



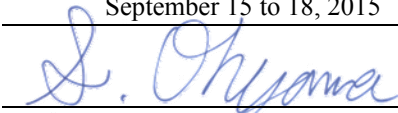
SAR TEST REPORT

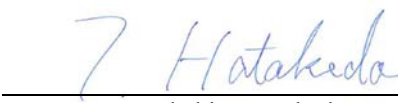
Test Report No. : 10935242H

Applicant : Intel Mobile Communications
Type of Equipment : WLAN and BT module installed on 2in1 PC PDW0J
Model No. : 7265D2W
FCC ID : PD97265D2
Test regulation : FCC47CFR 2.1093
Test Result : **Complied**
Reported SAR(1g) Value : **The highest reported SAR(1g)**
DTS: 2412-2462MHz band: 0.583 W/kg
UNII: 5180-5320MHz band: 1.120 W/kg
UNII: 5500-5700MHz band: 1.049 W/kg
UNII: 5745-5825MHz band: 0.703 W/kg
Simultaneous Transmission: 1.187 W/kg

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. This test report covers SAR technical requirements. It does not cover administrative issues such as Manual or non-SAR test related Requirements. (if applicable)

Date of test: September 15 to 18, 2015

Representative test engineer: 
Shuichi Ohyama
Engineer
Consumer Technology Division

Approved by : 
Takahiro Hatakeda
Leader
Consumer Technology Division



NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.
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REVISION HISTORY

Original Test Report No.: 10935242H

[illegible]

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SECTION 1: Customer information

Company Name : Intel Mobile Communications
Address : 100 Center Point Circle, Suite 200 Columbia, SC 29210

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment : WLAN and BT module installed on 2in1 PC PDW0J
Model No. : 7265D2W
Serial No. : Installed on PDW0J of serial No:8F018184H
Receipt Date of Sample : August 24, 2015
Modification of EUT : No Modification by the test lab

[Identification of Host]

Type of Equipment : 2in1 PC
Model No. : PDW0J
Serial No. : 8F018184H
Rating : Li-ion battery
3.8V, 26Wh
Option battery : None

2.2 Product Description

Model: 7265D2W (referred to as the EUT in this report) is a WLAN and BT module installed on 2in1 PC PDW0J.

Radio Specification

Radio Type : Transceiver

Specification of Wireless LAN (IEEE802.11b/g/a/n-20/n-40/11ac-20/11ac-40/11ac-80)

Type of radio	IEEE802.11b	IEEE802.11g/n (20 M band)	IEEE802.11n (40 M band)	IEEE802.11a/n/ac (20 M band)	IEEE802.11n/ac (40 M band)	IEEE802.11ac (80 M band)
Frequency of operation (MHz)	2412 - 2462	2412 - 2462	2422 - 2452	5180 - 5240 5260 - 5320 5500 - 5700 5745 - 5825	5190 - 5230 5270 - 5310 5510 - 5670 5755 - 5795	5210 5290 5530 - 5690 5775
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)		OFDM (64QAM, 16QAM, QPSK, BPSK, 256QAM(IEEE802.11ac only))		
Channel spacing	5 MHz			20 MHz	40 MHz	80 MHz
Antenna type	PIFA					
Antenna Gain	Peak Gain with Cable loss (dBi) [Main antenna] 2400-2500MHz: -1.89dBi (peak) 5150-5350MHz: -0.42dBi (peak) 5470-5725MHz: -2.90dBi (peak) 5725-5875MHz: -3.36dBi (peak) [Aux antenna] 2400-2500MHz: -0.78dBi (peak) 5150-5350MHz: -2.18dBi (peak) 5470-5725MHz: -2.59dBi (peak) 5725-5875MHz: -4.46dBi (peak)					

Specification of Bluetooth

Type of radio	Bluetooth
Frequency of operation (MHz)	2402- 2480
Type of modulation	GFSK: $\pi/4$ - DQPSK, 8DPSK Bluetooth v4.0
Bandwidth & Channel spacing	79MHz, 1MHz/CH [BT] 79MHz, 2MHz/CH [LE]
Antenna type	PIFA
Antenna Gain	Peak Gain with Cable loss (dBi) [Aux antenna] 2400-2500MHz: -0.78dBi (peak)

SECTION 3 : Test standard information

3.1 Test Specification

Title : **FCC47CFR 2.1093**

Radiofrequency radiation exposure evaluation: portable devices.

: **IEEE Std 1528-2013:**

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

: **Published RF exposure KDB procedures**

- ☒ **KDB447498D01(v05r02)** Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies
- ☐ **KDB447498D02(v02)** SAR Measurement Procedures for USB Dongle Transmitters
- ☐ **KDB648474D04(v01r02)** SAR Evaluation Considerations for Wireless Handsets
- ☐ **KDB941225D01(v02)** SAR Measurement Procedures for 3G Devices
- ☐ **KDB941225D02(v02r02)** 3GPP R6 HSPA and R7 HSPA+ SAR Guidance
- ☐ **KDB941225D03(v01)** Recommended SAR Test Reduction Procedures for GSM/GPRS/EDGE
- ☐ **KDB941225D04(v01)** Evaluating SAR for GSM/(E)GPRS Dual Transfer Mode
- ☐ **KDB941225D05(v02r03)** SAR for LTE Devices
- ☐ **KDB941225D06(v01r01)** SAR test procedures for devices incorporating SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities (Hot Spot SAR)
- ☐ **KDB941225D07(v01r01)** SAR Evaluation Procedures for UMPC Mini-Tablet Devices
- ☒ **KDB616217D04(v01r01)** SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers
- ☒ **KDB865664D01(v01r03)** SAR Measurement Requirements for 100MHz to 6 GHz
- ☒ **KDB248227D01(v02r01)** SAR Measurement Procedures for 802.11a/b/g Transmitters

Reference

[1]SPEAG uncertainty document (AN 15-7/AN19-17) for DASY 5 System from SPEAG (Schmid & Partner Engineering AG).

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

3.2 Procedure

Transmitter	WLAN
Test Procedure	Published RF exposure KDB procedures
	SAR
Category	FCC47CFR 2.1093
Note: UL Japan, Inc.'s SAR Work Procedures 13-EM-W0429 and 13-EM-W0430	

3.3 Exposure limit

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

Spatial Average (averaged over the whole body)	Spatial Peak (averaged over any 1g of tissue)	Spatial Peak (hands/wrists/feet/ankles averaged over 10g)
0.4	8.0	20.0

(B) Limits for General population/Uncontrolled Exposure (W/kg)

Spatial Average (averaged over the whole body)	Spatial Peak (averaged over any 1g of tissue)	Spatial Peak (hands/wrists/feet/ankles averaged over 10g)
0.08	1.6	4.0

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

General Population/Uncontrolled Environments: are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

NOTE:GENERAL POPULATION/UNCONTROLLED EXPOSURE SPATIAL PEAK(averaged over any 1g of tissue) LIMIT 1.6 W/kg
--

3.4 Test Location

*Shielded room for SAR testings

UL Japan, Inc. Ise EMC Lab. *NVLAP Lab. code: 200572-0

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999 Facsimile : +81 596 24 8124

UL Japan, Inc.

Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone: +81 596 24 8999

Facsimile: +81 596 24 8124

SECTION 4 : Test result

4.1 Stand-alone SAR result

Reported SAR

Measured SAR is scaled to the maximum tune-up tolerance limit by the following formulas.

Reported SAR= Measured SAR [W/kg] · Scaled factor *1

Maximum tune-up tolerance limit is by the specification from a customer.

Body SAR

Mode	Frequency	Measured power [dBm]*2	Measured power [mW]	Maximum tune-up tolerance limit [dBm]*3	Maximum tune-up tolerance limit [mW]*3	Measured SAR [W/kg]	Scaled factor	Reported SAR [W/kg]
WLAN 11b (DTS : 2412 - 2462MHz band)	2437MHz	16.17	41.40	16.50	44.67	0.540	1.079	0.583
WLAN 11ac80 (UNII : 5180 - 5320MHz band)	5290MHz	13.26	21.18	13.50	22.39	1.060	1.057	1.120
WLAN 11ac80 (UNII : 5500 - 5700MHz band)	5610MHz	13.25	21.13	13.50	22.39	0.990	1.059	1.049
WLAN 11ac80 (UNII : 5745 - 5825MHz band)	5775MHz	13.19	20.84	13.50	22.39	0.655	1.074	0.703
Bluetooth DH5	Exclusion							

Note

*1 Scaled factor = Maximum tune-up tolerance limit [mW] / Measured power [mW]

*2 The sample used by the SAR test is within the tune-up tolerance but not more than 2 dB lower than the maximum tune-up tolerance limit. That is, measured power is included the tune-up tolerance range.

*3 Maximum tune-up tolerance limit is defined as maximum timed-average value. (Considering to maximum duty cycle of WLAN.)

4.2 Simultaneous Transmission SAR result

Mode	Frequency	Measured power [dBm]*2	Measured power [mW]	Maximum tune-up tolerance limit [dBm]*3	Maximum tune-up tolerance limit [mW]*3	Measured SAR [W/kg]	Scaled factor	Reported SAR [W/kg]
WLAN 11ac80	5610MHz	12.44	17.54	13.50	22.39	0.930	1.276	1.187

Note

*1 Scaled factor = Maximum tune-up tolerance limit [mW] / Measured power [mW]

*2 The sample used by the SAR test is within the tune-up tolerance but not more than 2 dB lower than the maximum tune-up tolerance limit. That is, measured power is included the tune-up tolerance range.

*3 Maximum tune-up tolerance limit is defined as maximum timed-average value. (Considering to maximum duty cycle of WLAN.)

SECTION 5 SAR test exclusion considerations according to KDB447498 D01

The following is based on KDB447498D01.

1) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$$

for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

$f(\text{GHz})$ is the RF channel transmit frequency in GHz

Power and distance are rounded to the nearest mW and mm before calculation

The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

WLAN Main Ant 2.4GHz mode

Band	Standalone SAR tested	Position	Mode	Upper frequency of band *1	Maximum tune-up tolerance limit *4	Min distance *2	Calculation of exclusion *3
WLAN (2.4GHz band)	☒	Top	11b	2462 [MHz] (11ch)	16.5 [dBm] 44.67 [mW] 44 [mW]*5	5 [mm]	13.8
WLAN (2.4GHz band)	☒	Rear	11b	2462 [MHz] (11ch)	16.5 [dBm] 44.67 [mW] 44 [mW]*5	5 [mm]	13.8

WLAN Aux Ant 2.4GHz mode

Band	Standalone SAR tested	Position	Mode	Upper frequency of band *1	Maximum tune-up tolerance limit *4	Min distance *2	Calculation of exclusion *3
WLAN (2.4GHz band)	☒	Top	11b	2462 [MHz] (11ch)	16.5 [dBm] 44.67 [mW] 44 [mW]*5	5 [mm]	13.8
WLAN (2.4GHz band)	☒	Rear	11b	2462 [MHz] (11ch)	16.5 [dBm] 44.67 [mW] 44 [mW]*5	5 [mm]	13.8
WLAN (2.4GHz band)	☐	Left	11b	2462 [MHz] (11ch)	16.5 [dBm] 44.67 [mW] 44 [mW]*5	35 [mm]	2.0

Maximum tune-up tolerance limit of OFDM mode (11g, 11n20 and 11n40) is same as Maximum tune-up tolerance limit of DSSS mode.

Bluetooth Aux Ant

Band	Standalone SAR tested	Position	Mode	Upper frequency of band *1	Maximum tune-up tolerance limit *4	Min distance *2	Calculation of exclusion *3
Bluetooth	☐	Top	DH5	2480 [MHz] (78ch)	7 [dBm] 5.01 [mW] 5 [mW]*5	5 [mm]	1.6
Bluetooth	☐	Rear	DH5	2480 [MHz] (78ch)	7 [dBm] 5.01 [mW] 5 [mW]*5	5 [mm]	1.6
Bluetooth	☐	Left	DH5	2480 [MHz] (78ch)	7 [dBm] 5.01 [mW] 5 [mW]*5	35 [mm]	0.2

WLAN Main Ant 5.2GHz mode

Band	Standalone SAR tested	Positiom	Mode	Upper frequency of band *1	Maximum tune-up tolerance limit *4	Min distance *2	Calculation of exclusion *3
WLAN (5.2GHz band)	☒	Top	11a	5240 [MHz] (48ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	5 [mm]	10.1
WLAN (5.2GHz band)	☒	Rear	11a	5240 [MHz] (48ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	5 [mm]	10.1

WLAN Aux Ant 5.2GHz mode

Band	Standalone SAR tested	Positiom	Mode	Upper frequency of band *1	Maximum tune-up tolerance limit *4	Min distance *2	Calculation of exclusion *3
WLAN (5.2GHz band)	☒	Top	11a	5240 [MHz] (48ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	5 [mm]	10.1
WLAN (5.2GHz band)	☒	Rear	11a	5240 [MHz] (48ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	5 [mm]	10.1
WLAN (5.2GHz band)	☐	Left	11a	5240 [MHz] (48ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	35 [mm]	1.4

Maximum tune-up tolerance limit of 11n20, 11ac20, 11n40, 11ac40 and 11ac80 are same as Maximum tune-up tolerance limit of 11a.

WLAN Main Ant 5.3GHz mode

Band	Standalone SAR tested	Positiom	Mode	Upper frequency of band *1	Maximum tune-up tolerance limit *4	Min distance *2	Calculation of exclusion *3
WLAN (5.3GHz band)	☒	Top	11a	5320 [MHz] (64ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	5 [mm]	10.1
WLAN (5.3GHz band)	☒	Rear	11a	5320 [MHz] (64ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	5 [mm]	10.1

WLAN Aux Ant 5.3GHz mode

Band	Standalone SAR tested	Positiom	Mode	Upper frequency of band *1	Maximum tune-up tolerance limit *4	Min distance *2	Calculation of exclusion *3
WLAN (5.3GHz band)	☒	Top	11a	5320 [MHz] (64ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	5 [mm]	10.1
WLAN (5.3GHz band)	☒	Rear	11a	5320 [MHz] (64ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	5 [mm]	10.1
WLAN (5.3GHz band)	☐	Left	11a	5320 [MHz] (64ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	35 [mm]	1.4

Maximum tune-up tolerance limit of 11n20, 11ac20, 11n40, 11ac40 and 11ac80 are same as Maximum tune-up tolerance limit of 11a.

WLAN Main Ant 5.6GHz mode

Band	Standalone SAR tested	Positiom	Mode	Upper frequency of band *1	Maximum tune-up tolerance limit *4	Min distance *2	Calculation of exclusion *3
WLAN (5.6GHz band)	☒	Top	11a	5700 [MHz] (140ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	5 [mm]	10.5
WLAN (5.6GHz band)	☒	Rear	11a	5700 [MHz] (140ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	5 [mm]	10.5

WLAN Aux Ant 5.6GHz mode

Band	Standalone SAR tested	Positiom	Mode	Upper frequency of band *1	Maximum tune-up tolerance limit *4	Min distance *2	Calculation of exclusion *3
WLAN (5.6GHz band)	☒	Top	11a	5700 [MHz] (140ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	5 [mm]	10.5
WLAN (5.6GHz band)	☒	Rear	11a	5700 [MHz] (140ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	5 [mm]	10.5
WLAN (5.6GHz band)	☐	Left	11a	5700 [MHz] (140ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	35 [mm]	1.5

Maximum tune-up tolerance limit of 11n20, 11ac20, 11n40, 11ac40 and 11ac80 are same as Maximum tune-up tolerance limit of 11a.

WLAN Main Ant 5.8GHz mode

Band	Standalone SAR tested	Positiom	Mode	Upper frequency of band *1	Maximum tune-up tolerance limit *4	Min distance *2	Calculation of exclusion *3
WLAN (5.8GHz band)	☒	Top	11a	5825 [MHz] (165ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	5 [mm]	10.6
WLAN (5.8GHz band)	☒	Rear	11a	5825 [MHz] (165ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	5 [mm]	10.6

WLAN Aux Ant 5.8GHz mode

Band	Standalone SAR tested	Positiom	Mode	Upper frequency of band *1	Maximum tune-up tolerance limit *4	Min distance *2	Calculation of exclusion *3
WLAN (5.8GHz band)	☒	Top	11a	5825 [MHz] (165ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	5 [mm]	10.6
WLAN (5.8GHz band)	☒	Rear	11a	5825 [MHz] (165ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	5 [mm]	10.6
WLAN (5.8GHz band)	☐	Left	11a	5825 [MHz] (165ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	35 [mm]	1.5

Maximum tune-up tolerance limit of 11n20, 11ac20, 11n40, 11ac40 and 11ac80 are same as Maximum tune-up tolerance limit of 11a.

2) At 100 MHz to 6 GHz and for *test separation distances* > 50 mm, the SAR test exclusion threshold is determined according to the following.

- a) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm)·(f(MHz)/150)] mW, at 100MHz to 1500 MHz
b) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm)·10] mW at > 1500 MHz and ≤ 6 GHz

WLAN Main Ant 2.4GHz mode

Band	Standalone SAR tested	Position	Mode	Upper frequency of band *1	Maximum tune-up tolerance limit *4	Min distance	Calculation of threshold*6
WLAN (2.4GHz band)	☐	Bottom	11b	2462 [MHz] (11ch)	16.5 [dBm] 44.67 [mW] 44 [mW]*5	195 [mm]	1546 [mW]
WLAN (2.4GHz band)	☐	Left	11b	2462 [MHz] (11ch)	16.5 [dBm] 44.67 [mW] 44 [mW]*5	86 [mm]	456 [mW]
WLAN (2.4GHz band)	☐	Right	11b	2462 [MHz] (11ch)	16.5 [dBm] 44.67 [mW] 44 [mW]*5	196 [mm]	1556 [mW]

WLAN Aux Ant 2.4GHz mode

Band	Standalone SAR tested	Position	Mode	Upper frequency of band *1	Maximum tune-up tolerance limit *4	Min distance	Calculation of threshold*6
WLAN (2.4GHz band)	☐	Bottom	11b	2462 [MHz] (11ch)	16.5 [dBm] 44.67 [mW] 44 [mW]*5	195 [mm]	1546 [mW]
WLAN (2.4GHz band)	☐	Right	11b	2462 [MHz] (11ch)	16.5 [dBm] 44.67 [mW] 44 [mW]*5	247 [mm]	2066 [mW]

Maximum tune-up tolerance limit of OFDM mode (11g, 11n20 and 11n40) is same as Maximum tune-up tolerance limit of DSSS mode.

Bluetooth Aux Ant

Band	Standalone SAR tested	Position	Mode	Upper frequency of band *1	Maximum tune-up tolerance limit *4	Min distance	Calculation of threshold*6
Bluetooth	☐	Bottom	DH5	2480 [MHz] (78ch)	7 [dBm] 5.01 [mW] 5 [mW]*5	195 [mm]	1545 [mW]
Bluetooth	☐	Right	DH5	2480 [MHz] (78ch)	7 [dBm] 5.01 [mW] 5 [mW]*5	247 [mm]	2065 [mW]

WLAN Main Ant 5.2GHz mode

Band	Standalone SAR tested	Positiom	Mode	Upper frequency of band *1	Maximum tune-up tolerance limit *4	Min distance	Calculation of threshold*6
WLAN (5.2GHz band)	☐	Bottom	11a	5240 [MHz] (48ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	195 [mm]	1516 [mW]
WLAN (5.2GHz band)	☐	Left	11a	5240 [MHz] (48ch)	13.5 [dBm] 22.39 [mW] 0 [mW]*5	86 [mm]	426 [mW]
WLAN (5.2GHz band)	☐	Right	11a	5240 [MHz] (48ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	196 [mm]	1526 [mW]

WLAN Aux Ant 5.2GHz mode

Band	Standalone SAR tested	Positiom	Mode	Upper frequency of band *1	Maximum tune-up tolerance limit *4	Min distance	Calculation of threshold*6
WLAN (5.2GHz band)	☐	Bottom	11a	5240 [MHz] (48ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	195 [mm]	1516 [mW]
WLAN (5.2GHz band)	☐	Right	11a	5240 [MHz] (48ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	247 [mm]	2036 [mW]

Maximum tune-up tolerance limit of 11n20, 11ac20, 11n40, 11ac40 and 11ac80 are same as Maximum tune-up tolerance limit of 11a.

WLAN Main Ant 5.3GHz mode

Band	Standalone SAR tested	Positiom	Mode	Upper frequency of band *1	Maximum tune-up tolerance limit *4	Min distance	Calculation of threshold*6
WLAN (5.3GHz band)	☐	Bottom	11a	5320 [MHz] (64ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	195 [mm]	1515 [mW]
WLAN (5.3GHz band)	☐	Left	11a	5320 [MHz] (64ch)	13.5 [dBm] 22.39 [mW] 0 [mW]*5	86 [mm]	425 [mW]
WLAN (5.3GHz band)	☐	Right	11a	5320 [MHz] (64ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	196 [mm]	1525 [mW]

WLAN Aux Ant 5.3GHz mode

Band	Standalone SAR tested	Positiom	Mode	Upper frequency of band *1	Maximum tune-up tolerance limit *4	Min distance	Calculation of threshold*6
WLAN (5.3GHz band)	☐	Bottom	11a	5320 [MHz] (64ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	195 [mm]	1515 [mW]
WLAN (5.3GHz band)	☐	Right	11a	5320 [MHz] (64ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	247 [mm]	2035 [mW]

Maximum tune-up tolerance limit of 11n20, 11ac20, 11n40, 11ac40 and 11ac80 are same as Maximum tune-up tolerance limit of 11a.

WLAN Main Ant 5.6GHz mode

Band	Standalone SAR tested	Position	Mode	Upper frequency of band *1	Maximum tune-up tolerance limit *4	Min distance	Calculation of threshold*6
WLAN (5.6GHz band)	☐	Bottom	11a	5700 [MHz] (140ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	195 [mm]	1513 [mW]
WLAN (5.6GHz band)	☐	Left	11a	5700 [MHz] (140ch)	13.5 [dBm] 22.39 [mW] 0 [mW]*5	86 [mm]	423 [mW]
WLAN (5.6GHz band)	☐	Right	11a	5700 [MHz] (140ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	196 [mm]	1523 [mW]

WLAN Aux Ant 5.6GHz mode

Band	Standalone SAR tested	Position	Mode	Upper frequency of band *1	Maximum tune-up tolerance limit *4	Min distance	Calculation of threshold*6
WLAN (5.6GHz band)	☐	Bottom	11a	5700 [MHz] (140ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	195 [mm]	1513 [mW]
WLAN (5.6GHz band)	☐	Right	11a	5700 [MHz] (140ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	247 [mm]	2033 [mW]

Maximum tune-up tolerance limit of 11n20, 11ac20, 11n40, 11ac40 and 11ac80 are same as Maximum tune-up tolerance limit of 11a.

WLAN Main Ant 5.8GHz mode

Band	Standalone SAR tested	Position	Mode	Upper frequency of band *1	Maximum tune-up tolerance limit *4	Min distance	Calculation of threshold*6
WLAN (5.8GHz band)	☐	Bottom	11a	5825 [MHz] (165ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	195 [mm]	1512 [mW]
WLAN (5.8GHz band)	☐	Left	11a	5825 [MHz] (165ch)	13.5 [dBm] 22.39 [mW] 0 [mW]*5	86 [mm]	422 [mW]
WLAN (5.8GHz band)	☐	Right	11a	5825 [MHz] (165ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	196 [mm]	1522 [mW]

WLAN Aux Ant 5.8GHz mode

Band	Standalone SAR tested	Position	Mode	Upper frequency of band *1	Maximum tune-up tolerance limit *4	Min distance	Calculation of threshold*6
WLAN (5.8GHz band)	☐	Bottom	11a	5825 [MHz] (165ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	195 [mm]	1512 [mW]
WLAN (5.8GHz band)	☐	Right	11a	5825 [MHz] (165ch)	13.5 [dBm] 22.39 [mW] 22 [mW]*5	247 [mm]	2032 [mW]

Maximum tune-up tolerance limit of 11n20, 11ac20, 11n40, 11ac40 and 11ac80 are same as Maximum tune-up tolerance limit of 11a.

*1 The upper frequency of the frequency band was used in order to calculate standalone SAR test exclusion considerations.

*2 Based on KDB447498D01, min distance is 5mm. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

*3 $[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$
If it is Calculation of exclusion ≤ 3.0 standalone SAR test is excluded.

*4 Maximum tune-up tolerance limit is by the specification from a customer.

*5 Maximum tune-up tolerance limit(mW) is rounded to one decimal place.

