

FCC SAR Test Report

Applicant : Shenzhen Mytron Technology Limited

Address : Room 603, Block 4, Tongtai Times Center,
Fuyong, Bao'an District, Shenzhen,
Guangdong, China

Product Name : LTE smart phone

Report Date : Dec. 01, 2023

Shenzhen Anbotech Compliance Laboratory Limited



Contents

1	Statement of Compliance	6
2	General Information.....	7
2.1	Client Information	7
2.2	Description of Equipment Under Test (EUT).....	7
2.3	Device Category and SAR Limits	9
2.4	Applied Standard	9
2.5	Environment of Test Site.....	9
2.6	Description of Test Facility.....	9
2.7	Test Configuration.....	9
3	Specific Absorption Rate (SAR)	11
3.1	Introduction.....	11
3.2	SAR Definition	11
4	SAR Measurement System	12
4.1	E-Field Probe.....	13
4.2	Data Acquisition Electronics (DAE).....	13
4.3	Robot.....	14
4.4	Measurement Server	14
4.5	Phantom	15
4.6	Device Holder	16
4.7	Data Storage and Evaluation.....	16
5	Test Equipment List.....	19
6	Tissue Simulating Liquids.....	20
7	System Verification Procedures	22
8	EUT Testing Position.....	24
8.1	Handset Reference Points.....	24
8.2	Positioning for Cheek / Touch	25
8.3	Positioning for Ear / 15° Tilt	25
8.4	Body Worn Accessory Configurations.....	26
8.5	Wireless Router (Hotspot) Configurations	26
9	Measurement Procedures	28
9.1	Spatial Peak SAR Evaluation	28
9.2	Power Reference Measurement.....	29
9.3	Area Scan Procedures	29
9.4	Zoom Scan Procedures.....	29
9.5	Volume Scan Procedures	30
9.6	Power Drift Monitoring	30
10	TEST CONDITIONS AND RESULTS.....	31
10.1	Conducted Power	31
10.2	Transmit Antennas and SAR Measurement Position.....	49
10.3	Standalone SAR Test Exclusion Considerations	50



10.4	Estimated SAR	51
10.5	SAR Test Results Summary	52
10.6	SAR Results	53
10.7	SAR Measurement Variability	62
10.8	Simultaneous Transmission Analysis	63
11	Measurement Uncertainty	65
Appendix A.	EUT Photos and Test Setup Photos	67
Appendix B.	Plots of SAR System Check	69
Appendix C.	Plots of SAR Test Data	76
Appendix D.	DASY System Calibration Certificate	100



TEST REPORT

Applicant : Shenzhen Mytron Technology Limited
Manufacturer : Shenzhen Mytron Technology Limited
Product Name : LTE smart phone
Model No. : Digicel DL5 Pro
Trade Mark : N/A
Rating(s) : DC 3.7V From battery and DC 5.0V From external circuit

Test Standard(s) : IEC 62209-2:2010; IEEE 1528:2013; FCC 47 CFR Part 2.1093;

**ANSI/IEEE C95.1:2005; Reference FCC KDB 447498; KDB 248227;
KDB 616217; KDB 941225; KDB 865664**

The device described above is tested by Shenzhen Anbotech Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotech Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the IEEE 1528-2013, FCC 47 CFR Part 2.1093, ANSI/IEEE C95.1:2005 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotech Compliance Laboratory Limited.

Date of Receipt

Nov. 15, 2023

Date of Test

Nov. 17, 2023 – Nov. 23, 2023

Prepared By

Ella Liang
(Ella Liang)

Approved & Authorized Signer

Kingkong Jin
(Kingkong Jin)



Version

Version No.	Date	Description
R00	Dec. 01, 2023	Original



1 Statement of Compliance

<Highest SAR Summary>

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-2005, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013. The maximum results of Specific Absorption Rate (SAR) found during testing are as follows.

<Highest SAR Summary>

Frequency Band	Highest Reported 1g-SAR(W/Kg)			Simultaneous Reported SAR (W/Kg)
	Head	Body-Worn(10mm)	Host pot(10mm)	
GSM 850	0.310	0.653	0.653	Head: 1.036
PCS1900	0.190	0.464	0.464	
WCDMA Band II	0.174	0.466	0.466	
WCDMA Band V	0.196	0.434	0.434	
LTE Band 2	0.199	0.434	0.434	
LTE Band 4	0.249	0.390	0.390	
LTE Band 5	0.300	0.392	0.392	Body-Worn& Host pot: 0.888
LTE Band 12	0.135	0.335	0.335	
LTE Band 13	0.121	0.305	0.305	
WLAN2.4G	0.374	0.219	0.219	
WLAN5.2G	0.520	0.173	0.173	
WLAN5.8G	0.644	0.193	0.193	
SAR Test Limit (W/Kg)	1.60			
Test Result	PASS			

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-2005, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013.



2 General Information

2.1 Client Information

Applicant	:	Shenzhen Mytron Technology Limited
Address	:	Room 603, Block 4, Tongtai Times Center, Fuyong, Bao'an District, Shenzhen, Guangdong, China.
Manufacturer	:	Shenzhen Mytron Technology Limited
Address	:	Room 603, Block 4, Tongtai Times Center, Fuyong, Bao'an District, Shenzhen, Guangdong, China.

2.2 Description of Equipment Under Test (EUT)

Product Name	:	LTE smart phone
Model No.	:	Digicel DL5 Pro
Listed Models	:	Digicel DL5, mytron L551
Trade Mark	:	N/A
Test Power Supply	:	DC 3.70V battery inside
Test Sample No.	:	18220WC302495-1-2-1(Engineering Sample)
Tx Frequency	:	2.4G&5G: BT:2402~2480MHz 2.4G WIFI: 2412~2462MHz 5.2G WIFI:5180~5240MHz 5.8G WIFI:5745~5825MHz GSM: GSM850 TX: 824.2~848.8MHz PCS1900 TX: 1850.2~1909.8MHz WCDMA: Band 2: TX: 1852.4~1907.6MHz Band 5: TX: 826.40~846.60MHz LTE: FDD Band 2: TX: 1850~1909MHz FDD Band 4: TX: 1710~1755MHz FDD Band 5: TX: 824~849MHz FDD Band 12: TX: 699~716MHz FDD Band 13: TX: 777~787MHz
Type of Modulation	:	BT: GFSK, $\pi/4$ DQPSK, 8DPSK 2.4G WIFI: BPSK,QPSK,16QAM,64QAM 5G WIFI: BPSK,QPSK,16QAM,64QAM, 256QAM GSM:GMSK



	WCDMA:QPSK,16QAM LTE:QPSK,16QAM
Category of device	: Portable device
Remark: The above DUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.	



2.3 Device Category and SAR Limits

This device belongs to portable device category because its radiating structure is allowed to be used within 20 centimeters of the body of the user. Limit for General Population/Uncontrolled exposure should be applied for this device, it is 1.6 W/kg as averaged over any 1 gram of tissue.

2.4 Applied Standard

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards:

- FCC 47 CFR Part 2 (2.1093:2013)
- ANSI/IEEE C95.1:2005
- IEEE Std 1528:2013
- KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- KDB 865664 D02 RF Exposure Reporting v01r02
- KDB 447498 D01 General RF Exposure Guidance v06
- KDB 248227 D01 802.11 Wi-Fi SAR v02r02
- KDB 941225 D01 3G SAR Procedures v03r01
- KDB 941225 D05 SAR for LTE Devices v02r05
- KDB 941225 D06 Hotspot SAR v02r01
- KDB 648474 D04 Handset SAR v01r03

2.5 Environment of Test Site

Items	Required	Actual
Temperature (°C)	18-25	22~23
Humidity (%RH)	30-70	55~65

2.6 Description of Test Facility

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

FCC-Registration No.: **434132** Designation Number: **CN1339**

Shenzhen Anbotek Compliance Laboratory Limited has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

A2LA-Lab Cert. No.: **7035.01**

Shenzhen Anbotek Compliance Laboratory Limited has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

2.7 Test Configuration

The device was controlled by using a base station emulator. Communication between the device and the emulator was established by air link. The distance between the EUT and the antenna of the emulator is larger than 50 cm and the output power radiated from the emulator antenna is at least 30 dB smaller

Shenzhen Anbotek Compliance Laboratory Limited

Code:AB-RF-05-b

Address:1/F., Building D, Sogood Science and Technology Park, Sanwei Community,
Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.
Tel:(86) 0755-26066440 Fax:(86) 0755-26014772 Email:service@anbotek.com



Hotline

400-003-0500

www.anbotek.com.cn



than the output power of EUT. The EUT was set from the emulator to radiate maximum output power during all tests. For WLAN SAR testing, WLAN engineering testing software installed on the EUT can provide continuous transmitting RF signal.



3 Specific Absorption Rate (SAR)

3.1 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.

3.2 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:

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

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

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

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

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

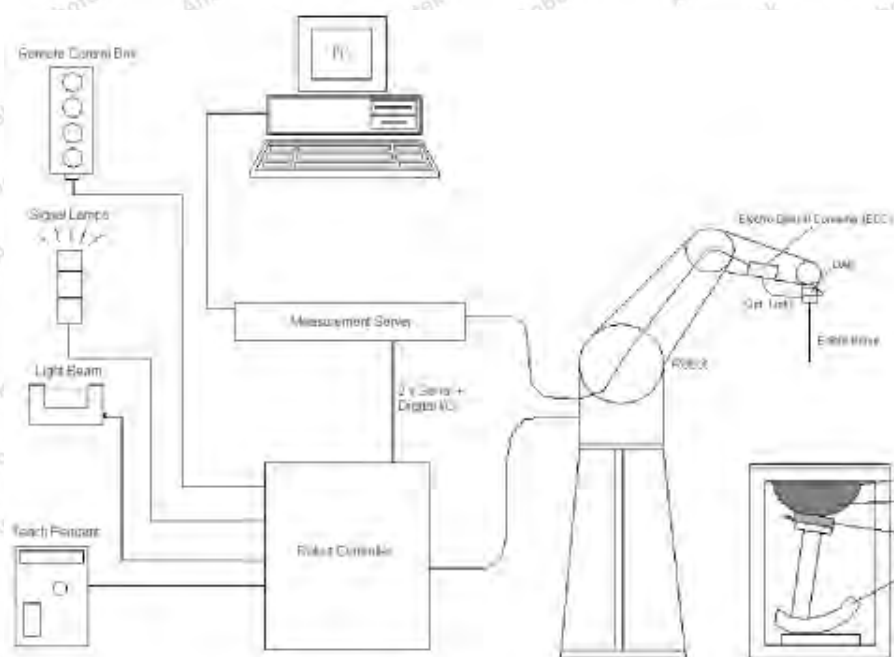
$$\text{SAR} = \frac{\sigma |E|^2}{\rho}$$

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

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



4 SAR Measurement System



DASY System Configurations

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

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

components are described in details in the following sub-sections.



4.1 E-Field Probe

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

➤ E-Field Probe Specification

<EX3DV4 Probe>

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

Photo of EX3DV4

➤ E-Field Probe Calibration

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

4.2 Data Acquisition Electronics (DAE)

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

The input impedance of the DAE is 200M Ω ; the inputs are symmetrical and floating. Common mode rejection is above 80dB.



**Photo of DAE**

4.3 Robot

The SPEAG DASY system uses the high precision robots (DASY5: TX60XL) type from Stäubli SA (France). For the 6-axis controllersystem, the robot controller version (DASY5: CS8c) from Stäubli is used. The Stäublirobot series have many features that are important for our application:

- High precision (repeatability ± 0.035 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)

**Photo of DASY5**

4.4 Measurement Server

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

The measurement server performs all the real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operations.





Photo of Server for DASY5

4.5 Phantom

<SAM Twin Phantom>

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



Photo of SAM Phantom

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

<ELI4 Phantom>

Shell Thickness	2 ± 0.2 mm (sagging: <1%)
Filling Volume	Approx. 30 liters
Dimensions	Major ellipse axis: 600 mm Minor axis: 400 mm

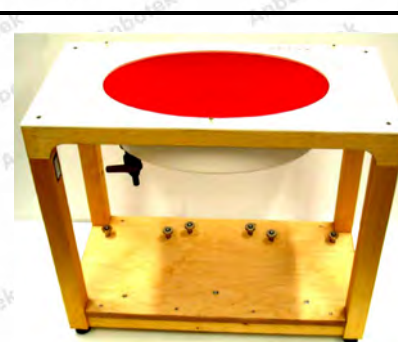


Photo of ELI4 Phantom

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



4.6 Device Holder

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

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

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



Device Holder

4.7 Data Storage and Evaluation

➤ Data Storage

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



incorrect crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be reevaluated.

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

➤ Data Evaluation

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

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

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

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

The formula for each channel can be given as:

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

with V_i = compensated signal of channel i, (i = x, y, z)

U_i = input signal of channel i, (i = x, y, z)

cf = crest factor of exciting field (DASY parameter)

dcp_i = diode compression point (DASY parameter)

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



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

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

with V_i = compensated signal of channel i, (i= x, y, z)

Norm_i = sensor sensitivity of channel i, (i= x, y, z), $\mu\text{V}/(\text{V/m})^2$ for E-field Probes

ConvF = sensitivity enhancement in solution

a_{ij} = sensor sensitivity factors for H-field probes

f = carrier frequency [GHz]

E_i = electric field strength of channel i in V/m

H_i = magnetic field strength of channel i in A/m

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

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

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

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

with SAR = local specific absorption rate in W/kg

E_{tot} = total field strength in V/m

σ = conductivity in [mho/m] or [Siemens/m]

ρ = equivalent tissue density in g/cm^3

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



5 Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	1118	Jun. 08,2021	Jun. 07,2024
SPEAG	835MHz System Validation Kit	D835V2	4d154	Jun. 16,2021	Jun. 15,2024
SPEAG	1750MHz System Validation Kit	D1750V2	1021	Jul. 01,2021	Jun. 30,2024
SPEAG	1900MHz System Validation Kit	D1900V2	5d175	Jun. 15,2022	Jun. 14,2025
SPEAG	2450MHz System Validation Kit	D2450V2	910	Jun. 15,2021	Jun. 14,2024
SPEAG	5GHz System Validation Kit	D5GHzV2	1160	Oct. 02, 2021	Oct. 01, 2024
Rohde & Schwarz	UNIVERSAL RADIO COMMUNICATION TESTER	CMW500	1201.0002K50-104209-JC	Nov.09, 2023	Nov.08, 2024
SPEAG	Data Acquisition Electronics	DAE3	428	Aug.30,2023	Aug.29,2024
SPEAG	Dosimetric E-Field Probe	EX3DV4	7396	May 06,2023	May 05,2024
Agilent	ENA Series Network Analyzer	E5071C	MY46317418	Oct.25, 2023	Oct.24, 2024
SPEAG	DAK	DAK-3.5	1226	NCR	NCR
SPEAG	SAM Twin Phantom	QD000P40CD	1802	NCR	NCR
SPEAG	ELI Phantom	QDOVA004AA	2058	NCR	NCR
AR	Amplifier	ZHL-42W	QA1118004	NCR	NCR
Agilent	Power Meter	N1914A	MY50001102	Oct.25, 2023	Oct.24, 2024
Agilent	Power Sensor	N8481H	MY51240001	Oct.25, 2023	Oct.24, 2024
R&S	Spectrum Analyzer	N9020A	MY51170037	Oct.25, 2023	Oct.24, 2024
Agilent	Signal Generation	N5182A	MY48180656	Oct.25, 2023	Oct.24, 2024
Worken	Directional Coupler	0110A05601O-10	COM5BNW1A2	Oct.25, 2023	Oct.24, 2024

Note:

1. The calibration certificate of DASY can be referred to appendix C of this report.
2. The dipole calibration interval can be extended to 3 years with justification. The dipoles are also not physically damaged, or repaired during the interval.
3. The Insertion Loss calibration of Dual Directional Coupler and Attenuator were characterized via the network analyzer and compensated during system check.
4. The dielectric probe kit was calibrated via the network analyzer, with the specified procedure (calibrated in pure water) and calibration kit (standard) short circuit, before the dielectric measurement. The specific procedure and calibration kit are provided by Agilent.
5. In system check we need to monitor the level on the power meter, and adjust the power amplifier level to have precise power level to the dipole; the measured SAR will be normalized to 1W input power according to the ratio of 1W to the input power to the dipole. For system check, the calibration of the power amplifier is deemed not critically required for correct measurement; the power meter is critical and we do have calibration for it



6 Tissue Simulating Liquids

For the measurement of the field distribution inside the SAM phantom with DASY, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 6.1. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm, which is shown as followed:

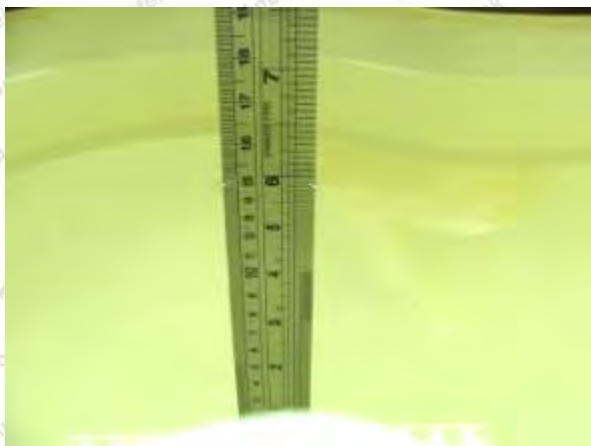


Photo of Liquid Height for Head SAR



Photo of Liquid Height for Body SAR

The following table gives the recipes for tissue simulating liquid.

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (ϵ_r)
For Head								
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
1800,1900,2000	55.2	0	0	0.3	0	44.5	1.40	40.0
2450	55.0	0	0	0	0	45.0	1.80	39.2
2600	54.8	0	0	0.1	0	45.1	1.96	39.0
For Body								
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
1800,1900,2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0	0	31.4	1.95	52.7
2600	65.5	0	0	0	0	31.5	2.16	52.5



The following table shows the measuring results for simulating liquid.

Measured Frequency (MHz)	Target Tissue		Measured Tissue				Liquid Temp.	Test Data
	ϵ_r	σ	ϵ_r	Dev. (%)	σ	Dev. (%)		
750	41.9	0.89	40.827	-2.56%	0.909	2.19%	22.7	11/16/2023
835	41.5	0.90	41.608	0.26%	0.920	2.27%	22.4	11/17/2023
1750	40.1	1.37	39.005	-2.73%	1.362	-0.59%	22.4	11/20/2023
1900	40.0	1.40	40.556	1.39%	1.413	0.96%	22.3	11/21/2023
2450	39.2	1.80	38.596	-1.54%	1.761	-2.18%	22.4	11/22/2023
5250	35.9	4.71	35.107	-2.21%	4.583	-2.70%	22.2	11/23/2023
5750	35.4	5.22	34.965	-1.23%	5.283	1.20%	22.6	11/23/2023



7 System Verification Procedures

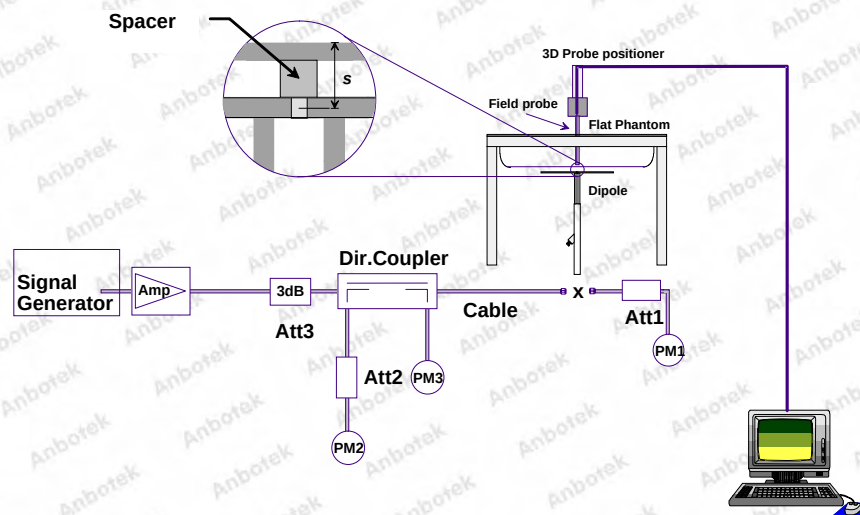
Each DASY system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the DASY software, enable the user to conduct the system performance check and system validation. System validation kit includes a dipole, tripod holder to fix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

➤ Purpose of System Performance check

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

➤ System Setup

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



System Setup for System Evaluation



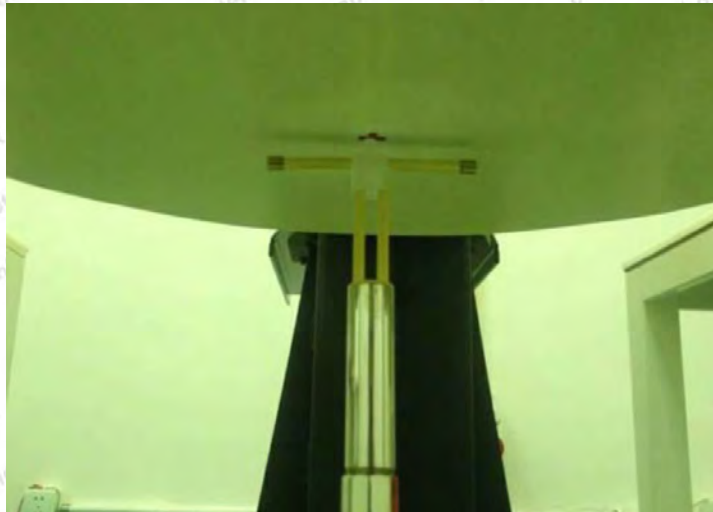


Photo of Dipole Setup

➤ Validation Results

Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10%. The table below shows the target SAR and measured SAR after normalized to 1W input power. It indicates that the system performance check can meet the variation criterion and the plots can be referred to Appendix A of this report.

Date	Frequency (MHz)	Power fed onto reference dipole (mW)	Targeted SAR (W/kg)	Measured SAR (W/kg)	Normalized SAR (W/kg)	Deviation (%)
11/16/2023	750	250	8.31	2.03	8.11	-2.41%
11/17/2023	835	250	9.24	2.38	9.52	3.03%
11/20/2023	1750	250	36.9	9.57	38.26	3.69%
11/21/2023	1900	250	40.4	10.40	41.60	2.97%
11/22/2023	2450	250	52.4	13.50	54.00	3.05%
11/23/2023	5250	100	80.7	7.99	79.90	-0.99%
11/23/2023	5750	100	82.0	8.43	84.30	2.80%

Target and Measurement SAR after Normalized



8 EUT Testing Position

8.1 Handset Reference Points

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



Fig.8-1 Illustration for Front, Back and Side of SAM Phantom

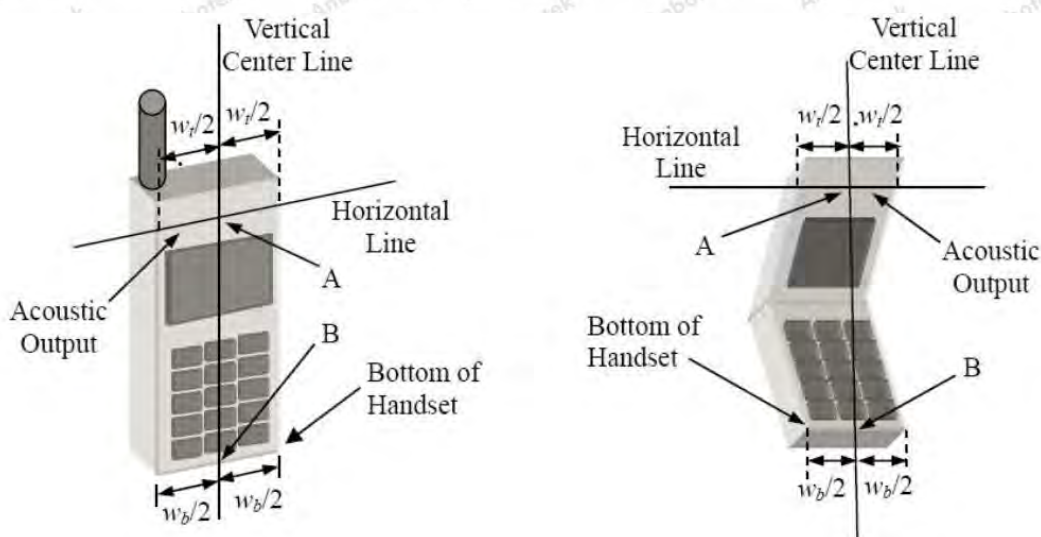


Fig.8-2 Illustration for Handset Vertical and Horizontal Reference Lines



8.2 Positioning for Cheek / Touch

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



Fig.8-3 Illustration for Cheek Position

8.3 Positioning for Ear / 15° Tilt

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



Fig.8-4 Illustration for Tilted Position



8.4 Body Worn Accessory Configurations

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

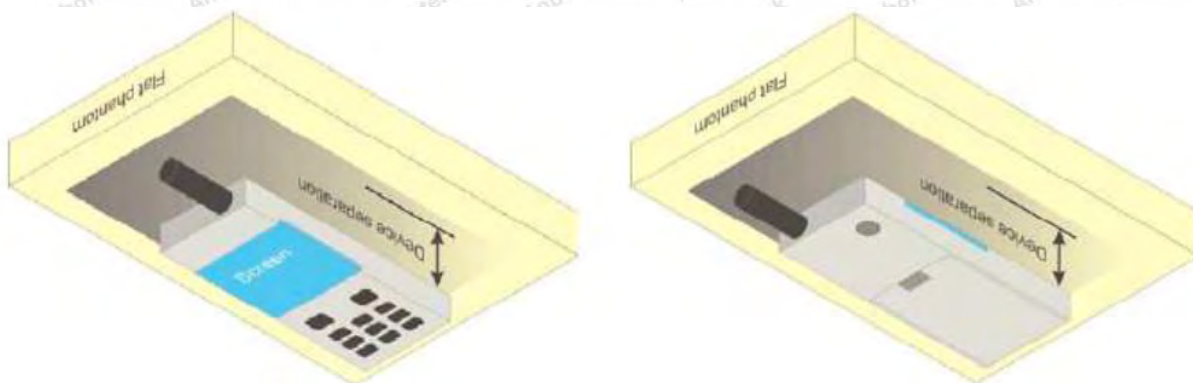


Fig.8-5 Illustration for Body Worn Position

8.5 Wireless Router (Hotspot) Configurations

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

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



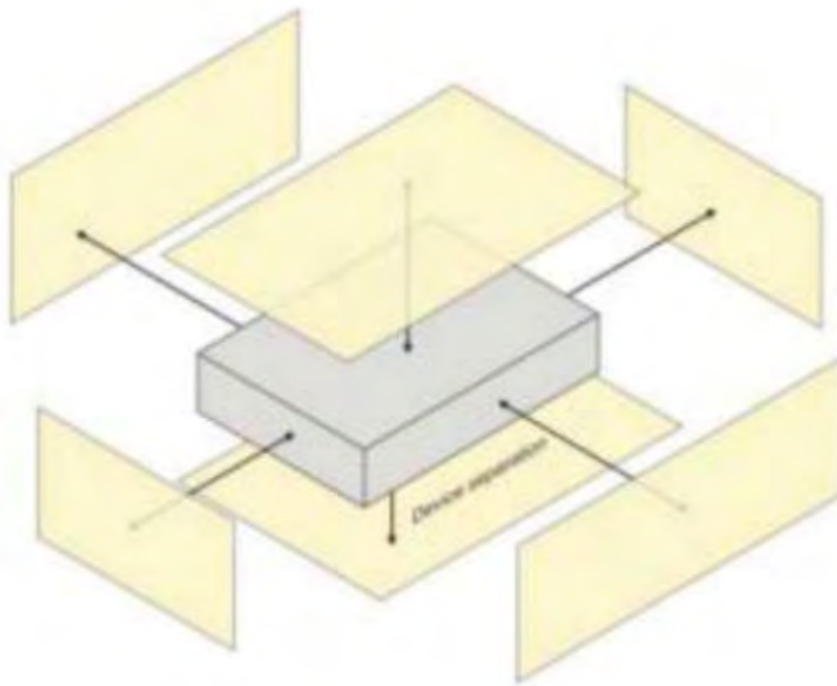


Fig.8-6 Illustration for Hotspot Position



9 Measurement Procedures

The measurement procedures are as follows:

- (a) Use base station simulator (if applicable) or engineering software to transmit RF power continuously (continuous Tx) in the middle channel.
- (b) Keep EUT to radiate maximum output power or 100% duty factor (if applicable)
- (c) Measure output power through RF cable and power meter.
- (d) Place the EUT in the positions as setup photos demonstrates.
- (e) Set scan area, grid size and other setting on the DASY software.
- (f) Measure SAR transmitting at the middle channel for all applicable exposure positions.
- (g) Identify the exposure position and device configuration resulting the highest SAR
- (h) Measure SAR at the lowest and highest channels at the worst exposure position and device configuration if applicable.

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

- (a) Power reference measurement
- (b) Area scan
- (c) Zoom scan
- (d) Power drift measurement

9.1 Spatial Peak SAR Evaluation

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

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

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

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



9.2 Power Reference Measurement

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

9.3 Area Scan Procedures

The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan), if only one zoom scan follows the area scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of zoom scans has to be increased accordingly.

Area scan parameters extracted from FCC KDB 865664 D01 SAR measurement 100 MHz to 6 GHz.

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area} , Δy_{Area}	≤ 2 GHz: ≤ 15 mm $2 - 3$ GHz: ≤ 12 mm	$3 - 4$ GHz: ≤ 12 mm $4 - 6$ GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

9.4 Zoom Scan Procedures

Zoom scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 gram and 10gram of simulated tissue. The zoom scan measures points (refer to table below) within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the zoom scan evaluates the averaged SAR for 1 gram and 10 gram and displays these values next to the job's label.

Zoom scan parameters extracted from FCC KDB 865664 D01 SAR measurement 100 MHz to 6 GHz.

	≤ 3 GHz	> 3 GHz
--	---------	---------



Maximum zoom scan spatial resolution: $\Delta x_{\text{Zoom}}, \Delta y_{\text{Zoom}}$			$\leq 2 \text{ GHz}: \leq 8 \text{ mm}$ $2 - 3 \text{ GHz}: \leq 5 \text{ mm}^*$	$3 - 4 \text{ GHz}: \leq 5 \text{ mm}^*$ $4 - 6 \text{ GHz}: \leq 4 \text{ mm}^*$
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{\text{Zoom}}(n)$		$\leq 5 \text{ mm}$	$3 - 4 \text{ GHz}: \leq 4 \text{ mm}$ $4 - 5 \text{ GHz}: \leq 3 \text{ mm}$ $5 - 6 \text{ GHz}: \leq 2 \text{ mm}$
	graded grid	$\Delta z_{\text{Zoom}}(1)$: between 1 st two points closest to phantom surface	$\leq 4 \text{ mm}$	$3 - 4 \text{ GHz}: \leq 3 \text{ mm}$ $4 - 5 \text{ GHz}: \leq 2.5 \text{ mm}$ $5 - 6 \text{ GHz}: \leq 2 \text{ mm}$
		$\Delta z_{\text{Zoom}}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{\text{Zoom}}(n-1)$	
Minimum zoom scan volume	x, y, z		$\geq 30 \text{ mm}$	$3 - 4 \text{ GHz}: \geq 28 \text{ mm}$ $4 - 5 \text{ GHz}: \geq 25 \text{ mm}$ $5 - 6 \text{ GHz}: \geq 22 \text{ mm}$

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

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

9.5 Volume Scan Procedures

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

9.6 Power Drift Monitoring

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



10 TEST CONDITIONS AND RESULTS

10.1 Conducted Power

<GSM Conducted power>

Band GSM850	Burst Average Power (dBm)				Frame-Average Power (dBm)		
TX Channel	Tune-up	128	190	251	128	190	251
Frequency (MHz)		824.2	836.6	848.8	824.2	836.6	848.6
GSM	33±1	33.20	33.72	33.34	24.17	24.69	24.31
GPRS (GMSK, 1 Tx slot)	33±1	33.14	33.66	33.28	24.11	24.63	24.25
GPRS (GMSK, 2 Tx slots)	30±1	30.03	30.54	30.27	24.01	24.52	24.25
GPRS (GMSK, 3 Tx slots)	28±1	28.12	28.64	28.24	23.86	24.38	23.98
GPRS (GMSK, 4 Tx slots)	27±1	26.50	27.01	26.62	23.49	24.00	23.61
Band PCS1900	Burst Average Power (dBm)				Frame-Average Power (dBm)		
TX Channel	Tune-up power	512	661	810	512	661	810
Frequency (MHz)		1850.2	1880.0	1909.8	1850.2	1880.0	1909.8
GSM	30±1	29.91	30.05	30.09	20.88	21.02	21.06
GPRS (GMSK, 1 Tx slot)	30±1	29.92	30.07	30.12	20.89	21.04	21.09
GPRS (GMSK, 2 Tx slots)	27±1	27.21	27.36	27.41	21.19	21.34	21.39
GPRS (GMSK, 3 Tx slots)	25±1	25.23	25.36	25.54	20.97	21.10	21.28
GPRS (GMSK, 4 Tx slots)	24±1	23.98	24.12	24.27	20.97	21.11	21.26

Remark: The frame-averaged power is linearly scaled the maximum burst averaged power over 8 time slots.
The calculated method are shown as below:

Frame-averaged power = Maximum burst averaged power (1 Tx Slot) – 9.03 dB

Frame-averaged power = Maximum burst averaged power (2 Tx Slots) – 6.02 dB

Frame-averaged power = Maximum burst averaged power (3 Tx Slots) - 4.26 dB

Frame-averaged power = Maximum burst averaged power (4 Tx Slots) – 3.01 dB

Note:

1. Per KDB 447498 D01, the maximum output power channel is used for SAR testing and for further SAR test reduction
2. For Data mode SAR testing, GPRS should be evaluated, therefore the EUT was set in corresponding TX slots due to its highest frame-average power.

