



CE SAR TEST REPORT

Applicant	:	Harman International Industries, Inc.
Applicant Address	:	8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES
Manufacturer	:	Harman International Industries, Inc.
Manufacturer Address	:	8500 Balboa Boulevard, Northridge, CA 91329, UNITED STATES
Equipment Under Test	:	PORTABLE BLUETOOTH SPEAKER
Model No.	:	GO5, GO5D
Test Standard(s)	:	EN IEC 62311:2020, EN 62479:2010, EN 50566:2017+A1:2023, EN IEC/IEEE 62209-1528:2021
Report No.	:	DDT-RE25091711-1E08
Issue Date	:	2025/11/04
Issue By	:	Guangdong Dongdian Testing Service Co., Ltd.
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REPORT

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Test Report Declare

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Test Standard Used:

EN EN IEC 62311:2020, EN 62479:2010, EN 50566:2017+A1:2023,
EN IEC/IEEE 62209-1528:2021

We Declare:

The equipment described above is tested by Guangdong Dongdian Testing Service Co., Ltd and in the configuration tested the equipment complied with the standards specified above. The test results are contained in this test report and Guangdong Dongdian Testing Service Co., Ltd is assumed of full responsibility for the accuracy and completeness of these tests.

After test and evaluation, our opinion is that the equipment provided for test compliance with the requirement of the above standards.

Report No.:	DDT-RE25091711-1E08		
Date of Receipt:	2025/09/28	Date of Test:	2025/09/28 - 2025/10/24

Created: Johnson Huang	Reviewed: Tiger Mo	Approved: Ella Gong
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2025/10/24	2025/11/03	2025/11/04

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The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

Revision History

Version	Revision Content	Issue Date	Approved
V0	Initial issue	2025/11/04	Ella Gong

1. General test information

1.1. Description of EUT

EUT Name	: PORTABLE BLUETOOTH SPEAKER
Model Number	: GO5, GO5D
Difference of model number	: Above models are identical in schematic and structure, only the model number are different, therefore the test performed on the model GO5D
EUT Function Description	: Please reference user manual of this device
Power Supply	: DC 5V/1.0A from external AC Adapter : DC 3.85V 1000mAh Polymer Li-ion built-in battery
Radio Specification	: Bluetooth BR/EDR/LE
Operation Frequency	: 2402 MHz to 2480 MHz
Modulation	: Bluetooth BR/EDR: GFSK, $\pi/4$ -DQPSK, 8DPSK : Bluetooth LE: GFSK
Hardware Version	: VerD
Software Version	: v25.38.12
Antenna Type	: PCB
Max Antenna Gain(dBi)	: 2.3

Note : EUT is the abbreviation of equipment under test.

1.2. Accessories of EUT

Accessories	Manufacturer	Model number	Description	Remark
/	/	/	/	/

1.3. Assistant equipment used for test

Accessories	Manufacturer	Model number	Description	Remark
/	/	/	/	/

1.4. Block diagram of EUT configuration for test



Test software: FCC_Tool_v3.0.exe

1.5. Test environment conditions

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

Condition	Normal Condition	Extreme Condition
Pressure range	86-106KPa	N/A
Relative Humidity	20-75%	N/A
Temperature(°C)	18°C-25°C	N/A
Voltage(V)	DC 3.85V	N/A

1.6. Test laboratory

Guangdong Dongdian Testing Service Co., Ltd.

Add: Unit 2, Building 1, No.17, Zongbu 2nd Road, Songshan Lake Park, Dongguan, Guangdong, China, 523808

Tel.: +86-0769-38826678, <http://www.dgddt.com>, Email: ddt@dgddt.com.

CNAS Accreditation No. L6451; A2LA Accreditation Number: 3870.01

FCC Designation Number: CN1182, Test Firm Registration Number: 540522

Innovation, Science and Economic Development Canada Site Registration Number: 10288A

Conformity Assessment Body identifier: CN0048

VCCI facility registration number: C-20087, T-20088, R-20123, R-20155, G-20118

2. Summary of Test Results

2.1. Report SAR results

Band	Test Position	Max. Reported SAR (W/kg)	SAR limit (W/kg)	Verdict
Bluetooth	Body(10-g) 0mm	0.088	2.0	Pass

EUT is compliant with Uncontrolled Environment General Population.

