FCC SAR Test Report

APPLICANT	:	Luxottica Group S.p.A.
EQUIPMENT	:	SMART GLASSES
BRAND NAME	:	Ray-Ban Meta or Ray-Ban
MODEL NAME	:	RW4006, RW4008, RW4009, RW4009F, RW4010, RW4006M
FCC ID	:	2AYOA-4003
STANDARD	:	FCC 47 CFR PART 2 (2.1093)

We, Sporton International Inc. (Shenzhen), would like to declare that the tested sample has been evaluated in accordance with the test procedures given in 47 CFR Part 2.1093 and FCC KDB and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Shenzhen), the test report shall not be reproduced except in full.

ACCREDITED
Cert #5145.01

Approved by: Si Zhang

Sporton International Inc. (Shenzhen)
1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055
People's Republic of China

Table of Contents

Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA272102-03	Rev. 01	Initial issue of report	Jan. 30, 2024

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Luxottica Group S.p.A., SMART GLASSES, RW4006, RW4008, RW4009, RW4009F, RW4010, RW4006M,** are as follows.

Highest 1g SAR Summary								
Equipment Class	Frequency Band		Head		Body			Highest Simultaneous Transmission 1g SAR (W/kg)
			Face-Worn (Separation 0mm)	Rest-on-Head (Separation 0mm)	Rest-on-Shirt (Separation 0mm)	Pocketing (outside Charging Case) (Separation 5mm)	Pocketing(inside Charging Case) (Separation 5mm)	
			1g SAR (W/kg)					
DTS	WLAN	2.4GHz WLAN	0.31	0.22	**1.02**	<0.10	0.20	-
NII		5GHz WLAN	**0.85**	0.33	0.64	<0.10	**0.63**	1.32
DSS	2.4GHz Band	Bluetooth	<0.10	<0.10	0.62	<0.10	<0.10	1.33

Highest 10g SAR Summary				
Equipment Class	Frequency Band		Extremity Handheld(inside Charging Case) (Separation 0mm) 10g SAR (W/kg)	Highest Simultaneous Transmission 10g SAR (W/kg)
DTS	WLAN	2.4GHz WLAN	0.16	-
NII		5GHz WLAN	**0.42**	0.60
DSS	2.4GHz Band	Bluetooth	<0.10	0.60
Date of Testing:			2023/10/4 ~ 2023/11/16	

Remark: This is a variant report for RW4006, RW4008, RW4009, RW4009F, RW4010, RW4006M, the different between them please refer to the RW4006, RW4008, RW4009, RW4009F, RW4010, RW4006M_Operational Description of Product Equality Declaration which is exhibited separately. According to the difference, added sample 4/5/6, only sample 4/5 verified the worse cases from original test report (Sporton Report Number FA272102-02). For sample 6, the differences do not affect the test, so sample 6 are not tested.

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg for Partial-Body 1g SAR, 4.0 W/kg for Product Specific 10g SAR) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications.

2. Administration Data

Sporton International Inc. (Shenzhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Testing Laboratory			
Test Firm	Sporton International Inc. (Shenzhen)		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	SAR05-SZ	CN1256	421272

Applicant	
Company Name	Luxottica Group S.p.A.
Address	Piazzale Cadorna 3 20123 Milan, Italy

Manufacturer	
Company Name	Luxottica Group S.p.A.
Address	Piazzale Cadorna 3 20123 Milan, Italy

3. Guidance Applied

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards:

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2013
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB 865664 D02 SAR Reporting v01r02
- FCC KDB 447498 D01 General RF Exposure Guidance v06
- FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r02
- TCB workshop October, 2016; RF Exposure Procedures (Bluetooth Duty Factor)
- TCB workshop April 2019; RF Exposure Procedures (802.11ax SAR Testing)

4. Equipment Under Test (EUT) Information

4.1 General Information

Product Feature & Specification	
Equipment Name	SMART GLASSES
Brand Name	Ray-Ban Meta or Ray-Ban
Model Name	RW4006, RW4008, RW4009, RW4009F, RW4010, RW4006M
FCC ID	2AYOA-4003
S/N	Sample 4: 2Q37W07F5F0009 Sample 5: 2Q37X0FFB1002R
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2472 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5720 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz WLAN 6GHz U-NII-5: 5955 MHz ~ 6415 MHz WLAN 6GHz U-NII-6: 6435 MHz ~ 6515 MHz WLAN 6GHz U-NII-7: 6535 MHz ~ 6855 MHz WLAN 6GHz U-NII-8: 6875 MHz ~ 7095 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 2.4GHz 802.11ac/ax VHT20/VHT40/HE20/HE40 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac/ax VHT20/VHT40/VHT80/VHT160/HE20/HE40/HE80/HE160 WLAN 6GHz 802.11a WLAN 6GHz 802.11ax HE20/HE40/HE80/HE160 Bluetooth BR/EDR/LE
HW Version	EVT2
SW Version	12/SQ3A. 220605. 009. A1/50162930072700100: userdebug/test-keys
EUT Stage	Identical Prototype

Remark:

1. Power States and the related triggering mechanisms are following as, the detailed Sensor Fusion Algorithm and Power State Decision Logic Flow, Exposure Condition and SAR Requirement summary please refer to KDB inquiry with the FCC.

Power State	Exposure Condition
A	Face-Worn
	Rest-on-Head
B	Rest- on-Shirt
	Pocketing
C	Pocketing/Handheld (in Charging Case)
D	Free Space/Off Body

2. There are six samples of EUT. The manufacturer declares that all the equipment and models share the same radio characteristics and Software/Firmware, the only differences between each of them are color of frames, lenses, and sizes which certainly do not affect the test results.

Sample	Model Name
Sample 1	RW4006
Sample 2	RW4008
Sample 3	RW4009
Sample 4	RW4009F
Sample 5	RW4010
Sample 6	RW4006M

3. SAR test report for WLAN 6GHz U-NII-5/6/7/8 will be separately submitted. About co-located SAR with WWAN/Bluetooth always chose higher SAR of WLAN5GHz U-NII-1/2A/2C/3 and WLAN 6GHz U-NII-5/6/7/8.

