Prüfbericht-Nr.: *Test Report No.:*	**50050527 007**	**Auftrags-Nr.:** *Order No.:*	164090929	Seite 1 von 34 *Page 1 of 34*
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" windows tablet
Bezeichnung / Typ-Nr.: *Identification / Type No.:*	NS-P11W7100, NS-P11W7100-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:*	17.04.2017
Prüfmuster-Nr.: *Test sample No.:*	A000530521-002
Prüfzeitraum: *Testing period:*	26.05.2017 - 27.05.2017
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:**		
26-06-2017	Andy Yan/Project Manager		26-06-2017	Owen Tian/Technical Certifier	
Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

Sonstiges / Other: FCC ID: 2AIB2-P11W7100W
IC: 21456-P11W7100W

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery:*	Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged*

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

V04

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 testd 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) durning 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	0.659
802.11 a/n/ac - 5GHz Band U-NII-1	Body	NII	0.509
802.11 a/n/ac - 5GHz Band U-NII-2A	Body		0.564
802.11 a/n/ac - 5GHz Band U-NII-2C	Body		0.659
802.11 a/n/ac - 5GHz Band U-NII-3	Body		0.644

Contents

1. GENERAL REMARKS 5
1.1 COMPLEMENTARY MATERIALS 5

2. TEST SITES 5
2.1 TEST FACILITIES 5
2.2 LIST OF TEST AND MEASUREMENT INSTRUMENTS 6

3. GENERAL PRODUCT INFORMATION 7
3.1 PRODUCT FUNCTION AND INTENDED USE 7
3.2 RATINGS AND SYSTEM DETAILS 7
3.3 INDEPENDENT OPERATION MODES 13
3.4 SUBMITTED DOCUMENTS 13

4. SAR MEASUREMENTS SYSTEM CONFIGURATION 14
4.1 SAR MEASUREMENTS SET-UP 14
4.2 DASY5 E-FILD PROBE SYSTEM 15
4.3 E-FILED PROBE CALIBRATION 16
4.4 OTHER TEST EQUIPMENT 16
4.4.1 Data Acquisition Electronics (DAE) 16
4.4.2 Robot 17
4.4.3 Measurement Server 17
4.4.4 Device Holder for Phantom 18
4.4.5 Phantom 19
4.5 SCANNING PROCEDURE 19
4.6 DATA STORAGE AND EVALUATION 21
4.6.1 Data Storage 21
4.6.2 Data Evaluation by SEMCAD 21

5. TEST SET-UP AND OPERATION MODES 23
5.1 PRINCIPLE OF CONFIGURATION SELECTION 23
5.2 TISSUE SIMULATING LIQUID INGREDIENTS 24
5.3 SPECIFIC ABSORPTION RATE (SAR) SYSTEM CHECK 24
5.4 EXPOSURE POSITIONS CONSIDERATION 25
5.5 TEST OPERATION AND TEST SOFTWARE 27
5.6 SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT 27

6. TEST RESULTS 28
6.1 HUAMAN EXPOSURE TO RADIOFREQUENCY ELECTROMAGNETIC FIELDS 28
6.2 MEASUREMENT UNCERTAINTY 32
6.2.1 Measurement uncertainty evaluation 32

7. **PHOTOGRAPHS OF THE TEST SET-UP** **33**

8. **LIST OF TABLES** **34**

9. **LIST OF PHOTOGRAPHS** **34**

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	2016-05-28	1year
RF Power Meter. Dual Channel	BOONTON	4232A	10539	2016-05-28	1year
Power Sensor	BOONTON	51011EMC	34236/34238	2016-05-28	1year
Wideband Radio Communication Tester	R&S	CMW500	1201.0002K50-140822zk	2016-05-28	1year
Signal Analyzer	Agilent	N9010A	My53470879	2016-05-28	1year
Network Analyzer	Agilent	E5071C	MY46316645	2016-05-28	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	2016-10-02	3years
Validation Kit 5GHz	SPEAG	D5GHzV2	1169	2016-06-17	3years
Dual Directional Coupler	Agilent	EE393	TW5451008	2016-05-28	1year
10dB Attenuator	Mini-Circuits	15542	3 1344	2016-05-28	1year
10dB Attenuator	Mini-Circuits	15542	3 1415	2016-05-28	1year
30dB Attenuator	Mini-Circuits	15542	3 1420	2016-05-28	1year
Power Amplifier	MILMEGA	80RF1000-175	1059345	2016-05-28	1 Year
Power Amplifier	MILMEGA	AS0102-55	1018770	2016-05-28	1 Year
Power Amplifier	MILMEGA	AS1860-50	1059346	2016-05-28	1 Year
Power Meter	Agilent	N1918A	MY54180006	2016-05-28	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	2016-05-15	1 Year

