SAR TEST REPORT

For

QUALITY TECHNOLOGY INDUSTRIAL CO., LTD

KIDS WATCH

Test Model: BUBBLE

Additional Model No.: BUMBLEE

Prepared for	:	QUALITY TECHNOLOGY INDUSTRIAL CO., LTD
Address	:	Room 201, Block B3, Ming You Industrial Products Procurement Center 168 Bao Yuan Rd, Baoan District, Shenzhen, China

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Date of receipt of test sample	:	July 12, 2019
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	July 12, 2019~ August 02, 2019
Date of Report	:	August 27, 2019

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SAR TEST REPORT

Report Reference No.....:	**LCS190305160AEB**
Date Of Issue.....:	August 27, 2019
Testing Laboratory Name .....:	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address.....:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure .....:	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name.....:	**QUALITY TECHNOLOGY INDUSTRIAL CO., LTD**
Address.....:	Room 201, Block B3, Ming You Industrial Products Procurement Center 168 Bao Yuan Rd, Baoan District, Shenzhen, China
Test Specification:	
Standard .....:	IEEE Std C95.1, 2005/IEEE Std 1528™-2013/ FCC Part 2.1093
Test Report Form No. .....:	LCSEMC-1.0
TRF Originator.....:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF .....:	Dated 2014-09

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Test Item Description.....:	**KIDS WATCH**
Trade Mark.....:	/
Test Model .....:	BUBBLE
Operation Frequency.....:	GSM850/1900, WCDMA Band V/II/IV , WIFI2.4G , WIFI5.2G WIFI5.8G and LTE2,3,4,5,7,12,17,28
Ratings .....:	DC 3.8V by Rechargeable Li-ion Battery(550mAh) Recharged by DC 5V Adapter
Result .....:	**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Cherrie Wang	Aking Jin	Gavin Liang
CherrieWang / File administrators	Aking Jin / Technique principal	Gavin Liang/ Manager

SAR -- TEST REPORT

Test Report No. : LCS190305160AEB	August 27, 2019 Date of issue

Test Model.....	: BUBBLE
EUT.....	: KIDS WATCH
Applicant.....	**: QUALITY TECHNOLOGY INDUSTRIAL CO., LTD**
Address.....	: Room 201, Block B3, Ming You Industrial Products Procurement Center 168 Bao Yuan Rd, Baoan District, Shenzhen, China
Telephone.....	: /
Fax.....	: /
Manufacturer.....	**: QUALITY TECHNOLOGY INDUSTRIAL CO., LTD**
Address.....	: Room 201, Block B3, Ming You Industrial Products Procurement Center 168 Bao Yuan Rd, Baoan District, Shenzhen, China
Telephone.....	: /
Fax.....	: /
Factory.....	**: /**
Address.....	: /
Telephone.....	: /
Fax.....	: /

Test Result	**Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revison History

Revision	Issue Date	Revisions	Revised By
000	August 27, 2019	Initial Issue	Gavin Liang

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1. TEST STANDARDS AND TEST DESCRIPTION

1.1. Test Standards

IEEE Std C95.1, 2005: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 KHz to 300 GHz. It specifies the maximum exposure limit of 1.6 W/kg as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.
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.
FCC Part 2.1093 Radiofrequency Radiation Exposure Evaluation:Portable Devices
KDB447498 D01 General RF Exposure Guidance v06 : Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies
KDB648474 D04, Handset SAR v01r03: SAR Evaluation Considerations for Wireless Handsets
KDB865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04 : SAR Measurement Requirements for 100 MHz to 6 GHz
KDB865664 D02 RF Exposure Reporting v01r02: RF Exposure Compliance Reporting and Documentation Considerations
KDB941225 D01 3G SAR Procedures v03r01: 3G SAR MEAUREMENT PROCEDURES
KDB248227 D01 802.11 Wi-Fi SAR: SAR Guidance For Ieee 802.11 (Wi-Fi) Transmitters
KDB 941225 D06 Hotspot Mode: SAR Evaluation Procedures For Portable Devices With Wireless Router Capabilities

1.2. Test Description

The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power . And Test device is identical prototype.

1.3. General Remarks

Date of receipt of test sample	:	July 12, 2019
Testing commenced on	:	July 12, 2019
Testing concluded on	:	August 02, 2019

1.4. Product Description

The QUALITY TECHNOLOGY INDUSTRIAL CO., LTD's Model: BUBBLE or the "EUT" as referred to in this report; more general information as follows, for more details, refer to the user's manual of the EUT.

General Description	
Product Name:	KIDS WATCH
Trade Mark:	/
Model/Type reference:	BUBBLE
Listed Model(s):	BUMBLEE
Modulation Type:	GMSK for GSM/GPRS; 8-PSK for EDGE; QPSK for UMTS; QPSK, 16QAM for LTE
Model Declaration:	PCB board, structure and internal of these model(s) are the same, Only model name and shell color is different for these models.
Device category:	Portable Device
Exposure category:	General population/uncontrolled environment
EUT Type:	Prototype
Hardware Version	W230_MB_V2.0
Software Version:	W230_M_8GB_QVGA_FDD3M_ZNSD_ITAUI_EN_V00_USER_20190627
Power supply:	DC 3.8V by Rechargeable Li-ion Battery(550mAh) Recharged by DC 5V Adapter
The EUT is GSM,WCDMA, LTE kids watch. the BUBBLE is equipped with GSM850,GSM1900, WCDMA Band V, Band II, Band IV *,LTE 2,4,5,7,12,17, WiFi2.4G, WiFi5.2G and WiFi5.8G functions. For more information see the following datasheet*	

Technical Characteristics	
GSM	
Operation Frequency Band:	GSM850/PCS1900/GPRS850/GPRS1900/EDGE850/EDGE1900
Modulation Type:	GMSK for GSM/GPRS; 8-PSK for EDGE
GSM/EDGE/GPRS:	Supported GSM/GPRS/EDGE
GSM Release Version:	R99
GSM/EDGE/GPRS Power Class:	GSM850:Power Class 4/ PCS1900:Power Class 1
GPRS/EDGE Multislot Class:	GPRS/EDGE: Multi-slot Class 12
GPRS operation mode:	Class B
Antenna Description:	LDS Antenna: -2.2dBi (max.) For GSM 850; -2.4dBi (max.) For GSM 900; 1.6dBi (max.) For DCS 1800; 1.8dBi (max.) For PCS 1900;
UMTS	
Support Networks	WCDMA RMC12.2K,HSDPA,HSUPA
Support Band:	WCDMA Band V, Band II, Band IV
Power Class:	Class 3
Modulation Type:	QPSK
WCDMA Release Version:	R8
HSDPA Release Version:	Release 8
HSUPA Release Version:	Release 8
DC-HSUPA Release Version:	Not Supported
Antenna Description:	LDS Antenna: 1.8dBi for WCDMA Band II; 1.5dBi for WCDMA Band IV; -2.2dBi for WCDMA Band V;
LTE	
Support Band:	LTE FDD band 2, 3, 4, 5, 7, 12, 17, 28
Power Class:	Class 3
Modulation Type:	QPSK, 16QAM for LTE
LTE Release Version:	R9
Antenna Description:	LDS Antenna: -1.7dBi for LTE Band 2; -1.5dBi for LTE Band 3; 1.6dBi for LTE Band 4; -1.2dBi for LTE Band 5; 1.3dBi for LTE Band 7; -3.1dBi for LTE Band 12; -3.2dBi for LTE Band 17; -3.2dBi for LTE Band 28;
Bluetooth	
Version:	Supported BTV4.0
Modulation:	GFSK, π/4-DQPSK, 8-DPSK(BT V4.0)
Operation frequency:	2402MHz~2480MHz
Channel number:	40
Channel Spacing:	2MHz
Antenna Description:	-1.5dBi (max.) For BT
WIFI 2.4G	
Frequency Range:	2412MHz ~ 2462MHz
Operation frequency:	IEEE 802.11b:2412-2462MHz IEEE 802.11g/n20:2412-2462MHz IEEE 802.11n40:2422-2452MHz
Type of Modulation:	CCK,DQPSK,DBPSK, 64QAM, 16QAM, QPSK, BPSK
Channel separation:	5MHz
Antenna Description	LDS Antenna, -1.5dBi (max.)
WIFI 5.2G	
Frequency Range:	5180-5240MHz
Operation frequency:	IEEE 802.11a/n20: 5180-5240MHz IEEE 802.11n40: 5190-5230MHz
Type of Modulation:	64QAM, 16QAM, QPSK, BPSK
Antenna Description	LDS Antenna, -1.5dBi (max.)
WIFI 5.8G	

Frequency Range:	5745-5825MHz
Operation frequency:	IEEE 802.11a/n20: 5745-5825MHz IEEE 802.11n40: 5755-5795MHz
Type of Modulation:	64QAM, 16QAM, QPSK, BPSK
Antenna Description	LDS Antenna, -1.5dBi (max.)

1.5. Statement of Compliance

The maximum of results of SAR found during testing for BUBBLE are follows:

<Highest Reported standalone SAR Summary>

***Next – to – Mouth Exposure Conditions* - Flat / Front (10mm)**

Classment Class	Frequency Band	Highest Measured SAR_{1-g} (W/Kg)	SAR_{1-g} Limit
PCT	GSM 850	0.306	1.6
	GSM1900	0.412	
	WCDMA Band V	0.338	
	WCDMA Band IV	0.302	
	WCDMA Band II	0.469	
	LTE Band 2	0.318	
	LTE Band 4	**0.687**	
	LTE Band 5	0.286	
	LTE Band 7	0.153	
	LTE Band 12	0.341	
	LTE Band 17	0.435	
DTS	WIFI2.4G	0.180	
NII	WIFI5.2G	0.156	
	WIFI5.8G	0.079	

Extremity Exposure Conditions - Flat / Rear (0mm)

Classment Class	Frequency Band	Highest Measured SAR_{10-g} (W/Kg)	SAR_{10-g} Limit
PCT	GSM 850	1.165	4.0
	GSM1900	0.848	
	WCDMA Band V	1.906	
	WCDMA Band IV	1.070	
	WCDMA Band II	1.057	
	LTE Band 2	1.744	
	LTE Band 4	1.693	
	LTE Band 5	0.996	
	LTE Band 7	0.709	
	LTE Band 12	1.066	
	LTE Band 17	**1.923**	
DTS	WIFI2.4G	0.581	
NII	WIFI5.2G	0.526	
	WIFI5.8G	0.601	

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg for 1g) for Next – to Mouth Exousre – Flat/Front (10mm) and Extremity Exposure limit (4.0W/Kg for 10g) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-2005, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013.
The EUT battery must be fully charged and checked periodically during the test to ascertain iniform power output

<Highest Reported simultaneous SAR Summary>

***Next – to – Mouth Exposure Conditions* - Flat / Front (10mm)**

Exposure Position	Frequency Band	Reported SAR_{1-g} (W/kg)	Classment Class	Highest Reported Simultaneous Transmission SAR_{1-g} (W/Kg)
Next – to - Mouth	LTE Band 4	0.687	PCT	**0.867**
	WIFI2.4G	0.180	DTS	

Extremity Exposure Conditions - Flat / Rear (0mm)

Exposure Position	Frequency Band	Reported SAR_{10-g} (W/kg)	Classment Class	Highest Reported Simultaneous Transmission SAR_{10-g} (W/Kg)
Extremity Exposure	LTE Band 17	1.923	PCT	2.524
	WIFI5.8G	0.601	NII	

2. TEST ENVIRONMENT

2.1. Test Facility

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

Site Description

EMC Lab. : FCC Registration Number. is 254912.
Industry Canada Registration Number. is 9642A-1.
ESMD Registration Number. is ARCB0108.
UL Registration Number. is 100571-492.
TUV SUD Registration Number. is SCN1081.
TUV RH Registration Number. is UA 50296516-001.
NVLAP Registration Code is 600167-0.

2.2. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	18-25 ° C
Humidity:	40-65 %
Atmospheric pressure:	950-1050mbar

2.3. SAR Limits

FCC Limit (1g Tissue)

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average(averaged over the whole body)	0.08	0.4
Spatial Peak(averaged over any 1 g of tissue)	1.6	8.0
Spatial Peak(hands/wrists/ feet/anklesaveraged over 10 g)	4.0	20.0

Population/Uncontrolled Environments are defined as locations where there is the exposure of individual who have no knowledge or control of their exposure.
Occupational/Controlled Environments are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure (i.e. as a result of employment or occupation).

2.4. Equipments Used during the Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	PC	Lenovo	G5005	MY42081102	N/A	N/A
2	SAR Measurement system	SATIMO	4014_01	SAR_4014_01	N/A	N/A
3	Signal Generator	Agilent	E4438C	MY49072627	2019-06-11	2020-06-10
4	Multimeter	Keithley	MiltiMeter 2000	4059164	2018-11-15	2019-11-14
5	S-parameter Network Analyzer	Agilent	8753ES	US38432944	2018-11-15	2019-11-14
6	Wideband Radio Communication Tester	R&S	CMW500	103818-1	2018-11-15	2019-11-14
7	E-Field PROBE	SATIMO	SSE5	SN 17/14 EP220	2018-10-31	2019-10-30
8	DIPOLE 750	SATIMO	SID 750	SN 07/14 DIP 0G750-302	2018-10-01	2021-09-30
9	DIPOLE 835	SATIMO	SID 835	SN 07/14 DIP 0G835-303	2018-10-01	2021-09-30
10	DIPOLE 900	SATIMO	SID 900	SN 07/14 DIP 0G900-300	2018-10-01	2021-09-30
11	DIPOLE 1800	SATIMO	SID 1800	SN 07/14 DIP 1G800-301	2018-10-01	2021-09-30
12	DIPOLE 1900	SATIMO	SID 1900	SN 38/18 DIP 1G900-466	2018-09-24	2021-09-23
13	DIPOLE 2450	SATIMO	SID 2450	SN 07/14 DIP 2G450-306	2018-10-01	2021-09-30
14	DIPOLE 2600	SATIMO	SID 2600	SN 38/18 DIP 2G600-468	2018-09-24	2021-09-23
15	DIPOLE 5000-6000	SATIMO	SID 5000-6000	SN 49/16 WAG 43	2018-09-24	2021-09-23
16	COMOSAR OPENCoaxial Probe	SATIMO	OCPG 68	SN 40/14 OCPG68	2018-11-15	2019-11-14
17	SAR Locator	SATIMO	VPS51	SN 40/14 VPS51	2018-11-15	2019-11-14
18	Communication Antenna	SATIMO	ANTA57	SN 39/14 ANTA57	2018-11-15	2019-11-14
19	FEATURE PHONEPOSITIONING DEVICE	SATIMO	MSH98	SN 40/14 MSH98	N/A	N/A
20	DUMMY PROBE	SATIMO	DP60	SN 03/14 DP60	N/A	N/A
21	SAM PHANTOM	SATIMO	SAM117	SN 40/14 SAM117	N/A	N/A
22	Liquid measurement Kit	HP	85033D	3423A03482	2018-11-15	2019-11-14
23	Power meter	Agilent	E4419B	MY45104493	2019-06-11	2020-06-10
24	Power meter	Agilent	E4419B	MY45100308	2018-11-28	2019-11-27
25	Power sensor	Agilent	E9301H	MY41495616	2018-11-28	2019-11-27
26	Power sensor	Agilent	E9301H	MY41495234	2019-06-11	2020-06-10
27	Directional Coupler	MCLI/USA	4426-20	03746	2019-06-11	2020-06-10

Note:

1) Per KDB865664D01 requirements for dipole calibration, the test laboratory has adopted three year extended calibration interval. Each measured dipole is expected to evalute with following criteria at least on annual interval.

a) There is no physical damage on the dipole;

b) System check with specific dipole is within 10% of calibrated values;

c) The most recent return-loss results,measued at least annually,deviates by no more than 20% from the previous measurement;

d) The most recent measurement of the real or imaginary parts of the impedance, measured at least annually is within 5Ω from the provious measurement.

2) Network analyzer probe calibration against air, distilled water and a shorting block performed before measuring liquid parameters.

3. SAR MEASUREMENTS SYSTEM CONFIGURATION

3.1. SARMeasurement Set-up

The OPENSAR system for performing compliance tests consist of the following items:

A standard high precision 6-axis robot (KUKA) with controller and software.

KUKA Control Panel (KCP)

A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with a Video Positioning System(VPS).

The stress sensor is composed with mechanical and electronic when the electronic part detects a change on the electro-mechanical switch,It sends an “Emergency signal” to the robot controller that to stop robot’s moves

A computer operating Windows XP.

OPENSAR software

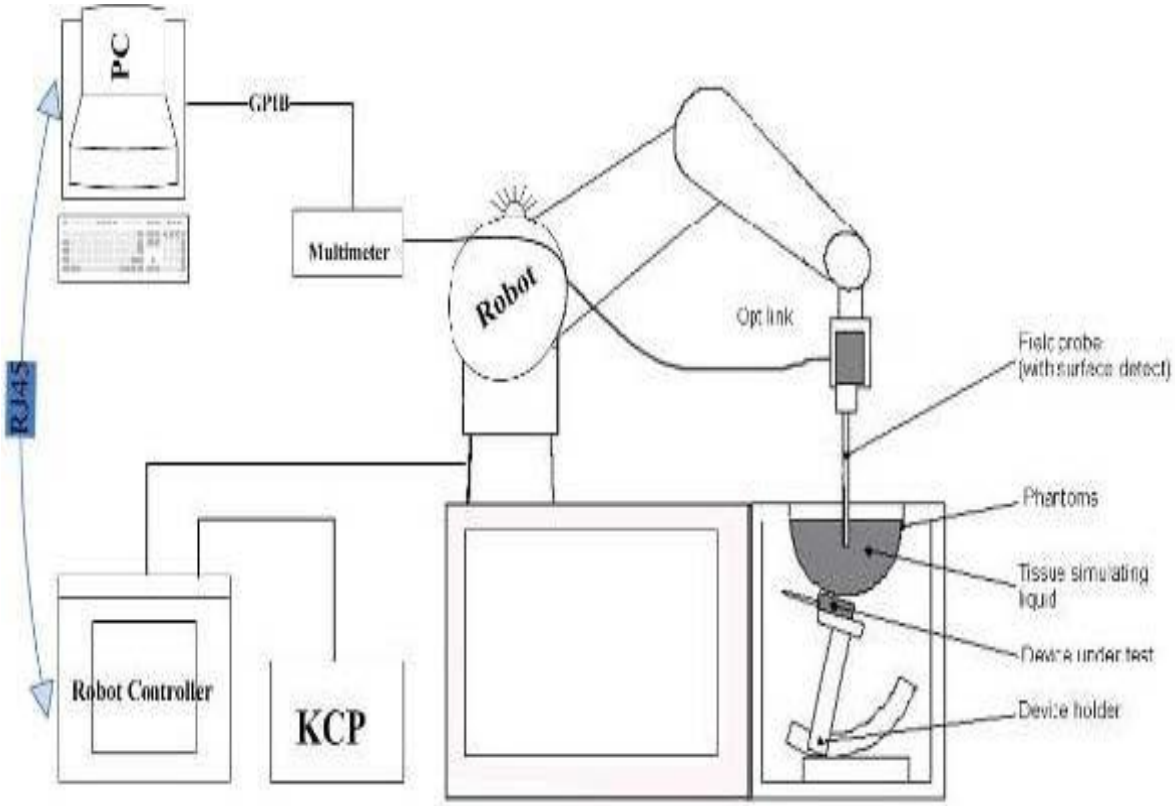
Remote control with teaches pendant and additional circuitry for robot safety such as warning lamps, etc.

The SAM phantom enabling testing left-hand right-hand and body usage.

The Position device for handheld EUT

Tissue simulating liquid mixed according to the given recipes .

System validation dipoles to validate the proper functioning of the system.



3.2. OPENSAR E-field Probe System

The SAR measurements were conducted with the dosimetric probe EPGO324 (manufactured by SATIMO), designed in the classical triangular configuration and optimized for dosimetric evaluation.

Probe Specification

ConstructionSymmetrical design with triangular core
Interleaved sensors
Built-in shielding against static charges
PEEK enclosure material (resistant to organic solvents, e.g., DGBE)

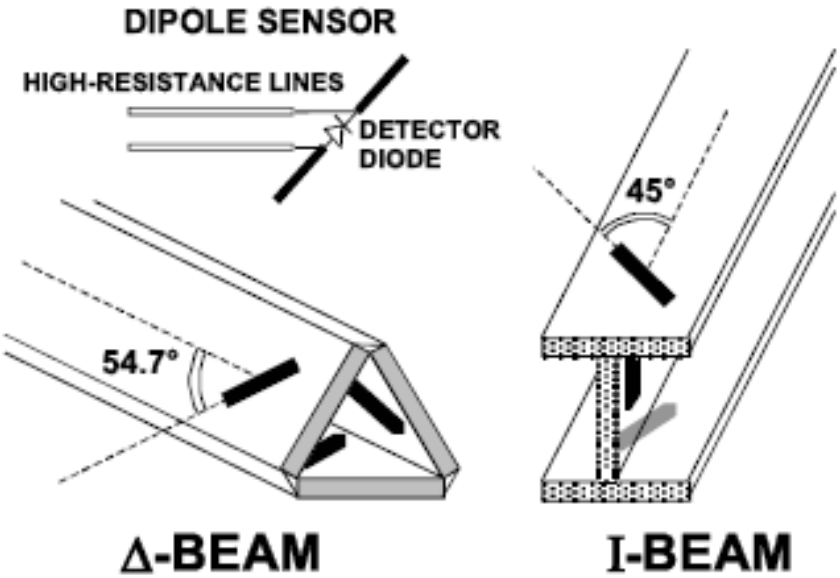
CalibrationISO/IEC 17025 calibration service available.

Frequency	450 MHz to 6 GHz; Linearity:0.25dB(450 MHz to 6 GHz)
Directivity	0.25 dB in HSL (rotation around probe axis) 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	0.01W/kg to > 100 W/kg; Linearity: 0.25 dB
Dimensions	Overall length: 330 mm (Tip: 16mm) Tip diameter: 5 mm (Body: 8 mm) Distance from probe tip to sensor centers: 2.5 mm
Application	General dosimetry up to 6 GHz Dosimetry in strong gradient fields Compliance tests of Mobile Phones

Isotropic E-Field Probe

The isotropic E-Field probe has been fully calibrated and assessed for isotropicity, and boundary effect within a controlled environment. Depending on the frequency for which the probe is calibrated the method utilized for calibration will change.

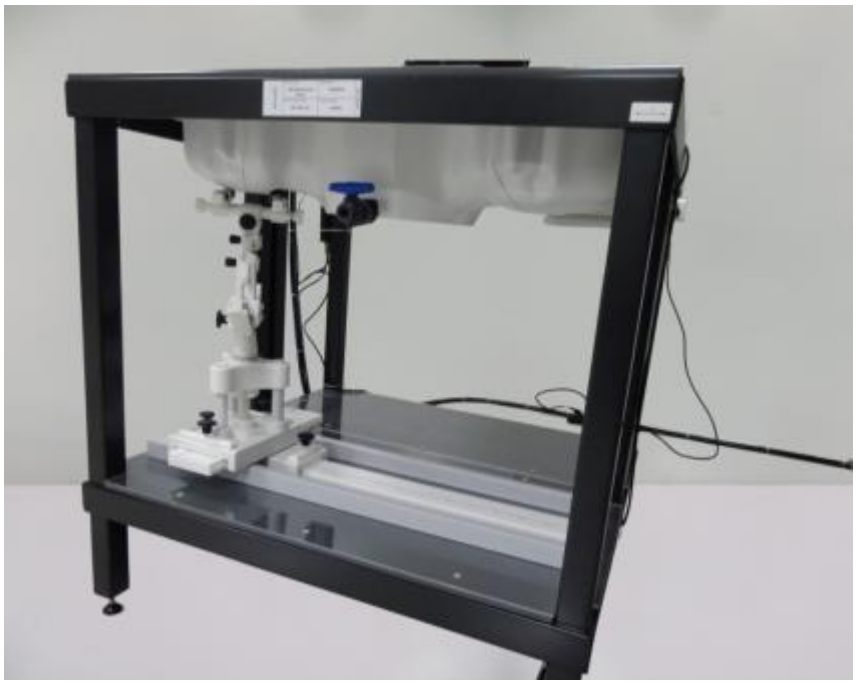
The E-Field probe utilizes a triangular sensor arrangement as detailed in the diagram below:



3.3. Phantoms

The SAM Phantom SAM117 is constructed of a fiberglass shell ntegrated in a wooden table. The shape of the shell is in compliance with the specification set in IEEE P1528 and CENELEC EN62209-1 , EN62209-2:2010.The phantom enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents the evaporation of the liquid. Reference markings on the Phantom allow the complete setup of allpredefined phantom positions and measurement grids by manually teaching three points in the robo

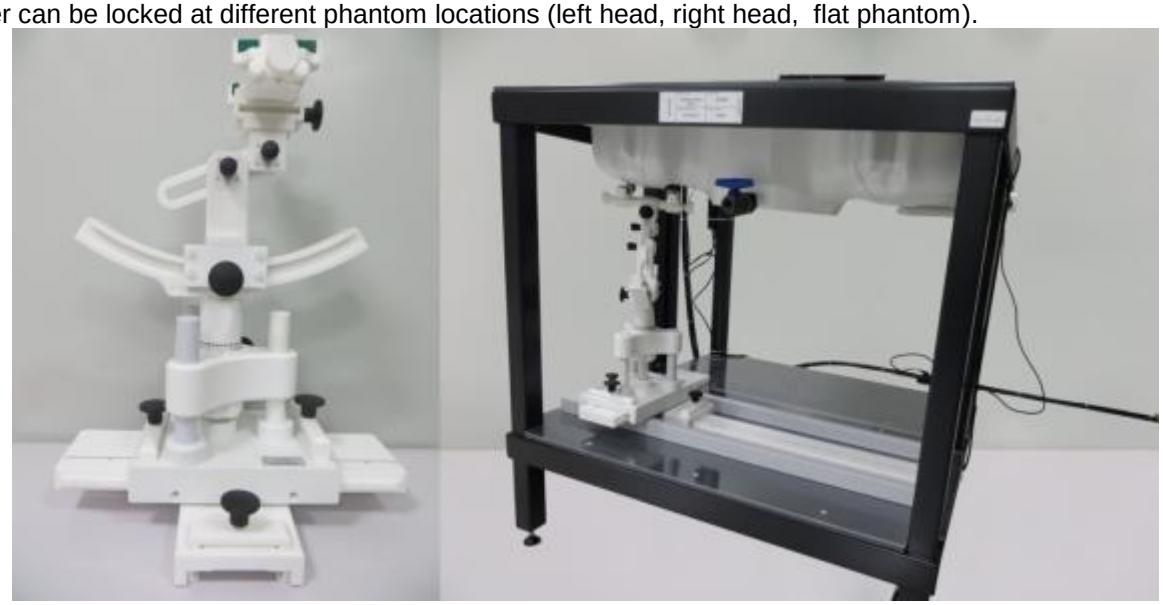
System checking was performed using the flat section, whilst Head SAR tests used the left and right head profile sections. Body SAR testing also used the flat section between the head profiles.



SAM Twin Phantom

3.4. Device Holder

In combination with the Generic Twin PhantomSAM117, the Mounting Device enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation points is the ear opening. The devices can be easily, accurately, and repeatedly positioned according to the FCC and CENELEC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).



Device holder supplied by SATIMO

3.5. Scanning Procedure

The procedure for assessing the peak spatial-average SAR value consists of the following steps

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

Area Scan
The Area Scan is used as a fast scan in two dimensions to find the area of high field values before running a detailed measurement around the hot spot.Before starting the area scan a grid spacing of 15 mm x 15 mm is set. During the scan the distance of the probe to the phantom remains unchanged. After finishing area scan, the field maxima within a range of 2 dB will be ascertained.

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 mm ± 1 mm	½·δ·ln(2) mm ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

Zoom Scan
Zoom Scans are used to estimate the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The default Zoom Scan is done by 7x7x7 points within a cube whose base is centered around the maxima found in the preceding area scan.

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

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see IEEE Std 1528-2013 for details.

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

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

3.6. Data Storage and Evaluation

Data Storage
The OPENSAR software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files . The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [mW/g], [mW/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

Data Evaluation
The OPENSAR software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters: - Sensitivity Normi, ai0, ai1, ai2
- Conversion factor ConvFi
- Diode compression point Dcpi

Device parameters: - Frequency f
- Crest factor cf

Media parameters: - Conductivity σ
- Density ρ

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

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

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

With Vi = compensated signal of channel i (i = x, y, z)
Ui = input signal of channel i (i = x, y, z)
cf = crest factor of exciting field
dcpi = diode compression point

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

$$\text{E} - \text{fieldprobes}: \qquad E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$$

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

With Vi = compensated signal of channel i (i = x, y, z)
Normi = sensor sensitivity of channel i (i = x, y, z)
[mV/(V/m)2] for E-field Probes
ConvF = sensitivity enhancement in solution

aij = sensor sensitivity factors for H-field probes
f = carrier frequency [GHz]
Ei = electric field strength of channel i in V/m
Hi = magnetic field strength of channel i in A/m

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

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

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

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1'000}$$

with SAR = local specific absorption rate in mW/g
Etot = total field strength in V/m
σ = conductivity in [mho/m] or [Siemens/m]
ρ = equivalent tissue density in g/cm3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid.

3.7. Position of the wireless device in relation to the phantom

Per KDB 447498 Section6.2. Wrist watch and wrist-worn transmitters: Transmitters that are built-in within a wrist watch or similar wrist-worn devices typically operate in speaker mode for voice communication, with the device worn on the wrist and positioned next to the mouth. Next to the mouth exposure requires 1-g SAR and the wrist-worn condition requires 10-g extremity SAR.58 The 10-g extremity and 1-g SAR test exclusions may be applied to the wrist and face exposure conditions. When SAR evaluation is required, next to the mouth use is evaluated with the front of the device positioned at 10 mm from a flat phantom filled with head tissue-equivalent medium. The wrist bands should be strapped together to represent normal use conditions. SAR for wrist exposure is evaluated with the back of the device positioned in direct contact against a flat phantom filled with body tissue-equivalent medium. The wrist bands should be unstrapped and touching the phantom. The space introduced by the watch or wrist bands and the phantom must be representative of actual use conditions; otherwise, if applicable, the neck or a curved head region of the SAM phantom may be used, provided the device positioning and SAR probe access issues have been addressed through a KDB inquiry. When other device positioning and SAR measurement considerations are necessary, a KDB inquiry is also required for the test results to be acceptable; for example, devices with rigid wrist bands or electronic circuitry and/or antenna(s) incorporated in the wrist bands. These test configurations are applicable only to devices that are worn on the wrist and cannot support other use conditions; therefore, the operating restrictions must be fully demonstrated in both the test reports and user manuals.

3.8. Tissue Dielectric Parameters for Head and Body Phantoms

The liquid is consisted of water,salt,Glycol,Sugar,Preventol and Cellulose.The liquid has previously been proven to be suited for worst-case.It's satisfying the latest tissue dielectric parameters requirements proposed by the KDB865664.

The composition of the tissue simulating liquid

Frequency (MHz)	Bactericide	DGBE	HEC	NaCl	Sucrose	1,2-Propanediol	X100	Water	Conductivity	Permittivity
	%	%	%	%	%	%	%	%	σ	εr
750	/	/	/	0.79	/	64.81	/	34.40	0.97	41.8
835	/	/	/	0.79	/	64.81	/	34.40	0.97	41.8
900	/	/	/	0.79	/	64.81	/	34.40	0.97	41.8
1800	/	13.84	/	0.35	/	/	30.45	55.36	1.38	41.0
1900	/	13.84	/	0.35	/	/	30.45	55.36	1.38	41.0
2000	/	7.99	/	0.16	/	/	19.97	71.88	1.55	41.1
2450	/	7.99	/	0.16	/	/	19.97	71.88	1.88	40.3
2600	/	7.99	/	0.16	/	/	19.97	71.88	1.88	40.3

Target Frequency (MHz)	Head		Body	
	ε_r	σ(S/m)	ε_r	σ(S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800-2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
2600	39.0	1.96	52.5	2.16
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

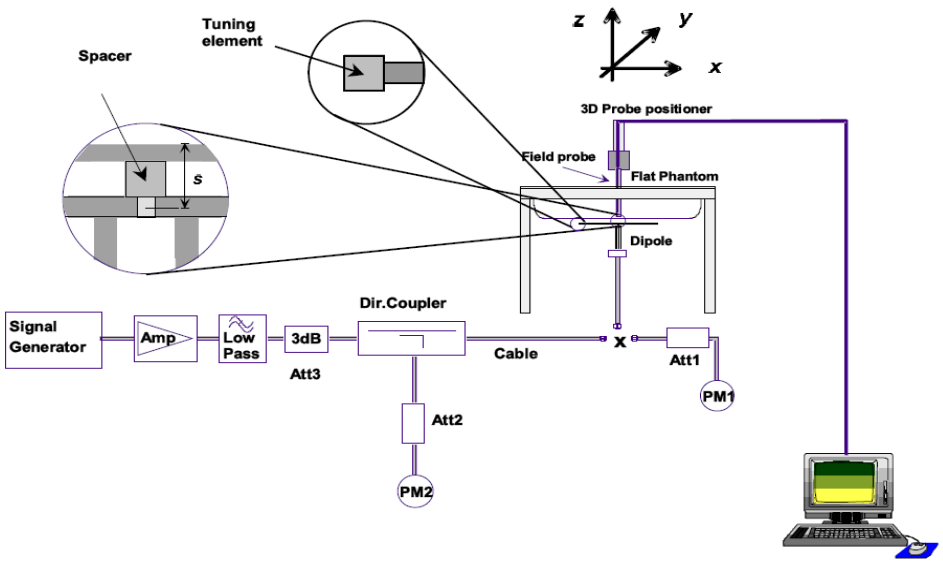
3.9. Tissue equivalent liquid properties

Dielectric Performance of Head and Body Tissue Simulating Liquid

Tissue Type	Measured Frequency (MHz)	Target Tissue		Measured Tissue				Liquid Temp.	Test Data
		ε_r	σ	ε_r	Dev.	σ	Dev.		
750B	750	56.57	0.99	55.98	-1.04%	0.98	-1.01%	22.6	07/12/2019
835B	835	55.20	0.97	55.18	-0.04%	0.94	-3.09%	21.7	07/15/2019
1800	1800	53.30	1.52	53.24	-0.11%	1.55	1.97%	22.8	07/17/2019
1900B	1900	53.30	1.52	54.10	1.50%	1.53	0.66%	21.9	07/19/2019
2450B	2450	52.70	1.95	51.97	-1.39%	2.02	3.59%	22.3	07/22/2019
2600B	2600	52.50	2.16	52.34	-1.30%	2.08	-3.70%	21.0	07/24/2019
5200B	5200	49.01	5.30	48.86	-0.31%	5.42	2.26%	22.8	07/26/2019
5800B	5800	48.20	6.00	48.13	-0.15%	5.75	-4.17%	22.5	08/02/2019

3.10. System Check

The purpose of the system check is to verify that the system operates within its specifications at the decice test frequency.The system check is simple check of repeatability to make sure that the system works correctly at the time of the compliance test;
System check results have to be equal or near the values determined during dipole calibration with the relevant liquids and test system (±10 %).



