

FCC SAR EVALUATION REPORT

**In accordance with the requirements of
FCC 47 CFR Part 2(2.1093) and
IEEE Std 1528-2013**

Product Name: PAL2

Model No.: PAL2

Serial Model: N/A

Brand Name: IT / Safety

Report No.: SZ26090022S01

FCC ID: 2BV6KPAL2

Prepared for

National Protective Systems, Inc.

6 Blackburn Center 2nd Floor Gloucester, MA 1930

Prepared by

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TEST RESULT CERTIFICATION

Applicant's name.....: National Protective Systems, Inc.

Address.....: 6 Blackburn Center 2nd Floor Gloucester, MA 1930

Manufacturer's Name.....: National Protective Systems, Inc.

Address.....: 6 Blackburn Center 2nd Floor Gloucester, MA 1930

Product description

Product name.....: PAL2

Trademark: IT / Safety

Model and/or type reference .: PAL2

Serial Model.....: N/A

FCC 47 CFR Part 2(2.1093)

Standards.....: IEEE Std 1528-2013

Published RF exposure KDB procedures

This device described above has been tested by Shenzhen Morlab Communications Technology Co., Ltd. In accordance with the measurement methods and procedures specified in IEEE Std 1528-2013 and KDB 865664 D01. Testing has shown that this device is capable of compliance with localized specific absorption rate (SAR) specified in FCC 47 CFR Part 2(2.1093). The test results in this report apply only to the tested sample of the stated device/equipment. Other similar device/equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

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Test Sample Number.....: SZ26090022-1#

Date of Test

Date (s) of performance of tests.....: Sep. 07, 2026

Date of Issue.....: Oct. 15, 2026

Test Result.....: **Pass**

Reviewed by: Pang Siyu
Pang Siyu

Approved by: Shen Junsheng
Shen Junsheng

※ ※ Revision History ※ ※

REV.	DESCRIPTION	ISSUED DATE	REMARK
Rev.1.0	Initial Test Report Release	Oct. 15, 2026	

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1. General Information

1.1. RF exposure limits

(A).Limits for Occupational/Controlled Exposure (W/kg)

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

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

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

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

Occupational/Controlled Environments:

Are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

General Population/Uncontrolled Environments:

Are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

NOTE
TRUNK LIMIT
1.6 W/kg
APPLIED TO THIS EUT

1.2. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing as follows.

Band	Max SAR Value Reported(W/kg)
	1-g Body (Separation distance of 5mm)
2.4GHz WLAN	1.239
Bluetooth	1.175
Zigbee	1.186

NOTE: 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 Part 2(2.1093), and had been tested in accordance with the measurement methods and procedures specified in IEEE Std 1528-2013 & KDB 865664 D01.

1.3. EUT Description

Device Information			
Product Name	PAL2		
Model Name	PAL2		
Family Model	N/A		
Model Difference	N/A		
Device Phase	Identical Prototype		
Exposure Category	General population / Uncontrolled environment		
Antenna Type	PCB Antenna		
Power Ratings	DC 3.6V from battery or DC 5V from external circuit		
Hardware version	PAL2		
Software version	V1.0.0		
Device Operating Configurations			
Supporting Mode(s)	WLAN 2.4G, Bluetooth, Zigbee		
Test Modulation	WLAN(DSSS/OFDM), Bluetooth (GFSK), Zigbee(O-QPSK)		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	WLAN 2.4G	2412-2462	
	Bluetooth	2402-2480	
	Zigbee	2405-2480	

1.4. Test specification(s)

FCC 47 CFR Part 2(2.1093)
IEEE Std 1528-2013
KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
KDB 865664 D02 RF Exposure Reporting v01r02
KDB 447498 D01 General RF Exposure Guidance v06
KDB 248227 D01 802.11 Wi-Fi SAR v02r02

1.5. Ambient Condition

Ambient temperature	20°C – 24°C
Relative Humidity	30% – 70%

1.6. Test Facility

Test Laboratory:

Shenzhen Morlab Communications Technology Co., Ltd.

FL.1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District,
ShenZhen, GuangDong Province, P. R. China

The test facility is recognized, certified or accredited by the following organizations:

FCC-Registration No.: 226174 Designation Number: CN1192

Shenzhen Morlab Communications Technology Co., Ltd. has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

IC —CAB identifier: CN0062

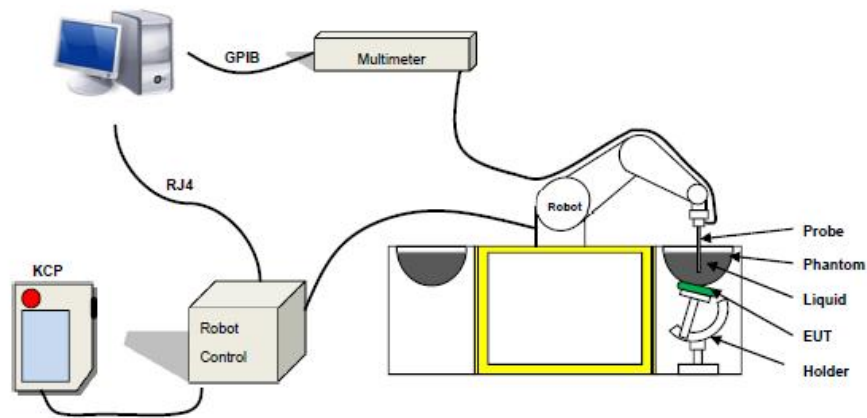
The 3m Semi-anechoic chamber of Shenzhen Morlab Communications Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 7183A

A2LA-Lab Cert. No.: 4267.01

Shenzhen Morlab Communications Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

2. SAR Measurement System

2.1. SATIMO SAR Measurement Set-up Diagram



These measurements were performed with the automated near-field scanning system OPENSAR from SATIMO. The system is based on a high precision robot (working range: 901 mm), which positions the probes with a positional repeatability of better than ± 0.03 mm. The SAR measurements were conducted with dosimetric probe (manufactured by SATIMO), designed in the classical triangular configuration and optimized for dosimetric evaluation.

The first step of the field measurement is the evaluation of the voltages induced on the probe by the device under test. Probe diode detectors are nonlinear. Below the diode compression point, the output voltage is proportional to the square of the applied E-field; above the diode compression point, it is linear to the applied E-field. The compression point depends on the diode, and a calibration procedure is necessary for each sensor of the probe.

The Keithley multimeter reads the voltage of each sensor and send these three values to the PC. The corresponding E field value is calculated using the probe calibration factors, which are stored in the working directory. This evaluation includes linearization of the diode characteristics. The field calculation is done separately for each sensor. Each component of the E field is displayed on the "Dipole Area Scan Interface" and the total E field is displayed on the "3D Interface"

2.2. Robot

The SATIMO SAR system uses the high precision robots from KUKA. For the 6-axis controller system, the robot controller version (KUKA) from KUKA is used. The KUKA robot series have many features that are important for our application:



- High precision (repeatability ± 0.03 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)

2.3. Probe

This E-field detection probe is composed of three orthogonal dipoles linked to special Schottky diodes with low detection thresholds. The probe allows the measurement of electric fields in liquids such as the one defined in the IEEE and CENELEC standards.

For the measurements the Specific Dosimetric E-Field Probe with following specifications is used.



- Probe Length: 330 mm
- Length of Individual Dipoles: 2 mm
- Maximum external diameter: 8 mm
- Probe Tip External Diameter: 2.5 mm
- Distance between dipole/probe extremity: 1 mm
- Dynamic range: 0.01-100 W/kg
- Probe linearity: 3%
- Axial Isotropy: < 0.10 dB
- Spherical Isotropy: < 0.10 dB
- Calibration range: 150 MHz to 7.5 GHz for head & body simulating liquid.
- Angle between probe axis (evaluation axis) and surface normal line: less than 30°

2.3.1. E-Field Probe Calibration

Each probe needs to be calibrated according to a dosimetric assessment procedure with accuracy better than $\pm 10\%$. The spherical isotropy shall be evaluated and within $\pm 0.25\text{dB}$. The sensitivity parameters (Norm X, Norm Y, and Norm Z), the diode compression parameter (DCP) and the conversion factor (Conv F) of the probe are tested. The calibration data can be referred to appendix D of this report.

2.4. Phantoms

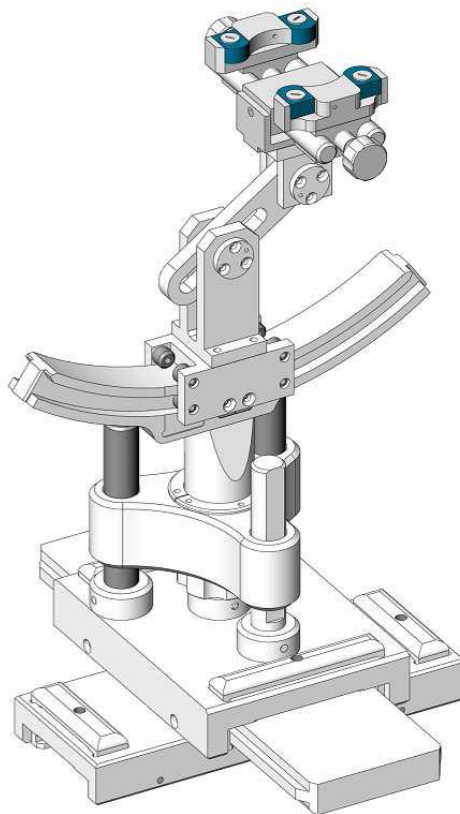
For the measurements the Specific Anthropomorphic Mannequin (SAM) defined by the IEEE SCC-34/SC2 group is used. The phantom is a polyurethane shell integrated in a wooden table. The thickness of the phantom amounts to 2mm +/- 0.2mm. It enables the dosimetric evaluation of left and right phone usage and includes an additional flat phantom part for the simplified performance check. The phantom set-up includes a cover, which prevents the evaporation of the liquid.



