SAR TEST REPORT

No. 24T04Z101045-002

For

TCL Communication Ltd.

Tablet PC

Model Name: 9491G

with

Hardware Version: 05

Software Version: 1AS0

FCC ID: 2ACCJB221

Issued Date: 2024-06-02

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL

Test Laboratory:

CTTL-Telecommunication Technology Labs, CAICT

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REPORT HISTORY

Report Number	Revision	Issue Date	Description
24T04Z101045-002	Rev.0	2024-06-02	Initial creation of test report

TABLE OF CONTENT

1 Test Laboratory

1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2017 accredited test laboratory under American Association for Laboratory Accreditation (A2LA) with lab code 7049.01, and is also an FCC accredited test laboratory (CN1349), and ISED accredited test laboratory (CAB identifier:CN0066). The detail accreditation scope can be found on A2LA website.

1.2. Testing Location

Location 1: CTTL(huayuan North Road)

Address:	No. 52, Huayuan North Road, Haidian District, Beijing, P. R. China 100191

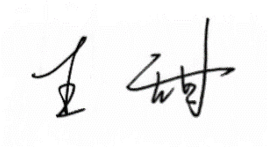
1.3. Testing Environment

Normal Temperature:	15-35℃
Extreme Temperature:	-10/+55℃
Relative Humidity:	20-75%

1.4. Project data

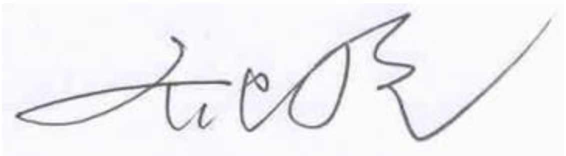
Testing Start Date:	2024-5-27
Testing End Date:	2024-5-28

1.5. Signature



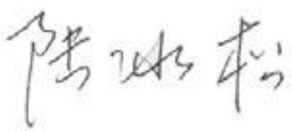
WangTian

(Prepared this test report)



Qi Dianyuan

(Reviewed this test report)



Lu Bingsong

Deputy Director of the laboratory

(Approved this test report)

2 Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for TCL Communication Ltd. Tablet PC 9491G are as follows:

Table 2.1: Highest Reported SAR (1g)

Technology Band	Body SAR 1g (W/kg)	Equipment Class
WLAN 2.4GHz	**0.42**	DTS
WLAN 5GHz	**1.34**	NII
Bluetooth	＜**0.01**	DSS

The SAR values found for the Mobile Phone are below the maximum recommended levels of 1.6 W/kg as averaged over any 1g tissue according to the ANSI C95.1-1992.

The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power output.

The measurement together with the test system set-up is described in annex C of this test report. A detailed description of the equipment under test can be found in chapter 4 of this test report. The highest reported SAR value is obtained at the case of **(Table 2.1),** and the values are**:**
Body: 1.34 W/kg(1g)

Table 2.2: The sum of SAR values

	Position	**WLAN 5G**	**BT**	**Sum**
Highest reported SAR value for Body	Rear 0mm	1.34	<0.01	**1.34**

According to the above tables, the highest sum of reported SAR values is **1.34 W/kg (1g)**. The detail for simultaneous transmission consideration is described in chapter 14.

Conclusion:
According to the above tables, the sum of reported SAR values is<1.6W/kg. So the simultaneous transmission SAR with volume scans is not required.

3 Client Information

3.1 Applicant Information

Company Name:	TCL Communication Ltd.
Address/Post:	5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
Contact Person:	Ting Wang
E-mail:	ting.wang.hz@tcl.com
Telephone:	+86 755 3661 1621
Fax:	0086-755-36612000-81722

3.2 Manufacturer Information

Company Name:	TCL Communication Ltd.
Address/Post:	5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
Contact Person:	Ting Wang
E-mail:	ting.wang.hz@tcl.com
Telephone:	+86 755 3661 1621
Fax:	0086-755-36612000-81722

4 Equipment Under Test (EUT) and Ancillary Equipment (AE)

4.1 About EUT

Description:	Tablet PC
Model name:	9491G
Operating mode(s):	BT, Wi-Fi(2.4G/5G)
Tested Tx Frequency:	2400 – 2483.5 MHz (Bluetooth)
	2412 – 2462 MHz (Wi-Fi 2.4G)
	5150 – 5250 MHz (U-NII-1)
	5250 – 5350 MHz (U-NII-2A)
	5470 – 5725 MHz (U-NII-2C)
	5725 – 5850 MHz (U-NII-3)
Test device production information:	Production unit
Device type:	Portable device
Antenna type:	Integrated antenna

4.2 Internal Identification of EUT used during the test

EUT ID*	IMEI/SN	HW Version	SW Version
EUT1	4HZXLJ7H4PWWLRK7	05	1AS0
EUT2	TGNVNRTOQC65Y9K7	05	1AS0
EUT3	VGMJ79GIKVPNMZB6	05	1AS0

*EUT ID: is used to identify the test sample in the lab internally.

Note: It is performed to test SAR with the EUT2-3 and conducted power with the EUT1.

4.3 Internal Identification of AE used during the test

AE ID*	Description	Model	SN	Manufacturer
AE1	Battery	TLp100A7	/	Dongguan Veken Battery CO., LTD.

*AE ID: is used to identify the test sample in the lab internally.

5 TEST METHODOLOGY

5.1 Applicable Limit Regulations

ANSI C95.1–1992:IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

It specifies the maximum exposure limit of **1.6 W/kg** as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

5.2 Applicable Measurement Standards

IEEE 1528–2013: Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.

KDB447498 D01: General RF Exposure Guidance v06: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

KDB616217 D04 SAR for laptop and tablets v01r02 SAR Evaluation Considerations for Laptop, Notebook, Notebook and Tablet Computers.

KDB248227 D01 802.11 Wi-Fi SAR v02r02: SAR GUIDANCE FOR IEEE 802.11 (Wi-Fi) TRANSMITTERS

KDB865664 D01 SAR measurement 100 MHz to 6 GHz v01r04: SAR Measurement Requirements for 100 MHz to 6 GHz.

KDB865664 D02 RF Exposure Reporting v01r02: RF Exposure Compliance Reporting and Documentation Considerations

6 Specific Absorption Rate (SAR)

6.1 Introduction

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

6.2 SAR Definition

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

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

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

SAR measurement can be either related to the temperature elevation in tissue by

$$SAR = c\left(\frac{\delta T}{\delta t}\right)$$

Where: C is the specific head capacity, δT is the temperature rise and δt is the exposure duration, or 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 tissue and E is the RMS electrical field strength.

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

7 Tissue Simulating Liquids

7.1 Targets for tissue simulating liquid

Table 7.1: Targets for tissue simulating liquid

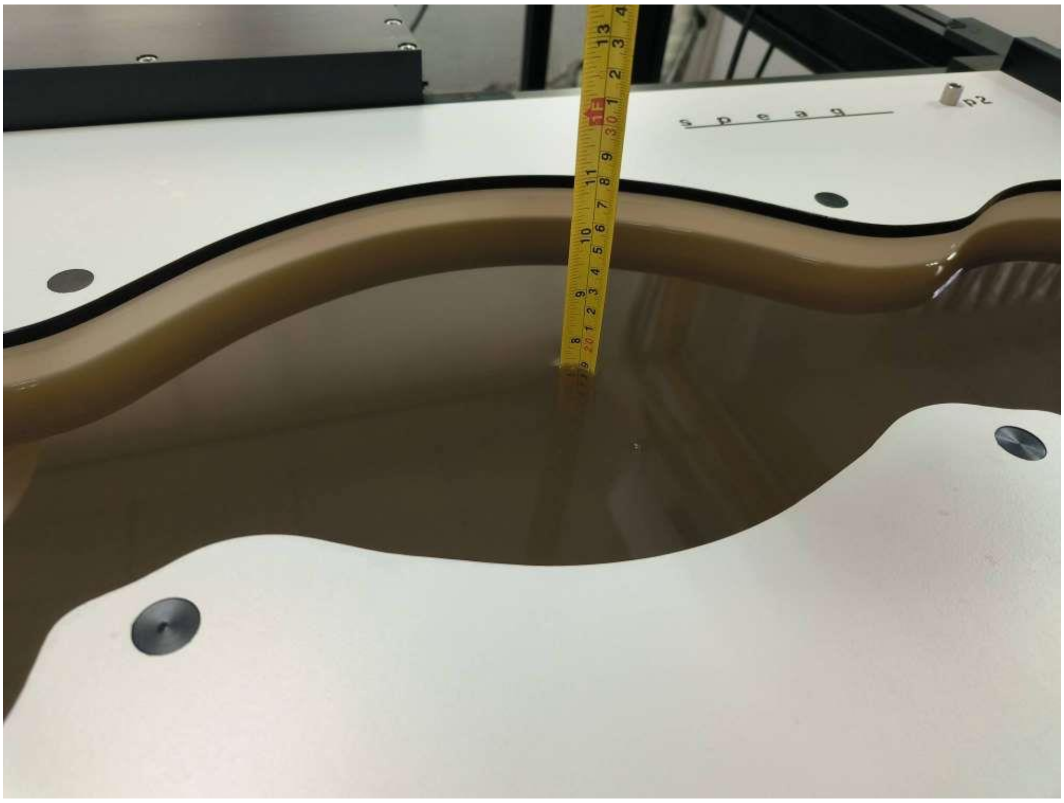
Frequency(MHz)	Liquid Type	Conductivity(σ)	± 5% Range	Permittivity(ε)	± 5% Range
2450	Head	1.8	1.71～1.89	39.2	37.24～41.16
5250	Head	4.71	4.47～4.95	35.93	34.13～37.73
5600	Head	5.07	4.82～5.32	35.53	33.8～37.3
5750	Head	5.22	4.96～5.48	35.36	33.59～37.13

