Prüfbericht-Nr.: *Test report no.:*	**IN22HIZ3 001** **ULR-TC568822300000105F**	**Auftrags-Nr.:** *Order no.:*	**146701433 020**	Seite 1 von 39 *Page 1 of 39*
Kunden-Referenz-Nr.: *Client reference no.:*	2141358	**Auftragsdatum:** *Order date:*	2022-07-19	
Auftraggeber: *Client:*	GE Vingmed Ultrasound AS Strandpromenaden 45, N-3183, Horten, Norway			
Prüfgegenstand: *Test item:*	Vscan Air SL			
Bezeichnung.: *Identification.:*	Vscan Air SL			
Auftrags-Inhalt: *Order content*:	Testing and issue of Test Report			
Prüfgrundlage: *Test specification:*	FCC 47 CFR Part 2 subpart 2.1093 RSS-102 Issue 5 IEEE Std 1528-2013 KDB 447498 D01 / KDB 248227 D01			
Wareneingangsdatum: *Date of sample receipt:*	2022-07-26			
Prüfmuster-Nr & Serien-Nr.: *Test sample no & serial no.:*	A003307764-001 A003307764-002			
Prüfzeitraum: *Testing period:*	2022-08-09 - 2022-08-11			
Ort der Prüfung: *Place of testing:*	Wireless laboratory, Bangalore			
Prüflaboratorium: *Testing laboratory:*	TÜV Rheinland (India) Pvt. Ltd. 27/B,2nd cross road, Electronic city Phase1, Banglore-560100, India FCC Test Site Registration No: 496599 ISED Test Site Registration No.:			
Prüfergebnis*: *Test result*:*	Pass			

geprüft von: *tested by:*		**genehmigt von:** *authorized by:*	
Datum: *Date:* 2022-08-14		**Ausstellatum:** *Issue date:* 2023-04-12	
Stellung / *Position:*	**Yogesh V** Engineer	**Stellung** / *Position:*	**Madhu K N** Senior Engineer
Sonstiges / *Other:*	FCC ID: YOM-VSCANAIRSL IC: 9136A-VSCANAIRSL		
Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery:*	Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged*		

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
** Legend:*	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

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TEST SUMMARY

Mode	Position	Exposure conditions	Reported SAR Value (1g) W/kg	Reported SAR Value (10g) W/kg	Limit		Result
					1-g SAR Trunk (W/kg	10- g SAR Limb (W/kg)	
2.4 GHz Wi-Fi (DTS)	Edge Bottom	Body-worn	0.1094	/	1.6	-	PASS
	Front	Hand-held	/	0.3471	-	4.0	PASS
5 GHz Wi-Fi (NII)	Edge Bottom	Body-worn	0.3265	/	1.6	-	PASS
	Front	Hand-held	/	1.5469	-	4.0	PASS

Note: Vscan Air SL is a handheld ultrasound wireless probe with dual transducer. Convex and Linear side of the probe is intended to be placed on human body for ultrasound scanning. Other faces of the probe (front, rear, left side and right side) are intended to be used by hand.

This device complies with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) and (4 W/kg) specified in FCC 47 CFR Subpart 2.1093 and ANSI/IEEE C95.1-1999. Testing is performed with measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications

Discipline: Electronics Testing
Group: EMC Test Facility

REVISION HISTORY OF THIS REPORT

Report Number	Version	Description	Issue date
ULR-TC568822300000105F	01	Initial issue of report	2023-03-29
ULR-TC568822300000105F	02	Reviewer comments updated	2023-04-12

Table of Contents

1 GENERAL REMARKS

1.1 Attachments

All attachments are part of this test report and are issued in separate document

1. Appendix A: PLOTS FOR SAR MEASUREMENT
2. APPENDIX B: PLOTS FOR SYSTEM VERIFICATION
3. APPENDIX C: CALIBRATION CERTIFICATE FOR PROBE AND DIPOLE

Bellow attachments are common to other test reports as well

1. TEST SETUP PHOTOS
2. EUT EXTERNAL PHOTOS
3. EUT INTERNAL PHOTOS
4. FCC LABEL AND LABEL LOCATION
5. BLOCK DIAGRAM
6. SPECIFICATION OF EUT
7. SCHEMATIC DIAGRAM
8. BILL OF MATERIAL
9. USER MANUAL
10. MAXIMUM PERMISSIBLE EXPOSURE INFORMATION

2 TEST SITES

2.1 Testing Facilities

TUV Rheinland (India) Private Limited
27/B, 2nd Cross Road,
Electronic City Phase 1,
Bangalore – 560 100.
India

2.2 List of Test and Measurement Instruments

Table 1: Test and measurement instruments used

Equipment	Manufacturer	Model Name	Serial Number	Firmware Versions	Calibration Due Date	Periodicity	Test Facility
System Validation Dipole	Schmid & Partner Engineering AG	D2450V2	902	-	18.08.2023	Yearly	System Performance Check
System Validation Dipole	Schmid & Partner Engineering AG	D5GHzV2	1109	-	19.08.2023	Yearly	
USB Wideband Power Sensor	Boonton	55006	10231	4.2.0.0	24.03.2023	Yearly	
RF and microwave Signal Generator	Rohde & Schwarz	SMB100A	108788	3.01.203.32	27-01-2023	Yearly	
Isotropic E-Field	Schmid & Partner Engineering AG	EX3DV4	7374	-	30-08-2023	Yearly	SAR Measurement
Data Acquisition Electronics	Schmid & Partner Engineering AG	DAE4	640	-	18-08-2023	Yearly	
SAR Chamber	Lindgren RF Enclosures	-	-	-	-	-	
DAK-3.5	Schmid & Partner Engineering AG	SMDAK 040 CA	1100	-	29-08-2023	Yearly	Liquid Validation
Network Analyzer	Rohde & Schwarz	ZVL-6	102433	3.32	23-02-2023	Yearly	

Table 2: Instrument application Software versions

Sl. No	Test Type	Application software	Version
1	SAR Measurement	cDSY6	6.14

3 GENERAL PRODUCT INFORMATION

3.1 Product Function and Intended Use

Vscan Air SL consists of a dual headed probe which integrates both, Sector and linear array transducers, and an app which can be installed on Android or iOS mobile devices.

Vscan Air SL is a battery-operated software-based general-purpose ultrasound imaging system for use by qualified and trained healthcare professionals or practitioners that are legally authorized or licensed by law in the country, state or other local municipality in which he or she practices. The users may or may not be working under supervision or authority of a physician. Users may also include Medical Students working under the supervision or authority of a physician during their education / training. The device is enabling visualization and measurement of anatomical structures and fluid including blood flow.

3.2 Ratings and System Details of Equipment Under Test

Table 3: Ratings and System Details as declared by client*

Radio Protocol		Wi-Fi (5GHz)	Wi-Fi (2.4GHz)	BLE
Operating Frequency Range		UNII-1 Band - 5150MHz to 5250MHz UNII-3 Band - 5725MHz to 5825MHz	2412MHz to 2462MHz	2402MHz to 2480MHz
No. of Channels		4 (Refer Table 5)	13 (Refer Table 6)	40 (Refer Table 7)
Channel Spacing		20 MHz	5 MHz	2 MHz
Max Conducted power in dBm		**13.07 dBm (MCS4 5240MHz)**	**14.55 dBm (at 6Mbps 2437MHz)**	**5.63 dBm (at 2480MHz)**
Modulation		802.11a/n : OFDM (BPSK / QPSK / 16-QAM / 64-QAM)	802.11b: DSSS (DBPSK/DQPSK/CCK) 802.11g/n: OFDM (BPSK/QPSK/16QAM/ 64QAM)	GFSK
Number of antennas		1		
Antenna Gain		UNII-1 = 4.00 dBi UNII-3 = 4.68 dBi	2.53 dBi	
Antenna Type		PCB Antenna		
Supply Voltage to Product		3.6V DC Li-Ion battery		
Environmental conditions	Storage	-40°C to + 70°C relative humidity<95%		
	Operating	0°C to + 35°C relative humidity<95%		
EUT Dimension (L x W x H)		141 x 67 x 33 mm		

***Disclaimer:**
The information/data is supplied by the client and the same is considered to arrive at the final value.
Any changes made apart from the specified specification, can directly impact on the tests results. Refer the products user manual for more details.

