TEST REPORT

KCTL Inc. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea Tel: 82-31-285-0894 Fax: 82-505-299-8311 www.kctl.co.kr	Report No.: KR17-SPF0005-E Page (1) of (99)	KCTL

1. Client

- Name : Rayence Co.,Ltd.
- Address : 14, Samsung 1-ro 1-gil, Hwaseong-si, Gyeonggi-do,South Korea, 18449
- Date of Receipt : 2017-06-21

2. Use of Report : -

3. Name of Product and Model : Medical Image Processing Unit / 1417WCC

Variant Model 1417WGC

4. Manufacturer and Country of Origin : Rayence Co.,Ltd. / Korea

5. FCC ID / IC : QIIRY1417WHD / 10742A-1417WHD

6. Date of Test : 2017-07-24 to 2017-07-26

7. Test method used : IEEE 1528-2013, ANSI/IEEE C95.1, KDB Publication, IEC 62209-2:2010

8. Test Results : Refer to the test result in the test report

Affirmation	Tested by Name : Gyuhyun, Shim (Signature)	Technical Manager Name : Cheonsig, Choi (Signature)

2017-08-25

KCTL Inc.

REPORT REVISION HISTORY

Date	Revision	Page No
2017-08-04	Originally issued	-
2017-08-11	Output power remeasurement	27~37
2017-08-18	Added results of 2.4G/5G MIMO Head/Body SAR and remeasured output power.	6, 7, 9, 10, 29~39
2017-08-23	Edit notes	9, 10, 34~39
2017-08-24	Revised RF power setting in TEST SW (5 725 MHz Band_802.11a)	7
2017-08-25	Revised a typo in power setting description	7

Please note: Report KR17-SPF0005-E issued on 2017-08-25 supercedes previously issued report KR17-SPF0005-D issued on 2017-08-24.

Contents

1. Client information

Client: Rayence Co.,Ltd.

Address: 14, Samsung 1-ro 1-gil, Hwaseong-si, Gyeonggi-do,South Korea, 18449

Telephone: +82-31-8015-6465

Fax: +82-31-8015-6300

E-mail: namyoung.ha@rayence.com

Contact name: Namyoung, Ha

2. Laboratory information

Address

KCTL Inc.

65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea

TEL: 82 31 285 0894 FAX: 82 505 299 8311

Certificate

KOLAS No.: KT231

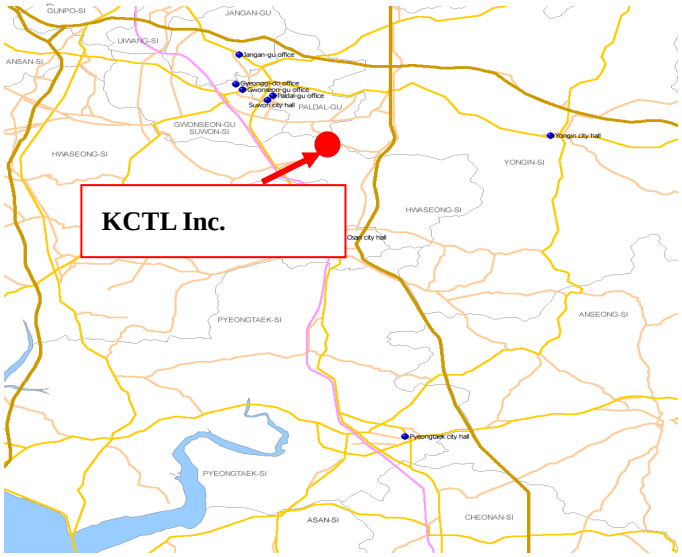
FCC Site Designation No.: KR0040

FCC Site Registration No.: 687132

VCCI Site Registration No.: R-3327, G-198, C-3706, T-1849

IC Site Registration No.: 8035A-2

SITE MAP

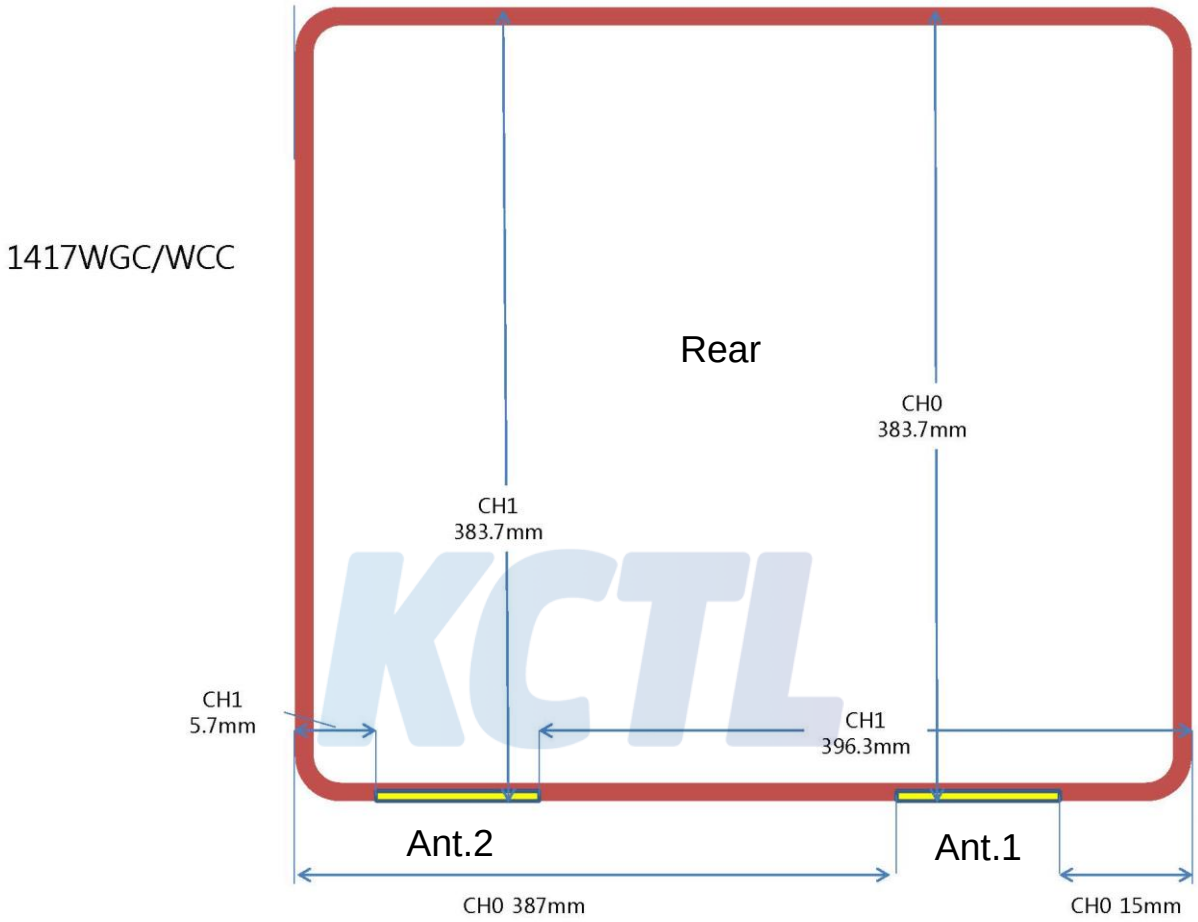


3. Identification of Sample

EUT Type	Medical Image Processing Unit
Brand Name	Rayence Co.,Ltd.
Mode of Operation	WLAN 2.4 GHz / 5 GHz
Model Number	1417WCC
Serial Number	CER016300069
Max. Power	WLAN 2.4 GHz : SISO 17 dBm, MIMO 20 dBm WLAN 5.2 GHz : SISO 17 dBm, MIMO 20 dBm WLAN 5.8 GHz : SISO 16 dBm, MIMO 19 dBm
Tx Freq.Range	WLAN 2.4 GHz: 2 412 MHz ~ 2 462 MHz WLAN 5.2 GHz: 5 180 MHz ~ 5 240 MHz WLAN 5.8 GHz: 5 745 MHz ~ 5 825 MHz
Rx Freq.Range	WLAN 2.4 GHz: 2 412 MHz ~ 2 462 MHz WLAN 5.2 GHz: 5 180 MHz ~ 5 240 MHz WLAN 5.8 GHz: 5 745 MHz ~ 5 825 MHz
Antenna Type	PCB Antenna
Antenna Size	49.5 mm x 8 mm
Normal Voltage	DC 11.1 V
H/W Version	7.0
S/W Version	FW-000.026

RF power setting in TEST SW (2.4 GHz)	802.11g: 16 (Low) / 16 (Mid) / 13 (High) 802.11n HT20 : 16 (Low) / 16 (Mid) / 12 (High) 802.11n HT40 : 13 (Low) / 13 (Mid) / 10 (High)
RF power setting in TEST SW (5 GHz)	5.2 GHz Band: 802.11a: 17 (Low) / 17 (Mid) / 17 (High) 802.11n HT20: 15 (Low) / 17 (Mid) / 17 (High) 802.11n HT40: 10 (Low) / 17 (Mid) 5.8 GHz Band: 802.11a: 17 (Low) / 17 (Mid) / 17 (High) 802.11n HT20: 17 (Low) / 17 (Mid) / 17 (High) 802.11n HT40: 17 (Low) / 17 (High)

3.1 Antenna Diagram



4.Test Result Summary

4.1 Head SAR Test Results

WLAN 2.4 GHz

Mode	Frequency (MHz)	Average Power (dBm)	Max. tune up power (dBm)	EUT Position	Distance (mm)	Measured 1 g SAR (W/kg)	Duty Cycle Compensate Factor	Scaling Factor	Scaled 1 g SAR (W/kg)	Ant.#	Sum (Ant. 1+2)
802.11n (HT-20)	2 437	16.0	16.5	Front	0	0.097	1.04	1.12	0.113	Ant.1	0.268
	2 437	15.3	16.5	Front	0	0.113	1.04	1.32	0.155	Ant.2	

WLAN 5.2 GHz

Mode	Frequency (MHz)	Average Power (dBm)	Max. tune up power (dBm)	EUT Position	Distance (mm)	Measured 1 g SAR (W/kg)	Duty Cycle Compensate Factor	Scaling Factor	Scaled 1 g SAR (W/kg)	Ant.#	Sum (Ant. 1+2)
802.11a	5 180	15.2	16.5	Front	0	0.534	1.03	1.35	0.742	Ant.1	1.11
	5 180	16.3	16.5	Front	0	0.340	1.03	1.05	0.367	Ant.2	

WLAN 5.8 GHz

Mode	Frequency (MHz)	Average Power (dBm)	Max. tune up power (dBm)	EUT Position	Distance (mm)	Measured 1 g SAR (W/kg)	Duty Cycle Compensate Factor	Scaling Factor	Scaled 1 g SAR (W/kg)	Ant.#	Sum (Ant. 1+2)
802.11n (HT-20)	5 785	14.1	15.0	Front	0	0.635	1.03	1.23	0.805	Ant.1	**1.18**
	5 785	14.3	15.0	Front	0	0.311	1.03	1.17	0.376	Ant.2	

<Note>

* The front with touch configuration was only tested since only the front is touched to human body in normal operation condition of this device.
* SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v06.
* Simultaneous transmission SAR test exclusion considerations
  : Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneously transmitting antenna. When the sum of 1-g or 10-g SAR of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit, SAR test exclusion applies to that simultaneous transmission configuration. Per KDB Publication 447498 D01v06.
* The above numerical summed SAR results for all the worst-case simultaneous transmission conditions were below the SAR limit (1.6 W/kg per 1-g). Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit. And therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v06.