SAM

The test, based on ultrasonic system, allows measuring the thickness with an accuracy of 10 μm .

2.6. Device Holder



The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5 mm distance, a positioning uncertainty of ± 0.5 mm would produce a SAR uncertainty of ± 20 %. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.

2.7. Test Equipment List

This table gives a complete overview of the SAR measurement equipment.

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
SAR Test System	SATIMO	N/A	V5.3.15.11	N/A	N/A
E-Field Probe	MVG	SSE2	SN 37/08 EP80	2026.07.05	2027.07.04
2450MHzDipole	MVG	SID2450	SN 30/13 DIP2G450-263	2026.07.05	2029.07.04
Dielectric Probe Kit	MVG	SCLMP	SN 32/14 OCPG67	2025.09.15	2026.09.14
Antenna	MVG	ANTA3	SN 07/13 ZNTA52	N/A	N/A
Phantom1	MVG	SAM	SN 32/14 SAM115	N/A	N/A
Phantom3	MVG	SAM	SN 21/21 ELLI48	N/A	N/A
Phone holder	MVG	N/A	SN 32/14 MSH97	N/A	N/A
Laptop holder	MVG	N/A	SN 32/14 LSH29	N/A	N/A
Attenuator	Agilent	HXT-10-8-SMA	240327017	2026.02.04	2027.02.03
Directional coupler	Xi'an Xingbo	XBOH-OA08-20dB	211123-4-3	2026.02.03	2027.02.02
Network Analyzer	Agilent	E5071C	MY46520378	2025.09.26	2026.09.24
Multi Meter	Keithley	Multi Meter 2000	4050073	2025.09.22	2026.09.21
Signal Generator	Agilent	N5182A	MY50140530	2025.09.26	2026.09.25
Wireless Communication Test Set	Agilent	8960-E5515C	MY48360751	2026.02.04	2027.02.03
Wireless Communication Test Set	R&S	CMW500	156324	2025.09.25	2026.09.24
Power Amplifier	DESAY	WCS-DLNA50M8G50G1	CSKJLNA231227A	2025.09.29	2026.09.28
Power Meter	R&S	NRP	100510	2025.09.25	2026.09.24
Power Sensor	R&S	NRP-Z11	101919	2025.09.25	2026.09.24
Power Sensor	Keysight	U2021XA	MY56280002	2025.09.25	2026.09.24
Temperature hygrometer	TOPRIE	TP502V4-P	6700000124198	2025.10.09	2026.10.08
Thermograph	Elitech	RC-4	S/N EF7176501537	2025.10.17	2026.10.16
MCL	Attenuation	6dB	351-218-010	2026.02.04	2027.02.03
MCL	Attenuation	6dB	351-218-011	2026.02.04	2027.02.03
MCL	Attenuation	6dB	351-218-012	2026.02.04	2027.02.03

3. SAR Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

- (a) For WWAN power measurement, use base station simulator to configure EUT WWAN transmission in conducted connection with RF cable, at maximum power in each supported wireless interface and frequency band.
- (b) Read the WWAN RF power level from the base station simulator.
- (c) For Wi-Fi/BT power measurement, use engineering software to configure EUT Wi-Fi/BT continuously transmission, at maximum RF power in each supported wireless interface and frequency band.
- (d) Connect EUT RF port through RF cable to the power meter, and measure Wi-Fi/BT output power.

<SAR measurement>

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

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

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

3.1. Power Reference

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

3.2. Area scan & Zoom scan

The area scan is a 2D scan to find the hot spot location on the DUT. The zoom scan is a 3D scan above the hot spot to calculate the 1g and 10g SAR value.

Measurement of the SAR distribution with a grid of 8 to 16 mm * 8 to 16 mm and a constant distance to the inner surface of the phantom. Since the sensors cannot directly measure at the inner phantom surface, the values between the sensors and the inner phantom surface are extrapolated. With these values the area of the maximum SAR is calculated by an interpolation scheme. Around this point, a cube of 30 * 30 * 30 mm or 32 * 32 * 32 mm is assessed by measuring 5 or 8 * 5 or 8 * 4 or 5 mm. With these data, the peak spatial-average SAR value can be calculated.

From the scanned SAR distribution, identify the position of the maximum SAR value, in addition identify the positions of any local maxima with SAR values within 2 dB of the maximum value that will not be within the zoom scan of other peaks; additional peaks shall be measured only when the primary peak is within 2 dB of the SAR compliance limit (e.g., 1 W/kg for 1,6 W/kg 1 g limit, or 1,26 W/kg for 2 W/kg, 10 g limit).

Area scan & Zoom scan scan parameters extracted from FCC KDB 865664 D01 SAR measurement 100 MHz to 6 GHz.

			$\leq 3 \text{ GHz}$	$> 3 \text{ GHz}$
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			$5 \pm 1 \text{ mm}$	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5 \text{ mm}$
Maximum probe angle from probe axis to phantom surface normal at the measurement location			$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
Maximum area scan spatial resolution: $\Delta x_{\text{Area}}, \Delta y_{\text{Area}}$			$\leq 2 \text{ GHz}: \leq 15 \text{ mm}$ $2 - 3 \text{ GHz}: \leq 12 \text{ mm}$	$3 - 4 \text{ GHz}: \leq 12 \text{ mm}$ $4 - 6 \text{ GHz}: \leq 10 \text{ mm}$
			When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: $\Delta x_{\text{Zoom}}, \Delta y_{\text{Zoom}}$			$\leq 2 \text{ GHz}: \leq 8 \text{ mm}$ $2 - 3 \text{ GHz}: \leq 5 \text{ mm}^*$	$3 - 4 \text{ GHz}: \leq 5 \text{ mm}^*$ $4 - 6 \text{ GHz}: \leq 4 \text{ mm}^*$
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{\text{Zoom}}(n)$		$\leq 5 \text{ mm}$	$3 - 4 \text{ GHz}: \leq 4 \text{ mm}$ $4 - 5 \text{ GHz}: \leq 3 \text{ mm}$ $5 - 6 \text{ GHz}: \leq 2 \text{ mm}$
	graded grid	$\Delta z_{\text{Zoom}}(1)$: between 1 st two points closest to phantom surface	$\leq 4 \text{ mm}$	$3 - 4 \text{ GHz}: \leq 3 \text{ mm}$ $4 - 5 \text{ GHz}: \leq 2.5 \text{ mm}$ $5 - 6 \text{ GHz}: \leq 2 \text{ mm}$
		$\Delta z_{\text{Zoom}}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{\text{Zoom}}(n-1)$	
Minimum zoom scan volume	x, y, z		$\geq 30 \text{ mm}$	$3 - 4 \text{ GHz}: \geq 28 \text{ mm}$ $4 - 5 \text{ GHz}: \geq 25 \text{ mm}$ $5 - 6 \text{ GHz}: \geq 22 \text{ mm}$
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.				
* When zoom scan is required and the <u>reported</u> SAR from the <u>area scan based 1-g SAR estimation</u> procedures of KDB 447498 is $\leq 1.4 \text{ W/kg}$, $\leq 8 \text{ mm}$, $\leq 7 \text{ mm}$ and $\leq 5 \text{ mm}$ zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

3.3. Description of interpolation/extrapolation scheme

The local SAR inside the phantom is measured using small dipole sensing elements inside a probe body. The probe tip must not be in contact with the phantom surface in order to minimise measurements errors, but the highest local SAR will occur at the surface of the phantom.

An extrapolation is used to determine this highest local SAR values. The extrapolation is based on a fourth-order least-square polynomial fit of measured data. The local SAR value is then extrapolated from the liquid surface with a 1 mm step.

The measurements have to be performed over a limited time (due to the duration of the battery) so the step of measurement is high. It could vary between 5 and 8 mm. To obtain an accurate assessment of the maximum SAR averaged over 10 grams and 1 gram requires a very fine resolution in the three dimensional scanned data array.

3.4. Volumetric Scan

The volumetric scan consists to a full 3D scan over a specific area. This 3D scan is useful for multi Tx SAR measurement. Indeed, it is possible with OpenSAR to add, point by point, several volumetric scans to calculate the SAR value of the combined measurement as it is defined in the standard IEEE1528 and IEC62209.

3.5. Power Drift

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In OpenSAR 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 V/m. If the power drifts more than $\pm 5\%$, the SAR will be retested.

