FCC AND ISED SAR TEST REPORT

Applicant	:	Harman International Industries, Incorporated.
Address of Applicant	:	8500 Balboa Boulevard Nothridge CA 91329,USA
Manufacturer	:	Harman International Industries, Incorporated.
Address of Manufacturer	:	8500 Balboa Boulevard Nothridge CA 91329,USA
Equipment under Test	:	Wireless Speaker
Model No.	:	BOOMBOX 3 Wi-Fi
FCC ID	:	APIJBLBB3-WIFI
IC	:	6132A-BB3WIFI
HVIN	:	JBLBB3WIFI
Test Standard(s)	:	Test Standard Used: IEEE Std. 1528-2013; IEC/IEEE 62209-1528:2020 FCC Rules and Regulations: 47 CFR § 2.1093 ISED Rules and Regulations: RSS-102 Issue5, Mar. 2015 Test Procedure Used: KDB447498 D04 v01, KDB 865664 D01 v01r04, KDB 865664 D02 v01r02 , KDB 248227 D01 v02r02
Report No.	:	DDT-RE23111312-2E14
Issue Date	:	2024/02/18
Issue By	:	Guangdong Dongdian Testing Service Co., Ltd.
Address of Laboratory	:	Unit 2, Building 1, No. 17, Zongbu 2nd Road, Songshan Lake Park, Dongguan, Guangdong, China, 523808

REPORT

Table of Contents

1. General test information 6
1.1. Description of EUT 6
1.2. Accessories of EUT 6
1.3. Assistant equipment used for test 6
1.4. Block diagram of EUT configuration for test 6
1.5. Test environment conditions 7
1.6. Test laboratory 7
2. Summary of test results 8
2.1. Report SAR results 8
2.2. RF exposure limits 8
3. SAR measurements system configuration 9
3.1. The SAR measurement system 9
3.2. Isotropic E-field probe EX3DV4 10
3.3. SAM twin phantom 10
3.4. ELI phantom 11
3.5. Data acquisition electronics (DAE) 11
3.6. Device holder for transmitters 12
4. Measurement procedure 13
4.1. Scanning procedure 13
5. Description of test position 15
5.1. Body-worn accessory configurations 15
5.2. Extremity exposure configurations 16
6. RF exposure conditions 17
6.1. Antenna position and EUT sides 17
6.2. Standalone SAR test exclusion considerations 17
6.3. Test sides 19
7. SAR system verification procedure 20
7.1. Tissue simulate liquid 20
7.1.1. Target dielectric properties of head tissue-equivalent material 20
7.1.2. Measurement for tissue simulate liquid 20
7.2. SAR system validation 22
7.2.1. Justification for extended SAR dipole calibrations 23
7.2.2. Validation test setup photograph 23
7.2.3. Summary system validation results 24
7.2.4. Detailed system validation results 24
8. Equipment list 25

9. Measurement uncertainty 26
10. Test results and measurement data 27
10.1. RF conducted power 27
10.2. Measurement of head SAR data 33
10.3. Simultaneous transmission SAR 36
Appendix 37

Test Report Declare

Applicant	:	Harman International Industries, Incorporated.
Address of Applicant	:	8500 Balboa Boulevard Nothridge CA 91329,USA
Manufacturer	:	Harman International Industries, Incorporated.
Address of Manufacturer	:	8500 Balboa Boulevard Nothridge CA 91329,USA
Equipment under Test	:	Wireless Speaker
Model No.	:	BOOMBOX 3 Wi-Fi

Test Standard Used:

IEEE Std. 1528-2013; IEC/IEEE 62209-1528:2020

FCC Rules and Regulations: 47 CFR § 2.1093

ISED Rules and Regulations: RSS-102 Issue5, Mar. 2015

Test Procedure Used:

KDB447498 D04 v01, KDB 865664 D01 v01r04, KDB 865664 D02 v01r02, KDB 248227 D01 v02r02

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 FCC and ISED standards.

Report No.:	DDT-RE23111312-2E14		
Date of Receipt:	2024/01/30	**Date of Test:**	2024/01/30 ~ 2024/02/18

Prepared By: ***Approved By:***

GUANGDONG DONGDIAN TESTING SERVICE CO.,LTD 东莞市东电检测技术有限公司 Certificate and Report Seal 检验检测专用章

Johnson Huang/Engineer ***Damon Hu/EMC Manager***

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Guangdong Dongdian Testing Service Co., Ltd.

Revision History

Rev.	Revisions	Issue Date	Revised By
---	Initial issue	2024/02/18	

1. General test information

1.1. Description of EUT

EUT Name	:	Wireless Speaker
Model Number	:	BOOMBOX 3 Wi-Fi
EUT Function Description	:	Please reference user manual of this device
Power Supply	:	AC 100-240V~ 50/60Hz 80W or DC 7.2V by Polymer Li-ion built-in battery
Radio Specification	:	Bluetooth (BR/EDR/LE); WIFI_2.4G: IEEE 802.11b/g/n/ax WIFI_5G: IEEE 802.11a/n/ac/ax
Antenna	:	FPC antenna BT BR/EDR/LE: Maximum PK gain 2.61dBi ANT1 WIFI_2.4G: Maximum PK gain 2.67dBi WIFI_5G: Maximum PK gain 2.95dBi ANT2 WIFI_2.4G: Maximum PK gain 2.3dBi WIFI_5G: Maximum PK gain 3.14dBi

Note: EUT is the abbreviation of equipment under test.

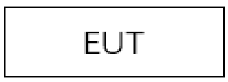
1.2. Accessories of EUT

Description of Accessories	Manufacturer	Model number	Description	Remark
N/A	N/A	N/A	N/A	N/A

1.3. Assistant equipment used for test

Assistant equipment	Manufacturer	Model number	EMC Compliance	SN
N/A	N/A	N/A	N/A	N/A

1.4. Block diagram of EUT configuration for test



Test software: adb.exe

1.5. Test environment conditions

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

Condition	Normal Condition	Extreme Condition
Relative Humidity	20-75%	N/A
Temperature(℃)	18℃-25℃	N/A
Voltage(V)	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(1-g) 0mm	0.06	1.6	Pass
WIFI_2.4G	Body(1-g) 0mm	0.75	1.6	Pass
WIFI_5G	Body(1-g) 0mm	0.81	1.6	Pass
Simultaneous Transmission	Body(1-g) 0mm	1.49	1.6	Pass

2.2. RF exposure limits

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Spatial Average SAR** (Whole Body)	0.08 W/kg	0.40 W/kg
Spatial Peak SAR* (Brain*Trunk)	1.60 W/kg	8.00 W/kg
Spatial Peak SAR*** (Hands/Feet/Ankle/Wrist)	4.00 W/kg	20.00 W/kg

Notes:

1) The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time

2) The Spatial Average value of the SAR averaged over the whole body.

3) 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.