3. General Product Information

3.1 Product Function and Intended Use

The EUTs are 11.6'' windows tablet with Wi-Fi, Bluetooth function.
These models are identical except the model name.
The EUTs have two antennas, two antennas cannot transmitter simultaneously.
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" windows tablet
Type Designation	NS-P11W7100, NS-P11W7100-C, NS-P11xxxxxxxxx (x=0-9, A-Z, a-z, -or blank, for market purpose only)
FCC ID	2AIB2-P11W7100W
IC	21456-P11W7100W
Operating Frequency band	2400 – 2483.5MHz, 5150 – 5850MHz
Extreme Temperature Range	0~+40℃
Operation Voltage	DC 3.7V (via built in battery)
Hardware version:	S116CJR110-CC34A
Software version:	BIOS: BI-11.6-S116CJR100-CC34A-029-S,5/19/2017
	OS: 10.0.14393 Build 14393(1607)
Antenna Gain	1.6dBi

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)**
Operating Frequency band (MHz)	2412 ~ 2472	2412 ~ 2472	2412 ~ 2472	2422 ~ 2452
Channel Number	13	13	13	9
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
Transmitter Output Power (Typical) (dBm)	13	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

Operating mode(s) / WiFi:	IEEE 802.11a	IEEE 802.11n HT20	IEEE 802.11n HT40
Test modulation	OFDM (BPSK, QPSK, 16-QAM, 64-QAM)	OFDM (BPSK, QPSK, 16-QAM, 64-QAM)	OFDM (BPSK, QPSK, 16-QAM, 64-QAM)
Transmit Frequency Range (MHz):	5180 - 5825	5180 - 5825	5180 - 5825
Channel Number	25	25	12
Data Rate (Mbps)	6, 9, 12, 18, 24, 36, 48, 54	MCS0 ~ MCS7	MCS0 ~ MCS7
Maximum tune-up average output power (dBm):	11	9	9
Media Access Protocol	CSMA/CA with ACK	CSMA/CA with ACK	CSMA/CA with ACK

Table 6: Technical Specification of 5GHz, 802.11ac

Operating mode(s) / WiFi:	IEEE 802.11ac VHT20	IEEE 802.11ac VHT40	IEEE 802.11ac VHT80
Test modulation	OFDM (BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM)	OFDM (BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM)	OFDM (BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM)
Transmit Frequency Range (MHz):	5180 - 5825	5180 - 5825	5180 - 5825
Channel Number	25	12	6
Data Rate (Mbps)	MCS0 ~ MCS8	MCS0 ~ MCS9	MCS0 ~ MCS9
Maximum tune-up average output power (dBm):	10	9	9
Media Access Protocol	CSMA/CA with ACK	CSMA/CA with ACK	CSMA/CA with ACK

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

802.11a		802.11n HT20		802.11n HT40	
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: List of WLAN Channel of 5GHz 802.11ac

802.11ac VHT20		802.11ac VHT40		802.11ac VHT80	
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
36	5180	38	5190	42	5210
40	5200	46	5230	58	5290
44	5220	54	5270	106	5530
48	5240	62	5310	122	5610 (only for FCC)
52	5260	102	5510	138	5690
56	5280	110	5550	155	5775
60	5300	118	5590		
64	5320	126	5630 (only for FCC)		
100	5500	134	5670		
104	5520	142	5710		
108	5540	151	5755		
112	5560	159	5795		
116	5580				
120	5600 (only for FCC)				
124	5620 (only for FCC)				
128	5640 (only for FCC)				
132	5660				
136	5680				
140	5700				
144	5720				
149	5745				
153	5765				
157	5785				
161	5805				
165	5825				

Table 9: Technical Specification of Bluetooth (BDR & EDR mode)

Technical Specification	**Value**
Kind of Equipment	11.6" windows tablet
Type Designation	NS-P11W7100, NS-P11W7100-C, NS-P11xxxxxxxxx (x=0-9, A-Z, a-z, -or blank, for market purpose only)
FCC ID	2AIB2-P11W7100W
IC	21456-P11W7100W
Operating Frequency band	2400 – 2483.5MHz
Channel separation	1MHz
Extreme Temperature Range	0~+40℃
Operation Voltage	DC 3.7V (via built in battery)
Modulation	FHSS, GFSK, 8DPSK, π/4DQPSK
Bluetooth version	4.0, Dual Mode
Antenna Gain	1.6dBi

Table 10: 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 11: Technical Specification of Bluetooth (Low Energy mode)

Technical Specification	Value
Kind of Equipment	11.6" windows tablet
Type Designation	NS-P11W7100, NS-P11W7100-C, NS-P11xxxxxxxxx (x=0-9, A-Z, a-z, -or blank, for market purpose only)
FCC ID	2AIB2-P11W7100W
IC	21456-P11W7100W
Operating Frequency band	2400 – 2483.5MHz
Channel separation	2MHz
Extreme Temperature Range	0~+40℃
Operation Voltage	DC 3.7V (via built in battery)
Modulation	GFSK
Bluetooth version	4.0, Dual Mode
Antenna Gain	1.6dBi