3.3 Measurement Uncertainty:

Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of $k = 2$

Table 4: Measurement Uncertainty

Worst-Case uncertainty budget for DASY6 assessed according to IEEE 1528, IEC 62209-1 & IEC 62209-2. The budget is valid for the frequency range 300MHz - 6GHz and represents a worst-case analysis. For specific tests and configurations, the uncertainty could be considerably smaller.

Error Description	Uncert. Value	Prob. Dist.	Div.	(ci) 1g	(ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)
Measurement System							
Probe Calibration	6.30%	N	2	1	1	3.2%	3.2%
Axial Isotropy	4.70%	R	SQRT(3)	0.7	0.7	1.9%	1.9%
Hemispherical Isotropy	9.60%	R	SQRT(3)	0.7	0.7	3.9%	3.9%
Boundary Effects	2.00%	R	SQRT(3)	1	1	1.2%	1.2%
Linearity	4.70%	R	SQRT(3)	1	1	2.7%	2.7%
System Detection Limits	1.00%	R	SQRT(3)	1	1	0.6%	0.6%
Modulation Response	2.40%	R	SQRT(3)	1	1	1.4%	1.4%
Readout Electronics	0.30%	N	1	1	1	0.3%	0.3%
Response Time	0.80%	R	SQRT(3)	1	1	0.5%	0.5%
Integration Time	2.60%	R	SQRT(3)	1	1	1.5%	1.5%
RF Ambient Noise	3.00%	R	SQRT(3)	1	1	1.7%	1.7%
RF Ambient Reflections	3.00%	R	SQRT(3)	1	1	1.7%	1.7%
Probe Positioner mechanical tolerance	0.04%	R	SQRT(3)	1	1	0.0%	0.0%
Probe Positioning with respect to phantom shell	0.80%	R	SQRT(3)	1	1	0.5%	0.5%
Max. SAR Eval.	4.00%	R	SQRT(3)	1	1	2.3%	2.3%
Test Sample Related							
Device Positioning	2.90%	N	1	1	1	2.9%	2.9%
Device Holder	3.60%	N	1	1	1	3.6%	3.6%
Power Drift	5.00%	R	SQRT(3)	1	1	2.9%	2.9%
Power Scaling	0%	R	SQRT(3)	1	1	0.0%	0.0%
Phantom and Setup							
Phantom Uncertainty	7.60%	R	SQRT(3)	1	1	4.4%	4.4%
SAR correction	1.90%	N	1	1	0.84	1.9%	1.6%
Liquid Conductivity (mea.)DAK	2.50%	N	1	0.78	0.71	2.0%	1.8%
Liquid Permittivity (mea.) DAK	2.50%	N	1	0.23	0.26	0.6%	0.7%
Temp. unc. - Conductivity	3.40%	R	SQRT(3)	0.78	0.71	1.5%	1.4%
Temp. unc. - Permittivity	0.40%	R	SQRT(3)	0.23	0.26	0.1%	0.1%
Combined Std. Uncertainty						10.6%	10.5%
Expanded STD Uncertainty						**21.2%**	**21.0%**

Note: The listed uncertainties are the worst case uncertainties for the entire range of measurements and are for the reporting purpose only and are not used in determining the PASS/FAIL of the results.

4 TEST SET-UP AND OPERATION MODE

4.1 Principle of Configuration Selection

Transmission was enabled with highest possible duty cycle on low, mid and high channels

This product operates in 2 mode (Linear and Convex) as described in operational description under clause 5 of this test report, these mode of operations are related to analog circuitry and do not affect the RF characteristics.

4.1.1 EUT Mode of operation Mode	**Description**
Sector / Curved	Deep scanning uses Sector transduser, with Wi-Fi in Tx and Rx mode and BLE is used for initial paring
Linear	Shallow scanning uses Linear transduser with Wi-Fi in Tx and Rx mode and BLE is used for initial paring
Charging mode	Scanning is paused and probe stays connected to display device via Wi-Fi.

4.1.2 Following configurations are used for testing

Test cases	**Mode of operation**
SAR testing	Special configuration tool is used to enable the Wi-Fi and BLE continuous transmission as needed

4.2 Test Operation and Test Software

Hardware Version of Vscan Air SL: GP000170 Rev01
Hardware Version of Digital board: GP200400 Rev15
Hardware Version of HV board: GP200401 Rev11
Hardware Version of Analog board: GP200402 Rev10
Probe FW Version :1.1.23.355
Vscan Air Application software:
 Vscan Air R2 for iOS
 Vscan Air R2 for Android
Note: Both Probe FW and App SW version has R2 features included.
APP Software Version: 1.1.26.18955
EUT can be configured for different test conditions using calibrator tool commands
Calibrator tool version = 0.80
Medical Device name of the probe: Vscan Air SL
Medical Device name of the application SW (app): Vscan Air

GlobTek Power adapter - GTM46101-1005-USB

Vscan Air Charger - GP200304

XP Power - VEU10US050

Anker wireless charger - A2503

4.3 Special Accessories and Auxiliary Equipment

- None

4.4 Countermeasures to achieve EMC Compliance

- None

4.5 List of Frequencies

Frequency Band (MHz)	Channel No.	Channel Frequency (MHz)
UNII-1:5150-5250 MHz	36	5180
	38	5190
	46	5230
	48	5240
UNII-3:5725-5825 MHz	149	5745
	151	5755
	159	5795
	165	5825

Table 5: List of center Frequencies(Wi-Fi 5 GHz)

Channel used for Wi-Fi testing

UNII-1

Channel Bandwidth 20MHz

Channel low : 5180MHz

Channel Mid: 5200MHz

Channel High : 5240MHz

Channel Bandwidth 40MHz

Channel low : 5190MHz

Channel High: 5230 MHz

UNII-3

Channel Bandwidth 20MHz

Channel low : 5745MHz

Channel Mid: 5785 MHz

Channel High : 5825MHz

Channel Bandwidth 40MHz

Channel low : 5755MHz

Channel High : 5795MHz

Frequency Band (MHz)	Channel No.	Channel Frequency (MHz)
2412 – 2462	**1**	**2412**
	2	2417
	3	**2422**
	4	2427
	5	2432
	6	2437
	7	**2442**
	8	2447
	9	**2452**
	10	2457
	11	**2462**

Table 6: List of Wi-Fi Frequiences(Wi-Fi 2.4 GHz)

Channel used for Wi-Fi testing

Channel Bandwidth 20MHz

Channel low : 2412MHz

Channel mid : 2437MHz

Channel high : 2462MHz

Channel Bandwidth 40MHz

Channel low : 2422MHz

Channel high : 2452MHz

Frequency Band (GHz)	Channel No.	Frequency (MHz)
BLE (2.4-2.4835)	**0**	**2402**
	1	2404
	2	2406
	3	2408
	:	:
	:	:
	18	2438
	19	**2440**
	20	2437
	:	:
	:	:
	36	2474
	37	2476
	38	2478
	39	**2480**

Table 7: List of BLE Frequiences of the EUT

Channel used for BLE testing

Channel low : 2402MHz

Channel mid : 2440MHz

Channel High : 2480MHz

Note:

TUV Sample Identification number : A003307764 - 004 → Radiated Sample

4.6 Report references

Note: Product Vscan Air SL has multiple protocols. All the supported wireless protocols and their respective test results are issued in saparate test reports, following table lists the report numbers.