<WCDMA Conducted Power>

Shenzhen Anbotek Compliance Laboratory Limited

Address: 1/F., Building D, Sogood Science and Technology Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China.

Tel: (86) 0755-26066440 Fax: (86) 0755-26014772 Email: service@anbotek.com

Code: AB-RF-05-b



Hotline

400-003-0500

www.anbotek.com.cn



The following tests were conducted according to the test requirements outlines in 3GPP TS 34.121 specification.

A summary of these settings are illustrated below:

HSDPA Setup Configuration:

- a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
- b. The RF path losses were compensated into the measurements.
- c. A call was established between EUT and Base Station with following setting:
 - i. Set Gain Factors (β_c and β_d) and parameters were set according to each
 - ii. Specific sub-test in the following table, C10.1.4, quoted from the TS 34.121
 - iii. Set RMC 12.2Kbps + HSDPA mode.
 - iv. Set Cell Power = -86 dBm
 - v. Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)
 - vi. Select HSDPA Uplink Parameters
 - vii. Set Delta ACK, Delta NACK and Delta CQI = 8
 - viii. Set Ack-Nack Repetition Factor to 3
 - ix. Set CQI Feedback Cycle (k) to 4 ms
 - x. Set CQI Repetition Factor to 2
 - xi. Power Ctrl Mode = All Up bits
- d. The transmitted maximum output power was recorded.

Table C.10.1.4: β values for transmitter characteristics tests with HS-DPCCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (Note 1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5
Note 1: Δ_{ACK}, Δ_{NACK} and $\Delta_{CQI} = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$. Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and $\Delta_{NACK} = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$, and $\Delta_{CQI} = 24/15$ with $\beta_{hs} = 24/15 * \beta_c$. Note 3: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases. Note 4: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 11/15$ and $\beta_d = 15/15$.							

Setup Configuration



HSUPA Setup Configuration:

- a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
- b. The RF path losses were compensated into the measurements.
- c. A call was established between EUT and Base Station with following setting * :
 - i. Call Configs = 5.2B, 5.9B, 5.10B, and 5.13.2B with QPSK
 - ii. Set the Gain Factors (β_c and β_d) and parameters (AG Index) were set according to each specific sub-test in the following table, C11.1.3, quoted from the TS 34.121
 - iii. Set Cell Power = -86 dBm
 - iv. Set Channel Type = 12.2k + HSPA
 - v. Set UE Target Power
 - vi. Power Ctrl Mode= Alternating bits
 - vii. Set and observe the E-TFCI
 - viii. Confirm that E-TFCI is equal to the target E-TFCI of 75 for sub-test 1, and other subtest's E-TFCI
- d. The transmitted maximum output power was recorded.

Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note 1)	β_{ec}	β_{ed} (Note 5) (Note 6)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 6)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	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 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (Note 4)	15/15 (Note 4)	64	15/15 (Note 4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$.

Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$.

Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 14/15$ and $\beta_d = 15/15$.

Note 5: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.

Note 6: β_{ed} can not be set directly, it is set by Absolute Grant Value.

Setup Configuration

<WCDMA Conducted Power>

WCDMA	Band II (dBm)				Band V (dBm)			
TX Channel	Tune-up	9262	9400	9538	Tune-up	4132	4183	4233
Frequency (MHz)		1852.4	1880.0	1907.6		826.4	836.6	846.6
RMC 12.2Kbps	23±1	23.47	23.50	23.43	23±1	23.60	23.72	23.67
RMC AMR	23±1	23.12	23.22	23.16	23±1	23.21	23.29	23.25
HSDPA Subtest-1	22±1	22.20	22.25	22.34	22±1	22.54	22.49	22.50
HSDPA Subtest-2	21±1	21.56	21.45	21.59	21±1	21.11	21.13	20.95
HSDPA Subtest-3	21±1	21.86	21.88	21.87	21±1	21.13	21.02	21.22
HSDPA Subtest-4	21±1	21.53	21.44	21.45	21±1	21.22	21.16	21.15
HSUPA Subtest-1	22±1	22.75	22.61	22.58	22±1	22.10	22.11	21.97
HSUPA Subtest-2	21±1	21.86	21.69	21.91	21±1	21.43	21.54	21.38
HSUPA Subtest-3	21±1	21.58	21.61	21.63	21±1	21.18	21.22	21.25
HSUPA Subtest-4	21±1	21.13	21.04	21.14	21±1	21.61	21.45	21.65
HSUPA Subtest-5	22±1	22.22	22.28	22.11	22±1	22.80	22.83	22.91

General Note

1. Per KDB 941225 D01 v02, RMC 12.2kbps setting is used to evaluate SAR. If AMR 12.2kbps power is < 0.25dB higher than RMC 12.2kbps, SAR tests with AMR 12.2kbps can be excluded.
2. By design, AMR and HSDPA/HSUPA RF power will not be larger than RMC 12.2kbps, detailed information is included in Tune-up Procure exhibit.
3. It is expected by the manufacturer that MPR for some HSDPA/HSUPA subtests may differ from the specification of 3GPP, according to the chipset implementation in this model. The implementation and expected deviation are detailed in tune-up procedure exhibit.



<LTE Conducted Power>

Condition	Band	Channel Bandwidth	Channel	RB Configure	Result (dBm)		Tune-Up	
					QPSK	16QAM	QPSK	16QAM
NTNV	Band2	1.4MHz	18607	1RB#0	23.68	22.43	23.0±1.0	22.0±1.0
NTNV	Band2	1.4MHz	18607	1RB#2	23.85	22.69	23.0±1.0	22.0±1.0
NTNV	Band2	1.4MHz	18607	1RB#5	23.46	22.29	23.0±1.0	22.0±1.0
NTNV	Band2	1.4MHz	18607	3RB#0	23.62	22.31	23.0±1.0	22.0±1.0
NTNV	Band2	1.4MHz	18607	3RB#1	23.80	22.52	23.0±1.0	22.0±1.0
NTNV	Band2	1.4MHz	18607	3RB#3	23.36	22.31	23.0±1.0	22.0±1.0
NTNV	Band2	1.4MHz	18607	6RB#0	23.81	22.83	23.0±1.0	22.0±1.0
NTNV	Band2	1.4MHz	18900	1RB#0	23.12	21.91	23.0±1.0	22.0±1.0
NTNV	Band2	1.4MHz	18900	1RB#2	23.60	22.30	23.0±1.0	22.0±1.0
NTNV	Band2	1.4MHz	18900	1RB#5	23.26	22.04	23.0±1.0	22.0±1.0
NTNV	Band2	1.4MHz	18900	3RB#0	23.09	21.92	23.0±1.0	22.0±1.0
NTNV	Band2	1.4MHz	18900	3RB#1	23.46	22.13	23.0±1.0	22.0±1.0
NTNV	Band2	1.4MHz	18900	3RB#3	23.13	22.15	23.0±1.0	22.0±1.0
NTNV	Band2	1.4MHz	18900	6RB#0	23.46	22.30	23.0±1.0	22.0±1.0
NTNV	Band2	1.4MHz	19193	1RB#0	23.26	21.98	23.0±1.0	22.0±1.0
NTNV	Band2	1.4MHz	19193	1RB#2	23.54	22.53	23.0±1.0	22.0±1.0
NTNV	Band2	1.4MHz	19193	1RB#5	23.35	22.21	23.0±1.0	22.0±1.0
NTNV	Band2	1.4MHz	19193	3RB#0	23.21	22.01	23.0±1.0	22.0±1.0
NTNV	Band2	1.4MHz	19193	3RB#1	23.49	22.23	23.0±1.0	22.0±1.0
NTNV	Band2	1.4MHz	19193	3RB#3	23.33	22.29	23.0±1.0	22.0±1.0
NTNV	Band2	1.4MHz	19193	6RB#0	23.53	22.22	23.0±1.0	22.0±1.0
NTNV	Band2	3MHz	18615	1RB#0	23.56	22.47	23.0±1.0	22.0±1.0
NTNV	Band2	3MHz	18615	1RB#8	23.85	22.54	23.0±1.0	22.0±1.0
NTNV	Band2	3MHz	18615	1RB#14	23.73	22.60	23.0±1.0	22.0±1.0
NTNV	Band2	3MHz	18615	8RB#0	23.46	22.19	23.0±1.0	22.0±1.0
NTNV	Band2	3MHz	18615	8RB#4	23.79	22.65	23.0±1.0	22.0±1.0
NTNV	Band2	3MHz	18615	8RB#7	23.68	22.57	23.0±1.0	22.0±1.0
NTNV	Band2	3MHz	18615	15RB#0	23.67	22.32	23.0±1.0	22.0±1.0
NTNV	Band2	3MHz	18900	1RB#0	23.88	22.72	23.0±1.0	22.0±1.0
NTNV	Band2	3MHz	18900	1RB#8	23.18	21.90	23.0±1.0	22.0±1.0
NTNV	Band2	3MHz	18900	1RB#14	23.10	21.76	23.0±1.0	22.0±1.0
NTNV	Band2	3MHz	18900	8RB#0	23.73	22.68	23.0±1.0	22.0±1.0
NTNV	Band2	3MHz	18900	8RB#4	23.16	21.84	23.0±1.0	22.0±1.0
NTNV	Band2	3MHz	18900	8RB#7	23.08	21.91	23.0±1.0	22.0±1.0
NTNV	Band2	3MHz	18900	15RB#0	23.81	22.75	23.0±1.0	22.0±1.0
NTNV	Band2	3MHz	19185	1RB#0	23.69	22.62	23.0±1.0	22.0±1.0
NTNV	Band2	3MHz	19185	1RB#8	23.85	22.67	23.0±1.0	22.0±1.0



NTNV	Band2	3MHz	19185	1RB#14	23.54	22.47	23.0±1.0	22.0±1.0
NTNV	Band2	3MHz	19185	8RB#0	23.53	22.53	23.0±1.0	22.0±1.0
NTNV	Band2	3MHz	19185	8RB#4	23.75	22.75	23.0±1.0	22.0±1.0
NTNV	Band2	3MHz	19185	8RB#7	23.51	22.31	23.0±1.0	22.0±1.0
NTNV	Band2	3MHz	19185	15RB#0	23.83	22.60	23.0±1.0	22.0±1.0
NTNV	Band2	5MHz	18625	1RB#0	23.22	21.91	23.0±1.0	22.0±1.0
NTNV	Band2	5MHz	18625	1RB#12	23.35	22.15	23.0±1.0	22.0±1.0
NTNV	Band2	5MHz	18625	1RB#24	23.87	22.81	23.0±1.0	22.0±1.0
NTNV	Band2	5MHz	18625	12RB#0	23.01	21.95	23.0±1.0	22.0±1.0
NTNV	Band2	5MHz	18625	12RB#6	23.25	22.26	23.0±1.0	22.0±1.0
NTNV	Band2	5MHz	18625	12RB#13	23.86	22.52	23.0±1.0	22.0±1.0
NTNV	Band2	5MHz	18625	25RB#0	23.82	22.77	23.0±1.0	22.0±1.0
NTNV	Band2	5MHz	18900	1RB#0	23.28	22.12	23.0±1.0	22.0±1.0
NTNV	Band2	5MHz	18900	1RB#12	23.46	22.20	23.0±1.0	22.0±1.0
NTNV	Band2	5MHz	18900	1RB#24	23.07	21.82	23.0±1.0	22.0±1.0
NTNV	Band2	5MHz	18900	12RB#0	23.12	21.84	23.0±1.0	22.0±1.0
NTNV	Band2	5MHz	18900	12RB#6	23.45	22.47	23.0±1.0	22.0±1.0
NTNV	Band2	5MHz	18900	12RB#13	22.97	21.90	23.0±1.0	22.0±1.0
NTNV	Band2	5MHz	18900	25RB#0	23.34	22.06	23.0±1.0	22.0±1.0
NTNV	Band2	5MHz	19175	1RB#0	23.30	22.32	23.0±1.0	22.0±1.0
NTNV	Band2	5MHz	19175	1RB#12	23.37	22.33	23.0±1.0	22.0±1.0
NTNV	Band2	5MHz	19175	1RB#24	23.18	22.19	23.0±1.0	22.0±1.0
NTNV	Band2	5MHz	19175	12RB#0	23.16	22.03	23.0±1.0	22.0±1.0
NTNV	Band2	5MHz	19175	12RB#6	23.28	21.97	23.0±1.0	22.0±1.0
NTNV	Band2	5MHz	19175	12RB#13	23.14	21.79	23.0±1.0	22.0±1.0
NTNV	Band2	5MHz	19175	25RB#0	23.31	22.13	23.0±1.0	22.0±1.0
NTNV	Band2	10MHz	18650	1RB#0	23.41	22.15	23.0±1.0	22.0±1.0
NTNV	Band2	10MHz	18650	1RB#24	23.43	22.46	23.0±1.0	22.0±1.0
NTNV	Band2	10MHz	18650	1RB#49	23.40	22.05	23.0±1.0	22.0±1.0
NTNV	Band2	10MHz	18650	25RB#0	23.40	22.22	23.0±1.0	22.0±1.0
NTNV	Band2	10MHz	18650	25RB#12	23.36	22.24	23.0±1.0	22.0±1.0
NTNV	Band2	10MHz	18650	25RB#25	23.32	22.18	23.0±1.0	22.0±1.0
NTNV	Band2	10MHz	18650	50RB#0	23.39	22.07	23.0±1.0	22.0±1.0
NTNV	Band2	10MHz	18900	1RB#0	23.49	22.46	23.0±1.0	22.0±1.0
NTNV	Band2	10MHz	18900	1RB#24	23.22	22.02	23.0±1.0	22.0±1.0
NTNV	Band2	10MHz	18900	1RB#49	23.04	22.01	23.0±1.0	22.0±1.0
NTNV	Band2	10MHz	18900	25RB#0	23.48	22.23	23.0±1.0	22.0±1.0
NTNV	Band2	10MHz	18900	25RB#12	23.14	22.01	23.0±1.0	22.0±1.0
NTNV	Band2	10MHz	18900	25RB#25	22.91	21.60	23.0±1.0	22.0±1.0
NTNV	Band2	10MHz	18900	50RB#0	23.30	22.13	23.0±1.0	22.0±1.0



NTNV	Band2	10MHz	19150	1RB#0	23.15	21.91	23.0±1.0	22.0±1.0
NTNV	Band2	10MHz	19150	1RB#24	23.00	21.85	23.0±1.0	22.0±1.0
NTNV	Band2	10MHz	19150	1RB#49	23.79	22.63	23.0±1.0	22.0±1.0
NTNV	Band2	10MHz	19150	25RB#0	23.14	22.11	23.0±1.0	22.0±1.0
NTNV	Band2	10MHz	19150	25RB#12	22.83	21.76	23.0±1.0	22.0±1.0
NTNV	Band2	10MHz	19150	25RB#25	23.77	22.68	23.0±1.0	22.0±1.0
NTNV	Band2	10MHz	19150	50RB#0	23.72	22.47	23.0±1.0	22.0±1.0
NTNV	Band2	15MHz	18675	1RB#0	23.78	22.47	23.0±1.0	22.0±1.0
NTNV	Band2	15MHz	18675	1RB#38	23.52	22.44	23.0±1.0	22.0±1.0
NTNV	Band2	15MHz	18675	1RB#74	23.82	22.69	23.0±1.0	22.0±1.0
NTNV	Band2	15MHz	18675	38RB#0	23.67	22.58	23.0±1.0	22.0±1.0
NTNV	Band2	15MHz	18675	38RB#18	23.49	22.47	23.0±1.0	22.0±1.0
NTNV	Band2	15MHz	18675	38RB#37	23.80	22.48	23.0±1.0	22.0±1.0
NTNV	Band2	15MHz	18675	75RB#0	23.65	22.56	23.0±1.0	22.0±1.0
NTNV	Band2	15MHz	18900	1RB#0	23.66	22.36	23.0±1.0	22.0±1.0
NTNV	Band2	15MHz	18900	1RB#38	23.25	22.15	23.0±1.0	22.0±1.0
NTNV	Band2	15MHz	18900	1RB#74	23.19	21.90	23.0±1.0	22.0±1.0
NTNV	Band2	15MHz	18900	38RB#0	23.61	22.27	23.0±1.0	22.0±1.0
NTNV	Band2	15MHz	18900	38RB#18	23.13	21.94	23.0±1.0	22.0±1.0
NTNV	Band2	15MHz	18900	38RB#37	23.18	21.84	23.0±1.0	22.0±1.0
NTNV	Band2	15MHz	18900	75RB#0	23.58	22.35	23.0±1.0	22.0±1.0
NTNV	Band2	15MHz	19125	1RB#0	23.25	22.01	23.0±1.0	22.0±1.0
NTNV	Band2	15MHz	19125	1RB#38	23.92	22.87	23.0±1.0	22.0±1.0
NTNV	Band2	15MHz	19125	1RB#74	23.27	22.14	23.0±1.0	22.0±1.0
NTNV	Band2	15MHz	19125	38RB#0	23.24	22.08	23.0±1.0	22.0±1.0
NTNV	Band2	15MHz	19125	38RB#18	23.89	22.63	23.0±1.0	22.0±1.0
NTNV	Band2	15MHz	19125	38RB#37	23.16	22.00	23.0±1.0	22.0±1.0
NTNV	Band2	15MHz	19125	75RB#0	23.83	22.78	23.0±1.0	22.0±1.0
NTNV	Band2	20MHz	18700	1RB#0	23.89	22.83	23.0±1.0	22.0±1.0
NTNV	Band2	20MHz	18700	1RB#49	23.45	22.47	23.0±1.0	22.0±1.0
NTNV	Band2	20MHz	18700	1RB#99	23.53	22.38	23.0±1.0	22.0±1.0
NTNV	Band2	20MHz	18700	50RB#0	23.87	22.82	23.0±1.0	22.0±1.0
NTNV	Band2	20MHz	18700	50RB#25	23.25	22.16	23.0±1.0	22.0±1.0
NTNV	Band2	20MHz	18700	50RB#50	23.41	22.15	23.0±1.0	22.0±1.0
NTNV	Band2	20MHz	18700	100RB#0	23.76	22.56	23.0±1.0	22.0±1.0
NTNV	Band2	20MHz	18900	1RB#0	23.66	22.32	23.0±1.0	22.0±1.0
NTNV	Band2	20MHz	18900	1RB#49	23.87	22.64	23.0±1.0	22.0±1.0
NTNV	Band2	20MHz	18900	1RB#99	23.23	22.00	23.0±1.0	22.0±1.0
NTNV	Band2	20MHz	18900	50RB#0	23.65	22.67	23.0±1.0	22.0±1.0
NTNV	Band2	20MHz	18900	50RB#25	23.85	22.65	23.0±1.0	22.0±1.0



NTNV	Band2	20MHz	18900	50RB#50	23.17	22.18	23.0±1.0	22.0±1.0
NTNV	Band2	20MHz	18900	100RB#0	23.75	22.44	23.0±1.0	22.0±1.0
NTNV	Band2	20MHz	19100	1RB#0	23.34	22.03	23.0±1.0	22.0±1.0
NTNV	Band2	20MHz	19100	1RB#49	23.28	21.97	23.0±1.0	22.0±1.0
NTNV	Band2	20MHz	19100	1RB#99	23.66	22.32	23.0±1.0	22.0±1.0
NTNV	Band2	20MHz	19100	50RB#0	23.24	21.91	23.0±1.0	22.0±1.0
NTNV	Band2	20MHz	19100	50RB#25	23.26	21.94	23.0±1.0	22.0±1.0
NTNV	Band2	20MHz	19100	50RB#50	23.63	22.36	23.0±1.0	22.0±1.0
NTNV	Band2	20MHz	19100	100RB#0	23.66	22.36	23.0±1.0	22.0±1.0

Condition	Band	Channel Bandwidth	Channel	RB Configure	Result (dBm)		Tune-Up	
					QPSK	16QAM	QPSK	16QAM
NTNV	Band4	1.4MHz	19957	1RB#0	23.43	22.43	23.0±1.0	22.0±1.0
NTNV	Band4	1.4MHz	19957	1RB#2	23.16	22.01	23.0±1.0	22.0±1.0
NTNV	Band4	1.4MHz	19957	1RB#5	23.42	22.43	23.0±1.0	22.0±1.0
NTNV	Band4	1.4MHz	19957	3RB#0	23.34	22.01	23.0±1.0	22.0±1.0
NTNV	Band4	1.4MHz	19957	3RB#1	23.15	22.01	23.0±1.0	22.0±1.0
NTNV	Band4	1.4MHz	19957	3RB#3	23.40	22.35	23.0±1.0	22.0±1.0
NTNV	Band4	1.4MHz	19957	6RB#0	23.32	22.13	23.0±1.0	22.0±1.0
NTNV	Band4	1.4MHz	20175	1RB#0	23.72	22.43	23.0±1.0	22.0±1.0
NTNV	Band4	1.4MHz	20175	1RB#2	23.02	22.01	23.0±1.0	22.0±1.0
NTNV	Band4	1.4MHz	20175	1RB#5	23.69	22.43	23.0±1.0	22.0±1.0
NTNV	Band4	1.4MHz	20175	3RB#0	23.68	22.41	23.0±1.0	22.0±1.0
NTNV	Band4	1.4MHz	20175	3RB#1	22.89	21.61	23.0±1.0	22.0±1.0
NTNV	Band4	1.4MHz	20175	3RB#3	23.69	22.43	23.0±1.0	22.0±1.0
NTNV	Band4	1.4MHz	20175	6RB#0	23.60	22.49	23.0±1.0	22.0±1.0
NTNV	Band4	1.4MHz	20393	1RB#0	23.48	22.19	23.0±1.0	22.0±1.0
NTNV	Band4	1.4MHz	20393	1RB#2	23.31	22.27	23.0±1.0	22.0±1.0
NTNV	Band4	1.4MHz	20393	1RB#5	23.70	22.60	23.0±1.0	22.0±1.0
NTNV	Band4	1.4MHz	20393	3RB#0	23.47	22.31	23.0±1.0	22.0±1.0
NTNV	Band4	1.4MHz	20393	3RB#1	23.29	22.07	23.0±1.0	22.0±1.0
NTNV	Band4	1.4MHz	20393	3RB#3	23.52	22.31	23.0±1.0	22.0±1.0
NTNV	Band4	1.4MHz	20393	6RB#0	23.61	22.60	23.0±1.0	22.0±1.0
NTNV	Band4	3MHz	19965	1RB#0	23.00	21.92	23.0±1.0	22.0±1.0
NTNV	Band4	3MHz	19965	1RB#8	23.35	22.02	23.0±1.0	22.0±1.0
NTNV	Band4	3MHz	19965	1RB#14	23.15	21.92	23.0±1.0	22.0±1.0
NTNV	Band4	3MHz	19965	8RB#0	22.94	21.87	23.0±1.0	22.0±1.0
NTNV	Band4	3MHz	19965	8RB#4	23.24	22.20	23.0±1.0	22.0±1.0
NTNV	Band4	3MHz	19965	8RB#7	23.08	21.79	23.0±1.0	22.0±1.0
NTNV	Band4	3MHz	19965	15RB#0	23.20	22.01	23.0±1.0	22.0±1.0



NTNV	Band4	3MHz	20175	1RB#0	23.24	22.03	23.0±1.0	22.0±1.0
NTNV	Band4	3MHz	20175	1RB#8	23.70	22.73	23.0±1.0	22.0±1.0
NTNV	Band4	3MHz	20175	1RB#14	23.10	21.92	23.0±1.0	22.0±1.0
NTNV	Band4	3MHz	20175	8RB#0	23.19	22.09	23.0±1.0	22.0±1.0
NTNV	Band4	3MHz	20175	8RB#4	23.61	22.47	23.0±1.0	22.0±1.0
NTNV	Band4	3MHz	20175	8RB#7	22.99	21.88	23.0±1.0	22.0±1.0
NTNV	Band4	3MHz	20175	15RB#0	23.50	22.34	23.0±1.0	22.0±1.0
NTNV	Band4	3MHz	20385	1RB#0	23.01	21.72	23.0±1.0	22.0±1.0
NTNV	Band4	3MHz	20385	1RB#8	23.21	22.24	23.0±1.0	22.0±1.0
NTNV	Band4	3MHz	20385	1RB#14	23.51	22.38	23.0±1.0	22.0±1.0
NTNV	Band4	3MHz	20385	8RB#0	22.85	21.62	23.0±1.0	22.0±1.0
NTNV	Band4	3MHz	20385	8RB#4	23.16	22.08	23.0±1.0	22.0±1.0
NTNV	Band4	3MHz	20385	8RB#7	23.44	22.33	23.0±1.0	22.0±1.0
NTNV	Band4	3MHz	20385	15RB#0	23.37	22.24	23.0±1.0	22.0±1.0
NTNV	Band4	5MHz	19975	1RB#0	23.70	22.72	23.0±1.0	22.0±1.0
NTNV	Band4	5MHz	19975	1RB#12	23.41	22.30	23.0±1.0	22.0±1.0
NTNV	Band4	5MHz	19975	1RB#24	23.49	22.22	23.0±1.0	22.0±1.0
NTNV	Band4	5MHz	19975	12RB#0	23.61	22.54	23.0±1.0	22.0±1.0
NTNV	Band4	5MHz	19975	12RB#6	23.27	22.25	23.0±1.0	22.0±1.0
NTNV	Band4	5MHz	19975	12RB#13	23.41	22.39	23.0±1.0	22.0±1.0
NTNV	Band4	5MHz	19975	25RB#0	23.69	22.54	23.0±1.0	22.0±1.0
NTNV	Band4	5MHz	20175	1RB#0	23.71	22.38	23.0±1.0	22.0±1.0
NTNV	Band4	5MHz	20175	1RB#12	23.28	22.25	23.0±1.0	22.0±1.0
NTNV	Band4	5MHz	20175	1RB#24	23.48	22.17	23.0±1.0	22.0±1.0
NTNV	Band4	5MHz	20175	12RB#0	23.68	22.62	23.0±1.0	22.0±1.0
NTNV	Band4	5MHz	20175	12RB#6	23.25	22.08	23.0±1.0	22.0±1.0
NTNV	Band4	5MHz	20175	12RB#13	23.44	22.12	23.0±1.0	22.0±1.0
NTNV	Band4	5MHz	20175	25RB#0	23.69	22.51	23.0±1.0	22.0±1.0
NTNV	Band4	5MHz	20375	1RB#0	23.02	21.79	23.0±1.0	22.0±1.0
NTNV	Band4	5MHz	20375	1RB#12	23.77	22.65	23.0±1.0	22.0±1.0
NTNV	Band4	5MHz	20375	1RB#24	23.85	22.76	23.0±1.0	22.0±1.0
NTNV	Band4	5MHz	20375	12RB#0	22.90	21.62	23.0±1.0	22.0±1.0
NTNV	Band4	5MHz	20375	12RB#6	23.67	22.52	23.0±1.0	22.0±1.0
NTNV	Band4	5MHz	20375	12RB#13	23.78	22.81	23.0±1.0	22.0±1.0
NTNV	Band4	5MHz	20375	25RB#0	23.75	22.65	23.0±1.0	22.0±1.0
NTNV	Band4	10MHz	20000	1RB#0	23.82	22.74	23.0±1.0	22.0±1.0
NTNV	Band4	10MHz	20000	1RB#24	23.60	22.25	23.0±1.0	22.0±1.0
NTNV	Band4	10MHz	20000	1RB#49	23.90	22.79	23.0±1.0	22.0±1.0
NTNV	Band4	10MHz	20000	25RB#0	23.63	22.37	23.0±1.0	22.0±1.0
NTNV	Band4	10MHz	20000	25RB#12	23.53	22.54	23.0±1.0	22.0±1.0



NTNV	Band4	10MHz	20000	25RB#25	23.80	22.48	23.0±1.0	22.0±1.0
NTNV	Band4	10MHz	20000	50RB#0	23.82	22.63	23.0±1.0	22.0±1.0
NTNV	Band4	10MHz	20175	1RB#0	23.16	21.93	23.0±1.0	22.0±1.0
NTNV	Band4	10MHz	20175	1RB#24	23.38	22.13	23.0±1.0	22.0±1.0
NTNV	Band4	10MHz	20175	1RB#49	23.14	21.90	23.0±1.0	22.0±1.0
NTNV	Band4	10MHz	20175	25RB#0	23.12	21.79	23.0±1.0	22.0±1.0
NTNV	Band4	10MHz	20175	25RB#12	23.33	22.26	23.0±1.0	22.0±1.0
NTNV	Band4	10MHz	20175	25RB#25	23.13	22.15	23.0±1.0	22.0±1.0
NTNV	Band4	10MHz	20175	50RB#0	23.29	22.03	23.0±1.0	22.0±1.0
NTNV	Band4	10MHz	20350	1RB#0	23.52	22.47	23.0±1.0	22.0±1.0
NTNV	Band4	10MHz	20350	1RB#24	23.25	22.09	23.0±1.0	22.0±1.0
NTNV	Band4	10MHz	20350	1RB#49	23.86	22.86	23.0±1.0	22.0±1.0
NTNV	Band4	10MHz	20350	25RB#0	23.43	22.28	23.0±1.0	22.0±1.0
NTNV	Band4	10MHz	20350	25RB#12	23.11	21.96	23.0±1.0	22.0±1.0
NTNV	Band4	10MHz	20350	25RB#25	23.81	22.79	23.0±1.0	22.0±1.0
NTNV	Band4	10MHz	20350	50RB#0	23.74	22.77	23.0±1.0	22.0±1.0
NTNV	Band4	15MHz	20025	1RB#0	23.48	22.17	23.0±1.0	22.0±1.0
NTNV	Band4	15MHz	20025	1RB#38	23.23	22.25	23.0±1.0	22.0±1.0
NTNV	Band4	15MHz	20025	1RB#74	23.91	22.61	23.0±1.0	22.0±1.0
NTNV	Band4	15MHz	20025	38RB#0	23.44	22.11	23.0±1.0	22.0±1.0
NTNV	Band4	15MHz	20025	38RB#18	23.01	21.68	23.0±1.0	22.0±1.0
NTNV	Band4	15MHz	20025	38RB#37	23.80	22.68	23.0±1.0	22.0±1.0
NTNV	Band4	15MHz	20025	75RB#0	23.86	22.71	23.0±1.0	22.0±1.0
NTNV	Band4	15MHz	20175	1RB#0	23.77	22.56	23.0±1.0	22.0±1.0
NTNV	Band4	15MHz	20175	1RB#38	23.68	22.39	23.0±1.0	22.0±1.0
NTNV	Band4	15MHz	20175	1RB#74	23.52	22.36	23.0±1.0	22.0±1.0
NTNV	Band4	15MHz	20175	38RB#0	23.76	22.57	23.0±1.0	22.0±1.0
NTNV	Band4	15MHz	20175	38RB#18	23.57	22.33	23.0±1.0	22.0±1.0
NTNV	Band4	15MHz	20175	38RB#37	23.49	22.14	23.0±1.0	22.0±1.0
NTNV	Band4	15MHz	20175	75RB#0	23.56	22.45	23.0±1.0	22.0±1.0
NTNV	Band4	15MHz	20325	1RB#0	23.88	22.65	23.0±1.0	22.0±1.0
NTNV	Band4	15MHz	20325	1RB#38	23.08	21.96	23.0±1.0	22.0±1.0
NTNV	Band4	15MHz	20325	1RB#74	23.30	21.98	23.0±1.0	22.0±1.0
NTNV	Band4	15MHz	20325	38RB#0	23.73	22.56	23.0±1.0	22.0±1.0
NTNV	Band4	15MHz	20325	38RB#18	23.01	22.04	23.0±1.0	22.0±1.0
NTNV	Band4	15MHz	20325	38RB#37	23.27	21.98	23.0±1.0	22.0±1.0
NTNV	Band4	15MHz	20325	75RB#0	23.72	22.38	23.0±1.0	22.0±1.0
NTNV	Band4	20MHz	20050	1RB#0	23.80	22.73	23.0±1.0	22.0±1.0
NTNV	Band4	20MHz	20050	1RB#49	23.43	22.42	23.0±1.0	22.0±1.0
NTNV	Band4	20MHz	20050	1RB#99	23.25	22.15	23.0±1.0	22.0±1.0



