.87	25.00
HSUPA	21.09	20.80	20.66	22.30
	20.71	20.79	20.80	22.30
	21.35	21.32	21.32	23.30
	20.26	20.35	20.35	21.80
	21.7	21.79	21.80	23.30
DC-HSDPA	22.69	22.87	22.84	23.30
	22.69	22.85	22.71	23.30
	22.26	22.40	22.37	23.30
	22.23	22.37	22.34	23.30
WCDMA1900	FDDII result (dBm)			Tune up
	9538/9938	9400/9800	9262/9662	
	(1907.6MHz)	(1880MHz)	(1852.4MHz)	
	23.22	23.13	23.18	24.50
HSUPA	20.97	20.93	20.95	21.80
	20.47	20.40	20.43	21.80
	21.36	21.29	21.45	22.80
	19.93	19.89	19.90	21.30
	21.36	21.27	21.40	22.80
DC-HSDPA	22.44	22.40	22.41	22.80
	22.41	22.24	22.28	22.80
	21.95	21.91	21.95	22.30
	21.89	21.83	21.86	22.30

**Table 11.2-2: The conducted Power for WCDMA- Power Level C1**

WCDMA1900	FDDII result (dBm)			Tune up
	9538/9938	9400/9800	9262/9662	
	(1907.6MHz)	(1880MHz)	(1852.4MHz)	
	22.10	22.15	22.25	23.00
HSUPA	19.47	19.37	19.05	21.00
	19.09	19.11	19.14	21.00
	19.12	19.14	19.24	21.00
	18.67	18.64	18.62	20.00
	20.08	20.08	20.05	21.50
DC-HSDPA	20.99	20.94	21.03	22.00
	20.99	20.90	20.96	22.00
	20.53	20.62	20.75	22.00
	20.50	20.62	20.68	22.00

### 11.3 LTE Measurement result

#### Maximum Target Power for Production Unit – Power Level A1/B1/C1

Band	Tune up (dBm)		
	Level A1	Level B1	Level C1
Band2	24.5	24.5	23
Band 5	24.5	24.5	24.5
Band 7-ANT0	24.5	24.5	21
Band 7-ANT4	16.5	24.5	20.5
Band 41	24.5	24.5	24.5

MPR condition (1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz)-Normal power

RB Size	Mod.	MPR	MPR (1.4MHz case)
1	QPSK	0	0
50%	QPSK	1	0
100%	QPSK	1	1
1	16-QAM	1	1
50%	16-QAM	2	1
100%	16-QAM	2	2

\*MPRTolerance:±0.5dB

MPR condition (1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz)-Low power

RB Size	Mod.	MPR	MPR (1.4MHz case)
1	QPSK	0	0
50%	QPSK	0	0
100%	QPSK	0	0
1	16-QAM	0	0
50%	16-QAM	0	0
100%	16-QAM	0	0

\*MPRTolerance:±0.5dB



Band2-Power Level A1/B1					
BANDWIDTH	Number of RBs	Frequency	QPSK	16QAM	64QAM
1.4MHz	1RB-High (5)	1909.3 (19193)	23.79	22.49	21.96
		1880 (18900)	23.55	22.57	21.94
		1850.7 (18607)	23.72	22.86	21.97
	1RB-Middle (3)	1909.3 (19193)	23.79	22.48	21.93
		1880 (18900)	23.73	22.58	21.92
		1850.7 (18607)	23.49	22.86	21.99
	1RB-Low (0)	1909.3 (19193)	23.48	22.49	22.01
		1880 (18900)	23.62	22.60	21.97
		1850.7 (18607)	23.63	22.87	21.95
	3RB-High (3)	1909.3 (19193)	23.44	22.63	21.96
		1880 (18900)	23.44	22.52	21.87
		1850.7 (18607)	23.44	22.71	21.94
	3RB-Middle (1)	1909.3 (19193)	23.47	22.64	21.98
		1880 (18900)	23.47	22.48	21.87
		1850.7 (18607)	23.44	22.75	21.92
	3RB-Low (0)	1909.3 (19193)	23.46	22.65	21.97
		1880 (18900)	23.46	22.49	21.87
		1850.7 (18607)	23.45	22.75	21.94
	6RB (0)	1909.3 (19193)	22.46	21.86	20.86
		1880 (18900)	22.46	21.72	20.73
		1850.7 (18607)	22.48	21.49	20.81
3MHz	1RB-High (14)	1908.5 (19185)	23.75	22.42	21.91
		1880 (18900)	23.51	22.31	22.00
		1851.5 (18615)	23.72	22.88	21.97
	1RB-Middle (7)	1908.5 (19185)	23.80	22.49	22.13
		1880 (18900)	23.57	22.41	21.99
		1851.5 (18615)	23.73	22.89	22.01
	1RB-Low (0)	1908.5 (19185)	23.49	22.44	21.99
		1880 (18900)	23.48	22.34	21.88
		1851.5 (18615)	23.48	22.84	21.97
	8RB-High (7)	1908.5 (19185)	22.44	21.71	20.91
		1880 (18900)	22.44	21.65	20.79
		1851.5 (18615)	22.43	21.70	20.84
	8RB-Middle (4)	1908.5 (19185)	22.45	21.74	20.89
		1880 (18900)	22.44	21.67	20.81
		1851.5 (18615)	22.44	21.72	20.87
	8RB-Low (0)	1908.5 (19185)	22.45	21.70	20.93
		1880 (18900)	22.44	21.66	20.79
		1851.5 (18615)	22.44	21.75	20.88
	15RB (0)	1908.5 (19185)	22.46	21.61	20.90
		1880 (18900)	22.46	21.62	20.77
		1851.5 (18615)	22.46	21.69	20.79

5MHz	1RB-High (24)	1907.5 (19175)	23.58	22.48	22.02	
		1880 (18900)	23.58	22.75	21.92	
		1852.5 (18625)	23.57	23.15	22.05	
	1RB-Middle (12)	1907.5 (19175)	23.62	22.51	22.04	
		1880 (18900)	23.63	22.80	21.96	
		1852.5 (18625)	23.56	23.19	22.06	
	1RB-Low (0)	1907.5 (19175)	23.57	22.52	21.94	
		1880 (18900)	23.57	22.75	21.99	
		1852.5 (18625)	23.52	23.13	21.97	
	12RB-High (13)	1907.5 (19175)	22.48	21.66	20.88	
		1880 (18900)	22.42	21.61	20.85	
		1852.5 (18625)	22.50	21.72	20.84	
	12RB-Middle (6)	1907.5 (19175)	22.54	21.75	20.92	
		1880 (18900)	22.44	21.64	20.84	
		1852.5 (18625)	22.56	21.76	20.86	
	12RB-Low (0)	1907.5 (19175)	22.56	21.77	20.96	
		1880 (18900)	22.49	21.66	20.81	
		1852.5 (18625)	22.58	21.83	20.87	
	25RB (0)	1907.5 (19175)	22.53	21.61	20.89	
		1880 (18900)	22.47	21.63	20.80	
		1852.5 (18625)	22.52	21.74	20.85	
	10MHz	1RB-High (49)	1905 (19150)	23.42	22.45	22.03
			1880 (18900)	23.39	22.31	21.89
			1855 (18650)	23.49	22.89	21.98
1RB-Middle (24)		1905 (19150)	23.44	22.47	21.97	
		1880 (18900)	23.47	22.40	21.95	
		1855 (18650)	23.55	22.91	22.03	
1RB-Low (0)		1905 (19150)	23.44	22.47	21.83	
		1880 (18900)	23.41	22.33	21.97	
		1855 (18650)	23.47	22.83	21.99	
25RB-High (25)		1905 (19150)	22.50	21.70	20.84	
		1880 (18900)	22.43	21.61	20.77	
		1855 (18650)	22.54	21.72	20.90	
25RB-Middle (12)		1905 (19150)	22.53	21.78	20.89	
		1880 (18900)	22.49	21.62	20.82	
		1855 (18650)	22.56	21.73	20.89	
25RB-Low (0)		1905 (19150)	22.46	21.70	20.82	
		1880 (18900)	22.51	21.64	20.86	
		1855 (18650)	22.58	21.76	20.93	
50RB (0)		1905 (19150)	22.51	21.64	20.87	
		1880 (18900)	22.49	21.59	20.83	
		1855 (18650)	22.59	21.74	20.89	

15MHz	1RB-High (74)	1902.5 (19125)	23.27	22.30	21.92
		1880 (18900)	23.30	22.70	21.87
		1857.5 (18675)	23.44	22.76	21.93
	1RB-Middle (37)	1902.5 (19125)	23.37	22.41	21.99
		1880 (18900)	23.45	22.85	22.00
		1857.5 (18675)	23.57	22.86	21.99
	1RB-Low (0)	1902.5 (19125)	23.41	22.31	21.92
		1880 (18900)	23.37	22.74	21.90
		1857.5 (18675)	23.48	22.73	21.95
	36RB-High (38)	1902.5 (19125)	22.35	21.58	20.91
		1880 (18900)	22.39	21.58	20.80
		1857.5 (18675)	22.48	21.58	20.83
	36RB-Middle (19)	1902.5 (19125)	22.45	21.60	20.90
		1880 (18900)	22.46	21.63	20.82
		1857.5 (18675)	22.52	21.62	20.87
	36RB-Low (0)	1902.5 (19125)	22.41	21.56	20.81
		1880 (18900)	22.42	21.60	20.83
		1857.5 (18675)	22.52	21.61	20.87
	75RB (0)	1902.5 (19125)	22.42	21.57	20.86
		1880 (18900)	22.46	21.57	20.80
		1857.5 (18675)	22.53	21.63	20.87
20MHz	1RB-High (99)	1900 (19100)	22.93	22.67	21.96
		1880 (18900)	22.92	22.33	21.79
		1860 (18700)	23.03	22.42	21.84
	1RB-Middle (50)	1900 (19100)	23.06	22.71	21.87
		1880 (18900)	23.11	22.54	21.92
		1860 (18700)	23.17	22.61	22.03
	1RB-Low (0)	1900 (19100)	22.87	22.52	21.91
		1880 (18900)	22.97	22.40	21.83
		1860 (18700)	23.01	22.40	21.93
	50RB-High (50)	1900 (19100)	22.19	21.30	20.86
		1880 (18900)	22.08	21.24	20.75
		1860 (18700)	22.17	21.29	20.83
	50RB-Middle (25)	1900 (19100)	22.14	21.13	20.84
		1880 (18900)	22.16	21.30	20.79
		1860 (18700)	22.21	21.31	20.88
	50RB-Low (0)	1900 (19100)	22.13	21.11	20.81
		1880 (18900)	22.15	21.29	20.86
		1860 (18700)	22.25	21.36	20.90
	100RB (0)	1900 (19100)	22.14	21.26	20.81
		1880 (18900)	22.10	21.25	20.77
		1860 (18700)	22.22	21.30	20.80

Band2-Power Level C1					
BANDWIDTH	Number of RBs	Frequency	QPSK	16QAM	64QAM
1.4MHz	1RB-High (5)	1909.3 (19193)	22.36	21.95	22.33
		1880 (18900)	22.51	22.09	22.29
		1850.7 (18607)	22.42	22.28	22.21
	1RB-Middle (3)	1909.3 (19193)	22.37	21.95	22.31
		1880 (18900)	22.53	22.06	21.82
		1850.7 (18607)	22.39	22.26	21.92
	1RB-Low (0)	1909.3 (19193)	22.35	21.93	22.36
		1880 (18900)	22.52	22.08	22.30
		1850.7 (18607)	22.39	22.31	22.25
	3RB-High (3)	1909.3 (19193)	22.49	22.09	22.33
		1880 (18900)	22.42	21.97	22.16
		1850.7 (18607)	22.38	22.13	22.25
	3RB-Middle (1)	1909.3 (19193)	22.48	22.11	22.37
		1880 (18900)	22.43	21.98	22.17
		1850.7 (18607)	22.40	22.14	22.21
	3RB-Low (0)	1909.3 (19193)	22.45	22.06	22.34
		1880 (18900)	22.41	21.95	22.25
		1850.7 (18607)	22.38	22.12	22.18
	6RB (0)	1909.3 (19193)	21.97	22.15	22.26
		1880 (18900)	21.95	22.07	22.11
		1850.7 (18607)	21.90	21.81	22.08
3MHz	1RB-High (14)	1908.5 (19185)	22.35	21.91	22.31
		1880 (18900)	22.40	21.80	22.21
		1851.5 (18615)	22.45	22.32	22.25
	1RB-Middle (7)	1908.5 (19185)	22.37	21.92	22.34
		1880 (18900)	22.43	21.87	22.27
		1851.5 (18615)	22.45	22.28	22.32
	1RB-Low (0)	1908.5 (19185)	22.38	21.91	22.27
		1880 (18900)	22.31	21.81	22.21
		1851.5 (18615)	22.40	22.25	22.18
	8RB-High (7)	1908.5 (19185)	21.90	22.01	22.21
		1880 (18900)	21.86	22.01	22.13
		1851.5 (18615)	21.88	21.99	22.16
	8RB-Middle (4)	1908.5 (19185)	21.85	22.02	22.23
		1880 (18900)	21.88	22.04	22.14
		1851.5 (18615)	21.92	22.00	22.12
	8RB-Low (0)	1908.5 (19185)	21.93	22.03	22.21
		1880 (18900)	21.87	22.02	22.14
		1851.5 (18615)	21.88	22.03	22.13
	15RB (0)	1908.5 (19185)	21.97	21.97	22.22
		1880 (18900)	21.89	21.97	22.10
		1851.5 (18615)	21.89	21.96	22.11

5MHz	1RB-High (24)	1907.5 (19175)	22.50	21.95	22.28	
		1880 (18900)	22.49	22.18	22.24	
		1852.5 (18625)	22.50	22.51	22.23	
	1RB-Middle (12)	1907.5 (19175)	22.49	22.02	22.32	
		1880 (18900)	22.53	22.21	22.34	
		1852.5 (18625)	22.49	22.52	22.25	
	1RB-Low (0)	1907.5 (19175)	22.43	21.92	22.23	
		1880 (18900)	22.52	22.16	22.22	
		1852.5 (18625)	22.43	22.47	22.19	
	12RB-High (13)	1907.5 (19175)	21.85	21.91	22.13	
		1880 (18900)	21.84	21.93	22.10	
		1852.5 (18625)	21.89	22.04	22.11	
	12RB-Middle (6)	1907.5 (19175)	21.94	22.01	22.19	
		1880 (18900)	21.89	21.97	22.13	
		1852.5 (18625)	21.93	22.04	22.14	
	12RB-Low (0)	1907.5 (19175)	21.96	22.02	22.25	
		1880 (18900)	21.91	22.00	22.19	
		1852.5 (18625)	21.95	22.07	22.20	
	25RB (0)	1907.5 (19175)	21.93	21.90	22.19	
		1880 (18900)	21.93	21.99	22.12	
		1852.5 (18625)	21.91	22.00	22.14	
	10MHz	1RB-High (49)	1905 (19150)	22.35	21.90	22.18
			1880 (18900)	22.33	21.76	22.17
			1855 (18650)	22.47	22.32	22.23
1RB-Middle (24)		1905 (19150)	22.37	21.91	22.26	
		1880 (18900)	22.45	21.86	22.25	
		1855 (18650)	22.49	22.32	22.20	
1RB-Low (0)		1905 (19150)	22.34	21.85	22.25	
		1880 (18900)	22.34	21.78	22.17	
		1855 (18650)	22.39	22.19	22.22	
25RB-High (25)		1905 (19150)	21.85	21.96	22.10	
		1880 (18900)	21.88	21.90	22.05	
		1855 (18650)	21.95	22.01	22.17	
25RB-Middle (12)		1905 (19150)	21.89	22.04	22.17	
		1880 (18900)	21.91	21.95	22.12	
		1855 (18650)	21.96	22.05	22.17	
25RB-Low (0)		1905 (19150)	21.82	21.96	22.10	
		1880 (18900)	21.93	21.98	22.15	
		1855 (18650)	21.96	22.03	22.17	
50RB (0)		1905 (19150)	21.92	21.92	22.12	
		1880 (18900)	21.93	21.92	22.14	
		1855 (18650)	22.00	22.03	22.19	

15MHz	1RB-High (74)	1902.5 (19125)	22.31	22.23	22.18
		1880 (18900)	22.30	22.17	22.08
		1857.5 (18675)	22.29	21.79	22.19
	1RB-Middle (37)	1902.5 (19125)	22.41	22.28	22.13
		1880 (18900)	22.43	22.30	22.24
		1857.5 (18675)	22.39	21.89	22.27
	1RB-Low (0)	1902.5 (19125)	22.39	22.23	22.13
		1880 (18900)	22.34	22.25	22.18
		1857.5 (18675)	22.27	21.76	22.17
	36RB-High (38)	1902.5 (19125)	21.83	21.93	22.06
		1880 (18900)	21.82	21.83	22.06
		1857.5 (18675)	21.95	21.99	22.16
	36RB-Middle (19)	1902.5 (19125)	21.88	21.96	22.10
		1880 (18900)	21.90	21.89	22.09
		1857.5 (18675)	21.93	21.95	22.15
	36RB-Low (0)	1902.5 (19125)	21.81	21.93	22.05
		1880 (18900)	21.88	21.88	22.15
		1857.5 (18675)	21.90	21.93	22.12
	75RB (0)	1902.5 (19125)	21.86	21.89	22.08
		1880 (18900)	21.89	21.91	22.08
		1857.5 (18675)	21.95	21.97	22.11
20MHz	1RB-High (99)	1900 (19100)	21.88	21.78	22.16
		1880 (18900)	21.83	21.85	22.02
		1860 (18700)	21.85	21.76	22.14
	1RB-Middle (50)	1900 (19100)	21.91	21.81	22.15
		1880 (18900)	21.94	22.02	22.19
		1860 (18700)	21.99	21.89	22.27
	1RB-Low (0)	1900 (19100)	21.79	21.68	22.11
		1880 (18900)	21.87	21.88	22.09
		1860 (18700)	21.86	21.66	22.14
	50RB-High (50)	1900 (19100)	21.36	21.32	22.07
		1880 (18900)	21.33	21.34	21.98
		1860 (18700)	21.43	21.49	22.11
	50RB-Middle (25)	1900 (19100)	21.42	21.39	22.09
		1880 (18900)	21.41	21.43	22.09
		1860 (18700)	21.50	21.49	22.15
	50RB-Low (0)	1900 (19100)	21.32	21.29	22.05
		1880 (18900)	21.46	21.48	22.12
		1860 (18700)	21.43	21.49	22.13
	100RB (0)	1900 (19100)	21.35	21.31	22.02
		1880 (18900)	21.39	21.43	22.06
		1860 (18700)	21.47	21.46	22.14

Band5-Power Level A1/B1/C1					
BANDWIDTH	Number of RBs	Frequency	QPSK	16QAM	64QAM
1.4MHz	1RB-High (5)	848.3 (20643)	23.69	22.37	21.87
		836.5 (20525)	23.74	22.65	21.89
		824.7 (20407)	23.72	22.87	21.97
	1RB-Middle (3)	848.3 (20643)	23.67	22.40	21.84
		836.5 (20525)	23.72	22.67	21.97
		824.7 (20407)	23.72	22.85	21.96
	1RB-Low (0)	848.3 (20643)	23.48	22.42	21.92
		836.5 (20525)	23.56	22.61	21.94
		824.7 (20407)	23.52	22.85	21.92
	3RB-High (3)	848.3 (20643)	23.42	22.53	21.83
		836.5 (20525)	23.45	22.54	21.87
		824.7 (20407)	23.49	22.73	21.91
	3RB-Middle (1)	848.3 (20643)	23.45	22.58	21.81
		836.5 (20525)	23.53	22.56	21.90
		824.7 (20407)	23.47	22.71	21.90
	3RB-Low (0)	848.3 (20643)	23.46	22.60	21.81
		836.5 (20525)	23.50	22.57	21.92
		824.7 (20407)	23.47	22.70	21.91
	6RB (0)	848.3 (20643)	22.49	21.63	20.68
		836.5 (20525)	22.62	21.62	20.80
		824.7 (20407)	22.50	21.35	20.79
3MHz	1RB-High (14)	847.5 (20635)	23.69	22.37	21.99
		836.5 (20525)	23.72	22.40	21.93
		825.5 (20415)	23.74	22.89	21.90
	1RB-Middle (7)	847.5 (20635)	23.65	22.42	21.97
		836.5 (20525)	23.72	22.44	21.99
		825.5 (20415)	23.73	22.90	21.96
	1RB-Low (0)	847.5 (20635)	23.62	22.53	21.98
		836.5 (20525)	23.55	22.42	21.98
		825.5 (20415)	23.58	22.84	21.98
	8RB-High (7)	847.5 (20635)	22.42	21.49	20.81
		836.5 (20525)	22.45	21.61	20.83
		825.5 (20415)	22.51	21.58	20.84
	8RB-Middle (4)	847.5 (20635)	22.43	21.52	20.86
		836.5 (20525)	22.49	21.63	20.84
		825.5 (20415)	22.50	21.57	20.85
	8RB-Low (0)	847.5 (20635)	22.47	21.49	20.79
		836.5 (20525)	22.50	21.59	20.86
		825.5 (20415)	22.51	21.57	20.82
	15RB (0)	847.5 (20635)	22.46	21.42	20.77
		836.5 (20525)	22.50	21.55	20.79
		825.5 (20415)	22.50	21.53	20.80

5MHz	1RB-High (24)	846.5 (20625)	23.50	22.40	21.88	
		836.5 (20525)	23.73	22.83	21.98	
		826.5 (20425)	23.58	23.19	21.93	
	1RB-Middle (12)	846.5 (20625)	23.52	22.49	21.91	
		836.5 (20525)	23.74	22.81	21.97	
		826.5 (20425)	23.51	23.14	21.93	
	1RB-Low (0)	846.5 (20625)	23.53	22.53	22.00	
		836.5 (20525)	23.71	22.85	22.02	
		826.5 (20425)	23.47	23.08	22.00	
	12RB-High (13)	846.5 (20625)	22.42	21.44	20.73	
		836.5 (20525)	22.47	21.46	20.74	
		826.5 (20425)	22.46	21.58	20.86	
	12RB-Middle (6)	846.5 (20625)	22.47	21.51	20.80	
		836.5 (20525)	22.51	21.52	20.83	
		826.5 (20425)	22.51	21.62	20.83	
	12RB-Low (0)	846.5 (20625)	22.54	21.61	20.86	
		836.5 (20525)	22.57	21.57	20.89	
		826.5 (20425)	22.52	21.65	20.84	
	25RB (0)	846.5 (20625)	22.46	21.42	20.74	
		836.5 (20525)	22.48	21.49	20.81	
		826.5 (20425)	22.50	21.57	20.83	
	10MHz	1RB-High (49)	844 (20600)	22.98	22.40	21.87
			836.5 (20525)	23.06	22.10	21.97
			829 (20450)	23.12	22.07	21.99
1RB-Middle (24)		844 (20600)	23.06	22.53	22.01	
		836.5 (20525)	23.15	22.19	22.02	
		829 (20450)	23.10	22.07	22.01	
1RB-Low (0)		844 (20600)	23.09	22.46	22.03	
		836.5 (20525)	23.12	22.13	21.98	
		829 (20450)	23.03	22.00	22.01	
25RB-High (25)		844 (20600)	22.07	21.13	20.77	
		836.5 (20525)	22.12	21.18	20.75	
		829 (20450)	22.15	21.17	20.85	
25RB-Middle (12)		844 (20600)	22.10	21.19	20.82	
		836.5 (20525)	22.21	21.29	20.83	
		829 (20450)	22.18	21.17	20.85	
25RB-Low (0)		844 (20600)	22.17	21.22	20.89	
		836.5 (20525)	22.16	21.23	20.86	
		829 (20450)	22.15	21.14	20.84	
50RB (0)		844 (20600)	22.17	21.12	20.82	
		836.5 (20525)	22.17	21.17	20.79	
		829 (20450)	22.19	21.17	20.81	



Band7-ANT0-Power Level A1/B1						
BANDWIDTH	Number of RBs	Frequency	QPSK	16QAM	64QAM	
5MHz	1RB-High (24)	2567.5 (21425)	23.64	22.08	21.99	
		2535 (21100)	23.34	22.42	21.90	
		2502.5 (20775)	23.04	22.56	22.09	
	1RB-Middle (12)	2567.5 (21425)	23.68	22.15	22.16	
		2535 (21100)	23.31	22.37	21.94	
		2502.5 (20775)	23.08	22.62	22.19	
	1RB-Low (0)	2567.5 (21425)	23.60	22.07	22.21	
		2535 (21100)	23.16	22.37	21.92	
		2502.5 (20775)	23.06	22.57	22.15	
	12RB-High (13)	2567.5 (21425)	22.55	21.63	21.14	
		2535 (21100)	22.54	21.58	20.92	
		2502.5 (20775)	22.51	21.64	21.06	
	12RB-Middle (6)	2567.5 (21425)	22.54	21.80	21.11	
		2535 (21100)	22.54	21.57	20.91	
		2502.5 (20775)	22.57	21.67	21.15	
	12RB-Low (0)	2567.5 (21425)	22.55	21.84	21.10	
		2535 (21100)	22.54	21.58	20.94	
		2502.5 (20775)	22.56	21.67	21.18	
	25RB (0)	2567.5 (21425)	22.55	21.70	21.13	
		2535 (21100)	22.58	21.60	20.92	
		2502.5 (20775)	22.57	21.60	21.16	
	10MHz	1RB-High (49)	2565 (21400)	23.51	22.21	22.12
			2535 (21100)	23.53	22.00	21.94
			2505 (20800)	23.03	22.42	22.13
1RB-Middle (24)		2565 (21400)	23.52	22.06	22.24	
		2535 (21100)	23.49	21.96	21.95	
		2505 (20800)	23.14	22.49	22.05	
1RB-Low (0)		2565 (21400)	23.46	22.19	22.05	
		2535 (21100)	23.36	21.92	21.85	
		2505 (20800)	23.01	22.36	22.11	
25RB-High (25)		2565 (21400)	22.53	21.80	21.12	
		2535 (21100)	22.64	21.64	20.94	
		2505 (20800)	22.57	21.60	21.10	
25RB-Middle (12)		2565 (21400)	22.54	21.79	21.09	
		2535 (21100)	22.57	21.57	20.92	
		2505 (20800)	22.50	21.55	21.10	
25RB-Low (0)		2565 (21400)	22.55	21.80	21.10	
		2535 (21100)	22.58	21.56	20.93	
		2505 (20800)	22.51	21.54	21.13	
50RB (0)		2565 (21400)	22.59	21.73	21.07	
		2535 (21100)	22.61	21.57	20.95	
		2505 (20800)	22.59	21.56	21.13	

15MHz	1RB-High (74)	2562.5 (21375)	23.43	22.43	22.11
		2535 (21100)	23.54	22.47	21.90
		2507.5 (20825)	22.84	21.87	21.98
	1RB-Middle (37)	2562.5 (21375)	23.46	22.65	22.26
		2535 (21100)	23.59	22.54	21.95
		2507.5 (20825)	23.28	22.19	22.05
	1RB-Low (0)	2562.5 (21375)	23.39	22.61	22.00
		2535 (21100)	23.31	22.51	21.89
		2507.5 (20825)	23.19	22.11	22.08
	36RB-High (38)	2562.5 (21375)	22.53	21.73	21.06
		2535 (21100)	22.54	21.52	20.94
		2507.5 (20825)	22.52	21.51	21.04
	36RB-Middle (19)	2562.5 (21375)	22.48	21.70	21.06
		2535 (21100)	22.51	21.51	20.98
		2507.5 (20825)	22.55	21.53	21.13
	36RB-Low (0)	2562.5 (21375)	22.50	21.60	21.07
		2535 (21100)	22.45	21.46	20.93
		2507.5 (20825)	22.51	21.51	21.11
75RB (0)	2562.5 (21375)	22.51	21.69	21.00	
	2535 (21100)	22.53	21.51	20.91	
	2507.5 (20825)	22.53	21.51	21.03	
20MHz	1RB-High (99)	2560 (21350)	23.75	22.94	22.03
		2535 (21100)	23.64	23.08	21.88
		2510 (20850)	23.61	23.23	21.93
	1RB-Middle (50)	2560 (21350)	23.79	23.04	22.08
		2535 (21100)	23.70	23.11	22.03
		2510 (20850)	23.73	23.27	22.18
	1RB-Low (0)	2560 (21350)	23.62	22.88	22.01
		2535 (21100)	23.52	22.93	21.84
		2510 (20850)	23.58	23.09	22.07
	50RB-High (50)	2560 (21350)	22.64	21.76	21.02
		2535 (21100)	22.75	21.70	20.96
		2510 (20850)	22.60	21.60	20.93
	50RB-Middle (25)	2560 (21350)	22.68	21.70	21.06
		2535 (21100)	22.78	21.67	20.97
		2510 (20850)	22.68	21.69	21.04
	50RB-Low (0)	2560 (21350)	22.66	21.67	21.05
		2535 (21100)	22.66	21.62	20.91
		2510 (20850)	22.59	21.60	21.07
100RB (0)	2560 (21350)	22.64	21.64	20.98	
	2535 (21100)	22.72	21.68	20.93	
	2510 (20850)	22.58	21.61	20.94	

Band7-ANT0-Power Level C1					
BANDWIDTH	Number of RBs	Frequency	QPSK	16QAM	64QAM
5MHz	1RB-High (24)	2567.5 (21425)	20.31	19.87	20.29
		2535 (21100)	20.37	19.99	20.16
		2502.5 (20775)	20.26	20.17	20.18
	1RB-Middle (12)	2567.5 (21425)	20.34	19.91	20.23
		2535 (21100)	20.39	19.97	20.10
		2502.5 (20775)	20.30	20.23	20.28
	1RB-Low (0)	2567.5 (21425)	20.35	19.94	20.25
		2535 (21100)	20.35	19.91	20.16
		2502.5 (20775)	20.28	20.18	20.30
	12RB-High (13)	2567.5 (21425)	19.71	19.74	20.06
		2535 (21100)	19.71	19.82	19.93
		2502.5 (20775)	19.69	19.85	20.12
	12RB-Middle (6)	2567.5 (21425)	19.75	19.82	20.11
		2535 (21100)	19.77	19.85	19.93
		2502.5 (20775)	19.72	19.87	20.17
	12RB-Low (0)	2567.5 (21425)	19.77	19.82	20.16
		2535 (21100)	19.74	19.86	19.99
		2502.5 (20775)	19.76	19.86	20.16
	25RB (0)	2567.5 (21425)	19.76	19.73	20.09
		2535 (21100)	19.74	19.80	19.97
		2502.5 (20775)	19.74	19.83	20.13
10MHz	1RB-High (49)	2565 (21400)	20.25	20.11	20.20
		2535 (21100)	20.25	19.79	20.01
		2505 (20800)	20.26	19.69	20.14
	1RB-Middle (24)	2565 (21400)	20.32	20.17	20.21
		2535 (21100)	20.34	19.85	20.09
		2505 (20800)	20.27	19.68	20.25
	1RB-Low (0)	2565 (21400)	20.22	20.11	20.31
		2535 (21100)	20.25	19.75	20.01
		2505 (20800)	20.16	19.64	20.29
	25RB-High (25)	2565 (21400)	19.70	19.78	20.07
		2535 (21100)	19.69	19.81	19.95
		2505 (20800)	19.73	19.82	20.13
	25RB-Middle (12)	2565 (21400)	19.78	19.80	20.11
		2535 (21100)	19.76	19.86	20.01
		2505 (20800)	19.73	19.77	20.08
	25RB-Low (0)	2565 (21400)	19.77	19.79	20.17
		2535 (21100)	19.75	19.87	19.97
		2505 (20800)	19.70	19.75	20.13
	50RB (0)	2565 (21400)	19.77	19.79	20.13
		2535 (21100)	19.72	19.76	19.90
		2505 (20800)	19.78	19.73	20.13

15MHz	1RB-High (74)	2562.5 (21375)	20.13	19.64	20.07
		2535 (21100)	20.21	20.08	20.04
		2507.5 (20825)	20.15	20.09	20.08
	1RB-Middle (37)	2562.5 (21375)	20.19	19.68	20.15
		2535 (21100)	20.32	20.16	20.06
		2507.5 (20825)	20.24	20.29	20.18
	1RB-Low (0)	2562.5 (21375)	20.10	19.59	20.18
		2535 (21100)	20.19	20.03	20.00
		2507.5 (20825)	20.17	20.19	20.27
	36RB-High (38)	2562.5 (21375)	19.65	19.72	20.06
		2535 (21100)	19.74	19.75	19.93
		2507.5 (20825)	19.68	19.69	20.00
	36RB-Middle (19)	2562.5 (21375)	19.73	19.73	20.10
		2535 (21100)	19.68	19.75	19.87
		2507.5 (20825)	19.65	19.68	20.04
	36RB-Low (0)	2562.5 (21375)	19.70	19.73	20.07
		2535 (21100)	19.72	19.79	20.00
		2507.5 (20825)	19.69	19.64	20.06
	75RB (0)	2562.5 (21375)	19.72	19.77	20.01
		2535 (21100)	19.71	19.75	19.86
		2507.5 (20825)	19.71	19.71	20.04
20MHz	1RB-High (99)	2560 (21350)	19.53	19.55	20.04
		2535 (21100)	19.58	19.48	20.08
		2510 (20850)	19.58	19.57	20.03
	1RB-Middle (50)	2560 (21350)	19.64	19.71	20.27
		2535 (21100)	19.67	19.63	20.08
		2510 (20850)	19.66	19.61	20.14
	1RB-Low (0)	2560 (21350)	19.48	19.58	20.14
		2535 (21100)	19.45	19.40	20.02
		2510 (20850)	19.54	19.48	20.22
	50RB-High (50)	2560 (21350)	19.14	19.14	20.02
		2535 (21100)	19.32	19.17	19.99
		2510 (20850)	19.09	19.10	19.96
	50RB-Middle (25)	2560 (21350)	19.21	19.19	20.08
		2535 (21100)	19.11	19.10	19.88
		2510 (20850)	19.25	19.14	20.04
	50RB-Low (0)	2560 (21350)	19.14	19.13	20.03
		2535 (21100)	19.14	19.14	20.00
		2510 (20850)	19.10	19.12	20.01
	100RB (0)	2560 (21350)	19.25	19.12	20.08
		2535 (21100)	19.26	19.10	19.89
		2510 (20850)	19.23	19.12	20.00

Band41-Power Level A1/B1/C1					
BANDWIDTH	Number of RBs	Frequency	QPSK	16QAM	64QAM
5MHz	1RB-High (24)	2687.5 (41565)	23.22	22.72	21.79
		2640.3(41093)	23.14	22.61	21.64
		2593 (40620)	23.12	22.30	21.66
		2545.8(40148)	22.99	22.34	21.41
		2498.5 (39675)	23.06	22.48	21.67
	1RB-Middle (12)	2687.5 (41565)	23.28	22.74	21.84
		2640.3(41093)	23.17	22.64	21.63
		2593 (40620)	23.21	22.36	21.73
		2545.8(40148)	23.06	22.41	21.45
		2498.5 (39675)	23.06	22.54	21.69
	1RB-Low (0)	2687.5 (41565)	23.25	22.73	21.83
		2640.3(41093)	23.15	22.59	21.64
		2593 (40620)	23.09	22.28	21.74
		2545.8(40148)	23.00	22.34	21.44
		2498.5 (39675)	23.05	22.48	21.73
	12RB-High (13)	2687.5 (41565)	22.36	21.32	21.16
		2640.3(41093)	22.11	21.38	21.00
		2593 (40620)	22.06	21.19	21.06
		2545.8(40148)	22.02	21.10	20.77
		2498.5 (39675)	22.03	21.24	21.07
	12RB-Middle (6)	2687.5 (41565)	22.34	21.32	21.16
		2640.3(41093)	22.14	21.38	21.00
		2593 (40620)	22.10	21.25	21.06
		2545.8(40148)	22.05	21.11	20.84
		2498.5 (39675)	22.07	21.31	21.09
	12RB-Low (0)	2687.5 (41565)	22.40	21.37	21.23
		2640.3(41093)	22.16	21.40	21.03
		2593 (40620)	22.09	21.28	21.12
2545.8(40148)		22.05	21.16	20.84	
2498.5 (39675)		22.09	21.34	21.11	
25RB (0)	2687.5 (41565)	22.35	21.37	21.23	
	2640.3(41093)	22.18	21.34	21.06	
	2593 (40620)	22.08	21.19	21.10	
	2545.8(40148)	22.04	21.16	20.88	
	2498.5 (39675)	22.10	21.21	21.16	

