

FCC SAR REPORT

Report No.: JYTSZ-R14-2300174

Applicant: TECNO MOBILE LIMITED

Address of Applicant: FLAT N 16/F BLOCK B UNIVERSAL INDUSTRIAL CENTRE
19-25 SHAN MEI STREET FOTAN NT HONGKONG

Equipment Under Test (EUT)

Product Name: Mobile Phone

Model No.: CL6s


Trade mark: TECNO

FCC ID: 2ADYY-CL6S

Applicable standards: FCC 47 CFR Part 2.1093

Date of Test: 13 Dec., 2023

Test Result: Maximum Reported 1-g SAR (W/kg)
Head: 1.117 Body: 0.958 Hotspot: 1.192

Project by:	 Eric Wang	Date:	05 Jan., 2023
Reviewed by:	Heta Zhang	Date:	05 Jan., 2023
Approved by:	James Wei Manager	Date:	05 Jan., 2023

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2 Version

Version No.	Date	Description
<i>00</i>	<i>05 Jan., 2023</i>	<i>Original</i>

3 Contents

1	COVER PAGE	1
2	VERSION	2
3	CONTENTS	3
4	SAR RESULTS SUMMARY	5
5	GENERAL INFORMATION	7
5.1	CLIENT INFORMATION.....	7
5.2	GENERAL DESCRIPTION OF EUT	7
5.3	MAXIMUM RF OUTPUT POWER	9
5.4	ENVIRONMENT OF TEST SITE	11
5.5	TEST SAMPLE PLAN	11
5.6	LABORATORY FACILITY.....	11
5.7	TEST LOCATION	11
6	INTRODUCTION	12
6.1	INTRODUCTION	12
6.2	SAR DEFINITION.....	12
7	RF EXPOSURE LIMITS	13
7.1	UNCONTROLLED ENVIRONMENT.....	13
7.2	CONTROLLED ENVIRONMENT	13
7.3	RF EXPOSURE LIMITS.....	13
8	SAR MEASUREMENT SYSTEM	14
8.1	E-FIELD PROBE.....	15
8.2	DATA ACQUISITION ELECTRONICS (DAE).....	15
8.3	ROBOT	16
8.4	MEASUREMENT SERVER	16
8.5	LIGHT BEAM UNIT.....	16
8.6	PHANTOM.....	17
8.7	DEVICE HOLDER.....	18
8.8	DATA STORAGE AND EVALUATION	19
8.9	TEST EQUIPMENT LIST	21
9	TISSUE SIMULATING LIQUIDS	22
10	SAR SYSTEM VERIFICATION	24
11	EUT TESTING POSITION	26
11.1	HANDSET REFERENCE POINTS	26
11.2	POSITIONING FOR CHEEK / TOUCH	27
11.3	POSITIONING FOR EAR / 150 TILT.....	27
11.4	SAR EVALUATIONS NEAR THE MOUTH/JAW REGIONS OF THE SAM PHANTOM	28
11.5	BODY WORN ACCESSORY CONFIGURATIONS.....	28
11.6	WIRELESS ROUTER (HOTSPOT) CONFIGURATIONS	29
12	MEASUREMENT PROCEDURES	30
12.1	SPATIAL PEAK SAR EVALUATION	30
12.2	POWER REFERENCE MEASUREMENT.....	31
12.3	AREA & ZOOM SCAN PROCEDURES.....	31
12.4	VOLUME SCAN PROCEDURES	32
12.5	SAR AVERAGED METHODS	32
12.6	POWER DRIFT MONITORING	32
13	CONDUCTED RF OUTPUT POWER	33
14	EXPOSURE POSITIONS CONSIDERATION	37
14.1	EUT ANTENNA LOCATIONS.....	37
14.2	TEST POSITIONS CONSIDERATION	38
15	SAR TEST RESULTS SUMMARY	39
15.1	STANDALONE HEAD SAR DATA.....	39
15.2	STANDALONE BODY SAR	41
15.3	BODY SAR IN HOTSPOT MODE	42
15.4	SPOT-CHEEK SAR MEASUREMENT	43

15.5 MULTI-BAND SIMULTANEOUS TRANSMISSION CONSIDERATIONS.....44

15.6 SAR SIMULTANEOUS TRANSMISSION ANALYSIS.....45

15.7 MEASUREMENT UNCERTAINTY.....46

15.8 MEASUREMENT CONCLUSION47

16 REFERENCE..... 48

APPENDIX A: PLOTS OF SAR SYSTEM CHECK49

APPENDIX B: PLOTS OF SAR TEST DATA53

4 SAR Results Summary

This report is revised according to the JYTSZ-R12-230164 report, FCC ID: 2ADYY-CL6 issued by JianYan Testing Group Shenzhen Co., Ltd. Differences: Add bands 13 and 26 by modifying software and changing component suppliers for U3220, U3204, U3228, so need to retest LTE Band13/26, spot-check worst mode.

The maximum results of Specific Absorption Rate (SAR) found during test as below:
 <Highest Reported standalone SAR Summary>

Exposure Position	Frequency Band	Reported 1-g SAR (W/kg)	Equipment Class	Highest Reported 1-g SAR (W/kg)
Head	GSM 850	1.032	PCE	1.117
	PCS 1900	1.117		
	WCDMA Band II	0.817		
	WCDMA Band IV	0.723		
	WCDMA Band V	0.755		
	LTE Band 2	0.792		
	LTE Band 5	0.728		
	LTE Band 7	0.817		
	LTE Band 12(17)	0.447		
	LTE Band 13	0.550		
	LTE Band 26	0.712		
	LTE Band 40(2305-2315)	0.911		
	LTE Band 40(2350-2360)	0.351		
	LTE Band 41(38)	0.773		
	LTE Band 66(4)	0.759		
	WLAN 2.4 GHz	0.260	DTS	
	Bluetooth	0.011	DSS	
	BLE	0.033	DTS	
	WLAN 5.2 GHz	0.440	NII	
WLAN 5.8 GHz	0.330			
Body (10 mm Gap)	GSM 850	0.567	PCE	0.958
	PCS 1900	0.958		
	WCDMA Band II	0.309		
	WCDMA Band IV	0.222		
	WCDMA Band V	0.436		
	LTE Band 2	0.200		
	LTE Band 5	0.313		
	LTE Band 7	0.523		
	LTE Band 12(17)	0.164		
	LTE Band 13	0.177		
	LTE Band 26	0.228		
	LTE Band 40(2305-2315)	0.169		
	LTE Band 40(2350-2360)	0.298		
	LTE Band 41(38)	0.548		
	LTE Band 66(4)	0.263		
	WLAN 2.4GHz	0.060	DTS	
	Bluetooth	0.006	DSS	
	BLE	0.009	DTS	
	WLAN 5.2 GHz	0.150	NII	
WLAN 5.8 GHz	0.019			

Hotspot (10 mm Gap)	GSM 850	0.567	PCE	1.192	
	PCS 1900	1.192			
	WCDMA Band II	0.339			
	WCDMA Band IV	0.263			
	WCDMA Band V	0.436			
	LTE Band 2	0.333			
	LTE Band 5	0.313			
	LTE Band 7	0.523			
	LTE Band 12(17)	0.164			
	LTE Band 13	0.177			
	LTE Band 26	0.228			
	LTE Band 40(2305-2315)	0.169			
	LTE Band 40(2350-2360)	0.298			
	LTE Band 41(38)	0.548			
	LTE Band 66(4)	0.307			
	WLAN 2.4 GHz	0.060			DTS
	Bluetooth	0.007			DSS
	BLE	0.007			DTS
WLAN 5.2 GHz	0.243	NII			
WLAN 5.8 GHz	0.155				

<Highest Reported simultaneous SAR Summary>

Exposure Position	Frequency Band	Reported 1-g SAR (W/kg)	Equipment Class	Highest Reported Simultaneous Transmission 1-g SAR (W/kg)
Hotspot Top (10 mm Gap)	WWAN	1.192	PCE	1.435
	WLAN 5.2 GHz	0.243	NII	
	NFC	0.00	DXX	

Note:

- The highest simultaneous transmission is scalar summation of Reported standalone SAR per FCC KDB 690783 D01 v01r03, and scalar SAR summation of all possible simultaneous transmission scenarios are < 1.6W/kg.
- This device is compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-2005, and had been tested in accordance with the measurement methods and procedures specified in IEC/IEEE 62209-1528:2020.
- For FDD-LTE Band 17 is full covered by FDD-LTE Band 12, so only FDD-LTE Band 12 was tested.
- For FDD-LTE Band 4 is full covered by FDD-LTE Band 66, so only FDD-LTE Band 66 was tested.
- For TDD-LTE Band 38 is full covered by TDD-LTE Band 41, so only TDD-LTE Band 41 was tested.

5 General Information

5.1 Client Information

Applicant:	TECNO MOBILE LIMITED
Address:	FLAT N 16/F BLOCK B UNIVERSAL INDUSTRIAL CENTRE 19-25 SHAN MEI STREET FOTAN NT HONGKONG
Manufacturer	TECNO MOBILE LIMITED
Address:	FLAT N 16/F BLOCK B UNIVERSAL INDUSTRIAL CENTRE 19-25 SHAN MEI STREET FOTAN NT HONGKONG
Factory:	SHENZHEN TECNO TECHNOLOGY CO., LTD.
Address:	101, Building 24, Waijing Industrial Park, Fumin Community, Fucheng Street, Longhua District, Shenzhen City, P.R.China

5.2 General Description of EUT

Product Name:	Mobile Phone			
Model No.:	CL6s			
Category of device	Portable device			
Operation Frequency:	GSM:	GSM850: 824.2~848.8 MHz	PCS 1900: 1850.2~1909.8 MHz	
	WCDMA:	Band II: 1852.4~1907.6 MHz	Band V: 826.4~846.6 MHz	
		Band IV: 1712.4~1752.6 MHz		
	LTE:	Band 2:1850MHz~1910MHz	Band 4:1710MHz~1755MHz	
		Band 5:824MHz~849MHz	Band 7: 2500MHz~2570MHz	
		Band 12: 699MHz~716MHz	Band 13: 777MHz~787MHz	
		Band 17: 704MHz~716MHz	Band 26: 814MHz~849MHz	
		Band 38: 2570MHz~2620MHz	Band 40 : 2305MHz-2315MHz	
		Band 40 : 2350MHz-2360MHz	Band 41: 2535MHz~2655MHz	
	Wi-Fi:	2412MHz~2462MHz	5150MHz-5250MHz	
5725MHz-5850MHz				
Bluetooth: 2402 MHz ~ 2480 MHz				
NFC:13.56MHz				
Modulation technology:	GSM:	<input checked="" type="checkbox"/> Voice(GMSK) <input checked="" type="checkbox"/> GPRS(GMSK) <input checked="" type="checkbox"/> EGPRS(GMSK, 8PSK)		
	WCDMA:	<input checked="" type="checkbox"/> RMC(QPSK) <input checked="" type="checkbox"/> HSUPA(QPSK) <input checked="" type="checkbox"/> HSDPA(QPSK, 16QAM)		
	LTE:	<input checked="" type="checkbox"/> QPSK <input checked="" type="checkbox"/> 16QAM <input checked="" type="checkbox"/> 64QAM		
	Wi-Fi:	<input checked="" type="checkbox"/> 802.11b(DSSS) <input checked="" type="checkbox"/> 802.11a/g/n/ac (OFDM)		
	Bluetooth:	<input checked="" type="checkbox"/> BDR(GFSK) <input checked="" type="checkbox"/> EDR(π /4-DQPSK, 8DPSK) <input checked="" type="checkbox"/> LE(GFSK)		
	NFC:	<input checked="" type="checkbox"/> ASK		
Antenna Type:	Internal Antenna			
Antenna Gain:	GSM 850:	-4.50 dBi	PCS 1900:	-3.77 dBi
	WCDMA Band II:	-3.77 dBi	WCDMA Band V	-4.50 dBi
	WCDMA Band IV:	-3.09 dBi		
	LTE Band 2:	-3.77 dBi	LTE Band 4	-3.09 dBi
	LTE Band 5:	-4.50 dBi	LTE Band 7:	-7.79 dBi

	LTE Band 12:	-5.78 dBi	LTE Band 13:	-5.78 dBi
	LTE Band 17:	-5.78 dBi	LTE Band 26:	-5.78 dBi
	LTE Band 38:	-7.79 dBi	LTE Band 40:	-5.84 dBi
	LTE Band 41:	-7.79 dBi	LTE Band 66:	-3.09 dBi
	Bluetooth ANT12:	-2.41 dBi	Bluetooth ANT14:	-4.51 dBi
	2.4G Wi-Fi ANT12:	-2.41 dBi	2.4G Wi-Fi ANT14:	-4.51 dBi
	5G Wi-Fi ANT12:	-1.82 dBi	5G Wi-Fi ANT14:	-4.31 dBi
(E)GPRS Class:	(E)GPRS Class: 12			
Dimensions (L*W*H):	166 mm (L)× 76 mm (W)× 8 mm (H)			
Accessories information:	Adapter: Model: U700TSA Input: AC100-240V, 50/60Hz, 2.0A Output: DC 5.0V, 3.0A 15.0W or 5.0V-10V, 7.0A or 11.0V, 6.4A or 4.0V-20.0V, 3.5A 70.0W		Battery: Rechargeable Li-ion Battery 3.91V/4900mAh	
			Headset: Support headset(Shipped without)	

5.3 Maximum RF Output Power

Mode	Average Power (dBm)	
	GSM 850	PCS 1900
GSM (Voice)	33.55	29.58
GPRS (1 TX Slot)	33.52	29.51
GPRS (2 TX Slots)	32.54	28.77
GPRS (3 TX Slots)	30.50	27.05
GPRS (4 TX Slots)	29.40	25.91
EGPRS (1 TX Slot)	27.75	25.70
EGPRS (2 TX Slots)	26.63	24.72
EGPRS (3 TX Slots)	24.53	22.84
EGPRS (4 TX Slots)	23.24	21.66

Mode	Average Power (dBm)		
	WCDMA Band II	WCDMA Band IV	WCDMA Band V
AMR 12.2 kbps	23.02	23.98	23.50
RMC 12.2 kbps	23.06	23.99	23.49
HSDPA Sub-test 1	22.07	22.97	22.52
HSDPA Sub-test 2	21.48	22.50	22.00
HSDPA Sub-test 3	21.48	22.50	22.00
HSDPA Sub-test 4	21.50	22.44	21.97
HSUPA Sub-test 1	21.02	22.04	21.58
HSUPA Sub-test 2	21.55	22.53	22.03
HSUPA Sub-test 3	22.01	22.96	22.55
HSUPA Sub-test 4	21.07	22.06	21.59
HSUPA Sub-test 5	23.01	24.03	23.57