7.2 Dielectric Performance

Table 7.2: Dielectric Performance of Tissue Simulating Liquid

Measurement Date (yyyy-mm-dd)	Type	Frequency	Permittivity ε	Drift (%)	Conductivity σ (S/m)	Drift (%)
2024-5-27	Head	2450 MHz	39.55	0.89%	1.841	2.28%
2024-5-28	Head	5250 MHz	35.74	-0.53%	4.728	0.38%
2024-5-28	Head	5600 MHz	35.04	-1.38%	5.125	1.08%
2024-5-28	Head	5750 MHz	34.75	-1.73%	5.301	1.55%

Note: The liquid temperature is 22.0℃

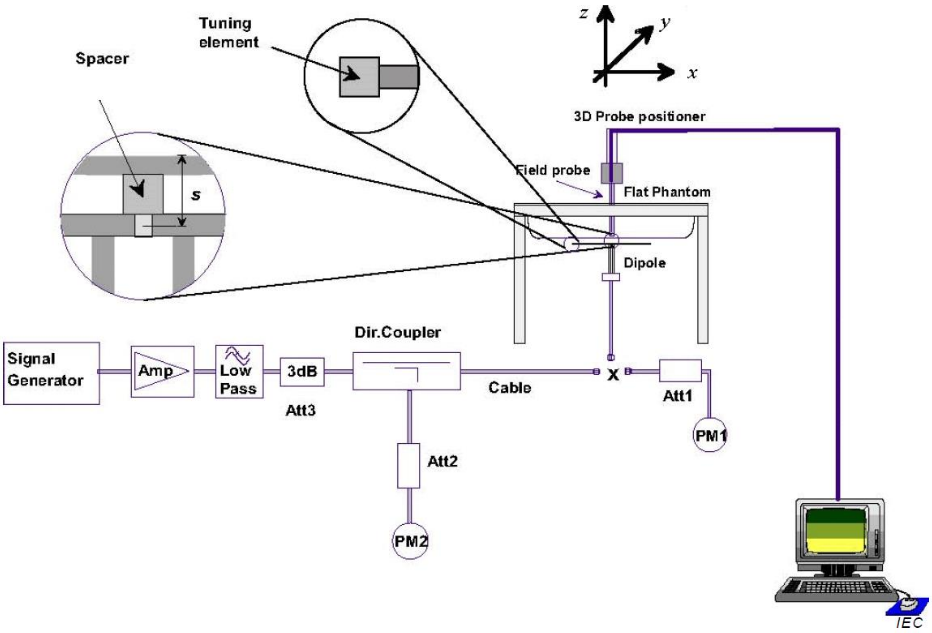


Picture 7-1 Liquid depth in the Flat Phantom

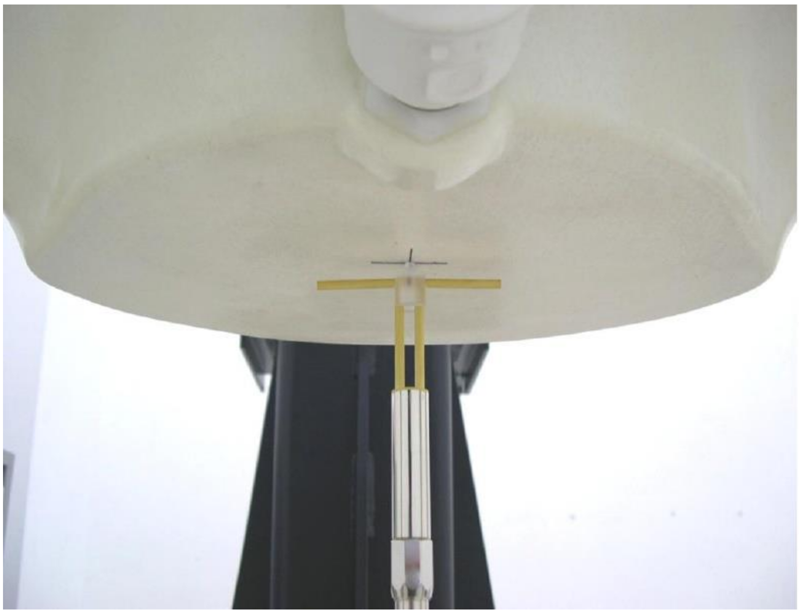
8 System verification

8.1 System Setup

In the simplified setup for system evaluation, the DUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave that comes from a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The equipment setup is shown below:



Picture 8.1 System Setup for System Evaluation



Picture 8.2 Photo of Dipole Setup

8.2 System Verification

SAR system verification is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device.

Table 8.1: System Verification of Head

Measurement Date (yyyy-mm-dd)	Frequency	Target value (W/kg)		Measured value(W/kg)		Deviation	
		10 g Average	1 g Average	10 g Average	1 g Average	10 g Average	1 g Average
2024-5-27	2450 MHz	24.7	52.1	25.3	52.8	2.35%	1.34%
2024-5-28	5250 MHz	22.8	79.6	22.5	80.1	-1.32%	0.63%
2024-5-28	5250 MHz	23.8	83.6	23.5	82.3	-1.26%	-1.56%
2024-5-28	5750 MHz	22.7	80.5	22.3	78.8	-1.76%	-2.11%

9 Measurement Procedures

9.1 Tests to be performed

In order to determine the highest value of the peak spatial-average SAR of a handset, all device positions, configurations and operational modes shall be tested for each frequency band according to steps 1 to 3 below. A flowchart of the test process is shown in picture 9.1.

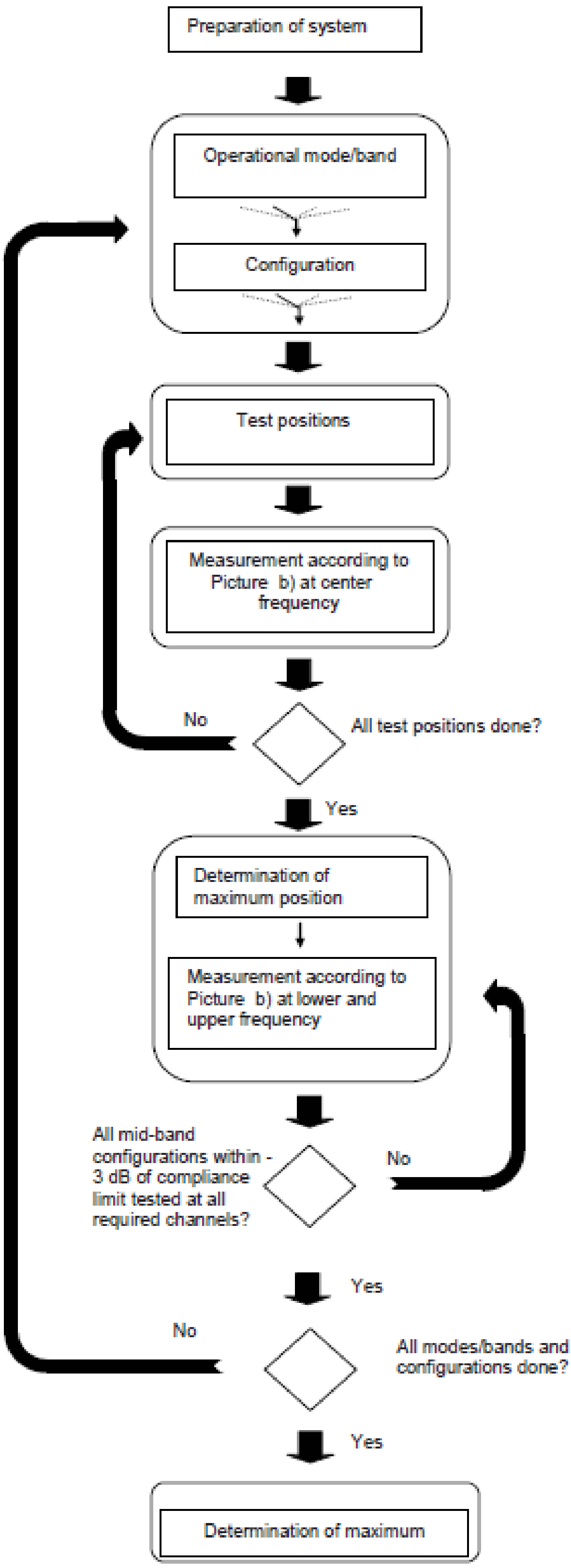
Step 1: The tests described in 9.2 shall be performed at the channel that is closest to the centre of the transmit frequency band (f_c) for:

a) all device positions (cheek and tilt, for both left and right sides of the SAM phantom, as described in annex D),
b) all configurations for each device position in a), e.g., antenna extended and retracted, and
c) all operational modes, e.g., analogue and digital, for each device position in a) and configuration in b) in each frequency band.