Table 12: 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. 802.11ac (VHT80)
   9. Bluetooth BDR
   10. Bluetooth EDR
   11. Bluetooth Low Energy

B. Off

3.4 Submitted Documents

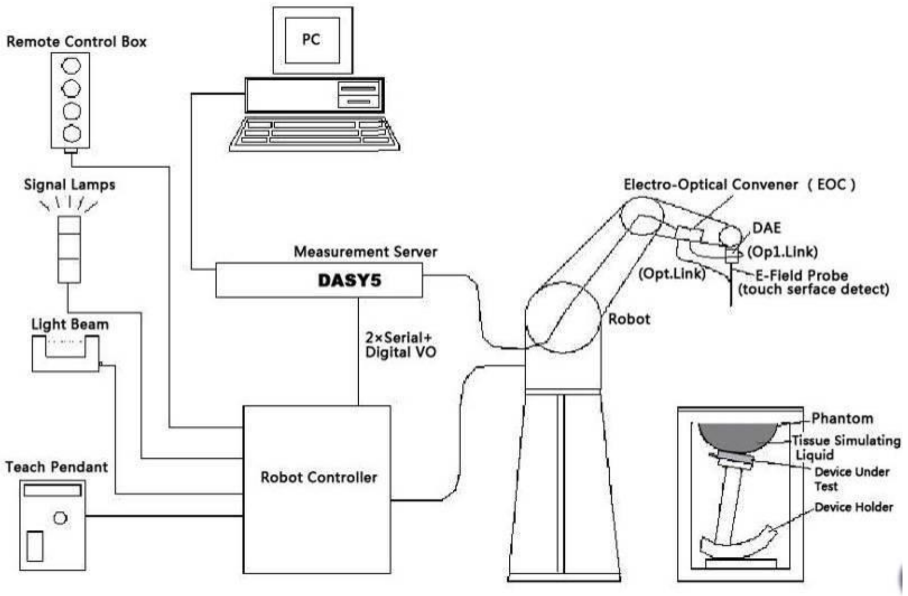
- Bill of Material
- Constructional Drawing
- PCB Layout
- Circuit Diagram
- Instruction Manual
- Rating Label

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/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).

4.4 Other Test Equipment

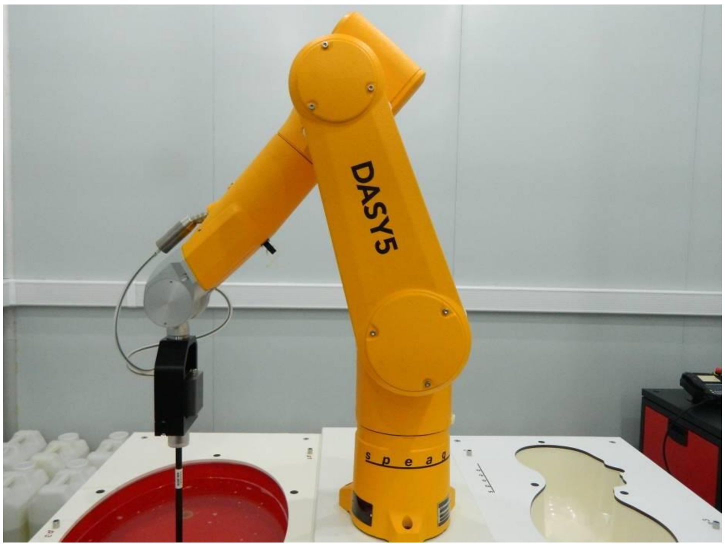
4.4.1 Data Acquisition Electronics (DAE)

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 broad 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 broad, which is directly connected to the PC/104 bus of the CPU broad.

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

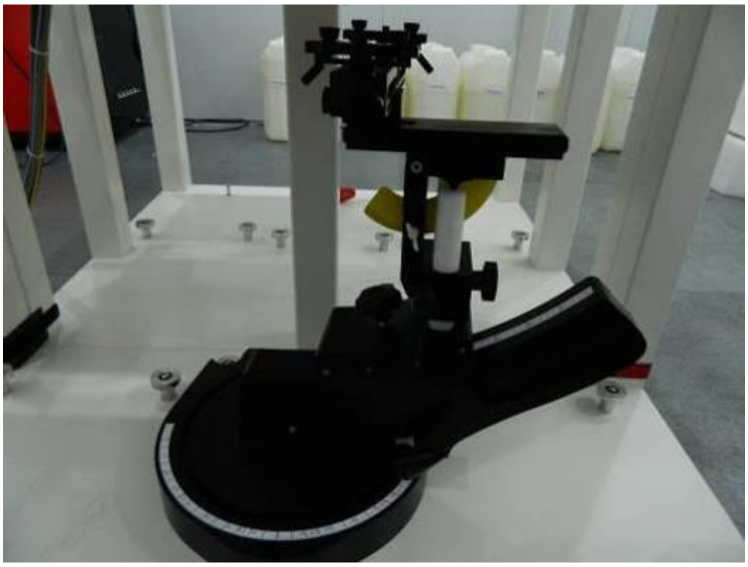
The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5mm distance, a positioning uncertainty of ±0.5mm would produce a SAR uncertainty of ±20%. Accurate device positioning is therefore crucial for accurate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

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 ε =3 and loss tangent δ =0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

<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.

