TESTING (OR CALIBRATION)
NVLAP LAB CODE 600141-0

Registration No.788871

TEST REPORT

FOR SAR TESTING

Report No.: SRTC2019-9004(F)-19042601(H)

Product Name: LTE Ufi

Product Model: MF971V

Applicant: ZTE Corporation

Manufacturer: ZTE Corporation

Specification: Part 2.1093

IEEE Std 1528

KDB Procedures

FCC ID: SRQ-ZTE-MF971V

The State Radio_monitoring_center Testing Center (SRTC)

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Contents

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

Company:	The State Radio_monitoring_center Testing Center (SRTC)
Address:	15th Building, No.30 Shixing Street, Shijingshan District, Beijing P.R.China
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1.3 Applicant's details

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1.4 Manufacturer's details

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City:	Shenzhen
Country or Region:	China
Contacted person:	Yang Zhao
Tel:	029-83600770
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Email:	zhao.yangxa@zte.com.cn

1.5 Test Environment

Date of Receipt of test sample at SRTC:	2019.04.27
Testing Start Date:	2019.05.04
Testing End Date:	2019.05.09

Environmental Data:	Temperature (°C)	Humidity (%)
Ambient	21-23	40-45

Normal Supply Voltage (Vdc.):	3.8

2. DESCRIPTION OF THE DEVICE UNDER TEST

2.1 Final Equipment Build Status

Wireless Technology and Frequency Bands	☒GSM Band: GSM850/PCS1900 ☒WCDMA Band: FDDII /V ☒LTE Band: 2/4/5/7/38 ☐Bluetooth Band: 2.4GHz ☒Wi-Fi Band: 2.4GHz/5GHz UNII-1
Mode	GSM ☐Voice (GMSK) ☒GPRS (GMSK) ☒EGPRS (GMSK) WCDMA ☒UMTS Rel. 99 (Voice & Data) ☒HSDPA (Rel. 5) ☒HSUPA (Rel. 6) ☒HSPA+ (Rel.) ☒DC-HSDPA (Rel.) LTE ☒QPSK ☒16QAM ☒64QAM Wi-Fi 2.4GHz ☒802.11b ☒802.11g ☒802.11n (20MHz/40MHz) 5GHz ☒802.11a ☒802.11ac ☒802.11n (20MHz/40MHz/80MHz)
Duty Cycle	GSM Voice: 12.5%; GPRS: 12.5% (1 Slot), 25% (2 Slots), 37.5% (3 Slots), 50% (4 Slots) WCDMA: 100% Wi-Fi 2.4GHz: 802.11b: 98.9%/11g: 96.7%/11n20: 95.3%/11n40: 93.8% Wi-Fi 5GHz: 11a:95.72%/11n20:95.52%/11n40:91.94%/11ac20:94.93%/11ac40:91.47/11ac80:83.88%
GPRS/EGPRS Multi-Slot Class	GPRS ☐Class 8 - One Up ☒Class 10 - Two Up ☐Class 12 - Four Up EGPRS ☐Class 8 - One Up ☐Class 10 - Two Up ☒Class 12 - 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 (Dual Transfer Mode)	Not Supported

2.2 Support Equipment

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

State of sample	Normal
Headset	N/A
Battery	Li3823T43P3h715345 / Zhongshan Tianmao Battery Co., Ltd.
H/W Version	dqaA
S/W Version	BD_MF971VV1.0.0B01
IMEI	869626021439288
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	2018	Radiofrequency radiation exposure evaluation: portable devices.
IEEE Std 1528	2013	IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
IEEE Std 1528a	2005	IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques Amendment 1: CAD File for Human Head Model (SAM Phantom)
KDB 447498 D01	v06	General RF Exposure Guidance
KDB 648474 D04	v01r03	Handset SAR
KDB 941225 D01	v03r01	3G SAR Procedures
KDB 248227 D01	v02r02	SAR GUIDANCE FOR IEEE 802.11 (Wi-Fi) TRANSMITTERS
KDB 865664 D01	v01r04	SAR Measurement from 100 MHz to 6 GHz
KDB 865664 D02	v01r02	RF Exposure Reporting
KDB 941225 D05	v02r05	SAR for LTE Devices

4. TEST CONDITIONS

4.1 Picture to demonstrate the required liquid depth

The liquid depth in the used SAM phantoms

Liquid depth for SAR Measurement

4.2 Test Signal, Frequencies and Output Power

The device was put into operation by using a call tester. Communication between the device and the call tester was established by air link.
The device output power was set to maximum power level for all tests; a fully charged battery was used for every test sequence.
In all operating bands the measurements were performed on middle channel, and few of them were also performed on lowest and highest channels.

4.3 SAR Measurement Set-up

The system is based on a high precision robot (working range greater than 0.9m), which positions the probes with a positional repeatability of better than ± 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 - 2013.
System checking was performed using the flat section, whilst Head SAR tests used the left and right head profile sections. Body SAR testing also used the flat section between the head profiles.
The SPEAG device holder (see Section 5.1) was used to position the device in all tests whilst a tripod was used to position the validation dipoles against the flat section of phantom.

4.5 Tissue Simulants

Recommended values for the dielectric parameters of the tissue simulants are given in IEEE 1528 - 2013 and FCC Supplement C to OET Bulletin 65. All tests were carried out using simulants whose dielectric parameters were within ± 5% of the recommended values. All tests were carried out within 24 hours of measuring the dielectric parameters.
The depth of the tissue simulant was 15.0 ± 0.5 cm measured from the ear reference point during system checking and device measurements.

4.5.1 Tissue Stimulant Recipes

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

Name	Broadband tissue-equivalent liquid
Type for Head	HBBL600-6000V6 Head Simulating Liquid
Type for Body	MBBL600-6000V6 Body Simulating Liquid

4.6 DESCRIPTION OF THE TEST PROCEDURE

4.6.1 Device Holder

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

Device holder supplied by SPEAG

4.6.2 Test positions

4.6.2.1 Against Phantom Head

Measurements were made in “cheek” and “tilt” positions on both the left hand and right-hand sides of the phantom.
The positions used in the measurements were according to IEEE 1528 - 2013 "IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques".

4.6.2.2 Body Worn Configuration

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

4.6.3 Scan Procedure

First, area scans were used for determination of the field distribution and the approximate location of the local peak SAR values. The SAR distribution is scanned along the inside surface, at least for an area larger than the projection of the handset and antenna. The angle between the probe axis and the surface normal line is recommended but not required to be less than 30°. The SAR distribution is first measured on a 2-D coarse grid. The scan region should cover all areas that are exposed and encompassed by the projection of the handset. There are 15 mm × 15 mm (equal or less than 2GHz), 12 mm × 12 mm (from 2GHz~3GHz) and 10mm x 10mm (above 5GHz) measurement grid used when two staggered one-dimensional cubic splines are used to estimate the maximum SAR location. Next, a zoom scan, a minimum of 7 x 7x7 points covering a volume of at least 30x30x30mm, was performed around the highest E-field value to determine the averaged SAR value. Drift was determined by measuring the same point at the start of the area scan and again at the end of the zoom scan.

4.6.4 SAR Averaging Methods

The maximum SAR value was averaged over a cube of tissue using interpolation and extrapolation.
The interpolation, extrapolation and maximum search routines within DASY5 are all based on the modified Quadratic Shepard’s method (Robert J. Renka, Multivariate Interpolation of Large Sets of Scattered Data”, University of North Texas ACM Transactions on Mathematical Software, vol. 14, no. 2, June 1988, pp. 139-148).
The interpolation scheme combines a least-square fitted function method with a weighted average method. A triradiate 3-D / bivariate 2-D quadratic function is computed for each measurement point and fitted to neighboring points by a least-square method. For the zoom scan, inverse distance weighting is incorporated to fit distant points more accurately. The interpolating function is finally calculated as a weighted average of the quadratics.
In the zoom scan, the interpolation function is used to extrapolate the Peak SAR from the deepest measurement points to the inner surface of the phantom.

5 RESULT SUMMAR

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

Exposure Position	Frequency Band	1g-SAR Result(W/kg)	Highest 1g-SAR Result(W/kg)		Limit (W/kg)/1g	Result
Body-Worn (10mm Gap)	GSM 850	0.80	1.30	1.30	1.6	pass
	GSM 1900	0.53				
	WCDMA Band II	1.25				
	WCDMA Band V	0.79				
	LTE Band 2	1.09				
	LTE Band 4	1.12				
	LTE Band 5	0.80				
	LTE Band 7	1.30				
	LTE Band 38	0.59				
	WLAN 2.4GHz ANT1	0.16				
	WLAN 2.4GHz ANT2	0.14				
	WLAN 2.4GHz MIMO	0.20				
	WLAN 5GHz ANT1	0.22				
	WLAN 5GHz ANT2	0.12				
	WLAN 5GHz MIMO	0.15				
Hotspot (10mm Gap)	GSM 850	0.80	1.30			
	GSM 1900	0.53				
	WCDMA Band II	1.25				
	WCDMA Band V	0.79				
	LTE Band 2	1.09				
	LTE Band 4	1.12				
	LTE Band 5	0.80				
	LTE Band 7	1.30				
	LTE Band 38	0.59				
	WLAN 2.4GHz ANT1	0.16				
	WLAN 2.4GHz ANT2	0.15				
	WLAN 2.4GHz MIMO	0.20				
	WLAN 5GHz ANT1	0.22				
	WLAN 5GHz ANT2	0.16				
	WLAN 5GHz MIMO	0.93				

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 (10mm Gap)	GSM & Wi-Fi	1.01	1.52	1.52	1.6	pass
	WCDMA & Wi-Fi	1.47				
	LTE & Wi-Fi	1.52				
hotspot (10mm Gap)	GSM & Wi-Fi(2.4G/5G)	1.19	1.52			
	WCDMA & Wi-Fi(2.4G/5G)	1.50				
	LTE & Wi-Fi(2.4G/5G)	1.52				

This Test Report Is Issued by: Mr. Peng Zhen	Checked by: Mr. Li Bin
Tested by: Miss. Wu Han	Issued date: 20190521

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)	26.0~30.0	26.0~30.0	26.0~30.0
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)	26.0~30.0	26.0~30.0	26.0~30.0
3 Txslot	Tolerance (dBm)	25.0~29.0	25.0~29.0	25.0~29.0
4 Txslot	Tolerance (dBm)	24.0~28.0	24.0~28.0	24.0~28.0
GSM 850 EGPRS(8PSK)				
Channel		128	189	251
1 Txslot	Tolerance (dBm)	23.0~27.0	23.0~27.0	23.0~27.0
2 Txslot	Tolerance (dBm)	21.0~25.0	21.0~25.0	21.0~25.0
3 Txslot	Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0
4 Txslot	Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0

GSM 1900 GPRS				
Channel		512	661	810
1 Txslot	Tolerance (dBm)	26.5~30.5	26.5~30.5	26.5~30.5
2 Txslot	Tolerance (dBm)	24.5~28.5	24.5~28.5	24.5~28.5
GSM 1900 EGPRS(GMSK)				
Channel		512	661	810
1 Txslot	Tolerance (dBm)	26.5~30.5	26.5~30.5	26.5~30.5
2 Txslot	Tolerance (dBm)	24.5~28.5	24.5~28.5	24.5~28.5
3 Txslot	Tolerance (dBm)	22.5~26.5	22.5~26.5	22.5~26.5
4 Txslot	Tolerance (dBm)	21.0~25.0	21.0~25.0	21.0~25.0
GSM 1900 EGPRS(8PSK)				
Channel		512	661	810
1 Txslot	Tolerance (dBm)	23.0~27.0	23.0~27.0	23.0~27.0
2 Txslot	Tolerance (dBm)	20.5~24.5	20.5~24.5	20.5~24.5
3 Txslot	Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0
4 Txslot	Tolerance (dBm)	17.5~21.5	17.5~21.5	17.5~21.5

WCDMA

WCDMA Band II			
Channel	9262	9400	9538
Tolerance (dBm)	20.0~24.0	20.0~24.0	20.0~24.0
WCDMA Band V			
Channel	4132	4183	4233
Tolerance (dBm)	20.5~24.5	20.5~24.5	20.5~24.5

HSDPA Band II				
Channel		9262	9400	9538
Sub test 1	Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5
Sub test 2	Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5
Sub test 3	Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5
Sub test 4	Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5
HSDPA Band V				
Channel		4132	4183	4233
Sub test 1	Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5
Sub test 2	Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5
Sub test 3	Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5
Sub test 4	Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5

HSUPA Band II				
Channel		9262	9400	9538
Sub test 1	Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5
Sub test 2	Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5
Sub test 3	Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5
Sub test 4	Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5
Sub test 5	Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5
HSUPA Band V				
Channel		4132	4183	4233
Sub test 1	Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5
Sub test 2	Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0
Sub test 3	Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5
Sub test 4	Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0
Sub test 5	Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0

HSPA+ Band II				
Channel		9262	9400	9538
QPSK	Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0
16QAM	Tolerance (dBm)	17.5~21.5	17.5~21.5	17.5~21.5
HSPA+ Band V				
Channel		4132	4183	4233
QPSK	Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0
16QAM	Tolerance (dBm)	17.5~21.5	17.5~21.5	17.5~21.5

DC-HSDPA Band II				
Channel		9262	9400	9538
Sub test 1	Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0
Sub test 2	Tolerance (dBm)	17.5~21.5	17.5~21.5	17.5~21.5
Sub test 3	Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0
Sub test 4	Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5
DC-HSDPA Band V				
Channel		4132	4183	4233
Sub test 1	Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5
Sub test 2	Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5
Sub test 3	Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0
Sub test 4	Tolerance (dBm)	18.0~22.0	18.0~22.0	18.0~22.0

LTE

Band 2

QPSK

20BW 1RB			
Channel	Channel 18700	Channel 18900	Channel 19100
Tolerance (dBm)	20.5~24.5	20.5~24.5	20.5~24.5
20BW 50%RB			
Channel	Channel 18700	Channel 18900	Channel 19100
Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0
20BW 100%RB			
Channel	Channel 18700	Channel 18900	Channel 19100
Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0

16QAM

20BW 1RB			
Channel	Channel 18700	Channel 18900	Channel 19100
Tolerance (dBm)	20.5~24.5	20.5~24.5	20.5~24.5
20BW 50%RB			
Channel	Channel 18700	Channel 18900	Channel 19100
Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0
20BW 100%RB			
Channel	Channel 18700	Channel 18900	Channel 19100
Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0

64QAM

20BW 1RB			
Channel	Channel 18700	Channel 18900	Channel 19100
Tolerance (dBm)	20.5~24.5	20.5~24.5	20.5~24.5
20BW 50%RB			
Channel	Channel 18700	Channel 18900	Channel 19100
Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0
20BW 100%RB			
Channel	Channel 18700	Channel 18900	Channel 19100
Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0

Band 4
QPSK

20BW 1RB			
Channel	Channel 20050	Channel 20175	Channel 20300
Tolerance (dBm)	20.0~24.0	20.0~24.0	20.0~24.0
20BW 50%RB			
Channel	Channel 20050	Channel 20175	Channel 20300
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5
20BW 100%RB			
Channel	Channel 20050	Channel 20175	Channel 20300
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5

16QAM

20BW 1RB			
Channel	Channel 20050	Channel 20175	Channel 20300
Tolerance (dBm)	20.0~24.0	20.0~24.0	20.0~24.0
20BW 50%RB			
Channel	Channel 20050	Channel 20175	Channel 20300
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5
20BW 100%RB			
Channel	Channel 20050	Channel 20175	Channel 20300
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5

64QAM

20BW 1RB			
Channel	Channel 20050	Channel 20175	Channel 20300
Tolerance (dBm)	20.0~24.0	20.0~24.0	20.0~24.0
20BW 50%RB			
Channel	Channel 20050	Channel 20175	Channel 20300
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5
20BW 100%RB			
Channel	Channel 20050	Channel 20175	Channel 20300
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5

Band 5
QPSK

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

16QAM

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

64QAM

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

Band 7

QPSK

20BW 1RB			
Channel	Channel 20850	Channel 21100	Channel 21350
Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5
20BW 50%RB			
Channel	Channel 20850	Channel 21100	Channel 21350
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5
20BW 100%RB			
Channel	Channel 20850	Channel 21100	Channel 21350
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5

16QAM

20BW 1RB			
Channel	Channel 20850	Channel 21100	Channel 21350
Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5
20BW 50%RB			
Channel	Channel 20850	Channel 21100	Channel 21350
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5
20BW 100%RB			
Channel	Channel 20850	Channel 21100	Channel 21350
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5

64QAM

20BW 1RB			
Channel	Channel 20850	Channel 21100	Channel 21350
Tolerance (dBm)	19.5~23.5	19.5~23.5	19.5~23.5
20BW 50%RB			
Channel	Channel 20850	Channel 21100	Channel 21350
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5
20BW 100%RB			
Channel	Channel 20850	Channel 21100	Channel 21350
Tolerance (dBm)	18.5~22.5	18.5~22.5	18.5~22.5

Band 38

QPSK

20BW 1RB			
Channel	Channel 37850	Channel 38000	Channel 38150
Tolerance (dBm)	20.0~24.0	20.0~24.0	20.0~24.0
20BW 50%RB			
Channel	Channel 37850	Channel 38000	Channel 38150
Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0
20BW 100%RB			
Channel	Channel 37850	Channel 38000	Channel 38150
Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0

16QAM

20BW 1RB			
Channel	Channel 37850	Channel 38000	Channel 38150
Tolerance (dBm)	20.0~24.0	20.0~24.0	20.0~24.0
20BW 50%RB			
Channel	Channel 37850	Channel 38000	Channel 38150
Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0
20BW 100%RB			
Channel	Channel 37850	Channel 38000	Channel 38150
Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0

64QAM

20BW 1RB			
Channel	Channel 37850	Channel 38000	Channel 38150
Tolerance (dBm)	20.0~24.0	20.0~24.0	20.0~24.0
20BW 50%RB			
Channel	Channel 37850	Channel 38000	Channel 38150
Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0
20BW 100%RB			
Channel	Channel 37850	Channel 38000	Channel 38150
Tolerance (dBm)	19.0~23.0	19.0~23.0	19.0~23.0

Wi-Fi (2.4GHz)

ANT1

802.11b			
Channel	1	6	11
Tolerance (dBm)	9.5~13.5	9.5~13.5	9.5~13.5
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)	9.5~13.5	9.5~13.5	9.5~13.5
802.11n HT40			
Channel	3	6	9
Tolerance (dBm)	9.0~13.0	9.0~13.0	9.0~13.0

ANT2

802.11b			
Channel	1	6	11
Tolerance (dBm)	10.0~14.0	10.0~14.0	10.0~14.0
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)	10.0~14.0	10.0~14.0	10.0~14.0
802.11n HT40			
Channel	3	6	9
Tolerance (dBm)	9.5~13.5	9.5~13.5	9.5~13.5

MIMO

802.11n HT20			
Channel	1	6	11
Tolerance (dBm)	13.0~17.0	13.0~17.0	13.0~17.0
802.11n HT40			
Channel	3	6	9
Tolerance (dBm)	12.0~16.0	12.0~16.0	12.0~16.0

Wi-Fi (5GHz)

ANT1

802.11a			
Channel	36	40	48
Tolerance (dBm)	6.5~10.5	6.5~10.5	6.5~10.5
802.11n HT20			
Channel	36	40	48
Tolerance (dBm)	7.0~11.0	7.0~11.0	7.0~11.0
802.11ac VHT20			
Channel	36	40	48
Tolerance (dBm)	7.0~11.0	7.0~11.0	7.0~11.0
802.11n HT40			
Channel	38	52	
Tolerance (dBm)	7.0~11.0	7.0~11.0	
802.11ac VHT40			
Channel	38	52	
Tolerance (dBm)	6.5~10.5	6.5~10.5	
802.11ac VHT80			
Channel	42		
Tolerance (dBm)	5.5~9.5		

ANT2

802.11a			
Channel	36	40	48
Tolerance (dBm)	7.0~11.0	7.0~11.0	7.0~11.0
802.11n HT20			
Channel	36	40	48
Tolerance (dBm)	7.5~11.5	7.5~11.5	7.5~11.5
802.11ac VHT20			
Channel	36	40	48
Tolerance (dBm)	7.0~11.0	7.0~11.0	7.0~11.0
802.11n HT40			
Channel	38	52	
Tolerance (dBm)	7.0~11.0	7.0~11.0	
802.11ac VHT40			
Channel	38	52	
Tolerance (dBm)	7.0~11.0	7.0~11.0	
802.11ac VHT80			
Channel	42		
Tolerance (dBm)	6.0~10.0		