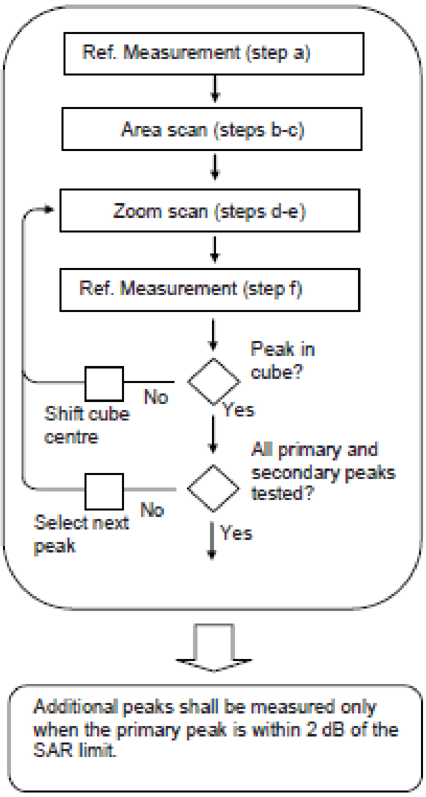
If more than three frequencies need to be tested according to 11.1 (i.e., $N_c > 3$), then all frequencies, configurations and modes shall be tested for all of the above test conditions.

Step 2: For the condition providing highest peak spatial-average SAR determined in Step 1,perform all tests described in 9.2 at all other test frequencies, i.e., lowest and highest frequencies. In addition, for all other conditions (device position, configuration and operational mode) where the peak spatial-average SAR value determined in Step 1 is within3 dB of the applicable SAR limit, it is recommended that all other test frequencies shall be tested as well.

Step 3: Examine all data to determine the highest value of the peak spatial-average SAR found in Steps 1 to 2.



Picture a – Tests to be performed



Picture b – General procedure

Picture 9.1 Block diagram of the tests to be performed

9.2 General Measurement Procedure

The area and zoom scan resolutions specified in the table below must be applied to the SAR measurements and fully documented in SAR reports to qualify for TCB approval. 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 Std 1528-2003. The results should be documented as part of the system validation records and may be requested to support test results when all the measurement parameters in the following table are not satisfied.

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 ± 1 mm	$\frac{1}{2}\cdot\delta\cdot\ln(2) \pm 0.5$ 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
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5\cdot\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

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

9.3 Bluetooth & Wi-Fi Measurement Procedures for SAR

Normal network operating configurations are not suitable for measuring the SAR of 802.11 transmitters in general. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure that the results are consistent and reliable.

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in a test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters. The test frequencies should correspond to actual channel frequencies defined for domestic use. SAR for devices with switched diversity should be measured with only one antenna transmitting at a time during each SAR measurement, according to a fixed modulation and data rate. The same data pattern should be used for all measurements.

9.4 Power Drift

To control the output power stability during the SAR test, DASY5 system calculates the power drift by measuring the E-field at the same location at the beginning and at the end of the measurement for each test position. These drift values can be found in section14 labeled as: (Power Drift [dB]). This ensures that the power drift during one measurement is within 5%.

10 Conducted Output Power

There is power reduction for WLAN by proximity sensor and the detail of proximity sensor is presented in annex I.

Mode	GFSK		
Channel	0	39	78
The conducted power (dBm)	10.22	10.61	10.33
Tune up	12	12	12

The average conducted power of Wi-Fi for full power is as following:

FCC			
802.11b	Channel\data rate	1Mbps	Tune up
WLAN2450	11(2462MHz)	18.89	20.00
	6(2437(MHz)	19.06	20.00
	1(2412MHz)	18.58	20.00
802.11g	Channel\data rate	6Mbps	
WLAN2450	11(2462MHz)	17.98	19.00
	6(2437(MHz)	18.05	19.00
	1(2412MHz)	17.56	19.00
802.11n-20MHz	Channel\data rate	MCS0	
WLAN2450	11(2462MHz)	17.83	19.00
	6(2437(MHz)	17.94	19.00
	1(2412MHz)	17.46	19.00
802.11n-40MHz	Channel\data rate	MCS0	
WLAN2450	9(2452MHz)	15.48	16.50
	6(2437MHz)	15.54	16.50
	3(2422MHz)	15.38	16.50

802.11a(dBm)		
Channel\data rate	6Mbps	Tuneup
36(5180 MHz)	16.69	18.00
40(5200 MHz)	16.51	18.00
44(5220 MHz)	16.64	18.00
48(5240 MHz)	16.66	18.00
52(5260 MHz)	16.44	18.00
56(5280 MHz)	16.43	18.00
60(5300 MHz)	16.53	18.00
64(5320 MHz)	16.25	18.00
100(5500 MHz)	16.85	18.00
104(5520 MHz)	16.80	18.00
108(5540 MHz)	16.81	18.00
112(5560 MHz)	16.67	18.00
116(5580 MHz)	16.64	18.00
120(5600 MHz)	16.63	18.00
124(5620 MHz)	16.41	18.00
128(5640 MHz)	16.25	18.00
132(5660 MHz)	16.43	18.00
136(5680 MHz)	16.34	18.00
140(5700 MHz)	16.25	18.00
144(5720 MHz)	16.24	18.00
149(5745 MHz)	16.53	18.00
153(5765 MHz)	16.35	18.00
157(5785 MHz)	16.39	18.00
161(5805 MHz)	16.31	18.00
165(5825 MHz)	16.36	18.00

802.11n(dBm)-20MHz		
Channel\data rate	MCS0	Tuneup
36(5180 MHz)	16.60	18.00
40(5200 MHz)	16.58	18.00
44(5220 MHz)	16.55	18.00
48(5240 MHz)	16.56	18.00
52(5260 MHz)	16.50	18.00
56(5280 MHz)	16.46	18.00
60(5300 MHz)	16.51	18.00
64(5320 MHz)	16.44	18.00
100(5500 MHz)	16.68	18.00
104(5520 MHz)	16.61	18.00
108(5540 MHz)	16.67	18.00
112(5560 MHz)	16.60	18.00
116(5580 MHz)	16.63	18.00
120(5600 MHz)	16.64	18.00
124(5620 MHz)	16.43	18.00
128(5640 MHz)	16.31	18.00
132(5660 MHz)	16.48	18.00
136(5680 MHz)	16.39	18.00
140(5700 MHz)	16.32	18.00
144(5720 MHz)	16.38	18.00
149(5745 MHz)	16.31	18.00
153(5765 MHz)	16.35	18.00
157(5785 MHz)	16.36	18.00
161(5805 MHz)	16.31	18.00
165(5825 MHz)	16.34	18.00

802.11n(dBm)-40MHz		
Channel\data rate	MCS0	
38(5190 MHz)	16.63	17.50
46(5230 MHz)	16.55	17.50
54(5270 MHz)	16.49	17.50
62(5310 MHz)	16.39	17.50
102(5510 MHz)	16.59	17.50
110(5550 MHz)	16.43	17.50
118(5590 MHz)	16.55	17.50
126(5630 MHz)	16.46	17.50
134(5670 MHz)	16.65	17.50
142(5710 MHz)	16.63	17.50
151(5755 MHz)	16.61	17.50
159(5795 MHz)	16.54	17.50