The output power on dipole port must be calibrated to 20 dBm (100mW) before dipole is connected.

Photo of Dipole Setup

Justification for Extended SAR Dipole Calibrations

Referring to KDB 865664D01V01r04, if dipoles are verified in return loss (<-20dB, within 20% of prior calibration), and in impedance (within 5 ohm of prior calibration), the annual calibration is not necessary and the calibration interval can be extended.While calibration intervals not exceed 3 years.

SID750 SN 07/14 DIP 0G750-302 Extend Dipole Calibrations

Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
2018-10-01	-34.80		50.7		1.6	

SID835 SN 07/14 DIP 0G835-303 Extend Dipole Calibrations

Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
2018-10-01	-24.49		54.9		2.8	

SID1800 SN 30/14 DIP 1G800-301 Extend Dipole Calibrations

Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
2018-10-01	-20.26		43.1		6.9	

SID1900 SN 38/18 DIP 1G900-466 Extend Dipole Calibrations

Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
2018-09-24	-26.43		50.5		4.7	

SID2450 SN 07/14 DIP 2G450-306 Extend Dipole Calibrations

Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
2018-10-01	-25.59		44.7		-1.1	

SID2600 SN 38/18 DIP 2G600-468 Extend Dipole Calibrations

Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
2018-09-24	-29.14		49.2		3.4	

SID5200 SN 49/16 DIP WGA43 Extend Dipole Calibrations

Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
2018-09-24	-8.59		19.38		13.50	

SID5800 SN 49/16 DIP WGA43 Extend Dipole Calibrations

Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
2018-09-24	-11.37		54.79		25.47	

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Mixture Type	Frequency (MHz)	Power	SAR_{1g} (W/Kg)	SAR_{10g} (W/Kg)	Drift (%)	1W Target		Difference percentage		Liquid Temp	Date
						SAR_{1g} (W/Kg)	SAR_{10g} (W/Kg)	1g	10g		
Body	750	100 mW	0.876	0.594	-0.14	8.77	5.78	-0.11%	2.77%	22.6	07/12/2019
		Normalize to 1 Watt	8.76	5.94							
Body	835	100 mW	0.987	0.624	-2.33	9.90	6.39	-0.30%	-2.35%	21.7	07/15/2019
		Normalize to 1 Watt	9.87	6.24							
Body	1800	100 mW	3.912	2.059	2.58	39.03	20.65	0.23%	-0.29%	22.8	07/17/2019
		Normalize to 1 Watt	39.12	20.59							
Body	1900	100 mW	4.028	2.142	-0.06	40.91	21.4	-1.54%	0.09%	21.9	07/19/2019
		Normalize to 1 Watt	40.28	21.42							
Body	2450	100 mW	5.374	2.501	1.59	54.65	24.58	-1.67%	1.75%	22.3	07/22/2019
		Normalize to 1 Watt	53.74	25.01							
Body	2600	100 mW	5.401	2.390	0.21	54.14	24.13	-2.33%	-2.85%	21.0	07/24/2019
		Normalize to 1 Watt	54.01	23.90							
Body	5200	100 mW	15.885	56.10	-2.17	159.09	56.13	-0.15%	-0.05%	22.8	07/26/2019
		Normalize to 1 Watt	158.85	56.10							
Body	5800	100 mW	17.764	60.85	3.05	177.77	61.06	-0.07%	-0.34%	22.5	08/02/2019
		Normalize to 1 Watt	177.64	60.85							

3.11. SAR measurement procedure

The measurement procedures are as follows:

3.11.1 Conducted power measurement

a. For WWAN power measurement, use base station simulator connection with RF cable, at maximum power in each supported wireless interface and frequency band.
b. Read the WWAN RF power level from the base station simulator.
c. For BT power measurement, use engineering software to configure EUT BT continuously Transmission, at maximum RF power in each supported wireless interface and frequency band.
d. Connect EUT RF port through RF cable to the power meter, and measure BT output power.

3.11.2 UMTS Test Configuration

3G SAR Test Reduction Procedure
In the following procedures, the mode tested for SAR is referred to as the primary mode. The equivalent modes considered for SAR test reduction are denoted as secondary modes. Both primary and secondary modes must be in the same frequency band. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.3 This is referred to as the 3G SAR test reduction procedure in the following SAR test guidance, where the primary mode is identified in the applicable wireless mode test procedures and the secondary mode is wireless mode being considered for SAR test reduction by that procedure. When the 3G SAR test reduction procedure is not satisfied, it is identified as “otherwise” in the applicable procedures; SAR measurement is required for the secondary mode.

Output power Verification

Maximum output power is verified on the high, middle and low channels according to procedures described in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC (transmit power control) set to all “1’s” for WCDMA/HSDPA or by applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Results for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HSDPA, HSPA) are requied in the SAR report. All configurations that are not supported by the handset or cannot be measured due to technical or equipment limitations must be clearly identified.

Head SAR

SAR for next to the ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all “1’s”. The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for 12.2 kbps AMR in 3.4 kbps SRB (signaling radio bearer) using the highest reported SAR configuration in 12.2 kbps RMC for head exposure.

1) Body-Worn Accessory SAR

SAR for body-worn accessory configurations is measured using a 12.2 kbps RMC with TPC bits configured to all “1’s”. The 3G SAR test reduction procedure is applied to other spreading codes and multiple DPDCHn configurations supported by the handset with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured using an applicable RMC configuration with the corresponding spreaing code or DPDCHn, for the highest reported body-worn accessory exposure SAR configuration in 12.2 kbps RMC. When more than 2 DPDCHn are supported by the handset, it may be necessary to configure additional DPDCHn using FTM (Factory Test Mode) or other chipset based test approaches with parameters similar to those used in 384 kbps and 768 kbps RMC.

2) Handsets with Release 5 HSDPA

The 3G SAR test reduction procedure is applied to HSDPA body-worn accessory configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for HSDPA using the HSDPA body SAR procedures in the “Release 5 HSDPA Data Devices” section of this document, for the highest reported SAR body-worn accessory exposure configuration in 12.2 kbps RMC. Handsets with both HSDPA and HSUPA are tested according to Release 6 HSPA test procedures.

HSDPA should be configured according to the UE category of a test device.The number of HSDSCH/ HS-PDSCHs, HARQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the H-set. To maintain a consistent test configuration and stable transmission conditions, QPSK is

used in the H-set for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 4 ms with a CQI repetition factor of 2 to maintain a constant rate of active CQI slots. DPCCH and DPDCH gain factors(βc, βd), and HS-DPCCH power offset parameters (ΔACK, ΔNACK, ΔCQI) should be set according to values indicated in the Table below. The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the H-set

Table 2: Subtests for UMTS Release 5 HSDPA

Sub-set	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (note 1, note 2)	CM(dB) (note 3)	MPR(dB)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (note 4)	15/15 (note 4)	64	12/15 (note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI}= 8 ⇔ $A_{hs} = \beta_{hs}/\beta_c$=30/15 ⇔ β_{hs}=30/15*β_c
Note2: CM=1 for β_c/β_d =12/15, β_{hs}/β_c=24/15.
Note3: For subtest 2 the $\beta_c\beta_d$ 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 (TFC1,TF1) to β_c=11/15 and β_d=15/15.

HSUPA Test Configuration

The 3G SAR test reduction procedure is applied to HSPA (HSUPA/HSDPA with RMC) body-worn accessory configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for HSPA using the HSPA body SAR procedures in the "Release 6 HSPA Data Devices" section of this document, for the highest reported body-worn accessory exposure SAR configuration in 12.2 kbps RMC. When VOIP is applicable for next to the ear head exposure in HSPA, the 3G SAR test reduction procedure is applied to HSPA with 12.2 kbps RMC as the primary mode; otherwise, the same HSPA configuration used for body-worn accessory measurements is tested for next to the ear head exposure.

Due to inner loop power control requirements in HSPA, a communication test set is required for output power and SAR tests. The 12.2 kbps RMC, FRC H-set 1 and E-DCH configurations for HSPA are configured according to the β values indicated in Table 2 and other applicable procedures described in the 'WCDMA Handset' and 'Release 5 HSDPA Data Devices' sections of this document

Table 3: Sub-Test 5 Setup for Release 6 HSUPA

Sub-set	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	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1}:47/15 β_{ed2}:47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15(4)	15/15(4)	64	15/15(4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, ΔNACK and Δ_{CQI} = 8 ⇔ $A_{hs} = \underline{\beta}_{hs}/\underline{\beta}_c$ = 30/15 ⇔ $\underline{\beta}_{hs}$= 30/15 *β_c.
Note 2: CM = 1 for βc/βd =12/15, $\underline{\beta}_{hs}/\underline{\beta}_c$ =24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
Note 3: For subtest 1 the βc/βd 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 βc = 10/15 and βd = 15/15.
Note 4: For subtest 5 the βc/βd 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 βc = 14/15 and βd = 15/15.
Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Figure 5.1g.
Note 6: βed can not be set directly; it is set by Absolute Grant Value.

3.11.3 WIFI Test Configuration

The SAR measurement and test reduction procedures are structured according to either the DSSS or OFDM transmission mode configurations used in each standalone frequency band and aggregated band. For devices that operate in exposure configurations that require multiple test positions, additional SAR test reduction may be applied. The maximum output power specified for production units, including tune-up tolerance, are used to determine initial SAR test requirements for the 802.11 transmission modes in a frequency band. SAR is measured using the highest measured maximum output power channel for the initial test configuration. SAR measurement and test reduction for the remaining 802.11 modes and test channels are determined according to

measured or specified maximum output power and reported SAR of the initial measurements. The general test reduction and SAR measurement approaches are summarized in the following:
1. The maximum output power specified for production units are determined for all applicable 802.11 transmission modes in each standalone and aggregated frequency band. Maximum output power is measured for the highest maximum output power configuration(s) in each frequency band according to the default power measurement procedures.
2. For OFDM transmission configurations in the 2.4 GHz and 5 GHz bands, an “initial test configuration” is first determined for each standalone and aggregated frequency band according to the maximum output power and tune-up tolerance specified for production units.
a. When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band.
b. SAR is measured for OFDM configurations using the initial test configuration procedures. Additional frequency band specific SAR test reduction may be considered for individual frequency bands
c. Depending on the reported SAR of the highest maximum output power channel tested in the initial test configuration, SAR test reduction may apply to subsequent highest output channels in the initial test configuration to reduce the number of SAR measurements.
3. The Initial test configuration does not apply to DSSS. The 2.4 GHz band SAR test requirements and 802.11b DSSS procedures are used to establish the transmission configurations required for SAR measurement.
4. An “initial test position”is applied to further reduce the number of SAR tests for devices operating in next to the ear, UMPC mini-tablet or hotspot mode exposure configurations that require multiple test positions .
a. SAR is measured for 802.11b according to the 2.4 GHz DSSS procedure using the exposure condition established by the initial test position.
b. SAR is measured for 2.4 GHz and 5 GHz OFDM configurations using the initial test configuration. 802.11b/g/n operating modes are tested independently according to the service requirements in each frequency band. 802.11b/g/n modes are tested on the maximum average output channel.
5. The Initial test position does not apply to devices that require a fixed exposure test position. SAR is measured in a fixed exposure test position for these devices in 802.11b according to the 2.4 GHz DSSS procedure or in 2.4 GHz and 5 GHz OFDM configurations using the initial test configuration procedures .
6. The “subsequent test configuration”procedures are applied to determine if additional SAR measurements are required for the remaining OFDM transmission modes that have not been tested in the initial test configuration. SAR test exclusion is determined according to reported SAR in the initial test configuration and maximum output power specified or measured for these other OFDM configurations.

2.4 GHz and 5GHz SAR Procedures
Separate SAR procedures are applied to DSSS and OFDM configurations in the 2.4 GHz band to simplify DSSS test requirements. For 802.11b DSSS SAR measurements, DSSS SAR procedure applies to fixed exposure test position and initial test position procedure applies to multiple exposure test positions. When SAR measurement is required for an OFDM configuration, the initial test configuration, subsequent test configuration and initial test position procedures are applied. The SAR test exclusion requirements for 802.11g/n OFDM configurations are described in section 5.2.2.
1. 802.11b DSSS SAR Test Requirements
SAR is measured for 2.4 GHz 802.11b DSSS using either a fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following:
a. When the reported SAR of the highest measured maximum output power channel (section 3.1) for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.
b. When the reported SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.
1. 2.4 GHz 802.11g/n OFDM SAR Test Exclusion Requirements
When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, the measurement and test reduction procedures for OFDM are applied (section 5.3). SAR is not required for the following 2.4 GHz OFDM conditions.
a. When KDB Publication 447498 SAR test exclusion applies to the OFDM configuration
b. When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.
2. SAR Test Requirements for OFDM Configurations
When SAR measurement is required for 802.11 a/g/n/ac OFDM configurations, each standalone and frequency aggregated band is considered separately for SAR test reduction. When the same transmitter and antenna(s) are used for U-NII-1 and U-NII-2A bands, additional SAR test reduction applies. When band gap channels between U-NII-2C band and 5.8 GHz U-NII-3 or §15.247 band are supported, the highest maximum output power

transmission mode configuration and maximum output power channel across the bands must be used to determine SAR test reduction, according to the initial test configuration and subsequent test configuration requirements.20 In applying the initial test configuration and subsequent test configuration procedures, the 802.11 transmission configuration with the highest specified maximum output power and the channel within a test configuration with the highest measured maximum output power should be clearly distinguished to apply the procedures.

3. OFDM Transmission Mode SAR Test Configuration and Channel Selection Requirements

The initial test configuration for 2.4 GHz and 5 GHz OFDM transmission modes is determined by the 802.11 configuration with the highest maximum output power specified for production units, including tune-up tolerance, in each standalone and aggregated frequency band. SAR for the initial test configuration is measured using the highest maximum output power channel determined by the default power measurement procedures (section 4). When multiple configurations in a frequency band have the same specified maximum output power, the initial test configuration is determined according to the following steps applied sequentially.

a. The largest channel bandwidth configuration is selected among the multiple configurations with the same specified maximum output power.
b. If multiple configurations have the same specified maximum output power and largest channel bandwidth, the lowest order modulation among the largest channel bandwidth configurations is selected.
c. If multiple configurations have the same specified maximum output power, largest channel bandwidth and lowest order modulation, the lowest data rate configuration among these configurations is selected.
d. When multiple transmission modes (802.11a/g/n/ac) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected; i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is chosen over 802.11n.

After an initial test configuration is determined, if multiple test channels have the same measured maximum output power, the channel chosen for SAR measurement is determined according to the following. These channel selection procedures apply to both the initial test configuration and subsequent test configuration(s), with respect to the default power measurement procedures or additional power measurements required for further SAR test reduction. The same procedures also apply to subsequent highest output power channel(s) selection.

a. Channels with measured maximum output power within ¼ dB of each other are considered to have the same maximum output.
b. When there are multiple test channels with the same measured maximum output power, the channel closest to mid-band frequency is selected for SAR measurement.
c. When there are multiple test channels with the same measured maximum output power and equal separation from mid-band frequency; for example, high and low channels or two mid-band channels, the higher frequency (number) channel is selected for SAR measurement.

Initial Test Configuration Procedures

An initial test configuration is determined for OFDM transmission modes according to the channel bandwidth, modulation and data rate combination(s) with the highest maximum output power specified for production units in each standalone and aggregated frequency band. SAR is measured using the highest measured maximum output power channel. For configurations with the same specified or measured maximum output power, additional transmission mode and test channel selection procedures are required (see section 5.3.2). SAR test reduction of subsequent highest output test channels is based on the reported SAR of the initial test configuration. For next to the ear, hotspot mode and UMC mini-tablet exposure configurations where multiple test positions are required, the initial test position procedure is applied to minimize the number of test positions required for SAR measurement using the initial test configuration transmission mode.23 For fixed exposure conditions that do not have multiple SAR test positions, SAR is measured in the transmission mode determined by the initial test configuration. When the reported SAR of the initial test configuration is > 0.8 W/kg, SAR measurement is required for the subsequent next highest measured output power channel(s) in the initial test configuration until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.

4. Subsequent Test Configuration Procedures

SAR measurement requirements for the remaining 802.11 transmission mode configurations that have not been tested in the initial test configuration are determined separately for each standalone and aggregated frequency band, in each exposure condition, according to the maximum output power specified for production units. The initial test position procedure is applied to next to the ear, UMPC mini-tablet and hotspot mode configurations. When the same maximum output power is specified for multiple transmission modes, the procedures in section 5.3.2 are applied to determine the test configuration. Additional power measurements may be required to determine if SAR measurements are required for subsequent highest output power channels in a subsequent test configuration. The subsequent test configuration and SAR measurement procedures are described in the following.

a. When SAR test exclusion provisions of KDB Publication 447498 are applicable and SAR measurement is not required for the initial test configuration, SAR is also not required for the next highest maximum output power transmission mode subsequent test configuration(s) in that frequency band or aggregated band and exposure configuration.

b. When the highest reported SAR for the initial test configuration (when applicable, include subsequent highest output channels), according to the initial test position or fixed exposure position requirements, is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for that subsequent test configuration.

c. The number of channels in the initial test configuration and subsequent test configuration can be different due to differences in channel bandwidth. When SAR measurement is required for a subsequent test configuration and the channel bandwidth is smaller than that in the initial test configuration, all channels in the subsequent test configuration that overlap with the larger bandwidth channel tested in the initial test configuration should be used to determine the highest maximum output power channel. This step requires additional power measurement to identify the highest maximum output power channel in the subsequent test configuration to determine SAR test reduction.

1). SAR should first be measured for the channel with highest measured output power in the subsequent test configuration.

2). SAR for subsequent highest measured maximum output power channels in the subsequent test configuration is required only when the reported SAR of the preceding higher maximum output power channel(s) in the subsequent test configuration is > 1.2 W/kg or until all required channels are tested.

a) For channels with the same measured maximum output power, SAR should be measured using the channel closest to the center frequency of the larger channel bandwidth channel in the initial test configuration.

d. SAR measurements for the remaining highest specified maximum output power OFDM transmission mode configurations that have not been tested in the initial test configuration (highest maximum output) or subsequent test configuration(s) (subsequent next highest maximum output power) is determined by applying the subsequent test configuration procedures in this section to the remaining configurations according to the following:

1) replace “subsequent test configuration” with “next subsequent test configuration” (i.e., subsequent next highest specified maximum output power configuration)

2) replace “initial test configuration” with “all tested higher output power configurations.

3.12. Power Reduction

The product without any power reduction.

3.13. Power Drift

To control the output power stability during the SAR test, SAR system calculates the power drift by measuring the E-field at the same location at the beginning and at the end of the measurement for each test position. This ensures that the power drift during one measurement is within 5%.

4. TEST CONDITIONS AND RESULTS

4.1. Conducted Power Results

Max Conducted power measurement results and power drift from tune-up tolerance provide by manufacturer:

Conducted power measurement results for GSM850/PCS1900

GSM 850		Tune-up	Burst Conducted power (dBm)			Division Factors	Tune-up	Average power (dBm)		
			Channel/Frequency(MHz)					Channel/Frequency(MHz)		
		Max	128/ 824.2	190/ 836.6	251/ 848.8		Max	128/ 824.2	190/ 836.6	251/8 48.8
GSM		32.50	32.37	32.48	32.31	-9.03dB	23.97	23.34	23.45	23.28
GPRS (GMSK)	1TX slot	32.50	32.31	32.42	32.25	-9.03dB	23.47	23.28	23.39	23.22
	2TX slot	31.00	30.64	30.80	30.58	-6.02dB	24.98	24.62	24.78	24.56
	3TX slot	**30.00**	**29.72**	**29.76**	**29.69**	**-4.26dB**	**25.74**	**25.46**	**25.50**	**25.43**
	4TX slot	28.50	28.23	28.31	28.18	-3.01dB	25.49	25.22	25.30	25.17
EGPRS (8PSK)	1TX slot	26.50	26.26	26.37	26.15	-9.03dB	17.47	17.23	17.34	17.12
	2TX slot	24.00	24.01	24.07	23.96	-6.02dB	18.48	17.99	18.05	17.94
	3TX slot	23.00	22.52	22.55	22.42	-4.26dB	18.74	18.26	18.29	18.16
	4TX slot	21.50	21.03	21.10	20.92	-3.01dB	18.49	18.02	18.09	17.91
GSM 1900		Tune-up	Burst Conducted power (dBm)			Division Factors	Tune-up	Average power (dBm)		
			Channel/Frequency(MHz)					Channel/Frequency(MHz)		
		Max	512/ 1850.2	661/ 1880	810/ 1909.8		Max.	512/ 1850.2	661/ 1880	810/ 1909. 8
GSM		30.00	29.39	29.47	29.35	-9.03dB	20.97	20.36	20.44	20.32
GPRS (GMSK)	1TX slot	29.50	29.23	29.29	29.17	-9.03dB	20.47	20.20	20.26	20.14
	2TX slot	28.00	27.59	27.68	27.41	-6.02dB	21.98	21.57	21.66	21.39
	3TX slot	**27.00**	**26.71**	**26.79**	**26.66**	**-4.26dB**	**22.74**	**22.45**	**22.53**	**22.40**
	4TX slot	25.50	25.27	25.34	25.19	-3.01dB	22.49	22.26	22.33	22.18
EGPRS (8PSK)	1TX slot	26.00	25.70	25.83	25.61	-9.03dB	16.97	16.67	16.8	16.58
	2TX slot	24.00	23.50	23.56	23.36	-6.02dB	17.98	17.48	17.54	17.34
	3TX slot	22.50	22.01	22.11	21.91	-4.26dB	18.24	17.75	17.85	17.65
	4TX slot	21.00	20.52	20.59	20.44	-3.01dB	17.99	17.51	17.58	17.43

Conducted Power Measurement Results(WCDMA Band II /IV/V)

Item	band	WCDMA Band II result (dBm)			WCDMA Band IV result (dBm)			WCDMA Band V result (dBm)		
		Channel/Frequency(MHz)			Channel/Frequency(MHz)			Channel/Frequency(MHz)		
	sub-test	9262/ 1852.4	9400/ 1880	9538/ 1907.6	1312/17 12.4	1413/17 32.6	1513/17 52.6	4132/ 826.4	4182/ 836.4	4233/ 846.6
RMC	12.2kbps	23.22	23.31	23.16	23.09	23.25	23.20	23.16	23.43	23.31
	64kbps	22.36	22.64	22.74	22.85	22.62	22.54	22.51	22.54	22.52
	144kbps	22.54	22.51	22.64	22.74	22.42	22.62	22.33	22.12	22.21
	384kbps	22.24	22.39	22.42	22.35	22.28	22.31	22.25	22.25	22.12
HSDPA	Sub –Test 1	22.61	22.65	22.56	22.43	22.59	22.47	22.58	22.70	22.61
	Sub –Test 2	22.49	22.59	22.51	22.51	22.55	22.48	22.30	22.63	22.49
	Sub –Test 3	22.44	22.50	22.42	22.56	22.65	22.46	22.51	22.57	22.49
	Sub –Test 4	22.40	22.55	22.47	22.37	22.53	22.50	22.35	22.53	22.37
HSUPA	Sub –Test 1	22.51	22.57	22.42	22.41	22.52	22.47	22.37	22.52	22.44
	Sub –Test 2	22.37	22.45	22.35	22.42	22.67	22.55	22.31	22.47	22.28
	Sub –Test 3	22.41	22.46	22.37	22.48	22.58	22.51	22.24	22.54	22.39
	Sub –Test 4	22.32	22.39	22.28	22.35	22.51	22.42	22.25	22.48	22.37
	Sub –Test 5	21.36	21.60	21.55	21.28	21.47	21.34	21.34	21.51	21.29

Note: When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤1/2dB higher than the primary mode (RMC12.2kbps) or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.

LTE Band2

BW (MHz)	Frequency (MHz)	RB Configuration		Average Power [dBm]	
		Size	Offset	QPSK	16QAM
1.4	1850.7	1	0	23.50	22.22
		1	3	23.62	22.26
		1	5	23.38	22.06
		3	0	22.97	22.07
		3	2	22.95	22.02
		3	3	22.92	22.02
		6	0	23.50	22.22
	1880.0	1	0	23.24	22.57
		1	3	23.34	22.67
		1	5	23.17	22.49
		3	0	23.31	22.27
		3	2	23.25	22.26
		3	3	23.24	22.25
		6	0	23.24	22.57
	1909.3	1	0	23.68	22.71
		1	3	23.73	22.83
		1	5	23.60	22.69
		3	0	23.62	22.62
		3	2	23.65	22.61
		3	3	23.60	22.60
		6	0	23.68	22.71
3	1851.5	1	0	22.90	22.11
		1	7	22.95	22.29
		1	14	22.74	22.01
		8	0	22.91	21.95
		8	4	22.88	21.95
		8	7	22.82	21.84
		15	0	22.90	22.11
	1880.0	1	0	23.23	22.49
		1	7	23.14	22.62
		1	14	23.07	22.27
		8	0	22.26	21.31
		8	4	22.26	21.28
		8	7	22.17	21.18
		15	0	23.23	22.49
	1908.5	1	0	23.47	22.73
		1	7	23.53	22.83
		1	14	23.14	22.79
		8	0	22.73	21.67
		8	4	22.76	21.65
		8	7	22.68	21.59
		15	0	23.67	22.83
5	1852.5	1	0	22.82	22.13
		1	12	22.96	22.35
		1	24	22.62	21.93
		12	0	22.83	21.98
		12	6	22.83	22.00
		12	13	22.74	21.86
		25	0	22.82	22.13
	1880.0	1	0	23.27	22.54
		1	12	23.48	22.71
		1	24	22.90	22.20
		12	0	22.25	21.42

		12	6	22.25	21.38
		12	13	22.07	21.23
		25	0	23.27	22.54
	1907.5	1	0	23.70	22.48
		1	12	23.43	22.80
		1	24	23.08	22.39
		12	0	22.71	21.67
		12	6	22.69	21.69
		12	13	22.58	21.60
		25	0	23.70	22.48
10	1855.0	1	0	22.82	22.13
		1	24	22.96	22.35
		1	49	22.62	21.93
		25	0	22.83	21.98
		25	12	22.83	22.00
		25	25	22.74	21.86
		50	0	22.82	22.13
	1880.0	1	0	22.10	22.35
		1	24	22.41	22.86
		1	49	22.01	22.75
		25	0	22.69	22.02
		25	12	22.55	21.98
		25	25	22.53	21.87
		50	0	22.99	22.06
	1905.0	1	0	22.36	22.48
		1	24	22.56	22.04
		1	49	22.10	22.39
		25	0	22.58	21.73
		25	12	22.05	21.46
		25	25	22.37	21.61
		50	0	22.06	22.19
15	1857.5	1	0	22.81	22.14
		1	37	22.96	22.25
		1	74	22.72	21.93
		37	0	22.13	21.88
		37	18	22.13	21.10
		37	38	23.04	21.96
		75	0	22.83	21.15
	1880.0	1	0	22.28	21.64
		1	37	22.52	21.91
		1	74	22.93	21.24
		37	0	22.25	21.42
		37	18	22.26	21.48
		37	38	23.07	22.25
		75	0	22.37	21.74
	1902.5	1	0	23.72	22.28
		1	37	23.13	22.89
		1	74	22.48	22.09
		37	0	23.71	22.97
		37	18	23.55	22.79
		37	38	22.28	21.63
		75	0	23.50	21.98
20	1860.0	1	0	22.82	22.13
		1	49	22.96	22.21
		1	99	22.62	21.93
		50	0	22.84	22.18
		50	25	22.83	22.15
		50	50	22.74	21.96
		100	0	23.82	22.13
	1880.0	1	0	22.37	21.44
		1	49	22.58	21.72

		1	99	23.90	22.30
		50	0	23.25	22.43
		50	25	22.75	21.98
		50	50	23.07	22.63
		100	0	22.37	21.14
	1900.0	1	0	23.10	21.08
		1	49	23.21	22.87
		1	99	22.18	22.29
		50	0	22.71	21.61
		50	25	22.69	21.52
		50	50	22.52	22.61
		100	0	22.73	22.28

LTE Band4

BW (MHz)	Frequency (MHz)	RB Configuration		Average Power [dBm]	
		Size	Offset	QPSK	16QAM
1.4	1710.7	1	0	22.98	22.02
		1	3	23.13	21.88
		1	5	23.15	21.71
		3	0	22.81	21.84
		3	2	22.92	21.94
		3	3	22.86	21.94
		6	0	22.96	21.98
	1732.5	1	0	23.40	22.64
		1	3	23.32	22.80
		1	5	23.40	22.70
		3	0	23.50	22.36
		3	2	23.38	22.39
		3	3	23.33	22.10
		6	0	23.34	22.59
	1754.3	1	0	22.23	21.30
		1	3	22.35	21.30
		1	5	22.16	21.24
		3	0	22.36	21.46
		3	2	22.49	21.08
		3	3	22.46	21.20
		6	0	22.27	21.24
3	1711.5	1	0	22.57	21.81
		1	7	22.50	21.63
		1	14	22.53	21.74
		8	0	22.47	21.27
		8	4	22.50	21.46
		8	7	22.55	21.37
		15	0	22.56	21.75
	1732.5	1	0	23.20	22.70
		1	7	22.99	22.39
		1	14	23.15	22.57
		8	0	22.21	21.14
		8	4	22.17	21.15
		8	7	22.21	21.24
		15	0	23.13	22.74
	1753.5	1	0	22.11	21.42
		1	7	22.28	21.50
		1	14	22.30	21.12
		8	0	22.28	21.47
		8	4	22.24	21.37
		8	7	22.25	21.30

		15	0	22.15	21.41
5	1712.0	1	0	22.21	21.49
		1	12	22.43	21.55
		1	24	22.57	21.72
		12	0	22.44	21.11
		12	6	22.26	21.25
		12	13	22.25	21.42
		25	0	22.28	21.51
	1732.5	1	0	22.83	21.92
		1	12	22.87	22.12
		1	24	23.28	22.52
		12	0	22.17	21.15
		12	6	22.03	21.12
		12	13	22.14	21.18
		25	0	22.80	21.91
	1752.5	1	0	23.30	21.58
		1	12	23.45	21.66
		1	24	23.28	21.65
		12	0	22.29	21.23
		12	6	22.32	21.27
		12	13	22.24	21.23
		25	0	23.30	21.54
10	1715.0	1	0	22.74	21.84
		1	24	22.80	22.26
		1	49	22.62	22.30
		25	0	22.49	21.29
		25	12	22.71	21.53
		25	25	22.72	21.58
		50	0	22.80	21.90
	1732.5	1	0	22.94	22.75
		1	24	23.14	22.48
		1	49	23.16	22.43
		25	0	22.11	21.25
		25	12	22.30	21.14
		25	25	22.39	21.26
		50	0	22.92	22.73
	1750.0	1	0	22.52	21.56
		1	24	22.99	22.29
		1	49	22.32	21.87
		25	0	22.52	21.65
		25	12	22.68	21.85
		25	25	22.66	21.70
		50	0	22.54	21.61
15	1717.5	1	0	22.46	21.83
		1	37	22.76	22.42
		1	74	22.55	22.46
		37	0	22.44	21.35
		37	18	22.55	21.58
		37	38	22.50	21.46
		75	0	22.37	21.89
	1732.5	1	0	22.41	22.33
		1	37	22.91	22.27
		1	74	23.00	22.34
		37	0	22.97	21.78
		37	18	22.35	21.30
		37	38	22.29	21.21
		75	0	22.38	22.36
	1747.5	1	0	23.22	22.66
		1	37	22.96	22.36
		1	74	22.43	21.80
		37	0	22.91	21.91