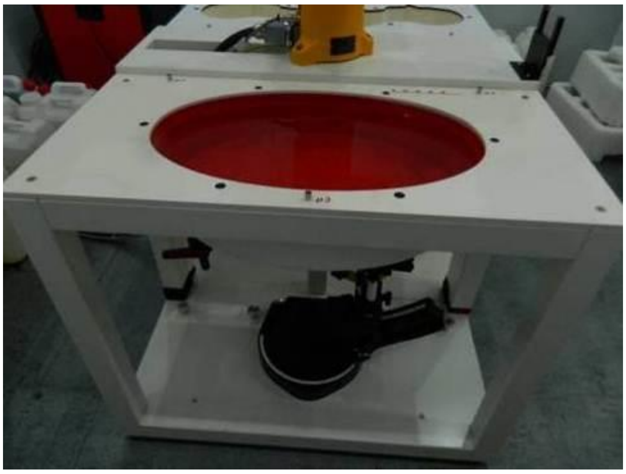


Picture 5 Device Holder

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 ± 30°.)

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) (Δxarea, Δyarea)	Maximum Zoom Scan Resolution (mm) (Δxzoom, Δyzoom)	Maximum Zoom Scan Spatial Resolution (mm) Δzzoom(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 loss less 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 Dcp_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:

$\mathbf{V_i = U_i + U_i^2 \cdot c\,f / dcp_i}$

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)

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:

E-field probes: $\mathbf{E_i = (V_i / Norm_i \cdot ConvF)^{1/2}}$

H-field probes: $\mathbf{H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1} f + a_{i2} f^2) / f}$

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

ConvF = sensitivity enhancement in solution

$\mathbf{a_{ij}}$ **=** sensor sensitivity factors for H-field probes

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):

$\mathbf{E_{tot} = (E_x^2 + E_Y^2 + E_z^2)^{1/2}}$

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

$\mathbf{SAR = (E_{tot})\ 2 \cdot \sigma / (\rho \cdot 1000)}$

with **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/cm^3

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.

$\mathbf{P_{pwe} = E_{tot}^2 / 3770 \text{ or } P_{pwe} = H_{tot}^2 \cdot 37.7}$

with $\mathbf{P_{pwe}}$ = equivalent power density of a plane wave in mW/cm^2

$\mathbf{E_{tot}}$ = 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 13: 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	
802.11ac(VHT80) (Band U-NII-1)	5180-5240	OFDM	---	CH42	---	
802.11ac(VHT80) (Band U-NII-2A)	5260-5320	OFDM	---	CH58	---	
802.11ac(VHT80) (Band U-NII-2C)	5500-5720	OFDM	CH106	CH122	CH138	
802.11ac(VHT80) (Band U-NII-3)	5745-5825	OFDM	---	CH155	---	
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.

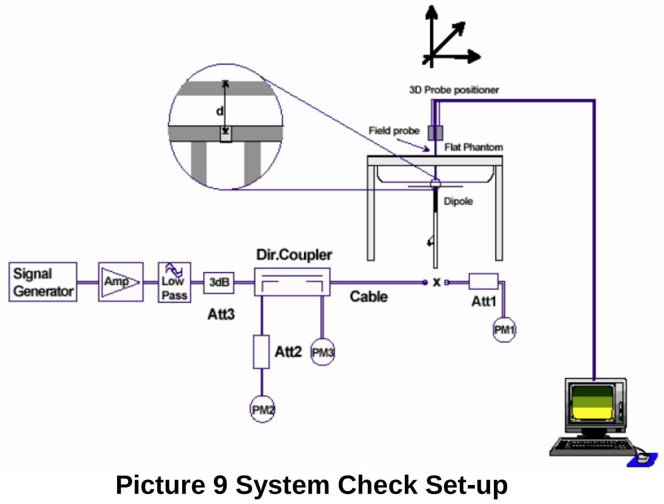
Table 14: Composition of Tissue Simulating Liquid