Band41-Power Level A1/B1/C1					
BANDWIDTH	Number of RBs	Frequency	QPSK	16QAM	64QAM
5MHz	1RB-High (24)	2687.5 (41565)	23.22	22.72	21.79
		2640.3(41093)	23.14	22.61	21.64
		2593 (40620)	23.12	22.30	21.66
		2545.8(40148)	22.99	22.34	21.41
		2498.5 (39675)	23.06	22.48	21.67
	1RB-Middle (12)	2687.5 (41565)	23.28	22.74	21.84
		2640.3(41093)	23.17	22.64	21.63
		2593 (40620)	23.21	22.36	21.73
		2545.8(40148)	23.06	22.41	21.45
		2498.5 (39675)	23.06	22.54	21.69
	1RB-Low (0)	2687.5 (41565)	23.25	22.73	21.83
		2640.3(41093)	23.15	22.59	21.64
		2593 (40620)	23.09	22.28	21.74
		2545.8(40148)	23.00	22.34	21.44
		2498.5 (39675)	23.05	22.48	21.73
	12RB-High (13)	2687.5 (41565)	22.36	21.32	21.16
		2640.3(41093)	22.11	21.38	21.00
		2593 (40620)	22.06	21.19	21.06
		2545.8(40148)	22.02	21.10	20.77
		2498.5 (39675)	22.03	21.24	21.07
	12RB-Middle (6)	2687.5 (41565)	22.34	21.32	21.16
		2640.3(41093)	22.14	21.38	21.00
		2593 (40620)	22.10	21.25	21.06
		2545.8(40148)	22.05	21.11	20.84
		2498.5 (39675)	22.07	21.31	21.09
	12RB-Low (0)	2687.5 (41565)	22.40	21.37	21.23
		2640.3(41093)	22.16	21.40	21.03
		2593 (40620)	22.09	21.28	21.12
		2545.8(40148)	22.05	21.16	20.84
		2498.5 (39675)	22.09	21.34	21.11
	25RB (0)	2687.5 (41565)	22.35	21.37	21.23
		2640.3(41093)	22.18	21.34	21.06
2593 (40620)		22.08	21.19	21.10	
2545.8(40148)		22.04	21.16	20.88	
2498.5 (39675)		22.10	21.21	21.16	

10MHz	1RB-High (49)	2685 (41540)	23.26	22.86	21.71
		2639(41080)	23.18	22.66	21.57
		2593 (40620)	23.22	22.41	21.60
		2547(40160)	23.01	22.54	21.42
		2501 (39700)	23.02	22.53	21.58
	1RB-Middle (24)	2685 (41540)	23.27	22.88	21.81
		2639(41080)	23.22	22.72	21.63
		2593 (40620)	23.30	22.44	21.75
		2547(40160)	23.04	22.59	21.48
		2501 (39700)	23.10	22.56	21.69
	1RB-Low (0)	2685 (41540)	23.23	22.80	21.82
		2639(41080)	23.12	22.64	21.61
		2593 (40620)	23.23	22.37	21.71
		2547(40160)	22.97	22.47	21.42
		2501 (39700)	23.00	22.52	21.67
	25RB-High (25)	2685 (41540)	22.42	21.38	21.17
		2639(41080)	22.17	21.35	21.00
		2593 (40620)	22.05	21.27	21.06
		2547(40160)	22.05	21.14	20.91
		2501 (39700)	22.09	21.25	21.11
	25RB-Middle (12)	2685 (41540)	22.42	21.37	21.25
		2639(41080)	22.13	21.35	21.03
		2593 (40620)	22.12	21.25	21.16
		2547(40160)	22.04	21.15	20.87
		2501 (39700)	22.10	21.24	21.05
25RB-Low (0)	2685 (41540)	22.39	21.39	21.24	
	2639(41080)	22.18	21.37	21.04	
	2593 (40620)	22.11	21.27	21.16	
	2547(40160)	21.99	21.14	20.89	
	2501 (39700)	22.10	21.24	21.11	
50RB (0)	2685 (41540)	22.44	21.37	21.18	
	2639(41080)	22.17	21.34	20.97	
	2593 (40620)	22.14	21.21	21.10	
	2547(40160)	22.06	21.18	20.86	
	2501 (39700)	22.11	21.24	21.07	

15MHz	1RB-High (74)	2682.5 (41515)	23.13	22.69	21.68
		2637.8(41068)	23.26	22.44	21.55
		2593 (40620)	23.07	22.60	21.60
		2548.3(40173)	22.88	22.31	21.40
		2503.5 (39725)	23.10	22.26	21.51
	1RB-Middle (37)	2682.5 (41515)	23.19	22.73	21.81
		2637.8(41068)	23.32	22.50	21.62
		2593 (40620)	23.18	22.68	21.74
		2548.3(40173)	22.94	22.37	21.43
		2503.5 (39725)	23.18	22.34	21.65
	1RB-Low (0)	2682.5 (41515)	23.10	22.63	21.77
		2637.8(41068)	23.26	22.42	21.60
		2593 (40620)	23.03	22.57	21.69
		2548.3(40173)	22.85	22.31	21.39
		2503.5 (39725)	23.16	22.32	21.64
	36RB-High (38)	2682.5 (41515)	22.35	21.42	21.12
		2637.8(41068)	22.18	21.29	20.93
		2593 (40620)	22.11	21.17	20.98
		2548.3(40173)	22.02	21.19	20.78
		2503.5 (39725)	22.07	21.13	20.93
	36RB-Middle (19)	2682.5 (41515)	22.33	21.38	21.14
		2637.8(41068)	22.19	21.33	20.97
		2593 (40620)	22.07	21.14	21.01
		2548.3(40173)	22.04	21.19	20.81
		2503.5 (39725)	22.07	21.19	21.04
36RB-Low (0)	2682.5 (41515)	22.31	21.32	21.18	
	2637.8(41068)	22.17	21.28	20.97	
	2593 (40620)	22.07	21.18	21.10	
	2548.3(40173)	21.98	21.16	20.80	
	2503.5 (39725)	22.02	21.13	20.99	
75RB (0)	2682.5 (41515)	22.38	21.30	21.13	
	2637.8(41068)	22.21	21.30	21.01	
	2593 (40620)	22.13	21.23	21.07	
	2548.3(40173)	22.07	21.16	20.88	
	2503.5 (39725)	22.07	21.19	21.01	



20MHz	1RB-High (99)	2680 (41490)	23.34	22.42	21.65
		2636.5(41055)	23.27	22.05	21.51
		2593 (40620)	23.15	22.20	21.53
		2549.5(40185)	23.00	21.96	21.38
		2506 (39750)	23.05	21.88	21.43
	1RB-Middle (50)	2680 (41490)	23.46	22.48	21.80
		2636.5(41055)	23.34	22.12	21.60
		2593 (40620)	23.28	22.32	21.73
		2549.5(40185)	23.12	22.06	21.46
		2506 (39750)	23.22	22.01	21.62
	1RB-Low (0)	2680 (41490)	23.29	22.32	21.74
		2636.5(41055)	23.19	21.99	21.58
		2593 (40620)	23.07	22.12	21.63
		2549.5(40185)	23.02	21.95	21.37
		2506 (39750)	23.12	21.93	21.62
	50RB-High (50)	2680 (41490)	22.45	21.41	21.14
		2636.5(41055)	22.26	21.34	20.93
		2593 (40620)	22.13	21.30	21.04
		2549.5(40185)	22.07	21.15	20.87
		2506 (39750)	22.10	21.17	20.95
	50RB-Middle (25)	2680 (41490)	22.51	21.42	21.21
		2636.5(41055)	22.25	21.40	21.00
		2593 (40620)	22.18	21.32	21.12
		2549.5(40185)	22.12	21.16	20.84
		2506 (39750)	22.15	21.26	20.99
50RB-Low (0)	2680 (41490)	22.47	21.39	21.18	
	2636.5(41055)	22.26	21.40	21.05	
	2593 (40620)	22.15	21.29	21.13	
	2549.5(40185)	22.09	21.10	20.87	
	2506 (39750)	22.09	21.23	21.05	
100RB (0)	2680 (41490)	22.44	21.42	21.17	
	2636.5(41055)	22.24	21.37	20.98	
	2593 (40620)	22.14	21.22	21.11	
	2549.5(40185)	22.06	21.17	20.87	
	2506 (39750)	22.10	21.19	21.02	

Band7-ANT4-Power Level A1					
BANDWIDTH	Number of RBs	Frequency	QPSK	16QAM	64QAM
5MHz	1RB-High (24)	2567.5 (21425)	20.49	20.97	20.98
		2535 (21100)	20.59	20.85	20.93
		2502.5 (20775)	20.60	20.81	20.98
	1RB-Middle (12)	2567.5 (21425)	20.86	20.96	20.72
		2535 (21100)	20.78	20.92	20.92
		2502.5 (20775)	20.68	20.96	20.77
	1RB-Low (0)	2567.5 (21425)	20.64	20.93	20.78
		2535 (21100)	20.43	20.96	20.93
		2502.5 (20775)	20.39	20.87	20.84
	12RB-High (13)	2567.5 (21425)	20.43	20.98	20.77
		2535 (21100)	20.56	20.98	20.94
		2502.5 (20775)	20.88	20.94	20.76
	12RB-Middle (6)	2567.5 (21425)	20.46	20.71	20.81
		2535 (21100)	20.94	20.90	20.92
		2502.5 (20775)	20.77	20.81	20.78
	12RB-Low (0)	2567.5 (21425)	20.47	20.93	20.89
		2535 (21100)	20.59	20.79	20.70
		2502.5 (20775)	20.57	20.89	20.77
	25RB (0)	2567.5 (21425)	20.31	20.77	20.94
		2535 (21100)	20.74	20.98	20.77
		2502.5 (20775)	20.71	20.99	20.92
10MHz	1RB-High (49)	2565 (21400)	20.49	20.95	20.89
		2535 (21100)	20.49	20.89	20.89
		2505 (20800)	20.74	20.78	20.87
	1RB-Middle (24)	2565 (21400)	20.87	20.95	20.73
		2535 (21100)	20.93	20.93	20.95
		2505 (20800)	20.83	20.95	20.92
	1RB-Low (0)	2565 (21400)	20.68	20.89	20.95
		2535 (21100)	20.46	20.80	20.97
		2505 (20800)	20.53	20.87	20.87
	25RB-High (25)	2565 (21400)	20.46	20.89	20.89
		2535 (21100)	20.48	20.94	20.80
		2505 (20800)	20.77	20.95	20.87
	25RB-Middle (12)	2565 (21400)	20.61	20.80	20.95
		2535 (21100)	20.80	20.93	20.96
		2505 (20800)	20.72	20.93	20.68
	25RB-Low (0)	2565 (21400)	20.53	20.87	20.74
		2535 (21100)	20.54	20.91	20.83
		2505 (20800)	20.53	20.89	20.88
	50RB (0)	2565 (21400)	20.46	20.74	20.90
		2535 (21100)	20.63	20.96	20.99
		2505 (20800)	20.56	20.94	20.95

15MHz	1RB-High (74)	2562.5 (21375)	20.38	20.93	20.72
		2535 (21100)	20.61	20.81	20.87
		2507.5 (20825)	20.61	20.89	20.93
	1RB-Middle (37)	2562.5 (21375)	20.90	20.92	20.72
		2535 (21100)	20.79	20.96	20.82
		2507.5 (20825)	20.68	20.90	20.80
	1RB-Low (0)	2562.5 (21375)	20.64	20.87	20.90
		2535 (21100)	20.60	20.96	20.92
		2507.5 (20825)	20.40	20.92	20.85
	36RB-High (38)	2562.5 (21375)	20.44	20.93	20.84
		2535 (21100)	20.55	20.88	20.95
		2507.5 (20825)	20.65	20.91	20.71
	36RB-Middle (19)	2562.5 (21375)	20.64	20.88	20.90
		2535 (21100)	20.71	20.91	20.93
		2507.5 (20825)	20.78	20.88	20.73
	36RB-Low (0)	2562.5 (21375)	20.54	20.90	20.96
		2535 (21100)	20.47	20.96	20.71
		2507.5 (20825)	20.42	20.92	20.81
	75RB (0)	2562.5 (21375)	20.47	20.80	20.82
		2535 (21100)	20.63	20.90	20.97
		2507.5 (20825)	20.56	20.98	20.93
20MHz	1RB-High (99)	2560 (21350)	20.53	20.95	20.98
		2535 (21100)	20.49	20.89	20.98
		2510 (20850)	20.53	20.95	20.95
	1RB-Middle (50)	2560 (21350)	20.78	20.95	20.85
		2535 (21100)	20.70	20.94	20.83
		2510 (20850)	20.68	20.93	20.84
	1RB-Low (0)	2560 (21350)	20.53	20.98	20.94
		2535 (21100)	20.52	20.94	20.97
		2510 (20850)	20.55	20.95	20.97
	50RB-High (50)	2560 (21350)	20.58	20.93	20.93
		2535 (21100)	20.58	20.94	20.97
		2510 (20850)	20.58	20.90	20.98
	50RB-Middle (25)	2560 (21350)	20.72	20.96	20.87
		2535 (21100)	20.64	20.96	20.93
		2510 (20850)	20.66	20.93	20.82
	50RB-Low (0)	2560 (21350)	20.58	20.96	20.96
		2535 (21100)	20.62	20.90	20.88
		2510 (20850)	20.56	20.89	20.89
	100RB (0)	2560 (21350)	20.58	20.95	20.85
		2535 (21100)	20.62	20.96	20.88
		2510 (20850)	20.60	20.96	20.87

Band7-ANT4-Power Level A1					
BANDWIDTH	Number of RBs	Frequency	QPSK	16QAM	64QAM
5MHz	1RB-High (24)	2567.5 (21425)	15.81	16.20	16.10
		2535 (21100)	15.82	16.14	16.27
		2502.5 (20775)	15.86	16.09	16.17
	1RB-Middle (12)	2567.5 (21425)	16.07	16.08	15.78
		2535 (21100)	15.97	16.04	16.25
		2502.5 (20775)	15.78	16.13	16.00
	1RB-Low (0)	2567.5 (21425)	15.70	16.18	15.84
		2535 (21100)	15.55	16.16	16.19
		2502.5 (20775)	15.67	15.92	15.96
	12RB-High (13)	2567.5 (21425)	15.55	16.20	15.92
		2535 (21100)	15.72	16.11	16.12
		2502.5 (20775)	16.03	16.13	16.01
	12RB-Middle (6)	2567.5 (21425)	15.68	15.97	15.90
		2535 (21100)	16.08	16.00	16.00
		2502.5 (20775)	16.10	16.04	16.13
	12RB-Low (0)	2567.5 (21425)	15.67	16.00	16.16
		2535 (21100)	15.84	15.98	15.96
		2502.5 (20775)	15.70	16.02	15.89
	25RB (0)	2567.5 (21425)	15.44	16.09	16.15
		2535 (21100)	16.09	16.22	16.00
		2502.5 (20775)	15.82	16.08	16.11
10MHz	1RB-High (49)	2565 (21400)	15.77	16.05	16.08
		2535 (21100)	15.70	16.05	15.94
		2505 (20800)	16.02	16.06	16.16
	1RB-Middle (24)	2565 (21400)	16.04	16.09	15.87
		2535 (21100)	16.10	16.26	16.00
		2505 (20800)	15.98	16.16	16.02
	1RB-Low (0)	2565 (21400)	15.94	16.01	16.13
		2535 (21100)	15.62	15.93	16.05
		2505 (20800)	15.84	16.10	16.15
	25RB-High (25)	2565 (21400)	15.70	16.00	16.23
		2535 (21100)	15.62	16.22	16.08
		2505 (20800)	15.83	16.10	16.20
	25RB-Middle (12)	2565 (21400)	15.86	16.14	16.10
		2535 (21100)	16.03	16.22	16.22
		2505 (20800)	15.90	16.16	15.75
	25RB-Low (0)	2565 (21400)	15.60	16.22	15.87
		2535 (21100)	15.89	16.26	16.08
		2505 (20800)	15.66	16.09	16.11
	50RB (0)	2565 (21400)	15.58	16.04	16.01
		2535 (21100)	15.75	16.10	16.34
		2505 (20800)	15.90	16.14	16.00

15MHz	1RB-High (74)	2562.5 (21375)	15.47	16.21	16.02
		2535 (21100)	15.86	15.88	16.10
		2507.5 (20825)	15.66	16.11	16.12
	1RB-Middle (37)	2562.5 (21375)	15.95	15.98	16.00
		2535 (21100)	15.84	16.19	16.06
		2507.5 (20825)	15.85	16.21	15.85
	1RB-Low (0)	2562.5 (21375)	15.71	16.15	16.20
		2535 (21100)	15.72	16.17	16.09
		2507.5 (20825)	15.60	16.25	16.20
	36RB-High (38)	2562.5 (21375)	15.54	16.01	15.99
		2535 (21100)	15.69	15.93	16.04
		2507.5 (20825)	15.78	16.18	15.79
	36RB-Middle (19)	2562.5 (21375)	15.96	16.20	16.14
		2535 (21100)	15.85	16.21	16.17
		2507.5 (20825)	15.87	16.17	15.78
	36RB-Low (0)	2562.5 (21375)	15.61	16.21	16.17
		2535 (21100)	15.79	16.18	15.80
		2507.5 (20825)	15.71	16.04	15.99
	75RB (0)	2562.5 (21375)	15.59	16.14	16.03
		2535 (21100)	15.79	15.98	16.32
		2507.5 (20825)	15.76	16.24	16.10
20MHz	1RB-High (99)	2560 (21350)	15.66	15.83	15.80
		2535 (21100)	15.86	16.06	15.87
		2510 (20850)	15.92	16.11	16.19
	1RB-Middle (50)	2560 (21350)	15.91	16.07	16.16
		2535 (21100)	16.03	16.21	16.29
		2510 (20850)	15.99	16.15	16.24
	1RB-Low (0)	2560 (21350)	15.84	15.99	16.16
		2535 (21100)	15.91	16.10	16.08
		2510 (20850)	15.87	16.07	16.11
	50RB-High (50)	2560 (21350)	15.75	15.89	15.82
		2535 (21100)	15.93	16.05	16.25
		2510 (20850)	15.97	16.09	16.27
	50RB-Middle (25)	2560 (21350)	15.91	16.01	16.18
		2535 (21100)	15.89	16.08	16.18
		2510 (20850)	15.94	16.11	16.01
	50RB-Low (0)	2560 (21350)	15.20	15.94	15.98
		2535 (21100)	15.95	16.13	16.04
		2510 (20850)	15.91	16.03	15.99
	100RB (0)	2560 (21350)	15.82	15.93	16.10
		2535 (21100)	15.89	16.01	16.15
		2510 (20850)	14.92	16.02	16.15

Band7-ANT4-Power Level B1					
BANDWIDTH	Number of RBs	Frequency	QPSK	16QAM	64QAM
5MHz	1RB-High (24)	2567.5 (21425)	23.12	21.70	21.28
		2535 (21100)	22.94	22.06	21.64
		2502.5 (20775)	22.75	22.32	21.57
	1RB-Middle (12)	2567.5 (21425)	22.87	21.79	21.24
		2535 (21100)	22.91	22.09	21.66
		2502.5 (20775)	22.73	22.30	21.47
	1RB-Low (0)	2567.5 (21425)	22.80	21.76	21.30
		2535 (21100)	22.91	22.02	21.64
		2502.5 (20775)	22.67	22.21	21.47
	12RB-High (13)	2567.5 (21425)	22.15	21.19	20.25
		2535 (21100)	22.22	21.29	20.64
		2502.5 (20775)	22.20	21.29	20.53
	12RB-Middle (6)	2567.5 (21425)	22.20	21.29	20.34
		2535 (21100)	22.28	21.33	20.70
		2502.5 (20775)	22.15	21.24	20.51
	12RB-Low (0)	2567.5 (21425)	22.26	21.30	20.36
		2535 (21100)	22.33	21.31	20.69
		2502.5 (20775)	22.15	21.25	20.52
	25RB (0)	2567.5 (21425)	22.23	21.19	20.31
		2535 (21100)	22.27	21.27	20.67
		2502.5 (20775)	22.14	21.19	20.50
10MHz	1RB-High (49)	2565 (21400)	23.13	21.66	21.20
		2535 (21100)	22.84	21.68	21.57
		2505 (20800)	22.69	22.09	21.59
	1RB-Middle (24)	2565 (21400)	23.20	21.76	21.28
		2535 (21100)	22.84	21.69	21.68
		2505 (20800)	22.73	22.08	21.58
	1RB-Low (0)	2565 (21400)	23.18	21.77	21.34
		2535 (21100)	22.88	21.63	21.63
		2505 (20800)	22.61	21.96	21.42
	25RB-High (25)	2565 (21400)	22.17	21.27	20.29
		2535 (21100)	22.27	21.25	20.63
		2505 (20800)	22.18	21.20	20.58
	25RB-Middle (12)	2565 (21400)	22.25	21.33	20.37
		2535 (21100)	22.31	21.30	20.69
		2505 (20800)	22.16	21.19	20.56
	25RB-Low (0)	2565 (21400)	22.29	21.40	20.46
		2535 (21100)	22.27	21.28	20.72
		2505 (20800)	22.16	21.20	20.52
	50RB (0)	2565 (21400)	22.28	21.29	20.41
		2535 (21100)	22.26	21.20	20.58
		2505 (20800)	22.19	21.17	20.53

15MHz	1RB-High (74)	2562.5 (21375)	22.90	21.54	21.15
		2535 (21100)	22.74	22.15	21.48
		2507.5 (20825)	22.64	22.05	21.57
	1RB-Middle (37)	2562.5 (21375)	23.07	21.69	21.40
		2535 (21100)	22.84	22.18	21.63
		2507.5 (20825)	22.67	22.06	21.52
	1RB-Low (0)	2562.5 (21375)	22.79	21.63	21.39
		2535 (21100)	22.68	22.03	21.59
		2507.5 (20825)	22.59	21.96	21.41
	36RB-High (38)	2562.5 (21375)	22.19	21.18	20.35
		2535 (21100)	22.23	21.29	20.62
		2507.5 (20825)	22.12	21.07	20.59
	36RB-Middle (19)	2562.5 (21375)	22.23	21.25	20.38
		2535 (21100)	22.22	21.26	20.67
		2507.5 (20825)	22.15	21.10	20.54
	36RB-Low (0)	2562.5 (21375)	22.23	21.28	20.45
		2535 (21100)	22.21	21.26	20.67
		2507.5 (20825)	22.09	21.08	20.49
	75RB (0)	2562.5 (21375)	22.22	21.22	20.31
		2535 (21100)	22.27	21.26	20.58
		2507.5 (20825)	22.14	21.10	20.47
20MHz	1RB-High (99)	2560 (21350)	23.11	22.54	21.19
		2535 (21100)	23.33	22.81	21.44
		2510 (20850)	23.28	22.54	21.55
	1RB-Middle (50)	2560 (21350)	23.41	22.77	21.35
		2535 (21100)	23.38	22.91	21.74
		2510 (20850)	23.44	22.59	21.54
	1RB-Low (0)	2560 (21350)	23.19	22.61	21.38
		2535 (21100)	23.22	22.67	21.58
		2510 (20850)	23.21	22.41	21.38
	50RB-High (50)	2560 (21350)	22.17	21.15	20.28
		2535 (21100)	22.33	21.29	20.61
		2510 (20850)	22.26	21.22	20.58
	50RB-Middle (25)	2560 (21350)	22.37	21.25	20.45
		2535 (21100)	22.28	21.28	20.63
		2510 (20850)	22.23	21.21	20.55
	50RB-Low (0)	2560 (21350)	22.28	21.23	20.54
		2535 (21100)	22.28	21.31	20.72
		2510 (20850)	22.14	21.16	20.52
	100RB (0)	2560 (21350)	22.22	21.21	20.37
		2535 (21100)	22.26	21.25	20.56
		2510 (20850)	22.16	21.12	20.50

Band7-ANT4-Power Level C1					
BANDWIDTH	Number of RBs	Frequency	QPSK	16QAM	64QAM
5MHz	1RB-High (24)	2567.5 (21425)	19.84	20.34	20.42
		2535 (21100)	20.00	20.22	20.41
		2502.5 (20775)	20.07	20.31	20.45
	1RB-Middle (12)	2567.5 (21425)	20.27	20.32	20.15
		2535 (21100)	20.25	20.37	20.32
		2502.5 (20775)	20.06	20.41	20.20
	1RB-Low (0)	2567.5 (21425)	19.99	20.41	20.15
		2535 (21100)	19.89	20.34	20.38
		2502.5 (20775)	19.77	20.35	20.29
	12RB-High (13)	2567.5 (21425)	19.78	20.47	20.18
		2535 (21100)	19.95	20.41	20.39
		2502.5 (20775)	20.29	20.30	20.13
	12RB-Middle (6)	2567.5 (21425)	19.94	20.11	20.23
		2535 (21100)	20.44	20.38	20.31
		2502.5 (20775)	20.21	20.18	20.16
	12RB-Low (0)	2567.5 (21425)	19.88	20.42	20.27
		2535 (21100)	19.96	20.24	20.16
		2502.5 (20775)	19.95	20.29	20.22
	25RB (0)	2567.5 (21425)	19.68	20.18	20.34
		2535 (21100)	20.23	20.35	20.12
		2502.5 (20775)	20.08	20.37	20.35
10MHz	1RB-High (49)	2565 (21400)	19.97	20.39	20.30
		2535 (21100)	19.85	20.39	20.38
		2505 (20800)	20.24	20.22	20.37
	1RB-Middle (24)	2565 (21400)	20.36	20.35	20.20
		2535 (21100)	20.38	20.36	20.40
		2505 (20800)	20.31	20.42	20.34
	1RB-Low (0)	2565 (21400)	20.10	20.30	20.43
		2535 (21100)	19.88	20.17	20.39
		2505 (20800)	19.93	20.24	20.23
	25RB-High (25)	2565 (21400)	19.87	20.39	20.38
		2535 (21100)	19.83	20.34	20.20
		2505 (20800)	20.20	20.38	20.33
	25RB-Middle (12)	2565 (21400)	20.01	20.28	20.38
		2535 (21100)	20.29	20.40	20.34
		2505 (20800)	20.18	20.31	20.05
	25RB-Low (0)	2565 (21400)	20.02	20.30	20.21
		2535 (21100)	19.94	20.32	20.18
		2505 (20800)	19.88	20.32	20.34
	50RB (0)	2565 (21400)	19.90	20.23	20.27
		2535 (21100)	20.00	20.37	20.40
		2505 (20800)	19.92	20.43	20.42



15MHz	1RB-High (74)	2562.5 (21375)	19.80	20.39	20.08
		2535 (21100)	20.11	20.31	20.29
		2507.5 (20825)	20.09	20.27	20.37
	1RB-Middle (37)	2562.5 (21375)	20.40	20.40	20.14
		2535 (21100)	20.21	20.42	20.22
		2507.5 (20825)	20.18	20.31	20.27
	1RB-Low (0)	2562.5 (21375)	20.11	20.32	20.40
		2535 (21100)	20.00	20.34	20.40
		2507.5 (20825)	19.82	20.30	20.27
	36RB-High (38)	2562.5 (21375)	19.93	20.33	20.33
		2535 (21100)	19.90	20.33	20.40
		2507.5 (20825)	20.02	20.35	20.15
	36RB-Middle (19)	2562.5 (21375)	20.07	20.26	20.36
		2535 (21100)	20.10	20.29	20.43
		2507.5 (20825)	20.25	20.30	20.20
	36RB-Low (0)	2562.5 (21375)	19.91	20.36	20.40
		2535 (21100)	19.96	20.43	20.15
		2507.5 (20825)	19.79	20.32	20.26
	75RB (0)	2562.5 (21375)	19.84	20.28	20.20
		2535 (21100)	20.00	20.37	20.32
		2507.5 (20825)	20.03	20.43	20.42
20MHz	1RB-High (99)	2560 (21350)	19.88	20.25	20.24
		2535 (21100)	20.11	20.40	20.09
		2510 (20850)	20.13	20.43	20.21
	1RB-Middle (50)	2560 (21350)	20.14	20.31	20.08
		2535 (21100)	20.26	20.44	20.18
		2510 (20850)	20.19	20.32	20.22
	1RB-Low (0)	2560 (21350)	20.04	20.38	20.13
		2535 (21100)	20.10	20.43	20.22
		2510 (20850)	20.08	20.44	20.19
	50RB-High (50)	2560 (21350)	19.94	20.33	20.13
		2535 (21100)	20.11	20.42	20.24
		2510 (20850)	20.19	20.39	20.11
	50RB-Middle (25)	2560 (21350)	20.07	20.39	20.10
		2535 (21100)	20.14	20.35	20.14
		2510 (20850)	20.25	20.49	20.22
	50RB-Low (0)	2560 (21350)	20.08	20.35	20.07
		2535 (21100)	20.20	20.31	20.20
		2510 (20850)	20.11	20.40	19.99
	100RB (0)	2560 (21350)	19.98	20.42	20.07
		2535 (21100)	20.12	20.39	20.24
		2510 (20850)	20.08	20.39	20.09

SAR test is not required since maximum output power when downlink carrier aggregation active is not more than ¼ dB higher than the maximum output power measured when downlink carrier aggregation inactive.

DL LTE CA Class	PCC								SCC			Power		
	PC C Band	PCC Band width (MHz)	PCC UL RB size	PCC UL RB offset	PCC DL RB size	PCC DL RB offset	PCC UL Channel	PCC DL Channel	SCC Band	SCC Band width (MHz)	SCC DL Channel	Rel 8 LTETx Power (dBm)	Rel 10 DL LTE CA Tx Power(dBm)	Tune-up
2A-2A	2	15	1	37	75	0	18675	675	2	20	1100	23.57	23.32	24.5
2C	2	15	1	37	75	0	18675	675	2	15	825	23.57	23.36	24.5
5B	5	10	1	49	50	0	20450	2450	5	10	2549	23.12	23.07	24.5
5A-5A	5	10	1	49	1	0	20450	2450	5	5	2625	23.12	23.03	24.5
5A-7A	5	10	1	49	1	0	20525	2525	7	20	3100	23.15	23.11	24.5
7C	7	10	1	49	1	0	21206	3106	7	20	3350	23.79	23.56	24.5
7A-7A	7	10	1	49	1	0	20775	2775	7	20	3350	23.79	23.44	24.5
41C	41	5	1	49	1	0	41373	41373	41	20	41490	23.46	23.31	24.5
41A-41A	41	5	1	49	1	0	39675	39675	41	20	41490	23.46	23.28	24.5

### 11.4 Wi-Fi and BT Measurement result

The maximum output power of BT antenna is 10.05dBm.

The maximum tune up of BT antenna is 11dBm.

The average conducted power for Wi-Fi 2.4G is as following-Power Level A1:

802.11b								
Channel\data rate	1Mbps	2Mbps	5.5Mbps	11Mbps				
11(2462MHz)	13.72	/	/	/				
6(2437(MHz)	13.95	13.87	13.73	13.68				
1(2412MHz)	13.81	/	/	/				
Tune up	14.00	14.00	14.00	14.00				
802.11g								
Channel\data rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
11(2462MHz)	13.82	/	/	/	/	/	/	/
6(2437(MHz)	13.84	/	/	/	/	/	/	/
1(2412MHz)	13.98	13.80	13.68	13.52	13.44	13.28	13.26	13.19
Tune up	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00
802.11n-20MHz								
Channel\data rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
11(2462MHz)	13.90	/	/	/	/	/	/	/
6(2437(MHz)	13.94	/	/	/	/	/	/	/
1(2412MHz)	13.98	13.88	13.86	13.64	13.48	13.53	13.46	13.37
Tune up	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00

The average conducted power for Wi-Fi 2.4G is as following-Power Level B1/C1:

<b>802.11b</b>								
Channel\data rate	1Mbps	2Mbps	5.5Mbps	11Mbps				
11(2462MHz)	18.98	18.87	18.96	18.93				
6(2437(MHz)	18.49	/	/	/				
1(2412MHz)	18.47	/	/	/				
Tune up	19.00	19.00	19.00	19.00				
<b>802.11g</b>								
Channel\data rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
11(2462MHz)	17.77							
6(2437(MHz)	17.95	17.85	17.47	16.99	16.38	15.95	15.48	14.99
1(2412MHz)	17.41	/	/	/	/	/	/	/
Tune up	18.00	18.00	17.50	17.00	16.50	16.00	15.50	15.00
<b>802.11n-20MHz</b>								
Channel\data rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
11(2462MHz)	16.61							
6(2437(MHz)	17.89	17.50	16.89	16.43	15.83	15.64	15.49	14.98
1(2412MHz)	17.34	/	/	/	/	/	/	/
Tune up	18.00	17.50	17.00	16.50	16.00	15.50	15.50	15.00

The average conducted power for Wi-Fi 5G is as following-Power Level A1:

<b>802.11ac(dBm)-20MHz</b>										
Channel\data rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	
36(5180 MHz)	11.79	11.37	11.54	11.48	11.35	10.83	10.71	10.65	10.55	
40(5200 MHz)	11.73	/	/	/	/	/	/	/	/	
44(5220 MHz)	11.47	/	/	/	/	/	/	/	/	
48(5240 MHz)	11.73	/	/	/	/	/	/	/	/	
52(5260 MHz)	11.14	/	/	/	/	/	/	/	/	
56(5280 MHz)	11.58	10.98	10.77	10.66	10.50	10.41	10.34	10.37	10.18	
60(5300 MHz)	11.47	/	/	/	/	/	/	/	/	
64(5320 MHz)	11.47	/	/	/	/	/	/	/	/	
Tune up	12.50	12.00	12.00	12.00	12.00	12.00	12.00	12.00	11.50	
<b>802.11ac(dBm)-80MHz</b>										
106(5530 MHz)	11.44	/	/	/	/	/	/	/	/	
122(5610 MHz)	11.59	11.52	11.34	11.29	10.96	9.53	9.31	9.02	8.97	8.44
Tune up	13.00	13.00	13.00	13.00	12.00	11.50	11.50	11.00	11.00	11.00
155(5775 MHz)	12.72	12.35	12.58	11.89	10.93	10.16	9.90	9.90	9.34	9.48
Tune up	13.00	13.00	13.00	13.00	12.00	11.50	11.50	11.00	11.00	11.00

The average conducted power for Wi-Fi 5G is as following-Power Level B1/C1:

802.11a(dBm)										
Channel\data rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps		
36(5180 MHz)	16.19	/	/	/	/	/	/	/		
40(5200 MHz)	16.49	15.79	15.86	15.02	14.84	14.24	14.18	13.82		
44(5220 MHz)	16.34	/	/	/	/	/	/	/		
48(5240 MHz)	16.11	/	/	/	/	/	/	/		
52(5260 MHz)	16.25	15.05	14.79	14.52	14.26	13.75	13.62	13.11		
56(5280 MHz)	15.81	/	/	/	/	/	/	/		
60(5300 MHz)	15.71	/	/	/	/	/	/	/		
64(5320 MHz)	15.91	/	/	/	/	/	/	/		
Tune up	17.00	16.50	16.50	16.00	16.00	15.50	15.50	15.00		
802.11n(dBm)-40MHz										
Channel\data rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7		
102(5510 MHz)	15.32	/	/	/	/	/	/	/		
110(5550 MHz)	15.94	/	/	/	/	/	/	/		
118(5590 MHz)	15.82	/	/	/	/	/	/	/		
126(5630 MHz)	15.92	/	/	/	/	/	/	/		
134(5670 MHz)	16.16	15.07	14.77	13.74	13.81	13.83	12.72	11.73		
Tune up	17.00	16.00	16.00	15.00	15.00	14.00	14.00	13.00		
802.11ac(dBm)-80MHz										
Channel\data rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
155(5775 MHz)	16.21	16.09	16.07	15.61	15.37	14.33	14.21	13.15	12.15	11.42
Tune up	18.00	17.50	17.50	17.00	17.00	16.00	16.00	15.00	14.00	13.00

## 11.5 5G NR Measurement result

### Maximum Target Power for Production Unit– Level A1/B1/C1

Band	Tune up (dBm)		
	Level A1 (Receiver on)	Level B1 (Receiver off, hotspot off)	Level C1 (Receiver off, hotspot on)
N5	24.5	24.5	24.5

### Maximum power reduction (MPR) for power class 3

Modulation	MPR (dB)		
	Edge RB allocations	Outer RB allocations	Inner RB allocations
DFT-s-OFDM PI/2 BPSK	$\leq 3.5^1$	$\leq 1.2^1$	$\leq 0.2^1$
	$0.5^2$	$0.5^2$	$0^2$
DFT-s-OFDM QPSK	$\leq 1$		0
DFT-s-OFDM 16 QAM	$\leq 2$		$\leq 1$
DFT-s-OFDM 64 QAM	$\leq 2.5$		
DFT-s-OFDM 256 QAM	4.5		
CP-OFDM QPSK	$\leq 3$		$\leq 1.5$
CP-OFDM 16 QAM	$\leq 3$		$\leq 2$
CP-OFDM 64 QAM	$\leq 3.5$		
CP-OFDM 256 QAM	$\leq 6.5$		

NOTE 1: Applicable for UE operating in TDD mode with PI/2 BPSK modulation and UE indicates support for UE capability [powerBoosting-pi2BPSK] and if the IE powerBoostPi2BPSK is set to 1 and 40 % or less slots in radio frame are used for UL transmission for bands n40, n41, n77, n78 and n79. The reference power of 0 dB MPR is 26 dBm.

