Industrial Internet Innovation Center (Shanghai) Co.,Ltd.

SAR TEST REPORT

PRODUCT	Wireless Display
BRAND	Fellowes
MODEL	LKOUT W
FCC ID	IDH-RMTDSPY
APPLICANT	Fellowes Inc.
ISSUE DATE	August 19, 2024
STANDARD(S)	ANSI/IEEE C95.1-1992, IEEE Std 1528-2013

Prepared by: Chen Jintao **Reviewed by: Yan Hang** **Approved by: *Zhang Min***

陈锦涛 鄢航 张旻

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CONTENTS

1 Summary of Test Report

1.1 Test Standard (s)

No.	Test Standard(s)	Title	Version
1	ANSI/IEEE C95.1	IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.	1992
2	IEEE Std 1528	IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques	2013

1.2 Reference Documents

No.	Reference Document(s)	Title	Version
1	KDB447498	General RF Exposure Guidance	D01 v06
2	KDB865664	SAR Measurement 100 MHz to 6 GHz	D01 v01r04
3	KDB865664	RF Exposure Reporting	D02 v01r02
4	KDB941225	3G SAR Procedures	D01 v03r01
5	KDB941225	SAR for LTE Devices	D05 v02r05
6	KDB941225	Hotspot SAR	D06 v02r01
7	KDB248227	802.11 Wi-Fi SAR	D01 v02r02
8	KDB616217	SAR for laptop and tablets	D04 v01r02

1.3 Summary of Test Results

1.3.1 The maximum results of Specific Absorption Rate (SAR) in standalone mode are as follows.

Band	Reported SAR 1g(W/Kg) Body(0mm)	Detailed Results
WCDMA Band Ⅱ	**1.25**	See section 14.1
WCDMA Band Ⅳ	1.14	See section 14.1
WCDMA Band Ⅴ	0.46	See section 14.1
LTE Band 2	1.22	See section 14.1
LTE Band 5	1.23	See section 14.1
LTE Band 12	1.13	See section 14.1
LTE Band 13	1.03	See section 14.1
LTE Band 14	1.05	See section 14.1
LTE Band 66	1.08	See section 14.1
LTE Band 71	1.16	See section 14.1
Wi-Fi 2.4G	0.87	See section 14.1
Wi-Fi 5G	0.73	See section 14.1
BT	<0.10	See section 14.1

NOTE1: The LKOUT W manufactured by Fellowes Inc. is a variant product for testing.
NOTE2: This report is a supplement of project 23B01I30452-SAR01-V00. So the report is not valid without the report of 23B01I30452-SAR01-V00.
NOTE3: According to client's requirement, a new model (LKOUT W) need to add in the model list. The display unit of the new model has the same PCB layout, schematic diagram, Bom and wireless technology as well as the other electrical construction as the original model. The only difference is that the original model (LKOUT P) is powered by an adapter. However, the new model (LKOUT W) is powered by a junction box. So, in this test report only test data of "Worst-mode SAR for each frequency band" were new data on the new model, the other tests were referred from 23B01I30452-SAR01-V00 and the test data are still effective.
NOTE4: The device supports LTE Band 4 and LTE Band 66, since the supported frequency span for LTE Band 4 falls completely within the supports frequency span for LTE Band 66. The maximum output power(including tolerance) of LTE Band 4 is less than or equal to LTE Band 66, and both LTE bands share the same transmission path, according to TCB workshop April 2015 RF Exposure Procedures(Overlapping LTE Bands), LTE Band 4 is covered by LTE Band 66, therefore, SAR was only assessed for LTE Band 66.
NOTE5: Industrial Internet Innovation Center (Shanghai) Co., Ltd. has verified that the compliance of the tested device specified in section 4 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 1 of this test report.

1.3.2 The maximum results of Specific Absorption Rate (SAR) in simultaneous mode are as follows.

Highest Reported SAR 1g(W/kg)			
Mode	**Position**	**Simultaneous Transmission SAR**	**Detailed Results**
WCDMA BandⅤ&Wi-Fi 2.4G&BT	Body(0mm)	1.33	See section 14.2

2 General Information of The Laboratory

2.1 Testing Laboratory

Lab Name	Industrial Internet Innovation Center (Shanghai) Co.,Ltd.
Address	Building 4, No. 766, Jingang Road, Pudong, Shanghai, China
Telephone	021-68866880
FCC Registration No.	708870
FCC Designation No.	CN1364

2.2 Laboratory Environmental Requirements

Temperature	18℃~25℃
Relative Humidity	25%RH~75%RH

2.3 Project Information

Project Manager	Xu Yuting
Test Date	August 8, 2024

3 General Information of The Customer

3.1 Applicant

Company	Fellowes Inc.
Address	1789 Norwood Avenue Itasca, Illinois 60143-1095, USA
Telephone	+16306715102

3.2 Manufacturer

Company	Fellowes Inc.
Address	1789 Norwood Avenue Itasca, Illinois 60143-1095, USA
Telephone	+16306715102

3.3 Factory

Company	Fellowes Office Products (Suzhou) Co., Ltd.
Address	No.1 Shilin Road, Suzhou New District, Jiangsu, 215151, People's Republic of China
Telephone	N/A

4 General Information of The Product

4.1 Product Description for Equipment under Test (EUT)

Product	Wireless Display
Model	LKOUT W
Date of Receipt	August 6, 2024
EUT ID*	S03
SN/IMEI	868105044720306
Supported Radio Technology and Bands	WCDMA Band Ⅱ/Ⅳ/Ⅴ LTE Band 2/4/5/12/13/14/66/71 Wi-Fi 802.11a/b/g/n/ac BLE 4.2 and Bluetooth V2.1+EDR
Tx Frequency	1850 MHz-1910 MHz (WCDMA Band Ⅱ) 1710 MHz-1755 MHz (WCDMA BandⅣ) 824 MHz-849 MHz (WCDMA Band V) 1850 MHz-1910 MHz (LTE Band 2) 1710 MHz-1755 MHz (LTE Band 4) 824 MHz-849 MHz (LTE Band 5) 699 MHz-716 MHz (LTE Band 12) 777 MHz-787 MHz (LTE Band 13) 788 MHz-798 MHz (LTE Band 14) 1710 MHz-1780 MHz (LTE Band 66) 663 MHz-698 MHz (LTE Band 71) 2412 MHz-2462 MHz (Wi-Fi 2.4G) 5180 MHz-5240 MHz (Wi-Fi 5G U-NII-1) 5745 MHz-5825 MHz (Wi-Fi 5G U-NII-3) 2402 MHz-2480 MHz (BT)
Hardware Version	V2.0
Software Version	11.0.1_#7210_10.1_2168A1-V2.0
Dimension	170.9*141.5*20mm
NOTE1: EUT ID is the internal identification code of the laboratory. NOTE2: Samples in the test report are provided by the customer. The test results are only applicable to the samples received by the laboratory.	

4.2 Description for Auxiliary Equipment (AE)

AE ID*	Description	Model	SN/Remark
N/A	N/A	N/A	N/A
NOTE: AE ID is the internal identification code of the laboratory.			

5 Test Configuration Information

5.1 Test Equipments Utilized

No.	Name	Model	S/N	Software Version	Hardware Version	Manufacturer	Cal. Date	Cal. Interval
1	Network analyzer	N5242A	MY51221755	A.09.33.09	N/A	Agilent	Oct.16, 2023	1 Year
2	Power meter	NRX	103851	02.50.21112602	20.00	R&S	Jul.25, 2024	1 Year
3	Power sensor	NRP18S-10	101841	N/A	N/A	R&S	Jul.25, 2024	1 Year
4	Power sensor	NRP18S-10	101842	N/A	N/A	R&S	Jul.25, 2024	1 Year
5	Signal Generator	E4438C	MY49072044	N/A	C.05.83	Agilent	Jul.25, 2024	1 Year
6	Amplifier	NTWPA-07605	22039018	N/A	N/A	RFLIGHT	Jul.25, 2024	1 Year
7	Test Software	DASY5	N/A	52.10.4.1527	N/A	SPEAG	N/A	N/A
8	DAE	DAE4	1581	N/A	N/A	SPEAG	Feb.22, 2024	1 Year
9	E-field Probe	EX3DV4	7634	N/A	N/A	SPEAG	Mar.20, 2024	1 Year
10	BTS	CMU 200	123102	V5.21	N/A	R&S	Jul.25, 2024	1 Year
11	BTS	MT8820C	6201240338	V3.8.10	N/A	Anritsu	Oct.16, 2023	1 Year
12	Dipole Validation Kit	D750 V3	1144	N/A	N/A	SPEAG	Sep.12, 2023	1 Year
13	Dipole Validation Kit	D835 V2	4d112	N/A	N/A	SPEAG	Sep.6, 2023	1 Year
14	Dipole Validation Kit	D1750V2	1044	N/A	N/A	SPEAG	Sep.8, 2023	1 Year
15	Dipole Validation Kit	D1900V2	5d232	N/A	N/A	SPEAG	Nov.16, 2023	1 Year
16	Dipole Validation Kit	D2450V2	858	N/A	N/A	SPEAG	Sep.12, 2023	1 Year
17	Dipole Validation Kit	D5GHzV2	1172	N/A	N/A	SPEAG	Sep.7, 2023	1 Year

5.2 Measurement Uncertainty

Item	Uncertainty
SAR	$U_{SAR(1g)}$=21.70%, $U_{SAR(10g)}$=21.42%
NOTE: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

5.3 EUT Connection Diagram of Test System

5.3.1 SAR

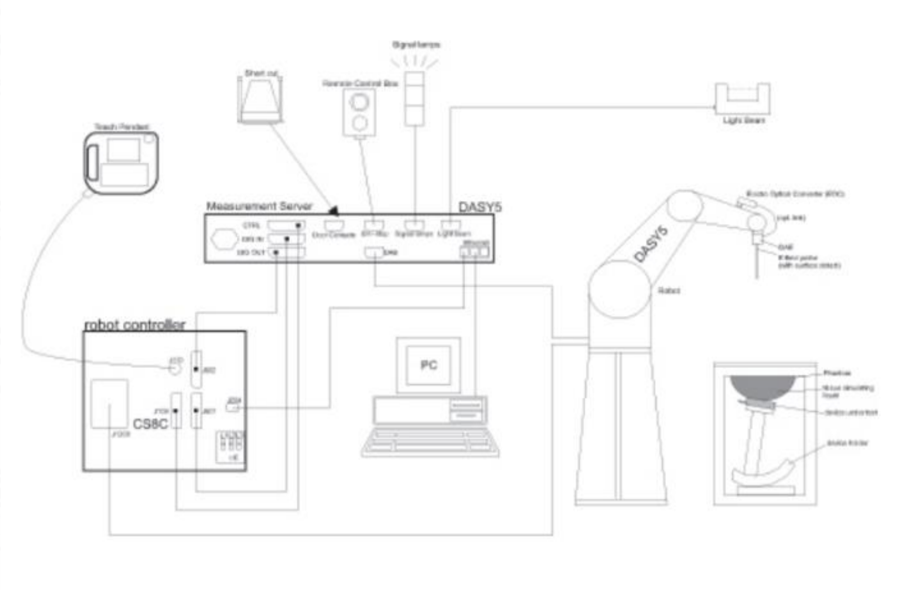


Figure 5.3.1-1 SAR Connection Diagram

6 Specific Absorption Rate(SAR)

6.1 Introduction

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

6.2 SAR Definition

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

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

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

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

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

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

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

Where:

σ is the conductivity of the tissue

ρ is the mass density of tissue, which is normally set to 1g/cm^3

E is the RMS electrical field strength

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

7 SAR Measurement System Introduction

7.1 Measurement Set-up

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

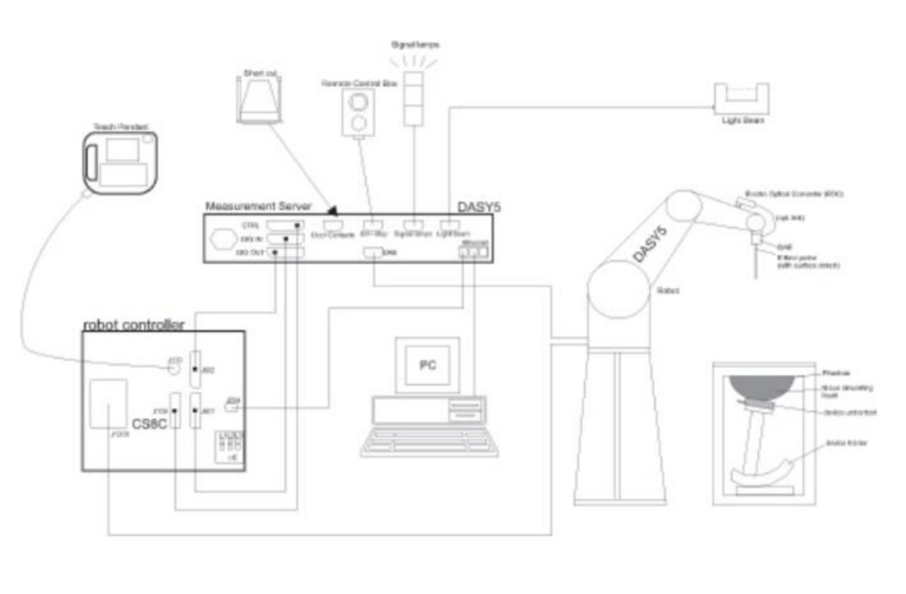


Figure 7.1-1 SAR Measurement Set-up

- A standard high precision 6-axis robot (Stäubli TX=RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP and the DASY software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.

The phantom, the device holder and other accessories according to the targeted measurement.

7.2 E-field Probe System

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

Probe Specifications	
Model	EX3DV4
Frequency Range	4 MHz – 10 GHz
Calibration	In head simulating tissue at frequency from 650MHz to 5900MHz
Linearity	±0.2 dB (30 MHz – 10 GHz)
Dynamic Range	10 µW/g – >100 mW/g
Probe Length	337 mm
Probe Tip Length	20 mm
Body Diameter	12 mm
Tip Diameter	2.5 mm
Tip-Center	1 mm
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better than 30%.

Figure 7.2-1 Detail of Probe

Figure 7.2-2 E-field Probe

7.3 E-field Probe Calibration

Each E-Probe/Probe Amplifier combination has unique calibration parameters. A TEM cell calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm2) using an RF Signal generator, TEM cell, and RF Power Meter.

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and inn a waveguide or other methodologies above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1 mW/cm2..

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

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

Where:

Δt = Exposure time (30 seconds),

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

ΔT = Temperature increase due to RF exposure.

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

Where:

σ = Simulated tissue conductivity,

ρ = Tissue density (kg/m^3).

7.4 Other Test Equipment

7.4.1 Data Acquisition Electronics (DAE)

The data acquisition electronics consist of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder with a control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information, as well as an optical uplink for commands and the clock.

The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection. The input impedance of the DAE is 200M Ohm; the inputs are symmetrical and floating. Common mode rejection is above 80dB.

Figure 7.4.1-1: DAE

7.4.2 Robot

The SPEAG DASY system uses the high precision robots (DASY5: TX90) type from Stäubli SA (France).
For the 6-axis controller system, the robot controller version from Stäubli is used. The Stäubli robot series have many features that are important for our application

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

Figure 7.4.2-1: DASY5

7.4.3 Measurement Server

The DASY5 measurement server is based on a PC/104 CPU board with a 400 MHz intel ULV Celeron, 128 MB chipdisk and 128 MB RAM. The necessary circuits for communication with either the DAE4 (or DAE3) electronics box as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY5 I/O board, which is directly connected to the PC/104 bus of the CPU board.

Figure 7.4.3-1 Server for DASY5

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

7.4.4 Device Holder for Phantom

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

The DASY device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

Figure 7.4.4-1: Device Holder

The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity ε =3 and loss tangent δ =0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the Mounting Device in place of the phone positioner. The extension is fully compatible with the Twin-SAM and ELI phantoms.

The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity ε =3 and loss tangent δ =0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

Figure 7.4.4-2: Laptop Extension Kit

7.4.5 Phantom

The SAM Twin Phantom V4.0 is constructed of a fiberglass shell integrated in a table. The shape of the shell is based on data from an anatomical study designed to represent the 90th percentile of the population. The phantom enables the dissymmetric evaluation of SAR for both left and right handed handset usage, as well as body-worn usage using the flat phantom region. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot. The shell phantom has a 2mm shell thickness (except the ear region where shell thickness increases to 6 mm).

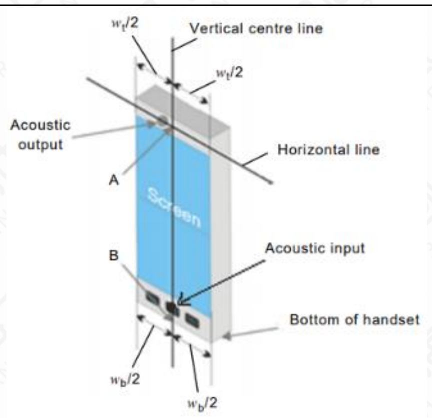
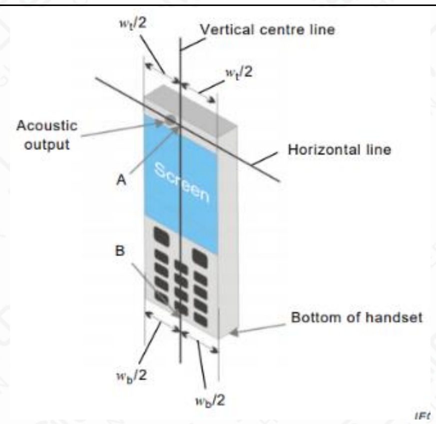
Shell Thickness	2 ± 0.2 mm
Available	Special
Filling Volume	Approx. 25 liters
Dimensions	810 mm x l000 mm x 500 mm (H x L x W)

Figure 7.4.5-1: SAM Twin Phantom

8 Test Position in Relation to the Phantom

8.1 General considerations

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

 Figure 8.1-1 full touch screen smart phone (top)	 Figure 8.1-2 keyboard handset (bottom)

W_t	Width of the handset at the level of the acoustic output
W_b	Width of the bottom of the handset
A	Midpoint of the width W_t of the DUT at the level of the acoustic output
B	Midpoint of the width W_b of the bottom of the handset

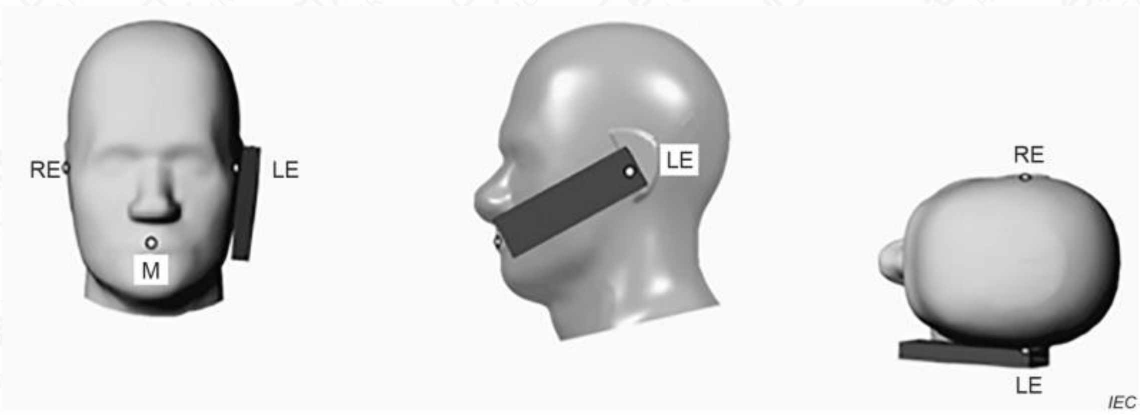


Figure 8.1-3 Cheek position of the wireless device on the left side of SAM

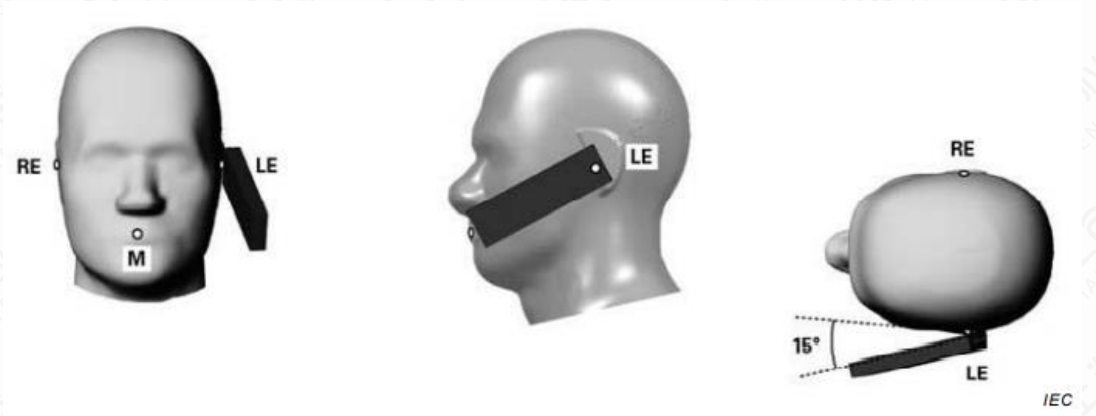


Figure 8.1-4 Tilt position of the wireless device on the left side of SAM

8.2 Body-worn device

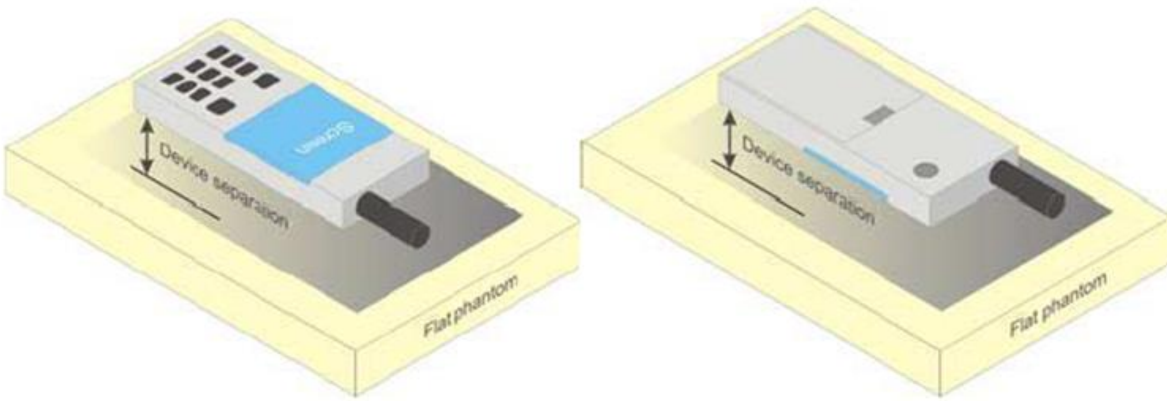
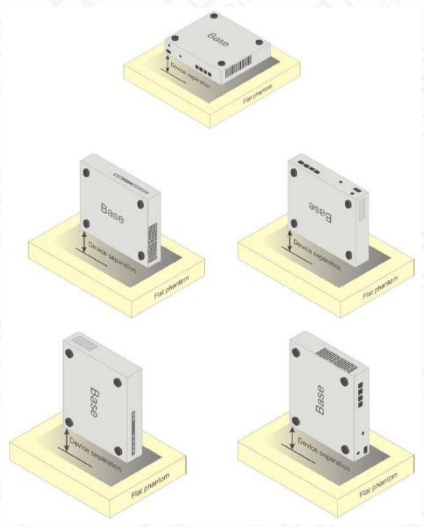


Figure 8.2-1 Test positions for body-worn devices

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

8.3 Desktop device

A typical example of a desktop device is a wireless enabled desktop computer placed on a table or desk when used.	 Figure 8.3-1 Test positions for desktop devices
The DUT shall be positioned at the distance and in the orientation to the phantom that corresponds to the intended use as specified by the manufacturer in the user instructions. For devices that employ an external antenna with variable positions.	
Tests shall be performed for all antenna positions specified.	
Picture 8-6 shows positions for desktop device SAR tests. If the intended use is not specified, the device shall be tested directly against the flat	

9 Tissue Simulating Liquids

9.1 Equivalent Tissues Composition

The liquid used for the frequency range of 650-6000 MHz consisted of water, sugar, salt, preventol, glycol monobutyl and Cellulose. The liquid has been previously proven to be suited for worst-case. The Table 9.1 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the IEEE Std 1528.

