TEST REPORT

No.I21N02743-SAR

For

Doro AB

mobile phone

Model Name: DSB-0400

With

Hardware Version: 1011

Software Version:

NEMO01A-S10A_DSB0400_120_USERDEBUG_210915

FCC ID: WS5DSB0400

Issued Date: 2021-10-13

Designation Number: CN1210

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of SAICT.

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I21N02743-SAR	Rev.0	1st edition	2021-10-13

TCONTENTS

1. Summary of Test Report

1.1. Test Items

Description:	mobile phone
Model Name:	DSB-0400
Applicant's name:	Doro AB
Manufacturer's Name:	Doro AB

1.2. Test Standards

ANSI C95.1–1992, IEEE 1528–2013

1.3. Test Result

Pass. Please refer to "13. Summary of Test Results"

1.4. Testing Location

Address: Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, P. R. China

1.5. Project Data

Testing Start Date: 2021-09-18 Testing End Date: 2021-09-26

1.6. Signature

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2. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for Doro AB mobile phone DSB-0400 are as follows:

Table 2.1: Highest Reported SAR for Head (1g)

Exposure Configuration	Technology Band	Highest Reported SAR 1g(W/Kg)	Equipment Class
Head	GSM850	0.33	PCE
	GSM1900	0.14	
	WCDMA Band 2	0.32	
	WCDMA Band 5	0.33	
	LTE Band 2	0.31	
	LTE Band 7	0.06	
	LTE Band 38	0.14	
	WLAN 2.4GHz	**0.57**	DTS

Table 2.2: Highest Reported SAR for Hotspot (1g)

Exposure Configuration	Technology Band	Highest Reported SAR 1g(W/Kg)	Equipment Class
Hotspot (Separation Distance 10mm)	GSM850	0.58	PCE
	GSM1900	0.57	
	WCDMA Band 2	0.58	
	WCDMA Band 5	0.37	
	LTE Band 2	0.69	
	LTE Band 7	0.58	
	LTE Band 38	**0.89**	
	WLAN 2.4GHz	0.19	DTS

Table 2.3: Highest Reported SAR for Body-worn (1g)

Exposure Configuration	Technology Band	Highest Reported SAR 1g(W/Kg)	Equipment Class
Body-worn (Separation Distance 10mm)	GSM850	0.58	PCE
	GSM1900	0.31	
	WCDMA Band 2	0.36	
	WCDMA Band 5	0.37	
	LTE Band 2	0.50	
	LTE Band 7	0.45	
	LTE Band 38	**0.62**	
	WLAN 2.4GHz	0.19	DTS

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.

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 & 2.2 & 2.3), the value is**: 0.89 W/kg (1g).**

Table 2.4: The sum of reported SAR values for WWAN antenna and WLAN antenna

/	Position	WWAN (W/kg)	WLAN (W/kg)	Sum (W/kg)
Highest reported SAR value for Head	Left Cheek	0.33	0.57	0.90
Highest reported SAR value for Hotspot	Bottom	0.89	/	0.89
Highest reported SAR value for Body-worn	Rear	0.62	0.19	0.81

Note: the test positions of above tables are for the worse case that has been evaluated.

Table 2.5: The sum of reported SAR values for WWAN antenna and Bluetooth antenna

/	Position	WWAN (W/kg)	Bluetooth (W/kg)	Sum (W/kg)
Highest reported SAR value for Head	Left Cheek	0.33	0.26	0.59
Highest reported SAR value for Hotspot	Bottom	0.89	0.13	**1.02**
Highest reported SAR value for Body-worn	Rear	0.62	0.13	0.75

Note: the test positions of above tables are for the worse case that has been evaluated.

According to the above tables, the highest sum of reported SAR values is **1.02 W/kg (1g)**.

The detail for simultaneous transmission consideration is described in chapter 12.

3. Client Information

3.1. Applicant Information

Company Name:	Doro AB
Address:	JÖRGEN KOCKSGATAN, 1B SE-211 20 MALMÖ, SWEDEN.
Contact:	Fredrik Bengtsson
Email:	fredrik.bengtsson@doro.com
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3.2. Manufacturer Information

Company Name:	Doro AB
Address:	JÖRGEN KOCKSGATAN, 1B SE-211 20 MALMÖ, SWEDEN.
Contact:	Fredrik Bengtsson
Email:	fredrik.bengtsson@doro.com
Telephone:	+46 46 280 5000

4. Equipment under Test (EUT) and Ancillary Equipment (AE)

4.1. About EUT

Description:	mobile phone
Model Name:	DSB-0400
Condition of EUT as received:	No obvious damage in appearance
Operating mode(s):	GSM850/1900, WCDMA Band 2/5, LTE Band 2/7/38, Bluetooth, WLAN 2.4G
Tested Tx Frequency:	824-849MHz (GSM 850)
	1850-1910MHz (GSM 1900)
	1850-1910MHz (WCDMA Band 2)
	824-849MHz (WCDMA Band 5)
	1850-1910MHz (LTE Band 2)
	2500-2570MHz (LTE Band 7)
	2570-2620MHz (LTE Band 38)
	2402-2480MHz (Bluetooth)
	2412-2462MHz (WLAN 2.4G)
GPRS / EGPRS Multislot Class:	12
GPRS capability Class:	B
Test device Production information:	Production unit
Device type:	Portable device
Antenna type:	Integrated antenna
Product Dimensions:	Long 158mm; Wide 72.99mm; Overall Diagonal 164mm
Remark: This device does not support DTM operation.	

4.2. Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version	Receipt Date
UT05aa	352477910012768	1011	NEMO01A-S10A_DSB0400_120_USERDEBUG_210915	2021-09-13
UT07aa	352477910012875	1011	NEMO01A-S10A_DSB0400_120_USERDEBUG_210915	2021-09-13
UT13aa	352477910010051	1011	NEMO01A-S10A_DSB0400_120_USERDEBUG_210915	2021-09-13

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

Note: It is performed to test SAR with the UT07 & UT13aa, and conducted power with the UT05aa.

4.3. Internal Identification of AE used during the test

AE ID*	Description	Model	Manufacturer
AE1	Battery	DBZ-3000A	GUANGDONG FENGHUA NEW ENERGY CO., LTD.
AE2	Headset	LYM300-03-001	LYAND ACOUSTIC TECHNOLOGY 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 **1.60 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: Experimental Techniques

KDB 447498 D01 General RF Exposure Guidance v06 RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices

KDB 648474 D04 Handset SAR v01r03 SAR Evaluation Considerations for Wireless Handsets.

KDB 941225 D01 SAR test for 3G devices v03r01 SAR Measurement Procedures for 3G Devices

KDB 941225 D05 SAR for LTE Devices v02r05 SAR Evaluation Considerations for LTE Devices

KDB 941225 D06 Hot Spot SAR v02r01 SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities

KDB 248227 D01 802.11 Wi-Fi SAR v02r02 SAR Guidance for IEEE 802.11 (Wi-Fi) Transmitters.

KDB 865664 D01SAR measurement 100 MHz to 6 GHz v01r04 SAR Measurement Requirements for 100 MHz to 6 GHz

KDB 865664 D02 RF Exposure Reporting v01r02 RF Exposure Compliance Reporting and Documentation Considerations

KDB 941225 D07 UMPC Mini Tablet v01r02 SAR Evaluation Procedures for UMPC Mini-Tablet Devices

TCB workshop April 2019; RF Exposure Procedures (Tissue Simulating Liquids)

6. Specific Absorption Rate (SAR)

6.1. Introduction

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

6.2. SAR Definition

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

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

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

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

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

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

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

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

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

7. Tissue Simulating Liquids

7.1. Targets for tissue simulating liquid

Table 7.1: Targets for tissue simulating liquid

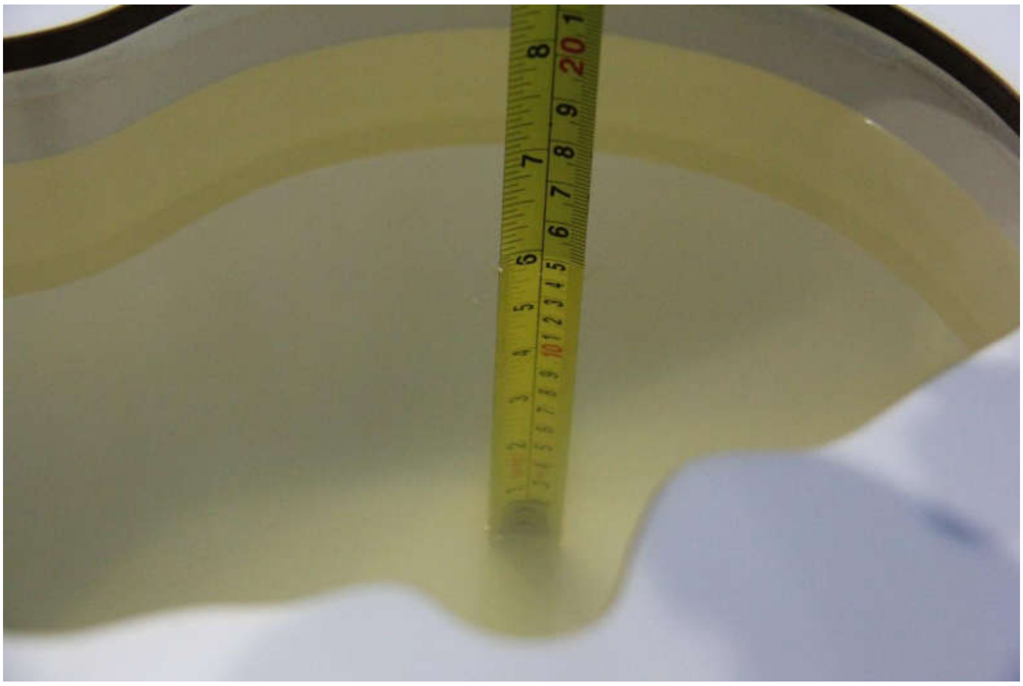
Frequency (MHz)	Liquid Type	Conductivity (σ)	± 5% Range	Permittivity (ε)	± 5% Range
750	Head	0.89	0.85～0.93	41.9	39.8～44.0
835	Head	0.90	0.86～0.95	41.5	39.4～43.6
1750	Head	1.37	1.30～1.44	40.1	38.1～42.1
1900	Head	1.40	1.33～1.47	40.0	38.0～42.0
2450	Head	1.80	1.71～1.89	39.2	37.2～41.2
2550	Head	1.91	1.81～2.01	39.1	37.1～41.0

7.2. Dielectric Performance

Table 7.2: Dielectric Performance of Tissue Simulating Liquid

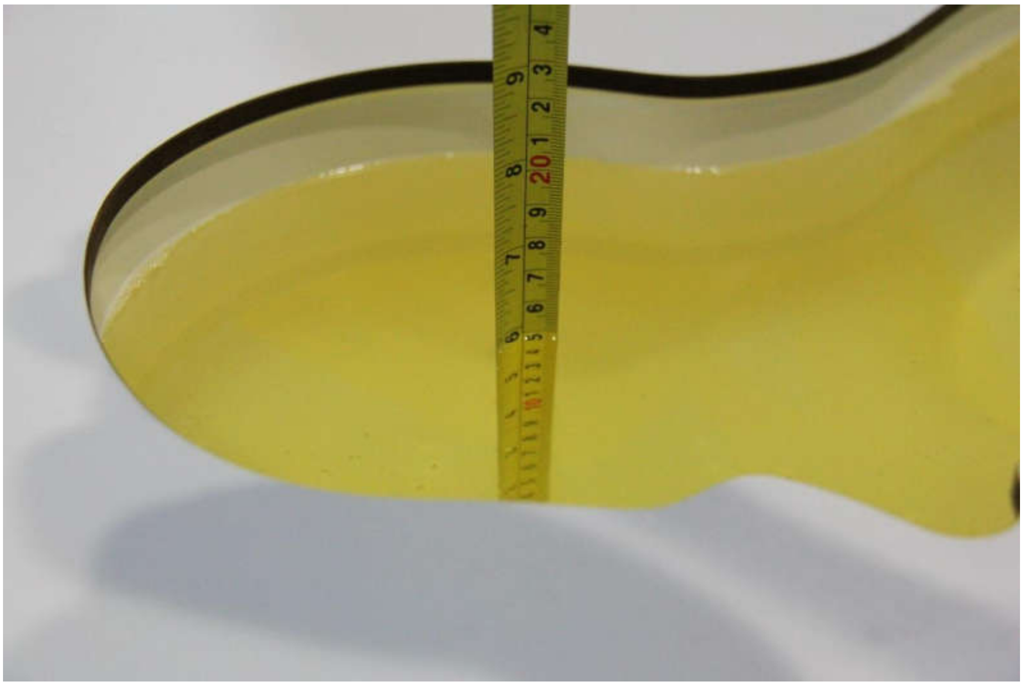
Measurement Date (yyyy-mm-dd)	Type	Frequency	Conductivity σ (S/m)	Drift (%)	Permittivity ε	Drift (%)
2021-09-18	Head	835 MHz	0.916	2.92	40.79	-2.65
2021-09-21	Head	1900 MHz	1.418	1.29	38.92	-2.70
2021-09-23	Head	2450 MHz	1.841	2.28	38.85	-0.89
2021-09-26	Head	2550 MHz	1.944	1.78	38.47	-1.61

Note: The liquid temperature is 22.0°C.



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

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



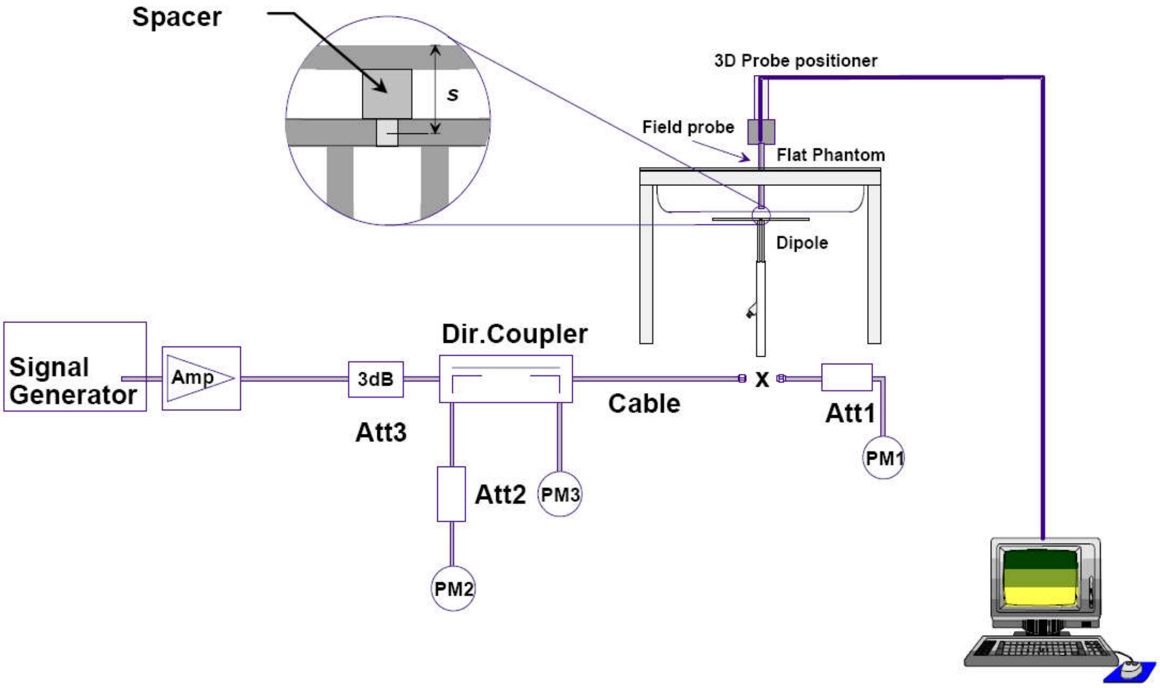
Picture 7-3: Liquid depth in the Head Phantom(2450MHz)

Picture 7-4: Liquid depth in the Head Phantom(2550MHz)

8. System verification

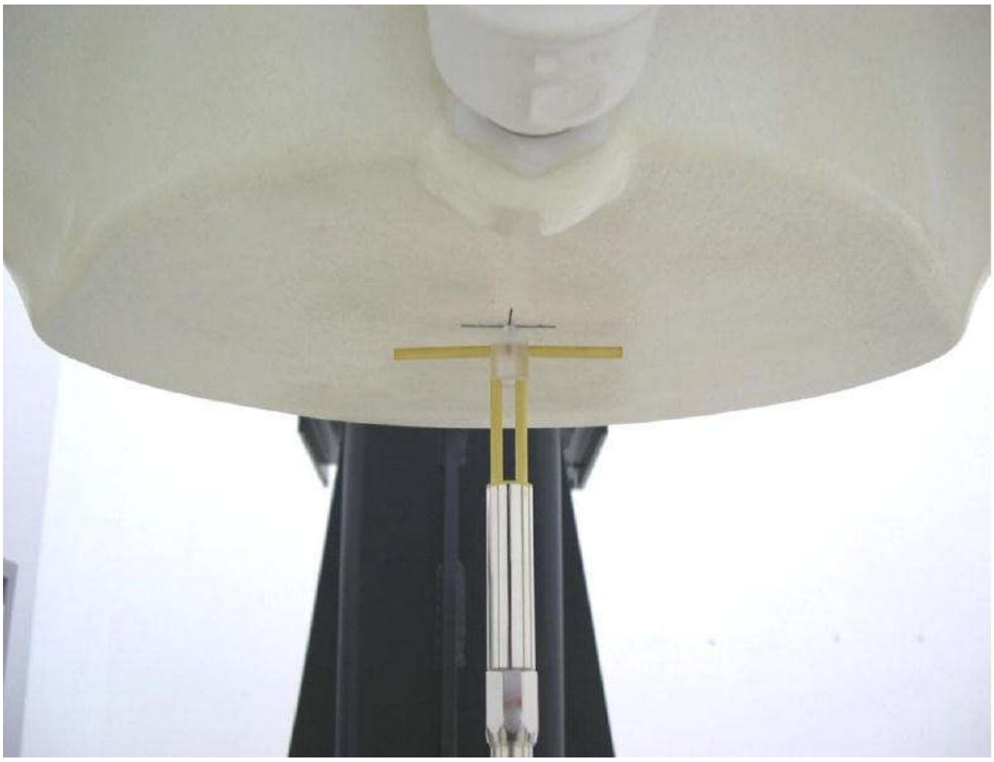
8.1. System Setup

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

For the dipole below 3GHz, the output power on dipole port must be calibrated to 24 dBm (250mW) before dipole is connected.



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.

Table 8.1: System Verification of Head

Measurement Date	Frequency (MHz)	Target value (W/kg)		Measured value (W/kg)				Deviation (%)	
				/		Normalize to 1W			
		10 g	1 g	10 g	1 g	10 g	1 g	10 g	1 g
2021-09-18	835	6.29	9.62	1.62	2.51	6.48	10.04	3.02	4.37
2021-09-21	1900	21.00	40.50	5.33	10.4	21.32	41.60	1.52	2.72
2021-09-23	2450	24.10	52.00	6.17	13.6	24.68	54.44	2.41	4.69
2021-09-26	2550	25.20	55.90	6.44	14.5	25.76	57.96	2.22	3.69

9. Measurement Procedures

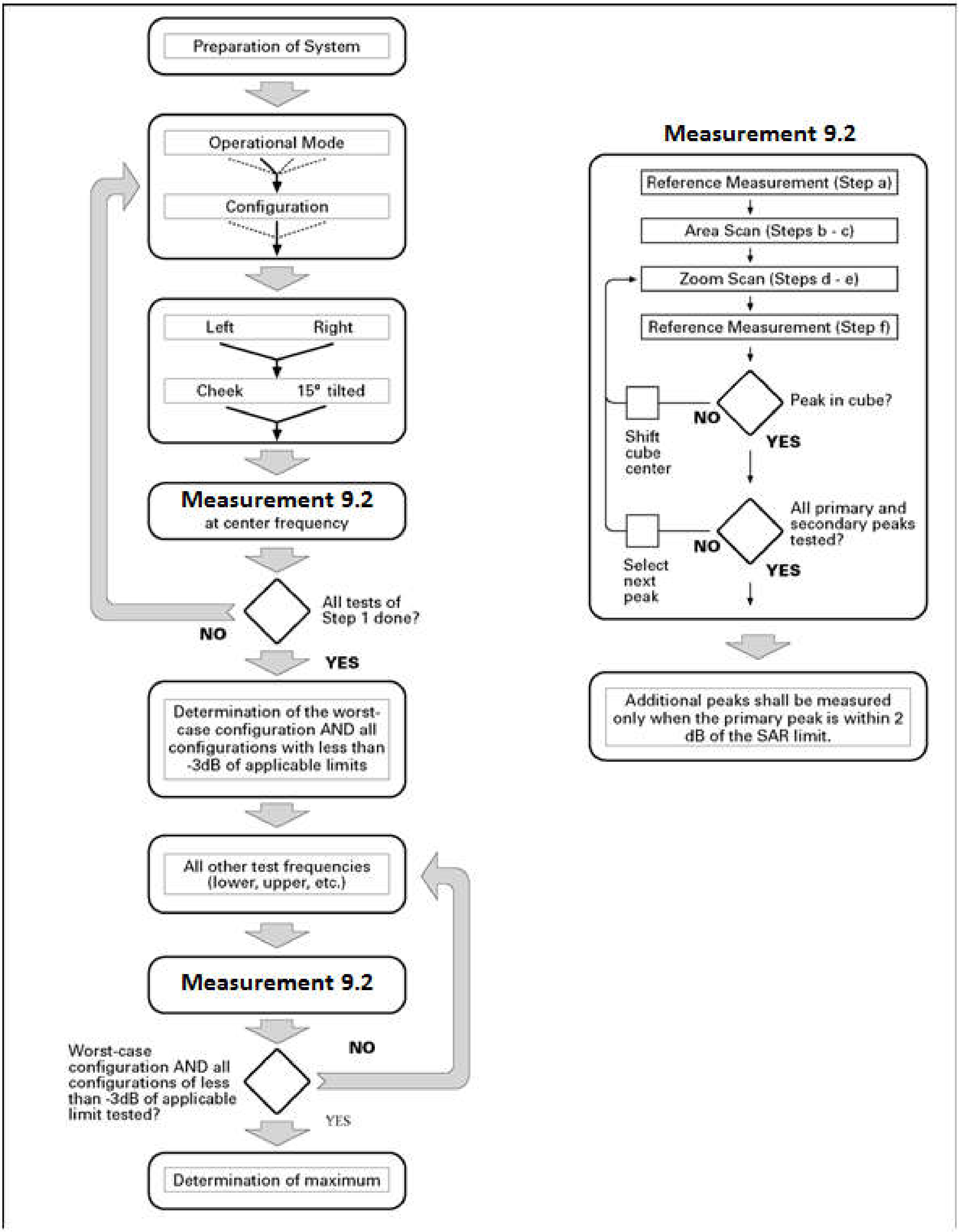
9.1. Tests to be performed

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 center 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, 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 1528-2013. 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.

<table>
<tr><th colspan="3"></th><th>$\leq$ 3 GHz</th><th>> 3 GHz</th></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 ± 1 mm</td><td>½·δ·ln(2) ± 0.5 mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>$\leq$ 2 GHz: $\leq$ 15 mm
2 – 3 GHz: $\leq$ 12 mm</td><td>3 – 4 GHz: $\leq$ 12 mm
4 – 6 GHz: $\leq$ 10 mm</td></tr>
<tr><td colspan="2">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.</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>$\leq$ 2 GHz: $\leq$ 8 mm
2 – 3 GHz: $\leq$ 5 mm*</td><td>3 – 4 GHz: $\leq$ 5 mm*
4 – 6 GHz: $\leq$ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>$\leq$ 5 mm</td><td>3 – 4 GHz: $\leq$ 4 mm
4 – 5 GHz: $\leq$ 3 mm
5 – 6 GHz: $\leq$ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>$\leq$ 4 mm</td><td>3 – 4 GHz: $\leq$ 3 mm
4 – 5 GHz: $\leq$ 2.5 mm
5 – 6 GHz: $\leq$ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>$\geq$ 30 mm</td><td>3 – 4 GHz: $\geq$ 28 mm
4 – 5 GHz: $\geq$ 25 mm
5 – 6 GHz: $\geq$ 22 mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.
* When zoom scan is required and the <u>reported</u> 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.</td></tr>
</table>

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 & $DPDCH_n$), 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	β_c	β_d	β_d （SF）	β_c / β_d	β_{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	β_c	β_d	β_d （SF）	β_c / β_d	β_{hs}	β_{ec}	β_{ed}	β_{ed} （SF）	β_{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	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	12/15	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1} :47/15 β_{ed2} :47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	4/15	56/75	4	1	3.0	2.0	17	71
5	15/15	15/15	64	15/15	24/15	30/15	134/15	4	1	1.0	0.0	21	81

9.4. LTE Measurement Procedures for SAR

SAR tests for LTE are performed with a base station simulator, Anristu MT8820C. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. All powers were measured with the Anristu MT8820C.It is performed for conducted power and SAR based on the KDB941225 D05.

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

1) QPSK with 1 RB allocation
   Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.
2) QPSK with 50% RB allocation
   The procedures required for 1 RB allocation in 1) are applied to measure the SAR for QPSK with 50% RB allocation.
3) QPSK with 100% RB allocation
   For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation in 1) and 2) are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.

11.5. LTE (TDD) Considerations

According to KDB 941225 D05 SAR for LTE Devices, for Time-Division Duplex (TDD) systems, SAR must be tested using a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by the defined 3GPP LTE TDD configurations.
SAR was tested with the highest transmission duty factor (63.33%) using Uplink-downlink configuration 0 and Special subframe configuration 7.

LTE TDD Band 38 support 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations and Table 4.2-1 for Special subframe configurations.