NOTE 2: Applicable for UE operating in FDD mode, or in TDD mode in bands other than n40, n41, n77, n78 and n79 and if the IE powerBoostPi2BPSK is set to 0 and if more than 40 % of slots in radio frame are used for UL transmission for bands n40, n41, n77, n78 and n79.

5G NR-n5-Power Level A1/B1/C1						
SCS (kHz)	NR BW (MHz)	Modulation	RB allocation		NR Test Freq. (MHz)	Power Results (dBm)
15	5	DFT-s-OFDM QPSK	Edge_1RB_Right	1@24	846.5	22.71
15	5	DFT-s-OFDM QPSK	Inner_Full	12@6	836.5	24.01
15	5	DFT-s-OFDM QPSK	Edge_1RB_Left	1@0	826.5	22.81
15	20	DFT-s-OFDM QPSK	Edge_1RB_Right	1@105	839	22.56
15	20	DFT-s-OFDM QPSK	Inner_Full	50@25	836.5	23.92
15	20	DFT-s-OFDM QPSK	Edge_1RB_Left	1@0	834	22.73
15	5	DFT-s-OFDM PI/2 BPSK1	Inner_Full	12@6	836.5	23.72
15	5	DFT-s-OFDM 16QAM	Inner_Full	12@6	836.5	23.26
15	5	DFT-s-OFDM 64QAM	Inner_Full	12@6	836.5	21.70
15	5	DFT-s-OFDM 256QAM	Inner_Full	12@6	836.5	19.35
15	5	CP-OFDM QPSK	Inner_Full	13@6	836.5	23.46
15	5	CP-OFDM 16QAM	Inner_Full	13@6	836.5	23.02
15	5	CP-OFDM 64QAM	Inner_Full	13@6	836.5	21.22
15	5	CP-OFDM 256QAM	Inner_Full	13@6	836.5	17.81
15	5	DFT-s-OFDM QPSK	Edge_Full_Right	2@23	836.5	22.89
15	5	DFT-s-OFDM QPSK	Edge_Full_Left	2@0	836.5	22.85
15	5	DFT-s-OFDM QPSK	Inner_1RB_Right	1@23	836.5	23.91
15	5	DFT-s-OFDM QPSK	Inner_1RB_Left	1@1	836.5	23.92
15	5	DFT-s-OFDM QPSK	Outer_Full	25@0	836.5	22.87
15	10	DFT-s-OFDM QPSK	Inner_Full	25@12	836.5	23.74
15	15	DFT-s-OFDM QPSK	Inner_Full	36@18	836.5	23.89

## 12 Simultaneous TX SAR Considerations

### 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 BT and Wi-Fi can transmit simultaneous with other transmitters.

### 12.2 Transmit Antenna Separation Distances

Please refer to the picture of antenna locations in the document:”The photos of SAR test-I21Z70041”.

### 12.3 SAR Measurement Positions

According to the KDB941225 D06 Hot Spot SAR, 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	Right	Top	Bottom
Main Antenna-ANT0	Yes	Yes	Yes	Yes	No	Yes
Main Antenna-ANT1	Yes	Yes	Yes	No	No	Yes
Main Antenna-ANT4	Yes	Yes	Yes	No	Yes	No
WiFi Antenna-ANT6	Yes	Yes	No	Yes	Yes	No

## 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  $\leq 50$  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	
Bluetooth	2.441	Head	9.60	11	12.59	No
		Body	19.20	11	12.59	Yes
2.4GHz WLAN	2.45	Head	9.58	19	79.43	No
		Body	19.17	19	79.43	No
5GHz WLAN	5.2	Head	6.58	17	50.12	No
		Body	13.16	17	50.12	No
	5.3	Head	6.52	17	50.12	No
		Body	13.03	17	50.12	No
	5.6	Head	6.34	17	50.12	No
		Body	12.68	17	50.12	No
	5.8	Head	6.23	18	63.10	No
		Body	12.46	18	63.10	No

### 13 Evaluation of Simultaneous

**Table 13.1: The sum of SAR values for Main antenna + WiFi-2.4G**

	Position	Main antenna	WiFi-2.4G	Sum
<b>Highest SAR value for Head</b>	Right head, Tilt (ENDC 7A-n5A)	0.86	0.13	<b>0.99</b>
<b>Highest SAR value for Body</b>	Rear 10mm (LTE Band2)	0.98	0.54	<b>1.52</b>

**Table 13.2: The sum of SAR values for Main antenna + WiFi-5G**

	Position	Main antenna	WiFi-5G	Sum
<b>Highest SAR value for Head</b>	Left head, Tilt (ENDC 7A-n5A)	0.83	0.76	<b>1.22</b>
<b>Highest SAR value for Body</b>	Rear 10mm (LTE Band2)	0.98	0.41	<b>1.39</b>

**Table 13.3: The sum of reported SAR values for main antenna and BT**

	Position	Main antenna	BT	Sum
<b>Maximum reported SAR value for Head</b>	Right head, Tilt (ENDC 7A-n5A)	0.86	<0.01	<b>0.86</b>
<b>Maximum reported SAR value for Body</b>	Bottom 10mm (LTE Band7)	1.05	<0.01	<b>1.05</b>

**Table 13.4: The sum of SAR values for ENDC**

4G Band	Exposure condition	Test position	Reported SAR 1g(W/kg)	5G Band SAR 1g(W/kg)-n5	Sum
LTE Band 7-ANT4	Head	Left Cheek	0.24	0.09	<b>0.33</b>
		Left Tilt	0.32	0.14	<b>0.46</b>
		Right Cheek	0.51	0.28	<b>0.79</b>
		Right Tilt	0.71	0.15	<b>0.86</b>
	Body	Front 10mm	0.29	0.37	<b>0.66</b>
		Rear 10mm	0.26	0.45	<b>0.71</b>
		Left 10mm	0.21	0.15	<b>0.36</b>
		Right 10mm	<0.01	0.35	<b>0.35</b>
		Bottom 10mm	<0.01	0.35	<b>0.35</b>
		Top 10mm	0.66	<0.01	<b>0.66</b>

**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.



**Table 13.5: The sum of reported SAR values for main antenna and WiFi (Extremity SAR)**

	band	Position	Main antenna	WiFi	Sum (10g)	Distance (mm)	Ratio
<b>Highest reported SAR value for Phablet</b>	WCDMA B2	Rear 0mm	3.20	1.45	<b>4.65</b>	158.78	0.06
	LTE B2	Rear 0mm	3.29	1.45	<b>4.74</b>	163.73	0.06
	LTE B7-ANT0	Rear 0mm	1.86	1.45	<b>3.31</b>	/	/
	LTE B7-ANT4	Top 0mm	0.36	1.05	<b>1.41</b>	/	/

According to the KDB 447498 D01, when the sum of SAR is larger than the limit, SAR test exclusion is determined by the SAR to peak location separation ratio. The ratio is determined by  $(SAR1 + SAR2)^{1.5}/R_i$ , rounded to two decimal digits, and must be  $\leq 0.1$  for all antenna pairs in the configuration to qualify for 10-g SAR test exclusion.

Find distance of maxima	
<input type="checkbox"/> Maxima and position w.r.t. Grid Reference Point	associated 1g averages
<input type="checkbox"/> Zoom Scan (D:\2021\I21Z70041(FCC)\WLAN2.4 Body 21a PJB 4.27.da53:0/Body TOP 0mm 11b 1M 18db 2)	
Max. 1 at (13.20, -71.00, -1.01) mm	4.40 W/kg
<input type="checkbox"/> Zoom Scan (D:\2021\I21Z70041(FCC)\4.27\WCDMA1900 Body 18a PJB 4.27.da53:0/Body REAR 0mm)	
Max. 2 at (-43.00, 77.50, -1.04) mm	4.99 W/kg
<input type="checkbox"/> Distances and Separation Ratios	
Max. 1 - Max. 2	Distance [mm]: 158.78 / Separation ratio [W/kg/mm]: 0.18

**Picture 13.1 Distance evaluation for WCDMA1900 and WiFi 2.4G Body**

Find distance of maxima	
<input type="checkbox"/> Maxima and position w.r.t. Grid Reference Point	associated 1g averages
<input type="checkbox"/> Zoom Scan (D:\2021\I21Z70041(FCC)\WLAN2.4 Body 21a PJB 4.27.da53:0/Body TOP 0mm 11b 1M 18db 2)	
Max. 1 at (13.20, -71.00, -1.01) mm	4.40 W/kg
<input type="checkbox"/> Zoom Scan (D:\2021\I21Z70041(FCC)\4.27\LTE BAND2 Body 18a PJB 4.27.da53:0/Body REAR 0mm 1-M)	
Max. 2 at (-41.00, 83.50, -1.03) mm	5.03 W/kg
<input type="checkbox"/> Distances and Separation Ratios	
Max. 1 - Max. 2	Distance [mm]: 163.73 / Separation ratio [W/kg/mm]: 0.18

**Picture 13.2 Distance evaluation for LTE B2 and WiFi 2.4G Body**

## 14 SAR Test Result

It is determined by user manual for the distance between the EUT and the phantom bottom. The distance is 10 mm 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  $P_{\text{Target}}$  is the power of manufacturing upper limit;

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

**Table 14.1: Duty Cycle**

Mode	Duty Cycle
Speech for GSM850/1900	1:8.3
GPRS&EGPRS for GSM 850/1900	1:2
WCDMA&LTE FDD&5G NR	1:1
LTE TDD	1:1.58

**The evaluation of multi-SIM cards:**

We'll perform the head measurement in all bands with the primary SIM depending on the evaluation of multi-SIM cards and retest on highest value point with other SIM. Then, repeat the measurement in the Body test.

Frequency		Side	Test Position	SIM cards	SAR(1g) (W/kg)	Power Drift(dB)
MHz	Ch.					
848.8	251	Right	Cheek	S1	0.171	-0.05
848.8	251	Right	Cheek	S2	0.165	0.02

Note: According to the values in the above table, the **S1** is the primary SIM card.

We'll perform the head measurement with the **S1** and retest on highest value point with others.

frequency		Test Position	Spacing (mm)	SIM cards	SAR(1g) (W/kg)	Power Drift(dB)
MHz	Ch.					
848.8	251	Rear	10	S1	0.632	0.02
848.8	251	Rear	10	S2	0.621	0.01

Note: According to the values in the above table, the **S1** is the primary SIM card.

We'll perform the body measurement with the **S1** and retest on highest value point with others.

**Note**

**S1: SIM1**

**S2: SIM2**

### 14.1 SAR results for 2G/3G/4G

**Table 14.1-1: SAR Values (GSM 850 MHz Band - Head)**

Frequency		Side	Test Position	Figure No.	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										
		Ambient Temperature: 22.9 °C      Liquid Temperature: 22.5°C									
190	836.6	Left	Cheek	/	31.99	33.5	0.079	<b>0.11</b>	0.097	<b>0.14</b>	0.00
190	836.6	Left	Tilt	/	31.99	33.5	0.049	<b>0.07</b>	0.058	<b>0.08</b>	-0.15
251	848.8	Right	Cheek	Fig.1	31.97	33.5	0.131	<b>0.19</b>	0.171	<b>0.24</b>	-0.05
190	836.6	Right	Cheek	/	31.99	33.5	0.104	<b>0.15</b>	0.127	<b>0.18</b>	0.17
128	824.2	Right	Cheek	/	31.89	33.5	0.099	<b>0.14</b>	0.129	<b>0.19</b>	0.07
190	836.6	Right	Tilt	/	31.99	33.5	0.055	<b>0.08</b>	0.069	<b>0.10</b>	-0.19
251	848.8	Right	Cheek	S2	31.97	33.5	0.122	<b>0.17</b>	0.165	<b>0.23</b>	0.02

**Table 14.1-2: SAR Values (GSM 850 MHz Band - Body)**

Frequency		Mode (number of timeslots)	Test Position	Figure No.	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										
		Ambient Temperature: 22.9 °C      Liquid Temperature: 22.5°C									
190	836.6	GPRS (4)	Front	/	28.29	30	0.27	<b>0.40</b>	0.451	<b>0.67</b>	0.02
251	848.8	GPRS (4)	Rear	Fig.2	28.33	30	0.368	<b>0.54</b>	0.632	<b>0.93</b>	0.02
190	836.6	GPRS (4)	Rear	/	28.29	30	0.327	<b>0.48</b>	0.582	<b>0.86</b>	0.15
128	824.2	GPRS (4)	Rear	/	28.23	30	0.262	<b>0.39</b>	0.448	<b>0.67</b>	0.08
190	836.6	GPRS (4)	Left	/	28.29	30	0.12	<b>0.18</b>	0.189	<b>0.28</b>	-0.1
190	836.6	GPRS (4)	Right	/	28.29	30	0.247	<b>0.37</b>	0.374	<b>0.55</b>	-0.17
190	836.6	GPRS (4)	Bottom	/	28.29	30	0.216	<b>0.32</b>	0.433	<b>0.64</b>	-0.12
190	836.6	EGPRS (4)	Rear	/	28.4	30	0.324	<b>0.47</b>	0.559	<b>0.81</b>	0.13
251	848.8	GPRS (4)	Rear	S2	28.33	30	0.356	<b>0.52</b>	0.621	<b>0.91</b>	0.01

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

**Table 14.1-3: SAR Values (GSM 1900 MHz Band - Head)**

Frequency		Side	Test Position	Figure No.	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										
Ambient Temperature: 22.9°C      Liquid Temperature: 22.5°C											
810	1909.8	Left	Cheek	/	28.84	30.5	0.048	<b>0.05</b>	0.076	<b>0.11</b>	-0.06
661	1880	Left	Cheek	/	28.85	30.5	0.061	<b>0.06</b>	0.099	<b>0.14</b>	-0.05
512	1850.2	Left	Cheek	Fig.3	28.93	30.5	0.047	<b>0.05</b>	0.075	<b>0.11</b>	-0.17
661	1880	Left	Tilt	/	28.85	30.5	<0.01	<0.01	<0.01	<0.01	/
661	1880	Right	Cheek	/	28.85	30.5	<0.01	<0.01	<0.01	<0.01	/
661	1880	Right	Tilt	/	28.85	30.5	<0.01	<0.01	<0.01	<0.01	/
661	1880	Left	Cheek	S2	28.85	30.5	0.041	<b>0.06</b>	0.077	<b>0.11</b>	0.08

**Table 14.1-4: SAR Values (GSM 1900 MHz Band – Body)**

Frequency		Mode (number of timeslots)	Test Position	Figure No.	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										
Ambient Temperature: 22.9°C      Liquid Temperature: 22.5°C											
661	1880	GPRS (1)	Front	/	25.53	27.5	0.208	<b>0.33</b>	0.35	<b>0.55</b>	0.18
810	1909.8	GPRS (1)	Rear	Fig.4	25.5	27.5	0.316	<b>0.50</b>	0.562	<b>0.89</b>	-0.02
661	1880	GPRS (1)	Rear	/	25.53	27.5	0.218	<b>0.34</b>	0.476	<b>0.75</b>	0.00
512	1850.2	GPRS (1)	Rear	/	25.51	27.5	0.301	<b>0.48</b>	0.534	<b>0.84</b>	0.14
661	1880	GPRS (1)	Left	/	25.53	27.5	0.165	<b>0.26</b>	0.302	<b>0.48</b>	-0.05
661	1880	GPRS (1)	Right	/	25.53	27.5	0.239	<b>0.38</b>	0.419	<b>0.66</b>	0.04
661	1880	GPRS (1)	Bottom	/	25.52	27.5	0.288	<b>0.45</b>	0.518	<b>0.82</b>	-0.04
810	1909.8	EGPRS (1)	Rear	/	25.5	27.5	0.307	<b>0.49</b>	0.551	<b>0.87</b>	-0.09
810	1909.8	GPRS (1)	Rear	S2	25.53	27.5	0.208	<b>0.33</b>	0.35	<b>0.55</b>	0.18

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

**Table 14.1-5: SAR Values (WCDMA 1900 MHz Band - Head)**

Frequency		Side	Test Position	Figure No.	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										
Ambient Temperature: 22.9°C      Liquid Temperature: 22.5°C											
9538	1907.6	Left	Cheek	/	23.22	24.5	0.144	<b>0.19</b>	0.231	<b>0.31</b>	-0.16
9400	1880	Left	Cheek	/	23.13	24.5	0.138	<b>0.19</b>	0.222	<b>0.30</b>	0.07
9262	1852.4	Left	Cheek	Fig.5	23.18	24.5	0.153	<b>0.21</b>	0.246	<b>0.33</b>	-0.05
9400	1880	Left	Tilt	/	23.13	24.5	0.062	<b>0.08</b>	0.096	<b>0.13</b>	0.00
9400	1880	Right	Cheek	/	23.13	24.5	0.091	<b>0.12</b>	0.137	<b>0.19</b>	-0.02
9400	1880	Right	Tilt	/	23.13	24.5	0.07	<b>0.10</b>	0.116	<b>0.16</b>	0.16
9400	1880	Left	Cheek	S2	23.18	24.5	0.147	<b>0.20</b>	0.235	<b>0.32</b>	0.01

**Table 14.1-6: SAR Values (WCDMA 1900 MHz Band – Body Worn)**

Ambient Temperature: 22.9 °C					Liquid Temperature: 22.5°C					
Frequency		Test Position	Figure No.	Conduct ed 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									
9538	1907.6	Front	/	23.22	24.5	0.159	<b>0.21</b>	0.25	<b>0.34</b>	0.16
9400	1880	Front	Fig.6	23.13	24.5	0.174	<b>0.24</b>	0.274	<b>0.38</b>	-0.01
9262	1852.4	Front	/	23.18	24.5	0.169	<b>0.23</b>	0.263	<b>0.36</b>	-0.19
9400	1880	Rear	/	23.13	24.5	0.156	<b>0.21</b>	0.247	<b>0.34</b>	-0.02
9400	1880	Front	S2	23.13	24.5	0.164	<b>0.22</b>	0.26	<b>0.36</b>	-0.04

Note: The distance between the EUT and the phantom bottom is 15mm

**Table 14.1-7: SAR Values (WCDMA 1900 MHz Band – Hotspot)**

Ambient Temperature: 22.9 °C					Liquid Temperature: 22.5°C					
Frequency		Test Position	Figure No.	Conduct ed 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									
9400	1880	Front	/	22.15	23	0.317	<b>0.39</b>	0.563	<b>0.68</b>	0.15
9538	1907.6	Rear	/	22.1	23	0.405	<b>0.50</b>	0.732	<b>0.90</b>	0.03
9400	1880	Rear	Fig.7	22.15	23	0.434	<b>0.53</b>	0.77	<b>0.94</b>	-0.06
9262	1852.4	Rear	/	22.25	23	0.408	<b>0.48</b>	0.746	<b>0.89</b>	-0.07
9400	1880	Left	/	22.15	23	0.251	<b>0.31</b>	0.475	<b>0.58</b>	0.01
9400	1880	Bottom	/	22.15	23	0.356	<b>0.43</b>	0.632	<b>0.77</b>	0.03
9400	1880	Rear	S2	22.15	23	0.427	<b>0.52</b>	0.758	<b>0.92</b>	-0.08

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

**Table 14.1-8: SAR Values (WCDMA 850 MHz Band - Head)**

Ambient Temperature: 22.9 °C					Liquid Temperature: 22.5°C						
Frequency		Side	Test Position	Figure No.	Conduct ed Power (dBm)	Max. tune-up Power (dBm)	Measure d SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reporte d SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
4183	836.6	Left	Cheek	/	23.85	25	0.172	<b>0.22</b>	0.22	<b>0.29</b>	-0.19
4183	836.6	Left	Tilt	/	23.85	25	0.09	<b>0.12</b>	0.109	<b>0.14</b>	-0.05
4233	846.6	Right	Cheek	Fig.8	23.73	25	0.214	<b>0.29</b>	0.278	<b>0.37</b>	-0.09
4183	836.6	Right	Cheek	/	23.85	25	0.211	<b>0.27</b>	0.269	<b>0.35</b>	-0.01
4132	826.4	Right	Cheek	/	23.87	25	0.178	<b>0.23</b>	0.233	<b>0.30</b>	0.05
4183	836.6	Right	Tilt	/	23.85	25	0.108	<b>0.14</b>	0.134	<b>0.17</b>	0.18
4233	846.6	Right	Cheek	S2	23.73	25	0.197	<b>0.26</b>	0.258	<b>0.35</b>	0.13

**Table 14.1-9: SAR Values (WCDMA 850 MHz Band - Body)**

Ambient Temperature: 22.9 °C						Liquid Temperature: 22.5°C				
Frequency		Test Position	Figure No.	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									
4182	836.4	Front	/	23.85	25	0.225	<b>0.29</b>	0.395	<b>0.51</b>	-0.02
4233	846.6	Rear	Fig.9	23.83	25	0.284	<b>0.37</b>	0.496	<b>0.65</b>	-0.15
4182	836.4	Rear	/	23.85	25	0.267	<b>0.35</b>	0.454	<b>0.59</b>	0.18
4132	826.4	Rear	/	23.87	25	0.261	<b>0.34</b>	0.446	<b>0.58</b>	-0.16
4182	836.4	Left	/	23.85	25	0.108	<b>0.14</b>	0.164	<b>0.21</b>	0.09
4182	836.4	Right	/	23.85	25	0.214	<b>0.28</b>	0.395	<b>0.51</b>	-0.11
4182	836.4	Bottom	/	23.85	25	0.206	<b>0.27</b>	0.409	<b>0.53</b>	0
4233	846.6	Rear	S2	23.83	25	0.276	<b>0.36</b>	0.487	<b>0.64</b>	0.10

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

**Table 14.1-10: SAR Values (LTE Band2 - Head)**

Ambient Temperature: 22.9 °C						Liquid Temperature: 22.5°C						
Frequency		Mode	Side	Test Position	Figure No.	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											
18700	1860	1RB_Mid	Left	Cheek	Fig.10	23.17	24.5	0.198	<b>0.27</b>	0.314	<b>0.43</b>	-0.02
18700	1860	1RB_Mid	Left	Tilt	/	23.17	24.5	0.112	<b>0.15</b>	0.172	<b>0.23</b>	0.00
18700	1860	1RB_Mid	Right	Cheek	/	23.17	24.5	0.148	<b>0.20</b>	0.218	<b>0.30</b>	-0.09
18700	1860	1RB_Mid	Right	Tilt	/	23.17	24.5	0.093	<b>0.13</b>	0.139	<b>0.19</b>	0.14
18700	1860	50RB-Low	Left	Cheek	/	22.25	23.5	0.19	<b>0.25</b>	0.301	<b>0.40</b>	-0.07
18700	1860	50RB-Low	Left	Tilt	/	22.25	23.5	0.012	<b>0.02</b>	0.181	<b>0.24</b>	-0.15
18700	1860	50RB-Low	Right	Cheek	/	22.25	23.5	0.085	<b>0.11</b>	0.129	<b>0.17</b>	0.15
18700	1860	50RB-Low	Right	Tilt	/	22.25	23.5	0.086	<b>0.11</b>	0.132	<b>0.18</b>	-0.03
18700	1860	1RB_Mid	Left	Cheek	S2	23.17	24.5	0.167	<b>0.23</b>	0.295	<b>0.40</b>	-0.01

Note1: The LTE mode is QPSK\_20MHz.

**Table 14.1-11: SAR Values (LTE Band2 – Body worn)**

Ambient Temperature: 22.9 °C						Liquid Temperature: 22.5°C				
Frequency		Mode	Figure No.	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									
18700	1860	1RB-Mid Front	/	23.17	24.5	0.201	<b>0.27</b>	0.342	<b>0.46</b>	0.06
18700	1860	1RB-Mid Rear	Fig.11	23.17	24.5	0.262	<b>0.36</b>	0.449	<b>0.61</b>	0.02
18700	1860	50RB-Low Front	/	22.25	23.5	0.171	<b>0.23</b>	0.272	<b>0.36</b>	-0.03
18700	1860	50RB-Low Rear	/	22.25	23.5	0.219	<b>0.29</b>	0.378	<b>0.50</b>	0.02
18700	1860	1RB-Mid Rear	S2	23.17	24.5	0.25	<b>0.34</b>	0.42	<b>0.57</b>	0.01

Note: The distance between the EUT and the phantom bottom is 15mm. The LTE mode is QPSK\_20MHz.

**Table 14.1-12: SAR Values (LTE Band2 – Hotspot)**

Frequency		Mode	Figure No.	Conduct ed 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									
18700	1860	1RB-Mid Front	/	21.99	23	0.294	<b>0.37</b>	0.513	<b>0.65</b>	-0.14
19100	1900	1RB-Mid Rear	/	21.91	23	0.421	<b>0.54</b>	0.73	<b>0.94</b>	0.08
18900	1880	1RB-Mid Rear	Fig.12	21.94	23	0.443	<b>0.57</b>	0.77	<b>0.98</b>	-0.11
18700	1860	1RB-Mid Rear	/	21.99	23	0.373	<b>0.47</b>	0.654	<b>0.83</b>	-0.17
18900	1880	100RB Rear	/	21.39	23	0.326	<b>0.47</b>	0.57	<b>0.83</b>	0.10
18700	1860	1RB-Mid Left	/	21.99	23	0.214	<b>0.27</b>	0.407	<b>0.51</b>	-0.09
19100	1900	1RB-Mid Bottom	/	21.91	23	0.398	<b>0.51</b>	0.706	<b>0.91</b>	-0.14
18900	1880	1RB-Mid Bottom	/	21.94	23	0.382	<b>0.49</b>	0.677	<b>0.86</b>	-0.02
18700	1860	1RB-Mid Bottom	/	21.99	23	0.316	<b>0.40</b>	0.554	<b>0.70</b>	0.17
19100	1900	100RB Bottom	/	21.35	23	0.322	<b>0.47</b>	0.568	<b>0.83</b>	-0.02
18700	1860	50RB-Low Front	/	21.5	23	0.227	<b>0.32</b>	0.391	<b>0.55</b>	-0.03
19100	1900	50RB-Low Rear	/	21.42	23	0.345	<b>0.50</b>	0.6	<b>0.86</b>	-0.10
18900	1880	50RB-Low Rear	/	21.41	23	0.325	<b>0.47</b>	0.568	<b>0.82</b>	0.17
18700	1860	50RB-Low Rear	/	21.5	23	0.324	<b>0.46</b>	0.566	<b>0.80</b>	-0.15
19100	1900	100RB Rear	/	21.35	23	0.338	<b>0.49</b>	0.586	<b>0.86</b>	0.11
18700	1860	50RB-Low Left	/	21.5	23	0.171	<b>0.24</b>	0.317	<b>0.45</b>	0.12
18700	1860	50RB-Low Bottom	/	21.5	23	0.238	<b>0.34</b>	0.416	<b>0.59</b>	-0.16
18900	1880	1RB-Mid Rear	S2	21.94	23	0.421	<b>0.54</b>	0.67	<b>0.86</b>	0.01

Note: The distance between the EUT and the phantom bottom is 10mm. The LTE mode is QPSK\_20MHz.



**Table 14.1-13: SAR Values (LTE Band5 - Head)**

Frequency		Ambient Temperature: 22.9 °C					Liquid Temperature: 22.5 °C					
Ch.	MHz	Mode	Side	Test Position	Figure No.	Conduct ed Power (dBm)	Max. tune-up Power (dBm)	Measure d SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measure d SAR(1g) (W/kg)	Reporte d SAR(1g) (W/kg)	Power Drift (dB)
20525	836.5	1RB_Mid	Left	Cheek	/	23.15	24.5	0.147	<b>0.20</b>	0.164	<b>0.22</b>	0.11
20525	836.5	1RB_Mid	Left	Tilt	/	23.15	24.5	0.145	<b>0.20</b>	0.162	<b>0.22</b>	0.09
20525	836.5	1RB_Mid	Right	Cheek	Fig.13	23.15	24.5	0.168	<b>0.23</b>	0.216	<b>0.29</b>	-0.09
20525	836.5	1RB_Mid	Right	Tilt	/	23.15	24.5	0.104	<b>0.14</b>	0.117	<b>0.16</b>	0.17
20525	836.5	25RB-Low	Left	Cheek	/	22.21	23.5	0.131	<b>0.18</b>	0.145	<b>0.20</b>	0.05
20525	836.5	25RB-Low	Left	Tilt	/	22.21	23.5	0.077	<b>0.10</b>	0.084	<b>0.11</b>	0.07
20525	836.5	25RB-Low	Right	Cheek	/	22.21	23.5	0.132	<b>0.18</b>	0.15	<b>0.20</b>	0.19
20525	836.5	25RB-Low	Right	Tilt	/	22.21	23.5	0.086	<b>0.12</b>	0.095	<b>0.13</b>	-0.17
20525	836.5	1RB_Mid	Right	Cheek	S2	23.15	24.5	0.156	<b>0.21</b>	0.203	<b>0.28</b>	0.12

Note1: The LTE mode is QPSK\_10MHz.

**Table 14.1-14: SAR Values (LTE Band5 - Body)**

Frequency		Ambient Temperature: 22.9 °C					Liquid Temperature: 22.5 °C				
Ch.	MHz	Mode	Figure No.	Conduct ed 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)	
20525	836.5	1RB-Mid Front	/	23.15	24.5	0.19	<b>0.26</b>	0.324	<b>0.44</b>	0.03	
20525	836.5	1RB-Mid Rear	Fig.14	23.15	24.5	0.244	<b>0.33</b>	0.419	<b>0.57</b>	-0.09	
20525	836.5	1RB-Mid Left	/	23.15	24.5	0.084	<b>0.11</b>	0.128	<b>0.17</b>	0.03	
20525	836.5	1RB-Mid Right	/	23.15	24.5	0.093	<b>0.13</b>	0.138	<b>0.19</b>	0.14	
20525	836.5	1RB-Mid Top	/	23.15	24.5	0.179	<b>0.24</b>	0.359	<b>0.49</b>	0.02	
20525	836.5	25RB-Mid Front	/	22.21	23.5	0.151	<b>0.20</b>	0.256	<b>0.34</b>	-0.11	
20525	836.5	25RB-Mid Rear	/	22.21	23.5	0.191	<b>0.26</b>	0.332	<b>0.45</b>	0.12	
20525	836.5	25RB-Mid Left	/	22.21	23.5	0.066	<b>0.09</b>	0.1	<b>0.13</b>	0.08	
20525	836.5	25RB-Mid Right	/	22.21	23.5	0.074	<b>0.10</b>	0.112	<b>0.15</b>	0.13	
20525	836.5	25RB-Mid Bottom	/	22.21	23.5	0.127	<b>0.17</b>	0.249	<b>0.34</b>	0.17	
20525	836.5	1RB-Mid Rear	S2	23.15	24.5	0.232	<b>0.32</b>	0.398	<b>0.54</b>	-0.02	

Note: The distance between the EUT and the phantom bottom is 10mm. The LTE mode is QPSK\_10MHz.

**Table 14.1-15: SAR Values (LTE Band7 ANT0 - Head)**

Frequency		Mode	Side	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	Cheek	/	23.79	24.5	0.085	<b>0.10</b>	0.166	<b>0.20</b>	0.14
21350	2560	1RB_Mid	Left	Tilt	/	23.79	24.5	0.095	<b>0.11</b>	0.196	<b>0.23</b>	0.12
21350	2560	1RB_Mid	Right	Cheek	Fig.15	23.79	24.5	0.111	<b>0.13</b>	0.220	<b>0.26</b>	-0.04
21350	2560	1RB_Mid	Right	Tilt	/	23.79	24.5	0.042	<b>0.05</b>	0.080	<b>0.09</b>	-0.01
21100	2535	50RB_Mid	Left	Cheek	/	22.78	23.5	0.054	<b>0.06</b>	0.107	<b>0.13</b>	-0.15
21100	2535	50RB_Mid	Left	Tilt	/	22.78	23.5	0.065	<b>0.08</b>	0.136	<b>0.16</b>	0.13
21100	2535	50RB_Mid	Right	Cheek	/	22.78	23.5	0.088	<b>0.10</b>	0.173	<b>0.20</b>	0.06
21100	2535	50RB_Mid	Right	Tilt	/	22.78	23.5	0.034	<b>0.04</b>	0.067	<b>0.08</b>	-0.09
21350	2560	1RB_Mid	Left	Cheek	S2	23.79	24.5	0.103	<b>0.12</b>	0.209	<b>0.25</b>	-0.01

Note: The LTE mode is QPSK\_20MHz.

**Table 14.1-16: SAR Values (LTE Band7 ANT0 – Body worn)**

Frequency		Mode	Figure No.	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 Front	/	23.79	24.5	0.123	<b>0.14</b>	0.262	<b>0.31</b>	0.17
21350	2560	1RB-Mid Rear		23.79	24.5	0.308	<b>0.36</b>	0.611	<b>0.72</b>	0.04
21100	2535	1RB-Mid Rear		23.7	24.5	0.327	<b>0.39</b>	0.633	<b>0.76</b>	0.05
20850	2510	1RB-Mid Rear	Fig.16	23.73	24.5	0.341	<b>0.41</b>	0.66	<b>0.79</b>	-0.15
20850	2510	100RB Rear		22.58	23.5	0.26	<b>0.32</b>	0.515	<b>0.64</b>	0.05
21100	2535	50RB-Mid Front	/	22.78	23.5	0.107	<b>0.13</b>	0.235	<b>0.28</b>	0.01
21100	2535	50RB-Mid Rear	/	22.78	23.5	0.258	<b>0.30</b>	0.512	<b>0.60</b>	-0.06
20850	2510	1RB-Mid Rear	S2	23.73	24.5	0.328	<b>0.39</b>	0.651	<b>0.78</b>	0.12

Note: The distance between the EUT and the phantom bottom is 15mm. The LTE mode is QPSK\_20MHz.

