SAR TEST REPORT

Test Report No. : 13478071H-R2

Applicant	:	**SOURCENEXT CORPORATION**
Type of EUT	:	**POCKETALK S Plus**
Model Number of EUT	:	**PTSP**
FCC ID	:	**2AOJA-PTSP**
Test regulation	:	**FCC47CFR 2.1093**
Test Result	:	**Complied (Refer to SECTION 4)**
Reported SAR (1 g) Value	:	**The highest reported SAR (1 g)** Standalone (Body): 0.89 W/kg Simultaneous Transmission (Body): 1.52 W/kg

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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.
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8. The information provided from the customer for this report is identified in SECTION 1.
9. This report is a revised version of 13478071H-R1. 13478071H-R1 is replaced with this report.

Date of test: April 24 to September 2, 2020

Representative test engineer:

Yutaka Yoshida
Engineer
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Approved by :

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Leader
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REVISION HISTORY

Original Test Report No.: 13478071H

Revision	Test report No.	Date	Page revised	Contents
- (Original)	13478071H	September 24, 2020	-	-
1	13478071H-R1	October 20, 2020	P1	Corrected simultaneous TX SAR value from 1.51 W/kg to 1.52 W/kg
1	13478071H-R1	October 20, 2020	P6 - 7	Deleted the antenna gain information
1	13478071H-R1	October 20, 2020	P13	Added Duty ratio to table of Software setting
1	13478071H-R1	October 20, 2020	P15 - 16	Added data of Duty Confirmation for WLAN
2	13478071H-R2	October 27, 2020	P11, 60, 64, 66, 67, 70, 71	Corrected data for Bluetooth and BTLE (Bluetooth Low Energy)

Reference: Abbreviations (Including words undescribed in this report)

A2LA	The American Association for Laboratory Accreditation
AC	Alternating Current
AFH	Adaptive Frequency Hopping
AM	Amplitude Modulation
Amp, AMP	Amplifier
ANSI	American National Standards Institute
Ant, ANT	Antenna
AP	Access Point
ASK	Amplitude Shift Keying
Atten., ATT	Attenuator
AV	Average
BPSK	Binary Phase-Shift Keying
BR	Bluetooth Basic Rate
BT	Bluetooth
BT LE	Bluetooth Low Energy
BW	BandWidth
Cal Int	Calibration Interval
CCK	Complementary Code Keying
Ch., CH	Channel
CISPR	Comite International Special des Perturbations Radioelectriques
CW	Continuous Wave
DBPSK	Differential BPSK
DC	Direct Current
D-factor	Distance factor
DFS	Dynamic Frequency Selection
DQPSK	Differential QPSK
DSSS	Direct Sequence Spread Spectrum
EDR	Enhanced Data Rate
EIRP, e.i.r.p.	Equivalent Isotropically Radiated Power
EMC	ElectroMagnetic Compatibility
EMI	ElectroMagnetic Interference
EN	European Norm
ERP, e.r.p.	Effective Radiated Power
EU	European Union
EUT	Equipment Under Test
Fac.	Factor
FCC	Federal Communications Commission
FHSS	Frequency Hopping Spread Spectrum
FM	Frequency Modulation
Freq.	Frequency
FSK	Frequency Shift Keying
GFSK	Gaussian Frequency-Shift Keying
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
Hori.	Horizontal
ICES	Interference-Causing Equipment Standard
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IF	Intermediate Frequency
ILAC	International Laboratory Accreditation Conference
ISED	Innovation, Science and Economic Development Canada
ISO	International Organization for Standardization
JAB	Japan Accreditation Board
LAN	Local Area Network
LIMS	Laboratory Information Management System
MCS	Modulation and Coding Scheme
MRA	Mutual Recognition Arrangement
N/A	Not Applicable
NIST	National Institute of Standards and Technology
NS	No signal detect.
NSA	Normalized Site Attenuation
NVLAP	National Voluntary Laboratory Accreditation Program
OBW	Occupied Band Width
OFDM	Orthogonal Frequency Division Multiplexing
P/M	Power meter
PCB	Printed Circuit Board
PER	Packet Error Rate
PHY	Physical Layer
PK	Peak
PN	Pseudo random Noise
PRBS	Pseudo-Random Bit Sequence
PSD	Power Spectral Density
QAM	Quadrature Amplitude Modulation
QP	Quasi-Peak
QPSK	Quadri-Phase Shift Keying
RBW	Resolution Band Width
RDS	Radio Data System
RE	Radio Equipment
RF	Radio Frequency
RMS	Root Mean Square
RSS	Radio Standards Specifications
Rx	Receiving
SA, S/A	Spectrum Analyzer
SG	Signal Generator
SVSWR	Site-Voltage Standing Wave Ratio
TR	Test Receiver
Tx	Transmitting
VBW	Video BandWidth
Vert.	Vertical
WLAN	Wireless LAN

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SECTION1: Customer information

Company Name	:	SOURCENEXT CORPORATION
Address	:	Shiodome City Center 33F, 1-5-2 Higashi Shimbashi Minato-ku, Tokyo 105-7133, Japan
Telephone Number	:	+81-50-5533-9606
Contact Person	:	Yukio Aotani

The information provided from the customer is as follows;
- Applicant, Type of Equipment, Model No. FCC ID on the cover and other relevant pages
- Operating/Test Mode(s) (Mode(s)) on all the relevant pages
- SECTION 1: Customer information
- SECTION 2: Equipment under test (EUT) other than the Receipt Date
- SECTION 5: Tune-up tolerance information and software information

* The laboratory is exempted from liability of any test results affected from the above information in SECTION 2.

SECTION2: Equipment under test (EUT)

2.1 Identification of EUT

<Information of the EUT>

Type	:	POCKETALK S Plus
Model Number	:	PTSP
Serial Number	:	864727045096644
Rating	:	Li-ion battery: M/N: PT305070 DC 3.8 V 1550 mAh (5.89 Wh)
Option battery	:	None
Body-worn accessory	:	None
Receipt Date	:	January 22, 2020
Country of Mass-production	:	China
Condition	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	:	No Modification by the test lab

2.2 Product description

Model: PTSP(referred to as the EUT in this report) is a POKETALK S Plus.
The EUT has some color variations.

General Specification

Operating Temperature : 0 deg. C to +40 deg. C

Radio Specification (1/2)

WLAN (IEEE802.11b/g/a/n-20/n-40)

Type of radio	IEEE802.11b	IEEE802.11g/n-20	IEEE802.11n-40	IEEE802.11a/n-20	IEEE802.11n-40
Frequency of operation	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz	2422 MHz - 2452 MHz	5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5700 MHz	5190 MHz - 5230 MHz 5270 MHz - 5310 MHz 5510 MHz - 5670 MHz
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)		OFDM (64QAM, 16QAM, QPSK, BPSK)	
Channel spacing	5 MHz			20 MHz	40 MHz
Antenna type	Planar Inverted-F Antenna				
Clock frequency	26 MHz				

Bluetooth (BR/EDR, BTLE(Low Energy))

	BR/EDR	BTLE(Low Energy)
Frequency of operation	2402 MHz - 2480 MHz	
Type of modulation	FHSS (GFSK, π/4DQPSK, 8DPSK)	GFSK
Channel spacing	1 MHz	2 MHz
Antenna type	Planar Inverted-F Antenna	
Clock frequency	26 MHz	

Radio Specification (2/2)

GSM

Equipment Type	Transceiver	
Frequency of Operation	[Up Link] PCS1900: 1850 MHz to 1910 MHz GSM850: 824 MHz to 849 MHz	[Down Link] PCS1900: 1930 MHz to 1990 MHz GSM850: 869 MHz to 894 MHz
Type of Modulation	GMSK, 8-PSK	
Multi-Slot Class	GPRS:12(4 Down/4 Up/5 Sum) EGPRS:12(4 Down/4 Up/5 Sum)	
Voice & Data communication	Data only	
Antenna Type	Planar Inverted-F Antenna	

WCDMA

Equipment Type	Transceiver	
Frequency of Operation	[Up Link] Band 2: 1850 MHz to 1910 MHz Band 5: 824 MHz to 849 MHz	[Down Link] Band 2: 1930 MHz to 1990 MHz Band 5: 869 MHz to 894 MHz
3GPP Release	Release7 and 8	
Uplink Category	7	
Downlink Category	24	
Type of Modulation	QPSK, 16QAM 64QAM(DL Only)	
Voice & Data communication	Data only	
Antenna Type	Planar Inverted-F Antenna	

LTE

Equipment Type	Transceiver	
Frequency of Operation	[Up Link] Band 2: 1850 MHz to 1910 MHz Band 5: 824 MHz to 849 MHz Band 7: 2500 MHz to 2570 MHz Band 26: 814 MHz to 849 MHz	[Down Link] Band 2: 1930 MHz to 1990 MHz Band 5: 869 MHz to 894 MHz Band 7: 2620 MHz to 2690 MHz Band 26: 859 MHz to 894 MHz
Type of Modulation	QPSK, 16QAM 64QAM(DL Only)	
Carrier Aggregation	No	
Voice & Data communication	Data only	

* WLAN and Bluetooth do not transmit simultaneously.

2.3 General LTE SAR Test and Reporting Considerations

Frequency range and channel bandwidth

Band	Frequency Range [MHz]		Supported Bandwidth [MHz]					
			20	15	10	5	3	1.4
2	1850 - 1910	Low	Ch:18700 Freq:1860	Ch:18675 Freq:1857.5	Ch:18650 Freq:1855	Ch:18625 Freq:1852.5	Ch:18615 Freq:1851.5	Ch:18067 Freq:1850.7
		Mid	Ch:18900 Freq:1880	Ch:18900 Freq:1880	Ch:18900 Freq:1880	Ch:18900 Freq:1880	Ch:18900 Freq:1880	Ch:18900 Freq:1880
		High	Ch:19100 Freq:1900	Ch:19125 Freq:1902.5	Ch:19150 Freq:1905	Ch:19175 Freq:1907.5	Ch:19185 Freq:1908.5	Ch:19193 Freq:1909.3
5 *1	824 - 849	Low	-	-	Ch:20450 Freq:829	Ch:20425 Freq:826.5	Ch:20415 Freq:825.5	Ch:20407 Freq:824.7
		Mid	-	-	Ch:20525 Freq:836.5	Ch:20525 Freq:836.5	Ch:20525 Freq:836.5	Ch:20525 Freq:836.5
		High	-	-	Ch:20600 Freq:844	Ch:20625 Freq:846.5	Ch:20635 Freq:847.5	Ch:20643 Freq:848.3
7	2500 - 2570	Low	Ch:20850 Freq:2510	Ch:20825 Freq:2507.5	Ch:20800 Freq:2505	Ch:20775 Freq:2502.5	-	-
		Mid	Ch:21100 Freq:2535	Ch:21100 Freq:2535	Ch:21100 Freq:2535	Ch:21100 Freq:2535	-	-
		High	Ch:21350 Freq:2560	Ch:21375 Freq:2562.5	Ch:21400 Freq:2565	Ch:21425 Freq:2567.5	-	-
26 *1	814 - 849	Low	-	-	Ch:26740 Freq:819	Ch:26715 Freq:816.5	Ch:26705 Freq:815.5	Ch:26697 Freq:814.7
		Mid	-	-	Ch:26865 Freq:831.5	Ch:26865 Freq:831.5	Ch:26865 Freq:831.5	Ch:26865 Freq:831.5
		High	-	-	Ch:26990 Freq:844	Ch:27015 Freq:846.5	Ch:27025 Freq:847.5	Ch:27033 Freq:848.3

*1 Frequency band 824-849MHz was tested by LTE Band 26 since LTE Band 5(824-849MHz) and LTE Band 26(814-849MHz) had same tune-up upper limit and power settings value.

LTE transmitter and antenna implementation

The LTE transmitter operates independently of the other wireless transmitters in the device, and it does not support voice talk.
LTE Antenna configuration is Main transmit antenna and Aux receive diversity.

Maximum power reduction (MPR)

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1 and 3

Modulation	Channel bandwidth / Transmission bandwidth (N_{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3

MPR Built-in by design
The manufacturer MPR values are always within the 3GPP maximum MPR allowance but may not follow the default MPR values.
A-MPR (additional MPR) was disabled during SAR testing

Spectrum plots for RB configurations

A properly configured basestation simulator was used for the SAR or power measurements;
therefore spectrum plots for each RB allocation and offset configuration are not included in the SAR report.

Test standard information

2.4 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(v06)**	RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices
☐	**KDB447498D02(v02r01)**	SAR Measurement Procedures for USB Dongle Transmitters
☐	**KDB648474D04(v01r03)**	SAR Evaluation Considerations for Wireless Handsets
☑	**KDB941225D01(v03r01)**	3G SAR Measurement Procedures
☑	**KDB941225D05(v02r05)**	SAR Evaluation Considerations for LTE Devices
☐	**KDB941225D06(v02r01)**	SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities (Hot Spot SAR)
☑	**KDB941225D07(v01r02)**	SAR Evaluation Procedures for UMPC Mini-Tablet Devices
☐	**KDB616217D04(v01r02)**	SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers
☑	**KDB865664D01(v01r04)**	SAR Measurement Requirements for 100MHz to 6 GHz
☑	**KDB248227D01(v02r02)**	SAR Guidance for 802.11(Wi-Fi) Transmitters

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

2.5 Procedure

Transmitter	**WWAN(GSM, WCDMA, LTE), WLAN, Bluetooth and BTLE**
Test Procedure	Published RF exposure KDB procedures
Category	FCC47CFR 2.1093
Note: UL Japan, Inc. 's SAR Work Procedures 13-EM-W0429 and 13-EM-W0430	

2.6 Additions or deviations to standard

Other than above, no addition, exclusion nor deviation has been made from the standard.

2.7 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

2.8 SAR

Specific Absorption Rate (SAR): The time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density (ρ), as shown in the following equation:

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

SAR is expressed in units of watts per kilogram (W/kg) or equivalently milliwatts per gram (mW/g).

SAR is related to the E-field at a point by the following equation:

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

where
σ = conductivity of the tissue (S/m)
ρ = mass density of the tissue (kg/m3)
E = rms E-field strength (V/m)

2.9 Test Location

UL Japan, Inc. Ise EMC Lab.
Shielded room for SAR testings
NVLAP Lab. code: 200572-0 / FCC Test Firm Registration Number: 199967 / ISED SAR Lab Company Number: 2973C
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999 Facsimile : +81 596 24 8124

SECTION3: Test result

3.1 Result

Complied
Highest values at each band are listed next section.

3.2 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
Maximum tune-up tolerance limit is by the specification from a customer.

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

Body SAR

Mode	Freq. (MHz)	Power (dBm)		Scaled factor	1-g SAR (W/kg)	
		Tune-up upper Power	Measured average Power		Meas.	Reported
GSM850	836.6	23.50	22.24	1.34	0.252	0.337
PCS1900	1909.8	20.00	19.79	1.05	0.612	0.642
WCDMA Band 2	1852.4	21.00	20.69	1.07	0.831	**0.892**
WCDMA Band 5	826.4	23.00	22.80	1.05	0.463	0.485
LTE Band 2	1860.0	19.50	19.15	1.08	0.660	0.715
LTE Band 7	2535.0	17.00	16.84	1.04	0.797	0.827
LTE Band 26	819.0	23.00	22.70	1.07	0.473	0.507
WLAN11b	2462.0	15.00	14.19	1.21	0.435	0.524
WLAN 5.3G 11n-40	5270.0	3.80	3.14	1.16	0.535	0.623
WLAN 5.6G 11n-40	5550.0	5.00	4.45	1.14	0.485	0.550

Mode	Freq. (MHz)	Power (dBm)		Scaled factor	Duty(%)	Duty Scaled factor	1-g SAR (W/kg)	
		Tune-up upper Power	Measured average Power				Meas.	Reported
Bluetooth	2402	5.00	4.98	1.00	77.2	1.12	0.020	0.023
BTLE	2402	5.00	4.91	1.02	63.3	1.99	0.015	0.030

Note(s):
The sample used by the SAR test is not more than 2 dB lower than the maximum tune-up tolerance limit. That is, measured power is included the tune-up tolerance range.

*Details are shown at section 11.

3.3 Simultaneous transmission SAR result

Body SAR: 1.515 W/kg

Refer to Section 11 “Simultaneous Transmission SAR Analysis”.

Wireless LAN 2.4G, Wireless LAN 5G, Bluetooth and BTLE(Bluetooth Low Energy) do not transmit simultaneously.