Mode	Average Power (dBm)							
	LTE Band 2	LTE Band 5	LTE Band 7	LTE Band 12	LTE Band 40 (2305-2315)	LTE Band 40 (2350-2360)	LTE Band 41	LTE Band 66
BW/1.4 MHz	22.85	23.16	/	23.69	/	/	/	23.39
BW/3.0 MHz	22.70	22.96	/	23.59	/	/	/	23.30
BW/5.0 MHz	23.03	23.30	23.11	23.89	22.58	23.32	23.09	23.66
BW/10 MHz	22.97	23.28	23.06	23.73	22.81	23.15	23.09	23.59
BW/15 MHz	23.01	/	22.63	/	/	/	23.20	23.61
BW/20 MHz	22.95	/	22.75	/	/	/	23.11	23.74

Mode	Average Power (dBm)	
	LTE Band 13	LTE Band 26
BW/1.4 MHz	/	23.94
BW/3.0 MHz	/	23.79
BW/5.0 MHz	24.71	24.11
BW/10 MHz	24.70	23.97
BW/15 MHz	/	24.12
BW/20 MHz	/	/

ANT12

WLAN 2.4 GHz Band Average Power (dBm)				
Mode/Band	b	g	n (HT-20)	n (HT-40)
WLAN 2.4GHz	17.72	14.51	14.36	13.24

WLAN 5.2 GHz Band Average Power (dBm)						
Mode/Band	a	ac 20	ac 40	ac 80	n 20	n 40
WLAN 5.2GHz	13.40	13.26	11.48	11.58	13.29	13.24

WLAN 5.8 GHz Band Average Power (dBm)						
Mode/Band	a	ac 20	ac 40	ac 80	n 20	n 40
WLAN 5.8GHz	13.90	13.74	12.22	12.22	13.62	12.88

Bluetooth Average Power (dBm)							
Mode/Band	1 Mbps (GFSK)	2 Mbps ($\pi/4$ DQPSK)	3 Mbps (8DPSK)	BLE PHY 1M	BLE PHY 2M	BLE Coded PHY S=2	BLE Coded PHY S=8
Bluetooth	3.99	3.26	2.88	5.26	5.26	5.24	5.22

ANT14

WLAN 2.4 GHz Band Average Power (dBm)				
Mode/Band	b	g	n (HT-20)	n (HT-40)
WLAN 2.4GHz	17.21	14.20	13.92	13.34

WLAN 5.2 GHz Band Average Power (dBm)						
Mode/Band	a	ac 20	ac 40	ac 80	n 20	n 40
WLAN 5.2GHz	13.76	13.41	11.47	11.75	13.60	13.36

WLAN 5.8 GHz Band Average Power (dBm)						
Mode/Band	a	ac 20	ac 40	ac 80	n 20	n 40
WLAN 5.8GHz	13.56	13.26	11.32	11.28	13.18	12.84

Bluetooth Average Power (dBm)							
Mode/Band	1 Mbps (GFSK)	2 Mbps ($\pi/4$ DQPSK)	3 Mbps (8DPSK)	BLE PHY 1M	BLE PHY 2M	BLE Coded PHY S=2	BLE Coded PHY S=8
Bluetooth	3.32	2.65	2.52	4.49	4.49	4.48	4.45

NFC Band Average Power (dBm)	
Mode/Band	ASK
NFC	-60.31

Please refer to FCC ID: 2ADYY-CL6, report No. JYTSZ-R14- 2300164.

5.4 Environment of Test Site

Temperature:	18°C ~25 °C
Humidity:	35%~75% RH
Atmospheric Pressure:	1010 mbar

5.5 Test Sample Plan

Sample Number	Used for Test Items
SZR012300627-3	SAR
<i>Remark: JianYan Testing Group Shenzhen Co., Ltd. is only responsible for the test project data of the above samples, and will keep the above samples for a month.</i>	

5.6 Laboratory Facility

<p>The test facility is recognized, certified, or accredited by the following organizations:</p> <ul style="list-style-type: none"> ● FCC - Designation No.: CN1211 JianYan Testing Group Shenzhen Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551. ● ISED – CAB identifier.: CN0021 The 3m Semi-anechoic chamber and 10m Semi-anechoic chamber of JianYan Testing Group Shenzhen Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1. ● CNAS - Registration No.: CNAS L15527 JianYan Testing Group Shenzhen Co., Ltd. is accredited to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L15527. ● A2LA - Registration No.: 4346.01 This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: https://portal.a2la.org/scopepdf/4346-01.pdf
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5.7 Test Location

<p>JianYan Testing Group Shenzhen Co., Ltd. No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, People's Republic of China. Tel: +86-755-23118282, Fax: +86-755-23116366 Email: info-JYTee@lets.com, Website: http://jyt.lets.com</p>
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6 Introduction

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:

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

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

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

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

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

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

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength. However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

7 RF Exposure Limits

7.1 Uncontrolled Environment

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

7.2 Controlled Environment

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

7.3 RF Exposure Limits

SAR Human Exposure Specified in ANSI/IEEE C95.1-1992 and Health Canada Safety Code 6

HUMAN EXPOSURE LIMITS		
	UNCONTROLLED ENVIRONMENT <i>General Population</i> (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT <i>Occupational</i> (W/kg) or (mW/g)
SPATIAL PEAK SAR Brain	1.6	8.0
SPATIAL AVERAGE SAR Whole Body	0.08	0.4
SPATIAL PEAK SAR Hands, Feet, Ankles, Wrists	4.0	20

Note:

1. The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
2. The Spatial Average value of the SAR averaged over the whole body.
3. The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

8 SAR Measurement System

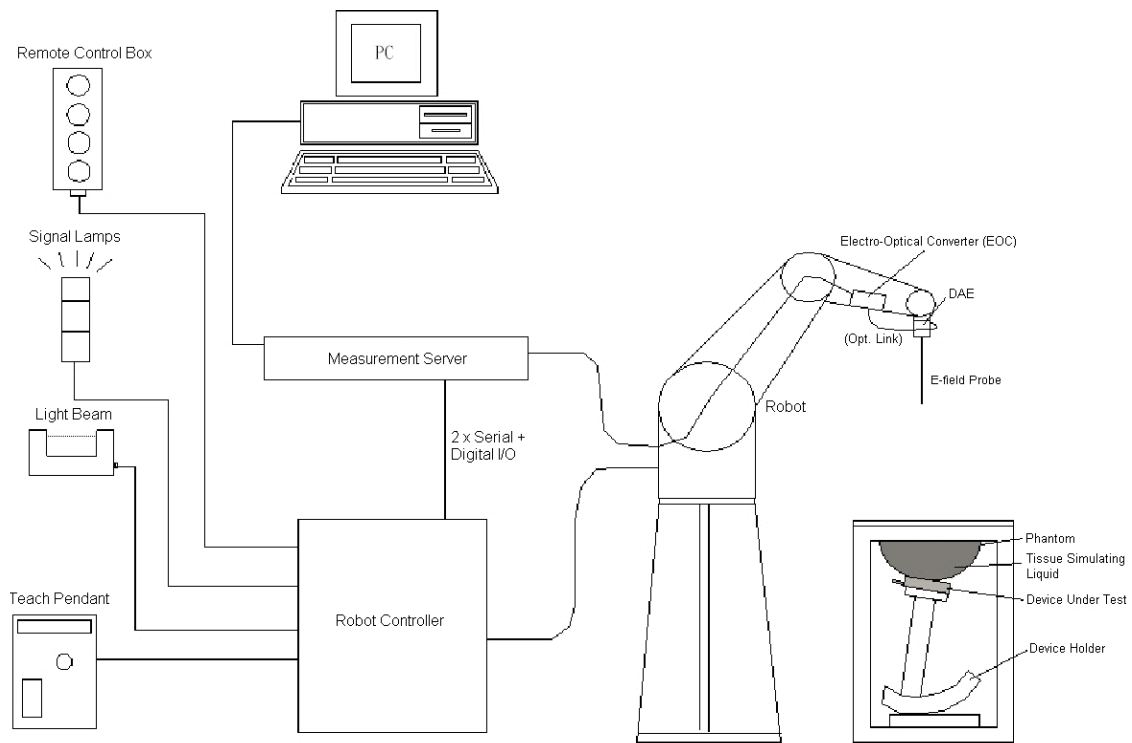


Fig. 8.1 SPEAG DASY System Configurations

The DASY system for performance compliance tests is illustrated above graphically. This system consists of the following items:

- A standard high precision 6-axis robot with controller, a teach pendant and software
- A data acquisition electronic (DAE) attached to the robot arm extension
- A dosimetric probe equipped with an optical surface detector system
- The electro-optical converter (EOC) performs the conversion between optical and electrical signals
- A measurement server performs the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the accuracy of the probe positioning
- A computer operating Windows XP
- DASY software
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom
- A device holder
- Tissue simulating liquid
- Dipole for evaluating the proper functioning of the system

Component details are described in the following sub-sections.

8.1 E-Field Probe

The SAR measurement is conducted with the dosimetric probe (manufactured by SPEAG). The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. This probe has a built in optical surface detection system to prevent from collision with phantom.

➤ **E-Field Probe Specification**
<EX3DV4 Probe>


Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency Directivity	10 MHz to 6 GHz; Linearity: ± 0.2 dB ± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)	
Dynamic Range	10 µW/g to 100 mW/g; Linearity: ± 0.2 dB (noise: typically < 1 µW/g)	
Dimensions	Overall length: 330 mm (Tip: 20mm) Tip diameter: 2.5 mm (Body: 12mm) Typical distance from probe tip to dipole centers: 1 mm	

Fig. 8.2 Photo of E-Field Probe

➤ **E-Field Probe Calibration**

Each probe needs to be calibrated according to a dosimetric assessment procedure with accuracy better than ± 10%. The spherical isotropy shall be evaluated and within ± 0.25 dB. The sensitivity parameters (Norm X, Norm Y and Norm Z), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested. The calibration data can be referred to appendix E of this report.

8.2 Data Acquisition Electronics (DAE)

The Data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock. The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.




Fig. 8.3 Photo of DAE

8.3 Robot

The SPEAG DASY system uses the high precision robots (DASY5: TX60L) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version (DASY5: CS8c) from Stäubli is used. The Stäubli robot series have many features that are important for our application:

- High precision (repeatability 0.02 mm)
- High reliability (industrial design)
- Low maintenance costs (virtually maintenance free due to direct drive gears; nobelt drives)
- Jerk-free straight movements
- Low ELF interference (motor control fields shielded via the closed metallic construction shields)



Fig. 8.4 Photo of Robot

8.4 Measurement Server

The measurement server is based on a PC/104 CPU board with CPU (DASY 5: 400MHz, Intel Celeron), chip-disk (DASY5: 128 MB), RAM (DASY5: 128 MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY I/O board, which is directly connected to the PC/104 bus of the CPU board. The measurement server performs all the real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operations.



Fig. 8.5 Photo of Server for DASY5

8.5 Light Beam Unit

The light beam switch allows automatic "tooling" of the probe. During the process, the actual position of the probe tip with respect to the robot arm is measured, as well as the probe length and the horizontal probe offset. The software then corrects all movements, such that the robot coordinates are valid for the probe tip. The repeatability of this process is better than 0.1 mm. If a position has been taught with an aligned probe, the same position will be reached with another aligned probe within 0.1 mm, even if the other probe has different dimensions. During probe rotations, the probe tip will keep its actual position.



Fig. 8.6 Photo of Light Beam

8.6 Phantom

<SAM Twin Phantom>

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



Fig. 8.7 Photo of SAM Twin Phantom

The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

<ELI4 Phantom >

The ELI4 phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30MHz to 6 GHz. ELI4 is fully compatible with the latest draft of the standard IEC 62209-2 and all known tissue simulating liquids.

ELI4 has been optimized regarding its performance and can be integrated into a SPEAG standard phantom table. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom can be used with the following tissue simulating liquids:

- Water-sugar based liquids can be left permanently in the phantom. Always cover the liquid if the system is not in use; otherwise the parameters will change due to water evaporation.
- DGBE based liquids should be used with care. As DGBE is a softener for most plastics, the liquid should be taken out of the phantom and the phantom should be dried when the system is not in use (desirable at least once a week).
- Do not use other organic solvents without previously testing the phantom resistiveness

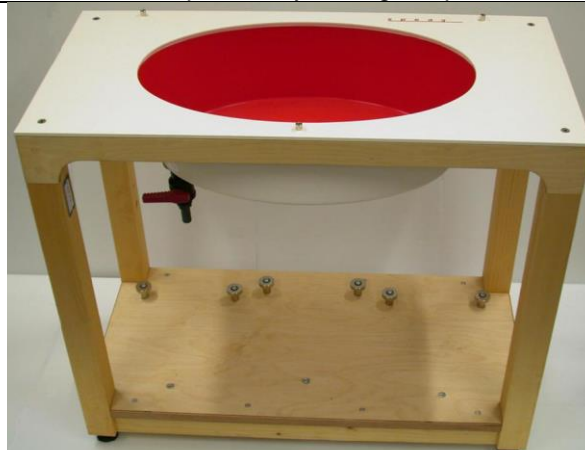


Fig.8.8 Photo of ELI4 Phantom

8.7 Device Holder

<Device Holder for SAM Twin 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 5 mm distance, a positioning uncertainty of ± 0.5 mm 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 different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation center 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-low POM material having the following dielectric parameters: relative permittivity $\epsilon = 3$ and loss tangent $\delta = 0.02$. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.



Fig. 8.9 Photo of Device Holder

8.8 Data storage and Evaluation

➤ Data Storage

The DASY software stores the assessed data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all the necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files. The post-processing software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verifications of the complete software setup even after the measurement and allows correction of erroneous parameter settings. For example, if a measurement has been performed with an incorrect crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be reevaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type (e.g., [V/m], [mW/g]). Some of these units are not available in certain situations or give meaningless results, e.g., a SAR-output in a non-lose media, will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

➤ Data Evaluation

The DASY post-processing software (SEMCAD) automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe Parameters:	- Sensitivity	Norm _i , a _{i0} , a _{i1} , a _{i2}
	- Conversion	ConvF _i
	- Diode compression point	dcp _i
Device Parameters:	- Frequency	f
	- Crest	cf
Media Parameters:	- Conductivity	σ
	- Density	ρ

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multi-meter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power.