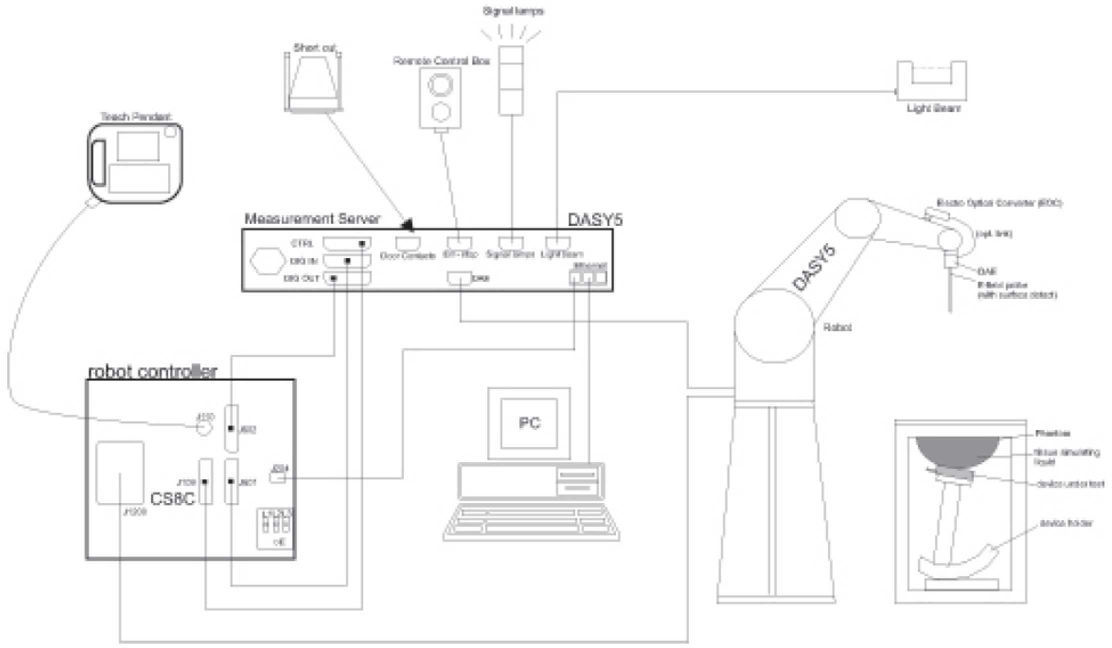
4) Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

5) 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= σ (|Ei|2)/ ρ 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

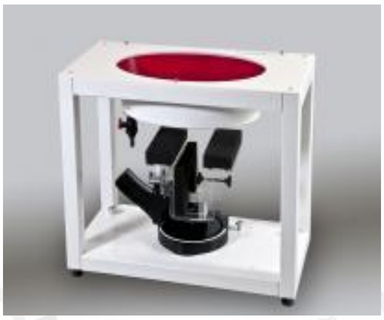
	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 Db (30 MHz to 6 GHz)
Directivity	± 0.3 Db in TSL (rotation around probe axis) ± 0.5 Db in TSL (rotation normal to probe axis)
Dynamic Range	10 µW/g to > 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
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

<table>
<tr><td>Material</td><td>Vinylester, glass fiber reinforced (VE-GF)</td><td rowspan="6"></td></tr>
<tr><td>Liquid Compatibility</td><td>Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)</td></tr>
<tr><td>Shell Thickness</td><td>2 ± 0.2 mm (6 ± 0.2 mm at ear point)</td></tr>
<tr><td>Dimensions (incl. Wooden Support)</td><td>Length: 1000 mm
Width: 500 mm
Height: adjustable feet</td></tr>
<tr><td>Filling Volume</td><td>10esolut. 25 liters</td></tr>
<tr><td>Wooden Support</td><td>SPEAG standard phantom table</td></tr>
<tr><td colspan="3">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</td></tr>
</table>

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. 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.

3.4. ELI 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 (bottom plate)	
Dimensions	Major axis: 600 mm Minor axis: 400 mm	
Filling Volume	11esolut. 30 liters	
Wooden Support	SPEAG standard phantom table	
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. ELI V5.0 has the same shell geometry and is manufactured from the same material as ELI4, but has reinforced top structure.		

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: mV,400 mV)	
Input Offset Voltage	< 5mv (with auto zero)	
Input Bias Current	< 50 fA	
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 ε=3 and loss tangent δ=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 (≤2GHz) and 7x7x7 points (≥2GHz). 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 neighboring 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 ± 1 mm	½·δ·ln(2) mm ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location		30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}		≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
		When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
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
	graded grid: $\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$ mm	
Minimum zoom scan volume	x, y, z	≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

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

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

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. ± 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

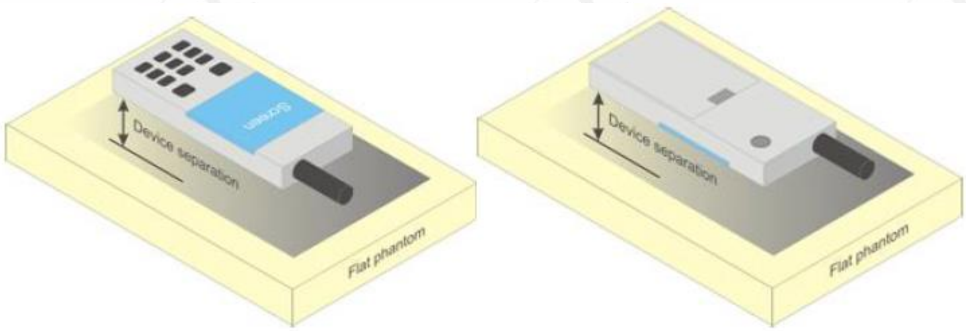
5.1. Body-worn accessory configurations

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use 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. Per FCC KDB Publication 648474 D04, Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB Publication 447498 D04 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. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

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 back 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.

