TEST REPORT

No. 24T04N001372-001-SAR

For

HMD Global Oy

Mobile Phone

Model Name: TA-1667

With

Hardware Version: FF646-MB-V0.2

Software Version: 0.2422.11.01

FCC ID: 2AJOTTA-1667

Issued Date: 2024-07-31

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.

Test Laboratory:

SAICT, Shenzhen Academy of Information and Communications Technology

Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, P. R. China 518000.

Tel:+86(0)755-33322000, Fax:+86(0)755-33322001

Email: yewu@caict.ac.cn. www.saict.ac.cn

REPORT HISTORY

Report Number	Revision	Description	Issue Date
24T04N001372-001-SAR	Rev.0	1st edition	2024-07-31

CONTENTS

1. Summary of Test Report

1.1. Test Items

Description:	Mobile Phone
Model Name:	TA-1667
Applicant’s Name:	HMD Global Oy
Manufacturer's Name:	HMD Global Oy

1.2. Test Standards

ANSI C95.1:1992, IEEE 1528:2013

1.3. Test Result

Pass. Please refer to “12. 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: 2024-07-07 Testing End Date: 2024-07-15

1.6. Signature

Li Yongfu

(Prepared this test report)

Liu Jian

(Reviewed this test report)

Cao Junfei

(Approved this test report)

2. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for HMD Global Oy Mobile Phone TA-1667 are as follows:

Table 2.1: Highest Reported SAR (1g)

Equipment Class	Frequency Bands	1g SAR (W/kg)	
		Head (Separation 0mm)	Body-worn (Separation 15mm)
PCE	GSM 850	0.60	1.09
	GSM 1900	0.49	0.62
	WCDMA Band 2	1.04	1.04
	WCDMA Band 4	0.69	0.98
	WCDMA Band 5	1.27	**1.23**
	LTE Band 2	1.02	1.01
	LTE Band 5	1.13	1.11
	LTE Band 7	**1.29**	1.04
	LTE Band 66/4	0.66	0.97
DSS	Bluetooth	0.05	0.01

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 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)**, Head value is **1.29 W/kg (1g)** and Body-worn value is **1.23 W/kg (1g)**.

Table 2.2: Maximum Simultaneous Transmission SAR

/	**Position**	**Sum (W/kg)**
Highest reported SAR value for Head	Right Cheek (LTE Band 7 + Bluetooth)	**1.33**
Highest reported SAR value for Body-worn	Rear Side (WCDMA Band 5 + Bluetooth)	**1.24**

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 **1.33 W/kg (1g)**.

The detail for simultaneous transmission consideration is described in chapter 11.

3. Client Information

3.1. Applicant Information

Company Name:	HMD Global Oy
Address:	Bertel Jungin aukio 9, 02600 Espoo, Finland
Contact:	reza.serafat
Email:	reza.serafat@hmdglobal.com
Telephone:	+491735287964

3.2. Manufacturer Information

Company Name:	HMD Global Oy
Address:	Bertel Jungin aukio 9, 02600 Espoo, Finland
Contact:	reza.serafat
Email:	reza.serafat@hmdglobal.com
Telephone:	+491735287964

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

4.1. About EUT

Description:	Mobile Phone
Model Name:	TA-1667
Condition of EUT as received:	No obvious damage in appearance
Frequency Bands:	GSM 850/900/1800/1900, WCDMA Band 1/2/4/5/8, LTE Band 1/2/3/4/5/7/8/28/40/66, Bluetooth
Tested Tx Frequency:	824 – 849MHz (GSM 850)
	1850 – 1910MHz (GSM 1900)
	1850 – 1910MHz (WCDMA Band 2)
	1710 – 1755MHz (WCDMA Band 4)
	824 – 849MHz (WCDMA Band 5)
	1850 – 1910MHz (LTE Band 2)
	1710 – 1755MHz (LTE Band 4)
	824 – 849MHz (LTE Band 5)
	2500 – 2570MHz (LTE Band 7)
	1710 – 1780MHz (LTE Band 66)
	2402 – 2480MHz (Bluetooth)
GPRS Multislot Class:	12
GPRS Capability Class:	B
Dual Transfer Mode (DTM)	Not support
Test device Production information:	Production unit
Device type:	Portable device
Antenna type:	Integrated antenna
Hotspot mode:	Not Support
Product Dimensions:	Long 126.07mm; Wide 52.5mm; Overall Diagonal 135.81mm
Note: LTE Band 40 be disabled by software.	

4.2. Internal Identification of EUT used during the test

EUT ID*	IMEI	HW Version	SW Version	Receipt Date
UT13aa	351368850001518	FF646-MB-V0.2	0.2422.11.01	2024-07-05
UT14aa	351368850002094	FF646-MB-V0.2	0.2422.11.01	2024-07-05
UT18aa	351368850003035	FF646-MB-V0.2	0.2422.11.01	2024-07-05

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

Note: It is performed to test SAR with the UT14aa & UT18aa, and conducted power with the UT13aa.

4.3. Internal Identification of AE used during the test

AE ID*	Description	Model	Manufacturer
AE1	Battery	BL-L5H	Guangdong Fenghua New Energy Co., Ltd
			FENG HUA NEW ENERGY PRIVATE LIMITED
AE2	Battery	BL-L5H	SHENZHEN UTILITY ENERGYCO., LTD.
			ADIT INFRATEL PVT.LTD
AE3	Headset	JWUB1710-W27H	HUIZHOU JUWEI ELECTRONICS CO., LTD

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

Note: The device has two types of batteries. We perform the SAR measurement with AE1 battery and Spot check test with AE2 battery.

4.4. General Description

According to “Justification Letter” provided by applicant, the table below shows the difference between configuration1 and configuration2:

Key material	Configuration1		Configuration2	
	Specification	Supplier	Specification	Supplier
Keymat	/	DONGGUAN LIANGKE SILICON PLASTIC PRODUCTS CO.	/	Dongguan Haixin Electronics Co..,Ltd.
Lens	/	Dongguan Ruijintai communication Technology Co., LTD	/	Xianghui Optoelectronics (Guangdong) Co., Ltd
USB	/	Saibao(Jiangxi) Communication Industrial	/	HUIZHOU JUWEI ELECTRONICS CO.,LTD
metal alloy Resistor	(F)metal alloy Resistor,0.068 ohm,±1%,1/2W,TCR ≤±75PPM/℃,0805,T=0.55± 0.15mm,PE0805FRM470R068L,YAGEO	YAGEO	(F)Resistors,0.068ohm,±1%,1/2W,TCR≤±75PPM/℃,0805,TL05W2F680MT5E,ROYALOHM	ROYALOHM
Metal Foil Chip Fixed Resistor	(T)Metal Foil Chip Fixed Resistor,0.01 ohm,± 1%,1/2W,TCR≤±50PPM/℃,0805,MFG05HR010FT,Fenghua	Fenghua	(P)(T)Metal Foil Chip Resistor,0.01 ohm,± 1%,1/2W,TCR≤±50 PPM/℃,0805,MS05W2F100MT5E,ROYALOHM	ROYALOHM
Varistor	(N)Varistor,5.5V,0402,SDV1005E5R5C400NPTF,Sunlord	Sunlord	(N)Varistor(10pF18V0402),SDV1005H180C100NPTF,SUNLORD	SUNLORD
TVS	(F)TVS(Transient Voltage Suppressor),Bi-directional,5V,0.7pF,DFN1006-2,1.0x0.6*0.5mm,PESDR0541P1A,PN-SILICON	PN-SILICON	(F)TVS(Transient Voltage Suppressor),Bi-directional,5V,0.6pF,DFN1006-2L,1.0x0.6x(0.50± 0.05)mm,WE05DUCF-BF,WAYON	WAYON
TVS	(P)(T)TVS,Bi-directional,5V,16pF,DFN1006-2L,1.0x0.6x0.5(± 0.05)mm,MESD5V0SF11B,Millersemi	Millersemi	(T)TVS,Bi-directional,,Bi-directional,5V,15pF,DFN1006-2L,1.0x0.6x0.5(± 0.05)mm,SSCE5V022N1,SSC	SSC
Power TVS	(T)TVS,Power Transient Voltage Suppressor,Uni-direction,12V,5600W,SOD-123FL,PESDU1271D1F,PN-Silicon	PN-Silicon	(P)(T)Power Transient Voltage Suppressor,Uni-direction,12V,5600W,SOD-123FL,JEU12D1FT,JIEJIE MICRO	JIEJIE MICRO
Power TVS	(P)(T)Power TVS,Uni-direction,4.5V,DFN2020-3L,2x2x(0.6±0.05)mm,PESDU4501P4-3M,PN-Silicon	PN-Silicon	(F)TVS(Transient Voltage Suppressor),Uni-direction,4.5V,3900W, DFN2020-3L, 2.0x2.0mm,WS4.5P4N3,WAYON	WAYON
MOS FET	(T)MOS FET,N-Channel Enhancement Mode MOSFET with PNP Transistor,DFN3x2,3.0x2.0x0.8mm,SSC8P22AN3, SSC	SSC	(P)(T) MOS FET,N-Channel Enhancement Mode MOSFET with PNP Transistor,DFN3020-8L,3.0x2.0x0.75mm,ML5812,Millersemi	Millersemi
MIC(SMT)	(T)MIC(SMT),ECM(Top-ported),Apply dust film,-42 ±3dB,Φ4.0xT1.3（±0.1） mm,FJM4013BSCRT2,Fenjinwei Electronic	Fenjinwei Electronic	(P)(T)MIC(SMT),Omnidirectional Electret Condenser MIC(Top-ported), Black air filter，-42± 1.5dB(V/Pa),Φ4.0xT1.3(±0.2)mm,SMD4013S-2A422-C10NR390,Ningbo Xinfengtai	Ningbo Xinfengtai
Antenna Tuning Switch	(P)(T)IC,0.4-3.8GHz SP4T Antenna Tuning Switch,QFN(10pin),1.5x1.1x0.37mm,CR2114GLA, Cenre	Cenre	(F)IC,0.4-3.8GHz SP4T Antenna Tuning Switch,VRF=45V,QFN-10,1.5x1.0x0.4mm,MXD8545A,Maxscend	Maxscend
FM LNA	(T)IC,FM Low-Noise-Amplifier in Alliance with Internal Antenna,DFN-6L,1.5x1.0x(0.55± 0.05)mm,AW5037DNR,AWINIC	AWINIC	(P)(T)IC,FM Low-Noise-Amplifier in Alliance with Internal Antenna,DFN-6L,1.5x1.0x(0.55± 0.05)mm,SW6115,Siliconwave	Siliconwave
SIM card holder	(T)NANO SIM Card Connector,Common bridge, with stopper, tin Angle welding, full SMT,7PIN, with detection. PIN,12.35x9.8x1.35mmH,A-WKSM07-B25412-22,Weikang	Weikang	(T)NANO SIM Card Connector,Common bridge, with stopper, tin Angle welding, full SMT,7PIN, with detection. PIN,12.35x9.8x1.35mmH,S126-0B07F13A,HONGRIDA	HONGRIDA
RF Switchable Receptacle	(T)RF Switchable Receptacle,Ⅲ Generation,four welded feet, silver plated shell, inner diameter 0.5, outer diameter 1.35,2.1x2.0x0.9mmH,818011998,ECT	ECT	(P)(T)RF Switchable Receptacle，Ⅲ Generation,Four welded feet, silver plated shell, inner diameter 0.5, outer diameter 1.35,2.1x2.0x0.9mmH,RF3S-1B090FR0,HONGRIDA	HONGRIDA
Battery Connector	(N)Battery Connector,shrapnel on board,4SMT, solder inside tin pin, with two positioning posts , 3PIN,3.0PITCH,9.0x3.5x6.0mmH,A-WKBT03-B30001-09,Weikang	Weikang	(T)Battery Connector,Shrapnel on board,4SMT, solder inside tin pin, with two positioning posts ,3PIN,3.0PITCH,9.0x3.5x6.0mmH,HW-BAT03P-060A,XINHANWEI	XINHANWEI
Audio Jack	(P)(T)Audio Jack(Φ3.5mm),on board, small bevel，5pin(4DIP+1SMT), 12.45x6.3x4.1mmH , HW-000538201002, XINHANWEI	XINHANWEI	P)(T)Audio Jack(Φ3.5mm),on board, small bevel,5pin(4DIP+1SMT),12.5x6.4x4.05mmH,A-WKPJ05-B38011-37,Weikang	Weikang
T-card Connector	(P)(T)T-card Connector(T-FLASH booth), Open-top type, 8PIN, 1.1PITCH, 13.4x13.6x1.6mmH,A-WKTF08-B11001-01,Weikang	Weikang	(T)T-card Connector(T-FLASH booth), Open-top type,8PIN,1.1PITCH,Add LOGO,14.5x13.6x1.6mmH,ALP-TFH815-02,Alips	Alips
Crystal	(T)Crystal,26MHz,± 10ppm,9pF,3225,3.2x2.5x0.6mm,2.3.3.260000908, MDH	MDH	(T)Crystal，26MHz，±10ppm，9pF，±10ppm@(-20~+70°C), 3225, 3.2x2.5x0.7mmH, 3S26000266，FAILONG	FAILONG
PCB	PCB,FF646-MB-V0.2，6 layers 1 level HDI	HongGao	PCB,FF646-MB-V0.2，6 layers 1 level HDI	BenChuang
Shielding case(BB)	(P)(T)Shielding case(BB),Irregular, white copper, material thickness 0.2mm, 29.75x23.4x1.6mmH,FF646,ShenYouWei	ShenYouWei	(P)(T)Shielding case(BB),Irregular, white copper, material thickness 0.2mm, ,29.75x23.4x1.6mmH,FF646,chuangyagao	ChuangYaGao
Shielding case(RF)	(P)(T)Shielding case(RF),rectangular, white copper, material thickness 0.2mm , 25.3x19.3x1.6mmH,FF646,ShenYouWei	ShenYouWei	(P)(T)Shielding case(RF),Rectangular, white copper, material thickness 0.2mm, 25.3x19.3x1.6mmH,FF646,ChuangYaGao	ChuangYaGao
Antenna spring (SMT)	(T) Antenna spring (SMT), stainless steel brush gold, pad 2.3x1.2, contact width 0.55, working range 0.65/1.25, 2.9x1.0x1.25mmH,KSN-A13000101R-0100,Huile	Huile	(P)(T)Antenna spring (SMT), stainless steel brush gold, pad 2.3x1.2, contact width 0.55, working range0.65/0.9,Optimum0.75, 2.9x1.0x1.25mmH,P18-BB01F06A,Hongrida	Hongrida
Battery	Lithium-ion batteries, Removable battery,1450 mAh,Cell:503862AR, 4.2 V, 0.15 Ω, maximum discharge current:1000 mA,ROHS+Reach+ halogen-free,38 mm*5.3 mm*66 mm,Min1400mAh,Model :BL-L5H	Fenghua	Lithium-ion batteries, Removable battery,1450 mAh,Cell:503862AR, 4.2 V, 0.15 Ω, maximum discharge current:1000 mA,ROHS+Reach+ halogen-free,38 mm*5.3 mm*66 mm,Min1400mAh,Model :BL-L5H	UTL
LCD	LCD,2.4”type:430 cd/㎡,ST7789P3-G6,BOE:0,0.5 mm ,16 pin,ROHS+Reach+ halogen-free,60.26 mm*42.72 mm*2.4 mm,0.1/0.1	EO	LCD,2.4”type:480 cd/㎡,ST7789P3-G6,BOE:0,0.5 mm ,16 pin,ROHS+Reach+ halogen-free,60.26 mm*42.72 mm*2.4 mm,0.1/0.1	zhongxin

We'll perform the SAR measurement with Configuration1 and Spot check test with Configuration2.

5. Test Methodology

5.1. Applicable Limit Regulations

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

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

5.2. Applicable Measurement Standards

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

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

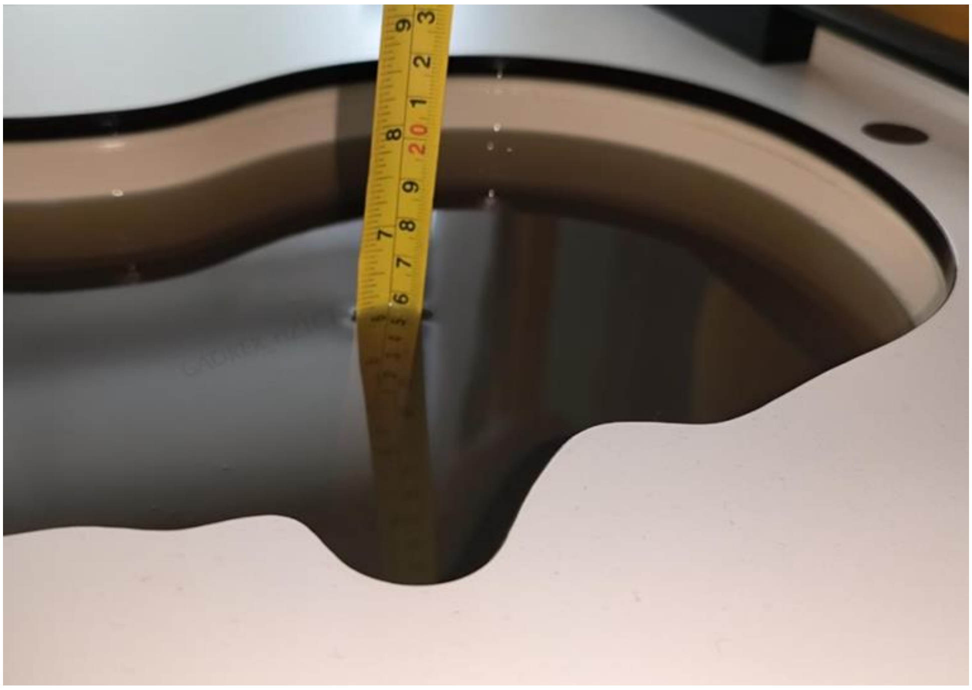
Frequency (MHz)	Liquid Type	Conductivity (σ)	± 5% Range	Permittivity (ε)	± 5% Range
835	Head	0.90	0.86～0.95	41.5	39.4～43.6
1750	Head	1.37	1.30～1.44	40.1	38.1～42.1
1900	Head	1.40	1.33～1.47	40.0	38.0～42.0
2450	Head	1.80	1.71～1.89	39.2	37.2～41.2
2550	Head	1.91	1.81～2.01	39.1	37.1～41.0

7.2. Dielectric Performance

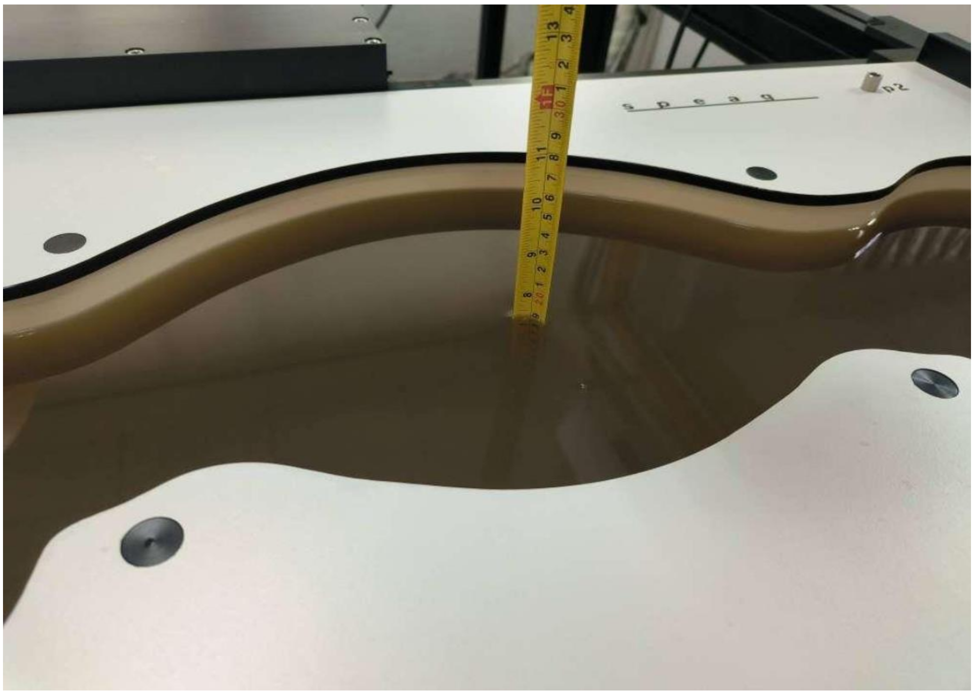
Table 7.2: Dielectric Performance of Tissue Simulating Liquid

Measurement Date (yyyy-mm-dd)	Frequency (MHz)	Type	Conductivity σ (S/m)	Drift (%)	Permittivity ε	Drift (%)
2024-07-07	835	Head	0.931	3.44	40.65	-2.05
2024-07-11	1750	Head	1.364	-0.44	40.62	1.30
2024-07-08	1900	Head	1.416	1.14	39.38	-1.55
2024-07-09	2450	Head	1.783	-0.94	39.79	1.51
2024-07-15	2550	Head	1.957	2.46	38.71	-1.00

Note: The liquid temperature is 22.0°C.



Picture 7.1 Liquid depth in the Head Phantom (0.7GHz - 6.5GHz)

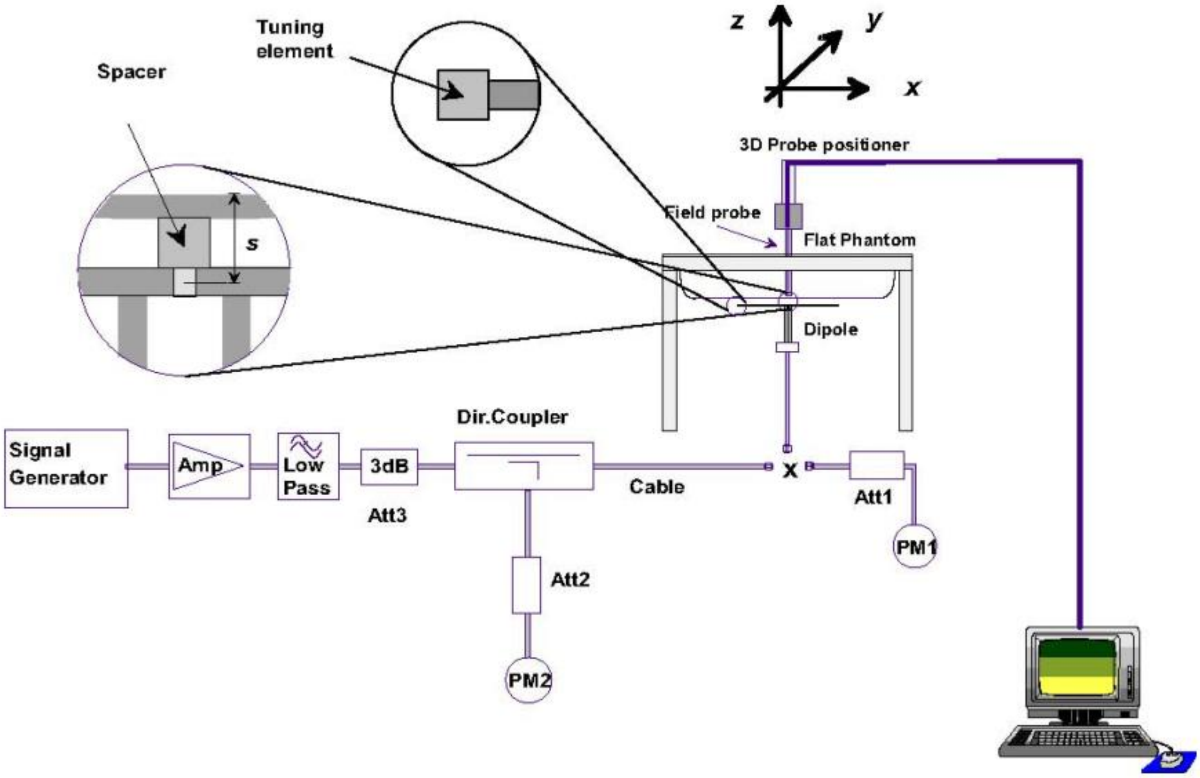


Picture 7.1 Liquid depth in the Flat Phantom (0.7GHz - 6.5GHz)

8. System verification

8.1. System Setup

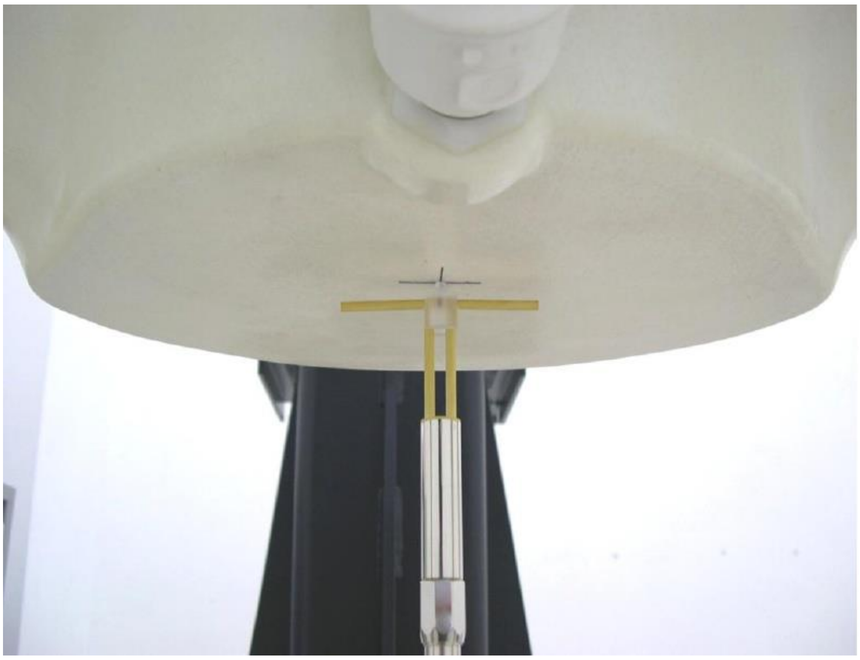
In the simplified setup for system evaluation, the DUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave that comes from a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder.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



Picture 8.1 System Setup for System Evaluation

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

For the dipole above 3GHz, the output power on dipole port must be calibrated to 20 dBm (100mW) 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			
		1 g	10 g	1 g	10 g	1 g	10 g	1 g	10 g
2024-07-07	835	9.64	6.29	2.50	1.62	10.00	6.48	3.73	3.02
2024-07-11	1750	36.30	19.60	8.92	4.84	35.68	19.36	-1.71	-1.22
2024-07-08	1900	40.20	20.50	10.4	5.26	41.60	21.04	3.48	2.63
2024-07-09	2450	53.20	24.20	13.1	6.03	52.40	24.12	-1.50	-0.33
2024-07-15	2550	55.00	25.00	14.2	6.38	56.80	25.52	3.27	2.08

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),

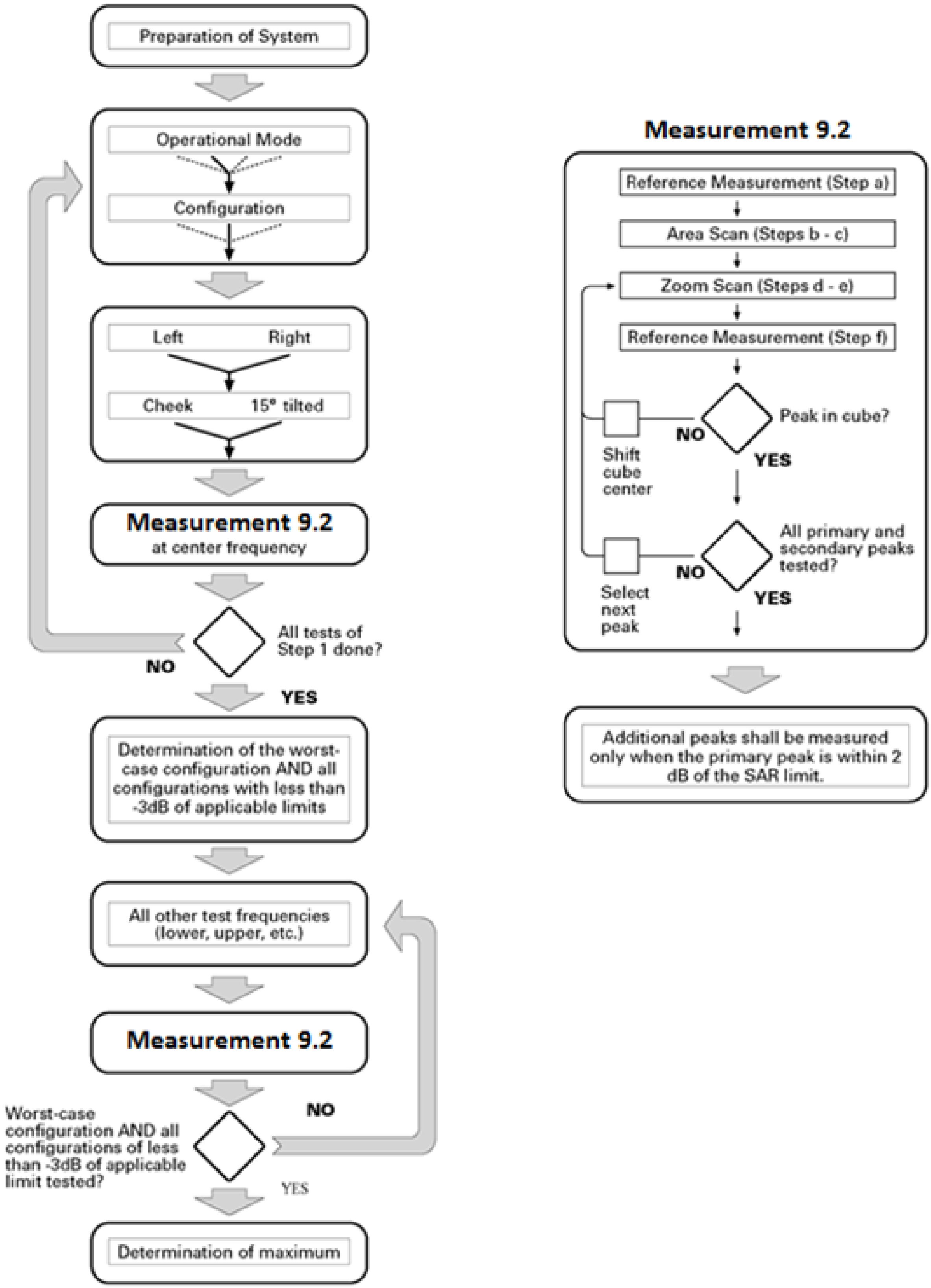
b) all configurations for each device position in a), e.g., antenna extended and retracted, and

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, 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><td colspan="3"></td><td>$\leq$ 3 GHz</td><td>> 3 GHz</td></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. SAR Measurement for LTE

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.