4.2 Body SAR Test Results

WLAN 2.4 GHz

Mode	Frequency (MHz)	Average Power (dBm)	Max. tune up power (dBm)	EUT Position	Distance (mm)	Measured 1 g SAR (W/kg)	Duty Cycle Compensate Factor	Scaling Factor	Scaled 1 g SAR (W/kg)	Ant.#	Sum (Ant. 1+2)
802.11n (HT-20)	2 437	16.0	16.5	Front	0	0.122	1.04	1.12	0.142	Ant.1	0.313
	2 437	15.3	16.5	Front	0	0.125	1.04	1.32	0.171	Ant.2	

WLAN 5.2 GHz

Mode	Frequency (MHz)	Average Power (dBm)	Max. tune up power (dBm)	EUT Position	Distance (mm)	Measured 1 g SAR (W/kg)	Duty Cycle Compensate Factor	Scaling Factor	Scaled 1 g SAR (W/kg)	Ant.#	Sum (Ant. 1+2)
802.11a	5 180	15.2	16.5	Front	0	0.462	1.03	1.35	0.642	Ant.1	1.06
	5 180	16.3	16.5	Front	0	0.390	1.03	1.05	0.421	Ant.2	

WLAN 5.8 GHz

Mode	Frequency (MHz)	Average Power (dBm)	Max. tune up power (dBm)	EUT Position	Distance (mm)	Measured 1 g SAR (W/kg)	Duty Cycle Compensate Factor	Scaling Factor	Scaled 1 g SAR (W/kg)	Ant.#	Sum (Ant. 1+2)
802.11n (HT-20)	5 785	14.1	15.0	Front	0	0.581	1.03	1.23	0.736	Ant.1	1.02
	5 785	14.3	15.0	Front	0	0.232	1.03	1.17	0.281	Ant.2	

<Note>

* The front with touch configuration was only tested since only the front is touched to human body in normal operation condition of this device.
* SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v06.
* Simultaneous transmission SAR test exclusion considerations
  : Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneously transmitting antenna. When the sum of 1-g or 10-g SAR of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit, SAR test exclusion applies to that simultaneous transmission configuration. Per KDB Publication 447498 D01v06.
* The above numerical summed SAR results for all the worst-case simultaneous transmission conditions were below the SAR limit (1.6 W/kg per 1-g). Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit. And therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v06.

5. Report Overview

This report details the results of testing carried out on the samples listed in section 3, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this test report is used in any configuration other than that detailed in the test report, the manufacturer must ensure the new configuration complies with all relevant standards and certification requirements. Any mention of KCTL Inc. Wireless lab or testing done by KCTL Inc. Wireless lab made in connection with the distribution or use of the tested product must be approved in writing by KCTL Inc. Wireless lab.

6. Test Lab Declaration or Comments

None

7. Applicant Declaration or Comments

None

8. Measurement Uncertainty

All measurements and results are recorded and maintained at the laboratory performing the tests and measurement uncertainties are taken into account when comparing measurements to pass/ fail criteria.

Uncertainty of SAR equipments for measurement 300 MHz to 3 GHz (Head)

SAR Measurement Uncertainty

A	*b*	*c*	D	*e = f(d,k)*	*g*	*i = c x g / e*	*k*
Source of Uncertainty	**Description** IEEE P1528 HEAD (0.3 ~ 3 GHz)	**Tolerance/ Uncertainty value** ± %	**Probability Distribution**	**Div.**	**Ci** (1 g)	**Standard uncertainty** ± %, (1 g)	**Vi or Veff**
Measurement System							
Probe calibration(k=1)	E.2.1	6.30	N	1	1	6.30	∞
Axial isotropy	E.2.2	0.50	R	1.73	0.71	0.20	∞
Hemispherical isotropy	E.2.2	2.60	R	1.73	0.71	1.06	∞
Linearity	E.2.4	0.60	R	1.73	1	0.35	∞
Boundary effect	E.2.3	1.00	R	1.73	1	0.58	∞
System detection limits	E.2.5	1.00	R	1.73	1	0.58	∞
Readout electronics	E.2.6	0.30	N	1	1	0.30	∞
Response time	E.2.7	0.80	R	1.73	1	0.46	∞
Integration time	E.2.8	2.60	R	1.73	1	1.50	∞
RF ambient conditions–noise	E.6.1	3.00	R	1.73	1	1.73	∞
RF ambient conditions–reflections	E.6.1	3.00	R	1.73	1	1.73	∞
Probe positioner mechanical tolerance	E.6.2	0.40	R	1.73	1	0.23	∞
Probe positioning with respect to phantom shell	E.6.3	2.90	R	1.73	1	1.67	∞
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	E.5	2.00	R	1.73	1	1.15	∞
Test Sample Related							
Test sample positioning	E.4.2	4.71	N	1	1	4.71	9
Device holder uncertainty	E.4.1	3.60	N	1	1	3.60	5
Output power variation—SAR drift measurement	6.6.2	5.00	R	1.73	1	2.89	∞
Phantom and Tissue Parameters							
Phantom uncertainty (shape and thickness tolerances)	E.3.1	6.10	R	1.73	1	3.52	∞
Liquid conductivity-measurement uncertainty	E.3.3	1.53	N	1	0.64	0.98	5
Liquid permittivity-measurement uncertainty	E.3.3	3.07	N	1	0.6	1.84	5
Liquid conductivity-deviation from target values	E.3.2	5.00	R	1.73	0.64	1.85	∞
Liquid permittivity-deviation from target values	E.3.2	5.00	R	1.73	0.6	1.73	∞
Combined standard uncertainty				RSS		11.00	165
Expanded uncertainty (95% CONFIDENCE INTERVAL)				K=2		22.00	

Uncertainty of SAR equipments for measurement 3 GHz to 6 GHz(Head)

SAR Measurement Uncertainty

A	*b*	*c*	D	*e = f(d,k)*	*g*	*i = c x g / e*	*k*
Source of Uncertainty	**Description** IEEE P1528 HEAD (3 ~ 6 GHz)	**Tolerance/ Uncertainty value** ± %	**Probability Distribution**	**Div.**	**Ci** (1 g)	**Standard uncertainty** ± %, (1 g)	**Vi or Veff**
Measurement System							
Probe calibration(k=1)	E.2.1	6.30	N	1	1	6.30	∞
Axial isotropy	E.2.2	0.50	R	1.73	0.71	0.20	∞
Hemispherical isotropy	E.2.2	2.60	R	1.73	0.71	1.06	∞
Linearity	E.2.4	0.60	R	1.73	1	0.35	∞
Boundary effect	E.2.3	2.00	R	1.73	1	1.15	∞
System detection limits	E.2.5	1.00	R	1.73	1	0.58	∞
Readout electronics	E.2.6	0.30	N	1	1	0.30	∞
Response time	E.2.7	0.80	R	1.73	1	0.46	∞
Integration time	E.2.8	2.60	R	1.73	1	1.50	∞
RF ambient conditions–noise	E.6.1	3.00	R	1.73	1	1.73	∞
RF ambient conditions–reflections	E.6.1	3.00	R	1.73	1	1.73	∞
Probe positioner mechanical tolerance	E.6.2	0.80	R	1.73	1	0.46	∞
Probe positioning with respect to phantom shell	E.6.3	6.70	R	1.73	1	3.87	∞
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	E.5	4.00	R	1.73	1	2.31	∞
Test Sample Related							
Test sample positioning	E.4.2	4.63	N	1	1	4.63	9
Device holder uncertainty	E.4.1	3.60	N	1	1	3.60	5
Output power variation—SAR drift measurement	6.6.2	5.00	R	1.73	1	2.89	∞
Phantom and Tissue Parameters							
Phantom uncertainty (shape and thickness tolerances)	E.3.1	6.60	R	1.73	1	3.81	∞
Liquid conductivity-measurement uncertainty	E.3.3	1.50	N	1	0.64	0.96	5
Liquid permittivity-measurement uncertainty	E.3.3	2.23	N	1	0.6	1.34	5
Liquid conductivity-deviation from target values	E.3.2	5.00	R	1.73	0.64	1.85	∞
Liquid permittivity-deviation from target values	E.3.2	5.00	R	1.73	0.6	1.73	∞
Combined standard uncertainty				RSS		11.75	225
Expanded uncertainty (95% CONFIDENCE INTERVAL)				K=2		23.50	

Uncertainty of SAR equipments for measurement 300 MHz to 3 GHz (Body)

SAR Measurement Uncertainty

A	*b*	*c*	D	*e = f(d,k)*	*g*	*i = c x g / e*	*k*
Source of Uncertainty	**Description** IEEE P1528 BODY (0.3 ~ 3 GHz)	**Tolerance/ Uncertainty value** ± %	**Probability Distribution**	**Div.**	**Ci** (1 g)	**Standard uncertainty** ± %, (1 g)	**Vi or Veff**
Measurement System							
Probe calibration(k=1)	E.2.1	6.30	N	1	1	6.30	∞
Axial isotropy	E.2.2	0.50	R	1.73	0.71	0.20	∞
Hemispherical isotropy	E.2.2	2.60	R	1.73	0.71	1.06	∞
Linearity	E.2.4	0.60	R	1.73	1	0.35	∞
Boundary effect	E.2.3	1.00	R	1.73	1	0.58	∞
System detection limits	E.2.5	1.00	R	1.73	1	0.58	∞
Readout electronics	E.2.6	0.30	N	1	1	0.30	∞
Response time	E.2.7	0.80	R	1.73	1	0.46	∞
Integration time	E.2.8	2.60	R	1.73	1	1.50	∞
RF ambient conditions–noise	E.6.1	3.00	R	1.73	1	1.73	∞
RF ambient conditions–reflections	E.6.1	3.00	R	1.73	1	1.73	∞
Probe positioner mechanical tolerance	E.6.2	0.40	R	1.73	1	0.23	∞
Probe positioning with respect to phantom shell	E.6.3	2.90	R	1.73	1	1.67	∞
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	E.5	2.00	R	1.73	1	1.15	∞
Test Sample Related							
Test sample positioning	E.4.2	4.71	N	1	1	4.71	9
Device holder uncertainty	E.4.1	3.60	N	1	1	3.60	5
Output power variation—SAR drift measurement	6.6.2	5.00	R	1.73	1	2.89	∞
Phantom and Tissue Parameters							
Phantom uncertainty (shape and thickness tolerances)	E.3.1	7.50	R	1.73	1	4.33	∞
Liquid conductivity-measurement uncertainty	E.3.3	1.53	N	1	0.64	0.98	5
Liquid permittivity-measurement uncertainty	E.3.3	3.07	N	1	0.6	1.84	5
Liquid conductivity-deviation from target values	E.3.2	5.00	R	1.73	0.64	1.85	∞
Liquid permittivity-deviation from target values	E.3.2	5.00	R	1.73	0.6	1.73	∞
Combined standard uncertainty				RSS		11.29	183
Expanded uncertainty (95% CONFIDENCE INTERVAL)				K=2		22.57	

Uncertainty of SAR equipments for measurement 3 GHz to 6 GHz (Body)

SAR Measurement Uncertainty

A	*b*	*c*	D	*e = f(d,k)*	*g*	*i = c x g / e*	*k*
Source of Uncertainty	**Description** IEEE P1528 BODY (3 ~ 6 GHz)	**Tolerance/ Uncertainty value** ± %	**Probability Distribution**	**Div.**	**Ci** (1 g)	**Standard uncertainty** ± %, (1 g)	**Vi or Veff**
Measurement System							
Probe calibration(k=1)	E.2.1	6.30	N	1	1	6.30	∞
Axial isotropy	E.2.2	0.50	R	1.73	0.71	0.20	∞
Hemispherical isotropy	E.2.2	2.60	R	1.73	0.71	1.06	∞
Linearity	E.2.4	0.60	R	1.73	1	0.35	∞
Boundary effect	E.2.3	2.00	R	1.73	1	1.15	∞
System detection limits	E.2.5	1.00	R	1.73	1	0.58	∞
Readout electronics	E.2.6	0.30	N	1	1	0.30	∞
Response time	E.2.7	0.80	R	1.73	1	0.46	∞
Integration time	E.2.8	2.60	R	1.73	1	1.50	∞
RF ambient conditions–noise	E.6.1	3.00	R	1.73	1	1.73	∞
RF ambient conditions–reflections	E.6.1	3.00	R	1.73	1	1.73	∞
Probe positioner mechanical tolerance	E.6.2	0.80	R	1.73	1	0.46	∞
Probe positioning with respect to phantom shell	E.6.3	6.70	R	1.73	1	3.87	∞
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	E.5	4.00	R	1.73	1	2.31	∞
Test Sample Related							
Test sample positioning	E.4.2	4.63	N	1	1	4.63	9
Device holder uncertainty	E.4.1	3.60	N	1	1	3.60	5
Output power variation—SAR drift measurement	6.6.2	5.00	R	1.73	1	2.89	∞
Phantom and Tissue Parameters							
Phantom uncertainty (shape and thickness tolerances)	E.3.1	7.90	R	1.73	1	4.56	∞
Liquid conductivity-measurement uncertainty	E.3.3	1.50	N	1	0.64	0.96	5
Liquid permittivity-measurement uncertainty	E.3.3	2.23	N	1	0.6	1.34	5
Liquid conductivity-deviation from target values	E.3.2	5.00	R	1.73	0.64	1.85	∞
Liquid permittivity-deviation from target values	E.3.2	5.00	R	1.73	0.6	1.73	∞
Combined standard uncertainty				RSS		12.02	246
Expanded uncertainty (95% CONFIDENCE INTERVAL)				K=2		24.03	