Table 9.1-1: Composition of the Head Tissue Equivalent Matter

Frequency (MHz)	**835**	**900**	**1800**	**1950**	**2300**	**2450**	**2600**	**5800**
Ingredients (% by weight)								
Water	41.45	40.92	55.242	54.89	56.34	58.79	58.79	65.53
Sugar	56.0	56.5	/	/	/	/	/	/
Salt	1.45	1.48	0.306	0.18	0.14	0.06	0.06	/
Preventol	0.1	0.1	/	/	/	/	/	/
Cellulose	1.0	1.0	/	/	/	/	/	/
GlycolMonobutyl	/	/	44.452	44.93	43.52	41.15	41.15	/
Diethylenglycol momohexylether	/	/	/	/	/	/	/	17.24
Triton X-100	/	/	/	/	/	/	/	17.23
Dielectric Parameters Target Value	ε=41.5 σ=0.90	ε=41.5 σ=0.97	ε=40.0 σ=1.40	ε=40.0 σ=1.40	ε=39.5 σ=1.67	ε=39.2 σ=1.80	ε=39.0 σ=1.96	ε=35.3 σ=5.27

Table 9.1-2: Targets for tissue simulating liquid

Frequency (MHz)	Liquid Type	Conductivity (σ)	±5% Range	Permittivity (ε)	±5% Range
750	Head	0.89	0.846~0.934	41.9	39.805~43.995
835	Head	0.90	0.855~0.945	41.5	39.425~43.575
900	Head	0.97	0.922~1.018	41.5	39.425~43.575
1450	Head	1.20	1.140~1.260	40.5	38.475~42.525
1750	Head	1.37	1.302~1.438	40.1	38.095~42.105
1800	Head	1.40	1.330~1.470	40.0	38.000~42.000
1900	Head	1.40	1.330~1.470	40.0	38.000~42.000
2000	Head	1.40	1.330~1.470	40.0	38.000~42.000
2100	Head	1.49	1.416~1.564	39.8	37.810~41.790
2300	Head	1.67	1.587~1.753	39.5	37.525~41.475
2450	Head	1.80	1.710~1.890	39.2	37.240~41.160
2600	Head	1.96	1.862~2.058	39.0	37.050~40.950
3000	Head	2.40	2.280~2.520	38.5	36.575~40.425
3500	Head	2.91	2.765~3.055	37.9	36.005~39.795
4000	Head	3.43	3.259~3.601	37.4	35.530~39.270
4500	Head	3.94	3.743~4.137	36.8	34.960~38.640
5000	Head	4.45	4.228~4.672	36.2	34.390~38.010
5200	Head	4.66	4.427~4.893	36.0	34.200~37.800
5400	Head	4.86	4.617~5.103	35.8	34.010~37.590
5600	Head	5.07	4.817~5.323	35.5	33.725~37.275
5800	Head	5.27	5.007~5.533	35.3	33.535~37.065
6000	Head	5.48	5.206~5.754	35.1	33.345~36.855
NOTE: For dielectric properties of head tissue-equivalent liquid at other frequencies within the frequency range, a linear interpolation method shall be used.					

9.2 Liquid depth

The Measurements were performed in the flat section of the TWIN SAM or ELI phantom, shell thickness: 2.0±0.2mm (bottom Plate) filled with Body or Head simulating Liquid.

The depth of tissue-equivalent liquid in a phantom must be ≥ 15.0 cm with ≤ ±0.5 cm variation for SAR measurements ≤ 3 GHz and ≥ 10.0 cm with ≤± 0.5 cm variation for measurements > 3 GHz.

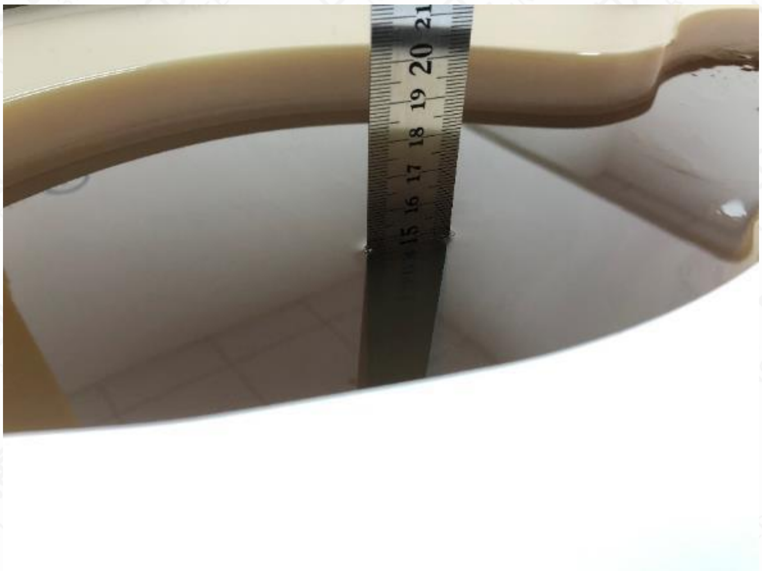


Figure 9.2-1 Liquid depth in the Flat Phantom for SAR measurements ≤ 3 GHz

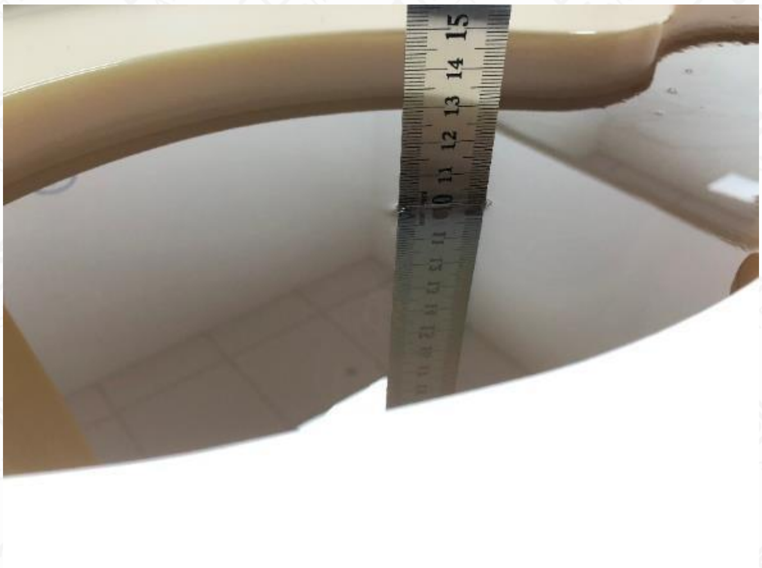


Figure 9.2-2 Liquid depth in the Flat Phantom for SAR measurements > 3 GHz

9.3 Dielectric Performance of TSL

Table 9.3-1: Dielectric Performance of Head Tissue Simulating Liquid

Tissue Simulating Liquid								
Frequency (MHz)	Head(Standard)		Temperature	Date	Test Result		Deviation	
	Permittivity ε	Conductivity σ			Permittivity ε	Conductivity σ	Permittivity ε	Conductivity σ
750	41.900	0.890	20.8°C	August 8, 2024	42.261	0.888	0.86%	-0.22%
835	41.500	0.900	20.8°C	August 8, 2024	41.989	0.919	1.18%	2.11%
1750	40.100	1.370	20.8°C	August 8, 2024	40.091	1.321	-0.02%	-3.58%
1900	40.000	1.400	20.8°C	August 8, 2024	39.905	1.422	-0.24%	1.57%
2450	39.200	1.800	20.8°C	August 8, 2024	38.079	1.829	-2.86%	1.61%
5200	36.000	4.660	20.8°C	August 8, 2024	35.232	4.668	-2.13%	0.17%
5800	35.300	5.270	20.8°C	August 8, 2024	34.035	5.299	-3.58%	0.55%

10 System Check

10.1 System Check

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.

10.2 System Setup

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

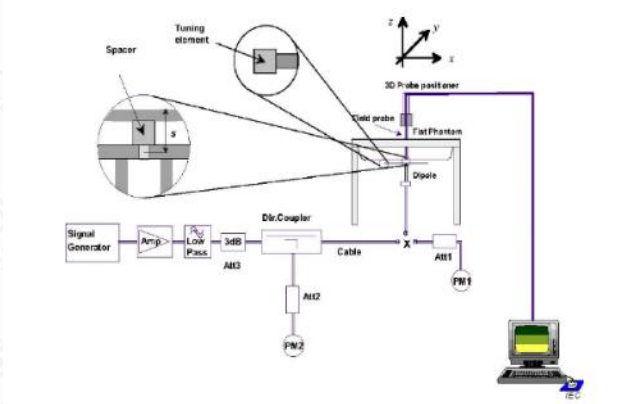


Figure 10.2-1 Set-up for the system check

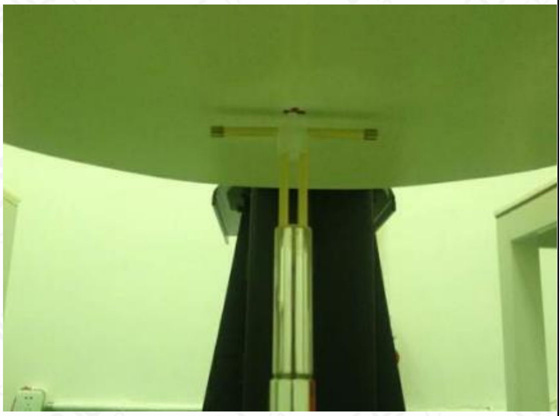


Figure 10.2-2. Setup for Dipole

10.3 System Check Result

Table 10.3-1: System Check Result of SAR

SAR System Check								
Frequency (MHz)	Target Value (w/kg)		Temperature	Date	Test Result (w/kg)		Deviation	
	10g	1g			10g	1g	10g	1g
750	5.48	8.43	21.7°C	August 8, 2024	5.56	8.56	1.46%	1.54%
835	6.24	9.67	21.7°C	August 8, 2024	6.24	9.72	0.00%	0.52%
1750	19.40	36.70	21.7°C	August 8, 2024	19.32	36.32	-0.41%	-1.04%
1900	20.70	39.80	21.7°C	August 8, 2024	20.36	39.24	-1.64%	-1.41%
2450	24.40	52.60	21.7°C	August 8, 2024	24.60	54.40	0.82%	3.42%
5200	21.80	77.40	21.7°C	August 8, 2024	22.10	77.60	1.38%	0.26%
5800	22.00	78.60	21.7°C	August 8, 2024	21.50	76.10	-2.27%	-3.18%
NOTE: The system verifies that the measured input power level is equivalent to 250mW for 0.6GHz to 3GHz and above 3GHz is equivalent to 100mW, and the measured results are compared with the target value by converting to 1W.								

11 Measurement Procedures

11.1 Test Steps

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

(a) Power reference measurement

The reference and drift jobs are useful for monitoring the power drift of the device under test in the batch process. Both jobs measure the electric field strength at a specified reference position, at a selectable distance from the phantom surface. The reference position can be either the selected section's grid reference point or a user point in this section. The reference job projects the selected point onto the phantom surface, orients the probe perpendicularly to the surface, and approaches the surface using the selected detection method.

(b) Area scan

The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a finer measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum locations even in relatively coarse grids. The scan area is defined by an editable grid. This grid is anchored at the grid reference point of the selected section in the phantom. When the area scan's property sheet is brought up, grid was at to 15mm * 15mm and can be edited by users.

(c) Zoom scan

Zoom scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1g and 10g of simulated tissue. The default zoom scan measures 5 * 5 * 7 points within a cube whose base faces are centered around the maximum found in a preceding area scan job within the same procedure. If the preceding Area Scan job indicates more than one maximum, the number of Zoom Scans has to be enlarged accordingly.

(d) Power drift measurement

The drift job measures the field at the same location as the most recent reference job within the same procedure, and with the same setting. The drift measurement gives the field difference in dB from the reading conducted within the last reference measurement. Several drift measurements are possible for one reference measurement. This allows a user to monitor the power drift of the device under within a batch process. In the properties of the drift job, the user can specify a limit for the drift and have DASY software stop the measurements if this limit is exceeded. This ensures that the power drift during one measurement is within 5%.

The SAR measurement procedures for each of test conditions are as follows:

(a) Make EUT to transmit it maximum output power

(b) Measure conducted output power through RF cable

(c) Place the EUT in the specific position of phantom

(d) Measure SAR results for Middle channel or the highest power channel on each testing position

(e) Measure SAR results for other channels in worst SAR testing position if the reported SAR of highest power channel is larger than 0.8 W/kg

(f) Record the SAR value

11.2 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the IEEE Std 1528 standard. It can be conducted for 1g and 10g.

The DASY system allows evaluations that combine measured data and robot positions, such as:

(a) Maximum Search

During a maximum search, global and local maximum searches are automatically performed in 2D after each Area Scan measurement with at least 6 measurement points. It is based on the evaluation of the local SAR gradient calculated by the Quadratic Shepard's method. The algorithm will find the global maximum and all local maxima within -2dB of the global maxima for all SAR distributions.

(b) Extrapolation

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. Several measurements at different distances are necessary for the extrapolation.

Extrapolation routines require at least 10 measurement points in 3D space. They are used in the Cube Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard's method for extrapolation. For a grid using 5*5*5 measurement points with 5mm resolution amounting to 343 measurement points, the uncertainty of the extrapolation routines is less than 1% for 1g and 10 cubes.

(c) Boundary effect

For measurements in the immediate vicinity of a phantom surface, the field coupling effects between the probe and the boundary influence the probe characteristics. Boundary effect errors of different dosi-metric probe types have been analyzed by measurements and using a numerical probe model. As expected, both methods showed an enhanced sensitivity in the immediate vicinity of the boundary. The effect strongly depends on the probe dimensions and disappears with increasing distance from the boundary. The sensitivity can be approximately given as:

$$\mathrm{S} \approx \mathrm{So} + \mathrm{Sb} * \exp\left(-\frac{z}{a}\right) * \cos\left(\pi\frac{z}{\lambda}\right)$$

Since the decay of the boundary effect dominates for small probe (a≪ λ), the cos-term can be omitted. Factors Sb (parameter Alpha in the DASY software) and a (parameter Delta in the DASY software) and assessed during probe calibration and used for numerical compensation of the boundary effect. Several simulations and measurements have confirmed that the compensation is valid for different field and boundary configurations.

This simple compensation procedure can largely reduce the probe uncertainty near boundaries. It works well as long as:

- The boundary curvature is small
- The probe axis is angled less than 30_to the boundary normal
- The distance between probe and boundary is larger than 25% of the probe diameter
- The probe is symmetric (all sensors have the same offset from the probe tip)

Since all of these requirements are fulfilled in a DASY system, the correction of the probe boundary effect in the vicinity of the phantom surface is performed in a fully automated manner via the measurement data extraction during post processing.

11.3 General Measurement Procedure

The area and zoom scan resolutions specified in the table below must be applied to the SAR measurements and fully documented in SAR reports to qualify for TCB approval. Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Both the probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1-g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in IEEE Std 1528-2013. The results should be documented as part of the system validation records and may be requested to support test results when all the measurement parameters in the following table are not satisfied.

Table 11.3-1: Test Resolution Requirement

<table>
<tr><th colspan="3">Items</th><th>≤3GHz</th><th>>3GHz</th></tr>
<tr><td colspan="3">Maximum Distance</td><td>5mm ±1mm</td><td>$\frac{1}{2} * \delta * \ln(2)$ mm ±0.5mm</td></tr>
<tr><td colspan="3">Maximum probe angle</td><td>30±1°</td><td>20±1°</td></tr>
<tr><td colspan="3" rowspan="3">Maximum Area Scan spatial resolution:
Δx_{Area} , Δy_{Area}</td><td>≤2GHz: ≤15mm</td><td>3-4GHz: ≤12mm</td></tr>
<tr><td>2-3GHz: ≤12mm</td><td>4-6GHz: ≤10mm</td></tr>
<tr><td colspan="2">when the x or y dimension of the device , in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the device with at least one measurement point on the device</td></tr>
<tr><td colspan="3" rowspan="2">Maximum Zoom Scan spatial resolution:
Δx_{Zoom} , Δy_{Zoom}</td><td>≤2GHz: ≤8mm</td><td>3-4GHz: ≤5mm</td></tr>
<tr><td>2-3GHz: ≤5mm</td><td>4-6GHz: ≤4mm</td></tr>
<tr><td rowspan="3">maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>≤5mm</td><td>3-4GHz: ≤4mm
4-5GHz: ≤3mm
5-6GHz: ≤2mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>≤4mm</td><td>3-4GHz: ≤3mm
4-5GHz: ≤2.5mm
5-6GHz: ≤2mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$ between subsequent points</td><td colspan="2">≤1.5*</td></tr>
<tr><td>minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥30mm</td><td>3-4GHz: ≥28mm
4-5GHz: ≥25mm
5-6GHz: ≥22mm</td></tr>
</table>

Notes:
δ is the penetration depth of a plane-wave at normal incidence to the tissue medium in IEEE Std 1528-2013.
When Zoom Scan is required and reported SAR from the Area Scan based 1-g SAR estimation procedure of KDB publication 447498 is $\leq$1.4 W/kg, $\leq$8mm for 2GHz-3GHz, $\leq$7mm for 3GHz-4GHz, $\leq$5mm for 4GHz-6GHz Zoom Scan resolution may be applied.

11.4 GSM/GPRS Measurement Procedures

GSM/GPRS/EDGE modes is determined by the source-based time-averaged output power including tune-up tolerance. The mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested. Other configurations of GSM/GPRS/EDGE are considered as secondary modes. The 3G SAR test reduction procedure is applied, when the maximum output power and tune-up tolerance specified for production units in a secondary mode is s $\leq \frac{1}{4}$dB higher than the primary mode, SAR measurement is not required for the secondary mode.

11.5 WCDMA Measurement Procedures

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

Table 11.5-1: HSDPA setting for Release 5

Sub-test	β_c	β_d	β_d (SF)	β_c / β_d	β_{hs}	CM (dB)	MPR (dB)
1	2/15	15/15	64	2/15	4/15	1.5	0.5
2	12/15	15/15	64	12/15	24/25	2.0	1
3	15/15	8/15	64	15/8	30/15	2.0	1
4	15/15	4/15	64	15/4	30/15	2.0	1

Table 11.5-2: HSUPA setting for Release 6

Sub-test	β_c	β_d	β_d (SF)	β_c / β_d	β_{hs}	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM (dB)	MPR (dB)	AG Index	E-TFCI

1	11/15	15/15	64	11/15	22/15	209/225	1039/225	4	1	2.0	1.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	12/15	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1}:47/15 β_{ed2}:47/15	4	2	3.0	2.0	15	92
4	2/15	15/15	64	2/15	4/15	4/15	56/75	4	1	2.0	1.0	17	71
5	15/15	15/15	64	15/15	24/15	30/15	134/15	4	1	2.0	1.0	21	81

11.6 LTE Measurement Procedure

SAR tests for LTE are performed with a base station simulator. Closed loop power control was used so the UE transmits with maximum output power during SAR testing.

(a) KDB 941225 D05, 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 for RB offsets at the upper edge, middle and lower edge of each required test channel.

(b) 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.

(c) 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 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.

(d) 16QAM/64QAM output power for each RB allocation configuration is > not $\frac{1}{2}$dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; 16QAM/64QAM SAR testing is not required.

(e) Smaller bandwidth output power for each RB allocation configuration is > not $\frac{1}{2}$dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; smaller bandwidth SAR testing is not required.

(f) For LTE Band 12/26 the maximum bandwidth does not support three non-overlapping channels, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

(g) LTE band 17/2/5/38/4 SAR test was covered by Band 12/25/26/41/66; according to TCB workshop, SAR test for overlapping LTE bands can be reduced if

- The maximum output power, including tolerance, for the smaller band is ≤ the larger band to qualify for the SAR test exclusion.
- The channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band.

11.6.1 LTE Carrier Aggregation Conducted Power (Downlink)

Uplink maximum output power measurement with downlink carrier aggregation active should be measured, using the highest output channel measured without downlink carrier aggregation, to confirm that uplink maximum output power with downlink carrier aggregation active remains within the specified tune-up tolerance limits and not more than ¼ dB higher than the maximum output measured without downlink carrier aggregation active.