The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}$$

With V_i = compensated signal of channel i, (i = x, y, z)
 U_i = input signal of channel i, (i = x, y, z)
 cf = crest factor of exciting field (DASY parameter)
 dcp_i = diode compression point (DASY parameter)

From the compensated input signals, the primary field data for each channel can be evaluated:

$$\text{E- Field Probes: } E_i = \sqrt{\frac{V_i}{\text{Norm}_i \cdot \text{ConvF}}}$$

$$\text{H-Field Probes: } H_i = \sqrt{V_i} \cdot \frac{a_{i0} + a_{i1}f + a_{i2}f^2}{f}$$

With V_i = compensated signal of channel i, (i = x, y, z)
 Norm_i = sensor sensitivity of channel i, (i = x, y, z), $\mu\text{V}/(\text{V/m})^2$
 ConvF = sensitivity enhancement in solution
 a_{ij} = sensor sensitivity factors for H-field probes
 f = carrier frequency (GHz)
 E_i = electric field strength of channel i in V/m
 H_i = magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}$$

The primary field data are used to calculate the derived field units.

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1000}$$

With SAR = local specific absorption rate in mW/g
 E_{tot} = total field strength in V/m
 σ = conductivity in (mho/m) or (Siemens/m)
 ρ = equipment tissue density in g/cm^3

Note that the density is set to 1, to account for actual head tissue density rather than the density of the tissue simulating liquid.

8.9 Test Equipment List

Manufacturer	Equipment Description	Model	Management Number	Cal. Information	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	WXJ023	05.18.2023	05.17.2024
SPEAG	835MHz System Validation Kit	D835V2	WXJ023-1	06.08.2022	06.07.2025
SPEAG	1900MHz System Validation Kit	D1900V2	WXJ023-2	06.07.2022	06.06.2025
SPEAG	Data Acquisition Electronics	DAE4	WXJ021-1	05.17.2023	05.16.2024
SPEAG	Dosimetric E-Field Probe	EX3DV4	WXJ022	01.03.2023	01.02.2024
SPEAG	DASY 52 Measurement Software	DASY 52	Version 52.10.4.1527	N.C.R	N.C.R
SPEAG	DASY 52 File Conversion Software	SEMCAD X	Version 14.6.14 (7501)	N.C.R	N.C.R
SPEAG	Robot Controller	CS8Cspeag-TX60	WXG021-1	N.C.R	N.C.R
SPEAG	Phantom	Twin SAM Phantom	WXG021-4	N.C.R	N.C.R
SPEAG	Phantom	ELI V5.0	WXG021-5	N.C.R	N.C.R
SPEAG	Phone Positioner	N/A	WXG021-6	N.C.R	N.C.R
St?ubli	Robot	TX60Lspeag	WXG021-3	N.C.R	N.C.R
R&S	Broadband radio communication tester	CMW500	WXJ008-3	06.13.2023	06.12.2024
Anritsu	Universal Radio Communication Analyzer	MT8820C	WXJ008-5	01.10.2023	01.09.2025
R&S	Universal Radio Communication Tester	CMU200	WXJ008-2	03.30.2022	03.29.2024
KEYSIGHT	Network Analyzer	E5071C	WXJ091	01.10.2023	01.09.2024
KEYSIGHT	EPM Series Power Meter	N1914A	WXJ075	06.13.2023	06.12.2024
KEYSIGHT	E-Series Power Sensor	E9300H	WXJ075-1	06.13.2023	06.12.2024
KEYSIGHT	E-Series Power Sensor	E9300H	WXJ075-2	06.13.2023	06.12.2024
KEYSIGHT	Signal Generator	N5173B	WXJ006-3	09.25.2023	09.24.2024
Huber Suhner	RF Cable	SUCOFLEX	WXG008-13	See Note 3	
Huber Suhner	RF Cable	SUCOFLEX	WXG008-14	See Note 3	
Huber Suhner	RF Cable	SUCOFLEX	WXG008-15	See Note 3	
Weinschel	Attenuator	23-3-34	WXG008-16	See Note 3	
Anritsu	Directional Coupler	MP654A	WXG008-17	See Note 3	
SPEAG	Dielectric Assessment Kit	3.5 Probe	WXG008-7	See Note 4	
SPEAG	DAK Measurement Software	DAK	Version: DAK 3.5	N.C.R	
TXC	Broadband Amplifier	BBA018000	WXG008-11	See Note 5	

Note:

1. The calibration certificate of DASY can be referred to appendix C of this report.
2. Referring to KDB 865664 D01v01r04, the dipole calibration interval can be extended to 3 years with justification. The dipoles are also not physically damaged, or repaired during the interval.
3. The Insertion Loss calibration of Dual Directional Coupler and Attenuator were characterized via the network analyzer and compensated during system check.
4. The dielectric probe kit was calibrated via the network analyzer, with the specified procedure (calibrated in pure water) and calibration kit (standard) short circuit, before the dielectric measurement. The specific procedure and calibration kit are provided by Speag.
5. In system check we need to monitor the level on the spectrum analyzer, and adjust the power amplifier level to have precise power level to the dipole; the measured SAR will be normalized to 1 W input power according to the ratio of 1 W to the input power to the dipole. For system check, the calibration of the power amplifier is deemed not critically required for correct measurement; the spectrum analyzer is critical and we do have calibration for it
6. Attenuator insertion loss is calibrated by the network Analyzer, which the calibration is valid, before system check.
7. N.C.R means No Calibration Requirement.

9 Tissue Simulating Liquids

For the measurement of the field distribution inside the SAM phantom with DASY, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 9.1, for body SAR testing, the liquid height from the center of the flat phantom to liquid top surface is larger than 15 cm, which is shown in Fig. 9.2.

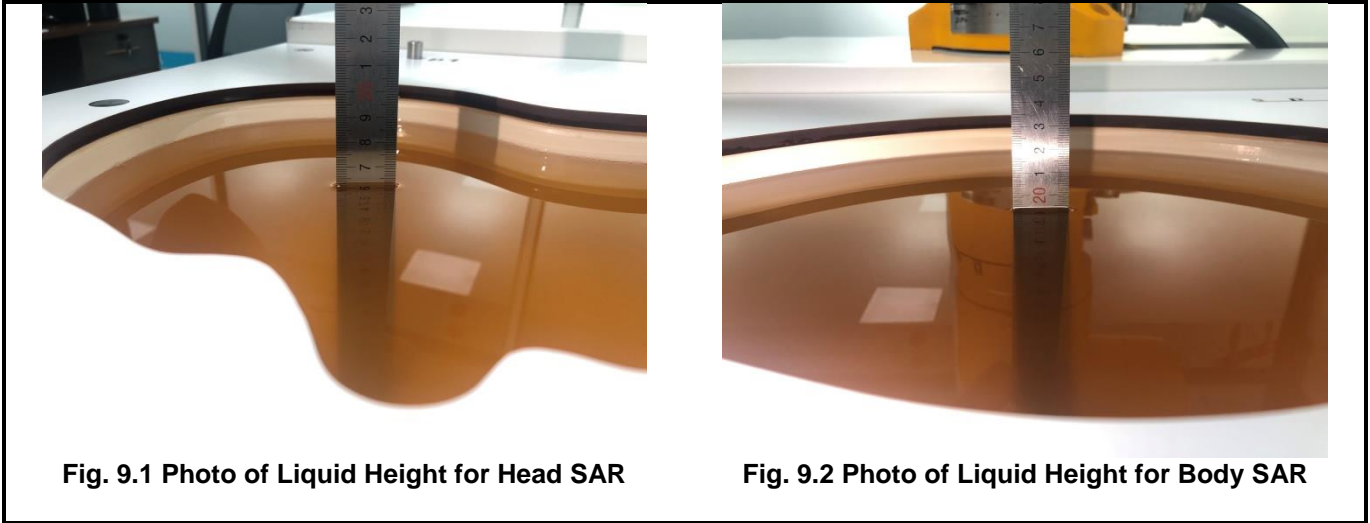


Fig. 9.1 Photo of Liquid Height for Head SAR

Fig. 9.2 Photo of Liquid Height for Body SAR

The relative permittivity and conductivity of the tissue material should be within $\pm 5\%$ of the values given in the table below recommended by the FCC OET 65 supplement C and RSS 102 Issue 5.

Target Frequency (MHz)	ϵ_r	σ (S/m)
150	52.3	0.76
300	45.3	0.87
450	43.5	0.87
835	41.5	0.90
900	41.5	0.97
915	41.5	0.98
1450	40.5	1.20
1610	40.3	1.29
1800-2000	40.0	1.40
2450	39.2	1.80
3000	38.5	2.40
5800	35.3	5.27

(ϵ_r = relative permittivity, σ = conductivity and $\rho = 1000 \text{ kg/m}^3$)

The dielectric parameters of liquids were verified prior to the SAR evaluation using a Speag Dielectric Probe Kit and an Agilent Network Analyzer.

The following table shows the measuring results for simulating liquid.

Frequency (MHz)	Liquid Temp. (°C)	Conductivity (σ)	Permittivity (ϵ_r)	Conductivity Target(σ)	Permittivity Target(ϵ_r)	Delta (σ)%	Delta (ϵ_r)%	Limit (%)	Date (mm/dd/yy)
750	21.9	0.89	40.65	0.89	41.90	0.00	-2.98	±5	12/13/2023
835	21.9	0.90	40.26	0.90	41.50	0.00	-2.99	±5	12/13/2023
1900	21.9	1.39	38.71	1.40	40.00	-0.71	-3.23	±5	12/13/2023

10 SAR System Verification

Each DASY system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the DASY software, enable the user to conduct the system performance check and system validation. System validation kit includes a dipole, tripod holder to fix it underneath the flat phantom and a corresponding distance holder.

➤ Purpose of System Performance check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results. The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

➤ System Setup

In the simplified setup for system evaluation, the EUT 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:

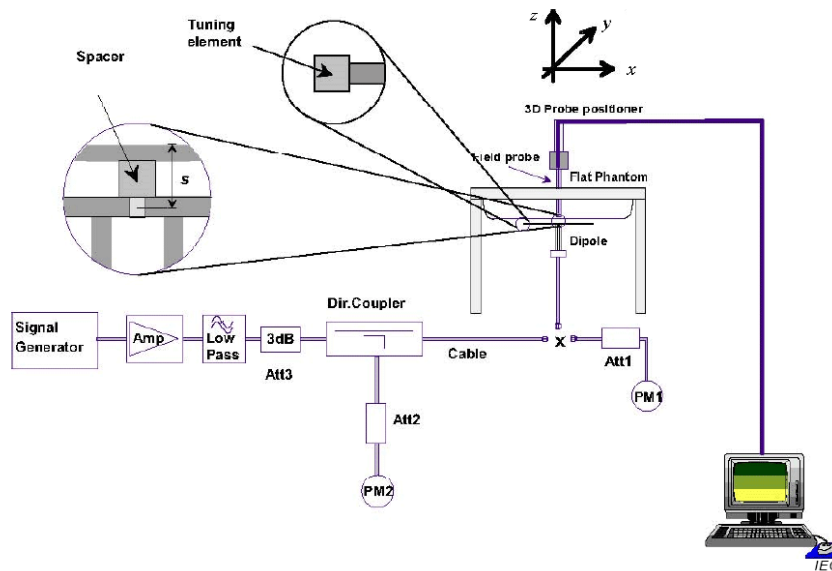


Fig.10.1 System Verification Setup Diagram

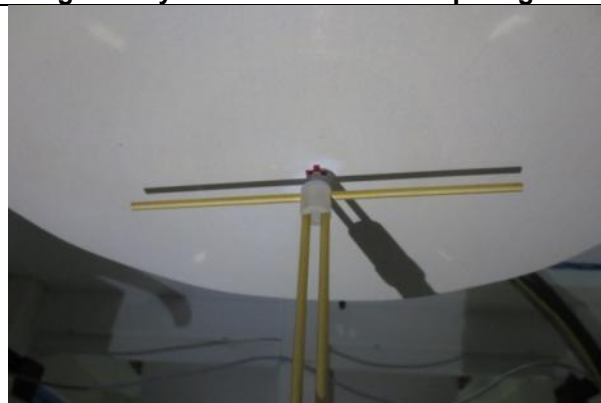


Fig.10.2 Photo of Dipole setup

➤

➤ **System Verification Results**

Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10%. The table as below indicates the system performance check can meet the variation criterion and the plots can be referred to Appendix C of this report.

Date (mm/dd/yy)	Frequency (MHz)	Power fed onto dipole (mW)	Measured 1g SAR (W/kg)	Normalized to 1W 1g SAR (W/kg)	1W Target 1g SAR (W/kg)	Deviation (%)
12/13/2023	750	80	0.693	8.66	8.55	1.29
12/13/2023	835	80	0.771	9.64	9.60	0.42
12/13/2023	1900	40	1.650	41.25	39.9	3.38

11 EUT Testing Position

This EUT was tested in nine different positions. They are right cheek/right tilted/left cheek/left tilted for head, Front/Back/Left Side/Right Side/Top Side of the EUT with phantom 10 mm gap, as illustrated below, please refer to Appendix B for the test setup photos.

11.1 Handset Reference Points

- The vertical centreline passes through two points on the front side of the handset – the midpoint of the width w_t of the handset at the level of the acoustic output, and the midpoint of the width w_b of the bottom of the handset.
- The horizontal line is perpendicular to the vertical centreline and passes the center of the acoustic output. The horizontal line is also tangential to the handset at point A.
- The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centreline is not necessarily parallel to the front face of the handset, especially for clamshell handsets, handsets with flip covers, and other irregularly shaped handsets.