9.5. Bluetooth Measurement Procedures for SAR

Normal network operating configurations are not suitable for measuring the SAR of 802.11 transmitters in general. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure that the results are consistent and reliable.
Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in a test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters. The test frequencies should correspond to actual channel frequencies defined for domestic use. SAR for devices with switched diversity should be measured with only one antenna transmitting at a time during each SAR measurement, according to a fixed modulation and data rate. The same data pattern should be used for all measurements.

9.6. Power Drift

To control the output power stability during the SAR test, 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 12 labeled as: (Power Drift [dB]). This ensures that the power drift during one measurement is within 5%.

10. Conducted Output Power

10.1. GSM Measurement result

Table 10.1: The conducted power measurement results GSM/GPRS

GSM850

GSM850 Speech	Tune up	Measured Power (dBm)			/			
		Ch.251	Ch.190	Ch.128				
1Tx slot	**33.5**	**32.82**	**32.94**	**33.04**				
GPRS 850	/	Measured timeslot-Averaged output Power (dBm)			calculation	Source-based time-Averaged output Power (dBm)		
		Ch.251	Ch.190	Ch.128		Ch.251	Ch.190	Ch.128
1Tx-slot	**33.5**	32.83	32.87	33.03	-9.03	23.80	23.84	24.00
2Tx-slots	**32.0**	**30.61**	**30.72**	**30.86**	-6.02	24.59	24.70	24.84
3Tx-slots	**30.0**	28.55	28.77	28.92	-4.26	24.29	24.51	24.66
4Tx-slots	**27.0**	26.51	26.70	26.85	-3.01	23.50	23.69	23.84

GSM1900

GSM1900 Speech	Tune up	Measured Power (dBm)			/			
		Ch.810	Ch.661	Ch.512				
1Tx slot	**30.5**	**29.87**	**29.97**	**29.99**				
GPRS 1900	/	Measured timeslot-Averaged output Power (dBm)			calculation	Source-based time-Averaged output Power (dBm)		
		Ch.810	Ch.661	Ch.512		Ch.810	Ch.661	Ch.512
1Tx-slot	**30.5**	29.80	29.99	30.00	-9.03	20.77	20.96	20.97
2Tx-slots	**29.0**	27.04	27.56	27.90	-6.02	21.02	21.54	21.88
3Tx-slots	**27.0**	**25.34**	**25.86**	**26.21**	-4.26	21.08	21.60	21.95
4Tx-slots	**25.0**	23.26	23.73	24.08	-3.01	20.25	20.72	21.07

10.2. WCDMA Measurement result

Table 10.2: The conducted power measurement results WCDMA

WCDMA Band 2

Item	Band	WCDMA Band 2 Result			
	ARFCN	**Tune up**	Ch.9538 (1907.6MHz)	Ch.9400 (1880MHz)	Ch.9262 (1852.4MHz)
WCDMA	12.2kbps RMC	**24.0**	**23.25**	**23.23**	**23.26**
HSUPA	1	**22.0**	21.59	21.68	21.43
	2	**22.0**	21.65	21.66	21.65
	3	**22.0**	21.38	21.58	21.45
	4	**22.0**	21.55	21.42	21.47
	5	**22.0**	21.37	21.51	21.40
HSDPA	1	**23.0**	22.61	22.69	22.47
	2	**23.0**	22.41	22.58	22.54
	3	**23.0**	21.90	22.01	21.87
	4	**23.0**	21.74	21.85	21.87

WCDMA Band 4

Item	Band	WCDMA Band 4 Result			
	ARFCN	**Tune up**	Ch.1513 (1752.6MHz)	Ch.1413 (1732.6MHz)	Ch.1312 (1712.4MHz)
WCDMA	12.2kbps RMC	**24.0**	**23.24**	**23.15**	**23.02**
HSUPA	1	**22.0**	21.55	21.63	21.44
	2	**22.0**	21.64	21.65	21.65
	3	**22.0**	21.40	21.60	21.42
	4	**22.0**	21.50	21.45	21.46
	5	**22.0**	21.40	21.48	21.42
HSDPA	1	**23.0**	22.58	22.72	22.47
	2	**23.0**	22.42	22.56	22.55
	3	**23.0**	21.89	22.01	21.84
	4	**23.0**	21.77	21.85	21.89

WCDMA Band 5

Item	Band	WCDMA Band 5 Result			
	ARFCN	**Tune up**	Ch.4233 (846.6MHz)	Ch.4183 (836.6MHz)	Ch.4132 (826.4MHz)
WCDMA	12.2kbps RMC	**24.0**	**22.93**	**22.83**	**22.89**
HSUPA	1	**22.0**	21.32	21.40	21.25
	2	**22.0**	21.43	21.44	21.41
	3	**22.0**	21.21	21.36	21.23
	4	**22.0**	21.27	21.26	21.27
	5	**22.0**	21.15	21.29	21.23
HSDPA	1	**23.0**	22.37	22.47	22.26
	2	**23.0**	22.18	22.35	22.31
	3	**23.0**	21.69	21.79	21.60
	4	**23.0**	21.59	21.65	21.65

10.3. LTE Measurement result

According to April 2015 TCB workshop, SAR Test exclusion can be applied for testing overlapping LTE Bands as follows:

a) The maximum out power, including tolerance, for the smaller band must be ≤ the larger band to qualify for SAR test exclusion.

b) The channel bandwidth and other operating parameters for the smaller band must be fully supported by the larger band.

LTE Band 4 (1710-1755MHz) is covered by LTE Band 66 (1710-1780MHz)

Table 10.3: The conducted Power for LTE

LTE Band 2

Bandwidth	Number of RBs	Frequency	QPSK	16QAM	QPSK Tune-up	16QAM Tune-up
1.4MHz	1RB-High (5)	1909.3	22.66	22.81	23.5	23.0
		1880.0	22.73	22.37		
		1850.7	22.49	22.47		
	1RB-Middle (3)	1909.3	22.62	22.79		
		1880.0	22.63	22.19		
		1850.7	22.50	22.52		
	1RB-Low (0)	1909.3	22.66	22.69		
		1880.0	22.73	22.11		
		1850.7	22.54	22.67		
	3RB-High (3)	1909.3	22.75	22.49		
		1880.0	22.73	22.07		
		1850.7	22.63	22.32		
	3RB-Middle (1)	1909.3	22.83	22.58		
		1880.0	22.74	22.09		
		1850.7	22.63	22.34		
	3RB-Low (0)	1909.3	22.80	22.61		
		1880.0	22.76	22.02		
		1850.7	22.54	22.33		
	6RB (0)	1909.3	22.34	21.29	23.0	22.0
		1880.0	22.23	21.13		
		1850.7	21.97	21.16		
3MHz	1RB-High (14)	1908.5	22.73	22.75	23.5	23.0
		1880.0	22.68	22.20		
		1851.5	22.57	22.47		
	1RB-Middle (7)	1908.5	22.77	22.88		
		1880.0	22.62	22.29		
		1851.5	22.51	22.55		
	1RB-Low (0)	1908.5	22.69	22.76		
		1880.0	22.62	22.14		
		1851.5	22.59	22.46		
	8RB-High (7)	1908.5	22.29	21.60	23.0	22.0
		1880.0	22.28	21.45		
		1851.5	22.17	21.24		
	8RB-Middle (4)	1908.5	22.36	21.62		
		1880.0	22.11	21.36		
		1851.5	22.07	21.41		
	8RB-Low (0)	1908.5	22.18	21.39		
		1880.0	22.16	21.41		
		1851.5	22.07	21.45		
	15RB (0)	1908.5	22.34	21.57		
		1880.0	22.17	21.39		
		1851.5	22.00	21.47		
5MHz	1RB-High (24)	1907.5	22.71	22.34	23.5	23.0
		1880.0	22.56	22.57		
		1852.5	22.57	22.71		
	1RB-Middle (12)	1907.5	22.68	22.14		
		1880.0	22.55	22.63		
		1852.5	22.53	22.52		
	1RB-Low (0)	1907.5	22.70	22.13		
		1880.0	22.43	22.51		
		1852.5	22.47	22.42		
	12RB-High (13)	1907.5	22.29	21.48	23.0	22.0
		1880.0	22.14	21.31		
		1852.5	22.10	21.19		
	12RB-Middle (6)	1907.5	22.07	21.34		
		1880.0	22.18	21.36		
		1852.5	22.10	21.17		
	12RB-Low (0)	1907.5	22.27	21.31		
		1880.0	22.06	21.34		
		1852.5	22.02	21.33		
	25RB (0)	1907.5	22.26	21.25		
		1880.0	22.09	21.46		
		1852.5	22.14	21.06		
10MHz	1RB-High (49)	1905.0	22.62	22.37	23.5	23.0
		1880.0	22.54	22.52		
		1855.0	22.51	22.55		
	1RB-Middle (24)	1905.0	22.63	22.14		
		1880.0	22.41	22.66		
		1855.0	22.52	22.51		
	1RB-Low (0)	1905.0	22.62	22.25		
		1880.0	22.42	22.57		
		1855.0	22.45	22.51		
	25RB-High (25)	1905.0	22.25	21.18	23.0	22.0
		1880.0	22.12	21.55		
		1855.0	21.99	21.45		
	25RB-Middle (12)	1905.0	22.07	21.37		
		1880.0	22.08	21.44		
		1855.0	21.95	21.11		
	25RB-Low (0)	1905.0	22.22	21.41		
		1880.0	22.03	21.34		
		1855.0	22.17	21.24		
	50RB (0)	1905.0	22.07	21.46		
		1880.0	22.02	21.33		
		1855.0	22.10	21.04		
15MHz	1RB-High (74)	1902.5	22.61	22.73	23.5	23.0
		1880.0	22.38	22.59		
		1857.5	22.43	22.52		
	1RB-Middle (37)	1902.5	22.61	22.72		
		1880.0	22.38	22.64		
		1857.5	22.45	22.65		
	1RB-Low (0)	1902.5	22.58	22.55		
		1880.0	22.35	22.68		
		1857.5	22.50	22.47		
	36RB-High (38)	1902.5	22.06	21.42	23.0	22.0
		1880.0	22.03	21.43		
		1857.5	22.11	20.98		
	36RB-Middle (19)	1902.5	22.15	21.39		
		1880.0	22.00	21.40		
		1857.5	22.01	21.26		
	36RB-Low (0)	1902.5	22.02	21.39		
		1880.0	22.10	21.23		
		1857.5	22.08	20.98		
	75RB (0)	1902.5	22.20	21.49		
		1880.0	22.06	21.35		
		1857.5	22.06	21.31		
20MHz	1RB-High (99)	1900.0	22.63	22.34	23.5	23.0
		1880.0	22.64	22.22		
		1860.0	22.45	22.33		
	1RB-Middle (50)	1900.0	22.48	22.15		
		1880.0	22.57	22.01		
		1860.0	22.44	22.59		
	1RB-Low (0)	1900.0	22.55	22.15		
		1880.0	22.52	22.18		
		1860.0	22.34	22.45		
	50RB-High (50)	1900.0	22.02	21.37	23.0	22.0
		1880.0	22.08	21.08		
		1860.0	22.04	21.13		
	50RB-Middle (25)	1900.0	22.12	21.38		
		1880.0	22.14	21.24		
		1860.0	22.10	21.02		
	50RB-Low (0)	1900.0	22.11	21.34		
		1880.0	22.00	21.22		
		1860.0	22.09	21.00		
	100RB (0)	1900.0	22.04	21.44		
		1880.0	22.15	21.33		
		1860.0	21.96	21.02		

LTE Band 5

Bandwidth	Number of RBs	Frequency	QPSK	16QAM	QPSK Tune-up	16QAM Tune-up
1.4MHz	1RB-High (5)	848.3	22.82	22.72	23.5	23.0
		836.5	22.53	22.63		
		824.7	22.61	22.26		
	1RB-Middle (3)	848.3	22.80	22.59		
		836.5	22.56	22.67		
		824.7	22.67	22.32		
	1RB-Low (0)	848.3	22.59	22.67		
		836.5	22.39	22.63		
		824.7	22.61	22.25		
	3RB-High (3)	848.3	22.87	22.51		
		836.5	22.66	22.55		
		824.7	22.76	22.57		
	3RB-Middle (1)	848.3	22.77	22.46		
		836.5	22.71	22.58		
		824.7	22.80	22.56		
	3RB-Low (0)	848.3	22.70	22.47		
		836.5	22.70	22.51		
		824.7	22.74	22.52		
	6RB (0)	848.3	22.29	21.47	23.0	22.0
		836.5	22.23	21.35		
		824.7	22.28	21.49		
3MHz	1RB-High (14)	847.5	22.79	22.20	23.5	23.0
		836.5	22.52	22.14		
		825.5	22.61	22.58		
	1RB-Middle (7)	847.5	22.68	22.16		
		836.5	22.57	22.26		
		825.5	22.61	22.74		
	1RB-Low (0)	847.5	22.70	22.09		
		836.5	22.54	22.10		
		825.5	22.57	22.75		
	8RB-High (7)	847.5	22.26	21.81	23.0	22.0
		836.5	22.23	21.66		
		825.5	22.26	21.78		
	8RB-Middle (4)	847.5	22.27	21.46		
		836.5	22.13	21.68		
		825.5	22.31	21.66		
	8RB-Low (0)	847.5	22.22	21.35		
		836.5	22.18	21.24		
		825.5	22.28	21.84		
	15RB (0)	847.5	22.27	21.36		
		836.5	22.23	21.69		
		825.5	22.28	21.71		
5MHz	1RB-High (24)	846.5	22.70	22.36	23.5	23.0
		836.5	22.56	22.45		
		826.5	22.57	22.15		
	1RB-Middle (12)	846.5	22.59	22.18		
		836.5	22.54	22.74		
		826.5	22.56	22.25		
	1RB-Low (0)	846.5	22.48	22.22		
		836.5	22.57	22.74		
		826.5	22.66	22.12		
	12RB-High (13)	846.5	22.28	21.42	23.0	22.0
		836.5	22.18	21.58		
		826.5	22.16	21.60		
	12RB-Middle (6)	846.5	22.22	21.41		
		836.5	22.18	21.64		
		826.5	22.27	21.65		
	12RB-Low (0)	846.5	22.24	21.64		
		836.5	22.17	21.20		
		826.5	22.22	21.63		
	25RB (0)	846.5	22.21	21.37		
		836.5	22.18	21.77		
		826.5	22.17	21.75		
10MHz	1RB-High (49)	844.0	22.76	22.87	23.5	23.0
		836.5	22.74	22.17		
		829.0	22.75	22.81		
	1RB-Middle (24)	844.0	22.73	22.79		
		836.5	22.73	22.31		
		829.0	22.65	22.81		
	1RB-Low (0)	844.0	22.69	22.74		
		836.5	22.52	22.05		
		829.0	22.74	22.83		
	25RB-High (25)	844.0	22.31	21.21	23.0	22.0
		836.5	22.65	21.66		
		829.0	22.24	21.75		
	25RB-Middle (12)	844.0	22.28	21.22		
		836.5	22.30	21.63		
		829.0	22.21	21.43		
	25RB-Low (0)	844.0	22.15	21.46		
		836.5	22.31	21.13		
		829.0	22.22	21.78		
	50RB (0)	844.0	22.32	21.29		
		836.5	22.21	21.67		
		829.0	22.26	21.23		

LTE Band 7

Bandwidth	Number of RBs	Frequency	QPSK	16QAM	QPSK Tune-up	16QAM Tune-up
5MHz	1RB-High (24)	2567.5	22.06	21.50	23.0	23.0
		2535.0	22.24	21.94		
		2502.5	22.43	22.10		
	1RB-Middle (12)	2567.5	21.99	21.64		
		2535.0	22.17	21.93		
		2502.5	22.50	22.08		
	1RB-Low (0)	2567.5	21.98	21.71		
		2535.0	22.32	21.90		
		2502.5	22.51	22.15		
	12RB-High (13)	2567.5	21.63	20.68	22.5	22.0
		2535.0	21.87	21.01		
		2502.5	22.19	21.16		
	12RB-Middle (6)	2567.5	21.67	20.72		
		2535.0	21.91	20.91		
		2502.5	22.12	21.06		
	12RB-Low (0)	2567.5	21.67	20.71		
		2535.0	21.91	21.00		
		2502.5	22.10	21.26		
	25RB (0)	2567.5	21.70	20.95		
		2535.0	21.79	21.22		
		2502.5	22.16	21.30		
10MHz	1RB-High (49)	2565.0	21.95	21.73	23.0	23.0
		2535.0	22.18	22.46		
		2505.0	22.52	22.14		
	1RB-Middle (24)	2565.0	22.08	21.69		
		2535.0	22.27	22.57		
		2505.0	22.34	22.07		
	1RB-Low (0)	2565.0	21.97	21.63		
		2535.0	22.33	22.52		
		2505.0	22.40	22.10		
	25RB-High (25)	2565.0	21.60	20.96	22.5	22.0
		2535.0	21.81	21.16		
		2505.0	22.03	21.06		
	25RB-Middle (12)	2565.0	21.58	21.00		
		2535.0	21.79	21.19		
		2505.0	22.08	21.06		
	25RB-Low (0)	2565.0	21.69	20.92		
		2535.0	21.81	21.13		
		2505.0	22.07	21.05		
	50RB (0)	2565.0	21.70	20.77		
		2535.0	21.90	20.88		
		2505.0	22.09	21.12		
15MHz	1RB-High (74)	2562.5	22.02	22.37	23.0	23.0
		2535.0	22.28	22.58		
		2507.5	22.30	22.76		
	1RB-Middle (37)	2562.5	21.95	22.36		
		2535.0	22.12	22.57		
		2507.5	22.34	22.80		
	1RB-Low (0)	2562.5	22.00	22.34		
		2535.0	22.19	22.57		
		2507.5	22.42	22.77		
	36RB-High (38)	2562.5	21.73	20.68	22.5	22.0
		2535.0	21.87	21.24		
		2507.5	22.03	21.09		
	36RB-Middle (19)	2562.5	21.77	20.61		
		2535.0	21.91	20.93		
		2507.5	21.99	21.10		
	36RB-Low (0)	2562.5	21.78	20.78		
		2535.0	21.90	20.91		
		2507.5	22.04	20.99		
	75RB (0)	2562.5	21.61	20.79		
		2535.0	21.83	21.01		
		2507.5	22.03	21.13		
20MHz	1RB-High (99)	2560.0	22.20	22.51	23.0	23.0
		2535.0	22.36	22.29		
		2510.0	22.46	22.84		
	1RB-Middle (50)	2560.0	22.16	22.57		
		2535.0	22.34	22.08		
		2510.0	22.42	22.76		
	1RB-Low (0)	2560.0	22.18	22.37		
		2535.0	22.26	22.24		
		2510.0	22.34	22.78		
	50RB-High (50)	2560.0	21.72	20.74	22.5	22.0
		2535.0	21.88	21.26		
		2510.0	21.95	21.18		
	50RB-Middle (25)	2560.0	21.76	20.85		
		2535.0	21.91	20.94		
		2510.0	21.99	21.07		
	50RB-Low (0)	2560.0	21.75	20.91		
		2535.0	21.83	20.92		
		2510.0	21.96	21.03		
	100RB (0)	2560.0	21.77	20.82		
		2535.0	21.81	20.94		
		2510.0	22.04	21.15		

LTE Band 66

Bandwidth	Number of RBs	Frequency	QPSK	16QAM	QPSK Tune-up	16QAM Tune-up
1.4MHz	1RB-High (5)	1779.3	22.87	22.41	23.5	23.0
		1745.0	22.55	22.29		
		1710.7	22.65	22.57		
	1RB-Middle (3)	1779.3	22.82	22.47		
		1745.0	22.59	22.38		
		1710.7	22.62	22.77		
	1RB-Low (0)	1779.3	22.76	22.46		
		1745.0	22.47	22.35		
		1710.7	22.63	22.78		
	3RB-High (3)	1779.3	22.83	22.68		
		1745.0	22.74	22.38		
		1710.7	22.58	22.49		
	3RB-Middle (1)	1779.3	22.92	22.68		
		1745.0	22.78	22.33		
		1710.7	22.61	22.49		
	3RB-Low (0)	1779.3	22.87	22.61		
		1745.0	22.70	22.36		
		1710.7	22.68	22.46		
	6RB (0)	1779.3	22.39	21.09	23.0	22.0
		1745.0	22.11	21.12		
		1710.7	22.17	20.92		
3MHz	1RB-High (14)	1778.5	22.71	22.43	23.5	23.0
		1745.0	22.57	22.68		
		1711.5	22.46	22.55		
	1RB-Middle (7)	1778.5	22.75	22.33		
		1745.0	22.58	22.67		
		1711.5	22.44	22.66		
	1RB-Low (0)	1778.5	22.75	22.42		
		1745.0	22.55	22.67		
		1711.5	22.53	22.73		
	8RB-High (7)	1778.5	22.40	21.44	23.0	22.0
		1745.0	22.16	21.31		
		1711.5	22.14	21.25		
	8RB-Middle (4)	1778.5	22.34	21.46		
		1745.0	22.17	21.33		
		1711.5	22.14	21.29		
	8RB-Low (0)	1778.5	22.30	21.46		
		1745.0	22.10	21.34		
		1711.5	22.22	21.34		
	15RB (0)	1778.5	22.30	21.42		
		1745.0	22.13	21.34		
		1711.5	22.09	21.29		
5MHz	1RB-High (24)	1777.5	22.89	22.69	23.5	23.0
		1745.0	22.64	22.68		
		1712.5	22.56	22.94		
	1RB-Middle (12)	1777.5	22.82	22.95		
		1745.0	22.56	22.66		
		1712.5	22.63	22.73		
	1RB-Low (0)	1777.5	22.84	23.08		
		1745.0	22.70	22.72		
		1712.5	22.56	22.77		
	12RB-High (13)	1777.5	22.31	21.38	23.0	22.0
		1745.0	22.22	21.24		
		1712.5	22.22	21.22		
	12RB-Middle (6)	1777.5	22.35	21.48		
		1745.0	22.06	21.23		
		1712.5	22.18	21.25		
	12RB-Low (0)	1777.5	22.45	21.47		
		1745.0	22.24	21.47		
		1712.5	22.16	21.29		
	25RB (0)	1777.5	22.46	21.37		
		1745.0	22.18	21.17		
		1712.5	22.19	21.33		
10MHz	1RB-High (49)	1775.0	22.74	22.32	23.5	23.0
		1745.0	22.62	22.21		
		1715.0	22.45	22.54		
	1RB-Middle (24)	1775.0	22.74	22.36		
		1745.0	22.63	22.18		
		1715.0	22.40	22.84		
	1RB-Low (0)	1775.0	22.71	22.41		
		1745.0	22.62	22.04		
		1715.0	22.51	22.71		
	25RB-High (25)	1775.0	22.34	21.61	23.0	22.0
		1745.0	22.16	21.40		
		1715.0	22.06	21.08		
	25RB-Middle (12)	1775.0	22.42	21.55		
		1745.0	22.21	21.44		
		1715.0	22.48	21.38		
	25RB-Low (0)	1775.0	22.37	21.90		
		1745.0	22.16	21.65		
		1715.0	22.25	21.16		
	50RB (0)	1775.0	22.46	21.40		
		1745.0	22.06	21.26		
		1715.0	22.42	21.43		
15MHz	1RB-High (74)	1772.5	22.76	22.94	23.5	23.0
		1745.0	22.67	22.21		
		1717.5	22.63	22.60		
	1RB-Middle (37)	1772.5	22.74	22.91		
		1745.0	22.60	22.24		
		1717.5	22.65	22.61		
	1RB-Low (0)	1772.5	22.71	23.02		
		1745.0	22.72	22.23		
		1717.5	22.68	22.72		
	36RB-High (38)	1772.5	22.31	21.57	23.0	22.0
		1745.0	22.18	21.33		
		1717.5	22.15	21.07		
	36RB-Middle (19)	1772.5	22.38	21.80		
		1745.0	22.15	21.26		
		1717.5	22.18	21.14		
	36RB-Low (0)	1772.5	22.23	21.52		
		1745.0	22.11	21.54		
		1717.5	22.50	21.40		
	75RB (0)	1772.5	22.32	21.76		
		1745.0	22.13	21.30		
		1717.5	22.24	21.19		
20MHz	1RB-High (99)	1770.0	22.76	22.90	23.5	23.0
		1745.0	22.63	22.25		
		1720.0	22.65	22.05		
	1RB-Middle (50)	1770.0	22.70	22.89		
		1745.0	22.54	22.33		
		1720.0	22.64	22.15		
	1RB-Low (0)	1770.0	22.72	22.95		
		1745.0	22.62	22.46		
		1720.0	22.62	22.06		
	50RB-High (50)	1770.0	22.41	21.43	23.0	22.0
		1745.0	22.28	21.33		
		1720.0	22.01	21.45		
	50RB-Middle (25)	1770.0	22.22	21.44		
		1745.0	22.17	21.25		
		1720.0	22.17	21.48		
	50RB-Low (0)	1770.0	22.42	21.48		
		1745.0	22.29	21.49		
		1720.0	22.50	21.43		
	100RB (0)	1770.0	22.25	21.44		
		1745.0	22.15	21.26		
		1720.0	22.16	21.47		

10.4. Bluetooth Measurement result

Table 10.4: The conducted Power measurement results for Bluetooth

Bluetooth

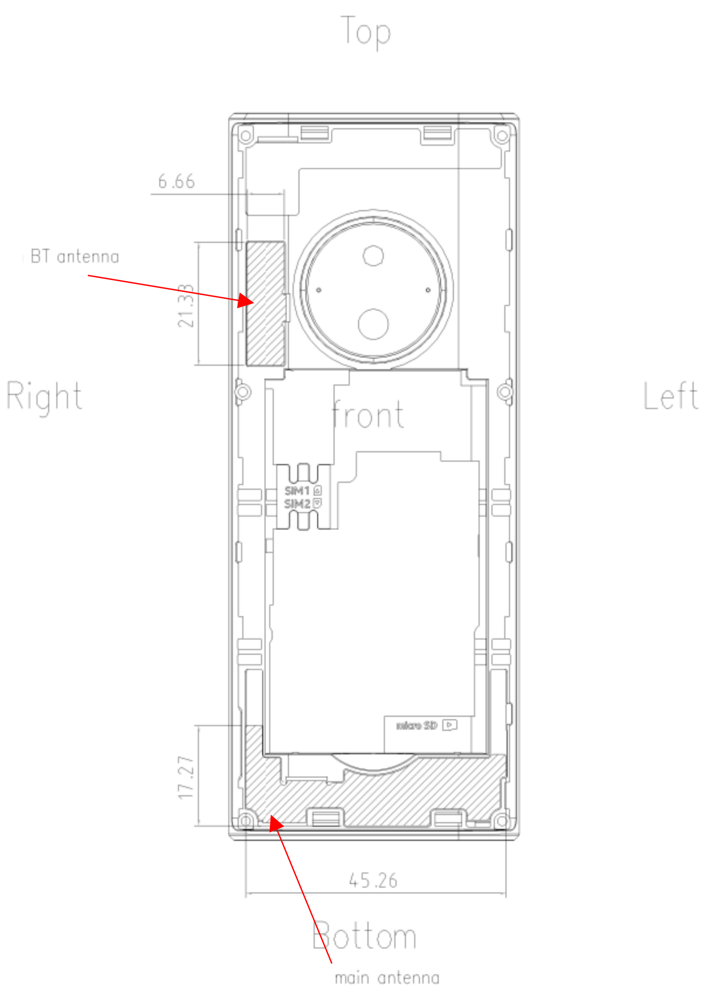
Averaged Power (dBm)_ Duty Cycle: **77.17%**				
Mode	**Tune up**	Ch.0 (2402MHz)	Ch.39 (2441MHz)	Ch.78 (2480MHz)
GFSK	**10.0**	8.62	8.69	8.20
EDR2M-4_DQPSK	**10.0**	8.93	8.97	8.50
EDR3M-8DPSK	**10.0**	9.07	**9.12**	8.67

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 Bluetooth can transmit simultaneous with other transmitters.

11.2. Transmit Antenna Separation Distances



Picture 11.1 Antenna Locations (Back View)

11.3. Evaluation of Simultaneous

No.	Simultaneous Transmission Configuration
1	WWAN + Bluetooth

Table 12.1: Maximum Simultaneous Transmission SAR

/	Position	Sum (W/kg)
Highest reported SAR value for Head	Right Cheek (LTE Band 7 + Bluetooth)	**1.33**
Highest reported SAR value for Body-worn	Rear Side (WCDMA Band 5 + Bluetooth)	**1.24**

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

Conclusion:

According to the above tables, the sum of reported SAR values is less than limit. So the simultaneous transmission SAR with volume scans is not required.

