TEST REPORT

Report No.	**CHTEW20110115**	Report verificaiton:
Project No.	**SHT2011046101EW**	
FCC ID	**XX6SC2124W**	
Applicant's name	**Sepura Limited**	
Address	9000 Cambridge Research Park, Beach Drive, Waterbeach, Cambridge CB25 9TL, UK	
Manufacturer	Plexus	
Address	Oradea,Eugeniu Carada Street, No. 2-4,Oradea 410610 Bihor, Romania	
Test item description	**SC21 Series Hand-portable radio**	
Trade Mark	Sepura	
Model/Type reference	SC2124	
Listed Model(s)	SC2124	
Standard	**FCC 47 CFR Part2.1093** **IEEE Std C95.1, 1999 Edition** **IEEE 1528: 2013**	
Date of receipt of test sample	Nov.13, 2020	
Date of testing	Nov.14, 2020- Nov.19, 2020	
Date of issue	May.28, 2021	
Result	**PASS**	

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Approved by (position+printed name+signature)	Manager: Hans Hu	Hans Hu

Testing Laboratory Name	**Shenzhen Huatongwei International Inspection Co., Ltd**
Address	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

Contents

1 . Test Standards and Report version

1.1. Test Standards

The tests were performed according to following standards:

FCC 47 Part 2.1093: Radiofrequency Radiation Exposure Evaluation:Portable Devices
IEEE Std C95.1, 1999 Edition: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
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 published RF exposure KDB procedures:
KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04: SAR Measurement Requirements for 100 MHz to 6 GHz
KDB 865664 D02 RF Exposure Reporting v01r02: RF Exposure Compliance Reporting and Documentation Considerations
KDB 447498 D01 General RF Exposure Guidance v06: Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies
KDB 643646 D01:SAR Test for PTT Radios v01r03: SAR Test Reduction Considerations for Occupational PTT Radios
KDB 248227 D01 802 11 Wi-Fi SAR v02r02: SAR Measurement Proceduresfor802.11 a/b/g Transmitters

TCB workshop April, 2019; Page 19, Tissue Simulating Liquids (TSL)

1.2. Report version

Revision No.	Date of issue	Description
N/A	2021-05-28	Original

2. Summary

2.1. Client Information

Applicant:	Sepura Limited
Address:	9000 Cambridge Research Park, Beach Drive, Waterbeach, Cambridge CB25 9TL, UK
Manufacturer:	Plexus
Address:	Oradea,Eugeniu Carada Street, No. 2-4,Oradea 410610 Bihor, Romania

2.2. Product Description

Name of EUT:	SC21 Series Hand-portable radio			
Trade mark:	Sepura			
Model/Type reference:	SC2124			
Listed model(s):	SC2124			
Accessories	300-01923, 300-01922, 300-01915, 300-01916, 300-01917,			
Device Category:	Portable			
RF Exposure Environment:	TETRA	Occupational/Controlled		
	WIFI&BT	General Population/Uncontrolled		
Power supply:	DC 7.4V			
Test sample No.:	1PR001909GM18RO,1PR001909GM18RX			
Hardware version:	Production Unit			
Software version:	200162208522			
Device Dimension:	Overall (Length x Width x Thickness): 120x60x20 mm Antenna(Length):50mm			
Maximum SAR Value				
Separation Distance:	Head:	0mm		
	Front-of-face:	25mm		
	Body-worn:	0mm		
Maximun SAR Value(1g):	Test location:	TETRA	WiFi	Ratios
	Head:	2.816 W/kg	0.274 W/kg	0.523
	Front-of-face:	0.733 W/kg	0.038 W/kg	0.115
	Body-worn:	1.256 W/kg	0.121 W/kg	0.233
TETRA specification				
Operation Frequency Range:	420~470MHz			
Rated Output Power:	35dBm			
Modulation Type:	π/4 DQPSK			
Channel Separation:	25kHz			
Antenna Type:	330-00016 Extended Helical Antenna 420MHz -470MHz			

WIFI 2.4G	
Operating Mode:	802.11b 802.11g 802.11n(HT20) 802.11n(HT40)
Antenna Type:	Ceramic Chip
Bluetooth-EDR	
Modulation:	GFSK π/4QPSK 8DPSK
Operation frequency:	2402MHz~2480MHz
Channel number:	79
Channel separation:	1MHz
Antenna type:	Ceramic Chip

Remark:

1. *The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power.*
2. *EUT supports duplex, with duty cycle calculated at 100%.*

2.3. Accessory Equipment information

Battery 1	
Model No. :	300-01853
Capacity:	1880mAh
Power supply:	DC 7.4V
Battery 2	
Model No. :	300-01852
Capacity:	1160mAh
Power supply:	DC 7.4V

2.4. Test frequency list

When the frequency channels required for SAR testing are not specified, the following should be applied to determine the number of required test channels.The test channels should be evenly spread across the transmission frequency band of each wireless mode.

$$N_c = Round\{[100(f_{high} - f_{low})/f_c]^{0.5} \times (f_c/100)^{0.2}\},$$

N_c is the number of test channels, rounded to the nearest integer,
f_{high} and f_{low} are the highest and lowest channel frequencies within the transmission band,
f_c is the mid-band channel frequency,
all frequencies are in MHz.

Operation Frequency		Test Frequency number
Start Frequency	Stop Frequency	
420	470	5

Mode	Operation Frequency	Test Channel	Test Frequency (MHz)
			TX
TETRA	420~470MHz	CH1	420.000
		CH2	432.500
		CH3	445.000
		CH4	457.500
		CH5	470.000

2.5. Test Configuration and Modes of Operation

The testing was performed with two battery variants (1160 mAh and 1880 mAh) which were supplied and manufactured by Sepura Limited. The batteries were fully charged before each measurement and there were no external connections.

For head SAR assessment, Tetra testing was performed with the EUT in the declared normal position of operation for the 420 MHz – 470 MHz frequency bands at the maximum specified power level on the channels which yielded the highest measured output power. The EUT was placed against a Specific Anthropomorphic Mannequin phantom. The phantom was filled with simulant liquid appropriate to the frequency band. The dielectric properties were measured and found to be in accordance with the requirements for the dielectric properties specified in KDB 865665. Testing was performed at both the left and right ear of the phantom at both handset positions stated in the applied specification using the 1880mAh battery. For the position and antenna which yielded the highest SAR level, a repeated scan was performed using the 1160mAh battery.

For front of face SAR assessment, Tetra testing was performed with the device in the intended normal position of operation for the 420 MHz – 470 MHz frequency bands at maximum power on the channels which yielded the highest measured output power. The handset was placed at a distance of 25 mm from the bottom of the flat phantom for all front of face testing. The phantom was filled to a depth of 150 mm with the appropriate head simulant liquid. The dielectric properties were in accordance with the requirements specified in KDB 865664 D01. Testing was performed using the both battery variants For body SAR assessment, Tetra testing was performed for the 420 MHz – 470 MHz frequency bands at the maximum specified power levels on the channels which yielded the highest measured output power, using various body worn accessories, of which all contain metal components. Body SAR testing was carried out with the device inside the holsters or with a belt clip attached at 0 mm separation distance between the accessory and the Elliptical Flat Phantom The separation distances caused by each accessory configuration is tabulated below.

Body Accessory	Battery	Separation distance EUT to phantom (mm)	Separation distance antenna to phantom (mm)
300-01923(Large Belt Clip)	300-01853(1880mAh)	20.0	25
300-01922(Shirt/Pocket Clip)	300-01853(1880mAh)	15.0	20.0
300-01915(Lightweight Leather Case with Belt Clip)	300-01853(1880mAh)	15.0	20
300-01916(Nylon Holster with Belt Loop)	300-01853(1880mAh)	5.0	10
300-01917(Leather Case with Klick Fast Stud)	300-01853(1880mAh)	15.0	20
300-01923(Large Belt Clip)	300-01852(1160mAh)	20.0	25
300-01922(Shirt/Pocket Clip)	300-01852(1160mAh)	15.0	20.0
300-01915(Lightweight Leather Case with Belt Clip)	300-01852(1160mAh)	15.0	20
300-01916(Nylon Holster with Belt Loop)	300-01852(1160mAh)	5.0	10
300-01917(Leather Case with Klick Fast Stud)	300-01852(1160mAh)	15.0	20

For the 420 MHz –470 MHz frequency bands additional body SAR tests were performed in the worst-case configurations with the Remote Speaker Microphone (RSM) attached. The RSM is of the non-radiating type, part number 300-00389.

2450 MHz 802.11g/n OFDM configurations met the test exclusion requirements of KDB 248227 D01 section 5.2.2 as the highest reported SAR for DSSS was adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR was ≤ 1.2 W/kg

The Elliptical Flat Phantom dimensions are 600 mm major axis and 400 mm minor axis with a shell thickness of 2.00 mm. The phantom was filled to a minimum depth of 150 mm with the appropriate Body simulant liquid. The dielectric properties were measured and found to be in accordance with the requirements specified in KDB 865664 D01.

For each scan, the EUT was configured into a continuous transmission test mode using software provided by Sepura Limited.