MIMO

802.11n HT20			
Channel	36	40	48
Tolerance (dBm)	10.0~14.0	10.0~14.0	10.0~14.0
802.11ac VHT20			
Channel	36	40	48
Tolerance (dBm)	10.0~14.0	10.0~14.0	10.0~14.0
802.11n HT40			
Channel	38	52	
Tolerance (dBm)	10.0~14.0	10.0~14.0	
802.11ac VHT40			
Channel	38	52	
Tolerance (dBm)	9.5~13.5	9.5~13.5	
802.11ac VHT80			
Channel	42		
Tolerance (dBm)	9.0~13.0		

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)	32.06	32.15	32.36	29.61	29.69	30.25
3Downlink2uplinkPower(dBm)	29.52	29.60	29.84	27.22	27.36	28.19

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)	23.03	23.12	23.33	20.58	20.66	21.22
3Downlink2uplinkPower(dBm)	23.50	23.58	23.82	21.20	21.34	22.17

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

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

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

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

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

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

According to the conducted power as above, the body measurements are performed with **2Txslots** (3Downlink2uplink) for GPRS850 and GPRS1900

EGPRS Measured Power

Mode	EGPRS850 (GMSK) / EGPRS850 (8PSK)			EGPRS1900 (GMSK) / EGPRS1900 (8PSK)		
Channel	128	189	251	512	661	810
Frequency(MHz)	824.2	836.4	848.8	1850.2	1880.0	1909.8
4Downlink1uplinkPower(dBm)	32.06	32.15	32.36	29.61	29.69	30.25
	26.73	26.55	26.91	26.27	26.31	26.6
3Downlink2uplinkPower(dBm)	29.52	29.60	29.84	27.22	27.36	28.19
	24.66	24.50	24.78	24.17	24.23	24.48
2Downlink3uplinkPower(dBm)	**28.55**	**28.68**	**28.78**	**25.93**	**26.01**	**26.14**
	22.74	22.70	22.89	22.41	22.44	22.65
1Downlink4uplinkPower(dBm)	27.27	27.44	27.6	24.61	24.75	24.81
	21.34	21.60	21.77	21.01	21.1	21.38

EGPRS Frame Average Power

Mode	EGPRS850 (GMSK) / EGPRS850 (8PSK)			EGPRS1900 (GMSK) / EGPRS1900 (8PSK)		
Channel	128	189	251	512	661	810
Frequency(MHz)	824.2	836.4	848.8	1850.2	1880.0	1909.8
4Downlink1uplinkPower(dBm)	23.03	23.12	23.33	20.58	20.66	21.22
	17.70	17.52	17.88	17.24	17.28	17.57
3Downlink2uplinkPower(dBm)	23.50	23.58	23.82	21.20	21.34	22.17
	18.64	18.48	18.76	18.15	18.21	18.46
2Downlink3uplinkPower(dBm)	**24.29**	**24.42**	**24.52**	**21.67**	**21.75**	**21.88**
	18.48	18.44	18.63	18.15	18.18	18.39
1Downlink4uplinkPower(dBm)	24.26	24.43	24.59	21.60	21.74	21.80
	18.33	18.59	18.76	18.00	18.09	18.37

Division Factors (for Measured Power and Averaged Power):
To average the power, the division factor is as follows:
1TX-slot (4Downlink1uplink) = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB
2TX-slots(3Downlink2uplink) = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB
3TX-slots (2Downlink3uplink) = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB
4TX-slots (1Downlink4uplink) = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB
According to the conducted power as above, the body measurements are performed with **3Txslots** (2Downlink3uplink) for EGPRS850 and EGPRS1900

6.3 WCDMA Measurement result

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

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

Measured Results

Mode	Band II			Band V		
Channel	9262	9400	9538	4132	4183	4233
Frequency (MHz)	1852.4	1880	1907.6	826.4	836.4	846.6
RB test mode1+64kRMC(dBm)	23.46	23.43	23.49	23.43	23.41	23.40
RB test mode1+12.2kRMC(dBm)	**23.63**	**23.56**	**23.68**	**23.94**	**23.84**	**24.07**
RB test mode1+144kRMC(dBm)	23.44	23.41	23.48	23.44	23.45	23.41
RB test mode1+384kRMC(dBm)	23.47	23.40	23.46	23.43	23.41	23.40

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

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	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: $\triangle_{ACK}$, Δ_{NACK} and Δ_{CQI} =8⇔ $A_{hs}=\beta_{hs}/\beta_c=30/15 \Leftrightarrow \beta_{hs}=30/15*\beta_c$.
Note2:CM=1 for β_c/β_d=12/15, β_{hs}/β_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 β_c=11/15 and β_d=15/15.

Measured Results

Mode	HSDPA Band II			HSDPA Band V		
Channel	9262	9400	9538	4132	4183	4233
Frequency (MHz)	1852.4	1880	1907.6	826.4	836.4	846.6
sub-test1(dBm)	23.34	23.36	23.35	23.11	23.13	23.15
sub-test2(dBm)	23.44	23.41	23.42	23.17	23.09	23.12
sub-test3(dBm)	23.37	23.36	23.35	23.10	23.13	23.12
sub-test4(dBm)	23.34	23.32	23.35	23.15	23.14	23.17

HSUPA

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

Sub-test	β_c	β_d	β_d (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: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} =8⇔A_{hs}=β_{hs}/β_c=30/15⇔β_{hs}=30/15*β_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

Mode	HSUPA Band II			HSUPA Band V		
Channel	9262	9400	9538	4132	4183	4233
Frequency (MHz)	1852.4	1880	1907.6	826.4	836.4	846.6
sub-test1(dBm)	23.33	23.32	23.33	22.98	22.97	23.01
sub-test2(dBm)	23.31	23.34	23.35	22.93	22.97	22.94
sub-test3(dBm)	23.38	23.41	23.43	22.99	23.01	22.96
sub-test4(dBm)	23.34	23.3	23.28	22.93	22.95	22.97
sub-test5(dBm)	23.27	23.25	23.33	22.95	22.96	22.98

HSPA+

Sub-test	β_c (Note3)	β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (2xSF2) (Note 4)	β_{ed} (2xSF4) (Note 4)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 4)	E-TFCI (Note 5)	E-TFCI (boost)
1	1	0	30/15	30/15	β_{ed}1: 30/15 β_{ed}2: 30/15	β_{ed}3: 24/15 β_{ed}4: 24/15	3.5	2.5	14	105	105

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c.
Note 2: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0).
Note 3: DPDCH is not configured, therefore the β_c is set to 1 and β_d = 0 by default.
Note 4: β_{ed} can not be set directly; it is set by Absolute Grant Value.
Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signaled to use the extrapolation algorithm.

Mode		WCDMA band II		
		Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
HSPA+	QPSK	1852.4	9262	22.62
		1880.0	9400	22.61
		1907.6	9538	22.64
	16QAM	1852.4	9262	21.38
		1880.0	9400	21.32
		1907.6	9538	21.29
DC-HSDPA	Subtest 1	1852.4	9262	22.50
		1880.0	9400	22.34
		1907.6	9538	21.81
	Subtest 2	1852.4	9262	22.53
		1880.0	9400	22.17
		1907.6	9538	22.12
	Subtest 3	1852.4	9262	22.50
		1880.0	9400	22.34
		1907.6	9538	22.12
	Subtest 4	1852.4	9262	21.73
		1880.0	9400	21.95
		1907.6	9538	22.16

Mode		WCDMA band V		
		Carrier frequency (MHz)	Channel No.	RF Power Output (dBm)
HSPA+	QPSK	826.4	4132	22.32
		836.6	4183	22.35
		846.6	4233	22.34
	16QAM	826.4	4132	21.03
		836.6	4183	21.07
		846.6	4233	21.05
DC-HSDPA	Subtest 1	826.4	4132	22.21
		836.6	4183	22.22
		846.6	4233	21.46
	Subtest 2	826.4	4132	21.82
		836.6	4183	22.23
		846.6	4233	21.62
	Subtest 3	826.4	4132	21.60
		836.6	4183	21.69
		846.6	4233	21.99
	Subtest 4	826.4	4132	21.66
		836.6	4183	21.64
		846.6	4233	21.46

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

6.4 LTE Measurement result

LTE2

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1850.7	18607	1.4	1	0	24.06
				1	5	24.10
				3	2	22.65
				6	0	22.62
	1880	18900		1	0	23.92
				1	5	23.93
				3	2	22.47
				6	0	22.41
	1909.3	19193		1	0	23.90
				1	5	23.92
				3	2	22.58
				6	0	22.50
16QAM	1850.7	18607	1.4	1	0	23.04
				1	5	23.08
				3	2	21.75
				6	0	21.49
	1880	18900		1	0	23.11
				1	5	23.08
				3	2	21.45
				6	0	21.34
	1909.3	19193		1	0	23.00
				1	5	23.01
				3	2	21.48
				6	0	21.45
64QAM	1850.7	18607	1.4	1	0	23.01
				1	5	23.04
				3	2	21.56
				6	0	21.51
	1880	18900		1	0	23.06
				1	5	23.10
				3	2	21.57
				6	0	21.47
	1909.3	19193		1	0	22.93
				1	5	22.97
				3	2	21.46
				6	0	21.41

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1851.5	18615	3	1	0	24.10
				1	14	24.05
				8	4	22.58
				15	0	22.58
	1880	18900		1	0	23.97
				1	14	23.95
				8	4	22.49
				15	0	22.46
	1908.5	19185		1	0	23.94
				1	14	23.85
				8	4	22.54
				15	0	22.51
16QAM	1851.5	18615	3	1	0	23.02
				1	14	23.05
				8	4	21.76
				15	0	21.56
	1880	18900		1	0	23.04
				1	14	23.10
				8	4	21.42
				15	0	21.37
	1908.5	19185		1	0	23.00
				1	14	23.02
				8	4	21.43
				15	0	21.38
64QAM	1851.5	18615	3	1	0	23.05
				1	14	23.01
				8	4	21.58
				15	0	21.53
	1880	18900		1	0	23.05
				1	14	23.08
				8	4	21.48
				15	0	21.43
	1908.5	19185		1	0	22.95
				1	14	22.92
				8	4	21.48
				15	0	21.41

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1852.5	18625	5	1	0	24.08
				1	24	24.06
				12	6	22.57
				25	0	22.60
	1880	18900		1	0	23.95
				1	24	23.90
				12	6	22.43
				25	0	22.40
	1907.5	19175		1	0	23.89
				1	24	23.91
				12	6	22.60
				25	0	22.52
16QAM	1852.5	18625	5	1	0	23.06
				1	24	23.06
				12	6	21.69
				25	0	21.54
	1880	18900		1	0	23.10
				1	24	23.08
				12	6	21.37
				25	0	21.40
	1907.5	19175		1	0	22.96
				1	24	22.96
				12	6	21.42
				25	0	21.40
64QAM	1852.5	18625	5	1	0	23.06
				1	24	23.04
				12	6	21.58
				25	0	21.56
	1880	18900		1	0	23.07
				1	24	23.07
				12	6	21.53
				25	0	21.41
	1907.5	19175		1	0	22.91
				1	24	22.95
				12	6	21.51
				25	0	21.40

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1855	18650	10	1	0	24.13
				1	49	24.07
				24	12	22.64
				50	0	22.56
	1880	18900		1	0	23.90
				1	49	23.98
				24	12	22.45
				50	0	22.41
	1905	19150		1	0	23.90
				1	49	23.88
				24	12	22.55
				50	0	22.49
16QAM	1855	18650	10	1	0	23.06
				1	49	23.05
				24	12	21.68
				50	0	21.50
	1880	18900		1	0	23.11
				1	49	23.12
				24	12	21.39
				50	0	21.41
	1905	19150		1	0	23.02
				1	49	23.03
				24	12	21.49
				50	0	21.41
64QAM	1855	18650	10	1	0	23.02
				1	49	23.05
				24	12	21.56
				50	0	21.47
	1880	18900		1	0	23.02
				1	49	23.10
				24	12	21.53
				50	0	21.47
	1905	19150		1	0	22.99
				1	49	23.01
				24	12	21.47
				50	0	21.39

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1857.5	18675	15	1	0	24.04
				1	74	24.14
				40	18	22.62
				75	0	22.57
	1880	18900		1	0	23.94
				1	74	23.97
				40	18	22.47
				75	0	22.43
	1902.5	19125		1	0	23.92
				1	74	23.90
				40	18	22.60
				75	0	22.55
16QAM	1857.5	18675	15	1	0	23.04
				1	74	23.05
				40	18	21.73
				75	0	21.50
	1880	18900		1	0	23.03
				1	74	23.04
				40	18	21.44
				75	0	21.39
	1902.5	19125		1	0	23.00
				1	74	23.02
				40	18	21.45
				75	0	21.40
64QAM	1857.5	18675	15	1	0	23.02
				1	74	23.03
				40	18	21.59
				75	0	21.52
	1880	18900		1	0	23.07
				1	74	23.10
				40	18	21.56
				75	0	21.41
	1902.5	19125		1	0	22.95
				1	74	22.97
				40	18	21.48
				75	0	21.44

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1860	18700	20	1	0	**24.14**
				1	99	**24.14**
				50	25	22.67
				100	0	22.65
	1880	18900		1	0	**23.99**
				1	99	**23.99**
				50	25	22.52
				100	0	22.49
	1900	19100		1	0	**23.95**
				1	99	**23.95**
				50	25	22.64
				100	0	22.56
16QAM	1860	18700	20	1	0	23.11
				1	99	23.11
				50	25	21.76
				100	0	21.59
	1880	18900		1	0	23.12
				1	99	23.12
				50	25	21.46
				100	0	21.42
	1900	19100		1	0	23.05
				1	99	23.05
				50	25	21.51
				100	0	21.45
64QAM	1860	18700	20	1	0	23.07
				1	99	23.07
				50	25	21.65
				100	0	21.57
	1880	18900		1	0	23.10
				1	99	23.10
				50	25	21.58
				100	0	21.51
	1900	19100		1	0	23.01
				1	99	23.01
				50	25	21.52
				100	0	21.48

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Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1710.7	19957	1.4	1	0	23.98
				1	5	24.00
				3	2	22.47
				6	0	22.29
	1732.5	20175		1	0	23.88
				1	5	23.93
				3	2	22.37
				6	0	22.23
	1754.3	20393		1	0	23.82
				1	5	23.84
				3	2	22.37
				6	0	22.28
16QAM	1710.7	19957	1.4	1	0	23.41
				1	5	23.35
				3	2	21.50
				6	0	21.34
	1732.5	20175		1	0	23.06
				1	5	23.09
				3	2	21.29
				6	0	21.27
	1754.3	20393		1	0	23.12
				1	5	23.09
				3	2	21.43
				6	0	21.28
64QAM	1710.7	19957	1.4	1	0	23.27
				1	5	23.20
				3	2	21.44
				6	0	21.40
	1732.5	20175		1	0	23.21
				1	5	23.19
				3	2	21.36
				6	0	21.25
	1754.3	20393		1	0	22.97
				1	5	23.01
				3	2	21.33
				6	0	21.31

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1711.5	19965	3	1	0	23.97
				1	14	23.95
				8	4	22.47
				15	0	22.32
	1732.5	20175		1	0	23.90
				1	14	23.87
				8	4	22.36
				15	0	22.22
	1753.5	20385		1	0	23.85
				1	14	23.87
				8	4	22.37
				15	0	22.24
16QAM	1711.5	19965	3	1	0	23.44
				1	14	23.43
				8	4	21.52
				15	0	21.42
	1732.5	20175		1	0	23.07
				1	14	23.11
				8	4	21.32
				15	0	21.30
	1753.5	20385		1	0	23.03
				1	14	23.13
				8	4	21.38
				15	0	21.32
64QAM	1711.5	19965	3	1	0	23.22
				1	14	23.24
				8	4	21.46
				15	0	21.35
	1732.5	20175		1	0	23.14
				1	14	23.17
				8	4	21.35
				15	0	21.25
	1753.5	20385		1	0	23.00
				1	14	23.01
				8	4	21.31
				15	0	21.28

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1712.5	19975	5	1	0	23.94
				1	24	23.93
				12	6	22.55
				25	0	22.36
	1732.5	20175		1	0	23.94
				1	24	23.91
				12	6	22.39
				25	0	22.28
	1752.5	20375		1	0	23.85
				1	24	23.87
				12	6	22.37
				25	0	22.24
16QAM	1712.5	19975	5	1	0	23.36
				1	24	23.41
				12	6	21.51
				25	0	21.37
	1732.5	20175		1	0	23.09
				1	24	23.15
				12	6	21.35
				25	0	21.27
	1752.5	20375		1	0	23.12
				1	24	23.06
				12	6	21.42
				25	0	21.27
64QAM	1712.5	19975	5	1	0	23.23
				1	24	23.21
				12	6	21.42
				25	0	21.41
	1732.5	20175		1	0	23.19
				1	24	23.19
				12	6	21.32
				25	0	21.29
	1752.5	20375		1	0	22.93
				1	24	23.01
				12	6	21.28
				25	0	21.31

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1715	20000	10	1	0	23.92
				1	49	23.98
				24	12	22.53
				50	0	22.30
	1732.5	20175		1	0	23.87
				1	49	23.89
				24	12	22.41
				50	0	22.32
	1750	20350		1	0	23.88
				1	49	23.81
				24	12	22.37
				50	0	22.27
16QAM	1715	20000	10	1	0	23.37
				1	49	23.39
				24	12	21.51
				50	0	21.33
	1732.5	20175		1	0	23.14
				1	49	23.10
				24	12	21.35
				50	0	21.27
	1750	20350		1	0	23.09
				1	49	23.06
				24	12	21.41
				50	0	21.31
64QAM	1715	20000	10	1	0	23.27
				1	49	23.21
				24	12	21.49
				50	0	21.39
	1732.5	20175		1	0	23.11
				1	49	23.16
				24	12	21.31
				50	0	21.31
	1750	20350		1	0	23.00
				1	49	22.94
				24	12	21.34
				50	0	21.26

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1717.5	20025	15	1	0	23.97
				1	74	23.97
				40	18	22.51
				75	0	22.33
	1732.5	20175		1	0	23.94
				1	74	23.95
				40	18	22.40
				75	0	22.25
	1747.5	20325		1	0	23.83
				1	74	23.87
				40	18	22.29
				75	0	22.27
16QAM	1717.5	20025	15	1	0	23.42
				1	74	23.35
				40	18	21.56
				75	0	21.42
	1732.5	20175		1	0	23.12
				1	74	23.13
				40	18	21.36
				75	0	21.30
	1747.5	20325		1	0	23.10
				1	74	23.07
				40	18	21.45
				75	0	21.25
64QAM	1717.5	20025	15	1	0	23.26
				1	74	23.25
				40	18	21.50
				75	0	21.41
	1732.5	20175		1	0	23.13
				1	74	23.19
				40	18	21.35
				75	0	21.29
	1747.5	20325		1	0	22.97
				1	74	23.00
				40	18	21.31
				75	0	21.33

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	1720	20050	20	1	0	**23.99**
				1	99	**23.99**
				50	25	22.46
				100	0	22.37
	1732.5	20175		1	0	**23.95**
				1	99	**23.95**
				50	25	22.43
				100	0	22.32
	1745	20300		1	0	**23.89**
				1	99	**23.89**
				50	25	22.38
				100	0	22.29
16QAM	1720	20050	20	1	0	23.44
				1	99	23.44
				50	25	21.58
				100	0	21.43
	1732.5	20175		1	0	23.16
				1	99	23.16
				50	25	21.38
				100	0	21.31
	1745	20300		1	0	23.13
				1	99	23.13
				50	25	21.46
				100	0	21.35
64QAM	1720	20050	20	1	0	23.29
				1	99	23.29
				50	25	21.51
				100	0	21.43
	1732.5	20175		1	0	23.21
				1	99	23.21
				50	25	21.38
				100	0	21.32
	1745	20300		1	0	23.03
				1	99	23.03
				50	25	21.36
				100	0	21.35