EUT have the same physical, mechanical, and thermal characteristics and operational tolerances expected for production units

2.2. RF exposure limits

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Localised SAR (head and trunk)	2.00 W/kg	10.00 W/kg
Localised SAR (limbs)	4.00 W/kg	20.00 W/kg

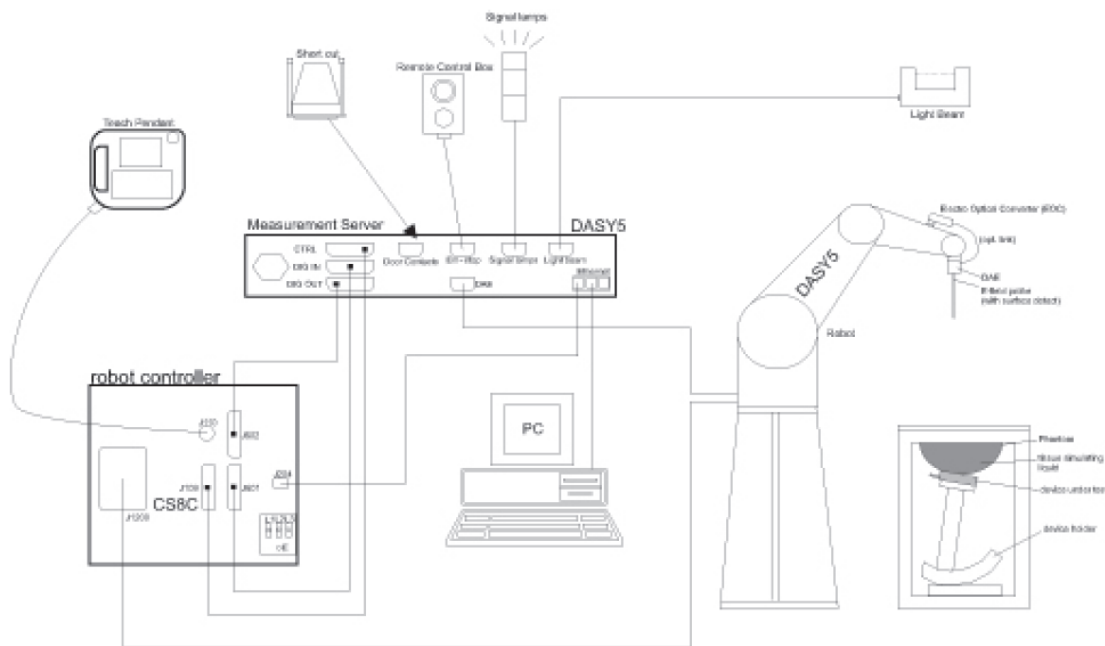
Notes:

- 1) The Spatial Peak value of the SAR averaged over any 10 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time
- 2) The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
- 3) Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.
- 4) 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.)

3. SAR measurements system configuration

3.1. The SAR measurement system

This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY5 professional system). A E-field probe is used to determine the internal electric fields. The SAR can be obtained from the equation $SAR = \sigma (|E|^2) / \rho$ where σ and ρ are the conductivity and mass density of the tissue-Simulate.




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

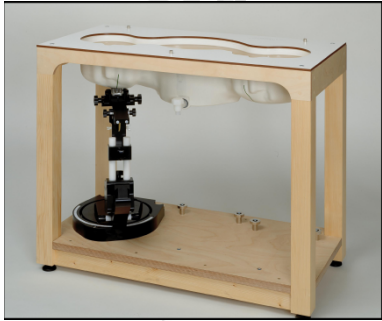
- A standard high precision 6-axis robot (Stabile RX family) with controller, teach pendant and software. An arm extension for accommodation the data acquisition electronics (DAE).
- An isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition 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 between optical and electrical of the signals for the digital communication to DAE and for the analog signal from the optical surface detection. The EOC is connected 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.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 7.
- DASY52 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand, right-hand and Body Worn usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.

- Validation dipole kits allowing to validating the proper functioning of the system.


3.2. Isotropic E-field probe EX3DV4

	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 Db (30 MHz to 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 μ W/g to > 100 Mw/g Linearity: ± 0.2 Db (noise: typically < 1 μ W/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
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better 30%.
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

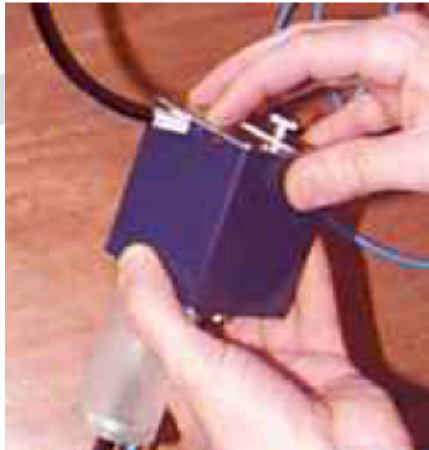
3.3. SAM twin phantom

Material	Vinylester, glass fiber reinforced (VE-GF)	
Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)	
Shell Thickness	2 ± 0.2 mm (6 ± 0.2 mm at ear point)	
Dimensions (incl. Wooden Support)	Length: 1000 mm Width: 500 mm Height: adjustable feet	
Filling Volume	10esolut. 25 liters	
Wooden Support	SPEAG standard phantom table	
<p>The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.</p> <p>Twin SAM V5.0 has the same shell geometry and is manufactured from the same material as Twin SAM V4.0, but has reinforced top structure.</p>		