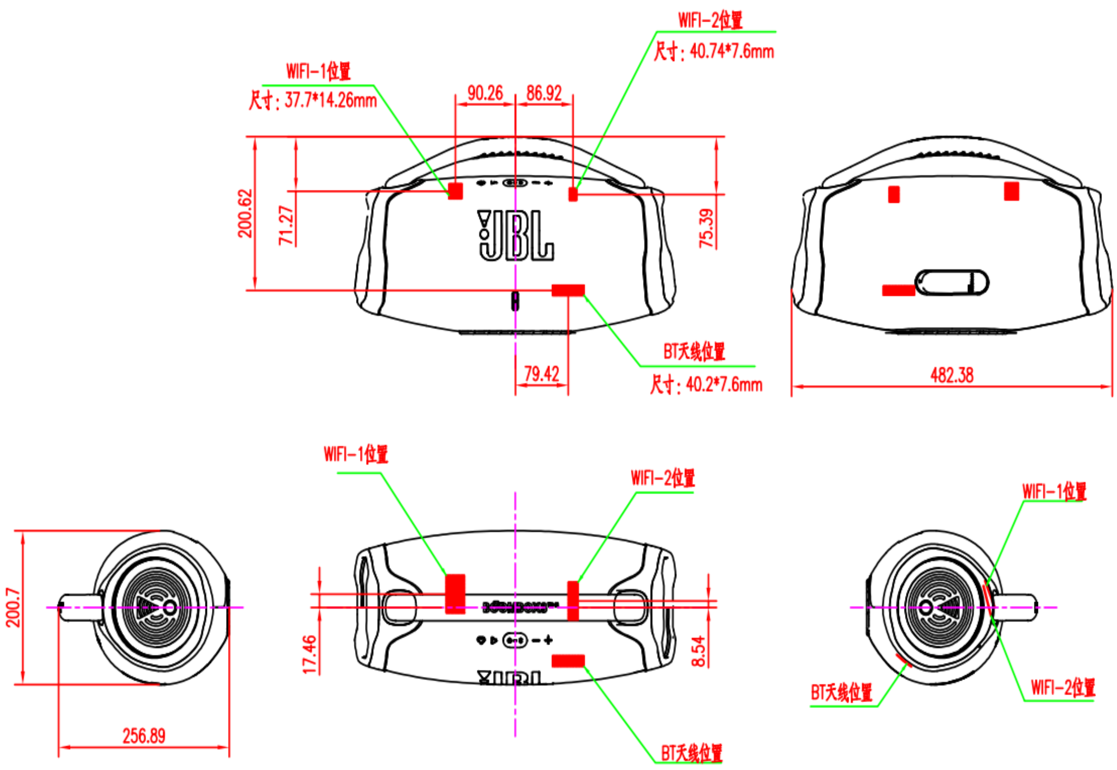


5.2. Extremity exposure configurations

Devices that are designed or intended for use on extremities or mainly operated in extremity only exposure conditions: i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation. When the device also operates in close proximity to the user's body, SAR compliance for the body is also required. The 1-g body and10-g extremity SAR Exclusion Thresholds found in KDB Publication 447498 D04v01 should be applied to determine SAR test requirements.
For smart phones with a display diagonal dimension >15.0 cm or an overall diagonal dimension > 16.0 cm that provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets that support voice calls next to the ear. the phablets procedures outlined in KDB Publication 648474 D04 v01r03 should be applied to evaluate SAR compliance. A device marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance. In addition to the normally required head and body-worm accessory SAR test procedures required for handsets, the UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna <=25 mm from that surface or edge, in direct contact with the phantom, for 10-g SAR. The UMPC mini-tablet 1-g SAR at 5 mm is not required. When hotspot mode applies, 10-g SAR is required only for the surfaces and edges with hotspot to the maximum output power (including tolerance) is 1-g SAR > 1.2 W/kg.

6. RF exposure conditions

6.1. Antenna position and EUT sides



Review

6.2. Standalone SAR test exclusion considerations

According to the KDB447498, the SAR test exclusion threshold:

Frequency (MHz)	Distance(mm)									
	5	10	15	20	25	30	35	40	45	50
300	39	65	88	110	129	148	166	184	201	217
450	22	44	67	89	112	135	158	180	203	226
835	9	25	44	66	90	116	145	175	207	240
1900	3	12	26	44	66	92	122	157	195	236
2450	3	10	22	38	59	83	111	143	179	219
3600	2	8	18	32	49	71	96	125	158	195
5800	1	6	14	25	40	58	80	106	136	169

According to RSS-102, the SAR test exclusion threshold:

Frequency (MHz)	Exemption Limits(mW)				
	At separation distance of ≤5mm	At separation distance of 10mm	At separation distance of 15mm	At separation distance of 20mm	At separation distance of 25mm
≤300	71mW	101mW	132mW	162mW	25mm
450	52mW	70mW	88mW	106mW	193mW
835	17mW	30mW	42mW	55mW	123mW
2450	7mW	10mW	18mW	34mW	67mW
3500	4mW	7mW	15mW	30mW	60mW
5800	2mW	6mw	16mW	32mW	52mW

Frequency (MHz)	Exemption Limits(mW)				
	At separation distance of 30mm	At separation distance of 35mm	At separation distance of 40mm	At separation distance of 45mm	At separation distance of ≥50mm
≤300	223mW	254mW	284mW	315mW	345mW
450	141mW	159mW	177mW	195mW	213mW
835	80mW	92mW	105mW	117mW	130mW
2450	99mW	153mW	225mW	316mW	431mW
3500	83mW	123mW	173mW	235mW	309mW
5800	86mW	124mW	170mW	225mW	290mW

6.3. Test sides

SAR test sides							
Antenna	Band	Body					
		Front	Back	Top	Bottom	Left	Right
ANT	BT&WIFI	√	√	√	√	√	√

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

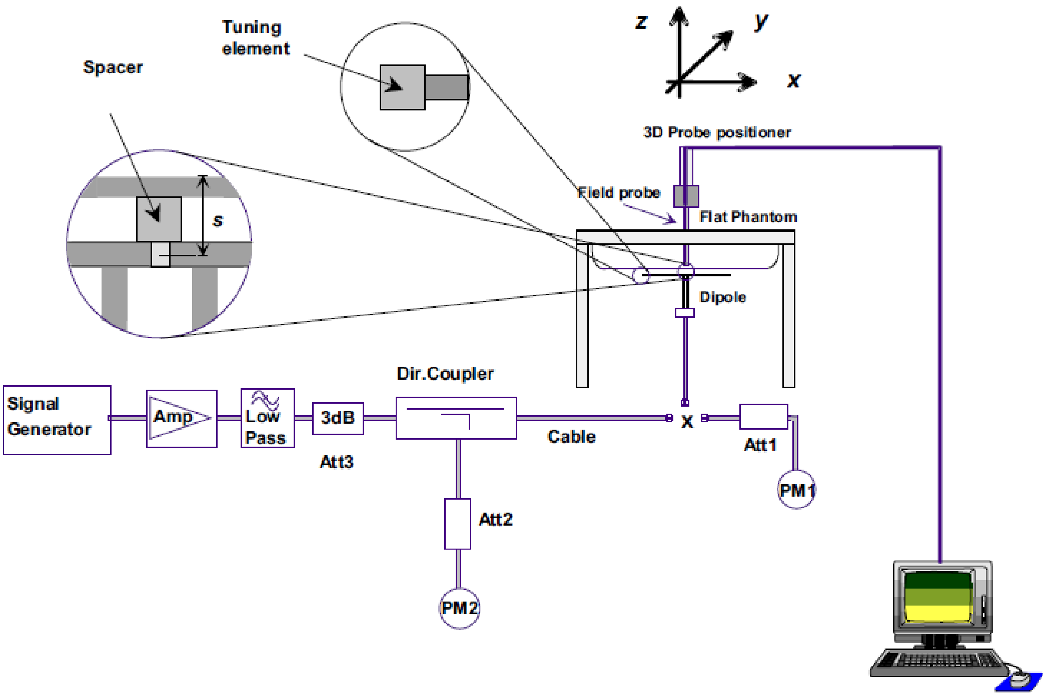
The dielectric properties for this Tissue Simulate Liquids were measured by using the Agilent Model 85070E Dielectric Probe in conjunction with Agilent E5071C Network Analyzer (300 KHz-8500 MHz). The Conductivity (σ) and Permittivity (ρ) are listed in table. For the SAR measurement given in this report.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