Included in this report are descriptions of the test method; the equipment used and an analysis of the test uncertainties applicable and diagrams indicating the locations of maximum SAR for each test position

3. Test Environment

3.1. Test laboratory

Laboratory:Shenzhen Huatongwei International Inspection Co., Ltd.
Address: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

3.2. Test Facility

Laboratory Name	Shenzhen Huatongwei International Inspection Co., Ltd.	
Laboratory Location	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China	
Connect information:	Tel: 86-755-26715499 E-mail: cs@szhtw.com.cn http://www.szhtw.com.cn	
Qualifications	Type	Accreditation Number
	FCC	762235

3.3. Environmental conditions

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

Ambient temperature	18 °C to 25 °C
Ambient humidity	30%RH to 70%RH
Air Pressure	950-1050mbar

4. Equipments Used during the Test

Used	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. date (YY-MM-DD)	Due date (YY-MM-DD)
●	Data Acquisition Electronics DAEx	SPEAG	DAE4	1549	2020/04/04	2021/04/03
●	E-field Probe	SPEAG	EX3DV4	3842	2020/04/01	2021/03/31
●	E-field Probe	SPEAG	EX3DV4	7494	2020/01/30	2021/01/29
○	Universal Radio Communication Tester	R&S	CMW500	137681	2020/06/18	2021/06/17
● Tissue-equivalent liquids Validation						
●	Dielectric Assessment Kit	SPEAG	DAK-3.5	1267	N/A	N/A
○	Dielectric Assessment Kit	SPEAG	DAK-12	1130	N/A	N/A
●	Network analyzer	Keysight	E5071C	MY46733048	2020/10/15	2021/10/14
○ System Validation						
○	System Validation Antenna	SPEAG	CLA-150	4024	2018/02/21	2021/02/20
●	System Validation Dipole	SPEAG	D450V3	1102	2018/02/23	2021/02/22
○	System Validation Dipole	SPEAG	D750V3	1180	2018/02/07	2021/02/06
○	System Validation Dipole	SPEAG	D835V2	4d238	2018/02/19	2021/02/18
○	System Validation Dipole	SPEAG	D1750V2	1164	2018/02/06	2021/02/05
○	System Validation Dipole	SPEAG	D1900V2	5d226	2018/02/22	2021/02/21
●	System Validation Dipole	SPEAG	D2450V2	1009	2018/02/05	2021/02/04
○	System Validation Dipole	SPEAG	D2600V2	1150	2018/02/05	2021/02/04
○	System Validation Dipole	SPEAG	D5GHzV2	1273	2018/02/21	2021/02/20
●	Signal Generator	R&S	SMB100A	114360	2020/08/11	2021/08/10
●	Power Viewer for Windows	R&S	N/A	N/A	N/A	N/A
●	Power sensor	R&S	NRP18A	101010	2020/08/11	2021/08/10
●	Power sensor	R&S	NRP18A	101386	2020/06/08	2021/06/07
●	Power Amplifier	BONN	BLWA 0160-2M	1811887	2020/11/12	2021/11/11
●	Dual Directional Coupler	Mini-Circuits	ZHDC-10-62-S+	F975001814	2020/11/12	2021/11/11
●	Attenuator	Mini-Circuits	VAT-3W2+	1819	2020/11/12	2021/11/11
●	Attenuator	Mini-Circuits	VAT-10W2+	1741	2020/11/12	2021/11/11

Note:

1. *The Probe,Dipole and DAE calibration reference to the Appendix B and C.*
2. *Referring to KDB865664 D01, the dipole calibration interval can be extended to 3 years with justifcatio. The dipole are also not physically damaged or repaired during the interval.*

5. Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg. The equivalent ratio (1.5/1.6) should be applied to extremity and occupational exposure conditions.The expanded SAR measurement uncertainty must be ≤ 30%, for a confidence interval of k = 2. If these conditions are met,extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval.

Therefore, the measurement uncertainty is not required.

6. <u>SAR Measurements System Configuration</u>

6.1. SAR Measurement Set-up

The DASY5 system for performing compliance tests consists of the following items:

A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).

A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.

A data acquisition electronic (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

A unit to operate the optical surface detector which is connected to the EOC.

The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY5 measurement server.

The DASY5 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows 2003.

DASY5 software and SEMCAD data evaluation software.

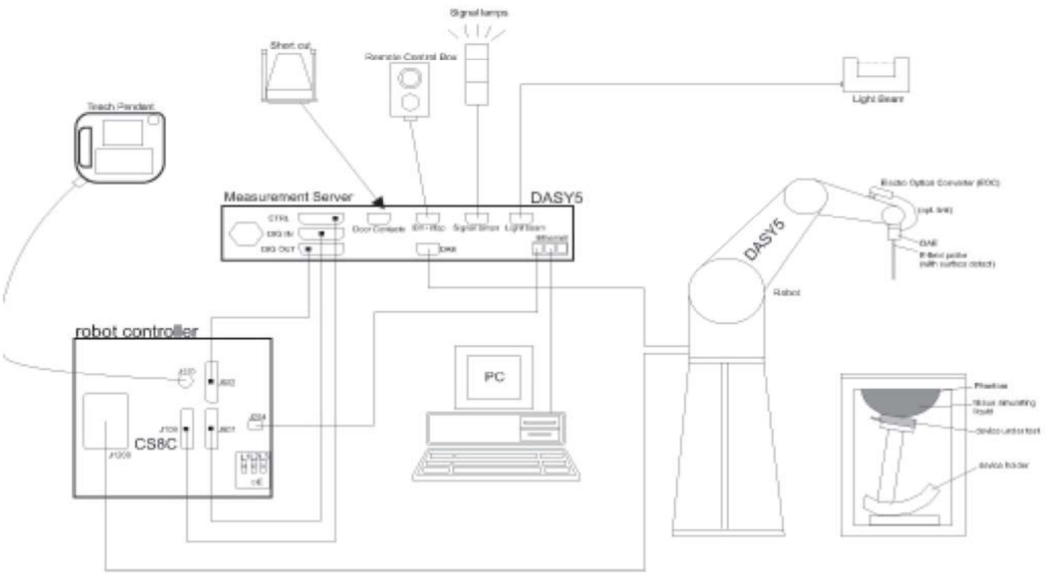
Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.

The generic twin phantom enabling the testing of left-hand and right-hand usage.

The device holder for handheld Mobile Phones.

Tissue simulating liquid mixed according to the given recipes.

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



6.2. DASY5 E-field Probe System

The SAR measurements were conducted with the dosimetric probe EX3DV4 (manufactured by SPEAG), 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)

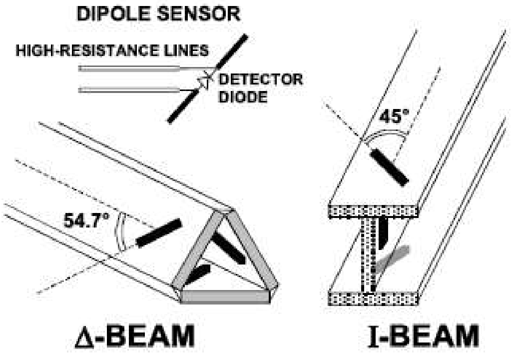
CalibrationISO/IEC 17025 calibration service available.

Frequency	10 MHz to 10 GHz; Linearity: ± 0.2 dB (30 MHz to 10 GHz)
Directivity	±0.1 dB in TSL (rotation around probe axis) ±0.3 dB in TSL (rotation normal to probe axis)
Dynamic Range	10 µW/g to > 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.0 mm
Application	General dosimetry up to 10 GHz Dosimetry in strong gradient fields Compliance tests of Mobile Phones
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

- **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:



6.3. Phantoms

The phantom used for all tests i.e. for both system checks and device testing, was the twin-headed "SAM Phantom", manufactured by SPEAG. The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region, where shell thickness increases to 6mm).
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

6.4. Device Holder

The device was placed in the device holder (illustrated below) that is supplied by SPEAG as an integral part of the DASY system.
The DASY device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

Device holder supplied by SPEAG

7. SAR Test Procedure

7.1. Scanning Procedure

The DASY5 installation includes predefined files with recommended procedures for measurements and validation. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.

The “reference” and “drift” measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT’s output power and should vary max. ± 5 %.

The “surface check” measurement tests the optical surface detection system of the DASY5 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ± 0.1mm). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe (It does not depend on the surface reflectivity or the probe angle to the surface within ± 30°.)

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.

Zoom Scan

After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the “Not a knot” condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm.

Spatial Peak Detection

The procedure for spatial peak SAR evaluation has been implemented and can determine values of masses of 1g and 10g, as well as for user-specific masses.The DASY5 system allows evaluations that combine measured data and robot positions, such as:

- maximum search
- extrapolation
- boundary correction
- peak search for averaged SAR

During a maximum search, global and local maxima searches are automatically performed in 2-D after each Area Scan measurement with at least 6 measurement points. It is based on the evaluation of the local SAR gradient calculated by the Quadratic Shepard’s method. The algorithm will find the global maximum and all local maxima within -2 dB of the global maxima for all SAR distributions.
Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation.
Extrapolation routines require at least 10 measurement points in 3-D space.
They are used in the Zoom Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard’s method for extrapolation.

A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 5mm steps.

Table 1: Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v04

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 mm ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2)$ 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.	
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	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$ 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.

7.2. Data Storage and Evaluation

Data Storage

The DASY5 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 with the extension ".DA4". 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 SEMCAD 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 DASY5 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:

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

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

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

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

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

Vi: compensated signal of channel (i = x, y, z)
Normi: sensor sensitivity of channel (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.

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

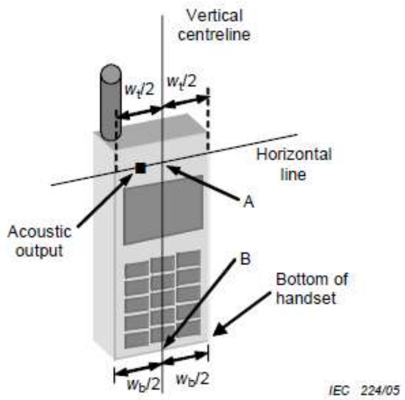
SAR: local specific absorption rate in mW/g
Etot: total field strength in V/m
σ: conductivity in [mho/m] or [Siemens/m]
ρ: equivalent tissue density in g/cm3

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.

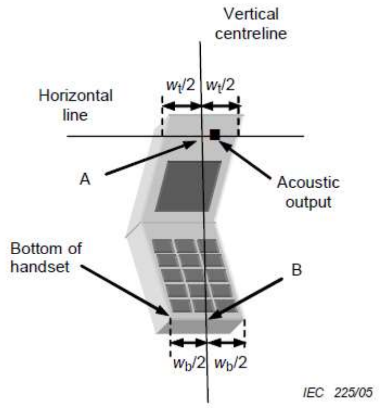
8. Position of the wireless device in relation to the phantom

8.1. Head Position

The wireless device define two imaginary lines on the handset, the vertical centreline and the horizontal line, for the handset in vertical orientation as shown in Figures 5a and 5b.
The vertical centreline passes through two points on the front side of the handset: the midpoint of the width W_t of the handset at the level of the acoustic output (point A in Figures 5a and 5b), and the midpoint of the width W_b of the bottom of the handset (point B).
The horizontal line is perpendicular to the vertical centreline and passes through the centre of the acoustic output (see Figures 5a and 5b). The two lines intersect at point A.
Note that for many handsets, point A coincides with the centre of the acoustic output. However, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centreline is not necessarily parallel to the front face of the handset (see Figure 5b), especially for clam-shell handsets, handsets with flip cover pieces, and other irregularly shaped handsets.