12. 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:

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

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

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

Note:

1. The device support dual SIMs, SIM1 was used for the all configuration SAR testing and SIM2 test the worst case SAR of SIM1.
2. B2 (Battery): BL-L5H (SHENZHEN UTILITY ENERGYCO., LTD.)
3. C2: Configuration2

Duty Cycle

Mode	Duty Cycle
GSM	1:8.3
GPRS	1:4 / 1:2.67
WCDMA	1:1
FDD_LTE	1:1
Bluetooth	1:1.3

12.1. Testing Environment

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

12.2. Test Results

Table 12.1: GSM 850 SAR Values

RF Exposure Conditions	Frequency Band	Channel Number	Frequency (MHz)	Mode/RB	Test Position	Distance	Note	Figure No.	EUT Measured Power (dBm)	Tune up (dBm)	Duty Cycle %	Duty Cycle Scaling Factor	Measured SAR 1g (W/kg)	Calculated SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Calculated SAR 10g (W/kg)	Power Drift
Head	GSM850	128	824.2	Speech	Left Cheek	0mm	\	\	33.04	33.50	\	\	0.412	**0.46**	0.306	**0.34**	0.05
Head	GSM850	128	824.2	Speech	Left Tilt	0mm	\	\	33.04	33.50	\	\	0.321	**0.36**	0.228	**0.25**	0.19
Head	GSM850	128	824.2	Speech	Right Cheek	0mm	\	\	33.04	33.50	\	\	0.418	**0.46**	0.308	**0.34**	0.08
Head	GSM850	128	824.2	Speech	Right Tilt	0mm	\	\	33.04	33.50	\	\	0.354	**0.39**	0.250	**0.28**	0.03
Head	GSM850	128	824.2	Speech	Right Cheek	0mm	C2	**1**	33.04	33.50	\	\	**0.541**	**0.60**	0.395	**0.44**	0.07
Body-Wron	GSM850	128	824.2	GPRS(2TX)	Front	15mm	\	\	30.86	32.00	\	\	0.504	**0.66**	0.345	**0.45**	0.04
Body-Wron	GSM850	128	824.2	GPRS(2TX)	Rear	15mm	\	\	30.86	32.00	\	\	0.714	**0.93**	0.522	**0.68**	0.02
Body-Wron	GSM850	251	848.8	GPRS(2TX)	Rear	15mm	\	\	30.61	32.00	\	\	0.718	**0.99**	0.526	**0.72**	-0.07
Body-Wron	GSM850	190	836.6	GPRS(2TX)	Rear	15mm	\	\	30.72	32.00	\	\	0.712	**0.96**	0.523	**0.70**	-0.01
Body-Wron	GSM850	251	848.8	GPRS(2TX)	Rear	15mm	C2	**2**	30.61	32.00	\	\	**0.795**	**1.09**	0.581	**0.80**	-0.05

Table 12.2: GSM 1900 SAR Values

RF Exposure Conditions	Frequency Band	Channel Number	Frequency (MHz)	Mode/RB	Test Position	Distance	Note	Figure No.	EUT Measured Power (dBm)	Tune up (dBm)	Duty Cycle %	Duty Cycle Scaling Factor	Measured SAR 1g (W/kg)	Calculated SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Calculated SAR 10g (W/kg)	Power Drift
Head	GSM1900	512	1850.2	Speech	Left Cheek	0mm	\	**3**	29.99	30.50	\	\	**0.439**	**0.49**	0.279	**0.31**	-0.07
Head	GSM1900	512	1850.2	Speech	Left Tilt	0mm	\	\	29.99	30.50	\	\	0.302	**0.34**	0.186	**0.21**	0.06
Head	GSM1900	512	1850.2	Speech	Right Cheek	0mm	\	\	29.99	30.50	\	\	0.427	**0.48**	0.277	**0.31**	0.03
Head	GSM1900	512	1850.2	Speech	Right Tilt	0mm	\	\	29.99	30.50	\	\	0.322	**0.36**	0.196	**0.22**	0.14
Head	GSM1900	512	1850.2	Speech	Left Cheek	0mm	C2	\	29.99	30.50	\	\	0.297	**0.33**	0.182	**0.20**	0.02
Body-Wron	GSM1900	512	1850.2	GPRS(3TX)	Front	15mm	\	\	26.21	27.00	\	\	0.351	**0.42**	0.209	**0.25**	0.06
Body-Wron	GSM1900	512	1850.2	GPRS(3TX)	Rear	15mm	\	**4**	26.21	27.00	\	\	**0.518**	**0.62**	0.332	**0.40**	0.10
Body-Wron	GSM1900	512	1850.2	GPRS(3TX)	Rear	15mm	C2	\	26.21	27.00	\	\	0.449	**0.54**	0.286	**0.34**	-0.07

Table 12.3: WCDMA Band 2 SAR Values

RF Exposure Conditions	Frequency Band	Channel Number	Frequency (MHz)	Mode/RB	Test Position	Distance	Note	Figure No.	EUT Measured Power (dBm)	Tune up (dBm)	Duty Cycle %	Duty Cycle Scaling Factor	Measured SAR 1g (W/kg)	Calculated SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Calculated SAR 10g (W/kg)	Power Drift
Head	WCDMA Band 2	9262	1852.4	RMC	Left Cheek	0mm	\	\	23.26	24.00	\	\	0.685	**0.81**	0.436	**0.52**	0.02
Head	WCDMA Band 2	9262	1852.4	RMC	Left Tilt	0mm	\	\	23.26	24.00	\	\	0.545	**0.65**	0.335	**0.40**	0.04
Head	WCDMA Band 2	9262	1852.4	RMC	Right Cheek	0mm	\	\	23.26	24.00	\	\	0.727	**0.86**	0.477	**0.57**	0.01
Head	WCDMA Band 2	9262	1852.4	RMC	Right Tilt	0mm	\	\	23.26	24.00	\	\	0.571	**0.68**	0.348	**0.41**	0.13
Head	WCDMA Band 2	9538	1907.6	RMC	Left Cheek	0mm	\	\	23.25	24.00	\	\	0.805	**0.96**	0.483	**0.57**	-0.17
Head	WCDMA Band 2	9400	1880.0	RMC	Left Cheek	0mm	\	\	23.23	24.00	\	\	0.704	**0.84**	0.434	**0.52**	0.02
Head	WCDMA Band 2	9538	1907.6	RMC	Right Cheek	0mm	\	\	23.25	24.00	\	\	0.716	**0.85**	0.429	**0.51**	0.05
Head	WCDMA Band 2	9400	1880.0	RMC	Right Cheek	0mm	\	**5**	23.23	24.00	\	\	**0.874**	**1.04**	0.539	**0.64**	0.02
Head	WCDMA Band 2	9400	1880.0	RMC	Right Cheek	0mm	C2	\	23.23	24.00	\	\	0.565	**0.67**	0.349	**0.42**	0.19
Body-Wron	WCDMA Band 2	9262	1852.4	RMC	Front	15mm	\	\	23.26	24.00	\	\	0.542	**0.64**	0.329	**0.39**	0.14
Body-Wron	WCDMA Band 2	9262	1852.4	RMC	Rear	15mm	\	**6**	23.26	24.00	\	\	**0.879**	**1.04**	0.560	**0.66**	0.01
Body-Wron	WCDMA Band 2	9538	1907.6	RMC	Rear	15mm	\	\	23.25	24.00	\	\	0.865	**1.03**	0.547	**0.65**	0.02
Body-Wron	WCDMA Band 2	9400	1880.0	RMC	Rear	15mm	\	\	23.23	24.00	\	\	0.872	**1.04**	0.554	**0.66**	0.02
Body-Wron	WCDMA Band 2	9262	1852.4	RMC	Rear	15mm	C2	\	23.26	24.00	\	\	0.829	**0.98**	0.524	**0.62**	0.00

Table 12.4: WCDMA Band 4 SAR Values

RF Exposure Conditions	Frequency Band	Channel Number	Frequency (MHz)	Mode/RB	Test Position	Distance	Note	Figure No.	EUT Measured Power (dBm)	Tune up (dBm)	Duty Cycle %	Duty Cycle Scaling Factor	Measured SAR 1g (W/kg)	Calculated SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Calculated SAR 10g (W/kg)	Power Drift
Head	WCDMA Band 4	1513	1752.6	RMC	Left Cheek	0mm	\	\	23.24	24.00	\	\	0.512	**0.61**	0.334	**0.40**	0.09
Head	WCDMA Band 4	1513	1752.6	RMC	Left Tilt	0mm	\	\	23.24	24.00	\	\	0.310	**0.37**	0.194	**0.23**	0.02
Head	WCDMA Band 4	1513	1752.6	RMC	Right Cheek	0mm	\	**7**	23.24	24.00	\	\	**0.581**	**0.69**	0.389	**0.46**	-0.14
Head	WCDMA Band 4	1513	1752.6	RMC	Right Tilt	0mm	\	\	23.24	24.00	\	\	0.348	**0.41**	0.213	**0.25**	-0.11
Head	WCDMA Band 4	1513	1752.6	RMC	Right Cheek	0mm	C2	\	23.24	24.00	\	\	0.496	**0.59**	0.314	**0.37**	-0.14
Body-Wron	WCDMA Band 4	1513	1752.6	RMC	Front	15mm	\	\	23.24	24.00	\	\	0.384	**0.46**	0.233	**0.28**	0.01
Body-Wron	WCDMA Band 4	1513	1752.6	RMC	Rear	15mm	\	**8**	23.24	24.00	\	\	**0.826**	**0.98**	0.530	**0.63**	0.02
Body-Wron	WCDMA Band 4	1413	1732.6	RMC	Rear	15mm	\	\	23.15	24.00	\	\	0.735	**0.89**	0.472	**0.57**	0.04
Body-Wron	WCDMA Band 4	1312	1712.4	RMC	Rear	15mm	\	\	23.02	24.00	\	\	0.647	**0.81**	0.415	**0.52**	0.08
Body-Wron	WCDMA Band 4	1513	1752.6	RMC	Rear	15mm	C2	\	23.24	24.00	\	\	0.661	**0.79**	0.418	**0.50**	0.02

Table 12.5: WCDMA Band 5 SAR Values

RF Exposure Conditions	Frequency Band	Channel Number	Frequency (MHz)	Mode/RB	Test Position	Distance	Note	Figure No.	EUT Measured Power (dBm)	Tune up (dBm)	Duty Cycle %	Duty Cycle Scaling Factor	Measured SAR 1g (W/kg)	Calculated SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Calculated SAR 10g (W/kg)	Power Drift
Head	WCDMA Band 5	4233	846.6	RMC	Left Cheek	0mm	\	9	22.93	24.00	\	\	0.990	1.27	0.730	0.93	0.01
Head	WCDMA Band 5	4233	846.6	RMC	Left Tilt	0mm	\	\	22.93	24.00	\	\	0.575	0.74	0.409	0.52	0.15
Head	WCDMA Band 5	4233	846.6	RMC	Right Cheek	0mm	\	\	22.93	24.00	\	\	0.939	1.20	0.688	0.88	0.07
Head	WCDMA Band 5	4233	846.6	RMC	Right Tilt	0mm	\	\	22.93	24.00	\	\	0.576	0.74	0.407	0.52	0.04
Head	WCDMA Band 5	4183	836.6	RMC	Left Cheek	0mm	\	\	22.83	24.00	\	\	0.821	1.07	0.558	0.73	0.16
Head	WCDMA Band 5	4132	826.4	RMC	Left Cheek	0mm	\	\	22.89	24.00	\	\	0.738	0.95	0.515	0.66	-0.08
Head	WCDMA Band 5	4183	836.6	RMC	Right Cheek	0mm	\	\	22.83	24.00	\	\	0.817	1.07	0.566	0.74	0.12
Head	WCDMA Band 5	4132	826.4	RMC	Right Cheek	0mm	\	\	22.89	24.00	\	\	0.736	0.95	0.508	0.66	0.03
Head	WCDMA Band 5	4233	846.6	RMC	Left Cheek	0mm	SIM2	\	22.93	24.00	\	\	0.985	1.26	0.723	0.92	-0.06
Head	WCDMA Band 5	4233	846.6	RMC	Left Cheek	0mm	B2	\	22.93	24.00	\	\	0.967	1.24	0.705	0.90	0.08
Head	WCDMA Band 5	4233	846.6	RMC	Left Cheek	0mm	C2	\	22.93	24.00	\	\	0.829	1.06	0.613	0.78	0.09
Body-Wron	WCDMA Band 5	4233	846.6	RMC	Front	15mm	\	\	22.93	24.00	\	\	0.696	0.89	0.474	0.61	0.03
Body-Wron	WCDMA Band 5	4233	846.6	RMC	Rear	15mm	\	10	22.93	24.00	\	\	0.962	1.23	0.701	0.90	-0.04
Body-Wron	WCDMA Band 5	4183	836.6	RMC	Front	15mm	\	\	22.83	24.00	\	\	0.673	0.88	0.458	0.60	0.06
Body-Wron	WCDMA Band 5	4132	826.4	RMC	Front	15mm	\	\	22.89	24.00	\	\	0.650	0.84	0.443	0.57	-0.07
Body-Wron	WCDMA Band 5	4183	836.6	RMC	Rear	15mm	\	\	22.83	24.00	\	\	0.930	1.22	0.678	0.89	-0.04
Body-Wron	WCDMA Band 5	4132	826.4	RMC	Rear	15mm	\	\	22.89	24.00	\	\	0.898	1.16	0.655	0.85	-0.06
Body-Wron	WCDMA Band 5	4233	846.6	RMC	Rear	15mm	SIM2	\	22.93	24.00	\	\	0.951	1.22	0.697	0.89	0.02
Body-Wron	WCDMA Band 5	4233	846.6	RMC	Rear	15mm	B2	\	22.93	24.00	\	\	0.937	1.20	0.689	0.88	0.06
Body-Wron	WCDMA Band 5	4233	846.6	RMC	Rear	15mm	C2	\	22.93	24.00	\	\	0.875	1.12	0.636	0.81	-0.01
Body-Wron	WCDMA Band 5	4233	846.6	RMC	Rear	15mm	Headset	\	22.93	24.00	\	\	0.926	1.18	0.670	0.86	0.03

Table 12.6: LTE Band 2 SAR Values

RF Exposure Conditions	Frequency Band	Channel Number	Frequency (MHz)	Mode/RB	Test Position	Distance	Note	Figure No.	EUT Measured Power (dBm)	Tune up (dBm)	Duty Cycle %	Duty Cycle Scaling Factor	Measured SAR 1g (W/kg)	Calculated SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Calculated SAR 10g (W/kg)	Power Drift
Head	LTE Band 2	18900	1880.0	1RB99	Left Cheek	0mm	\	11	22.64	23.50	\	\	0.837	1.02	0.523	0.64	-0.17
Head	LTE Band 2	18900	1880.0	50RB25	Left Cheek	0mm	\	\	22.14	23.00	\	\	0.727	0.89	0.455	0.55	0.12
Head	LTE Band 2	18900	1880.0	1RB99	Left Tilt	0mm	\	\	22.64	23.50	\	\	0.687	0.84	0.428	0.52	-0.17
Head	LTE Band 2	18900	1880.0	50RB25	Left Tilt	0mm	\	\	22.14	23.00	\	\	0.607	0.74	0.379	0.46	0.19
Head	LTE Band 2	18900	1880.0	1RB99	Right Cheek	0mm	\	\	22.64	23.50	\	\	0.738	0.90	0.459	0.56	0.19
Head	LTE Band 2	18900	1880.0	50RB25	Right Cheek	0mm	\	\	22.14	23.00	\	\	0.631	0.77	0.393	0.48	0.12
Head	LTE Band 2	18900	1880.0	1RB99	Right Tilt	0mm	\	\	22.64	23.50	\	\	0.658	0.80	0.418	0.51	-0.16
Head	LTE Band 2	18900	1880.0	50RB25	Right Tilt	0mm	\	\	22.14	23.00	\	\	0.568	0.69	0.361	0.44	-0.08
Head	LTE Band 2	19100	1900.0	1RB99	Left Cheek	0mm	\	\	22.63	23.50	\	\	0.831	1.02	0.518	0.63	-0.09
Head	LTE Band 2	18700	1860.0	1RB99	Left Cheek	0mm	\	\	22.45	23.50	\	\	0.782	1.00	0.490	0.62	-0.02
Head	LTE Band 2	19100	1900.0	50RB25	Left Cheek	0mm	\	\	22.12	23.00	\	\	0.754	0.92	0.470	0.58	0.07
Head	LTE Band 2	18700	1860.0	50RB25	Left Cheek	0mm	\	\	22.10	23.00	\	\	0.680	0.84	0.426	0.52	-0.15
Head	LTE Band 2	18900	1880.0	100RB	Left Cheek	0mm	\	\	22.15	23.00	\	\	0.668	0.81	0.413	0.50	-0.07
Head	LTE Band 2	19100	1900.0	1RB99	Left Tilt	0mm	\	\	22.63	23.50	\	\	0.662	0.81	0.413	0.50	0.06
Head	LTE Band 2	18700	1860.0	1RB99	Left Tilt	0mm	\	\	22.45	23.50	\	\	0.628	0.80	0.394	0.50	0.15
Head	LTE Band 2	18900	1880.0	100RB	Left Tilt	0mm	\	\	22.15	23.00	\	\	0.586	0.71	0.367	0.45	0.03
Head	LTE Band 2	19100	1900.0	1RB99	Right Cheek	0mm	\	\	22.63	23.50	\	\	0.770	0.94	0.470	0.57	-0.15
Head	LTE Band 2	18700	1860.0	1RB99	Right Cheek	0mm	\	\	22.45	23.50	\	\	0.778	0.99	0.479	0.61	-0.14
Head	LTE Band 2	18900	1880.0	100RB	Right Cheek	0mm	\	\	22.15	23.00	\	\	0.716	0.87	0.440	0.54	-0.15
Head	LTE Band 2	19100	1900.0	1RB99	Right Tilt	0mm	\	\	22.63	23.50	\	\	0.685	0.84	0.427	0.52	0.18
Head	LTE Band 2	18700	1860.0	1RB99	Right Tilt	0mm	\	\	22.45	23.50	\	\	0.658	0.84	0.410	0.52	-0.17
Head	LTE Band 2	18900	1880.0	100RB	Right Tilt	0mm	\	\	22.15	23.00	\	\	0.621	0.76	0.410	0.50	0.06
Head	LTE Band 2	18900	1880.0	1RB99	Left Cheek	0mm	C2	\	22.64	23.50	\	\	0.688	0.84	0.429	0.52	0.03
Body-Wron	LTE Band 2	18900	1880.0	1RB99	Front	15mm	\	\	22.64	23.50	\	\	0.566	0.69	0.339	0.41	-0.01
Body-Wron	LTE Band 2	18900	1880.0	50RB25	Front	15mm	\	\	22.14	23.00	\	\	0.505	0.62	0.302	0.37	0.07
Body-Wron	LTE Band 2	18900	1880.0	1RB99	Rear	15mm	\	12	22.64	23.50	\	\	0.829	1.01	0.525	0.64	0.01
Body-Wron	LTE Band 2	18900	1880.0	50RB25	Rear	15mm	\	\	22.14	23.00	\	\	0.588	0.72	0.373	0.45	-0.10
Body-Wron	LTE Band 2	19100	1900.0	1RB99	Rear	15mm	\	\	22.63	23.50	\	\	0.807	0.99	0.481	0.59	-0.01
Body-Wron	LTE Band 2	18700	1860.0	1RB99	Rear	15mm	\	\	22.45	23.50	\	\	0.797	1.01	0.478	0.61	-0.02
Body-Wron	LTE Band 2	18900	1880.0	100RB	Rear	15mm	\	\	22.15	23.00	\	\	0.730	0.89	0.436	0.53	0.12
Body-Wron	LTE Band 2	18900	1880.0	1RB99	Rear	15mm	C2	\	22.64	23.50	\	\	0.828	1.01	0.525	0.64	0.05

Table 12.7: LTE Band 5 SAR Values

RF Exposure Conditions	Frequency Band	Channel Number	Frequency (MHz)	Mode/RB	Test Position	Distance	Note	Figure No.	EUT Measured Power (dBm)	Tune up (dBm)	Duty Cycle %	Duty Cycle Scaling Factor	Measured SAR 1g (W/kg)	Calculated SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Calculated SAR 10g (W/kg)	Power Drift
Head	LTE Band 5	20600	844.0	1RB49	Left Cheek	0mm	\	13	22.76	23.50	\	\	0.952	1.13	0.701	0.83	0.03
Head	LTE Band 5	20525	836.5	25RB25	Left Cheek	0mm	\	\	22.65	23.00	\	\	0.776	0.84	0.542	0.59	0.05
Head	LTE Band 5	20600	844.0	1RB49	Left Tilt	0mm	\	\	22.76	23.50	\	\	0.555	0.66	0.394	0.47	-0.17
Head	LTE Band 5	20525	836.5	25RB25	Left Tilt	0mm	\	\	22.65	23.00	\	\	0.472	0.51	0.335	0.36	0.07
Head	LTE Band 5	20600	844.0	1RB49	Right Cheek	0mm	\	\	22.76	23.50	\	\	0.951	1.13	0.693	0.82	-0.17
Head	LTE Band 5	20525	836.5	25RB25	Right Cheek	0mm	\	\	22.65	23.00	\	\	0.759	0.82	0.527	0.57	0.05
Head	LTE Band 5	20600	844.0	1RB49	Right Tilt	0mm	\	\	22.76	23.50	\	\	0.587	0.70	0.416	0.49	-0.18
Head	LTE Band 5	20525	836.5	25RB25	Right Tilt	0mm	\	\	22.65	23.00	\	\	0.514	0.56	0.363	0.39	-0.18
Head	LTE Band 5	20525	836.5	1RB49	Left Cheek	0mm	\	\	22.74	23.50	\	\	0.904	1.08	0.663	0.79	0.19
Head	LTE Band 5	20450	829.0	1RB49	Left Cheek	0mm	\	\	22.75	23.50	\	\	0.812	0.97	0.595	0.71	0.15
Head	LTE Band 5	20600	844.0	25RB25	Left Cheek	0mm	\	\	22.31	23.00	\	\	0.857	1.00	0.629	0.74	0.15
Head	LTE Band 5	20450	829.0	25RB25	Left Cheek	0mm	\	\	22.24	23.00	\	\	0.706	0.84	0.517	0.62	0.03
Head	LTE Band 5	20600	844.0	50RB	Left Cheek	0mm	\	\	22.32	23.00	\	\	0.825	0.96	0.606	0.71	-0.16
Head	LTE Band 5	20525	836.5	1RB49	Right Cheek	0mm	\	\	22.74	23.50	\	\	0.876	1.04	0.640	0.76	0.13
Head	LTE Band 5	20450	829.0	1RB49	Right Cheek	0mm	\	\	22.75	23.50	\	\	0.807	0.96	0.587	0.70	0.00
Head	LTE Band 5	20600	844.0	25RB25	Right Cheek	0mm	\	\	22.31	23.00	\	\	0.836	0.98	0.610	0.72	0.10
Head	LTE Band 5	20450	829.0	25RB25	Right Cheek	0mm	\	\	22.24	23.00	\	\	0.704	0.84	0.513	0.61	-0.12
Head	LTE Band 5	20600	844.0	50RB	Right Cheek	0mm	\	\	22.32	23.00	\	\	0.818	0.96	0.597	0.70	-0.07
Head	LTE Band 5	20600	844.0	1RB49	Left Cheek	0mm	C2	\	22.76	23.50	\	\	0.751	0.89	0.700	0.83	0.03
Body-Wron	LTE Band 5	20600	844.0	1RB49	Front	15mm	\	\	22.76	23.50	\	\	0.685	0.81	0.463	0.55	-0.14
Body-Wron	LTE Band 5	20525	836.5	25RB25	Front	15mm	\	\	22.65	23.00	\	\	0.625	0.68	0.421	0.46	-0.15
Body-Wron	LTE Band 5	20600	844.0	1RB49	Rear	15mm	\	14	22.76	23.50	\	\	0.937	1.11	0.682	0.81	-0.17
Body-Wron	LTE Band 5	20525	836.5	25RB25	Rear	15mm	\	\	22.65	23.00	\	\	0.826	0.90	0.599	0.65	-0.16
Body-Wron	LTE Band 5	20525	836.5	1RB49	Front	15mm	\	\	22.74	23.50	\	\	0.654	0.78	0.423	0.50	-0.12
Body-Wron	LTE Band 5	20450	829.0	1RB49	Front	15mm	\	\	22.75	23.50	\	\	0.621	0.74	0.401	0.48	-0.17
Body-Wron	LTE Band 5	20600	844.0	50RB	Front	15mm	\	\	22.32	23.00	\	\	0.585	0.68	0.377	0.44	0.15
Body-Wron	LTE Band 5	20525	836.5	1RB49	Rear	15mm	\	\	22.74	23.50	\	\	0.926	1.10	0.623	0.74	0.10
Body-Wron	LTE Band 5	20450	829.0	1RB49	Rear	15mm	\	\	22.75	23.50	\	\	0.879	1.04	0.590	0.70	0.03
Body-Wron	LTE Band 5	20600	844.0	25RB25	Rear	15mm	\	\	22.31	23.00	\	\	0.824	0.97	0.556	0.65	-0.17
Body-Wron	LTE Band 5	20450	829.0	25RB25	Rear	15mm	\	\	22.24	23.00	\	\	0.807	0.96	0.542	0.65	-0.17
Body-Wron	LTE Band 5	20600	844.0	50RB	Rear	15mm	\	\	22.32	23.00	\	\	0.828	0.97	0.556	0.65	-0.09
Body-Wron	LTE Band 5	20600	844.0	1RB49	Rear	15mm	C2	\	22.76	23.50	\	\	0.873	1.04	0.635	0.75	0.02

Table 12.8: LTE Band 7 SAR Values

RF Exposure Conditions	Frequency Band	Channel Number	Frequency (MHz)	Mode/RB	Test Position	Distance	Note	Figure No.	EUT Measured Power (dBm)	Tune up (dBm)	Duty Cycle %	Duty Cycle Scaling Factor	Measured SAR 1g (W/kg)	Calculated SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Calculated SAR 10g (W/kg)	Power Drift
Head	LTE Band 7	20850	2510.0	1RB99	Left Cheek	0mm	\	\	22.46	23.00	\	\	1.050	1.19	0.646	0.73	0.06
Head	LTE Band 7	20850	2510.0	50RB25	Left Cheek	0mm	\	\	21.99	22.50	\	\	1.010	1.14	0.623	0.70	0.01
Head	LTE Band 7	20850	2510.0	1RB99	Left Tilt	0mm	\	\	22.46	23.00	\	\	0.300	0.34	0.182	0.21	-0.14
Head	LTE Band 7	20850	2510.0	50RB25	Left Tilt	0mm	\	\	21.99	22.50	\	\	0.294	0.33	0.177	0.20	-0.13
Head	LTE Band 7	20850	2510.0	1RB99	Right Cheek	0mm	\	\	22.46	23.00	\	\	1.070	1.21	0.656	0.74	-0.09
Head	LTE Band 7	20850	2510.0	50RB25	Right Cheek	0mm	\	\	21.99	22.50	\	\	1.020	1.15	0.627	0.71	-0.17
Head	LTE Band 7	20850	2510.0	1RB99	Right Tilt	0mm	\	\	22.46	23.00	\	\	0.397	0.45	0.225	0.25	0.19
Head	LTE Band 7	20850	2510.0	50RB25	Right Tilt	0mm	\	\	21.99	22.50	\	\	0.390	0.44	0.223	0.25	-0.16
Head	LTE Band 7	21350	2560.0	1RB99	Left Cheek	0mm	\	\	22.20	23.00	\	\	0.688	0.83	0.406	0.49	0.01
Head	LTE Band 7	21100	2535.0	1RB99	Left Cheek	0mm	\	\	22.36	23.00	\	\	0.822	0.95	0.484	0.56	0.09
Head	LTE Band 7	21350	2560.0	50RB25	Left Cheek	0mm	\	\	21.76	22.50	\	\	0.668	0.79	0.391	0.46	0.05
Head	LTE Band 7	21100	2535.0	50RB25	Left Cheek	0mm	\	\	21.91	22.50	\	\	0.773	0.89	0.455	0.52	-0.18
Head	LTE Band 7	20850	2510.0	100RB	Left Cheek	0mm	\	\	22.04	22.50	\	\	0.839	0.93	0.499	0.55	0.09
Head	LTE Band 7	21350	2560.0	1RB99	Right Cheek	0mm	\	\	22.20	23.00	\	\	0.750	0.90	0.459	0.55	0.03
Head	LTE Band 7	21100	2535.0	1RB99	Right Cheek	0mm	\	\	22.36	23.00	\	\	0.845	0.98	0.527	0.61	0.14
Head	LTE Band 7	21350	2560.0	50RB25	Right Cheek	0mm	\	\	21.76	22.50	\	\	0.707	0.84	0.435	0.52	0.18
Head	LTE Band 7	21100	2535.0	50RB25	Right Cheek	0mm	\	\	21.91	22.50	\	\	0.785	0.90	0.490	0.56	-0.05
Head	LTE Band 7	20850	2510.0	100RB	Right Cheek	0mm	\	\	22.04	22.50	\	\	0.871	0.97	0.547	0.61	-0.15
Head	LTE Band 7	20850	2510.0	1RB99	Right Cheek	0mm	C2	15	22.46	23.00	\	\	1.140	1.29	0.695	0.79	0.09
Body-Wron	LTE Band 7	20850	2510.0	1RB99	Front	15mm	\	\	22.46	23.00	\	\	0.372	0.42	0.212	0.24	0.06
Body-Wron	LTE Band 7	20850	2510.0	50RB25	Front	15mm	\	\	21.99	22.50	\	\	0.381	0.43	0.217	0.24	-0.03
Body-Wron	LTE Band 7	20850	2510.0	1RB99	Rear	15mm	\	\	22.46	23.00	\	\	0.758	0.86	0.393	0.45	0.04
Body-Wron	LTE Band 7	20850	2510.0	50RB25	Rear	15mm	\	\	21.99	22.50	\	\	0.689	0.77	0.355	0.40	0.04
Body-Wron	LTE Band 7	21350	2560.0	1RB99	Rear	15mm	\	\	22.20	23.00	\	\	0.504	0.61	0.258	0.31	0.05
Body-Wron	LTE Band 7	21100	2535.0	1RB99	Rear	15mm	\	\	22.36	23.00	\	\	0.627	0.73	0.319	0.37	-0.09
Body-Wron	LTE Band 7	20850	2510.0	100RB	Rear	15mm	\	\	22.04	22.50	\	\	0.728	0.81	0.363	0.40	0.07
Body-Wron	LTE Band 7	20850	2510.0	1RB99	Front	15mm	C2	\	22.46	23.00	\	\	0.431	0.49	0.240	0.27	0.06
Body-Wron	LTE Band 7	20850	2510.0	50RB25	Front	15mm	C2	\	21.99	22.50	\	\	0.398	0.45	0.229	0.26	0.01
Body-Wron	LTE Band 7	20850	2510.0	1RB99	Rear	15mm	C2	16	22.46	23.00	\	\	0.914	1.04	0.480	0.54	0.08
Body-Wron	LTE Band 7	20850	2510.0	50RB25	Rear	15mm	C2	\	21.99	22.50	\	\	0.583	0.66	0.297	0.33	0.05
Body-Wron	LTE Band 7	21350	2560.0	1RB99	Rear	15mm	C2	\	22.20	23.00	\	\	0.751	0.90	0.382	0.46	-0.12
Body-Wron	LTE Band 7	21100	2535.0	1RB99	Rear	15mm	C2	\	22.36	23.00	\	\	0.873	1.01	0.431	0.50	-0.02
Body-Wron	LTE Band 7	20850	2510.0	100RB	Rear	15mm	C2	\	22.04	22.50	\	\	0.873	0.97	0.434	0.48	-0.06

