SRTC
The State Radio_monitoring_center Testing Center
国家无线电监测中心检测中心

Certificate Number: 5055.02

TEST REPORT FOR SAR TESTING

Report No.: SRTC2019-9004(F)-19102501(H)

Product Name: LTE Ufi

Product Model: MF79U

Marketing Name: MF79U

Applicant: ZTE Corporation

Manufacturer: ZTE Corporation

Specification: Part 2.1093

IEEE Std 1528

KDB Procedures

FCC ID: SRQ-MF79U

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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The test results relate only to individual items of the samples which have been tested.
The certification and accreditation identifiers used in this report shall not be applicable to the tested or calibrated samples thereof. The manufacturer shall not mark the tested samples or items (or a separate part of the item) with the identifiers of certification and accreditation to mislead relevant parties about the tested samples or items.

1.2 Information about the testing laboratory

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1.5 Test Environment

Date of Receipt of test sample at SRTC:	2019.10.25
Testing Start Date:	2019.10.25
Testing End Date:	2019.11.29

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

Normal Supply Voltage (Vdc.):	5

2. DESCRIPTION OF THE DEVICE UNDER TEST

2.1 Final Equipment Build Status

Wireless Technology and Frequency Bands	☒GSM Band: GSM850/GSM1900 ☒WCDMA Band: FDD II/V ☒LTE Band: 2/5/7/41 ☒Wi-Fi Band: 2.4GHz
Mode	GSM ☒GPRS (GMSK) ☒EGPRS (GMSK/8PSK) WCDMA ☒UMTS Rel. 99 ☒HSDPA (Rel. 5) ☒HSUPA (Rel. 6) ☒HSPA+ (Rel.7) ☐DC-HSDPA (Rel.8) Wi-Fi 2.4GHz ☒802.11b ☒802.11g ☒802.11n HT20 ☒802.11n HT40 LTE ☒QPSK ☒16QAM ☐64QAM
Duty Cycle*	GPRS: 12.5% (1 Slot), 25% (2 Slots), 37.5% (3 Slots), 50% (4 Slots) EDGE(GMSK/8PSK) 12.5% (1 Slot), 25% (2 Slots), 37.5% (3 Slots), 50% (4 Slots) WCDMA: 100% Wi-Fi 2.4GHz:802.11b: 98.6%/11g: 92.9%/11n 20: 61.9%/11n 40: 59.4%
Multi-Slot Class for GPRS/EDGE	☐Class 8 - One Up ☐Class 10 - Two Up ☒Class 12 - Four Up ☐Class 33- Four Up
Mobile Phone Capability	☐Class A - Mobile phones can be connected to both GPRS and GSM services simultaneously. ☒Class B - Mobile phones can be attached to both GPRS and GSM services, using one service at a time. ☐Class C - Mobile phones are attached to either GPRS or GSM voice service. You need to switch manually between services
DTM	Not Supported
Note*	For licensed cellular network duty cycle is inherent. For unlicensed network WLAN Duty cycle are depend on the data traffic, and the traffic allocation in operating mode could be the most conservative condition which with 100% duty cycle. SAR measurement also use non signalling mode, so the duty factor shall be taken into consideration.

2.2 Support Equipment

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

State of sample	Normal
H/W Version S/W Version	dwqB BD_MF79UV1.0.0B01
IMEI	868916040002188
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
KDB 447498 D01	v06	General RF Exposure Guidance
KDB 447498 D02	v02r01	SAR MEASUREMENT PROCEDURES FOR USB DONGLE TRANSMITTERS
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

4. TEST CONDITIONS

4.1 Picture to demonstrate the required liquid depth

The liquid depth is large than 15cm in the used SAM phantoms in flat section, and the depth of the tissue simulant was 15.0 ± 0.5 cm measured from the ear reference point during system checking and device measurements.

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 ± 0.02mm. 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.
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 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

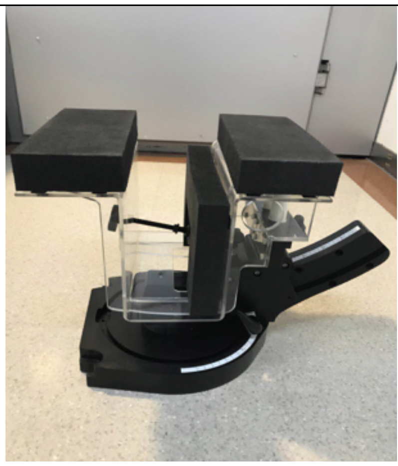
Recommended values for the dielectric parameters of the tissue simulants are given in IEEE 1528. All tests were carried out using simulants whose dielectric parameters were within ± 10% below 3GHz and ± 5% above 3GHz of the recommended values when use DASY system according to KDB865664D01. All tests were carried out within 24 hours of measuring the dielectric parameters.

Tissue Stimulant Recipes	
Name	Broadband tissue-equivalent liquid
Type	HBBL600-6000V6 Simulating Liquid
Note: The stimulant could be the same for head and body.	

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 Dasy system.



Device holder supplied by SPEAG

4.6.2 Test Exposure Conditions

4.6.2.1 Head Configuration

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 "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 normally determined according to the actual scene which might be the worst use condition for general exposure. The device’s front and rear were oriented facing the phantom since these orientations give higher results for most regular portable devices.

4.6.2.3 Hotspot Configuration

Hotspot mode SAR is measured for all edges and surfaces of the device with a transmitting antenna located within 25 mm from that surface or edge; for the data modes, wireless technologies and frequency bands supporting hotspot mode.

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~4GHz) and 10mm x 10mm (from 4GHz~6GHz) measurement grid used when two staggered one-dimensional cubic splines are used to estimate the maximum SAR location.
When the reported 1g-SAR estimated by area scan is less than 1.40 w/kg.
Zoom scan was performed by using the configuration mentioned below or more conservative scan area and step 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.
Below 3GHz：32mmX32mmX30mm scan area with 8 mm X8 mm X5 mm steps
2GHz-3GHz：32mmX32mmX30mm scan area with 8 mm X8 mm X5 mm steps
3GHz-4GHz：28mmX28mmX28mm scan area with 7 mm X7 mm X4 mm steps
4GHz-5GHz： 25mmX25mmX24mm scan area with 5 mm X5 mm X3 mm steps
5GHz-6GHz： 25mmX25mmX22mm scan area with 5 mm X5 mm X2 mm steps

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.

Exposure Position	Frequency Band	1g-SAR Result(W/kg)	Highest 1g-SAR Result(W/kg)	Limit (W/kg)/1g	Result
Body-Worn (5mm Gap)	GSM 850	0.95	0.95	1.6	PASS
	GSM 1900	0.47			
	WCDMA Band II	0.61			
	WCDMA Band V	0.54			
	LTE Band 2	0.74			
	LTE Band 5	0.59			
	LTE Band 7	0.76			
	LTE Band 41	0.37			
	WLAN 2.4GHz	0.53			

Simultaneous Transmission Summary

Exposure Position	Frequency Band	1g-SAR Result (W/kg)	Highest 1g-SAR Result(W/kg)	Limit (W/kg)/1g	Result
Body-Worn (5mm Gap)	GSM & Wi-Fi (2.4G)	1.48	1.48	1.6	PASS
	WCDMA & Wi-Fi (2.4G)	1.14			
	LTE & Wi-Fi (2.4G)	1.29			

This Test Report Is Approved by: Mr. Peng Zhen	Review by: Mr. Li Bin
Tested and issued by: Miss Wu Han	Approved date: 20191204

6 TEST RESULT

6.1 Manufacturing Tolerance

GSM

GSM 850 GPRS				
Channel		128	189	251
1 Txslot	Tolerance (dBm)	28.5~32.5	28.5~32.5	28.5~32.5
2 Txslot	Tolerance (dBm)	27.0~31.0	27.0~31.0	27.0~31.0
3 Txslot	Tolerance (dBm)	25.0~29.0	25.0~29.0	25.0~29.0
4 Txslot	Tolerance (dBm)	24.5~28.5	24.5~28.5	24.5~28.5

GSM 850 EGPRS(GMSK)				
Channel		128	189	251
1 Txslot	Tolerance (dBm)	28.5~32.5	28.5~32.5	28.5~32.5
2 Txslot	Tolerance (dBm)	27.0~31.0	27.0~31.0	27.0~31.0
3 Txslot	Tolerance (dBm)	25.0~29.0	25.0~29.0	25.0~29.0
4 Txslot	Tolerance (dBm)	24.5~28.5	24.5~28.5	24.5~28.5

GSM 850 EGPRS(8PSK)				
Channel		128	189	251
1 Txslot	Tolerance (dBm)	22.0~26.0	22.0~26.0	22.0~26.0
2 Txslot	Tolerance (dBm)	21.0~25.0	21.0~25.0	21.0~25.0
3 Txslot	Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5
4 Txslot	Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5

GSM 1900 GPRS				
Channel		512	661	810
1 Txslot	Tolerance (dBm)	23.5~27.5	23.5~27.5	23.5~27.5
2 Txslot	Tolerance (dBm)	22.5~26.5	22.5~26.5	22.5~26.5
3 Txslot	Tolerance (dBm)	20.0~24.0	20.0~24.0	20.0~24.0
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)	23.5~27.5	23.5~27.5	23.5~27.5
2 Txslot	Tolerance (dBm)	22.5~26.5	22.5~26.5	22.5~26.5
3 Txslot	Tolerance (dBm)	20.0~24.0	20.0~24.0	20.0~24.0
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)	19.0~23.0	19.0~23.0	19.0~23.0
2 Txslot	Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0
3 Txslot	Tolerance (dBm)	17.0~21.0	17.0~21.0	17.0~21.0
4 Txslot	Tolerance (dBm)	17.0~21.0	17.0~21.0	17.0~21.0

WCDMA

WCDMA Band II			
Channel	9262	9400	9538
Tolerance (dBm)	16.5~20.5	16.5~20.5	16.5~20.5

HSDPA Band II				
Channel		9262	9400	9538
Sub test 1	Tolerance (dBm)	16.0~20.0	16.0~20.0	16.0~20.0
Sub test 2	Tolerance (dBm)	16.0~20.0	16.0~20.0	16.0~20.0
Sub test 3	Tolerance (dBm)	15.5~19.5	15.5~19.5	15.5~19.5
Sub test 4	Tolerance (dBm)	15.5~19.5	15.5~19.5	15.5~19.5

HSUPA Band II				
Channel		9262	9400	9538
Sub test 1	Tolerance (dBm)	16.0~20.0	16.0~20.0	16.0~20.0
Sub test 2	Tolerance (dBm)	16.0~20.0	16.0~20.0	16.0~20.0
Sub test 3	Tolerance (dBm)	15.5~19.5	15.5~19.5	15.5~19.5
Sub test 4	Tolerance (dBm)	15.5~19.5	15.5~19.5	15.5~19.5
Sub test 5	Tolerance (dBm)	15.5~19.5	15.5~19.5	15.5~19.5

HSPA+ Band II				
Channel		9262	9400	9538
QPSK	Tolerance (dBm)	16.0~20.0	16.0~20.0	16.0~20.0
16QAM	Tolerance (dBm)	15.0~19.0	15.0~19.0	15.0~19.0

WCDMA Band V			
Channel	4132	4183	4233
Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0

HSDPA Band V				
Channel		4132	4183	4233
Sub test 1	Tolerance (dBm)	17.5~21.5	17.5~21.5	17.5~21.5
Sub test 2	Tolerance (dBm)	17.5~21.5	17.5~21.5	17.5~21.5
Sub test 3	Tolerance (dBm)	17.5~21.5	17.5~21.5	17.5~21.5
Sub test 4	Tolerance (dBm)	17.0~21.0	17.0~21.0	17.0~21.0

HSUPA Band V				
Channel		4132	4183	4233
Sub test 1	Tolerance (dBm)	17.5~21.5	17.5~21.5	17.5~21.5
Sub test 2	Tolerance (dBm)	17.5~21.5	17.5~21.5	17.5~21.5
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)	17.0~21.0	17.0~21.0	17.0~21.0

HSPA+ Band II				
Channel		4132	4183	4233
QPSK	Tolerance (dBm)	17.5~21.5	17.5~21.5	17.5~21.5
16QAM	Tolerance (dBm)	16.5~20.5	16.5~20.5	16.5~20.5

LTE

Note: RB allocation mentioned below is for all Bandwidths, and the Frequency Range are divided to 3 ranges (Low, Mid, High)

Band 2

QPSK

100%RB			
Frequency Range	Low	Mid	High
Tolerance (dBm)	16.5~20.0	16.5~20.0	16.5~20.0
50%RB			
Frequency Range	Low	Mid	High
Tolerance (dBm)	16.5~20.0	16.5~20.0	16.5~20.0
1RB			
Frequency Range	Low	Mid	High
Tolerance (dBm)	17.5~21.5	17.5~21.5	17.5~21.5

16QAM

100%RB			
Frequency Range	Low	Mid	High
Tolerance (dBm)	16.5~20.0	16.5~20.0	16.5~20.0
50%RB			
Frequency Range	Low	Mid	High
Tolerance (dBm)	16.5~20.0	16.5~20.0	16.5~20.0
1RB			
Frequency Range	Low	Mid	High
Tolerance (dBm)	17.5~21.5	17.5~21.5	17.5~21.5

Band 5

QPSK

100%RB			
Frequency Range	Low	Mid	High
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5
50%RB			
Frequency Range	Low	Mid	High
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5
1RB			
Frequency Range	Low	Mid	High
Tolerance (dBm)	20.5~24.5	20.5~24.5	20.5~24.5

16QAM

100%RB			
Frequency Range	Low	Mid	High
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5
50%RB			
Frequency Range	Low	Mid	High
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5
1RB			
Frequency Range	Low	Mid	High
Tolerance (dBm)	20.5~24.5	20.5~24.5	20.5~24.5

Band 7

QPSK

100%RB			
Frequency Range	Low	Mid	High
Tolerance (dBm)	15.5~19.5	15.5~19.5	15.5~19.5
50%RB			
Frequency Range	Low	Mid	High
Tolerance (dBm)	15.5~19.5	15.5~19.5	15.5~19.5
1RB			
Frequency Range	Low	Mid	High
Tolerance (dBm)	17.0~21.0	17.0~21.0	17.0~21.0

16QAM

100%RB			
Frequency Range	Low	Mid	High
Tolerance (dBm)	15.5~19.5	15.5~19.5	15.5~19.5
50%RB			
Frequency Range	Low	Mid	High
Tolerance (dBm)	15.5~19.5	15.5~19.5	15.5~19.5
1RB			
Frequency Range	Low	Mid	High
Tolerance (dBm)	17.0~21.0	17.0~21.0	17.0~21.0

Band 41

QPSK

100%RB			
Frequency Range	Low	Mid	High
Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0
50%RB			
Frequency Range	Low	Mid	High
Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0
1RB			
Frequency Range	Low	Mid	High
Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0

16QAM

100%RB			
Frequency Range	Low	Mid	High
Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0
50%RB			
Frequency Range	Low	Mid	High
Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0
1RB			
Frequency Range	Low	Mid	High
Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0

WLAN 2.4GHz

802.11b			
Channel	1	6	11
Tolerance (dBm)	12.0~16.0	12.0~16.0	12.0~16.0
802.11g			
Channel	1	6	11
Tolerance (dBm)	10.0~14.0	10.0~14.0	10.0~14.0
802.11n HT20			
Channel	1	6	11
Tolerance (dBm)	7.5~11.5	7.5~11.5	7.5~11.5
802.11n HT40			
Channel	3	6	9
Tolerance (dBm)	4.5~8.5	4.5~8.5	4.5~8.5

6.2 GSM Measurement result

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)	32.16	32.21	32.25	27.42	27.20	26.91
3Downlink2uplinkPower(dBm)	30.87	30.92	30.98	26.08	25.86	25.58
2Downlink3uplinkPower(dBm)	28.68	28.75	28.67	23.91	23.66	23.44
1Downlink4uplinkPower(dBm)	28.42	28.37	28.44	23.79	23.58	23.23

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)	23.13	23.18	23.18	18.39	18.17	17.88
3Downlink2uplinkPower(dBm)	24.85	24.90	24.90	20.06	19.84	19.56
2Downlink3uplinkPower(dBm)	24.42	24.49	24.49	19.65	19.40	19.18
1Downlink4uplinkPower(dBm)	**25.41**	**25.36**	**25.36**	**20.78**	**20.57**	**20.22**

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
1uplinkPower(dBm)	32.16	32.21	32.25	27.42	27.20	26.91
	25.10	25.82	25.85	22.94	22.97	22.75
2uplinkPower(dBm)	30.87	30.92	30.98	26.08	25.86	25.58
	24.63	24.47	24.55	21.51	21.60	21.46
3uplinkPower(dBm)	28.68	28.75	28.67	23.91	23.66	23.44
	23.03	23.41	23.36	20.88	20.91	20.83
4uplinkPower(dBm)	28.42	28.37	28.44	23.79	23.58	23.23
	22.75	23.05	23.12	20.69	20.62	20.50

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
1uplinkPower(dBm)	23.13	23.18	23.22	18.39	18.17	17.88
	16.07	16.79	16.82	13.91	13.94	13.72
2uplinkPower(dBm)	24.85	24.90	24.96	20.06	19.84	19.56
	18.61	18.45	18.53	15.49	15.58	15.44
3uplinkPower(dBm)	24.42	24.49	24.41	19.65	19.40	19.18
	18.77	19.15	19.10	16.62	16.65	16.57
4uplinkPower(dBm)	25.41	25.36	25.43	20.78	20.57	20.22
	19.74	20.04	20.11	17.68	17.61	17.49

Division Factors (for Measured Power and Frame Average Power):
To average the power, the division factor is as follows:
1TX-slot (1uplink) = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB
2TX-slots(2uplink) = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB
3TX-slots (3uplink) = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB
4TX-slots (4uplink) = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB

According to the frame average conducted power, the SAR measurements are performed with **4Txslots (4uplink)** of GPRS850 (GMSK) and GPRS1900 (GMSK).

6.3 WCDMA Measurement result

Release 99
The following procedures are according to FCC KDB Publication 941225 D01.
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
	RMC mode AMR mode	12.2kbps RMC 12.2kbps RMC in 3.4 kbps SRB
	Power Control Algorithm	Algorithm2
	βc/βd	8/15

Measured Results

Mode	Band II		
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880	1907.6
RB test mode1+64kRMC(dBm)	20.28	19.65	19.51
RB test mode1+12.2kRMC(dBm)	**20.33**	**19.84**	**19.67**
RB test mode1+12.2k AMR in 3.4 kbps SRB (dBm)	20.17	19.40	19.55
RB test mode1+144kRMC(dBm)	20.12	19.67	19.51
RB test mode1+384kRMC(dBm)	20.14	19.52	19.53

Mode	Band V		
Channel	4132	4183	4233
Frequency(MHz)	826.4	836.4	846.6
RB test mode1+64kRMC(dBm)	21.26	21.31	20.75
RB test mode1+12.2kRMC(dBm)	**21.46**	**21.50**	**20.88**
RB test mode1+12.2k AMR in 3.4 kbps SRB (dBm)	21.29	21.20	20.83
RB test mode1+144kRMC(dBm)	21.27	21.32	20.75
RB test mode1+384kRMC(dBm)	21.21	21.28	20.74

Release 5

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	β_{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 Δ_{CQI} =8⇔ $A_{hs}=\beta_{hs}/\beta_c=30/15$⇔$\beta_{hs}=30/15*\beta_c$.

