FCC SAR REPORT

Report No.: JYTSZ-R14-2400025

Applicant: INFINIX MOBILITY 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.: X6851

Trade mark Infinix

FCC ID: 2AIZN-X6851

Applicable standards: FCC 47 CFR Part 2.1093

Date of Test: 19 Mar., 2024

Test Result: Maximum Reported 1-g SAR (W/kg)
Head: 1.002 Body: 0.685 Hotspot: 0.878

Project by:	Eric Wang ***Project Engineer***	***Date:***	*25 Mar., 2024*
Reviewed by:	Victor Hang ***Senior Engineer***	***Date:***	*25 Mar., 2024*
Approved by:	James Wei ***Manager***	***Date:***	*25 Mar., 2024*

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2 Version

Version No.	Date	Description
00	*25 Mar., 2024*	*Original*

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4 SAR Results Summary

This report was amended on FCC ID: 2AIZN-X6851 follow FCC Class II Permissive Change. The original report: JYTSZ-R14-2300180, issued by JianYan Testing Group Shenzhen Co., Ltd. The differences between them as below: Add LTE Band 42. So need to test Band 42.

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	0.177	PCE	1.002
	PCS 1900	0.068		
	WCDMA Band II	0.125		
	WCDMA Band IV	0.128		
	WCDMA Band V	0.191		
	LTE Band 2	0.114		
	LTE Band 5	0.203		
	LTE Band 7	0.904		
	LTE Band 12 & LTE Band 17	0.113		
	LTE Band 41 & LTE Band 38	0.360		
	LTE Band 42	0.668		
	LTE Band 66 & LTE Band 4	0.130		
	NR n5	0.166		
	NR n7	1.002		
	NR n12	0.078		
	NR n41& n38	0.069		
	NR n66	0.349		
	NR n77 (3450MHz~3550MHz) & n78 (3450MHz~3550MHz)	0.286		
	NR n77 (3550MHz~3700MHz) & NR n78 (3550MHz~3700MHz)	0.279		
	NRn77 (3700MHz~3980MHz) & n78 (3700MHz~3800MHz)	0.244		
	WLAN 2.4 GHz	0.374	DTS	
	Bluetooth	0.050	DSS	
	WLAN 5.2 GHz	0.167	NII	
	WLAN 5.8 GHz	0.288		
Body (10 mm Gap)	GSM 850	0.455	PCE	0.685
	PCS 1900	0.685		
	WCDMA Band II	0.612		
	WCDMA Band IV	0.594		
	WCDMA Band V	0.293		
	LTE Band 2	0.654		
	LTE Band 5	0.292		
	LTE Band 7	0.333		
	LTE Band 12 & LTE Band 17	0.188		

	LTE Band 41 & LTE Band 38	0.136		
	LTE Band 42	0.162		
	LTE Band 66 & LTE Band 4	0.572		
	NR n5	0.276		
	NR n7	0.400		
	NR n12	0.174		
	NR n41& n38	0.273		
	NR n66	0.585		
	NR n77 (3450MHz~3550MHz) & n78 (3450MHz~3550MHz)	0.229		
	NR n77 (3550MHz~3700MHz) & NR n78 (3550MHz~3700MHz)	0.047		
	NRn77 (3700MHz~3980MHz) & n78 (3700MHz~3800MHz)	0.225		
	WLAN 2.4 GHz	0.102	DTS	
	Bluetooth	0.011	DSS	
	WLAN 5.2 GHz	0.036	NII	
	WLAN 5.8 GHz	0.073		
Hotspot (10 mm Gap)	GSM 850	0.455	PCE	0.878
	PCS 1900	0.878		
	WCDMA Band II	0.758		
	WCDMA Band IV	0.878		
	WCDMA Band V	0.293		
	LTE Band 2	0.676		
	LTE Band 5	0.292		
	LTE Band 7	0.612		
	LTE Band 12 & LTE Band 17	0.188		
	LTE Band 41 & LTE Band 38	0.201		
	LTE Band 42	0.166		
	LTE Band 66 & LTE Band 4	0.864		
	NR n5	0.276		
	NR n7	0.470		
	NR n12	0.174		
	NR n41& n38	0.345		
	NR n66	0.797		
	NR n77 (3450MHz~3550MHz) & n78 (3450MHz~3550MHz)	0.229		
	NR n77 (3550MHz~3700MHz) & NR n78 (3550MHz~3700MHz)	0.047		
	NRn77 (3700MHz~3980MHz) & n78	0.225		

	(3700MHz~3800MHz)			
	WLAN 2.4 GHz	0.124	DTS	
	Bluetooth	0.011	DSS	
	WLAN 5.2 GHz	0.067	NII	
	WLAN 5.8 GHz	0.142		

<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)
Right Tilted	EN-DC 7A_n77A	1.183	PCE	1.534
	2.4G WIFI	0.351	DTS	
	NFC	0	DXX	

Note:

1. 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.
2. 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.
3. For FDD-LTE Band 17 is full covered by FDD-LTE Band 12, so only FDD-LTE Band 12 was tested.
4. For FDD-LTE Band 4 is full covered by FDD-LTE Band 66, so only FDD-LTE Band 66 was tested.
5. For TDD-LTE Band 38 is full covered by TDD-LTE Band 41, so only TDD-LTE Band 41 was tested.
6. For FDD-LTE Band 17 is full covered by FDD-LTE Band 12, so only FDD-LTE Band 12 was tested.
7. For TDD-NR n38 is full covered by TDD-NR n41, so only TDD-NR n41 was tested.
8. For TDD-NR n78 is full covered by TDD-NR n77, so only TDD-NR n77 was tested.

5 General Information

5.1 Client Information

Applicant:	INFINIX MOBILITY LIMITED
Address of Applicant:	FLAT N 16/F BLOCK B UNIVERSAL INDUSTRIAL CENTRE 19-25 SHAN MEI STREET FOTAN NT HONGKONG
Manufacturer:	INFINIX MOBILITY LIMITED
Address of Manufacturer:	FLAT N 16/F BLOCK B UNIVERSAL INDUSTRIAL CENTRE 19-25 SHAN MEI STREET FOTAN NT HONGKONG
Factory:	SHENZHEN TECNO TECHNOLOGY CO.,LTD.
Address of Factory:	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.:	X6851			
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 17: 704MHz~716MHz	
		Band 38: 2570MHz~2620MHz	Band 41: 2496MHz~2690MHz	
		Band 42: 3450MHz~3550MHz	Band 66:1710MHz~1780MHz	
	5G NR	n5: 824MHz~849MHz	n7: 2500MHz~2570MHz	
		n12: 699-716MHz	n38: 2570MHz~2620MHz	
		n41: 2496MHz~2690MHz	n66:1710MHz~1780MHz	
		n77: 3450MHz~3550MHz	n77: 3550MHz~3700MHz	
		n77: 3700MHz~3980MHz	n78: 3450MHz~3550MHz	
		n78: 3550MHz~3700MHz	n78: 3700MHz~3800MHz	
	Wi-Fi:	2412MHz~2462MHz	5150MHz-5250MHz	
		5725MHz-5850MHz		
	Bluetooth: 2402 MHz ~ 2480 MHz			
	NFC:13.56MHz			
Modulation technology:	GSM:	☒Voice(GMSK)	☒GPRS(GMSK)	☒EGPRS(GMSK, 8PSK)
	WCDMA:	☒RMC(QPSK)	☒HSUPA(QPSK)	☒HSDPA(QPSK,16QAM)
	LTE:	☒QPSK	☒16QAM	☒64QAM
	5G NR:	☒CP-OFDM(QPSK,16QAM,64QAM,256QAM)		
		☒DFT-s-OFDM(π/2 -BPSK,QPSK,16QAM,64QAM,256QAM)		
	Wi-Fi:	☒802.11b(DSSS)	☒802.11a/g/n/ac (OFDM)	
	Bluetooth:	☒BDR(GFSK)	☒EDR(π/4-DQPSK, 8DPSK)	☒LE(GFSK)
	NFC:	☒ASK		