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

Configuration of special subframe (lengths of DwPTS/GP/UpPTS)

Uplink-Downlink Configuration	Downlink-to-Uplink Switch-point Periodicity	Subframe Number										Calculated Duty Cycle (%)
		0	1	2	3	4	5	6	7	8	9	
0	5 ms	D	S	U	U	U	D	S	U	U	U	63.33
1	5 ms	D	S	U	U	D	D	S	U	U	D	43.33
2	5 ms	D	S	U	D	D	D	S	U	D	D	23.33
3	10 ms	D	S	U	U	U	D	D	D	D	D	31.67
4	10 ms	D	S	U	U	D	D	D	D	D	D	21.67
5	10 ms	D	S	U	D	D	D	D	D	D	D	11.67
6	5 ms	D	S	U	U	U	D	S	U	U	D	53.33

Calculated Duty Cycle

Calculated Duty Cycle = Extended cyclic prefix in uplink x (Ts) x # of S + # of U
Example for Calculated Duty Cycle for Uplink-Downlink Configuration 0:
Calculated Duty Cycle = 5120 x [1/(15000 x 2048)] x 2 + 6 ms = 63.33%
Where
Ts = 1/(15000 x 2048) seconds

9.6. Bluetooth & WLAN 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.

9.7. Power Drift

To control the output power stability during the SAR test, DASY5 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%.

9.8. Proximity Sensor Considerations

This device uses a proximity sensor that share the same metallic electrode as the transmitting antenna to facilitate triggering in typical user interactivity with the device. Due to the operating configurations and exposure conditions required by the device, the proximity sensor is used to indicate when the tablet is held close to a user's body exposure condition. It utilizes the proximity sensor to reduce the output power in specific wireless and operating modes to ensure SAR compliance for the following scenarios: To reduce the output power of main antennas during body operating configurations. . It is also set an output power leveled to the lowest one to make sure that in any case of SAR sensor hardware failure the SAR requirements can still be satisfied.

Sensor triggering distance summary data is included in Appendix K.

10. Conducted Output Power

For main ANT, there are two sets of tune-up power, Normal power, Low power for GSM1900/WCDMA B2/LTE B2/LTE B7/LTE B38 under status of sensor on.

10.1. 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 12.1: The conducted power measurement results for GSM

GSM850	Tune up	Conducted Power (dBm)		
		Ch.251 (848.8MHz)	Ch.190 (836.6MHz)	Ch.128 (824.2MHz)
	34.0	33.04	32.94	32.86
Normal Power				
GSM1900	Tune up	Conducted Power (dBm)		
		Ch.810 (1909.8MHz)	Ch.661 (1880.0MHz)	Ch.512 (1850.2MHz)
	31.0	30.33	30.37	30.33
Sensor on				
GSM1900	Tune up	Conducted Power (dBm)		
		Ch.810 (1909.8MHz)	Ch.661 (1880.0MHz)	Ch.512 (1850.2MHz)
	23.5	22.98	23.10	23.09

Table 10.1: The conducted power measurement results for GPRS and EGPRS

GPRS850/ EGPRS850	Tune up	Measured Power (dBm)			calculation	Average Power (dBm)		
		Ch.251	Ch.190	Ch.128		Ch.251	Ch.190	Ch.128
1Tx-slots	34.0	33.05	32.91	32.84	-9.03dB	24.02	23.88	23.81
2Tx-slots	32.0	**30.96**	**30.78**	**30.72**	-6.02dB	24.94	24.76	24.70
3Tx-slots	30.0	29.02	28.86	28.79	-4.26dB	24.76	24.60	24.53
4Tx-slots	28.0	27.06	26.92	26.81	-3.01dB	24.05	23.91	23.80
EGPRS 850 (8PSK)	Tune up	Measured Power (dBm)			calculation	Measured Power (dBm)		
		Ch.251	Ch.190	Ch.128		Ch.251	Ch.190	Ch.128
1Tx-slots	27.0	26.08	25.76	25.81	-9.03dB	17.05	16.73	16.78
2Tx-slots	27.0	25.82	25.45	25.60	-6.02dB	19.80	19.43	19.58
3Tx-slots	25.0	24.46	24.16	24.26	-4.26dB	20.20	19.90	20.00
4Tx-slots	23.0	22.30	22.08	22.16	-3.01dB	19.29	19.07	19.15

Normal Power							
GPRS1900/ EGPRS1900	Tune up	Measured Power (dBm)			calculation	Average Power (dBm)		
		Ch.810	Ch.661	Ch.512		Ch.810	Ch.661	Ch.512
1Tx-slots	**31.0**	30.35	30.35	30.31	-9.03dB	21.32	21.32	21.28
2Tx-slots	**29.0**	28.11	28.19	28.16	-6.02dB	22.09	22.17	22.14
3Tx-slots	**27.5**	**26.54**	**26.62**	**26.60**	-4.26dB	22.28	22.36	22.34
4Tx-slots	**25.5**	24.45	24.57	24.55	-3.01dB	21.44	21.56	21.54
GPRS1900/ EGPRS1900	Tune up	Measured Power (dBm)			calculation	Measured Power (dBm)		
		Ch.810	Ch.661	Ch.512		Ch.810	Ch.661	Ch.512
1Tx-slots	**26.0**	25.18	25.45	25.26	-9.03dB	16.15	16.42	16.23
2Tx-slots	**26.0**	25.01	25.19	25.06	-6.02dB	18.99	19.17	19.04
3Tx-slots	**24.5**	23.70	23.95	23.85	-4.26dB	19.44	19.69	19.59
4Tx-slots	**22.5**	21.11	21.64	21.57	-3.01dB	18.10	18.63	18.56
Sensor on								
GPRS1900/ EGPRS1900	Tune up	Measured Power (dBm)			calculation	Average Power (dBm)		
		Ch.810	Ch.661	Ch.512		Ch.810	Ch.661	Ch.512
1Tx-slots	**23.5**	22.93	23.08	23.13	-9.03dB	13.90	14.05	14.10
2Tx-slots	**23.5**	22.91	23.04	23.10	-6.02dB	16.89	17.02	17.08
3Tx-slots	**23.5**	22.86	22.97	23.06	-4.26dB	18.60	18.71	18.80
4Tx-slots	**23.5**	**22.82**	**22.95**	**23.01**	-3.01dB	19.81	19.94	20.00
GPRS1900/ EGPRS1900	Tune up	Measured Power (dBm)			calculation	Measured Power (dBm)		
		Ch.810	Ch.661	Ch.512		Ch.810	Ch.661	Ch.512
1Tx-slots	**14.0**	12.51	13.06	13.39	-9.03dB	3.48	4.03	4.36
2Tx-slots	**14.0**	12.47	12.96	13.38	-6.02dB	6.45	6.94	7.36
3Tx-slots	**14.0**	12.40	12.89	13.33	-4.26dB	8.14	8.63	9.07
4Tx-slots	**14.0**	12.32	12.85	13.24	-3.01dB	9.31	9.84	10.23

Note:

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 2Txslots for GSM850 and 3Txslots for GSM1900; 4Txslots for GSM1900 Sensor-on mode.

10.2. WCDMA Measurement result

Table 10.2: T The conducted power measurement results WCDMA

Normal Power					
Item	band	WCDMA Band 2			
	ARFCN	Tune up	Ch. 9538 (1907.6MHz)	Ch. 9400 (1880MHz)	Ch. 9262 (1852.4MHz)
WCDMA	\	25.0	24.7	24.4	24.4
HSUPA	1	22.5	21.3	21.3	21.5
	2	22.5	21.9	21.8	22.1
	3	22.5	21.6	21.6	21.8
	4	22.5	22.1	22.1	22.4
	5	24.5	24.0	23.9	24.2
HSDPA	1	24.5	24.0	24.0	24.3
	2	24.5	23.7	23.6	23.9
	3	24.5	23.5	23.5	23.7
	4	24.5	23.5	23.5	23.7
Sensor on					
Item	band	WCDMA Band 2			
	ARFCN	Tune up	Ch. 9538 (1907.6MHz)	Ch. 9400 (1880MHz)	Ch. 9262 (1852.4MHz)
WCDMA	\	21.0	20.9	20.7	20.5
HSUPA	1	18.5	17.4	17.5	17.6
	2	18.5	17.9	18.1	18.2
	3	18.5	17.7	17.9	17.9
	4	18.5	18.1	18.3	18.5
	5	20.5	20.1	20.1	20.3
HSDPA	1	20.5	20.2	20.1	20.3
	2	20.5	19.8	19.8	20.0
	3	20.5	19.7	19.6	19.8
	4	20.5	19.7	19.6	19.8

Item	band	WCDMA Band 5			
	ARFCN	Tune up	Ch. 4233 (846.6MHz)	Ch. 4182 (836.4MHz)	Ch. 4132 (826.4MHz)
WCDMA	\	24.5	24.3	24.2	24.2
HSUPA	1	22.5	21.5	21.5	21.2
	2	22.5	21.6	21.8	21.4
	3	22.5	21.4	21.4	21.2
	4	22.5	21.5	21.5	21.2
	5	24.0	23.2	23.1	22.9
HSDPA	1	24.0	23.5	23.4	23.3
	2	24.0	23.1	23.1	22.9
	3	24.0	22.8	22.7	22.5
	4	24.0	22.7	22.7	22.5

10.3. LTE Measurement result

Table 10.3: The conducted Power for LTE

Normal Power								
LTE Band 2			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
1.4 MHz	1RB_5	1909.3MHz	22.60	21.70	/	24.0	23.0	/
		1880MHz	23.00	21.10	/	24.0	23.0	/
		1850.7MHz	22.70	21.40	/	24.0	23.0	/
	1RB_3	1909.3MHz	22.70	21.70	/	24.0	23.0	/
		1880MHz	22.90	21.10	/	24.0	23.0	/
		1850.7MHz	22.80	21.40	/	24.0	23.0	/
	1RB_0	1909.3MHz	22.40	21.70	/	24.0	23.0	/
		1880MHz	23.00	21.10	/	24.0	23.0	/
		1850.7MHz	22.70	21.30	/	24.0	23.0	/
	3RB_3	1909.3MHz	22.70	21.50	/	24.0	23.0	/
		1880MHz	23.10	21.20	/	24.0	23.0	/
		1850.7MHz	22.90	21.20	/	24.0	23.0	/
	3RB_1	1909.3MHz	22.70	21.50	/	24.0	23.0	/
		1880MHz	23.00	21.20	/	24.0	23.0	/
		1850.7MHz	22.90	21.20	/	24.0	23.0	/
	3RB_0	1909.3MHz	22.60	21.50	/	24.0	23.0	/
		1880MHz	23.10	21.20	/	24.0	23.0	/
		1850.7MHz	22.90	21.20	/	24.0	23.0	/
	6RB_0	1909.3MHz	22.20	20.20	/	23.0	22.0	/
		1880MHz	22.00	20.11	/	23.0	22.0	/
		1850.7MHz	21.90	20.08	/	23.0	22.0	/

Normal Power									
LTE Band 2			Actual output Power (dBm)			Tune up			
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation			
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM	
3 MHz	1RB_14	1908.5MHz	22.63	21.68	/	24.0	23.0	/	
		1880MHz	22.98	21.22	/	24.0	23.0	/	
		1851.5MHz	22.72	21.26	/	24.0	23.0	/	
	1RB_7	1908.5MHz	22.62	21.72	/	24.0	23.0	/	
		1880MHz	23.02	21.13	/	24.0	23.0	/	
		1851.5MHz	22.69	21.30	/	24.0	23.0	/	
	1RB_0	1908.5MHz	22.18	21.75	/	24.0	23.0	/	
		1880MHz	22.93	21.12	/	24.0	23.0	/	
		1851.5MHz	22.70	21.23	/	24.0	23.0	/	
	8RB_7	1908.5MHz	22.28	20.36	/	23.0	22.0	/	
		1880MHz	22.08	20.14	/	23.0	22.0	/	
		1851.5MHz	21.82	20.06	/	23.0	22.0	/	
	8RB_4	1908.5MHz	22.22	20.40	/	23.0	22.0	/	
		1880MHz	22.09	20.14	/	23.0	22.0	/	
		1851.5MHz	21.90	20.08	/	23.0	22.0	/	
	8RB_0	1908.5MHz	22.24	20.44	/	23.0	22.0	/	
		1880MHz	21.99	20.12	/	23.0	22.0	/	
		1851.5MHz	21.91	20.10	/	23.0	22.0	/	
	15RB_0	1908.5MHz	22.14	20.33	/	23.0	22.0	/	
		1880MHz	22.04	20.22	/	23.0	22.0	/	
		1851.5MHz	21.88	20.14	/	23.0	22.0	/	

Normal Power								
LTE Band 2			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
5 MHz	1RB_24	1907.5MHz	22.79	21.79	/	**24.0**	**23.0**	/
		1880MHz	23.05	21.63	/	**24.0**	**23.0**	/
		1852.5MHz	22.78	21.42	/	**24.0**	**23.0**	/
	1RB_12	1907.5MHz	22.59	21.75	/	**24.0**	**23.0**	/
		1880MHz	22.95	21.59	/	**24.0**	**23.0**	/
		1852.5MHz	22.81	21.39	/	**24.0**	**23.0**	/
	1RB_0	1907.5MHz	22.89	21.76	/	**24.0**	**23.0**	/
		1880MHz	22.72	21.61	/	**24.0**	**23.0**	/
		1852.5MHz	22.84	21.49	/	**24.0**	**23.0**	/
	12RB_13	1907.5MHz	22.14	20.34	/	**23.0**	**22.0**	/
		1880MHz	21.92	20.22	/	**23.0**	**22.0**	/
		1852.5MHz	21.78	20.30	/	**23.0**	**22.0**	/
	12RB_6	1907.5MHz	22.10	20.34	/	**23.0**	**22.0**	/
		1880MHz	21.99	20.14	/	**23.0**	**22.0**	/
		1852.5MHz	21.77	20.00	/	**23.0**	**22.0**	/
	12RB_0	1907.5MHz	22.22	20.35	/	**23.0**	**22.0**	/
		1880MHz	22.02	20.16	/	**23.0**	**22.0**	/
		1852.5MHz	21.85	20.13	/	**23.0**	**22.0**	/
	25RB_0	1907.5MHz	22.11	20.24	/	**23.0**	**22.0**	/
		1880MHz	22.00	20.04	/	**23.0**	**22.0**	/
		1852.5MHz	21.84	20.08	/	**23.0**	**22.0**	/

Normal Power								
LTE Band 2			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
10 MHz	1RB_49	1905MHz	22.76	21.80	/	**24.0**	**23.0**	/
		1880MHz	22.98	21.57	/	**24.0**	**23.0**	/
		1855MHz	22.81	21.43	/	**24.0**	**23.0**	/
	1RB_24	1905MHz	22.33	21.72	/	**24.0**	**23.0**	/
		1880MHz	22.89	21.51	/	**24.0**	**23.0**	/
		1855MHz	22.73	21.51	/	**24.0**	**23.0**	/
	1RB_0	1905MHz	22.49	21.74	/	**24.0**	**23.0**	/
		1880MHz	22.71	21.53	/	**24.0**	**23.0**	/
		1855MHz	22.73	21.54	/	**24.0**	**23.0**	/
	25RB_25	1905MHz	22.10	20.24	/	**23.0**	**22.0**	/
		1880MHz	22.04	20.08	/	**23.0**	**22.0**	/
		1855MHz	21.84	20.11	/	**23.0**	**22.0**	/
	25RB_12	1905MHz	22.18	20.21	/	**23.0**	**22.0**	/
		1880MHz	21.99	20.04	/	**23.0**	**22.0**	/
		1855MHz	21.88	20.13	/	**23.0**	**22.0**	/
	25RB_0	1905MHz	22.12	20.23	/	**23.0**	**22.0**	/
		1880MHz	21.99	20.03	/	**23.0**	**22.0**	/
		1855MHz	21.91	20.15	/	**23.0**	**22.0**	/
	50RB_0	1905MHz	22.14	20.24	/	**23.0**	**22.0**	/
		1880MHz	22.01	20.09	/	**23.0**	**22.0**	/
		1855MHz	21.88	20.16	/	**23.0**	**22.0**	/

Normal Power								
LTE Band 2			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
15 MHz	1RB_74	1902.5MHz	22.49	21.70	/	**24.0**	**23.0**	/
		1880MHz	22.91	21.37	/	**24.0**	**23.0**	/
		1857.5MHz	22.89	21.25	/	**24.0**	**23.0**	/
	1RB_37	1902.5MHz	22.63	21.70	/	**24.0**	**23.0**	/
		1880MHz	22.86	21.32	/	**24.0**	**23.0**	/
		1857.5MHz	22.89	21.22	/	**24.0**	**23.0**	/
	1RB_0	1902.5MHz	22.97	21.67	/	**24.0**	**23.0**	/
		1880MHz	22.84	21.46	/	**24.0**	**23.0**	/
		1857.5MHz	22.82	21.22	/	**24.0**	**23.0**	/
	36RB_38	1902.5MHz	22.20	20.39	/	**23.0**	**22.0**	/
		1880MHz	22.02	20.07	/	**23.0**	**22.0**	/
		1857.5MHz	21.98	20.16	/	**23.0**	**22.0**	/
	36RB_19	1902.5MHz	22.22	20.32	/	**23.0**	**22.0**	/
		1880MHz	21.96	20.04	/	**23.0**	**22.0**	/
		1857.5MHz	21.93	20.24	/	**23.0**	**22.0**	/
	36RB_0	1902.5MHz	22.21	20.34	/	**23.0**	**22.0**	/
		1880MHz	21.97	20.00	/	**23.0**	**22.0**	/
		1857.5MHz	21.95	20.12	/	**23.0**	**22.0**	/
	75RB_0	1902.5MHz	22.14	20.24	/	**23.0**	**22.0**	/
		1880MHz	22.03	20.12	/	**23.0**	**22.0**	/
		1857.5MHz	21.84	20.10	/	**23.0**	**22.0**	/

Normal Power								
LTE Band 2			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20 MHz	1RB_99	1900MHz	22.94	21.66	/	**24.0**	**23.0**	/
		1880MHz	**23.19**	21.30	/	**24.0**	**23.0**	/
		1860MHz	22.81	21.59	/	**24.0**	**23.0**	/
	1RB_50	1900MHz	23.00	21.47	/	**24.0**	**23.0**	/
		1880MHz	23.07	21.07	/	**24.0**	**23.0**	/
		1860MHz	22.70	21.46	/	**24.0**	**23.0**	/
	1RB_0	1900MHz	22.97	21.48	/	**24.0**	**23.0**	/
		1880MHz	23.03	21.06	/	**24.0**	**23.0**	/
		1860MHz	22.84	21.55	/	**24.0**	**23.0**	/
	50RB_50	1900MHz	22.13	20.26	/	**23.0**	**22.0**	/
		1880MHz	22.06	20.16	/	**23.0**	**22.0**	/
		1860MHz	21.98	20.01	/	**23.0**	**22.0**	/
	50RB_25	1900MHz	22.14	20.23	/	**23.0**	**22.0**	/
		1880MHz	22.01	20.20	/	**23.0**	**22.0**	/
		1860MHz	21.86	20.04	/	**23.0**	**22.0**	/
	50RB_0	1900MHz	**22.16**	20.20	/	**23.0**	**22.0**	/
		1880MHz	21.95	20.14	/	**23.0**	**22.0**	/
		1860MHz	21.98	20.03	/	**23.0**	**22.0**	/
	100RB_0	1900MHz	22.10	20.21	/	**23.0**	**22.0**	/
		1880MHz	22.10	20.18	/	**23.0**	**22.0**	/
		1860MHz	21.85	20.03	/	**23.0**	**22.0**	/

Sensor on								
LTE Band 2			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
1.4 MHz	1RB_5	1909.3MHz	19.61	18.46	/	21.0	19.5	/
		1880MHz	19.53	18.26	/	21.0	19.5	/
		1850.7MHz	19.18	18.03	/	21.0	19.5	/
	1RB_3	1909.3MHz	19.59	18.64	/	21.0	19.5	/
		1880MHz	19.48	18.47	/	21.0	19.5	/
		1850.7MHz	19.23	18.19	/	21.0	19.5	/
	1RB_0	1909.3MHz	19.63	18.42	/	21.0	19.5	/
		1880MHz	19.53	18.28	/	21.0	19.5	/
		1850.7MHz	19.15	18.14	/	21.0	19.5	/
	3RB_3	1909.3MHz	19.70	18.26	/	21.0	19.5	/
		1880MHz	19.56	18.15	/	21.0	19.5	/
		1850.7MHz	19.34	18.19	/	21.0	19.5	/
	3RB_1	1909.3MHz	19.73	18.20	/	21.0	19.5	/
		1880MHz	19.62	18.21	/	21.0	19.5	/
		1850.7MHz	19.33	18.17	/	21.0	19.5	/
	3RB_0	1909.3MHz	19.66	18.13	/	21.0	19.5	/
		1880MHz	19.56	18.15	/	21.0	19.5	/
		1850.7MHz	19.23	18.17	/	21.0	19.5	/
	6RB_0	1909.3MHz	19.01	17.46	/	21.0	19.5	/
		1880MHz	19.08	17.20	/	21.0	19.5	/
		1850.7MHz	18.80	17.02	/	21.0	19.5	/

Sensor on								
LTE Band 2			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
3 MHz	1RB_14	1908.5MHz	19.63	18.45	/	21.0	19.5	/
		1880MHz	19.47	18.36	/	21.0	19.5	/
		1851.5MHz	19.23	18.44	/	21.0	19.5	/
	1RB_7	1908.5MHz	19.55	18.55	/	21.0	19.5	/
		1880MHz	19.51	18.46	/	21.0	19.5	/
		1851.5MHz	19.17	18.36	/	21.0	19.5	/
	1RB_0	1908.5MHz	19.54	18.20	/	21.0	19.5	/
		1880MHz	19.56	18.35	/	21.0	19.5	/
		1851.5MHz	19.19	18.13	/	21.0	19.5	/
	8RB_7	1908.5MHz	19.02	17.43	/	21.0	19.5	/
		1880MHz	19.10	17.19	/	21.0	19.5	/
		1851.5MHz	19.11	17.30	/	21.0	19.5	/
	8RB_4	1908.5MHz	19.02	17.43	/	21.0	19.5	/
		1880MHz	19.14	17.24	/	21.0	19.5	/
		1851.5MHz	19.04	17.25	/	21.0	19.5	/
	8RB_0	1908.5MHz	18.89	17.30	/	21.0	19.5	/
		1880MHz	19.10	17.21	/	21.0	19.5	/
		1851.5MHz	18.85	17.08	/	21.0	19.5	/
	15RB_0	1908.5MHz	18.95	17.34	/	21.0	19.5	/
		1880MHz	19.10	17.16	/	21.0	19.5	/
		1851.5MHz	18.99	17.19	/	21.0	19.5	/

Sensor on								
LTE Band 2			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
5 MHz	1RB_24	1907.5MHz	19.60	18.04	/	**21.0**	**19.5**	/
		1880MHz	19.51	17.99	/	**21.0**	**19.5**	/
		1852.5MHz	19.29	18.35	/	**21.0**	**19.5**	/
	1RB_12	1907.5MHz	19.67	18.25	/	**21.0**	**19.5**	/
		1880MHz	19.47	18.46	/	**21.0**	**19.5**	/
		1852.5MHz	19.26	18.55	/	**21.0**	**19.5**	/
	1RB_0	1907.5MHz	19.56	17.84	/	**21.0**	**19.5**	/
		1880MHz	19.49	18.02	/	**21.0**	**19.5**	/
		1852.5MHz	19.31	17.59	/	**21.0**	**19.5**	/
	12RB_13	1907.5MHz	18.87	17.24	/	**21.0**	**19.5**	/
		1880MHz	19.02	17.07	/	**21.0**	**19.5**	/
		1852.5MHz	19.32	17.46	/	**21.0**	**19.5**	/
	12RB_6	1907.5MHz	18.89	17.26	/	**21.0**	**19.5**	/
		1880MHz	19.16	17.20	/	**21.0**	**19.5**	/
		1852.5MHz	19.18	17.41	/	**21.0**	**19.5**	/
	12RB_0	1907.5MHz	18.70	17.11	/	**21.0**	**19.5**	/
		1880MHz	19.01	17.07	/	**21.0**	**19.5**	/
		1852.5MHz	18.82	17.05	/	**21.0**	**19.5**	/
	25RB_0	1907.5MHz	18.78	17.18	/	**21.0**	**19.5**	/
		1880MHz	19.02	17.08	/	**21.0**	**19.5**	/
		1852.5MHz	19.06	17.28	/	**21.0**	**19.5**	/

Sensor on								
LTE Band 2			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
10 MHz	1RB_49	1905MHz	19.53	18.73	/	**21.0**	**19.5**	/
		1880MHz	19.48	18.96	/	**21.0**	**19.5**	/
		1855MHz	19.18	19.14	/	**21.0**	**19.5**	/
	1RB_24	1905MHz	19.52	18.44	/	**21.0**	**19.5**	/
		1880MHz	19.48	18.43	/	**21.0**	**19.5**	/
		1855MHz	19.22	18.69	/	**21.0**	**19.5**	/
	1RB_0	1905MHz	19.47	18.98	/	**21.0**	**19.5**	/
		1880MHz	19.36	18.32	/	**21.0**	**19.5**	/
		1855MHz	19.20	18.06	/	**21.0**	**19.5**	/
	25RB_25	1905MHz	19.03	17.50	/	**21.0**	**19.5**	/
		1880MHz	19.41	17.50	/	**21.0**	**19.5**	/
		1855MHz	19.69	17.91	/	**21.0**	**19.5**	/
	25RB_12	1905MHz	19.01	17.45	/	**21.0**	**19.5**	/
		1880MHz	19.20	17.24	/	**21.0**	**19.5**	/
		1855MHz	19.31	17.55	/	**21.0**	**19.5**	/
	25RB_0	1905MHz	19.24	17.75	/	**21.0**	**19.5**	/
		1880MHz	19.10	17.19	/	**21.0**	**19.5**	/
		1855MHz	18.88	17.13	/	**21.0**	**19.5**	/
	50RB_0	1905MHz	19.11	17.62	/	**21.0**	**19.5**	/
		1880MHz	19.25	17.35	/	**21.0**	**19.5**	/
		1855MHz	19.31	17.55	/	**21.0**	**19.5**	/