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 $\beta_d=15/15$.

Measured Results

WCDMA Band II				
Mode		Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
HSDPA	Subtest 1	1852.4	9262	19.56
		1880.0	9400	19.51
		1907.6	9538	19.59
	Subtest 2	1852.4	9262	19.53
		1880.0	9400	19.50
		1907.6	9538	19.55
	Subtest 3	1852.4	9262	19.46
		1880.0	9400	19.42
		1907.6	9538	19.48
	Subtest 4	1852.4	9262	19.44
		1880.0	9400	19.49
		1907.6	9538	19.47

WCDMA Band V				
Mode		Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
HSDPA	Subtest 1	826.4	4132	21.12
		836.6	4183	21.16
		846.6	4233	21.23
	Subtest 2	826.4	4132	21.08
		836.6	4183	21.11
		846.6	4233	21.14
	Subtest 3	826.4	4132	21.00
		836.6	4183	21.03
		846.6	4233	21.09
	Subtest 4	826.4	4132	20.91
		836.6	4183	20.94
		846.6	4233	20.97

Release 6

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 (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM (2) (dB)	MPR (dB)	AG (4) Index	E-TFCI
1	11/15 (3)	15/15 (3)	64	11/15 (3)	22/15	209/225	1039/225	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	β_{ed1}:47/15 β_{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: $\triangle_{ACK}$, $\triangle_{NACK}$ and $\triangle_{CQI}$ =8⇔$A_{hs}=\beta_{hs}/\beta_c$=30/15⇔$\beta_{hs}$=30/15*$\beta_c$.

Note2: CM=1 for β_c/β_d =12/15, β_{hs}/β_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 β_c=10/15 and β_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 β_c=14/15 and β_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.

Measured Results

WCDMA Band II				
Mode		Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
HSPA	Subtest 1	1852.4	9262	19.60
		1880.0	9400	19.55
		1907.6	9538	19.65
	Subtest 2	1852.4	9262	19.54
		1880.0	9400	19.47
		1907.6	9538	19.55
	Subtest 3	1852.4	9262	19.39
		1880.0	9400	19.33
		1907.6	9538	19.41
	Subtest 4	1852.4	9262	19.36
		1880.0	9400	19.29
		1907.6	9538	19.40
	Subtest 5	1852.4	9262	19.30
		1880.0	9400	19.27
		1907.6	9538	19.35

WCDMA Band V				
Mode		Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
HSPA	Subtest 1	826.4	4132	21.17
		836.6	4183	21.21
		846.6	4233	21.24
	Subtest 2	826.4	4132	21.07
		836.6	4183	21.11
		846.6	4233	21.14
	Subtest 3	826.4	4132	21.03
		836.6	4183	21.05
		846.6	4233	21.07
	Subtest 4	826.4	4132	20.95
		836.6	4183	20.99
		846.6	4233	21.03
	Subtest 5	826.4	4132	20.87
		836.6	4183	20.92
		846.6	4233	20.96

HSPA+

WCDMA Band II				
Mode		Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
HSPA+	Subtest 1	1852.4	9262	19.64
		1880.0	9400	19.57
		1907.6	9538	19.69
	Subtest 2	1852.4	9262	18.65
		1880.0	9400	18.56
		1907.6	9538	18.74

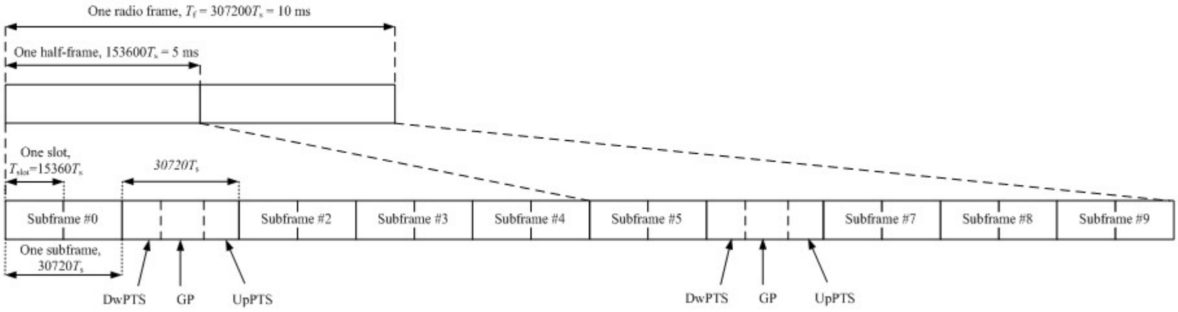
WCDMA Band V				
Mode		Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
HSPA+	Subtest 1	826.4	4132	21.21
		836.6	4183	21.25
		846.6	4233	21.28
	Subtest 2	826.4	4132	19.99
		836.6	4183	20.03
		846.6	4233	20.08

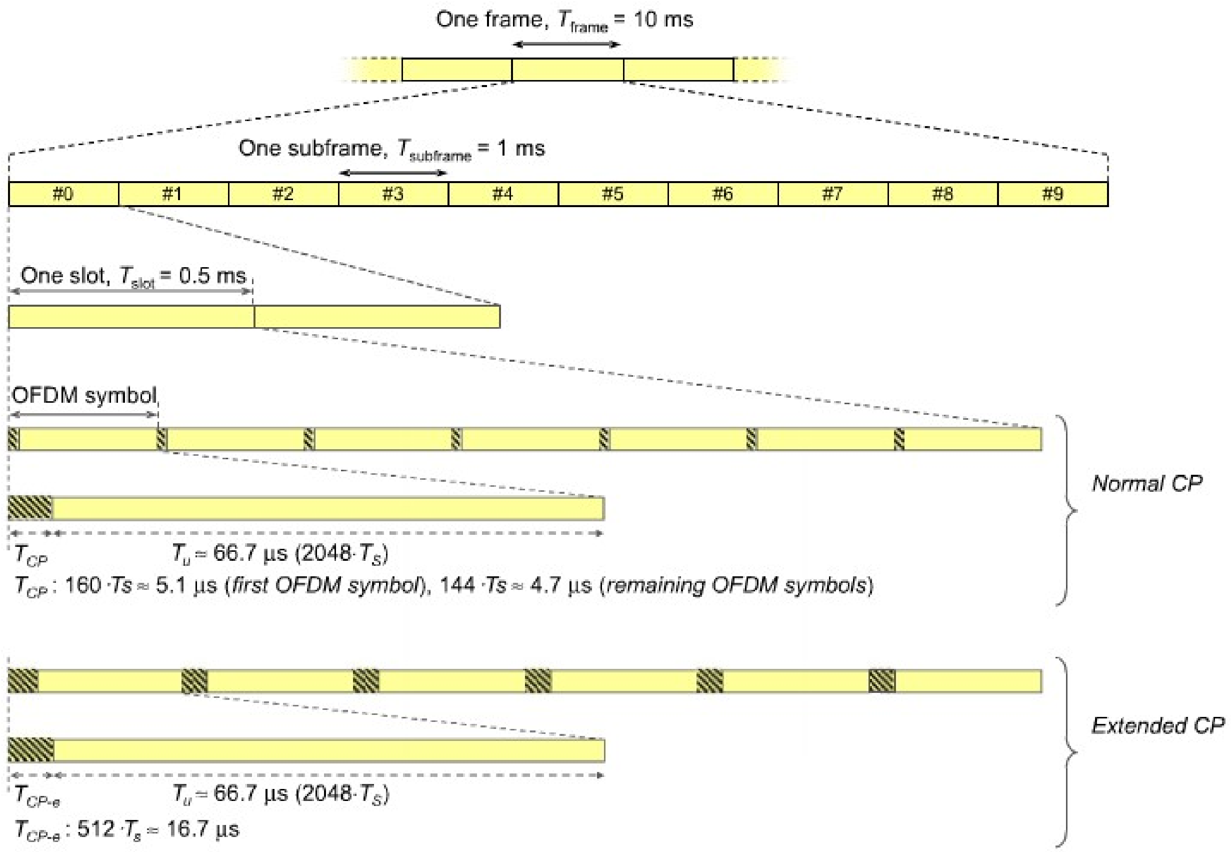
Note: UMTS SAR was tested with 12.2 RMC kbps mode per KDB Publication 941225 D01.HSPA SAR was not required since the average output power of the HSDPA and HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg with RMC mode.

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	$26336 \cdot T_s$			$7680 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
5	$6592 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$20480 \cdot T_s$		
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			-	-	-
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%	8.33%
	5~9	14.3%	16.7%
Extended cyclic prefix in downlink	0~3	7.13%	8.33%
	4~7	14.3%	16.7%

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

Note: One sub-frame is 30720Ts=1ms, 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*3+5120)/(30720*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	20.07
				1	5	20.07
				3	2	20.12
				6	0	19.49
	1880	18900		1	0	20.28
				1	5	20.28
				3	2	20.13
				6	0	19.51
	1909.3	19193		1	0	20.98
				1	5	20.98
				3	2	20.96
				6	0	19.86
16QAM	1850.7	18607	1.4	1	0	19.27
				1	5	19.27
				3	2	19.24
				6	0	17.55
	1880	18900		1	0	18.87
				1	5	19.30
				3	2	19.12
				6	0	17.75
	1909.3	19193		1	0	20.34
				1	5	20.34
				3	2	20.08
				6	0	18.37

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1851.5	18615	3	1	0	20.47
				1	14	20.47
				8	4	18.87
				15	0	18.78
	1880	18900		1	0	20.55
				1	14	20.55
				8	4	18.92
				15	0	18.85
	1908.5	19185		1	0	20.92
				1	14	20.92
				8	4	18.88
				15	0	19.37
16QAM	1851.5	18615	3	1	0	19.61
				1	14	19.00
				8	4	18.14
				15	0	18.06
	1880	18900		1	0	18.80
				1	14	18.84
				8	4	17.96
				15	0	17.90
	1908.5	19185		1	0	19.52
				1	14	19.51
				8	4	18.03
				15	0	18.04

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1852.5	18625	5	1	0	20.56
				1	24	20.56
				12	6	19.01
				25	0	19.05
	1880	18900		1	0	20.45
				1	24	20.45
				12	6	18.92
				25	0	18.93
	1907.5	19175		1	0	20.89
				1	24	20.89
				12	6	19.65
				25	0	19.77
16QAM	1852.5	18625	5	1	0	19.78
				1	24	18.70
				12	6	18.05
				25	0	18.22
	1880	18900		1	0	18.69
				1	24	19.49
				12	6	17.96
				25	0	18.10
	1907.5	19175		1	0	19.55
				1	24	18.69
				12	6	18.02
				25	0	18.16

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1855	18650	10	1	0	21.01
				1	49	21.01
				24	12	19.06
				50	0	19.09
	1880	18900		1	0	20.78
				1	49	20.78
				24	12	18.83
				50	0	18.82
	1905	19150		1	0	21.25
				1	49	21.25
				24	12	19.44
				50	0	19.64
16QAM	1855	18650	10	1	0	18.70
				1	49	18.52
				24	12	18.01
				50	0	17.97
	1880	18900		1	0	19.46
				1	49	19.14
				24	12	18.01
				50	0	17.82
	1905	19150		1	0	19.16
				1	49	19.66
				24	12	17.96
				50	0	17.89

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1857.5	18675	15	1	0	21.09
				1	74	21.09
				40	18	19.05
				75	0	19.15
	1880	18900		1	0	20.84
				1	74	20.84
				40	18	18.75
				75	0	18.78
	1902.5	19125		1	0	21.46
				1	74	21.46
				40	18	19.62
				75	0	19.57
16QAM	1857.5	18675	15	1	0	19.64
				1	74	19.64
				40	18	18.10
				75	0	18.08
	1880	18900		1	0	19.75
				1	74	19.75
				40	18	17.93
				75	0	17.89
	1902.5	19125		1	0	19.12
				1	74	19.12
				40	18	17.98
				75	0	18.01

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1860	18700	20	1	0	20.97
				1	99	20.97
				50	25	19.13
				100	0	19.12
	1880	18900		1	0	20.68
				1	99	20.68
				50	25	19.85
				100	0	18.97
	1900	19100		1	0	21.48
				1	99	21.48
				50	25	19.96
				100	0	19.68
16QAM	1860	18700	20	1	0	18.70
				1	99	18.88
				50	25	17.97
				100	0	17.87
	1880	18900		1	0	18.74
				1	99	18.87
				50	25	17.94
				100	0	17.83
	1900	19100		1	0	18.87
				1	99	18.86
				50	25	17.86
				100	0	17.93

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	22.98
				1	5	22.98
				3	2	22.84
				6	0	22.79
	836.5	20525		1	0	23.78
				1	5	23.78
				3	2	23.64
				6	0	22.79
	848.3	20643		1	0	22.75
				1	5	22.75
				3	2	22.72
				6	0	21.15
16QAM	824.7	20407	1.4	1	0	21.98
				1	5	21.98
				3	2	20.84
				6	0	20.85
	836.5	20525		1	0	21.99
				1	5	21.99
				3	2	20.84
				6	0	20.81
	848.3	20643		1	0	21.93
				1	5	21.93
				3	2	20.86
				6	0	20.83

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	825.5	20415	3	1	0	23.53
				1	14	23.53
				8	4	22.28
				15	0	22.10
	836.5	20525		1	0	23.28
				1	14	23.28
				8	4	22.13
				15	0	22.16
	847.5	20635		1	0	22.16
				1	14	22.16
				8	4	20.97
				15	0	21.01
16QAM	825.5	20415	3	1	0	22.01
				1	14	22.01
				8	4	20.87
				15	0	20.88
	836.5	20525		1	0	22.04
				1	14	22.04
				8	4	20.89
				15	0	20.86
	847.5	20635		1	0	21.98
				1	14	21.98
				8	4	20.91
				15	0	20.88

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	826.5	20425	5	1	0	23.09
				1	24	23.09
				12	6	21.84
				25	0	21.57
	836.5	20525		1	0	22.87
				1	24	22.87
				12	6	22.26
				25	0	22.23
	846.5	20625		1	0	22.10
				1	24	22.10
				12	6	21.12
				25	0	21.10
16QAM	826.5	20425	5	1	0	22.02
				1	24	22.02
				12	6	20.88
				25	0	20.89
	836.5	20525		1	0	22.03
				1	24	22.03
				12	6	20.88
				25	0	20.85
	846.5	20625		1	0	21.97
				1	24	21.97
				12	6	20.90
				25	0	20.87

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	829	20450	10	1	0	**23.38**
				1	49	**23.38**
				24	12	21.42
				50	0	21.20
	836.5	20525		1	0	**23.98**
				1	49	**23.98**
				24	12	22.14
				50	0	22.28
	844	20600		1	0	**24.48**
				1	49	**24.48**
				24	12	21.90
				50	0	21.89
16QAM	829	20450	10	1	0	22.10
				1	49	22.10
				24	12	20.96
				50	0	20.97
	836.5	20525		1	0	22.11
				1	49	22.11
				24	12	20.96
				50	0	20.93
	844	20600		1	0	22.05
				1	49	22.05
				24	12	20.98
				50	0	20.95

LTE Band 7

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	2502.5	20775	5	1	0	20.64
				1	24	20.64
				12	6	19.56
				25	0	19.59
	2535	21100		1	0	20.28
				1	24	20.28
				12	6	18.95
				25	0	18.98
	2567.5	21425		1	0	20.09
				1	24	20.09
				12	6	18.67
				25	0	18.57
16QAM	2502.5	20775	5	1	0	20.07
				1	24	20.07
				12	6	18.93
				25	0	19.02
	2535	21100		1	0	20.06
				1	24	20.06
				12	6	19.09
				25	0	19.10
	2567.5	21425		1	0	20.15
				1	24	20.15
				12	6	19.01
				25	0	18.96

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	2505	20800	10	1	0	20.87
				1	49	20.87
				24	12	19.32
				50	0	19.26
	2535	21100		1	0	20.67
				1	49	20.67
				24	12	18.93
				50	0	18.76
	2565	21400		1	0	20.82
				1	49	20.82
				24	12	19.18
				50	0	18.60
16QAM	2505	20800	10	1	0	20.11
				1	49	20.11
				24	12	18.97
				50	0	19.06
	2535	21100		1	0	20.10
				1	49	20.10
				24	12	19.13
				50	0	19.14
	2565	21400		1	0	20.19
				1	49	20.19
				24	12	19.05
				50	0	18.96

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	2507.5	20825	15	1	0	20.82
				1	74	20.82
				40	18	19.25
				75	0	19.24
	2535	21100		1	0	20.67
				1	74	20.67
				40	18	18.78
				75	0	18.81
	2562.5	21375		1	0	20.28
				1	74	20.28
				40	18	18.56
				75	0	19.04
16QAM	2507.5	20825	15	1	0	20.04
				1	74	20.04
				40	18	18.90
				75	0	18.99
	2535	21100		1	0	20.03
				1	74	20.03
				40	18	19.11
				75	0	19.12
	2562.5	21375		1	0	20.17
				1	74	20.17
				40	18	19.03
				75	0	18.98

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	2510	20850	20	1	0	20.67
				1	99	20.67
				50	25	19.19
				100	0	19.17
	2535	21100		1	0	20.55
				1	99	20.55
				50	25	18.80
				100	0	18.75
	2560	21350		1	0	19.81
				1	99	19.81
				50	25	18.30
				100	0	19.03
16QAM	2510	20850	20	1	0	20.15
				1	99	20.15
				50	25	19.01
				100	0	19.10
	2535	21100		1	0	20.14
				1	99	20.14
				50	25	19.17
				100	0	19.18
	2560	21350		1	0	20.23
				1	99	20.23
				50	25	19.09
				100	0	19.04

LTE Band 41

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted Average (dBm)
QPSK	2498.5	39675	5	1	0	21.09
				1	24	21.09
				12	6	19.91
				25	0	19.94
	2593	40620		1	0	21.31
				1	24	21.31
				12	6	20.24
				25	0	20.62
	2687.5	41565		1	0	22.37
				1	24	22.37
				12	6	20.87
				25	0	20.73
16QAM	2498.5	39675	5	1	0	20.16
				1	24	20.13
				12	6	19.57
				25	0	19.31
	2593	40620		1	0	20.31
				1	24	20.35
				12	6	19.55
				25	0	19.59
	2687.5	41565		1	0	20.32
				1	24	20.20
				12	6	19.50
				25	0	19.43

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted Average (dBm)
QPSK	2501	39700	10	1	0	21.98
				1	49	21.98
				24	12	20.40
				50	0	20.62
	2593	40620		1	0	22.73
				1	49	22.73
				24	12	21.24
				50	0	21.26
	2685	41540		1	0	22.75
				1	49	22.75
				24	12	22.00
				50	0	21.88
16QAM	2501	39700	10	1	0	20.23
				1	49	20.41
				24	12	19.67
				50	0	19.47
	2593	40620		1	0	20.50
				1	49	20.29
				24	12	19.45
				50	0	19.44
	2685	41540		1	0	20.34
				1	49	20.36
				24	12	19.69
				50	0	19.37

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted Average (dBm)
QPSK	2503.5	39725	15	1	0	22.09
				1	74	22.09
				40	18	20.80
				75	0	21.13
	2593	40620		1	0	22.81
				1	74	22.68
				40	18	21.08
				75	0	21.27
	2682.5	41515		1	0	22.20
				1	74	22.20
				40	18	21.97
				75	0	21.95
16QAM	2503.5	39725	15	1	0	20.37
				1	74	20.45
				40	18	19.51
				75	0	19.55
	2593	40620		1	0	20.48
				1	74	20.51
				40	18	19.54
				75	0	19.57
	2682.5	41515		1	0	20.27
				1	74	20.39
				40	18	19.58
				75	0	19.37

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted Average (dBm)
QPSK	2506	39750	20	1	0	**21.83**
				1	99	**21.83**
				50	25	20.87
				100	0	21.22
	2593	40620		1	0	**22.67**
				1	99	**22.67**
				50	25	21.83
				100	0	21.25
	2680	41490		1	0	**22.98**
				1	99	**22.98**
				50	25	21.80
				100	0	21.95
16QAM	2506	39750	20	1	0	20.42
				1	99	20.47
				50	25	19.67
				100	0	19.63
	2593	40620		1	0	20.51
				1	99	20.51
				50	25	19.75
				100	0	19.65
	2680	41490		1	0	20.46
				1	99	20.47
				50	25	19.66
				100	0	19.59

6.5 Wi-Fi Measurement result

WIFI 2.4GHz

Modulation type	Average power output (dBm)		
	2412MHz	2437MHz	2462MHz
802.11b	13.12	14.96	15.87
802.11g	11.02	12.76	13.68
802.11n HT20	8.92	10.67	11.35
Modulation type	Average power output (dBm)		
	2422MHz	2437MHz	2452MHz
802.11n HT40	8.38	7.50	8.09

6.6 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

Mothod1:
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:

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] · [√f (GHz)] ≤ 3.0 for 1-g SAR, where

- ·f(GHz) is the RF channel transmit frequency in GHz
- ·Power and distance are rounded to the nearest mW and mm before calculation
- ·The result is rounded to one decimal place for comparison

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 [(max. power of channel, including tune-up tolerance, mW)/(60/√f(GHz) mW)] ·[20 mm/(min.test separation distance, mm)] ≤ 1.0 for 1-g SAR; also see Appendix A for approximate exclusion threshold values at selected frequencies and distances.