Tissue Type	Freq. （MHz）	Target Tissue (±5%)		Measured Tissue		Liquid Temp.	Measured Date
		εr	σ(S/m)	εr	σ(S/m)	(℃)	
2.4G head	2360	39.38 (37.411~41.349)	1.722 (1.6359~1.808)	39.64	1.644	23.0	2024/01/30
	2402	39.3 (37.33-41.27)	1.76 (1.672-1.848)	39.64	1.677	23.0	2024/01/30
	2412	39.3 (37.33-41.27)	1.76 (1.672-1.848)	39.64	1.688	23.0	2024/01/30
	2440	39.22 （37.25-41.18）	1.79 （1.7005-1.879）	39.62	1.71	23.0	2024/01/30
	2441	39.22 （37.25-41.18）	1.79 （1.7005-1.879）	39.62	1.71	23.0	2024/01/30
	2450	39.20 (37.240~41.160)	1.80 (1.710~1.890)	39.61	1.72	23.0	2024/01/30
	2480	39.16 （37.20-41.12）	1.83 （1.750-1.920）	39.61	1.747	23.0	2024/01/30
	2540	39.02 (37.069~40.971)	1.878 (1.7841~1.972)	39.56	1.806	23.0	2024/01/30
5G head	5160	36.04 (34.238~37.842)	4.618 (4.387~4.849)	37.14	4.413	23.0	2024/02/01
	5200	36 （34.2-37.8）	4.66 （4.427-4.893）	36.96	4.487	23.0	2024/02/01
	5300	35.9 （34.105-37.695）	4.76 （4.522-4.998）	36.7	4.628	23.0	2024/02/01
	5340	35.86 （34.067-37.653）	4.8 （4.56-5.04）	36.49	4.653	23.0	2024/02/01
	5500	35.6 （33.82-37.38）	4.96 （4.712-5.208）	35.94	4.822	23.0	2024/02/01
	5600	35.5 （33.725-37.275）	5.07 （4.816-5.323）	35.75	4.92	23.0	2024/02/01
	5660	35.44 (33.668~37.212)	5.13 (4.8735~5.3865)	35.57	4.579	23.0	2024/02/01
	5690	35.41 (33.6395~37.1805)	5.16 (4.902~5.418)	35.48	5.01	23.0	2024/02/01
	5750	35.35 (33.5825~37.1175)	5.22 (4.959~5.481)	35.33	5.069	23.0	2024/02/01
	5800	35.3 （33.535-37.065）	5.27 （5.006-5.534）	35.31	5.12	23.0	2024/02/01
	5840	35.26 (33.497~37.023)	5.312 (5.0464~5.5776)	35.15	5.16	23.0	2024/02/01

Head Tisuue Simulating Liquid


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 +/- 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 laboratory temperature range shall not exceed 2℃, the relative humidity was in the range 75% 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. Justification for extended SAR dipole calibrations

1) Referring to KDB865664 D01 requirements for dipole calibration, instead of the typical annual calibration recommended by measurement standards, longer calibration intervals of up to three years may be considered when it is demonstrated that the SAR target, impedance and return loss of a dipole have remain stable according to the following requirements. Each measured dipole is expected to evaluate with the following criteria at least on annual interval in Appendix C.

a) There is no physical damage on the dipole;

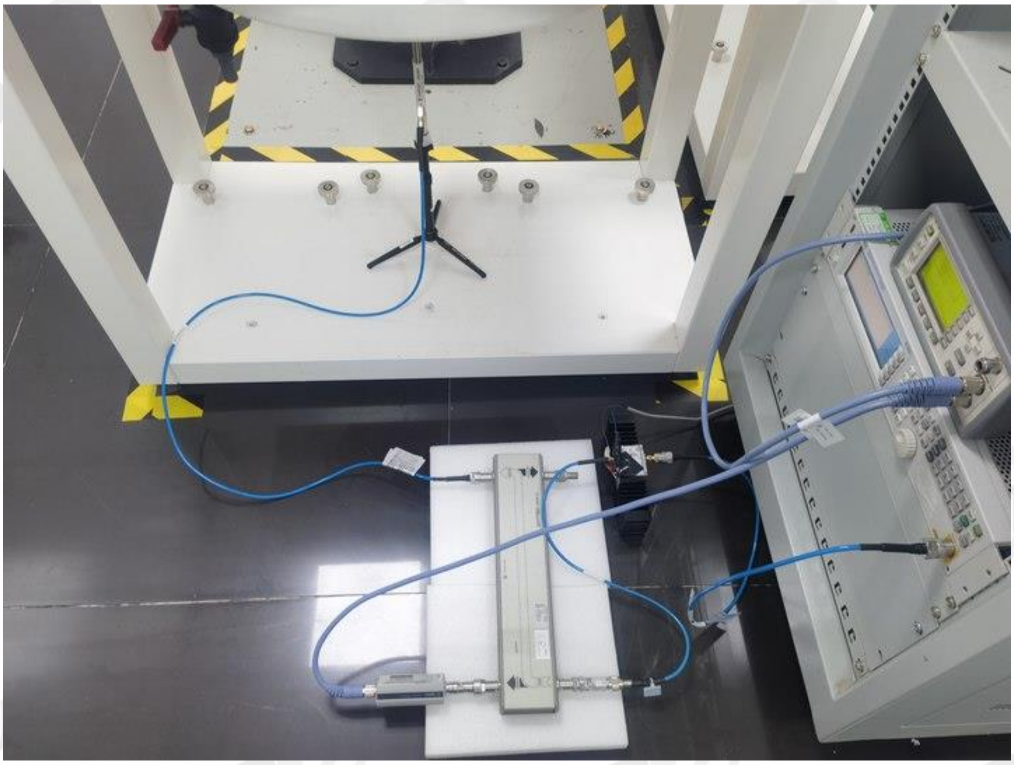
b) System check with specific dipole is within 10% of calibrated value;

c) Return-loss is within 10% of calibrated measurement;

d) Impedance is within 5Ω from the previous measurement.

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

7.2.2. Validation test setup photograph



7.2.3. Summary system validation results

Validation Kit		Measured SAR 250mW (W/kg)	Measured SAR normalized to 1w (W/kg)	Target SAR normalized to 1w (±10%) (W/kg)	Liquid Temp. (℃)	Measured Date
D2450V2 @2450MHz	1-g	12.3	49.2	53.1 (47.79~58.41)	23.0	2024/01/30
	10-g	5.75	23	24.5 （22.05~26.95）	23.0	2024/01/30

Validation Kit		Measured SAR 100mW (W/kg)	Measured SAR normalized to 1w (W/kg)	Target SAR (normalized to 1w (±10%) (W/kg)	Liquid Temp. (℃)	Measured Date
D5GHzV2 @5200MHz	1-g	7.02	70.2	75.6 (68.04~83.16)	23.0	2024/02/01
	10-g	2.02	20.2	21.2 (19.08~23.32)		
D5GHzV2 @5600MHz	1-g	7.82	78.2	80.8 (72.72~88.88)	23.0	2024/02/01
	10-g	2.22	22.2	22.6 (20.34~24.86)		
D5GHzV2 @5800MHz	1-g	7.11	71.1	76.9 (69.21~84.59)	23.0	2024/02/01
	10-g	2.01	20.1	21.3 (19.17~23.43)		

