

Prüfbericht-Nr.: Test Report No.:	50094373 004	Auftrags-Nr.: Order No.:	164090912	Seite 1 von 37 Page 1 of 37
Kunden-Referenz-Nr.: Client Reference No.:	N/A	Auftragsdatum: Order date:	17.04.2017	
Auftraggeber: Client:	GIEC TECHNOLOGY (HONG KONG) CO., LTD. Unit 7, 22/F., Billion Trade Centre, 31 Hung To Road, Kwun Tong, Hongkong			
Prüfgegenstand: Test item:	11.6" Android tablet			
Bezeichnung / Typ-Nr.: Identification / Type No.:	NS-P11A8100, NS-P11A8100-C, NS-P11XXXXXXXXX (x=0-9, A-Z, a-z, - or blank, for market purpose only)			
Auftrags-Inhalt: Order content:	FCC/IC Certification			
Prüfgrundlage: Test specification:	CFR Title 47 Part 2 Subpart J Section 2.1093 ANSI/IEEE C95.1-1992 IEEE 1528-2013 KDB 447498 D01 v06 KDB 248227 D01 v02 RSS-102 Issue 5 March 2015			
Wareneingangsdatum: Date of receipt:	29.04.2017			
Prüfmuster-Nr.: Test sample No.:	A000575755-003			
Prüfzeitraum: Testing period:	08.07.2017 - 09.07.2017			
Ort der Prüfung: Place of testing:	Shenzhen EMTEK Co., Ltd.			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: Test result*:	Pass			
geprüft von / tested by:		kontrolliert von / reviewed by:		
10-07-2017	Andy Yan/Project Manager	10-07-2017	Owen Tian/Technical Certifier	
Datum Date	Name / Stellung Name / Position	Unterschrift Signature	Datum Date	Name / Stellung Name / Position
Sonstiges / Other:				
FCC ID: 2AIB2-P11A8100 IC: 21456-P11A8100 HVIN: NS-P11A8100-C				
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:		Prüfmuster vollständig und unbeschädigt Test item complete and undamaged		
<p>* 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</p> <p>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</p>				
<p>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</p>				

STATEMENT OF COMPLIANCE

TEST ITEM	SPECIFICATION	RESULT
Specific Absorption Rate - Wi-Fi 802.11 b/g/n - 2.4GHz Band	Exposure Rules 47 C.F.R 2.1093 Radiofrequency Radiation Exposure Evaluation: Portable Devices KDB 447498 D01 General RF Exposure Guidance v06 KDB 248227 D01 802.11 Wi-Fi SAR v02r01 KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r03 KDB 865664 D02 RF Exposure Reporting v01r01 KDB 616217 D04 SAR for laptop and tablets v01r01	PASS
Specific Absorption Rate - Wi-Fi 802.11 a/n/ac - 5GHz Band U- NII-1		PASS
Specific Absorption Rate - Wi-Fi 802.11 a/n/ac - 5GHz Band U- NII-2A		PASS
Specific Absorption Rate - Wi-Fi 802.11 a/n/ac - 5GHz Band U- NII-2C		PASS
Specific Absorption Rate - Wi-Fi 802.11 a/n/ac - 5GHz Band U- NII-3		PASS
Specific Absorption Rate – Bluetooth BDR/EDR/LE - 2.4GHz Band		PASS

This device complies with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6W/kg) specified in CFR Title 47 Part 2 Subpart J Section 2.1093 and ANSI/IEEE C95.1-1992.

This device has been tested in accordance with the measurement methods and procedure specified in IEEE 1528-2003 and Published RF exposure KDB procedures

Refer to the maximum results of Specific Absorption Rate (SAR) during testing as below.

FREQUENCY BAND	EXPOSURE POSITION	EQUIPMENT CLASS	HIGHEST REPORTED SAR VALUE (W/KG)
802.11 b/g/n - 2.4GHz Band	Body	DTS	1.353
802.11 a/n/ac - 5GHz Band U- NII-1	Body	NII	1.402
802.11 a/n/ac - 5GHz Band U- NII-2A	Body		1.250
802.11 a/n/ac - 5GHz Band U- NII-2C	Body		1.160
802.11 a/n/ac - 5GHz Band U- NII-3	Body		0.976

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1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: System Performance Check and Test Plots
Appendix B: Calibration Certificate

2. Test Sites

2.1 Test Facilities

Shenzhen EMTEK Co., Ltd.

Bldg 69, Majialong Industry Zone, Nanshan District,
Shenzhen, Guangdong, P.R. China

The tests at the test site have been conducted under the supervision of a TÜV engineer.

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
Signal Generator	Agilent	N5181A	MY50145187	2017-05-28	1year
RF Power Meter. Dual Channel	BOONTON	4232A	10539	2017-05-28	1year
Power Sensor	BOONTON	51011EMC	34236/34238	2017-05-28	1year
Wideband Radio Communication Tester	R&S	CMW500	1201.0002K50-140822zk	2017-05-28	1year
Signal Analyzer	Agilent	N9010A	My53470879	2017-05-28	1year
Network Analyzer	Agilent	E5071C	MY46316645	2017-05-28	1year
E-Field Probe	SPEAG	EX3DV4	3970	2016-09-07	1year
DAE	SPEAG	DAE4	1341	2016-09-05	1year
Validation Kit 2450MHz	SPEAG	D2450V2	927	2016-10-12	3years
Validation Kit 5GHz	SPEAG	D5GHzV2	1169	2016-06-17	3years
Dual Directional Coupler	Agilent	EE393	TW5451008	2017-05-28	1year
10dB Attenuator	Mini-Circuits	15542	3 1344	2017-05-28	1year
10dB Attenuator	Mini-Circuits	15542	3 1415	2017-05-28	1year
30dB Attenuator	Mini-Circuits	15542	3 1420	2017-05-28	1year
Power Amplifier	MILMEGA	80RF1000-175	1059345	2017-05-28	1 Year
Power Amplifier	MILMEGA	AS0102-55	1018770	2017-05-28	1 Year
Power Amplifier	MILMEGA	AS1860-50	1059346	2017-05-28	1 Year
Power Meter	Agilent	N1918A	MY54180006	2017-05-28	1 Year
ELI V5.0	SPEAG	QD 0VA 022 AA	1231	N/A	N/A
Device Holder	SPEAG	N/A	N/A	N/A	N/A
SAR Test System	SPEAG	DASY52 SAR TX60XL	F13/5R4XA1/A/01	2017-05-28	1 Year

3. General Product Information

3.1 Product Function and Intended Use

The EUTs are 11.6" Android tablet with Wi-Fi, Bluetooth function.
 All models are identical except the model number, brand or color.
 For details refer to the User Manual and Circuit Diagram.

3.2 Ratings and System Details

Table 2: Technical Specification of Wi-Fi

Technical Specification	Value
Kind of Equipment	11.6" Android tablet
Type Designation	NS-P11A8100, NS-P11A8100-C, NS-P11XXXXXXXXX (x=0-9, A-Z, a-z, - or blank, for market purpose only)
FCC ID	2AIB2-P11A8100
IC	21456-P11A8100
HVIN	NS-P11A8100-C
Operating Frequency band	2400 – 2483.5MHz, 5150 – 5850MHz
Extreme Temperature Range	0~+40°C
Operation Voltage	DC 3.7V (via built in battery)
Hardware version:	MQ-MPEG-H11A-01G_V2.0
Software version:	NS-P11A8100.V01.001
Maximum Antenna Gain	2.1dBi for 2400 – 2483.5MHz, 3.92dBi for 5150 – 5850MHz

Table 3: Technical Specification of 2.4GHz, 802.11b/g/n

Item	Description			
	IEEE 802.11b	IEEE 802.11g	IEEE 802.11n (HT20)	IEEE 802.11n (HT40)
Transmit frequency range (MHz)	2412 ~ 2462	2412 ~ 2462	2412 ~ 2462	2422 ~ 2452
Channel number	11	11	11	7
Modulation	DSSS (DBPSK, DQPSK), CCK)	OFDM (DBPSK, DQPSK)	OFDM (BPSK, QPSK, 16-QAM, 64-QAM)	OFDM (BPSK, QPSK, 16-QAM, 64-QAM)
Data rate (Mbps)	1, 2, 5, 11	6, 9, 12, 18, 24, 36, 48, 54	MCS0 ~ MCS7	MCS0 ~ MCS7
Maximum tune-up average output power (dBm)	15	13	13	13
Media access protocol	CSMA/CA with ACK	CSMA/CA with ACK	CSMA/CA with ACK	CSMA/CA with ACK

Table 4: List of WLAN Channel of 802.11b/g/n

802.11b		802.11g		802.11n (HT20)		802.11n (HT40)	
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
1	2412	1	2412	1	2412	3	2422
2	2417	2	2417	2	2417	4	2427
3	2422	3	2422	3	2422	5	2432
4	2427	4	2427	4	2427	6	2437
5	2432	5	2432	5	2432	7	2442
6	2437	6	2437	6	2437	8	2447
7	2442	7	2442	7	2442	9	2452
8	2447	8	2447	8	2447		
9	2452	9	2452	9	2452		
10	2457	10	2457	10	2457		
11	2462	11	2462	11	2462		

Table 5: Technical Specification of 5GHz, 802.11a/n

Item	Description		
	IEEE 802.11a	IEEE 802.11n HT20	IEEE 802.11n HT40
Transmit frequency range (MHz)	5180 - 5825	5180 - 5825	5190 - 5795
Channel number	25	25	12
Modulation	OFDM (BPSK, QPSK, 16-QAM, 64-QAM)	OFDM (BPSK, QPSK, 16-QAM, 64-QAM)	OFDM (BPSK, QPSK, 16-QAM, 64-QAM)
Data rate (Mbps)	6, 9, 12, 18, 24, 36, 48, 54	MCS0 ~ MCS7	MCS0 ~ MCS7
Maximum tune-up average output power (dBm)	12	12	12
Media access protocol	CSMA/CA with ACK	CSMA/CA with ACK	CSMA/CA with ACK

Table 6: Technical Specification of 5GHz, 802.11ac

Item	Description	
	IEEE 802.11ac VHT20	IEEE 802.11ac VHT40
Transmit frequency range (MHz)	5180 - 5825	5190 - 5795
Channel number	25	12
Modulation	OFDM (BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM)	OFDM (BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM)
Data rate (Mbps)	MCS0 ~ MCS7	MCS0 ~ MCS7
Maximum tune-up average output power (dBm)	12	12
Media access protocol	CSMA/CA with ACK	CSMA/CA with ACK