NTNV	Band4	20MHz	20050	50RB#0	23.65	22.34	23.0±1.0	22.0±1.0
NTNV	Band4	20MHz	20050	50RB#25	23.33	22.31	23.0±1.0	22.0±1.0
NTNV	Band4	20MHz	20050	50RB#50	23.18	22.04	23.0±1.0	22.0±1.0
NTNV	Band4	20MHz	20050	100RB#0	23.73	22.65	23.0±1.0	22.0±1.0
NTNV	Band4	20MHz	20175	1RB#0	23.43	22.30	23.0±1.0	22.0±1.0
NTNV	Band4	20MHz	20175	1RB#49	23.27	21.97	23.0±1.0	22.0±1.0
NTNV	Band4	20MHz	20175	1RB#99	23.27	22.02	23.0±1.0	22.0±1.0
NTNV	Band4	20MHz	20175	50RB#0	23.27	22.19	23.0±1.0	22.0±1.0
NTNV	Band4	20MHz	20175	50RB#25	23.14	21.98	23.0±1.0	22.0±1.0
NTNV	Band4	20MHz	20175	50RB#50	23.14	21.99	23.0±1.0	22.0±1.0
NTNV	Band4	20MHz	20175	100RB#0	23.42	22.43	23.0±1.0	22.0±1.0
NTNV	Band4	20MHz	20300	1RB#0	23.16	22.13	23.0±1.0	22.0±1.0
NTNV	Band4	20MHz	20300	1RB#49	23.83	22.57	23.0±1.0	22.0±1.0
NTNV	Band4	20MHz	20300	1RB#99	23.80	22.63	23.0±1.0	22.0±1.0
NTNV	Band4	20MHz	20300	50RB#0	23.06	22.08	23.0±1.0	22.0±1.0
NTNV	Band4	20MHz	20300	50RB#25	23.76	22.47	23.0±1.0	22.0±1.0
NTNV	Band4	20MHz	20300	50RB#50	23.78	22.59	23.0±1.0	22.0±1.0
NTNV	Band4	20MHz	20300	100RB#0	23.73	22.62	23.0±1.0	22.0±1.0

Condition	Band	Channel Bandwidth	Channel	RB Configure	Result (dBm)		Tune-Up	
					QPSK	16QAM	QPSK	16QAM
NTNV	Band5	1.4MHz	20407	1RB#0	23.14	22.07	23.0±1.0	22.0±1.0
NTNV	Band5	1.4MHz	20407	1RB#2	23.46	22.12	23.0±1.0	22.0±1.0
NTNV	Band5	1.4MHz	20407	1RB#5	23.03	21.71	23.0±1.0	22.0±1.0
NTNV	Band5	1.4MHz	20407	3RB#0	22.98	21.96	23.0±1.0	22.0±1.0
NTNV	Band5	1.4MHz	20407	3RB#1	23.29	21.96	23.0±1.0	22.0±1.0
NTNV	Band5	1.4MHz	20407	3RB#3	22.91	21.74	23.0±1.0	22.0±1.0
NTNV	Band5	1.4MHz	20407	6RB#0	23.35	22.02	23.0±1.0	22.0±1.0
NTNV	Band5	1.4MHz	20525	1RB#0	23.06	21.74	23.0±1.0	22.0±1.0
NTNV	Band5	1.4MHz	20525	1RB#2	23.25	22.20	23.0±1.0	22.0±1.0
NTNV	Band5	1.4MHz	20525	1RB#5	23.45	22.13	23.0±1.0	22.0±1.0
NTNV	Band5	1.4MHz	20525	3RB#0	22.87	21.71	23.0±1.0	22.0±1.0
NTNV	Band5	1.4MHz	20525	3RB#1	23.04	21.88	23.0±1.0	22.0±1.0
NTNV	Band5	1.4MHz	20525	3RB#3	23.42	22.18	23.0±1.0	22.0±1.0
NTNV	Band5	1.4MHz	20525	6RB#0	23.30	21.98	23.0±1.0	22.0±1.0
NTNV	Band5	1.4MHz	20643	1RB#0	23.74	22.76	23.0±1.0	22.0±1.0
NTNV	Band5	1.4MHz	20643	1RB#2	23.00	22.01	23.0±1.0	22.0±1.0
NTNV	Band5	1.4MHz	20643	1RB#5	23.04	21.76	23.0±1.0	22.0±1.0
NTNV	Band5	1.4MHz	20643	3RB#0	23.64	22.31	23.0±1.0	22.0±1.0



NTNV	Band5	1.4MHz	20643	3RB#1	22.85	21.64	23.0±1.0	22.0±1.0
NTNV	Band5	1.4MHz	20643	3RB#3	22.89	21.68	23.0±1.0	22.0±1.0
NTNV	Band5	1.4MHz	20643	6RB#0	23.63	22.34	23.0±1.0	22.0±1.0
NTNV	Band5	3MHz	20415	1RB#0	23.09	21.99	23.0±1.0	22.0±1.0
NTNV	Band5	3MHz	20415	1RB#8	23.35	22.09	23.0±1.0	22.0±1.0
NTNV	Band5	3MHz	20415	1RB#14	23.09	21.93	23.0±1.0	22.0±1.0
NTNV	Band5	3MHz	20415	8RB#0	22.95	21.72	23.0±1.0	22.0±1.0
NTNV	Band5	3MHz	20415	8RB#4	23.17	21.88	23.0±1.0	22.0±1.0
NTNV	Band5	3MHz	20415	8RB#7	22.93	21.82	23.0±1.0	22.0±1.0
NTNV	Band5	3MHz	20415	15RB#0	23.29	22.05	23.0±1.0	22.0±1.0
NTNV	Band5	3MHz	20525	1RB#0	23.65	22.52	23.0±1.0	22.0±1.0
NTNV	Band5	3MHz	20525	1RB#8	23.59	22.48	23.0±1.0	22.0±1.0
NTNV	Band5	3MHz	20525	1RB#14	23.75	22.53	23.0±1.0	22.0±1.0
NTNV	Band5	3MHz	20525	8RB#0	23.61	22.28	23.0±1.0	22.0±1.0
NTNV	Band5	3MHz	20525	8RB#4	23.52	22.22	23.0±1.0	22.0±1.0
NTNV	Band5	3MHz	20525	8RB#7	23.66	22.39	23.0±1.0	22.0±1.0
NTNV	Band5	3MHz	20525	15RB#0	23.70	22.44	23.0±1.0	22.0±1.0
NTNV	Band5	3MHz	20635	1RB#0	23.50	22.16	23.0±1.0	22.0±1.0
NTNV	Band5	3MHz	20635	1RB#8	23.01	21.86	23.0±1.0	22.0±1.0
NTNV	Band5	3MHz	20635	1RB#14	23.92	22.76	23.0±1.0	22.0±1.0
NTNV	Band5	3MHz	20635	8RB#0	23.34	22.19	23.0±1.0	22.0±1.0
NTNV	Band5	3MHz	20635	8RB#4	22.99	21.75	23.0±1.0	22.0±1.0
NTNV	Band5	3MHz	20635	8RB#7	23.85	22.84	23.0±1.0	22.0±1.0
NTNV	Band5	3MHz	20635	15RB#0	23.70	22.55	23.0±1.0	22.0±1.0
NTNV	Band5	5MHz	20425	1RB#0	23.30	21.95	23.0±1.0	22.0±1.0
NTNV	Band5	5MHz	20425	1RB#12	23.62	22.34	23.0±1.0	22.0±1.0
NTNV	Band5	5MHz	20425	1RB#24	23.77	22.61	23.0±1.0	22.0±1.0
NTNV	Band5	5MHz	20425	12RB#0	23.18	21.89	23.0±1.0	22.0±1.0
NTNV	Band5	5MHz	20425	12RB#6	23.49	22.40	23.0±1.0	22.0±1.0
NTNV	Band5	5MHz	20425	12RB#13	23.70	22.65	23.0±1.0	22.0±1.0
NTNV	Band5	5MHz	20425	25RB#0	23.72	22.50	23.0±1.0	22.0±1.0
NTNV	Band5	5MHz	20525	1RB#0	23.92	22.76	23.0±1.0	22.0±1.0
NTNV	Band5	5MHz	20525	1RB#12	23.00	21.68	23.0±1.0	22.0±1.0
NTNV	Band5	5MHz	20525	1RB#24	23.94	22.66	23.0±1.0	22.0±1.0
NTNV	Band5	5MHz	20525	12RB#0	23.83	22.55	23.0±1.0	22.0±1.0
NTNV	Band5	5MHz	20525	12RB#6	22.87	21.63	23.0±1.0	22.0±1.0
NTNV	Band5	5MHz	20525	12RB#13	23.84	22.61	23.0±1.0	22.0±1.0
NTNV	Band5	5MHz	20525	25RB#0	23.77	22.69	23.0±1.0	22.0±1.0
NTNV	Band5	5MHz	20625	1RB#0	23.37	22.32	23.0±1.0	22.0±1.0
NTNV	Band5	5MHz	20625	1RB#12	23.19	22.08	23.0±1.0	22.0±1.0



NTNV	Band5	5MHz	20625	1RB#24	23.69	22.49	23.0±1.0	22.0±1.0
NTNV	Band5	5MHz	20625	12RB#0	23.17	22.14	23.0±1.0	22.0±1.0
NTNV	Band5	5MHz	20625	12RB#6	23.15	21.99	23.0±1.0	22.0±1.0
NTNV	Band5	5MHz	20625	12RB#13	23.56	22.21	23.0±1.0	22.0±1.0
NTNV	Band5	5MHz	20625	25RB#0	23.62	22.53	23.0±1.0	22.0±1.0
NTNV	Band5	10MHz	20450	1RB#0	23.94	22.65	23.0±1.0	22.0±1.0
NTNV	Band5	10MHz	20450	1RB#24	23.43	22.45	23.0±1.0	22.0±1.0
NTNV	Band5	10MHz	20450	1RB#49	23.05	22.07	23.0±1.0	22.0±1.0
NTNV	Band5	10MHz	20450	25RB#0	23.92	22.93	23.0±1.0	22.0±1.0
NTNV	Band5	10MHz	20450	25RB#12	23.28	22.18	23.0±1.0	22.0±1.0
NTNV	Band5	10MHz	20450	25RB#25	22.83	21.78	23.0±1.0	22.0±1.0
NTNV	Band5	10MHz	20450	50RB#0	23.80	22.74	23.0±1.0	22.0±1.0
NTNV	Band5	10MHz	20525	1RB#0	23.39	22.37	23.0±1.0	22.0±1.0
NTNV	Band5	10MHz	20525	1RB#24	23.83	22.64	23.0±1.0	22.0±1.0
NTNV	Band5	10MHz	20525	1RB#49	23.27	22.17	23.0±1.0	22.0±1.0
NTNV	Band5	10MHz	20525	25RB#0	23.20	22.12	23.0±1.0	22.0±1.0
NTNV	Band5	10MHz	20525	25RB#12	23.75	22.52	23.0±1.0	22.0±1.0
NTNV	Band5	10MHz	20525	25RB#25	23.24	22.00	23.0±1.0	22.0±1.0
NTNV	Band5	10MHz	20525	50RB#0	23.80	22.58	23.0±1.0	22.0±1.0
NTNV	Band5	10MHz	20600	1RB#0	23.70	22.44	23.0±1.0	22.0±1.0
NTNV	Band5	10MHz	20600	1RB#24	23.28	22.13	23.0±1.0	22.0±1.0
NTNV	Band5	10MHz	20600	1RB#49	23.58	22.40	23.0±1.0	22.0±1.0
NTNV	Band5	10MHz	20600	25RB#0	23.48	22.28	23.0±1.0	22.0±1.0
NTNV	Band5	10MHz	20600	25RB#12	23.09	22.05	23.0±1.0	22.0±1.0
NTNV	Band5	10MHz	20600	25RB#25	23.43	22.20	23.0±1.0	22.0±1.0
NTNV	Band5	10MHz	20600	50RB#0	23.53	22.49	23.0±1.0	22.0±1.0



Condition	Band	Channel Bandwidth	Channel	RB Configure	Result (dBm)		Tune-Up	
					QPSK	16QAM	QPSK	16QAM
NTNV	Band12	1.4MHz	23017	1RB#0	23.07	22.01	23.0±1.0	22.0±1.0
NTNV	Band12	1.4MHz	23017	1RB#2	23.69	22.40	23.0±1.0	22.0±1.0
NTNV	Band12	1.4MHz	23017	1RB#5	23.68	22.59	23.0±1.0	22.0±1.0
NTNV	Band12	1.4MHz	23017	3RB#0	23.02	21.70	23.0±1.0	22.0±1.0
NTNV	Band12	1.4MHz	23017	3RB#1	23.61	22.59	23.0±1.0	22.0±1.0
NTNV	Band12	1.4MHz	23017	3RB#3	23.59	22.47	23.0±1.0	22.0±1.0
NTNV	Band12	1.4MHz	23017	6RB#0	23.53	22.52	23.0±1.0	22.0±1.0
NTNV	Band12	1.4MHz	23095	1RB#0	23.44	22.31	23.0±1.0	22.0±1.0
NTNV	Band12	1.4MHz	23095	1RB#2	23.23	22.06	23.0±1.0	22.0±1.0
NTNV	Band12	1.4MHz	23095	1RB#5	23.84	22.55	23.0±1.0	22.0±1.0
NTNV	Band12	1.4MHz	23095	3RB#0	23.35	22.37	23.0±1.0	22.0±1.0
NTNV	Band12	1.4MHz	23095	3RB#1	23.21	21.99	23.0±1.0	22.0±1.0
NTNV	Band12	1.4MHz	23095	3RB#3	23.73	22.43	23.0±1.0	22.0±1.0
NTNV	Band12	1.4MHz	23095	6RB#0	23.65	22.52	23.0±1.0	22.0±1.0
NTNV	Band12	1.4MHz	23173	1RB#0	23.48	22.13	23.0±1.0	22.0±1.0
NTNV	Band12	1.4MHz	23173	1RB#2	23.63	22.28	23.0±1.0	22.0±1.0
NTNV	Band12	1.4MHz	23173	1RB#5	23.69	22.35	23.0±1.0	22.0±1.0
NTNV	Band12	1.4MHz	23173	3RB#0	23.42	22.39	23.0±1.0	22.0±1.0
NTNV	Band12	1.4MHz	23173	3RB#1	23.53	22.31	23.0±1.0	22.0±1.0
NTNV	Band12	1.4MHz	23173	3RB#3	23.65	22.52	23.0±1.0	22.0±1.0
NTNV	Band12	1.4MHz	23173	6RB#0	23.56	22.21	23.0±1.0	22.0±1.0
NTNV	Band12	3MHz	23025	1RB#0	23.15	21.84	23.0±1.0	22.0±1.0
NTNV	Band12	3MHz	23025	1RB#8	23.83	22.57	23.0±1.0	22.0±1.0
NTNV	Band12	3MHz	23025	1RB#14	23.76	22.55	23.0±1.0	22.0±1.0
NTNV	Band12	3MHz	23025	8RB#0	23.11	22.08	23.0±1.0	22.0±1.0
NTNV	Band12	3MHz	23025	8RB#4	23.75	22.55	23.0±1.0	22.0±1.0
NTNV	Band12	3MHz	23025	8RB#7	23.66	22.34	23.0±1.0	22.0±1.0
NTNV	Band12	3MHz	23025	15RB#0	23.70	22.45	23.0±1.0	22.0±1.0
NTNV	Band12	3MHz	23095	1RB#0	23.69	22.36	23.0±1.0	22.0±1.0
NTNV	Band12	3MHz	23095	1RB#8	23.76	22.75	23.0±1.0	22.0±1.0
NTNV	Band12	3MHz	23095	1RB#14	23.88	22.79	23.0±1.0	22.0±1.0
NTNV	Band12	3MHz	23095	8RB#0	23.55	22.21	23.0±1.0	22.0±1.0
NTNV	Band12	3MHz	23095	8RB#4	23.60	22.44	23.0±1.0	22.0±1.0
NTNV	Band12	3MHz	23095	8RB#7	23.83	22.82	23.0±1.0	22.0±1.0
NTNV	Band12	3MHz	23095	15RB#0	23.77	22.52	23.0±1.0	22.0±1.0
NTNV	Band12	3MHz	23165	1RB#0	23.47	22.34	23.0±1.0	22.0±1.0
NTNV	Band12	3MHz	23165	1RB#8	23.13	21.95	23.0±1.0	22.0±1.0



NTNV	Band12	3MHz	23165	1RB#14	23.37	22.17	23.0±1.0	22.0±1.0
NTNV	Band12	3MHz	23165	8RB#0	23.35	22.13	23.0±1.0	22.0±1.0
NTNV	Band12	3MHz	23165	8RB#4	23.06	21.94	23.0±1.0	22.0±1.0
NTNV	Band12	3MHz	23165	8RB#7	23.32	22.24	23.0±1.0	22.0±1.0
NTNV	Band12	3MHz	23165	15RB#0	23.46	22.34	23.0±1.0	22.0±1.0
NTNV	Band12	5MHz	23035	1RB#0	23.23	22.08	23.0±1.0	22.0±1.0
NTNV	Band12	5MHz	23035	1RB#12	23.75	22.67	23.0±1.0	22.0±1.0
NTNV	Band12	5MHz	23035	1RB#24	23.74	22.42	23.0±1.0	22.0±1.0
NTNV	Band12	5MHz	23035	12RB#0	23.18	22.06	23.0±1.0	22.0±1.0
NTNV	Band12	5MHz	23035	12RB#6	23.68	22.70	23.0±1.0	22.0±1.0
NTNV	Band12	5MHz	23035	12RB#13	23.69	22.41	23.0±1.0	22.0±1.0
NTNV	Band12	5MHz	23035	25RB#0	23.69	22.71	23.0±1.0	22.0±1.0
NTNV	Band12	5MHz	23095	1RB#0	23.62	22.49	23.0±1.0	22.0±1.0
NTNV	Band12	5MHz	23095	1RB#12	23.68	22.64	23.0±1.0	22.0±1.0
NTNV	Band12	5MHz	23095	1RB#24	23.24	22.26	23.0±1.0	22.0±1.0
NTNV	Band12	5MHz	23095	12RB#0	23.50	22.19	23.0±1.0	22.0±1.0
NTNV	Band12	5MHz	23095	12RB#6	23.63	22.41	23.0±1.0	22.0±1.0
NTNV	Band12	5MHz	23095	12RB#13	23.18	21.98	23.0±1.0	22.0±1.0
NTNV	Band12	5MHz	23095	25RB#0	23.52	22.38	23.0±1.0	22.0±1.0
NTNV	Band12	5MHz	23155	1RB#0	23.46	22.37	23.0±1.0	22.0±1.0
NTNV	Band12	5MHz	23155	1RB#12	23.37	22.32	23.0±1.0	22.0±1.0
NTNV	Band12	5MHz	23155	1RB#24	23.63	22.52	23.0±1.0	22.0±1.0
NTNV	Band12	5MHz	23155	12RB#0	23.31	22.06	23.0±1.0	22.0±1.0
NTNV	Band12	5MHz	23155	12RB#6	23.36	22.34	23.0±1.0	22.0±1.0
NTNV	Band12	5MHz	23155	12RB#13	23.43	22.44	23.0±1.0	22.0±1.0
NTNV	Band12	5MHz	23155	25RB#0	23.49	22.26	23.0±1.0	22.0±1.0
NTNV	Band12	10MHz	23060	1RB#0	23.54	22.25	23.0±1.0	22.0±1.0
NTNV	Band12	10MHz	23060	1RB#24	23.51	22.31	23.0±1.0	22.0±1.0
NTNV	Band12	10MHz	23060	1RB#49	23.46	22.36	23.0±1.0	22.0±1.0
NTNV	Band12	10MHz	23060	25RB#0	23.49	22.18	23.0±1.0	22.0±1.0
NTNV	Band12	10MHz	23060	25RB#12	23.51	22.54	23.0±1.0	22.0±1.0
NTNV	Band12	10MHz	23060	25RB#25	23.43	22.25	23.0±1.0	22.0±1.0
NTNV	Band12	10MHz	23060	50RB#0	23.53	22.31	23.0±1.0	22.0±1.0
NTNV	Band12	10MHz	23095	1RB#0	23.93	22.78	23.0±1.0	22.0±1.0
NTNV	Band12	10MHz	23095	1RB#24	23.23	22.01	23.0±1.0	22.0±1.0
NTNV	Band12	10MHz	23095	1RB#49	23.41	22.34	23.0±1.0	22.0±1.0
NTNV	Band12	10MHz	23095	25RB#0	23.80	22.56	23.0±1.0	22.0±1.0
NTNV	Band12	10MHz	23095	25RB#12	23.05	21.79	23.0±1.0	22.0±1.0
NTNV	Band12	10MHz	23095	25RB#25	23.26	22.10	23.0±1.0	22.0±1.0
NTNV	Band12	10MHz	23095	50RB#0	23.85	22.51	23.0±1.0	22.0±1.0



NTNV	Band12	10MHz	23130	1RB#0	23.84	22.61	23.0±1.0	22.0±1.0
NTNV	Band12	10MHz	23130	1RB#24	23.48	22.31	23.0±1.0	22.0±1.0
NTNV	Band12	10MHz	23130	1RB#49	23.83	22.54	23.0±1.0	22.0±1.0
NTNV	Band12	10MHz	23130	25RB#0	23.70	22.52	23.0±1.0	22.0±1.0
NTNV	Band12	10MHz	23130	25RB#12	23.40	22.22	23.0±1.0	22.0±1.0
NTNV	Band12	10MHz	23130	25RB#25	23.78	22.45	23.0±1.0	22.0±1.0
NTNV	Band12	10MHz	23130	50RB#0	23.72	22.43	23.0±1.0	22.0±1.0

Condition	Band	Channel Bandwidth	Channel	RB Configure	Result (dBm)		Tune-Up	
					QPSK	16QAM	QPSK	16QAM
NTNV	Band13	5MHz	23205	1RB#0	23.09	21.79	23.0±1.0	22.0±1.0
NTNV	Band13	5MHz	23205	1RB#12	23.63	22.50	23.0±1.0	22.0±1.0
NTNV	Band13	5MHz	23205	1RB#24	23.36	22.38	23.0±1.0	22.0±1.0
NTNV	Band13	5MHz	23205	12RB#0	22.97	21.93	23.0±1.0	22.0±1.0
NTNV	Band13	5MHz	23205	12RB#6	23.49	22.27	23.0±1.0	22.0±1.0
NTNV	Band13	5MHz	23205	12RB#13	23.34	22.36	23.0±1.0	22.0±1.0
NTNV	Band13	5MHz	23205	25RB#0	23.55	22.54	23.0±1.0	22.0±1.0
NTNV	Band13	5MHz	23230	1RB#0	23.07	22.08	23.0±1.0	22.0±1.0
NTNV	Band13	5MHz	23230	1RB#12	23.36	22.29	23.0±1.0	22.0±1.0
NTNV	Band13	5MHz	23230	1RB#24	23.83	22.69	23.0±1.0	22.0±1.0
NTNV	Band13	5MHz	23230	12RB#0	22.94	21.87	23.0±1.0	22.0±1.0
NTNV	Band13	5MHz	23230	12RB#6	23.29	22.03	23.0±1.0	22.0±1.0
NTNV	Band13	5MHz	23230	12RB#13	23.69	22.39	23.0±1.0	22.0±1.0
NTNV	Band13	5MHz	23230	25RB#0	23.65	22.30	23.0±1.0	22.0±1.0
NTNV	Band13	5MHz	23255	1RB#0	23.48	22.38	23.0±1.0	22.0±1.0
NTNV	Band13	5MHz	23255	1RB#12	23.58	22.24	23.0±1.0	22.0±1.0
NTNV	Band13	5MHz	23255	1RB#24	23.04	21.97	23.0±1.0	22.0±1.0
NTNV	Band13	5MHz	23255	12RB#0	23.28	22.07	23.0±1.0	22.0±1.0
NTNV	Band13	5MHz	23255	12RB#6	23.49	22.27	23.0±1.0	22.0±1.0
NTNV	Band13	5MHz	23255	12RB#13	22.90	21.84	23.0±1.0	22.0±1.0
NTNV	Band13	5MHz	23255	25RB#0	23.44	22.31	23.0±1.0	22.0±1.0
NTNV	Band13	10MHz	23230	1RB#0	23.72	22.55	23.0±1.0	22.0±1.0
NTNV	Band13	10MHz	23230	1RB#24	23.85	22.68	23.0±1.0	22.0±1.0
NTNV	Band13	10MHz	23230	1RB#49	23.46	22.25	23.0±1.0	22.0±1.0
NTNV	Band13	10MHz	23230	25RB#0	23.69	22.38	23.0±1.0	22.0±1.0
NTNV	Band13	10MHz	23230	25RB#12	23.83	22.77	23.0±1.0	22.0±1.0
NTNV	Band13	10MHz	23230	25RB#25	23.35	22.08	23.0±1.0	22.0±1.0
NTNV	Band13	10MHz	23230	50RB#0	23.72	22.55	23.0±1.0	22.0±1.0



<WLAN 2.4GHz Conducted Power>

Mode	Channel	Frequency (MHz)	Conducted Peak Output Power(dBm)	Conducted Average Output Power(dBm)	Tune-up
802.11b	1	2412	15.45	13.68	13±1.0
	6	2437	15.59	13.92	13±1.0
	11	2462	15.37	13.59	13±1.0
802.11g	1	2412	14.90	11.77	11±1.0
	6	2437	15.10	11.85	11±1.0
	11	2462	14.77	11.49	11±1.0
802.11n(HT20)	1	2412	14.92	11.77	11±1.0
	6	2437	15.24	11.91	11±1.0
	11	2462	15.12	11.87	11±1.0
802.11n(HT40)	3	2422	13.82	10.91	11±1.0
	6	2437	14.38	11.59	11±1.0
	9	2452	14.37	11.56	11±1.0

<WLAN 5.2GHz Conducted Power>

Type	Channel	Frequency (MHz)	Conducted Average Output Power(dBm)	Tune-up
802.11a	36	5180	12.10	11.5±1.0
	40	5200	10.70	10.5±1.0
	48	5240	10.46	10.5±1.0
802.11n(HT20)	36	5180	11.17	11.5±1.0
	40	5200	9.77	10.5±1.0
	48	5240	9.54	10.5±1.0
802.11n(HT40)	38	5190	10.63	10.5±1.0
	46	5230	9.78	10.5±1.0
802.11ac(HT20)	36	5180	11.13	11.5±1.0
	40	5200	9.71	10.5±1.0
	48	5240	9.57	10.5±1.0
802.11ac(HT40)	38	5190	10.67	10.5±1.0
	46	5230	9.81	10.5±1.0
802.11ac(HT80)	42	5210	10.42	10.5±1.0



<WLAN 5.8GHz Conducted Power>

Type	Channel	Frequency (MHz)	Conducted Average Output Power(dBm)	Tune-up
802.11a	149	5745	10.53	10.5±1.0
	157	5785	11.85	11.5±1.0
	165	5825	13.18	12.5±1.0
802.11n(HT20)	149	5745	9.51	10.5±1.0
	157	5785	10.91	11.5±1.0
	165	5825	12.23	12.5±1.0
802.11n(HT40)	151	5755	9.93	9.5±1.0
	159	5795	11.11	10.5±1.0
802.11ac(HT20)	149	5745	9.53	10.5±1.0
	157	5785	10.94	11.5±1.0
	165	5825	12.22	12.5±1.0
802.11ac(HT40)	151	5755	9.92	9.5±1.0
	159	5795	11.10	10.5±1.0
802.11ac(HT80)	155	5775	10.71	10.5±1.0

<Bluetooth Conducted Power>

Mode	Channel	Frequency (MHz)	Conducted Average Output Power(dBm)	Tune-up
GFSK	0	2402	-2.35	-2±1.0
	39	2441	-1.65	-1±1.0
	78	2480	-0.93	0±1.0
π/4DQPSK	0	2402	-1.45	-1±1.0
	39	2441	-0.78	0±1.0
	78	2480	-0.09	0±1.0
8DPSK	0	2402	-1.47	-1±1.0
	39	2441	-0.78	0±1.0
	78	2480	-0.11	0±1.0
BLE1M(GFSK)	00	2402	1.55	2±1.0
	19	2440	2.22	2±1.0
	39	2480	2.66	2±1.0

Note:

1. Per KDB 447498 D01, the 1-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}]$$

≤ 3.0 for 1-g SAR, where

f(GHz) is the RF channel transmit frequency in GHz

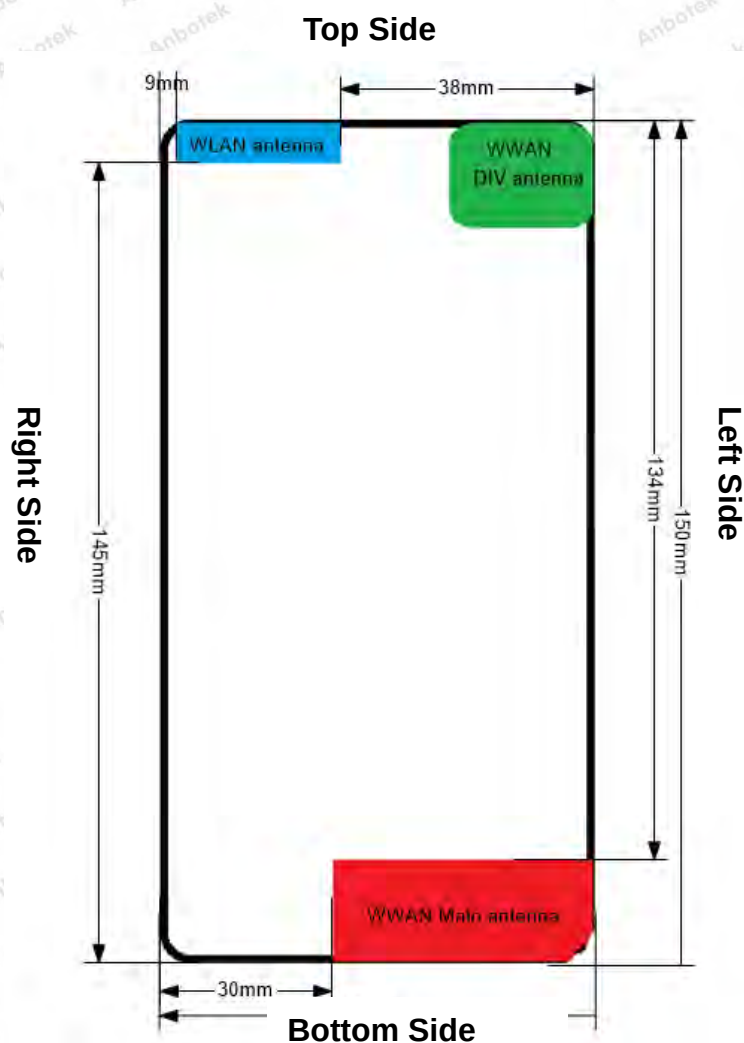
Power and distance are rounded to the nearest mW and mm before calculation

The result is rounded to one decimal place for comparison



2. Per KDB 248227 D01, choose the highest output power channel to test SAR and determine further SAR exclusion.
3. Per KDB 248227 D01, In the 2.4 GHz band, separate SAR procedures are applied to DSSS and OFDM configurations to simplify DSSS test requirements. SAR is not required for the following 2.4 GHz OFDM conditions:
- 1) When KDB Publication 447498 SAR test exclusion applies to the OFDM configuration.
 - 2) 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.