Mothod2:
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.

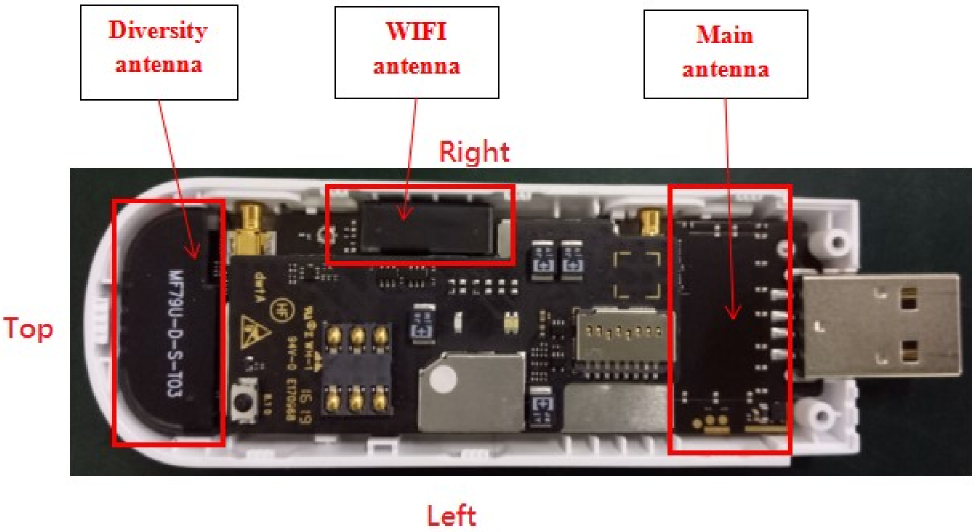
MHz	5	10	15	20	25	mm
150	39	77	116	155	194	*SAR Test Exclusion Threshold* (mW)
300	27	55	82	110	137	
450	22	45	67	89	112	
835	16	33	49	66	82	
900	16	32	47	63	79	
1500	12	24	37	49	61	
1900	11	22	33	44	54	
2450	10	19	29	38	48	
3600	8	16	24	32	40	
5200	7	13	20	26	33	
5400	6	13	19	26	32	
5800	6	12	19	25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

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 Wi-Fi	Body	10	38.64	Yes

6.7 RF exposure conditions

Refer to the follow picture "Antenna information" for the specific details of the antenna-to-antenna and antenna-to-edge(s) distances.



Note: we defined these position when we face the screen of EUT, the reason why we perform SAR test for these edges is that the structures of antennas is close to our body, and for the other edges do not necessary cause we already consider the worst case.

6.7.1 Body Exposure conditions

For WWAN

Test Configurations	SAR Required	Antenna-to-edge(s) distances
Back	Yes	＜25mm
Front	Yes	＜25mm
Top	Yes	＜25mm
Left	Yes	＜25mm
Right	Yes	＜25mm

For WLAN

Test Configurations	SAR Required	Antenna-to-edge(s) distances
Back	Yes	＜25mm
Front	Yes	＜25mm
Top	Yes	＜25mm
Left	Yes	＜25mm
Right	Yes	＜25mm

6.8 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.

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 (%)
2019.10.25	835	εr	40.266	41.50	-3.0	±10
		σ[S/m]	0.911	0.90	1.2	±10
2019.11.08	1800	εr	40.688	40.00	1.7	±10
		σ[S/m]	1.418	1.40	1.3	±10
2019.11.09	1800	εr	40.722	40.00	1.8	±10
		σ[S/m]	1.427	1.40	1.9	±10
2019.11.10	2000	εr	39.844	40.00	-0.4	±10
		σ[S/m]	1.427	1.40	1.9	±10
2019.11.11	2000	εr	40.355	40.00	0.9	±10
		σ[S/m]	1.377	1.40	-1.6	±10
2019.11.12	2450	εr	38.343	39.20	-2.2	±10
		σ[S/m]	1.866	1.80	3.7	±10
2019.11.13	2450	εr	39.672	39.20	1.2	±10
		σ[S/m]	1.851	1.80	2.8	±10

Note: For DASY system, the conservative tolerance 5% could expand to 10% when the frequency under 3GHz

A system check measurement was made following once 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 (%)
2019.10.25	D835V2	Head	1g	9.56	9.37	2.0	±10
2019.11.08	D1800V2	Head	1g	37.96	38.9	-2.4	±10
2019.11.09	D1800V2	Head	1g	38.12	38.9	-2.0	±10
2019.11.10	D2000V2	Head	1g	39.28	40.3	-2.5	±10
2019.11.11	D2000V2	Head	1g	39.92	40.3	-0.9	±10
2019.11.12	D2450V2	Head	1g	54.0	52.4	3.1	±10
2019.11.13	D2450V2	Head	1g	52.8	52.4	0.8	±10

Note: According to KDB 865664 D01&IEEE 1528, SRTC use 2450MHz dipole to perform system check could cover the frequency range from 2205MHz to 2695 MHz

6.9 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., Nc > 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.
Duty Factor = 1 / Duty Cycle(%)
For cellular network:
Reported SAR (W/kg) = Measured SAR (W/kg) * Scaling Factor
For WLAN
Reported SAR (W/kg) = Measured SAR (W/kg) * Scaling Factor*Duty factor
2. Per KDB 447498 D01v06, for each exposure position, if the highest output channel reported SAR ≤0.8W/kg, other channels SAR testing are not necessary.
3. The distance between the EUT and the phantom bottom is 5mm.

Mode		Duty cycle	Duty factor	Note
Licensed Frequency	GSM Band	Depends on UP slots	NA	According to the theory, we configured duty cycle with relevant value on the communication tester, so correction factor do not need such as "duty factor"
	WCDMA Band	100%		
	FDD-LTE Band	100%		
	TDD-LTE Band	63.3%		
Unlicensed Frequency	WIFI 2.4GHz 802.11b	99.7%	1.00	SRTC perform SAR test with non-signaling mode, and duty factor shall be considered because of the uncertainty of data traffic.

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

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
Back	GPRS 4TX (body- worn)	L1	28.42	28.50	1.02	0.913	0.931
		M1	28.37	28.50	1.03	**0.922**	**0.950**
		H1	28.44	28.50	1.01	0.836	0.844
		L2	28.42	28.50	1.02	0.912	0.930
		M2	28.37	28.50	1.03	0.921	0.949
		H2	28.44	28.50	1.01	0.821	0.829
Front		L	28.42	28.50	1.02	---	---
		M	28.37	28.50	1.03	0.742	0.764
		H	28.44	28.50	1.01	---	---
Top		L	28.42	28.50	1.02	---	---
		M	28.37	28.50	1.03	0.063	0.065
		H	28.44	28.50	1.01	---	---
Left		L	28.42	28.50	1.02	---	---
		M	28.37	28.50	1.03	0.117	0.121
		H	28.44	28.50	1.01	---	---
Right		L	28.42	28.50	1.02	---	---
		M	28.37	28.50	1.03	0.215	0.221
		H	28.44	28.50	1.01	---	---

Mode: GSM1900(GPRS)

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

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
Back	GPRS 4TX (body- worn)	L	23.79	24.00	1.05	---	---
		M	23.58	24.00	1.10	**0.423**	**0.465**
		H	23.23	24.00	1.19	---	---
Front		L	23.79	24.00	1.05	---	---
		M	23.58	24.00	1.10	0.211	0.232
		H	23.23	24.00	1.19	---	---
Top		L	23.79	24.00	1.05	---	---
		M	23.58	24.00	1.10	0.075	0.083
		H	23.23	24.00	1.19	---	---
Left		L	23.79	24.00	1.05	---	---
		M	23.58	24.00	1.10	0.148	0.163
		H	23.23	24.00	1.19	---	---
Right		L	23.79	24.00	1.05	---	---
		M	23.58	24.00	1.10	0.203	0.223
		H	23.23	24.00	1.19	---	---

Mode: WCDMA BAND II
fL (MHz)= 1852.4MHz fM (MHz)= 1880.0MHz fH (MHz)= 1907.6MHz
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
Back	12.2KRMC (body- worn)	L	20.33	20.50	1.04	---	---
		M	19.84	20.50	1.16	**0.527**	**0.611**
		H	19.67	20.50	1.21	---	---
Front		L	20.33	20.50	1.04	---	---
		M	19.84	20.50	1.16	0.428	0.496
		H	19.67	20.50	1.21	---	---
Top		L	20.33	20.50	1.04	---	---
		M	19.84	20.50	1.16	0.056	0.065
		H	19.67	20.50	1.21	---	---
Left		L	20.33	20.50	1.04	---	---
		M	19.84	20.50	1.16	0.295	0.342
		H	19.67	20.50	1.21	---	---
Right		L	20.33	20.50	1.04	---	---
		M	19.84	20.50	1.16	0.202	0.234
		H	19.67	20.50	1.21	---	---

Mode: WCDMA BAND V

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

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
Back	12.2KRMC (body- worn)	L	21.46	22.00	1.13	---	---
		M	21.50	22.00	1.12	**0.486**	**0.544**
		H	20.88	22.00	1.29	---	---
Front		L	21.46	22.00	1.13	---	---
		M	21.50	22.00	1.12	0.410	0.459
		H	20.88	22.00	1.29	---	---
Top		L	21.46	22.00	1.13	---	---
		M	21.50	22.00	1.12	0.024	0.027
		H	20.88	22.00	1.29	---	---
Left		L	21.46	22.00	1.13	---	---
		M	21.50	22.00	1.12	0.085	0.095
		H	20.88	22.00	1.29	---	---
Right		L	21.46	22.00	1.13	---	---
		M	21.50	22.00	1.12	0.126	0.141
		H	20.88	22.00	1.29	---	---

Mode: LTE Band 2

fL (MHz)= 1860MHz fM (MHz)= 1880MHz fH (MHz)= 1900MHz

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
Back	20BW 1RB (body- worn)	L	20.97	21.50	1.13	---	---
		M	20.68	21.50	1.21	**0.609**	**0.737**
		H	21.48	21.50	1.00	---	---
Front		L	20.97	21.50	1.13	---	---
		M	20.68	21.50	1.21	0.423	0.512
		H	21.48	21.50	1.00	---	---
Top		L	20.97	21.50	1.13	---	---
		M	20.68	21.50	1.21	0.125	0.151
		H	21.48	21.50	1.00	---	---
Left		L	20.97	21.50	1.13	---	---
		M	20.68	21.50	1.21	0.276	0.334
		H	21.48	21.50	1.00	---	---
Right		L	20.97	21.50	1.13	---	---
		M	20.68	21.50	1.21	0.161	0.195
		H	21.48	21.50	1.00	---	---
Back	20BW 50%RB (body- worn)	L	19.13	20.00	1.22	---	---
		M	19.85	20.00	1.04	0.475	0.494
		H	19.96	20.00	1.01	---	---
Front		L	19.13	20.00	1.22	---	---
		M	19.85	20.00	1.04	0.301	0.313
		H	19.96	20.00	1.01	---	---
Top		L	19.13	20.00	1.22	---	---
		M	19.85	20.00	1.04	0.104	0.108
		H	19.96	20.00	1.01	---	---
Left		L	19.13	20.00	1.22	---	---
		M	19.85	20.00	1.04	0.185	0.192
		H	19.96	20.00	1.01	---	---
Right		L	19.13	20.00	1.22	---	---
		M	19.85	20.00	1.04	0.112	0.116
		H	19.96	20.00	1.01	---	---

Mode: LTE Band 5

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

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
Back	10BW 1RB (body- worn)	L	23.38	24.50	1.29	---	---
		M	23.98	24.50	1.13	**0.522**	**0.590**
		H	24.48	24.50	1.00	---	---
Front		L	23.38	24.50	1.29	---	---
		M	23.98	24.50	1.13	0.493	0.557
		H	24.48	24.50	1.00	---	---
Top		L	23.38	24.50	1.29	---	---
		M	23.98	24.50	1.13	0.083	0.094
		H	24.48	24.50	1.00	---	---
Left		L	23.38	24.50	1.29	---	---
		M	23.98	24.50	1.13	0.093	0.105
		H	24.48	24.50	1.00	---	---
Right		L	23.38	24.50	1.29	---	---
		M	23.98	24.50	1.13	0.115	0.130
		H	24.48	24.50	1.00	---	---
Back	10BW 50%RB (body- worn)	L	21.42	22.50	1.28	---	---
		M	22.14	22.50	1.09	0.346	0.377
		H	21.90	22.50	1.15	---	---
Front		L	21.42	22.50	1.28	---	---
		M	22.14	22.50	1.09	0.236	0.257
		H	21.90	22.50	1.15	---	---
Top		L	21.42	23.50	1.61	---	---
		M	22.14	23.50	1.37	0.044	0.060
		H	21.90	23.50	1.45	---	---
Left		L	21.42	23.50	1.61	---	---
		M	22.14	23.50	1.37	0.035	0.048
		H	21.90	23.50	1.45	---	---
Right		L	21.42	23.50	1.61	---	---
		M	22.14	23.50	1.37	0.101	0.138
		H	21.90	23.50	1.45	---	---

Mode: LTE Band 7

fL (MHz)=2510 MHz fM (MHz)=2535MHz fH (MHz)= 2560MHz

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
Back	20BW 1RB (body- worn)	L	20.67	21.00	1.08	---	---
		M	20.55	21.00	1.11	**0.688**	**0.764**
		H	19.81	21.00	1.32	---	---
Front		L	20.67	21.00	1.08	---	---
		M	20.55	21.00	1.11	0.561	0.623
		H	19.81	21.00	1.32	---	---
Top		L	20.67	21.00	1.08	---	---
		M	20.55	21.00	1.11	0.117	0.130
		H	19.81	21.00	1.32	---	---
Left		L	20.67	21.00	1.08	---	---
		M	20.55	21.00	1.11	0.177	0.196
		H	19.81	21.00	1.32	---	---
Right		L	20.67	21.00	1.08	---	---
		M	20.55	21.00	1.11	0.197	0.219
		H	19.81	21.00	1.32	---	---
Back	20BW 50%RB (body- worn)	L	19.19	19.50	1.07	---	---
		M	18.80	19.50	1.17	0.426	0.498
		H	18.30	19.50	1.32	---	---
Front		L	19.19	19.50	1.07	---	---
		M	18.80	19.50	1.17	0.337	0.394
		H	18.30	19.50	1.32	---	---
Top		L	19.19	19.50	1.07	---	---
		M	18.80	19.50	1.17	0.103	0.121
		H	18.30	19.50	1.32	---	---
Left		L	19.19	19.50	1.07	---	---
		M	18.80	19.50	1.17	0.136	0.159
		H	18.30	19.50	1.32	---	---
Right		L	19.19	19.50	1.07	---	---
		M	18.80	19.50	1.17	0.125	0.146
		H	18.30	19.50	1.32	---	---

Mode: LTE Band 41

fL (MHz)=2506 MHz fM (MHz)=2593MHz fH (MHz)= 2680MHz

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
Back	20BW 1RB (body- worn)	L	21.83	23.00	1.31	---	---
		M	22.67	23.00	1.08	**0.339**	**0.366**
		H	22.98	23.00	1.00	---	---
Front		L	21.83	23.00	1.31	---	---
		M	22.67	23.00	1.08	0.281	0.303
		H	22.98	23.00	1.00	---	---
Top		L	21.83	23.00	1.31	---	---
		M	22.67	23.00	1.08	0.063	0.068
		H	22.98	23.00	1.00	---	---
Left		L	21.83	23.00	1.31	---	---
		M	22.67	23.00	1.08	0.050	0.054
		H	22.98	23.00	1.00	---	---
Right		L	21.83	23.00	1.31	---	---
		M	22.67	23.00	1.08	0.051	0.055
		H	22.98	23.00	1.00	---	---
Back	20BW 50%RB (body- worn)	L	20.87	22.00	1.30	---	---
		M	21.83	22.00	1.04	0.271	0.282
		H	21.80	22.00	1.05	---	---
Front		L	20.87	22.00	1.30	---	---
		M	21.83	22.00	1.04	0.245	0.255
		H	21.80	22.00	1.05	---	---
Top		L	20.87	22.00	1.30	---	---
		M	21.83	22.00	1.04	0.051	0.053
		H	21.80	22.00	1.05	---	---
Left		L	20.87	22.00	1.30	---	---
		M	21.83	22.00	1.04	0.047	0.049
		H	21.80	22.00	1.05	---	---
Right		L	20.87	22.00	1.30	---	---
		M	21.83	22.00	1.04	0.041	0.043
		H	21.80	22.00	1.05	---	---

Mode: Wi-Fi 2.4GHz
fL (MHz)=2412MHz fM (MHz)=2437MHz fH (MHz)= 2462MHz
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
Back	802.11b (body- worn)	L	13.12	16.00	1.94	---	---
		M	14.96	16.00	1.27	**0.418**	**0.531**
		H	15.87	16.00	1.03	---	---
Front		L	13.12	16.00	1.94	---	---
		M	14.96	16.00	1.27	0.407	0.517
		H	15.87	16.00	1.03	---	---
Top		L	13.12	16.00	1.94	---	---
		M	14.96	16.00	1.27	0.052	0.066
		H	15.87	16.00	1.03	---	---
Left		L	13.12	16.00	1.94	---	---
		M	14.96	16.00	1.27	0.049	0.062
		H	15.87	16.00	1.03	---	---
Right		L	13.12	16.00	1.94	---	---
		M	14.96	16.00	1.27	0.212	0.269
		H	15.87	16.00	1.03	---	---