Table 7: List of WLAN Channel of 5GHz 802.11a/n/ac

802.11a		802.11n HT20 / 802.11ac VHT20		802.11n HT40 / 802.11ac VHT40	
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
36	5180	36	5180	38	5190
40	5200	40	5200	46	5230
44	5220	44	5220	54	5270
48	5240	48	5240	62	5310
52	5260	52	5260	102	5510
56	5280	56	5280	110	5550
60	5300	60	5300	118	5590
64	5320	64	5320	126	5630 (only for FCC)
100	5500	100	5500	134	5670
104	5520	104	5520	142	5710
108	5540	108	5540	151	5755
112	5560	112	5560	159	5795
116	5580	116	5580		
120	5600 (only for FCC)	120	5600 (only for FCC)		
124	5620 (only for FCC)	124	5620 (only for FCC)		
128	5640 (only for FCC)	128	5640 (only for FCC)		
132	5660	132	5660		
136	5680	136	5680		
140	5700	140	5700		
144	5720	144	5720		
149	5745	149	5745		
153	5765	153	5765		
157	5785	157	5785		
161	5805	161	5805		
165	5825	165	5825		

Table 8: Technical Specification of Bluetooth (BDR & EDR mode)

Technical Specification	Value
Kind of Equipment	11.6" Android tablet
Type Designation	NS-P11A8100, NS-P11A8100-C, NS-P11XXXXXXXX (x=0-9, A-Z, a-z, - or blank, for market purpose only)
FCC ID	2AIB2-P11A8100
IC	21456-P11A8100
HVIN	NS-P11A8100-C
Operating Frequency band	2400 – 2483.5MHz
Channel separation	1MHz
Extreme Temperature Range	0~+40°C
Operation Voltage	DC 3.7V (via built in battery)
Modulation	FHSS, GFSK, 8DPSK, $\pi/4$ DQPSK
Bluetooth version	Dual Mode
Antenna Gain	2.1dBi

Table 9: RF channel and frequency of Bluetooth (BDR & EDR mode)

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
0	2402.00	21	2423.00	42	2444.00	63	2465.00
1	2403.00	22	2424.00	43	2445.00	64	2466.00
2	2404.00	23	2425.00	44	2446.00	65	2467.00
3	2405.00	24	2426.00	45	2447.00	66	2468.00
4	2406.00	25	2427.00	46	2448.00	67	2469.00
5	2407.00	26	2428.00	47	2449.00	68	2470.00
6	2408.00	27	2429.00	48	2450.00	69	2471.00
7	2409.00	28	2430.00	49	2451.00	70	2472.00
8	2410.00	29	2431.00	50	2452.00	71	2473.00
9	2411.00	30	2432.00	51	2453.00	72	2474.00
10	2412.00	31	2433.00	52	2454.00	73	2475.00
11	2413.00	32	2434.00	53	2455.00	74	2476.00
12	2414.00	33	2435.00	54	2456.00	75	2477.00
13	2415.00	34	2436.00	55	2457.00	76	2478.00
14	2416.00	35	2437.00	56	2458.00	77	2479.00
15	2417.00	36	2438.00	57	2459.00	78	2480.00
16	2418.00	37	2439.00	58	2460.00		
17	2419.00	38	2440.00	59	2461.00		
18	2420.00	39	2441.00	60	2462.00		
19	2421.00	40	2442.00	61	2463.00		
20	2422.00	41	2443.00	62	2464.00		

Table 10: Technical Specification of Bluetooth (Low Energy mode)

Technical Specification	Value
Kind of Equipment	11.6" Android tablet
Type Designation	NS-P11A8100, NS-P11A8100-C, NS-P11XXXXXXXX (x=0-9, A-Z, a-z, - or blank, for market purpose only)
FCC ID	2AIB2-P11A8100
IC	21456-P11A8100
HVIN	NS-P11A8100-C
Operating Frequency band	2400 – 2483.5MHz
Channel separation	2MHz
Extreme Temperature Range	0~+40°C
Operation Voltage	DC 3.7V (via built in battery)
Modulation	GFSK
Bluetooth version	Dual Mode
Antenna Gain	2.1dBi

Table 11: RF channel and frequency of Bluetooth (Low Energy mode)

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
0	2402.00	11	2424.00	22	2446.00	33	2468.00
1	2404.00	12	2426.00	23	2448.00	34	2470.00
2	2406.00	13	2428.00	24	2450.00	35	2472.00
3	2408.00	14	2430.00	25	2452.00	36	2474.00
4	2410.00	15	2432.00	26	2454.00	37	2476.00
5	2412.00	16	2434.00	27	2456.00	38	2478.00
6	2414.00	17	2436.00	28	2458.00	39	2480.00
7	2416.00	18	2438.00	29	2460.00		
8	2418.00	19	2440.00	30	2462.00		
9	2420.00	20	2442.00	31	2464.00		
10	2422.00	21	2444.00	32	2466.00		

3.3 Independent Operation Modes

The basic operation modes are:

- A. On, transmitting
 - 1. 802.11b
 - 2. 802.11g
 - 3. 802.11n (HT20)
 - 4. 802.11n (HT40)
 - 5. 802.11a
 - 6. 802.11ac (VHT20)
 - 7. 802.11ac (VHT40)
 - 8. Bluetooth BDR
 - 9. Bluetooth EDR
 - 10. Bluetooth Low Energy
- B. Off

3.4 Submitted Documents

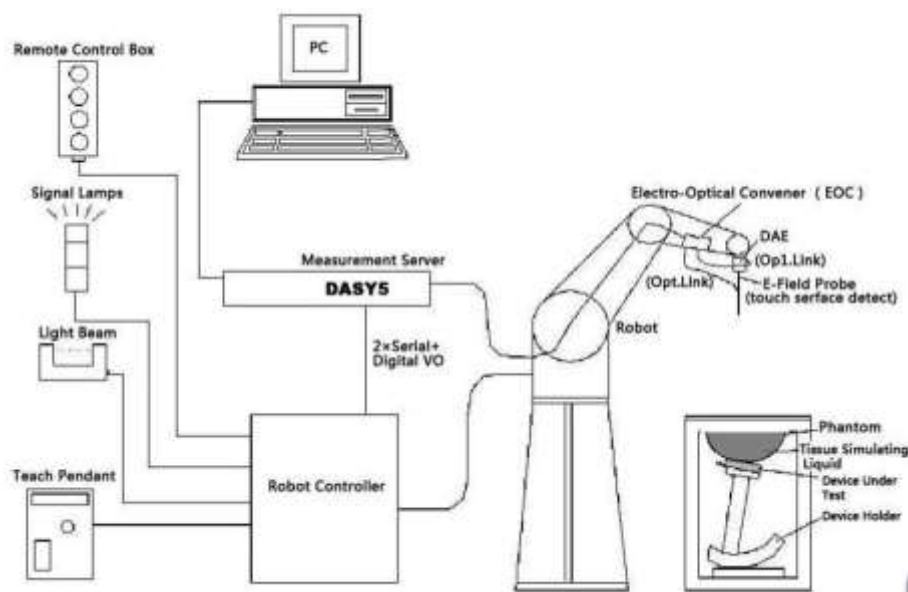
- Bill of Material
- Constructional Drawing
- PCB Layout
- Circuit Diagram
- Instruction Manual
- Rating Label

4. SAR Measurements System Configuration

4.1 SAR Measurements Set-up

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

- A standard high precision 6-axis robot (Stäubli TX=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 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The generic twin phantom enabling the testing of left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- System validation dipoles allowing to validate the proper functioning of the system.



Picture 1 SAR Lab Test Measurement Set-up

4.2 DASY5 E-Fild 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 software reads the reflection turning a software approach and looks for the maximum using 2nd ord curve fitting. The approach is stopped at reaching the maximum.

Probe Specifications:

Model: EX3DV4

Frequency Range: 10MHz - 6.0GHz (EX3DV4)

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

Dynamic Range: 10 mW/kg - 100W/kg

Probe Length: 330 mm

Probe Tip Length: 20 mm

Body Diameter: 12 mm

Tip Diameter: 2.5 mm

Tip-Center: 1 mm

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



Picture 2 E-field Probe

4.3 E-Filed 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/cm²) 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 in 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 equate to 1 mW/cm².

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/m³).

4.4 Other Test Equipment

4.4.1 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.

4.4.2 Robot

The SPEAG DASY system uses the high precision robots (DASY5: TX60XL) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version from Stäubli is used. The Stäubli robot series have many features that are important for our application:

High precision (repeatability 0.02mm)

High reliability (industrial design)

Low maintenance costs (virtually maintenance free due to direct drive gears; no belt drives)

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

Low ELF interference (motor control fields shielded via the closed metallic construction shields)



Picture 3 DASY 5

4.4.3 Measurement Server

The Measurement server is based on a PC/104 CPU board with CPU (DASY5: 400 MHz, Intel Celeron), chip disk (DASY5: 128MB), RAM (DASY5: 128MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY I/O board, which is directly connected to the PC/104 bus of the CPU board.



Picture 4 Server for DASY 5

The measurement server performs all real-time data evaluation of field measurements and surface detection, controls robot movements and handles safety operation. The PC operating system cannot interfere with these time critical processes. All connections are supervised by a

watchdog, and disconnection of any of the cables to the measurement server will automatically disarm the robot and disable all program-controlled robot movements. Furthermore, the measurement server is equipped with an expansion port which is reserved for future applications. Please note that this expansion port does not have a standardized pinout, and therefore only devices provided by SPEAG can be connected. Devices from any other supplier could seriously damage the measurement server.

4.4.4 Device Holder for Phantom

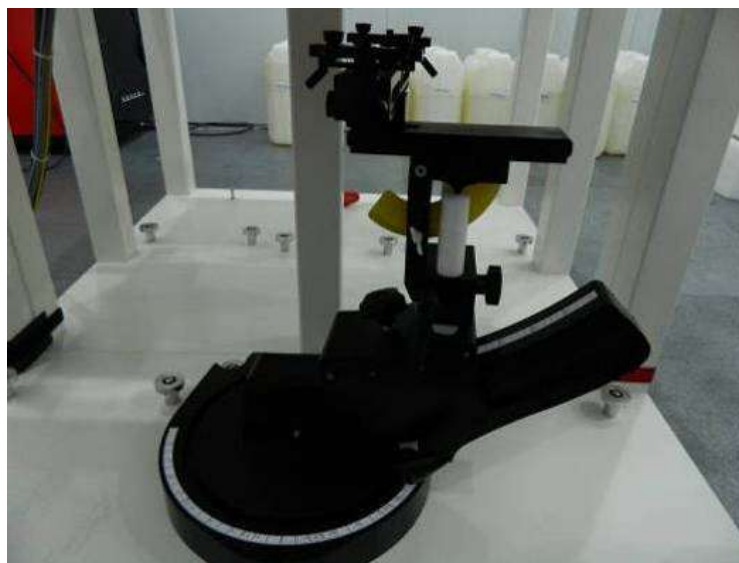
The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5mm distance, a positioning uncertainty of $\pm 0.5\text{mm}$ would produce a SAR uncertainty of $\pm 20\%$. Accurate device positioning is therefore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

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

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

<Laptop Extension Kit>

The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the Mounting Device in place of the phone positioner. The extension is fully compatible with the Twin-SAM and ELI phantoms.