Fig.11.1 Illustration for Front, Back and Side of SAM Phantom

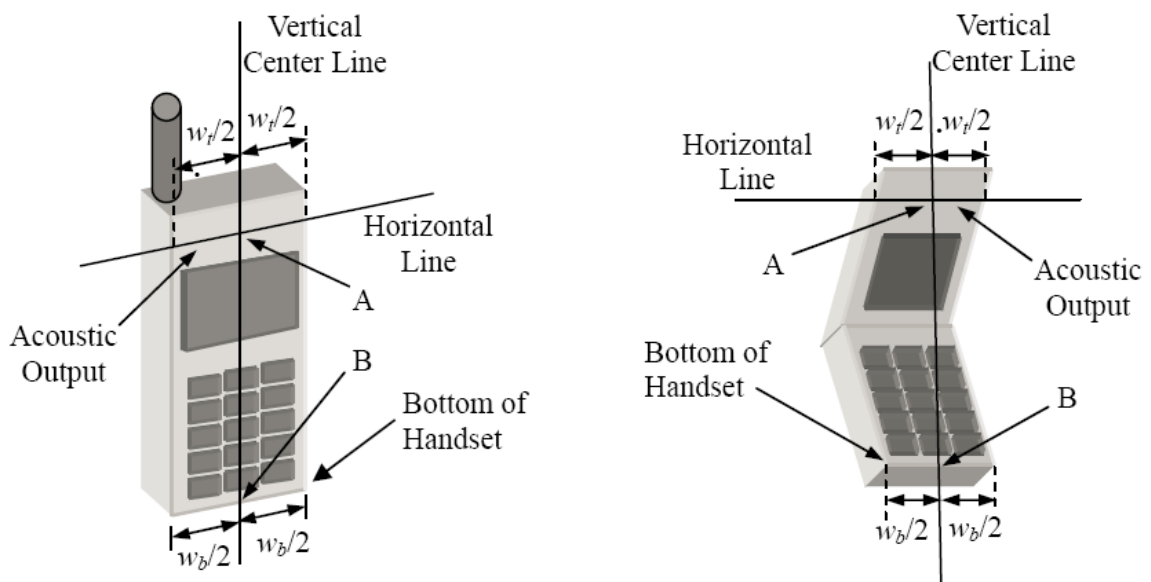


Fig. 11.2 Illustration for Handset Vertical and Horizontal Reference Lines

11.2 Positioning for Cheek / Touch

- To position the device with the vertical center line of the body of the device and the horizontal line crossing the center piece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, align the vertical center line with the reference plane containing the three ear and mouth reference point (M: Mouth, RE: Right Ear and LE: Left Ear) and align the center of the ear piece with the line RE-LE.
- To move the device towards the phantom with the ear piece aligned with the line LE-RE until the phone touched the ear. While maintaining the device in the reference plane and maintaining the phone contact with the ear, move the bottom of the phone until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost (see below figure)



Fig. 11.3 Illustration for Cheek Position

11.3 Positioning for Ear / 15o Tilt

- To position the device in the “cheek” position described above.
- While maintaining the device the reference plane described above and pivoting against the ear, moves it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost (see figure below).



Fig.11.4 Illustration for Tilted Position

11.4 SAR Evaluations near the Mouth/Jaw Regions of the SAM Phantom

Antennas located near the bottom of a phone may require SAR measurements around the mouth and jaw regions of the SAM head phantom. This typically applies to clam-shell style phones that are generally longer in the unfolded normal use positions or to certain older style long rectangular phones.

Under these circumstances, the following procedures apply, adopted from the FCC guidance on SAR handsets document FCC KDB Publication 648474 D04v01r03. The SAR required in these regions of SAM should be measured using a flat phantom. The phone should be positioned with a separation distance of 4 mm between the ear reference point (ERP) and the outer surface of the flat phantom shell. While maintaining this distance at the ERP location, the low (bottom) edge of the phone should be lowered from the phantom to establish the same separation distance between the peak SAR locations identified by the truncated partial SAR distribution measured with the SAM phantom. The distance from the peak SAR location to the phone is determined by the straight line passing perpendicularly through the phantom surface. When it is not feasible to maintain 4 mm separation at the ERP while also establishing the required separation at the peak SAR location, the top edge of the phone will be allowed to touch the phantom with a separation < 4 mm at the ERP. The phone should not be tilted to the left or right while placed in this inclined position to the flat phantom.

11.5 Body Worn Accessory Configurations

- To position the device parallel to the phantom surface with either keypad up or down.
- To adjust the device parallel to the flat phantom.
- To adjust the distance between the device surface and the flat phantom to 10 mm or holster surface and the flat phantom to 0 mm.

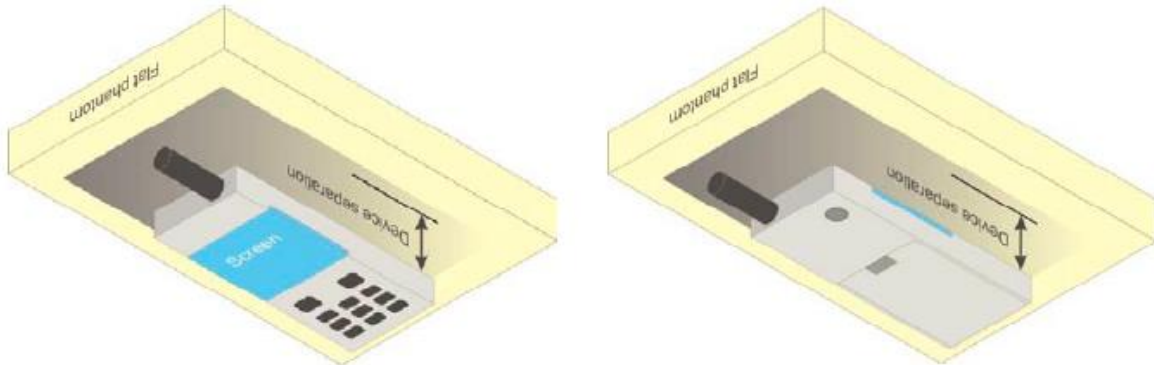


Fig.11.5 Illustration for Body Worn Position

11.6 Wireless Router (Hotspot) Configurations

Some battery-operated handsets have the capability to transmit and receive internet connectivity through simultaneous transmission of WIFI in conjunction with a separate licensed transmitter. The FCC has provided guidance in KDB Publication 941225 D06 where SAR test considerations for handsets ($L \times W \geq 9 \text{ cm} \times 5 \text{ cm}$) are based on a composite test separation distance of 10 mm from the front, back and edges of the device with antennas 2.5 cm or closer to the edge of the device, determined from general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions. Therefore, SAR must be evaluated for each frequency transmission and mode separately and summed with the WIFI transmitter according to KDB 648474 publication procedures. The “Portable Hotspot” feature on the handset was NOT activated, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal.

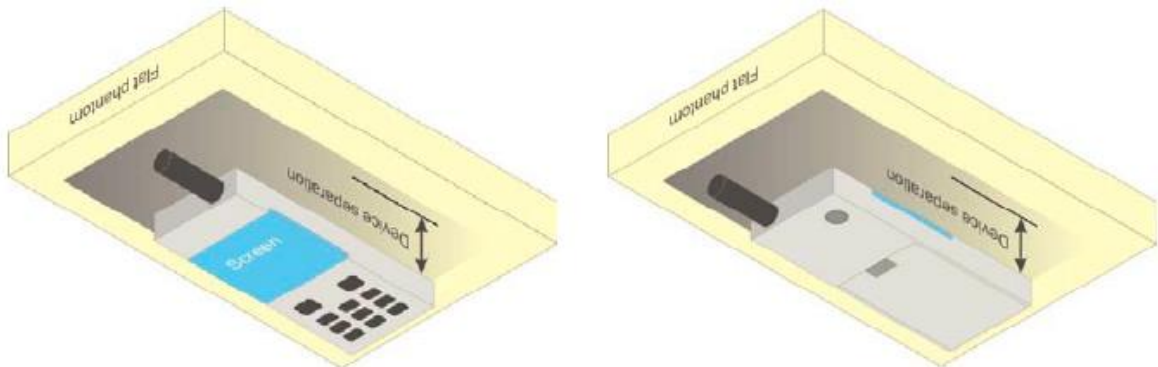


Fig.11.6 Illustration for Hotspot Position

12 Measurement Procedures

The measurement procedures are as below:

<Conducted power measurement>

- For WWAN power measurement, use base station simulator to configure EUT WWAN transition in conducted connection with RF cable, at maximum power in each supported wireless interface and frequency band.
- Read the WWAN RF power level from the base station simulator.
- For WLAN/BT power measurement, use engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power in each supported wireless interface and frequency band.
- Connect EUT RF port through RF cable to the power meter or spectrum analyzer, and measure WLAN/BT output power.

<Conducted power measurement>

- Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power, in the highest power channel.
- Place the EUT in positions as Appendix B demonstrates.
- Set scan area, grid size and other setting on the DASY software.
- Measure SAR results for the highest power channel on each testing position.
- Find out the largest SAR result on these testing positions of each band.
- Measure SAR results for other channels in worst SAR testing position if the Reported SAR or highest power channel is larger than 0.8 W/kg.

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

- Power reference measurement
- Area scan
- Zoom scan
- Power drift measurement

12.1 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a “cube” measurement. The measured volume must include the 1g and 10 g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

The entire evaluation of the spatial peak values is performed within the post-processing engine (SEMCAD). The system always gives the maximum values for 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

- Extraction of the measured data (grid and values) from the Zoom Scan.
- Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters).
- Generation of a high-resolution mesh within the measured volume.
- Interpolation of all measured values from the measurement grid to the high-resolution grid
- Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
- Calculation of the averaged SAR within masses of 1g and 10g.

12.2 Power Reference Measurement

The Power Reference Measurement and Power Drift Measurement are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

12.3 Area & Zoom Scan Procedures

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10g. Area scan and zoom scan resolution setting follows KDB 865664 D01v01r04 quoted below.

		≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface		5 ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location		$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
Maximum area scan spatial resolution: $\Delta x_{Area}, \Delta y_{Area}$		≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
		When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be \leq the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: $\Delta x_{Zoom}, \Delta y_{Zoom}$		≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$	≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1 st two points closest to phantom surface	≤ 4 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$
Minimum zoom scan volume	x, y, z	≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm
<p>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.</p> <p>* When zoom scan is required and the <u>reported</u> SAR from the <u>area scan based 1-g SAR estimation</u> procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</p>			

12.4 Volume Scan Procedures

The volume scan is used to assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD post-processor scan combine and subsequently superpose these measurement data to calculating the multiband SAR.

12.5 SAR Averaged Methods

In DASYS, the interpolation and extrapolation are both based on the modified Quadratic Shepard's method. The interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1g and 10g cubes, the extrapolation distance should not be larger than 5 mm.

12.6 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In DASYS measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drifts more than 5%, the SAR will be retested.

13 Conducted RF Output Power

Other data, please refer to FCC ID: 2ADYY-CL6, report No. JYTSZ-R14- 2300164.

LTE Band 13 part:

LTE Band	Bandwidth h (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					23205	23230	23255
					779.5MHz	782MHz	784.5MHz
Band 13	5	QPSK	1	0	24.57	24.48	24.52
			1	12	24.63	24.62	24.71
			1	24	24.53	24.54	24.67
			12	0	23.36	23.39	23.42
			12	6	23.41	23.43	23.41
			12	11	23.43	23.53	23.51
			25	0	23.39	23.48	23.46
		16QAM	1	0	23.31	23.38	23.29
			1	12	23.46	23.59	23.46
			1	24	23.41	23.49	23.39
			12	0	22.31	22.42	22.39
			12	6	22.34	22.46	22.39
			12	11	22.37	22.55	22.41
			25	0	22.38	22.42	22.45

LTE Band	Bandwidth h (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
						23230	
						782MHz	
Band 13	10	QPSK	1	0		24.54	
			1	24		24.57	
			1	49		24.70	
			25	0		23.37	
			25	12		23.34	
			25	24		23.45	
			50	0		23.52	
		16QAM	1	0		23.39	
			1	24		23.50	
			1	49		23.52	
			25	0		22.38	
			25	12		22.34	
			25	24		22.47	
			50	0		22.43	

LTE Band 26 part:

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					26697	26865	27033
					814.7MHz	831.5MHz	848.3MHz
Band 26	1.4	QPSK	1	0	23.40	23.34	23.79
			1	2	23.37	23.30	23.80
			1	5	23.36	23.30	23.76
			3	0	23.53	23.44	23.93
			3	1	23.51	23.40	23.94
			3	2	23.52	23.35	23.93
			6	0	22.58	22.39	22.96
		16QAM	1	0	22.25	22.36	22.52
			1	2	22.34	22.39	22.59
			1	5	22.25	22.27	22.51
			3	0	22.27	22.31	22.64
			3	1	22.31	22.52	22.67
			3	2	22.25	22.44	22.63
			6	0	21.62	21.68	21.91

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					26705	26865	27025
					815.5MHz	831.5MHz	847.5MHz
Band 26	3	QPSK	1	0	23.24	23.48	23.67
			1	7	23.41	23.60	23.79
			1	14	23.32	23.51	23.69
			8	0	22.43	22.57	22.89
			8	4	22.48	22.61	22.93
			8	7	22.52	22.68	22.90
			15	0	22.53	22.73	22.94
		16QAM	1	0	22.26	22.30	22.40
			1	7	22.50	22.49	22.56
			1	14	22.40	22.38	22.40
			8	0	21.50	21.75	21.91
			8	4	21.46	21.58	21.88
			8	7	21.59	21.67	21.89
			15	0	21.57	21.64	21.82

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					26715	26865	27015
					816.5MHz	831.5MHz	846.5MHz
Band 26	5	QPSK	1	0	23.58	23.61	23.96
			1	12	23.75	23.93	24.11
			1	24	23.75	23.86	24.01
			12	0	22.45	22.78	22.97
			12	6	22.56	22.75	22.95
			12	11	22.70	22.81	22.84
			25	0	22.60	22.84	22.98
		16QAM	1	0	22.54	22.63	22.77
			1	12	22.73	22.86	22.96
			1	24	22.72	22.80	22.88
			12	0	21.55	21.97	22.00
			12	6	21.51	21.83	22.01
			12	11	21.69	21.76	21.87
			25	0	21.65	21.72	21.98

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					26740	26865	26990
					819MHz	831.5MHz	844MHz
Band 26	10	QPSK	1	0	23.54	23.71	23.94
			1	24	23.75	23.82	23.97
			1	49	23.90	23.93	23.96
			25	0	22.52	22.78	22.87
			25	12	22.49	22.74	22.91
			25	24	22.89	22.80	22.81
			50	0	22.73	22.76	22.89
		16QAM	1	0	22.60	22.66	22.74
			1	24	22.78	22.70	22.68
			1	49	22.90	22.82	22.74
			25	0	21.46	21.63	21.92
			25	12	21.54	21.60	21.93
			25	24	21.87	21.80	21.83
			50	0	21.71	21.70	21.92