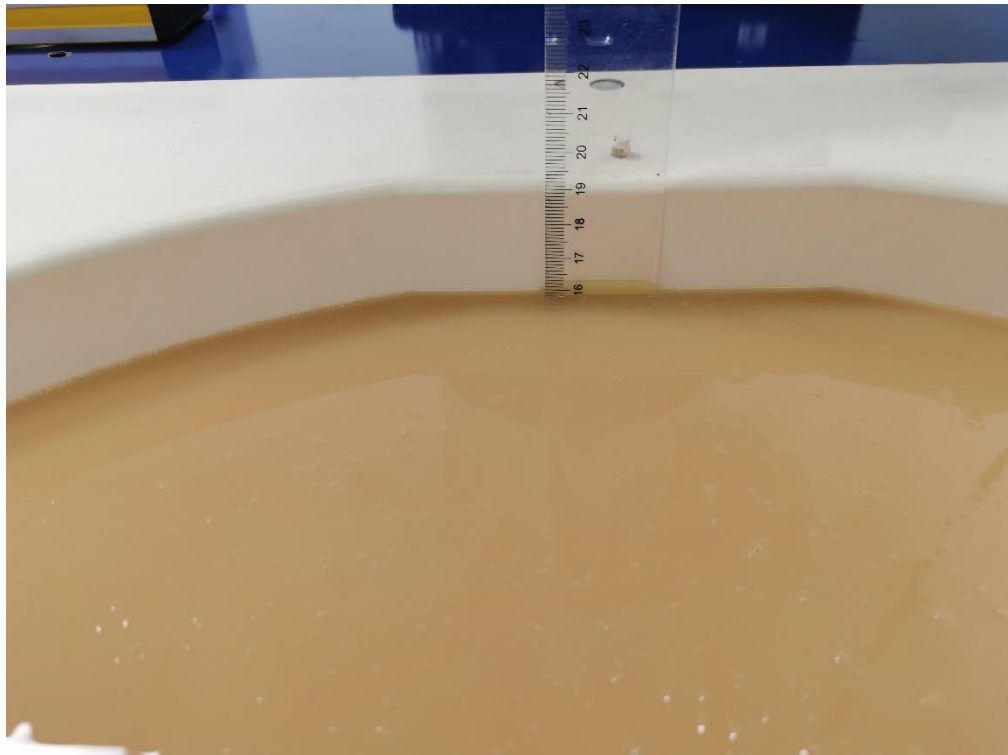
4. System Verification Procedure

4.1. Tissue Verification

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

Ingredients (% of weight)	Head Tissue									
	750	835	900	1800	1900	2000	2450	2600	5200	5800
Frequency Band (MHz)	750	835	900	1800	1900	2000	2450	2600	5200	5800
Water	34.40	34.40	34.40	55.36	55.36	57.87	57.87	57.87	65.53	65.53
NaCl	0.79	0.79	0.79	0.35	0.35	0.16	0.16	0.16	0.00	0.00
1,2-Propanediol	64.81	64.81	64.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triton X-100	0.00	0.00	0.00	30.45	30.45	19.97	19.97	19.97	24.24	24.24
DGBE	0.00	0.00	0.00	13.84	13.84	22.00	22.00	22.00	10.23	10.23

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 depth from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm.



4.1.1. Tissue Dielectric Parameter Check Results

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine if the dielectric parameters are within the tolerances of the specified target values. The measured conductivity and relative permittivity should be within $\pm 5\%$ of the target values.

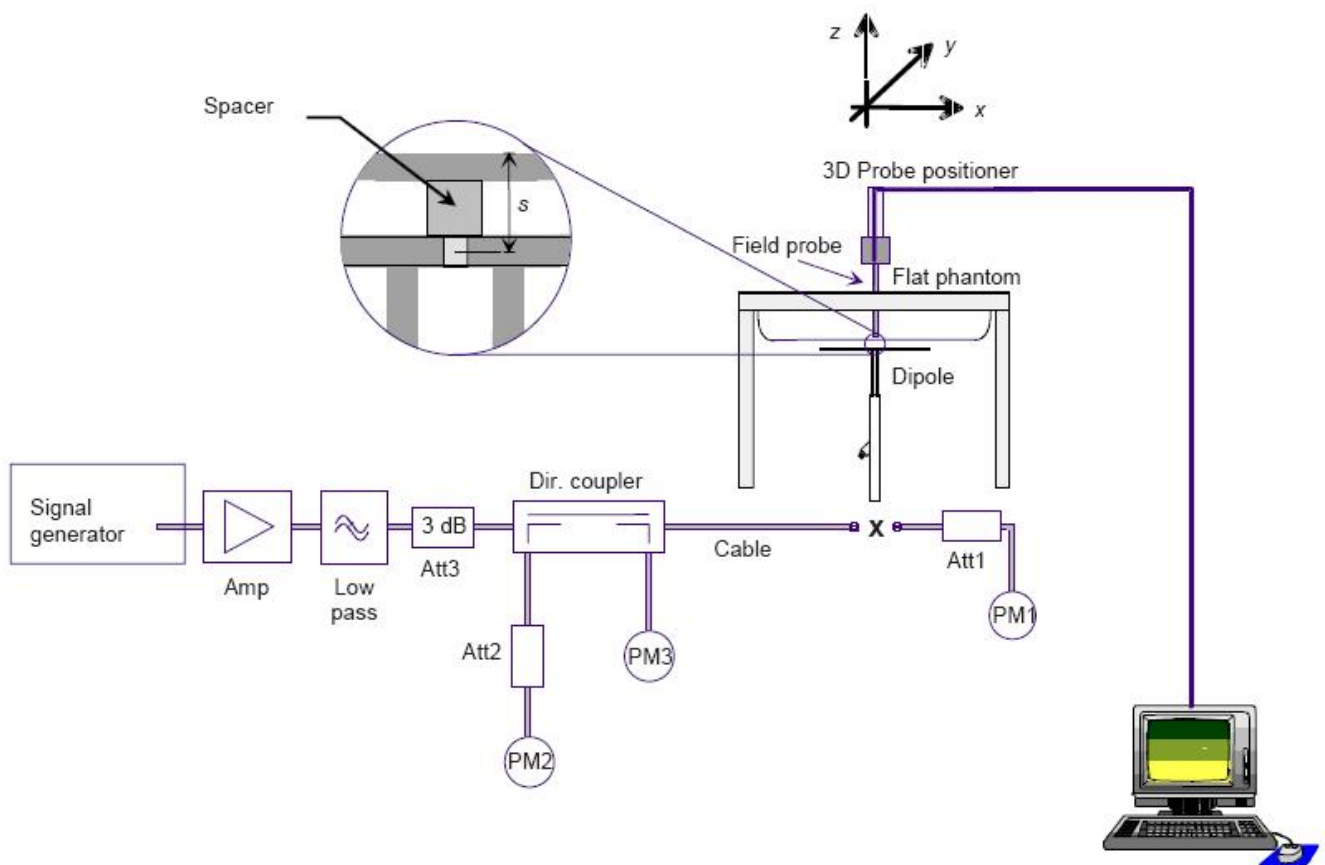
Tissue Type	Measured Frequency (MHz)	Target Tissue		Measured Tissue		Liquid Temp.	Test Date
		$\epsilon_r (\pm 5\%)$	$\sigma \text{ (S/m)} (\pm 5\%)$	ϵ_r	$\sigma \text{ (S/m)}$		
Head 2450	2450	39.20 (37.24~41.16)	1.80 (1.71~1.89)	41.04	1.80	21.6 °C	Sep. 07, 2026

NOTE: The dielectric parameters of the tissue-equivalent liquid should be measured under similar ambient conditions and within 2 °C of the conditions expected during the SAR evaluation to satisfy protocol requirements.

4.2. System Verification Procedure

The system verification is performed for verifying the accuracy of the complete measurement system and performance of the software. The dipole is connected to the signal source consisting of signal generator and amplifier via a directional coupler, N-connector cable and adaption to SMA. It is fed with a power of 100mW (below 5GHz) or 50mW (above 5GHz). To adjust this power a power meter is used. The power sensor is connected to the cable before the system verification to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the system verification to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test (result on plot).

The system verification is shown as below picture:



4.2.1. System Verification Results

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

System Verification	Power fed to reference dipole (mW)	Measured SAR Value		Measured SAR (Normalized to 1W)		Target SAR Value (1W)		Deviation (%)		Test Date
		1-g (W/Kg)	10-g (W/Kg)	1-g (W/Kg)	10-g (W/Kg)	1-g (W/Kg)	10-g (W/Kg)	1-g (W/Kg)	10-g (W/Kg)	
2450MHz	100	5.184	2.359	51.84	23.59	53.34	24.22	-2.81%	-2.6%	Sep. 07, 2026

5. SAR measurement variability

Per KDB865664 D01 SAR measurement 100 MHz to 6 GHz, SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. The additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.

2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.

3) 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).

4) 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 .