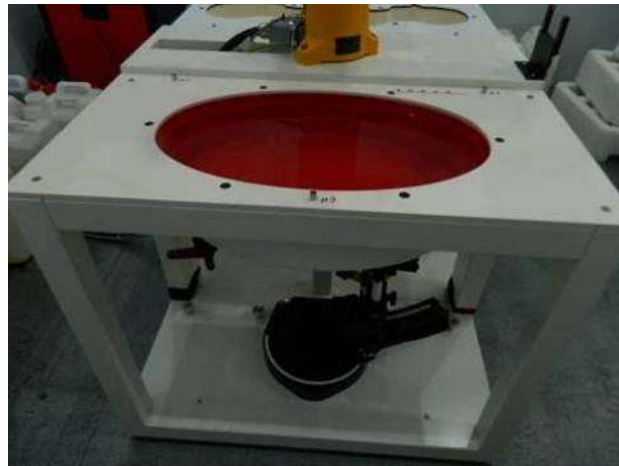


Picture 5 Device Holder

4.4.5 Phantom

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)
Liquid compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)
Shell thickness	2.0 ± 0.2 mm (bottom plate)
Dimensions	Major axis: 650 mm, Minor axis: 400 mm
Filling volume	approx. 30 liters
Wooden support	SPEAG standard phantom table



Picture 8 ELI4 Phantom

4.5 Scanning Procedure

The DASY5 installation includes predefined files with recommended procedures for measurements and validation. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.

The “reference” and “drift” measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT’s output power and should vary max. ± 5 %.

The “surface check” measurement tests the optical surface detection system of the DASY5 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ± 0.1mm). To prevent wrong results tests are only executed when the liquid is free of air

bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within $\pm 30^\circ$.)

Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values before running a detailed measurement around the hot spot. Before starting the area scan a grid spacing is set according to FCC KDB Publication 865664. During scan the distance of the probe to the phantom remains unchanged. After finishing area scan, the field maxima within a range of 2 dB will be ascertained.

Zoom Scan

After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm.

Spatial Peak Detection

The procedure for spatial peak SAR evaluation has been implemented and can determine values of masses of 1g and 10g, as well as for user-specific masses. The DASY5 system allows evaluations that combine measured data and robot positions, such as:

- maximum search
- extrapolation
- boundary correction
- peak search for averaged SAR

During a maximum search, global and local maxima searches are automatically performed in 2-D after each Area Scan measurement with at least 6 measurement points. It is based on the evaluation of the local SAR gradient calculated by the Quadratic Shepard's method. The algorithm will find the global maximum and all local maxima within -2 dB of the global maxima for all SAR distributions.

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. Several measurements at different distances are necessary for the extrapolation. Extrapolation routines require at least 10 measurement points in 3-D space.

They are used in the Zoom Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard's method for extrapolation.

A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 5mm steps.

Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01

Frequency	Maximum Area Scan Resolution (mm) (Δx_{area} , Δy_{area})	Maximum Zoom Scan Resolution (mm) (Δx_{zoom} , Δy_{zoom})	Maximum Zoom Scan Spatial Resolution (mm) $\Delta z_{zoom}(n)$	Minimum Zoom Scan Volume (mm) (x,y,z)
≤ 2 GHz	≤ 15	≤ 8	≤ 5	≥ 30

2-3 GHz	≤12	≤5	≤5	≥30
3-4 GHz	≤12	≤5	≤4	≥28
4-5 GHz	≤10	≤4	≤3	≥25
5-6 GHz	≤10	≤4	≤2	≥22

4.6 Data Storage and Evaluation

4.6.1 Data Storage

The DASY5 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension “.DAE4”. The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device set up, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [mW/g], [mW/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

4.6.2 Data Evaluation by SEMCAD

The SEMCAD software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters: - Sensitivity Norm_i, a_{i0}, a_{i1}, a_{i2}

- Conversion factor ConvF_i

- Diode compression point D_{cp_i}

Device parameters: - Frequency f

- Crest factor cf

Media parameters: - Conductivity
- Density

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY5 components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$\mathbf{V}_i = \mathbf{U}_i + \mathbf{U}_i^2 \cdot \mathbf{c} \cdot \mathbf{f} / \mathbf{dcp}_i$$

With \mathbf{V}_i = compensated signal of channel i ($i = x, y, z$)

\mathbf{U}_i = input signal of channel i ($i = x, y, z$)

\mathbf{cf} = crest factor of exciting field (DASY parameter)

\mathbf{dcp}_i = diode compression point (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

$$\text{E-field probes: } \mathbf{E}_i = (\mathbf{V}_i / \mathbf{Norm}_i \cdot \mathbf{ConvF})^{1/2}$$

$$\text{H-field probes: } \mathbf{H}_i = (\mathbf{V}_i)^{1/2} \cdot (\mathbf{a}_{i0} + \mathbf{a}_{i1} \cdot \mathbf{f} + \mathbf{a}_{i2} \cdot \mathbf{f}^2) / \mathbf{f}$$

With \mathbf{V}_i = compensated signal of channel i ($i = x, y, z$)

\mathbf{Norm}_i = sensor sensitivity of channel i ($i = x, y, z$)

[mV/(V/m)²] for E-field Probes

\mathbf{ConvF} = sensitivity enhancement in solution

\mathbf{a}_{ij} = sensor sensitivity factors for H-field probes

\mathbf{f} = carrier frequency [GHz]

\mathbf{E}_i = electric field strength of channel i in V/m

\mathbf{H}_i = magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$\mathbf{E}_{\text{tot}} = (\mathbf{E}_x^2 + \mathbf{E}_y^2 + \mathbf{E}_z^2)^{1/2}$$

The primary field data are used to calculate the derived field units.

$$\mathbf{SAR} = (\mathbf{E}_{\text{tot}})^2 \cdot \sigma / (\rho \cdot 1000)$$

with \mathbf{SAR} = local specific absorption rate in mW/g

\mathbf{E}_{tot} = total field strength in V/m

= conductivity in [mho/m] or [Siemens/m]

= equivalent tissue density in g/cm³

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

$$\mathbf{P}_{\text{pwe}} = \mathbf{E}_{\text{tot}}^2 / 3770 \text{ or } \mathbf{P}_{\text{pwe}} = \mathbf{H}_{\text{tot}}^2 \cdot 37.7$$

with \mathbf{P}_{pwe} = equivalent power density of a plane wave in mW/cm²

\mathbf{E}_{tot} = total electric field strength in V/m; \mathbf{H}_{tot} = total magnetic field strength in A/m

5. Test Set-up and Operation Modes

5.1 Principle of Configuration Selection

The EUT is commanded to operate at maximum transmitting power. The EUT shall use its internal transmitter. The antenna, battery and accessories shall be those specified by the manufacturer. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power output.

Table 12: Configuration of EUT

Operation mode	Frequency Range (MHz)	Modulation	Default Test Channel			Power Control Level
			Low	Middle	High	
802.11b/g/n(HT20)	2412-2462	DSSS, OFDM	CH1	CH6	CH11	Test software was used to configure the EUT to transmit at maximum output power
802.11n(HT40)	2422-2452	OFDM	CH3	CH6	CH9	
802.11a/n(HT20)/ac(VHT20) (Band U-NII-1)	5180-5240	OFDM	CH36	CH40	CH48	
802.11a/n(HT20)/ac(VHT20) (Band U-NII-2A)	5260-5320	OFDM	CH52	CH60	CH64	
802.11a/n(HT20)/ac(VHT20) (Band U-NII-2C)	5500-5720	OFDM	CH100	CH120	CH144	
802.11a/n(HT20)/ac(VHT20) (Band U-NII-3)	5745-5825	OFDM	CH149	CH157	CH165	
802.11n(HT40)/ac(VHT40) (Band U-NII-1)	5180-5240	OFDM	CH38	---	CH46	
802.11n(HT40)/ac(VHT40) (Band U-NII-2A)	5260-5320	OFDM	CH54	---	CH62	
802.11n(HT40)/ac(VHT40) (Band U-NII-2C)	5500-5720	OFDM	CH101	CH118	CH142	
802.11n(HT40)/ac(VHT40) (Band U-NII-3)	5745-5825	OFDM	CH151	---	CH159	
Bluetooth (BDR & EDR)	2402-2480	FHSS	CH0	CH39	CH78	
Bluetooth (Low Energy)	2402-2480	GFSK	CH0	CH19	CH39	

5.2 Tissue Simulating Liquid Ingredients

The liquid is consisted of Water, Salt, Glycol and DGBE. The liquid has previously been proven to be suited for worst-case. The following table shows the detail solution.

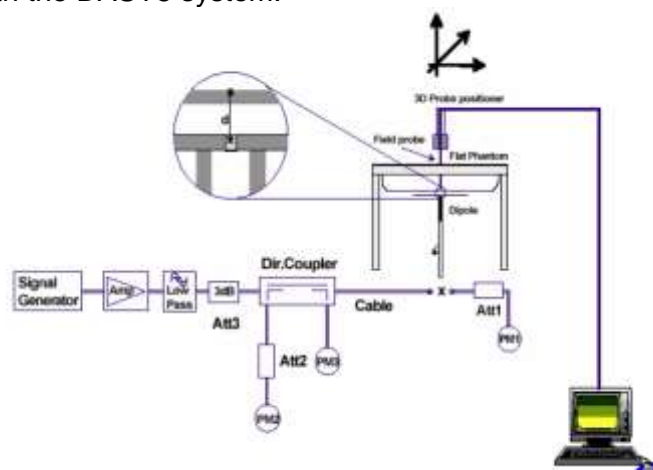
Table 13: Composition of Tissue Simulating Liquid

MIXTURE%(Weight)	FREQUENCY (Body) 2450MHz
Water	73.2
Glycol	26.7
Salt	0.1
Dielectric Parameters Target Value	f=2450MHz $\epsilon=52.70$ $\sigma=1.95$

MIXTURE%(Weight)	FREQUENCY (Body) 5GHz
Water	75.68
DGBE	4.42
Triton X-100	19.47
Salt	0.43
Dielectric Parameters Target Value	f=5200MHz $\epsilon=49.00$ $\sigma=5.30$ f=5300MHz $\epsilon=48.90$ $\sigma=5.42$ f=5500MHz $\epsilon=48.60$ $\sigma=5.65$ f=5600MHz $\epsilon=48.50$ $\sigma=5.77$ f=5800MHz $\epsilon=48.20$ $\sigma=6.00$

5.3 Specific Absorption Rate (SAR) System Check

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulants were measured every day using the dielectric probe kit and the network analyzer. A system check measurement was made following the determination of the dielectric parameters of the simulant, using the dipole validation kit. A power level of 250 mW was supplied to the dipole antenna, which was placed under the flat section of the twin SAM phantom. The system check results (dielectric parameters and SAR values) are given in Appendix A. System check results have to be equal or near the values determined during dipole calibration with the relevant liquids and test system ($\pm 10\%$). System check is performed regularly on all frequency bands where tests are performed with the DASY5 system.