6.10 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 (~ 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	Body-worn(w/kg)
Below 1GHz	GSM850 WCDMA BANDV LTE BAND5	>0.8
1GHz-2GHz	GSM1900 WCDMA BANDII LTE BAND2	<0.8
2GHz-3GHz	WIFI 2.4GHz LTE BAND7 LTE BAND41	<0.8

6.11 Simultaneous Transmission SAR Analysis

The sum of SAR values for GSM +Wi-Fi

	MAXIMUM SAR VALUE FOR BODY WORN
GSM	0.950
Wi-Fi	0.531
Sum	1.481
Note	Back: GSM850+WIFI2.4GHz

The sum of SAR values for WCDMA + Wi-Fi

	MAXIMUM SAR VALUE FOR BODY
WCDMA	0.611
Wi-Fi	0.531
Sum	1.142
Note	Back: WCDMA Band II+ WIFI2.4GHz

The sum of SAR values for LTE + Wi-Fi

	MAXIMUM SAR VALUE FOR BODY
LTE	0.764
Wi-Fi	0.531
Sum	1.295
Note	Back: LTE Band7 + WIFI2.4GHz

According to the above tables, the sum of SAR values＜1.6W/kg. So simultaneous transmission SAR are not required for WIFI 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_i) 1g	(c_i) 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	2019.08.28	2020.08.27
Dosimetric E-field Probe	ES3DV3	3127	2019.08.27	2020.08.26
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	2019.08.20	2020.08.19
Signal Generator	SML 03	103514	2019.08.20	2020.08.19
Power meter	E4417A	MY45101182	2019.08.20	2020.08.19
Power Sensor	E4412A	MY41502214	2019.08.20	2020.08.19
Power Sensor	E4412A	MY41502130	2019.08.20	2020.08.19
Power meter	E4417A	MY45101004	2019.08.20	2020.08.19
Power Sensor	E9300B	MY41496001	2019.08.20	2020.08.19
Power Sensor	E9300B	MY41496003	2019.08.20	2020.08.19
Communication Tester	E5515C	MY48367401	2019.08.20	2020.08.19
Communication Tester	CMU500	114666	2019.08.20	2020.08.19
Communication Tester	MT8820C	6201300660	2019.08.20	2020.08.19
Communication Tester	MT8821C	6201547819	2019.08.20	2020.08.19
Vector Network Analyzer	VNA R140	0011213	2019.09.18	2020.09.17
Dielectric Parameter Probe	DAKS-3.5	1042	2019.09.17	2020.09.16

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 μW/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 μW/g to > 100 W/kg Linearity: ± 0.2 dB (noise: typically < 1 μW/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×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 835

SAR target

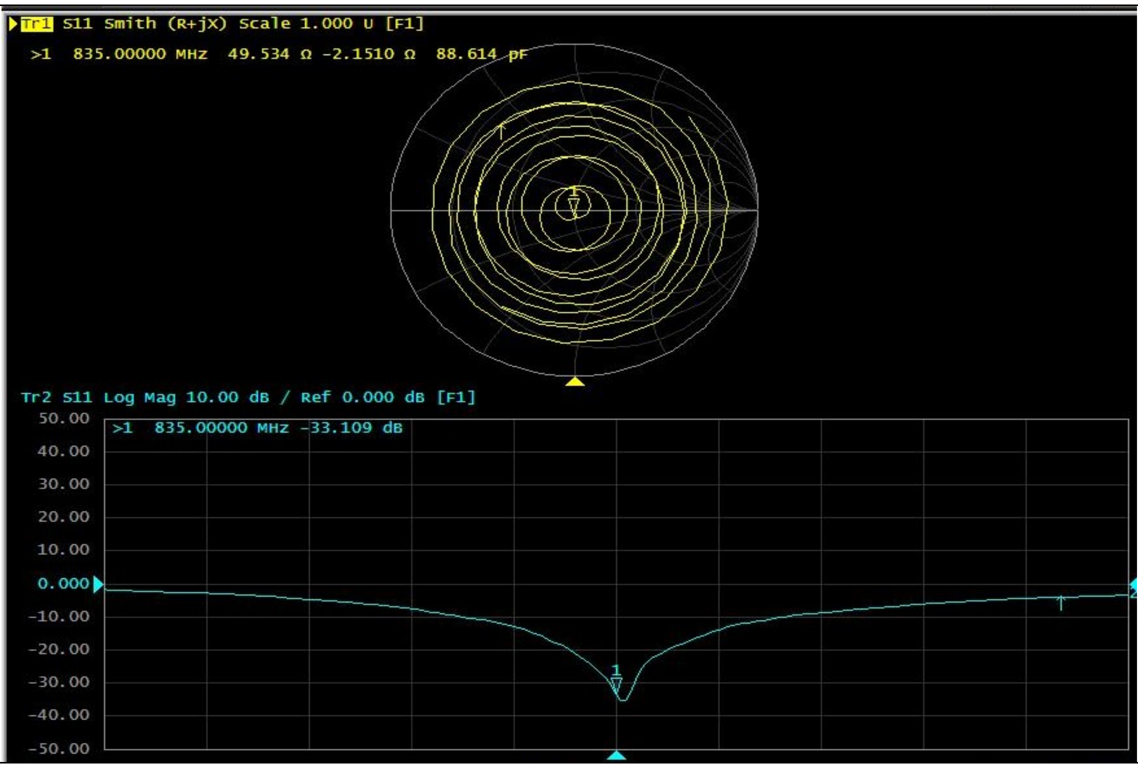
Refers to system check, measured SAR (1g and 10g) deviates from the Target SAR value of calibration report within 10%.

Impedance and Return loss measured by Network analyzer

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

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

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%



TSL Parameters

Dipole1800

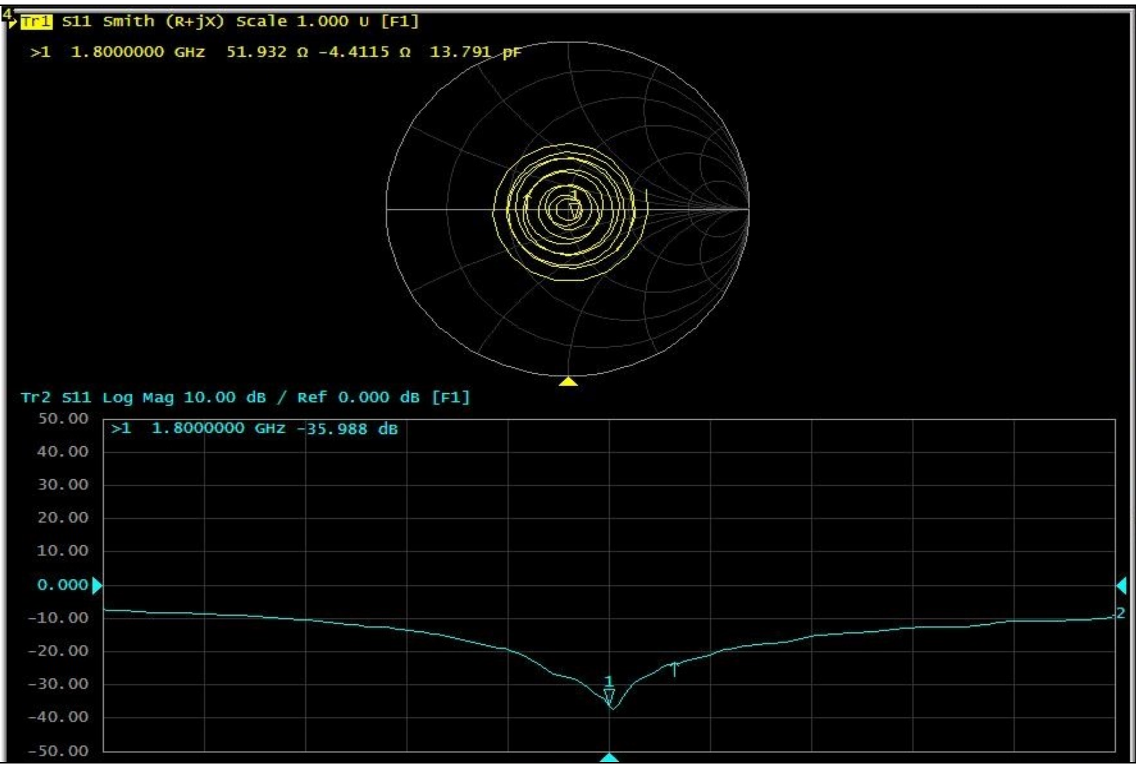
SAR target

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, deviates within 5 Ω from the previous measurement. (Data from the last calibration report)
The most recent return-loss result deviates within 20% from the previous measurement. (Data from the last calibration report)

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%



TSL Parameters

Dipole2000

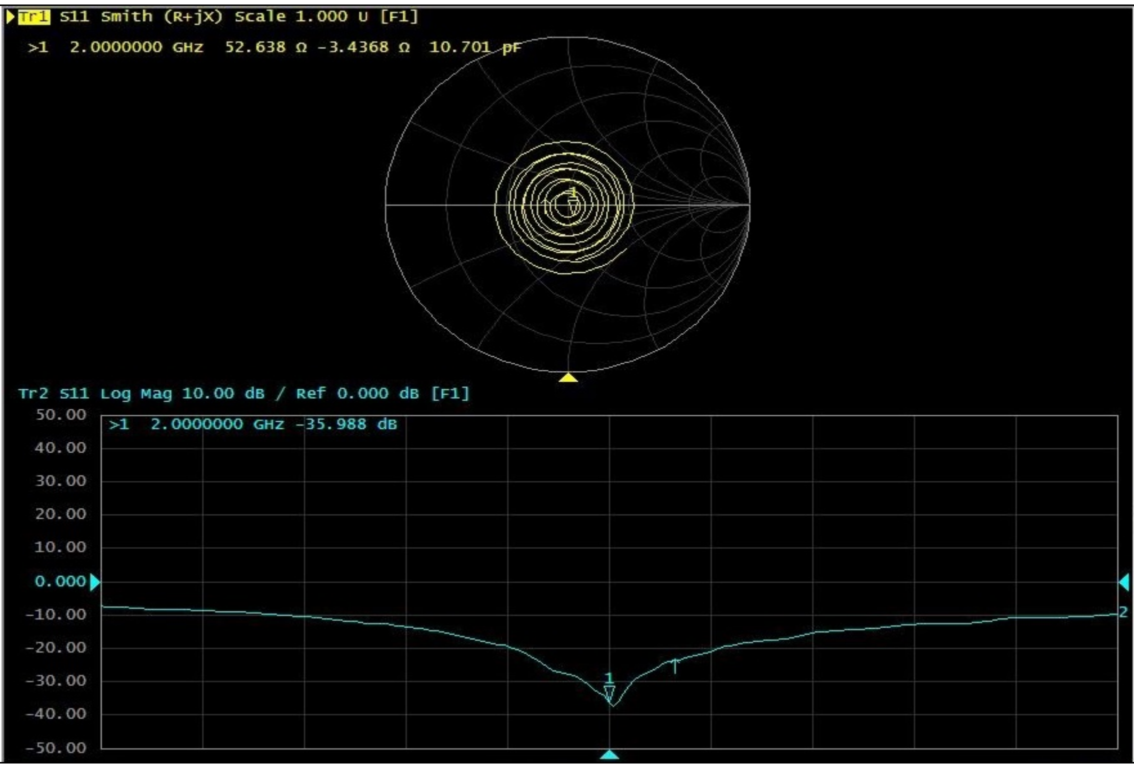
SAR target

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, deviates within 5 Ω from the previous measurement. (Data from the last calibration report)
The most recent return-loss result deviates within 20% from the previous measurement. (Data from the last calibration report)

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%



TSL Parameters

Dipole2450

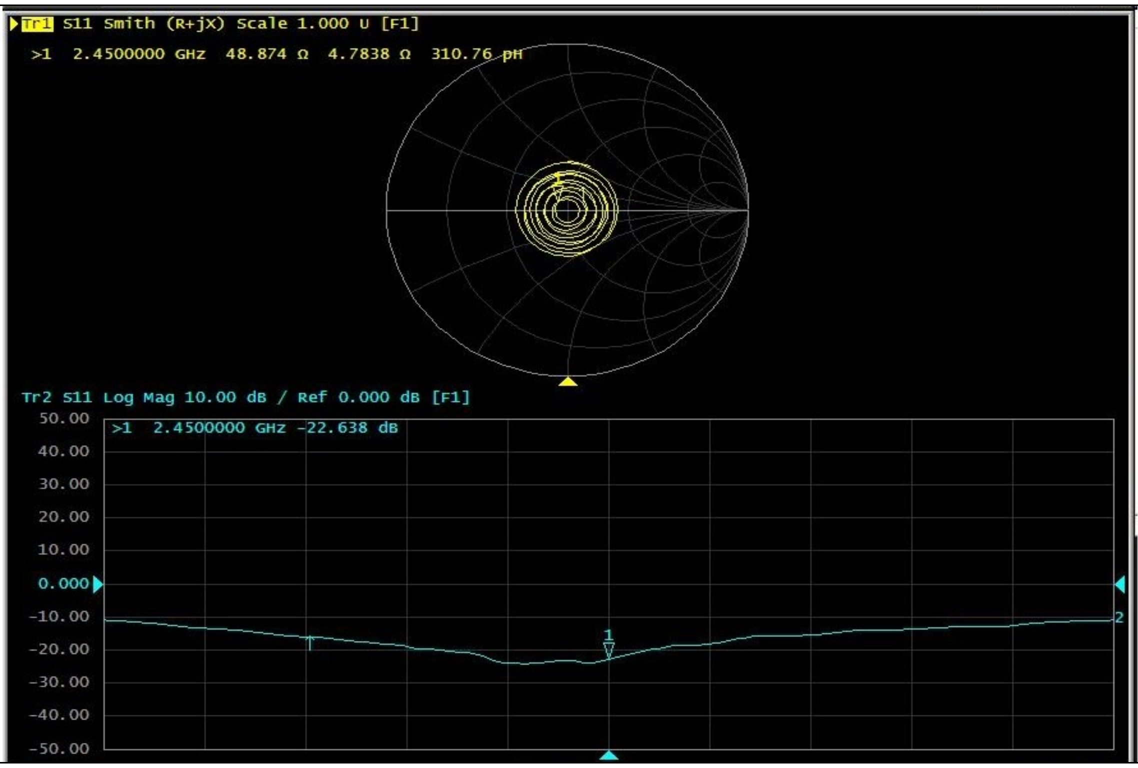
SAR target

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 deviates within 5 Ω from the previous measurement. (Data from the last calibration report)
The most recent return-loss result deviates within 20% from the previous measurement. (Data from the last calibration report)

TSL Parameters			
Parameters	Target (Ref. Value)	Measured data	Deviation
Impedance	51.3Ω+5.92jΩ	48.9Ω+4.78jΩ	<5Ω
Return loss	-24.5 dB	-22.6dB	<20%



TSL Parameters

ANNEX A – TEST PLOTS

Please refer to the attachment.

ANNEX B – RELEVANT PAGES FROM CALIBRATION REPORTS

Please refer to the attachment.

ANNEX A – TEST PLOTS

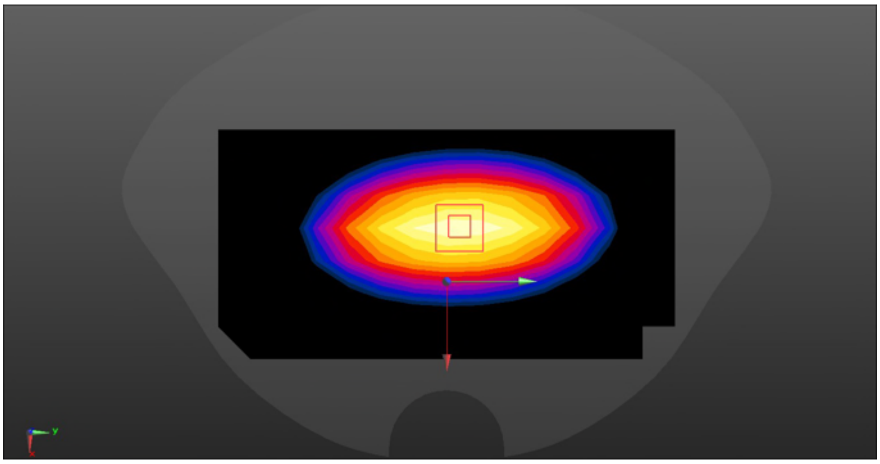
System check	835MHz

Communication System: UID 0, CW (0); Frequency: 835 MHz
Medium parameters used (interpolated): f = 835 MHz; σ = 0.911 S/m; ε_r = 40.266 ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(6.20, 6.20, 6.20); Calibrated: 8/27/2019;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 8/28/2019
- Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

Configuration 835/835/Area Scan (8x15x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.72 W/kg
Configuration 835/835/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
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



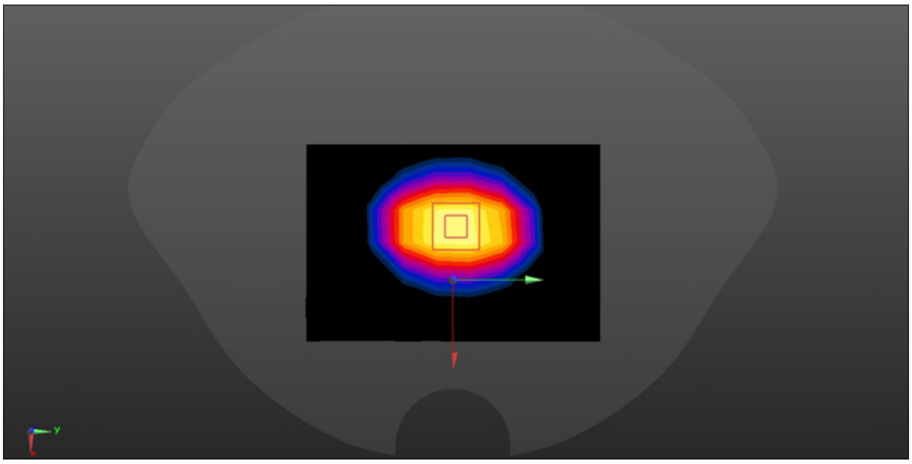
System check	1800MHz

Communication System: UID 0, CW (0); Frequency: 1800 MHz
Medium parameters used: f = 1800 MHz; σ = 1.418 S/m; ε_r = 40.688; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(5.10, 5.10, 5.10); Calibrated: 8/27/2019;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 8/28/2019
- 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=15mm, dy=15mm
Maximum value of SAR (measured) = 8.31 W/kg
Configuration 1800/1800/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
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