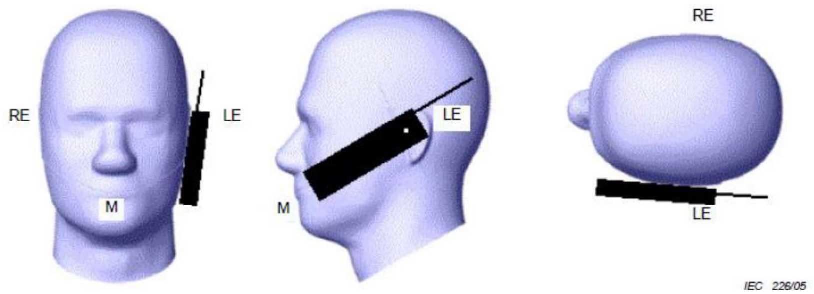
Figures 5a



Figures 5b

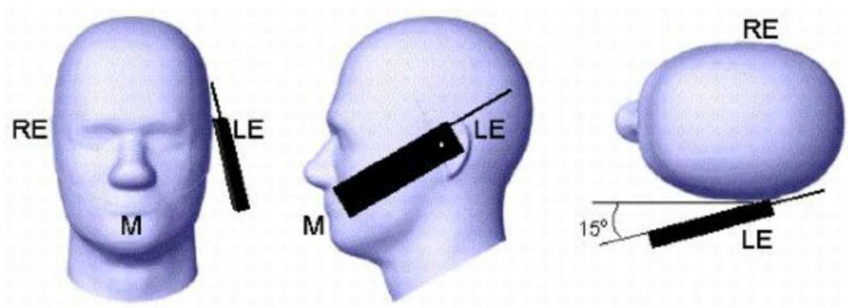
W_t	Width of the handset at the level of the acoustic
W_b	Width of the bottom of the handset
A	Midpoint of the widthwt of the handset at the level of the acoustic output
B	Midpoint of the width wb of the bottom of the handset

Cheek position



Cheek position of the wireless device on the left side of SAM

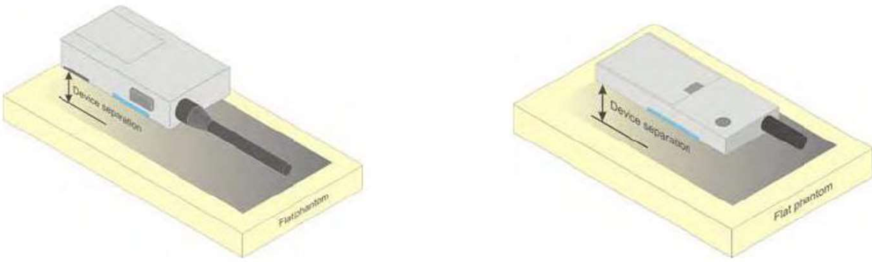
Tilt position



Tilt position of the wireless device on the left side of SAM

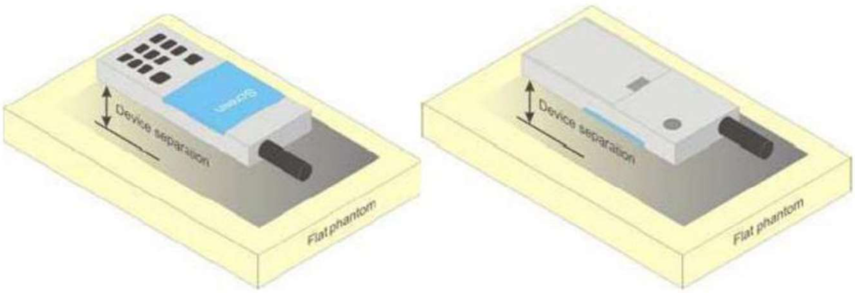
8.2. Front-of-face

A typical example of a front-of-face device is a two-way radio that is held at a distance from the face of the user when transmitting. In these cases the device under test shall be positioned at the distance to the phantom surface that corresponds to the intended use as specified by the manufacturer in the user instructions. If the intended use is not specified, a separation distance of 25 mm between the phantom surface and the device shall be used.



8.3. Body Position

A typical example of a body-worn device is a mobile phone, wireless enabled PDA or other battery operated wireless device with the ability to transmit while mounted on a person’s body using a carry accessory approved by the wireless device manufacturer.



9. System Check

9.1. Tissue Dielectric Parameters

It's satisfying the latest tissue dielectric parameters requirements proposed by the KDB865664 D01.

Targets for tissue simulating liquid

Tissue dielectric parameters for head and body				
Target Frequency	Head		Body	
(MHz)	εr	σ(s/m)	εr	σ(s/m)
450	43.5	0.87	56.7	0.94
2450	39.2	1.80	52.7	1.95

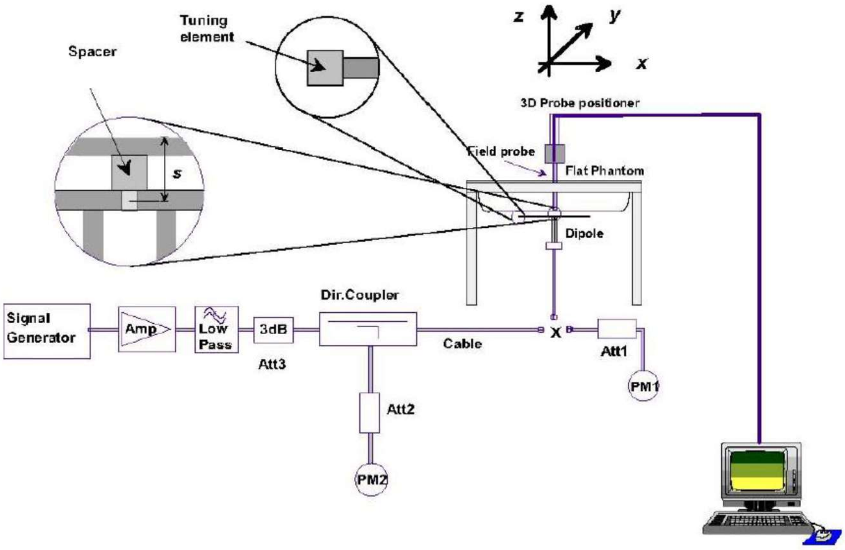
CheckResult:

Dielectric performance of Head tissue simulating liquid									
Frequency (MHz)	εr		σ(s/m)		Delta (εr)	Delta (σ)	Limit	Temp (℃)	Date
	Target	Measured	Target	Measured					
450	43.50	42.76	0.870	0.853	-1.70%	-1.94%	±5%	22.2	2020-11-17
2450	39.20	40.44	1.800	1.835	3.16%	1.94%	±5%	22.5	2020-11-18

9.2. SAR 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%).
System check is performed regularly on all frequency bands where tests are performed with the DASY5 system.



System Performance Check Setup

Photo of Dipole Setup

Check Result:

Head											
Frequency (MHz)	1g SAR			10g SAR			Delta (1g)	Delta (10g)	Limit	Temp (℃)	Date
	Target 1W	Normalize to 1W	Measured 250mW	Target 1W	Normalize to 1W	Measured 250mW					
450	4.48	4.52	1.13	3.00	3.05	0.763	0.89%	1.73%	±10%	22.2	2020-11-17
2450	51.50	55.20	13.80	24.10	25.80	6.45	7.18%	7.05%	±10%	22.5	2020-11-18

Note:

1. *the graph results see follow.*

System Performance Check-Head 450MHz

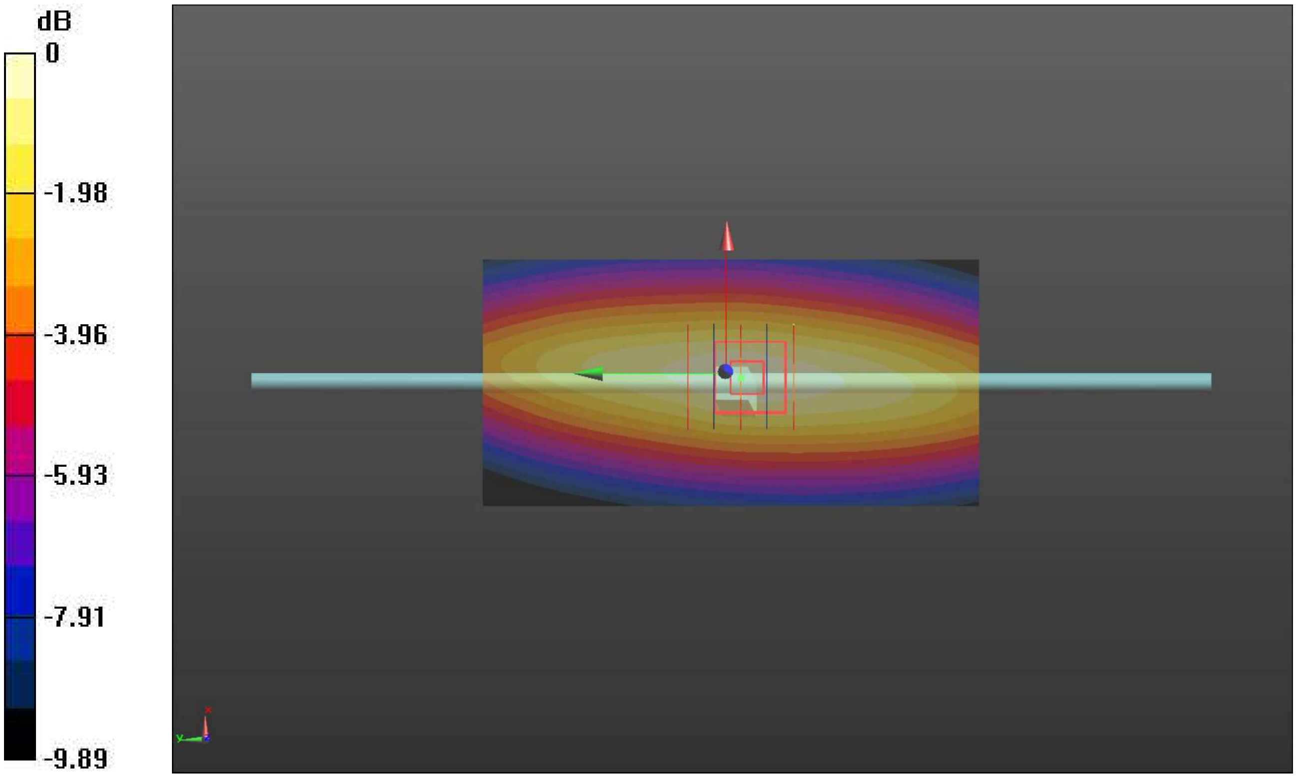
DUT: D450V3; Type: D450V3; Serial: 1102
Date: 2020-11-17
Communication System: UID 0, A-CW (0); Frequency: 450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 450 MHz; $\sigma = 0.853$ S/m; $\varepsilon_r = 42.758$; $\rho = 1000$ kg/m^3
Phantom section: Flat Section
Ambient Temperature:22.2℃;Liquid Temperature:22.0℃;