Picture 9 System Check Set-up

Table 14: System Check Results of Tissue Simulating Liquid

Frequency (MHz)	Tissue Type	Liquid Temp. (°C)	Conductivity (σ)	Permittivity (ϵ_r)	Conductivity Target (σ)	Permittivity Target (ϵ_r)	Delta (σ) (%)	Delta (ϵ_r) (%)	Limit (%)	Date
2450	Body	22.7	2.026	52.960	1.95	52.70	3.90	0.49	±5	2017-07-08
5200	Body	22.9	5.159	50.050	5.30	49.00	-2.66	2.14	±5	2017-07-09
5300	Body	22.7	5.316	49.950	5.42	48.90	-1.92	2.15	±5	2017-07-09
5600	Body	22.7	5.825	49.400	5.77	48.50	0.95	1.86	±5	2017-07-09
5800	Body	22.6	6.124	48.900	6.00	48.20	2.07	1.45	±5	2017-07-09

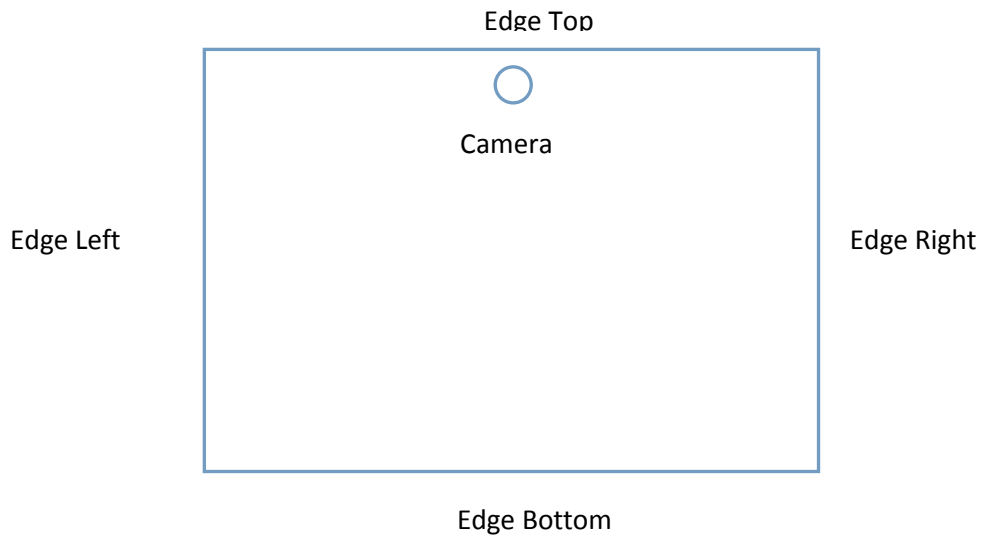
(Liquid depth: 15cm)

CH	Frequency (MHz)	Tissue Type	Conductivity (σ)	Permittivity (ϵ_r)	Conductivity Target (σ)	Permittivity Target (ϵ_r)	Delta (σ) (%)	Delta (ϵ_r) (%)	Limit (%)	Date
1	2412	Body	1.968	50.861	1.91	52.75	3.04	-3.67	±5	2017-07-08
6	2437	Body	2.013	50.739	1.94	52.72	3.76	-3.72	±5	2017-07-08
11	2462	Body	2.048	50.622	1.97	52.68	3.96	-3.94	±5	2017-07-08
36	5180	Body	5.129	50.086	5.28	49.03	-2.86	2.22	±5	2017-07-09
40	5200	Body	5.159	50.05	5.30	49.00	-2.66	2.14	±5	2017-07-09
48	5240	Body	5.222	50.023	5.35	48.96	-2.39	2.09	±5	2017-07-09
52	5260	Body	5.257	50.010	5.37	48.94	-2.10	2.27	±5	2017-07-09
56	5280	Body	5.289	49.988	5.39	48.92	-1.87	2.22	±5	2017-07-09
64	5320	Body	5.353	49.908	5.44	48.67	-1.60	2.48	±5	2017-07-09
100	5500	Body	5.661	49.628	5.65	48.60	0.19	2.12	±5	2017-07-09
120	5600	Body	5.825	49.400	5.77	48.50	0.95	1.86	±5	2017-07-09
140	5700	Body	5.978	49.140	5.88	48.35	1.67	1.53	±5	2017-07-09
149	5745	Body	6.044	49.062	5.94	48.28	1.75	1.58	±5	2017-07-09
157	5785	Body	6.097	48.941	5.98	48.22	1.96	1.54	±5	2017-07-09
165	5825	Body	6.167	48.495	6.00	48.20	2.78	0.61	±5	2017-07-09

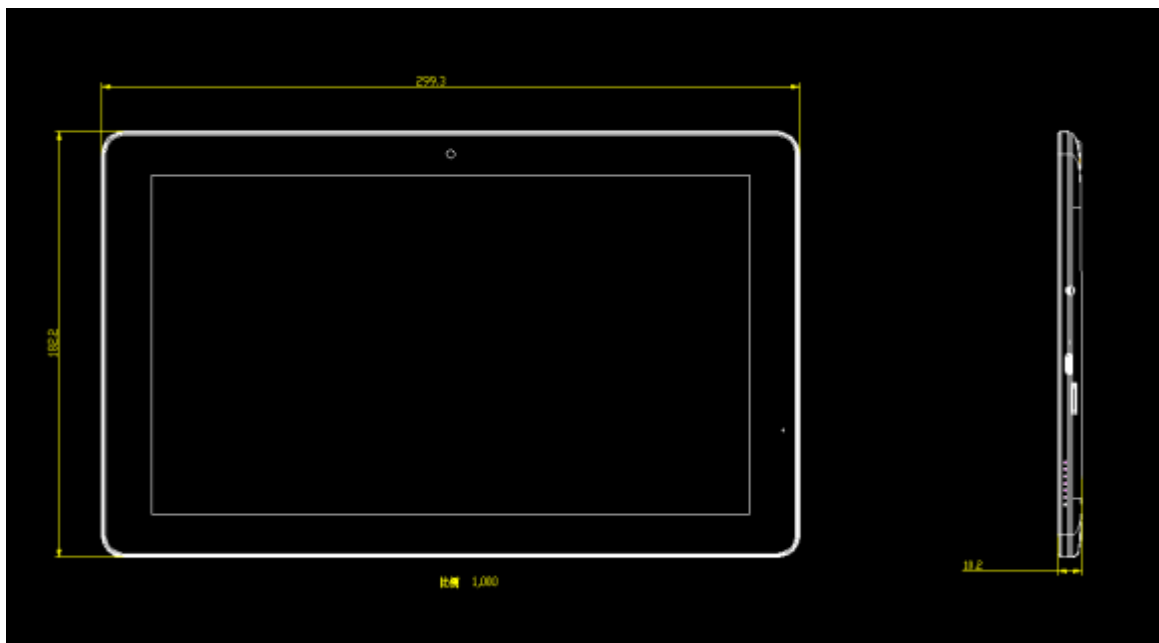
Table 15: System Validation

Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)	Date
2450	Body	250	927	3970	1418	12.39	51.20	49.56	-3.20	2017-07-08
5200	Body	100	1169	3970	1418	7.39	72.90	73.90	1.37	2017-07-09
5300	Body	100	1169	3970	1418	7.56	76.40	75.60	-1.05	2017-07-09
5600	Body	100	1169	3970	1418	7.81	78.40	78.10	-0.38	2017-07-09
5800	Body	100	1169	3970	1418	7.49	75.20	74.90	-0.40	2017-07-09

5.4 Exposure Positions Consideration



Size:



Antenna location:



5.5 Test Operation and Test Software

Test operation refers to test setup in chapter 5.

A communication link is set up with the test mode software for WiFi mode test. During the test, at the each test frequency channel, the EUT is operated at the RF continuous emission mode.

802.11 a/b/g/n/ac operating modes are tested independently according to the service requirements in each frequency band. 802.11a/b/g/n/ac modes are tested on channel low/middle/high. However, if output power reduction is necessary for channels lowest and/or highest to meet restricted band requirements the highest output channel closest to each of these channels must be tested instead.

SAR is not required for 2.4GHz 802.11g/n when

- a) KDB Publication 447498 D01 SAR test exclusion applies to the OFDM configuration.
- b) 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.

5.6 Special Accessories and Auxiliary Equipment

None.

Channel	Frequency (MHz)	Average power (dBm)								Tune-Up Limit
		Data Rate								
		6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps	
CH 1	2412	12.65	12.26	12.31	12.19	12.09	12.41	12.33	12.09	13
CH 6	2437	12.58	12.41	12.31	12.16	12.18	12.24	12.41	12.08	13
CH 11	2462	12.35	12.49	12.51	12.34	12.61	12.19	12.25	12.33	13

Table 18: Test result of Conducted Power of 802.11n (HT20), 2.4GHz

Channel	Frequency (MHz)	Average power (dBm)								Tune-up Limit
		MCS Index								
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
CH 1	2412	12.64	12.35	12.16	12.25	12.41	12.43	12.51	12.28	13
CH 6	2437	12.77	12.61	12.32	12.18	12.24	12.33	12.26	12.45	13
CH 11	2462	12.58	12.34	12.07	12.16	12.09	12.38	12.14	12.02	13

Table 19: Test result of Conducted Power of 802.11n (HT40), 2.4GHz

Channel	Frequency (MHz)	Average power (dBm)								Tune-up Limit
		MCS Index								
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
CH 3	2422	11.62	11.26	11.31	11.18	11.06	10.98	11.34	11.17	12
CH 6	2437	11.41	10.95	11.06	11.21	10.87	11.13	11.07	11.06	12
CH 9	2452	11.50	11.21	11.09	11.17	11.25	10.86	10.79	11.03	12