SECTION4: Tune-up tolerance information and software information

Maximum tune-up tolerance limit

Mode	Maximum frequency in each band	Maximum tune-up tolerance limit *1 [dBm]	Maximum tune-up tolerance limit *1 [mW]
GSM850 GMSK 1 time slot *3	848.6	27.00	501.19
GSM850 GMSK 2 time slots *3	848.6	26.00	398.11
GSM850 GMSK 3 time slots *3	848.6	24.50	281.84
GSM850 GMSK 4 time slots *3	848.6	23.50	223.87
GSM850 8PSK 1 time slot *3	848.6	22.00	158.49
GSM850 8PSK 2 time slots *3	848.6	21.00	125.89
GSM850 8PSK 3 time slots *3	848.6	19.00	79.43
GSM850 8PSK4 time slots *3	848.6	17.50	56.23
PCS1900 GMSK 1 time slot *3	1909.8	23.00	199.53
PCS1900 GMSK 2 time slots *3	1909.8	22.50	177.83
PCS1900 GMSK 3 time slots *3	1909.8	21.00	125.89
PCS1900 GMSK 4 time slots *3	1909.8	20.00	100.00
PCS1900 8PSK 1 time slot *3	1909.8	23.00	199.53
PCS1900 8PSK 2 time slots *3	1909.8	22.50	177.83
PCS1900 8PSK 3 time slots *3	1909.8	20.50	112.20
PCS1900 8PSK4 time slots *3	1909.8	19.50	89.13
WCDMA Band 2 R99	1907.6	21.00	125.89
WCDMA Band 2 HSDPA	1907.6	19.50	89.13
WCDMA Band 2 HSUPA	1907.6	19.50	89.13
WCDMA Band 2 DC-HSDPA	1907.6	19.50	89.13
WCDMA Band 2 HSPA+	1907.6	18.50	70.79
WCDMA Band 5 R99	846.6	23.00	199.53
WCDMA Band 5 HSDPA	846.6	22.00	158.49
WCDMA Band 5 HSUPA	846.6	22.00	158.49
WCDMA Band 5 DC-HSDPA	846.6	22.00	158.49
WCDMA Band 5 HSPA+	846.6	22.00	158.49
LTE Band 2	1900	19.50	89.13
LTE Band 5 *2	844	23.00	199.53
LTE Band 7	2560	17.00	50.12
LTE Band 26 *2	844	23.00	199.53
WLAN 11b	2462	15.00	31.62
WLAN 11g	2462	11.00	12.59
WLAN 11n-20	2462	11.00	12.59
WLAN 11n-40	2452	9.00	7.94
Bluetooth DH5 BDR	2480	5.00	3.16
Bluetooth 2DH5 EDR	2480	2.00	1.58
Bluetooth 3DH5 EDR	2480	2.00	1.58
BTLE	2480	5.00	3.16
WLAN 11a	5240	3.30	2.14
WLAN 11a	5320	3.80	2.40
WLAN 11a	5700	5.00	3.16
WLAN 11n-20	5240	3.30	2.14
WLAN 11n-20	5320	3.80	2.40
WLAN 11n-20	5700	5.00	3.16
WLAN 11n-40	5230	3.30	2.14
WLAN 11n-40	5310	3.80	2.40
WLAN 11n-40	5670	5.00	3.16

*1 Maximum tune-up tolerance limit in above the table are defined by a customer as Burst Power(duty100%).
*2 LTE Band 5(824-849MHz) was covered by LTE Band 26(814-849MHz) since the channel bandwidth, maximum output power including tolerance and other operating parameters were same as LTE Band 26.
*3 SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power(Frame Power) specified for production units, including tune-up tolerance. The data mode with highest specified time-averaged output power(Frame Power) should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested.

Software setting

*Power of the EUT was set by the software as follows;
WLAN/Bluetooth/BTLE Power settings:

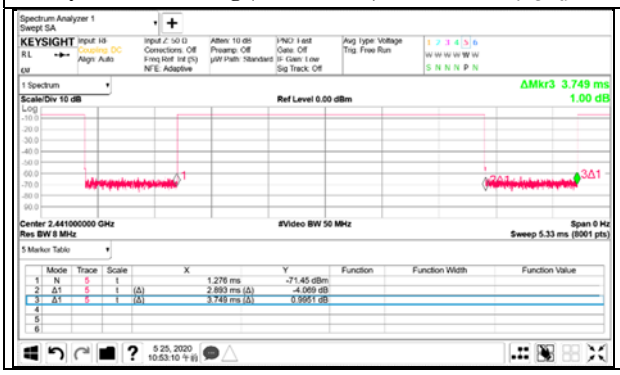
Mode	Channel	Power Setting	Duty ratio(MAX)
11b	1-11	19.0	100%
11g, 11n-20(2.4GHz)	1,11	17.0	100%
	2-10	15.0	100%
11n-40(2.4GHz)	3,9	16.5	100%
	4-8	13.5	100%
11a, 11n-20(5GHz), 11n-40(5GHz)	U-NII-1, U-NII-2A	8.0	100%
	U-NII-2C	9.0	100%
Bluetooth	0-78	Same as production model	77.2%
BTLE	0-39	Same as production model	63.3%

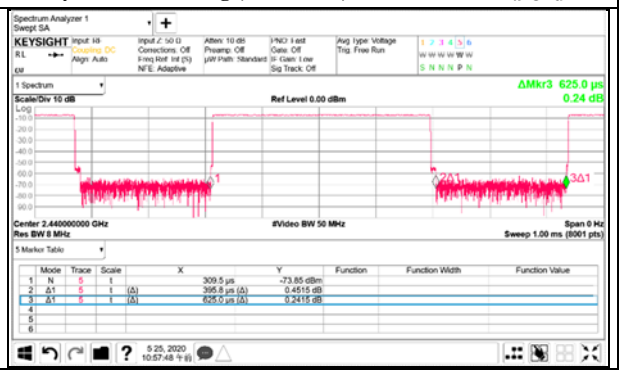
WWAN Power setting: Same as production model
Software: 1.1.4

*This setting of software is the worst case.
The test was performed with condition that obtained the maximum average power (Burst) in pre-check.
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.

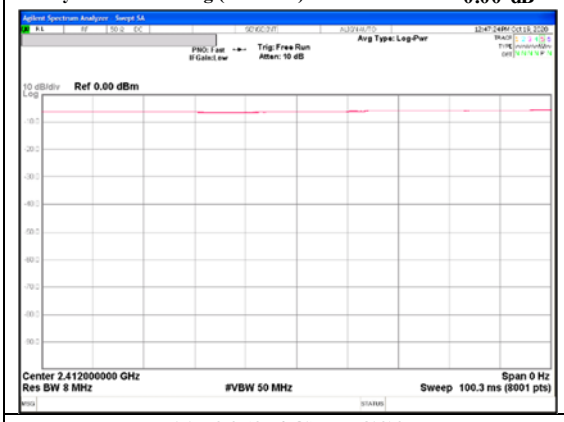
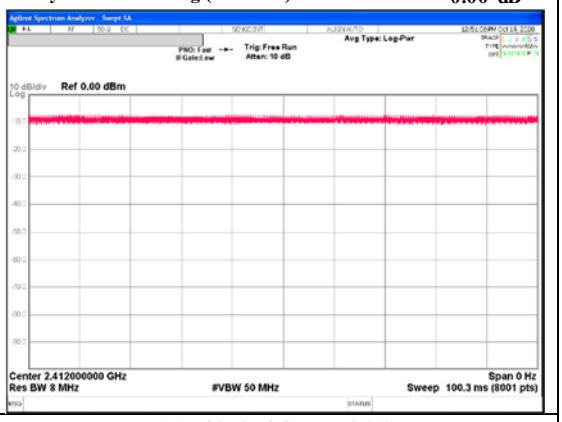
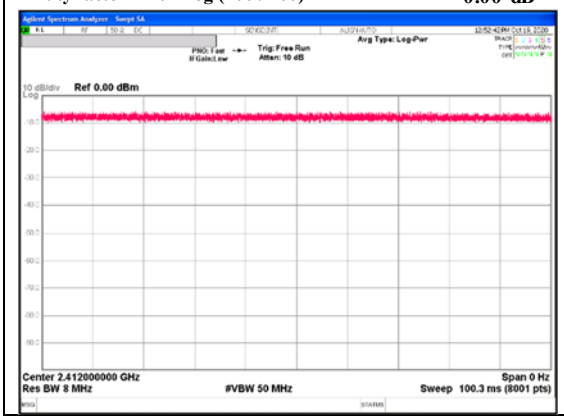
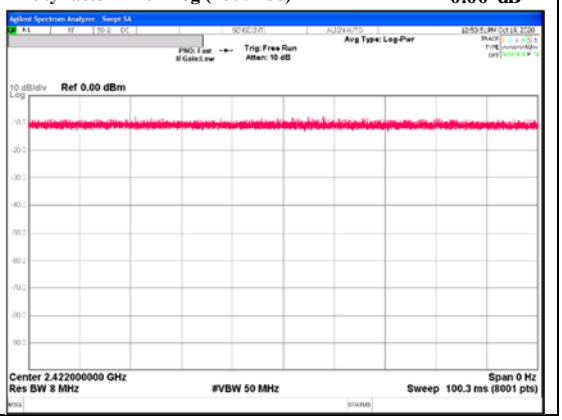
Duty Confirmation for Bluetooth/BTLE

Bluetooth DH5		BTLE	
Tx on / (Tx on + Tx off) =	0.772	Tx on / (Tx on + Tx off) =	0.633
Tx on / (Tx on + Tx off) * 100 =	77.2 %	Tx on / (Tx on + Tx off) * 100 =	63.3 %
Duty factor = 10 * log (3.749 / 2.893) =	1.13 dB	Duty factor = 10 * log (625 / 395.8) =	1.98 dB

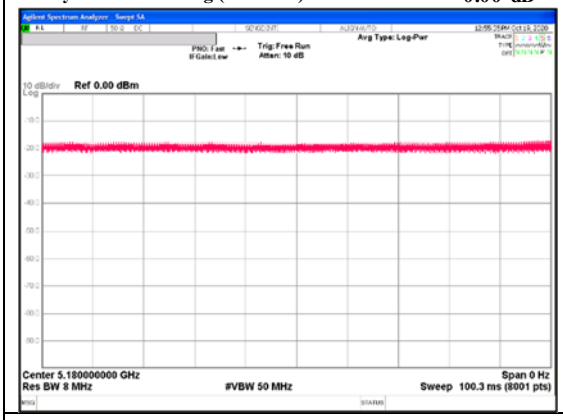
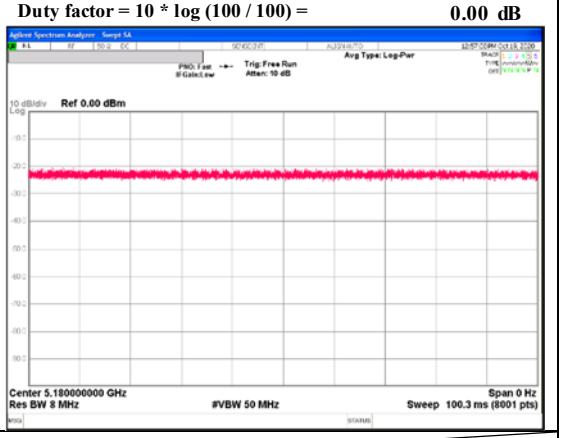
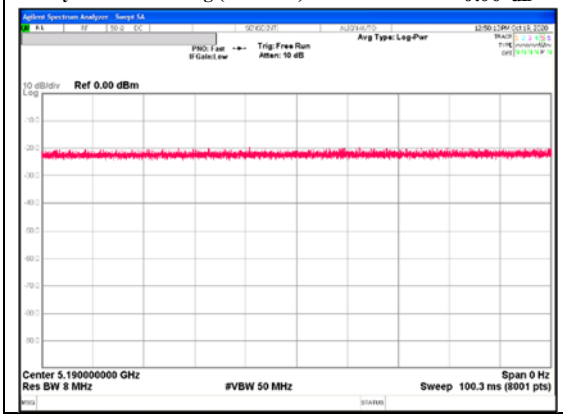




Duty Confirmation for WLAN (1/2)

11b 1Mbps		11g 6Mbps	
Tx on / (Tx on + Tx off) =	1.000	Tx on / (Tx on + Tx off) =	1.000
Tx on / (Tx on + Tx off) * 100 =	100.0 %	Tx on / (Tx on + Tx off) * 100 =	100.0 %
Duty factor = 10 * log (100 / 100) =	0.00 dB	Duty factor = 10 * log (100 / 100) =	0.00 dB
			
11n20(2.4G) MCS0		**11n40(2.4G) MCS0**	
Tx on / (Tx on + Tx off) =	1.000	Tx on / (Tx on + Tx off) =	1.000
Tx on / (Tx on + Tx off) * 100 =	100.0 %	Tx on / (Tx on + Tx off) * 100 =	100.0 %
Duty factor = 10 * log (100 / 100) =	0.00 dB	Duty factor = 10 * log (100 / 100) =	0.00 dB
			

Duty Confirmation for WLAN (2/2)

11a 6Mbps	11n20(5G) MCS0
Tx on / (Tx on + Tx off) = 1.000 Tx on / (Tx on + Tx off) * 100 = 100.0 % Duty factor = 10 * log (100 / 100) = 0.00 dB  	Tx on / (Tx on + Tx off) = 1.000 Tx on / (Tx on + Tx off) * 100 = 100.0 % Duty factor = 10 * log (100 / 100) = 0.00 dB 
11n40(5G) MCS0	
Tx on / (Tx on + Tx off) = 1.000 Tx on / (Tx on + Tx off) * 100 = 100.0 % Duty factor = 10 * log (100 / 100) = 0.00 dB  	

SECTION5: RF Exposure Conditions (Test Configurations)

5.1 Summary of the distance between antenna and surface of EUT

Test position	WWAN Antenna	WLAN/Bluetooth/BTLE Antenna
	Distance	
Front	4.47 mm	7.19 mm
Rear	1.20 mm	1.34 mm
Left	2.81 mm	54.33 mm
Right	2.38 mm	2.10 mm
Top	96.83 mm	9.73 mm
Bottom	1.58mm	90.53 mm

*Details are shown in appendix 4

5.2 Applicability of SAR test as UMPC Mini-Tablet and next ot mouth

The UMPC SAR test is applicable because the EUT is with a display and overall diagonal dimension ≤ 20 cm (~7.9") as shown in the figure below.

Test was done at 5mm separation distance to cover use as UMPC and also address next to mouth use which requires a separation distance of 10mm.

5.3 SAR test exclusion considerations according to KDB UMPC

Based on KDB941225D07, UMPC mini-tablet devices must be tested for 1-g SAR on all surfaces and side edges with a transmitting antenna location at ≦25 mm from that surface or edges, at 5 mm separation from a flat phantom, for the data modes, wireless technologies and frequency bands by the devices to determine SAR compliance.

KDB 941225 UMPC

Antenna	Tx Interface	Frequency (MHz)	Output Power		SAR test required					
			dBm	mW	Front	Rear	Left	Right	Top	Bottom
Main	GSM850 GMSK 4 time slots	848.6	23.50	223.87	MEASURE	MEASURE	MEASURE	MEASURE	EXEMPT	MEASURE
Main	PCS1900 GMSK 4 time slots	1909.8	20.00	100.00	MEASURE	MEASURE	MEASURE	MEASURE	EXEMPT	MEASURE

Antenna	Tx Interface	Frequency (MHz)	Output Power		SAR test required					
			dBm	mW	Front	Rear	Left	Right	Top	Bottom
Main	WCDMA Band 2 (R99)	1910	21.00	125.89	MEASURE	MEASURE	MEASURE	MEASURE	EXEMPT	MEASURE
Main	WCDMA Band 5 (R99)	849	23.00	199.53	MEASURE	MEASURE	MEASURE	MEASURE	EXEMPT	MEASURE
Main	LTE Band 2	1910	19.50	89.13	MEASURE	MEASURE	MEASURE	MEASURE	EXEMPT	MEASURE
Main	LTE Band 7	2570	17.00	50.12	MEASURE	MEASURE	MEASURE	MEASURE	EXEMPT	MEASURE
Main	LTE Band 26	849	23.00	199.53	MEASURE	MEASURE	MEASURE	MEASURE	EXEMPT	MEASURE

Antenna	Tx Interface	Frequency (MHz)	Output Power		SAR test required					
			dBm	mW	Front	Rear	Left	Right	Top	Bottom
Main	11b	2462	15.00	31.62	MEASURE	MEASURE	EXEMPT	MEASURE	MEASURE	EXEMPT
Main	11g	2462	11.00	12.59	MEASURE	MEASURE	EXEMPT	MEASURE	MEASURE	EXEMPT
Main	11n-20	2462	11.00	12.59	MEASURE	MEASURE	EXEMPT	MEASURE	MEASURE	EXEMPT
Main	11n-40	2452	9.00	7.94	MEASURE	MEASURE	EXEMPT	MEASURE	MEASURE	EXEMPT
Main	BT DH5	2480	5.00	3.16	MEASURE	MEASURE	EXEMPT	MEASURE	MEASURE	EXEMPT
Main	BT 2DH5	2480	2.00	1.58	MEASURE	MEASURE	EXEMPT	MEASURE	MEASURE	EXEMPT
Main	BT 3DH5	2480	2.00	1.58	MEASURE	MEASURE	EXEMPT	MEASURE	MEASURE	EXEMPT
Main	BTLE	2480	5.00	3.16	MEASURE	MEASURE	EXEMPT	MEASURE	MEASURE	EXEMPT

Antenna	Tx Interface	Frequency (MHz)	Output Power		SAR test required					
			dBm	mW	Front	Rear	Left	Right	Top	Bottom
Main	11a	5320	3.80	2.40	MEASURE	MEASURE	EXEMPT	MEASURE	MEASURE	EXEMPT
Main	11a	5700	5.00	3.16	MEASURE	MEASURE	EXEMPT	MEASURE	MEASURE	EXEMPT
Main	11n-20	5320	3.80	2.40	MEASURE	MEASURE	EXEMPT	MEASURE	MEASURE	EXEMPT
Main	11n-20	5700	5.00	3.16	MEASURE	MEASURE	EXEMPT	MEASURE	MEASURE	EXEMPT
Main	11n-40	5310	3.80	2.40	MEASURE	MEASURE	EXEMPT	MEASURE	MEASURE	EXEMPT
Main	11n-40	5670	5.00	3.16	MEASURE	MEASURE	EXEMPT	MEASURE	MEASURE	EXEMPT

Description of the Body setup

5.4 Procedure for SAR test position determination

-The tested procedure was performed according to the KDB 941225 D07 (SAR Evaluation Procedures for UMPC Mini-Tablet Devices).

5.5 Test position for Body setup

No.	Position	Test distance	WWAN	WLAN/Bluetooth/BTLE
			Tested	Tested
1	Front	5mm	☑	☑
2	Rear	5mm	☑	☑
3	Left	5mm	☑	☑ *1
4	Right	5mm	☑	☑
5	Top	5mm	☑ *1	☑
6	Bottom	5mm	☑	☑ *1

*1 Antenna located at> 25mm, but tested for simultaneous transmission analysis.