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					26765	26865	26965
					821.5MHz	831.5MHz	841.5MHz
Band 26	15	QPSK	1	0	23.80	23.84	23.97
			1	37	24.05	24.12	24.07
			1	74	23.96	24.01	24.02
			36	0	23.10	23.13	22.97
			36	16	23.04	23.14	23.00
			36	35	23.10	23.13	23.01
			75	0	22.71	23.13	23.00
		16QAM	1	0	22.75	22.81	22.73
			1	37	22.90	23.14	22.85
			1	74	22.82	23.03	22.73
			36	0	23.01	23.05	22.97
			36	16	22.95	23.12	22.96
			36	35	22.98	23.12	22.96
			75	0	21.93	22.03	21.90

14 Exposure Positions Consideration

14.1 EUT Antenna Locations

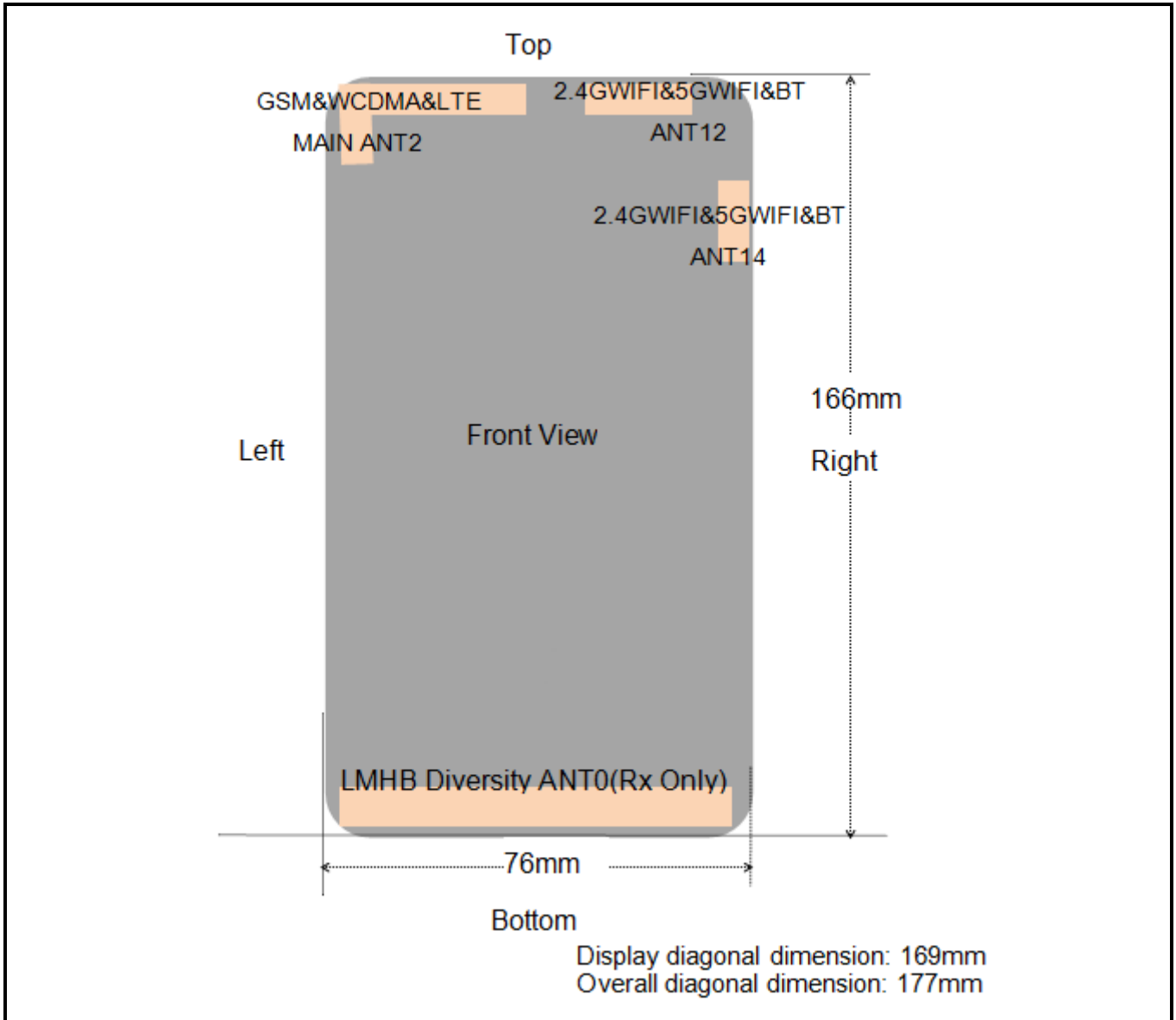


Fig.14.1 EUT Antenna Locations

Note: This antenna diagram is only used as a reference for the distance from the antenna to each edge. For the specific shape of the antenna, please refer to the physical photo.

14.2 Test Positions Consideration

Distance of Antennas to EUT edge/surface Test distance: 10mm						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
2G/3G/4G ANT2	<25mm	<25mm	<25mm	147mm	37mm	<25mm
WLAN & Bluetooth ANT12	<25mm	<25mm	<25mm	160mm	<25mm	47mm
WLAN & Bluetooth ANT14	<25mm	<25mm	<25mm	125mm	<25mm	70mm

Test Positions Test distance: 10mm						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
2G/3G/4G ANT2	Yes	Yes	Yes	No	No	Yes
WLAN & Bluetooth ANT12	Yes	Yes	Yes	No	Yes	No
WLAN & Bluetooth ANT14	Yes	Yes	Yes	No	Yes	No

Note:

1. Head/Body-worn/Hotspot mode SAR assessments are required.
2. Referring to KDB 941225 D06 v02r01, when the overall device length and width are $\geq 9\text{cm} * 5\text{cm}$, the test distance is 10mm. SAR must be measured for all sides and surfaces with a transmitting antenna located within 25mm from that surface or edge.
3. Per KDB 447498 D04v01, for handsets the test separation distance is determined by the smallest distance between the outer surface of the device and the user, which is 0 mm for head SAR, 10 mm for hotspot SAR, and 10 mm for body-worn SAR.
4. Per KDB 648474 D04 v01r03, when hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR $> 1.2\text{ W/kg}$

15 SAR Test Results Summary

For the worst case, please refer to FCC ID: 2ADYY-CL6, report No. JYTSZ-R14- 2300164.

15.1 Standalone Head SAR Data

➤ GSM Head SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)
1	PCS1900/Voice	Right Tilted	810	1909.8	29.51	0.04	30.0	0.937	1.119	1.049
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							1.6 W/kg (mW/g) Averaged over 1g			

➤ FDD-LTE Band 13(10MHz) QPSK Head SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)
2	Band13/1RB#49	Right Cheek	23230	782	24.70	-0.07	25.0	0.513	1.072	0.550
	Band13/1RB#49	Right Tilted	23230	782	24.70	0.08	25.0	0.443	1.072	0.475
	Band13/1RB#49	Left Cheek	23230	782	24.70	0.15	25.0	0.396	1.072	0.425
	Band13/1RB#49	Left Tilted	23230	782	24.70	-0.08	25.0	0.315	1.072	0.338
	Band13/50%RB#24	Right Cheek	23230	782	23.45	0.01	23.5	0.426	1.012	0.431
	Band13/50%RB#24	Right Tilted	23230	782	23.45	-0.12	23.5	0.368	1.012	0.372
	Band13/50%RB#24	Left Cheek	23230	782	23.45	0.04	23.5	0.329	1.012	0.333
	Band13/50%RB#24	Left Tilted	23230	782	23.45	-0.16	23.5	0.271	1.012	0.274
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							1.6 W/kg (mW/g) Averaged over 1g			

➤ FDD-LTE Band 26(15MHz) QPSK Head SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)
3	Band26/1RB#12	Right Cheek	26865	831.5	24.12	0.07	24.5	0.653	1.091	0.712
	Band26/1RB#12	Right Tilted	26865	831.5	24.12	0.09	24.5	0.594	1.091	0.648
	Band26/1RB#12	Left Cheek	26865	831.5	24.12	0.14	24.5	0.542	1.091	0.591
	Band26/1RB#12	Left Tilted	26865	831.5	24.12	-0.11	24.5	0.473	1.091	0.516
	Band26/50%RB#16	Right Cheek	26865	831.5	23.14	-0.01	23.5	0.543	1.086	0.590
	Band26/50%RB#16	Right Tilted	26865	831.5	23.14	0.04	23.5	0.494	1.086	0.536
	Band26/50%RB#16	Left Cheek	26865	831.5	23.14	0.16	23.5	0.452	1.086	0.491
	Band26/50%RB#16	Left Tilted	26865	831.5	23.14	0.12	23.5	0.396	1.086	0.430
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					1.6 W/kg (mW/g) Averaged over 1g					

Note:

1. Per KDB 447498 D04v01, for each exposure position, if the highest output power channel Reported SAR ≤ 0.8W/kg, other channels SAR testing is not necessary.
2. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required when the measured SAR is ≥ 0.8W/kg.
3. Per KDB 941225 D05v02r05, 100% RB allocation SAR measurement is not required when the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg.
4. Per KDB 248227 D01v02r02, for 802.11b DSSS , when the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required in that exposure configuration.
5. Per KDB 248227 D01v02r02, OFDM SAR is not required when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg. Cuz the maximum output power specified for OFDM and DSSS are 31.62mW(15.0dBm) and 63.10mW(18.0dBm), the scaled SAR would be $1.192 \times (31.62/63.10) = 0.597 \text{ W/Kg} < 1.2 \text{ W/kg}$, therefore, SAR is not required for OFDM.
6. According to KDB 865664 D02v01r02, SAR plot is required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination
7. Highlight part of test data means repeated test.
8. *: Due the antenna location and antenna performance results the SAR value lower than the lowest system limit, then we show “<0.001* W/Kg” in the report.

15.2 Standalone Body SAR

> GSM Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)
4	GPRS1900/4 slots	Back	810	1909.8	25.88	0.12	26.0	0.866	1.028	0.890
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							1.6 W/kg (mW/g) Averaged over 1g			

> FDD-LTE Band 13(10MHz) QPSK Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)
	Band13/1RB#49	Front	23230	782	24.70	0.04	25.0	0.121	1.072	0.130
5	Band13/1RB#49	Back	23230	782	24.70	-0.16	25.0	0.165	1.072	0.177
	Band13/50%RB#24	Front	23230	782	23.45	-0.01	23.5	0.103	1.012	0.104
	Band13/50%RB#24	Back	23230	782	23.45	0.03	23.5	0.140	1.012	0.142
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							1.6 W/kg (mW/g) Averaged over 1g			

> FDD-LTE Band 26(15MHz) QPSK Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)
	Band26/1RB#12	Front	26865	831.5	24.12	-0.07	24.5	0.166	1.091	0.181
6	Band26/1RB#12	Back	26865	831.5	24.12	-0.06	24.5	0.209	1.091	0.228
	Band26/50%RB#16	Front	26865	831.5	23.14	0.12	23.5	0.141	1.086	0.153
	Band26/50%RB#16	Back	26865	831.5	23.14	0.18	23.5	0.177	1.086	0.192
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							1.6 W/kg (mW/g) Averaged over 1g			

Note:

- Body-worn SAR testing was performed at 10mm separation, and this distance is determined by the handset manufacturer that there will be body-worn accessories that users may acquire at the time of equipment certification, to enable users to purchase aftermarket body-worn accessories with the required minimum separation.
- Per KDB 941225 D06v02r01, when the same wireless modes and device transmission configurations are required for testing body-worn accessories and hotspot mode, it is not necessary to test body-worn accessory SAR for the same device orientation if the test separation distance for hotspot mode is more conservative than that used for body-worn accessories.
- Body-worn exposure conditions are intended to voice call operations, therefore GSM voice call is selected to be tested.
- Per KDB 648474 D04v01r03, when the *Reported* SAR for a body-worn accessory measured without a headset connected to the handset is ≤ 1.2 W/kg, SAR testing with a headset connected to the handset is not required.
- The WLAN SAR perform the front and back position, due considered the simultaneous SAR for body-worn.
- Per KDB 447498 D04v01, for each exposure position, if the highest output channel Reported SAR ≤ 0.8 W/kg, other channels SAR testing is not necessary.
- Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required when the measured SAR is ≥ 0.8 W/kg.
- Per KDB 941225 D05v02r05, 100% RB allocation SAR measurement is not required when the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg.
- According to KDB 865664 D02v01r02, SAR plot is required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination.
- Highlight part of test data means repeated test.
- *: Due the antenna location and antenna performance results the SAR value lower than the lowest system limit, then we show " <0.001 * W/Kg" in the report.