Table 20: Test result of Conducted Power of 802.11a

Channel	Frequency (MHz)	Average Power (dBm)								Tune-up Limit
		Data Rate								
		6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps	
CH 36	5180	11.63	11.32	11.16	11.24	11.09	11.52	11.26	11.19	12
CH 40	5200	11.69	11.22	11.31	11.06	11.15	11.07	11.35	10.98	12
CH 48	5240	11.99	11.53	11.61	11.28	11.73	11.25	11.19	11.43	12
CH 52	5260	11.49	11.34	11.40	11.28	11.16	11.11	11.09	11.42	12
CH 56	5280	11.81	11.25	11.34	11.54	11.29	11.18	11.19	11.07	12
CH 64	5320	11.51	10.94	11.08	11.35	11.50	11.41	11.22	11.26	12
CH 100	5500	11.35	11.06	11.31	11.25	11.18	11.33	10.98	10.86	12
CH 120	5600	11.61	11.13	11.35	11.26	11.34	11.18	11.06	11.18	12
CH 140	5700	11.71	10.95	11.08	11.11	11.05	11.27	11.30	11.21	12
CH 149	5745	11.68	11.51	11.42	11.31	11.05	11.19	11.28	11.38	12
CH 157	5785	11.79	11.09	11.33	11.49	11.26	11.29	11.61	11.48	12
CH 165	5825	11.91	11.25	11.31	11.09	11.11	11.09	11.42	11.05	12

Table 21: Test result of Conducted Power of 802.11n (HT20), 5GHz

Channel	Frequency (MHz)	Average Power (dBm)								Tune-up Limit
		Data Rate								
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
CH 36	5180	11.68	10.89	11.02	10.67	11.11	10.69	10.79	10.61	12
CH 40	5200	11.35	11.21	11.06	11.13	11.02	11.30	10.98	10.78	12
CH 48	5240	11.61	11.50	11.34	11.29	11.41	11.16	11.09	11.24	12
CH 52	5260	11.39	11.02	11.10	11.03	10.98	10.96	11.05	11.01	12
CH 56	5280	11.52	11.03	11.08	10.97	10.61	10.49	11.03	10.96	12
CH 64	5320	11.43	11.23	11.10	10.99	10.95	10.89	11.04	11.11	12
CH 100	5500	11.25	11.06	11.03	11.15	10.96	10.75	10.81	11.04	12
CH 120	5600	11.16	10.97	11.01	11.07	11.16	11.06	10.67	10.56	12
CH 140	5700	11.20	10.88	10.64	10.97	11.01	10.68	10.79	11.05	12
CH 149	5745	11.34	11.26	11.13	11.10	11.22	10.97	10.99	11.06	12
CH 157	5785	11.02	10.77	10.59	10.91	10.85	10.67	10.89	10.11	12
CH 165	5825	11.11	10.97	11.05	10.84	11.01	10.69	10.72	10.64	12

Table 22: Test result of Conducted Power of 802.11n (HT40), 5GHz

Channel	Frequency (MHz)	Average Power (dBm)								Tune-up Limit
		MCS Index								
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
CH 38	5190	11.56	11.38	11.43	11.19	11.27	11.46	11.37	11.18	12
CH 46	5230	11.67	11.53	11.49	11.51	11.27	11.16	11.51	11.34	12
CH 54	5270	11.02	10.92	10.93	10.83	10.97	10.95	10.81	10.76	12
CH 62	5310	11.75	11.62	11.71	11.65	11.59	11.32	11.51	11.49	12
CH 102	5510	11.49	11.49	11.5	11.46	11.34	11.35	11.48	11.17	12
CH 118	5590	11.38	11.28	11.23	11.15	11.31	11.29	11.08	11.24	12
CH 134	5670	11.65	11.59	11.61	11.46	11.18	11.42	11.19	11.51	12
CH 151	5755	11.36	11.25	11.29	11.23	11.15	11.11	11.19	11.24	12
CH 159	5795	11.69	11.51	11.26	11.5	11.34	11.26	11.31	11.3	12

Table 23: Test result of Conducted Power of 802.11ac (VHT20)

Channel	Frequency (MHz)	Average Power (dBm)								Tune-up Limit
		Data Rate								
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
CH 36	5180	11.26	11.03	11.09	10.79	10.75	10.87	11.01	11.21	12
CH 40	5200	11.64	11.53	11.25	11.19	11.42	11.35	11.06	10.94	12
CH 48	5240	11.91	11.06	11.29	11.64	11.59	11.34	11.67	11.39	12
CH 52	5260	11.51	11.42	11.31	11.28	11.40	11.06	11.13	11.11	12
CH 56	5280	11.01	10.64	10.94	10.58	10.61	10.57	10.34	11.00	12
CH 64	5320	11.23	11.16	11.05	11.13	10.98	10.59	11.04	11.11	12
CH 100	5500	11.21	11.12	11.06	11.08	11.16	10.98	10.89	11.05	12
CH 120	5600	11.43	11.26	11.19	11.30	11.09	11.02	11.25	11.31	12
CH 140	5700	11.54	11.34	11.26	11.28	11.14	11.20	11.09	11.34	12
CH 149	5745	11.65	11.61	11.40	11.38	11.31	11.29	11.50	11.09	12
CH 157	5785	11.49	11.51	11.48	11.53	11.39	11.50	11.47	11.39	12
CH 165	5825	11.89	11.64	11.35	11.28	11.53	11.61	11.72	11.42	12

Table 24: Test result of Conducted Power of 802.11ac (VHT40)

Channel	Frequency (MHz)	Average Power (dBm)								Tune-up Limit
		MCS Index								
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
CH 38	5190	11.56	11.43	11.39	11.45	11.5	11.45	11.41	11.37	12
CH 46	5230	11.62	11.53	11.6	11.58	11.52	11.51	11.53	11.49	12
CH 54	5270	10.86	10.81	10.76	10.83	10.75	10.76	10.82	10.81	12
CH 62	5310	11.2	11.16	11.13	11.09	11.14	11.07	11.06	11.15	12
CH 102	5510	11.39	11.34	11.26	11.19	11.2	11.09	11.17	11.05	12
CH 118	5590	11.41	11.26	11.24	11.18	11.31	11.05	11.11	11.2	12
CH 134	5670	11.25	11.06	11.13	10.92	10.79	11.04	11.13	10.88	12
CH 151	5755	11.13	10.53	10.49	10.68	10.87	10.69	10.59	10.99	12
CH 159	5795	11.35	11.16	11.24	11.18	11.3	11.05	10.97	11.01	12

The Maximum Bluetooth Peak output Power is less than 4mW which is below the SAR exclusion threshold.

Table 25: Initial test configurations Test result of SAR Values

Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Power Setting	configure	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Date
WLAN2.4G	802.11b	Bottom Face	0	1	2412	14	1Mbps	14.76	15.00	1.057	-0.13	1.280	1.353	2017-07-08
WLAN2.4G	802.11b	Front Face	0	1	2412	14	1Mbps	14.76	15.00	1.057	-0.1	1.102	1.165	2017-07-08
WLAN2.4G	802.11b	Edge 1	0	1	2412	14	1Mbps	14.76	15.00	1.057	-0.1	0.022	0.023	2017-07-08
WLAN2.4G	802.11b	Edge 2	0	1	2412	14	1Mbps	14.76	15.00	1.057	-0.1	0.533	0.563	2017-07-08
WLAN2.4G	802.11b	Bottom Face	0	6	2437	14	1Mbps	14.65	15.00	1.084	-0.09	1.160	1.257	2017-07-08
WLAN2.4G	802.11b	Bottom Face	0	11	2462	14	1Mbps	14.44	15.00	1.138	-0.04	1.109	1.262	2017-07-08
WLAN5G	802.11a	Bottom Face	0	36	5180	12	6Mbps	11.25	12.00	1.189	0.01	1.180	1.402	2017-07-09
WLAN5G	802.11a	Bottom Face	0	40	5200	12	6Mbps	11.39	12.00	1.151	-0.10	0.995	1.145	2017-07-09
WLAN5G	802.11a	Bottom Face	0	48	5240	12	6Mbps	11.61	12.00	1.094	-0.17	0.994	1.087	2017-07-09
WLAN5G	802.11a	Bottom Face	0	52	5260	12	6Mbps	11.39	12.00	1.151	-0.10	1.025	1.180	2017-07-09
WLAN5G	802.11a	Bottom Face	0	56	5280	12	6Mbps	11.52	12.00	1.117	0.01	1.110	1.240	2017-07-09
WLAN5G	802.11a	Bottom Face	0	64	5320	12	6Mbps	11.60	12.00	1.096	-0.11	1.140	1.250	2017-07-09
WLAN5G	802.11a	Bottom Face	0	100	5500	12	6Mbps	11.35	12.00	1.161	-0.03	0.999	1.160	2017-07-09
WLAN5G	802.11a	Bottom Face	0	120	5600	12	6Mbps	11.61	12.00	1.094	0.06	0.974	1.066	2017-07-09
WLAN5G	802.11a	Bottom Face	0	140	5700	12	6Mbps	11.52	12.00	1.117	-0.04	0.911	1.017	2017-07-09
WLAN5G	802.11a	Bottom Face	0	149	5745	12	6Mbps	11.68	12.00	1.076	-0.06	0.824	0.887	2017-07-09
WLAN5G	802.11a	Bottom Face	0	157	5785	12	6Mbps	11.79	12.00	1.050	-0.08	0.924	0.970	2017-07-09
WLAN5G	802.11a	Bottom Face	0	165	5825	12	6Mbps	11.64	12.00	1.086	-0.13	0.898	0.976	2017-07-09

Note: Only the worst case sar value were reported.
Refer to attached Appendix A for details of test results.

6.2 Measurement Uncertainty

6.2.1 Measurement uncertainty evaluation

The measured SAR were <1.5 W/kg for all frequency bands, therefore per KDB Publication 865664 D01, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports.

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Appendix A

System Performance Check

Test Laboratory: EMTEK (Shenzhen) Co., Ltd.

Date: 08.07.2017

SystemPerformanceCheck-D2450V2-MSL-170708

Communication System: UID 0, CW (0); Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: MSL_2450_170708

Medium parameters used: $f = 2450$ MHz; $\sigma = 2.026$ S/m; $\epsilon_r = 52.96$; $\rho = 1000$ kg/m³
Ambient Temperature: 23.2 °C; Liquid Temperature: 22.5 °C

DASY Configuration:

- Probe: EX3DV4 - SN3873; ConvF(7.30, 7.30, 7.30); Calibrated: 07.09.2016;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1341; Calibrated: 05.09.2016
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1231
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

System Performance Check at Frequency at 2450MHz/d=10mm, Pin=250mW, dist=2.0mm (EX-Probe)/Area Scan (41x61x1): Interpolated grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 17.4 W/kg

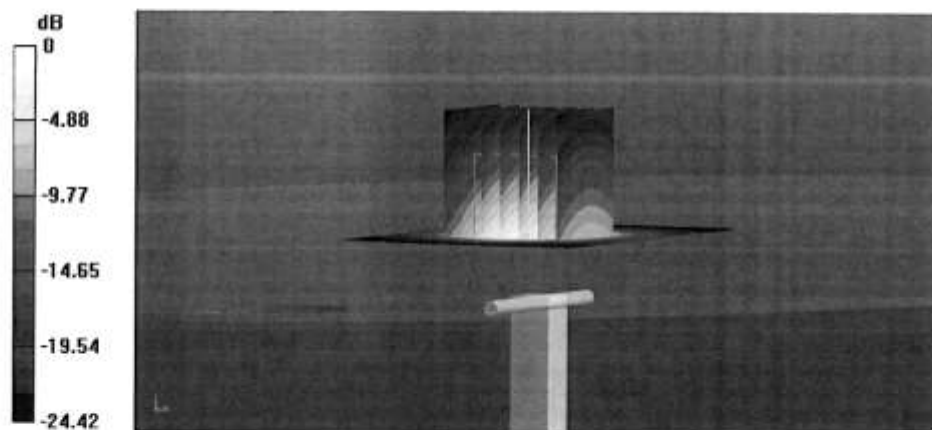
System Performance Check at Frequency at 2450MHz/d=10mm, Pin=250mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.371 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 26.5 W/kg

SAR(1 g) = 12.39 W/kg; SAR(10 g) = 5.78 W/kg

Maximum value of SAR (measured) = 17.6 W/kg



0 dB = 17.6 W/kg = 12.46 dBW/kg

Test Laboratory: EMTEK (Shenzhen) Co.,Ltd.