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Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	824.7	20407	1.4	1	0	23.61
				1	5	23.67
				3	2	22.57
				6	0	22.45
	836.5	20525		1	0	23.59
				1	5	23.56
				3	2	22.77
				6	0	22.49
	848.3	20643		1	0	23.57
				1	5	23.51
				3	2	22.53
				6	0	22.39
16QAM	824.7	20407	1.4	1	0	22.99
				1	5	22.99
				3	2	21.68
				6	0	21.45
	836.5	20525		1	0	23.04
				1	5	22.99
				3	2	21.59
				6	0	21.47
	848.3	20643		1	0	22.99
				1	5	23.02
				3	2	21.55
				6	0	21.27
64QAM	824.7	20407	1.4	1	0	23.03
				1	5	23.09
				3	2	21.66
				6	0	21.40
	836.5	20525		1	0	23.02
				1	5	23.03
				3	2	21.54
				6	0	21.39
	848.3	20643		1	0	22.90
				1	5	22.97
				3	2	21.51
				6	0	21.34

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	825.5	20415	3	1	0	23.62
				1	14	23.60
				8	4	22.56
				15	0	22.53
	836.5	20525		1	0	23.58
				1	14	23.61
				8	4	22.75
				15	0	22.50
	847.5	20635		1	0	23.49
				1	14	23.53
				8	4	22.55
				15	0	22.36
16QAM	825.5	20415	3	1	0	23.04
				1	14	23.06
				8	4	21.69
				15	0	21.39
	836.5	20525		1	0	23.03
				1	14	23.08
				8	4	21.60
				15	0	21.44
	847.5	20635		1	0	22.95
				1	14	22.99
				8	4	21.60
				15	0	21.35
64QAM	825.5	20415	3	1	0	23.03
				1	14	23.05
				8	4	21.66
				15	0	21.40
	836.5	20525		1	0	23.02
				1	14	22.99
				8	4	21.58
				15	0	21.35
	847.5	20635		1	0	22.93
				1	14	22.93
				8	4	21.51
				15	0	21.38

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	826.5	20425	5	1	0	23.64
				1	24	23.59
				12	6	22.63
				25	0	22.51
	836.5	20525		1	0	23.54
				1	24	23.61
				12	6	22.77
				25	0	22.50
	846.5	20625		1	0	23.54
				1	24	23.50
				12	6	22.59
				25	0	22.36
16QAM	826.5	20425	5	1	0	23.00
				1	24	23.08
				12	6	21.67
				25	0	21.37
	836.5	20525		1	0	23.01
				1	24	23.02
				12	6	21.65
				25	0	21.44
	846.5	20625		1	0	23.01
				1	24	23.02
				12	6	21.59
				25	0	21.27
64QAM	826.5	20425	5	1	0	23.07
				1	24	23.02
				12	6	21.68
				25	0	21.40
	836.5	20525		1	0	23.07
				1	24	23.06
				12	6	21.57
				25	0	21.32
	846.5	20625		1	0	22.89
				1	24	22.97
				12	6	21.51
				25	0	21.39

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	829	20450	10	1	0	**23.68**
				1	49	**23.68**
				24	12	22.64
				50	0	22.55
	836.5	20525		1	0	**23.62**
				1	49	**23.62**
				24	12	22.79
				50	0	22.51
	844	20600		1	0	**23.58**
				1	49	**23.58**
				24	12	22.62
				50	0	22.43
16QAM	829	20450	10	1	0	23.08
				1	49	23.08
				24	12	21.69
				50	0	21.46
	836.5	20525		1	0	23.09
				1	49	23.09
				24	12	21.65
				50	0	21.52
	844	20600		1	0	23.05
				1	49	23.05
				24	12	21.64
				50	0	21.35
64QAM	829	20450	10	1	0	23.12
				1	49	23.12
				24	12	21.68
				50	0	21.45
	836.5	20525		1	0	23.09
				1	49	23.09
				24	12	21.62
				50	0	21.41
	844	20600		1	0	22.98
				1	49	22.98
				24	12	21.54
				50	0	21.42

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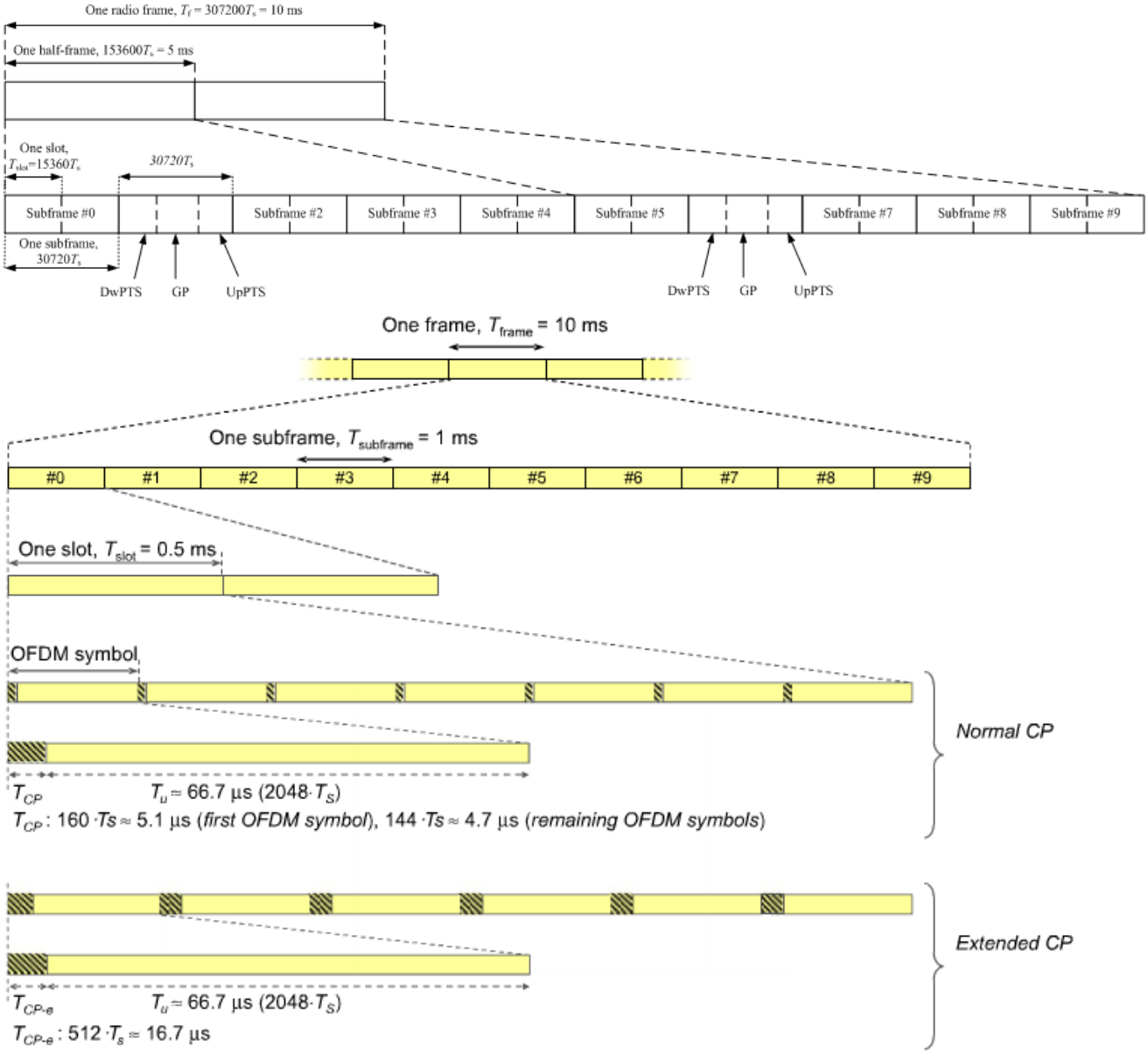
Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	2502.5	20775	5	1	0	23.30
				1	24	23.28
				12	6	22.31
				25	0	22.24
	2535	21100		1	0	23.34
				1	24	23.26
				12	6	22.46
				25	0	22.43
	2567.5	21425		1	0	23.04
				1	24	22.97
				12	6	22.28
				25	0	22.21
16QAM	2502.5	20775	5	1	0	22.44
				1	24	22.40
				12	6	21.24
				25	0	21.13
	2535	21100		1	0	22.15
				1	24	22.14
				12	6	21.23
				25	0	20.91
	2567.5	21425		1	0	21.99
				1	24	22.03
				12	6	21.06
				25	0	20.97
64QAM	2502.5	20775	5	1	0	22.03
				1	24	22.07
				12	6	21.01
				25	0	20.94
	2535	21100		1	0	22.11
				1	24	22.06
				12	6	20.99
				25	0	20.94
	2567.5	21425		1	0	21.97
				1	24	21.94
				12	6	20.96
				25	0	20.82

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	2505	20800	10	1	0	23.24
				1	49	23.22
				24	12	22.23
				50	0	22.25
	2535	21100		1	0	23.26
				1	49	23.31
				24	12	22.53
				50	0	22.46
	2565	21400		1	0	23.04
				1	49	22.97
				24	12	22.28
				50	0	22.20
16QAM	2505	20800	10	1	0	22.40
				1	49	22.38
				24	12	21.27
				50	0	21.16
	2535	21100		1	0	22.19
				1	49	22.15
				24	12	21.24
				50	0	20.87
	2565	21400		1	0	22.01
				1	49	22.02
				24	12	21.08
				50	0	21.02
64QAM	2505	20800	10	1	0	22.06
				1	49	22.01
				24	12	21.02
				50	0	20.92
	2535	21100		1	0	22.08
				1	49	22.14
				24	12	20.96
				50	0	20.95
	2565	21400		1	0	21.97
				1	49	21.91
				24	12	20.98
				50	0	20.74

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	2507.5	20825	15	1	0	23.31
				1	74	23.23
				40	18	22.31
				75	0	22.27
	2535	21100		1	0	23.33
				1	74	23.34
				40	18	22.50
				75	0	22.44
	2562.5	21375		1	0	23.01
				1	74	23.04
				40	18	22.27
				75	0	22.21
16QAM	2507.5	20825	15	1	0	22.41
				1	74	22.37
				40	18	21.21
				75	0	21.18
	2535	21100		1	0	22.19
				1	74	22.20
				40	18	21.18
				75	0	20.92
	2562.5	21375		1	0	22.02
				1	74	21.95
				40	18	21.04
				75	0	20.92
64QAM	2507.5	20825	15	1	0	22.04
				1	74	22.07
				40	18	21.02
				75	0	21.01
	2535	21100		1	0	22.10
				1	74	22.05
				40	18	20.97
				75	0	20.93
	2562.5	21375		1	0	21.93
				1	74	22.00
				40	18	20.98
				75	0	20.82

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	2510	20850	20	1	0	**23.31**
				1	99	**23.31**
				50	25	22.32
				100	0	22.28
	2535	21100		1	0	**23.35**
				1	99	**23.35**
				50	25	22.45
				100	0	22.42
	2560	21350		1	0	**23.05**
				1	99	**23.05**
				50	25	22.32
				100	0	22.22
16QAM	2510	20850	20	1	0	22.44
				1	99	22.44
				50	25	21.31
				100	0	21.18
	2535	21100		1	0	22.21
				1	99	22.21
				50	25	21.25
				100	0	20.92
	2560	21350		1	0	22.03
				1	99	22.03
				50	25	21.10
				100	0	21.02
64QAM	2510	20850	20	1	0	22.11
				1	99	22.11
				50	25	21.07
				100	0	21.01
	2535	21100		1	0	22.15
				1	99	22.15
				50	25	21.05
				100	0	21.02
	2560	21350		1	0	22.01
				1	99	22.01
				50	25	21.00
				100	0	20.82

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)

LTE38

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	2572.5	37775	5	1	0	23.51
				1	24	23.50
				12	6	22.71
				25	0	22.56
	2595	38000		1	0	23.61
				1	24	23.59
				12	6	22.80
				25	0	22.55
	2617.5	38225		1	0	23.49
				1	24	23.47
				12	6	22.73
				25	0	22.55
16QAM	2572.5	37775	5	1	0	22.58
				1	24	22.64
				12	6	21.73
				25	0	21.25
	2595	38000		1	0	22.61
				1	24	22.61
				12	6	21.75
				25	0	21.33
	2617.5	38225		1	0	22.62
				1	24	22.59
				12	6	21.68
				25	0	21.26
64QAM	2572.5	37775	5	1	0	22.50
				1	24	22.53
				12	6	21.66
				25	0	21.27
	2595	38000		1	0	22.60
				1	24	22.65
				12	6	21.66
				25	0	21.24
	2617.5	38225		1	0	22.49
				1	24	22.62
				12	6	21.64
				25	0	21.24

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	2575	37800	10	1	0	23.55
				1	49	23.50
				24	12	22.68
				50	0	22.51
	2595	38000		1	0	23.58
				1	49	23.61
				24	12	22.81
				50	0	22.50
	2615	38200		1	0	23.52
				1	49	23.51
				24	12	22.68
				50	0	22.58
16QAM	2575	37800	10	1	0	22.54
				1	49	22.58
				24	12	21.72
				50	0	21.25
	2595	38000		1	0	22.65
				1	49	22.66
				24	12	21.70
				50	0	21.31
	2615	38200		1	0	22.63
				1	49	22.59
				24	12	21.63
				50	0	21.26
64QAM	2575	37800	10	1	0	22.56
				1	49	22.55
				24	12	21.60
				50	0	21.30
	2595	38000		1	0	22.58
				1	49	22.62
				24	12	21.66
				50	0	21.29
	2615	38200		1	0	22.56
				1	49	22.58
				24	12	21.69
				50	0	21.28

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	2577.5	37825	15	1	0	23.49
				1	74	23.48
				40	18	22.69
				75	0	22.50
	2595	38000		1	0	23.57
				1	74	23.54
				40	18	22.73
				75	0	22.57
	2612.5	38175		1	0	23.45
				1	74	23.52
				40	18	22.73
				75	0	22.52
16QAM	2577.5	37825	15	1	0	22.59
				1	74	22.59
				40	18	21.72
				75	0	21.18
	2595	38000		1	0	22.69
				1	74	22.67
				40	18	21.69
				75	0	21.32
	2612.5	38175		1	0	22.63
				1	74	22.58
				40	18	21.68
				75	0	21.27
64QAM	2577.5	37825	15	1	0	22.56
				1	74	22.52
				40	18	21.65
				75	0	21.24
	2595	38000		1	0	22.59
				1	74	22.60
				40	18	21.64
				75	0	21.27
	2612.5	38175		1	0	22.59
				1	74	22.62
				40	18	21.68
				75	0	21.31

Modulation	Carrier frequency (MHz)	UL Channel	BW	RB Size	RB Offset	Conducted power (dBm)
QPSK	2580	37850	20	1	0	**23.57**
				1	99	**23.57**
				50	25	22.76
				100	0	22.56
	2595	38000		1	0	**23.62**
				1	99	**23.62**
				50	25	22.82
				100	0	22.59
	2610	38150		1	0	**23.55**
				1	99	**23.55**
				50	25	22.73
				100	0	22.59
16QAM	2580	37850	20	1	0	22.62
				1	99	22.66
				50	25	21.78
				100	0	21.26
	2595	38000		1	0	22.69
				1	99	22.69
				50	25	21.78
				100	0	21.34
	2610	38150		1	0	22.65
				1	99	22.61
				50	25	21.71
				100	0	21.29
64QAM	2580	37850	20	1	0	22.60
				1	99	22.61
				50	25	21.67
				100	0	21.30
	2595	38000		1	0	22.67
				1	99	22.67
				50	25	21.72
				100	0	21.33
	2610	38150		1	0	22.59
				1	99	22.65
				50	25	21.72
				100	0	21.32

6.5 Carrier Aggregation Power Measurement result

When carrier aggregation is limited to downlink only, uplink maximum output power (single carrier) is measured for the supported combinations of downlink carrier aggregation listed in the table below. In applying the power measurement procedures of KDB 941225 D05A for DL CA to qualify for UL SAR test exclusion, power measurement is required only for the subset in each row with the largest combination of frequency bands and CCs (far right most configuration highlighted in the table below).

In applying the power measurement procedures of KDB 941225 D05A for DL CA to qualify for UL SAR test exclusion, power measurement is required only for the CA configuration with the largest aggregated DL CA BW in each frequency band, independently for contiguous and non-contiguous CA; however, if the same frequency band is used for both contiguous and non-contiguous CA, power measurement was performed using the configuration with the largest aggregated BW and maximum output power among contiguous and non-contiguous CA

CA configuration	
DL Intra-Band Non-Contiguous	DL Intra-Band Contiguous
CA_7A_7A	CA_7C
	CA_38C

DL Intra-Band Non-Contiguous

CA Configuration	Bands		DL						UL								
	PCC	SCC	PCC			SCC			PCC								
	1st	2nd	BW	Freq.	CH	BW	Freq.	CH	Modulation	RB	Offset	BW	Freq.	CH	Aggregated BW	CA Inactive	CA Active	Delta
CA_7A-7A	7A	7A	20	2630	2850	20	2680	3350	QPSK	1	99	20	2535	21100	40	23.35	23.30	-0.05

DL Intra-Band Contiguous

CA Configuration	Bands		DL						UL								
	PCC	SCC	PCC			SCC			PCC								
	1st	2nd	BW	Freq.	CH	BW	Freq.	CH	Modulation	RB	Offset	BW	Freq.	CH	Aggregated BW	CA Inactive	CA Active	Delta
CA_7C	7C	7C	20	2655	3100	20	2675	3300	QPSK	1	99	20	2535	21100	40	23.35	23.25	-0.10
CA_38C	38C	38C	20	2585.1	37901	20	2604.9	38099	QPSK	1	99	20	2595	38000	40	23.62	23.57	-0.05

Summary for SAR Test Exclusion for LTE Downlink CA

Per power confirmation results in above, the uplink maximum output power with downlink CA active remains within the specified tune-up tolerance and not more than 0.25dB higher than the maximum output power with downlink CA inactive. According to KDB 941225 D05A, the SAR test exclusion applies to LTE downlink CA operation.

6.6 Wi-Fi Measurement result

WIFI 2.4GHz

SISO Mode

Test Mode	Ant	Average power (dBm)		
		2412MHz	2437MHz	2462MHz
802.11b	Ant1	13.33	13.03	12.93
802.11b	Ant2	13.59	13.36	13.44
802.11g	Ant1	**13.57**	**13.54**	**13.44**
802.11g	Ant2	**13.93**	**13.95**	**13.99**
802.11n HT20	Ant1	13.36	13.37	13.27
802.11n HT20	Ant2	13.78	13.81	13.88
Test Mode	Ant	Average power (dBm)		
		2422MHz	2437MHz	2452MHz
802.11n HT40	Ant1	12.28	12.47	12.58
802.11n HT40	Ant2	13.11	13.15	13.25

MIMO Mode

Test Mode	Ant	Average power (dBm)		
		2412MHz	2437MHz	2462MHz
802.11n HT20	MIMO	**16.56**	**16.57**	**16.51**
Test Mode	Ant	Average power (dBm)		
		2422MHz	2437MHz	2452MHz
802.11n HT40	MIMO	15.94	15.95	15.98

WIFI 5GHz

SISO Mode

Test Mode	Ant	Average Power(dBm)		
		5180 MHz	5200 MHz	5240MHz
802.11a	Ant1	10.11	10.13	10.09
802.11a	Ant2	10.51	10.48	10.54
802.11n HT20	Ant1	**10.61**	**10.55**	**10.71**
802.11n HT20	Ant2	**11.18**	**11.03**	**11.12**
802.11ac VHT20	Ant1	10.33	10.37	10.35
802.11ac VHT20	Ant2	10.58	10.62	10.64

Test Mode	Ant	Average Power(dBm)	
		5190 MHz	5230 MHz
802.11n HT40	Ant1	10.52	10.61
802.11n HT40	Ant2	10.73	10.81
802.11ac VHT40	Ant1	10.21	10.37
802.11ac VHT40	Ant2	10.49	10.55

Test Mode	Ant	Average Power(dBm)
		5210 MHz
802.11ac VHT80	Ant1	9.28
802.11ac VHT80	Ant2	9.62

MIMO Mode

Test Mode	Ant	Average power (dBm)		
		5180 MHz	5200 MHz	5240MHz
802.11n HT20	MIMO	**13.91**	**13.81**	**13.93**
802.11ac VHT20	MIMO	13.47	13.51	13.51

Test Mode	Ant	Average Power(dBm)	
		5190 MHz	5230 MHz
802.11n HT40	MIMO	13.64	13.72
802.11ac VHT40	MIMO	13.36	13.47

Test Mode	Ant	Average Power(dBm)
		5210 MHz
802.11ac VHT80	MIMO	12.46

6.7 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

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.
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.