6. SAR Measurement Uncertainty

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Symbol	Uncertainty Component	Prob. Dist.	Unc. $a(x_i)$	Div. q_i	$u(x_i) = a(x_i)/q_i$	C_i	$u(y) = C_i * u(x_i)$	v_i
Measurement system errors								
CF	Probe calibration	N ($k = 2$)	5.72	2	2.86	1	2.86	∞
CF _{drift}	Probe calibration drift	R	0.15	$\sqrt{3}$	0.09	1	0.09	∞
LIN	Probe linearity and detection limit	R	1.27	$\sqrt{3}$	0.73	1	0.73	∞
BBS	Broadband signal	R	0.12	$\sqrt{3}$	0.07	1	0.07	∞
ISO	Probe isotropy	R	0.16	$\sqrt{3}$	0.09	1	0.09	∞
DAE	Other probe and data acquisition errors	N	2.4	1	2.40	1	2.40	∞
AMB	RF ambient and noise	N	3.51	1	3.51	1	3.51	∞
Δ_{xyz}	Probe positioning errors	N	1.2	1	1.20	2/5	1.20	
DAT	Data processing errors	N	2.1	1	2.10	1	2.10	∞
Phantom and device (DUT or validation antenna) errors								
LIQ(σ)	Measurement of phantom conductivity(σ)	N	4.1	1	4.1	C_ϵ, C_σ	4.10	∞
LIQ(T_c)	Temperature effects (medium)	R	2.7	$\sqrt{3}$	1.56	C_ϵ, C_σ	1.56	∞
EPS	Shell permittivity	R	2.1	$\sqrt{3}$	1.21	See 8.4.2.3	0.30	∞
DIS	Distance between the radiating element of the DUT and the phantom medium	N	0.7	1	0.7	2	1.40	∞
D_{xyz}	Repeatability of positioning the DUT or source against the phantom	N	1.2	1	1.2	1	1.20	5
H	Device holder effects	N	3.8	1	3.8	1	3.80	
MOD	Effect of operating mode on probe sensitivity	R	3.42	$\sqrt{3}$	1.97	1	1.97	∞
TAS	Time-average SAR	R	1.8	$\sqrt{3}$	1.04	1	1.04	∞
RF _{drift}	Variation in SAR due to drift in output of DUT	N	4.5	1	4.5	1	4.50	
VAL	Validation antenna uncertainty (validation measurement only)	N	1.4	1	1.4	1	1.40	
P_{in}	Uncertainty in accepted power (validation measurement only)	N	2.4	1	2.4	1	2.40	
Corrections to the SAR result (if applied)								
$C(\epsilon', \sigma)$	Phantom deviation from target (ϵ', σ)	N	3.7	1	3.7	1	3.70	
$C(R)$	SAR scaling	R	1.8	$\sqrt{3}$	1.04	1	1.04	
$u(\Delta SAR)$	Combined uncertainty						10.84	
U	Expanded uncertainty and effective degrees of freedom					U =	21.68	

7. RF Exposure Positions

7.1. Generic device

The SAR evaluation shall be performed for surface of the DUT that are accessible during intended use, as indicated in Figure 7.1. Adjust the distance between the device surface and the flat phantom to 5mm.

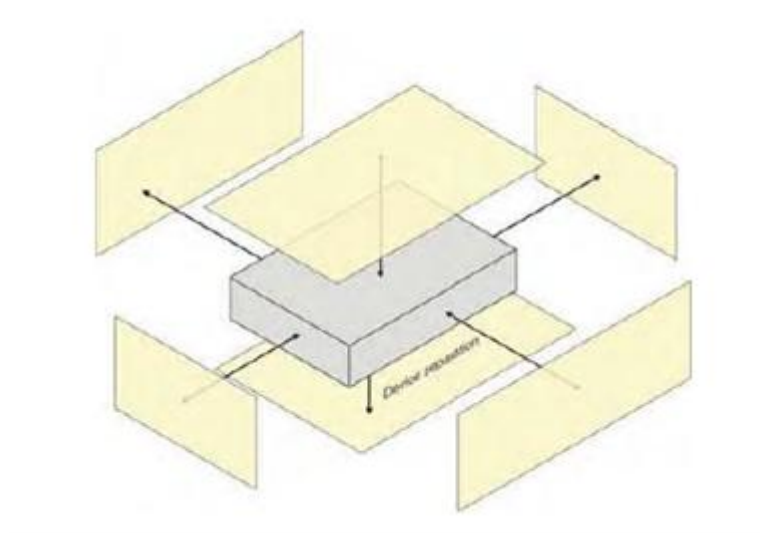


Figure 7.1 – Test positions for generic device

8. RF Output Power

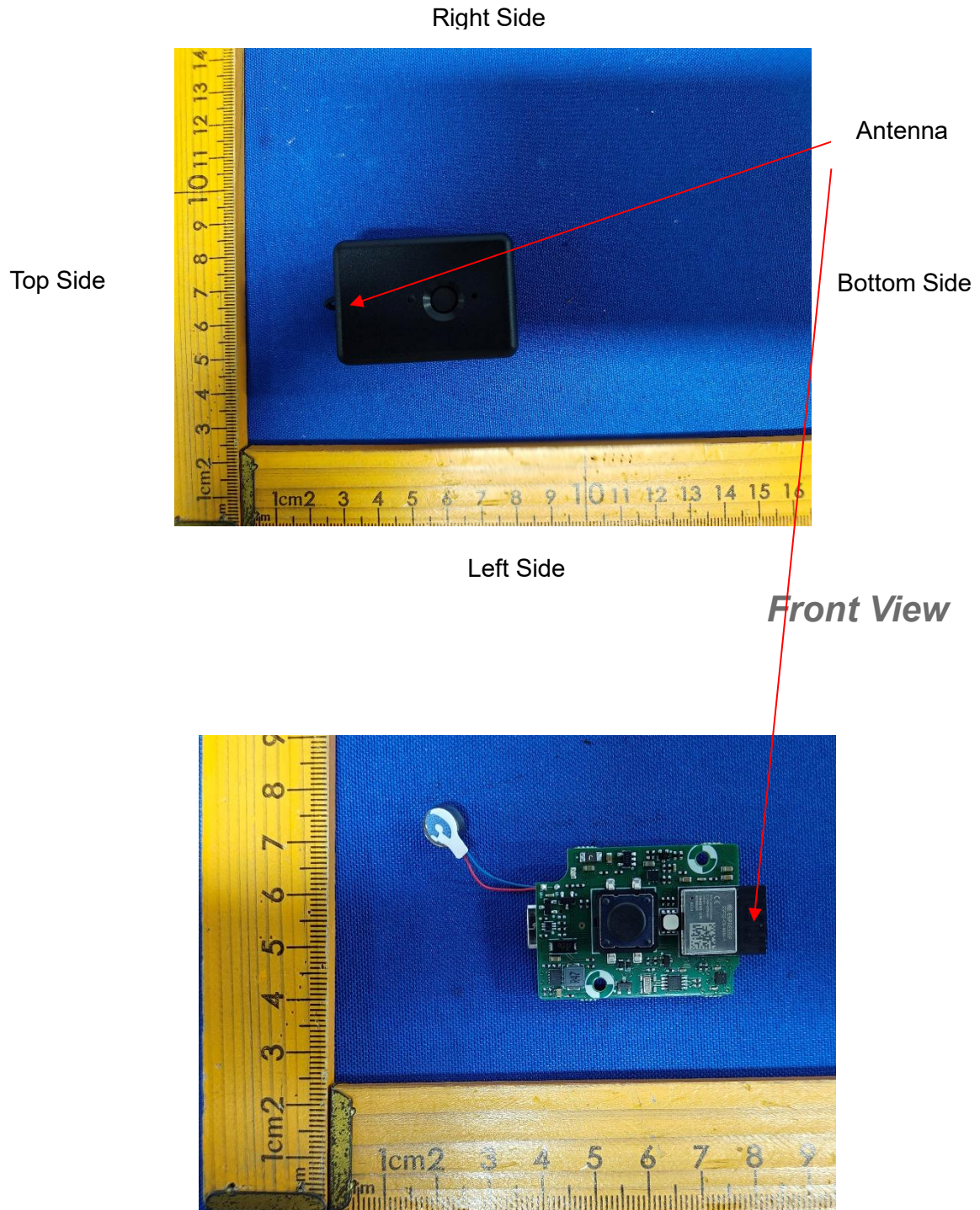
8.1. Wi-Fi & BT & Zigbee Output Power

Mode	Channel	Frequency (MHz)	Tune-Up (dBm)	Output Power (dBm)
802.11b	1	2412	24.50	24.04
	6	2437	24.50	24.31
	11	2462	24.50	24.36
802.11g	1	2412	26.00	25.82
	6	2437	27.50	27.24
	10	2457	27.00	26.20
	11	2462	26.00	25.09
802.11n (HT20)	1	2412	26.00	25.79
	6	2437	27.00	26.95
	10	2457	27.00	26.27
	11	2462	25.00	24.54
802.11n (H40)	3	2422	27.00	26.46
	6	2437	27.00	26.62
	9	2452	25.00	24.10
802.11ax (H20)	1	2412	26.50	26.19
	6	2437	27.50	27.01
	10	2457	26.50	26.38
	11	2462	25.00	24.65

Mode	Channel	Freq. (MHz)	Tune-up (dBm)	Output Power (dBm)
BLE1M	CH00	2402	19.00	18.50
	CH19	2440	20.00	19.14
	CH38	2478	20.50	20.32
	CH39	2480	13.00	12.12
BLE2M	CH00	2402	19.00	18.71
	CH19	2440	20.00	19.58
	CH38	2478	20.50	20.08
	CH39	2480	12.50	12.32

Mode	Channel	Freq. (MHz)	Tune-up (dBm)	Output Power (dBm)
Zigbee	11	2405	20.00	19.34
	18	2440	21.00	20.05
	25	2475	20.00	19.51
	26	2480	7.00	6.88

9. Antenna Location



Antenna information:

Distance of The Antenna to the EUT surface and edge (mm)						
Antennas	Front Side	Back Side	Top Side	Bottom Side	Left Side	Right Side
BT/WLAN/Zigbee	5	10	5	41	10	10

Note: When the minimum separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

NOTE: The bottom is the power supply port for the product, and it is more than 25mm away from the antenna. Therefore, no testing is required.