		37	18	22.67	21.75
		37	38	22.58	21.60
		75	0	23.14	22.69
20	1720.0	1	0	22.46	21.83
		1	49	22.76	22.42
		1	99	22.55	22.46
		50	0	22.44	21.35
		50	25	22.55	21.58
		50	50	22.50	21.46
		100	0	22.37	21.89
	1732.5	1	0	22.41	22.33
		1	49	22.91	22.27
		1	99	23.00	22.34
		50	0	22.97	21.78
		50	25	22.35	21.30
		50	50	22.29	21.21
		100	0	22.38	22.36
	1745.0	1	0	23.22	22.66
		1	49	22.96	22.36
		1	99	22.43	21.80
		50	0	22.91	21.91
		50	25	22.67	21.75
		50	50	22.58	21.60
		100	0	23.14	22.69

LTE Band5

BW (MHz)	Frequency (MHz)	RB Configuration		Average Power [dBm]	
		Size	Offset	QPSK	16QAM
1.4	824.7	1	0	23.47	22.64
		1	3	23.54	22.71
		1	5	23.41	22.54
		3	0	23.46	22.58
		3	2	23.51	22.59
		3	3	23.49	22.52
		6	0	23.47	22.60
	836.5	1	0	23.39	22.62
		1	3	23.38	22.74
		1	5	23.25	22.59
		3	0	23.48	22.42
		3	2	23.35	22.32
		3	3	23.41	22.31
		6	0	23.37	22.57
	848.3	1	0	22.28	21.47
		1	3	22.34	21.55
		1	5	22.29	21.49
		3	0	22.31	21.41
		3	2	22.32	21.27
		3	3	22.31	21.44
		6	0	22.33	21.52
3	825.5	1	0	23.50	22.63
		1	7	23.58	22.82
		1	14	23.31	22.58
		8	0	22.43	21.48
		8	4	22.48	21.45
		8	7	22.39	21.40
		15	0	23.47	22.62
	836.5	1	0	23.43	22.56

		1	7	23.52	22.69
		1	14	23.18	22.39
		8	0	22.33	21.42
		8	4	22.41	21.48
		8	7	22.30	21.32
		15	0	23.43	22.51
	847.5	1	0	22.39	21.83
		1	7	22.52	21.88
		1	14	22.31	21.62
		8	0	22.39	21.41
		8	4	22.44	21.38
		8	7	22.32	21.34
		15	0	22.45	21.83
5	826.5	1	0	23.36	22.70
		1	12	23.62	22.94
		1	24	23.26	22.56
		12	0	22.34	21.53
		12	6	22.45	21.51
		12	13	22.43	21.46
		25	0	23.42	22.66
	836.5	1	0	23.28	22.61
		1	12	23.75	22.86
		1	24	23.03	22.35
		12	0	22.40	21.59
		12	6	22.41	21.58
		12	13	22.26	21.40
		25	0	23.33	22.62
	846.5	1	0	22.61	21.48
		1	12	22.63	21.72
		1	24	22.26	21.19
		12	0	22.59	21.62
		12	6	22.52	21.68
		12	13	22.25	21.48
		25	0	22.58	21.49
10	829.0	1	0	23.58	22.75
		1	24	23.61	22.90
		1	49	23.49	22.70
		25	0	22.53	21.51
		25	12	22.55	21.58
		25	25	22.36	21.38
		50	0	23.57	22.74
	836.5	1	0	23.58	22.72
		1	24	23.63	22.88
		1	49	23.03	22.22
		25	0	22.77	21.63
		25	12	22.49	21.49
		25	25	22.47	21.39
		50	0	23.52	22.73
	844.0	1	0	23.09	22.42
		1	24	22.92	22.29
		1	49	22.38	21.66
		25	0	22.95	21.86
		25	12	22.87	21.81
		25	25	22.47	21.42
		50	0	23.07	22.45

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LTE Band7

BW (MHz)	Frequency (MHz)	RB Configuration		Average Power [dBm]	
		Size	Offset	QPSK	16QAM
5	2502.5	1	0	22.91	22.21
		1	12	23.30	22.49
		1	24	23.02	22.30
		12	0	22.03	21.16
		12	6	22.18	21.34
		12	13	22.07	21.25
		25	0	22.94	22.25
	2535.0	1	0	22.57	21.43
		1	12	22.99	21.92
		1	24	22.68	21.58
		12	0	22.59	21.66
		12	6	22.74	21.79
		12	13	22.68	21.83
		25	0	22.56	21.43
	2567.5	1	0	22.68	21.73
		1	12	22.27	21.27
		1	24	22.15	21.15
		12	0	22.99	21.91
		12	6	22.58	21.66
		12	13	22.66	21.68
		25	0	22.67	21.76
10	2505.0	1	0	22.91	22.08
		1	24	23.19	22.47
		1	49	22.89	22.10
		25	0	22.15	21.16
		25	12	22.16	21.21
		25	25	22.13	21.11
		50	0	22.96	22.13
	2535.0	1	0	22.40	21.68
		1	24	22.87	22.05
		1	49	22.78	22.00
		25	0	22.66	21.68
		25	12	22.82	21.80
		25	25	22.82	21.78
		50	0	22.42	21.61
	2565.0	1	0	22.53	21.90
		1	24	22.96	22.30
		1	49	22.15	21.51
		25	0	22.79	21.82
		25	12	22.96	21.91
		25	25	22.12	21.14
		50	0	22.50	21.88
15	2507.5	1	0	22.87	22.08
		1	37	23.18	22.36
		1	74	22.43	21.69
		37	0	22.29	21.08
		37	18	22.16	21.10
		37	38	22.98	21.90
		75	0	22.84	22.10
	2535.0	1	0	22.22	21.55
		1	37	22.88	22.03
		1	74	22.75	21.82
		37	0	22.61	21.53
		37	18	22.79	21.81
		37	38	22.86	21.87
		75	0	22.26	21.54
	2562.5	1	0	22.47	21.73
		1	37	22.84	22.05

		1	74	22.12	21.27
		37	0	22.60	21.62
		37	18	22.80	21.82
		37	38	22.73	21.71
		75	0	22.85	22.13
20	2510.0	1	0	22.80	21.90
		1	49	23.15	22.32
		1	99	22.10	21.15
		50	0	22.35	21.37
		50	25	22.40	21.41
		50	50	22.70	21.73
		100	0	22.83	21.90
	2535.0	1	0	22.20	21.36
		1	49	22.98	22.06
		1	99	22.51	21.64
		50	0	22.55	21.53
		50	25	22.83	21.78
		50	50	22.87	21.87
		100	0	22.14	21.30
	2560	1	0	22.75	22.07
		1	49	22.78	22.08
		1	99	22.98	22.22
		50	0	22.82	21.86
		50	25	22.78	21.79
		50	50	22.97	22.02
		100	0	22.74	22.06

LTE Band 12

BW (MHz)	Frequency (MHz)	RB Configuration		Average Power [dBm]	
		Size	Offset	QPSK	16QAM
1.4	699.7	1	0	22.24	21.43
		1	3	22.36	21.59
		1	5	22.26	21.50
		3	0	22.33	21.53
		3	2	22.44	21.54
		3	3	22.38	21.48
		6	0	22.28	21.42
	707.5	1	0	22.67	21.90
		1	3	22.82	22.08
		1	5	22.73	22.01
		3	0	22.77	21.68
		3	2	22.76	21.73
		3	3	22.84	21.73
		6	0	22.63	21.85
	715.3	1	0	23.06	22.04
		1	3	23.10	22.19
		1	5	22.90	22.07
		3	0	23.10	22.04
		3	2	23.12	21.97
		3	3	23.04	22.06
		6	0	23.02	22.01
3	700.5	1	0	23.02	22.27
		1	7	23.37	22.47
		1	14	23.21	22.45
		8	0	22.17	21.17
		8	4	22.33	21.30
		8	7	22.28	21.36
		15	0	23.08	22.26
	707.5	1	0	23.34	22.46
		1	7	23.67	22.89
		1	14	23.46	22.71
		8	0	22.53	21.57

		8	4	22.53	21.61
		8	7	22.55	21.54
		15	0	23.32	22.46
	715.3	1	0	23.71	22.90
		1	7	23.68	22.71
		1	14	23.59	22.64
		8	0	22.80	21.71
		8	4	22.94	21.82
		8	7	22.78	21.65
		15	0	23.76	22.92
5	701.5	1	0	23.02	22.32
		1	12	23.42	22.82
		1	24	23.23	22.47
		12	0	22.95	22.24
		12	6	22.28	21.51
		12	13	22.50	21.71
		25	0	22.98	22.39
	707.5	1	0	23.33	22.56
		1	12	23.65	22.84
		1	24	23.42	22.79
		12	0	22.74	21.84
		12	6	22.57	21.70
		12	13	22.45	21.58
		25	0	23.28	22.49
	714.5	1	0	23.50	22.45
		1	12	23.61	22.31
		1	24	23.76	22.53
		12	0	22.43	21.51
		12	6	22.66	21.70
		12	13	22.55	21.66
		25	0	23.54	22.45
10	704	1	0	22.95	22.31
		1	24	23.42	22.68
		1	49	23.50	22.73
		25	0	22.98	21.96
		25	12	22.41	21.32
		25	25	22.18	21.16
		50	0	22.97	22.38
	707.5	1	0	23.17	22.44
		1	24	23.60	22.78
		1	49	23.55	22.74
		25	0	22.69	21.63
		25	12	22.59	21.57
		25	25	22.62	21.63
		50	0	23.24	22.44
	713.5	1	0	23.28	22.60
		1	24	23.78	22.93
		1	49	23.72	22.81
		25	0	22.84	21.78
		25	12	22.70	21.74
		25	25	23.02	21.84
		50	0	23.27	22.58

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LTE Band17

BW (MHz)	Frequency (MHz)	RB Configuration		Average Power [dBm]	
		Size	Offset	QPSK	16QAM
5	706.5	1	0	23.53	22.60
		1	12	23.52	22.67
		1	24	22.87	22.22
		12	0	22.61	21.64
		12	6	22.42	21.55
		12	13	22.91	22.07
		25	0	23.46	22.64
	710	1	0	23.04	21.96
		1	12	23.13	22.00
		1	24	23.13	21.94
		12	0	22.02	21.09
		12	6	22.12	21.15
		12	13	22.19	21.19
		25	0	23.11	21.93
	713.5	1	0	22.86	21.93
		1	12	23.50	22.36
		1	24	23.25	22.17
		12	0	22.90	21.97
		12	6	22.22	21.29
		12	13	22.18	21.15
		25	0	22.87	21.95
10	709	1	0	23.50	22.61
		1	24	23.07	22.33
		1	49	23.24	22.29
		25	0	22.61	21.71
		25	12	22.12	21.13
		25	25	22.38	21.33
		50	0	23.56	22.60
	710	1	0	23.33	22.42
		1	24	22.97	22.21
		1	49	23.42	22.42
		25	0	22.50	21.55
		25	12	22.44	21.30
		25	25	22.47	21.40
		50	0	23.36	22.41
	711	1	0	23.21	22.37
		1	24	23.08	22.42
		1	49	23.40	22.57
		25	0	22.27	21.36
		25	12	22.11	21.12
		25	25	22.40	21.34
		50	0	23.22	22.37

<WLAN 2.4GHz Conducted Power>

Mode	Channel	Frequency (MHz)	Data rate (Mbps)	Average Output Power (dBm)
IEEE 802.11b	1	2412	1	12.49
			2	12.31
			5.5	12.24
			11	12.10
	6	2437	1	13.08
			2	13.01
			5.5	12.87
			11	12.85
	11	2462	1	13.08
			2	12.73
			5.5	12.96
			11	13.02
IEEE 802.11g	1	2412	6	13.89
			9	13.69
			12	13.54
			18	15.32
			24	15.07
			36	15.54
			48	15.41
			54	15.33
	6	2437	6	14.99
			9	14.22
			12	14.54
			18	14.87
			24	14.23
			36	14.58
			48	14.63
			54	14.48
	11	2462	6	13.89
			9	13.69
			12	13.54
			18	15.32
			24	15.07
			36	15.54
			48	15.41
			54	15.33
IEEE 802.11n HT20	1	2412	MCS0	13.69
			MCS1	13.27
			MCS2	13.58
			MCS3	13.52
			MCS4	13.41
			MCS5	13.28
			MCS6	13.54
			MCS7	13.23
	6	2437	MCS0	14.88
			MCS1	14.22
			MCS2	14.48
			MCS3	14.00
			MCS4	14.64
			MCS5	14.23
			MCS6	14.74
			MCS7	14.82
	11	2462	MCS0	14.30
			MCS1	14.21
			MCS2	14.01
			MCS3	14.22
			MCS4	14.07

			MCS5	13.98
			MCS6	13.65
			MCS7	13.73
IEEE 802.11n HT40	3	2422	MCS0	9.27
			MCS1	9.20
			MCS2	9.07
			MCS3	9.42
			MCS4	9.21
			MCS5	8.89
			MCS6	8.73
			MCS7	8.85
	6	2437	MCS0	9.76
			MCS1	9.25
			MCS2	9.43
			MCS3	9.52
			MCS4	9.44
			MCS5	9.61
			MCS6	9.50
			MCS7	9.76
	9	2452	MCS0	9.47
			MCS1	9.31
			MCS2	9.28
			MCS3	9.21
			MCS4	9.37
			MCS5	9.35
			MCS6	9.20
			MCS7	9.00

<WLAN 5GHz U-NI-1 Conducted Power>

Mode	Channel	Frequency (MHz)	Conducted Output Power(dBm)
802.11a	36	5180	10.21
	40	5200	10.08
	48	5240	10.08
802.11n(20MHz)	36	5180	9.99
	40	5200	10.16
	48	5240	10.25
802.11n(40MHz)	38	5190	10.19
	46	5230	10.49

<WLAN 5GHz U-NI-3 Conducted Power>

Mode	Channel	Frequency (MHz)	Conducted Output Power(dBm)
802.11a	149	5745	10.64
	157	5785	9.77
	165	5825	9.48
802.11n(20MHz)	149	5745	11.92
	157	5785	12.12
	165	5825	11.73
802.11n(40MHz)	151	5755	12.15
	159	5795	11.84

Note: SAR is not required for the following 2.4 GHz OFDM conditions as the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

<BT Conducted Power>

Mode	channel	Frequency (MHz)	Conducted AVG output power (dBm)
GFSK-BLE	0	2402	2.651
	19	2440	3.191
	39	2480	2.138
GFSK	0	2402	2.786
	39	2441	3.306
	78	2480	2.238
π/4-DQPSK	0	2402	2.018
	39	2441	2.540
	78	2480	1.500
8DPSK	0	2402	2.141
	39	2441	2.727
	78	2480	1.589

Per KDB 447498 D01v06, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] ·[√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR

- 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

Bluetooth Turn up Power (dBm)	Separation Distance (mm)	Frequency (GHz)	Exclusion Thresholds
4.0	5	2.45	0.8

Per KDB 447498 D01v06, when the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion. The test exclusion threshold is 0.6< 3.0, SAR testing is not required.

4.2. Manufacturing tolerance

GSM

GSM 850 (GMSK) (Burst Average Power)			
Channel	Channel 251	Channel 190	Channel 128
Target (dBm)	31.5	31.5	31.5
Tolerance ±(dB)	1.0	1.0	1.0
GSM 1900 (GMSK) (Burst Average Power)			
Channel	Channel 810	Channel 661	Channel 512
Target (dBm)	28.5	28.5	28.5
Tolerance ±(dB)	1.0	1.0	1.0

GSM 850 GPRS (GMSK) (Burst Average Power)				
Channel		128	190	251
1 Txslot	Target (dBm)	31.5	31.5	31.5
	Tolerance ±(dB)	1.0	1.0	1.0
2 Txslot	Target (dBm)	30.0	30.0	30.0
	Tolerance ±(dB)	1.0	1.0	1.0
3 Txslot	Target (dBm)	29.0	29.0	29.0
	Tolerance ±(dB)	1.0	1.0	1.0
4 Txslot	Target (dBm)	27.5	27.5	27.5
	Tolerance ±(dB)	1.0	1.0	1.0
GSM850 EGPRS (8PSK) (Burst Average Power)				
Channel		128	190	251
1 Txslot	Target (dBm)	25.5	25.5	25.5
	Tolerance ±(dB)	1.0	1.0	1.0
2 Txslot	Target (dBm)	23.5	23.5	23.0
	Tolerance ±(dB)	1.0	1.0	1.0
3 Txslot	Target (dBm)	22.0	22.0	21.5
	Tolerance ±(dB)	1.0	1.0	1.0
4 Txslot	Target (dBm)	20.5	20.5	20.0
	Tolerance ±(dB)	1.0	1.0	1.0
GSM 1900 GPRS (GMSK) (Burst Average Power)				
Channel		512	661	810
1 Txslot	Target (dBm)	28.5	28.5	28.5
	Tolerance ±(dB)	1.0	1.0	1.0
2 Txslot	Target (dBm)	27.0	27.0	26.5
	Tolerance ±(dB)	1.0	1.0	1.0
3 Txslot	Target (dBm)	26.0	26.0	26.0
	Tolerance ±(dB)	1.0	1.0	1.0
4 Txslot	Target (dBm)	24.5	24.5	24.5
	Tolerance ±(dB)	1.0	1.0	1.0
GSM 1900 EDGE (8PSK) (Burst Average Power)				
Channel		512	661	810
1 Txslot	Target (dBm)	25.0	25.0	25.0
	Tolerance ±(dB)	1.0	1.0	1.0
2 Txslot	Target (dBm)	23.0	23.0	22.5
	Tolerance ±(dB)	1.0	1.0	1.0
3 Txslot	Target (dBm)	21.5	21.5	21.0
	Tolerance ±(dB)	1.0	1.0	1.0
4 Txslot	Target (dBm)	20.0	20.0	19.5
	Tolerance ±(dB)	1.0	1.0	1.0

UMTS

UMTS Band V			
Channel	Channel 4132	Channel 4183	Channel 4233
Target (dBm)	22.5	22.5	22.5
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band V HSDPA(sub-test 1)			
Channel	Channel 4132	Channel 4183	Channel 4233

Target (dBm)	22.0	22.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band V HSDPA(sub-test 2)			
Channel	Channel 4132	Channel 4183	Channel 4233
Target (dBm)	21.5	22.0	21.5
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band V HSDPA(sub-test 3)			
Channel	Channel 4132	Channel 4183	Channel 4233
Target (dBm)	22.0	22.0	21.5
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band V HSDPA(sub-test 4)			
Channel	Channel 4132	Channel 4183	Channel 4233
Target (dBm)	21.5	22.0	21.5
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band V HSUPA(sub-test 1)			
Channel	Channel 4132	Channel 4183	Channel 4233
Target (dBm)	21.5	22.0	21.5
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band V HSUPA(sub-test 2)			
Channel	Channel 4132	Channel 4183	Channel 4233
Target (dBm)	21.5	21.5	21.5
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band V HSUPA(sub-test 3)			
Channel	Channel 4132	Channel 4183	Channel 4233
Target (dBm)	21.5	22.0	21.5
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band V HSUPA(sub-test 4)			
Channel	Channel 4132	Channel 4183	Channel 4233
Target (dBm)	21.5	21.5	21.5
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band V HSUPA(sub-test 5)			
Channel	Channel 4132	Channel 4183	Channel 4233
Target (dBm)	20.5	21.0	20.5
Tolerance ±(dB)	1.0	1.0	1.0

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UMTS Band IV			
Channel	Channel 1312	Channel 1413	Channel 1513
Target (dBm)	22.5	22.5	22.5
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band V HSDPA(sub-test 1)			
Channel	Channel 1312	Channel 1413	Channel 1513
Target (dBm)	21.5	21.5	21.5
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band V HSDPA(sub-test 2)			
Channel	Channel 1312	Channel 1413	Channel 1513
Target (dBm)	21.5	22.0	21.5
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band V HSDPA(sub-test 3)			
Channel	Channel 1312	Channel 1413	Channel 1513
Target (dBm)	22.0	22.0	21.5
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band V HSDPA(sub-test 4)			
Channel	Channel 1312	Channel 1413	Channel 1513
Target (dBm)	21.5	22.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band V HSUPA(sub-test 1)			
Channel	Channel 1312	Channel 1413	Channel 1513
Target (dBm)	21.5	22.0	21.5
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band V HSUPA(sub-test 2)			
Channel	Channel 1312	Channel 1413	Channel 1513
Target (dBm)	21.5	22.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band V HSUPA(sub-test 3)			
Channel	Channel 1312	Channel 1413	Channel 1513
Target (dBm)	21.5	22.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band V HSUPA(sub-test 4)			
Channel	Channel 1312	Channel 1413	Channel 1513
Target (dBm)	21.5	22.0	21.5
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band V HSUPA(sub-test 5)			
Channel	Channel 1312	Channel 1413	Channel 1513
Target (dBm)	20.5	20.5	20.5
Tolerance ±(dB)	1.0	1.0	1.0

UMTS Band II			
Channel	Channel 9262	Channel 9400	Channel 9538
Target (dBm)	22.5	22.5	22.5
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band II HSDPA(sub-test 1)			
Channel	Channel 9262	Channel 9400	Channel 9538
Target (dBm)	22.0	22.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band II HSDPA(sub-test 2)			
Channel	Channel 9262	Channel 9400	Channel 9538
Target (dBm)	21.5	22.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band II HSDPA(sub-test 3)			
Channel	Channel 9262	Channel 9400	Channel 9538
Target (dBm)	21.5	22.0	21.5
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band II HSDPA(sub-test 4)			
Channel	Channel 9262	Channel 9400	Channel 9538
Target (dBm)	21.5	22.0	21.5
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band II HSUPA(sub-test 1)			
Channel	Channel 9262	Channel 9400	Channel 9538
Target (dBm)	22.0	22.0	21.5
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band II HSUPA(sub-test 2)			
Channel	Channel 9262	Channel 9400	Channel 9538
Target (dBm)	21.5	21.5	21.5
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band II HSUPA(sub-test 3)			
Channel	Channel 9262	Channel 9400	Channel 9538
Target (dBm)	21.5	21.5	21.5
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band II HSUPA(sub-test 4)			
Channel	Channel 9262	Channel 9400	Channel 9538
Target (dBm)	21.5	21.5	21.5
Tolerance ±(dB)	1.0	1.0	1.0
UMTS Band II HSUPA(sub-test 5)			
Channel	Channel 9262	Channel 9400	Channel 9538
Target (dBm)	20.5	21.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0

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LTE Band 2

BW:1.4MHz [<RB=1>]						
Channel	Channel 18607		Channel 18900		Channel 19193	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	23.0	22.0	23.0	22.0	23.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:1.4MHz [<RB=3>, <RB=6>]						
Channel	Channel 18607		Channel 18900		Channel 19193	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	22.0	23.0	22.0	23.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:3MHz [<RB=1>]						
Channel	Channel 18615		Channel 18900		Channel 19185	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	22.0	23.0	22.0	23.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:3MHz [<RB=8>, <RB=15>]						
Channel	Channel 18615		Channel 18900		Channel 19185	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	22.0	21.0	22.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:5MHz [<RB=1>]						
Channel	Channel 18625		Channel 18900		Channel 19175	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	22.0	23.0	22.0	23.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:5MHz [<RB=12>, <RB=25>]						
Channel	Channel 18625		Channel 18900		Channel 19175	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	22.0	22.0	21.0	22.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:10MHz [<RB=1>]						
Channel	Channel 18650		Channel 18900		Channel 19150	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	22.0	22.0	22.0	22.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:10MHz [<RB=25>, <RB=50>]						
Channel	Channel 18650		Channel 18900		Channel 19150	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	22.0	22.0	22.0	22.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:15MHz [<RB=1>]						
Channel	Channel 18675		Channel 18900		Channel 19125	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	22.0	22.0	21.0	23.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:15MHz [<RB=37>, <RB=75>]						
Channel	Channel 18675		Channel 18900		Channel 19125	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	23.0	22.0	23.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:20MHz [<RB=1>]						
Channel	Channel 18700		Channel 18900		Channel 19100	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	22.0	23.0	22.0	23.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:20MHz [<RB=50>, <RB=100>]						
Channel	Channel 18700		Channel 18900		Channel 19100	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	22.0	23.0	22.0	22.0	22.0

Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0

LTE Band 4

BW:1.4MHz [<RB=1>]						
Channel	Channel 19957		Channel 20175		Channel 20393	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	23.0	22.0	23.0	22.0	22.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:1.4MHz [<RB=3>, <RB=6>]						
Channel	Channel 19957		Channel 20175		Channel 20393	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	23.0	22.0	22.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:3MHz [<RB=1>]						
Channel	Channel 19965		Channel 20175		Channel 20385	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	23.0	22.0	22.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:3MHz [<RB=8>, <RB=15>]						
Channel	Channel 19965		Channel 20175		Channel 20385	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	22.0	21.0	22.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:5MHz [<RB=1>]						
Channel	Channel 19975		Channel 20175		Channel 20375	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	23.0	22.0	23.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:5MHz [<RB=12>, <RB=25>]						
Channel	Channel 19975		Channel 20175		Channel 20375	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	22.0	21.0	22.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:10MHz [<RB=1>]						
Channel	Channel 20000		Channel 20175		Channel 20350	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	22.0	23.0	22.0	22.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:10MHz [<RB=25>, <RB=50>]						
Channel	Channel 20000		Channel 20175		Channel 20350	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	22.0	21.0	22.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:15MHz [<RB=1>]						
Channel	Channel 20025		Channel 20175		Channel 20325	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	22.0	22.0	22.0	23.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:15MHz [<RB=37>, <RB=75>]						
Channel	Channel 20025		Channel 20175		Channel 20325	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	22.0	21.0	22.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:20MHz [<RB=1>]						
Channel	Channel 20050		Channel 20175		Channel 20300	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	22.0	23.0	22.0	23.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:20MHz [<RB=50>, <RB=100>]						
Channel	Channel 20050		Channel 20175		Channel 20300	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM

Target (dBm)	22.0	21.0	22.0	21.0	22.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0

LTE Band 5

BW:1.4MHz [<RB=1>]						
Channel	Channel 20407		Channel 20525		Channel 20643	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	23.0	22.0	22.0	22.0	23.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:1.4MHz [<RB=3>, <RB=6>]						
Channel	Channel 20407		Channel 20525		Channel 20643	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	23.0	22.0	23.0	22.0	22.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:3MHz [<RB=1>]						
Channel	Channel 20415		Channel 20525		Channel 20635	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	23.0	22.0	23.0	22.0	22.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:3MHz [<RB=8>, <RB=15>]						
Channel	Channel 20415		Channel 20525		Channel 20635	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	22.0	21.0	22.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:5MHz [<RB=1>]						
Channel	Channel 20425		Channel 20525		Channel 20625	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	23.0	22.0	23.0	22.0	22.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:5MHz [<RB=12>, <RB=25>]						
Channel	Channel 20425		Channel 20525		Channel 20625	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	22.0	21.0	22.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:10MHz [<RB=1>]						
Channel	Channel 20450		Channel 20525		Channel 20600	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	23.0	22.0	23.0	22.0	23.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:10MHz [<RB=25>, <RB=50>]						
Channel	Channel 20450		Channel 20525		Channel 20600	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	22.0	21.0	22.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0

LTE Band 7

BW:5MHz [<RB=1>]						
Channel	Channel 20775		Channel 21100		Channel 21425	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	23.0	22.0	22.0	21.0	22.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:5MHz [<RB=12>, <RB=25>]						
Channel	Channel 20775		Channel 21100		Channel 21425	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	22.0	21.0	22.0	21.0

Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:10MHz [<RB=1>]						
Channel	Channel 20800		Channel 21100		Channel 21400	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	23.0	22.0	22.0	22.0	22.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:10MHz [<RB=25>, <RB=50>]						
Channel	Channel 20800		Channel 21100		Channel 21400	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	22.0	21.0	22.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:15MHz [<RB=1>]						
Channel	Channel 20825		Channel 21100		Channel 21375	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	23.0	22.0	22.0	22.0	22.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:15MHz [<RB=37>, <RB=75>]						
Channel	Channel 20825		Channel 21100		Channel 21375	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	22.0	21.0	22.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:20MHz [<RB=1>]						
Channel	Channel 20850		Channel 21100		Channel 21350	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	23.0	22.0	22.0	22.0	22.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:20MHz [<RB=50>, <RB=100>]						
Channel	Channel 20850		Channel 21100		Channel 21350	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	22.0	21.0	22.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0

LTE Band 12

BW:1.4MHz [<RB=1>]						
Channel	Channel 19957		Channel 20175		Channel 20393	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	22.0	22.0	23.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:1.4MHz [<RB=3>, <RB=6>]						
Channel	Channel 19957		Channel 20175		Channel 20393	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	22.0	21.0	23.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:3MHz [<RB=1>]						
Channel	Channel 19965		Channel 20175		Channel 20385	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	23.0	22.0	23.0	22.0	23.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:3MHz [<RB=8>, <RB=15>]						
Channel	Channel 19965		Channel 20175		Channel 20385	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	22.0	21.0	22.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:5MHz [<RB=1>]						
Channel	Channel 19975		Channel 20175		Channel 20375	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	23.0	22.0	23.0	22.0	23.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:5MHz [<RB=12>, <RB=25>]						
Channel	Channel 19975		Channel 20175		Channel 20375	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM

Target (dBm)	22.0	22.0	22.0	21.0	22.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:10MHz [<RB=1>]						
Channel	Channel 20000		Channel 20175		Channel 20350	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	23.0	22.0	23.0	22.0	23.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:10MHz [<RB=25>, <RB=50>]						
Channel	Channel 20000		Channel 20175		Channel 20350	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	22.0	21.0	22.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0

LTE Band 17

BW:5MHz [<RB=1>]						
Channel	Channel 23755		Channel 23790		Channel 23825	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	23.0	22.0	23.0	22.0	23.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:5MHz [<RB=12>, <RB=25>]						
Channel	Channel 23755		Channel 23790		Channel 23825	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	22.0	22.0	21.0	22.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:10MHz [<RB=1>]						
Channel	Channel 23780		Channel 23790		Channel 23800	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	23.0	22.0	23.0	22.0	23.0	22.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0
BW:10MHz [<RB=25>, <RB=50>]						
Channel	Channel 23780		Channel 23790		Channel 23800	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	22.0	21.0	22.0	21.0
Tolerance ±(dB)	1.0	1.0	1.0	1.0	1.0	1.0

WiFi 2.4G

802.11b (Average)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	12.0	13.0	13.0
Tolerance ±(dB)	1.0	1.0	1.0
802.11g (Average)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	15.0	14.0	15.0
Tolerance ±(dB)	1.0	1.0	1.0
802.11n HT20 (Average)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	13.0	14.0	14.0
Tolerance ±(dB)	1.0	1.0	1.0
802.11n HT40 (Average)			
Channel	Channel 3	Channel 6	Channel 9
Target (dBm)	9.0	9.0	9.0
Tolerance ±(dB)	1.0	1.0	1.0

WiFi 5.2G

802.11a (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	10.0	10.0	10.0

Tolerance ±(dB)	1.0	1.0	1.0
802.11n HT20 (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	9.0	10.0	10.0
Tolerance ±(dB)	1.0	1.0	1.0
802.11n HT40 (Average)			
Channel	Channel 38	Channel 40	
Target (dBm)	10.0	10.0	
Tolerance ±(dB)	1.0	1.0	

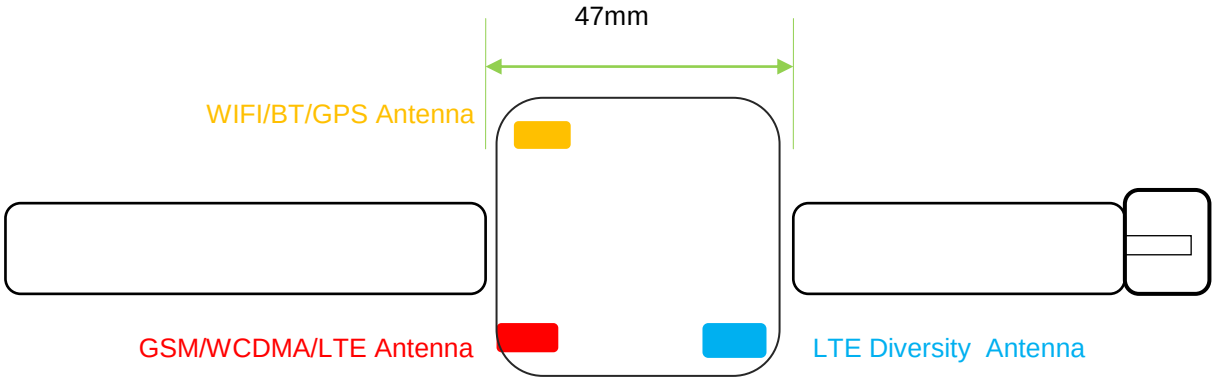
WiFi 5.8G

802.11a (Average)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	10.0	9.0	9.0
Tolerance ±(dB)	1.0	1.0	1.0
802.11n HT20 (Average)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	11.0	12.0	11.0
Tolerance ±(dB)	1.0	1.0	1.0
802.11n HT40 (Average)			
Channel	Channel 151	Channel 159	
Target (dBm)	12.0	11.0	
Tolerance ±(dB)	1.0	1.0	