**Table 14.1-17: SAR Values (LTE Band7 ANT0 –Hotspot)**

Frequency		Mode	Figure No.	Conduct ed 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									
21100	2535	1RB-High Front	/	19.67	21	0.149	<b>0.20</b>	0.312	<b>0.42</b>	0.14
21350	2560	1RB-Mid Rear	/	19.64	21	0.286	<b>0.39</b>	0.598	<b>0.82</b>	-0.04
21100	2535	1RB-Mid Rear	/	19.67	21	0.308	<b>0.42</b>	0.647	<b>0.88</b>	0.06
20850	2510	1RB-Mid Rear	/	19.66	21	0.312	<b>0.42</b>	0.657	<b>0.89</b>	-0.01
20850	2510	100RB Rear	/	19.23	21	0.261	<b>0.39</b>	0.584	<b>0.88</b>	-0.13
21100	2535	1RB-High Left	/	19.67	21	0.061	<b>0.08</b>	0.11	<b>0.15</b>	-0.17
21100	2535	1RB-High Right	/	19.67	21	0.087	<b>0.12</b>	0.171	<b>0.23</b>	0.10
21350	2560	1RB-Mid Bottom	/	19.64	21	0.323	<b>0.44</b>	0.697	<b>0.95</b>	-0.03
21100	2535	1RB-Mid Bottom	Fig.17	19.67	21	0.354	<b>0.48</b>	0.772	<b>1.05</b>	-0.01
20850	2510	1RB-Mid Bottom	/	19.66	21	0.341	<b>0.46</b>	0.753	<b>1.03</b>	-0.13
21100	2535	100RB Bottom	/	19.26	21	0.303	<b>0.45</b>	0.689	<b>1.03</b>	-0.15
21100	2535	50RB-High Front	/	19.32	21	0.129	<b>0.19</b>	0.283	<b>0.42</b>	-0.14
21100	2535	50RB-High Rear	/	19.32	21	0.262	<b>0.39</b>	0.55	<b>0.81</b>	-0.01
21100	2535	50RB-High Left	/	19.32	21	0.049	<b>0.07</b>	0.092	<b>0.14</b>	-0.09
21100	2535	50RB-High Right	/	19.32	21	0.075	<b>0.11</b>	0.145	<b>0.21</b>	0.02
21350	2560	50RB-High Bottom	/	19.21	21	0.282	<b>0.43</b>	0.609	<b>0.92</b>	0.04
21100	2535	50RB-High Bottom	/	19.32	21	0.306	<b>0.45</b>	0.668	<b>0.98</b>	-0.14
20850	2510	50RB-High Bottom	/	19.25	21	0.312	<b>0.47</b>	0.678	<b>1.01</b>	-0.07
20850	2510	100RB Bottom	/	19.23	21	0.291	<b>0.44</b>	0.661	<b>0.99</b>	-0.02
21100	2535	1RB-High Bottom	S2	19.67	21	0.341	<b>0.46</b>	0.765	<b>1.04</b>	0.01
21100	2535	1RB-High Bottom	Single SIM	19.67	21	0.323	<b>0.44</b>	0.756	<b>1.03</b>	0.13

Note: The distance between the EUT and the phantom bottom is 10mm. The LTE mode is QPSK\_20MHz.

**Table 14.1-18: SAR Values (LTE Band41 - Head)**

Frequency		Mode	Side	Test Position	Figure No.	Ambient Temperature: 22.9 °C		Liquid Temperature: 22.5°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)			
41490	2680	1RB-High	Left	Cheek	Fig.18	23.46	24.5	0.047	<b>0.06</b>	0.09	<b>0.11</b>	0.05
41490	2680	1RB-High	Left	Tilt	/	23.46	24.5	0.032	<b>0.04</b>	0.065	<b>0.08</b>	0.19
41490	2680	1RB-High	Right	Cheek	/	23.46	24.5	0.039	<b>0.05</b>	0.081	<b>0.10</b>	-0.02
41490	2680	1RB-High	Right	Tilt	/	23.46	24.5	<0.01	<0.01	<0.01	<0.01	/
41490	2680	50RB-Mid	Left	Cheek	/	22.51	23.5	0.041	<b>0.05</b>	0.081	<b>0.10</b>	0.19
41490	2680	50RB-Mid	Left	Tilt	/	22.51	23.5	0.025	<b>0.03</b>	0.053	<b>0.07</b>	0.11
41490	2680	50RB-Mid	Right	Cheek	/	22.51	23.5	0.022	<b>0.03</b>	0.044	<b>0.06</b>	-0.19
41490	2680	50RB-Mid	Right	Tilt	/	22.51	23.5	<0.01	<0.01	<0.01	<0.01	/
41490	2680	1RB-High	Left	Cheek	S2	23.46	24.5	0.042	<b>0.05</b>	0.067	<b>0.09</b>	0.01

Note1: The LTE mode is QPSK\_20MHz.

**Table 14.1-19: SAR Values (LTE Band41 - Body)**

Frequency		Mode	Figure No.	Ambient Temperature: 22.9 °C		Liquid Temperature: 22.5°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)			
41490	2680	1RB-High Front	/	23.46	24.5	0.125	<b>0.16</b>	0.204	<b>0.26</b>	-0.03
41490	2680	1RB-High Rear	/	23.46	24.5	0.269	<b>0.34</b>	0.455	<b>0.58</b>	-0.17
41490	2680	1RB-High Left	/	23.46	24.5	0.072	<b>0.09</b>	0.108	<b>0.14</b>	0.07
41490	2680	1RB-High Right	/	23.46	24.5	0.063	<b>0.08</b>	0.104	<b>0.13</b>	0.06
41490	2680	1RB-High Bottom	Fig.19	23.46	24.5	0.285	<b>0.36</b>	0.611	<b>0.78</b>	-0.08
41490	2680	50RB-Mid Front	/	22.51	23.5	0.119	<b>0.15</b>	0.193	<b>0.24</b>	-0.11
41490	2680	50RB-Mid Rear	/	22.51	23.5	0.22	<b>0.28</b>	0.369	<b>0.46</b>	-0.05
41490	2680	50RB-Mid Left	/	22.51	23.5	0.06	<b>0.08</b>	0.09	<b>0.11</b>	0.05
41490	2680	50RB-Low Right	/	22.51	23.5	0.048	<b>0.06</b>	0.078	<b>0.10</b>	-0.16
41490	2680	50RB-Mid Bottom	Fig.17	22.51	23.5	0.231	<b>0.29</b>	0.403	<b>0.51</b>	-0.14
41490	2680	1RB-High Bottom	S2	23.46	24.5	0.265	<b>0.34</b>	0.589	<b>0.75</b>	0.02

Note: The distance between the EUT and the phantom bottom is 10mm. The LTE mode is QPSK\_20MHz.

**Table 14.1-20: SAR Values (LTE Band7 ANT4 – Head for ENDC)**

Frequency		Mode	Side	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											
21100	2535	1RB_Mid	Left	Cheek	/	16.03	16.5	0.098	<b>0.11</b>	0.212	<b>0.24</b>	-0.09
21100	2535	1RB_Mid	Left	Tilt	/	16.03	16.5	0.136	<b>0.15</b>	0.289	<b>0.32</b>	0.03
21100	2535	1RB_Mid	Right	Cheek	/	16.03	16.5	0.199	<b>0.22</b>	0.41	<b>0.46</b>	0.11
21100	2535	1RB_Mid	Right	Tilt	/	16.03	16.5	0.265	<b>0.30</b>	0.615	<b>0.69</b>	0.16
20850	2510	50RB_Mid	Left	Cheek	/	15.97	16.5	0.087	<b>0.10</b>	0.186	<b>0.21</b>	0.11
20850	2510	50RB_Mid	Left	Tilt	/	15.97	16.5	0.12	<b>0.14</b>	0.256	<b>0.29</b>	0.06
20850	2510	50RB_Mid	Right	Cheek	/	15.97	16.5	0.205	<b>0.23</b>	0.451	<b>0.51</b>	0.18
20850	2510	50RB_Mid	Right	Tilt	Fig.20	15.97	16.5	0.259	<b>0.29</b>	0.631	<b>0.71</b>	0.08
20850	2510	50RB_Mid	Left	Cheek	S2	15.97	16.5	0.245	<b>0.28</b>	0.612	<b>0.69</b>	0.02

Note: The LTE mode is QPSK\_20MHz.

**Table 14.1-21: SAR Values (LTE Band7 ANT4 – Body worn for ENDC)**

Frequency		Mode	Figure No.	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									
20850	2510	1RB-Mid Front	Fig.21	23.44	24.5	0.151	<b>0.19</b>	0.293	<b>0.37</b>	0.14
20850	2510	1RB-Mid Rear	/	23.44	24.5	0.126	<b>0.16</b>	0.257	<b>0.33</b>	-0.17
21350	2560	50RB-Mid Front	/	22.37	23.5	0.112	<b>0.15</b>	0.223	<b>0.29</b>	0.03
21350	2560	50RB-Mid Rear	/	22.37	23.5	0.107	<b>0.14</b>	0.216	<b>0.28</b>	-0.07

Note: The distance between the EUT and the phantom bottom is 15mm. The LTE mode is QPSK\_20MHz.

**Table 14.1-22: SAR Values (LTE Band7 ANT4 –Hotspot for ENDC)**

Frequency		Mode	Figure No.	Ambient Temperature: 22.9 °C		Liquid Temperature: 22.5°C				Power Drift (dB)
Ch.	MHz			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)	
21350	2560	1RB-Mid Front	/	20.26	20.5	0.134	<b>0.14</b>	0.271	<b>0.29</b>	0.13
21350	2560	1RB-Mid Rear	/	20.26	20.5	0.125	<b>0.13</b>	0.248	<b>0.26</b>	-0.03
21350	2560	1RB-Mid Left	/	20.26	20.5	0.108	<b>0.11</b>	0.203	<b>0.21</b>	0.07
21350	2560	1RB-Mid Top	Fig.22	20.26	20.5	0.259	<b>0.27</b>	0.623	<b>0.66</b>	-0.11
21350	2560	50RB-Mid Front	/	20.25	20.5	0.123	<b>0.13</b>	0.253	<b>0.27</b>	-0.12
21350	2560	50RB-Mid Rear	/	20.25	20.5	0.127	<b>0.13</b>	0.254	<b>0.27</b>	-0.01
21350	2560	50RB-Mid Left	/	20.25	20.5	0.099	<b>0.10</b>	0.195	<b>0.21</b>	0.08
21350	2560	50RB-Mid Top	/	20.25	20.5	0.248	<b>0.26</b>	0.574	<b>0.61</b>	/
21350	2560	1RB-Mid Top	S2	20.26	20.5	0.251	<b>0.27</b>	0.612	<b>0.65</b>	-0.01

Note: The distance between the EUT and the phantom bottom is 10mm. The LTE mode is QPSK\_20MHz.

## 14.2 SAR results for 5G NR

**Table 14.2-1: SAR Values (5G NR n5-Head)**

Frequency		Side	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											
		Ambient Temperature: 22.2 °C						Liquid Temperature: 22 °C				
167300	836.5	Left	Cheek	/	24.01	24.5	0.062	<b>0.07</b>	0.081	<b>0.09</b>	0.13	
167300	836.5	Left	Tilt	/	24.01	24.5	0.099	<b>0.11</b>	0.126	<b>0.14</b>	-0.07	
167300	836.5	Right	Cheek	Fig.23	24.01	24.5	0.189	<b>0.21</b>	0.247	<b>0.28</b>	0.06	
167300	836.5	Right	Tilt	/	24.01	24.5	0.107	<b>0.12</b>	0.137	<b>0.15</b>	-0.12	
167300	836.5	Right	Cheek	S2	24.01	24.5	0.177	<b>0.20</b>	0.231	<b>0.26</b>	-0.02	

**Table 14.2-2: SAR Values (5G NR n5-Body)**

Frequency		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										
		Ambient Temperature: 22.2 °C						Liquid Temperature: 22 °C			
167300	836.5	Front	/	24.01	24.5	0.19	<b>0.21</b>	0.328	<b>0.37</b>	0.14	
167300	836.5	Rear	Fig.24	24.01	24.5	0.234	<b>0.26</b>	0.406	<b>0.45</b>	0.03	
167300	836.5	Left	/	24.01	24.5	0.086	<b>0.10</b>	0.133	<b>0.15</b>	-0.14	
167300	836.5	Right	/	24.01	24.5	0.199	<b>0.22</b>	0.31	<b>0.35</b>	-0.13	
167300	836.5	Bottom	/	24.01	24.5	0.154	<b>0.17</b>	0.314	<b>0.35</b>	0.07	
167300	836.5	Rear	S2	24.01	24.5	0.213	<b>0.24</b>	0.378	<b>0.42</b>	0.02	

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

### 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.

#### Head Evaluation

**Table 14.3-1: SAR Values (WLAN - Head)– 802.11b (Fast SAR)**

Frequency		Side	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										
6	2437	Left	Cheek	/	13.95	14	0.114	<b>0.12</b>	0.286	<b>0.29</b>	0.03
6	2437	Left	Tilt	/	13.95	14	0.143	<b>0.14</b>	0.37	<b>0.37</b>	-0.07
6	2437	Right	Cheek	/	13.95	14	0.045	<b>0.05</b>	0.112	<b>0.11</b>	0.03
6	2437	Right	Tilt	/	13.95	14	0.053	<b>0.05</b>	0.131	<b>0.13</b>	-0.01
6	2437	Left	Tilt	S2	13.95	14	0.141	<b>0.14</b>	0.368	<b>0.37</b>	0.02

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

**Table 14.3-2: SAR Values (WLAN - Head)– 802.11b (Full SAR)**

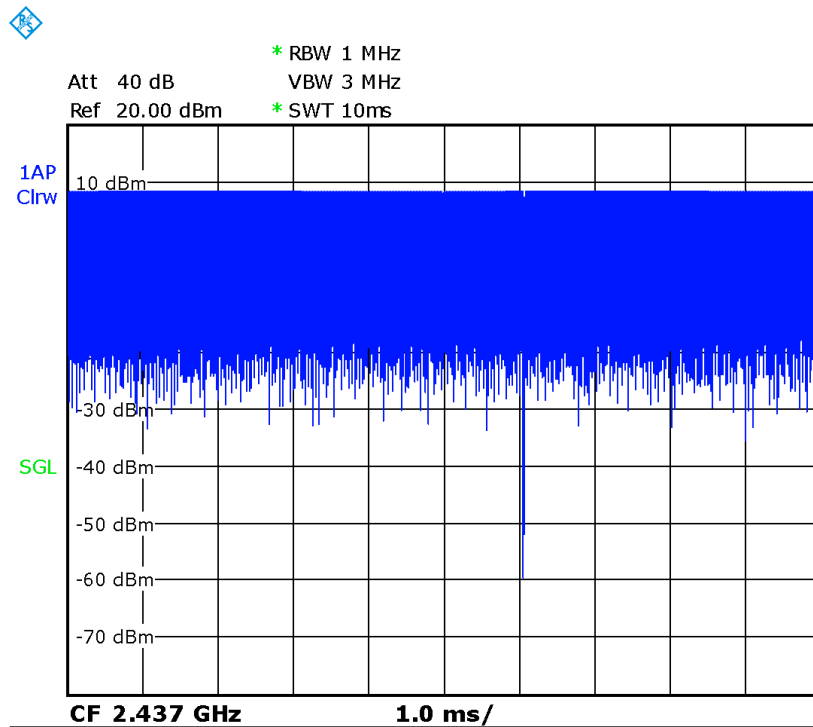
Frequency		Side	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g)( W/kg)	Power Drift (dB)
Ch.	MHz										
6	2437	Left	Tilt	Fig.25	13.95	14	0.146	<b>0.15</b>	0.372	<b>0.38</b>	-0.07

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.



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.



Picture 14.3-1 Duty factor plot

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

Frequency		Side	Test Position	Actual duty factor	maximum duty factor	Reported SAR (1g)(W/kg)	Scaled reported SAR (1g)(W/kg)
Ch.	MHz						
Ambient Temperature: 22.9 °C      Liquid Temperature: 22.5°C							
6	2437	Left	Tilt	100%	100%	<b>0.38</b>	<b>0.38</b>

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

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

Frequency		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									
		Ambient Temperature: 22.9 °C				Liquid Temperature: 22.5 °C				
11	2462	Front	/	18.98	19	0.105	<b>0.11</b>	0.231	<b>0.23</b>	0.12
11	2462	Rear	/	18.98	19	0.225	<b>0.23</b>	0.533	<b>0.54</b>	-0.02
11	2462	Right	/	18.98	19	0.077	<b>0.08</b>	0.157	<b>0.16</b>	0.09
11	2462	Top	/	18.98	19	0.223	<b>0.22</b>	0.527	<b>0.53</b>	-0.05
11	2462	Rear	S2	18.98	19	0.218	<b>0.22</b>	0.522	<b>0.52</b>	-0.03

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

As shown above table, the initial test position for body is “Rear 10mm”. So the body SAR of WLAN is presented as below:

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

Frequency		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									
		Ambient Temperature: 22.9 °C				Liquid Temperature: 22.5 °C				
11	2462	Rear	Fig.26	18.98	19	0.229	<b>0.23</b>	0.536	<b>0.54</b>	-0.02

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.

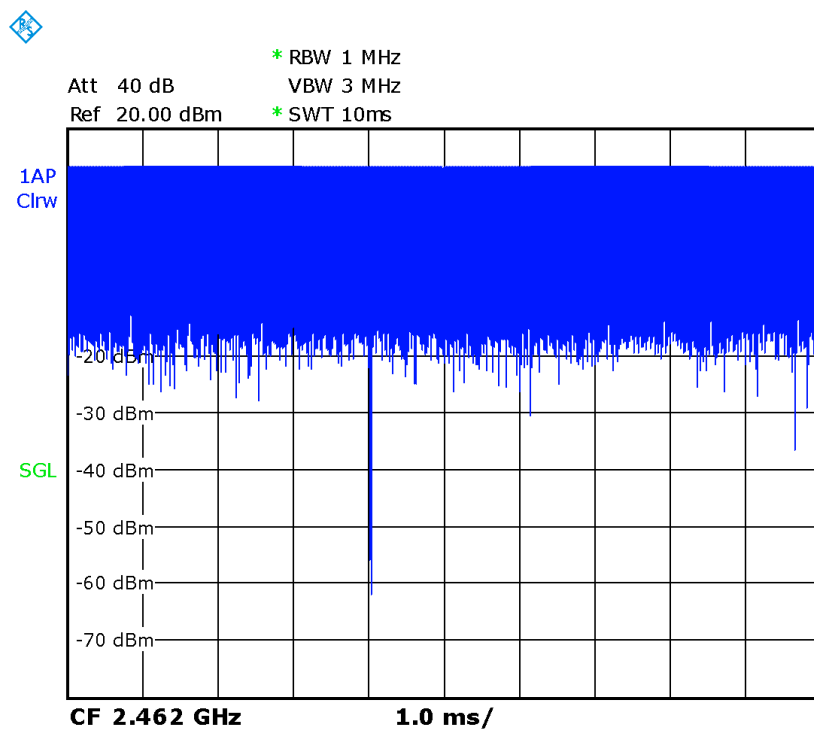
Note2: For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel until the reported SAR is  $\leq$  1.2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

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)**

Frequency		Test Position	Actual duty factor	maximum duty factor	Reported SAR (1g)(W/kg)	Scaled reported SAR (1g)(W/kg)
Ch.	MHz					
11	2462	Right	100%	100%	<b>0.54</b>	<b>0.54</b>

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



Picture 14.3-2 Duty factor plot

## 14.4 WLAN Evaluation For 5G

**Table 14.4-1: OFDM mode specified maximum output power of WLAN antenna**

802.11 mode	a	g	n		ac			
Ch. BW(MHz)	20	20	20	40	20	40	80	160
U-NII-1	X	X	X	X	X	X	X	
U-NII-2A	X	X	X	X	X	X	X	
U-NII-2C	X	X	X	X	X	X	X	
U-NII-3	X	X	X	X	X	X	X	
§ 15.247 (5.8 GHz)								

X: maximum(conducted) output power(mW), including tolerance, specified for production units

**Table 14.4-2: Maximum output power specified of WLAN antenna – Head**

802.11 mode	a	g	n		ac			
Ch. BW(MHz)	20	20	20	40	20	40	80	160
U-NII-1	16		16	16	18	16	16	
U-NII-2A	16		16	16	18	16	16	
U-NII-2C	20		20	20	20	20	20	
U-NII-3	20		20	20	20	20	20	
§ 15.247 (5.8 GHz)								

- The maximum output power specified for production units is the same for all channels, modulations and data rates in each channel bandwidth configuration of the 802.11a/g/n/ac modes.
- The blue highlighted cells represent highest output configurations in each standalone or aggregated frequency band, with tune-up tolerance included.

**Table 14.4-3: Maximum output power specified of WLAN antenna–Body**

802.11 mode	a	g	n		ac			
Ch. BW(MHz)	20	20	20	40	20	40	80	160
U-NII-1	50		50	40	50	35	40	
U-NII-2A	50		50	40	50	35	40	
U-NII-2C	45		40	50	45	50	45	
U-NII-3	63		63	63	63	63	63	
§ 15.247 (5.8 GHz)								

- The maximum output power specified for production units is the same for all channels, modulations and data rates in each channel bandwidth configuration of the 802.11a/g/n/ac modes.
- The blue highlighted cells represent highest output configurations in each standalone or aggregated frequency band, with tune-up tolerance included.

**Table 14.4-4: Maximum output power measured of WLAN antenna, for the applicable OFDM configurations according to the default power measurement procedures for selection initial test configurations – Head**

802.11 Mode	a	n		ac		
	20	20	40	20	40	80
U-NII-1	36/40/44/48 Lower power	36/40/44/48 Lower power	38/46 Lower power	36/40/44/48 <b>15/15/14/15</b>	38/46 Lower power	42 Lower power
U-NII-2A	52/56/60/64 Lower power	52/56/60/64 Lower power	54/62 Lower power	52/56/60/64 <b>13/14/14/14</b>	54/62 Lower power	58 Lower power
U-NII-2C	100/104/108/112 116/120/124/128/ 132/136/140/144 Lower power	100/104/108/112 116/120/124/128/ 132/136/140/144 Lower power	102/110/118/ 126/134/142 Lower power	100/104/108/112 116/120/124/128/ 132/136/140/144 Lower power	102/110/118/ 126/134/142 Lower power	106/122/ <b>14/14</b>
U-NII-3	149/153/157/161/ 165 Lower power	149/153/157/161/ 165 Lower power	151/159 Lower power	149/153/157/161 /165 Lower power	151/159 Lower power	<b>155</b> <b>19</b>

- The **bold numbers** is the maximum output measured power (mW).
- Channels with measured maximum power within 0.25dB are considered to have the same measured output. Channels selected for initial test configuration are **highlighted in yellow**.

**Table 14.4-5: Maximum output power measured of WLAN antenna, for the applicable OFDM configurations according to the default power measurement procedures for selection initial test configurations – Body**

802.11 Mode	a	n		ac		
	20	20	40	20	40	80
U-NII-1	36/40/44/48 <b>42/45/43/41</b>	36/40/44/48 Lower power	38/46 Lower power	36/40/44/48 Lower power	38/46 Lower power	42 Lower power
U-NII-2A	<b>52/56/60/64</b> <b>42/38/37/39</b>	52/56/60/64 Lower power	54/62 Lower power	52/56/60/64 Lower power	54/62 Lower power	58 Lower power
U-NII-2C	100/104/108/112 116/120/124/128/ 132/136/140/144 Lower power	100/104/108/112 116/120/124/128/ 132/136/140/144 Lower power	102/110/118/ 126/134 <b>34/39/38/39/</b> <b>41</b>	100/104/108/112 116/120/124/128/ 132/136/140/144 Lower power	102/110/118/ 126/134/142 Lower power	106/122/ 138 Lower power
U-NII-3	149/153/157/161/ 165 Lower power	149/153/157/161/ 165 Lower power	151/159 Lower power	149/153/157/161 /165 Lower power	151/159 Lower power	<b>155</b> <b>42</b>

- The **bold numbers** is the maximum output measured power (mW).
- Channels with measured maximum power within 0.25dB are considered to have the same measured output. Channels selected for initial test configuration are **highlighted in yellow**.

**Table 14.4-6: Reported SAR of initial test configuration for Head**

802.11 mode	a	n		ac		
BW(MHz)	20	20	40	20	40	80
U-NII-1	36/40/44/48	36/40/44/48	38/46	36/40/44/48	38/46	42
U-NII-2A	52/56/60/64	52/56/60/64	54/62	52/56/60/64 <b>0.76</b>	54/62	58
U-NII-2C	100/104/108/112/116/120/ 124/128/132/136/140/144	100/104/108/112/ 116/120/124/128/ 132/136/140/144	102/110/ 118/126/ 134/142	100/104/108/112 /116/120/124/12 8/132/136/140/1 44	102/110 /118/12 6/134/1 42	106/12 <b>2</b> <b>0.37</b>
U-NII-3	149/153/157/161/165 <b>0.51</b>	149/153/157/161 /165	151/159	149/153/157/161 /165	151/159	<b>155</b> <b>0.28</b>
Highest measured output power channel tested initially are in <b>yellow highlight</b> .						

**Table 14.4-7: Reported SAR of initial test configuration for Body**

802.11 mode	a	n		ac		
BW(MHz)	20	20	40	20	40	80
U-NII-1	36/40/44/48	36/40/44/48	38/46	36/40/44/48	38/46	42
U-NII-2A	52/56/60/64 <b>0.70</b>	52/56/60/64	54/62	52/56/60/64	54/62	58 <b>0.22</b>
U-NII-2C	100/104/108/112/116/120/ 124/128/132/136/140/144	100/104/108/112/ 116/120/124/128/ 132/136/140/144	102/110/ 118/126/ <b>134</b> <b>0.40</b>	100/104/108/112 /116/120/124/12 8/132/136/140/1 44	102/110 /118/12 6/134/1 42	106/12 2/138
U-NII-3	149/153/157/161/165	149/153/157/161 /165	151/159	149/153/157/161 /165	151/159	<b>155</b> <b>0.25</b>
Highest measured output power channel tested initially are in <b>yellow highlight</b> .						

**Table 14.4-8: SAR Values (WLAN 5G - Head)**

Frequency		Side	Test Position	Figure No.	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										
56	5280	Left	Cheek	/	11.58	12.5	0.131	<b>0.16</b>	0.548	<b>0.68</b>	0.07
56	5280	Left	Tilt	Fig.27	11.58	12.5	0.138	<b>0.17</b>	0.616	<b>0.76</b>	-0.11
56	5280	Right	Cheek	/	11.58	12.5	0.082	<b>0.10</b>	0.239	<b>0.30</b>	0.07
56	5280	Right	Tilt	/	11.58	12.5	0.082	<b>0.10</b>	0.260	<b>0.32</b>	-0.07
122	5610	Left	Cheek	/	11.59	13	0.053	<b>0.07</b>	0.207	<b>0.29</b>	0.15
122	5610	Left	Tilt	/	11.59	13	0.068	<b>0.09</b>	0.264	<b>0.37</b>	0.03
122	5610	Right	Cheek	/	11.59	13	0.039	<b>0.05</b>	0.129	<b>0.18</b>	-0.11
122	5610	Right	Tilt	/	11.59	13	0.045	<b>0.06</b>	0.152	<b>0.21</b>	0.09
155	5775	Left	Cheek	/	12.72	13	0.04	<b>0.04</b>	0.156	<b>0.17</b>	0.12
155	5775	Left	Tilt	/	12.72	13	0.067	<b>0.07</b>	0.264	<b>0.28</b>	-0.09
155	5775	Right	Cheek	/	12.72	13	0.037	<b>0.04</b>	0.12	<b>0.13</b>	0.12
155	5775	Right	Tilt	/	12.72	13	0.033	<b>0.04</b>	0.158	<b>0.17</b>	-0.07
56	5280	Left	Tilt	S2	11.58	12.5	0.128	<b>0.16</b>	0.599	<b>0.74</b>	0.01

**Table 14.4-9: SAR Values (WLAN 5G - Body)**

Frequency		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									
52	5260	Front	/	16.25	17	0.079	<b>0.09</b>	0.212	<b>0.25</b>	0.03
52	5260	Rear	/	16.25	17	0.133	<b>0.16</b>	0.348	<b>0.41</b>	-0.11
52	5260	Right	/	16.25	17	0.029	<b>0.03</b>	0.074	<b>0.09</b>	0.09
52	5260	Top	Fig.28	16.25	17	0.192	<b>0.23</b>	0.585	<b>0.70</b>	0.08
134	5670	Front	/	16.16	17	0.063	<b>0.08</b>	0.197	<b>0.24</b>	0.05
134	5670	Rear	/	16.16	17	0.048	<b>0.06</b>	0.133	<b>0.16</b>	-0.03
134	5670	Right	/	16.16	17	0.01	<b>0.01</b>	0.071	<b>0.09</b>	-0.02
134	5670	Top	/	16.16	17	0.109	<b>0.13</b>	0.327	<b>0.40</b>	-0.07
155	5775	Front	/	16.21	18	0.032	<b>0.05</b>	0.097	<b>0.15</b>	0.03
155	5775	Rear	/	16.21	18	0.031	<b>0.05</b>	0.085	<b>0.13</b>	-0.02
155	5775	Right	/	16.21	18	0.003	<b>0.00</b>	0.016	<b>0.02</b>	0.06
155	5775	Top	/	16.21	18	0.056	<b>0.08</b>	0.166	<b>0.25</b>	-0.17
52	5260	Front	S2	16.25	17	0.175	<b>0.21</b>	0.554	<b>0.66</b>	0.13

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

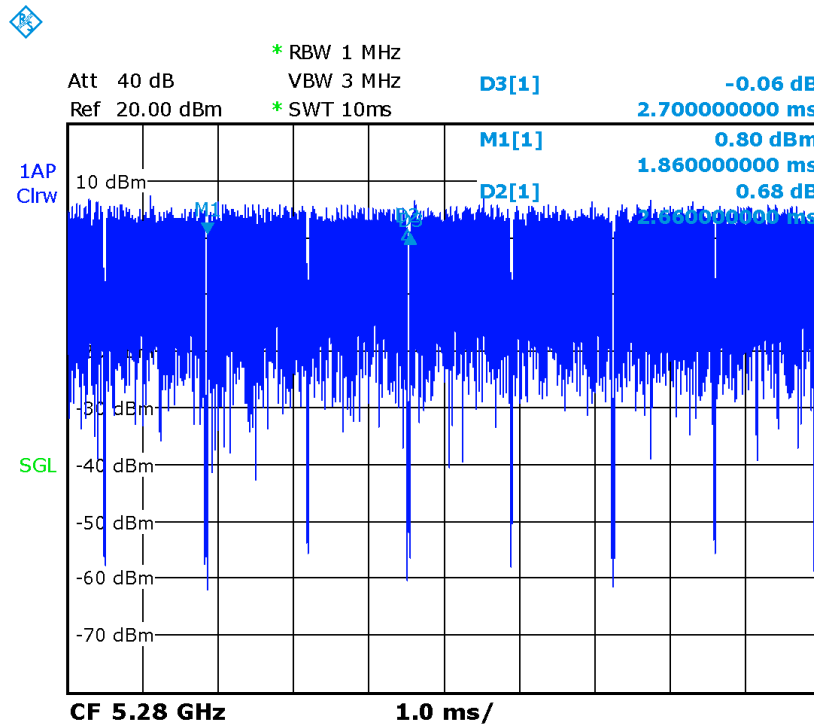
According to the KDB248227 D01, The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. The scaled reported SAR is presented as below.

**Table 14.4-10: SAR Values (WLAN 5G - Head) (Scaled Reported SAR)**

Frequency		Side	Test Position	Actual duty factor	maximum duty factor	Reported SAR (1g) (W/kg)	Scaled reported SAR (1g) (W/kg)
Ch.	MHz						
56	5280	Left	Tilt	98.5%	100%	<b>0.76</b>	<b>0.77</b>

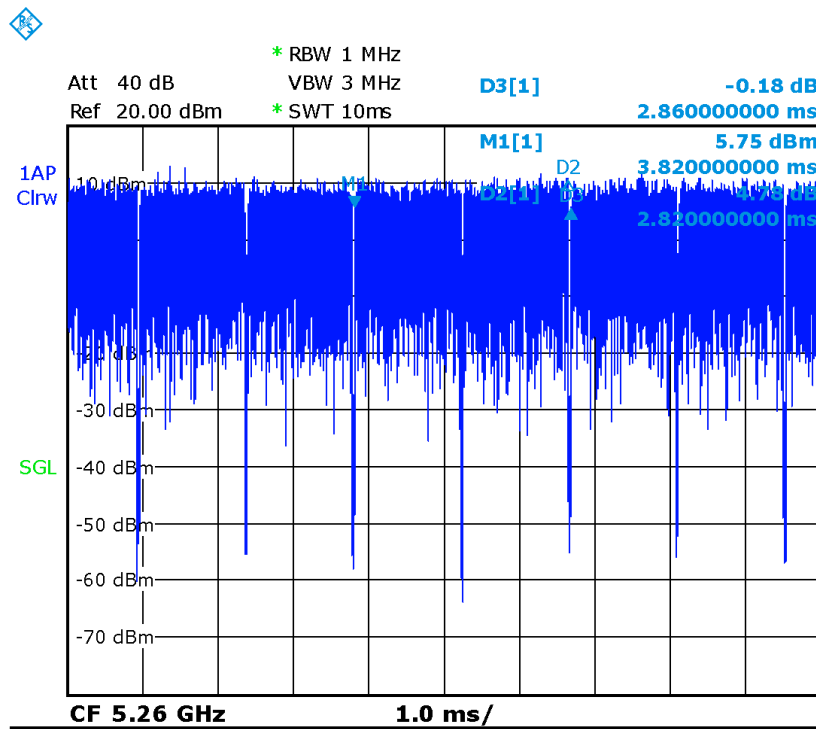
**Table 14.4-11: SAR Values (WLAN 5G - Body) (Scaled Reported SAR)**

Frequency		Test Position	D (mm)	Actual duty factor	maximum duty factor	Reported SAR (1g) (W/kg)	Scaled reported SAR (1g) (W/kg)
Ch.	MHz						
60	5300	Top	10	99%	100%	<b>0.70</b>	<b>0.70</b>



**Picture 14.4-1 The plot of duty factor for Head**





Picture 14.4-2 The plot of duty factor for Body

### 14.5 SAR results for BT

**Table 14.5-1: SAR Values (BT - Head)**

Frequency		Side	Test Position	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									
78	2480	Left	Cheek	10.05	11	<0.01	<0.01	<0.01	<0.01	/
78	2480	Left	Tilt	10.05	11	<0.01	<0.01	<0.01	<0.01	/
78	2480	Right	Cheek	10.05	11	<0.01	<0.01	<0.01	<0.01	/
78	2480	Right	Tilt	10.05	11	<0.01	<0.01	<0.01	<0.01	/

**Table 14.5-2: SAR Values (BT - Body)**

Frequency		Test Position	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								
78	2480	Front	10.05	11	<0.01	<0.01	<0.01	<0.01	/
78	2480	Rear	10.05	11	<0.01	<0.01	<0.01	<0.01	/
78	2480	Right	10.05	11	<0.01	<0.01	<0.01	<0.01	/
78	2480	Top	10.05	11	<0.01	<0.01	<0.01	<0.01	/

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

### 14.6 SAR results for 10-g extremity SAR

According to the KDB648474 D04, the UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna located at  $\leq 25$  mm from that surface or edge, in direct contact with a flat phantom, for 10-g extremity SAR according to the body-equivalent tissue dielectric parameters in KDB Publication 865664 D01 to address interactive hand use exposure conditions. When hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR  $> 1.2$  W/kg

**Table 14.6-1: SAR Values for phablet**

Band	Frequency		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									
WCDMA B2	9538	1907.6	Rear	/	23.22	24.5	2.38	<b>3.20</b>	4.99	<b>6.70</b>	0.13
WCDMA B2	9400	1880	Rear	/	23.13	24.5	2.09	<b>2.87</b>	4.38	<b>6.00</b>	-0.06
WCDMA B2	9262	1852.4	Rear	/	23.18	24.5	2.31	<b>3.13</b>	4.64	<b>6.29</b>	0.12
LTE B2	19100	1900	Rear	Fig.29	23.06	24.5	2.36	<b>3.29</b>	5.07	<b>7.06</b>	0.12
LTE B2	18900	1880	Rear	/	23.11	24.5	2.21	<b>3.04</b>	5.05	<b>6.95</b>	-0.03
LTE B2	18700	1860	Rear	/	23.17	24.5	2.26	<b>3.07</b>	4.75	<b>6.45</b>	0.09
LTE B2	19100	1900	Bottom	/	23.06	24.5	1.63	<b>2.27</b>	3.24	<b>4.51</b>	-0.07
LTE B2	18900	1880	Bottom	/	23.11	24.5	1.01	<b>1.39</b>	2.51	<b>3.46</b>	0.12
LTE B7-ANT0	21350	2560	Rear	Note2	19.64	21	1.25	<b>1.71</b>	2.66	<b>3.64</b>	0.03
LTE B7-ANT0	21100	2535	Rear	Note2	19.67	21	1.37	<b>1.86</b>	3.18	<b>4.32</b>	-0.06
LTE B7-ANT0	20850	2510	Rear	Note2	19.66	21	1.32	<b>1.80</b>	2.71	<b>3.69</b>	0.08
LTE B7-ANT0	21350	2560	Bottom	Note2	19.64	21	1.51	<b>2.07</b>	3.77	<b>5.16</b>	-0.07
LTE B7-ANT0	21100	2535	Bottom	Note2	19.67	21	1.67	<b>2.27</b>	4.08	<b>5.54</b>	0.12
LTE B7-ANT0	20850	2510	Bottom	Note2	19.66	21	1.76	<b>2.40</b>	4.49	<b>6.11</b>	0.09
LTE B7-ANT4	21350	2560	Top	Note2	20.26	20.5	0.345	<b>0.36</b>	1.21	<b>1.28</b>	0.06
WIFI2450	11	2462	Top	/	18.98	19	0.777	<b>0.78</b>	2.43	<b>2.44</b>	-0.08
WIFI2450	11	2462	Rear	/	18.98	19	1.44	<b>1.45</b>	4.4	<b>4.42</b>	0.05
WIFI5G	52	5260	Top	/	16.25	17	0.88	<b>1.05</b>	5.29	<b>6.29</b>	0.12
WIFI5G	52	5260	Rear	/	16.25	17	0.553	<b>0.66</b>	2.34	<b>2.78</b>	-0.08

Note1: The distance between the EUT and the phantom bottom is 0mm.