11.6.2 LTE Carrier Aggregation Conducted Power (Uplink)

UL CA shall be tested based on the worst-case SAR configuration determined from non-CA SAR testing result. The channel BW, channel number, RB allocation, etc. would be selected to allow contiguous CA of PCC and SCC. Uplink output power for UL CA is the total power measured across the PCC and SCC.

UL CA power measurements were performed for each antennas at with QPSK modulation based on the worst-case standalone SAR.

The UL CA mode power measurements represent the total power across both carriers. Measurements were made for all supported PCC bandwidths using the channel/RB combination resulting in the highest standalone output power at the least MPR (0 dB). SCCs were set to use configurations similar to the PCC to establish conservative or worst case equivalent SAR test conditions (highest maximum power with MPR of 0 dB).

The standalone power measurement is the power for the PCC in the non-CA mode (i.e. single carrier power). In all cases the UL CA power is less than or equal to the standalone power.

11.6.3 LTE TDD Considerations

Time-Division Duplex (TDD) systems, SAR must be tested using a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by the defined 3GPP LTE TDD configurations.

SAR was tested with the highest transmission duty factor (63.33%) using Uplink-downlink configuration 0 and Special sub-frame configuration 7.

Table 11.6.3-1 Calculated Duty Cycle for LTE TDD

Uplink-Downlink Configuration		**Sub-frame Number**										**Calculated**
Config	Periodicity	1	2	3	4	5	6	7	8	9	10	Duty Cycle (%)
0	5 ms	D	S	U	U	U	D	S	U	U	U	63.33
1	5 ms	D	S	U	U	D	D	S	U	U	D	43.33
2	5 ms	D	S	U	D	D	D	S	U	D	D	23.33
3	10 ms	D	S	U	U	U	D	D	D	D	D	31.67
4	10 ms	D	S	U	U	D	D	D	D	D	D	21.67
5	10 ms	D	S	U	D	D	D	D	D	D	D	11.67

6	5 ms	D	S	U	U	U	D	S	U	U	D	53.33

Example for Calculated Duty Cycle for Uplink-Downlink Configuration 0:

Calculated Duty Cycle = (5120 × Ts × 2 + 6 ms) / 10ms = 63.33%

Where

Ts = 1/(15000 x 2048) seconds

11.7 Bluetooth & Wi-Fi Measurement Procedures

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

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

Per KDB 248227 D01v02r02, for 2.4GHz 802.11g/n SAR testing 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.

Per KDB 248227 D01v02r02, U-NII-1 SAR testing is not required when the U-NII-2A band highest reported SAR for a test configuration is ≤1.2 W/kg, SAR is not required for U-NII-1 band. For all positions / configurations, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions / configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤1.2 W/kg or all required channels are tested.

11.8 Area Scan Based 1g SAR

According to the KDB447498 D01, a first class of fast SAR techniques is based on a modified measurement procedure and post processing algorithms. In practice, these methods require a special software, for example DASY52 form SPEAG.

When the implementation is based the specific polynomial fit algorithm as presented at the 29th Bio-electromagnetics Society meeting (2007) and the estimated 1-g SAR is ≤ 1.2 W/kg, a zoom scan measurement is not required provided it is also not needed for any other purpose; for example, if the peak SAR location required for simultaneous transmission SAR test exclusion can be determined accurately by the SAR system or manually to discriminate between distinctive peaks and scattered noisy SAR distributions from area scans.

There must not be any warning or alert messages due to various measurement concerns identified by the SAR system; for example, noise in measurements, peaks too close to scan boundary, peaks are too sharp, spatial resolution and uncertainty issues etc. When all the SAR results for each exposure condition in a frequency band and wireless mode are based on estimated 1-g SAR, the 1-g SAR for the highest SAR configuration must be determined by a zoom scan.

The approach is based on the area scan measurement applying a frequency dependent attenuation parameter. This attenuation parameter was empirically determined by analyzing a large number of phones. The MOTOROLA FAST SAR was developed and validated by the MOTOROLA Research Group in Ft. Lauderdale.

In the initial study, an approximation algorithm based on Linear fit was developed. The accuracy of the algorithm has been demonstrated across a broad frequency range (136-2450 MHz) and for both 1-g and 10-g averaged SAR using a sample of 264 SAR measurements from 55 wireless handsets. For the sample size studied, the root-mean-squared errors of the algorithm are 1.2% and 5.8% for 1- and 10-g averaged SAR, respectively. The paper describing the algorithm in detail is expected to be published in August 2004 within the Special Issue of Transactions on MTT.

In the second step, the same research group optimized the fitting algorithm to an Polynomial fit whereby the frequency validity was extended to cover the range 30MHz-6000MHz. Details of this study can be found in the BEMS 2007 Proceedings.

12 Simultaneous Transmission SAR Considerations

12.1 Reference Document

The following procedures adopted from "FCC SAR Considerations for Cell Phones with Multiple Transmitters" are applicable to handsets with built-in unlicensed transmitters such as IEEE 802.11 a/b/g/n/ac/ax and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

12.2 Antenna Separation Distances

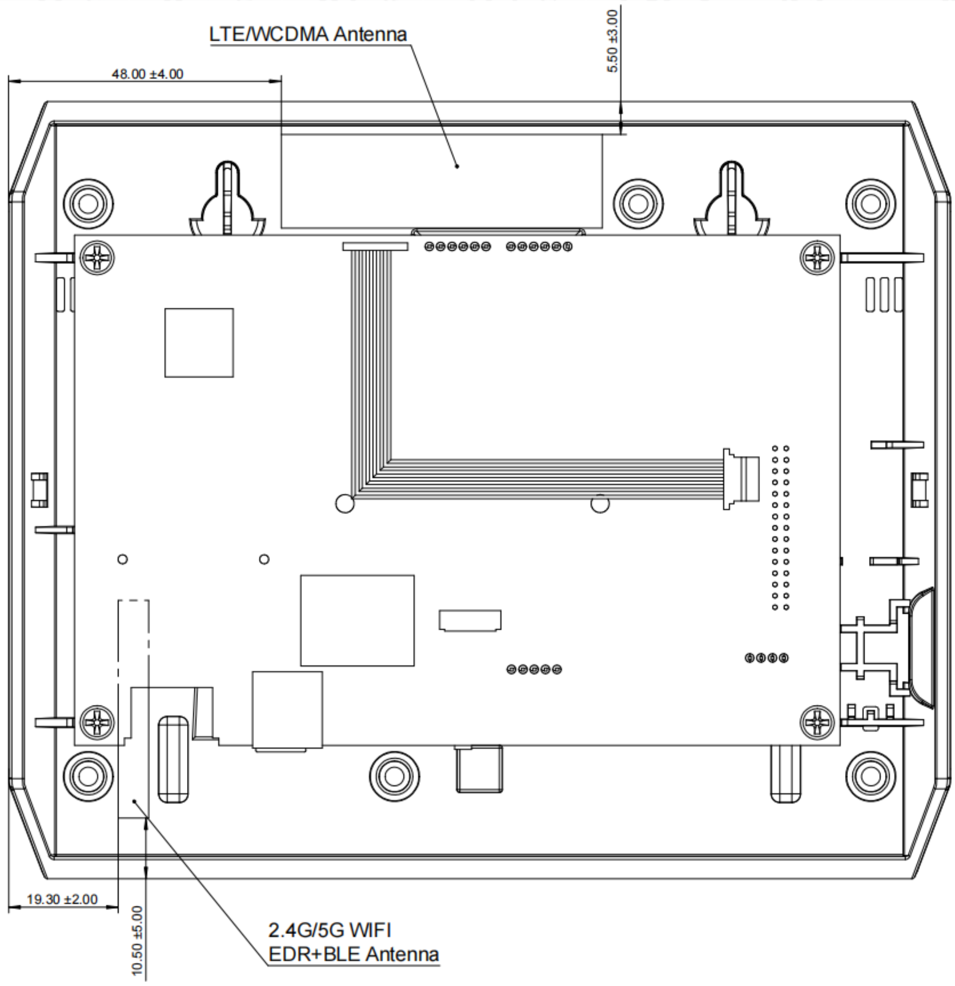


Figure 12.2-1 Antenna Locations(Front View)

12.3 SAR Measurement Positions

According to KDB 447498 D01, the SAR test exclusion condition is based on source-based time-averaged maximum conducted output power, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions. The SAR exclusion threshold is determined by the following formula.

(a) For 100 MHz to 6 GHz and test separation distances ≤ 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

$$\frac{(max.power\ of\ channel, including\ tune-up\ tolerance, mW)}{(min.test\ separation\ distance, mm)} \times \sqrt{Frequency(GHz)} \leq 3.0$$

(b) For 100 MHz to 6 GHz and test separation distances > 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

1) for 100 MHz to 1500 MHz

{[Power allowed at numeric threshold for 50 mm in step a)] + [(test separation distance – 50 mm)·(f(MHz)/150)]} mW

2) for > 1500 MHz and ≤ 6 GHz

{[Power allowed at numeric threshold for 50 mm in step a)] + [(test separation distance – 50 mm)·10]} mW

When the separation distance from the antenna to an adjacent edge is ≤ 5mm, a distance of 5 mm is applied to determine SAR test exclusion.

12.4 Simultaneous Transmission Analysis

KDB 447498 D01 General RF Exposure Guidance introduces a new formula for calculating the SPLSR (SAR to Peak Location Ratio) between pairs of simultaneously transmitting antennas:

$$\mathrm{SPLSR} = \sqrt{(\mathrm{SAR1} + \mathrm{SAR2})^3}/\mathrm{Ri}$$

Where:

- SAR1 is the highest measured or estimated SAR for the first of a pair of simultaneous transmitting antennas, in a specific test operating mode and exposure condition.
- SAR2 is the highest measured or estimated SAR for the second of a pair of simultaneous transmitting antennas, in the same test operating mode and exposure condition as the first.
- Ri is the separation distance between the pair of simultaneous transmitting antennas. When the SAR is measured, for both antennas in the pair, it is determined by the actual x, y and z coordinates in the 1-g SAR for each SAR peak location , based on the extrapolated and interpolated result in the zoom scan measurement, using the formula of

$$(\mathrm{x1} - \mathrm{x2})^2 + (\mathrm{y1} - \mathrm{y2})^2 + (z1 - z2)^2$$

In order for a pair of simultaneous transmitting antennas with the sum of 1-g SAR > 1.6 W/kg to qualify for exemption from Simultaneous Transmission SAR measurements, it has to satisfy the condition of:

$$\sqrt{(\mathrm{SAR1} + \mathrm{SAR2})^3}/\mathrm{Ri} < 0.04$$

12.5 Simultaneous Transmission Table

Table 12.6-1: Simultaneous Transmission Configurations

Items	Capable Transmit Configurations
1	WCDMA+BT
2	WCDMA+Wi-Fi 2.4G
3	WCDMA+Wi-Fi 5G
4	WCDMA+Wi-Fi 2.4G+BT
5	WCDMA+Wi-Fi 5G+BT
6	LTE+BT
7	LTE+Wi-Fi 2.4G
8	LTE+Wi-Fi 5G
9	LTE+Wi-Fi 2.4G+BT
10	LTE+Wi-Fi 5G+BT
NOTE: For the DUT, the following combination that can transmit signal simultaneously.	

13 Conducted Output Power

13.1 WCDMA Measurement result

Table 13.1-1: The conducted Power for WCDMA Band Ⅱ

WCDMA Band Ⅱ		Maximum Conducted Power (dBm)			
Mode	Test Mode	Tune up	Channel/Frequency(MHz)		
			9262/1852.4	9400/1880	9538/1907.6
WCDMA	RMC	14.00	13.52	13.57	13.41
HSDPA	Subtest1	13.50	13.10	13.23	13.01
	Subtest2	13.50	13.12	13.05	12.75
	Subtest3	13.00	12.52	12.67	12.49
	Subtest4	13.00	12.44	12.67	12.41
HSUPA	Subtest1	13.50	13.12	13.15	12.99
	Subtest2	12.50	11.96	12.07	11.95
	Subtest3	13.00	12.60	12.71	12.47
	Subtest4	12.50	11.96	11.97	11.83
	Subtest5	13.50	13.14	13.07	12.93

Table 13.1-2: The conducted Power for WCDMA Band Ⅳ

WCDMA Band Ⅳ		Maximum Conducted Power (dBm)			
Mode	Test Mode	Tune up	Channel/Frequency(MHz)		
			1312/1712.4	1413/1732.6	1513/1752.6
WCDMA	RMC	14.00	12.95	13.95	13.02
HSDPA	Subtest1	14.00	12.41	13.53	12.50
	Subtest2	14.00	12.59	13.35	12.56
	Subtest3	13.50	12.09	12.95	12.00
	Subtest4	13.50	11.91	12.93	12.04
HSUPA	Subtest1	14.00	12.39	13.57	12.64
	Subtest2	12.50	11.33	12.29	11.40
	Subtest3	13.50	12.03	13.01	12.04
	Subtest4	13.00	11.59	12.61	11.42
	Subtest5	14.00	12.39	13.41	12.68

Table 13.1-3: The conducted Power for WCDMA Band Ⅴ

WCDMA BandⅤ		Maximum Conducted Power (dBm)			
Mode	Test Mode	Tune up	Channel/Frequency(MHz)		
			4132/826.4	4183/836.6	4233/846.6
WCDMA	RMC	17.50	16.98	17.29	17.21
HSDPA	Subtest1	17.00	16.40	16.71	16.81
	Subtest2	17.00	16.32	16.65	16.79
	Subtest3	17.00	16.12	16.33	16.35
	Subtest4	17.00	16.02	16.37	16.23
HSUPA	Subtest1	17.00	16.52	16.73	16.69
	Subtest2	16.00	15.32	15.75	15.69
	Subtest3	16.50	15.86	16.27	16.29
	Subtest4	16.00	15.34	15.71	15.79
	Subtest5	17.00	16.62	16.87	16.83

13.2 LTE Measurement result

Table 13.2-1: The conducted Power for LTE Band 2

LTE B2				Maximum Conducted Power (dBm)		
Modulation	RB	RB Offset	Tune up	1.4MHz		
				Channel/Frequency(MHz)		
				18607/1850.7	18900/1880	19193/1909.3
QPSK	1	Low	14.00	12.30	12.84	13.09
		Middle		13.46	13.45	13.55
		High		12.87	12.74	13.05
	50%	Low	14.00	12.76	12.79	13.55
		Middle		12.71	12.74	12.81
		High		12.68	12.63	12.58
	100%	/	13.00	11.75	11.83	11.78
16QAM	1	Low	13.00	11.82	11.89	11.86
		Middle		11.80	11.75	11.68
		High		11.76	11.74	11.85
	50%	Low	13.00	11.57	11.71	11.66
		Middle		11.74	11.68	11.61
		High		11.64	11.59	11.63
	100%	/	12.00	10.63	10.63	10.52
Modulation	RB	RB Offset	Tune up	3MHz		
				Channel/Frequency(MHz)		
				18615/1851.5	18900/1880	19185/1908.5
QPSK	1	Low	14.00	12.32	12.88	13.12
		Middle		13.44	13.48	13.45
		High		12.90	12.79	13.09
	50%	Low	13.00	11.86	11.91	12.57
		Middle		11.83	11.84	11.93
		High		11.78	11.74	11.68
	100%	/	13.00	11.75	11.87	11.81
16QAM	1	Low	13.00	11.85	11.91	11.89
		Middle		11.83	11.75	11.72
		High		11.78	11.78	11.88
	50%	Low	12.00	10.68	10.84	10.78
		Middle		10.85	10.81	10.73
		High		10.74	10.71	10.76
	100%	/	12.00	10.66	10.67	10.55
Modulation	RB	RB Offset	Tune up	5MHz		
				Channel/Frequency(MHz)		
				18625/1852.5	18900/1880	19175/1907.5
QPSK	1	Low	14.00	12.29	12.86	13.08
		Middle		13.42	13.44	13.54

		High		12.87	12.74	13.05
	50%	Low	13.00	11.83	11.86	12.60
		Middle		11.81	11.80	11.88
		High		11.76	11.72	11.64
	100%	/	13.00	11.75	11.86	11.79
16QAM	1	Low	13.00	11.82	11.87	11.86
		Middle		11.80	11.73	11.69
		High		11.75	11.76	11.84
	50%	Low	12.00	10.66	10.80	10.75
		Middle		10.82	10.76	10.69
		High		10.71	10.66	10.72
	100%	/	12.00	10.64	10.63	10.50
Modulation	RB	RB Offset	Tune up	10MHz		
				Channel/Frequency(MHz)		
				18650/1855	18900/1880	19150/1905
QPSK	1	Low	14.00	12.31	12.87	13.11
		Middle		13.45	13.49	13.52
		High		12.89	12.78	13.08
	50%	Low	13.00	11.86	11.91	12.56
		Middle		11.84	11.85	11.92
		High		11.78	11.76	11.69
	100%	/	13.00	11.79	11.88	11.83
16QAM	1	Low	13.00	11.84	11.90	11.88
		Middle		11.83	11.77	11.72
		High		11.78	11.78	11.87
	50%	Low	12.00	10.69	10.85	10.79
		Middle		10.84	10.80	10.72
		High		10.74	10.71	10.76
	100%	/	12.00	10.67	10.68	10.54
Modulation	RB	RB Offset	Tune up	15MHz		
				Channel/Frequency(MHz)		
				18675/1857.5	18900/1880	19125/1902.5
QPSK	1	Low	14.00	12.30	12.83	13.09
		Middle		13.43	13.48	13.53
		High		12.86	12.73	13.04
	50%	Low	13.00	11.84	11.87	12.54
		Middle		11.81	11.80	11.88
		High		11.75	11.73	11.65
	100%	/	13.00	11.77	11.84	11.78
16QAM	1	Low	13.00	11.79	11.88	11.86
		Middle		11.81	11.74	11.70
		High		11.75	11.74	11.84

	50%	Low	12.00	10.66	10.83	10.76
		Middle		10.81	10.75	10.68
		High		10.72	10.67	10.73
	100%	/	12.00	10.64	10.63	10.50
Modulation	RB	RB Offset	Tune up	20MHz		
				Channel/Frequency(MHz)		
				18700/1860	18900/1880	19100/1900
QPSK	1	Low	14.00	12.27	12.79	13.06
		Middle		13.42	13.44	13.57
		High		12.84	12.72	13.01
	50%	Low	13.00	11.81	11.82	12.61
		Middle		11.79	11.76	11.85
		High		11.72	11.68	11.61
	100%	/	13.00	11.74	11.79	11.74
16QAM	1	Low	13.00	11.81	11.84	11.81
		Middle		11.77	11.72	11.66
		High		11.73	11.71	11.82
	50%	Low	12.00	10.63	10.79	10.73
		Middle		10.78	10.73	10.65
		High		10.69	10.62	10.69
	100%	/	12.00	10.62	10.59	10.47

Table 13.2-2: The conducted Power for LTE Band 4

LTE B4			Maximum Conducted Power (dBm)			
Modulation	RB	RB Offset	Tune up	1.4MHz		
				Channel/Frequency(MHz)		
				19957/1710.7	20175/1732.5	20393/1754.3
QPSK	1	Low	13.00	12.04	12.61	12.71
		Middle		12.30	12.77	12.77
		High		12.70	12.75	12.17
	50%	Low	13.00	12.76	12.74	12.71
		Middle		12.76	12.75	12.68
		High		12.77	12.76	12.75
	100%	/	12.50	11.76	11.86	11.78
16QAM	1	Low	12.50	11.90	11.84	11.76
		Middle		11.88	11.94	11.84
		High		11.80	11.86	11.76
	50%	Low	12.50	11.56	11.59	11.52
		Middle		11.58	11.64	11.51
		High		11.61	11.59	11.48
	100%	/	12.00	10.68	10.76	10.82
Modulation	RB	RB Offset	Tune up	3MHz		

				Channel/Frequency(MHz)		
				19965/1711.5	20175/1732.5	20385/1753.5
QPSK	1	Low	13.00	12.06	12.65	12.74
		Middle		12.28	12.73	12.71
		High		12.73	12.76	12.21
	50%	Low	12.50	11.96	11.95	11.94
		Middle		11.88	11.85	11.80
		High		11.87	11.91	11.85
	100%	/	12.50	11.76	11.90	11.81
16QAM	1	Low	12.50	11.93	11.86	11.79
		Middle		11.91	11.94	11.88
		High		11.82	11.90	11.79
	50%	Low	12.00	10.67	10.72	10.64
		Middle		10.69	10.77	10.63
		High		10.71	10.71	10.61
	100%	/	12.00	10.71	10.80	10.85
Modulation	RB	RB Offset	Tune up	5MHz		
				Channel/Frequency(MHz)		
				19975/1712.5	20175/1732.5	20375/1752.5
QPSK	1	Low	13.00	12.03	12.63	12.71
		Middle		12.26	12.76	12.76
		High		12.70	12.75	12.17
	50%	Low	12.50	11.93	11.95	11.90
		Middle		11.86	11.81	11.75
		High		11.85	11.89	11.81
	100%	/	12.50	11.76	11.89	11.79
16QAM	1	Low	12.50	11.90	11.82	11.76
		Middle		11.88	11.92	11.85
		High		11.79	11.88	11.75
	50%	Low	12.00	10.65	10.68	10.61
		Middle		10.66	10.72	10.59
		High		10.68	10.66	10.57
	100%	/	12.00	10.69	10.76	10.80
Modulation	RB	RB Offset	Tune up	10MHz		
				Channel/Frequency(MHz)		
				20000/1715	20175/1732.5	20350/1750
QPSK	1	Low	13.00	12.05	12.64	12.63
		Middle		12.29	12.71	12.72
		High		12.72	12.69	12.20
	50%	Low	12.50	11.96	11.94	11.94
		Middle		11.89	11.86	11.79
		High		11.87	11.93	11.86