7.2.4. 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	QDOVA002AA	1752	NCR	NCR
Data Acquisition Electronics	SPEAG	DAE4	1366	2023-04-10	2024-04-9
SAR test Probe	SPEAG	EX3DV4	3906	2023-04-21	2024-04-20
Validation Kits	SPEAG	D2450V2	904	2022-01-26	2025-01-25
Agilent Network Analyzer	Agilent	E5071C	MY46316792	2023-04-21	2024-04-20
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	N5171B	MY51350349	2023-04-21	2024-04-20
Preamplifier	Mini-Circuits	ZHL-42W	QA1240001	NCR	NCR
Preamplifier	Mini-Circuits	ZVE-8G+	926701231	NCR	NCR
EPM Series Power Meter	Agilent	E4417A	MY50000999	2023-04-21	2024-04-20
Power Sensor	Agilent	E9327A	MY44420458	2023-04-21	2024-04-20
Power Sensor	Agilent	E9327A	MY44420760	2023-04-21	2024-04-20
Attenuator	Agilent	8491A 3dB	MY52460179	NCR	NCR
Attenuator	Agilent	8491A 10dB	MY52460275	NCR	NCR
Humidity and Temperature Indicator	Euchamp Electronics	YSWS3020	20210916	2023-08-22	2024-08-21
Test software	Speag	DASY5	N/A	N/A	N/A

9. Measurement uncertainty

Uncertainty Component	probability distribution	Contains the factor	Standard uncertainty Ui	C1(1g)	C1(10g)
Sensitivity of probe	N	1	±6.55%	1	1
Isotropy of the probe	R	√3	±1.08%	1	1
Linearity of the probe	R	√3	±0.35%	1	1
Coupling effect between probe and dielectric boundary	R	√3	±0.46%	1	1
The detection limit of the system	R	√3	±0.14%	1	1
Errors in electronic reading equipment	N	1	±0.35%	1	1
Measure the response time of the equipment	R	√3	0	1	1
Measure the integral time of the equipment	R	√3	±1.50%	1	1
Data post-processing algorithm	R	√3	±0.58%	1	1
Electromagnetic environment disturbance	R	√3	±1.73%	1	1
the positioning accuracy of the probe	R	√3	±0.87%	1	1
The positioning accuracy of the probe tip relative to the model surface	R	√3	±1.67%	1	1
Manufacturing tolerances for models	R	√3	±2.31%	1	1
Deviation of measured liquid conductivity from target value	R	√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	√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	√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

Antenna conducted power

Bluetooth BR/EDR					
Average conducted power					
Mode	Channel	Frequency (MHz)	Power (dBm)	Duty-Cycle	Max. Tune-up Power (dBm)
DH5	0	2402	9.48	0.576	10.0
	39	2441	9.51	0.576	10.0
	78	2480	9.41	0.5749	10.0
2DH5	0	2402	11.87	0.5768	12.0
	39	2441	11.86	0.5768	12.0
	78	2480	11.72	0.5749	12.0
3DH5	0	2402	12.40	0.5768	13.0
	39	2441	12.19	0.576	13.0
	78	2480	12.16	0.5768	13.0

Bluetooth BLE					
Average conducted power					
Mode	Channel	Frequency (MHz)	Power (dBm)	Duty-Cycle	Max. Tune-up Power (dBm)
BLE-1Mbps	0	2402	7.12	0.852	8.0
	19	2440	7.27	0.852	8.0
	39	2480	7.09	0.852	8.0
BLE-2Mbps	1	2404	7.19	0.5722	8.0
	19	2440	7.15	0.5691	8.0
	38	2478	7.03	0.5722	8.0

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 3DH5, select 3DH5 mode to test SAR.

WIFI_2.4G					
Test Mode	Antenna	Frequency [MHz]	Average conducted power	Duty Cycle	Max. Tune-up Power (dBm)
11B	Ant1	2412	13.91	0.9964	14.0
	Ant2	2412	14.41	0.9964	14.5
	Ant1	2437	13.92	0.9964	14.0
	Ant2	2437	14.29	0.9964	14.5
	Ant1	2462	13.87	0.9964	14.0
	Ant2	2462	14.35	0.9964	14.5
11G	Ant1	2412	11.04	0.972	11.5
	Ant2	2412	11.53	0.972	12.0
	Ant1	2437	10.99	0.9789	11.5
	Ant2	2437	11.66	0.972	12.0
	Ant1	2462	11.29	0.972	11.5
	Ant2	2462	11.33	0.972	12.0
11N20MIMO	Ant1	2412	9.43	0.9437	10.0
	Ant2	2412	9.86	0.9437	10.5
	Ant1	2437	9.49	0.9437	10.0
	Ant2	2437	10.03	0.9437	10.5
	Ant1	2462	9.54	0.9437	10.0
	Ant2	2462	10.03	0.9437	10.5
11N40MIMO	Ant1	2422	7.18	0.9211	8.0
	Ant2	2422	7.65	0.9211	8.0
	Ant1	2437	7.16	0.9211	8.0
	Ant2	2437	7.63	0.9211	8.0
	Ant1	2452	7.20	0.8947	8.0
	Ant2	2452	7.64	0.8974	8.0
11AX20MIMO	Ant1	2412	8.30	0.9619	8.5
	Ant2	2412	8.72	0.9619	9.0
	Ant1	2437	8.29	0.9619	8.5
	Ant2	2437	8.69	0.9714	9.0
	Ant1	2462	8.16	0.9619	8.5
	Ant2	2462	8.72	0.9714	9.0
11AX40MIMO	Ant1	2422	7.15	0.9298	8.5
	Ant2	2422	7.62	0.9298	9.0
	Ant1	2437	7.12	0.9474	8.5
	Ant2	2437	7.61	0.9298	9.0
	Ant1	2452	7.12	0.9474	8.5
	Ant2	2452	7.63	0.9298	9.0

WIFI_5G					
Test Mode	Antenna	Frequency [MHz]	Duty Cycle	Average conducted power(dBm)	Max. Tune-up Power (dBm)
11A	Ant1	5180	0.972	12.94	13.5
	Ant2	5180	0.9789	13.72	14

	Ant1	5200	0.972	13.18	13.5
	Ant2	5200	0.9789	13.85	14
	Ant1	5240	0.972	13.36	13.5
	Ant2	5240	0.972	13.70	14
	Ant1	5260	0.972	13.30	13.5
	Ant2	5260	0.9789	13.21	14
	Ant1	5280	0.9789	13.30	13.5
	Ant2	5280	0.972	13.43	14
	Ant1	5320	0.972	13.57	14
	Ant2	5320	0.972	13.36	14
	Ant1	5500	0.9789	13.57	14
	Ant2	5500	0.972	12.91	14
	Ant1	5580	0.9789	13.46	14
	Ant2	5580	0.9789	13.40	14
	Ant1	5700	0.972	11.84	13.0
	Ant2	5700	0.972	12.06	13.0
	Ant1	5720	0.9789	11.75	12.5
	Ant2	5720	0.972	12.02	12.5
	Ant1	5745	0.972	11.61	12.5
	Ant2	5745	0.9789	11.99	12.5
	Ant1	5785	0.979	11.82	12.5
	Ant2	5785	0.9789	12.00	12.5
	Ant1	5825	0.972	11.72	12.5
	Ant2	5825	0.9789	11.89	12.5
11N20 MIMO	Ant1	5180	0.9571	10.88	12.0
	Ant2	5180	0.9571	11.45	12.5
	Ant1	5200	0.9437	11.15	12.5
	Ant2	5200	0.9571	11.61	12.5
	Ant1	5240	0.9437	11.32	12.5
	Ant2	5240	0.9437	11.54	12.5
	Ant1	5260	0.9437	11.22	12.5
	Ant2	5260	0.9571	11.63	12.5
	Ant1	5280	0.9437	11.36	12.5
	Ant2	5280	0.9571	11.77	12.5
	Ant1	5320	0.9571	11.57	12.5
	Ant2	5320	0.9571	11.63	12.5
	Ant1	5500	0.9437	11.64	12.5
	Ant2	5500	0.9571	10.82	12.5
	Ant1	5580	0.9437	11.75	12.5
	Ant2	5580	0.9571	12.01	12.5
	Ant1	5700	0.9571	10.00	11.5
	Ant2	5700	0.9437	10.66	11.5
	Ant1	5720	0.9437	9.94	11.5
	Ant2	5720	0.9571	10.55	11.5
	Ant1	5745	0.9437	9.82	11.5
	Ant2	5745	0.9571	10.54	11.5
	Ant1	5785	0.9437	9.95	11.5
	Ant2	5785	0.9571	10.47	11.5
	Ant1	5825	0.9437	10.00	11.5
	Ant2	5825	0.9571	10.41	11.5
11N40	Ant1	5190	0.9211	10.34	12