10.2 Transmit Antennas and SAR Measurement Position



Back View

Distance of The Antenna to the EUT surface and edge						
Antennas	Front	Back	Top Side	Bottom Side	Left Side	Right Side
WWAN	<25mm	<25mm	>25mm	<25mm	<25mm	>25mm
WLAN	<25mm	<25mm	<25mm	>25mm	>25mm	<25mm



Positions for SAR tests; Hotspot mode						
Antennas	Front	Back	Top Side	Bottom Side	Left Side	Right Side
WWAN	Yes	Yes	No	Yes	Yes	No
WLAN	Yes	Yes	Yes	No	No	Yes

Note:

1). According to the KDB941225 D06 Hot Spot SAR v02, the edges with less than 2.5 cm distance to the antennas need to be tested for SAR.

10.3 Standalone SAR Test Exclusion Considerations

Per KDB447498 for standalone 1-g head or body SAR evaluation by measurement or numerical simulation is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied.

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

- $f(\text{GHz})$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

Standalone SAR test exclusion considerations							
Modulation	Frequency (MHz)	Configuration	Maximum Average Power (dBm)	Separation Distance (mm)	Calculation Result	SAR Exclusion Thresholds	Standalone SAR Exclusion
WIFI 2.4G	2437	Head	14.00	0	7.8	3.0	no
WIFI 5.2G	5180	Head	12.50	0	8.1	3.0	no
WIFI 5.8G	5825	Head	13.50	0	10.8	3.0	no
Bluetooth	2480	Head	3.00	0	0.6	3.0	Yes
WIFI 2.4G	2437	Body& Hotspot	14.00	10	3.9	3.0	no
WIFI 5.2G	5180	Body& Hotspot	12.50	10	4.0	3.0	no
WIFI 5.8G	5825	Body& Hotspot	13.50	10	5.4	3.0	no
Bluetooth	2480	Body& Hotspot	3.00	10	0.3	3.0	Yes

Remark:

1. Maximum average power including tune-up tolerance;
2. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion
3. Body including Hotspot mode as body use distance is 0mm from manufacturer declaration of user manual.



10.4 Estimated SAR

Per KDB447498 requires when the standalone SAR test exclusion of section 4.3.1 is applied to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to the following to determine simultaneous transmission SAR test exclusion;

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

where x = 7.5 for 1-g SAR, and x = 18.75 for 10-g SAR.

• 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distances is > 50 mm

Per FCC KD B447498 D01, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR for all the transmitting antenna in a specific a physical test configuration is ≤1.6 W/Kg. When the sum is greater than the SAR limit, SAR test exclusion is determined by the SAR to peak location separation ratio.

$$\text{Ratio} = \frac{(\text{SAR}_1 + \text{SAR}_2)^{1.5}}{(\text{peak location separation, mm})} < 0.04$$

Estimated stand alone SAR					
Communication system	Frequency (MHz)	Configuration	Maximum Power (dBm)	Separation Distance (mm)	Estimated SAR _{1-g} (W/kg)
Bluetooth	2480	Head	3	0	0.084
Bluetooth	2480	Body& Hotspot	3	10	0.042
/	/	/	/	/	/

Remark:

1. Maximum average power including tune-up tolerance;
2. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion
3. Body including Hotspot mode as body use distance is 10mm from manufacturer declaration of user manual.



10.5 SAR Test Results Summary

General Note:

1.Per KDB 447498 D01v05r01, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.

Scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.

Reported SAR(W/kg)= Measured SAR(W/kg) Scaling Factor*

2.Per KDB 447498 D01v05r01, for each exposure position, if the highest output channel reported SAR≤0.8W/kg, other channels SAR testing are not necessary

3.Per 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.

4.Per KDB 941225 D05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.

5.Per KDB 941225 D05, 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.

6.Per KDB 941225 D05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05, 16QAM SAR testing is not required.

7.Per KDB 941225 D05, Smaller bandwidth output power for each RB allocation configuration is > not ½ 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; Per KDB 941225 D05, smaller bandwidth SAR testing is not required.

8.Per KDB865664 D01, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/Kg; if the deviation among the repeated measurement is ≤20%,and the measured SAR <1.45W/Kg, only one repeated measurement is required.

9.When the user enables the personal Wireless router functions for the handsets, actual operations include simultaneous transmission of both the Wi-Fi transmitting frequency and thus cannot be evaluated for SAR under actual use conditions. The "Portable Hotspot" feature on the handset was NOT activated, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal.



10.6 SAR Results

Head SAR

SAR Values GSM

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
GSM 850										
	GSM Voice	Left Cheek	190	836.6	33.72	34.00	1.067	-0.05	0.289	0.308
	GSM Voice	Left Tilt	190	836.6	33.72	34.00	1.067	-0.07	0.275	0.293
#1	GSM Voice	Right Cheek	190	836.6	33.72	34.00	1.067	0.03	0.291	0.310
	GSM Voice	Right Tilt	190	836.6	33.72	34.00	1.067	-0.11	0.287	0.306
	GPRS 1Tx slots	Right Cheek	190	836.6	33.66	34.00	1.081	-0.06	0.276	0.298
GSM 1900										
	GSM Voice	Left Cheek	810	1909.8	30.09	31.00	1.233	0.05	0.152	0.187
	GSM Voice	Left Tilt	810	1909.8	30.09	31.00	1.233	-0.10	0.142	0.175
#2	GSM Voice	Right Cheek	810	1909.8	30.09	31.00	1.233	-0.04	0.154	0.190
	GSM Voice	Right Tilt	810	1909.8	30.09	31.00	1.233	-0.05	0.152	0.187
	GPRS 2Tx slots	Right Cheek	810	1909.8	27.41	28.00	1.146	-0.03	0.137	0.157



SAR Values for WCDMA

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
WCDMA Band II										
	RMC 12.2Kbps	Left Cheek	9400	1880.0	23.50	24.00	1.122	0.07	0.151	0.169
	RMC 12.2Kbps	Left Tilt	9400	1880.0	23.50	24.00	1.122	-0.06	0.136	0.153
#3	RMC 12.2Kbps	Right Cheek	9400	1880.0	23.50	24.00	1.122	0.02	0.155	0.174
	RMC 12.2Kbps	Right Tilt	9400	1880.0	23.50	24.00	1.122	0.09	0.153	0.172
WCDMA Band V										
	RMC 12.2Kbps	Left Cheek	4183	836.6	23.72	24.00	1.067	-0.05	0.183	0.195
	RMC 12.2Kbps	Left Tilt	4183	836.6	23.72	24.00	1.067	-0.07	0.167	0.178
#4	RMC 12.2Kbps	Right Cheek	4183	836.6	23.72	24.00	1.067	0.06	0.184	0.196
	RMC 12.2Kbps	Right Tilt	4183	836.6	23.72	24.00	1.067	0.11	0.175	0.187

SAR Values for LTE

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
LTE Band 2										
	20MHz/1RB#0	Left Cheek	18700	1860	23.89	24.00	1.026	-0.05	0.187	0.192
	20MHz/1RB#0	Left Tilt	18700	1860	23.89	24.00	1.026	0.05	0.181	0.186
#5	20MHz/1RB#0	Right Cheek	18700	1860	23.89	24.00	1.026	0.08	0.194	0.199
	20MHz/1RB#0	Right Tilt	18700	1860	23.89	24.00	1.026	0.04	0.187	0.192
	20MHz/50RB#0	Left Cheek	18700	1860	23.87	24.00	1.030	0.06	0.184	0.190
	20MHz/50RB#0	Left Tilt	18700	1860	23.87	24.00	1.030	-0.09	0.174	0.179
	20MHz/50RB#0	Right Cheek	18700	1860	23.87	24.00	1.030	0.05	0.191	0.197
	20MHz/50RB#0	Right Tilt	18700	1860	23.87	24.00	1.030	-0.10	0.183	0.189
LTE Band 4										
	20MHz/1RB#49	Left Cheek	20300	1745	23.83	24.00	1.040	0.03	0.238	0.248
	20MHz/1RB#49	Left Tilt	20300	1745	23.83	24.00	1.040	0.07	0.227	0.236
#6	20MHz/1RB#49	Right Cheek	20300	1745	23.83	24.00	1.040	-0.03	0.239	0.249



	20MHz/1RB#49	Right Tilt	20300	1745	23.83	24.00	1.040	-0.09	0.237	0.246
	20MHz/50RB#50	Left Cheek	20300	1745	23.78	24.00	1.052	0.05	0.229	0.241
	20MHz/50RB#50	Left Tilt	20300	1745	23.78	24.00	1.052	-0.11	0.222	0.234
	20MHz/50RB#50	Right Cheek	20300	1745	23.78	24.00	1.052	-0.07	0.235	0.247
	20MHz/50RB#50	Right Tilt	20300	1745	23.78	24.00	1.052	-0.09	0.234	0.246
LTE Band 5										
	10MHz/1RB#0	Left Cheek	20450	829	23.94	24.00	1.014	0.11	0.293	0.297
	10MHz/1RB#0	Left Tilt	20450	829	23.94	24.00	1.014	0.05	0.281	0.285
#7	10MHz/1RB#0	Right Cheek	20450	829	23.94	24.00	1.014	0.05	0.296	0.300
	10MHz/1RB#0	Right Tilt	20450	829	23.94	24.00	1.014	-0.05	0.295	0.299
	10MHz/25RB#0	Left Cheek	20450	829	23.92	24.00	1.019	0.10	0.288	0.293
	10MHz/25RB#0	Left Tilt	20450	829	23.92	24.00	1.019	-0.11	0.277	0.282
	10MHz/25RB#0	Right Cheek	20450	829	23.92	24.00	1.019	-0.07	0.291	0.296
	10MHz/25RB#0	Right Tilt	20450	829	23.92	24.00	1.019	0.05	0.291	0.296
LTE Band 12										
	10MHz/1RB#0	Left Cheek	23095	707.5	23.93	24.00	1.016	0.11	0.129	0.131
	10MHz/1RB#0	Left Tilt	23095	707.5	23.93	24.00	1.016	0.05	0.115	0.117
#8	10MHz/1RB#0	Right Cheek	23095	707.5	23.93	24.00	1.016	0.09	0.133	0.135
	10MHz/1RB#0	Right Tilt	23095	707.5	23.93	24.00	1.016	-0.05	0.132	0.134
	10MHz/25RB#0	Left Cheek	23095	707.5	23.80	24.00	1.047	0.10	0.126	0.132
	10MHz/25RB#0	Left Tilt	23095	707.5	23.80	24.00	1.047	-0.11	0.113	0.118
	10MHz/25RB#0	Right Cheek	23095	707.5	23.80	24.00	1.047	-0.07	0.127	0.133
	10MHz/25RB#0	Right Tilt	23095	707.5	23.80	24.00	1.047	0.05	0.123	0.129
LTE Band 13										
	10MHz/1RB#24	Left Cheek	23230	782	23.85	24.00	1.035	0.03	0.114	0.118
	10MHz/1RB#24	Left Tilt	23230	782	23.85	24.00	1.035	0.05	0.104	0.108
#9	10MHz/1RB#24	Right Cheek	23230	782	23.85	24.00	1.035	0.04	0.117	0.121
	10MHz/1RB#24	Right Tilt	23230	782	23.85	24.00	1.035	0.11	0.113	0.117
	10MHz/25RB#12	Left Cheek	23230	782	23.83	24.00	1.040	0.10	0.109	0.113



10MHz/25RB#12	Left Tilt	23230	782	23.83	24.00	1.040	-0.05	0.102	0.106
10MHz/25RB#12	Right Cheek	23230	782	23.83	24.00	1.040	0.07	0.115	0.120
10MHz/25RB#12	Right Tilt	23230	782	23.83	24.00	1.040	-0.04	0.109	0.113

SAR Values for WIFI

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
WIFI 2.4G										
#10	802.11b	Left Cheek	6	2437	13.92	14.00	1.019	-0.03	0.367	0.374
	802.11b	Left Tilt	6	2437	13.92	14.00	1.019	0.04	0.359	0.366
	802.11b	Right Cheek	6	2437	13.92	14.00	1.019	0.03	0.365	0.372
	802.11b	Right Tilt	6	2437	13.92	14.00	1.019	-0.10	0.352	0.359
WIFI 5.2G										
#11	802.11a	Left Cheek	36	5180	12.10	12.50	1.096	-0.05	0.474	0.520
	802.11a	Left Tilt	36	5180	12.10	12.50	1.096	0.03	0.467	0.512
	802.11a	Right Cheek	36	5180	12.10	12.50	1.096	-0.11	0.472	0.518
	802.11a	Right Tilt	36	5180	12.10	12.50	1.096	0.09	0.456	0.500
WIFI 5.8G										
#12	802.11a	Left Cheek	165	5825	13.18	13.50	1.076	0.05	0.598	0.644
	802.11a	Left Tilt	165	5825	13.18	13.50	1.076	0.05	0.593	0.638
	802.11a	Right Cheek	165	5825	13.18	13.50	1.076	0.06	0.596	0.642
	802.11a	Right Tilt	165	5825	13.18	13.50	1.076	-0.06	0.580	0.624



Body & Hotspot SAR

SAR Values [GSM 850]

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
Measured / Reported SAR numbers-Body& hotspot open distance 10mm										
	GPRS 1Tx slots	Front Side	190	836.6	33.66	34.00	1.081	0.07	0.574	0.621
#13	GPRS 1Tx slots	Rear Side	190	836.6	33.66	34.00	1.081	-0.17	0.604	0.653
	GPRS 1Tx slots	Left Edge	190	836.6	33.66	34.00	1.081	0.04	0.596	0.645
	GPRS 1Tx slots	Bottom Edge	190	836.6	33.66	34.00	1.081	-0.07	0.601	0.650

SAR Values [PCS 1900]

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
Measured / Reported SAR numbers-Body& hotspot open distance 10mm										
	GPRS 2Tx slots	Front Side	810	1909.8	27.41	28.00	1.146	0.05	0.378	0.433
#14	GPRS 2Tx slots	Rear Side	810	1909.8	27.41	28.00	1.146	0.01	0.405	0.464
	GPRS 2Tx slots	Left Edge	810	1909.8	27.41	28.00	1.146	-0.05	0.398	0.456
	GPRS 2Tx slots	Bottom Edge	810	1909.8	27.41	28.00	1.146	-0.11	0.400	0.458

SAR Values [WCDMA II]

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
Measured / Reported SAR numbers-Body& hotspot open distance 10mm										
	RMC 12.2Kbps	Front Side	9400	1880.0	23.50	24.00	1.122	0.02	0.384	0.431
#15	RMC 12.2Kbps	Rear Side	9400	1880.0	23.50	24.00	1.122	0.05	0.415	0.466
	RMC 12.2Kbps	Left Edge	9400	1880.0	23.50	24.00	1.122	0.15	0.403	0.452
	RMC 12.2Kbps	Bottom Edge	9400	1880.0	23.50	24.00	1.122	0.05	0.408	0.458



SAR Values [WCDMA V]

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
Measured / Reported SAR numbers-Body& hotspot open distance 10mm										
	RMC 12.2Kbps	Front Side	4183	836.6	23.72	24.00	1.067	-0.05	0.375	0.400
#16	RMC 12.2Kbps	Rear Side	4183	836.6	23.72	24.00	1.067	0.08	0.407	0.434
	RMC 12.2Kbps	Left Edge	4183	836.6	23.72	24.00	1.067	0.11	0.397	0.423
	RMC 12.2Kbps	Bottom Edge	4183	836.6	23.72	24.00	1.067	0.04	0.399	0.426

SAR Values [LTE Band 2]

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
Measured / Reported SAR numbers-Body& hotspot open distance 10mm										
	20MHz/1RB#0	Front Side	18700	1860	23.89	24.00	1.026	-0.05	0.397	0.407
#17	20MHz/1RB#0	Rear Side	18700	1860	23.89	24.00	1.026	-0.11	0.423	0.434
	20MHz/1RB#0	Left Edge	18700	1860	23.89	24.00	1.026	-0.07	0.418	0.429
	20MHz/1RB#0	Bottom Edge	18700	1860	23.89	24.00	1.026	0.03	0.421	0.432
	20MHz/50RB#0	Front Side	18700	1860	23.87	24.00	1.030	0.07	0.388	0.400
	20MHz/50RB#0	Rear Side	18700	1860	23.87	24.00	1.030	-0.05	0.421	0.434
	20MHz/50RB#0	Left Edge	18700	1860	23.87	24.00	1.030	0.11	0.416	0.429
	20MHz/50RB#0	Bottom Edge	18700	1860	23.87	24.00	1.030	0.03	0.419	0.432

SAR Values [LTE Band 4]

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
Measured / Reported SAR numbers-Body& hotspot open distance 10mm										
	20MHz/1RB#49	Front Side	20300	1745	23.83	24.00	1.040	-0.05	0.341	0.355
#18	20MHz/1RB#49	Rear Side	20300	1745	23.83	24.00	1.040	0.03	0.375	0.390
	20MHz/1RB#49	Left Edge	20300	1745	23.83	24.00	1.040	-0.09	0.362	0.376



	20MHz/1RB#49	Bottom Edge	20300	1745	23.83	24.00	1.040	0.05	0.371	0.386
	20MHz/50RB#50	Front Side	20300	1745	23.78	24.00	1.052	-0.11	0.338	0.356
	20MHz/50RB#50	Rear Side	20300	1745	23.78	24.00	1.052	0.07	0.371	0.390
	20MHz/50RB#50	Left Edge	20300	1745	23.78	24.00	1.052	0.05	0.365	0.384
	20MHz/50RB#50	Bottom Edge	20300	1745	23.78	24.00	1.052	0.10	0.366	0.385

SAR Values [LTE Band 5]

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
Measured / Reported SAR numbers-Body& hotspot open distance 10mm										
	10MHz/1RB#0	Front Side	20450	829	23.94	24.00	1.014	0.07	0.353	0.358
#19	10MHz/1RB#0	Rear Side	20450	829	23.94	24.00	1.014	-0.10	0.387	0.392
	10MHz/1RB#0	Left Edge	20450	829	23.94	24.00	1.014	-0.03	0.375	0.380
	10MHz/1RB#0	Bottom Edge	20450	829	23.94	24.00	1.014	0.03	0.385	0.390
	10MHz/25RB#0	Front Side	20450	829	23.92	24.00	1.019	0.10	0.349	0.355
	10MHz/25RB#0	Rear Side	20450	829	23.92	24.00	1.019	0.05	0.384	0.391
	10MHz/25RB#0	Left Edge	20450	829	23.92	24.00	1.019	0.07	0.373	0.380
	10MHz/25RB#0	Bottom Edge	20450	829	23.92	24.00	1.019	0.09	0.381	0.388

SAR Values [LTE Band 12]

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
Measured / Reported SAR numbers-Body& hotspot open distance 10mm										
	10MHz/1RB#0	Front Side	23095	707.5	23.93	24.00	1.016	0.03	0.291	0.296
#20	10MHz/1RB#0	Rear Side	23095	707.5	23.93	24.00	1.016	0.07	0.326	0.331
	10MHz/1RB#0	Left Edge	23095	707.5	23.93	24.00	1.016	-0.03	0.320	0.325
	10MHz/1RB#0	Bottom Edge	23095	707.5	23.93	24.00	1.016	-0.10	0.323	0.328
	10MHz/25RB#0	Front Side	23095	707.5	23.80	24.00	1.047	-0.11	0.295	0.309
	10MHz/25RB#0	Rear Side	23095	707.5	23.80	24.00	1.047	0.05	0.320	0.335
	10MHz/25RB#0	Left Edge	23095	707.5	23.80	24.00	1.047	-0.07	0.316	0.331



	10MHz/25RB#0	Bottom Edge	23095	707.5	23.80	24.00	1.047	0.05	0.317	0.332
--	--------------	-------------	-------	-------	-------	-------	-------	------	-------	-------

SAR Values [LTE Band 13]

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
Measured / Reported SAR numbers-Body& hotspot open distance 10mm										
	10MHz/1RB#24	Front Side	23230	782	23.85	24.00	1.035	0.05	0.270	0.279
#21	10MHz/1RB#24	Rear Side	23230	782	23.85	24.00	1.035	0.04	0.295	0.305
	10MHz/1RB#24	Left Edge	23230	782	23.85	24.00	1.035	-0.07	0.282	0.292
	10MHz/1RB#24	Bottom Edge	23230	782	23.85	24.00	1.035	0.04	0.293	0.303
	10MHz/25RB#12	Front Side	23230	782	23.83	24.00	1.040	0.12	0.263	0.273
	10MHz/25RB#12	Rear Side	23230	782	23.83	24.00	1.040	0.05	0.290	0.302
	10MHz/25RB#12	Left Edge	23230	782	23.83	24.00	1.040	-0.06	0.285	0.296
	10MHz/25RB#12	Bottom Edge	23230	782	23.83	24.00	1.040	-0.07	0.289	0.301

SAR Values [WIFI 2.4G]

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
Measured / Reported SAR numbers-Body& hotspot open distance 10mm										
	802.11b	Front Side	6	2437	13.92	14.00	1.019	0.05	0.187	0.190
#22	802.11b	Rear Side	6	2437	13.92	14.00	1.019	-0.05	0.215	0.219
	802.11b	Right Edge	6	2437	13.92	14.00	1.019	-0.10	0.208	0.212
	802.11b	Top Edge	6	2437	13.92	14.00	1.019	0.03	0.211	0.215

Note: 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.



SAR Values [WIFI 5.2G]

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
Measured / Reported SAR numbers-Body& hotspot open distance 10mm										
	802.11a	Front Side	36	5180	12.10	12.50	1.096	-0.05	0.129	0.141
#23	802.11a	Rear Side	36	5180	12.10	12.50	1.096	0.03	0.158	0.173
	802.11a	Right Edge	36	5180	12.10	12.50	1.096	0.10	0.152	0.167
	802.11a	Top Edge	36	5180	12.10	12.50	1.096	-0.06	0.156	0.171

SAR Values [WIFI 5.8G]

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
Measured / Reported SAR numbers-Body& hotspot open distance 10mm										
	802.11a	Front Side	165	5825	13.18	13.50	1.076	-0.11	0.151	0.163
#24	802.11a	Rear Side	165	5825	13.18	13.50	1.076	0.03	0.179	0.193
	802.11a	Right Edge	165	5825	13.18	13.50	1.076	0.07	0.176	0.189
	802.11a	Top Edge	165	5825	13.18	13.50	1.076	-0.05	0.177	0.191



10.7 SAR Measurement Variability

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

- 1 Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.
- 2 When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
- 3 Perform a 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 .

SAR Measurement Variability

Band	Mode	Test Position	Spacing (mm)	Ch.	Original SAR (W/kg)	First Repeated SAR (W/kg)	The Ratio	Second Repeated SAR (W/kg)
--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--



10.8 Simultaneous Transmission Analysis

10.8.1 Introduction

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

Application Simultaneous Transmission information:

No.	Simultaneous Transmission Configurations	Portable Handset		
		Head	Body-worn	Hotspot
1	WWAN (2/3/4G) + WLAN 2.4GHz	Yes	Yes	Yes
2	WWAN (2/3/4G) + WLAN 5GHz	Yes	Yes	Yes*
3	WWAN (2/3/4G) + Bluetooth	Yes	Yes	Yes
4	WWAN (2/3/4G) + WLAN 5GHz + Bluetooth	Yes	Yes	Yes*

Note: * only support WLAN 5GHz opening on U-NII-I and U-NII-3.

10.8.2 Evaluation of Simultaneous SAR

Head Simultaneous transmission SAR for WLAN/BT and GSM/WCDMA/ LTE

Exposure Position	1	2	3	4	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)	1+4 Summed 1g SAR (W/kg)	1+3+4 Summed 1g SAR (W/kg)	SPLSR
	MAX. WWAN Reported SAR	MAX. WLAN2.4G Reported SAR	MAX. WLAN5G Reported SAR	Bluetooth					
	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)					
Left Cheek	0.308	0.374	0.644	0.084	0.682	0.952	0.392	1.036	N/A
Left Tilt	0.293	0.366	0.638	0.084	0.659	0.931	0.377	1.015	N/A
Right Cheek	0.310	0.372	0.642	0.084	0.682	0.952	0.394	1.036	N/A
Right Tilt	0.306	0.359	0.624	0.084	0.665	0.930	0.390	1.014	N/A

MAX. $\Sigma SAR_{1g} = 1.036$ W/kg < 1.6 W/kg, so the Simultaneous transmission SAR with volume scan are not required.



Body-worn and hotspot Simultaneous transmission SAR for WLAN/BT and GSM/WCDMA/ LTE

Exposure Position	1	2	3	4	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)	1+4 Summed 1g SAR (W/kg)	1+3+4 Summed 1g SAR (W/kg)	SPLSR
	MAX. WWAN Reported SAR	MAX. WLAN2.4G Reported SAR	MAX. WLAN5G Reported SAR	Bluetooth					
	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)					
Front Side	0.621	0.19	0.163	0.042	0.811	0.784	0.663	0.826	N/A
Rear Side	0.653	0.219	0.193	0.042	0.872	0.846	0.695	0.888	N/A
Left Edge	0.645	N/A	N/A	0.042	0.645	0.645	0.687	0.687	N/A
Right Edge	N/A	0.212	0.189	0.042	0.212	0.189	0.042	0.231	N/A
Top Side	N/A	0.215	0.191	0.042	0.215	0.191	0.042	0.233	N/A
Bottom Edge	0.650	N/A	N/A	0.042	0.65	0.65	0.692	0.692	N/A

MAX. $\Sigma SAR_{1g} = 0.888 \text{ W/kg} < 1.6 \text{ W/kg}$, so the Simultaneous transmission SAR with volume scan are not required.



11 Measurement Uncertainty

NO	Source	Uncert. ai (%)	Prob. Dist.	Div. k	ci (1g)	ci (10g)	Stand.U ncert. ui (1g)	Stand.U ncert. ui (10g)	Veff
1	Repeat	0.4	N	1	1	1	0.4	0.4	9
Instrument									
2	Probe calibration	7	N	2	1	1	3.5	3.5	∞
3	Axial isotropy	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
4	Hemispherical isotropy	9.4	R	$\sqrt{3}$	0.7	0.7	3.9	3.9	∞
5	Boundary effect	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
6	Linearity	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
7	Detection limits	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
8	Readout electronics	0.3	N	1	1	1	0.3	0.3	∞
9	Response time	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
10	Integration time	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
11	Ambient noise	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
12	Ambient reflections	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
13	Probe positioner mech. restrictions	0.4	R	$\sqrt{3}$	1	1	0.2	0.2	∞
14	Probe positioning with respect to phantom shell	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
15	Max.SAR evaluation	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞



Test sample related									
16	Device positioning	3.8	N	1	1	1	3.8	3.8	99
17	Device holder	5.1	N	1	1	1	5.1	5.1	5
18	Drift of output power	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up									
19	Phantom uncertainty	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
20	Liquid conductivity (target)	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
21	Liquid conductivity (meas)	2.5	N	1	0.64	0.43	1.6	1.2	∞
22	Liquid Permittivity (target)	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.5	∞
23	Liquid Permittivity (meas)	2.5	N	1	0.6	0.49	1.5	1.2	∞
Combined standard			RSS	$U_c = \sqrt{\sum C^2 U^2}$			11.4%	11.3%	236
Expanded uncertainty(P=95%)		$U = k U_c$			,k=2		22.8%	22.6%	



Appendix A. EUT Photos and Test Setup Photos



Right Head Cheek



Right Head Tilted



Left Head Cheek



Left Head Tilted



Front Side (10mm)



Rear Side (10mm)



Right Side (10mm)



Left Side (10mm)



Top Side (10mm)

Bottom Side (10mm)



Appendix B. Plots of SAR System Check

750MHz System Check

Date: 11/16/2023

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

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

Medium parameters used (interpolated): $f = 750 \text{ MHz}$; $\sigma = 0.909 \text{ S/m}$; $\epsilon_r = 40.827$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(9.82, 9.82, 9.82); Calibrated: 05.06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

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

Maximum value of SAR (interpolated) = 2.72 W/kg

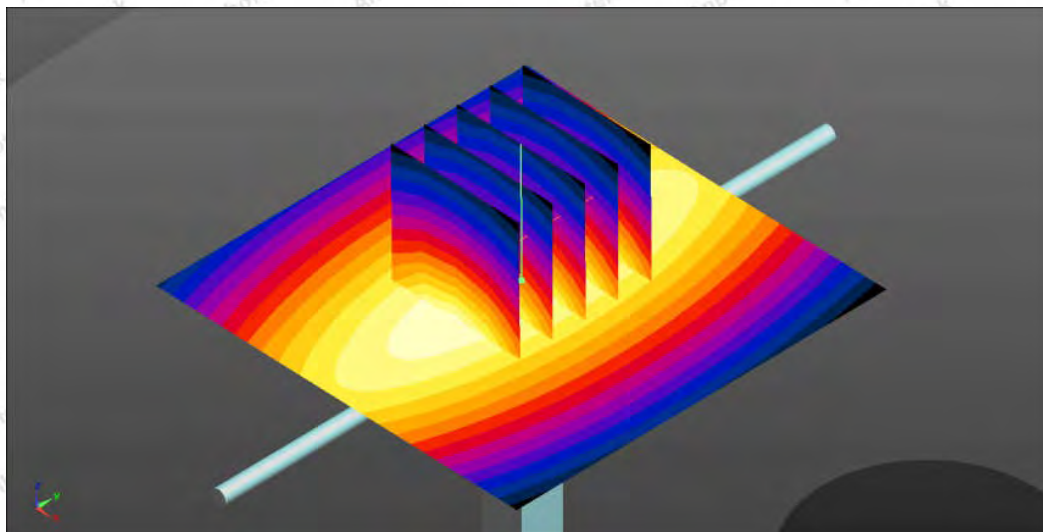
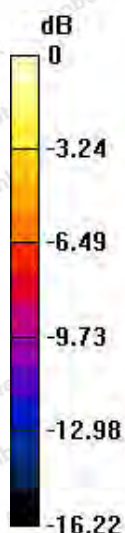
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 61.37 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 3.31 W/kg