Radio Protocol	Report Number
RF test report for Wi-Fi (2.4GHz) and BLE	ULR-TC568822300000100F
RF test report for Wi-Fi (5GHz UNII-1 & UNII-3)	ULR-TC568822300000101F
SAR test report for Wi-Fi (2.4GHz and 5GHz) – (This report)	**ULR-TC568822300000105F**
RF test report for Wireless power transmission systems, Wireless charger (111 kHz to 205 kHz)	ULR-TC568822300000102F

5 TEST METHODOLOGY

The Specific Absorption Rate (SAR) measurement specifications, methods, and procedures for this device are in accordance with the following standards:

- IEEE 1528-2013 – IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
- FCC KDB 447498 D01 – General RF Exposure Guidance v06
- FCC KDB 248227 D01 – 802.11 Wi-Fi SAR v02r02
- FCC KDB 865664 D01 – SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB 865664 D02 – RF Exposure Reporting v01r02

6 Statement of Compliance

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR Subpart 2.1093 and ANSI/IEEE C95.1-1999. Testing is performed with measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications

7 RF Exposure Limits

7.1 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.

7.2 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. because 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. However, 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.

Guideline /Standard	**Limits for Occupational/ Controlled Exposure**		**Limits for General Population/ Uncontrolled Exposure**	
	Head, trunk, arms, legs (W/kg)	**Hands, wrists, feet and ankles (W/kg)**	**Head, trunk, arms, legs (W/kg)**	**Hands, wrists, feet and ankles (W/kg)**
ANSI/IEEE C95.1-1999	8 (1g)	20 (10g)	1.6 (1g)	4 (10g)

7.2.1 Applicable Limits for EUT planes

Position	**Extremity**	**Limit 1 g (W/kg)**	**Limit 10g (W/kg)**
Edge Top & Edge Bottom	Trunk	1.6	-
Front , Back , Edge Right , Edge Left	Limb	-	4

8 SAR Measurement System

8.1 Definition of Specific Absorption Rate (SAR)

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 modelling. 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.

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:

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

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

SAR measurement can be related to the electrical field in the tissue by

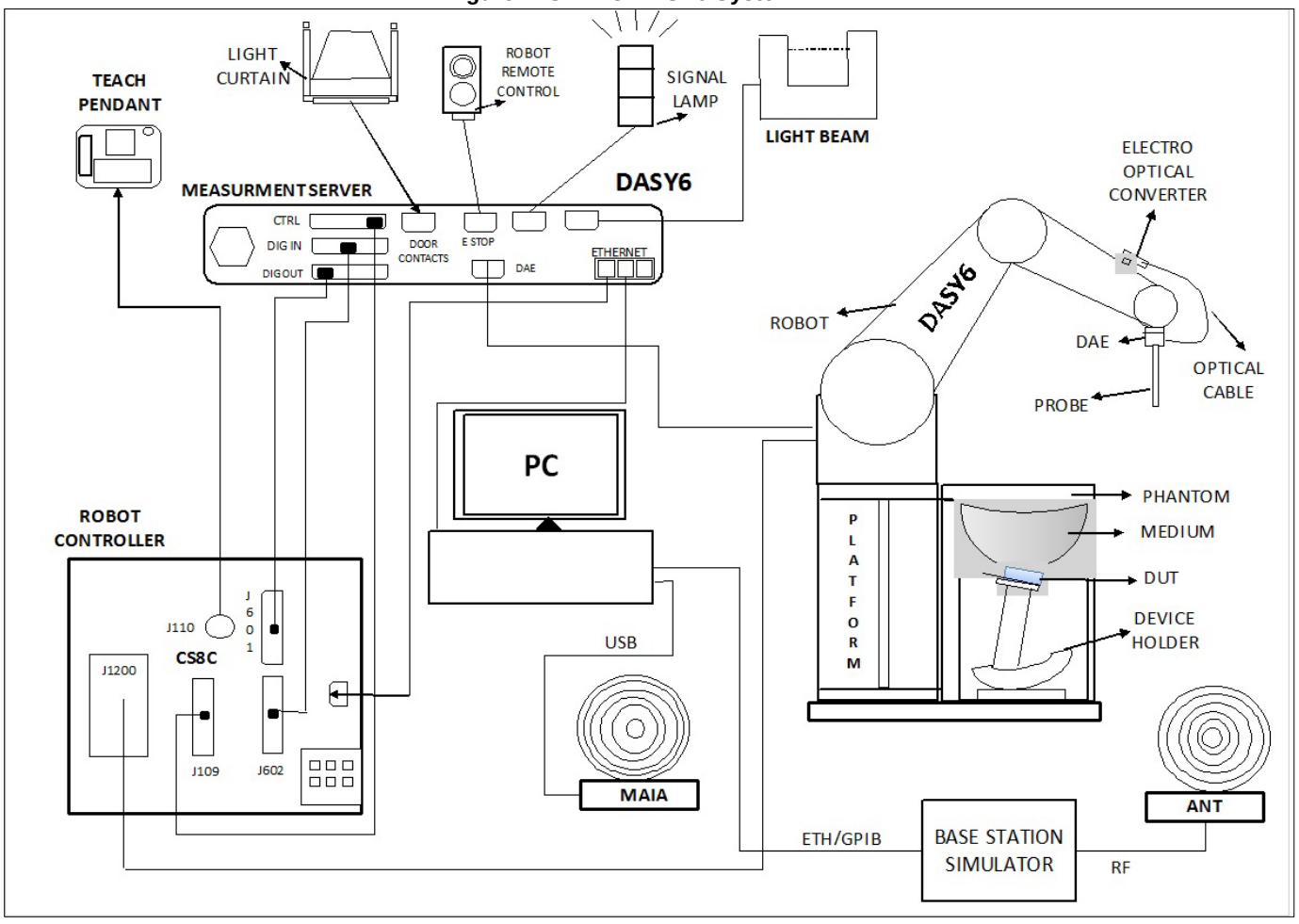
$$SAR = \frac{\sigma|E|^2}{\rho}$$

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

8.2 SPEAG DASY System

DASY system consists of high precision robot, probe alignment sensor, phantom, robot controller, controlled measurement server and near-field probe. The robot includes six axes that can move to the precision position of the DASY6 software defined. The DASY software can define the area that is detected by the probe. The robot is connected to controlled box. Controlled measurement server is connected to the controlled robot box. The DAE includes amplifier, signal multiplexing, AD converter, offset measurement and surface detection. It is connected to the Electro-optical coupler (ECO). The ECO performs the conversion form the optical into digital electric signal of the DAE and transfers data to the PC.

Figure 1: SPEAG DASY6 System



Robot

The DASY system uses the high precision robots from Stäubli SA (France). For the 6-axis controller system, the robot controller version (DASY6: CS8c) from Stäubli is used. The Stäubli robot series have many features that are important for our application:

· High precision (repeatability ±0.02 mm)

· High reliability (industrial design)

· Jerk-free straight movements(brushless synchron motors, no stepper motors)

· Low ELF interference (motor control fields are shielded by the closed metallic construction)

Figure 2: SPEAG DASY6 Robot

Probes

The SAR measurement is conducted with the dosimetric probe. 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.