MIMO	Ant2	5190	0.8947	11.63	12
	Ant1	5230	0.8947	10.87	12
	Ant2	5230	0.8974	11.66	12
	Ant1	5270	0.8947	10.74	12
	Ant2	5270	0.8947	11.64	12
	Ant1	5310	0.9211	10.89	12
	Ant2	5310	0.8974	11.69	12
	Ant1	5510	0.9211	10.85	12
	Ant2	5510	0.8974	10.79	12
	Ant1	5550	0.9211	10.94	12
	Ant2	5550	0.8947	11.21	12
	Ant1	5670	0.9211	9.17	11
	Ant2	5670	0.8947	10.47	11
	Ant1	5710	0.9211	9.31	11
	Ant2	5710	0.9211	10.42	11
	Ant1	5755	0.8947	9.20	11
	Ant2	5755	0.8947	10.51	11
	Ant1	5795	0.8974	9.24	11
	Ant2	5795	0.8947	10.39	11
11AC20 MIMO	Ant1	5180	0.9704	10.96	12
	Ant2	5180	0.9776	11.68	12
	Ant1	5200	0.9778	11.07	12
	Ant2	5200	0.9776	11.87	12
	Ant1	5240	0.9704	11.27	12
	Ant2	5240	0.9704	11.83	12
	Ant1	5260	0.9776	11.31	12
	Ant2	5260	0.9776	11.92	12
	Ant1	5280	0.9776	11.30	12
	Ant2	5280	0.9704	12.16	12.5
	Ant1	5320	0.9776	11.52	12.5
	Ant2	5320	0.9776	12.06	12.5
	Ant1	5500	0.9704	11.55	12.5
	Ant2	5500	0.9776	11.14	12.5
	Ant1	5580	0.9704	11.69	12.5
	Ant2	5580	0.9704	12.36	12.5
	Ant1	5700	0.9776	9.96	11.5
	Ant2	5700	0.9704	10.93	11.5
	Ant1	5720	0.9704	9.94	11.5
	Ant2	5720	0.9776	10.90	11.5
	Ant1	5745	0.9704	9.81	11.5
	Ant2	5745	0.9704	10.95	11.5
	Ant1	5785	0.9704	9.52	11
	Ant2	5785	0.9776	10.78	11
	Ant1	5825	0.9776	9.70	11
	Ant2	5825	0.9704	10.70	11
11AC40 MIMO	Ant1	5190	0.9559	10.30	11
	Ant2	5190	0.942	11.70	12
	Ant1	5230	0.942	10.85	11.5
	Ant2	5230	0.942	11.87	12
	Ant1	5270	0.9559	10.63	12
	Ant2	5270	0.942	11.84	12

	Ant1	5310	0.9559	10.88	12
	Ant2	5310	0.942	11.93	12
	Ant1	5510	0.942	11.06	12
	Ant2	5510	0.942	11.00	12
	Ant1	5550	0.9559	11.07	12
	Ant2	5550	0.9559	11.35	12
	Ant1	5670	0.9559	9.29	11
	Ant2	5670	0.942	10.70	11
	Ant1	5710	0.942	9.50	11
	Ant2	5710	0.942	10.71	11
	Ant1	5755	0.9559	9.31	11
	Ant2	5755	0.942	10.77	11
	Ant1	5795	0.942	9.37	11
	Ant2	5795	0.9559	10.54	11
11AC80 MIMO	Ant1	5210	0.9744	8.53	10
	Ant2	5210	0.9744	9.54	10
	Ant1	5290	0.9658	8.77	10
	Ant2	5290	0.9744	9.62	10
	Ant1	5530	0.9658	8.84	10
	Ant2	5530	0.9744	8.82	10
	Ant1	5610	0.9744	9.43	10
	Ant2	5610	0.9744	10.20	10.5
	Ant1	5690	0.9658	7.38	9.0
	Ant2	5690	0.9744	8.51	9.0
	Ant1	5775	0.9658	7.34	9.0
	Ant2	5775	0.9658	8.49	9.0
11AX20 MIMO	Ant1	5180	0.9714	10.62	12
	Ant2	5180	0.9619	11.49	12
	Ant1	5200	0.9619	10.85	12
	Ant2	5200	0.9619	11.65	12
	Ant1	5240	0.9619	11.12	12
	Ant2	5240	0.9623	11.53	12
	Ant1	5260	0.9619	11.04	12
	Ant2	5260	0.9714	11.51	12
	Ant1	5280	0.9619	11.05	12
	Ant2	5280	0.9714	11.58	12
	Ant1	5320	0.9619	11.09	12
	Ant2	5320	0.9619	11.41	12
	Ant1	5500	0.9714	11.15	12
	Ant2	5500	0.9714	10.53	12
	Ant1	5580	0.9619	11.36	12
	Ant2	5580	0.9714	11.71	12
	Ant1	5700	0.9619	9.80	11
	Ant2	5700	0.9619	10.43	11
	Ant1	5720	0.9714	9.66	11
	Ant2	5720	0.9714	10.35	11
	Ant1	5745	0.9714	9.57	11
	Ant2	5745	0.9714	10.32	11
	Ant1	5785	0.9619	9.73	11
	Ant2	5785	0.9714	10.38	11
	Ant1	5825	0.9619	9.73	11