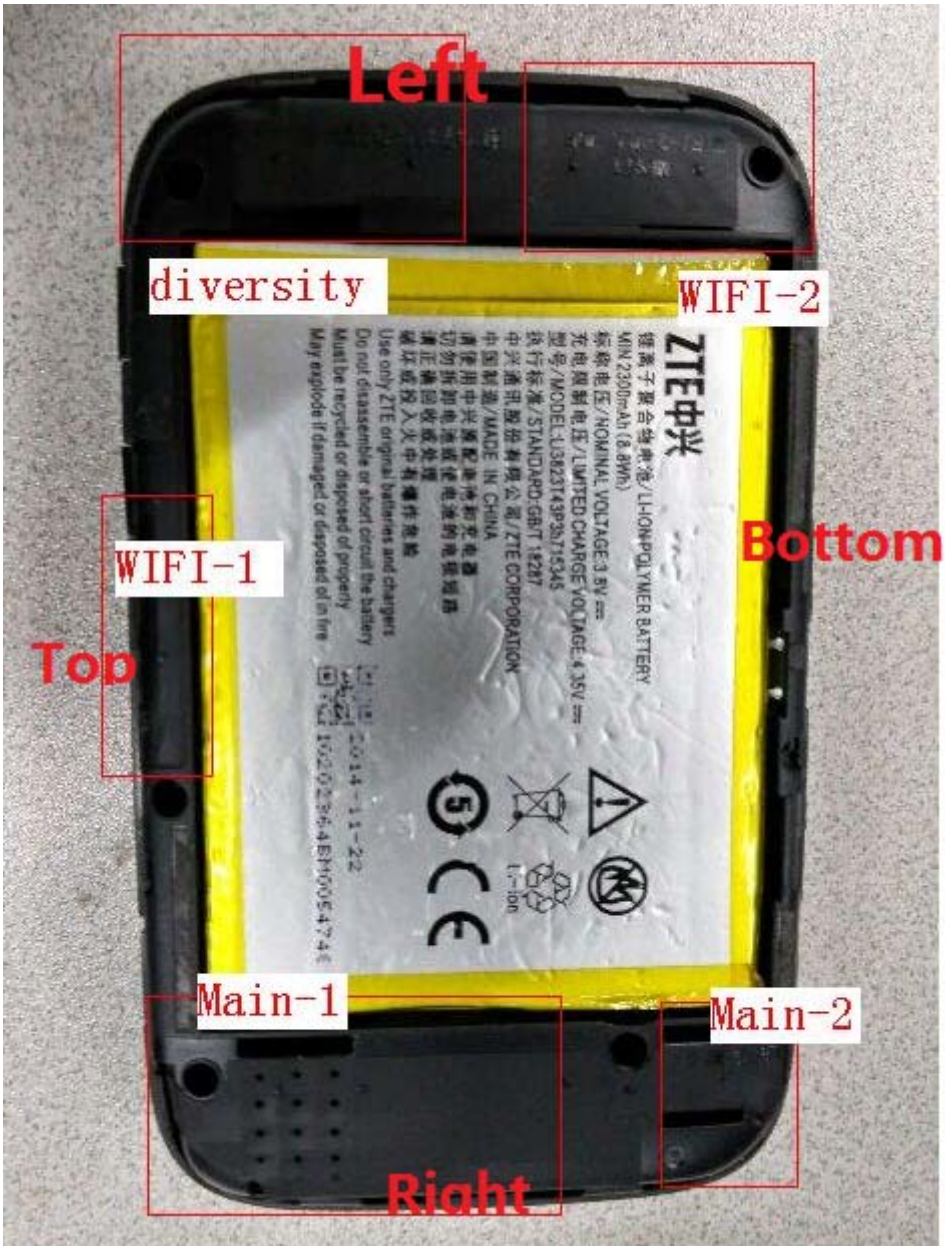
MHz	5	10	15	20	25	mm
150	39	77	116	155	194	*SAR Test Exclusion Threshold* (mW)
300	27	55	82	110	137	
450	22	45	67	89	112	
835	16	33	49	66	82	
900	16	32	47	63	79	
1500	12	24	37	49	61	
1900	11	22	33	44	54	
2450	10	19	29	38	48	
3600	8	16	24	32	40	
5200	7	13	20	26	33	
5400	6	13	19	26	32	
5800	6	12	19	25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

Summary of Transmitters

Band/Mode	Position	Max. RF output power (mW)	SAR test exclusion Threshold (mW)	SAR Required
(2.4~2.4835) GHz Wi-Fi ANT1	Body	22.75	19	Yes
(2.4~2.4835) GHz Wi-Fi ANT2	Body	25.06	19	Yes
(2.4~2.4835) GHz Wi-Fi MIMO	Body	45.39	19	Yes
(5.15~5.25) GHz Wi-Fi ANT1	Body	11.78	13	No
(5.15~5.25) GHz Wi-Fi ANT2	Body	13.12	13	Yes
(5.15~5.25) GHz Wi-Fi MIMO	Body	24.72	13	Yes

6.8 RF exposure conditions

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



All of Implementation antenna

Main-1 antenna: GSM850/GSM900 RX&TX 、WCDMA B2/5 RX&TX、 LTE FDD B2/4/5/RX&TX

Main-2 antenna: LTE FDD B17 RX&TX，LTETDD B38 RX&TX

WiFi antenna1&2: 2412MHz~2472MHz ， 5150MHz~5250MHz

6.8.1 Body Exposure Conditions

Main Antenna 1&2

For WWAN

Test Configurations	SAR Required	Note
Back	yes	/
Front	yes	/

Wi-Fi Antenna 1&2

For WLAN

Test Configurations	SAR Required	Note
Back	yes	/
Front	yes	/

6.8.2 Hotspot Exposure conditions

Main Antenna 1&2

For WWAN

Test Configurations	Antenna-to-edge/surface	SAR Required
Back	<25 mm	Yes
Front	<25 mm	Yes
Top	<25 mm	Yes
Bottom	<25 mm	Yes
Left	>25 mm	No
Right	<25 mm	Yes

Wi-Fi Antenna 1&2

For WLAN

Test Configurations	Antenna-to-edge/surface	SAR Required
Back	<25 mm	Yes
Front	<25 mm	Yes
Top	<25 mm	Yes
Bottom	<25 mm	Yes
Left	<25 mm	Yes
Right	<25 mm	Yes

6.9 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 analyzer. A system check measurement was made following the determination of the dielectric parameters of the simulant, using the dipole validation kit. A power level of 250 mW was supplied to the dipole antenna **except D5GHzV2 used 10mW**, which was placed under the flat section of the twin SAM phantom. 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 (%)
2019/05/04	D835V2	Body	1g	8.96	9.47	-5.4	±10
2019/05/06	D1800V2	Body	1g	38.08	39.70	-4.1	±10
2019/05/07	D2000V2	Body	1g	39.36	40.30	-2.3	±10
2019/05/08	D2450V2	Body	1g	52.12	54.40	-4.2	±10
2019/05/09	D5GHzV2 (5300MHz)	Head	1g	72.3	76.9	-6.0	±10

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

Date Tested	Freq. (MHz)	Liquid parameters	measured	Target	Delta (%)	Tolerance (%)
2019/05/04	Body 835	εr	55.24	55.20	0.1	±5
		σ[S/m]	0.97	0.97	0.0	±5
2019/05/06	Body 1800	εr	53.29	53.30	0.0	±5
		σ[S/m]	1.50	1.52	-1.3	±5
2019/05/07	Body 2000	εr	52.60	53.30	-1.3	±5
		σ[S/m]	1.59	1.52	4.3	±5
2019/05/08	Body 2450	εr	51.15	52.70	-2.9	±5
		σ[S/m]	2.02	1.95	3.6	±5
2019/05/09	Body 5300	εr	48.79	48.9	-0.2	±5
		σ[S/m]	5.47	5.42	0.9	±5

6.10 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.
Reported SAR (W/kg) = Measured SAR (W/kg) * Scaling Factor
2. Per KDB 447498 D01v06, for each exposure position, if the highest output channel reported SAR ≤0.8W/kg, other channels SAR testing are not necessary.
3. The distance between the EUT and the phantom bottom is 10mm.

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

Mode: GSM 850(GPRS)
fL(MHz)=824.2MHz fM(MHz)=836.5MHz fH(MHz)= 848.8MHz
SAR Values (850MHz Band)
Limit of SAR (W/kg): <1.6W/kg (1g Average)

Test Case		Ch	Measure Conducted Power (dBm)	Tune-up limit (dBm)	Scaling Factor	Measure Results (W/kg)	Reported Results (W/kg)
position	mode					1g Average	1g Average
Back	GPRS 3TX (body-worn)	L	28.55	29.00	1.11	---	---
		M	28.68	29.00	1.08	**0.740**	**0.799**
		H	28.78	29.00	1.05	---	---
Front		L	28.55	29.00	1.11	---	---
		M	28.68	29.00	1.08	0.693	0.748
		H	28.78	29.00	1.05	---	---
Top	GPRS 3TX (hotspot)	L	28.55	29.00	1.11	---	---
		M	28.68	29.00	1.08	0.196	0.212
		H	28.78	29.00	1.05	---	---
Bottom		L	28.55	29.00	1.11	---	---
		M	28.68	29.00	1.08	0.133	0.144
		H	28.78	29.00	1.05	---	---
Left		L	28.55	29.00	1.11	---	---
		M	28.68	29.00	1.08	0.038	0.041
		H	28.78	29.00	1.05	---	---
Right		L	28.55	29.00	1.11	---	---
		M	28.68	29.00	1.08	0.055	0.059
		H	28.78	29.00	1.05	---	---

.

Mode: GSM1900(GPRS)

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

SAR Values (1900MHz Band)

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

Test Case		Ch	Measure Conducted Power (dBm)	Tune-up limit (dBm)	Scaling Factor	Measure Results (W/kg)	Reported Results (W/kg)
position	mode					1g Average	1g Average
Back	GPRS 3TX (body-worn)	L	25.93	26.50	1.14	---	---
		M	26.01	26.50	1.12	**0.473**	**0.530**
		H	26.14	26.50	1.09	---	---
Front		L	25.93	26.50	1.14	---	---
		M	26.01	26.50	1.12	0.466	0.522
		H	26.14	26.50	1.09	---	---
Top	GPRS 3TX (hotspot)	L	25.93	26.50	1.14	---	---
		M	26.01	26.50	1.12	0.232	0.260
		H	26.14	26.50	1.09	---	---
Bottom		L	25.93	26.50	1.14	---	---
		M	26.01	26.50	1.12	0.099	0.111
		H	26.14	26.50	1.09	---	---
Left		L	25.93	26.50	1.14	---	---
		M	26.01	26.50	1.12	0.031	0.035
		H	26.14	26.50	1.09	---	---
Right		L	25.93	26.50	1.14	---	---
		M	26.01	26.50	1.12	0.339	0.380
		H	26.14	26.50	1.09	---	---

Mode: WCDMA BAND2

fL (MHz)=1852.4MHz fM (MHz)=1880MHz fH (MHz)= 1907.6MHz
SAR Values (WCDMA BAND2)
Limit of SAR (W/kg) :< 1.6W/kg (1g Average)

Test Case		Ch	Measure Conducted Power (dBm)	Tune-up limit (dBm)	Scaling Factor	Measure Results (W/kg)	Reported Results (W/kg)
position	mode					1g Average	1g Average
Back	12.2KRMC (body-worn)	L1	25.93	26.50	1.14	0.937	1.021
		M1	26.01	26.50	1.12	**1.130**	**1.254**
		H1	26.14	26.50	1.09	1.040	1.123
		L2	25.93	26.50	1.14	0.951	1.037
		M2	26.01	26.50	1.12	1.090	1.210
		H2	26.14	26.50	1.09	1.037	1.120
Front		L1	25.93	26.50	1.14	0.869	0.947
		M1	26.01	26.50	1.12	1.110	1.232
		H1	26.14	26.50	1.09	0.952	1.028
		L2	25.93	26.50	1.14	0.871	0.949
		M2	26.01	26.50	1.12	1.046	1.161
		H2	26.14	26.50	1.09	0.947	1.023
Top	12.2KRMC (hotspot)	L	25.93	26.50	1.14	---	---
		M	26.01	26.50	1.12	0.516	0.573
		H	26.14	26.50	1.09	---	---
Bottom		L	25.93	26.50	1.14	---	---
		M	26.01	26.50	1.12	0.219	0.243
		H	26.14	26.50	1.09	---	---
Left		L	25.93	26.50	1.14	---	---
		M	26.01	26.50	1.12	0.077	0.085
		H	26.14	26.50	1.09	---	---
Right		L	25.93	26.50	1.14	---	---
		M	26.01	26.50	1.12	0.717	0.796
		H	26.14	26.50	1.09	---	---

Mode: WCDMA BAND5
fL (MHz)=826.4MHz fM (MHz)=836.4MHz fH (MHz)= 846.6MHz
SAR Values (WCDMA BAND5)
Limit of SAR (W/kg): <1.6W/kg (1g Average)

Test Case		Ch	Measure Conducted Power (dBm)	Tune-up limit (dBm)	Scaling Factor	Measure Results (W/kg)	Reported Results (W/kg)
position	mode					1g Average	1g Average
Back	12.2KRMC (body-worn)	L	23.94	24.50	1.14	---	---
		M	23.84	24.50	1.16	**0.677**	**0.785**
		H	24.07	24.50	1.10	---	---
Front		L	23.94	24.50	1.14	---	---
		M	23.84	24.50	1.16	0.649	0.753
		H	24.07	24.50	1.10	---	---
Top	12.2KRMC (hotspot)	L	23.94	24.50	1.14	---	---
		M	23.84	24.50	1.16	0.237	0.275
		H	24.07	24.50	1.10	---	---
Bottom		L	23.94	24.50	1.14	---	---
		M	23.84	24.50	1.16	0.176	0.204
		H	24.07	24.50	1.10	---	---
Left		L	23.94	24.50	1.14	---	---
		M	23.84	24.50	1.16	0.053	0.061
		H	24.07	24.50	1.10	---	---
Right		L	23.94	24.50	1.14	---	---
		M	23.84	24.50	1.16	0.071	0.082
		H	24.07	24.50	1.10	---	---

Mode: LTE Band 2

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

SAR Values(LTE BAND2)

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

Test Case		Ch	Measure Conducted Power (dBm)	Tune-up limit (dBm)	Scaling Factor	Measure Results (W/kg)	Reported Results (W/kg)
position	mode					1g Average	1g Average
Back	20BW 1RB (body-worn)	L1	24.14	24.50	1.09	0.923	1.006
		M1	23.99	24.50	1.12	**0.975**	**1.092**
		H1	23.95	24.50	1.14	0.753	0.858
		L2	24.14	24.50	1.09	0.931	1.011
		M2	23.99	24.50	1.12	0.948	1.066
		H2	23.95	24.50	1.14	0.727	0.825
Front		L1	24.14	24.50	1.09	0.850	0.927
		M1	23.99	24.50	1.12	0.891	0.998
		H1	23.95	24.50	1.14	0.706	0.805
		L2	24.14	24.50	1.09	0.853	0.927
		M2	23.99	24.50	1.12	0.873	0.982
		H2	23.95	24.50	1.14	0.711	0.807
Top	20BW 1RB (hotspot)	L	24.14	24.50	1.09	---	---
		M	23.99	24.50	1.12	0.381	0.427
		H	23.95	24.50	1.14	---	---
Bottom		L	24.14	24.50	1.09	---	---
		M	23.99	24.50	1.12	0.211	0.236
		H	23.95	24.50	1.14	---	---
Left		L	24.14	24.50	1.09	---	---
		M	23.99	24.50	1.12	0.089	0.100
		H	23.95	24.50	1.14	---	---
Right		L	24.14	24.50	1.09	---	---
		M	23.99	24.50	1.12	0.711	0.796
		H	23.95	24.50	1.14	---	---
Back	20BW 50%RB (body-worn)	L	22.67	23.00	1.08	---	---
		M	22.52	23.00	1.12	0.703	0.787
		H	22.64	23.00	1.09	---	---
Front		L	22.67	23.00	1.08	---	---
		M	22.52	23.00	1.12	0.670	0.750
		H	22.64	23.00	1.09	---	---
Back	20BW 100%RB (body-worn)	L	22.65	23.00	1.08	---	---
		M	22.49	23.00	1.12	0.686	0.768
		H	22.56	23.00	1.11	---	---
Front		L	22.65	23.00	1.08	---	---
		M	22.49	23.00	1.12	0.561	0.628
		H	22.56	23.00	1.11	---	---

Mode: LTE Band 4

fL (MHz)= 1710.7MHz fM (MHz)= 1732.5MHz fH (MHz)= 1754.3MHz

SAR Values (LTE BAND4)

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

Test Case		Ch	Measure Conducted Power (dBm)	Tune-up limit (dBm)	Scaling Factor	Measure Results (W/kg)	Reported Results (W/kg)
position	mode					1g Average	1g Average
Back	20BW 1RB (body-worn)	L1	23.99	24.00	1.00	1.031	1.031
		M1	23.95	24.00	1.01	**1.110**	**1.121**
		H1	23.89	24.00	1.03	0.911	0.938
		L2	23.99	24.00	1.00	0.989	0.991
		M2	23.95	24.00	1.01	1.092	1.105
		H2	23.89	24.00	1.03	0.935	0.959
Front		L1	23.99	24.00	1.00	1.010	1.010
		M1	23.95	24.00	1.01	1.070	1.081
		H1	23.89	24.00	1.03	0.823	0.848
		L2	23.99	24.00	1.00	0.994	0.996
		M2	23.95	24.00	1.01	1.062	1.074
		H2	23.89	24.00	1.03	0.841	0.863
Top	20BW 1RB (hotspot)	L	23.99	24.00	1.00	---	---
		M	23.95	24.00	1.01	0.529	0.534
		H	23.89	24.00	1.03	---	---
Bottom		L	23.99	24.00	1.00	---	---
		M	23.95	24.00	1.01	0.442	0.446
		H	23.89	24.00	1.03	---	---
Left		L	23.99	24.00	1.00	---	---
		M	23.95	24.00	1.01	0.069	0.070
		H	23.89	24.00	1.03	---	---
Right		L	23.99	24.00	1.00	---	---
		M	23.95	24.00	1.01	0.564	0.570
		H	23.89	24.00	1.03	---	---
Back	20BW 50%RB (body-worn)	L	22.67	23.00	1.08	---	---
		M	22.52	23.00	1.12	0.783	0.799
		H	22.64	23.00	1.09	---	---
Front		L	22.67	23.00	1.08	---	---
		M	22.52	23.00	1.12	0.777	0.793
		H	22.64	23.00	1.09	---	---
Back	20BW 100%RB (body-worn)	L	22.65	23.00	1.08	---	---
		M	22.49	23.00	1.12	0.638	0.664
		H	22.56	23.00	1.11	---	---
Front		L	22.65	23.00	1.08	---	---
		M	22.49	23.00	1.12	0.626	0.651
		H	22.56	23.00	1.11	---	---

Mode: LTE Band 5

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

SAR Values (LTE BAND5)