	100%	/	12.50	11.80	11.91	11.83
16QAM	1	Low	12.50	11.92	11.85	11.78
		Middle		11.91	11.96	11.88
		High		11.82	11.90	11.78
	50%	Low	12.00	10.68	10.73	10.65
		Middle		10.68	10.76	10.62
		High		10.71	10.71	10.61
	100%	/	12.00	10.72	10.81	10.84
Modulation	RB	RB Offset	Tune up	15MHz		
				Channel/Frequency(MHz)		
				20025/1717.5	20175/1732.5	20325/1747.5
QPSK	1	Low	13.00	12.04	12.60	12.75
		Middle		12.27	12.72	12.73
		High		12.69	12.74	12.16
	50%	Low	12.50	11.94	11.73	11.91
		Middle		11.86	11.81	11.75
		High		11.84	11.90	11.82
	100%	/	12.50	11.78	11.87	11.78
16QAM	1	Low	12.50	11.87	11.83	11.76
		Middle		11.89	11.93	11.86
		High		11.79	11.86	11.75
	50%	Low	12.00	10.65	10.71	10.62
		Middle		10.65	10.71	10.58
		High		10.69	10.67	10.58
	100%	/	12.00	10.69	10.76	10.80
Modulation	RB	RB Offset	Tune up	20MHz		
				Channel/Frequency(MHz)		
				20050/1720	20175/1732.5	20300/1745
QPSK	1	Low	13.00	12.01	12.56	**12.78**
		Middle		12.26	12.76	12.77
		High		12.67	12.73	12.13
	50%	Low	12.50	11.91	**11.97**	11.87
		Middle		11.84	11.77	11.72
		High		11.81	11.85	11.78
	100%	/	12.50	11.75	11.82	11.74
16QAM	1	Low	12.50	11.72	11.79	11.71
		Middle		11.85	11.91	11.82
		High		11.77	11.83	11.73
	50%	Low	12.00	10.62	10.67	10.59
		Middle		10.62	10.69	10.55
		High		10.66	10.62	10.54
	100%	/	12.00	10.67	10.72	10.77

Table 13.2-3: The conducted Power for LTE Band 5

LTE B5			Maximum Conducted Power (dBm)			
Modulation	RB	RB Offset	Tune up	1.4MHz		
				Channel/Frequency(MHz)		
				20407/824.7	20525/836.5	20643/848.3
QPSK	1	Low	21.00	20.47	20.56	20.59
		Middle		20.59	20.67	20.64
		High		20.44	20.33	20.62
	50%	Low	21.00	20.41	20.48	20.43
		Middle		20.34	20.43	20.38
		High		20.28	20.31	20.28
	100%	/	20.00	19.43	19.36	19.31
16QAM	1	Low	20.00	19.40	19.32	19.27
		Middle		19.38	19.27	19.27
		High		19.26	19.22	19.11
	50%	Low	20.00	19.16	19.18	19.15
		Middle		19.23	19.17	19.23
		High		19.33	19.28	19.18
	100%	/	19.00	18.43	18.42	18.36
Modulation	RB	RB Offset	Tune up	3MHz		
				Channel/Frequency(MHz)		
				20415/825.5	20525/836.5	20635/847.5
QPSK	1	Low	21.00	20.48	20.59	20.61
		Middle		20.58	20.64	20.64
		High		20.46	20.37	20.65
	50%	Low	20.00	19.48	19.47	19.43
		Middle		19.47	19.45	19.49
		High		19.38	19.44	19.39
	100%	/	20.00	19.47	19.41	19.36
16QAM	1	Low	20.00	19.42	19.33	19.29
		Middle		19.41	19.29	19.31
		High		19.28	19.26	19.13
	50%	Low	19.00	18.28	18.32	18.28
		Middle		18.33	18.29	18.34
		High		18.43	18.40	18.31
	100%	/	19.00	18.47	18.47	18.38
Modulation	RB	RB Offset	Tune up	5MHz		
				Channel/Frequency(MHz)		
				20425/826.5	20525/836.5	20625/846.5
QPSK	1	Low	21.00	20.47	20.55	20.59
		Middle		20.56	20.63	20.66
		High		20.43	20.32	20.61

	50%	Low	20.00	19.49	19.47	19.45
		Middle		19.44	19.49	19.45
		High		19.35	19.41	19.35
	100%	/	20.00	19.45	19.37	19.31
16QAM	1	Low	20.00	19.37	19.31	19.27
		Middle		19.39	19.26	19.29
		High		19.25	19.22	19.10
	50%	Low	19.00	18.25	18.30	18.25
		Middle		18.30	18.24	18.30
		High		18.41	18.36	18.28
	100%	/	19.00	18.44	18.42	18.34
Modulation	RB	RB Offset	Tune up	10MHz		
				Channel/Frequency(MHz)		
				20450/829	20525/836.5	20600/844
QPSK	1	Low	21.00	20.44	20.51	20.56
		Middle		20.55	20.69	20.64
		High		20.41	20.31	20.58
	50%	Low	20.00	19.46	19.51	19.49
		Middle		19.42	19.45	19.42
		High		19.32	19.36	19.31
	100%	/	20.00	19.42	19.32	19.27
16QAM	1	Low	20.00	19.28	19.27	19.22
		Middle		19.35	19.24	19.25
		High		19.23	19.19	19.08
	50%	Low	19.00	18.22	18.26	18.22
		Middle		18.27	18.22	18.27
		High		18.38	18.31	18.24
	100%	/	19.00	18.42	18.38	18.31

Table 13.2-4: The conducted Power for LTE Band 12

LTE B12			Maximum Conducted Power (dBm)			
Modulation	RB	RB Offset	Tune up	1.4MHz		
				Channel/Frequency(MHz)		
				23017/699.7	23095/707.5	23173/715.3
QPSK	1	Low	17.00	16.44	16.46	16.51
		Middle		16.50	16.48	16.52
		High		16.41	16.55	16.35
	50%	Low	17.00	16.42	16.51	16.45
		Middle		16.36	16.51	16.43
		High		16.35	16.29	16.24
	100%	/	16.00	15.37	15.45	15.39
16QAM	1	Low	16.00	15.34	15.40	15.29

		Middle		15.32	15.41	15.31
		High		15.39	15.44	15.27
	50%	Low	16.00	15.25	15.28	15.15
		Middle		15.23	15.27	15.32
		High		15.17	15.21	15.15
	100%	/	15.00	14.18	14.32	14.21
Modulation	RB	RB Offset	Tune up	3MHz		
				Channel/Frequency(MHz)		
				23025/700.5	23095/707.5	23165/714.5
QPSK	1	Low	17.00	16.45	16.49	16.53
		Middle		16.49	16.52	16.47
		High		16.43	16.49	16.38
	50%	Low	16.00	15.52	15.53	15.48
		Middle		15.49	15.52	15.44
		High		15.45	15.42	15.35
	100%	/	16.00	15.41	15.50	15.44
16QAM	1	Low	16.00	15.36	15.41	15.31
		Middle		15.35	15.43	15.35
		High		15.41	15.48	15.29
	50%	Low	15.00	14.37	14.42	14.28
		Middle		14.33	14.39	14.43
		High		14.27	14.33	14.28
	100%	/	15.00	14.22	14.37	14.23
Modulation	RB	RB Offset	Tune up	5MHz		
				Channel/Frequency(MHz)		
				23035/701.5	23095/707.5	23155/713.5
QPSK	1	Low	17.00	16.44	16.45	16.51
		Middle		16.56	16.54	16.54
		High		16.40	16.54	16.34
	50%	Low	16.00	15.50	15.49	15.45
		Middle		15.46	15.47	15.50
		High		15.42	15.39	15.31
	100%	/	16.00	15.39	15.46	15.39
16QAM	1	Low	16.00	15.31	15.39	15.29
		Middle		15.33	15.40	15.33
		High		15.38	15.44	15.26
	50%	Low	15.00	14.34	14.40	14.25
		Middle		14.30	14.34	14.39
		High		14.25	14.29	14.25
	100%	/	15.00	14.19	14.32	14.19
Modulation	RB	RB Offset	Tune up	10MHz		
				Channel/Frequency(MHz)		

				23060/704	23095/707.5	23130/711
QPSK	1	Low	17.00	16.41	16.41	16.48
		Middle		16.56	16.57	16.52
		High		16.38	16.53	16.31
	50%	Low	16.00	15.44	15.54	15.46
		Middle		15.47	15.53	15.51
		High		15.39	15.34	15.27
	100%	/	16.00	15.36	15.41	15.35
16QAM	1	Low	16.00	15.31	15.35	15.24
		Middle		15.29	15.38	15.29
		High		15.36	15.41	15.24
	50%	Low	15.00	14.31	14.36	14.22
		Middle		14.27	14.32	14.36
		High		14.22	14.24	14.21
	100%	/	15.00	14.17	14.28	14.16

Table 13.2-5: The conducted Power for LTE Band 13

LTE B13				**Maximum Conducted Power (dBm)**		
Modulation	RB	RB Offset	Tune up	5MHz		
				Channel/Frequency(MHz)		
				23205/779.5	23230/782	23255/784.5
QPSK	1	Low	18.00	17.67	17.81	17.68
		Middle		17.56	17.82	17.70
		High		17.70	17.75	17.69
	50%	Low	17.00	16.60	16.61	16.65
		Middle		16.50	16.58	16.50
		High		16.54	16.57	16.54
	100%	/	17.00	16.67	16.63	16.61
16QAM	1	Low	17.00	16.55	16.57	16.60
		Middle		16.62	16.45	16.50
		High		16.67	16.65	16.61
	50%	Low	16.00	15.61	15.63	15.67
		Middle		15.55	15.48	15.41
		High		15.47	15.54	15.45
	100%	/	16.00	15.51	15.41	15.46
Modulation	RB	RB Offset	Tune up	10MHz		
				Channel/Frequency(MHz)		
				/	23230/782	/
QPSK	1	Low	18.00	/	17.77	/
		Middle		/	17.88	/
		High		/	17.74	/
	50%	Low	17.00	/	16.66	/

		Middle		/	16.64	/
		High		/	16.62	/
	100%	/	17.00	/	16.58	/
16QAM	1	Low	17.00	/	16.53	/
		Middle		/	16.43	/
		High		/	16.62	/
	50%	Low	16.00	/	15.59	/
		Middle		/	15.46	/
		High		/	15.49	/
	100%	/	16.00	/	15.37	/

Table 13.2-6: The conducted Power for LTE Band 14

LTE B14				**Maximum Conducted Power (dBm)**		
Modulation	RB	RB Offset	Tune up	5MHz		
				Channel/Frequency(MHz)		
				23305/790.5	23330/793	23355/795.5
QPSK	1	Low	18.00	17.41	17.40	17.44
		Middle		17.52	17.50	17.51
		High		17.34	17.33	17.38
	50%	Low	17.00	16.40	16.52	16.56
		Middle		16.31	16.48	16.53
		High		16.45	16.47	16.54
	100%	/	17.00	16.40	16.42	16.46
16QAM	1	Low	17.00	15.59	15.58	15.60
		Middle		15.54	15.53	15.56
		High		15.48	15.48	15.52
	50%	Low	16.00	15.51	15.53	15.55
		Middle		15.43	15.45	15.50
		High		15.44	15.53	15.57
	100%	/	16.00	15.38	15.41	15.46
Modulation	RB	RB Offset	Tune up	10MHz		
				Channel/Frequency(MHz)		
				/	23330/793	/
QPSK	1	Low	18.00	/	17.36	/
		Middle		/	17.63	/
		High		/	17.32	/
	50%	Low	17.00	/	16.57	/
		Middle		/	16.54	/
		High		/	16.52	/
	100%	/	17.00	/	16.37	/
16QAM	1	Low	17.00	/	15.54	/
		Middle		/	15.51	/

		High		/	15.45	/
	50%	Low	16.00	/	15.49	/
		Middle		/	15.43	/
		High		/	15.48	/
	100%	/	16.00	/	15.37	/

Table 13.2-7: The conducted Power for LTE Band 66

LTE B66				Maximum Conducted Power (dBm)		
Modulation	RB	RB Offset	Tune up	1.4MHz		
				Channel/Frequency(MHz)		
				131979/1710.7	132322/1745	132665/1779.3
QPSK	1	Low	13.00	11.84	12.46	12.40
		Middle		12.55	12.67	12.75
		High		12.04	12.05	12.42
	50%	Low	13.00	12.76	12.84	12.84
		Middle		12.57	12.69	12.81
		High		11.97	12.04	12.40
	100%	/	12.50	11.35	11.48	11.57
16QAM	1	Low	12.50	11.36	11.41	11.62
		Middle		11.34	11.29	11.50
		High		11.19	11.28	11.65
	50%	Low	12.50	11.22	11.30	11.45
		Middle		11.20	11.27	11.62
		High		11.12	11.28	11.67
	100%	/	12.00	10.32	10.31	10.48
Modulation	RB	RB Offset	Tune up	3MHz		
				Channel/Frequency(MHz)		
				131987/1711.5	132322/1745	132657/1778.5
QPSK	1	Low	13.00	11.86	12.50	12.43
		Middle		12.53	12.70	12.79
		High		12.07	12.10	12.46
	50%	Low	12.50	11.86	12.04	12.29
		Middle		11.69	11.79	11.93
		High		11.07	11.15	11.50
	100%	/	12.50	11.35	11.52	11.60
16QAM	1	Low	12.50	11.39	11.43	11.65
		Middle		11.37	11.29	11.54
		High		11.21	11.32	11.68
	50%	Low	12.00	10.33	10.43	10.57
		Middle		10.31	10.40	10.74
		High		10.22	10.40	10.80
	100%	/	12.00	10.35	10.35	10.51

Modulation	RB	RB Offset	Tune up	5MHz		
				Channel/Frequency(MHz)		
				131997/1712.5	132322/1745	132647/1777.5
QPSK	1	Low	13.00	11.83	12.48	12.39
		Middle		12.51	12.66	12.76
		High		12.04	12.05	12.42
	50%	Low	12.50	11.83	11.99	12.25
		Middle		11.67	11.75	11.88
		High		11.05	11.13	11.46
	100%	/	12.50	11.35	11.51	11.58
16QAM	1	Low	12.50	11.36	11.39	11.62
		Middle		11.34	11.27	11.51
		High		11.18	11.30	11.64
	50%	Low	12.00	10.31	10.39	10.54
		Middle		10.28	10.35	10.70
		High		10.19	10.35	10.76
	100%	/	12.00	10.33	10.31	10.46
Modulation	RB	RB Offset	Tune up	10MHz		
				Channel/Frequency(MHz)		
				132022/1715	132322/1745	132622/1775
QPSK	1	Low	13.00	11.85	12.49	12.42
		Middle		12.54	12.71	12.84
		High		12.06	12.09	12.45
	50%	Low	12.50	11.86	12.04	12.29
		Middle		11.70	11.80	11.92
		High		11.07	11.17	11.51
	100%	/	12.50	11.39	11.53	11.62
16QAM	1	Low	12.50	11.38	11.42	11.64
		Middle		11.37	11.31	11.54
		High		11.21	11.32	11.67
	50%	Low	12.00	10.34	10.44	10.58
		Middle		10.30	10.39	10.73
		High		10.22	10.40	10.80
	100%	/	12.00	10.36	10.36	10.50
Modulation	RB	RB Offset	Tune up	15MHz		
				Channel/Frequency(MHz)		
				132047/1717.5	132322/1745	132597/1772.5
QPSK	1	Low	13.00	11.84	12.45	12.40
		Middle		12.52	12.77	12.75
		High		12.03	12.04	12.41
	50%	Low	12.50	11.84	12.00	12.26
		Middle		11.67	11.75	11.88

		High		11.04	11.14	11.47
	100%	/	12.50	11.37	11.49	11.57
16QAM	1	Low	12.50	11.33	11.40	11.62
		Middle		11.35	11.28	11.52
		High		11.18	11.28	11.64
	50%	Low	12.00	10.31	10.42	10.55
		Middle		10.27	10.34	10.69
		High		10.20	10.36	10.77
	100%	/	12.00	10.33	10.31	10.46
Modulation	RB	RB Offset	Tune up	20MHz		
				Channel/Frequency(MHz)		
				132072/1720	132322/1745	132572/1770
QPSK	1	Low	13.00	11.81	12.41	12.37
		Middle		12.51	12.66	12.85
		High		12.01	12.03	12.38
	50%	Low	12.50	11.81	11.95	12.32
		Middle		11.65	11.71	11.85
		High		11.01	11.09	11.43
	100%	/	12.50	11.34	11.44	11.53
16QAM	1	Low	12.50	11.31	11.36	11.57
		Middle		11.31	11.26	11.48
		High		11.16	11.25	11.62
	50%	Low	12.00	10.28	10.38	10.52
		Middle		10.24	10.32	10.66
		High		10.17	10.31	10.73
	100%	/	12.00	10.31	10.27	10.43

Table 13.2-8: The conducted Power for LTE Band 71

LTE B71				**Maximum Conducted Power (dBm)**		
Modulation	RB	RB Offset	Tune up	5MHz		
				Channel/Frequency(MHz)		
				133147/665.5	133297/680.5	133447/695.5
QPSK	1	Low	17.50	16.97	16.75	15.66
		Middle		16.94	17.14	17.13
		High		16.68	16.84	16.65
	50%	Low	16.50	15.95	16.01	15.88
		Middle		15.95	16.01	15.90
		High		15.88	15.96	15.81
	100%	/	16.50	15.84	15.95	15.89
16QAM	1	Low	16.50	15.86	15.84	15.72
		Middle		15.84	15.85	15.84
		High		15.86	15.83	15.91

	50%	Low	15.50	15.81	14.83	15.80
		Middle		15.15	15.06	15.15
		High		15.11	15.07	15.21
	100%	/	15.50	14.89	15.02	15.09
Modulation	RB	RB Offset	Tune up	10MHz		
				Channel/Frequency(MHz)		
				133172/668	133297/680.5	133422/693
QPSK	1	Low	17.50	16.99	16.76	15.69
		Middle		16.97	17.14	17.13
		High		16.70	16.88	16.68
	50%	Low	16.50	15.98	16.02	15.92
		Middle		15.98	16.02	15.94
		High		15.90	16.00	15.86
	100%	/	16.50	15.88	15.97	15.93
16QAM	1	Low	16.50	15.88	15.87	15.74
		Middle		15.87	15.89	15.87
		High		15.89	15.85	15.94
	50%	Low	15.50	15.84	14.88	15.84
		Middle		15.17	15.10	15.18
		High		15.14	15.12	15.25
	100%	/	15.50	14.92	15.07	15.13
Modulation	RB	RB Offset	Tune up	15MHz		
				Channel/Frequency(MHz)		
				133197/670.5	133297/680.5	133397/690.5
QPSK	1	Low	17.50	16.98	16.72	15.67
		Middle		16.95	17.13	17.10
		High		16.67	16.83	16.64
	50%	Low	16.50	15.96	16.01	15.89
		Middle		15.95	16.01	15.90
		High		15.87	15.97	15.82
	100%	/	16.50	15.86	15.93	15.88
16QAM	1	Low	16.50	15.83	15.85	15.72
		Middle		15.85	15.86	15.85
		High		15.86	15.81	15.91
	50%	Low	15.50	15.81	14.86	15.81
		Middle		15.14	15.05	15.14
		High		15.12	15.08	15.22
	100%	/	15.50	14.89	15.02	15.09
Modulation	RB	RB Offset	Tune up	20MHz		
				Channel/Frequency(MHz)		
				133222/673	133322/683	133372/688
QPSK	1	Low	17.50	16.95	16.68	15.64

		Middle		16.94	17.19	17.18
		High		16.65	16.82	16.61
	50%	Low	16.50	15.93	16.03	15.85
		Middle		15.92	15.97	15.84
		High		15.84	15.92	15.78
	100%	/	16.50	15.83	15.88	15.84
16QAM	1	Low	16.50	15.92	15.81	15.67
		Middle		15.81	15.84	15.81
		High		15.84	15.78	15.89
	50%	Low	15.50	15.78	14.82	15.78
		Middle		15.11	15.03	15.11
		High		15.09	15.03	15.18
	100%	/	15.50	14.87	14.98	15.06

13.3 BT Measurement result

Table 13.3-1: The conducted power for Bluetooth

BlueTooth	**Maximum Output Power (dBm)**					
Channel/Frequency(MHz)	0/2402		39/2441		78/2480	
Mode	Tune up	Output Power	Tune up	Output Power	Tune up	Output Power
1-DH5	5.00	4.04	4.00	2.90	4.00	2.34
2-DH5	2.50	1.48	2.00	0.42	1.00	-0.09
3-DH5	2.50	1.83	2.00	0.80	1.00	0.28
Mode	Channel/Frequency(MHz)		Tune up		Output Power	
BLE	0/2402		3.00		2.24	
	19/2440		2.00		1.11	
	39/2480		1.00		0.55	

13.4 Wi-Fi Measurement result

Table 13.4-1: The conducted power for Wi-Fi 2.4G

Wi-Fi 2.4G			Maximum Conducted Power (dBm)	
Mode	BW	Channel/Frequency (MHz)	Tune up(dBm)	Output Power(dBm)
802.11b	20M	1/2412	12.00	11.63
		6/2437	12.00	11.57
		11/2462	12.00	11.82
802.11g	20M	1/2412	6.50	5.89
		6/2437	6.50	5.88
		11/2462	6.50	6.20
802.11n	20M	1/2412	6.50	5.70
		6/2437	6.50	5.70
		11/2462	6.50	5.96
	40M	3/2422	6.00	5.65
		6/2437	6.00	5.70
		9/2452	6.00	5.80

Table 13.4-2: The conducted power for Wi-Fi 5G

Wi-Fi 5G			Maximum Conducted Power (dBm)	
Mode	BW	Channel/Frequency(MHz)	Tune up	Output Power
802.11a	20M	36/5180	6.50	5.14
		40/5200	6.50	5.39
		48/5240	6.50	6.00
		149/5745	9.00	7.74
		157/5785	10.00	8.97
		165/5825	10.00	9.64
802.11n	20M	36/5180	5.00	4.59
		40/5200	6.00	5.16
		48/5240	6.00	5.65
		149/5745	9.00	7.45
		157/5785	9.00	8.65
		165/5825	10.00	9.33

	40M	38/5190	6.00	5.03
		46/5230	6.00	5.61
		151/5755	8.50	7.95
		159/5795	9.00	8.92
802.11ac	20M	36/5180	5.00	4.45
		40/5200	6.00	5.12
		48/5240	6.00	5.59
		149/5745	9.00	7.46
		157/5785	9.00	8.72
		165/5825	10.00	9.33
	40M	38/5190	6.00	4.93
		46/5230	6.00	5.75
		151/5755	8.00	7.96
		159/5795	9.00	8.77
	80M	42/5210	6.00	5.13
		155/5775	9.00	8.24

14 Test Results

14.1 Standalone SAR Test Result

14.1.1 Limit/Criterion

At frequencies between 100 kHz and 6 GHz, the MPE (Maximum Permissible Exposure) in population/ uncontrolled environments for electromagnetic field strengths may be exceeded if

(a) The exposure conditions can be shown by appropriate techniques to produce SARs below 0.08W/kg, as averaged over the whole body, and spatial peak SAR values not exceeding 1.6 W/kg, as averaged over any 1g of tissue (defined as a tissue volume in the shape of a cube), except for the hands, wrists, feet, and ankles where the spatial peak SAR shall not exceed 4 W/kg, as averaged over any 10g of tissue (defined as a tissue volume in the shape of a cube); and

(b) The induced currents in the body confirm with the MPE in table 2, Part B in ANSI/IEEE C95.1-1992.