*6 $[(3 \cdot 50) / (\sqrt{f_{(\text{GHz})}})] + (\text{test separation distance} - 50 \text{ mm}) \cdot (f(\text{MHz}) / 150) \text{ mW}$ at > 100 MHz and $\leq 1500 \text{ MHz}$
 $[(3 \cdot 50) / (\sqrt{f_{(\text{GHz})}})] + (\text{test separation distance} - 50 \text{ mm}) \cdot 10 \text{ mW}$ at > 1500 MHz and $\leq 6 \text{ GHz}$

SECTION 6 : SAR test opearting mode

6.1 Output Power and SAR test required

The initial test configuration for 2.4 GHz and 5 GHz OFDM transmission modes is determined by the 802.11 configuration with the highest maximum output power specified for production units, including tune-up tolerance, in each standalone and aggregated frequency band. SAR for the initial test configuration is measured using the highest maximum output power channel determined by the default power measurement procedures. When multiple configurations in a frequency band have the same specified maximum output power, the initial test configuration is determined according to the following steps applied sequentially.

- 1) The largest channel bandwidth configuration is selected among the multiple configurations with the same specified maximum output power.
- 2) If multiple configurations have the same specified maximum output power and largest channel bandwidth, the lowest order modulation among the largest channel bandwidth configurations is selected.
- 3) If multiple configurations have the same specified maximum output power, largest channel bandwidth and lowest order modulation, the lowest data rate configuration among these configurations is selected.
- 4) When multiple transmission modes (802.11a/g/n/ac) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected; i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is chosen over 802.11n.

Wi-Fi 2.4GHz (DTS Band)

SISO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Measured average Power (dBm)		Tune-up upper Power (dBm)		SAR Test (Yes/No)	Note(s)
					Main Ant Tx	Sub Ant Tx	Main Ant Tx	Sub Ant Tx		
2.4	802.11b	1 Mbps	1	2412	16.28	16.09	16.5	16.5	Yes	
			6	2437	16.48	16.17				
			11	2462	16.43	16.05				

Note(s):

1. According to KDB248227D01, SAR is not required for 802.11g/n HT20 channels when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

Software information

*The power value of the EUT was set for testing as follows (setting value might be different from product specification value);

- Power Setting: 16.5dBm(1ch, 6ch), 16.0dBm(11ch)
- Software: DRTU
Version : 1.7.7-01519

*This setting of software is the worst case.

Any conditions under the normal use do not exceed the condition of setting.

In addition, end users cannot change the settings of the output power of the product.

Wi-Fi 5GHz

SISO

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Measured average Power (dBm)		Tune-up upper Power (dBm)		SAR Test (Yes/No)	Note(s)
					Main Ant Tx	Sub Ant Tx	Main Ant Tx	Sub Ant Tx		
5.2 (U-NII 1)	802.11ac (VHT80)	29.3 Mbps	42	5210	13.13	13.48	13.5	13.5	No	3
5.3 (U-NII 2A)	802.11ac (VHT80)	29.3 Mbps	58	5290	13.30	13.26	13.5	13.5	Yes	
5.6 (U-NII 2C)	802.11ac (VHT80)	29.3 Mbps	106	5530	13.06	13.23	13.5	13.5	Yes	
			122	5610	13.11	13.25	13.5	13.5		
			138	5690	13.09	13.24	13.5	13.5		
5.8 (U-NII 3)	802.11ac (VHT80)	29.3 Mbps	155	5775	13.32	13.19	13.5	13.5	Yes	

Note(s):

- According to KDB248227D01, SAR measurement is not required for 802.11a, 802.11n HT20, HT40 and 802.11ac VHT20, 802.11ac VHT40 channels because the specified tune-up tolerances for 802.11a, 802.11n HT20, HT40 and 802.11ac VHT20, 802.11ac VHT40 are same or lower than 802.11ac VHT80 and the measured SAR is ≤ 1.2 W/Kg.
- According to KDB248227D01, when the same transmission mode configurations have the same maximum output power on the same channel for the 802.11 a/g/n/ac modes, the channel in the lower order/sequence 802.11 mode (i.e. a, g, n then ac) is selected.
- According to KDB248227D01, when the specified maximum output power is the same for both UNII band I and UNII band 2A, begin SAR measurement in UNII band 2A; and if the highest reported SAR for UNII band 2A is
 - ≤ 1.2 W/kg, SAR is not required for UNII band I
 - > 1.2 W/kg, both bands should be tested independently for SAR.

Software information

*The power value of the EUT was set for testing as follows (setting value might be different from product specification value);

- Power Setting: Refer to the following table.

- Software: DRTU

Version : 1.7.7-01519

*This setting of software is the worst case.

Any conditions under the normal use do not exceed the condition of setting.

In addition, end users cannot change the settings of the output power of the product.

[Power Settings]

Main Ant

80MHz Band	Ch42	Ch58	Ch106	Ch122	Ch138	Ch155
11ac-80	14.0dBm	14.0dBm	14.0dBm	13.5dBm	14.0dBm	14.5dBm

Aux Ant

80MHz Band	Ch42	Ch58	Ch106	Ch122	Ch138	Ch155
11ac-80	13.5dBm	13.5dBm	13.5dBm	13.5dBm	14.0dBm	14.0dBm

UL Japan, Inc.

Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone: +81 596 24 8999

Facsimile: +81 596 24 8124

SECTION 7: Description of the Body setup

7.1 Test position for Body setup

i) Procedure for SAR testing

-The tested procedure was performed according to the KDB447498 D01 (Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies)

ii) Test mode

WLAN	11b, 11ac80
Bluetooth	DH5

iii) Test position

No.	Position	Test distance	WLAN	Bluetooth
			Tested	Tested
1	Top	0mm	☒	☐
2	Bottom	0mm	☐	☐
3	Rear	0mm	☒	☐
4	Left	0mm	☐	☐
5	Right	0mm	☐	☐

SECTION 8 : Test surrounding

8.1 Measurement uncertainty

This measurement uncertainty budget is suggested by IEEE Std 1528(2013) and IEC62209-2:2010, and determined by Schmid & Partner Engineering AG (DASY5 Uncertainty Budget). Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r01 Section 2.8.1., when the highest measured SAR(1g) within a frequency band is < 1.5W/kg, the extensive SAR measurement uncertainty analysis described in IEEE Std.1528 (2013) is not required in SAR reports submitted for equipment approval.

<0.3 – 3GHz range Body>

Error Description	Uncertai value ±	Probability distribution	divisor	(ci) lg	Standard (1g)	vi or veff
Measurement System						
Probe calibration	± 6.00	Normal	1	1	± 6.00	∞
Axial isotropy of the probe	± 4.7	Rectangular	√3	0.7	± 1.9	∞
Spherical isotropy of the probe	± 9.6	Rectangular	√3	0.7	± 3.9	∞
Boundary effects	± 1.0	Rectangular	√3	1	± 0.6	∞
Probe linearity	± 4.7	Rectangular	√3	1	± 2.7	∞
Detection limit	± 1.0	Rectangular	√3	1	± 0.6	∞
Modulation response	± 2.4	Rectangular	√3	1	± 1.4	∞
Readout electronics	± 0.3	Normal	1	1	± 0.3	∞
Response time	± 0.8	Rectangular	√3	1	± 0.5	∞
Integration time	± 2.6	Rectangular	√3	1	± 1.5	∞
RF ambient Noise	± 3.0	Rectangular	√3	1	± 1.7	∞
RF ambient Reflections	± 3.0	Rectangular	√3	1	± 1.7	∞
Probe Positioner	± 0.4	Rectangular	√3	1	± 0.2	∞
Probe positioning	± 2.9	Rectangular	√3	1	± 1.7	∞
MaxSAR Eval.	± 2.0	Rectangular	√3	1	± 1.2	∞
Test Sample Related						
Device positioning	± 2.9	Normal	1	1	± 2.9	1
Device holder uncertainty	± 3.6	Normal	1	1	± 3.6	3
Power drift	± 5.0	Rectangular	√3	1	± 2.9	∞
Power Scaling	+ 0.0	Rectangular	√3	1	± 0.0	∞
Phantom and Setup						
Phantom uncertainty	± 6.1	Rectangular	√3	1	± 3.5	∞
Algorithm for correcting SAR for deviations in permittivity and conductivity	± 1.9	Normal	1	1	± 1.9	∞
Liquid conductivity (meas.)	+ 3.2	Rectangular	1	0.78	+ 2.5	∞
Liquid permittivity (meas.)	- 2.9	Rectangular	1	0.23	- 0.7	∞
Liquid conductivity - temp.unc (below 2deg.C.)	± 5.2	Rectangular	√3	0.78	± 2.3	∞
Liquid permittivity - temp.unc (below 2deg.C.)	± 0.8	Rectangular	√3	0.23	± 0.1	∞
Combined Standard Uncertainty						
					± 11.553	
Expanded Uncertainty (k=2)					± 23.1	

* Table of uncertainties are listed for ISO/IEC 17025.

UL Japan, Inc.

Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone: +81 596 24 8999

Facsimile: +81 596 24 8124

<3 – 6GHz range Body>

Error Description	Uncertain value ±	Probability distribution	divisor	(ci) lg	Standard (lg)	vi or veff
Measurement System						
Probe calibration	± 6.55	Normal	1	1	± 6.55	∞
Axial isotropy of the probe	± 4.7	Rectangular	√3	0.7	± 1.9	∞
Spherical isotropy of the probe	± 9.6	Rectangular	√3	0.7	± 3.9	∞
Boundary effects	± 2.0	Rectangular	√3	1	± 1.2	∞
Probe linearity	± 4.7	Rectangular	√3	1	± 2.7	∞
Detection limit	± 1.0	Rectangular	√3	1	± 0.6	∞
Modulation response	± 2.4	Rectangular	√3	1	± 1.4	∞
Readout electronics	± 0.3	Normal	1	1	± 0.3	∞
Response time	± 0.8	Rectangular	√3	1	± 0.5	∞
Integration time	± 2.6	Rectangular	√3	1	± 1.5	∞
RF ambient Noise	± 3.0	Rectangular	√3	1	± 1.7	∞
RF ambient Reflections	± 3.0	Rectangular	√3	1	± 1.7	∞
Probe Positioner	± 0.8	Rectangular	√3	1	± 0.5	∞
Probe positioning	± 6.7	Rectangular	√3	1	± 3.9	∞
Max.SAR Eval.	± 4.0	Rectangular	√3	1	± 2.3	∞
Test Sample Related						
Device positioning	± 2.9	Normal	1	1	± 2.9	1
Device holder uncertainty	± 3.6	Normal	1	1	± 3.6	19
Power drift	± 5.0	Rectangular	√3	1	± 2.9	∞
Power Scaling	+ 0.0	Rectangular	√3	1	± 0.0	∞
Phantom and Setup						
Phantom uncertainty	± 6.6	Rectangular	√3	1	± 3.8	∞
Algorithm for correcting SAR for deviations in permittivity and conductivity	± 1.9	Normal	1	1	± 1.9	∞
Liquid conductivity (meas.)	+ 2.7	Rectangular	1	0.78	+ 2.1	∞
Liquid permittivity (meas.)	- 2.0	Rectangular	1	0.23	- 0.5	∞
Liquid conductivity - temp.unc (below 2deg.C.)	± 2.4	Rectangular	√3	0.78	± 1.1	∞
Liquid permittivity - temp.unc (below 2deg.C.)	± 0.8	Rectangular	√3	0.23	± 0.1	∞
Combined Standard Uncertainty						
					± 12.390	
Expanded Uncertainty (k=2)						
					± 24.8	

* Table of uncertainties are listed for ISO/IEC 17025.

UL Japan, Inc.

Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone: +81 596 24 8999

Facsimile: +81 596 24 8124

SECTION 9 : Measurement results

9.1 Body SAR of WLAN 2.4GHz

(1)Method of measurement

Step.1 The searching for the worst position

The test was performed at the highest power channel of DSSS. *1*2

Note:

*1 Highest measured output power channel was tested initially according to KDB248227D01.

*2 SAR is not required for the following 2.4 GHz OFDM conditions according to KDB248227D01.

1) When KDB447498D01 SAR test exclusion applies to the OFDM configuration.

2) When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg. Refer to (4) OFDM mode exclusion considerations.

*3 According to KDB248227D01

1) When the *reported* SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.

2) When the *reported* SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any *reported* SAR is > 1.2 W/kg, SAR is required for the third channel.

*4 According to KDB865664 D1.

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

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

3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg ($\sim 10\%$ from the 1-g SAR limit).

4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 .

(2)Simulated Tissue Liquid Parameter confirmation

The dielectric parameters were checked prior to assessment using the DAKS dielectric probe kit.

The dielectric parameters measurement is reported in each correspondent section.

DIELECTRIC PARAMETERS MEASUREMENT RESULTS											
Date	Ambient Temp. [deg.c]	Relative Humidity [%]	Liquid type	Liquid Temp. [deg.c]	Measured Frequency [MHz]	Parameters	Target Value	Measured	Deviation [%]	Limit [%]	Remark
-	-	-	-	-	2000	ϵ_r	53.3	-	-	-	*1
						σ [mho/m]	1.52	-	-	-	
18-Sep	24.0	48	MSL 2450	23.5	2437	ϵ_r	52.7	51.2	-2.9	+/-5	*2
						σ [mho/m]	1.94	2.00	3.2	+/-5	
-	-	-	-	-	2450	ϵ_r	52.7	-	-	-	*1
						σ [mho/m]	1.95	-	-	-	

ϵ_r : Relative Permittivity / σ : Conductivity

*1 The Target value is a parameter defined in KDB 865664D01.

*2 The dielectric parameters should be linearly interpolated between the closest pair of target frequencies to determine the applicable dielectric parameters corresponding to the device test frequency.

(3)Result of Body SAR

Main Ant

SAR MEASUREMENT RESULTS														
Frequency		Modulation	Measured power		Maximum tune-up tolerance limit		Phantom Section	EUT Set-up Conditions			Measured SAR(1g) [W/kg]	Scaled factor *1	Reported SAR(1g) [W/kg] *2	Remark
Channel	[MHz]		[dBm]	[mW]	[dBm]	[mW]		Antenna	Position	Separation [mm]				
Step.1 The searching for the worst position														
6	2437	11b 1Mbps	16.48	44.46	16.50	44.67	Flat	Main	Top	0	0.171	1.005	0.172	
6	2437	11b 1Mbps	16.48	44.46	16.50	44.67	Flat	Main	Rear	0	0.341	1.005	0.343	

Aux Ant

SAR MEASUREMENT RESULTS														
Frequency		Modulation	Measured power		Maximum tune-up tolerance limit		Phantom Section	EUT Set-up Conditions			Measured SAR(1g) [W/kg]	Scaled factor *1	Reported SAR(1g) [W/kg] *2	Remark
Channel	[MHz]		[dBm]	[mW]	[dBm]	[mW]		Antenna	Position	Separation [mm]				
Step.1 The searching for the worst position														
6	2437	11b 1Mbps	16.17	41.40	16.50	44.67	Flat	Main	Top	0	0.282	1.079	0.304	
6	2437	11b 1Mbps	16.17	41.40	16.50	44.67	Flat	Main	Rear	0	0.540	1.079	0.583	*3

*1 Scaled factor = Maximum tune-up tolerance limit [mW] / Measured power [mW]

*2 Reported SAR= Measured SAR [W/kg] · Scaled factor

*3 OFDM mode exclusion considerations

OFDM was excluded from the following table according to KDB248227D01.

Maximum tune-up tolerance limit		Maximum tune-up tolerance limit		OFDM scaled factor *4	Position	DSSS Reported SAR value [W/kg]	OFDM Estimated SAR value [W/kg] *5	Exclusion limit [W/kg]	Standalone SAR tested
DSSS		OFDM							
[dBm]	[mW]	[dBm]	[mW]						
16.50	44.67	16.50	44.67	1.000	Rear	0.583	0.583	< 1.2	No

*4 OFDM scaled factor = Maximum tune-up tolerance limit of OFDM [mW] / Maximum tune-up tolerance limit of DSSS [mW]

*5 Estimated SAR of OFDM= Reported SAR of DSSS[W/kg] · OFDM scaled factor

9.2 Body SAR of WLAN 5.3GHz

(1)Method of measurement

Step.1 The searching for the worst position

The test was performed at the highest power channel of 5.3GHz band 11ac80 MCS0. *1 *2

Step.2 The repeated measurement *4

The test was performed at the worst condition of Step1.

Note:

*1 According to KDB248227D01

1) The largest channel bandwidth configuration is selected among the multiple configurations in a frequency band with the same specified maximum output power.

2) If multiple configurations have the same specified maximum output power and largest channel bandwidth, the lowest order modulation among the largest channel bandwidth configurations is selected.

3) If multiple configurations have the same specified maximum output power, largest channel bandwidth and lowest order modulation, the lowest data rate configuration among these configurations is selected.

4) When multiple transmission modes (802.11a/g/n/ac) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected.

*2 SAR is not required for the following OFDM U-NII-1(5.2 GHz band) conditions according to KDB248227D01.

1) When the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A(5.3GHz band) band by applying the OFDM SAR requirements. If the highest *reported* SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1(5.2GHz band) band for that configuration (802.11 mode and exposure condition); otherwise, each band is tested independently for SAR.

2) When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest *reported* SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for the band with lower maximum output power in that test configuration; otherwise, each band is tested independently for SAR.

*3 According to KDB248227D01

When the *reported* SAR of the initial test configuration is > 0.8 W/kg, SAR measurement is required for subsequent next highest measured output power channel(s) in the initial test configuration until *reported* SAR is ≤ 1.2 W/kg or all required channels are tested.

*4 According to KDB865664 D1.

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

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

3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg ($\sim 10\%$ from the 1-g SAR limit).

4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 .

(2) Simulated Tissue Liquid Parameter confirmation

The dielectric parameters were checked prior to assessment using the DAKS dielectric probe kit.

The dielectric parameters measurement is reported in each correspondent section.

DIELECTRIC PARAMETERS MEASUREMENT RESULTS											
Date	Ambient Temp. [deg.c]	Relative Humidity [%]	Liquid type	Liquid Temp. [deg.c]	Measured Frequency [MHz]	Parameters	Target Value	Measured	Deviation [%]	Limit [%]	Remark
-	-	-	-	-	3000	ϵ_r	52.0	-	-	-	*1
						σ [mho/m]	2.73	-	-	-	
17-Sep	24.0	50	MBBL 3.5-5.8	23.5	5290	ϵ_r	48.9	48.0	-1.9	+/-5	*2
						σ [mho/m]	5.40	5.42	0.4	+/-5	
-	-	-	MBBL 3.5-5.8	-	5800	ϵ_r	48.2	-	-	+/-5	*1
						σ [mho/m]	6.00	-	-	+/-5	

ϵ_r : Relative Permittivity / σ : Conductivity

*1 The Target value is a parameter defined in KDB 865664D01.

*2 The dielectric parameters should be linearly interpolated between the closest pair of target frequencies to determine the applicable dielectric parameters corresponding to the device test frequency.

(3) Result of Body SAR

Main Ant

SAR MEASUREMENT RESULTS															
Frequency		Modulation	Measured power		Maximum tune-up tolerance limit		Phantom Section	EUT Set-up Conditions			Measured SAR(1g) [W/kg]	Scaled factor *1	Reported SAR(1g) [W/kg] *2	Remark	
Channel	[MHz]		[dBm]	[mW]	[dBm]	[mW]		Antenna	Position	Separation [mm]					
Step.1 The searching for the worst position															
58	5290	11ac80 VHT0	13.30	21.38	13.50	22.39	Flat	Main	Top	0	1.030	1.047	1.079		
58	5290	11ac80 VHT0	13.30	21.38	13.50	22.39	Flat	Main	Rear	0	0.910	1.047	0.953		

Aux Ant

SAR MEASUREMENT RESULTS														
Frequency		Modulation	Measured power		Maximum tune-up tolerance limit		Phantom Section	EUT Set-up Conditions			Measured SAR(1g) [W/kg]	Scaled factor *1	Reported SAR(1g) [W/kg] *2	Remark
Channel	[MHz]		[dBm]	[mW]	[dBm]	[mW]		Antenna	Position	Separation [mm]				
Step.1 The searching for the worst position														
58	5290	11ac80 VHT0	13.26	21.18	13.50	22.39	Flat	Aux	Top	0	0.746	1.057	0.788	
58	5290	11ac80 VHT0	13.26	21.18	13.50	22.39	Flat	Aux	Rear	0	1.060	1.057	1.120	*3
Step.3 Repeat measurement of worst mode (Measured SAR level in Step.1 > 0.8 w/kg)														
58	5290	11ac80 VHT0	13.26	21.18	13.50	22.39	Flat	Aux	Rear	0	1.060	1.057	1.120	

*1 Scaled factor = Maximum tune-up tolerance limit [mW] / Measured power [mW]

*2 Reported SAR= Measured SAR [W/kg] · Scaled factor

*3 OFDM 5.2GHz band mode exclusion considerations

OFDM 5.2GHz band was excluded from the following table according to KDB248227D01.

Maximum tune-up tolerance limit		Maximum tune-up tolerance limit		OFDM scaled factor *4	Position	OFDM 5.3GHz band Reported SAR value [W/kg]	OFDM 5.2GHz band Estimated SAR value [W/kg] *5	Exclusion limit [W/kg]	Standalone SAR tested
OFDM 5.3GHz band		OFDM 5.2GHz band							
[dBm]	[mW]	[dBm]	[mW]						
13.50	22.39	13.50	22.39	1.000	Rear	1.12	1.12	< 1.2	No

*3 Scaled factor = Maximum tune-up tolerance limit of OFDM 5.2GHz band [mW] / Maximum tune-up tolerance limit of 5.3GHz band [mW]

*4 Estimated SAR of OFDM 5.2GHz band= Reported SAR of 5.3GHz band [W/kg] · OFDM scaled factor

UL Japan, Inc.

Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone: +81 596 24 8999

Facsimile: +81 596 24 8124

9.3 Body SAR of WLAN 5.6GHz

(1)Method of measurement

- Step.1 The searching for the worst position
The test was performed at the highest power channel of 5.3GHz band 11ac80 MCS0. *1
- Step.2 The changing of the channel *3
The test was performed at the worst position of Step.1.
- Step.3 The repeated measurement *4
The test was performed at the worst condition of Step1 to Step2.

Note:

*1 According to KDB248227D01

- 1) The largest channel bandwidth configuration is selected among the multiple configurations in a frequency band with the same specified maximum output power.
- 2) If multiple configurations have the same specified maximum output power and largest channel bandwidth, the lowest order modulation among the largest channel bandwidth configurations is selected.
- 3) If multiple configurations have the same specified maximum output power, largest channel bandwidth and lowest order modulation, the lowest data rate configuration among these configurations is selected.
- 4) When multiple transmission modes (802.11a/g/n/ac) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected.

*2 According to KDB248227D01

When the *reported* SAR of the initial test configuration is > 0.8 W/kg, SAR measurement is required for subsequent next highest measured output power channel(s) in the initial test configuration until *reported* SAR is ≤ 1.2 W/kg or all required channels are tested.

*3 According to KDB865664 D1.

- 1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.
- 2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
- 3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg ($\sim 10\%$ from the 1-g SAR limit).
- 4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 .

(2)Simulated Tissue Liquid Parameter confirmation

The dielectric parameters were checked prior to assessment using the DAKS dielectric probe kit.

The dielectric parameters measurement is reported in each correspondent section.

DIELECTRIC PARAMETERS MEASUREMENT RESULTS											
Date	Ambient Temp. [deg.c]	Relative Humidity [%]	Liquid type	Liquid Temp. [deg.c]	Measured Frequency [MHz]	Parameters	Target Value	Measured	Deviation [%]	Limit [%]	Remark
-	-	-	-	-	3000	ϵ_r	52.0	-	-	-	*1
						σ [mho/m]	2.73	-	-	-	
15-Sep	24.0	40	MBBL 3.5-5.8	23.5	5610	ϵ_r	48.5	48.2	-0.5	+/-5	*2
						σ [mho/m]	5.78	5.92	2.4	+/-5	
15-Sep	24.0	40	MBBL 3.5-5.8	23.5	5690	ϵ_r	48.4	48.1	-0.4	+/-5	*2
						σ [mho/m]	5.87	6.03	2.7	+/-5	
-	-	-	MBBL 3.5-5.8	-	5800	ϵ_r	48.2	-	-	+/-5	*1
						σ [mho/m]	6.00	-	-	+/-5	

ϵ_r : Relative Permittivity / σ : Conductivity

*1 The Target value is a parameter defined in KDB 865664D01.

*2 The dielectric parameters should be linearly interpolated between the closest pair of target frequencies to determine the applicable dielectric parameters corresponding to the device test frequency.