Figure 3: EX3DV4 Probe

Model	EX3DV4
Construction	Symmetrical design with triangular core. Built-in shielding against static charges. PEEK enclosure material (resistant to organic solvents, e.g., DGBE).
Frequency	4 MHz – 10 GHz Linearity: ±0.2 dB (30 MHz – 10 GHz)
Directivity	±0.1 dB in TSL (rotation around probe axis) ±0.3 dB in TSL (rotation normal to probe axis)
Dynamic Range	10 µW/g – >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

Data Acquisition Electronics (DAE)

Figure 4: DAE4

Model	DAE4
Construction	Signal amplifier, multiplexer, A/D converter and control logic. Serial optical link for communication with DASY 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	< 5µV (with auto zero)
Input Bias Current	< 50 fA
Dimensions	60 x 60 x 68 mm

Phantoms

Figure 5: Twin SAM Phantom

Model	Twin SAM
Construction	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.
Material	Vinylester, glass fiber reinforced (VE-GF)
Shell Thickness	2 ± 0.2 mm (6 ± 0.2 mm at ear point)
Dimensions	Length: 1000 mm Width: 500 mm Height: adjustable feet
Filling Volume	approx. 25 liters

Figure 6: ELI Phantom

Model	ELI
Construction	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.
Material	Vinylester, glass fiber reinforced (VE-GF)
Shell Thickness	2.0 ± 0.2 mm (bottom plate)
Dimensions	Major axis: 600 mm Minor axis: 400 mm
Filling Volume	approx. 30 liters

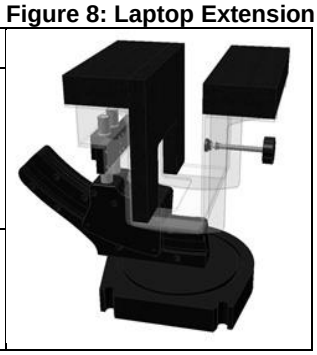
Device Holder

Figure 7: Mounting Device

Model	Mounting Device
Construction	In combination with the Twin SAM Phantom or ELI4, the Mounting Device enables the rotation of the mounted transmitter device in spherical coordinates. Rotation point is the ear opening point. 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).
Material	POM

Figure 8: Laptop Extension

Model	Laptop Extensions Kit
Construction	Simple but effective and easy-to-use extension for Mounting Device that facilitates the testing of larger devices according to IEC 62209-2 (e.g., laptops, cameras, etc.). It is lightweight and fits easily on the upper part of the Mounting Device in place of the phone positioner.
Material	POM, Acrylic glass, Foam



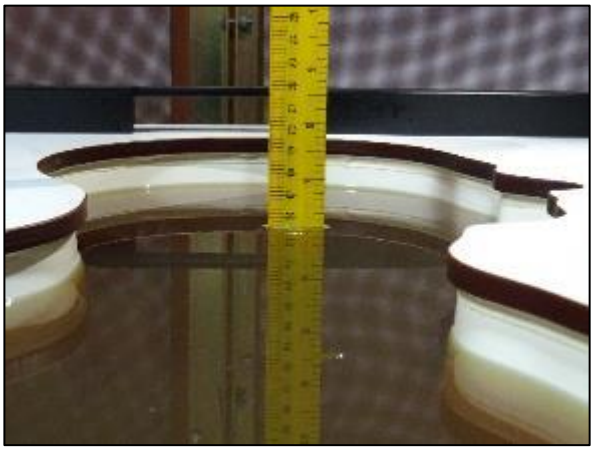
System Validation Dipoles

Figure 9: D-Serial Dipole

Model	D-Serial
Construction	Symmetrical dipole with λ/4 balun. Enables measurement of feed point impedance with NWA. Matched for use near flat phantoms filled with tissue simulating solutions.
Frequency	750 MHz to 5800 MHz
Return Loss	> 20 dB
Power Capability	> 100 W (f < 1GHz), > 40 W (f > 1GHz)

Tissue Simulating Liquids

For SAR measurement of the field distribution inside the phantom, the phantom must be filled with homogeneous tissue simulating liquid to a depth of at least 15 cm. 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. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm. The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 5% are listed.



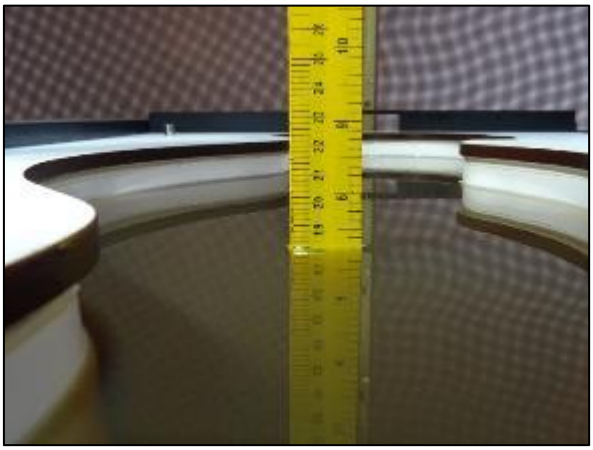


Figure 10: Photo of Liquid Height for Head Position & Photo of Liquid Height for Body Position

The dielectric properties of the head tissue simulating liquids are defined in IEEE 1528, and KDB 865664 D01 Appendix A. For the body tissue simulating liquids, the dielectric properties are defined in KDB 865664 D01 Appendix A. The dielectric properties of the tissue simulating liquids were verified prior to the SAR evaluation using a dielectric assessment kit(DAK) and a network analyzer.

Table 8: Targets of Tissue Simulating Liquid

Frequency (MHz)	Target Permittivity	Range of ±5%	Target Conductivity	Range of ±5%
For Head				
750	41.9	39.8 ~ 44.0	0.89	0.85 ~ 0.93
835	41.5	39.4 ~ 43.6	0.90	0.86 ~ 0.95
900	41.5	39.4 ~ 43.6	0.97	0.92 ~ 1.02
1450	40.5	38.5 ~ 42.5	1.20	1.14 ~ 1.26
1640	40.3	38.3 ~ 42.3	1.29	1.23 ~ 1.35
1750	40.1	38.1 ~ 42.1	1.37	1.30 ~ 1.44
1800	40.0	38.0 ~ 42.0	1.40	1.33 ~ 1.47
1900	40.0	38.0 ~ 42.0	1.40	1.33 ~ 1.47
2000	40.0	38.0 ~ 42.0	1.40	1.33 ~ 1.47
2300	39.5	37.5 ~ 41.5	1.67	1.59 ~ 1.75
2450	39.2	37.2 ~ 41.2	1.80	1.71 ~ 1.89
2600	39.0	37.1 ~ 41.0	1.96	1.86 ~ 2.06
3500	37.9	36.0 ~ 39.8	2.91	2.76 ~ 3.06
5200	36.0	34.2 ~ 37.8	4.66	4.43 ~ 4.89
5300	35.9	34.1 ~ 37.7	4.76	4.52 ~ 5.00
5500	35.6	33.8 ~ 37.4	4.96	4.71 ~ 5.21
5600	35.5	33.7 ~ 37.3	5.07	4.82 ~ 5.32
5800	35.3	33.5 ~ 37.1	5.27	5.01 ~ 5.53
For Body				
750	55.5	52.7 ~ 58.3	0.96	0.91 ~ 1.01
835	55.2	52.4 ~ 58.0	0.97	0.92 ~ 1.02
900	55.0	52.3 ~ 57.8	1.05	1.00 ~ 1.10
1450	54.0	51.3 ~ 56.7	1.30	1.24 ~ 1.37
1640	53.8	51.1 ~ 56.5	1.40	1.33 ~ 1.47
1750	53.4	50.7 ~ 56.1	1.49	1.42 ~ 1.56
1800	53.3	50.6 ~ 56.0	1.52	1.44 ~ 1.60
1900	53.3	50.6 ~ 56.0	1.52	1.44 ~ 1.60
2000	53.3	50.6 ~ 56.0	1.52	1.44 ~ 1.60
2300	52.9	50.3 ~ 55.5	1.81	1.72 ~ 1.90
2450	52.7	50.1 ~ 55.3	1.95	1.85 ~ 2.05
2600	52.5	49.9 ~ 55.1	2.16	2.05 ~ 2.27
3500	51.3	48.7 ~ 53.9	3.31	3.14 ~ 3.48
5200	49.0	46.6 ~ 51.5	5.30	5.04 ~ 5.57
5300	48.9	46.5 ~ 51.3	5.42	5.15 ~ 5.69
5500	48.6	46.2 ~ 51.0	5.65	5.37 ~ 5.93
5600	48.5	46.1 ~ 50.9	5.77	5.48 ~ 6.06
5800	48.2	45.8 ~ 50.6	6.00	5.70 ~ 6.30

The following table gives the recipes for tissue simulating liquids.