14.1.2 Test Results

Table 14.1.2-1: SAR Values for WCDMA Band II

Test Position	Cover Type	Mode	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
								Measured SAR1g	Scaling Factor	Report SAR1g	
Body SAR (0mm)-original											
Front Side	Standard	RMC12.2k	9400	1880	13.57	14.00	0.02	0.095	1.10	0.105	/
Back Side	Standard	RMC12.2k	9400	1880	13.57	14.00	0.00	1.000	1.10	1.104	/
Left Side	Standard	RMC12.2k	9400	1880	13.57	14.00	0.08	0.013	1.10	0.015	/
Right Side	Standard	RMC12.2k	9400	1880	13.57	14.00	0.10	0.027	1.10	0.030	/
Top Side	Standard	RMC12.2k	9400	1880	13.57	14.00	0.00	0.004	1.10	0.004	/
Bottom Side	Standard	RMC12.2k	9400	1880	13.57	14.00	0.08	0.007	1.10	0.008	/
Back Side	Standard	RMC12.2k	9262	1852.4	13.52	14.00	0.00	1.120	1.12	1.251	/
Back Side	Standard	RMC12.2k	9538	1907.6	13.41	14.00	0.00	0.943	1.15	1.080	/
Repeat-original											
Back Side	Standard	RMC12.2k	9262	1852.4	13.52	14.00	0.00	1.100	1.12	1.229	/
Body SAR (0mm)-variant											
Back Side	Standard	RMC12.2k	9262	1852.4	13.52	14.00	-0.05	0.004	1.12	0.004	A.1-1

Table 14.1.2-2: SAR Values for WCDMA Band Ⅳ

Test Position	Cover Type	Mode	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
								Measured SAR1g	Scaling Factor	Report SAR1g	
Body SAR (0mm)-original											
Front Side	Standard	RMC12.2k	1413	1732.6	13.95	14.00	0.00	0.132	1.01	0.134	/
Back Side	Standard	RMC12.2k	1413	1732.6	13.95	14.00	0.00	0.984	1.01	0.995	/
Left Side	Standard	RMC12.2k	1413	1732.6	13.95	14.00	0.02	0.031	1.01	0.032	/
Right Side	Standard	RMC12.2k	1413	1732.6	13.95	14.00	0.09	0.014	1.01	0.014	/
Top Side	Standard	RMC12.2k	1413	1732.6	13.95	14.00	0.03	0.112	1.01	0.113	/
Bottom Side	Standard	RMC12.2k	1413	1732.6	13.95	14.00	0.00	0.001	1.01	0.001	/
Back Side	Standard	RMC12.2k	1312	1712.4	12.95	14.00	0.00	0.741	1.27	0.944	/
Back Side	Standard	RMC12.2k	1513	1752.6	13.02	14.00	-0.15	0.910	1.25	1.140	/
Repeat-original											
Back Side	Standard	RMC12.2k	1413	1732.6	13.95	14.00	0.12	0.980	1.01	0.991	/
Body SAR (0mm)-variant											
Back Side	Standard	RMC12.2k	1513	1752.6	13.02	14.00	0.05	0.003	1.25	0.004	A.1-2

Table 14.1.2-3: SAR Values for WCDMA Band V

Test Position	Cover Type	Mode	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
								Measured SAR1g	Scaling Factor	Report SAR1g	
Body SAR (0mm)-original											
Front Side	Standard	RMC12.2k	4183	836.6	17.29	17.50	0.06	0.044	1.05	0.046	/
Back Side	Standard	RMC12.2k	4183	836.6	17.29	17.50	0.03	0.407	1.05	0.427	/
Left Side	Standard	RMC12.2k	4183	836.6	17.29	17.50	-0.01	0.027	1.05	0.028	/
Right Side	Standard	RMC12.2k	4183	836.6	17.29	17.50	0.03	0.005	1.05	0.005	/
Top Side	Standard	RMC12.2k	4183	836.6	17.29	17.50	0.00	0.000	1.05	0.000	/
Bottom Side	Standard	RMC12.2k	4183	836.6	17.29	17.50	0.03	0.059	1.05	0.061	/
Back Side	Standard	RMC12.2k	4132	826.4	16.98	17.50	0.03	0.409	1.13	0.461	/
Back Side	Standard	RMC12.2k	4233	846.6	17.21	17.50	0.02	0.371	1.07	0.397	/
Body SAR (0mm)-variant											
Back Side	Standard	RMC12.2k	4132	826.4	16.98	17.50	0.06	0.003	1.13	0.003	A.1-3

Table 14.1.2-4: SAR Values for LTE Band 2

Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
Body SAR (0mm)-original														
Front Side	Standard	QPSK	20	1	mid	19100	1900	13.57	14.00	0.03	0.063	1.10	0.069	/
Back Side	Standard	QPSK	20	1	mid	19100	1900	13.57	14.00	0.08	1.000	1.10	1.104	/
Left Side	Standard	QPSK	20	1	mid	19100	1900	13.57	14.00	0.02	0.005	1.10	0.005	/
Right Side	Standard	QPSK	20	1	mid	19100	1900	13.57	14.00	-0.01	0.006	1.10	0.007	/
Top Side	Standard	QPSK	20	1	mid	19100	1900	13.57	14.00	-0.15	0.174	1.10	0.192	/
Bottom Side	Standard	QPSK	20	1	mid	19100	1900	13.57	14.00	0.00	0.000	1.10	0.000	/
Front Side	Standard	QPSK	20	50%	low	19100	1900	12.61	13.00	0.01	0.046	1.09	0.050	/
Back Side	Standard	QPSK	20	50%	low	19100	1900	12.61	13.00	0.07	0.898	1.09	0.982	/
Left Side	Standard	QPSK	20	50%	low	19100	1900	12.61	13.00	-0.02	0.009	1.09	0.009	/
Right Side	Standard	QPSK	20	50%	low	19100	1900	12.61	13.00	-0.03	0.006	1.09	0.006	/
Top Side	Standard	QPSK	20	50%	low	19100	1900	12.61	13.00	-0.04	0.131	1.09	0.143	/
Bottom Side	Standard	QPSK	20	50%	low	19100	1900	12.61	13.00	0.00	0.000	1.09	0.000	/
Back Side	Standard	QPSK	20	1	mid	18700	1860	13.42	14.00	0.03	1.010	1.14	1.154	/
Back Side	Standard	QPSK	20	1	mid	18900	1880	13.44	14.00	0.03	1.070	1.14	1.217	/
Back Side	Standard	QPSK	20	50%	low	18700	1860	11.81	13.00	0.07	0.682	1.32	0.897	/
Back Side	Standard	QPSK	20	50%	low	18900	1880	11.82	13.00	0.04	0.840	1.31	1.102	/
Repeat-original														
Back Side	Standard	QPSK	20	1	mid	18900	1880	13.44	14.00	0.03	1.060	1.14	1.206	/
Body SAR (0mm)-variant														
Back Side	Standard	QPSK	20	1	mid	18900	1880	13.44	14.00	0.00	0.000	1.14	0.000	/

Table 14.1.2-5: SAR Values for LTE Band 5

Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
Body SAR (0mm)-original														
Front Side	Standard	QPSK	10	1	mid	20525	836.5	20.69	21.00	0.04	0.128	1.07	0.137	/
Back Side	Standard	QPSK	10	1	mid	20525	836.5	20.69	21.00	0.12	1.000	1.07	1.074	/
Left Side	Standard	QPSK	10	1	mid	20525	836.5	20.69	21.00	-0.06	0.030	1.07	0.032	/
Right Side	Standard	QPSK	10	1	mid	20525	836.5	20.69	21.00	-0.02	0.008	1.07	0.009	/
Top Side	Standard	QPSK	10	1	mid	20525	836.5	20.69	21.00	0.05	0.306	1.07	0.329	/
Bottom Side	Standard	QPSK	10	1	mid	20525	836.5	20.69	21.00	-0.16	0.012	1.07	0.013	/
Front Side	Standard	QPSK	10	50%	low	20525	836.5	19.51	20.00	0.12	0.093	1.12	0.104	/
Back Side	Standard	QPSK	10	50%	low	20525	836.5	19.51	20.00	0.10	0.828	1.12	0.927	/
Left Side	Standard	QPSK	10	50%	low	20525	836.5	19.51	20.00	-0.13	0.009	1.12	0.010	/
Right Side	Standard	QPSK	10	50%	low	20525	836.5	19.51	20.00	-0.10	0.016	1.12	0.018	/
Top Side	Standard	QPSK	10	50%	low	20525	836.5	19.51	20.00	-0.03	0.207	1.12	0.232	/
Bottom Side	Standard	QPSK	10	50%	low	20525	836.5	19.51	20.00	-0.04	0.009	1.12	0.010	/
Back Side	Standard	QPSK	10	1	mid	20450	829	20.55	21.00	0.06	1.090	1.11	1.209	/
Back Side	Standard	QPSK	10	1	mid	20600	844	20.64	21.00	0.15	0.954	1.09	1.036	/
Back Side	Standard	QPSK	10	50%	low	20450	829	19.46	20.00	0.08	0.882	1.13	0.999	/
Back Side	Standard	QPSK	10	50%	low	20600	844	19.49	20.00	0.10	0.749	1.12	0.842	/
Repeat-original														
Back Side	Standard	QPSK	10	1	mid	20450	829	20.55	21.00	0.06	1.110	1.11	1.231	/
Body SAR (0mm)-variant														
Back Side	Standard	QPSK	10	1	mid	20450	829	20.55	21.00	0.02	0.002	1.11	0.002	A.1-4

Table 14.1.2-6: SAR Values for LTE Band 12

Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
Body SAR (0mm)-original														
Front Side	Standard	QPSK	10	1	mid	23095	707.5	16.57	17.00	0.00	0.014	1.10	0.016	/
Back Side	Standard	QPSK	10	1	mid	23095	707.5	16.57	17.00	0.04	0.688	1.10	0.760	/
Left Side	Standard	QPSK	10	1	mid	23095	707.5	16.57	17.00	0.00	0.000	1.10	0.000	/
Right Side	Standard	QPSK	10	1	mid	23095	707.5	16.57	17.00	0.00	0.000	1.10	0.000	/
Top Side	Standard	QPSK	10	1	mid	23095	707.5	16.57	17.00	0.03	0.017	1.10	0.019	/
Bottom Side	Standard	QPSK	10	1	mid	23095	707.5	16.57	17.00	0.00	0.000	1.10	0.000	/
Front Side	Standard	QPSK	10	50%	low	23095	707.5	15.54	16.00	0.00	0.005	1.11	0.005	/
Back Side	Standard	QPSK	10	50%	low	23095	707.5	15.54	16.00	0.07	0.531	1.11	0.590	/
Left Side	Standard	QPSK	10	50%	low	23095	707.5	15.54	16.00	0.00	0.000	1.11	0.000	/
Right Side	Standard	QPSK	10	50%	low	23095	707.5	15.54	16.00	0.00	0.002	1.11	0.002	/
Top Side	Standard	QPSK	10	50%	low	23095	707.5	15.54	16.00	-0.07	0.008	1.11	0.009	/
Bottom Side	Standard	QPSK	10	50%	low	23095	707.5	15.54	16.00	0.00	0.000	1.11	0.000	/
Back Side	Standard	QPSK	10	1	mid	23060	704	16.56	17.00	0.02	0.675	1.11	0.747	/
Back Side	Standard	QPSK	10	1	mid	23130	711	16.52	17.00	-0.08	1.010	1.12	1.128	/
Back Side	Standard	QPSK	10	50%	mid	23060	704	15.47	16.00	-0.11	0.756	1.13	0.854	/
Back Side	Standard	QPSK	10	50%	mid	23130	711	15.51	16.00	-0.04	0.765	1.12	0.856	/
Repeat-original														
Back Side	Standard	QPSK	10	1	mid	23130	711	16.52	17.00	-0.01	0.998	1.12	1.115	/
Body SAR (0mm)-variant														
Back Side	Standard	QPSK	10	1	mid	23130	711	16.52	17.00	0.00	0.000	1.12	0.000	/

Table 14.1.2-7: SAR Values for LTE Band 13

Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
Body SAR (0mm)-original														
Front Side	Standard	QPSK	10	1	mid	23230	782	17.88	18.00	0.00	0.017	1.03	0.017	/
Back Side	Standard	QPSK	10	1	mid	23230	782	17.88	18.00	0.12	0.999	1.03	1.027	/
Left Side	Standard	QPSK	10	1	mid	23230	782	17.88	18.00	0.00	0.000	1.03	0.000	/
Right Side	Standard	QPSK	10	1	mid	23230	782	17.88	18.00	0.00	0.001	1.03	0.001	/
Top Side	Standard	QPSK	10	1	mid	23230	782	17.88	18.00	0.06	0.047	1.03	0.048	/
Bottom Side	Standard	QPSK	10	1	mid	23230	782	17.88	18.00	-0.06	0.010	1.03	0.010	/
Front Side	Standard	QPSK	10	50%	low	23230	782	16.66	17.00	0.00	0.012	1.08	0.013	/
Back Side	Standard	QPSK	10	50%	low	23230	782	16.66	17.00	-0.06	0.799	1.08	0.864	/
Left Side	Standard	QPSK	10	50%	low	23230	782	16.66	17.00	0.00	0.000	1.08	0.000	/
Right Side	Standard	QPSK	10	50%	low	23230	782	16.66	17.00	-0.03	0.003	1.08	0.003	/
Top Side	Standard	QPSK	10	50%	low	23230	782	16.66	17.00	-0.03	0.032	1.08	0.035	/
Bottom Side	Standard	QPSK	10	50%	low	23230	782	16.66	17.00	-0.14	0.008	1.08	0.008	/
Repeat-original														
Back Side	Standard	QPSK	10	1	mid	23230	782	17.88	18.00	-0.04	0.985	1.03	1.013	/
Body SAR (0mm)-variant														
Back Side	Standard	QPSK	10	1	mid	23230	782	17.88	18.00	0.03	0.006	1.03	0.006	A.1-5

Table 14.1.2-8: SAR Values for LTE Band 14

Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
Body SAR (0mm)-original														
Front Side	Standard	QPSK	10	1	mid	23330	793	17.63	18.00	0.00	0.025	1.09	0.027	/
Back Side	Standard	QPSK	10	1	mid	23330	793	17.63	18.00	-0.02	0.905	1.09	0.985	/
Left Side	Standard	QPSK	10	1	mid	23330	793	17.63	18.00	0.00	0.000	1.09	0.000	/
Right Side	Standard	QPSK	10	1	mid	23330	793	17.63	18.00	-0.14	0.002	1.09	0.002	/
Top Side	Standard	QPSK	10	1	mid	23330	793	17.63	18.00	-0.04	0.052	1.09	0.057	/
Bottom Side	Standard	QPSK	10	1	mid	23330	793	17.63	18.00	0.00	0.000	1.09	0.000	/
Front Side	Standard	QPSK	10	50%	low	23330	793	16.57	17.00	0.00	0.021	1.10	0.023	/
Back Side	Standard	QPSK	10	50%	low	23330	793	16.57	17.00	-0.12	0.722	1.10	0.797	/
Left Side	Standard	QPSK	10	50%	low	23330	793	16.57	17.00	0.00	0.000	1.10	0.000	/
Right Side	Standard	QPSK	10	50%	low	23330	793	16.57	17.00	-0.05	0.001	1.10	0.001	/
Top Side	Standard	QPSK	10	50%	low	23330	793	16.57	17.00	0.00	0.031	1.10	0.034	/
Bottom Side	Standard	QPSK	10	50%	low	23330	793	16.57	17.00	0.00	0.000	1.10	0.000	/
Repeat-original														
Back Side	Standard	QPSK	10	1	mid	23330	793	17.63	18.00	-0.05	0.962	1.09	1.048	/
Body SAR (0mm)-variant														
Back Side	Standard	QPSK	10	1	mid	23330	793	17.63	18.00	0.10	0.005	1.09	0.006	A.1-6

Table 14.1.2-9: SAR Values for LTE Band 66

Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
Body SAR (0mm)-original														
Front Side	Standard	QPSK	20	1	mid	132572	1770	12.85	13.00	0.09	0.053	1.04	0.055	/
Back Side	Standard	QPSK	20	1	mid	132572	1770	12.85	13.00	0.10	1.020	1.04	1.056	/
Left Side	Standard	QPSK	20	1	mid	132572	1770	12.85	13.00	-0.03	0.004	1.04	0.004	/
Right Side	Standard	QPSK	20	1	mid	132572	1770	12.85	13.00	0.03	0.005	1.04	0.005	/
Top Side	Standard	QPSK	20	1	mid	132572	1770	12.85	13.00	0.04	0.105	1.04	0.109	/
Bottom Side	Standard	QPSK	20	1	mid	132572	1770	12.85	13.00	0.00	0.000	1.04	0.000	/
Front Side	Standard	QPSK	20	50%	low	132572	1770	12.32	12.50	0.03	0.053	1.04	0.055	/
Back Side	Standard	QPSK	20	50%	low	132572	1770	12.32	12.50	-0.05	0.816	1.04	0.851	/
Left Side	Standard	QPSK	20	50%	low	132572	1770	12.32	12.50	0.00	0.005	1.04	0.006	/
Right Side	Standard	QPSK	20	50%	low	132572	1770	12.32	12.50	-0.02	0.002	1.04	0.002	/
Top Side	Standard	QPSK	20	50%	low	132572	1770	12.32	12.50	0.00	0.000	1.04	0.000	/
Bottom Side	Standard	QPSK	20	50%	low	132572	1770	12.32	12.50	0.00	0.000	1.04	0.000	/
Back Side	Standard	QPSK	20	1	mid	132072	1720	12.51	13.00	0.01	0.968	1.12	1.084	/
Back Side	Standard	QPSK	20	1	mid	132322	1745	12.66	13.00	0.00	0.817	1.08	0.884	/
Back Side	Standard	QPSK	20	50%	low	132072	1720	11.81	12.50	0.05	0.582	1.17	0.682	/
Back Side	Standard	QPSK	20	50%	low	132322	1745	11.95	12.50	0.10	0.808	1.14	0.917	/
Repeat-original														
Back Side	Standard	QPSK	20	1	mid	132572	1770	12.85	13.00	0.04	1.040	1.04	1.077	/
Body SAR (0mm)-variant														
Back Side	Standard	QPSK	20	1	mid	132072	1720	12.51	13.00	0.00	0.000	1.12	0.000	/

Table 14.1.2-10: SAR Values for LTE Band 71

Test Position	Cover Type	Mode				Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)			Figure No.
		Modulation	BW(MHz)	RB Allocation	RB Offset						Measured SAR1g	Scaling Factor	Report SAR1g	
Body SAR (0mm)-original														
Front Side	Standard	QPSK	20	1	mid	133322	683	17.19	17.50	-0.13	0.015	1.07	0.016	/
Back Side	Standard	QPSK	20	1	mid	133322	683	17.19	17.50	0.05	1.010	1.07	1.085	/
Left Side	Standard	QPSK	20	1	mid	133322	683	17.19	17.50	0.00	0.000	1.07	0.000	/
Right Side	Standard	QPSK	20	1	mid	133322	683	17.19	17.50	0.00	0.000	1.07	0.000	/
Top Side	Standard	QPSK	20	1	mid	133322	683	17.19	17.50	0.08	0.014	1.07	0.015	/
Bottom Side	Standard	QPSK	20	1	mid	133322	683	17.19	17.50	0.00	0.000	1.07	0.000	/
Front Side	Standard	QPSK	20	50%	low	133322	683	16.03	16.50	0.00	0.011	1.11	0.012	/
Back Side	Standard	QPSK	20	50%	low	133322	683	16.03	16.50	0.04	0.809	1.11	0.901	/
Left Side	Standard	QPSK	20	50%	low	133322	683	16.03	16.50	0.00	0.000	1.11	0.000	/
Right Side	Standard	QPSK	20	50%	low	133322	683	16.03	16.50	0.00	0.000	1.11	0.000	/
Top Side	Standard	QPSK	20	50%	low	133322	683	16.03	16.50	0.06	0.012	1.11	0.013	/
Bottom Side	Standard	QPSK	20	50%	low	133322	683	16.03	16.50	0.00	0.000	1.11	0.000	/
Back Side	Standard	QPSK	20	1	mid	133222	673	16.94	17.50	0.04	1.020	1.14	1.160	/
Back Side	Standard	QPSK	20	1	mid	133372	688	17.18	17.50	-0.03	1.050	1.08	1.130	/
Back Side	Standard	QPSK	20	50%	low	133222	673	15.93	16.50	-0.14	0.745	1.14	0.849	/
Back Side	Standard	QPSK	20	50%	low	133372	688	15.85	16.50	0.04	0.820	1.16	0.952	/
Repeat-original														
Back Side	Standard	QPSK	20	1	mid	133372	688	17.18	17.50	-0.04	0.990	1.08	1.066	/
Body SAR (0mm)-variant														
Back Side	Standard	QPSK	20	1	mid	133222	673	16.94	17.50	0.00	0.000	1.14	0.000	/

