
TEST REPORT FOR SAR TESTING

Report No.: SRTC2019-9004(F)-19080101(H)

Product Name: LTE/WCDMA/GSM (GPRS) Multi-Mode

Digital Mobile Phone

Product Model: ZTE Blade A7 2019

Applicant: ZTE Corporation

Manufacturer: ZTE Corporation

Specification: Part 2.1093

IEEE Std 1528

KDB Procedures

FCC ID: SRQ-A72019

The State Radio_monitoring_center Testing Center (SRTC)

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1. GENERAL INFORMATION

1.1 Notes of the test report

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1.2 Information about the testing laboratory

Company:	The State Radio_monitoring_center Testing Center (SRTC)
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1.3 Applicant's details

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1.4 Manufacturer's details

Company:	ZTE Corporation
Address:	ZTE Plaza, Keji Road South,Hi-Tech, Industrial Park, Nanshan District,Shenzhen, P.R.China ,
City:	Shenzhen
Country or Region:	China
Contacted person:	Gong Yu
Tel:	86-21-68895397
Fax:	---
Email:	gongyu@zte.com.cn

1.5 Test Environment

Date of Receipt of test sample at SRTC:	2019.08.01
Testing Start Date:	2019.08.01
Testing End Date:	2019.08.19

Environmental Data:	Temperature (°C)	Humidity (%)
Ambient	25	40

Normal Supply Voltage (Vdc.):	3.85
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2. DESCRIPTION OF THE DEVICE UNDER TEST

2.1 Final Equipment Build Status

Wireless Technology and Frequency Bands	<input checked="" type="checkbox"/> GSM Band: GSM850/PCS1900 <input checked="" type="checkbox"/> WCDMA Band: FDD II/V <input checked="" type="checkbox"/> LTE Band: 2/4/5/12/13/17 <input checked="" type="checkbox"/> Bluetooth Band: 2.4GHz <input checked="" type="checkbox"/> Wi-Fi Band: 2.4GHz
Mode	GSM <input checked="" type="checkbox"/> Voice (GMSK) <input checked="" type="checkbox"/> GPRS (GMSK) <input checked="" type="checkbox"/> EGPRS (GMSK) WCDMA <input checked="" type="checkbox"/> UMTS Rel. 99 (Voice & Data) <input checked="" type="checkbox"/> HSDPA (Rel. 5) <input checked="" type="checkbox"/> HSUPA (Rel. 6) <input checked="" type="checkbox"/> HSPA+ (Rel.7) <input type="checkbox"/> DC-HSDPA (Rel.8) Wi-Fi 2.4GHz <input checked="" type="checkbox"/> 802.11b <input checked="" type="checkbox"/> 802.11g <input checked="" type="checkbox"/> 802.11n (20MHz) Bluetooth <input checked="" type="checkbox"/> BR(GFSK) <input checked="" type="checkbox"/> EDR ($\pi/4$ DQPSK, 8-DPSK) <input checked="" type="checkbox"/> BLE(GFSK) LTE <input checked="" type="checkbox"/> QPSK <input checked="" type="checkbox"/> 16QAM <input checked="" type="checkbox"/> 64QAM
Duty Cycle	GSM Voice: 12.5%; GPRS: 12.5% (1 Slot), 25% (2 Slots), 37.5% (3 Slots), 50% (4 Slots) WCDMA: 100% Bluetooth: 31.39% (DH1), 66.28% (DH3), 76.84% (DH5) Wi-Fi 2.4GHz:802.11b: 99.47%/11g: 97.11%/11n 20: 97.34%
GPRS/EGPRS Multi-Slot Class	<input type="checkbox"/> Class 8 - One Up <input type="checkbox"/> Class 10 - Two Up <input checked="" type="checkbox"/> Class 12 - Four Up <input type="checkbox"/> Class 33 - Four Up
Mobile Phone Capability	<input type="checkbox"/> Class A - Mobile phones can be connected to both GPRS and GSM services simultaneously. <input checked="" type="checkbox"/> Class B - Mobile phones can be attached to both GPRS and GSM services, using one service at a time. <input type="checkbox"/> Class C - Mobile phones are attached to either GPRS or GSM voice service. You need to switch manually between services
DTM	Not Supported

2.2 Support Equipment

The following support equipment was used to exercise the DUT during testing:

State of sample	Normal
Batteries1	Li3931T44P8h806139/Ningbo Veken Battery Co., Ltd.
Batteries2	Li3931T44P8h806139/ Zhongshan Tianmao Battery Co., Ltd.
H/W Version S/W Version	ukhB TEL_BHM_ZTE_Blade_A7_2019V1.0
IMEI	864432040464877
Notes	As the information described above, we use test sample offered by the customer. The relevant tests have been performed in order to verify in which combination case the EUT would have the worst features.

3. REFERENCE SPECIFICATION

Specification	Version	Title
Part 2.1093	2019	Radiofrequency radiation exposure evaluation: portable devices.
IEEE Std 1528	2013	IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
IEEE Std 1528a	2005	IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques Amendment 1: CAD File for Human Head Model (SAM Phantom)
KDB 447498 D01	v06	General RF Exposure Guidance
KDB 648474 D04	v01r03	Handset SAR
KDB 941225 D01	v03r01	3G SAR Procedures
KDB 248227 D01	v02r02	SAR GUIDANCE FOR IEEE 802.11 (Wi-Fi) TRANSMITTERS
KDB 865664 D01	v01r04	SAR Measurement from 100 MHz to 6 GHz
KDB 865664 D02	v01r02	RF Exposure Reporting
KDB 941225 D05	v02r05	SAR for LTE Devices
KDB 941225 D05A	v01r02	LTE Rel.10 KDB Inquiry Sheet

4. TEST CONDITIONS

4.1 Picture to demonstrate the required liquid depth

The liquid depth in the used SAM phantoms



Liquid depth for SAR Measurement

4.2 Test Signal, Frequencies and Output Power

The device was put into operation by using a call tester. Communication between the device and the call tester was established by air link.

The device output power was set to maximum power level for all tests; a fully charged battery was used for every test sequence.

In all operating bands the measurements were performed on middle channel, and few of them were also performed on lowest and highest channels.

4.3 SAR Measurement Set-up

The system is based on a high precision robot (working range greater than 0.9m), which positions the probes with a positional repeatability of better than $\pm 0.02\text{mm}$. Special E-field probes have been developed for measurements close to material discontinuity, the sensors of which are directly loaded with a Schottky diode and connected via highly resistive lines (length =300mm) to the data acquisition unit. A cell controller system contains the power supply, robot controller, teaches pendant (Joystick), and remote control, is used to drive the robot motors.

The PC consists of the Micron Pentium IV computer with Win7 system and SAR Measurement Software DASY5 Professional, A/D interface card, monitor, mouse, and

keyboard. The Stäubli Robot is connected to the cell controller to allow software manipulation of the robot.

A data acquisition electronic (DAE) circuit performs the signal amplification; signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card. The DAE consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines.

The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection

The robot uses its own controller with a built in VME-bus computer.

4.4 Phantoms

The phantom used for all tests i.e. for both system checks and device testing, was the twin headed "SAM Phantom", manufactured by SPEAG. The phantom conforms to the requirements of IEEE 1528 - 2013.

System checking was performed using the flat section, whilst Head SAR tests used the left and right head profile sections. Body SAR testing also used the flat section between the head profiles.

The SPEAG device holder (see Section 5.1) was used to position the device in all tests whilst a tripod was used to position the validation dipoles against the flat section of phantom.

4.5 Tissue Simulants

Recommended values for the dielectric parameters of the tissue simulants are given in IEEE 1528 - 2013 and FCC Supplement C to OET Bulletin 65. All tests were carried out using simulants whose dielectric parameters were within $\pm 5\%$ of the recommended values. All tests were carried out within 24 hours of measuring the dielectric parameters.

The depth of the tissue simulant was 15.0 ± 0.5 cm measured from the ear reference point during system checking and device measurements.

4.5.1 Tissue Stimulant Recipes

The following tissue stimulants were used for Head and Body test:

Name	Broadband tissue-equivalent liquid
Type for Head	HBBL600-6000V6 Head Simulating Liquid
Type for Body	HBBL600-6000V6 Head Simulating Liquid

4.6 DESCRIPTION OF THE TEST PROCEDURE

4.6.1 Device Holder

The device was placed in the device holder (illustrated below) that is supplied by SPEAG as an integral part of the Dasy5 system.



Device holder supplied by SPEAG

4.6.2 Test positions

4.6.2.1 Against Phantom Head

Measurements were made in “cheek” and “tilt” positions on both the left hand and right-hand sides of the phantom.

The positions used in the measurements were according to IEEE 1528 - 2013 "IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques".

4.6.2.2 Body Worn Configuration

The device was placed in the SPEAG holder below the flat section of the phantom. The distance between the device and the phantom was kept at the separation distance using a separate flat spacer that was removed before the start of the measurements. And the distance is 10mm. The device was oriented with its antenna facing the phantom since this orientation gives higher results.

4.6.3 Scan Procedure

First, area scans were used for determination of the field distribution and the approximate location of the local peak SAR values. The SAR distribution is scanned along the inside surface, at least for an area larger than the projection of the handset and antenna. The angle between the probe axis and the surface normal line is recommended but not required to be less than 30°. The SAR distribution is first measured on a 2-D coarse grid. The scan region should cover all areas that are exposed and encompassed by the projection of the handset. There are 15 mm × 15 mm (equal or less than 2GHz), 12 mm × 12 mm (from 2GHz~3GHz) and 10mm x 10mm (above 5GHz) measurement grid used when two staggered one-dimensional cubic splines are used to estimate the maximum SAR location. Next, a zoom scan, a minimum of 7x7x7 points covering a volume of at least 30x30x30mm, was performed around the highest E-field value to determine the averaged SAR value. Drift was determined by measuring the same point at the start of the area scan and again at the end of the zoom scan.

4.6.4 SAR Averaging Methods

The maximum SAR value was averaged over a cube of tissue using interpolation and extrapolation.

The interpolation, extrapolation and maximum search routines within DASY5 are all based on the modified Quadratic Shepard's method (Robert J. Renka, Multivariate Interpolation of Large Sets of Scattered Data", University of North Texas ACM Transactions on Mathematical Software, vol. 14, no. 2, June 1988, pp. 139-148).

The interpolation scheme combines a least-square fitted function method with a weighted average method. A triradiate 3-D / bivariate 2-D quadratic function is computed for each measurement point and fitted to neighboring points by a least-square method. For the zoom scan, inverse distance weighting is incorporated to fit distant points more accurately. The interpolating function is finally calculated as a weighted average of the quadratics.

In the zoom scan, the interpolation function is used to extrapolate the Peak SAR from the deepest measurement points to the inner surface of the phantom.

5 RESULT SUMMAR

The maximum reported SAR values for Head configuration and Body Worn configuration are given as follows. The device conforms to the requirements of the standard(s) when the maximum reported SAR value is less than or equal to the limit.

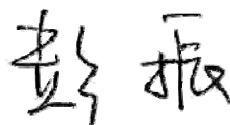


The second supply is tested for the worst mode of the main supply and the SAR values is less than main supply test result, so the result summary only reported SAR values for main supply.

Exposure Position	Frequency Band	1g-SAR Result(W/kg)	Highest 1g-SAR Result(W/kg)		Limit	Result
					(W/kg)/1g	
Head	GSM 850	0.19	0.40	0.76	1.6	Pass
	GSM 1900	0.09				
	WCDMA Band 2	0.22				
	WCDMA Band 5	0.21				
	LTE Band 2	0.26				
	LTE Band 4	0.19				
	LTE Band 5	0.19				
	LTE Band 12	0.12				
	LTE Band 13	0.13				
	LTE Band 17	0.12				
	BT/BLE 2.4GHz Band	0.21				
WLAN 2.4GHz	0.40					
Body-Worn (10mm Gap)	GSM 850	0.34	0.76	0.76	1.6	Pass
	GSM 1900	0.66				
	WCDMA Band 2	0.73				
	WCDMA Band 5	0.30				
	LTE Band 2	0.73				
	LTE Band 4	0.76				
	LTE Band 5	0.33				
	LTE Band 12	0.33				
	LTE Band 13	0.34				
	LTE Band 17	0.31				
	BT/BLE 2.4GHz Band	0.10				
WLAN 2.4GHz	0.22					

Exposure Position	Frequency Band	1g-SAR Result(W/kg)	Highest 1g-SAR Result(W/kg)		Limit	Result
					(W/kg)/1g	
Hotspot (10mm Gap)	GSM 850	0.34	0.76	0.76	1.6	Pass
	GSM 1900	0.66				
	WCDMA Band 2	0.73				
	WCDMA Band 5	0.30				
	LTE Band 2	0.37				
	LTE Band 4	0.76				
	LTE Band 5	0.33				
	LTE Band 12	0.33				
	LTE Band 13	0.34				
	LTE Band 17	0.31				
	WLAN 2.4GHz	0.10				

Simultaneous Transmission Summary

Exposure Position	Frequency Band	1g-SAR Result (W/kg)	Highest 1g-SAR Result(W/kg)		Limit (W/kg)/1g	Result
Head	GSM & Wi-Fi(2.4G) /BT/BLE	0.54	0.57	0.99	1.6	pass
	WCDMA & Wi-Fi(2.4G) /BT/BLE	0.57				
	LTE & Wi-Fi(2.4G) /BT/BLE	0.54				
Body-Worn (10mm Gap)	GSM & Wi-Fi(2.4G) /BT/BLE	0.88	0.99	0.99	1.6	pass
	WCDMA & Wi-Fi(2.4G) /BT/BLE	0.95				
	LTE & Wi-Fi(2.4G) /BT/BLE	0.99				
hotspot (10mm Gap)	GSM & Wi-Fi(2.4G)	0.88	0.99	0.99	1.6	pass
	WCDMA & Wi-Fi(2.4G)	0.95				
	LTE & Wi-Fi(2.4G)	0.99				

This Test Report Is Issued by: Mr. Peng Zhen 	Checked by: Mr. Lin Bin 
Tested by: Mr. Tong Daocheng 	Issued date: 20190829

6 TEST RESULT

6.1 Manufacturing Tolerance

GSM

GSM 850			
Channel	Channel 128	Channel 189	Channel 251
Tolerance (dBm)	29.0~33.0	29.0~33.0	29.0~33.0

GSM 850 GPRS				
Channel		128	189	251
1 Txslot	Tolerance (dBm)	29.0~33.0	29.0~33.0	29.0~33.0
2 Txslot	Tolerance (dBm)	27.0~31.0	27.0~31.0	27.0~31.0
3 Txslot	Tolerance (dBm)	25.5~29.5	25.5~29.5	25.5~29.5
4 Txslot	Tolerance (dBm)	23.5~27.5	23.5~27.5	23.5~27.5

GSM 850 EGPRS(GMSK)				
Channel		128	189	251
1 Txslot	Tolerance (dBm)	29.0~33.0	29.0~33.0	29.0~33.0
2 Txslot	Tolerance (dBm)	27.0~31.0	27.0~31.0	27.0~31.0
3 Txslot	Tolerance (dBm)	25.5~29.5	25.5~29.5	25.5~29.5
4 Txslot	Tolerance (dBm)	23.5~27.5	23.5~27.5	23.5~27.5

GSM 850 EGPRS(8PSK)				
Channel		128	189	251
1 Txslot	Tolerance (dBm)	22.0~26.0	22.5~26.5	22.5~26.5
2 Txslot	Tolerance (dBm)	21.0~25.0	21.0~25.0	21.0~25.0
3 Txslot	Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0
4 Txslot	Tolerance (dBm)	17.0~21.0	17.0~21.0	17.0~21.0

GSM 1900			
Channel	Channel 512	Channel 661	Channel 810
Tolerance (dBm)	26.0~30.0	26.0~30.0	26.0~30.0

GSM 1900 GPRS				
Channel		512	661	810
1 Txslot	Tolerance (dBm)	26.0~30.0	26.0~30.0	26.0~30.0
2 Txslot	Tolerance (dBm)	24.0~28.0	24.0~28.0	24.0~28.0
3 Txslot	Tolerance (dBm)	22.0~26.0	22.0~26.0	22.0~26.0
4 Txslot	Tolerance (dBm)	20.0~24.0	20.0~24.0	20.0~24.0

GSM 1900 EGPRS(GMSK)				
Channel		512	661	810
1 Txslot	Tolerance (dBm)	26.0~30.0	26.0~30.0	26.0~30.0
2 Txslot	Tolerance (dBm)	24.0~28.0	24.0~28.0	24.0~28.0
3 Txslot	Tolerance (dBm)	22.0~26.0	22.0~26.0	22.0~26.0
4 Txslot	Tolerance (dBm)	20.0~24.0	20.0~24.0	20.0~24.0

GSM 1900 EGPRS(8PSK)				
Channel		512	661	810
1 Txslot	Tolerance (dBm)	21.5~25.5	21.5~25.5	21.5~25.5
2 Txslot	Tolerance (dBm)	20.0~24.0	20.0~24.0	20.0~24.0
3 Txslot	Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0
4 Txslot	Tolerance (dBm)	15.5~19.5	15.5~19.5	15.5~19.5

WCDMA

WCDMA Band II			
Channel	9262	9400	9538
Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0

HSDPA Band II				
Channel		9262	9400	9538
Sub test 1	Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0
Sub test 2	Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0
Sub test 3	Tolerance (dBm)	17.5~21.5	17.5~21.5	17.5~21.5
Sub test 4	Tolerance (dBm)	17.5~21.5	17.5~21.5	17.5~21.5

HSUPA Band II				
Channel		9262	9400	9538
Sub test 1	Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0
Sub test 2	Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0
Sub test 3	Tolerance (dBm)	17.5~21.5	17.5~21.5	17.5~21.5
Sub test 4	Tolerance (dBm)	17.5~21.5	17.5~21.5	17.5~21.5
Sub test 5	Tolerance (dBm)	17.5~21.5	17.5~21.5	17.5~21.5

HSPA+ Band II				
Channel		9262	9400	9538
QPSK	Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0
16QAM	Tolerance (dBm)	17.0~21.0	17.0~21.0	17.0~21.0

WCDMA Band V				
Channel		4132	4183	4233
Tolerance (dBm)		20.0~24.0	20.0~24.0	20.0~24.0

HSDPA Band V				
Channel		4132	4183	4233
Sub test 1	Tolerance (dBm)	20.0~24.0	20.0~24.0	20.0~24.0
Sub test 2	Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5
Sub test 3	Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5
Sub test 4	Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5

HSUPA Band V				
Channel		4132	4183	4233
Sub test 1	Tolerance (dBm)	20.0~24.0	20.0~24.0	20.0~24.0
Sub test 2	Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5
Sub test 3	Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5
Sub test 4	Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5
Sub test 5	Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5

HSPA+ Band V				
Channel		4132	4183	4233
QPSK	Tolerance (dBm)	20.0~24.0	20.0~24.0	20.0~24.0
16QAM	Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5

LTE

Band 2

QPSK

20BW 100%RB			
Channel	Channel 18700	Channel 18900	Channel 19100
Tolerance (dBm)	17.0~21.0	17.0~21.0	17.0~21.0
20BW 50%RB			
Channel	Channel 18700	Channel 18900	Channel 19100
Tolerance (dBm)	17.0~21.0	17.0~21.0	17.0~21.0
20BW 1RB			
Channel	Channel 18700	Channel 18900	Channel 19100
Tolerance (dBm)	18.2~22.2	18.2~22.2	18.2~22.2

16QAM

20BW 100%RB			
Channel	Channel 18700	Channel 18900	Channel 19100
Tolerance (dBm)	16.0~20.0	16.0~20.0	16.0~20.0
20BW 50%RB			
Channel	Channel 18700	Channel 18900	Channel 19100
Tolerance (dBm)	16.0~20.0	16.0~20.0	16.0~20.0
20BW 1RB			
Channel	Channel 18700	Channel 18900	Channel 19100
Tolerance (dBm)	17.0~21.0	17.0~21.0	17.0~21.0

64QAM

20BW 100%RB			
Channel	Channel 18700	Channel 18900	Channel 19100
Tolerance (dBm)	16.0~20.0	16.0~20.0	16.0~20.0
20BW 50%RB			
Channel	Channel 18700	Channel 18900	Channel 19100
Tolerance (dBm)	16.0~20.0	16.0~20.0	16.0~20.0
20BW 1RB			
Channel	Channel 18700	Channel 18900	Channel 19100
Tolerance (dBm)	16.5~20.5	16.5~20.5	16.5~20.5

Band 4
QPSK

20BW 100%RB			
Channel	Channel 20050	Channel 20175	Channel 20300
Tolerance (dBm)	15.0~19.0	15.0~19.0	15.0~19.0
20BW 50%RB			
Channel	Channel 20050	Channel 20175	Channel 20300
Tolerance (dBm)	15.0~19.0	15.0~19.0	15.0~19.0
20BW 1RB			
Channel	Channel 20050	Channel 20175	Channel 20300
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5

16QAM

20BW 100%RB			
Channel	Channel 20050	Channel 20175	Channel 20300
Tolerance (dBm)	16.0~20.0	16.0~20.0	16.0~20.0
20BW 50%RB			
Channel	Channel 20050	Channel 20175	Channel 20300
Tolerance (dBm)	16.5~20.5	16.5~20.5	16.5~20.5
20BW 1RB			
Channel	Channel 20050	Channel 20175	Channel 20300
Tolerance (dBm)	17.0~21.0	17.0~21.0	17.0~21.0

64QAM

20BW 100%RB			
Channel	Channel 20050	Channel 20175	Channel 20300
Tolerance (dBm)	16.0~20.0	16.0~20.0	16.0~20.0
20BW 50%RB			
Channel	Channel 20050	Channel 20175	Channel 20300
Tolerance (dBm)	16.0~20.0	16.0~20.0	16.0~20.0
20BW 1RB			
Channel	Channel 20050	Channel 20175	Channel 20300
Tolerance (dBm)	17.0~21.0	17.0~21.0	17.0~21.0

Band 5
QPSK

10BW 100%RB			
Channel	Channel 20450	Channel 20525	Channel 20600
Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0
10BW 50%RB			
Channel	Channel 20450	Channel 20525	Channel 20600
Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0
10BW 1RB			
Channel	Channel 20450	Channel 20525	Channel 20600
Tolerance (dBm)	20.0~24.0	20.0~24.0	20.0~24.0

16QAM

10BW 100%RB			
Channel	Channel 20450	Channel 20525	Channel 20600
Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0
10BW 50%RB			
Channel	Channel 20450	Channel 20525	Channel 20600
Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0
10BW 1RB			
Channel	Channel 20450	Channel 20525	Channel 20600
Tolerance (dBm)	20.0~24.0	20.0~24.0	20.0~24.0

64QAM

10BW 100%RB			
Channel	Channel 20450	Channel 20525	Channel 20600
Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0
10BW 50%RB			
Channel	Channel 20450	Channel 20525	Channel 20600
Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0
10BW 1RB			
Channel	Channel 20450	Channel 20525	Channel 20600
Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0

Band 12
QPSK

10BW 100%RB			
Channel	Channel 23060	Channel 23095	Channel 23130
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5
10BW 50%RB			
Channel	Channel 23060	Channel 23095	Channel 23130
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5
10BW 1RB			
Channel	Channel 23060	Channel 23095	Channel 23130
Tolerance (dBm)	20.0~24.0	20.0~24.0	20.0~24.0

16QAM

10BW 100%RB			
Channel	Channel 23060	Channel 23095	Channel 23130
Tolerance (dBm)	17.5~21.5	17.5~21.5	17.5~21.5
10BW 50%RB			
Channel	Channel 23060	Channel 23095	Channel 23130
Tolerance (dBm)	17.5~21.5	17.5~21.5	17.5~21.5
10BW 1RB			
Channel	Channel 23060	Channel 23095	Channel 23130
Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5

64QAM

10BW 100%RB			
Channel	Channel 23060	Channel 23095	Channel 23130
Tolerance (dBm)	20.0~24.0	20.0~24.0	20.0~24.0
10BW 50%RB			
Channel	Channel 23060	Channel 23095	Channel 23130
Tolerance (dBm)	15.5~19.5	15.5~19.5	15.5~19.5
10BW 1RB			
Channel	Channel 23060	Channel 23095	Channel 23130
Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0

Band 13
QPSK

10BW 1RB			
Channel	Channel 23230	Channel 23230	Channel 23230
Tolerance (dBm)	20.0~24.0	20.0~24.0	20.0~24.0
10BW 50%RB			
Channel	Channel 23230	Channel 23230	Channel 23230
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5
10BW 100%RB			
Channel	Channel 23230	Channel 23230	Channel 23230
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5

16QAM

10BW 1RB			
Channel	Channel 23230	Channel 23230	Channel 23230
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5
10BW 50%RB			
Channel	Channel 23230	Channel 23230	Channel 23230
Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0
10BW 100%RB			
Channel	Channel 23230	Channel 23230	Channel 23230
Tolerance (dBm)	17.5~21.5	17.5~21.5	17.5~21.5

64QAM

10BW 1RB			
Channel	Channel 23230	Channel 23230	Channel 23230
Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0
10BW 50%RB			
Channel	Channel 23230	Channel 23230	Channel 23230
Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0
10BW 100%RB			
Channel	Channel 23230	Channel 23230	Channel 23230
Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0

Band 17
QPSK

10BW 100%RB			
Channel	Channel 23780	Channel 23790	Channel 23800
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5
10BW 50%RB			
Channel	Channel 23780	Channel 23790	Channel 23800
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5
10BW 1RB			
Channel	Channel 23780	Channel 23790	Channel 23800
Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5

16QAM

10BW 100%RB			
Channel	Channel 23780	Channel 23790	Channel 23800
Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0
10BW 50%RB			
Channel	Channel 23780	Channel 23790	Channel 23800
Tolerance (dBm)	17.5~21.5	17.5~21.5	17.5~21.5
10BW 1RB			
Channel	Channel 23780	Channel 23790	Channel 23800
Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0

64QAM

10BW 100%RB			
Channel	Channel 23780	Channel 23790	Channel 23800
Tolerance (dBm)	17.5~21.5	17.5~21.5	17.5~21.5
10BW 50%RB			
Channel	Channel 23780	Channel 23790	Channel 23800
Tolerance (dBm)	17.5~21.5	17.5~21.5	17.5~21.5
10BW 1RB			
Channel	Channel 23780	Channel 23790	Channel 23800
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5

Bluetooth

GFSK			
Channel	0	39	78
Tolerance (dBm)	3.0~7.0	3.0~7.0	3.0~7.0
$\pi/4$ DQPSK			
Channel	0	39	78
Tolerance (dBm)	2.0~6.0	2.0~6.0	2.0~6.0
8DPSK			
Channel	0	39	78
Tolerance (dBm)	1.5~5.5	1.5~5.5	1.5~5.5

Bluetooth (BLE)

GFSK(1Mbps)			
Channel	0	19	39
Tolerance (dBm)	-5.5~-1.5	-5.5~-1.5	-5.5~-1.5

WLAN 2.4GHz

802.11b			
Channel	1	6	11
Tolerance (dBm)	14.0~18.0	14.0~18.0	14.0~18.0
802.11g			
Channel	1	6	11
Tolerance (dBm)	13.5~17.5	13.5~17.5	13.5~17.5
802.11n HT20			
Channel	1	6	11
Tolerance (dBm)	12.5~16.5	12.5~16.5	12.5~16.5

6.2 GSM Measurement result

GSM Measured Power

Mode	GSM850			GSM1900		
Channel	128	189	251	512	661	810
Frequency (MHz)	824.2	836.4	848.8	1850.2	1880.0	1909.8
Measured Power(dBm)	32.92	32.95	32.99	29.43	29.60	29.64

GSM Frame Average Power

Mode	GSM850			GSM1900		
Channel	128	189	251	512	661	810
Frequency (MHz)	824.2	836.4	848.8	1850.2	1880.0	1909.8
Frame Average Power (dBm)	23.89	23.92	23.96	20.40	20.57	20.61

GPRS Measured Power

Mode	GPRS850			GPRS1900		
Channel	128	189	251	512	661	810
Frequency (MHz)	824.2	836.4	848.8	1850.2	1880.0	1909.8
4Downlink1uplinkPower(dBm)	32.92	32.96	32.99	29.43	29.60	29.64
3Downlink2uplinkPower(dBm)	30.97	30.99	30.98	27.59	27.44	27.35
2Downlink3uplinkPower(dBm)	29.16	29.17	29.15	25.75	25.68	25.57
1Downlink4uplinkPower(dBm)	27.04	27.07	27.04	23.95	23.91	23.80

GPRS Frame Average Power

Mode	GPRS850			GPRS1900		
Channel	128	189	251	512	661	810
Frequency (MHz)	824.2	836.4	848.8	1850.2	1880.0	1909.8
4Downlink1uplinkPower(dBm)	23.89	23.93	23.96	20.40	20.57	20.61
3Downlink2uplinkPower(dBm)	24.95	24.97	24.96	21.57	21.42	21.33
2Downlink3uplinkPower(dBm)	24.90	24.91	24.89	21.49	21.42	21.31
1Downlink4uplinkPower(dBm)	24.03	24.06	24.03	20.94	20.90	20.79

EGPRS Measured Power

Mode	EGPRS850(GMSK)			EGPRS1900(GMSK)		
	EGPRS850 (8PSK)			EGPRS1900 (8PSK)		
Channel	128	189	251	512	661	810
Frequency(MHz)	824.2	836.4	848.8	1850.2	1880.0	1909.8
4Downlink1uplinkPower(dBm)	32.92	32.96	32.99	29.43	29.60	29.64
	25.79	25.97	25.77	25.08	25.48	25.14
3Downlink2uplinkPower(dBm)	30.97	30.99	30.98	27.59	27.44	27.35
	24.40	24.65	24.39	23.38	23.74	23.37
2Downlink3uplinkPower(dBm)	29.16	29.17	29.15	25.75	25.68	25.57
	22.46	22.58	22.29	21.16	21.60	21.16
1Downlink4uplinkPower(dBm)	27.04	27.07	27.04	23.95	23.91	23.80
	20.30	20.58	20.15	18.74	19.07	18.69

EGPRS Frame Average Power

Mode	EGPRS850(GMSK)			EGPRS1900(GMSK)		
	EGPRS850 (8PSK)			EGPRS1900 (8PSK)		
Channel	128	189	251	512	661	810
Frequency(MHz)	824.2	836.4	848.8	1850.2	1880.0	1909.8
4Downlink1uplinkPower(dBm)	23.89	23.93	23.96	20.4	20.57	20.61
	16.76	16.94	16.74	16.05	16.45	16.11
3Downlink2uplinkPower(dBm)	24.95	24.97	24.96	21.57	21.42	21.33
	18.38	18.63	18.37	17.36	17.72	17.35
2Downlink3uplinkPower(dBm)	24.90	24.91	24.89	21.49	21.42	21.31
	18.20	18.32	18.03	16.90	17.34	16.90
1Downlink4uplinkPower(dBm)	24.03	24.06	24.03	20.94	20.90	20.79
	17.29	17.57	17.14	15.73	16.06	15.68

Division Factors (for Measured Power and Frame Average Power):

To average the power, the division factor is as follows:

1TX-slot (4Downlink1uplink) = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB

2TX-slots(3Downlink2uplink) = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB

3TX-slots (2Downlink3uplink) = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB

4TX-slots (1Downlink4uplink) = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB

There is a little difference for modulation type GMSK between GPRS and EDGE (EGPRS), the bit rate is not the same, so we also test the power of GMSK type for EDGE. According to the frame average conducted power as above, the SAR measurements are performed with **2Txslots (3Downlink2uplink)** of GPRS (GMSK).