3.4. ELI phantom

Material	Vynylester, glass fiber reinforced (VE-GF)	
Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)	
Shell Thickness	2 ± 0.2 mm (bottom plate)	
Dimensions	Major axis: 600 mm Minor axis: 400 mm	
Filling Volume	11esolut. 30 liters	
Wooden Support	SPEAG standard phantom table	
<p>Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.</p> <p>ELI V5.0 has the same shell geometry and is manufactured from the same material as ELI4, but has reinforced top structure.</p>		

3.5. Data acquisition electronics (DAE)

Model	DAE4	
Construction	Signal amplifier, multiplexer, A/D converter and control logic. Serial optical link for communication with DASY4/5 embedded system (fully remote controlled). Two step probe touch detector for mechanical surface detection and emergency robot stop.	
Measurement Range	-100 to +300 Mv (16 bit resolution and two range settings: 4Mv,400Mv)	
Input Offset Voltage	< 5Mv (with auto zero)	
Input Bias Current	< 50 f A	
Dimensions	60 x 60 x 68 mm	

3.6. Device holder for transmitters



The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation centres for both scales are the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

The DASY device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity $\epsilon=3$ and loss tangent $\delta=0.02$. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

4. Measurement procedure

4.1. Scanning procedure

Step 1: Power reference measurement

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.

Step 2: Area scan

The SAR distribution at the exposed side of the head was measured at a distance of 4mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 15mm*15mm or 12mm*12mm or 10mm*10mm. Based on the area scan data, the area of the maximum absorption was determined by spline interpolation.

Step 3: Zoom scan

Around this point, a volume of 30mm*30mm*30mm (fine resolution volume scan, zoom scan) was assessed by measuring 5x5x7 points ($\leq 2\text{GHz}$) and 7x7x7 points ($\geq 2\text{GHz}$). On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

The data at the surface was extrapolated, since the centre of the dipoles is 2.0mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2mm. (This can be variable. Refer to the probe specification). The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-Spline interpolation algorithm. The volume was integrated with the trapezoidal algorithm. One thousand points were interpolated to calculate the average. All neighbouring volumes were evaluated until no neighbouring volume with a higher average value was found.

The area and zoom scan resolutions specified in the table below must be applied to the SAR measurements. Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Both the probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1-g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in IEEE 1528-2013.

		≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface		5 mm \pm 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2)$ mm \pm 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location		$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
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 \leq 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 1 st 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 <i>reported</i> SAR from the <i>area scan based 1-g SAR estimation</i> 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.			

Step 4: Power reference measurement (drift)

The Power Drift Measurement job measures the field at the same location as the most recent power reference measurement job within the same procedure, and with the same settings. The indicated drift is mainly the variation of the DUT's output power and should vary max. $\pm 5\%$

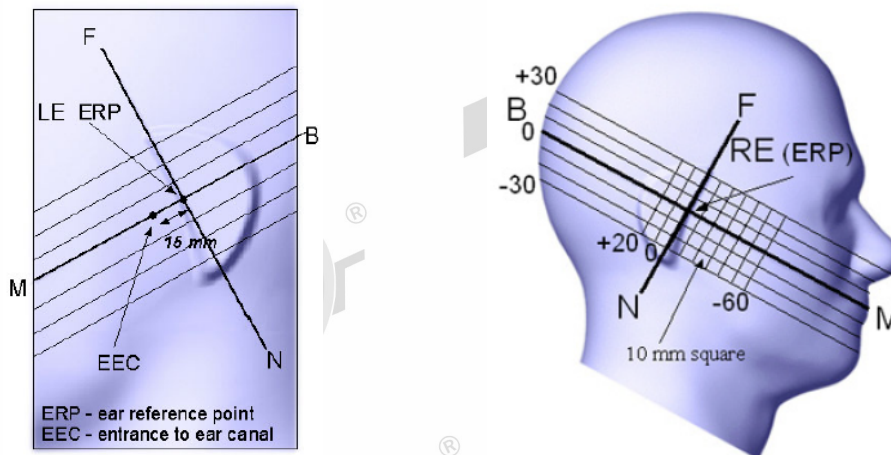
Step 5: Z-Scan (FCC only)

The Z scan measures points along a vertical straight line. The line runs along the Z-axis of a one-dimensional grid. In order to get a reasonable extrapolation, the extrapolated distance should not be greater than the step size in Z-direction.