Table 14.1.2-11: SAR Values for Wi-Fi 2.4G

Test Position	Cover Type	Mode	BW(MHz)	Duty Cycle	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)				Figure No.
										Measured SAR1g	Duty Cycle Scaling Factor	Scaling Factor	Report SAR10g	
Body SAR (0mm)-original														
Front Side	Standard	802.11b	20	100%	11	2462	11.82	12.00	0.10	0.088	1.00	1.04	0.092	/
Back Side	Standard	802.11b	20	100%	11	2462	11.82	12.00	-0.03	0.643	1.00	1.04	0.670	/
Left Side	Standard	802.11b	20	100%	11	2462	11.82	12.00	0.12	0.033	1.00	1.04	0.035	/
Right Side	Standard	802.11b	20	100%	11	2462	11.82	12.00	-0.03	0.004	1.00	1.04	0.005	/
Top Side	Standard	802.11b	20	100%	11	2462	11.82	12.00	-0.03	0.005	1.00	1.04	0.005	/
Bottom Side	Standard	802.11b	20	100%	11	2462	11.82	12.00	0.11	0.007	1.00	1.04	0.007	/
Back Side	Standard	802.11b	20	100%	1	2412	11.63	12.00	0.00	0.694	1.00	1.09	0.756	/
Back Side	Standard	802.11b	20	100%	6	2437	11.57	12.00	0.00	0.786	1.00	1.10	0.868	/
Body SAR (0mm)-variant														
Back Side	Standard	802.11b	20	100%	6	2437	11.57	12.00	0.00	0.000	1.00	1.10	0.000	/

Table 14.1.2-12: SAR Values for Wi-Fi 5G U-NII-1

Test Position	Cover Type	Mode	BW(MHz)	Duty Cycle	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)				Figure No.
										Measured SAR1g	Duty Cycle Scaling Factor	Scaling Factor	Report SAR10g	
Body SAR (0mm)-original														
Front Side	Standard	802.11a	20	92.68%	48	5240	6.00	6.50	0.00	0.016	1.08	1.12	0.019	/
Back Side	Standard	802.11a	20	92.68%	48	5240	6.00	6.50	0.00	0.602	1.08	1.12	0.729	/
Left Side	Standard	802.11a	20	92.68%	48	5240	6.00	6.50	0.00	0.026	1.08	1.12	0.031	/
Right Side	Standard	802.11a	20	92.68%	48	5240	6.00	6.50	0.00	0.008	1.08	1.12	0.010	/
Top Side	Standard	802.11a	20	92.68%	48	5240	6.00	6.50	0.00	0.012	1.08	1.12	0.014	/
Bottom Side	Standard	802.11a	20	92.68%	48	5240	6.00	6.50	0.00	0.005	1.08	1.12	0.006	/
Back Side	Standard	802.11a	20	93.11%	36	5180	5.14	6.50	0.00	0.387	1.07	1.37	0.568	/
Back Side	Standard	802.11a	20	94.19%	40	5200	5.39	6.50	0.00	0.414	1.06	1.29	0.568	/
Body SAR (0mm)-variant														
Back Side	Standard	802.11a	20	92.68%	48	5240	6.00	6.50	0.00	0.000	1.08	1.12	0.000	/

Table 14.1.2-13: SAR Values for Wi-Fi 5G U-NII-3

Test Position	Cover Type	Mode	BW(MHz)	Duty Cycle	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)				Figure No.
										Measured SAR1g	Duty Cycle Scaling Factor	Scaling Factor	Report SAR10g	
Body SAR (0mm)-original														
Front Side	Standard	802.11a	20	92.26%	165	5825	9.64	10.00	0.00	0.103	1.08	1.09	0.121	/
Back Side	Standard	802.11a	20	92.26%	165	5825	9.64	10.00	0.00	0.565	1.08	1.09	0.665	/
Left Side	Standard	802.11a	20	92.26%	165	5825	9.64	10.00	0.00	0.036	1.08	1.09	0.042	/
Right Side	Standard	802.11a	20	92.26%	165	5825	9.64	10.00	0.00	0.013	1.08	1.09	0.015	/
Top Side	Standard	802.11a	20	92.26%	165	5825	9.64	10.00	-0.02	0.019	1.08	1.09	0.022	/
Bottom Side	Standard	802.11a	20	92.26%	165	5825	9.64	10.00	0.00	0.017	1.08	1.09	0.020	/
Back Side	Standard	802.11a	20	96.16%	149	5745	7.74	9.00	0.00	0.154	1.04	1.34	0.214	/
Back Side	Standard	802.11a	20	93.76%	157	5785	8.97	10.00	0.00	0.462	1.07	1.27	0.625	/
Body SAR (0mm)-variant														
Back Side	Standard	802.11a	20	92.26%	165	5825	9.64	10.00	0.00	0.000	1.08	1.09	0.000	/

Table 14.1.2-14: SAR Values for BT

Test Position	Cover Type	Mode	Duty Cycle	Channel	Frequency (MHz)	Measured power (dBm)	Tune-up (dBm)	Power Drift (dB)	Limit of 1gSAR 1.6 W/kg (mW/g)				Figure No.
									Measured SAR1g	Duty Cycle Scaling Factor	Scaling Factor	Report SAR1g	
Body SAR (0mm)-original													
Front Side	Standard	1-DH5	100%	0	2402	4.04	5.00	0.00	0.005	1.00	1.25	0.006	/
Back Side	Standard	1-DH5	100%	0	2402	4.04	5.00	0.00	0.000	1.00	1.25	0.000	/
Left Side	Standard	1-DH5	100%	0	2402	4.04	5.00	0.00	0.005	1.00	1.25	0.006	/
Right Side	Standard	1-DH5	100%	0	2402	4.04	5.00	0.00	0.000	1.00	1.25	0.000	/
Top Side	Standard	1-DH5	100%	0	2402	4.04	5.00	0.00	0.007	1.00	1.25	0.008	/
Bottom Side	Standard	1-DH5	100%	0	2402	4.04	5.00	0.00	0.004	1.00	1.25	0.005	/
Top Side	Standard	1-DH5	100%	39	2441	2.90	4.00	-0.15	0.002	1.00	1.29	0.003	/
Top Side	Standard	1-DH5	100%	78	2480	2.34	4.00	-0.02	0.006	1.00	1.47	0.008	/
Body SAR (0mm)-variant													
Top Side	Standard	1-DH5	100%	0	2402	4.04	5.00	0.00	0.000	1.00	1.25	0.000	/

14.2 Simultaneous SAR Evaluation

Table 14.2-1 Max. Reported SAR for WCDMA/LTE

Simultaneous Transmission Table	Report SAR$_{1g}$(W/kg) / Test Position	WCDMA Band II	WCDMA Band IV	WCDMA Band V	LTE B2	LTE B5	LTE B12	LTE B13	LTE B14	LTE B66	LTE B71	Max.Report SAR$_{1g}$ WCDMA/LTE
Body SAR (0mm)	Front Side	0.105	0.134	0.046	0.069	0.137	0.016	0.017	0.027	0.055	0.016	0.137
	Back Side	1.251	1.140	0.461	1.217	1.231	1.128	1.027	1.048	1.084	1.160	0.461
	Left Side	0.015	0.032	0.028	0.009	0.032	0.000	0.000	0.000	0.006	0.000	0.032
	Right Side	0.030	0.014	0.005	0.007	0.018	0.002	0.003	0.002	0.005	0.000	0.030
	Top Side	0.004	0.113	0.000	0.192	0.329	0.019	0.048	0.057	0.109	0.015	0.329
	Bottom Side	0.008	0.001	0.061	0.000	0.013	0.000	0.010	0.000	0.000	0.000	0.061

Note: Data marked in black in the table will be calculated separately, as detailed in Table 14.2-4.

Table 14.2-2 Max. Reported SAR for Wi-Fi/BT

Simultaneous Transmission Table	Report SAR$_{1g}$(W/kg) / Test Position	Non-Cellular				
		Max.Report SAR$_{1g}$ BT	Max.Report SAR$_{1g}$ Wi-Fi 2.4G	Wi-Fi 5G		Max.Report SAR$_{1g}$ Wi-Fi 5G
				U-NII-1	U-NII-3	
Body SAR (0mm)	Front Side	0.006	0.092	0.019	0.121	0.121
	Back Side	0.000	0.868	0.729	0.665	0.729
	Left Side	0.006	0.035	0.031	0.042	0.042
	Right Side	0.000	0.005	0.010	0.015	0.015
	Top Side	0.008	0.005	0.014	0.022	0.022
	Bottom Side	0.005	0.007	0.006	0.020	0.020

Table 14.2-3 Simultaneous transmission SAR

Simultaneous Transmission Table	Report SAR$_{1g}$(W/kg) / Test Position	Max.Report SAR$_{1g}$ WCDMA/LTE	Non-Cellular			WWAN+BT	WWAN+Wi-Fi 2.4G	WWAN+Wi-Fi 5G	WWAN+Wi-Fi 2.4G+BT	WWAN+Wi-Fi 5G+BT	MAX.ΣSAR$_{1g}$
			Max.Report SAR$_{1g}$ BT	Max.Report SAR$_{1g}$ Wi-Fi 2.4G	Max.Report SAR$_{1g}$ Wi-Fi 5G						
Body SAR (0mm)	Front Side	0.137	0.006	0.092	0.121	0.14	0.23	0.26	0.24	0.27	0.27
	Back Side	0.461	0.000	0.868	0.729	1.25	1.33	1.19	1.33	1.19	1.33
	Left Side	0.032	0.006	0.035	0.042	0.04	0.07	0.07	0.07	0.08	0.08
	Right Side	0.030	0.000	0.005	0.015	0.03	0.03	0.05	0.03	0.05	0.05
	Top Side	0.329	0.008	0.005	0.022	0.34	0.33	0.35	0.34	0.36	0.36
	Bottom Side	0.061	0.005	0.007	0.020	0.07	0.07	0.08	0.07	0.09	0.09

Table 14.2-4 Results of SPLSR(SAR to peak location separation ratio) Analysis

No.	Band	Position	SAR(W/kg)	GAP(mm)	SAR peak location (mm)			Case	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
					X	Y	Z					
1	WCDMA Band II	Back Side	1.251	0	29	-20	-207	1+10	94.85	2.119	0.03	Not required
								1+11	105.85	1.980	0.03	Not required
2	WCDMA Band IV	Back Side	1.140	0	31	-18	-206	2+10	97.51	2.008	0.03	Not required
								2+11	108.46	1.869	0.02	Not required
3	LTE B2	Back Side	1.217	0	33	-12	-206	3+10	102.00	2.085	0.03	Not required
								3+11	112.73	1.946	0.02	Not required
4	LTE B5	Back Side	1.231	0	33	-4	-206	4+10	106.00	2.099	0.03	Not required
								4+11	116.36	1.960	0.02	Not required
5	LTE B12	Back Side	1.128	0	33	-10	-206	5+10	101.61	1.996	0.03	Not required
								5+11	109.13	1.857	0.02	Not required
6	LTE B13	Back Side	1.027	0	15	-16	-206	6+10	84.38	1.895	0.03	Not required
								6+11	94.83	1.756	0.02	Not required
7	LTE B14	Back Side	1.048	0	27	-12	-206	7+10	96.75	1.916	0.03	Not required
								7+11	107.33	1.777	0.02	Not required
8	LTE B66	Back Side	1.084	0	33	-10	-206	8+10	87.66	1.952	0.03	Not required
								8+11	97.75	1.813	0.02	Not required
9	LTE B71	Back Side	1.160	0	31	2	-206	9+10	107.65	2.028	0.03	Not required
								9+11	117.66	1.889	0.02	Not required
10	Wi-Fi 2.4G	Back Side	0.868	0	-57	-60	-206	/	/	/	/	/
11	Wi-Fi 5G	Back Side	0.729	0	-69	-60	-206	/	/	/	/	/

14.3 SAR Measurement Variability

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

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

(a) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps(b) through (d) do not apply.

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

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

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

Note: According to the KDB 865664 D01 repeated measurement is not required when the original highest measured SAR is < 0.8 W/kg.

A.1 SAR Graph Results

WCDMA BandⅡ Back Side Mode Low 0mm
Date/Time: 2024/8/8
Electronics: DAE4 Sn1581
Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.385 S/m; ε_r = 39.989; ρ = 1000 kg/m^3
Ambient Temperature:21.7°C Liquid Temperature:20.8°C
Communication System: WCDMA Professional 1750MHz; Frequency: 1852.4 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7634ConvF(8.51, 8.51, 8.51) @ 1852.4 MHz
WCDMA BandⅡ Back Side Mode Low 0mm/Area Scan (7x11x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.00619 W/kg
WCDMA BandⅡ Back Side Mode Low 0mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.177 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.00544 W/kg
SAR(1 g) = 0.00366 W/kg; SAR(10 g) = 0.00319 W/kg
Maximum of SAR (measured) = 0.00433 W/kg

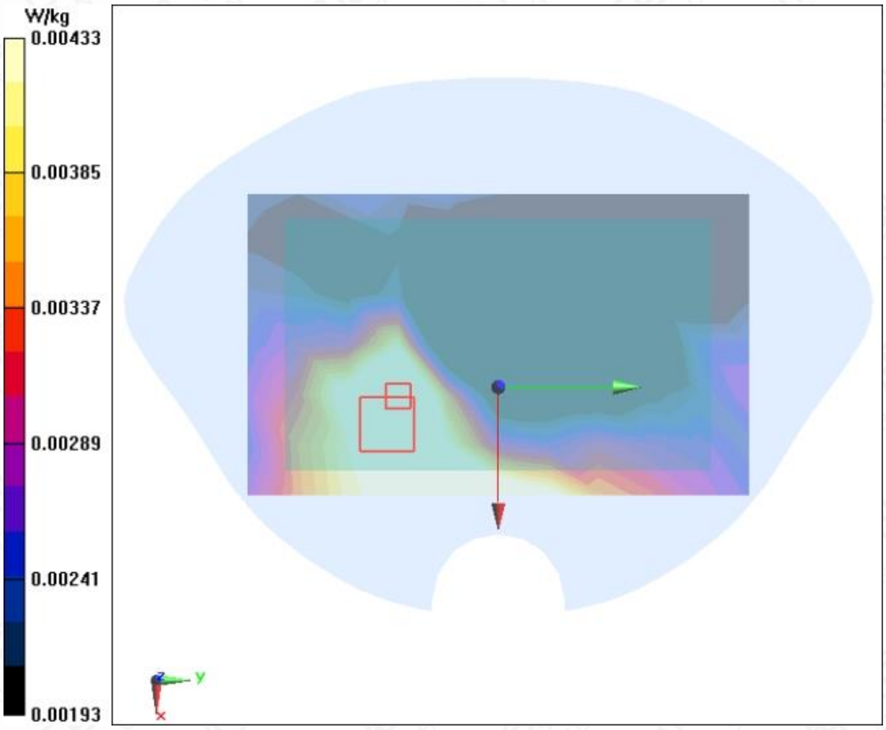


Figure A.1-1 WCDMA BandⅡ Back Side Mode Low 0mm

WCDMA BandⅣ Back Side Mode High 0mm

Date/Time: 2024/8/8

Electronics: DAE4 Sn1581

Medium parameters used: f = 1753 MHz; σ = 1.323 S/m; ε_r = 40.086; ρ = 1000 kg/m^3

Ambient Temperature:21.7°C   Liquid Temperature:20.8°C

Communication System: WCDMA Professional 1750MHz; Frequency: 1752.6 MHz; Duty Cycle: 1:1

Probe: EX3DV4 - SN7634ConvF(8.86, 8.86, 8.86) @ 1752.6 MHz

WCDMA BandⅣ Back Side Mode High 0mm/Area Scan (7x11x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.00306 W/kg

WCDMA BandⅣ Back Side Mode High 0mm/Zoom Scan (7x7x7)/Cube 0:

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

Reference Value = 0.1960 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.00527 W/kg

SAR(1 g) = 0.00285 W/kg; SAR(10 g) = 0.00212 W/kg

Maximum value of SAR (measured) = 0.00358 W/kg

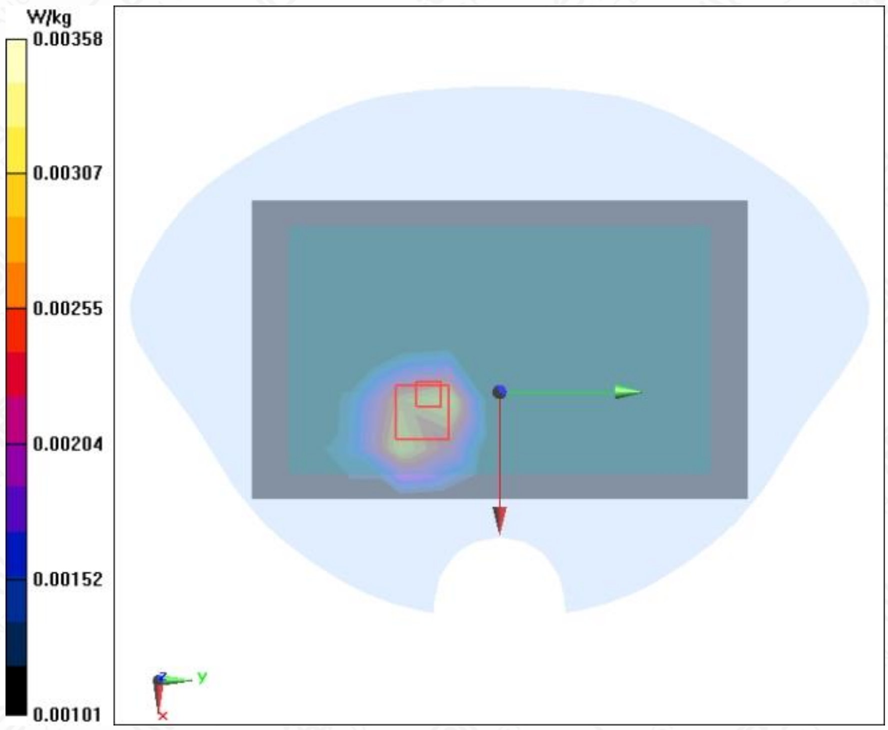


Figure A.1-2 WCDMA BandⅣ Back Side Mode High 0mm

WCDMA BandⅤ Back Side Mode Low 0mm
Date/Time: 2024/8/8
Electronics: DAE4 Sn1581
Medium parameters used (interpolated): f = 826.4 MHz; σ = 0.915 S/m; ε_r = 42.017; ρ = 1000 kg/m^3
Ambient Temperature:21.7°C Liquid Temperature:20.8°C
Communication System: WCDMA Professional Band Ⅴ; Frequency: 826.4 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7634ConvF(10.19, 10.19, 10.19) @ 826.4 MHz
WCDMA BandⅤ Back Side Mode Low 0mm/Area Scan (7x11x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.00337 W/kg
WCDMA BandⅤ Back Side Mode Low 0mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.737 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.00945 W/kg
SAR(1 g) = 0.00288 W/kg; SAR(10 g) = 0.00237 W/kg
Maximum of SAR (measured) = 0.00494 W/kg

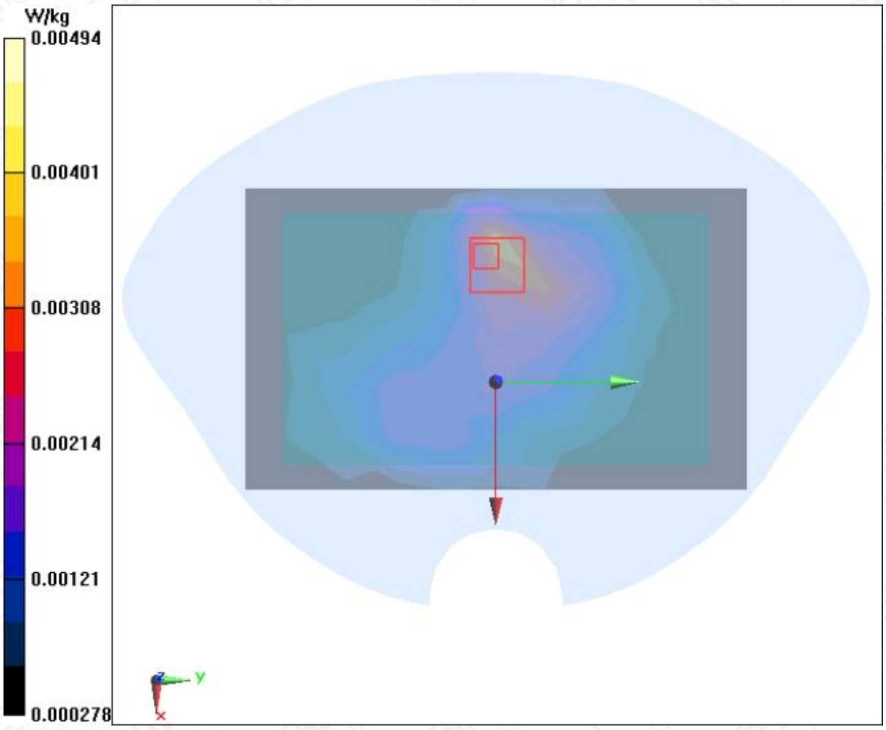


Figure A.1-3 WCDMA BandⅤ Back Side Mode Low 0mm

LTE Band 5 10MHz 1RB 25offset Back Side Mode Low 0mm
Date/Time: 2024/8/8
Electronics: DAE4 Sn1581
Medium parameters used: f = 829 MHz; σ = 0.916 S/m; ε_r = 42.009; ρ = 1000 kg/m^3
Ambient Temperature:21.7°C   Liquid Temperature:20.8°C
Communication System: LTE Band 5 Professional 900MHz;   Frequency: 829 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7634ConvF(10.19, 10.19, 10.19) @ 829 MHz
LTE Band 5 10MHz 1RB 25offset Back Side Mode Low 0mm/Area Scan (7x11x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.00262 W/kg
LTE Band 5 10MHz 1RB 25offset Back Side Mode Low 0mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.381 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.00301 W/kg
SAR(1 g) = 0.00222 W/kg; SAR(10 g) = 0.00187 W/kg
Maximum of SAR (measured) = 0.00259 W/kg