802.11ac(dBm)-20MHz		
Channel\data rate	MCS0	
36(5180 MHz)	16.49	18.00
40(5200 MHz)	16.43	18.00
44(5220 MHz)	16.44	18.00
48(5240 MHz)	16.47	18.00
52(5260 MHz)	16.48	18.00
56(5280 MHz)	16.46	18.00
60(5300 MHz)	16.45	18.00
64(5320 MHz)	16.43	18.00
100(5500 MHz)	16.41	18.00
104(5520 MHz)	16.57	18.00
108(5540 MHz)	16.49	18.00
112(5560 MHz)	16.51	18.00
116(5580 MHz)	16.64	18.00
120(5600 MHz)	16.61	18.00
124(5620 MHz)	16.63	18.00
128(5640 MHz)	16.52	18.00
132(5660 MHz)	16.69	18.00
136(5680 MHz)	16.66	18.00
140(5700 MHz)	16.64	18.00
144(5720 MHz)	16.76	18.00
149(5745 MHz)	16.59	18.00
153(5765 MHz)	16.55	18.00
157(5785 MHz)	16.54	18.00
161(5805 MHz)	16.49	18.00
165(5825 MHz)	16.56	18.00

802.11ac(dBm)-40MHz		
Channel\data rate	MCS0	
38(5190 MHz)	16.48	17.50
46(5230 MHz)	16.41	17.50
54(5270 MHz)	16.49	17.50
62(5310 MHz)	16.47	17.50
102(5510 MHz)	16.58	17.50
110(5550 MHz)	16.57	17.50
118(5590 MHz)	16.56	17.50
126(5630 MHz)	16.64	17.50
134(5670 MHz)	16.69	17.50
142(5710 MHz)	16.67	17.50
151(5755 MHz)	16.60	17.50
159(5795 MHz)	16.54	17.50

802.11ac(dBm)-80MHz		
Channel\data rate	MCS0	
42(5210 MHz)	16.59	17.50
58(5290 MHz)	16.61	17.50
106(5530 MHz)	16.57	17.50
122(5610 MHz)	16.52	17.50
138(5690 MHz)	16.56	17.50
155(5775 MHz)	16.58	17.50

The average conducted power of Wi-Fi for low power is as following:

802.11a(dBm)		
Channel\data rate	6Mbps	Tuneup
36(5180 MHz)	5.91	7.00
40(5200 MHz)	5.48	7.00
44(5220 MHz)	5.50	7.00
48(5240 MHz)	5.65	7.00
52(5260 MHz)	5.71	7.00
56(5280 MHz)	5.66	7.00
60(5300 MHz)	5.77	7.00
64(5320 MHz)	5.56	7.00
100(5500 MHz)	5.59	7.00
104(5520 MHz)	5.28	7.00
108(5540 MHz)	5.38	7.00
112(5560 MHz)	5.33	7.00
116(5580 MHz)	5.46	7.00
120(5600 MHz)	5.28	7.00
124(5620 MHz)	5.11	7.00
128(5640 MHz)	5.05	7.00
132(5660 MHz)	5.26	7.00
136(5680 MHz)	5.43	7.00
140(5700 MHz)	5.21	7.00
144(5720 MHz)	5.17	7.00
149(5745 MHz)	5.23	7.00
153(5765 MHz)	5.07	7.00
157(5785 MHz)	5.01	7.00
161(5805 MHz)	5.10	7.00
165(5825 MHz)	5.06	7.00

802.11n(dBm)-20MHz		
Channel\data rate	MCS0	
36(5180 MHz)	5.52	7.00
40(5200 MHz)	5.62	7.00
44(5220 MHz)	5.56	7.00
48(5240 MHz)	5.43	7.00
52(5260 MHz)	5.46	7.00
56(5280 MHz)	5.55	7.00
60(5300 MHz)	5.46	7.00
64(5320 MHz)	5.57	7.00
100(5500 MHz)	5.45	7.00
104(5520 MHz)	5.43	7.00
108(5540 MHz)	5.16	7.00
112(5560 MHz)	5.10	7.00
116(5580 MHz)	5.43	7.00
120(5600 MHz)	5.21	7.00
124(5620 MHz)	5.06	7.00
128(5640 MHz)	5.08	7.00
132(5660 MHz)	5.44	7.00
136(5680 MHz)	5.28	7.00
140(5700 MHz)	5.17	7.00
144(5720 MHz)	5.00	7.00
149(5745 MHz)	5.01	7.00
153(5765 MHz)	5.27	7.00
157(5785 MHz)	5.06	7.00
161(5805 MHz)	5.12	7.00
165(5825 MHz)	5.02	7.00

802.11n(dBm)-40MHz		Tuneup
Channel\data rate	MCS0	
38(5190 MHz)	5.35	6.50
46(5230 MHz)	5.36	6.50
54(5270 MHz)	5.41	6.50
62(5310 MHz)	5.22	6.50
102(5510 MHz)	5.42	6.50
110(5550 MHz)	5.41	6.50
118(5590 MHz)	5.27	6.50
126(5630 MHz)	5.18	6.50
134(5670 MHz)	5.23	6.50
142(5710 MHz)	5.14	6.50
151(5755 MHz)	5.01	6.50
159(5795 MHz)	5.08	6.50

802.11ac(dBm)-20MHz		
Channel\data rate	MCS0	
36(5180 MHz)	5.50	7.00
40(5200 MHz)	5.54	7.00
44(5220 MHz)	5.68	7.00
48(5240 MHz)	5.57	7.00
52(5260 MHz)	5.65	7.00
56(5280 MHz)	5.66	7.00
60(5300 MHz)	5.64	7.00
64(5320 MHz)	5.56	7.00
100(5500 MHz)	5.49	7.00
104(5520 MHz)	5.52	7.00
108(5540 MHz)	5.37	7.00
112(5560 MHz)	5.36	7.00
116(5580 MHz)	5.32	7.00
120(5600 MHz)	5.36	7.00
124(5620 MHz)	5.01	7.00
128(5640 MHz)	5.27	7.00
132(5660 MHz)	5.46	7.00
136(5680 MHz)	5.35	7.00
140(5700 MHz)	5.26	7.00
144(5720 MHz)	5.25	7.00
149(5745 MHz)	5.19	7.00
153(5765 MHz)	5.22	7.00
157(5785 MHz)	5.25	7.00
161(5805 MHz)	5.13	7.00
165(5825 MHz)	4.89	7.00

802.11ac(dBm)-40MHz		
Channel\data rate	MCS0	
38(5190 MHz)	5.33	6.50
46(5230 MHz)	5.31	6.50
54(5270 MHz)	5.33	6.50
62(5310 MHz)	5.44	6.50
102(5510 MHz)	5.40	6.50
110(5550 MHz)	5.41	6.50
118(5590 MHz)	5.15	6.50
126(5630 MHz)	5.11	6.50
134(5670 MHz)	5.43	6.50
142(5710 MHz)	5.03	6.50
151(5755 MHz)	4.93	6.50
159(5795 MHz)	5.04	6.50

802.11ac(dBm)-80MHz		
Channel\data rate	MCS0	
42(5210 MHz)	5.28	6.50
58(5290 MHz)	5.36	6.50
106(5530 MHz)	5.25	6.50
122(5610 MHz)	4.81	6.50
138(5690 MHz)	4.65	6.50
155(5775 MHz)	4.82	6.50

11 Antenna Location

11.1 Transmit Antenna Separation Distances

The detail for transmit antenna separation distance is described in the additional document:
Appendix to test report No. 24T04Z101045-002
The photos of SAR test

11.2 SAR Measurement Positions

SAR measurement positions						
Mode	Front	Rear	Left edge	Right edge	Top edge	Bottom edge
BT/WiFi 2.4G antenna	No	Yes	No	Yes	Yes	No
WiFi 5G antenna	No	Yes	No	No	No	No

12 SAR Test Result

The calculated SAR is obtained by the following formula:

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

Where P_{Target} is the power of manufacturing upper limit;

$P_{Measured}$ is the measured power in chapter 10.

The maximum output power specified for production units are determined for all applicable 802.11 transmission modes in each standalone and aggregated frequency band. Maximum output power is measured for the highest maximum output power configuration(s) in each frequency band according to the default power measurement procedures.

When the same transmission mode configurations have the same maximum output power on the same channel for the 802.11 a/g/n/ac/ax modes, the channel in the lower order/sequence 802.11 mode (i.e. a, g, n ac then ax) is selected.

SAR Test reduction was applied from KDB 248227 guidance, 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. Additional output power measurements were not deemed necessary.

WLAN 2.4G

Test Position	Frequency Band	Channel Number	Frequency (MHz)	Mode/RB	Test Position	Distance	Figure No./Note	EUT Measured Power (dBm)	Tune up (dBm)	Duty Cycle	Measured SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Reported SAR 10g (W/kg)	Power Drift
Body	WLAN 2.4G	6	2437	11b	Rear	0mm	\	19.06	20	100%	0.095	**0.12**	0.050	**0.06**	0.18
Body	WLAN 2.4G	6	2437	11b	Right	0mm	\	19.06	20	100%	0.038	**0.05**	0.014	**0.02**	0.19
Body	WLAN 2.4G	6	2437	11b	Top	0mm	Fig.1	19.06	20	100%	0.339	**0.42**	0.171	**0.21**	0.18

Note: SAR is not required for OFDM because the 802.11b adjusted SAR ≤ 1.2 W/kg.