Table 12.9: LTE Band 66 SAR Values

RF Exposure Conditions	Frequency Band	Channel Number	Frequency (MHz)	Mode/RB	Test Position	Distance	Note	Figure No.	EUT Measured Power (dBm)	Tune up (dBm)	Duty Cycle %	Duty Cycle Scaling Factor	Measured SAR 1g (W/kg)	Calculated SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Calculated SAR 10g (W/kg)	Power Drift
Head	LTE Band 66	132572	1770.0	1RB99	Left Cheek	0mm	\	\	22.76	23.50	\	\	0.559	**0.66**	0.375	**0.44**	0.14
Head	LTE Band 66	132072	1720.0	50RB0	Left Cheek	0mm	\	\	22.50	23.00	\	\	0.437	**0.49**	0.295	**0.33**	-0.16
Head	LTE Band 66	132572	1770.0	1RB99	Left Tilt	0mm	\	\	22.76	23.50	\	\	0.422	**0.50**	0.286	**0.34**	-0.16
Head	LTE Band 66	132072	1720.0	50RB0	Left Tilt	0mm	\	\	22.50	23.00	\	\	0.266	**0.30**	0.182	**0.20**	0.02
Head	LTE Band 66	132572	1770.0	1RB99	Right Cheek	0mm	\	**17**	22.76	23.50	\	\	**0.559**	0.66	0.375	**0.44**	-0.08
Head	LTE Band 66	132072	1720.0	50RB0	Right Cheek	0mm	\	\	22.50	23.00	\	\	0.423	**0.47**	0.291	**0.33**	-0.18
Head	LTE Band 66	132572	1770.0	1RB99	Right Tilt	0mm	\	\	22.76	23.50	\	\	0.429	**0.51**	0.282	**0.33**	0.17
Head	LTE Band 66	132072	1720.0	50RB0	Right Tilt	0mm	\	\	22.50	23.00	\	\	0.271	**0.30**	0.180	**0.20**	-0.06
Head	LTE Band 66	132572	1770.0	1RB99	Right Cheek	0mm	C2	\	22.76	23.50	\	\	0.512	**0.61**	0.346	**0.41**	0.07
Body-Wron	LTE Band 66	132572	1770.0	1RB99	Front	15mm	\	\	22.76	23.50	\	\	0.419	**0.50**	0.250	**0.30**	-0.10
Body-Wron	LTE Band 66	132072	1720.0	50RB0	Front	15mm	\	\	22.50	23.00	\	\	0.244	**0.27**	0.151	**0.17**	0.05
Body-Wron	LTE Band 66	132572	1770.0	1RB99	Rear	15mm	\	**18**	22.76	23.50	\	\	**0.820**	0.97	0.525	**0.62**	0.14
Body-Wron	LTE Band 66	132072	1720.0	50RB0	Rear	15mm	\	\	22.50	23.00	\	\	0.676	**0.76**	0.404	**0.45**	-0.14
Body-Wron	LTE Band 66	132322	1745.0	1RB99	Rear	15mm	\	\	22.63	23.50	\	\	0.728	**0.89**	0.439	**0.54**	0.12
Body-Wron	LTE Band 66	132072	1720.0	1RB99	Rear	15mm	\	\	22.65	23.50	\	\	0.715	**0.87**	0.426	**0.52**	0.17
Body-Wron	LTE Band 66	132572	1770.0	50RB0	Rear	15mm	\	\	22.42	23.00	\	\	0.745	**0.85**	0.442	**0.51**	-0.02
Body-Wron	LTE Band 66	132322	1745.0	50RB0	Rear	15mm	\	\	22.29	23.00	\	\	0.658	**0.77**	0.395	**0.47**	-0.15
Body-Wron	LTE Band 66	132572	1770.0	100RB	Rear	15mm	\	\	22.25	23.00	\	\	0.728	**0.87**	0.441	**0.52**	-0.11
Body-Wron	LTE Band 66	132572	1770.0	1RB99	Rear	15mm	C2	\	22.76	23.50	\	\	0.819	**0.97**	0.513	**0.61**	-0.02

Note: SAR for LTE Band 4 is covered by LTE Band 66 due to similar frequency range, same maximum tune-up limit and same channel bandwidth.

Table 12.10: Bluetooth SAR Values

RF Exposure Conditions	Frequency Band	Channel Number	Frequency (MHz)	Mode/RB	Test Position	Distance	Note	Figure No.	EUT Measured Power (dBm)	Tune up (dBm)	Duty Cycle %	Duty Cycle Scaling Factor	Measured SAR 1g (W/kg)	Calculated SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Calculated SAR 10g (W/kg)	Power Drift
Head	Bluetooth	39	2441.0	8DPSK	Left Cheek	0mm	\	\	9.12	10.00	77.17	1.30	0.027	**0.04**	0.015	**0.02**	0.09
Head	Bluetooth	39	2441.0	8DPSK	Left Tilt	0mm	\	\	9.12	10.00	77.17	1.30	0.021	**0.03**	0.011	**0.02**	0.03
Head	Bluetooth	39	2441.0	8DPSK	Right Cheek	0mm	\	\	9.12	10.00	77.17	1.30	0.024	**0.04**	0.014	**0.02**	0.03
Head	Bluetooth	39	2441.0	8DPSK	Right Tilt	0mm	\	\	9.12	10.00	77.17	1.30	0.020	**0.03**	0.011	**0.02**	0.06
Head	Bluetooth	39	2441.0	8DPSK	Left Cheek	0mm	C2	**19**	9.12	10.00	77.17	1.30	**0.034**	0.05	0.018	**0.03**	0.06
Body-Wron	Bluetooth	39	2441.0	8DPSK	Front	15mm	\	\	9.12	10.00	77.17	1.30	0.007	**0.01**	0.004	**0.01**	0.07
Body-Wron	Bluetooth	39	2441.0	8DPSK	Rear	15mm	\	\	9.12	10.00	77.17	1.30	0.006	**0.01**	0.003	**0.01**	0.09
Body-Wron	Bluetooth	39	2441.0	8DPSK	Front	15mm	C2	**20**	9.12	10.00	77.17	1.30	**0.008**	0.01	0.005	**0.01**	-0.04

13. 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 13.1: SAR Measurement Variability

RF Exposure Conditions	Frequency Band	Frequency		Mode/RB	Test Position	Distance	Original	1st Repeated	Ratio	2nd Repeated
		Ch.	MHz				SAR (W/kg)	SAR (W/kg)		SAR (W/kg)
Head	WCDMA Band 2	9400	1880.0	RMC	Right Cheek	0mm	0.874	0.851	1.03	/
Body-Wron	WCDMA Band 2	9262	1852.4	RMC	Rear	15mm	0.879	0.842	1.04	/
Body-Wron	WCDMA Band 4	1513	1752.6	RMC	Rear	15mm	0.826	0.780	1.06	/
Head	WCDMA Band 5	4233	846.6	RMC	Left Cheek	0mm	0.990	0.945	1.05	/
Body-Wron	WCDMA Band 5	4233	846.6	RMC	Rear	15mm	0.962	0.927	1.04	/
Head	LTE Band 2	18900	1880.0	1RB99	Left Cheek	0mm	0.837	0.806	1.04	/
Body-Wron	LTE Band 2	18900	1880.0	1RB99	Rear	15mm	0.829	0.788	1.05	/
Head	LTE Band 5	20600	844.0	1RB49	Left Cheek	0mm	0.952	0.931	1.02	/
Body-Wron	LTE Band 5	20600	844.0	1RB49	Rear	15mm	0.937	0.908	1.03	/
Head	LTE Band 7	20850	2510.0	1RB99	Right Cheek	0mm	1.140	1.070	1.07	/
Body-Wron	LTE Band 7	20850	2510.0	1RB99	Rear	15mm	0.914	0.879	1.04	/
Body-Wron	LTE Band 66	132572	1770.0	1RB99	Rear	15mm	0.820	0.773	1.06	/

14. Measurement Uncertainty

14.1. 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	12.7	N	2	1	1	6.35	6.35	∞
2	Axial isotropy	B	4.7	R	$\sqrt{3}$	$\sqrt{0.5}$	$\sqrt{0.5}$	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	Power scaling	B	0	R	$\sqrt{3}$	1	1	0	0	∞
19	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
					Phantom and set-up					
20	Phantom uncertainty	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
21	Algorithm for correcting SAR for deviations in permittivity and conductivity	B	1.9	N	1	1	0.84	1.9	1.6	∞
22	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
23	Liquid conductivity (meas.)	A	1.3	N	1	0.64	0.43	0.83	0.56	9
24	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
25	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	0.96	0.78	9
Combined standard uncertainty		$u_c' = \sqrt{\sum_{i=1}^{23} c_i^2 u_i^2}$						11.6	11.4	95.5
Expanded uncertainty (Confidence interval of 95 %)		$u_e = 2u_c$						23.2	22.8	

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

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	13.9	N	2	1	1	6.95	6.95	∞
2	Axial isotropy	B	4.7	R	√3	√0.5	√0.5	4.3	4.3	∞
3	Hemispherical isotropy	B	9.6	R	√3	1	1	4.8	4.8	∞
4	Boundary effect	B	1.1	R	√3	1	1	0.6	0.6	∞
5	Linearity	B	4.7	R	√3	1	1	2.7	2.7	∞
6	Detection limit	B	1.0	R	√3	1	1	0.6	0.6	∞
7	modulation response	B	4.0	R	√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	0.0	R	√3	1	1	0.0	0.0	∞
10	Integration time	B	1.7	R	√3	1	1	1.0	1.0	∞
11	RF ambient conditions-noise	B	3.0	R	√3	1	1	1.7	1.7	∞
12	RF ambient conditions-reflection	B	3.0	R	√3	1	1	1.7	1.7	∞
13	Probe positioned mech. Restrictions	B	0.35	R	√3	1	1	0.2	0.2	∞
14	Probe positioning with respect to phantom shell	B	2.9	R	√3	1	1	1.7	1.7	∞
15	Post-processing	B	1.0	R	√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	Power scaling	B	0	R	√3	1	1	0	0	∞
19	Drift of output power	B	5.0	R	√3	1	1	2.9	2.9	∞
Phantom and set-up										
20	Phantom uncertainty	B	1.0	R	√3	1	1	0.6	0.6	∞
21	Algorithm for correcting SAR for deviations in permittivity and conductivity	B	1.9	N	1	1	0.84	1.9	1.6	∞
22	Liquid conductivity (target)	B	5.0	R	√3	0.64	0.43	1.8	1.2	∞
23	Liquid conductivity (meas.)	A	1.3	N	1	0.64	0.43	0.83	0.56	9
24	Liquid permittivity (target)	B	5.0	R	√3	0.6	0.49	1.7	1.4	∞
25	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	0.96	0.78	9
Combined standard uncertainty		$u_c^{'} = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$						11.9	11.8	95.5
Expanded uncertainty (Confidence interval of 95 %)		$u_e = 2u_c$						23.8	23.6	

15. Main Test Instruments

Table 15.1: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	E5071C	MY46103759	2023-11-13	One year
02	Dielectric probe	85070E	MY44300317	/	/
03	Power meter	E4418B	MY50000366	2023-12-10	One year
04	Power sensor	E9304A	MY50000188	2023-12-10	One year
05	Power meter	NRP	102603	2023-12-28	One year
06	Power sensor	NRP-Z51	102211	2023-12-28	One year
07	Signal Generator	E8257D	MY47461211	2024-01-12	One year
08	Amplifier	VTL5400	0404	/	/
09	DAE	DAE4	786	2023-12-11	One year
10	E-field Probe	EX3DV4	7621	2024-01-10	One year
11	Dipole Validation Kit	D835V2	4d057	2021-10-18	Three years
12	Dipole Validation Kit	D1750V2	1152	2022-08-22	Three years
13	Dipole Validation Kit	D1900V2	5d088	2021-10-18	Three years
14	Dipole Validation Kit	D2450V2	873	2021-10-21	Three years
15	Dipole Validation Kit	D2550V2	1010	2024-04-23	Three years
16	BTS	E5515C	GB46110722	2024-01-12	One year
17	BTS	MT8820C	6201341853	2024-03-22	One year
18	Thermometer	51II	99250045	2023-11-22	One year
19	Software	DASY5	/	/	/

ANNEX A: Graph Results

GSM 850 Head

Date: 2024-07-07

Electronics: DAE4 Sn786

Medium: Head 835MHz

Medium parameters used (interpolated): f = 824.2 MHz; σ = 0.921 S/m; ε_r = 40.777; ρ = 1000 kg/m^3

Communication System: UID 0, GSM (0) Frequency: 824.2 MHz Duty Cycle: 1:8.3

Probe: EX3DV4 - SN7621 ConvF (11.02, 11.02, 11.02)

Right Cheek Low/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.628 W/kg

Right Cheek Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.037 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.703 W/kg

SAR(1 g) = 0.541 W/kg; SAR(10 g) = 0.395 W/kg

Maximum value of SAR (measured) = 0.632 W/kg

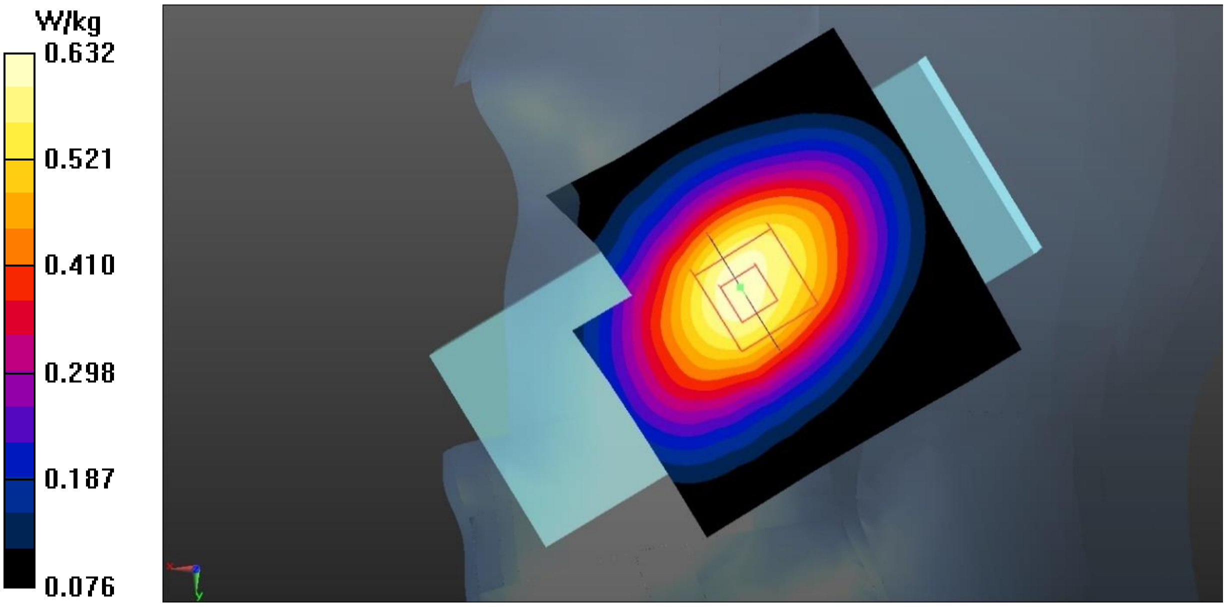


Fig.1 GSM 850 Head

GSM 850 Body

Date: 2024-07-07

Electronics: DAE4 Sn786

Medium: Head 835MHz

Medium parameters used (interpolated): f = 848.8 MHz; σ = 0.944 S/m; ε_r = 40.481; ρ = 1000 kg/m^3

Communication System: UID 0, 2 slot GPRS (0) Frequency: 848.8 MHz Duty Cycle: 1:4

Probe: EX3DV4 - SN7621 ConvF (11.02, 11.02, 11.02)

Rear Side High/Area Scan (61x91x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.956 W/kg

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

Reference Value = 28.75 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 1.05 W/kg

SAR(1 g) = 0.795 W/kg; SAR(10 g) = 0.581 W/kg

Maximum value of SAR (measured) = 0.932 W/kg

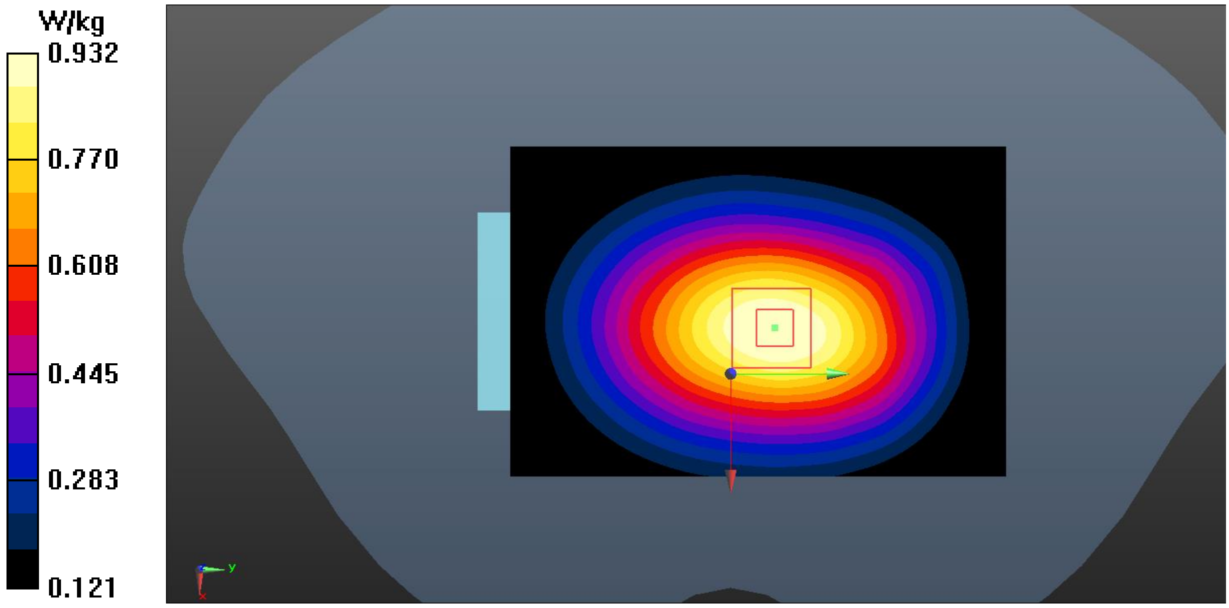


Fig.2 GSM 850 Body

GSM 1900 Head

Date: 2024-07-08

Electronics: DAE4 Sn786

Medium: Head 1900MHz

Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.372 S/m; ε_r = 39.578; ρ = 1000 kg/m^3

Communication System: UID 0, GSM (0) Frequency: 1850.2 MHz Duty Cycle: 1:8.3

Probe: EX3DV4 - SN7621 ConvF (8.76, 8.76, 8.76)

Left Cheek Low/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.589 W/kg

Left Cheek Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.185 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 0.646 W/kg

SAR(1 g) = 0.439 W/kg; SAR(10 g) = 0.279 W/kg

Maximum value of SAR (measured) = 0.543 W/kg

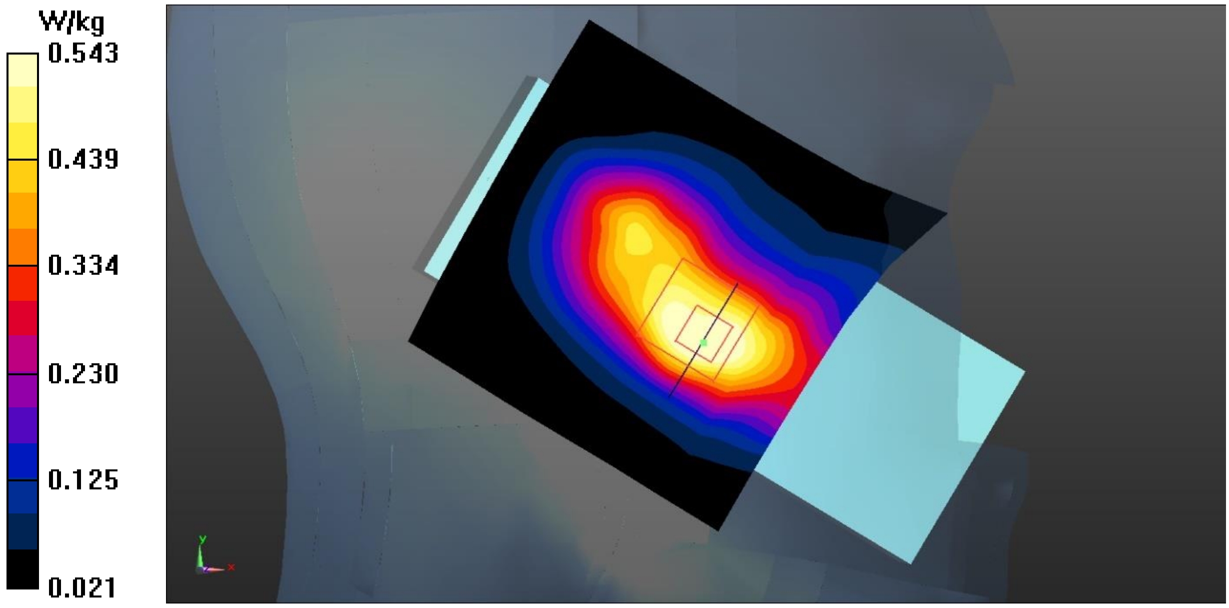


Fig.3 GSM 1900 Head

GSM 1900 Body

Date: 2024-07-08

Electronics: DAE4 Sn786

Medium: Head 1900MHz

Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.372 S/m; ε_r = 39.578; ρ = 1000 kg/m^3

Communication System: UID 0, 3 slot GPRS (0) Frequency: 1850.2 MHz Duty Cycle: 1:2.67

Probe: EX3DV4 - SN7621 ConvF (8.76, 8.76, 8.76)

Rear Side Low/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.700 W/kg

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

Reference Value = 6.520 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 0.778 W/kg

SAR(1 g) = 0.518 W/kg; SAR(10 g) = 0.332 W/kg

Maximum value of SAR (measured) = 0.655 W/kg

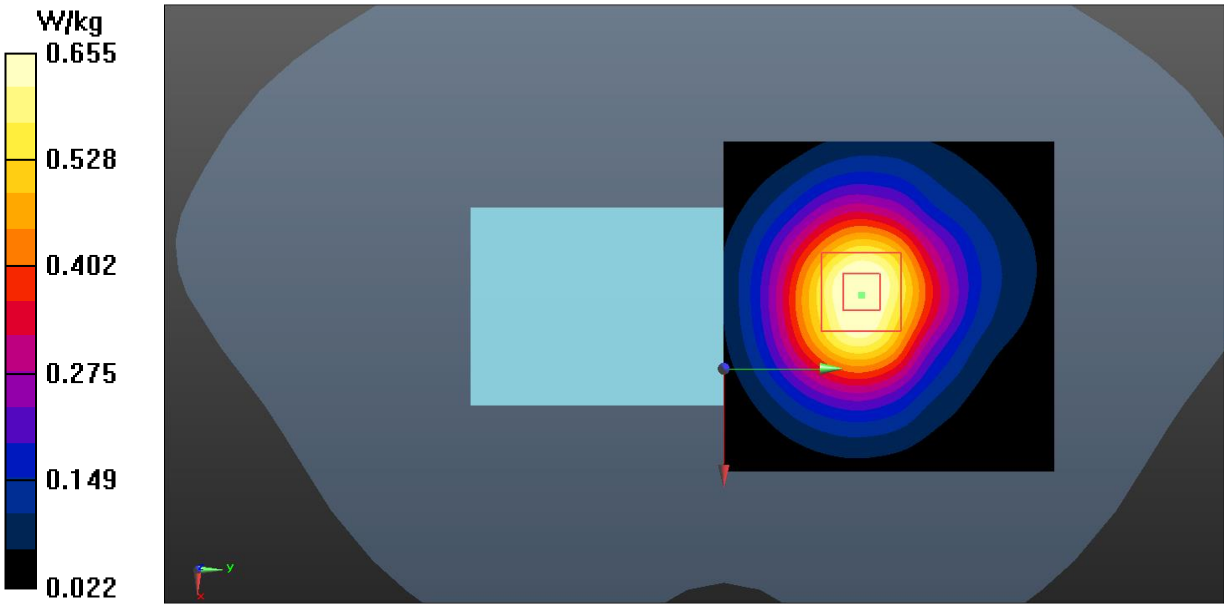


Fig.4 GSM 1900 Body

WCDMA Band 2 Head
Date: 2024-07-08
Electronics: DAE4 Sn786
Medium: Head 1900MHz
Medium parameters used: f = 1880 MHz; σ = 1.398 S/m; ε_r = 39.462; ρ = 1000 kg/m^3
Communication System: UID 0, WCDMA (0) Frequency: 1880 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7621 ConvF (8.76, 8.76, 8.76)

Right Cheek Middle/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.13 W/kg

Right Cheek Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.498 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.34 W/kg
SAR(1 g) = 0.874 W/kg; SAR(10 g) = 0.539 W/kg
Maximum value of SAR (measured) = 1.11 W/kg

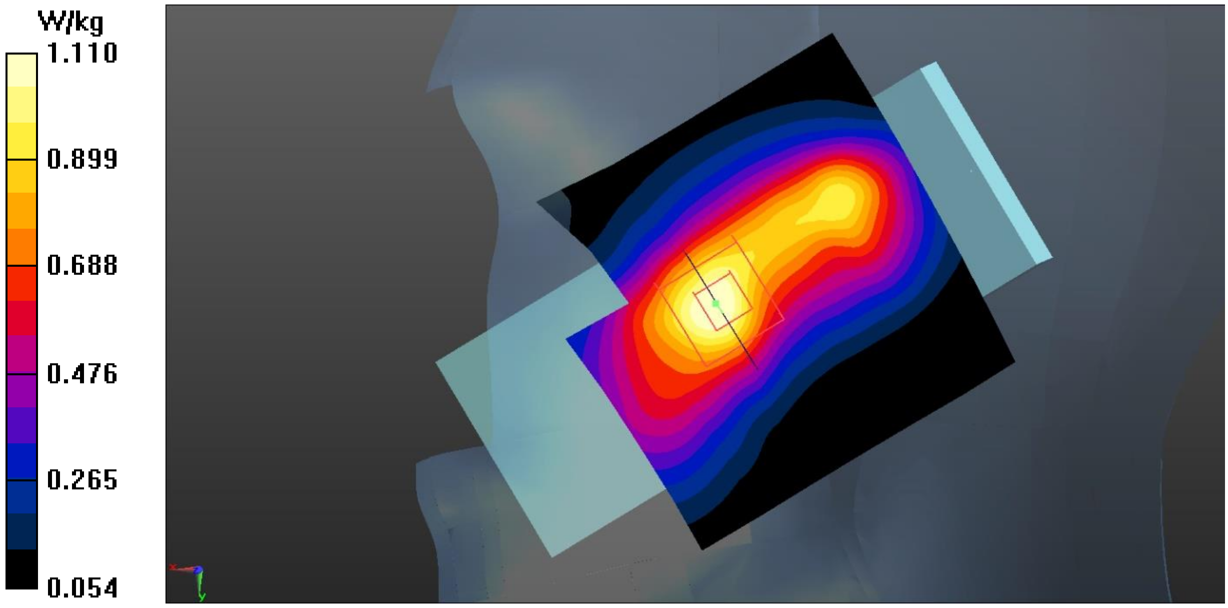


Fig.5 WCDMA Band 2 Head

WCDMA Band 2 Body
Date: 2024-07-08
Electronics: DAE4 Sn786
Medium: Head 1900MHz
Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.374 S/m; ε_r = 39.57; ρ = 1000 kg/m^3
Communication System: UID 0, WCDMA (0) Frequency: 1852.4 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7621 ConvF (8.76, 8.76, 8.76)

Rear Side Low/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.15 W/kg

Rear Side Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.636 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.32 W/kg
SAR(1 g) = 0.879 W/kg; SAR(10 g) = 0.560 W/kg
Maximum value of SAR (measured) = 1.11 W/kg