10. Duty Cycle

The calculated SAR is obtained by the following formula:

$$\text{Reported SAR} = \text{Measured SAR} \times 10^{(P_{\text{target}} - P_{\text{measured}})/10}$$

$$\text{Scaling factor} = 10^{(P_{\text{target}} - P_{\text{measured}})/10}$$

$$\text{Reported SAR} = \text{Measured SAR} \times \text{Scaling factor}$$

Where

P_{target} is the power of manufacturing upper limit;

P_{measured} is the measured power;

Measured SAR is measured SAR at measured power which including power drift)

Reported SAR which including Power Drift and Scaling factor

Duty Cycle

Test Mode	Duty Cycle
WLAN	100%
Bluetooth	100%
Zigbee	100%

11. SAR Measurement Results

< WLAN 2.4G >

Test Position of Body with 5mm	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)	Date	Plot
			1g	10g						
Back Side	11/2462	802.11b	0.745	0.420	1.03	24.36	24.50	0.769	2026/9/7	
Front Side	11/2462	802.11b	1.200	0.714	1.55	24.36	24.50	1.239	2026/9/7	#2
Front Side Repeated	11/2462	802.11b	1.118	0.712	0.45	24.36	24.50	1.155	2026/9/7	
Front Side	1/2412	802.11b	1.005	0.687	0.12	24.04	24.50	1.117	2026/9/7	
Front Side	6/2437	802.11b	1.102	0.700	2.60	24.31	24.50	1.151	2026/9/7	
Left Side	11/2462	802.11b	0.911	0.500	0.50	24.36	24.50	0.941	2026/9/7	
Left Side Repeated	11/2462	802.11b	0.907	0.496	0.89	24.36	24.50	0.934	2026/9/7	
Left Side	1/2412	802.11b	0.804	0.397	1.21	24.04	24.50	0.894	2026/9/7	
Left Side	6/2437	802.11b	0.843	0.411	0.74	24.31	24.50	0.880	2026/9/7	
Right Side	11/2462	802.11b	0.602	0.387	-1.26	24.36	24.50	0.622	2026/9/7	
Top Side	11/2462	802.11b	0.576	0.352	3.20	24.36	24.50	0.595	2026/9/7	
Front Side	6/2437	802.11g	1.100	0.708	1.02	27.24	27.50	1.168	2026/9/7	
Front Side Repeated	6/2437	802.11g	1.087	0.701	1.54	27.24	27.50	1.154	2026/9/7	
Front Side	1/2412	802.11g	0.875	0.417	2.34	25.82	26.00	0.912	2026/9/7	
Front Side	11/2462	802.11g	0.634	0.203	0.76	25.09	26.00	0.782	2026/9/7	
Left Side	1/2412	802.11g	0.736	0.341	1.45	25.82	26.00	0.767	2026/9/7	
Right Side	1/2412	802.11g	0.587	0.288	2.11	25.82	26.00	0.612	2026/9/7	
Top Side	1/2412	802.11g	0.444	0.205	1.67	25.82	26.00	0.463	2026/9/7	
Front Side	6/2437	802.11n20	1.042	0.631	0.76	26.95	27.00	1.054	2026/9/7	
Front Side Repeated	6/2437	802.11n20	1.038	0.627	-1.46	26.95	27.00	1.050	2026/9/7	
Front Side	1/2412	802.11n20	0.898	0.404	1.79	25.79	26.00	0.942	2026/9/7	
Front Side	11/2462	802.11n20	0.748	0.316	2.48	24.54	25.00	0.832	2026/9/7	
Left Side	6/2437	802.11n20	0.847	0.414	1.23	26.95	27.00	0.857	2026/9/7	
Left Side	1/2412	802.11n20	0.704	0.341	-3.01	25.79	26.00	0.739	2026/9/7	
Left Side	11/2462	802.11n20	0.666	0.307	-2.63	24.54	25.00	0.740	2026/9/7	
Right Side	6/2437	802.11n20	0.658	0.351	2.04	26.95	27.00	0.666	2026/9/7	
Top Side	6/2437	802.11n20	0.555	0.206	3.25	26.95	27.00	0.561	2026/9/7	
Front Side	6/2437	802.11n40	0.978	0.479	1.42	26.62	27.00	1.067	2026/9/7	
Front Side Repeated	6/2437	802.11n40	0.969	0.468	1.68	26.62	27.00	1.058	2026/9/7	

Front Side	3/2422	802.11n40	0.803	0.384	0.79	26.46	27.00	0.909	2026/9/7	
Front Side	9/2452	802.11n40	0.699	0.302	-2.44	24.10	27.00	1.363	2026/9/7	
Left Side	6/2437	802.11n40	0.832	0.412	2.57	26.62	27.00	0.908	2026/9/7	
Left Side	3/2422	802.11n40	0.745	0.316	1.58	26.46	27.00	0.844	2026/9/7	
Left Side	9/2452	802.11n40	0.639	0.327	1.67	26.62	27.00	0.697	2026/9/7	
Right Side	3/2422	802.11n40	0.625	0.302	2.38	26.62	27.00	0.682	2026/9/7	
Top Side	3/2422	802.11n40	0.597	0.243	1.06	26.62	27.00	0.652	2026/9/7	
Front Side	6/2437	802.11ax20	1.022	0.512	0.98	27.01	27.50	1.144	2026/9/7	
Front Side Repeated	6/2437	802.11ax20	1.016	0.534	-1.69	27.01	27.50	1.137	2026/9/7	
Front Side	1/2412	802.11ax20	0.904	0.463	-2.36	26.16	26.50	0.978	2026/9/7	
Front Side	11/2462	802.11ax20	0.859	0.452	-1.87	24.65	25.00	0.931	2026/9/7	
Left Side	6/2437	802.11ax20	0.896	0.428	1.28	27.01	27.50	1.003	2026/9/7	
Left Side	1/2412	802.11ax20	0.741	0.399	0.58	26.16	26.50	0.801	2026/9/7	
Left Side	11/2462	802.11ax20	0.687	0.372	-0.77	24.65	25.00	0.745	2026/9/7	
Right Side	6/2437	802.11ax20	0.735	0.333	2.05	27.01	27.50	0.823	2026/9/7	
Top Side	6/2437	802.11ax20	0.626	0.301	1.86	27.01	27.50	0.701	2026/9/7	

< Bluetooth >

Test Position of Body with 5mm	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)	Date	Plot
			1g	10g						
Back Side	38/2478	GFSK	0.720	0.411	1.03	20.32	20.50	0.750	2026/9/7	
Front Side	38/2478	GFSK	1.127	0.677	-3.93	20.32	20.50	1.175	2026/9/7	#1
Front Side Repeated	38/2478	GFSK	1.121	0.654	2.04	20.32	20.50	1.169	2026/9/7	
Front Side	0/2402	GFSK	0.879	0.403	-1.44	18.50	19.00	0.986	2026/9/7	
Front Side	19/2440	GFSK	0.941	0.475	1.04	19.14	20.00	1.147	2026/9/7	
Left Side	38/2478	GFSK	0.895	0.487	-1.00	20.32	20.50	0.933	2026/9/7	
Left Side	0/2402	GFSK	0.755	0.394	-3.05	18.50	19.00	0.847	2026/9/7	
Left Side	19/2440	GFSK	0.864	0.412	1.97	19.14	20.00	1.053	2026/9/7	
Right Side	38/2478	GFSK	0.583	0.360	2.08	20.32	20.50	0.608	2026/9/7	
Top Side	38/2478	GFSK	0.552	0.343	1.39	20.32	20.50	0.575	2026/9/7	

< Zigbee >

Test Position of Body with 5mm	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)	Date	Plot
			1g	10g						
Back Side	18/2440	O-QPSK	0.612	0.320	0.25	20.05	21.00	0.762	2026/9/7	
Front Side	18/2440	O-QPSK	0.953	0.525	-3.59	20.05	21.00	1.186	2026/9/7	#3
Front Side Repeated	18/2440	O-QPSK	0.947	0.513	-3.14	20.05	21.00	1.179	2026/9/7	
Front Side	11/2405	O-QPSK	0.812	0.398	1.64	19.34	20.00	0.945	2026/9/7	
Front Side	26/2480	O-QPSK	0.302	0.114	1.77	6.88	7.00	0.310	2026/9/7	
Left Side	18/2440	O-QPSK	0.754	0.378	1.03	20.05	21.00	0.938	2026/9/7	
Right Side	18/2440	O-QPSK	0.420	0.258	4.08	20.05	21.00	0.523	2026/9/7	
Top Side	18/2440	O-QPSK	0.403	0.220	3.10	20.05	21.00	0.502	2026/9/7	

Note:

- 1) When the reported SAR of the highest measured maximum output power channel for the Initial test configuration is ≤ 0.8 W/kg, no further SAR testing is required for other channels.
- 2) SAR is not required for the following 2.4 GHz OFDM conditions.
 - a) When KDB Publication 447498 D01 SAR test exclusion applies to the OFDM configuration.
 - b) 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.