Sensor on								
LTE Band 2			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
15 MHz	1RB_74	1902.5MHz	19.56	18.74	/	**21.0**	**19.5**	/
		1880MHz	19.43	18.95	/	**21.0**	**19.5**	/
		1857.5MHz	19.15	18.17	/	**21.0**	**19.5**	/
	1RB_37	1902.5MHz	19.46	18.22	/	**21.0**	**19.5**	/
		1880MHz	19.45	18.39	/	**21.0**	**19.5**	/
		1857.5MHz	19.16	18.93	/	**21.0**	**19.5**	/
	1RB_0	1902.5MHz	19.39	19.54	/	**21.0**	**19.5**	/
		1880MHz	19.39	18.64	/	**21.0**	**19.5**	/
		1857.5MHz	19.21	18.19	/	**21.0**	**19.5**	/
	36RB_38	1902.5MHz	18.49	17.36	/	**21.0**	**19.5**	/
		1880MHz	19.40	17.40	/	**21.0**	**19.5**	/
		1857.5MHz	19.36	17.56	/	**21.0**	**19.5**	/
	36RB_19	1902.5MHz	18.94	17.07	/	**21.0**	**19.5**	/
		1880MHz	19.17	17.18	/	**21.0**	**19.5**	/
		1857.5MHz	19.42	17.65	/	**21.0**	**19.5**	/
	36RB_0	1902.5MHz	19.75	17.89	/	**21.0**	**19.5**	/
		1880MHz	19.31	17.31	/	**21.0**	**19.5**	/
		1857.5MHz	19.11	17.34	/	**21.0**	**19.5**	/
	75RB_0	1902.5MHz	19.13	17.28	/	**21.0**	**19.5**	/
		1880MHz	19.34	17.37	/	**21.0**	**19.5**	/
		1857.5MHz	19.24	17.45	/	**21.0**	**19.5**	/

Sensor on								
LTE Band 2			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20 MHz	1RB_99	1900MHz	19.76	18.39	/	**21.0**	**19.5**	/
		1880MHz	**19.78**	18.36	/	**21.0**	**19.5**	/
		1860MHz	19.40	18.44	/	**21.0**	**19.5**	/
	1RB_50	1900MHz	19.58	18.68	/	**21.0**	**19.5**	/
		1880MHz	19.60	18.39	/	**21.0**	**19.5**	/
		1860MHz	19.31	19.03	/	**21.0**	**19.5**	/
	1RB_0	1900MHz	19.55	19.06	/	**21.0**	**19.5**	/
		1880MHz	19.56	19.14	/	**21.0**	**19.5**	/
		1860MHz	19.31	18.11	/	**21.0**	**19.5**	/
	50RB_50	1900MHz	18.96	17.62	/	**21.0**	**19.5**	/
		1880MHz	19.92	17.96	/	**21.0**	**19.5**	/
		1860MHz	19.50	17.76	/	**21.0**	**19.5**	/
	50RB_25	1900MHz	19.55	17.65	/	**21.0**	**19.5**	/
		1880MHz	19.22	17.27	/	**21.0**	**19.5**	/
		1860MHz	19.70	18.00	/	**21.0**	**19.5**	/
	50RB_0	1900MHz	**20.21**	18.31	/	**21.0**	**19.5**	/
		1880MHz	19.34	17.38	/	**21.0**	**19.5**	/
		1860MHz	19.42	17.80	/	**21.0**	**19.5**	/
	100RB_0	1900MHz	19.61	17.69	/	**21.0**	**19.5**	/
		1880MHz	19.61	17.66	/	**21.0**	**19.5**	/
		1860MHz	19.42	17.76	/	**21.0**	**19.5**	/

Normal Power								
LTE Band 7			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
5 MHz	1RB_24	2567.4MHz	23.37	22.23	/	**24.0**	**23.0**	/
		2535MHz	23.34	22.14	/	**24.0**	**23.0**	/
		2502.5MHz	23.34	22.14	/	**24.0**	**23.0**	/
	1RB_12	2567.4MHz	23.40	22.15	/	**24.0**	**23.0**	/
		2535MHz	23.22	22.09	/	**24.0**	**23.0**	/
		2502.5MHz	23.44	22.17	/	**24.0**	**23.0**	/
	1RB_0	2567.4MHz	23.47	22.28	/	**24.0**	**23.0**	/
		2535MHz	23.36	22.16	/	**24.0**	**23.0**	/
		2502.5MHz	23.30	22.13	/	**24.0**	**23.0**	/
	12RB_13	2567.4MHz	22.61	20.76	/	**23.0**	**22.0**	/
		2535MHz	22.55	20.59	/	**23.0**	**22.0**	/
		2502.5MHz	22.53	20.70	/	**23.0**	**22.0**	/
	12RB_6	2567.4MHz	22.58	20.75	/	**23.0**	**22.0**	/
		2535MHz	22.46	20.52	/	**23.0**	**22.0**	/
		2502.5MHz	22.55	20.63	/	**23.0**	**22.0**	/
	12RB_0	2567.4MHz	22.49	20.68	/	**23.0**	**22.0**	/
		2535MHz	22.62	20.71	/	**23.0**	**22.0**	/
		2502.5MHz	22.48	20.59	/	**23.0**	**22.0**	/
	25RB_0	2567.4MHz	22.75	21.03	/	**23.0**	**22.0**	/
		2535MHz	22.48	20.60	/	**23.0**	**22.0**	/
		2502.5MHz	22.47	20.88	/	**23.0**	**22.0**	/

Normal Power								
LTE Band 7			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
10 MHz	1RB_49	2565MHz	23.50	22.29	/	**24.0**	**23.0**	/
		2535MHz	23.37	22.11	/	**24.0**	**23.0**	/
		2505MHz	23.46	22.23	/	**24.0**	**23.0**	/
	1RB_24	2565MHz	23.48	22.20	/	**24.0**	**23.0**	/
		2535MHz	23.30	22.04	/	**24.0**	**23.0**	/
		2505MHz	23.42	22.18	/	**24.0**	**23.0**	/
	1RB_0	2565MHz	23.47	22.30	/	**24.0**	**23.0**	/
		2535MHz	23.36	22.10	/	**24.0**	**23.0**	/
		2505MHz	23.32	22.10	/	**24.0**	**23.0**	/
	25RB_25	2565MHz	22.58	20.71	/	**23.0**	**22.0**	/
		2535MHz	22.40	20.55	/	**23.0**	**22.0**	/
		2505MHz	22.58	20.65	/	**23.0**	**22.0**	/
	25RB_12	2565MHz	22.62	20.64	/	**23.0**	**22.0**	/
		2535MHz	22.49	20.59	/	**23.0**	**22.0**	/
		2505MHz	22.56	20.56	/	**23.0**	**22.0**	/
	25RB_0	2565MHz	22.56	20.64	/	**23.0**	**22.0**	/
		2535MHz	22.48	20.68	/	**23.0**	**22.0**	/
		2505MHz	22.53	20.53	/	**23.0**	**22.0**	/
	50RB_0	2565MHz	22.77	20.80	/	**23.0**	**22.0**	/
		2535MHz	22.47	20.59	/	**23.0**	**22.0**	/
		2505MHz	22.49	20.61	/	**23.0**	**22.0**	/

Normal Power								
LTE Band 7			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
15 MHz	1RB_74	2562.5MHz	23.52	21.91	/	**24.0**	**23.0**	/
		2535MHz	23.42	22.26	/	**24.0**	**23.0**	/
		2507.5MHz	23.48	21.91	/	**24.0**	**23.0**	/
	1RB_37	2562.5MHz	23.54	21.86	/	**24.0**	**23.0**	/
		2535MHz	23.32	22.14	/	**24.0**	**23.0**	/
		2507.5MHz	23.51	21.89	/	**24.0**	**23.0**	/
	1RB_0	2562.5MHz	23.47	22.33	/	**24.0**	**23.0**	/
		2535MHz	23.30	22.14	/	**24.0**	**23.0**	/
		2507.5MHz	23.28	21.72	/	**24.0**	**23.0**	/
	36RB_38	2562.5MHz	22.71	20.97	/	**23.0**	**22.0**	/
		2535MHz	22.48	20.74	/	**23.0**	**22.0**	/
		2507.5MHz	22.56	20.82	/	**23.0**	**22.0**	/
	36RB_19	2562.5MHz	22.69	20.84	/	**23.0**	**22.0**	/
		2535MHz	22.48	20.60	/	**23.0**	**22.0**	/
		2507.5MHz	22.55	20.67	/	**23.0**	**22.0**	/
	36RB_0	2562.5MHz	22.54	20.80	/	**23.0**	**22.0**	/
		2535MHz	22.57	20.81	/	**23.0**	**22.0**	/
		2507.5MHz	22.43	20.71	/	**23.0**	**22.0**	/
	75RB_0	2562.5MHz	22.77	20.95	/	**23.0**	**22.0**	/
		2535MHz	22.48	20.76	/	**23.0**	**22.0**	/
		2507.5MHz	22.69	20.71	/	**23.0**	**22.0**	/

Normal Power								
LTE Band 7			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20 MHz	1RB_99	2560MHz	**23.69**	22.44	/	**24.0**	**23.0**	/
		2535MHz	23.56	21.94	/	**24.0**	**23.0**	/
		2510MHz	23.65	22.35	/	**24.0**	**23.0**	/
	1RB_50	2560MHz	23.60	22.28	/	**24.0**	**23.0**	/
		2535MHz	23.42	21.81	/	**24.0**	**23.0**	/
		2510MHz	23.48	22.25	/	**24.0**	**23.0**	/
	1RB_0	2560MHz	23.53	22.23	/	**24.0**	**23.0**	/
		2535MHz	23.36	21.82	/	**24.0**	**23.0**	/
		2510MHz	23.41	21.71	/	**24.0**	**23.0**	/
	50RB_50	2560MHz	22.64	20.83	/	**23.0**	**22.0**	/
		2535MHz	22.55	20.64	/	**23.0**	**22.0**	/
		2510MHz	22.55	20.81	/	**23.0**	**22.0**	/
	50RB_25	2560MHz	**22.68**	20.74	/	**23.0**	**22.0**	/
		2535MHz	22.52	20.60	/	**23.0**	**22.0**	/
		2510MHz	22.47	20.60	/	**23.0**	**22.0**	/
	50RB_0	2560MHz	22.58	20.72	/	**23.0**	**22.0**	/
		2535MHz	22.48	20.70	/	**23.0**	**22.0**	/
		2510MHz	22.50	20.58	/	**23.0**	**22.0**	/
	100RB_0	2560MHz	22.73	20.95	/	**23.0**	**22.0**	/
		2535MHz	22.64	20.68	/	**23.0**	**22.0**	/
		2510MHz	22.61	20.75	/	**23.0**	**22.0**	/

Sensor on								
LTE Band 7			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
5 MHz	1RB_24	2567.4MHz	17.51	16.13	/	19.5	17.5	/
		2535MHz	18.11	16.43	/	19.5	17.5	/
		2502.5MHz	18.37	16.69	/	19.5	17.5	/
	1RB_12	2567.4MHz	18.17	16.71	/	19.5	17.5	/
		2535MHz	18.52	16.84	/	19.5	17.5	/
		2502.5MHz	18.61	16.91	/	19.5	17.5	/
	1RB_0	2567.4MHz	17.74	16.30	/	19.5	17.5	/
		2535MHz	18.03	16.31	/	19.5	17.5	/
		2502.5MHz	17.76	16.04	/	19.5	17.5	/
	12RB_13	2567.4MHz	17.12	15.23	/	18.5	16.5	/
		2535MHz	17.30	15.48	/	18.5	16.5	/
		2502.5MHz	17.49	15.68	/	18.5	16.5	/
	12RB_6	2567.4MHz	17.02	15.40	/	18.5	16.5	/
		2535MHz	17.42	15.61	/	18.5	16.5	/
		2502.5MHz	17.48	15.65	/	18.5	16.5	/
	12RB_0	2567.4MHz	16.92	15.24	/	18.5	16.5	/
		2535MHz	17.28	15.47	/	18.5	16.5	/
		2502.5MHz	17.17	15.33	/	18.5	16.5	/
	25RB_0	2567.4MHz	16.88	15.20	/	18.5	16.5	/
		2535MHz	17.30	15.49	/	18.5	16.5	/
		2502.5MHz	17.34	15.51	/	18.5	16.5	/

Sensor on								
LTE Band 7			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
10 MHz	1RB_49	2565MHz	18.21	16.75	/	19.5	17.5	/
		2535MHz	18.87	17.11	/	19.5	17.5	/
		2505MHz	18.81	16.96	/	19.5	17.5	/
	1RB_24	2565MHz	18.25	16.72	/	19.5	17.5	/
		2535MHz	18.46	16.74	/	19.5	17.5	/
		2505MHz	18.40	16.55	/	19.5	17.5	/
	1RB_0	2565MHz	18.17	16.68	/	19.5	17.5	/
		2535MHz	18.21	16.47	/	19.5	17.5	/
		2505MHz	17.49	15.57	/	19.5	17.5	/
	25RB_25	2565MHz	17.23	15.61	/	18.5	16.5	/
		2535MHz	17.64	15.82	/	18.5	16.5	/
		2505MHz	17.65	15.70	/	18.5	16.5	/
	25RB_12	2565MHz	17.18	15.58	/	18.5	16.5	/
		2535MHz	17.45	15.62	/	18.5	16.5	/
		2505MHz	17.35	15.39	/	18.5	16.5	/
	25RB_0	2565MHz	17.17	15.54	/	18.5	16.5	/
		2535MHz	17.32	15.51	/	18.5	16.5	/
		2505MHz	16.99	15.00	/	18.5	16.5	/
	50RB_0	2565MHz	17.20	15.51	/	18.5	16.5	/
		2535MHz	17.48	15.70	/	18.5	16.5	/
		2505MHz	17.34	15.39	/	18.5	16.5	/

Sensor on								
LTE Band 7			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
15 MHz	1RB_74	2562.5MHz	17.71	16.12	/	**19.5**	**17.5**	/
		2535MHz	18.56	16.90	/	**19.5**	**17.5**	/
		2507.5MHz	18.52	16.62	/	**19.5**	**17.5**	/
	1RB_37	2562.5MHz	18.16	16.60	/	**19.5**	**17.5**	/
		2535MHz	18.48	16.73	/	**19.5**	**17.5**	/
		2507.5MHz	18.56	16.72	/	**19.5**	**17.5**	/
	1RB_0	2562.5MHz	18.35	16.79	/	**19.5**	**17.5**	/
		2535MHz	18.38	16.64	/	**19.5**	**17.5**	/
		2507.5MHz	17.69	15.76	/	**19.5**	**17.5**	/
	36RB_38	2562.5MHz	16.96	15.25	/	**18.5**	**16.5**	/
		2535MHz	17.52	15.75	/	**18.5**	**16.5**	/
		2507.5MHz	17.63	15.65	/	**18.5**	**16.5**	/
	36RB_19	2562.5MHz	17.10	15.28	/	**18.5**	**16.5**	/
		2535MHz	17.43	15.62	/	**18.5**	**16.5**	/
		2507.5MHz	17.48	15.52	/	**18.5**	**16.5**	/
	36RB_0	2562.5MHz	17.30	15.54	/	**18.5**	**16.5**	/
		2535MHz	17.43	15.65	/	**18.5**	**16.5**	/
		2507.5MHz	17.23	15.24	/	**18.5**	**16.5**	/
	75RB_0	2562.5MHz	17.12	15.35	/	**18.5**	**16.5**	/
		2535MHz	17.47	15.70	/	**18.5**	**16.5**	/
		2507.5MHz	17.44	15.47	/	**18.5**	**16.5**	/

Sensor on								
LTE Band 7			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20 MHz	1RB_99	2560MHz	18.45	16.75	/	**19.5**	**17.5**	/
		2535MHz	**19.17**	16.94	/	**19.5**	**17.5**	/
		2510MHz	18.87	16.86	/	**19.5**	**17.5**	/
	1RB_50	2560MHz	18.17	16.74	/	**19.5**	**17.5**	/
		2535MHz	18.44	16.74	/	**19.5**	**17.5**	/
		2510MHz	18.41	16.51	/	**19.5**	**17.5**	/
	1RB_0	2560MHz	18.44	16.93	/	**19.5**	**17.5**	/
		2535MHz	18.50	16.85	/	**19.5**	**17.5**	/
		2510MHz	17.64	15.66	/	**19.5**	**17.5**	/
	50RB_50	2560MHz	17.10	15.52	/	**18.5**	**16.5**	/
		2535MHz	**17.74**	16.02	/	**18.5**	**16.5**	/
		2510MHz	17.55	15.57	/	**18.5**	**16.5**	/
	50RB_25	2560MHz	17.14	15.45	/	**18.5**	**16.5**	/
		2535MHz	17.45	15.67	/	**18.5**	**16.5**	/
		2510MHz	17.32	15.37	/	**18.5**	**16.5**	/
	50RB_0	2560MHz	17.19	15.58	/	**18.5**	**16.5**	/
		2535MHz	17.29	15.56	/	**18.5**	**16.5**	/
		2510MHz	16.96	15.00	/	**18.5**	**16.5**	/
	100RB_0	2560MHz	17.22	15.50	/	**18.5**	**16.5**	/
		2535MHz	17.51	15.77	/	**18.5**	**16.5**	/
		2510MHz	17.26	15.27	/	**18.5**	**16.5**	/

Normal Power								
LTE Band 38			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
5 MHz	1RB_24	2617.5MHz	23.47	21.34	/	**24.0**	**23.0**	/
		2595MHz	23.40	21.78	/	**24.0**	**23.0**	/
		2572.5MHz	23.55	21.77	/	**24.0**	**23.0**	/
	1RB_12	2617.5MHz	23.43	22.05	/	**24.0**	**23.0**	/
		2595MHz	23.48	21.95	/	**24.0**	**23.0**	/
		2572.5MHz	23.52	21.52	/	**24.0**	**23.0**	/
	1RB_0	2617.5MHz	23.49	21.70	/	**24.0**	**23.0**	/
		2595MHz	23.45	21.43	/	**24.0**	**23.0**	/
		2572.5MHz	23.54	21.74	/	**24.0**	**23.0**	/
	12RB_13	2617.5MHz	22.55	20.50	/	**23.0**	**22.0**	/
		2595MHz	22.42	20.58	/	**23.0**	**22.0**	/
		2572.5MHz	22.46	20.60	/	**23.0**	**22.0**	/
	12RB_6	2617.5MHz	22.55	20.52	/	**23.0**	**22.0**	/
		2595MHz	22.48	20.58	/	**23.0**	**22.0**	/
		2572.5MHz	22.62	20.63	/	**23.0**	**22.0**	/
	12RB_0	2617.5MHz	22.46	20.56	/	**23.0**	**22.0**	/
		2595MHz	22.47	20.59	/	**23.0**	**22.0**	/
		2572.5MHz	22.54	20.56	/	**23.0**	**22.0**	/
	25RB_0	2617.5MHz	22.58	20.62	/	**23.0**	**22.0**	/
		2595MHz	22.52	20.52	/	**23.0**	**22.0**	/
		2572.5MHz	22.52	20.59	/	**23.0**	**22.0**	/

Normal Power								
LTE Band 38			Actual output Power (dBm)			**Tune up**		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
10 MHz	1RB_49	2615MHz	23.53	21.62	/	**24.0**	**23.0**	/
		2595MHz	23.48	21.24	/	**24.0**	**23.0**	/
		2575MHz	23.50	21.74	/	**24.0**	**23.0**	/
	1RB_24	2615MHz	23.47	21.67	/	**24.0**	**23.0**	/
		2595MHz	23.54	22.05	/	**24.0**	**23.0**	/
		2575MHz	23.47	21.73	/	**24.0**	**23.0**	/
	1RB_0	2615MHz	23.50	21.85	/	**24.0**	**23.0**	/
		2595MHz	23.57	21.83	/	**24.0**	**23.0**	/
		2575MHz	23.45	21.28	/	**24.0**	**23.0**	/
	25RB_25	2615MHz	22.54	20.65	/	**23.0**	**22.0**	/
		2595MHz	22.51	20.56	/	**23.0**	**22.0**	/
		2575MHz	22.50	20.52	/	**23.0**	**22.0**	/
	25RB_12	2615MHz	22.49	20.61	/	**23.0**	**22.0**	/
		2595MHz	22.49	20.54	/	**23.0**	**22.0**	/
		2575MHz	22.45	20.61	/	**23.0**	**22.0**	/
	25RB_0	2615MHz	22.46	20.57	/	**23.0**	**22.0**	/
		2595MHz	22.56	20.53	/	**23.0**	**22.0**	/
		2575MHz	22.43	20.59	/	**23.0**	**22.0**	/
	50RB_0	2615MHz	22.50	20.63	/	**23.0**	**22.0**	/
		2595MHz	22.60	20.67	/	**23.0**	**22.0**	/
		2575MHz	22.48	20.67	/	**23.0**	**22.0**	/

Normal Power								
LTE Band 38			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
15 MHz	1RB_74	2612.5MHz	23.51	21.34	/	24.0	23.0	/
		2595MHz	23.57	21.63	/	24.0	23.0	/
		2577.5MHz	23.49	21.86	/	24.0	23.0	/
	1RB_37	2612.5MHz	23.47	21.99	/	24.0	23.0	/
		2595MHz	23.42	22.02	/	24.0	23.0	/
		2577.5MHz	23.49	21.76	/	24.0	23.0	/
	1RB_0	2612.5MHz	23.49	21.59	/	24.0	23.0	/
		2595MHz	23.42	22.01	/	24.0	23.0	/
		2577.5MHz	23.48	21.73	/	24.0	23.0	/
	36RB_38	2612.5MHz	22.58	20.52	/	23.0	22.0	/
		2595MHz	22.10	20.56	/	23.0	22.0	/
		2577.5MHz	22.52	20.56	/	23.0	22.0	/
	36RB_19	2612.5MHz	22.04	20.59	/	23.0	22.0	/
		2595MHz	22.53	20.55	/	23.0	22.0	/
		2577.5MHz	22.58	20.61	/	23.0	22.0	/
	36RB_0	2612.5MHz	22.57	20.56	/	23.0	22.0	/
		2595MHz	22.53	20.60	/	23.0	22.0	/
		2577.5MHz	22.54	20.59	/	23.0	22.0	/
	75RB_0	2612.5MHz	22.48	20.69	/	23.0	22.0	/
		2595MHz	22.54	20.63	/	23.0	22.0	/
		2577.5MHz	22.59	20.70	/	23.0	22.0	/

Normal Power								
LTE Band 38			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20 MHz	1RB_99	2610MHz	23.48	21.72	/	**24.0**	**23.0**	/
		2595MHz	23.46	21.86	/	**24.0**	**23.0**	/
		2580MHz	23.49	21.83	/	**24.0**	**23.0**	/
	1RB_50	2610MHz	23.47	21.98	/	**24.0**	**23.0**	/
		2595MHz	23.43	21.96	/	**24.0**	**23.0**	/
		2580MHz	23.44	21.68	/	**24.0**	**23.0**	/
	1RB_0	2610MHz	**23.53**	21.67	/	**24.0**	**23.0**	/
		2595MHz	23.47	22.04	/	**24.0**	**23.0**	/
		2580MHz	23.49	21.71	/	**24.0**	**23.0**	/
	50RB_50	2610MHz	22.50	20.63	/	**23.0**	**22.0**	/
		2595MHz	22.48	20.62	/	**23.0**	**22.0**	/
		2580MHz	22.17	20.63	/	**23.0**	**22.0**	/
	50RB_25	2610MHz	22.45	20.68	/	**23.0**	**22.0**	/
		2595MHz	22.50	20.59	/	**23.0**	**22.0**	/
		2580MHz	**22.60**	20.65	/	**23.0**	**22.0**	/
	50RB_0	2610MHz	22.45	20.70	/	**23.0**	**22.0**	/
		2595MHz	22.49	20.64	/	**23.0**	**22.0**	/
		2580MHz	22.57	20.67	/	**23.0**	**22.0**	/
	100RB_0	2610MHz	22.48	20.73	/	**23.0**	**22.0**	/
		2595MHz	22.49	20.63	/	**23.0**	**22.0**	/
		2580MHz	22.49	20.69	/	**23.0**	**22.0**	/

Sensor on								
LTE Band 38			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
5 MHz	1RB_24	2617.5MHz	21.81	19.84	/	22.0	21.0	/
		2595MHz	21.78	19.99	/	22.0	21.0	/
		2572.5MHz	21.72	19.31	/	22.0	21.0	/
	1RB_12	2617.5MHz	21.76	19.79	/	22.0	21.0	/
		2595MHz	21.79	19.88	/	22.0	21.0	/
		2572.5MHz	21.74	19.66	/	22.0	21.0	/
	1RB_0	2617.5MHz	21.78	19.81	/	22.0	21.0	/
		2595MHz	21.74	19.89	/	22.0	21.0	/
		2572.5MHz	21.72	19.71	/	22.0	21.0	/
	12RB_13	2617.5MHz	20.86	18.53	/	21.0	20.0	/
		2595MHz	20.85	18.45	/	21.0	20.0	/
		2572.5MHz	20.76	18.36	/	21.0	20.0	/
	12RB_6	2617.5MHz	20.80	18.75	/	21.0	20.0	/
		2595MHz	20.85	18.67	/	21.0	20.0	/
		2572.5MHz	20.74	18.55	/	21.0	20.0	/
	12RB_0	2617.5MHz	20.81	18.65	/	21.0	20.0	/
		2595MHz	20.88	18.57	/	21.0	20.0	/
		2572.5MHz	20.79	18.45	/	21.0	20.0	/
	25RB_0	2617.5MHz	20.88	18.67	/	21.0	20.0	/
		2595MHz	20.85	18.59	/	21.0	20.0	/
		2572.5MHz	20.80	18.48	/	21.0	20.0	/

Sensor on								
LTE Band 38			Actual output Power (dBm)			Tune up		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
10 MHz	1RB_49	2615MHz	21.82	19.85	/	22.0	21.0	/
		2595MHz	21.82	19.86	/	22.0	21.0	/
		2575MHz	21.94	19.95	/	22.0	21.0	/
	1RB_24	2615MHz	21.87	19.69	/	22.0	21.0	/
		2595MHz	21.79	19.89	/	22.0	21.0	/
		2575MHz	21.80	19.78	/	22.0	21.0	/
	1RB_0	2615MHz	21.83	19.82	/	22.0	21.0	/
		2595MHz	21.32	20.02	/	22.0	21.0	/
		2575MHz	21.68	19.85	/	22.0	21.0	/
	25RB_25	2615MHz	20.88	18.72	/	21.0	20.0	/
		2595MHz	20.86	18.74	/	21.0	20.0	/
		2575MHz	20.78	18.63	/	21.0	20.0	/
	25RB_12	2615MHz	20.83	18.71	/	21.0	20.0	/
		2595MHz	20.87	18.72	/	21.0	20.0	/
		2575MHz	20.89	18.54	/	21.0	20.0	/
	25RB_0	2615MHz	20.87	18.69	/	21.0	20.0	/
		2595MHz	20.84	18.69	/	21.0	20.0	/
		2575MHz	20.83	18.52	/	21.0	20.0	/
	50RB_0	2615MHz	20.92	18.73	/	21.0	20.0	/
		2595MHz	20.87	18.74	/	21.0	20.0	/
		2575MHz	20.90	18.59	/	21.0	20.0	/