5. RF Exposure Limits

5.1 Uncontrolled Environment

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

5.2 Controlled Environment

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. The exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	20.0

Limits for General Population/Uncontrolled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	1.6	4.0

Whole-Body SAR is averaged over the entire body, partial-body SAR is averaged over any 1gram of tissue defined as a tissue volume in the shape of a cube. SAR for hands, wrists, feet and ankles is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

6. Specific Absorption Rate (SAR)

6.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

6.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

$$\mathbf{SAR} = \frac{\mathbf{d}}{\mathbf{dt}}\left(\frac{\mathbf{dW}}{\mathbf{dm}}\right) = \frac{\mathbf{d}}{\mathbf{dt}}\left(\frac{\mathbf{dW}}{\boldsymbol{\rho}\mathbf{dv}}\right)$$

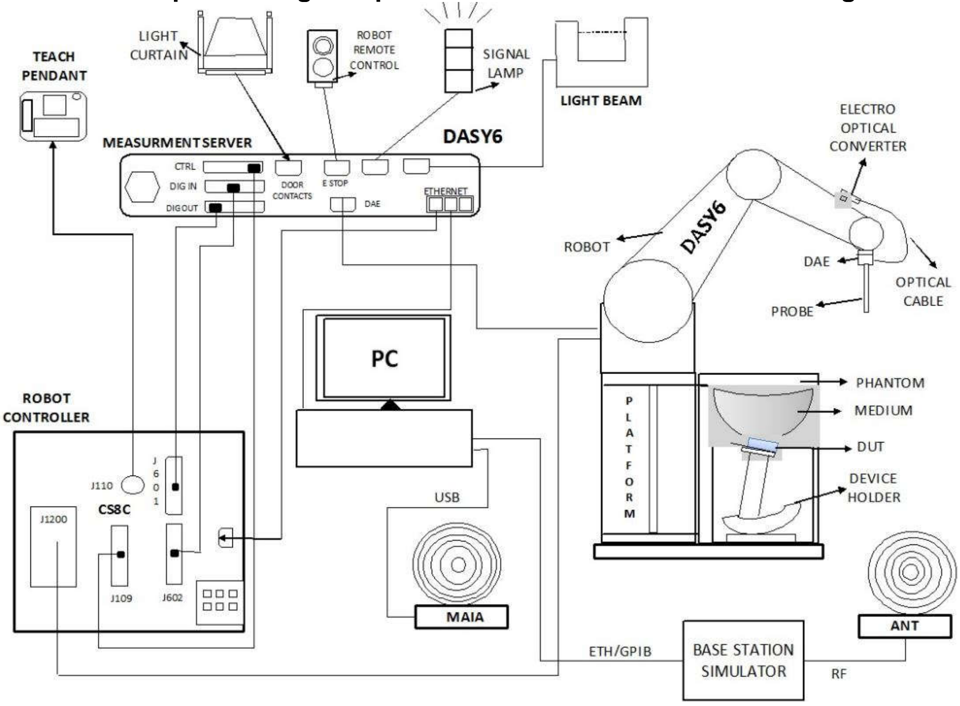
SAR is expressed in units of Watts per kilogram (W/kg)

$$\mathbf{SAR} = \frac{\boldsymbol{\sigma}|\mathbf{E}|^2}{\boldsymbol{\rho}}$$

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength.

7. System Description and Setup

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



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (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.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Win7 or Win10 and the DASY5 or DASY6 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

7.1 E-Field Probe

The SAR measurement is conducted with the dosimetric probe (manufactured by SPEAG).The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. This probe has a built in optical surface detection system to prevent from collision with phantom.

<EX3DV4 Probe>

Construction	Symmetric design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Frequency	10 MHz – >6 GHz Linearity: ±0.2 dB (30 MHz – 6 GHz)
Directivity	±0.3 dB in TSL (rotation around probe axis) ±0.5 dB in TSL (rotation normal to probe axis)
Dynamic Range	10 μW/g – >100 mW/g Linearity: ±0.2 dB (noise: typically <1 μW/g)
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 2.5 mm (body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm

7.2 Data Acquisition Electronics (DAE)

The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.

The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Photo of DAE

7.3 Phantom

<SAM Twin Phantom>

Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm	
Filling Volume	Approx. 25 liters	
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet	
Measurement Areas	Left Hand, Right Hand, Flat Phantom	

The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

<ELI Phantom>

Shell Thickness	2 ± 0.2 mm (sagging: <1%)	
Filling Volume	Approx. 30 liters	
Dimensions	Major ellipse axis: 600 mm Minor axis: 400 mm	

The ELI phantom is intended for compliance testing of handheld and body-mounted wireless devices or for evaluating transmitters operating at low frequencies. ELI is fully compatible with standard and all known tissue simulating liquids.

<SAM Head-Stand Phantom>

Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm	
Filling Volume	Approx. 10 liters	
Measurement Areas	The top-head or around-the-head wireless accessories (head-belts and similar wireless head accessories etc.)	

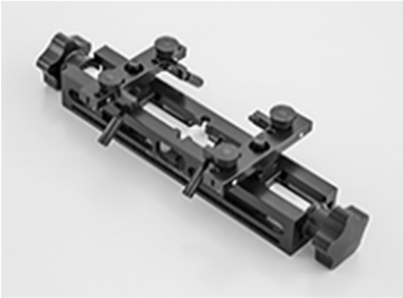
The Head-Stand phantom is a SAM phantom with the top of the head facing downward. It is truncated along a plane above the bottom of the ear reference point. Above this plane, an upper extension is added to ensure that the tissue simulating liquid is deep enough to measure in the relevant regions of the SAM phantom. The upper extension is flanged to allow better measurement probe access for the top of the head (bottom of the head-stand phantom).

7.4 Device Holder

<Mounting Device for Hand-Held Transmitter>

In combination with the Twin SAM V5.0/V5.0c or ELI phantoms, the Mounting Device for Hand-Held Transmitters enables rotation of the mounted transmitter device to specified spherical coordinates. At the heads, the rotation axis is at the ear opening. Transmitter devices can be easily and accurately positioned according to IEC 62209-1, IEEE 1528, FCC, or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat). And upgrade kit to Mounting Device to enable easy mounting of wider devices like big smart-phones, e-books, small tablets, etc. It holds devices with width up to 140 mm.