	Ant2	5825	0.9714	10.25	11
11AX40 MIMO	Ant1	5190	0.9298	8.56	10.5
	Ant2	5190	0.9298	9.93	10.5
	Ant1	5230	0.9298	9.10	10.5
	Ant2	5230	0.9298	9.99	10.5
	Ant1	5270	0.9298	8.92	10.5
	Ant2	5270	0.9298	10.04	10.5
	Ant1	5310	0.9298	9.18	10.5
	Ant2	5310	0.9298	10.12	10.5
	Ant1	5510	0.9298	9.20	10.5
	Ant2	5510	0.9298	9.11	10
	Ant1	5550	0.9298	9.35	10
	Ant2	5550	0.9298	9.59	10
	Ant1	5670	0.9298	7.69	9
	Ant2	5670	0.9298	8.86	9
	Ant1	5710	0.9298	7.73	9
	Ant2	5710	0.9298	8.91	9
	Ant1	5755	0.9298	7.51	9
	Ant2	5755	0.9298	8.99	9
	Ant1	5795	0.9298	7.63	9
	Ant2	5795	0.9298	8.82	9
11AX80 MIMO	Ant1	5210	0.9063	8.80	10
	Ant2	5210	0.875	9.80	10
	Ant1	5290	0.9063	8.94	10
	Ant2	5290	0.8788	9.89	10
	Ant1	5530	0.9063	9.16	10
	Ant2	5530	0.9063	9.05	10
	Ant1	5610	0.9063	9.75	10
	Ant2	5610	0.9063	10.31	10.5
	Ant1	5690	0.9063	7.72	9.0
	Ant2	5690	0.9063	8.00	9.0
	Ant1	5775	0.9063	7.55	9.0
	Ant2	5775	0.875	8.76	9.0

10.2. Measurement of Body SAR data

Bluetooth Body 0mm SAR 1-g											
Test position	Test mode	Test Ch./Freq (MHz)	Duty Cycle	SAR 1-g (W/kg)	Power drift (dB)	Conduct power (dBm)	Max. Tune-up Power (dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp. (℃)	SAR limit 1-g (W/kg)
Top	3DH5	0/2402	0.5768	0.014	0.08	12.40	13.0	1.991	0.02	23.0	1.6
Bottom	3DH5	0/2402	0.5768	0.009	-0.05	12.40	13.0	1.991	0.02	23.0	1.6
Back	3DH5	0/2402	0.5768	0.013	0.17	12.40	13.0	1.991	0.03	23.0	1.6
Left	3DH5	0/2402	0.5768	0.012	0.14	12.40	13.0	1.991	0.02	23.0	1.6
Right	3DH5	0/2402	0.5768	0.012	0.13	12.40	13.0	1.991	0.03	23.0	1.6
Front	3DH5	0/2402	0.5768	0.026	006	12.40	13.0	1.991	0.05	23.0	1.6
Front	3DH5	39/2441	0.576	0.027	0.11	12.19	13.0	2.092	**0.06**	23.0	1.6
Front	3DH5	78/2480	0.5768	0.011	0.09	12.16	13.0	2.104	0.02	23.0	1.6

ANT1 WIFI_2.4G Body 0mm SAR 1g											
Test position	Test mode	Test Ch./Freq (MHz)	Duty Cycle	SAR 1-g (W/kg)	Power drift (dB)	Conduct power (dBm)	Max. Tune-up Power (dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp. (℃)	SAR limit 1-g (W/kg)
Front	802.11b	6/2437	0.9964	0.287	0.09	13.92	14.0	1.022	0.29	23.0	1.6
Bottom	802.11b	6/2437	0.9964	0.302	0.14	13.92	14.0	1.022	0.31	23.0	1.6
Back	802.11b	6/2437	0.9964	0.246	0.03	13.92	14.0	1.022	0.25	23.0	1.6
Left	802.11b	6/2437	0.9964	0.319	-0.04	13.92	14.0	1.022	0.33	23.0	1.6
Right	802.11b	6/2437	0.9964	0.259	0.11	13.92	14.0	1.022	0.27	23.0	1.6
Top	802.11b	6/2437	0.9964	0.402	0.08	13.92	14.0	1.022	0.41	23.0	1.6
Top	802.11b	1/2412	0.9964	0.567	0.12	13.91	14.0	1.025	**0.58**	23.0	1.6
Top	802.11b	11/2462	0.9964	0.377	0.13	13.87	14.0	1.034	0.39	23.0	1.6

ANT2 WIFI_2.4G Body 0mm SAR 1g											
Test position	Test mode	Test Ch./Freq (MHz)	Duty Cycle	SAR 1-g (W/kg)	Power drift (dB)	Conduct power (dBm)	Max. Tune-up Power (dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp. (℃)	SAR limit 1-g (W/kg)
Front	802.11b	1/2412	0.9964	0.503	-0.14	14.41	14.5	1.025	0.52	23.0	1.6
Bottom	802.11b	1/2412	0.9964	0.401	0.06	14.41	14.5	1.025	0.41	23.0	1.6
Back	802.11b	1/2412	0.9964	0.305	0.15	14.41	14.5	1.025	0.31	23.0	1.6
Left	802.11b	1/2412	0.9964	0.411	0.05	14.41	14.5	1.025	0.42	23.0	1.6
Right	802.11b	1/2412	0.9964	0.384	0.11	14.41	14.5	1.025	0.30	23.0	1.6
Top	802.11b	1/2412	0.9964	0.731	0.19	14.41	14.5	1.025	**0.75**	23.0	1.6
Top	802.11b	6/2437	0.9964	0.665	0.04	14.29	14.5	1.053	0.70	23.0	1.6
Top	802.11b	11/2462	0.9964	0.36	0.16	14.35	14.5	1.039	0.37	23.0	1.6

ANT1 WIFI_5G UNII-1& UNII-2A Body 0mm SAR 1g											
Test position	Test mode	Test Ch./Freq (MHz)	Duty Cycle	SAR 1-g (W/kg)	Power drift (dB)	Conduct power (dBm)	Max. Tune-up Power (dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp. (℃)	SAR limit 1-g (W/kg)
Top	802.11a	64/5320	0.972	0.491	0.16	13.57	14.0	1.136	0.56	23.0	1.6
Front	802.11a	64/5320	0.972	0.308	0.13	13.57	14.0	1.136	0.35	23.0	1.6
Bottom	802.11a	64/5320	0.972	0.204	-0.18	13.57	14.0	1.136	0.23	23.0	1.6
Back	802.11a	64/5320	0.972	0.317	0.07	13.57	14.0	1.136	0.36	23.0	1.6
Left	802.11a	64/5320	0.972	0.246	-0.14	13.57	14.0	1.136	0.28	23.0	1.6
Right	802.11a	64/5320	0.972	0.305	0.04	13.57	14.0	1.136	0.35	23.0	1.6
Top	802.11a	48/5240	0.972	0.406	0.12	13.36	14.0	1.192	0.48	23.0	1.6

ANT1 WIFI_5G UNII-2C Body 0mm SAR 1g											
Test position	Test mode	Test Ch./Freq (MHz)	Duty Cycle	SAR 1-g (W/kg)	Power drift (dB)	Conduct power (dBm)	Max. Tune-up Power (dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp. (℃)	SAR limit 1-g (W/kg)
Top	802.11a	100/5500	0.979	0.413	0.03	13.57	14.0	1.128	0.47	23.0	1.6
Front	802.11a	100/5500	0.979	0.303	0.14	13.57	14.0	1.128	0.34	23.0	1.6
Bottom	802.11a	100/5500	0.979	0.236	0.11	13.57	14.0	1.128	0.27	23.0	1.6
Back	802.11a	100/5500	0.979	0.311	0.05	13.57	14.0	1.128	0.35	23.0	1.6
Left	802.11a	100/5500	0.979	0.241	0.17	13.57	14.0	1.128	0.27	23.0	1.6
Right	802.11a	100/5500	0.979	0.271	-0.14	13.57	14.0	1.128	0.31	23.0	1.6
Top	802.11a	116/5580	0.979	0.703	0.11	13.46	14.0	1.157	**0.81**	23.0	1.6