	SA: NR n5, n7,n12, n38, n41,n66, n77, n78			
	CA: CA_N41A_N78A(Only supports downlink CA)			
	NSA(EN-DC): DC_2A_n7A, DC_5A_n7A, DC_7A_n7A, DC_66A_n7A, DC_5A_n38A, DC_66A_n38A, DC_4A_n41A, DC_5A_n41A, DC_41A_n41A, DC_66A_n41A, DC_2A_n66A, DC_5A_n66A, DC_7A_n66A, DC_66A_n66A, DC_2A_n78A, DC_4A_n78A, DC_5A_n78A, DC_7A_n78A, DC_38A_n78A, DC_41A_n78A, DC_66A_n78A, DC_5A_n77A, DC_7A_n77A, DC_41A_n77A, DC_66A_n77A EN-DC with LTE 2CA： DC_7C_n78A, DC_41C_n78A, DC_7C_n77A, DC_41C_n77A, DC_41C_n41A, DC_7A_7A_n78A, DC_2A_7A_n78, DC_2A_66A_n78, DC_5A-7A_n78A, DC_2A_7C_N78 (LTE Band 7C and 41C only supports downlink)			
Antenna Type:	Internal Antenna			
Antenna Gain:	GSM 850:	-6.80 dBi	PCS 1900:	-5.20 dBi
	WCDMA Band II:	-5.20 dBi	WCDMA Band V	-6.80 dBi
	WCDMA Band IV:	-4.38 dBi		
	LTE Band 2:	-5.20 dBi	LTE Band 4	-4.38 dBi
	LTE Band 5:	-6.80 dBi	LTE Band 7 ANT2:	-3.76 dBi
	LTE Band 7 ANT6:	-1.84 dBi	LTE Band 12:	-8.16 dBi
	LTE Band 17:	-8.16 dBi	LTE Band 38:	-3.76 dBi
	LTE Band 41 ANT2:	-3.76 dBi	LTE Band 41 ANT6:	-1.84 dBi
	LTE Band 42	-1.85 dBi	LTE Band 66 ANT2:	-4.38 dBi
	LTE Band 66 ANT6:	-1.74 dBi		
	n5:	-6.80 dBi	n7 ANT2:	-3.76 dBi
	n7 ANT6:	-1.84 dBi	n12:	-8.16 dBi
	n38 ANT2:	-3.76 dBi	n38 ANT6:	-1.84 dBi
	n41 ANT2:	-3.76 dBi	n41 ANT6:	-1.84 dBi
	n66 ANT2:	-4.38 dBi	n66 ANT6:	-1.74 dBi
	n77 ANT7:	-1.85 dBi	n78 ANT7:	-1.85 dBi
	Bluetooth ANT13:	-1.91 dBi	2.4G Wi-Fi ANT13:	-1.91 dBi
	Bluetooth ANT8:	-3.88 dBi	2.4G Wi-Fi ANT8:	-3.88 dBi
	5G Wi-Fi:	-1.54 dBi		
(E)GPRS Class:	(E)GPRS Class: 12			
Dimensions (L*W*H):	164 mm (L)× 75 mm (W)× 8 mm (H)			
Accessories information:	Adapter: Model: U450XSB Input:100-240V AC,50/60Hz 1.8A Output:5.0V DC 3.0A 15.0W or 5.0V-10.0V DC 4.5A or 11.0V DC 4.1A 45.0W MAX		Battery: Rechargeable Li-ion Battery 3.91V/4900mAh Headset: Support headset	

5.3 Maximum RF Output Power

Mode	Average Power (dBm)	
	GSM 850	PCS 1900
GSM (Voice)	33.25	29.14
GPRS (1 TX Slot)	33.24	29.18
GPRS (2 TX Slots)	32.51	28.46
GPRS (3 TX Slots)	30.77	26.65
GPRS (4 TX Slots)	29.69	25.61
EGPRS (1 TX Slot)	26.87	25.94
EGPRS (2 TX Slots)	25.80	24.98
EGPRS (3 TX Slots)	23.54	22.92
EGPRS (4 TX Slots)	22.39	21.68

Mode	Average Power (dBm)		
	WCDMA Band II	WCDMA Band IV	WCDMA Band V
AMR 12.2 kbps	23.20	22.87	23.71
RMC 12.2 kbps	23.28	22.92	23.72
HSDPA Sub-test 1	23.26	22.94	23.73
HSDPA Sub-test 2	22.71	22.44	23.42
HSDPA Sub-test 3	22.77	22.49	23.47
HSDPA Sub-test 4	22.74	22.45	23.42
HSUPA Sub-test 1	21.19	20.91	21.94
HSUPA Sub-test 2	21.72	21.43	22.41
HSUPA Sub-test 3	22.21	21.92	22.94
HSUPA Sub-test 4	21.23	20.94	21.96
HSUPA Sub-test 5	23.23	22.96	23.75

Mode	Average Power (dBm)						
	LTE Band 2	LTE Band 5	LTE Band 7	LTE Band 12	LTE Band 41(38)	LTE Band 42	LTE Band 66(4)
BW/1.4 MHz	23.29	23.74	/	23.49	/	/	22.85
BW/3.0 MHz	23.26	23.80	/	23.42	/	/	22.67
BW/5.0 MHz	23.59	24.03	22.27	23.54	24.49	23.46	22.98
BW/10 MHz	23.48	23.94	22.10	23.39	24.55	23.36	22.70
BW/15 MHz	23.33	/	22.03	/	24.65	23.48	22.77
BW/20 MHz	23.40	/	22.12	/	24.54	23.23	22.90

Mode	Average Power (dBm)							
	NR Band n5	NR Band n7	NR Band n12	NR Band n41	NR Band n66	NR Band n77 3450-3550	NR Band n77 3550-3700	NR Band n77 3700-3980
BW/10MHz	23.14	22.96	23.67	22.77	23.38	25.38	26.01	26.41
BW/15MHz	22.96	22.90	23.65	22.75	23.37	25.19	25.99	26.35
BW/20MHz	22.86	22.84	/	22.71	23.30	25.20	25.95	26.38
BW/30MHz	/	/	/	22.81	23.21	25.15	25.40	26.54
BW/40MHz	/	/	/	22.75	/	25.31	25.86	26.57
BW/50MHz	/	/	/	22.70	/	25.22	25.89	26.44
BW/60MHz	/	/	/	22.58	/	25.19	25.90	26.34
BW/80MHz	/	/	/	22.53	/	25.10	25.83	26.32
BW/90MHz	/	/	/	22.48	/	25.15	25.75	26.32
BW/100MHz	/	/	/	22.39	/	24.92	25.83	26.27

ANT13:

WLAN 2.4 GHz Band Average Power (dBm)				
Mode/Band	b	g	n (HT-20)	n (HT-40)
WLAN 2.4GHz	17.57	14.32	13.30	13.24

ANT8:

WLAN 2.4 GHz Band Average Power (dBm)				
Mode/Band	b	g	n (HT-20)	n (HT-40)
WLAN 2.4GHz	17.88	15.22	15.13	14.82

WLAN 5.2 GHz Band Average Power (dBm)						
Mode/Band	a	ac 20	ac 40	ac 80	n 20	n 40
WLAN 5.2GHz	16.88	14.00	13.54	13.12	15.79	14.27

WLAN 5.8 GHz Band Average Power (dBm)						
Mode/Band	a	ac 20	ac 40	ac 80	n 20	n 40
WLAN 5.8GHz	16.35	14.86	14.58	13.78	15.29	15.44

ANT13:

Bluetooth Average Power (dBm)							
Mode/Band	1 Mbps (GFSK)	2 Mbps (π/4DQPSK)	3 Mbps (8DPSK)	BLE PHY 1M	BLE PHY 2M	BLE Coded PHY S=2	BLE Coded PHY S=8
Bluetooth	11.63	11.35	11.50	6.93	6.32	6.23	5.79

ANT8:

Bluetooth Average Power (dBm)							
Mode/Band	1 Mbps (GFSK)	2 Mbps (π/4DQPSK)	3 Mbps (8DPSK)	BLE PHY 1M	BLE PHY 2M	BLE Coded PHY S=2	BLE Coded PHY S=8
Bluetooth	10.45	9.90	9.68	4.53	4.62	4.51	4.50

NFC Band Average Power (dBm)	
Mode/Band	ASK
NFC	-56.05

Please refer to FCC ID: 2AIZN-X6851, report No. JYTSZ-R14-2300180.