Mounting Device for Hand-Held Transmitters



Mounting Device Adaptor for Wide-Phones

<Mounting Device for Laptops and other Body-Worn Transmitters>

The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the mounting device in place of the phone positioned. The extension is fully compatible with the SAM Twin and ELI phantoms.

Mounting Device for Laptops

8. Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

(a) For WWAN power measurement, use base station simulator to configure EUT WWAN transmission in conducted 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 WLAN/BT power measurement, use engineering software to configure EUT WLAN/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 WLAN/BT output power

<SAR measurement>

(a) Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power, in the highest power channel.
(b) Place the EUT in the positions as Appendix D demonstrates.
(c) Set scan area, grid size and other setting on the DASY software.
(d) Measure SAR results for the highest power channel on each testing position.
(e) Find out the largest SAR result on these testing positions of each band
(f) Measure SAR results for other channels in worst SAR testing position if the reported SAR of highest power channel is larger than 0.8 W/kg

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

(a) Power reference measurement
(b) Area scan
(c) Zoom scan
(d) Power drift measurement

8.1 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

The entire evaluation of the spatial peak values is performed within the post-processing engine (SEMCAD). The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

(a) Extraction of the measured data (grid and values) from the Zoom Scan
(b) Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
(c) Generation of a high-resolution mesh within the measured volume
(d) Interpolation of all measured values form the measurement grid to the high-resolution grid
(e) Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
(f) Calculation of the averaged SAR within masses of 1g and 10g

8.2 Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

8.3 Area Scan

The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum found in the scanned area, within a range of the global maximum. The range (in dB0 is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan), if only one zoom scan follows the area scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of zoom scans has to be increased accordingly.

Area scan parameters extracted from FCC KDB 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz.

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	½·δ·ln(2) ± 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.	

8.4 Zoom Scan

Zoom scans are used assess the peak spatial SAR values within a cubic averaging volume containing 1 gram and 10 gram of simulated tissue. The zoom scan measures points (refer to table below) within a cube shoes base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the zoom scan evaluates the averaged SAR for 1 gram and 10 gram and displays these values next to the job's label.

Zoom scan parameters extracted from FCC KDB 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz.

			≤ 3 GHz	> 3 GHz
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	$\le 1.5 \cdot \Delta z_{Zoom}(n-1)$	
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 draft standard IEEE P1528-2011 for details. * When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB 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.				

8.5 Volume Scan Procedures

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

8.6 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In DASY measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drifts more than 5%, the SAR will be retested.

9. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	2450MHz System Validation Kit	D2450V2	1095	Dec. 07, 2022	Dec. 06, 2023
SPEAG	5000MHz System Validation Kit	D5GHzV2	1341	Dec. 13, 2021	Dec. 11, 2024
SPEAG	Data Acquisition Electronics	DAE4	1664	Jun. 06, 2023	Jun. 05, 2024
SPEAG	Dosimetric E-Field Probe	EX3DV4	7641	Apr. 24, 2023	Apr. 23, 2024
SPEAG	SAM Twin Phantom	QD 000 P41 AA	2033	NCR	NCR
SPEAG	SAM Head-Stand	QD 012 003 CC	1024	NCR	NCR
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
Keysight	Network Analyzer	E5071C	MY46523671	Oct. 16, 2023	Oct. 15, 2024
Speag	Dielectric Assessment KIT	DAK-3.5	1071	Feb. 20, 2023	Feb. 19, 2024
Agilent	Signal Generator	N5181A	MY50145381	Dec. 27, 2022	Dec. 26, 2023
R&S	Signal Generator	SMB100A	175779	Dec. 28, 2022	Dec. 27, 2023
Anritsu	Power Senor	MA2411B	1306099	Oct. 16, 2023	Oct. 15, 2024
Anritsu	Power Meter	ML2495A	1349001	Oct. 16, 2023	Oct. 15, 2024
Anritsu	Power Sensor	MA2411B	1542004	Dec. 27, 2022	Dec. 26, 2023
Anritsu	Power Meter	ML2495A	1339473	Dec. 27, 2022	Dec. 26, 2023
R&S	Power Sensor	NRP50S	101254	Apr. 06, 2023	Apr. 05, 2024
R&S	Power Sensor	NRP8S	109228	Apr. 06, 2023	Apr. 05, 2024
R&S	CBT BLUETOOTH TESTER	CBT	100963	Dec. 27, 2022	Dec. 26, 2023
R&S	Spectrum Analyzer	FSP7	100818	Jul. 05, 2023	Jul. 04, 2024
TES	Hygrometer	1310	200505600	Jul. 08, 2023	Jul. 07, 2024
Anymetre	Thermo-Hygrometer	JR593	2020062101	Jul. 08, 2023	Jul. 07, 2024
SPEAG	Device Holder	N/A	N/A	N/A	N/A
AR	Amplifier	5S1G4	0333096	Note 1	
Mini-Circuits	Amplifier	ZVE-3W-83+	599201528	Note 1	
ARRA	Power Divider	A3200-2	N/A	Note 1	
ET Industries	Dual Directional Coupler	C-058-10	N/A	Note 1	
Weinschel	Attenuator 1	3M-10	N/A	Note 1	

Note:

1. Prior to system verification and validation, the path loss from the signal generator to the system check source and the power meter, which includes the amplifier, cable, attenuator and directional coupler, was measured by the network analyzer. The reading of the power meter was offset by the path loss difference between the path to the power meter and the path to the system check source to monitor the actual power level fed to the system check source.
2. The dipole calibration interval can be extended to 3 years with justification according to KDB 865664 D01. The dipoles are also not physically damaged, or repaired during the interval. The justification data in appendix C can be found which the return loss is < -20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration for each dipole.

10. System Verification

10.1 Tissue Simulating Liquids

For the measurement of the field distribution inside the SAM phantom with DASY, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 10.1. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 10.2.