Table 9: Recipes of Tissue Simulating Liquid

Tissue Type	Bactericide	DGBE	HEC	NaCl	Sucrose	Triton X-100	Water	Diethylene Glycol Mono-hexylether
H750	0.2	-	0.2	1.5	56.0	-	42.1	-
H835	0.2	-	0.2	1.5	57.0	-	41.1	-
H900	0.2	-	0.2	1.4	58.0	-	40.2	-
H1450	-	43.3	-	0.6	-	-	56.1	-
H1640	-	45.8	-	0.5	-	-	53.7	-
H1750	-	47.0	-	0.4	-	-	52.6	-
H1800	-	44.5	-	0.3	-	-	55.2	-
H1900	-	44.5	-	0.2	-	-	55.3	-
H2000	-	44.5	-	0.1	-	-	55.4	-
H2300	-	44.9	-	0.1	-	-	55.0	-
H2450	-	45.0	-	0.1	-	-	54.9	-
H2600	-	45.1	-	0.1	-	-	54.8	-
H3500	-	8.0	-	0.2	-	20.0	71.8	-
H5G	-	-	-	-	-	17.2	65.5	17.3
B750	0.2	-	0.2	0.8	48.8	-	50.0	-
B835	0.2	-	0.2	0.9	48.5	-	50.2	-
B900	0.2	-	0.2	0.9	48.2	-	50.5	-
B1450	-	34.0	-	0.3	-	-	65.7	-
B1640	-	32.5	-	0.3	-	-	67.2	-
B1750	-	31.0	-	0.2	-	-	68.8	-
B1800	-	29.5	-	0.4	-	-	70.1	-
B1900	-	29.5	-	0.3	-	-	70.2	-
B2000	-	30.0	-	0.2	-	-	69.8	-
B2300	-	31.0	-	0.1	-	-	68.9	-
B2450	-	31.4	-	0.1	-	-	68.5	-
B2600	-	31.8	-	0.1	-	-	68.1	-
B3500	-	28.8	-	0.1	-	-	71.1	-
B5G	-	-	-	-	-	10.7	78.6	10.7

SAR System Verification

The system check verifies that the system operates within its specifications. It is performed daily or before every SAR measurement. The system check uses normal SAR measurements in the flat section of the phantom with a matched dipole at a specified distance. The system verification setup is shown as below.

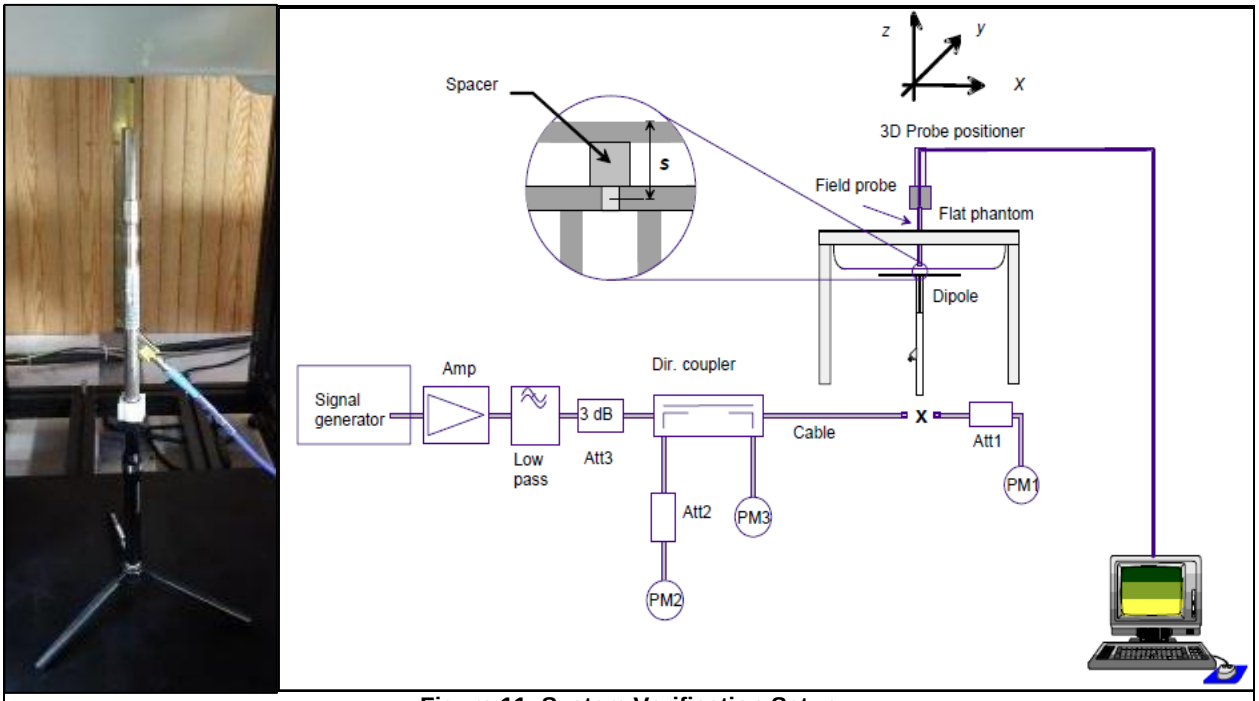


Figure 11: System Verification Setup

The validation dipole is placed beneath the flat phantom with the specific spacer in place. The distance spacer is touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The spectrum analyzer measures the forward power at the location of the system check dipole connector. The signal generator is adjusted for the desired forward power (250 mW is used for 700 MHz to 3 GHz, 100 mW is used for 3.5 GHz to 6 GHz) at the dipole connector and the power meter is read at that level. After connecting the cable to the dipole, the signal generator is readjusted for the same reading at power meter.

After system check testing, the SAR result will be normalized to 1W forward input power and compared with the reference SAR value derived from validation dipole certificate report. The deviation of system check should be within 10 %.

9 SAR Measurement Procedure

According to the SAR 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

The SAR measurement procedures for each of test conditions are as follows:

(a) Make EUT to transmit maximum output power

(b) Measure conducted output power through RF cable

(c) Place the EUT in the specific position of phantom

(d) Perform SAR testing steps on the DASY system

(e) Record the SAR value

9.1 Area & Zoom Scan Procedure

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g. According to KDB 865664 D01, the resolution for Area and Zoom scan is specified in the table below.

Items	<= 2 GHz	2-3 GHz	3-4 GHz	4-5 GHz	5-6 GHz
Area Scan (Δx, Δy)	<= 15 mm	<= 12 mm	<= 12 mm	<= 10 mm	<= 10 mm
Zoom Scan (Δx, Δy)	<= 8 mm	<= 5 mm	<= 5 mm	<= 4 mm	<= 4 mm
Zoom Scan (Δz)	<= 5 mm	<= 5 mm	<= 4 mm	<= 3 mm	<= 2 mm
Zoom Scan Volume	>= 30 mm	>= 30 mm	>= 28 mm	>= 25 mm	>= 22 mm

Note:

When zoom scan is required and report SAR is <= 1.4 W/kg, the zoom scan resolution of Δx / Δy (2-3GHz: <= 8 mm, 3-4GHz: <= 7 mm, 4-6GHz: <= 5 mm) may be applied.

9.2 Volume Scan Procedure

Volume Scans are 3D scans used to assess the peak spatial SAR values within an averaging volume containing 1g and 10g of simulated tissue. It is compatible with any phantom. For regular phantoms, the measurement grid is generated by projecting a plane onto the phantom surface as for Area and Zoom scans. For specific phantoms, the measurement grid is generated by a conformal offset to the phantom surface at the desired distances. The grid extents can be set by the end user to cover the DUT dimensions or the whole measurable area of the phantom.

9.3 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 drift more than 5%, the SAR will be retested.

9.4 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the IEEE 1528 standard. It can be conducted for 1 g and 10 g, as well as for user-specific masses. 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 from 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

In DASY5 V5.2 SAR, the calculation is performed in the SEMCAD post processing engine. In cDASY6 Module SAR, the 1 g and 10 g cubes are calculated in the software itself.

9.5 SAR Averaged Methods

In DASY, the interpolation and extrapolation are both based on the modified Quadratic Shepard's method. The interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5 mm.