MIXTURE%(Weight)	FREQUENCY (Body) 2450MHz
Water	73.2
Glycol	26.7
Salt	0.1
Dielectric Parameters Target Value	f=2450MHz ε=52.70 σ=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 ε=49.00 σ=5.30 f=5300MHz ε=48.90 σ=5.42 f=5500MHz ε=48.60 σ=5.65 f=5600MHz ε=48.50 σ=5.77 f=5800MHz ε=48.20 σ=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 (±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 15: System Check Results of Tissue Simulating Liquid

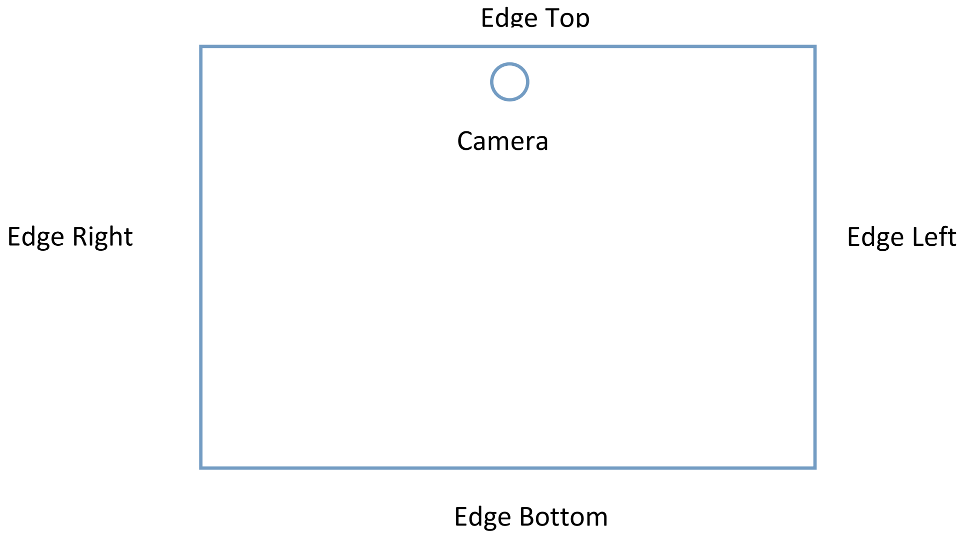
Frequency (MHz)	Tissue Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
2450	Body	22.5	2.026	52.972	1.95	52.70	3.90	0.52	±5	2017-05-27
5200	Body	22.8	5.164	50.130	5.30	49.00	-2.57	2.31	±5	2017-05-26
5300	Body	22.7	5.323	49.975	5.42	48.90	-1.79	2.20	±5	2017-05-26
5600	Body	22.4	5.831	49.380	5.77	48.50	1.06	1.81	±5	2017-05-27
5800	Body	22.6	6.133	48.881	6.00	48.20	2.22	1.41	±5	2017-05-27

(Liquid depth: 15cm)

Table 16: 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	845	3970	1418	12.39	51.20	49.56	-3.20	2017-05-27
5200	Body	100	1040	3970	1418	7.39	72.90	73.9	1.37	2017-05-26
5300	Body	100	1040	3970	1418	7.56	76.40	75.6	-1.05	2017-05-26
5600	Body	100	1040	3970	1418	7.81	78.40	78.1	-0.38	2017-05-27
5800	Body	100	1040	3970	1418	7.49	75.20	74.9	-0.40	2017-05-27

5.4 Exposure Positions Consideration




INSIGNIA
Windows
intel inside
BOSI TOOLS
BS181360

5.5 Test Operation and Test Software

Test operation refers to test setup in chapter 5.

For WLAN SAR testing, WLAN engineering testing software installed on the EUT can provide continuous transmitting RF singal. This RF signal utilized in SAR measurement has almost 100% duty cycle and its crest factor is1.

For the 802.11a/b/g/n/ac SAR tests, a communication link is setup with the test mode software for WiFi mode test, during the test, each test frequency channel, the EUT is operated at the RF continuous emission mode. Each channel should be tested at the lowest data rate. Testing at higher data rates is not required when the maximum average output power is less than 0.25dB higher than those measured at the lowest data rate.

802.11a/b/g/n/ac operating modes are tested independentyly according to the service requirements in each frequency band. 802.11a/b/g/n/ac modes are tested on the maximum average output channel.

SAR is not required for 802.11g/n channels when the maximum average output power is lees than 0.25dB higher than that measured on the corresponding 802.11b channels.

For the 2.4GHz and 5GHz bands bands, when the same maximum output power was specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration with largest channel bandwidth, lowest order modulation and lowest data rate. When the maximum output power of a channel is the same for equivalent OFDM configurations, the lower order 802.11 mode is used for SAR measurement.

5.6 Special Accessories and Auxiliary Equipment

None.