DASY5 Configuration:

- Probe: EX3DV4 - SN3842; ConvF(9.96, 9.96, 9.96) @ 450 MHz; Calibrated: 1/30/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 4/4/2020
- Phantom: ELI V8.0 ; Type: QD OVA 004 AA ; Serial: 2078
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Head/d=15mm, Pin=250mW, dist=1.4mm/Area Scan (51x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.54 W/kg

Head/d=15mm, Pin=250mW, dist=1.4mm /Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 41.62 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 1.80 W/kg
SAR(1 g) = 1.13 W/kg; SAR(10 g) = 0.763 W/kg
Maximum value of SAR (measured) = 1.54 W/kg



0 dB = 1.54 W/kg = 1.88 dBW/kg

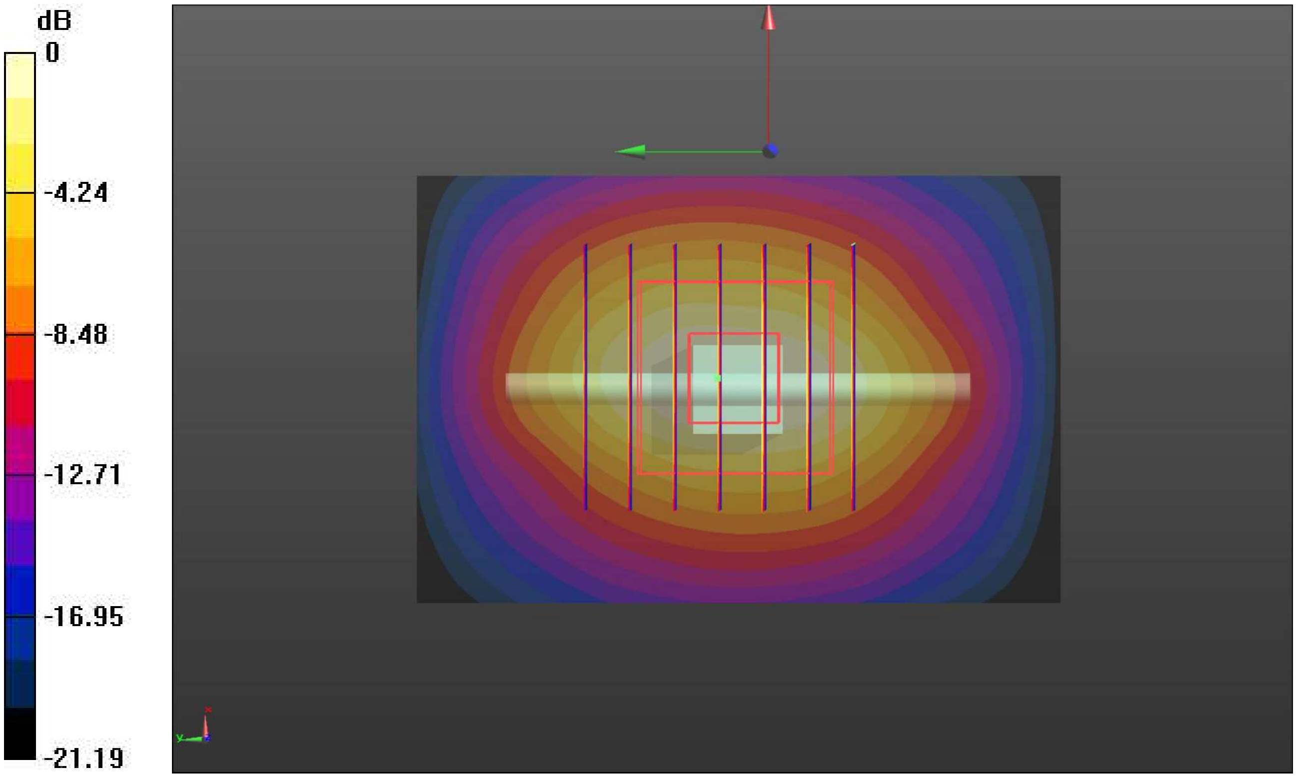
SystemPerformanceCheck-Head 2450MHz

DUT: D2450V2; Type: D2450V2; Serial: 1009
Date: 2020-11-18
Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2450 MHz; σ = 1.835 S/m; ε_r = 40.444; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient Temperature:22.4℃;Liquid Temperature:22.2℃;

DASY5 Configuration:

- Probe: EX3DV4 - SN7494; ConvF(7.91, 7.91, 7.91) @ 2450 MHz; Calibrated: 4/1/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 4/4/2020
- Phantom: Twin-SAM V8.0 ; Type: QD 000 P41 AA; Serial: 1974
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Head/d=10mm,Pin=250mW/Area Scan (41x61x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 23.4 W/kg
Head/d=10mm,Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 115.9 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 28.5 W/kg
SAR(1 g) = 13.8 W/kg; SAR(10 g) = 6.45 W/kg
Maximum value of SAR (measured) = 22.8 W/kg



0 dB = 22.8 W/kg = 13.58 dBW/kg

10. SAR Exposure Limits

SAR assessments have been made in line with the requirements of FCC 47 CFR § 2.1093.

Type Exposure	Limit (W/kg)	
	General Population / Uncontrolled Exposure Environment	Occupational / Controlled Exposure Environment
Spatial Average SAR (whole body)	0.08	0.4
Spatial Peak SAR (1g cube tissue for head and trunk)	1.6	8.0
Spatial Peak SAR (10g for limb)	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).

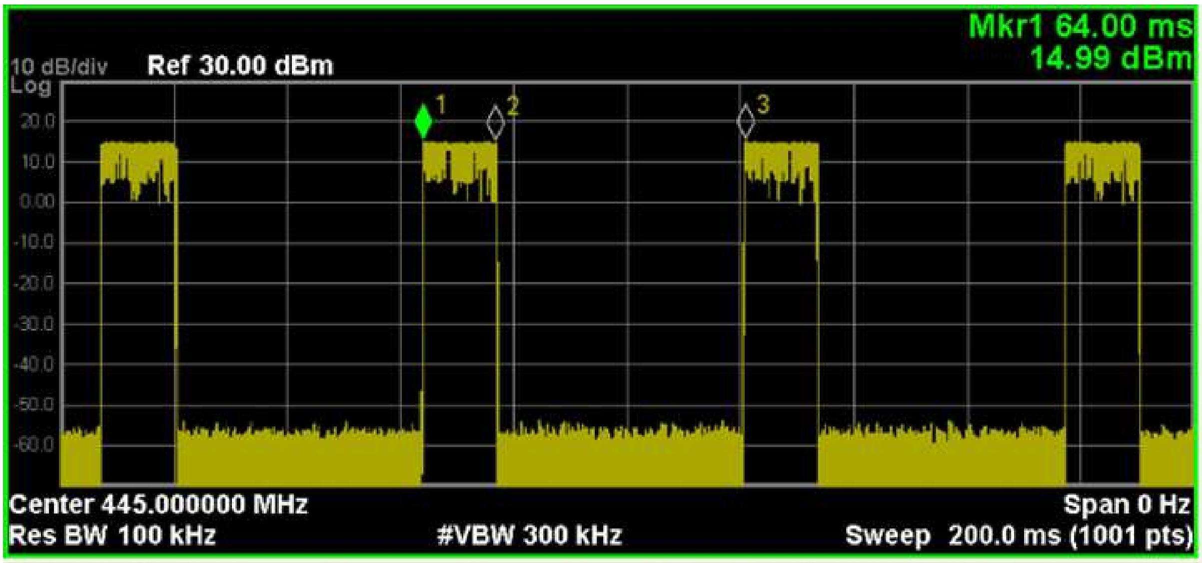
11. Conducted Power Measurement Results

TETRA				
Mode	Operation Frequency	Frequency		Conducted Power (dBm)
		Channel	MHz	
TETRA	420~470MHz	CH1	420.000	34.09
		CH2	432.500	34.11
		CH3	445.000	34.14
		CH4	457.500	34.09
		CH5	470.000	34.12

Duty Factor Measured Results

Mode	Type	T on (ms)	Period (ms)	Duty Cycle	Crest Factor (1/duty cycle)
Digtal	4FSK	12.8	56.8	22.54%	4.4375

Duty Cycle plot



MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	t	64.00 ms	14.99 dBm			
2	N	1	t	76.80 ms	14.73 dBm			
3	N	1	t	120.8 ms	14.98 dBm			
4								
5								
6								
7								
8								
9								
10								
11								

For 2.4GHz WiFi SAR testing, highest average RF output power channel for the lowest data rate for 802.11b were for SAR evaluation.

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.

SAR testing is not required for OFDM mode(s) 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.

WiFi 2.4G			
Mode	Channel	Frequency (MHz)	Conducted Average Power (dBm)
802.11b	1	2412	14.85
	6	2437	15.94
	11	2462	16.02
802.11g	1	2412	19.18
	6	2437	19.52
	11	2462	19.79
802.11n (HT20)	1	2412	18.25
	6	2437	18.48
	11	2462	18.60
802.11n (HT40)	3	2422	17.04
	6	2437	17.56
	9	2452	17.33

Bluetooth		
Mode	Frequency (MHz)	Conducted Power(dBm)
GFSK	2402~2480	8.16
π/4QPSK	2402~2480	5.10
8DPSK	2402~2480	5.58

12. Maximum Tune-up Limit

This device operates using the following maximum output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB publication 447498 D01.