Uncertainty of SAR equipments for measurement 300 MHz to 3 GHz

SAR Measurement Uncertainty

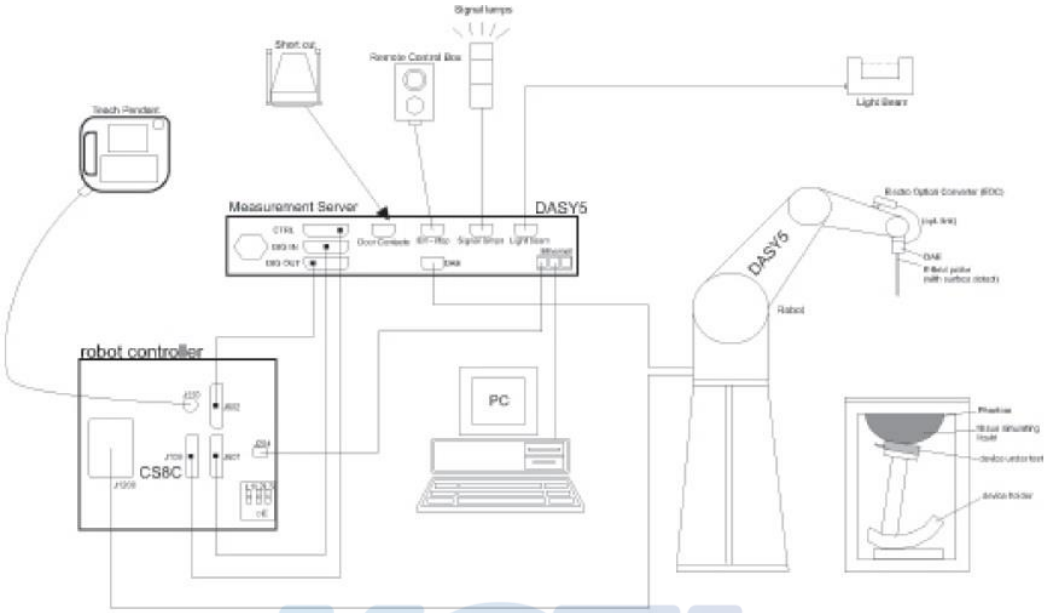
A	*b*	*c*	D	*e = f(d,k)*	*g*	*i = c x g / e*	*k*
Source of Uncertainty	**Description** 62209-2	**Tolerance/ Uncertainty value**	**Probability Distribution**	**Div.**	**Ci**	**Standard uncertainty**	**Vi or Veff**
	(0.3 ~ 3	± %			(10 g)	± %, (10 g)	
Measurement System							
Probe calibration	7.2.2.1	6.30	N	1	1	6.30	∞
Isotropy	7.2.2.2	1.87	R	1.73	1	1.08	∞
Linearity	7.2.1.3	0.60	R	1.73	1	0.35	∞
Probe modulation response	7.2.2.4	2.40	R	1.73	1	1.39	∞
Detection limits	7.2.2.6	1.00	R	1.73	1	0.58	∞
Boundary effect	7.2.2.6	1.00	R	1.73	1	0.58	∞
Readout electronics	7.2.2.7	0.30	N	1	1	0.30	∞
Response time	7.2.2.8	0.80	R	1.73	1	0.46	∞
Integration time	7.2.2.9	2.60	R	1.73	1	1.50	∞
RF ambient conditions–noise	7.2.4.5	3.00	R	1.73	1	1.73	∞
RF ambient conditions–reflections	7.2.4.5	3.00	R	1.73	1	1.73	∞
Probe positioner mech. restrictions	7.2.3.1	0.40	R	1.73	1	0.23	∞
Probe positioning with respect to phantom shell	7.2.3.3	2.90	R	1.73	1	1.67	∞
Post-processing	7.2.5	2.00	R	1.73	1	1.15	∞
Test Sample Related							
Device holder uncertainty	7.2.3.4.2	3.60	N	1	1	3.60	5
Test sample positioning	7.2.3.4.3	4.11	N	1	1	4.11	9
Power scaling	L.3	0.00	R	1.73	1	0.00	∞
Drift of output power (measured SAR drift)	7.2.2.10	5.00	R	1.73	1	2.89	∞
Phantom and Setup							
Phantom uncertainty (shape and thickness tolerances)	7.2.3.2	7.50	R	1.73	1	4.33	∞
Algorithm for correcting SAR for deviations in permittivity and conductivity	7.2.4.3	1.90	N	1	0.84	1.60	∞
Liquid conductivity (meas.)	7.2.4.3	1.53	N	1	0.71	1.09	5
Liquid permittivity (meas.)	7.2.4.3	3.07	N	1	0.26	0.80	5
Liquid conductivity–temperature uncertainty	7.2.4.4	3.36	R	1.73	0.71	1.38	∞
Liquid permittivity–temperature uncertainty	7.2.4.4	0.40	R	1.73	0.26	0.06	∞
Combined standard uncertainty	7.3.1			RSS		10.93	218
Expanded uncertainty	7.3.2			K=2		21.86	
(95% CONFIDENCE INTERVAL)							

Uncertainty of SAR equipments for measurement 3 GHz to 6 GHz

SAR Measurement Uncertainty

A	*b*	*c*	D	*e = f(d,k)*	*g*	*i = c x g / e*	*k*
Source of Uncertainty	**Description** 62209-2	**Tolerance/ Uncertainty value**	**Probability Distribution**	**Div.**	**Ci**	**Standard uncertainty**	**Vi or Veff**
	(3 ~ 6 GHz)	± %			(10 g)	± %, (10 g)	
Measurement System							
Probe calibration	7.2.2.1	6.30	N	1	1	6.30	∞
Isotropy	7.2.2.2	1.87	R	1.73	1	1.08	∞
Linearity	7.2.1.3	0.60	R	1.73	1	0.35	∞
Probe modulation response	7.2.2.4	2.40	R	1.73	1	1.39	∞
Detection limits	7.2.2.5	1.00	R	1.73	1	0.58	∞
Boundary effect	7.2.2.6	2.00	R	1.73	1	1.15	∞
Readout electronics	7.2.2.7	0.30	N	1	1	0.30	∞
Response time	7.2.2.8	0.80	R	1.73	1	0.46	∞
Integration time	7.2.2.9	2.60	R	1.73	1	1.50	∞
RF ambient conditions–noise	7.2.4.5	3.00	R	1.73	1	1.73	∞
RF ambient conditions–reflections	7.2.4.5	3.00	R	1.73	1	1.73	∞
Probe positioner mech. restrictions	7.2.3.1	0.80	R	1.73	1	0.46	∞
Probe positioning with respect to phantom shell	7.2.3.3	6.70	R	1.73	1	3.87	∞
Post-processing	7.2.5	4.00	R	1.73	1	2.31	∞
Test Sample Related							
Device holder uncertainty	7.2.3.4.2	3.60	N	1	1	3.60	5
Test sample positioning	7.2.3.4.3	5.03	N	1	1	5.03	9
Power scaling	L.3	0.00	R	1.73	1	0.00	∞
Drift of output power (measured SAR drift)	7.2.2.10	5.00	R	1.73	1	2.89	∞
Phantom and Setup							
Phantom uncertainty (shape and thickness tolerances)	7.2.3.2	7.90	R	1.73	1	4.56	∞
Algorithm for correcting SAR for deviations in permittivity and conductivity	7.2.4.3	1.90	N	1	0.84	1.60	∞
Liquid conductivity (meas.)	7.2.4.3	1.50	N	1	0.71	1.07	5
Liquid permittivity (meas.)	7.2.4.3	2.23	N	1	0.26	0.58	5
Liquid conductivity–temperature uncertainty	7.2.4.4	3.36	R	1.73	0.71	1.38	∞
Liquid permittivity–temperature uncertainty	7.2.4.4	0.40	R	1.73	0.26	0.06	∞
Combined standard uncertainty	7.3.1			RSS		12.12	206
Expanded uncertainty	7.3.2			K=2		24.24	
(95% CONFIDENCE INTERVAL)							

9. The SAR Measurement System

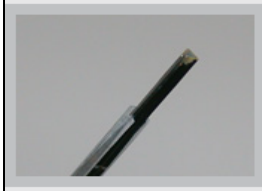


<SAR System Configuration>

- A standard high precision 6-axis robot 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.
- 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 or Win7 and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

9.1 Isotropic E-field Probe

ES3DV3 **Isotropic E-Field Probe for Dosimetric Measurements**	
	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	10 MHz to 4 GHz; Linearity: ± 0.2 dB (30 MHz to 4 GHz)
Directivity	± 0.2 dB in TSL (rotation around probe axis) ± 0.3 dB in TSL (rotation normal to probe axis)
Dynamic Range	5 µW/g to > 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 3.9 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.0 mm
Application	General dosimetry up to 4 GHz Dosimetry in strong gradient fields Compliance tests of mobile phones
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

EX3DV4 **Smallest Isotropic E-Field Probe for Dosimetric Measurements** **(Preliminary Specifications)**	
	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in TSL (rotation around probe axis) ± 0.5 dB in TSL (rotation normal to probe axis)
Dynamic Range	10 µW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better 30%.
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

9.2 Phantom

Twin SAM	
	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot. Twin SAM V5.0 has the same shell geometry and is manufactured from the same material as Twin SAM V4.0, but has reinforced top structure.
Material	Vinylester, glass fiber reinforced (VE-GF)
Liquid Compatibility	Compatible with all SPEAG tissue simulating liquids (incl. DGBE type)
Shell Thickness	2 ± 0.2 mm (6 ± 0.2 mm at ear point)
Dimensions **(incl. Wooden Support)**	Length: 1000 mm Width: 500 mm Height: adjustable feet
Filling Volume	approx. 25 liters
Wooden Support	SPEAG standard phantom table
Accessories	Mounting Device and Adaptors

ELI	
	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. ELI V5.0 has the same shell geometry and is manufactured from the same material as ELI4, but has reinforced top structure. ELI V6.0, released in August 2014, has the same shell geometry as ELI4 but offers increased longterm stability.
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: 600 mm Minor axis: 400 mm
Filling Volume	approx. 30 liters
Wooden Support	SPEAG standard phantom table
Accessories	Mounting Device and Adaptors

9.3 Device Holder for Transmitters

Mounting Devices and Adaptors

Mounting Device for Hand-Held Transmitters

MD4HHTV5 - Mounting Device for Hand-Held Transmitters

In combination with the Twin SAM V5.0/V5.0c or ELI Phantoms, the Mounting Device for Hand-Held Transmitters enables rotation of the mounted transmitter device to specified spherical coordinates. At the heads, the rotation axis is at the ear opening. Transmitter devices can be easily and accurately positioned according to IEC 62209-1, IEEE 1528, FCC, or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat).

Material: Polyoxymethylene (POM)

Mounting Device for Laptops

MD4LAPV5 - Mounting Device for Laptops and other Body-Worn Transmitters

In combination with the Twin SAM V5.0/V5.0c or ELI Phantoms, the Mounting Device (Body-Worn) enables testing of ransmitter devices according to IEC 62209-2 specifications. The device holder can be locked for positioning at flat phantom section.