SECTION6: Description of the operating mode

6.1 Output Power for GSM

Per KDB 941225 D01 3G SAR Procedures:
SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power specified for production units, including tune-up tolerance. The data mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested.
When different maximum output power applies to GSM voice or GPRS/EDGE time slots, GSM voice and GPRS/EDGE time slots should be tested separately to determine compliance by summing the corresponding reported SAR.
The GMSK EDGE configurations are grouped with GPRS and considered with respect to time-averaged maximum output power to determine compliance

Per October 2013 TCB Workshop:
When the maximum frame-averaged powers levels are within 0.25 dB of each other, test the configuration with the most number of time slots.

GSM850

Mode	Coding Scheme	Time Slots	Ch No.	Freq (MHz)	Maximum Average Power(dBm)			
					Measured		Tune-up Limit	
					Burst Pwr	Frame Pwr (Timed AV)	Burst Pwr	Frame Pwr (Timed AV)
GPRS/EGPRS (GMSK)	CS1	1	128	824.2	25.93	16.88	27.00	17.97
			190	836.6	25.30	16.32	27.00	17.97
			251	848.6	25.23	16.21	27.00	17.97
		2	128	824.2	25.43	19.40	26.00	19.98
			190	836.6	24.79	18.83	26.00	19.98
			251	848.6	24.71	18.75	26.00	19.98
		3	128	824.2	24.02	19.79	24.50	20.24
			190	836.6	23.32	19.19	24.50	20.24
			251	848.6	23.24	19.04	24.50	20.24
		4	128	824.2	22.95	20.02	23.50	20.49
			190	836.6	22.24	19.24	23.50	20.49
			251	848.6	22.15	19.15	23.50	20.49
EGPRS (8PSK)	MCS5	1	128	824.2	21.75	12.55	22.00	12.97
			190	836.6	21.92	12.83	22.00	12.97
			251	848.6	21.88	12.71	22.00	12.97
		2	128	824.2	20.47	13.92	21.00	14.98
			190	836.6	20.73	14.17	21.00	14.98
			251	848.6	20.38	13.80	21.00	14.98
		3	128	824.2	18.01	12.82	19.00	14.74
			190	836.6	18.26	13.08	19.00	14.74
			251	848.6	18.10	12.93	19.00	14.74
		4	128	824.2	16.78	12.69	17.50	14.49
			190	836.6	16.93	12.89	17.50	14.49
			251	848.6	16.66	12.68	17.50	14.49

The worst-case configuration and mode for SAR testing is determined to be as follows:
- GPRS/EGPRS (GMSK) mode with 4 time slots for Max power, based on the Tune-up Procedure.
- SAR is not required for EGPRS (8PSK) mode because the maximum output power and tune-up limit is ≤ 1/4dB higher than GPRS/EGPRS (GMSK) or the adjusted SAR of the highest reported SAR of GPRS/EGPRS (GMSK) is ≤ 1.2W/kg.

PCS1900

Mode	Coding Scheme	Time Slots	Ch No.	Freq (MHz)	Maximum Average Power(dBm)			
					Measured		Tune-up Limit	
					Burst Pwr	Frame Pwr (Timed AV)	Burst Pwr	Frame Pwr (Timed AV)
GPRS/EGPRS (GMSK)	CS1	1	512	1850.2	22.58	13.06	23.00	13.97
			661	1880	22.73	13.15	23.00	13.97
			810	1909.8	22.83	13.54	23.00	13.97
		2	512	1850.2	22.08	15.66	22.50	16.48
			661	1880	22.24	15.78	22.50	16.48
			810	1909.8	22.35	15.87	22.50	16.48
		3	512	1850.2	20.63	16.02	21.00	16.74
			661	1880	20.74	16.08	21.00	16.74
			810	1909.8	20.90	16.22	21.00	16.74
		4	512	1850.2	19.54	16.07	20.00	16.99
			661	1880	19.68	16.21	20.00	16.99
			810	1909.8	19.79	16.39	20.00	16.99
EGPRS (8PSK)	MCS5	1	512	1850.2	22.98	13.95	23.00	13.97
			661	1880	22.82	13.84	23.00	13.97
			810	1909.8	22.65	13.62	23.00	13.97
		2	512	1850.2	21.97	15.93	22.50	16.48
			661	1880	21.86	15.78	22.50	16.48
			810	1909.8	21.73	15.66	22.50	16.48
		3	512	1850.2	19.99	15.70	20.50	16.24
			661	1880	19.86	15.51	20.50	16.24
			810	1909.8	19.69	15.36	20.50	16.24
		4	512	1850.2	18.85	15.78	19.50	16.49
			661	1880	18.86	15.79	19.50	16.49
			810	1909.8	18.68	15.53	19.50	16.49

The worst-case configuration and mode for SAR testing is determined to be as follows:

- GPRS/EGPRS (GMSK) mode with 4 time slots for Max power, based on the Tune-up Procedure.
- SAR is not required for EGPRS (8PSK) mode because the maximum output power and tune-up limit is ≤ 1/4dB higher than GPRS/EGPRS (GMSK) or the adjusted SAR of the highest reported SAR of GPRS/EGPRS (GMSK) is ≤ 1.2W/kg.

6.2 Output Power for WCDMA

Release 99 Setup Procedures used to establish the test signals

The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 specification. The DUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7).

Mode	Subtest	Rel99
WCDMA General Settings	Loopback Mode	Test Mode 2
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	βc/βd	8/15

HSDPA Setup Procedures used to establish the test signals

The following 4 Sub-tests were completed according to Release 5 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

Table C.10.2.4: β values for transmitter characteristics tests with HS-DPCCH

Sub-test	β_c (Note5)	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c .

Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and Δ_{NACK} = 30/15 with β_{hs} = 30/15 * β_c , and Δ_{CQI} = 24/15 with β_{hs} = 24/15 * β_c .

Note 3: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 11/15 and β_d = 15/15.

HSPA (HSDPA & HSUPA) Setup Procedures used to establish the test signals

The following 5 Sub-tests were completed according to Release 6 procedures in table C,11.1.3 of 3GPP TS 34.121-1
A summary of these settings are illustrated below:

Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note 1)	β_{ec}	β_{ed} (Note 4) (Note 5)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2) (Note 6)	AG Index (Note 5)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed}1: 47/15 β_{ed}2: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	0	-	-	5/15	5/15	47/15	4	1	1.0	0.0	12	67

Note 1: For sub-test 1 to 4, Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c . For sub-test 5, Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 5/15 with β_{hs} = 5/15 * β_c .

Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.

Note 4: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.

Note 5: β_{ed} can not be set directly; it is set by Absolute Grant Value.

Note 6: For subtests 2, 3 and 4, UE may perform E-DPDCH power scaling at max power which could results in slightly smaller MPR values.

DC-HSDPA Setup Procedures used to establish the test signals

The following 4 Subtests for DC-HSDPA were completed according to Release 8 procedures in table C08.1.12 of 3GPP TS34.121-1. A summary of subtests settings are illustrated below:

Table C.8.1.12: Fixed Reference Channel H-Set 12

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	Processes	6
Information Bit Payload (N_{INF})	Bits	120
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	960
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	3200
Coding Rate		0.15
Number of Physical Channel Codes	Codes	1
Modulation		QPSK
Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table. Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.		

HSPA+ Setup Procedures used to establish the test signals

The following Sub-test was completed according to Release 7 procedures in table C.11.1.4 of 3GPP TS23.121. A summary of these settings are illustrated below:

Table C.11.1.4: β values for transmitter characteristics tests with HS-DPCCH and E-DCH with 16QAM

Sub-test	β_c (Note3)	β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (2xSF2) (Note 4)	β_{ed} (2xSF4) (Note 4)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 4)	E-TFCI (Note 5)	E-TFCI (boost)
1	1	0	30/15	30/15	$\beta_{ed}1$: 30/15 $\beta_{ed}2$: 30/15	$\beta_{ed}3$: 24/15 $\beta_{ed}4$: 24/15	3.5	2.5	14	105	105

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c .
Note 2: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0).
Note 3: DPDCH is not configured, therefore the β_c is set to 1 and β_d = 0 by default.
Note 4: β_{ed} can not be set directly; it is set by Absolute Grant Value.
Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signalled to use the extrapolation algorithm.

W-CDMA Band 2

R99

Band	Mode	UL Ch No.	Freq.	Tune-up Upper Power(dBm)	Avg Pwr (dBm) Full Power
W-CDMA (UMTS) Band II	Rel 99 (RMC, 12.2 kbps)	9262	1852.4	21.00	20.69
		9400	1880.0	21.00	20.58
		9538	1907.6	21.00	20.20

HSDPA

Band	Mode	UL Ch No.	Freq.	Tune-up Upper Power(dBm)	Avg Pwr (dBm) Full Power
W-CDMA (UMTS) Band II	Subtest 1	9262	1852.4	19.50	18.70
		9400	1880.0	19.50	18.34
		9538	1907.6	19.50	17.77
	Subtest 2	9262	1852.4	19.00	18.13
		9400	1880.0	19.00	17.98
		9538	1907.6	19.00	17.40
	Subtest 3	9262	1852.4	18.50	18.11
		9400	1880.0	18.50	17.81
		9538	1907.6	18.50	17.23
	Subtest 4	9262	1852.4	18.50	18.14
		9400	1880.0	18.50	17.72
		9538	1907.6	18.50	17.23

HSUPA

Band	Mode	UL Ch No.	Freq.	Tune-up Upper Power(dBm)	Avg Pwr (dBm) Full Power
WCDMA (UMTS) Band II	Subtest 1	9262	1852.4	18.50	17.78
		9400	1880.0	18.50	17.54
		9538	1907.6	18.50	17.24
	Subtest 2	9262	1852.4	18.50	17.74
		9400	1880.0	18.50	17.58
		9538	1907.6	18.50	17.29
	Subtest 3	9262	1852.4	19.50	18.71
		9400	1880.0	19.50	18.50
		9538	1907.6	19.50	18.28
	Subtest 4	9262	1852.4	17.50	17.13
		9400	1880.0	17.50	17.08
		9538	1907.6	17.50	16.78
	Subtest 5	9262	1852.4	19.50	18.62
		9400	1880.0	19.50	18.49
		9538	1907.6	19.50	18.22

DC-HSDPA

Band	Mode	UL Ch No.	Freq	Tune-up Upper Power	Avg Pwr(dBm) Full Power
W-CDMA (UMTS) Band II	Subtest 1	9262	1852.4	19.50	18.72
		9400	1880.0	19.50	18.34
		9538	1907.6	19.50	17.76
	Subtest 2	9262	1852.4	19.00	18.69
		9400	1880.0	19.00	18.32
		9538	1907.6	19.00	17.78
	Subtest 3	9262	1852.4	18.50	18.20
		9400	1880.0	18.50	17.79
		9538	1907.6	18.50	17.31
	Subtest 4	9262	1852.4	18.50	18.17
		9400	1880.0	18.50	17.80
		9538	1907.6	18.50	17.32

HSPA+

Band	Mode	UL Ch No.	Freq	Tune-up Upper Power	Avg Pwr(dBm) Full Power
W-CDMA (UMTS) Band II	Subtest 1	9262	1852.4	18.50	18.12
		9400	1880.0	18.50	17.91
		9538	1907.6	18.50	17.38

W-CDMA Band 5

R99

Band	Mode	UL Ch No.	Freq. (MHz)	Tune-up Upper Power(dBm)	Avg Pwr (dBm) Full Power
W-CDMA (UMTS) Band V	Rel 99 (RMC, 12.2 kbps)	4132	826.4	23.00	22.80
		4183	836.6	23.00	22.74
		4233	846.6	23.00	22.88

HSDPA

Band	Mode	UL Ch No.	Freq. (MHz)	Tune-up Upper Power(dBm)	Avg Pwr (dBm) Full Power
W-CDMA (UMTS) Band V	Subtest 1	4132	826.4	22.00	21.77
		4183	836.6	22.00	21.87
		4233	846.6	22.00	21.79
	Subtest 2	4132	826.4	22.00	21.63
		4183	836.6	22.00	21.69
		4233	846.6	22.00	21.73
	Subtest 3	4132	826.4	22.00	21.44
		4183	836.6	22.00	21.51
		4233	846.6	22.00	21.49
	Subtest 4	4132	826.4	22.00	21.50
		4183	836.6	22.00	21.37
		4233	846.6	22.00	21.43

HSUPA

Band	Mode	UL Ch No.	Freq. (MHz)	Tune-up Upper Power(dBm)	Avg Pwr (dBm) Full Power
WCDMA (UMTS) Band V	Subtest 1	4132	826.4	22.00	20.88
		4183	836.6	22.00	20.90
		4233	846.6	22.00	20.97
	Subtest 2	4132	826.4	22.00	21.00
		4183	836.6	22.00	20.90
		4233	846.6	22.00	21.13
	Subtest 3	4132	826.4	22.00	21.05
		4183	836.6	22.00	20.94
		4233	846.6	22.00	20.98
	Subtest 4	4132	826.4	22.00	20.75
		4183	836.6	22.00	20.53
		4233	846.6	22.00	20.74
	Subtest 5	4132	826.4	22.00	20.88
		4183	836.6	22.00	20.90
		4233	846.6	22.00	21.05

DC-HSDPA

Band	Mode	UL Ch No.	Freq	Tune-up Upper Power	Avg Pwr(dBm) Full Power
W-CDMA (UMTS) Band V	Subtest 1	4132	826.4	22.00	21.80
		4183	836.6	22.00	21.88
		4233	846.6	22.00	21.96
	Subtest 2	4132	826.4	22.00	21.80
		4183	836.6	22.00	21.70
		4233	846.6	22.00	21.78
	Subtest 3	4132	826.4	22.00	21.31
		4183	836.6	22.00	21.38
		4233	846.6	22.00	21.37
	Subtest 4	4132	826.4	22.00	21.30
		4183	836.6	22.00	21.36
		4233	846.6	22.00	21.46

HSPA+

Band	Mode	UL Ch No.	Freq	Tune-up Upper Power	Avg Pwr(dBm) Full Power
W-CDMA (UMTS) Band V	Subtest 1 (16QAM)	4132	826.4	22.00	21.33
		4183	836.6	22.00	21.43
		4233	846.6	22.00	21.50

6.3 Output Power for LTE

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.
UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3

Modulation	Channel bandwidth / Transmission bandwidth (N_{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3
256 QAM	≥ 1						≤ 5

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS_01".

Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)

Network Signalling value	Requirements (subclause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	N/A
NS_03	6.6.2.2.1	2, 4,10, 23, 25, 35, 36, 66, 70	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2, 6.6.3.3.19	41	5, 10, 15, 20	Table 6.2.4-4, Table 6.2.4-4a	
NS_05	6.6.3.3.1	1	10,15,20	≥ 50 (NOTE1)	≤ 1 (NOTE1)
			15, 20	Table 6.2.4-18 (NOTE2)	
		65 (NOTE 3)	10,15,20	≥ 50	≤ 1 (NOTE 1)
			15,20	Table 6.2.4-18 (NOTE 2)	
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	N/A
NS_07	6.6.2.2.3 6.6.3.3.2	13	10	Table 6.2.4-2	
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	
NS_11	6.6.2.2.1 6.6.3.3.13	23	1.4, 3, 5, 10, 15, 20	Table 6.2.4-5	
NS_12	6.6.3.3.5	26	1.4, 3, 5, 10, 15	Table 6.2.4-6	
NS_13	6.6.3.3.6	26	5	Table 6.2.4-7	
NS_14	6.6.3.3.7	26	10, 15	Table 6.2.4-8	
NS_15	6.6.3.3.8	26	1.4, 3, 5, 10, 15	Table 6.2.4-9 Table 6.2.4-10	
NS_16	6.6.3.3.9	27	3, 5, 10	Table 6.2.4-11, Table 6.2.4-12, Table 6.2.4-13	
NS_17	6.6.3.3.10	28	5, 10	Table 5.6-1	N/A
NS_18	6.6.3.3.11	28	5	≥ 2	≤ 1
			10, 15, 20	≥ 1	≤ 4
NS_19	6.6.3.3.12	44	10, 15, 20	Table 6.2.4-14	
NS_20	6.2.2 6.6.2.2.1 6.6.3.3.14	23	5, 10, 15, 20	Table 6.2.4-15	
NS_21	6.6.2.2.1 6.6.3.3.15	30	5, 10	Table 6.2.4-16	
NS_22	6.6.3.3.16	42, 43	5, 10, 15, 20	Table 6.2.4-17	
NS_23	6.6.3.3.17	42, 43	5, 10, 15, 20	N/A	
NS_24	6.6.3.3.20	65 (NOTE 4)	5, 10, 15, 20	Table 6.2.4-19	
NS_25	6.6.3.3.21	65 (NOTE 4)	5, 10, 15, 20	Table 6.2.4-20	
NS_26	6.6.3.3.22	68	10, 15	Table 6.2.4-21	
NS_27	6.6.2.2.5, 6.6.3.3.23	48	5, 10, 15, 20	Table 6.2.4-22	
NS_28	6.2.2A, 6.6.3.3.24	46 (NOTE 5)	20	Table 6.2.4-23	
NS_29	6.2.2A, 6.6.2.3.1a, 6.6.3.3.25	46 (NOTE 5)	20	Table 6.2.4-24	
NS_30	6.2.2A, 6.6.3.3.26	46 (NOTE 5)	20	Table 6.2.4-25	
NS_31	6.2.2A, 6.6.3.3.27	46 (NOTE 5)	20	Table 6.2.4-26	
NS_32	-	-	-	-	-