6.3 WCDMA Measurement result

The following procedures are according to FCC KDB Publication 941225 D01.Release 99
The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 specification. The DUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7).

Mode	Subtest	Rel99
WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	β_c/β_d	8/15

HSDPA

The following 4 Sub-tests were completed according to Release 5 procedures in section 5.2 of 3GPP TS34.121.

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	$\beta_{hs}^{(1)}$	CM(dB) ⁽²⁾
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15 ⁽³⁾	15/15 ⁽³⁾	64	12/15 ⁽³⁾	24/15	1.0
3	15/15	8/15	64	15/18	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5

Note1: Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$.

Note2: CM=1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$.

Note3: 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 signaled gain factors for the reference TFC(TF1,TF1) to $\beta_c = 11/15$ and $\beta_d = 15/15$.

HSUPA

The following 5 Sub-tests were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121.

Sub-test	β_c	β_d	β_d (S F)	β_c/β_d	$\beta_{hs}^{(1)}$	β_{ec}	β_{ed}	β_{ed} (S F)	β_{ed} (code s)	CM ⁽²⁾ (dB)	MP R (dB)	AG ⁽⁴⁾ Index	E-TF CI
1	11/15 ⁽³⁾	15/15 ⁽³⁾	64	11/15 ⁽³⁾	22/15	209/25	1039/25	4	1	1.0	2.0	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	$\beta_{ed1}:47/15$ $\beta_{ed2}:47/15$	4	2	2.0	2.0	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 ⁽⁴⁾	15/15 ⁽⁴⁾	64	15/15 ⁽⁴⁾	30/15	24/15	134/15	4	1	1.0	2.0	21	81

Note1: Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$.

Note2: 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.

Note3: 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 signaled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$.

Note4: 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 signaled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 14/15$ and $\beta_d = 15/15$.

NOTE5: Testing UE using E-DPDCH Physical layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g.

NOTE6: β_{ed} can not be set directly; it is set by Absolute Grant Value.

R99 Measured Results

Mode	Band II		
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880	1907.6
RB test mode1+64kRMC(dBm)	20.58	20.65	20.71
RB test mode1+12.2kRMC(dBm)	21.77	21.73	21.78
RB test mode1+144kRMC(dBm)	20.62	20.67	20.71
RB test mode1+384kRMC(dBm)	20.64	20.52	20.63

Mode	Band V		
Channel	4132	4183	4233
Frequency(MHz)	826.4	836.4	846.6
RB test mode1+64kRMC(dBm)	22.96	23.01	22.75
RB test mode1+12.2kRMC(dBm)	23.80	23.86	23.81
RB test mode1+144kRMC(dBm)	22.97	23.02	22.75
RB test mode1+384kRMC(dBm)	22.91	23.08	22.74

WCDMA Band II

Mode		Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
HSDPA	Subtest 1	1852.4	9262	21.77
		1880.0	9400	21.73
		1907.6	9538	21.78
	Subtest 2	1852.4	9262	21.56
		1880.0	9400	21.51
		1907.6	9538	21.59
	Subtest 3	1852.4	9262	21.53
		1880.0	9400	21.50
		1907.6	9538	21.55
	Subtest 4	1852.4	9262	21.46
		1880.0	9400	21.42
		1907.6	9538	21.48
HSUPA	Subtest 1	1852.4	9262	21.44
		1880.0	9400	21.49
		1907.6	9538	21.47
	Subtest 2	1852.4	9262	21.60
		1880.0	9400	21.55
		1907.6	9538	21.65
	Subtest 3	1852.4	9262	21.54
		1880.0	9400	21.47
		1907.6	9538	21.55
	Subtest 4	1852.4	9262	21.39
		1880.0	9400	21.33
		1907.6	9538	21.41
	Subtest 5	1852.4	9262	21.36
		1880.0	9400	21.29
		1907.6	9538	21.40
HSPA+	QPSK	1852.4	9262	21.30
		1880.0	9400	21.27
		1907.6	9538	21.35
	16QAM	1852.4	9262	21.64
		1880.0	9400	21.57
		1907.6	9538	21.69

WCDMA Band V

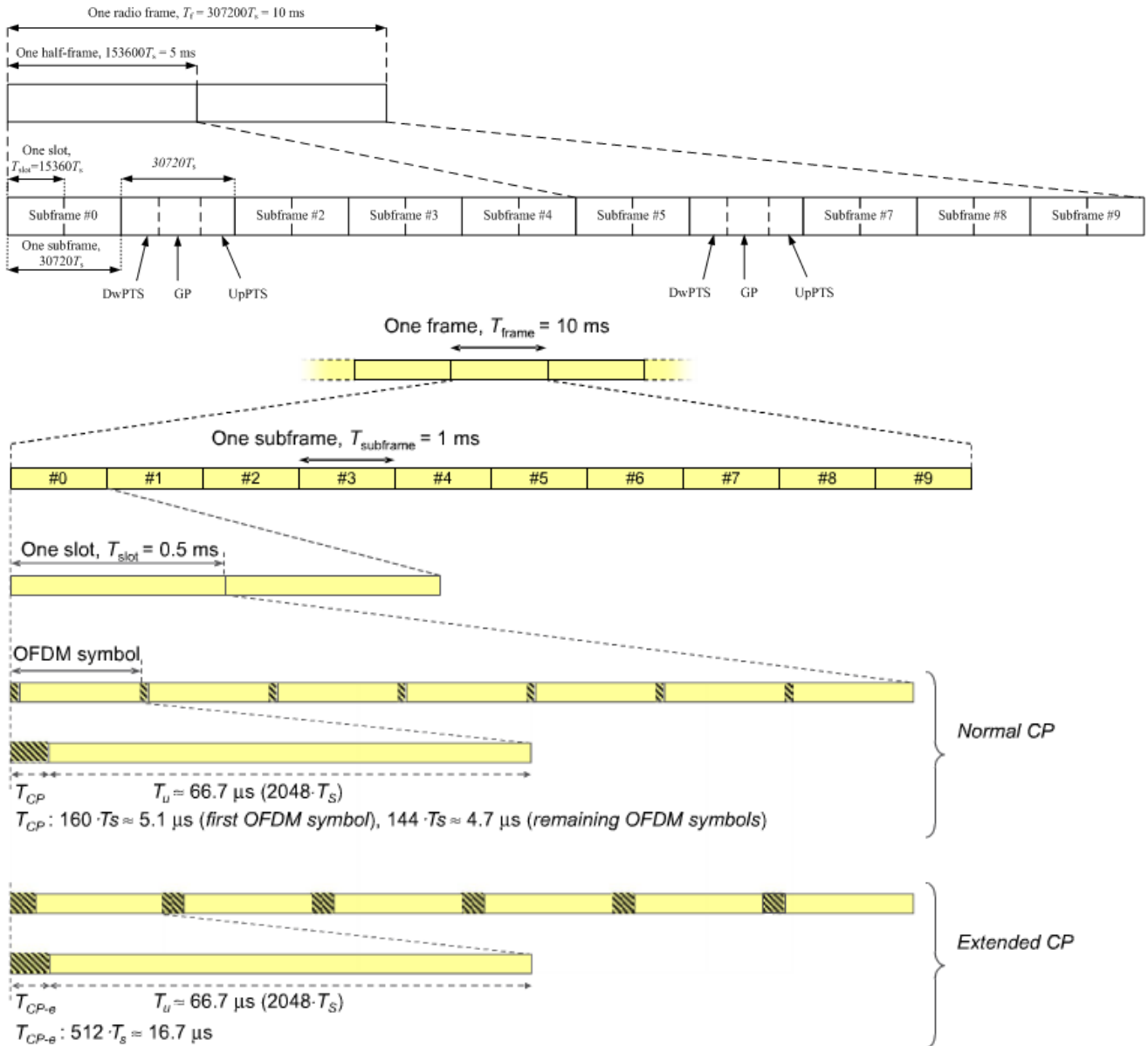
Mode		Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
HSDPA	Subtest 1	826.4	4132	23.46
		836.6	4183	23.50
		846.6	4233	23.57
	Subtest 2	826.4	4132	23.42
		836.6	4183	23.45
		846.6	4233	23.48
	Subtest 3	826.4	4132	23.34
		836.6	4183	23.37
		846.6	4233	23.43
	Subtest 4	826.4	4132	23.25
		836.6	4183	23.28
		846.6	4233	23.31
HSUPA	Subtest 1	826.4	4132	23.51
		836.6	4183	23.55
		846.6	4233	23.58
	Subtest 2	826.4	4132	23.41
		836.6	4183	23.45
		846.6	4233	23.48
	Subtest 3	826.4	4132	23.37
		836.6	4183	23.39
		846.6	4233	23.41
	Subtest 4	826.4	4132	23.29
		836.6	4183	23.33
		846.6	4233	23.37
	Subtest 5	826.4	4132	23.21
		836.6	4183	23.26
		846.6	4233	23.30
HSPA+	QPSK	826.4	4132	23.55
		836.6	4183	23.59
		846.6	4233	23.62
	16QAM	826.4	4132	22.33
		836.6	4183	22.37
		846.6	4233	22.42

Note: UMTS SAR was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01.HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.

6.4 LTE Measurement result

General description:

TDD-LTE frame structure



Uplink-downlink configuration

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

Special sub-frame configuration

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

Special sub-frame with cyclic prefix uplink

Special sub-frame configuration	Duty factor with normal cyclic prefix in uplink	Duty factor with extended cyclic prefix in uplink
Normal cyclic prefix in downlink	0~4	7.13%
	5~9	14.3%
Extended cyclic prefix in downlink	0~3	7.13%
	4~7	14.3%

So we perform SAR test with maximum duty factor equal to 63.3% by using uplink-downlink configuration 0.

Note: One sub-frame is $30720T_s=1\text{ms}$, when UpPTS(uplink) in special sub-frame with extended cyclic prefix, duty factor = $5120/30720=0.167$. There are 5 sub-frames in half frame(3up link), so the final duty factor is $(30720 \cdot 3 + 5120) / (30720 \cdot 5) = 63.3\%$ which we used to evaluate the SAR compliance (worst case)

LTE Band 2

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1850.7	18607	1.4	1	0	21.78
				1	5	21.78
				3	2	21.98
				6	0	20.96
	1880	18900		1	0	21.87
				1	5	21.87
				3	2	22.07
				6	0	20.91
	1909.3	19193		1	0	21.76
				1	5	21.76
				3	2	22.03
				6	0	20.87
16QAM	1850.7	18607	1.4	1	0	21.27
				1	5	21.27
				3	2	21.24
				6	0	19.55
	1880	18900		1	0	20.87
				1	5	21.30
				3	2	21.12
				6	0	19.75
	1909.3	19193		1	0	21.34
				1	5	21.34
				3	2	21.07
				6	0	19.72
64QAM	1850.7	18607	1.4	1	0	20.02
				1	5	20.22
				3	2	19.55
				6	0	19.42
	1880	18900		1	0	20.00
				1	5	20.11
				3	2	19.47
				6	0	19.47
	1909.3	19193		1	0	20.09
				1	5	20.05
				3	2	19.62
				6	0	19.29

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1851.5	18615	3	1	0	21.83
				1	14	21.83
				8	4	20.87
				15	0	20.85
	1880	18900		1	0	21.97
				1	14	21.97
				8	4	20.85
				15	0	20.84
	1908.5	19185		1	0	21.91
				1	14	21.91
				8	4	20.88
				15	0	20.84
16QAM	1851.5	18615	3	1	0	21.61
				1	14	21.00
				8	4	20.14
				15	0	20.06
	1880	18900		1	0	20.80
				1	14	20.84
				8	4	19.96
				15	0	19.90
	1908.5	19185		1	0	21.52
				1	14	21.51
				8	4	20.03
				15	0	20.04
64QAM	1851.5	18615	3	1	0	19.89
				1	14	20.21
				8	4	19.48
				15	0	19.21
	1880	18900		1	0	20.04
				1	14	20.21
				8	4	19.49
				15	0	19.55
	1908.5	19185		1	0	20.02
				1	14	20.03
				8	4	19.55
				15	0	19.23

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1852.5	18625	5	1	0	21.83
				1	24	21.83
				12	6	20.74
				25	0	20.89
	1880	18900		1	0	21.89
				1	24	21.89
				12	6	20.81
				25	0	20.79
	1907.5	19175		1	0	21.89
				1	24	21.89
				12	6	20.90
				25	0	20.77
16QAM	1852.5	18625	5	1	0	21.78
				1	24	20.70
				12	6	20.05
				25	0	20.22
	1880	18900		1	0	20.69
				1	24	21.49
				12	6	19.96
				25	0	20.10
	1907.5	19175		1	0	21.55
				1	24	20.69
				12	6	20.02
				25	0	20.16
64QAM	1852.5	18625	5	1	0	20.23
				1	24	20.18
				12	6	19.49
				25	0	19.27
	1880	18900		1	0	20.16
				1	24	19.99
				12	6	19.66
				25	0	19.33
	1907.5	19175		1	0	20.10
				1	24	20.02
				12	6	19.58
				25	0	19.26

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1855	18650	10	1	0	22.07
				1	49	22.07
				24	12	21.85
				50	0	20.88
	1880	18900		1	0	22.07
				1	49	22.07
				24	12	21.78
				50	0	20.88
	1905	19150		1	0	22.02
				1	49	22.02
				24	12	20.78
				50	0	20.85
16QAM	1855	18650	10	1	0	20.70
				1	49	20.52
				24	12	20.01
				50	0	19.97
	1880	18900		1	0	21.46
				1	49	21.14
				24	12	20.01
				50	0	19.82
	1905	19150		1	0	21.16
				1	49	21.66
				24	12	19.96
				50	0	19.89
64QAM	1855	18650	10	1	0	20.05
				1	49	20.02
				24	12	19.38
				50	0	19.42
	1880	18900		1	0	20.03
				1	49	20.06
				24	12	19.42
				50	0	19.51
	1905	19150		1	0	20.16
				1	49	20.01
				24	12	19.58
				50	0	19.55

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1857.5	18675	15	1	0	22.06
				1	74	22.06
				40	18	20.85
				75	0	20.86
	1880	18900		1	0	21.84
				1	74	21.84
				40	18	20.95
				75	0	20.78
	1902.5	19125		1	0	21.90
				1	74	21.90
				40	18	20.90
				75	0	20.71
16QAM	1857.5	18675	15	1	0	21.64
				1	74	21.64
				40	18	20.10
				75	0	20.08
	1880	18900		1	0	21.75
				1	74	21.75
				40	18	19.93
				75	0	19.89
	1902.5	19125		1	0	21.12
				1	74	21.12
				40	18	19.98
				75	0	20.01
64QAM	1857.5	18675	15	1	0	20.11
				1	74	20.11
				40	18	19.57
				75	0	19.33
	1880	18900		1	0	20.03
				1	74	20.21
				40	18	19.63
				75	0	19.57
	1902.5	19125		1	0	20.08
				1	74	20.00
				40	18	19.46
				75	0	19.22

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1860	18700	20	1	0	21.97
				1	99	21.97
				50	25	20.79
				100	0	20.83
	1880	18900		1	0	22.08
				1	99	22.08
				50	25	20.75
				100	0	20.87
	1900	19100		1	0	21.82
				1	99	21.82
				50	25	20.76
				100	0	20.68
16QAM	1860	18700	20	1	0	20.70
				1	99	20.88
				50	25	19.97
				100	0	19.87
	1880	18900		1	0	20.74
				1	99	20.87
				50	25	19.94
				100	0	19.83
	1900	19100		1	0	20.87
				1	99	20.86
				50	25	19.86
				100	0	19.93
64QAM	1860	18700	20	1	0	20.18
				1	99	20.19
				50	25	19.71
				100	0	19.53
	1880	18900		1	0	20.24
				1	99	20.23
				50	25	19.74
				100	0	19.61
	1900	19100		1	0	20.21
				1	99	20.16
				50	25	19.74
				100	0	19.51

LTE Band 4

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1710.7	19957	1.4	1	0	21.87
				1	5	21.87
				3	2	21.86
				6	0	20.72
	1732.5	20175		1	0	21.97
				1	5	21.97
				3	2	21.93
				6	0	20.96
	1754.3	20393		1	0	21.70
				1	5	21.70
				3	2	20.78
				6	0	20.84
16QAM	1710.7	19957	1.4	1	0	20.94
				1	5	20.94
				3	2	20.84
				6	0	19.48
	1732.5	20175		1	0	21.47
				1	5	21.47
				3	2	21.12
				6	0	19.87
	1754.3	20393		1	0	20.74
				1	5	20.74
				3	2	20.07
				6	0	19.54
64QAM	1710.7	19957	1.4	1	0	20.19
				1	5	20.19
				3	2	19.65
				6	0	19.68
	1732.5	20175		1	0	20.33
				1	5	20.33
				3	2	19.70
				6	0	19.43
	1754.3	20393		1	0	20.50
				1	5	20.50
				3	2	19.54
				6	0	19.40

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1711.5	19965	3	1	0	21.81
				1	14	21.81
				8	4	20.76
				15	0	20.78
	1732.5	20175		1	0	21.95
				1	14	21.95
				8	4	20.86
				15	0	20.88
	1753.5	20385		1	0	21.76
				1	14	21.76
				8	4	20.75
				15	0	20.89
16QAM	1711.5	19965	3	1	0	21.17
				1	14	20.19
				8	4	19.91
				15	0	19.87
	1732.5	20175		1	0	21.56
				1	14	21.62
				8	4	19.97
				15	0	19.84
	1753.5	20385		1	0	21.68
				1	14	20.61
				8	4	19.96
				15	0	19.99
64QAM	1711.5	19965	3	1	0	20.20
				1	14	20.39
				8	4	19.54
				15	0	19.51
	1732.5	20175		1	0	20.30
				1	14	20.46
				8	4	19.59
				15	0	19.52
	1753.5	20385		1	0	20.35
				1	14	20.42
				8	4	19.50
				15	0	19.59

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1712.5	19975	5	1	0	21.86
				1	24	21.86
				12	6	20.75
				25	0	20.79
	1732.5	20175		1	0	21.92
				1	24	21.92
				12	6	20.89
				25	0	20.93
	1752.5	20375		1	0	21.78
				1	24	21.78
				12	6	20.78
				25	0	20.84
16QAM	1712.5	19975	5	1	0	20.71
				1	24	20.52
				12	6	19.96
				25	0	20.05
	1732.5	20175		1	0	20.82
				1	24	20.79
				12	6	19.96
				25	0	20.08
	1752.5	20375		1	0	21.16
				1	24	20.83
				12	6	19.92
				25	0	20.36
64QAM	1712.5	19975	5	1	0	20.47
				1	24	20.49
				12	6	19.66
				25	0	19.58
	1732.5	20175		1	0	20.57
				1	24	20.65
				12	6	19.52
				25	0	19.58
	1752.5	20375		1	0	20.25
				1	24	20.39
				12	6	19.44
				25	0	19.59

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1715	20000	10	1	0	22.13
				1	49	22.13
				24	12	20.75
				50	0	20.83
	1732.5	20175		1	0	22.17
				1	49	22.17
				24	12	20.87
				50	0	20.78
	1750	20350		1	0	21.82
				1	49	21.82
				24	12	20.88
				50	0	20.87
16QAM	1715	20000	10	1	0	19.90
				1	49	19.95
				24	12	19.99
				50	0	19.96
	1732.5	20175		1	0	21.76
				1	49	20.62
				24	12	20.08
				50	0	19.95
	1750	20350		1	0	21.27
				1	49	20.40
				24	12	19.98
				50	0	19.94
64QAM	1715	20000	10	1	0	20.60
				1	49	20.42
				24	12	19.55
				50	0	19.53
	1732.5	20175		1	0	20.39
				1	49	20.61
				24	12	19.71
				50	0	19.49
	1750	20350		1	0	20.50
				1	49	20.44
				24	12	19.68
				50	0	19.46

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1717.5	20025	15	1	0	21.98
				1	74	21.98
				40	18	20.70
				75	0	20.95
	1732.5	20175		1	0	22.06
				1	74	22.06
				40	18	20.94
				75	0	20.98
	1747.5	20325		1	0	21.87
				1	74	21.87
				40	18	20.78
				75	0	20.90
16QAM	1717.5	20025	15	1	0	21.78
				1	74	21.64
				40	18	19.88
				75	0	19.98
	1732.5	20175		1	0	21.67
				1	74	21.65
				40	18	19.98
				75	0	20.10
	1747.5	20325		1	0	21.65
				1	74	20.46
				40	18	19.96
				75	0	20.02
64QAM	1717.5	20025	15	1	0	20.46
				1	74	20.30
				40	18	19.61
				75	0	19.50
	1732.5	20175		1	0	20.62
				1	74	20.39
				40	18	19.72
				75	0	19.46
	1747.5	20325		1	0	20.51
				1	74	20.24
				40	18	19.66
				75	0	19.56

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1720	20050	20	1	0	21.89
				1	99	21.89
				50	25	20.80
				100	0	20.84
	1732.5	20175		1	0	22.31
				1	99	22.31
				50	25	20.84
				100	0	20.81
	1745	20300		1	0	21.98
				1	99	21.98
				50	25	20.81
				100	0	20.73
16QAM	1720	20050	20	1	0	20.67
				1	99	20.54
				50	25	19.95
				100	0	19.87
	1732.5	20175		1	0	20.87
				1	99	20.75
				50	25	19.94
				100	0	19.95
	1745	20300		1	0	21.78
				1	99	20.88
				50	25	20.05
				100	0	19.95
64QAM	1720	20050	20	1	0	20.55
				1	99	20.55
				50	25	19.73
				100	0	19.68
	1732.5	20175		1	0	20.61
				1	99	20.61
				50	25	19.77
				100	0	19.70
	1745	20300		1	0	20.59
				1	99	20.60
				50	25	19.69
				100	0	19.70

LTE Band 5

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	824.7	20407	1.4	1	0	23.78
				1	5	23.78
				3	2	23.74
				6	0	22.79
	836.5	20525		1	0	23.86
				1	5	23.86
				3	2	23.84
				6	0	22.75
	848.3	20643		1	0	23.64
				1	5	23.64
				3	2	23.78
				6	0	22.75
16QAM	824.7	20407	1.4	1	0	23.56
				1	5	23.56
				3	2	23.26
				6	0	21.54
	836.5	20525		1	0	23.58
				1	5	23.58
				3	2	23.21
				6	0	21.63
	848.3	20643		1	0	22.97
				1	5	22.97
				3	2	22.86
				6	0	21.56
64QAM	824.7	20407	1.4	1	0	22.88
				1	5	22.71
				3	2	21.88
				6	0	21.53
	836.5	20525		1	0	22.69
				1	5	22.92
				3	2	21.67
				6	0	21.86
	848.3	20643		1	0	22.74
				1	5	22.65
				3	2	21.70
				6	0	21.78

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	825.5	20415	3	1	0	23.93
				1	14	23.93
				8	4	22.78
				15	0	22.77
	836.5	20525		1	0	23.96
				1	14	23.96
				8	4	22.73
				15	0	22.74
	847.5	20635		1	0	23.85
				1	14	23.85
				8	4	22.71
				15	0	22.70
16QAM	825.5	20415	3	1	0	23.19
				1	14	23.19
				8	4	21.85
				15	0	21.98
	836.5	20525		1	0	23.46
				1	14	23.46
				8	4	22.04
				15	0	21.98
	847.5	20635		1	0	23.95
				1	14	23.95
				8	4	21.82
				15	0	21.78
64QAM	825.5	20415	3	1	0	22.71
				1	14	22.76
				8	4	21.62
				15	0	21.57
	836.5	20525		1	0	22.90
				1	14	22.90
				8	4	21.87
				15	0	21.76
	847.5	20635		1	0	22.66
				1	14	22.70
				8	4	21.67
				15	0	21.64

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	826.5	20425	5	1	0	23.78
				1	24	23.78
				12	6	22.75
				25	0	22.73
	836.5	20525		1	0	23.84
				1	24	23.84
				12	6	22.83
				25	0	22.74
	846.5	20625		1	0	23.86
				1	24	23.86
				12	6	22.64
				25	0	22.63
16QAM	826.5	20425	5	1	0	23.84
				1	24	23.84
				12	6	21.73
				25	0	21.76
	836.5	20525		1	0	23.05
				1	24	23.05
				12	6	21.96
				25	0	21.87
	846.5	20625		1	0	23.12
				1	24	23.12
				12	6	21.85
				25	0	21.69
64QAM	826.5	20425	5	1	0	22.97
				1	24	22.78
				12	6	21.70
				25	0	21.56
	836.5	20525		1	0	22.81
				1	24	22.90
				12	6	21.81
				25	0	21.65
	846.5	20625		1	0	22.61
				1	24	22.77
				12	6	21.61
				25	0	21.59

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	829	20450	10	1	0	23.86
				1	49	23.86
				24	12	22.74
				50	0	22.79
	836.5	20525		1	0	23.98
				1	49	23.98
				24	12	22.84
				50	0	22.78
	844	20600		1	0	23.98
				1	49	23.98
				24	12	22.73
				50	0	22.73
16QAM	829	20450	10	1	0	22.64
				1	49	22.64
				24	12	21.93
				50	0	21.78
	836.5	20525		1	0	23.64
				1	49	23.64
				24	12	21.92
				50	0	21.80
	844	20600		1	0	22.63
				1	49	22.63
				24	12	21.87
				50	0	21.72
64QAM	829	20450	10	1	0	22.97
				1	49	22.87
				24	12	21.90
				50	0	21.80
	836.5	20525		1	0	22.98
				1	49	22.95
				24	12	21.97
				50	0	21.81
	844	20600		1	0	22.91
				1	49	22.93
				24	12	21.91
				50	0	21.75

LTE Band 12

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	699.7	23017	1.4	1	0	23.28
				1	5	23.28
				3	2	22.38
				6	0	22.30
	707.5	23095		1	0	23.22
				1	5	23.22
				3	2	22.32
				6	0	22.23
	715.3	23173		1	0	23.14
				1	5	23.14
				3	2	22.41
				6	0	22.42
16QAM	699.7	23017	1.4	1	0	22.41
				1	5	22.41
				3	2	22.33
				6	0	21.05
	707.5	23095		1	0	22.71
				1	5	22.71
				3	2	22.42
				6	0	21.03
	715.3	23173		1	0	22.73
				1	5	22.73
				3	2	22.48
				6	0	21.02
64QAM	699.7	23017	1.4	1	0	22.15
				1	5	22.12
				3	2	21.88
				6	0	21.71
	707.5	23095		1	0	22.21
				1	5	22.32
				3	2	21.82
				6	0	21.74
	715.3	23173		1	0	22.30
				1	5	22.26
				3	2	21.74
				6	0	21.49

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	700.5	23025	3	1	0	23.30
				1	14	23.30
				8	4	22.30
				15	0	22.32
	707.5	23095		1	0	23.23
				1	14	23.23
				8	4	22.17
				15	0	22.20
	714.5	23165		1	0	23.17
				1	14	23.17
				8	4	22.27
				15	0	22.26
16QAM	700.5	23025	3	1	0	22.97
				1	14	22.97
				8	4	21.36
				15	0	21.37
	707.5	23095		1	0	22.34
				1	14	22.34
				8	4	21.52
				15	0	21.32
	714.5	23165		1	0	22.38
				1	14	22.38
				8	4	21.42
				15	0	21.46
64QAM	700.5	23025	3	1	0	22.15
				1	14	22.10
				8	4	21.73
				15	0	21.57
	707.5	23095		1	0	22.25
				1	14	22.29
				8	4	21.74
				15	0	21.68
	714.5	23165		1	0	22.11
				1	14	22.04
				8	4	21.73
				15	0	21.59

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	701.5	23035	5	1	0	23.30
				1	24	23.30
				12	6	22.24
				25	0	22.35
	707.5	23095		1	0	23.57
				1	24	23.57
				12	6	22.23
				25	0	22.34
	713.5	23155		1	0	23.24
				1	24	23.24
				12	6	22.34
				25	0	22.31
16QAM	701.5	23035	5	1	0	22.35
				1	24	22.35
				12	6	21.38
				25	0	21.72
	707.5	23095		1	0	22.51
				1	24	22.51
				12	6	21.37
				25	0	21.42
	713.5	23155		1	0	22.78
				1	24	22.78
				12	6	21.43
				25	0	21.43
64QAM	701.5	23035	5	1	0	22.01
				1	24	22.06
				12	6	21.66
				25	0	21.65
	707.5	23095		1	0	22.16
				1	24	22.12
				12	6	21.80
				25	0	21.78
	713.5	23155		1	0	22.34
				1	24	21.97
				12	6	21.64
				25	0	21.78

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	704	23060	10	1	0	22.23
				1	49	22.23
				24	12	22.21
				50	0	22.22
	707.5	23095		1	0	23.29
				1	49	23.29
				24	12	22.18
				50	0	22.22
	711	23130		1	0	23.26
				1	49	23.26
				24	12	22.28
				50	0	22.24
16QAM	704	23060	10	1	0	22.58
				1	49	22.58
				24	12	21.45
				50	0	21.23
	707.5	23095		1	0	22.75
				1	49	22.75
				24	12	21.41
				50	0	21.23
	711	23130		1	0	22.53
				1	49	22.53
				24	12	21.37
				50	0	21.32
64QAM	704	23060	10	1	0	22.28
				1	49	22.32
				24	12	21.88
				50	0	21.74
	707.5	23095		1	0	22.38
				1	49	22.33
				24	12	21.93
				50	0	21.82
	711	23130		1	0	22.35
				1	49	22.24
				24	12	21.85
				50	0	23.74

LTE Band 13

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	779.5	23205	5	1	0	23.37
				1	24	23.37
				12	6	22.27
				25	0	22.26
	782	23230		1	0	23.31
				1	24	23.31
				12	6	22.32
				25	0	22.27
	784.5	23255		1	0	23.23
				1	24	23.23
				12	6	22.27
				25	0	22.32
16QAM	779.5	23205	5	1	0	23.17
				1	24	23.17
				12	6	21.42
				25	0	21.56
	782	23230		1	0	23.12
				1	24	23.12
				12	6	21.67
				25	0	21.38
	784.5	23255		1	0	22.81
				1	24	22.81
				12	6	21.34
				25	0	21.32
64QAM	779.5	23205	5	1	0	22.79
				1	24	22.82
				12	6	21.51
				25	0	21.59
	782	23230		1	0	22.88
				1	24	22.72
				12	6	21.82
				25	0	21.64
	784.5	23255		1	0	22.77
				1	24	22.63
				12	6	21.79
				25	0	21.54

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	782	23230	10	1	0	23.54
				1	49	23.54
				24	12	22.29
				50	0	22.25
16QAM	782	23230	10	1	0	22.46
				1	49	22.46
				24	12	21.69
				50	0	21.33
64QAM	782	23230	10	1	0	22.96
				1	49	22.94
				24	12	21.86
				50	0	21.78

LTE Band 17

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	706.5	23755	5	1	0	23.09
				1	24	23.09
				12	6	22.10
				25	0	22.23
	710	23790		1	0	23.17
				1	24	23.17
				12	6	23.14
				25	0	22.19
	713.5	23825		1	0	23.21
				1	24	23.21
				12	6	22.15
				25	0	22.32
16QAM	706.5	23755	5	1	0	22.43
				1	24	22.43
				12	6	21.35
				25	0	21.27
	710	23790		1	0	22.48
				1	24	22.48
				12	6	21.23
				25	0	21.27
	713.5	23825		1	0	22.87
				1	24	22.87
				12	6	21.13
				25	0	21.38
64QAM	709	23780	5	1	0	22.20
				1	24	22.26
				12	6	21.38
				25	0	21.25
	710	23790		1	0	22.26
				1	24	22.35
				12	6	21.42
				25	0	21.32
	711	23800		1	0	22.22
				1	24	22.33
				12	6	21.36
				25	0	21.28

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	709	23780	10	1	0	23.22
				1	49	23.22
				24	12	22.18
				50	0	22.21
	710	23790		1	0	23.26
				1	49	23.26
				24	12	22.19
				50	0	22.24
	711	23800		1	0	23.37
				1	49	23.37
				24	12	22.23
				50	0	22.22
16QAM	709	23780	10	1	0	22.56
				1	49	22.56
				24	12	21.16
				50	0	21.45
	710	23790		1	0	22.78
				1	49	22.78
				24	12	21.23
				50	0	21.47
	711	23800		1	0	22.87
				1	49	22.87
				24	12	21.38
				50	0	21.57
64QAM	709	23780	10	1	0	22.05
				1	49	22.23
				24	12	21.08
				50	0	21.11
	710	23790		1	0	22.10
				1	49	22.25
				24	12	21.39
				50	0	21.25
	711	23800		1	0	21.95
				1	49	22.16
				24	12	21.34
				50	0	21.02

6.6 Bluetooth Measurement result

Modulation type	Test Result (dBm)		
	2402MHz (Ch0)	2441MHz (Ch39)	2480MHz (Ch78)
GFSK	6.37	6.91	6.58
$\pi/4$ DQPSK	3.94	5.52	4.58
8DPSK	3.92	5.42	4.59
Modulation type	2402MHz (Ch0)	2440MHz (Ch19)	2480MHz (Ch39)
GFSK (BLE1Mbps)	-4.44	-1.58	-1.66

6.7 Wi-Fi Measurement result

WIFI 2.4GHz

Test Mode	Average power (dBm)		
	2412MHz	2437MHz	2462MHz
802.11b	16.92	16.52	17.85
802.11g	15.86	15.83	17.27
802.11n HT20	14.72	14.68	16.22

6.8 Standalone SAR Test Exclusion Considerations

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.