Date: 09.07.2017

SystemPerformanceCheck-D5GHzV2-5200MHz-MSL-170709

Communication System: UID 0, CW (0); Frequency: 5200 MHz;Duty Cycle: 1:1
Medium: MSL_5G_170709

Medium parameters used: $f = 5200$ MHz; $\sigma = 5.159$ S/m; $\epsilon_r = 50.05$; $\rho = 1000$ kg/m³
Ambient Temperature: 23.2 °C; Liquid Temperature: 22.8 °C

DASY Configuration:

- Probe: EX3DV4 - SN3873; ConvF(4.40, 4.40, 4.40); Calibrated: 07.09.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1341; Calibrated: 05.09.2016
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1231
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

System Performance Check at Frequency at 5200MHz/d=10mm, Pin=100mW, dist=1.4mm (EX-Probe)/Area Scan (91x91x1): Interpolated grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 17.3 W/kg

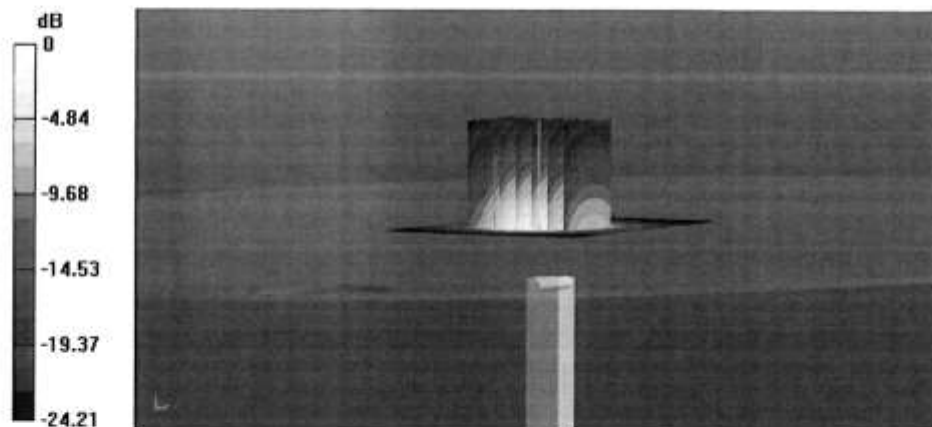
System Performance Check at Frequency at 5200MHz/d=10mm, Pin=100mW, dist=1.4mm (EX-Probe)/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 59.051 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 32.3 W/kg

SAR(1 g) = 7.39 W/kg; SAR(10 g) = 2.051 W/kg

Maximum value of SAR (measured) = 17.5 W/kg



0 dB = 17.5 W/kg = 12.43 dBW/kg

Test Laboratory: EMTEK (Shenzhen) Co.,Ltd.

Date: 09.07.2017

SystemPerformanceCheck-D5GHzV2-5300MHz-MSL-170709

Communication System: UID 0, CW (0); Frequency: 5300 MHz; Duty Cycle: 1:1
Medium: MSL_5G_170709

Medium parameters used: $f = 5300$ MHz; $\sigma = 5.316$ S/m; $\epsilon_r = 49.95$; $\rho = 1000$ kg/
m³ Ambient Temperature: 23.3 °C; Liquid Temperature: 22.7 °C

DASY Configuration:

- Probe: EX3DV4 - SN3970; ConvF(4.75, 4.75, 4.75); Calibrated: 07.09.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1418; Calibrated: 05.09.2016
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1231
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

System Performance Check at Frequency at 5200MHz/d=10mm, Pin=100mW, dist=2.0mm (EX-Probe)/Area Scan (41x61x1): Interpolated grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 17.9 W/kg

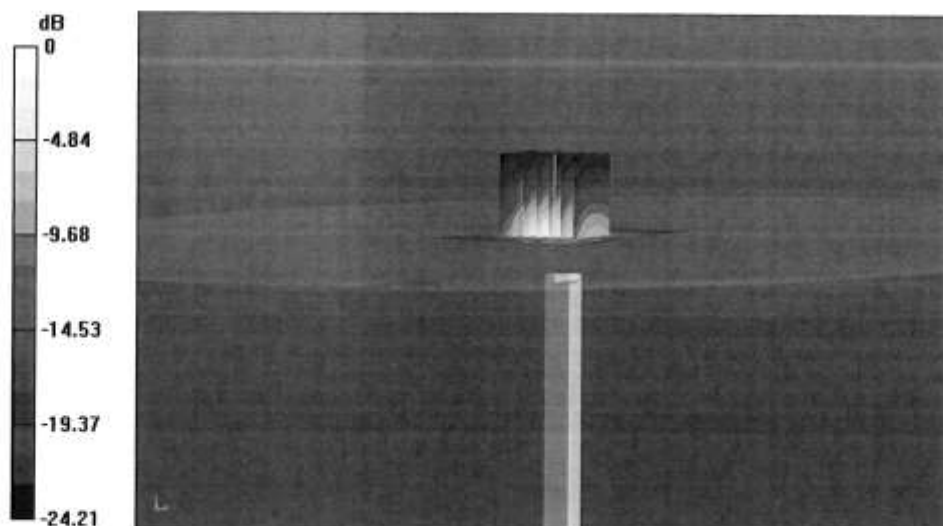
System Performance Check at Frequency at 5200MHz/d=10mm, Pin=100mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 99.18 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 31.7 W/kg

SAR(1 g) = 7.56 W/kg; SAR(10 g) = 2.31 W/kg

Maximum value of SAR (measured) = 18.2 W/kg



0 dB = 18.2 W/kg = 12.6 dBW/kg

Test Laboratory: EMTEK (Shenzhen) Co.,Ltd.

Date: 09.07.2017

SystemPerformanceCheck-D5GHzV2-5600MHz-MSL-170709

Communication System: UID 0, CW (0); Frequency: 5600 MHz;Duty Cycle: 1:1
Medium: MSL_5G_170709

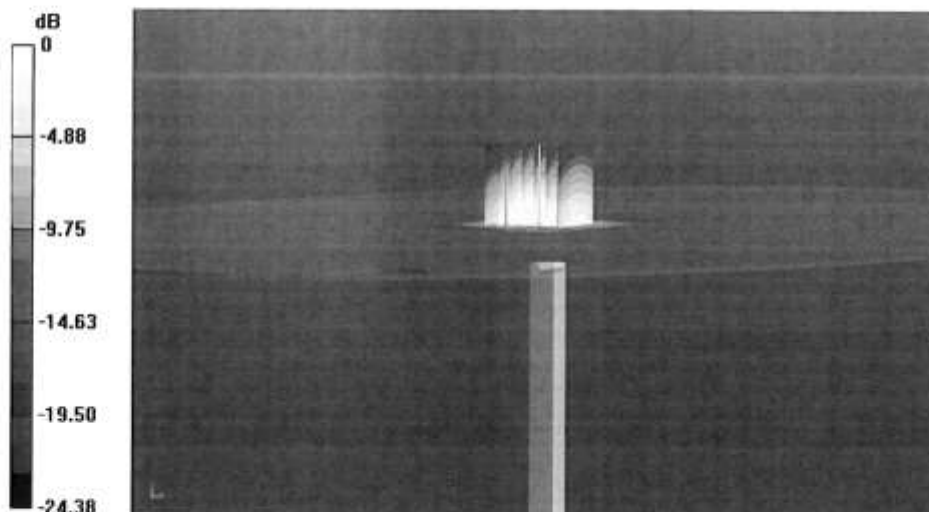
Medium parameters used: $f = 5600$ MHz; $\sigma = 5.825$ S/m; $\epsilon_r = 49.4$; $\rho = 1000$ kg/m³
Ambient Temperature: 23.3 °C; Liquid Temperature: 22.4 °C

DASY Configuration:

- Probe: EX3DV4 - SN3970; ConvF(4.22, 4.22, 4.22); Calibrated: 07.09.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1418; Calibrated: 05.09.2016
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1231
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

System Performance Check at Frequency at 5600MHz/d=10mm, Pin=100mW, dist=2.0mm (EX-Probe)/Area Scan (41x61x1): Interpolated grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 17.5 W/kg

System Performance Check at Frequency at 5600MHz/d=10mm, Pin=100mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 92.3 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 30.6 W/kg
SAR(1 g) = 7.81 W/kg; SAR(10 g) = 2.46 W/kg
Maximum value of SAR (measured) = 17.7 W/kg



0 dB = 17.7 W/kg = 12.48 dBW/kg

Test Laboratory: EMTEK (Shenzhen) Co.,Ltd.