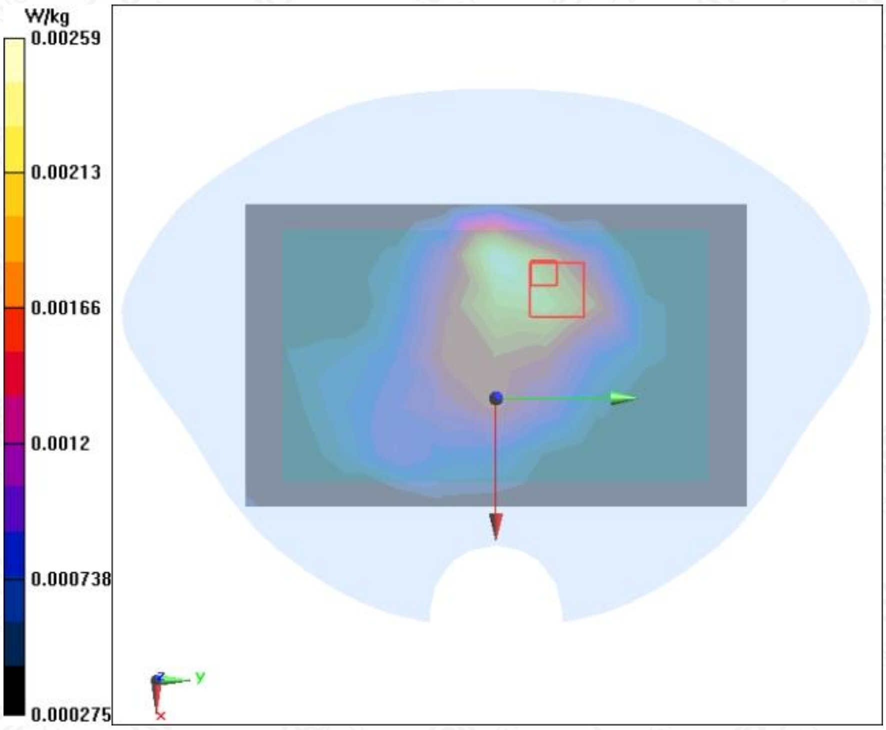


Figure A.1-4 LTE Band 5 10MHz 1RB 25offset Back Side Mode Low 0mm

LTE Band 13 10MHz 1RB 25offset Back Side Mode Middle 0mm
Date/Time: 2024/8/8
Electronics: DAE4 Sn1581
Medium parameters used: f = 782 MHz; σ = 0.899 S/m; ε_r = 42.147; ρ = 1000 kg/m^3
Ambient Temperature:21.7°C   Liquid Temperature:20.8°C
Communication System: LTE Band 13 Professional 900MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7634ConvF(10.6, 10.6, 10.6) @ 782 MHz
LTE Band 13 10MHz 1RB 25offset Back Side Mode Middle 0mm/Area Scan (7x11x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.00623 W/kg
LTE Band 13 10MHz 1RB 25offset Back Side Mode Middle 0mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.446 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.0380 W/kg
SAR(1 g) = 0.00627 W/kg; SAR(10 g) = 0.00362 W/kg
Maximum of SAR (measured) = 0.013 W/kg

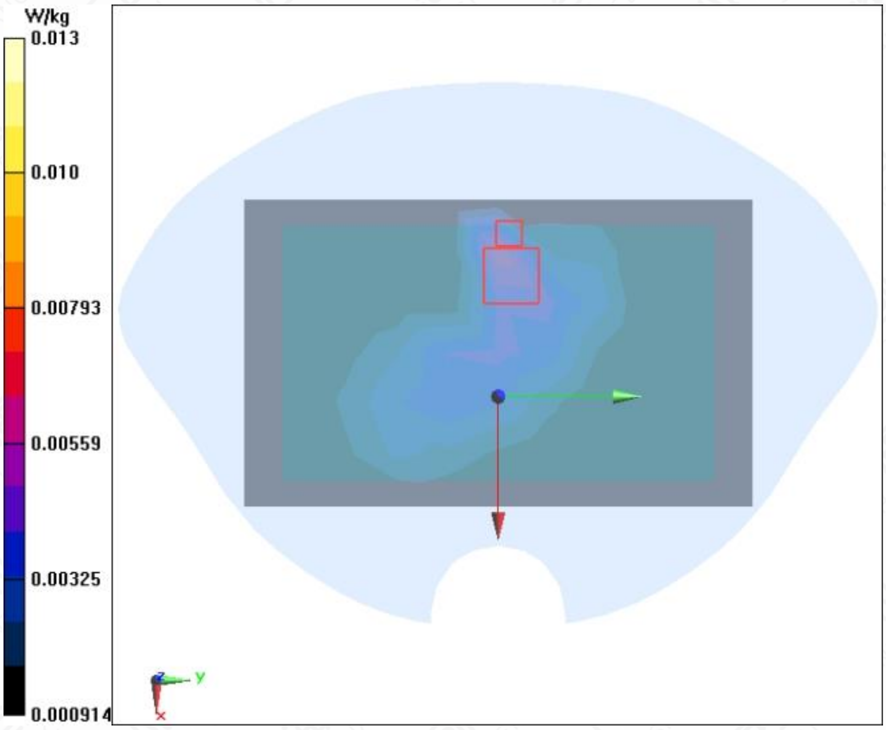


Figure A.1-5 LTE Band 13 10MHz 1RB 25offset Back Side Mode Middle 0mm

LTE Band 14 10MHz 1RB 25offset Back Side Mode Middle 0mm
Date/Time: 2024/8/8
Electronics: DAE4 Sn1581
Medium parameters used: f = 793 MHz; σ = 0.902 S/m; ε_r = 42.109; ρ = 1000 kg/m^3
Ambient Temperature:21.7°C Liquid Temperature:20.8°C
Communication System: LTE Band 14 Professional 900MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7634ConvF(10.6, 10.6, 10.6) @ 793 MHz
LTE Band 14 10MHz 1RB 25offset Back Side Mode Middle 0mm/Area Scan (7x11x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.00615 W/kg
LTE Band 14 10MHz 1RB 25offset Back Side Mode Middle 0mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.206 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.0160 W/kg
SAR(1 g) = 0.00538 W/kg; SAR(10 g) = 0.00357 W/kg
Maximum of SAR (measured) = 0.012 W/kg

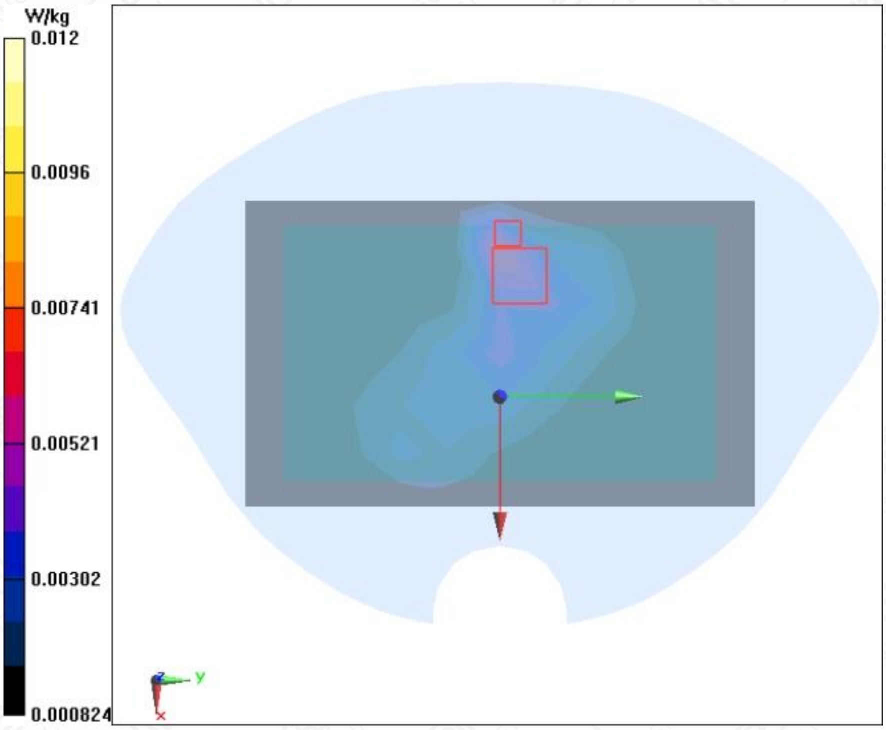


Figure A.1-6 LTE Band 14 10MHz 1RB 25offset Back Side Mode Middle 0mm

A.2 System Check Graph Results

System Check 750MHz

Date/Time: 2024/8/8

Electronics: DAE4 Sn1581

Medium parameters used: f = 750 MHz; σ = 0.888 S/m; ε_r = 42.261; ρ = 1000 kg/m^3

Ambient Temperature:21.7°C   Liquid Temperature:20.8°C

Communication System: CW 750MHz;   Frequency: 750 MHz; Duty Cycle: 1:1

Probe: EX3DV4 - SN7634ConvF(10.6, 10.6, 10.6) @ 750 MHz

System Check 750MHz/Area Scan (7x13x1):

Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 2.59 W/kg

System Check 750MHz/Zoom Scan (7x7x7) (5x5x7)/Cube 0:

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

Reference Value = 59.11 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 3.44 W/kg

SAR(1 g) = 2.14 W/kg; SAR(10 g) = 1.39 W/kg

Maximum value of SAR (measured) = 2.96 W/kg

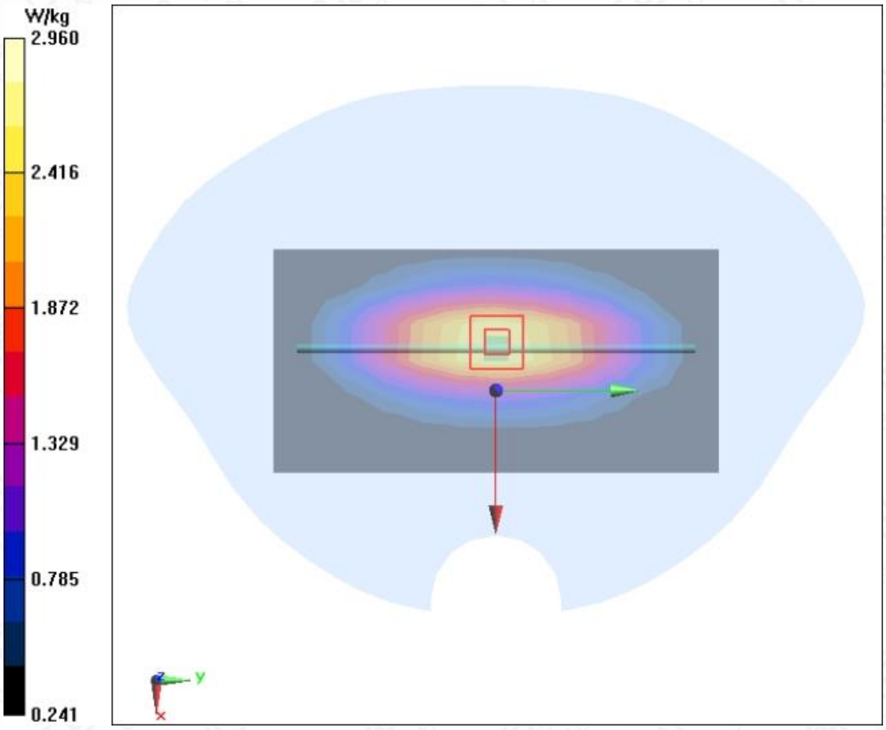


Figure A.2-1 System Check 750MHz

System Check 835MHz
Date/Time: 2024/8/8
Electronics: DAE4 Sn1581
Medium parameters used: f = 835 MHz; σ = 0.919 S/m; ε_r = 41.989; ρ = 1000 kg/m^3
Ambient Temperature:21.7°C Liquid Temperature:20.8°C
Communication System: CW 750MHz; Frequency: 835 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7634ConvF(10.19, 10.19, 10.19) @ 835 MHz
System Check 835MHz/Area Scan (7x13x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.95 W/kg
System Check 835MHz/Zoom Scan (7x7x7) (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 60.65 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 3.94 W/kg
SAR(1 g) = 2.43 W/kg; SAR(10 g) = 1.56 W/kg
Maximum value of SAR (measured) = 3.39 W/kg

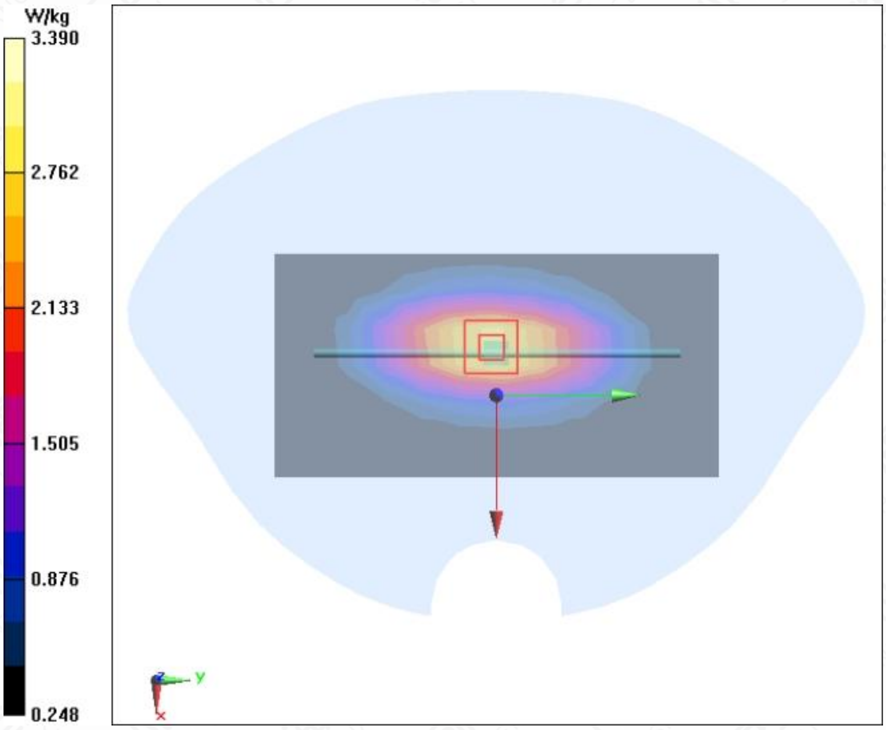


Figure A.2-2 System Check 835MHz

System Check 1750MHz
Date/Time: 2024/8/8
Electronics: DAE4 Sn1581
Medium parameters used: f = 1750 MHz; σ = 1.321 S/m; ε_r = 40.091; ρ = 1000 kg/m^3
Ambient Temperature:21.7°C Liquid Temperature:20.8°C
Communication System: CW 1750MHz; Frequency: 1750 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7634ConvF(8.86, 8.86, 8.86) @ 1750 MHz
System Check 1750MHz/Area Scan (8x7x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 10.9 W/kg
System Check 1750MHz/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 112.1 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 16.9 W/kg
SAR(1 g) = 9.08 W/kg; SAR(10 g) = 4.83 W/kg
Maximum value of SAR (measured) = 14.0 W/kg

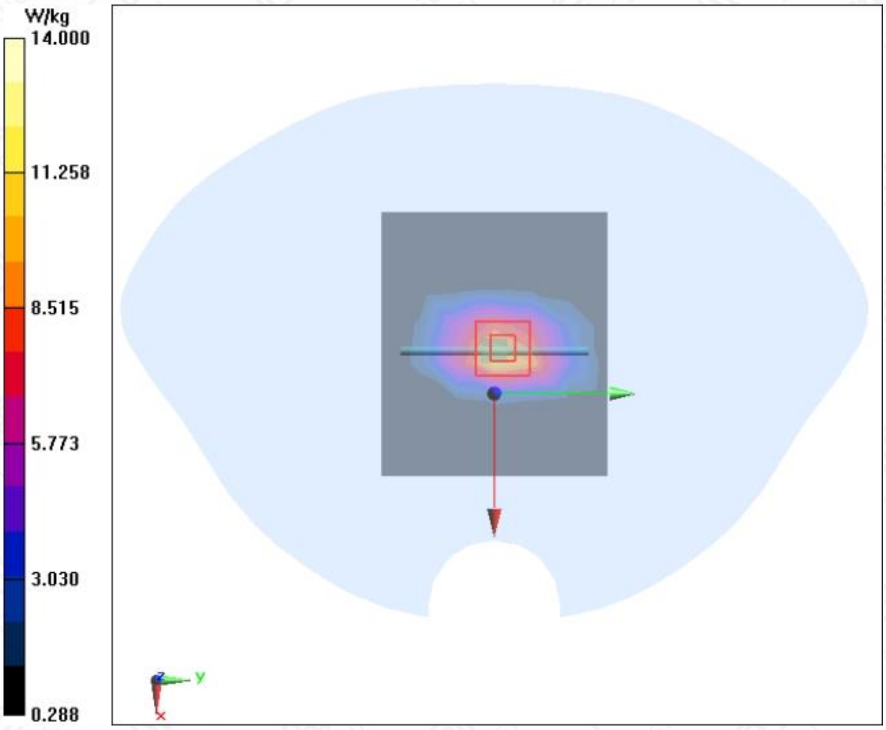


Figure A.2-3 System Check 1750MHz

System Check 1900MHz
Date/Time: 2024/8/8
Electronics: DAE4 Sn1581
Medium parameters used: f = 1900 MHz; σ = 1.422 S/m; ε_r = 39.905; ρ = 1000 kg/m^3
Ambient Temperature:21.7°C Liquid Temperature:20.8°C
Communication System: CW 1750MHz; Frequency: 1900 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7634ConvF(8.51, 8.51, 8.51) @ 1900 MHz
System Check 1900MHz/Area Scan (8x7x1):
Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 10.8 W/kg
System Check 1900MHz/Zoom Scan (7x7x7) (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 103.5 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 18.2 W/kg
SAR(1 g) = 9.81 W/kg; SAR(10 g) = 5.09 W/kg
Maximum value of SAR (measured) = 15.1 W/kg

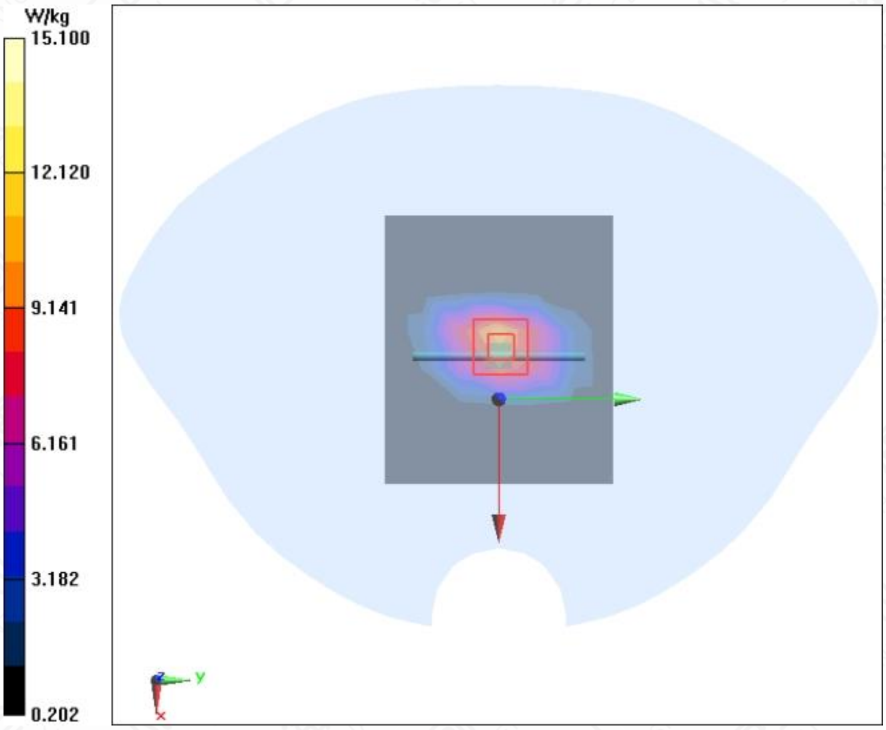


Figure A.2-4 System Check 1900MHz

System Check 2450MHz

Date/Time: 2024/8/8

Electronics: DAE4 Sn1581

Medium parameters used: f = 2450 MHz; σ = 1.829 S/m; ε_r = 38.079; ρ = 1000 kg/m^3

Ambient Temperature:21.7°C   Liquid Temperature:20.8°C

Communication System: CW 2600MHz; Frequency: 2450 MHz; Duty Cycle: 1:1

Probe: EX3DV4 - SN7634ConvF(8.05, 8.05, 8.05) @ 2450 MHz

System Check 2450MHz/Area Scan (8x8x1):

Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 18.9 W/kg

System Check 2450MHz/Zoom Scan (7x7x7)/Cube 0:

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

Reference Value = 117.2 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 29.3 W/kg

SAR(1 g) = 13.6 W/kg; SAR(10 g) = 6.15 W/kg

Maximum value of SAR (measured) = 23.3 W/kg

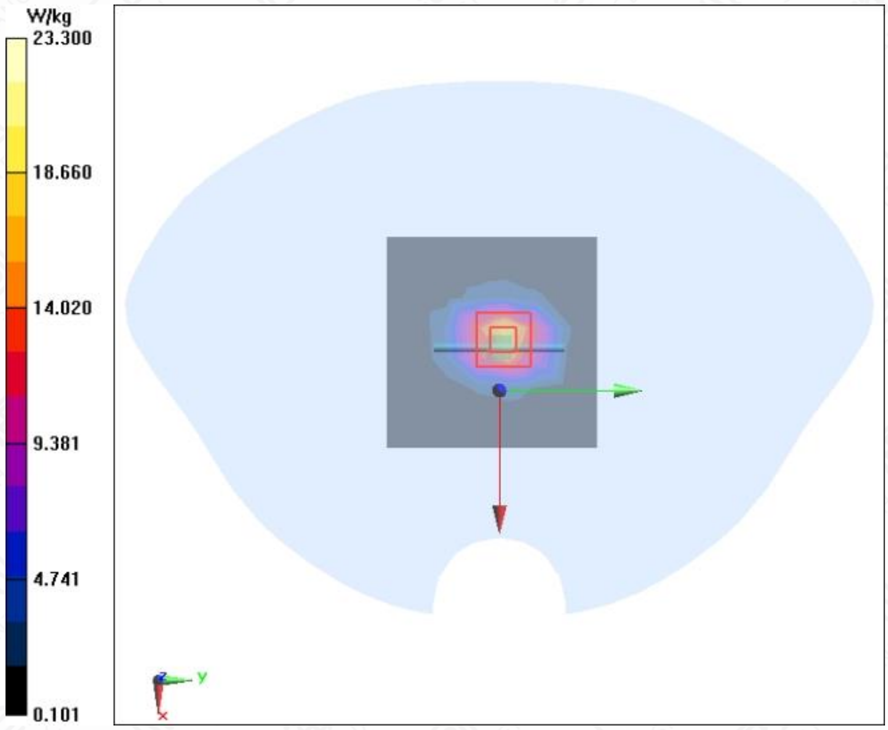


Figure A.2-5 System Check 2450MHz

System Check 5200MHz
Date/Time: 2024/8/8
Electronics: DAE4 Sn1581
Medium parameters used: f = 5200 MHz; σ = 4.668 S/m; ε_r = 35.232; ρ = 1000 kg/m^3
Ambient Temperature:21.7°C   Liquid Temperature:20.8°C
Communication System: CW 5000MHz; Frequency: 5200 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7634ConvF(5.75, 5.75, 5.75) @ 5200 MHz
System Check 5200MHz/Area Scan (10x10x1):
Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 13.9 W/kg
System Check 5200MHz/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 68.93 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 32.4 W/kg
SAR(1 g) = 7.76 W/kg; SAR(10 g) = 2.21 W/kg
Maximum of SAR (measured) = 19.8 W/kg