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

Test Case		Ch	Measure Conducted Power (dBm)	Tune-up limit (dBm)	Scaling Factor	Measure Results (W/kg)	Reported Results (W/kg)
position	mode					1g Average	1g Average
Back	10BW 1RB (body-worn)	L	23.68	24.00	1.08	---	---
		M	23.62	24.00	1.09	**0.730**	**0.796**
		H	23.58	24.00	1.10	---	---
Front		L	23.68	24.00	1.08	---	---
		M	23.62	24.00	1.09	0.721	0.786
		H	23.58	24.00	1.10	---	---
Top	10BW 1RB (hotspot)	L	23.68	24.00	1.08	---	---
		M	23.62	24.00	1.09	0.372	0.405
		H	23.58	24.00	1.10	---	---
Bottom		L	23.68	24.00	1.08	---	---
		M	23.62	24.00	1.09	0.245	0.267
		H	23.58	24.00	1.10	---	---
Left		L	23.68	24.00	1.08	---	---
		M	23.62	24.00	1.09	0.023	0.025
		H	23.58	24.00	1.10	---	---
Right		L	23.68	24.00	1.08	---	---
		M	23.62	24.00	1.09	0.068	0.074
		H	23.58	24.00	1.10	---	---

Mode: LTE Band 7

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

SAR Values (LTE BAND7)

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)	L1	23.31	23.50	1.04	1.151	1.197
		M1	23.35	23.50	1.04	**1.250**	**1.300**
		H1	23.05	23.50	1.11	0.968	1.074
		L2	23.31	23.50	1.04	1.169	1.221
		M2	23.35	23.50	1.04	1.236	1.279
		H2	23.05	23.50	1.11	0.972	1.078
Front		L	23.31	23.50	1.04	---	---
		M	23.35	23.50	1.04	0.723	0.752
		H	23.05	23.50	1.11	---	---
Top	20BW 1RB (hotspot)	L	23.31	23.50	1.04	---	---
		M	23.35	23.50	1.04	0.117	0.122
		H	23.05	23.50	1.11	---	---
Bottom		L	23.31	23.50	1.04	---	---
		M	23.35	23.50	1.04	0.446	0.464
		H	23.05	23.50	1.11	---	---
Left		L	23.31	23.50	1.04	---	---
		M	23.35	23.50	1.04	0.129	0.134
		H	23.05	23.50	1.11	---	---
Right		L	23.31	23.50	1.04	---	---
		M	23.35	23.50	1.04	0.224	0.233
		H	23.05	23.50	1.11	---	---
Back	20BW 50%RB (body-worn)	L1	22.32	22.50	1.04	0.930	0.967
		M1	22.45	22.50	1.01	1.050	1.061
		H1	22.32	22.50	1.04	0.835	0.868
		L2	22.32	22.50	1.04	0.973	1.014
		M2	22.45	22.50	1.01	0.981	0.992
		H2	22.32	22.50	1.04	0.825	0.860
Back	20BW 100%RB (body-worn)	L	22.28	22.50	1.05	---	---
		M	22.42	22.50	1.02	0.701	0.715
		H	22.22	22.50	1.07	---	---

Mode: LTE Band 38
fL (MHz)= 2580 MHz fM (MHz)= 2595MHz fH (MHz)= 2610MHz
SAR Values (LTE BAND38)
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	23.57	24.00	1.10	---	---
		M	23.62	24.00	1.09	**0.538**	**0.586**
		H	23.55	24.00	1.11	---	---
Front		L	23.57	24.00	1.10	---	---
		M	23.62	24.00	1.09	0.293	0.319
		H	23.55	24.00	1.11	---	---
Top	20BW 1RB (hotspot)	L	23.57	24.00	1.10	---	---
		M	23.62	24.00	1.09	0.036	0.039
		H	23.55	24.00	1.11	---	---
Bottom		L	23.57	24.00	1.10	---	---
		M	23.62	24.00	1.09	0.238	0.259
		H	23.55	24.00	1.11	---	---
Left		L	23.57	24.00	1.10	---	---
		M	23.62	24.00	1.09	0.071	0.077
		H	23.55	24.00	1.11	---	---
Right		L	23.57	24.00	1.10	---	---
		M	23.62	24.00	1.09	0.099	0.108
		H	23.55	24.00	1.11	---	---

Mode: Wi-Fi 2.4GHz-ANT1

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

SAR Values (Wi-Fi 802.11g)

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	802.11g (body-worn)	L	13.57	14.00	1.10	---	---
		M	13.54	14.00	1.11	0.141	0.157
		H	13.44	14.00	1.14	---	---
Front		L	13.57	14.00	1.10	---	---
		M	13.54	14.00	1.11	0.083	0.092
		H	13.44	14.00	1.14	---	---
Top	802.11g (hotspot)	L	13.57	14.00	1.10	---	---
		M	13.54	14.00	1.11	0.114	0.127
		H	13.44	14.00	1.14	---	---
Bottom		L	13.57	14.00	1.10	---	---
		M	13.54	14.00	1.11	0.116	0.129
		H	13.44	14.00	1.14	---	---
Left		L	13.57	14.00	1.10	---	---
		M	13.54	14.00	1.11	0.031	0.034
		H	13.44	14.00	1.14	---	---
Right		L	13.57	14.00	1.10	---	---
		M	13.54	14.00	1.11	0.019	0.021
		H	13.44	14.00	1.14	---	---

Mode: Wi-Fi 2.4GHz-ANT2

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

SAR Values (Wi-Fi 802.11g)

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	802.11g (body-worn)	L	13.93	14.00	1.02	---	---
		M	13.95	14.00	1.01	0.134	0.135
		H	13.99	14.00	1.00	---	---
Front		L	13.93	14.00	1.02	---	---
		M	13.95	14.00	1.01	0.128	0.129
		H	13.99	14.00	1.00	---	---
Top	802.11g (hotspot)	L	13.93	14.00	1.02	---	---
		M	13.95	14.00	1.01	0.124	0.125
		H	13.99	14.00	1.00	---	---
Bottom		L	13.93	14.00	1.02	---	---
		M	13.95	14.00	1.01	0.102	0.103
		H	13.99	14.00	1.00	---	---
Left		L	13.93	14.00	1.02	---	---
		M	13.95	14.00	1.01	0.151	0.153
		H	13.99	14.00	1.00	---	---
Right		L	13.93	14.00	1.02	---	---
		M	13.95	14.00	1.01	0.008	0.008
		H	13.99	14.00	1.00	---	---

Mode: Wi-Fi 2.4GHz-MIMO

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

SAR Values (Wi-Fi 802.11n HT20)

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	802.11n HT20 (body-worn)	L	16.56	17.00	1.11	---	---
		M	16.57	17.00	1.10	**0.180**	**0.198**
		H	16.51	17.00	1.12	---	---
Front		L	16.56	17.00	1.11	---	---
		M	16.57	17.00	1.10	0.128	0.141
		H	16.51	17.00	1.12	---	---
Top	802.11n HT20 (hotspot)	L	16.56	17.00	1.11	---	---
		M	16.57	17.00	1.10	0.136	0.150
		H	16.51	17.00	1.12	---	---
Bottom		L	16.56	17.00	1.11	---	---
		M	16.57	17.00	1.10	0.117	0.131
		H	16.51	17.00	1.12	---	---
Left		L	16.56	17.00	1.11	---	---
		M	16.57	17.00	1.10	0.156	0.172
		H	16.51	17.00	1.12	---	---
Right		L	16.56	17.00	1.11	---	---
		M	16.57	17.00	1.10	0.020	0.022
		H	16.51	17.00	1.12	---	---

Mode: Wi-Fi 5GHz-ANT1

fL (MHz)= 5180MHz fM (MHz)= 5200MHz fH (MHz)= 5240MHz

SAR Values (Wi-Fi 802.11n HT20)

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	802.11n HT20 (body-worn)	L	10.61	11.00	1.09	---	---
		M	10.55	11.00	1.11	0.194	0.215
		H	10.71	11.00	1.07	---	---
Front		L	10.61	11.00	1.09	---	---
		M	10.55	11.00	1.11	0.161	0.179
		H	10.71	11.00	1.07	---	---
Top	802.11n HT20 (hotspot)	L	10.61	11.00	1.09	---	---
		M	10.55	11.00	1.11	0.085	0.094
		H	10.71	11.00	1.07	---	---
Bottom		L	10.61	11.00	1.09	---	---
		M	10.55	11.00	1.11	0.079	0.088
		H	10.71	11.00	1.07	---	---
Left		L	10.61	11.00	1.09	---	---
		M	10.55	11.00	1.11	0.062	0.069
		H	10.71	11.00	1.07	---	---
Right		L	10.61	11.00	1.09	---	---
		M	10.55	11.00	1.11	0.016	0.018
		H	10.71	11.00	1.07	---	---

Mode: Wi-Fi 5GHz-ANT2

fL (MHz)= 5180MHz fM (MHz)= 5200MHz fH (MHz)= 5240MHz

SAR Values (Wi-Fi 802.11n HT20)

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	802.11n HT20 (body-worn)	L	11.18	11.50	1.08	---	---
		M	11.03	11.50	1.11	0.108	0.120
		H	11.12	11.50	1.09	---	---
Front		L	11.18	11.50	1.08	---	---
		M	11.03	11.50	1.11	0.096	0.107
		H	11.12	11.50	1.09	---	---
Top	802.11n HT20 (hotspot)	L	11.18	11.50	1.08	---	---
		M	11.03	11.50	1.11	0.087	0.097
		H	11.12	11.50	1.09	---	---
Bottom		L	11.18	11.50	1.08	---	---
		M	11.03	11.50	1.11	0.042	0.047
		H	11.12	11.50	1.09	---	---
Left		L	11.18	11.50	1.08	---	---
		M	11.03	11.50	1.11	0.144	0.160
		H	11.12	11.50	1.09	---	---
Right		L	11.18	11.50	1.08	---	---
		M	11.03	11.50	1.11	0.014	0.016
		H	11.12	11.50	1.09	---	---

Mode: Wi-Fi 5GHz-ANT2

fL (MHz)= 5180MHz fM (MHz)= 5200MHz fH (MHz)= 5240MHz

SAR Values (Wi-Fi 802.11n HT20)

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	802.11n HT20 (body-worn)	L	11.18	11.50	1.08	---	---
		M	11.03	11.50	1.11	0.108	0.120
		H	11.12	11.50	1.09	---	---
Front		L	11.18	11.50	1.08	---	---
		M	11.03	11.50	1.11	0.096	0.107
		H	11.12	11.50	1.09	---	---
Top	802.11n HT20 (hotspot)	L	11.18	11.50	1.08	---	---
		M	11.03	11.50	1.11	0.087	0.097
		H	11.12	11.50	1.09	---	---
Bottom		L	11.18	11.50	1.08	---	---
		M	11.03	11.50	1.11	0.042	0.047
		H	11.12	11.50	1.09	---	---
Left		L	11.18	11.50	1.08	---	---
		M	11.03	11.50	1.11	0.144	0.160
		H	11.12	11.50	1.09	---	---
Right		L	11.18	11.50	1.08	---	---
		M	11.03	11.50	1.11	0.014	0.016
		H	11.12	11.50	1.09	---	---

Mode: Wi-Fi 5GHz-MIMO

fL (MHz)= 5180MHz fM (MHz)= 5200MHz fH (MHz)= 5240MHz

SAR Values (Wi-Fi 802.11n HT20)

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	802.11n HT20 (body-worn)	L	13.91	14.00	1.02	---	---
		M	13.81	14.00	1.04	0.146	0.152
		H	13.93	14.00	1.02	---	---
Front		L	13.91	14.00	1.02	---	---
		M	13.81	14.00	1.04	0.024	0.025
		H	13.93	14.00	1.02	---	---
Top	802.11n HT20 (hotspot)	L	13.91	14.00	1.02	0.772	0.787
		M1	13.81	14.00	1.04	**0.895**	**0.931**
		M2	13.81	14.00	1.04	0.886	0.921
		H	13.93	14.00	1.02	0.738	0.753
Bottom		L	13.91	14.00	1.02	---	---
		M	13.81	14.00	1.04	0.179	0.183
		H	13.93	14.00	1.02	---	---
Left		L	13.91	14.00	1.02	---	---
		M	13.81	14.00	1.04	0.062	0.064
		H	13.93	14.00	1.02	---	---
Right		L	13.91	14.00	1.02	---	---
		M	13.81	14.00	1.04	0.030	0.031
		H	13.93	14.00	1.02	---	---

6.11 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)	Hotspot(w/kg)
850 MHz	GSM850 WCDMA BAND5 LTE BAND5	≤0.8	≤0.8
1800/1900 MHz	GSM1900 WCDMA BAND2 LTE BAND4 LTE BAND2	>0.8	>0.8
2.4 GHz	WIFI 2.4 GHz LTE BAND7 LTE BAND38	≤0.8	≤0.8
5 GHz	WIFI 5 GHz	≤0.8	>0.8

6.12 Simultaneous Transmission SAR Analysis

The sum of SAR values for GSM & Wi-Fi

	MAXIMUM SAR VALUE FOR BODY WORN	MAXIMUM SAR VALUE FOR HOTSPOT
GSM	0.799	0.260
Wi-Fi	0.215	0.931
Sum	1.014	1.191
Note	Back: GSM850+wifi5G-ANT1	Top: GSM1900+wifi5G-MIMO

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

The sum of SAR values for WCDMA & Wi-Fi

	MAXIMUM SAR VALUE FOR BODY	MAXIMUM SAR VALUE FOR HOTSPOT
WCDMA	1.254	0.573
Wi-Fi	0.215	0.931
Sum	1.469	1.504
Note	Back: WCDMAII+ wifi5G-ANT1	Top: WCDMAII+ wifi5G-MIMO

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

The sum of SAR values for LTE& Wi-Fi

	MAXIMUM SAR VALUE FOR BODY	MAXIMUM SAR VALUE FOR HOTSPOT
LTE	1.300	1.300
Wi-Fi	0.215	0.215
Sum	1.515	1.515
Note	Back: LTE7 + wifi5G-ANT1	Back: LTE7 + wifi5G-ANT1

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

7 MEASUREMENT UNCERTAINTY

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

(3 - 6 GHz range)								
Error Description	Uncert. value	Prob. Dist.	Div.	(c_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	2018.10.15	2019.10.14
DAE	DAE4	720	2018.10.15	2019.10.14
Dosimetric E-field Probe	ES3DV3	3127	2018.11.02	2019.11.01
Dosimetric E-field Probe	EX3DV4	3708	2018.10.22	2019.10.21
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
Dipole Validation Kit	D5GHzV2	1079	2017.09.25	2020.09.24

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%.

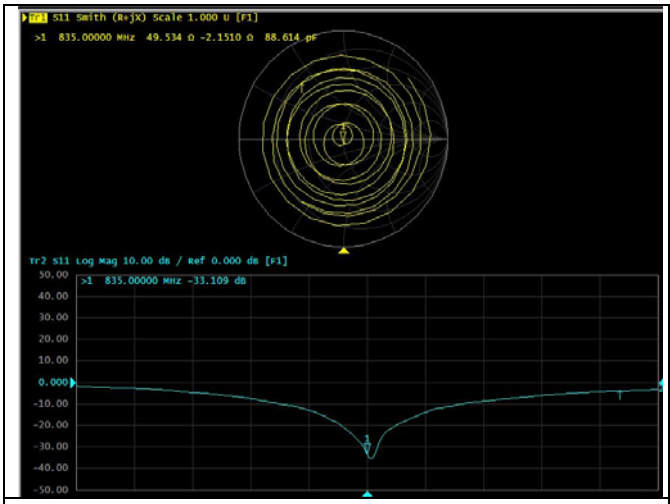
Impedance and Return loss measured by Network analyzer

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

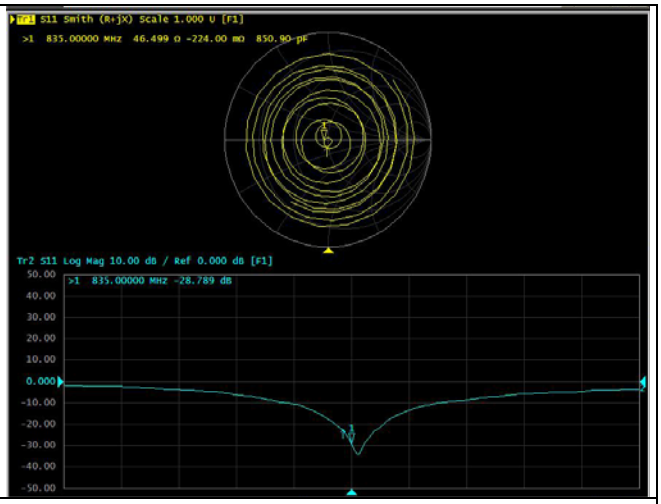
The most recent return-loss result (measured on 2018.8.20) deviates within 20% from the previous measurement. (Data from the last calibration report)

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

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



Head TSL Parameters



Body 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%.

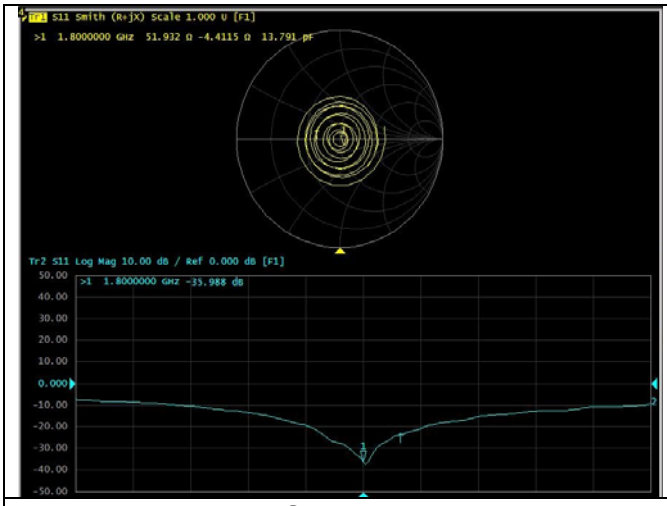
Impedance and Return loss measured by Network analyzer

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

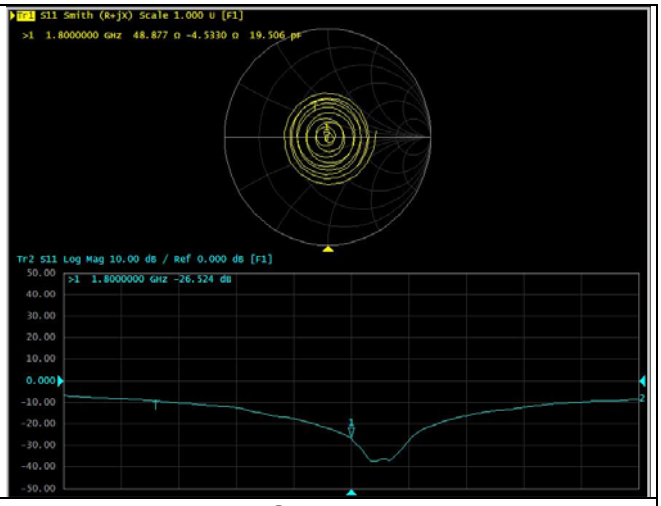
The most recent return-loss result (measured on 2018.8.20) deviates within 20% from the previous measurement. (Data from the last calibration report)

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

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



Head TSL Parameters



Body 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%.

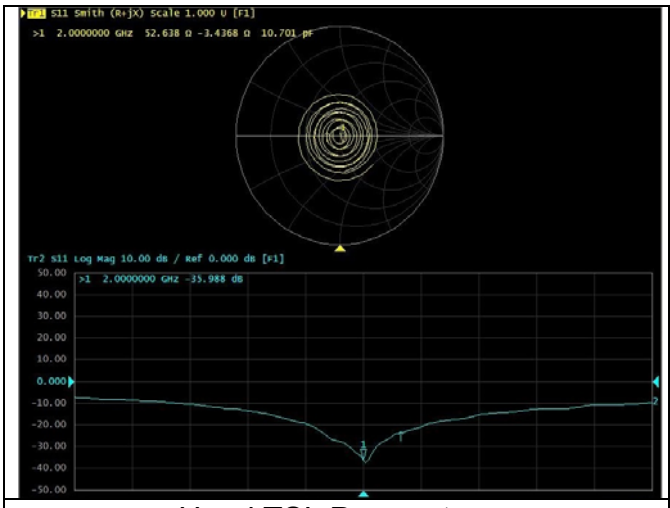
Impedance and Return loss measured by Network analyzer

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

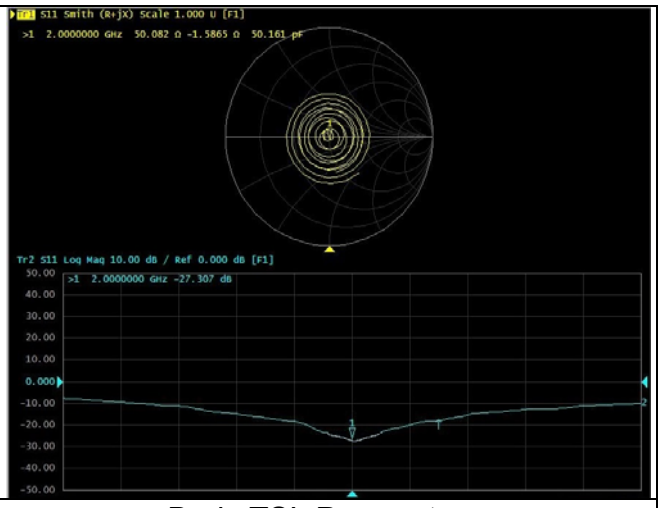
The most recent return-loss result (measured on 2018.8.20) deviates within 20% from the previous measurement. (Data from the last calibration report)

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

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



Head TSL Parameters



Body 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%.