Note2: The results is for DUT working under low power for sensor. The detail information of sensor is on ANNEX I.

## 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  $\geq 0.80$  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  $\geq 1.45$  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  $\geq 1.5$  W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is  $> 1.20$

## 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
<b>Measurement system</b>										
1	Probe calibration	B	6.0	N	1	1	1	6.0	6.0	$\infty$
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	$\infty$
3	Boundary effect	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	$\infty$
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	$\infty$
5	Detection limit	B	1.0	N	1	1	1	0.6	0.6	$\infty$
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	$\infty$
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	$\infty$
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	$\infty$
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	$\infty$
10	RF ambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	$\infty$
11	Probe positioned mech. restrictions	B	0.4	R	$\sqrt{3}$	1	1	0.2	0.2	$\infty$
12	Probe positioning with respect to phantom shell	B	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	$\infty$
13	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	$\infty$
<b>Test sample related</b>										
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	$\infty$
<b>Phantom and set-up</b>										
17	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	$\infty$
18	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	$\infty$
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	$\infty$
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
<b>Measurement system</b>										
1	Probe calibration	B	6.55	N	1	1	1	6.55	6.55	$\infty$
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	$\infty$
3	Boundary effect	B	2.0	R	$\sqrt{3}$	1	1	1.2	1.2	$\infty$
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	$\infty$
5	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	$\infty$
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	$\infty$
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	$\infty$
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	$\infty$
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	$\infty$
10	RFambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	$\infty$
11	Probe positioned mech. restrictions	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	$\infty$
12	Probe positioning with respect to phantom shell	B	6.7	R	$\sqrt{3}$	1	1	3.9	3.9	$\infty$
13	Post-processing	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	$\infty$
<b>Test sample related</b>										
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	$\infty$
<b>Phantom and set-up</b>										
17	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	$\infty$
18	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	$\infty$
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	$\infty$

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
<b>Measurement system</b>										
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	RFambient 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	∞
<b>Test sample related</b>										
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	∞
<b>Phantom and set-up</b>										
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	$\infty$
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
<b>Measurement system</b>										
1	Probe calibration	B	6.55	N	1	1	1	6.55	6.55	$\infty$
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	$\infty$
3	Boundary effect	B	2.0	R	$\sqrt{3}$	1	1	1.2	1.2	$\infty$
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	$\infty$
5	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	$\infty$
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	$\infty$
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	$\infty$
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	$\infty$
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	$\infty$
10	RF ambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	$\infty$
11	Probe positioned mech. Restrictions	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	$\infty$
12	Probe positioning with respect to phantom shell	B	6.7	R	$\sqrt{3}$	1	1	3.9	3.9	$\infty$
13	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	$\infty$
14	Fast SAR z-Approximation	B	14.0	R	$\sqrt{3}$	1	1	8.1	8.1	$\infty$
<b>Test sample related</b>										
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	$\infty$
<b>Phantom and set-up</b>										
18	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	$\infty$
19	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	$\infty$
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	$\infty$
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 17.1: List of Main Instruments**

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	E5071C	MY46110673	January 14, 2021	One year
02	Power meter	NRP2	101919	May 12, 2020	One year
03	Power sensor	NRP-Z91	101547		
04	Signal Generator	E4438C	MY49071430	February 1, 2021	One Year
05	Amplifier	60S1G4	0331848	No Calibration Requested	
06	BTS	CMW500	159889	January 13, 2021	One year
07	E-field Probe	SPEAG EX3DV4	7307	May 29, 2020	One year
08	DAE	SPEAG DAE4	536	November 6, 2020	One year
10	Dipole Validation Kit	SPEAG D835V2	4d069	July 24,,2020	One year
11	Dipole Validation Kit	SPEAG D1900V2	5d101	July 28,2020	One year
12	Dipole Validation Kit	SPEAG D2450V2	853	July 21,2020	One year
13	Dipole Validation Kit	SPEAG D2600V2	1012	July 21,2020	One year
14	Dipole Validation Kit	SPEAG D5GHzV2	1060	July 27,2020	One year

\*\*\*END OF REPORT BODY\*\*\*

## ANNEX A Graph Results

### GSM850\_CH251 Right Cheek

Date: 4/5/2021

Electronics: DAE4 Sn536

Medium: head 835 MHz

Medium parameters used:  $f = 848.8$  MHz;  $\sigma = 0.902$  mho/m;  $\epsilon_r = 42.27$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: GSM850 848.8 MHz Duty Cycle: 1:8.3

Probe: EX3DV4 – SN7307 ConvF(10.2,10.2,10.2)

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

Maximum value of SAR (interpolated) = 0.207 W/kg

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

Reference Value = 4.958 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.224 W/kg

**SAR(1 g) = 0.171 W/kg; SAR(10 g) = 0.131 W/kg**

Maximum value of SAR (measured) = 0.205 W/kg

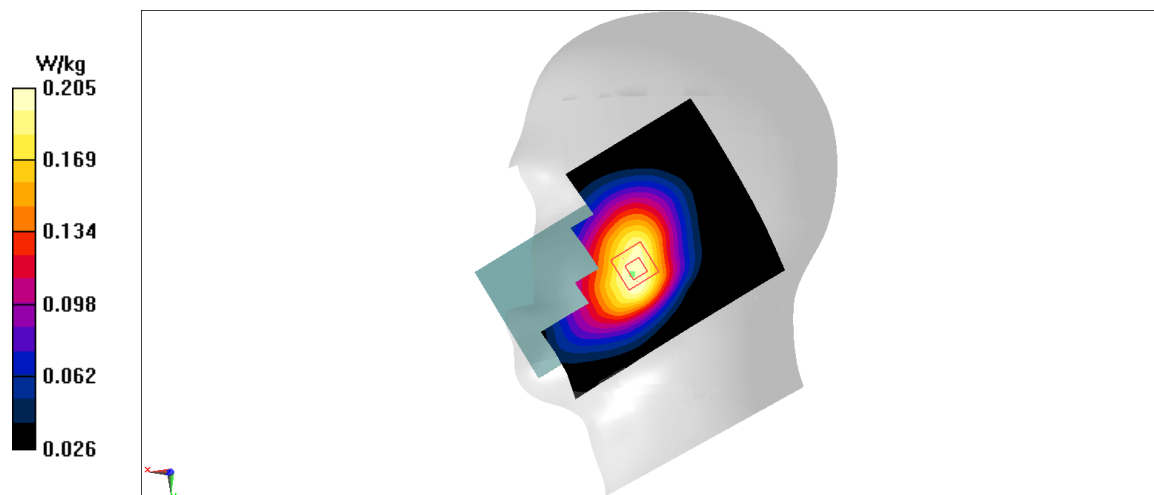


Fig A.1

**GSM850\_CH251 Rear 10mm**

Date: 4/5/2021

Electronics: DAE4 Sn536

Medium: head 835 MHz

Medium parameters used:  $f = 848.8$  MHz;  $\sigma = 0.902$  mho/m;  $\epsilon_r = 42.27$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: GSM850 848.8 MHz Duty Cycle: 1:2

Probe: EX3DV4 – SN7307 ConvF(10.2,10.2,10.2)

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

Maximum value of SAR (interpolated) = 0.915 W/kg

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

Reference Value = 19.78 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 1.16 W/kg

**SAR(1 g) = 0.632 W/kg; SAR(10 g) = 0.368 W/kg**

Maximum value of SAR (measured) = 0.93 W/kg

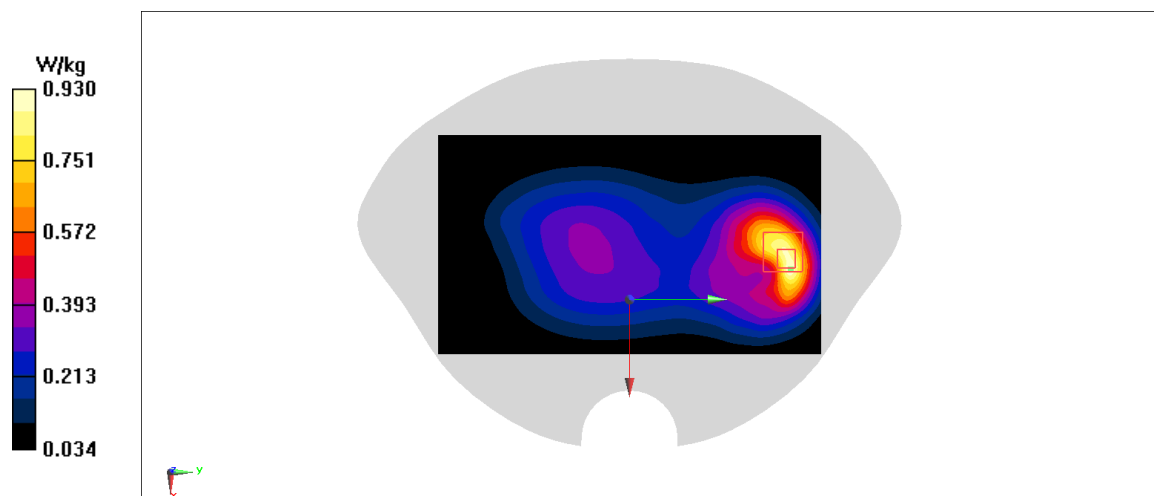


Fig A.2

**PCS1900\_CH661 Left Cheek**

Date: 4/6/2021

Electronics: DAE4 Sn536

Medium: head 1900 MHz

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.369$  mho/m;  $\epsilon_r = 40.79$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: PCS1900 1880 MHz Duty Cycle: 1:8.3

Probe: EX3DV4 – SN7307 ConvF(8.33,8.33,8.33)

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

Maximum value of SAR (interpolated) = 0.145 W/kg

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

Reference Value = 4.063 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.164 W/kg

**SAR(1 g) = 0.099 W/kg; SAR(10 g) = 0.061 W/kg**

Maximum value of SAR (measured) = 0.137 W/kg

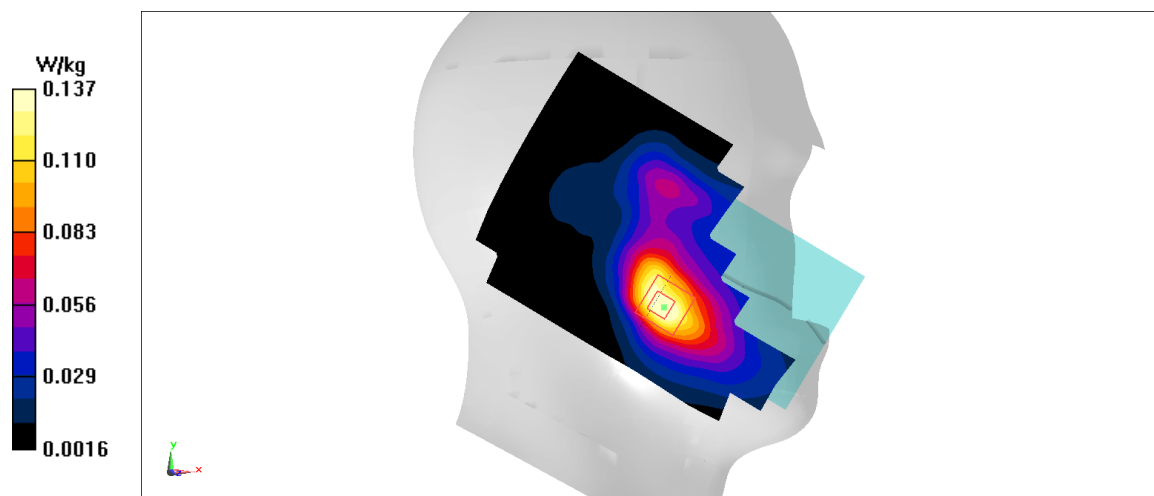


Fig A.3

**PCS1900\_CH810 Rear 10mm**

Date: 4/6/2021

Electronics: DAE4 Sn536

Medium: head 1900 MHz

Medium parameters used:  $f = 1909.8$  MHz;  $\sigma = 1.398$  mho/m;  $\epsilon_r = 40.76$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: PCS1900 1909.8 MHz Duty Cycle: 1:2

Probe: EX3DV4 – SN7307 ConvF(8.33,8.33,8.33)

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

Maximum value of SAR (interpolated) = 0.87 W/kg

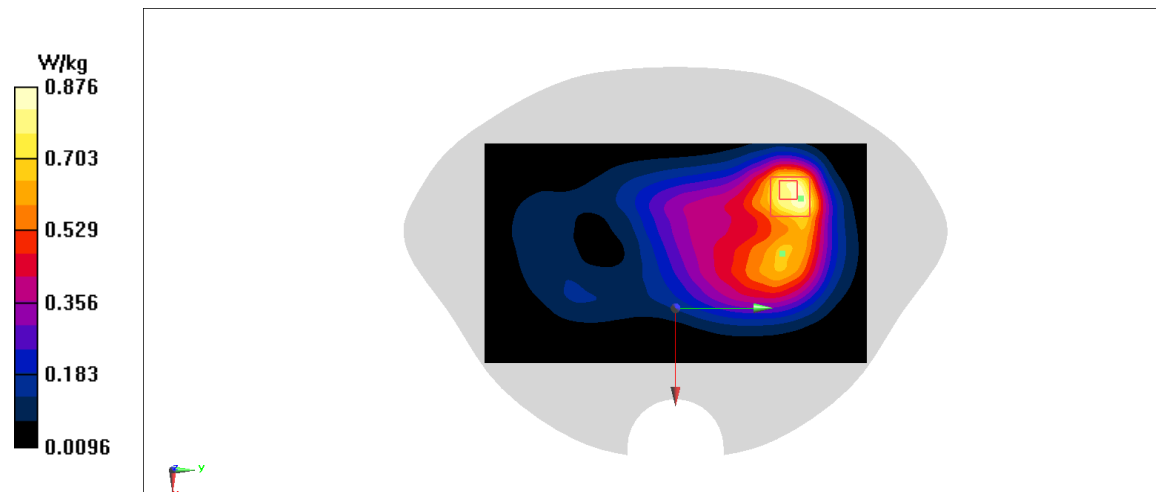
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.14 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 1.07 W/kg

**SAR(1 g) = 0.562 W/kg; SAR(10 g) = 0.316 W/kg**

Maximum value of SAR (measured) = 0.876 W/kg

**Fig A.4**

**WCDMA1900-BII\_CH9262 Left Cheek**

Date: 4/6/2021

Electronics: DAE4 Sn536

Medium: head 1900 MHz

Medium parameters used:  $f = 1852.4$  MHz;  $\sigma = 1.342$  mho/m;  $\epsilon_r = 40.83$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: WCDMA1900-BII 1852.4 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(8.33,8.33,8.33)

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

Maximum value of SAR (interpolated) = 0.35 W/kg

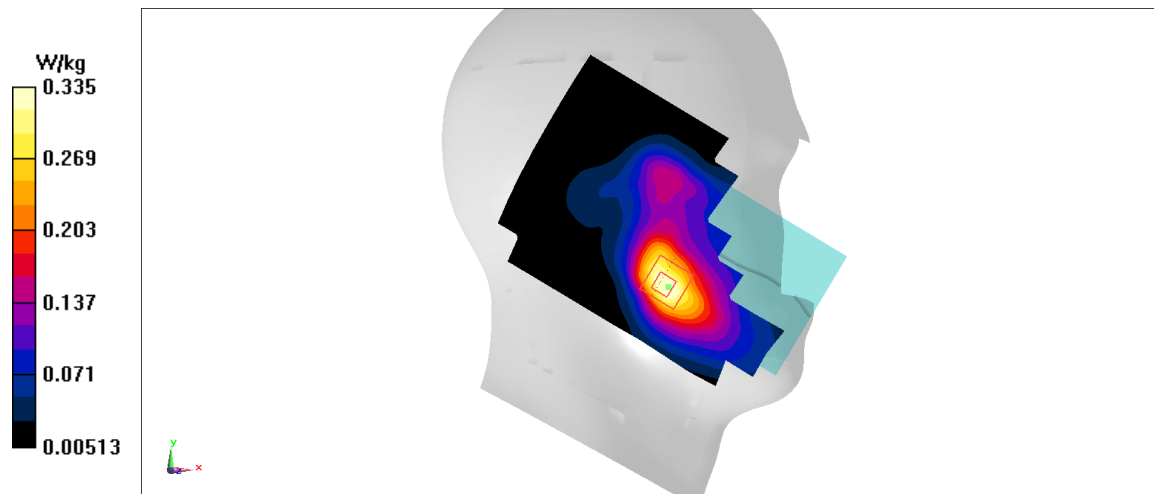
**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.783 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.391 W/kg

**SAR(1 g) = 0.246 W/kg; SAR(10 g) = 0.153 W/kg**

Maximum value of SAR (measured) = 0.335 W/kg



**Fig A.5**

**WCDMA1900-BII\_CH9400 Front 15mm**

Date: 4/6/2021

Electronics: DAE4 Sn536

Medium: head 1900 MHz

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.369$  mho/m;  $\epsilon_r = 40.79$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: WCDMA1900-BII 1880 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(8.33,8.33,8.33)

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

Maximum value of SAR (interpolated) = 0.385 W/kg

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

Reference Value = 11.41 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.444 W/kg

**SAR(1 g) = 0.274 W/kg; SAR(10 g) = 0.174 W/kg**

Maximum value of SAR (measured) = 0.381 W/kg

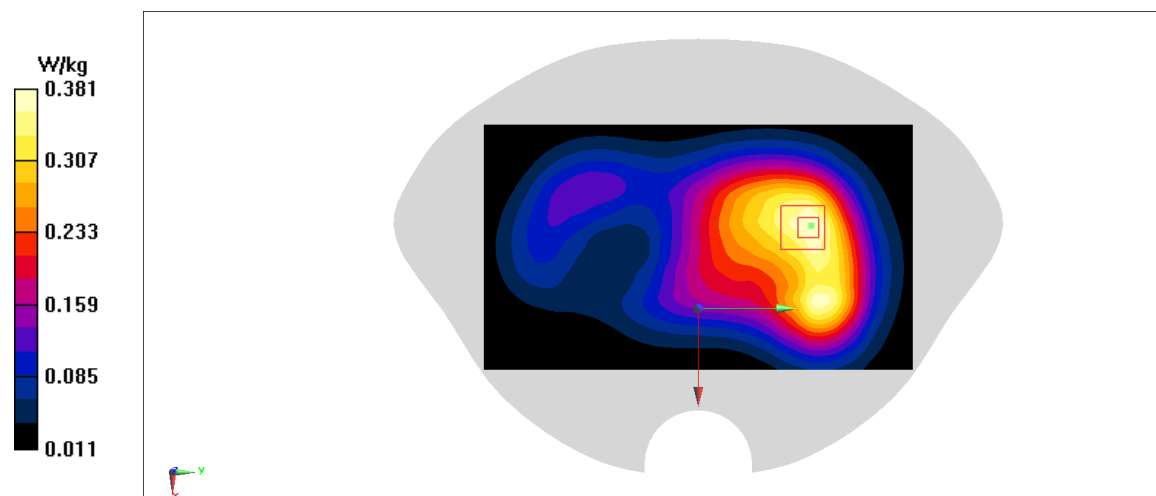


Fig A.6



**WCDMA1900-BII\_CH9400 Rear 10mm**

Date: 4/6/2021

Electronics: DAE4 Sn536

Medium: head 1900 MHz

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.369$  mho/m;  $\epsilon_r = 40.79$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: WCDMA1900-BII 1880 Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(8.33,8.33,8.33)

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

Maximum value of SAR (interpolated) = 1.27 W/kg

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

Reference Value = 15.98 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 1.46 W/kg

**SAR(1 g) = 0.77 W/kg; SAR(10 g) = 0.434 W/kg**

Maximum value of SAR (measured) = 1.18 W/kg

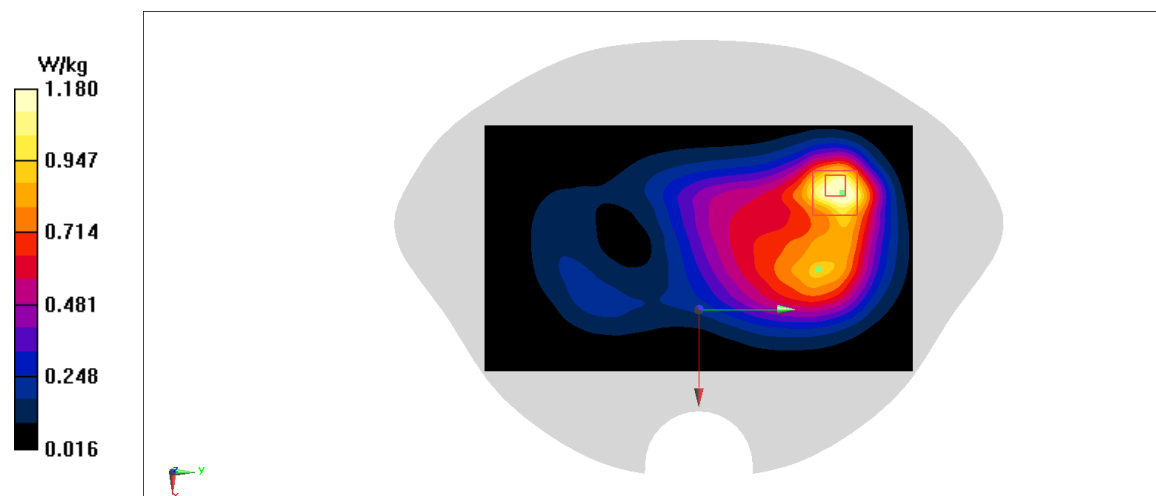


Fig A.7

**WCDMA850-BV\_CH4233 Right Cheek**

Date: 4/5/2021

Electronics: DAE4 Sn536

Medium: head 835 MHz

Medium parameters used:  $f = 846.6$  MHz;  $\sigma = 0.9$  mho/m;  $\epsilon_r = 42.28$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: WCDMA850-BV 846.6 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(10.2,10.2,10.2)

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

Maximum value of SAR (interpolated) = 0.207 W/kg

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

Reference Value = 4.958 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 0.224 W/kg

**SAR(1 g) = 0.278 W/kg; SAR(10 g) = 0.214 W/kg**

Maximum value of SAR (measured) = 0.205 W/kg

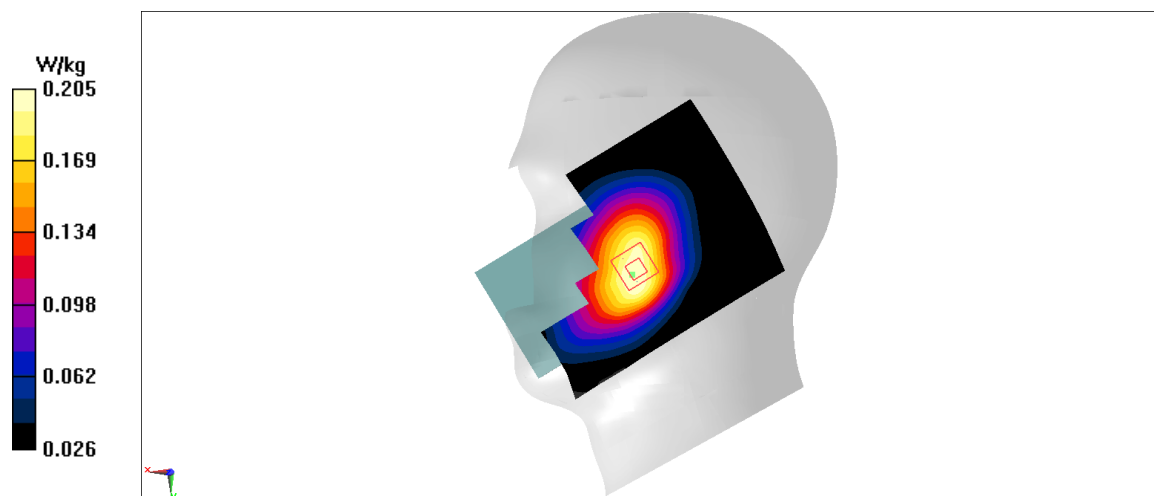


Fig A.8

**WCDMA850-BV\_CH4233 Rear 10mm**

Date: 4/5/2021

Electronics: DAE4 Sn536

Medium: head 835 MHz

Medium parameters used:  $f = 846.6$  MHz;  $\sigma = 0.9$  mho/m;  $\epsilon_r = 42.28$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: WCDMA850-BV 846.6 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(10.2,10.2,10.2)

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

Maximum value of SAR (interpolated) = 0.671 W/kg

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

Reference Value = 19.31 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 0.93 W/kg

**SAR(1 g) = 0.496 W/kg; SAR(10 g) = 0.284 W/kg**

Maximum value of SAR (measured) = 0.752 W/kg

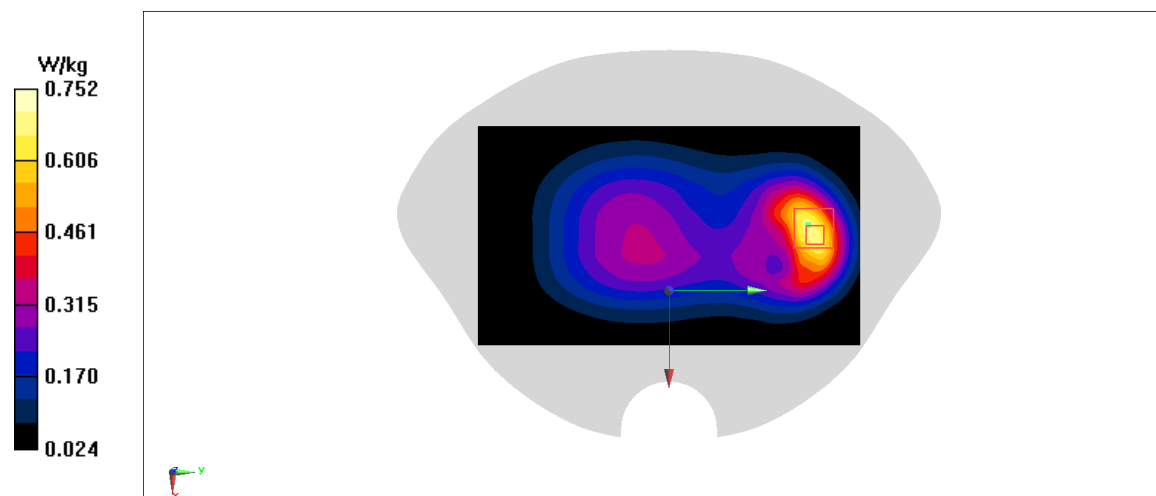


Fig A.9

**LTE1900-FDD2\_CH18700 Left Cheek**

Date: 4/6/2021

Electronics: DAE4 Sn536

Medium: head 1900 MHz

Medium parameters used:  $f = 1860$  MHz;  $\sigma = 1.35$  mho/m;  $\epsilon_r = 40.82$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: LTE1900-FDD2 1860 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(8.33,8.33,8.33)

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

Maximum value of SAR (interpolated) = 0.43 W/kg

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

Reference Value = 6.187 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.485 W/kg

**SAR(1 g) = 0.314 W/kg; SAR(10 g) = 0.198 W/kg**

Maximum value of SAR (measured) = 0.423 W/kg

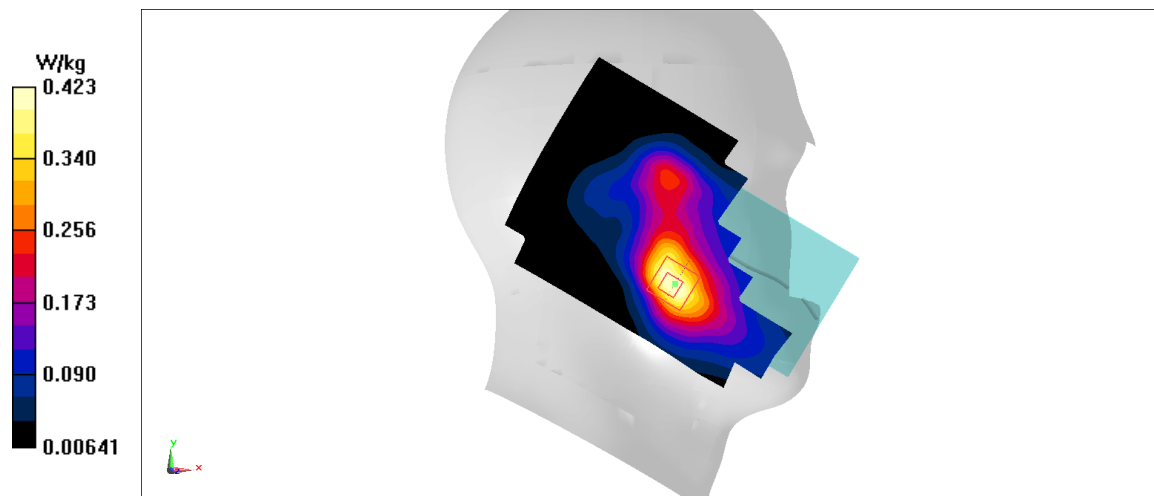


Fig A.10

**LTE1900-FDD2\_CH18700 Rear 15mm**

Date: 4/6/2021

Electronics: DAE4 Sn536

Medium: head 1900 MHz

Medium parameters used:  $f = 1860$  MHz;  $\sigma = 1.35$  mho/m;  $\epsilon_r = 40.82$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: LTE1900-FDD2 1860 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(8.33,8.33,8.33)

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

Maximum value of SAR (interpolated) = 0.686 W/kg

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

Reference Value = 16.25 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.809 W/kg

**SAR(1 g) = 0.449 W/kg; SAR(10 g) = 0.262 W/kg**

Maximum value of SAR (measured) = 0.67 W/kg

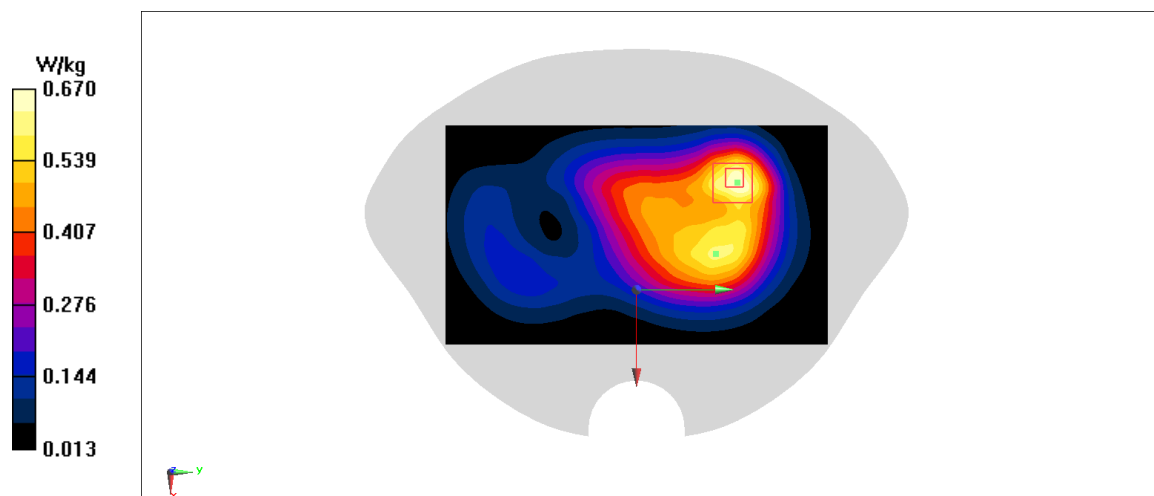


Fig A.11

**LTE1900-FDD2\_CH18900 Rear 10mm**

Date: 4/6/2021

Electronics: DAE4 Sn536

Medium: head 1900 MHz

Medium parameters used:  $f = 1880$  MHz;  $\sigma = 1.369$  mho/m;  $\epsilon_r = 40.79$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: LTE1900-FDD2 1880 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(8.33,8.33,8.33)

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

Maximum value of SAR (interpolated) = 1.25 W/kg

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

Reference Value = 14.21 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 1.46 W/kg

**SAR(1 g) = 0.77 W/kg; SAR(10 g) = 0.443 W/kg**

Maximum value of SAR (measured) = 1.19 W/kg

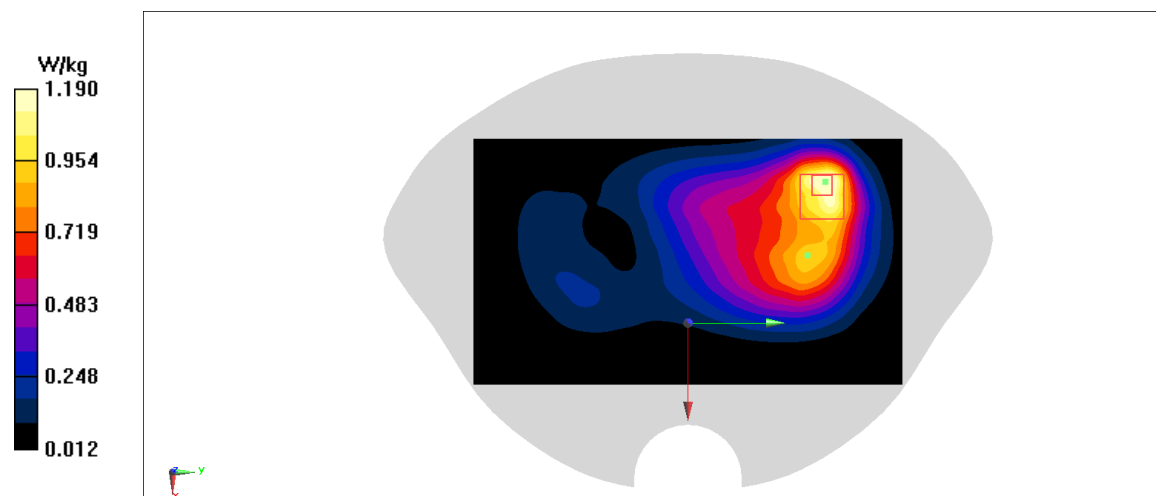


Fig A.12

**LTE850-FDD5\_CH20525 Right Cheek**

Date: 4/5/2021

Electronics: DAE4 Sn536

Medium: head 835 MHz

Medium parameters used:  $f = 836.5$  MHz;  $\sigma = 0.89$  mho/m;  $\epsilon_r = 42.29$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: LTE850-FDD5 836.5 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(10.2,10.2,10.2)

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

Maximum value of SAR (interpolated) = 0.258 W/kg

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

Reference Value = 4.09 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 0.279 W/kg