15.3 Body SAR in Hotspot Mode

➤ GSM Body SAR in Hotspot mode

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)
	GPRS1900/4 slots	Back	810	1909.8	25.88	0.12	26.0	0.866	1.028	0.890
7	GPRS1900/4 slots	Top	810	1909.8	25.88	0.06	26.0	1.130	1.028	1.162
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					1.6 W/kg (mW/g) Averaged over 1g					

➤ FDD-LTE Band 13(10MHz) QPSK Body SAR in Hotspot mode

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)
	Band13/1RB#49	Front	23230	782	24.70	0.04	25.0	0.121	1.072	0.130
5	Band13/1RB#49	Back	23230	782	24.70	-0.16	25.0	0.165	1.072	0.177
	Band13/1RB#49	Left	23230	782	24.70	0.20	25.0	0.052	1.072	0.056
	Band13/1RB#49	Top	23230	782	24.70	-0.10	25.0	0.103	1.072	0.110
	Band13/50%RB#24	Front	23230	782	23.45	-0.01	23.5	0.103	1.012	0.104
	Band13/50%RB#24	Back	23230	782	23.45	0.03	23.5	0.140	1.012	0.142
	Band13/50%RB#24	Left	23230	782	23.45	-0.08	23.5	0.044	1.012	0.045
	Band13/50%RB#24	Top	23230	782	23.45	-0.18	23.5	0.089	1.012	0.090
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					1.6 W/kg (mW/g) Averaged over 1g					

➤ FDD-LTE Band 26(15MHz) QPSK Body SAR in Hotspot mode

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR _{1g} (W/kg)	Scaling Factor	Reported SAR _{1g} (W/kg)
	Band26/1RB#12	Front	26865	831.5	24.12	-0.07	24.5	0.166	1.091	0.181
6	Band26/1RB#12	Back	26865	831.5	24.12	-0.06	24.5	0.209	1.091	0.228
	Band26/1RB#12	Left	26865	831.5	24.12	-0.14	24.5	0.071	1.091	0.077
	Band26/1RB#12	Top	26865	831.5	24.12	0.08	24.5	0.140	1.091	0.153
	Band26/50%RB#16	Front	26865	831.5	23.14	0.12	23.5	0.141	1.086	0.153
	Band26/50%RB#16	Back	26865	831.5	23.14	0.18	23.5	0.177	1.086	0.192
	Band26/50%RB#16	Left	26865	831.5	23.14	-0.14	23.5	0.060	1.086	0.065
	Band26/50%RB#16	Top	26865	831.5	23.14	0.13	23.5	0.119	1.086	0.129
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					1.6 W/kg (mW/g) Averaged over 1g					

Note:

- Per KDB 447498 D04v01, for each exposure position, if the highest output channel Reported SAR ≤ 0.8W/kg, other channels SAR testing is not necessary.
- Additional WLAN SAR testing was performed for simultaneous transmission analysis.
- For Hotspot SAR testing, per KDB 941225 D06v02r01, for EUT dimension ≥ 9cm*5cm, the test distance is 10mm. SAR must be measured for all surfaces and sides with a transmitting antenna located within 2.5cm from that surface or edge.
- Per KDB 941225 D01v03r01, RMC 12.2kbps setting is used to evaluate SAR. If HSDPA output power is < 0.25dB higher than RMC 12.2kbps, or Reported SAR with RMC 12.2kbps setting is ≤ 1.2W/kg, HSDPA SAR evaluation can be excluded.
- Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required when the measured SAR is ≥ 0.8W/kg.
- Per KDB 648474 D04v01r03, when the Reported SAR for a body-worn accessory measured without a headset connected to the handset is > 1.2 W/kg, SAR testing with a headset connected to the handset is required.
- Per KDB 941225 D05v02r05, 100% RB allocation SAR measurement is not required when the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel.
- According to KDB 865664 D02v01r02, SAR plot is required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination.
- Highlight part of test data means repeated test.
- *: Due the antenna location and antenna performance results the SAR value lower than the lowest system limit, then we show “<0.001* W/Kg” in the report.

15.4 Spot-Cheek SAR measurement

Band/ Mode	Test Position	CH.	Freq. (MHz)	Reported SAR (W/kg)		
				Original	Spot-Cheek Value	Ratio (%)
PCS1900/Voice	Right Tilted	810	1909.8	1.117	1.049	-6.09
GPRS1900/4 slots	Back	661	1880	0.958	0.890	-7.10
GPRS1900/4 slots	Top	810	1909.8	1.192	1.162	-2.52
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population				1.6 W/kg (mW/g) Averaged over 1g		

Note.

1. Original Reported SAR is the worst-case SAR results based on which reported in the original FCC ID filing. Per Spot-Cheek plan, the ratio of *original* and *Spot-Cheek Value* should be $\leq \pm 20\%$.

15.5 Multi-Band Simultaneous Transmission Considerations

Please refer to FCC ID: 2ADYY-CL6, report No. JYTSZ-R14- 2300164.

15.6 SAR Simultaneous Transmission Analysis**➤ Simultaneous Transmission**

Please refer to FCC ID: 2ADYY-CL6, report No. JYTSZ-R14- 2300164.

15.7 Measurement Uncertainty

Per KDB865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg, the extensive SAR measurement uncertainty analysis described in IEC/IEEE 62209-1528:2020 is not required in SAR reports submitted for equipment approval. The equivalent ratio (1.5/1.6) is applied to extremity and occupational exposure conditions.

15.8 Measurement Conclusion

The SAR evaluation indicates that the EUT complies with the RF radiation exposure limits of the FCC and Industry Canada, with respect to all parameters subject to this test. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested. Please note that the absorption and distribution of electromagnetic energy in the body are very complex phenomena that depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because various factors may interact with one another to vary the specific biological outcome of an exposure to electromagnetic fields, any protection guide should consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables.

16 Reference

- [1]. FCC 47 CFR Part 2 “Frequency Allocations and Radio Treaty Matters; General Rules and Regulations”
- [2]. ANSI/IEEE Std. C95.1-1992, “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”, September 1992
- [3]. IEC/IEEE 62209-1528:2020, “Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices –Part 1528: Human models, instrumentation, and procedures (Frequency range of 4 MHz to 10 GHz)”, October 2020
- [4]. SPEAG DASY52 System Handbook
- [5]. FCC KDB 248227 D01 v02r02, “SAR GUIDANCE FOR IEEE 802.11 (Wi-Fi) TRANSMITTERS”, October 2015
- [6]. FCC KDB 447498 D04 v01, “RF EXPOSURE PROCEDURES AND EQUIPMENT AUTHORIZATION POLICIES FOR MOBILE AND PORTABLE DEVICES”, November 2021
- [7]. FCC KDB 648474 D04 v01r03, “SAR EVALUATION CONSIDERATIONS FOR WIRELESS HANDSETS”, October 2015
- [8]. FCC KDB 941225 D01 v03r01, “3G SAR MEAUREMENT PROCEDURES”, October 2015
- [9]. FCC KDB 941225 D05 v02r05, “SAR EVALUATION CONSIDERATIONS FOR LTE DEVICES”, Dec 2015
- [10]. FCC KDB 941225 D06 v02r01, " SAR EVALUATION PROCEDURES FOR PORTABLE DEVICES WITH WIRELESS ROUTER CAPABILITIES", October 2015
- [11]. FCC KDB 865664 D01 v01r04, “SAR MEASUREMENT REQUIREMENTS FOR 100 MHz TO 6 GHz”, August 2015

Appendix A: Plots of SAR System Check

Test Laboratory: JYTSZ

Date: 12.13.2023

DUT: Dipole 750 MHz; Type: D750V3; Serial: SN:1118

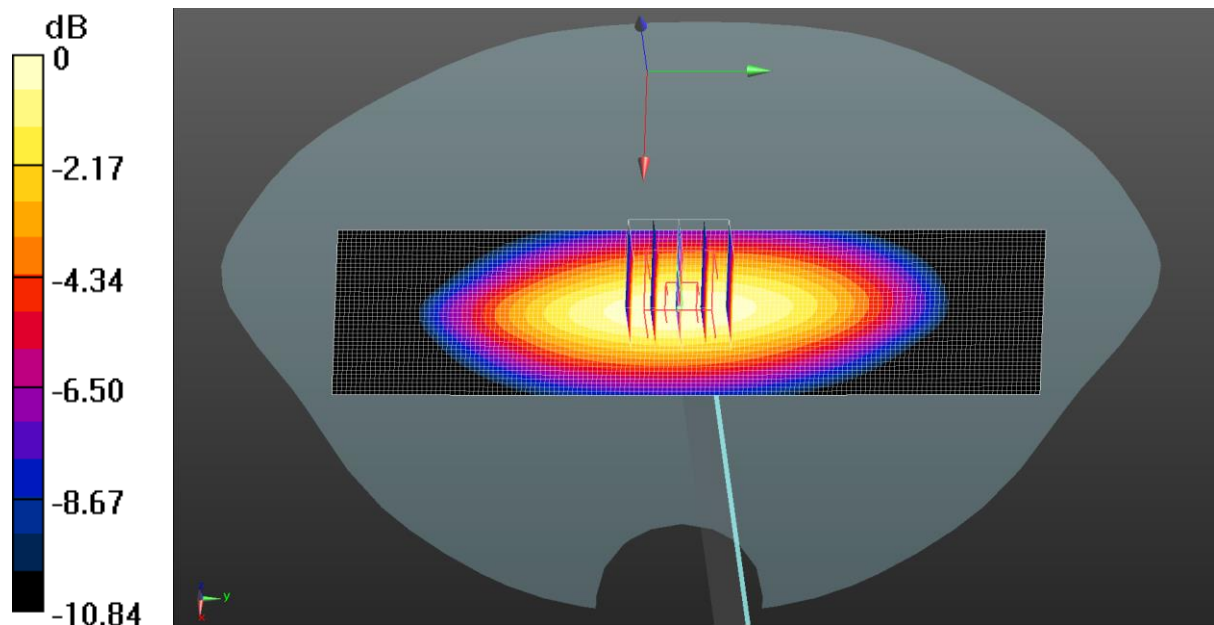
Communication System: UID 0, CW (0); Frequency: 750 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.888 \text{ S/m}$; $\epsilon_r = 40.650$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3924; ConvF(10.2, 10.2, 10.2) @ 750 MHz; Calibrated: 01.03.2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1452; Calibrated: 05.17.2023
- Phantom: SAM-Twin; Type: QD 000 P40 CD; Serial: 1885
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

System Performance Check at Frequency 750 MHz Head Tissue/d=15mm, Pin=80 mW, dist=1.4mm (EX-Probe)/Area Scan (41x151x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$
 Maximum value of SAR (interpolated) = 0.934 W/kg

System Performance Check at Frequency 750 MHz Head Tissue/d=15mm, Pin=80 mW, dist=1.4mm (EX-Probe)/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
 Reference Value = 33.10 V/m; Power Drift = 0.11 dB
 Peak SAR (extrapolated) = 1.08 W/kg
SAR(1 g) = 0.693 W/kg; SAR(10 g) = 0.436 W/kg
 Smallest distance from peaks to all points 3 dB below = 17.6 mm
 Ratio of SAR at M2 to SAR at M1 = 64%
 Maximum value of SAR (measured) = 0.938 W/kg



0 dB = 0.938 W/kg = -0.28 dBW/kg

Test Laboratory: JYTSZ

Date: 12.13.2023

DUT: Dipole 835 MHz; Type: D835V2; Serial: SN:4D154

Communication System: UID 0, CW (0); Frequency: 835 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.904 \text{ S/m}$; $\epsilon_r = 40.261$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3924; ConvF(9.8, 9.8, 9.8) @ 835 MHz; Calibrated: 01.03.2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1452; Calibrated: 05.17.2023
- Phantom: SAM-Twin; Type: QD 000 P40 CD; Serial: 1885
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

System Performance Check at Frequency 835 MHz Head Tissue/d=15mm, Pin=80 mW, dist=1.4mm (EX-Probe)/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 35.07 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 1.18 W/kg

SAR(1 g) = 0.771 W/kg; SAR(10 g) = 0.501 W/kg

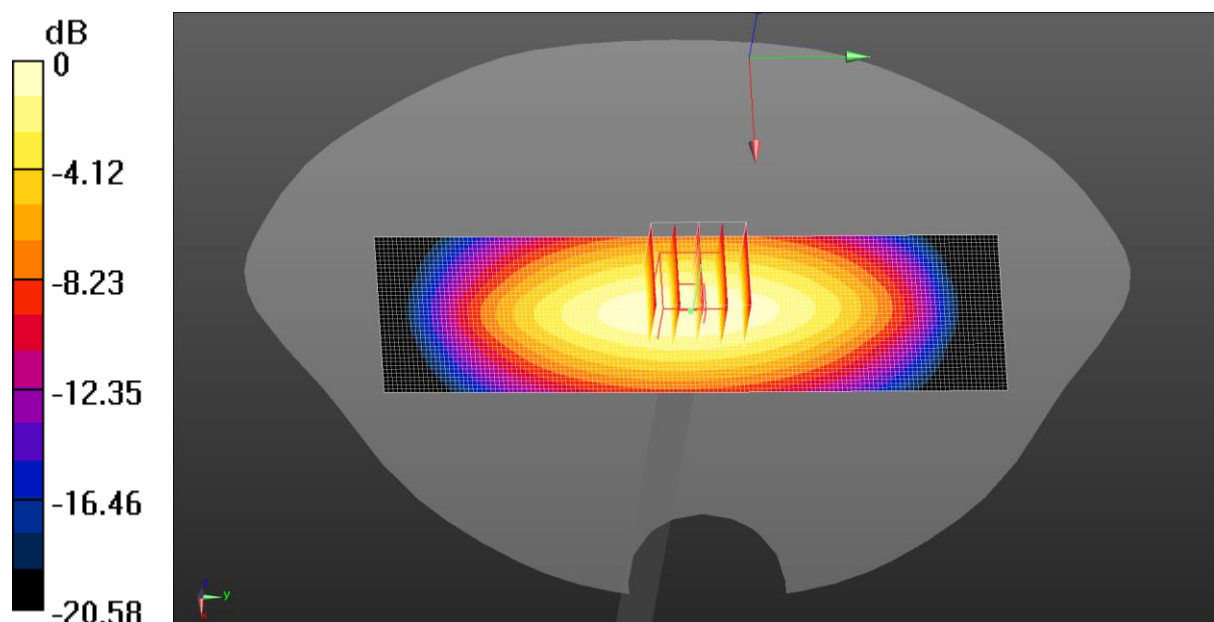
Smallest distance from peaks to all points 3 dB below = 17.6 mm

Ratio of SAR at M2 to SAR at M1 = 63.3%

Maximum value of SAR (measured) = 1.02 W/kg

System Performance Check at Frequency 835 MHz Head Tissue/d=15mm, Pin=80 mW, dist=1.4mm (EX-Probe)/Area Scan (41x141x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

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



0 dB = 1.10 W/kg = 0.41 dBW/kg

Test Laboratory: JYTSZ

Date: 12.13.2023

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: SN:5d175

Communication System: UID 0, CW (0); Frequency: 1900 MHz; Duty Cycle: 1:1
 Medium parameters used: $f = 1900 \text{ MHz}$; $\sigma = 1.387 \text{ S/m}$; $\epsilon_r = 38.708$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3924; ConvF(8.05, 8.05, 8.05) @ 1900 MHz; Calibrated: 01.03.2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1452; Calibrated: 05.17.2023
- Phantom: SAM-Twin; Type: QD 000 P40 CD; Serial: 1885
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

System Performance Check at Frequency 1900 MHz Head Tissue/d=10mm, Pin=40 mW, dist=1.4mm (EX-Probe)/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 43.79 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.20 W/kg