NOTE 1: Applicable when the lower edge of the assigned E-UTRA UL channel bandwidth frequency is larger than or equal to the upper edge of PHS band (1915.7 MHz) + 4 MHz + the channel BW assigned, where channel BW is as defined in subclause 5.6. A-MPR for

LTE Band 2

Band : 2

BW (MHz)	UL Ch #	Freq. (MHz)	Modu-lation	UL RB Allocation	UL RB Start	Target MPR	Meas. MPR	Tune-up Limit (dBm)	Meas. Pwr Avg (dBm)
20	18700	1860	QPSK	1	0	0	0	19.5	18.69
				1	49	0	0	19.5	19.15
				1	99	0	0	19.5	19.00
				50	0	1	1	18.5	18.12
				50	24	1	1	18.5	18.20
				50	49	1	1	18.5	18.23
				100	0	1	1	18.5	18.16
			16QAM	1	0	1	1	18.5	18.35
				1	49	1	1	18.5	18.44
				1	99	1	1	18.5	18.44
				50	0	2	2	17.5	17.12
				50	24	2	2	17.5	17.16
				50	49	2	2	17.5	17.20
				100	0	2	2	17.5	17.12
	18900	1880	QPSK	1	0	0	0	19.5	18.64
				1	49	0	0	19.5	18.89
				1	99	0	0	19.5	18.40
				50	0	1	1	18.5	18.04
				50	24	1	1	18.5	17.92
				50	49	1	1	18.5	17.71
				100	0	1	1	18.5	17.84
			16QAM	1	0	1	1	18.5	18.27
				1	49	1	1	18.5	18.31
				1	99	1	1	18.5	17.97
				50	0	2	2	17.5	17.00
				50	24	2	2	17.5	16.91
				50	49	2	2	17.5	16.70
				100	0	2	2	17.5	16.77
	19100	1900	QPSK	1	0	0	0	19.5	18.29
				1	49	0	0	19.5	18.48
				1	99	0	0	19.5	18.22
				50	0	1	1	18.5	17.56
				50	24	1	1	18.5	17.47
				50	49	1	1	18.5	17.43
				100	0	1	1	18.5	17.48
			16QAM	1	0	1	1	18.5	17.87
				1	49	1	1	18.5	17.94
				1	99	1	1	18.5	17.81
				50	0	2	2	17.5	16.56
				50	24	2	2	17.5	16.44
				50	49	2	2	17.5	16.41
				100	0	2	2	17.5	16.66

Band : 2

BW (MHz)	UL Ch #	Freq. (MHz)	Modu-lation	UL RB Allocation	UL RB Start	Target MPR	Meas. MPR	Tune-up Limit (dBm)	Meas. Pwr Avg (dBm)
15	18675	1857.5	QPSK	1	0	0	0	19.5	18.89
				1	37	0	0	19.5	19.18
				1	74	0	0	19.5	18.95
				36	0	1	1	18.5	18.20
				36	19	1	1	18.5	18.22
				36	39	1	1	18.5	18.18
				75	0	1	1	18.5	18.20
			16QAM	1	0	1	1	18.5	17.97
				1	37	1	1	18.5	18.26
				1	74	1	1	18.5	18.02
				36	0	2	2	17.5	17.15
				36	19	2	2	17.5	17.18
				36	39	2	2	17.5	17.15
				75	0	2	2	17.5	17.17
	18900	1880	QPSK	1	0	0	0	19.5	18.88
				1	37	0	0	19.5	19.06
				1	74	0	0	19.5	18.73
				36	0	1	1	18.5	18.02
				36	19	1	1	18.5	18.00
				36	39	1	1	18.5	17.88
				75	0	1	1	18.5	17.93
			16QAM	1	0	1	1	18.5	17.92
				1	37	1	1	18.5	18.07
				1	74	1	1	18.5	17.81
				36	0	2	2	17.5	17.03
				36	19	2	2	17.5	17.01
				36	39	2	2	17.5	16.87
				75	0	2	2	17.5	16.90
	19125	1902.5	QPSK	1	0	0	0	19.5	18.45
				1	37	0	0	19.5	18.55
				1	74	0	0	19.5	18.36
				36	0	1	1	18.5	17.43
				36	19	1	1	18.5	17.41
				36	39	1	1	18.5	17.36
				75	0	1	1	18.5	17.40
			16QAM	1	0	1	1	18.5	17.42
				1	37	1	1	18.5	17.50
				1	74	1	1	18.5	17.29
				36	0	2	2	17.5	16.43
				36	19	2	2	17.5	16.42
				36	39	2	2	17.5	16.37
				75	0	2	2	17.5	16.40

Band : 2

BW (MHz)	UL Ch #	Freq. (MHz)	Modu-lation	UL RB Allocation	UL RB Start	Target MPR	Meas. MPR	Tune-up Limit (dBm)	Meas. Pwr Avg (dBm)
10	18650	1855	QPSK	1	0	0	0	19.5	19.04
				1	24	0	0	19.5	19.16
				1	49	0	0	19.5	19.10
				25	0	1	1	18.5	18.20
				25	12	1	1	18.5	18.27
				25	24	1	1	18.5	18.21
				50	0	1	1	18.5	18.18
			16QAM	1	0	1	1	18.5	18.05
				1	24	1	1	18.5	18.31
				1	49	1	1	18.5	18.15
				25	0	2	2	17.5	17.18
				25	12	2	2	17.5	17.25
				25	24	2	2	17.5	17.22
				50	0	2	2	17.5	17.16
	18900	1880	QPSK	1	0	0	0	19.5	18.88
				1	24	0	0	19.5	19.03
				1	49	0	0	19.5	18.90
				25	0	1	1	18.5	18.00
				25	12	1	1	18.5	18.03
				25	24	1	1	18.5	17.88
				50	0	1	1	18.5	17.91
			16QAM	1	0	1	1	18.5	17.98
				1	24	1	1	18.5	18.09
				1	49	1	1	18.5	17.88
				25	0	2	2	17.5	17.02
				25	12	2	2	17.5	17.05
				25	24	2	2	17.5	16.88
				50	0	2	2	17.5	16.88
	19150	1905	QPSK	1	0	0	0	19.5	18.51
				1	24	0	0	19.5	18.69
				1	49	0	0	19.5	18.59
				25	0	1	1	18.5	17.52
				25	12	1	1	18.5	17.59
				25	24	1	1	18.5	17.56
				50	0	1	1	18.5	17.50
			16QAM	1	0	1	1	18.5	17.52
				1	24	1	1	18.5	17.63
				1	49	1	1	18.5	17.59
				25	0	2	2	17.5	16.51
				25	12	2	2	17.5	16.55
				25	24	2	2	17.5	16.58
				50	0	2	2	17.5	16.51

Band : 2

BW (MHz)	UL Ch #	Freq. (MHz)	Modu-lation	UL RB Allocation	UL RB Start	Target MPR	Meas. MPR	Tune-up Limit (dBm)	Meas. Pwr Avg (dBm)
5	18625	1852.5	QPSK	1	0	0	0	19.5	18.98
				1	12	0	0	19.5	19.32
				1	24	0	0	19.5	19.10
				12	0	1	1	18.5	18.12
				12	6	1	1	18.5	18.22
				12	11	1	1	18.5	18.20
				25	0	1	1	18.5	18.11
			16QAM	1	0	1	1	18.5	18.21
				1	12	1	1	18.5	18.49
				1	24	1	1	18.5	18.28
				12	0	2	2	17.5	17.19
				12	6	2	2	17.5	17.29
				12	11	2	2	17.5	17.25
				25	0	2	2	17.5	17.06
	18900	1880	QPSK	1	0	0	0	19.5	18.79
				1	12	0	0	19.5	19.07
				1	24	0	0	19.5	18.81
				12	0	1	1	18.5	17.95
				12	6	1	1	18.5	17.97
				12	11	1	1	18.5	17.93
				25	0	1	1	18.5	17.93
			16QAM	1	0	1	1	18.5	18.08
				1	12	1	1	18.5	18.35
				1	24	1	1	18.5	18.02
				12	0	2	2	17.5	17.04
				12	6	2	2	17.5	17.03
				12	11	2	2	17.5	17.00
				25	0	2	2	17.5	16.93
	19175	1907.5	QPSK	1	0	0	0	19.5	18.39
				1	12	0	0	19.5	18.75
				1	24	0	0	19.5	18.55
				12	0	1	1	18.5	17.50
				12	6	1	1	18.5	17.63
				12	11	1	1	18.5	17.61
				25	0	1	1	18.5	17.54
			16QAM	1	0	1	1	18.5	17.61
				1	12	1	1	18.5	18.00
				1	24	1	1	18.5	17.76
				12	0	2	2	17.5	16.59
				12	6	2	2	17.5	16.72
				12	11	2	2	17.5	16.69
				25	0	2	2	17.5	16.53

Band : 2

BW (MHz)	UL Ch #	Freq. (MHz)	Modu-lation	UL RB Allocation	UL RB Start	Target MPR	Meas. MPR	Tune-up Limit (dBm)	Meas. Pwr Avg (dBm)
3	18615	1851.5	QPSK	1	0	0	0	19.5	19.08
				1	7	0	0	19.5	19.21
				1	14	0	0	19.5	19.07
				8	0	1	1	18.5	18.17
				8	4	1	1	18.5	18.18
				8	7	1	1	18.5	18.16
				15	0	1	1	18.5	18.13
			16QAM	1	0	1	1	18.5	18.10
				1	7	1	1	18.5	18.26
				1	14	1	1	18.5	18.09
				8	0	2	2	17.5	17.27
				8	4	2	2	17.5	17.30
				8	7	2	2	17.5	17.24
				15	0	2	2	17.5	17.21
	18900	1880	QPSK	1	0	0	0	19.5	18.89
				1	7	0	0	19.5	19.02
				1	14	0	0	19.5	18.83
				8	0	1	1	18.5	17.98
				8	4	1	1	18.5	17.95
				8	7	1	1	18.5	17.91
				15	0	1	1	18.5	17.92
			16QAM	1	0	1	1	18.5	17.91
				1	7	1	1	18.5	18.01
				1	14	1	1	18.5	17.86
				8	0	2	2	17.5	17.05
				8	4	2	2	17.5	17.02
				8	7	2	2	17.5	16.97
				15	0	2	2	17.5	16.96
	19185	1908.5	QPSK	1	0	0	0	19.5	18.51
				1	7	0	0	19.5	18.68
				1	14	0	0	19.5	18.57
				8	0	1	1	18.5	17.56
				8	4	1	1	18.5	17.58
				8	7	1	1	18.5	17.55
				15	0	1	1	18.5	17.52
			16QAM	1	0	1	1	18.5	17.49
				1	7	1	1	18.5	17.56
				1	14	1	1	18.5	17.51
				8	0	2	2	17.5	16.65
				8	4	2	2	17.5	16.65
				8	7	2	2	17.5	16.65
				15	0	2	2	17.5	16.58

Band : 2

BW (MHz)	UL Ch #	Freq. (MHz)	Modu-lation	UL RB Allocation	UL RB Start	Target MPR	Meas. MPR	Tune-up Limit (dBm)	Meas. Pwr Avg (dBm)
1.4	18607	1850.7	QPSK	1	0	0	0	19.5	19.09
				1	2	0	0	19.5	19.20
				1	5	0	0	19.5	19.14
				3	0	0	0	19.5	19.10
				3	1	0	0	19.5	19.16
				3	3	0	0	19.5	19.15
				6	0	1	1	18.5	18.18
			16QAM	1	0	1	1	18.5	18.18
				1	2	1	1	18.5	18.32
				1	5	1	1	18.5	18.26
				3	0	1	1	18.5	18.22
				3	1	1	1	18.5	18.27
				3	3	1	1	18.5	18.25
				6	0	2	2	17.5	17.28
	18900	1880	QPSK	1	0	0	0	19.5	18.90
				1	2	0	0	19.5	19.03
				1	5	0	0	19.5	18.91
				3	0	0	0	19.5	18.97
				3	1	0	0	19.5	19.00
				3	3	0	0	19.5	18.93
				6	0	1	1	18.5	17.96
			16QAM	1	0	1	1	18.5	18.05
				1	2	1	1	18.5	18.18
				1	5	1	1	18.5	18.03
				3	0	1	1	18.5	18.06
				3	1	1	1	18.5	18.11
				3	3	1	1	18.5	18.07
				6	0	2	2	17.5	17.11
	19193	1909.3	QPSK	1	0	0	0	19.5	18.57
				1	2	0	0	19.5	18.72
				1	5	0	0	19.5	18.63
				3	0	0	0	19.5	18.61
				3	1	0	0	19.5	18.66
				3	3	0	0	19.5	18.62
				6	0	1	1	18.5	17.56
			16QAM	1	0	1	1	18.5	17.68
				1	2	1	1	18.5	17.77
				1	5	1	1	18.5	17.67
				3	0	1	1	18.5	17.66
				3	1	1	1	18.5	17.70
				3	3	1	1	18.5	17.66
				6	0	2	2	17.5	16.73

LTE Band 7

Band : 7

BW (MHz)	UL Ch #	Freq. (MHz)	Modu-lation	UL RB Allocation	UL RB Start	Target MPR	Meas. MPR	Tune-up Limit (dBm)	Meas. Pwr Avg (dBm)
20	20850	2510	QPSK	1	0	0	0	17.0	16.00
				1	49	0	0	17.0	16.34
				1	99	0	0	17.0	16.31
				50	0	1	1	16.0	14.97
				50	24	1	1	16.0	15.20
				50	49	1	1	16.0	15.34
				100	0	1	1	16.0	15.14
			16QAM	1	0	1	1	16.0	14.98
				1	49	1	1	16.0	15.74
				1	99	1	1	16.0	15.72
				50	0	2	2	15.0	13.97
				50	24	2	2	15.0	14.17
				50	49	2	2	15.0	14.24
				100	0	2	2	15.0	14.12
	21100	2535	QPSK	1	0	0	0	17.0	16.45
				1	49	0	0	17.0	16.84
				1	99	0	0	17.0	16.51
				50	0	1	1	16.0	15.57
				50	24	1	1	16.0	15.62
				50	49	1	1	16.0	15.55
				100	0	1	1	16.0	15.60
			16QAM	1	0	1	1	16.0	15.87
				1	49	1	1	16.0	16.00
				1	99	1	1	16.0	15.91
				50	0	2	2	15.0	14.54
				50	24	2	2	15.0	14.61
				50	49	2	2	15.0	14.55
				100	0	2	2	15.0	14.65
	21350	2560	QPSK	1	0	0	0	17.0	16.30
				1	49	0	0	17.0	16.46
				1	99	0	0	17.0	16.00
				50	0	1	1	16.0	15.32
				50	24	1	1	16.0	15.28
				50	49	1	1	16.0	15.25
				100	0	1	1	16.0	15.23
			16QAM	1	0	1	1	16.0	15.73
				1	49	1	1	16.0	15.91
				1	99	1	1	16.0	15.30
				50	0	2	2	15.0	14.30
				50	24	2	2	15.0	14.25
				50	49	2	2	15.0	14.17
				100	0	2	2	15.0	14.30

Band : 7

BW (MHz)	UL Ch #	Freq. (MHz)	Modu-lation	UL RB Allocation	UL RB Start	Target MPR	Meas. MPR	Tune-up Limit (dBm)	Meas. Pwr Avg (dBm)
15	20825	2507.5	QPSK	1	0	0	0	17.0	15.88
				1	37	0	0	17.0	16.28
				1	74	0	0	17.0	16.34
				36	0	1	1	16.0	14.89
				36	19	1	1	16.0	14.99
				36	39	1	1	16.0	15.16
				75	0	1	1	16.0	15.08
			16QAM	1	0	1	1	16.0	14.94
				1	37	1	1	16.0	15.44
				1	74	1	1	16.0	15.48
				36	0	2	2	15.0	13.90
				36	19	2	2	15.0	14.06
				36	39	2	2	15.0	14.15
				75	0	2	2	15.0	14.06
	21100	2535	QPSK	1	0	0	0	17.0	16.64
				1	37	0	0	17.0	16.89
				1	74	0	0	17.0	16.70
				36	0	1	1	16.0	15.65
				36	19	1	1	16.0	15.69
				36	39	1	1	16.0	15.74
				75	0	1	1	16.0	15.72
			16QAM	1	0	1	1	16.0	15.92
				1	37	1	1	16.0	16.00
				1	74	1	1	16.0	15.91
				36	0	2	2	15.0	14.62
				36	19	2	2	15.0	14.66
				36	39	2	2	15.0	14.64
				75	0	2	2	15.0	14.70
	21375	2562.5	QPSK	1	0	0	0	17.0	16.51
				1	37	0	0	17.0	16.58
				1	74	0	0	17.0	16.09
				36	0	1	1	16.0	15.35
				36	19	1	1	16.0	15.33
				36	39	1	1	16.0	15.23
				75	0	1	1	16.0	15.34
			16QAM	1	0	1	1	16.0	15.73
				1	37	1	1	16.0	15.76
				1	74	1	1	16.0	15.27
				36	0	2	2	15.0	14.37
				36	19	2	2	15.0	14.35
				36	39	2	2	15.0	14.25
				75	0	2	2	15.0	14.38