Date : 09.07.2017

SystemPerformanceCheck-D5GHzV2-5800MHz-MSL-170709

Communication System: UID 0, CW (0); Frequency: 5800 MHz;Duty Cycle: 1:1
Medium: MSL_5G_170709

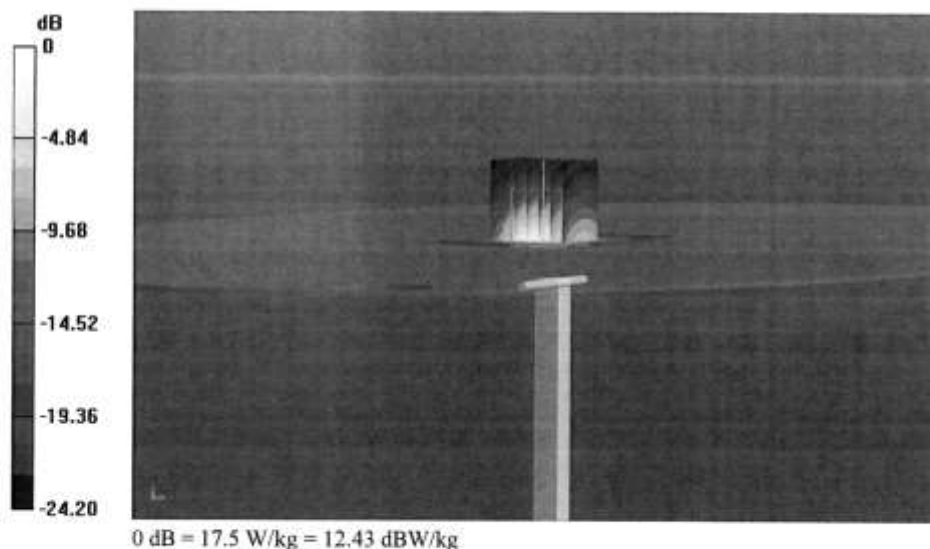
Medium parameters used: $f = 5800 \text{ MHz}$; $\sigma = 6.124 \text{ S/m}$; $\epsilon_r = 48.9$; $\rho = 1000 \text{ kg/m}^3$
Ambient Temperature: $23.2 \text{ }^\circ\text{C}$; Liquid Temperature: $22.6 \text{ }^\circ\text{C}$

DASY Configuration:

- Probe: EX3DV4 - SN3970; ConvF(4.34, 4.34, 4.34); Calibrated: 07.09.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1418; Calibrated: 05.09.2016
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1231
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

System Performance Check at Frequency at 5750MHz/d=10mm, Pin=100mW, dist=2.0mm (EX-Probe)/Area Scan (41x61x1): Interpolated grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 17.2 W/kg

System Performance Check at Frequency at 5750MHz/d=10mm, Pin=100mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 59.241 V/m ; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 29.7 W/kg
SAR(1 g) = 7.49 W/kg ; SAR(10 g) = 2.11 W/kg
Maximum value of SAR (measured) = 17.5 W/kg



Appendix A

Test Plots of SAR Measurement

Test Laboratory: Shenzhen EMTEK Co.,Ltd.

Date: 08.07.2017

2-WLAN2.4GHz-802.11b 1Mbps-Bottom-0cm-Ch1

Communication System: UID 0, WIFI (0); Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: MSL_2450_170708

Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.968$ S/m; $\epsilon_r = 50.861$; $\rho = 1000$ kg/m³

Ambient Temperature: 23.5 °C; Liquid Temperature: 22.5 °C

DASY Configuration:

- Probe: EX3DV4 - SN3970; ConvF(7.57, 7.57, 7.57); Calibrated: 07.09.2016;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1418; Calibrated: 05.09.2016
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1231
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Configuration/Unnamed procedure/Area Scan (101x61x1): Interpolated grid:

$dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 2.68 W/kg

Configuration/Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement

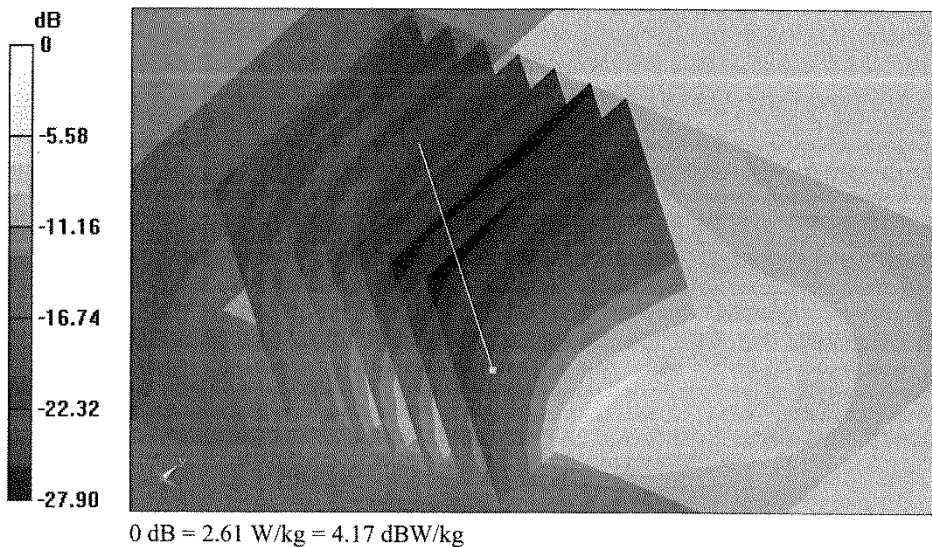
grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 29.798 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 3.71 W/kg

SAR(1 g) = 1.28 W/kg; SAR(10 g) = 0.532 W/kg

Maximum value of SAR (measured) = 2.61 W/kg



Test Laboratory: Shenzhen EMTEK Co.,Ltd.

Date: 08.07.2017

1-WLAN2.4GHz-802.11b 1Mbps-Front-0cm-Ch1

Communication System: UID 0, WIFI (0); Frequency: 2412 MHz;Duty Cycle: 1:1

Medium: MSL_2450_170708

Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.968$ S/m; $\epsilon_r = 50.861$; $\rho = 1000$ kg/m³

Ambient Temperature: 23.5 °C; Liquid Temperature: 22.5 °C

DASY Configuration:

- Probe: EX3DV4 - SN3970; ConvF(7.57, 7.57, 7.57); Calibrated: 07.09.2016;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1418; Calibrated: 05.09.2016
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1231
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Configuration/Unnamed procedure/Area Scan (101x61x1): Interpolated grid:

$dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 1.98 W/kg

Configuration/Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement

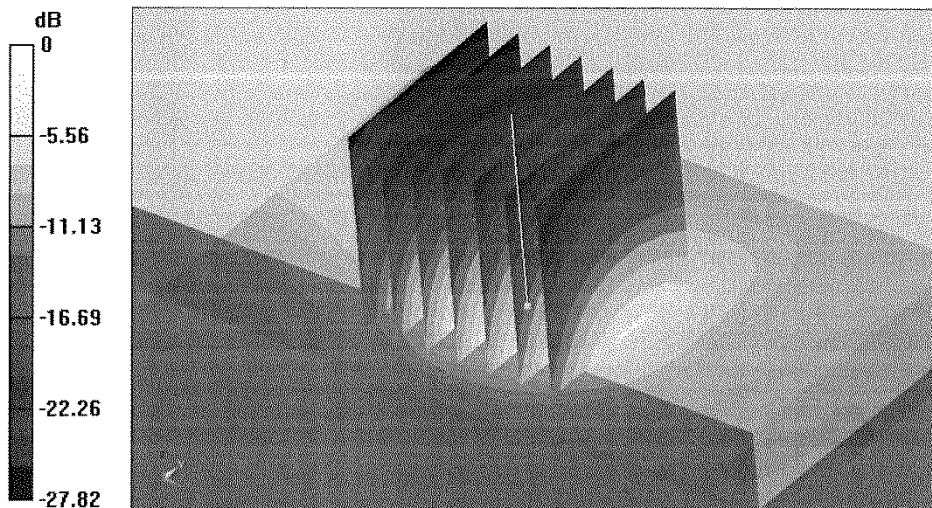
grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 23.445 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 2.64 W/kg

SAR(1 g) = 1.102 W/kg; SAR(10 g) = 0.448 W/kg

Maximum value of SAR (measured) = 1.88 W/kg



0 dB = 1.88 W/kg = 2.74 dBW/kg

Test Laboratory: Shenzhen EMTEK Co.,Ltd.

Date: 08.07.2017

2-WLAN2.4GHz-802.11b 1Mbps-Edge1-0cm-Ch1

Communication System: UID 0, WIFI (0); Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: MSL_2450_170708

Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.998$ S/m; $\epsilon_r = 53.0555$;

$\rho = 1000$ kg/m³

Ambient Temperature: 23.5 °C; Liquid Temperature: 22.5 °C

DASY Configuration:

- Probe: EX3DV4 - SN3970; ConvF(7.66, 7.66, 7.66); Calibrated: 07.09.2016;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1418; Calibrated: 05.09.2016
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1231
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Configuration/Unnamed procedure/Area Scan (61x61x1): Interpolated grid:

$dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.0323 W/kg

Configuration/Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement

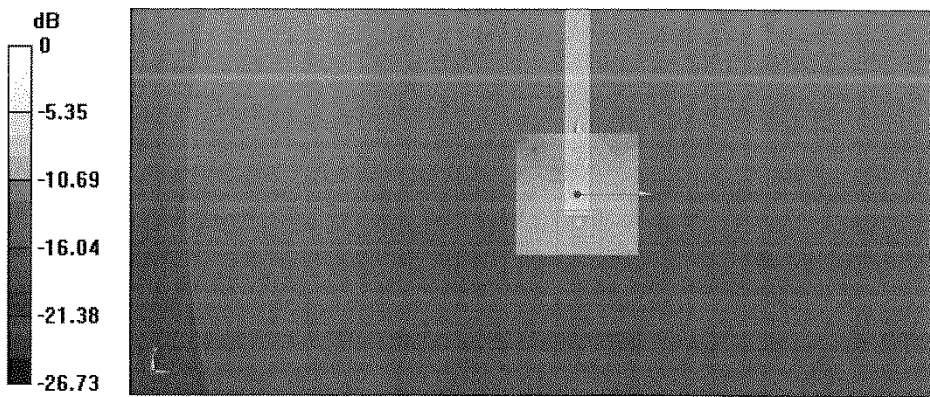
grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 3.602 V/m; Power Drift = -0.04dB

Peak SAR (extrapolated) = 0.0440 W/kg

SAR(1 g) = 0.022 W/kg; SAR(10 g) = 0.012 W/kg

Maximum value of SAR (measured) = 0.0319 W/kg



0 dB = 0.0319 W/kg = -14.96 dBW/kg

Test Laboratory: Shenzhen EMTEK Co.,Ltd.