(3)Result of Body SAR

Main Ant

Frequency		Modulation	Measured power		Maximum tune-up tolerance limit		Phantom Section	EUT Set-up Conditions			Measured SAR(1g) [W/kg]	Scaled factor *1	Reported SAR(1g) [W/kg] *2	Remark
Channel	[MHz]		[dBm]	[mW]	[dBm]	[mW]		Antenna	Position	Separation [mm]				
Step.1 The searching for the worst position														
122	5610	11ac80 VHT0	13.11	20.46	13.50	22.39	Fixed	Main	Top	0	0.865	1.094	0.946	
122	5610	11ac80 VHT0	13.11	20.46	13.50	22.39	Fixed	Main	Rear	0	0.818	1.094	0.895	
Step.2 Next highest measured power channel (SAR level in Step.1 > 0.4 W/kg)														
138	5690	11ac80 VHT0	13.09	20.37	13.50	22.39	Fixed	Main	Top	0	0.562	1.099	0.618	

Aux Ant

SAR MEASUREMENT RESULTS														
Frequency		Modulation	Measured power		Maximum tune-up tolerance limit		Phantom Section	EUT Set-up Conditions			Measured SAR(1g) [W/kg]	Scaled factor *1	Reported SAR(1g) [W/kg] *2	Remark
Channel	[MHz]		[dBm]	[mW]	[dBm]	[mW]		Antenna	Position	Separation [mm]				
Step.1 The searching for the worst position														
122	5610	11ac80 VHT0	13.25	21.13	13.50	22.39	Flat	Aux	Top	0	0.884	1.059	0.936	
122	5610	11ac80 VHT0	13.25	21.13	13.50	22.39	Flat	Aux	Rear	0	0.990	1.059	1.049	
Step.2 Next highest measured power channel (SAR level in Step.1 > 0.4 W/kg)														
138	5690	11ac80 VHT0	13.24	21.09	13.50	22.39	Flat	Aux	Rear	0	0.796	1.062	0.845	
Step.3 Repeat measurement of worst mode (Measured SAR level in Step.1 > 0.8 w/kg)														
122	5610	11ac80 VHT0	13.25	21.13	13.50	22.39	Flat	Aux	Rear	0	0.943	1.059	0.999	

*1 Scaled factor = Maximum tune-up tolerance limit [mW] / Measured power [mW]

*2 Reported SAR= Measured SAR [W/kg] · Scaled factor

9.4 Body SAR of WLAN 5.8GHz

(1)Method of measurement

Step.1 The searching for the worst position

The test was performed at the highest power channel of 5.8GHz band 11ac80 MCS0. *1

Note:

*1 According to KDB248227D01

- 1) The largest channel bandwidth configuration is selected among the multiple configurations in a frequency band with the same specified maximum output power.
- 2) If multiple configurations have the same specified maximum output power and largest channel bandwidth, the lowest order modulation among the largest channel bandwidth configurations is selected.
- 3) If multiple configurations have the same specified maximum output power, largest channel bandwidth and lowest order modulation, the lowest data rate configuration among these configurations is selected.
- 4) When multiple transmission modes (802.11a/g/n/ac) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected.

*2 According to KDB248227D01

When the *reported* SAR of the initial test configuration is > 0.8 W/kg, SAR measurement is required for subsequent next highest measured output power channel(s) in the initial test configuration until *reported* SAR is ≤ 1.2 W/kg or all required channels are tested.

*3 According to KDB865664 D1.

- 1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.
- 2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
- 3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg ($\sim 10\%$ from the 1-g SAR limit).
- 4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 .

(2)Simulated Tissue Liquid Parameter confirmation

The dielectric parameters were checked prior to assessment using the DAKS dielectric probe kit.

The dielectric parameters measurement is reported in each correspondent section.

DIELECTRIC PARAMETERS MEASUREMENT RESULTS											
Date	Ambient Temp. [deg.c]	Relative Humidity [%]	Liquid type	Liquid Temp. [deg.c]	Measured Frequency [MHz]	Parameters	Target Value	Measured	Deviation [%]	Limit [%]	Remark
-	-	-	-	-	3000	ϵ_r	52.0	-	-	-	*1
						σ [mho/m]	2.73	-	-	-	
17-Sep	24.0	50	MBBL 3.5-5.8	23.5	5775	ϵ_r	48.2	47.3	-2.0	+/-5	*2
						σ [mho/m]	5.97	6.07	1.7	+/-5	
-	-	-	MBBL 3.5-5.8	-	5800	ϵ_r	48.2	-	-	+/-5	*1
						σ [mho/m]	6.00	-	-	+/-5	

ϵ_r : Relative Permittivity / σ : Conductivity

*1 The Target value is a parameter defined in KDB 865664D01.

*2 The dielectric parameters should be linearly interpolated between the closest pair of target frequencies to determine the applicable dielectric parameters corresponding to the device test frequency.

(3)Result of Body SAR

Main Ant

SAR MEASUREMENT RESULTS														
Frequency		Modulation	Measured power		Maximum tune-up tolerance limit		Phantom Section	EUT Set-up Conditions			Measured SAR(1g) [W/kg]	Scaled factor *1	Reported SAR(1g) [W/kg] *2	Remark
Channel	[MHz]		[dBm]	[mW]	[dBm]	[mW]		Antenna	Position	Separation [mm]				
Step.1 The searching for the worst position														
155	5775	11ac80 VHT0	13.32	21.48	13.50	22.39	Flat	Main	Top	0	0.376	1.042	0.392	
155	5775	11ac80 VHT0	13.32	21.48	13.50	22.39	Flat	Main	Rear	0	0.344	1.042	0.359	

Aux Ant

SAR MEASUREMENT RESULTS														
Frequency		Modulation	Measured power		Maximum tune-up tolerance limit		Phantom Section	EUT Set-up Conditions			Measured SAR(1g) [W/kg]	Scaled factor *1	Reported SAR(1g) [W/kg] *2	Remark
Channel	[MHz]		[dBm]	[mW]	[dBm]	[mW]		Antenna	Position	Separation [mm]				
Step.1 The searching for the worst position														
155	5775	11ac80 VHT0	13.19	20.84	13.50	22.39	Flat	Aux	Top	0	0.655	1.074	0.703	
155	5775	11ac80 VHT0	13.19	20.84	13.50	22.39	Flat	Aux	Rear	0	0.638	1.074	0.685	

*1 Scaled factor = Maximum tune-up tolerance limit [mW] / Measured power [mW]

*2 Reported SAR= Measured SAR [W/kg] · Scaled factor

SECTION 10 Simultaneous Transmission SAR Analysis

10.1 Estimated SAR value for Bluetooth

The following description is in the KDB447498D01 Clause 4.3.2. Simultaneous transmission SAR test exclusion considerations.

- 2) When the standalone SAR test exclusion of section 4.3.1 is applied to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to the following to determine simultaneous transmission SAR test exclusion:30
- $(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm}) \cdot [\sqrt{f(\text{GHz})}/x] \text{ W/kg}$ for test separation distances $\leq 50 \text{ mm}$;
where $x = 7.5$ for 1-g SAR, and $x = 18.75$ for 10-g SAR.
 - 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distances is $> 50 \text{ mm}$.

Estimated SAR value when the distance from the antenna to the exterior surface is within 50mm

Upper frequency of band *1	Maximum tune-up tolerance limit	Minimum distance *2	Calculation of Estimated SAR*3
2480 [MHz]	7 [dBm] 5.01 [mW]	5 [mm]	0.210 [W/kg]

*1 The upper frequency of the frequency band of Bluetooth was used in order to calculate the maximum estimated SAR.

*2 When the minimum test separation distance is $< 5 \text{ mm}$, a distance of 5 mm is applied.

*3 $(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm}) \cdot [\sqrt{f(\text{GHz})}/x] \text{ W/kg}$

10.2 Simultaneous Transmission SAR Consideration

Test Position	WiFi 2.4 GHz Main	WiFi 2.4 GHz Aux	WiFi 5.3 GHz Main	WiFi 5.3 GHz Aux	Bluetooth	Σ 1-g SAR (mW/g)	Remark
Top Wi-Fi 1Tx	0.172				0.210	0.382	
			1.079		0.210	1.289	
Top Wi-Fi 2Tx	0.172	0.304				0.476	
			1.079	0.788		1.867	Refer to clause 10.3
Rear Wi-Fi 1Tx	0.343				0.210	0.553	
			0.953		0.210	1.163	
Rear Wi-Fi 2Tx	0.343	0.583				0.926	
			0.953	1.120		2.073	Refer to clause 10.3

Test Position						Σ 1-g SAR (mW/g)	Remark
	WiFi 5.6 GHz Main	WiFi 5.6 GHz Aux	WiFi 5.8 GHz Main	WiFi 5.8 GHz Aux	Bluetooth		
Top Wi-Fi 1Tx	0.946				0.210	1.156	
			0.392		0.210	0.602	
Top Wi-Fi 2Tx	0.946	0.936				1.882	Refer to clause 10.3
			0.392	0.703		1.095	
Rear Wi-Fi 1Tx	0.895				0.210	1.105	
			0.359		0.210	0.569	
Rear Wi-Fi 2Tx	0.895	1.049				1.944	Refer to clause 10.3
			0.359	0.685		1.044	

Note(s):

1. Bluetooth and Wi-Fi Aux cannot simultaneously transmit
2. Left, Right and Bottom are not considered because standalone SAR for each side is not required.
3. Values shaded green are estimated SAR

10.3 Simultaneous Transmission SAR Measurement

(1)Method of measurement

Step.1 The measurement for the Simultaneous transmission

The test was performed at the combination which sum of 1g SAR is over 1.6 W/kg

(2)Output Power measurement

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Measured average Power (dBm)		Tune-up upper Power (dBm)		Sum of Measured averaged Power (dBm)	Note(s)
					Main Ant Tx	Sub Ant Tx	Main Ant Tx	Sub Ant Tx		
5.3 (U-NII 2A)	802.11ac (VHT80)	29.3 Mbps	58	5290	12.63	13.19	13.5	13.5	15.93	
5.6 (U-NII 2C)	802.11ac (VHT80)	29.3 Mbps	106	5530	12.73	12.79	13.5	13.5	15.77	
			122	5610	12.44	13.02	13.5	13.5	15.75	
			138	5690	13.35	13.30	13.5	13.5	16.34	

Software information

*The power value of the EUT was set for testing as follows (setting value might be different from product specification value);

- Power Setting: 13.5dBm

- Software: DRTU
Version : 1.7.7-01519

*This setting of software is the worst case.

Any conditions under the normal use do not exceed the condition of setting.

In addition, end users cannot change the settings of the output power of the product.

(3) Simulated Tissue Liquid Parameter confirmation

The dielectric parameters were checked prior to assessment using the DAKS dielectric probe kit.

The dielectric parameters measurement is reported in each correspondent section.

DIELECTRIC PARAMETERS MEASUREMENT RESULTS											
Date	Ambient Temp. [deg.c]	Relative Humidity [%]	Liquid type	Liquid Temp. [deg.c]	Measured Frequency [MHz]	Parameters	Target Value	Measured	Deviation [%]	Limit [%]	Remark
-	-	-	-	-	3000	ϵ_r	52.0	-	-	-	*1
						σ [mho/m]	2.73	-	-	-	
17-Sep	24.0	50	MBBL 3.5-5.8	23.5	5290	ϵ_r	48.9	48.0	-1.9	+/-5	*2
						σ [mho/m]	5.40	5.42	0.4	+/-5	
15-Sep	24.0	40	MBBL 3.5-5.8	23.5	5610	ϵ_r	48.5	48.2	-0.5	+/-5	*2
						σ [mho/m]	5.78	5.92	2.4	+/-5	
-	-	-	MBBL 3.5-5.8	-	5800	ϵ_r	48.2	-	-	+/-5	*1
						σ [mho/m]	6.00	-	-	+/-5	

ϵ_r : Relative Permittivity / σ : Conductivity

*1 The Target value is a parameter defined in KDB 865664D01.

*2 The dielectric parameters should be linearly interpolated between the closest pair of target frequencies to determine the applicable dielectric parameters corresponding to the device test frequency.

(4) Result of Body SAR

SAR MEASUREMENT RESULTS														
Frequency		Modulation	Measured power		Maximum tune-up tolerance limit		Phantom Section	EUT Set-up Conditions			Measured SAR(1g) [W/kg]	Scaled factor *1	Reported SAR(1g) [W/kg] *2	Remark
Channel	[MHz]		[dBm]	[mW]	[dBm]	[mW]		Antenna	Position	Separation [mm]				
Step.1 The measurement for the Simultaneous transmission														
58	5290	11ac80 VHT0	13.19	20.84	13.50	22.39	Flat	Main + Aux	Top	0	0.915	1.074	0.983	*3
58	5290	11ac80 VHT0	13.19	20.84	13.50	22.39	Flat	Main + Aux	Rear	0	0.885	1.074	0.950	*3
122	5610	11ac80 VHT0	12.44	17.54	13.50	22.39	Flat	Main + Aux	Top	0	0.930	1.276	1.187	*3
122	5610	11ac80 VHT0	13.02	20.04	13.50	22.39	Flat	Main + Aux	Rear	0	0.951	1.117	1.062	*3

*1 Scaled factor = Maximum tune-up tolerance limit [mW] / Measured power [mW]

*2 Reported SAR= Measured SAR [W/kg] · Scaled factor

*3 Scaled factor is defined by the antenna side of highest SAR measured

SECTION 11 Test instruments

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MPM-12	Power Meter	Anritsu	ML2495A	0825002	SAR	2015/06/09 * 12
MPSE-17	Power sensor	Anritsu	MA2411B	0738285	SAR	2015/06/09 * 12
MPM-09	Power Meter	Anritsu	ML2495A	6K00003348	SAR	2014/10/06 * 12
MPSE-12	Power sensor	Anritsu	MA2411B	011598	SAR	2014/10/06 * 12
MAT-20	Attenuator(10dB)(above 1GHz)	HIROSE ELECTRIC CO.,LTD.	AT-110	-	SAR	2015/01/08 * 12
MAT-23	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	SAR	2015/03/13 * 12
MOS-37	Digital thermometer	LKM electronic	DTM3000	-	SAR	2015/07/07 * 12
MDPK-03	Dielectric assessment kit	Schmid&Partner Engineering AG	DAK-3.5	0008	SAR	2015/03/10 * 12
COTS-MSAR-04	Dielectric assessment software	Schmid&Partner Engineering AG	DAK	-	SAR	-
MPM-11	Dual Power Meter	Agilent	E4419B	MY45102060	SAR	2015/08/04 * 12
MPSE-15	Power sensor	Agilent	E9301A	MY41498311	SAR	2015/08/04 * 12
MPSE-16	Power sensor	Agilent	E9301A	MY41498313	SAR	2015/08/04 * 12
MHDC-12	Dual Directional Coupler	Hewlett Packard	772D	2839A0016	SAR(2-18GHz)	Pre Check
MRFA-24	Pre Amplifier	R&K	R&K CGA020M602-2633R	B30550	SAR	2015/06/15 * 12
MSG-13	Signal Generator	Rohde & Schwarz	SMA 100A	103764	SAR	2015/06/15 * 12
MDA-07	Dipole Antenna	Schmid&Partner Engineering AG	D2450V2	713	SAR(D2450)	2013/09/10 * 36
MDA-08	Dipole Antenna	Schmid&Partner Engineering AG	D5GHzV2	1020	SAR(D5G)	2015/01/13 * 12
MAT-78	Attenuator	Telegrartner	J01156A0011	0042294119	SAR	Pre Check
MPSE-25	Power sensor	Anritsu	MA24106A	1031504	SAR	2015/08/17 * 12
MAT-81	Attenuator	Weinschel Associates	WA1-20-33	100131	SAR	2015/05/04 * 12
COTS-MPSE	Software for MA24106A	Anritsu	Anritsu Power meter software	-	SAR	-
MDAE-02	Data Acquisition Electronics	Schmid&Partner Engineering AG	DAE4	1369	SAR	2015/05/22 * 12
MPB-08	Dosimetric E-Field Probe	Schmid&Partner Engineering AG	EX3DV4	3917	SAR	2015/05/29 * 12
MPF-03	2mm Oval Flat Phantom	Schmid&Partner Engineering AG	QDOVA001BB	1203	SAR	2015/05/11 * 12
MDH-04	Device holder	Schmid&Partner Engineering AG	Mounting device for transmitter	-	SAR	Pre Check
MOS-35	Digital thermometer	HANNA	Checktemp 4	-	SAR	2015/07/07 * 12
COTS-MSAR-03	Dasy5	Schmid&Partner Engineering AG	DASY5	-	SAR	-
MRBT-03	SAR robot	Schmid&Partner Engineering AG	TX60 Lspeag	F13/5PP1D1/A/01	SAR	2015/06/23 * 12

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MDAE-03	Data Acquisition Electronics	Schmid&Partner Engineering AG	DAE4	1372	SAR	2015/06/15 * 12
MPB-09	Dosimetric E-Field Probe	Schmid&Partner Engineering AG	EX3DV4	3922	SAR	2015/06/17 * 12
MPF-04	2mm Oval Flat Phantom	Schmid&Partner Engineering AG	QDOVA001BB	1207	SAR	2015/05/11 * 12
MDH-03	Device holder	Schmid&Partner Engineering AG	Mounting device for transmitter	-	SAR	Pre Check
MRBT-04	SAR robot	Schmid&Partner Engineering AG	TX60 Lspeag	F13/5PP1A1/A/ 01	SAR	2015/06/23 * 12
MSL2450					Daily check	Target value $\pm$ 5%
MBBL3.5-5.8					Daily check	Target value $\pm$ 5%
SAR Room					Daily check Ambient Noise<0.012W/kg	

The expiration date of the calibration is the end of the expired month.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

APPENDIX 1 : SAR Measurement data

1. Evaluation procedure

The evaluation was performed with the following procedure:

Step 1: Measurement of the E-field at a fixed location above the ear point or central position of flat phantom was used as a reference value for assessing the power drop.

Step 2: The SAR distribution at the exposed side of head or body position was measured at a distance of each device from the inner surface of the shell. The area covered the entire dimension of the antenna of EUT and the horizontal grid spacing was 15 mm x 15 mm, 12 mm x 12 mm or 10mm x 10mm. Based on these data, the area of the maximum absorption was determined by spline interpolation.

Step 3: Around this point found in the Step 2 (area scan), a volume of 30mm x 30mm x 30mm or more was assessed by measuring 7 x 7 x 7 points at least for below 3GHz and a volume of 28 mm x 28mm x 22.5mm or more was assessed by measuring 8 x 8 x 6(ratio step method (*1)) points at least for 5GHz band.

And for any secondary peaks found in the Step2 which are within 2dB of maximum peak and not with this Step3 (Zoom scan) is repeated. On the basis of this data set, the spatial peak SAR value was evaluated under the following procedure:

(1). The data at the surface were extrapolated, since the center of the dipoles is 1mm(EX3DV4) away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.3 mm. The extrapolation was based on a least square algorithm [4]. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

(2). The maximum interpolated value was searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g or 10 g) were computed by the 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) [4], [5]. The volume was integrated with the trapezoidal-algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.

(3). All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

Step 4: Re-measurement of the E-field at the same location as in Step 1.

It was checked that the power drift [W] is within +/-5%. The verification of power drift during the SAR test is that DASY5 system calculates the power drift by measuring the e-filed at the same location at beginning and the end of the scan measurement for each test position.

DASY5 system calculation Power drift value[dB] = $20\log(E_a)/(E_b)$

Before SAR testing : $E_b[V/m]$

After SAR testing : $E_a[V/m]$

Limit of power drift[W] = +/-5%

$X[dB] = 10\log[P] = 10\log(1.05/1) = 10\log(1.05) - 10\log(1) = 0.212dB$

from E-filed relations with power.

$p = E^2/\eta = E^2/$

Therefore, The correlation of power and the E-filed

$XdB = 10\log(P) = 10\log(E)^2 = 20\log(E)$

Therefore,

The calculated power drift of DASY5 System must be the less than +/-0.212dB.

***1. Ratio step method parameters used;**

The first measurement point: 2mm from the phantom surface, the initial grid separation: 2mm, subsequent graded grid ratio: 1.5

These parameters comply with the requirement of the KDB 865664D01.

2. Measurement data(2.4GHz)

WLAN 2.4G Ant Main 11b 1Mbps 2437MHz Top 0mm

Communication System: UID 0, WLAN 11a/b/g/n (0); Communication System Band: 11b/g/n (2.4G); Frequency: 2437 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 2.002$ S/m; $\epsilon_r = 51.178$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3917 (add ConvF); ConvF(7.15, 7.15, 7.15); Calibrated: 2015/08/13;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1369; Calibrated: 2015/05/22

Phantom: ELI v5.0 (30deg probe tilt); Type: QDOVA002AA; Serial: TP:1203

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (51x141x1): Interpolated grid: $dx=1.200$ mm, $dy=1.200$ mm

Maximum value of SAR (interpolated) = 0.260 W/kg

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

Reference Value = 12.59 V/m; Power Drift = -0.12 dB

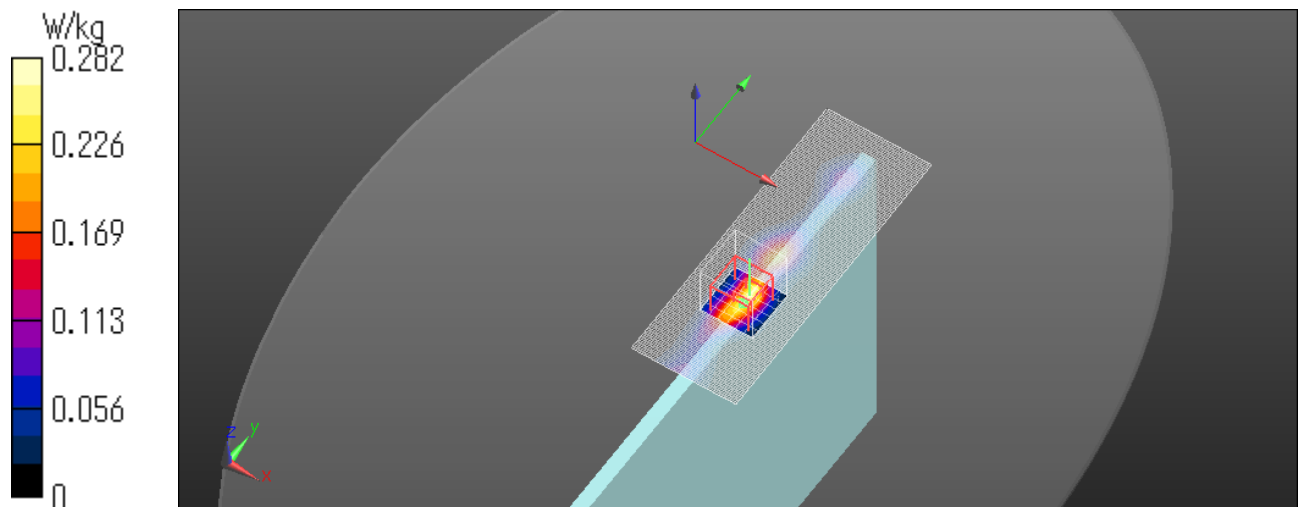
Peak SAR (extrapolated) = 0.431 W/kg

SAR(1 g) = 0.171 W/kg; SAR(10 g) = 0.075 W/kg

Maximum value of SAR (measured) = 0.282 W/kg

Date: 2015/09/18

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



WLAN 2.4G Ant Main 11b 1Mbps 2437MHz Rear 0mm

Communication System: UID 0, WLAN 11a/b/g/n (0); Communication System Band: 11b/g/n (2.4G); Frequency: 2437 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 2.002$ S/m; $\epsilon_r = 51.178$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3917 (add ConvF); ConvF(7.15, 7.15, 7.15); Calibrated: 2015/08/13;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1369; Calibrated: 2015/05/22

Phantom: ELI v5.0 (30deg probe tilt); Type: QDOVA002AA; Serial: TP:1203

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (71x121x1): Interpolated grid: $dx=1.200$ mm, $dy=1.200$ mm