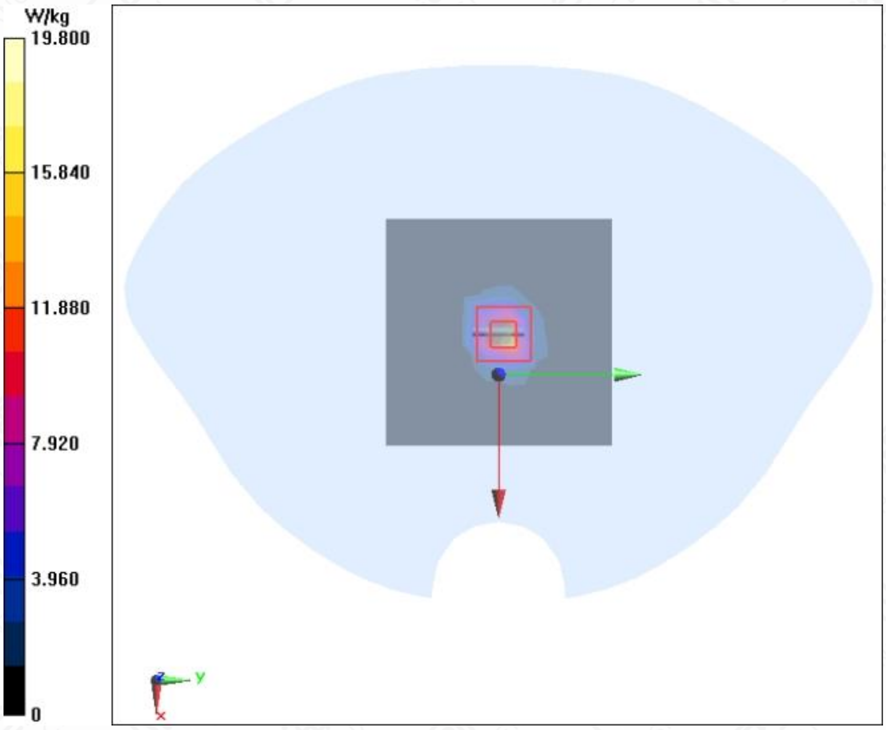


Figure A.2-6 System Check 5200MHz

System Check 5800MHz
Date/Time: 2024/8/8
Electronics: DAE4 Sn1581
Medium parameters used: f = 5800 MHz; σ = 5.299 S/m; ε_r = 34.035; ρ = 1000 kg/m^3
Ambient Temperature:21.7°C   Liquid Temperature:20.8°C
Communication System: CW 5G; Frequency: 5800 MHz; Duty Cycle: 1:1
Probe: EX3DV4 - SN7634ConvF(5.25, 5.25, 5.25) @ 5800 MHz
System Check 5800MHz/Area Scan (10x10x1):
Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 17.9 W/kg
System Check 5800MHz/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 60.60 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 34.8 W/kg
SAR(1 g) = 7.61 W/kg; SAR(10 g) = 2.15 W/kg
Maximum of SAR (measured) = 20.1 W/kg

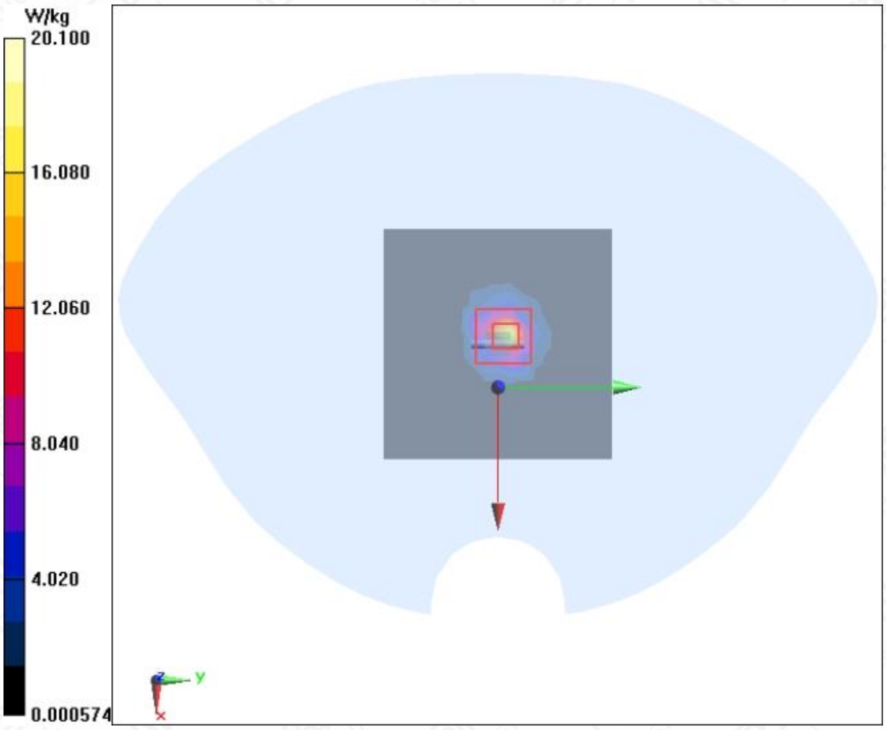


Figure A.2-7 System Check 5800MHz

Annex B: Calibration Certificate

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Client : 3in

Certificate No: 24J02Z000044

CALIBRATION CERTIFICATE

Object	DAE4 - SN: 1581
Calibration Procedure(s)	FF-Z11-002-01 Calibration Procedure for the Data Acquisition Electronics (DAEx)
Calibration date:	February 22, 2024

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Process Calibrator 753	1971018	12-Jun-23 (CTTL, No.J23X05436)	Jun-24

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

Issued: February 26, 2024

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

Certificate No: 24J02Z000044 Page 1 of 3

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Glossary:

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

Methods Applied and Interpretation of Parameters:

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

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DC Voltage Measurement

A/D - Converter Resolution nominal

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

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

Calibration Factors	X	Y	Z
High Range	405.345 ± 0.15% (k=2)	405.593 ± 0.15% (k=2)	405.846 ± 0.15% (k=2)
Low Range	3.99569 ± 0.7% (k=2)	3.99961 ± 0.7% (k=2)	4.00455 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	13° ± 1 °

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Client 3in

Certificate No: 24J02Z000043

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN : 7634
Calibration Procedure(s)	FF-Z11-004-02 Calibration Procedures for Dosimetric E-field Probes
Calibration date:	March 20, 2024

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	12-Jun-23(CTTL, No.J23X05435)	Jun-24
Power sensor NRP-Z91	101547	12-Jun-23(CTTL, No.J23X05435)	Jun-24
Power sensor NRP-Z91	101548	12-Jun-23(CTTL, No.J23X05435)	Jun-24
Reference 10dBAttenuator	18N50W-10dB	19-Jan-23(CTTL, No.J23X00212)	Jan-25
Reference 20dBAttenuator	18N50W-20dB	19-Jan-23(CTTL, No.J23X00211)	Jan-25
Reference Probe EX3DV4	SN 3846	31-May-23(SPEAG, No.EX-3846_May23)	May-24
DAE4	SN 1555	24-Aug-23(SPEAG, No.DAE4-1555_Aug23)	Aug-24
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
SignalGenerator MG3700A	6201052605	12-Jun-23(CTTL, No.J23X05434)	Jun-24
Network Analyzer E5071C	MY46110673	25-Dec-23(CTTL, No.J23X13425)	Dec-24
Reference 10dBAttenuator	BT0520	11-May-23(CTTL, No.J23X04061)	May-25
Reference 20dBAttenuator	BT0267	11-May-23(CTTL, No.J23X04062)	May-25
OCP DAK-12	SN 1174	25-Oct-23(SPEAG, No.OCP-DAK12-1174_Oct23)	Oct-24

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

Issued: March 24, 2024

Certificate No: 24J02Z000043 Page 1 of 22

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Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013

b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016

c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010

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

Methods Applied and Interpretation of Parameters:

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

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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7634

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm(μV/(V/m)²)^A	0.62	0.64	0.62	±10.0%
DCP(mV)^B	109.5	111.3	108.6	

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Max Dev.	Max Unc^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	211.2	±2.1%	±4.7%
		Y	0.0	0.0	1.0		218.3		
		Z	0.0	0.0	1.0		208.3		
10352-AAA	Pulse Waveform (200Hz, 10%)	X	1.55	60.28	5.97	10.00	60	±4.1%	±9.6%
		Y	1.60	60.70	6.22		60		
		Z	1.50	60.31	6.08		60		
10353-AAA	Pulse Waveform (200Hz, 20%)	X	92.00	82.00	11.00	6.99	80	±3.7%	±9.6%
		Y	0.82	60.00	4.71		80		
		Z	0.78	60.00	4.72		80		
10354-AAA	Pulse Waveform (200Hz, 40%)	X	0.50	154.57	2.16	3.98	95	±3.5%	±9.6%
		Y	0.06	131.17	0.46		95		
		Z	0.18	140.02	0.50		95		
10355-AAA	Pulse Waveform (200Hz, 60%)	X	10.60	157.68	19.93	2.22	120	±2.1%	±9.6%
		Y	6.46	159.99	3.69		120		
		Z	7.47	159.97	15.20		120		
10387-AAA	QPSK Waveform, 1 MHz	X	0.63	63.29	11.08	1.00	150	±4.7%	±9.6%
		Y	0.53	62.60	11.41		150		
		Z	0.69	65.82	13.23		150		
10388-AAA	QPSK Waveform, 10 MHz	X	1.38	65.14	13.29	0.00	150	±1.3%	±9.6%
		Y	1.38	65.93	13.87		150		
		Z	1.49	66.99	14.56		150		
10396-AAA	64-QAM Waveform, 100 kHz	X	1.91	66.04	17.25	3.01	150	±0.9%	±9.6%
		Y	1.93	66.82	17.73		150		
		Z	1.94	67.19	18.27		150		
10414-AAA	WLAN CCDF, 64-QAM, 40MHz	X	3.98	65.94	15.17	0.00	150	±4.0%	±9.6%
		Y	3.98	66.49	15.48		150		
		Z	4.09	66.85	15.78		150		

Note: For details on UID parameters see Appendix

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

^A The uncertainties of Norm X, Y, Z do not affect the E²-field uncertainty inside TSL (see Page 5).
^B Numerical linearization parameter: uncertainty not required.
^E Uncertainly is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7634

Sensor Model Parameters

	C1 fF	C2 fF	α V^{-1}	T1 $ms.V^{-2}$	T2 $ms.V^{-1}$	T3 ms	T4 V^{-2}	T5 V^{-1}	T6
X	12.14	87.63	33.20	2.74	0.00	4.90	0.08	0.09	1.01
Y	10.73	76.37	32.48	2.58	0.00	4.90	0.57	0.00	1.01
Z	10.91	78.80	33.39	1.51	0.00	4.90	0.39	0.00	1.01

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	62.1
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disable
Probe Overall Length	337mm
Probe Body Diameter	10mm
Tip Length	9mm
Tip Diameter	2.5mm
Probe Tip to Sensor X Calibration Point	1mm
Probe Tip to Sensor Y Calibration Point	1mm
Probe Tip to Sensor Z Calibration Point	1mm
Recommended Measurement Distance from Surface	1.4mm

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DASY/EASY – Parameters of Probe: EX3DV4 – SN:7634

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz][C]	Relative Permittivity[F]	Conductivity (S/m)[F]	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unct. (k=2)
750	41.9	0.89	10.60	10.60	10.60	0.17	1.19	±12.7%
835	41.5	0.90	10.19	10.19	10.19	0.16	1.39	±12.7%
900	41.5	0.97	10.15	10.15	10.15	0.18	1.31	±12.7%
1750	40.1	1.37	8.86	8.86	8.86	0.22	1.11	±12.7%
1900	40.0	1.40	8.51	8.51	8.51	0.25	1.12	±12.7%
2000	40.0	1.40	8.46	8.46	8.46	0.26	1.08	±12.7%
2300	39.5	1.67	8.32	8.32	8.32	0.66	0.68	±12.7%
2450	39.2	1.80	8.05	8.05	8.05	0.61	0.70	±12.7%
2600	39.0	1.96	7.85	7.85	7.85	0.66	0.68	±12.7%
3300	38.2	2.71	7.40	7.40	7.40	0.42	1.05	±13.9%
3500	37.9	2.91	7.20	7.20	7.20	0.45	1.03	±13.9%
3700	37.7	3.12	7.03	7.03	7.03	0.45	1.05	±13.9%
3900	37.5	3.32	6.79	6.79	6.79	0.40	1.48	±13.9%
4100	37.2	3.53	6.85	6.85	6.85	0.40	1.15	±13.9%
4200	37.1	3.63	6.78	6.78	6.78	0.35	1.35	±13.9%
4400	36.9	3.84	6.68	6.68	6.68	0.40	1.25	±13.9%
4600	36.7	4.04	6.63	6.63	6.63	0.50	1.10	±13.9%
4800	36.4	4.25	6.56	6.56	6.56	0.45	1.25	±13.9%
4950	36.3	4.40	6.36	6.36	6.36	0.45	1.25	±13.9%
5250	35.9	4.71	5.75	5.75	5.75	0.40	1.50	±13.9%
5600	35.5	5.07	5.10	5.10	5.10	0.45	1.40	±13.9%
5750	35.4	5.22	5.25	5.25	5.25	0.50	1.30	±13.9%

[C] Frequency validity above 300 MHz of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

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

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

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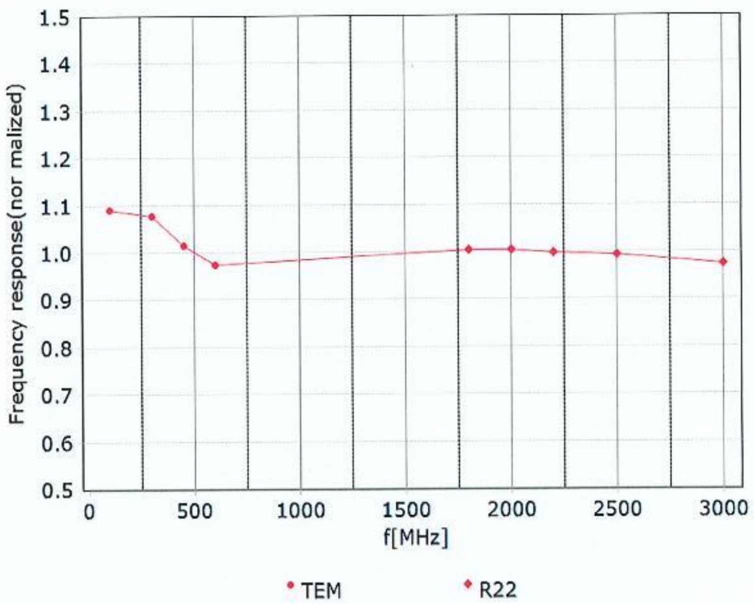
Frequency Response of E-Field
(TEM-Cell: ifi110 EXX, Waveguide: R22)



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

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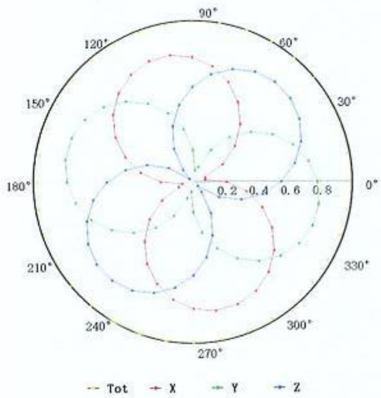
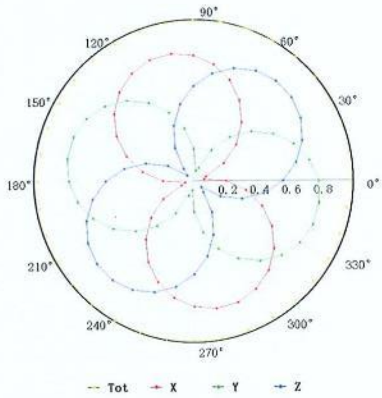
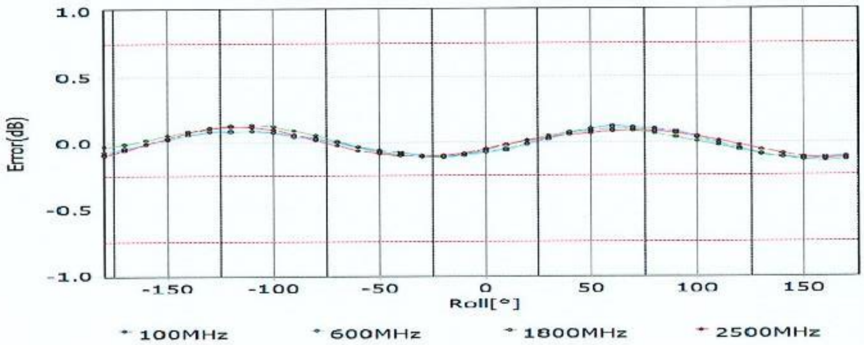
Receiving Pattern (Φ), θ=0°

f=600 MHz, TEM

f=1800 MHz, R22







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

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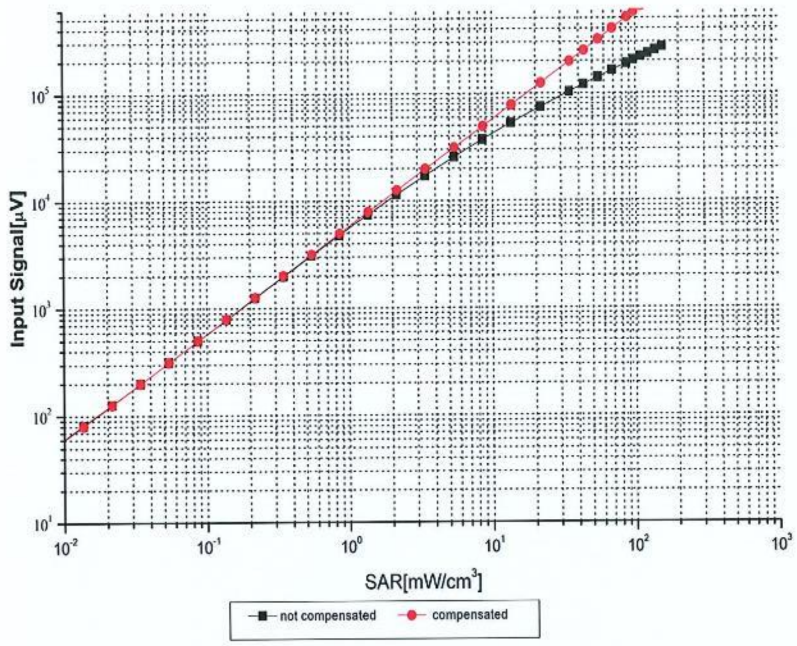
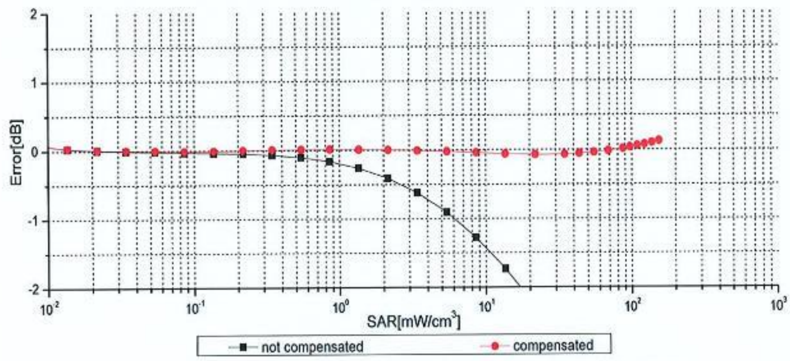
Dynamic Range f(SAR$_{head}$)
(TEM cell, f = 900 MHz)





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

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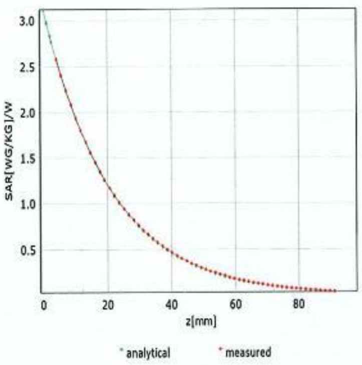
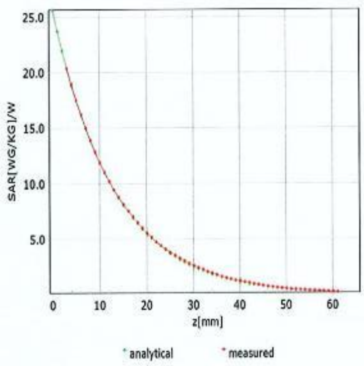
Conversion Factor Assessment

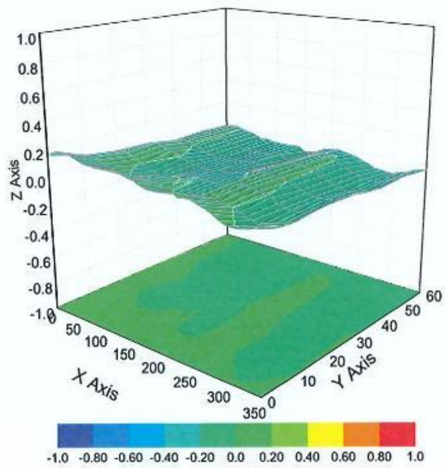
f=750 MHz,WGLS R9(H_convF)



f=1750 MHz,WGLS R22(H_convF)



Deviation from Isotropy in Liquid



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

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