Bluetooth V4.0

BLE-GFSK (Average)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	2.0	3.0	2.0
Tolerance ±(dB)	1.0	1.0	1.0
GFSK (Average)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	2.0	3.0	2.0
Tolerance ±(dB)	1.0	1.0	1.0
π/4DQPSK (Average)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	2.0	2.0	1.0
Tolerance ±(dB)	1.0	1.0	1.0
8DPSK (Average)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	2.0	2.0	1.0
Tolerance ±(dB)	1.0	1.0	1.0

4.3. Transmit Antenna



Rear view

4.4. SAR Measurement Results

The calculated SAR is obtained by the following formula:

Reported SAR=Measured SAR*$10^{(Ptarget-Pmeasured))/10}$

Scaling factor=$10^{(Ptarget-Pmeasured))/10}$

Reported SAR= Measured SAR* Scaling factor

Where

P_{target} is the power of manufacturing upper limit;

$P_{measured}$ is the measured power;

Measured SAR is measured SAR at measured power which including power drift)

Reported SAR which including Power Drift and Scaling factor

Duty Cycle

Test Mode	Duty Cycle
GPRS850	1:2.67
GPRS1900	1:2.67
UMTS	1:1
LTE	1:1
WLAN2450	1:1
5GWLAN	1:1

4.4.1 SAR Results

Next – to – Mouth <Flat / Front (10mm)>

Ch.	*Freq. (MHz)*	*Time slots /Channel/ Service*	*Test Position*	*Conducted Power (dBm)*	*Maximum Allowed Power (dBm)*	*Power Drift (%)*	*Scaling Factor*	*SAR_{1-g} results(W/kg)*		*Graph Results*
								Measured	*Reported*	
190	836.6	3Txslots	Front	29.76	30.00	-2.14	1.057	**0.290**	**0.306**	**Plot 1**
661	1880	3Txslots	Front	26.79	27.00	-1.63	1.050	**0.393**	**0.412**	**Plot 2**
4182	836.4	RMC	Front	23.43	24.00	-4.67	1.140	**0.296**	**0.338**	**Plot 3**
1413	1732.6	RMC	Front	23.25	24.00	3.02	1.189	**0.254**	**0.302**	**Plot 4**
9400	1800.0	RMC	Front	23.31	24.00	-3.93	1.172	**0.400**	**0.469**	**Plot 5**
18900	1880.0	1RB	Front	23.90	24.00	-1.36	1.023	**0.311**	**0.318**	**Plot 6**
18900	1880.0	50%RB	Front	23.25	24.00	0.21	1.189	0.247	0.294	
20300	1745.0	1RB	Front	23.22	24.00	4.96	1.197	**0.574**	**0.687**	**Plot 7**
20175	1732.5	50%RB	Front	22.97	23.00	1.87	1.007	0.431	0.434	
20525	836.5	1RB	Front	23.63	24.00	2.87	1.089	**0.263**	**0.286**	**Plot 8**
20600	844.0	50%RB	Front	22.95	23.00	-1.68	1.012	0.190	0.192	
20850	2510.0	1RB	Front	23.15	24.00	0.36	1.216	**0.126**	**0.153**	**Plot 9**
21350	2560.0	50%RB	Front	22.97	23.00	-2.91	1.007	0.108	0.109	
23155	713.5	1RB	Front	23.78	24.00	2.24	1.052	**0.324**	**0.341**	**Plot 10**
23155	713.5	50%RB	Front	23.27	24.00	-0.67	1.183	0.261	0.309	
23780	709.0	1RB	Front	23.50	24.00	1.97	1.122	**0.388**	**0.435**	**Plot 11**
23780	709.0	50%RB	Front	22.61	23.00	-3.01	1.094	0.257	0.281	
6	2437	802.11g	Front	14.99	15.00	-0.89	1.002	**0.180**	**0.180**	**Plot 12**
46	5230	802.11n40	Front	10.49	11.00	-1.40	1.125	**0.139**	**0.156**	**Plot 13**
151	5755	802.11n40	Front	12.15	13.00	-1.04	1.216	**0.065**	**0.079**	**Plot 14**

Extremity <Flat / Rear (0mm)>

Ch.	Freq. (MHz)	Time slots /Channel/ Service	Test Position	Conducted Power (dBm)	Maximum Allowed Power (dBm)	Power Drift (%)	Scaling Factor	SAR_{10-g} results(W/kg)		Graph Results
								Measured	Reported	
190	836.6	3Txslots	Back	29.76	30.00	1.07	1.057	**1.102**	**1.165**	**Plot 15**
661	1880	3Txslots	Back	26.79	27.00	-2.91	1.050	**0.808**	**0.848**	**Plot 16**
4182	836.4	RMC	Back	23.43	24.00	-2.13	1.140	**1.672**	**1.906**	**Plot 17**
1413	1732.6	RMC	Back	23.25	24.00	1.79	1.189	**0.900**	**1.070**	**Plot 18**
9400	1800.0	RMC	Back	23.31	24.00	0.92	1.172	**0.902**	**1.057**	**Plot 19**
18900	1880.0	1RB	Back	23.90	24.00	-0.57	1.023	**1.704**	**1.744**	**Plot 20**
18900	1880.0	50%RB	Back	23.25	24.00	1.48	1.189	0.653	0.776	
20300	1745.0	1RB	Back	23.22	24.00	1.22	1.197	**1.415**	**1.693**	**Plot 21**
20175	1732.5	50%RB	Back	22.97	23.00	0.06	1.007	1.001	1.008	
20525	836.5	1RB	Back	23.63	24.00	-0.00	1.089	**0.915**	**0.996**	**Plot 22**
20600	844.0	50%RB	Back	22.95	23.00	2.35	1.012	0.521	0.527	
20850	2510.0	1RB	Back	23.15	24.00	-0.89	1.216	**0.583**	**0.709**	**Plot 23**
21350	2560.0	50%RB	Back	22.97	23.00	-3.15	1.007	0.301	0.303	
23155	713.5	1RB	Back	23.78	24.00	-2.87	1.052	**1.013**	**1.066**	**Plot 24**
23155	713.5	50%RB	Back	23.27	24.00	2.44	1.183	0.732	0.866	
23780	709.0	1RB	Back	23.50	24.00	-1.17	1.122	**1.714**	**1.923**	**Plot 25**
23780	709.0	50%RB	Back	22.61	23.00	-1.72	1.094	1.185	1.296	
6	2437	802.11g	Back	14.99	15.00	-2.30	1.002	**0.580**	**0.581**	**Plot 26**
46	5230	802.11n40	Back	10.49	11.00	0.71	1.125	**0.468**	**0.526**	**Plot 27**
151	5755	802.11n40	Back	12.15	13.00	2.46	1.216	**0.494**	**0.601**	**Plot 28**

Note:

1. The value with black color is the maximum Reported SAR Value of each test band.
2. Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is optional for such test configuration(s).

4.5. Standalone SAR Test Exclusion Considerations and Estimated SAR

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

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

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

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

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

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

Estimated stand alone SAR					
Communication system	Frequency (MHz)	Configuration	Maximum Power (dBm)	Separation Distance (mm)	Estimated SAR_{1-g} (W/kg)
Bluetooth*	2441	Hotspot	4.00	10	0.052
Bluetooth*	2441	Body-worn	4.00	10	0.052

Remark:

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

4.6. Simultaneous TX SAR Considerations

4.5.1 Introduction

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

For the DUT,,WCDMA and WLAN share difference modular and diffence antenna, need consider simultaneous transmitter.

Application Simultaneous Transmission information:

Air-Interface	Band (MHz)	Type	Simultaneous Transmissions	Voice over Digital Transport(Data)
GSM	GPRS	DT	Yes,WLAN or BT/BLE	N/A
WCDMA	Band II /Band V/ Band IV	DT	Yes,WLAN or BT/BLE	N/A
LTE	Band2/Band4/ Band5/Band7/Band12/Band17	DT	Yes,WLAN or BT/BLE	N/A
WLAN	2450/5200/5800	DT	Yes, GPRS, UMTS,LTE	Yes
BT/BLE	2450	DT	Yes, GPRS, UMTS,LTE	N/A

Note:

BT and WLAN can be active at the same time, but only with interleaving of packages switched on board level. That means that they don’t transmit at the same time.

BLE-Bluetooth low energy;

BT- Classical Bluetooth;

4.5.2 Evaluation of Simultaneous SAR

Next – to – Mouth Exposure Conditions

Simultaneous transmission SAR for WiFi and GSM

Test Position	GSM850 Reported SAR1-g (W/Kg)	GSM1900 Reported SAR1-g (W/Kg)	WiFi2.4G Reported SAR1-g (W/kg)	WiFi5.2G Reported SAR1-g (W/kg)	WiFi5.8G Reported SAR1-g (W/kg)	MAX. ΣSAR1-g (W/Kg)	SAR1-g Limit (W/Kg)	Peak location separation ratio	Simut Meas. Required
Front	0.306	0.412	0.180	0.156	0.079	**0.592**	1.6	no	no

Simultaneous transmission SAR for WiFi and UMTS

Test Position	UMTS Band V Reported SAR1-g (W/Kg)	UMTS Band IV Reported SAR1-g (W/Kg)	UMTS Band II Reported SAR1-g W/Kg)	WiFi2.4G Reported SAR1-g (W/kg)	WiFi5.2G Reported SAR1-g (W/kg)	WiFi5.8G Reported SAR1-g (W/kg)	MAX. ΣSAR1-g (W/Kg)	SAR1-g Limit (W/Kg)	Peak location separation ratio	Simut Meas. Required
Front	0.338	0.302	0.469	0.180	0.156	0.079	**0.649**	1.6	no	no

Simultaneous transmission SAR for WiFi and LTE

Reported SAR1-g(W/kg)	Front
LTE Band2	0.318
LTE Band4	0.687
LTE Band5	0.286
LTE Band7	0.153
LTE Band12	0.341
LTE Band17	0.435
WiFi2.4G	0.180
5GWIFI U-NII-1	0.156
5GWIFI U-NII-3	0.079
MAX. ΣSAR1-g (W/kg)	**0.867**
SAR1-g Limit (W/kg)	1.6
Peak location separation ratio	no
Simut Meas. Required	no

Simultaneous transmission SAR for BT and GSM

Test Position	GSM850 Reported SAR1-g (W/Kg)	GSM1900 Reported SAR1-g (W/Kg)	BT Estimated SAR1-g (W/kg)	MAX. ΣSAR1-g (W/Kg)	SAR1-g Limit (W/Kg)	Peak location separation ratio	Simut Meas. Required
Front	0.306	0.412	0.052	**0.464**	1.6	no	no

Simultaneous transmission SAR for BT and UMTS

Test Position	UMTS Band V Reported SAR1-g (W/Kg)	UMTS Band IV Reported SAR1-g (W/Kg)	UMTS Band II Reported SAR1-g W/Kg)	BT Estimated SAR1-g (W/kg)	MAX. ΣSAR1-g (W/Kg)	SAR1-g Limit (W/Kg)	Peak location separation ratio	Simut Meas. Required
Front	0.338	0.302	0.469	0.052	**0.521**	1.6	no	no

Simultaneous transmission SAR for BT and LTE

Reported SAR1-g(W/kg)	Front
LTE Band2	0.318
LTE Band4	0.687
LTE Band5	0.286
LTE Band7	0.153
LTE Band12	0.341
LTE Band17	0.435
BT Estimated SAR1-g (W/kg)	0.052
MAX. ΣSAR1-g (W/kg)	**0.739**
SAR1-g Limit (W/kg)	1.6
Peak location separation ratio	no
Simut Meas. Required	no

Extremity Exposure Conditions

Simultaneous transmission SAR for WiFi and GSM

Test Position	GSM850 Reported SAR1-g (W/Kg)	GSM1900 Reported SAR1-g (W/Kg)	WiFi2.4G Reported SAR1-g (W/kg)	WiFi5.2G Reported SAR1-g (W/kg)	WiFi5.8G Reported SAR1-g (W/kg)	MAX. ΣSAR1-g (W/Kg)	SAR1-g Limit (W/Kg)	Peak location separation ratio	Simut Meas. Required
Rear	1.165	0.848	0.581	0.526	0.601	**1.766**	4.0	no	no

Simultaneous transmission SAR for WiFi and UMTS

Test Position	UMTS Band V Reported SAR1-g (W/Kg)	UMTS Band IV Reported SAR1-g (W/Kg)	UMTS Band II Reported SAR1-g W/Kg)	WiFi2.4G Reported SAR1-g (W/kg)	WiFi5.2G Reported SAR1-g (W/kg)	WiFi5.8G Reported SAR1-g (W/kg)	MAX. ΣSAR1-g (W/Kg)	SAR1-g Limit (W/Kg)	Peak location separation ratio	Simut Meas. Required
Rear	1.906	1.070	1.057	0.581	0.526	0.601	**2.507**	4.0	no	no

Simultaneous transmission SAR for WiFi and LTE

Reported SAR1-g(W/kg)	Front
LTE Band2	1.744
LTE Band4	1.693
LTE Band5	0.996
LTE Band7	0.709
LTE Band12	1.066
LTE Band17	1.923
WiFi2.4G	0.581
5GWIFI U-NII-1	0.526
5GWIFI U-NII-3	0.601
MAX. ΣSAR1-g (W/kg)	**2.524**
SAR1-g Limit (W/kg)	4.0
Peak location separation ratio	no
Simut Meas. Required	no

Simultaneous transmission SAR for BT and GSM

Test Position	GSM850 Reported SAR1-g (W/Kg)	GSM1900 Reported SAR1-g (W/Kg)	BT Estimated SAR1-g (W/kg)	MAX. ΣSAR1-g (W/Kg)	SAR1-g Limit (W/Kg)	Peak location separation ratio	Simut Meas. Required
Rear	1.165	0.848	0.052	**1.217**	4.0	no	no

Simultaneous transmission SAR for WiFi and UMTS

Test Position	UMTS Band V Reported SAR1-g (W/Kg)	UMTS Band IV Reported SAR1-g (W/Kg)	UMTS Band II Reported SAR1-g W/Kg)	BT Estimated SAR1-g (W/kg)	MAX. ΣSAR1-g (W/Kg)	SAR1-g Limit (W/Kg)	Peak location separation ratio	Simut Meas. Required
Rear	1.906	1.070	1.057	0.052	**1.958**	4.0	no	no

Simultaneous transmission SAR for WiFi and LTE

Reported SAR1-g(W/kg)	Rear
LTE Band2	1.744
LTE Band4	1.693
LTE Band5	0.996
LTE Band7	0.709
LTE Band12	1.066
LTE Band17	1.923
BT Estimated SAR1-g (W/kg)	0.052
MAX. ΣSAR1-g (W/kg)	**1.975**
SAR1-g Limit (W/kg)	4.0
Peak location separation ratio	no

Note:
2. The value with block color is the maximum values of standalone
3. The value with blue color is the maximum values of $\sum SAR_{1\text{-}g}$

4.7. SAR Measurement Variability

According to KDB865664, Repeated measurements are required only when the measured SAR is ≥ 0.80 W/kg. If the measured SAR value of the initial repeated measurement is < 1.42 W/kg with ≤ 20% variation, only one repeated measurement is required to reaffirm that the results are not expected to have substantial variations, which may introduce significant compliance concerns. A second repeated measurement is required only if the measured result for the initial repeated measurement is within 10% of the SAR limit and vary by more than 20%, which are often related to device and measurement setup difficulties. The following procedures are applied to determine if repeated measurements are required. The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.19 The repeated measurement results must be clearly identified in the SAR report. All measured SAR, including the repeated results, must be considered to determine compliance and for reporting according to KDB 690783.Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.

3) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
4) 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 ≥ 1.42 W/kg (~ 10% from the 1-g SAR limit).
5) 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.
6) 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 > 1.2

Next – to – Mouth Exposure Conditions

Frequency Band (MHz)	Air Interface	RF Exposure Configuration	Test Position	Repeated SAR (yes/no)	Highest Measured SAR_{1-g} (W/Kg)	First Repeated	
						Measued SAR_{1-g} (W/Kg)	Largest to Smallest SAR Ratio
750	LTE Band 12	Standalone	Front	no	0.324	n/a	n/a
835	WCDMA Band V	Standalone	Front	no	0.296	n/a	n/a
	GSM 850	Standalone	Front	no	0.290	n/a	n/a
	LTE Band 5	Standalone	Front	no	0.263	n/a	n/a
1800	LTE Band 4	Standalone	Front	no	0.574	n/a	n/a
	WCDMA Band IV	Standalone	Front	no	0.254	n/a	n/a
1900	GSM 1900	Standalone	Front	no	0.393	n/a	n/a
	WCDMA Band II	Standalone	Front	no	0.400	n/a	n/a
	LTE Band 2	Standalone	Front	no	0.311	n/a	n/a
2450	2.4GWLAN	Standalone	Front	no	0.180	n/a	n/a
2600	LTE Band 7	Standalone	Front	no	0.126	n/a	n/a
5G-6G	5GWIFI U-NII-1	Standalone	Front	no	0.139	n/a	n/a
	5GWIFI U-NII-3	Standalone	Front	no	0.065	n/a	n/a

Extremity Exposure Conditions

Frequency Band (MHz)	Air Interface	RF Exposure Configuration	Test Position	Repeated SAR (yes/no)	Highest Measured SAR_{1-g} (W/Kg)	First Repeated	
						Measued SAR_{1-g} (W/Kg)	Largest to Smallest SAR Ratio
750	LTE Band 12	Standalone	Rear	no	1.013	n/a	n/a
835	WCDMA Band V	Standalone	Rear	no	1.672	n/a	n/a
	GSM 850	Standalone	Rear	no	1.102	n/a	n/a
	LTE Band 5	Standalone	Rear	no	0.915	n/a	n/a
1800	LTE Band 4	Standalone	Rear	no	1.415	n/a	n/a
	WCDMA Band IV	Standalone	Rear	no	0.900	n/a	n/a
1900	GSM 1900	Standalone	Rear	no	0.808	n/a	n/a
	WCDMA Band II	Standalone	Rear	no	0.902	n/a	n/a
	LTE Band 2	Standalone	Rear	no	1.704	n/a	n/a
2450	2.4GWLAN	Standalone	Rear	no	0.580	n/a	n/a
2600	LTE Band 7	Standalone	Rear	no	0.583	n/a	n/a
5G-6G	5GWIFI U-NII-1	Standalone	Rear	no	0.468	n/a	n/a
	5GWIFI U-NII-3	Standalone	Rear	no	0.494	n/a	n/a

Remark:

1. *Second Repeated Measurement is not required since the ratio of the largest to smallest SAR for the orignal and first repeated measurement is not > 1.20 or 3 (1-g or 10-g respectively)*

4.8. General description of test procedures

1. The DUT is tested using CMW 500 communications testers as controller unit to set test channels and maximum output power to the DUT, as well as for measuring the conducted peak power.
2. Test positions as described in the tables above are in accordance with the specified test standard.
3. Tests in body position were performed in that configuration, which generates the highest time based averaged output power (see conducted power results).
4. According to KDB 447498 D01 testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:
   - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
   - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
   - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
5. Per KDB648474 D04 require when the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is < 1.2 W/kg.

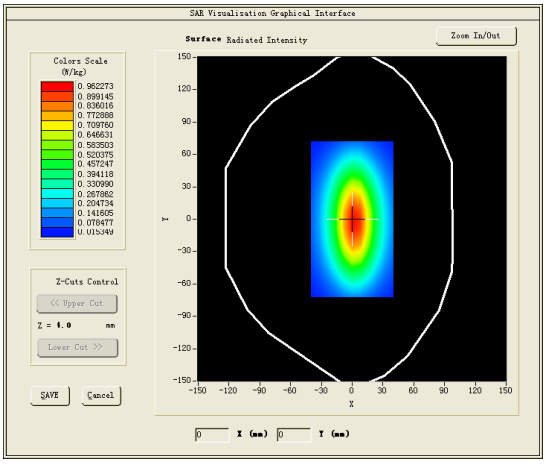
4.9. Measurement Uncertainty (300MHz-6GHz)

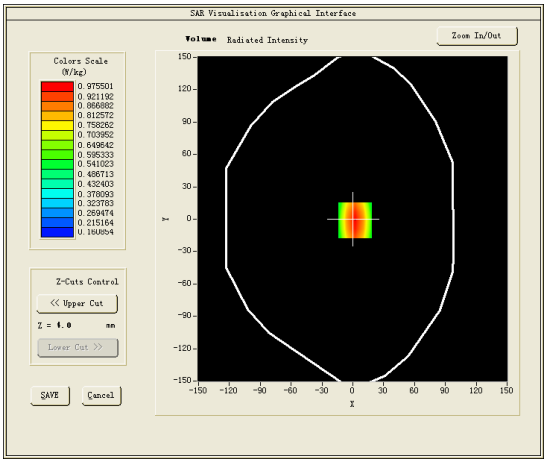
Not required as SAR measurement uncertainty analysis is required in SAR reports only when the highest measured SAR in a frequency band is ≥ 1.5 W/kg for 1-g SAR accoridng to KDB865664D01.

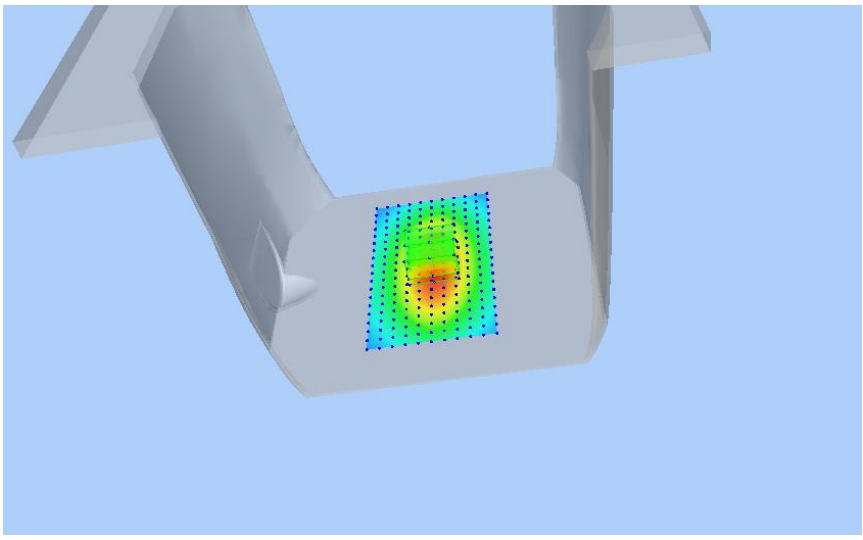
4.10. System Check Results

Test mode:750MHz(Body)
Product Description:Validation
Model:Dipole SID750
E-Field Probe: SSE2(SN 31/17 EPGO324)
Test Date: July 12, 2019

Medium(liquid type)	MSL_750
Frequency (MHz)	750.0000
Relative permittivity (real part)	55.98
Conductivity (S/m)	0.98
Input power	100mW
Crest Factor	1.0
Conversion Factor	1.45
Variation (%)	-0.140000
SAR 10g (W/Kg)	0.594215
SAR 1g (W/Kg)	0.875984
SURFACE SAR	**VOLUME SAR**

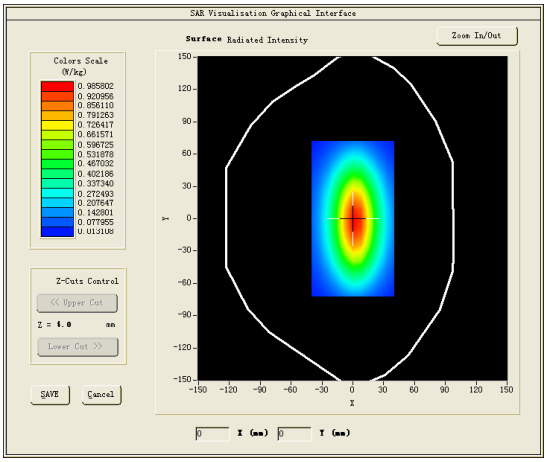


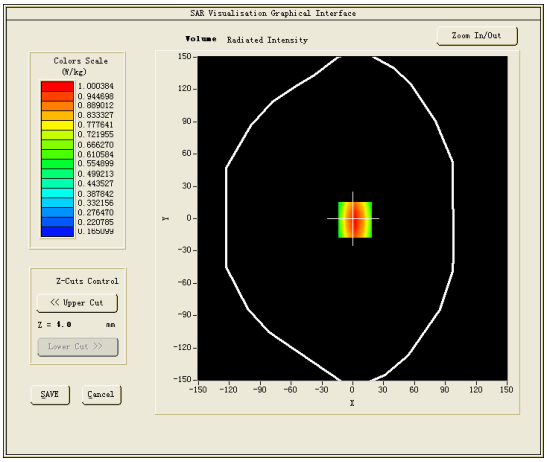


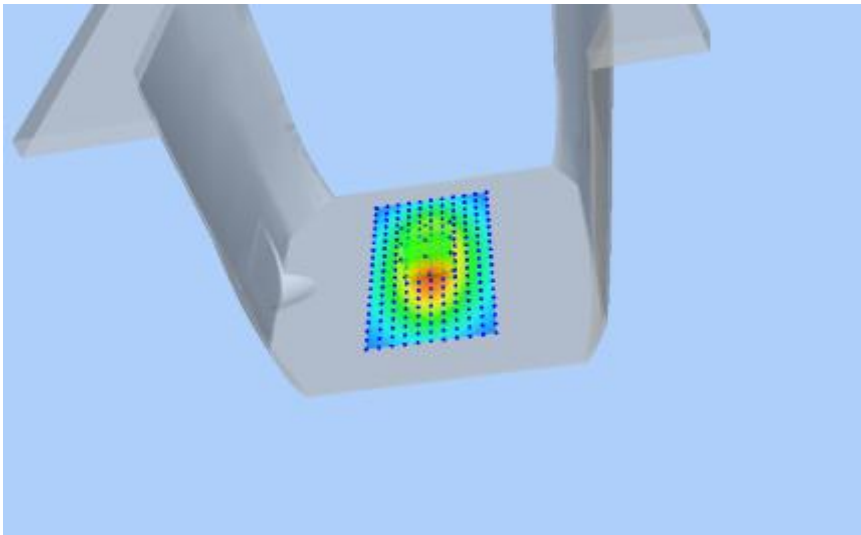


Test mode:835MHz(Body)
Product Description:Validation
Model:Dipole SID835
E-Field Probe:SSE2(SN31/17 EPGO324)
Test Date: July 15, 2019

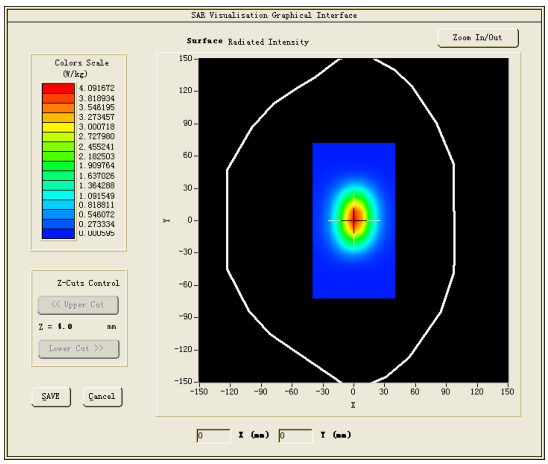
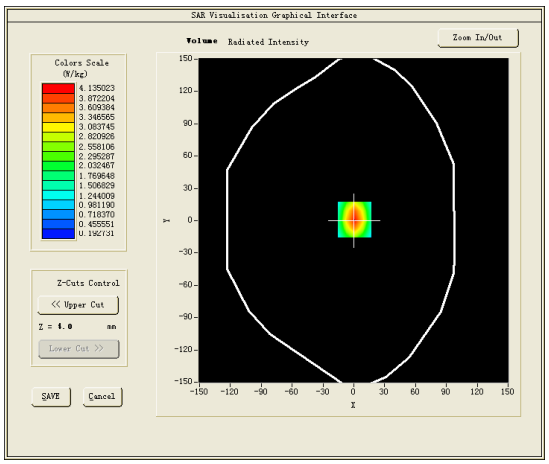
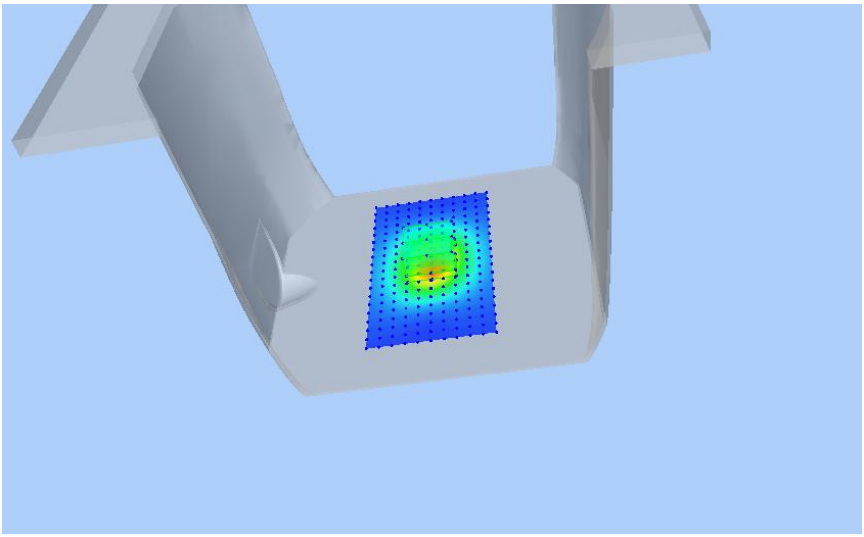
Medium(liquid type)	MSL_850
Frequency (MHz)	835.0000
Relative permittivity (real part)	55.18
Conductivity (S/m)	0.94
Input power	100mW
Crest Factor	1.0
Conversion Factor	1.85
Variation (%)	-2.330000
SAR 10g (W/Kg)	0.623672
SAR 1g (W/Kg)	0.987418
SURFACE SAR	**VOLUME SAR**





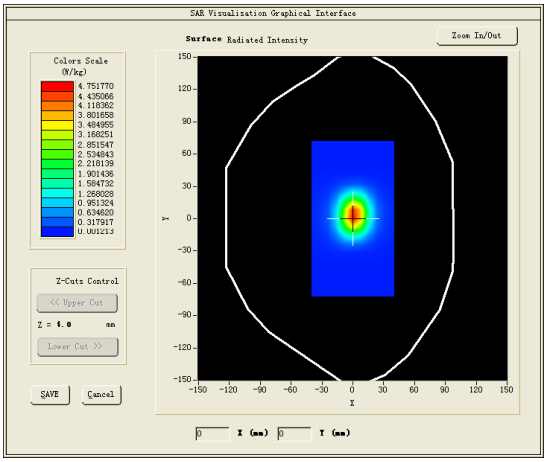


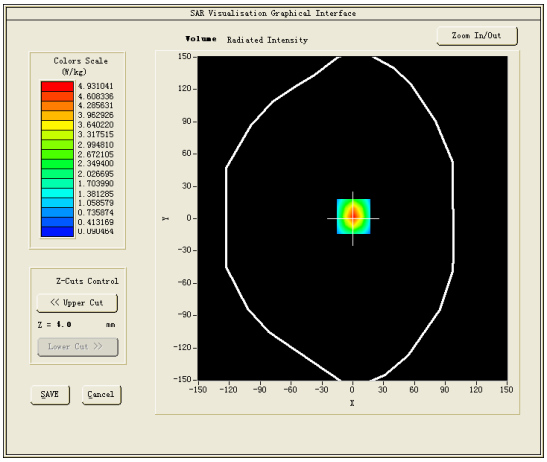
Test mode:1800MHz(Body)
Product Description:Validation
Model :Dipole SID1800
E-Field Probe:SSE2(SN 31/17 EPGO324)
Test Date: July 17, 2019

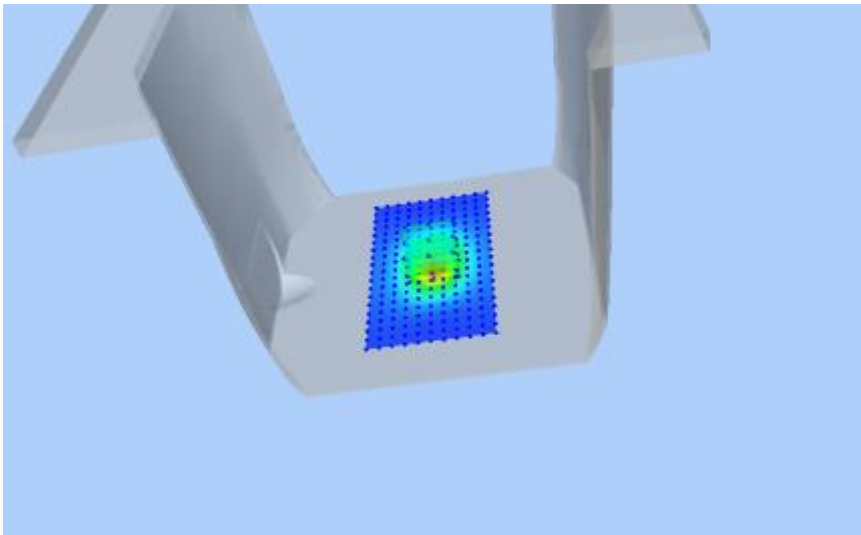
Medium(liquid type)	MSL_1800
Frequency (MHz)	1800.0000
Relative permittivity (real part)	53.24
Conductivity (S/m)	1.55
Input power	100mW
Crest Factor	1.0
Conversion Factor	1.65
Variation (%)	2.580000
SAR 10g (W/Kg)	2.142472
SAR 1g (W/Kg)	3.911853
SURFACE SAR	**VOLUME SAR**
	