6. Test Results

6.1 Huaman Exposure to Radiofrequency Electromagnetic Fields

RESULT: **Passed**

Date of testing	:	2017-05-26 to 2017-05-27
Test standard	:	CFR Title 47 Part 2 Subpart J Section 2.1093 ANSI/IEEE C95.1-1992 IEEE 1528-2013
FCC KDB Publication	:	KDB 447498 D01 v06 KDB 248227 D01 v01r02 KDB 616217 D04 v01r01 KDB 865664 D01 v01r01
Limits	:	1.6W/kg

Test setup

Operation mode	:	A
Ambient temperature	:	23℃
Relative humidity	:	50%
Atmospheric pressure	:	101.0kPa

Note: Wi-Fi antenna and Bluetooth cannot transmitter simultaneously.
According to the position of antenna and dimension of product, the test was carried out on front face, bottom face & edge 1 (left).
For 2.4GHz 802.11g/n OFDM SAR test, according to clause 5.2.2 b) of KDB 248227 D01 v02r02: the highest report SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is <1.2W/kg, hence this requirement is exclusion.

Test result of Conducted Power of 802.11b

Channel	Channel Frequency (MHz)	Conducted Power (dBm)	
		ANT A	ANT B
Low Channel	2412	12.40	12.17
Middle Channel	2437	12.64	12.83
High Channel	2462	12.19	12.35

Table 17: Test result of Conducted Power of 802.11g

Channel	Channel Frequency (MHz)	Conducted Power (dBm)	
		ANT A	ANT B
Low Channel	2412	11.04	10.52
Middle Channel	2437	11.73	12.95
High Channel	2462	10.20	10.41

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

Channel	Channel Frequency (MHz)	Conducted Power (dBm)	
		ANT A	ANT B
Low Channel	2412	10.55	10.33
Middle Channel	2437	12.45	12.72
High Channel	2462	10.68	10.04

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

Channel	Channel Frequency (MHz)	Conducted Power (dBm)	
		ANT A	ANT B
Low Channel	2422	11.17	10.58
Middle Channel	2437	12.16	11.71
High Channel	2452	10.17	10.56

Table 20: Test result of Conducted Power of Band U-NII-1

Mode	Channel Frequency (MHz)	Conducted Power (dBm)	
		ANT A	ANT B
802.11a	5180	9.92	10.59
	5200	N/A	10.84
	5240	N/A	10.52
802.11n HT20	5180	N/A	7.81
	5200	N/A	8.20
	5240	N/A	8.02
802.11n HT40	5190	N/A	8.62
	5230	N/A	7.86
802.11ac VHT20	5180	N/A	10.12
	5200	N/A	9.79
	5240	N/A	9.54
802.11ac VHT40	5190	N/A	8.54
	5230	N/A	9.03
802.11ac VHT80	5210	N/A	8.43

Table 21: Test result of Conducted Power of Band U-NII-2A

Mode	Channel Frequency (MHz)	Conducted Power (dBm)	
		ANT A	ANT B
802.11a	5260	N/A	10.35
	5280	7.80	10.75
	5320	N/A	10.43
802.11n HT20	5260	N/A	7.84
	5280	N/A	8.28
	5320	N/A	7.83
802.11n HT40	5270	N/A	8.04
	5310	N/A	8.28
802.11ac VHT20	5260	N/A	9.40
	5280	N/A	9.58
	5320	N/A	9.63
802.11ac VHT40	5270	N/A	8.75
	5310	N/A	8.40
802.11ac VHT80	5290	N/A	7.75

Table 22: Test result of Conducted Power of Band U-NII-2C

Mode	Channel Frequency (MHz)	Conducted Power (dBm)	
		ANT A	ANT B
802.11a	5500	N/A	10.32
	5600	N/A	10.47
	5700	6.91	10.10
802.11n HT20	5500	N/A	8.41
	5600	N/A	7.98
	5700	N/A	7.48
802.11n HT40	5510	N/A	8.39
	5590	N/A	8.26
	5670	N/A	8.51
802.11ac VHT20	5500	N/A	8.41
	5600	N/A	8.23
	5700	N/A	8.26
802.11ac VHT40	5510	N/A	8.53
	5590	N/A	8.54
	5670	N/A	8.62
802.11ac VHT80	5530	N/A	8.55
	5610	N/A	7.85

Table 23: Test result of Conducted Power of Band U-NII-3

Mode	Channel Frequency (MHz)	Conducted Power (dBm)	
		ANT A	ANT B
802.11a	5745	N/A	10.12
	5785	N/A	9.75
	5825	N/A	9.12
802.11n HT20	5745	6.47	7.64
	5785	N/A	7.06
	5825	N/A	6.51
802.11n HT40	5755	N/A	7.60
	5795	N/A	7.13
802.11ac VHT20	5745	N/A	8.63
	5785	N/A	7.11
	5825	N/A	7.57
802.11ac VHT40	5755	N/A	8.70
	5795	N/A	7.26
802.11ac VHT80	5775	N/A	6.99

Maximum Bluetooth Peak Output Power is 4.5dBm which below the threshold of SAR testing 9.5dBm for 2.4GHz ISM Band.