Sensor on									
LTE Band 38			Actual output Power (dBm)			Tune up			
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation			
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM	
15 MHz	1RB_74	2612.5MHz	21.82	19.89	/	22.0	21.0	/	
		2595MHz	21.36	19.92	/	22.0	21.0	/	
		2577.5MHz	21.89	20.09	/	22.0	21.0	/	
	1RB_37	2612.5MHz	21.85	19.41	/	22.0	21.0	/	
		2595MHz	21.75	19.88	/	22.0	21.0	/	
		2577.5MHz	21.96	19.82	/	22.0	21.0	/	
	1RB_0	2612.5MHz	21.75	19.84	/	22.0	21.0	/	
		2595MHz	21.77	20.14	/	22.0	21.0	/	
		2577.5MHz	21.70	19.92	/	22.0	21.0	/	
	36RB_38	2612.5MHz	20.90	18.59	/	21.0	20.0	/	
		2595MHz	20.91	18.54	/	21.0	20.0	/	
		2577.5MHz	20.89	18.43	/	21.0	20.0	/	
	36RB_19	2612.5MHz	20.93	18.70	/	21.0	20.0	/	
		2595MHz	20.92	18.63	/	21.0	20.0	/	
		2577.5MHz	20.90	18.48	/	21.0	20.0	/	
	36RB_0	2612.5MHz	20.86	18.82	/	21.0	20.0	/	
		2595MHz	20.95	18.79	/	21.0	20.0	/	
		2577.5MHz	20.91	18.60	/	21.0	20.0	/	
	75RB_0	2612.5MHz	20.90	18.75	/	21.0	20.0	/	
		2595MHz	20.86	18.71	/	21.0	20.0	/	
		2577.5MHz	20.82	18.57	/	21.0	20.0	/	

Sensor on								
LTE Band 38			Actual output Power (dBm)			**Tune up**		
Band -width	RB No. / RB offset	Frequency	Modulation			Modulation		
			QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
20 MHz	1RB_99	2610MHz	21.82	19.86	/	**22.0**	**21.0**	/
		2595MHz	**21.84**	20.09	/	**22.0**	**21.0**	/
		2580MHz	21.74	20.04	/	**22.0**	**21.0**	/
	1RB_50	2610MHz	21.81	19.96	/	**22.0**	**21.0**	/
		2595MHz	21.79	19.92	/	**22.0**	**21.0**	/
		2580MHz	21.73	19.95	/	**22.0**	**21.0**	/
	1RB_0	2610MHz	21.78	19.83	/	**22.0**	**21.0**	/
		2595MHz	21.69	20.23	/	**22.0**	**21.0**	/
		2580MHz	21.72	19.46	/	**22.0**	**21.0**	/
	50RB_50	2610MHz	20.84	18.68	/	**21.0**	**20.0**	/
		2595MHz	20.85	18.71	/	**21.0**	**20.0**	/
		2580MHz	20.87	18.54	/	**21.0**	**20.0**	/
	50RB_25	2610MHz	20.89	18.64	/	**21.0**	**20.0**	/
		2595MHz	**20.91**	18.65	/	**21.0**	**20.0**	/
		2580MHz	20.84	18.45	/	**21.0**	**20.0**	/
	50RB_0	2610MHz	20.90	18.67	/	**21.0**	**20.0**	/
		2595MHz	20.86	18.72	/	**21.0**	**20.0**	/
		2580MHz	20.85	18.45	/	**21.0**	**20.0**	/
	100RB_0	2610MHz	20.96	18.66	/	**21.0**	**20.0**	/
		2595MHz	20.85	18.71	/	**21.0**	**20.0**	/
		2580MHz	20.90	18.49	/	**21.0**	**20.0**	/

10.4. Bluetooth and WLAN Measurement result

Table 10.4: The conducted Power measurement results for Bluetooth

Mode	Tune up	Averaged Power (dBm)		
		Ch.0 (2402MHz)	Ch.39 (2441MHz)	Ch.78 (2480MHz)
GFSK	**8.0**	7.31	7.12	6.70
EDR2M-4_DQPSK	**8.0**	7.02	7.26	6.81
EDR3M-8DPSK	**8.0**	7.08	7.55	7.12
/	**/**	Ch.0 (2402MHz)	Ch.19 (2440MHz)	Ch.39 (2480MHz)
BLE(1M)	**3.0**	0.51	1.98	1.72

Table 10.5: The conducted Power measurement results for WLAN 2.4G

Mode	Tune up	Averaged Power (dBm) Duty Cycle: **100%**		
		Ch.1 (2412MHz)	Ch.6 (2437MHz)	Ch.11 (2462MHz)
802.11b	**17.0**	16.13	16.20	15.68
802.11g	**16.0**	15.14	15.12	15.21
802.11n(20MHz)	**16.0**	15.22	14.94	15.02

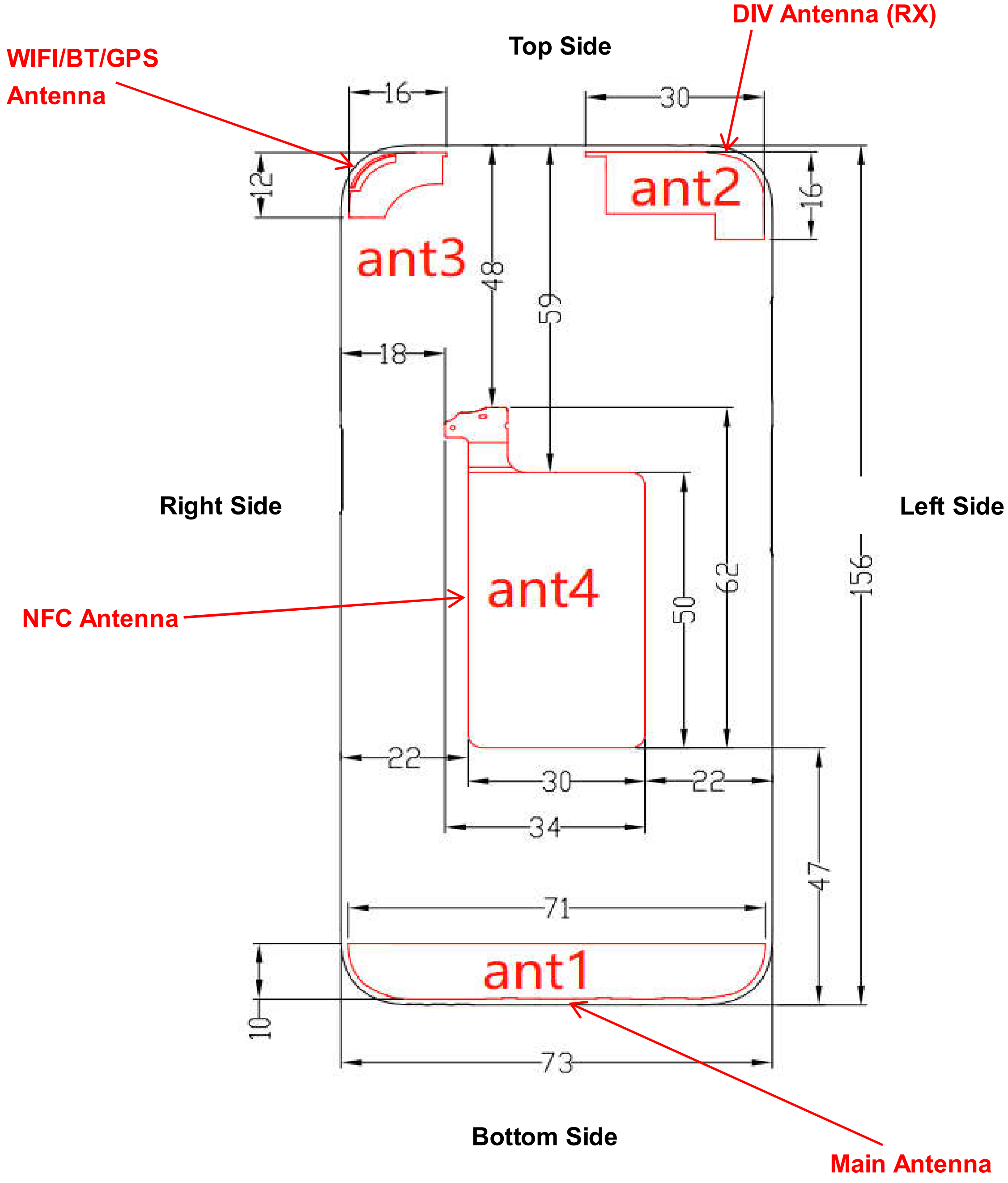
11. Simultaneous TX SAR Considerations

11.1. 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 WLAN can transmit simultaneous with other transmitters.

11.2. Transmit Antenna Separation Distances



Antenna Locations (Back View)

11.3. SAR Measurement Positions

According to the KDB941225 D06 Hot Spot SAR, the edges with less than 25mm distance to the antennas need to be tested for SAR.

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

11.4. Standalone SAR Test Exclusion Considerations

Standalone 1-g head or body SAR evaluation by measurement or numerical simulation is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied.

The 1-g SAR test exclusion threshold for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR, where

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

Table 11.1: Standalone SAR test exclusion considerations

Band	f(GHz)	Position	SAR test exclusion threshold (mW)	RF output power		SAR test exclusion
				dBm	mW	
Bluetooth	2.441	Head	9.60	8.0	6.31	Yes
		Body	19.20	8.0	6.31	Yes
WLAN 2.4G	2.45	Head	9.58	17.0	50.12	No
		Body	19.17	17.0	50.12	No

12. Evaluation of Simultaneous

Table 12.1: The sum of reported SAR values for WWAN antenna and WLAN antenna

/	Position	WWAN (W/kg)	WLAN (W/kg)	Sum (W/kg)
Highest reported SAR value for Head	Left Cheek	0.33	0.57	0.90
Highest reported SAR value for Hotspot	Bottom	0.89	/	0.89
Highest reported SAR value for Body-worn	Rear	0.62	0.19	0.81

Note: the test positions of above tables are for the worse case that has been evaluated.

Table 12.2: The sum of reported SAR values for WWAN antenna and Bluetooth antenna

/	Position	WWAN (W/kg)	Bluetooth (W/kg)	Sum (W/kg)
Highest reported SAR value for Head	Left Cheek	0.33	0.26	0.59
Highest reported SAR value for Hotspot	Bottom	0.89	0.13	1.02
Highest reported SAR value for Body-worn	Rear	0.62	0.13	0.75

Note: the test positions of above tables are for the worse case that has been evaluated.

Table 12.3: Estimated SAR for Bluetooth

Position	f (GHz)	Distance (mm)	Upper limit of power *		Estimated$_{1g}$ (W/kg)
			dBm	mW	
Head	2.441	5	8.0	6.31	0.26
Body	2.441	10	8.0	6.31	0.13

* - Maximum possible output power declared by manufacturer

When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)]·[√f(GHz)/x] W/kg for test separation distances ≤ 50 mm;

Where x = 7.5 for 1-g SAR.

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion

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.

13. Summary of Test Results

According to the client's decision rule in the test registration form, which is "based on the measurement results as the basis of the conformity statement", the test conclusion of this report meets the limit requirements.

The calculated SAR is obtained by the following formula:

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

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

$P_{Measured}$ is the measured power in chapter 10.

Duty Cycle

Mode	**Duty Cycle**
Speech for GSM850/1900	1:8.3
GPRS for GSM850	1:4
GPRS for GSM1900	1:2.67
GPRS for GSM1900 (Sensor-on mode)	1:2
WCDMA Band 2/5	1:1
FDD_LTE Band 2/7	1:1
TDD_LTE Band 38	1:1.58

13.1. Testing Environment

Temperature:	18°C~25°C
Relative humidity:	30%~70%
Ground system resistance:	<4Ω
Ambient noise & Reflection:	< 0.012 W/kg

13.2. SAR results

Table 13.1: SAR Values (GSM 850 - Head)

Ambient Temperature: 22.6°C Liquid Temperature: 22.0°C									
Frequency		Test Mode	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
Ch.	MHz								
190	836.6	Speech	Left Cheek	/	32.94	34.0	0.253	**0.32**	0.13
190	836.6	Speech	Left Tilt	/	32.94	34.0	0.145	**0.19**	0.02
190	836.6	Speech	Right Cheek	**1**	32.94	34.0	**0.258**	**0.33**	0.02
190	836.6	Speech	Right Tilt	/	32.94	34.0	0.137	**0.17**	-0.17

Table 13.2: SAR Values (GSM 850 - Body)

Ambient Temperature: 22.6°C Liquid Temperature: 22.0°C									
Frequency		Test Mode	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
Ch.	MHz								
Hotspot / Body-Worn Test Data (10mm)									
190	836.6	GPRS-2	Front	/	30.78	32.0	0.390	**0.52**	-0.07
190	836.6	GPRS-2	Rear	**2**	30.78	32.0	**0.437**	**0.58**	0.01
Hotspot Test Data (10mm)									
190	836.6	GPRS-2	Left	/	30.78	32.0	0.304	**0.40**	0.16
190	836.6	GPRS-2	Right	/	30.78	32.0	0.342	**0.45**	0.02
190	836.6	GPRS-2	Bottom	/	30.78	32.0	0.056	**0.07**	0.19

Table 13.3: SAR Values (GSM 1900 - Head)

Ambient Temperature: 22.4°C Liquid Temperature: 21.9°C									
Frequency		Test Mode	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
Ch.	MHz								
661	1880.0	Speech	Left Cheek	/	30.37	31.0	0.112	**0.13**	0.04
661	1880.0	Speech	Left Tilt	/	30.37	31.0	0.105	**0.12**	0.05
661	1880.0	Speech	Right Cheek	**3**	30.37	31.0	**0.120**	**0.14**	0.01
661	1880.0	Speech	Right Tilt	/	30.37	31.0	0.064	**0.07**	0.02

Table 13.4: SAR Values (GSM 1900 - Body)

Ambient Temperature: 22.4°C Liquid Temperature: 21.9°C									
Frequency		Test Mode	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
Ch.	MHz								
Hotspot / Body-Worn Test Data (10mm)									
661	1880.0	GPRS-4	Front	/	22.95	23.5	0.197	**0.22**	-0.19
661	1880.0	GPRS-4	Rear	/	22.95	23.5	0.253	**0.29**	0.05
Hotspot Test Data (10mm)									
661	1880.0	GPRS-3	Left	/	26.62	27.5	0.124	**0.15**	0.10
661	1880.0	GPRS-3	Right	/	26.62	27.5	0.083	**0.10**	0.08
661	1880.0	GPRS-4	Bottom	**4**	22.95	23.5	**0.505**	**0.57**	-0.06
Sensor off Test Data									
661	1880.0	GPRS-3	Front	15mm	26.62	27.5	0.171	**0.21**	0.03
661	1880.0	GPRS-3	Rear	19mm	26.62	27.5	0.253	**0.31**	0.06
661	1880.0	GPRS-3	Bottom	19mm	26.62	27.5	0.287	**0.35**	-0.02

Table 13.5: SAR Values (WCDMA Band 2 - Head)

Ambient Temperature: 22.4°C Liquid Temperature: 21.9°C									
Frequency		Test Mode	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
Ch.	MHz								
9400	1880.0	RMC	Left Cheek	/	24.40	25.0	0.258	**0.30**	0.07
9400	1880.0	RMC	Left Tilt	/	24.40	25.0	0.218	**0.25**	0.10
9400	1880.0	RMC	Right Cheek	**5**	24.40	25.0	**0.283**	**0.32**	0.07
9400	1880.0	RMC	Right Tilt	/	24.40	25.0	0.149	**0.17**	0.07

Table 13.6: SAR Values (WCDMA Band 2 - Body)

Ambient Temperature: 22.4°C Liquid Temperature: 21.9°C									
Frequency		Test Mode	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
Ch.	MHz								
Hotspot / Body-Worn Test Data (10mm)									
9400	1880.0	RMC	Front	/	20.70	21.0	0.224	**0.24**	0.18
9400	1880.0	RMC	Rear	/	20.70	21.0	0.298	**0.32**	0.10
Hotspot Test Data (10mm)									
9400	1880.0	RMC	Left	/	24.40	25.0	0.323	**0.37**	0.02
9400	1880.0	RMC	Right	/	24.40	25.0	0.171	**0.20**	0.05
9400	1880.0	RMC	Bottom	**6**	20.70	21.0	**0.543**	**0.58**	0.10
Sensor off Test Data									
9400	1880.0	RMC	Front	15mm	24.40	25.0	0.316	**0.36**	0.03
9400	1880.0	RMC	Rear	19mm	24.40	25.0	0.227	**0.26**	0.19
9400	1880.0	RMC	Bottom	19mm	24.40	25.0	0.432	**0.50**	-0.04

Table 13.7: SAR Values (WCDMA Band 5 - Head)

Ambient Temperature: 22.6°C Liquid Temperature: 22.0°C									
Frequency		Test Mode	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
Ch.	MHz								
4182	836.4	RMC	Left Cheek	/	24.20	24.5	0.306	**0.33**	0.15
4182	836.4	RMC	Left Tilt	/	24.20	24.5	0.138	**0.15**	0.06
4182	836.4	RMC	Right Cheek	**7**	24.20	24.5	**0.309**	**0.33**	0.08
4182	836.4	RMC	Right Tilt	/	24.20	24.5	0.125	**0.13**	0.06

Table 13.8: SAR Values (WCDMA Band 5 - Body)

Ambient Temperature: 22.6°C Liquid Temperature: 22.0°C									
Frequency		Test Mode	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
Ch.	MHz								
Hotspot / Body-Worn Test Data (10mm)									
4182	836.4	RMC	Front	/	24.20	24.5	0.286	**0.31**	0.03
4182	836.4	RMC	Rear	**8**	24.20	24.5	**0.345**	**0.37**	0.05
Hotspot Test Data (10mm)									
4182	836.4	RMC	Left	/	24.20	24.5	0.258	**0.28**	0.12
4182	836.4	RMC	Right	/	24.20	24.5	0.284	**0.30**	0.17
4182	836.4	RMC	Bottom	/	24.20	24.5	0.055	**0.06**	0.17

Table 13.9: SAR Values (LTE Band 2 - Head)

Ambient Temperature: 22.4°C Liquid Temperature: 21.9°C									
Frequency		Test Mode	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
Ch.	MHz								
18900	1880.0	1RB99	Left Cheek	/	23.19	24.0	0.237	**0.29**	0.03
19100	1900.0	50RB0	Left Cheek	/	22.16	23.0	0.196	**0.24**	0.09
18900	1880.0	1RB99	Left Tilt	/	23.19	24.0	0.192	**0.23**	-0.01
19100	1900.0	50RB0	Left Tilt	/	22.16	23.0	0.163	**0.20**	0.06
18900	1880.0	1RB99	Right Cheek	**9**	23.19	24.0	**0.255**	**0.31**	-0.04
19100	1900.0	50RB0	Right Cheek	/	22.16	23.0	0.213	**0.26**	0.07
18900	1880.0	1RB99	Right Tilt	/	23.19	24.0	0.139	**0.17**	0.04
19100	1900.0	50RB0	Right Tilt	/	22.16	23.0	0.114	**0.14**	0.09

Table 13.10: SAR Values (LTE Band 2 - Body)

Ambient Temperature: 22.4°C Liquid Temperature: 21.9°C									
Frequency		Test Mode	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
Ch.	MHz								
Hotspot / Body-Worn Test Data (10mm)									
18900	1880.0	1RB99	Front	/	19.78	21.0	0.347	**0.46**	0.03
19100	1900.0	50RB0	Front	/	20.21	21.0	0.290	**0.35**	-0.07
18900	1880.0	1RB99	Rear	/	19.78	21.0	0.381	**0.50**	-0.19
19100	1900.0	50RB0	Rear	/	20.21	21.0	0.320	**0.38**	0.08
Hotspot Test Data (10mm)									
18900	1880.0	1RB99	Left	/	23.19	24.0	0.293	**0.35**	0.11
19100	1900.0	50RB0	Left	/	22.16	23.0	0.251	**0.30**	0.18
18900	1880.0	1RB99	Right	/	23.19	24.0	0.158	**0.19**	0.09
19100	1900.0	50RB0	Right	/	22.16	23.0	0.131	**0.16**	0.03
18900	1880.0	1RB99	Bottom	/	19.78	21.0	0.477	**0.63**	-0.02
19100	1900.0	50RB0	Bottom	**10**	20.21	21.0	**0.574**	**0.69**	-0.18
Sensor off Test Data									
18900	1880.0	1RB99	Front	15mm	23.19	24.0	0.326	**0.39**	0.04
19100	1900.0	50RB0	Front	15mm	22.16	23.0	0.268	**0.33**	0.04
18900	1880.0	1RB99	Rear	19mm	23.19	24.0	0.233	**0.28**	0.04
19100	1900.0	50RB0	Rear	19mm	22.16	23.0	0.192	**0.23**	0.16
18900	1880.0	1RB99	Bottom	19mm	23.19	24.0	0.461	**0.56**	0.09
19100	1900.0	50RB0	Bottom	19mm	22.16	23.0	0.366	**0.44**	0.03

Table 13.11: SAR Values (LTE Band 7 - Head)

Ambient Temperature: 23.0°C Liquid Temperature: 22.5°C									
Frequency		Test Mode	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
Ch.	MHz								
21350	2560.0	1RB99	Left Cheek	/	23.69	24.0	0.018	**0.02**	0.05
21350	2560.0	50RB25	Left Cheek	/	22.68	23.0	0.013	**0.01**	-0.09
21350	2560.0	1RB99	Left Tilt	/	23.69	24.0	0.026	**0.03**	0.07
21350	2560.0	50RB25	Left Tilt	/	22.68	23.0	0.015	**0.02**	0.03
21350	2560.0	1RB99	Right Cheek	**11**	23.69	24.0	**0.059**	**0.06**	0.05
21350	2560.0	50RB25	Right Cheek	/	22.68	23.0	0.035	**0.04**	0.03
21350	2560.0	1RB99	Right Tilt	/	23.69	24.0	0.042	**0.05**	0.02
21350	2560.0	50RB25	Right Tilt	/	22.68	23.0	0.026	**0.03**	0.03

Table 13.12: SAR Values (LTE Band 7 - Body)

Ambient Temperature: 23.0°C Liquid Temperature: 22.5°C									
Frequency		Test Mode	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
Ch.	MHz								
Hotspot / Body-Worn Test Data (10mm)									
21100	2535.0	1RB99	Front	/	19.17	19.5	0.245	**0.26**	-0.07
21100	2535.0	50RB50	Front	/	17.74	18.5	0.248	**0.30**	0.00
21100	2535.0	1RB99	Rear	/	19.17	19.5	0.377	**0.41**	-0.02
21100	2535.0	50RB50	Rear	/	17.74	18.5	0.379	**0.45**	0.04
Hotspot Test Data (10mm)									
21350	2560.0	1RB99	Left	/	23.69	24.0	0.233	**0.25**	0.04
21350	2560.0	50RB25	Left	/	22.68	23.0	0.189	**0.20**	0.07
21350	2560.0	1RB99	Right	/	23.69	24.0	0.310	**0.33**	-0.01
21350	2560.0	50RB25	Right	/	22.68	23.0	0.236	**0.25**	0.17
21100	2535.0	1RB99	Bottom	**12**	19.17	19.5	**0.489**	**0.53**	0.02
21100	2535.0	50RB50	Bottom	/	17.74	18.5	0.486	**0.58**	-0.04
Sensor off Test Data									
21350	2560.0	1RB99	Front	15mm	23.69	24.0	0.368	**0.40**	-0.03
21350	2560.0	50RB25	Front	15mm	22.68	23.0	0.279	**0.30**	0.09
21350	2560.0	1RB99	Rear	19mm	23.69	24.0	0.337	**0.36**	0.10
21350	2560.0	50RB25	Rear	19mm	22.68	23.0	0.244	**0.26**	0.06
21350	2560.0	1RB99	Bottom	19mm	23.69	24.0	0.409	**0.44**	0.07
21350	2560.0	50RB25	Bottom	19mm	22.68	23.0	0.308	**0.33**	0.16

Table 13.13: SAR Values (LTE Band 38 - Head)

Ambient Temperature: 23.0°C Liquid Temperature: 22.5°C									
Frequency		Test Mode	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
Ch.	MHz								
38150	2610.0	1RB0	Left Cheek	/	23.53	24.0	0.027	**0.03**	0.09
37850	2580.0	50RB25	Left Cheek	/	22.60	23.0	0.020	**0.02**	-0.15
38150	2610.0	1RB0	Left Tilt	/	23.53	24.0	0.022	**0.02**	0.08
37850	2580.0	50RB25	Left Tilt	/	22.60	23.0	0.030	**0.03**	0.04
38150	2610.0	1RB0	Right Cheek	**13**	23.53	24.0	**0.126**	**0.14**	0.01
37850	2580.0	50RB25	Right Cheek	/	22.60	23.0	0.079	**0.09**	-0.06
38150	2610.0	1RB0	Right Tilt	/	23.53	24.0	0.062	**0.07**	0.08
37850	2580.0	50RB25	Right Tilt	/	22.60	23.0	0.048	**0.05**	-0.17

Table 13.14: SAR Values (LTE Band 38 - Body)

Ambient Temperature: 23.0°C Liquid Temperature: 22.5°C									
Frequency		Test Mode	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
Ch.	MHz								
Hotspot / Body-Worn Test Data (10mm)									
38000	2595.0	1RB99	Front	/	21.84	22.0	0.312	**0.32**	0.06
38000	2595.0	50RB25	Front	/	20.91	21.0	0.233	**0.24**	0.01
38000	2595.0	1RB99	Rear	/	21.84	22.0	0.599	**0.62**	0.07
38000	2595.0	50RB25	Rear	/	20.91	21.0	0.476	**0.49**	0.03
Hotspot Test Data (10mm)									
38150	2610.0	1RB0	Left	/	23.53	24.0	0.129	**0.14**	0.03
37850	2580.0	50RB25	Left	/	22.60	23.0	0.108	**0.12**	0.07
38150	2610.0	1RB0	Right	/	23.53	24.0	0.219	**0.24**	0.13
37850	2580.0	50RB25	Right	/	22.60	23.0	0.157	**0.17**	0.03
38000	2595.0	1RB99	Bottom	/	21.84	22.0	0.776	**0.81**	-0.11
38000	2595.0	50RB25	Bottom	/	20.91	21.0	0.564	**0.58**	-0.07
38150	2610.0	1RB99	Bottom	**14**	21.82	22.0	**0.850**	**0.89**	-0.16
37850	2580.0	1RB99	Bottom	/	21.74	22.0	0.665	**0.71**	-0.19
38150	2610.0	100RB0	Bottom	/	20.96	21.0	0.621	**0.63**	-0.04
Sensor off Test Data									
38150	2610.0	1RB0	Front	15mm	23.53	24.0	0.311	**0.35**	0.08
37850	2580.0	50RB25	Front	15mm	22.60	23.0	0.213	**0.23**	0.07
38150	2610.0	1RB0	Rear	19mm	23.53	24.0	0.372	**0.41**	0.18
37850	2580.0	50RB25	Rear	19mm	22.60	23.0	0.260	**0.29**	0.00
38150	2610.0	1RB0	Bottom	19mm	23.53	24.0	0.522	**0.58**	-0.07
37850	2580.0	50RB25	Bottom	19mm	22.60	23.0	0.373	**0.41**	0.01

13.3. 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.