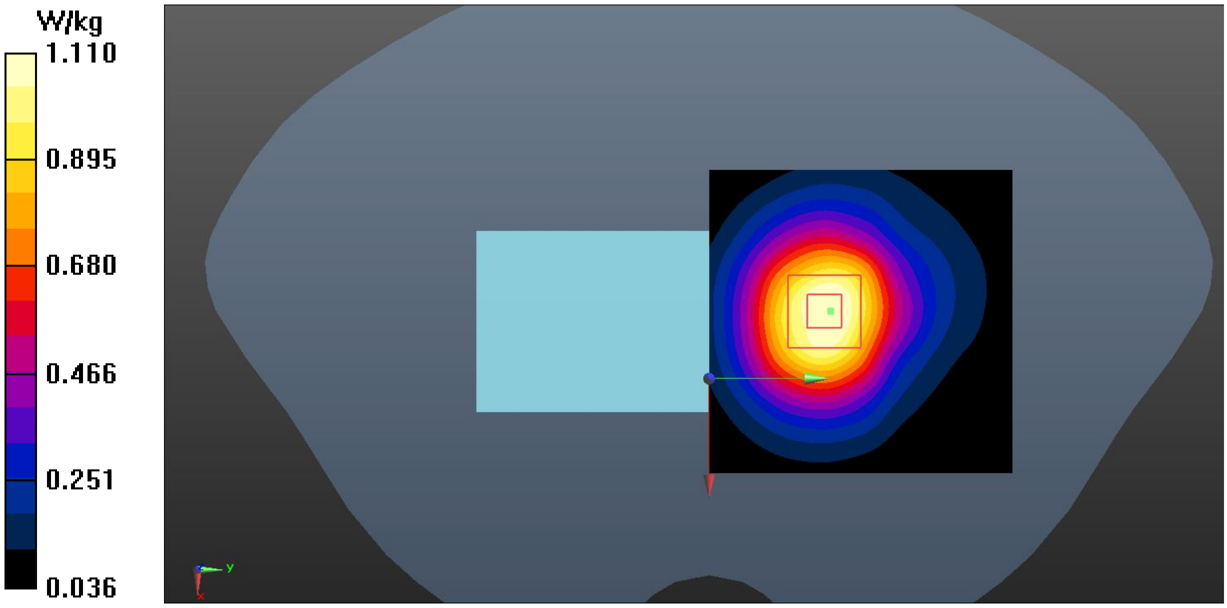


Fig.6 WCDMA Band 2 Body

WCDMA Band 4 Head
Date: 2024-07-11
Electronics: DAE4 Sn786
Medium: Head 1750MHz
Medium parameters used (interpolated): f = 1752.6 MHz; σ = 1.366 S/m; ε_r = 40.612; ρ = 1000 kg/m^3
Communication System: UID 0, WCDMA (0) Frequency: 1752.6 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7621 ConvF (9.11, 9.11, 9.11)

Right Cheek High/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.753 W/kg

Right Cheek High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.743 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 0.795 W/kg
SAR(1 g) = 0.581 W/kg; SAR(10 g) = 0.389 W/kg
Maximum value of SAR (measured) = 0.695 W/kg

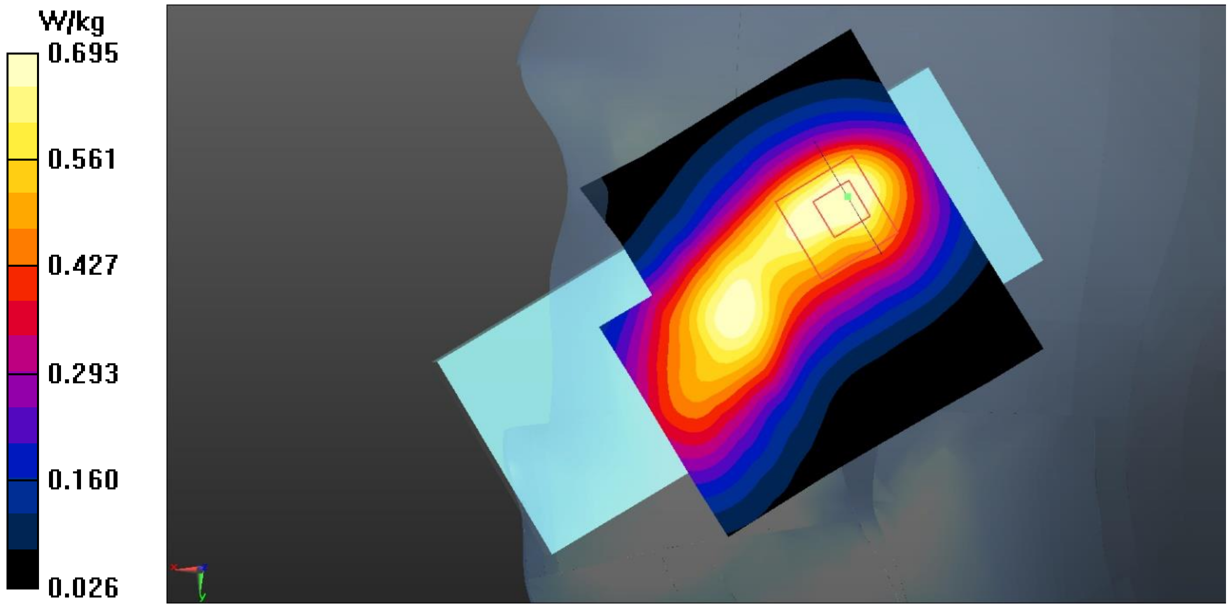


Fig.7 WCDMA Band 4 Head

WCDMA Band 4 Body
Date: 2024-07-11
Electronics: DAE4 Sn786
Medium: Head 1750MHz
Medium parameters used (interpolated): f = 1752.6 MHz; σ = 1.366 S/m; ε_r = 40.612; ρ = 1000 kg/m^3
Communication System: UID 0, WCDMA (0) Frequency: 1752.6 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7621 ConvF (9.11, 9.11, 9.11)

Rear Side High/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.10 W/kg

Rear Side High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.302 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.24 W/kg
SAR(1 g) = 0.826 W/kg; SAR(10 g) = 0.530 W/kg
Maximum value of SAR (measured) = 1.04 W/kg

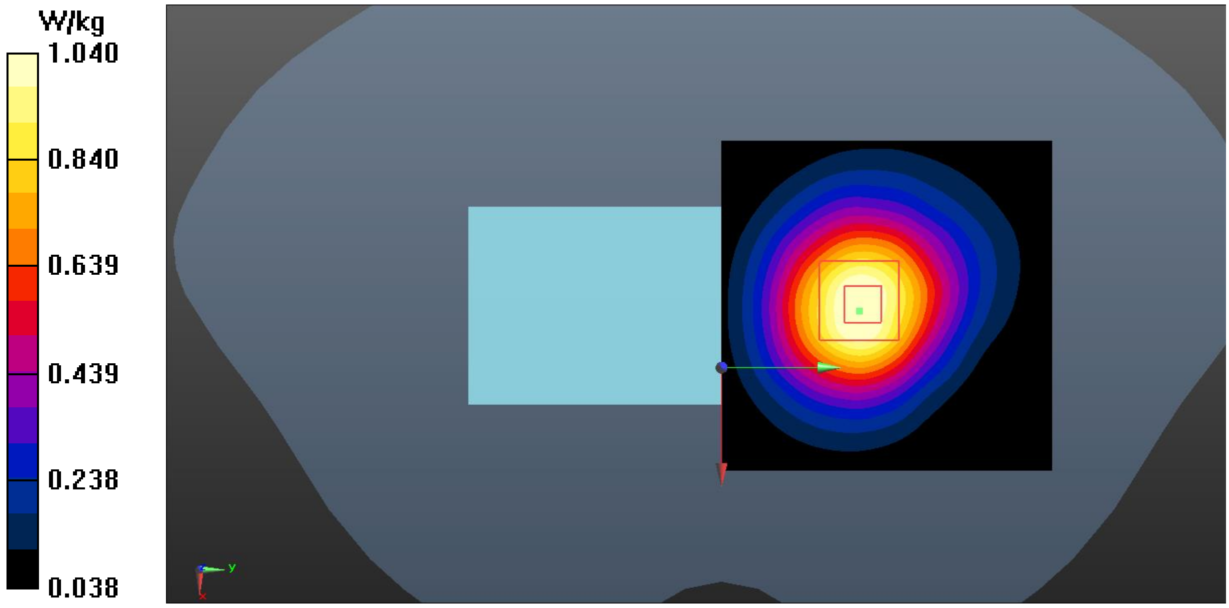


Fig.8 WCDMA Band 4 Body

WCDMA Band 5 Head
Date: 2024-07-07
Electronics: DAE4 Sn786
Medium: Head 835MHz
Medium parameters used (interpolated): f = 846.6 MHz; σ = 0.942 S/m; ε_r = 40.508; ρ = 1000 kg/m^3
Communication System: UID 0, WCDMA (0) Frequency: 846.6 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7621 ConvF (11.02, 11.02, 11.02)

Left Cheek High/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.16 W/kg

Left Cheek High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.004 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.27 W/kg
SAR(1 g) = 0.990 W/kg; SAR(10 g) = 0.730 W/kg
Maximum value of SAR (measured) = 1.14 W/kg

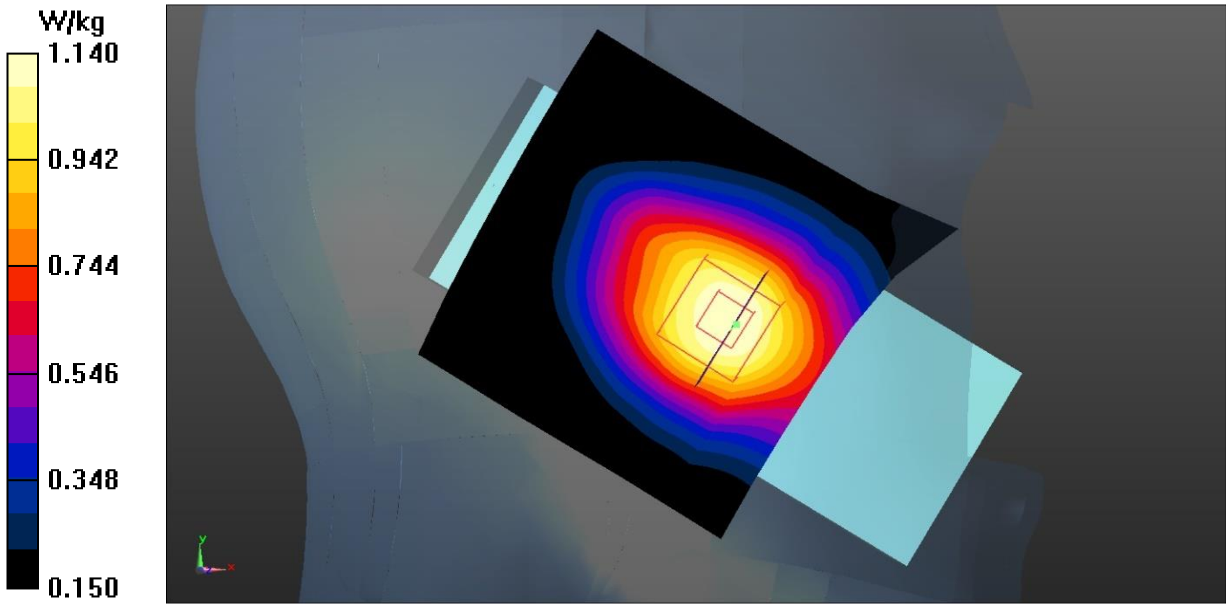


Fig.9 WCDMA Band 5 Head

WCDMA Band 5 Body
Date: 2024-07-07
Electronics: DAE4 Sn786
Medium: Head 835MHz
Medium parameters used (interpolated): f = 846.6 MHz; σ = 0.942 S/m; ε_r = 40.508; ρ = 1000 kg/m^3
Communication System: UID 0, WCDMA (0) Frequency: 846.6 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7621 ConvF (11.02, 11.02, 11.02)

Rear Side High/Area Scan (61x91x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.14 W/kg

Rear Side High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 31.95 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.28 W/kg
SAR(1 g) = 0.962 W/kg; SAR(10 g) = 0.701 W/kg
Maximum value of SAR (measured) = 1.14 W/kg

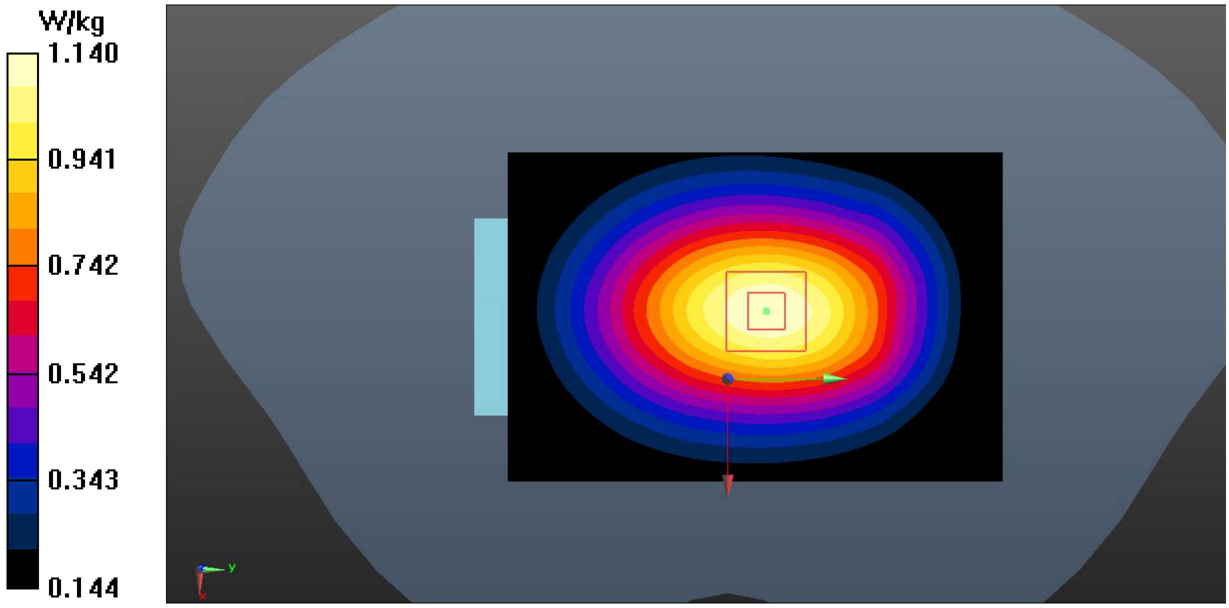


Fig.10 WCDMA Band 5 Body

LTE Band 2 Head

Date: 2024-07-08

Electronics: DAE4 Sn786

Medium: Head 1900MHz

Medium parameters used: f = 1880 MHz; σ = 1.398 S/m; ε_r = 39.462; ρ = 1000 kg/m^3

Communication System: UID 0, LTE_FDD (0) Frequency: 1880 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7621 ConvF (8.76, 8.76, 8.76)

Left Cheek Middle 1RB99/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.13 W/kg

Left Cheek Middle 1RB99/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.502 V/m; Power Drift = -0.17 dB

Peak SAR (extrapolated) = 1.22 W/kg

SAR(1 g) = 0.837 W/kg; SAR(10 g) = 0.523 W/kg

Maximum value of SAR (measured) = 1.03 W/kg

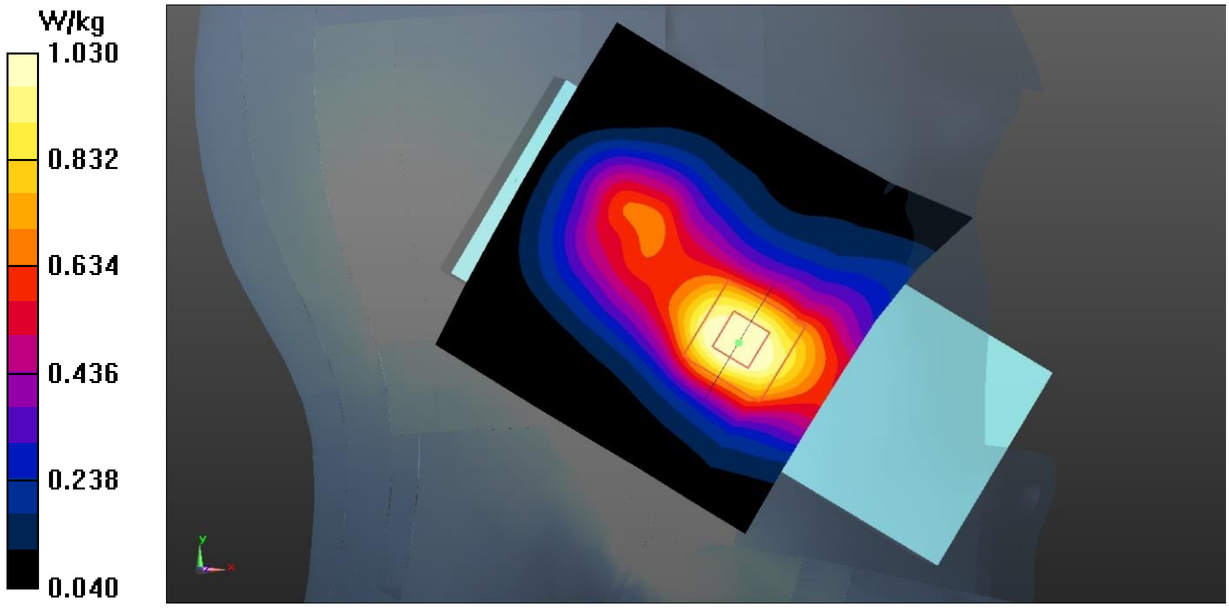


Fig.11 LTE Band 2 Head

LTE Band 2 Body
Date: 2024-07-08
Electronics: DAE4 Sn786
Medium: Head 1900MHz
Medium parameters used: f = 1880 MHz; σ = 1.398 S/m; ε_r = 39.462; ρ = 1000 kg/m^3
Communication System: UID 0, LTE_FDD (0) Frequency: 1880 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7621 ConvF (8.76, 8.76, 8.76)

Rear Side Middle 1RB99/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.09 W/kg

Rear Side Middle 1RB99/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.060 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.25 W/kg
SAR(1 g) = 0.829 W/kg; SAR(10 g) = 0.525 W/kg
Maximum value of SAR (measured) = 1.06 W/kg

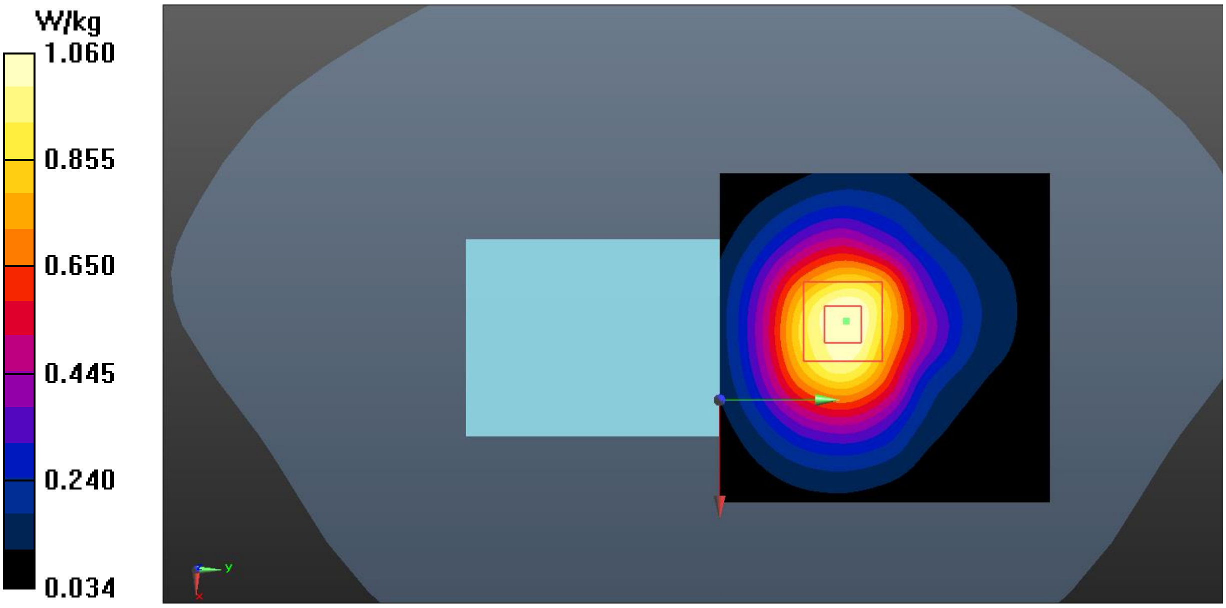


Fig.12 LTE Band 2 Body

LTE Band 5 Head
Date: 2024-07-07
Electronics: DAE4 Sn786
Medium: Head 835MHz
Medium parameters used: f = 844 MHz; σ = 0.939 S/m; ε_r = 40.539; ρ = 1000 kg/m^3
Communication System: UID 0, LTE_FDD (0) Frequency: 844 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7621 ConvF (11.02, 11.02, 11.02)

Left Cheek High 1RB49/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.14 W/kg

Left Cheek High 1RB49/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.698 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.26 W/kg
SAR(1 g) = 0.952 W/kg; SAR(10 g) = 0.701 W/kg
Maximum value of SAR (measured) = 1.12 W/kg

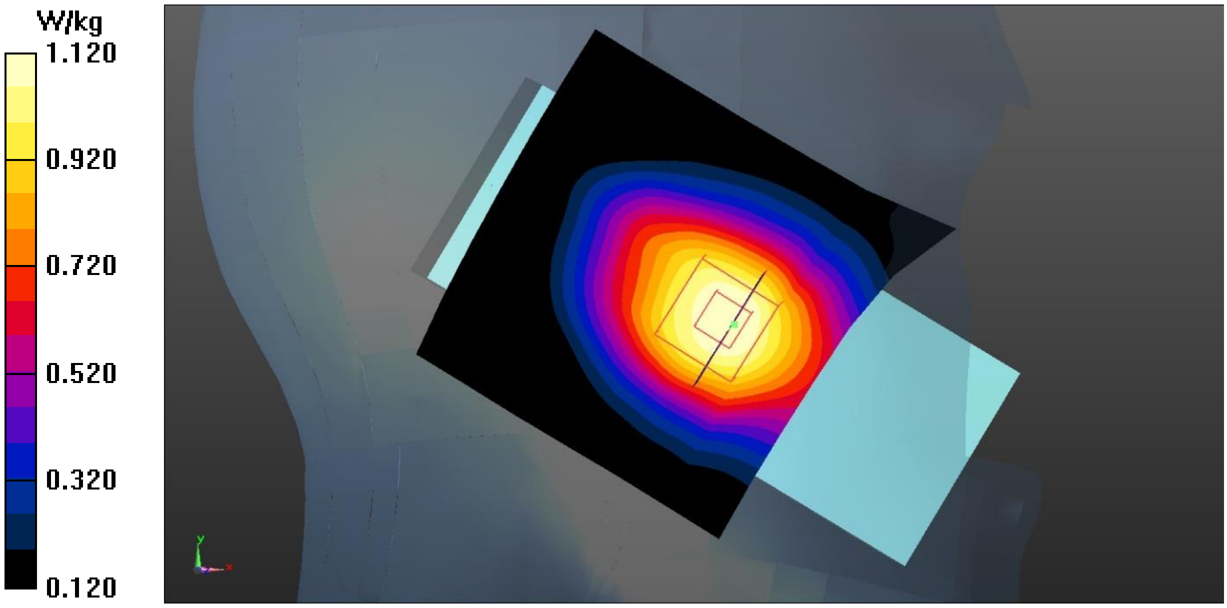


Fig.13 LTE Band 5 Head

LTE Band 5 Body
Date: 2024-07-07
Electronics: DAE4 Sn786
Medium: Head 835MHz
Medium parameters used: f = 844 MHz; σ = 0.939 S/m; ε_r = 40.539; ρ = 1000 kg/m^3
Communication System: UID 0, LTE_FDD (0) Frequency: 844 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7621 ConvF (11.02, 11.02, 11.02)

Rear Side High 1RB49/Area Scan (61x91x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.10 W/kg

Rear Side High 1RB49/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 31.16 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 1.24 W/kg
SAR(1 g) = 0.937 W/kg; SAR(10 g) = 0.682 W/kg
Maximum value of SAR (measured) = 1.11 W/kg

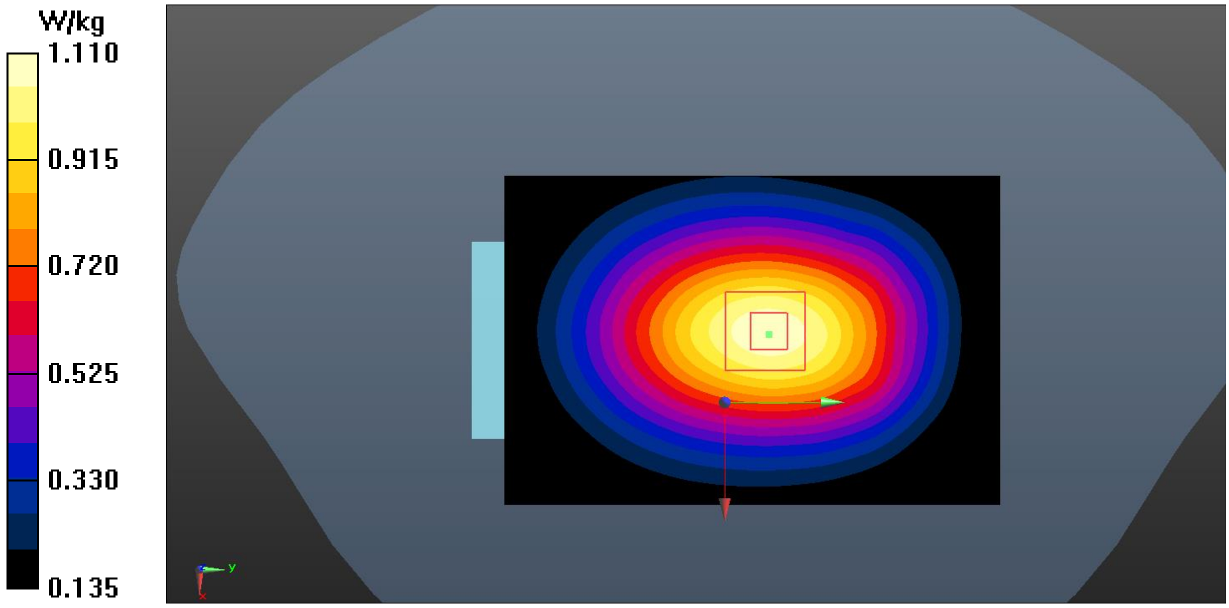


Fig.14 LTE Band 5 Body

LTE Band 7 Head
Date: 2024-07-15
Electronics: DAE4 Sn786
Medium: Head 2550MHz
Medium parameters used: f = 2510 MHz; σ = 1.91 S/m; ε_r = 38.841; ρ = 1000 kg/m^3
Communication System: UID 0, LTE_FDD (0) Frequency: 2510 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7621 ConvF (8.21, 8.21, 8.21)

Right Cheek Low 1RB99/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.64 W/kg

Right Cheek Low 1RB99/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.544 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 1.75 W/kg
SAR(1 g) = 1.14 W/kg; SAR(10 g) = 0.695 W/kg
Maximum value of SAR (measured) = 1.47 W/kg

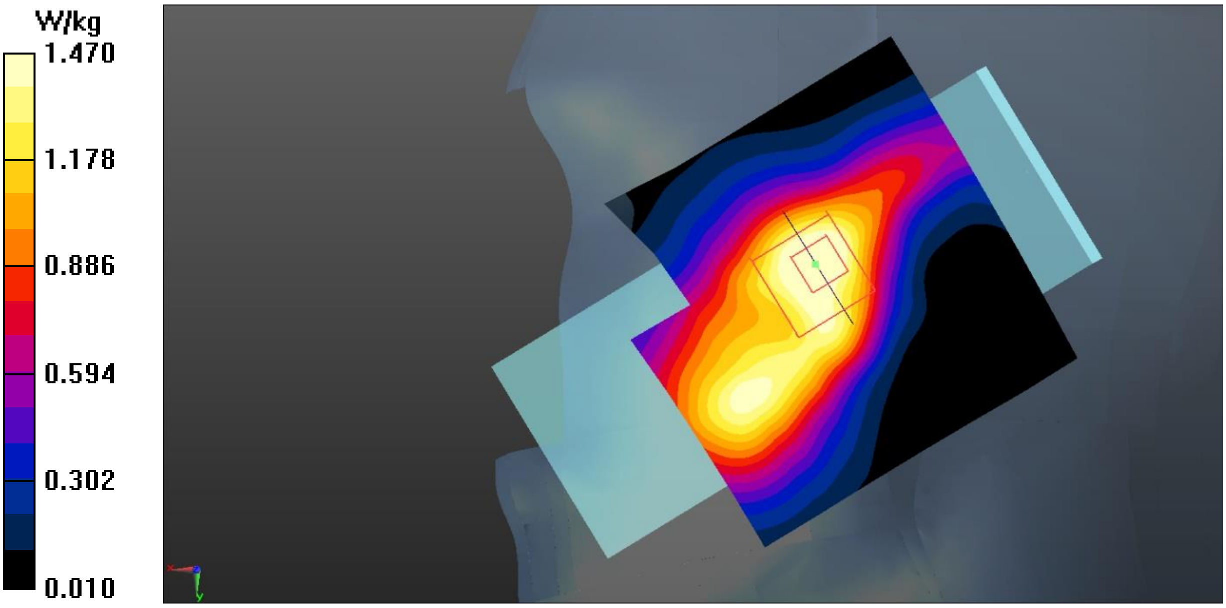


Fig.15 LTE Band 7 Head

LTE Band 7 Body
Date: 2024-07-15
Electronics: DAE4 Sn786
Medium: Head 2550MHz
Medium parameters used: f = 2510 MHz; σ = 1.91 S/m; ε_r = 38.841; ρ = 1000 kg/m^3
Communication System: UID 0, LTE_FDD (0) Frequency: 2510 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7621 ConvF (8.21, 8.21, 8.21)