WLAN 5G

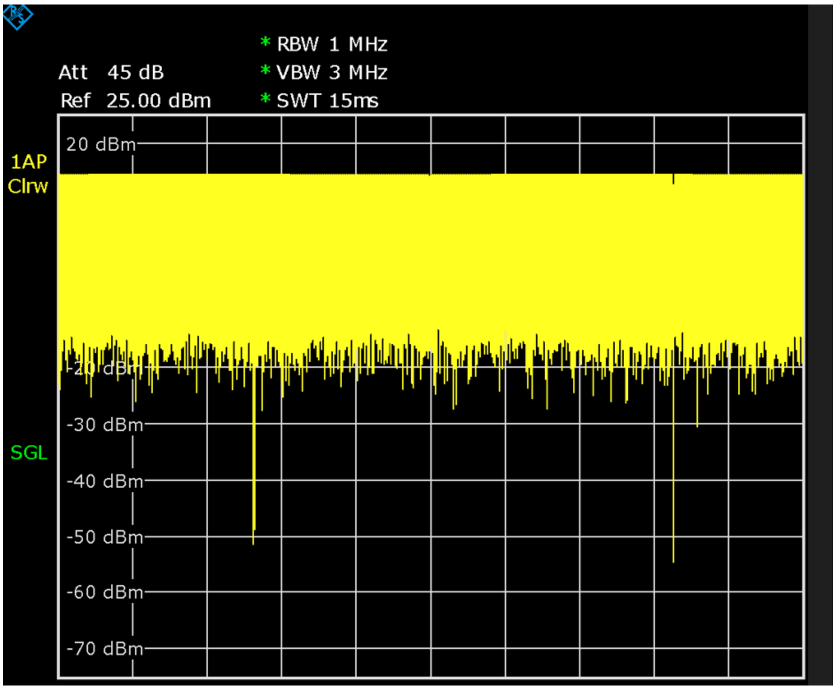
Test Position	Frequency Band	Channel Number	Frequency (MHz)	Mode/RB	Test Position	Distance	Figure No./Note	EUT Measured Power (dBm)	Tune up (dBm)	Duty Cycle	Measured SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Reported SAR 10g (W/kg)	Power Drift
Body	WLAN 5G	36	5180	11a	Rear	17mm	Fig.2	16.69	18	100%	0.994	**1.34**	0.355	**0.48**	0.17
Body	WLAN 5G	48	5240	11a	Rear	17mm	\	16.66	18	100%	0.824	**1.12**	0.302	**0.41**	-0.05
Body	WLAN 5G	60	5300	11a	Rear	17mm	\	16.53	18	100%	0.734	**1.03**	0.28	**0.39**	-0.09
Body	WLAN 5G	56	5280	11a	Rear	17mm	\	16.43	18	100%	0.622	**0.89**	0.204	**0.29**	-0.17
Body	WLAN 5G	100	5500	11a	Rear	17mm	\	16.85	18	100%	0.62	**0.81**	0.235	**0.31**	0.14
Body	WLAN 5G	108	5540	11a	Rear	17mm	\	16.81	18	100%	0.512	**0.67**	0.196	**0.26**	0.08
Body	WLAN 5G	149	5745	11a	Rear	17mm	\	16.53	18	100%	0.61	**0.86**	0.241	**0.34**	0.16
Body	WLAN 5G	157	5785	11a	Rear	17mm	\	16.39	18	100%	0.509	**0.74**	0.203	**0.29**	-0.12
Body	WLAN 5G	36	5180	11a	Rear	0mm	\	5.91	7	100%	0.899	**1.16**	0.196	**0.25**	0.09
Body	WLAN 5G	48	5240	11a	Rear	0mm	\	5.65	7	100%	0.752	**1.03**	0.149	**0.20**	0.15
Body	WLAN 5G	60	5300	11a	Rear	0mm	\	5.77	7	100%	0.878	**1.17**	0.193	**0.26**	0.01
Body	WLAN 5G	52	5260	11a	Rear	0mm	\	5.71	7	100%	0.822	**1.11**	0.175	**0.24**	-0.09
Body	WLAN 5G	100	5500	11a	Rear	0mm	\	5.59	7	100%	0.778	**1.08**	0.156	**0.22**	-0.1
Body	WLAN 5G	116	5580	11a	Rear	0mm	\	5.46	7	100%	0.742	**1.06**	0.149	**0.21**	-0.18
Body	WLAN 5G	149	5745	11a	Rear	0mm	\	5.23	7	100%	0.735	**1.10**	0.139	**0.21**	0.02
Body	WLAN 5G	161	5805	11a	Rear	0mm	\	5.10	7	100%	0.625	**0.97**	0.118	**0.18**	-0.11

BT

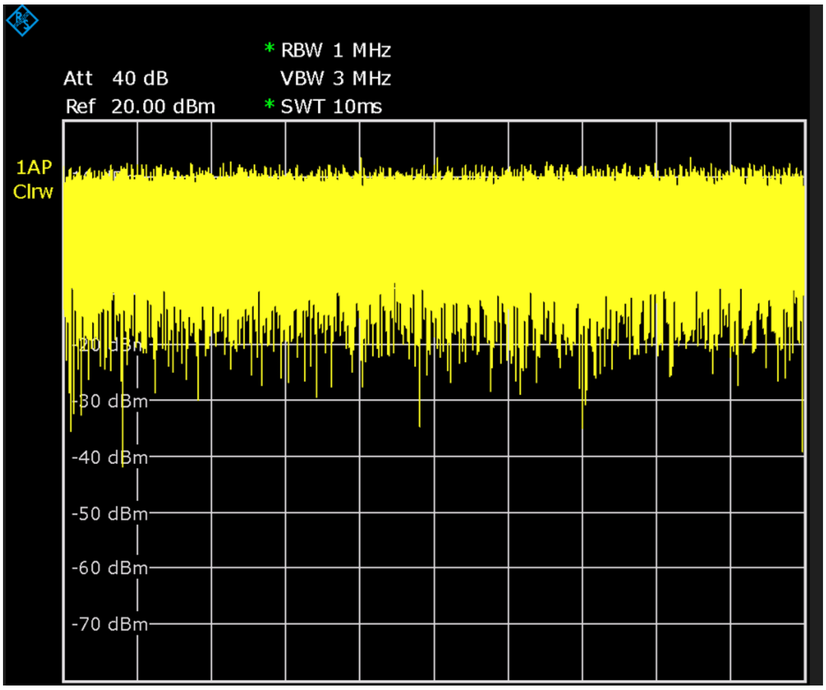
Test Position	Frequency Band	Channel Number	Frequency (MHz)	Mode/RB	Test Position	Distance	Figure No./Note	EUT Measured Power (dBm)	Tune up (dBm)	Measured SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Reported SAR 10g (W/kg)	Power Drift
Body	BT	39	2437	GFSK	Rear	0mm	\	10.61	12	＜0.01	**＜0.01**	＜0.01	**＜0.01**	\
Body	BT	39	2437	GFSK	Right	0mm	\	10.61	12	＜0.01	**＜0.01**	＜0.01	**＜0.01**	\
Body	BT	39	2437	GFSK	Top	0mm	\	10.61	12	＜0.01	**＜0.01**	＜0.01	**＜0.01**	\

Duty factor plot

WLAN 2.4G



WLAN 5G



13 SAR Measurement Variability

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. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium.

The following procedures are applied to determine if repeated measurements are required.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps2) 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 ≥ 1.45W/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

Table 13.1: SAR Measurement Variability for Body (1g)

Frequency Band	Channel Number	Frequency (MHz)	Mode/RB	Test Position	Distance	Original SAR (W/kg)	First Repeated SAR (W/kg)	The Ratio	Second Repeated SAR (W/kg)
WLAN 5G	36	5180	11a	Rear	17mm	0.994	0.945	1.05	\
WLAN 5G	48	5240	11a	Rear	17mm	0.824	0.815	1.01	\
WLAN 5G	36	5180	11a	Rear	0mm	0.899	0.879	1.02	\
WLAN 5G	60	5300	11a	Rear	0mm	0.878	0.855	1.03	\
WLAN 5G	52	5260	11a	Rear	0mm	0.822	0.816	1.01	\

14 Evaluation of Simultaneous

14.1 Introduction

The following procedures adopted from “FCC SAR Considerations for Cell Phones with Multiple Transmitters” are applicable to handsets with built-in unlicensed transmitters such as WLAN and Bluetooth devices which may simultaneously transmit with the licensed transmitter. KDB 447498 D01 provides two procedures for determining simultaneous transmission SAR test exclusion: Sum of SAR and SAR to Peak Location Ratio (SPLSR)

14.1.1 Sum of SAR

To qualify for simultaneous transmission SAR test exclusion based upon Sum of SAR the sum of the reported standalone SARs for all simultaneously transmitting antennas shall be below the applicable standalone SAR limit. If the sum of the SARs is above the applicable limit then simultaneous transmission SAR test exclusion may still apply if the requirements of the SAR to Peak Location Ratio (SPLSR) evaluation are met.