SAR Test Exclusion Thresholds for 100 MHz – 6 GHz and ≤ 50 mm

Method1:

According to the KDB447498 4.3.1 (1)

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

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

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm, and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

This is equivalent to $[(\text{max. power of channel, including tune-up tolerance, mW}) / (60 / \sqrt{f} (\text{GHz}) \text{ mW})] \cdot [20 \text{ mm} / (\text{min. test separation distance, mm})] \leq 1.0$ for 1-g SAR; also see Appendix A for approximate exclusion threshold values at selected frequencies and distances.

Method2:

According to the KDB447498 appendix A

Approximate SAR Test Exclusion Power Thresholds at Selected Frequencies and Test Separation Distances are illustrated in the following Table.

MHz	5	10	15	20	25	mm
150	39	77	116	155	194	<i>SAR Test Exclusion Threshold (mW)</i>
300	27	55	82	110	137	
450	22	45	67	89	112	
835	16	33	49	66	82	
900	16	32	47	63	79	
1500	12	24	37	49	61	
1900	11	22	33	44	54	
2450	10	19	29	38	48	
3600	8	16	24	32	40	
5200	7	13	20	26	33	
5400	6	13	19	26	32	
5800	6	12	19	25	31	

According to KDB 248227 D01 802 11 Wi-Fi SAR chapter 5.3.1 b)

For devices that operate in only one of the U-NII-1 and U-NII-2A bands, the normally required SAR procedures for OFDM configurations are applied. For devices that operate in both U-NII bands using the same transmitter and antenna(s), SAR test reduction is determined according to the following, with respect to the highest *reported* SAR and maximum output power specified for production units. The procedures are applied independently to each exposure configuration; for example, head, body, hotspot mode etc. When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest *reported* SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for the band with lower maximum output power in that test configuration; otherwise, each band is tested independently for SAR.

Summary of Transmitters

Band/Mode	Position	SAR test exclusion threshold (mW)	Max conducted power adjusted for tune-up tolerance(mW)	Standalone SAR Required
2.4GHz BT/BLE	Head	10	4.91	No
	Body	19	4.91	No
2.4GHz Wi-Fi	Head	10	60.95	Yes
	Body	19	60.95	Yes

6.9 RF exposure conditions

Refer to the follow picture “Antenna Locations & Separation Distances” for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.



Main antenna: LTE FDD B2/3/4/5/12/13/17(RX&TX); WCDMA B2/5(RX&TX);
GSM850/900/1800/1900(RX&TX)

Div antenna: LTE FDD B2/3/4/5/12/13/17(RX); WCDMA B2/5(RX); GSM850/1900(RX)

GPS&WIFI antenna:GPS (1575.42MHz RX);Wi-Fi (2412MHz~2472MHz RX&TX)

6.9.1 Head Exposure Conditions For WWAN

Test Configurations	SAR Required	Note
Left Touch	yes	/
Left Tilt (15°)	yes	/
Right Touch	yes	/
Right Tilt (15°)	yes	/

For WLAN&BT/BLE

Test Configurations	SAR Required	Note
Left Touch	yes	/
Left Tilt (15°)	yes	/
Right Touch	yes	/
Right Tilt (15°)	yes	/

6.9.2 Body Exposure conditions

For WWAN

Test Configurations	SAR Required	Note
Back	yes	/
Front	yes	/

For WLAN&BT/BLE

Test Configurations	SAR Required	Note
Back	yes	/
Front	yes	/

6.9.3 Hotspot Exposure conditions

For WWAN

Test Configurations	SAR Required	Note
Back	Yes	/
Front	Yes	/
Top	Yes	/
Bottom	Yes	/
Right	Yes	/
Left	Yes	/

For WLAN&BT/BLE

Test Configurations	SAR Required	Note
Back	Yes	/
Front	Yes	/
Top	Yes	/
Bottom	Yes	/
Left	Yes	/
Right	Yes	/

Note: For hotspot mode, it's not necessary test Rear and Front position cause we already test the these position without hotspot mode in Body Exposure conditions, Normally if the hotspot mode opened, the technology "power reduction" used for mobile, so we consider the worst condition, and remain the data of body worn as hotspots mode.

6.10 System Checking

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulants were measured every day using the dielectric probe kit and the network analyser. A system check measurement was made following the determination of the dielectric parameters of the simulant, using the dipole validation kit. The system checking results (dielectric parameters and SAR values) are given in the table below.

Date Tested	System dipole	T.S. Liquid	SAR measured (normalized to 1W)		Target (Ref. Value)	Delta (%)	Tolerance (%)
2019.08.01	D750V3	Head	1g	8.36	8.26	1.2	±10
2019.08.02	D750V3	Head	1g	8.48	8.26	2.7	±10
2019.08.04	D835V2	Head	1g	9.64	9.37	2.9	±10
2019.08.05	D835V2	Head	1g	9.56	9.37	2.0	±10
2019.08.07	D1800V2	Head	1g	38.2	38.9	-1.8	±10
2019.08.09	D1800V2	Head	1g	37.96	38.9	-2.4	±10
2019.08.10	D1800V2	Head	1g	38.12	38.9	-2.0	±10
2019.08.12	D2000V2	Head	1g	39.28	40.3	-2.5	±10
2019.08.13	D2000V2	Head	1g	39.92	40.3	-0.9	±10
2019.08.16	D2450V2	Head	1g	54.0	52.4	3.1	±10
2019.08.19	D2450V2	Head	1g	52.8	52.4	0.8	±10

According to KDB 865664 D01&IEEE 1528-2013, 2450MHz system check could cover the frequency range from 2205MHz to 2695 MHz

Plots of the system checking scans are given in Appendix A.

Tissue Simulants used in the Measurements

For the measurement of the following parameters the SPEAG DAKS-3.5 dielectric parameter probe is used, representing the open-ended coaxial probe measurement procedure.

Date Tested	Freq. (MHz)	Liquid parameters	measured	Target	Delta (%)	Tolerance (%)
2019.08.01	Head 750	ϵ_r	42.263	41.90	0.9	± 5
		σ [S/m]	0.914	0.89	2.7	± 5
2019.08.02	Head 750	ϵ_r	42.177	41.90	0.7	± 5
		σ [S/m]	0.92	0.89	3.4	± 5
2019.08.04	Head 835	ϵ_r	42.533	41.50	2.5	± 5
		σ [S/m]	0.917	0.90	1.9	± 5
2019.08.05	Head 835	ϵ_r	40.266	41.50	-3.0	± 5
		σ [S/m]	0.911	0.90	1.2	± 5
2019.08.07	Head 1800	ϵ_r	38.885	40.00	-2.8	± 5
		σ [S/m]	1.414	1.40	1.0	± 5
2019.08.09	Head 1800	ϵ_r	40.688	40.00	1.7	± 5
		σ [S/m]	1.418	1.40	1.3	± 5
2019.08.10	Head 1800	ϵ_r	40.722	40.00	1.8	± 5
		σ [S/m]	1.427	1.40	1.9	± 5
2019.08.12	Head 2000	ϵ_r	39.844	40.00	-0.4	± 5
		σ [S/m]	1.427	1.40	1.9	± 5
2019.08.13	Head 2000	ϵ_r	40.355	40.00	0.9	± 5
		σ [S/m]	1.377	1.40	-1.6	± 5
2019.08.16	Head 2450	ϵ_r	38.343	39.20	-2.2	± 5
		σ [S/m]	1.866	1.80	3.7	± 5
2019.08.19	Head 2450	ϵ_r	39.672	39.20	1.2	± 5
		σ [S/m]	1.851	1.80	2.8	± 5

6.11 SAR TEST RESULT

In order to determine the largest value of the peak spatial-average SAR of a handset, all device positions, configurations, and operational modes should be tested for each frequency band according to Steps 1 to 3 below.

Step 1: The tests should be performed at the channel that is closest to the center of the transmit frequency band.

a) All device positions (cheek and tilt, for both left and right sides of the SAM phantom),
b) All configurations for each device position in a), e.g., antenna extended and retracted, and
c) All operational modes for each device position in item a) and configuration in item b) in each frequency band, e.g., analog and digital, If more than three frequencies need to be tested (i.e., $N_c > 3$), then all frequencies, configurations and modes shall be tested for all of the above test conditions.

Step 2: For the condition providing the highest peak spatial-average SAR determined in Step 1 for each frequency, perform all tests at all other test frequency channels, e.g., lowest and highest frequencies. In addition, for all other conditions (device position, configuration, and operational mode) where the peak spatial-average SAR value determined in Step 1 is within 3 dB of the applicable SAR limit, it is recommended that all other test frequencies should be tested as well.

Step 3: Examine all data to determine the largest value of the peak.

Note:

1. Per KDB 447498 D01v06, 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 D01v06, for each exposure position, if the highest output channel reported SAR ≤ 0.8 W/kg, other channels SAR testing are not necessary.

3. The distance between the EUT and the phantom bottom is 10mm.

The measured and reported Head/body SAR values for the test device are tabulated below:

Mode: GSM 850(GPRS)

fL(MHz)=824.2MHz

fM(MHz)=836.5MHz

fH(MHz)= 848.8MHz

SAR Values (850MHz Band)

Limit of SAR (W/kg): <1.6W/kg (1g Average)

Test Case		Ch	Measure Conducted Power (dBm)	Tune-up limit (dBm)	Scaling Factor	Measure Results (W/kg)	Reported Results (W/kg)
position	mode					1g Average	1g Average
Left cheek	GPRS 2TX (head)	L	30.97	31.00	1.01	---	---
		M	30.99	31.00	1.00	0.168	0.168
		H	30.98	31.00	1.00	---	---
Left Tilted		L	30.97	31.00	1.01	---	---
		M	30.99	31.00	1.00	0.106	0.106
		H	30.98	31.00	1.00	---	---
Right cheek		L	30.97	31.00	1.01	---	---
		M	30.99	31.00	1.00	0.194	0.194
		H	30.98	31.00	1.00	---	---
Right Tilted	L	30.97	31.00	1.01	---	---	
	M	30.99	31.00	1.00	0.099	0.099	
	H	30.98	31.00	1.00	---	---	
Back	GPRS 2TX (body-worn)	L	30.97	31.00	1.01	---	---
		M	30.99	31.00	1.00	0.343	0.343
		H	30.98	31.00	1.00	---	---
Front		L	30.97	31.00	1.01	---	---
		M	30.99	31.00	1.00	0.187	0.187
		H	30.98	31.00	1.00	---	---
Top		L	30.97	31.00	1.01	---	---
		M	30.99	31.00	1.00	0.005	0.005
		H	30.98	31.00	1.00	---	---
Bottom	L	30.97	31.00	1.01	---	---	
	M	30.99	31.00	1.00	0.112	0.112	
	H	30.98	31.00	1.00	---	---	
Left	GPRS 2TX (hotspot)	L	30.97	31.00	1.01	---	---
		M	30.99	31.00	1.00	0.151	0.151
		H	30.98	31.00	1.00	---	---
Right		L	30.97	31.00	1.01	---	---
		M	30.99	31.00	1.00	0.203	0.203
		H	30.98	31.00	1.00	---	---

Mode: GSM1900(GPRS)

fL (MHz)=1850.2MHz fM (MHz)=1880.0MHz fH (MHz)=1909.8MHz

SAR Values (1900MHz Band)

Limit of SAR (W/kg): <1.6W/kg (1g Average)

Test Case		Ch	Measure Conducted Power (dBm)	Tune-up limit (dBm)	Scaling Factor	Measure Results (W/kg)	Reported Results (W/kg)
position	mode					1g Average	1g Average
Left cheek	GPRS 2TX (head)	L	27.59	28.00	1.10	---	---
		M	27.44	28.00	1.14	0.059	0.067
		H	27.35	28.00	1.16	---	---
Left Tilted		L	27.59	28.00	1.10	---	---
		M	27.44	28.00	1.14	0.040	0.046
		H	27.35	28.00	1.16	---	---
Right cheek		L	27.59	28.00	1.10	---	---
		M	27.44	28.00	1.14	0.081	0.092
		H	27.35	28.00	1.16	---	---
Right Tilted	L	27.59	28.00	1.10	---	---	
	M	27.44	28.00	1.14	0.051	0.058	
	H	27.35	28.00	1.16	---	---	
Back	GPRS 2TX (body-worn)	L	27.59	28.00	1.10	---	---
		M	27.44	28.00	1.14	0.579	0.660
		H	27.35	28.00	1.16	---	---
Front		L	27.59	28.00	1.10	---	---
		M	27.44	28.00	1.14	0.104	0.119
		H	27.35	28.00	1.16	---	---
Top		L	27.59	28.00	1.10	---	---
		M	27.44	28.00	1.14	0.002	0.002
		H	27.35	28.00	1.16	---	---
Bottom	L	27.59	28.00	1.10	---	---	
	M	27.44	28.00	1.14	0.125	0.143	
	H	27.35	28.00	1.16	---	---	
Left	L	27.59	28.00	1.10	---	---	
	M	27.44	28.00	1.14	0.048	0.055	
	H	27.35	28.00	1.16	---	---	
Right	L	27.59	28.00	1.10	---	---	
	M	27.44	28.00	1.14	0.037	0.042	
	H	27.35	28.00	1.16	---	---	

Mode: WCDMA BAND II

fL (MHz)= 1852.4MHz fM (MHz)= 1880.0MHz fH (MHz)= 1907.6MHz

SAR Values (WCDMA BANDII)

Limit of SAR (W/kg): <1.6W/kg (1g Average)

Test Case		Ch	Measure Conducted Power (dBm)	Tune-up limit (dBm)	Scaling Factor	Measure Results (W/kg)	Reported Results (W/kg)
position	mode					1g Average	1g Average
Left cheek	12.2KRMC (head)	L	21.77	22.00	1.05	---	---
		M	21.73	22.00	1.06	0.122	0.129
		H	21.78	22.00	1.05	---	---
Left Tilted		L	21.77	22.00	1.05	---	---
		M	21.73	22.00	1.06	0.109	0.116
		H	21.78	22.00	1.05	---	---
Right cheek		L	21.77	22.00	1.05	---	---
		M	21.73	22.00	1.06	0.206	0.218
		H	21.78	22.00	1.05	---	---
Right Tilted	L	21.77	22.00	1.05	---	---	
	M	21.73	22.00	1.06	0.124	0.131	
	H	21.78	22.00	1.05	---	---	
Back	12.2KRMC (body-worn)	L	21.77	22.00	1.05	---	---
		M	21.73	22.00	1.06	0.686	0.727
		H	21.78	22.00	1.05	---	---
Front		L	21.77	22.00	1.05	---	---
		M	21.73	22.00	1.06	0.240	0.254
		H	21.78	22.00	1.05	---	---
Top	12.2KRMC (hotspot)	L	21.77	22.00	1.05	---	---
		M	21.73	22.00	1.06	0.004	0.004
		H	21.78	22.00	1.05	---	---
Bottom		L	21.77	22.00	1.05	---	---
		M	21.73	22.00	1.06	0.211	0.224
		H	21.78	22.00	1.05	---	---
Left		L	21.77	22.00	1.05	---	---
		M	21.73	22.00	1.06	0.137	0.145
		H	21.78	22.00	1.05	---	---
Right		L	21.77	22.00	1.05	---	---
		M	21.73	22.00	1.06	0.017	0.018
		H	21.78	22.00	1.05	---	---

Mode: WCDMA BANDV

fL (MHz)=826.4MHz fM (MHz)=836.4MHz fH (MHz)= 846.6MHz

SAR Values (WCDMA BANDV)

Limit of SAR (W/kg): <1.6W/kg (1g Average)

Test Case		Ch	Measure Conducted Power (dBm)	Tune-up limit (dBm)	Scaling Factor	Measure Results (W/kg)	Reported Results (W/kg)
position	mode					1g Average	1g Average
Left cheek	12.2KRMC (head)	L	23.80	24.00	1.05	---	---
		M	23.86	24.00	1.03	0.149	0.153
		H	23.81	24.00	1.04	---	---
Left Tilted		L	23.80	24.00	1.05	---	---
		M	23.86	24.00	1.03	0.088	0.091
		H	23.81	24.00	1.04	---	---
Right cheek		L	23.80	24.00	1.05	---	---
		M	23.86	24.00	1.03	0.200	0.206
		H	23.81	24.00	1.04	---	---
Right Tilted	L	23.80	24.00	1.05	---	---	
	M	23.86	24.00	1.03	0.098	0.101	
	H	23.81	24.00	1.04	---	---	
Back	12.2KRMC (body-worn)	L	23.80	24.00	1.05	---	---
		M	23.86	24.00	1.03	0.292	0.301
		H	23.81	24.00	1.04	---	---
Front		L	23.80	24.00	1.05	---	---
		M	23.86	24.00	1.03	0.260	0.268
		H	23.81	24.00	1.04	---	---
Top	L	23.80	24.00	1.05	---	---	
	M	23.86	24.00	1.03	0.003	0.003	
	H	23.81	24.00	1.04	---	---	
Bottom	L	23.80	24.00	1.05	---	---	
	M	23.86	24.00	1.03	0.149	0.153	
	H	23.81	24.00	1.04	---	---	
Left	12.2KRMC (hotspot)	L	23.80	24.00	1.05	---	---
		M	23.86	24.00	1.03	0.193	0.199
		H	23.81	24.00	1.04	---	---
Right		L	23.80	24.00	1.05	---	---
		M	23.86	24.00	1.03	0.280	0.288
		H	23.81	24.00	1.04	---	---

Mode: LTE Band 2

fL (MHz)= 1860MHz

fM (MHz)= 1880MHz

fH (MHz)= 1900MHz

SAR Values (LTE BAND2)

Limit of SAR (W/kg): <1.6W/kg (1g Average)

Test Case		Ch	Measure Conducted Power (dBm)	Tune-up limit (dBm)	Scaling Factor	Measure Results (W/kg)	Reported Results (W/kg)
position	mode					1g Average	1g Average
Left cheek	20BW 1RB (head)	L	21.97	22.20	1.05	---	---
		M	22.08	22.20	1.03	0.255	0.263
		H	21.82	22.20	1.09	---	---
Left Tilted		L	21.97	22.20	1.05	---	---
		M	22.08	22.20	1.03	0.093	0.096
		H	21.82	22.20	1.09	---	---
Right cheek		L	21.97	22.20	1.05	---	---
		M	22.08	22.20	1.03	0.071	0.073
		H	21.82	22.20	1.09	---	---
Right Tilted	L	21.97	22.20	1.05	---	---	
	M	22.08	22.20	1.03	0.135	0.139	
	H	21.82	22.20	1.09	---	---	
Back	20BW 1RB (body-worn)	L	21.97	22.20	1.05	---	---
		M	22.08	22.20	1.03	0.708	0.729
		H	21.82	22.20	1.09	---	---
Front		L	21.97	22.20	1.05	---	---
		M	22.08	22.20	1.03	0.218	0.225
		H	21.82	22.20	1.09	---	---
Top		L	21.97	22.20	1.05	---	---
		M	22.08	22.20	1.03	0.039	0.040
		H	21.82	22.20	1.09	---	---
Bottom	L	21.97	22.20	1.05	---	---	
	M	22.08	22.20	1.03	0.357	0.368	
	H	21.82	22.20	1.09	---	---	
Left	20BW 1RB (hotspot)	L	21.97	22.20	1.05	---	---
		M	22.08	22.20	1.03	0.101	0.104
		H	21.82	22.20	1.09	---	---
Right		L	21.97	22.20	1.05	---	---
		M	22.08	22.20	1.03	0.047	0.048
		H	21.82	22.20	1.09	---	---

Left cheek	20BW 50%RB (head)	L	21.97	22.20	1.05	---	---
		M	22.08	22.20	1.03	0.130	0.134
		H	21.82	22.20	1.09	---	---
Left Tilted		L	21.97	22.20	1.05	---	---
		M	22.08	22.20	1.03	0.084	0.087
		H	21.82	22.20	1.09	---	---
Right cheek		L	21.97	22.20	1.05	---	---
		M	22.08	22.20	1.03	0.064	0.066
		H	21.82	22.20	1.09	---	---
Right Tilted		L	21.97	22.20	1.05	---	---
		M	22.08	22.20	1.03	0.106	0.109
		H	21.82	22.20	1.09	---	---
Back	20BW 50%RB (body- worn)	L	21.97	22.20	1.05	---	---
		M	22.08	22.20	1.03	0.365	0.376
		H	21.82	22.20	1.09	---	---
Front		L	21.97	22.20	1.05	---	---
		M	22.08	22.20	1.03	0.187	0.193
		H	21.82	22.20	1.09	---	---

Mode: LTE Band 4

fL (MHz)= 1720MHz fM (MHz)= 1732.5MHz fH (MHz)= 1745MHz

SAR Values (LTE BAND4) **Limit of SAR (W/kg): <1.6W/kg (1g Average)**

Test Case		Ch	Measure Conducted Power (dBm)	Tune-up limit (dBm)	Scaling Factor	Measure Results (W/kg)	Reported Results (W/kg)
position	mode					1g Average	1g Average
Left cheek	20BW 1RB (head)	L	21.89	22.50	1.15	---	---
		M	22.31	22.50	1.04	0.184	0.191
		H	21.98	22.50	1.13	---	---
Left Tilted		L	21.89	22.50	1.15	---	---
		M	22.31	22.50	1.04	0.101	0.105
		H	21.98	22.50	1.13	---	---
Right cheek		L	21.89	22.50	1.15	---	---
		M	22.31	22.50	1.04	0.088	0.092
		H	21.98	22.50	1.13	---	---
Right Tilted	L	21.89	22.50	1.15	---	---	
	M	22.31	22.50	1.04	0.075	0.078	
	H	21.98	22.50	1.13	---	---	
Back	20BW 1RB (body-worn)	L	21.89	22.50	1.15	---	---
		M1	22.31	22.50	1.04	0.734	0.763
		M2	22.31	22.50	1.04	0.716	0.745
H		21.98	22.50	1.13	---	---	
Front		L	21.89	22.50	1.15	---	---
		M	22.31	22.50	1.04	0.213	0.222
	H	21.98	22.50	1.13	---	---	
Top	20BW 1RB (hotspot)	L	21.89	22.50	1.15	---	---
		M	22.31	22.50	1.04	0.008	0.008
		H	21.98	22.50	1.13	---	---
Bottom		L	21.89	22.50	1.15	---	---
		M	22.31	22.50	1.04	0.277	0.288
		H	21.98	22.50	1.13	---	---
Left		L	21.89	22.50	1.15	---	---
		M	22.31	22.50	1.04	0.112	0.116
		H	21.98	22.50	1.13	---	---
Right		L	21.89	22.50	1.15	---	---
		M	22.31	22.50	1.04	0.103	0.107
		H	21.98	22.50	1.13	---	---

NOTE:M1 main supply battery
M2 secondary supply battery

Left cheek	20BW 50%RB (head)	L	21.89	22.50	1.15	---	---
		M	22.31	22.50	1.04	0.108	0.112
		H	21.98	22.50	1.13	---	---
Left Tilted		L	21.89	22.50	1.15	---	---
		M	22.31	22.50	1.04	0.089	0.093
		H	21.98	22.50	1.13	---	---
Right cheek		L	21.89	22.50	1.15	---	---
		M	22.31	22.50	1.04	0.075	0.078
		H	21.98	22.50	1.13	---	---
Right Tilted	L	21.89	22.50	1.15	---	---	
	M	22.31	22.50	1.04	0.082	0.085	
	H	21.98	22.50	1.13	---	---	
Back	20BW 50%RB (body- worn)	L	21.89	22.50	1.15	---	---
		M	22.31	22.50	1.04	0.377	0.392
		H	21.98	22.50	1.13	---	---
Front		L	21.89	22.50	1.15	---	---
		M	22.31	22.50	1.04	0.156	0.162
		H	21.98	22.50	1.13	---	---

Mode: LTE Band 5

fL (MHz)=829 MHz fM (MHz)=836.5MHz fH (MHz)= 844MHz

SAR Values (LTE BAND5)

Limit of SAR (W/kg) : <1.6W/kg (1g Average)

Test Case		Ch	Measure Conducted Power (dBm)	Tune-up limit (dBm)	Scaling Factor	Measure Results (W/kg)	Reported Results (W/kg)
position	mode					1g Average	1g Average
Left cheek	10BW 1RB (head)	L1	23.86	24.00	1.03	---	---
		M1	23.98	24.00	1.00	0.135	0.135
		H1	23.98	24.00	1.00	---	---
Left Tilted		L	23.86	24.00	1.03	---	---
		M	23.98	24.00	1.00	0.104	0.104
		H	23.98	24.00	1.00	---	---
Right cheek		L	23.86	24.00	1.03	---	---
		M	23.98	24.00	1.00	0.194	0.194
		H	23.98	24.00	1.00	---	---
Right Tilted	L	23.86	24.00	1.03	---	---	
	M	23.98	24.00	1.00	0.091	0.091	
	H	23.98	24.00	1.00	---	---	
Back	10BW 1RB (body-worn)	L	23.86	24.00	1.03	---	---
		M	23.98	24.00	1.00	0.329	0.329
		H	23.98	24.00	1.00	---	---
Front		L	23.86	24.00	1.03	---	---
		M	23.98	24.00	1.00	0.207	0.207
		H	23.98	24.00	1.00	---	---
Top	L	23.86	24.00	1.03	---	---	
	M	23.98	24.00	1.00	0.011	0.011	
	H	23.98	24.00	1.00	---	---	
Bottom	L	23.86	24.00	1.03	---	---	
	M	23.98	24.00	1.00	0.115	0.115	
	H	23.98	24.00	1.00	---	---	
Left	10BW 1RB (hotspot)	L	23.86	24.00	1.03	---	---
		M	23.98	24.00	1.00	0.157	0.157
		H	23.98	24.00	1.00	---	---
Right		L	23.86	24.00	1.03	---	---
		M	23.98	24.00	1.00	0.227	0.227
		H	23.98	24.00	1.00	---	---