Band : 7

BW (MHz)	UL Ch #	Freq. (MHz)	Modu-lation	UL RB Allocation	UL RB Start	Target MPR	Meas. MPR	Tune-up Limit (dBm)	Meas. Pwr Avg (dBm)
10	20800	2505	QPSK	1	0	0	0	17.0	15.80
				1	24	0	0	17.0	16.22
				1	49	0	0	17.0	16.24
				25	0	1	1	16.0	14.84
				25	12	1	1	16.0	15.01
				25	24	1	1	16.0	15.08
				50	0	1	1	16.0	14.97
			16QAM	1	0	1	1	16.0	15.03
				1	24	1	1	16.0	15.37
				1	49	1	1	16.0	15.45
				25	0	2	2	15.0	13.89
				25	12	2	2	15.0	14.03
				25	24	2	2	15.0	14.14
				50	0	2	2	15.0	13.97
	21100	2535	QPSK	1	0	0	0	17.0	16.77
				1	24	0	0	17.0	16.92
				1	49	0	0	17.0	16.81
				25	0	1	1	16.0	15.82
				25	12	1	1	16.0	15.75
				25	24	1	1	16.0	15.72
				50	0	1	1	16.0	15.80
			16QAM	1	0	1	1	16.0	15.98
				1	24	1	1	16.0	16.00
				1	49	1	1	16.0	16.00
				25	0	2	2	15.0	14.71
				25	12	2	2	15.0	14.72
				25	24	2	2	15.0	14.69
				50	0	2	2	15.0	14.73
	21400	2565	QPSK	1	0	0	0	17.0	16.37
				1	24	0	0	17.0	16.45
				1	49	0	0	17.0	16.14
				25	0	1	1	16.0	15.31
				25	12	1	1	16.0	15.24
				25	24	1	1	16.0	15.29
				50	0	1	1	16.0	15.25
			16QAM	1	0	1	1	16.0	15.63
				1	24	1	1	16.0	15.63
				1	49	1	1	16.0	15.34
				25	0	2	2	15.0	14.27
				25	12	2	2	15.0	14.20
				25	24	2	2	15.0	14.22
				50	0	2	2	15.0	14.28

Band : 7

BW (MHz)	UL Ch #	Freq. (MHz)	Modu-lation	UL RB Allocation	UL RB Start	Target MPR	Meas. MPR	Tune-up Limit (dBm)	Meas. Pwr Avg (dBm)
5	20775	2502.5	QPSK	1	0	0	0	17.0	15.79
				1	12	0	0	17.0	16.18
				1	24	0	0	17.0	16.02
				12	0	1	1	16.0	14.79
				12	6	1	1	16.0	14.91
				12	11	1	1	16.0	14.95
				25	0	1	1	16.0	14.91
			16QAM	1	0	1	1	16.0	15.02
				1	12	1	1	16.0	15.43
				1	24	1	1	16.0	15.22
				12	0	2	2	15.0	13.86
				12	6	2	2	15.0	13.96
				12	11	2	2	15.0	13.98
				25	0	2	2	15.0	13.89
	21100	2535	QPSK	1	0	0	0	17.0	16.65
				1	12	0	0	17.0	16.90
				1	24	0	0	17.0	16.72
				12	0	1	1	16.0	15.66
				12	6	1	1	16.0	15.75
				12	11	1	1	16.0	15.72
				25	0	1	1	16.0	15.69
			16QAM	1	0	1	1	16.0	15.87
				1	12	1	1	16.0	16.00
				1	24	1	1	16.0	15.95
				12	0	2	2	15.0	14.71
				12	6	2	2	15.0	14.79
				12	11	2	2	15.0	14.75
				25	0	2	2	15.0	14.70
	21425	2567.5	QPSK	1	0	0	0	17.0	16.24
				1	12	0	0	17.0	16.39
				1	24	0	0	17.0	16.10
				12	0	1	1	16.0	15.15
				12	6	1	1	16.0	15.19
				12	11	1	1	16.0	15.16
				25	0	1	1	16.0	15.14
			16QAM	1	0	1	1	16.0	15.49
				1	12	1	1	16.0	15.66
				1	24	1	1	16.0	15.36
				12	0	2	2	15.0	14.19
				12	6	2	2	15.0	14.20
				12	11	2	2	15.0	14.20
				25	0	2	2	15.0	14.17

LTE Band 26

Band : 26

BW (MHz)	UL Ch #	Freq. (MHz)	Modu-lation	UL RB Allocation	UL RB Start	Target MPR	Meas. MPR	Tune-up Limit (dBm)	Meas. Pwr Avg (dBm)
10	26740	819	QPSK	1	0	0	0	23.0	22.50
				1	24	0	0	23.0	22.70
				1	49	0	0	23.0	22.43
				25	0	1	1	22.0	21.47
				25	12	1	1	22.0	21.51
				25	24	1	1	22.0	21.58
				50	0	1	1	22.0	21.43
			16QAM	1	0	1	1	22.0	21.58
				1	24	1	1	22.0	21.51
				1	49	1	1	22.0	21.52
				25	0	2	2	21.0	20.28
				25	12	2	2	21.0	20.27
				25	24	2	2	21.0	20.39
				50	0	2	2	21.0	20.29
	26865	831.5	QPSK	1	0	0	0	23.0	22.41
				1	24	0	0	23.0	22.53
				1	49	0	0	23.0	22.55
				25	0	1	1	22.0	21.53
				25	12	1	1	22.0	21.43
				25	24	1	1	22.0	21.28
				50	0	1	1	22.0	21.33
			16QAM	1	0	1	1	22.0	21.58
				1	24	1	1	22.0	21.33
				1	49	1	1	22.0	21.42
				25	0	2	2	21.0	20.48
				25	12	2	2	21.0	20.31
				25	24	2	2	21.0	20.08
				50	0	2	2	21.0	20.22
	26990	844	QPSK	1	0	0	0	23.0	22.36
				1	24	0	0	23.0	22.39
				1	49	0	0	23.0	22.43
				25	0	1	1	22.0	21.31
				25	12	1	1	22.0	21.38
				25	24	1	1	22.0	21.26
				50	0	1	1	22.0	21.24
			16QAM	1	0	1	1	22.0	21.32
				1	24	1	1	22.0	21.61
				1	49	1	1	22.0	21.31
				25	0	2	2	21.0	20.30
				25	12	2	2	21.0	20.39
				25	24	2	2	21.0	20.21
				50	0	2	2	21.0	20.23

Band : 26

BW (MHz)	UL Ch #	Freq. (MHz)	Modu-lation	UL RB Allocation	UL RB Start	Target MPR	Meas. MPR	Tune-up Limit (dBm)	Meas. Pwr Avg (dBm)
5	26715	816.5	QPSK	1	0	0	0	23.0	22.43
				1	12	0	0	23.0	22.79
				1	24	0	0	23.0	22.57
				12	0	1	1	22.0	21.46
				12	6	1	1	22.0	21.58
				12	11	1	1	22.0	21.53
				25	0	1	1	22.0	21.47
			16QAM	1	0	1	1	22.0	21.57
				1	12	1	1	22.0	21.73
				1	24	1	1	22.0	21.42
				12	0	2	2	21.0	20.45
				12	6	2	2	21.0	20.52
				12	11	2	2	21.0	20.42
				25	0	2	2	21.0	20.36
	26865	831.5	QPSK	1	0	0	0	23.0	22.35
				1	12	0	0	23.0	22.51
				1	24	0	0	23.0	22.42
				12	0	1	1	22.0	21.47
				12	6	1	1	22.0	21.45
				12	11	1	1	22.0	21.36
				25	0	1	1	22.0	21.34
			16QAM	1	0	1	1	22.0	21.48
				1	12	1	1	22.0	21.44
				1	24	1	1	22.0	21.31
				12	0	2	2	21.0	20.40
				12	6	2	2	21.0	20.37
				12	11	2	2	21.0	20.23
				25	0	2	2	21.0	20.19
	26765	821.5	QPSK	1	0	0	0	23.0	22.45
				1	12	0	0	23.0	22.66
				1	24	0	0	23.0	22.34
				12	0	1	1	22.0	21.40
				12	6	1	1	22.0	21.49
				12	11	1	1	22.0	21.48
				25	0	1	1	22.0	21.39
			16QAM	1	0	1	1	22.0	21.35
				1	12	1	1	22.0	21.66
				1	24	1	1	22.0	21.51
				12	0	2	2	21.0	20.23
				12	6	2	2	21.0	20.38
				12	11	2	2	21.0	20.40
				25	0	2	2	21.0	20.26

Band : 26

BW (MHz)	UL Ch #	Freq. (MHz)	Modu-lation	UL RB Allocation	UL RB Start	Target MPR	Meas. MPR	Tune-up Limit (dBm)	Meas. Pwr Avg (dBm)
3	26705	815.5	QPSK	1	0	0	0	23.0	22.52
				1	7	0	0	23.0	22.72
				1	14	0	0	23.0	22.61
				8	0	1	1	22.0	21.64
				8	4	1	1	22.0	21.72
				8	7	1	1	22.0	21.70
				15	0	1	1	22.0	21.55
			16QAM	1	0	1	1	22.0	21.56
				1	7	1	1	22.0	21.69
				1	14	1	1	22.0	21.55
				8	0	2	2	21.0	20.50
				8	4	2	2	21.0	20.55
				8	7	2	2	21.0	20.51
				15	0	2	2	21.0	20.42
	26865	831.5	QPSK	1	0	0	0	23.0	22.41
				1	7	0	0	23.0	22.53
				1	14	0	0	23.0	22.46
				8	0	1	1	22.0	21.55
				8	4	1	1	22.0	21.58
				8	7	1	1	22.0	21.53
				15	0	1	1	22.0	21.37
			16QAM	1	0	1	1	22.0	21.39
				1	7	1	1	22.0	21.45
				1	14	1	1	22.0	21.32
				8	0	2	2	21.0	20.35
				8	4	2	2	21.0	20.40
				8	7	2	2	21.0	20.33
				15	0	2	2	21.0	20.21
	26775	822.5	QPSK	1	0	0	0	23.0	22.50
				1	7	0	0	23.0	22.62
				1	14	0	0	23.0	22.39
				8	0	1	1	22.0	21.58
				8	4	1	1	22.0	21.60
				8	7	1	1	22.0	21.51
				15	0	1	1	22.0	21.42
			16QAM	1	0	1	1	22.0	21.39
				1	7	1	1	22.0	21.59
				1	14	1	1	22.0	21.53
				8	0	2	2	21.0	20.43
				8	4	2	2	21.0	20.48
				8	7	2	2	21.0	20.47
				15	0	2	2	21.0	20.35

Band : 26

BW (MHz)	UL Ch #	Freq. (MHz)	Modu-lation	UL RB Allocation	UL RB Start	Target MPR	Meas. MPR	Tune-up Limit (dBm)	Meas. Pwr Avg (dBm)
1.4	26697	814.7	QPSK	1	0	0	0	23.0	22.46
				1	2	0	0	23.0	22.58
				1	5	0	0	23.0	22.50
				3	0	0	0	23.0	22.32
				3	1	0	0	23.0	22.35
				3	3	0	0	23.0	22.29
				6	0	1	1	22.0	21.67
			16QAM	1	0	1	1	22.0	21.42
				1	2	1	1	22.0	21.54
				1	5	1	1	22.0	21.42
				3	0	1	1	22.0	21.45
				3	1	1	1	22.0	21.43
				3	3	1	1	22.0	21.40
				6	0	2	2	21.0	20.46
	26865	831.5	QPSK	1	0	0	0	23.0	22.34
				1	2	0	0	23.0	22.45
				1	5	0	0	23.0	22.33
				3	0	0	0	23.0	22.17
				3	1	0	0	23.0	22.17
				3	3	0	0	23.0	22.14
				6	0	1	1	22.0	21.66
			16QAM	1	0	1	1	22.0	21.30
				1	2	1	1	22.0	21.34
				1	5	1	1	22.0	21.27
				3	0	1	1	22.0	21.15
				3	1	1	1	22.0	21.15
				3	3	1	1	22.0	21.05
				6	0	2	2	21.0	20.34
	26783	823.3	QPSK	1	0	0	0	23.0	22.37
				1	2	0	0	23.0	22.48
				1	5	0	0	23.0	22.33
				3	0	0	0	23.0	22.35
				3	1	0	0	23.0	22.39
				3	3	0	0	23.0	22.36
				6	0	1	1	22.0	21.53
			16QAM	1	0	1	1	22.0	21.38
				1	2	1	1	22.0	21.49
				1	5	1	1	22.0	21.43
				3	0	1	1	22.0	21.43
				3	1	1	1	22.0	21.43
				3	3	1	1	22.0	21.44
				6	0	2	2	21.0	20.43

6.4 Output Power and SAR test required for WLAN and Bluetooth

According to KDB248227D01, 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.

*Transmitting duty was 100% on all WLAN tests.

WLAN 2.4GHz (DTS Band)

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Tune-up upper Power (dBm)	Measured average Power (dBm)	Initial test configuration	Note(s)
2.4	11b	1 Mbps	1	2412	15.00	13.81		
			6	2437	15.00	13.94		
			11	2462	15.00	14.19	Yes	
	11g	6 Mbps	1	2412	11.00	9.50		
			6	2437	11.00	10.26		
			11	2462	11.00	10.02		
	11n-20	6.5 Mbps (MCS 0)	1	2412	11.00	9.85		
			6	2437	11.00	10.46		
			11	2462	11.00	10.33		
	11n-40	13.5 Mbps (MCS 0)	3	2422	9.00	7.87		
			6	2437	9.00	8.39		
			9	2452	9.00	8.23		

Note(s):

1. Provided higher maximum output power is not specified for the other channels, channels 1, 6 and 11 are used to configure DSSS and OFDM channels for SAR measurements; otherwise, the closest adjacent channel with the highest maximum output power specified for production units should be tested instead of channels 1, 6 or 11.
2. When the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for that subsequent test configuration.
3. Initial SAR test channel was chosen. (shaded blue frame)

Bluetooth

Band (GHz)	Mode	Data Rate	Ch #	Freq. (MHz)	Measured average Pow er (dBm) (Burst)	Tune-up upper Pow er (dBm)	SAR Test (Yes/No)	Note(s)
					BT Ant Tx	BT Ant Tx		
2.4	Bluetooth BR	DH5	0	2402	4.98	5.00	Yes	
			39	2441	4.53			
			78	2480	3.17			
	Bluetooth EDR	2DH5	0	2402	1.99	2.00	No	1
			39	2441	1.93			
			78	2480	0.92			
	Bluetooth EDR	3DH5	0	2402	1.99	2.00	No	1
			39	2441	1.90			
			78	2480	0.89			
	BTLE	-	37	2402	4.91	5.00	Yes	
			17	2440	4.26			
			39	2480	3.01			

Note(s):

1. According to KDB865664, SAR measurement is not required for EDR when the specified tune-up tolerances for EDR is lower than BR.
2. SAR test channel was chosen. (shaded blue frame)

Wi-Fi 5GHz (U-NII-1 and U-NII-2A Bands)

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	Main Ant Tx		
5.2 (U-NII-1)	802.11a	6 Mbps	36	5180	2.00	3.3	No	2
			44	5220	2.61			
			48	5240	2.92			
	802.11n -20	6.5 Mbps	36	5180	2.08	3.3	No	2
			44	5220	2.68			
			48	5240	2.71			
	802.11n-40	13.5 Mbps	38	5190	2.38	3.3	No	2,3
			46	5230	2.79			
5.3 (U-NII-2A)	802.11a	6 Mbps	52	5260	2.71	3.8	No	2
			60	5300	3.06			
			64	5320	3.29			
	802.11n-20	6.5 Mbps	52	5260	2.76	3.8	No	2
			60	5300	3.15			
			64	5320	3.13			
	802.11n-40	13.5 Mbps	54	5270	3.14	3.8	Yes	2,3,4
			62	5310	3.53			

Wi-Fi 5GHz (U-NII-2C Band)

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	Main Ant Tx		
5.5 (U-NII-2C)	802.11a	6 Mbps	100	5500	4.54	5.0	No	2
			116	5580	4.44			
			140	5700	4.26			
	802.11n-20	6.5 Mbps	100	5500	4.30	5.0	No	2
			116	5580	4.45			
			140	5700	4.20			
	802.11n-40	13.5 Mbps	102	5510	4.40	5.0	Yes	2,4
			110	5550	4.45			
			134	5670	4.35			

Note(s):

1. Output Power and SAR measurement is not required for 802.11a/n HT20 channels when the specified tune-up tolerances for 802.11a/n HT20 are lower than 802.11n HT40 and the measured SAR is ≤ 1.2 W/Kg.
2. When the same transmission mode configurations have the same maximum output power on the same channel for the 802.11 a/g/n modes, the channel with the largest bandwidth and lowest data rate is selected (i.e. 802.11n HT40).
3. 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.
4. According to KDB248227D01, SAR test channel was chosen. (shaded blue frame)

SECTION7: Test surrounding

7.1 Measurement uncertainty

This measurement uncertainty budget is suggested by IEEE Std 1528(2013) and IEC62209-2:2010, and determined by Schmid & Partner Engineering AG (DASY5/6 Uncertainty Budget). Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz 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.