14.1.2 SAR to Peak Location Ratio (SPLSR)

KDB 447498 D01 General RF Exposure Guidance explains how to calculate the SAR to Peak Location Ratio (SPLSR) between pairs of simultaneously transmitting antennas:

$SPLSR = (SAR1 + SAR2)^{1.5} / Ri$

Where:

SAR1 is the highest reported or estimated SAR for the first of a pair of simultaneous transmitting antennas, in a specific test operating mode and exposure condition.

SAR2 is the highest reported or estimated SAR for the second of a pair of simultaneous transmitting antennas, in the same test operating mode and exposure condition as the first .

Ri is the separation distance between the pair of simultaneous transmitting antennas. When the SAR is measured, for both antennas in the pair, it is determined by the actual x, y and z coordinates in the 1-g SAR for each SAR peak location, based on the extrapolated and interpolated result in the zoom scan measurement, using the formula of

$[(x1-x2)^2 + (y1-y2)^2 + (z1-z2)^2]$

In order for a pair of simultaneous transmitting antennas with the sum of 1-g SAR > 1.6 W/kg to qualify for exemption from Simultaneous Transmission SAR measurements, it has to satisfy the condition of:

$(SAR1 + SAR2)^{1.5} / Ri \leqslant 0.04$

When an individual antenna transmits at on two bands simultaneously, the sum of the highest reported SAR for the frequency bands should be used to determine SAR1 or SAR2. When SPLSR is necessary, the smallest distance between the peak SAR locations for the antenna pair with respect to the peaks from each antenna should be used.

14.2 Simultaneous Transmission Capabilities

The simultaneous transmission possibilities for this device are listed as below:

NO	If support: WWAN*1TX and WLAN*1TX	Y or N
1	WLAN 2.4GHz +BT	N
2	WLAN 5GHz +BT	Y

Note:

1. The reported SAR summation is calculated based on the same configuration and test position.
2. For the devices edges with antennas more than 2.5 cm from edge are not required to be evaluated for SAR, we determined the SAR of this edges were less than 0.01. For the convenience of simultaneous transmission calculation, all SAR values less than or equal to 0.01 are uniformly written as 0.00

14.3 SAR Simultaneous Transmission Analysis

Table 14.1: The sum of reported SAR values for main antenna and WiFi

	Position	WLAN 5G	BT	Sum
Highest reported SAR value for Body	Rear 0mm	1.34	<0.01	**1.34**

14.4 Conclusion

According to the above tables, the highest simultaneous transmission reported SAR values is **1.34W/kg (10g).** The sum of reported SAR values is < 1.6W/kg.

15 Measurement Uncertainty

15.1 Measurement Uncertainty for Normal SAR Tests (300MHz~3GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	6.0	N	1	1	1	6.0	6.0	∞
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	N	1	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	∞
10	RFambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	∞
11	Probe positioned mech. restrictions	B	0.4	R	$\sqrt{3}$	1	1	0.2	0.2	∞
12	Probe positioning with respect to phantom shell	B	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
13	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
Test sample related										
14	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
15	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
16	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
17	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
18	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
19	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
20	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
21	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521
Combined standard uncertainty		$u_c' = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$						9.55	9.43	257
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						19.1	18.9	

15.2 Measurement Uncertainty for Normal SAR Tests (3~6GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	6.55	N	1	1	1	6.55	6.55	∞
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	2.0	R	$\sqrt{3}$	1	1	1.2	1.2	∞
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	∞
10	RFambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	∞
11	Probe positioned mech. restrictions	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
12	Probe positioning with respect to phantom shell	B	6.7	R	$\sqrt{3}$	1	1	3.9	3.9	∞
13	Post-processing	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
Test sample related										
14	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
15	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
16	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
17	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
18	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
19	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
20	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
21	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521
Combined standard uncertainty		$u_c' = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$						10.7	10.6	257
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						21.4	21.1	

16 MAIN TEST INSTRUMENTS

Table 16.1: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	N5239A	MY55491241	June 5, 2023	One year
02	Power sensor	NRP50S	101488	June 14, 2023	One year
03	Power sensor	NRP50S	101489		
04	Signal Generator	MG3700A	6201052605	June 12 2023	One Year
05	Amplifier	60S1G4	0331848	No Calibration Requested	
06	DAE	SPEAG DAE4	1331	September 14,2023	One year
07	E-field Probe	SPEAG EX3DV4	7673	July 24,2023	One year
08	Dipole Validation Kit	SPEAG D2450V2	853	July 11 2023	One year
09	Dipole Validation Kit	SPEAG D5GHzV2	1060	June 19,2023	One year

END OF REPORT BODY

ANNEX A Graph Results

WLAN2.4G Body

Date/Time: 2024-05-27

Electronics: DAE4 Sn1331

Medium: H700-6000M

Medium parameters used: f = 2435 MHz; σ = 1.828 S/m; ε_r = 39.573; ρ = 1000 kg/m^3

Ambient Temperature:23.3°C   Liquid Temperature: 22.5°C

Communication System: UID 0, 1WIFI 2450 (0) Frequency: 2437 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7673 ConvF(7.65, 7.65, 7.65) @ 2437 MHz

Area Scan (101x131x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.587 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.492 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 0.740 W/kg
SAR(1 g) = 0.339 W/kg; SAR(10 g) = 0.171 W/kg
Smallest distance from peaks to all points 3 dB below = 7 mm
Ratio of SAR at M2 to SAR at M1 = 44.3%

Maximum value of SAR (measured) = 0.563 W/kg

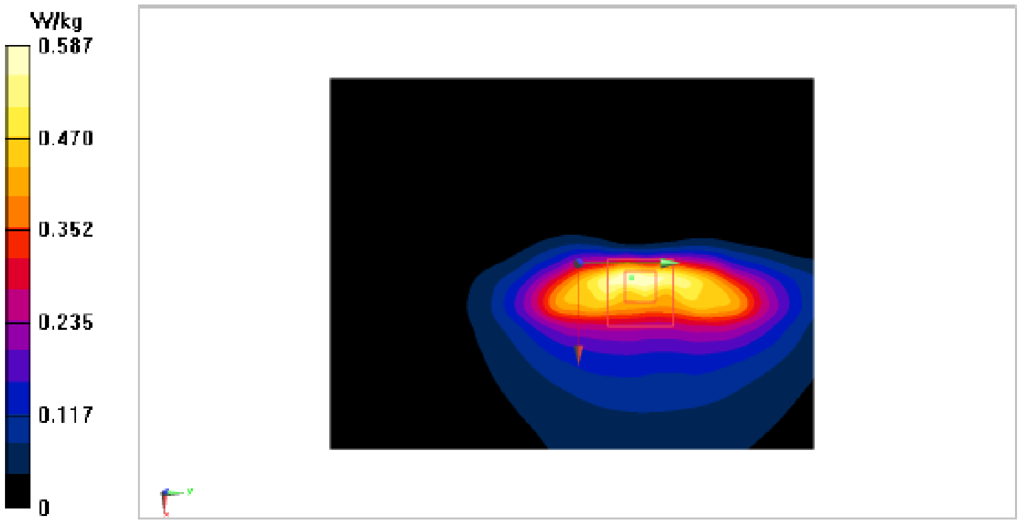


Fig .1

WLAN5G Body

Date/Time: 2024-05-28

Electronics: DAE4 Sn1331

Medium: H700-6000M

Medium parameters used: f = 5180 MHz; σ = 4.649 S/m; ε_r = 35.89; ρ = 1000 kg/m^3

Ambient Temperature:23.3°C Liquid Temperature: 22.5°C

Communication System: UID 0, 1WLAN 11a (0) Frequency: 5180 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7673 ConvF(5.19, 5.19, 5.19) @ 5180 MHz

Area Scan (111x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 2.38 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 12.31 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 3.65 W/kg
SAR(1 g) = 0.994 W/kg; SAR(10 g) = 0.355 W/kg
Smallest distance from peaks to all points 3 dB below = 10.2 mm
Ratio of SAR at M2 to SAR at M1 = 22.1%