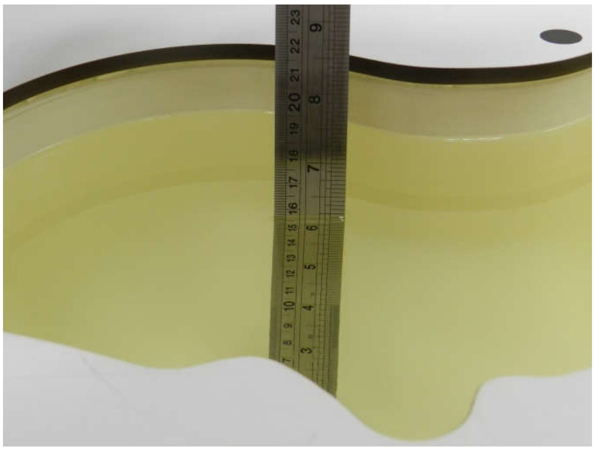


Fig 10.1Photo of Liquid Height for Head SAR

Fig 10.2 Photo of Liquid Height for Body SAR

10.2 Tissue Verification

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (εr)
For Head								
2450	55.0	0	0	0	0	45.0	1.80	39.2

Simulating Liquid for 5GHz, Manufactured by SPEAG

Ingredients	(% by weight)
Water	64~78%
Mineral oil	11~18%
Emulsifiers	9~15%
Additives and Salt	2~3%

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Tissue Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
2450	Head	22.6	1.831	39.993	1.80	39.20	1.72	2.02	±5	2023/10/4
5250	Head	22.4	4.644	35.816	4.71	35.95	-1.40	-0.37	±5	2023/10/7
5750	Head	22.3	5.142	35.033	5.22	35.35	-1.49	-0.90	±5	2023/10/9
2450	Head	22.2	1.792	38.945	1.80	39.20	-0.44	-0.65	±5	2023/11/12
5250	Head	22.7	4.564	35.620	4.71	35.95	-3.10	-0.92	±5	2023/11/13
5750	Head	22.6	5.093	35.309	5.22	35.35	-2.43	-0.12	±5	2023/11/15

Frequency (MHz)	Tissue Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (εr)	Conductivity Target (σ)	Permittivity Target (εr)	Delta (σ) (%)	Delta (εr) (%)	Limit (%)	Date
2450	Head	22.4	1.82	41	1.80	39.20	1.11	4.59	±5	2023/10/10
5800	Head	22.5	5.23	35.3	5.27	35.30	-0.76	0.00	±5	2023/10/12
2450	Head	22.3	1.82	40	1.80	39.20	1.11	2.04	±5	2023/11/15
5800	Head	22.4	5.24	36.3	5.27	35.30	-0.57	2.83	±5	2023/11/16

10.3 System Performance Check Results

Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10 %. Below table shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance check can meet the variation criterion and the plots can be referred to Appendix A of this report.

<1g SAR>

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)
2023/10/4	2450	Head	250	1095	7641	1664	12.700	52.000	50.8	-2.31
2023/10/7	5250	Head	100	1341	7641	1664	8.080	80.700	80.8	0.12
2023/10/9	5750	Head	100	1341	7641	1664	8.020	80.600	80.2	-0.50
2023/11/12	2450	Head	250	1095	7641	1664	13.400	52.000	53.6	3.08
2023/11/13	5250	Head	100	1341	7641	1664	8.000	80.700	80	-0.87
2023/11/15	5750	Head	100	1341	7641	1664	8.070	80.600	80.7	0.12

<10g SAR>

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 10g SAR (W/kg)	Targeted 10g SAR (W/kg)	Normalized 10g SAR (W/kg)	Deviation (%)
2023/10/4	2450	Head	250	1095	7641	1664	5.810	24.600	23.24	-5.53
2023/10/7	5250	Head	100	1341	7641	1664	2.220	23.100	22.2	-3.90
2023/10/9	5750	Head	100	1341	7641	1664	2.200	22.700	22	-3.08
2023/11/12	2450	Head	250	1095	7641	1664	6.210	24.600	24.84	0.98
2023/11/13	5250	Head	100	1341	7641	1664	2.230	23.100	22.3	-3.46
2023/11/15	5750	Head	100	1341	7641	1664	2.200	22.700	22	-3.08

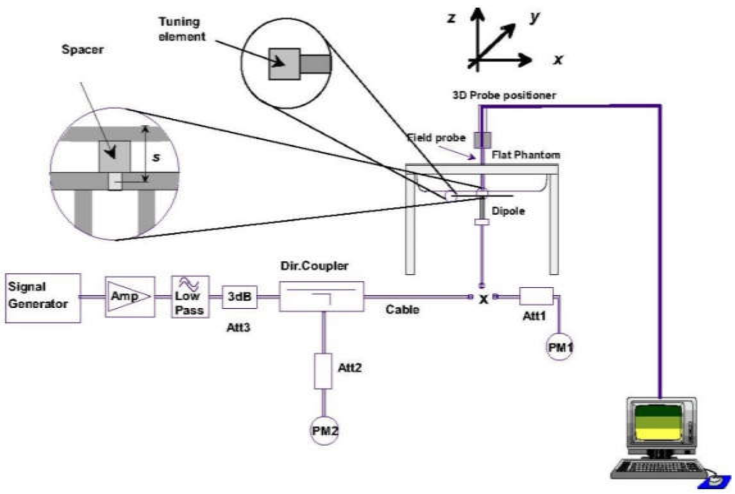


Fig 10.3.1 System Performance Check Setup

Fig 10.3.2 Setup Photo

10.4 Additional System Check on SAM Head-Stand phantom

When using DASY6 with Head-Stand phantom, additional system verifications were performed using the Head-Stand phantom itself. As recommended by the SAR system manufacture and confirmed as appropriate through KDB inquiry with the FCC, i.e. the Head-Stand Phantoms, is performed according to the validation points described in the SPEAG's DASY SAR manual. The locations of the nine points are shown in Figure below.

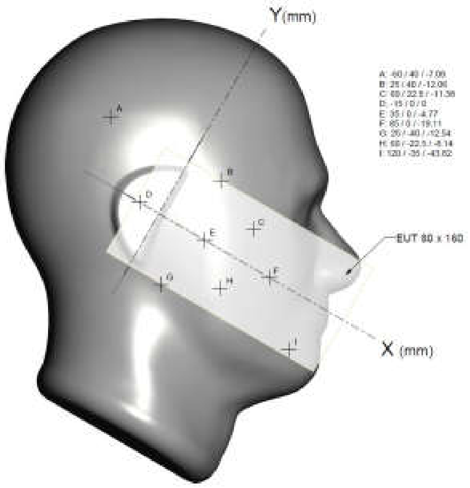


Fig 10.4.1 System check and validation locations for the head phantom

The target values vary slightly based on what angle the dipole is oriented in. The three possible dipole arm orientations for which target values are defined are shown below. The dipoles were placed in the orientation defined as 90º.