<Body>

Error Description	Uncert. value	Prob. Dist.	Div.	(ci) 1g	(ci) 10g	Std. Unc. (1g)	Std.Unc. (10g)
Measurement System							
Probe Calibration	± 6.55 %	N	1	1	1	±6.55%	±6.55%
Axial Isotropy	± 4.7 %	R	√3	0.7	0.7	±1.9%	±1.9%
Hemispherical Isotropy	± 9.6 %	R	√3	0.7	0.7	±3.9%	±3.9%
Linearity	± 4.7 %	R	√3	1	1	±2.7%	±2.7%
Modulation Response	± 2.4 %	R	√3	1	1	±1.4%	±1.4%
System Detection Limits	± 1.0 %	R	√3	1	1	±0.6%	±0.6%
Boundary Effects	± 2.0 %	R	√3	1	1	±1.2%	±1.2%
Readout Electronics	± 0.3 %	N	1	1	1	±0.3%	±0.3%
Response Time	± 0.8 %	R	√3	1	1	±0.5%	±0.5%
Integration Time	± 2.6 %	R	√3	1	1	±1.5%	±1.5%
RF Ambient Noise	± 3.0 %	R	√3	1	1	±1.7%	±1.7%
RF Ambient Reflections	± 3.0 %	R	√3	1	1	±1.7%	±1.7%
Probe Positioner	± 0.04 %	R	√3	1	1	±0.0%	±0.0%
Probe Positioning	± 0.8 %	R	√3	1	1	±0.5%	±0.5%
Post-processing	± 4.0 %	R	√3	1	1	±2.3%	±2.3%
Test Sample Related							
Device Holder	± 3.6 %	N	1	1	1	±3.6%	±3.6%
Test sample Positioning	± 2.9 %	N	1	1	1	±2.9%	±2.9%
Power Scaling	± 0.0 %	R	√3	1	1	±0.0%	±0.0%
Power Drift	± 5.0 %	R	√3	1	1	±2.9%	±2.9%
Phantom and Setup							
Phantom Uncertainty	± 7.6 %	R	√3	1	1	±4.4%	±4.4%
SAR correction	± 1.9 %	N	1	1	0.84	±1.9%	±1.6%
Liquid Conductivity (mea.)	- 3.3 %	N	1	0.78	0.71	±2.6%	±2.4%
Liquid Permittivity (mea.)	- 2.2 %	N	1	0.23	0.26	±0.5%	±0.6%
Temp. unc. - Conductivity	± 3.4 %	R	√3	0.78	0.71	±1.5%	±1.4%
Temp. unc. - Permittivity	± 0.4 %	R	√3	0.23	0.26	±0.1%	±0.1%
Combined Std. Uncertainty						±12.2%	±12.1%
Expanded STD Uncertainty (κ =2)						±24.4%	±24.2%

Note: This uncertainty budget for validation is worst-case.
Table of uncertainties are listed for ISO/IEC 17025.

SECTION8: Parameter Check

The dielectric parameters were checked prior to assessment using the DAK dielectric probe kit.
The dielectric parameters measurement is reported in each correspondent section.

According to KDB865664 D01, +/- 5% tolerances are required for εr and σ and then below table which is the target value of the simulated tissue liquid is quoted from KDB865664 D01.

Target Frequency	Head		Body	
(MHz)	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

(ε_r = relative permittivity, σ = conductivity and ρ = 1000 kg/m^3)

8.1 For SAR system check

Date	Ambient Temp. [deg.c]	Relative Humidity [%]	Liquid type	Liquid Temp. [deg.c]	Measured Frequency [MHz]	Target [σ]	Target [εr]	Measure [σ]	Measure [εr]	Deviation σ [%]	Deviation εr [%]	Limiit [%]	Remark
2020/4/24	24.0	45.0	HSL1900V2	23.3	1900.0	1.40	40.0	1.41	39.7	0.6	-0.7	+-5	*1
2020/4/27	25.0	45.0	HSL1900V2	24.3	1900.0	1.40	40.0	1.41	40.0	0.4	-0.1	+-5	*1
2020/4/28	23.5	45.0	HSL1900V2	22.8	1900.0	1.40	40.0	1.41	39.9	0.7	-0.2	+-5	*1
2020/5/7	22.5	45.0	HBBL600-10000	21.8	2600.0	1.96	39.0	1.94	38.9	-1.1	-0.3	+-5	*2
2020/5/12	23.5	45.0	HBBL600-10000	22.7	2450.0	1.80	39.2	1.83	39.2	1.6	-0.1	+-5	*1
2020/5/13	23.5	45.0	HBBL600-10000	22.5	2450.0	1.80	39.2	1.80	38.8	0.1	-1.0	+-5	*1
2020/5/14	23.0	50.0	HBBL600-10000	22.0	5250.0	4.71	35.9	4.65	35.7	-1.2	-0.7	+-5	*2
2020/5/18	22.0	50.0	HBBL600-10000	21.0	5600.0	5.07	35.5	4.92	34.9	-2.9	-1.8	+-5	*2
2020/8/27	22.0	45.0	HBBL600-10000	21.2	835.0	0.90	41.5	0.93	42.3	***3.2***	***1.9***	+-5	*1
2020/8/28	21.5	45.0	HBBL600-10000	20.8	835.0	0.90	41.5	0.92	41.9	1.9	1.0	+-5	*1
2020/9/2	21.0	45.0	HBBL600-10000	20.3	835.0	0.90	41.5	0.92	41.8	1.7	0.8	+-5	*1

σ : Conductivity / εr: Relative Permittivity
*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.

8.2 For SAR measurement

DIELECTRIC PARAMETERS MEASUREMENT RESULTS													
Date	Ambient Temp. [deg.c]	Relative Humidity [%]	Liquid type	Liquid Temp. [deg.c]	Measured Frequency [MHz]	Target [σ]	Target [εr]	Measure [σ]	Measure [εr]	Deviation σ [%]	Deviation εr [%]	Limiit [%]	Remark
2020/4/24	24.0	45.0	HSL1900V2	23.3	1850.2	1.40	40.0	1.36	39.9	-3.2	-0.3	+-5	*1
2020/4/24	24.0	45.0	HSL1900V2	23.3	1880.0	1.40	40.0	1.39	39.8	-0.9	-0.5	+-5	*1
2020/4/24	24.0	45.0	HSL1900V2	23.3	1909.8	1.40	40.0	1.42	39.7	1.4	-0.7	+-5	*1
2020/4/27	25.0	45.0	HSL1900V2	24.3	1852.4	1.40	40.0	1.36	40.2	-3.2	0.4	+-5	*1
2020/4/27	25.0	45.0	HSL1900V2	24.3	1880.0	1.40	40.0	1.38	40.0	-1.1	0.1	+-5	*1
2020/4/27	25.0	45.0	HSL1900V2	24.3	1907.6	1.40	40.0	1.41	39.9	0.9	-0.1	+-5	*1
2020/4/28	23.5	45.0	HSL1900V2	22.8	1860.0	1.40	40.0	1.36	40.0	-2.6	0.1	+-5	*1
2020/5/7	22.5	45.0	HBBL600-10000	21.8	2535.0	1.89	39.1	1.90	39.0	0.2	-0.2	+-5	*2
2020/5/12	23.5	45.0	HBBL600-10000	22.7	2412.0	1.77	39.3	1.80	39.2	1.7	-0.2	+-5	*2
2020/5/12	23.5	45.0	HBBL600-10000	22.7	2437.0	1.79	39.2	1.82	39.2	1.6	-0.1	+-5	*2
2020/5/12	23.5	45.0	HBBL600-10000	22.7	2462.0	1.81	39.2	1.84	39.1	1.4	-0.1	+-5	*2
2020/5/13	23.5	45.0	HBBL600-10000	22.5	2402.0	1.76	39.3	1.77	38.8	0.9	-1.3	+-5	*2
2020/5/14	23.0	50.0	HBBL600-10000	22.0	5270.0	4.73	35.9	4.69	35.6	-0.8	-0.8	+-5	*2
2020/5/14	23.0	50.0	HBBL600-10000	22.0	5310.0	4.77	35.9	4.76	35.6	-0.2	-0.8	+-5	*2
2020/5/18	22.0	50.0	HBBL600-10000	21.0	5510.0	4.97	35.6	4.81	35.5	***-3.3***	-0.3	+-5	*2
2020/5/18	22.0	50.0	HBBL600-10000	21.0	5550.0	5.01	35.6	4.85	35.3	-3.3	-0.9	+-5	*2
2020/5/18	22.0	50.0	HBBL600-10000	21.0	5670.0	5.14	35.4	5.12	34.7	-0.2	***-2.2***	+-5	*2
2020/8/27	22.0	45.0	HBBL600-10000	21.2	824.2	0.90	41.6	0.93	42.4	2.9	1.9	+-5	*2
2020/8/27	22.0	45.0	HBBL600-10000	21.2	836.6	0.90	41.5	0.93	42.3	3.0	1.9	+-5	*2
2020/8/27	22.0	45.0	HBBL600-10000	21.2	848.8	0.92	41.5	0.93	42.3	2.1	1.8	+-5	*2
2020/8/28	21.5	45.0	HBBL600-10000	20.8	826.6	0.90	41.5	0.92	41.9	1.8	0.9	+-5	*2
2020/8/28	21.5	45.0	HBBL600-10000	20.8	836.6	0.90	41.5	0.92	41.9	1.8	1.0	+-5	*2
2020/8/28	21.5	45.0	HBBL600-10000	20.8	846.6	0.91	41.5	0.92	41.9	1.0	0.9	+-5	*2
2020/8/28	21.5	45.0	HBBL600-10000	20.8	819.0	0.90	41.6	0.91	42.0	1.4	0.9	+-5	*2
2020/9/2	21.0	45.0	HBBL600-10000	20.3	819.0	0.90	41.6	0.91	41.9	1.1	0.7	+-5	*2

σ : Conductivity / εr: Relative Permittivity
*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.

SECTION9: System Check confirmation

The measurements were performed in the flat section of the TWIN SAM or ELI phantom, shell thickness: 2.0 ±0.2 mm (bottom plate) filled with Body or Head simulating liquid of the following parameters.
The depth of tissue-equivalent liquid in a phantom must be ≥ 15.0 cm ± 0.5 cm for SAR measurements ≤ 3 GHz and ≥ 10.0 cm ± 0.5 cm for measurements > 3 GHz.
The DASY system with an E-Field Probe was used for the measurements.
The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom).
The standard measuring distance was 10 mm (above 1GHz to 6GHz) and 15 mm (below 1GHz) from dipole center to the simulating liquid surface.
The coarse grid with a grid spacing of 12 mm (1GHz to 3GHz) and15 mm (below 1GHz) was aligned with the dipole.
For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
Special 7x7x7 (below 3 GHz) and/or 8x8x7 (above 3 GHz) fine cube was chosen for the cube.
Distance between probe sensors and phantom surface was set to 3 mm.
For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.5 mm
The dipole input power (forward power) was 100 mW(For 5GHz band) or 250 mW(For other band).
The results are normalized to 1 W input power.

Target Value

Freq [MHz]	Model,S/N	Head	
		(SPEAG) 1g [W/kg]	(SPEAG) 10g[W/kg]
835	D835,4d149	9.56	6.24
1900	D1900,5d169	39.48	20.64
2450	D2450,713	54.80	25.40
2600	D2600,1030	57.20	25.16
5250	D5GHV2,1020	82.20	23.50
5600	D5GHV2,1020	85.00	24.20

*1 The target(reference) SAR values can be obtained from the calibration certificate of system validation dipoles(Refer to Appendix 2). The target SAR values are SAR measured value in the calibration certificate scaled to 1W.

Date Tested	Test Freq	Model,S/N	T.S. Liquid		Measured Results		Target (Ref. Value)	Delta ±10 %
					Zoom Scan	Normalize to 1 W		
2020/4/24	1900	D1900,5d169	Head	1g	9.44	37.76	39.48	-4.4
				10g	4.87	19.48	20.64	-5.6
2020/4/27	1900	D1900,5d169	Head	1g	9.32	37.28	39.48	-5.6
				10g	4.90	19.60	20.64	-5.0
2020/4/28	1900	D1900,5d169	Head	1g	9.34	37.36	39.48	-5.4
				10g	4.83	19.32	20.64	-6.4
2020/5/7	2600	D2600,1030	Head	1g	14.40	57.60	57.20	0.7
				10g	6.47	25.88	25.16	2.9
2020/5/12	2450	D2450,713	Head	1g	13.80	55.20	54.80	0.7
				10g	6.29	25.16	25.40	-0.9
2020/5/13	2450	D2450,713	Head	1g	14.10	56.40	54.80	2.9
				10g	6.53	26.12	25.40	2.8
2020/5/14	5250	D5GHV2,1020	Head	1g	8.42	84.20	82.20	2.4
				10g	2.39	23.90	23.50	1.7
2020/5/18	5600	D5GHV2,1020	Head	1g	8.56	85.60	85.00	0.7
				10g	2.40	24.00	24.20	-0.8
2020/8/27	835	D835,4d149	Body	1g	2.43	9.72	9.84	-1.2
				10g	1.57	6.28	6.44	-2.5
2020/8/28	835	D835,4d149	Body	1g	2.46	9.84	9.84	0.0
				10g	1.60	6.40	6.44	-0.6
2020/9/2	835	D835,4d149	Body	1g	2.44	9.76	9.84	-0.8
				10g	1.58	6.32	6.44	-1.9

SECTION10: Measured and Reported (Scaled) SAR Results

WLAN SAR Test Reduction criteria are as follows

- **KDB 248227 D01 (SAR Guidance for 802.11(Wi-Fi) Transmitters):**

SAR test reduction for 802.11 WLAN transmission mode configurations are considered separately for DSSS and OFDM. An initial test position is determined to reduce the number of tests required for certain exposure configurations with multiple test positions. An initial test configuration is determined for each frequency band and aggregated band according to maximum output power, channel bandwidth, wireless mode configurations and other operating parameters to streamline the measurement requirements. For 2.4 GHz DSSS, either the initial test position or DSSS procedure is applied to reduce the number of SAR tests; these are mutually exclusive. For OFDM, an initial test position is only applicable to next to the ear, UMPC mini-tablet and hotspot mode configurations, which is tested using the initial test configuration to facilitate test reduction. For other exposure conditions with a fixed test position, SAR test reduction is determined using only the initial test configuration.
The multiple test positions require SAR measurements in head, hotspot mode or UMPC mini-tablet configurations may be reduced according to the highest reported SAR determined using the *initial test position(s)* by applying the DSSS or OFDM SAR measurement procedures in the required wireless mode test configuration(s). The *initial test position(s)* is measured using the highest measured maximum output power channel in the required wireless mode test configuration(s). When the *reported* SAR for the *initial test position* is:

- ✧ ≤ 0.4 W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and wireless mode combination within the frequency band or aggregated band. DSSS and OFDM configurations are considered separately according to the required SAR procedures.
- ✧ > 0.4 W/kg, SAR is repeated using the same wireless mode test configuration tested in the *initial test position* to measure the subsequent next closet/smallest test separation distance and maximum coupling test position, on the highest maximum output power channel, until the *reported* SAR is ≤ 0.8 W/kg or all required test positions are tested.
    - o For subsequent test positions with equivalent test separation distance or when exposure is dominated by coupling conditions, the position for maximum coupling condition should be tested.
    - o When it is unclear, all equivalent conditions must be tested.
- ✧ For all positions/configurations tested using the *initial test position* and subsequent test positions, when the *reported* SAR is > 0.8 W/kg, measure the SAR for these positions/configurations on the subsequent next highest measured output power channel(s) until the *reported* SAR is ≤ 1.2 W/kg or all required test channels are considered.
    - o The additional power measurements required for this step should be limited to those necessary for identifying subsequent highest output power channels to apply the test reduction.
- ✧ When the specified maximum output power is the same for both UNII 1 and UNII 2A, begin SAR measurements in UNII 2A with the channel with the highest measured output power. If the reported SAR for UNII 2A is ≤ 1.2 W/kg, SAR is not required for UNII 1; otherwise treat the remaining bands separately and test them independently for SAR.
- ✧ When the specified maximum output power is different between UNII 1 and UNII 2A, begin SAR with the band that has the higher specified maximum output. If the highest reported SAR for the band with the highest specified power is ≤ 1.2 W/kg, testing for the band with the lower specified output power is not required; otherwise test the remaining bands independently for SAR.

To determine the *initial test position*, Area Scans were performed to determine the position with the *Maximum Value of SAR (measured)*. The position that produced the highest *Maximum Value of SAR* is considered the worst case position; thus used as the *initial test position*.

SAR Test Reduction criteria(excluding WLAN) are as follows

KDB 447498 D01 (General RF Exposure Guidance):

Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:

- ✧ ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
- ✧ ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
- ✧ ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz

- According to Notice 2016-DRS001 based on the IEEE1528 and IEC 62209 requirements, the low, mid and high frequency channels for the configuration with the highest SAR value must be tested regardless of the SAR value measured.
- When reported SAR value is exceed 1.2W/kg(if any), device holder perturbation verification is required; however, since distance between device holder and antenna of EUT is enough, it was not conducted.
- Reported SAR= Measured SAR [W/kg] · Scaled factor
  * Scaled factor = Maximum tune-up tolerance limit [mW] / Measured power [mW]
- Maximum tune-up tolerance limit is by the specification from a customer.