Maximum value of SAR (interpolated) = 0.443 W/kg

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

Reference Value = 18.93 V/m; Power Drift = 0.00 dB

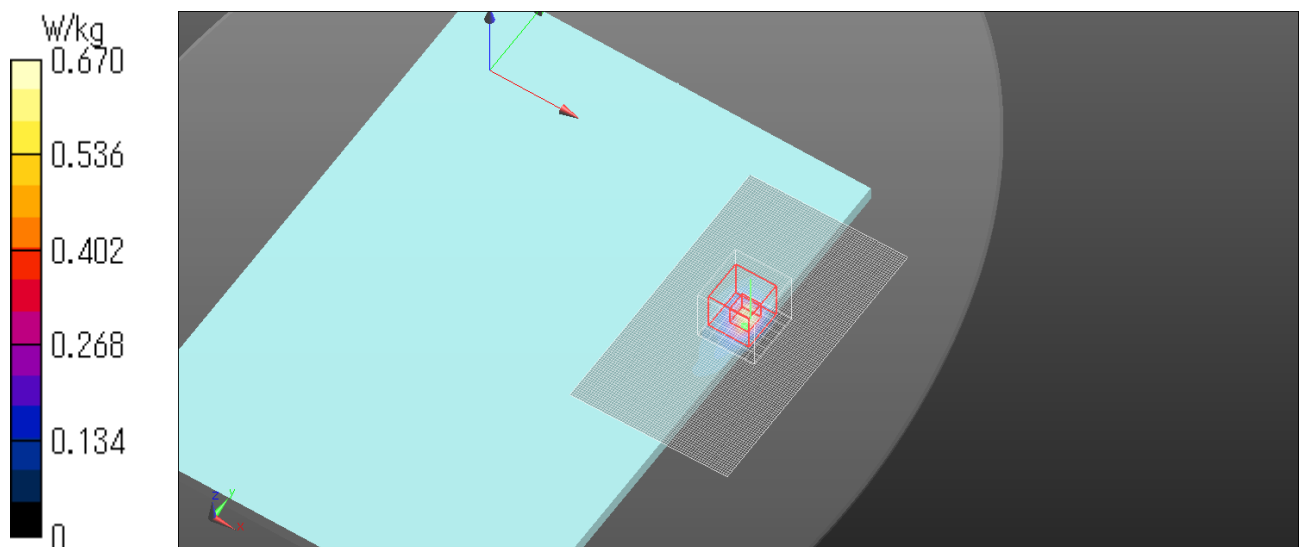
Peak SAR (extrapolated) = 1.14 W/kg

SAR(1 g) = 0.341 W/kg; SAR(10 g) = 0.113 W/kg

Maximum value of SAR (measured) = 0.670 W/kg

Date: 2015/09/18

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



WLAN 2.4G Ant Aux 11b 1Mbps 2437MHz Top 0mm

Communication System: UID 0, WLAN 11a/b/g/n (0); Communication System Band: 11b/g/n (2.4G); Frequency: 2437 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 2.002$ S/m; $\epsilon_r = 51.178$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3917 (add ConvF); ConvF(7.15, 7.15, 7.15); Calibrated: 2015/08/13;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1369; Calibrated: 2015/05/22

Phantom: ELI v5.0 (30deg probe tilt); Type: QDOVA002AA; Serial: TP:1203

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (51x141x1): Interpolated grid: $dx=1.200$ mm, $dy=1.200$ mm

Maximum value of SAR (interpolated) = 0.398 W/kg

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

Reference Value = 16.21 V/m; Power Drift = -0.14 dB

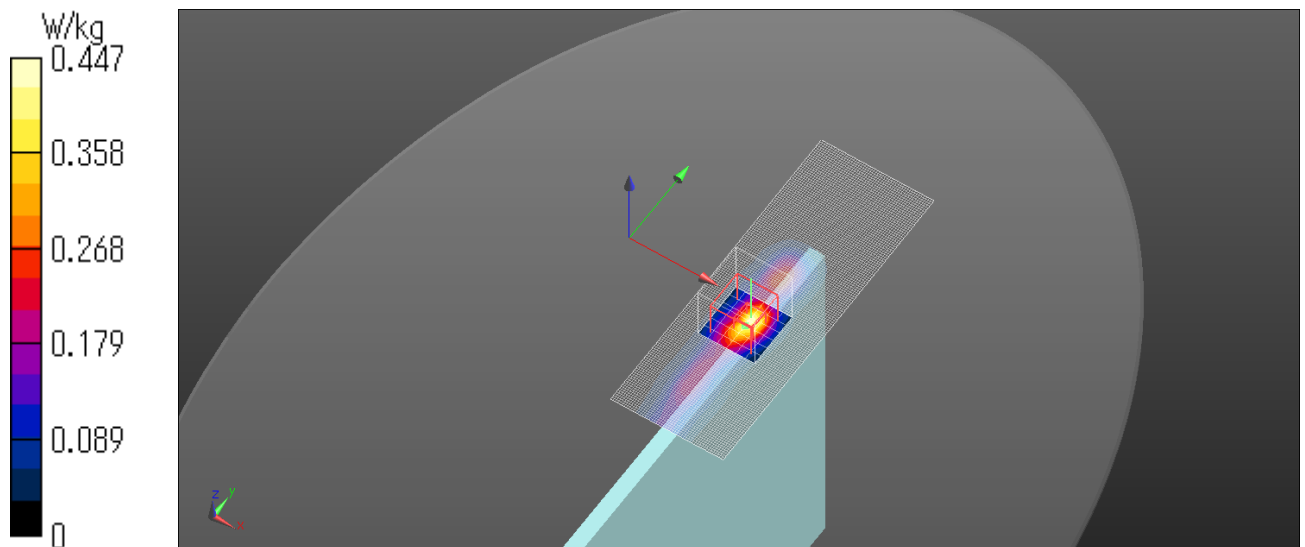
Peak SAR (extrapolated) = 0.674 W/kg

SAR(1 g) = 0.282 W/kg; SAR(10 g) = 0.117 W/kg

Maximum value of SAR (measured) = 0.447 W/kg

Date: 2015/09/18

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



WLAN 2.4G Ant Aux 11b 1Mbps 2437MHz Rear 0mm

Communication System: UID 0, WLAN 11a/b/g/n (0); Communication System Band: 11b/g/n (2.4G); Frequency: 2437 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 2.002$ S/m; $\epsilon_r = 51.178$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3917 (add ConvF); ConvF(7.15, 7.15, 7.15); Calibrated: 2015/08/13;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1369; Calibrated: 2015/05/22

Phantom: ELI v5.0 (30deg probe tilt); Type: QDOVA002AA; Serial: TP:1203

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (51x141x1): Interpolated grid: $dx=1.200$ mm, $dy=1.200$ mm

Maximum value of SAR (interpolated) = 0.852 W/kg

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

Reference Value = 26.39 V/m; Power Drift = -0.12 dB

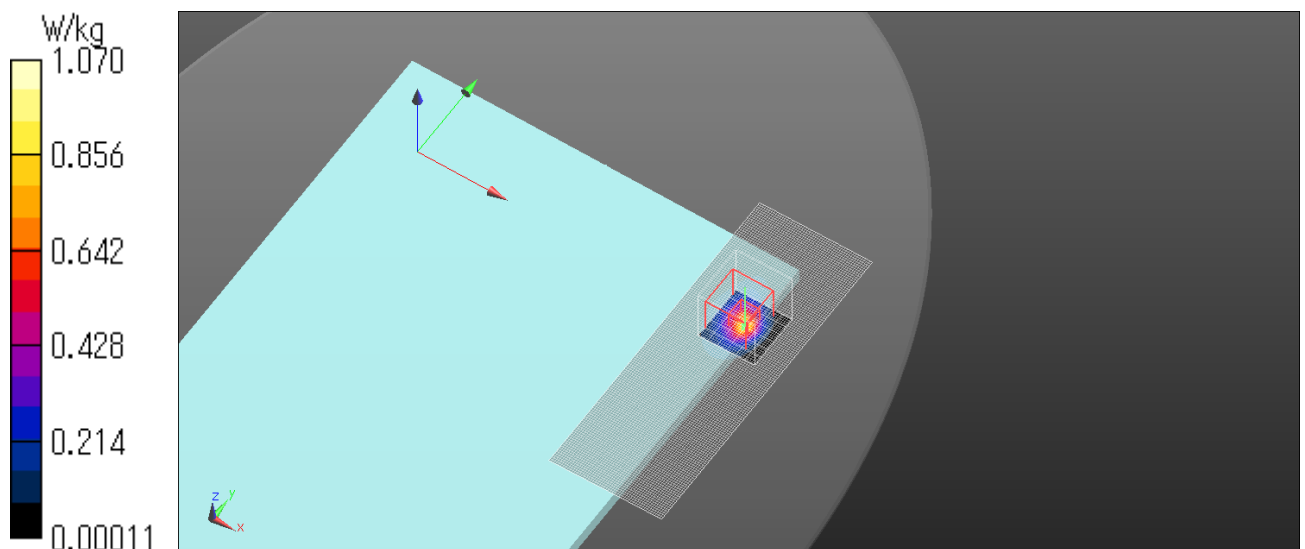
Peak SAR (extrapolated) = 1.78 W/kg

SAR(1 g) = 0.540 W/kg; SAR(10 g) = 0.180 W/kg

Maximum value of SAR (measured) = 1.07 W/kg

Date: 2015/09/18

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



3. Measurement data(5.3GHz)

WLAN 5.3G Ant Main 11ac80 VHT0 5290MHz Top 0mm

Communication System: UID 0, WLAN (0); Communication System Band: 11ac80; Frequency: 5290 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5290$ MHz; $\sigma = 5.42$ S/m; $\epsilon_r = 47.975$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(4.46, 4.46, 4.46); Calibrated: 2015/06/17;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (61x171x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 2.44 W/kg

Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 26.06 V/m; Power Drift = -0.12 dB

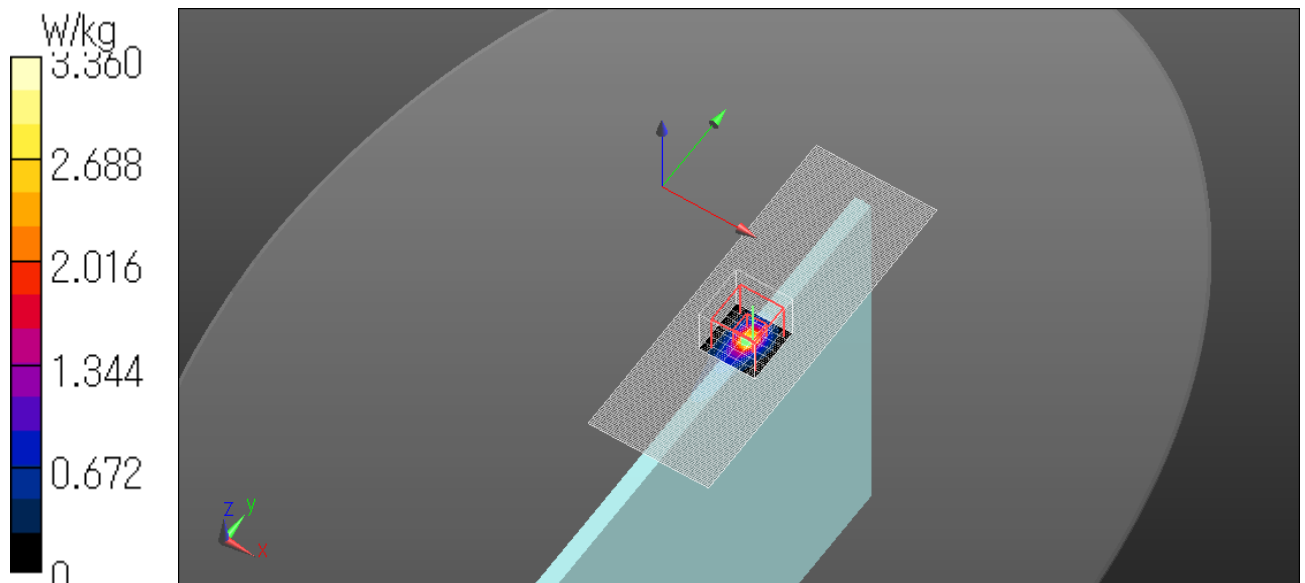
Peak SAR (extrapolated) = 6.44 W/kg

SAR(1 g) = 1.03 W/kg; SAR(10 g) = 0.243 W/kg

Maximum value of SAR (measured) = 3.36 W/kg

Date: 2015/09/17

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



WLAN 5.3G Ant Main 11ac80 VHT0 5290MHz Rear 0mm

Communication System: UID 0, WLAN (0); Communication System Band: 11ac80; Frequency: 5290 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5290$ MHz; $\sigma = 5.42$ S/m; $\epsilon_r = 47.975$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(4.46, 4.46, 4.46); Calibrated: 2015/06/17;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (61x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 2.21 W/kg

Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 24.21 V/m; Power Drift = -0.00 dB

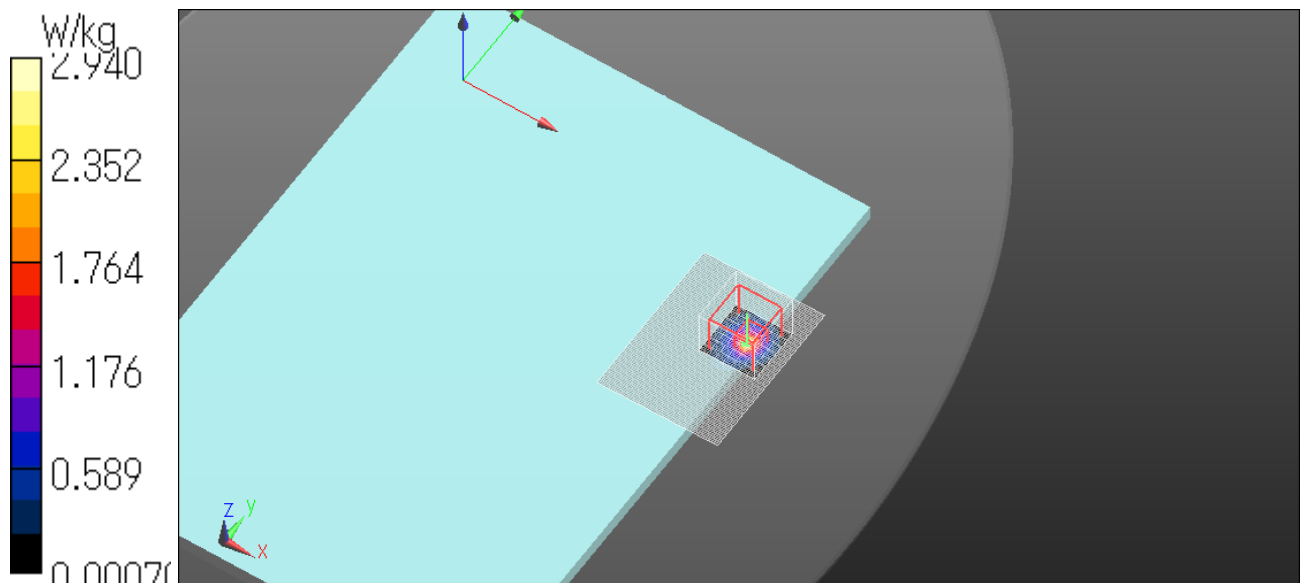
Peak SAR (extrapolated) = 6.43 W/kg

SAR(1 g) = 0.910 W/kg; SAR(10 g) = 0.208 W/kg

Maximum value of SAR (measured) = 2.94 W/kg

Date: 2015/09/17

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



WLAN 5.3G Ant Aux 11ac80 VHT0 5290MHz Top 0mm

Communication System: UID 0, WLAN (0); Communication System Band: 11ac80; Frequency: 5290 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5290$ MHz; $\sigma = 5.42$ S/m; $\epsilon_r = 47.975$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(4.46, 4.46, 4.46); Calibrated: 2015/06/17;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (61x171x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 1.68 W/kg

Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 19.64 V/m; Power Drift = 0.16 dB

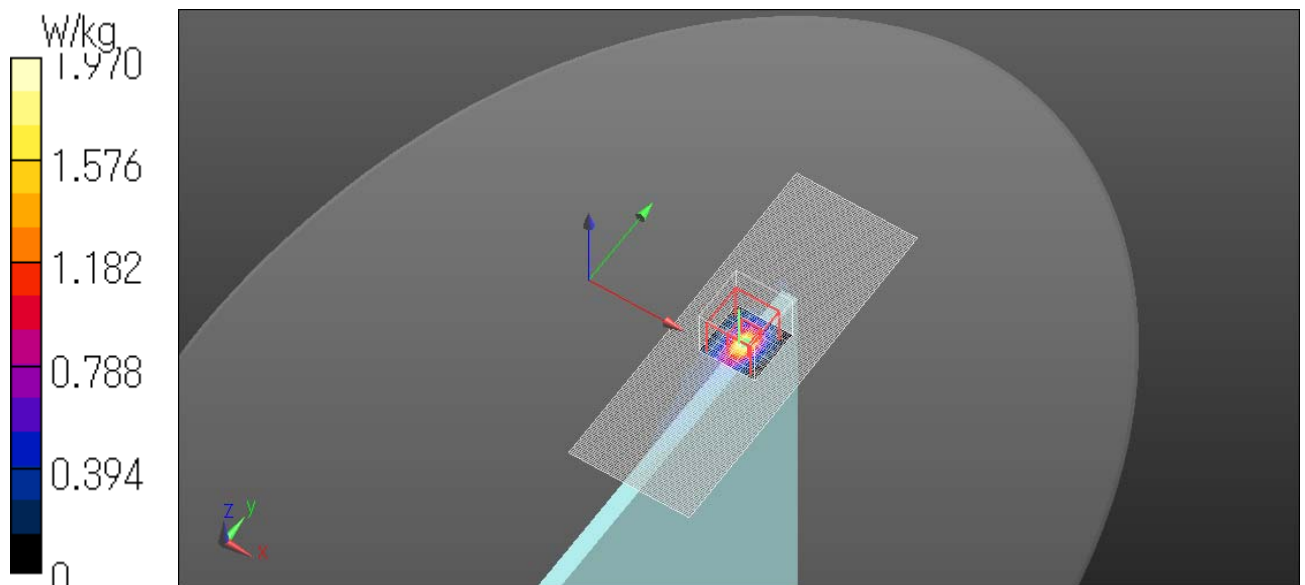
Peak SAR (extrapolated) = 3.78 W/kg

SAR(1 g) = 0.746 W/kg; SAR(10 g) = 0.181 W/kg

Maximum value of SAR (measured) = 1.97 W/kg

Date: 2015/09/17

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



WLAN 5.3G Ant Aux 11ac80 VHT0 5290MHz Rear 0mm

Communication System: UID 0, WLAN (0); Communication System Band: 11ac80; Frequency: 5290 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5290$ MHz; $\sigma = 5.42$ S/m; $\epsilon_r = 47.975$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(4.46, 4.46, 4.46); Calibrated: 2015/06/17;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (61x101x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 2.81 W/kg

Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 25.34 V/m; Power Drift = 0.10 dB

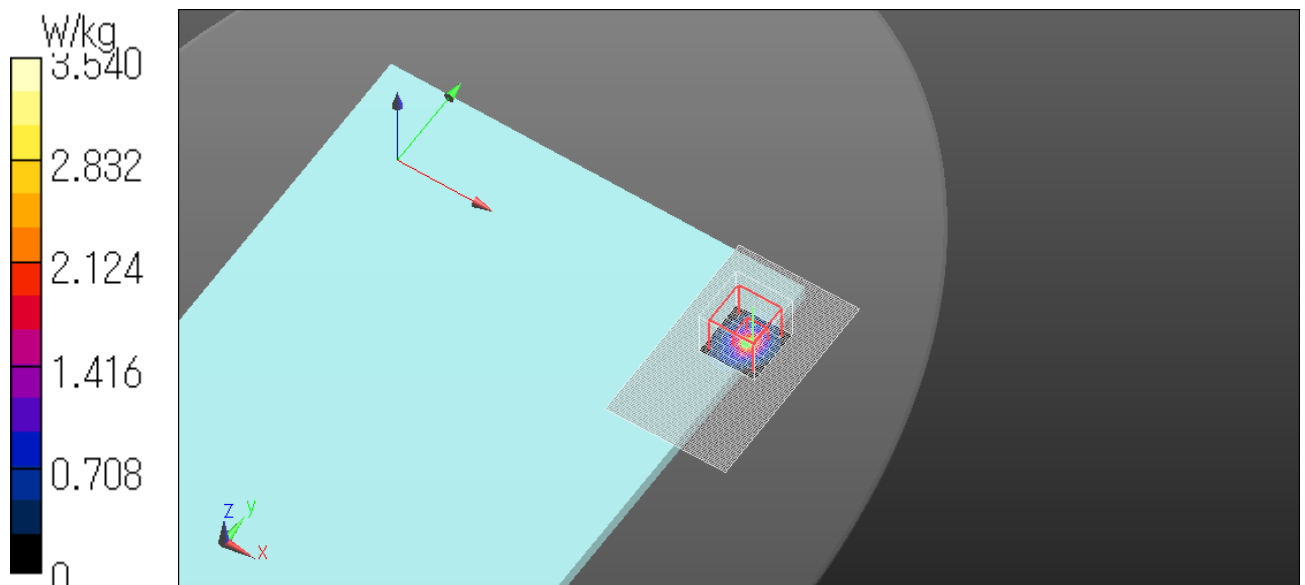
Peak SAR (extrapolated) = 6.53 W/kg

SAR(1 g) = 1.06 W/kg; SAR(10 g) = 0.253 W/kg

Maximum value of SAR (measured) = 3.54 W/kg

Date: 2015/09/17

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



WLAN 5.3G Ant Aux 11ac80 VHT0 5290MHz Rear 0mm_Rpeat

Communication System: UID 0, WLAN (0); Communication System Band: 11ac80; Frequency: 5290 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5290$ MHz; $\sigma = 5.42$ S/m; $\epsilon_r = 47.975$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(4.46, 4.46, 4.46); Calibrated: 2015/06/17;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (61x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 1.70 W/kg

Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 24.82 V/m; Power Drift = -0.05 dB

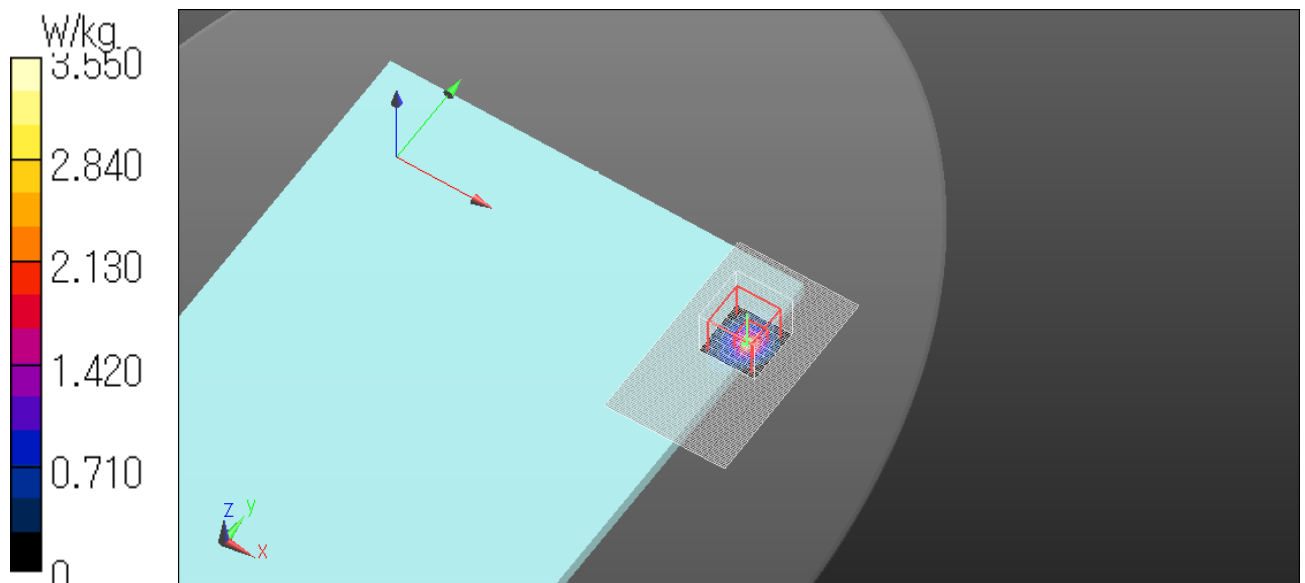
Peak SAR (extrapolated) = 10.1 W/kg

SAR(1 g) = 1.06 W/kg; SAR(10 g) = 0.236 W/kg

Maximum value of SAR (measured) = 3.55 W/kg

Date: 2015/09/17

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



4. Measurement data(5.6GHz)

WLAN 5.6G Ant Main 11ac80 VHT0 5610MHz Top 0mm

Communication System: UID 0, WLAN (0); Communication System Band: 11ac80; Frequency: 5610 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5610$ MHz; $\sigma = 5.916$ S/m; $\epsilon_r = 48.23$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(3.87, 3.87, 3.87); Calibrated: 2015/06/17;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (61x171x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 3.21 W/kg

Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 25.76 V/m; Power Drift = -0.03 dB