Material: Polyoxymethylene (POM), PET-G, Foam

10. System Verification

10.1 Tissue Verification

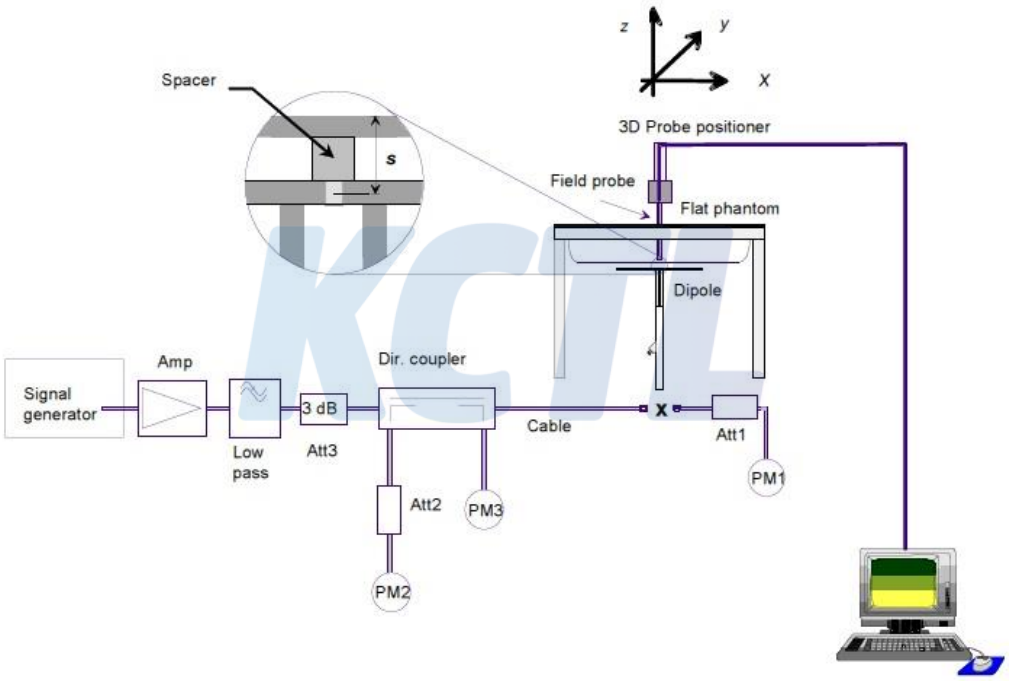
The dielectric properties for this Tissue Simulant Liquids were measured by using the SPEAG Model DAK3.5 Dielectric Probe in conjunction with Agilent E5071B Network Analyzer (300 kHz – 8 500 MHz). The Conductivity (σ) and Permittivity (ρ) are listed in Table 1. For the SAR measurement given in this report.

Freq. (MHz)	Tissue Type	Limit/Measured	Permittivity (ρ)	Conductivity (σ)	Temp (℃)
2 450	HSL	Recommended Limit	39.20 ± 5 % (37.24 ~ 41.16)	1.80 ± 5 % (1.71 ~ 1.89)	22 ± 2
		Measured, 2017-07-26	37.87	1.84	21.66
2 450	MSL	Recommended Limit	52.70 ± 5 % (50.07 ~ 55.34)	1.95 ± 5 % (1.85 ~ 2.05)	22 ± 2
		Measured, 2017-07-26	53.20	1.98	21.76
5 200	HSL	Recommended Limit	36.00 ± 5 % (34.20 ~ 37.80)	4.66 ± 5 % (4.43 ~ 4.89)	22 ± 2
		Measured, 2017-07-24	35.13	4.70	21.66
5 200	MSL	Recommended Limit	49.01 ± 5 % (46.56 ~ 51.46)	5.30 ± 5 % (5.04 ~ 5.57)	22 ± 2
		Measured, 2017-07-24	49.25	5.36	21.72
5 800	HSL	Recommended Limit	35.30 ± 5 % (33.54 ~ 37.07)	5.27 ± 5 % (5.01 ~ 5.53)	22 ± 2
		Measured, 2017-07-25	34.21	5.41	21.72
5 800	MSL	Recommended Limit	48.20 ± 5 % (45.79 ~ 50.61)	6.00 ± 5 % (5.70 ~ 6.30)	22 ± 2
		Measured, 2017-07-25	49.87	6.17	21.42

<Table 1. Measurement result of Tissue electric parameters>

10.2 Test System Verification

The microwave circuit arrangement for system verification is sketched below picture. The daily system accuracy verification occurs within the flat section of the phantom.
A SAR measurement was performed to see if the measured SAR was within ± 10% from the target SAR values. The tests were conducted on the samedays as the measurement of the EUT. The obtained results from the system accuracy verification are displayed in the Table 2. During the tests, the ambient temperature of the laboratory was in the range (22 ± 2) ℃, the relative humidity was in the range (50 ± 20) % and the liquid depth above the ear/grid reference points was above 15 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.



Validation Kit	Dipole Ant. S/N	Frequency (MHz)	Tissue Type	Limit/Measurement (Normalized to 1 W)	
					1 g
D2450V2	895	2 450	HSL	Recommended Limit (Normalized)	52.00 ± 10 % (46.80 ~ 57.20)
				Measured, 2017-07-26	55.20
D2450V2	895	2 450	MSL	Recommended Limit (Normalized)	50.80 ± 10 % (45.72 ~ 55.88)
				Measured, 2017-07-26	51.20
D5GHzV2	1134	5 200	HSL	Recommended Limit (Normalized)	79.70 ± 10 % (71.73 ~ 87.67)
				Measured, 2017-07-24	84.40
D5GHzV2	1134	5 200	MSL	Recommended Limit (Normalized)	73.00 ± 10 % (65.70 ~ 80.30)
				Measured, 2017-07-24	74.30
D5GHzV2	1134	5 800	HSL	Recommended Limit (Normalized)	80.40± 10 % (72.36 ~ 88.44)
				Measured, 2017-07-25	84.90
D5GHzV2	1134	5 800	MSL	Recommended Limit (Normalized)	77.20 ± 10 % (69.48 ~ 84.92)
				Measured, 2017-07-25	78.00

<Table 2. Test System Verification Result>

11. Operation Configurations

Measurements were performed at the lowest, middle and highest channels of the operating band. The EUT was set to maximum power level during all tests and at the beginning of each test the battery was fully charged.

12. SAR Measurement Procedures

Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift ofthe device under test in the batch process. The Minimum distance of probe sensors to surfacedetermines the closest measurement point to phantom surface. The minimum distance of probe sensorsto surface is 2 mm. This distance cannot be smaller than the Distance of sensor calibration points toprobe tip as defined in the probe properties.

Step 2: Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doinga fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASYsoftware can find the maximum locations even in relatively coarse grids. When an Area Scan hasmeasured all reachable points, it computes the field maximal found in the scanned area, within a rangeof the global maximum. The range (in dB) is specified in the standards for compliance testing. Forexample, a 2 dB range is required in IEEE Standard 1528 and IEC 62209 standards, whereby 3 dB is arequirement when compliance is assessed in accordance with the ARIB standard (Japan). If only oneZoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. Forcases where multiple maximums are detected, the number of Zoom Scans has to be increasedaccordingly.

Area Scan Parameters extracted from KDB 865664 D01 SAR Measument 100 MHz to 6 GHz v01r04.

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

Step 3: Zoom Scan
Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing1 g and 10 g of simulated tissue. The Zoom Scan measures 5x5x7 points within a cube whose base faces are centered on the maxima found in a preceding area scanjob within the same procedure. When the measurement is done, the Zoom Scan evaluates theaveraged SAR for 1 g and 10 g and displays these values next to the job's label.

Zoom Scan Parameters extracted from KDB 865664 D01 SAR Measument 100 MHz to 6 GHz v01r04.

			≤ 3 GHz	> 3 GHz
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

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

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

Step 4: Power drift measurement
The Power Drift Measurement measures the field at the same location as the most recent powerreference measurement within the same procedure, and with the same settings. The Power DriftMeasurement gives the field difference in dB from the reading conducted within the last PowerReference Measurement. This allows a user to monitor the power drift of the device under test within abatch process. The measurement procedure is the same as Step 1.

Step 5: Z-Scan
The Z Scan measures points along a vertical straight line. The line runs along the Z-axis of a onedimensionalgrid. In order to get a reasonable extrapolation, the extrapolated distance should not belarger than the step size in Z-direction.

* Z Scan Report on Liquid Measure the height Annex C Liquid Depth photo to replace

13. Test Equipment Information

Test Platform	SPEAG DASY5 System			
Version	DASY5 : Version 5.0, Build 125 / SEMCAD : Version 13.4, Build 125			
Location	KCTL Inc.			
Manufacture	SPEAG			
Hardware Reference				
Equipment	Model	Serial Number	Date of Calibration	Due date of next Calibration
Shield Room	Shield Room	8F - #1	N/A	N/A
DASY5 Robot	TX90XL speag	F07/554JA1/A/01	N/A	N/A
DASY5 Controller	CS8C speag TX90XL	F07/554JA1/C/01	N/A	N/A
Phantom	2mm Oval Phantom ELI 5	1178	N/A	N/A
Phantom	2mm Oval Phantom ELI5	1173	N/A	N/A
Mounting Device	Mounting Device	None	N/A	N/A
DAE	DAE4	666	2017-05-23	2018-05-23
Probe	EX3DV4	3928	2017-01-31	2018-01-31
Signal Generator	E4438C	MY42080486	2017-01-06	2018-01-06
Dual Power Meter	E4419B	GB43312301	2017-05-16	2018-05-16
Power Sensor	8481H	3318A19377	2017-05-16	2018-05-16
Power Sensor	8481H	3318A19379	2017-05-16	2018-05-16
Attenuator	8491B 3dB	17387	2017-05-16	2018-05-16
Attenuator	8491B 10dB	29425	2017-05-16	2018-05-16
Attenuator	8491B-6dB	MY39270294	2017-05-16	2018-05-16
Attenuator	8491B-6dB	MY39270295	2017-05-16	2018-05-16
Power Amplifier	2055 BBS3Q7E9I	1005D/C0521	2017-05-16	2018-05-16
Power Amplifier	5190FE	1012	2017-05-16	2018-05-16
Dual Directional Coupler	772D	2839A00719	2017-05-16	2018-05-16
Low Pass Filter	LA-30N	36543	2017-05-16	2018-05-16
Low Pass Filter	LA-60N	40058	2017-05-16	2018-05-16
Dipole Validation Kits	D2450V2	895	2016-07-25	2018-07-25
Dipole Validation Kits	D5GHzV2	1134	2017-05-26	2019-05-26
Network Analyzer	E5071B	MY42403524	2017-01-06	2018-01-06
Dielectric Assessment kit	DAK-3.5	1078	2016-08-25	2017-08-25
Humidity/Temp.Data Recorder	MHB-382SD	23107	2017-01-09	2018-01-09
Usb Rf Power Sensor	RPR3006W	13I00030SNO73	2016-08-29	2017-08-29

14. RF Average Conducted Output Power

14.1 Average Conducted Output Power

14.1.1 WLAN 2.4 GHz

Ant.1 (SISO)

Mode	Conducted Powers (dBm)					
	Average power			Peak power		
	Low	Mid.	High	Low	Mid.	High
802.11g_6 Mbps	16.4	16.4	12.9	24.6	24.6	22.5
802.11n(HT-20)_MCS0	15.7	16.0	11.8	24.4	24.7	22.1
802.11n(HT-40)_MCS0	12.7	12.9	9.9	21.6	21.8	19.1

Ant.2 (SISO)

Mode	Conducted Powers (dBm)					
	Average power			Peak power		
	Low	Mid.	High	Low	Mid.	High
802.11g_6 Mbps	15.3	15.1	12.8	24.1	24.1	22.5
802.11n(HT-20)_MCS0	15.1	15.3	11.9	24.4	24.5	22.4
802.11n(HT-40)_MCS0	12.0	11.7	8.7	21.4	21.0	18.3

Ant.1 + Ant.2 (MIMO)

Mode	Conducted Powers (dBm)					
	Average power			Peak power		
	Low	Mid.	High	Low	Mid.	High
802.11g_6 Mbps	18.9	18.8	15.9	27.4	27.4	25.5
802.11n(HT-20)_MCS8	18.4	18.7	14.9	27.4	27.6	25.2
802.11n(HT-40)_MCS8	15.4	15.4	12.4	24.5	24.4	21.8

14.1.2 WLAN 5 GHz

Ant.1 (SISO)

Mode	Conducted Powers (dBm)					
	5.2G			5.8G		
	Low	Mid.	High	Low	Mid.	High
802.11a_6 Mbps	15.2	15.7	16.3	15.0	14.1	13.8
802.11n(HT-20)_MCS0	14.3	15.7	16.2	15.1	14.1	13.7
802.11n(HT-40)_MCS0	8.7	-	16.3	14.6	-	13.8

Ant.2 (SISO)

Mode	Conducted Powers (dBm)					
	5.2G			5.8G		
	Low	Mid.	High	Low	Mid.	High
802.11a_6 Mbps	16.3	14.9	16.5	15.6	14.6	13.8
802.11n(HT-20)_MCS0	13.2	15.0	16.5	15.6	14.3	14.5
802.11n(HT-40)_MCS0	8.1	-	16.2	15.2	-	14.4

Ant.1 + Ant.2 (MIMO)

Mode	Conducted Powers (dBm)					
	5.2G			5.8G		
	Low	Mid.	High	Low	Mid.	High
802.11a_6 Mbps	18.9	18.5	19.6	18.5	17.5	17.0
802.11n(HT-20)_MCS8	17.1	18.7	19.7	18.6	17.5	17.4
802.11n(HT-40)_MCS8	11.9	-	19.7	18.4	-	17.5