12. Simultaneous Transmission Analysis

Note: Wi-Fi, Bluetooth and Zigbee cannot transmit simultaneously.

Appendix A. Photo documentation

Refer to appendix Test Setup photo-SAR

Appendix B. System Check Plots

Table of contents
#1 System Performance Check - 2450MHz

#1

Date of measurement: 7/9/2026

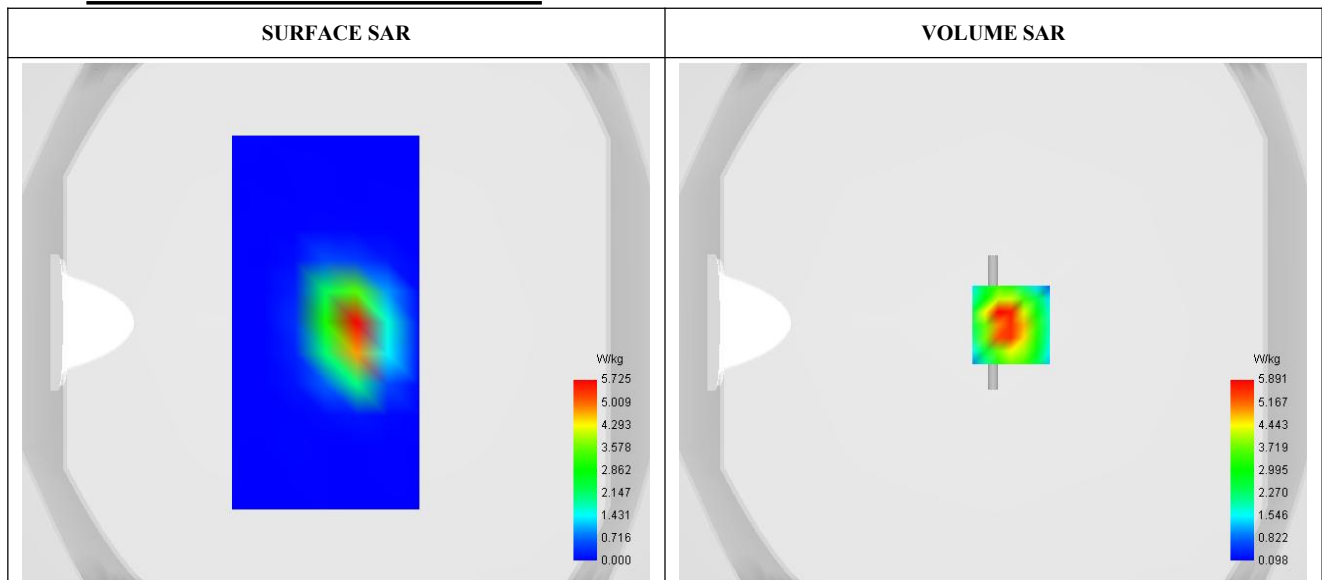
A. Experimental conditions.

Probe	SN 37/08 EP80
ConvF	4.82
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW2450
Channels/Frequency	Middle

B. Permittivity

Middle TX Frequency (MHz)	2450.000
Relative permittivity (real part)	41.040
Relative permittivity (imaginary part)	13.220
Conductivity (S/m)	1.799

C. SAR Surface and Volume



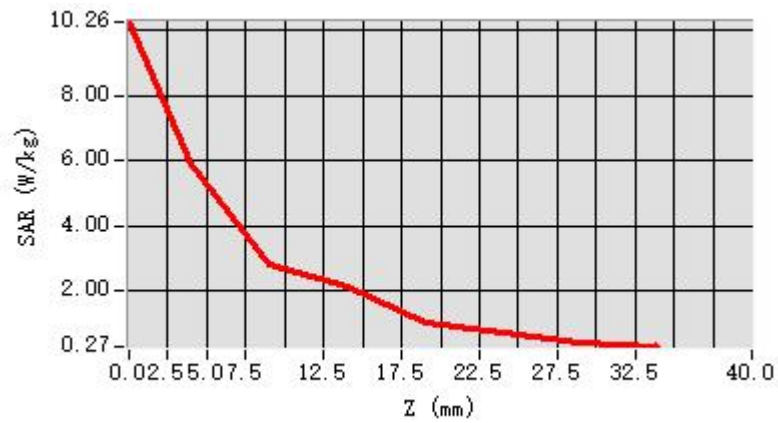
Maximum location: X=7.00, Y=-1.00 ; SAR Peak: 8.99 W/kg

D. SAR 1g & 10g

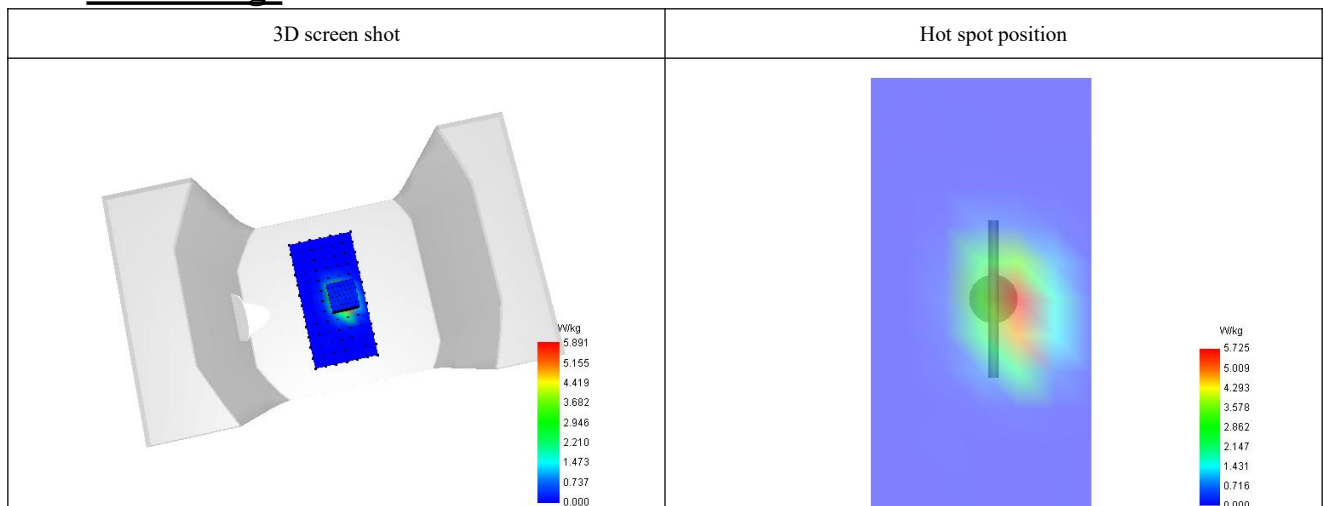
SAR 10g (W/Kg)	2.359
SAR 1g (W/Kg)	5.184
Variation (%)	-3.040
Horizontal validation criteria: minimum distance (mm)	10.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	47.564081

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	10.263	5.891	2.802	2.126	1.045	0.723	0.415



F. 3D Image



Appendix C. SAR Test Plots

Table of contents
#1 WALN 2.4G Body (8GB RAM)
#2 WALN 2.4G Body (4GB RAM)

#1

Date of measurement: 7/9/2026

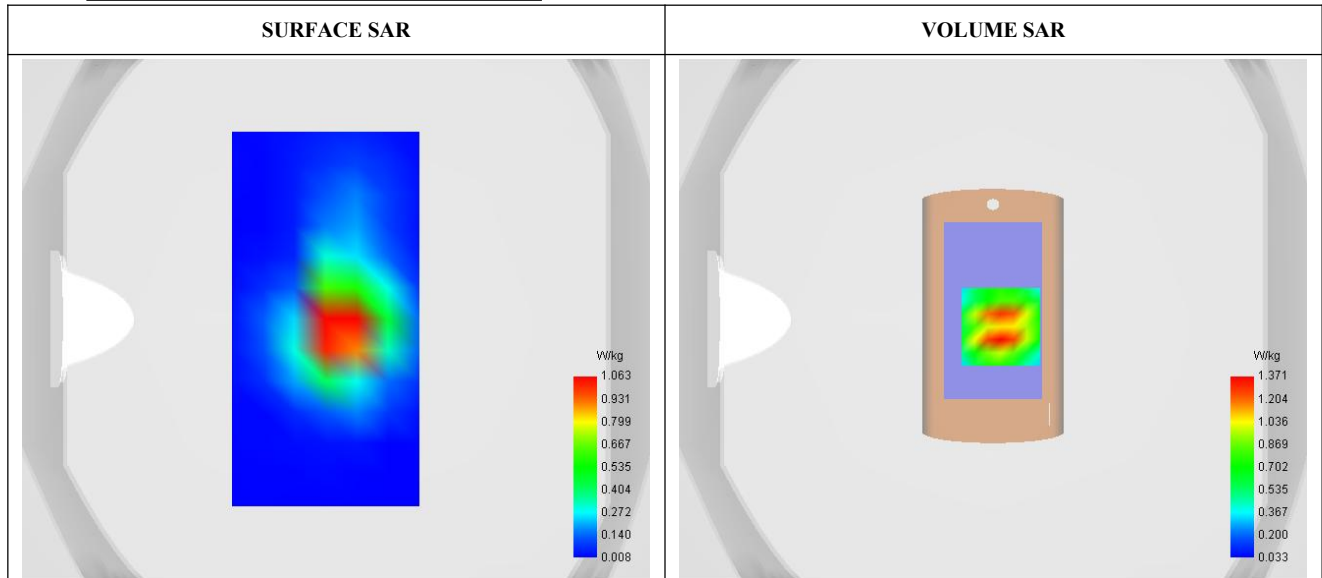
A. Experimental conditions.