5. Description of test position

5.1. EAR reference position

The center-of-mouth reference point is labeled “M”, the left ear reference point (ERP) is marked “LE”, and the right ERP is marked “RE”. Each ERP is on the B-M (back-mouth) line located 15mm behind the entrance-to-ear-canal (EEC) point. The Reference Plane is defined as passing through the two ears reference point and point M. The line N-F (Neck-Front), also called the Reference Pivoting Line, is not perpendicular to the reference plane, Line B-M is perpendicular to the N-F line. Both N-F and B-M lines are marked on the external phantom shell to facilitate handset positioning.



5.2. Handset reference position

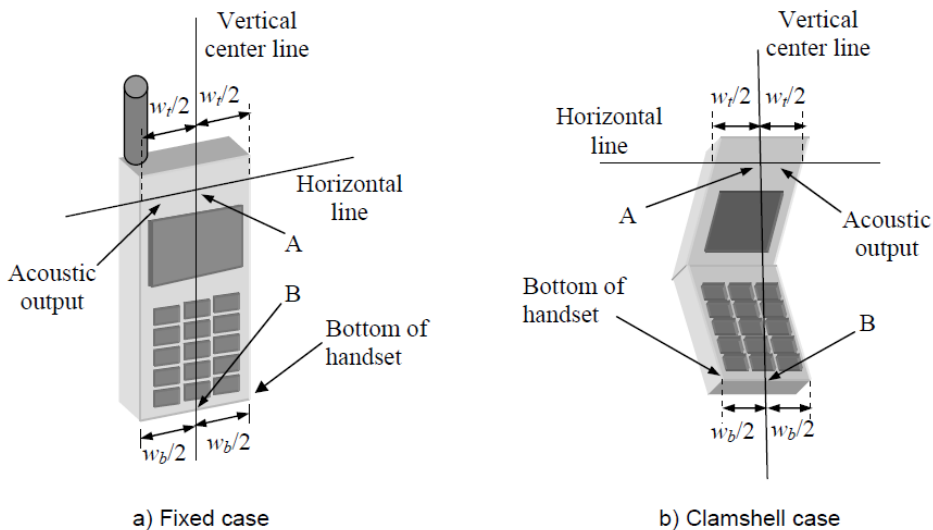
Two imaginary lines on the handset were established: the vertical centerline and the horizontal line. The device under test was placed in a normal operating position with the acoustic output located along the “vertical centerline” on the front of the device aligned to the ear reference point”. The acoustic output was then located at the same level as the center of the ear reference point. The device under test was positioned so that the “vertical centerline” was bisecting the front surface of the handset at its top and bottom edges, positioning the “ear reference point” on the outer surface of the both the left and right head phantoms on the ear reference point.



5.3. Handset reference lines

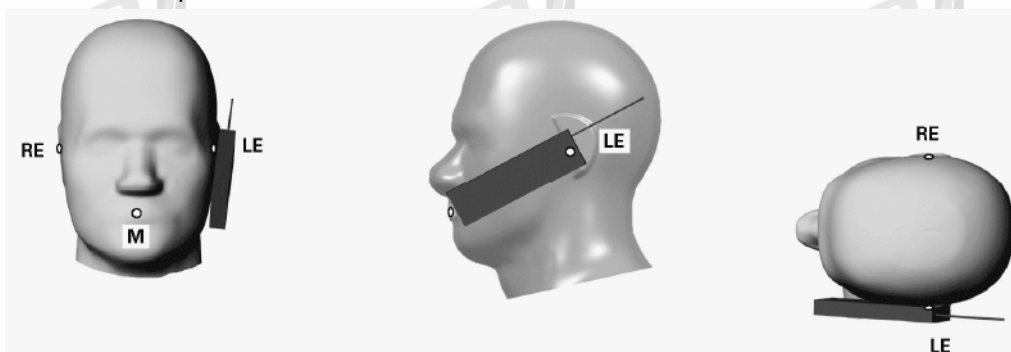
Define two imaginary lines on the handset—the vertical centerline and the horizontal line. The vertical centerline passes through two points on the front side of the handset—the midpoint of the

width w_t of the handset at the level of the acoustic output (point A), and the midpoint of the width w_b at the bottom of the handset (point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output. The horizontal line is also tangential to the face of the handset at point A. The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset, especially for clamshell handsets, handsets with flip covers, and other irregularly-shaped handsets, the vertical centerline passes through point A but not the tip edge of the phone.