Table 13.15: SAR Values (WLAN 2.4G - Head)

Ambient Temperature: 22.3°C									Liquid Temperature: 21.8°C
Frequency		Test Mode	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
Ch.	MHz								
1	2412.0	802.11b	Left Cheek	**15**	16.20	17.0	**0.477**	**0.57**	-0.10
1	2412.0	802.11b	Left Tilt	/	16.20	17.0	0.215	**0.26**	0.07
1	2412.0	802.11b	Right Cheek	/	16.20	17.0	0.194	**0.23**	-0.01
1	2412.0	802.11b	Right Tilt	/	16.20	17.0	0.186	**0.22**	0.08

Note: 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 ≤ 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.

Table 13.16: SAR Values (WLAN - Head) – 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					
1	2412.0	Left Cheek	100%	100%	0.57	**0.57**

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

Table 13.17: SAR Values (WLAN 2.4G - Body)

Ambient Temperature: 22.3°C Liquid Temperature: 21.8°C									
Frequency		Test Mode	Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift(dB)
Ch.	MHz								
Hotspot / Body-Worn Test Data (10mm)									
1	2412.0	802.11b	Front	/	16.20	17.0	0.105	**0.13**	-0.04
1	2412.0	802.11b	Rear	**16**	16.20	17.0	**0.157**	**0.19**	0.02
Hotspot Test Data (10mm)									
1	2412.0	802.11b	Left	/	16.20	17.0	0.020	**0.02**	0.06
1	2412.0	802.11b	Right	/	16.20	17.0	0.101	**0.12**	0.06
1	2412.0	802.11b	Top	/	16.20	17.0	0.104	**0.13**	-0.18

Note: 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 ≤ 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.

Table 13.18: 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					
1	2412.0	Rear	100%	100%	0.19	**0.19**

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

14. SAR Measurement Variability

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

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

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.

2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.

3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).

4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

Table 14.1: SAR Measurement Variability for Body – LTE Band 38

Frequency		Test Position	Original	1st Repeated	Ratio	2nd Repeated
Ch.	MHz		SAR (W/kg)	SAR (W/kg)		SAR (W/kg)
38150	2610.0	Bottom	0.850	0.839	1.01	/

15. Measurement Uncertainty

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

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	12	N	2	1	1	6.0	6.0	∞
2	Axial isotropy	B	4.7	R	$\sqrt{3}$	√0.5	√0.5	4.3	4.3	∞
3	Hemispherical isotropy	B	9.6	R	$\sqrt{3}$	1	1	4.8	4.8	∞
4	Boundary effect	B	1.1	R	$\sqrt{3}$	1	1	0.6	0.6	∞
5	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
6	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
7	Modulation response	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
8	Readout electronics	B	1.0	N	1	1	1	1.0	1.0	∞
9	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
10	Integration time	B	1.7	R	$\sqrt{3}$	1	1	1.0	1.0	∞
11	RF ambient conditions-noise	B	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
12	RF ambient conditions-reflection	B	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
13	Probe positioned mech. restrictions	B	0.35	R	$\sqrt{3}$	1	1	0.2	0.2	∞
14	Probe positioning with respect to phantom shell	B	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
15	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Test sample related										
16	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	5
17	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
18	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
19	Phantom uncertainty	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
20	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
21	Liquid conductivity (meas.)	A	1.3	N	1	0.64	0.43	0.83	0.56	9
22	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
23	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	0.96	0.78	9
Combined standard uncertainty		$u_c' = \sqrt{\sum_{i=1}^{23} c_i^2 u_i^2}$						11.3	11.2	95.5
Expanded uncertainty (Confidence interval of 95 %)		$u_e = 2u_c$						22.6	22.4	

16. Main Test Instruments

Table 16.1: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	E5071C	MY46103759	2020-11-15	One year
02	Dielectric probe	85070E	MY44300317	/	/
03	Power meter	E4418B	MY50000366	2020-12-13	One year
04	Power sensor	E9304A	MY50000188		
05	Power meter	NRP	101460	2021-01-15	One year
06	Power sensor	NRP-Z91	100553		
07	Signal Generator	E8257D	MY47461211	2021-01-15	One year
08	Amplifier	VTL5400	0404	/	/
09	E-field Probe	EX3DV4	7621	2020-11-30 & 2020-10-05	One year
10	DAE	DAE4	1527	2020-11-06	One year
11	Dipole Validation Kit	D835V2	4d057	2018-10-09	Three year
12	Dipole Validation Kit	D1900V2	5d088	2018-10-24	Three year
13	Dipole Validation Kit	D2450V2	873	2018-10-26	Three year
14	Dipole Validation Kit	D2550V2	1010	2021-05-21	Three year
15	BTS	MT8820C	6201341853	2021-01-15	One year
16	BTS	E5515C	GB46110722	2021-01-15	One year
18	BTS	CMW500	158344	2021-07-17	One year
19	Software	DASY5	52.8.8.1222	/	/

ANNEX A: Graph Results

GSM850 Head
Date: 2021-9-18
Electronics: DAE4 Sn1527
Medium: Head 835MHz
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.917 S/m; ε_r = 40.769; ρ = 1000 kg/m^3
Communication System: UID 0, GSM (0) Frequency: 836.6 MHz Duty Cycle: 1:8.3
Probe: EX3DV4 – SN7621 ConvF (10.35, 10.35, 10.35);

Right Cheek Middle/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.293 W/kg

Right Cheek Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.696 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.320 W/kg
SAR(1 g) = 0.258 W/kg; SAR(10 g) = 0.199 W/kg
Maximum value of SAR (measured) = 0.292 W/kg

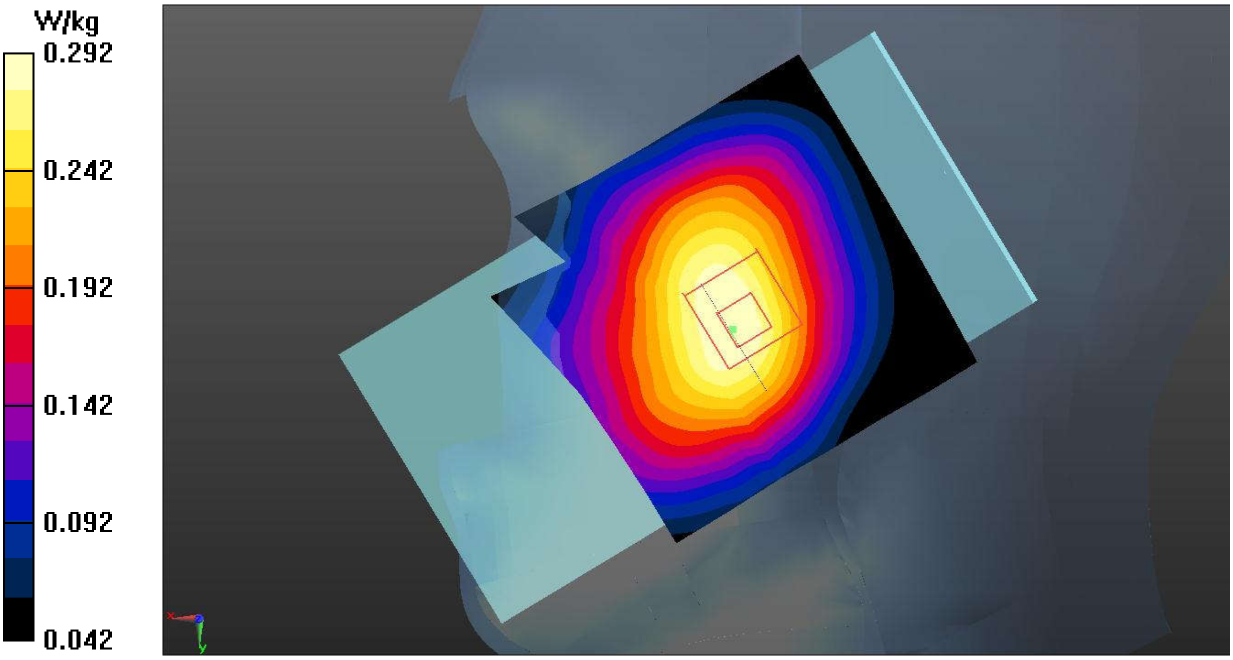


Fig.1 GSM 850

GSM850 Body

Date: 2021-9-18

Electronics: DAE4 Sn1527

Medium: Head 835MHz

Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.917 S/m; ε_r = 40.769; ρ = 1000 kg/m^3

Communication System: UID 0, GPRS 2Txslot (0) Frequency: 836.6 MHz Duty Cycle: 1:4

Probe: EX3DV4 – SN7621 ConvF (10.35, 10.35, 10.35);

Rear Side Middle/Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.484 W/kg

Rear Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 21.83 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.569 W/kg

SAR(1 g) = 0.437 W/kg; SAR(10 g) = 0.331 W/kg

Maximum value of SAR (measured) = 0.481 W/kg

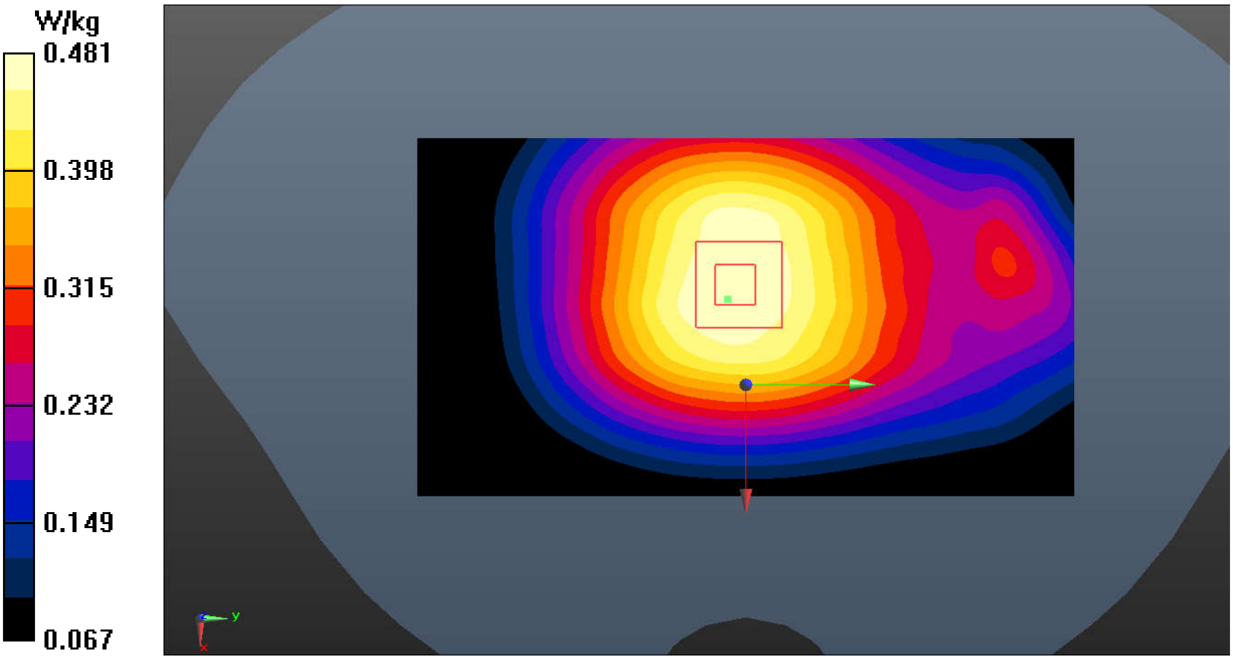


Fig.2 GSM 850

GSM1900 Head
Date: 2021-9-21
Electronics: DAE4 Sn1527
Medium: Head 1900MHz
Medium parameters used: f = 1880 MHz; σ = 1.4 S/m; ε_r = 39.002; ρ = 1000 kg/m^3
Communication System: UID 0, GSM (0) Frequency: 1880 MHz Duty Cycle: 1:8.3
Probe: EX3DV4 – SN7621 ConvF (8.77, 8.77, 8.77);

Right Cheek Middle/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.155 W/kg

Right Cheek Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.816 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.170 W/kg
SAR(1 g) = 0.120 W/kg; SAR(10 g) = 0.080 W/kg
Maximum value of SAR (measured) = 0.146 W/kg

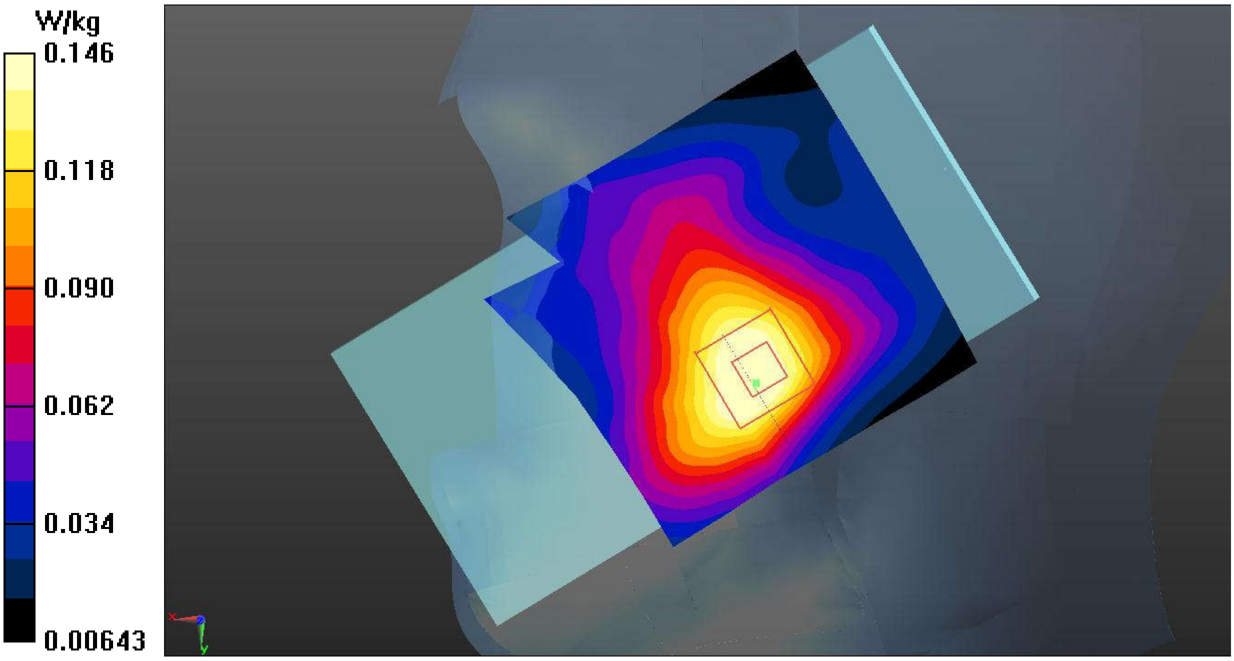


Fig.3 GSM 1900

GSM1900 Body
Date: 2021-9-21
Electronics: DAE4 Sn1527
Medium: Head 1900MHz
Medium parameters used: f = 1880 MHz; σ = 1.4 S/m; ε_r = 39.002; ρ = 1000 kg/m^3
Communication System: UID 0, GPRS 4Txslot (0) Frequency: 1880 MHz Duty Cycle: 1:2
Probe: EX3DV4 – SN7621 ConvF (8.77, 8.77, 8.77);

Bottom Side Middle/Area Scan (41x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.722 W/kg

Bottom Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.88 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.867 W/kg
SAR(1 g) = 0.505 W/kg; SAR(10 g) = 0.269 W/kg
Maximum value of SAR (measured) = 0.686 W/kg

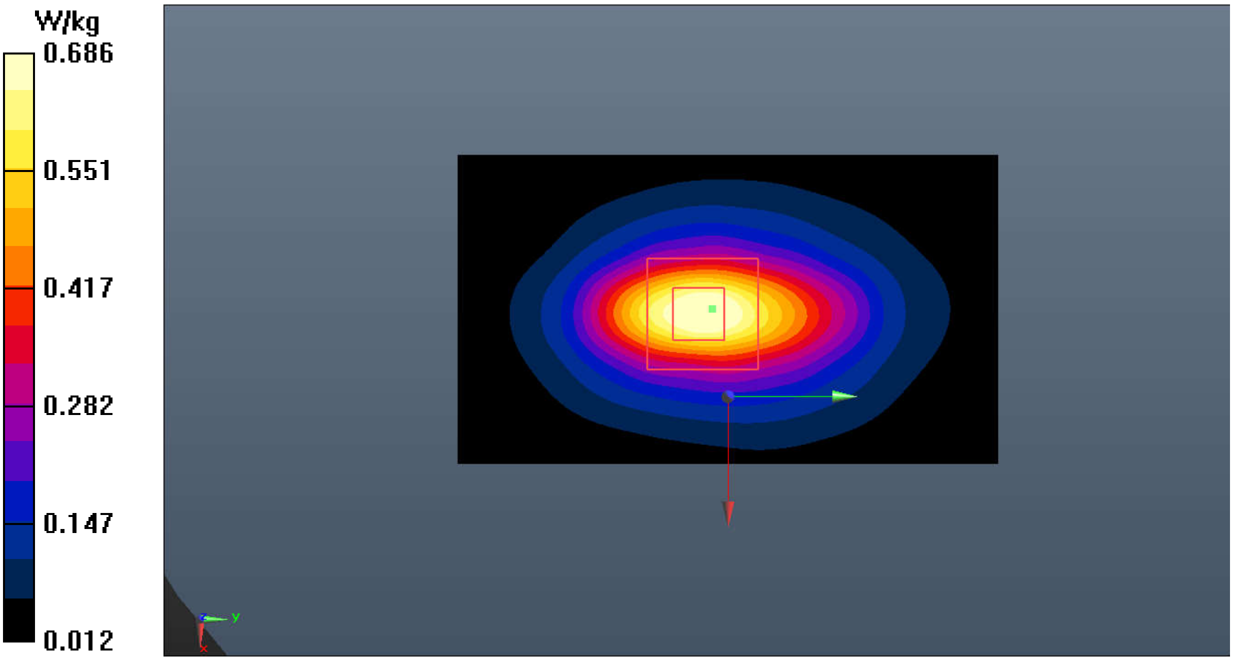


Fig.4 GSM 1900

WCDMA Band 2 Head
Date: 2021-9-21
Electronics: DAE4 Sn1527
Medium: Head 1900MHz
Medium parameters used: f = 1880 MHz; σ = 1.4 S/m; ε_r = 39.002; ρ = 1000 kg/m^3
Communication System: UID 0, WCDMA (0) Frequency: 1880 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7621 ConvF (8.77, 8.77, 8.77);

Right Cheek Middle/Area Scan (61x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.344 W/kg

Right Cheek Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.048 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.432 W/kg
SAR(1 g) = 0.283 W/kg; SAR(10 g) = 0.178 W/kg
Maximum value of SAR (measured) = 0.330 W/kg

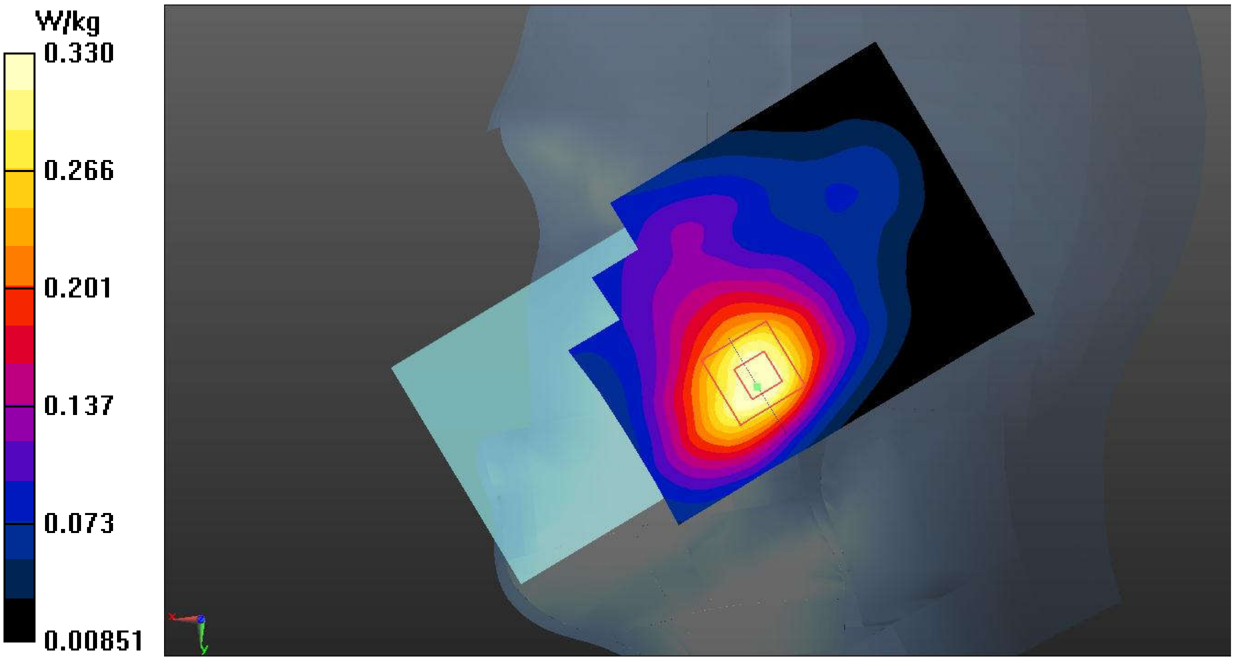


Fig.5 WCDMA Band 2

WCDMA Band 2 Body
Date: 2021-9-21
Electronics: DAE4 Sn1527
Medium: Head 1900MHz
Medium parameters used: f = 1880 MHz; σ = 1.4 S/m; ε_r = 39.002; ρ = 1000 kg/m^3
Communication System: UID 0, WCDMA (0) Frequency: 1880 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7621 ConvF (8.77, 8.77, 8.77);

Bottom Side Middle/Area Scan (41x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.795 W/kg

Bottom Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.58 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.925 W/kg
SAR(1 g) = 0.543 W/kg; SAR(10 g) = 0.292 W/kg
Maximum value of SAR (measured) = 0.752 W/kg

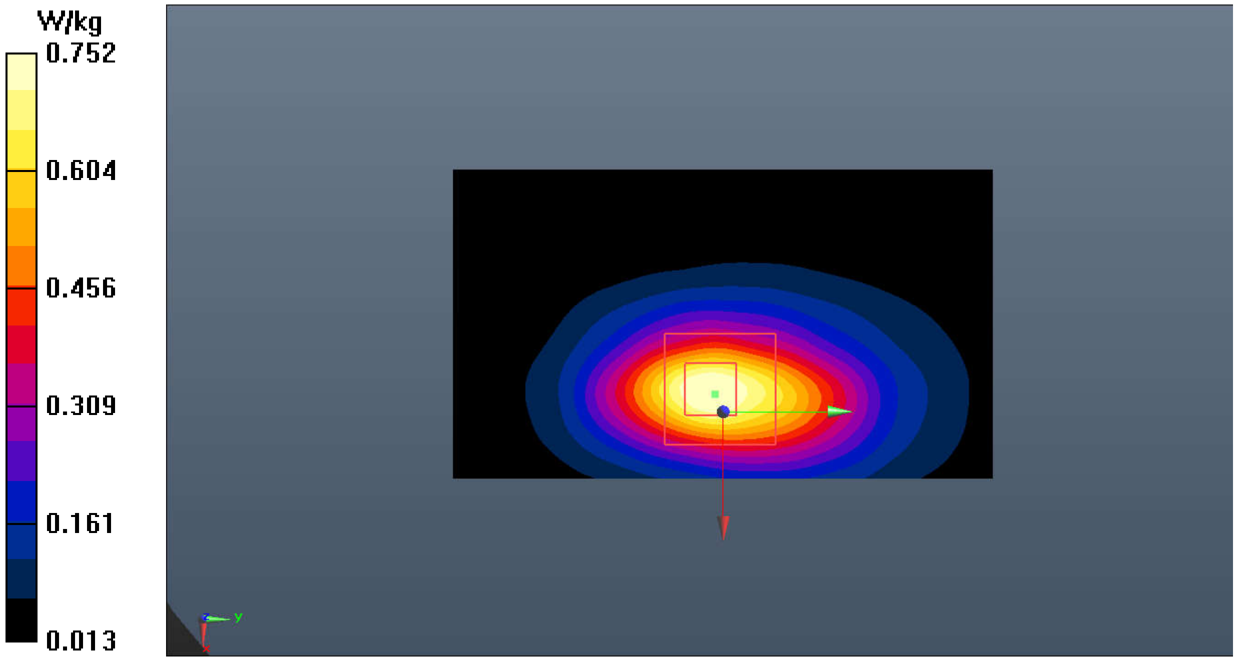


Fig.6 WCDMA Band 2

WCDMA Band 5 Head
Date: 2021-9-18
Electronics: DAE4 Sn1527
Medium: Head 835MHz
Medium parameters used (interpolated): f = 836.4 MHz; σ = 0.917 S/m; ε_r = 40.771; ρ = 1000 kg/m^3
Communication System: UID 0, WCDMA (0) Frequency: 836.4 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7621 ConvF (10.35, 10.35, 10.35);