Maximum value of SAR (measured) = 2.26 W/kg

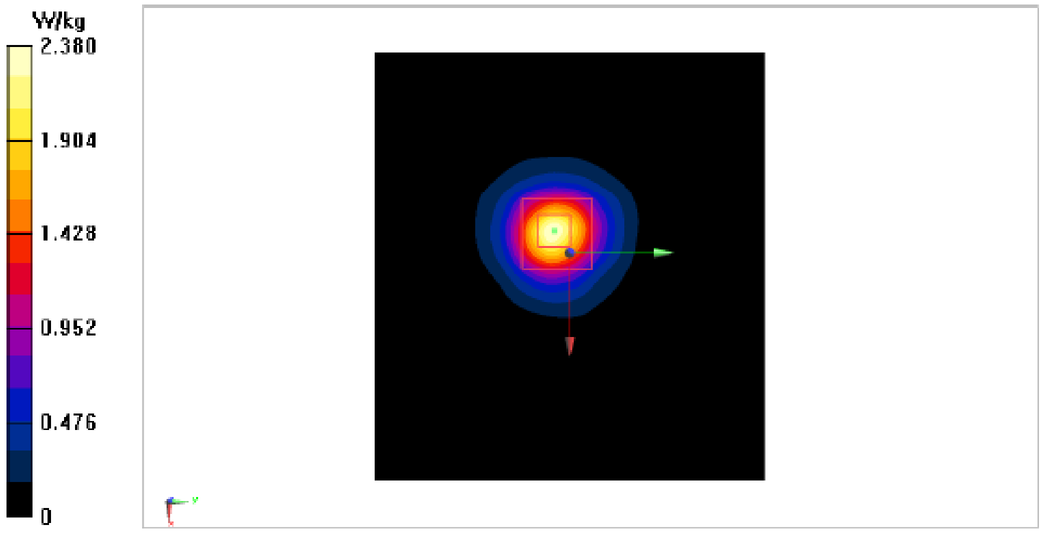


Fig .2

ANNEX B System Verification Results

2450 MHz

Date: 2024-05-27

Electronics: DAE4 Sn1331

Medium: H700-6000M

Medium parameters used: f = 2450 MHz; σ =1.841 mho/m; εr = 39.55; ρ = 1000 kg/m3

Ambient Temperature: 22.5oC Liquid Temperature: 22.3oC

Communication System: CW Frequency: 2450 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7673 ConvF(7.65, 7.65, 7.65)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 21.79 W/kg

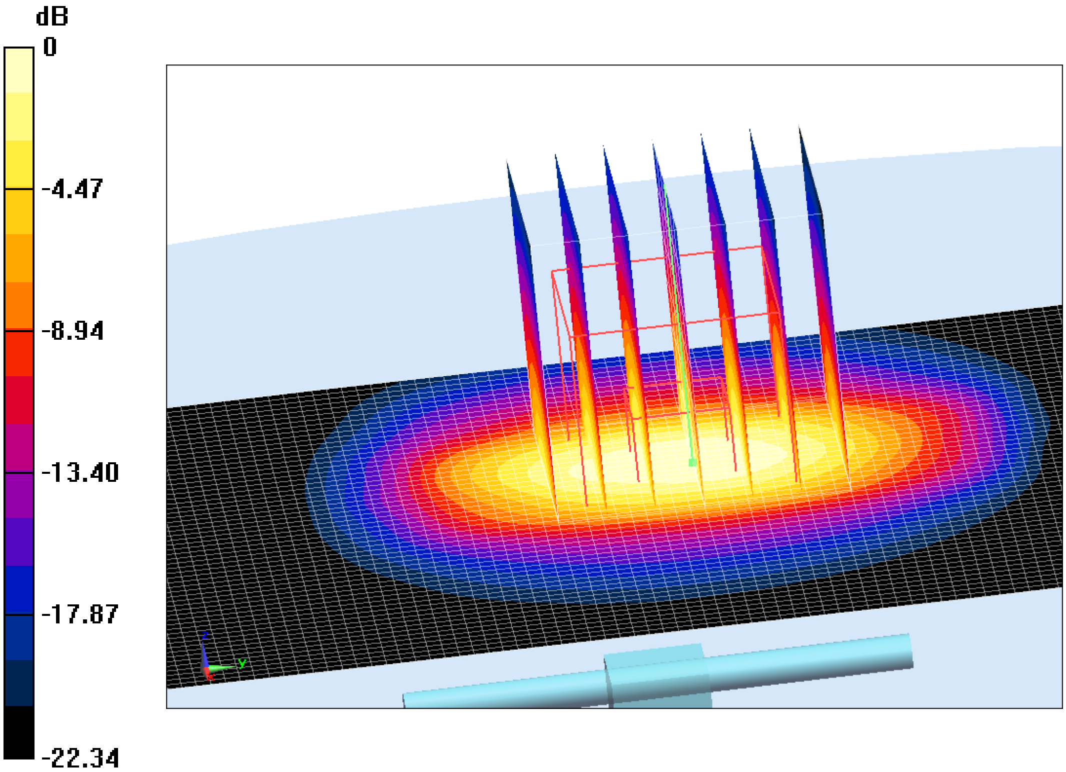
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value =117.26 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 26.42 W/kg

SAR(1 g) = 13.20 W/kg; SAR(10 g) = 6.32 W/kg

Maximum value of SAR (measured) = 22.17 W/kg



0 dB = 22.17 W/kg = 13.46 dB W/kg

5250 MHz

Date: 2024-05-28

Electronics: DAE4 Sn1331

Medium: H700-6000M

Medium parameters used: f = 5250 MHz; σ =4.728 mho/m; εr = 35.74; ρ = 1000 kg/m3

Ambient Temperature: 22.5oC Liquid Temperature: 22.3oC

Communication System: CW Frequency: 5250 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7673 ConvF(5.19, 5.19, 5.19)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 18.5 W/kg

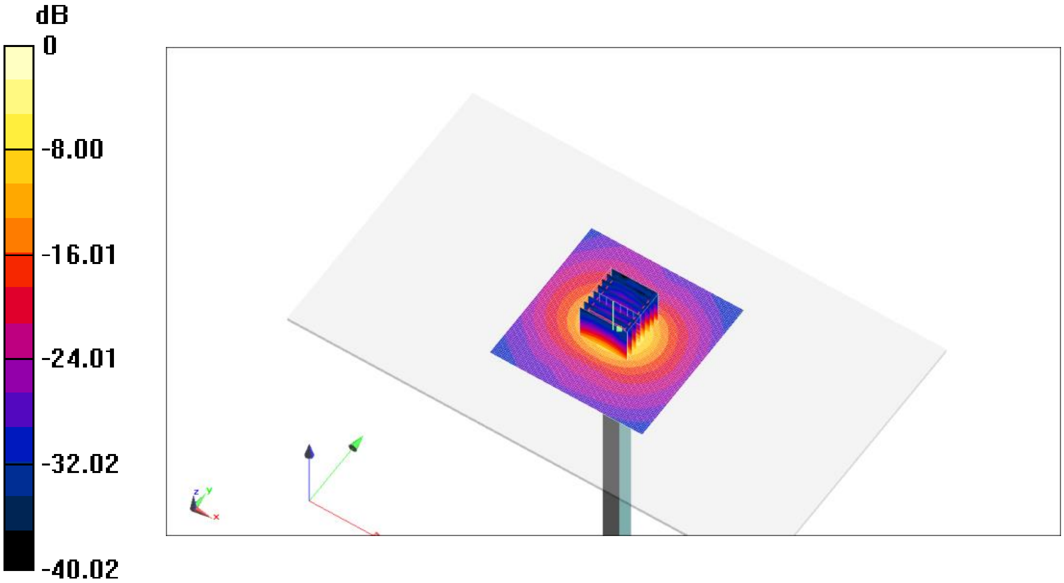
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value =79.26 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 28.29 W/kg

SAR(1 g) = 8.01 W/kg; SAR(10 g) = 2.25W/kg

Maximum value of SAR (measured) = 18.16 W/kg



0 dB = 18.16 W/kg = 12.59 dB W/kg

5600 MHz

Date: 2024-05-28

Electronics: DAE4 Sn1331

Medium: H700-6000M

Medium parameters used: f = 5600 MHz; σ =5.125 mho/m; εr = 35.04; ρ = 1000 kg/m3

Ambient Temperature: 22.5oC Liquid Temperature: 22.3oC

Communication System: CW Frequency: 5600 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7673 ConvF(4.69, 4.69, 4.69)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 20.15 W/kg