Rear Side Low 1RB99/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.34 W/kg

Rear Side Low 1RB99/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.13 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 1.76 W/kg
SAR(1 g) = 0.914 W/kg; SAR(10 g) = 0.480 W/kg
Maximum value of SAR (measured) = 1.32 W/kg

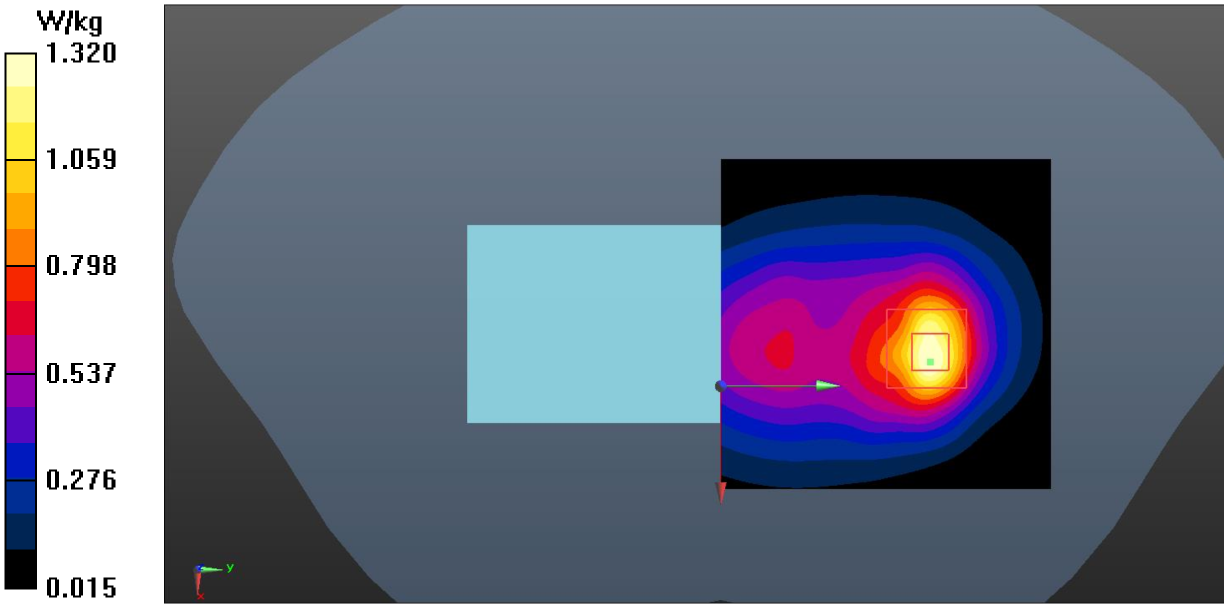


Fig.16 LTE Band 7 Body

LTE Band 66 Head
Date: 2024-07-11
Electronics: DAE4 Sn786
Medium: Head 1750MHz
Medium parameters used: f = 1770 MHz; σ = 1.382 S/m; ε_r = 40.544; ρ = 1000 kg/m^3
Communication System: UID 0, LTE_FDD (0) Frequency: 1770 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7621 ConvF (9.11, 9.11, 9.11)

Right Cheek High 1RB99/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.715 W/kg

Right Cheek High 1RB99/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.362 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0.767 W/kg
SAR(1 g) = 0.559 W/kg; SAR(10 g) = 0.375 W/kg
Maximum value of SAR (measured) = 0.674 W/kg

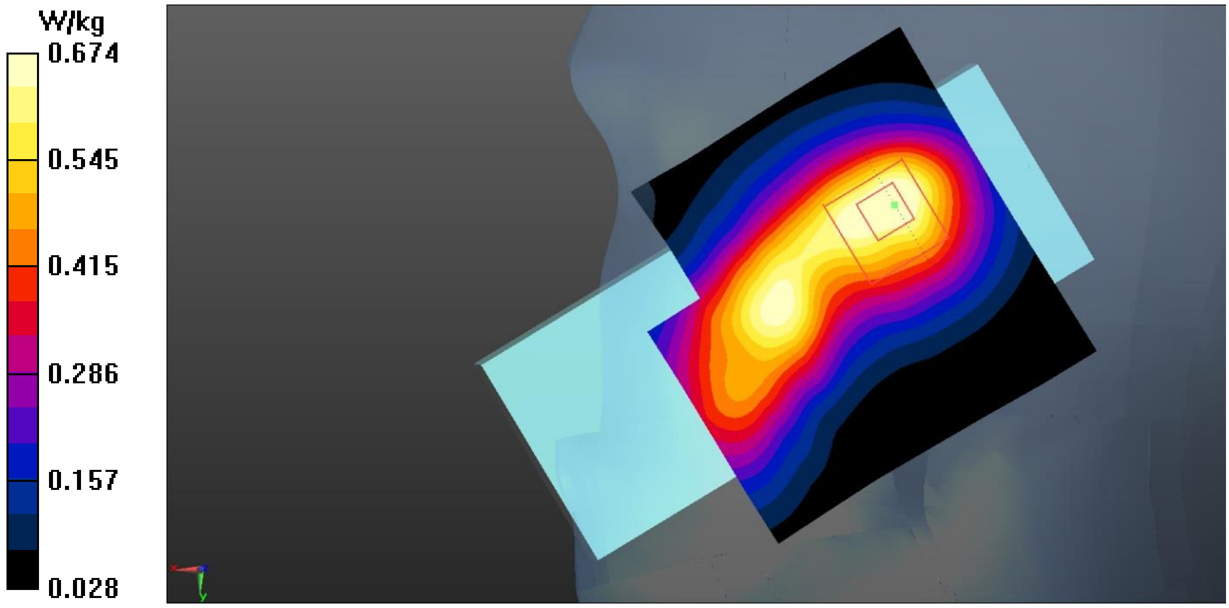


Fig.17 LTE Band 66 Head

LTE Band 66 Body

Date: 2024-07-11

Electronics: DAE4 Sn786

Medium: Head 1750MHz

Medium parameters used: f = 1770 MHz; σ = 1.382 S/m; ε_r = 40.544; ρ = 1000 kg/m^3

Communication System: UID 0, LTE_FDD (0) Frequency: 1770 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7621 ConvF (9.11, 9.11, 9.11)

Rear Side High 1RB99/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.12 W/kg

Rear Side High 1RB99/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.87 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 1.23 W/kg

SAR(1 g) = 0.820 W/kg; SAR(10 g) = 0.525 W/kg

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

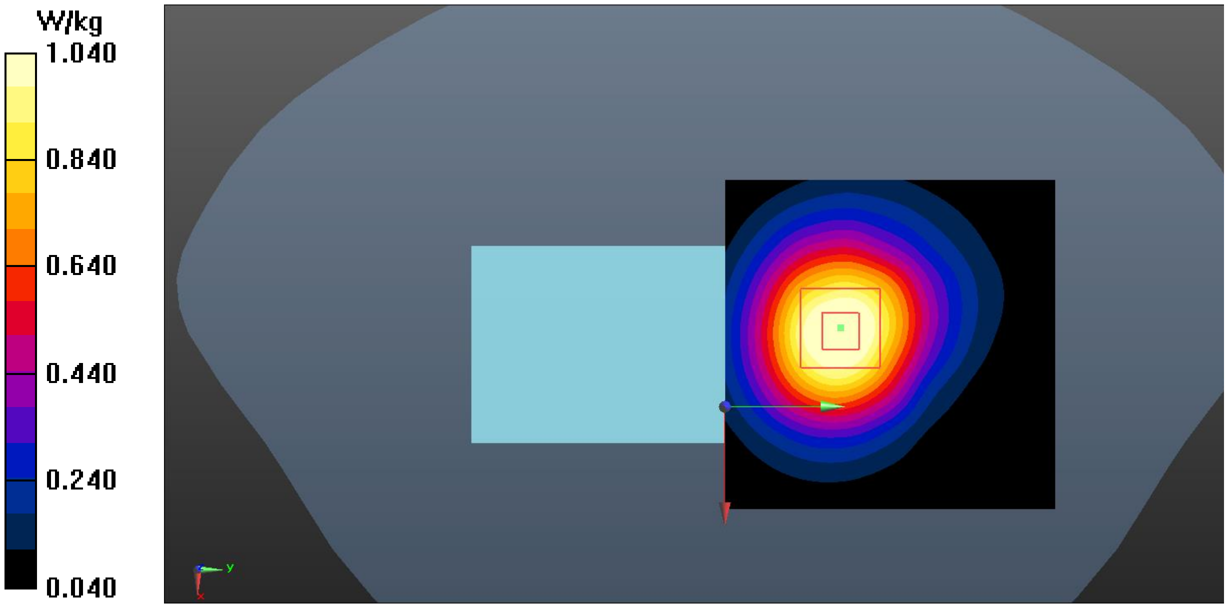


Fig.18 LTE Band 66 Body

Bluetooth Head
Date: 2024-07-09
Electronics: DAE4 Sn786
Medium: Head 2450MHz
Medium parameters used (interpolated): f = 2441 MHz; σ = 1.772 S/m; ε_r = 39.816; ρ = 1000 kg/m^3
Communication System: UID 0, BT (0) Frequency: 2441 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7621 ConvF (8.21, 8.21, 8.21)

Left Cheek Ch.39/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.0735 W/kg

Left Cheek Ch.39/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.500 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.0590 W/kg
SAR(1 g) = 0.034 W/kg; SAR(10 g) = 0.018 W/kg
Maximum value of SAR (measured) = 0.0434 W/kg

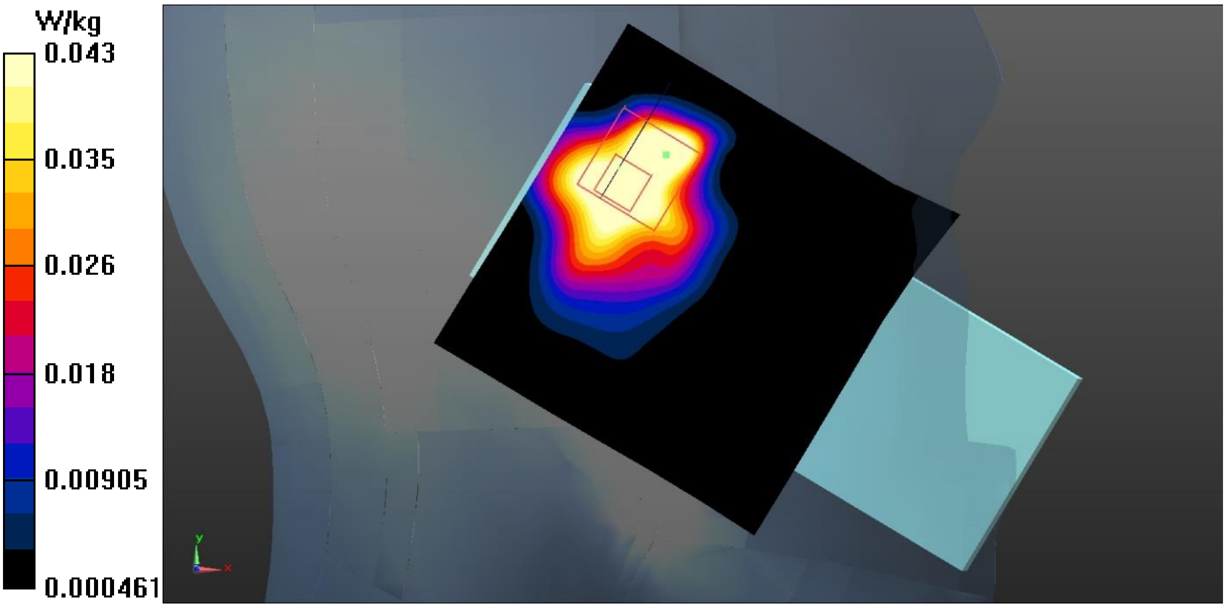


Fig.19 Bluetooth Head

Bluetooth Body
Date: 2024-07-09
Electronics: DAE4 Sn786
Medium: Head 2450MHz
Medium parameters used (interpolated): f = 2441 MHz; σ = 1.772 S/m; ε_r = 39.816; ρ = 1000 kg/m^3
Communication System: UID 0, BT (0) Frequency: 2441 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7621 ConvF (8.21, 8.21, 8.21)

Front Side Ch.39/Area Scan (91x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.0117 W/kg

Front Side Ch.39/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.057 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 0.0130 W/kg
SAR(1 g) = 0.00802 W/kg; SAR(10 g) = 0.00511 W/kg
Maximum value of SAR (measured) = 0.0102 W/kg

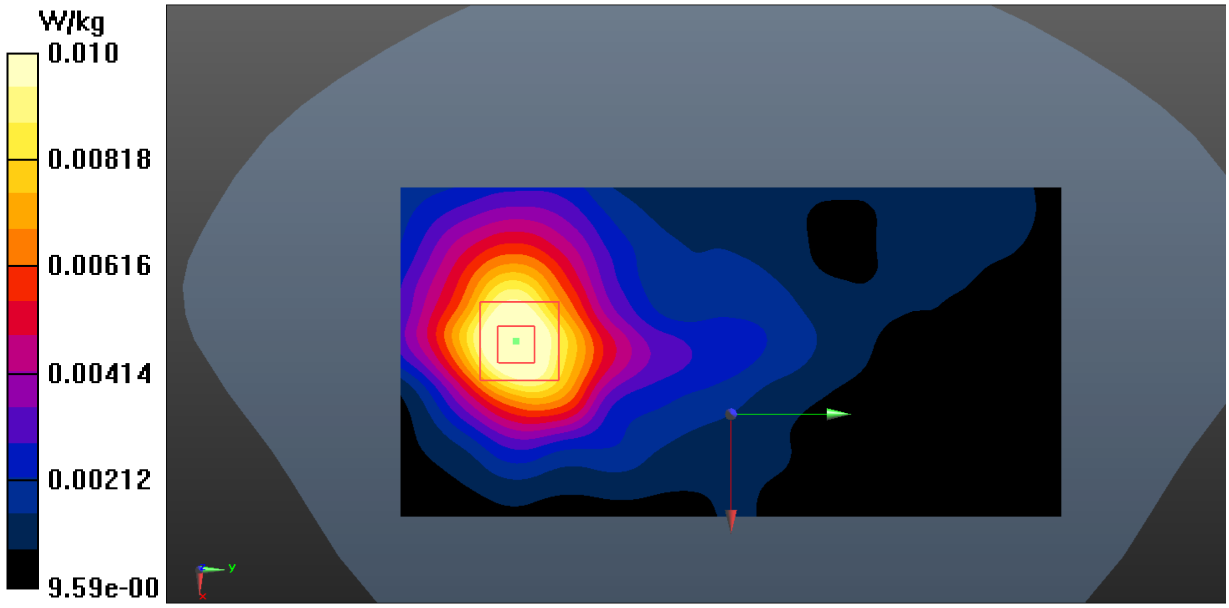


Fig.20 Bluetooth Body

ANNEX B: SystemVerification Results

835MHz

Date: 2024-07-07

Electronics: DAE4 Sn786

Medium: Head 835MHz

Medium parameters used: f = 835 MHz; σ = 0.931 S/m; εr = 40.647; ρ = 1000 kg/m^3

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

Probe: EX3DV4 - SN7621 ConvF (11.02, 11.02, 11.02)

System Validation/Area Scan (91x161x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 66.258 V/m; Power Drift = 0.09 dB

SAR(1 g) = 2.45 W/kg; SAR(10 g) = 1.60 W/kg

Maximum value of SAR (interpolated) = 3.83 W/kg

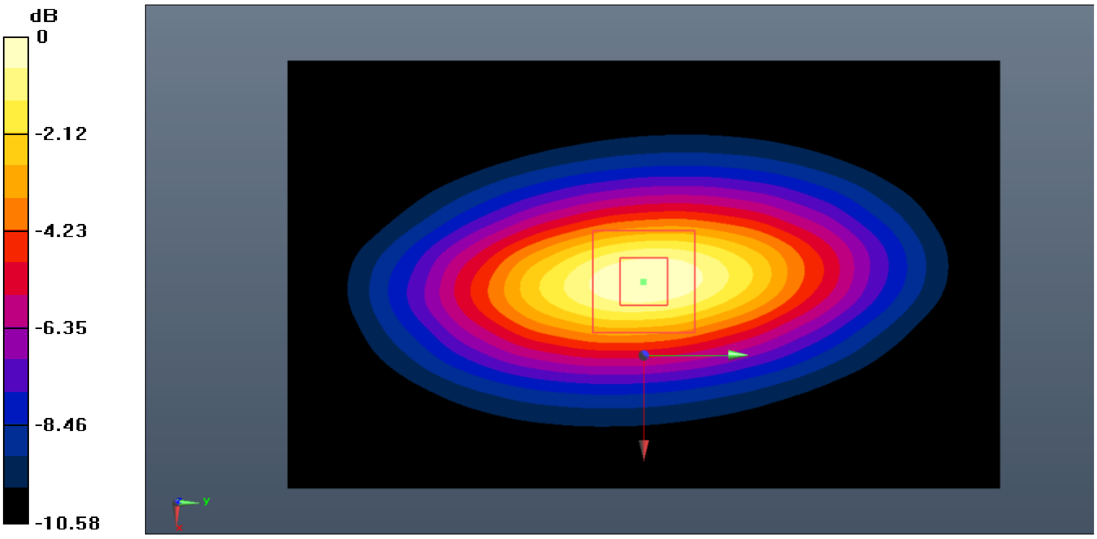
System Validation/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 66.258 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 4.12 W/kg

SAR(1 g) = 2.50 W/kg; SAR(10 g) = 1.62 W/kg

Maximum value of SAR (measured) = 3.86 W/kg



0 dB = 3.86 W/kg = 5.87 dB W/kg

Fig.B.1. Validation 835MHz 250mW

1750MHz

Date: 2024-07-11

Electronics: DAE4 Sn786

Medium: Head 1750MHz

Medium parameters used: f = 1750 MHz; σ = 1.364 S/m; ε_r = 40.622; ρ = 1000 kg/m^3

Communication System: CW Frequency: 1750 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7621 ConvF (9.11, 9.11, 9.11)

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

Reference Value = 78.266 V/m; Power Drift = -0.05 dB

SAR(1 g) = 9.05 W/kg; SAR(10 g) = 5.01 W/kg

Maximum value of SAR (interpolated) = 13.2 W/kg

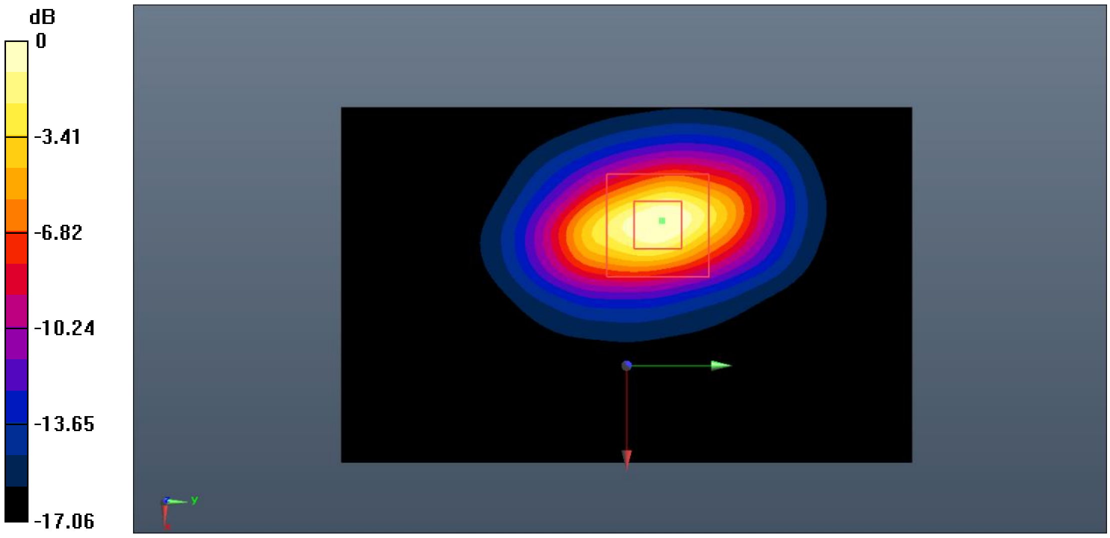
System Validation/Zoom Scan (7x7x7)/Cube0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 78.266 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 17.8 W/kg

SAR(1 g) = 8.92 W/kg; SAR(10 g) = 4.84 W/kg

Maximum value of SAR (measured) = 12.9 W/kg



0 dB = 12.9 W/kg = 11.10 dB W/kg

Fig.B.2. Validation 1750MHz 250mW

1900MHz

Date: 2024-07-08

Electronics: DAE4 Sn786

Medium: Head 1900MHz

Medium parameters used: f = 1900 MHz; σ = 1.416 S/m; ε_r = 39.384; ρ = 1000 kg/m^3

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

Probe: EX3DV4 - SN7621 ConvF (8.76, 8.76, 8.76)

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

Reference Value = 87.395 V/m; Power Drift = 0.07 dB

SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.15 W/kg

Maximum value of SAR (interpolated) = 16.6 W/kg

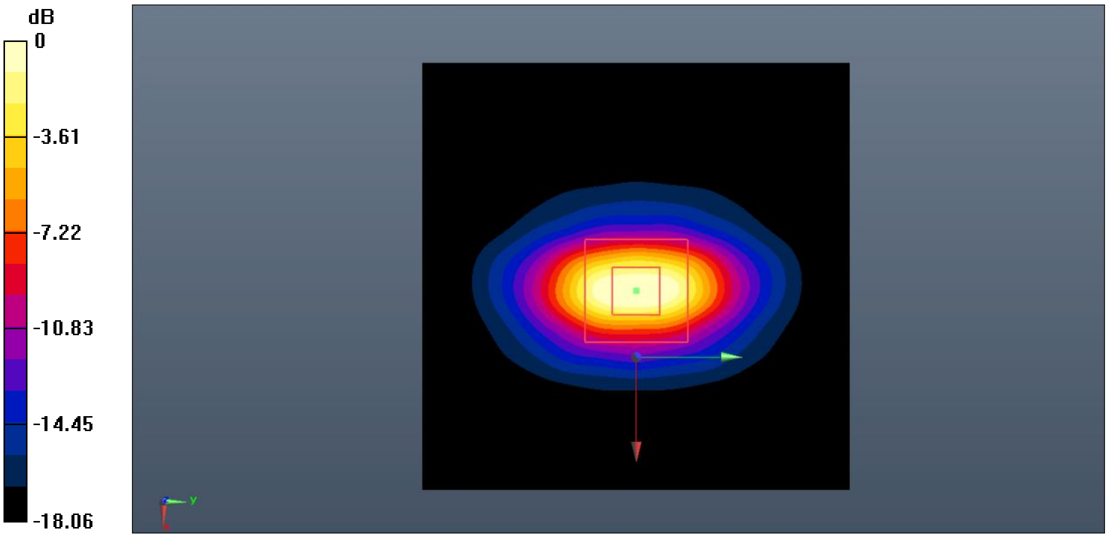
System Validation/Zoom Scan (7x7x7)/Cube0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 87.395 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 22.3 W/kg

SAR(1 g) = 10.4 W/kg; SAR(10 g) = 5.26 W/kg

Maximum value of SAR (measured) = 16.9 W/kg



0 dB = 16.9 W/kg = 12.28 dB W/kg

Fig.B.3. Validation 1900MHz 250mW

2450MHz

Date: 2024-07-09

Electronics: DAE4 Sn786

Medium: Head 2450MHz

Medium parameters used: f = 2450 MHz; σ = 1.783 S/m; ε_r = 39.787; ρ = 1000 kg/m^3

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

Probe: EX3DV4 - SN7621 ConvF (8.21, 8.21, 8.21)

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

Reference Value = 93.578 V/m; Power Drift = -0.13 dB

SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.10 W/kg

Maximum value of SAR (interpolated) = 21.4 W/kg

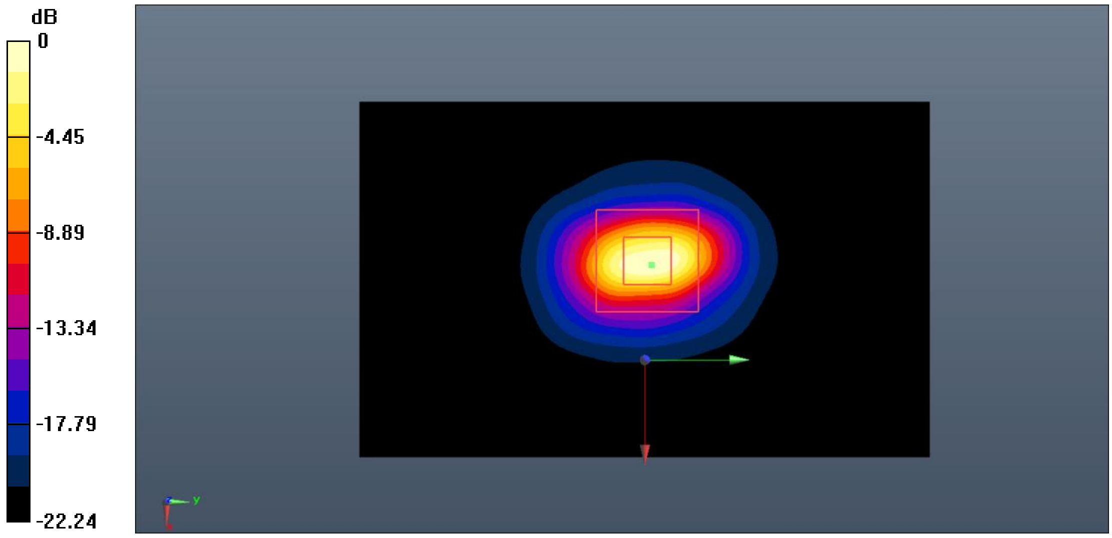
System Validation/Zoom Scan (7x7x7)/Cube0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.578 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 30.2 W/kg

SAR(1 g) = 13.1 W/kg; SAR(10 g) = 6.03 W/kg

Maximum value of SAR (measured) = 21.1 W/kg



0 dB = 21.1 W/kg = 13.24 dB W/kg

Fig.B.4. Validation 2450MHz 250mW

2550MHz

Date: 2024-07-15

Electronics: DAE4 Sn786

Medium: Head 2550MHz

Medium parameters used: f = 2550 MHz; σ = 1.957 S/m; ε_r = 38.709; ρ = 1000 kg/m^3

Communication System: CW Frequency: 2550 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7621 ConvF (8.21, 8.21, 8.21)

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

Reference Value = 96.251 V/m; Power Drift = 0.12 dB

SAR(1 g) = 13.8 W/kg; SAR(10 g) = 6.24 W/kg

Maximum value of SAR (interpolated) = 23.4 W/kg

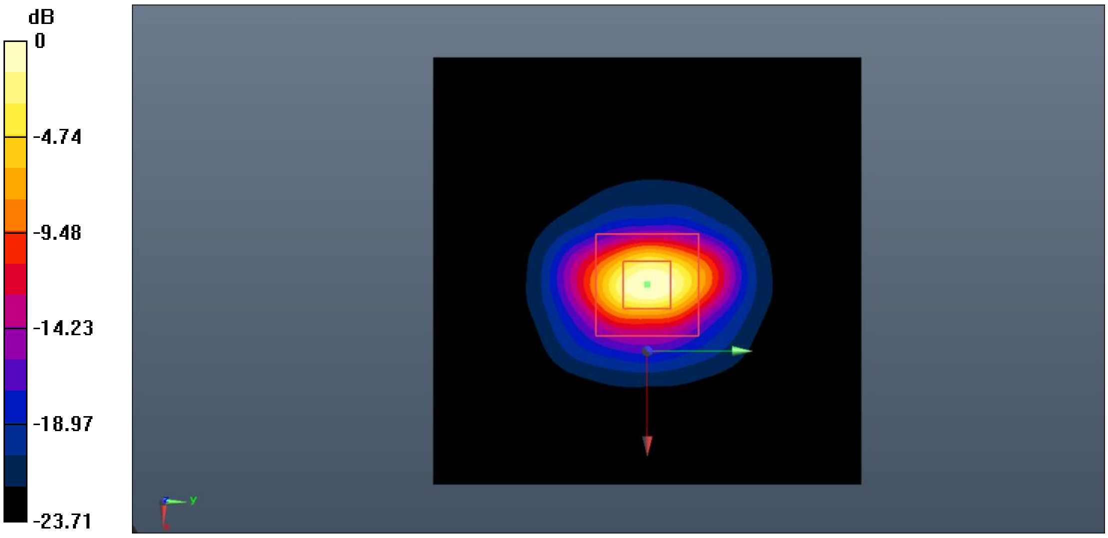
System Validation/Zoom Scan (7x7x7)/Cube0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.251 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 29.7 W/kg

SAR(1 g) = 14.2 W/kg; SAR(10 g) = 6.38 W/kg

Maximum value of SAR (measured) = 23.6 W/kg



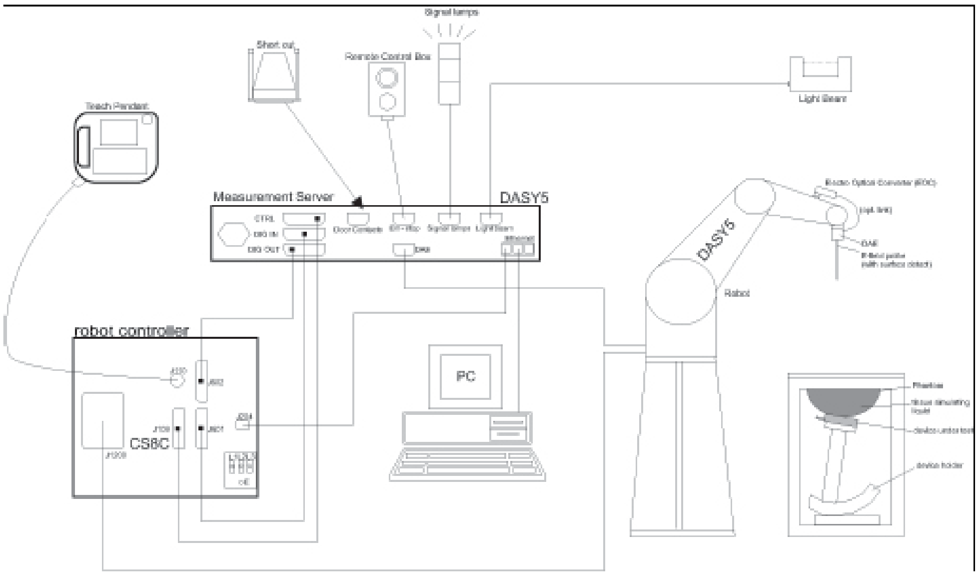
0 dB = 23.6 W/kg = 13.73 dB W/kg

Fig.B.5. 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:



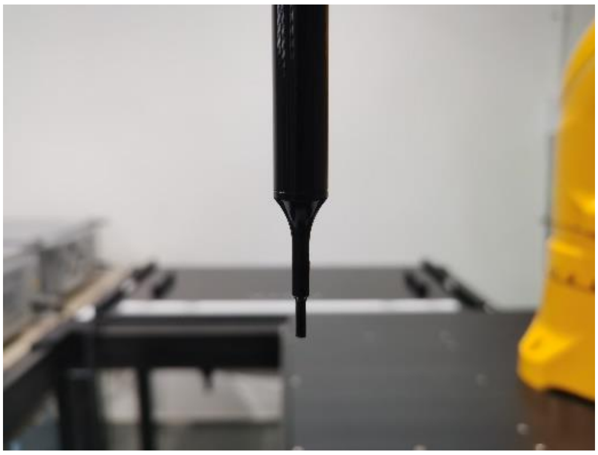
Picture C.1 SAR Lab Test Measurement Set-up

- 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.