SAR(1 g) = 2.03 W/kg; SAR(10 g) = 1.46 W/kg

Maximum value of SAR (measured) = 2.76 W/kg



0 dB = 2.72 W/kg = 4.35 dBW/kg

System Performance Check 750MHz 250mW



835MHz System Check

Date: 11/17/2023

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d154

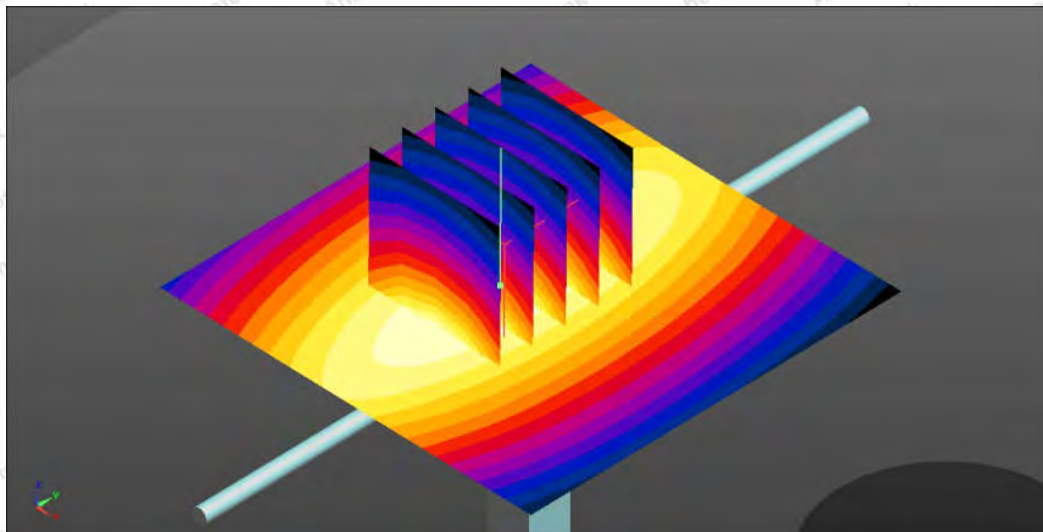
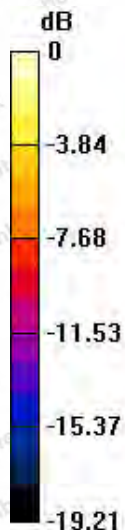
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 835 \text{ MHz}$; $\sigma = 0.920 \text{ S/m}$; $\epsilon_r = 41.608$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(9.71, 9.71, 9.71); Calibrated: 05.06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (61x61x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$ Maximum value of SAR (interpolated) = 3.48 W/kg **Zoom Scan (7x7x7)/Cube 0:** Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$ Reference Value = 62.41 V/m ; Power Drift = 0.05 dB Peak SAR (extrapolated) = 4.12 W/kg **SAR(1 g) = 2.38 W/kg ; SAR(10 g) = 1.55 W/kg** Maximum value of SAR (measured) = 3.51 W/kg  $0 \text{ dB} = 3.51 \text{ W/kg} = 5.45 \text{ dBW/kg}$

System Performance Check 835MHz 250mW



1750MHz System Check

Date: 11/20/2023

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1021

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

Medium parameters used (interpolated): $f = 1750$ MHz; $\sigma = 1.362$ S/m; $\epsilon_r = 39.005$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(8.61, 8.61, 8.61); Calibrated: 05.06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

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

Maximum value of SAR (interpolated) = 15.7 W/kg

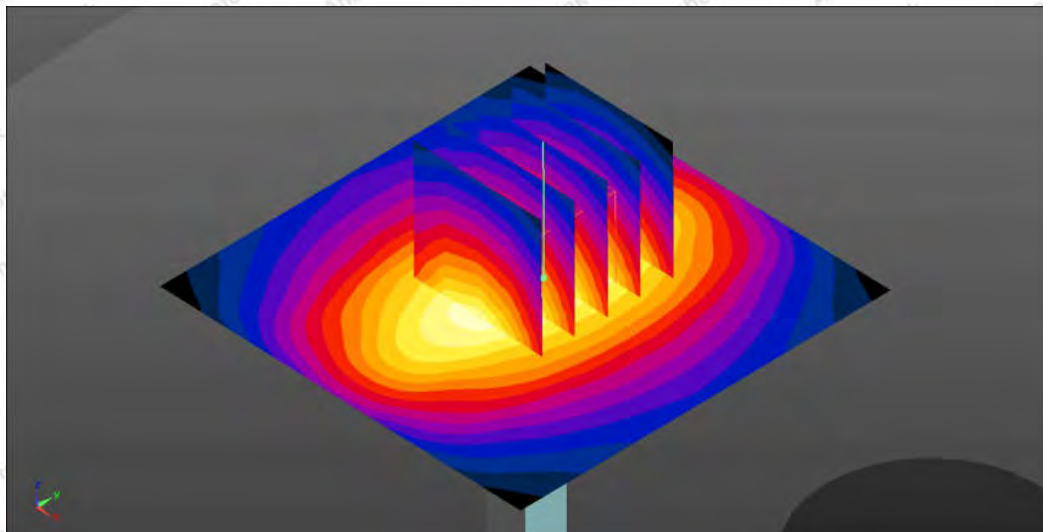
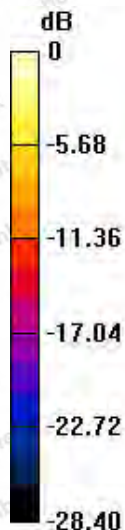
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 90.3 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 19.1 W/kg

SAR(1 g) = 9.57 W/kg; SAR(10 g) = 5.08 W/kg

Maximum value of SAR (measured) = 15.7 W/kg



0 dB = 15.7 W/kg = 11.96 dBW/kg

System Performance Check 1750MHz 250mW



1900MHz System Check

Date: 11/21/2023

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

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

Medium parameters used (interpolated): $f = 1900$ MHz; $\sigma = 1.413$ S/m; $\epsilon_r = 40.556$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN7396; ConvF(8.13, 8.13, 8.13); Calibrated: 05,06.2023;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;

Phantom: SAM 1; Type: SAM;

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

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

Maximum value of SAR (interpolated) = 13.4 W/kg

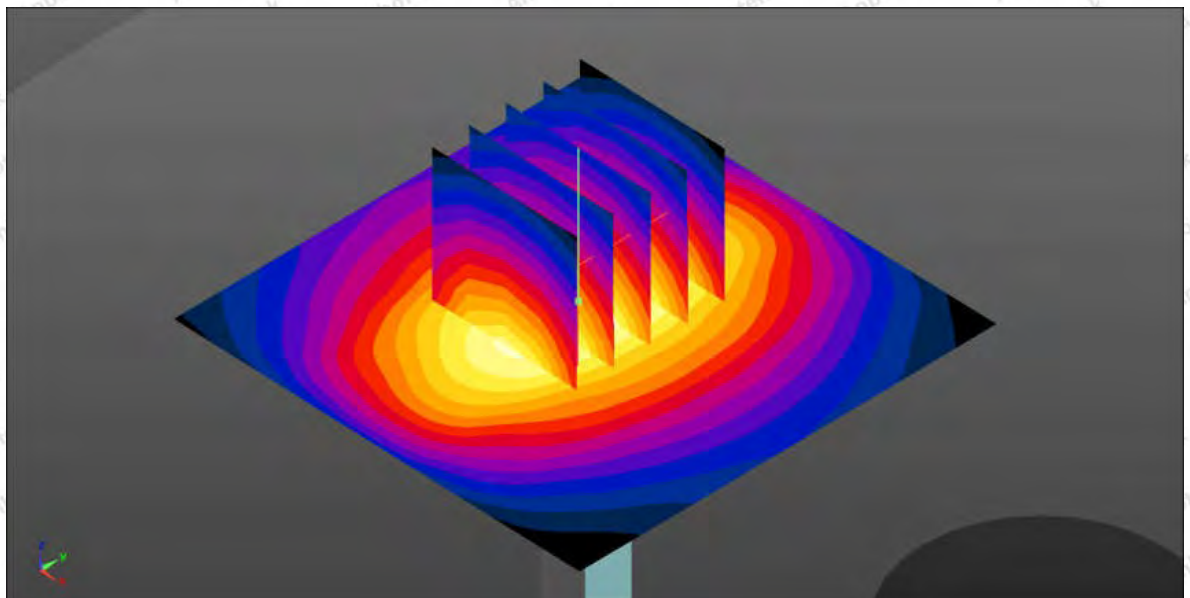
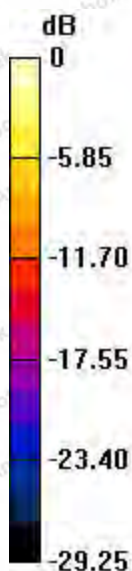
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 82.95 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 16.70 W/kg

SAR(1 g) = 10.40 W/kg; SAR(10 g) = 5.19 W/kg

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



0 dB = 13.2W/kg = 11.21 dBW/kg

System Performance Check 1900MHz 250mW



2450MHz System Check

Date: 11/22/2023

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 910

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

Medium parameters used (interpolated): $f = 2450$ MHz; $\sigma = 1.761$ S/m; $\epsilon_r = 38.596$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(7.57, 7.57, 7.57); Calibrated: 05.06.2023;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (71x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 19.1 W/kg

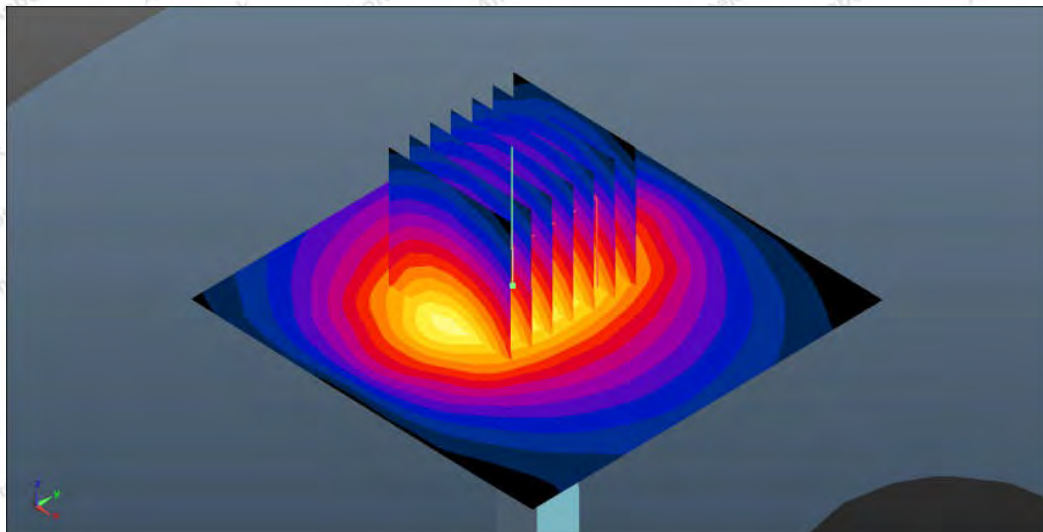
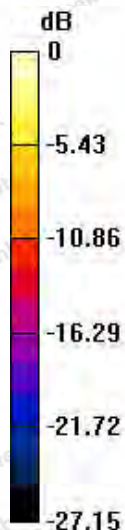
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 106.8 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 25.1 W/kg

SAR(1 g) = 13.50 W/kg; SAR(10 g) = 6.21 W/kg

Maximum value of SAR (measured) = 18.2 W/kg



0 dB = 18.2 W/kg = 12.60 dBW/kg

System Performance Check 2450MHz 250mW



5250MHz System Check

Date:11/23/2023

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: 1160

Communication System: CW; Frequency: 5250 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 5250$ MHz; $\sigma = 4.583$ S/m; $\epsilon_r = 35.107$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(5.33, 5.33, 5.33); Calibrated: 05.06.2023;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (71x71x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 20.8 W/kg

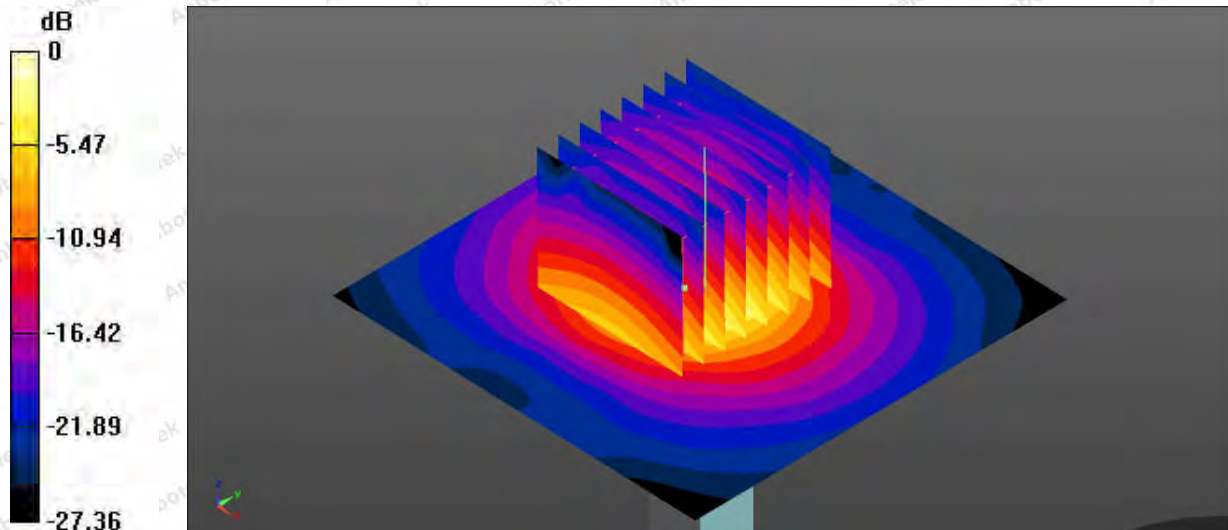
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 46.53 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 33.5 W/kg

SAR(1 g) = 7.99 W/kg; SAR(10 g) = 2.45 W/kg

Maximum value of SAR (measured) = 19.6 W/kg



0 dB = 19.6 W/kg = 12.92 dBW/kg

System Performance Check 5250MHz 100mW



5750MHz System Check

Date: 11/23/2023

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: 1160

Communication System: CW; Frequency: 5750 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 5750$ MHz; $\sigma = 5.283$ S/m; $\epsilon_r = 34.965$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(4.92, 4.92, 4.92); Calibrated: 05.06.2023;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (71x71x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 19.6 W/kg

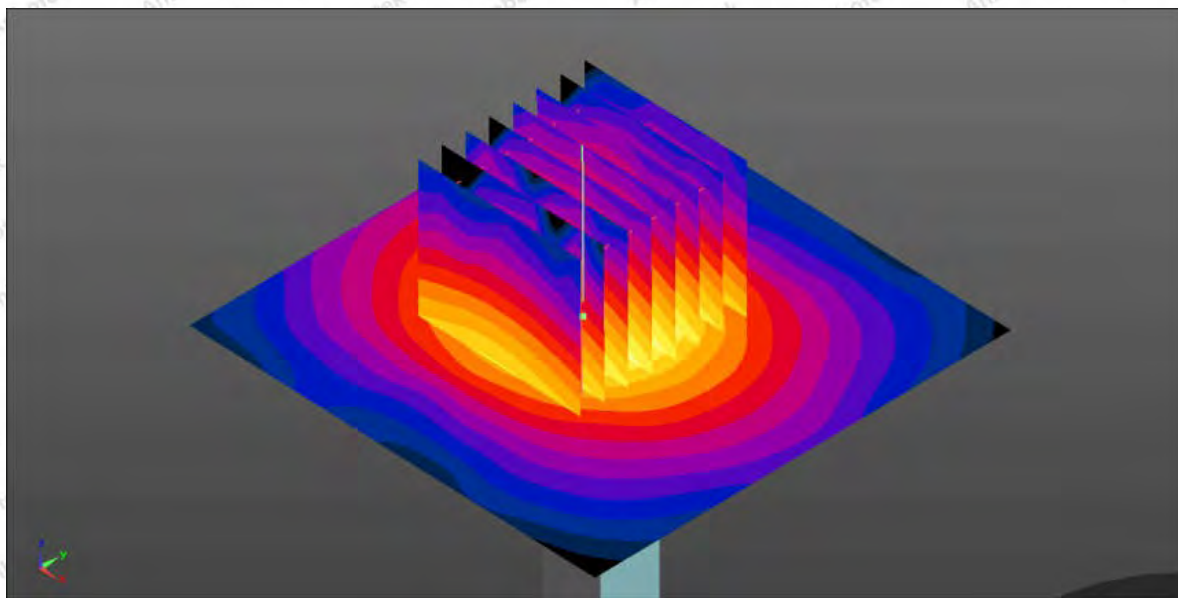
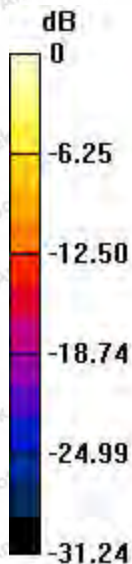
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 40.41 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 33.3 W/kg

SAR(1 g) = 8.43 W/kg; SAR(10 g) = 2.35 W/kg

Maximum value of SAR (measured) = 19.2 W/kg



0 dB = 19.2 W/kg = 12.83 dBW/kg

System Performance Check 5750MHz 100mW



Appendix C. Plots of SAR Test Data

#1

Date: 11/17/2023

GSM850_GSM Voice_Right Cheek_0mm_Ch190

Communication System: UID 0, GSM (0); Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.943$ S/m; $\epsilon_r = 42.081$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(9.71, 9.71, 9.71); Calibrated: 05,06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (71x101x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 0.345 W/kg

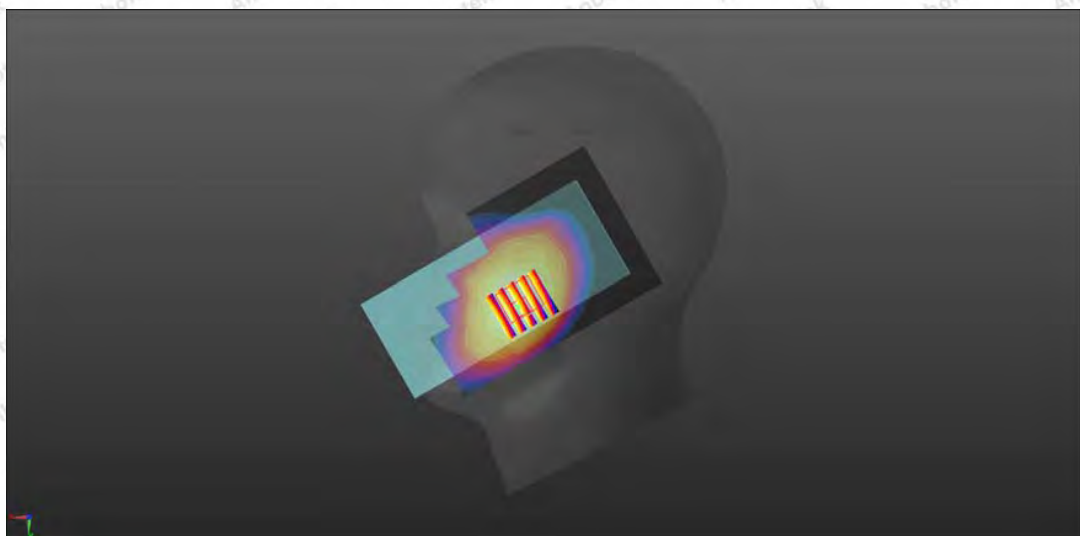
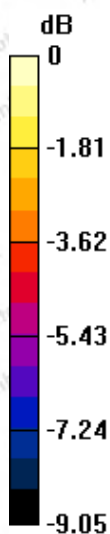
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 5.484 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.376 W/kg

SAR(1 g) = 0.291 W/kg; SAR(10 g) = 0.139 W/kg

Maximum value of SAR (measured) = 0.333 W/kg



0dB = 0.333 W/kg = -4.77 dBW/kg



#2

Date: 11/21/2023

GSM1900_GSM Voice_Right Cheek_0mm_Ch810

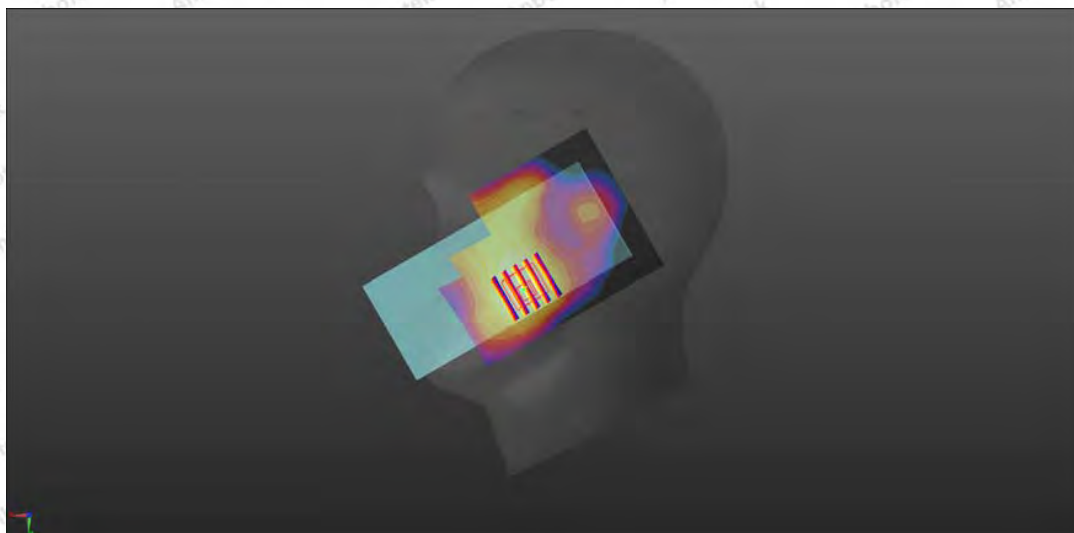
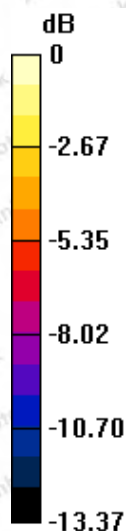
Communication System: UID 0, GSM (0); Frequency: 1909.8 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1909.8 \text{ MHz}$; $\sigma = 1.372 \text{ S/m}$; $\epsilon_r = 38.583$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(8.13, 8.13, 8.13); Calibrated: 05.06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (71x91x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$ Maximum value of SAR (interpolated) = 0.193 W/kg **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$ Reference Value = 5.419 V/m ; Power Drift = -0.04 dB Peak SAR (extrapolated) = 0.206 W/kg **SAR(1 g) = 0.154 W/kg ; SAR(10 g) = 0.101 W/kg** Maximum value of SAR (measured) = 0.177 W/kg  $0\text{dB} = 0.177 \text{ W/kg} = -7.52 \text{ dBW/kg}$ 

#3

Date: 11/21/2023

WCDMA II_RMC 12.2Kbps_Right Cheek_0mm_Ch9400

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

Medium parameters used (interpolated): $f = 1880$ MHz; $\sigma = 1.403$ S/m; $\epsilon_r = 38.465$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(8.13, 8.13, 8.13); Calibrated: 05.06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (71x91x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 0.196 W/kg

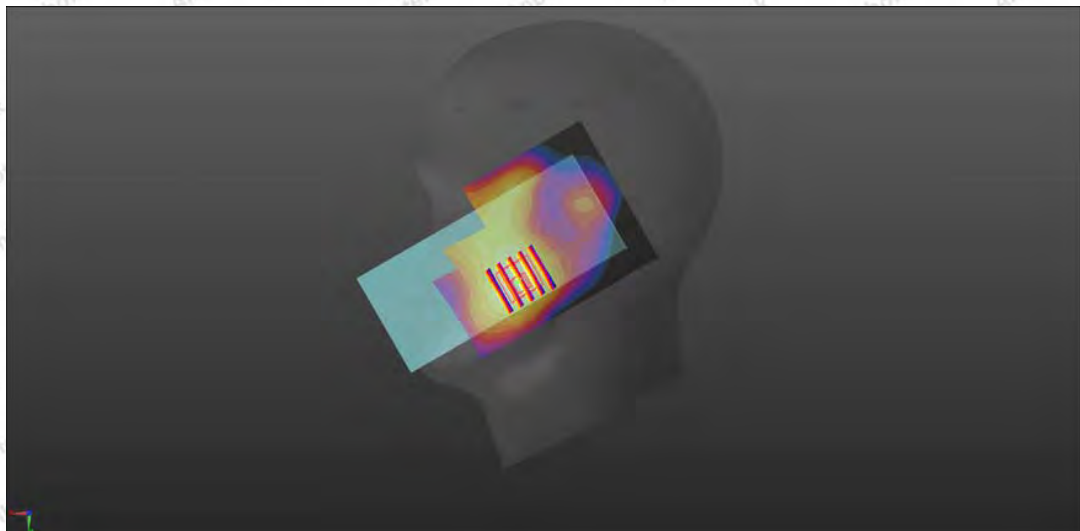
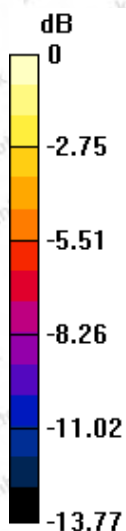
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 5.078 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.212 W/kg

SAR(1 g) = 0.155 W/kg; SAR(10 g) = 0.104 W/kg

Maximum value of SAR (measured) = 0.183 W/Kg



0dB = 0.183 W/kg = -7.37 dBW/kg



#4

Date: 11/17/2023

WCDMA V_RMC 12.2Kbps_Right Cheek_0mm_Ch4183

Communication System: UID 0, GSM (0); Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.931$ S/m; $\epsilon_r = 42.2$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(9.71, 9.71, 9.71); Calibrated: 05.06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (71x91x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 0.235 W/kg

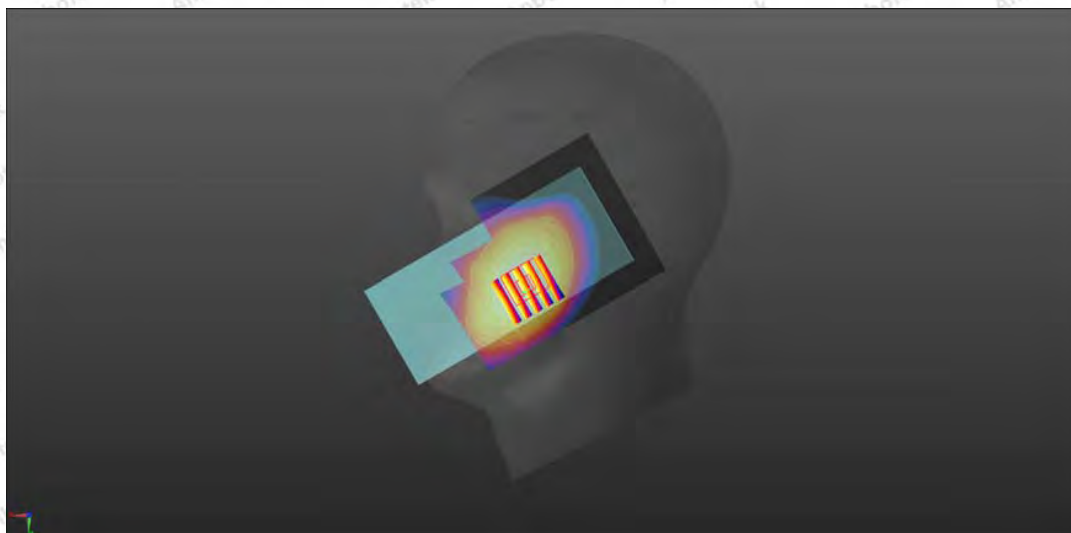
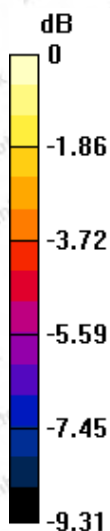
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 3.858 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.355 W/kg

SAR(1 g) = 0.184 W/kg; SAR(10 g) = 0.111 W/kg

Maximum value of SAR (measured) = 0.311 W/Kg



0dB = 0.311 W/kg = -5.07 dBW/kg



#5

Date: 11/21/2023

LTE Band 2_20M_QPSK_1RB#0_Right Cheek_0mm_Ch18700

Communication System: UID 0, GSM (0); Frequency: 1860 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1860$ MHz; $\sigma = 1.403$ S/m; $\epsilon_r = 38.465$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(8.13, 8.13, 8.13); Calibrated: 05.06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (71x91x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 0.236W/kg

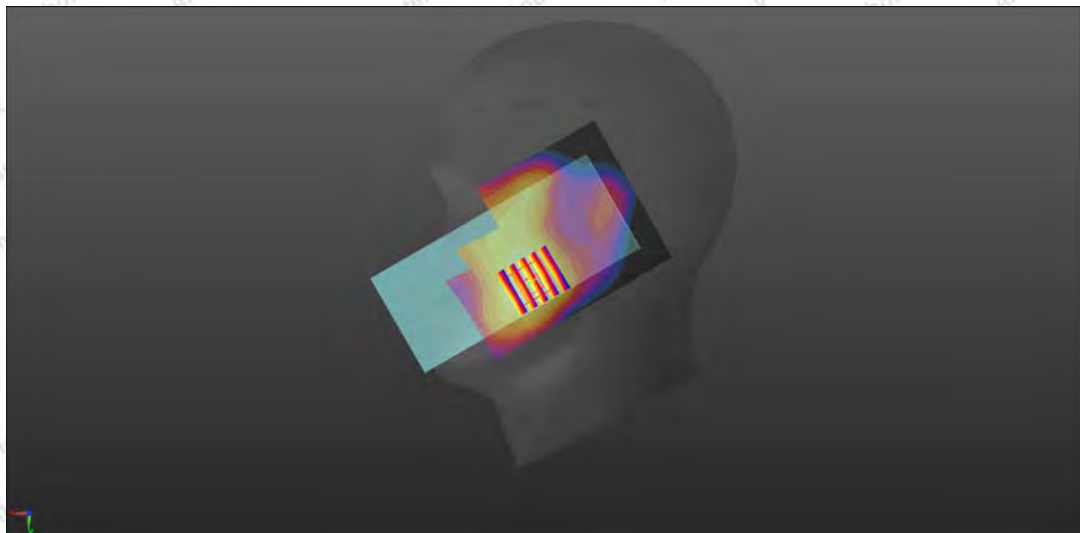
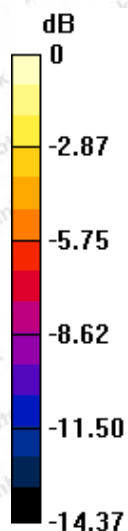
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 5.719 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 0.289 W/kg

SAR(1 g) = 0.194 W/kg; SAR(10 g) = 0.126 W/kg

Maximum value of SAR (measured) = 0.258 W/kg



0dB = 0.258 W/kg = -5.88 dBW/kg



#6

Date: 11/20/2023

LTE Band 4_20M_QPSK_1RB#49_Right Cheek_0mm_Ch20300

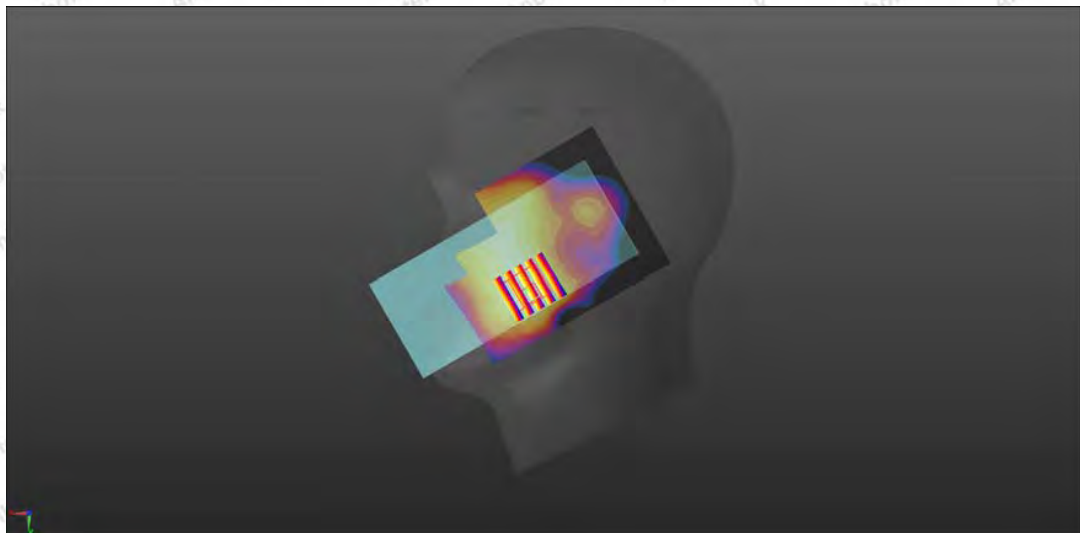
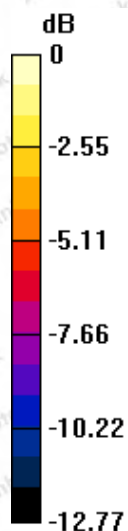
Communication System: UID 0, GSM (0); Frequency: 1745 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1745 \text{ MHz}$; $\sigma = 0.925 \text{ S/m}$; $\epsilon_r = 42.251$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(8.61, 8.61, 8.61); Calibrated: 05.06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (71x91x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$ Maximum value of SAR (interpolated) = 0.288 W/kg **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$ Reference Value = 4.885 V/m ; Power Drift = -0.03 dB Peak SAR (extrapolated) = 0.459 W/kg **SAR(1 g) = 0.239 W/kg ; SAR(10 g) = 0.147 W/kg** Maximum value of SAR (measured) = 0.385 W/kg  $0\text{dB} = 0.385 \text{ W/kg} = -4.14 \text{ dBW/kg}$ 