ANT1 WIFI_5G UNII-3 Body 0mm SAR 1g											
Test position	Test mode	Test Ch./Freq (MHz)	Duty Cycle	SAR 1-g (W/kg)	Power drift (dB)	Conduct power (dBm)	Max. Tune-up Power (dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp. (℃)	SAR limit 1-g (W/kg)
Top	802.11a	157/5785	0.979	0.296	0.11	11.82	12.5	1.195	0.35	23.0	1.6
Front	802.11a	157/5785	0.979	0.209	0.12	11.82	12.5	1.195	0.25	23.0	1.6
Bottom	802.11a	157/5785	0.979	0.143	0.23	11.82	12.5	1.195	0.17	23.0	1.6
Back	802.11a	157/5785	0.979	0.176	0.06	11.82	12.5	1.195	0.21	23.0	1.6
Left	802.11a	157/5785	0.979	0.236	-0.14	11.82	12.5	1.195	0.28	23.0	1.6
Right	802.11a	157/5785	0.979	0.221	-0.13	11.82	12.5	1.195	0.26	23.0	1.6
Top	802.11a	165/5825	0.972	0.350	0.06	11.72	12.5	1.231	0.43	23.0	1.6

ANT2 WIFI_5G UNII-1 Body 0mm SAR 1g											
Test position	Test mode	Test Ch./Freq (MHz)	Duty Cycle	SAR 1-g (W/kg)	Power drift (dB)	Conduct power (dBm)	Max. Tune-up Power (dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp. (℃)	SAR limit 1-g (W/kg)
Top	802.11a	40/5200	0.979	0.502	0.11	13.85	14.0	1.057	0.53	23.0	1.6
Front	802.11a	40/5200	0.979	0.412	0.14	13.85	14.0	1.057	0.44	23.0	1.6
Bottom	802.11a	40/5200	0.979	0.357	0.06	13.85	14.0	1.057	0.38	23.0	1.6
Back	802.11a	40/5200	0.979	0.258	0.17	13.85	14.0	1.057	0.27	23.0	1.6
Left	802.11a	40/5200	0.979	0.247	0.03	13.85	14.0	1.057	0.26	23.0	1.6
Right	802.11a	40/5200	0.979	0.309	0.17	13.85	14.0	1.057	0.33	23.0	1.6
Top	802.11a	36/5180	0.979	0.423	0.03	13.72	14.0	1.089	0.46	23.0	1.6

ANT2 WIFI_5G UNII-2C Body 0mm SAR 1g											
Test position	Test mode	Test Ch./Freq (MHz)	Duty Cycle	SAR 1-g (W/kg)	Power drift (dB)	Conduct power (dBm)	Max. Tune-up Power (dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp. (℃)	SAR limit 1-g (W/kg)
Top	802.11a	116/5580	0.979	0.576	0.12	13.40	14.0	1.173	**0.68**	23.0	1.6
Front	802.11a	116/5580	0.979	0.401	0.14	13.40	14.0	1.173	0.47	23.0	1.6
Bottom	802.11a	116/5580	0.979	0.325	-0.11	13.40	14.0	1.173	0.38	23.0	1.6
Back	802.11a	116/5580	0.979	0.341	0.15	13.40	14.0	1.173	0.40	23.0	1.6
Left	802.11a	116/5580	0.979	0.289	0.09	13.40	14.0	1.173	0.34	23.0	1.6
Right	802.11a	116/5580	0.979	0.344	0.17	13.40	14.0	1.173	0.40	23.0	1.6
Top	802.11a	100/5500	0.972	0.493	0.16	12.91	14.0	1.322	0.65	23.0	1.6

ANT2 WIFI_5G UNII-3 Body 0mm SAR 1g											
Test position	Test mode	Test Ch./Freq (MHz)	Duty Cycle	SAR 1-g (W/kg)	Power drift (dB)	Conduct power (dBm)	Max. Tune-up Power (dBm)	Scaled factor	Scaled SAR 1-g (W/kg)	Liquid Temp. (℃)	SAR limit 1-g (W/kg)
Top	802.11a	157/5785	0.979	0.301	0.11	12.0	12.5	1.175	0.62	23.0	1.6
Front	802.11a	157/5785	0.979	0.221	0.13	12.0	12.5	1.175	0.55	23.0	1.6
Bottom	802.11a	157/5785	0.979	0.103	0.17	12.0	12.5	1.175	0.43	23.0	1.6
Back	802.11a	157/5785	0.979	0.221	0.14	12.0	12.5	1.175	0.27	23.0	1.6
Left	802.11a	157/5785	0.979	0.243	0.06	12.0	12.5	1.175	0.17	23.0	1.6
Right	802.11a	157/5785	0.979	0.106	-0.14	12.0	12.5	1.175	0.42	23.0	1.6

Note:

1)The maximum Scaled SAR value is marked in bold. Graph Results refer to Appendix B

2)Scaled factor= (Max. Tune-up Power in mW) / (Conducted Power in mW) / (Duty Cycle)

3)Scaled SAR=Test SAR * Scaled factor

10.3. Simultaneous transmission SAR

Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneous transmitting antenna.

Mode	Combination
1	BT+ANT1 WIFI_2.4G+ANT2 WIFI_2.4G
2	ANT1 WIFI_5G+ANT2 WIFI_5G

Mode1	Simultaneous transmission Body SAR						
	BT WIFI	ANT1 WIFI		ANT2 WIFI		/	
Test Position	BT 1-g SAR (W/kg)	WIFI_2.4G 1-g SAR (W/kg)	WIFI_5G 1-g SAR (W/kg)	WIFI_2.4G 1-g SAR (W/kg)	WIFI_5G 1-g SAR (W/kg)	SUM 1-g SAR (W/kg)	SPLSR
Top	0.02	0.58	/	0.75	/	1.35	Excluded
Bottom	0.02	0.31	/	0.41	/	0.74	Excluded
Back	0.03	0.25	/	0.31	/	0.59	Excluded
Left	0.02	0.33	/	0.42	/	0.77	Excluded
Right	0.03	0.27	/	0.30	/	0.6	Excluded
Front	0.06	0.29	/	0.52	/	0.87	Excluded

Mode1	Simultaneous transmission Body SAR						
	BT WIFI	ANT1 WIFI		ANT2 WIFI		/	
Test Position	BT 1-g SAR (W/kg)	WIFI_2.4G 1-g SAR (W/kg)	WIFI_5G 1-g SAR (W/kg)	WIFI_2.4G 1-g SAR (W/kg)	WIFI_5G 1-g SAR (W/kg)	SUM 1-g SAR (W/kg)	SPLSR
Top	/	/	0.81	/	0.68	**1.49**	Excluded
Bottom	/	/	0.27	/	0.43	0.7	Excluded
Back	/	/	0.36	/	0.40	0.76	Excluded
Left	/	/	0.28	/	0.34	0.62	Excluded
Right	/	/	0.33	/	0.42	0.75	Excluded
Front	/	/	0.35	/	0.55	0.90	Excluded

Appendix

Appendix A: System Validation Plots

Appendix B: Highest Test Plots

Appendix C: Calibration Certification

Appendix D: Test setup photograph

END REPORT