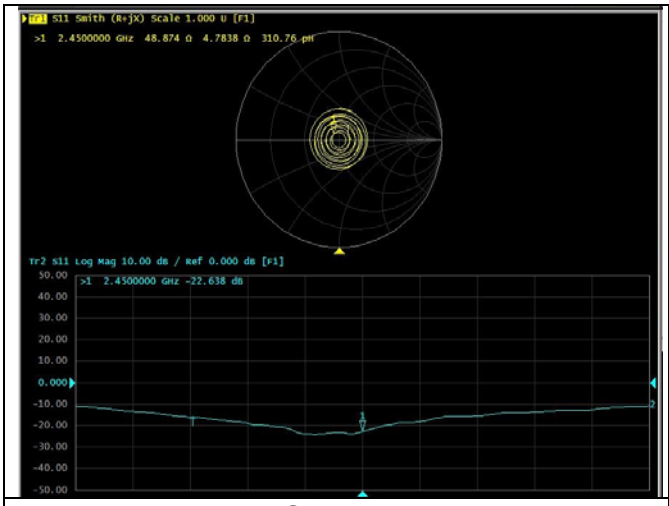
Impedance and Return loss measured by Network analyzer

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

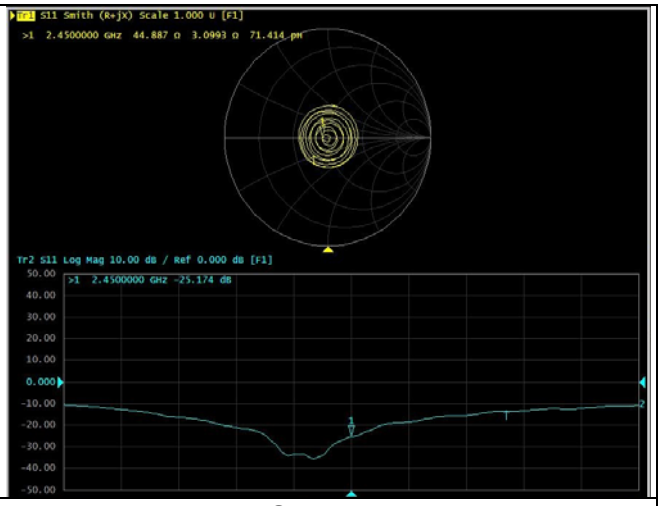
The most recent return-loss result (measured on 2018.8.20) deviates within 20% from the previous measurement. (Data from the last calibration report)

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

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



Head TSL Parameters



Body TSL Parameters

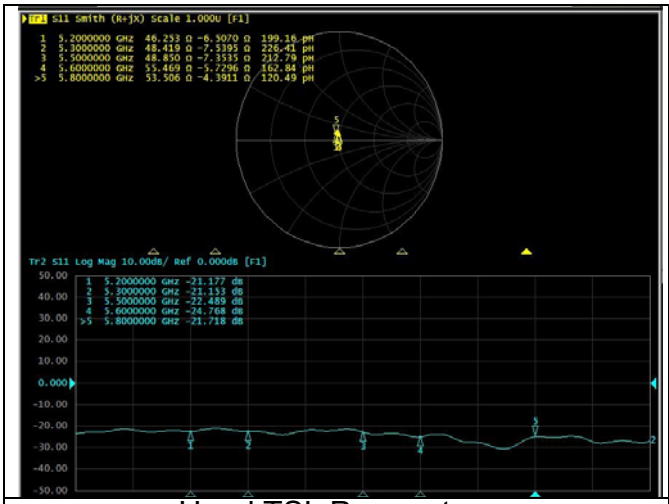
Dipole5GHz

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

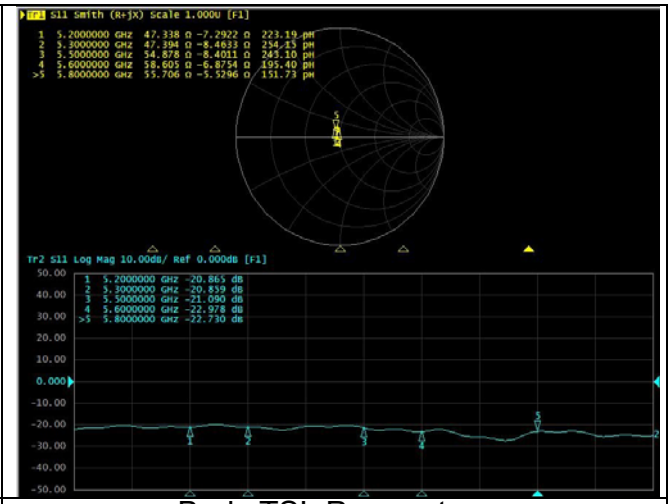
Impedance and Return loss measured by Network analyzer
The most recent measurement of the real or imaginary parts of the impedance (measured on 2018.8.20), deviates within 5 Ω from the previous measurement. (Data from the last calibration report)
The most recent return-loss result (measured on 2018.8.20) deviates within 20% from the previous measurement. (Data from the last calibration report)

Head TSL Parameters				
Parameters	Target (Ref. Value)	Measured data	Deviation	Frequency (MHz)
Impedance	47.6Ω-8.77jΩ	46.3Ω-6.51jΩ	<5Ω	5200
Return loss	-20.7dB	-20.9dB	<20%	5200
Impedance	45.5Ω-6.82jΩ	48.4Ω-7.54jΩ	<5Ω	5300
Return loss	-21.4dB	-20.9dB	<20%	5300
Impedance	50.7Ω-7.14jΩ	48.9Ω-7.35jΩ	<5Ω	5500
Return loss	-23.0dB	-20.9dB	<20%	5500
Impedance	55.2Ω-4.00jΩ	55.5Ω-5.73jΩ	<5Ω	5600
Return loss	-24.1dB	-20.9dB	<20%	5600
Impedance	52.2Ω-8.20jΩ	53.5Ω-4.39jΩ	<5Ω	5800
Return loss	-21.6dB	-20.9dB	<20%	5800

Body TSL Parameters				
Parameters	Target (Ref. Value)	Measured data	Deviation	Frequency (MHz)
Impedance	50.8Ω-10.10jΩ	47.3Ω-7.29jΩ	<5Ω	5200
Return loss	-20.0dB	-20.9dB	<20%	5200
Impedance	48.5Ω-8.56jΩ	47.4Ω-8.46jΩ	<5Ω	5300
Return loss	-21.1dB	-20.9dB	<20%	5300
Impedance	54.9Ω-6.85jΩ	54.9Ω-8.40jΩ	<5Ω	5500
Return loss	-21.9dB	-21.1dB	<20%	5500
Impedance	56.6Ω-2.29jΩ	58.6Ω-6.88jΩ	<5Ω	5600
Return loss	-23.7dB	-23.0dB	<20%	5600
Impedance	56.7Ω-8.10jΩ	55.7Ω-5.53jΩ	<5Ω	5800
Return loss	-20.2dB	-22.7dB	<20%	5800



Head TSL Parameters



Body TSL Parameters

Additional test equipment used in testing:

Test Equipment	Model	Serial Number	Calibration date	Calibration Due data
Signal Generator	E4428C	MY45280865	2018.08.20	2019.08.19
Signal Generator	SML 03	103514	2018.08.20	2019.08.19
Power meter	E4417A	MY45101182	2018.08.20	2019.08.19
Power Sensor	E4412A	MY41502214	2018.08.20	2019.08.19
Power Sensor	E4412A	MY41502130	2018.08.20	2019.08.19
Power meter	E4417A	MY45101004	2018.08.20	2019.08.19
Power Sensor	E9300B	MY41496001	2018.08.20	2019.08.19
Power Sensor	E9300B	MY41496003	2018.08.20	2019.08.19
Communication Tester	MT8820C	6201300660	2018.08.20	2019.08.19
Vector Network Analyzer	VNA R140	0011213	2018.10.17	2019.10.16
Dielectric Parameter Probe	DAKS-3.5	1042	2018.10.17	2019.10.16
Network Analyzer	E5072A	MY51100334	2018.03.01	2019.02.28
Measurement System	firmware		software	
DASY	DASY5PRO		Dasy52.10.1.1476	

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%.

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

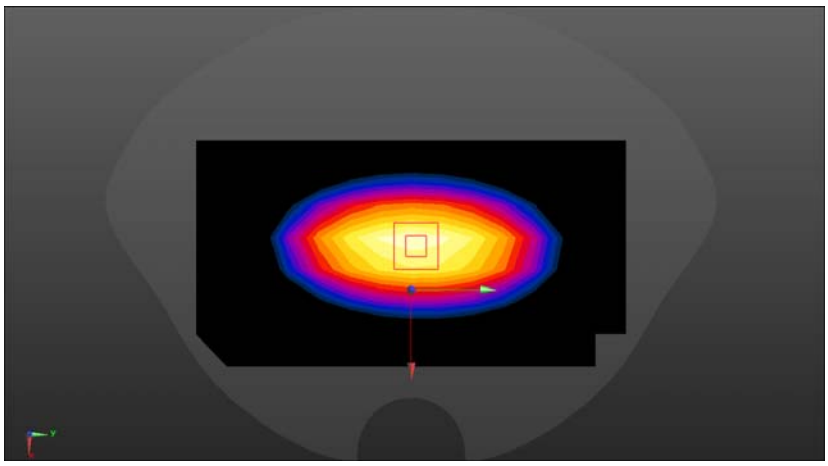
Body liquid

System check	835MHz

Communication System: UID 0, CW (0); Frequency: 835 MHz
Medium parameters used (interpolated): f = 835 MHz; σ = 0.966 S/m; ε_r = 55.236; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(6.13, 6.13, 6.13); Calibrated: 2018/11/2;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 2018/10/15
- Phantom: 1659; 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) = 2.57 W/kg
  Configuration 835/835/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
  Reference Value = 51.34 V/m; Power Drift = 0.19 dB
  Peak SAR (extrapolated) = 3.26 W/kg
  SAR(1 g) = 2.24 W/kg; SAR(10 g) = 1.45 W/kg
  Maximum value of SAR (measured) = 2.58 W/kg



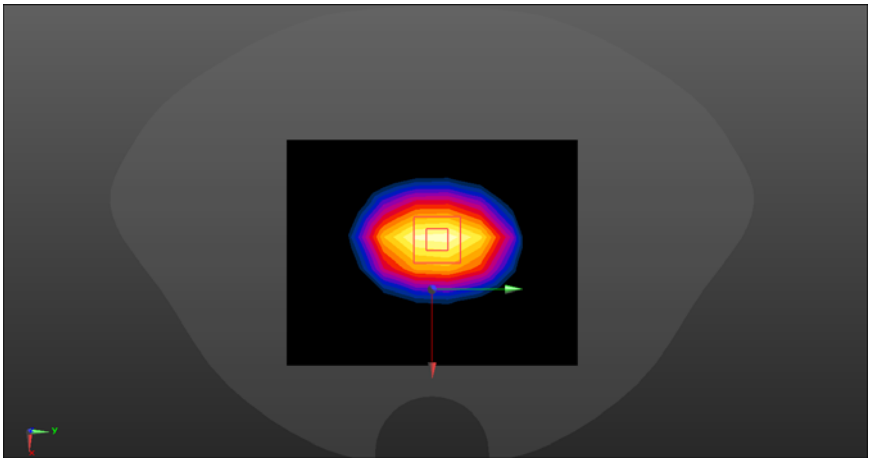
System check	1800MHz

Communication System: UID 0, CW (0); Frequency: 1800 MHz
Medium parameters used: f = 1800 MHz; σ = 1.502 S/m; ε_r = 53.287; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(4.76, 4.76, 4.76); Calibrated: 2018/11/2;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 2018/10/15
- Phantom: 1659; 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 (8x10x1): Measurement grid: dx=15mm, dy=15mm
  Maximum value of SAR (measured) = 11.5 W/kg
  Configuration 1800/1800/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
  Reference Value = 80.17 V/m; Power Drift = 0.05 dB
  Peak SAR (extrapolated) = 17.8 W/kg
  SAR(1 g) = 9.52 W/kg; SAR(10 g) = 5.03 W/kg
  Maximum value of SAR (measured) = 12.4 W/kg

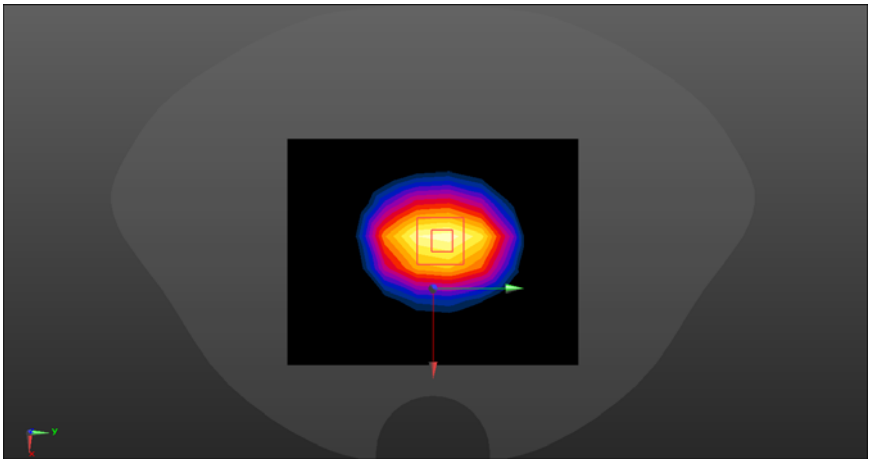


System check	2000MHz

Communication System: UID 0, CW (0); Frequency: 2000 MHz
Medium parameters used: f = 2000 MHz; σ = 1.586 S/m; ε_r = 52.557; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(4.80, 4.80, 4.80); Calibrated: 2018/11/2;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 2018/10/15
- Phantom: 1660; Type: QD 000 P40 CD; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)
  Configuration 2000/2000/Area Scan (8x10x1): Measurement grid: dx=12mm, dy=12mm
  Maximum value of SAR (measured) = 11.1 W/kg
  Configuration 2000/2000/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
  Reference Value = 78.14 V/m; Power Drift = 0.05 dB
  Peak SAR (extrapolated) = 17.8 W/kg
  SAR(1 g) = 9.84 W/kg; SAR(10 g) = 4.78 W/kg
  Maximum value of SAR (measured) = 12.1 W/kg

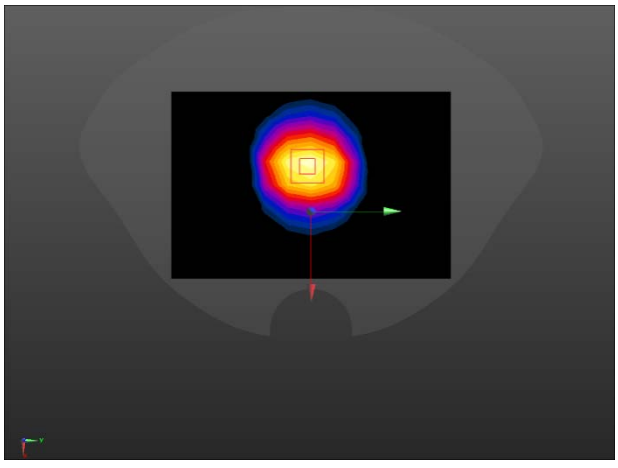


System check	2450MHz

Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz); Frequency: 2450 MHz;
Medium parameters used: f = 2450 MHz; σ = 2.017 S/m; ε_r = 51.146; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: ES3DV3 - SN3127; ConvF(4.31, 4.31, 4.31); Calibrated: 2018/11/2;
- Sensor-Surface: 3mm (Mechanical Surface Detection), z = -3.0, 32.0
- Electronics: DAE4 Sn546; Calibrated: 2018/10/15
- Phantom: 1659; Type: QD 000 P40 CD; Serial: xxxx
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)
  System Performance Check at Frequencies 2450MHz Head/d=10mm, Pin=250 mW, dist=4.0mm (EX-Probe)/Area Scan (9x13x1): Measurement grid: dx=12mm, dy=12mm
  Maximum value of SAR (measured) = 13.4 W/kg
  System Performance Check at Frequencies 2450MHz Head/d=10mm, Pin=250 mW, dist=4.0mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
  Measurement grid: dx=5mm, dy=5mm, dz=5mm
  Reference Value = 62.29 V/m; Power Drift = 0.12 dB
  Peak SAR (extrapolated) = 29.3 W/kg
  SAR(1 g) = 13.03 W/kg; SAR(10 g) = 6.11 W/kg
  Maximum value of SAR (measured) = 18.9 W/kg

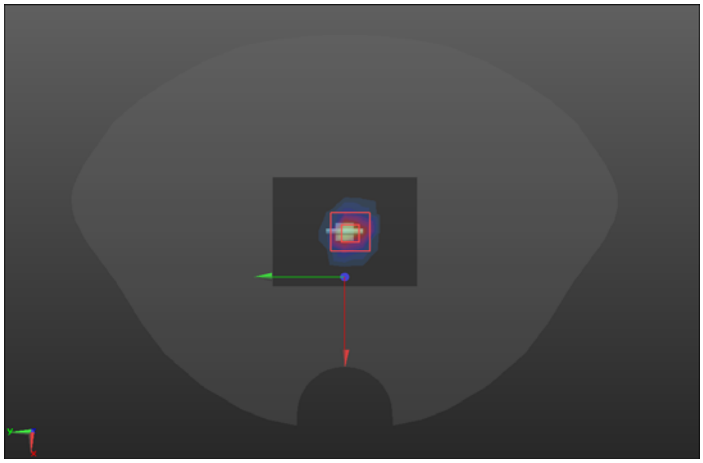


System check	5300MHz

Communication System: UID 0, CW (0); Frequency: 5300 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5300 MHz; σ = 5.465 S/m; ε_r = 48.792; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3708; ConvF(4.41, 4.41, 4.41); Calibrated: 2018/10/22;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn720; Calibrated: 2018/10/15
- Phantom: Twin-SAM 1560; Type: QD 000 P40 CD; Serial: xxxx
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.10 (7373)
  body/5300MHz/Area Scan (7x9x1): Measurement grid: dx=10mm, dy=10mm
  Maximum value of SAR (measured) = 1.90 W/kg
  body/5300MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
  Reference Value = 21.43 V/m; Power Drift = -0.06 dB
  Peak SAR (extrapolated) = 3.49 W/kg
  SAR(1 g) = 0.723 W/kg; SAR(10 g) = 0.220 W/kg
  Maximum value of SAR (measured) = 2.09 W/kg



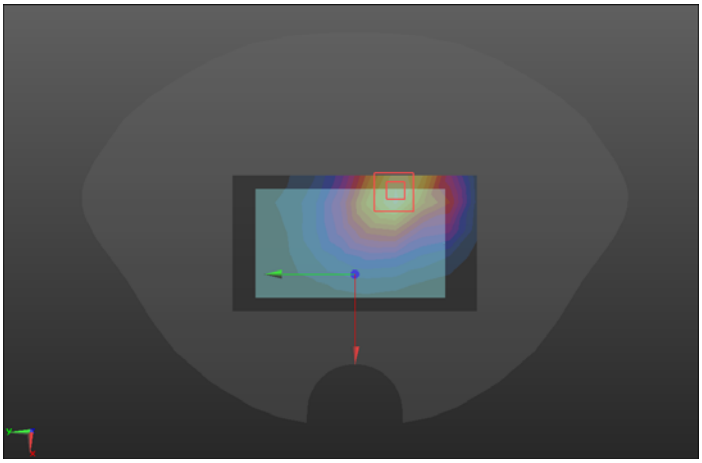
GSM (850MHz with GPRS/Flat)