#7

Date: 11/17/2023

LTE Band 5_10M_QPSK_1RB#0_Right Cheek_0mm_Ch20450

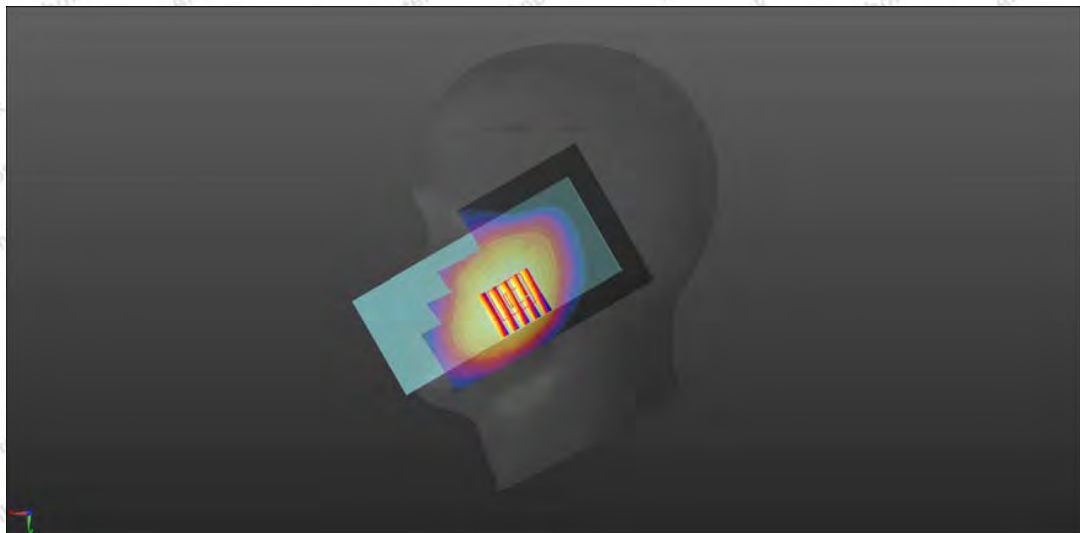
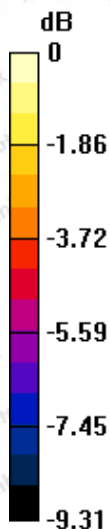
Communication System: UID 0, GSM (0); Frequency: 829 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 829 \text{ MHz}$; $\sigma = 0.925 \text{ S/m}$; $\epsilon_r = 42.251$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(9.71, 9.71, 9.71); Calibrated: 05.06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (71x101x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$ Maximum value of SAR (interpolated) = 0.299 W/kg **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$ Reference Value = 3.387 V/m ; Power Drift = 0.05 dB Peak SAR (extrapolated) = 0.322 W/kg **SAR(1 g) = 0.296 W/kg ; SAR(10 g) = 0.208 W/kg** Maximum value of SAR (measured) = 0.311 W/Kg  $0\text{dB} = 0.311 \text{ W/kg} = -5.07 \text{ dBW/kg}$ 

#8

Date: 11/16/2023

LTE Band 12_10M_QPSK_1RB#0_Right Cheek_0mm_Ch23095

Communication System: UID 0, GSM (0); Frequency: 707.5 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 707.5$ MHz; $\sigma = 0.853$ S/m; $\epsilon_r = 42.316$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(9.82, 9.82, 9.82); Calibrated: 05.06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (71x91x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 0.155 W/kg

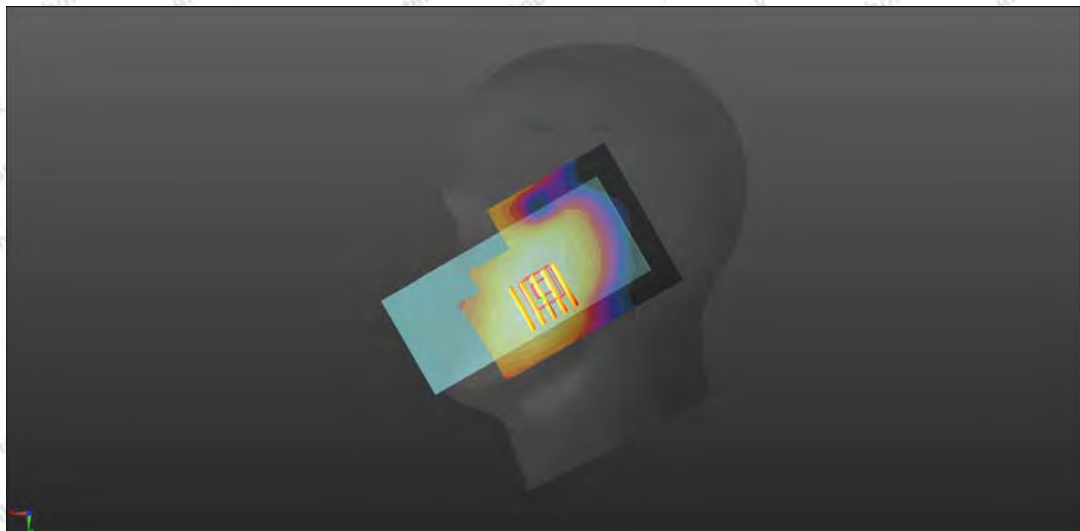
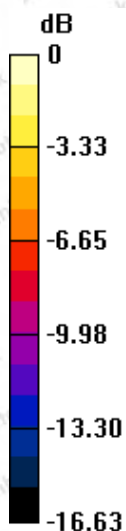
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 2.397 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.348 W/kg

SAR(1 g) = 0.133 W/kg; SAR(10 g) = 0.106 W/kg

Maximum value of SAR (measured) = 0.232 W/kg



0dB = 0.232 W/kg = -6.34 dBW/kg



#9

Date: 11/16/2023

LTE Band 13_10M_QPSK_1RB#24_Right Cheek_0mm_23230

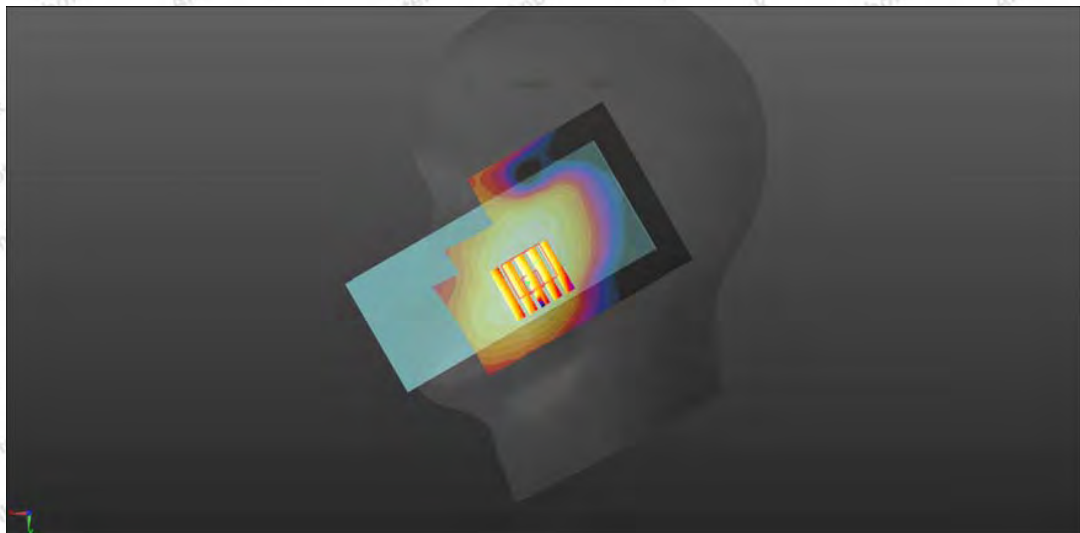
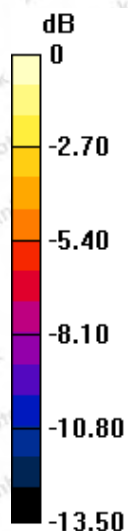
Communication System: UID 0, GSM (0); Frequency: 782 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 782 \text{ MHz}$; $\sigma = 0.924 \text{ S/m}$; $\epsilon_r = 42.316$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(9.82, 9.82, 9.82); Calibrated: 05.06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (71x91x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$ Maximum value of SAR (interpolated) = 0.125 W/kg **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$ Reference Value = 2.704 V/m ; Power Drift = 0.04 dB Peak SAR (extrapolated) = 0.305 W/kg **SAR(1 g) = 0.117 W/kg ; SAR(10 g) = 0.098 W/kg** Maximum value of SAR (measured) = 0.295 W/kg  $0\text{dB} = 0.295 \text{ W/kg} = -5.30 \text{ dBW/kg}$ 

#10

Date: 11/22/2023

WLAN2.4GHz_802.11b 1Mbps_ Left Cheek _0mm_Ch6

Communication System: UID 0, GSM (0); Frequency: 2437 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.715$ S/m; $\epsilon_r = 40.207$; $\rho = 1000$ kg/m³

Phantom section: Left Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(7.57, 7.57, 7.57); Calibrated: 05.06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (81x101x1): Interpolated grid: $dx=1.200$ mm, $dy=1.200$ mm

Maximum value of SAR (interpolated) = 0.398 W/kg

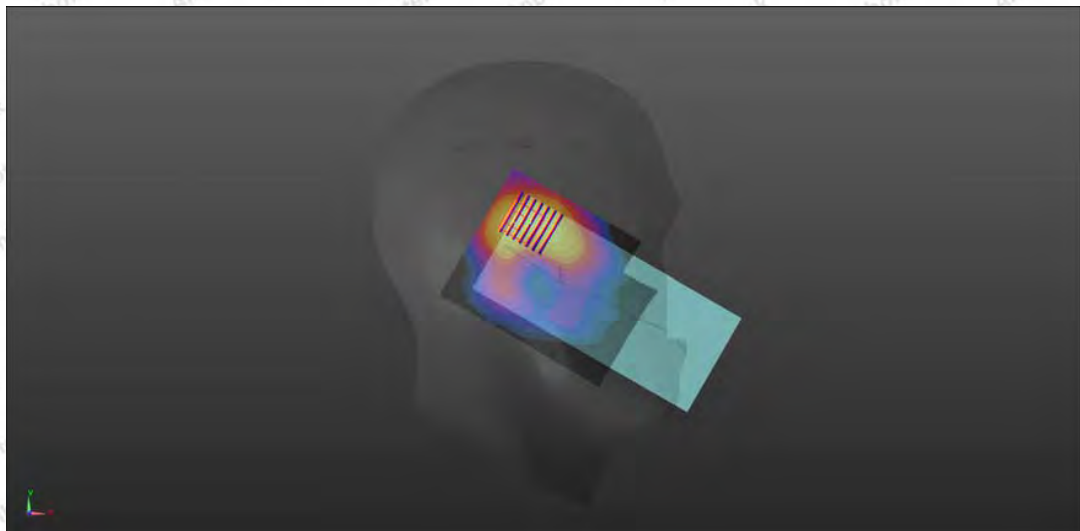
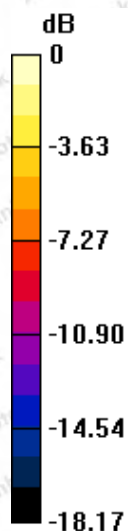
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 8.997 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.698 W/kg

SAR(1 g) = 0.367 W/kg; SAR(10 g) = 0.187 W/kg

Maximum value of SAR (measured) = 0.517 W/kg



0dB = 0.517 W/kg = -2.68 dBW/kg



#11

Date: 11/23/2023

WLAN5.2GHz_802.11a 6Mbps_ Left Cheek _0mm_Ch36

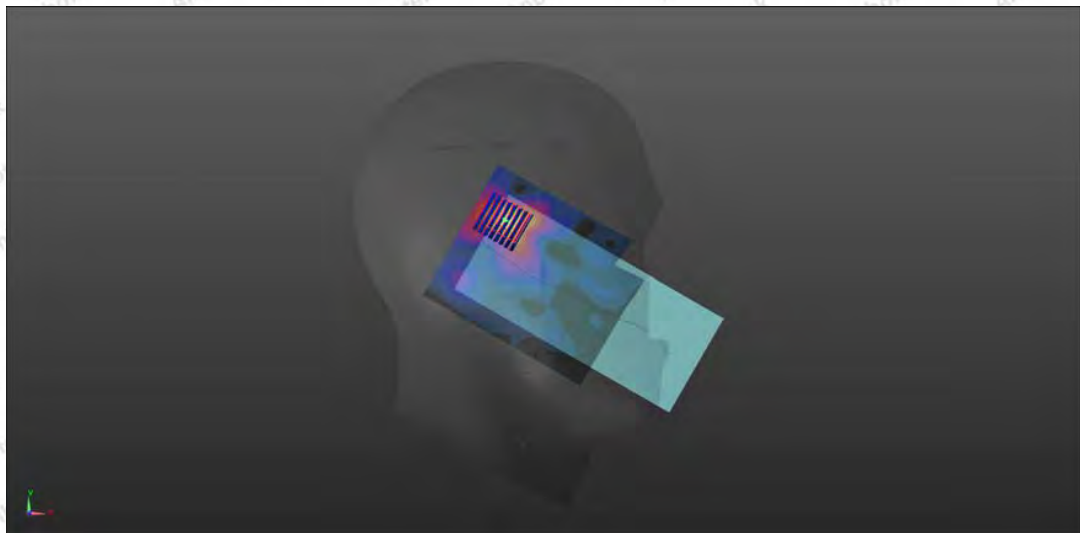
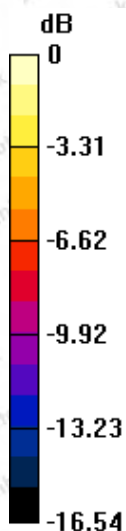
Communication System: UID 0, GSM (0); Frequency: 5180 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 5180 \text{ MHz}$; $\sigma = 4.622 \text{ S/m}$; $\epsilon_r = 36.391$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(5.33, 5.33, 5.33); Calibrated: 05,06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (101x121x1): Interpolated grid: $dx=1.000 \text{ mm}$, $dy=1.000 \text{ mm}$ Maximum value of SAR (interpolated) = 1.01 W/kg **Zoom Scan (8x8x15)/Cube 0:** Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2\text{mm}$ Reference Value = 1.278 V/m ; Power Drift = -0.05 dB Peak SAR (extrapolated) = 1.26 W/kg **SAR(1 g) = 0.474 W/kg ; SAR(10 g) = 0.192 W/kg** Maximum value of SAR (measured) = 1.08 W/Kg  $0\text{dB} = 1.08 \text{ W/kg} = 0.33 \text{ dBW/kg}$ 

#12

Date: 11/23/2023

WLAN5.8GHz_802.11a 6Mbps_Left Cheek_0mm_Ch165

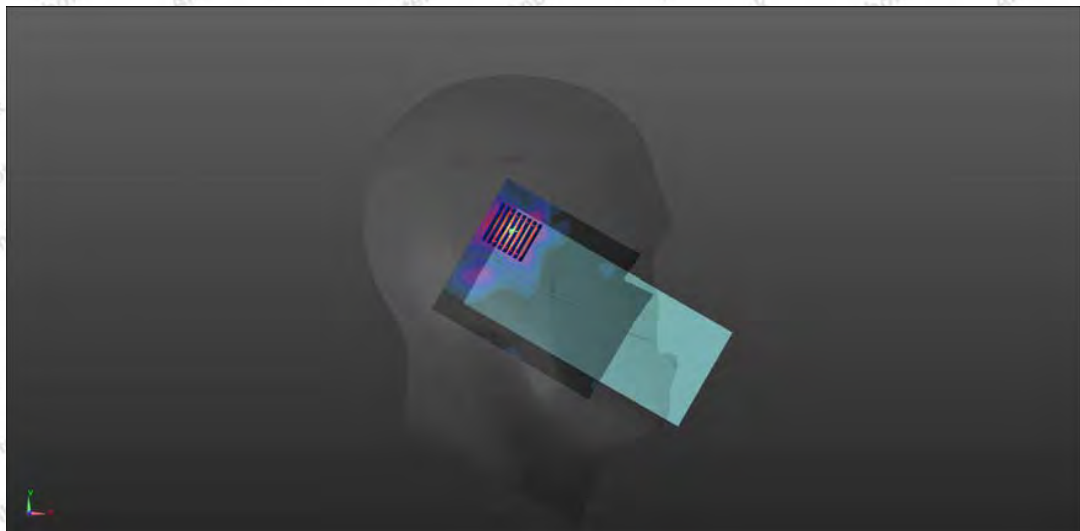
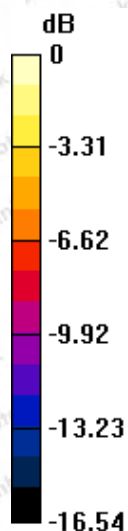
Communication System: UID 0, GSM (0); Frequency: 5825 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 5825 \text{ MHz}$; $\sigma = 5.199 \text{ S/m}$; $\epsilon_r = 35.548$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(4.92, 4.92, 4.92); Calibrated: 05.06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (101x121x1): Interpolated grid: $dx=1.000 \text{ mm}$, $dy=1.000 \text{ mm}$ Maximum value of SAR (interpolated) = 1.32 W/kg **Zoom Scan (8x8x15)/Cube 0:** Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=2\text{mm}$ Reference Value = 1.624 V/m ; Power Drift = 0.05 dB Peak SAR (extrapolated) = 2.04 W/kg **SAR(1 g) = 0.598 W/kg ; SAR(10 g) = 0.241 W/kg** Maximum value of SAR (measured) = 1.65 W/Kg  $0\text{dB} = 1.65 \text{ W/kg} = 2.17 \text{ dBW/kg}$ 

#13

Date: 11/17/2023

GSM 850 _ GPRS 1Tx slots _ Rear Side _CH190_10mm

Communication System: UID 0, GSM (0); Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.977$ S/m; $\epsilon_r = 42.081$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(9.71, 9.71, 9.71); Calibrated: 05.06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (71x121x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 0.739 W/Kg

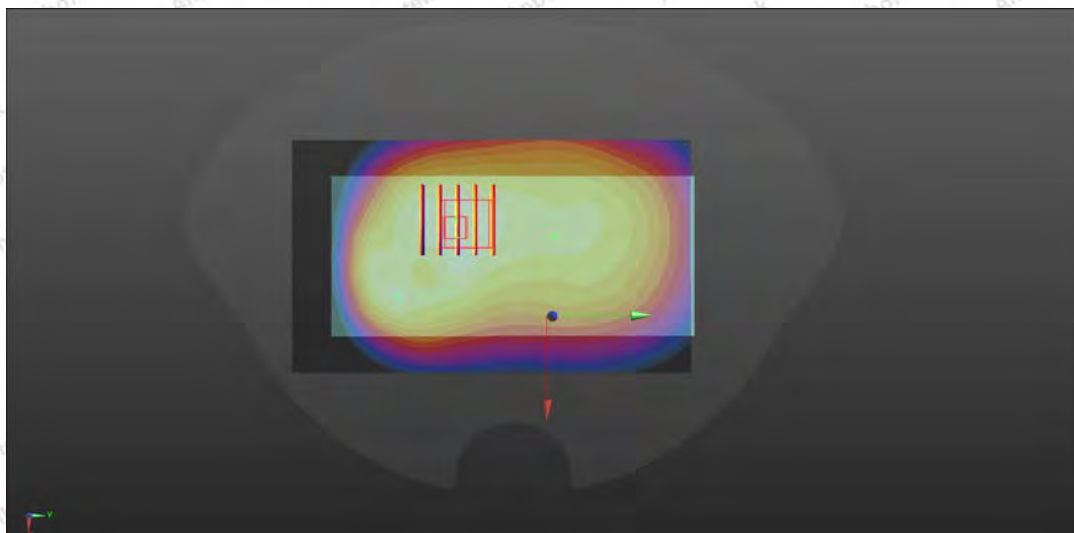
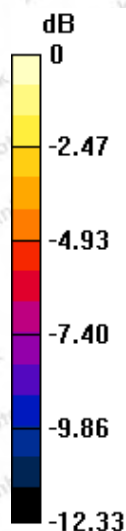
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 22.48 V/m; Power Drift = -0.17 dB

Peak SAR (extrapolated) = 0.807 W/kg

SAR(1 g) = 0.604 W/Kg; SAR(10 g) = 0.357 W/Kg

Maximum value of SAR (measured) = 0.707 W/Kg



0dB = 0.707 W/kg = -1.50dBW/kg



#14

Date: 11/21/2023

GSM 1900 _ GPRS 2Tx slots _Rear Side_10mm_CH810

Communication System: UID 0, GSM (0); Frequency: 1909.8 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1909.8$ MHz; $\sigma = 1.436$ S/m; $\epsilon_r = 38.337$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(8.13, 8.13, 8.13); Calibrated: 05.06.2023;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Area Scan (71x91x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 0.528 W/Kg

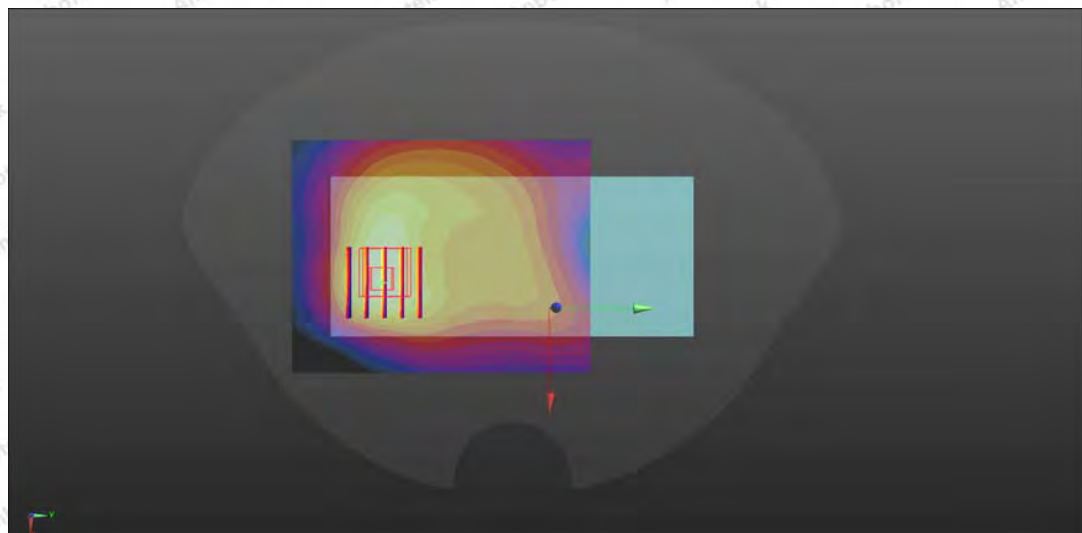
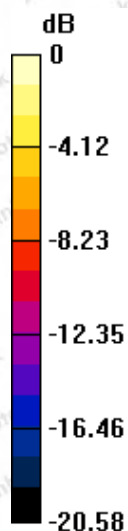
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 8.895 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.787 W/kg

SAR(1 g) = 0.405 W/Kg; SAR(10 g) = 0.214 W/Kg

Maximum value of SAR (measured) = 0.687 W/Kg



0 dB = 0.687 W/kg = -1.63 dBW/kg



#15

Date: 11/21/2023

WCDMA II_RMC 12.2Kbps_Rear Side_10mm_Ch9400

Communication System: UID 0, Generic WCDMA (0); Frequency: 1880 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.434$ S/m; $\epsilon_r = 38.343$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(8.13, 8.13, 8.13); Calibrated: 05.06.2023;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Area Scan (71x91x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 0.609 W/kg

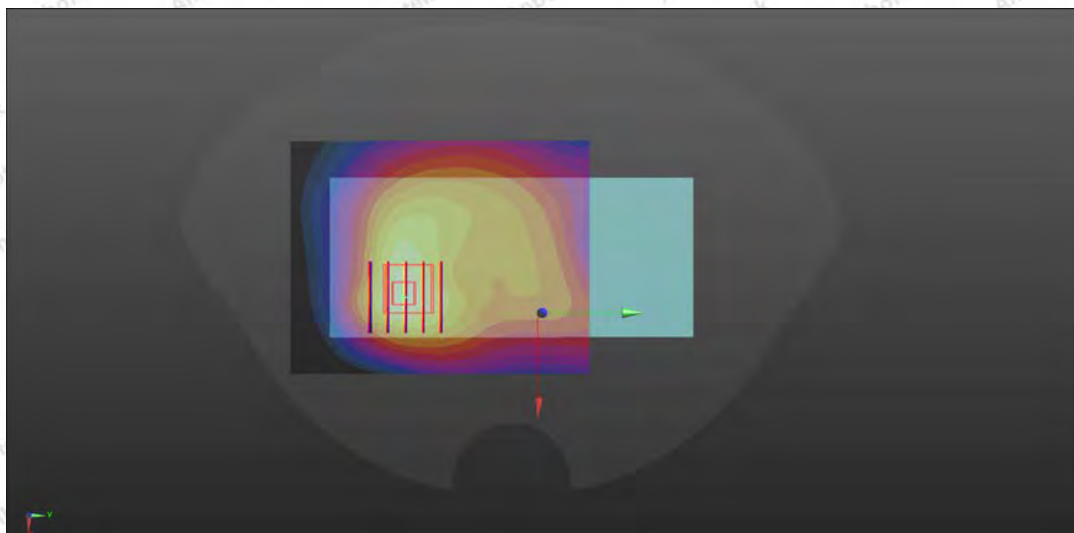
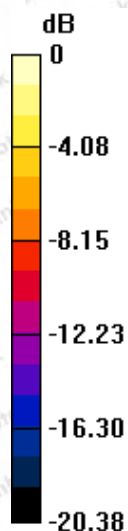
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8$ mm, $dy=8$ mm, $dz=5$ mm

Reference Value = 9.451 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.750 W/kg

SAR(1 g) = 0.415 W/Kg; SAR(10 g) = 0.225 W/Kg

Maximum value of SAR (measured) = 0.591 W/Kg



0 dB = 0.591 W/kg = -2.28 dBW/kg



#16

Date: 11/17/2023

WCDMA V_RMC 12.2Kbps_Rear Side_10mm_Ch4183

Communication System: UID 0, Generic WCDMA (0); Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 836.6\text{MHz}$; $\sigma = 0.931\text{ S/m}$; $\epsilon_r = 42.194$; $\rho = 1000\text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(9.71, 9.71, 9.71); Calibrated: 05,06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (71x91x1): Interpolated grid: $dx=1.500\text{ mm}$, $dy=1.500\text{ mm}$

Maximum value of SAR (interpolated) = 0.519 W/Kg

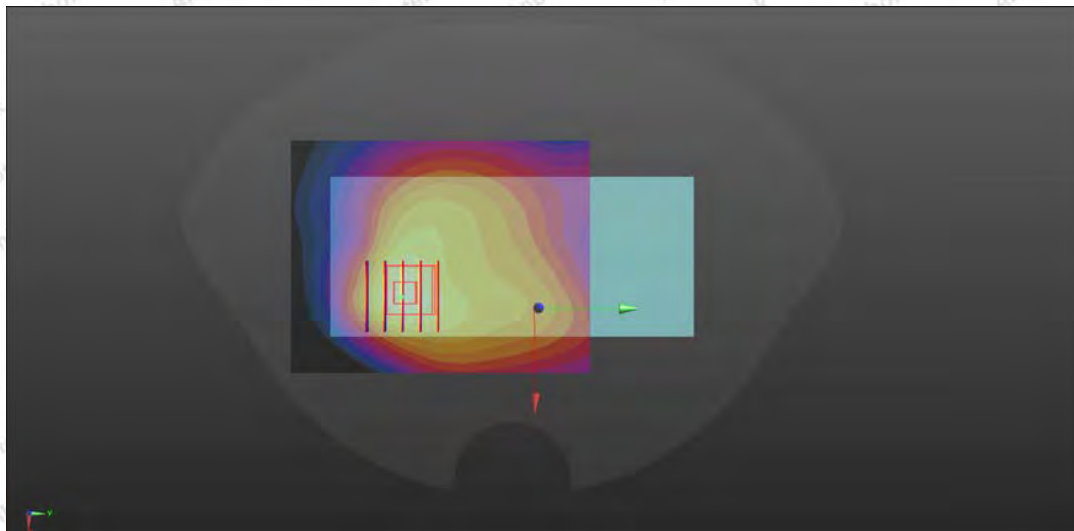
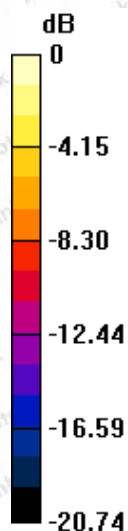
Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 8.111 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 0.958 W/Kg

SAR(1 g) = 0.407 W/Kg; SAR(10 g) = 0.267 W/Kg

Maximum value of SAR (measured) = 0.683 W/Kg



0 dB = 0.683 W/kg = -1.65 dBW/kg



#17

Date: 11/21/2023

LTE Band 2_20M_QPSK_1RB#0_Rear Side_10mm_Ch18700

Communication System: UID 0, Generic LTE (0); Frequency: 1860 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1860$ MHz; $\sigma = 1.383$ S/m; $\epsilon_r = 38.547$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(8.13, 8.13, 8.13); Calibrated: 05.06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (41x91x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.664 W/Kg

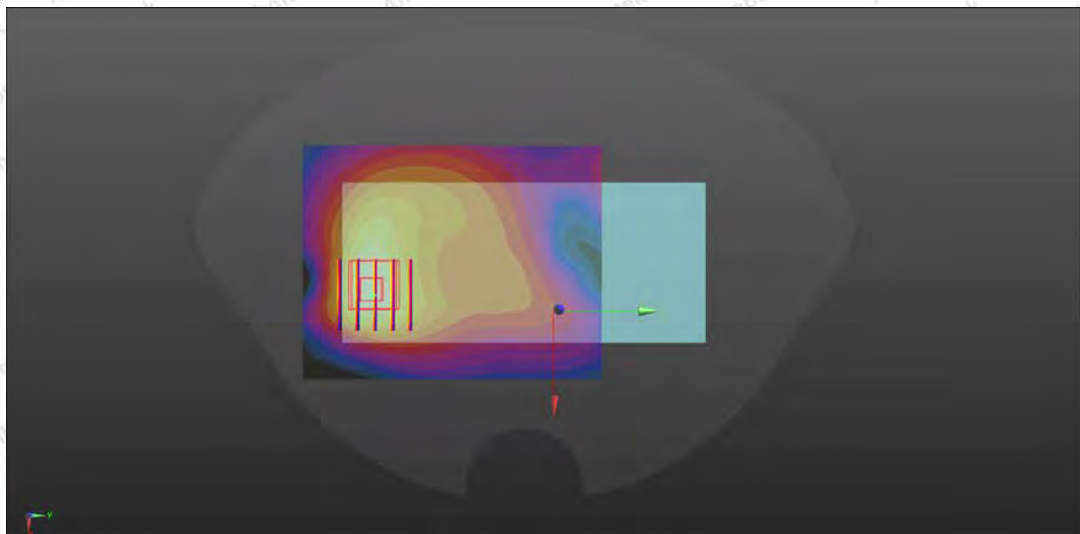
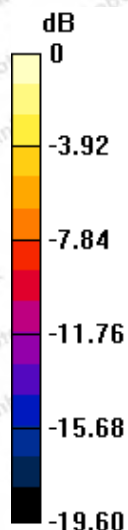
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.390 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 0.785 W/kg