14.2 Max. tune up power

14.2.1 WLAN 2.4 GHz (SISO)

Mode	Frequency (MHz)	Target Power	Tolerance	Max. Allowed Power
802.11g	Low	16.0 dBm	± 1 dB	17.0 dBm
	Mid.	16.0 dBm	± 1 dB	17.0 dBm
	High	13.0 dBm	± 1 dB	14.0 dBm
802.11n(HT-20)	Low	15.5 dBm	± 1 dB	16.5 dBm
	Mid.	15.5 dBm	± 1 dB	16.5 dBm
	High	12.0 dBm	± 1 dB	13.0 dBm
802.11n(HT-40)	Low	12.5 dBm	± 1 dB	13.5 dBm
	Mid.	12.5 dBm	± 1 dB	13.5 dBm
	High	9.0 dBm	± 1 dB	10.0 dBm

14.2.2 WLAN 2.4 GHz (MIMO)

Mode	Frequency (MHz)	Target Power	Tolerance	Max. Allowed Power
802.11g_ Ant.1 + 2	Low	19.0 dBm	± 1 dB	20.0 dBm
	Mid.	19.0 dBm	± 1 dB	20.0 dBm
	High	16.0 dBm	± 1 dB	17.0 dBm
802.11n(HT-20)_ Ant.1 + 2	Low	18.0 dBm	± 1 dB	19.0 dBm
	Mid.	18.0 dBm	± 1 dB	19.0 dBm
	High	15.0 dBm	± 1 dB	16.0 dBm
802.11n(HT-40)_ Ant.1 + 2	Low	15.0 dBm	± 1 dB	16.0 dBm
	Mid.	15.0 dBm	± 1 dB	16.0 dBm
	High	12.0 dBm	± 1 dB	13.0 dBm

14.2.3 WLAN 5.2 GHz (SISO)

Mode	Frequency (MHz)	Target Power	Tolerance	Max. Allowed Power
802.11a	Low	15.5 dBm	± 1 dB	16.5 dBm
	Mid.	15.5 dBm	± 1 dB	16.5 dBm
	High	16.0 dBm	± 1 dB	17.0 dBm
802.11n(HT-20)	Low	13.5 dBm	± 1 dB	14.5 dBm
	Mid.	15.0 dBm	± 1 dB	16.0 dBm
	High	16.0 dBm	± 1 dB	17.0 dBm
802.11n(HT-40)	Low	8.0 dBm	± 1 dB	9.0 dBm
	Mid.	-	-	-
	High	16.0 dBm	± 1 dB	17.0 dBm

14.2.4 WLAN 5.8 GHz (SISO)

Mode	Frequency (MHz)	Target Power	Tolerance	Max. Allowed Power
802.11a	Low	15.0 dBm	± 1 dB	16.0 dBm
	Mid.	14.0 dBm	± 1 dB	15.0 dBm
	High	14.0 dBm	± 1 dB	15.0 dBm
802.11n(HT-20)	Low	15.0 dBm	± 1 dB	16.0 dBm
	Mid.	14.0 dBm	± 1 dB	15.0 dBm
	High	14.0 dBm	± 1 dB	15.0 dBm
802.11n(HT-40)	Low	15.0 dBm	± 1 dB	16.0 dBm
	Mid.	-	-	-
	High	14.0 dBm	± 1 dB	15.0 dBm

14.2.5 WLAN 5.2 GHz (MIMO)

Mode	Frequency (MHz)	Target Power	Tolerance	Max. Allowed Power
802.11a_ Ant.1 + 2	Low	19.0 dBm	± 1 dB	20.0 dBm
	Mid.	19.0 dBm	± 1 dB	20.0 dBm
	High	19.0 dBm	± 1 dB	20.0 dBm
802.11n(HT-20)_ Ant.1 + 2	Low	17.0 dBm	± 1 dB	18.0 dBm
	Mid.	19.0 dBm	± 1 dB	20.0 dBm
	High	19.0 dBm	± 1 dB	20.0 dBm
802.11n(HT-40)_ Ant.1 + 2	Low	12.0 dBm	± 1 dB	13.0 dBm
	Mid.	-	-	-
	High	19.0 dBm	± 1 dB	20.0 dBm

14.2.6 WLAN 5.8 GHz (MIMO)

Mode	Frequency (MHz)	Target Power	Tolerance	Max. Allowed Power
802.11a_ Ant.1 + 2	Low	18.0 dBm	± 1 dB	19.0 dBm
	Mid.	18.0 dBm	± 1 dB	19.0 dBm
	High	17.0 dBm	± 1 dB	18.0 dBm
802.11n(HT-20)_ Ant.1 + 2	Low	18.0 dBm	± 1 dB	19.0 dBm
	Mid.	18.0 dBm	± 1 dB	19.0 dBm
	High	17.0 dBm	± 1 dB	18.0 dBm
802.11n(HT-40)_ Ant.1 + 2	Low	18.0 dBm	± 1 dB	19.0 dBm
	Mid.	-	-	-
	High	17.0 dBm	± 1 dB	18.0 dBm

15. SAR Test Results

15.1 WLAN 2.4 GHz Head SAR Test Results

Mode	Frequency (MHz)	Average Power (dBm)	Max. tune up power (dBm)	EUT Position	Distance (mm)	Measured 1 g SAR (W/kg)	Duty Cycle Compensate Factor	Scaling Factor	Scaled 1 g SAR (W/kg)	Ant.#
802.11n	2 437	16.0	16.5	Front	0	0.097	1.04	1.12	**0.113**	Ant.1
(HT-20)	2 437	15.3	16.5	Front	0	0.113	1.04	1.32	**0.155**	Ant.2

Mode	Frequency (MHz)	Average Power (dBm)	Max. tune up power (dBm)	EUT Position	Distance (mm)	Measured 1 g SAR (W/kg)	Duty Cycle Compensate Factor	Scaling Factor	Scaled 1 g SAR (W/kg)	Ant.#
802.11n	2 412	15.7	16.5	Front	0	0.057	1.04	1.20	0.071	Ant.1
(HT-20)	2 412	15.1	16.5	Front	0	0.071	1.04	1.38	0.102	Ant.2

Mode	Frequency (MHz)	Average Power (dBm)	Max. tune up power (dBm)	EUT Position	Distance (mm)	Measured 1 g SAR (W/kg)	Duty Cycle Compensate Factor	Scaling Factor	Scaled 1 g SAR (W/kg)	Ant.#
802.11n	2 462	11.8	13.0	Front	0	0.081	1.04	1.32	0.111	Ant.1
(HT-20)	2 462	11.9	13.0	Front	0	0.035	1.04	1.29	0.047	Ant.2

<Note>

* The front with touch configuration was only tested since only the front is touched to human body in normal operation condition of this device.
* SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v06.
* Simultaneous transmission SAR test exclusion considerations
  : Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneously transmitting antenna. When the sum of 1-g or 10-g SAR of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit, SAR test exclusion applies to that simultaneous transmission configuration. Per KDB Publication 447498 D01v06.
* The above numerical summed SAR results for all the worst-case simultaneous transmission conditions were below the SAR limit (1.6 W/kg per 1-g). Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit. And therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v06.

15.2 WLAN 2.4 GHz Body SAR Test Results

Mode	Frequency (MHz)	Average Power (dBm)	Max. tune up power (dBm)	EUT Position	Distance (mm)	Measured 1 g SAR (W/kg)	Duty Cycle Compensate Factor	Scaling Factor	Scaled 1 g SAR (W/kg)	Ant.#
802.11n (HT-20)	2 437	16.0	16.5	Front	0	0.122	1.04	1.12	**0.142**	Ant.1
	2 437	15.3	16.5	Front	0	0.125	1.04	1.32	**0.171**	Ant.2

Mode	Frequency (MHz)	Average Power (dBm)	Max. tune up power (dBm)	EUT Position	Distance (mm)	Measured 1 g SAR (W/kg)	Duty Cycle Compensate Factor	Scaling Factor	Scaled 1 g SAR (W/kg)	Ant.#
802.11n (HT-20)	2 412	15.7	16.5	Front	0	0.061	1.04	1.20	0.076	Ant.1
	2 412	15.1	16.5	Front	0	0.082	1.04	1.38	0.118	Ant.2

Mode	Frequency (MHz)	Average Power (dBm)	Max. tune up power (dBm)	EUT Position	Distance (mm)	Measured 1 g SAR (W/kg)	Duty Cycle Compensate Factor	Scaling Factor	Scaled 1 g SAR (W/kg)	Ant.#
802.11n (HT-20)	2 462	11.8	13.0	Front	0	0.083	1.04	1.32	0.114	Ant.1
	2 462	11.9	13.0	Front	0	0.032	1.04	1.29	0.043	Ant.2

<Note>

* The front with touch configuration was only tested since only the front is touched to human body in normal operation condition of this device.
* SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v06.
* Simultaneous transmission SAR test exclusion considerations
  : Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneously transmitting antenna. When the sum of 1-g or 10-g SAR of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit, SAR test exclusion applies to that simultaneous transmission configuration. Per KDB Publication 447498 D01v06.
* The above numerical summed SAR results for all the worst-case simultaneous transmission conditions were below the SAR limit (1.6 W/kg per 1-g). Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit. And therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v06.

15.3 WLAN 5.2 GHz Head SAR Test Results

Mode	Frequency (MHz)	Average Power (dBm)	Max. tune up power (dBm)	EUT Position	Distance (mm)	Measured 1 g SAR (W/kg)	Duty Cycle Compensate Factor	Scaling Factor	Scaled 1 g SAR (W/kg)	Ant.#
802.11a	5 200	15.7	16.5	Front	0	0.535	1.03	1.20	0.663	Ant.1
	5 200	14.9	16.5	Front	0	0.291	1.03	1.45	**0.433**	Ant.2

Mode	Frequency (MHz)	Average Power (dBm)	Max. tune up power (dBm)	EUT Position	Distance (mm)	Measured 1 g SAR (W/kg)	Duty Cycle Compensate Factor	Scaling Factor	Scaled 1 g SAR (W/kg)	Ant.#
802.11a	5 180	15.2	16.5	Front	0	0.534	1.03	1.35	**0.742**	Ant.1
	5 180	16.3	16.5	Front	0	0.340	1.03	1.05	0.367	Ant.2

Mode	Frequency (MHz)	Average Power (dBm)	Max. tune up power (dBm)	EUT Position	Distance (mm)	Measured 1 g SAR (W/kg)	Duty Cycle Compensate Factor	Scaling Factor	Scaled 1 g SAR (W/kg)	Ant.#
802.11a	5 240	16.3	17.0	Front	0	0.530	1.03	1.17	0.641	Ant.1
	5 240	16.5	17.0	Front	0	0.210	1.03	1.12	0.243	Ant.2

<Note>

* The front with touch configuration was only tested since only the front is touched to human body in normal operation condition of this device.
* SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v06.
* Simultaneous transmission SAR test exclusion considerations
  : Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneously transmitting antenna. When the sum of 1-g or 10-g SAR of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit, SAR test exclusion applies to that simultaneous transmission configuration. Per KDB Publication 447498 D01v06.
* The above numerical summed SAR results for all the worst-case simultaneous transmission conditions were below the SAR limit (1.6 W/kg per 1-g). Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit. And therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v06.

15.4 WLAN 5.2 GHz Body SAR Test Results

Mode	Frequency (MHz)	Average Power (dBm)	Max. tune up power (dBm)	EUT Position	Distance (mm)	Measured 1 g SAR (W/kg)	Duty Cycle Compensate Factor	Scaling Factor	Scaled 1 g SAR (W/kg)	Ant.#
802.11a	5 200	15.7	16.5	Front	0	0.451	1.03	1.20	0.558	Ant.1
	5 200	14.9	16.5	Front	0	0.330	1.03	1.45	**0.491**	Ant.2

Mode	Frequency (MHz)	Average Power (dBm)	Max. tune up power (dBm)	EUT Position	Distance (mm)	Measured 1 g SAR (W/kg)	Duty Cycle Compensate Factor	Scaling Factor	Scaled 1 g SAR (W/kg)	Ant.#
802.11a	5 180	15.2	16.5	Front	0	0.462	1.03	1.35	**0.642**	Ant.1
	5 180	16.3	16.5	Front	0	0.390	1.03	1.05	0.421	Ant.2

Mode	Frequency (MHz)	Average Power (dBm)	Max. tune up power (dBm)	EUT Position	Distance (mm)	Measured 1 g SAR (W/kg)	Duty Cycle Compensate Factor	Scaling Factor	Scaled 1 g SAR (W/kg)	Ant.#
802.11a	5 240	16.3	17.0	Front	0	0.400	1.03	1.17	0.484	Ant.1
	5 240	16.5	17.0	Front	0	0.223	1.03	1.12	0.258	Ant.2

<Note>

* The front with touch configuration was only tested since only the front is touched to human body in normal operation condition of this device.
* SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v06.
* Simultaneous transmission SAR test exclusion considerations
  : Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneously transmitting antenna. When the sum of 1-g or 10-g SAR of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit, SAR test exclusion applies to that simultaneous transmission configuration. Per KDB Publication 447498 D01v06.
* The above numerical summed SAR results for all the worst-case simultaneous transmission conditions were below the SAR limit (1.6 W/kg per 1-g). Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit. And therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v06.