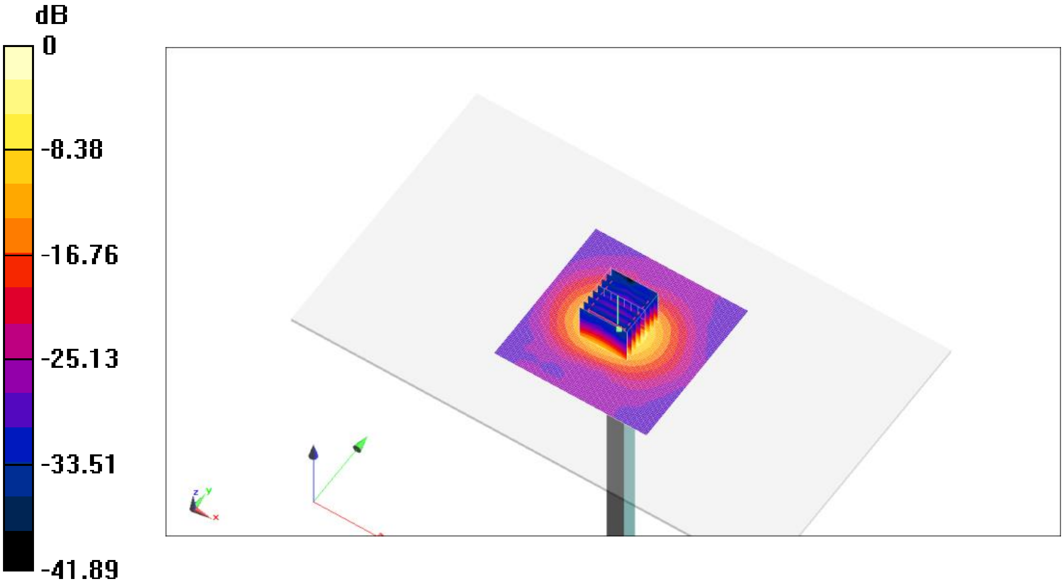
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value =78.53 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 31.47 W/kg

SAR(1 g) = 8.23 W/kg; SAR(10 g) = 2.35 W/kg

Maximum value of SAR (measured) = 20.47 W/kg



0 dB = 20.47 W/kg = 13.11 dB W/kg

5750 MHz

Date: 2024-05-28

Electronics: DAE4 Sn1331

Medium: H700-6000M

Medium parameters used: f = 5750 MHz; σ =5.301 mho/m; εr = 34.75; ρ = 1000 kg/m3

Ambient Temperature: 22.5oC Liquid Temperature: 22.3oC

Communication System: CW Frequency: 5750 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7673 ConvF(4.79, 4.79, 4.79)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 20.08 W/kg

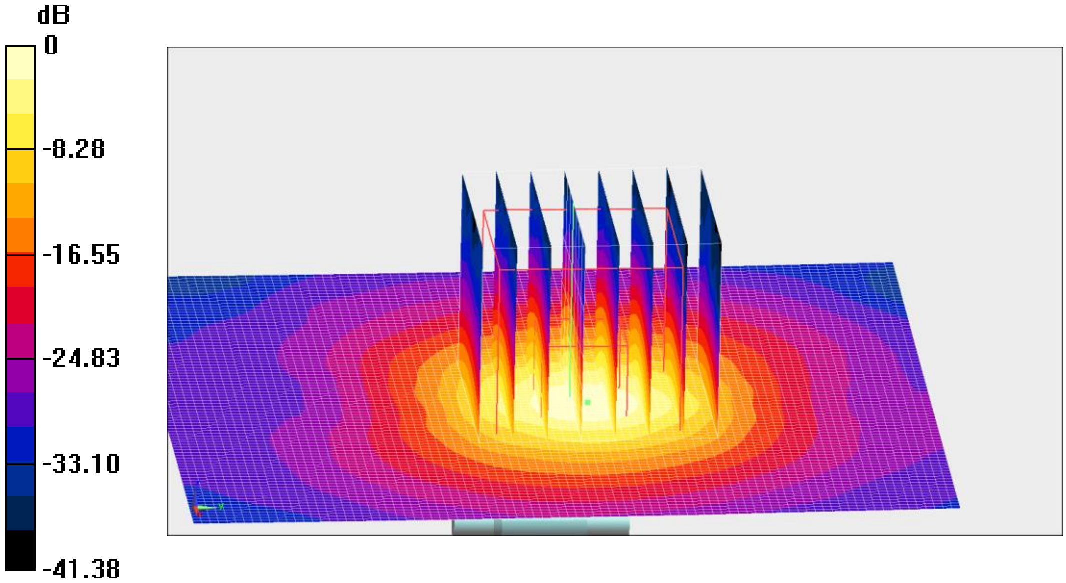
System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value =76.84 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 31.91 W/kg

SAR(1 g) = 7.88 W/kg; SAR(10 g) = 2.23 W/kg

Maximum value of SAR (measured) = 19.67 W/kg

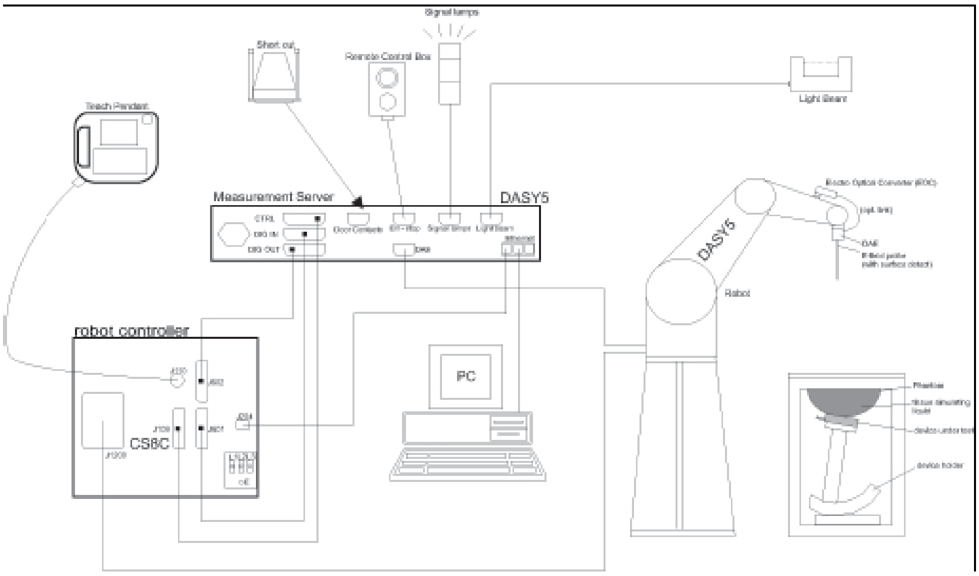


0 dB = 19.67 W/kg = 12.94 dB W/kg

ANNEX C SAR Measurement Setup

C.1 Measurement Set-up

The Dasy5 or DASY6 system for performing compliance tests is illustrated above graphically. This system consists of the following items:



Picture C.1SAR Lab Test Measurement Set-up

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

C.2 Dasy5 E-field Probe System

The SAR measurements were conducted with the dosimetric probe designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multifiber line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY5 or DASY6 software reads the reflection durning a software approach and looks for the maximum using 2nd ord curve fitting. The approach is stopped at reaching the maximum.

Picture C.2Near-field Probe

Probe Specifications:

Model: ES3DV3, EX3DV4

Frequency Range: 10MHz — 6.0GHz(EX3DV4)
10MHz — 4GHz(ES3DV3)

Calibration: In head and body simulating tissue at Frequencies from 835 up to 5800MHz

Linearity: ± 0.2 dB(30 MHz to 6 GHz) for EX3DV4
± 0.2 dB(30 MHz to 4 GHz) for ES3DV3

DynamicRange: 10 mW/kg — 100W/kg

Probe Length: 330 mm

Probe Tip Length: 20 mm

Body Diameter: 12 mm

Tip Diameter: 2.5 mm (3.9 mm for ES3DV3)

Tip-Center: 1 mm (2.0mm for ES3DV3)

Application:SAR Dosimetry Testing
Compliance tests ofmobile phones
Dosimetry in strong gradient fields

Picture C.3E-field Probe

C.3 E-field Probe Calibration

Each E-Probe/Probe Amplifier combination has unique calibration parameters. A TEM cell calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm^2) using an RF Signal generator, TEM cell, and RF Power Meter.

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and inn a waveguide or other methodologies above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1 mW/cm^2.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The E-field in the medium correlates with the temperature rise in the dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$SAR = C\frac{\Delta T}{\Delta t}$$

Where:

Δt = Exposure time (30 seconds),

C = Heat capacity of tissue (brain or muscle),

ΔT = Temperature increase due to RF exposure.

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

Where:

σ = Simulated tissue conductivity,

ρ = Tissue density (kg/m^3).

C.4 Other Test Equipment

C.4.1 Data Acquisition Electronics(DAE)

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

The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

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

PictureC.4: DAE