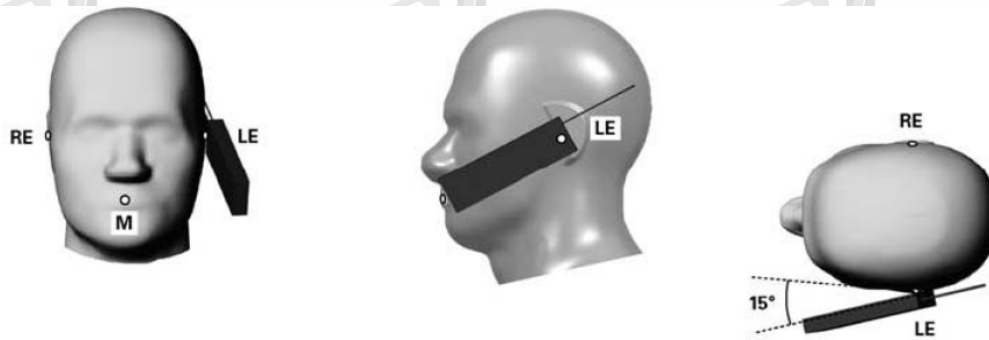
5.4. Position for cheek

The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated. This device position shall be maintained for the phantom test setup.



5.5. Position for tilt

Place the device in the cheek position. Then while maintaining the orientation of the device, retract the device parallel to the reference plane far enough away from the phantom to enable a rotation of the device by 15° .

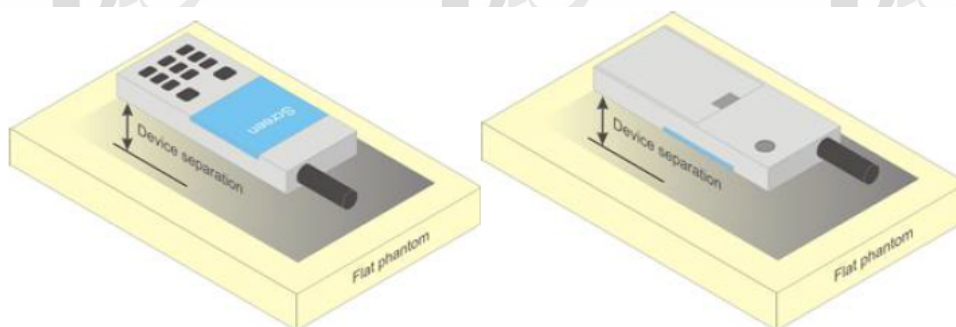


5.6. Body-Worn accessory configurations

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration. Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable.

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are tested with the device with each accessory. If multiple accessories share an identical metallic component (i.e., the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

Body-worn accessories may not always be supplied or available as options for some devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the surface of the device and the flat phantom is used. Test position spacing was documented. Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom in head fluid. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessories, including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.



6. RF exposure conditions

6.1. EUT Test sides

SAR test sides							
Antenna	Band	Body					
		Front	Back	Top	Bottom	Left	Right
ANT	Bluetooth	√	√	√	√	√	√

6.2. WIFI test reduction and configuration

For the 802.11b/g/n SAR tests, a communication link is set up with the test mode software for Wi-Fi mode test. The Absolute Radio Frequency Channel Number (ARFCN) is allocated to 1, 7 and 13 respectively in the case of 2450 MHz during the test at each test frequency channel. the EUT is operated at the RF continuous emission mode. Each channel should be tested at the lowest rate. 802.11b/g/n operating modes are tested independently according to the service requirements in each frequency band. 802.11b/g/n modes are tested on channel 1, 7, 13; however, if output power reduction is necessary for channels 1 and/or 13 to meet restricted band requirements the highest output channel closest to each of these channels must be tested instead.

SAR is not required for 802.11g/n channels when the maximum average output power is less than 0.25dB higher than that measured on the corresponding 802.11b channels.

For the 802.11a SAR test, a communication link is set up with the test mode software for WiFi mode test. 802.11a operating modes are tested independently according to the service requirements in each 5G WiFi frequency band. During the test, at each test frequency channel, the EUT is operated at the RF continuous emission mode. Each channel should be tested at the lowest data rate.

For each frequency band of WiFi 5G, SAR test at higher data rates and higher order modulations (including 802.11ac/n) were not required since the maximum average output power for each of these configurations is not more than 1/4dB higher than the tested channel for the lowest data rate of 802.11a mode.