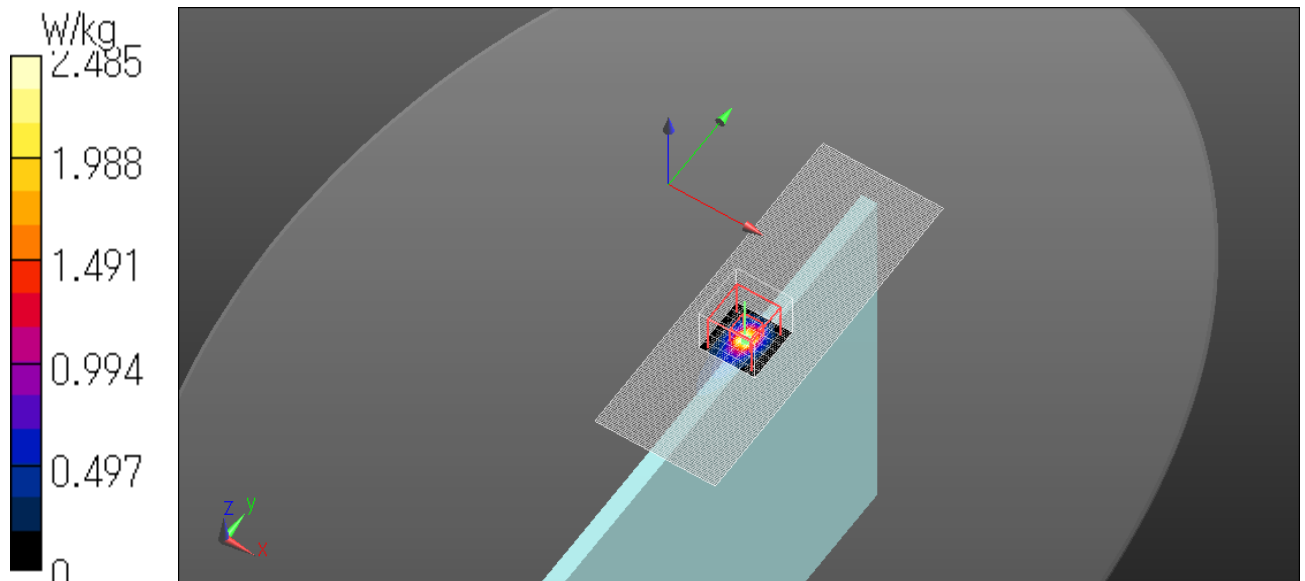
Peak SAR (extrapolated) = 5.05 W/kg

SAR(1 g) = 0.865 W/kg; SAR(10 g) = 0.167 W/kg

Maximum value of SAR (measured) = 2.48 W/kg

Date: 2015/09/15

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



WLAN 5.6G Ant Main 11ac80 VHT0 5610MHz Rear 0mm

Communication System: UID 0, WLAN (0); Communication System Band: 11ac80; Frequency: 5610 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5610$ MHz; $\sigma = 5.916$ S/m; $\epsilon_r = 48.23$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(3.87, 3.87, 3.87); Calibrated: 2015/06/17;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (61x81x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 2.07 W/kg

Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 25.67 V/m; Power Drift = -0.04 dB

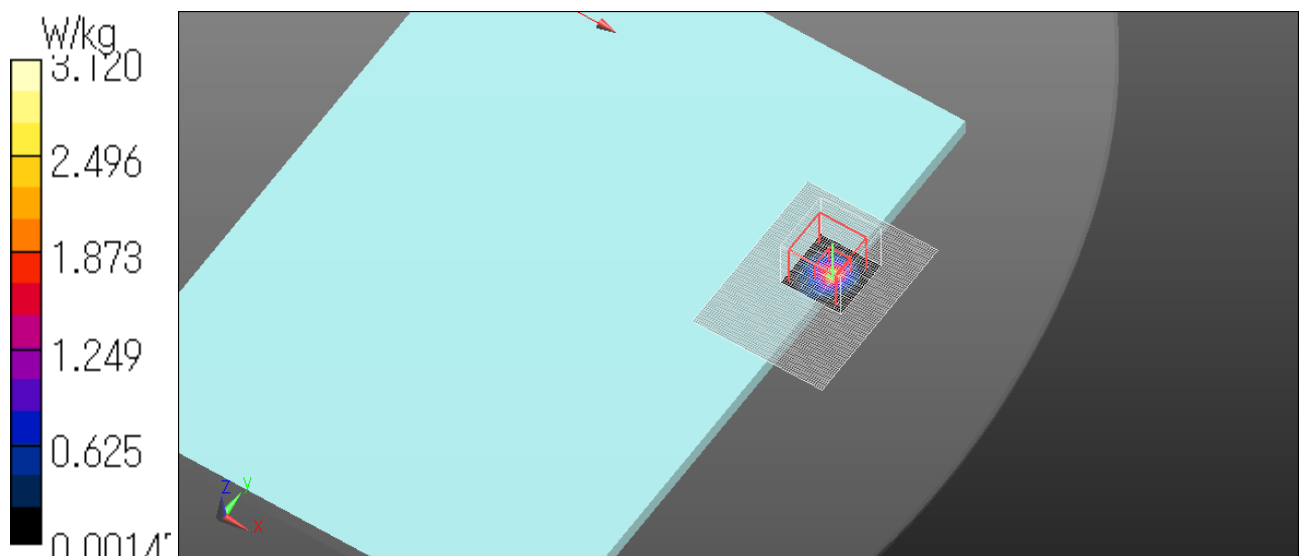
Peak SAR (extrapolated) = 5.05 W/kg

SAR(1 g) = 0.818 W/kg; SAR(10 g) = 0.184 W/kg

Maximum value of SAR (measured) = 3.12 W/kg

Date: 2015/09/15

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



WLAN 5.6G Ant Main 11ac80 VHT0 5690MHz Top 0mm

Communication System: UID 0, WLAN (0); Communication System Band: 11ac80; Frequency: 5690 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5690$ MHz; $\sigma = 6.028$ S/m; $\epsilon_r = 48.135$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(3.87, 3.87, 3.87); Calibrated: 2015/06/17;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (61x171x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 2.87 W/kg

Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 23.89 V/m; Power Drift = 0.17 dB

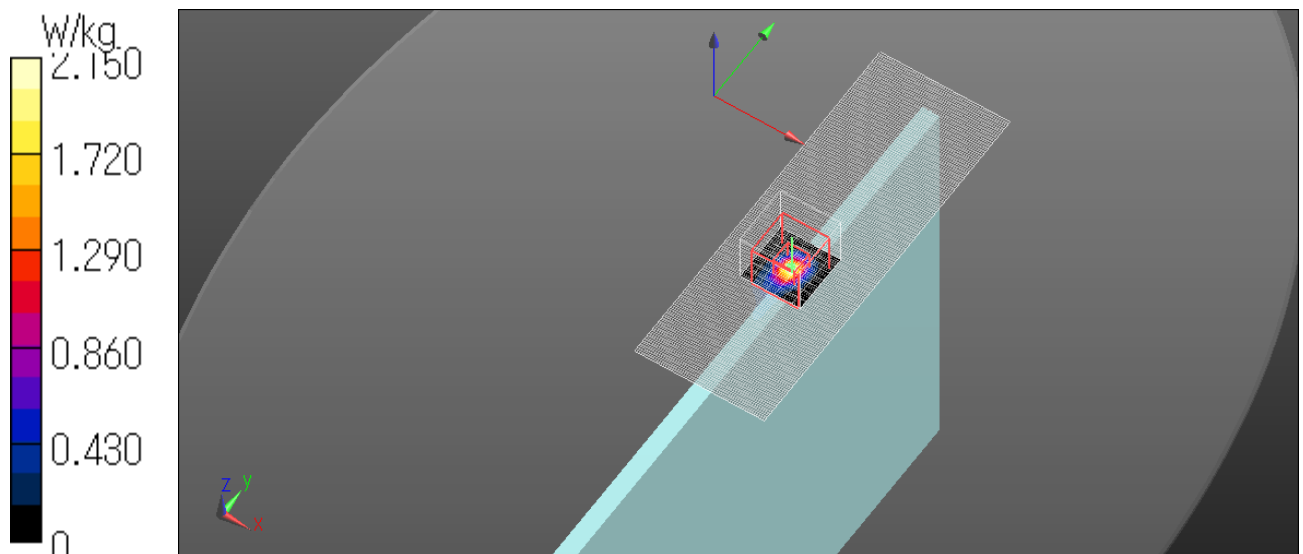
Peak SAR (extrapolated) = 3.88 W/kg

SAR(1 g) = 0.562 W/kg; SAR(10 g) = 0.092 W/kg

Maximum value of SAR (measured) = 2.15 W/kg

Date: 2015/09/15

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



WLAN 5.6G Ant Aux 11ac80 VHT0 5610MHz Top 0mm

Communication System: UID 0, WLAN (0); Communication System Band: 11ac80; Frequency: 5610 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5610$ MHz; $\sigma = 5.916$ S/m; $\epsilon_r = 48.23$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(3.87, 3.87, 3.87); Calibrated: 2015/06/17;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (61x171x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 2.18 W/kg

Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 24.32 V/m; Power Drift = 0.16 dB

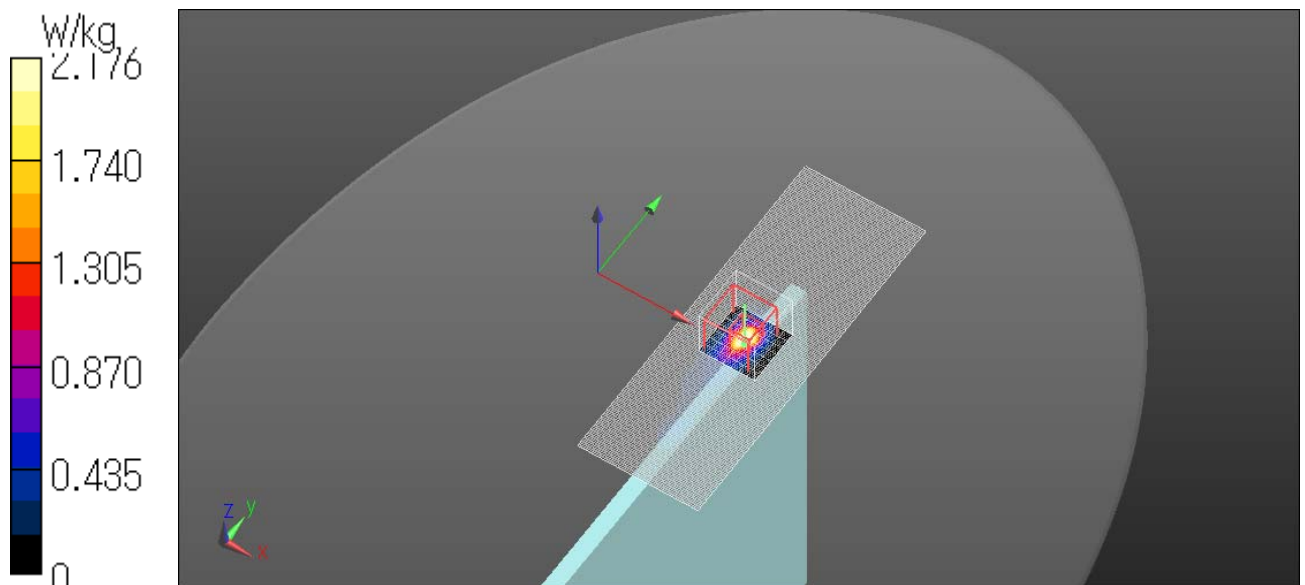
Peak SAR (extrapolated) = 5.01 W/kg

SAR(1 g) = 0.884 W/kg; SAR(10 g) = 0.190 W/kg

Maximum value of SAR (measured) = 2.88 W/kg

Date: 2015/09/15

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



WLAN 5.6G Ant Aux 11ac80 VHT0 5610MHz Rear 0mm

Communication System: UID 0, WLAN (0); Communication System Band: 11ac80; Frequency: 5610 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5610$ MHz; $\sigma = 5.916$ S/m; $\epsilon_r = 48.23$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(3.87, 3.87, 3.87); Calibrated: 2015/06/17;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (61x101x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 2.67 W/kg

Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 29.86 V/m; Power Drift = -0.11 dB

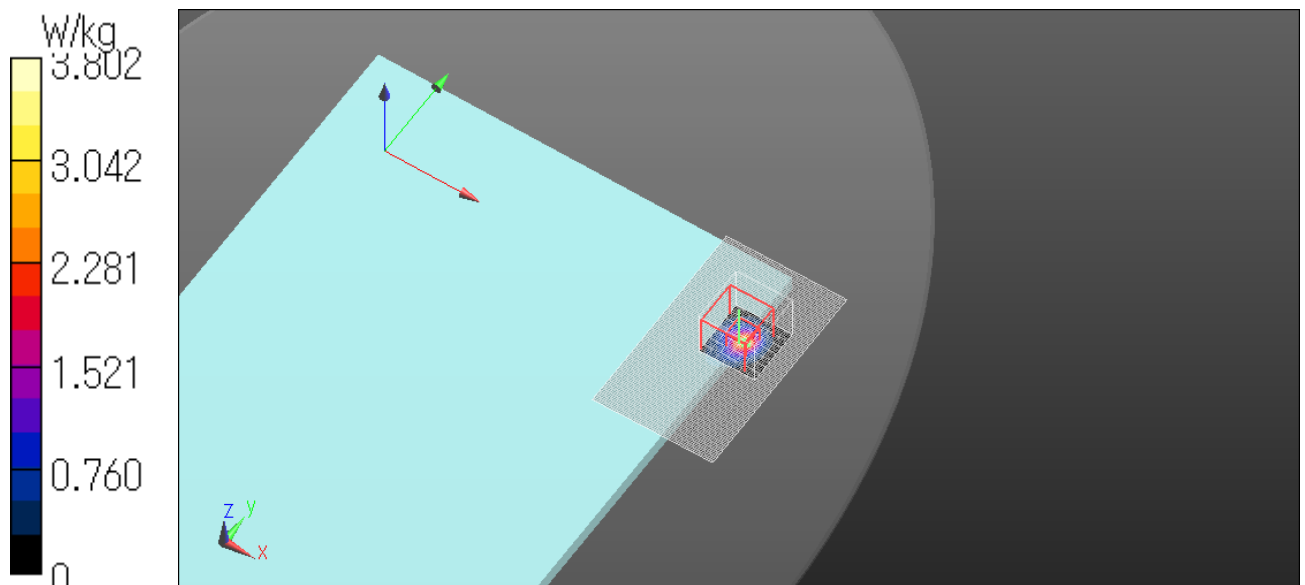
Peak SAR (extrapolated) = 8.28 W/kg

SAR(1 g) = 0.990 W/kg; SAR(10 g) = 0.231 W/kg

Maximum value of SAR (measured) = 3.80 W/kg

Date: 2015/09/15

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



WLAN 5.6G Ant Aux 11ac80 VHT0 5690MHz Rear 0mm

Communication System: UID 0, WLAN (0); Communication System Band: 11ac80; Frequency: 5690 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5690$ MHz; $\sigma = 6.028$ S/m; $\epsilon_r = 48.135$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(3.87, 3.87, 3.87); Calibrated: 2015/06/17;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (61x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 1.99 W/kg

Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 19.80 V/m; Power Drift = 0.01 dB

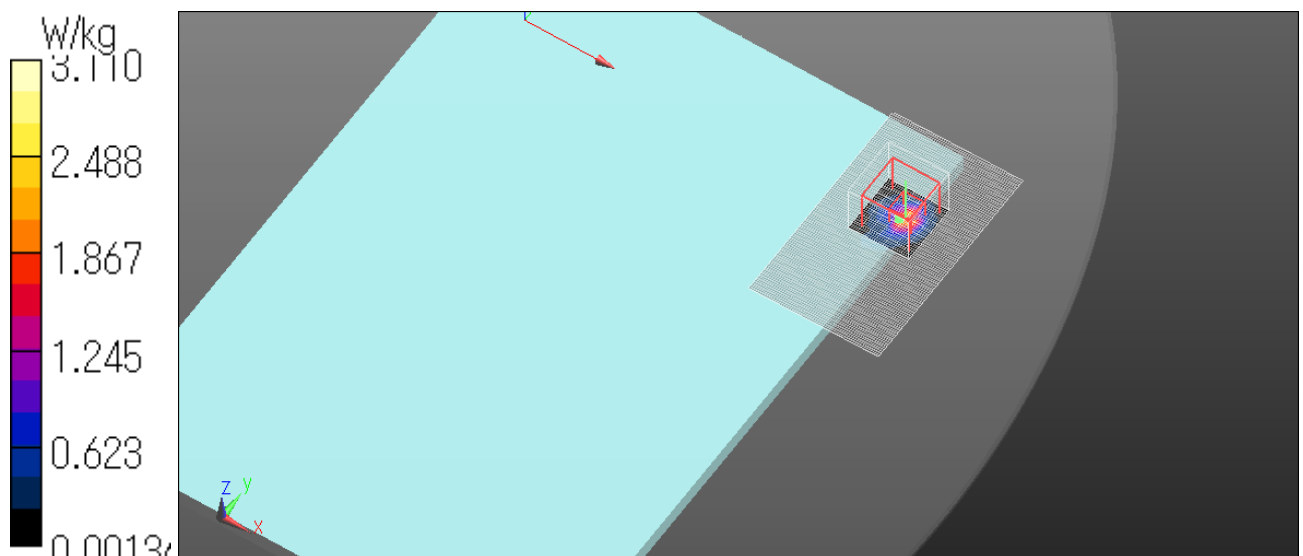
Peak SAR (extrapolated) = 8.60 W/kg

SAR(1 g) = 0.796 W/kg; SAR(10 g) = 0.159 W/kg

Maximum value of SAR (measured) = 3.11 W/kg

Date: 2015/09/15

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



WLAN 5.6G Ant Aux 11ac80 VHT0 5610MHz Rear 0mm Repeat

Communication System: UID 0, WLAN (0); Communication System Band: 11ac80; Frequency: 5610 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5610$ MHz; $\sigma = 5.916$ S/m; $\epsilon_r = 48.23$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(3.87, 3.87, 3.87); Calibrated: 2015/06/17;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (61x101x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 3.02 W/kg

Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 28.79 V/m; Power Drift = -0.05 dB

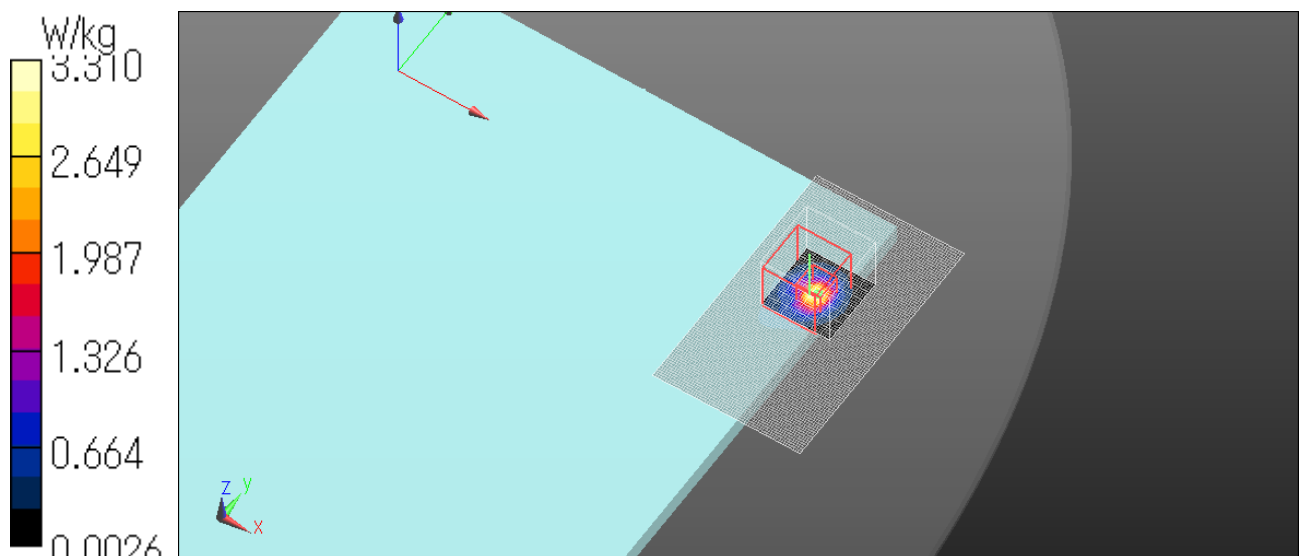
Peak SAR (extrapolated) = 6.95 W/kg

SAR(1 g) = 0.943 W/kg; SAR(10 g) = 0.217 W/kg

Maximum value of SAR (measured) = 3.31 W/kg

Date: 2015/09/15

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



5. Measurement data(5.8GHz)

WLAN 5.8G Ant Main 11ac80 VHT0 5775MHz Top 0mm

Communication System: UID 0, WLAN (0); Communication System Band: 11ac80; Frequency: 5775 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 5775$ MHz; $\sigma = 6.071$ S/m; $\epsilon_r = 47.274$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(4.08, 4.08, 4.08); Calibrated: 2015/06/17;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (61x171x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 1.36 W/kg

Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 17.21 V/m; Power Drift = 0.11 dB

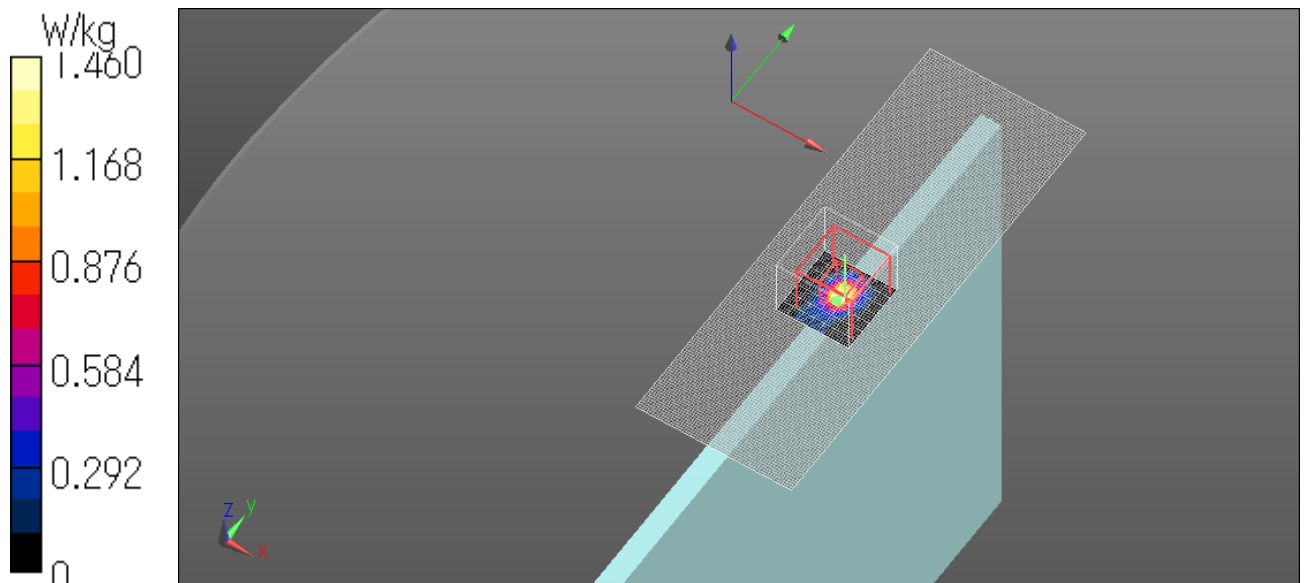
Peak SAR (extrapolated) = 2.90 W/kg

SAR(1 g) = 0.376 W/kg; SAR(10 g) = 0.055 W/kg

Maximum value of SAR (measured) = 1.46 W/kg

Date: 2015/09/17

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



WLAN 5.8G Ant Main 11ac80 VHT0 5775MHz Rear 0mm

Communication System: UID 0, WLAN (0); Communication System Band: 11ac80; Frequency: 5775 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 5775$ MHz; $\sigma = 6.071$ S/m; $\epsilon_r = 47.274$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(4.08, 4.08, 4.08); Calibrated: 2015/06/17;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (71x81x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 0.873 W/kg

Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 19.03 V/m; Power Drift = -0.02 dB

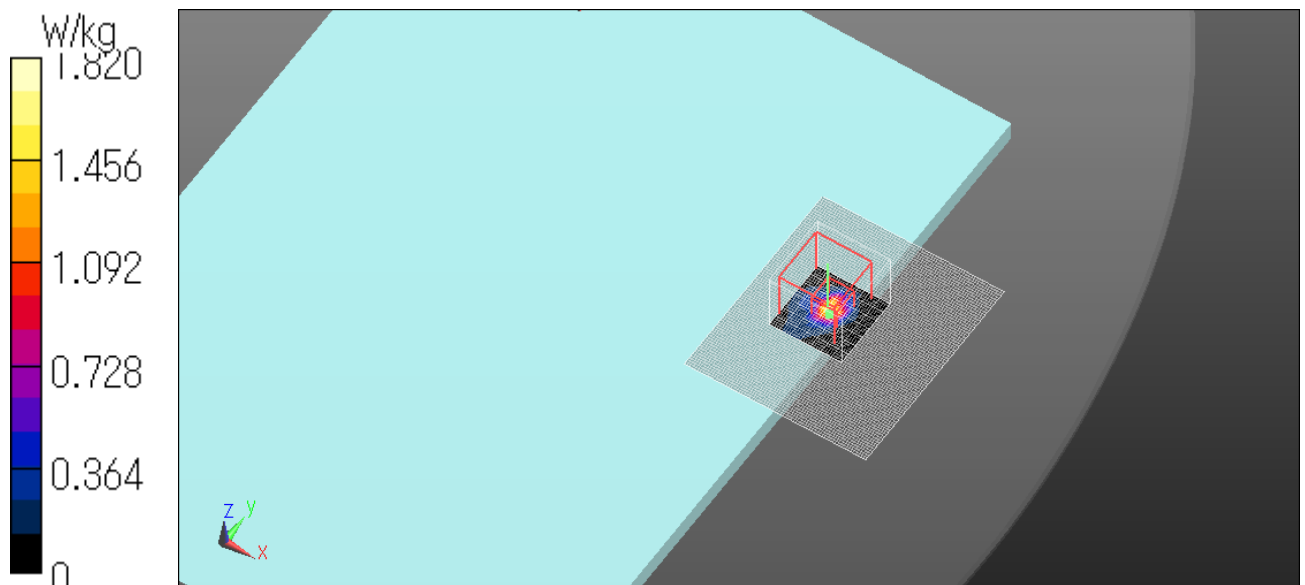
Peak SAR (extrapolated) = 3.52 W/kg

SAR(1 g) = 0.344 W/kg; SAR(10 g) = 0.048 W/kg

Maximum value of SAR (measured) = 1.82 W/kg

Date: 2015/09/17

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



WLAN 5.8G Ant Aux 11ac80 VHT0 5775MHz Top 0mm

Communication System: UID 0, WLAN (0); Communication System Band: 11ac80; Frequency: 5775 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 5775$ MHz; $\sigma = 6.071$ S/m; $\epsilon_r = 47.274$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(4.08, 4.08, 4.08); Calibrated: 2015/06/17;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (61x171x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