Right Cheek Middle/Area Scan (61x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.355 W/kg

Right Cheek Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.070 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.424 W/kg
SAR(1 g) = 0.309 W/kg; SAR(10 g) = 0.228 W/kg
Maximum value of SAR (measured) = 0.344 W/kg

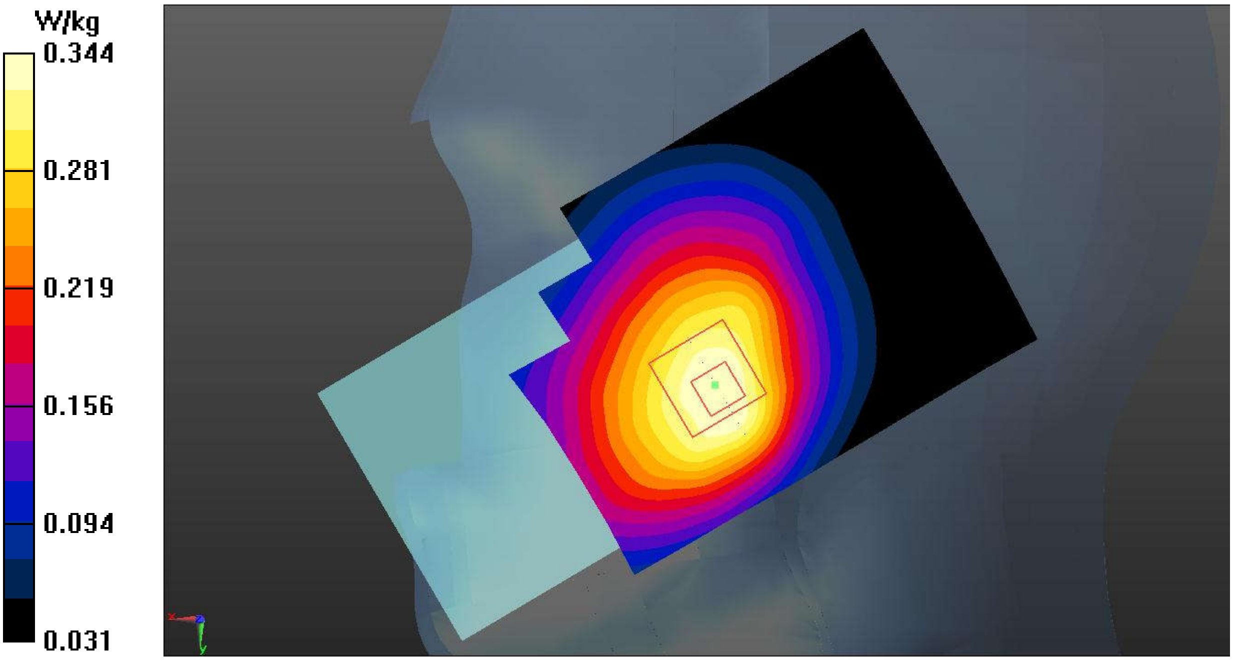


Fig.7 WCDMA Band 5

WCDMA Band 5 Body
Date: 2021-9-18
Electronics: DAE4 Sn1527
Medium: Head 835MHz
Medium parameters used (interpolated): f = 836.4 MHz; σ = 0.917 S/m; ε_r = 40.771; ρ = 1000 kg/m^3
Communication System: UID 0, WCDMA (0) Frequency: 836.4 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7621 ConvF (10.35, 10.35, 10.35);

Rear Side Middle/Area Scan (61x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.378 W/kg

Rear Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.06 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.454 W/kg
SAR(1 g) = 0.345 W/kg; SAR(10 g) = 0.260 W/kg
Maximum value of SAR (measured) = 0.381 W/kg

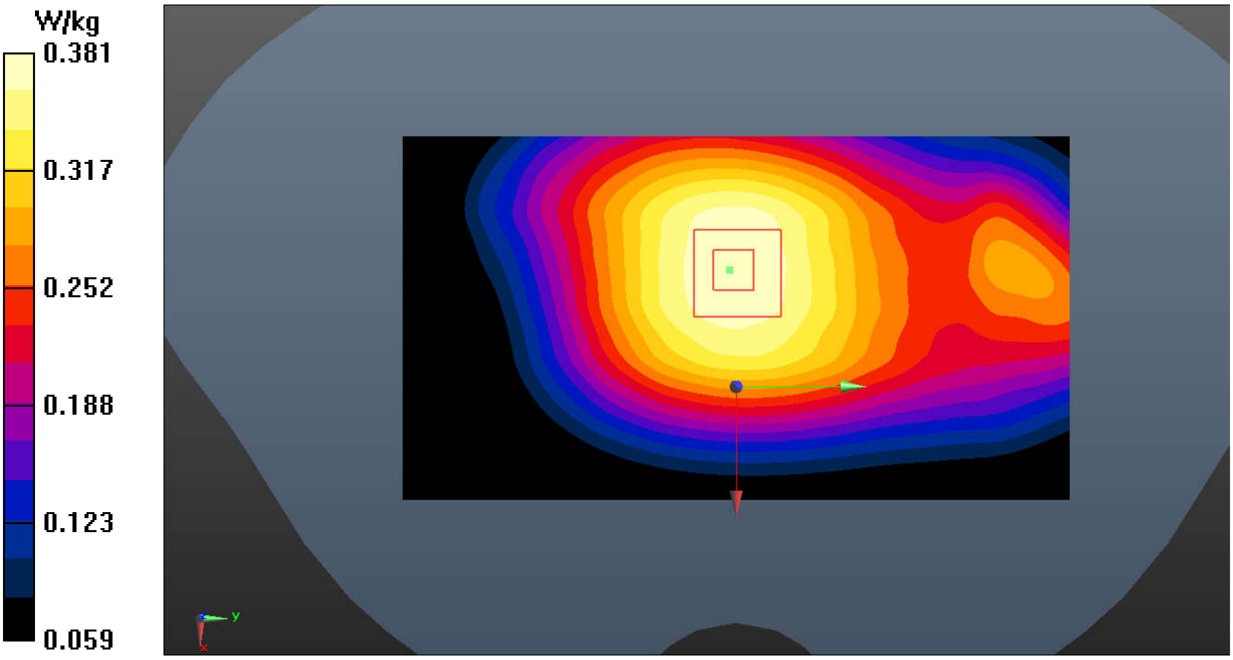


Fig.8 WCDMA Band 5

LTE Band 2 Head
Date: 2021-9-21
Electronics: DAE4 Sn1527
Medium: Head 1900MHz
Medium parameters used: f = 1880 MHz; σ = 1.4 S/m; ε_r = 39.002; ρ = 1000 kg/m^3
Communication System: UID 0, LTE_FDD (0) Frequency: 1880 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7621 ConvF (8.77, 8.77, 8.77);

Right Cheek Middle 1RB99/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.321 W/kg

Right Cheek Middle 1RB99/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.035 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.384 W/kg
SAR(1 g) = 0.255 W/kg; SAR(10 g) = 0.163 W/kg
Maximum value of SAR (measured) = 0.302 W/kg

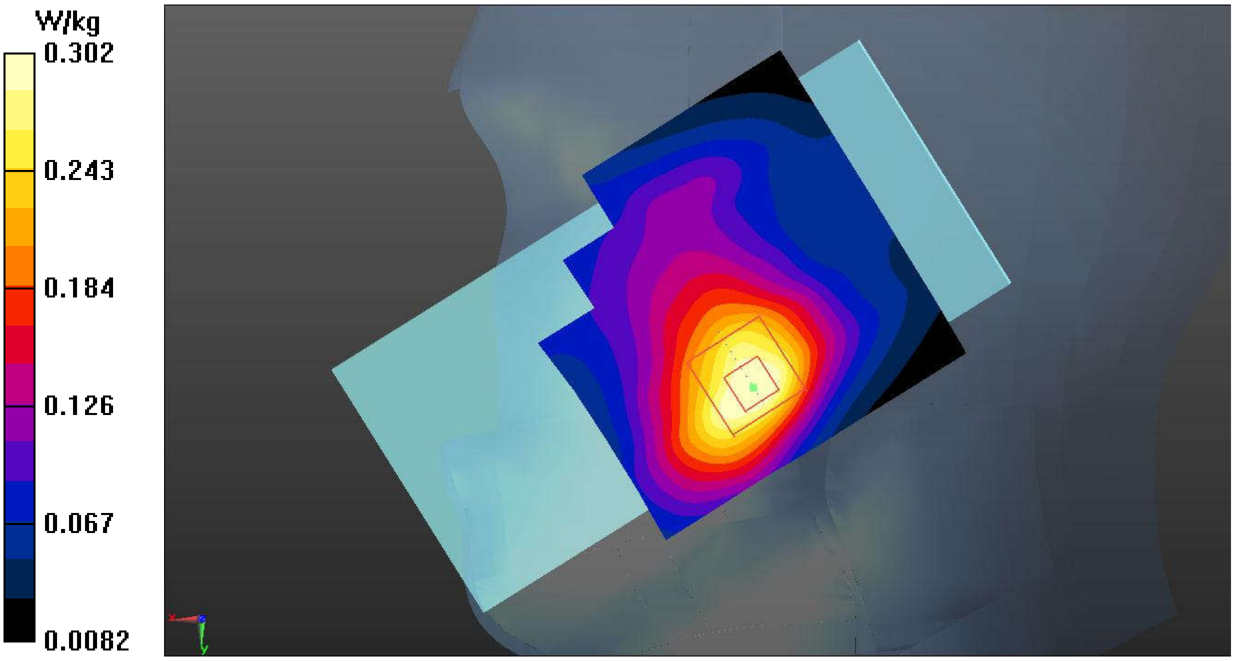


Fig.9 LTE Band 2

LTE Band 2 Body
Date: 2021-9-21
Electronics: DAE4 Sn1527
Medium: Head 1900MHz
Medium parameters used: f = 1900 MHz; σ = 1.418 S/m; ε_r = 38.924; ρ = 1000 kg/m^3
Communication System: UID 0, LTE_FDD (0) Frequency: 1900 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7621 ConvF (8.77, 8.77, 8.77);

Bottom Side High 50RB0/Area Scan (41x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.807 W/kg

Bottom Side High 50RB0/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.27 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 0.983 W/kg
SAR(1 g) = 0.574 W/kg; SAR(10 g) = 0.308 W/kg
Maximum value of SAR (measured) = 0.797 W/kg

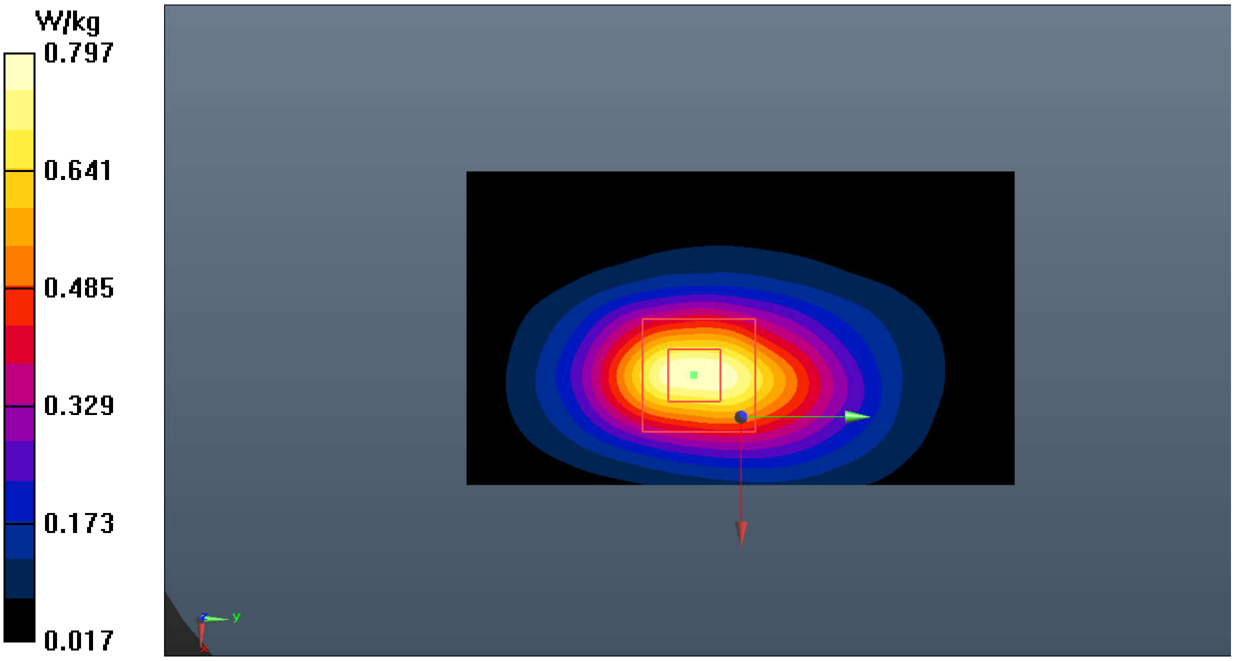


Fig.10 LTE Band 2

LTE Band 7 Head
Date: 2021-9-26
Electronics: DAE4 Sn1527
Medium: Head 2550MHz
Medium parameters used: f = 2560 MHz; σ = 1.956 S/m; ε_r = 38.436; ρ = 1000 kg/m^3
Communication System: UID 0, LTE_FDD (0) Frequency: 2560 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7621 ConvF (7.84, 7.84, 7.84);

Right Cheek High 1RB99/Area Scan (91x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.127 W/kg

Right Cheek High 1RB99/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.002 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.113 W/kg
SAR(1 g) = 0.059 W/kg; SAR(10 g) = 0.030 W/kg
Maximum value of SAR (measured) = 0.0833 W/kg

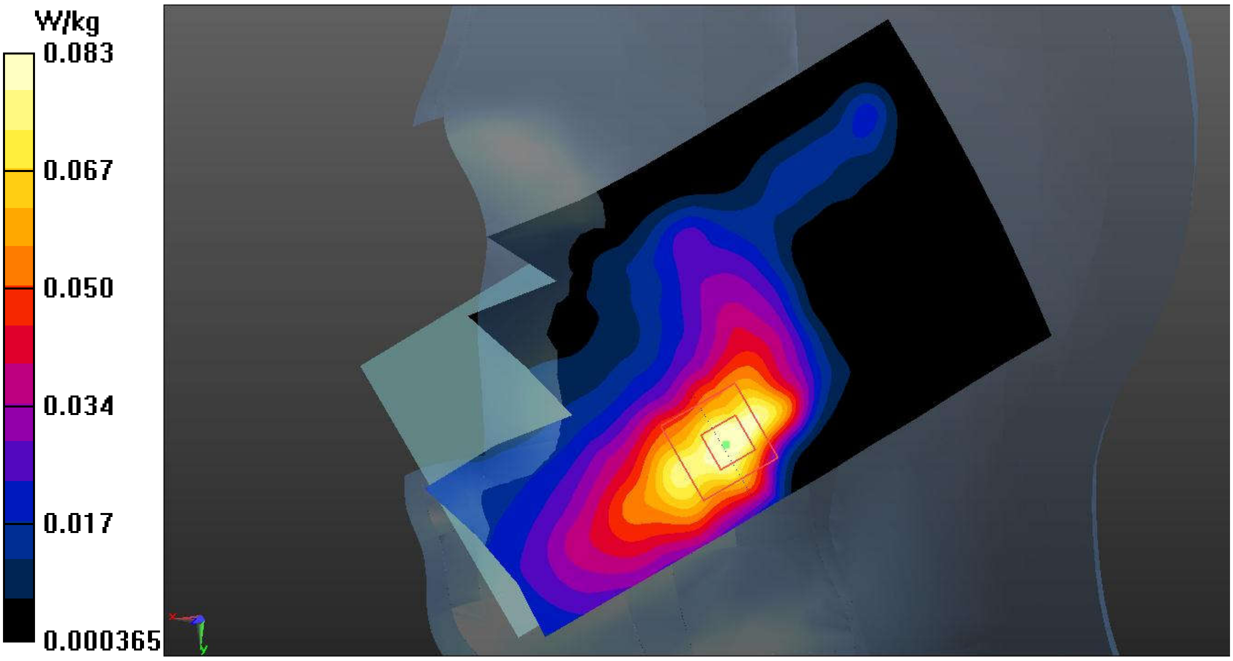


Fig.11 LTE Band 7

LTE Band 7 Body
Date: 2021-9-26
Electronics: DAE4 Sn1527
Medium: Head 2550MHz
Medium parameters used (interpolated): f = 2535 MHz; σ = 1.926 S/m; ε_r = 38.519; ρ = 1000 kg/m^3
Communication System: UID 0, LTE_FDD (0) Frequency: 2535 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7621 ConvF (8.01, 8.01, 8.01);

Bottom Side Middle 1RB99/Area Scan (61x111x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.746 W/kg

Bottom Side Middle 1RB99/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.858 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.04 W/kg
SAR(1 g) = 0.489 W/kg; SAR(10 g) = 0.208 W/kg
Maximum value of SAR (measured) = 0.762 W/kg

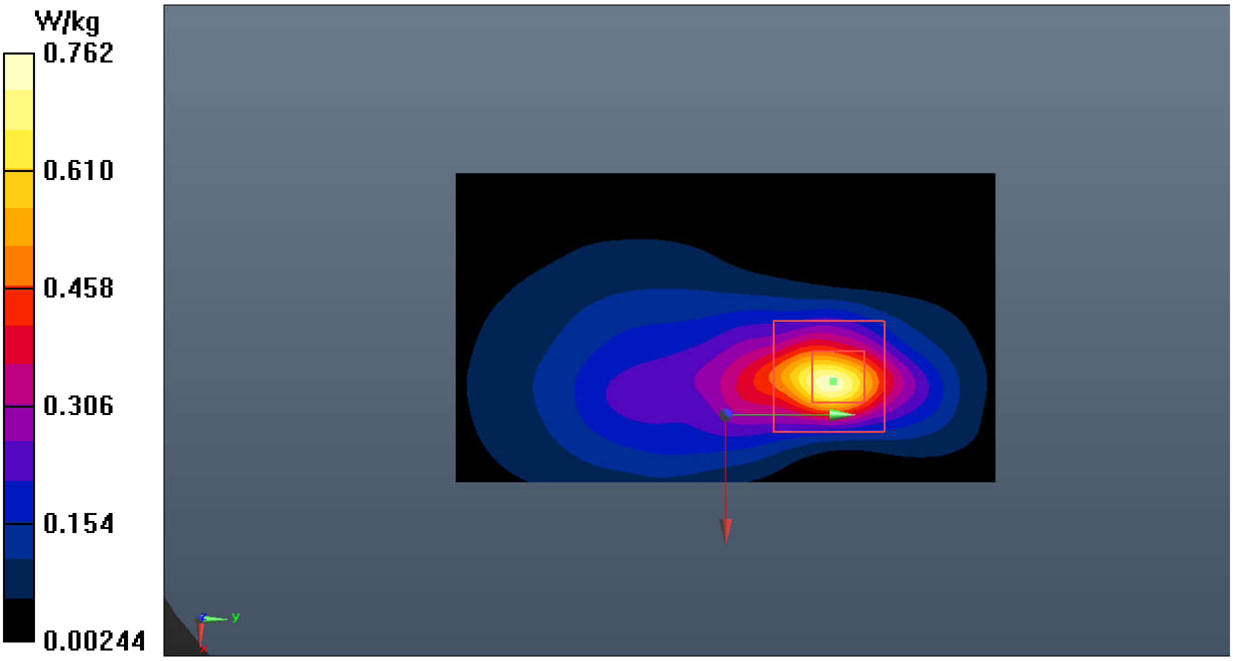


Fig.12 LTE Band 7

LTE Band 38 Head
Date: 2021-9-26
Electronics: DAE4 Sn1527
Medium: Head 2550MHz
Medium parameters used: f = 2610 MHz; σ = 2.015 S/m; ε_r = 38.271; ρ = 1000 kg/m^3
Communication System: UID 0, LTE_TDD (0) Frequency: 2610 MHz Duty Cycle: 1:1.58
Probe: EX3DV4 – SN7621 ConvF (7.84, 7.84, 7.84);

Right Cheek High 1RB0/Area Scan (91x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.184 W/kg

Right Cheek High 1RB0/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.135 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.228 W/kg
SAR(1 g) = 0.126 W/kg; SAR(10 g) = 0.069 W/kg
Maximum value of SAR (measured) = 0.177 W/kg

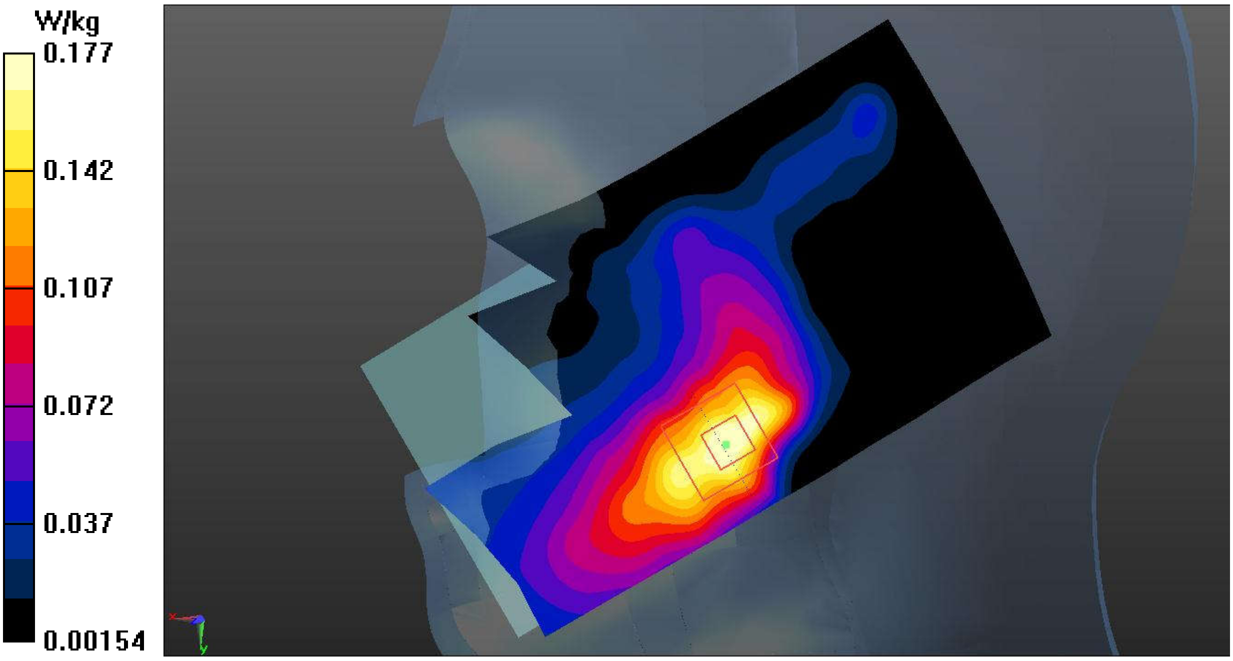


Fig.13 LTE Band 38

LTE Band 38 Body
Date: 2021-9-26
Electronics: DAE4 Sn1527
Medium: Head 2550MHz
Medium parameters used: f = 2610 MHz; σ = 2.015 S/m; ε_r = 38.271; ρ = 1000 kg/m^3
Communication System: UID 0, LTE_TDD (0) Frequency: 2610 MHz Duty Cycle: 1:1.58
Probe: EX3DV4 – SN7621 ConvF (7.84, 7.84, 7.84);

Bottom Side High 1RB99/Area Scan (61x111x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.36 W/kg

Bottom Side High 1RB99/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.09 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 1.81 W/kg
SAR(1 g) = 0.850 W/kg; SAR(10 g) = 0.367 W/kg
Maximum value of SAR (measured) = 1.32 W/kg

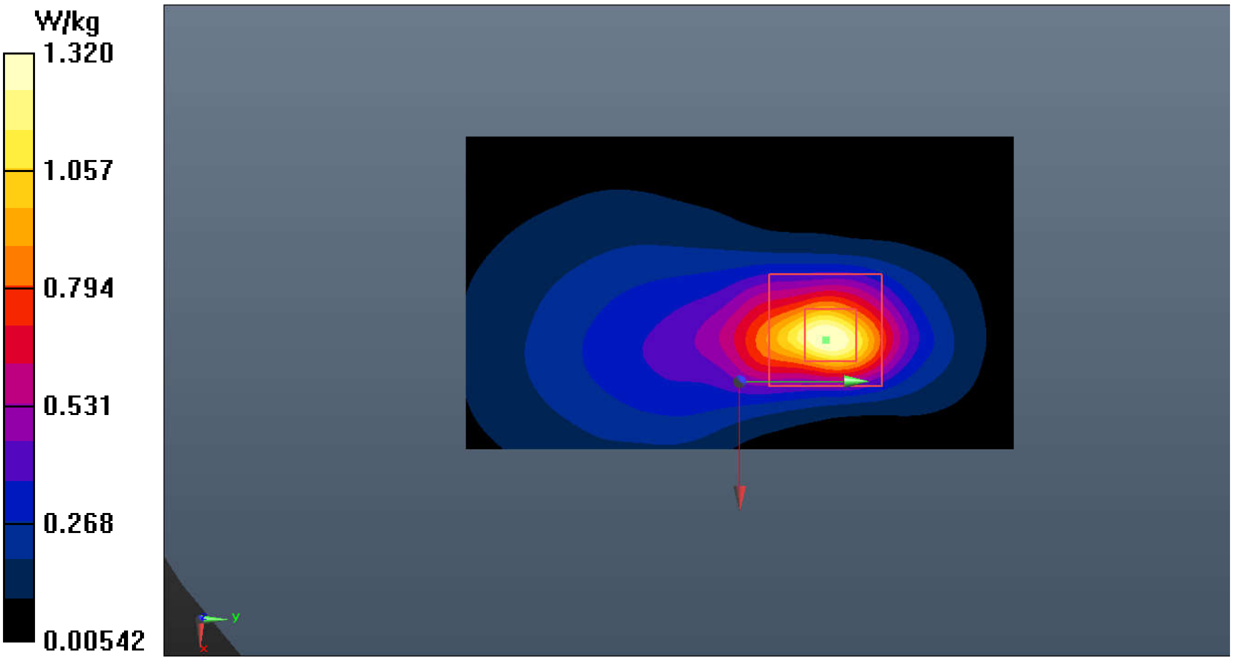


Fig.14 LTE Band 38

WLAN 2.4G Head
Date: 2021-9-23
Electronics: DAE4 Sn1527
Medium: Head 2450MHz
Medium parameters used: f = 2412 MHz; σ = 1.796 S/m; ε_r = 38.975; ρ = 1000 kg/m^3
Communication System: UID 0, WiFi (0) Frequency: 2412 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7621 ConvF (8.01, 8.01, 8.01);