7. SAR system verification procedure

7.1. Tissue Simulate Liquid

7.1.1. Target dielectric properties of head tissue-equivalent material

Frequency (MHz)	Relative permittivity (ϵ_r)	Conductivity (σ) (S/m)
300	45.3	0.87
450	43.5	0.87
750	41.9	0.89
835	41.5	0.90
900	41.5	0.97
1450	40.5	1.20
1500	40.4	1.23
1640	40.2	1.31
1750	40.1	1.37
1800	40.0	1.40
1900	40.0	1.40
2000	40.0	1.40
2100	39.8	1.49
2300	39.5	1.67
2450	39.2	1.80
2600	39.0	1.96
3000	38.5	2.40
3500	37.9	2.91
4000	37.4	3.43
4500	36.8	3.94
5000	36.2	4.45
5200	36.0	4.66
5400	35.8	4.86
5600	35.5	5.07
5800	35.3	5.27
6000	35.1	5.48

NOTE—For convenience, permittivity and conductivity values at some frequencies that are not part of the original data from Drossos et al. [B60] or the extension to 5800 MHz are provided (i.e., the values shown in italics). These values were linearly interpolated between the values in this table that are immediately above and below these values, except the values at 6000 MHz that were linearly extrapolated from the values at 3000 MHz and 5800 MHz.

7.1.2. Measurement for tissue simulate liquid

The dielectric properties for this Tissue Simulate Liquids were measured by using the Agilent Model 85070E Dielectric Probe in conjunction with Agilent E5071C Network Analyzer (300 KHz-8500 MHz). The Conductivity (σ) and Permittivity (ρ) are listed in table. For the SAR measurement given in this report. The temperature variation of the Tissue Simulate Liquids was $\pm 2^\circ\text{C}$.

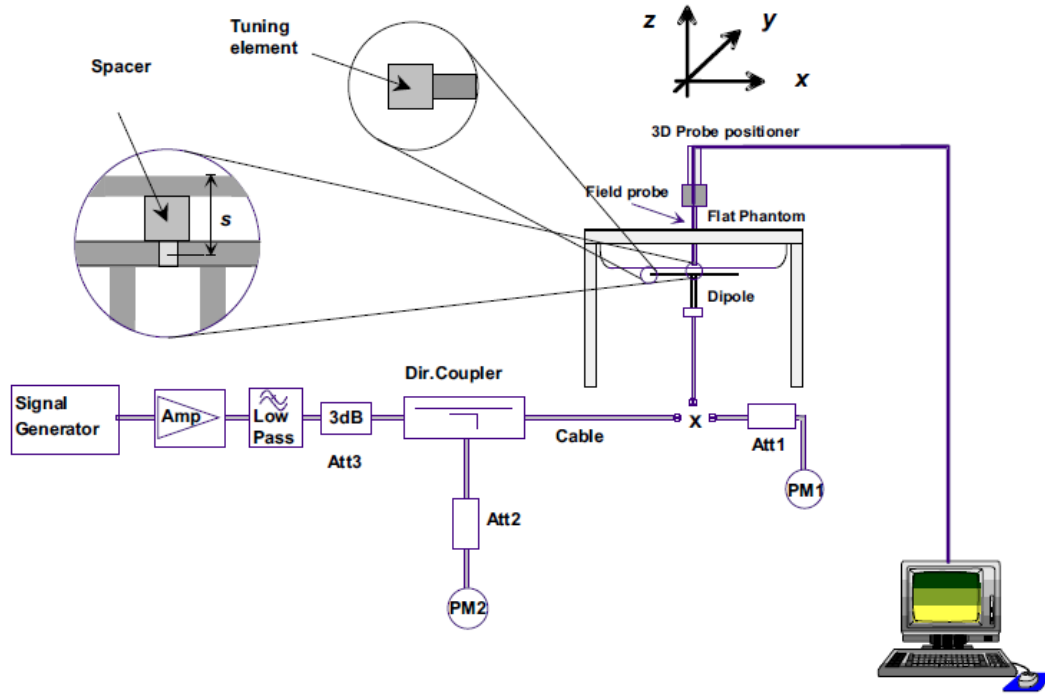
Tissue Type	Freq. (MHz)	Target Tissue ($\pm 5\%$)		Measured Tissue		Liquid Temp. ($^\circ\text{C}$)	Measured Date
		ϵ_r	$\sigma(\text{S/m})$	ϵ_r	$\sigma(\text{S/m})$		
2.4G head	2360	39.38 (37.411~41.349)	1.722 (1.6359~1.808)	39.15	1.758	23.5	2025/10/20
	2402	39.3 (37.33-41.27)	1.76 (1.672-1.848)	39.1	1.783	23.5	2025/10/20
	2440	39.22 (37.25-41.18)	1.79 (1.7005-1.879)	39.07	1.813	23.5	2025/10/20
	2441	39.22 (37.25-41.18)	1.79 (1.7005-1.879)	39.07	1.814	23.5	2025/10/20
	2450	39.20 (37.240~41.160)	1.80 (1.710~1.890)	39.06	1.82	23.5	2025/10/20
	2480	39.16 (37.20-41.12)	1.83 (1.750-1.920)	39.04	1.841	23.5	2025/10/20
	2540	39.02 (37.069~40.971)	1.878 (1.7841~1.972)	38.98	1.885	23.5	2025/10/20