15.5 WLAN 5.8 GHz Head SAR Test Results

Mode	Frequency (MHz)	Average Power (dBm)	Max. tune up power (dBm)	EUT Position	Distance (mm)	Measured 1 g SAR (W/kg)	Duty Cycle Compensate Factor	Scaling Factor	Scaled 1 g SAR (W/kg)	Ant.#
802.11n (HT-20)	5 785	14.1	15.0	Front	0	0.635	1.03	1.23	**0.805**	Ant.1
	5 785	14.3	15.0	Front	0	0.311	1.03	1.17	**0.376**	Ant.2

Mode	Frequency (MHz)	Average Power (dBm)	Max. tune up power (dBm)	EUT Position	Distance (mm)	Measured 1 g SAR (W/kg)	Duty Cycle Compensate Factor	Scaling Factor	Scaled 1 g SAR (W/kg)	Ant.#
802.11n (HT-20)	5 745	15.1	16.0	Front	0	0.513	1.03	1.23	0.650	Ant.1
	5 745	15.6	16.0	Front	0	0.162	1.03	1.10	0.183	Ant.2

Mode	Frequency (MHz)	Average Power (dBm)	Max. tune up power (dBm)	EUT Position	Distance (mm)	Measured 1 g SAR (W/kg)	Duty Cycle Compensate Factor	Scaling Factor	Scaled 1 g SAR (W/kg)	Ant.#
802.11n (HT-20)	5 825	13.7	15.0	Front	0	0.536	1.03	1.35	0.745	Ant.1
	5 825	14.5	15.0	Front	0	0.245	1.03	1.12	0.283	Ant.2

<Note>

* The front with touch configuration was only tested since only the front is touched to human body in normal operation condition of this device.
* SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v06.
* Simultaneous transmission SAR test exclusion considerations
  : Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneously transmitting antenna. When the sum of 1-g or 10-g SAR of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit, SAR test exclusion applies to that simultaneous transmission configuration. Per KDB Publication 447498 D01v06.
* The above numerical summed SAR results for all the worst-case simultaneous transmission conditions were below the SAR limit (1.6 W/kg per 1-g). Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit. And therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v06.

15.6 WLAN 5.8 GHz Body SAR Test Results

Mode	Frequency (MHz)	Average Power (dBm)	Max. tune up power (dBm)	EUT Position	Distance (mm)	Measured 1 g SAR (W/kg)	Duty Cycle Compensate Factor	Scaling Factor	Scaled 1 g SAR (W/kg)	Ant.#
802.11n (HT-20)	5 785	14.1	15.0	Front	0	0.581	1.03	1.23	**0.736**	Ant.1
	5 785	14.3	15.0	Front	0	0.232	1.03	1.17	**0.281**	Ant.2

Mode	Frequency (MHz)	Average Power (dBm)	Max. tune up power (dBm)	EUT Position	Distance (mm)	Measured 1 g SAR (W/kg)	Duty Cycle Compensate Factor	Scaling Factor	Scaled 1 g SAR (W/kg)	Ant.#
802.11n (HT-20)	5 745	15.1	16.0	Front	0	0.395	1.03	1.23	0.501	Ant.1
	5 745	15.6	16.0	Front	0	0.120	1.03	1.10	0.136	Ant.2

Mode	Frequency (MHz)	Average Power (dBm)	Max. tune up power (dBm)	EUT Position	Distance (mm)	Measured 1 g SAR (W/kg)	Duty Cycle Compensate Factor	Scaling Factor	Scaled 1 g SAR (W/kg)	Ant.#
802.11n (HT-20)	5 825	13.7	15.0	Front	0	0.361	1.03	1.35	0.502	Ant.1
	5 825	14.5	15.0	Front	0	0.174	1.03	1.12	0.201	Ant.2

<Note>

* The front with touch configuration was only tested since only the front is touched to human body in normal operation condition of this device.
* SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v06.
* Simultaneous transmission SAR test exclusion considerations
  : Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneously transmitting antenna. When the sum of 1-g or 10-g SAR of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit, SAR test exclusion applies to that simultaneous transmission configuration. Per KDB Publication 447498 D01v06.
* The above numerical summed SAR results for all the worst-case simultaneous transmission conditions were below the SAR limit (1.6 W/kg per 1-g). Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit. And therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v06.

16. Test System Verification Results

Head 2 450 MHz

Procedure Name: d=10 mm, Pin=250 mW, dist=2.0 mm (EX-Probe)

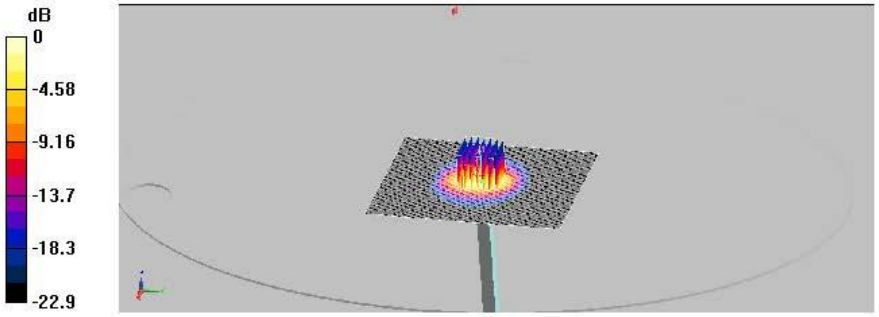
Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.84 mho/m; ε_r = 37.9; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928; ConvF(7.48, 7.48, 7.48);
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 2017-05-23
- Phantom: ELI v5.0_Left_20170321; Type: QDOVA002AA; Serial: 1173
- Measurement SW: DASY5, V5.0 Build 125;

d=10 mm, Pin=250 mW, dist=2.0 mm (EX-Probe)/Area Scan (101x131x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 21.8 mW/g

d=10 mm, Pin=250 mW, dist=2.0 mm (EX-Probe)/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 100.4 V/m; Power Drift = 0.199 dB
Peak SAR (extrapolated) = 29.1 W/kg
SAR(1 g) = 13.8 mW/g; SAR(10 g) = 6.32 mW/g
Maximum value of SAR (measured) = 21.1 mW/g



0 dB = 21.1mW/g

Body 2 450 MHz

Procedure Name: d=10 mm, Pin=250 mW, dist=2.0 mm (EX-Probe)

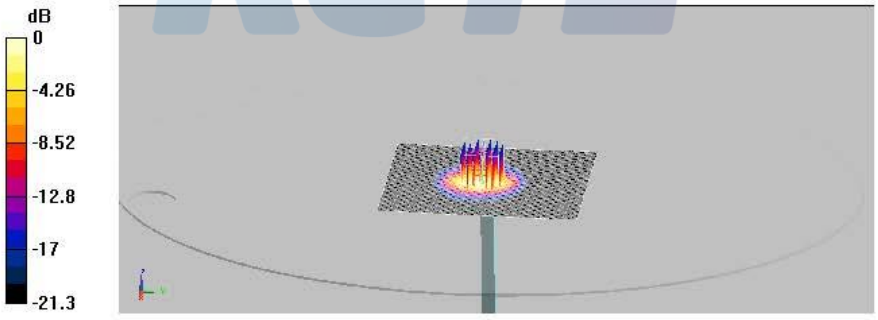
Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.98 mho/m; ε_r = 53.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928; ConvF(7.53, 7.53, 7.53);
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 2017-05-23
- Phantom: ELI v5.0_Right_20170321; Type: QDOVA002AA; Serial: 1220
- Measurement SW: DASY5, V5.0 Build 125;

d=10 mm, Pin=250 mW, dist=2.0 mm (EX-Probe)/Area Scan (101x131x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 19.3 mW/g

d=10 mm, Pin=250 mW, dist=2.0 mm (EX-Probe)/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.4 V/m; Power Drift = 0.024 dB
Peak SAR (extrapolated) = 25.8 W/kg
SAR(1 g) = 12.8 mW/g; SAR(10 g) = 6.06 mW/g
Maximum value of SAR (measured) = 19.3 mW/g



0 dB = 19.3mW/g

Head 5 200 MHz

Procedure Name: d=10 mm, Pin=100 mW, dist=2.0 mm (EX-Probe)

Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 4.7 mho/m; ε_r = 35.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928; ConvF(5.54, 5.54, 5.54);
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 2017-05-23
- Phantom: ELI v5.0_Left_20170321; Type: QDOVA002AA; Serial: 1173
- Measurement SW: DASY5, V5.0 Build 125;

d=10 mm, Pin=100 mW, dist=2.0 mm (EX-Probe)/Area Scan (81x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 17.5 mW/g

d=10 mm, Pin=100 mW, dist=2.0 mm (EX-Probe)/Zoom Scan (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 63.6 V/m; Power Drift = 0.078 dB
Peak SAR (extrapolated) = 37.1 W/kg
SAR(1 g) = 8.44 mW/g; SAR(10 g) = 2.45 mW/g
Maximum value of SAR (measured) = 17.7 mW/g

0 dB = 17.7mW/g

Body 5 200 MHz

Procedure Name: d=10 mm, Pin=100 mW, dist=2.0 mm (EX-Probe)

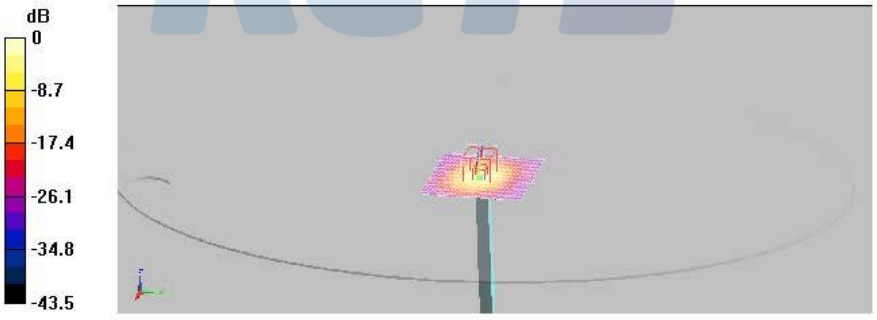
Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 5.36 mho/m; ε_r = 49.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928; ConvF(4.75, 4.75, 4.75);
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 2017-05-23
- Phantom: ELI v5.0_Right_20170321; Type: QDOVA002AA; Serial: 1220
- Measurement SW: DASY5, V5.0 Build 125;

d=10 mm, Pin=100 mW, dist=2.0 mm (EX-Probe)/Area Scan (81x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 14.6 mW/g

d=10 mm, Pin=100 mW, dist=2.0 mm (EX-Probe)/Zoom Scan (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 55.2 V/m; Power Drift = 0.106 dB
Peak SAR (extrapolated) = 30.8 W/kg
SAR(1 g) = 7.43 mW/g; SAR(10 g) = 2.16 mW/g
Maximum value of SAR (measured) = 15.1 mW/g



0 dB = 15.1mW/g

Head 5 800 MHz

Procedure Name: d=10 mm, Pin=100 mW, dist=2.0 mm (EX-Probe)