Body worn&Hotspot	Back

Communication System: UID 0, Generic GSM (0); Frequency: 836.6 MHz;Duty Cycle: 3:8.30042
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.976 S/m; ε_r = 55.195; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(6.13, 6.13, 6.13); Calibrated: 2018/11/2;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 2018/10/15
- Phantom: 1659; Type: QD 000 P40 CD; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)
  BACK&FRONT/BACK GPRS850/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm
  Maximum value of SAR (measured) = 0.843 W/kg
  BACK&FRONT/BACK GPRS850/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
  Reference Value = 19.45 V/m; Power Drift = -0.20 dB
  Peak SAR (extrapolated) = 1.22 W/kg
  SAR(1 g) = 0.740 W/kg; SAR(10 g) = 0.468 W/kg
  Maximum value of SAR (measured) = 0.887 W/kg



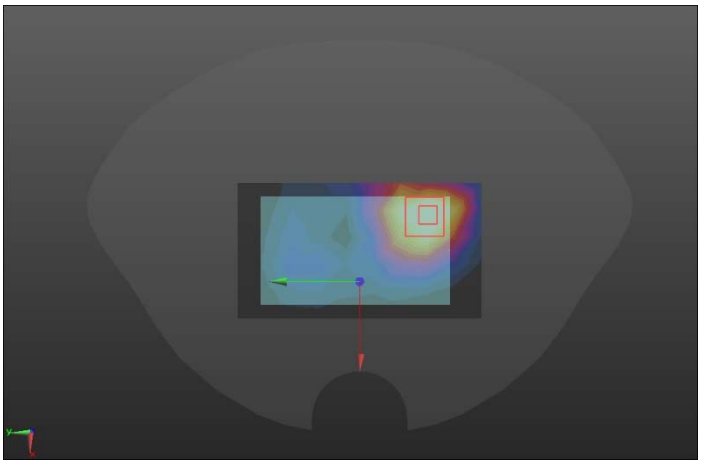
GSM (1900MHz with GPRS/Flat)

Body worn&Hotspot	Back

Communication System: UID 0, Generic GSM (0); Frequency: 1880 MHz;Duty Cycle: 3:8.30042
Medium parameters used (interpolated): f = 1880 MHz; σ = 1.526 S/m; ε_r = 53.291; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(4.76, 4.76, 4.76); Calibrated: 2018/11/2;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 2018/10/15
- Phantom: 1659; Type: QD 000 P40 CD; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)
  BACK&FRONT/f GPRS1900/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm
  Maximum value of SAR (measured) = 0.643 W/kg
  BACK&FRONT/f GPRS1900/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
  Reference Value = 7.276 V/m; Power Drift = -0.08 dB
  Peak SAR (extrapolated) = 0.804 W/kg
  SAR(1 g) = 0.473 W/kg; SAR(10 g) = 0.278 W/kg
  Maximum value of SAR (measured) = 0.559 W/kg



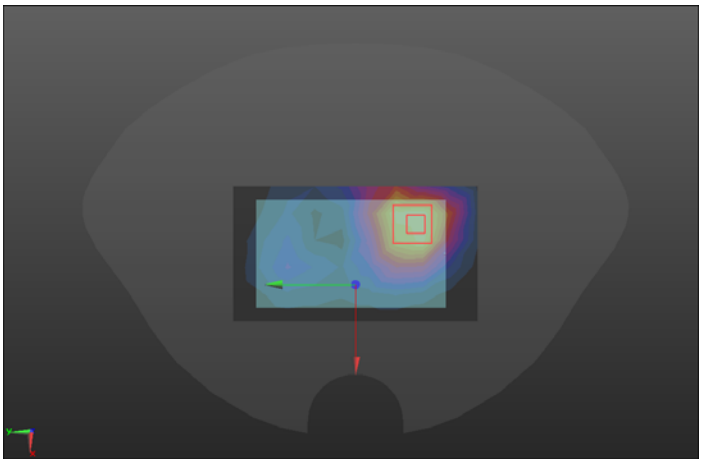
WCDMA Band II

Body worn&Hotspot	Back

Communication System: UID 0, WCDMA BAND2 (0); Frequency: 1880 MHz; Medium parameters used (interpolated): f = 1880 MHz; σ = 1.526 S/m; ε_r = 53.291; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(4.76, 4.76, 4.76); Calibrated: 2018/11/2;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 2018/10/15
- Phantom: 1659; Type: QD 000 P40 CD; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)
  BACK&FRONT/BACK WCDMA B2/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm
  Maximum value of SAR (measured) = 1.24 W/kg
  BACK&FRONT/BACK WCDMA B2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
  Reference Value = 12.92 V/m; Power Drift = -0.09 dB
  Peak SAR (extrapolated) = 1.86 W/kg
  SAR(1 g) = 1.13 W/kg; SAR(10 g) = 0.681 W/kg
  Maximum value of SAR (measured) = 1.34 W/kg



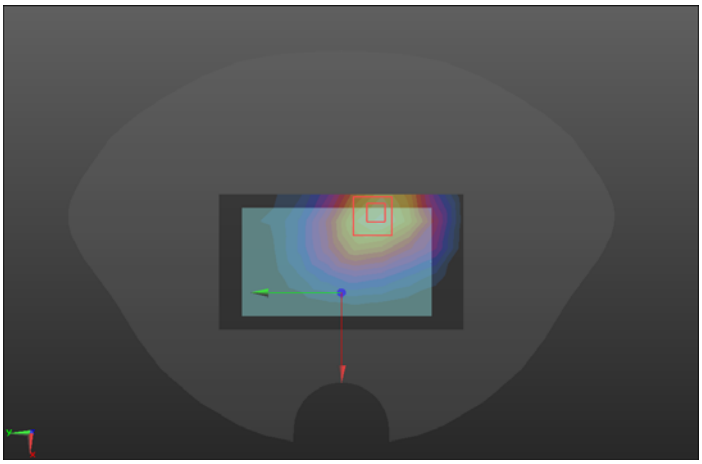
WCDMA Band V

Body worn&Hotspot	Back

Communication System: UID 0, WCDMA BAND 5 (0); Frequency: 836.6 MHz;
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.976 S/m; ε_r = 55.195; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(6.13, 6.13, 6.13); Calibrated: 2018/11/2;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 2018/10/15
- Phantom: 1659; Type: QD 000 P40 CD; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)
  BACK&FRONT/BACK WCDMA B5/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm
  Maximum value of SAR (measured) = 0.761 W/kg
  BACK&FRONT/BACK WCDMA B5/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
  Reference Value = 20.27 V/m; Power Drift = 0.06 dB
  Peak SAR (extrapolated) = 1.02 W/kg
  SAR(1 g) = 0.677 W/kg; SAR(10 g) = 0.443 W/kg
  Maximum value of SAR (measured) = 0.785 W/kg



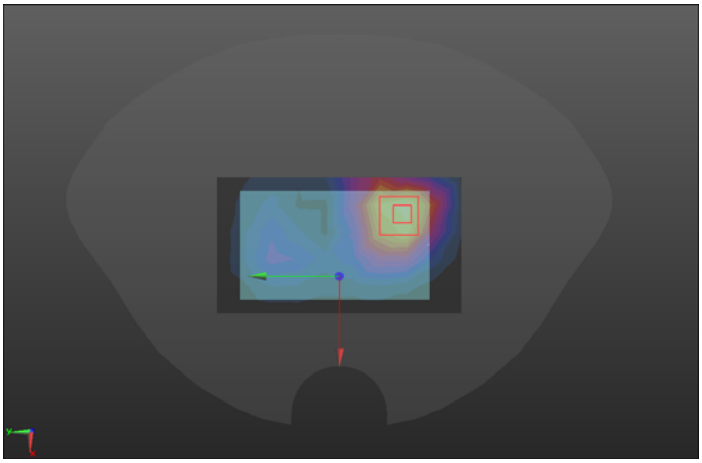
LTE Band 2 (20BW 1RB)

Body worn&Hotspot	Back

Communication System: UID 0, LTE band 02 (0); Frequency: 1880 MHz;
Medium parameters used (interpolated): f = 1880 MHz; σ = 1.526 S/m; ε_r = 53.291; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(4.76, 4.76, 4.76); Calibrated: 2018/11/2;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 2018/10/15
- Phantom: 1659; Type: QD 000 P40 CD; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)
  BACK&FRONT/B LTE2/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm
  Maximum value of SAR (measured) = 1.07 W/kg
  BACK&FRONT/B LTE2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
  Reference Value = 12.25 V/m; Power Drift = -0.16 dB
  Peak SAR (extrapolated) = 1.62 W/kg
  SAR(1 g) = 0.975 W/kg; SAR(10 g) = 0.581 W/kg
  Maximum value of SAR (measured) = 1.16 W/kg



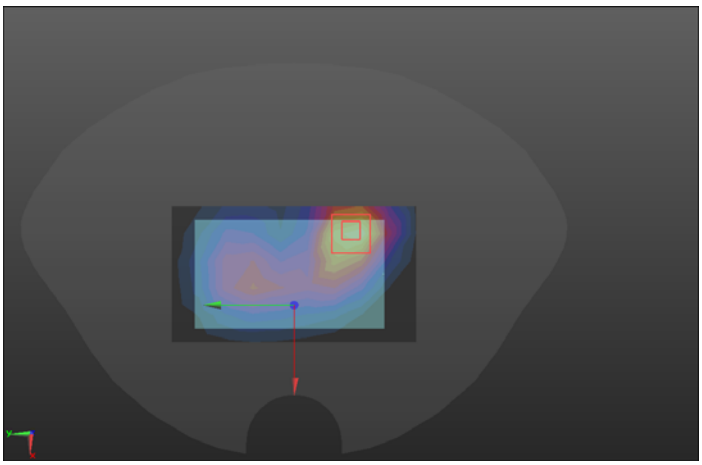
LTE Band 4 (20BW 1RB)

Body worn&Hotspot	Back

Communication System: UID 0, LTE band 4 (0); Frequency: 1732.5 MHz;
Medium parameters used (interpolated): f = 1732.5 MHz; σ = 1.477 S/m; ε_r = 53.46; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(4.76, 4.76, 4.76); Calibrated: 2018/11/2;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 2018/10/15
- Phantom: 1659; Type: QD 000 P40 CD; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)
  BACK&FRONT/B LTE4/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm
  Maximum value of SAR (measured) = 1.25 W/kg
  BACK&FRONT/B LTE4/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
  Reference Value = 20.40 V/m; Power Drift = -0.04 dB
  Peak SAR (extrapolated) = 1.87 W/kg
  SAR(1 g) = 1.11 W/kg; SAR(10 g) = 0.650 W/kg
  Maximum value of SAR (measured) = 1.34 W/kg



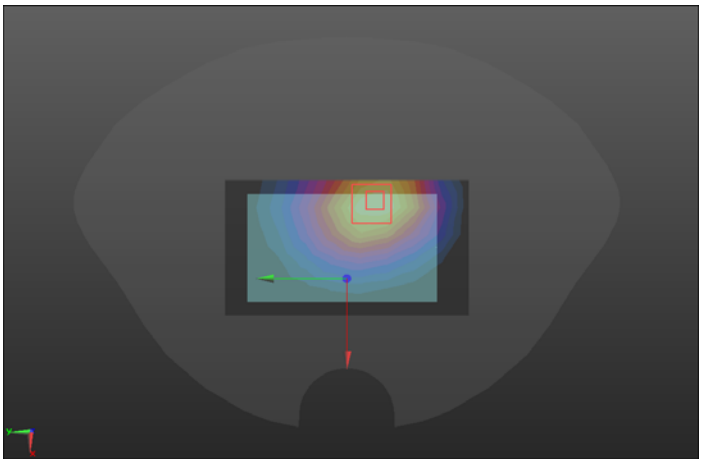
LTE Band 5 (10BW 1RB)

Body worn&Hotspot	Back

Communication System: UID 0, LTE Band 5 (0); Frequency: 836.5 MHz;
Medium parameters used (interpolated): f = 836.5 MHz; σ = 0.976 S/m; ε_r = 55.195; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(6.13, 6.13, 6.13); Calibrated: 2018/11/2;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 2018/10/15
- Phantom: 1659; Type: QD 000 P40 CD; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)
  BACK&FRONT/B LTE5/Area Scan (6x10x1): Measurement grid: dx=15mm, dy=15mm
  Maximum value of SAR (measured) = 0.812 W/kg
  BACK&FRONT/B LTE5/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
  Reference Value = 22.18 V/m; Power Drift = 0.04 dB
  Peak SAR (extrapolated) = 1.09 W/kg
  SAR(1 g) = 0.730 W/kg; SAR(10 g) = 0.506 W/kg
  Maximum value of SAR (measured) = 0.865 W/kg



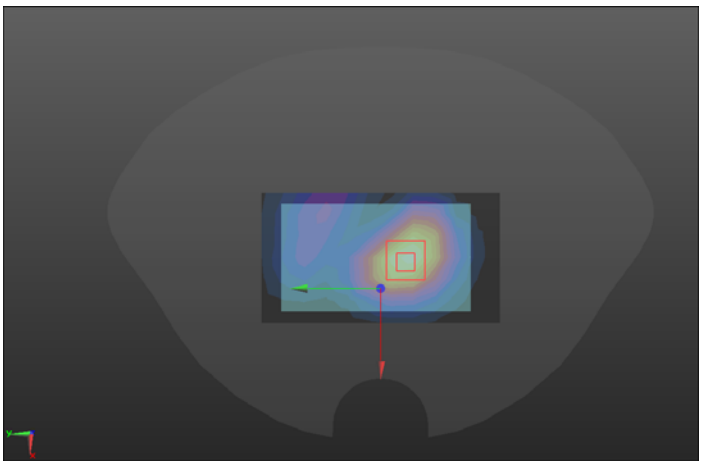
LTE Band 7 (20BW 1RB)

Body worn&Hotspot	Back

Communication System: UID 0, LTE Band 7 (0); Frequency: 2535 MHz;
Medium parameters used (interpolated): f = 2535 MHz; σ = 2.067 S/m; ε_r = 52.592; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(4.31, 4.31, 4.31); Calibrated: 2018/11/2;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 2018/10/15
- Phantom: 1659; Type: QD 000 P40 CD; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)
  BACK&FRONT/B lte7/Area Scan (7x12x1): Measurement grid: dx=12mm, dy=12mm
  Maximum value of SAR (measured) = 1.51 W/kg
  BACK&FRONT/B lte7/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
  Reference Value = 24.40 V/m; Power Drift = -0.13 dB
  Peak SAR (extrapolated) = 2.30 W/kg
  SAR(1 g) = 1.25 W/kg; SAR(10 g) = 0.686 W/kg
  Maximum value of SAR (measured) = 1.53 W/kg



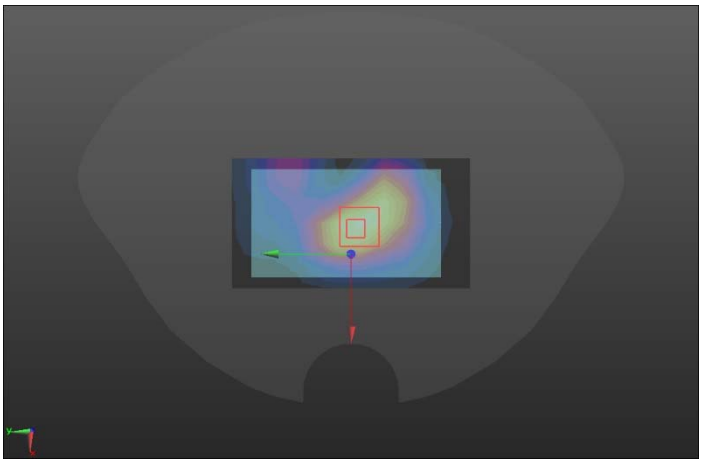
LTE Band 38
20BW 1RB

Body worn&Hotspot	Back

Communication System: UID 0, LTE Band 38 (0); Frequency: 2595 MHz;
Medium parameters used (interpolated): f = 2595 MHz; σ = 2.153 S/m; ε_r = 52.516; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(4.14, 4.14, 4.14); Calibrated: 2018/11/2;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 2018/10/15
- Phantom: 1659; Type: QD 000 P40 CD; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)
  BACK&FRONT/B LTE38/Area Scan (7x12x1): Measurement grid: dx=12mm, dy=12mm
  Maximum value of SAR (measured) = 0.645 W/kg
  BACK&FRONT/B LTE38/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
  Reference Value = 17.75 V/m; Power Drift = -0.03 dB
  Peak SAR (extrapolated) = 1.01 W/kg
  SAR(1 g) = 0.538 W/kg; SAR(10 g) = 0.296 W/kg
  Maximum value of SAR (measured) = 0.660 W/kg



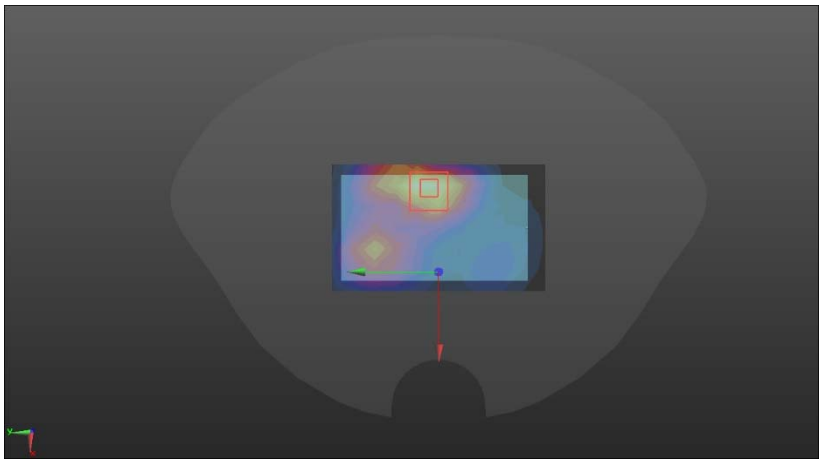
WLAN 2.4GHz-MIMO

Body worn&Hotspot	Back

Communication System: UID 0, WIFI 2.4GHz (0); Frequency: 2437 MHz;
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.933 S/m; ε_r = 52.717; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ES3DV3 - SN3127; ConvF(4.31, 4.31, 4.31); Calibrated: 2018/11/2;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn546; Calibrated: 2018/10/15
- Phantom: 1659; Type: QD 000 P40 CD; Serial: xxxx
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7373)
- **BACK&FRONT/BACK MIMO 2.4/Area Scan (7x11x1):** Measurement grid: dx=12mm, dy=12mm
  Maximum value of SAR (measured) = 0.425 W/kg
  BACK&FRONT/BACK MIMO 2.4/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
  Reference Value = 10.14 V/m; Power Drift = 0.12 dB
  Peak SAR (extrapolated) = 0.375 W/kg
  SAR(1 g) = 0.180 W/kg; SAR(10 g) = 0.082 W/kg
  Maximum value of SAR (measured) = 0.332 W/kg