9.6 Tissue Verification

Table 10: The measuring results for tissue simulating liquid

Tissue Type	Frequency (MHz)	Liquid Temp. (℃)	Measured Conductivity (σ)	Measured Permittivity (ε_r)	Target Conductivity (σ)	Target Permittivity (ε_r)	Conductivity Deviation (%)	Permittivity Deviation (%)	Test Date
H2450	2450	23.12	1.84	39.70	1.80	39.2	2.22	1.28	Aug. 10, 2022
H5200	5200	22.26	4.50	35.90	4.66	36.0	-3.43	-0.28	Aug. 10, 2022

Note:

1. The dielectric properties of the tissue simulating liquid must be measured within 24 hours before the SAR testing and within ±5% of the target values. Liquid temperature during the SAR testing must be within ±2°C.
2. Since the maximum deviation of dielectric properties of the tissue simulating liquid is within 5%, SAR correction is evaluated in the measurement uncertainty shown on section 3.3 of this report.

9.7 System Verification

Table 11: The measuring results for system check

Frequency (MHz)	TSL	Power [dBm]	Deviation 1g [%]	Deviation 10g [%]	Deviation Peak [%]	Isotropic Error [%]	Test Date
2450	HSL	17	-0.40	-1.20	2.60	-2.30	Aug. 10, 2022
5200	HSL	17	-8.90	-7.80	-6.60	-3.80	Aug. 10, 2022

Note:

Comparing to the reference SAR value provided by SPEAG, the validation data should be within its specification of 10 %. The result indicates the system check can meet the variation criterion and the plots can be referred to APPENDIX B: PLOTS FOR SYSTEM VERIFICATION. of this report.

9.8 RF Conducted Power

The measuring conducted power (Unit: dBm) are shown as below.

Table 12: The results of conducted power (Wi-Fi 2.4GHz)

Mode	Data rate (Mbps)	Channel Frequency (MHz)	Average Power (dBm)	Tune up tolerance (dB)	Duty cycle (%)	Average Power Including Tune-up Tolerance (dBm)
b	1	2412	14.52	2	99.11	16.52
		2437	14.18	2	99.21	16.18
		2462	13.95	2	99.48	15.95
	11	2412	14.20	2	93.41	16.20
		2437	14.20	2	92.79	16.20
		2462	13.77	2	92.81	15.77
g	6	2412	10.12	2	95.56	12.12
		2437	14.55	2	95.73	16.55
		2462	9.52	2	95.55	11.52
	24	2412	9.42	2	84.28	11.42
		2437	12.95	2	84.08	14.95
		2462	8.55	2	84.91	10.55
	54	2412	8.62	2	70.93	10.62
		2437	10.17	2	71.76	12.17
		2462	8.40	2	71.43	10.40
n_HT40	MCS0	2422	10.26	2	94.70	12.26
		2437	13.78	2	94.93	15.78
		2452	9.56	2	95.14	11.56
	MCS4	2422	9.54	2	75.76	11.54
		2437	11.97	2	75.00	13.97
		2452	8.87	2	76.24	10.87
	MCS7	2422	8.54	2	64.79	10.54
		2437	9.16	2	64.79	11.16
		2452	8.03	2	67.61	10.03
n_HT20	MCS0	2412	6.93	2	88.84	8.93
		2462	6.68	2	89.21	8.68
	MCS4	2412	5.74	2	55.74	7.74
		2462	5.35	2	58.06	7.35
	MCS7	2412	4.74	2	46.81	6.74
		2462	4.42	2	45.83	6.42

Table 13: The results of conducted power (BLE)

Data rate (Mbps)	Frequency (MHz)	Peak Power (dBm)	Maximum power including Tune-up Tolerance (dBm)
1	2402	4.42	6.42
1	2440	4.85	6.85
1	2480	5.63	7.63

Notes :
***Refer clause 9.9 SAR Test Exclusion of this test report

Table 14: The results of conducted power (Wi-Fi 5GHz)

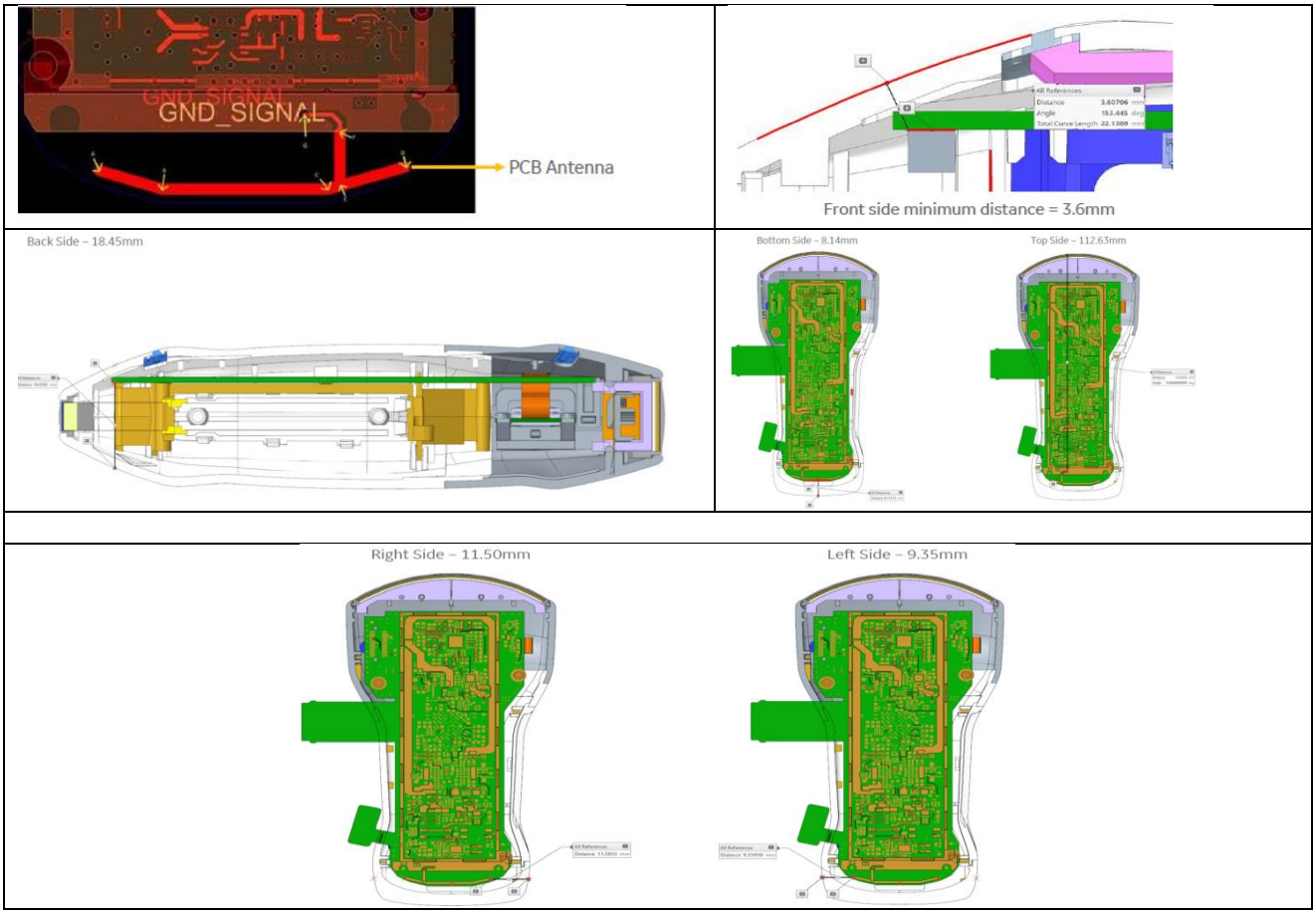
Mode	Data rate (Mbps)	Frequency (MHz)	Average Power (dBm)	Tune-up Tolerance (dB)	Duty cycle factor (dB)	Average Power Including Tune-up Tolerance (dBm)
802.11a	6	5180	12.12	2	0.24	14.12
		5240	12.67	2	0.24	14.67
		5745	8.7	2	0.23	10.70
		5825	9.52	2	0.21	11.52
	24	5180	11.6	2	0.71	13.60
		5240	12.06	2	0.76	14.06
		5745	7.99	2	0.74	9.99
		5825	8.92	2	0.71	10.92
	54	5180	10.04	2	1.44	12.04
		5240	10.43	2	1.74	12.43
		5745	7.47	2	1.39	9.47
		5825	8.48	2	1.53	10.48
802.11n HT20	MCS0	5180	12.36	2	0.23	14.36
		5240	12.57	2	0.24	14.57
		5745	8.78	2	0.25	10.78
		5825	9.71	2	0.22	11.71
	MCS4	5180	11.36	2	1.24	13.36
		5240	11.93	2	1.14	13.93
		5745	7.98	2	1.18	9.98
		5825	8.82	2	1.18	10.82
	MCS7	5180	7.86	2	1.89	9.86
		5240	8.38	2	1.70	10.38
		5745	7.44	2	1.79	9.44
		5825	7.83	2	1.91	9.83
802.11n HT40	MCS0	5180	12.36	2	0.23	14.36
		5240	12.57	2	0.24	14.57
		5745	8.78	2	0.25	10.78
		5825	9.71	2	0.22	11.71
	MCS4	5180	11.36	2	1.24	13.36
		5240	11.93	2	1.14	13.93
		5745	7.98	2	1.18	9.98
		5825	8.82	2	1.18	10.82
	MCS7	5180	7.86	2	1.89	9.86
		5240	8.38	2	1.70	10.38
		5745	7.44	2	1.79	9.44
		5825	7.83	2	1.91	9.83