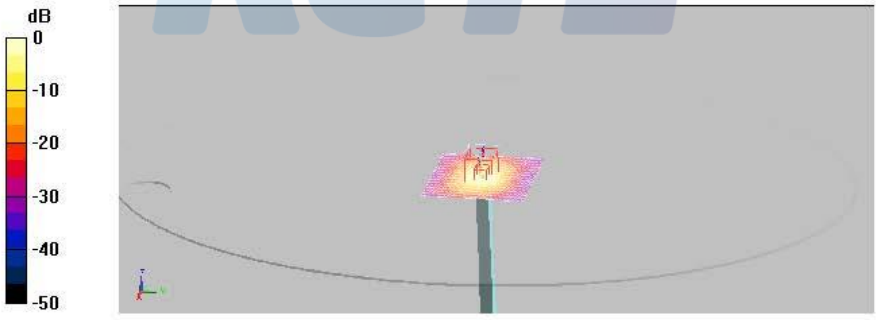
Frequency: 5800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; σ = 5.41 mho/m; ε_r = 34.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928; ConvF(4.85, 4.85, 4.85);
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 2017-05-23
- Phantom: ELI v5.0_Left_20170321; Type: QDOVA002AA; Serial: 1173
- Measurement SW: DASY5, V5.0 Build 125;

d=10 mm, Pin=100 mW, dist=2.0 mm (EX-Probe)/Area Scan (81x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 17.6 mW/g

d=10 mm, Pin=100 mW, dist=2.0 mm (EX-Probe)/Zoom Scan (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 60.8 V/m; Power Drift = -0.048 dB
Peak SAR (extrapolated) = 39.9 W/kg
SAR(1 g) = 8.49 mW/g; SAR(10 g) = 2.44 mW/g
Maximum value of SAR (measured) = 18.1 mW/g



0 dB = 18.1mW/g

Body 5 800 MHz

Procedure Name: d=10 mm, Pin=100 mW, dist=2.0 mm (EX-Probe)

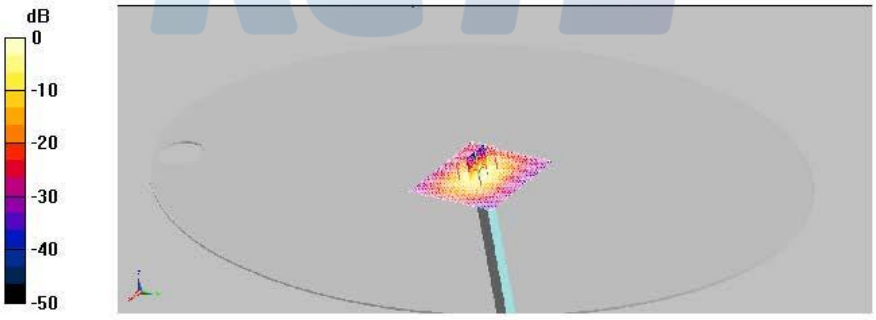
Frequency: 5800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; σ = 6.17 mho/m; ε_r = 49.9; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928; ConvF(4.14, 4.14, 4.14);
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 2017-05-23
- Phantom: ELI v5.0_Right_20170321; Type: QDOVA002AA; Serial: 1220
- Measurement SW: DASY5, V5.0 Build 125;

d=10 mm, Pin=100 mW, dist=2.0 mm (EX-Probe)/Area Scan (81x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 16.3 mW/g

d=10 mm, Pin=100 mW, dist=2.0 mm (EX-Probe)/Zoom Scan (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 54.7 V/m; Power Drift = 0.195 dB
Peak SAR (extrapolated) = 36.7 W/kg
SAR(1 g) = 7.8 mW/g; SAR(10 g) = 2.19 mW/g
Maximum value of SAR (measured) = 16.7 mW/g



0 dB = 16.7mW/g

17. Test Results

Procedure Name: 802.11n20_f.2 437_Front_0 mm_ANT.1

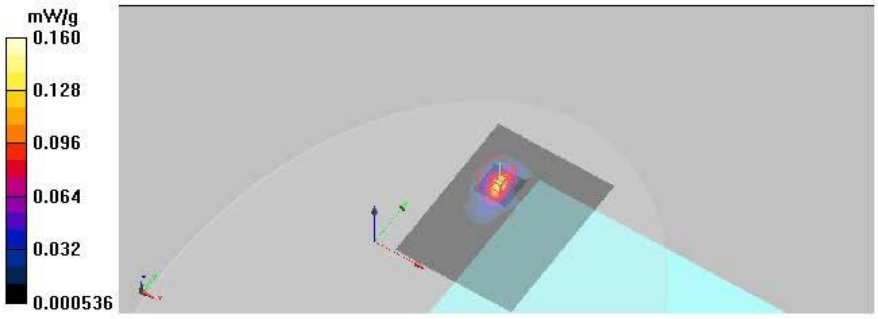
Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.83 mho/m; ε_r = 37.8; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928; ConvF(7.48, 7.48, 7.48);
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 2017-05-23
- Phantom: ELI v5.0_Left_20170321; Type: QDOVA002AA; Serial: 1173
- Measurement SW: DASY5, V5.0 Build 125;

802.11n20_f.2 437_Front_0 mm_ANT.1/Area Scan (91x121x1): Measurement grid:
dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.159 mW/g

802.11n20_f.2 437_Front_0 mm_ANT.1/Zoom Scan (7x7x7)/Cube 0: Measurement grid:
dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.97 V/m; Power Drift = 0.022 dB
Peak SAR (extrapolated) = 0.233 W/kg
SAR(1 g) = 0.097 mW/g; SAR(10 g) = 0.039 mW/g
Maximum value of SAR (measured) = 0.160 mW/g



Procedure Name: 802.11n20_f.2 437_Front_0 mm_ANT.2

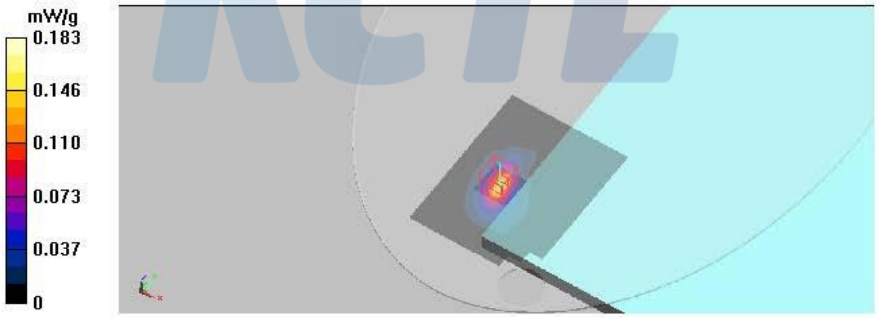
Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.83 mho/m; ε_r = 37.8; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928; ConvF(7.48, 7.48, 7.48);
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 2017-05-23
- Phantom: ELI v5.0_Left_20170321; Type: QDOVA002AA; Serial: 1173
- Measurement SW: DASY5, V5.0 Build 125;

802.11n20_f.2 437_Front_0 mm_ANT.2/Area Scan (91x121x1): Measurement grid:
dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.149 mW/g

802.11n20_f.2 437_Front_0 mm_ANT.2/Zoom Scan (7x7x7)/Cube 0: Measurement grid:
dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.64 V/m; Power Drift = 0.021 dB
Peak SAR (extrapolated) = 0.270 W/kg
SAR(1 g) = 0.113 mW/g; SAR(10 g) = 0.049 mW/g
Maximum value of SAR (measured) = 0.183 mW/g



Procedure Name: 802.11n20_f.2 437_Front_0 mm_ANT.1

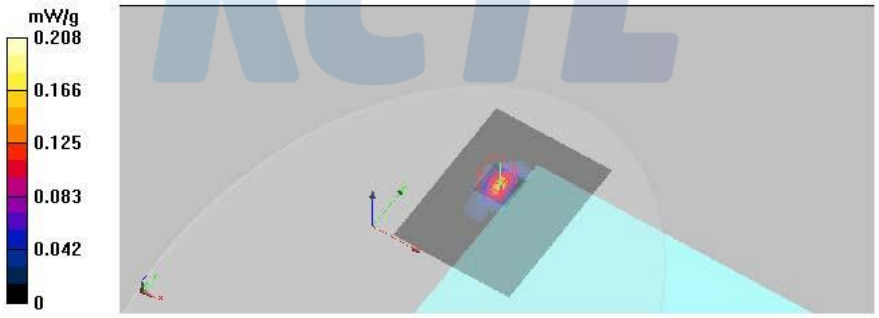
Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.98 mho/m; ε_r = 53.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928; ConvF(7.53, 7.53, 7.53);
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 2017-05-23
- Phantom: ELI v5.0_Right_20170321; Type: QDOVA002AA; Serial: 1220
- Measurement SW: DASY5, V5.0 Build 125;

802.11n20_f.2 437_Front_0 mm_ANT.1/Area Scan (91x121x1): Measurement grid:
dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.152 mW/g

802.11n20_f.2 437_Front_0 mm_ANT.1/Zoom Scan (7x7x7)/Cube 0: Measurement grid:
dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.63 V/m; Power Drift = -0.181 dB
Peak SAR (extrapolated) = 0.299 W/kg
SAR(1 g) = 0.122 mW/g; SAR(10 g) = 0.048 mW/g
Maximum value of SAR (measured) = 0.208 mW/g



Procedure Name: 802.11n20_f.2 437_Front_0 mm_ANT.2

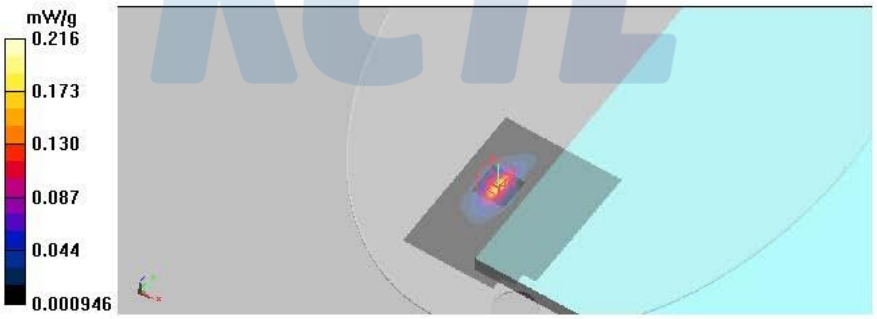
Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.98 mho/m; ε_r = 53.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928; ConvF(7.53, 7.53, 7.53);
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 2017-05-23
- Phantom: ELI v5.0_Right_20170321; Type: QDOVA002AA; Serial: 1220
- Measurement SW: DASY5, V5.0 Build 125;

802.11n20_f.2 437_Front_0 mm_ANT.2/Area Scan (91x121x1): Measurement grid:
dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.177 mW/g

802.11n20_f.2 437_Front_0 mm_ANT.2/Zoom Scan (7x7x7)/Cube 0: Measurement grid:
dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.62 V/m; Power Drift = 0.143 dB
Peak SAR (extrapolated) = 0.304 W/kg
SAR(1 g) = 0.125 mW/g; SAR(10 g) = 0.052 mW/g
Maximum value of SAR (measured) = 0.216 mW/g



Procedure Name: 802.11a_f.5 180_Front_0 mm_ANT.1

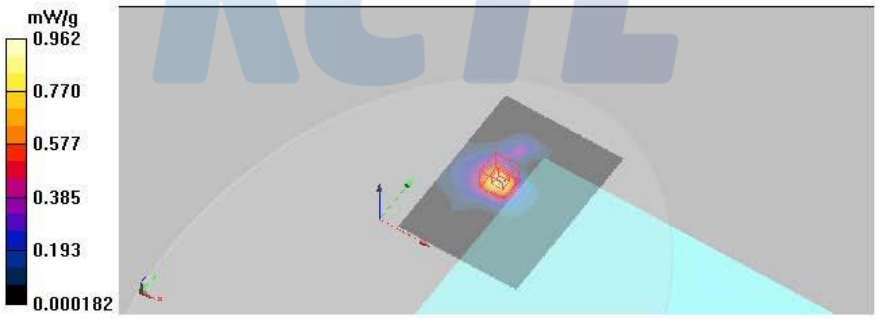
Frequency: 5180 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5180 MHz; σ = 4.68 mho/m; ε_r = 35.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928; ConvF(5.54, 5.54, 5.54);
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 2017-05-23
- Phantom: ELI v5.0_Left_20170321; Type: QDOVA002AA; Serial: 1173
- Measurement SW: DASY5, V5.0 Build 125;

802.11a_f.5 180_Front_0 mm_ANT.1/Area Scan (111x151x1): Measurement grid:
dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.996 mW/g

802.11a_f.5 180_Front_0 mm_ANT.1/Zoom Scan (7x7x12)/Cube 0: Measurement grid:
dx=4mm, dy=4mm, dz=2mm
Reference Value = 6.45 V/m; Power Drift = -0.083 dB
Peak SAR (extrapolated) = 2.01 W/kg
SAR(1 g) = 0.534 mW/g; SAR(10 g) = 0.217 mW/g
Maximum value of SAR (measured) = 0.962 mW/g