TETRA			
Mode	Channel Separation (KHz)	Operation Frequency Range (MHz)	Maximum tune-up power (dBm)
TETRA	25	420~470	35.00dBm

WiFi 2.4G	
Mode	Maximum Tune-up (dBm) Conducted Average Power
802.11b	16.50
802.11g	20.00
802.11n(HT20)	19.00
802.11n(HT40)	18.00

Bluetooth		
Mode	Frequency (MHz)	Maximum tune-up power (dBm)
GFSK	2402~2480	8.50
π/4QPSK	2402~2480	5.50
8DPSK	2402~2480	6.00

Per KDB 447498 D01, the 1-g and 10-g SAR test exclusion thresholds for 100MHz to 6GHz at test separation distances ≦50mm 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

Band/Mode	F(GHz)	Position	Separation Distance (mm)	Exclusion Thresholds	SAR test exclusion
Bluetooth	2.45	Head	0	0.4	Yes
		Front-of-face	25	2.2	Yes
		Body	0	2.2	Yes

Per KDB 447498 D01, when the minimum test separation distance is <5mm, a distance of 5mm is applied to determine SAR test exclusion.

The test exclusion thereshold is ≦3, SAR testing is not required.

13. SAR Measurement Results

TETRA

Head											
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune-up limit (dBm)	Tune-up scaling factor	Power Drift(dB)	Measured SAR(1g)	Report SAR(1g)	100% Duty factor SAR	Test Plot
		CH	MHz					(W/kg)	(W/kg)	(W/kg)	
TETRA(1880mAh)	Left Cheek (300-01922)	CH1	420.000	34.09	35.00	1.233	-	-	-	-	-
		CH2	432.500	34.11	35.00	1.227	-	-	-	-	-
		CH3	445.000	34.14	35.00	1.219	-0.04	1.840	2.243	2.243	-
		CH4	457.500	34.09	35.00	1.233	-	-	-	-	-
		CH5	470.000	34.12	35.00	1.225	-	-	-	-	-
	Left Tilt 15 (300-01922)	CH1	420.000	34.09	35.00	1.233	-	-	-	-	-
		CH2	432.500	34.11	35.00	1.227	-	-	-	-	-
		CH3	445.000	34.14	35.00	1.219	0.01	2.310	2.816	2.816	1
		CH4	457.500	34.09	35.00	1.233	-	-	-	-	-
		CH5	470.000	34.12	35.00	1.225	-	-	-	-	-
	Right Cheek (300-01922)	CH1	420.000	34.09	35.00	1.233	-	-	-	-	-
		CH2	432.500	34.11	35.00	1.227	-	-	-	-	-
		CH3	445.000	34.14	35.00	1.219	0.01	1.550	1.889	1.889	-
		CH4	457.500	34.09	35.00	1.233	-	-	-	-	-
		CH5	470.000	34.12	35.00	1.225	-	-	-	-	-
	Right Tilt 15 (300-01922)	CH1	420.000	34.09	35.00	1.233	-	-	-	-	-
		CH2	432.500	34.11	35.00	1.227	-	-	-	-	-
		CH3	445.000	34.14	35.00	1.219	-0.10	1.500	1.828	1.828	-
		CH4	457.500	34.09	35.00	1.233	-	-	-	-	-
		CH5	470.000	34.12	35.00	1.225	-	-	-	-	-

worse case(1880mAh) Evaluate the worst case in the minimum EUT separation distance											
TETRA	Left Tilt (300-01916)	CH3	445.000	34.14	35.00	1.219	-0.18	2.160	2.633	2.633	-
worse case(1160mAh) Assess the worst case for different battery capacities at the same test distance.											
TETRA	Left Tilt (300-01922)	CH3	445.000	34.14	35.00	1.219	-0.13	2.250	2.743	2.743	-

Front-of-face											
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune-up limit (dBm)	Tune-up scaling factor	Power Drift(dB)	Measured SAR(1g)	Report SAR(1g)	100% Duty factor SAR	Test Plot
		CH	MHz					(W/kg)	(W/kg)	(W/kg)	
TETRA(1880mAh)	Front (300-01922)	CH1	420.000	34.09	35.00	1.233	-	-	-	-	-
		CH2	432.500	34.11	35.00	1.227	-	-	-	-	-
		CH3	445.000	34.14	35.00	1.219	-0.05	0.601	0.733	0.733	3
		CH4	457.500	34.09	35.00	1.233	-	-	-	-	-
		CH5	470.000	34.12	35.00	1.225	-	-	-	-	-

worse case(1880mAh) Evaluate the worst case in the minimum EUT separation distance											
TETRA	Front (300-01916)	CH3	445.000	34.14	35.00	1.219	-0.09	0.572	0.697	0.697	-
worse case(1160mAh) Assess the worst case for different battery capacities at the same test distance.											
TETRA	Front (300-01922)	CH3	445.000	34.14	35.00	1.219	0.14	0.596	0.727	0.727	-

Body-worn											
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune-up limit (dBm)	Tune-up scaling factor	Power Drift(dB)	Measured SAR(1g)	Report SAR(1g)	100% Duty factor SAR	Test Plot
		CH	MHz					(W/kg)	(W/kg)	(W/kg)	
TETRA(1880mAh)	Rear (300-01916)	CH1	420.000	34.09	35.00	1.233	-	-	-	-	-
		CH2	432.500	34.11	35.00	1.227	-	-	-	-	-
		CH3	445.000	34.14	35.00	1.219	-0.12	1.030	1.256	1.256	5
		CH4	457.500	34.09	35.00	1.233	-	-	-	-	-
		CH5	470.000	34.12	35.00	1.225	-	-	-	-	-

worse case(1880mAh) Evaluate the worst case in the minimum EUT separation distance											
TETRA	Rear (big clip)	CH3	445.000	34.14	35.00	1.219	-0.05	0.922	1.124	1.124	-
	Rear (300-01922)	CH3	445.000	34.14	35.00	1.219	0.17	0.974	1.187	1.187	-
	Rear (leather 1)	CH3	445.000	34.14	35.00	1.219	-0.03	0.951	1.159	1.159	-
	Rear (leather 3)	CH3	445.000	34.14	35.00	1.219	-0.11	0.943	1.150	1.150	-
worse case(1160mAh) Assess the worst case for different battery capacities at the same test distance.											
TETRA	Rear (300-01916)	CH3	445.000	34.14	35.00	1.219	-0.16	0.982	1.197	1.197	-

Note:

1 Batteries are fully charged at the beginning of the SAR measurements.

1 The distance of the body and head test is 0mm, the distance of the face test is 25mm.

2 The Body-worn SAR evaluation was performed with the Leather Case body-worn accessory attached to the DUT and touching the outer surface of the planar phantom.

3 When the SAR for all antennas tested using the default battery is ≤ 3.5 W/kg (100% PTT duty factor), testing of all other required channels is not necessary.

WIFI 2.4G

Head										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune-up limit (dBm)	Tune-up scaling factor	Power Drift(dB)	Measured SAR(1g)	Report SAR(1g)	Test Plot
		CH	MHz					(W/kg)	(W/kg)	
802.11b 1Mbps(1880mAh)	Left Cheek (300-01922)	1	2412	14.85	15.00	1.035	-	-	-	-
		6	2437	15.94	16.00	1.014	-	-	-	-
		11	2462	16.02	16.50	1.117	-0.17	0.245	0.274	2
	Left Tilt 15 (300-01922)	1	2412	14.85	15.00	1.035	-	-	-	-
		6	2437	15.94	16.00	1.014	-	-	-	-
		11	2462	16.02	16.50	1.117	-0.16	0.048	0.053	-
	Right Cheek (300-01922)	1	2412	14.85	15.00	1.035	-	-	-	-
		6	2437	15.94	16.00	1.014	-	-	-	-
		11	2462	16.02	16.50	1.117	-0.10	0.158	0.176	-
	Right Tilt 15 (300-01922)	1	2412	14.85	15.00	1.035	-	-	-	-
		6	2437	15.94	16.00	1.014	-	-	-	-
		11	2462	16.02	16.50	1.117	-0.15	0.035	0.039	-

worse case(1880mAh) Evaluate the worst case in the minimum EUT separation distance										
802.11b 1Mbps	Left (300-01916)	11	2462	16.02	16.50	1.117	0.01	0.240	0.268	-
worse case(1160mAh) Assess the worst case for different battery capacities at the same test distance.										
802.11b 1Mbps	Left (300-01922)	11	2462	16.02	16.50	1.117	-0.16	0.243	0.271	-

Front-of-face										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune-up limit (dBm)	Tune-up scaling factor	Power Drift(dB)	Measured SAR(1g)	Report SAR(1g)	Test Plot
		CH	MHz					(W/kg)	(W/kg)	
802.11b 1Mbps(1880mAh)	Front (300-01922)	1	2412	14.85	15.00	1.035	-	-	-	-
		6	2437	15.94	16.00	1.014	-	-	-	-
		11	2462	16.02	16.50	1.117	0.17	0.034	0.038	4

worse case(1880mAh) Evaluate the worst case in the minimum EUT separation distance										
802.11b 1Mbps	Front (300-01916)	11	2462	16.02	16.50	1.117	0.11	0.030	0.034	-
worse case(1160mAh) Assess the worst case for different battery capacities at the same test distance.										
802.11b 1Mbps	Front (pocket clip)	11	2462	16.02	16.50	1.117	-0.15	0.032	0.036	-

Body-worn										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune-up limit (dBm)	Tune-up scaling factor	Power Drift(dB)	Measured SAR(1g)	Report SAR(1g)	Test Plot
		CH	MHz					(W/kg)	(W/kg)	
802.11b 1Mbps(1880mAh)	Rear (300-01916)	1	2412	14.85	15.00	1.035	-	-	-	-
		6	2437	15.94	16.00	1.014	-	-	-	-
		11	2462	16.02	16.50	1.117	-0.12	0.108	0.121	6
worse case(1880mAh) Evaluate the worst case in the minimum EUT separation distance										
802.11b 1Mbps	Rear (big clip)	11	2462	16.02	16.50	1.117	-0.08	0.073	0.082	-
	Rear (300-01922)	11	2462	16.02	16.50	1.117	-0.10	0.105	0.117	-
	Rear (leather 1)	11	2462	16.02	16.50	1.117	-0.16	0.100	0.112	-
	Rear (leather 3)	11	2462	16.02	16.50	1.117	-0.07	0.096	0.107	-
worse case(1160mAh) Assess the worst case for different battery capacities at the same test distance.										
802.11b 1Mbps	Front (pocket clip)	11	2462	16.02	16.50	1.117	-0.08	0.106	0.118	-

Note:

1. *Batteries are fully charged at the beginning of the SAR measurements.*
2. *The distance of the body and head test is 0mm, the distance of the face test is 25mm.*
3. *The Body-worn SAR evaluation was performed with the Leather Case body-worn accessory attached to the DUT and touching the outer surface of the planar phantom.*

SAR Test Data Plots to the Appendix A.