SAR(1 g) = 1.65 W/kg; SAR(10 g) = 0.827 W/kg

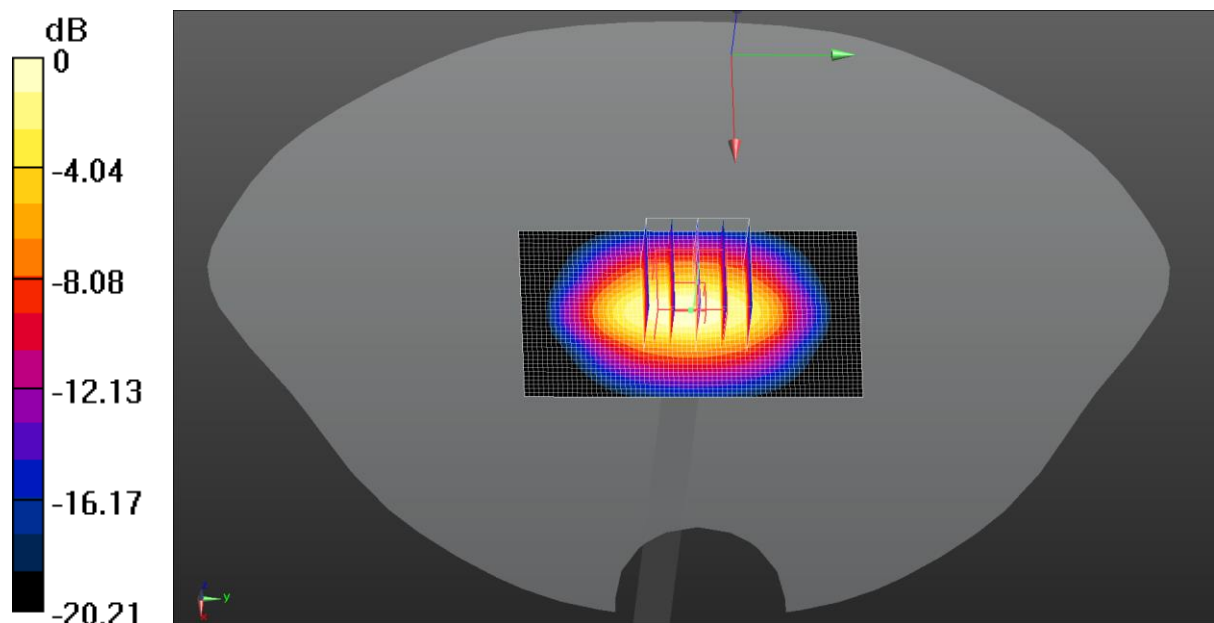
Smallest distance from peaks to all points 3 dB below = 9.6 mm

Ratio of SAR at M2 to SAR at M1 = 53.2%

Maximum value of SAR (measured) = 2.56 W/kg

System Performance Check at Frequency 1900 MHz Head Tissue/d=10mm, Pin=40 mW, dist=1.4mm (EX-Probe)/Area Scan (41x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 2.78 W/kg



0 dB = 2.78 W/kg = 4.44 dBW/kg

Appendix B: Plots of SAR Test Data

Test Laboratory: JYTSZ

Date: 12.13.2023

DUT: Mobile Phone; Type: CL6s; Serial: SZR012300627-3

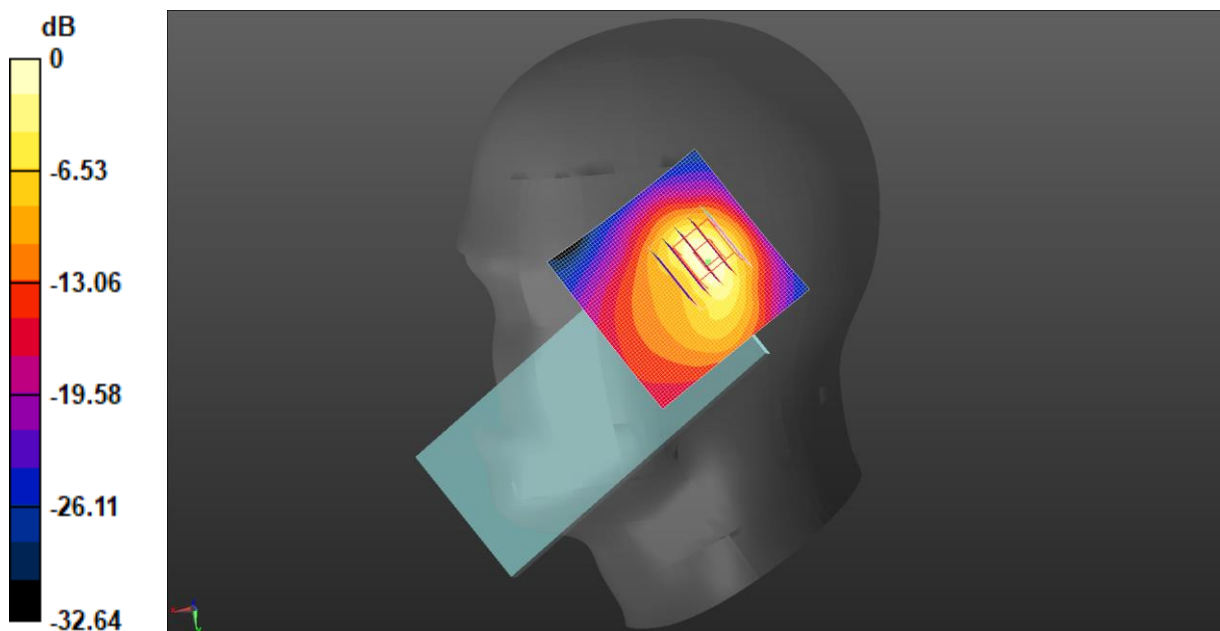
Communication System: UID 0, GSM (0); Frequency: 1909.8 MHz;Duty Cycle: 1:8.30042
 Medium parameters used: $f = 1910 \text{ MHz}$; $\sigma = 1.387 \text{ S/m}$; $\epsilon_r = 38.708$; $\rho = 1000 \text{ kg/m}^3$
 Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3924; ConvF(8.05, 8.05, 8.05) @ 1909.8 MHz; Calibrated: 2023/1/3
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1452; Calibrated: 2023/5/17
- Phantom: SAM-Twin; Type: QD 000 P40 CD; Serial: 1885
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

GSM 1900 Right Tilted/High Channel/Area Scan (61x61x1): Interpolated grid:
 $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$
 Maximum value of SAR (interpolated) = 1.47 W/kg

GSM 1900 Right Tilted/High Channel/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$
 Reference Value = 22.10 V/m; Power Drift = 0.04 dB
 Peak SAR (extrapolated) = 2.05 W/kg
SAR(1 g) = 0.937 W/kg; SAR(10 g) = 0.419 W/kg
 Smallest distance from peaks to all points 3 dB below = 8 mm
 Ratio of SAR at M2 to SAR at M1 = 46.3%
 Maximum value of SAR (measured) = 1.48 W/kg



$0 \text{ dB} = 1.47 \text{ W/kg} = 1.68 \text{ dBW/kg}$

Test Laboratory: JYTSZ

Date: 12.13.2023

DUT: Mobile Phone; Type: CL6s; Serial: SZR012300627-3

Communication System: UID 0, LTE-Fdd(USA) 1RB QPSK (0); Frequency: 782 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 782 \text{ MHz}$; $\sigma = 0.89 \text{ S/m}$; $\epsilon_r = 40.483$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3924; ConvF(10.2, 10.2, 10.2) @ 782 MHz; Calibrated: 01.03.2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1452; Calibrated: 05.17.2023
- Phantom: SAM-Twin; Type: QD 000 P40 CD; Serial: 1885
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

LTE Band 13 1RB(10MHz) Right Cheek/Middle Channel/Area Scan

(61x61x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 0.869 W/kg

LTE Band 13 1RB(10MHz) Right Cheek/Middle Channel/Zoom Scan

(5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 24.62 V/m; Power Drift = -0.07 dB

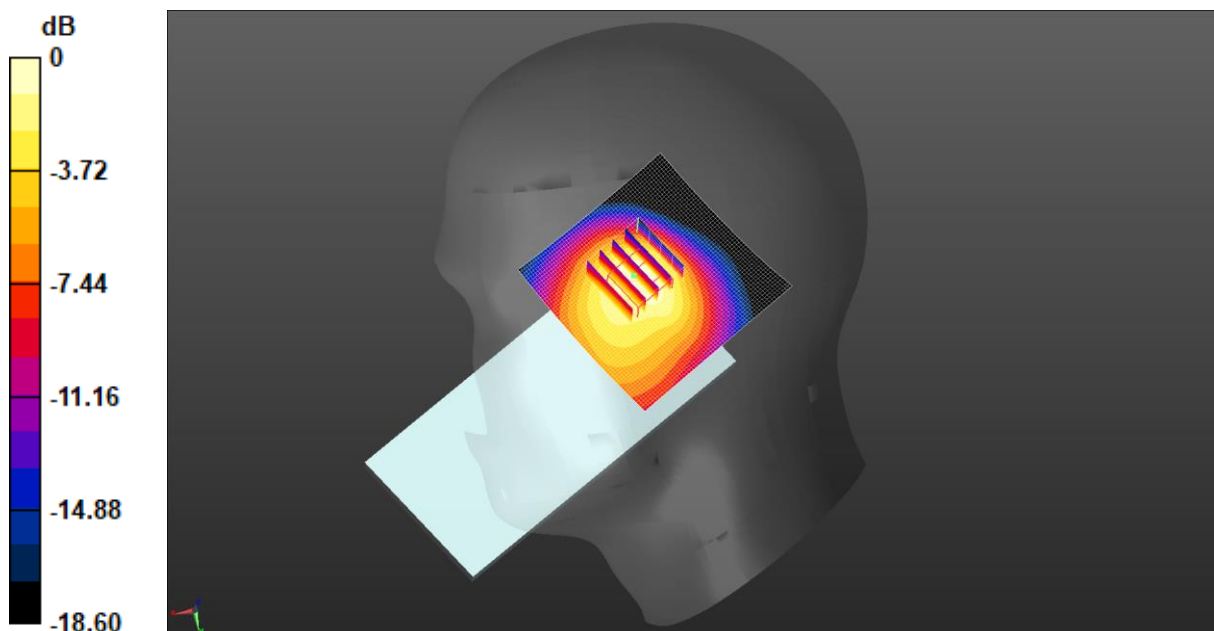
Peak SAR (extrapolated) = 1.20 W/kg

SAR(1 g) = 0.513 W/kg; SAR(10 g) = 0.309 W/kg

Smallest distance from peaks to all points 3 dB below = 11.6 mm

Ratio of SAR at M2 to SAR at M1 = 43.5%

Maximum value of SAR (measured) = 0.851 W/kg



0 dB = 0.851 W/kg = -0.70 dBW/kg

Test Laboratory: JYTSZ

Date: 12.13.2023

DUT: Mobile Phone; Type: CL6s; Serial: SZR012300627-3

Communication System: UID 0, LTE-Fdd(USA) 1RB QPSK (0); Frequency: 831.5 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 831.5$ MHz; $\sigma = 0.903$ S/m; $\epsilon_r = 40.275$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3924; ConvF(9.8, 9.8, 9.8) @ 831.5 MHz; Calibrated: 01.03.2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1452; Calibrated: 05.17.2023
- Phantom: SAM-Twin; Type: QD 000 P40 CD; Serial: 1885
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

LTE Band 26 1RB(15MHz) Right Cheek/Middle Channel/Area Scan

(61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.56 W/kg

LTE Band 26 1RB(15MHz) Right Cheek/Middle Channel/Zoom Scan

(5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 25.88 V/m; Power Drift = 0.07 dB

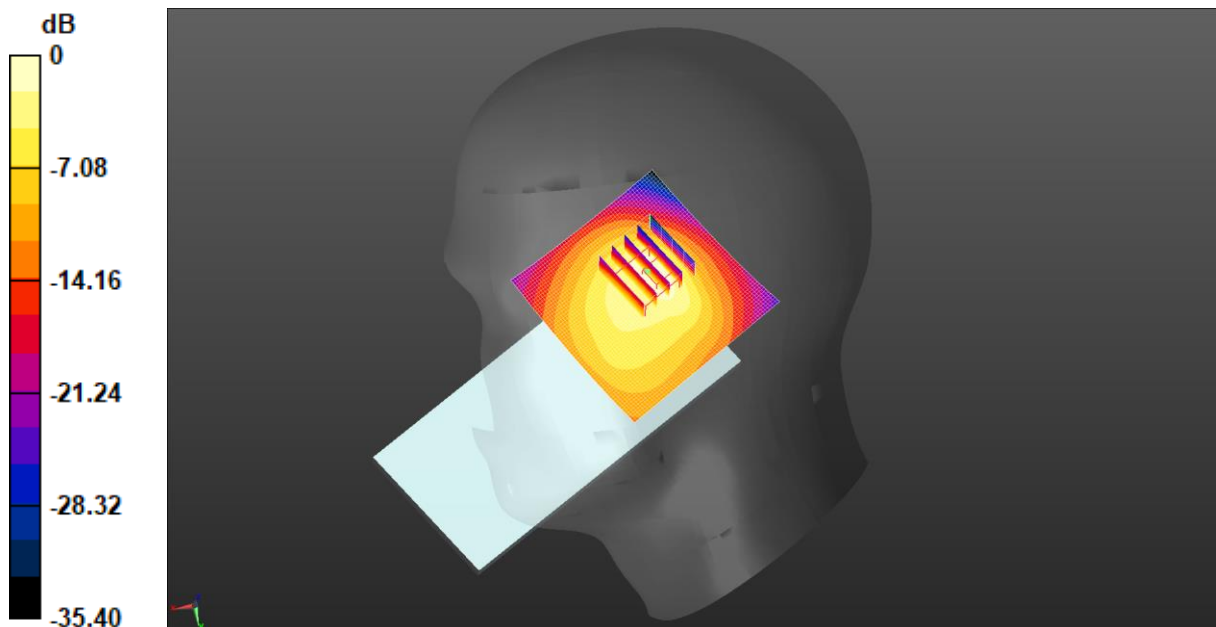
Peak SAR (extrapolated) = 1.66 W/kg

SAR(1 g) = 0.653 W/kg; SAR(10 g) = 0.398 W/kg

Smallest distance from peaks to all points 3 dB below = 7.2 mm

Ratio of SAR at M2 to SAR at M1 = 36.7%

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



0 dB = 1.56 W/kg = 1.94 dBW/kg

Test Laboratory: JYTSZ

Date: 12.13.2023

DUT: Mobile Phone; Type: CL6s; Serial: SZR012300627-3

Communication System: UID 0, GPRS(4 Slots) (0); Frequency: 1880 MHz;Duty Cycle: 1:1.99986

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.387$ S/m; $\epsilon_r = 38.708$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3924; ConvF(8.05, 8.05, 8.05) @ 1880 MHz; Calibrated: 2023/1/3
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1452; Calibrated: 2023/5/17
- Phantom: SAM-Twin; Type: QD 000 P40 CD; Serial: 1885
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