**SAR(1 g) = 0.216 W/kg; SAR(10 g) = 0.168 W/kg**

Maximum value of SAR (measured) = 0.257 W/kg

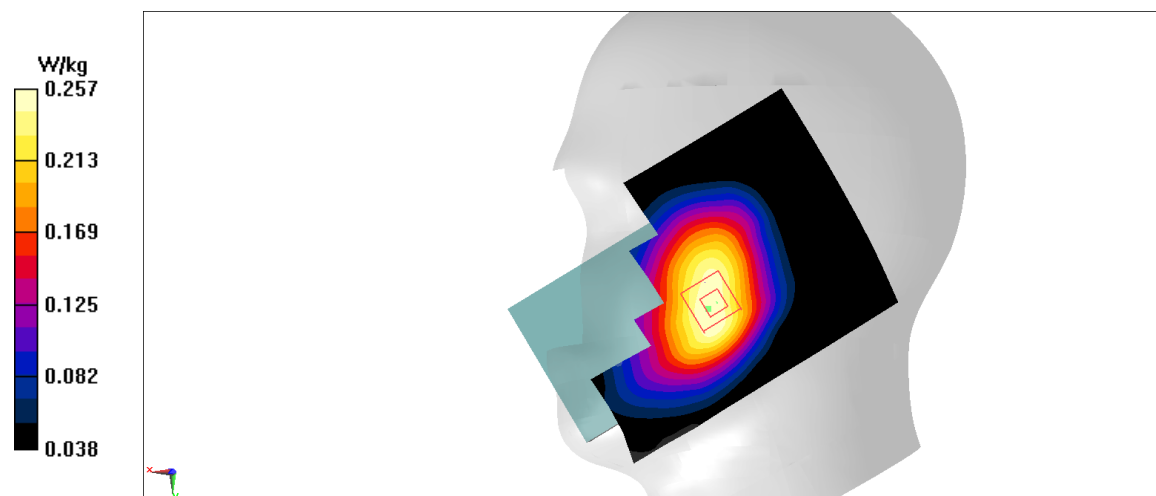


Fig A.13

**LTE850-FDD5\_CH20525 Rear 10mm**

Date: 4/5/2021

Electronics: DAE4 Sn536

Medium: head 835 MHz

Medium parameters used:  $f = 836.5$  MHz;  $\sigma = 0.89$  mho/m;  $\epsilon_r = 42.29$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: LTE850-FDD5 836.5 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(10.2,10.2,10.2)

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

Maximum value of SAR (interpolated) = 0.631 W/kg

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

Reference Value = 18.54 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 0.775 W/kg

**SAR(1 g) = 0.419 W/kg; SAR(10 g) = 0.244 W/kg**

Maximum value of SAR (measured) = 0.629 W/kg

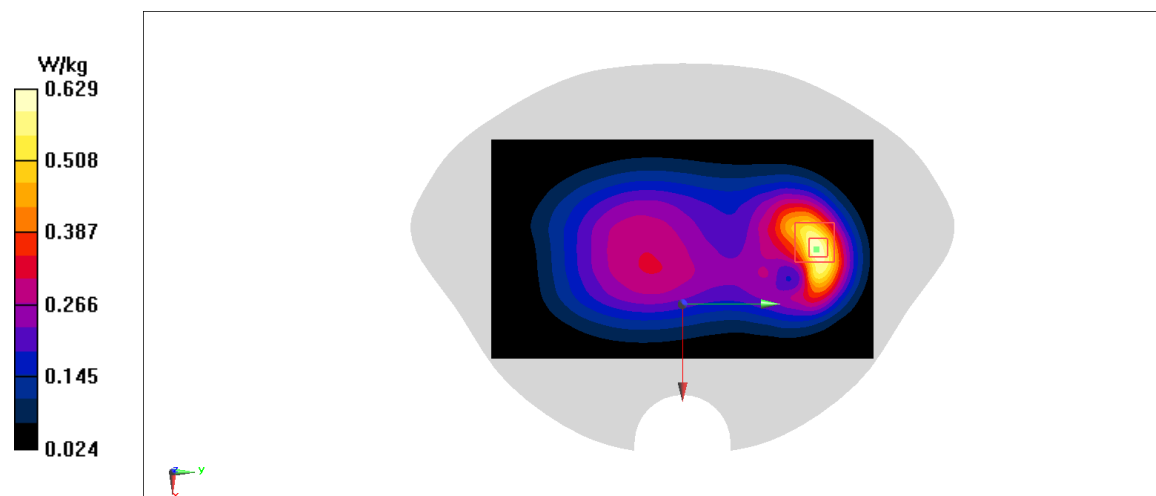


Fig A.14



**LTE2500-FDD7 ANT0\_CH21350 Right Cheek**

Date: 4/8/2021

Electronics: DAE4 Sn536

Medium: head 2600 MHz

Medium parameters used:  $f = 2560$  MHz;  $\sigma = 1.919$  mho/m;  $\epsilon_r = 38.87$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

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

Probe: EX3DV4 – SN7307 ConvF(7.61,7.61,7.61)

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

Maximum value of SAR (interpolated) = 0.333 W/kg

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

Reference Value = 3.303 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 0.4 W/kg

**SAR(1 g) = 0.22 W/kg; SAR(10 g) = 0.111 W/kg**

Maximum value of SAR (measured) = 0.335 W/kg

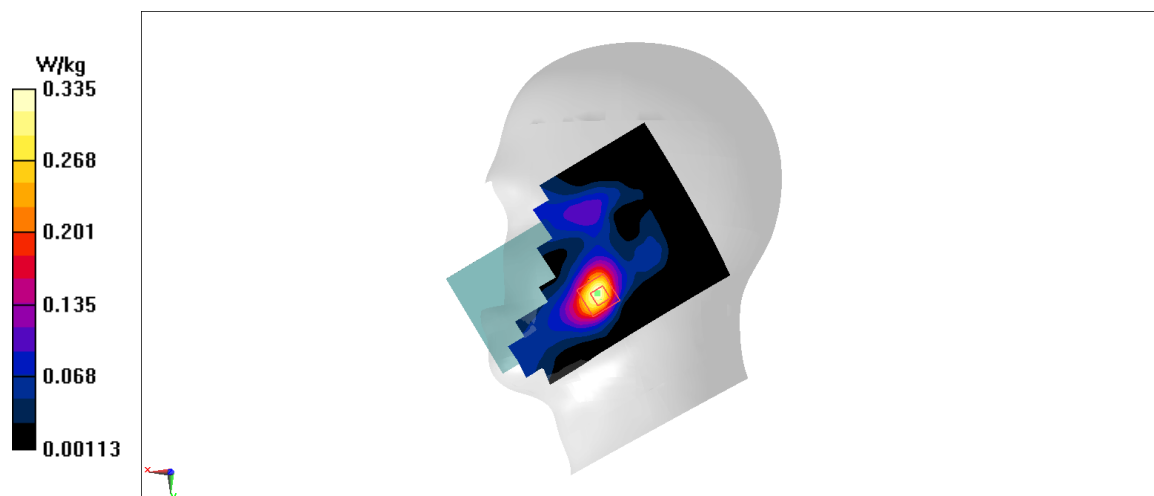


Fig A.15

**LTE2500-FDD7 ANT0\_CH20850 Rear 15mm**

Date: 4/8/2021

Electronics: DAE4 Sn536

Medium: head 2600 MHz

Medium parameters used:  $f = 2510$  MHz;  $\sigma = 1.872$  mho/m;  $\epsilon_r = 38.93$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: LTE2500-FDD7 2510 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(7.61,7.61,7.61)

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

Maximum value of SAR (interpolated) = 1.04 W/kg

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

Reference Value = 8.41 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 1.27 W/kg

**SAR(1 g) = 0.66 W/kg; SAR(10 g) = 0.341 W/kg**

Maximum value of SAR (measured) = 1.04 W/kg

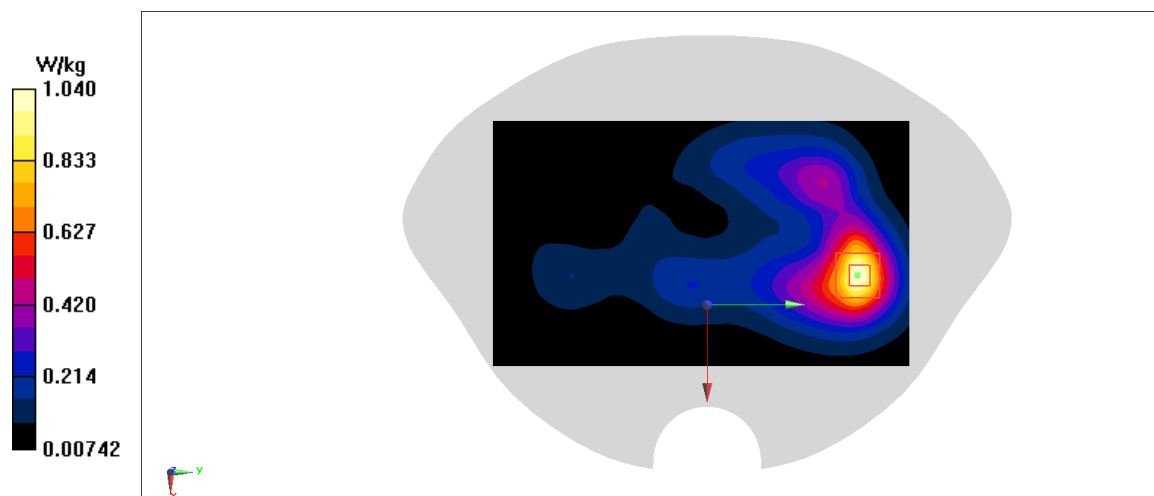


Fig A.16

**LTE2500-FDD7 ANT0\_CH21100 Bottom 10mm**

Date: 4/8/2021

Electronics: DAE4 Sn536

Medium: head 2600 MHz

Medium parameters used:  $f = 2535$  MHz;  $\sigma = 1.895$  mho/m;  $\epsilon_r = 38.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: LTE2500-FDD7 2535 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(7.61,7.61,7.61)

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

Maximum value of SAR (interpolated) = 1.39 W/kg

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

Reference Value = 15.03 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 1.63 W/kg

**SAR(1 g) = 0.772 W/kg; SAR(10 g) = 0.354 W/kg**

Maximum value of SAR (measured) = 1.22 W/kg

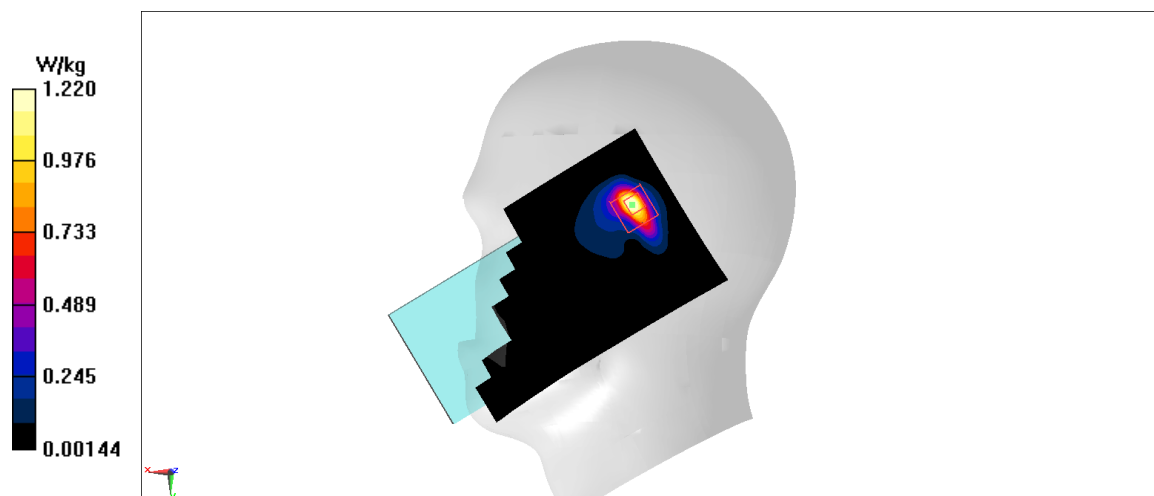


Fig A.17

**LTE2500-TDD41\_CH41490 Left Cheek**

Date: 4/8/2021

Electronics: DAE4 Sn536

Medium: head 2600 MHz

Medium parameters used:  $f = 2680$  MHz;  $\sigma = 2.142$  mho/m;  $\epsilon_r = 39.67$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: LTE2500-TDD41 2680 MHz Duty Cycle: 1:1.58

Probe: EX3DV4 – SN7307 ConvF(7.61,7.61,7.61)

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

Maximum value of SAR (interpolated) = 0.137 W/kg

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

Reference Value = 1.564 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.177 W/kg

**SAR(1 g) = 0.09 W/kg; SAR(10 g) = 0.047 W/kg**

Maximum value of SAR (measured) = 0.143 W/kg

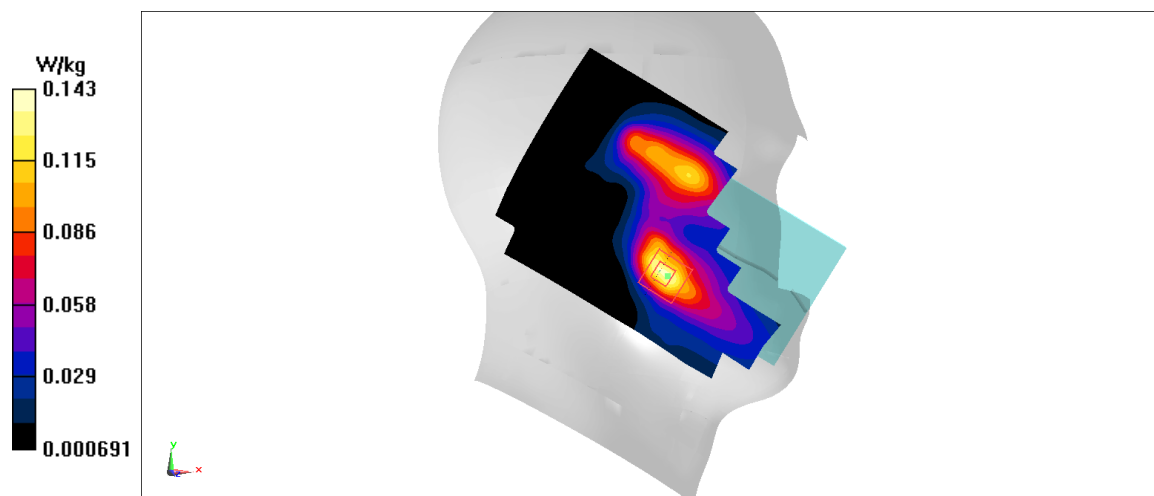


Fig A.18

**LTE2500-TDD41\_CH41490 Bottom 10mm**

Date: 4/8/2021

Electronics: DAE4 Sn536

Medium: head 2600 MHz

Medium parameters used:  $f = 2680$  MHz;  $\sigma = 2.142$  mho/m;  $\epsilon_r = 39.67$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: LTE2500-TDD41 2680 MHz Duty Cycle: 1:1.58

Probe: EX3DV4 – SN7307 ConvF(7.61,7.61,7.61)

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

Maximum value of SAR (interpolated) = 1.39 W/kg

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

Reference Value = 21.12 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 1.74 W/kg

**SAR(1 g) = 0.611 W/kg; SAR(10 g) = 0.285 W/kg**

Maximum value of SAR (measured) = 1.39 W/kg

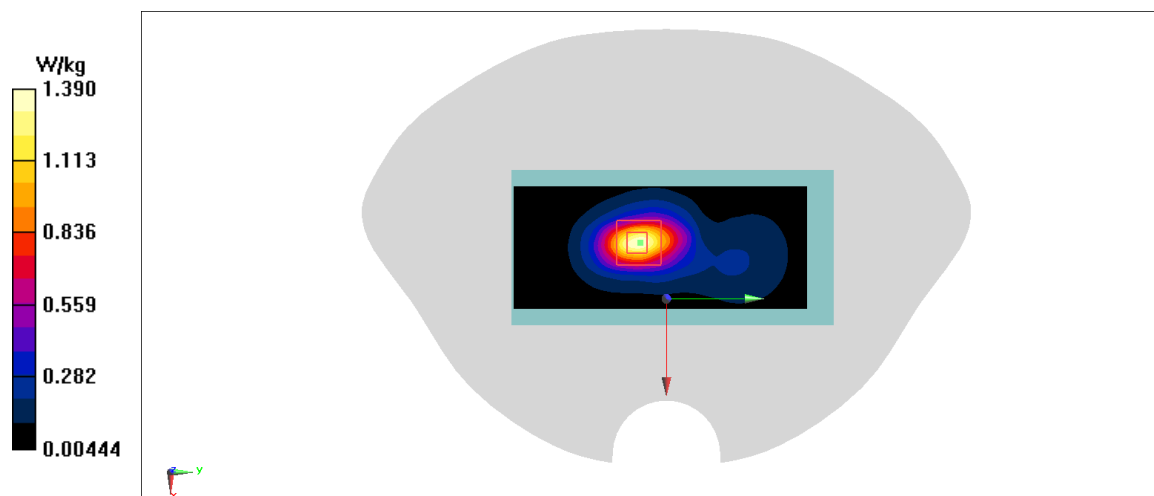


Fig A.19

**LTE2500-FDD7 ANT4\_CH21100 Bottom 10mm-For ENDC**

Date: 4/8/2021

Electronics: DAE4 Sn536

Medium: head 2600 MHz

Medium parameters used:  $f = 2535$  MHz;  $\sigma = 1.895$  mho/m;  $\epsilon_r = 38.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: LTE2500-FDD7 2535 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(7.61,7.61,7.61)

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

Maximum value of SAR (interpolated) = 1.39 W/kg

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

Reference Value = 15.03 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 1.63 W/kg

**SAR(1 g) = 0.772 W/kg; SAR(10 g) = 0.354 W/kg**

Maximum value of SAR (measured) = 1.22 W/kg

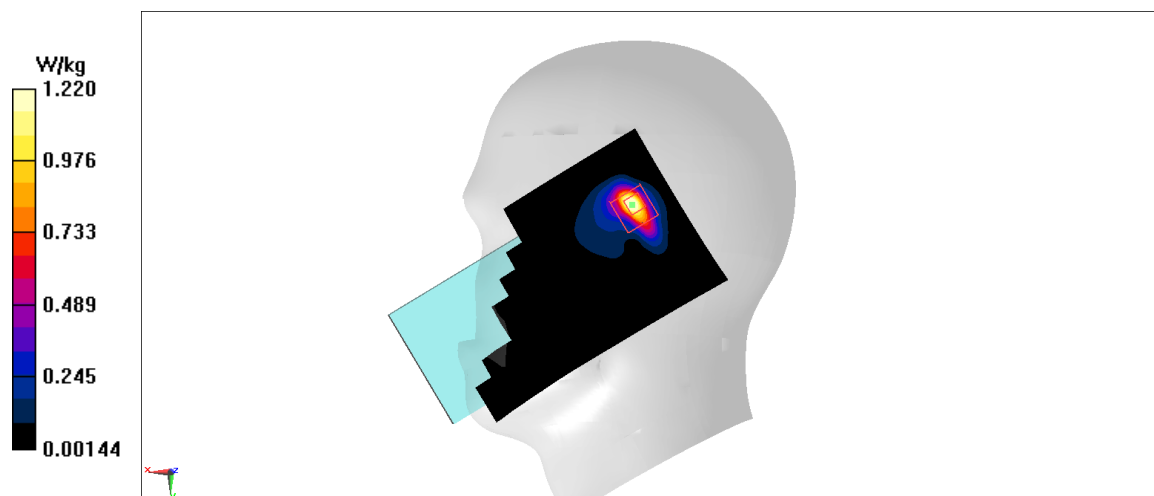


Fig A.20

**LTE2500-FDD7 ANT4\_CH21100 Front 15mm-For ENDC**

Date: 4/8/2021

Electronics: DAE4 Sn536

Medium: head 2600 MHz

Medium parameters used:  $f = 2535$  MHz;  $\sigma = 1.895$  mho/m;  $\epsilon_r = 38.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: LTE2500-FDD7 2535 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(7.61,7.61,7.61)

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

Maximum value of SAR (interpolated) = 0.483 W/kg

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

Reference Value = 10.71 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 0.565 W/kg

**SAR(1 g) = 0.293 W/kg; SAR(10 g) = 0.151 W/kg**

Maximum value of SAR (measured) = 0.460 W/kg

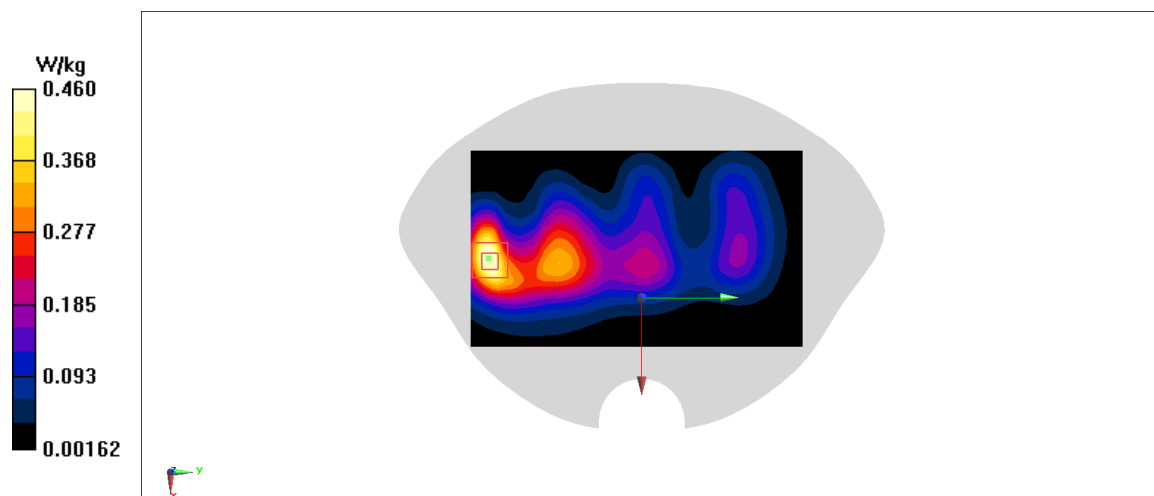


Fig A.21

**LTE2500-FDD7 ANT4\_CH21350 Top 10mm-For ENDC**

Date: 4/8/2021

Electronics: DAE4 Sn536

Medium: head 2600 MHz

Medium parameters used:  $f = 2560$  MHz;  $\sigma = 1.919$  mho/m;  $\epsilon_r = 38.87$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

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

Probe: EX3DV4 – SN7307 ConvF(7.61,7.61,7.61)

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

Maximum value of SAR (interpolated) = 1.10 W/kg

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

Reference Value = 4.921 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 1.38 W/kg

**SAR(1 g) = 0.623 W/kg; SAR(10 g) = 0.259 W/kg**

Maximum value of SAR (measured) = 1.09 W/kg

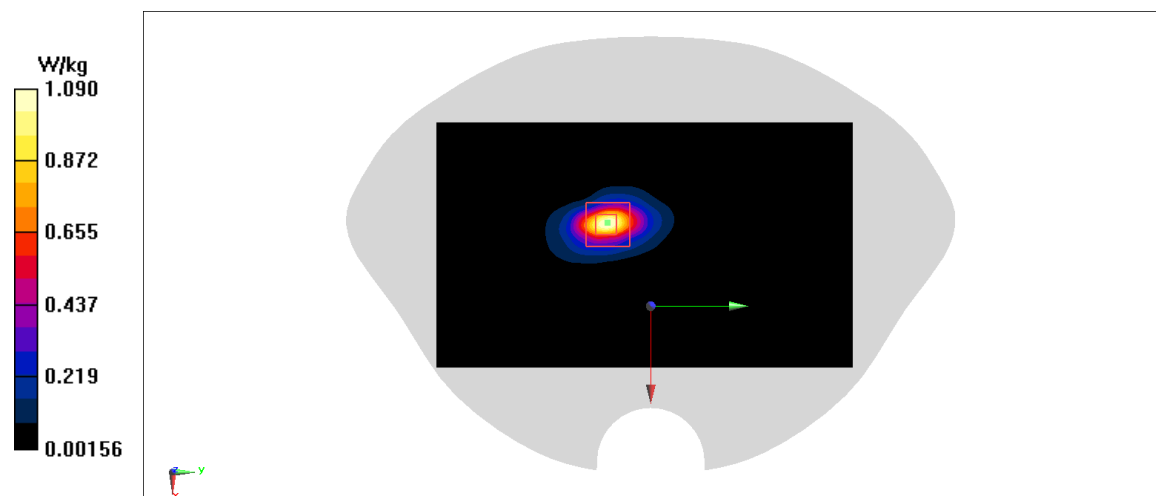


Fig A.22



**5G NR-n5\_CH167300 Right Cheek**

Date: 4/5/2021

Electronics: DAE4 Sn536

Medium: head 835 MHz

Medium parameters used:  $f = 836.5$  MHz;  $\sigma = 0.89$  mho/m;  $\epsilon_r = 42.29$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: 5G NR-n5 836.5 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(10.2,10.2,10.2)

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

Maximum value of SAR (interpolated) = 0.294 W/kg

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

Reference Value = 4.281 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.328 W/kg

**SAR(1 g) = 0.247 W/kg; SAR(10 g) = 0.189 W/kg**

Maximum value of SAR (measured) = 0.299 W/kg

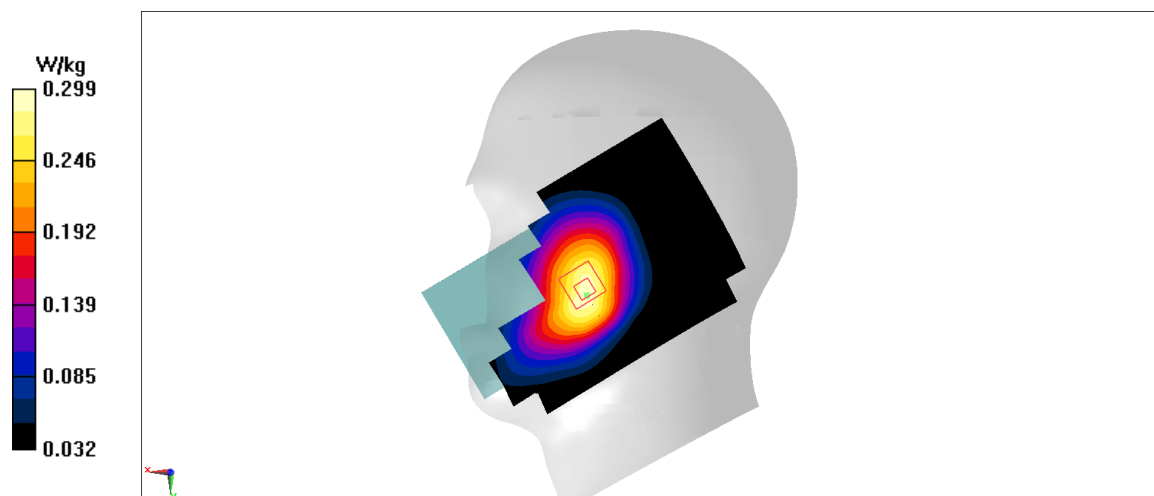


Fig A.23

**5G NR-n5\_CH167300 Rear 10mm**

Date: 4/5/2021

Electronics: DAE4 Sn536

Medium: head 835 MHz

Medium parameters used:  $f = 836.5$  MHz;  $\sigma = 0.89$  mho/m;  $\epsilon_r = 42.29$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: 5G NR-n5 836.5 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(10.2,10.2,10.2)

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

Maximum value of SAR (interpolated) = 0.610 W/kg

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

Reference Value = 19.59 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.775 W/kg

**SAR(1 g) = 0.406 W/kg; SAR(10 g) = 0.234 W/kg**

Maximum value of SAR (measured) = 0.616 W/kg

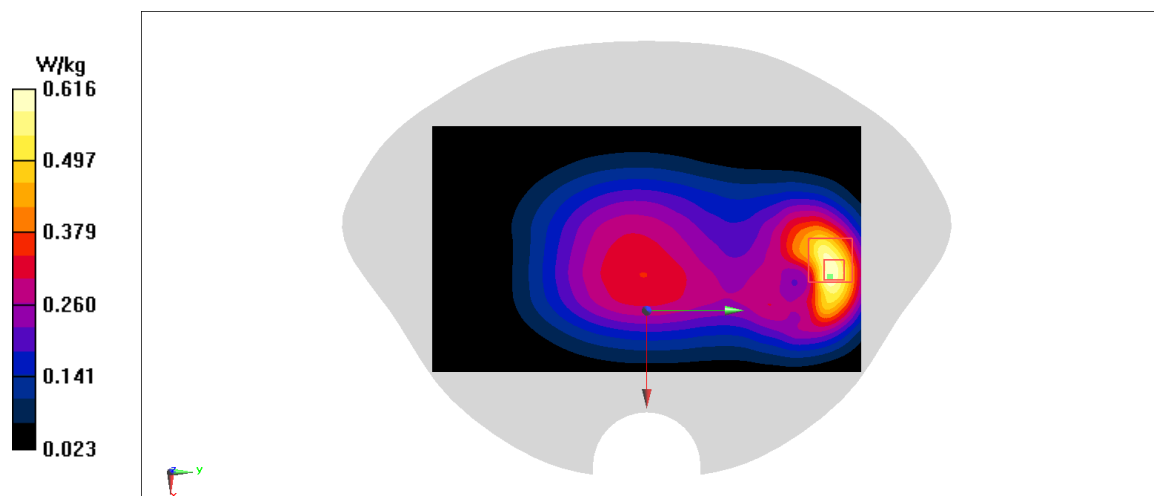


Fig A.24

**WLAN2450\_CH6 Left Tilt**

Date: 4/7/2021

Electronics: DAE4 Sn536

Medium: head 2450 MHz

Medium parameters used:  $f = 2437$  MHz;  $\sigma = 1.812$  mho/m;  $\epsilon_r = 39.39$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

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

Probe: EX3DV4 – SN7307 ConvF(7.77,7.77,7.77)

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

Maximum value of SAR (interpolated) = 0.751 W/kg

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

Reference Value = 8.882 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 0.923 W/kg

**SAR(1 g) = 0.372 W/kg; SAR(10 g) = 0.146 W/kg**

Maximum value of SAR (measured) = 0.688 W/kg

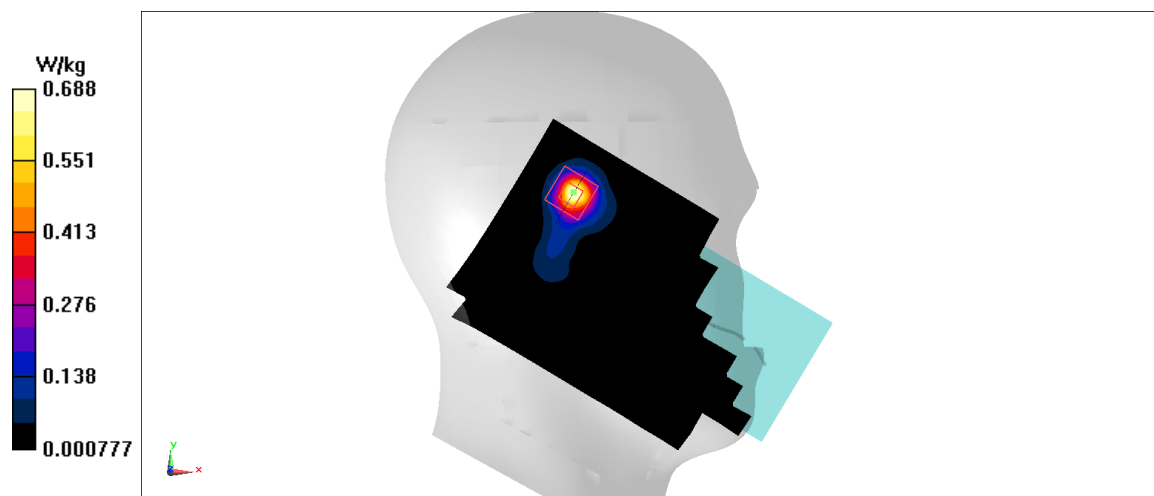


Fig A.25

**WLAN2450\_CH11 Rear 10mm**

Date: 4/7/2021

Electronics: DAE4 Sn536

Medium: head 2450 MHz

Medium parameters used:  $f = 2462$  MHz;  $\sigma = 1.835$  mho/m;  $\epsilon_r = 39.36$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

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

Probe: EX3DV4 – SN7307 ConvF(7.77,7.77,7.77)

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

Maximum value of SAR (interpolated) = 0.867 W/kg

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

Reference Value = 3.742 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 1.18 W/kg

**SAR(1 g) = 0.536 W/kg; SAR(10 g) = 0.229 W/kg**

Maximum value of SAR (measured) = 0.925 W/kg

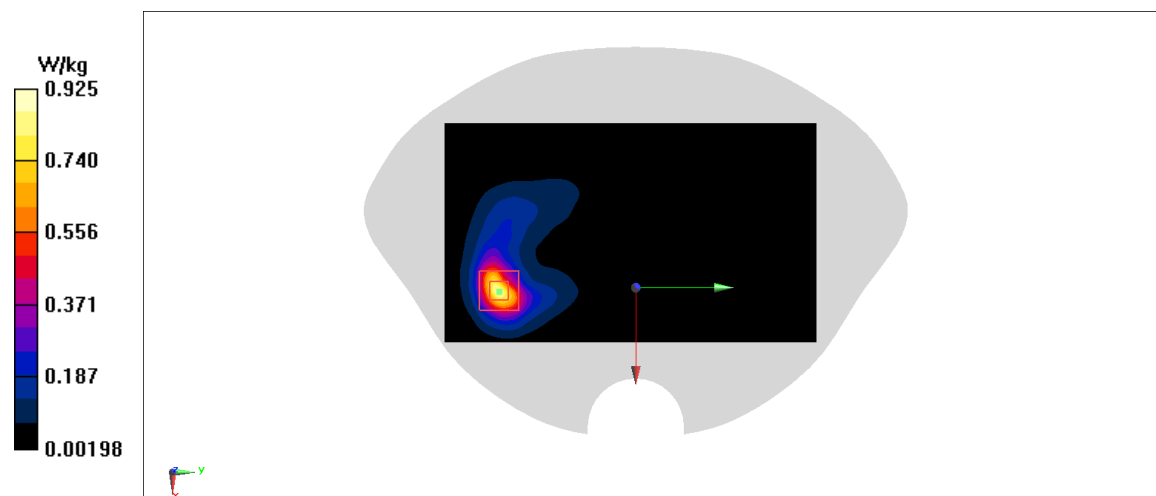


Fig A.26

**WLAN5G\_CH56 Left Cheek**

Date: 4/9/2021

Electronics: DAE4 Sn536

Medium: head 5250 MHz

Medium parameters used:  $f = 5280$  MHz;  $\sigma = 4.482$  mho/m;  $\epsilon_r = 34.1$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: WLAN5G 5280 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(5.61,5.61,5.61)

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

Maximum value of SAR (interpolated) = 1.84 W/kg

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

Reference Value = 4.259 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 3.31 W/kg

**SAR(1 g) = 0.616 W/kg; SAR(10 g) = 0.138 W/kg**

Maximum value of SAR (measured) = 1.82 W/kg

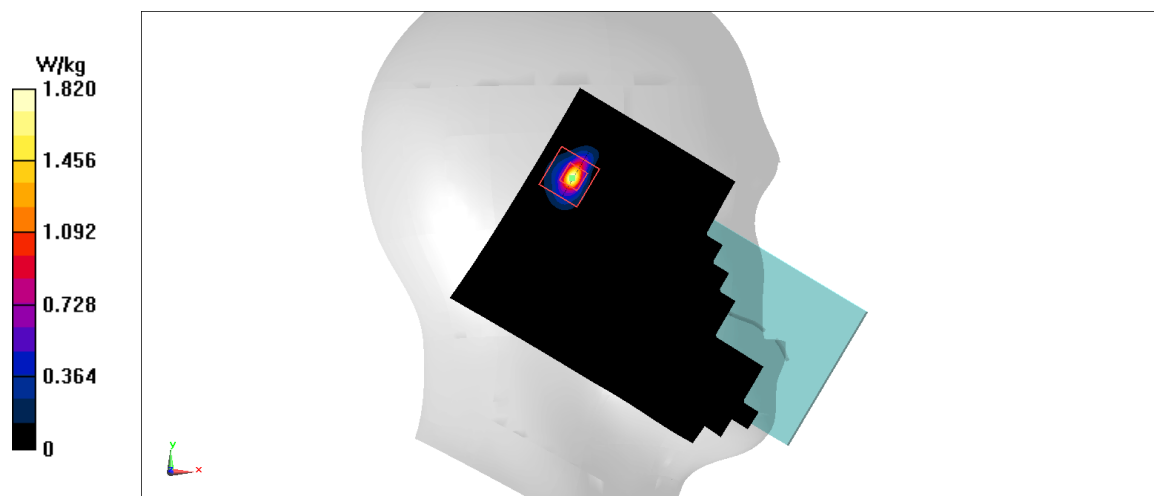


Fig A.27

**WLAN5G\_CH52 Top 10mm**

Date: 4/9/2021

Electronics: DAE4 Sn536

Medium: head 5250 MHz

Medium parameters used:  $f = 5260$  MHz;  $\sigma = 4.53$  mho/m;  $\epsilon_r = 33.93$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: WLAN5G 5260 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(5.61,5.61,5.61)