7.2. SAR system validation

The microwave circuit arrangement for system verification is sketched in bellow figure. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within $\pm 10\%$ from the target SAR values. The tests were conducted on the same days as the measurement of the EUT. The obtained results from the system accuracy verification are displayed in the table 5 (A power level of 250mw was input to the dipole antenna). During the tests, the ambient temperature of the laboratory was in the range $22\pm 2^\circ\text{C}$, the relative humidity was in the range 60% and the liquid depth above the ear

reference points was above 15 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.



7.2.1. Validation test setup photograph



7.2.2. Summary system validation result(s)

Validation Kit		Measured SAR 100mW (W/kg)	Measured SAR normalized to 1w (W/kg)	Target SAR normalized to 1w (±10%) (W/kg)	Liquid Temp. (°C)	Measured Date
D2450V2 @2450MHz	1-g	5.27	52.7	52.8 (47.52~58.08)	23.5	2025/10/20
	10-g	2.52	25.2	24.6 (22.14~27.06)	23.5	2025/10/20

7.2.3. Detailed system validation results

See the Appendix A.

8. Equipment list

Test Platform	SPEAG DASY5 Professional				
Location	SAR room				
Description	SAR Test System (Frequency range 300MHz-6GHz)				
Equipment	Manufacturer	Model	Serial Number	Calibration Date	Due date of calibration
Robot	Staubli	TX90 XL	F12/5N3XC/A/01	NCR	NCR
ELI Phantom	SPEAG	QDOVA002 AA	1752	NCR	NCR
Data Acquisition Electronics	SPEAG	DAE4	1366	2025-05-28	2026-05-27
SAR test Probe	SPEAG	EX3DV4	3906	2025-05-28	2026-05-27
Validation Kits	SPEAG	D2450V2	904	2025-02-24	2028-02-23
Agilent Network Analyzer	Agilent	E5071C	MY46316792	2025-03-29	2026-03-28
Dielectric Probe Kit	Agilent	85070E	85070-20037	NCR	NCR
0.1G-2Ghz DUAL DIRECTIONAL COUPLER	Agilent	778D	MY52180233	NCR	NCR
2G-18Ghz DUAL DIRECTIONAL COUPLER	Agilent	772D	MY52180116	NCR	NCR
Signal Generator	Agilent	N5182A	MY19060405	2025-03-29	2026-03-28
Preamplifier	Mini-Circuits	ZHL-42W	QA1240001	NCR	NCR
Preamplifier	Mini-Circuits	ZVE-8G+	926701231	NCR	NCR
EPM Series Power Meter	Agilent	E4417A	MY50000999	2025-03-29	2026-03-28
Power Sensor	Agilent	E9327A	MY44420458	2025-03-29	2026-03-28
Power Sensor	Agilent	E9327A	MY44420760	2025-03-29	2026-03-28
Attenuator	Agilent	8491A 3dB	MY52460179	NCR	NCR
Attenuator	Agilent	8491A 10dB	MY52460275	NCR	NCR
Humidity and Temperature Indicator	Euchamp Electronics	YSWS53020 B	20210916	2025-08-13	2026-08-12
Test software	Speag	DASY5	V52.10.4.1535	N/A	N/A

9. Measurement uncertainty

Uncertainty Component	probability distribution	Contains the factor	Standard uncertainty U_i	C1(1g)	C1(10g)
Sensitivity of probe	N	1	±6.55%	1	1
Isotropy of the probe	R	$\sqrt{3}$	±1.08%	1	1
Linearity of the probe	R	$\sqrt{3}$	±0.35%	1	1
Coupling effect between probe and dielectric boundary	R	$\sqrt{3}$	±0.46%	1	1
The detection limit of the system	R	$\sqrt{3}$	±0.14%	1	1
Errors in electronic reading equipment	N	1	±0.35%	1	1
Measure the response time of the equipment	R	$\sqrt{3}$	0	1	1
Measure the integral time of the equipment	R	$\sqrt{3}$	±1.50%	1	1
Data post-processing algorithm	R	$\sqrt{3}$	±0.58%	1	1
Electromagnetic environment disturbance	R	$\sqrt{3}$	±1.73%	1	1
the positioning accuracy of the probe	R	$\sqrt{3}$	±0.87%	1	1
The positioning accuracy of the probe tip relative to the model surface	R	$\sqrt{3}$	±1.67%	1	1
Manufacturing tolerances for models	R	$\sqrt{3}$	±2.31%	1	1
Deviation of measured liquid conductivity from target value	R	$\sqrt{3}$	±2.89%	0.64	0.43
Liquid conductivity test system accuracy	N	1	±2.5%	0.64	0.43
The deviation between the measured permittivity of liquid and the target value	R	$\sqrt{3}$	±2.89%	0.6	0.49
Test precision of liquid permittivity test system	N	1	±2.5%	0.6	0.49
The disturbance of the positioning fixture	N	1	±5.2%	1	1
Accuracy of sample positioning	N	1	±4.6%	1	1
The output power of the tested sample drifts	R	$\sqrt{3}$	±2.89%	1	1
Combined standard uncertainty	Uc(1g)=11.3%, Uc(10g)=11.0%				
Expanded uncertainty(95% confidence interval) k=2	U(1g)=22.6%, U(10g)=22%				