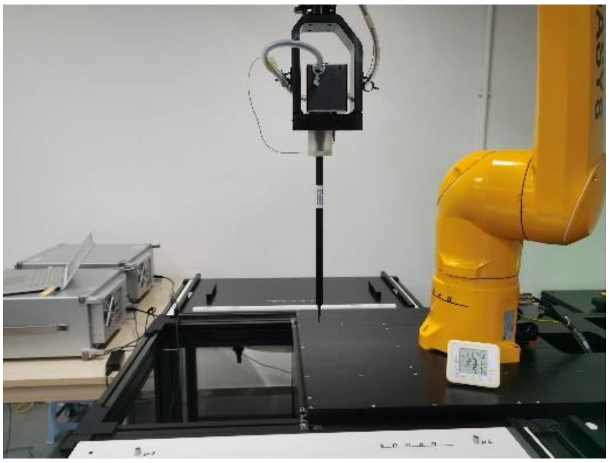
C.2. DASY E-field Probe System

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 OR DASY8 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:	EX3DV4
Frequency Range:	10 MHz - 6.0 GHz
Calibration:	In head simulating tissue at Frequencies from 750 up to 5750 MHz
Linearity:	± 0.2 dB (30 MHz to 6 GHz)
Dynamic Range:	10 mW/kg - 100 W/kg
Probe Length:	337 mm
Probe Tip Length:	20 mm
Body Diameter:	12 mm
Tip Diameter:	2.5 mm
Tip-Center:	1 mm
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.

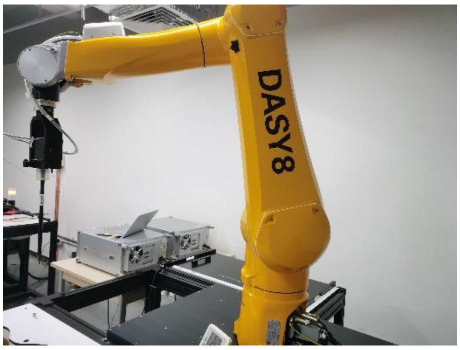
Picture C.4: DAE

C.4.2. Robot

The SPEAG DASY system uses the high precision robots (DASY5: RX90L) 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



Picture C.6: DASY 8

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.7: Server for DASY 5

Picture C.8: Server for DASY 8

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.

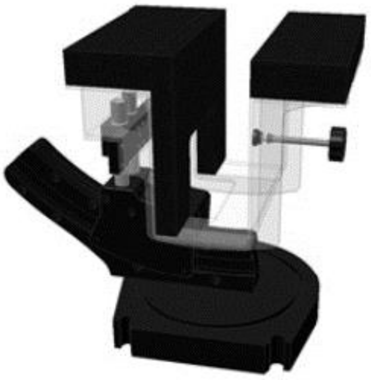
The DASY device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference 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.9: Device Holder



Picture C.10: Laptop Extension Kit

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).

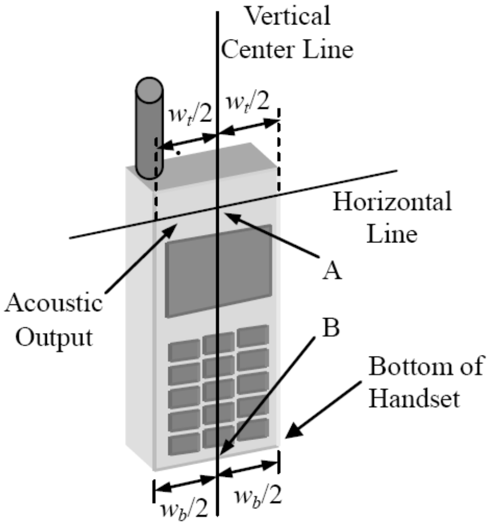
Shell Thickness: 2 ± 0. 2 mm
Filling Volume: Approx. 25 liters
Dimensions: 810 x l000 x 500 mm (H x L x W)
Available: Special

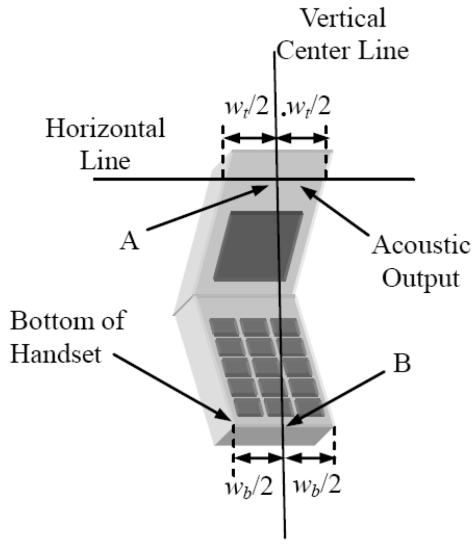
Picture C.11: SAM Twin Phantom

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.





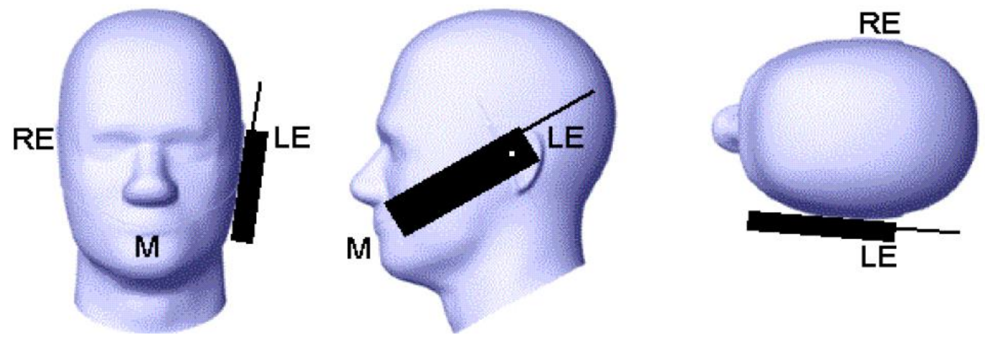
w_t Width of the handset at the level of the acoustic

w_b Width of the bottom of the handset

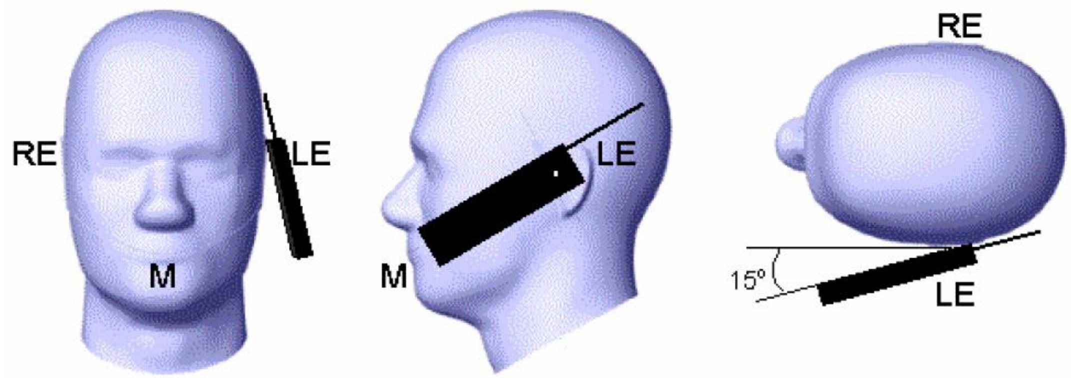
A Midpoint of the width w_t of the handset at the level of the acoustic output

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



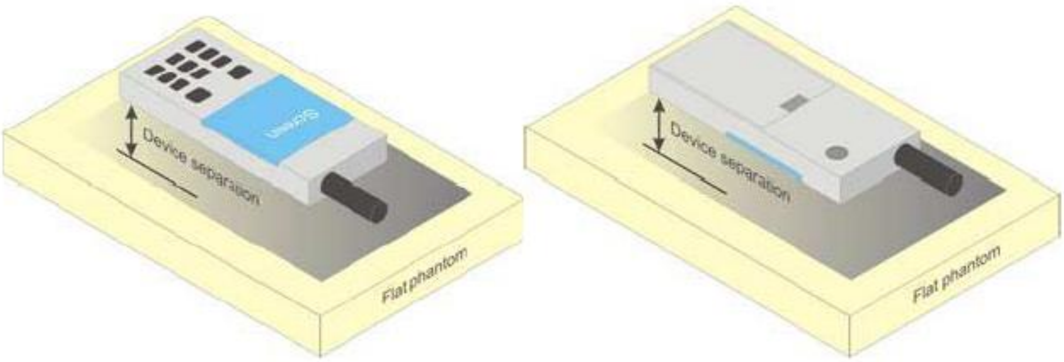
Picture D.2 Cheek position of the wireless device on the left side of SAM



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.

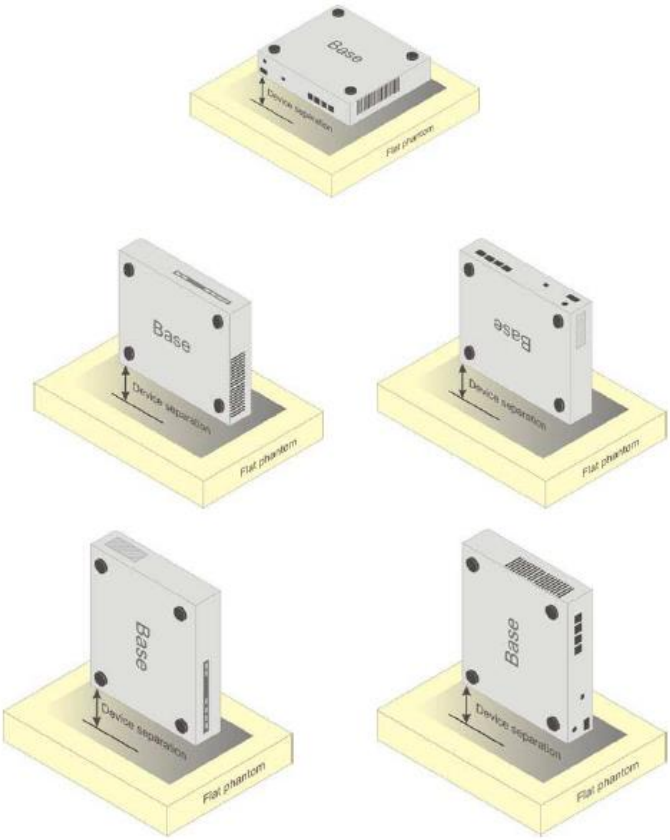


Picture D.4 Test positions for body-worn devices

D.3. Desktop device

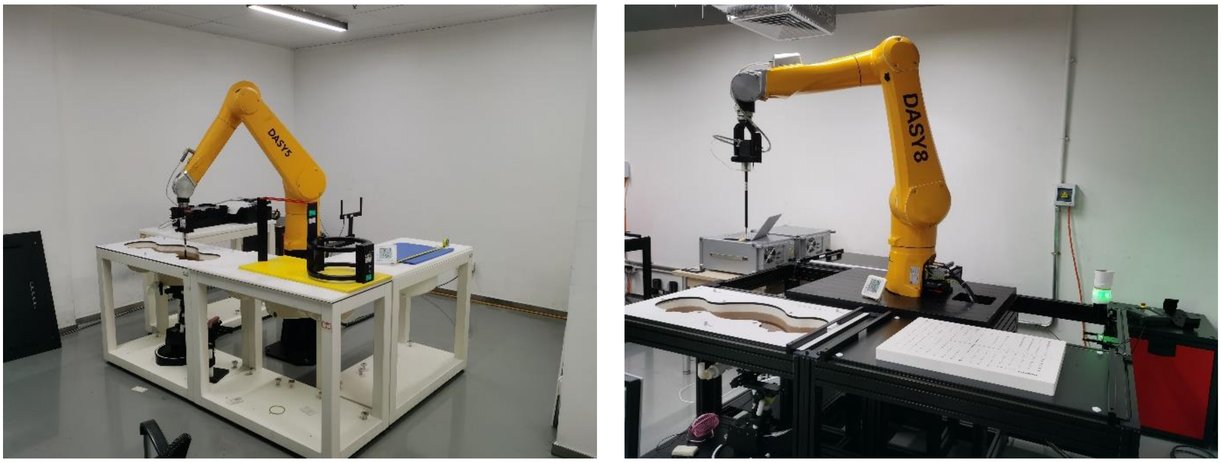
A typical example of a desktop device is a wireless enabled desktop computer placed on a table or desk when used.

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 Specific Absorption Rate Test Layout

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 (MHz)	Validation date	Frequency point	CW Validation	Modulation Signal Validation		
					Modulation Type	Duty Factor	PAR
7621	Head 750	2024-01-18	750MHz	Pass	N/A	N/A	N/A
7621	Head 835	2024-01-18	835MHz	Pass	GMSK	Pass	N/A
7621	Head 1750	2024-01-18	1750MHz	Pass	N/A	N/A	N/A
7621	Head 1900	2024-01-18	1900MHz	Pass	GMSK	Pass	N/A
7621	Head 2450	2024-01-20	2450MHz	Pass	OFDM/TDD	Pass	Pass
7621	Head 2550	2024-01-20	2550MHz	Pass	TDD	Pass	N/A
7621	Head 3500	2024-01-19	3500MHz	Pass	TDD	Pass	N/A
7621	Head 3700	2024-01-19	3700MHz	Pass	TDD	Pass	N/A
7621	Head 3900	2024-01-19	3900MHz	Pass	TDD	Pass	N/A
7621	Head 5250	2024-01-22	5250MHz	Pass	OFDM	N/A	Pass
7621	Head 5600	2024-01-22	5600MHz	Pass	OFDM	N/A	Pass
7621	Head 5750	2024-01-22	5750MHz	Pass	OFDM	N/A	Pass

ANNEX G: DAE Calibration Certificate

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

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

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

Accreditation No.: **SCS 0108**

Client **SAICT**
Shenzhen

Certificate No: **DAE4-786_Dec23**

CALIBRATION CERTIFICATE

Object: DAE4 - SD 000 D04 BM - SN: 786

Calibration procedure(s): QA CAL-06.v30
Calibration procedure for the data acquisition electronics (DAE)

Calibration date: December 11, 2023

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
Keithley Multimeter Type 2001	SN: 0810278	29-Aug-23 (No:37421)	Aug-24
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Auto DAE Calibration Unit	SE UWS 053 AA 1001	27-Jan-23 (in house check)	In house check: Jan-24
Calibrator Box V2.1	SE UMS 006 AA 1002	27-Jan-23 (in house check)	In house check: Jan-24

	Name	Function	Signature
Calibrated by:	Dominique Steffen	Laboratory Technician	[signature]
Approved by:	Sven Kühn	Technical Manager	i.V. [signature]

Issued: December 11, 2023

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

Certificate No: DAE4-786_Dec23 Page 1 of 5

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

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

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

Accreditation No.: SCS 0108

Glossary

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 following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
  - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
  - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
  - *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.
  - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - *Input resistance:* Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
  - *Power consumption:* Typical value for information. Supply currents in various operating modes.

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	404.093 ± 0.02% (k=2)	404.226 ± 0.02% (k=2)	404.638 ± 0.02% (k=2)
Low Range	3.97228 ± 1.50% (k=2)	3.94201 ± 1.50% (k=2)	3.95929 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	331.0 ° ± 1 °

Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	199986.65	1.02	0.00
Channel X	+ Input	19998.56	2.44	0.01
Channel X	- Input	-20002.95	4.99	-0.02
Channel Y	+ Input	199984.14	-1.62	-0.00
Channel Y	+ Input	19995.50	-0.73	-0.00
Channel Y	- Input	-20005.81	1.90	-0.01
Channel Z	+ Input	199983.31	-2.86	-0.00
Channel Z	+ Input	19996.62	0.41	0.00
Channel Z	- Input	-20004.38	3.36	-0.02

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	1995.80	0.72	0.04
Channel X	+ Input	196.27	0.94	0.48
Channel X	- Input	-204.04	0.34	-0.17
Channel Y	+ Input	1995.03	-0.18	-0.01
Channel Y	+ Input	195.70	0.17	0.09
Channel Y	- Input	-205.47	-1.22	0.60
Channel Z	+ Input	1995.18	-0.00	-0.00
Channel Z	+ Input	194.54	-0.97	-0.50
Channel Z	- Input	-205.29	-1.05	0.51

2. Common mode sensitivity

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

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	14.09	11.76
	- 200	-10.45	-12.35
Channel Y	200	22.26	21.00
	- 200	-22.82	-22.83
Channel Z	200	7.79	7.64
	- 200	-9.85	-9.72

3. Channel separation

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

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	-2.10	-3.21
Channel Y	200	9.93	-	-0.01
Channel Z	200	7.19	7.69	-

Certificate No: DAE4-786_Dec23 Page 4 of 5

4. AD-Converter Values with inputs shorted

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

	High Range (LSB)	Low Range (LSB)
Channel X	16083	14669
Channel Y	15939	15420
Channel Z	16116	13718

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	0.87	-1.01	1.96	0.50
Channel Y	-0.17	-1.30	1.23	0.46
Channel Z	-0.13	-1.47	0.93	0.48

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

8. Low Battery Alarm Voltage (Typical values for information)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	-0.01	-8	-9

ANNEX H: Probe Calibration Certificate

In Collaboration with speag
CALIBRATION LABORATORY
Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2117
E-mail: emf@caict.ac.cn http://www.caict.ac.cn

中国认可 国际互认 校准 CALIBRATION CNAS L0570 CAICT

Client **SAICT** **Certificate No: J23Z60349**

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN : 7621

Calibration Procedure(s): FF-Z11-004-02
Calibration Procedures for Dosimetric E-field Probes

Calibration date: January 10, 2024

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	12-Jun-23(CTTL, No.J23X05435)	Jun-24
Power sensor NRP-Z91	101547	12-Jun-23(CTTL, No.J23X05435)	Jun-24
Power sensor NRP-Z91	101548	12-Jun-23(CTTL, No.J23X05435)	Jun-24
Reference 10dBAttenuator	18N50W-10dB	19-Jan-23(CTTL, No.J23X00212)	Jan-25
Reference 20dBAttenuator	18N50W-20dB	19-Jan-23(CTTL, No.J23X00211)	Jan-25
Reference Probe EX3DV4	SN 3846	31-May-23(SPEAG, No.EX-3846_May23)	May-24
DAE4	SN 1555	24-Aug-23(SPEAG, No.DAE4-1555_Aug23)	Aug-24
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
SignalGenerator MG3700A	6201052605	12-Jun-23(CTTL, No.J23X05434)	Jun-24
Network Analyzer E5071C	MY46110673	10-Jan-23(CTTL, No.J23X00104)	Jan-24
Reference 10dBAttenuator	BT0520	11-May-23(CTTL, No.J23X04061)	May-25
Reference 20dBAttenuator	BT0267	11-May-23(CTTL, No.J23X04062)	May-25
OCP DAK-12	SN 1174	25-Oct-23(SPEAG, No.OCP-DAK12-1174_Oct23)	Oct-24

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

Issued: January 16, 2024

In Collaboration with
s p e a g
CALIBRATION LABORATORY

CAICT

Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2117
E-mail: emf@caict.ac.cn http://www.caict.ac.cn

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).

Certificate No:J23Z60349 Page 2 of 22

In Collaboration with
s p e a g
CALIBRATION LABORATORY

CAICT

Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2117
E-mail: emf@caict.ac.cn http://www.caict.ac.cn

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]	0.75	0.69	0.56	±10.0%
DCP(mV)[B]	116.3	111.8	114.1	

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Max Dev.	Max Unc[E] (*k*=2)
0	CW	X	0.0	0.0	1.0	0.00	245.0	±2.2%	±4.7%
		Y	0.0	0.0	1.0		228.9		
		Z	0.0	0.0	1.0		200.2		
10352-AAA	Pulse Waveform (200Hz, 10%)	X	1.58	60.00	5.98	10.00	60	±4.6%	±9.6%
		Y	1.66	60.00	6.30		60		
		Z	1.55	60.00	5.90		60		
10353-AAA	Pulse Waveform (200Hz, 20%)	X	1.00	60.00	4.70	6.99	80	±5.0%	±9.6%
		Y	1.16	60.00	5.35		80		
		Z	0.88	60.00	4.61		80		
10354-AAA	Pulse Waveform (200Hz, 40%)	X	0.56	60.00	3.40	3.98	95	±4.2%	±9.6%
		Y	0.72	60.00	4.43		95		
		Z	0.13	135.25	0.44		95		
10355-AAA	Pulse Waveform (200Hz, 60%)	X	15.06	149.56	3.00	2.22	120	±2.5%	±9.6%
		Y	19.78	144.48	5.80		120		
		Z	0.04	157.67	14.77		120		
10387-AAA	QPSK Waveform, 1 MHz	X	0.67	62.21	9.98	1.00	150	±4.8%	±9.6%
		Y	0.60	62.87	11.02		150		
		Z	0.60	62.46	10.17		150		
10388-AAA	QPSK Waveform, 10 MHz	X	1.35	64.07	12.55	0.00	150	±1.4%	±9.6%
		Y	1.43	65.73	13.69		150		
		Z	1.31	64.32	12.60		150		
10396-AAA	64-QAM Waveform, 100 kHz	X	2.08	68.01	18.04	3.01	150	±1.0%	±9.6%
		Y	1.90	66.41	17.71		150		
		Z	2.09	68.06	18.19		150		
10414-AAA	WLAN CCDF, 64-QAM, 40MHz	X	4.04	65.58	14.84	0.00	150	±5.2%	±9.6%
		Y	4.02	66.13	15.30		150		
		Z	3.92	65.71	14.88		150		

Note: For details on UID parameters see Appendix

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] Uncertainly is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

In Collaboration with
s p e a g
CALIBRATION LABORATORY

CAICT

Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2117
E-mail: emf@caict.ac.cn http://www.caict.ac.cn

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

Sensor Model Parameters

	C1 fF	C2 fF	α V^{-1}	T1 $ms.V^{-2}$	T2 $ms.V^{-1}$	T3 ms	T4 V^{-2}	T5 V^{-1}	T6
X	15.06	105.97	31.62	5.46	0.00	4.90	0.72	0.00	1.02
Y	12.33	88.55	32.92	13.24	0.00	4.90	0.18	0.05	1.02
Z	12.49	87.81	31.63	2.66	0.00	4.90	0.76	0.00	1.02

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	136
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disable
Probe Overall Length	337mm
Probe Body Diameter	10mm
Tip Length	9mm
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

Certificate No:J23Z60349 Page 4 of 22

In Collaboration with
s p e a g
CALIBRATION LABORATORY

CAICT

Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2117
E-mail: emf@caict.ac.cn http://www.caict.ac.cn

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	11.02	11.02	11.02	0.14	1.34	±12.7%
900	41.5	0.97	10.53	10.53	10.53	0.16	1.38	±12.7%
1750	40.1	1.37	9.11	9.11	9.11	0.24	0.99	±12.7%
1900	40.0	1.40	8.76	8.76	8.76	0.28	0.95	±12.7%
2100	39.8	1.49	8.72	8.72	8.72	0.26	1.01	±12.7%
2300	39.5	1.67	8.50	8.50	8.50	0.65	0.68	±12.7%
2450	39.2	1.80	8.21	8.21	8.21	0.67	0.67	±12.7%
2600	39.0	1.96	8.02	8.02	8.02	0.65	0.68	±12.7%
3300	38.2	2.71	7.70	7.70	7.70	0.43	0.95	±13.9%
3500	37.9	2.91	7.52	7.52	7.52	0.41	1.00	±13.9%
3700	37.7	3.12	7.31	7.31	7.31	0.43	1.04	±13.9%
3900	37.5	3.32	7.09	7.09	7.09	0.35	1.50	±13.9%
4100	37.2	3.53	7.10	7.10	7.10	0.40	1.15	±13.9%
5250	35.9	4.71	5.95	5.95	5.95	0.45	1.40	±13.9%
5600	35.5	5.07	5.25	5.25	5.25	0.50	1.35	±13.9%
5800	35.3	5.27	5.33	5.33	5.33	0.55	1.25	±13.9%

[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 up to 6 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

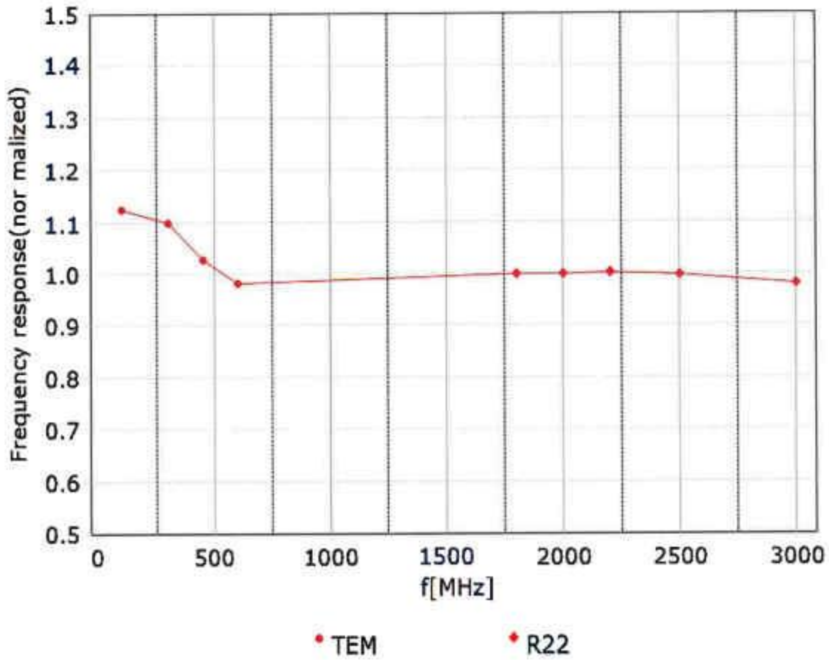
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

In Collaboration with
s p e a g
CALIBRATION LABORATORY

CAICT

Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2117
E-mail: emf@caict.ac.cn http://www.caict.ac.cn

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



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

Certificate No:J23Z60349 Page 6 of 22

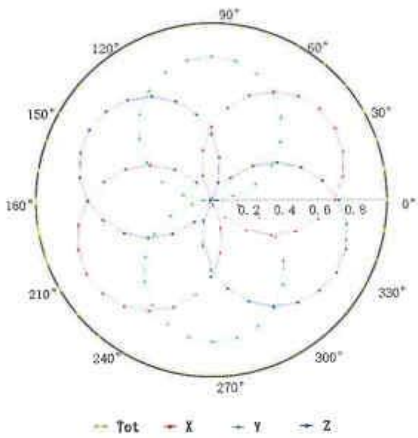
In Collaboration with
s p e a g
CALIBRATION LABORATORY

CAICT

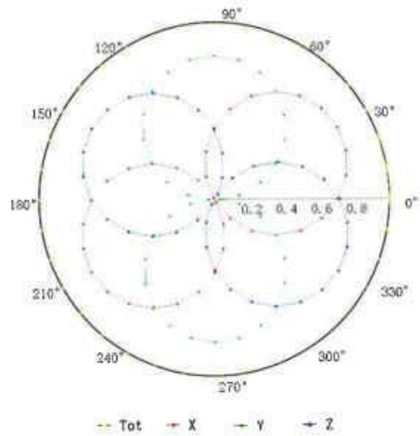
Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2117
E-mail: emf@caict.ac.cn http://www.caict.ac.cn