	

Test mode:1900MHz(Body)
Product Description:Validation
Model :Dipole SID1900
E-Field Probe:SSE2(SN31/17 EPGO324)
Test Date: July 19, 2019

Medium(liquid type)	MSL_1900
Frequency (MHz)	1900.0000
Relative permittivity (real part)	54.10
Conductivity (S/m)	1.53
Input power	100mW
Crest Factor	1.0
Conversion Factor	2.16
Variation (%)	-2.430000
SAR 10g (W/Kg)	2.142287
SAR 1g (W/Kg)	4.027584
SURFACE SAR	**VOLUME SAR**

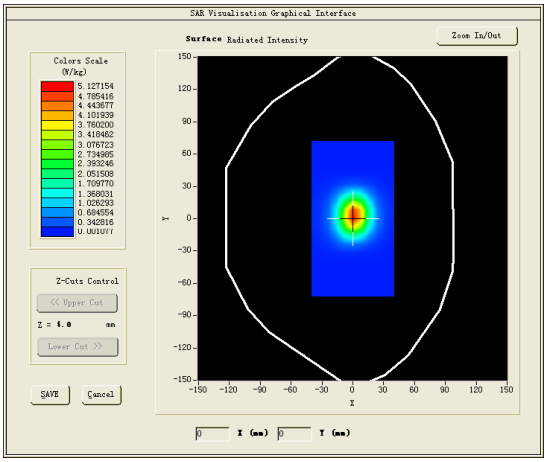


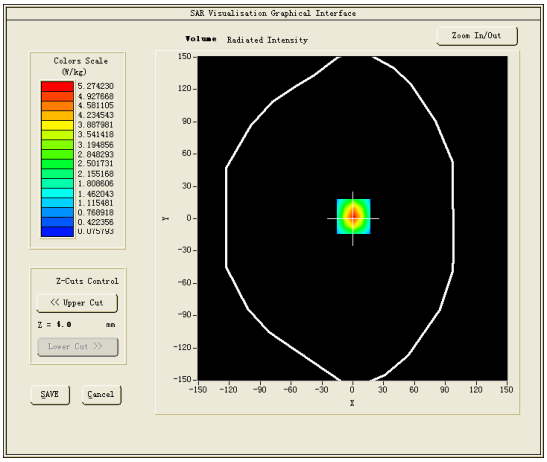


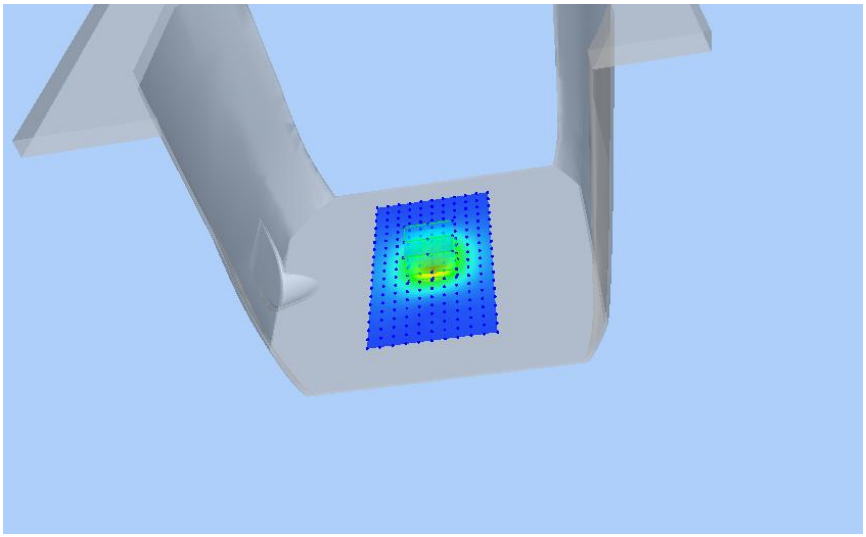


Test mode:2450MHz(Body)
Product Description:Validation
Model:Dipole SID2450
E-Field Probe:SSE2(SN31/17 EPGO324)
Test Date: July 22, 2019

Medium(liquid type)	MSL_2450
Frequency (MHz)	2450.000000
Relative permittivity (real part)	51.97
Conductivity (S/m)	2.02
Input power	100mW
Crest Factor	1.0
Conversion Factor	2.28
Variation (%)	1.590000
SAR 10g (W/Kg)	2.501254
SAR 1g (W/Kg)	5.373581
SURFACE SAR	**VOLUME SAR**

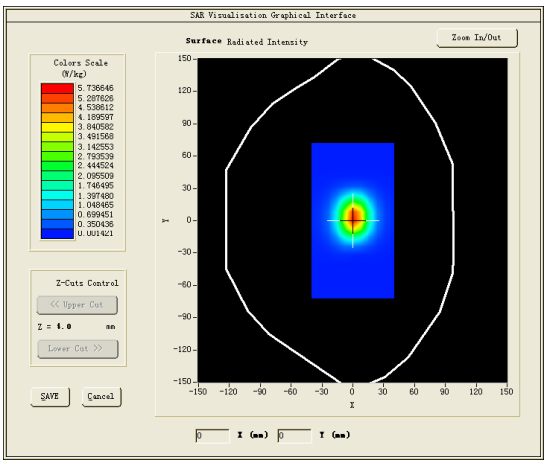


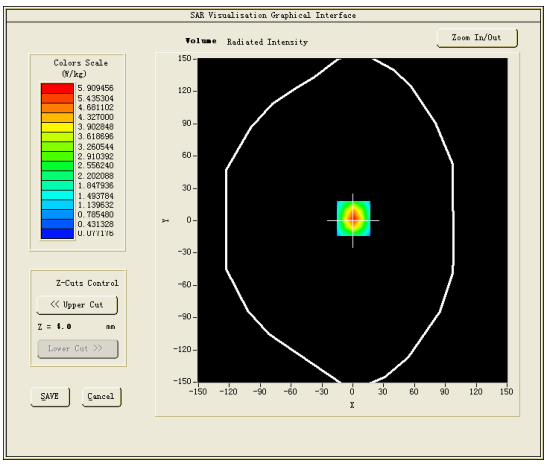


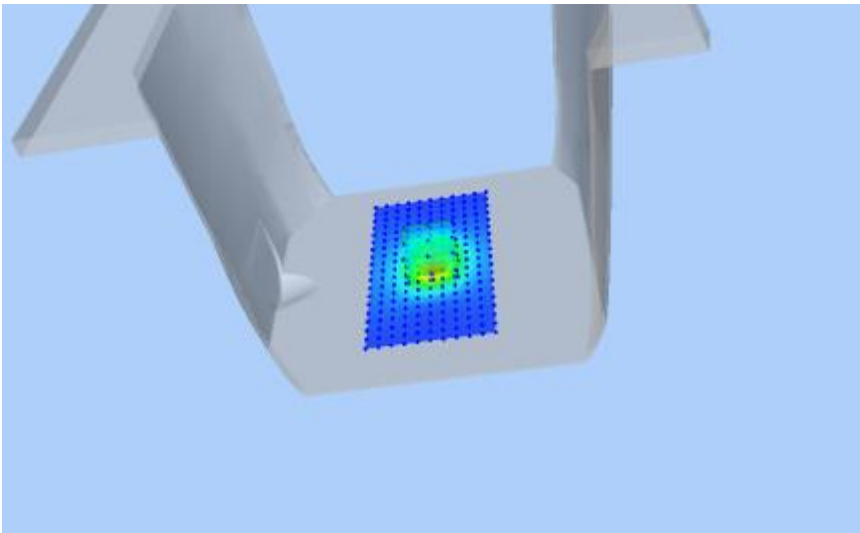


Test mode:2600MHz(Body)
Product Description:Validation
Model:Dipole SID2600
E-Field Probe:SSE2(SN 31/17 EPGO324)
Test Date: July 24, 2019

Medium(liquid type)	HSL_2600
Frequency (MHz)	2600.0000
Relative permittivity (real part)	39.65
Conductivity (S/m)	1.67
Input power	100mW
Crest Factor	1.0
Conversion Factor	1.89
Variation (%)	1.590000
SAR 10g (W/Kg)	2.387023
SAR 1g (W/Kg)	5.400871
SURFACE SAR	**VOLUME SAR**

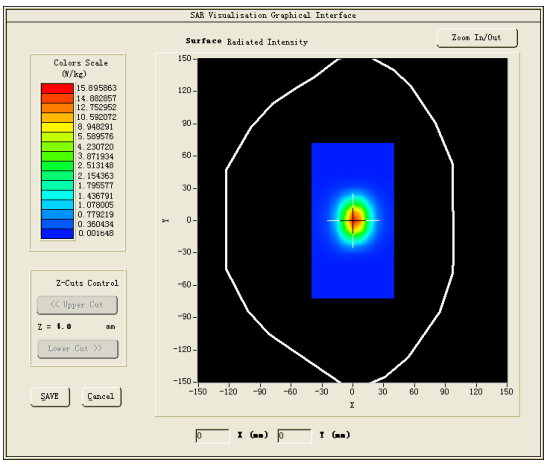


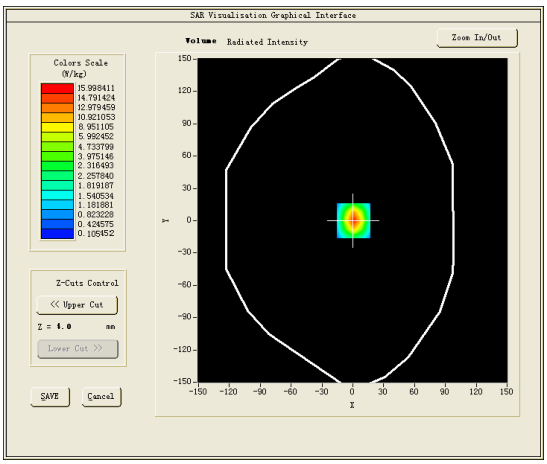


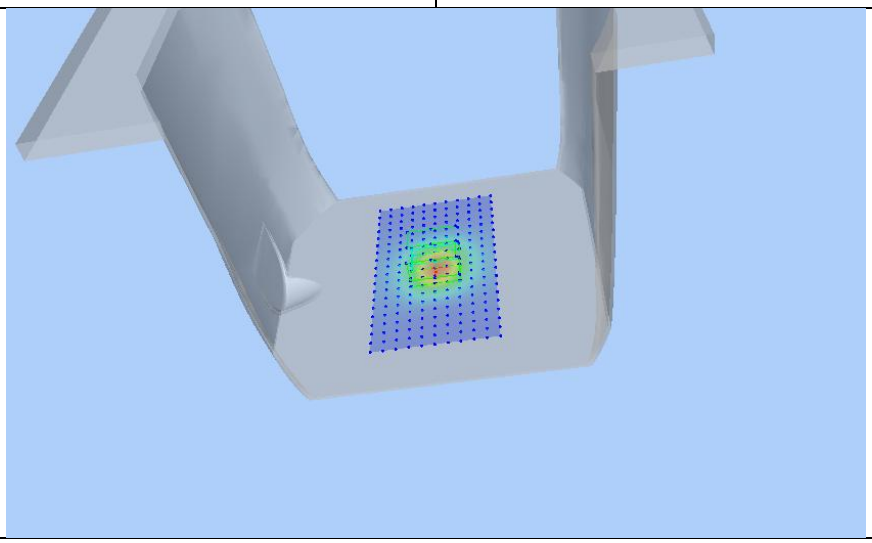


Test mode:5200MHz(Body))
Product Description:Validation
Model:Dipole SID5000
E-Field Probe: SE2(SN 31/17 EPGO324)
Test Date: July 26, 2019

Medium(liquid type)	MSL_5000
Frequency (MHz)	5000.0000
Relative permittivity (real part)	48.86
Conductivity (S/m)	5.75
Input power	100mW
Crest Factor	1.0
Conversion Factor	1.50
Variation (%)	-2.170000
SAR 10g (W/Kg)	5.606421
SAR 1g (W/Kg)	15.884671
SURFACE SAR	**VOLUME SAR**

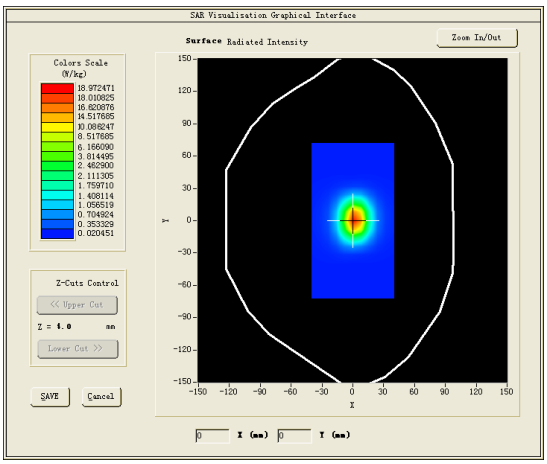


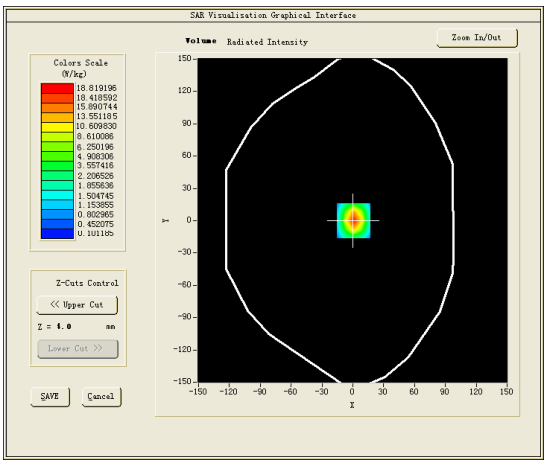


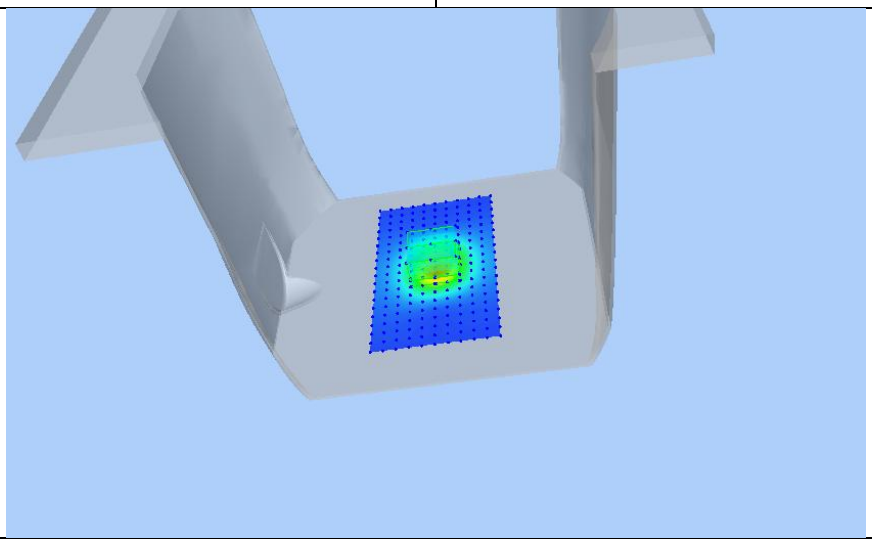


Test mode:5800MHz((Body))
Product Description:Validation
Model:Dipole SID5000
E-Field Probe: SSE2(SN 31/17 EPGO324)
Test Date: August 02, 2019

Medium(liquid type)	MSL_5000
Frequency (MHz)	5000.0000
Relative permittivity (real part)	48.13
Conductivity (S/m)	5.75
Input power	100mW
Crest Factor	1.0
Conversion Factor	1.50
Variation (%)	-3.300000
SAR 10g (W/Kg)	6.085430
SAR 1g (W/Kg)	17.764412
SURFACE SAR	**VOLUME SAR**







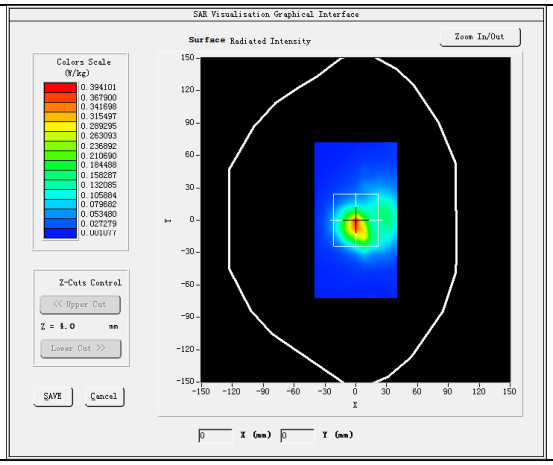
4.11. SAR Test Graph Results

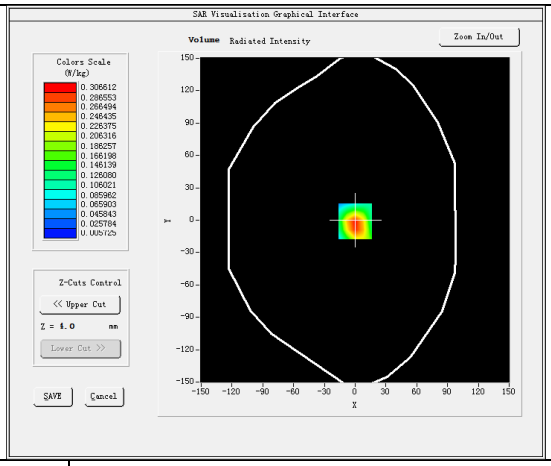
SAR plots for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination according to FCC KDB 865664 D02

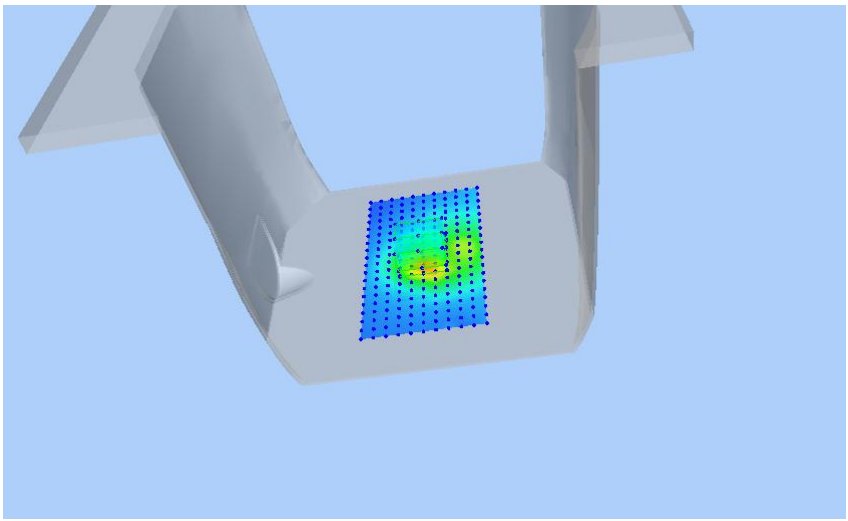
#1

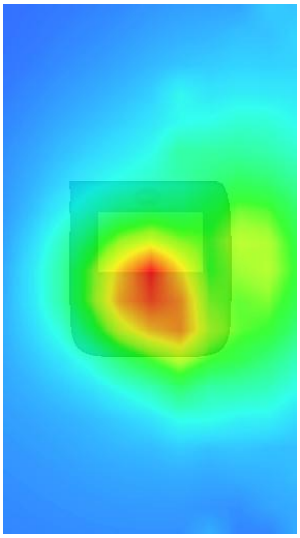
Test Mode: Hotspot WCDMA 850MHz,Middle channel < Next – to – Mouth (Front 10mm)>
Product Description: KIDS WATCH
Model: BUBBLE
Test Date: July 15, 2019

Medium(liquid type)	MSL_850
Frequency (MHz)	836.6000
Relative permittivity (real part)	55.18
Conductivity (S/m)	0.94
E-Field Probe	SN 31/17 EPGO324
Crest Factor	2.0
Conversion Factor	1.59
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-2.140000
SAR 10g (W/Kg)	0.149658
SAR 1g (W/Kg)	0.289878
SURFACE SAR	VOLUME SAR









#2

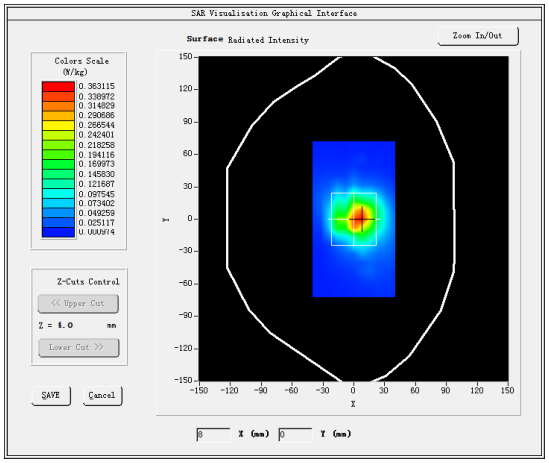
Test Mode: Hotspot GPRS1900MHz,Middle channel< Next – to – Mouth (Front 10mm)>

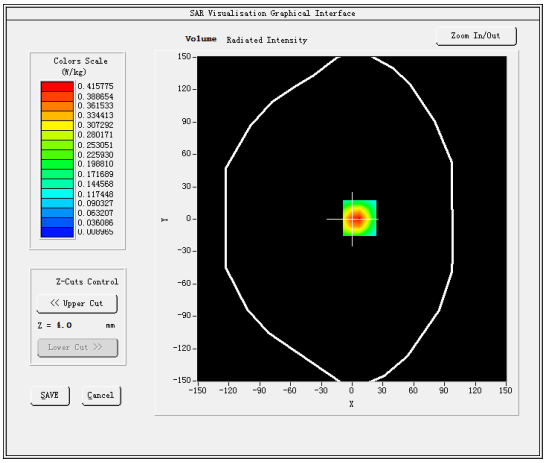
Product Description: KIDS WATCH

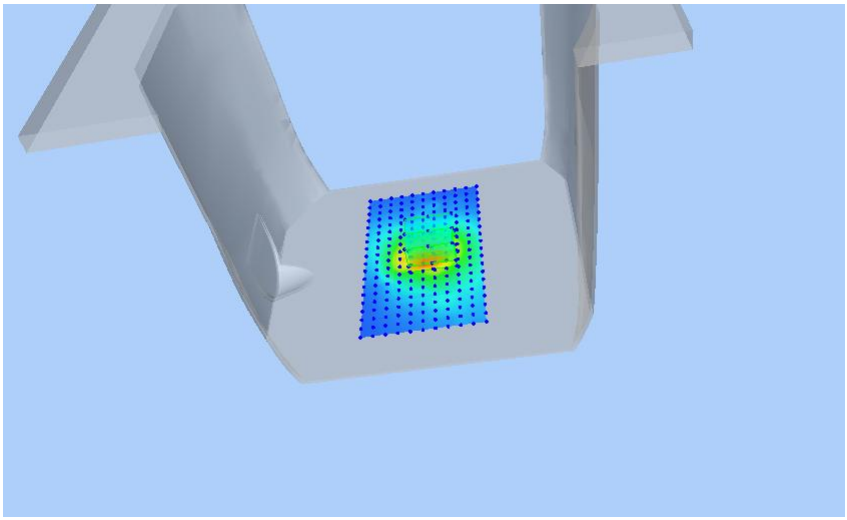
Model: BUBBLE

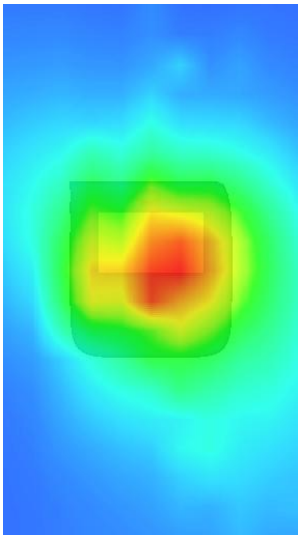
Test Date: July 19, 2019

Medium(liquid type)	MSL_1900
Frequency (MHz)	1880.0000
Relative permittivity (real part)	54.10
Conductivity (S/m)	1.53
E-Field Probe	SN 31/17 EPGO324
Crest Factor	2.0
Conversion Factor	1.93
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-1.630000
SAR 10g (W/Kg)	0.195415
SAR 1g (W/Kg)	0.393349
SURFACE SAR	**VOLUME SAR**









#3

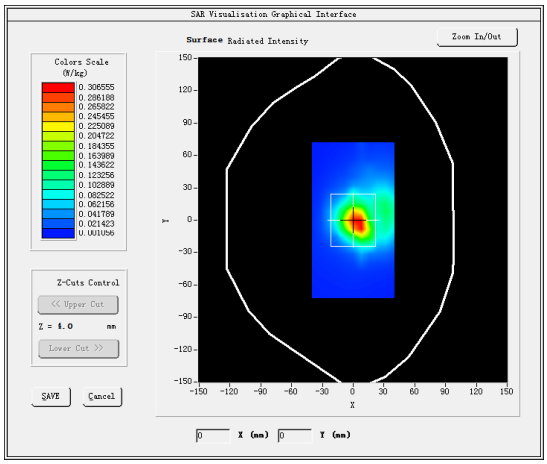
Test Mode: Hotspot WCDMA Band V,Middle channel< Next – to – Mouth (Front 10mm)>

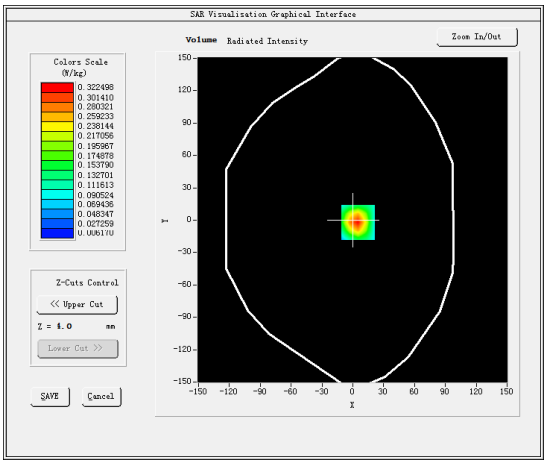
Product Description: KIDS WATCH

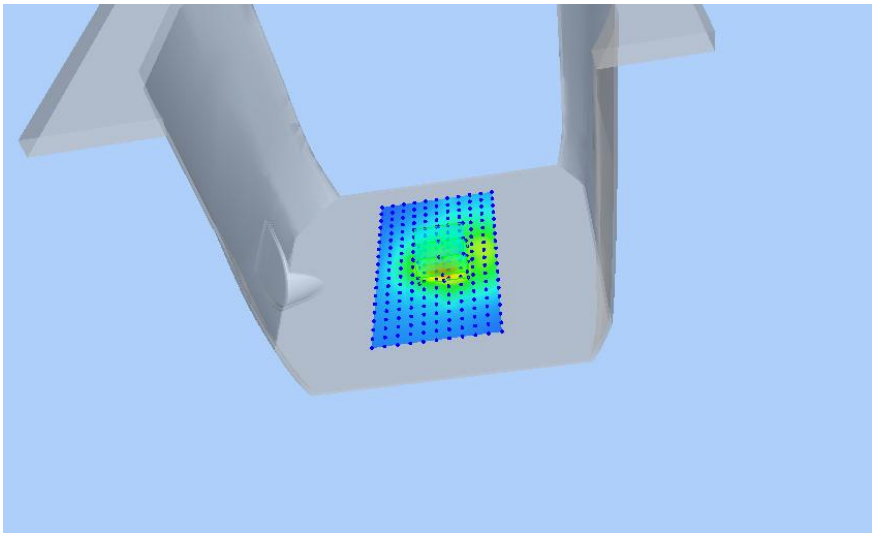
Model: BUBBLE

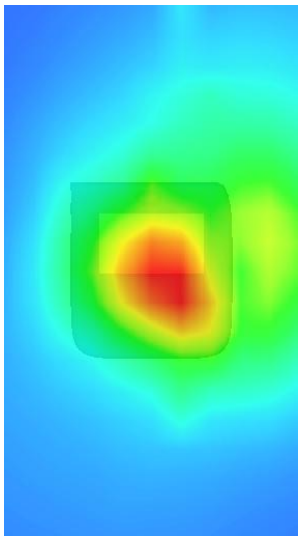
Test Date: July 15, 2019

Medium(liquid type)	MSL_850
Frequency (MHz)	836.4000
Relative permittivity (real part)	55.18
Conductivity (S/m)	0.94
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.59
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-4.670000
SAR 10g (W/Kg)	0.148246
SAR 1g (W/Kg)	0.296020
SURFACE SAR	**VOLUME SAR**









#4

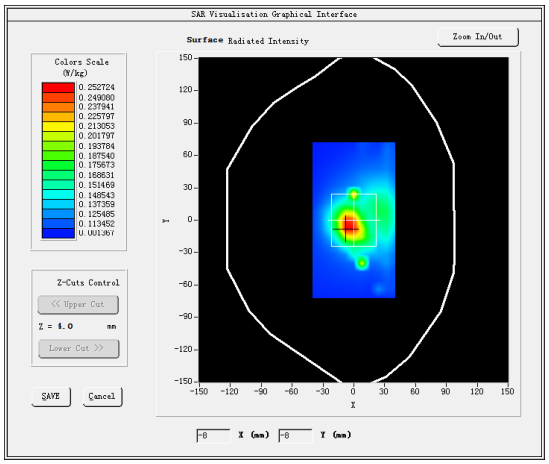
Test Mode: Hotspot WCDMA Band IV,Middle channel< Next – to – Mouth (Front 10mm)>

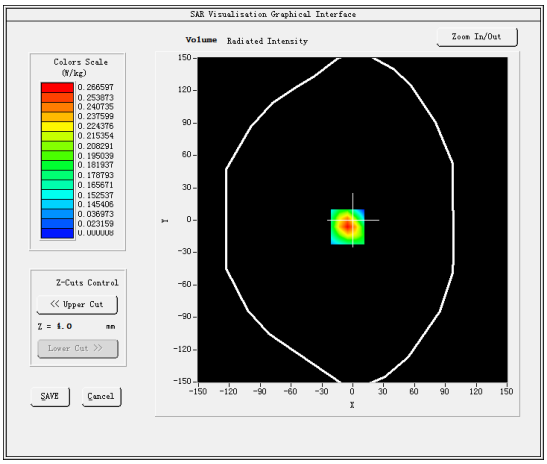
Product Description: KIDS WATCH

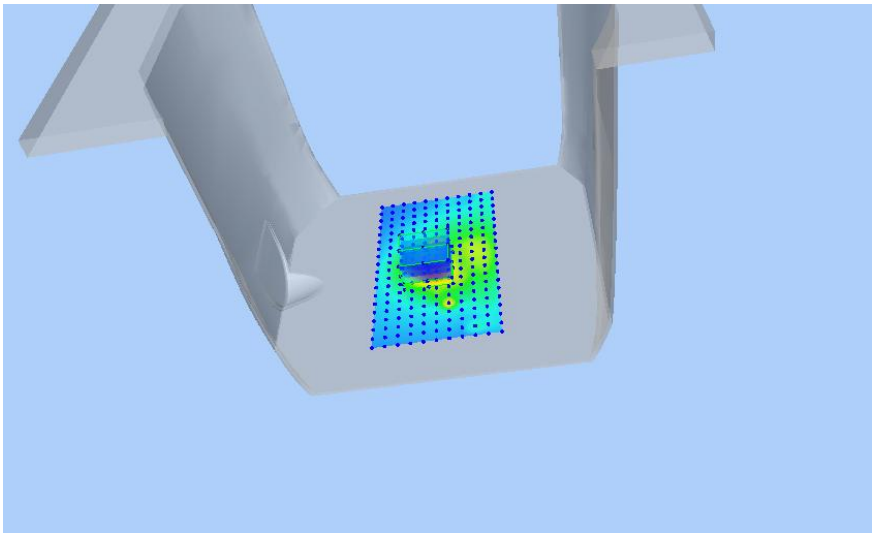
Model: BUBBLE

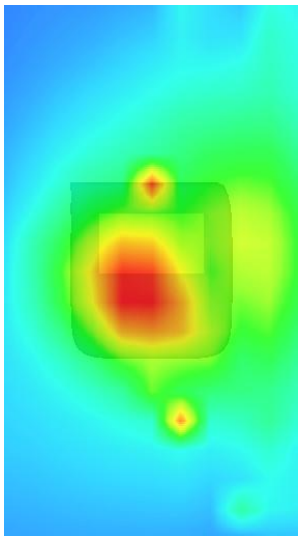
Test Date: July 17, 2019

Medium(liquid type)	MSL_1800
Frequency (MHz)	1732.6000
Relative permittivity (real part)	53.24
Conductivity (S/m)	1.55
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.59
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	3.020000
SAR 10g (W/Kg)	0.098095
SAR 1g (W/Kg)	0.254151
SURFACE SAR	**VOLUME SAR**









#5

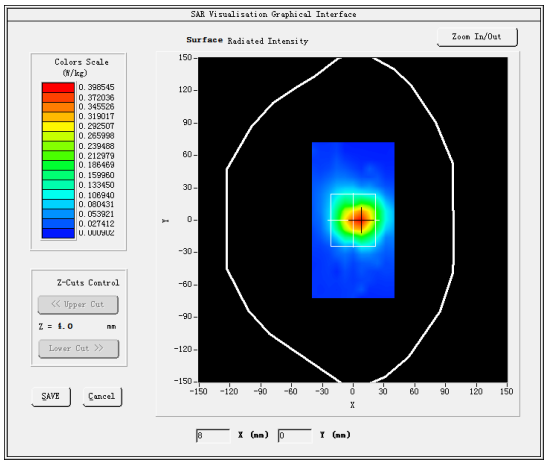
Test Mode: Hotspot WCDMA Band II,Middle channel< Next – to – Mouth (Front 10mm)>