Notes : SAR test reduction was applied from KDB 248227

9.9 SAR Test Exclusion

Based on the conducted power measurement, reported under section " RF Conducted Power " of this test report and derivation of Low-Power exclusion level defined in FCC KDB 447498 D01 section 4.3 and RSS-102 section 2.5.1. General RF Exposure Guidance v06 (See 4.3 a), SAR test exclusion was identified for the followong frequency band.

9.9.1 Antenna location diagram and test sides analysis



Stand-alone SAR evalution:

Side	Front	Back	Left	Right	Top	Bottom
Distance to Antenna (mm)	3.78	18.45	9.35	11.50	122.63	8.14
SAR Test required for WLAN?	**Y**	**Y**	**Y**	**Y**	N	**Y**
SAR Test required for BLE?	N	N	N	N	N	N

- Vscan Air CL is a handheld ultrasound wireless probe with dual transducer. Convex and Linear side (i.e. top and bottom) of the probe is intended to be placed on human body for ultrasound scanning. Other faces of the probe (front, rear, left side and right side) are intended to be used by hand.
- SAR reductions are based on RSS-102 section 2.5.1 and KDB447498 D01 section 4.3.1.
- For extremity SAR, the exemption limits are multiplied by a factor of 2.5.
- Same antenna is used for BLE, Wi-Fi 2.4GHz and Wi-Fi 5GHz.

Simultaneous transmission SAR evalution:

This device do not support Simultaneous transmission.

9.10 Guidelines Applied

FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r02

- The maximum output power specified for production units, including tune-up tolerance, are used to determine initial SAR test requirements for the 802.11 transmission modes in a frequency band.
- SAR test reduction is determined according to 802.11 transmission mode and configuration with multiple positons
- When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band
- The reported SAR must be scaled to the maximum transmission duty factor to determine compliance
- During SAR testing, RF transmission and EUT fuctionality is verified with spectrum analyzer
- When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR testing is not required for OFDM

FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04

- Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg
- When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once
- Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
- Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

FCC KDB 447498 D01 General RF Exposure Guidance v06

- Measured SAR is adjusted for maximum tune-up tolerance
- The test separation distances required for a device to demonstrate SAR or MPE compliance must be sufficiently conservative to support the operational separation distances required by the device and its antennas and radiating structures
- For SAR testing of WLAN signal with duty cycle <100%, the measured SAR is scalled-up by the duty cycle scalling factor (i.e. 1/duty cycle)
- For all the applicable exposure position, testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR of the mid-channel or highest output power channel is
  - ≤0.8 W/kg or ≤2 W/kg, for 1-g or 10-g respectively, when transmission band is ≤100MHz
  - ≤0.6 W/kg or ≤1.5 W/kg, for 1-g or 10-g respectively, when transmission band is between 100MHz and 200 MHz
  - ≤0.4 W/kg or ≤1 W/kg, for 1-g or 10-g respectively, when transmission band is ≥200MHz

9.11 SAR Testing Results

Position	Extremity	Limit 1 g (W/kg)	Limit 10g (W/kg)
Edge Top & Edge Bottom	Trunk	1.6	-
Front , Back , Edge Right , Edge Left	Limb	-	4

Table 15: SAR Testing Results(Wi-Fi 2.4 GHz)

Phantom	Position	Description	Channel	Frequency (MHz)	psSAR 1g [W/Kg]	psSAR 10g [W/Kg]	Tune up tolerance	Adjusted SAR Value (1g) W/kg	Adjusted SAR Value (10g) W/kg
Flat HSL	FRONT	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)	6	2437	0.418	0.219	±2	**0.6625**	**0.3471**
Flat HSL	BACK	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)	6	2437	0.056	0.031	±2	0.0888	0.0491
Flat HSL	EDGE TOP	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)	6	2437	0.017	0.009	±2	0.0269	0.0143
Flat HSL	EDGE BOTTOM	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)	6	2437	0.069	0.036	±2	0.1094	0.0571
Flat HSL	EDGE RIGHT	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)	6	2437	0.1	0.049	±2	0.1585	0.0777
Flat HSL	EDGE LEFT	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)	6	2412	0.103	0.053	±2	0.1632	0.0840
Flat HSL	FRONT	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)	1	2412	0.141	0.074	±2	0.2235	0.1173

Note :

1. As the hieghest measured SAR is < 0.8 W/kg for lowest bandwidth channel, which is also the highest power configuration, remaining channels are optional, However these channels are measured as an additional analysis and reported in below table

2. For 2.4 GHz 802.11 g/n OFDMA mode, SAR testing is not required when the hieghest reported SAR for DSSS adjusted by the ration of OFDMA to DSSS specified maximum output power and adjusted SAR is ≤ 1.2 W/kg, however this exlusion is not applied as an additional analysis, OFDMA test results are reported in the below table.

Flat HSL	FRONT	IEEE 802.11g WiFi 2.4 GHz (ERP-OFDM, 6 Mbps, 96pc duty cycle)	11	2462	0.148	0.078	±2	0.2346	0.1236
Flat HSL	FRONT	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle)	1	2412	0.333	0.17	±2	**0.5278**	**0.2694**
Flat HSL	FRONT	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle)	6	2437	0.367	0.188	±2	**0.5817**	**0.2980**
Flat HSL	FRONT	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps, 96pc duty cycle)	11	2462	0.343	0.174	±2	**0.5436**	**0.2758**
Flat HSL	FRONT	IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK)	1	2412	0.144	0.072	±2	0.2282	0.1141
Flat HSL	FRONT	IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK)	6	2437	0.324	0.172	±2	0.5135	0.2726
Flat HSL	FRONT	IEEE 802.11n (HT Greenfield, 7.2 Mbps, BPSK)	11	2462	0.15	0.079	±2	0.2377	0.1252
Flat HSL	FRONT	IEEE 802.11n (HT Greenfield, 15 Mbps, BPSK)	3	2422	0.073	0.037	±2	0.1157	0.0586
Flat HSL	FRONT	IEEE 802.11n (HT Greenfield,15 Mbps, BPSK)	9	2452	0.093	0.048	±2	0.1474	0.0761

Position	Extremity	Limit 1 g (W/kg)	Limit 10g (W/kg)
Edge Top & Edge Bottom	Trunk	1.6	-
Front , Back , Edge Right , Edge Left	Limb	-	4

Table 16: SAR Testing Results(Wi-Fi 5 GHz- UNII Band 1)