Note: Measured value is rounded round off to three decimal places

10.1 GSM850

Test Position	Dist. (mm)	Mode	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
					Tune-up limit	Meas.	Meas.	Scaled	
Front	5	GPRS GMSK 4 time slots	128	824.2	23.50	22.95	0.112	0.127	
			190	836.6	23.50	22.24			
			251	848.8	23.50	22.15			
Rear	5	GPRS GMSK 4 time slots	128	824.2	23.50	22.95	0.241	0.274	
			190	836.6	23.50	22.24	0.252	**0.337**	1
			251	848.8	23.50	22.15	0.244	0.333	
Left	5	GPRS GMSK 4 time slots	128	824.2	23.50	22.95	0.068	0.077	
			190	836.6	23.50	22.24			
			251	848.8	23.50	22.15			
Right	5	GPRS GMSK 4 time slots	128	824.2	23.50	22.95	0.069	0.078	
			190	836.6	23.50	22.24			
			251	848.8	23.50	22.15			
Top	5	GPRS GMSK 4 time slots	128	824.2	23.50	22.95	0.003	0.003	
			190	836.6	23.50	22.24			
			251	848.8	23.50	22.15			
Bottom	5	GPRS GMSK 4 time slots	128	824.2	23.50	22.95	0.058	0.066	
			190	836.6	23.50	22.24			
			251	848.8	23.50	22.15			

10.2 PCS1900

GPRS

Test Position	Dist. (mm)	Mode	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
					Tune-up limit	Meas.	Meas.	Scaled	
Front	5	GPRS GMSK 4 time slots	512	1850.2	20.00	19.54			
			661	1880.0	20.00	19.68			
			810	1909.8	20.00	19.79	0.266	0.279	
Rear	5	GPRS GMSK 4 time slots	512	1850.2	20.00	19.54	0.566	0.629	
			661	1880.0	20.00	19.68	0.542	0.583	
			810	1909.8	20.00	19.79	0.612	**0.642**	2
Left	5	GPRS GMSK 4 time slots	512	1850.2	20.00	19.54			
			661	1880.0	20.00	19.68			
			810	1909.8	20.00	19.79	0.096	0.101	
Right	5	GPRS GMSK 4 time slots	512	1850.2	20.00	19.54			
			661	1880.0	20.00	19.68			
			810	1909.8	20.00	19.79	0.350	0.367	
Top	5	GPRS GMSK 4 time slots	512	1850.2	20.00	19.54			
			661	1880.0	20.00	19.68			
			810	1909.8	20.00	19.79	0.069	0.072	
Bottom	5	GPRS GMSK 4 time slots	512	1850.2	20.00	19.54			
			661	1880.0	20.00	19.68			
			810	1909.8	20.00	19.79	0.255	0.268	

10.3 WCDMA Band 2

Test Position	Dist. (mm)	Mode	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
					Tune-up limit	Meas.	Meas.	Scaled	
Front	5	Rel 99 RMC 12.2 kbps	9262	1852.4	21.00	20.69			
			9400	1880.0	21.00	20.58	0.260	0.286	
			9538	1907.6	21.00	20.20			
Rear	5	Rel 99 RMC 12.2 kbps	9262	1852.4	21.00	20.69	0.831	**0.892**	3
			9400	1880.0	21.00	20.58	0.713	0.785	
			9538	1907.6	21.00	20.20	0.712	0.856	
Left	5	Rel 99 RMC 12.2 kbps	9262	1852.4	21.00	20.69			
			9400	1880.0	21.00	20.58	0.093	0.102	
			9538	1907.6	21.00	20.20			
Right	5	Rel 99 RMC 12.2 kbps	9262	1852.4	21.00	20.69			
			9400	1880.0	21.00	20.58	0.342	0.377	
			9538	1907.6	21.00	20.20			
Top	5	Rel 99 RMC 12.2 kbps	9262	1852.4	21.00	20.69			
			9400	1880.0	21.00	20.58	0.060	0.066	
			9538	1907.6	21.00	20.20			
Bottom	5	Rel 99 RMC 12.2 kbps	9262	1852.4	21.00	20.69			
			9400	1880.0	21.00	20.58	0.333	0.367	
			9538	1907.6	21.00	20.20			

10.4 WCDMA Band 5

Test Position	Dist. (mm)	Mode	Ch #.	Freq. (MHz)	Power (dBm)		1-g SAR (W/kg)		Plot No.
					Tune-up limit	Meas.	Meas.	Scaled	
Front	5	Rel 99 RMC 12.2 kbps	4132	826.4	23.00	22.80			
			4183	836.6	23.00	22.74			
			4233	846.6	23.00	22.88	0.216	0.222	
Rear	5	Rel 99 RMC 12.2 kbps	4132	826.4	23.00	22.80	0.463	**0.485**	4
			4183	836.6	23.00	22.74	0.401	0.426	
			4233	846.6	23.00	22.88	0.340	0.350	
Left	5	Rel 99 RMC 12.2 kbps	4132	826.4	23.00	22.80			
			4183	836.6	23.00	22.74			
			4233	846.6	23.00	22.88	0.107	0.110	
Right	5	Rel 99 RMC 12.2 kbps	4132	826.4	23.00	22.80			
			4183	836.6	23.00	22.74			
			4233	846.6	23.00	22.88	0.132	0.136	
Top	5	Rel 99 RMC 12.2 kbps	4132	826.4	23.00	22.80			
			4183	836.6	23.00	22.74			
			4233	846.6	23.00	22.88	0.004	0.005	
Bottom	5	Rel 99 RMC 12.2 kbps	4132	826.4	23.00	22.80			
			4183	836.6	23.00	22.74			
			4233	846.6	23.00	22.88	0.107	0.110	

10.5 LTE Band 2

Test Position	Dist. (mm)	Modu-lation	UL CH #	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm) Tune-up limit	Power (dBm) Meas. Avg	1-g SAR (W/kg) Meas.	1-g SAR (W/kg) Scaled	Plot No.
Front	5	QPSK	18700	1860	1	49	19.5	19.15	0.268	0.290	
			18900	1880	1	49	19.5	18.89			
			19100	1900	1	49	19.5	18.48			
			18700	1860	50	49	18.5	18.23	0.202	0.215	
			18900	1880	50	0	18.5	18.04			
			19100	1900	50	0	18.5	17.56			
			18700	1860	100	0	18.5	18.16			
Rear	5	QPSK	18700	1860	1	49	19.5	19.15	0.660	**0.715**	5
			18900	1880	1	49	19.5	18.89			
			19100	1900	1	49	19.5	18.48			
			18700	1860	50	49	18.5	18.23	0.499	0.531	
			18900	1880	50	0	18.5	18.04			
			19100	1900	50	0	18.5	17.56			
			18700	1860	100	0	18.5	18.16			
Left	5	QPSK	18700	1860	1	49	19.5	19.15	0.094	0.102	
			18900	1880	1	49	19.5	18.89			
			19100	1900	1	49	19.5	18.48			
			18700	1860	50	49	18.5	18.23	0.077	0.082	
			18900	1880	50	0	18.5	18.04			
			19100	1900	50	0	18.5	17.56			
			18700	1860	100	0	18.5	18.16			
Right	5	QPSK	18700	1860	1	49	19.5	19.15	0.457	0.495	
			18900	1880	1	49	19.5	18.89			
			19100	1900	1	49	19.5	18.48			
			18700	1860	50	49	18.5	18.23	0.358	0.381	
			18900	1880	50	0	18.5	18.04			
			19100	1900	50	0	18.5	17.56			
			18700	1860	100	0	18.5	18.16			
Top	5	QPSK	18700	1860	1	49	19.5	19.15	0.053	0.057	
			18900	1880	1	49	19.5	18.89			
			19100	1900	1	49	19.5	18.48			
			18700	1860	50	49	18.5	18.23	0.047	0.050	
			18900	1880	50	0	18.5	18.04			
			19100	1900	50	0	18.5	17.56			
			18700	1860	100	0	18.5	18.16			
Bottom	5	QPSK	18700	1860	1	49	19.5	19.15	0.370	0.401	
			18900	1880	1	49	19.5	18.89			
			19100	1900	1	49	19.5	18.48			
			18700	1860	50	49	18.5	18.23	0.276	0.294	
			18900	1880	50	0	18.5	18.04			
			19100	1900	50	0	18.5	17.56			
			18700	1860	100	0	18.5	18.16			

10.6 LTE Band 7

Test Position	Dist. (mm)	Modu-lation	UL CH #	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm) Tune-up limit	Power (dBm) Meas. Avg	1-g SAR (W/kg) Meas.	1-g SAR (W/kg) Scaled	Plot No.
Front	5	QPSK	20850	2510	1	49	17.0	16.34			
			21100	2535	1	49	17.0	16.84	0.255	0.265	
			21350	2560	1	49	17.0	16.46			
			20850	2510	50	49	16.0	15.34			
			21100	2535	50	24	16.0	15.62	0.196	0.214	
			21350	2560	50	0	16.0	15.32			
			21100	2535	100	0	16.0	15.60			
Rear	5	QPSK	20850	2510	1	49	17.0	16.34	0.449	0.523	
			21100	2535	1	49	17.0	16.84	0.797	**0.827**	6
			21350	2560	1	49	17.0	16.46	0.431	0.488	
			20850	2510	50	49	16.0	15.34			
			21100	2535	50	24	16.0	15.62	0.588	0.642	
			21350	2560	50	0	16.0	15.32			
			21100	2535	100	0	16.0	15.60	0.344	0.377	
Left	5	QPSK	20850	2510	1	49	17.0	16.34			
			21100	2535	1	49	17.0	16.84	0.126	0.131	
			21350	2560	1	49	17.0	16.46			
			20850	2510	50	49	16.0	15.34			
			21100	2535	50	24	16.0	15.62	0.097	0.106	
			21350	2560	50	0	16.0	15.32			
			21100	2535	100	0	16.0	15.60			
Right	5	QPSK	20850	2510	1	49	17.0	16.34			
			21100	2535	1	49	17.0	16.84	0.068	0.071	
			21350	2560	1	49	17.0	16.46			
			20850	2510	50	49	16.0	15.34			
			21100	2535	50	24	16.0	15.62	0.050	0.055	
			21350	2560	50	0	16.0	15.32			
			21100	2535	100	0	16.0	15.60			
Top	5	QPSK	20850	2510	1	49	17.0	16.34			
			21100	2535	1	49	17.0	16.84	0.033	0.034	
			21350	2560	1	49	17.0	16.46			
			20850	2510	50	49	16.0	15.34			
			21100	2535	50	24	16.0	15.62	0.025	0.027	
			21350	2560	50	0	16.0	15.32			
			21100	2535	100	0	16.0	15.60			
Bottom	5	QPSK	20850	2510	1	49	17.0	16.34			
			21100	2535	1	49	17.0	16.84	0.328	0.340	
			21350	2560	1	49	17.0	16.46			
			20850	2510	50	49	16.0	15.34			
			21100	2535	50	24	16.0	15.62	0.248	0.271	
			21350	2560	50	0	16.0	15.32			
			21100	2535	100	0	16.0	15.60			

10.7 LTE Band 26

Test Position	Dist. (mm)	Modu-lation	UL CH #	Freq. (MHz)	UL RB Allocation	UL RB Start	Power (dBm) Tune-up limit	Power (dBm) Meas. Avg	1-g SAR (W/kg) Meas.	1-g SAR (W/kg) Scaled	Plot No.
Front	5	QPSK	26740	819	1	24	23.0	22.70	0.324	0.347	
			26865	831.5	1	49	23.0	22.55			
			26990	844	1	49	23.0	22.43			
			26740	819	25	24	22.0	21.58	0.245	0.270	
			26865	831.5	25	0	22.0	21.53			
			26990	844	25	12	22.0	21.38			
			26740	819	50	0	22.0	21.43			
Rear	5	QPSK	26740	819	1	24	23.0	22.70	0.473	**0.507**	7
			26865	831.5	1	49	23.0	22.55			
			26990	844	1	49	23.0	22.43			
			26740	819	25	24	22.0	21.58	0.374	0.412	
			26865	831.5	25	0	22.0	21.53			
			26990	844	25	12	22.0	21.38			
			26740	819	50	0	22.0	21.43			
Left	5	QPSK	26740	819	1	24	23.0	22.70	0.165	0.177	
			26865	831.5	1	49	23.0	22.55			
			26990	844	1	49	23.0	22.43			
			26740	819	25	24	22.0	21.58	0.138	0.152	
			26865	831.5	25	0	22.0	21.53			
			26990	844	25	12	22.0	21.38			
			26740	819	50	0	22.0	21.43			
Right	5	QPSK	26740	819	1	24	23.0	22.70	0.213	0.228	
			26865	831.5	1	49	23.0	22.55			
			26990	844	1	49	23.0	22.43			
			26740	819	25	24	22.0	21.58	0.174	0.192	
			26865	831.5	25	0	22.0	21.53			
			26990	844	25	12	22.0	21.38			
			26740	819	50	0	22.0	21.43			
Top	5	QPSK	26740	819	1	24	23.0	22.70	0.008	0.008	
			26865	831.5	1	49	23.0	22.55			
			26990	844	1	49	23.0	22.43			
			26740	819	25	24	22.0	21.58	0.006	0.007	
			26865	831.5	25	0	22.0	21.53			
			26990	844	25	12	22.0	21.38			
			26740	819	50	0	22.0	21.43			
Bottom	5	QPSK	26740	819	1	24	23.0	22.70	0.131	0.140	
			26865	831.5	1	49	23.0	22.55			
			26990	844	1	49	23.0	22.43			
			26740	819	25	24	22.0	21.58	0.101	0.111	
			26865	831.5	25	0	22.0	21.53			
			26990	844	25	12	22.0	21.38			
			26740	819	50	0	22.0	21.43			

10.8 WLAN 2.4GHz Band

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		Scaled factor	1-g SAR (W/kg)		Plot No.
					Tune-up upper Power	Measured average Power		Meas.	Reported	
Front	802.11b	5	1	2412	15.00	13.81	1.32			
			6	2437	15.00	13.94	1.28			
			11	2462	15.00	14.19	1.21	0.034	0.041	
Rear	802.11b	5	1	2412	15.00	13.81	1.32	0.222	0.292	
			6	2437	15.00	13.94	1.28	0.323	0.412	
			11	2462	15.00	14.19	1.21	0.435	**0.524**	10
Left	802.11b	5	1	2412	15.00	13.81	1.32			
			6	2437	15.00	13.94	1.28			
			11	2462	15.00	14.19	1.21	0.001	0.001	
Right	802.11b	5	1	2412	15.00	13.81	1.32			
			6	2437	15.00	13.94	1.28			
			11	2462	15.00	14.19	1.21	0.181	0.218	
Top	802.11b	5	1	2412	15.00	13.81	1.32			
			6	2437	15.00	13.94	1.28			
			11	2462	15.00	14.19	1.21	0.009	0.011	
Bottom	802.11b	5	1	2412	15.00	13.81	1.32			
			6	2437	15.00	13.94	1.28			
			11	2462	15.00	14.19	1.21	0.006	0.007	

OFDM was excluded from the following table according to KDB248227D01.
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.

Maximum tune-up tolerance limit		Maximum tune-up tolerance limit		OFDM scaled factor	Position	DSSS Reported SAR value [W/kg]	OFDM Estimated SAR value [W/kg]	Exclusion limit [W/kg]	**Standalone SAR request**
DSSS		OFDM							
[dBm]	[mW]	[dBm]	[mW]						
15.00	31.62	11.00	12.59	0.398	Rear	0.524	0.209	< 1.2	**No**
15.00	31.62	9.00	7.94	0.251	Rear	0.524	0.132	< 1.2	**No**

Note(s):
- OFDM scaled factor = Maximum tune-up tolerance limit of OFDM [mW] / Maximum tune-up tolerance limit of DSSS [mW]
- Estimated SAR of OFDM= Reported SAR of DSSS[W/kg] · OFDM scaled factor

10.9 Bluetooth

Test Position	Dist. (mm)	Mode	Ch #.	Freq. (MHz)	Power (dBm)		Scaled factor	Duty(%)	Duty Scaled factor	1-g SAR (W/kg)		Plot No.
					Tune-up upper Power	Measured average Power				Meas.	Reported	
Front	5	DH5	0	2402	5.00	4.98	1.00	77.2	1.12	Not detect	-	
			39	2441	5.00	4.53	1.11	77.2	1.12			
			78	2480	5.00	3.17	1.52	77.2	1.12			
Rear	5	DH5	0	2402	5.00	4.98	1.00	77.2	1.12	0.020	0.023	8
			39	2441	5.00	4.53	1.11	77.2	1.12			
			78	2480	5.00	3.17	1.52	77.2	1.12			
Left	5	DH5	0	2402	5.00	4.98	1.00	77.2	1.12	Not detect	-	
			39	2441	5.00	4.53	1.11	77.2	1.12			
			78	2480	5.00	3.17	1.52	77.2	1.12			
Right	5	DH5	0	2402	5.00	4.98	1.00	77.2	1.12	0.006	0.006	
			39	2441	5.00	4.53	1.11	77.2	1.12			
			78	2480	5.00	3.17	1.52	77.2	1.12			
Top	5	DH5	0	2402	5.00	4.98	1.00	77.2	1.12	0.000	0.000	
			39	2441	5.00	4.53	1.11	77.2	1.12			
			78	2480	5.00	3.17	1.52	77.2	1.12			
Bottom	5	DH5	0	2402	5.00	4.98	1.00	77.2	1.12	Not detect	-	
			39	2441	5.00	4.53	1.11	77.2	1.12			
			78	2480	5.00	3.17	1.52	77.2	1.12			

"Not detect" means no peak was detected

10.10 BTLE

Test Position	Dist. (mm)	Mode	Ch #.	Freq. (MHz)	Power (dBm)		Scaled factor	Duty(%)	Duty Scaled factor	1-g SAR (W/kg)		Plot No.
					Tune-up upper Power	Measured average Power				Meas.	Reported	
Front	5	LE	37	2402	5.00	4.91	1.02	63.3	1.99	0.000	0.000	
			17	2440	5.00	4.26	1.19	63.3	1.99			
			39	2480	5.00	3.01	1.58	63.3	1.99			
Rear	5	LE	37	2402	5.00	4.91	1.02	63.3	1.99	0.015	0.030	9
			17	2440	5.00	4.26	1.19	63.3	1.99			
			39	2480	5.00	3.01	1.58	63.3	1.99			
Left	5	LE	37	2402	5.00	4.91	1.02	63.3	1.99	Not detect	-	
			17	2440	5.00	4.26	1.19	63.3	1.99			
			39	2480	5.00	3.01	1.58	63.3	1.99			
Right	5	LE	37	2402	5.00	4.91	1.02	63.3	1.99	0.002	0.005	
			17	2440	5.00	4.26	1.19	63.3	1.99			
			39	2480	5.00	3.01	1.58	63.3	1.99			
Top	5	LE	37	2402	5.00	4.91	1.02	63.3	1.99	0.000	0.001	
			17	2440	5.00	4.26	1.19	63.3	1.99			
			39	2480	5.00	3.01	1.58	63.3	1.99			
Bottom	5	LE	37	2402	5.00	4.91	1.02	63.3	1.99	0.000	0.001	
			17	2440	5.00	4.26	1.19	63.3	1.99			
			39	2480	5.00	3.01	1.58	63.3	1.99			

"Not detect" means no peak was detected

10.11 WLAN 5.3GHz Band

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		Scaled factor	1-g SAR (W/kg)		Plot No.
					Tune-up upper Power	Measured average Power		Meas.	Reported	
Front	11n-40	5	54	5270	3.80	3.14	1.16			
			62	5310	3.80	3.53	1.06	Not detect	-	
Rear	11n-40	5	54	5270	3.80	3.14	1.16	0.535	0.623	11
			62	5310	3.80	3.53	1.06	0.523	0.557	
Left	11n-40	5	54	5270	3.80	3.14	1.16			
			62	5310	3.80	3.53	1.06	Not detect	-	
Right	11n-40	5	54	5270	3.80	3.14	1.16			
			62	5310	3.80	3.53	1.06	0.105	0.112	
Top	11n-40	5	54	5270	3.80	3.14	1.16			
			62	5310	3.80	3.53	1.06	0.002	0.003	
Bottom	11n-40	5	54	5270	3.80	3.14	1.16			
			62	5310	3.80	3.53	1.06	Not detect	-	

"Not detect" means no peak was detected

10.12 WLAN 5.6GHz Band

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Power (dBm)		Scaled factor	1-g SAR (W/kg)		Plot No.
					Tune-up upper Power	Measured average Power		Meas.	Reported	
Front	11n-40	5	102	5510	5.00	4.40	1.15			
			110	5550	5.00	4.45	1.14	Not detect	-	
			134	5670	5.00	4.35	1.16			
Rear	11n-40	5	102	5510	5.00	4.40	1.15	0.465	0.534	
			110	5550	5.00	4.45	1.14	0.485	0.550	12
			134	5670	5.00	4.35	1.16	0.431	0.501	
Left	11n-40	5	102	5510	5.00	4.40	1.15			
			110	5550	5.00	4.45	1.14	Not detect	-	
			134	5670	5.00	4.35	1.16			
Right	11n-40	5	102	5510	5.00	4.40	1.15			
			110	5550	5.00	4.45	1.14	0.111	0.126	
			134	5670	5.00	4.35	1.16			
Top	11n-40	5	102	5510	5.00	4.40	1.15			
			110	5550	5.00	4.45	1.14	Not detect	-	
			134	5670	5.00	4.35	1.16			
Bottom	11n-40	5	102	5510	5.00	4.40	1.15			
			110	5550	5.00	4.45	1.14	Not detect	-	
			134	5670	5.00	4.35	1.16			

"Not detect" means no peak was detected

10.13 Repeated measurement

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 (~ 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.