Left cheek	10BW 50%RB (head)	L	23.86	24.00	1.03	---	---
		M	23.98	24.00	1.00	0.113	0.113
		H	23.98	24.00	1.00	---	---
Left Tilted		L	23.86	24.00	1.03	---	---
		M	23.98	24.00	1.00	0.084	0.084
		H	23.98	24.00	1.00	---	---
Right cheek		L	23.86	24.00	1.03	---	---
		M	23.98	24.00	1.00	0.163	0.163
		H	23.98	24.00	1.00	---	---
Right Tilted	L	23.86	24.00	1.03	---	---	
	M	23.98	24.00	1.00	0.086	0.086	
	H	23.98	24.00	1.00	---	---	
Back	10BW 50%RB (body- worn)	L	23.86	24.00	1.03	---	---
		M	23.98	24.00	1.00	0.211	0.211
		H	23.98	24.00	1.00	---	---
Front		L	23.86	24.00	1.03	---	---
		M	23.98	24.00	1.00	0.144	0.144
		H	23.98	24.00	1.00	---	---

Mode: LTE Band 12

fL (MHz)=704 MHz fM (MHz)=707.5MHz fH (MHz)= 711MHz

SAR Values (LTE BAND12)

Limit of SAR (W/kg): <1.6W/kg (1g Average)

Test Case		Ch	Measure Conducted Power (dBm)	Tune-up limit (dBm)	Scaling Factor	Measure Results (W/kg)	Reported Results (W/kg)
position	position					1g Average	1g Average
Left cheek	10BW 1RB (head)	L	23.30	24.00	1.17		
		M	23.57	24.00	1.10	0.097	0.107
		H	23.24	24.00	1.19		
Left Tilted		L	23.30	24.00	1.17		
		M	23.57	24.00	1.10	0.084	0.092
		H	23.24	24.00	1.19		
Right cheek		L	23.30	24.00	1.17	---	---
		M	23.57	24.00	1.10	0.107	0.118
		H	23.24	24.00	1.19	---	---
Right Tilted	L	23.30	24.00	1.17	---	---	
	M	23.57	24.00	1.10	0.067	0.074	
	H	23.24	24.00	1.19	---	---	
Back	10BW 1RB (body-worn)	L	23.30	24.00	1.17	---	---
		M	23.57	24.00	1.10	0.304	0.334
		H	23.24	24.00	1.19	---	---
Front		L	23.30	24.00	1.17	---	---
		M	23.57	24.00	1.10	0.143	0.157
		H	23.24	24.00	1.19	---	---
Top		L	23.30	24.00	1.17	---	---
		M	23.57	24.00	1.10	0.009	0.010
		H	23.24	24.00	1.19	---	---
Bottom	L	23.30	24.00	1.17	---	---	
	M	23.57	24.00	1.10	0.057	0.063	
	H	23.24	24.00	1.19	---	---	
Left	L	23.30	24.00	1.17	---	---	
	M	23.57	24.00	1.10	0.166	0.183	
	H	23.24	24.00	1.19	---	---	
Right	L	23.30	24.00	1.17	---	---	
	M	23.57	24.00	1.10	0.209	0.230	
	H	23.24	24.00	1.19	---	---	

Left cheek	10BW 50%RB (head)	L	23.30	24.00	1.17	---	---
		M	23.57	24.00	1.10	0.087	0.096
		H	23.24	24.00	1.19	---	---
Left Tilted		L	23.30	24.00	1.17	---	---
		M	23.57	24.00	1.10	0.066	0.073
		H	23.24	24.00	1.19	---	---
Right cheek		L	23.30	24.00	1.17	---	---
		M	23.57	24.00	1.10	0.097	0.107
		H	23.24	24.00	1.19	---	---
Right Tilted	L	23.30	24.00	1.17	---	---	
	M	23.57	24.00	1.10	0.052	0.057	
	H	23.24	24.00	1.19	---	---	
Back	10BW 50%RB (body- worn)	L	23.30	24.00	1.17	---	---
		M	23.57	24.00	1.10	0.154	0.169
		H	23.24	24.00	1.19	---	---
Front		L	23.30	24.00	1.17	---	---
		M	23.57	24.00	1.10	0.088	0.097
		H	23.24	24.00	1.19	---	---

Mode: LTE Band 13

fL (MHz)=782 MHz fM (MHz)= 782MHz fH (MHz)= 782MHz

SAR Values (LTE BAND13)

Limit of SAR (W/kg): <1.6W/kg (1g Average)

Test Case		Ch	Measure Conducted Power (dBm)	Tune-up limit (dBm)	Scaling Factor	Measure Results (W/kg)	Reported Results (W/kg)
position	position					1g Average	1g Average
Left cheek	10BW 1RB (head)	L	23.54	24.00	1.11	---	---
		M	23.54	24.00	1.11	0.095	0.105
		H	23.54	24.00	1.11	---	---
Left Tilted		L	23.54	24.00	1.11	---	---
		M	23.54	24.00	1.11	0.073	0.081
		H	23.54	24.00	1.11	---	---
Right cheek		L	23.54	24.00	1.11	---	---
		M	23.54	24.00	1.11	0.116	0.129
		H	23.54	24.00	1.11	---	---
Right Tilted	L	23.54	24.00	1.11	---	---	
	M	23.54	24.00	1.11	0.076	0.084	
	H	23.54	24.00	1.11	---	---	
Back	10BW 1RB (body-worn)	L	23.54	24.00	1.11	---	---
		M	23.54	24.00	1.11	0.306	0.340
		H	23.54	24.00	1.11	---	---
Front		L	23.54	24.00	1.11	---	---
		M	23.54	24.00	1.11	0.152	0.169
		H	23.54	24.00	1.11	---	---
Top	L	23.54	24.00	1.11	---	---	
	M	23.54	24.00	1.11	0.003	0.003	
	H	23.54	24.00	1.11	---	---	
Bottom	L	23.54	24.00	1.11	---	---	
	M	23.54	24.00	1.11	0.063	0.070	
	H	23.54	24.00	1.11	---	---	
Left	L	23.54	24.00	1.11	---	---	
	M	23.54	24.00	1.11	0.141	0.157	
	H	23.54	24.00	1.11	---	---	
Right	L	23.54	24.00	1.11	---	---	
	M	23.54	24.00	1.11	0.191	0.212	
	H	23.54	24.00	1.11	---	---	

Left cheek	10BW 50%RB (head)	L	23.54	24.00	1.11	---	---
		M	23.54	24.00	1.11	0.077	0.085
		H	23.54	24.00	1.11	---	---
Left Tilted		L	23.54	24.00	1.11	---	---
		M	23.54	24.00	1.11	0.058	0.064
		H	23.54	24.00	1.11	---	---
Right cheek		L	23.54	24.00	1.11	---	---
		M	23.54	24.00	1.11	0.094	0.104
		H	23.54	24.00	1.11	---	---
Right Tilted	L	23.54	24.00	1.11	---	---	
	M	23.54	24.00	1.11	0.062	0.069	
	H	23.54	24.00	1.11	---	---	
Back	10BW 50%RB (body- worn)	L	23.54	24.00	1.11	---	---
		M	23.54	24.00	1.11	0.189	0.210
		H	23.54	24.00	1.11	---	---
Front		L	23.54	24.00	1.11	---	---
		M	23.54	24.00	1.11	0.095	0.105
		H	23.54	24.00	1.11	---	---

Mode: LTE Band 17

fL (MHz)=709 MHz fM (MHz)=710MHz fH (MHz)= 711MHz

SAR Values (LTE BAND17)

Limit of SAR (W/kg): <1.6W/kg (1g Average)

Test Case		Ch	Measure Conducted Power (dBm)	Tune-up limit (dBm)	Scaling Factor	Measure Results (W/kg)	Reported Results (W/kg)
position	position					1g Average	1g Average
Left cheek	10BW 1RB (head)	L	23.22	23.50	1.07		
		M	23.26	23.50	1.06	0.103	0.109
		H	23.37	23.50	1.03		
Left Tilted		L	23.22	23.50	1.07		
		M	23.26	23.50	1.06	0.080	0.085
		H	23.37	23.50	1.03		
Right cheek		L	23.22	23.50	1.07	---	---
		M	23.26	23.50	1.06	0.109	0.116
		H	23.37	23.50	1.03	---	---
Right Tilted	L	23.22	23.50	1.07	---	---	
	M	23.26	23.50	1.06	0.063	0.067	
	H	23.37	23.50	1.03	---	---	
Back	10BW 1RB (body-worn)	L	23.22	23.50	1.07	---	---
		M	23.26	23.50	1.06	0.295	0.313
		H	23.37	23.50	1.03	---	---
Front		L	23.22	23.50	1.07	---	---
		M	23.26	23.50	1.06	0.141	0.149
		H	23.37	23.50	1.03	---	---
Top		L	23.22	23.50	1.07		
		M	23.26	23.50	1.06	0.011	0.012
		H	23.37	23.50	1.03		
Bottom	L	23.22	23.50	1.07	---	---	
	M	23.26	23.50	1.06	0.055	0.058	
	H	23.37	23.50	1.03	---	---	
Left	L	23.22	23.50	1.07	---	---	
	M	23.26	23.50	1.06	0.161	0.171	
	H	23.37	23.50	1.03	---	---	
Right	L	23.22	23.50	1.07	---	---	
	M	23.26	23.50	1.06	0.217	0.230	
	H	23.37	23.50	1.03	---	---	

Left cheek	20BW 50%RB (head)	L	23.22	23.50	1.07	---	---
		M	23.26	23.50	1.06	0.084	0.089
		H	23.37	23.50	1.03	---	---
Left Tilted		L	23.22	23.50	1.07	---	---
		M	23.26	23.50	1.06	0.064	0.068
		H	23.37	23.50	1.03	---	---
Right cheek		L	23.22	23.50	1.07	---	---
		M	23.26	23.50	1.06	0.087	0.092
		H	23.37	23.50	1.03	---	---
Right Tilted	L	23.22	23.50	1.07	---	---	
	M	23.26	23.50	1.06	0.051	0.054	
	H	23.37	23.50	1.03	---	---	
Back	20BW 50%RB (body- worn)	L	23.22	23.50	1.07	---	---
		M	23.26	23.50	1.06	0.208	0.220
		H	23.37	23.50	1.03	---	---
Front		L	23.22	23.50	1.07	---	---
		M	23.26	23.50	1.06	0.117	0.124
		H	23.37	23.50	1.03	---	---

Mode: Wi-Fi 2.4GHz

fL (MHz)=2412MHz fM (MHz)=2437MHz fH (MHz)= 2462MHz

SAR Values (Wi-Fi 802.11b)

Limit of SAR (W/kg): <1.6W/kg (1g Average)

Test Case		Ch	Measure Conducted Power (dBm)	Tune-up limit (dBm)	Scaling Factor	Measure Results (W/kg)	Reported Results (W/kg)
position	mode					1g Average	1g Average
Left cheek	802.11b (head)	L	16.92	18.00	1.28	---	---
		M	16.52	18.00	1.41	0.175	0.247
		H	17.85	18.00	1.04	---	---
Left Tilted		L	16.92	18.00	1.28	---	---
		M	16.52	18.00	1.41	0.225	0.317
		H	17.85	18.00	1.04	---	---
Right cheek		L	16.92	18.00	1.28	---	---
		M	16.52	18.00	1.41	0.246	0.347
		H	17.85	18.00	1.04	---	---
Right Tilted	L	16.92	18.00	1.28	---	---	
	M1	16.52	18.00	1.41	0.282	0.398	
	M2	16.52	18.00	1.41	0.277	0.391	
	H	17.85	18.00	1.04	---	---	
Back	802.11b (body- worn)	L	16.92	18.00	1.28	---	---
		M	16.52	18.00	1.41	0.158	0.223
		H	17.85	18.00	1.04	---	---
Front		L	16.92	18.00	1.28	---	---
		M	16.52	18.00	1.41	0.077	0.109
		H	17.85	18.00	1.04	---	---
Top	L	16.92	18.00	1.28	---	---	
	M	16.52	18.00	1.41	0.150	0.212	
	H	17.85	18.00	1.04	---	---	
Bottom	L	16.92	18.00	1.28	---	---	
	M	16.52	18.00	1.41	0.006	0.008	
	H	17.85	18.00	1.04	---	---	
Left	802.11b (hotspot)	L	16.92	18.00	1.28	---	---
		M	16.52	18.00	1.41	0.106	0.149
		H	17.85	18.00	1.04	---	---
Right		L	16.92	18.00	1.28	---	---
		M	16.52	18.00	1.41	0.030	0.042
		H	17.85	18.00	1.04	---	---

NOTE:M1 main supply battery
M2 secondary supply battery

6.12 SAR Measurement Variability

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

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

- 1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.
- 2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
- 3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg ($\sim 10\%$ from the 1-g SAR limit).
- 4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 .

The Highest Reported SAR configuration in Each Frequency Band

Frequency band	Air interface	Head(w/kg)	Body-worn(w/kg)	Hotspot(w/kg)
750 MHz	LTE BAND12 LTE BAND13 LTE BAND17	<0.8	<0.8	<0.8
835 MHz	GSM850 WCDMA BAND5 LTE BAND5	<0.8	<0.8	<0.8
1800/2000 MHz	GSM1900 WCDMA BAND2 LTE BAND2 LTE BAND4	<0.8	<0.8	<0.8
2.4 GHz	BT/BLE WIFI 2.4G	<0.8	<0.8	<0.8

6.13 Simultaneous Transmission SAR Analysis

The sum of SAR values for GSM & Wi-Fi 2.4G/ Bluetooth

	MAXIMUM SAR VALUE FOR HEAD	MAXIMUM SAR VALUE FOR BODY WORN	MAXIMUM SAR VALUE FOR HOTSPOT
GSM	0.194	0.660	0.660
Wi-Fi	0.347	0.223	0.223
Sum	0.541	0.883	0.883
Note	Right cheek: GSM850+WIFI2.4G	Back: GSM1900+WIFI2.4G	Back: GSM1900+WIFI2.4G

According to the above tables, the sum of SAR values for GSM and Wi-Fi < 1.6W/kg. So simultaneous transmission SAR are not required for Wi-Fi transmitter.

The sum of SAR values for WCDMA & Wi-Fi 2.4G/ Bluetooth

	MAXIMUM SAR VALUE FOR HEAD	MAXIMUM SAR VALUE FOR BODY	MAXIMUM SAR VALUE FOR HOTSPOT
WCDMA	0.218	0.727	0.727
Wi-Fi	0.347	0.223	0.223
Sum	0.565	0.950	0.950
Note	Right cheek: WCDMAII+ WIFI2.4G	Back: WCDMAII+ WIFI2.4G	Back: WCDMAII+ WIFI2.4G

According to the above tables, the sum of SAR values for WCDMA and Wi-Fi < 1.6W/kg. So simultaneous transmission SAR are not required for Wi-Fi transmitter.5

The sum of SAR values for LTE& Wi-Fi 2.4G/ Bluetooth

	MAXIMUM SAR VALUE FOR HEAD	MAXIMUM SAR VALUE FOR BODY	MAXIMUM SAR VALUE FOR HOTSPOT
LTE	0.194	0.763	0.763
Wi-Fi	0.347	0.223	0.223
Sum	0.541	0.986	0.986
Note	Right cheek: LTE4 + WIFI2.4G	Back: LTE4 + WIFI2.4G	Back: LTE4 + WIFI2.4G

According to the above tables, the sum of SAR values for LTE and Wi-Fi < 1.6W/kg. So simultaneous transmission SAR are not required for Wi-Fi transmitter.

7 MEASUREMENT UNCERTAINTY

(0.3 - 3 GHz range)								
Error Description	Uncert. value	Prob. Dist.	Div.	(c_i) 1g	(c_i) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(v_i) v_{eff}
Measurement System								
Probe Calibration	±6.0 %	N	1	1	1	±6.0 %	±6.0 %	∞
Axial Isotropy	±4.7 %	R	$\sqrt{3}$	0.7	0.7	±1.9 %	±1.9 %	∞
Hemispherical Isotropy	±9.6 %	R	$\sqrt{3}$	0.7	0.7	±3.9 %	±3.9 %	∞
Boundary Effects	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %	∞
Linearity	±4.7 %	R	$\sqrt{3}$	1	1	±2.7 %	±2.7 %	∞
System Detection Limits	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %	∞
Modulation Response ^m	±2.4 %	R	$\sqrt{3}$	1	1	±1.4 %	±1.4 %	∞
Readout Electronics	±0.3 %	N	1	1	1	±0.3 %	±0.3 %	∞
Response Time	±0.8 %	R	$\sqrt{3}$	1	1	±0.5 %	±0.5 %	∞
Integration Time	±2.6 %	R	$\sqrt{3}$	1	1	±1.5 %	±1.5 %	∞
RF Ambient Noise	±3.0 %	R	$\sqrt{3}$	1	1	±1.7 %	±1.7 %	∞
RF Ambient Reflections	±3.0 %	R	$\sqrt{3}$	1	1	±1.7 %	±1.7 %	∞
Probe Positioner	±0.4 %	R	$\sqrt{3}$	1	1	±0.2 %	±0.2 %	∞
Probe Positioning	±2.9 %	R	$\sqrt{3}$	1	1	±1.7 %	±1.7 %	∞
Max. SAR Eval.	±2.0 %	R	$\sqrt{3}$	1	1	±1.2 %	±1.2 %	∞
Test Sample Related								
Device Positioning	±2.9 %	N	1	1	1	±2.9 %	±2.9 %	145
Device Holder	±3.6 %	N	1	1	1	±3.6 %	±3.6 %	5
Power Drift	±5.0 %	R	$\sqrt{3}$	1	1	±2.9 %	±2.9 %	∞
Power Scaling ^P	±0 %	R	$\sqrt{3}$	1	1	±0.0 %	±0.0 %	∞
Phantom and Setup								
Phantom Uncertainty	±6.1 %	R	$\sqrt{3}$	1	1	±3.5 %	±3.5 %	∞
SAR correction	±1.9 %	R	$\sqrt{3}$	1	0.84	±1.1 %	±0.9 %	∞
Liquid Conductivity (mea.) ^{DAK}	±2.5 %	R	$\sqrt{3}$	0.78	0.71	±1.1 %	±1.0 %	∞
Liquid Permittivity (mea.) ^{DAK}	±2.5 %	R	$\sqrt{3}$	0.26	0.26	±0.3 %	±0.4 %	∞
Temp. unc. - Conductivity ^{BB}	±3.4 %	R	$\sqrt{3}$	0.78	0.71	±1.5 %	±1.4 %	∞
Temp. unc. - Permittivity ^{BB}	±0.4 %	R	$\sqrt{3}$	0.23	0.26	±0.1 %	±0.1 %	∞
Combined Std. Uncertainty						±11.2 %	±11.1 %	361
Expanded STD Uncertainty						±22.3 %	±22.2 %	

(3 - 6 GHz range)

Error Description	Uncert. value	Prob. Dist.	Div.	(c_1) 1g	(c_2) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(v_i) v_{eff}
Measurement System								
Probe Calibration	±6.55 %	N	1	1	1	±6.55 %	±6.55 %	∞
Axial Isotropy	±4.7 %	R	$\sqrt{3}$	0.7	0.7	±1.9 %	±1.9 %	∞
Hemispherical Isotropy	±9.6 %	R	$\sqrt{3}$	0.7	0.7	±3.9 %	±3.9 %	∞
Boundary Effects	±2.0 %	R	$\sqrt{3}$	1	1	±1.2 %	±1.2 %	∞
Linearity	±4.7 %	R	$\sqrt{3}$	1	1	±2.7 %	±2.7 %	∞
System Detection Limits	±1.0 %	R	$\sqrt{3}$	1	1	±0.6 %	±0.6 %	∞
Modulation Response ^m	±2.4 %	R	$\sqrt{3}$	1	1	±1.4 %	±1.4 %	∞
Readout Electronics	±0.3 %	N	1	1	1	±0.3 %	±0.3 %	∞
Response Time	±0.8 %	R	$\sqrt{3}$	1	1	±0.5 %	±0.5 %	∞
Integration Time	±2.6 %	R	$\sqrt{3}$	1	1	±1.5 %	±1.5 %	∞
RF Ambient Noise	±3.0 %	R	$\sqrt{3}$	1	1	±1.7 %	±1.7 %	∞
RF Ambient Reflections	±3.0 %	R	$\sqrt{3}$	1	1	±1.7 %	±1.7 %	∞
Probe Positioner	±0.8 %	R	$\sqrt{3}$	1	1	±0.5 %	±0.5 %	∞
Probe Positioning	±6.7 %	R	$\sqrt{3}$	1	1	±3.9 %	±3.9 %	∞
Max. SAR Eval.	±4.0 %	R	$\sqrt{3}$	1	1	±2.3 %	±2.3 %	∞
Test Sample Related								
Device Positioning	±2.9 %	N	1	1	1	±2.9 %	±2.9 %	145
Device Holder	±3.6 %	N	1	1	1	±3.6 %	±3.6 %	5
Power Drift	±5.0 %	R	$\sqrt{3}$	1	1	±2.9 %	±2.9 %	∞
Power Scaling ^P	±0 %	R	$\sqrt{3}$	1	1	±0.0 %	±0.0 %	∞
Phantom and Setup								
Phantom Uncertainty	±6.6 %	R	$\sqrt{3}$	1	1	±3.8 %	±3.8 %	∞
SAR correction	±1.9 %	R	$\sqrt{3}$	1	0.84	±1.1 %	±0.9 %	∞
Liquid Conductivity (mea.) ^{DAK}	±2.5 %	R	$\sqrt{3}$	0.78	0.71	±1.1 %	±1.0 %	∞
Liquid Permittivity (mea.) ^{DAK}	±2.5 %	R	$\sqrt{3}$	0.26	0.26	±0.3 %	±0.4 %	∞
Temp. unc. - Conductivity ^{BB}	±3.4 %	R	$\sqrt{3}$	0.78	0.71	±1.5 %	±1.4 %	∞
Temp. unc. - Permittivity ^{BB}	±0.4 %	R	$\sqrt{3}$	0.23	0.26	±0.1 %	±0.1 %	∞
Combined Std. Uncertainty						±12.3 %	±12.2 %	748
Expanded STD Uncertainty						±24.6 %	±24.5 %	

8 TEST EQUIPMENTS

The measurements were performed using an automated near-field scanning system, DASY5, manufactured by Schmid & Partner Engineering AG (SPEAG) in Switzerland. The SAR extrapolation algorithm used in all measurements was the ‘advanced extrapolation’ algorithm.

The following table lists calibration dates of SPEAG components:

Test Equipment	Model	Serial Number	Calibration date	Calibration Due data
DAE	DAE4	546	2018.10.15	2019.10.14
Dosimetric E-field Probe	ES3DV3	3127	2018.11.02	2019.11.01
Dipole Validation Kit	D750V3	1101	2017.09.13	2020.09.12
Dipole Validation Kit	D835V2	4d023	2017.09.13	2020.09.12
Dipole Validation Kit	D1800V2	2d084	2017.09.15	2020.09.14
Dipole Validation Kit	D2000V2	1009	2018.02.01	2021.01.31
Dipole Validation Kit	D2450V2	738	2017.09.18	2020.09.17

Additional test equipment used in testing:

Test Equipment	Model	Serial Number	Calibration date	Calibration Due data
Signal Generator	E4428C	MY45280865	2018.08.20	2019.08.19
Signal Generator	SML 03	103514	2018.08.20	2019.08.19
Power meter	E4417A	MY45101182	2018.08.20	2019.08.19
Power Sensor	E4412A	MY41502214	2018.08.20	2019.08.19
Power Sensor	E4412A	MY41502130	2018.08.20	2019.08.19
Power meter	E4417A	MY45101004	2018.08.20	2019.08.19
Power Sensor	E9300B	MY41496001	2018.08.20	2019.08.19
Power Sensor	E9300B	MY41496003	2018.08.20	2019.08.19
Communication Tester	E5515C	MY48367401	2018.08.20	2019.08.19
Communication Tester	CMU500	114666	2018.08.20	2019.08.19
Communication Tester	MT8820C	6201300660	2018.08.20	2019.08.19
Communication Tester	MT8821C	6201547819	2018.08.20	2019.08.19
Vector Network Analyzer	E5072A	MY51100334	2018.03.01	2019.02.28
Vector Network Analyzer	VNA R140	0011213	2018.10.17	2019.10.16
Dielectric Parameter Probe	DAKS-3.5	1042	2018.10.17	2019.10.16

Detailed information of Isotropic E-field Probe Type ES3DV3

Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	Calibration certificate in Appendix C
Frequency	10 MHz to 4 GHz; Linearity: ± 0.2 dB (30 MHz to 4 GHz)
Optical Surface Detection	± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 3.9 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.0 mm
Dynamic Range	5 μ W/g to > 100 W/kg; Linearity: ± 0.2 dB
Application	General dosimetry up to 4 GHz Dosimetry in strong gradient fields Compliance tests of mobile phones

Detailed information of Isotropic E-field Probe Type EX3DV4

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	Calibration certificate in Appendix C
Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Optical Surface Detection	± 0.3 mm repeatability in air and clear liquids over diffuse reflecting surfaces
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Dynamic Range	10 μ W/g to > 100 W/kg Linearity: ± 0.2 dB (noise: typically < 1 μ W/g)
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better 30%.

According to KDB 865664 D01 section 3.2.2, instead of the typical annual calibration recommended by measurement standards, longer calibration intervals of up to three years may be considered when it is demonstrated that the **SAR target, impedance and return loss** of a dipole have remain stable according to the following requirements.

- 1) The test laboratory must ensure that the required supporting information and documentation are included in the SAR report to qualify for the three-year extended calibration interval; otherwise, the IEEE Std 1528-2013 recommended annual calibration applies.
- 2) Immediate re-calibration is required for the following conditions.
 - a) After a dipole is damaged and properly repaired to meet required specifications.
 - b) When the measured SAR deviates from the calibrated SAR value by more than 10% due to changes in physical, mechanical, electrical or other relevant dipole conditions; i.e., the error is not introduced by incorrect measurement procedures or other issues relating to the SAR measurement system.
 - c) When the most recent return-loss result, measured at least annually, deviates by more than 20% from the previous measurement (i.e. value in dB \times 0.2) or not meeting the required 20 dB minimum return-loss requirement.
 - d) When the most recent measurement of the real or imaginary parts of the impedance, measured at least annually, deviates by more than 5 Ω from the previous measurement.

Dipole 750

SAR target

Refers to system check, measured SAR (1g and 10g) deviates from the Target SAR value of calibration report within 10%.

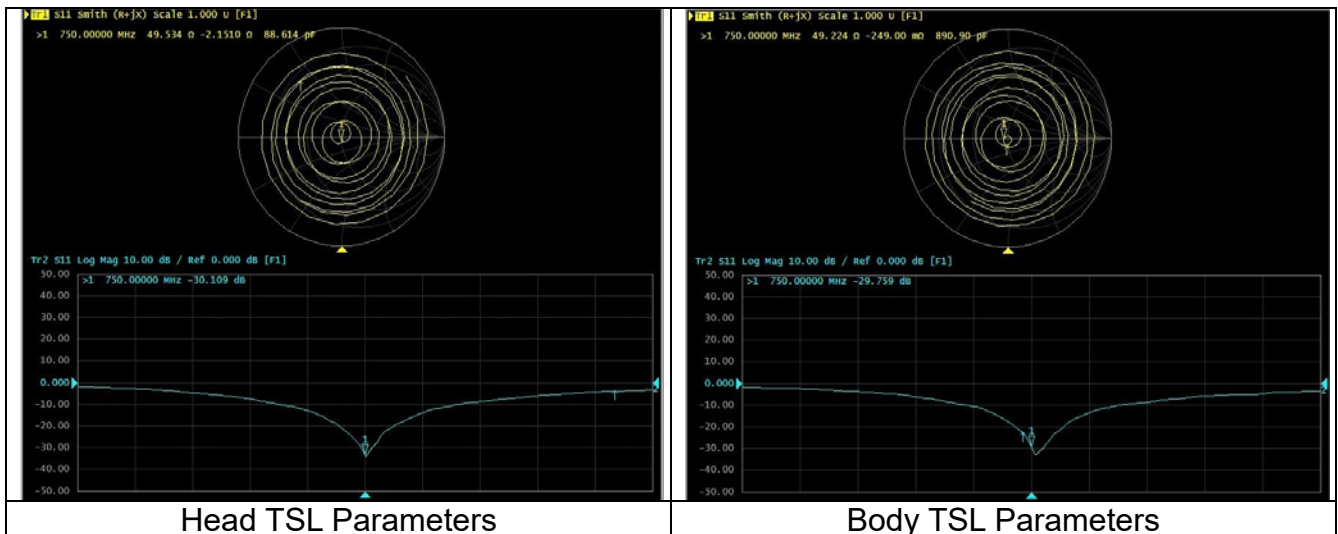
Impedance and Return loss measured by Network analyzer

The most recent measurement of the real or imaginary parts of the impedance (measured on 2018.8.20), deviates within 5 Ω from the previous measurement. (Data from the last calibration report)

The most recent return-loss result (measured on 2018.8.20) deviates within 20% from the previous measurement. (Data from the last calibration report)

Head TSL Parameters			
Parameters	Target (Ref. Value)	Measured data	Deviation
Impedance	53.9Ω+0.24jΩ	49.5Ω-2.15jΩ	<5Ω
Return loss	-28.4dB	-29.8dB	<20%

Body TSL Parameters			
Parameters	Target (Ref. Value)	Measured data	Deviation
Impedance	52.0Ω-2.22jΩ	49.2Ω-0.25jΩ	<5Ω
Return loss	-30.6dB	-30.1dB	<20%



Dipole 835

SAR target

Refers to system check, measured SAR (1g and 10g) deviates from the Target SAR value of calibration report within 10%.