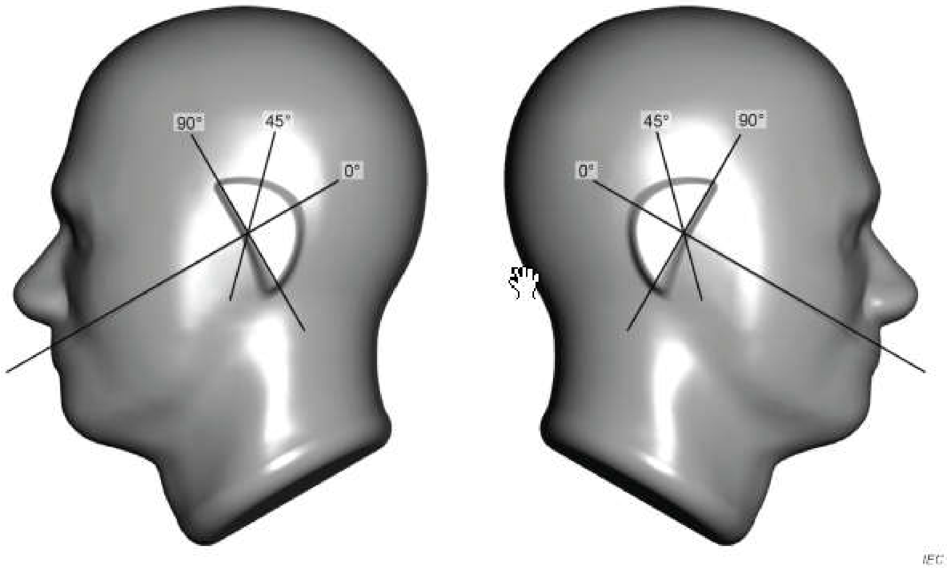


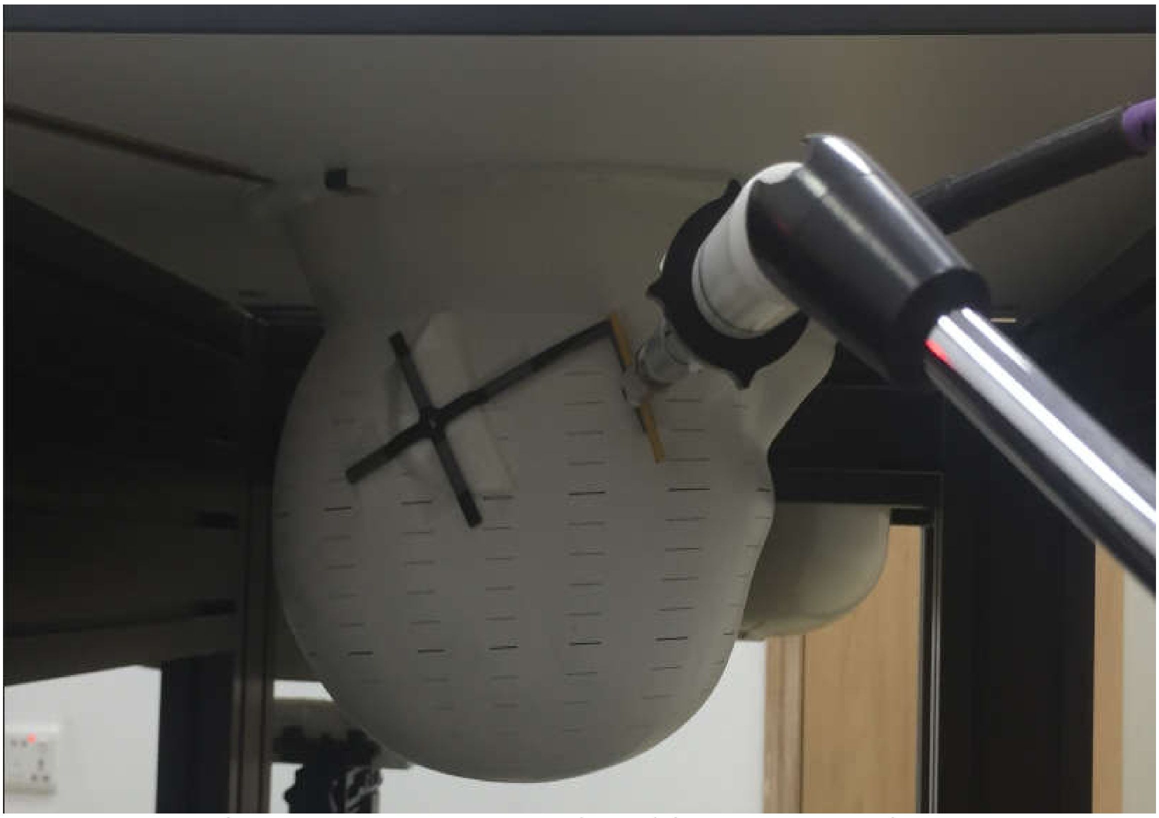
Fig 10.4.2 Definition of rotation angles for dipoles

Point C (on left face) was chosen as it is the closest point to the portion of the phantom which is utilized for the EUT measurements. Since SPEAG dipole calibration does not provide system check target values for specific phantoms, the target values in Table 7.4.4 from SPEAG's DASY6/DASY8 SAR Manual (shown in Fig. 10.4.3) are used and tabulated in Table below. The detailed please refer to KDB inquiry with the FCC.