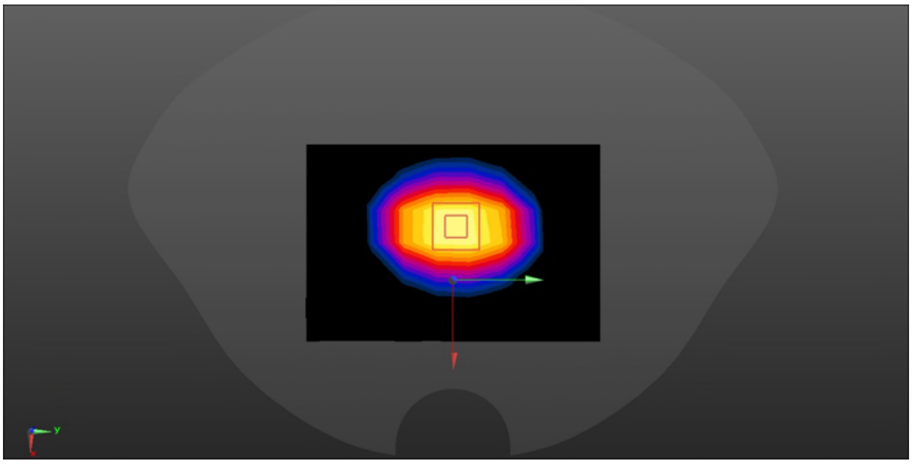
System check	1800MHz

Communication System: UID 0, CW (0); Frequency: 1800 MHz
Medium parameters used: f = 1800 MHz; σ = 1.427 S/m; ε_r = 40.722; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(5.10, 5.10, 5.10); Calibrated: 8/27/2019;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 8/28/2019
- 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=15mm, dy=15mm
Maximum value of SAR (measured) = 8.31 W/kg
Configuration 1800/1800/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
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



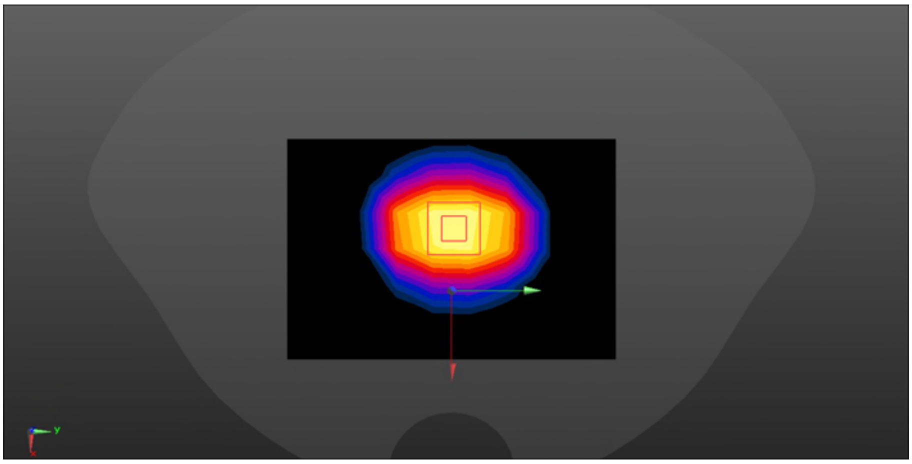
System check	2000MHz

Communication System: UID 0, CW (0); Frequency: 2000 MHz
Medium parameters used: f = 2000 MHz; σ = 1.427 S/m; ε_r = 39.844; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(5.02, 5.02, 5.02); Calibrated: 8/27/2019;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 8/28/2019
- 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=10mm, dy=10mm
Maximum value of SAR (measured) = 8.40 W/kg
Configuration 2000/2000/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
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



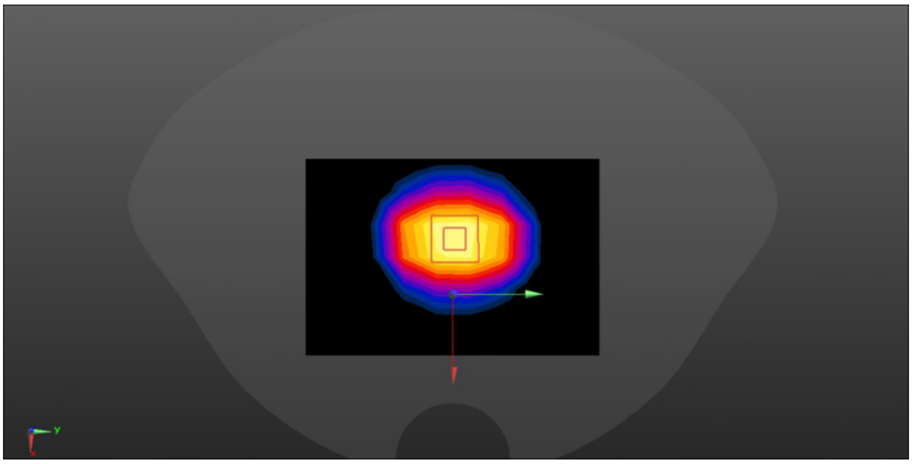
System check	2000MHz

Communication System: UID 0, CW (0); Frequency: 2000 MHz
Medium parameters used: f = 2000 MHz; σ = 1.377 S/m; ε_r = 40.355; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(5.02, 5.02, 5.02); Calibrated: 8/27/2019;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 8/28/2019
- 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=10mm, dy=10mm
Maximum value of SAR (measured) = 8.96 W/kg
Configuration 2000/2000/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
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



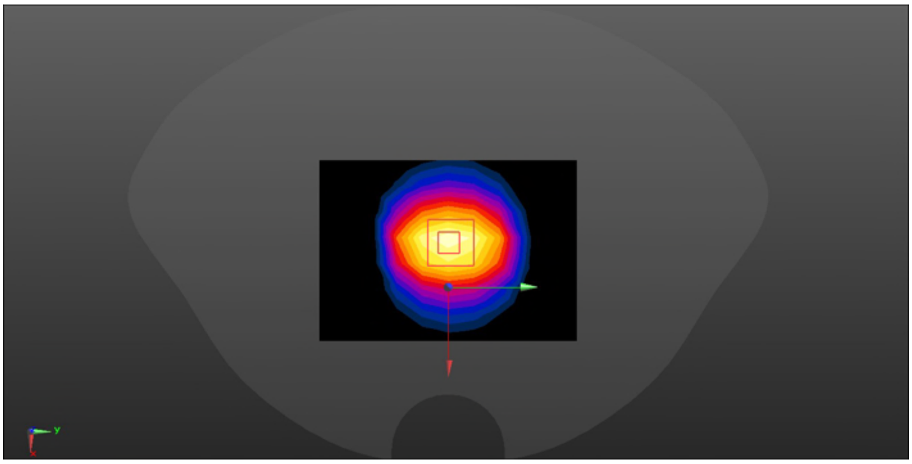
System check	2450MHz

Communication System: UID 0, CW (0); Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.866 S/m; ε_r = 38.343; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(4.50, 4.50, 4.50); Calibrated: 8/27/2019;
- Sensor-Surface: 3mm (Mechanical Surface Detection), z = -3.0, 32.0
- Electronics: DAE4 Sn546; Calibrated: 8/28/2019
- Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

System Performance Check at Frequencies 2450 MHz/2450/Area Scan (8x11x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 21.2 W/kg
System Performance Check at Frequencies 2450 MHz/2450/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
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



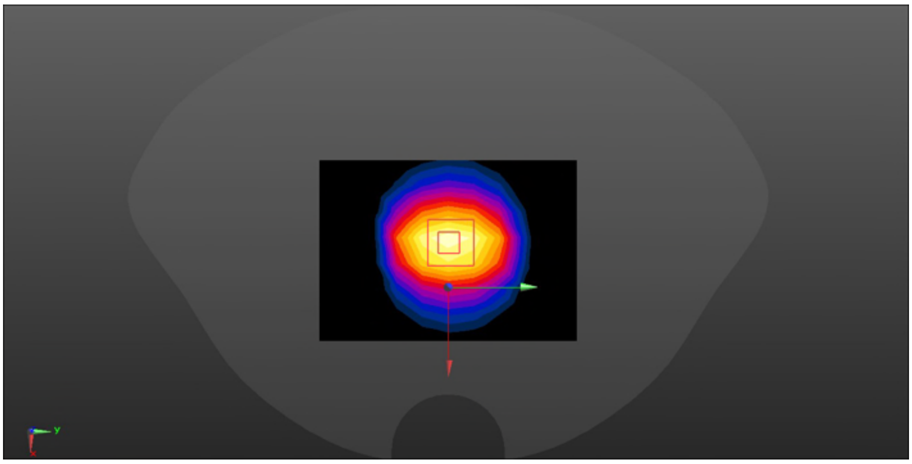
System check	2450MHz

Communication System: UID 0, CW (0); Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.851 S/m; ε_r = 39.672; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(4.50, 4.50, 4.50); Calibrated: 8/27/2019;
- Sensor-Surface: 3mm (Mechanical Surface Detection), z = -3.0, 32.0
- Electronics: DAE4 Sn546; Calibrated: 8/28/2019
- Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

System Performance Check at Frequencies 2450 MHz/2450/Area Scan (8x11x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 21.2 W/kg
System Performance Check at Frequencies 2450 MHz/2450/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
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



GSM850

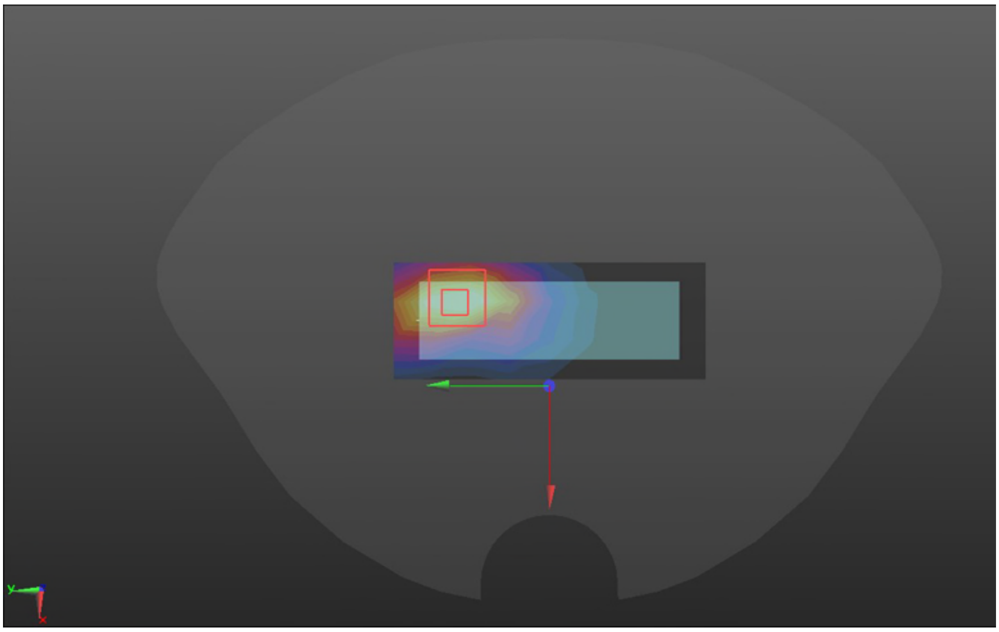
Body-worn	Back

Communication System: UID 0, Generic GSM (0); Frequency: 836.6 MHz;Duty Cycle: 4:8
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.905 S/m; ε_r = 41.528; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(6.2, 6.2, 6.2) @ 836.6 MHz; Calibrated: 8/27/2019
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 8/28/2019
- Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.12 (7450)

back/G850 F/Area Scan (4x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.41 W/kg
back/G850 F/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.94 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 2.16 W/kg
SAR(1 g) = 0.922 W/kg; SAR(10 g) = 0.472 W/kg
Maximum value of SAR (measured) = 1.30 W/kg



GSM1900

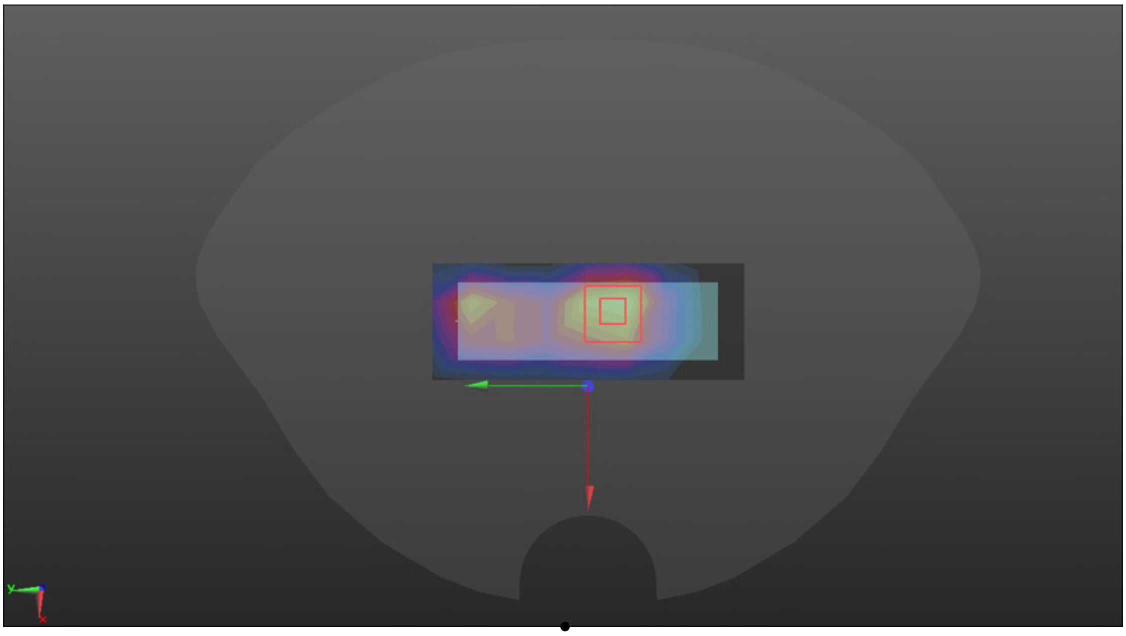
Body-worn	**Back**

Communication System: UID 0, Generic GSM (0); Frequency: 1880 MHz;Duty Cycle: 4:8
Medium parameters used (interpolated): f = 1880 MHz; σ = 1.4 S/m; ε_r = 40; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(5.10, 5.10, 5.10) @ 1850.2 MHz; Calibrated: 8/27/2019
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 8/28/2019
- Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.12 (7450)

back/G1900 B 2 2/Area Scan (4x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.464 W/kg
back/G1900 B 2 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.96 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.701 W/kg
SAR(1 g) = 0.423 W/kg; SAR(10 g) = 0.238 W/kg
Maximum value of SAR (measured) = 0.515 W/kg



WCDMA Band II

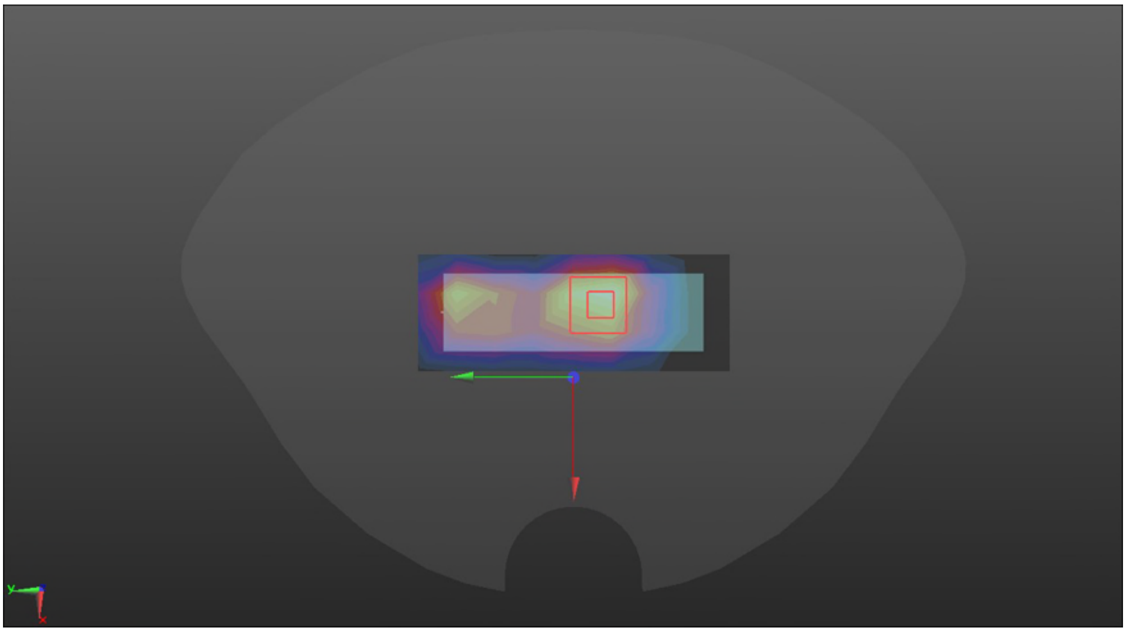
Body-worn	Back

Communication System: UID 0, WCDMA BAND2 (0); Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1880 MHz; σ = 1.4 S/m; ε_r = 40; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(5.1, 5.1, 5.1) @ 1880 MHz; Calibrated: 8/27/2019
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 8/28/2019
- Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.12 (7450)

back/w2 B/Area Scan (4x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.636 W/kg
back/w2 B/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.14 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 0.871 W/kg
SAR(1 g) = 0.527 W/kg; SAR(10 g) = 0.298 W/kg
Maximum value of SAR (measured) = 0.642 W/kg



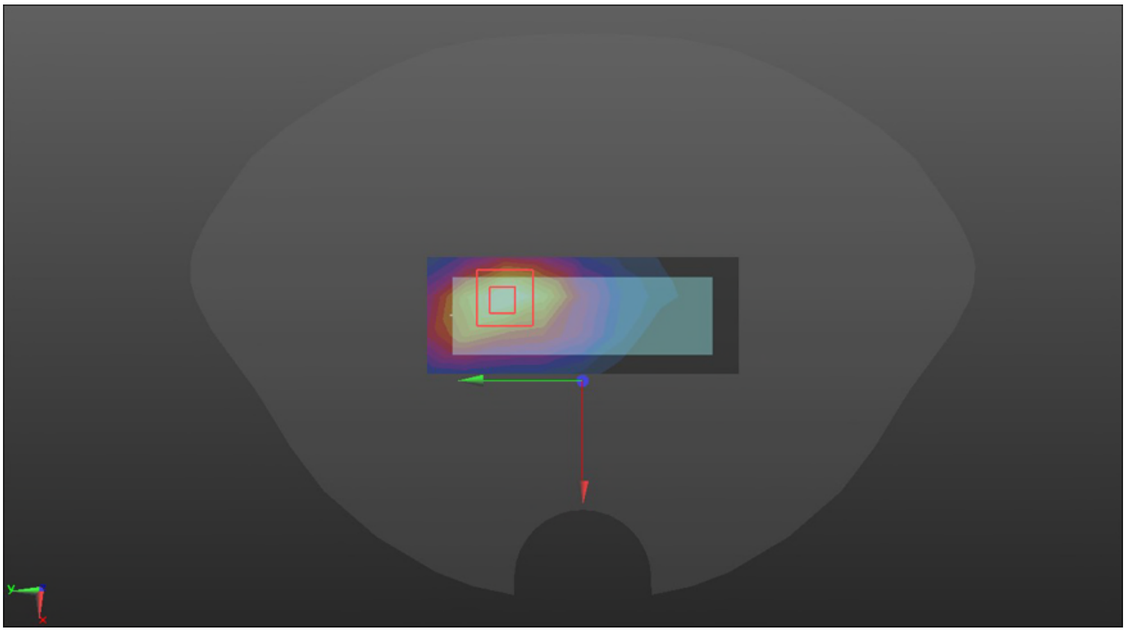
WCDMA Band V

Body-worn	Back

Communication System: UID 0, WCDMA 5 (0); Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.905 S/m; ε_r = 41.528; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(6.2, 6.2, 6.2) @ 836.6 MHz; Calibrated: 8/27/2019
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 8/28/2019
- Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)
- **back/w5 1RB/Area Scan (4x9x1):** Measurement grid: dx=15mm, dy=15mm
  Maximum value of SAR (measured) = 0.589 W/kg
  back/w5 1RB/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
  Reference Value = 17.86 V/m; Power Drift = -0.05 dB
  Peak SAR (extrapolated) = 0.776 W/kg
  SAR(1 g) = 0.486 W/kg; SAR(10 g) = 0.299 W/kg
  Maximum value of SAR (measured) = 0.544 W/kg