Left Cheek Low/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.654 W/kg

Left Cheek Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.63 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.971 W/kg
SAR(1 g) = 0.477 W/kg; SAR(10 g) = 0.242 W/kg
Maximum value of SAR (measured) = 0.581 W/kg

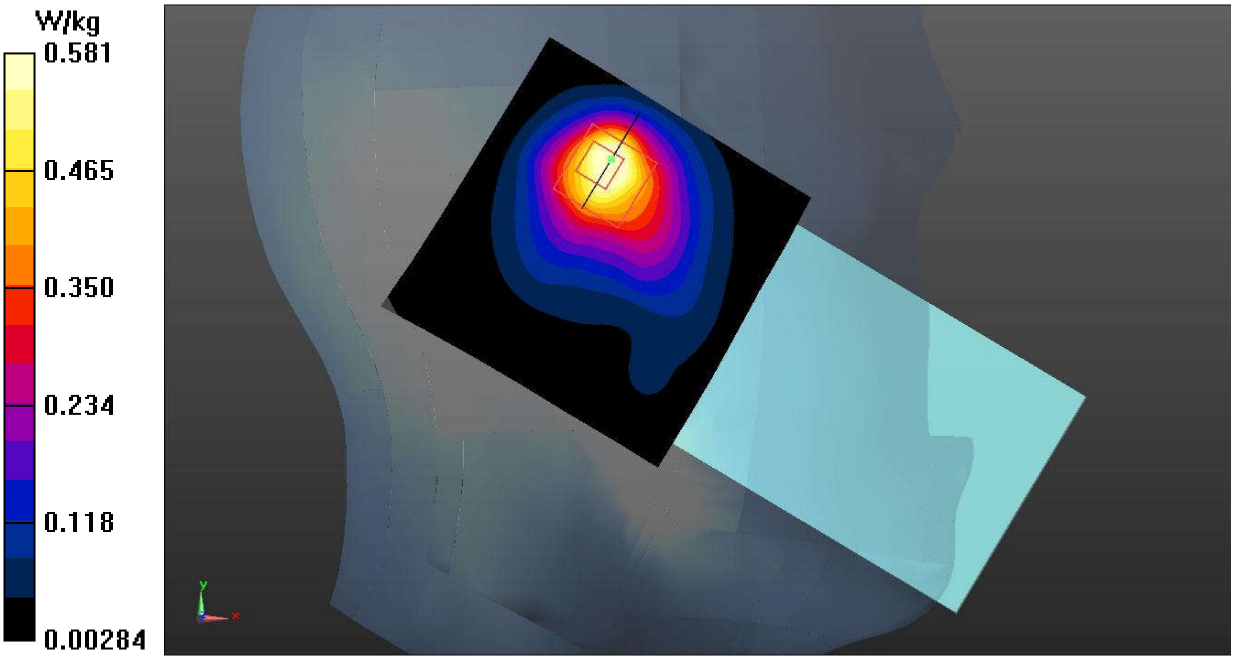


Fig.15 WLAN 2.4G

WLAN 2.4G Body
Date: 2021-9-23
Electronics: DAE4 Sn1527
Medium: Head 2450MHz
Medium parameters used: f = 2412 MHz; σ = 1.796 S/m; ε_r = 38.975; ρ = 1000 kg/m^3
Communication System: UID 0, WiFi (0) Frequency: 2412 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7621 ConvF (8.01, 8.01, 8.01);

Rear Side Low/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.219 W/kg

Rear Side Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.368 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.333 W/kg
SAR(1 g) = 0.157 W/kg; SAR(10 g) = 0.078 W/kg
Maximum value of SAR (measured) = 0.198 W/kg

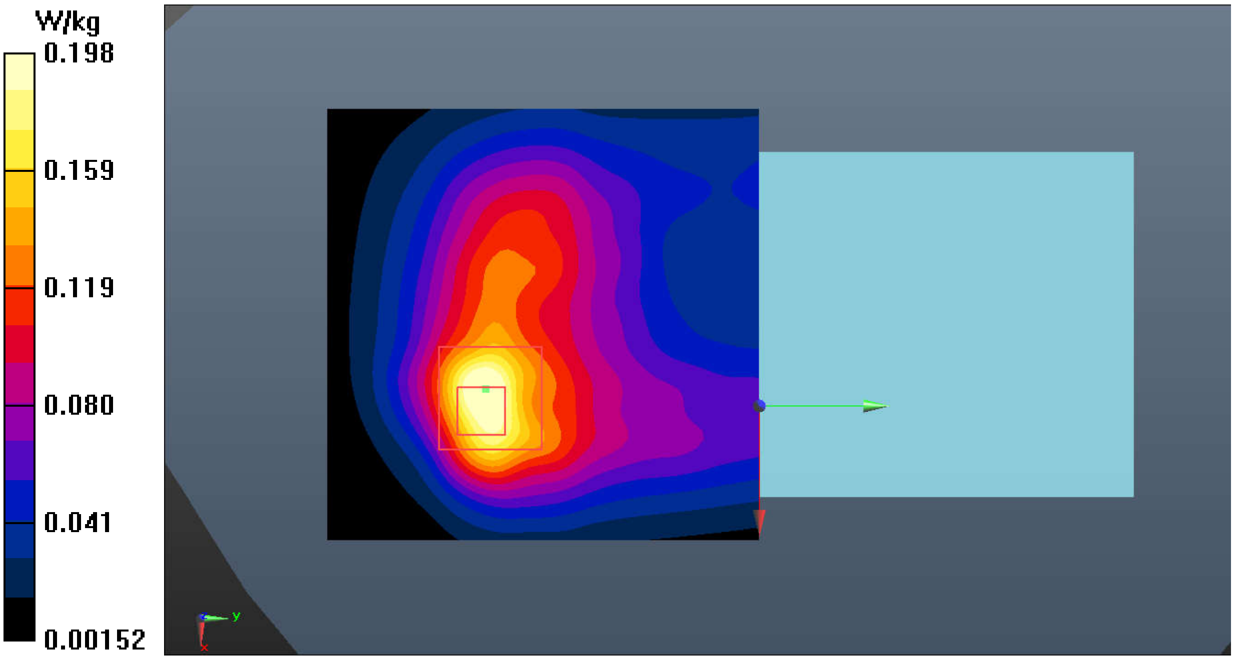


Fig.16 WLAN 2.4G

ANNEX B: SystemVerification Results

835MHz

Date: 2021-9-18

Electronics: DAE4 Sn1527

Medium: Head 835MHz

Medium parameters used: f = 835 MHz; σ = 0.916 S/m; εr = 40.788; ρ = 1000 kg/m^3

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

Probe: EX3DV4 – SN7621 ConvF (10.35, 10.35, 10.35);

System Validation/Area Scan (81x151x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 65.245 V/m; Power Drift = 0.05 dB

SAR(1 g) = 2.46 W/kg; SAR(10 g) = 1.59 W/kg

Maximum value of SAR (interpolated) = 3.43 W/kg

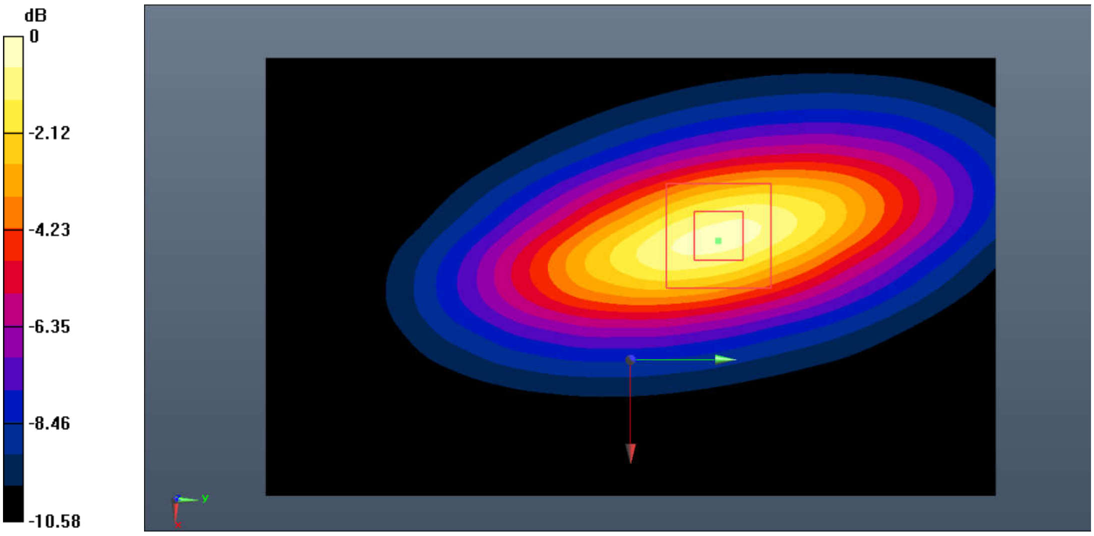
System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 65.245 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 3.74 W/kg

SAR(1 g) = 2.51 W/kg; SAR(10 g) = 1.62 W/kg

Maximum value of SAR (measured) = 3.46 W/kg



0 dB = 3.46 W/kg = 5.39 dB W/kg

Fig.B.1. Validation 835MHz 250mW

1900MHz

Date: 2021-9-21

Electronics: DAE4 Sn1527

Medium: Head 1900MHz

Medium parameters used: f = 1900 MHz; σ = 1.418 S/m; ε_r = 38.924; ρ = 1000 kg/m^3

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

Probe: EX3DV4 – SN7621 ConvF (8.77, 8.77, 8.77);

System Validation/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 82.562 V/m; Power Drift = 0.10 dB

SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.24 W/kg

Maximum value of SAR (interpolated) = 12.3 W/kg

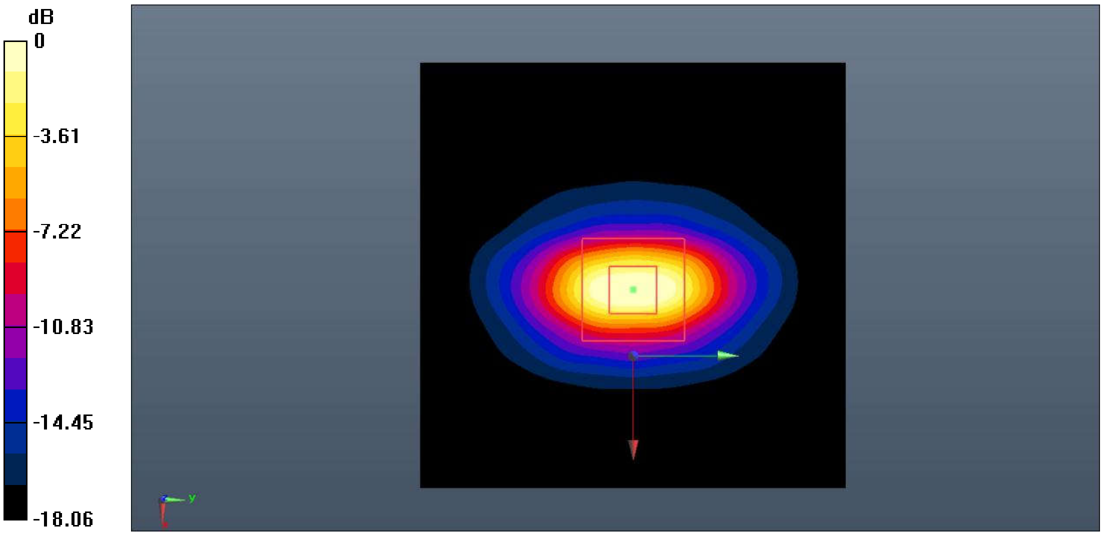
System Validation/Zoom Scan (7x7x7)/Cube0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 82.562 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 27.1 W/kg

SAR(1 g) = 10.4 W/kg; SAR(10 g) = 5.33 W/kg

Maximum value of SAR (measured) = 12.5 W/kg



0 dB = 12.5 W/kg = 10.97 dB W/kg

Fig.B.2. Validation 1900MHz 250mW

2450MHz

Date: 2021-9-23

Electronics: DAE4 Sn1527

Medium: Head 2450MHz

Medium parameters used: f = 2450 MHz; σ = 1.841 S/m; ε_r = 38.85; ρ = 1000 kg/m^3

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

Probe: EX3DV4 – SN7621 ConvF (8.01, 8.01, 8.01);

System Validation/Area Scan (81x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 92.108 V/m; Power Drift = 0.05 dB

SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.09 W/kg

Maximum value of SAR (interpolated) = 15.3 W/kg

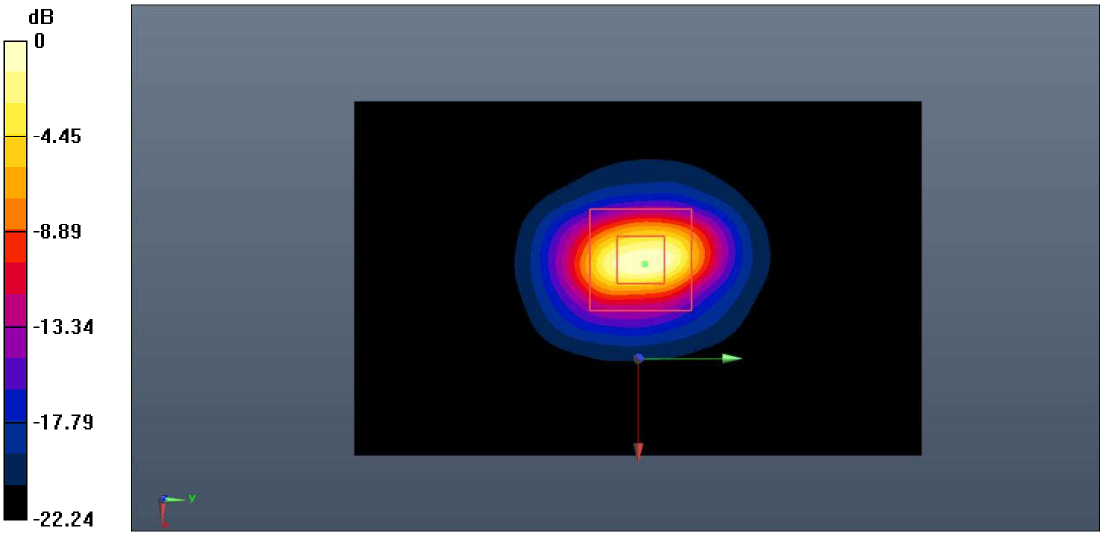
System Validation/Zoom Scan (7x7x7)/Cube0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 92.108 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 33.6 W/kg

SAR(1 g) = 13.6 W/kg; SAR(10 g) = 6.17 W/kg

Maximum value of SAR (measured) = 15.6 W/kg



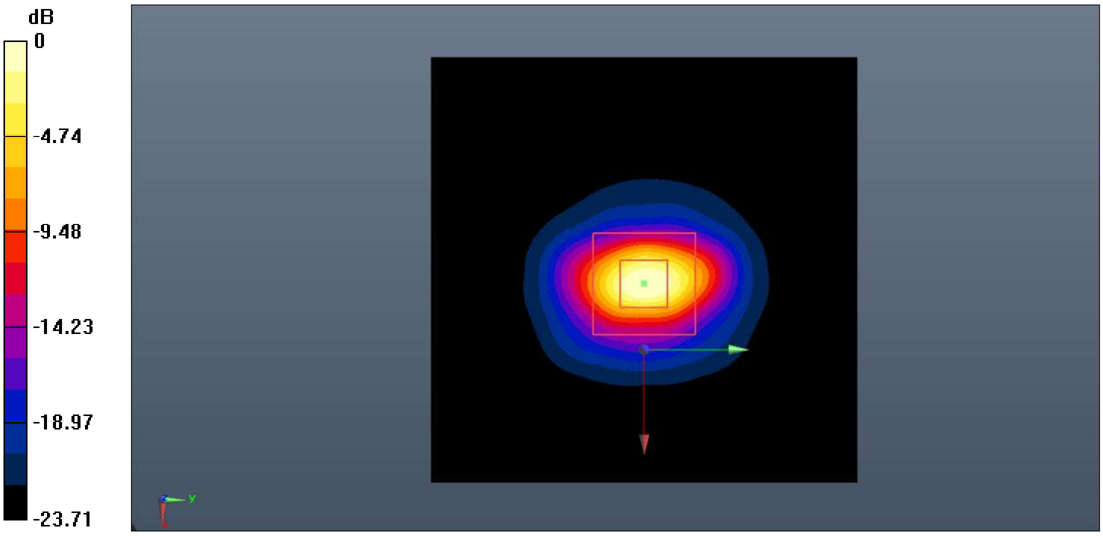
0 dB = 15.6 W/kg = 11.93 dB W/kg

Fig.B.3. Validation 2450MHz 250mW

2550MHz
Date: 2021-9-26
Electronics: DAE4 Sn1527
Medium: Head 2550MHz
Medium parameters used: f = 2550 MHz; σ = 1.944 S/m; ε_r = 38.469; ρ = 1000 kg/m^3
Communication System: CW_TMC Frequency: 2550 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7621 ConvF (8.01, 8.01, 8.01);

System Validation/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 93.128 V/m; Power Drift = 0.13 dB
SAR(1 g) = 14.2 W/kg; SAR(10 g) = 6.29 W/kg
Maximum value of SAR (interpolated) = 16.2 W/kg

System Validation/Zoom Scan (7x7x7)/Cube0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.128 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 35.8 W/kg
SAR(1 g) = 14.5 W/kg; SAR(10 g) = 6.44 W/kg
Maximum value of SAR (measured) = 16.6 W/kg



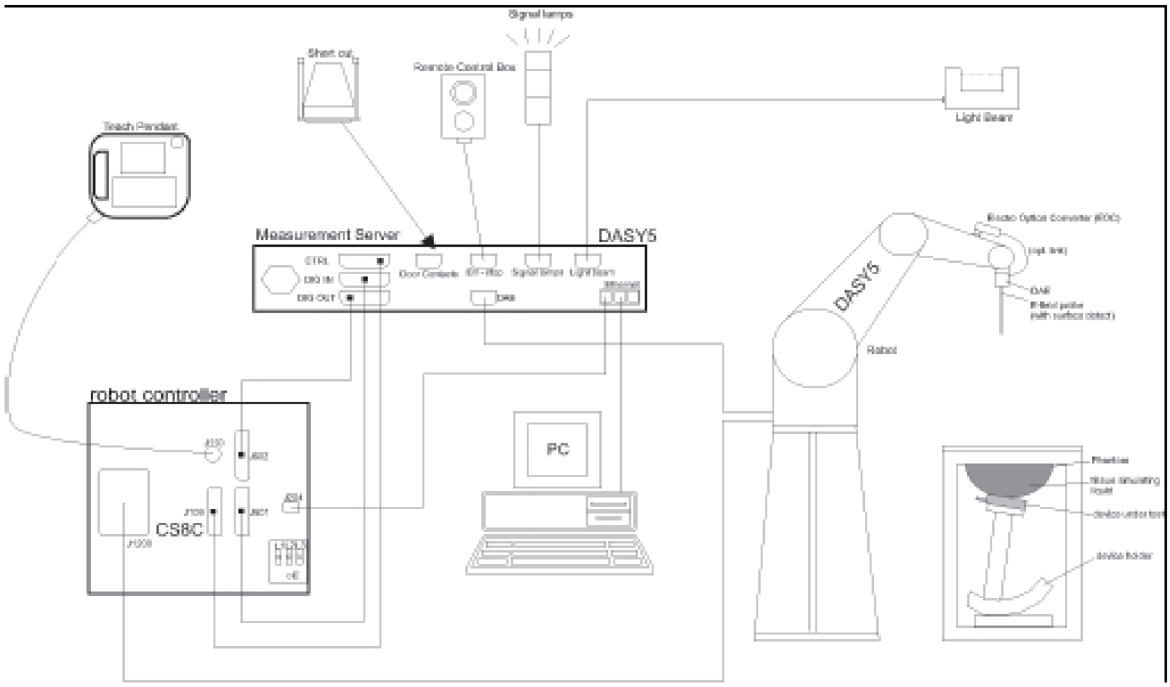
0 dB = 16.6 W/kg = 12.20 dB W/kg

Fig.B.4. Validation 2550MHz 250mW

ANNEX C: SAR Measurement Setup

C.1. Measurement Set-up

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 (Stäubli TX=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 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. 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 DASY5 software reads the reflection durning a software approach and looks for the maximum using 2ndord curve fitting. The approach is stopped at reaching the maximum.

Probe Specifications:

Model: ES3DV3, EX3DV4

Frequency Range: 10MHz — 6.0GHz(EX3DV4)
10MHz — 4GHz(ES3DV3)

Calibration: In head and body simulating tissue at Frequencies from 835 up to 5800MHz

Linearity: ± 0.2 dB(30 MHz to 6 GHz) for EX3DV4
± 0.2 dB(30 MHz to 4 GHz) for ES3DV3

Dynamic Range: 10 mW/kg — 100W/kg

Probe Length: 330 mm

Probe Tip Length: 20 mm

Body Diameter: 12 mm

Tip Diameter: 2.5 mm (3.9 mm for ES3DV3)

Tip-Center: 1 mm (2.0mm for ES3DV3)

Application: SAR Dosimetry Testing
Compliance tests of mobile phones
Dosimetry in strong gradient fields

Picture C.2 Near-field Probe

Picture C.3 E-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^2) 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 inn 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^2.

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:

Δt = Exposure time (30 seconds),

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

ΔT = Temperature increase due to RF exposure.

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

Where:

σ = Simulated tissue conductivity,

ρ = Tissue density (kg/m^3).

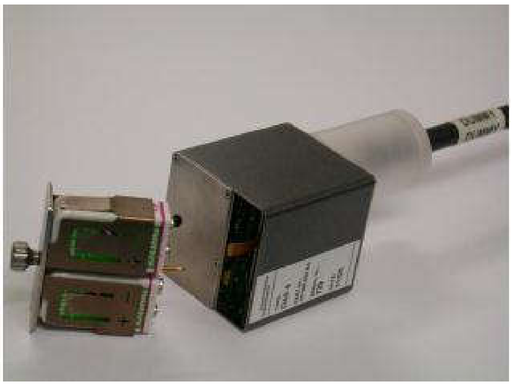
C.4. Other Test Equipment

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 (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 5

C.4.3. Measurement Server

The Measurement server is based on a PC/104 CPU broad with CPU (DASY5: 400 MHz, Intel Celeron), chipdisk (DASY5:128MB), RAM (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 broad, which is directly connected to the PC/104 bus of the CPU broad.

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.6 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 ±0.5mm would produce a SAR uncertainty of ±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.

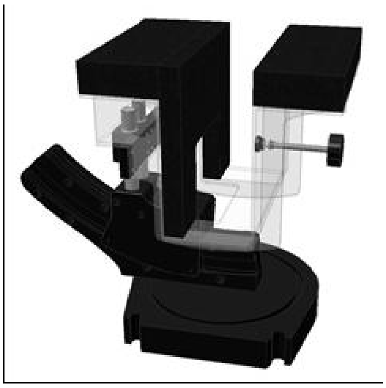
The DASY device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference 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 ε =3 and loss tangent δ =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.7-1: Device Holder



Picture C.7-2: 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 90th 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).

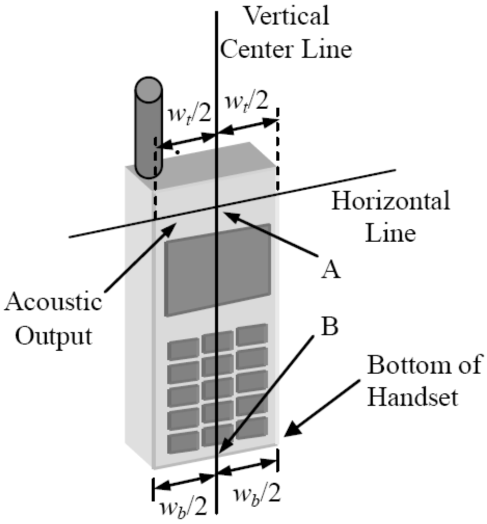
Shell Thickness:	2 ± 0. 2 mm
Filling Volume:	Approx. 25 liters
Dimensions:	810 x l000 x 500 mm (H x L x W)
Available:	Special

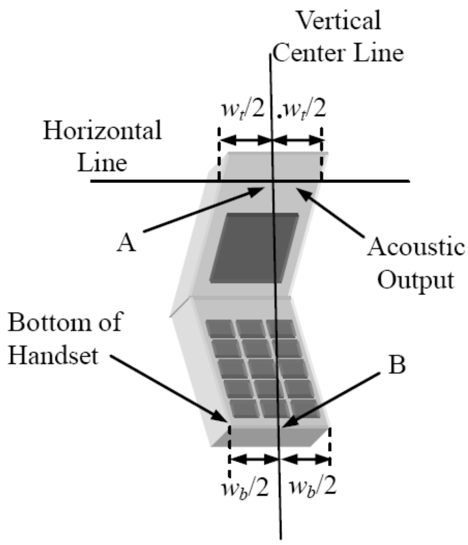
Picture C.8: SAM Twin Phantom

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

D.1. General considerations

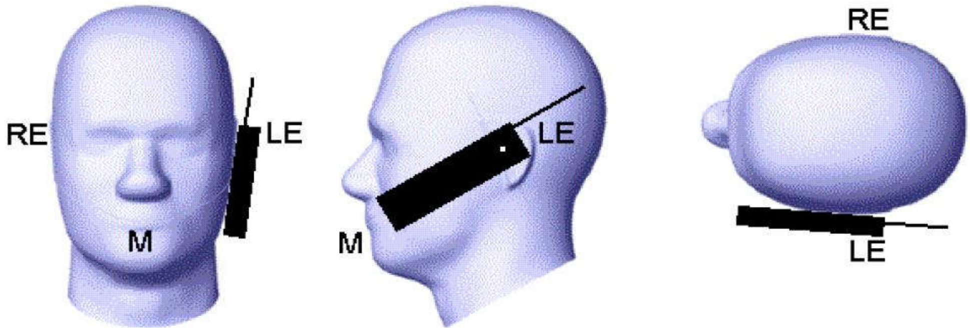
This standard specifies two handset test positions against the head phantom – the “cheek” position and the “tilt” position.