GPRS 1900 4Slots Body Back/Middle Channel/Area Scan

(61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.38 W/kg

GPRS 1900 4Slots Body Back/Middle Channel/Zoom Scan (5x5x7)/Cube

0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.870 V/m; Power Drift = 0.12 dB

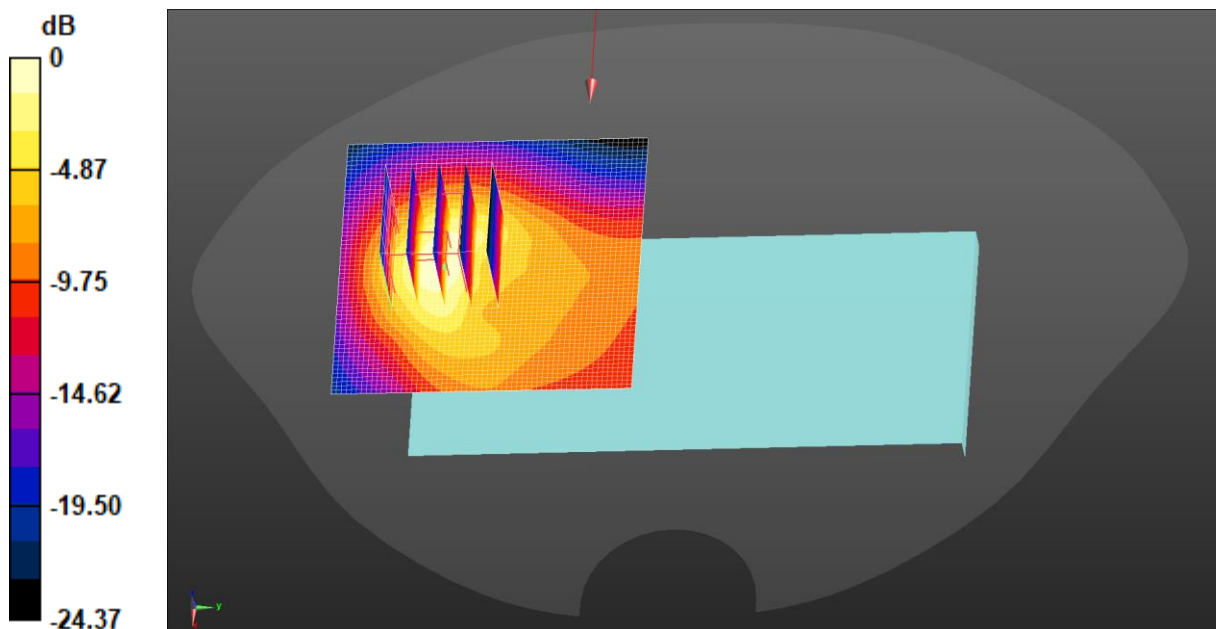
Peak SAR (extrapolated) = 1.75 W/kg

SAR(1 g) = 0.866 W/kg; SAR(10 g) = 0.428 W/kg

Smallest distance from peaks to all points 3 dB below = 9.3 mm

Ratio of SAR at M2 to SAR at M1 = 53.9%

Maximum value of SAR (measured) = 1.30 W/kg



$$0 \text{ dB} = 1.38 \text{ W/kg} = 1.39 \text{ dBW/kg}$$

Test Laboratory: JYTSZ

Date: 12.13.2023

DUT: Mobile Phone; Type: CL6s; Serial: SZR012300627-3

Communication System: UID 0, LTE-Fdd(USA) 1RB QPSK (0); Frequency: 782 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 782 \text{ MHz}$; $\sigma = 0.89 \text{ S/m}$; $\epsilon_r = 40.483$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3924; ConvF(10.2, 10.2, 10.2) @ 782 MHz; Calibrated: 01.03.2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1452; Calibrated: 05.17.2023
- Phantom: SAM-Twin; Type: QD 000 P40 CD; Serial: 1885
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

LTE Band 13 1RB(10MHz) Body Back/Middle Channel/Area Scan (61x81x1):

Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 0.243 W/kg

LTE Band 13 1RB(10MHz) Body Back/Middle Channel/Zoom Scan

(5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 12.94 V/m; Power Drift = -0.16 dB

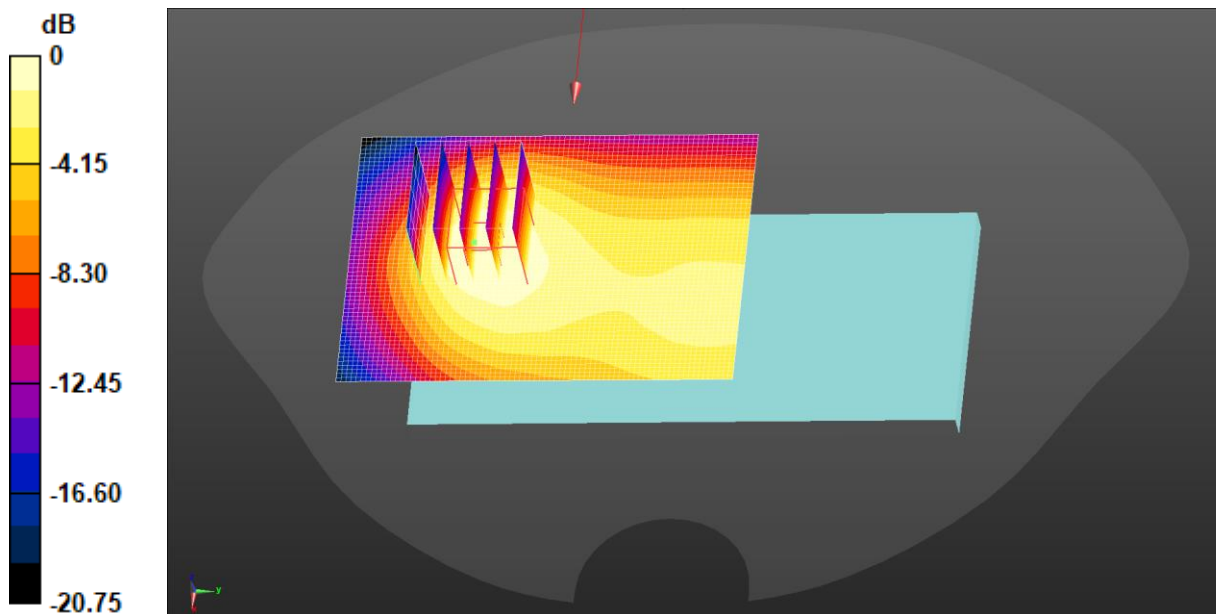
Peak SAR (extrapolated) = 0.292 W/kg

SAR(1 g) = 0.165 W/kg; SAR(10 g) = 0.108 W/kg

Smallest distance from peaks to all points 3 dB below = 16.3 mm

Ratio of SAR at M2 to SAR at M1 = 56.1%

Maximum value of SAR (measured) = 0.237 W/kg



0 dB = 0.243 W/kg = -6.14 dBW/kg

Test Laboratory: JYTSZ

Date: 12.13.2023

DUT: Mobile Phone; Type: CL6s; Serial: SZR012300627-3

Communication System: UID 0, LTE-Fdd(USA) 1RB QPSK (0); Frequency: 831.5 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 831.5$ MHz; $\sigma = 0.903$ S/m; $\epsilon_r = 40.275$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3924; ConvF(9.8, 9.8, 9.8) @ 831.5 MHz; Calibrated: 01.03.2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1452; Calibrated: 05.17.2023
- Phantom: SAM-Twin; Type: QD 000 P40 CD; Serial: 1885
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

LTE Band 26 1RB(15MHz) Body Back/Middle Channel/Area Scan (61x81x1):

Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.312 W/kg

LTE Band 26 1RB(15MHz) Body Back/Middle Channel/Zoom Scan

(5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.88 V/m; Power Drift = -0.06 dB

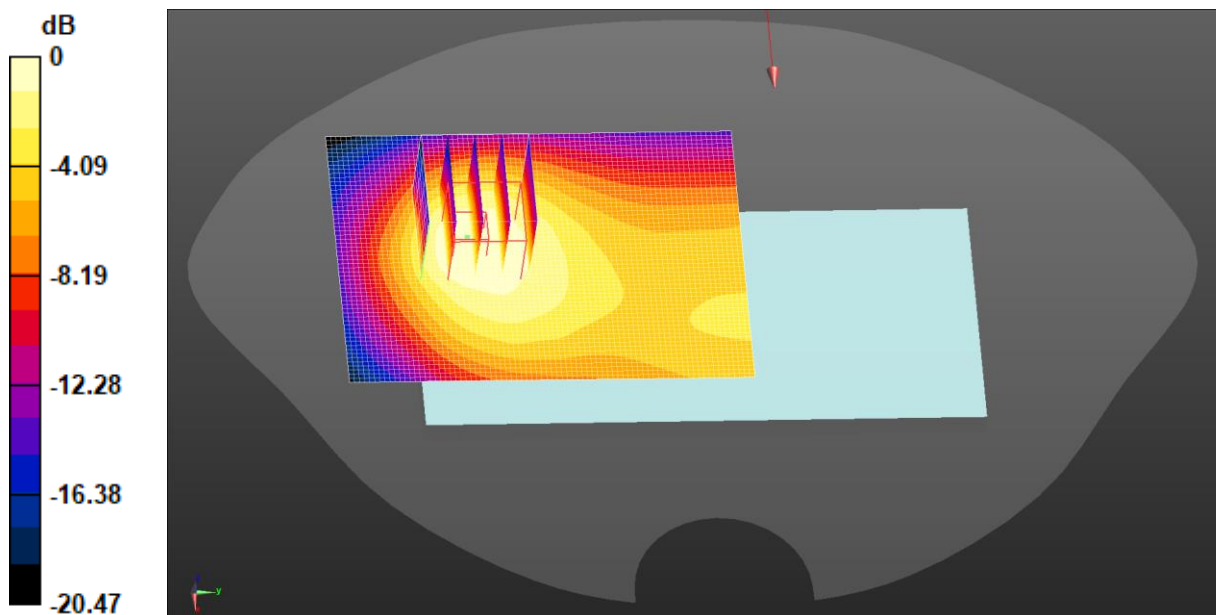
Peak SAR (extrapolated) = 0.368 W/kg

SAR(1 g) = 0.209 W/kg; SAR(10 g) = 0.134 W/kg

Smallest distance from peaks to all points 3 dB below = 15.1 mm

Ratio of SAR at M2 to SAR at M1 = 57.5%

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



0 dB = 0.312 W/kg = -5.06 dBW/kg

Test Laboratory: JYTSZ

Date: 12.13.2023

DUT: Mobile Phone; Type: CL6s; Serial: SZR012300627-3

Communication System: UID 0, GPRS(4 Slots) (0); Frequency: 1909.8 MHz; Duty Cycle: 1:1.99986

Medium parameters used: $f = 1910 \text{ MHz}$; $\sigma = 1.387 \text{ S/m}$; $\epsilon_r = 38.708$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3924; ConvF(8.05, 8.05, 8.05) @ 1909.8 MHz; Calibrated: 2023/1/3
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1452; Calibrated: 2023/5/17
- Phantom: SAM-Twin; Type: QD 000 P40 CD; Serial: 1885
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

GPRS 1900 4Slots Body Top/High Channel/Area Scan (51x61x1): Interpolated grid:
 $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$
Maximum value of SAR (interpolated) = 1.88 W/kg

GPRS 1900 4Slots Body Top/High Channel/Zoom Scan (5x5x7)/Cube

0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 27.34 V/m; Power Drift = 0.06 dB

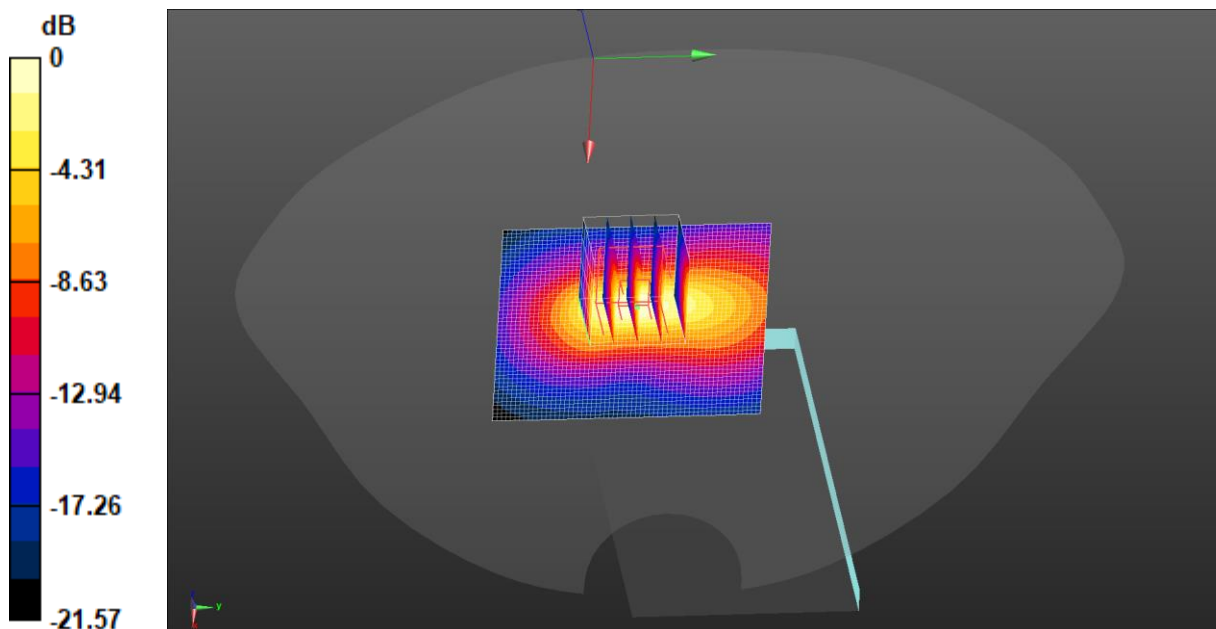
Peak SAR (extrapolated) = 2.34 W/kg

SAR(1 g) = 1.13 W/kg; SAR(10 g) = 0.533 W/kg

Smallest distance from peaks to all points 3 dB below = 8 mm

Ratio of SAR at M2 to SAR at M1 = 50.3%

Maximum value of SAR (measured) = 1.86 W/kg



0 dB = 1.88 W/kg = 2.73 dBW/kg

-----End of Report-----