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
SZR012300635-5	SAR
***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.*	

5.6 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **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

5.7 Test Location

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

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 *General Population* (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT *Occupational* (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

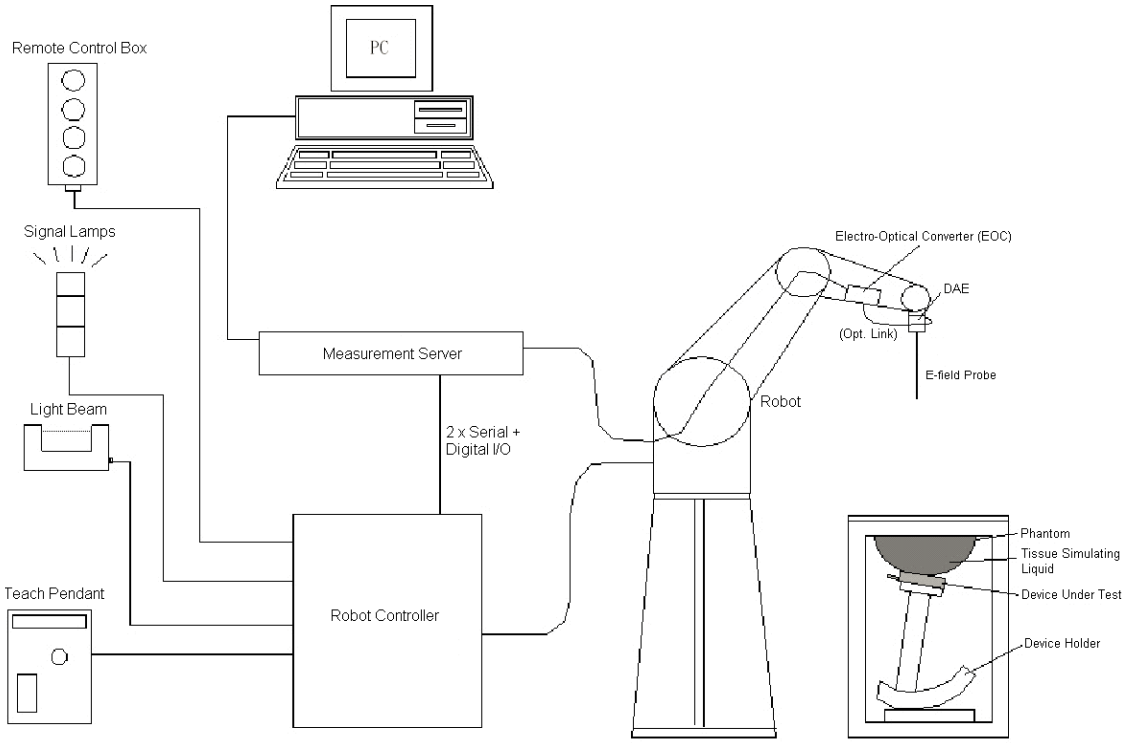


Fig. 8.1 SPEAG DASY System Configurations

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
- Remove control with teach pendant and additional circuitry for robot safety such as warming 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.

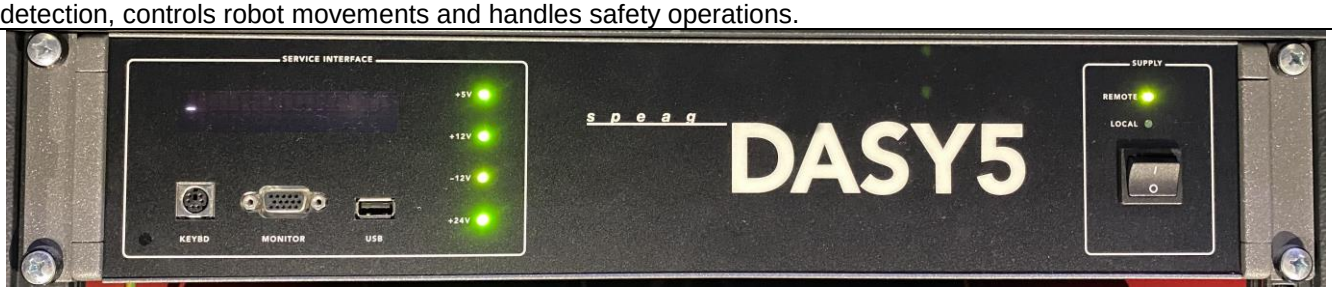


Fig. 8.5 Photo of Server for DASY5

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 than0.1 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	 **Fig. 8.7 Photo of SAM Twin Phantom**
Filling Volume **Dimensions**	Approx. 25 liters Length: 1000mm; Width: 500mm; Height: adjustable feet	
Measurement Areas	Left Head, Right Head, Flat 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

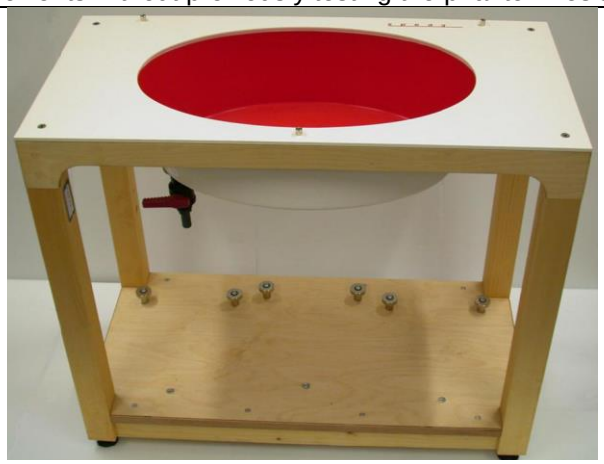


Fig.8.8 Photo of ELI4 Phantom

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 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.

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:

E- Field Probes: $E_i = \sqrt{\frac{v_i}{Norm_i \cdot ConvF}}$

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)
$Norm_i$ = senor sensitivity of channel i, (i = x, y, z), μV/ $(V/m)^2$
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
Hi = 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	3500MHz System Validation Kit	D3500V2	WXJ023-8	01.22.2024	01.21.2027
SPEAG	Data Acquisition Electronics	DAE4	WXJ021	11.27.2023	11.26.2024
SPEAG	Dosimetric E-Field Probe	EX3DV4	SN:7728	11.22.2023	11.21.2024
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	WXG023-1	N.C.R	N.C.R
SPEAG	Phantom	Twin SAM V5.0	WXG023-4	N.C.R	N.C.R
SPEAG	Phantom	2mm Oval Phantom ELI5	WXG023-5	N.C.R	N.C.R
SPEAG	Phone Positioner	N/A	WXG023-6	N.C.R	N.C.R
St?ubli	Robot	TX60Lspeag	WXG023-3	N.C.R	N.C.R
KEYSIGHT	UXM 5G Wireless Test Platform	E7515B	WXJ008-6	09.25.2023	09.24.2024
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	12.27.2023	12.26.2025
KEYSIGHT	Network Analyzer	E5071C	WXJ091	12.27.2023	12.26.2024
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.

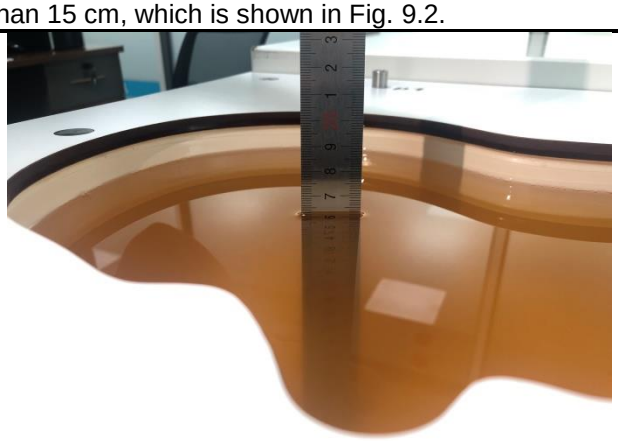


Fig. 9.1 Photo of Liquid Height for Head SAR

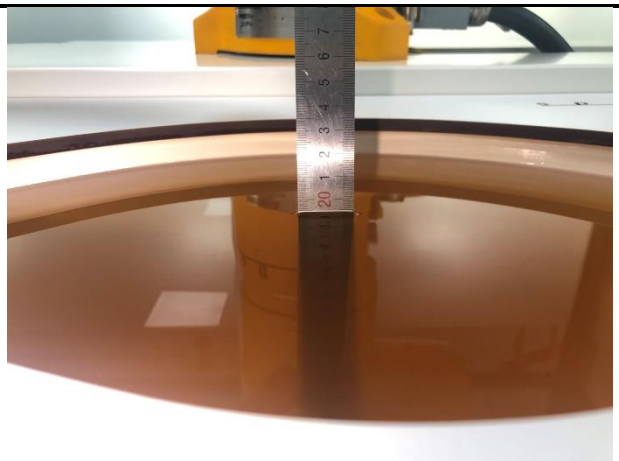


Fig. 9.2 Photo of Liquid Height for Body SAR

The relative permittivity and conductivity of the tissue material should be within ±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)	εr	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

(εr = relative permittivity, σ = conductivity and ρ = 1000 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. (℃)	Conductivity (σ)	Permittivity (εr)	Conductivity Target(σ)	Permittivity Target(εr)	Delta (σ)%	Delta (εr)%	Limit (%)	Date (mm/dd/yy)
3500	22.4	3.00	39.69	2.91	37.90	3.09	4.72	±5	03/19/2024