Point	Freq [MHz]	Rot [°]	d [mm]	Meas [W/kg] 1 g	Meas [W/kg] 10 g	Target [W/kg] 1 g	Target [W/kg] 10 g	Dev [dB] 1 g	Dev [dB] 10 g	Probe Angle [°] Max	Probe Angle [°] Avg
A	835	90	15	9.04	5.89	9.00	6.02	0.02	−0.09	45.0	38.1
B	835	90	15	9.52	6.25	9.70	6.37	−0.08	−0.09	45.0	41.4
C	900	90	15	11.3	7.22	11.2	7.25	0.06	−0.02	50.0	39.9
A	1950	90	10	45.8	23.8	41.0	21.1	0.48	0.52	45.0	36.4
B	1950	90	10	46.2	23.8	41.7	21.2	0.44	0.51	45.0	41.4
B	1950	90	5	75.6	34.8	77.2	34.2	−0.09	0.07	45.0	41.9
A	2450	0	10	60.9	27.9	54.6	24.6	0.47	0.55	45.0	39.9
B	2450	90	10	60.1	27.7	53.8	24.3	0.48	0.57	45.0	41.8
C	2450	90	10	51.0	23.5	54.8	24.9	−0.31	−0.25	45.0	39.6
C	5800	90	25	19.0	6.78	17.1	5.97	0.45	0.55	40.0	39.4

Fig 10.4.3 Target Values for System Check on SAM Head-Stand Phantom

As confirmed as appropriate through KDB inquiry with the FCC and confirmation with the manufacturer, since SPEAG has not yet developed the specific phantom SAR system check target values for the 7 GHz band. Only the system checks using the Head Stand Phantom are to be performed using one frequency in the 2.4 GHz band and one frequency in the 5 GHz band.



2.4GHz Dipole Placed at Location C in 90º Orientation (10mm Spacer)

5GHz Dipole Placed at Location C in 90º Orientation (25mm Spacer)

10.5 System Performance Check Results on SAM phantom

Below table shows the target SAR and measured SAR after normalized to 1W input power. The dipole target values please refer to Fig. 10.4.3 in section 10.4. The table below indicates the system performance check can meet the variation criterion and the plots can be referred to Appendix A of this report.

Date	Frequency (MHz)	Tissue Type	Input Power(mW)	Probe S/N	DAE S/N	Dipole S/N	Distance (mm)	Point	Rot [°]	Measured 1g SAR (w/kg)	Targeted 1g SAR (w/kg)	Normalized 1g SAR (w/kg)	Deviation (dB)
2023/10/10	2450	Head	250	7641	1664	1095	10	C(Left Face)	90	11.9	54.8	47.2	-0.65
2023/10/12	5800	Head	100	7641	1664	1341	25	C(Left Face)	90	1.74	17.1	17.4	0.08
2023/11/15	2450	Head	250	7641	1664	1095	10	C(Left Face)	90	11.8	54.8	47.2	-0.65
2023/11/16	5800	Head	100	7641	1664	1341	25	C(Left Face)	90	1.78	17.1	17.8	0.17

Note: The Expanded Uncertainty for measurement on a specific phantom of the measuring system (DASY6/DASY8). To be conservative, the smaller Expanded Uncertainty, which is from DASY6 – 1g SAR: 29.8%, 1.1 dB (k=2) – is used. Target values in Fig. 10.4.3 have an uncertainty of 0.4 dB (k=2). The Combined Uncertainty of target values (0.4 dB) and system uncertainty (1.1 dB) is 1.2 dB (k=2). All deviations between normalized SAR values and target values should be within this 1.2 dB measurement uncertainty to demonstrate a successful system check on the SAM Head-Stand Phantom.

11. RF Exposure Positions

11.1 Head SAR Testing for SMART GLASSES

The device was mounted on the SAM Head-Stand Phantom as it is intended to be worn, the detailed please refer to KDB inquiry with the FCC.

11.2 Body SAR Testing for SMART GLASSES

a) To position the device parallel to the phantom surface to 0mm with the Device's antenna is located on the left temple arm outer edge in Rest-on-Shirt exposure condition.

b) To position the device parallel to the phantom surface to 5mm with the Device's antenna is located on the left temple arm in Pocketing (outside Charging Case) exposure condition.

c) To position the device parallel to the phantom surface to 5mm with the EUT's top or bottom in Pocketing(inside Charging Case) exposure condition.

11.3 Extremity SAR Testing for SMART GLASSES

a) The device shall be placed directly against the flat phantom, for those sides of the device that are in contact with the hand during intended use.

b) To adjust the device parallel to the flat phantom.

c) To adjust the distance between the device surface and the flat phantom to 0cm.

<EUT Setup Photos>

Please refer to Appendix D for the test setup photos.

12. SAR Test Results

12.1 Face-Worn SAR

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Sample	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
01	Bluetooth	DH5 1Mbps	On the Front of the Face	0mm	Ant 1	A	39	2441	4	7.40	9.00	1.445	100	1.000	0.03	0.065	0.094
	Bluetooth	DH5 1Mbps	On the Front of the Face	0mm	Ant 1	A	39	2441	5	7.40	9.00	1.445	100	1.000	0.04	0.057	0.082
	WLAN2.4GHz	802.11b 1Mbps	On the Front of the Face	0mm	Ant 1	A	1	2412	4	14.50	15.00	1.122	100	1.000	-0.19	0.255	0.286
02	WLAN2.4GHz	802.11b 1Mbps	On the Front of the Face	0mm	Ant 1	A	1	2412	5	14.50	15.00	1.122	100	1.000	0.02	0.275	0.309
	WLAN5.5GHz	802.11ac-VHT160 MCS0	On the Front of the Face	0mm	Ant 1	A	114	5570	4	12.04	12.75	1.178	100	1.000	0.06	0.416	0.490
03	WLAN5.5GHz	802.11ac-VHT160 MCS0	On the Front of the Face	0mm	Ant 1	A	114	5570	5	12.04	12.75	1.178	100	1.000	0.04	0.723	0.851

12.2 Rest-on-Head SAR Test

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Sample	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
04	Bluetooth	DH5 1Mbps	On of the head	0mm	Ant 1	A	39	2441	4	7.40	9.00	1.445	100	1.000	-0.05	0.043	0.062
	Bluetooth	DH5 1Mbps	On of the head	0mm	Ant 1	A	0	2402	5	7.20	9.00	1.514	100	1.000	-0.15	0.037	0.053
05	WLAN2.4GHz	802.11b 1Mbps	On of the head	0mm	Ant 1	A	1	2412	4	14.50	15.00	1.122	100	1.000	0.13	0.196	0.220
	WLAN2.4GHz	802.11b 1Mbps	On of the head	0mm	Ant 1	A	1	2412	5	14.50	15.00	1.122	100	1.000	0.05	0.173	0.194
	WLAN5.5GHz	802.11ac-VHT160 MCS0	On of the head	0mm	Ant 1	A	114	5570	4	12.04	12.75	1.178	100	1.000	0.01	0.207	0.244
06	WLAN5.5GHz	802.11ac-VHT160 MCS0	On of the head	0mm	Ant 1	A	114	5570	5	12.04	12.75	1.178	100	1.000	-0.03	0.277	0.326