14. Simultaneous Transmission analysis

No.	Simultaneous Transmission Configurations	Head	Front-of-face	Body-worn
1	TETRA + Bluetooth(data)	Yes	Yes	Yes
2	TETRA + WiFi(data)	Yes	Yes	Yes

General note:

1. The reported SAR summation is calculated based on the same configuration and test position.
2. For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01 based on the formula below
   a) [(max. Power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] * [√f(GHz)/x]W/kg for test separation distances ≦50mm; whetn x=7.5 for 1-g SAR, and x=18.75 for 10-g SAR.
   b) When the minimum separation distance is <5mm, the distance is used 5mm to determine SAR test exclusion
   c) 0.4 W/kg for 1-g SAR and 1.0W/kg for 10-g SAR, when the test separation distances is >50mm.

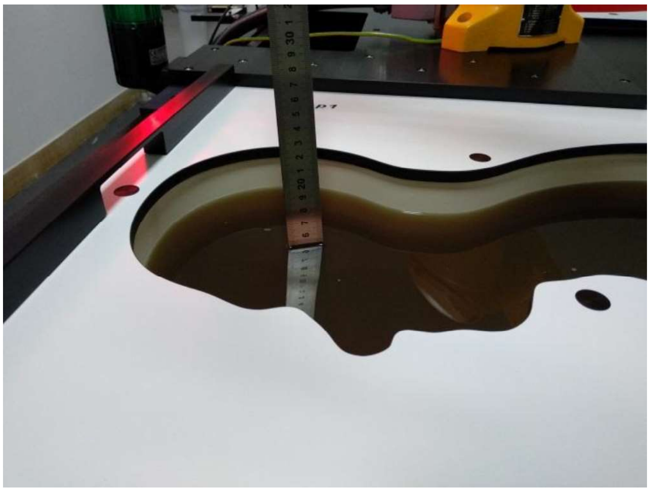
Mode	Max power	Exposure position	Head	Front-of-face	Body-worn
		Test separation	0mm	25mm	0mm
Bluetooth	8.50 dBm	Estimated SAR (W/kg)	0.295	0.059	0.295

According to KDB 447498 Section 7.2,
The [Σ of (the highest measured or estimated SAR for each standalone antenna configuration, adjusted for maximum tune-up tolerance) / 1.6 W/kg] + [Σ of MPE ratios] is ≤ 1.0.

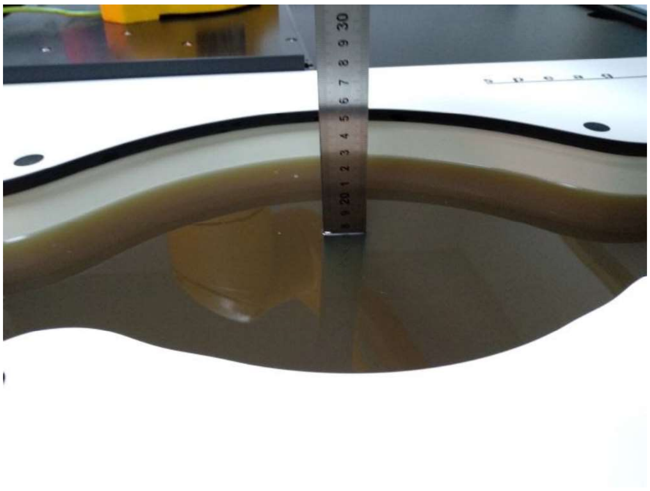
Exposure Position	Max SAR (W/kg)		Ratios
	TETRA	Bluetooth	
Head	2.816	0.295	0.536
Front-of-face	0.733	0.059	0.129
Body-worn	1.256	0.295	0.341

Exposure Position	Max SAR (W/kg)		Ratios
	TETRA	WIFI	
Head	2.816	0.274	0.523
Front-of-face	0.733	0.038	0.115
Body-worn	1.256	0.121	0.233