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

Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 21.73 V/m; Power Drift = -0.17 dB

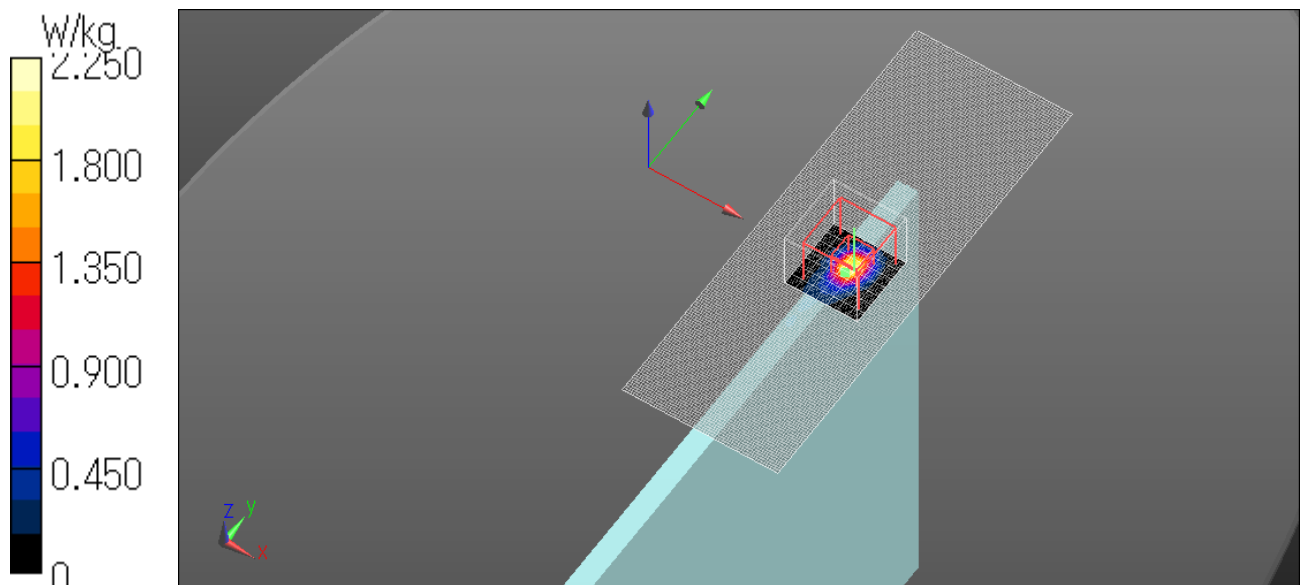
Peak SAR (extrapolated) = 4.37 W/kg

SAR(1 g) = 0.655 W/kg; SAR(10 g) = 0.110 W/kg

Maximum value of SAR (measured) = 2.25 W/kg

Date: 2015/09/17

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



WLAN 5.8G Ant Aux 11ac80 VHT0 5775MHz Rear 0mm

Communication System: UID 0, WLAN (0); Communication System Band: 11ac80; Frequency: 5775 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 5775$ MHz; $\sigma = 6.071$ S/m; $\epsilon_r = 47.274$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(4.08, 4.08, 4.08); Calibrated: 2015/06/17;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (61x171x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 1.84 W/kg

Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 13.73 V/m; Power Drift = -0.06 dB

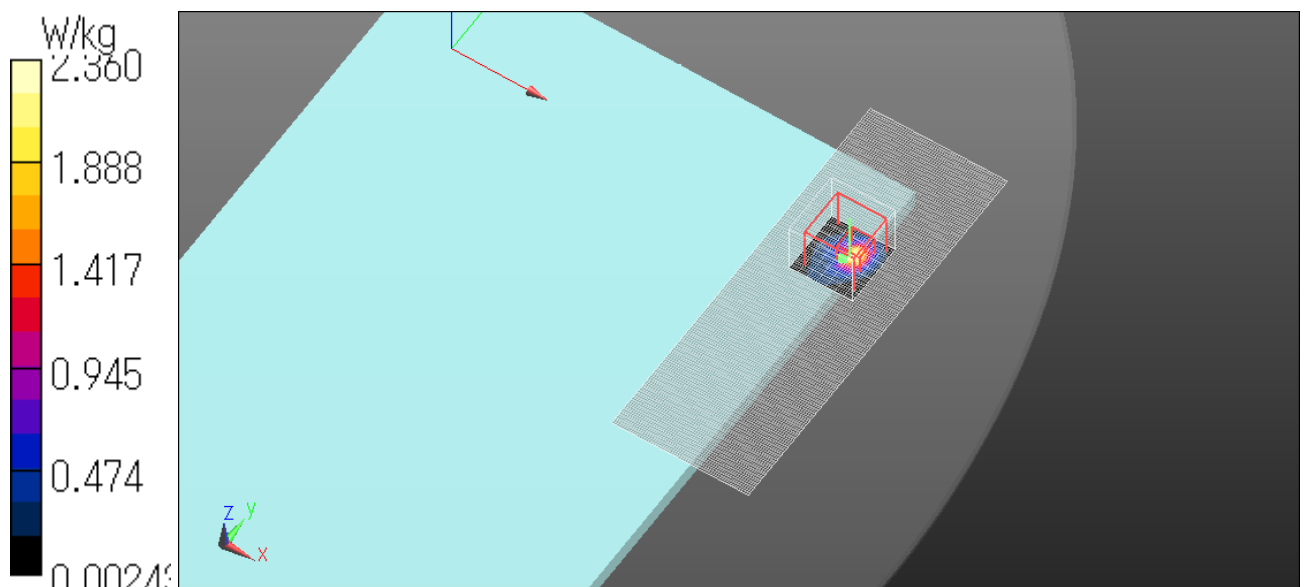
Peak SAR (extrapolated) = 4.24 W/kg

SAR(1 g) = 0.638 W/kg; SAR(10 g) = 0.117 W/kg

Maximum value of SAR (measured) = 2.36 W/kg

Date: 2015/09/17

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



6. Measurement data(Simultaneous Transmission)

WLAN 5.3G Ant Main+Aux 11ac80 VHT0 5290MHz Top 0mm

Communication System: UID 0, WLAN (0); Communication System Band: 11ac80; Frequency: 5290 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5290$ MHz; $\sigma = 5.42$ S/m; $\epsilon_r = 47.975$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(4.46, 4.46, 4.46); Calibrated: 2015/06/17;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (61x171x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 2.31 W/kg

Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 25.03 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 5.46 W/kg

SAR(1 g) = 0.915 W/kg; SAR(10 g) = 0.207 W/kg

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

Zoom Scan 2 (8x8x7)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 25.03 V/m; Power Drift = -0.14 dB

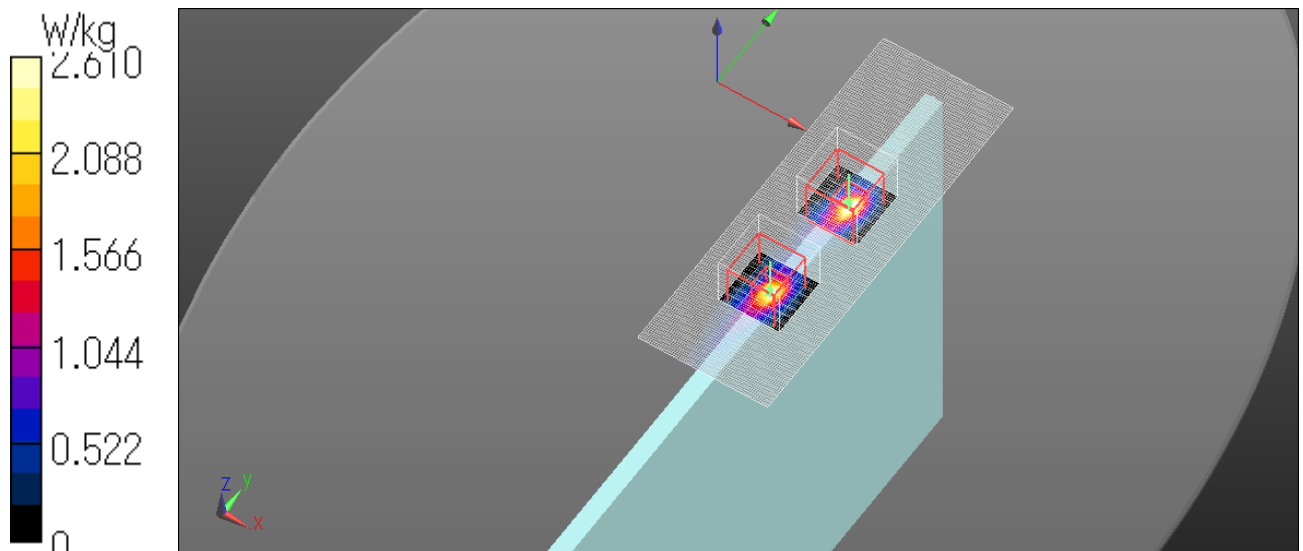
Peak SAR (extrapolated) = 5.02 W/kg

SAR(1 g) = 0.890 W/kg; SAR(10 g) = 0.189 W/kg

Maximum value of SAR (measured) = 3.06 W/kg

Date: 2015/09/17

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



WLAN 5.3G Ant Main+Aux 11ac80 VHT0 5290MHz Rear 0mm

Communication System: UID 0, WLAN (0); Communication System Band: 11ac80; Frequency: 5290 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5290$ MHz; $\sigma = 5.42$ S/m; $\epsilon_r = 47.975$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(4.46, 4.46, 4.46); Calibrated: 2015/06/17;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (61x171x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 4.84 W/kg

Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 25.22 V/m; Power Drift = -0.16 dB

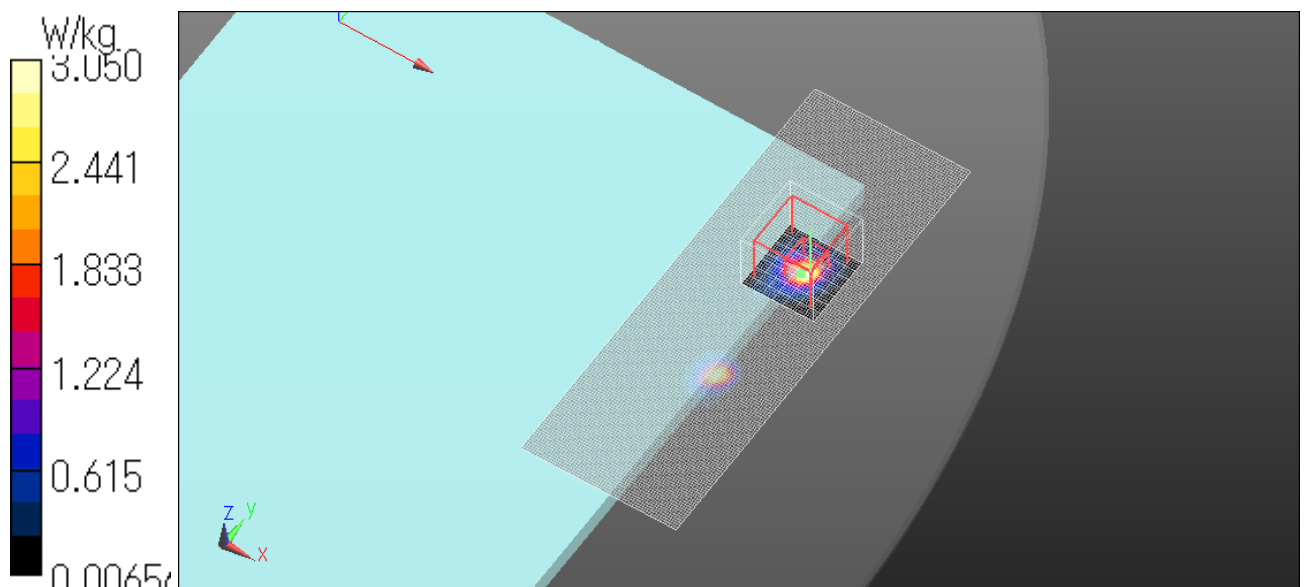
Peak SAR (extrapolated) = 11.2 W/kg

SAR(1 g) = 0.885 W/kg; SAR(10 g) = 0.196 W/kg

Maximum value of SAR (measured) = 3.05 W/kg

Date: 2015/09/17

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



WLAN 5.6G Ant Main+Aux 11ac80 VHT0 5610MHz Top 0mm

Communication System: UID 0, WLAN (0); Communication System Band: 11ac80; Frequency: 5610 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5610$ MHz; $\sigma = 5.916$ S/m; $\epsilon_r = 48.23$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(3.87, 3.87, 3.87); Calibrated: 2015/06/17;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (61x171x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 2.62 W/kg

Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 25.85 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 5.82 W/kg

SAR(1 g) = 0.930 W/kg; SAR(10 g) = 0.207 W/kg

Maximum value of SAR (measured) = 3.09 W/kg

Zoom Scan 2 (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 25.85 V/m; Power Drift = -0.01 dB

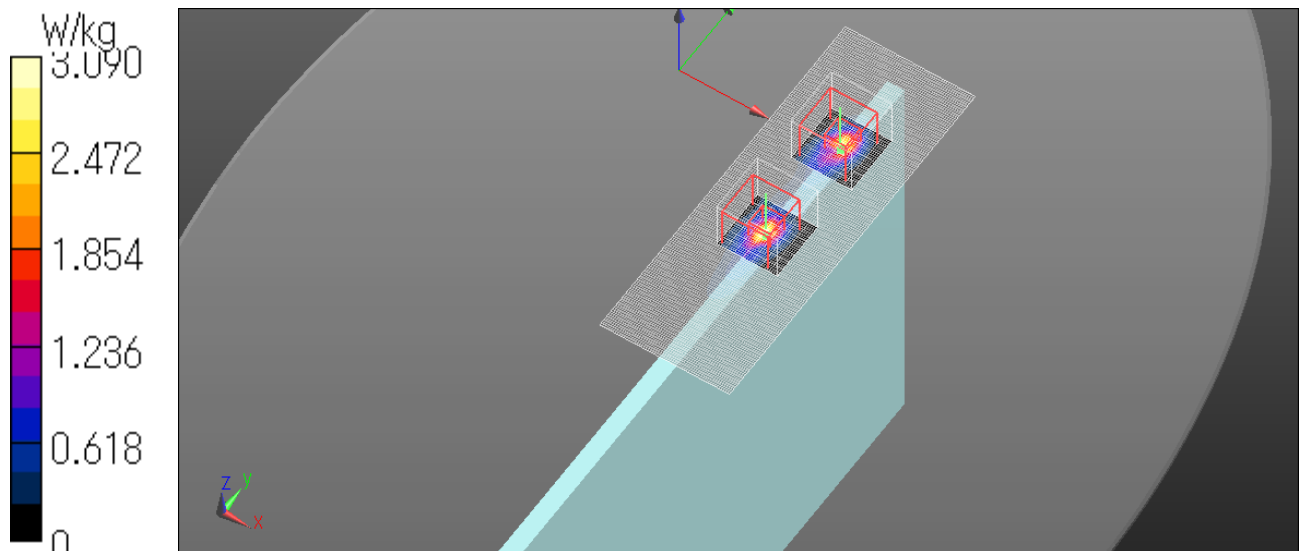
Peak SAR (extrapolated) = 5.28 W/kg

SAR(1 g) = 0.924 W/kg; SAR(10 g) = 0.207 W/kg

Maximum value of SAR (measured) = 3.02 W/kg

Date: 2015/09/15

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



UL Japan, Inc.

Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone: +81 596 24 8999

Facsimile: +81 596 24 8124

WLAN 5.6G Ant Main+Aux 11ac80 VHT0 5610MHz Rear 0mm

Communication System: UID 0, WLAN (0); Communication System Band: 11ac80; Frequency: 5610 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5610$ MHz; $\sigma = 5.916$ S/m; $\epsilon_r = 48.23$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(3.87, 3.87, 3.87); Calibrated: 2015/06/17;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (61x171x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 2.51 W/kg

Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 25.57 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 6.12 W/kg

SAR(1 g) = 0.850 W/kg; SAR(10 g) = 0.186 W/kg

Maximum value of SAR (measured) = 2.53 W/kg

Zoom Scan 2 (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 25.57 V/m; Power Drift = -0.06 dB

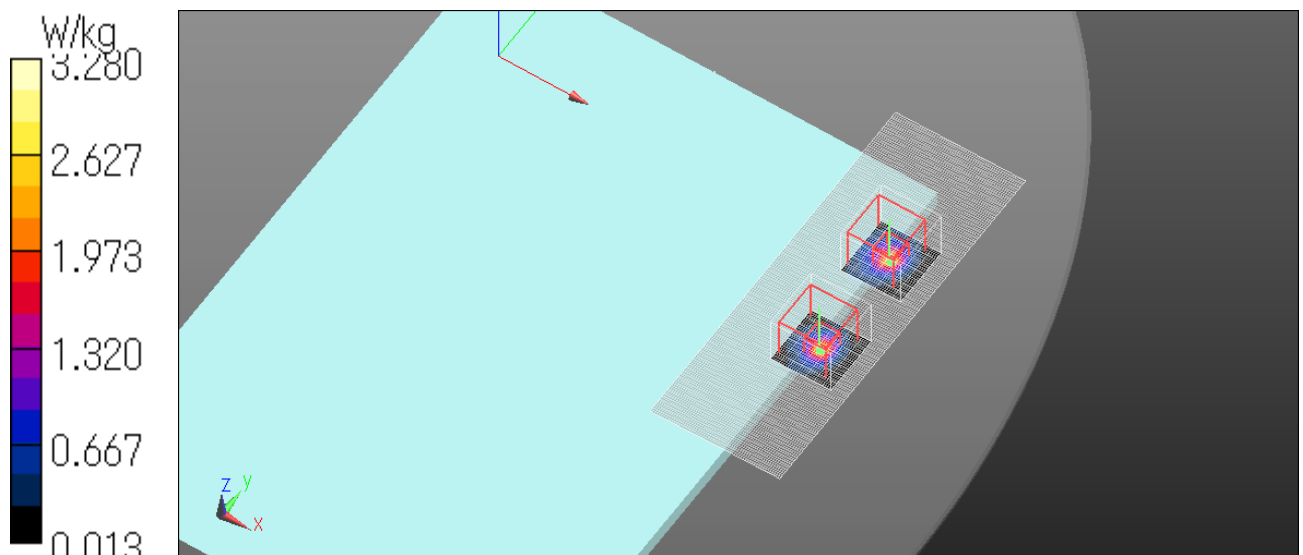
Peak SAR (extrapolated) = 6.36 W/kg

SAR(1 g) = 0.951 W/kg; SAR(10 g) = 0.227 W/kg

Maximum value of SAR (measured) = 3.28 W/kg

Date: 2015/09/15

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



APPENDIX2 : System Check

1. System check result Body 2450MHz

(1) Simulated Tissue Liquid Parameter confirmation

DIELECTRIC PARAMETERS MEASUREMENT RESULTS											
Date	Ambient Temp. [deg.c]	Relative Humidity [%]	Liquid type	Liquid Temp. [deg.c]	Measured Frequency [MHz]	Parameters	Target Value	Measured	Deviation [%]	Limit [%]	Remark
18-Sep	24.0	48	MSL 2450	23.5	2450	ϵ_r	52.7	51.1	-3.0	+/-5	*1
						σ [mho/m]	1.95	2.02	3.6	+/-5	

ϵ_r : Relative Permittivity / σ : Conductivity

*1 The Target value is a parameter defined in KDB 865664D01.

DIELECTRIC PARAMETERS MEASUREMENT RESULTS											
Date	Ambient Temp. [deg.c]	Relative Humidity [%]	Liquid type	Liquid Temp. [deg.c]	Measured Frequency [MHz]	Parameters	Target Value	Measured	Deviation [%]	Limit [%]	Remark
18-Sep	24.0	48	MSL 2450	23.5	2450	ϵ_r	52.2	51.1	-2.0	+/-6	*2 *3
						σ [mho/m]	2.00	2.02	1.0	+/-6	

ϵ_r : Relative Permittivity / σ : Conductivity

*2 The target value is the calibrated dipole Body TSL parameters. (D2450V2 SN:713, Measured Body TSL parameters)

*3 The limit is for deviation provided by manufacture.