Date: 08.07.2017

4-WLAN2.4GHz-802.11b 1Mbps-Edge2-0cm-Ch1

Communication System: UID 0, WIFI (0); Frequency: 2412 MHz; Duty Cycle: 1:1

Medium: MSL_2450_170708

Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.998$ S/m; $\epsilon_r = 53.0555$;

$\rho = 1000$ kg/m³

Ambient Temperature: 23.5 °C; Liquid Temperature: 22.5 °C

DASY Configuration:

- Probe: EX3DV4 - SN3970; ConvF(7.66, 7.66, 7.66); Calibrated: 07.09.2016;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1418; Calibrated: 05.09.2016
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1231
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Configuration/Unnamed procedure/Area Scan (61x101x1): Interpolated grid:

$dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.896 W/kg

Configuration/Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement

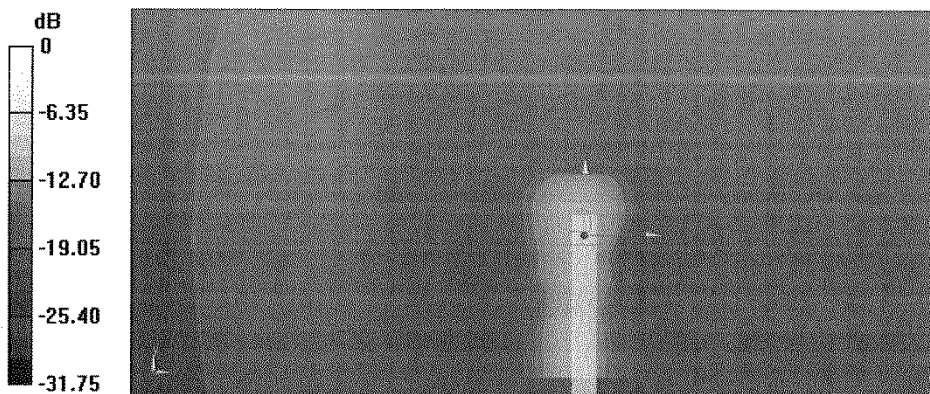
grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 19.140 V/m; Power Drift = 0.07dB

Peak SAR (extrapolated) = 1.16 W/kg

SAR(1 g) = 0.533 W/kg; SAR(10 g) = 0.224 W/kg

Maximum value of SAR (measured) = 0.849 W/kg



0 dB = 0.849 W/kg = -0.71 dBW/kg

Test Laboratory: Shenzhen EMTEK Co.,Ltd.

Date: 08.07.2017

3-WLAN2.4GHz-802.11b 1Mbps-Bottom-0cm-Ch6

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

Medium: MSL_2450_170708

Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 2.013$ S/m; $\epsilon_r = 50.739$; $\rho = 1000$ kg/m³

Ambient Temperature: 23.5 °C; Liquid Temperature: 22.5 °C

DASY Configuration:

- Probe: EX3DV4 - SN3970; ConvF(7.57, 7.57, 7.57); Calibrated: 07.09.2016;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1418; Calibrated: 05.09.2016
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1231
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Configuration/Unnamed procedure/Area Scan (101x61x1): Interpolated grid:

$dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 2.52 W/kg

Configuration/Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement

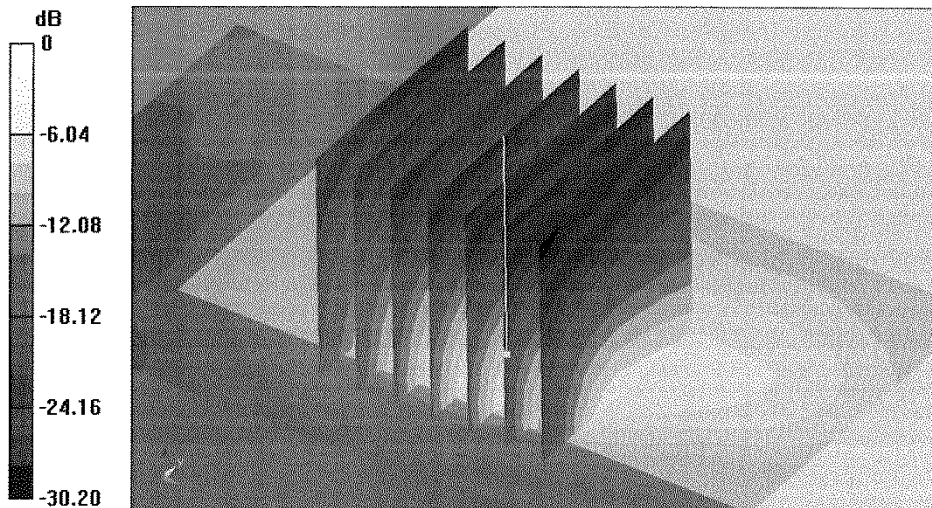
grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 23.991 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 4.00 W/kg

SAR(1 g) = 1.16 W/kg; SAR(10 g) = 0.459 W/kg

Maximum value of SAR (measured) = 2.59 W/kg



0 dB = 2.59 W/kg = 4.13 dBW/kg

Test Laboratory: Shenzhen EMTEK Co.,Ltd.

Date: 08.07.2017

4-WLAN2.4GHz-802.11b 1Mbps-Bottom-0cm-Ch11

Communication System: UID 0, WIFI (0); Frequency: 2462 MHz; Duty Cycle: 1:1

Medium: MSL_2450_170708

Medium parameters used (interpolated): $f = 2462$ MHz; $\sigma = 2.048$ S/m; $\epsilon_r = 50.622$; $\rho = 1000$ kg/m³

Ambient Temperature: 23.5 °C; Liquid Temperature: 22.5 °C

DASY Configuration:

- Probe: EX3DV4 - SN3970; ConvF(7.57, 7.57, 7.57); Calibrated: 07.09.2016;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1418; Calibrated: 05.09.2016
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1231
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Configuration/Unnamed procedure/Area Scan (101x61x1): Interpolated grid:

$dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 2.59 W/kg

Configuration/Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement

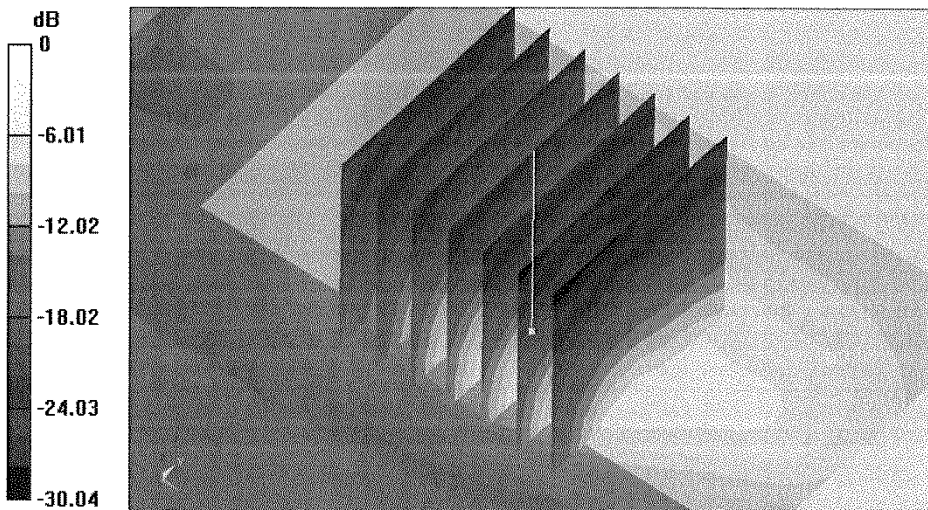
grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 16.193 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 2.98 W/kg

SAR(1 g) = 1.109 W/kg; SAR(10 g) = 0.394 W/kg

Maximum value of SAR (measured) = 2.68 W/kg



0 dB = 2.68 W/kg = 4.28 dBW/kg

Test Laboratory: Shenzhen EMTEK Co.,Ltd.

Date: 09.07.2017

5-WLAN5GHz-802.11a 6Mbps-Bottom-0cm-Ch36

Communication System: UID 0, WIFI (0); Frequency: 5180 MHz; Duty Cycle: 1:1

Medium: MSL_5G_170709

Medium parameters used: $f = 5180$ MHz; $\sigma = 5.129$ S/m; $\epsilon_r = 50.086$; $\rho = 1000$ kg/m³

Ambient Temperature: 23.5 °C; Liquid Temperature: 22.5 °C

DASY Configuration:

- Probe: EX3DV4 - SN3970; ConvF(4.94, 4.94, 4.94); Calibrated: 07.09.2016;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 SnI418; Calibrated: 05.09.2016
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1231
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Configuration/Unnamed procedure/Area Scan (101x61x1): Interpolated grid:

$dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 2.55 W/kg

Configuration/Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement

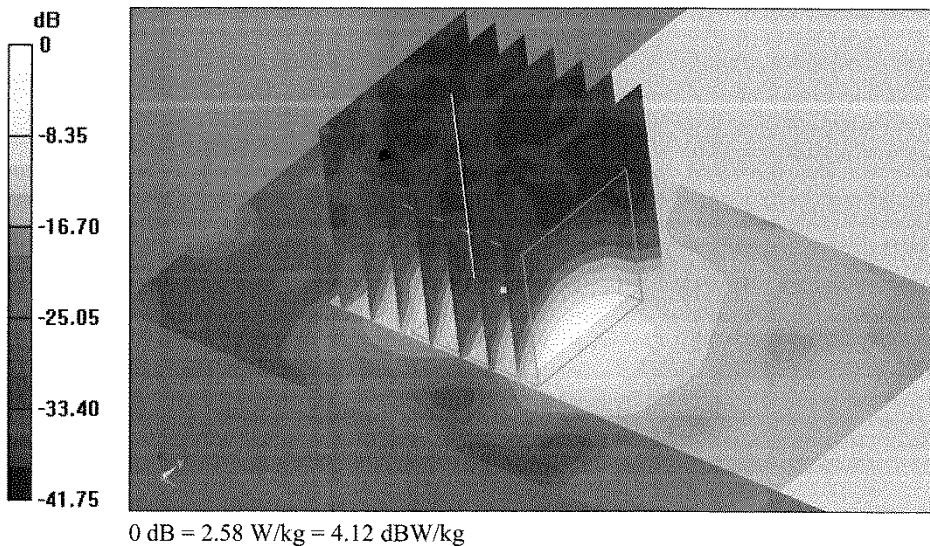
grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 15.913 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 8.22 W/kg

SAR(1 g) = 1.18 W/kg; SAR(10 g) = 0.269 W/kg

Maximum value of SAR (measured) = 2.58 W/kg



Test Laboratory: Shenzhen EMTEK Co.,Ltd.

Date: 09.07.2017

6-WLAN5GHz-802.11a 6Mbps-Bottom-0cm-Ch40

Communication System: UID 0, WIFI (0); Frequency: 5200 MHz; Duty Cycle: 1:1

Medium: MSL_5G_170709

Medium parameters used: $f = 5200$ MHz; $\sigma = 5.159$ S/m; $\epsilon_r = 50.05$; $\rho = 1000$ kg/m³

Ambient Temperature: 23.5 °C; Liquid Temperature: 22.5 °C

DASY Configuration:

- Probe: EX3DV4 - SN3970; ConvF(4.94, 4.94, 4.94); Calibrated: 07.09.2016;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1418; Calibrated: 05.09.2016
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1231
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Configuration/Unnamed procedure/Area Scan (101x61x1): Interpolated grid:

$dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 2.39 W/kg

Configuration/Unnamed procedure/Zoom Scan (7x7x7)/Cube 0: Measurement

grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 16.701 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 6.09 W/kg

SAR(1 g) = 0.995 W/kg; SAR(10 g) = 0.294 W/kg

Maximum value of SAR (measured) = 2.46 W/kg