SAR(1 g) = 0.423 W/Kg; SAR(10 g) = 0.259 W/Kg

Maximum value of SAR (measured) = 0.715 W/Kg



0 dB = 0.715 W/kg = -1.45 dBW/kg



#18

Date: 11/20/2023

LTE Band 4_20M_QPSK_1RB#49_Rear Side_10mm_Ch20300

Communication System: UID 0, Generic LTE (0); Frequency: 1745 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1745$ MHz; $\sigma = 1.405$ S/m; $\epsilon_r = 39.627$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(8.61, 8.61, 8.61); Calibrated: 05,06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (71x91x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.518 W/Kg

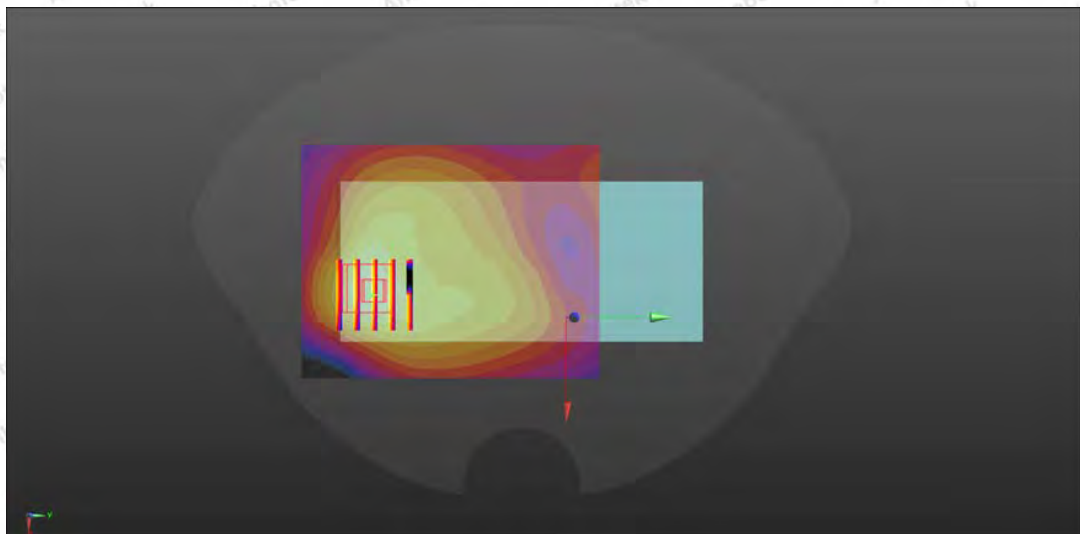
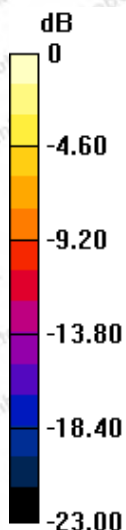
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value =6.064 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.701 W/kg

SAR(1 g) = 0.375 W/Kg; SAR(10 g) = 0.197 W/Kg

Maximum value of SAR (measured) = 0.601 W/Kg



0 dB = 0.601 W/kg = -2.21 dBW/kg



#19

Date: 11/17/2023

LTE Band 5_10M_QPSK_1RB#0_Rear Side_10mm_Ch20450

Communication System: UID 0, Generic LTE (0); Frequency: 829 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 829$ MHz; $\sigma = 0.924$ S/m; $\epsilon_r = 42.267$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(9.82, 9.82, 9.82); Calibrated: 05.06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (71x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.459 W/Kg

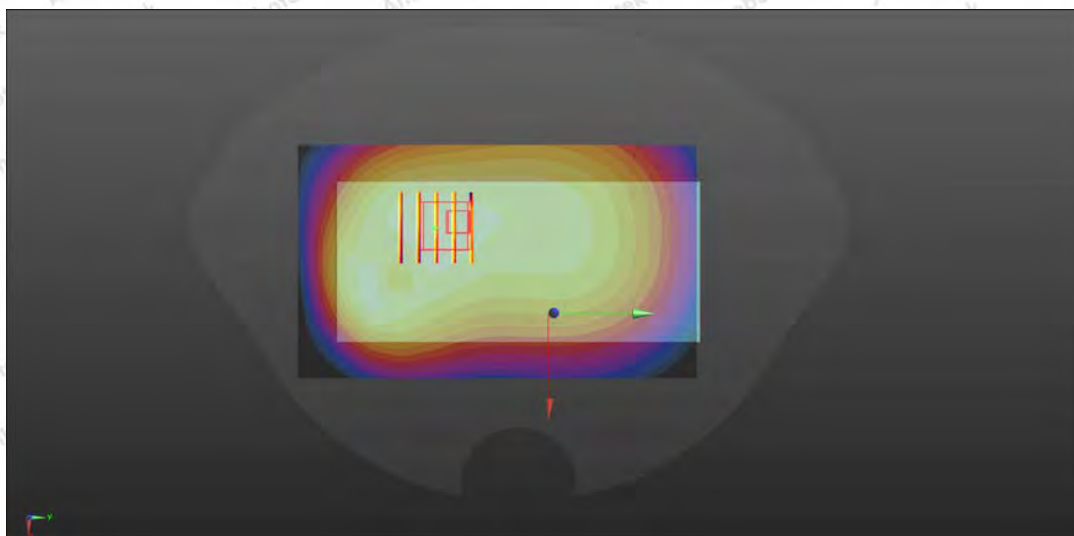
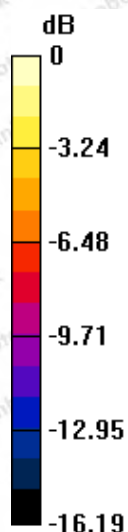
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 17.67 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 0.657 W/kg

SAR(1 g) = 0.387 W/Kg; SAR(10 g) = 0.262 W/Kg

Maximum value of SAR (measured) = 0.555 W/Kg



0 dB = 0.555 W/kg = -2.55 dBW/kg



#20

Date: 11/16/2023

LTE Band 12_10M_QPSK_1RB#0_Rear Side_10mm_Ch23095

Communication System: UID 0, Generic LTE (0); Frequency: 707.5 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 707.5$ MHz; $\sigma = 0.853$ S/m; $\epsilon_r = 42.316$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(9.82, 9.82, 9.82); Calibrated: 05.06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (71x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.416 W/Kg

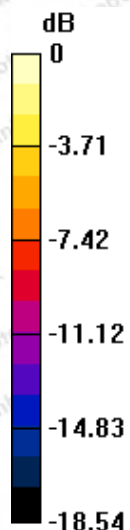
Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 14.87 V/m; Power Drift = 0.07dB

Peak SAR (extrapolated) = 0.715 W/kg

SAR(1 g) = 0.326 W/Kg; SAR(10 g) = 0.188 W/Kg

Maximum value of SAR (measured) = 0.515 W/Kg



0 dB = 0.515 W/kg = -2.88 dBW/kg



#21

Date: 11/16/2023

LTE Band 13_10M_QPSK_1RB#24_Rear Side_10mm_Ch23230

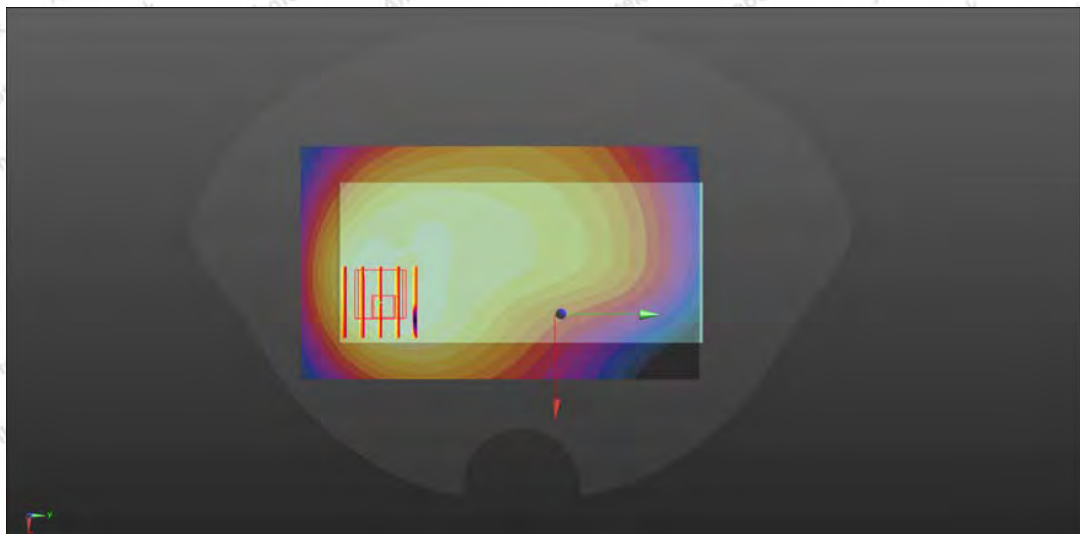
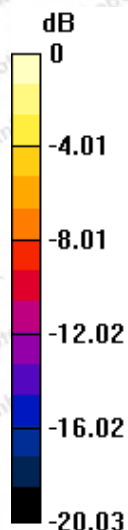
Communication System: UID 0, Generic LTE (0); Frequency: 782 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 782 \text{ MHz}$; $\sigma = 0.924 \text{ S/m}$; $\epsilon_r = 41.333$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(9.82, 9.82, 9.82); Calibrated: 05.06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (71x121x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$ Maximum value of SAR (interpolated) = 0.414 W/Kg **Zoom Scan (5x5x7)/Cube 0:** Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$ Reference Value = 15.425 V/m ; Power Drift = 0.04 dB Peak SAR (extrapolated) = 0.612 W/kg **SAR(1 g) = 0.295 W/Kg ; SAR(10 g) = 0.179 W/Kg** Maximum value of SAR (measured) = 0.505 W/Kg 0 dB = 0.505 W/kg = -2.96 dBW/kg 

#22

Date: 11/22/2023

WLAN2.4GHz_802.11b 1Mbps_Rear Side_10mm_Ch06

Communication System: UID 0, Generic LTE (0); Frequency: 2437 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.715$ S/m; $\epsilon_r = 40.207$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(7.57, 7.57, 7.57); Calibrated: 05.06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (91x91x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.278 W/Kg

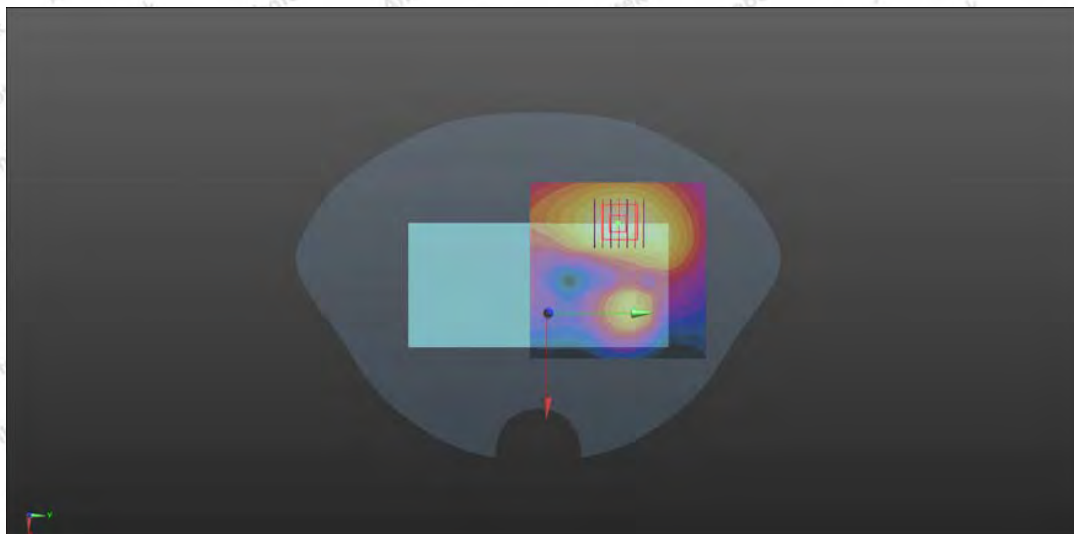
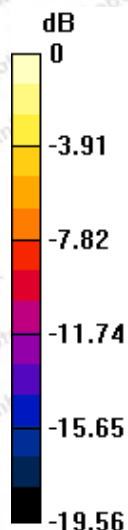
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.838 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.365 W/kg

SAR(1 g) = 0.215 W/Kg; SAR(10 g) = 0.109 W/Kg

Maximum value of SAR (measured) = 0.285 W/Kg



0 dB = 0.285 W/kg = -5.45 dBW/kg



#23

Date: 11/23/2023

WLAN5.2GHz_802.11a 6Mbps_Rear Side_10mm_Ch36

Communication System: UID 0, Generic LTE (0); Frequency: 5180 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 5180$ MHz; $\sigma = 4.569$ S/m; $\epsilon_r = 36.45$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(5.33, 5.33, 5.33); Calibrated: 05,06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (101x101x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.295 W/Kg

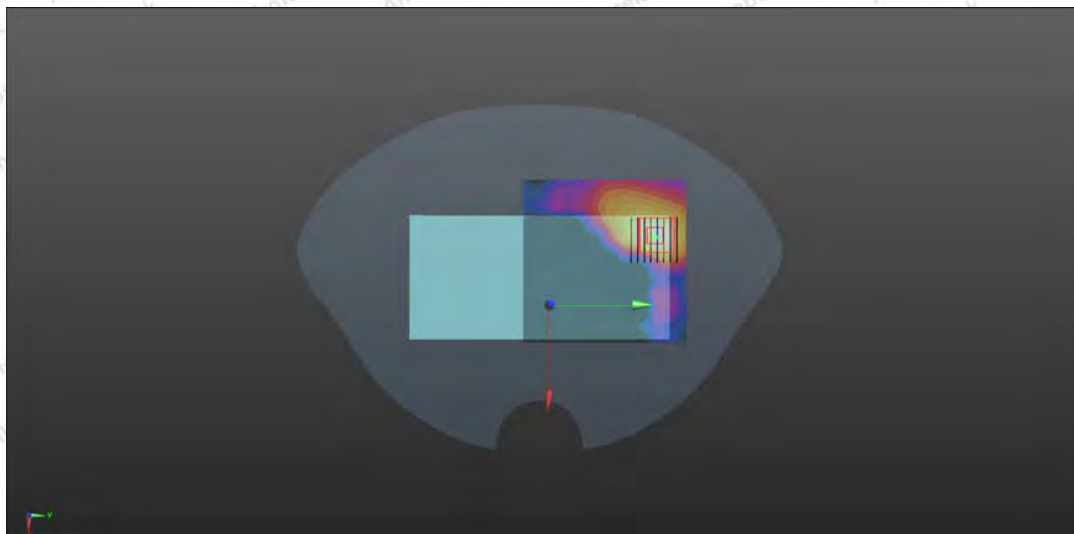
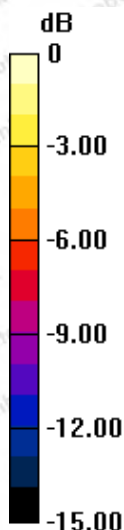
Zoom Scan (8x8x15)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=2$ mm

Reference Value = 0.520 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.524 W/kg

SAR(1 g) = 0.158 W/Kg; SAR(10 g) = 0.074 W/Kg

Maximum value of SAR (measured) = 0.287 W/Kg



0 dB = 0.287 W/kg = -5.42 dBW/kg



#24

Date: 11/23/2023

WLAN5.8GHz_802.11a 6Mbps_Rear Side_10mm_Ch165

Communication System: UID 0, Generic LTE (0); Frequency: 5825 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 5825$ MHz; $\sigma = 5.985$ S/m; $\epsilon_r = 48.710$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(4.92, 4.92, 4.92); Calibrated: 05.06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (101x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.341 W/Kg

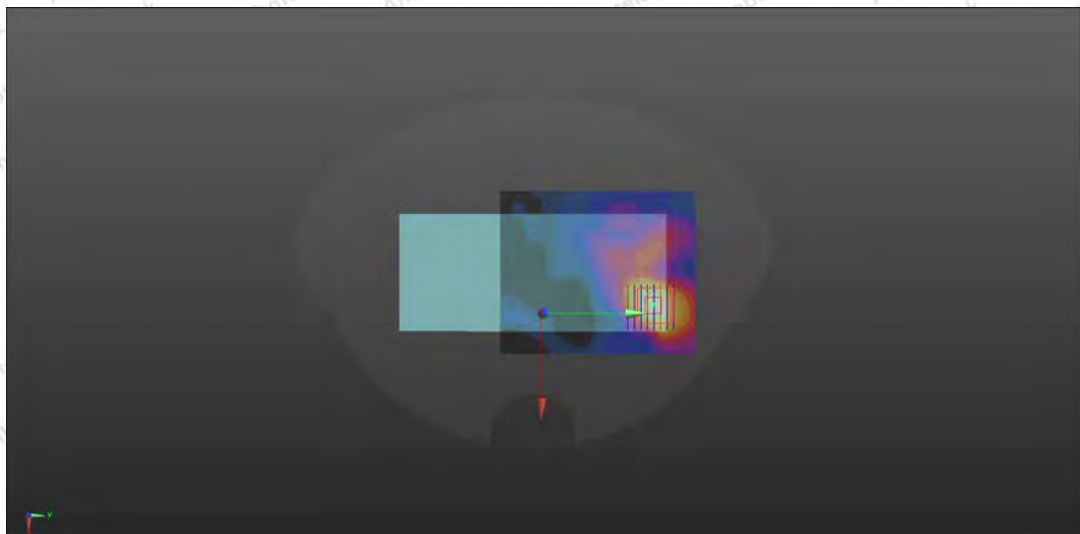
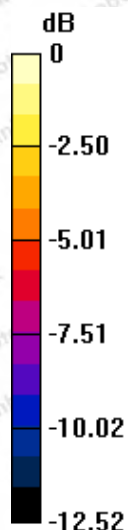
Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 0.570 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.636 W/kg

SAR(1 g) = 0.179 W/Kg; SAR(10 g) = 0.085 W/Kg

Maximum value of SAR (measured) = 0.310 W/Kg



0 dB = 0.310 W/kg = -5.08 dBW/kg



Appendix D. DASY System Calibration Certificate



In Collaboration with
s p e a g
CALIBRATION LABORATORY



中国认可
国际互认
校准
CALIBRATION
CNAS L0570

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209
E-mail: cttl@chinattl.com Http://www.chinattl.cn

Client

Anbotek (Auden)

Certificate No: Z23-98671

CALIBRATION CERTIFICATE

Object EX3DV4 - SN:7396

Calibration Procedure(s) FF-Z12-006-08
Calibration Procedures for Dosimetric E-field Probes

Calibration date: May 06, 2023

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	20-Jun-22 (CTTL, No.J22 X07447)	Jun-21
Power sensor NRP-Z91	101547	20-Jun-22 (CTTL, No.J22 X07447)	Jun-21
Power sensor NRP-Z91	101548	20-Jun-22 (CTTL, No.J22 X07447)	Jun-21
Reference10dBAttenuator	18N50W-10dB	13-Mar-23(CTTL,No.J23X01547)	Mar-22
Reference20dBAttenuator	18N50W-20dB	13-Mar-23(CTTL, No.J23X01548)	Mar-22
Reference Probe EX3DV4	SN 7433	26-Sep-22(SPEAG,No.EX3-7433_Sep22)	Sep-21
DAE4	SN 549	13-Dec-22(SPEAG, No.DAE4-549_Dec22)	Dec -21
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
SignalGeneratorMG3700A	6201052605	27-Jun-22 (CTTL, No.J22X04776)	Jun-21
Network Analyzer E5071C	MY46110673	13-Jan-23 (CTTL, No.J23X00285)	Jan -22

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

Issued: May06, 2023

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

Certificate No: Z23-98671

Page 1 of 11





In Collaboration with

s p e a k
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China

Tel: +86-10-62304633-2218

Fax: +86-10-62304633-2209

E-mail: cttl@chinattl.com

[Http://www.chinattl.cn](http://www.chinattl.cn)**Glossary:**

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,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 $\theta=0$ 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:

- 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
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
- 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
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}:** Assessed for E-field polarization $\theta=0$ ($f \leq 900\text{MHz}$ in TEM-cell; $f > 1800\text{MHz}$: waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E^2 -field uncertainty inside TSL (see below ConvF).
- NORM(f),_{x,y,z} = NORM_{x,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.
- DCP_{x,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.
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,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 $f \leq 800\text{MHz}$) and inside waveguide using analytical field distributions based on power measurements for $f > 800\text{MHz}$. 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 NORM_{x,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 $\pm 50\text{MHz}$ to $\pm 100\text{MHz}$.
- Spherical isotropy (3D deviation from isotropy):** in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset:** The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle:** The angle is assessed using the information gained by determining the NORM_x (no uncertainty required).

Certificate No: Z23-98671

Page 2 of 11





In Collaboration with

s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing: 100191, China

Tel: +86-10-62304633-2218

Fax: +86-10-62304633-2209

E-mail: cttl@chinattl.com[Http://www.chinattl.cn](http://www.chinattl.cn)

Probe EX3DV4

SN: 7396

Calibrated: May 06, 2023

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)





In Collaboration with

s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China

Tel: +86-10-62304633-2218

E-mail: cttl@chinattl.com

Fax: +86-10-62304633-2209

[Http://www.chinattl.cn](http://www.chinattl.cn)**DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7396****Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.54	0.53	0.50	±10.0%
DCP(mV) ^B	97.8	104.5	102.5	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB/ μV	C	D dB	VR mV	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	199.9	±2.4%
		Y	0.0	0.0	1.0		203.3	
		Z	0.0	0.0	1.0		195.0	

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 and Page 6).

^B Numerical linearization parameter: uncertainty not required.

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





In Collaboration with

s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China

Tel: +86-10-62304633-2218

Fax: +86-10-62304633-2209

E-mail: cttl@chinattl.com

[Http://www.chinattl.cn](http://www.chinattl.cn)**DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7396****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	9.82	9.82	9.82	0.30	0.85	± 12.1%
835	41.5	0.90	9.71	9.71	9.71	0.15	1.36	± 12.1%
900	41.5	0.97	9.87	9.87	9.87	0.16	1.37	± 12.1%
1750	40.1	1.37	8.61	8.61	8.61	0.25	1.04	± 12.1%
1900	40.0	1.40	8.13	8.13	8.13	0.24	1.01	± 12.1%
2100	39.8	1.49	8.14	8.14	8.14	0.24	1.04	± 12.1%
2300	39.5	1.67	7.85	7.85	7.85	0.40	0.75	± 12.1%
2450	39.2	1.80	7.57	7.57	7.57	0.50	0.75	± 12.1%
2600	39.0	1.96	7.38	7.38	7.38	0.64	0.68	± 12.1%
5250	35.9	4.71	5.33	5.33	5.33	0.45	1.30	± 13.3%
5600	35.5	5.07	4.89	4.89	4.89	0.45	1.35	± 13.3%
5750	35.4	5.22	4.92	4.92	4.92	0.45	1.45	± 13.3%

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

^F At frequency below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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





In Collaboration with

s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China

Tel: +86-10-62304633-2218

Fax: +86-10-62304633-2209

E-mail: cttl@chinattl.com<http://www.chinattl.cn>**DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7396****Calibration Parameter Determined in Body 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	55.5	0.96	10.09	10.09	10.09	0.30	0.90	± 12.1%
835	55.2	0.97	9.88	9.88	9.88	0.19	1.32	± 12.1%
900	55.0	1.05	9.82	9.82	9.82	0.23	1.15	± 12.1%
1750	53.4	1.49	8.24	8.24	8.24	0.24	1.06	± 12.1%
1900	53.3	1.52	7.97	7.97	7.97	0.19	1.24	± 12.1%
2100	53.2	1.62	8.18	8.18	8.18	0.19	1.39	± 12.1%
2300	52.9	1.81	7.88	7.88	7.88	0.55	0.80	± 12.1%
2450	52.7	1.95	7.53	7.53	7.53	0.46	0.89	± 12.1%
2600	52.5	2.16	7.38	7.38	7.38	0.52	0.80	± 12.1%
5250	48.9	5.36	4.93	4.93	4.93	0.45	1.80	± 13.3%
5600	48.5	5.77	4.19	4.19	4.19	0.48	1.90	± 13.3%
5750	48.3	5.94	4.52	4.52	4.52	0.48	1.95	± 13.3%

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

^F At frequency below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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





In Collaboration with

s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China

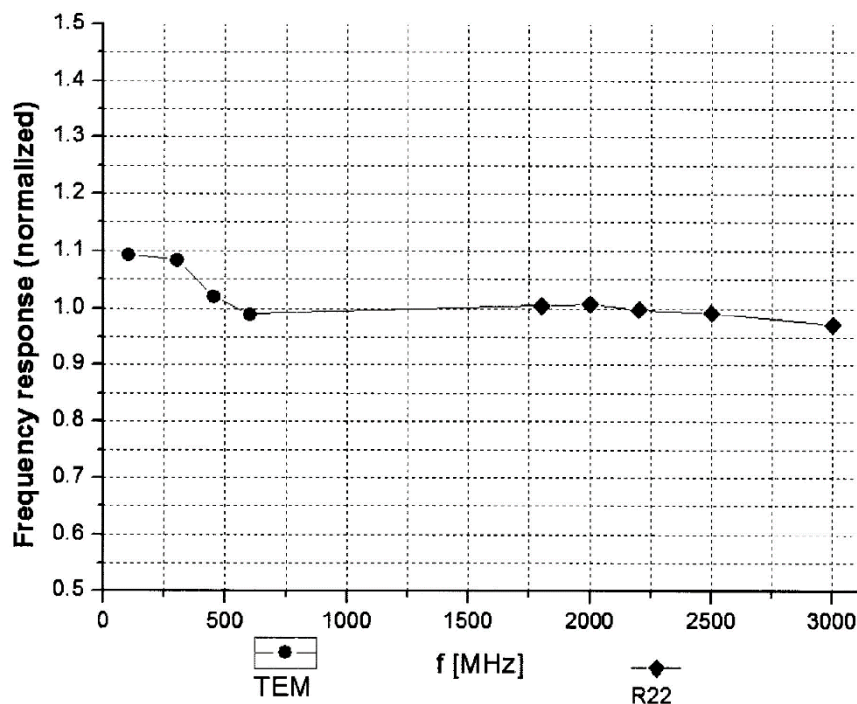
Tel: +86-10-62304633-2218

Fax: +86-10-62304633-2209

E-mail: cttl@chinattl.com

[Http://www.chinattl.cn](http://www.chinattl.cn)

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

Uncertainty of Frequency Response of E-field: $\pm 7.4\%$ ($k=2$)

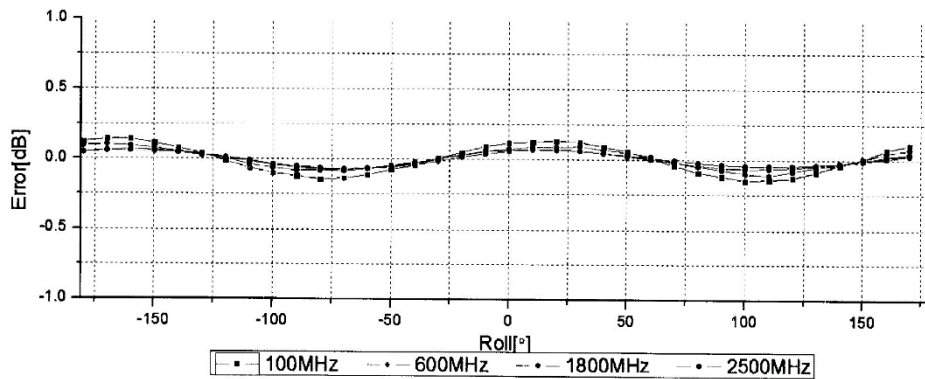
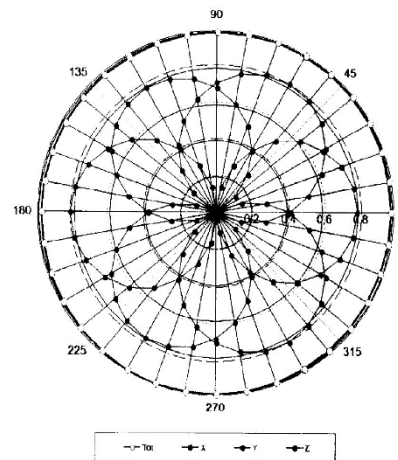
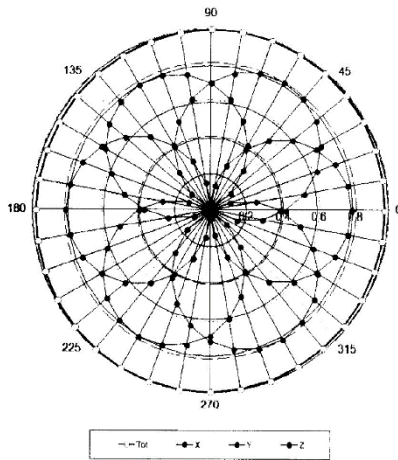


Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209
E-mail: cttl@chinattl.com [Http://www.chinattl.cn](http://www.chinattl.cn)

Receiving Pattern (Φ), $\theta=0^\circ$

f=600 MHz, TEM

f=1800 MHz, R22



Uncertainty of Axial Isotropy Assessment: $\pm 1.2\%$ (k=2)

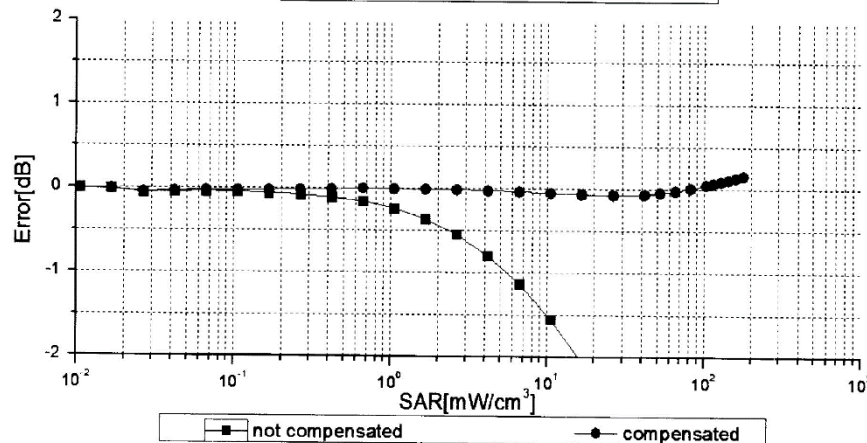
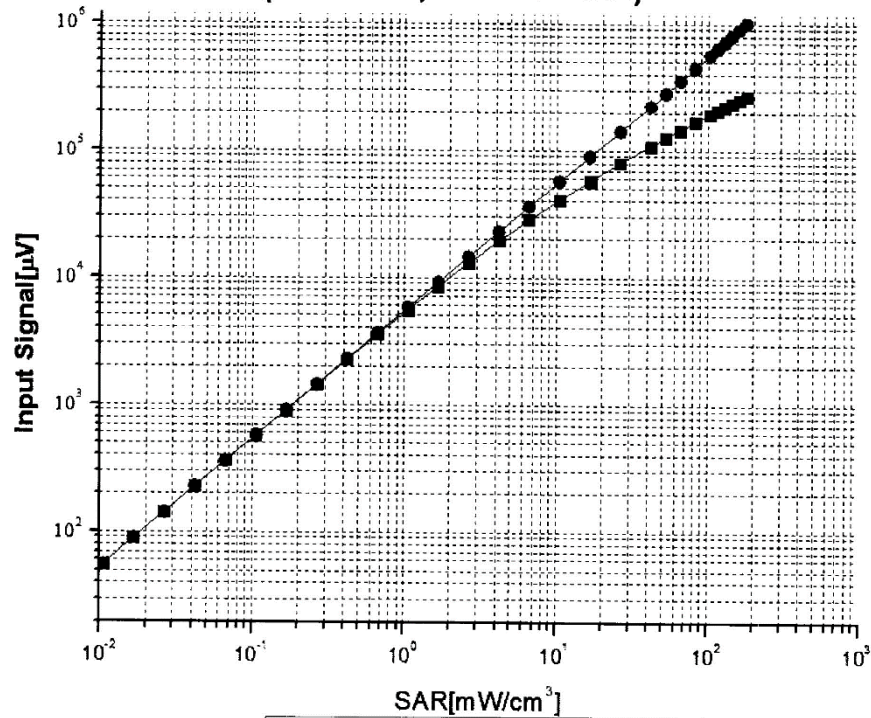