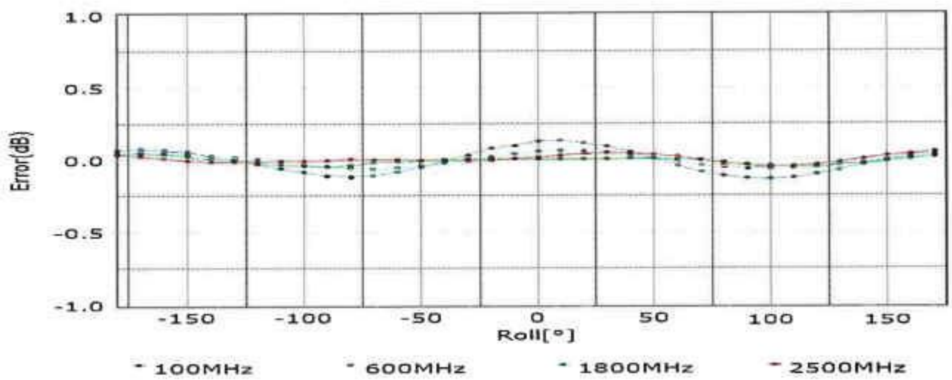
Receiving Pattern (Φ), θ=0°

f=600 MHz, TEM



f=1800 MHz, R22

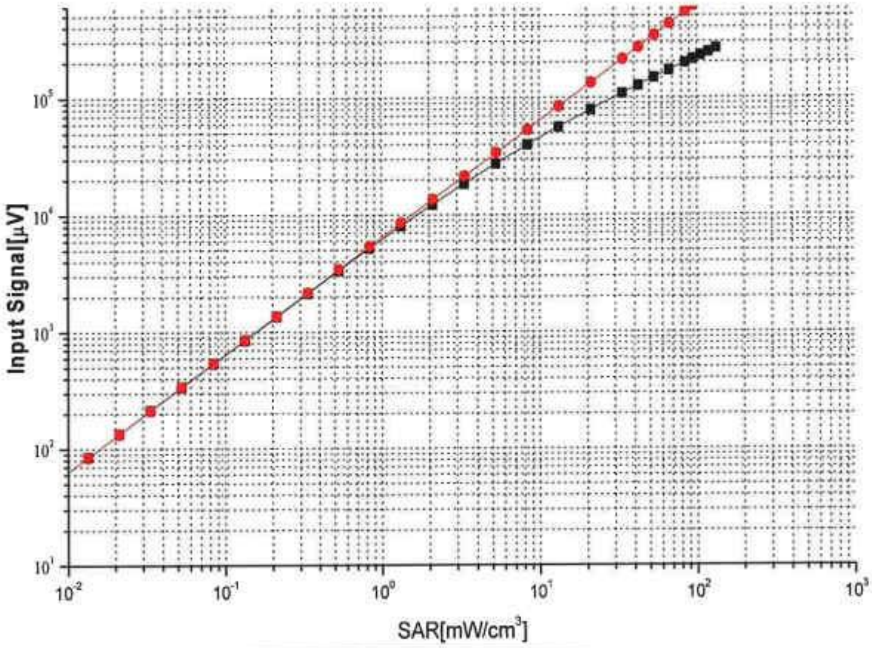


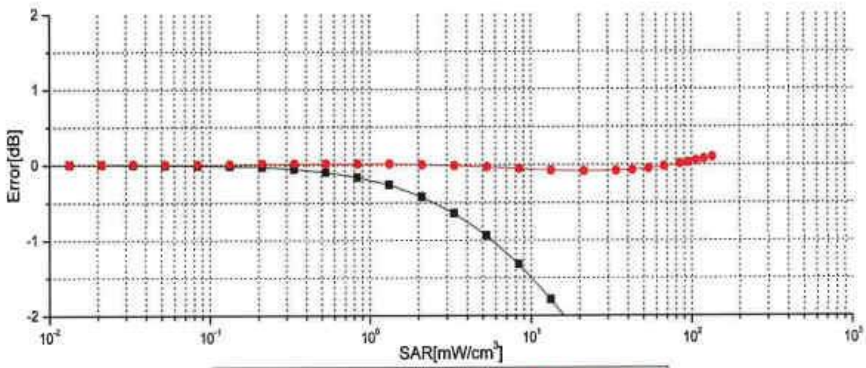


Uncertainty of Axial Isotropy Assessment: ±1.2% (k=2)

In Collaboration with
s p e a g
CALIBRATION LABORATORY
Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2117
E-mail: emf@caict.ac.cn http://www.caict.ac.cn

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





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

Certificate No:J23Z60349 Page 8 of 22

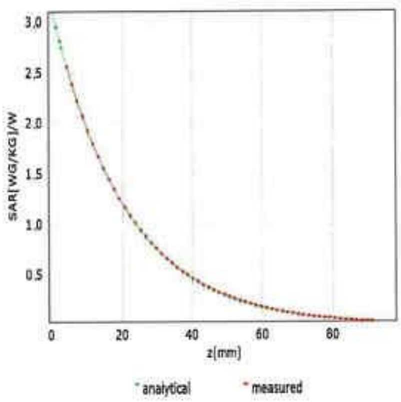
In Collaboration with
s p e a g
CALIBRATION LABORATORY

CAICT

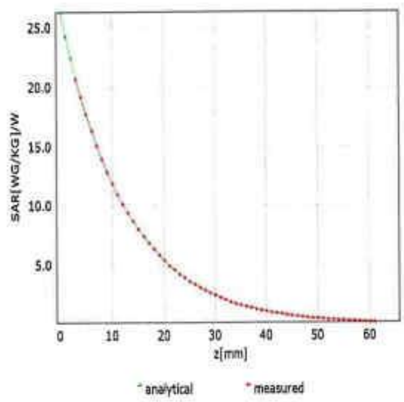
Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2117
E-mail: emf@caict.ac.cn http://www.caict.ac.cn

Conversion Factor Assessment

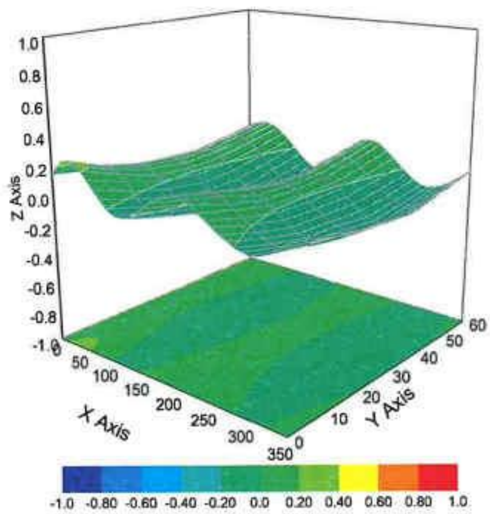
f=750 MHz,WGLS R9(H_convF)



f=1750 MHz,WGLS R22(H_convF)



Deviation from Isotropy in Liquid



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

Certificate No:J23Z60349 Page 9 of 22

In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2117
E-mail: emf@caict.ac.cn http://www.caict.ac.cn

Appendix: Modulation Calibration Parameters

UID	Rev	Communication System Name	Group	PAR (dB)	UncE (k=2)
0		CW	CW	0.00	± 4.7 %
10010	CAA	SAR Validation (Square, 100ms, 10ms)	Test	10.00	± 9.6 %
10011	CAB	UMTS-FDD (WCDMA)	WCDMA	2.91	± 9.6 %
10012	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	WLAN	1.87	± 9.6 %
10013	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	WLAN	9.46	± 9.6 %
10021	DAC	GSM-FDD (TDMA, GMSK)	GSM	9.39	± 9.6 %
10023	DAC	GPRS-FDD (TDMA, GMSK, TN 0)	GSM	9.57	± 9.6 %
10024	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1)	GSM	6.56	± 9.6 %
10025	DAC	EDGE-FDD (TDMA, 8PSK, TN 0)	GSM	12.62	± 9.6 %
10026	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1)	GSM	9.55	± 9.6 %
10027	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	GSM	4.80	± 9.6 %
10028	DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	GSM	3.55	± 9.6 %
10029	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	GSM	7.78	± 9.6 %
10030	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH1)	Bluetooth	5.30	± 9.6 %
10031	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH3)	Bluetooth	1.87	± 9.6 %
10032	CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	Bluetooth	1.16	± 9.6 %
10033	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH1)	Bluetooth	7.74	± 9.6 %
10034	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH3)	Bluetooth	4.53	± 9.6 %
10035	CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH5)	Bluetooth	3.83	± 9.6 %
10036	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH1)	Bluetooth	8.01	± 9.6 %
10037	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH3)	Bluetooth	4.77	± 9.6 %
10038	CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH5)	Bluetooth	4.10	± 9.6 %
10039	CAB	CDMA2000 (1xRTT, RC1)	CDMA2000	4.57	± 9.6 %
10042	CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Halfrate)	AMPS	7.78	± 9.6 %
10044	CAA	IS-91/EIA/TIA-553 FDD (FDMA, FM)	AMPS	0.00	± 9.6 %
10048	CAA	DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24)	DECT	13.80	± 9.6 %
10049	CAA	DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)	DECT	10.79	± 9.6 %
10056	CAA	UMTS-TDD (TD-SCDMA, 1.28 Mcps)	TD-SCDMA	11.01	± 9.6 %
10058	DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)	GSM	6.52	± 9.6 %
10059	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)	WLAN	2.12	± 9.6 %
10060	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps)	WLAN	2.83	± 9.6 %
10061	CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	WLAN	3.60	± 9.6 %
10062	CAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	WLAN	8.68	± 9.6 %
10063	CAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	WLAN	8.63	± 9.6 %
10064	CAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)	WLAN	9.09	± 9.6 %
10065	CAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)	WLAN	9.00	± 9.6 %
10066	CAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)	WLAN	9.38	± 9.6 %
10067	CAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)	WLAN	10.12	± 9.6 %
10068	CAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	WLAN	10.24	± 9.6 %
10069	CAD	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	WLAN	10.56	± 9.6 %
10071	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 9 Mbps)	WLAN	9.83	± 9.6 %
10072	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)	WLAN	9.62	± 9.6 %
10073	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps)	WLAN	9.94	± 9.6 %
10074	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps)	WLAN	10.30	± 9.6 %
10075	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps)	WLAN	10.77	± 9.6 %
10076	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps)	WLAN	10.94	± 9.6 %
10077	CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)	WLAN	11.00	± 9.6 %
10081	CAB	CDMA2000 (1xRTT, RC3)	CDMA2000	3.97	± 9.6 %
10082	CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Fullrate)	AMPS	4.77	± 9.6 %
10090	DAC	GPRS-FDD (TDMA, GMSK, TN 0-4)	GSM	6.56	± 9.6 %
10097	CAC	UMTS-FDD (HSDPA)	WCDMA	3.98	± 9.6 %
10098	DAC	UMTS-FDD (HSUPA, Subtest 2)	WCDMA	3.98	± 9.6 %
10099	CAC	EDGE-FDD (TDMA, 8PSK, TN 0-4)	GSM	9.55	± 9.6 %
10100	CAC	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-FDD	5.67	± 9.6 %
10101	CAB	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	± 9.6 %

In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2117
E-mail: emf@caict.ac.cn http://www.caict.ac.cn

10102	CAB	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10103	DAC	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	LTE-TDD	9.29	± 9.6 %
10104	CAE	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	LTE-TDD	9.97	± 9.6 %
10105	CAE	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	LTE-TDD	10.01	± 9.6 %
10108	CAE	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-FDD	5.80	± 9.6 %
10109	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10110	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-FDD	5.75	± 9.6 %
10111	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-FDD	6.44	± 9.6 %
10112	CAG	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-FDD	6.59	± 9.6 %
10113	CAG	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-FDD	6.62	± 9.6 %
10114	CAG	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	WLAN	8.10	± 9.6 %
10115	CAG	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	WLAN	8.46	± 9.6 %
10116	CAG	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	WLAN	8.15	± 9.6 %
10117	CAG	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	WLAN	8.07	± 9.6 %
10118	CAD	IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)	WLAN	8.59	± 9.6 %
10119	CAD	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	WLAN	8.13	± 9.6 %
10140	CAD	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-FDD	6.49	± 9.6 %
10141	CAD	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-FDD	6.53	± 9.6 %
10142	CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10143	CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-FDD	6.35	± 9.6 %
10144	CAC	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-FDD	6.65	± 9.6 %
10145	CAC	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	LTE-FDD	5.76	± 9.6 %
10146	CAC	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.41	± 9.6 %
10147	CAC	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.72	± 9.6 %
10149	CAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-FDD	6.42	± 9.6 %
10150	CAE	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10151	CAE	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-TDD	9.28	± 9.6 %
10152	CAE	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	LTE-TDD	9.92	± 9.6 %
10153	CAE	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	LTE-TDD	10.05	± 9.6 %
10154	CAF	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-FDD	5.75	± 9.6 %
10155	CAF	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10156	CAF	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-FDD	5.79	± 9.6 %
10157	CAE	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-FDD	6.49	± 9.6 %
10158	CAE	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-FDD	6.62	± 9.6 %
10159	CAG	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-FDD	6.56	± 9.6 %
10160	CAG	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-FDD	5.82	± 9.6 %
10161	CAG	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-FDD	6.43	± 9.6 %
10162	CAG	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-FDD	6.58	± 9.6 %
10166	CAG	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-FDD	5.46	± 9.6 %
10167	CAG	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.21	± 9.6 %
10168	CAG	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.79	± 9.6 %
10169	CAG	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10170	CAG	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10171	CAE	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-FDD	6.49	± 9.6 %
10172	CAE	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10173	CAE	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10174	CAF	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10175	CAF	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10176	CAF	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10177	CAE	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10178	CAE	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10179	AAE	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10180	CAG	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10181	CAG	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10182	CAG	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10183	CAG	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10184	CAG	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10185	CAI	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-FDD	6.51	± 9.6 %
10186	CAG	LTE-FDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %

In Collaboration with
s p e a g
CALIBRATION LABORATORY

CAICT

Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2117
E-mail: emf@caict.ac.cn http://www.caict.ac.cn

10187	CAG	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-FDD	5.73	± 9.6 %
10188	CAG	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-FDD	6.52	± 9.6 %
10189	CAE	LTE-FDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-FDD	6.50	± 9.6 %
10193	CAE	IEEE 802.11n (HT Greenfield, 6.5 Mbps, BPSK)	WLAN	8.09	± 9.6 %
10194	AAD	IEEE 802.11n (HT Greenfield, 39 Mbps, 16-QAM)	WLAN	8.12	± 9.6 %
10195	CAE	IEEE 802.11n (HT Greenfield, 65 Mbps, 64-QAM)	WLAN	8.21	± 9.6 %
10196	CAE	IEEE 802.11n (HT Mixed, 6.5 Mbps, BPSK)	WLAN	8.10	± 9.6 %
10197	AAE	IEEE 802.11n (HT Mixed, 39 Mbps, 16-QAM)	WLAN	8.13	± 9.6 %
10198	CAF	IEEE 802.11n (HT Mixed, 65 Mbps, 64-QAM)	WLAN	8.27	± 9.6 %
10219	CAF	IEEE 802.11n (HT Mixed, 7.2 Mbps, BPSK)	WLAN	8.03	± 9.6 %
10220	AAF	IEEE 802.11n (HT Mixed, 43.3 Mbps, 16-QAM)	WLAN	8.13	± 9.6 %
10221	CAC	IEEE 802.11n (HT Mixed, 72.2 Mbps, 64-QAM)	WLAN	8.27	± 9.6 %
10222	CAC	IEEE 802.11n (HT Mixed, 15 Mbps, BPSK)	WLAN	8.06	± 9.6 %
10223	CAD	IEEE 802.11n (HT Mixed, 90 Mbps, 16-QAM)	WLAN	8.48	± 9.6 %
10224	CAD	IEEE 802.11n (HT Mixed, 150 Mbps, 64-QAM)	WLAN	8.08	± 9.6 %
10225	CAD	UMTS-FDD (HSPA+)	WCDMA	5.97	± 9.6 %
10226	CAD	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.49	± 9.6 %
10227	CAD	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.26	± 9.6 %
10228	CAD	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK)	LTE-TDD	9.22	± 9.6 %
10229	DAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10230	CAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10231	CAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK)	LTE-TDD	9.19	± 9.6 %
10232	CAD	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10233	CAD	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10234	CAD	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10235	CAD	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10236	CAD	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10237	CAD	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10238	CAB	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	LTE-TDD	9.48	± 9.6 %
10239	CAB	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	LTE-TDD	10.25	± 9.6 %
10240	CAB	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	LTE-TDD	9.21	± 9.6 %
10241	CAB	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.82	± 9.6 %
10242	CAD	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	LTE-TDD	9.86	± 9.6 %
10243	CAD	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	LTE-TDD	9.46	± 9.6 %
10244	CAD	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-TDD	10.06	± 9.6 %
10245	CAG	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	LTE-TDD	10.06	± 9.6 %
10246	CAG	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	LTE-TDD	9.30	± 9.6 %
10247	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	LTE-TDD	9.91	± 9.6 %
10248	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	LTE-TDD	10.09	± 9.6 %
10249	CAG	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	LTE-TDD	9.29	± 9.6 %
10250	CAG	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	LTE-TDD	9.81	± 9.6 %
10251	CAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	LTE-TDD	10.17	± 9.6 %
10252	CAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	LTE-TDD	9.24	± 9.6 %
10253	CAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	LTE-TDD	9.90	± 9.6 %
10254	CAB	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	LTE-TDD	10.14	± 9.6 %
10255	CAB	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	LTE-TDD	9.20	± 9.6 %
10256	CAB	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	LTE-TDD	9.96	± 9.6 %
10257	CAD	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	LTE-TDD	10.08	± 9.6 %
10258	CAD	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	LTE-TDD	9.34	± 9.6 %
10259	CAD	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	LTE-TDD	9.98	± 9.6 %
10260	CAG	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	LTE-TDD	9.97	± 9.6 %
10261	CAG	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	LTE-TDD	9.24	± 9.6 %
10262	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	LTE-TDD	9.83	± 9.6 %
10263	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	LTE-TDD	10.16	± 9.6 %
10264	CAG	LTE-TDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	LTE-TDD	9.23	± 9.6 %
10265	CAG	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	LTE-TDD	9.92	± 9.6 %
10266	CAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	LTE-TDD	10.07	± 9.6 %
10267	CAF	LTE-TDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	LTE-TDD	9.30	± 9.6 %
10268	CAF	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	LTE-TDD	10.06	± 9.6 %

In Collaboration with
speag
CALIBRATION LABORATORY

Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2117
E-mail: emf@caict.ac.cn http://www.caict.ac.cn

10269	CAB	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	LTE-TDD	10.13	± 9.6 %
10270	CAB	LTE-TDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	LTE-TDD	9.58	± 9.6 %
10274	CAB	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.10)	WCDMA	4.87	± 9.6 %
10275	CAD	UMTS-FDD (HSUPA, Subtest 5, 3GPP Rel8.4)	WCDMA	3.96	± 9.6 %
10277	CAD	PHS (QPSK)	PHS	11.81	± 9.6 %
10278	CAD	PHS (QPSK, BW 884MHz, Rolloff 0.5)	PHS	11.81	± 9.6 %
10279	CAG	PHS (QPSK, BW 884MHz, Rolloff 0.38)	PHS	12.18	± 9.6 %
10290	CAG	CDMA2000, RC1, SO55, Full Rate	CDMA2000	3.91	± 9.6 %
10291	CAG	CDMA2000, RC3, SO55, Full Rate	CDMA2000	3.46	± 9.6 %
10292	CAG	CDMA2000, RC3, SO32, Full Rate	CDMA2000	3.39	± 9.6 %
10293	CAG	CDMA2000, RC3, SO3, Full Rate	CDMA2000	3.50	± 9.6 %
10295	CAG	CDMA2000, RC1, SO3, 1/8th Rate 25 fr.	CDMA2000	12.49	± 9.6 %
10297	CAF	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	LTE-FDD	5.81	± 9.6 %
10298	CAF	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, QPSK)	LTE-FDD	5.72	± 9.6 %
10299	CAF	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM)	LTE-FDD	6.39	± 9.6 %
10300	CAC	LTE-FDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM)	LTE-FDD	6.60	± 9.6 %
10301	CAC	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC)	WiMAX	12.03	± 9.6 %
10302	CAB	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, QPSK, PUSC, 3CTRL)	WiMAX	12.57	± 9.6 %
10303	CAB	IEEE 802.16e WiMAX (31:15, 5ms, 10MHz, 64QAM, PUSC)	WiMAX	12.52	± 9.6 %
10304	CAA	IEEE 802.16e WiMAX (29:18, 5ms, 10MHz, 64QAM, PUSC)	WiMAX	11.86	± 9.6 %
10305	CAA	IEEE 802.16e WiMAX (31:15, 10ms, 10MHz, 64QAM, PUSC)	WiMAX	15.24	± 9.6 %
10306	CAA	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 64QAM, PUSC)	WiMAX	14.67	± 9.6 %
10307	AAB	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, PUSC)	WiMAX	14.49	± 9.6 %
10308	AAB	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM, PUSC)	WiMAX	14.46	± 9.6 %
10309	AAB	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, 16QAM,AMC 2x3)	WiMAX	14.58	± 9.6 %
10310	AAB	IEEE 802.16e WiMAX (29:18, 10ms, 10MHz, QPSK, AMC 2x3	WiMAX	14.57	± 9.6 %
10311	AAB	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, QPSK)	LTE-FDD	6.06	± 9.6 %
10313	AAD	iDEN 1:3	iDEN	10.51	± 9.6 %
10314	AAD	iDEN 1:6	iDEN	13.48	± 9.6 %
10315	AAD	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc dc)	WLAN	1.71	± 9.6 %
10316	AAD	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc dc)	WLAN	8.36	± 9.6 %
10317	AAA	IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc dc)	WLAN	8.36	± 9.6 %
10352	AAA	Pulse Waveform (200Hz, 10%)	Generic	10.00	± 9.6 %
10353	AAA	Pulse Waveform (200Hz, 20%)	Generic	6.99	± 9.6 %
10354	AAA	Pulse Waveform (200Hz, 40%)	Generic	3.98	± 9.6 %
10355	AAA	Pulse Waveform (200Hz, 60%)	Generic	2.22	± 9.6 %
10356	AAA	Pulse Waveform (200Hz, 80%)	Generic	0.97	± 9.6 %
10387	AAA	QPSK Waveform, 1 MHz	Generic	5.10	± 9.6 %
10388	AAA	QPSK Waveform, 10 MHz	Generic	5.22	± 9.6 %
10396	AAA	64-QAM Waveform, 100 kHz	Generic	6.27	± 9.6 %
10399	AAA	64-QAM Waveform, 40 MHz	Generic	6.27	± 9.6 %
10400	AAD	IEEE 802.11ac WiFi (20MHz, 64-QAM, 99pc dc)	WLAN	8.37	± 9.6 %
10401	AAA	IEEE 802.11ac WiFi (40MHz, 64-QAM, 99pc dc)	WLAN	8.60	± 9.6 %
10402	AAA	IEEE 802.11ac WiFi (80MHz, 64-QAM, 99pc dc)	WLAN	8.53	± 9.6 %
10403	AAB	CDMA2000 (1xEV-DO, Rev. 0)	CDMA2000	3.76	± 9.6 %
10404	AAB	CDMA2000 (1xEV-DO, Rev. A)	CDMA2000	3.77	± 9.6 %
10406	AAD	CDMA2000, RC3, SO32, SCH0, Full Rate	CDMA2000	5.22	± 9.6 %
10410	AAA	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Sub=2,3,4,7,8,9)	LTE-TDD	7.82	± 9.6 %
10414	AAA	WLAN CCDF, 64-QAM, 40MHz	Generic	8.54	± 9.6 %
10415	AAA	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 99pc dc)	WLAN	1.54	± 9.6 %
10416	AAA	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 99pc dc)	WLAN	8.23	± 9.6 %
10417	AAA	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps, 99pc dc)	WLAN	8.23	± 9.6 %
10418	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc, Long)	WLAN	8.14	± 9.6 %
10419	AAA	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps, 99pc, Short)	WLAN	8.19	± 9.6 %
10422	AAA	IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK)	WLAN	8.32	± 9.6 %
10423	AAA	IEEE 802.11n (HT Greenfield, 43.3 Mbps, 16-QAM)	WLAN	8.47	± 9.6 %
10424	AAE	IEEE 802.11n (HT Greenfield, 72.2 Mbps, 64-QAM)	WLAN	8.40	± 9.6 %
10425	AAE	IEEE 802.11n (HT Greenfield, 15 Mbps, BPSK)	WLAN	8.41	± 9.6 %
10426	AAE	IEEE 802.11n (HT Greenfield, 90 Mbps, 16-QAM)	WLAN	8.45	± 9.6 %

In Collaboration with
s p e a g
CALIBRATION LABORATORY

CAICT

Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2117
E-mail: emf@caict.ac.cn http://www.caict.ac.cn

10427	AAB	IEEE 802.11n (HT Greenfield, 150 Mbps, 64-QAM)	WLAN	8.41	± 9.6 %
10430	AAB	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1)	LTE-FDD	8.28	± 9.6 %
10431	AAC	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1)	LTE-FDD	8.38	± 9.6 %
10432	AAB	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1)	LTE-FDD	8.34	± 9.6 %
10433	AAC	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1)	LTE-FDD	8.34	± 9.6 %
10434	AAG	W-CDMA (BS Test Model 1, 64 DPCH)	WCDMA	8.60	± 9.6 %
10435	AAA	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10447	AAA	LTE-FDD (OFDMA, 5 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.56	± 9.6 %
10448	AAA	LTE-FDD (OFDMA, 10 MHz, E-TM 3.1, Clippin 44%)	LTE-FDD	7.53	± 9.6 %
10449	AAC	LTE-FDD (OFDMA, 15 MHz, E-TM 3.1, Cliping 44%)	LTE-FDD	7.51	± 9.6 %
10450	AAA	LTE-FDD (OFDMA, 20 MHz, E-TM 3.1, Clipping 44%)	LTE-FDD	7.48	± 9.6 %
10451	AAA	W-CDMA (BS Test Model 1, 64 DPCH, Clipping 44%)	WCDMA	7.59	± 9.6 %
10453	AAC	Validation (Square, 10ms, 1ms)	Test	10.00	± 9.6 %
10456	AAC	IEEE 802.11ac WiFi (160MHz, 64-QAM, 99pc dc)	WLAN	8.63	± 9.6 %
10457	AAC	UMTS-FDD (DC-HSDPA)	WCDMA	6.62	± 9.6 %
10458	AAC	CDMA2000 (1xEV-DO, Rev. B, 2 carriers)	CDMA2000	6.55	± 9.6 %
10459	AAC	CDMA2000 (1xEV-DO, Rev. B, 3 carriers)	CDMA2000	8.25	± 9.6 %
10460	AAC	UMTS-FDD (WCDMA, AMR)	WCDMA	2.39	± 9.6 %
10461	AAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10462	AAC	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 16-QAM, UL Sub)	LTE-TDD	8.30	± 9.6 %
10463	AAD	LTE-TDD (SC-FDMA, 1 RB, 1.4 MHz, 64-QAM, UL Sub)	LTE-TDD	8.56	± 9.6 %
10464	AAD	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10465	AAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10466	AAC	LTE-TDD (SC-FDMA, 1 RB, 3 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	± 9.6 %
10467	AAA	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10468	AAF	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10469	AAD	LTE-TDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM, UL Sub)	LTE-TDD	8.56	± 9.6 %
10470	AAD	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10471	AAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10472	AAC	LTE-TDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	± 9.6 %
10473	AAA	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, QPSK, UL Sub)	LTE-TDD	7.82	± 9.6 %
10474	AAC	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10475	AAD	LTE-TDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	± 9.6 %
10477	AAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM, UL Sub)	LTE-TDD	8.32	± 9.6 %
10478	AAC	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM, UL Sub)	LTE-TDD	8.57	± 9.6 %
10479	AAC	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK, UL Sub)	LTE-TDD	7.74	± 9.6 %
10480	AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM, UL Sub)	LTE-TDD	8.18	± 9.6 %
10481	AAA	LTE-TDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM, UL Sub)	LTE-TDD	8.45	± 9.6 %
10482	AAA	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, QPSK, UL Sub)	LTE-TDD	7.71	± 9.6 %
10483	AAA	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 16-QAM, Sub)	LTE-TDD	8.39	± 9.6 %
10484	AAB	LTE-TDD (SC-FDMA, 50% RB, 3 MHz, 64-QAM, UL Sub)	LTE-TDD	8.47	± 9.6 %
10485	AAB	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, QPSK, UL Sub)	LTE-TDD	7.59	± 9.6 %
10486	AAB	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM, UL Sub)	LTE-TDD	8.38	± 9.6 %
10487	AAC	LTE-TDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM, UL Sub)	LTE-TDD	8.60	± 9.6 %
10488	AAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, QPSK, UL Sub)	LTE-TDD	7.70	± 9.6 %
10489	AAC	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM, UL Sub)	LTE-TDD	8.31	± 9.6 %
10490	AAF	LTE-TDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM, UL Sub)	LTE-TDD	8.54	± 9.6 %
10491	AAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, QPSK, UL Sub)	LTE-TDD	7.74	± 9.6 %
10492	AAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM, UL Sub)	LTE-TDD	8.41	± 9.6 %
10493	AAF	LTE-TDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM, UL Sub)	LTE-TDD	8.55	± 9.6 %
10494	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK, UL Sub)	LTE-TDD	7.74	± 9.6 %
10495	AAF	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM, UL Sub)	LTE-TDD	8.37	± 9.6 %
10496	AAE	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM, UL Sub)	LTE-TDD	8.54	± 9.6 %
10497	AAE	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK, UL Sub)	LTE-TDD	7.67	± 9.6 %
10498	AAE	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM, UL Sub)	LTE-TDD	8.40	± 9.6 %
10499	AAC	LTE-TDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM, UL Sub)	LTE-TDD	8.68	± 9.6 %
10500	AAF	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, QPSK, UL Sub)	LTE-TDD	7.67	± 9.6 %
10501	AAF	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM, UL Sub)	LTE-TDD	8.44	± 9.6 %
10502	AAB	LTE-TDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM, UL Sub)	LTE-TDD	8.52	± 9.6 %