(2) System check result (for calibration by manufacture)

SYSTEM CHECK							
Date	Frequency [MHz]	SAR 1g [W/kg]			Deviation [%]	Limit [%]	Remark
		Forward Power	Conversion 1W	Target Value(1W)			
		Measured	Calculation				
18-Sep	2450.00	13.70	54.80	50.40	8.7	+/-10	*4

*4 The taget value is the parameter defined in SAR measured x4(12.6 x 4 = 50.4) in manufacturer calibrated dipole (D2450V2 SN:713)

Body 2450MHz System Check DATA/ D2450V2/ Forward Conducted Power: 250mW

Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz); Frequency: 2450 MHz;
Duty Cycle: 1:1

Medium parameters used: $f = 2450$ MHz; $\sigma = 2.02$ S/m; $\epsilon_r = 51.133$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3917 (add ConvF); ConvF(7.15, 7.15, 7.15); Calibrated: 2015/08/13;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1369; Calibrated: 2015/05/22

Phantom: ELI v5.0 (30deg probe tilt); Type: QDOVA002AA; Serial: TP:1203

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (81x71x1): Interpolated grid: $dx=1.200$ mm, $dy=1.200$ mm

Maximum value of SAR (interpolated) = 22.6 W/kg

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

Reference Value = 102.5 V/m; Power Drift = 0.06 dB

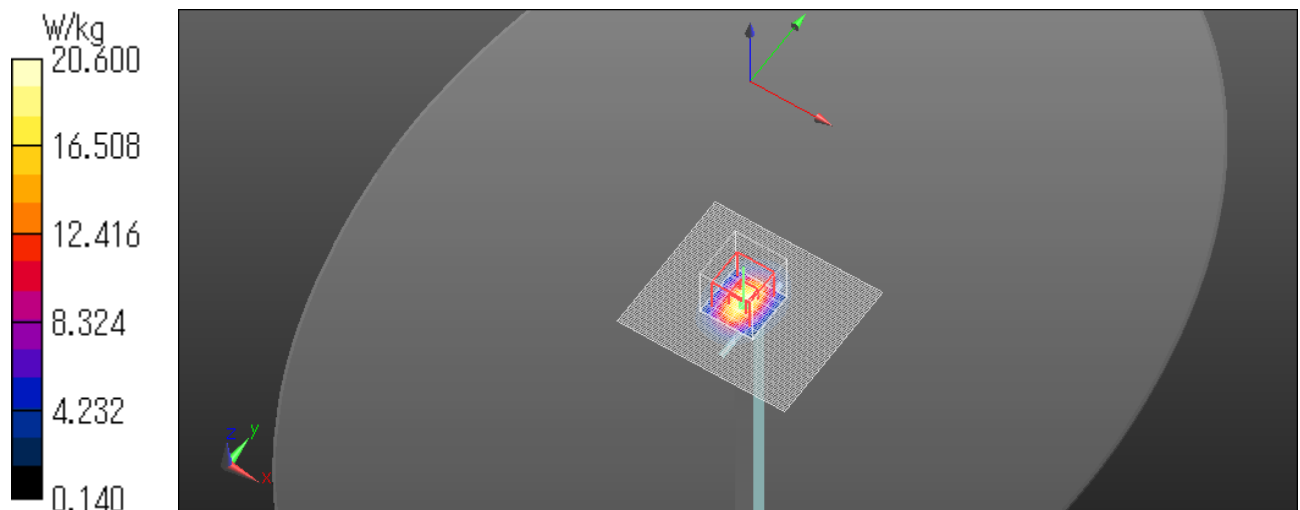
Peak SAR (extrapolated) = 27.6 W/kg

SAR(1 g) = 13.7 W/kg; SAR(10 g) = 6.4 W/kg

Maximum value of SAR (measured) = 20.6 W/kg

Date: 2015/09/18

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



Body 2450MHz System Check DATA/ D2450V2/ Forward Conducted Power: 250mW

Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz); Frequency: 2450 MHz;
Duty Cycle: 1:1

Medium parameters used: $f = 2450$ MHz; $\sigma = 2.02$ S/m; $\epsilon_r = 51.133$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3917 (add ConvF); ConvF(7.15, 7.15, 7.15); Calibrated: 2015/08/13;

Sensor-Surface: 0mm (Fix Surface)

Electronics: DAE4 Sn1369; Calibrated: 2015/05/22

Phantom: ELI v5.0 (30deg probe tilt); Type: QDOVA002AA; Serial: TP:1203

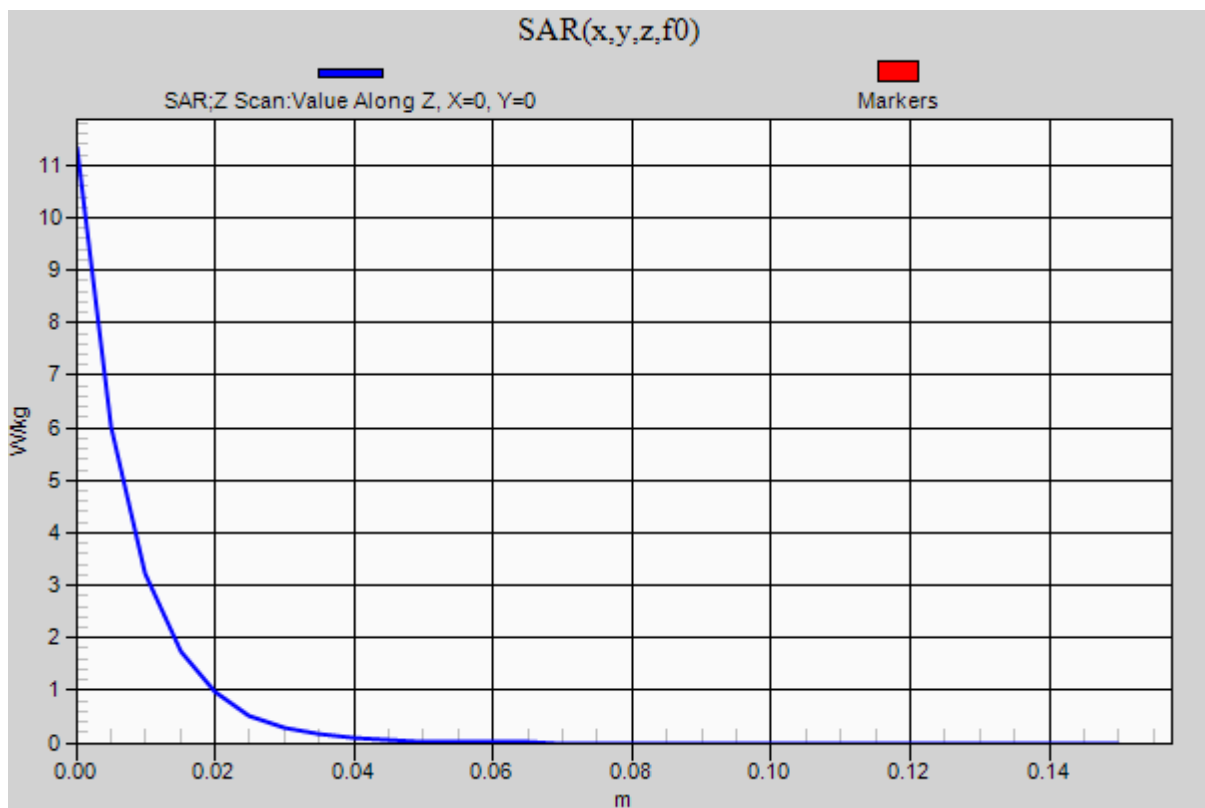
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Z Scan (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 11.3 W/kg

Date: 2015/09/18

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



2. System check result Body 5250MHz

(1) Simulated Tissue Liquid Parameter confirmation

DIELECTRIC PARAMETERS MEASUREMENT RESULTS											
Date	Ambient Temp. [deg.c]	Relative Humidity [%]	Liquid type	Liquid Temp. [deg.c]	Measured Frequency [MHz]	Parameters	Target Value	Measured	Deviation [%]	Limit [%]	Remark
-	-	-	-	-	3000	ϵ_r	52.0	-	-	-	*1
						σ [mho/m]	2.73	-	-	-	
17-Sep	24.0	50	MBBL 3.5-5.8	23.5	5250	ϵ_r	49.0	48.1	-1.7	+/-5	*2
						σ [mho/m]	5.36	5.36	0.0	+/-5	
-	-	-	-	-	5800	ϵ_r	48.2	-	-	-	*1
						σ [mho/m]	6.00	-	-	-	

ϵ_r : Relative Permittivity / σ : Conductivity

*1 The Target value is a parameter defined in KDB 865664D01.

*2 The dielectric parameters should be linearly interpolated between the closest pair of target frequencies to determine the applicable dielectric parameters corresponding to the device test frequency.

DIELECTRIC PARAMETERS MEASUREMENT RESULTS											
Date	Ambient Temp. [deg.c]	Relative Humidity [%]	Liquid type	Liquid Temp. [deg.c]	Measured Frequency [MHz]	Parameters	Target Value	Measured	Deviation [%]	Limit [%]	Remark
17-Sep	24.0	50	MBBL 3.5-5.8	23.5	5250	ϵ_r	49.3	48.1	-2.4	+/-6	*3*4
						σ [mho/m]	5.48	5.36	-2.2	+/-6	

ϵ_r : Relative Permittivity / σ : Conductivity

*3 The target value is the calibrated dipole Body TSL parameters. (D5GHzV2 SN:1020, Measured Body TSL parameters)

*4 The limit is for deviation provided by manufacture.

(2) System check result (for calibration by manufacture)

SYSTEM CHECK							
Date	Frequency [MHz]	SAR 1g [W/kg]			Deviation [%]	Limit [%]	Remark
		Forward Power	Conversion 1W	Target Value(1W)			
		Measured	Calculation				
17-Sep	5250.00	7.48	74.80	73.80	1.4	+/-10	*5

*5 The target value is the parameter defined in SAR measured x 10(7.38 x 10 = 73.8) in manufacturer calibrated dipole (D5GHzV2 SN:1020)
Please refer to " SAR result with Body TSL of Appendix 2 System Check Dipole (D5GHzV2 SN:1020)".

Body 5250MHz System Check Data / D5GHzV2 / Forward Conducted Power: 100mW

Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5250 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5250$ MHz; $\sigma = 5.362$ S/m; $\epsilon_r = 48.116$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(4.46, 4.46, 4.46); Calibrated: 2015/06/17;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 18.6 W/kg

Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 62.22 V/m; Power Drift = -0.07 dB

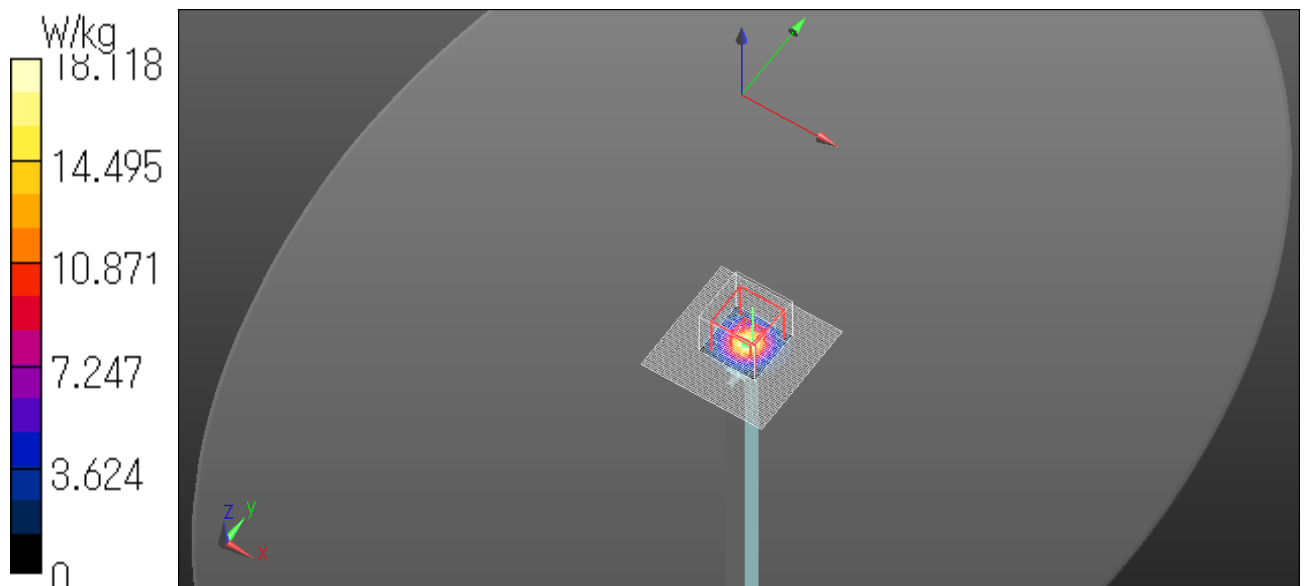
Peak SAR (extrapolated) = 32.1 W/kg

SAR(1 g) = 7.48 W/kg; SAR(10 g) = 2.1 W/kg

Maximum value of SAR (measured) = 18.1 W/kg

Date: 2015/09/17

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



Body 5250MHz System Check Data / D5GHzV2 / Forward Conducted Power: 100mW

Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5250 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5250$ MHz; $\sigma = 5.362$ S/m; $\epsilon_r = 48.116$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(4.46, 4.46, 4.46); Calibrated: 2015/06/17;

Sensor-Surface: 0mm (Fix Surface)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

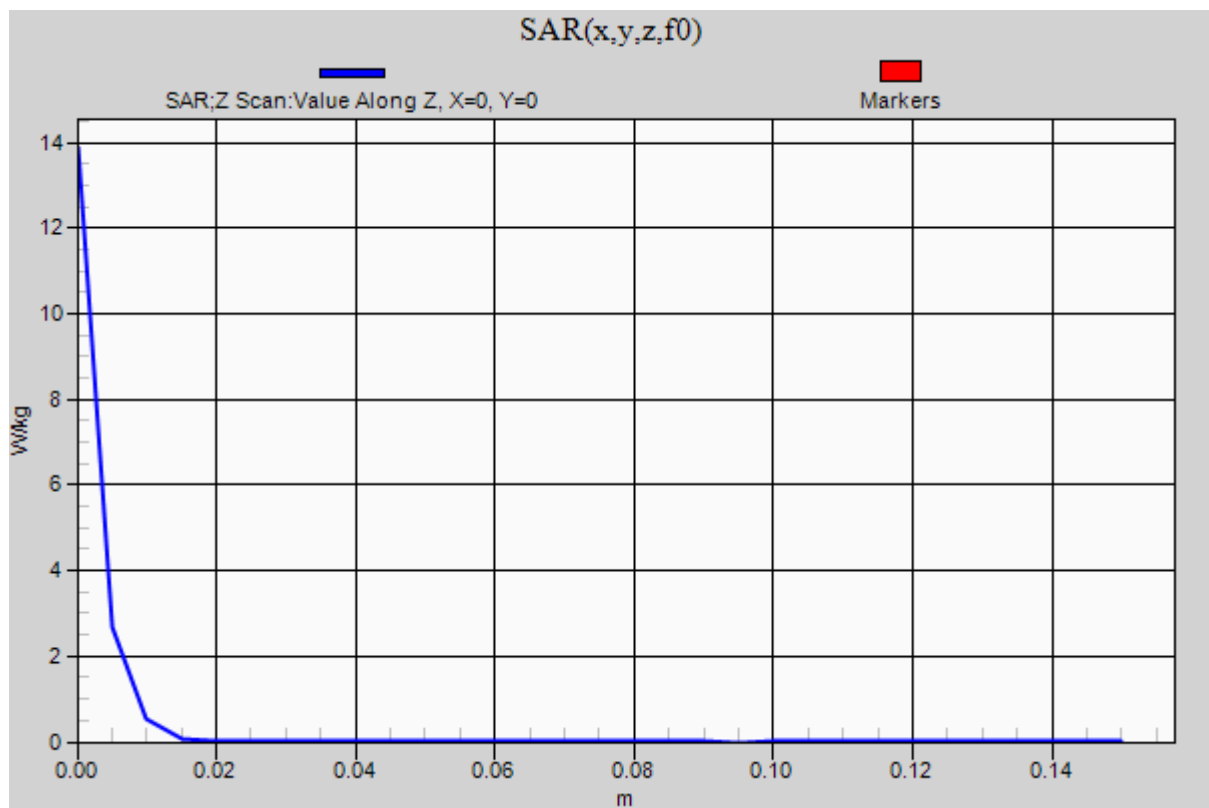
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Z Scan (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 13.9 W/kg

Date: 2015/09/17

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



3. System check result Body 5600MHz

(1) Simulated Tissue Liquid Parameter confirmation

DIELECTRIC PARAMETERS MEASUREMENT RESULTS											
Date	Ambient Temp. [deg.c]	Relative Humidity [%]	Liquid type	Liquid Temp. [deg.c]	Measured Frequency [MHz]	Parameters	Target Value	Measured	Deviation [%]	Limit [%]	Remark
-	-	-	-	-	3000	ϵ_r	52.0	-	-	-	*1
						σ [mho/m]	2.73	-	-	-	
15-Sep	24.0	48	MBBL 3.5-5.8	23.5	5600	ϵ_r	48.5	48.3	-0.4	+/-5	*2
						σ [mho/m]	5.77	5.87	1.7	+/-5	
-	-	-	-	-	5800	ϵ_r	48.2	-	-	-	*1
						σ [mho/m]	6.00	-	-	-	

ϵ_r : Relative Permittivity / σ : Conductivity

*1 The Target value is a parameter defined in KDB 865664D01.

*2 The dielectric parameters should be linearly interpolated between the closest pair of target frequencies to determine the applicable dielectric parameters corresponding to the device test frequency.

DIELECTRIC PARAMETERS MEASUREMENT RESULTS											
Date	Ambient Temp. [deg.c]	Relative Humidity [%]	Liquid type	Liquid Temp. [deg.c]	Measured Frequency [MHz]	Parameters	Target Value	Measured	Deviation [%]	Limit [%]	Remark
15-Sep	24.0	48	MBBL 3.5-5.8	23.5	5600	ϵ_r	48.7	48.3	-0.9	+/-6	*3*4
						σ [mho/m]	5.96	5.87	-1.6	+/-6	

ϵ_r : Relative Permittivity / σ : Conductivity

*3 The target value is the calibrated dipole Body TSL parameters. (D5GHzV2 SN:1020, Measured Body TSL parameters)

*4 The limit is for deviation provided by manufacture.

(2) System check result (for calibration by manufacture)

SYSTEM CHECK							
Date	Frequency [MHz]	SAR 1g [W/kg]					
		Forward Power	Conversion 1W	Target Value(1W)	Deviation [%]	Limit [%]	Remark
		Measured	Calculation				
15-Sep	5600.00	8.31	83.10	77.20	7.6	+/-10	*5

*5 The target value is the parameter defined in SAR measured $\times 10$ ($7.72 \times 10 = 77.2$) in manufacturer calibrated dipole (D5GHzV2 SN:1020)
Please refer to " SAR result with Body TSL of Appendix 2 System Check Dipole (D5GHzV2 SN:1020)".

Body 5600MHz System Check Data / D5GHzV2 / Forward Conducted Power: 100mW

Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5600 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5600$ MHz; $\sigma = 5.867$ S/m; $\epsilon_r = 48.254$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(3.87, 3.87, 3.87); Calibrated: 2015/06/17;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (61x61x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 21.4 W/kg

Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 65.49 V/m; Power Drift = 0.03 dB

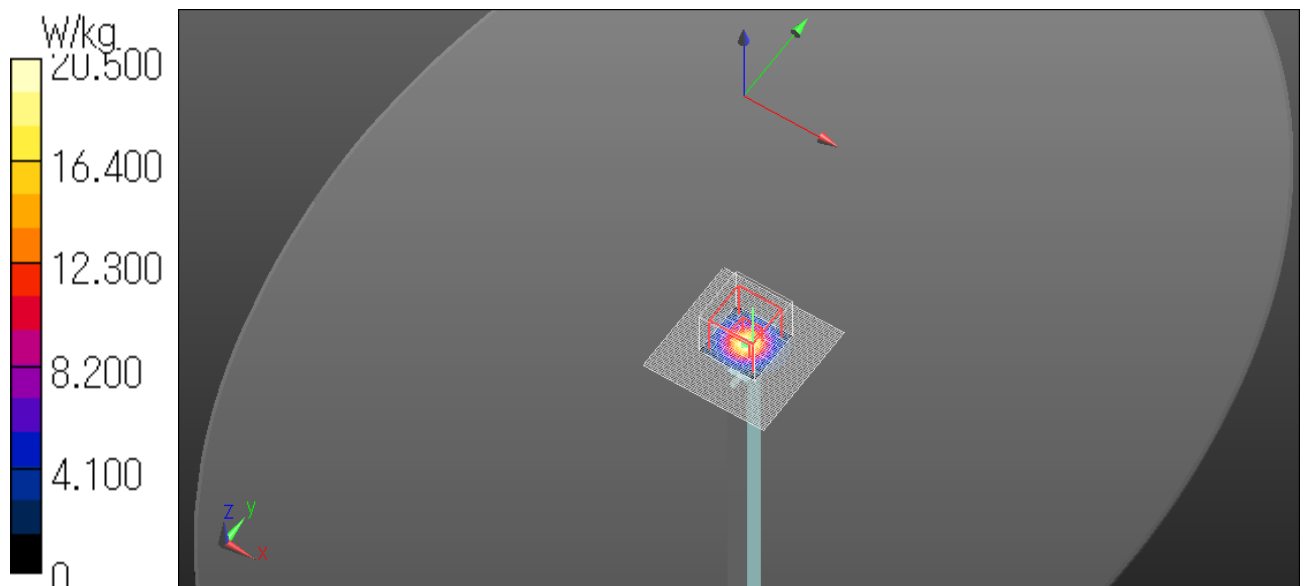
Peak SAR (extrapolated) = 37.0 W/kg

SAR(1 g) = 8.31 W/kg; SAR(10 g) = 2.31 W/kg

Maximum value of SAR (measured) = 20.5 W/kg

Date: 2015/09/15

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



Body 5600MHz System Check Data / D5GHzV2 / Forward Conducted Power: 100mW

Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5600 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5600$ MHz; $\sigma = 5.867$ S/m; $\epsilon_r = 48.254$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(3.87, 3.87, 3.87); Calibrated: 2015/06/17;

Sensor-Surface: 0mm (Fix Surface)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

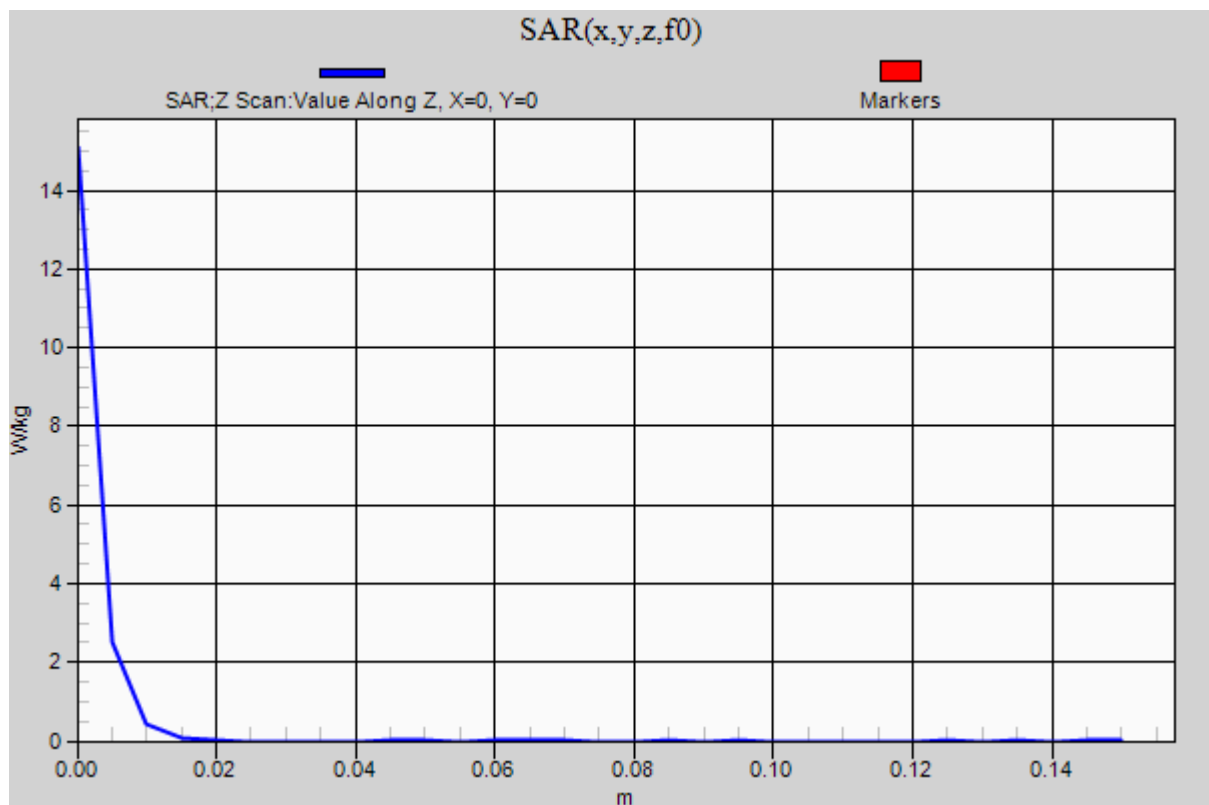
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Z Scan (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 15.1 W/kg

Date: 2015/09/15

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



4. System check result Body 5750MHz

(2) Simulated Tissue Liquid Parameter confirmation

DIELECTRIC PARAMETERS MEASUREMENT RESULTS											
Date	Ambient Temp. [deg.c]	Relative Humidity [%]	Liquid type	Liquid Temp. [deg.c]	Measured Frequency [MHz]	Parameters	Target Value	Measured	Deviation [%]	Limit [%]	Remark
-	-	-	-	-	3000	ϵ_r	52.0	-	-	-	*1
						σ [mho/m]	2.73	-	-	-	
17-Sep	24.0	50	MBBL 3.5-5.8	23.5	5750	ϵ_r	48.3	47.4	-1.9	+/-5	*2
						σ [mho/m]	5.94	6.10	2.7	+/-5	
-	-	-	-	-	5800	ϵ_r	48.2	-	-	-	*1
						σ [mho/m]	6.00	-	-	-	

ϵ_r : Relative Permittivity / σ : Conductivity

*1 The Target value is a parameter defined in KDB 865664D01.

*2 The dielectric parameters should be linearly interpolated between the closest pair of target frequencies to determine the applicable dielectric parameters corresponding to the device test frequency.

DIELECTRIC PARAMETERS MEASUREMENT RESULTS											
Date	Ambient Temp. [deg.c]	Relative Humidity [%]	Liquid type	Liquid Temp. [deg.c]	Measured Frequency [MHz]	Parameters	Target Value	Measured	Deviation [%]	Limit [%]	Remark
17-Sep	24.0	50	MBBL 3.5-5.8	23.5	5750	ϵ_r	48.5	47.4	-2.4	+/-6	*3*4
						σ [mho/m]	6.18	6.10	-1.3	+/-6	

ϵ_r : Relative Permittivity / σ : Conductivity

*3 The target value is the calibrated dipole Body TSL parameters. (D5GHzV2 SN:1020, Measured Body TSL parameters)

*4 The limit is for deviation provided by manufacture.

(2) System check result (for calibration by manufacture)

SYSTEM CHECK							
Date	Frequency [MHz]	SAR 1g [W/kg]					
		Forward Power	Conversion 1W	Target Value(1W)	Deviation [%]	Limit [%]	Remark
		Measured	Calculation				
17-Sep	5750.00	7.82	78.20	73.70	6.1	+/-10	*5

*5 The target value is the parameter defined in SAR measured x 10(7.37 x 10 = 73.7) in manufacturer calibrated dipole (D5GHzV2 SN:1020)
Please refer to " SAR result with Body TSL of Appendix 2 System Check Dipole (D5GHzV2 SN:1020)".