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:

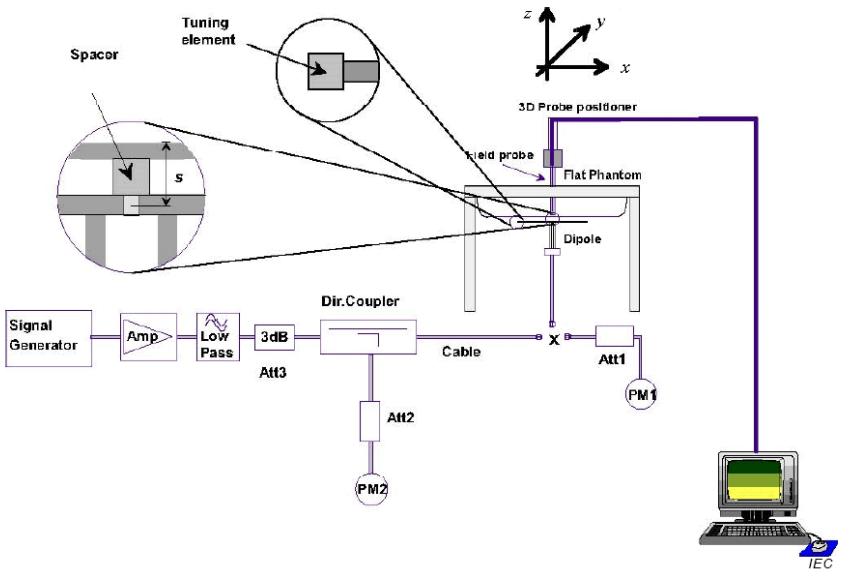


Fig.10.1 System Verification Setup Diagram

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 to1W 1g SAR (W/kg)	1W Target 1g SAR (W/kg)	Deviation (%)
03/19/2024	3500	40	2.710	67.75	65.6	3.28

11 EUT Testing Position

This EUT was tested in ten different positions. They are right cheek/right tilted/left cheek/left tilted for head, Front/Back/Left Side/Right Side/Top Side/Bottom 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.

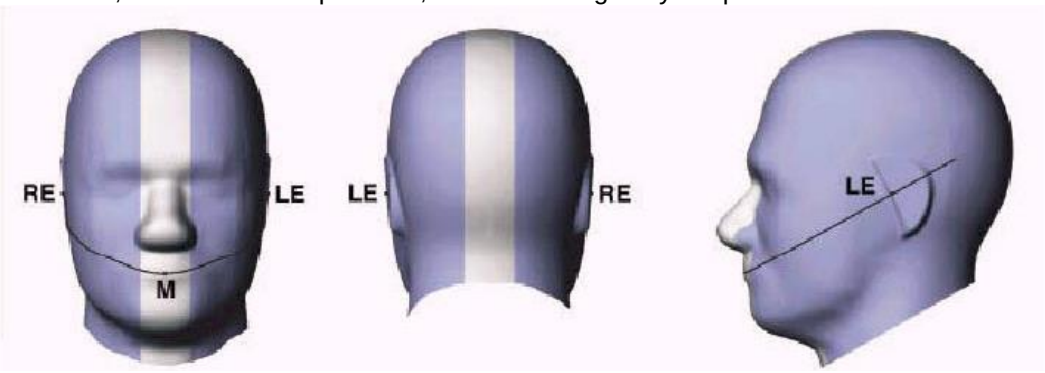


Fig.11.1 Illustration for Front, Back and Side of SAM Phantom

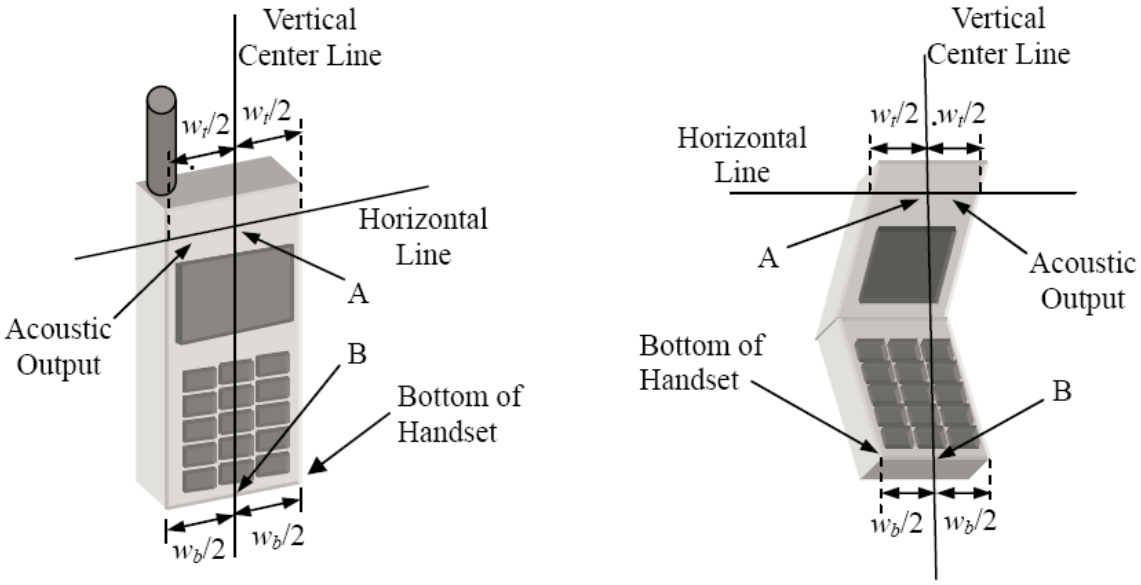


Fig. 11.2 Illustration for Handset Vertical and Horizontal Reference Lines

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.

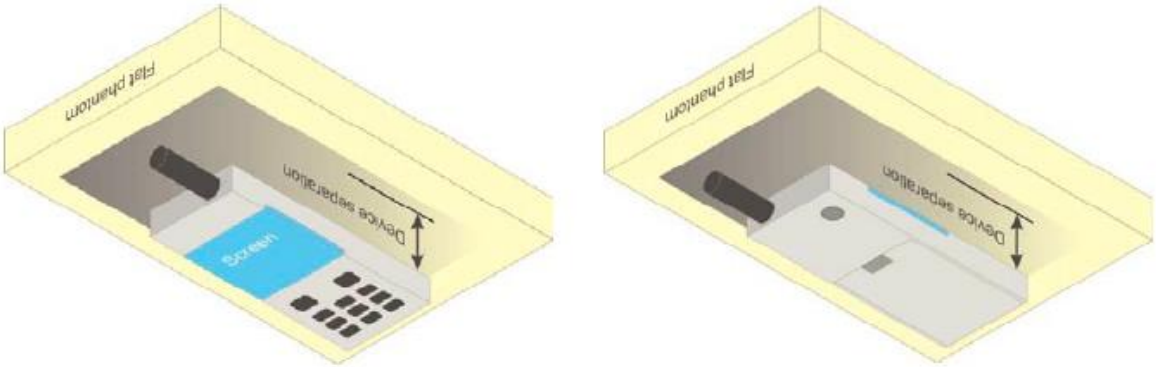


Fig.11.5 Illustration for Body Worn Position

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 x W ≥
9 cm x 5 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.

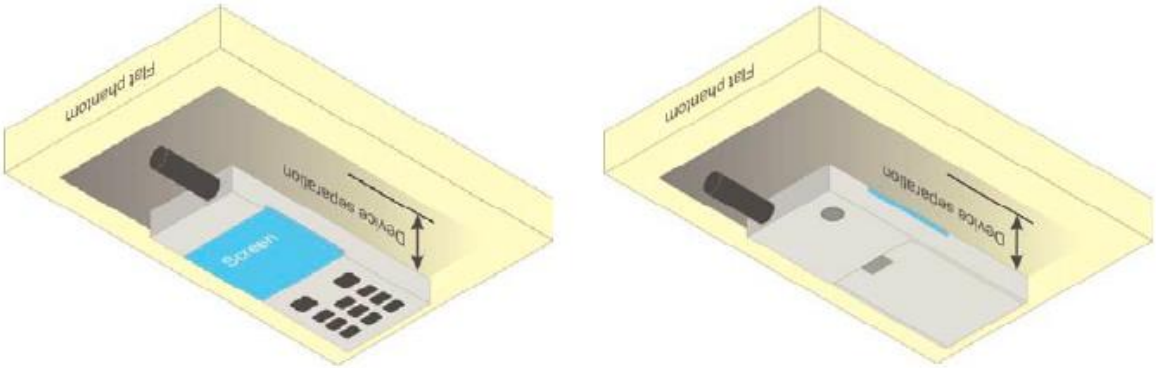


Fig.11.6 Illustration for Hotspot Position

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 form 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	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}			≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
			When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

* When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

12.4 Volume Scan Procedures

The volume scan is used for 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 DASY, 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 DASY 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

The detailed conducted power table can refer to JYTSZ-R14-2300180 Appendix D Conducted RF Output Power.