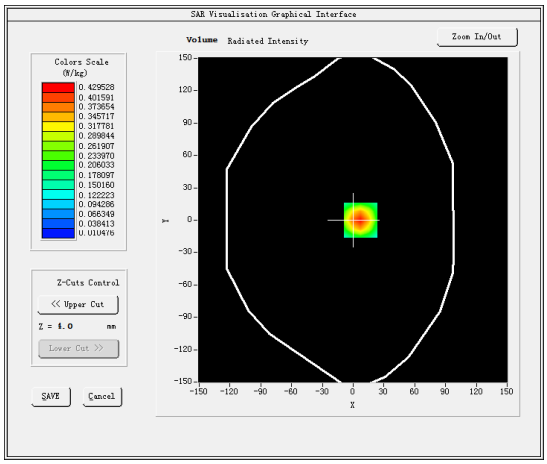
Product Description: KIDS WATCH

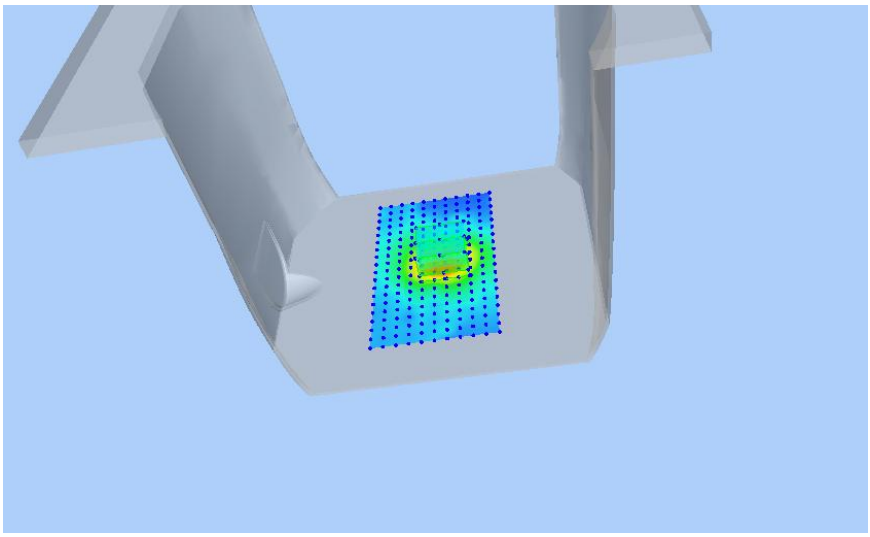
Model: BUBBLE

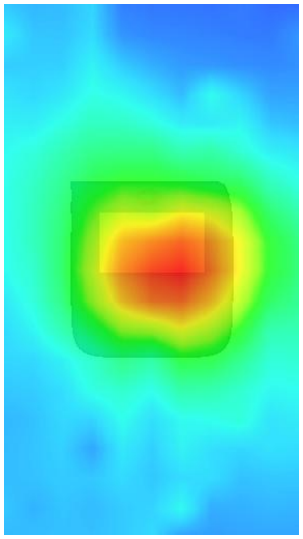
Test Date: July 19, 2019

Medium(liquid type)	MSL_1900
Frequency (MHz)	1880.0000
Relative permittivity (real part)	54.10
Conductivity (S/m)	1.52
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.93
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-3.930000
SAR 10g (W/Kg)	0.199444
SAR 1g (W/Kg)	0.399600
SURFACE SAR	**VOLUME SAR**





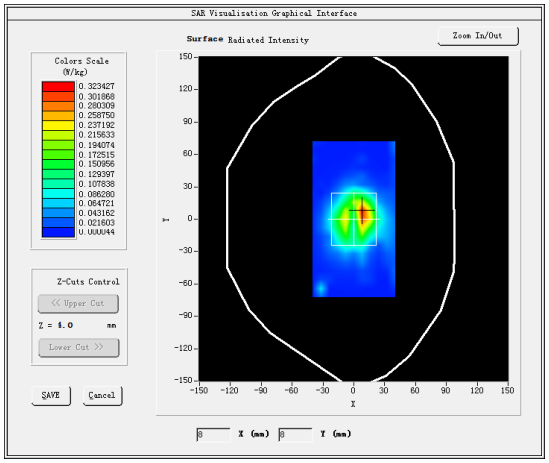


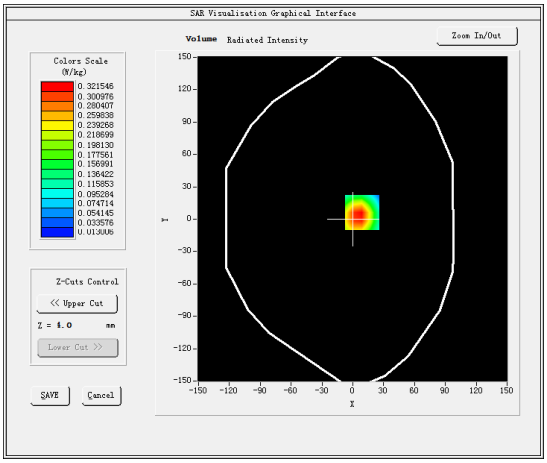


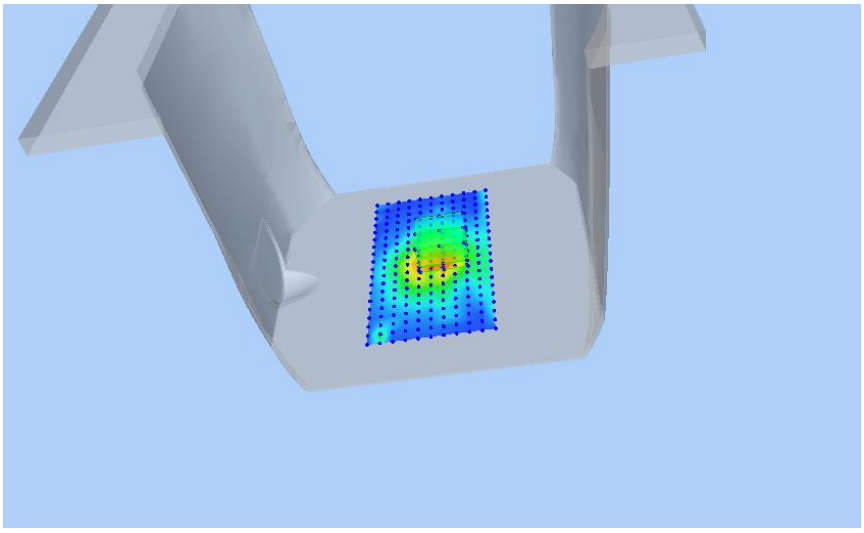
#6

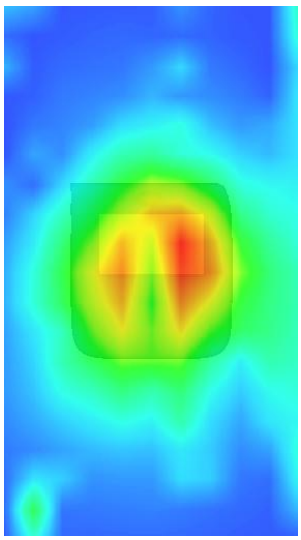
Test Mode: Hotspot LTE Band 2, 1RB,Middle channel< Next – to – Mouth (Front 10mm)>
Product Description: KIDS WATCH
Model: BUBBLE
Test Date: July 19, 2019

Medium(liquid type)	MSL_1900
Frequency (MHz)	1880.0000
Relative permittivity (real part)	54.10
Conductivity (S/m)	1.53
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.68
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-1.360000
SAR 10g (W/Kg)	0.173771
SAR 1g (W/Kg)	0.311310
SURFACE SAR	**VOLUME SAR**









#7

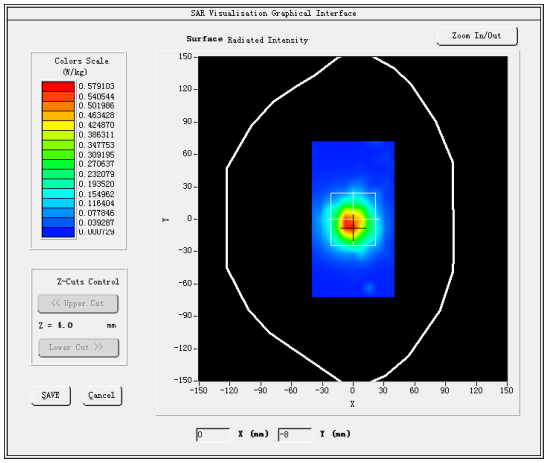
Test Mode: Hotspot LTE Band 4, 1RB,High channel< Next – to – Mouth (Front 10mm)>

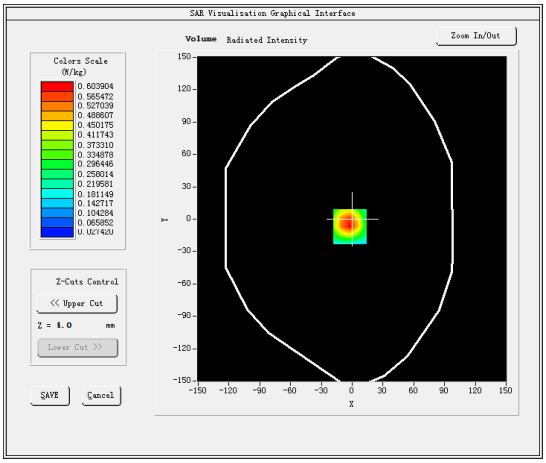
Product Description: KIDS WATCH

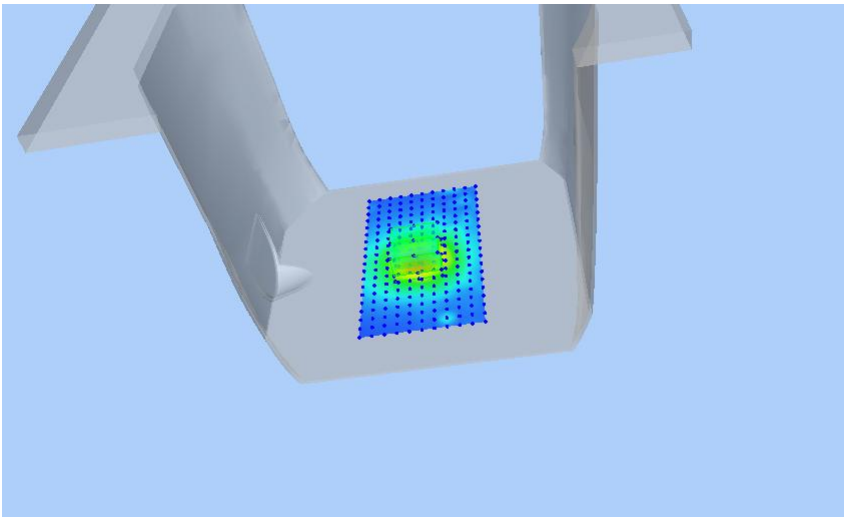
Model: BUBBLE

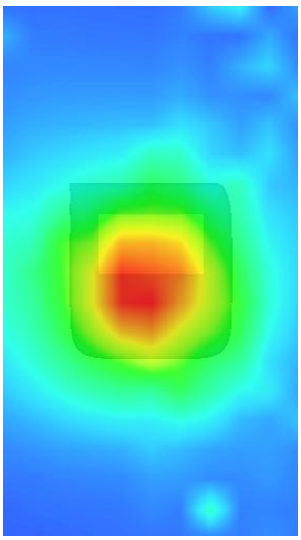
Test Date: July 17, 2019

Medium(liquid type)	MSL_1800
Frequency (MHz)	1745.0000
Relative permittivity (real part)	53.24
Conductivity (S/m)	1.55
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.68
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	4.960000
SAR 10g (W/Kg)	0.325238
SAR 1g (W/Kg)	0.574518
SURFACE SAR	**VOLUME SAR**









#8

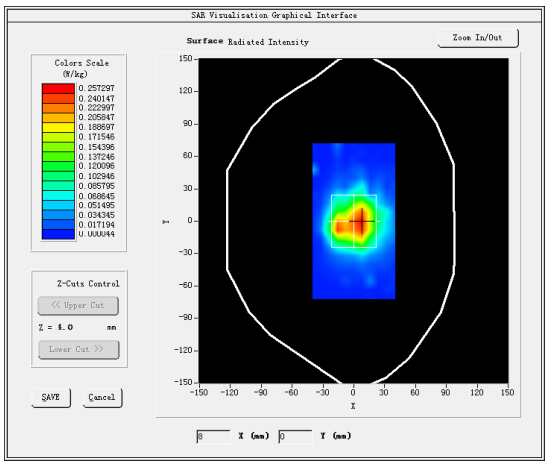
Test Mode: Hotspot LTE Band 5, 1RB,Low channel< Next – to – Mouth (Front 10mm)>

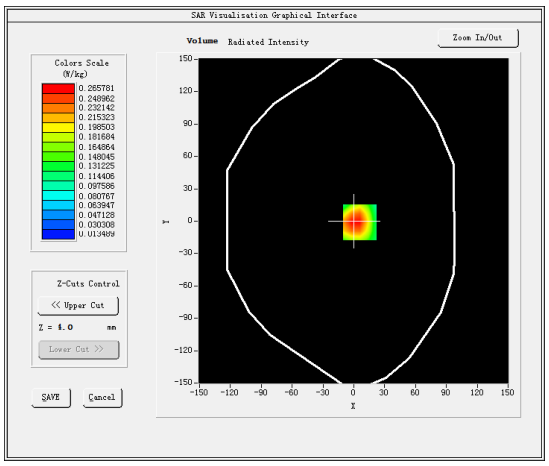
Product Description: KIDS WATCH

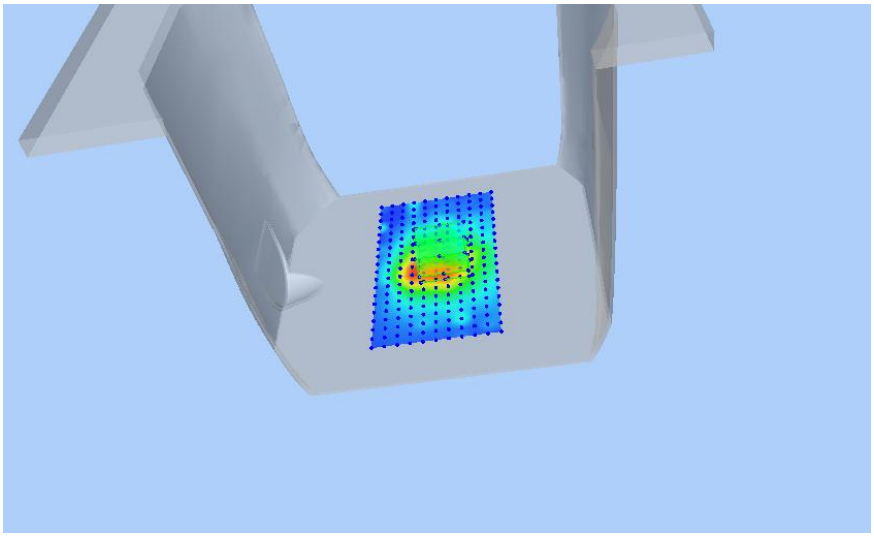
Model: BUBBLE

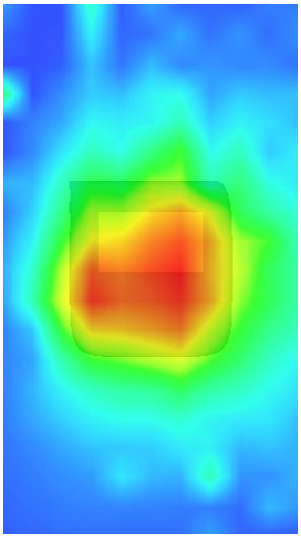
Test Date: July 15, 2019

Medium(liquid type)	MSL_835
Frequency (MHz)	836.5000
Relative permittivity (real part)	55.18
Conductivity (S/m)	0.94
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.59
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	2.870000
SAR 10g (W/Kg)	0.144143
SAR 1g (W/Kg)	0.263115
SURFACE SAR	**VOLUME SAR**









#9

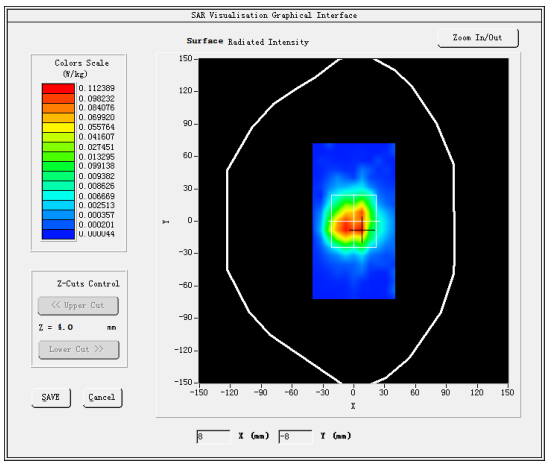
Test Mode: Hotspot LTE Band 7, 1RB,Low channel< Next – to – Mouth (Front 10mm)>

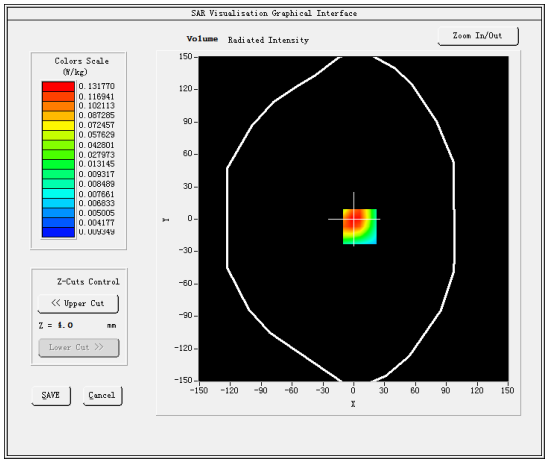
Product Description: KIDS WATCH

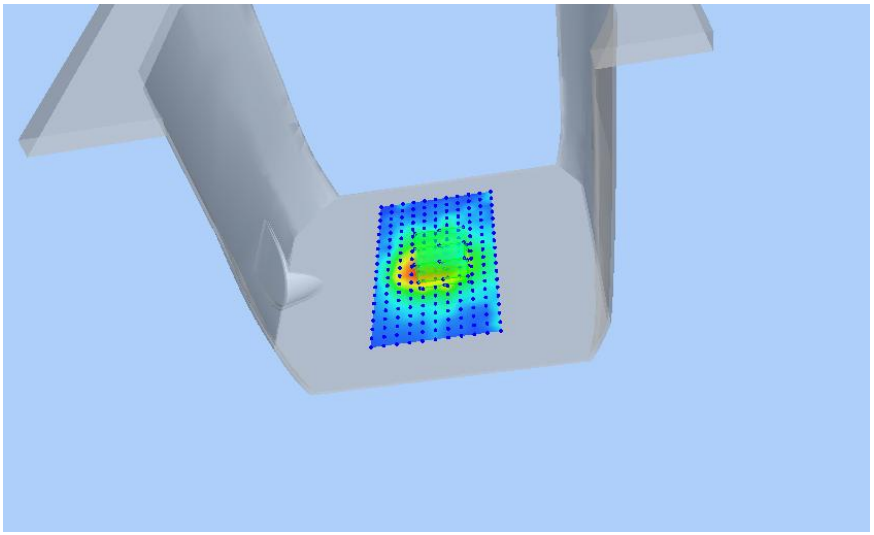
Model: BUBBLE

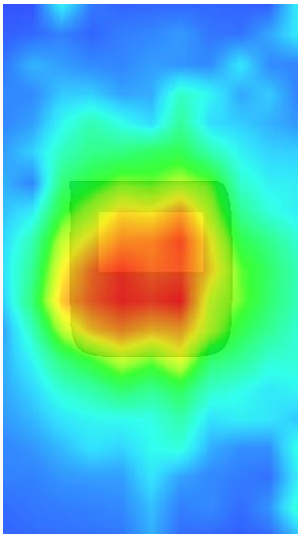
Test Date: July 24, 2019

Medium(liquid type)	MSL_2600
Frequency (MHz)	2510.0000
Relative permittivity (real part)	52.34
Conductivity (S/m)	2.08
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.98
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	0.360000
SAR 10g (W/Kg)	0.062726
SAR 1g (W/Kg)	0.125926
SURFACE SAR	**VOLUME SAR**





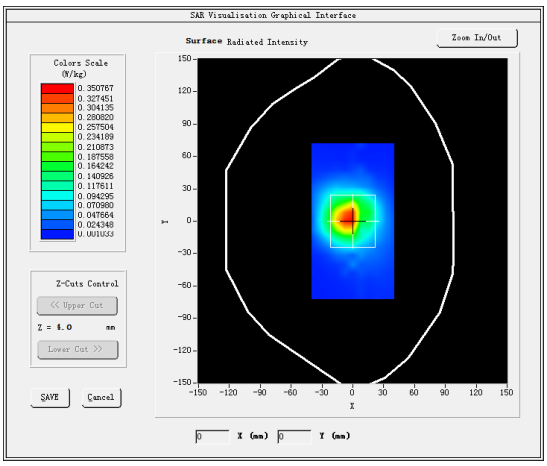


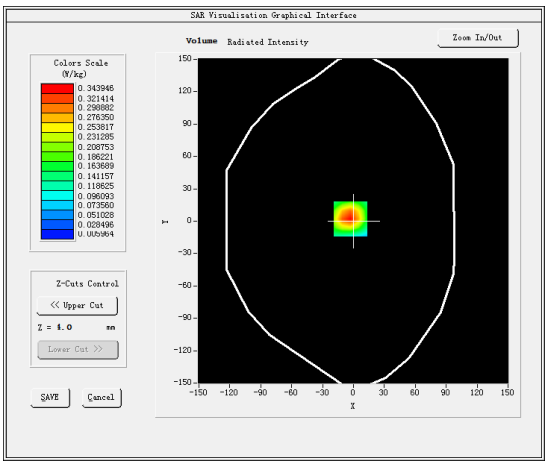


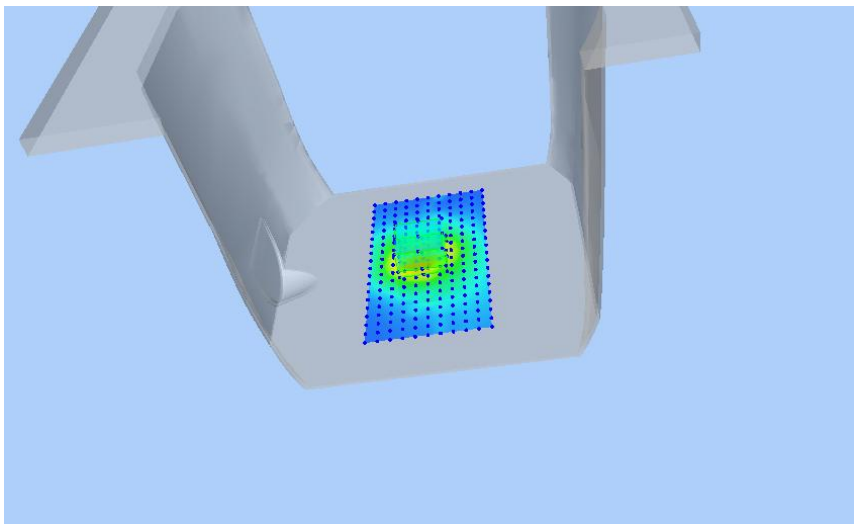
#10

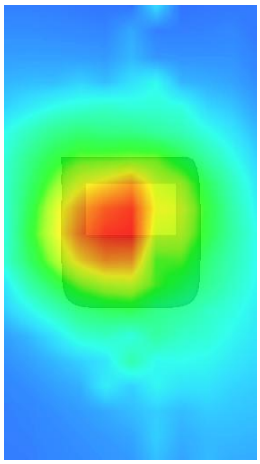
Test Mode: Hotspot LTE Band 12, 1RB,High channel < Next – to – Mouth (Front 10mm)>
Product Description: KIDS WATCH
Model: BUBBLE
Test Date: July 12, 2019

Medium(liquid type)	MSL_750
Frequency (MHz)	713.5000
Relative permittivity (real part)	55.98
Conductivity (S/m)	0.98
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.50
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	2.240000
SAR 10g (W/Kg)	0.163213
SAR 1g (W/Kg)	0.324422
SURFACE SAR	**VOLUME SAR**









#11

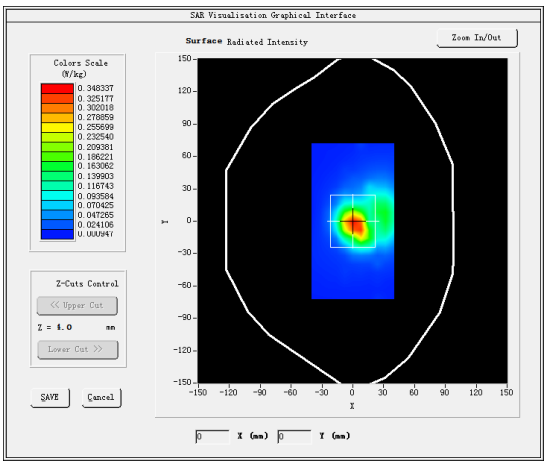
Test Mode: Hotspot LTE Band 17, 1RB,Low channel< Next – to – Mouth (Front 10mm)>

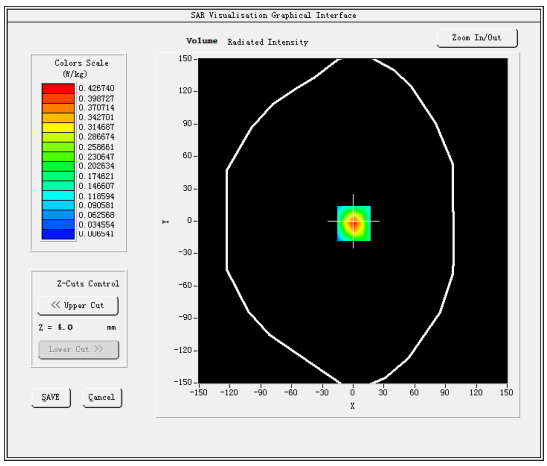
Product Description: KIDS WATCH

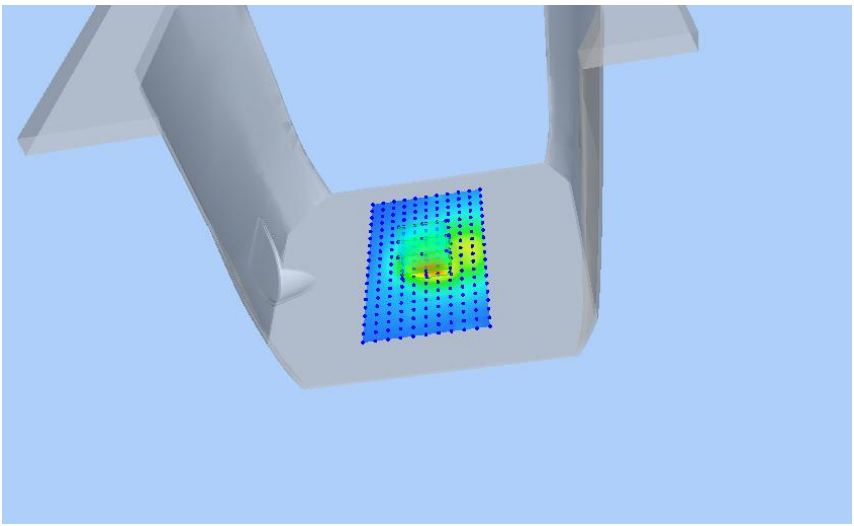
Model: BUBBLE

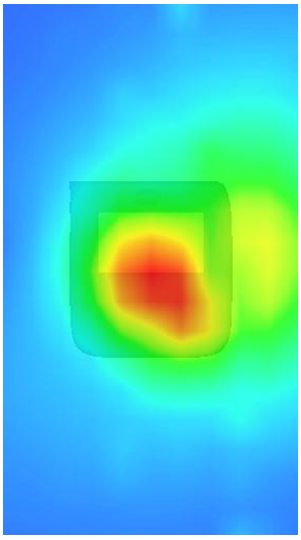
Test Date: July 12, 2019

Medium(liquid type)	MSL_750
Frequency (MHz)	709.0000
Relative permittivity (real part)	55.98
Conductivity (S/m)	0.98
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.50
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	1.970000
SAR 10g (W/Kg)	0.183579
SAR 1g (W/Kg)	0.387685
SURFACE SAR	**VOLUME SAR**









#12

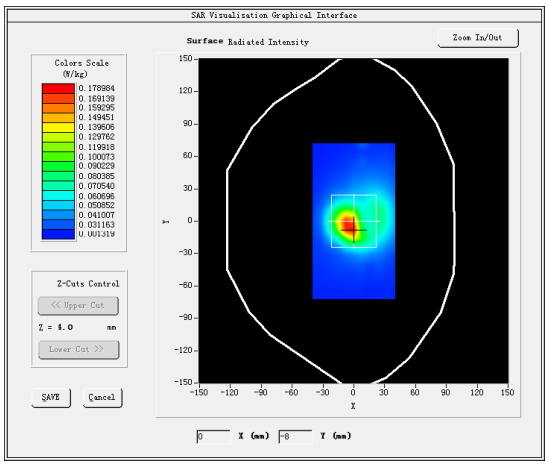
Test Mode: Hotspot 802.11b(WiFi2.4G),Middle channel < Next – to – Mouth (Front 10mm)>

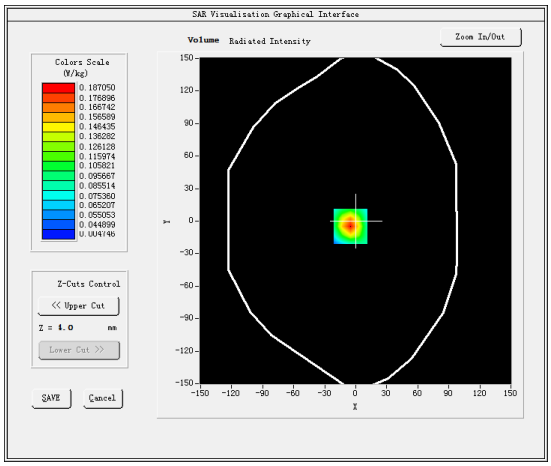
Product Description: KIDS WATCH

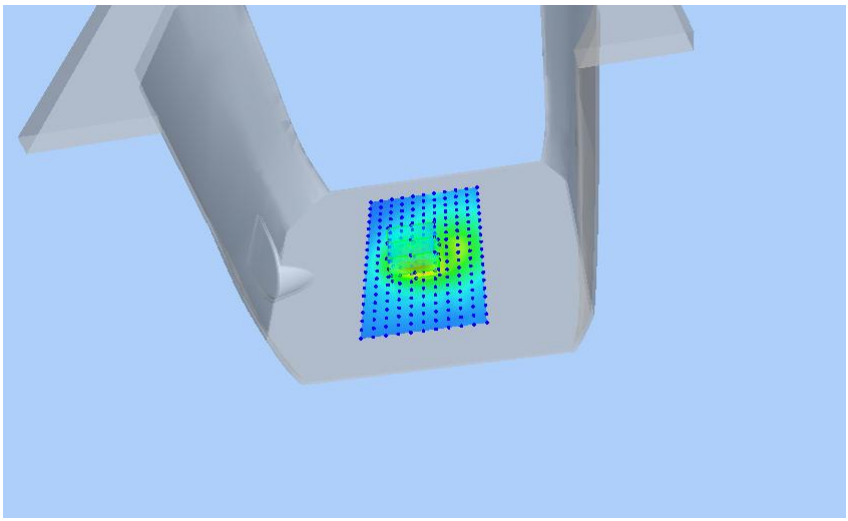
Model: BUBBLE

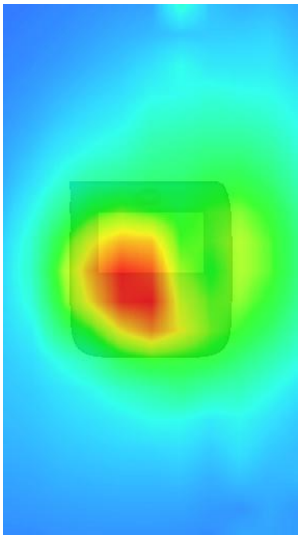
Test Date: July 22, 2019

Medium(liquid type)	MSL_2450
Frequency (MHz)	2437.0000
Relative permittivity (real part)	51.97
Conductivity (S/m)	2.02
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.95
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-0.890000
SAR 10g (W/Kg)	0.068747
SAR 1g (W/Kg)	0.179542
SURFACE SAR	**VOLUME SAR**