In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209
E-mail: cttl@chinattl.com [Http://www.chinattl.cn](http://www.chinattl.cn)

Dynamic Range f(SAR_{head}) (TEM cell, f = 900 MHz)



Uncertainty of Linearity Assessment: $\pm 0.9\%$ (k=2)

Certificate No: Z23-98671

Page 9 of 11





In Collaboration with

s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China

Tel: +86-10-62304633-2218

Fax: +86-10-62304633-2209

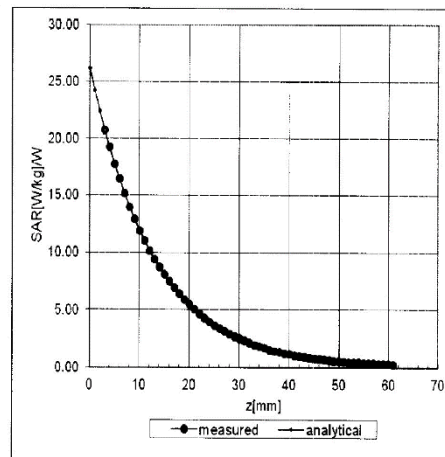
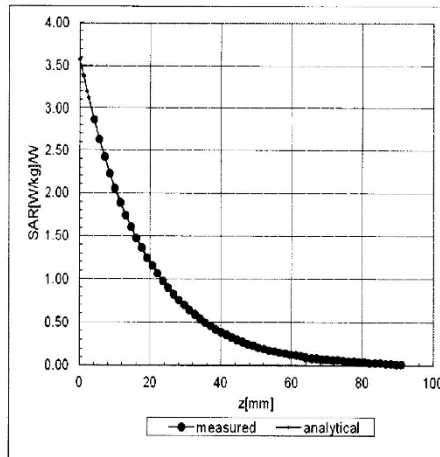
E-mail: cttl@chinattl.com

Http://www.chinattl.cn

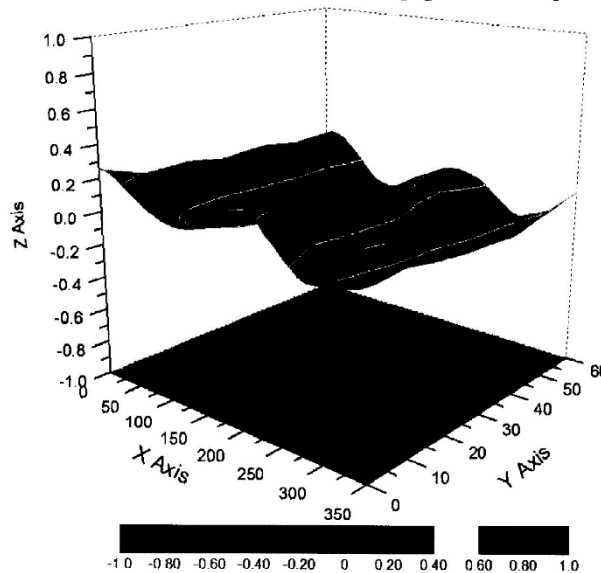
Conversion Factor Assessment

f=900 MHz, WGLS R9(H_convF)

f=1750 MHz, WGLS R22(H_convF)



Deviation from Isotropy in Liquid

Uncertainty of Spherical Isotropy Assessment: $\pm 3.2\%$ (K=2)



In Collaboration with

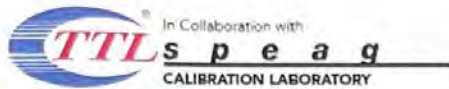
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209
E-mail: cttl@chinattl.com [Http://www.chinattl.cn](http://www.chinattl.cn)

DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7396**Other Probe Parameters**

Sensor Arrangement	Triangular
Connector Angle (°)	156.9
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





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

<http://www.caict.ac.cn>



中国认可
国际互认
校准
CALIBRATION
CNAS L0570

Client : CTA

Certificate No: J23Z60391

CALIBRATION CERTIFICATE

Object DAE3 - SN: 428

Calibration Procedure(s) FF-Z11-002-01
Calibration Procedure for the Data Acquisition Electronics
(DAEx)

Calibration date: August 30, 2023

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

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

Calibration Equipment used (M&TE critical for calibration)

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

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

Signature

Issued: September 06, 2023

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

Certificate No: J23Z60391

Page 1 of 3





In Collaboration with

s p e a g
CALIBRATION LABORATORY

Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China

Tel: +86-10-62304633-2117

E-mail: cmf@caict.ac.cn

<http://www.caict.ac.cn>**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.





In Collaboration with

s p e a g
CALIBRATION LABORATORY

Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China

Tel: +86-10-62304633-2117

E-mail: cmf@caict.ac.cn

<http://www.caict.ac.cn>**DC Voltage Measurement**

A/D - Converter Resolution nominal

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

Low Range: 1LSB = 61nV, full range = -1.....+3mV

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

Calibration Factors	X	Y	Z
High Range	404.468 ± 0.15% (k=2)	404.804 ± 0.15% (k=2)	404.579 ± 0.15% (k=2)
Low Range	3.95934 ± 0.7% (k=2)	3.95437 ± 0.7% (k=2)	3.91875 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	258.5° ± 1°
---	-------------





In Collaboration with
s p e a g
CALIBRATION LABORATORY



中国认可
国际互认
校准
CALIBRATION
CNAS L0570

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

Client **Anbotek (Auden)**Certificate No: **Z18-98076****CALIBRATION CERTIFICATE**Object **D750V3 - SN: 1118**Calibration Procedure(s)
FD-Z11-003-01
Calibration Procedures for dipole validation kitsCalibration date: **June 08, 2021**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	01-Jul-20 (CTTL, No.J27X04256)	Jun-21
Power sensor NRP-Z91	101547	01-Jul-20 (CTTL, No.J27X04256)	Jun-21
Reference Probe EX3DV4	SN 7307	19-Feb-21(SPEAG,No.EX3-7307_Feb18)	Feb-22
DAE4	SN 771	02-Feb-21(CTTL-SPEAG,No.Z18-97011)	Feb-22
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	01-Feb-21 (CTTL, No.J18X00893)	Jan-22
Network Analyzer E5071C	MY46110673	26-Jan-21 (CTTL, No.J18X00894)	Jan-22

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

Issued: June 10, 2021

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

Certificate No: Z18-97076

Page 1 of 8





In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM _{x,y,z}
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- 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
- IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

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%.





In Collaboration with

s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY52	52.10.0.1442
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	42.1 $\pm$ 6 %	0.88 mho/m $\pm$ 6 %
Head TSL temperature change during test	<1.0 °C	—	—

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.06 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	8.31 mW / g $\pm$ 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.37 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	5.52 mW / g $\pm$ 18.7 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	55.7 $\pm$ 6 %	0.97 mho/m $\pm$ 6 %
Body TSL temperature change during test	<1.0 °C	—	—

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.21 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	8.76 mW / g $\pm$ 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.48 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	5.88 mW / g $\pm$ 18.7 % (k=2)

Certificate No: Z18-97076

Page 3 of 8





In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China

Tel: +86-10-62304633-2079

E-mail: cttl@chinattl.com

Fax: +86-10-62304633-2504

http://www.chinattl.cn

Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.3Ω- 4.83jΩ
Return Loss	- 24.9dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.5Ω- 6.11jΩ
Return Loss	- 23.9dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.135 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
-----------------	-------





In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

DASY5 Validation Report for Head TSL

Date: 06.08.2021

Test Laboratory: CCTL, Beijing, China

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

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.882 \text{ S/m}$; $\epsilon_r = 42.14$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(10.05, 10.05, 10.05); Calibrated: 2/19/2021;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2021-02-02
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7372)

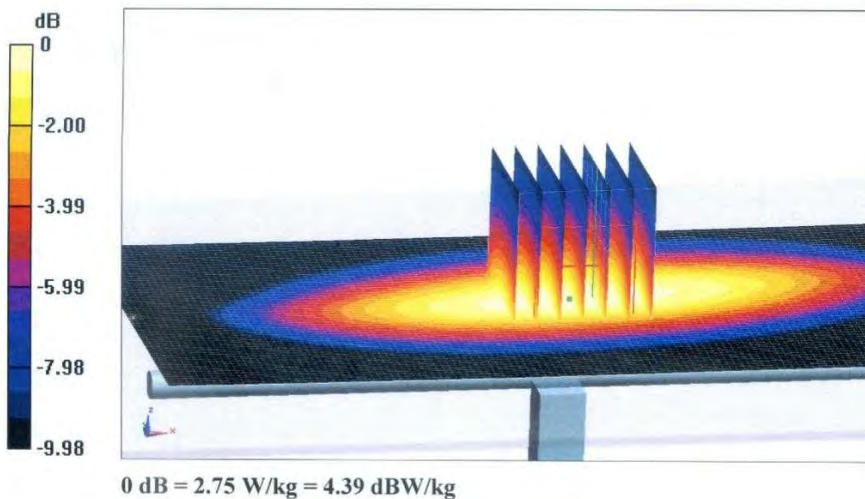
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 56.45 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 3.14 W/kg

SAR(1 g) = 2.06 W/kg; SAR(10 g) = 1.37 W/kg

Maximum value of SAR (measured) = 2.75 W/kg

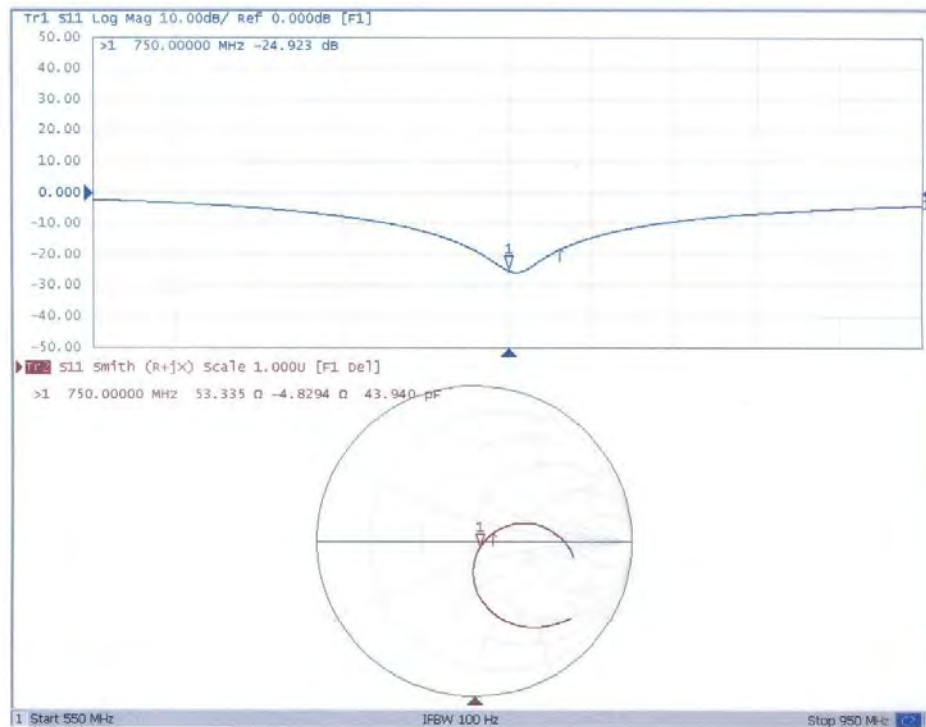




In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

Impedance Measurement Plot for Head TSL





In Collaboration with

s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China

Tel: +86-10-62304633-2079

Fax: +86-10-62304633-2504

E-mail: cttl@chinattl.com

http://www.chinattl.cn

DASY5 Validation Report for Body TSL

Date: 06.08.2021

Test Laboratory: CTTL, Beijing, China

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

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.972 \text{ S/m}$; $\epsilon_r = 55.73$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(9.8, 9.8, 9.8); Calibrated: 2/19/2021;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2021-02-02
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7372)

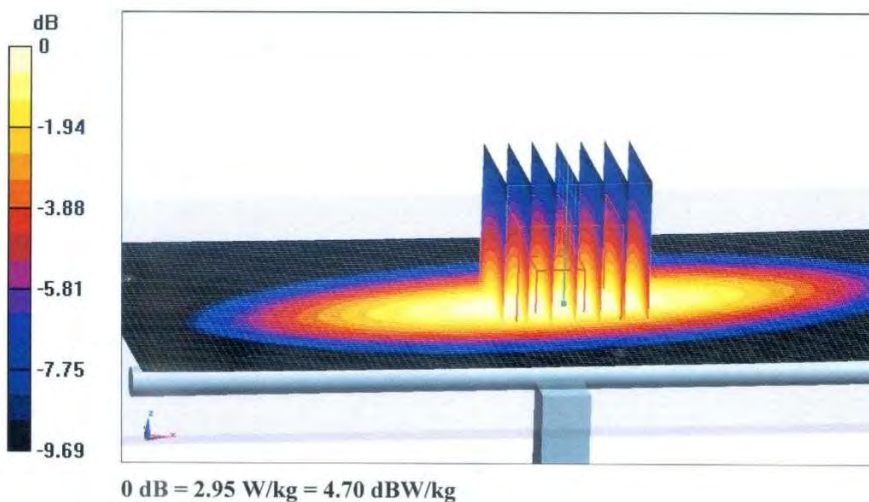
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 54.05 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 3.37 W/kg

SAR(1 g) = 2.21 W/kg; SAR(10 g) = 1.48 W/kg

Maximum value of SAR (measured) = 2.95 W/kg



Certificate No: Z18-97076

Page 7 of 8



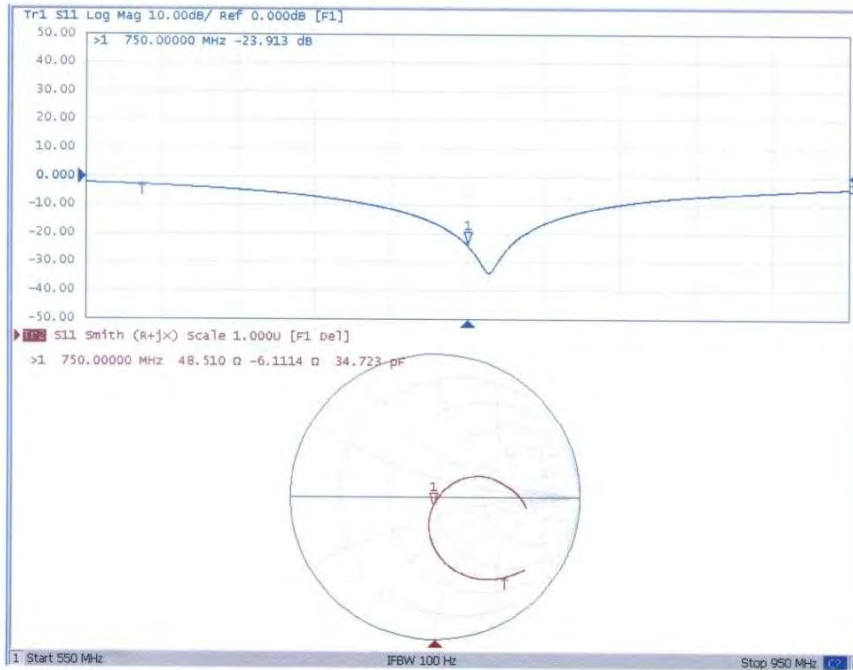


In Collaboration with

s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

Impedance Measurement Plot for Body TSL





In Collaboration with
s p e a g
CALIBRATION LABORATORY



中国认可
国际互认
校准
CALIBRATION
CNAS L0570

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com [Http://www.chinattl.cn](http://www.chinattl.cn)

Client

Anbotek (Auden)

Certificate No: Z18-97089

CALIBRATION CERTIFICATE

Object D835V2 - SN: 4d154

Calibration Procedure(s) FD-Z11-2-003-01
Calibration Procedures for dipole validation kits

Calibration date: Jun 16, 2021

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	1-Jul-20 (CTTL, No.J17X04256)	Jun-21
Power sensor NRP-Z91	101547	1-Jul-20 (CTTL, No.J17X04256)	Jun-21
Reference Probe EX3DV4	SN 7307	19-Feb-21(SPEAG,No.EX3-7307_Feb18)	Feb-22
DAE4	SN 771	02-Feb-21(CTTL-SPEAG,No.Z18-97011)	Feb-22
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	01-Feb-21 (CTTL, No.J18X00893)	Jan-22
Network Analyzer E5071C	MY46110673	26-Jan-21 (CTTL, No.J18X00894)	Jan-22

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: Jun 17, 2021

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

Certificate No: Z18-97089

Page 1 of 8





In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- 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
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

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%.





In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY52	52.8.8.1258
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	41.0 $\pm$ 6 %	0.89 mho/m $\pm$ 6 %
Head TSL temperature change during test	<1.0 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.30 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	9.24 mW / g $\pm$ 20.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.50 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	6.02 mW / g $\pm$ 20.4 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	55.4 $\pm$ 6 %	0.99 mho/m $\pm$ 6 %
Body TSL temperature change during test	<1.0 °C	---	---

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.43 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	9.57 mW / g $\pm$ 20.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.61 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	6.36 mW / g $\pm$ 20.4 % (k=2)

Certificate No: Z18-97089

Page 3 of 8





In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.2Ω- 3.11jΩ
Return Loss	- 29.8dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.6Ω- 2.33jΩ
Return Loss	- 27.4dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.508 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
-----------------	-------





In Collaboration with

s p e a k
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

DASY5 Validation Report for Head TSL

Date: 06.16.2021

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d154

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.891 \text{ S/m}$; $\epsilon_r = 40.97$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(10.01, 10.01, 10.01); Calibrated: 2/19/2021;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2021-02-02
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

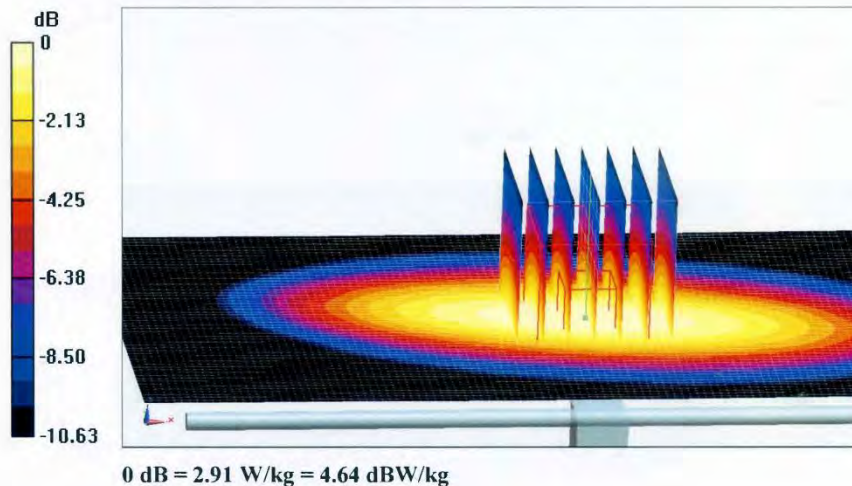
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 58.14V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 3.41 W/kg

SAR(1 g) = 2.3 W/kg; SAR(10 g) = 1.5 W/kg

Maximum value of SAR (measured) = 2.91 W/kg



Certificate No: Z18-97089

Page 5 of 8

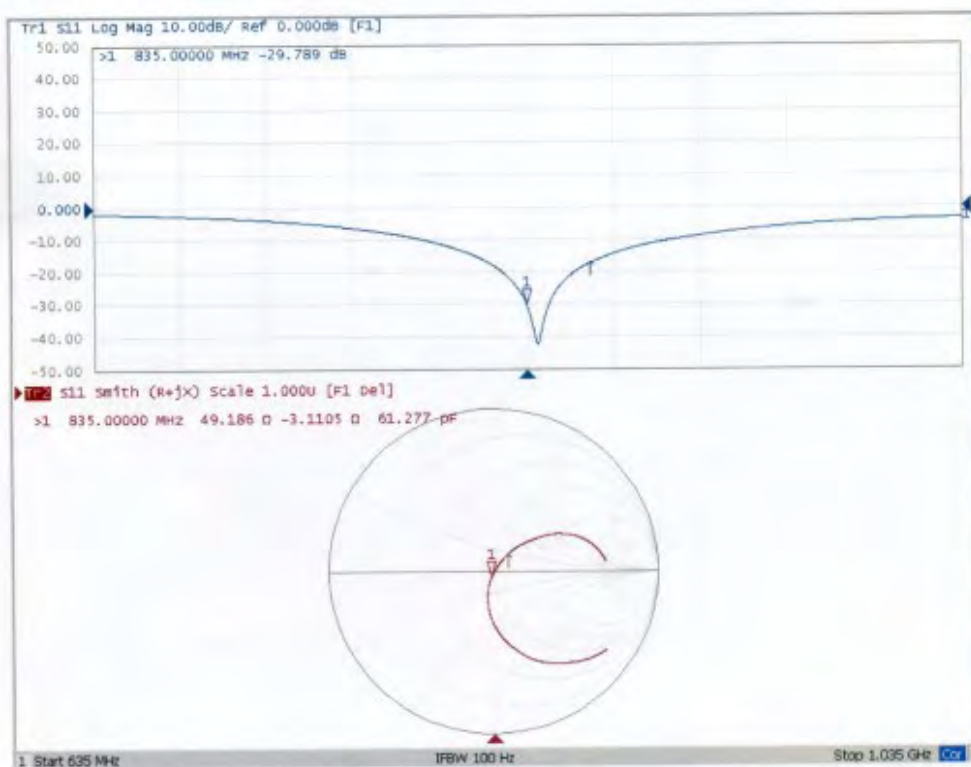




In Collaboration with
s p e a k
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

Impedance Measurement Plot for Head TSL



Certificate No: Z18-97089

Page 6 of 8



In Collaboration with

s p e a k
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

DASY5 Validation Report for Body TSL

Date: 06.16.2021

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d154

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.991 \text{ S/m}$; $\epsilon_r = 55.41$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(9.83,9.83, 9.83); Calibrated: 2/19/2021;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2021-02-02
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

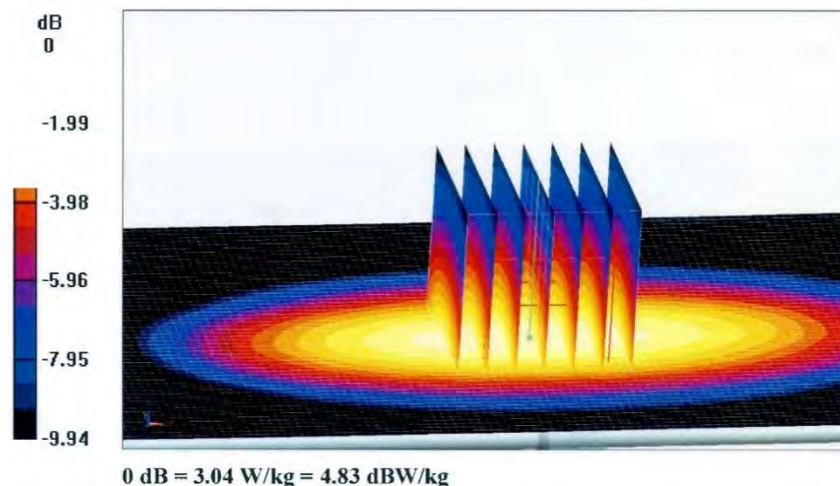
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$,
 $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 54.01 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.53 W/kg

SAR(1 g) = 2.43 W/kg; SAR(10 g) = 1.61 W/kg

Maximum value of SAR (measured) = 3.04 W/kg



Certificate No: Z18-97089

Page 7 of 8

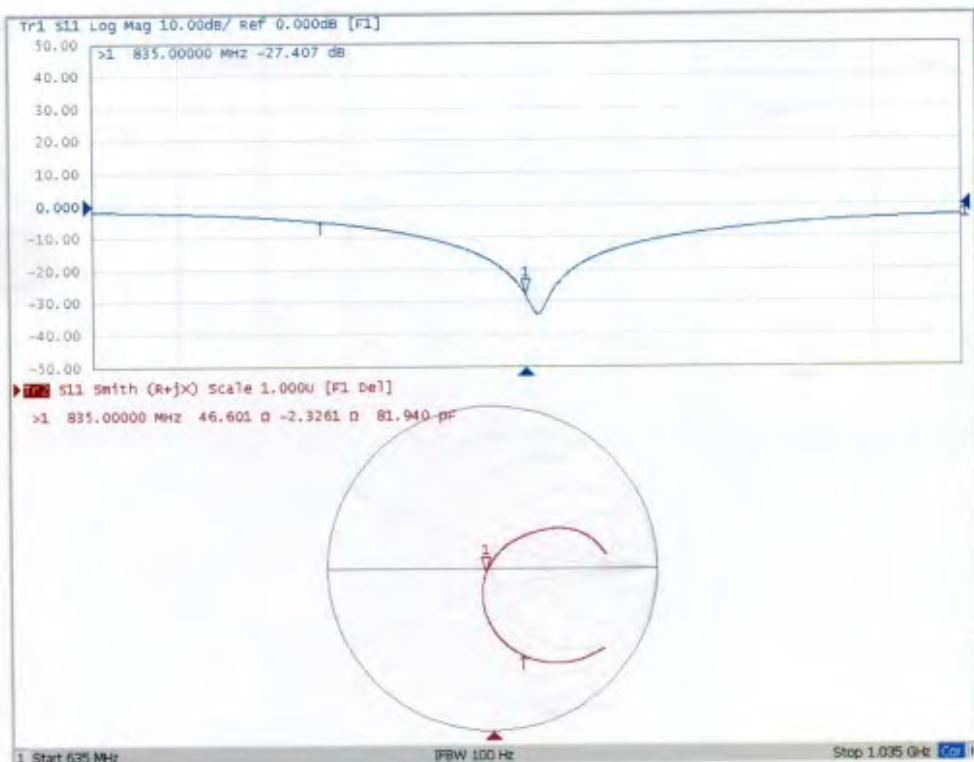




In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

Impedance Measurement Plot for Body TSL



Certificate No: Z18-97089

Page 8 of 8





In Collaboration with
s p e a g
CALIBRATION LABORATORY



中国认可
国际互认
校准
CALIBRATION
CNAS L0570

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com <http://www.chinattl.cn>

Client **Anbotek (Audien)**

Certificate No: 222-97090

CALIBRATION CERTIFICATE

Object **D1900V2 - SN: 5d175**

Calibration Procedure(s) **FD-Z11-2-003-01**
Calibration Procedures for dipole validation kits

Calibration date: **Jun 15, 2022**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	01-Jul-22 (CTTL, No.J22X04256)	Jun-22
Power sensor NRP-Z91	101547	01-Jul-22 (CTTL, No.J22X04256)	Jun-22
Reference Probe EX3DV4	SN 7307	19-Feb-22 (SPEAG, No.EX3-7307_Feb19)	Feb-22
D4E4	SN 771	02-Feb-22 (CTTL-SPEAG, No.222-97011)	Feb-22
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	01-Feb-22 (CTTL, No.J19X00893)	Jan-22
Network Analyzer E5071C	MY46110673	26-Jan-22 (CTTL, No.J19X00894)	Jan-22

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Qi Diaryuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: Jun 17, 2022

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

Certificate No: 222-97090

Page 1 of 8





In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: ttl@chinattl.com Http://www.chinattl.cn

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM _{x,y,z}
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- 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
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

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%.





In Collaboration with
s p e a k
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cntl@chinatitl.com Http://www.chinatitl.cn

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY52	52.8.8.1258
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	40.3 $\pm$ 6 %	1.38 mho/m $\pm$ 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.99 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	40.4 mW / g $\pm$ 20.8 % (k=2)
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.28 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	21.3 mW / g $\pm$ 20.4 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	53.3 $\pm$ 6 %	1.54 mho/m $\pm$ 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.1 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	40.1 mW / g $\pm$ 20.8 % (k=2)
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.39 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	21.5 mW / g $\pm$ 20.4 % (k=2)

Certificate No: Z.22-97090

Page 3 of 8





In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xuexuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.2Ω+ 5.44jΩ
Return Loss	- 24.3dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.9Ω+ 5.75jΩ
Return Loss	- 24.6dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.304 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
-----------------	-------





In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinaatl.com Http://www.chinaatl.cn

DASY5 Validation Report for Head TSL

Date: 06.15.2022

Test Laboratory: CCTL, Beijing, China

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

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.381$ S/m; $\epsilon_r = 40.33$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(8.1, 8.1, 8.1); Calibrated: 2/19/2022;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2/2/2022
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0; Measurement grid:

$dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 103.5V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 18.0W/kg

SAR(1 g) = 9.99 W/kg; SAR(10 g) = 5.28 W/kg

Maximum value of SAR (measured) = 14.1 W/kg



Certificate No: Z22-97090

Page 5 of 8

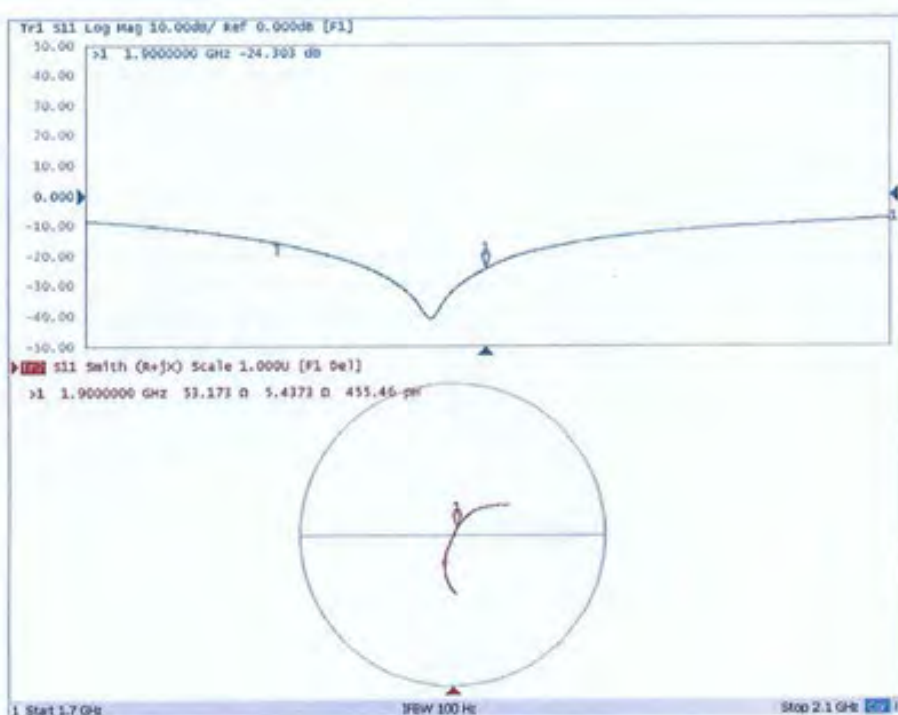




In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: ctt@chinattl.com http://www.chinattl.cn

Impedance Measurement Plot for Head TSL



Certificate No: Z22-97090

Page 6 of 8