13.1 LTE Conducted Power

13.1.1 Largest channel bandwidth standalone SAR test requirements

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.8 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.

QPSK with 50% RB allocation

The procedures required for 1 RB allocation in section 4.2.1 are applied to measure the SAR for QPSK with 50% RB allocation.9

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 sections 4.2.1 and 4.2.2 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.

Higher order modulations

For each modulation besides QPSK; e.g., 16-QAM, 64-QAM, apply the QPSK procedures in sections 4.2.1, 5.2.2 and 4.2.3 to determine the QAM configurations that may need SAR measurement. For each configuration identified as required for testing, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is > 1/2dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg.

13.1.2 Other channel bandwidth standalone SAR test requirements

For the other channel bandwidths used by the device in a frequency band, apply all the procedures required for the largest channel bandwidth in section 4.2 to determine the channels and RB configurations that need SAR testing and only measure SAR when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > 1/2 dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the reported SAR of a configuration for the largest channel bandwidth is > 1.45 W/kg. The equivalent channel configuration for the RB allocation, RB offset and modulation etc. is determined for the smaller channel bandwidth according to the same number of RB allocated in the largest channel bandwidth. For example, 50 RB in 10 MHz channel bandwidth does not apply to 5 MHz channel bandwidth; therefore, this cannot be tested in the smaller channel bandwidth. However, 50% RB allocation in 10 MHz channel bandwidth is equivalent to 100% RB allocation in 5 MHz channel bandwidth; therefore, these are the equivalent configurations to be compared to determine the specific channel and configuration in the smaller channel bandwidth that need SAR testing.

13.3.3 TDD LTE configuration setup for SAR measurement

According to KDB 941225 D05v02r03 and April 2013 TCB workshop slides, SAR must be tested with a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by 3GPP.

- see 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations
- “special subframe S” contains both uplink and downlink transmissions and must be taken into consideration to determine the transmission duty factor
  - according to the worst case uplink and downlink cyclic prefix requirements for UpPTS to determine the highest SAR test duty factor

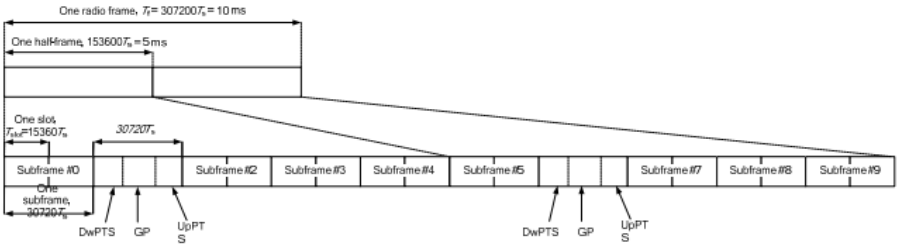


Figure 4.2-1: Frame structure type 2 (for 5 ms switch-point periodicity)

Table 4.2-1: Configuration of special subframe (lengths of DwPTS/GP/UpPTS)

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

Per 3GPP 36.211 section 4.2, each radio frame of length T_f=37200Ts = 10 ms consists of two half-frames of length 153600Ts = 5ms each. Each half-frame consists of five subframes of length 30720Ts = 1ms. So, the uplink duty factor in special subframe as below:

Special Subframe configuration	Normal cyclic prefix in downlink		Extended cyclic prefix in downlink	
	Duty factor of Uplink		Duty factor of Uplink	
	Normal cyclic prefix in uplink	Extended cyclic prefix in uplink	Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	7.14%	8.33%	7.14%	8.33%
1	7.14%	8.33%	7.14%	8.33%
2	7.14%	8.33%	7.14%	8.33%
3	7.14%	8.33%	7.14%	8.33%
4	7.14%	8.33%	14.27%	16.67%
5	14.27%	16.67%	14.27%	16.67%
6	14.27%	16.67%	14.27%	16.67%
7	14.27%	16.67%	14.27%	16.67%
8	14.27%	16.67%	/	/
9	14.27%	16.67%	/	/

Table 4.2-2: Uplink-downlink configurations

Uplink-downlink configuration	Downlink-to-Uplink Switch-point periodicity	Subframe number									
		0	1	2	3	4	5	6	7	8	9
0	5 ms	D	S	U	U	U	D	S	U	U	U
1	5 ms	D	S	U	U	D	D	S	U	U	D
2	5 ms	D	S	U	D	D	D	S	U	D	D
3	10 ms	D	S	U	U	U	D	D	D	D	D
4	10 ms	D	S	U	U	D	D	D	D	D	D
5	10 ms	D	S	U	D	D	D	D	D	D	D
6	5 ms	D	S	U	U	U	D	S	U	U	D

According to above table:

1. The highest duty factor is configuration 0;
2. The duty factor of uplink in one half-frame with normal cyclic prefix is: (3ms + 0.143ms)/5ms=62.86%;
3. The duty factor of uplink in one half-frame with extended cyclic prefix is: (3ms + 0.167ms)/5ms=63.34%;
4. For purpose to get the worst case SAR test duty factor, the duty factor of normal cyclic prefix in uplink scaled-up to the extended cyclic prefix in uplink, the scaling factor is 63.34%/62.86%=1.008, and the scaling factor will be taken into the final measured SAR.

LTE Band 42 part(3450-3550):

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					42115	42590	43065
					3452.5	3500	3547.5
Band 42	5	QPSK	1	0	23.17	23.42	22.98
			1	12	23.15	23.43	22.96
			1	24	23.17	23.46	23.00
			12	0	22.20	22.24	22.00
			12	6	22.20	22.29	22.00
			12	11	22.16	22.28	22.05
			25	0	22.18	22.27	22.03
		16QAM	1	0	22.23	22.55	22.09
			1	12	22.16	22.53	22.09
			1	24	22.16	22.54	22.10
			12	0	21.08	21.24	21.01
			12	6	21.11	21.22	21.05
			12	11	21.09	21.21	21.05
			25	0	21.14	21.25	21.04
		64QAM	1	0	21.09	21.46	21.38
			1	12	21.05	21.44	21.39
			1	24	21.04	21.49	21.44
			12	0	20.08	20.22	20.05
			12	6	20.06	20.22	20.03
			12	11	20.02	20.19	20.05
			25	0	20.12	20.28	19.97

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					42140	42590	43040
					3455	3500	3545
Band 42	10	QPSK	1	0	23.23	23.36	23.04
			1	24	23.25	23.36	23.04
			1	49	23.18	23.33	23.07
			25	0	22.20	22.32	22.02
			25	12	22.25	22.31	21.96
			25	24	22.17	22.30	22.05
			50	0	22.19	22.31	22.07
		16QAM	1	0	22.45	22.07	21.95
			1	24	22.38	22.08	21.96
			1	49	22.34	22.07	21.97
			25	0	21.30	21.30	21.00
			25	12	21.29	21.31	21.03
			25	24	21.21	21.26	21.05
			50	0	21.22	21.31	21.00
		64QAM	1	0	21.45	21.01	21.32
			1	24	21.44	21.08	21.33
			1	49	21.37	21.04	21.39
			25	0	20.21	20.16	20.01
			25	12	20.21	20.18	19.99
			25	24	20.14	20.17	20.04
			50	0	20.18	20.20	20.02

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					42165	42590	43015
					3457.5	3500	3542.5
Band 42	15	QPSK	1	0	23.20	23.41	23.02
			1	37	23.18	23.48	23.00
			1	74	23.09	23.40	22.99
			36	0	22.14	22.35	22.00
			36	16	22.13	22.33	22.00
			36	35	22.13	22.32	21.99
			75	0	22.18	22.33	22.01
		16QAM	1	0	22.40	22.15	21.95
			1	37	22.39	22.23	21.94
			1	74	22.25	22.10	21.94
			36	0	22.14	22.34	21.99
			36	16	22.13	22.34	22.00
			36	35	22.15	22.32	22.00
			75	0	21.19	21.33	20.99
		64QAM	1	0	21.40	21.47	21.33
			1	37	21.40	21.55	21.31
			1	74	21.30	21.48	21.33
			36	0	22.19	22.33	21.99
			36	16	22.12	22.32	21.99
			36	35	22.17	22.32	22.00
			75	0	20.19	20.34	20.07