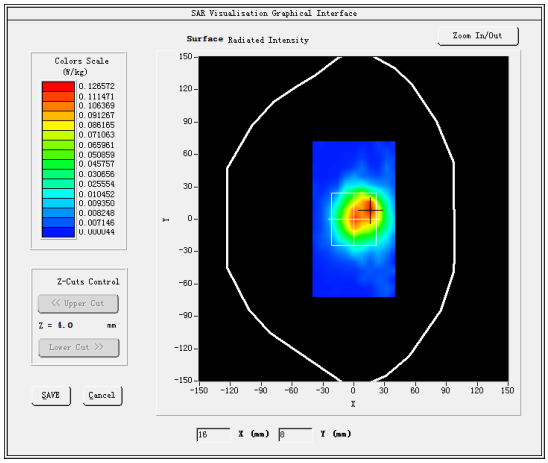


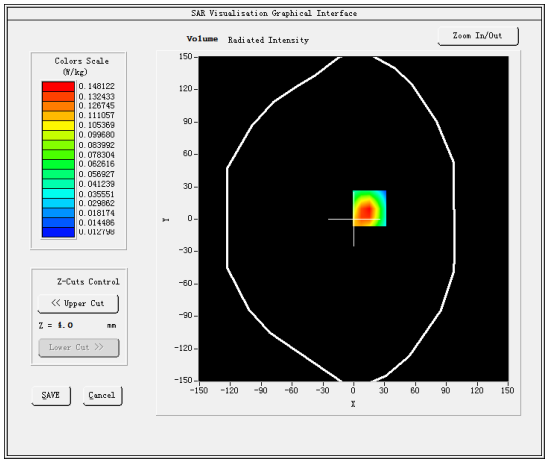


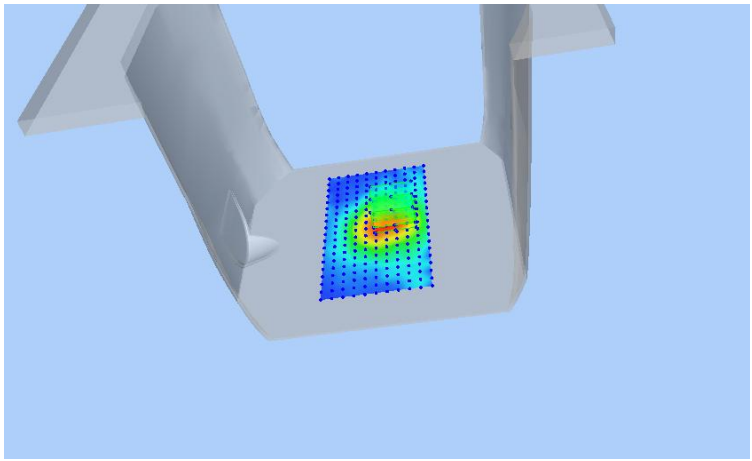
#13

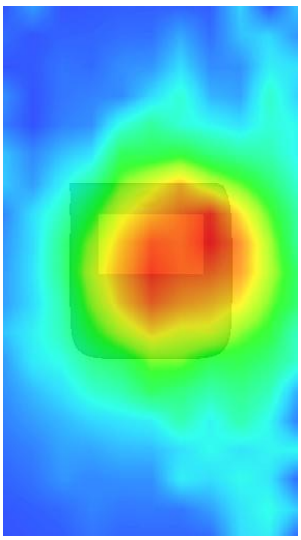
Test Mode: Hotspot 802.11a(WiFi5.2G),Low channel< Next – to – Mouth (Front 10mm)>
Product Description: KIDS WATCH
Model: BUBBLE
Test Date:July 26, 2019

Medium(liquid type)	MSL_5000
Frequency (MHz)	5230.0000
Relative permittivity (real part)	48.86
Conductivity (S/m)	5.24
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.50
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-1.400000
SAR 10g (W/Kg)	0.062455
SAR 1g (W/Kg)	0.139354
SURFACE SAR	**VOLUME SAR**





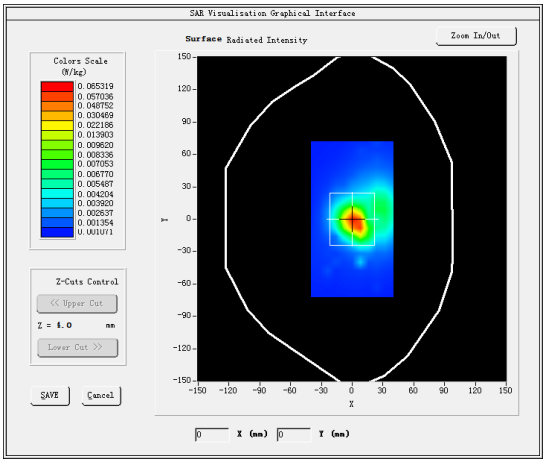


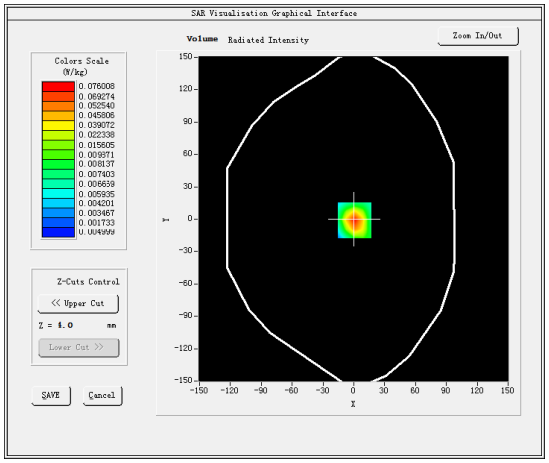


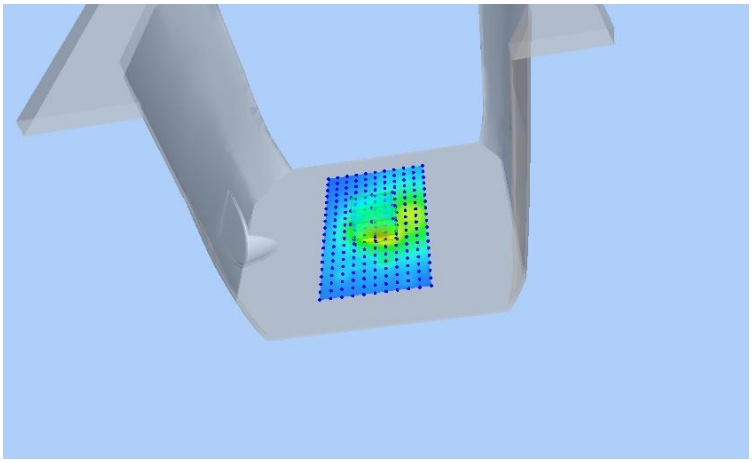
#14

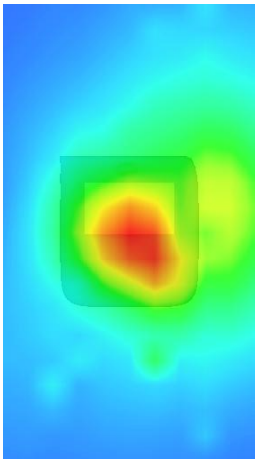
Test Mode: Hotspot 802.11a(SRD 5.8G), Middle channel < Next – to – Mouth (Front 10mm)>
Product Description: KIDS WATCH
Model: BUBBLE
Test Date:August 02, 2019

Medium(liquid type)	MSL_5000
Frequency (MHz)	5755.0000
Relative permittivity (real part)	48.13
Conductivity (S/m)	5.75
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.50
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-1.040000
SAR 10g (W/Kg)	0.028242
SAR 1g (W/Kg)	0.064993
SURFACE SAR	**VOLUME SAR**





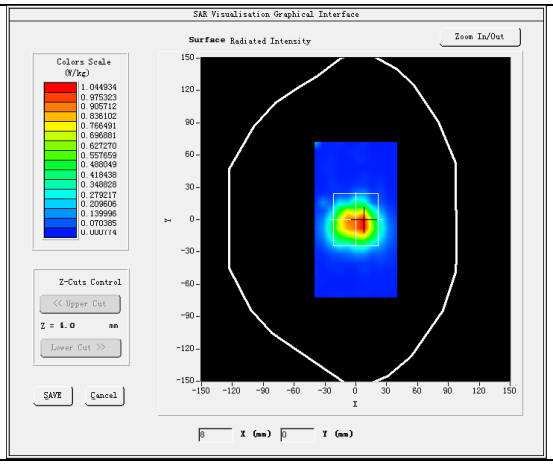


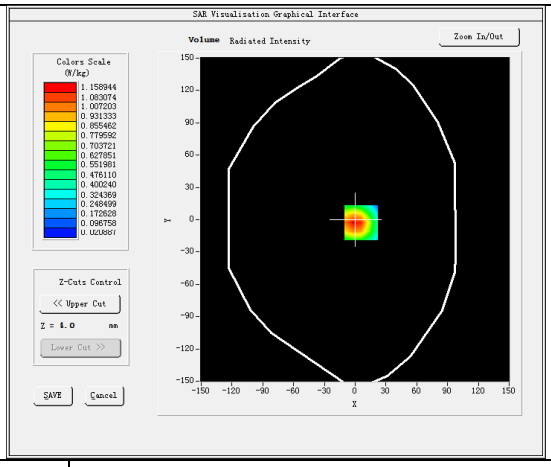


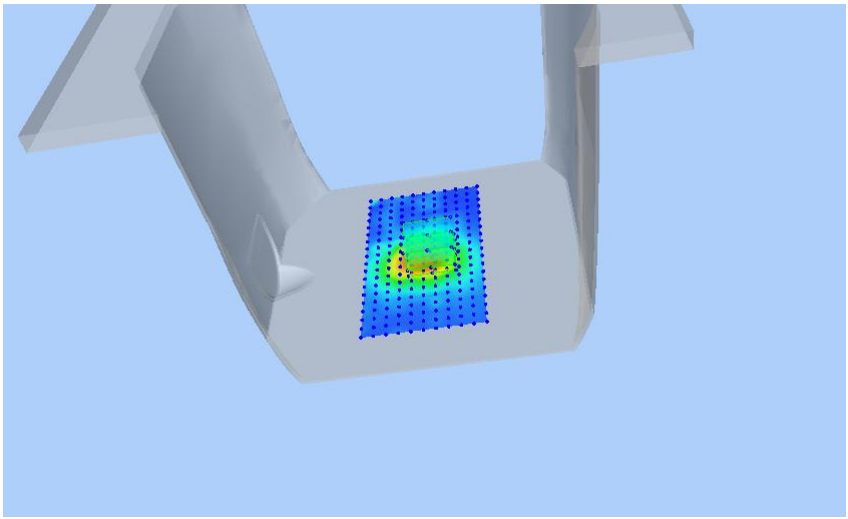
#15

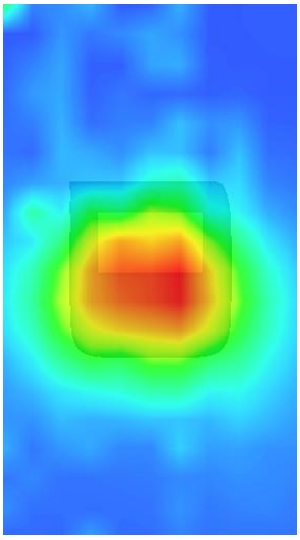
Test Mode: Hotspot GSM850MHz,Middle channel< Extremity Exposure (Rear 0mm)>
Product Description: KIDS WATCH
Model: BUBBLE
Test Date: July 15, 2019

Medium(liquid type)	MSL_850
Frequency (MHz)	836.6000
Relative permittivity (real part)	55.18
Conductivity (S/m)	0.94
E-Field Probe	SN 31/17 EPGO324
Crest Factor	2.0
Conversion Factor	1.59
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	1.070000
SAR 10g (W/Kg)	0.565083
SAR 1g (W/Kg)	1.101968
SURFACE SAR	VOLUME SAR





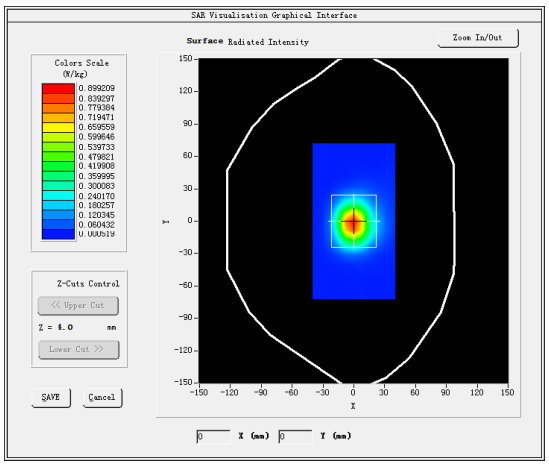


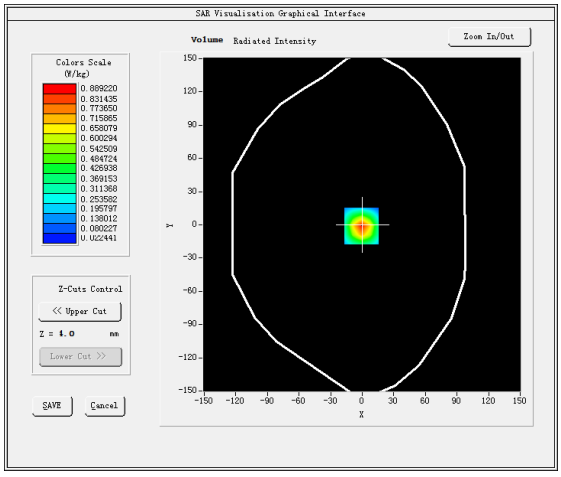


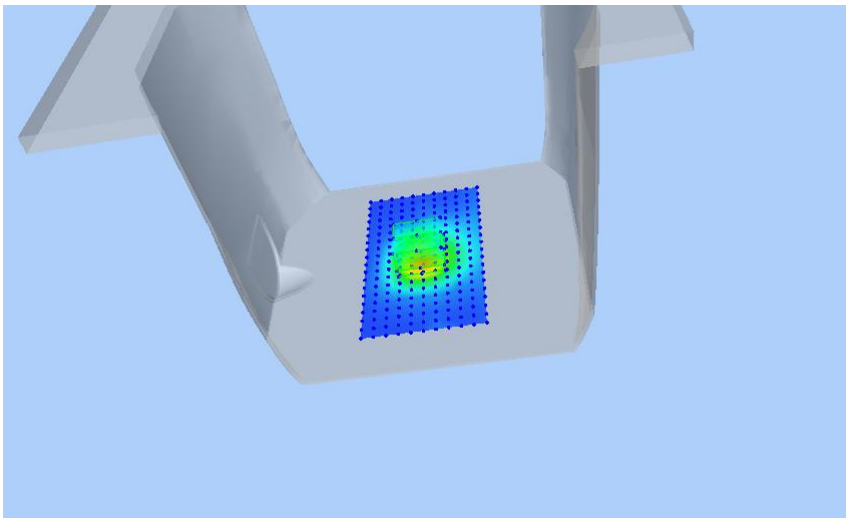
#16

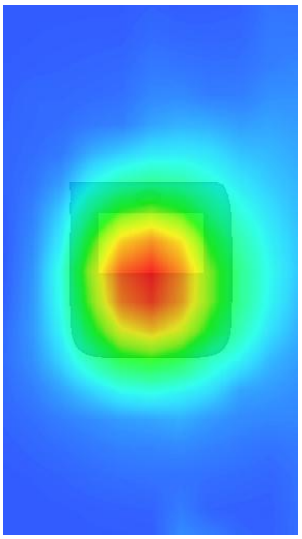
Test Mode: Hotspot GPRS1900MHz,Middle channel< Extremity Exposure (Rear 0mm)>
Product Description: KIDS WATCH
Model: BUBBLE
Test Date: July 15, 2019

Medium(liquid type)	MSL_1900
Frequency (MHz)	1880.0000
Relative permittivity (real part)	53.24
Conductivity (S/m)	1.55
E-Field Probe	SN 31/17 EPGO324
Crest Factor	2.0
Conversion Factor	1.93
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-2.910000
SAR 10g (W/Kg)	0.426663
SAR 1g (W/Kg)	0.807579
SURFACE SAR	**VOLUME SAR**





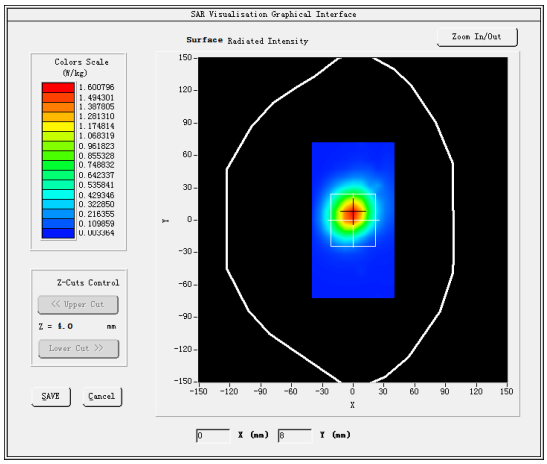


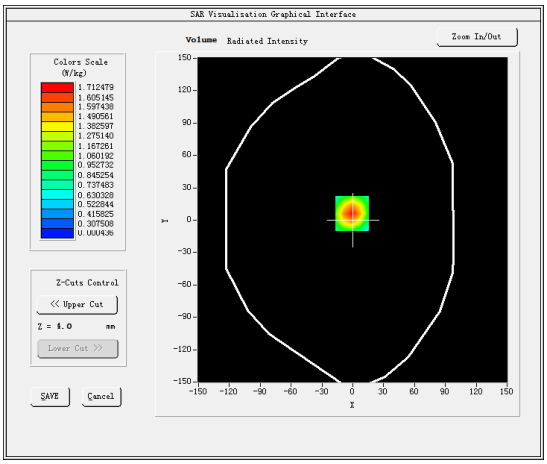


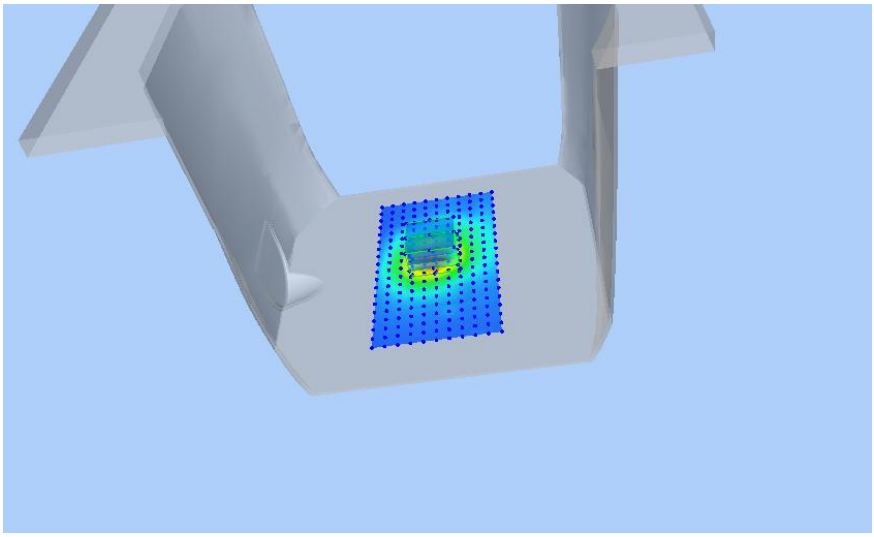
#17

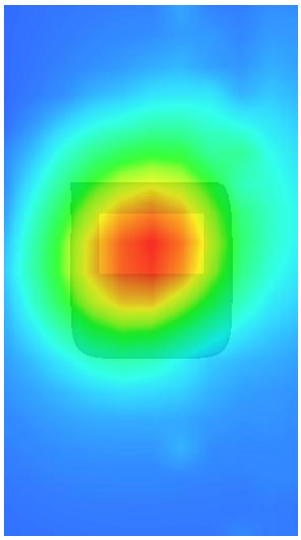
Test Mode: Hotspot WCDMA Band V,Middle channel< Extremity Exposure (Rear 0mm)>
Product Description: KIDS WATCH
Model: BUBBLE
Test Date: July 15, 2019

Medium(liquid type)	MSL_850
Frequency (MHz)	836.4000
Relative permittivity (real part)	55.18
Conductivity (S/m)	0.94
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.59
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-2.130000
SAR 10g (W/Kg)	0.809799
SAR 1g (W/Kg)	1.671770
SURFACE SAR	**VOLUME SAR**





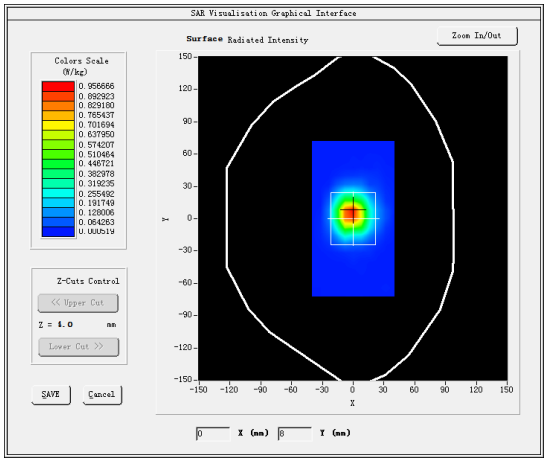


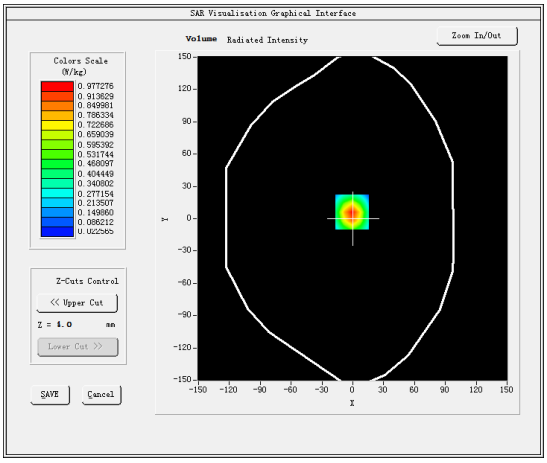


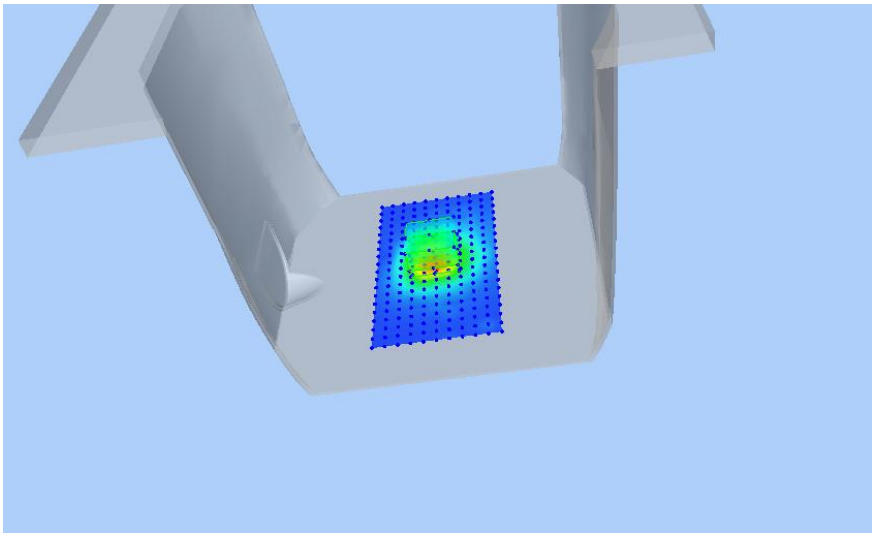
#18

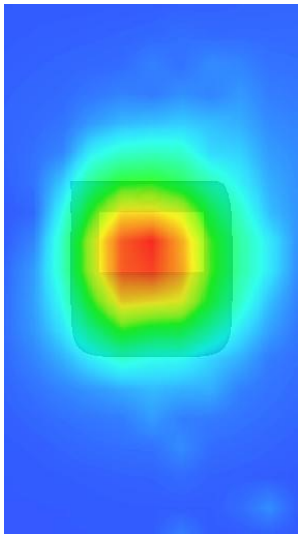
Test Mode: Hotspot WCDMA Band IV,Middle channel< Extremity Exposure (Rear 0mm)>
Product Description: KIDS WATCH
Model: BUBBLE
Test Date: July 17, 2019

Medium(liquid type)	MSL_1800
Frequency (MHz)	1732.6000
Relative permittivity (real part)	53.24
Conductivity (S/m)	1.55
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.59
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	1.790000
SAR 10g (W/Kg)	0.487473
SAR 1g (W/Kg)	0.899714
SURFACE SAR	**VOLUME SAR**





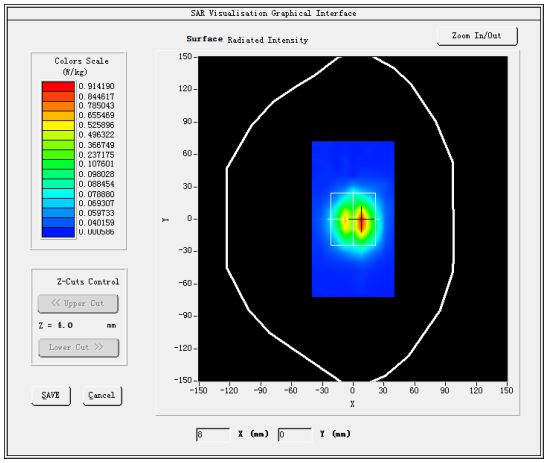


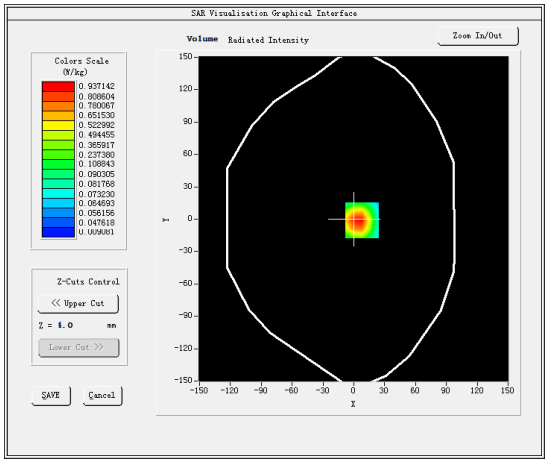


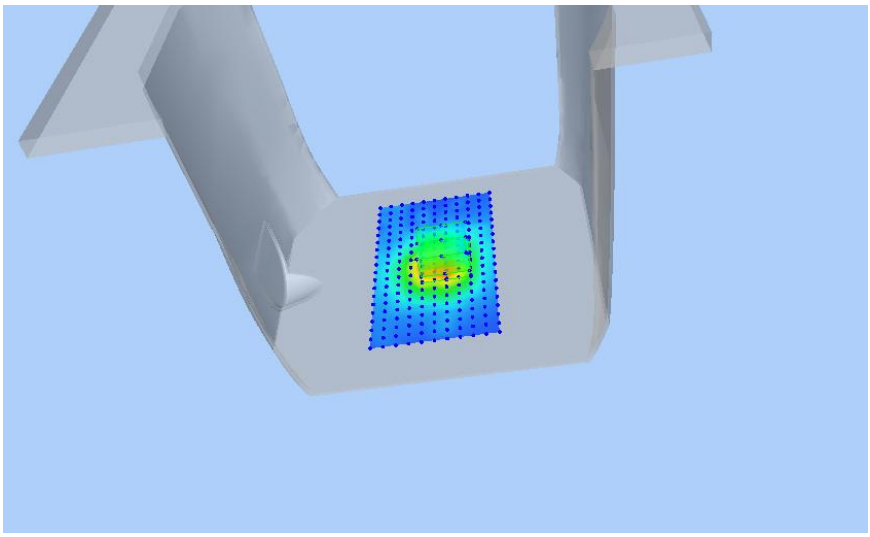
#19

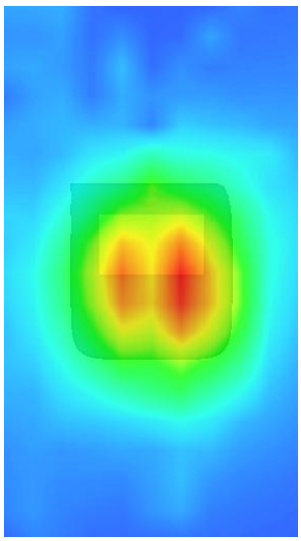
Test Mode: Hotspot WCDMA Band II,Middle channel< Extremity Exposure (Rear 0mm)>
Product Description: KIDS WATCH
Model: BUBBLE
Test Date: July 19, 2019

Medium(liquid type)	MSL_1900
Frequency (MHz)	1880.0000
Relative permittivity (real part)	54.10
Conductivity (S/m)	1.53
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.93
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	0.920000
SAR 10g (W/Kg)	0.433691
SAR 1g (W/Kg)	0.901870
SURFACE SAR	**VOLUME SAR**





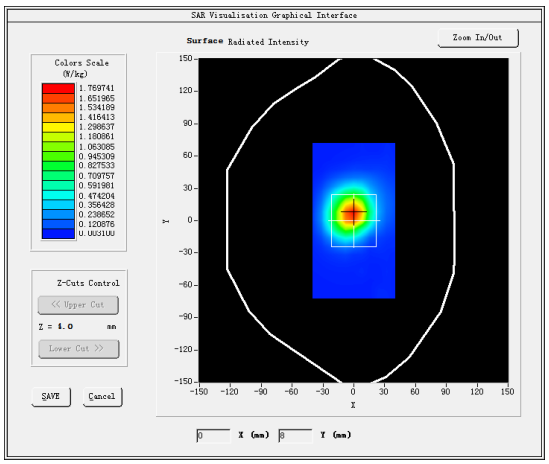


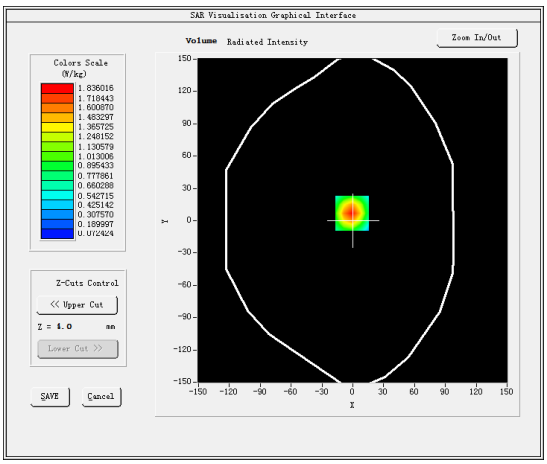


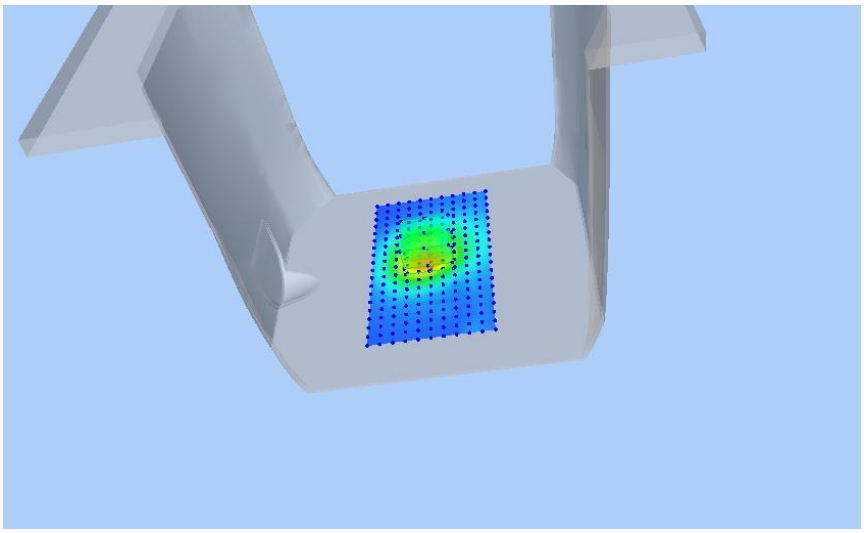
#20

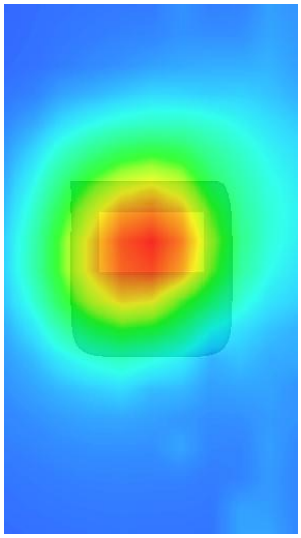
Test Mode: Hotspot LTE Band 2, 1RB,Middle channel< Extremity Exposure (Rear 0mm)>
Product Description: KIDS WATCH
Model: BUBBLE
Test Date: July 19, 2019

Medium(liquid type)	MSL_1900
Frequency (MHz)	1880.0000
Relative permittivity (real part)	54.10
Conductivity (S/m)	1.53
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.68
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-0.570000
SAR 10g (W/Kg)	0.972777
SAR 1g (W/Kg)	1.704079
SURFACE SAR	**VOLUME SAR**