Probe	SN 37/08 EP80
ConvF	4.82
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	Bluetooth
Channels/Frequency	Middle (38)/ frequency 2478.00 Mhz

B. Permittivity

Middle TX Frequency (MHz)	2478.00
Relative permittivity (real part)	39.220
Relative permittivity (imaginary part)	13.210
Conductivity (S/m)	1.819

C. SAR Surface and Volume



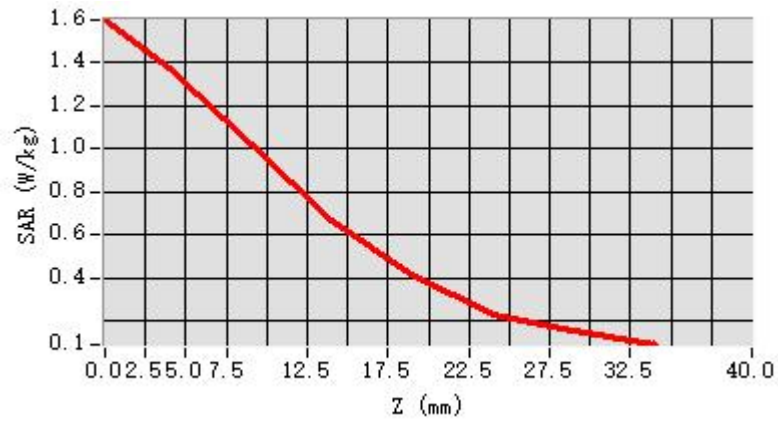
Maximum location: X=3.00, Y=-3.00 ; SAR Peak: 1.85 W/kg

D. SAR 1g & 10g

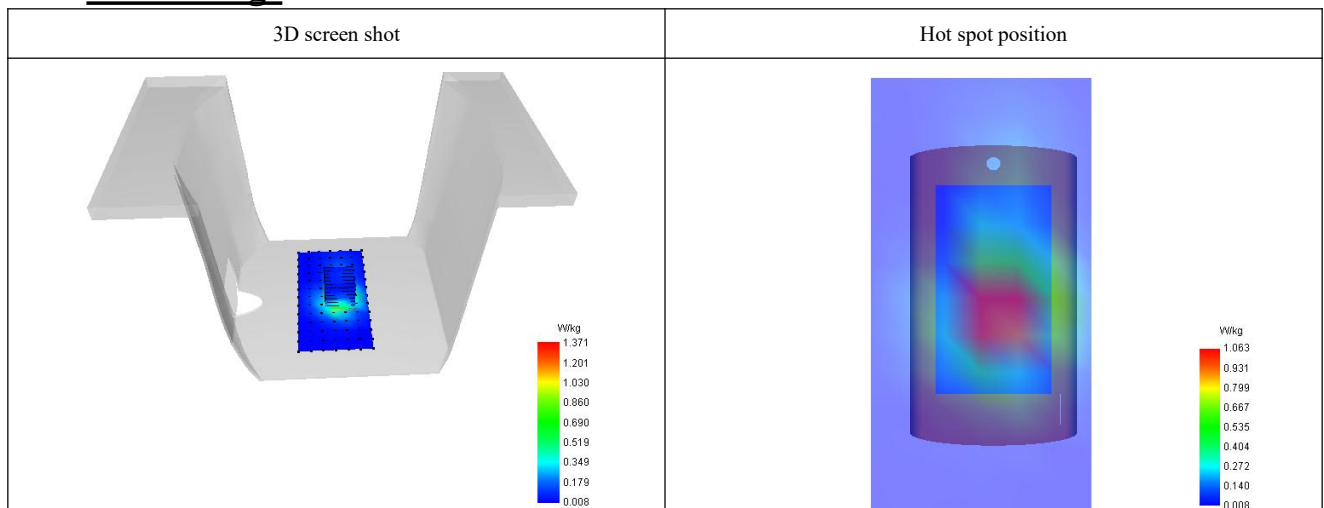
SAR 10g (W/Kg)	0.677
SAR 1g (W/Kg)	1.127
Variation (%)	-3.930
Horizontal validation criteria: minimum distance (mm)	11.180340
Vertical validation criteria: SAR ratio M2/M1 (%)	74.325310

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.597	1.371	1.019	0.669	0.414	0.228	0.151



F. 3D Image



#2

Date of measurement: 7/9/2026

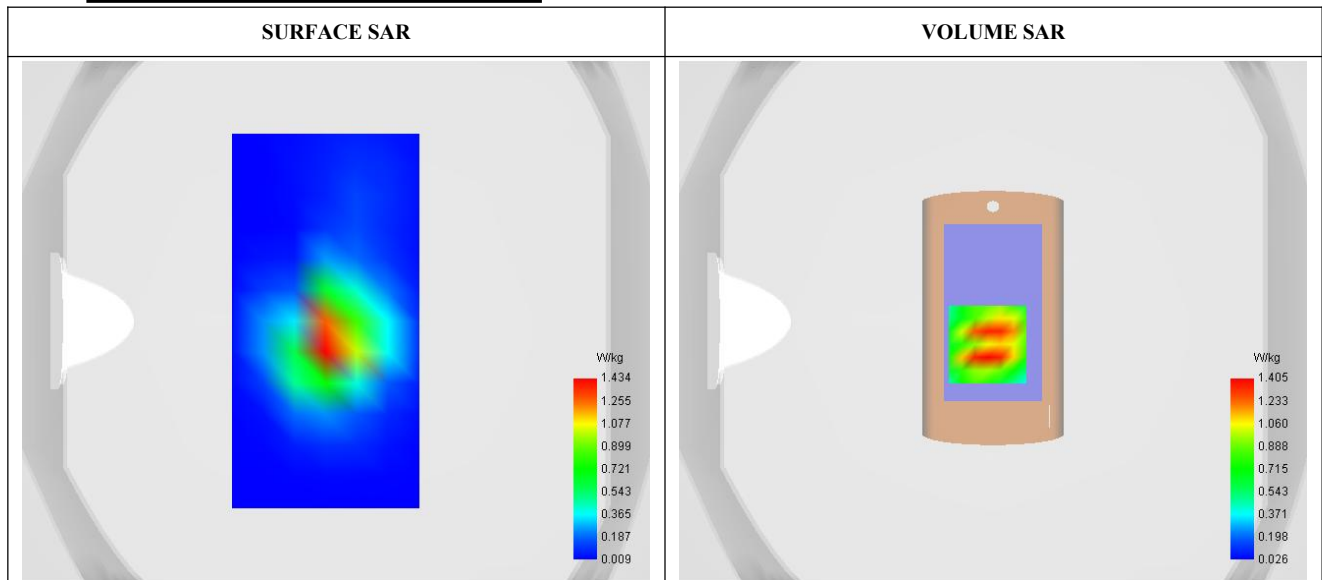
A. Experimental conditions.

Probe	SN 37/08 EP80
ConvF	4.82
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	ISM
Channels/Frequency	Higher (11)/ frequency 2462.00 Mhz

B. Permittivity

Middle TX Frequency (MHz)	2462.00
Relative permittivity (real part)	39.184
Relative permittivity (imaginary part)	13.248
Conductivity (S/m)	1.812

C. SAR Surface and Volume



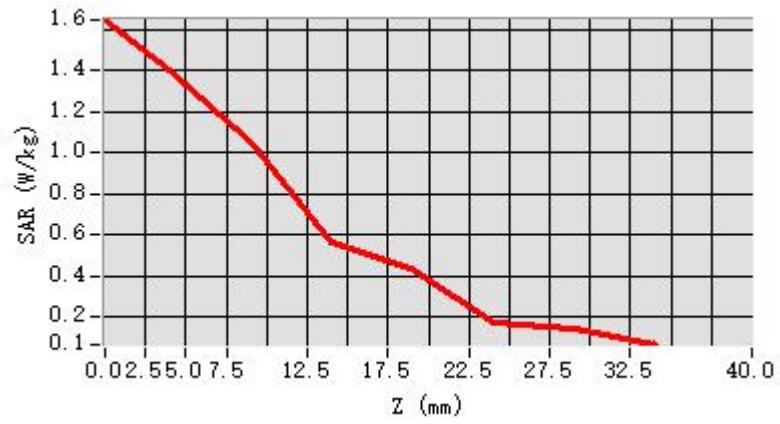
Maximum location: X=-2.00, Y=-9.00 ; SAR Peak: 2.11 W/kg