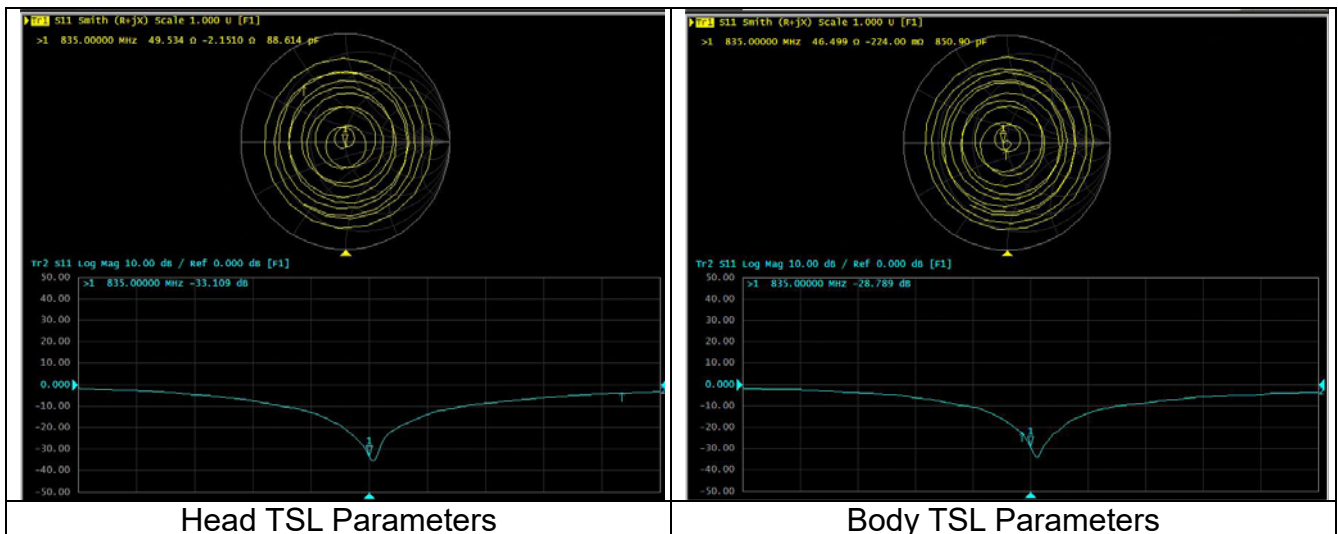
Impedance and Return loss measured by Network analyzer

The most recent measurement of the real or imaginary parts of the impedance (measured on 2018.8.20), deviates within 5 Ω from the previous measurement. (Data from the last calibration report)

The most recent return-loss result (measured on 2018.8.20) deviates within 20% from the previous measurement. (Data from the last calibration report)

Head TSL Parameters			
Parameters	Target (Ref. Value)	Measured data	Deviation
Impedance	51.0Ω-2.79jΩ	49.5Ω-2.15jΩ	<5Ω
Return loss	-30.7 dB	-33.1 dB	<20%

Body TSL Parameters			
Parameters	Target (Ref. Value)	Measured data	Deviation
Impedance	46.6Ω-3.61jΩ	49.5Ω-0.22jΩ	<5Ω
Return loss	-25.8dB	-28.8dB	<20%



Dipole1800

SAR target

Refers to system check, measured SAR (1g and 10g) deviates from the Target SAR value of calibration report within 10%.

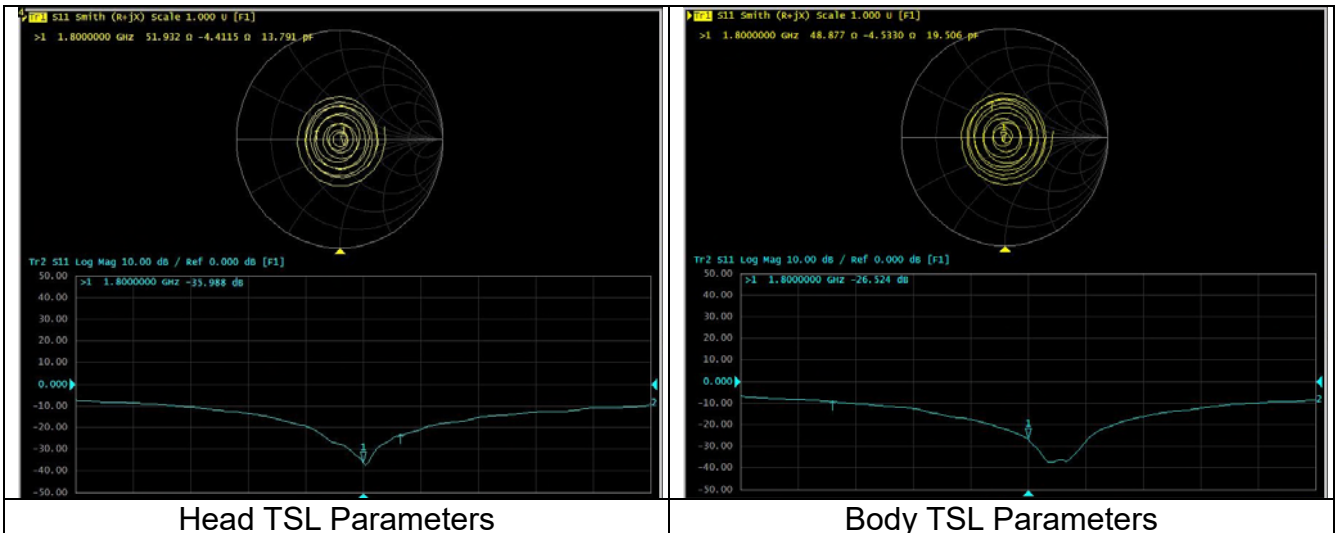
Impedance and Return loss measured by Network analyzer

The most recent measurement of the real or imaginary parts of the impedance (measured on 2018.8.20), deviates within 5 Ω from the previous measurement. (Data from the last calibration report)

The most recent return-loss result (measured on 2018.8.20) deviates within 20% from the previous measurement. (Data from the last calibration report)

Head TSL Parameters			
Parameters	Target (Ref. Value)	Measured data	Deviation
Impedance	49.3Ω-1.55jΩ	51.9Ω-4.41jΩ	<5Ω
Return loss	-35.4 dB	-36.0dB	<20%

Body TSL Parameters			
Parameters	Target (Ref. Value)	Measured data	Deviation
Impedance	46.0Ω-1.32jΩ	48.9Ω-4.53jΩ	<5Ω
Return loss	-27.1dB	-26.5dB	<20%



Dipole2000

SAR target

Refers to system check, measured SAR (1g and 10g) deviates from the Target SAR value of calibration report within 10%.

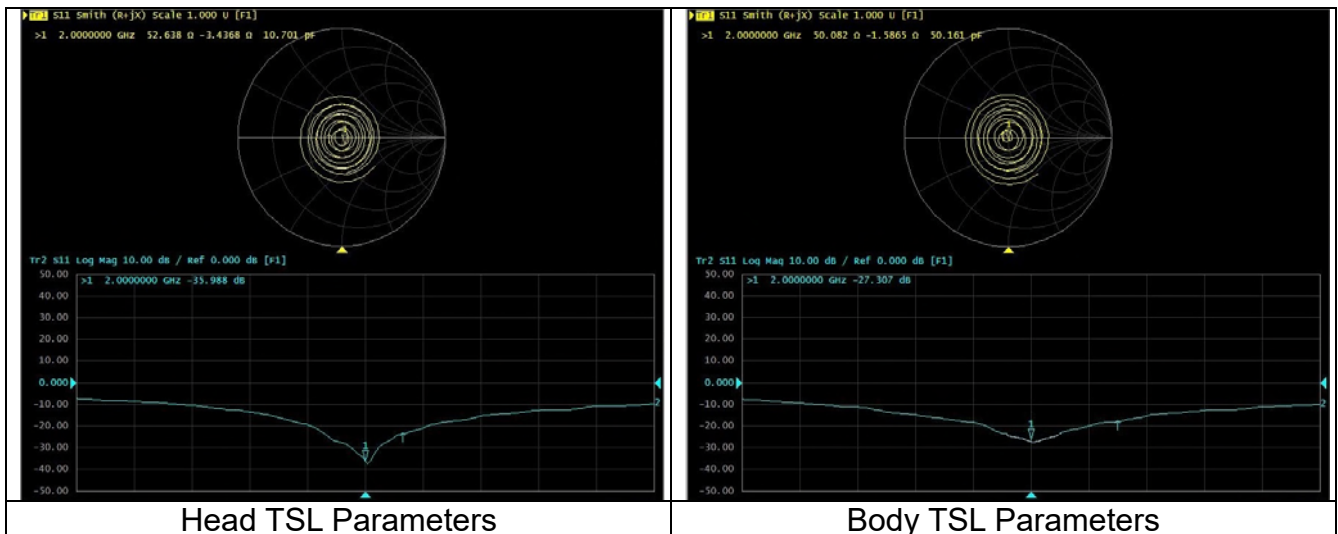
Impedance and Return loss measured by Network analyzer

The most recent measurement of the real or imaginary parts of the impedance (measured on 2018.8.20), deviates within 5 Ω from the previous measurement. (Data from the last calibration report)

The most recent return-loss result (measured on 2018.8.20) deviates within 20% from the previous measurement. (Data from the last calibration report)

Head TSL Parameters			
Parameters	Target (Ref. Value)	Measured data	Deviation
Impedance	49.8Ω-2.08jΩ	52.6Ω-3.44jΩ	<5Ω
Return loss	-33.6dB	-36.0dB	<20%

Body TSL Parameters			
Parameters	Target (Ref. Value)	Measured data	Deviation
Impedance	46.3Ω-1.63jΩ	50.1Ω-1.59jΩ	<5Ω
Return loss	-27.6dB	-27.3dB	<20%



Dipole2450

SAR target

Refers to system check, measured SAR (1g and 10g) deviates from the Target SAR value of calibration report within 10%.

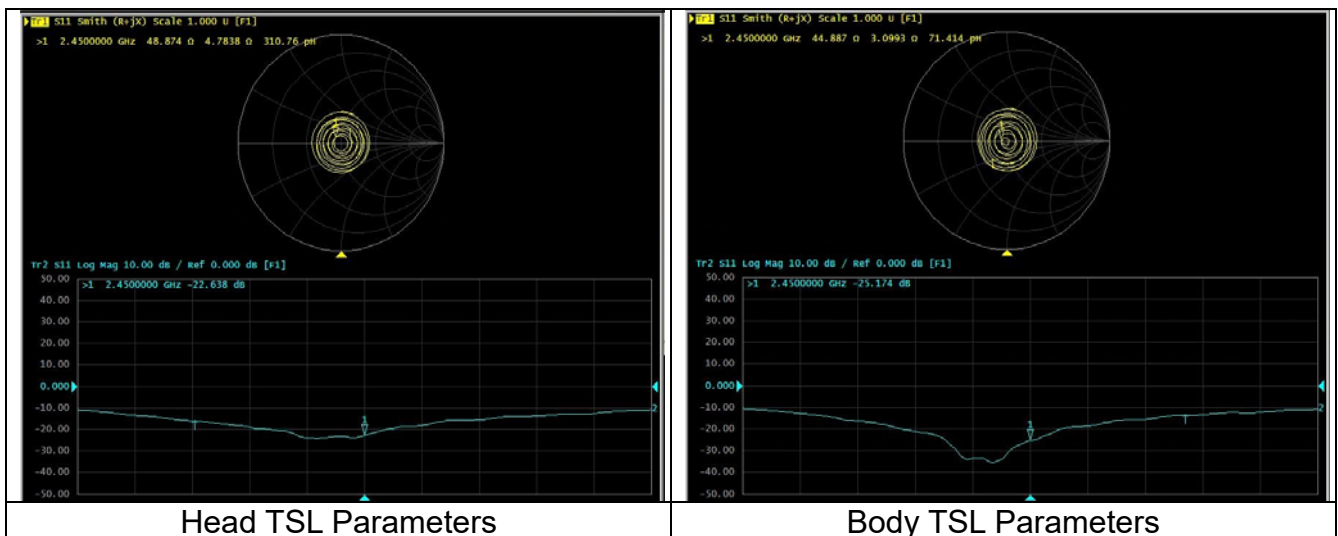
Impedance and Return loss measured by Network analyzer

The most recent measurement of the real or imaginary parts of the impedance (measured on 2018.8.20), deviates within $5\ \Omega$ from the previous measurement. (Data from the last calibration report)

The most recent return-loss result (measured on 2018.8.20) deviates within 20% from the previous measurement. (Data from the last calibration report)

Head TSL Parameters			
Parameters	Target (Ref. Value)	Measured data	Deviation
Impedance	$51.3\Omega + 5.92j\Omega$	$48.9\Omega + 4.78j\Omega$	$<5\Omega$
Return loss	-24.5 dB	-22.6dB	$<20\%$

Body TSL Parameters			
Parameters	Target (Ref. Value)	Measured data	Deviation
Impedance	$47.6\Omega + 6.39j\Omega$	$44.9\Omega + 3.10j\Omega$	$<5\Omega$
Return loss	-23.1dB	-25.2dB	$<20\%$



ANNEX A – TEST PLOTS



Please refer to the attachment.


ANNEX B – RELEVANT PAGES FROM CALIBRATION REPORTS

Please refer to the attachment.

ANNEX B – RELEVANT PAGES FROM CALIBRATION REPORTS

DAE4 Sn:546

 <p>In Collaboration with S P E A G CALIBRATION LABORATORY</p> <p>Address: No. 51 Xuyuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-42204633-2312 Fax: +86-10-42204633-2304 E-mail: cti@chinaeet.com http://www.chinaeet.com</p> <p>Client: SRTC Certificate No: Z18-60400</p> <p>CALIBRATION CERTIFICATE</p> <p>Object: DAE4 - SN: 546</p> <p>Calibration Procedure(s): FF-Z11-002-01 Calibration Procedure for the Data Acquisition Electronics (DAE)</p> <p>Calibration date: October 15, 2018</p> <p>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.</p> <p>All calibrations have been conducted in the closed laboratory facility; environment temperature(23±1)°C and humidity<70%.</p> <p>Calibration Equipment used (M&TE critical for calibration)</p> <table border="1"> <thead> <tr> <th>Primary Standards</th> <th>ID #</th> <th>Cal Date/Calibrated by, Certificate No.)</th> <th>Scheduled Calibration</th> </tr> </thead> <tbody> <tr> <td>Process Calibrator 753</td> <td>1971018</td> <td>20-Jun-18 (CTTL, No.J18X00034)</td> <td>June-19</td> </tr> </tbody> </table> <p>Calibrated by: Yu Zongying SAR Test Engineer Reviewed by: Lin Hao SAR Test Engineer Approved by: Qi Dianyuan SAR Project Leader</p> <p>Issued: October 17, 2018</p> <p>This calibration certificate shall not be reproduced except in full without written approval of the laboratory.</p> <p>Certificate No: Z18-60400 Page 1 of 3</p>	Primary Standards	ID #	Cal Date/Calibrated by, Certificate No.)	Scheduled Calibration	Process Calibrator 753	1971018	20-Jun-18 (CTTL, No.J18X00034)	June-19	 <p>In Collaboration with S P E A G CALIBRATION LABORATORY</p> <p>Address: No. 51 Xuyuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-42204633-2312 Fax: +86-10-42204633-2304 E-mail: cti@chinaeet.com http://www.chinaeet.com</p> <p>Glossary: DAE: data acquisition electronics Connector angle: information used in DASY system to align probe sensor X to the robot coordinate system.</p> <p>Methods Applied and Interpretation of Parameters:</p> <ul style="list-style-type: none"> 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. <p>Certificate No: Z18-60400 Page 2 of 3</p>
Primary Standards	ID #	Cal Date/Calibrated by, Certificate No.)	Scheduled Calibration						
Process Calibrator 753	1971018	20-Jun-18 (CTTL, No.J18X00034)	June-19						



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DC Voltage Measurement

A/D Converter Resolution nominal: 8.1µV, full range = -100...+300 mV
High Range: 1LSB = 81µV, full range = -1...+3mV
Low Range: 1LSB = 81µV, full range = -1...+3mV
DASY measurement parameters: Auto Zero Time: 3 sec, Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	405.308 ± 0.15% (k=2)	404.059 ± 0.15% (k=2)	404.180 ± 0.15% (k=2)
Low Range	3.98893 ± 0.7% (k=2)	3.98878 ± 0.7% (k=2)	3.98021 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	238° ± 1°
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Certificate No: Z18-60400 Page 1 of 3

ES3DV3 Sn:3127



Client: SRTC Certificate No: Z18-60398

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN3127

Calibration Procedure(s): FF-Z11-004-01
Calibration Procedures for Dosimetric E-field Probes

Calibration date: November 02, 2018

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±0.1)°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-18 (CTTL No.J18X05032)	Jun-19
Power sensor NRP-Z91	101547	20-Jun-18 (CTTL No.J18X05032)	Jun-19
Power sensor NRP-Z91	101548	20-Jun-18 (CTTL No.J18X05032)	Jun-19
Reference10dBAttenuator	18NS0W-10dB	09-Feb-18(CTTL No.J18X01133)	Feb-20
Reference20dBAttenuator	18NS0W-20dB	09-Feb-18(CTTL No.J18X01133)	Feb-20
Reference Probe EX3DV4	SN 3846	25-Jan-18(SPEAG, No.EK3-3846_Jan18)	Jan-19
DAE4	SN 777	15-Dec-17(SPEAG, No.DAE4-777_Dec17)	Dec-18
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
SignalGeneratorMG3700A	6201052605	21-Jun-18 (CTTL No.J18X05033)	Jun-19
Network Analyzer E5071C	MY46110673	14-Jan-18 (CTTL No.J18X00581)	Jan-19

Calibrated by: Yu Zongying SAR Test Engineer

Reviewed by: Lin Hao SAR Test Engineer

Approved by: Qi Dianyan SAR Project Leader

Issued: November 04, 2018

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Certificate No: Z18-60398

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Glossary:

TSL: Issue simulating liquid
 NORM_{x,y,z}: sensitivity in free space
 ComF: sensitivity in TSL / NORM_{x,y,z}
 DCP: diode compression point
 CF: crest factor (15dB_{typ} cycle) of the RF signal
 A,B,C,D: modulation dependent linearization parameters
 Polarization θ : θ rotation around probe axis
 Polarization ϕ : ϕ 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:
 a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
 b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2018
 c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2018
 d) KDB 850564, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}: Assessed for E-field polarization $\theta=0$ (th600MHz in TEM-cell; f>1800MHz: waveguide). NORM_{x,y,z} are only identifiable values, i.e., the uncertainties of NORM_{x,y,z} does not effect the z^2 -field uncertainty inside TSL (see below ComF).
- NORM_{(Rx,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 ComF.}
- 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 characteristic.
- A_{x,y,z}, B_{x,y,z}, C_{x,y,z}, V_{Rx,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.
- ComF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for 1500MHz) and inside waveguide using analytical field distributions based on power measurements for f > 600MHz. 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} ComF whereas the uncertainty corresponds to that given for ComF. A frequency dependent ComF is used in DASY version 4.4 and higher which allows extending the validity from 50MHz to 100MHz.
- Spherical isotropy (3D deviation from isotropy): in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the NORM_x (no uncertainty required).

Certificate No: Z18-60398

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Probe ES3DV3

SN: 3127

Calibrated: November 02, 2018

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

Certificate No: Z18-60398

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DASY/EASY – Parameters of Probe: ES3DV3 - SN: 3127

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm($\mu V/(V/m)^2$) ^A	1.27	1.26	1.21	$\pm 10.0\%$
DCP(mV) ^B	103.3	104.4	105.0	

Modulation Calibration Parameters

UID	Communication System Name	A dB	B dB- μV	C	D dB	VR mV	Unc ^C
0	CW	X 0.0	0.0	1.0	0.00	285.6	$\pm 2.2\%$
		Y 0.0	0.0	1.0		287.9	
		Z 0.0	0.0	1.0		282.9	

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



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DASY/EASY – Parameters of Probe: ES3DV3 - SN: 3127

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz] ^D	Relative Permittivity ^E	Conductivity (S/m) ^F	CorrvF X	CorrvF Y	CorrvF Z	Alpha ^G	Depth ^H (mm)	Unc. (k=2)
750	41.9	0.89	6.34	6.34	6.34	0.40	1.35	$\pm 12.1\%$
835	41.5	0.90	6.18	6.18	6.18	0.35	1.58	$\pm 12.1\%$
1810	40.0	1.40	5.07	5.07	5.07	0.66	1.24	$\pm 12.1\%$
2000	40.0	1.40	4.96	4.96	4.96	0.70	1.20	$\pm 12.1\%$
2300	39.5	1.67	4.79	4.79	4.79	0.90	1.08	$\pm 12.1\%$
2450	39.2	1.80	4.66	4.66	4.66	0.90	1.08	$\pm 12.1\%$
2600	39.0	1.96	4.40	4.40	4.40	0.80	1.21	$\pm 12.1\%$

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

^E At frequency below 3 GHz, the validity of tissue parameters (x and y) can be relaxed to $\pm 10\%$ if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (x and y) is restricted to $\pm 5\%$. The uncertainty is the RSS of the CorrvF 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 $\pm 1\%$ for frequencies below 3 GHz and below $\pm 2\%$ for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.



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DASY/EASY – Parameters of Probe: ES3DV3 - SN: 3127

Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz] ^D	Relative Permittivity ^E	Conductivity (S/m) ^F	CorrvF X	CorrvF Y	CorrvF Z	Alpha ^G	Depth ^H (mm)	Unc. (k=2)
750	55.5	0.96	6.33	6.33	6.33	0.40	1.40	$\pm 12.1\%$
835	55.2	0.97	6.13	6.13	6.13	0.37	1.62	$\pm 12.1\%$
1810	53.3	1.52	4.78	4.78	4.78	0.85	1.27	$\pm 12.1\%$
2000	53.3	1.52	4.80	4.80	4.80	0.87	1.27	$\pm 12.1\%$
2300	52.9	1.81	4.48	4.48	4.48	0.90	1.15	$\pm 12.1\%$
2450	52.7	1.95	4.31	4.31	4.31	0.78	1.28	$\pm 12.1\%$
2600	52.5	2.18	4.14	4.14	4.14	0.90	1.10	$\pm 12.1\%$

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

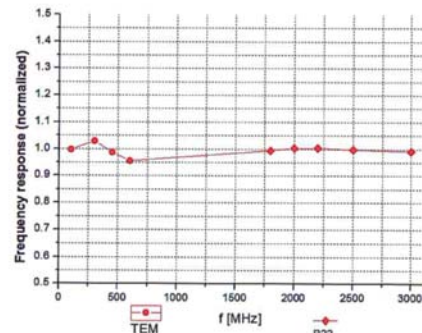
^E At frequency below 3 GHz, the validity of tissue parameters (x and y) can be relaxed to $\pm 10\%$ if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (x and y) is restricted to $\pm 5\%$. The uncertainty is the RSS of the CorrvF 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 $\pm 1\%$ for frequencies below 3 GHz and below $\pm 2\%$ for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.



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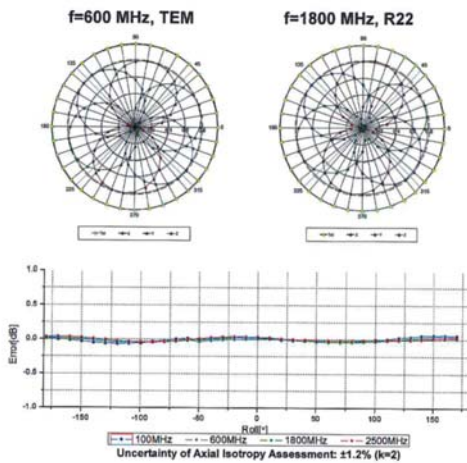
**Frequency Response of E-Field
(TEM-Cell: If1110 EXX, Waveguide: R22)**



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



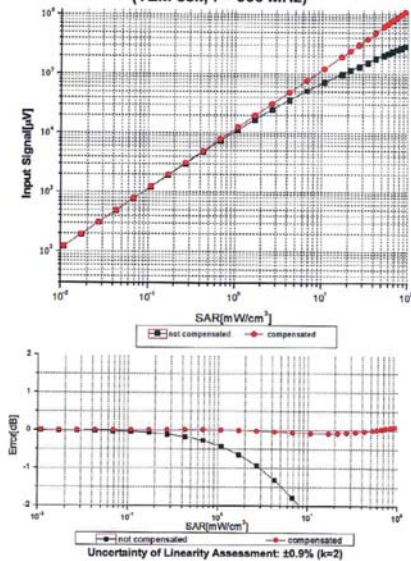
Receiving Pattern (Φ), $\theta=0^\circ$



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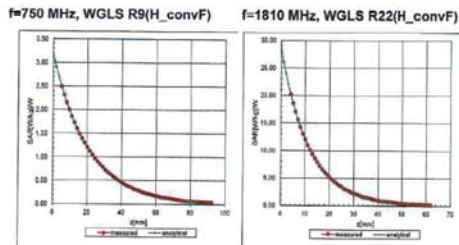
Dynamic Range f(SAR_{head})
(TEM cell, f = 900 MHz)



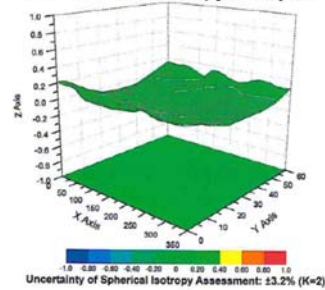
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Conversion Factor Assessment



Deviation from Isotropy in Liquid



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Appendix: Modulation Calibration Parameters

UID	Communication System Name	PAR	A dB	B dB/μV	C	VR mV	Unc ^k (k=2)
0	CW	0.00	X	0.0	0.0	1.0	282.3
			Y	0.0	0.0	1.0	280.9
			Z	0.0	0.0	1.0	275.1
10012	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	1.87	X	2.77	68.02	18.46	143.0
			Y	2.75	68.05	18.52	145.0
			Z	2.71	67.79	18.25	142.3
10100	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	5.67	X	6.13	66.4	18.97	141.9
			Y	6.15	66.49	19.06	144.2
			Z	6.09	66.32	18.90	140.9
10108	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	5.80	X	6.09	66.24	19.07	139.5
			Y	6.10	66.33	19.15	141.5
			Z	6.05	66.19	19.05	138.0
10164	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	5.75	X	5.81	65.85	18.93	136.1
			Y	5.82	65.92	19.01	137.8
			Z	5.79	65.89	18.97	134.7
10169	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	5.73	X	4.84	65.92	19.20	130.8
			Y	4.82	65.98	19.27	131.3
			Z	4.80	66.00	19.29	129.1
10175	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	5.72	X	4.88	66.14	19.40	131.6
			Y	4.83	66.08	19.33	130.9
			Z	4.79	66.02	19.29	129.3
10297	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	5.81	X	6.19	66.61	19.42	141.9
			Y	6.13	66.43	19.26	140.7
			Z	6.14	66.52	19.33	139.6

Certificate No: Z17-97142 Page 12 of 12

750V3 Sn:1101 (1/2)

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Client: **SRTC** Certificate No: **Z17-97134**

CALIBRATION CERTIFICATE

Object: D750V3 - SN: 1101

Calibration Procedure(s): FF-Z11-003-01
Calibration Procedures for dipole validation kits

Calibration date: September 13, 2017

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(S). 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(23±3)°C and humidity<70%.

Calibration Equipment used (MTE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by Certificate No.)	Scheduled Calibration
Power Meter NRV-D	102196	02-Mar-17 (CTTL No.J17X01254)	Mar-18
Power sensor NRV-Z5	100596	02-Mar-17 (CTTL No.J17X01254)	Mar-18
Reference Probe EX3D/V4	SN 7433	26-Sep-16(SPEAG, No EX3-7433_Sep16)	Sep-17
DAE4	SN 1331	19-Jan-17(CTTL-SPEAG, No Z17-97015)	Jan-18
Secondary Standards	ID #	Cal Date(Calibrated by Certificate No.)	Scheduled Calibration
Signal Generator E4439C	MY49071430	13-Jan-17 (CTTL No.J17X00285)	Jan-18
Network Analyzer E5071C	MY46111013	13-Jan-17 (CTTL No.J17X00285)	Jan-18

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

Issued: September 16, 2017
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CNAS L6579

Address: No. 31 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2304
E-mail: cti@china-cti.com.cn http://www.china-cti.com.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, "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
- KDB65664, SAR Measurement Requirements for 100 MHz to 6 GHz.

Additional Documentation:
a) 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%.