12.3 Rest-on-Shirt SAR Test

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Sample	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
07	Bluetooth	DH5 1Mbps	Left Temple Arm Outer Edge Touching Phantom	0mm	Ant 1	B	39	2441	4	7.40	9.00	1.445	100	1.000	0.11	0.429	0.620
	Bluetooth	DH5 1Mbps	Left Temple Arm Outer Edge Touching Phantom	0mm	Ant 1	B	39	2441	5	7.40	9.00	1.445	100	1.000	0.06	0.341	0.493
	WLAN2.4GHz	802.11b 1Mbps	Left Temple Arm Outer Edge Touching Phantom	0mm	Ant 1	B	1	2412	4	11.30	12.25	1.245	100	1.000	0.01	0.815	1.014
08	WLAN2.4GHz	802.11b 1Mbps	Left Temple Arm Outer Edge Touching Phantom	0mm	Ant 1	B	1	2412	5	11.30	12.25	1.245	100	1.000	-0.16	0.816	1.016
	WLAN5.3GHz	802.11ac-VHT160 MCS0	Left Temple Arm Outer Edge Touching Phantom	0mm	Ant 1	B	50	5250	4	5.75	6.50	1.189	100	1.000	0.1	0.480	0.570
09	WLAN5.3GHz	802.11ac-VHT160 MCS0	Left Temple Arm Outer Edge Touching Phantom	0mm	Ant 1	B	50	5250	5	5.75	6.50	1.189	100	1.000	0.11	0.534	0.635

12.4 Pocketing (outside Charging Case)SAR Test

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Sample	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	Bluetooth	DH5 1Mbps	Left Lens Kept 5mm Distance from Phantom	5mm	Ant 1	B	0	2402	4	7.20	9.00	1.514	100	1.000	0.19	0.014	0.022
10	Bluetooth	DH5 1Mbps	Left Lens Kept 5mm Distance from Phantom	5mm	Ant 1	B	0	2402	5	7.20	9.00	1.514	100	1.000	0.11	0.024	**0.036**
	WLAN2.4GHz	802.11b 1Mbps	Left Lens Kept 5mm Distance from Phantom	5mm	Ant 1	B	6	2437	4	11.40	12.25	1.216	100	1.000	0.09	0.026	0.032
11	WLAN2.4GHz	802.11b 1Mbps	Left Lens Kept 5mm Distance from Phantom	5mm	Ant 1	B	6	2437	5	11.40	12.25	1.216	100	1.000	0.18	0.051	**0.062**
12	WLAN5.8GHz	802.11ac-VHT80 MCS0	Left Lens Kept 5mm Distance from Phantom	5mm	Ant 1	B	155	5775	4	5.05	6.50	1.396	100	1.000	0.07	0.019	**0.026**
	WLAN5.8GHz	802.11ac-VHT80 MCS0	Left Lens Kept 5mm Distance from Phantom	5mm	Ant 1	B	155	5775	5	5.05	6.50	1.396	100	1.000	0.14	0.012	0.017

12.5 Pocketing(inside Charging Case)SAR Test

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Sample	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
13	Bluetooth	DH5 1Mbps	Bottom Edge Kept 5mm Distance from Phantom	5mm	Ant 1	C	0	2402	4	7.20	9.00	1.514	100	1.000	-0.15	0.013	**0.020**
	Bluetooth	DH5 1Mbps	Bottom Edge Kept 5mm Distance from Phantom	5mm	Ant 1	C	0	2402	5	7.20	9.00	1.514	100	1.000	-0.01	0.008	0.012
14	WLAN2.4GHz	802.11b 1Mbps	Bottom Edge Kept 5mm Distance from Phantom	5mm	Ant 1	C	6	2437	4	17.60	18.00	1.096	100	1.000	0.18	0.181	**0.198**
	WLAN2.4GHz	802.11b 1Mbps	Bottom Edge Kept 5mm Distance from Phantom	5mm	Ant 1	C	6	2437	5	17.60	18.00	1.096	100	1.000	0.03	0.154	0.169
	WLAN5.3GHz	802.11n-HT40 MCS0	Bottom Edge Kept 5mm Distance from Phantom	5mm	Ant 1	C	54	5270	4	17.27	18.00	1.183	100	1.000	-0.12	0.481	0.569
15	WLAN5.3GHz	802.11n-HT40 MCS0	Bottom Edge Kept 5mm Distance from Phantom	5mm	Ant 1	C	54	5270	5	17.27	18.00	1.183	100	1.000	0.09	0.532	**0.629**

12.6 Handheld(inside Charging Case) SAR Test

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Power State	Ch.	Freq. (MHz)	Sample	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
16	Bluetooth	DH5 1Mbps	Back	0mm	Ant 1	C	0	2402	4	7.20	9.00	1.514	100	1.000	0.12	0.013	**0.019**
	Bluetooth	DH5 1Mbps	Back	0mm	Ant 1	C	0	2402	5	7.20	9.00	1.514	100	1.000	0.02	0.008	0.013
	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	Ant 1	C	6	2437	4	17.60	18.00	1.096	100	1.000	-0.01	0.124	0.136
17	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	Ant 1	C	6	2437	5	17.60	18.00	1.096	100	1.000	0.01	0.142	**0.156**
	WLAN5.3GHz	802.11n-HT40 MCS0	Back	0mm	Ant 1	C	54	5270	4	17.27	18.00	1.183	100	1.000	0.14	0.259	0.306
18	WLAN5.3GHz	802.11n-HT40 MCS0	Back	0mm	Ant 1	C	54	5270	5	17.27	18.00	1.183	100	1.000	0.08	0.357	**0.422**

13. Simultaneous Transmission Analysis

No.	Simultaneous Transmission Configurations	SMART GLASSES				
		Face-Worn	Rest-on-Head	Rest-on-Shirt	Pocketing	Handheld 10g SAR
1.	Bluetooth + WLAN5GHz	Yes	Yes	Yes	Yes	Yes
2.	Bluetooth + WLAN6GHz	Yes	Yes	Yes	Yes	Yes