Phantom	Position	Description	Channel	Frequency (MHz)	psSAR 1g [W/Kg]	psSAR 10g [W/Kg]	Tune up tolerance	Adjusted SAR Value (1g) W/kg	Adjusted SAR Value (10g) W/kg
Flat HSL	FRONT	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	36	5180	0.825	0.331	±2	**1.3075**	**0.5246**
Flat HSL	EDGE TOP	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	36	5180	0.101	0.034	±2	0.1601	0.0539
Flat HSL	EDGE BOTTOM	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	36	5180	0.157	0.053	±2	0.2488	0.0840
Flat HSL	FRONT	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	48	5240	0.976	0.365	±2	**1.5469**	**0.5785**
Flat HSL	BACK	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	48	5240	0.018	0.007	±2	0.0285	0.0111
Flat HSL	EDGE RIGHT	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	48	5240	0.104	0.043	±2	0.1648	0.0682
Flat HSL	EDGE LEFT	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	48	5240	0.014	0.006	±2	0.0222	0.0095
Flat HSL	EDGE TOP	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	48	5240	0.083	0.025	±2	0.1315	0.0396
Flat HSL	**EDGE BOTTOM**	**IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)**	**48**	**5240**	**0.206**	**0.066**	**±2**	**0.3265**	**0.1046**

Note :
1. all the planes of EUT are investigated using highest channel in the initial test configuration, as the highest measured 1-g SAR is less than 0.8W/kg (10-SAR 2.0W/kg for extremity) in initial configuration, remaining Channels not required. However, these channels were measured as an addtional analysis.

Flat HSL	FRONT	IEEE 802.11n (HT Mixed, 39 Mbps, BPSK)	36	5180	0.909	0.361	±2	**1.4407**	**0.5721**
Flat HSL	EDGE TOP	IEEE 802.11n (HT Mixed, 39 Mbps, BPSK)	36	5180	0.095	0.031	±2	0.1506	0.0491
Flat HSL	EDGE BOTTOM	IEEE 802.11n (HT Mixed, 39 Mbps, BPSK)	36	5180	0.205	0.065	±2	0.3249	0.1030
Flat HSL	FRONT	IEEE 802.11n (HT Mixed, 39 Mbps, BPSK)	48	5240	0.889	0.363	±2	**1.4090**	**0.5753**
Flat HSL	EDGE TOP	IEEE 802.11n (HT Mixed, 39 Mbps, BPSK)	48	5240	0.070	0.026	±2	0.1109	0.0412
Flat HSL	EDGE BOTTOM	IEEE 802.11n (HT Mixed, 39 Mbps, BPSK)	48	5240	0.195	0.066	±2	0.3091	0.1046

Flat HSL	FRONT	IEEE 802.11n (HT Mixed, 81 Mbps, BPSK)	38	5190	0.262	0.101	±2	0.4152	0.1601
Flat HSL	EDGE TOP	IEEE 802.11n (HT Mixed, 81 Mbps, BPSK)	38	5190	0.024	0.008	±2	0.0380	0.0127
Flat HSL	EDGE BOTTOM	IEEE 802.11n (HT Mixed, 81 Mbps, BPSK)	38	5190	0.050	0.015	±2	0.0792	0.0238
Flat HSL	FRONT	IEEE 802.11n (HT Mixed, 81 Mbps, BPSK)	46	5230	0.590	0.233	±2	0.9351	0.3693
Flat HSL	EDGE TOP	IEEE 802.11n (HT Mixed, 81 Mbps, BPSK)	46	5230	0.059	0.021	±2	0.0935	0.0333
Flat HSL	EDGE BOTTOM	IEEE 802.11n (HT Mixed, 81 Mbps, BPSK)	46	5230	0.157	0.051	±2	0.2488	0.0808

Note :
1. all the planes of EUT are investigated using highest channel in the initial test configuration, as the highest measured 1-g SAR is less than 0.8W/kg (10-SAR 2.0W/kg for extremity) in initial configuration, remaining Channels not required. However, these channels were measured as an addtional analysis.

Position	Extremity	Limit 1 g (W/kg)	Limit 10g (W/kg)
Edge Top & Edge Bottom	Trunk	1.6	-
Front , Back , Edge Right , Edge Left	Limb	-	4

Table 17: SAR Testing Results(Wi-Fi 5 GHz- UNII Band 3)

Phantom	Position	Description	Channel	Frequency (MHz)	psSAR 1g [W/Kg]	psSAR 10g [W/Kg]	Tune up tolerance	Adjusted SAR Value (1g) W/kg	Adjusted SAR Value (10g) W/kg
Flat HSL	FRONT	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	149	5745	0.463	0.162	±2	0.7338	0.2568
Flat HSL	EDGE TOP	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	149	5745	0.022	0.007	±2	0.0349	0.0111
Flat HSL	EDGE BOTTOM	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	149	5745	0.122	0.042	±2	0.1934	0.0666
Flat HSL	FRONT	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	165	5825	0.616	0.219	±2	0.9763	0.3471
Flat HSL	EDGE TOP	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	165	5825	0.018	0.005	±2	0.0285	0.0079
Flat HSL	EDGE BOTTOM	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	165	5825	0.139	0.053	±2	0.2203	0.0840

Note :
1. all the planes of EUT are investigated using highest channel in the initial test configuration, as the highest measured 1-g SAR is less than 0.8W/kg (10-SAR 2.0W/kg for extremity) in initial configuration, remaining Channels not required. However, these channels were measured as an addtional analysis.

Flat HSL	FRONT	IEEE 802.11n (HT Mixed, 39 Mbps, BPSK)	149	5745	0.382	0.138	±2	0.6054	0.2187
Flat HSL	EDGE TOP	IEEE 802.11n (HT Mixed, 39 Mbps, BPSK)	149	5745	0.014	0.004	±2	0.0222	0.0063
Flat HSL	EDGE BOTTOM	IEEE 802.11n (HT Mixed, 39 Mbps, BPSK)	149	5745	0.134	0.046	±2	0.2124	0.0729
Flat HSL	FRONT	IEEE 802.11n (HT Mixed, 39 Mbps, BPSK)	165	5825	0.607	0.216	±2	0.9620	0.3423
Flat HSL	EDGE TOP	IEEE 802.11n (HT Mixed, 39 Mbps, BPSK)	165	5825	0.027	0.009	±2	0.0428	0.0143
Flat HSL	EDGE BOTTOM	IEEE 802.11n (HT Mixed, 39 Mbps, BPSK)	165	5825	0.136	0.048	±2	0.2155	0.0761

Flat HSL	FRONT	IEEE 802.11n (HT Mixed, 81 Mbps, BPSK)	151	5755	0.250	0.086	±2	0.3962	0.1363
Flat HSL	EDGE TOP	IEEE 802.11n (HT Mixed, 81 Mbps, BPSK)	151	5755	0.010	0.003	±2	0.0158	0.0048
Flat HSL	EDGE BOTTOM	IEEE 802.11n (HT Mixed, 81 Mbps, BPSK)	151	5755	0.062	0.020	±2	0.0983	0.0317
Flat HSL	FRONT	IEEE 802.11n (HT Mixed, 81 Mbps, BPSK)	159	5795	0.569	0.198	±2	0.9018	0.3138
Flat HSL	EDGE TOP	IEEE 802.11n (HT Mixed, 81 Mbps, BPSK)	159	5795	0.020	0.005	±2	0.0317	0.0079
Flat HSL	EDGE BOTTOM	IEEE 802.11n (HT Mixed, 81 Mbps, BPSK)	159	5795	0.130	0.047	±2	0.2060	0.0745

Note :
1. all the planes of EUT are investigated using highest channel in the initial test configuration, as the highest measured 1-g SAR is less than 0.8W/kg (10-SAR 2.0W/kg for extremity) in initial configuration, remaining Channels not required. However, these channels were measured as an addtional analysis.

10 LIST OF TABLES

11 LIST OF FIGURES

*****END OF TEST REPORT*****