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

Maximum value of SAR (interpolated) = 1.4 W/kg

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

Reference Value = 6.537 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 2.3 W/kg

**SAR(1 g) = 0.585 W/kg; SAR(10 g) = 0.192 W/kg**

Maximum value of SAR (measured) = 1.43 W/kg

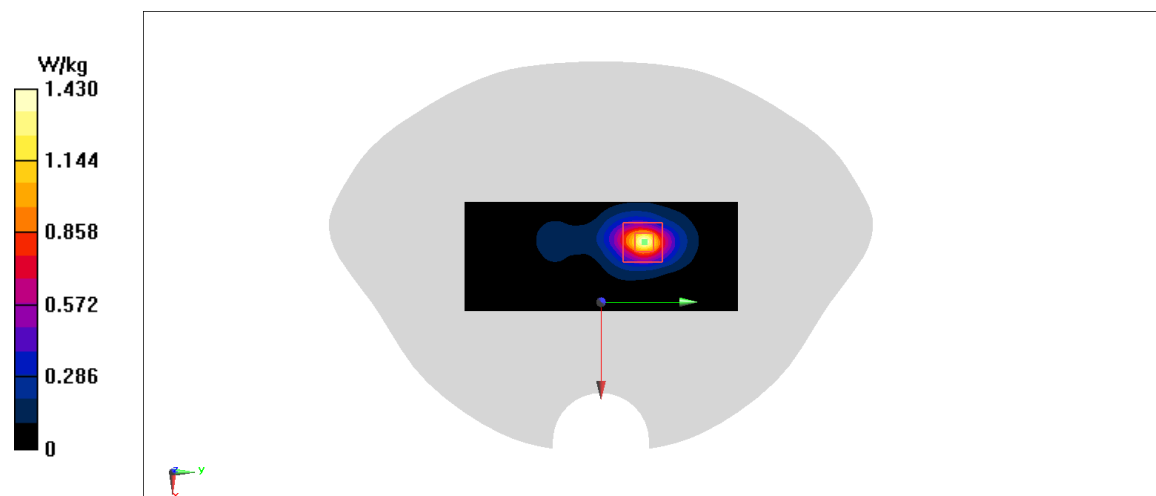


Fig A.28

**LTE1900-FDD2\_CH19100 Rear 0mm for Extremity SAR**

Date: 4/6/2021

Electronics: DAE4 Sn536

Medium: head 1900 MHz

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.388$  mho/m;  $\epsilon_r = 40.77$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: LTE1900-FDD2 1900 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(8.33,8.33,8.33)

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

Maximum value of SAR (interpolated) = 7.99 W/kg

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

Reference Value = 2.424 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 12.7 W/kg

**SAR(1 g) = 5.07 W/kg; SAR(10 g) = 2.36 W/kg**

Maximum value of SAR (measured) = 8.82 W/kg

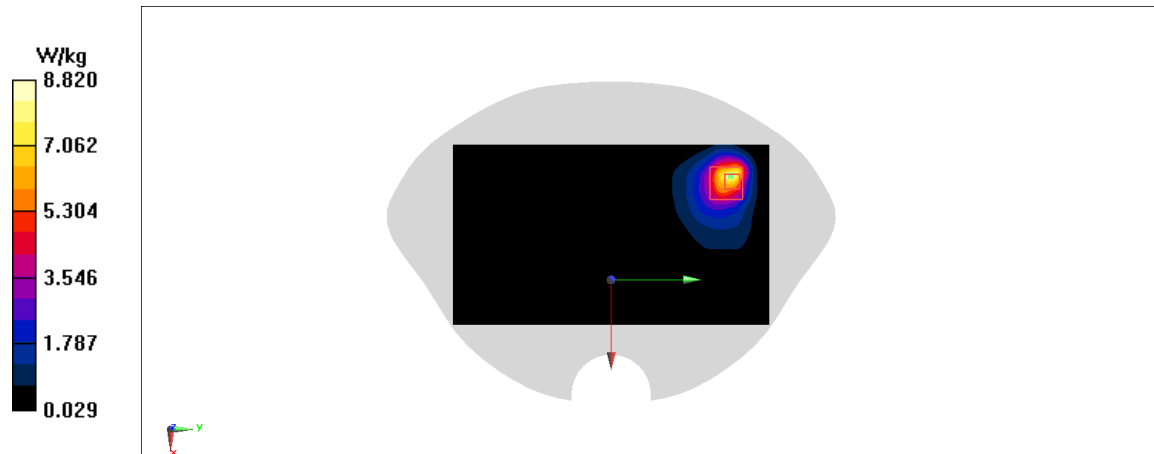
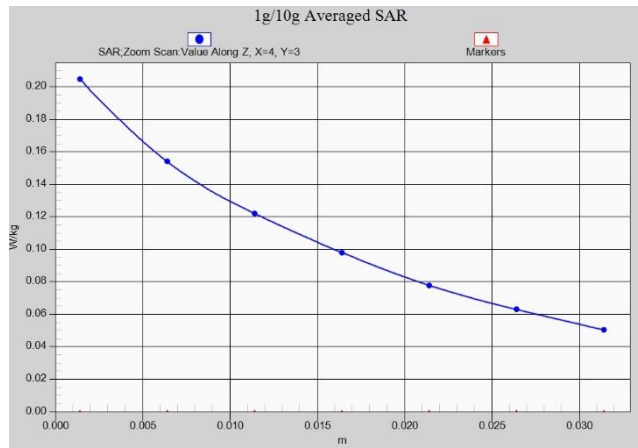
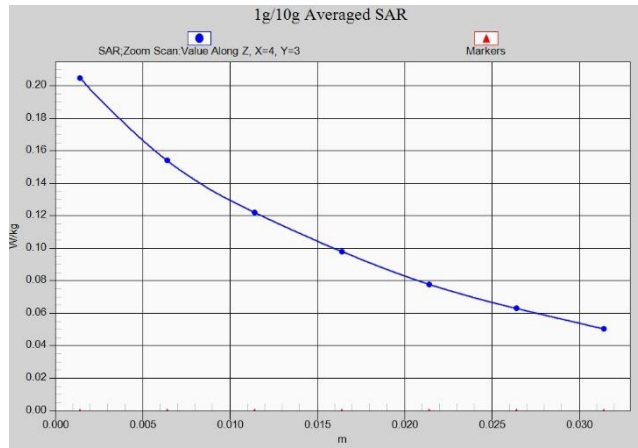


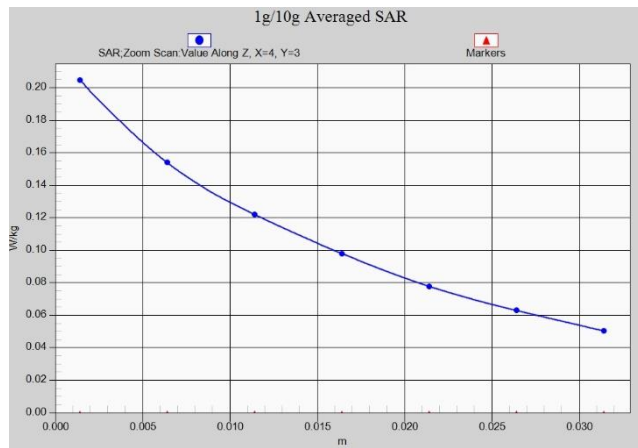
Fig A.29



**Z-Scan at power reference point (850 MHz)**

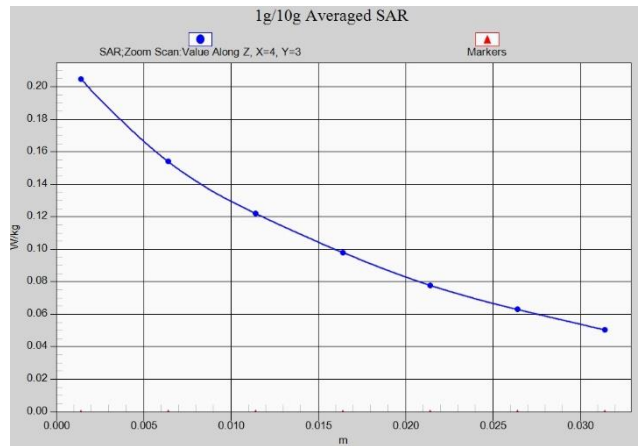


**Z-Scan at power reference point (850 MHz)**

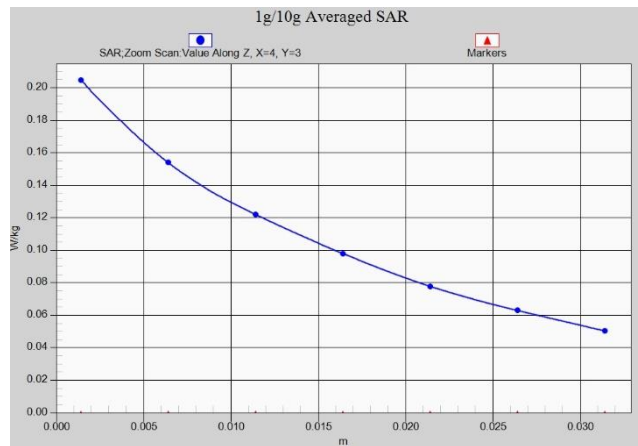


**Z-Scan at power reference point (1900 MHz)**

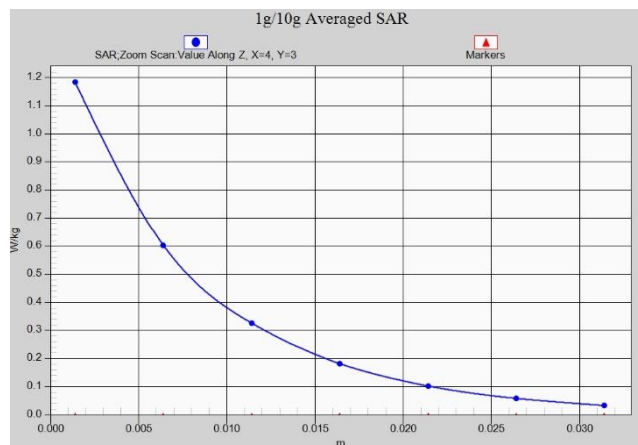




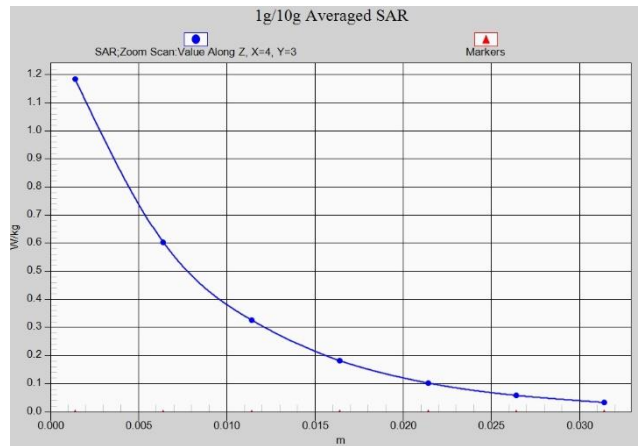
**Z-Scan at power reference point (GSM1900)**



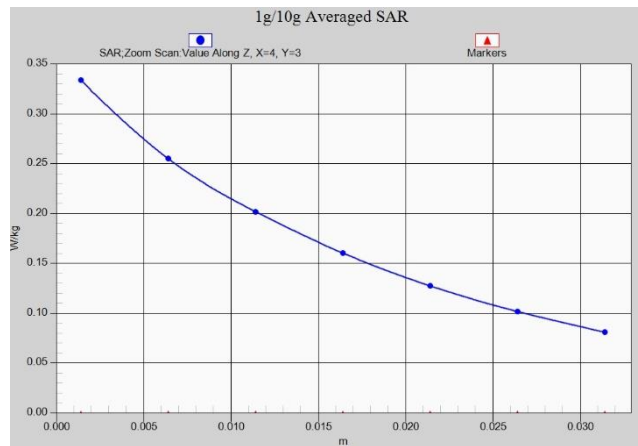
**Z-Scan at power reference point (WCDMA1900)**



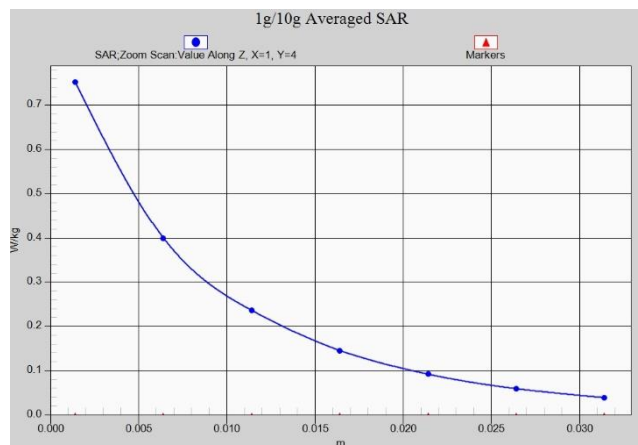
**Z-Scan at power reference point (WCDMA1900)**



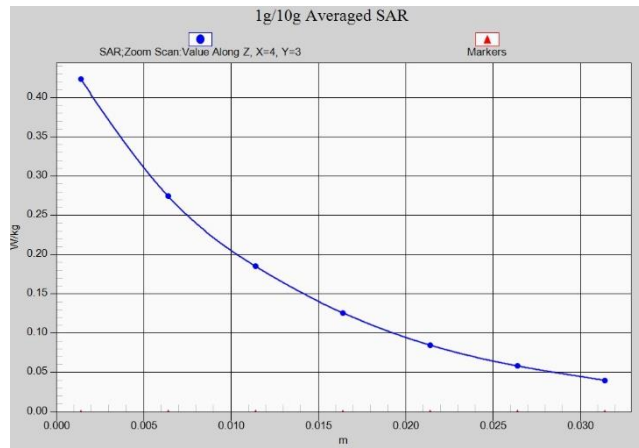
**Z-Scan at power reference point (WCDMA1900)**



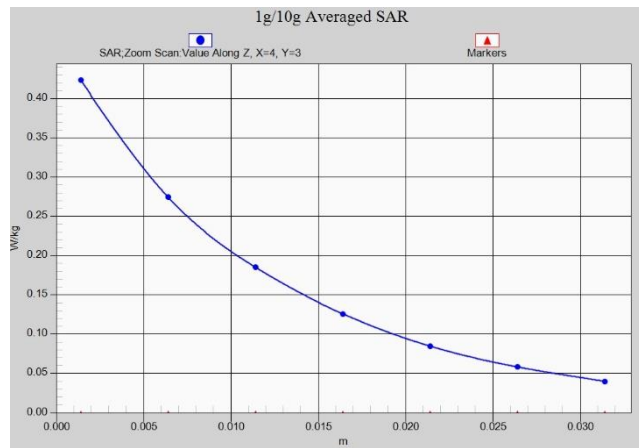
**Z-Scan at power reference point (WCDMA850)**



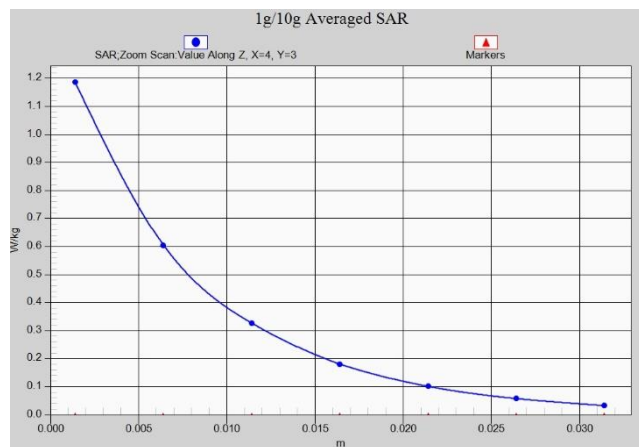
**Z-Scan at power reference point (WCDMA850)**



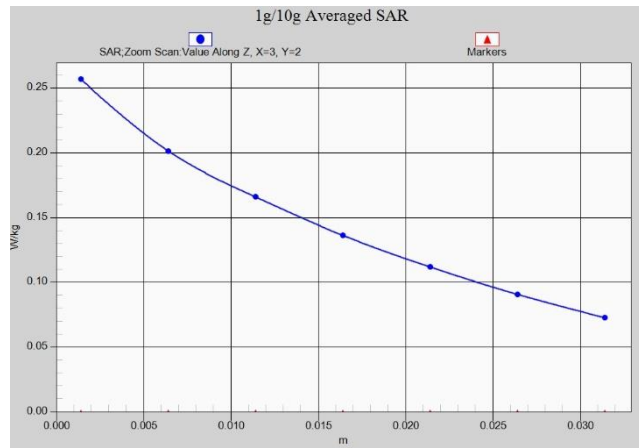
**Z-Scan at power reference point (LTEB2)**



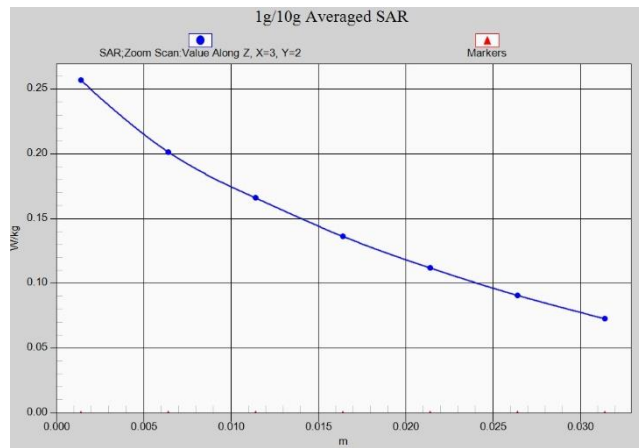
**Z-Scan at power reference point (LTEB2)**



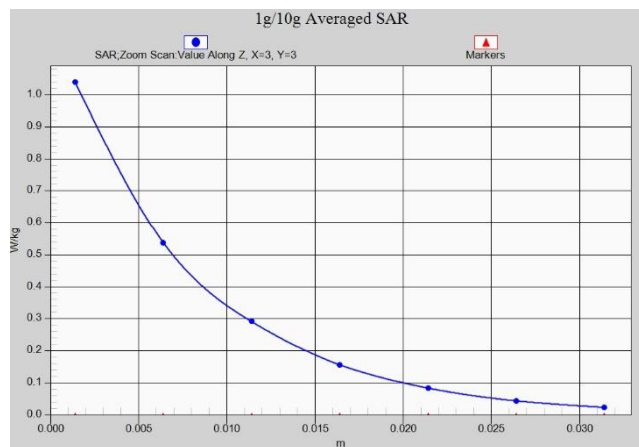
**Z-Scan at power reference point (LTEB2)**



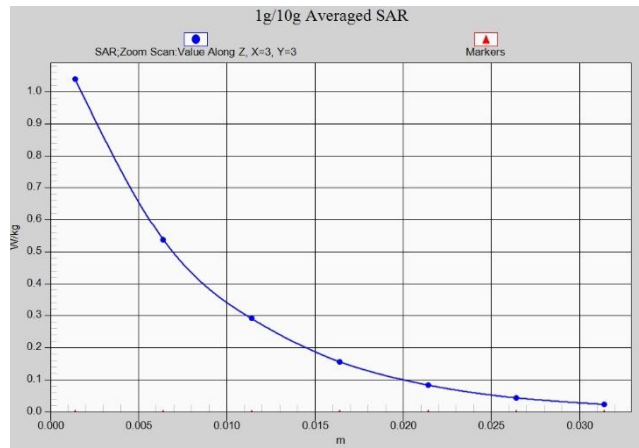
**Z-Scan at power reference point (LTEB5)**



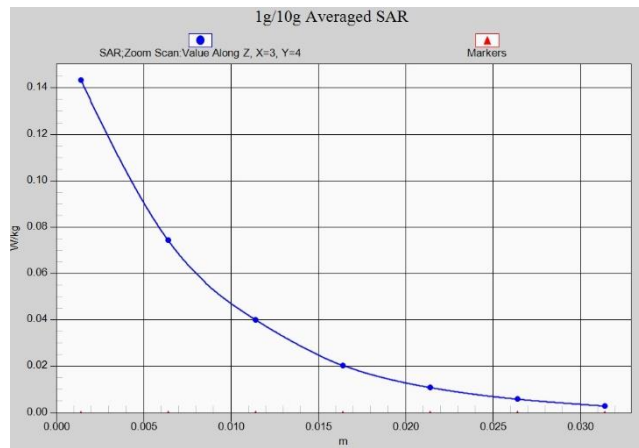
**Z-Scan at power reference point (LTEB5)**



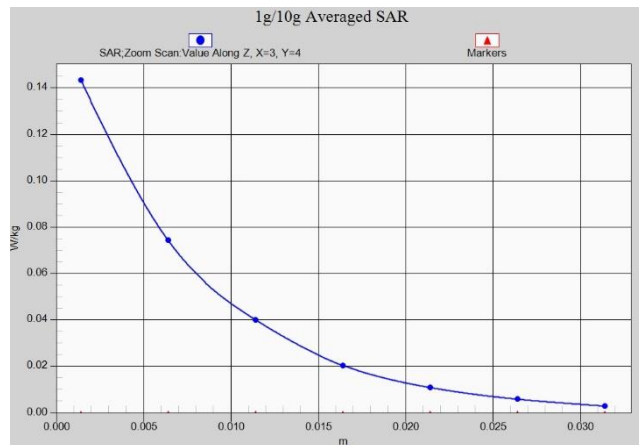
**Z-Scan at power reference point (LTEB7)-ANT0**



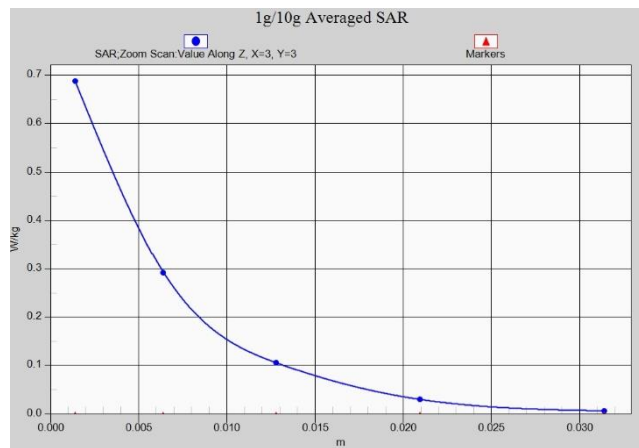
**Z-Scan at power reference point (LTEB7) -ANT0**



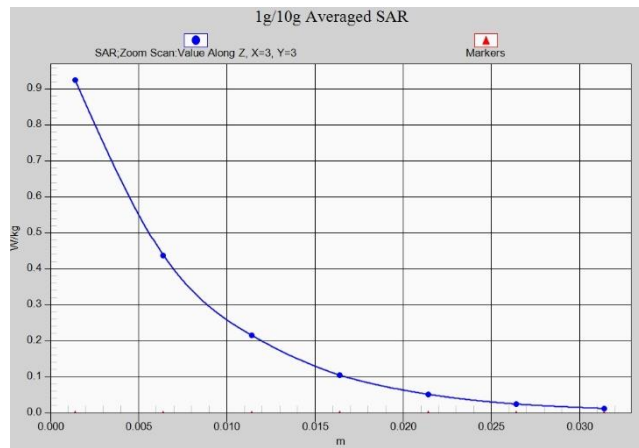
**Z-Scan at power reference point (LTEB41)**



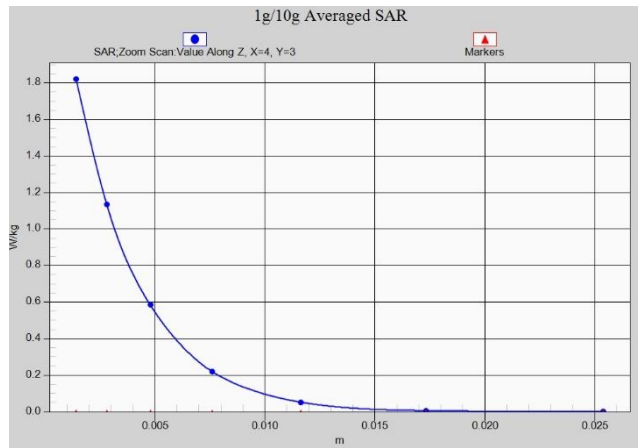
**Z-Scan at power reference point (LTEB41)**



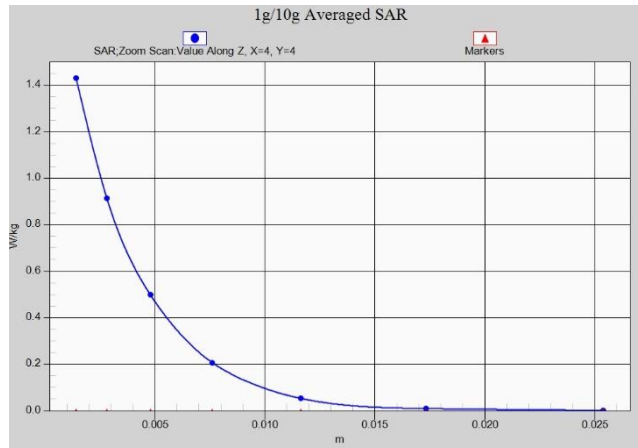
**Z-Scan at power reference point (WIFI2.4G)**



**Z-Scan at power reference point (WIFI2.4G)**



**Z-Scan at power reference point (WIFI5G)**



**Z-Scan at power reference point (WIFI5G)**

## ANNEX B System Verification Results

### 835 MHz

Date: 4/5/2021

Electronics: DAE4 Sn536

Medium: Head 835 MHz

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.889$  mho/m;  $\epsilon_r = 42.29$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: CW Frequency: 835 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(10.2,10.2,10.2)

**System Validation /Area Scan (81x191x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 62.84 V/m; Power Drift = 0.01

**Fast SAR: SAR(1 g) = 2.44 W/kg; SAR(10 g) = 1.54 W/kg**

Maximum value of SAR (interpolated) = 3.18 W/kg

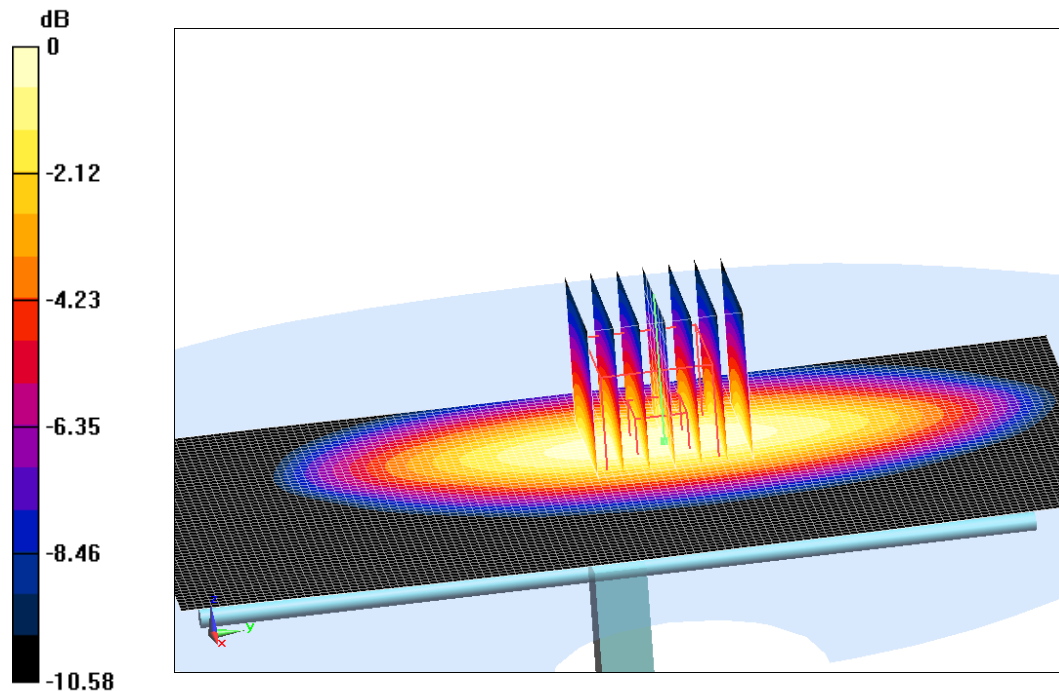
**System Validation /Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 62.84 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.58 W/kg

**SAR(1 g) = 2.43 W/kg; SAR(10 g) = 1.56 W/kg**

Maximum value of SAR (measured) = 3.25 W/kg



0 dB = 3.25 W/kg = 5.12 dB W/kg

**Fig.B.1 validation 835 MHz 250mW**



## 1900 MHz

Date: 4/6/2021

Electronics: DAE4 Sn536

Medium: Head 1900 MHz

Medium parameters used:  $f = 1900$  MHz;  $\sigma = 1.388$  mho/m;  $\epsilon_r = 40.77$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: CW Frequency: 1900 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(8.33,8.33,8.33)

**System Validation /Area Scan (81x191x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 109.41 V/m; Power Drift = 0.07

**Fast SAR: SAR(1 g) = 9.82 W/kg; SAR(10 g) = 5.15 W/kg**

Maximum value of SAR (interpolated) = 15.24 W/kg

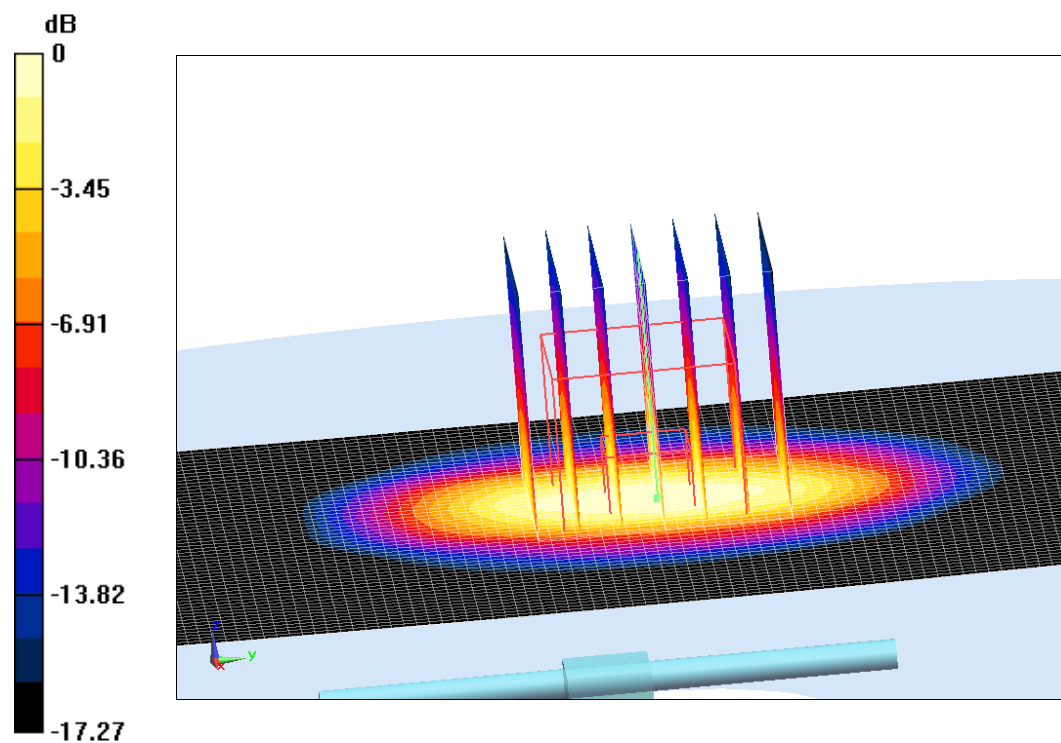
**System Validation /Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value =109.41 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 18.42 W/kg

**SAR(1 g) = 9.94 W/kg; SAR(10 g) = 5.11 W/kg**

Maximum value of SAR (measured) = 15.09 W/kg



0 dB = 15.09 W/kg = 11.79 dB W/kg

**Fig.B.2 validation 1900 MHz 250mW**

## 2450 MHz

Date: 4/7/2021

Electronics: DAE4 Sn536

Medium: Head 2450 MHz

Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.824$  mho/m;  $\epsilon_r = 39.37$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: CW Frequency: 2450 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(7.77,7.77,7.77)

**System Validation /Area Scan (81x191x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 120.1 V/m; Power Drift = 0.02

**Fast SAR: SAR(1 g) = 13.22 W/kg; SAR(10 g) = 6.07 W/kg**

Maximum value of SAR (interpolated) = 21.73 W/kg

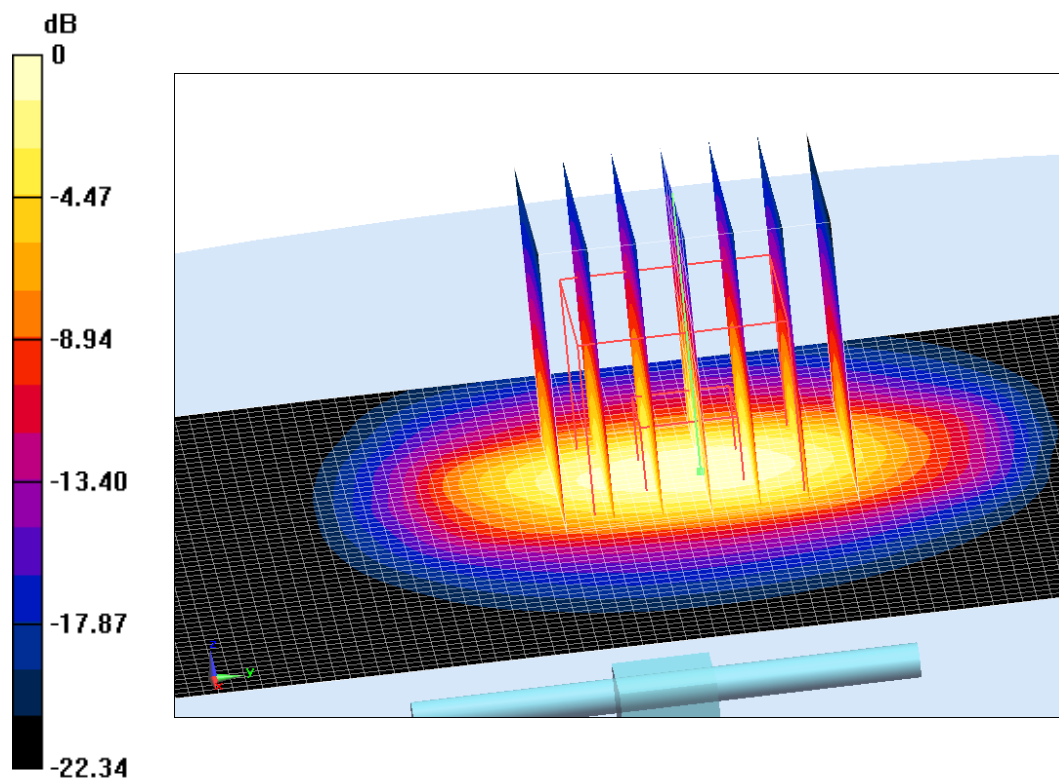
**System Validation /Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value =120.1 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 26.48 W/kg

**SAR(1 g) = 13.13 W/kg; SAR(10 g) = 6.07 W/kg**

Maximum value of SAR (measured) = 21.67 W/kg



0 dB = 21.67 W/kg = 13.36 dB W/kg

**Fig.B.3 validation 2450 MHz 250mW**

## 2600 MHz

Date: 4/8/2021

Electronics: DAE4 Sn536

Medium: Head 2600 MHz

Medium parameters used:  $f = 2600$  MHz;  $\sigma = 1.957$  mho/m;  $\epsilon_r = 38.82$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: CW Frequency: 2600 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(7.61,7.61,7.61)

**System Validation /Area Scan (81x191x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 121.95 V/m; Power Drift = -0.06