LTE Band 2

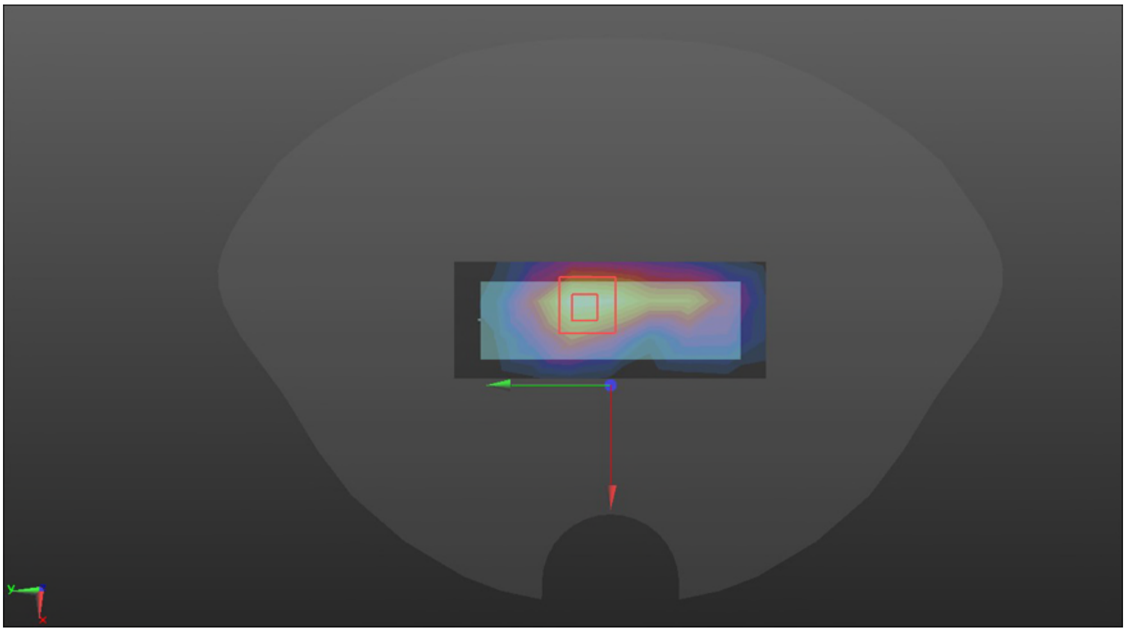
Body-worn	Back

Communication System: UID 0, LTE BAND02 (0); Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1880 MHz; σ = 1.4 S/m; ε_r = 40; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(5.1, 5.1, 5.1) @ 1860 MHz; Calibrated: 8/27/2019
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 8/28/2019
- Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

back/LTE2 1RB 2/Area Scan (4x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.748 W/kg
back/LTE2 1RB 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.26 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 1.00 W/kg
SAR(1 g) = 0.609 W/kg; SAR(10 g) = 0.345 W/kg
Maximum value of SAR (measured) = 0.742 W/kg

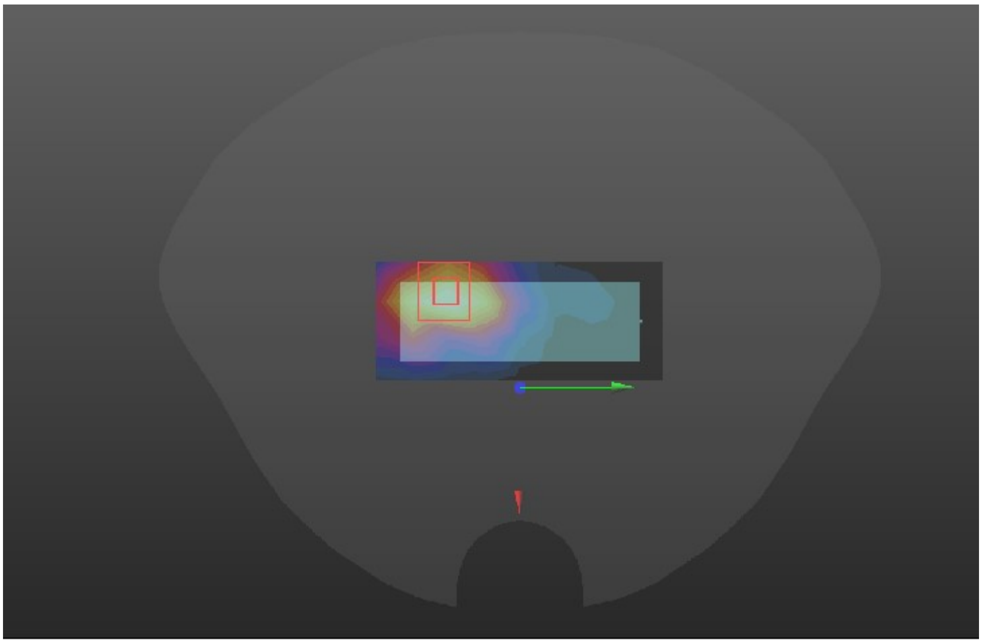


LTE Band 5

Body-worn	Back

Communication System: UID 0, LTE Band 5 (0); Frequency: 836.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.5 MHz; σ = 0.905 S/m; ε_r = 41.528; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(6.2, 6.2, 6.2) @ 836.5 MHz; Calibrated: 8/27/2019;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 8/28/2019
- Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)
  back/LTE5 1RB /Area Scan (4x9x1): Measurement grid: dx=15mm, dy=15mm
  Maximum value of SAR (measured) = 0.618 W/kg
  back/LTE5 1RB /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
  Reference Value = 13.78 V/m; Power Drift = 0.21 dB
  Peak SAR (extrapolated) = 0.861 W/kg
  SAR(1 g) = 0.522 W/kg; SAR(10 g) = 0.305 W/kg
  Maximum value of SAR (measured) = 0.579 W/kg
- 

LTE Band 7

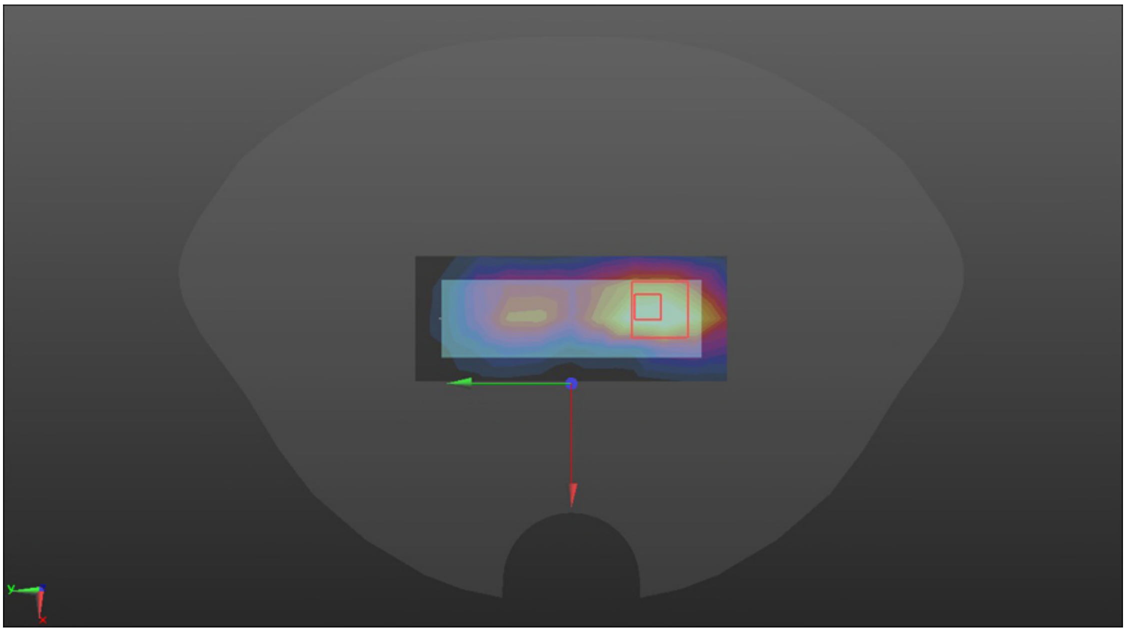
Body-worn	Back

Communication System: UID 0, LTE BAND07 (0); Frequency: 2535 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2535 MHz; σ = 1.916 S/m; ε_r = 39.051; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(4.32, 4.32, 4.32) @ 2560 MHz; Calibrated: 8/27/2019
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 8/28/2019
- Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

back/LTE7 1RB/Area Scan (5x11x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.844 W/kg
back/LTE7 1RB/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.03 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 1.59 W/kg
SAR(1 g) = 0.688 W/kg; SAR(10 g) = 0.334 W/kg
Maximum value of SAR (measured) = 0.735 W/kg



LTE Band 41

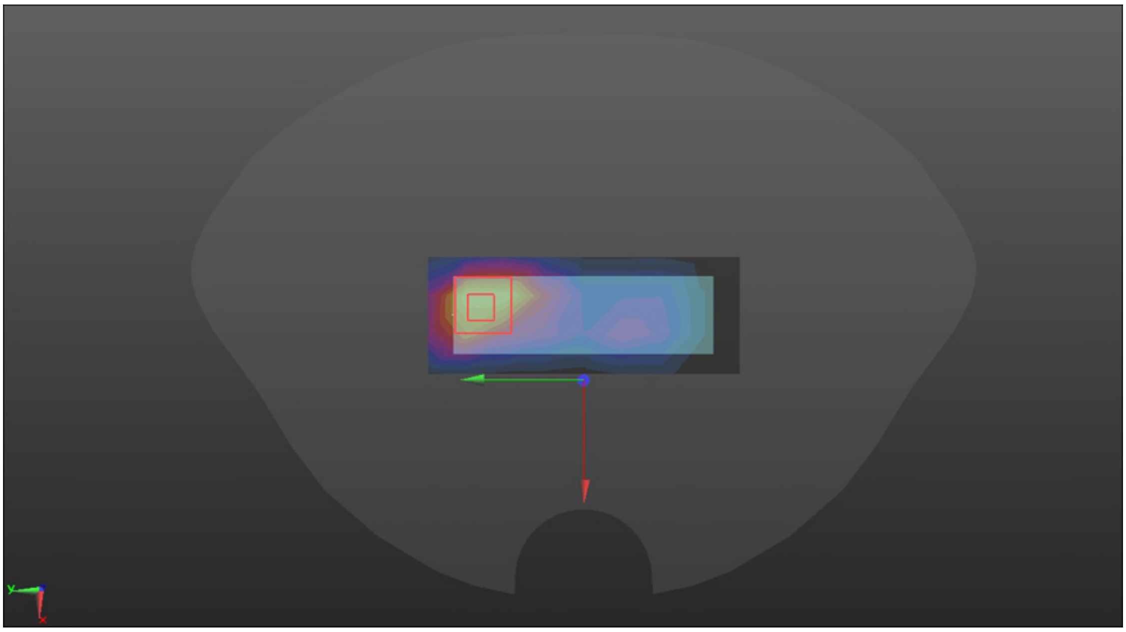
Body-worn	Back

Communication System: UID 0, LTE BAND41 (0); Frequency: 2593 MHz;Duty Cycle: 0.633:1
Medium parameters used (interpolated): f = 2593 MHz; σ = 1.952 S/m; ε_r = 39.009; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(4.32, 4.32, 4.32) @ 2593 MHz; Calibrated: 8/27/2019
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 8/28/2019
- Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

back/LTE41 1RB/Area Scan (5x11x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.329 W/kg
back/LTE41 1RB/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.214 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.690 W/kg
SAR(1 g) = 0.339 W/kg; SAR(10 g) = 0.165 W/kg
Maximum value of SAR (measured) = 0.380 W/kg



WIFI 2.4GHz

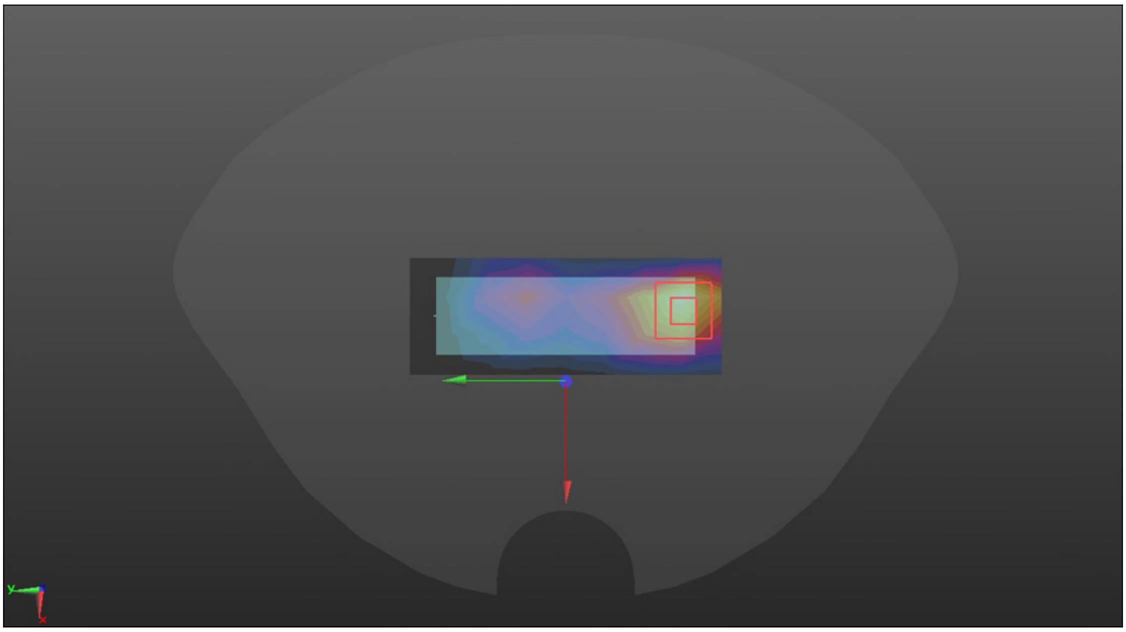
Body-worn	Back

Communication System: UID 0, WIFI 2.4GHz (0); Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.788 S/m; ε_r = 39.219; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(4.50, 4.50, 4.50) @ 2437 MHz; Calibrated: 8/27/2019
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 2019/8/28
- Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)

back/WIFI F#40/Area Scan (5x11x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.466 W/kg
back/WIFI F#40/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.598 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0.848 W/kg
SAR(1 g) = 0.418 W/kg; SAR(10 g) = 0.202 W/kg
Maximum value of SAR (measured) = 0.466 W/kg



ANNEX B – RELEVANT PAGES FROM CALIBRATION REPORTS

DAE4 Sn:546

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **SRTC (Auden)**

Certificate No: **DAE4-546_Aug19**

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BM - SN: 546
Calibration procedure(s)	QA CAL-06.v29 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	August 28, 2019

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 (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	03-Sep-18 (No:23488)	Sep-19
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Auto DAE Calibration Unit	SE UWS 053 AA 1001	07-Jan-19 (in house check)	In house check: Jan-20
Calibrator Box V2.1	SE UMS 006 AA 1002	07-Jan-19 (in house check)	In house check: Jan-20

	Name	Function	Signature
Calibrated by:	Eric Hainfeld	Laboratory Technician	
Approved by:	Sven Kühn	Deputy Manager	i.V.

Issued: August 28, 2019

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Certificate No: DAE4-546_Aug19 Page 1 of 5

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Accreditation No.: **SCS 0108**

Glossary

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

Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle:* The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
  - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
  - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
  - *Input Offset Measurement:* Output voltage and statistical results over a large number of zero voltage measurements.
  - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - *Input resistance:* Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
  - *Power consumption:* Typical value for information. Supply currents in various operating modes.

DC Voltage Measurement

A/D - Converter Resolution nominal

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

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

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

Calibration Factors	X	Y	Z
High Range	405.352 ± 0.02% (k=2)	404.098 ± 0.02% (k=2)	404.222 ± 0.02% (k=2)
Low Range	3.98830 ± 1.50% (k=2)	3.95641 ± 1.50% (k=2)	3.97961 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	237.0 ° ± 1 °

Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	199995.19	-1.38	-0.00
Channel X	+ Input	20000.83	-0.80	-0.00
Channel X	- Input	-19997.26	4.75	-0.02
Channel Y	+ Input	199989.47	-7.29	-0.00
Channel Y	+ Input	20002.52	0.88	0.00
Channel Y	- Input	-20001.62	0.45	-0.00
Channel Z	+ Input	199996.94	0.28	0.00
Channel Z	+ Input	19998.55	-3.07	-0.02
Channel Z	- Input	-20002.95	-0.90	0.00

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	2001.48	0.50	0.03
Channel X	+ Input	201.14	-0.15	-0.07
Channel X	- Input	-198.97	-0.38	0.19
Channel Y	+ Input	2000.52	-0.41	-0.02
Channel Y	+ Input	200.95	-0.13	-0.07
Channel Y	- Input	-199.00	-0.30	0.15
Channel Z	+ Input	2000.96	-0.05	-0.00
Channel Z	+ Input	200.01	-1.11	-0.55
Channel Z	- Input	-199.97	-1.27	0.64

2. Common mode sensitivity

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

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	2.12	-0.11
	- 200	0.79	-0.91
Channel Y	200	1.95	0.12
	- 200	-0.90	-1.27
Channel Z	200	1.15	1.74
	- 200	-4.83	-4.14

3. Channel separation

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

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	-2.05	-3.29
Channel Y	200	9.27	-	-0.65
Channel Z	200	4.64	6.39	-

Certificate No: DAE4-546_Aug19 Page 4 of 5

4. AD-Converter Values with inputs shorted

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

	High Range (LSB)	Low Range (LSB)
Channel X	15840	15900
Channel Y	16134	12789
Channel Z	15911	16644

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	1.16	0.11	3.01	0.45
Channel Y	0.12	-0.83	1.50	0.46
Channel Z	-0.42	-1.81	0.51	0.42

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

8. Low Battery Alarm Voltage (Typical values for information)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	-0.01	-8	-9

Certificate No: DAE4-546_Aug19 Page 5 of 5

ES3DV3

Calibration Laboratory of
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **SRTC (Auden)**

Certificate No: **ES3-3127_Aug19**

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3127

Calibration procedure(s): QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v7
Calibration procedure for dosimetric E-field probes

Calibration date: August 27, 2019

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 (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	03-Apr-19 (No. 217-02892/02893)	Apr-20
Power sensor NRP-Z91	SN: 103244	03-Apr-19 (No. 217-02892)	Apr-20
Power sensor NRP-Z91	SN: 103245	03-Apr-19 (No. 217-02893)	Apr-20
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-19 (No. 217-02894)	Apr-20
DAE4	SN: 660	19-Dec-18 (No. DAE4-660_Dec18)	Dec-19
Reference Probe ES3DV2	SN: 3013	31-Dec-18 (No. ES3-3013_Dec18)	Dec-19
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-18)	In house check: Jun-20
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