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					42190	42590	42990
					3460	3500	3540
Band 42	20	QPSK	1	0	23.18	23.23	23.19
			1	49	23.13	23.23	23.08
			1	99	22.99	23.15	22.99
			50	0	22.21	22.35	22.08
			50	24	22.24	22.34	22.13
			50	49	22.13	22.36	22.03
			100	0	22.15	22.32	21.99
		16QAM	1	0	22.21	21.84	21.82
			1	49	22.19	21.91	21.68
			1	99	22.01	21.75	21.62
			50	0	21.23	21.35	21.02
			50	24	21.21	21.36	21.06
			50	49	21.11	21.39	20.97
			100	0	21.09	21.31	21.01
		64QAM	1	0	21.04	21.23	21.15
			1	49	21.03	21.35	21.09
			1	99	20.94	21.20	20.98
			50	0	20.16	20.42	20.06
			50	24	20.15	20.41	20.04
			50	49	20.04	20.40	20.01
			100	0	20.13	20.30	19.93

14 Exposure Positions Consideration

14.1 EUT Antenna Locations

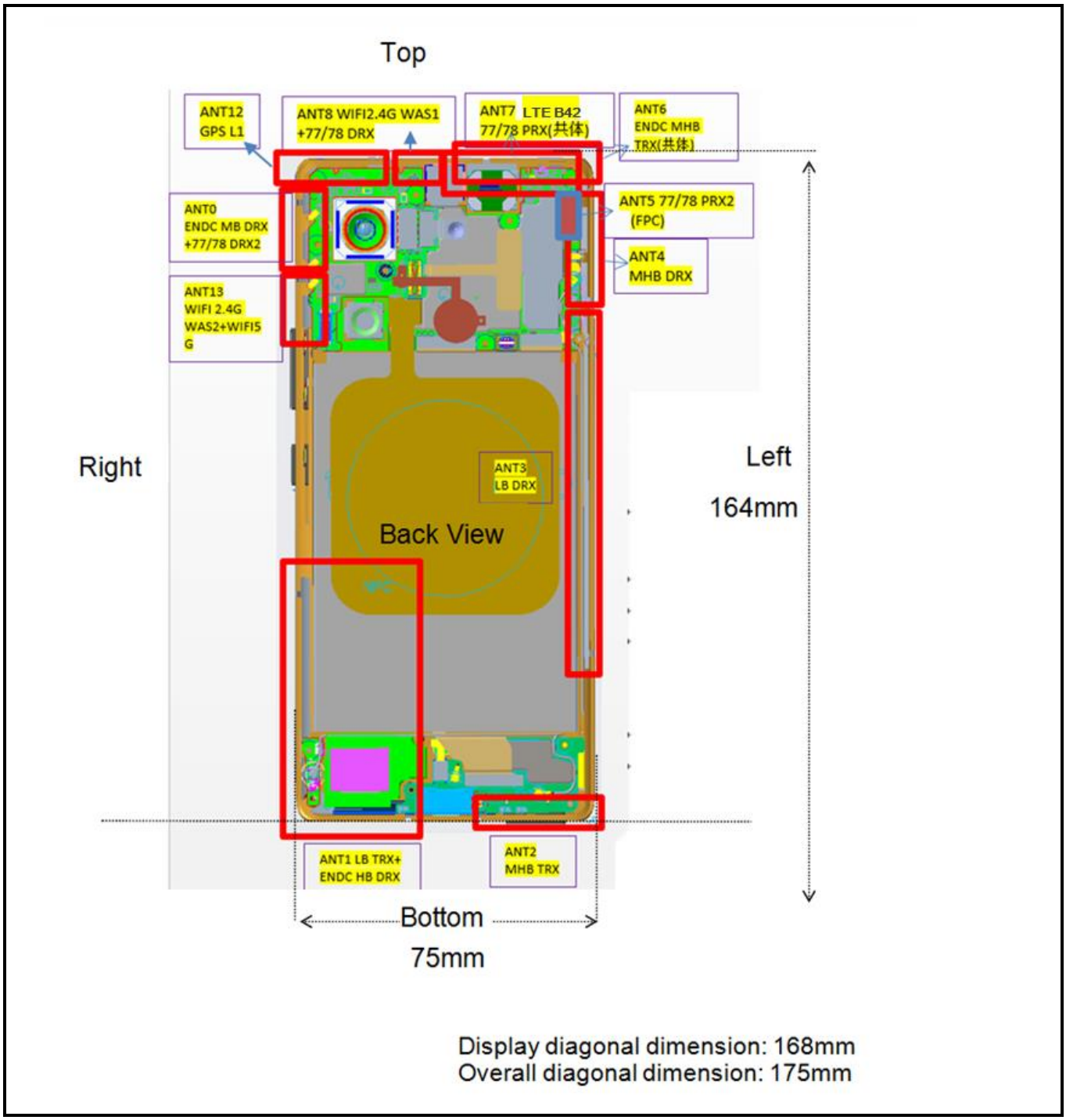


Fig.14.1 EUT Antenna Locations

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**
ANT1	<25mm	<25mm	121mm	<25mm	<25mm	61mm
ANT2	<25mm	<25mm	116mm	<25mm	59mm	<25mm
ANT6	<25mm	<25mm	<25mm	156mm	63mm	<25mm
ANT7	<25mm	<25mm	<25mm	156mm	63mm	<25mm
ANT8	<25mm	<25mm	<25mm	156mm	<25mm	55mm
ANT13	<25mm	<25mm	<25mm	122mm	<25mm	60mm

Test Positions Test distance: 10mm						
Antennas	**Back**	**Front**	**Top Side**	**Bottom Side**	**Right Side**	**Left Side**
ANT1	Yes	Yes	No	Yes	Yes	No
ANT2	Yes	Yes	No	Yes	No	Yes
ANT6	Yes	Yes	Yes	No	No	Yes
ANT7	Yes	Yes	Yes	No	No	Yes
ANT8	Yes	Yes	Yes	No	Yes	No
ANT13	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 ≥ 9cm * 5cm, 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.

15 SAR Test Results Summary

15.1 Standalone Head SAR Data

➢ TDD-LTE Band42(20MHz) QPSK Head SAR

Plot No.	Band/Mode	ANT	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	D.C Factor	Reported SAR_{1g} (W/kg)
1	Band42/1RB#0	7	Right Cheek	42590	3500	23.23	0.09	23.5	**0.623**	1.064	1.008	0.668
	Band42/1RB#0	7	Right Tilted	42590	3500	23.23	0.20	23.5	0.537	1.064	1.008	0.576
	Band42/1RB#0	7	Left Cheek	42590	3500	23.23	0.13	23.5	0.269	1.064	1.008	0.289
	Band42/1RB#0	7	Left Tilted	42590	3500	23.23	-0.01	23.5	0.194	1.064	1.008	0.208
	Band42/50%RB#49	7	Right Cheek	42590	3500	22.36	-0.18	22.5	0.542	1.033	1.008	0.564
	Band42/50%RB#49	7	Right Tilted	42590	3500	22.36	0.10	22.5	0.467	1.033	1.008	0.486
	Band42/50%RB#49	7	Left Cheek	42590	3500	22.36	-0.07	22.5	0.214	1.033	1.008	0.223
	Band42/50%RB#49	7	Left Tilted	42590	3500	22.36	-0.13	22.5	0.159	1.033	1.008	0.166
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. According to KDB 865664 D02v01r02, SAR plot is required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination
6. Highlight part of test data means repeated test.
7. *: 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

➢ TDD-LTE Band 42(20MHz) QPSK Body SAR

Plot No.	Band/Mode	ANT	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	D.C Factor	Reported SAR_{1g} (W/kg)
	Band42/1RB#0	7	Front	42590	3500	23.23	0.08	23.5	0.064	1.064	1.008	0.069
2	Band42/1RB#0	7	Back	42590	3500	23.23	0.09	23.5	**0.151**	1.064	1.008	0.162
	Band42/50%RB#49	7	Front	42590	3500	22.36	0.02	22.5	0.053	1.033	1.008	0.055
	Band42/50%RB#49	7	Back	42590	3500	22.36	0.05	22.5	0.129	1.033	1.008	0.134
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						**1.6 W/kg (mW/g) Averaged over 1g**						

Note:

1. 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.
2. 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.
3. 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.
4. The WLAN SAR perform the front and back position, due considered the simultaneous SAR for body-worn.
5. 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.
6. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required when the measured SAR is ≥0.8W/kg.
7. 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.
8. According to KDB 865664 D02v01r02, SAR plot is required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination.
9. Highlight part of test data means repeated test.
10. *: 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