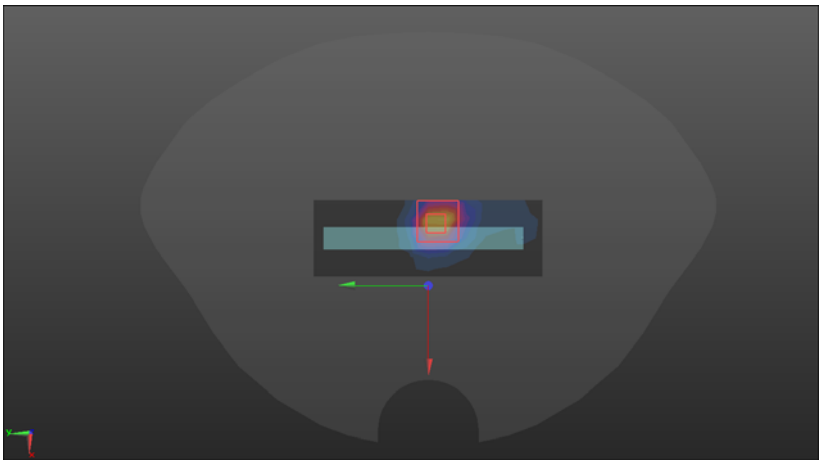
WLAN 5GHz-MIMO

Hotspot	Top

Communication System: UID 10062 - CAB, IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps);
Frequency: 5200 MHz;
Medium parameters used: f = 5200 MHz; σ = 5.355 S/m; ε_r = 49.035; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3708; ConvF(4.53, 4.53, 4.53); Calibrated: 10/22/2018, ConvF(4.53, 4.53, 4.53); Calibrated: 10/22/2018;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn720; Calibrated: 10/15/2018
- Phantom: Twin-SAM 1560; Type: QD 000 P40 CD; Serial: xxxx
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7437)
  TOP 16/TOP MIMO 10/Area Scan (5x13x1): Measurement grid: dx=10mm, dy=10mm
  Maximum value of SAR (measured) = 0.993 W/kg
  TOP 16/TOP MIMO 10/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
  Reference Value = 12.59 V/m; Power Drift = -0.08 dB
  Peak SAR (extrapolated) = 1.87 W/kg
  SAR(1 g) = 0.895 W/kg; SAR(10 g) = 0.474 W/kg
  Maximum value of SAR (measured) = 1.22 W/kg



ANNEX B – RELEVANT PAGES FROM CALIBRATION REPORTS

DAE4 Sn:546

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Client : SRTC Certificate No: Z18-60400

CALIBRATION CERTIFICATE

Object	DAE4 - SN: 546
Calibration Procedure(s)	FF-Z11-002-01 Calibration Procedure for the Data Acquisition Electronics (DAEx)
Calibration date:	October 15, 2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Process Calibrator 753	1971018	20-Jun-18 (CTTL, No.J18X05034)	June-19

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

Issued: October 17, 2018

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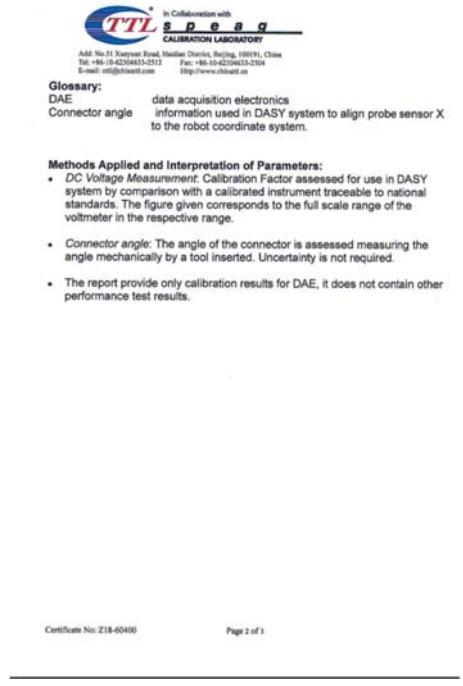
Certificate No: Z18-60400 Page 1 of 3



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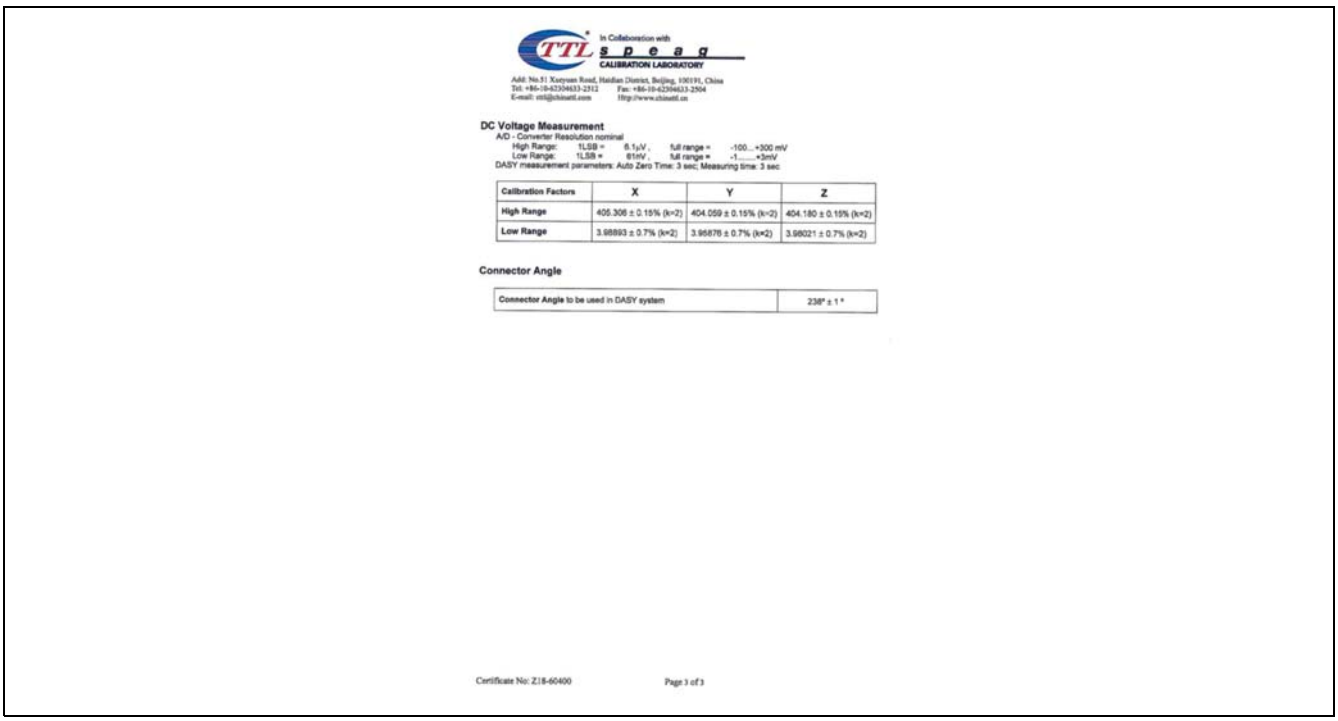
Glossary:

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

Methods Applied and Interpretation of Parameters:

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

Certificate No: Z18-60400 Page 2 of 3



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DC Voltage Measurement

A/D - Converter Resolution nominal
High Range: 1LSB = 6.1μV, full range = -100...+300 mV
Low Range: 1LSB = 61nV, full range = -1.....+3mV
DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

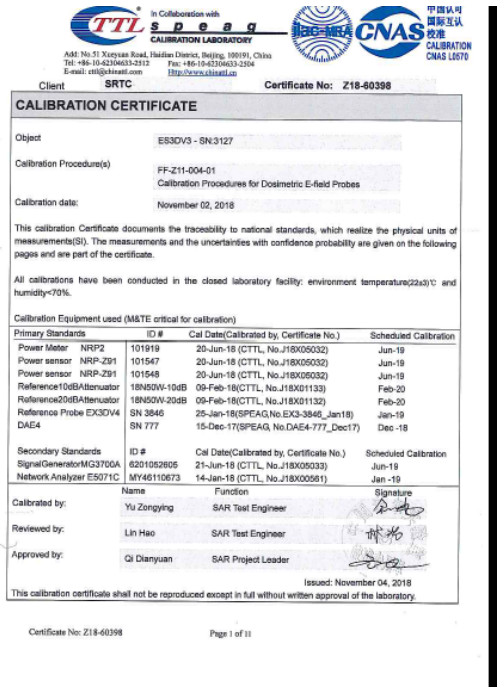
Calibration Factors	X	Y	Z
High Range	405.306 ± 0.15% (k=2)	404.059 ± 0.15% (k=2)	404.180 ± 0.15% (k=2)
Low Range	3.98893 ± 0.7% (k=2)	3.95876 ± 0.7% (k=2)	3.98021 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	238° ± 1 °

Certificate No: Z18-60400 Page 3 of 3

ES3DV3 Sn:3127



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Client SRTC Certificate No: Z18-60398

CALIBRATION CERTIFICATE

Object	ES3DV3 - SN:3127
Calibration Procedure(s)	FF-Z11-004-01 Calibration Procedures for Dosimetric E-field Probes
Calibration date:	November 02, 2018

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	20-Jun-18 (CTTL, No.J18X05032)	Jun-19
Power sensor NRP-Z91	101547	20-Jun-18 (CTTL, No.J18X05032)	Jun-19
Power sensor NRP-Z91	101548	20-Jun-18 (CTTL, No.J18X05032)	Jun-19
Reference10dBAttenuator	18N50W-10dB	09-Feb-18(CTTL, No.J18X01133)	Feb-20
Reference20dBAttenuator	18N50W-20dB	09-Feb-18(CTTL, No.J18X01132)	Feb-20
Reference Probe EX3DV4	SN 3846	25-Jan-18(SPEAG,No.EX3-3846_Jan18)	Jan-19
DAE4	SN 777	15-Dec-17(SPEAG, No.DAE4-777_Dec17)	Dec -18
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
SignalGeneratorMG3700A	6201052605	21-Jun-18 (CTTL, No.J18X05033)	Jun-19
Network Analyzer E5071C	MY46110673	14-Jan-18 (CTTL, No.J18X00561)	Jan -19

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

Issued: November 04, 2018

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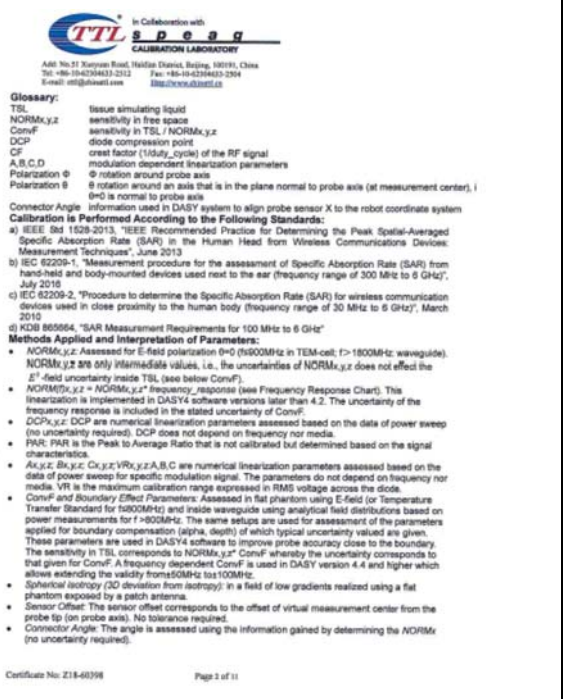
Certificate No: Z18-60398 Page 1 of 11



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Glossary:

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

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z*: Assessed for E-field polarization θ=0 (fs900MHz in TEM-cell; f>1800MHz: waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below ConvF).
- *NORM(f)x,y,z = NORMx,y,z* frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- *DCPx,y,z*: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics.
- *Ax,y,z; Bx,y,z; Cx,y,z; VRx,y,z*: A,B,C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters*: Assessed in flat phantom using E-field (or Temperature Transfer Standard for fs800MHz) and inside waveguide using analytical field distributions based on power measurements for f >800MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty valued are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from±50MHz to±100MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

Certificate No: Z18-60398 Page 2 of 11

Probe ES3DV3

SN: 3127

Calibrated: November 02, 2018

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

Certificate No: Z18-60398 Page 3 of 11

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

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm(μV/(V/m)²)[A]	1.27	1.26	1.21	±10.0%
DCP(mV)[B]	103.3	104.4	105.0	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB·μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	285.6	±2.2%
		Y	0.0	0.0	1.0		287.9	
		Z	0.0	0.0	1.0		282.9	

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

[A] The uncertainties of Norm X, Y, Z do not affect the E^2-field uncertainty inside TSL (see Page 5 and Page 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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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)	Unct. (k=2)
750	41.9	0.89	6.34	6.34	6.34	0.40	1.35	±12.1%
835	41.5	0.90	6.18	6.18	6.18	0.35	1.58	±12.1%
1810	40.0	1.40	5.07	5.07	5.07	0.66	1.24	±12.1%
2000	40.0	1.40	4.96	4.96	4.96	0.70	1.20	±12.1%
2300	39.5	1.67	4.79	4.79	4.79	0.90	1.08	±12.1%
2450	39.2	1.80	4.66	4.66	4.66	0.90	1.08	±12.1%
2600	39.0	1.96	4.40	4.40	4.40	0.80	1.21	±12.1%

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

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

Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz][C]	Relative Permittivity[F]	Conductivity (S/m)[F]	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unct. (k=2)
750	55.5	0.96	6.33	6.33	6.33	0.40	1.40	±12.1%
835	55.2	0.97	6.13	6.13	6.13	0.37	1.62	±12.1%
1810	53.3	1.52	4.76	4.76	4.76	0.65	1.27	±12.1%
2000	53.3	1.52	4.80	4.80	4.80	0.67	1.27	±12.1%
2300	52.9	1.81	4.46	4.46	4.46	0.90	1.15	±12.1%
2450	52.7	1.95	4.31	4.31	4.31	0.78	1.28	±12.1%
2600	52.5	2.16	4.14	4.14	4.14	0.90	1.10	±12.1%

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

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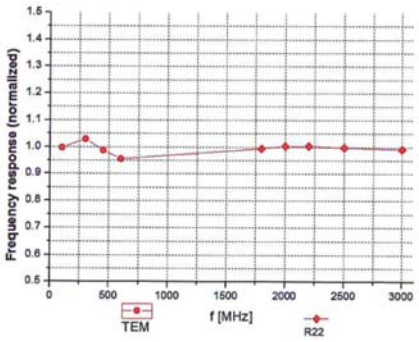
Frequency Response of E-Field
(TEM-Cell: ifi110 EXX, Waveguide: R22)



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

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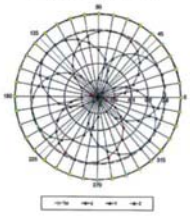
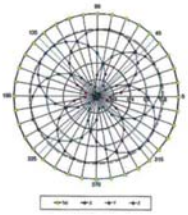
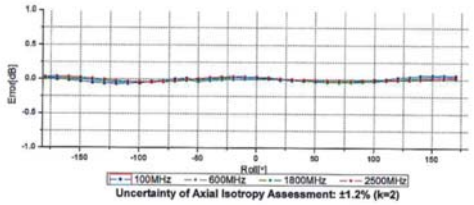
Receiving Pattern (Φ), θ=0°

f=600 MHz, TEM



f=1800 MHz, R22





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

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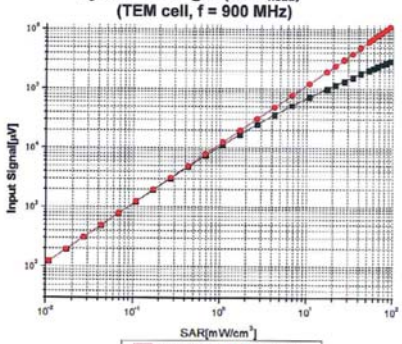
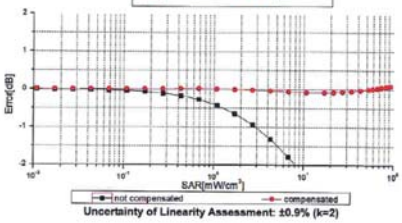
Dynamic Range f(SAR$_{head}$)
(TEM cell, f = 900 MHz)





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

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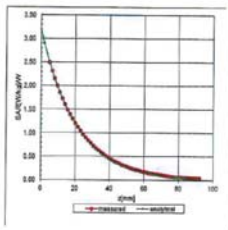
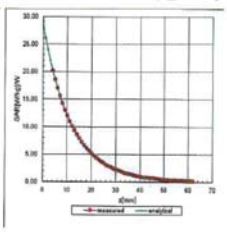
Conversion Factor Assessment

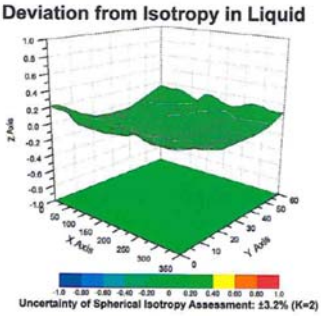
f=750 MHz, WGLS R9(H_convF)



f=1810 MHz, WGLS R22(H_convF)



Deviation from Isotropy in Liquid



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

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Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209
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Appendix: Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB√μV	C	VR mV	Unc[E] (k=2)
0	CW	0.00	X	0.0	0.0	1.0	282.3	±2.5%
			Y	0.0	0.0	1.0	280.9	
			Z	0.0	0.0	1.0	275.1	
10012	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	1.87	X	2.77	68.02	18.46	143.0	±1.8%
			Y	2.75	68.05	18.52	145.0	
			Z	2.71	67.79	18.25	142.3	
10100	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	5.67	X	6.13	66.4	18.97	141.9	±1.9%
			Y	6.15	66.49	19.06	144.2	
			Z	6.09	66.32	18.90	140.9	
10108	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	5.80	X	6.09	66.24	19.07	139.5	±1.9%
			Y	6.10	66.33	19.15	141.5	
			Z	6.05	66.19	19.05	138.0	
10154	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	5.75	X	5.81	65.85	18.93	136.1	±1.9%
			Y	5.82	65.92	19.01	137.8	
			Z	5.79	65.89	18.97	134.7	
10169	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	5.73	X	4.84	65.92	19.20	130.8	±1.9%
			Y	4.82	65.98	19.27	131.3	
			Z	4.80	66.00	19.29	129.1	
10175	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	5.72	X	4.88	66.14	19.40	131.6	±1.9%
			Y	4.83	66.08	19.33	130.9	
			Z	4.79	66.02	19.29	129.3	
10297	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	5.81	X	6.19	66.61	19.42	141.9	±1.9%
			Y	6.13	66.43	19.26	140.7	
			Z	6.14	66.52	19.33	139.6	

DAE4 Sn:720

In Collaboration with s p e a g CALIBRATION LABORATORY

Client : SRTC Certificate No: Z18-60399

CALIBRATION CERTIFICATE

Object: DAE4 - SN: 720

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

Calibration date: October 15, 2018

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

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

Calibration Equipment used (M&TE critical for calibration)

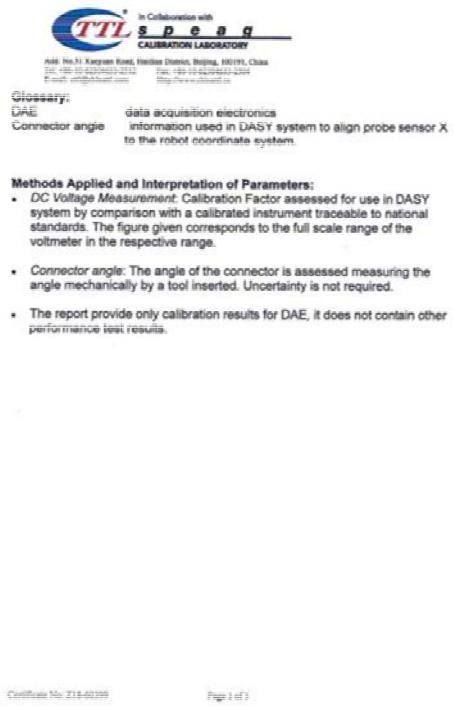
Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Process Calibrator 753	1971018	20-Jun-18 (CTTL, No.J18X05034)	June-19

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

Issued: October 17, 2018

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

Certificate No: Z18-60399 Page 1 of 3



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Glossary:

DAE data acquisition electronics

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

Methods Applied and Interpretation of Parameters:

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

Certificate No: Z18-60399 Page 2 of 3

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DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 14-bit = 6.1μV, full range = -100...+300 mV

Low Range: 14-bit = 61nV, full range = -1...+3 mV

DASY measurement parameters: Auto Zero Time: 5 sec; Measuring Time: 3 sec

Calibration Factors	X	Y	Z
High Range	403.543 ± 0.15% (k=2)	404.773 ± 0.15% (k=2)	403.566 ± 0.15% (k=2)
Low Range	3.99374 ± 0.7% (k=2)	3.99999 ± 0.7% (k=2)	3.99080 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	297° ± 1°

Certificate No: Z18-60399 Page 3 of 3