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Measurement Conditions
DASy system configuration, as far as not given on page 1

DASy Version	DASy92	52.10.0.1448
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	750 MHz ± 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 ± 0.2) °C	41.5 ± 6 %	0.89 mho/m ± 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	2.05 mW/g
SAR measured	250 mW input power	2.05 mW/g
SAR for nominal Head TSL parameters	normalized to 1W	8.26 mW/g ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	1.34 mW/g
SAR measured	250 mW input power	1.34 mW/g
SAR for nominal Head TSL parameters	normalized to 1W	5.39 mW/g ± 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 ± 0.2) °C	55.4 ± 6 %	0.95 mho/m ± 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	2.15 mW/g
SAR measured	250 mW input power	2.15 mW/g
SAR for nominal Body TSL parameters	normalized to 1W	8.69 mW/g ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	1.42 mW/g
SAR measured	250 mW input power	1.42 mW/g
SAR for nominal Body TSL parameters	normalized to 1W	6.73 mW/g ± 18.7 % (k=2)

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Appendix (Additional assessments outside the scope of CNAS L6570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.90 ± 0.24jΩ
Return Loss	-28.4dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	52.00 ± 2.22jΩ
Return Loss	-30.8dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.136 ns
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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
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D750V3 Sn:1101 (2/2)

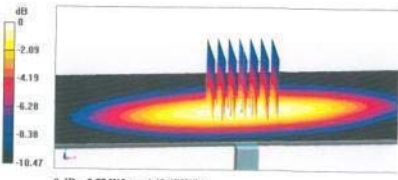
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E-mail: cti@china.ttl.com http://www.chinatit.com

DASY5 Validation Report for Head TSL Date: 09.13.2017
Test Laboratory: C.T.T.L., Beijing, China
DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1101
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 750 \text{ MHz}$; $n = 0.879$ Sim; $\epsilon_r = 41.54$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN7433; ConvF(10.01, 10.01, 10.01); Calibrated: 9/26/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 1/19/2017
- 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 (7417)

Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.10 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 3.17 W/kg
SAR(1 g) = 2.85 W/kg; SAR(10 g) = 1.34 W/kg
Maximum value of SAR (measured) = 2.77 W/kg



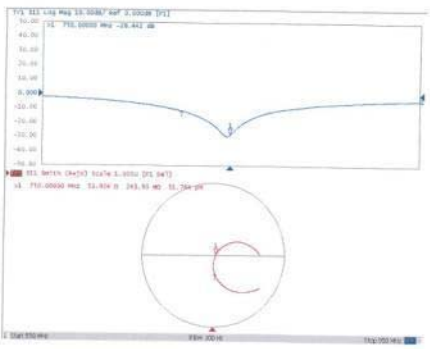
0 dB = 2.77 W/kg = 4.42 dBW/kg

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Impedance Measurement Plot for Head TSL



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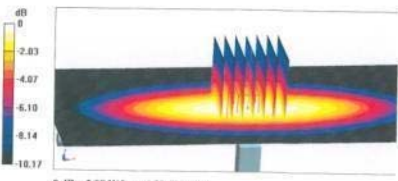
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DASY5 Validation Report for Body TSL Date: 09.13.2017
Test Laboratory: C.T.T.L., Beijing, China
DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1101
Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 750 \text{ MHz}$; $n = 0.946$ Sim; $\epsilon_r = 55.41$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Center Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN7433; ConvF(9.83, 9.83, 9.83); Calibrated: 9/26/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 1/19/2017
- 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 (7417)

Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.35 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.27 W/kg
SAR(1 g) = 2.15 W/kg; SAR(10 g) = 1.42 W/kg
Maximum value of SAR (measured) = 2.88 W/kg



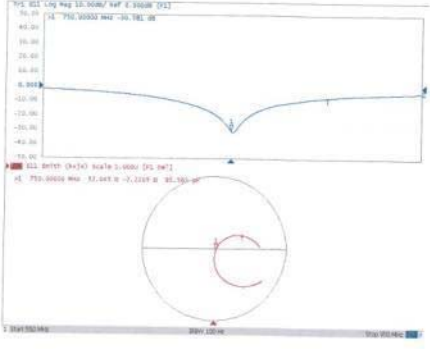
0 dB = 2.88 W/kg = 4.59 dBW/kg

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Impedance Measurement Plot for Body TSL



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D835V2 Sn:4d023

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The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.</p> <p>All calibrations have been conducted in the closed laboratory facility: environment temperature(23.3)°C and humidity<70%.</p> <p>Calibration Equipment used (M&TE critical for calibration)</p> <table border="1" style="width:100%; border-collapse: collapse; font-size: x-small;"> <tr> <th>Primary Standards</th> <th>ID #</th> <th>Cal Date(Calibrated by, Certificate No.)</th> <th>Scheduled Calibration</th> </tr> <tr> <td>Power Meter NRV-D</td> <td>102196</td> <td>02-Mar-17 (CTTL, No.J17X01254)</td> <td>Mar-18</td> </tr> <tr> <td>Power sensor NRV-Z5</td> <td>100596</td> <td>02-Mar-17 (CTTL, No.J17X01254)</td> <td>Mar-18</td> </tr> <tr> <td>Reference Probe EX3D/V4</td> <td>SN 7433</td> <td>26-Sep-16(SPEAG, No EX3-7433_Sep16)</td> <td>Sep-17</td> </tr> <tr> <td>DAE4</td> <td>SN 1331</td> <td>19-Jan-17(CTTL-SPEAG, No Z17-97015)</td> <td>Jan-18</td> </tr> <tr> <th>Secondary Standards</th> <th>ID #</th> <th>Cal Date(Calibrated by, Certificate No.)</th> <th>Scheduled Calibration</th> </tr> <tr> <td>Signal Generator E4438C</td> <td>MY49071430</td> <td>13-Jan-17 (CTTL, No.J17X00286)</td> <td>Jan-18</td> </tr> <tr> <td>Network Analyzer E5071C</td> <td>MY46110673</td> <td>13-Jan-17 (CTTL, No.J17X00286)</td> <td>Jan-18</td> </tr> </table> <p>Calibrated by: <table style="width:100%; border: none;"><tr><td style="width:30%;">Name</td><td style="width:40%;">Function</td><td style="width:30%;">Signature</td></tr><tr><td>Zhao Jing</td><td>SAR Test Engineer</td><td></td></tr></table></p> <p>Reviewed by: <table style="width:100%; border: none;"><tr><td style="width:30%;">Name</td><td style="width:40%;">Function</td><td style="width:30%;">Signature</td></tr><tr><td>Yu Zongying</td><td>SAR Test Engineer</td><td></td></tr></table></p> <p>Approved by: <table style="width:100%; border: none;"><tr><td style="width:30%;">Name</td><td style="width:40%;">Function</td><td style="width:30%;">Signature</td></tr><tr><td>Qi Dianyuan</td><td>SAR Project Leader</td><td></td></tr></table></p> <p style="text-align: right; font-size: x-small;">Issued: September 16, 2017 This calibration certificate shall not be reproduced except in full without written approval of the laboratory.</p> <p style="font-size: x-small;">Certificate No: Z17-97135 Page 1 of 8</p>	Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration	Power Meter NRV-D	102196	02-Mar-17 (CTTL, No.J17X01254)	Mar-18	Power sensor NRV-Z5	100596	02-Mar-17 (CTTL, No.J17X01254)	Mar-18	Reference Probe EX3D/V4	SN 7433	26-Sep-16(SPEAG, No EX3-7433_Sep16)	Sep-17	DAE4	SN 1331	19-Jan-17(CTTL-SPEAG, No Z17-97015)	Jan-18	Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration	Signal Generator E4438C	MY49071430	13-Jan-17 (CTTL, No.J17X00286)	Jan-18	Network Analyzer E5071C	MY46110673	13-Jan-17 (CTTL, No.J17X00286)	Jan-18	Name	Function	Signature	Zhao Jing	SAR Test Engineer		Name	Function	Signature	Yu Zongying	SAR Test Engineer		Name	Function	Signature	Qi Dianyuan	SAR Project Leader		<p style="text-align: center;"> In Collaboration with S P E A G CALIBRATION LABORATORY 中国认可 国际互认 校准 CALIBRATION CNAS L5570 </p> <p style="font-size: x-small;">Add: No.31 Xueyuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-62306633-2079 Fax: +86-10-62306633-2504 E-mail: cti@chinaatl.com http://www.chinaatl.com</p> <p>Glossary:</p> <p>TSL: tissue simulating liquid ConvF: sensitivity in TSL / NDRMx,y,z N/A: not applicable or not measured</p> <p>Calibration is Performed According to the Following Standards:</p> <ol style="list-style-type: none"> a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013 b) IEC 62209-1, "Measurement procedure for 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 c) 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 d) KDB855664, SAR Measurement Requirements for 100 MHz to 6 GHz <p>Additional Documentation:</p> <ol style="list-style-type: none"> e) DASY4/5 System Handbook <p>Methods Applied and Interpretation of Parameters:</p> <ul style="list-style-type: none"> • 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 positioned at the center 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, with the spacer to position it 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. 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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.</p> <p>Additional EUT Data</p> <table border="1" style="width:100%; border-collapse: collapse; font-size: x-small;"> <tr> <td>Manufactured by</td> <td>SPEAG</td> </tr> </table> <p style="font-size: x-small;">Certificate No: Z17-97135 Page 4 of 8</p>	Impedance, transformed to feed point	51.0D- 2.79jD	Return Loss	- 30.7dB	Impedance, transformed to feed point	46.6D- 3.61jD	Return Loss	- 25.8dB	Electrical Delay (one direction)	1.495 ns	Manufactured by	SPEAG
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D835V2 Sn:4d023



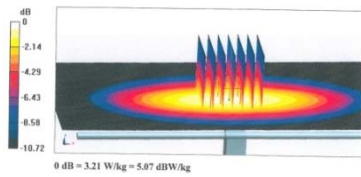
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TTL Calibration Laboratory
Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-42304633-2079 Fax: +86-10-42304633-2504
E-mail: cti@china.ttl.com http://www.china.ttl.com

DASY5 Validation Report for Head TSL Date: 09.13.2017
Test Laboratory: CTTL, Beijing, China
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d023
Communication System: UTD 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 835$ MHz; $\sigma = 0.903$ S/m; $\epsilon_r = 41.34$; $\rho = 1000$ kg/m³
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7433; ConvF(9.82, 9.82); Calibrated: 9/26/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 1/19/2017
- 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 (7417)

Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0; Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.28V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.66 W/kg
SAR(1 g) = 2.35 W/kg; SAR(10 g) = 1.52 W/kg
Maximum value of SAR (measured) = 3.21 W/kg



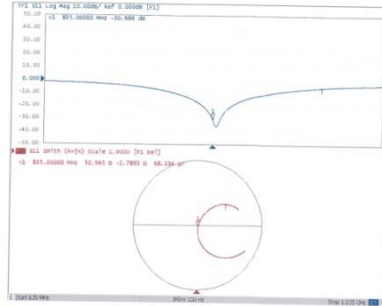
Certificate No: Z17-97135

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Impedance Measurement Plot for Head TSL



Certificate No: Z17-97135

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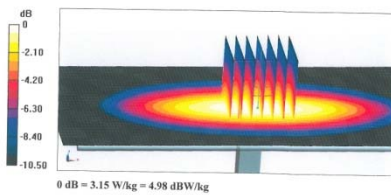
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E-mail: cti@china.ttl.com http://www.china.ttl.com

DASY5 Validation Report for Body TSL Date: 09.13.2017
Test Laboratory: CTTL, Beijing, China
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d023
Communication System: UTD 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 835$ MHz; $\sigma = 0.958$ S/m; $\epsilon_r = 55.68$; $\rho = 1000$ kg/m³
Phantom section: Center Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7433; ConvF(9.5, 9.5); Calibrated: 9/26/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 1/19/2017
- 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 (7417)

Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0; Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.17 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.57 W/kg
SAR(1 g) = 2.34 W/kg; SAR(10 g) = 1.53 W/kg
Maximum value of SAR (measured) = 3.15 W/kg



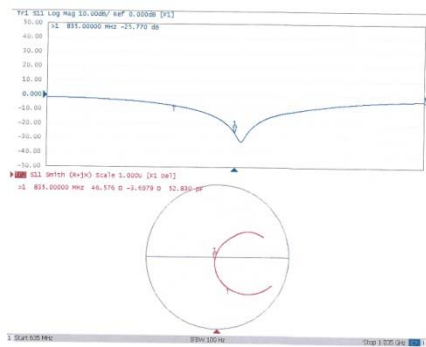
Certificate No: Z17-97135

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Impedance Measurement Plot for Body TSL



Certificate No: Z17-97135

Page 8 of 8

D1800V2 Sn:2d084

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国际互认
校准
CNAS
CALIBRATION
CNAS L0570

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E-mail: cti@chinaati.com http://www.chinaati.cn

Client: **SRTC** Certificate No: **Z17-97138**

CALIBRATION CERTIFICATE

Object: D1800V2 - SN: 2d084

Calibration Procedure(s): FF-Z11-003-01
Calibration Procedures for dipole validation kits

Calibration date: September 15, 2017

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(2±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	102196	02-Mar-17 (CTTL, No.J17X01254)	Mar-18
Power sensor NRP-Z91	100596	02-Mar-17 (CTTL, No.J17X01254)	Mar-18
Reference Probe EX30V4	SN 7433	26-Sep-16(SPEAG, No EX3-7433_Sep16)	Sep-17
D4E4	SN 1331	19-Jan-17(CTTL-SPEAG, No Z17-97015)	Jan-18

Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	13-Jan-17 (CTTL, No.J17X00286)	Jan-18
Network Analyzer E5071C	MY46110673	13-Jan-17 (CTTL, No.J17X00286)	Jan-18

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

Issued: September 18, 2017

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

Certificate No: Z17-97138 Page 1 of 8

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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 2009
- 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
- KDB85664, 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 transferred 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%.

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

DASY Version	DASY52	52.10.0.1448
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	1800 MHz ± 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 ± 0.2) °C	40.4 ± 6 %	1.42 mho/m ± 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	9.79 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	38.9 mW / g ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.12 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	20.4 mW / g ± 18.7 % (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 ± 0.2) °C	53.8 ± 6 %	1.50 mho/m ± 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	9.84 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	39.7 mW / g ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.18 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	20.8 mW / g ± 18.7 % (k=2)

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.3Ω: 1.55Ω
Return Loss	- 35.4dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.0Ω: 1.32Ω
Return Loss	- 27.1dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.318 ns
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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
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Certificate No: Z17-97138 Page 4 of 8

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DASY5 Validation Report for Head TSL Date: 09.13.2017
Test Laboratory: CTTL, Beijing, China
DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 2d084
Communication System: UTD 0, CW; Frequency: 1800 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1800$ MHz; $\sigma = 1.423$ S/m; $\epsilon_r = 40.37$; $\rho = 1000$ kg/m³
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN7433; ConvF(7.97, 7.97, 7.97); Calibrated: 9/26/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 1/19/2017
- 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 (7417)

System Performance Check/Zoom Scan (7x7x7) (7x7x7) Cube 0: Measurement grid:
dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.90 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 18.7 W/kg
SAR(1 g) = 9.79 W/kg; SAR(10 g) = 5.12 W/kg
Maximum value of SAR (measured) = 15.5 W/kg

Certificate No: Z17-97138 Page 5 of 8

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Impedance Measurement Plot for Head TSL

Certificate No: Z17-97138 Page 6 of 8

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E-mail: cti@china.ttl.com http://www.chinatitl.com

DASY5 Validation Report for Body TSL Date: 09.14.2017
Test Laboratory: CTTL, Beijing, China
DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 2d084
Communication System: UTD 0, CW; Frequency: 1800 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 1800$ MHz; $\sigma = 1.503$ S/m; $\epsilon_r = 53.79$; $\rho = 1000$ kg/m³
Phantom section: Center Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN7433; ConvF(7.75, 7.75, 7.75); Calibrated: 9/26/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 1/19/2017
- 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 (7413)

System Performance Check/Zoom Scan (7x7x7) (7x7x7) Cube 0: Measurement grid:
dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.57 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 18.0 W/kg
SAR(1 g) = 9.84 W/kg; SAR(10 g) = 5.18 W/kg
Maximum value of SAR (measured) = 15.2 W/kg

Certificate No: Z17-97138 Page 7 of 8

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Impedance Measurement Plot for Body TSL

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D2000V2 Sn:1009



Client: SRTC Certificate No: Z18-97021

CALIBRATION CERTIFICATE			
Object	D2000V2 - SN: 1009		
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits		
Calibration date:	February 1, 2018		
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 (MATE critical for calibration)			
Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRV-D	102196	02-Mar-17 (CTTL, No.J17X01254)	Mar-18
Power sensor NRV-Z5	100596	02-Mar-17 (CTTL, No.J17X01254)	Mar-18
Reference Probe EX30V4 DAE4	SN 7454 SN 1525	12-Sep-17 (SPEAG, No.EX3-7454_Sep17) 02-Oct-17 (SPEAG, No.DAE4-1525_Oct17)	Sep-18 Oct-18
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY46071430	23-Jan-18 (CTTL, No.J18X00560)	Jan-19
Network Analyzer E6071C	MY46110673	24-Jan-18 (CTTL, No.J18X00561)	Jan-19
Calibrated by:	Name	Function	Signature
	Zhao Jing	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	
Issued: February 4, 2018			
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			

Certificate No: Z18-97021 Page 1 of 4



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:

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1, "Measurement procedure for 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
- c) 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
- d) KDB658564, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- e) DAS4/S 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%.

Certificate No: Z18-97021 Page 2 of 4



Measurement Conditions

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

DASY Version	DASY52	52.10.0.1446
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	2000 MHz ± 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 ± 0.2) °C	38.9 ± 6 %	1.42 mho/m ± 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	10.2 mW/g
SAR for nominal Head TSL parameters	normalized to 1W	40.3 mW/g ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.17 mW/g
SAR for nominal Head TSL parameters	normalized to 1W	20.6 mW/g ± 18.7 % (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 ± 0.2) °C	51.8 ± 6 %	1.56 mho/m ± 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	10.3 mW/g
SAR for nominal Body TSL parameters	normalized to 1W	40.3 mW/g ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.18 mW/g
SAR for nominal Body TSL parameters	normalized to 1W	20.6 mW/g ± 18.7 % (k=2)

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.8C- 2.06jΩ
Return Loss	- 33.6dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.3C- 1.63jΩ
Return Loss	- 27.9dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.047 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
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D2000V2 Sn:1009

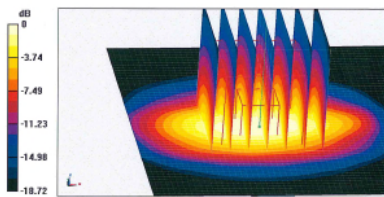


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E-mail: cti@tstest.com http://www.tstest.cn

DASY5 Validation Report for Head TSL Date: 02.01.2018
Test Laboratory: CTTL, Beijing, China
DUT: Dipole 2000 MHz; Type: D2000V2; Serial: D2000V2 - SN: 1009
Communication System: UID 0, CW; Frequency: 2000 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 2000$ MHz; $\sigma = 1.416$ S/m; $\epsilon_r = 38.89$; $\rho = 1000$ kg/m³
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN7464; ConvF(8.39, 8.39, 8.39); Calibrated: 9/12/2017,
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1525; Calibrated: 10/2/2017
- 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 (7417)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:
 $d_x=5$ mm, $d_y=5$ mm, $d_z=5$ mm
Reference Value = 95.98 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 19.7 W/kg
SAR(1 g) = 10.2 W/kg; SAR(10 g) = 5.17 W/kg
Maximum value of SAR (measured) = 16.2 W/kg



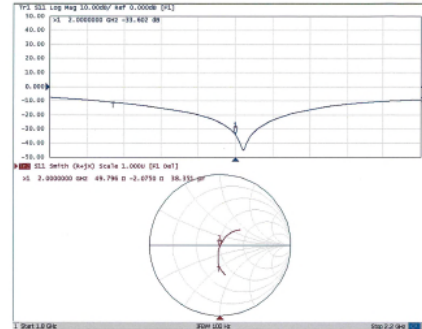
Certificate No: Z18-97021

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Impedance Measurement Plot for Head TSL



Certificate No: Z18-97021

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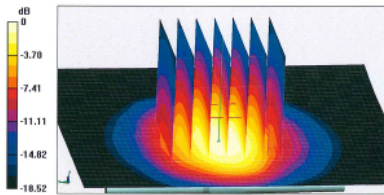


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Tel: +86-10-42334633-2079 Fax: +86-10-42334633-2204
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DASY5 Validation Report for Body TSL Date: 02.01.2018
Test Laboratory: CTTL, Beijing, China
DUT: Dipole 2000 MHz; Type: D2000V2; Serial: D2000V2 - SN: 1009
Communication System: UID 0, CW; Frequency: 2000 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 2000$ MHz; $\sigma = 1.564$ S/m; $\epsilon_r = 51.83$; $\rho = 1000$ kg/m³
Phantom section: Center Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN7464; ConvF(8.24,8.24,8.24); Calibrated: 9/12/2017,
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1525; Calibrated: 10/2/2017
- 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 (7417)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:
 $d_x=5$ mm, $d_y=5$ mm, $d_z=5$ mm
Reference Value = 93.84 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 19.7 W/kg
SAR(1 g) = 10.3 W/kg; SAR(10 g) = 5.18 W/kg
Maximum value of SAR (measured) = 16.3 W/kg



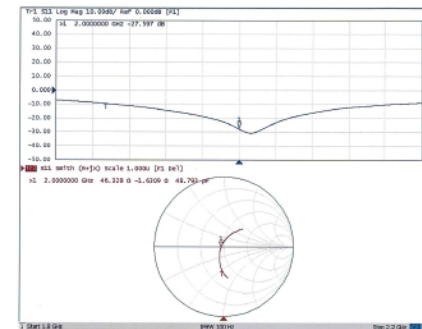
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Impedance Measurement Plot for Body TSL



Certificate No: Z18-97021

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D2450V2 Sn:738



Client: **SRTC** Certificate No: **Z17-97140**

CALIBRATION CERTIFICATE

Object: D2450V2 - SN: 738

Calibration Procedure(s): FF-Z11-003-01
Calibration Procedures for dipole validation kits

Calibration date: September 18, 2017

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 NRVD	102196	02-Mar-17 (CTTL No.J17X01254)	Mar-18
Power sensor NRV-Z5	100596	02-Mar-17 (CTTL No.J17X01254)	Mar-18
Reference Probe EX3DV4	SN 7433	26-Sep-16(SPEAG.No.EX3-7433_Sep16)	Sep-17
D4E4	SN 1331	19-Jan-17(CTTL-SPEAG.No.Z17-97015)	Jan-18

Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY46071430	13-Jan-17 (CTTL No.J17X00285)	Jan-18
Network Analyzer E5071C	MY46110673	13-Jan-17 (CTTL No.J17X00285)	Jan-18

Calibrated by: Zhao Jing SAR Test Engineer

Reviewed by: Yu Zongying SAR Test Engineer

Approved by: Qi Dianyuan SAR Project Leader

Issued: September 21, 2017

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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:
a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for 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 (F frequency range of 300MHz to 6GHz)", July 2016
c) 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
d) KDB655664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:
e) 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%.



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

DASY Version	DASY52	52.10.0.1446
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	2450 MHz ± 1 MHz	

Head TSL parameters
The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.7 ± 6 %	1.79 mho/m ± 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	13.1 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	52.4 mW / g ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	6.10 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	24.4 mW / g ± 18.7 % (k=2)

Body TSL parameters
The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.5 ± 6 %	1.98 mho/m ± 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	13.2 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	52.3 mW / g ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	6.10 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	24.3 mW / g ± 18.7 % (k=2)



Appendix (Additional assessments outside the scope of CNAS L5070)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.30+ j 5.92Ω
Return Loss	- 24.5dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.60+ j 6.38Ω
Return Loss	- 23.1dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.268 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
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D2450V2 Sn:738

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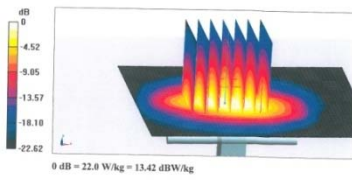
Address: No. 51 Xueyuan Road, Haidian District, Beijing, 100191, China
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E-mail: cti@chinattl.com http://www.chinattl.com

Date: 09.18.2017

DASY5 Validation Report for Head TSL
Test Laboratory: CTTL, Beijing, China
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 738
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 2450$ MHz; $\sigma = 1.788$ S/m; $\alpha = 38.67$; $\rho = 1000$ kg/m³
Phantom section: Left Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN7433; ConvF(7.45, 7.45, 7.45); Calibrated: 9/26/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 1/19/2017
- 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 (7417)

Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0; Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 102.1 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 27.8 W/kg
SAR(1 g) = 13.1 W/kg; SAR(10 g) = 6.1 W/kg
Maximum value of SAR (measured) = 22.0 W/kg



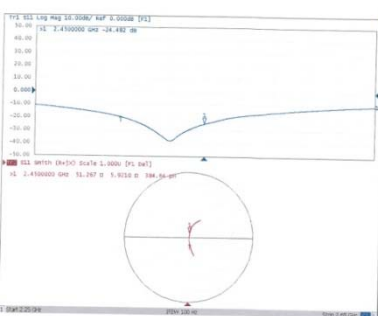
0 dB = 22.0 W/kg = 13.42 dBW/kg

Certificate No: Z17-97140 Page 5 of 8

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Impedance Measurement Plot for Head TSL



Certificate No: Z17-97140 Page 6 of 8

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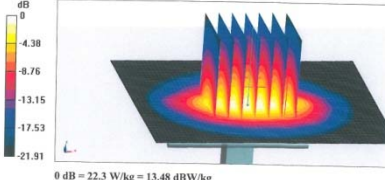
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E-mail: cti@chinattl.com http://www.chinattl.com

Date: 09.18.2017

DASY5 Validation Report for Body TSL
Test Laboratory: CTTL, Beijing, China
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 738
Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium parameters used: $f = 2450$ MHz; $\sigma = 1.983$ S/m; $\epsilon_r = 52.51$; $\rho = 1000$ kg/m³
Phantom section: Center Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN7433; ConvF(7.46, 7.46, 7.46); Calibrated: 9/26/2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 1/19/2017
- 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 (7417)

Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0; Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.41 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 27.8 W/kg
SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.1 W/kg
Maximum value of SAR (measured) = 22.3 W/kg



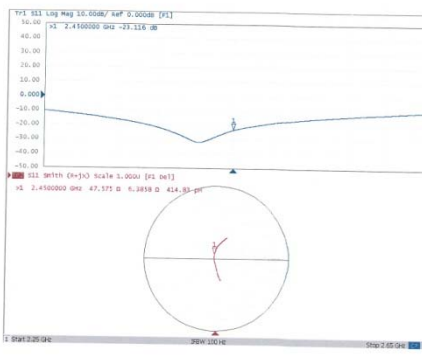
0 dB = 22.3 W/kg = 13.48 dBW/kg

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In Collaboration with
TTL **s p e a g**
CALIBRATION LABORATORY

Address: No. 51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62306633-2079 Fax: +86-10-62306633-2504
E-mail: cti@chinattl.com http://www.chinattl.com

Impedance Measurement Plot for Body TSL

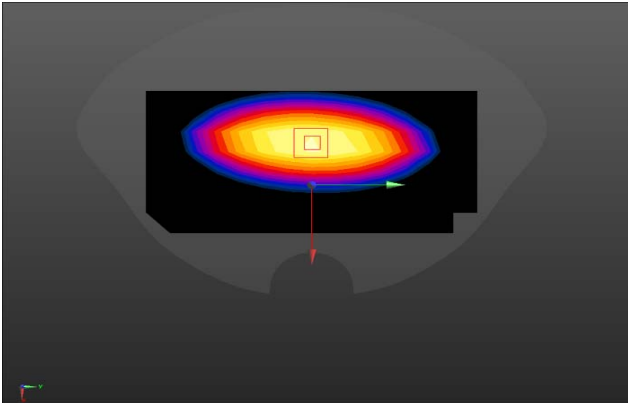


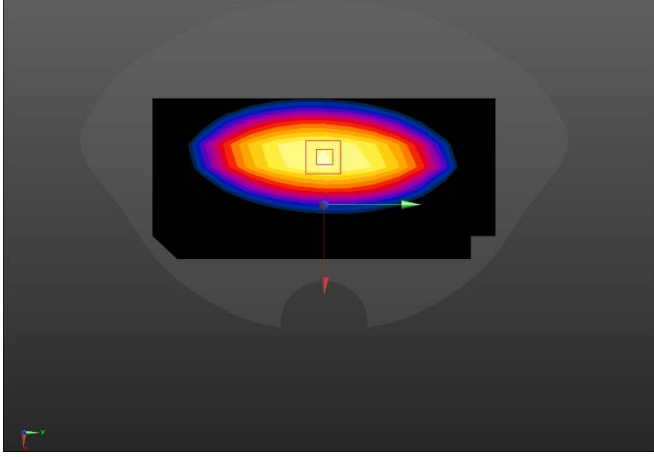
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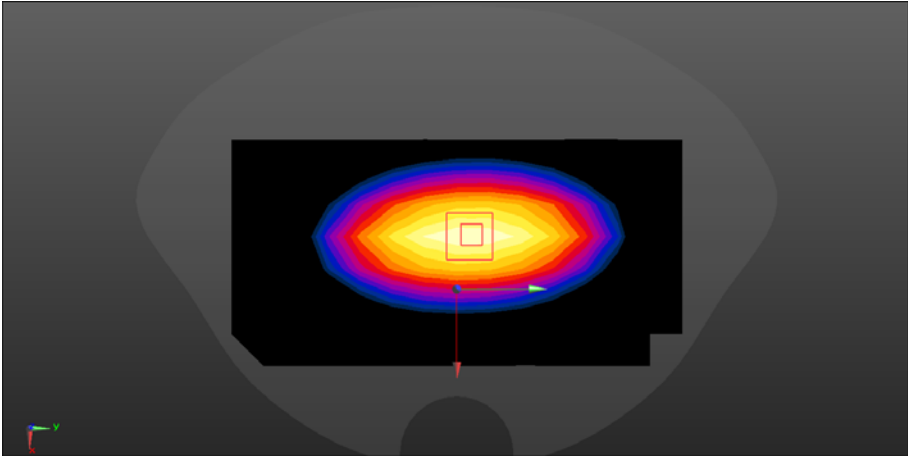
-----End of the test report-----

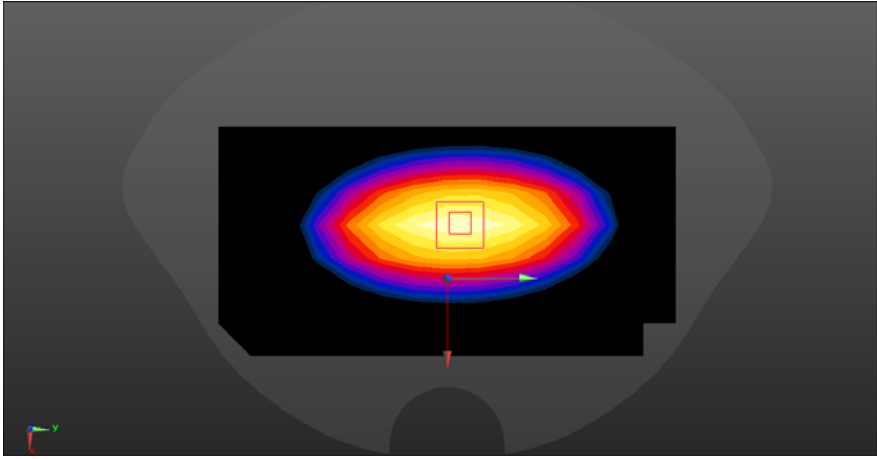
ANNEX A – TEST PLOTS

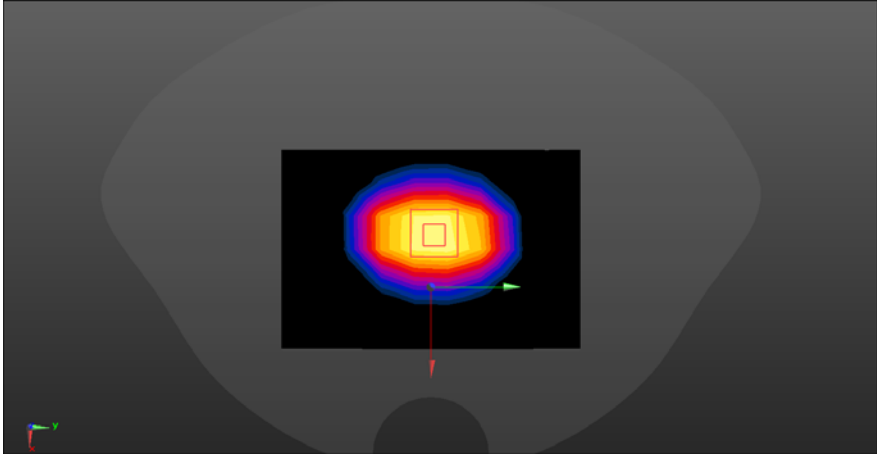
Head liquid

System check	750MHz
<p>Communication System: UID 0, CW (0); Communication System Band: D750 (750.0 MHz); Frequency: 750 MHz; Communication System PAR: 0 dB Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.914 \text{ S/m}$; $\epsilon_r = 42.263$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section</p>	
<p>DASY Configuration:</p>	
<ul style="list-style-type: none"> Probe: ES3DV3 - SN3127; ConvF(6.34, 6.34, 6.34); Calibrated: 2018/11/2; Sensor-Surface: 3mm (Mechanical Surface Detection), $z = -3.0, 32.0$ Electronics: DAE4 Sn546; Calibrated: 2018/10/15 Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373) 	
<p>System Performance Check at Frequencies 750MHz/d=15mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Area Scan (8x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$</p>	
<p>Maximum value of SAR (measured) = 2.16 W/kg</p>	
<p>System Performance Check at Frequencies 750MHz/d=15mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$</p>	
<p>Reference Value = 41.77 V/m; Power Drift = 0.19 dB</p>	
<p>Peak SAR (extrapolated) = 3.26 W/kg</p>	
<p>SAR(1 g) = 2.09 W/kg; SAR(10 g) = 1.37 W/kg</p>	
<p>Maximum value of SAR (measured) = 2.49 W/kg</p>	
	