General Note:

1. For Simultaneous transmission analysis for all bands and all position are based on maximum SAR results chosen between the original filing and Spot check Verification Data.
2. According to the EUT characteristic, WLAN 5GHz/6GHz and Bluetooth can transmit simultaneously.
3. According to the EUT characteristic, WLAN 5GHz/6GHz and WLAN 2.4GHz can’t transmit simultaneously.
4. According to the EUT characteristic, WLAN 5GHz and WLAN 6GHz can’t transmit simultaneously.
5. WLAN 2.4GHz and Bluetooth share the same antenna, and they cannot transmit simultaneously.
6. The reported SAR summation is calculated based on the same configuration and test position
7. Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
   i) 1g Scalar SAR summation < 1.6W/kg and 10g Scalar SAR summation < 4.0W/kg.
   ii) SPLSR = (SAR1 + SAR2)^1.5 / (min. separation distance, mm), and the peak separation distance is determined from the square root of [(x1-x2)2 + (y1-y2)2 + (z1-z2)2], where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the extrapolated peak SAR locations in the zoom scan.
   iii) If SPLSR ≤ 0.04 for 1g SAR and SPLSR≤ 0.10 for 10g SAR , simultaneously transmission SAR measurement is not necessary.
   iv) Simultaneously transmission SAR measurement, and the reported multi-band 1g SAR < 1.6W/kg and 10g SAR < 4.0W/kg.
8. The WLAN6GHz Sim-Tx analysis guidance with other transmitters was based on SAR test results. The simultaneous transmission and test exemption analysis were compliant with KDB 447498 D01. For the device does not support FR2 or other MPE field measurement, therefore section 13 in the SAR report has no TER analysis according to KDB 987594 requirement.

13.1 Face-Worn Exposure Conditions

Exposure Position	3	10	11	17	10+17	11+17
	WLAN2.4GHz Ant 1	WLAN5GHz Ant 1	WLAN6GHz Ant 1	Bluetooth Ant 1	**Summed**	**Summed**
	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	**1g SAR (W/kg)**	**1g SAR (W/kg)**
On the Front of the Face	0.473	1.039	0.271	0.120	1.16	0.39

13.2 Rest-on-Head Exposure Conditions

Exposure Position	3	10	11	17	10+17	11+17
	WLAN2.4GHz Ant 1	WLAN5GHz Ant 1	WLAN6GHz Ant 1	Bluetooth Ant 1	**Summed**	**Summed**
	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	**1g SAR (W/kg)**	**1g SAR (W/kg)**
On of the head	0.338	0.326	0.145	0.103	0.43	0.25

13.3 Rest-on-Shirt Exposure Conditions

Exposure Position	3	10	11	17	10+17	11+17
	WLAN2.4GHz Ant 1	WLAN5GHz Ant 1	WLAN6GHz Ant 1	Bluetooth Ant 1	**Summed**	**Summed**
	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	**1g SAR (W/kg)**	**1g SAR (W/kg)**
Left Temple Arm Outer Edge Touching Phantom	1.109	0.666	0.667	0.658	1.32	1.33

13.4 Pocketing (outside Charging Case) Exposure Conditions

Exposure Position	3	10	11	17	10+17	11+17
	WLAN2.4GHz Ant 1	WLAN5GHz Ant 1	WLAN6GHz Ant 1	Bluetooth Ant 1	**Summed**	**Summed**
	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	**1g SAR (W/kg)**	**1g SAR (W/kg)**
Left Lens Kept 5mm Distance from Phantom	0.062	0.038	0.067	0.039	0.08	0.11

13.5 Pocketing(inside Charging Case) Exposure Conditions

Exposure Position	3 WLAN2.4GHz Ant 1 1g SAR (W/kg)	10 WLAN5GHz Ant 1 1g SAR (W/kg)	11 WLAN6GHz Ant 1 1g SAR (W/kg)	17 Bluetooth Ant 1 1g SAR (W/kg)	**10+17 Summed 1g SAR (W/kg)**	**11+17 Summed 1g SAR (W/kg)**
Top Edge Kept 5mm Distance from Phantom at 5mm	0.121	0.198	0.101		0.20	0.10
Bottom Edge Kept 5mm Distance from Phantom at 5mm	0.207	0.707	0.519	0.027	0.73	0.55

13.6 Handheld(inside Charging Case) Exposure Conditions

Exposure Position	3 WLAN2.4GHz Ant 1 10g SAR (W/kg)	10 WLAN5GHz Ant 1 10g SAR (W/kg)	11 WLAN6GHz Ant 1 10g SAR (W/kg)	17 Bluetooth Ant 1 10g SAR (W/kg)	**10+17 Summed 10g SAR (W/kg)**	**11+17 Summed 10g SAR (W/kg)**
Front	0.058	0.123	0.110		0.12	0.11
Back	0.212	0.561	0.278	0.034	**0.60**	0.31
Left side	0.008	0.028			0.03	0.00
Right side	0.054	0.165	0.192	0.004	0.17	0.20
Top side	0.109	0.134	0.123	0.006	0.14	0.13
Bottom side	0.033	0.100	0.023	0.004	0.10	0.03

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14. Uncertainty Assessment

Per KDB 865664 D01 SAR measurement 100MHz to 6GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg. 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. For this device, the highest measured 1-g SAR is less 1.5W/kg and highest measured 10-g SAR is less 3.75W/kg. Therefore, the measurement uncertainty table is not required in this report.

15. References

[1] FCC 47 CFR Part 2 “Frequency Allocations and Radio Treaty Matters; General Rules and Regulations”

[2] ANSI/IEEE Std. C95.1-1992, “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”, September 1992

[3] 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”, Sep 2013

[4] SPEAG DASY System Handbook

[5] FCC KDB 248227 D01 v02r02, “SAR Guidance for IEEE 802.11 (WiFi) Transmitters”, Oct 2015.

[6] FCC KDB 447498 D01 v06, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, Oct 2015

[7] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.

[8] FCC KDB 865664 D02 v01r02, “RF Exposure Compliance Reporting and Documentation Considerations” Oct 2015.

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