	Name	Function	Signature
Calibrated by	Manu Seitz	Laboratory Technician	
Approved by	Katja Pokovic	Technical Manager	

Issued: August 29, 2019

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Certificate No: ES3-3127_Aug19 Page 1 of 9

Sn:3127

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Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, ", "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy):* in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset:* The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle:* The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

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]	1.26	1.23	1.19	± 10.1 %
DCP (mV)[B]	103.2	103.9	103.8	

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB$\sqrt{\mu V}$	C	D dB	VR mV	Max dev.	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	216.9	±3.5 %	± 4.7 %
		Y	0.0	0.0	1.0		214.8		
		Y	0.0	0.0	1.0		213.3		

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 E^2-field uncertainty inside TSL (see Page 5).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-19
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

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

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
750	41.9	0.89	6.34	6.34	6.34	0.80	1.25	± 12.0 %
835	41.5	0.90	6.20	6.20	6.20	0.42	1.61	± 12.0 %
1810	40.0	1.40	5.10	5.10	5.10	0.70	1.20	± 12.0 %
2000	40.0	1.40	5.02	5.02	5.02	0.69	1.27	± 12.0 %
2300	39.5	1.67	4.68	4.68	4.68	0.63	1.38	± 12.0 %
2450	39.2	1.80	4.50	4.50	4.50	0.67	1.37	± 12.0 %
2600	39.0	1.96	4.32	4.32	4.32	0.70	1.35	± 12.0 %

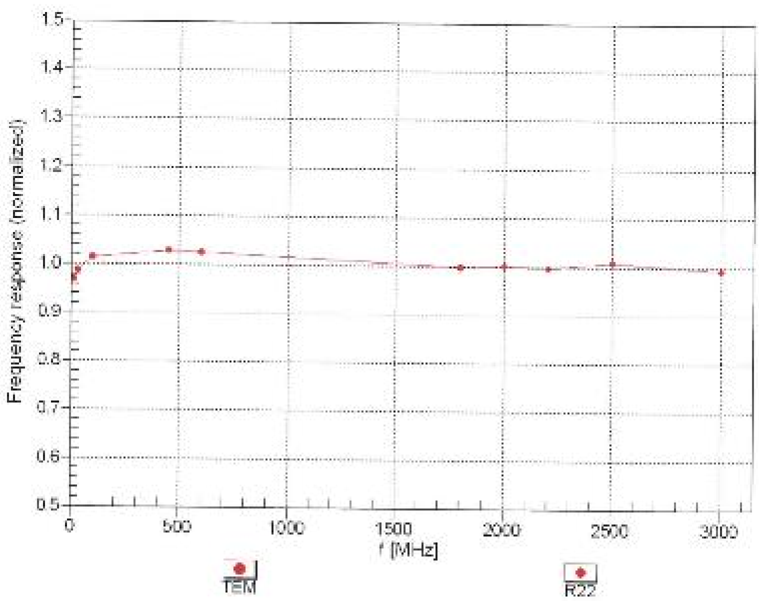
[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

ES3DV3– SN:3127

August 27, 2019

Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Certificate No: ES3-3127_Aug19

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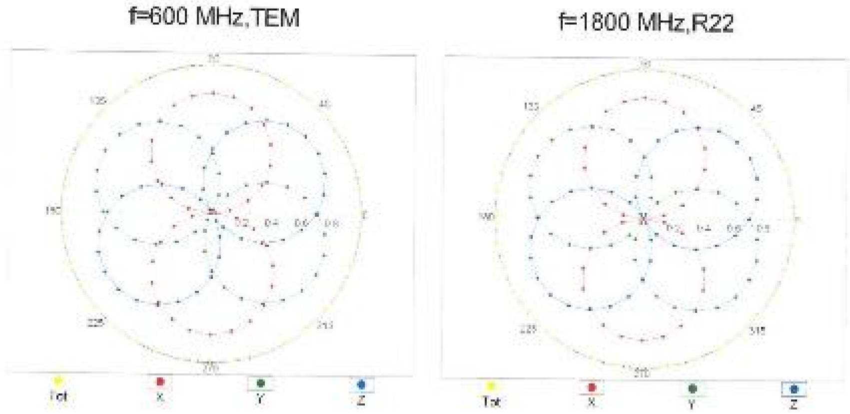
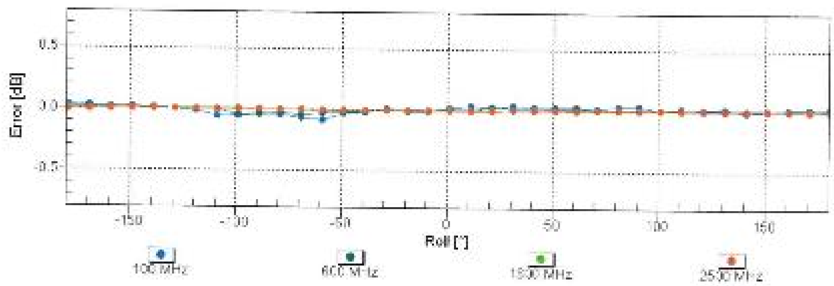
Receiving Pattern (ϕ), $\vartheta = 0°$



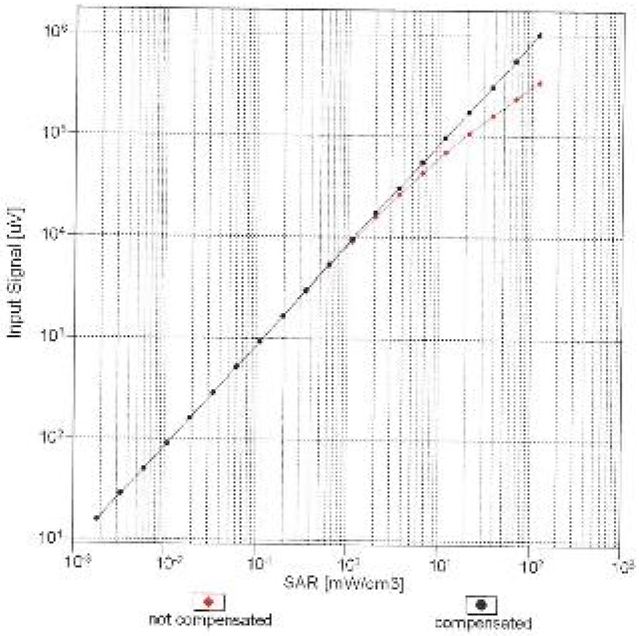


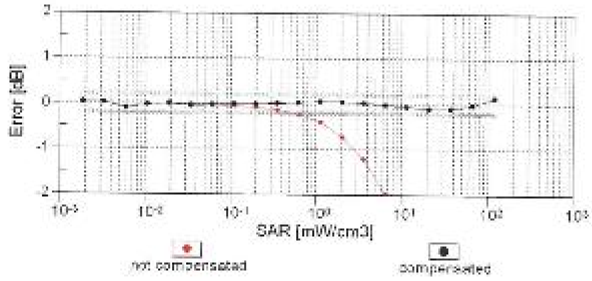
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

ES3DV3– SN:3127

August 27, 2019

Dynamic Range f(SAR_{head})
(TEM cell , f_{eval}= 1900 MHz)



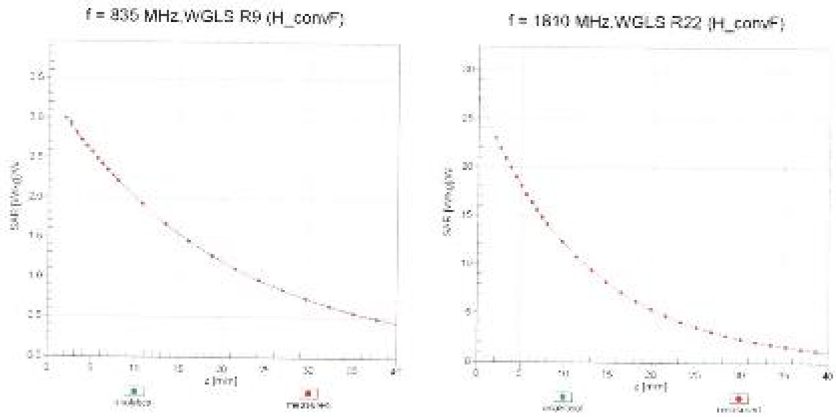


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

ES3DV3– SN:3127

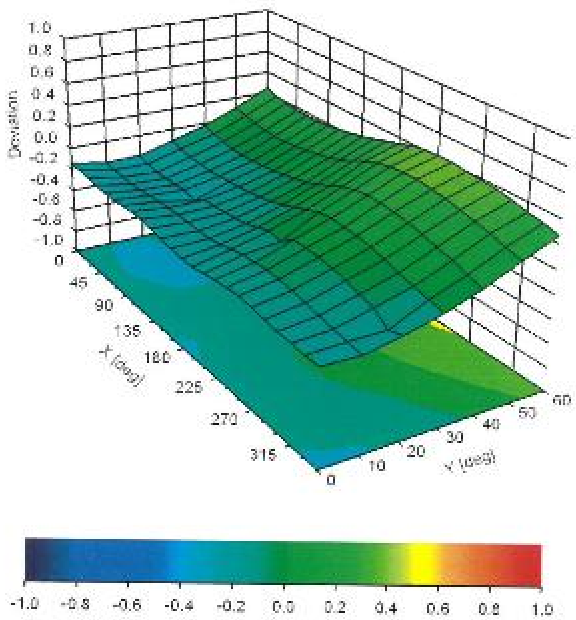
August 27, 2019

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (φ, θ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

Certificate No: ES3-3127_Aug19

Page 9 of 9

D835V2

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Client SRTC | Certificate No: Z17-97135

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 4d023
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(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter 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
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.J17X00285)	Jan-18

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

Issued: September 16, 2017

Sn:4d0232

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E-mail: cttl@chinattl.com http://www.chinattl.cn

Glossary:

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

Calibration is Performed According to the Following Standards:

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) KDB865664, 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%.

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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	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.3 ± 6 %	0.90 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	2.35 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**9.37 mW /g ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.52 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**6.06 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	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.7 ± 6 %	0.96 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	2.34 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**9.47 mW /g ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.53 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**6.17 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	51.0Ω- 2.79jΩ
Return Loss	- 30.7dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.8Ω- 3.61jΩ
Return Loss	- 25.8dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.495 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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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: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: f = 835 MHz; σ = 0.903 S/m; ε_r = 41.34; ρ = 1000 kg/m^3

Phantom section: Left Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7433; ConvF(9.82, 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)

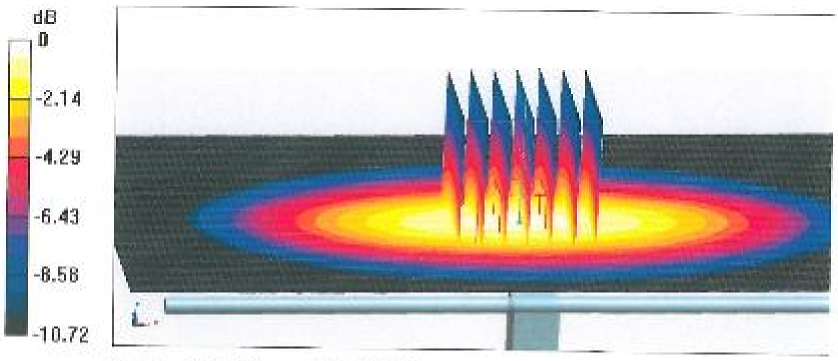
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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



0 dB = 3.21 W/kg = 5.07 dBW/kg

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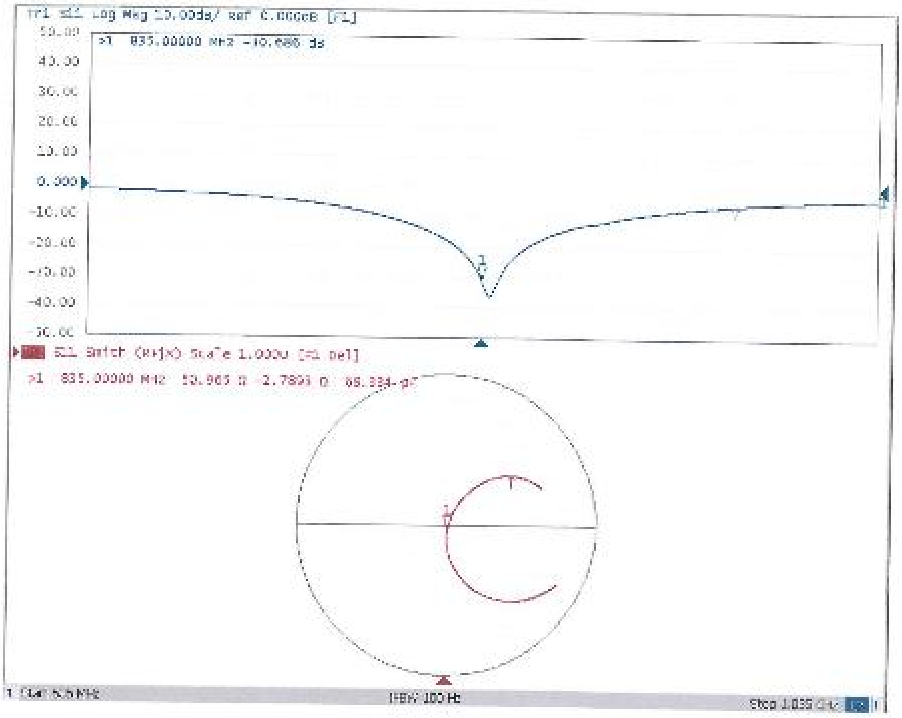
Impedance Measurement Plot for Head TSL



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

Medium parameters used: f = 835 MHz; σ = 0.958 S/m; ε_r = 55.68; ρ = 1000 kg/m^3

Phantom section: Center Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN7433; ConvF(9.5,9.5, 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)

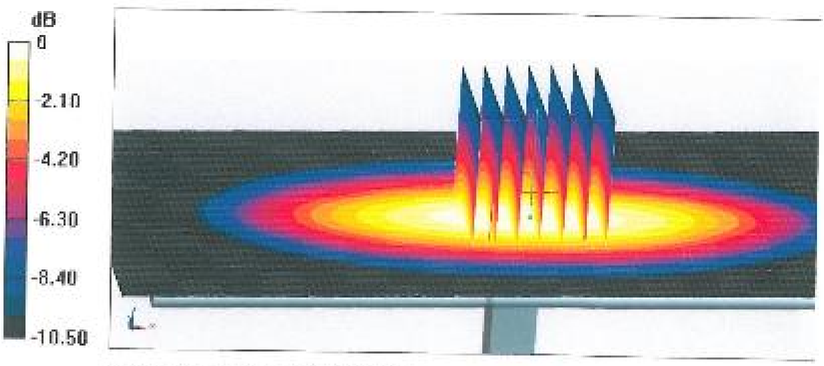
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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



0 dB = 3.15 W/kg = 4.98 dBW/kg

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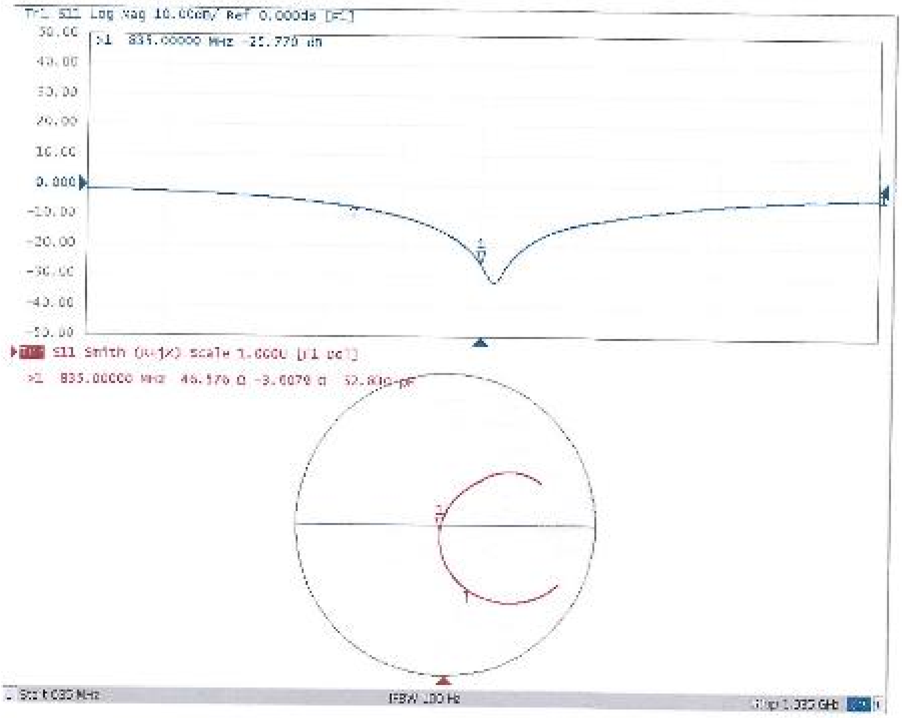
Impedance Measurement Plot for Body TSL



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D1800V2

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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(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	102196	02-Mar-17 (CTTL, No.J17X01254)	Mar-18
Power sensor NRP-Z91	100596	02-Mar-17 (CTTL, No.J17X01254)	Mar-18
Reference Probe EX3DV4	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.J17X00285)	Jan-18

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

Issued: September 18, 2017

Sn:2d084

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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, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
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) KDB865664, 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%.