Body 5750MHz System Check Data / D5GHzV2 / Forward Conducted Power: 100mW

Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5750$ MHz; $\sigma = 6.098$ S/m; $\epsilon_r = 47.354$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(4.08, 4.08, 4.08); Calibrated: 2015/06/17;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Area Scan (61x61x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 20.1 W/kg

Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 63.70 V/m; Power Drift = 0.01 dB

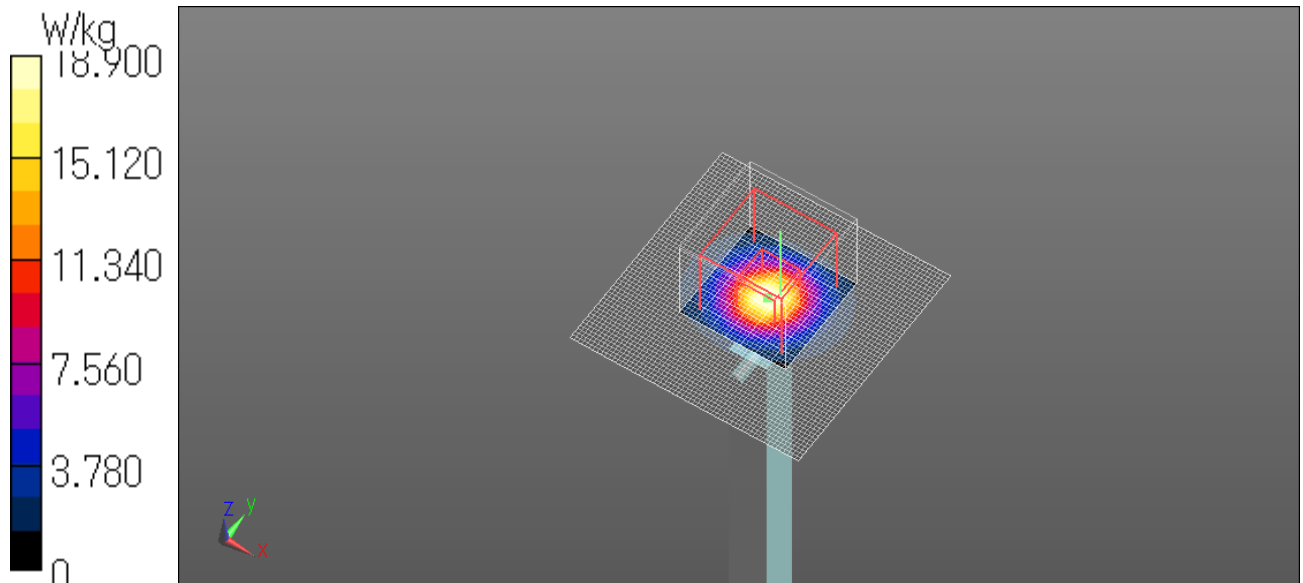
Peak SAR (extrapolated) = 35.6 W/kg

SAR(1 g) = 7.82 W/kg; SAR(10 g) = 2.17 W/kg

Maximum value of SAR (measured) = 18.9 W/kg

Date: 2015/09/17

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



Body 5750MHz System Check Data / D5GHzV2 / Forward Conducted Power: 100mW

Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 5750$ MHz; $\sigma = 6.098$ S/m; $\epsilon_r = 47.354$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration

Probe: EX3DV4 - SN3922; ConvF(4.08, 4.08, 4.08); Calibrated: 2015/06/17;

Sensor-Surface: 0mm (Fix Surface)

Electronics: DAE4 Sn1372; Calibrated: 2015/06/15

Phantom: ELI v5.0 TP1207; Type: QDOVA001BB; Serial: TP:1207

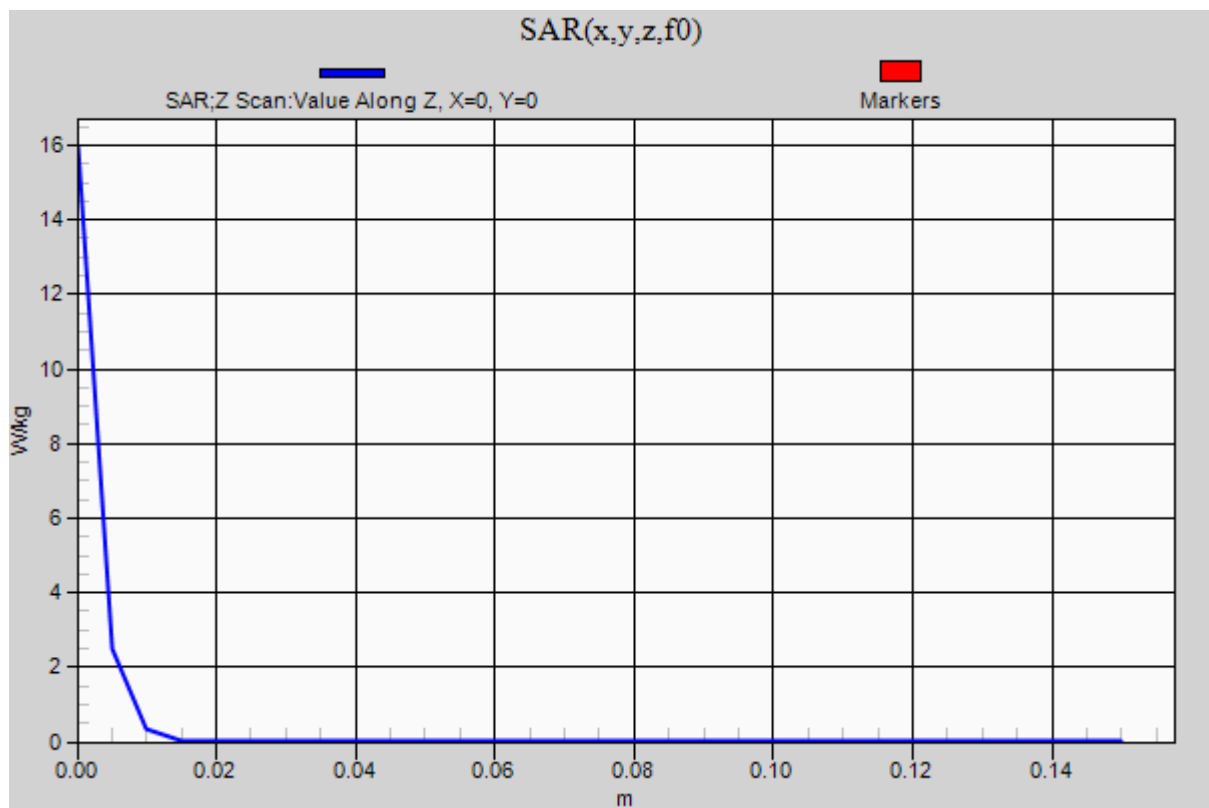
Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Z Scan (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 15.9 W/kg

Date: 2015/09/17

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.5 degree.C.



5. System Check Dipole (D2450V2,S/N:713)

**Calibration Laboratory of
Schmid & Partner
Engineering AG**
Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Client **UL Japan (PTT)**

Certificate No: **D2450V2-713_Sep13**

CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 713**

Calibration procedure(s) **QA CAL-05.v9
Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **September 10, 2013**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-13 (No. 217-01736)	Apr-14
Type-N mismatch combination	SN: 5047.3 / 06327	04-Apr-13 (No. 217-01739)	Apr-14
Reference Probe ES3DV3	SN: 3205	28-Dec-12 (No. ES3-3205_Dec12)	Dec-13
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

Calibrated by:	Name Israe El-Naouq	Function Laboratory Technician	Signature
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 10, 2013

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

**Calibration Laboratory of
Schmid & Partner
Engineering AG**
Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	39.4 $\pm$ 6 %	1.83 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	-----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.0 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	51.6 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.05 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.1 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	52.2 $\pm$ 6 %	2.00 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	-----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.6 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	49.7 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.89 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	23.4 W/kg $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.8 Ω + 0.7 j Ω
Return Loss	- 34.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.7 Ω + 2.8 j Ω
Return Loss	- 30.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.162 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	July 05, 2002

DASY5 Validation Report for Head TSL

Date: 10.09.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 713

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.83$ S/m; $\epsilon_r = 39.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.52, 4.52, 4.52); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

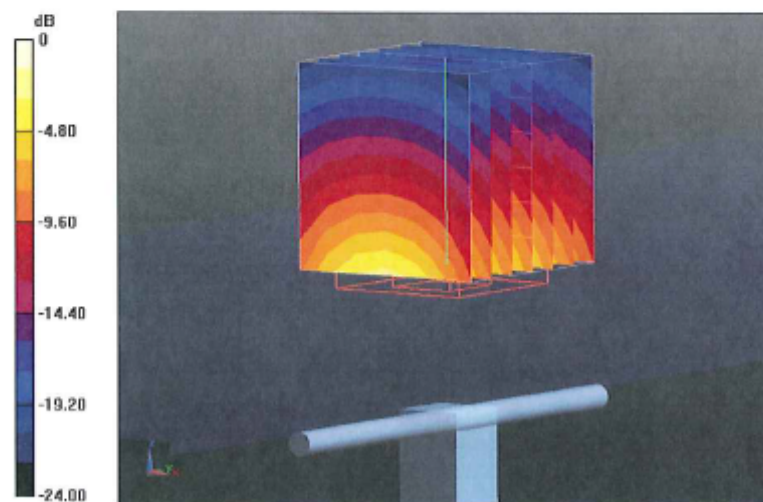
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.095 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 26.7 W/kg

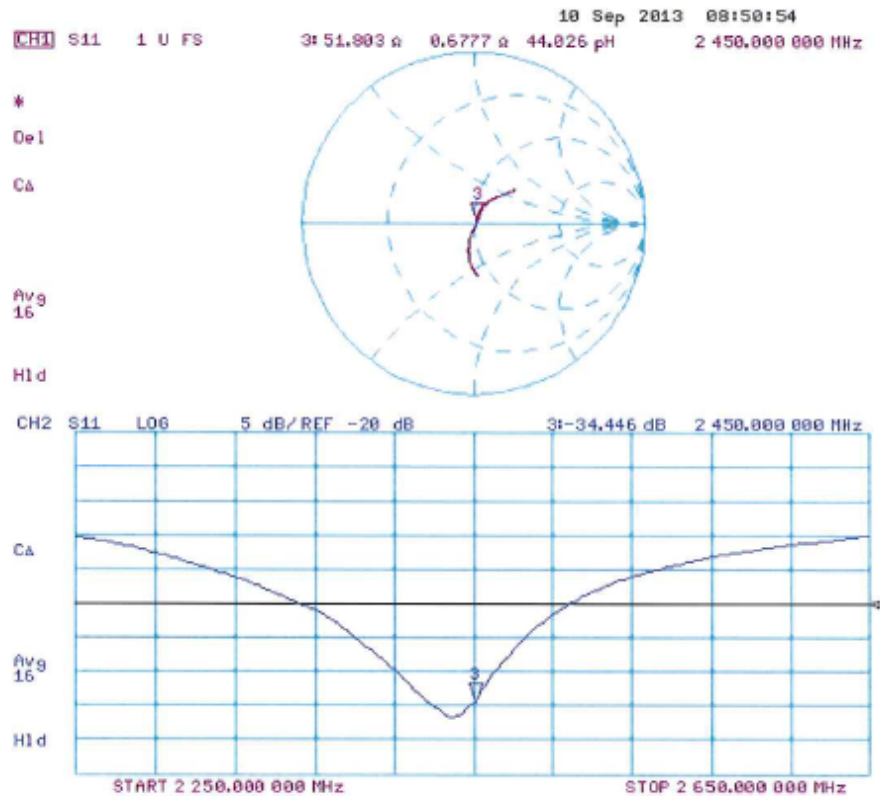
SAR(1 g) = 13 W/kg; SAR(10 g) = 6.05 W/kg

Maximum value of SAR (measured) = 17.0 W/kg



0 dB = 17.0 W/kg = 12.30 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 10.09.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 713

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 2$ S/m; $\epsilon_r = 52.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.42, 4.42, 4.42); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

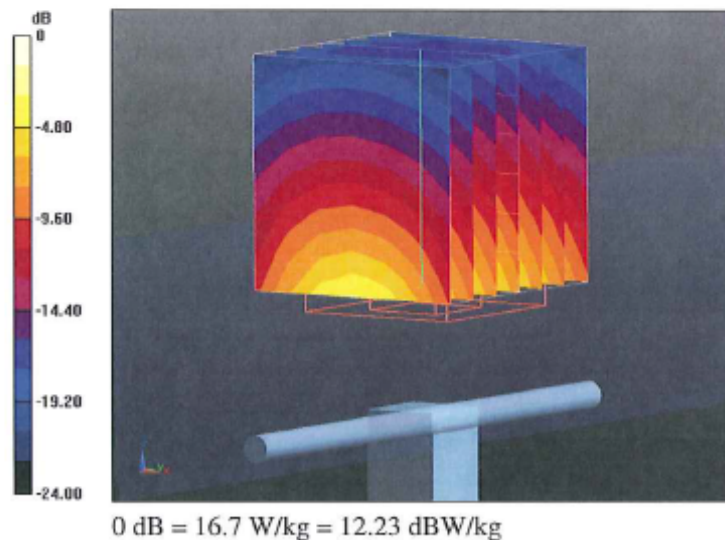
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.095 V/m; Power Drift = 0.03 dB

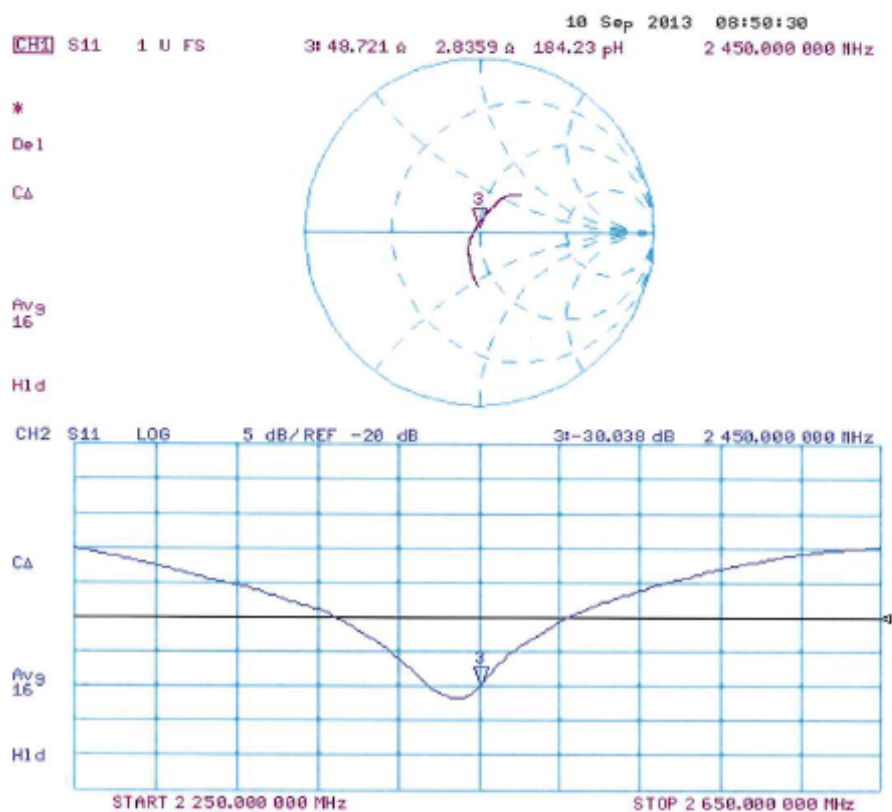
Peak SAR (extrapolated) = 26.1 W/kg

SAR(1 g) = 12.6 W/kg; SAR(10 g) = 5.89 W/kg

Maximum value of SAR (measured) = 16.7 W/kg



Impedance Measurement Plot for Body TSL



D2450V2 Calibration for Impedance and Return-loss

1. Test environment

Date	July 21, 2015		
Ambient Temperature	24.0 deg.C	Relative humidity	50%RH

2. Equipment used

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
EST-54	Network Analyzer	Hewlett Packard	8753ES	US39171615	SAR	2015/05/05 * 12
EST-08	Calibration Kit	Agilent	85032B	3217A12903	SAR	2015/05/04 * 12
MPF-04	2mm Oval Flat Phantom	Schmid&Partner Engineering AG	QDOVA001BB	1207	SAR	2015/05/11 * 12
MPSAM-04	SAM Phantom	Schmid&Partner Engineering AG	QD000P40CD	1762	SAR	2015/05/11 * 12
MOS-38	Digital thermometer	HANNA	Checktemp 4	-	SAR	2015/04/28 * 12
MOS-31	Thermo-Hygrometer	Custom	CTH-201	3101	SAR	2015/07/07 * 12
HSL2450						Daily check
MSL2450						Daily check
SAR room1						Daily check

3. Test Result

Impedance, Transformed to feed point	Head	Deviation	Tolerance	Result
Calibration (SPEAG) 2013/09/10	51.8 Ω +0.7j Ω	-	-	-
Calibration(ULJ)2015/7/21	50.94 Ω +0.86j Ω	-0.9 Ω +0.2j Ω	+/-5 Ω +/-5j Ω	Complied

Return loss	Head	Deviation	Tolerance	Result
Calibration (SPEAG) 2013/09/10	-34.4dB	-	-	-
Calibration(ULJ)2015/7/21	-37.97dB	-3.5dB	-34.4 *+/-20%	Complied

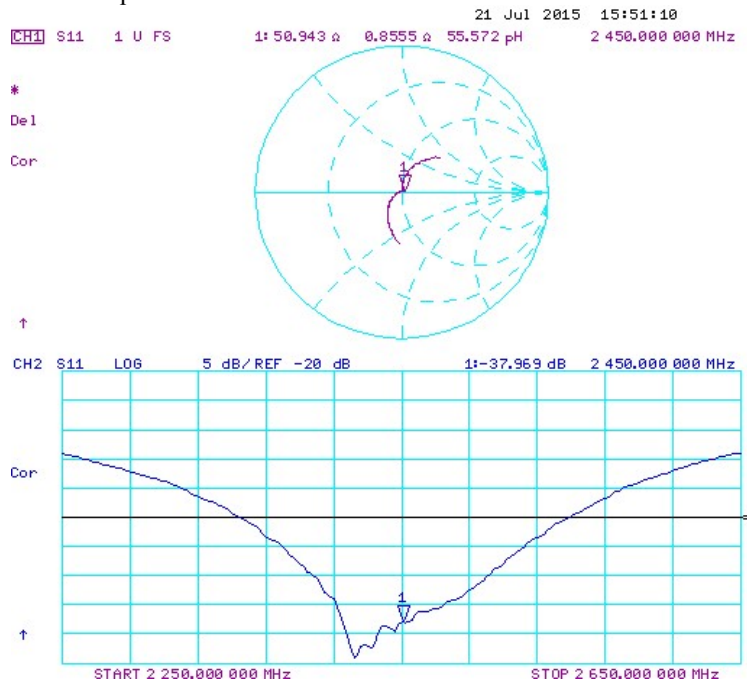
Impedance, Transformed to feed point	Body	Deviation	Tolerance	Result
Calibration (SPEAG) 2013/09/10	48.7 Ω +2.8j Ω	-	-	-
Calibration(ULJ)2015/7/21	50.53 Ω +2.48j Ω	+1.8 Ω +/-0.3j Ω	+/-5 Ω +/-5j Ω	Complied

Return loss	Body	Deviation	Tolerance	Result
Calibration (SPEAG) 2013/09/10	-30.0dB	-	-	-
Calibration(ULJ)2015/7/21	-31.95dB	-1.95dB	-30.0 *+/-20%	Complied

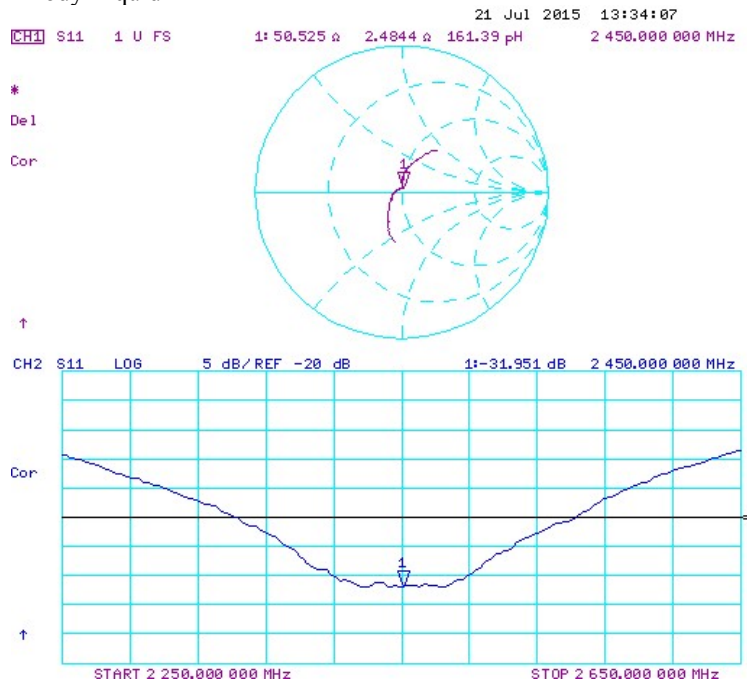
*Tolerance : According to the KDB450824D02

Measurement Plots

<Head Liquid>



<Body Liquid>



6. System Check Dipole (D5GHzV2,S/N:1020)

**Calibration Laboratory of
Schmid & Partner
Engineering AG**
Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **UL Japan (Vitec)**

Certificate No: **D5GHzV2-1020_Jan15**

CALIBRATION CERTIFICATE

Object	D5GHzV2 - SN:1020																																														
Calibration procedure(s)	QA CAL-22.v2 Calibration procedure for dipole validation kits between 3-6 GHz																																														
Calibration date:	January 13, 2015																																														
This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate. All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$. Calibration Equipment used (M&TE critical for calibration) <table><thead><tr><th>Primary Standards</th><th>ID #</th><th>Cal Date (Certificate No.)</th><th>Scheduled Calibration</th></tr></thead><tbody><tr><td>Power meter EPM-442A</td><td>GB37460704</td><td>07-Oct-14 (No. 217-02020)</td><td>Oct-15</td></tr><tr><td>Power sensor HP 8481A</td><td>US37292783</td><td>07-Oct-14 (No. 217-02020)</td><td>Oct-15</td></tr><tr><td>Power sensor HP 8481A</td><td>MY41092317</td><td>07-Oct-14 (No. 217-02021)</td><td>Oct-15</td></tr><tr><td>Reference 20 dB Attenuator</td><td>SN: 5058 (20k)</td><td>03-Apr-14 (No. 217-01918)</td><td>Apr-15</td></tr><tr><td>Type-N mismatch combination</td><td>SN: 5047.2 / 06327</td><td>03-Apr-14 (No. 217-01921)</td><td>Apr-15</td></tr><tr><td>Reference Probe EX3DV4</td><td>SN: 3503</td><td>30-Dec-14 (No. EX3-3503_Dec14)</td><td>Dec-15</td></tr><tr><td>DAE4</td><td>SN: 601</td><td>18-Aug-14 (No. DAE4-601_Aug14)</td><td>Aug-15</td></tr></tbody></table> <table><thead><tr><th>Secondary Standards</th><th>ID #</th><th>Check Date (in house)</th><th>Scheduled Check</th></tr></thead><tbody><tr><td>RF generator R&S SMT-06</td><td>100005</td><td>04-Aug-99 (in house check Oct-13)</td><td>In house check: Oct-16</td></tr><tr><td>Network Analyzer HP 8753E</td><td>US37390585 S4206</td><td>18-Oct-01 (in house check Oct-14)</td><td>In house check: Oct-15</td></tr></tbody></table>				Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration	Power meter EPM-442A	GB37460704	07-Oct-14 (No. 217-02020)	Oct-15	Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15	Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15	Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15	Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15	Reference Probe EX3DV4	SN: 3503	30-Dec-14 (No. EX3-3503_Dec14)	Dec-15	DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15	Secondary Standards	ID #	Check Date (in house)	Scheduled Check	RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16	Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15
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Calibrated by:	Name Israe Elnaouq	Function Laboratory Technician	Signature 																																												
Approved by:	Katja Pokovic	Technical Manager																																													
Issued: January 14, 2015																																															
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.																																															

Certificate No: D5GHzV2-1020_Jan15

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UL Japan, Inc.

Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone: +81 596 24 8999

Facsimile: +81 596 24 8124

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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Accreditation No.: **SCS 0108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEC 62209-2, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation, and Procedures"; Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for including accessories and multiple transmitters", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"
- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5200 MHz $\pm$ 1 MHz 5250 MHz $\pm$ 1 MHz 5300 MHz $\pm$ 1 MHz 5500 MHz $\pm$ 1 MHz 5600 MHz $\pm$ 1 MHz 5750 MHz $\pm$ 1 MHz 5800 MHz $\pm$ 1 MHz	

Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	36.0	4.66 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	36.3 $\pm$ 6 %	4.56 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5200 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.82 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	78.3 W/kg $\pm$ 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.23 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	22.3 W/kg $\pm$ 19.5 % (k=2)