➢ TDD-LTE Band 42(20MHz) QPSK Body SAR in Hotspot mode

Plot No.	Band/Mode	ANT	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	D.C Factor	Reported SAR_{1g} (W/kg)
	Band42/1RB#0	7	Front	42590	3500	23.23	0.08	23.5	0.064	1.064	1.008	0.069
	Band42/1RB#0	7	Back	42590	3500	23.23	0.09	23.5	0.151	1.064	1.008	0.162
	Band42/1RB#0	7	Left	42590	3500	23.23	0.13	23.5	0.108	1.064	1.008	0.116
3	Band42/1RB#0	7	Top	42590	3500	23.23	0.03	23.5	**0.155**	1.064	1.008	0.166
	Band42/50%RB#49	7	Front	42590	3500	22.36	0.02	22.5	0.053	1.033	1.008	0.055
	Band42/50%RB#49	7	Back	42590	3500	22.36	0.05	22.5	0.129	1.033	1.008	0.134
	Band42/50%RB#49	7	Left	42590	3500	22.36	-0.18	22.5	0.091	1.033	1.008	0.095
	Band42/50%RB#49	7	Top	42590	3500	22.36	-0.04	22.5	0.134	1.033	1.008	0.140
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 channel Reported SAR ≤0.8W/kg, other channels SAR testing is not necessary.
2. Additional WLAN SAR testing was performed for simultaneous transmission analysis.
3. 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.
4. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required when the measured SAR is ≥0.8W/kg.
5. 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.
6. 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.
7. According to KDB 865664 D02v01r02, SAR plot is required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination.
8. Highlight part of test data means repeated test.
9. *: 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 Multi-Band Simultaneous Transmission Considerations

Please refer to FCC ID: 2AIZN-X6851, report No. JYTSZ-R14-2300180.

15.5 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.

15.6 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: 03.19.2024

DUT: Dipole 3500 MHz; Type: D3500V2; Serial: SN:1118

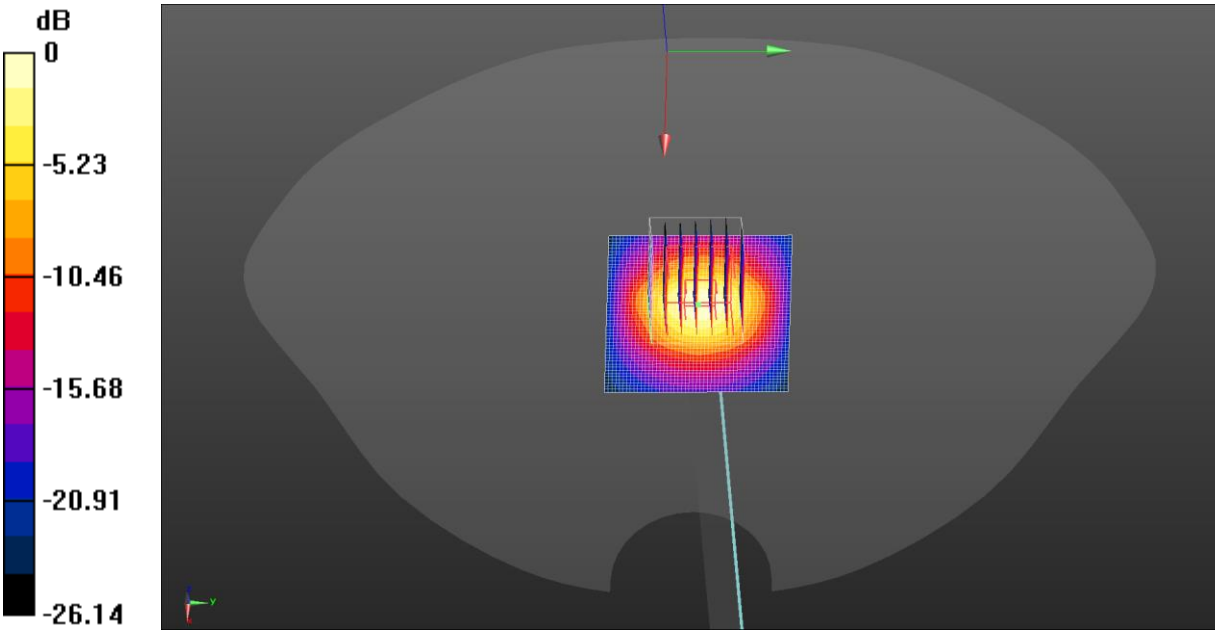
Communication System: UID 0, CW (0); Frequency: 3500 MHz;Duty Cycle: 1:1
Medium parameters used: f = 3500 MHz; σ = 2.997 S/m; ε_r = 39.687; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7728; ConvF(6.51, 7.12, 6.73) @ 3500 MHz; Calibrated: 11.22.2023
  Sensor-Surface: 1.4mm (Mechanical Surface Detection)
  Electronics: DAE4 Sn1373; Calibrated: 11.27.2023
  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 Frequency3500 MHz Head Tissue/d=10mm, Pin=40 mW, dist=1.4mm (EX-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 44.25 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 7.13 W/kg
SAR(1 g) = 2.71 W/kg; SAR(10 g) = 1.03 W/kg
Smallest distance from peaks to all points 3 dB below = 8 mm
Ratio of SAR at M2 to SAR at M1 = 38.6%
Maximum value of SAR (measured) = 5.34 W/kg

System Performance Check at Frequency3500 MHz Head Tissue/d=10mm, Pin=40 mW, dist=1.4mm (EX-Probe)/Area Scan (51x51x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 5.57 W/kg



0 dB = 5.57 W/kg = 7.46 dBW/kg

Appendix B: Plots of SAR Test Data

Test Laboratory: JYTSZ Date: 03.19.2024

DUT: Mobile Phone; Type: X6851; Serial: SZR012300635-5

Communication System: UID 0, LTE-TDD(USA) 20MHz 1RB QPSK (0); Frequency: 3500 MHz;Duty Cycle: 1:1.59956
Medium parameters used: f = 3500 MHz; σ = 2.997 S/m; ε_r = 39.687; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY5 Configuration:

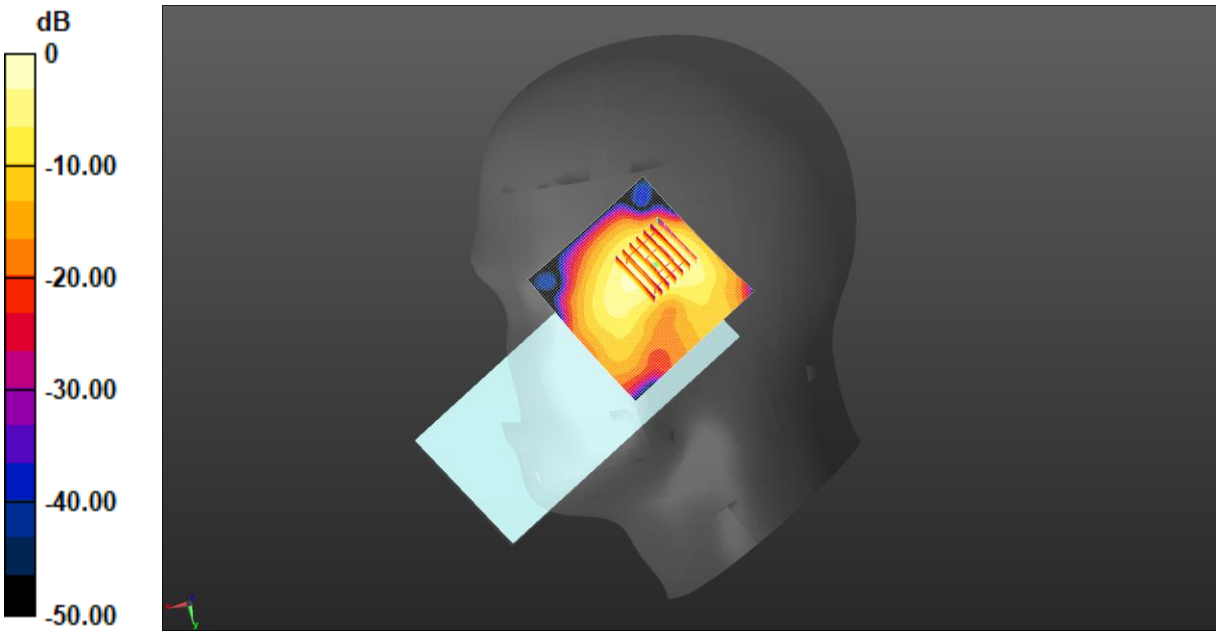
- Probe: EX3DV4 – SN7728; ConvF(6.51, 7.12, 6.73) @ 3500 MHz; Calibrated: 11.22.2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 11.27.2023
- Phantom: SAM-Twin; Type: QD 000 P40 CD; Serial: 1885
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