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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	1900 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- 1.55jΩ
Return Loss	- 35.4dB

Antenna Parameters with Body TSL

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

General Antenna Parameters and Design

Electrical Delay (one direction)	1.316 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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DASY5 Validation Report for Head TSL

Date: 09.15.2017

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN: 2d084

Communication System: UID 0, CW; Frequency: 1800 MHz; Duty Cycle: 1:1

Medium parameters used: f = 1800 MHz; σ = 1.423 S/m; εr = 40.37; ρ = 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)

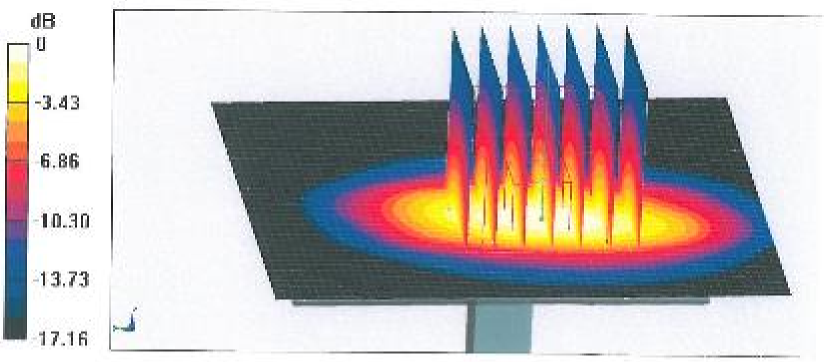
System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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



0 dB = 15.5 W/kg = 11.90 dBW/kg

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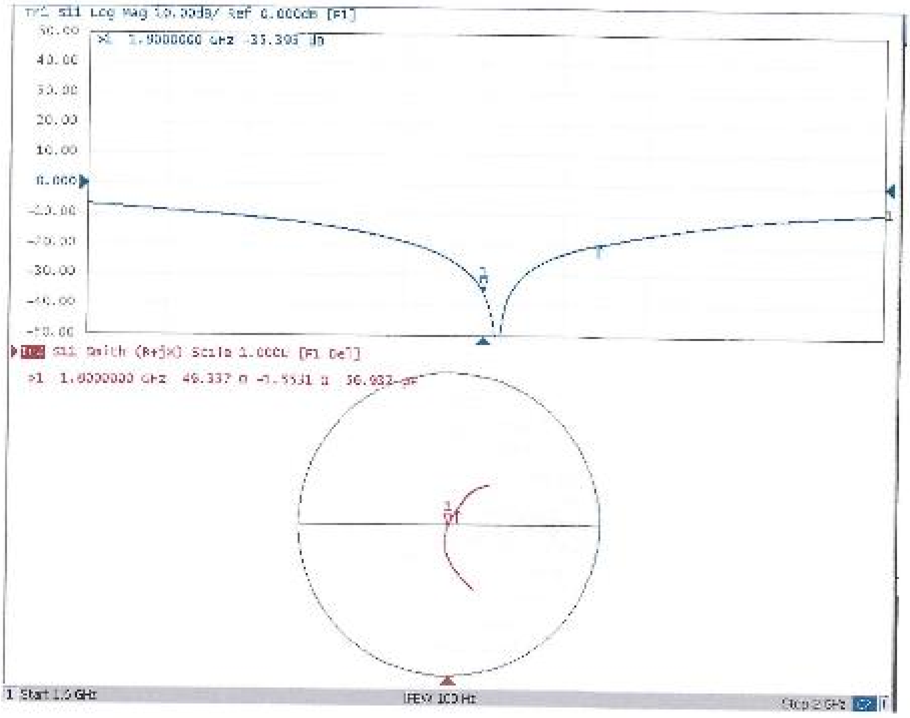
Impedance Measurement Plot for Head TSL



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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: UID 0, CW; Frequency: 1800 MHz; Duty Cycle: 1:1

Medium parameters used: f = 1800 MHz; σ = 1.503 S/m; ε_r = 53.79; ρ = 1000 kg/m^3

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)

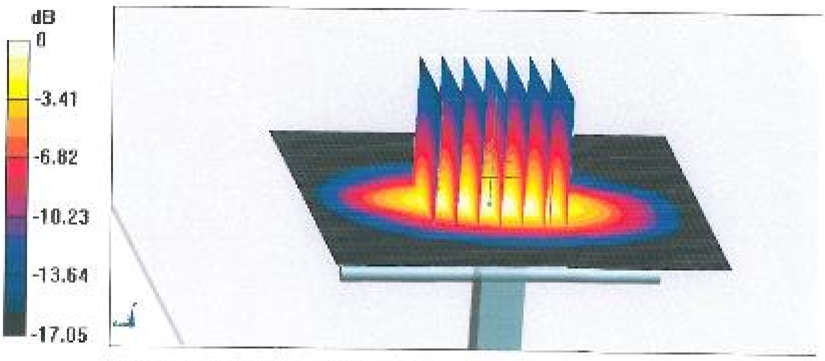
System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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



0 dB = 15.2 W/kg = 11.82 dBW/kg

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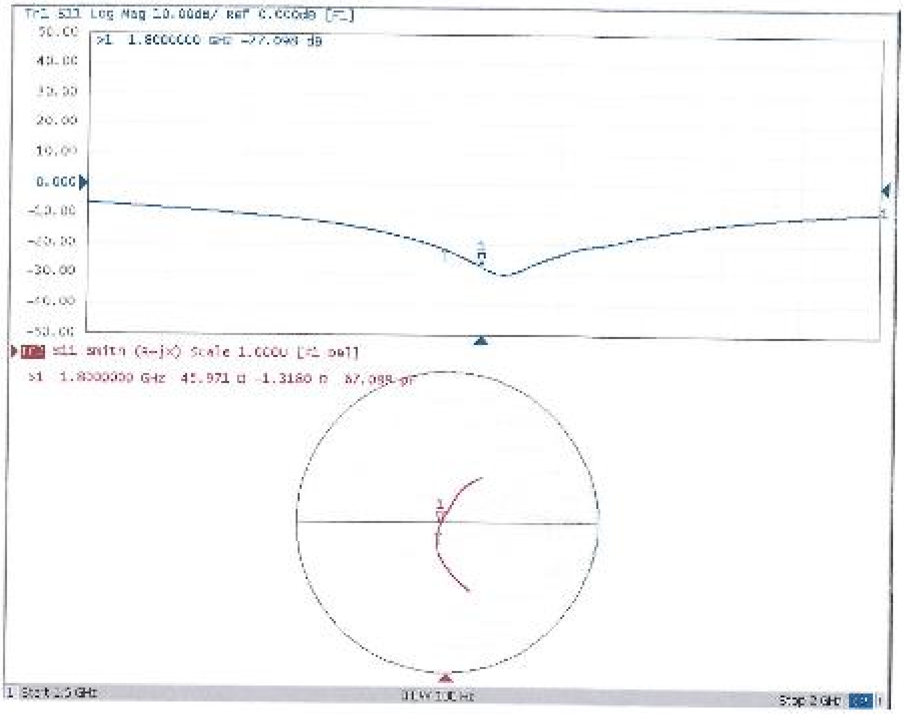
Impedance Measurement Plot for Body TSL



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D2000V2

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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)℃ 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 7464	12-Sep-17(SPEAG,No.EX3-7464_Sep17)	Sep-18
DAE4	SN 1525	02-Oct-17(SPEAG,No.DAE4-1525_Oct17)	Oct-18
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	23-Jan-18 (CTTL, No.J18X00560)	Jan-19
Network Analyzer E5071C	MY46110673	24-Jan-18 (CTTL, No.J18X00561)	Jan-19

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

Issued: February 4, 2018

Sn:1009

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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 (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) KDB865664, 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%.

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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	**20.5 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	**20.4 mW /g ± 18.7 % (k=2)**

Certificate No: Z18-97021 Page 3 of 8

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.8Ω- 2.08jΩ
Return Loss	- 33.6dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.3Ω- 1.63jΩ
Return Loss	- 27.6dB

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

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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; σ = 1.416 S/m; εr = 38.89; ρ = 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)

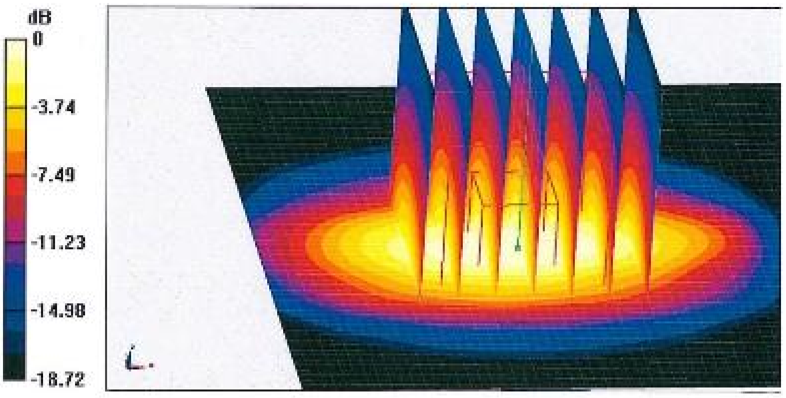
System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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



0 dB = 16.2 W/kg = 12.10 dBW/kg

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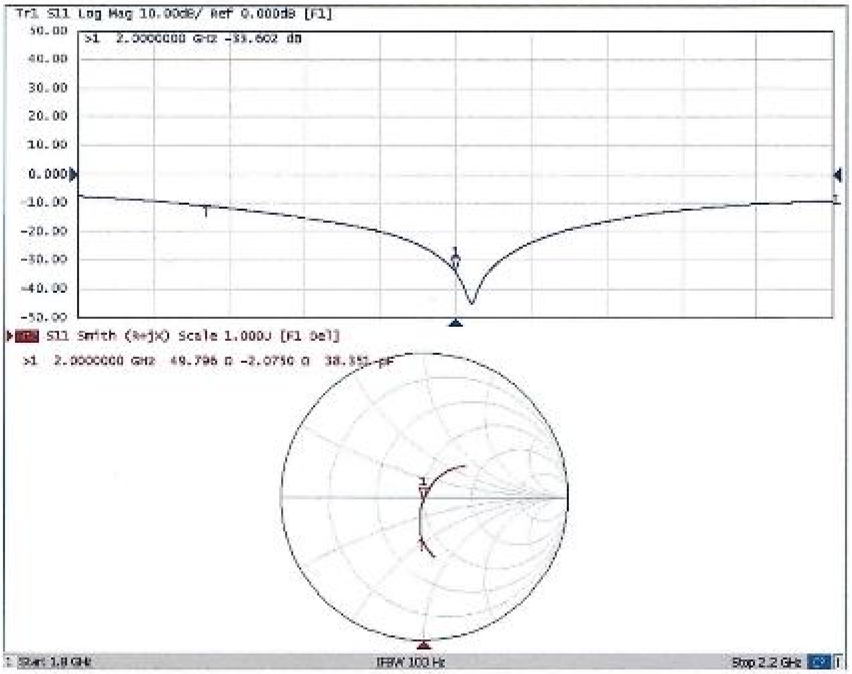
Impedance Measurement Plot for Head TSL



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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; σ = 1.564 S/m; ε_r = 51.83; ρ = 1000 kg/m^3

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)

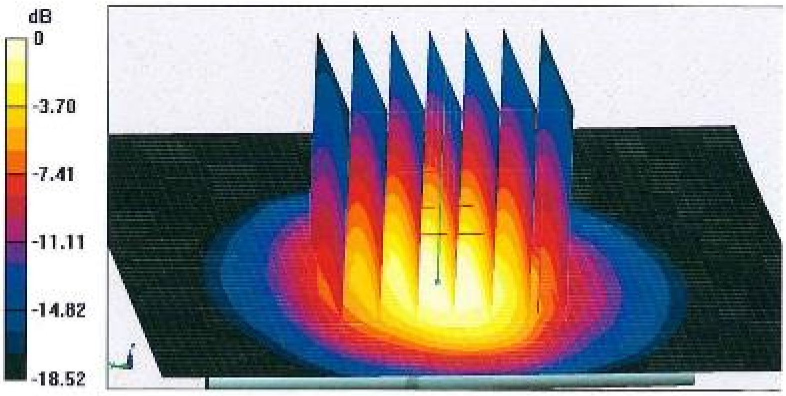
System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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



0 dB = 16.3 W/kg = 12.12 dBW/kg

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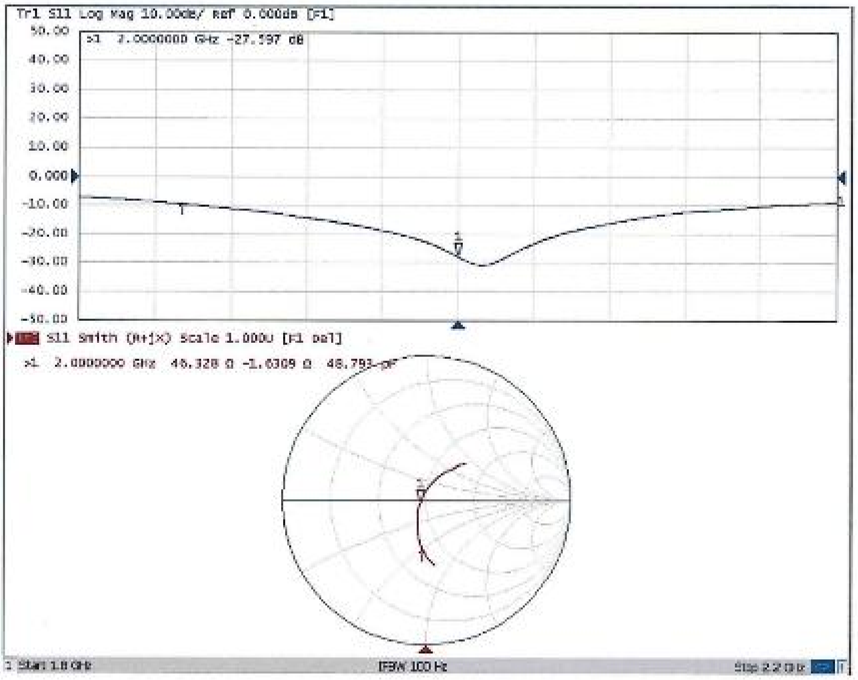
Impedance Measurement Plot for Body TSL



D2450V2

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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)℃ 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
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.J17X00285)	Jan-18

	Name	Function	Signature
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

Sn:738

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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 (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) KDB865664, 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%.

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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)**

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.3Ω+ 5.92jΩ
Return Loss	- 24.5dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.6Ω+ 6.39jΩ
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

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DASY5 Validation Report for Head TSL

Date: 09.18.2017

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; σ = 1.788 S/m; εr = 38.67; ρ = 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)

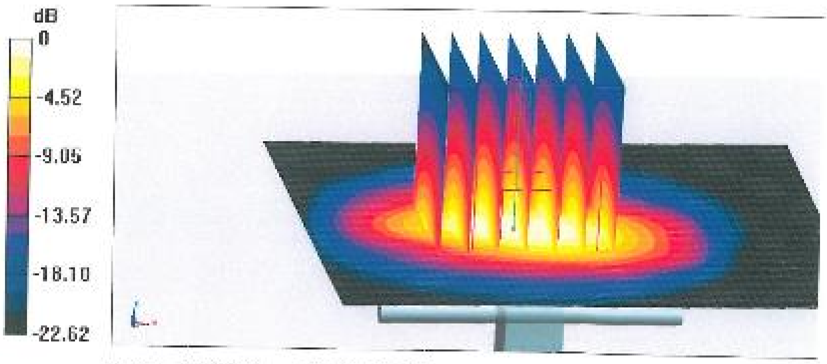
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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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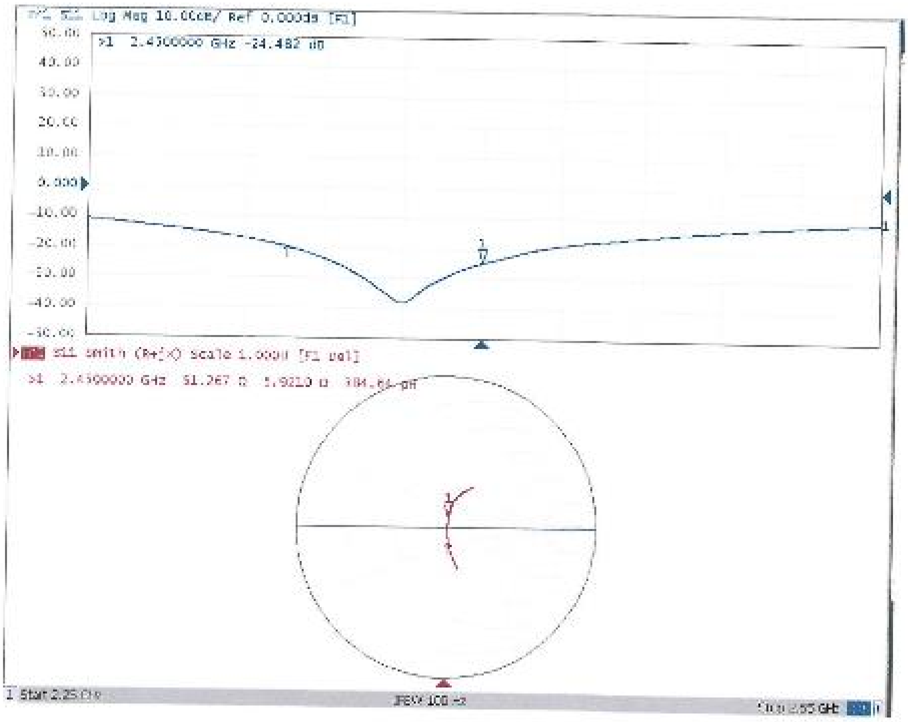
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL Date: 09.18.2017

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; σ = 1.983 S/m; ε_r = 52.51; ρ = 1000 kg/m^3

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)

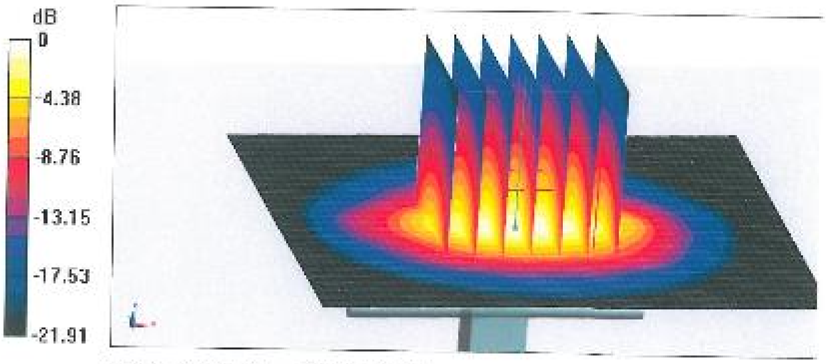
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

Certificate No: Z17-97140 Page 7 of 8

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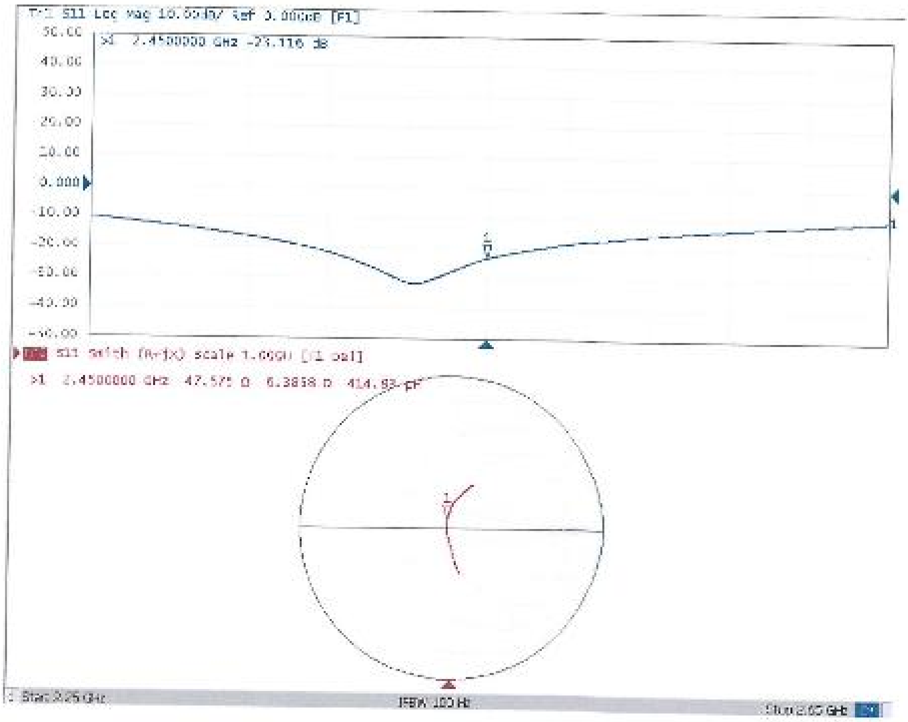
Impedance Measurement Plot for Body TSL



--End of the test report--