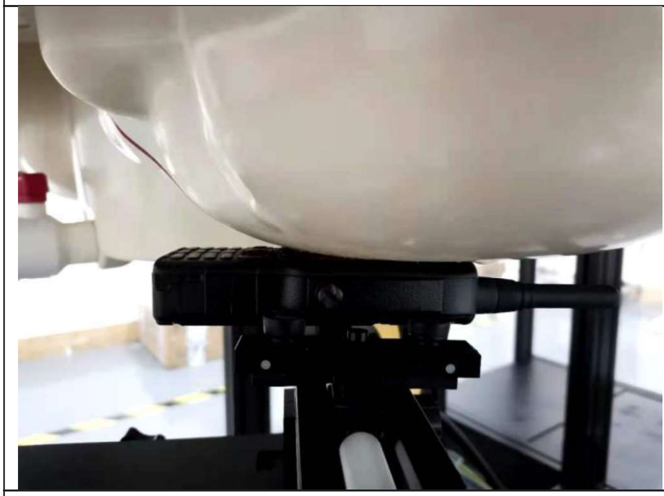
15. Test Setup Photos



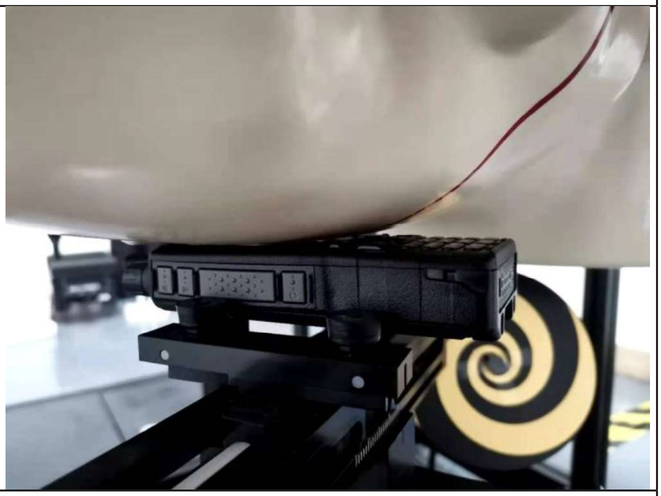
Liquid depth in the Head phantom



Liquid depth in the Body phantom

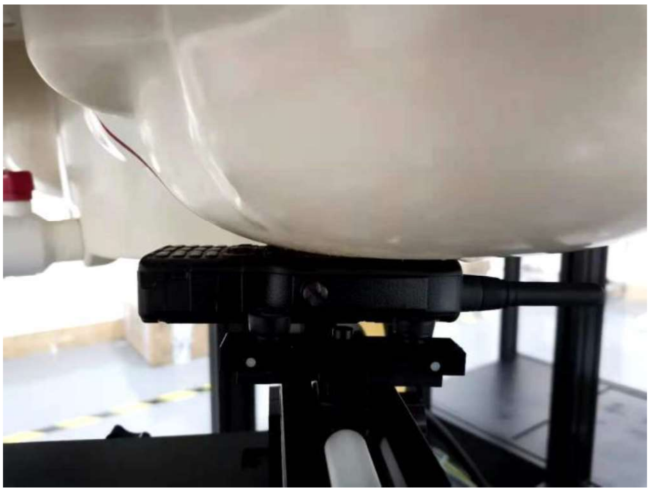


300-01923(1160mAh) Left Cheek Touch

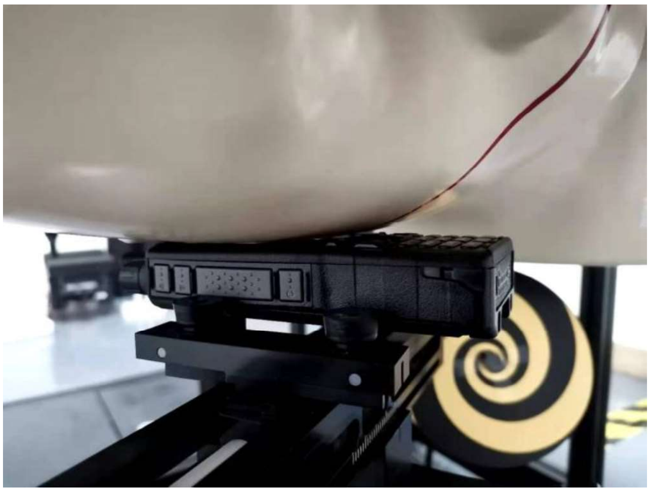


300-01923 (1160mAh) Right Cheek Touch

300-01923 (1160mAh) Rear 0mm



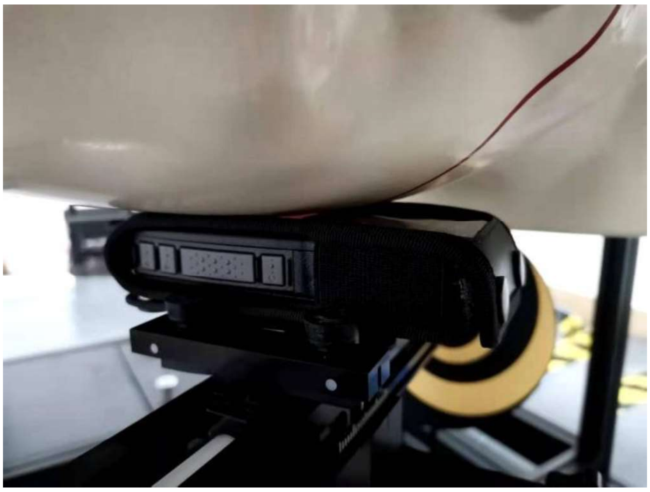
300-01922 (1160mAh) Left Cheek Touch



300-01922 (1160mAh) Right Cheek Touch

300-01922 (1160mAh) Rear 0mm

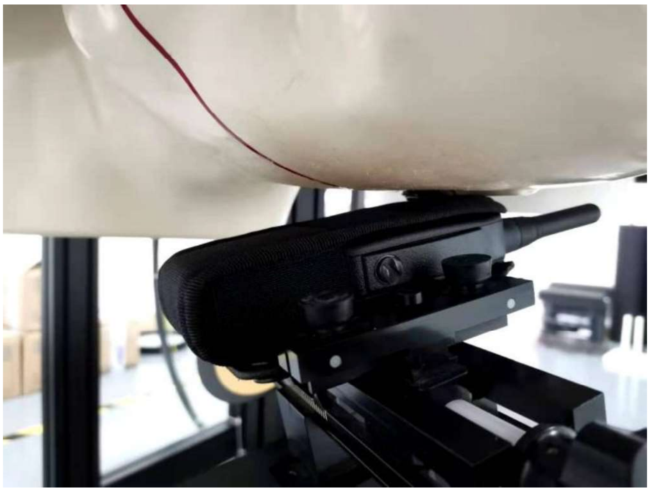
300-01915(1160mAh) Left Cheek Touch



300-01915 (1160mAh) Right Cheek Touch

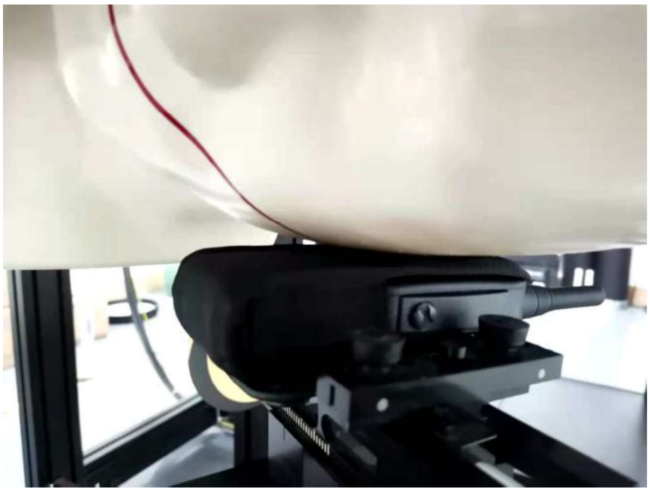
300-01915 (1160mAh) Rear 0mm

300-01916 (1160mAh) Front of face 25mm

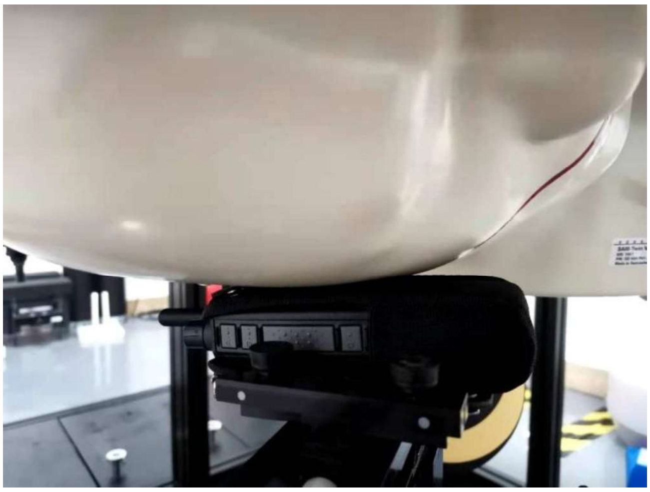


300-01916 (1160mAh) Left Cheek Touch Tilt 15

300-01916 (1160mAh) Right Cheek Touh Tilt 15



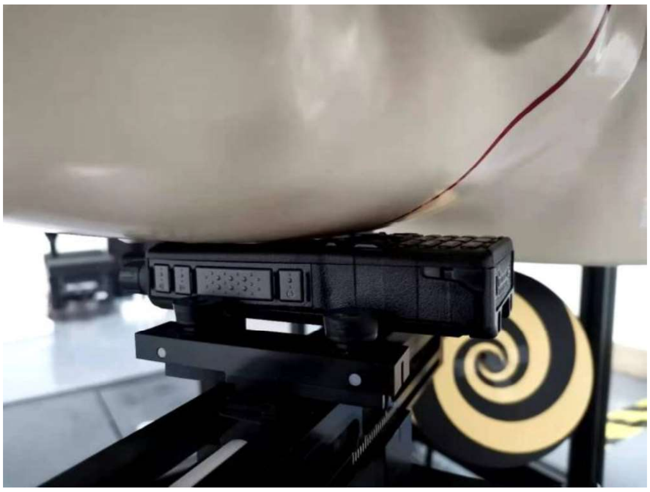
300-01916 (1160mAh) Left Cheek Touch



300-01916 (1160mAh) Right Cheek Touch

300-01916 (1160mAh) Rear 0mm

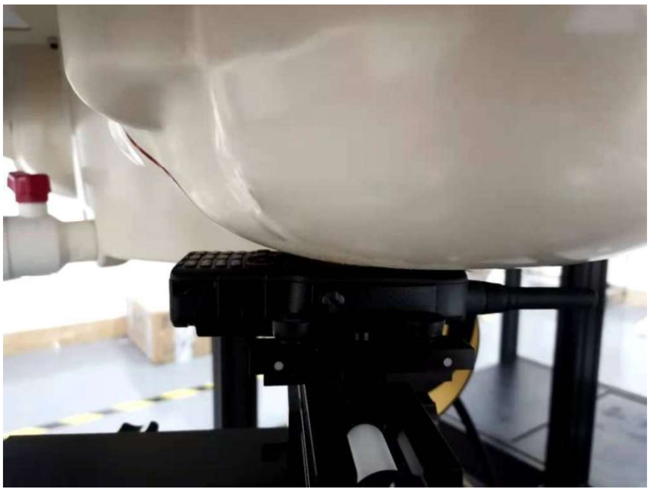
300-01917 (1160mAh) Left Cheek Touch



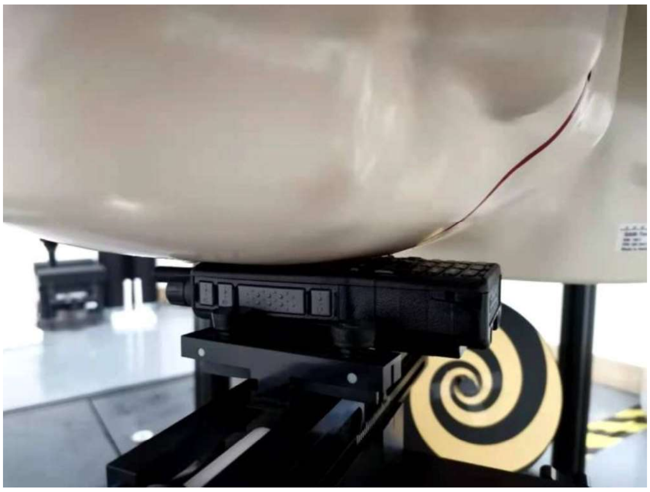
300-01917 (1160mAh) Right Cheek Touch

300-01917 (1160mAh) Rear 0mm

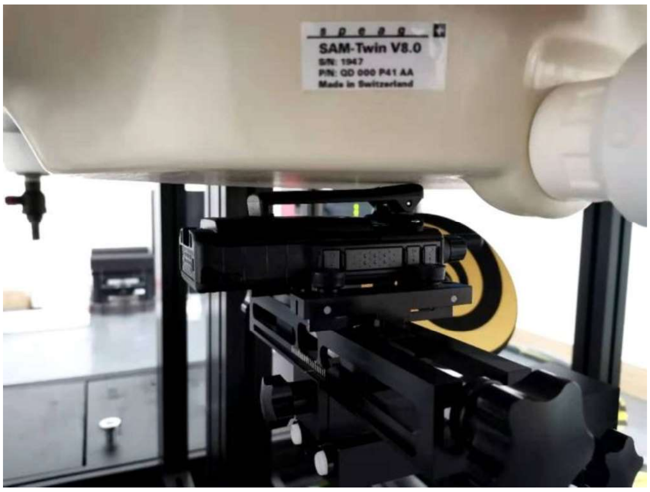
Rear face - 1160 mAh battery with Nylon Holster and RSM