**Fast SAR: SAR(1 g) = 14.37 W/kg; SAR(10 g) = 6.3 W/kg**

Maximum value of SAR (interpolated) = 24.54 W/kg

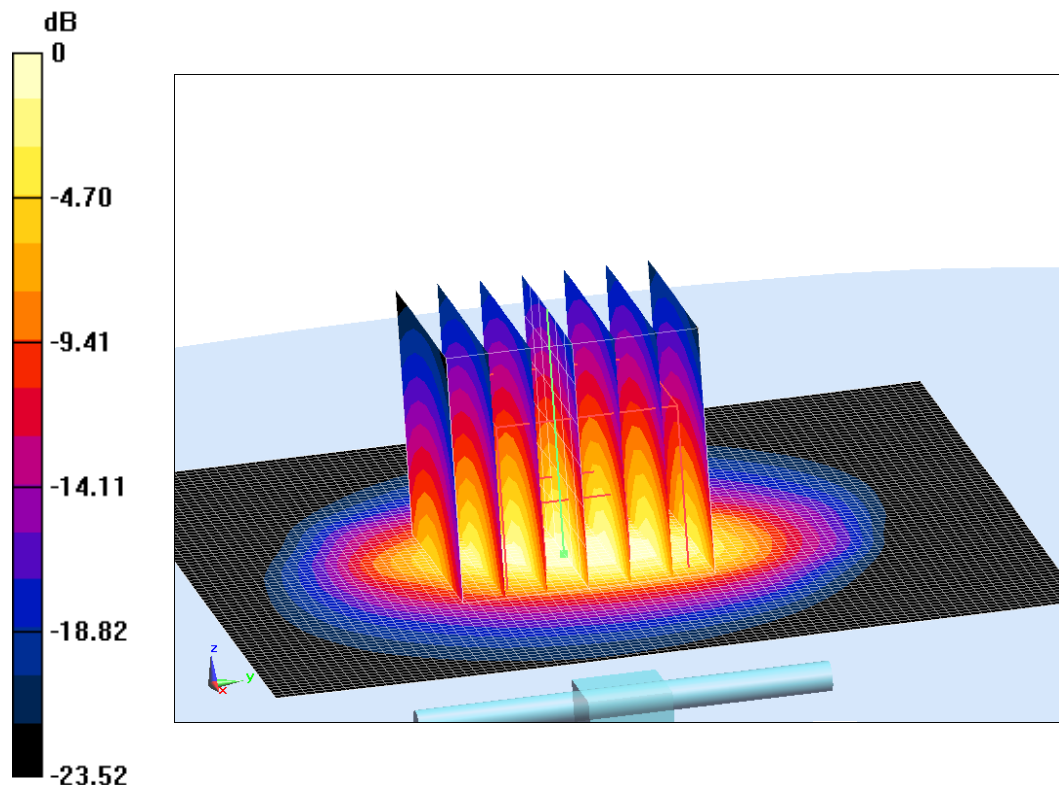
**System Validation /Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value =121.95 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 28.83 W/kg

**SAR(1 g) = 14.36 W/kg; SAR(10 g) = 6.21 W/kg**

Maximum value of SAR (measured) = 23.95 W/kg



0 dB = 23.95 W/kg = 13.79 dB W/kg

**Fig.B.4 validation 2600 MHz 250mW**

## 5250 MHz

Date: 4/9/2021

Electronics: DAE4 Sn536

Medium: Head 5250 MHz

Medium parameters used:  $f = 5250$  MHz;  $\sigma = 4.771$  mho/m;  $\epsilon_r = 35.89$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: CW Frequency: 5250 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(5.61,5.61,5.61)

**System Validation /Area Scan (81x191x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 80.11 V/m; Power Drift = -0.01

Maximum value of SAR (interpolated) = 18.38 W/kg

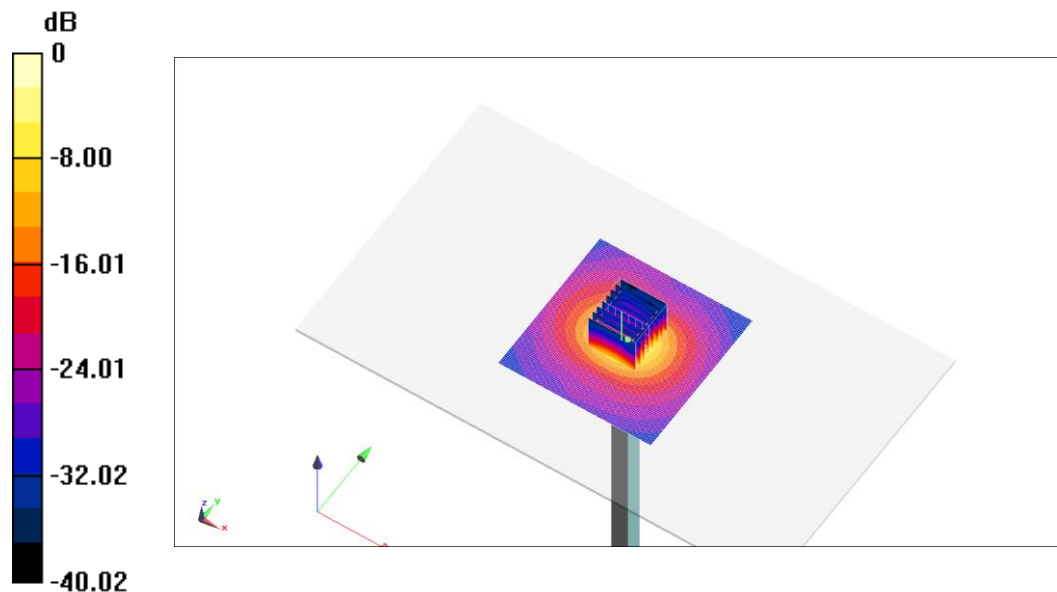
**System Validation /Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.2mm

Reference Value =80.11 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 27.92 W/kg

**SAR(1 g) = 20.29 W/kg; SAR(10 g) = 5.62 W/kg**

Maximum value of SAR (measured) = 18.74 W/kg



0 dB = 18.74 W/kg = 12.73 dB W/kg

**Fig.B.5 validation 5250 MHz 250mW**

## 5600 MHz

Date: 4/10/2021

Electronics: DAE4 Sn536

Medium: Head 5600 MHz

Medium parameters used:  $f = 5600$  MHz;  $\sigma = 5.044$  mho/m;  $\epsilon_r = 35.12$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: CW Frequency: 5600 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(5.1,5.1,5.1)

**System Validation /Area Scan (81x191x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 78.65 V/m; Power Drift = -0.05

Maximum value of SAR (interpolated) = 19.89 W/kg

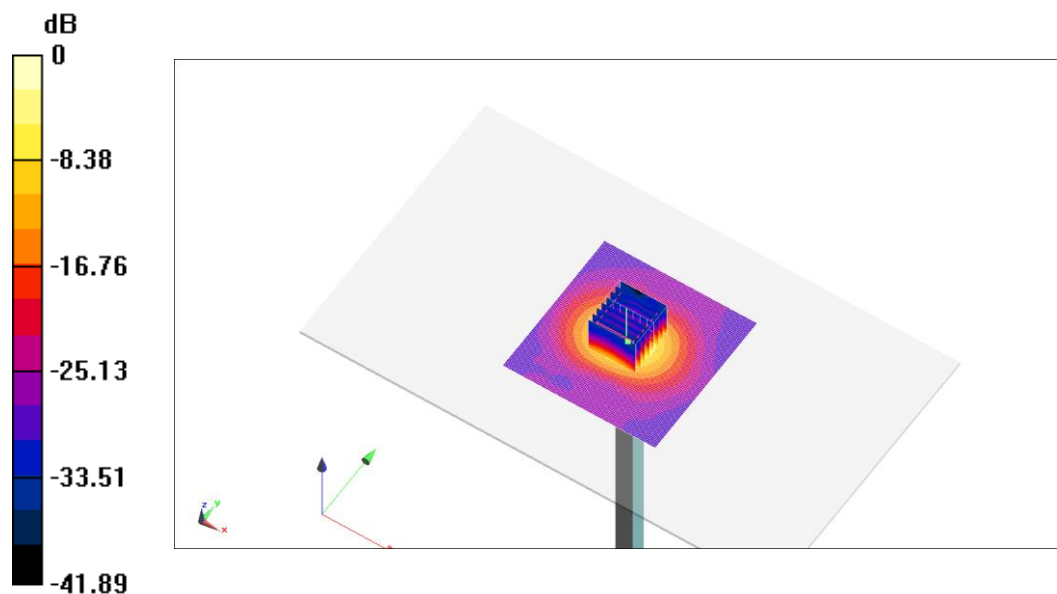
**System Validation /Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.2mm

Reference Value =78.65 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 31.71 W/kg

**SAR(1 g) = 20.74 W/kg; SAR(10 g) = 5.85 W/kg**

Maximum value of SAR (measured) = 20.52 W/kg



0 dB = 20.52 W/kg = 13.12 dB W/kg

**Fig.B.6 validation 5600 MHz 250mW**

## 5750 MHz

Date: 4/11/2021

Electronics: DAE4 Sn536

Medium: Head 5750 MHz

Medium parameters used:  $f = 5750$  MHz;  $\sigma = 5.168$  mho/m;  $\epsilon_r = 35.57$ ;  $\rho = 1000$  kg/m<sup>3</sup>

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

Communication System: CW Frequency: 5750 MHz Duty Cycle: 1:1

Probe: EX3DV4 – SN7307 ConvF(5.05,5.05,5.05)

**System Validation /Area Scan (81x191x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 75.12 V/m; Power Drift = 0.08

Maximum value of SAR (interpolated) = 19.77 W/kg

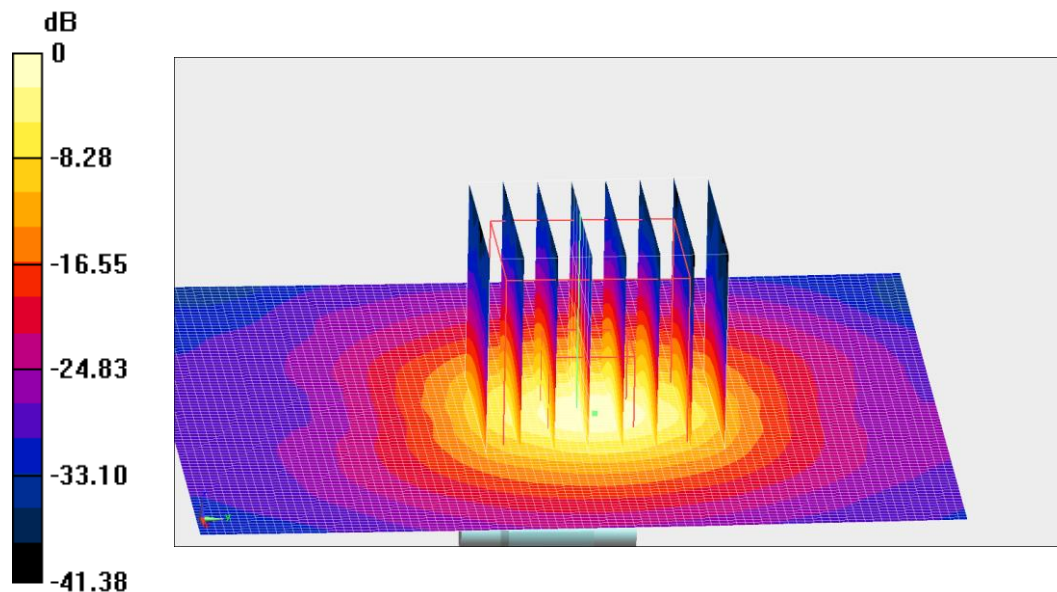
**System Validation /Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.2mm

Reference Value =75.12 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 32.19 W/kg

**SAR(1 g) = 20.02 W/kg; SAR(10 g) = 5.62 W/kg**

Maximum value of SAR (measured) = 19.82 W/kg



0 dB = 19.82 W/kg = 12.97 dB W/kg

**Fig.B.7 validation 5750 MHz 250mW**

The SAR system verification must be required that the area scan estimated 1-g SAR is within 3% of the zoom scan 1-g SAR.

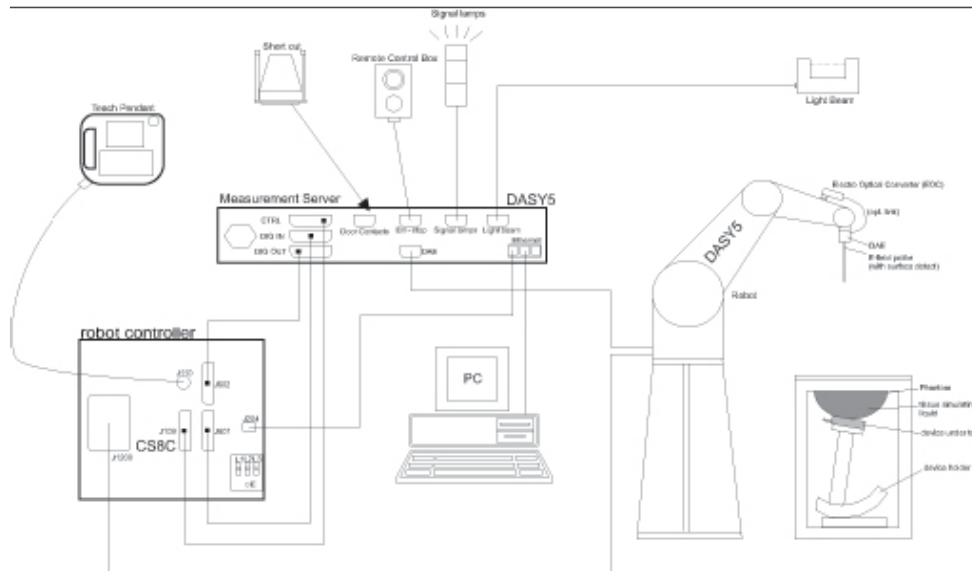
**Table B.1 Comparison between area scan and zoom scan for system verification**

<b>Date</b>	<b>Band</b>	<b>Position</b>	<b>Area scan (1g)</b>	<b>Zoom scan (1g)</b>	<b>Drift (%)</b>
2021-4-5	835 MHz	Head	2.44	2.43	0.41
2021-4-6	1900 MHz	Head	9.82	9.94	-1.21
2021-4-7	2450 MHz	Head	13.22	13.13	0.69
2021-4-8	2600 MHz	Head	14.37	14.36	0.07

## ANNEX C SAR Measurement Setup

### C.1 Measurement Set-up

The Dasy4 or DASY5 system for performing compliance tests is illustrated above graphically. This system consists of the following items:



Picture C.1 SAR Lab Test Measurement Set-up

- A standard high precision 6-axis robot (StäubliTX=RX family) 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 and the DASY4 or 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.



## C.2 Dasy4 or DASY5 E-field Probe System

The SAR measurements were conducted with the dosimetric probe designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multifiber line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY4 or DASY5 software reads the reflection during a software approach and looks for the maximum using 2<sup>nd</sup> ord curve fitting. The approach is stopped at reaching the maximum.

### Probe Specifications:

<b>Model:</b>	ES3DV3, EX3DV4
<b>Frequency</b>	10MHz — 6.0GHz(EX3DV4)
<b>Range:</b>	10MHz — 4GHz(ES3DV3)
<b>Calibration:</b>	In head and body simulating tissue at Frequencies from 835 up to 5800MHz
<b>Linearity:</b>	± 0.2 dB(30 MHz to 6 GHz) for EX3DV4 ± 0.2 dB(30 MHz to 4 GHz) for ES3DV3
<b>DynamicRange:</b>	10 mW/kg — 100W/kg
<b>Probe Length:</b>	330 mm
<b>Probe Tip</b>	
<b>Length:</b>	20 mm
<b>Body Diameter:</b>	12 mm
<b>Tip Diameter:</b>	2.5 mm (3.9 mm for ES3DV3)
<b>Tip-Center:</b>	1 mm (2.0mm for ES3DV3)
<b>Application:</b>	SAR Dosimetry Testing Compliance tests of mobile phones Dosimetry in strong gradient fields



Picture C.2Near-field Probe



Picture C.3E-field Probe

## C.3 E-field Probe Calibration

Each E-Probe/Probe Amplifier combination has unique calibration parameters. A TEM cell calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm<sup>2</sup>) using an RF Signal generator, TEM cell, and RF Power Meter.

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and in a waveguide or

other methodologies above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1 mW/cm<sup>2</sup>.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The E-field in the medium correlates with the temperature rise in the dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$SAR = C \frac{\Delta T}{\Delta t}$$

Where:

$\Delta t$  = Exposure time (30 seconds),

C = Heat capacity of tissue (brain or muscle),

$\Delta T$  = Temperature increase due to RF exposure.

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

Where:

$\sigma$  = Simulated tissue conductivity,

$\rho$  = Tissue density (kg/m<sup>3</sup>).

## C.4 Other Test Equipment

### C.4.1 Data Acquisition Electronics(DAE)

The data acquisition electronics consist 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 with a 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 mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

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



PictureC.4: DAE

### C.4.2 Robot

The SPEAG DASY system uses the high precision robots (DASY4: RX90XL; DASY5: RX160L) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version from Stäubli is used. The Stäubli robot series have many features that are important for our application:

- High precision (repeatability 0.02mm)
- High reliability (industrial design)
- Low maintenance costs (virtually maintenance free due to direct drive gears; no belt drives)
- Jerk-free straight movements (brushless synchron motors; no stepper motors)
- Low ELF interference (motor control fields shielded via the closed metallic construction shields)



Picture C.5 DASY 4



Picture C.6 DASY 5

### C.4.3 Measurement Server

The Measurement server is based on a PC/104 CPU board with CPU (dasy4: 166 MHz, Intel Pentium; DASY5: 400 MHz, Intel Celeron), chipdisk (DASY4: 32 MB; DASY5: 128MB), RAM (DASY4: 64 MB, DASY5: 128MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY I/O board, which is directly connected to the PC/104 bus of the CPU board.

The measurement server performs all real-time data evaluation of field measurements and surface detection, controls robot movements and handles safety operation. The PC operating system cannot interfere with these time critical processes. All connections are supervised by a watchdog, and disconnection of any of the cables to the measurement server will automatically disarm the robot and disable all program-controlled robot movements. Furthermore, the measurement server is equipped with an expansion port which is reserved for future applications. Please note that this expansion port does not have a standardized pinout, and therefore only devices provided by SPEAG can be connected. Devices from any other supplier could seriously damage the measurement server.



Picture C.7 Server for DASY 4



Picture C.8 Server for DASY 5

#### C.4.4 Device Holder for Phantom

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5mm distance, a positioning uncertainty of  $\pm 0.5\text{mm}$  would produce a SAR uncertainty of  $\pm 20\%$ . Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.

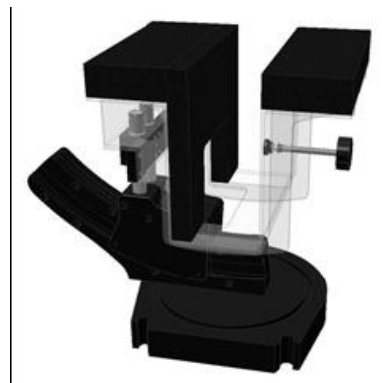
The DASY device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales are the ear reference point (ERP). Thus the device needs no repositioning when changing the angles. The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity  $\epsilon = 3$  and loss tangent  $\delta = 0.02$ . The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

<Laptop Extension Kit>

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 positioner. The extension is fully compatible with the Twin-SAM and ELI phantoms.



Picture C.9-1: Device Holder



Picture C.9-2: Laptop Extension Kit

### C.4.5 Phantom

The SAM Twin Phantom V4.0 is constructed of a fiberglass shell integrated in a table. The shape of the shell is based on data from an anatomical study designed to

Represent the 90<sup>th</sup> percentile of the population. The phantom enables the dissymmetric evaluation of SAR for both left and right handed handset usage, as well as body-worn usage using the flat phantom region. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot. The shell phantom has a 2mm shell thickness (except the ear region where shell thickness increases to 6 mm).

Shell Thickness:  $2 \pm 0.2$  mm

Filling Volume: Approx. 25 liters

Dimensions: 810 x 1000 x 500 mm (H x L x W)

Available: Special

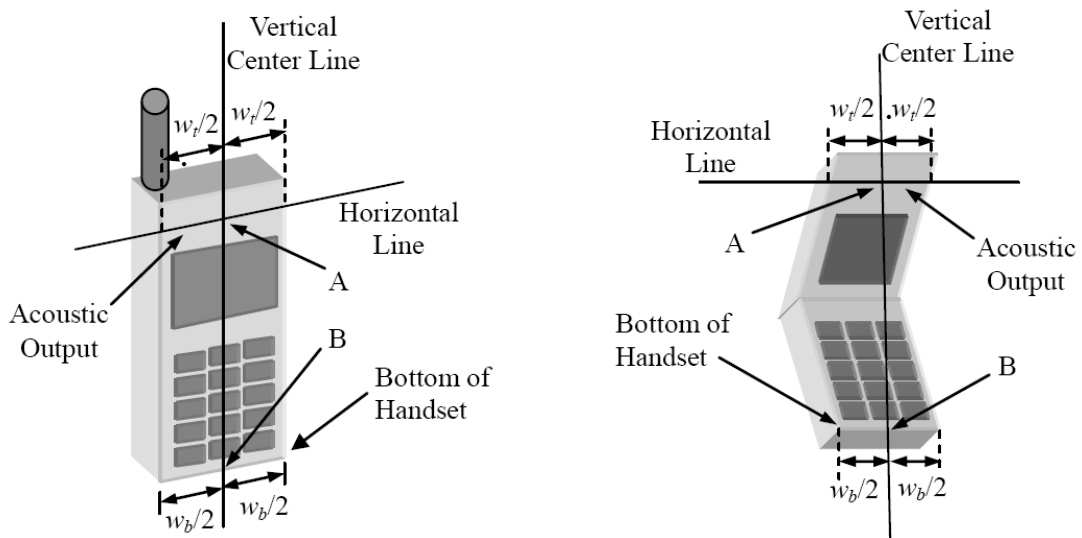


**Picture C.10: SAM Twin Phantom**

## ANNEX D Position of the wireless device in relation to the phantom

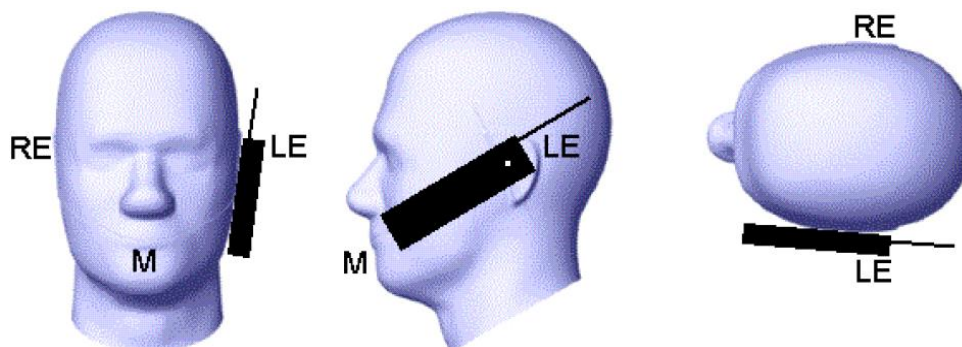
### D.1 General considerations

This standard specifies two handset test positions against the head phantom – the “cheek” position and the “tilt” position.

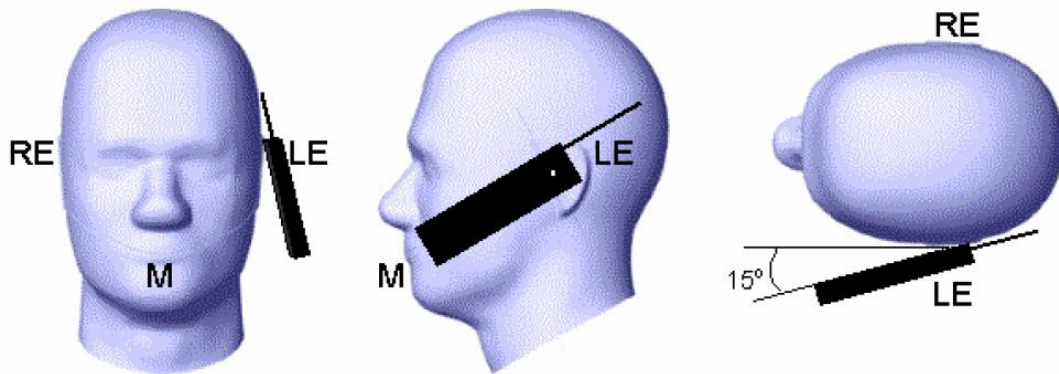


- $w_t$  Width of the handset at the level of the acoustic
- $w_b$  Width of the bottom of the handset
- A Midpoint of the width  $w_t$  of the handset at the level of the acoustic output
- B Midpoint of the width  $w_b$  of the bottom of the handset

Picture D.1-a Typical “fixed” case handset    Picture D.1-b Typical “clam-shell” case handset



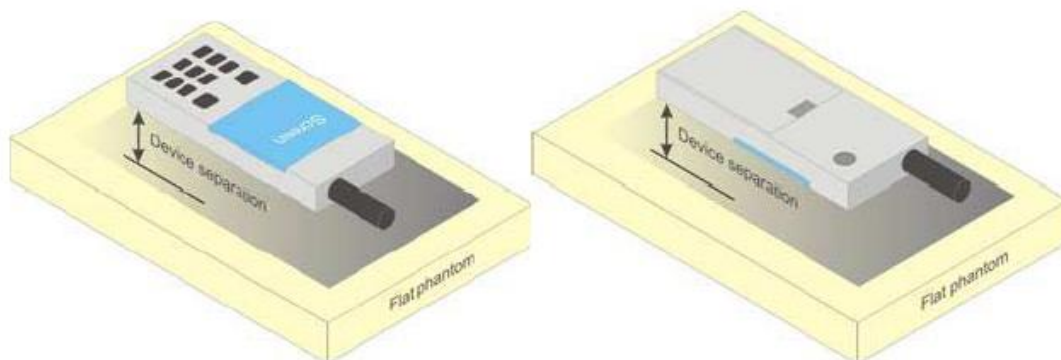
Picture D.2 Cheek position of the wireless device on the left side of SAM



Picture D.3 Tilt position of the wireless device on the left side of SAM

## D.2 Body-worn device

A typical example of a body-worn device is a mobile phone, wireless enabled PDA or other battery operated wireless device with the ability to transmit while mounted on a person's body using a carry accessory approved by the wireless device manufacturer.

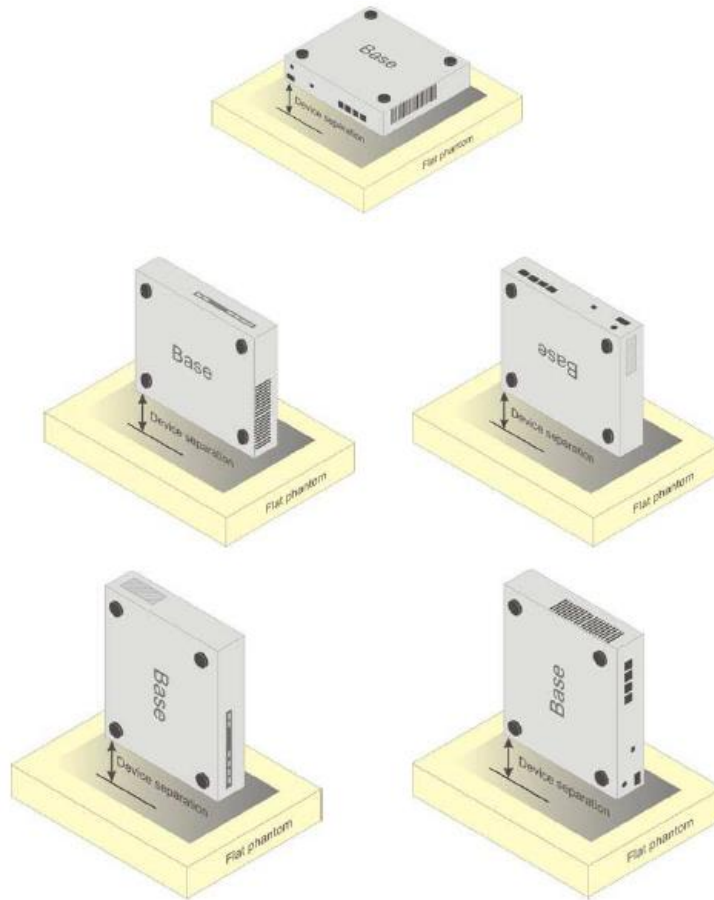


Picture D.4 Test positions for body-worn devices

## D.3 Desktop device

A typical example of a desktop device is a wireless enabled desktop computer placed on a table or desk when used.

The DUT shall be positioned at the distance and in the orientation to the phantom that corresponds to the intended use as specified by the manufacturer in the user instructions. For devices that employ an external antenna with variable positions, tests shall be performed for all antenna positions specified. Picture 8.5 show positions for desktop device SAR tests. If the intended use is not specified, the device shall be tested directly against the flat phantom.



Picture D.5 Test positions for desktop devices

#### D.4 DUT Setup Photos



Picture D.6



## ANNEX E Equivalent Media Recipes

The liquid used for the frequency range of 800-3000 MHz consisted of water, sugar, salt, preventol, glycol monobutyl and Cellulose. The liquid has been previously proven to be suited for worst-case. The Table E.1 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the IEEE 1528 and IEC 62209.

**TableE.1: Composition of the Tissue Equivalent Matter**

Frequency (MHz)	835Head	835Body	1900 Head	1900 Body	2450 Head	2450 Body	5800 Head	5800 Body
Ingredients (% by weight)								
Water	41.45	52.5	55.242	69.91	58.79	72.60	65.53	65.53
Sugar	56.0	45.0	\	\	\	\	\	\
Salt	1.45	1.4	0.306	0.13	0.06	0.18	\	\
Preventol	0.1	0.1	\	\	\	\	\	\
Cellulose	1.0	1.0	\	\	\	\	\	\
Glycol Monobutyl	\	\	44.452	29.96	41.15	27.22	\	\
Diethylenglycol monohexylether	\	\	\	\	\	\	17.24	17.24
Triton X-100	\	\	\	\	\	\	17.24	17.24
Dielectric Parameters Target Value	$\epsilon=41.5$ $\sigma=0.90$	$\epsilon=55.2$ $\sigma=0.97$	$\epsilon=40.0$ $\sigma=1.40$	$\epsilon=53.3$ $\sigma=1.52$	$\epsilon=39.2$ $\sigma=1.80$	$\epsilon=52.7$ $\sigma=1.95$	$\epsilon=35.3$ $\sigma=5.27$	$\epsilon=48.2$ $\sigma=6.00$

**Note: There are a little adjustment respectively for 750, 1750, 2600, 5200, 5300 and 5600 based on the recipe of closest frequency in table E.1.**

## ANNEX F System Validation

The SAR system must be validated against its performance specifications before it is deployed. When SAR probes, system components or software are changed, upgraded or recalibrated, these must be validated with the SAR system(s) that operates with such components.

**Table F.1: System Validation for 7307**

Probe SN.	Liquid name	Validation date	Frequency point	Status (OK or Not)
7307	Head 750MHz	June.15,2020	750 MHz	OK
7307	Head 850MHz	June.15,2020	835 MHz	OK
7307	Head 900MHz	June.15,2020	900 MHz	OK
7307	Head 1750MHz	June.15,2020	1750 MHz	OK
7307	Head 1810MHz	June.15,2020	1810 MHz	OK
7307	Head 1900MHz	June.16,2020	1900 MHz	OK
7307	Head 2000MHz	June.16,2020	2000 MHz	OK
7307	Head 2100MHz	June.16,2020	2100 MHz	OK
7307	Head 2300MHz	June.16,2020	2300 MHz	OK
7307	Head 2450MHz	June.16,2020	2450 MHz	OK
7307	Head 2600MHz	June.17,2020	2600 MHz	OK
7307	Head 3500MHz	June.17,2020	3500 MHz	OK
7307	Head 3700MHz	June.17,2020	3700 MHz	OK
7307	Head 5200MHz	June.17,2020	5250 MHz	OK
7307	Head 5500MHz	June.17,2020	5600 MHz	OK
7307	Head 5800MHz	June.17,2020	5800 MHz	OK
7307	Body 750MHz	June.17,2020	750 MHz	OK
7307	Body 850MHz	June.18,2020	835 MHz	OK
7307	Body 900MHz	June.18,2020	900 MHz	OK
7307	Body 1750MHz	June.18,2020	1750 MHz	OK
7307	Body 1810MHz	June.18,2020	1810 MHz	OK
7307	Body 1900MHz	June.18,2020	1900 MHz	OK
7307	Body 2000MHz	June.19,2020	2000 MHz	OK
7307	Body 2100MHz	June.19,2020	2100 MHz	OK
7307	Body 2300MHz	June.19,2020	2300 MHz	OK
7307	Body 2450MHz	June.19,2020	2450 MHz	OK
7307	Body 2600MHz	June.19,2020	2600 MHz	OK
7307	Body 3500MHz	June.20,2020	3500 MHz	OK
7307	Body 3700MHz	June.20,2020	3700 MHz	OK
7307	Body 5200MHz	June.20,2020	5250 MHz	OK
7307	Body 5500MHz	June.20,2020	5600 MHz	OK
7307	Body 5800MHz	June.20,2020	5800 MHz	OK

# ANNEX G Probe Calibration Certificate

## Probe 7307 Calibration Certificate

**Calibration Laboratory of**  
**Schmid & Partner**  
**Engineering AG**  
 Zeughausstrasse 43, 8004 Zurich, Switzerland



**S** Schweizerischer Kalibrierdienst  
**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
 Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)  
 The Swiss Accreditation Service is one of the signatories to the EA  
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **CTTL (Auden)**

Certificate No: **EX3-7307\_May20**

### CALIBRATION CERTIFICATE

Object: **EX3DV4 - SN:7307**

Calibration procedure(s): **QA CAL-01.v9, QA CAL-12.v9, QA CAL-14.v5, QA CAL-23.v5, QA CAL-25.v7**  
 Calibration procedure for dosimetric E-field probes

Calibration date: **May 29, 2020**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	01-Apr-20 (No. 217-03100/03101)	Apr-21
Power sensor NRP-Z91	SN: 103244	01-Apr-20 (No. 217-03100)	Apr-21
Power sensor NRP-Z91	SN: 103245	01-Apr-20 (No. 217-03101)	Apr-21
Reference 20 dB Attenuator	SN: CC2552 (20x)	31-Mar-20 (No. 217-03106)	Apr-21
DAE4	SN: 660	27-Dec-19 (No. DAE4-660_Dec19)	Dec-20
Reference Probe ES3DV2	SN: 3013	31-Dec-19 (No. ES3-3013_Dec19)	Dec-20
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-18)	In house check: Jun-20
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-19)	In house check: Oct-20

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: June 2, 2020

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Calibration Laboratory of  
Schmid & Partner  
Engineering AG  
Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst  
C Service suisse d'étalonnage  
S Servizio svizzero di taratura  
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)  
The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

#### Glossary:

TSL	tissue simulating liquid
NORM <sub>x,y,z</sub>	sensitivity in free space
ConvF	sensitivity in TSL / NORM <sub>x,y,z</sub>
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization $\varphi$	$\varphi$ rotation around probe axis
Polarization $\vartheta$	$\vartheta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

#### Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

#### Methods Applied and Interpretation of Parameters:

- NORM<sub>x,y,z</sub>**: Assessed for E-field polarization  $\vartheta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide). NORM<sub>x,y,z</sub> are only intermediate values, i.e., the uncertainties of NORM<sub>x,y,z</sub> does not affect the  $E^2$ -field uncertainty inside TSL (see below ConvF).
- NORM(f)<sub>x,y,z</sub>** = NORM<sub>x,y,z</sub> \* frequency\_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP<sub>x,y,z</sub>**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A<sub>x,y,z</sub>; B<sub>x,y,z</sub>; C<sub>x,y,z</sub>; D<sub>x,y,z</sub>; VR<sub>x,y,z</sub>**: A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM<sub>x,y,z</sub> \* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from  $\pm 50$  MHz to  $\pm 100$  MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle**: The angle is assessed using the information gained by determining the NORM<sub>x</sub> (no uncertainty required).