Note: for 5G band, the power of ANT A is less than ANT B, hence only some power were measured as verification.

Table 24: 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(ANT a)	Left Edge	0	6	2437	13	1Mbps	12.64	13.00	1.086	-0.07	0.587	0.638	2017-05-27
WLAN2.4G	802.11b(ANT b)	Left Edge	0	6	2437	13	1Mbps	12.83	13.00	1.040	-0.02	0.561	0.583	2017-05-27
WLAN2.4G	802.11b(ANT b)	Bottom Face	0	6	2437	13	1Mbps	12.83	13.00	1.040	-0.12	0.634	0.659	2017-05-27
WLAN2.4G	802.11b(ANT a)	Bottom Face	0	6	2437	13	1Mbps	12.64	13.00	1.086	-0.12	0.388	0.422	2017-05-27
WLAN5G	802.11a(ANT b)	Bottom Face	0	36	5180	11	6Mbps	10.59	11.00	1.099	-0.05	0.463	0.509	2017-05-26
WLAN5G	802.11a(ANT b)	Left Edge	0	36	5180	11	6Mbps	10.59	11.00	1.099	-0.05	0.443	0.487	2017-05-26
WLAN5G	802.11a(ANT b)	Bottom Face	0	56	5280	11	6Mbps	10.75	11.00	1.059	-0.08	0.532	0.564	2017-05-26
WLAN5G	802.11a(ANT b)	Left Edge	0	56	5280	11	6Mbps	10.75	11.00	1.059	-0.08	0.512	0.542	2017-05-26
WLAN5G	802.11a(ANT b)	Bottom Face	0	100	5500	11	6Mbps	10.32	10.50	1.042	-0.02	0.632	0.659	2017-05-27
WLAN5G	802.11a(ANT b)	Left Edge	0	100	5500	11	6Mbps	10.32	10.50	1.042	-0.02	0.413	0.430	2017-05-27
WLAN5G	802.11a(ANT b)	Bottom Face	0	149	5745	11	6Mbps	10.12	10.50	1.091	-0.17	0.59	0.644	2017-05-27
WLAN5G	802.11a(ANT b)	Left Edge	0	149	5745	11	6Mbps	10.12	10.50	1.091	-0.17	0.304	0.332	2017-05-27

Refer to attached Appendix A for details of test results.