LTE Band 42 1RB(20MHz) Right Cheek/Middle Channel/Area Scan

(71x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 1.18 W/kg

LTE Band 42 1RB(20MHz) Right Cheek/Middle Channel/Zoom Scan

(7x7x8)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=4mm
Reference Value = 12.14 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 1.59 W/kg
SAR(1 g) = 0.623 W/kg; SAR(10 g) = 0.258 W/kg
Smallest distance from peaks to all points 3 dB below = 8.6 mm
Ratio of SAR at M2 to SAR at M1 = 46.6%
Maximum value of SAR (measured) = 1.15 W/kg



0 dB = 1.18 W/kg = 0.72 dBW/kg

Test Laboratory: JYTSZ Date: 03.19.2024

DUT: Mobile Phone; Type: X6851; Serial: SZR012300635-5

Communication System: UID 0, LTE-TDD(USA) 20MHz 1RB QPSK (0); Frequency: 3500 MHz;Duty Cycle: 1:1.59956
Medium parameters used: f = 3500 MHz; σ = 2.997 S/m; ε_r = 39.687; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

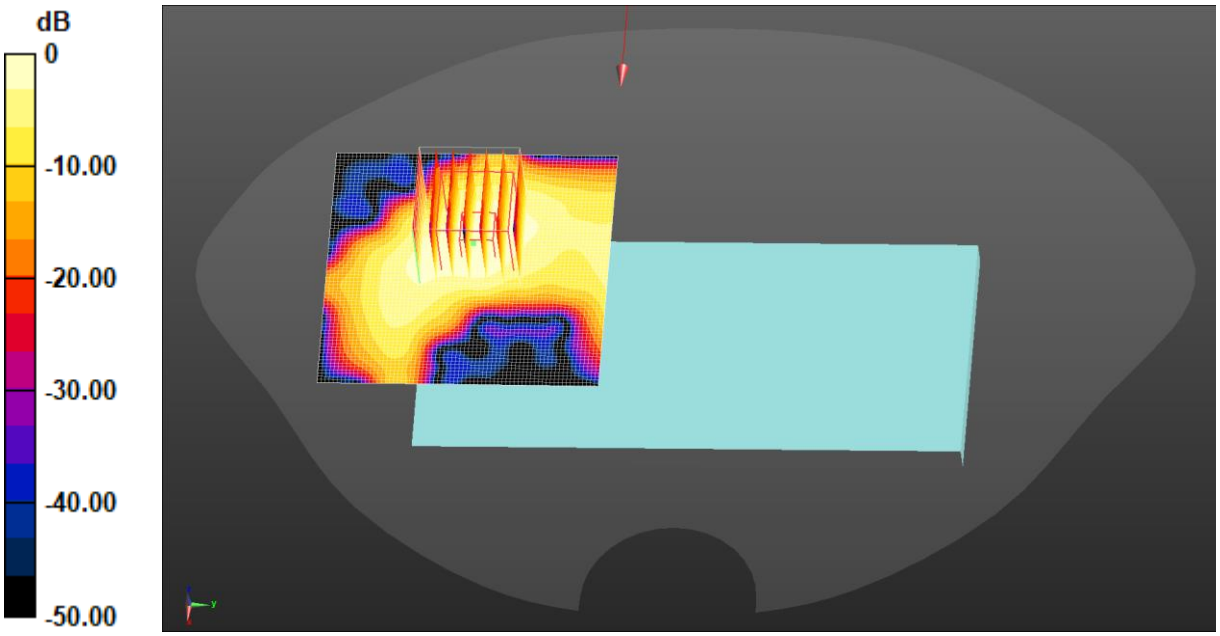
- Probe: EX3DV4 – SN7728; ConvF(6.51, 7.12, 6.73) @ 3500 MHz; Calibrated: 11.22.2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 11.27.2023
- Phantom: SAM-Twin; Type: QD 000 P40 CD; Serial: 1885
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

LTE Band 42 1RB(20MHz) Body Back/Middle Channel/Area Scan (71x71x1):

Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.290 W/kg

LTE Band 42 1RB(20MHz) Body Back/Middle Channel/Zoom Scan (7x7x8)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=4mm
Reference Value = 1.421 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.368 W/kg
SAR(1 g) = 0.151 W/kg; SAR(10 g) = 0.068 W/kg
Smallest distance from peaks to all points 3 dB below = 12 mm
Ratio of SAR at M2 to SAR at M1 = 45.7%
Maximum value of SAR (measured) = 0.270 W/kg



0 dB = 0.290 W/kg = -5.38 dBW/kg

Test Laboratory: JYTSZ Date: 03.19.2024

DUT: Mobile Phone; Type: X6851; Serial: SZR012300635-5

Communication System: UID 0, LTE-TDD(USA) 20MHz 1RB QPSK (0); Frequency: 3500 MHz;Duty Cycle: 1:1.59956
Medium parameters used: f = 3500 MHz; σ = 2.997 S/m; ε_r = 39.687; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

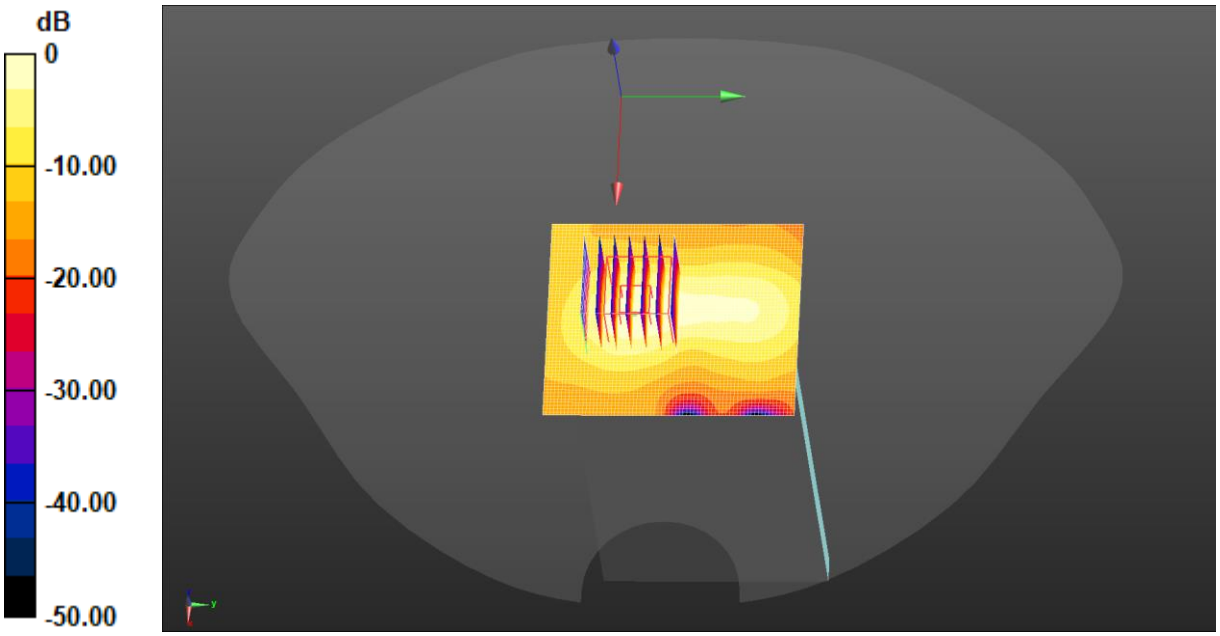
- Probe: EX3DV4 – SN7728; ConvF(6.51, 7.12, 6.73) @ 3500 MHz; Calibrated: 11.22.2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 11.27.2023
- Phantom: SAM-Twin; Type: QD 000 P40 CD; Serial: 1885
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

LTE Band 42 1RB(20MHz) Body Top/Middle Channel/Area Scan (61x71x1):

Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.309 W/kg

LTE Band 42 1RB(20MHz) Body Top/Middle Channel/Zoom Scan (7x7x8)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=4mm
Reference Value = 8.395 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.405 W/kg
SAR(1 g) = 0.155 W/kg; SAR(10 g) = 0.064 W/kg
Smallest distance from peaks to all points 3 dB below = 8 mm
Ratio of SAR at M2 to SAR at M1 = 44.9%
Maximum value of SAR (measured) = 0.294 W/kg



0 dB = 0.309 W/kg = -5.09 dBW/kg

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