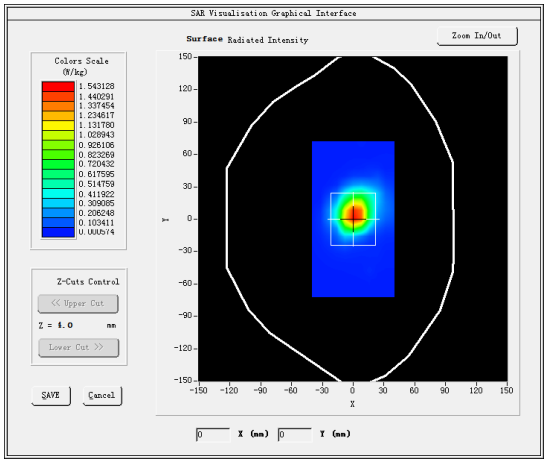


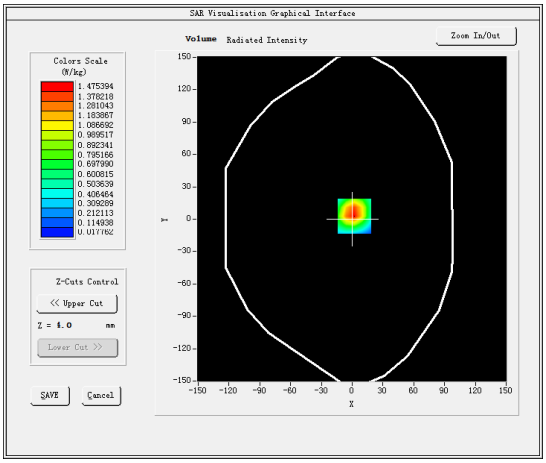


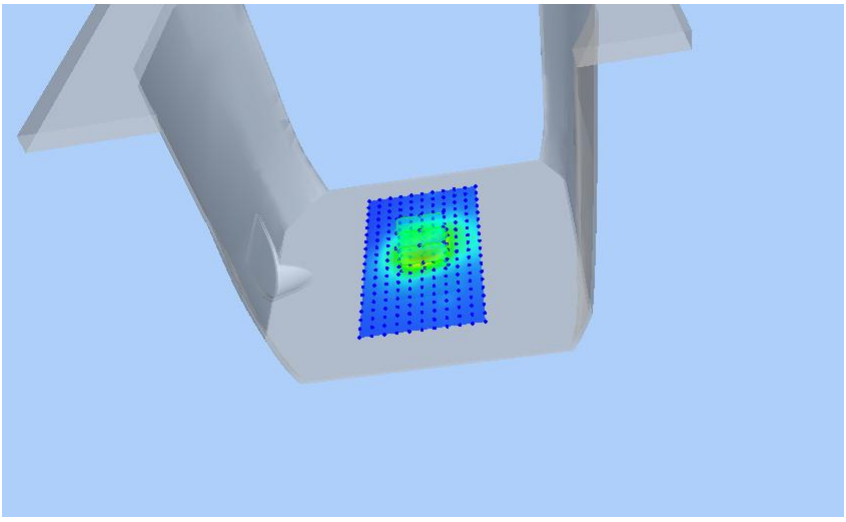
#21

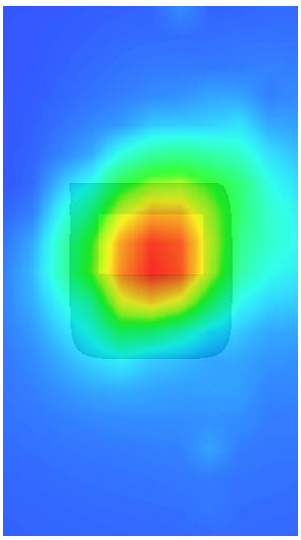
Test Mode: Hotspot LTE Band 4, 1RB,High channel< Extremity Exposure (Rear 0mm)>
Product Description: KIDS WATCH
Model: BUBBLE
Test Date: July 17, 2019

Medium(liquid type)	MSL_1800
Frequency (MHz)	1745.0000
Relative permittivity (real part)	53.24
Conductivity (S/m)	1.55
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.68
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	1.220000
SAR 10g (W/Kg)	0.699131
SAR 1g (W/Kg)	1.415371
SURFACE SAR	**VOLUME SAR**





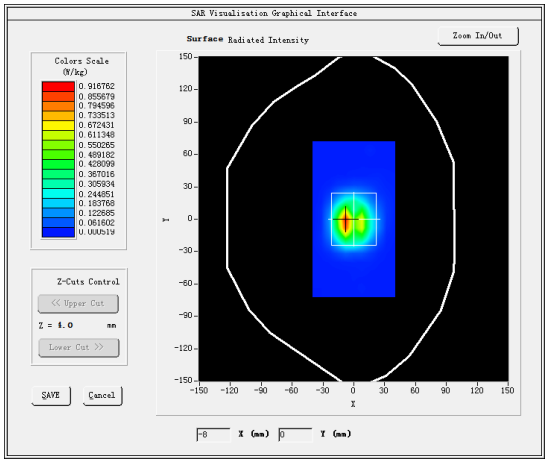


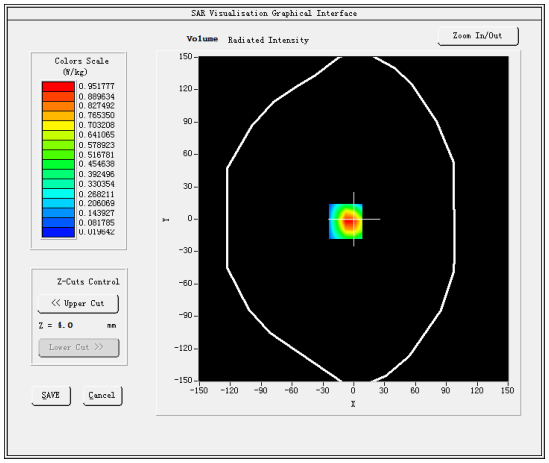


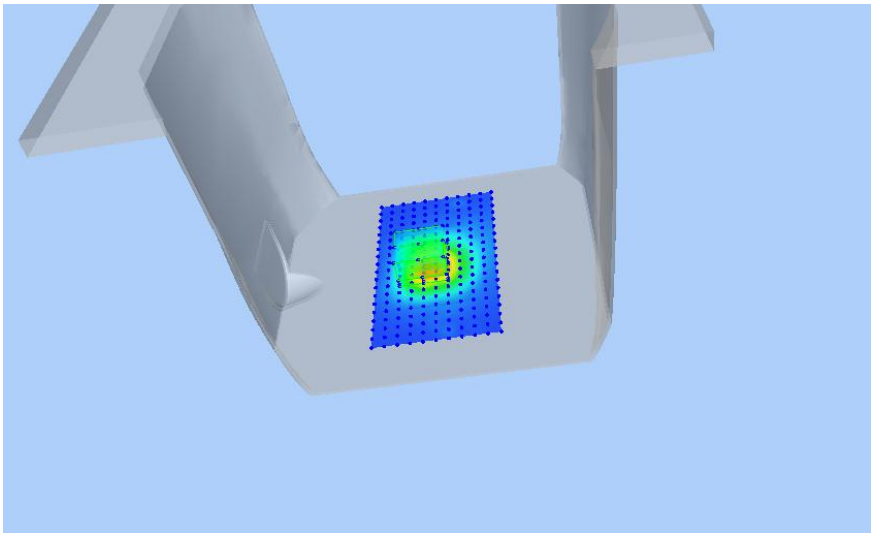
#22

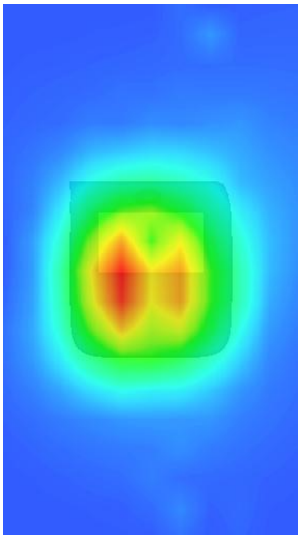
Test Mode: Hotspot LTE Band 5, 1RB,Middle channel< Extremity Exposure (Rear 0mm)>
Product Description: KIDS WATCH
Model: BUBBLE
Test Date: July 15, 2019

Medium(liquid type)	MSL_835
Frequency (MHz)	836.5000
Relative permittivity (real part)	55.18
Conductivity (S/m)	0.94
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.59
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-0.000000
SAR 10g (W/Kg)	0.499902
SAR 1g (W/Kg)	0.914512
SURFACE SAR	**VOLUME SAR**



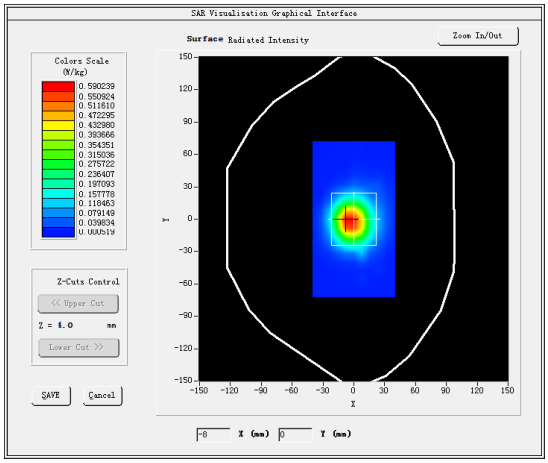
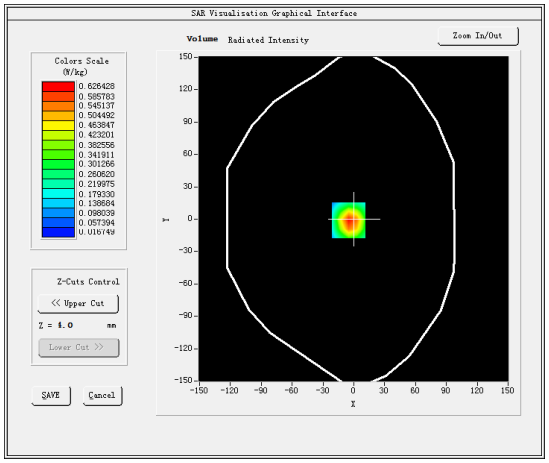
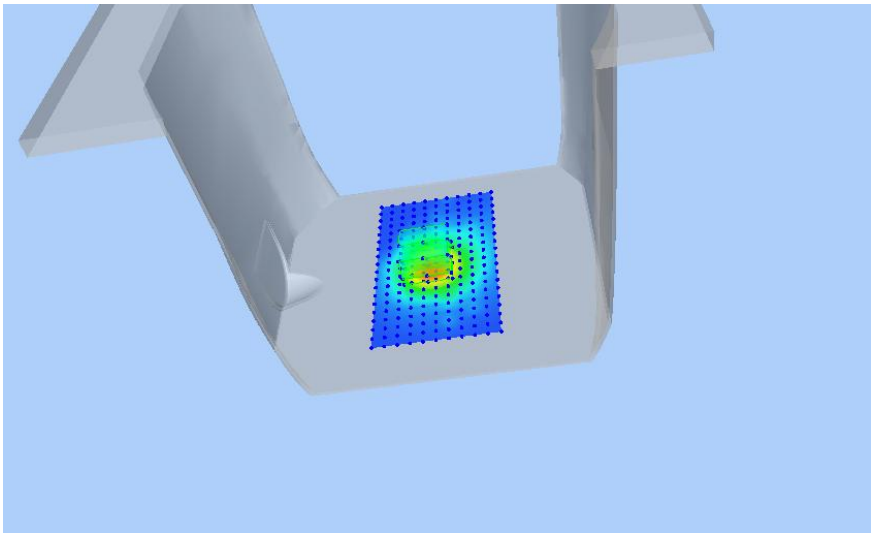
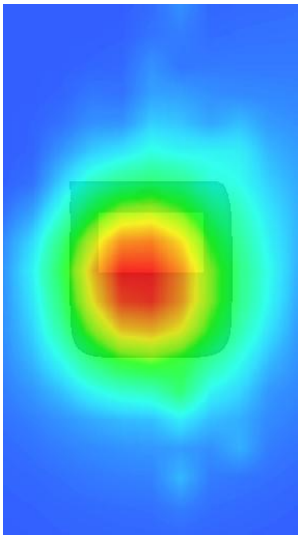






#23

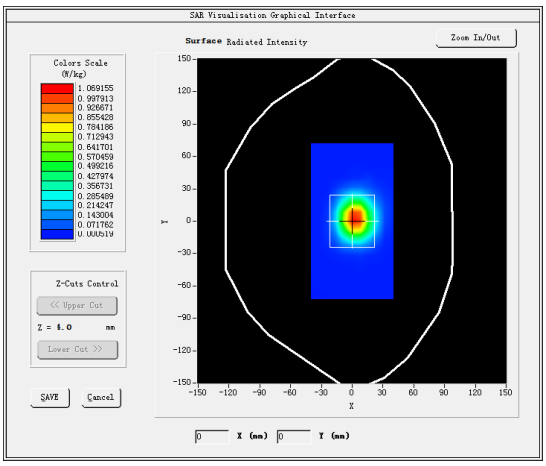
Test Mode: Hotspot LTE Band 7, 1RB,Low channel< Extremity Exposure (Rear 0mm)>
Product Description: KIDS WATCH
Model: BUBBLE
Test Date: July 24, 2019

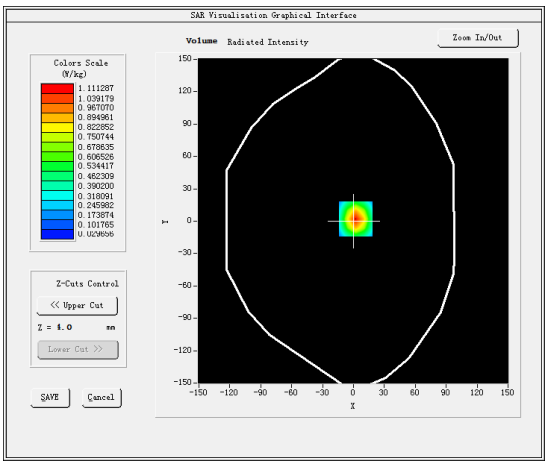
Medium(liquid type)	MSL_2600
Frequency (MHz)	2510.0000
Relative permittivity (real part)	52.34
Conductivity (S/m)	2.08
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.98
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-0.890000
SAR 10g (W/Kg)	0.315363
SAR 1g (W/Kg)	0.582805
SURFACE SAR	**VOLUME SAR**
	
	

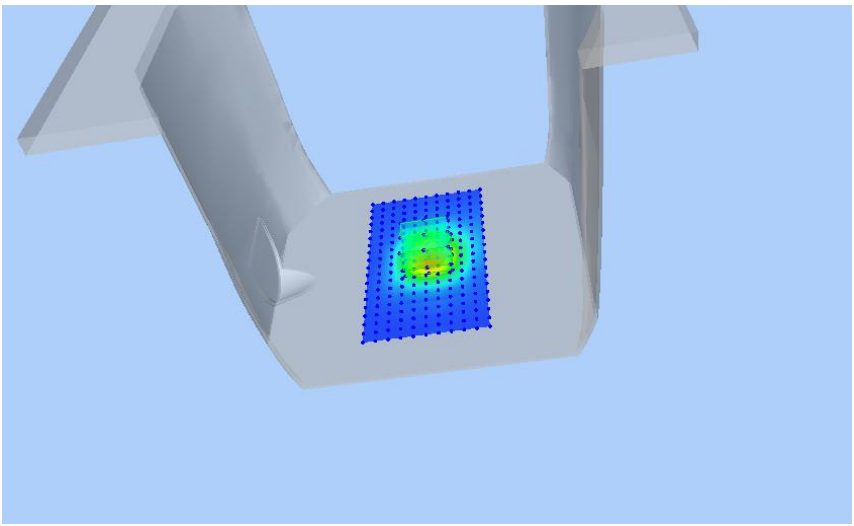
#24

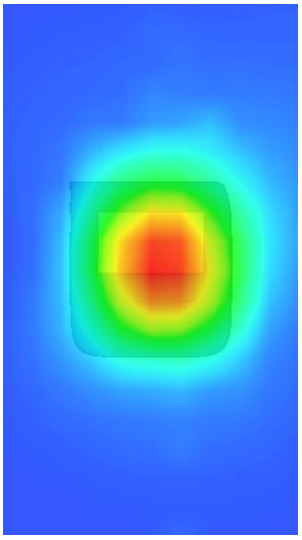
Test Mode: Hotspot LTE Band 12, 1RB,High channel < Extremity Exposure (Rear 0mm)>
Product Description: KIDS WATCH
Model: BUBBLE
Test Date: July 12, 2019

Medium(liquid type)	MSL_750
Frequency (MHz)	713.5000
Relative permittivity (real part)	55.98
Conductivity (S/m)	0.98
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.50
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-2.870000
SAR 10g (W/Kg)	0.540821
SAR 1g (W/Kg)	1.013476
SURFACE SAR	**VOLUME SAR**





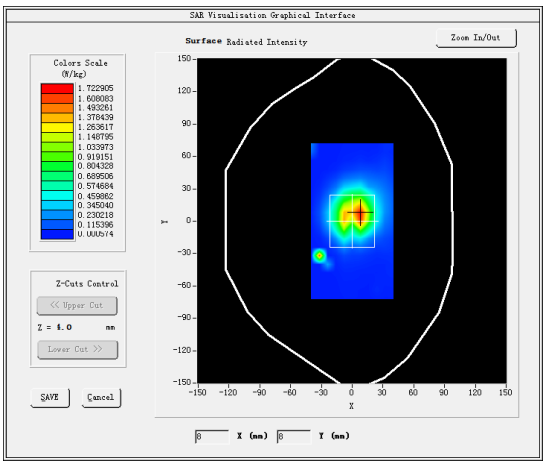


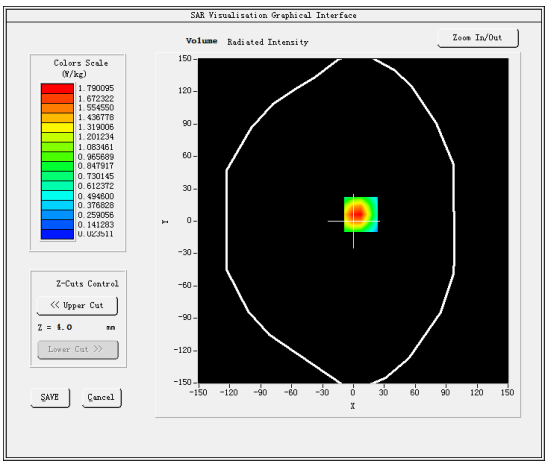


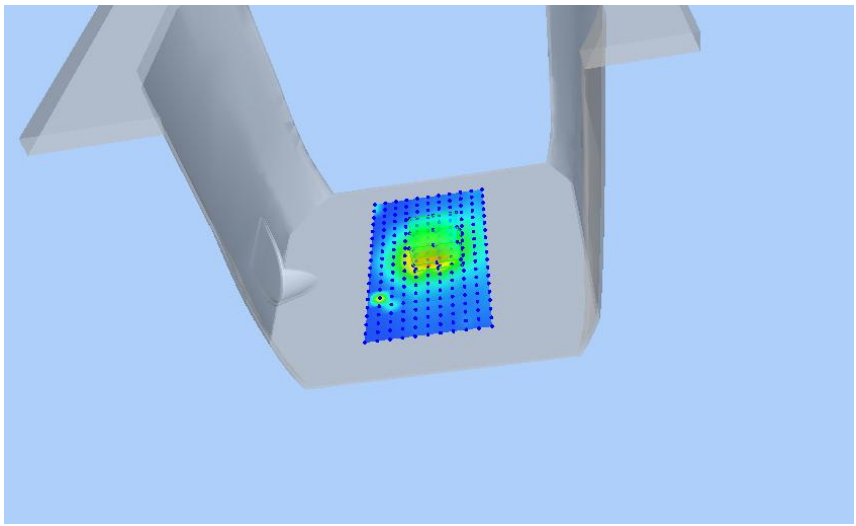
#25

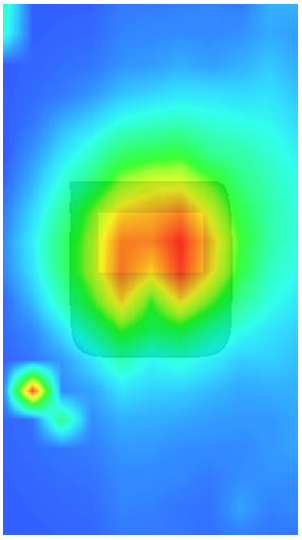
Test Mode: Hotspot LTE Band 17, 1RB,Low channel < Extremity Exposure (Rear 0mm)>
Product Description: KIDS WATCH
Model: BUBBLE
Test Date: July 10, 2019

Medium(liquid type)	MSL_750
Frequency (MHz)	709.0000
Relative permittivity (real part)	55.98
Conductivity (S/m)	0.98
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.50
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-1.170000
SAR 10g (W/Kg)	0.978953
SAR 1g (W/Kg)	1.713765
SURFACE SAR	**VOLUME SAR**





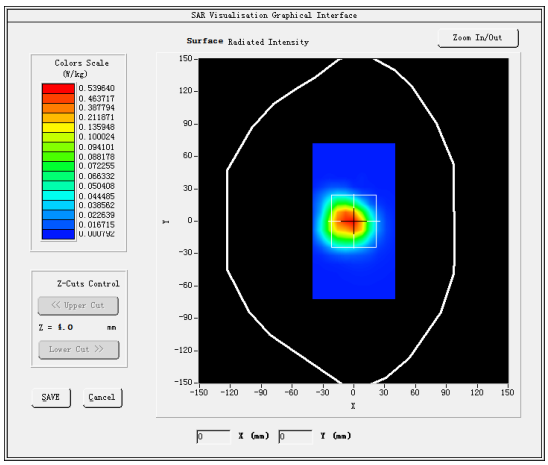


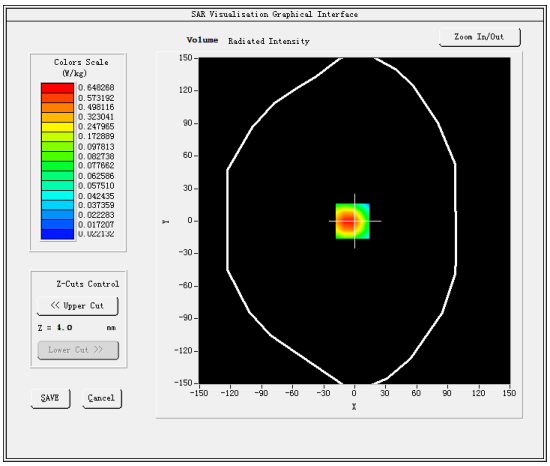


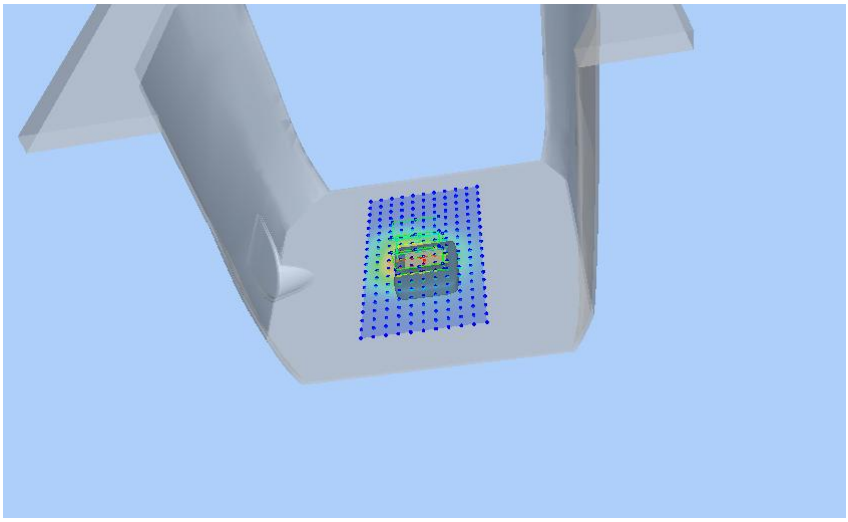
#26

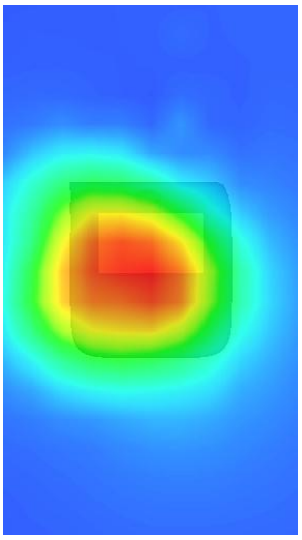
Test Mode: Hotspot 802.11b(WiFi2.4G),Middle channel < Extremity Exposure (Rear 0mm)>
Product Description: KIDS WATCH
Model: BUBBLE
Test Date: July 22, 2019

Medium(liquid type)	MSL_2450
Frequency (MHz)	2412.0000
Relative permittivity (real part)	51.97
Conductivity (S/m)	2.02
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.95
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	-2.030000
SAR 10g (W/Kg)	0.249443
SAR 1g (W/Kg)	0.580481
SURFACE SAR	**VOLUME SAR**





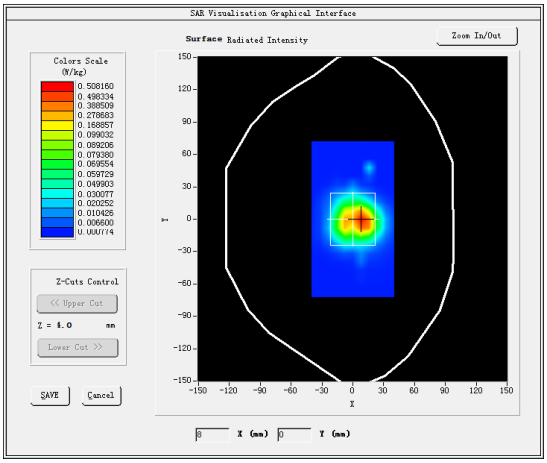


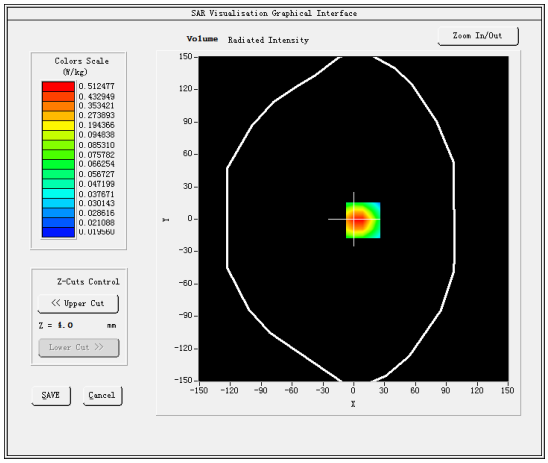


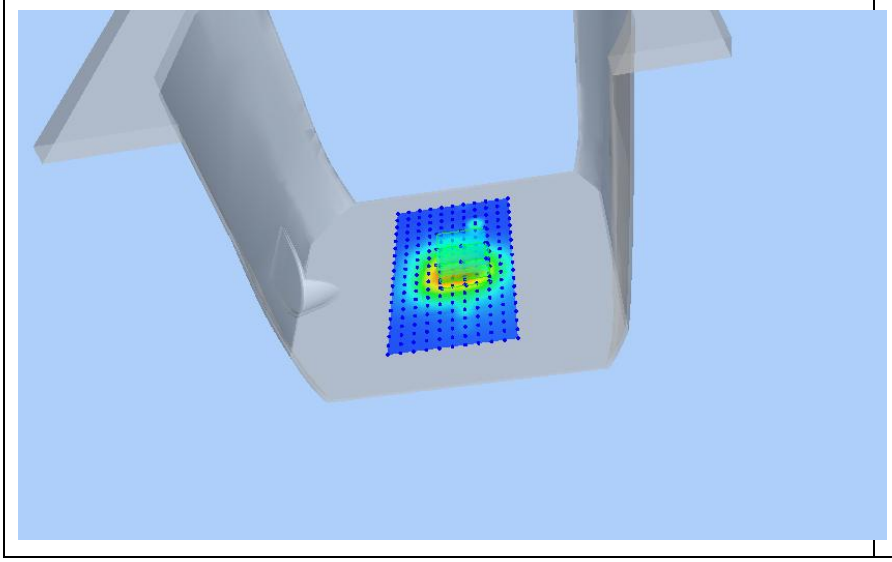
#27

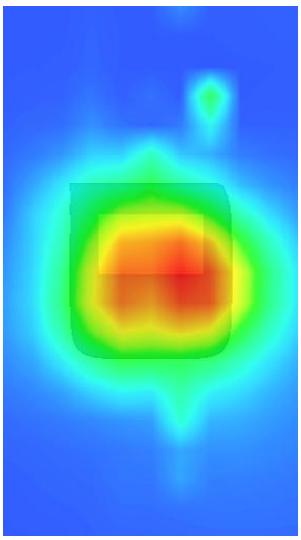
Test Mode:802.11a(WiFi5.2G),High channel< Extremity Exposure (Rear 0mm)>
Product Description: KIDS WATCH
Model: BUBBLE
Test Date:July 26 2019

Medium(liquid type)	MSL_5000
Frequency (MHz)	5230.0000
Relative permittivity (real part)	48.86
Conductivity (S/m)	5.42
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.50
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	0.710000
SAR 10g (W/Kg)	0.226953
SAR 1g (W/Kg)	0.467963
SURFACE SAR	**VOLUME SAR**

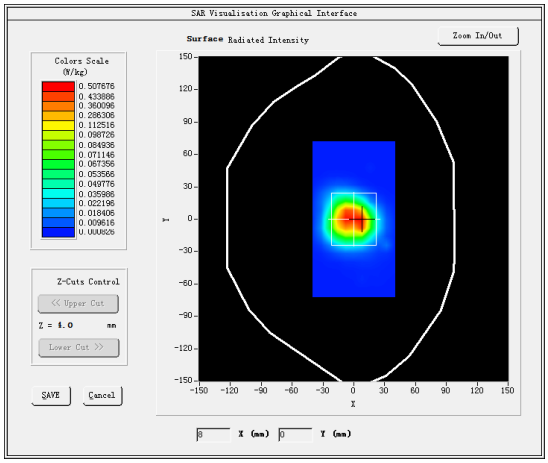
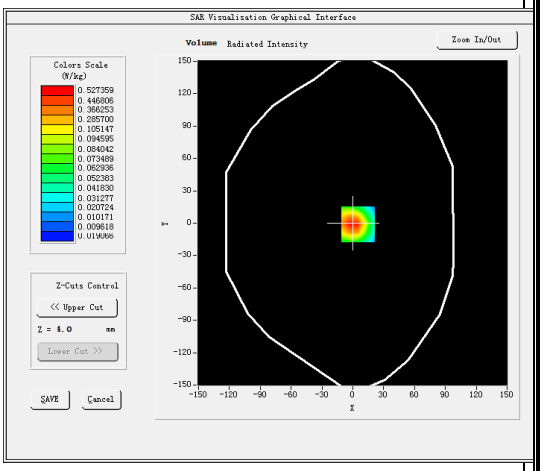
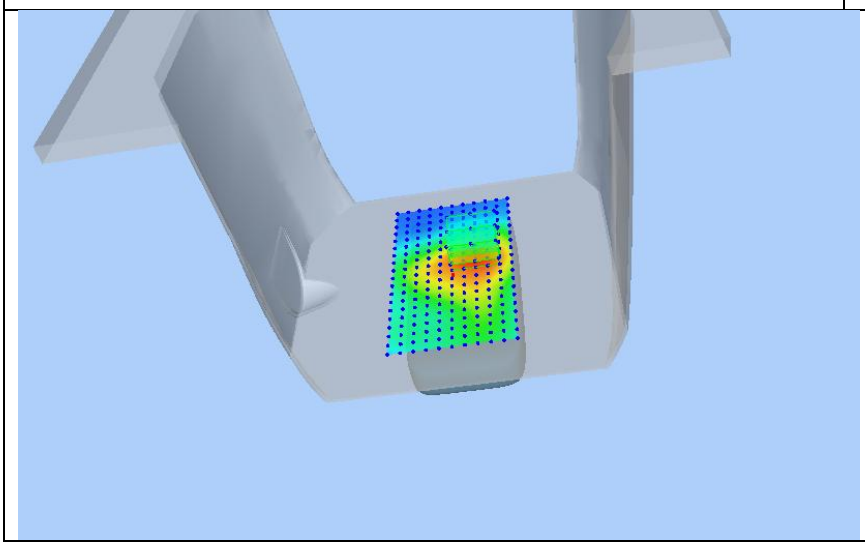
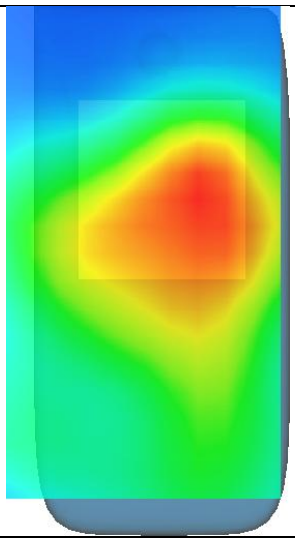








#28

Test Mode: 802.11a(SRD 5.8G), Middle channel < Extremity Exposure (Rear 0mm)>
Product Description: KIDS WATCH
Model: BUBBLE
Test Date:August 02, 2019

Medium(liquid type)	MSL_5000
Frequency (MHz)	5755.0000
Relative permittivity (real part)	48.13
Conductivity (S/m)	5.75
E-Field Probe	SN 31/17 EPGO324
Crest Factor	1.0
Conversion Factor	1.50
Sensor	4mm
Area Scan	dx=8mm dy=8mm
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Variation (%)	2.460000
SAR 10g (W/Kg)	0.287639
SAR 1g (W/Kg)	0.494377
SURFACE SAR	**VOLUME SAR**