<p>0 dB = 2.49 W/kg = 3.96 dBW/kg</p>	

System check	750MHz
<p>Communication System: UID 0, CW (0); Communication System Band: D750 (750.0 MHz); Frequency: 750 MHz; Communication System PAR: 0 dB Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.920 \text{ S/m}$; $\epsilon_r = 42.177$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section</p>	
<p>DASY Configuration:</p> <ul style="list-style-type: none"> Probe: ES3DV3 - SN3127; ConvF(6.34, 6.34, 6.34); Calibrated: 2018/11/2; Sensor-Surface: 3mm (Mechanical Surface Detection), $z = -3.0, 32.0$ Electronics: DAE4 Sn546; Calibrated: 2018/10/15 Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373) Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7437) <p>System Performance Check at Frequencies 750MHz/d=15mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Area Scan (8x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$ Maximum value of SAR (measured) = 2.27 W/kg</p> <p>System Performance Check at Frequencies 750MHz/d=15mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$ Reference Value = 43.47 V/m; Power Drift = -0.10 dB Peak SAR (extrapolated) = 4.11 W/kg SAR(1 g) = 2.12 W/kg; SAR(10 g) = 1.45 W/kg Maximum value of SAR (measured) = 2.55 W/kg</p>	
<div style="text-align: center;">  </div> <p style="text-align: center;">0 dB = 2.55 W/kg = 4.07 dBW/kg</p>	

System check	835MHz
<p>Communication System: UID 0, CW (0); Frequency: 835 MHz Medium parameters used (interpolated): $f = 835 \text{ MHz}$; $\sigma = 0.917 \text{ S/m}$; $\epsilon_r = 42.533$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> Probe: ES3DV3 - SN3127; ConvF(6.18, 6.18, 6.18); Calibrated: 2018/11/2; Sensor-Surface: 3mm (Mechanical Surface Detection) Electronics: DAE4 Sn546; Calibrated: 2018/10/15 Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>Configuration 835/835/Area Scan (8x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$ Maximum value of SAR (measured) = 2.75 W/kg</p> <p>Configuration 835/835/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$ Reference Value = 52.68 V/m; Power Drift = -0.09 dB Peak SAR (extrapolated) = 3.58 W/kg SAR(1 g) = 2.41 W/kg; SAR(10 g) = 1.56 W/kg Maximum value of SAR (measured) = 2.79 W/kg</p>  <p>The image displays a SAR measurement visualization. It features a central heatmap representing the SAR distribution within a phantom section. The heatmap shows a bright yellow/orange core, indicating the highest SAR values, surrounded by concentric rings of decreasing intensity through red, orange, and yellow to blue. A small white square highlights a specific region of interest within the core. The background is dark, and there are some faint, larger-scale contours visible around the main phantom area.</p>	

System check	835MHz
<p>Communication System: UID 0, CW (0); Frequency: 835 MHz Medium parameters used (interpolated): $f = 835 \text{ MHz}$; $\sigma = 0.911 \text{ S/m}$; $\epsilon_r = 40.266$ $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> Probe: ES3DV3 - SN3127; ConvF(6.18, 6.18, 6.18); Calibrated: 2018/11/2; Sensor-Surface: 3mm (Mechanical Surface Detection) Electronics: DAE4 Sn546; Calibrated: 2018/10/15 Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>Configuration 835/835/Area Scan (8x15x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$ Maximum value of SAR (measured) = 2.72 W/kg</p> <p>Configuration 835/835/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$ Reference Value = 51.67 V/m; Power Drift = 0.08 dB Peak SAR (extrapolated) = 3.58 W/kg SAR(1 g) = 2.39 W/kg; SAR(10 g) = 1.51 W/kg Maximum value of SAR (measured) = 2.75 W/kg</p> 	

System check	1800MHz
<p>Communication System: UID 0, CW (0); Frequency: 1800 MHz Medium parameters used: $f = 1800 \text{ MHz}$; $\sigma = 1.414 \text{ S/m}$; $\epsilon_r = 38.885$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> Probe: ES3DV3 - SN3127; ConvF(5.07, 5.07, 5.07); Calibrated: 2018/11/2; Sensor-Surface: 3mm (Mechanical Surface Detection) Electronics: DAE4 Sn546; Calibrated: 2018/10/15 Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>Configuration 1800/1800/Area Scan (7x10x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$ Maximum value of SAR (measured) = 8.57 W/kg</p> <p>Configuration 1800/1800/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$ Reference Value = 80.04 V/m; Power Drift = 0.11 dB Peak SAR (extrapolated) = 17.7 W/kg SAR(1 g) = 9.55 W/kg; SAR(10 g) = 4.97 W/kg Maximum value of SAR (measured) = 12.0 W/kg</p> 	

System check

1800MHz

Communication System: UID 0, CW (0); Frequency: 1800 MHz

Medium parameters used: $f = 1800 \text{ MHz}$; $\sigma = 1.418 \text{ S/m}$; $\epsilon_r = 40.688$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(5.07, 5.07, 5.07); Calibrated: 2018/11/2;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 2018/10/15
- Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

Configuration 1800/1800/Area Scan (7x10x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 8.31 W/kg

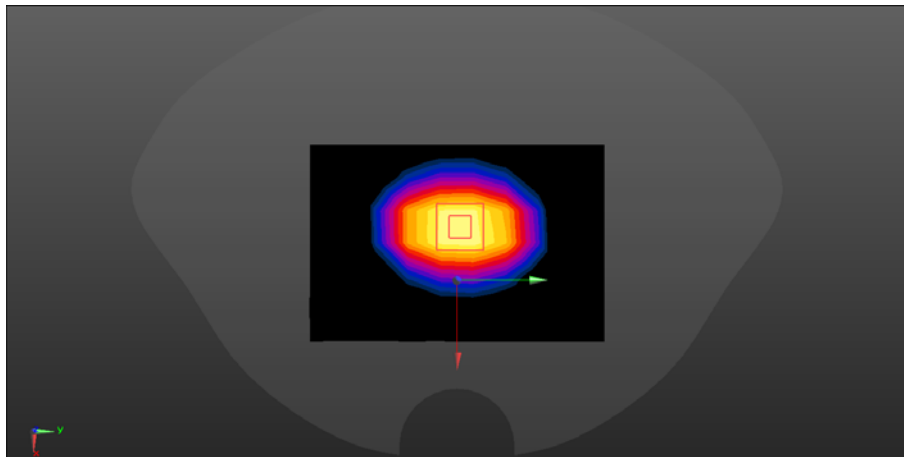
Configuration 1800/1800/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

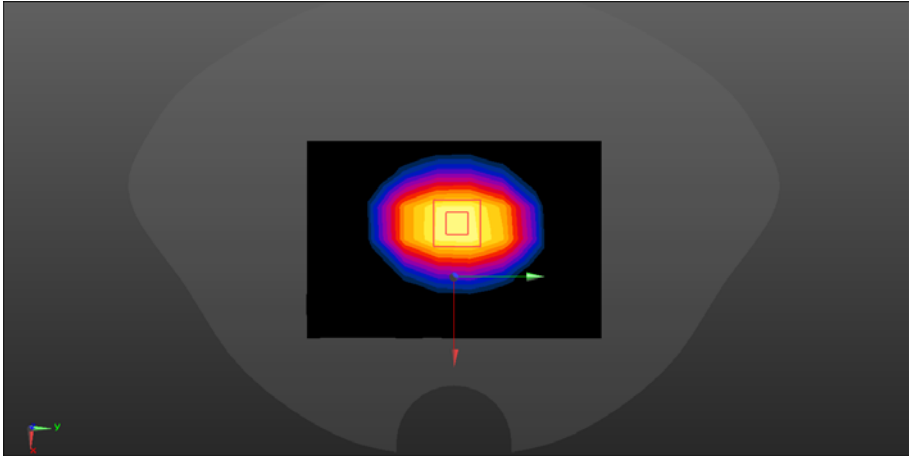
Reference Value = 76.60 V/m; Power Drift = 0.01 dB

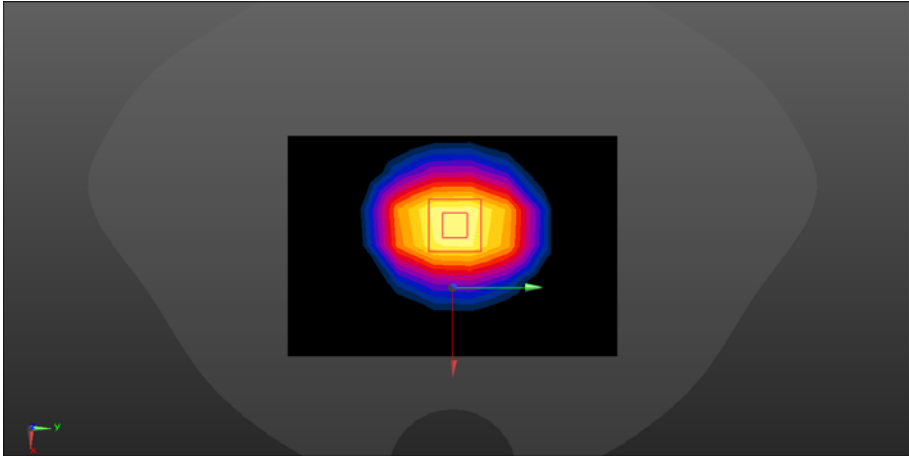
Peak SAR (extrapolated) = 17.5 W/kg

SAR(1 g) = 9.49 W/kg; SAR(10 g) = 4.97 W/kg

Maximum value of SAR (measured) = 12.1 W/kg



System check	1800MHz
<p>Communication System: UID 0, CW (0); Frequency: 1800 MHz Medium parameters used: $f = 1800 \text{ MHz}$; $\sigma = 1.427 \text{ S/m}$; $\epsilon_r = 40.722$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> Probe: ES3DV3 - SN3127; ConvF(5.07, 5.07, 5.07); Calibrated: 2018/11/2; Sensor-Surface: 3mm (Mechanical Surface Detection) Electronics: DAE4 Sn546; Calibrated: 2018/10/15 Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>Configuration 1800/1800/Area Scan (7x10x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$ Maximum value of SAR (measured) = 8.31 W/kg</p> <p>Configuration 1800/1800/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$ Reference Value = 76.40 V/m; Power Drift = 0.05 dB Peak SAR (extrapolated) = 17.5 W/kg SAR(1 g) = 9.53 W/kg; SAR(10 g) = 4.99 W/kg Maximum value of SAR (measured) = 12.2 W/kg</p> 	

System check	2000MHz
<p>Communication System: UID 0, CW (0); Frequency: 2000 MHz Medium parameters used: $f = 2000 \text{ MHz}$; $\sigma = 1.427 \text{ S/m}$; $\epsilon_r = 39.844$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> Probe: ES3DV3 - SN3127; ConvF(4.96, 4.96, 4.96); Calibrated: 2018/11/2; Sensor-Surface: 3mm (Mechanical Surface Detection) Electronics: DAE4 Sn546; Calibrated: 2018/10/15 Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>Configuration 2000/2000/Area Scan (7x10x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$ Maximum value of SAR (measured) = 8.40 W/kg</p> <p>Configuration 2000/2000/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$ Reference Value = 76.22 V/m; Power Drift = 0.07 dB Peak SAR (extrapolated) = 18.7 W/kg SAR(1 g) = 9.82 W/kg; SAR(10 g) = 4.96 W/kg Maximum value of SAR (measured) = 12.9 W/kg</p> 	

System check

2000MHz

Communication System: UID 0, CW (0); Frequency: 2000 MHz
Medium parameters used: $f = 2000 \text{ MHz}$; $\sigma = 1.377 \text{ S/m}$; $\epsilon_r = 40.355$; $\rho = 1000 \text{ kg/m}^3$
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(4.96, 4.96, 4.96); Calibrated: 2018/11/2;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 2018/10/15
- Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

Configuration 2000/2000/Area Scan (7x10x1): Measurement grid: $dx=10\text{mm}$, $dy=10\text{mm}$

Maximum value of SAR (measured) = 8.96 W/kg

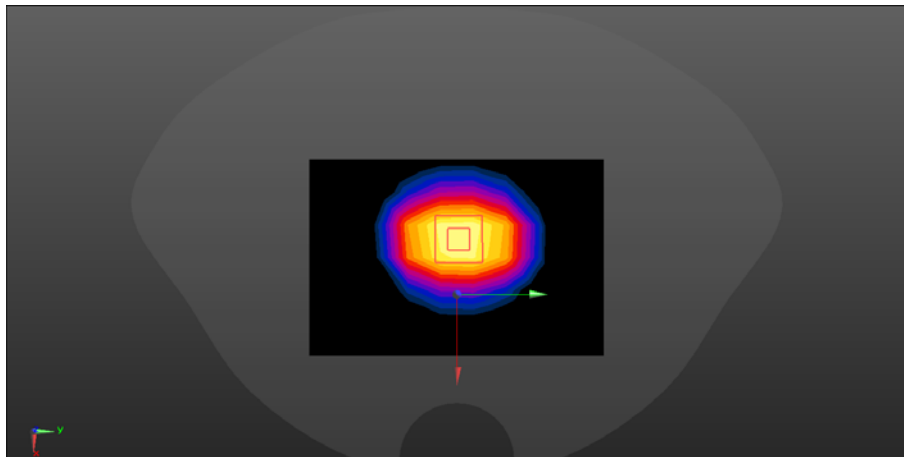
Configuration 2000/2000/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

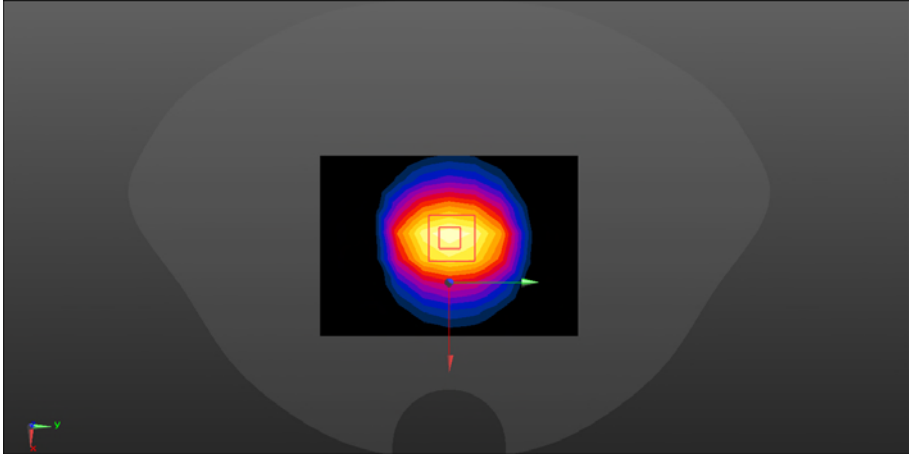
Reference Value = 77.20 V/m; Power Drift = 0.15 dB

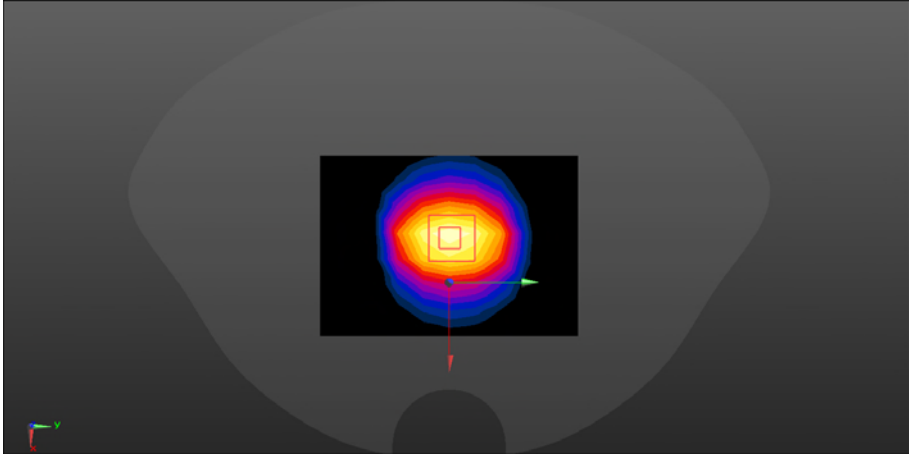
Peak SAR (extrapolated) = 19.9 W/kg

SAR(1 g) = 9.98 W/kg; SAR(10 g) = 5.09 W/kg

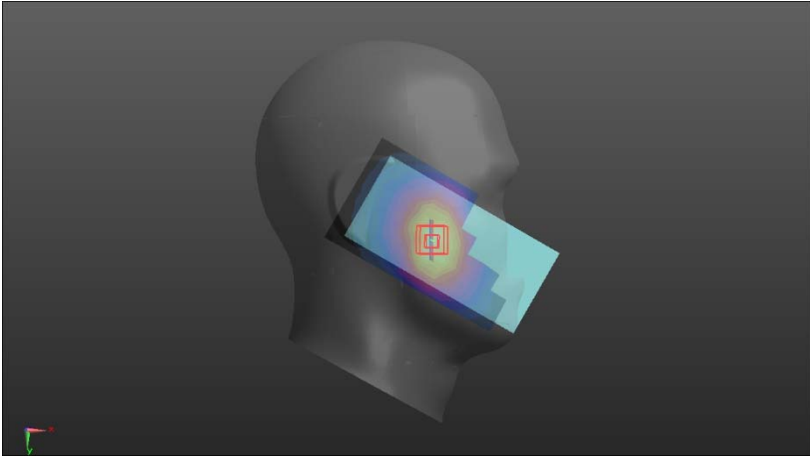
Maximum value of SAR (measured) = 13.0 W/kg



System check	2450MHz
<p>Communication System: UID 0, CW (0); Frequency: 2450 MHz Medium parameters used: $f = 2450$ MHz; $\sigma = 1.866$ S/m; $\epsilon_r = 38.343$; $\rho = 1000$ kg/m³ Phantom section: Flat Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> Probe: ES3DV3 - SN3127; ConvF(4.66, 4.66, 4.66); Calibrated: 2018/11/2; Sensor-Surface: 3mm (Mechanical Surface Detection), $z = -3.0, 32.0$ Electronics: DAE4 Sn546; Calibrated: 2018/10/15 Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373) <p>System Performance Check at Frequencies 2450 MHz/2450/Area Scan (8x11x1): Measurement grid: $dx=12$mm, $dy=12$mm Maximum value of SAR (measured) = 21.2 W/kg</p> <p>System Performance Check at Frequencies 2450 MHz/2450/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5$mm, $dy=5$mm, $dz=5$mm Reference Value = 108.3 V/m; Power Drift = 0.19 dB Peak SAR (extrapolated) = 28.2 W/kg SAR(1 g) = 13.5 W/kg; SAR(10 g) = 6.14 W/kg Maximum value of SAR (measured) = 22.6 W/kg</p> 	

System check	2450MHz
<p>Communication System: UID 0, CW (0); Frequency: 2450 MHz Medium parameters used: $f = 2450$ MHz; $\sigma = 1.851$ S/m; $\epsilon_r = 39.672$; $\rho = 1000$ kg/m³ Phantom section: Flat Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> Probe: ES3DV3 - SN3127; ConvF(4.66, 4.66, 4.66); Calibrated: 2018/11/2; Sensor-Surface: 3mm (Mechanical Surface Detection), $z = -3.0, 32.0$ Electronics: DAE4 Sn546; Calibrated: 2018/10/15 Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373) <p>System Performance Check at Frequencies 2450 MHz/2450/Area Scan (8x11x1): Measurement grid: $dx=12$mm, $dy=12$mm Maximum value of SAR (measured) = 21.2 W/kg</p> <p>System Performance Check at Frequencies 2450 MHz/2450/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5$mm, $dy=5$mm, $dz=5$mm Reference Value = 106.9 V/m; Power Drift = -0.08 dB Peak SAR (extrapolated) = 28.2 W/kg SAR(1 g) = 13.2 W/kg; SAR(10 g) = 5.98 W/kg Maximum value of SAR (measured) = 22.2 W/kg</p> 	

GSM (850MHz)

Right Side	Cheek
<p>Communication System: UID 0, Generic GSM (0); Frequency: 836.6 MHz;Duty Cycle: 2:8.30042 Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.905$ S/m; $\epsilon_r = 41.528$; $\rho = 1000$ kg/m³ Phantom section: Right Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> Probe: ES3DV3 - SN3127; ConvF(6.18, 6.18, 6.18); Calibrated: 2018/11/2; Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection) Electronics: DAE4 Sn546; Calibrated: 2018/10/15 Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>RT/GPRS 850/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.215 W/kg</p> <p>RT/GPRS 850/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 5.697 V/m; Power Drift = 0.29 dB Peak SAR (extrapolated) = 0.265 W/kg SAR(1 g) = 0.194 W/kg; SAR(10 g) = 0.139 W/kg Maximum value of SAR (measured) = 0.218 W/kg</p> 	

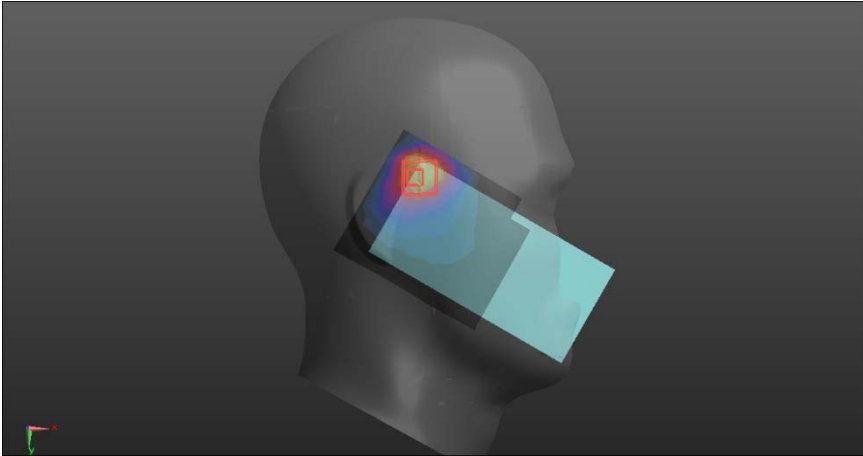
Body-worn	Back
<p>Communication System: UID 0, Generic GSM (0); Frequency: 836.6 MHz;Duty Cycle: 2:8.30042</p> <p>Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.905$ S/m; $\epsilon_r = 41.528$; $\rho = 1000$ kg/m³</p> <p>Phantom section: Flat Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> Probe: ES3DV3 - SN3127; ConvF(6.18, 6.18, 6.18); Calibrated: 2018/11/2; Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection) Electronics: DAE4 Sn546; Calibrated: 2018/10/15 Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>BACK/GPRS 850/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.377 W/kg</p> <p>BACK/GPRS 850/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm</p> <p>Reference Value = 20.08 V/m; Power Drift = -0.03 dB</p> <p>Peak SAR (extrapolated) = 0.453 W/kg</p> <p>SAR(1 g) = 0.343 W/kg; SAR(10 g) = 0.251 W/kg</p> <p>Maximum value of SAR (measured) = 0.382 W/kg</p> 	

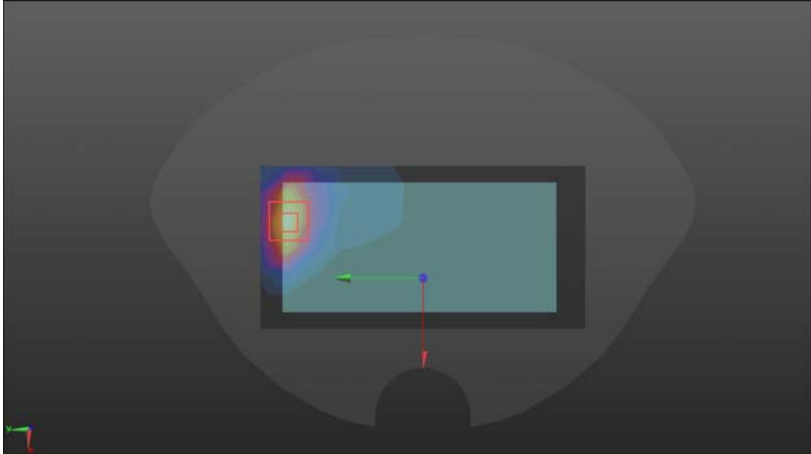
GSM (1900MHz)

Right side	Cheek
<p>Communication System: UID 0, Generic GSM (0); Frequency: 1880 MHz;Duty Cycle: 2:8.30042</p> <p>Medium parameters used (interpolated): $f = 1880$ MHz; $\sigma = 1.4$ S/m; $\epsilon_r = 40$; $\rho = 1000$ kg/m³</p> <p>Phantom section: Right Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> • Probe: ES3DV3 - SN3127; ConvF(5.07, 5.07, 5.07); Calibrated: 2018/11/2; • Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection) • Electronics: DAE4 Sn546; Calibrated: 2018/10/15 • Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx • Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>RT/GPRS 1900/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.0937 W/kg</p> <p>RT/GPRS 1900/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm</p> <p>Reference Value = 3.593 V/m; Power Drift = 0.56 dB</p> <p>Peak SAR (extrapolated) = 0.125 W/kg</p> <p>SAR(1 g) = 0.081 W/kg; SAR(10 g) = 0.050 W/kg</p> <p>Maximum value of SAR (measured) = 0.0963 W/kg</p> <div data-bbox="392 1256 1209 1709" data-label="Image"> </div>	

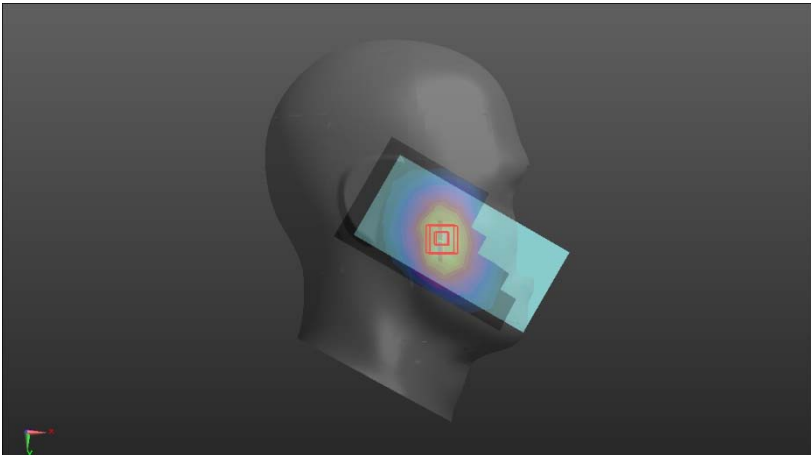
Body-worn	Back
<p>Communication System: UID 0, Generic GSM (0); Frequency: 1880 MHz;Duty Cycle: 2:8.30042 Medium parameters used (interpolated): f = 1880 MHz; $\sigma = 1.4$ S/m; $\epsilon_r = 40$; $\rho = 1000$ kg/m³ Phantom section: Flat Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> Probe: ES3DV3 - SN3127; ConvF(5.07, 5.07, 5.07); Calibrated: 2018/11/2; Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection) Electronics: DAE4 Sn546; Calibrated: 2018/10/15 Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>BACK/GPRS 1900/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.691 W/kg</p> <p>BACK/GPRS 1900/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 3.467 V/m; Power Drift = 0.26 dB Peak SAR (extrapolated) = 1.07 W/kg SAR(1 g) = 0.579 W/kg; SAR(10 g) = 0.303 W/kg Maximum value of SAR (measured) = 0.715 W/kg</p> 	

WCDMA Band II

Right side	Cheek
<p>Communication System: UID 0, WCDMA BAND2 (0); Frequency: 1880 MHz;Duty Cycle: 1:1 Medium parameters used (interpolated): $f = 1880$ MHz; $\sigma = 1.4$ S/m; $\epsilon_r = 40$; $\rho = 1000$ kg/m³ Phantom section: Flat Section</p>	
<p>DASY5 Configuration:</p>	
<ul style="list-style-type: none"> • Probe: ES3DV3 - SN3127; ConvF(5.07, 5.07, 5.07); Calibrated: 2018/11/2; • Sensor-Surface: 3mm (Mechanical Surface Detection) • Electronics: DAE4 Sn546; Calibrated: 2018/10/15 • Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx • Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>BACK/WCDMA 2 /Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.852 W/kg</p> <p>BACK/WCDMA 2 /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 3.535 V/m; Power Drift = 0.15 dB Peak SAR (extrapolated) = 1.22 W/kg SAR(1 g) = 0.686 W/kg; SAR(10 g) = 0.369 W/kg Maximum value of SAR (measured) = 0.847 W/kg</p>	
	

Body-worn	Back
<p>Communication System: UID 0, WCDMA BAND2 (0); Frequency: 1880 MHz;Duty Cycle: 1:1 Medium parameters used (interpolated): $f = 1880$ MHz; $\sigma = 1.4$ S/m; $\epsilon_r = 40$; $\rho = 1000$ kg/m³ Phantom section: Flat Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> • Probe: ES3DV3 - SN3127; ConvF(5.07, 5.07, 5.07); Calibrated: 2018/11/2; • Sensor-Surface: 3mm (Mechanical Surface Detection) • Electronics: DAE4 Sn546; Calibrated: 2018/10/15 • Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx • Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>BACK/WCDMA 2 /Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.852 W/kg</p> <p>BACK/WCDMA 2 /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 3.535 V/m; Power Drift = 0.15 dB Peak SAR (extrapolated) = 1.22 W/kg SAR(1 g) = 0.686 W/kg; SAR(10 g) = 0.369 W/kg Maximum value of SAR (measured) = 0.847 W/kg</p> 	