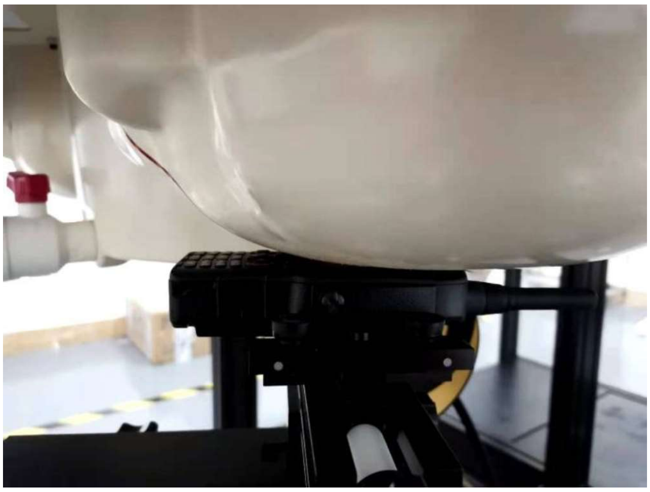
300-01923(1880mAh) Left Cheek Touch



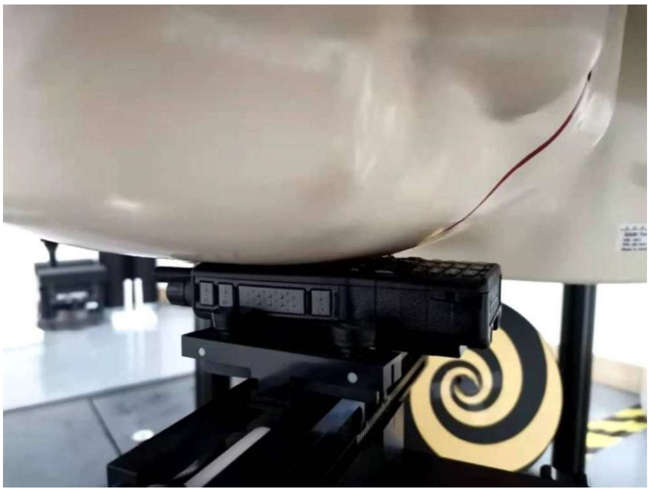
300-01923 (1880mAh) Right Cheek Touch



300-01923 (1880mAh) Rear 0mm



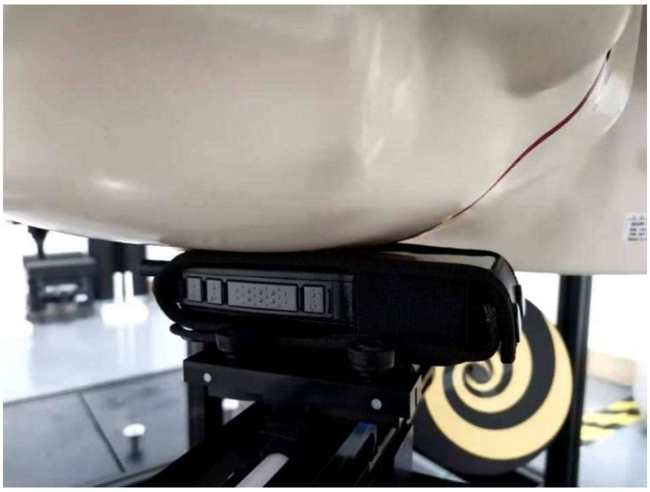
300-01922 (1880mAh) Left Cheek Touch



300-01922 (1880mAh) Right Cheek Touch

300-01922 (1880mAh) Rear 0mm

300-01915 (1880mAh) Left Cheek Touch

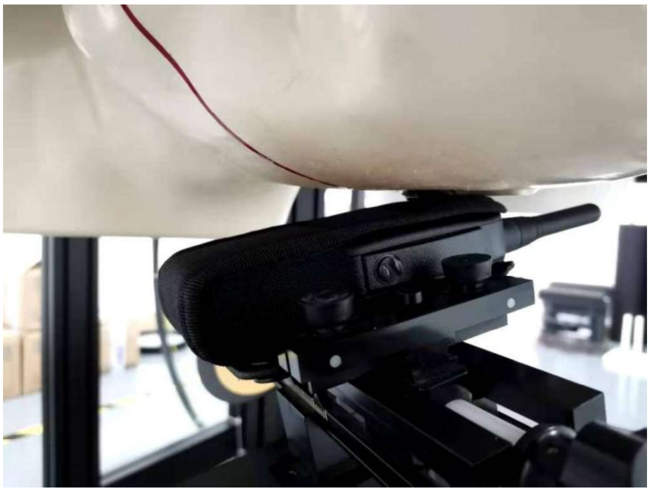


300-01915 (1880mAh) Right Cheek Touch

300-01915 (1880mAh) Rear 0mm

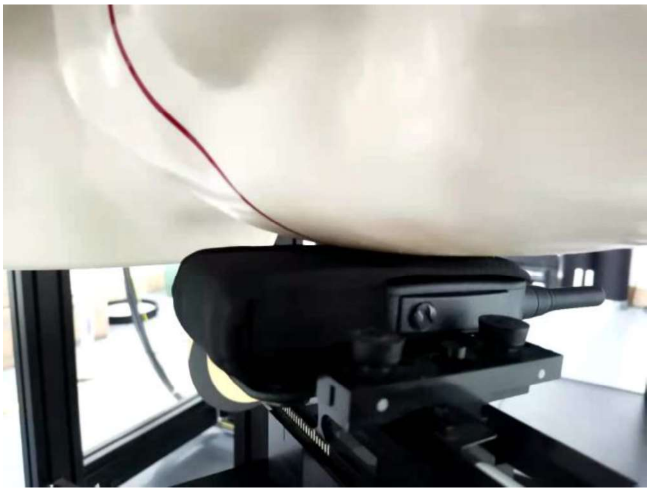
300-01916 (1880mAh) Front of face 25mm

300-01916 (1880mAh) Rear 0mm

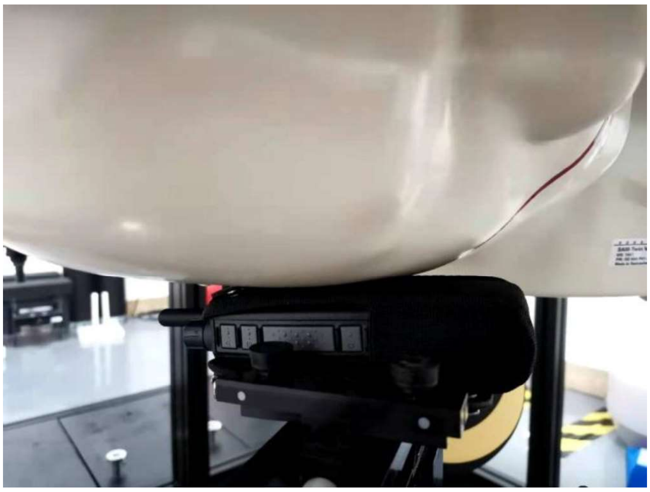


300-01916 (1880mAh) Left Cheek Touch Tilt 15

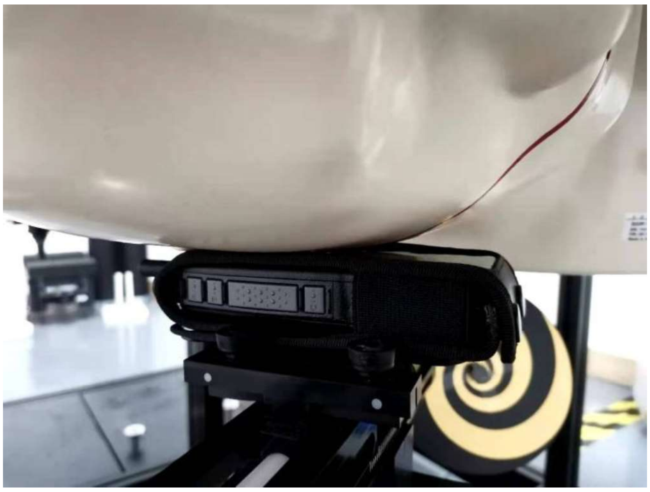
300-01916 (1880mAh) Right Cheek Touch Tilt 15



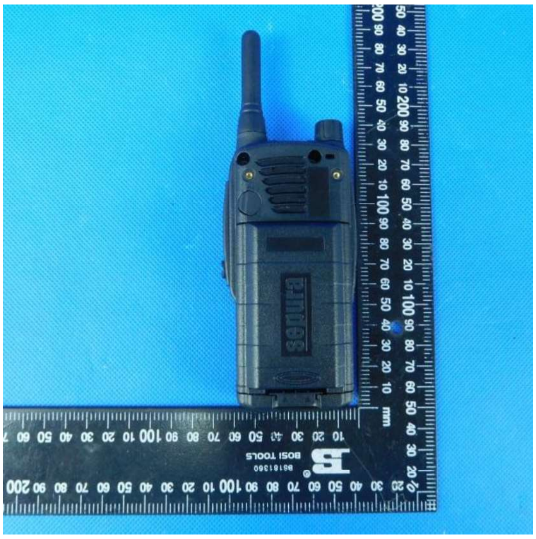
300-01916 (1880mAh) Left Cheek Touch



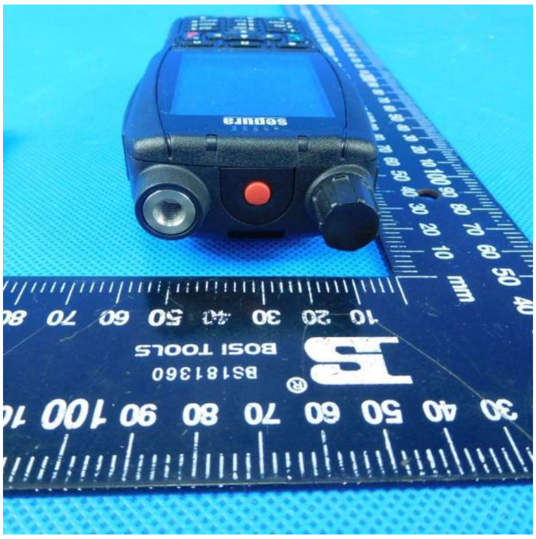
300-01916 (1880mAh) Right Cheek Touch

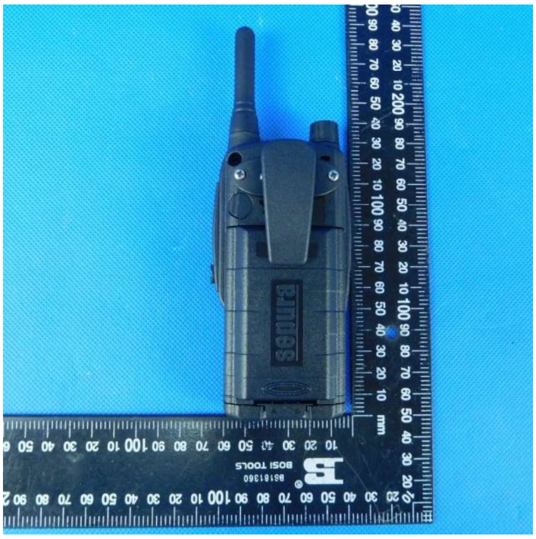
	
300-01917 (1880mAh) Left Cheek Touch	300-01917 (1880mAh) Right Cheek Touch
	
300-01917 (1880mAh) Rear 0mm	

16. External Photos of the EUT




BOSI TOOLS
BS181360


BOSI TOOLS
BS181360



1160 battery

1880 battery

---------End of Report---------