Procedure Name: 802.11a_f.5 180_Front_0 mm_ANT.2

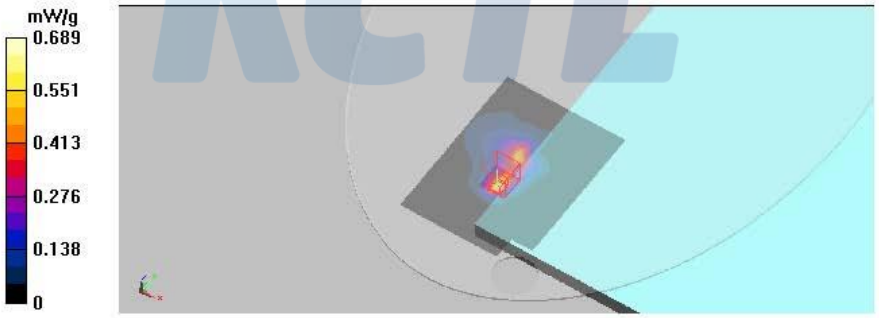
Frequency: 5180 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5180 MHz; σ = 4.68 mho/m; ε_r = 35.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928; ConvF(5.54, 5.54, 5.54);
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 2017-05-23
- Phantom: ELI v5.0_Left_20170321; Type: QDOVA002AA; Serial: 1173
- Measurement SW: DASY5, V5.0 Build 125;

802.11a_f.5 180_Front_0 mm_ANT.2/Area Scan (111x151x1): Measurement grid:
dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.558 mW/g

802.11a_f.5 180_Front_0 mm_ANT.2/Zoom Scan (7x7x12)/Cube 0: Measurement grid:
dx=4mm, dy=4mm, dz=2mm
Reference Value = 9.43 V/m; Power Drift = 0.041 dB
Peak SAR (extrapolated) = 1.72 W/kg
SAR(1 g) = 0.340 mW/g; SAR(10 g) = 0.107 mW/g
Maximum value of SAR (measured) = 0.689 mW/g



Procedure Name: 802.11a_f.5 180_Front_0 mm_ANT.1

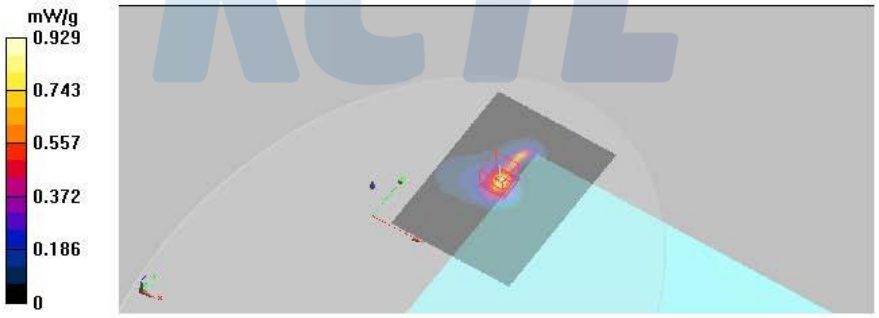
Frequency: 5180 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5180 MHz; σ = 5.32 mho/m; ε_r = 49.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928; ConvF(4.75, 4.75, 4.75);
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 2017-05-23
- Phantom: ELI v5.0_Right_20170321; Type: QDOVA002AA; Serial: 1220
- Measurement SW: DASY5, V5.0 Build 125;

802.11a_f.5 180_Front_0 mm_ANT.1/Area Scan (111x151x1): Measurement grid:
dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.939 mW/g

802.11a_f.5 180_Front_0 mm_ANT.1/Zoom Scan (7x7x12)/Cube 0: Measurement grid:
dx=4mm, dy=4mm, dz=2mm
Reference Value = 6.96 V/m; Power Drift = -0.169 dB
Peak SAR (extrapolated) = 1.89 W/kg
SAR(1 g) = 0.462 mW/g; SAR(10 g) = 0.163 mW/g
Maximum value of SAR (measured) = 0.929 mW/g



Procedure Name: 802.11a_f.5 180_Front_0 mm_ANT.2

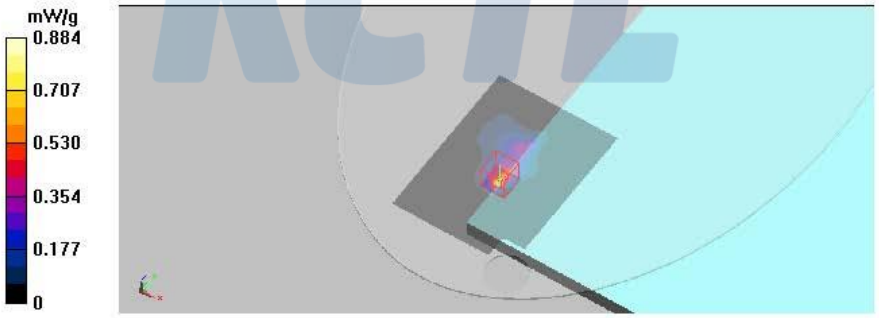
Frequency: 5180 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5180 MHz; σ = 5.32 mho/m; ε_r = 49.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928; ConvF(4.75, 4.75, 4.75);
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 2017-05-23
- Phantom: ELI v5.0_Right_20170321; Type: QDOVA002AA; Serial: 1220
- Measurement SW: DASY5, V5.0 Build 125;

802.11a_f.5 180_Front_0 mm_ANT.2/Area Scan (111x151x1): Measurement grid:
dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.781 mW/g

802.11a_f.5 180_Front_0 mm_ANT.2/Zoom Scan (7x7x12)/Cube 0: Measurement grid:
dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.75 V/m; Power Drift = -0.144 dB
Peak SAR (extrapolated) = 2.13 W/kg
SAR(1 g) = 0.390 mW/g; SAR(10 g) = 0.107 mW/g
Maximum value of SAR (measured) = 0.884 mW/g



Procedure Name: 802.11n20_f.5 785_Front_0 mm_ANT.1

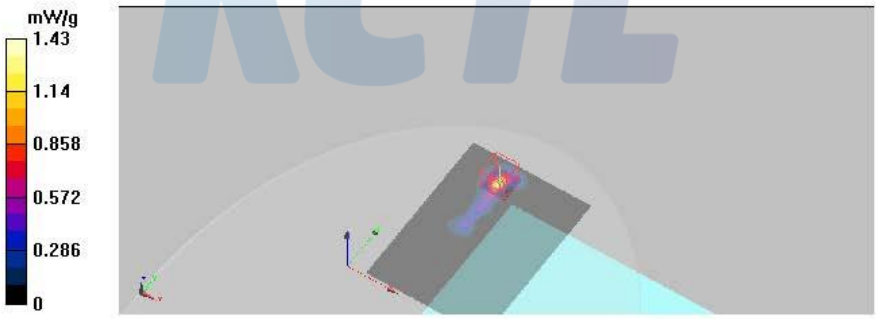
Frequency: 5785 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5785 MHz; σ = 5.4 mho/m; ε_r = 34.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928; ConvF(4.85, 4.85, 4.85);
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 2017-05-23
- Phantom: ELI v5.0_Left_20170321; Type: QDOVA002AA; Serial: 1173
- Measurement SW: DASY5, V5.0 Build 125;

802.11n20_f.5 785_Front_0 mm_ANT.1/Area Scan (111x151x1): Measurement grid:
dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.87 mW/g

802.11n20_f.5 785_Front_0 mm_ANT.1/Zoom Scan (7x7x12)/Cube 0: Measurement grid:
dx=4mm, dy=4mm, dz=2mm
Reference Value = 4.59 V/m; Power Drift = 0.00994 dB
Peak SAR (extrapolated) = 3.7 W/kg
SAR(1 g) = 0.635 mW/g; SAR(10 g) = 0.164 mW/g
Maximum value of SAR (measured) = 1.43 mW/g



Procedure Name: 802.11n20_f.5 785_Front_0 mm_ANT.2

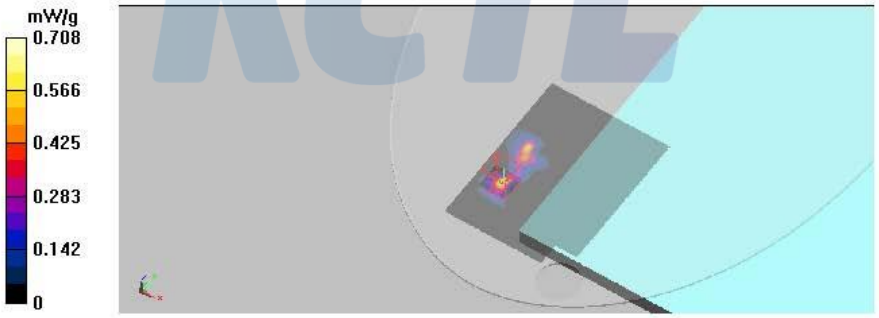
Frequency: 5785 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5785 MHz; σ = 5.4 mho/m; ε_r = 34.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928; ConvF(4.85, 4.85, 4.85);
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 2017-05-23
- Phantom: ELI v5.0_Left_20170321; Type: QDOVA002AA; Serial: 1173
- Measurement SW: DASY5, V5.0 Build 125;

802.11n20_f.5 785_Front_0 mm_ANT.2/Area Scan (111x151x1): Measurement grid:
dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.668 mW/g

802.11n20_f.5 785_Front_0 mm_ANT.2/Zoom Scan (7x7x12)/Cube 0: Measurement grid:
dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.19 V/m; Power Drift = -0.155 dB
Peak SAR (extrapolated) = 2.38 W/kg
SAR(1 g) = 0.311 mW/g; SAR(10 g) = 0.078 mW/g
Maximum value of SAR (measured) = 0.708 mW/g



Procedure Name: 802.11n20_f.5 785_Front_0 mm_ANT.1

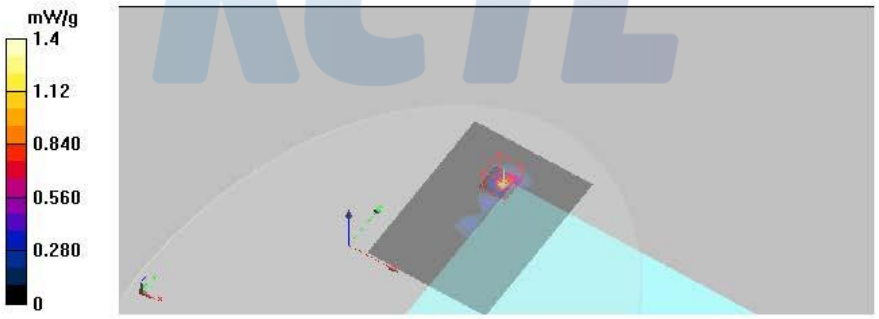
Frequency: 5785 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5785 MHz; σ = 6.13 mho/m; ε_r = 50; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928; ConvF(4.14, 4.14, 4.14);
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 2017-05-23
- Phantom: ELI v5.0_Right_20170321; Type: QDOVA002AA; Serial: 1220
- Measurement SW: DASY5, V5.0 Build 125;

802.11n20_f.5 785_Front_0 mm_ANT.1/Area Scan (111x151x1): Measurement grid:
dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.1 mW/g

802.11n20_f.5 785_Front_0 mm_ANT.1/Zoom Scan (7x7x12)/Cube 0: Measurement grid:
dx=4mm, dy=4mm, dz=2mm
Reference Value = 7.45 V/m; Power Drift = 0.179 dB
Peak SAR (extrapolated) = 4.19 W/kg
SAR(1 g) = 0.581 mW/g; SAR(10 g) = 0.138 mW/g
Maximum value of SAR (measured) = 1.4 mW/g



Procedure Name: 802.11n20_f.5 785_Front_0 mm_ANT.2

Frequency: 5785 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5785 MHz; σ = 6.13 mho/m; ε_r = 50; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3928; ConvF(4.14, 4.14, 4.14);
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn666; Calibrated: 2017-05-23
- Phantom: ELI v5.0_Right_20170321; Type: QDOVA002AA; Serial: 1220
- Measurement SW: DASY5, V5.0 Build 125;

802.11n20_f.5 785_Front_0 mm_ANT.2/Area Scan (111x151x1): Measurement grid:
dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.648 mW/g

802.11n20_f.5 785_Front_0 mm_ANT.2/Zoom Scan (7x7x12)/Cube 0: Measurement grid:
dx=4mm, dy=4mm, dz=2mm
Reference Value = 4.65 V/m; Power Drift = -0.088 dB
Peak SAR (extrapolated) = 1.25 W/kg
SAR(1 g) = 0.232 mW/g; SAR(10 g) = 0.057 mW/g
Maximum value of SAR (measured) = 0.523 mW/g