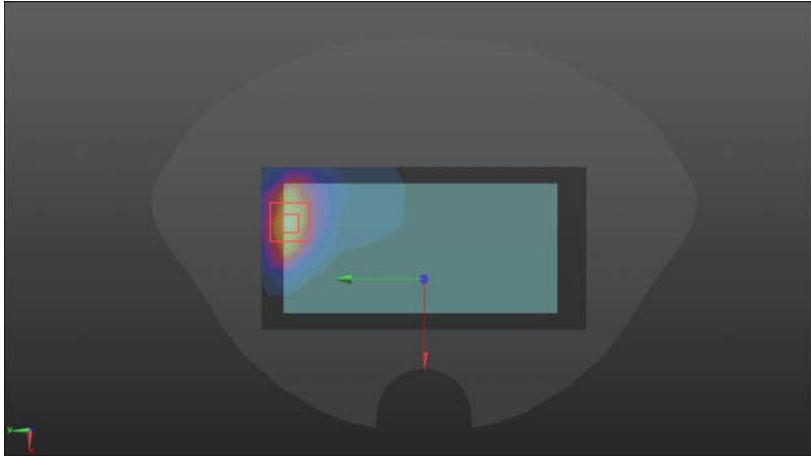
WCDMA Band V

Right side	Cheek
<p>Communication System: UID 0, LTE Band 5 (0); Frequency: 836.5 MHz;Duty Cycle: 1:1 Medium parameters used (interpolated): $f = 836.5 \text{ MHz}$; $\sigma = 0.905 \text{ S/m}$; $\epsilon_r = 41.528$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Right Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> • Probe: ES3DV3 - SN3127; ConvF(6.18, 6.18, 6.18); Calibrated: 2018/11/2; • Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection) • Electronics: DAE4 Sn546; Calibrated: 2018/10/15 • Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx • Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>RT/WCDMA 5/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.220 W/kg</p> <p>RT/WCDMA 5/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 5.655 V/m; Power Drift = 0.30 dB Peak SAR (extrapolated) = 0.268 W/kg SAR(1 g) = 0.200 W/kg; SAR(10 g) = 0.145 W/kg Maximum value of SAR (measured) = 0.224 W/kg</p> 	

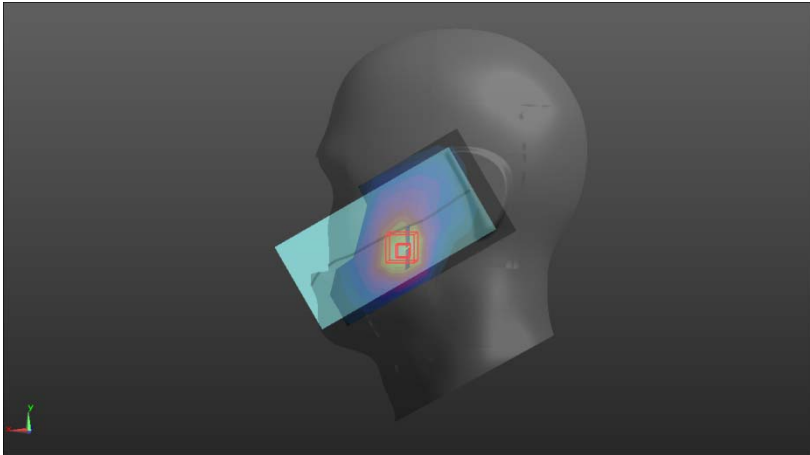
Body-worn	Back
<p>Communication System: UID 0, LTE Band 5 (0); Frequency: 836.5 MHz;Duty Cycle: 1:1 Medium parameters used (interpolated): $f = 836.5$ MHz; $\sigma = 0.905$ S/m; $\epsilon_r = 41.528$; $\rho = 1000$ kg/m³ Phantom section: Right Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> • Probe: ES3DV3 - SN3127; ConvF(6.18, 6.18, 6.18); Calibrated: 2018/11/2; • Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection) • Electronics: DAE4 Sn546; Calibrated: 2018/10/15 • Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx • Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>RT/WCDMA 5/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.220 W/kg</p> <p>RT/WCDMA 5/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 5.655 V/m; Power Drift = 0.30 dB Peak SAR (extrapolated) = 0.268 W/kg SAR(1 g) = 0.200 W/kg; SAR(10 g) = 0.145 W/kg Maximum value of SAR (measured) = 0.224 W/kg</p> <div data-bbox="392 1214 1209 1668" data-label="Image"> </div>	

LTE B2

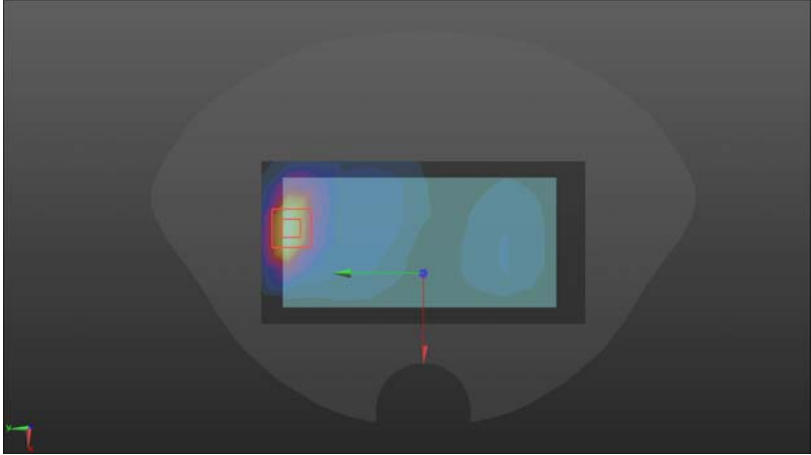
Left side	Cheek
<p>Communication System: UID 0, LTE band 02 (0); Frequency: 1880 MHz;Duty Cycle: 1:1 Medium parameters used (interpolated): $f = 1880$ MHz; $\sigma = 1.4$ S/m; $\epsilon_r = 40$; $\rho = 1000$ kg/m³ Phantom section: Left Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> Probe: ES3DV3 - SN3127; ConvF(5.07, 5.07, 5.07); Calibrated: 2018/11/2; Sensor-Surface: 3mm (Mechanical Surface Detection) Electronics: DAE4 Sn546; Calibrated: 2018/10/15 Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>LC/LTE 2/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.271 W/kg</p> <p>LC/LTE 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 5.707 V/m; Power Drift = 0.15 dB Peak SAR (extrapolated) = 0.396 W/kg SAR(1 g) = 0.255 W/kg; SAR(10 g) = 0.152 W/kg Maximum value of SAR (measured) = 0.304 W/kg</p> 	

Body-worn	Back
<p>Communication System: UID 0, WCDMA BAND2 (0); Frequency: 1880 MHz; Medium parameters used (interpolated): $f = 1880$ MHz; $\sigma = 1.4$ S/m; $\epsilon_r = 40$; $\rho = 1000$ kg/m³ Phantom section: Flat Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> Probe: ES3DV3 - SN3127; ConvF(5.07, 5.07, 5.07); Calibrated: 2018/11/2; Sensor-Surface: 3mm (Mechanical Surface Detection) Electronics: DAE4 Sn546; Calibrated: 2018/10/15 Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>BACK/WCDMA 2 /Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.852 W/kg</p> <p>BACK/WCDMA 2 /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 3.535 V/m; Power Drift = 0.15 dB Peak SAR (extrapolated) = 1.22 W/kg SAR(1 g) = 0.686 W/kg; SAR(10 g) = 0.369 W/kg Maximum value of SAR (measured) = 0.847 W/kg</p> 	

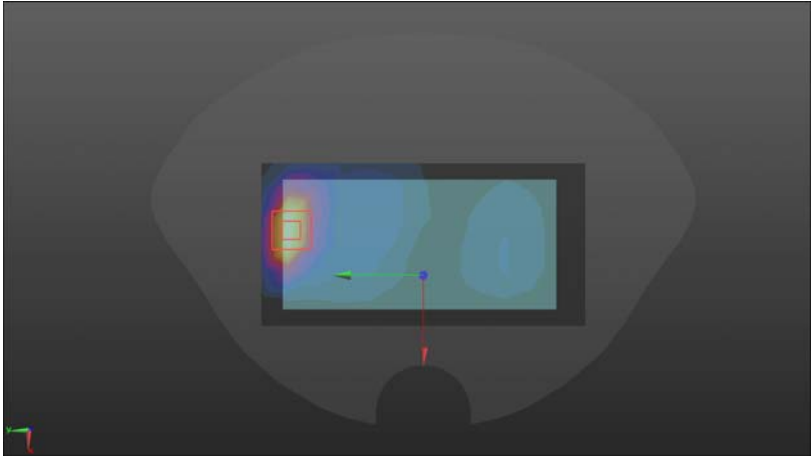
LTE B4

Left side	Cheek
<p>Communication System: UID 0, LTE band 4 (0); Frequency: 1732.5 MHz; Medium parameters used (interpolated): $f = 1732.5$ MHz; $\sigma = 1.375$ S/m; $\epsilon_r = 40.07$; $\rho = 1000$ kg/m³ Phantom section: Left Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> • Probe: ES3DV3 - SN3127; ConvF(5.07, 5.07, 5.07); Calibrated: 2018/11/2; • Sensor-Surface: 3mm (Mechanical Surface Detection) • Electronics: DAE4 Sn546; Calibrated: 2018/10/15 • Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx • Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>LC/LTE 4/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.214 W/kg</p> <p>LC/LTE 4/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 3.302 V/m; Power Drift = 0.78 dB Peak SAR (extrapolated) = 0.283 W/kg SAR(1 g) = 0.184 W/kg; SAR(10 g) = 0.114 W/kg Maximum value of SAR (measured) = 0.217 W/kg</p> 	

Main supply battery

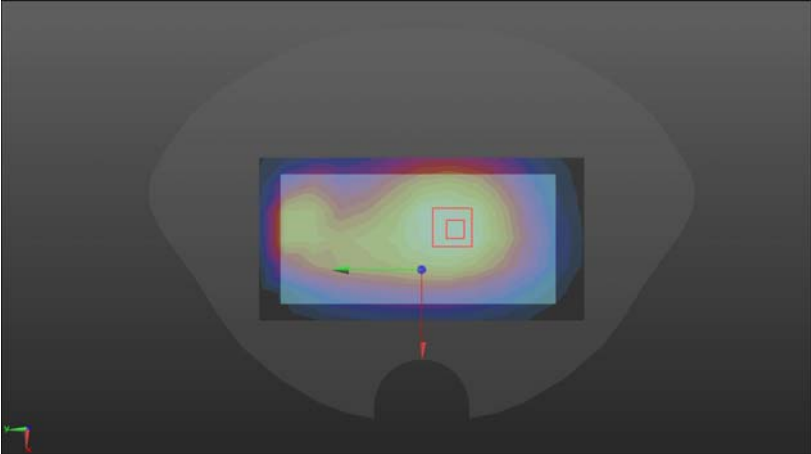
Body-worn	Back
<p>Communication System: UID 0, LTE band 4 (0); Frequency: 1732.5 MHz; Medium parameters used (interpolated): $f = 1732.5$ MHz; $\sigma = 1.375$ S/m; $\epsilon_r = 40.07$; $\rho = 1000$ kg/m³ Phantom section: Flat Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> Probe: ES3DV3 - SN3127; ConvF(5.07, 5.07, 5.07); Calibrated: 2018/11/2; Sensor-Surface: 3mm (Mechanical Surface Detection) Electronics: DAE4 Sn546; Calibrated: 2018/10/15 Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>BACK/LTE 4 1RB jiang2db/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.820 W/kg</p> <p>BACK/LTE 4 1RB jiang2db/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 4.784 V/m; Power Drift = 0.84 dB Peak SAR (extrapolated) = 1.28 W/kg SAR(1 g) = 0.734 W/kg; SAR(10 g) = 0.389 W/kg Maximum value of SAR (measured) = 0.905 W/kg</p> 	

Secondary supply battery

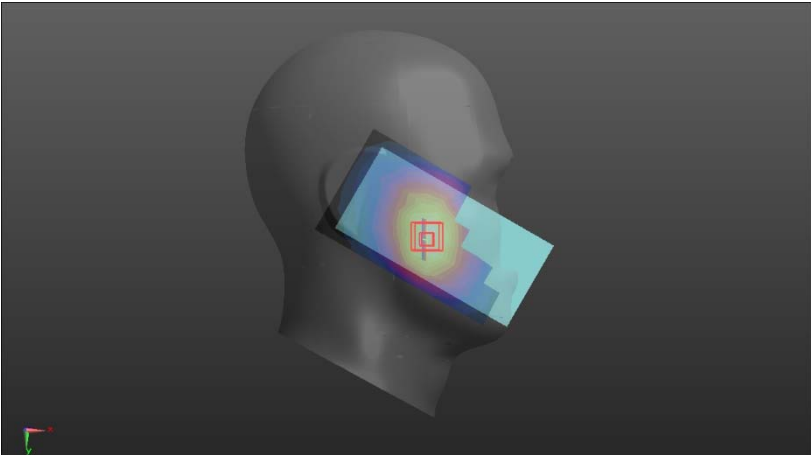
Body-worn	Back
<p>Communication System: UID 0, LTE band 4 (0); Frequency: 1732.5 MHz; Medium parameters used (interpolated): $f = 1732.5$ MHz; $\sigma = 1.375$ S/m; $\epsilon_r = 40.07$; $\rho = 1000$ kg/m³ Phantom section: Flat Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> Probe: ES3DV3 - SN3127; ConvF(5.07, 5.07, 5.07); Calibrated: 2018/11/2; Sensor-Surface: 3mm (Mechanical Surface Detection) Electronics: DAE4 Sn546; Calibrated: 2018/10/15 Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>BACK/LTE 4 /Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.830 W/kg</p> <p>BACK/LTE 4 /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 4.676 V/m; Power Drift = 0.07 dB Peak SAR (extrapolated) = 1.17 W/kg SAR(1 g) = 0.716 W/kg; SAR(10 g) = 0.376 W/kg Maximum value of SAR (measured) = 0.884 W/kg</p> 	

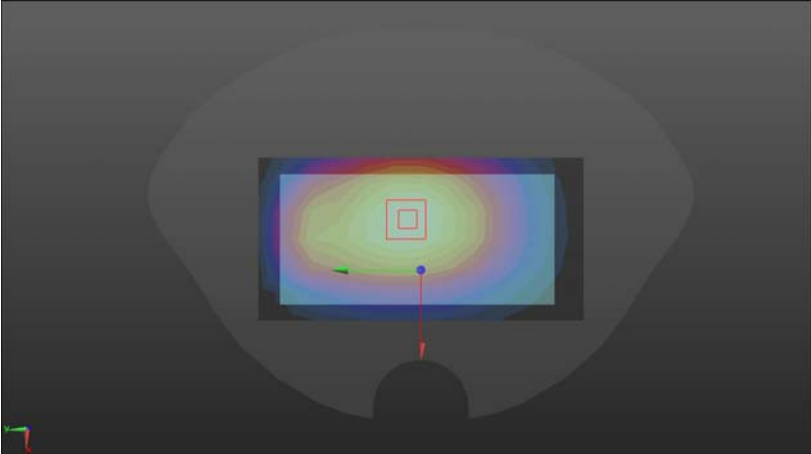
LTE B5

Right side	Cheek
<p>Communication System: UID 0, LTE Band 5 (0); Frequency: 836.5 MHz; Medium parameters used (interpolated): $f = 836.5$ MHz; $\sigma = 0.905$ S/m; $\epsilon_r = 41.528$; $\rho = 1000$ kg/m³ Phantom section: Right Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> • Probe: ES3DV3 - SN3127; ConvF(6.18, 6.18, 6.18); Calibrated: 2018/11/2; • Sensor-Surface: 3mm (Mechanical Surface Detection) • Electronics: DAE4 Sn546; Calibrated: 2018/10/15 • Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx • Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>RT/LTE 5/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.225 W/kg</p> <p>RT/LTE 5/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 6.443 V/m; Power Drift = 0.11 dB Peak SAR (extrapolated) = 0.261 W/kg SAR(1 g) = 0.194 W/kg; SAR(10 g) = 0.141 W/kg Maximum value of SAR (measured) = 0.213 W/kg</p> <div data-bbox="392 1214 1209 1668" data-label="Figure"> </div>	

Body-worn	Back
<p>Communication System: UID 0, LTE Band 5 (0); Frequency: 836.5 MHz; Medium parameters used (interpolated): $f = 836.5$ MHz; $\sigma = 0.905$ S/m; $\epsilon_r = 41.528$; $\rho = 1000$ kg/m³ Phantom section: Flat Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> Probe: ES3DV3 - SN3127; ConvF(6.18, 6.18, 6.18); Calibrated: 2018/11/2; Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection) Electronics: DAE4 Sn546; Calibrated: 2018/10/15 Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>BACK/LTE 5/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.363 W/kg</p> <p>BACK/LTE 5/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 19.45 V/m; Power Drift = 0.10 dB Peak SAR (extrapolated) = 0.429 W/kg SAR(1 g) = 0.329 W/kg; SAR(10 g) = 0.243 W/kg Maximum value of SAR (measured) = 0.364 W/kg</p> 	

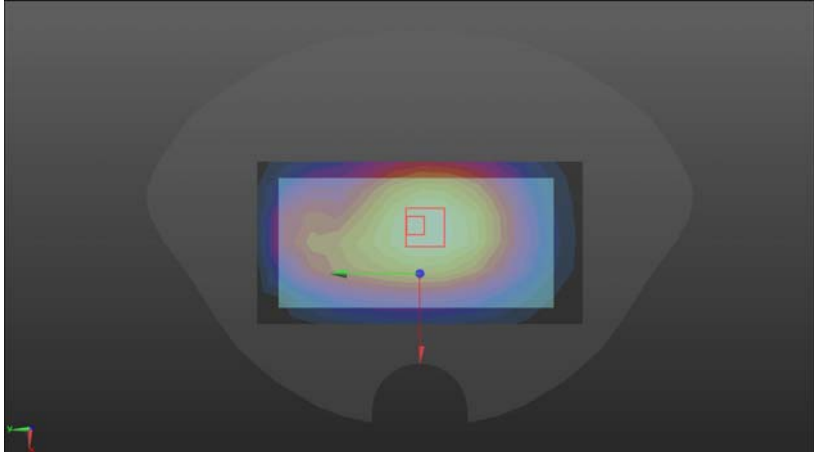
LTE B12

Right side	Cheek
<p>Communication System: UID 0, LTE Band 12 (0); Frequency: 707.5 MHz; Medium parameters used (interpolated): $f = 707.5$ MHz; $\sigma = 0.887$ S/m; $\epsilon_r = 42.115$; $\rho = 1000$ kg/m³ Phantom section: Right Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> • Probe: ES3DV3 - SN3127; ConvF(6.34, 6.34, 6.34); Calibrated: 2018/11/2; • Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection) • Electronics: DAE4 Sn546; Calibrated: 2018/10/15 • Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx • Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>RT/LTE 12/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.115 W/kg</p> <p>RT/LTE 12/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 4.807 V/m; Power Drift = 0.29 dB Peak SAR (extrapolated) = 0.142 W/kg SAR(1 g) = 0.107 W/kg; SAR(10 g) = 0.080 W/kg Maximum value of SAR (measured) = 0.118 W/kg</p> 	

Body-worn	Back
<p>Communication System: UID 0, LTE Band 12 (0); Frequency: 707.5 MHz; Medium parameters used (interpolated): $f = 707.5$ MHz; $\sigma = 0.887$ S/m; $\epsilon_r = 42.115$; $\rho = 1000$ kg/m³ Phantom section: Flat Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> Probe: ES3DV3 - SN3127; ConvF(6.34, 6.34, 6.34); Calibrated: 2018/11/2; Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection) Electronics: DAE4 Sn546; Calibrated: 2018/10/15 Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>BACK/LTE 12/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.328 W/kg</p> <p>BACK/LTE 12/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 19.07 V/m; Power Drift = 0.06 dB Peak SAR (extrapolated) = 0.415 W/kg SAR(1 g) = 0.304 W/kg; SAR(10 g) = 0.222 W/kg Maximum value of SAR (measured) = 0.345 W/kg</p> 	

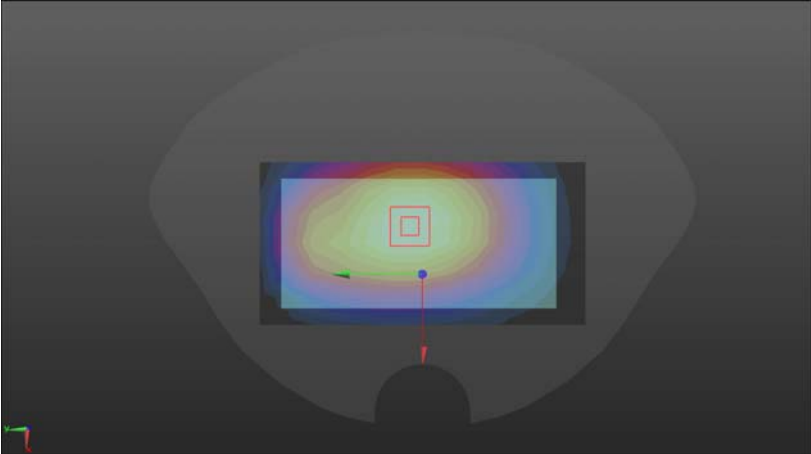
LTE B13

Right side	Cheek
<p>Communication System: UID 0, LTE band 13 (0); Frequency: 782 MHz; Medium parameters used (interpolated): $f = 782 \text{ MHz}$; $\sigma = 0.893 \text{ S/m}$; $\epsilon_r = 41.712$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Right Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> Probe: ES3DV3 - SN3127; ConvF(6.34, 6.34, 6.34); Calibrated: 2018/11/2; Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection) Electronics: DAE4 Sn546; Calibrated: 2018/10/15 Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>RT/LTE 13/Area Scan (7x13x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$ Maximum value of SAR (measured) = 0.126 W/kg</p> <p>RT/LTE 13/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$ Reference Value = 5.236 V/m; Power Drift = 0.27 dB Peak SAR (extrapolated) = 0.156 W/kg SAR(1 g) = 0.116 W/kg; SAR(10 g) = 0.085 W/kg Maximum value of SAR (measured) = 0.130 W/kg</p> 	

Body-worn	Back
<p>Communication System: UID 0, LTE band 13 (0); Frequency: 782 MHz; Medium parameters used (interpolated): $f = 782 \text{ MHz}$; $\sigma = 0.893 \text{ S/m}$; $\epsilon_r = 41.712$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> Probe: ES3DV3 - SN3127; ConvF(6.34, 6.34, 6.34); Calibrated: 2018/11/2; Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection) Electronics: DAE4 Sn546; Calibrated: 2018/10/15 Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>BACK/LTE 13/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.335 W/kg</p> <p>BACK/LTE 13/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 19.37 V/m; Power Drift = 0.01 dB Peak SAR (extrapolated) = 0.422 W/kg SAR(1 g) = 0.306 W/kg; SAR(10 g) = 0.226 W/kg Maximum value of SAR (measured) = 0.349 W/kg</p> 	

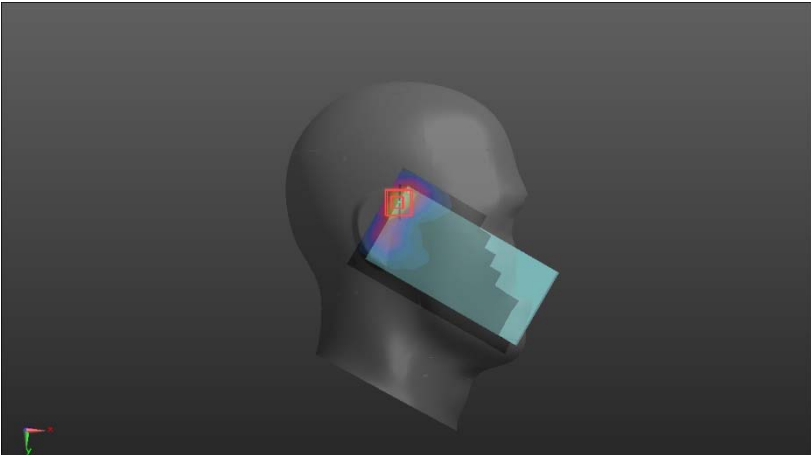
LTE B17

Right side	Cheek
<p>Communication System: UID 0, LTE Band 17 (0); Frequency: 710 MHz; Medium parameters used (interpolated): $f = 710$ MHz; $\sigma = 0.887$ S/m; $\epsilon_r = 42.102$; $\rho = 1000$ kg/m³ Phantom section: Right Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> • Probe: ES3DV3 - SN3127; ConvF(6.34, 6.34, 6.34); Calibrated: 2018/11/2; • Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection) • Electronics: DAE4 Sn546; Calibrated: 2018/10/15 • Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx • Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>RT/LTE 17/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.117 W/kg</p> <p>RT/LTE 17/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 4.807 V/m; Power Drift = 0.42 dB Peak SAR (extrapolated) = 0.145 W/kg SAR(1 g) = 0.109 W/kg; SAR(10 g) = 0.081 W/kg Maximum value of SAR (measured) = 0.121 W/kg</p> <div data-bbox="392 1312 1209 1767" data-label="Figure"> </div>	

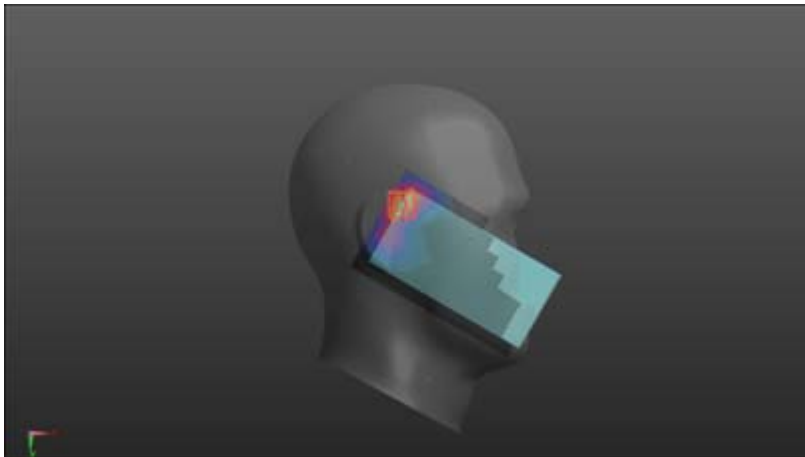
Body-worn	Back
<p>Communication System: UID 0, LTE Band 17 (0); Frequency: 710 MHz; Medium parameters used (interpolated): $f = 710$ MHz; $\sigma = 0.887$ S/m; $\epsilon_r = 42.102$; $\rho = 1000$ kg/m³ Phantom section: Flat Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> Probe: ES3DV3 - SN3127; ConvF(6.34, 6.34, 6.34); Calibrated: 2018/11/2; Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection) Electronics: DAE4 Sn546; Calibrated: 2018/10/15 Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>BACK/LTE 17/Area Scan (7x13x1): Measurement grid: dx=15mm, dy=15mm Maximum value of SAR (measured) = 0.308 W/kg</p> <p>BACK/LTE 17/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 18.75 V/m; Power Drift = -0.03 dB Peak SAR (extrapolated) = 0.402 W/kg SAR(1 g) = 0.295 W/kg; SAR(10 g) = 0.216 W/kg Maximum value of SAR (measured) = 0.336 W/kg</p> 	

WIFI 2.4GHz

Main supply battery

Right side	Tilt
<p>Communication System: UID 0, WIFI 2.4GHz (0); Frequency: 2437 MHz; Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.788$ S/m; $\epsilon_r = 39.219$; $\rho = 1000$ kg/m³ Phantom section: Right Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> Probe: ES3DV3 - SN3127; ConvF(4.66, 4.66, 4.66); Calibrated: 2018/11/2; Sensor-Surface: 3mm (Mechanical Surface Detection) Electronics: DAE4 Sn546; Calibrated: 2018/10/15 Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>RIGHT HEAD/RT 11B/Area Scan (9x16x1): Measurement grid: dx=12mm, dy=12mm Maximum value of SAR (measured) = 0.371 W/kg</p> <p>RIGHT HEAD/RT 11B/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 10.98 V/m; Power Drift = -0.22 dB Peak SAR (extrapolated) = 0.601 W/kg SAR(1 g) = 0.282 W/kg; SAR(10 g) = 0.134 W/kg Maximum value of SAR (measured) = 0.370 W/kg</p> 	

Secondary supply battery

Right side	Tilt
<p>Communication System: UID 0, WIFI 2.4GHz (0); Frequency: 2437 MHz; Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.788$ S/m; $\epsilon_r = 39.219$; $\rho = 1000$ kg/m³ Phantom section: Right Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> • Probe: ES3DV3 - SN3127; ConvF(4.66, 4.66, 4.66); Calibrated: 2018/11/2; • Sensor-Surface: 3mm (Mechanical Surface Detection) • Electronics: DAE4 Sn546; Calibrated: 2018/10/15 • Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx • Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>RIGHT HEAD/RT 11B/Area Scan (9x16x1): Measurement grid: dx=12mm, dy=12mm Maximum value of SAR (measured) = 0.366 W/kg</p> <p>RIGHT HEAD/RT 11B/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 10.77 V/m; Power Drift = -0.08 dB Peak SAR (extrapolated) = 0.593 W/kg SAR(1 g) = 0.277 W/kg; SAR(10 g) = 0.132 W/kg Maximum value of SAR (measured) = 0.366 W/kg</p> 	

Body-worn	Back
<p>Communication System: UID 0, WIFI 2.4GHz (0); Frequency: 2437 MHz; Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.788$ S/m; $\epsilon_r = 39.219$; $\rho = 1000$ kg/m³ Phantom section: Flat Section</p> <p>DASY5 Configuration:</p> <ul style="list-style-type: none"> Probe: ES3DV3 - SN3127; ConvF(4.66, 4.66, 4.66); Calibrated: 2018/11/2; Sensor-Surface: 3mm (Mechanical Surface Detection) Electronics: DAE4 Sn546; Calibrated: 2018/10/15 Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373) <p>BACK&FRONT/BACK 11B/Area Scan (9x16x1): Measurement grid: dx=12mm, dy=12mm Maximum value of SAR (measured) = 0.209 W/kg</p> <p>BACK&FRONT/BACK 11B/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 3.470 V/m; Power Drift = 0.27 dB Peak SAR (extrapolated) = 0.362 W/kg SAR(1 g) = 0.158 W/kg; SAR(10 g) = 0.073 W/kg Maximum value of SAR (measured) = 0.211 W/kg</p> 	