10. Test results and measurement data

10.1. RF conducted power

Bluetooth BR/EDR							
Average conducted power							
Mode	Channel	Frequency (MHz)	Power (dBm)	E.I.R.P Power (dBm)	Duty-Cycle	Max. Tune-up Power (dBm)	Max. Tune-up E.I.R.P Power (dBm)
DH5	0	2402	9.41	11.71	0.9535	10.0	12.3
	39	2441	8.99	11.29	0.9535	10.0	12.3
	78	2480	8.93	11.23	0.9535	10.0	12.3
2DH5	0	2402	9.24	11.54	0.8947	10.0	12.3
	39	2441	8.84	11.14	0.8916	10.0	12.3
	78	2480	8.78	11.08	0.8947	10.0	12.3
3DH5	0	2402	9.04	11.34	0.8348	10.0	12.3
	39	2441	8.92	11.22	0.8353	10.0	12.3
	78	2480	8.74	11.04	0.8353	10.0	12.3

Bluetooth LE							
Average conducted power							
Mode	Channel	Frequency (MHz)	Power (dBm)	E.I.R.P Power (dBm)	Duty-Cycle	Max. Tune-up Power (dBm)	Max. Tune-up E.I.R.P Power (dBm)
BLE 1M	0	2402	10.79	13.09	0.9509	11.0	13.3
	19	2440	10.50	12.80	0.9509	11.0	13.3
	39	2480	10.36	12.66	0.9509	11.0	13.3
BLE 2M	1	2404	10.45	12.75	0.9076	11.0	13.3
	19	2440	10.20	12.50	0.9076	11.0	13.3
	38	2478	10.09	12.39	0.8571	11.0	13.3

Note:

- 1) The output power of the device was set to transmit at maximum power for all test.
- 2) The Bluetooth maximum output power mode is BLE 1M, select BLE 1M mode to test SAR.

10.2. Measurement of SAR data

Bluetooth Body 0mm SAR 10-g											
Test position	Test mode	Test Freq (MHz)	Duty Cycle	SAR 10-g (W/kg)	Power drift (dB)	E.I.R.P Power (dBm)	Max. Tune-up E.I.R.P Power (dBm)	Scaled factor	Scaled SAR 10-g (W/kg)	Liquid Temp. (°C)	SAR limit 10-g (W/kg)
Top	BLE 1M	2402	0.9509	0.0050	-0.19	13.09	13.3	1.104	0.006	23.5	2.0
Bottom	BLE 1M	2402	0.9509	0.0287	0.04	13.09	13.3	1.104	0.032	23.5	2.0
Front	BLE 1M	2402	0.9509	0.0322	-0.09	13.09	13.3	1.104	0.036	23.5	2.0
Back	BLE 1M	2402	0.9509	0.0491	-0.13	13.09	13.3	1.104	0.054	23.5	2.0
Left	BLE 1M	2402	0.9509	0.0736	0.16	13.09	13.3	1.104	0.081	23.5	2.0
Right	BLE 1M	2402	0.9509	0.0117	-0.16	13.09	13.3	1.104	0.013	23.5	2.0
Left	BLE 1M	2440	0.9509	0.0743	0.17	12.80	13.3	1.180	0.088	23.5	2.0
Left	BLE 1M	2480	0.9509	0.0497	0.13	12.66	13.3	1.219	0.061	23.5	2.0

Note:

- 1)The maximum Scaled SAR value is marked in bold. Graph Results refer to Appendix B
- 2)Scaled factor= (Max. Tune-up. E.I.R.P power in mW) / (E.I.R.P Power in mW) / (Duty Cycle)
- 3)Scaled SAR=Test SAR * Scaled factor

11. Appendix

Appendix A: System validation plots

Appendix B: Highest test plots

Appendix C: Calibration certification

Appendix D: Test setup photograph

END REPORT