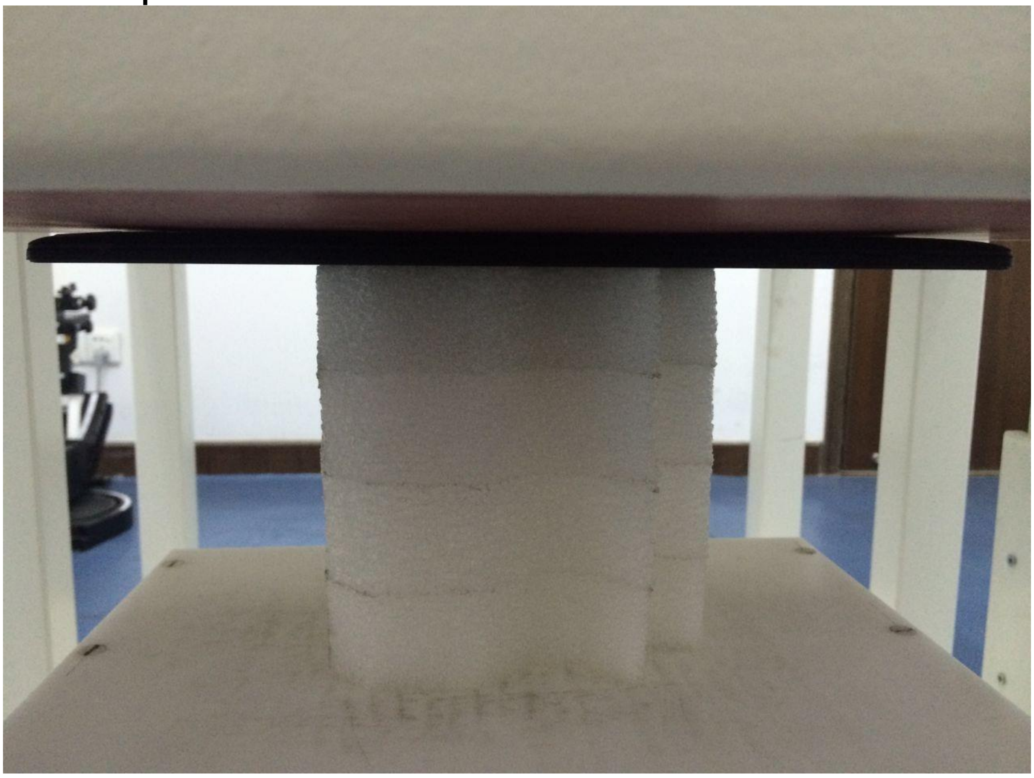
6.2 Measurement Uncertainty

6.2.1 Measurement uncertainty evaluation

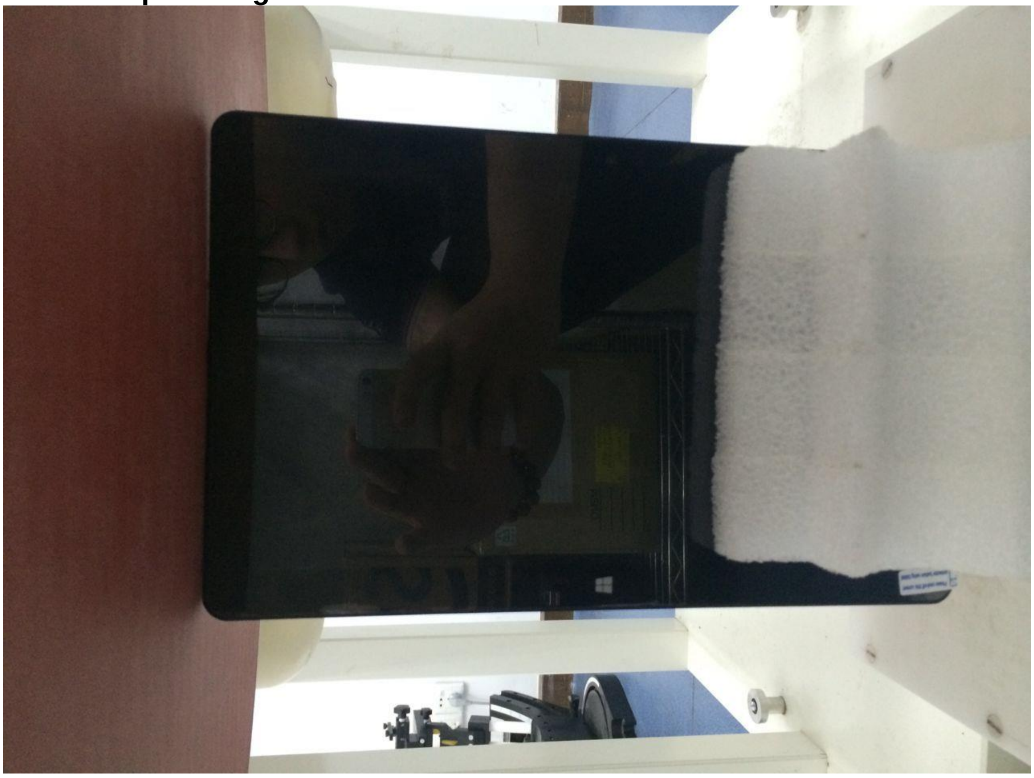
The measured SAR were <1.5 W/kg for all frequency bands, therefore per KDB Publication 865664 D01, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports.

7. Photographs of the Test Set-Up

Photograph 1: Set-up for Bottom Face



Photograph 2: Set-up for Edge Left



8. List of Tables

Table 1: List of Test and Measurement Equipment 6
Table 2: Technical Specification of Wi-Fi 7
Table 3: Technical Specification of 2.4GHz, 802.11b/g/n 7
Table 4: List of WLAN Channel of 802.11b/g/n 8
Table 5: Technical Specification of 5GHz, 802.11a/n 8
Table 6: Technical Specification of 5GHz, 802.11ac 9
Table 7: List of WLAN Channel of 5GHz 802.11a/n 9
Table 8: List of WLAN Channel of 5GHz 802.11ac 10
Table 9: Technical Specification of Bluetooth (BDR & EDR mode) 10
Table 10: RF channel and frequency of Bluetooth (BDR & EDR mode) 11
Table 11: Technical Specification of Bluetooth (Low Energy mode) 11
Table 12: RF channel and frequency of Bluetooth (Low Energy mode) 12
Table 13: Configuration of EUT 23
Table 14: Composition of Tissue Simulating Liquid 24
Table 15: System Check Results of Tissue Simulating Liquid 25
Table 16: System Validation 25
Table 17: Test result of Conducted Power of 802.11g 28
Table 18: Test result of Conducted Power of 802.11n (HT20) 29
Table 19: Test result of Conducted Power of 802.11n (HT40) 29
Table 20: Test result of Conducted Power of Band U-NII-1 29
Table 21: Test result of Conducted Power of Band U-NII-2A 29
Table 22: Test result of Conducted Power of Band U-NII-2C 30
Table 23: Test result of Conducted Power of Band U-NII-3 30
Table 24: Initial test configurations Test result of SAR Values 31

9. List of Photographs

Photograph 1: Set-up for Bottom Face 33
Photograph 2: Set-up for Edge Left 33