D. SAR 1g & 10g

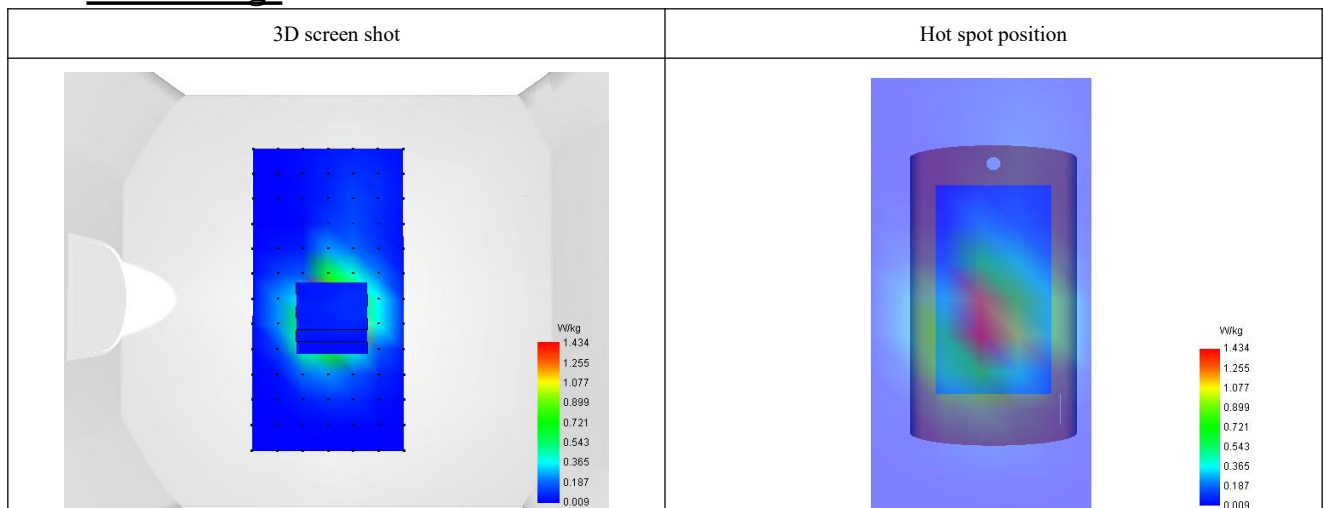
SAR 10g (W/Kg)	0.714
SAR 1g (W/Kg)	1.200
Variation (%)	1.550
Horizontal validation criteria: minimum distance (mm)	11.180340
Vertical validation criteria: SAR ratio M2/M1 (%)	75.160142

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.649	1.405	1.056	0.562	0.435	0.177	0.147



F. 3D Image



#3

Date of measurement: 7/9/2026

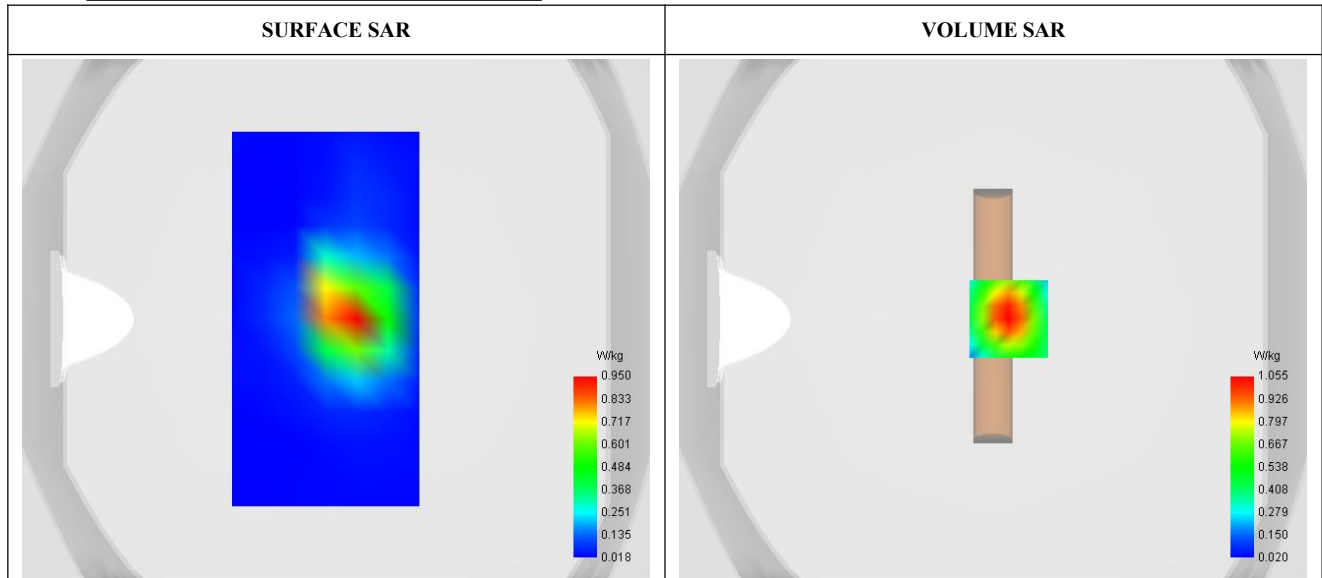
A. Experimental conditions.

Probe	SN 37/08 EP80
ConvF	4.82
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Very fast
Phantom	Validation plane
Device Position	Body
Band	ISM
Channels/Frequency	Middle (18)/ frequency 2440.00 Mhz

B. Permittivity

Middle TX Frequency (MHz)	2440.00
Relative permittivity (real part)	39.180
Relative permittivity (imaginary part)	13.242
Conductivity (S/m)	1.795

C. SAR Surface and Volume



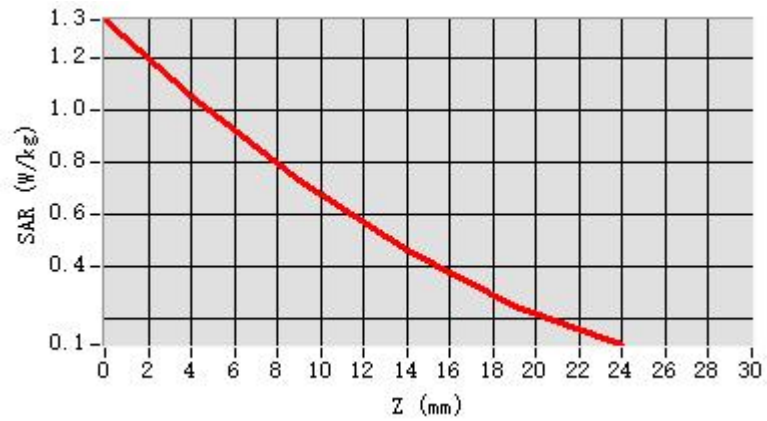
Maximum location: X=6.00, Y=0.00 ; SAR Peak: 1.36 W/kg

D. SAR 1g & 10g

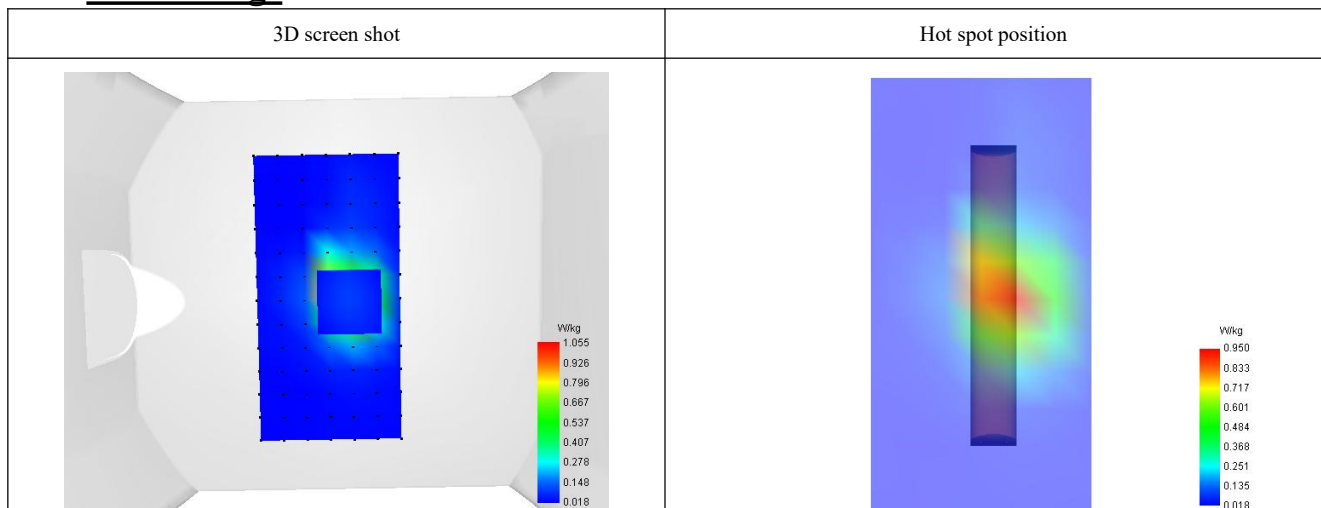
SAR 10g (W/Kg)	0.525
SAR 1g (W/Kg)	0.953
Variation (%)	-3.590
Horizontal validation criteria: minimum distance (mm)	16.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	69.573460

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.345	1.055	0.734	0.463	0.250



F. 3D Image



Appendix D. Calibration Certificate

Table of contents
E Field Probe - SN 37/08 EP80
2450 MHz Dipole - SN 30/13 DIP2G450-263

※※END OF THE REPORT※※