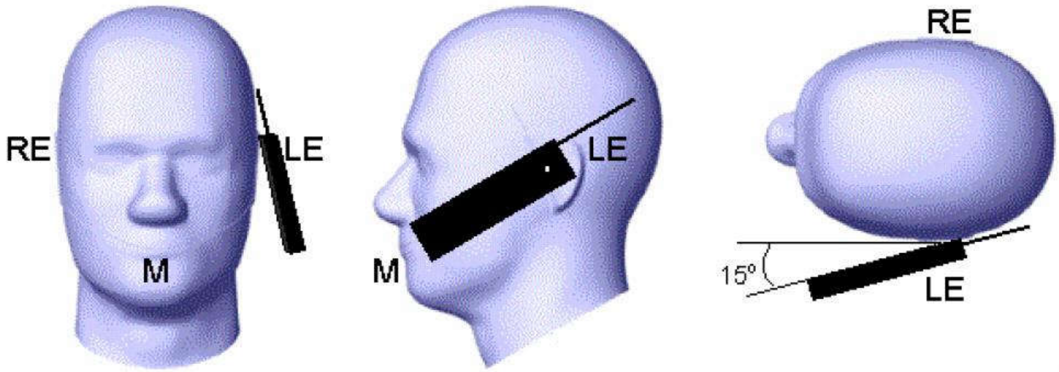


w_t	Width of the handset at the level of the acoustic
w_b	Width of the bottom of the handset
A	Midpoint of the width w_t of the handset at the level of the acoustic output
B	Midpoint of the width w_b of the bottom of the handset

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



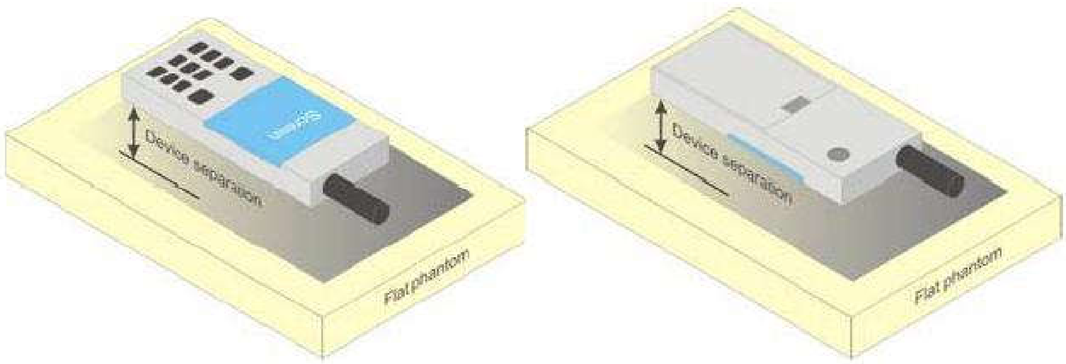
Picture D.2 Cheek position of the wireless device on the left side of SAM



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.

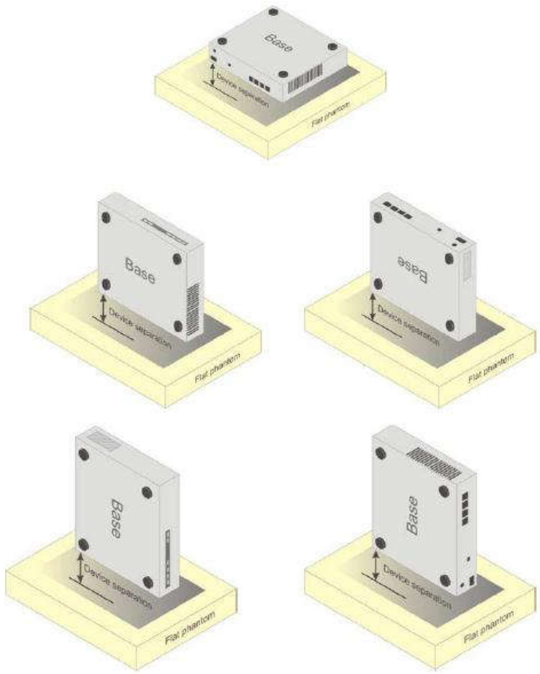


Picture D.4 Test positions for body-worn devices

D.3. Desktop device

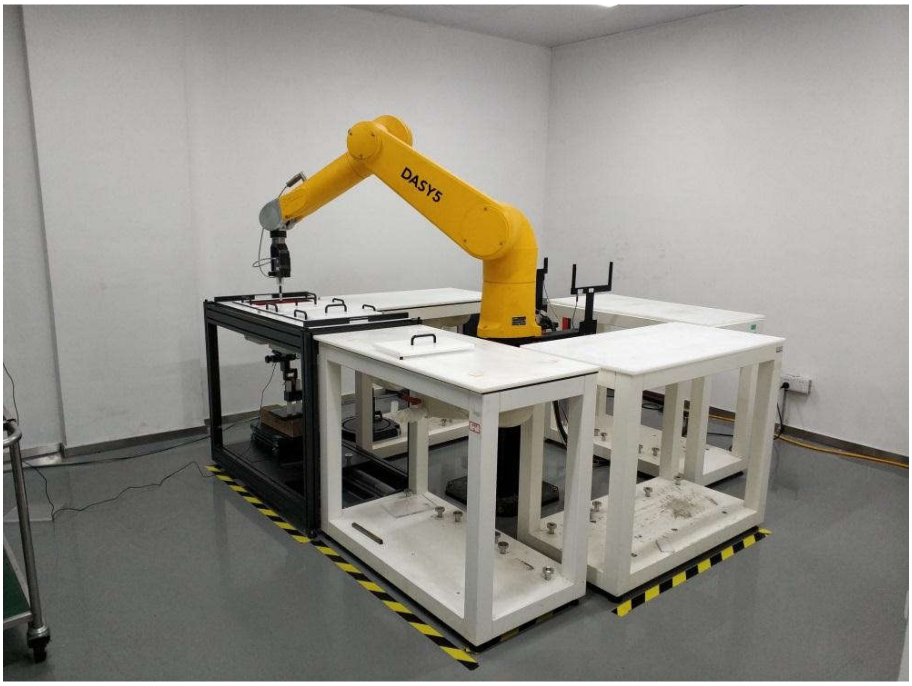
A typical example of a desktop device is a wireless enabled desktop computer placed on a table or desk when used.

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 700-6000 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.

Table E.1: Composition of the Tissue Equivalent Matter

Frequency (MHz)	835	1750	1900	2450	2600	5200	5800
Water	41.45	55.242	55.242	58.79	58.79	65.53	66.10
Sugar	56.0	/	/	/	/	/	/
Salt	1.45	0.306	0.306	0.06	0.06		
Preventol	0.1	/	/	/	/	17.24	16.95
Cellulose	1.0	/	/	/	/	17.24	16.95
Glycol Monobutyl	/	44.452	44.452	41.15	41.15	/	/
Diethylenglycol monohexylether	/	/	/	/	/	/	/
Triton X-100	/	/	/	/	/	/	/
Dielectric Parameters Target Value	ε=41.5 σ=0.90	ε=40.08 σ=1.37	ε=40.0 σ=1.40	ε=39.20 σ=1.80	ε=39.01 σ=1.96	ε=35.99 σ=4.66	ε=35.30 σ=5.27

Note: There is a little adjustment respectively for 750, 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

Probe SN.	Liquid name	Validation date	Frequency point	Status (OK or Not)
7621	Head 750MHz	2020-12-02	750 MHz	OK
7621	Head 835MHz	2020-04-03	835 MHz	OK
7621	Head 1750MHz	2020-10-20	1750 MHz	OK
7621	Head 1900MHz	2020-12-02	1900 MHz	OK
7621	Head 2300MHz	2020-12-03	2300 MHz	OK
7621	Head 2450MHz	2020-12-03	2450 MHz	OK
7621	Head 2550MHz	2020-12-03	2550 MHz	OK
7621	Head 5200MHz	2020-12-04	5250 MHz	OK
7621	Head 5600MHz	2020-12-04	5600 MHz	OK
7621	Head 5750MHz	2020-12-04	5750 MHz	OK

ANNEX G: DAE Calibration Certificate

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国际互认
校准
CALIBRATION
CNAS L0570

Client : CTTL(South Branch)

Certificate No: Z20-60433

CALIBRATION CERTIFICATE

Object	DAE4 - SN: 1527
Calibration Procedure(s)	FF-Z11-002-01 Calibration Procedure for the Data Acquisition Electronics (DAEx)
Calibration date:	November 06, 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)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Process Calibrator 753	1971018	16-Jun-20 (CTTL, No.J20X04342)	Jun-21

	Name	Function	Signature
Calibrated by:	Yu Zongying	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: November 08, 2020

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Glossary:

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters:

- *DC Voltage Measurement*: Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The report provide only calibration results for DAE, it does not contain other performance test results.

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DC Voltage Measurement

A/D - Converter Resolution nominal

High Range:	1LSB =	6.1μV ,	full range =	-100...+300 mV
Low Range:	1LSB =	61nV ,	full range =	-1.......+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	403.863 ± 0.15% (k=2)	403.582 ± 0.15% (k=2)	403.801 ± 0.15% (k=2)
Low Range	3.95875 ± 0.7% (k=2)	3.98892 ± 0.7% (k=2)	3.96720 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	223.5° ± 1 °

Certificate No: Z20-60433 Page 3 of 3

ANNEX H: Probe Calibration Certificate

Probe EX3DV4-SN: 7621 Calibration Certificate (2020-11-30)

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Client **CTTL(South Branch)** **Certificate No: Z20-60434**

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN : 7621
Calibration Procedure(s)	FF-Z11-004-02 Calibration Procedures for Dosimetric E-field Probes
Calibration date:	November 30, 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)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	16-Jun-20(CTTL, No.J20X04344)	Jun-21
Power sensor NRP-Z91	101547	16-Jun-20(CTTL, No.J20X04344)	Jun-21
Power sensor NRP-Z91	101548	16-Jun-20(CTTL, No.J20X04344)	Jun-21
Reference 10dBAttenuator	18N50W-10dB	10-Feb-20(CTTL, No.J20X00525)	Feb-22
Reference 20dBAttenuator	18N50W-20dB	10-Feb-20(CTTL, No.J20X00526)	Feb-22
Reference Probe EX3DV4	SN 7307	29-May-20(SPEAG, No.EX3-7307_May20)	May-21
DAE4	SN 1556	4-Feb-20(SPEAG, No.DAE4-1556_Feb20)	Feb-21
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
SignalGenerator MG3700A	6201052605	23-Jun-20(CTTL, No.J20X04343)	Jun-21
Network Analyzer E5071C	MY46110673	10-Feb-20(CTTL, No.J20X00515)	Feb-21

	Name	Function	Signature
Calibrated by:	Yu Zongying	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: December 02, 2020

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

Certificate No: Z20-60434 Page 1 of 9

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Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A,B,C,D	modulation dependent linearization parameters
Polarization Φ	Φ rotation around probe axis
Polarization θ	θ rotation around an axis that is in the plane normal to probe axis (at measurement center), i θ=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:

a) 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

b) 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

c) 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

d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization θ=0 (f≤900MHz in TEM-cell; f>1800MHz: waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below ConvF).
- *NORM(f)x,y,z = NORMx,y,z* 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.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (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.
- *Ax,y,z; Bx,y,z; Cx,y,z;VRx,y,z:*A,B,C 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≤800MHz) and inside waveguide using analytical field distributions based on power measurements for f >800MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty valued are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z* 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±50MHz to±100MHz.
- *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 *NORMx* (no uncertainty required).

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DASY/EASY – Parameters of Probe: EX3DV4 – SN:7621

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (*k*=2)
Norm(μV/(V/m)^2)[A]	0.72	0.72	0.55	±10.0%
DCP(mV)[B]	109.7	109.6	112.2	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (*k*=2)
0	CW	X	0.0	0.0	1.0	0.00	221.7	±2.1%
		Y	0.0	0.0	1.0		222.7	
		Z	0.0	0.0	1.0		188.9	

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor *k*=2, which for a normal distribution Corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of Norm X, Y, Z do not affect the E^2-field uncertainty inside TSL (see Page 4).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainly is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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DASY/EASY – Parameters of Probe: EX3DV4 – SN:7621

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz][C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unct. (*k*=2)
750	41.9	0.89	10.88	10.88	10.88	0.40	0.75	±12.1%
1640	40.3	1.29	9.19	9.19	9.19	0.33	0.86	±12.1%
1900	40.0	1.40	8.77	8.77	8.77	0.27	1.02	±12.1%
2100	39.8	1.49	8.81	8.81	8.81	0.24	1.10	±12.1%
2300	39.5	1.67	8.40	8.40	8.40	0.53	0.71	±12.1%
2450	39.2	1.80	8.01	8.01	8.01	0.43	0.86	±12.1%
2600	39.0	1.96	7.84	7.84	7.84	0.52	0.76	±12.1%
3700	37.7	3.12	6.87	6.87	6.87	0.40	1.15	±13.3%
3900	37.5	3.32	7.03	7.03	7.03	0.40	1.30	±13.3%
4100	37.2	3.53	7.02	7.02	7.02	0.40	1.15	±13.3%
4400	36.9	3.84	6.81	6.81	6.81	0.35	1.33	±13.3%
4600	36.7	4.04	6.61	6.61	6.61	0.40	1.40	±13.3%
4800	36.4	4.25	6.56	6.56	6.56	0.40	1.41	±13.3%
4950	36.3	4.40	6.29	6.29	6.29	0.45	1.30	±13.3%
5250	35.9	4.71	5.97	5.97	5.97	0.45	1.30	±13.3%
5600	35.5	5.07	5.43	5.43	5.43	0.55	1.15	±13.3%
5750	35.4	5.22	5.38	5.38	5.38	0.55	1.20	±13.3%

[C] Frequency validity above 300 MHz of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.
[F] At frequency below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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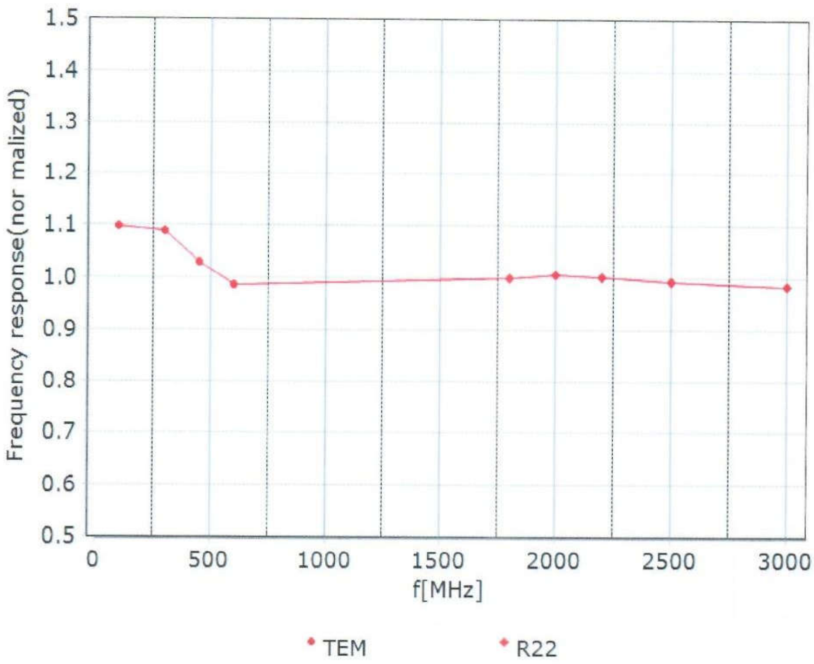
Frequency Response of E-Field
(TEM-Cell: ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ±7.4% (*k*=2)

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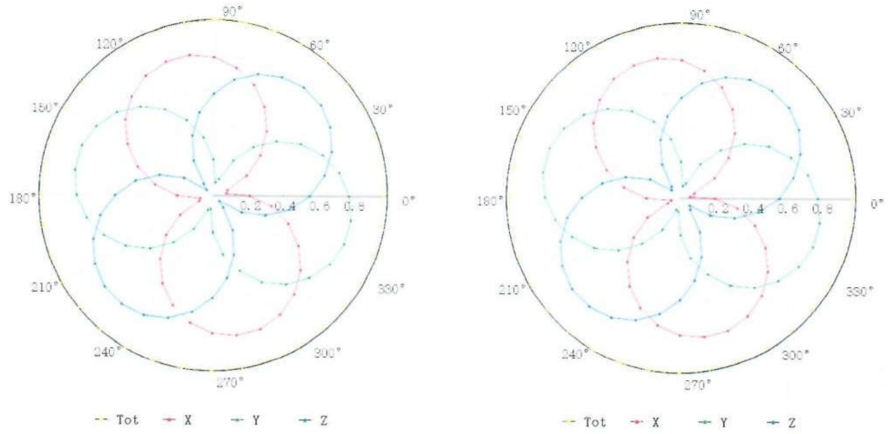
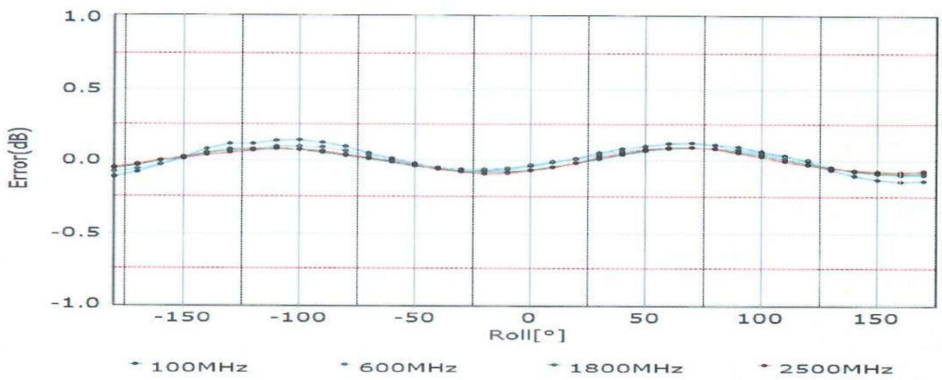
Receiving Pattern (Φ), θ=0°

f=600 MHz, TEM **f=1800 MHz, R22**





Uncertainty of Axial Isotropy Assessment: ±1.2% (k=2)

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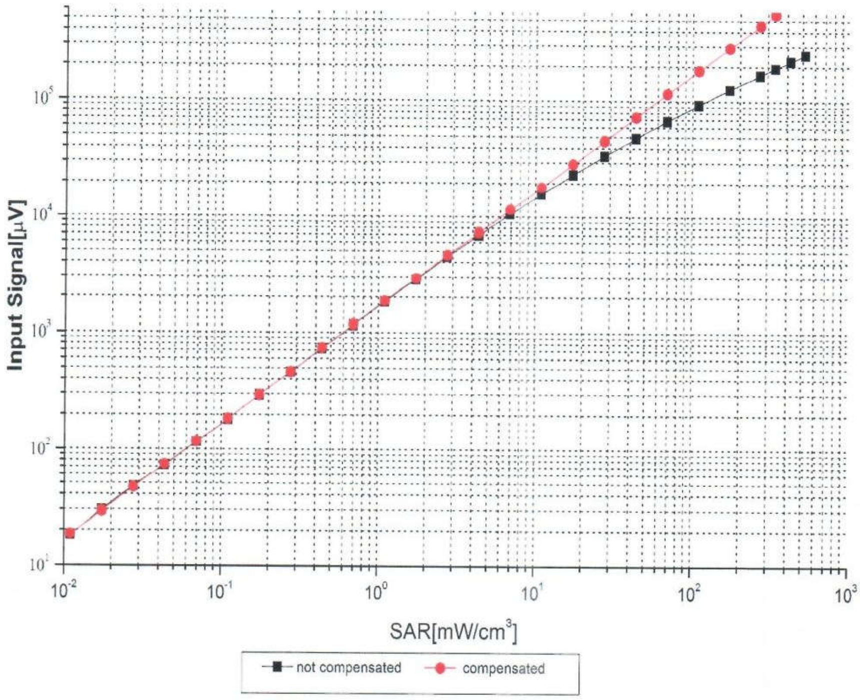
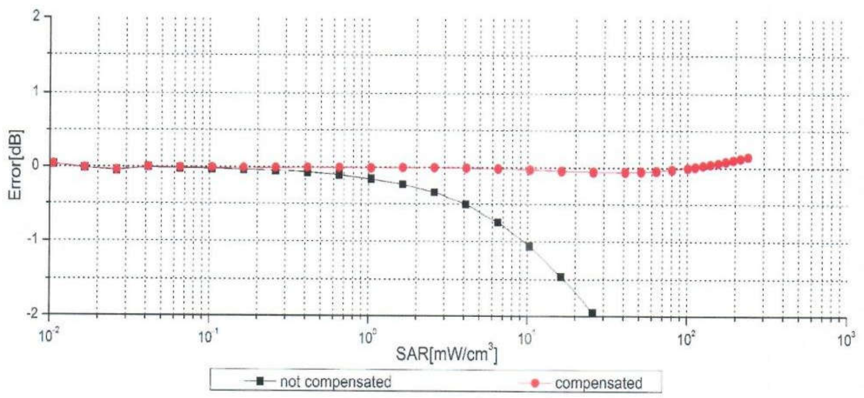
Dynamic Range f(SAR$_{head}$)
(TEM cell, f = 900 MHz)





Uncertainty of Linearity Assessment: ±0.9% (*k*=2)

Certificate No:Z20-60434 Page 7 of 9

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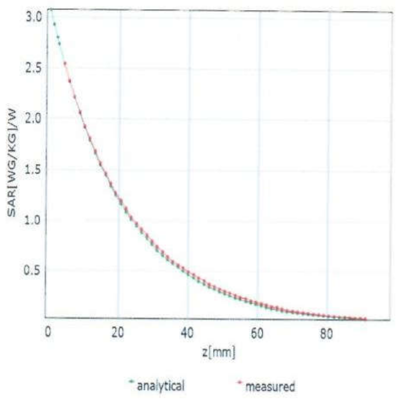
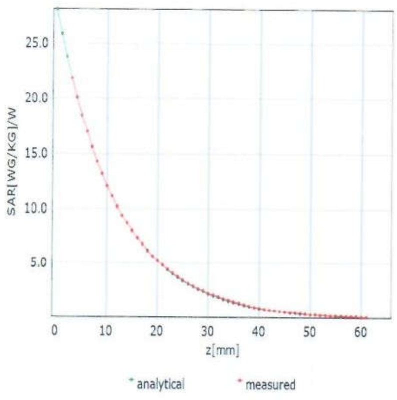
Conversion Factor Assessment

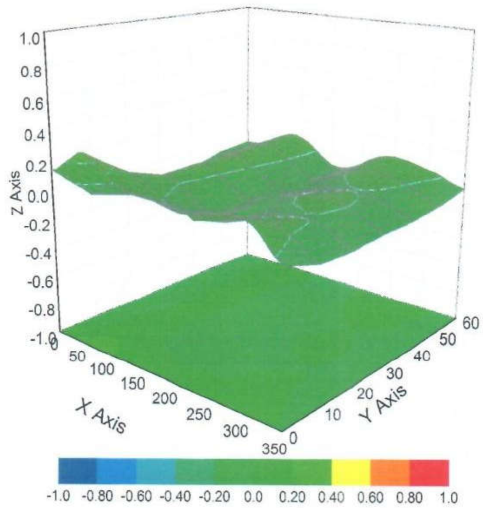
f=750 MHz,WGLS R9(H_convF)



f=1900 MHz,WGLS R22(H_convF)



Deviation from Isotropy in Liquid



Uncertainty of Spherical Isotropy Assessment: ±3.2% (*k*=2)

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DASY/EASY – Parameters of Probe: EX3DV4 – SN:7621

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	96.6
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disable
Probe Overall Length	337mm
Probe Body Diameter	10mm
Tip Length	10mm
Tip Diameter	2.5mm
Probe Tip to Sensor X Calibration Point	1mm
Probe Tip to Sensor Y Calibration Point	1mm
Probe Tip to Sensor Z Calibration Point	1mm
Recommended Measurement Distance from Surface	1.4mm

Probe EX3DV4-SN: 7621 Calibration Certificate (2020-10-05)

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Accreditation No.: **SCS 0108**

Client **CTTL-SZ (Auden)**

Certificate No: **EX3-7621_Oct20**

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:7621

Calibration procedure(s): QA CAL-01.v9, QA CAL-14.v6, QA CAL-23.v5, QA CAL-25.v7
Calibration procedure for dosimetric E-field probes

Calibration date: October 5, 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-20)	In house check: Jun-22
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-20)	In house check: Jun-22
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-21

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	M.Weber
Approved by:	Katja Pokovic	Technical Manager	

Issued: October 6, 2020

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Accreditation No.: **SCS 0108**

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 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:

a) 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
b) 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
c) 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
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * 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*.
- *DCPx,y,z:* 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
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: 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 ≤ 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 *NORMx,y,z * 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 ± 50 MHz to ± 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 *NORMx* (no uncertainty required).

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DASY/EASY - Parameters of Probe: EX3DV4 - SN:7621

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.71	0.68	0.56	± 10.1 %
DCP (mV)[B]	108.2	106.8	108.9	

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B $dB\sqrt{\mu V}$	C	D dB	VR mV	Max dev.	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	157.3	± 3.0 %	± 4.7 %
		Y	0.0	0.0	1.0		148.5		
		Z	0.0	0.0	1.0		155.4		

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of Norm X,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 5).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.