Wireless Technologies	Test Configuration			Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Meas. SAR (W/kg)		Largest to Smallest SAR Ratio	Plot No.
	Transmit Antenna	Exposure	Position					Original	Repeated		
GSM850	Main	Body	Rear	GPRS GMSK 4 times slots	5	190	836.6	0.252	N/A	N/A	-
PCS1900	Main	Body	Rear	GPRS GMSK 4 times slots	5	810	1909.8	0.612	N/A	N/A	-
WCDMA Band 2	Main	Body	Rear	QPSK RMC12.2k	5	9262	1852.4	0.831	0.823	1.010	13
WCDMA Band 5	Main	Body	Rear	QPSK RMC12.2k	5	4132	826.4	0.463	N/A	N/A	-
LTE Band 2	Main	Body	Rear	QPSK RB1-49	5	18700	1860	0.660	N/A	N/A	-
LTE Band 7	Main	Body	Rear	QPSK RB1-49	5	21100	2532	0.797	N/A	N/A	-
LTE Band 26	Main	Body	Rear	QPSK RB1-24	5	26740	819	0.473	N/A	N/A	-
Bluetooth	Main	Body	Rear	DH5	5	0	2402	0.020	N/A	N/A	-
BTLE	Main	Body	Rear	LE	5	37	2402	0.015	N/A	N/A	-
WLAN 2.4 GHz	Main	Body	Rear	11b 1Mbps	5	11	2462	0.435	N/A	N/A	-
WLAN 5.3 GHz	Main	Body	Rear	11n-40 MCS 0	5	54	5270	0.535	N/A	N/A	-
WLAN 5.6 GHz	Main	Body	Rear	11n-40 MCS 0	5	110	5550	0.485	N/A	N/A	-

Note(s):
N/A: Repeated Measurement is not required since the original highest measured SAR for all band is < 0.80 W/kg.

SECTION11: Simultaneous Transmission SAR Analysis

Capable Transmit Configurations		
GSM	+	WLAN 2.4GHz
GSM	+	WLAN 5GHz
GSM	+	Bluetooth
GSM	+	BTLE(Bluetooth Low Energy)
WCDMA	+	WLAN 2.4GHz
WCDMA	+	WLAN 5GHz
WCDMA	+	Bluetooth
WCDMA	+	BTLE(Bluetooth Low Energy)
LTE	+	WLAN 2.4GHz
LTE	+	WLAN 5GHz
LTE	+	Bluetooth

GSM and WLAN 2.4GHz

Sum of the SAR for GSM850 & WLAN 2.4GHz

	Mode			
Test Position	GSM850	WLAN 2.4GHz	Sum of SAR (1g/Wkg)	Remarks
Front	0.127	0.041	0.168	-
Rear	0.337	0.524	0.861	-
Left	0.077	0.001	0.078	-
Right	0.078	0.218	0.296	-
Top	0.003	0.011	0.014	-
Bottom	0.066	0.007	0.073	-

Sum of the SAR for PCS1900 & WLAN 2.4GHz

	Mode			
Test Position	PCS1900	WLAN 2.4GHz	Sum of SAR (1g/Wkg)	Remarks
Front	0.279	0.041	0.320	-
Rear	0.642	0.524	1.166	-
Left	0.101	0.001	0.102	-
Right	0.367	0.218	0.585	-
Top	0.072	0.011	0.083	-
Bottom	0.268	0.007	0.275	-

GSM and Bluetooth

Sum of the SAR for GSM850 & Bluetooth

	Mode			
Test Position	GSM850	Bluetooth	Sum of SAR (1g/Wkg)	Remarks
Front	0.127	0.000	0.127	-
Rear	0.337	0.023	0.360	-
Left	0.077	0.000	0.077	-
Right	0.078	0.006	0.084	-
Top	0.003	0.000	0.003	-
Bottom	0.066	0.000	0.066	-

Sum of the SAR for PCS1900 & Bluetooth

	Mode			
Test Position	PCS1900	Bluetooth	Sum of SAR (1g/Wkg)	Remarks
Front	0.279	0.000	0.279	-
Rear	0.642	0.023	0.665	-
Left	0.101	0.000	0.101	-
Right	0.367	0.006	0.373	-
Top	0.072	0.000	0.072	-
Bottom	0.268	0.000	0.268	-

GSM and BTLE

Sum of the SAR for GSM850 & BTLE

	Mode			
Test Position	GSM850	BTLE	Sum of SAR (1g/Wkg)	Remarks
Front	0.127	0.000	0.127	-
Rear	0.337	0.030	0.367	-
Left	0.077	0.000	0.077	-
Right	0.078	0.005	0.083	-
Top	0.003	0.001	0.004	-
Bottom	0.066	0.001	0.067	-

Sum of the SAR for PCS1900 & BTLE

	Mode			
Test Position	PCS1900	BTLE	Sum of SAR (1g/Wkg)	Remarks
Front	0.279	0.000	0.279	-
Rear	0.642	0.030	0.672	-
Left	0.101	0.000	0.101	-
Right	0.367	0.005	0.372	-
Top	0.072	0.001	0.073	-
Bottom	0.268	0.001	0.269	-

GSM and WLAN 5.3GHz

Sum of the SAR for GSM850 & WLAN 5.3GHz

	Mode			
Test Position	GSM850	WLAN 5.3GHz	Sum of SAR (1g/Wkg)	Remarks
Front	0.127	0.000	0.127	-
Rear	0.337	0.623	0.960	-
Left	0.077	0.000	0.077	-
Right	0.078	0.112	0.190	-
Top	0.003	0.003	0.006	-
Bottom	0.066	0.000	0.066	-

Sum of the SAR for PCS1900 & WLAN 5.3GHz

	Mode			
Test Position	PCS1900	WLAN 5.3GHz	Sum of SAR (1g/Wkg)	Remarks
Front	0.279	0.000	0.279	-
Rear	0.642	0.623	1.265	-
Left	0.101	0.000	0.101	-
Right	0.367	0.112	0.479	-
Top	0.072	0.003	0.075	-
Bottom	0.268	0.000	0.268	-

GSM and WLAN 5.6GHz

Sum of the SAR for GSM850 & WLAN 5.6GHz

	Mode			
Test Position	GSM850	WLAN 5.6GHz	Sum of SAR (1g/Wkg)	Remarks
Front	0.127	0.000	0.127	-
Rear	0.337	0.550	0.887	-
Left	0.077	0.000	0.077	-
Right	0.078	0.126	0.204	-
Top	0.003	0.000	0.003	-
Bottom	0.066	0.000	0.066	-

Sum of the SAR for PCS1900 & WLAN 5.6GHz

	Mode			
Test Position	PCS1900	WLAN 5.6GHz	Sum of SAR (1g/Wkg)	Remarks
Front	0.279	0.000	0.279	-
Rear	0.642	0.550	1.192	-
Left	0.101	0.000	0.101	-
Right	0.367	0.126	0.493	-
Top	0.072	0.000	0.072	-
Bottom	0.268	0.000	0.268	-

WCDMA and WLAN 2.4GHz

Sum of the SAR for WCDMA B2 & WLAN 2.4GHz

	Mode			
Test Position	WCDMA B2	WLAN 2.4GHz	Sum of SAR (1g/Wkg)	Remarks
Front	0.286	0.041	0.327	-
Rear	0.892	0.524	1.416	-
Left	0.102	0.001	0.103	-
Right	0.377	0.218	0.595	-
Top	0.066	0.011	0.077	-
Bottom	0.367	0.007	0.374	-

Sum of the SAR for WCDMA B5 & WLAN 2.4GHz

	Mode			
Test Position	WCDMA B5	WLAN 2.4GHz	Sum of SAR (1g/Wkg)	Remarks
Front	0.222	0.041	0.263	-
Rear	0.485	0.524	1.009	-
Left	0.110	0.001	0.111	-
Right	0.136	0.218	0.354	-
Top	0.005	0.011	0.016	-
Bottom	0.110	0.007	0.117	-

WCDMA and Bluetooth

Sum of the SAR for WCDMA B2 & Bluetooth

	Mode			
Test Position	WCDMA B2	Bluetooth	Sum of SAR (1g/Wkg)	Remarks
Front	0.286	0.000	0.286	-
Rear	0.892	0.023	0.915	-
Left	0.102	0.000	0.102	-
Right	0.377	0.006	0.383	-
Top	0.066	0.000	0.066	-
Bottom	0.367	0.000	0.367	-

Sum of the SAR for WCDMA B5 & Bluetooth

	Mode			
Test Position	WCDMA B5	Bluetooth	Sum of SAR (1g/Wkg)	Remarks
Front	0.222	0.000	0.222	-
Rear	0.485	0.023	0.508	-
Left	0.110	0.000	0.110	-
Right	0.136	0.006	0.142	-
Top	0.005	0.000	0.005	-
Bottom	0.110	0.000	0.110	-

WCDMA and BTLE

Sum of the SAR for WCDMA B2 & BTLE

	Mode			
Test Position	WCDMA B2	BTLE	Sum of SAR (1g/Wkg)	Remarks
Front	0.286	0.000	0.286	-
Rear	0.892	0.030	0.922	-
Left	0.102	0.000	0.102	-
Right	0.377	0.005	0.382	-
Top	0.066	0.001	0.067	-
Bottom	0.367	0.001	0.368	-

Sum of the SAR for WCDMA B5 & BTLE

	Mode			
Test Position	WCDMA B5	BTLE	Sum of SAR (1g/Wkg)	Remarks
Front	0.222	0.000	0.222	-
Rear	0.485	0.030	0.515	-
Left	0.110	0.000	0.110	-
Right	0.136	0.005	0.141	-
Top	0.005	0.001	0.006	-
Bottom	0.110	0.001	0.111	-

WCDMA and WLAN 5.3GHz

Sum of the SAR for WCDMA B2 & WLAN 5.3GHz

	Mode			
Test Position	WCDMA B2	WLAN 5.3GHz	Sum of SAR (1g/Wkg)	Remarks
Front	0.286	0.000	0.286	-
Rear	0.892	0.623	**1.515**	-
Left	0.102	0.000	0.102	-
Right	0.377	0.112	0.489	-
Top	0.066	0.003	0.069	-
Bottom	0.367	0.000	0.367	-

Sum of the SAR for WCDMA B5 & WLAN 5.3GHz

	Mode			
Test Position	WCDMA B5	WLAN 5.3GHz	Sum of SAR (1g/Wkg)	Remarks
Front	0.222	0.000	0.222	-
Rear	0.485	0.623	1.108	-
Left	0.110	0.000	0.110	-
Right	0.136	0.112	0.248	-
Top	0.005	0.003	0.008	-
Bottom	0.110	0.000	0.110	-

WCDMA and WLAN 5.6GHz

Sum of the SAR for WCDMA B2 & WLAN 5.6GHz

	Mode			
Test Position	WCDMA B2	WLAN 5.6GHz	Sum of SAR (1g/Wkg)	Remarks
Front	0.286	0.000	0.286	-
Rear	0.892	0.550	1.442	-
Left	0.102	0.000	0.102	-
Right	0.377	0.126	0.503	-
Top	0.066	0.000	0.066	-
Bottom	0.367	0.000	0.367	-

Sum of the SAR for WCDMA B5 & WLAN 5.6GHz

	Mode			
Test Position	WCDMA B5	WLAN 5.6GHz	Sum of SAR (1g/Wkg)	Remarks
Front	0.222	0.000	0.222	-
Rear	0.485	0.550	1.035	-
Left	0.110	0.000	0.110	-
Right	0.136	0.126	0.262	-
Top	0.005	0.000	0.005	-
Bottom	0.110	0.000	0.110	-

LTE and WLAN 2.4GHz

Sum of the SAR for LTE B2 & WLAN 2.4GHz

	Mode			
Test Position	LTE B2	WLAN 2.4GHz	Sum of SAR (1g/Wkg)	Remarks
Front	0.290	0.041	0.331	-
Rear	0.715	0.524	1.239	-
Left	0.102	0.001	0.103	-
Right	0.495	0.218	0.713	-
Top	0.057	0.011	0.068	-
Bottom	0.401	0.007	0.408	-

Sum of the SAR for LTE B7 & WLAN 2.4GHz

	Mode			
Test Position	LTE B7	WLAN 2.4GHz	Sum of SAR (1g/Wkg)	Remarks
Front	0.265	0.041	0.306	-
Rear	0.827	0.524	1.351	-
Left	0.131	0.001	0.132	-
Right	0.071	0.218	0.289	-
Top	0.034	0.011	0.045	-
Bottom	0.340	0.007	0.347	-

Sum of the SAR for LTE B26 & WLAN 2.4GHz

	Mode			
Test Position	LTE B26	WLAN 2.4GHz	Sum of SAR (1g/Wkg)	Remarks
Front	0.347	0.041	0.388	-
Rear	0.507	0.524	1.031	-
Left	0.177	0.001	0.178	-
Right	0.228	0.218	0.446	-
Top	0.008	0.011	0.019	-
Bottom	0.140	0.007	0.147	-

LTE and Bluetooth

Sum of the SAR for LTE B2 & Bluetooth

	Mode			
Test Position	LTE B2	Bluetooth	Sum of SAR (1g/Wkg)	Remarks
Front	0.290	0.000	0.290	-
Rear	0.715	0.023	0.738	-
Left	0.102	0.000	0.102	-
Right	0.495	0.006	0.501	-
Top	0.057	0.000	0.057	-
Bottom	0.401	0.000	0.401	-

Sum of the SAR for LTE B7 & Bluetooth

	Mode			
Test Position	LTE B7	Bluetooth	Sum of SAR (1g/Wkg)	Remarks
Front	0.265	0.000	0.265	-
Rear	0.827	0.023	0.850	-
Left	0.131	0.000	0.131	-
Right	0.071	0.006	0.077	-
Top	0.034	0.000	0.034	-
Bottom	0.340	0.000	0.340	-

Sum of the SAR for LTE B26 & Bluetooth

	Mode			
Test Position	LTE B26	Bluetooth	Sum of SAR (1g/Wkg)	Remarks
Front	0.347	0.000	0.347	-
Rear	0.507	0.020	0.527	-
Left	0.177	0.000	0.177	-
Right	0.228	0.006	0.234	-
Top	0.008	0.000	0.008	-
Bottom	0.140	0.000	0.140	-

LTE and BTLE

Sum of the SAR for LTE B2 & BTLE

	Mode			
Test Position	LTE B2	BTLE	Sum of SAR (1g/Wkg)	Remarks
Front	0.290	0.000	0.290	-
Rear	0.715	0.030	0.745	-
Left	0.102	0.000	0.102	-
Right	0.495	0.005	0.500	-
Top	0.057	0.001	0.058	-
Bottom	0.401	0.001	0.402	-

Sum of the SAR for LTE B7 & BTLE

	Mode			
Test Position	LTE B7	BTLE	Sum of SAR (1g/Wkg)	Remarks
Front	0.265	0.000	0.265	-
Rear	0.827	0.030	0.857	-
Left	0.131	0.000	0.131	-
Right	0.071	0.005	0.076	-
Top	0.034	0.001	0.035	-
Bottom	0.340	0.001	0.341	-

Sum of the SAR for LTE B26 & BTLE

	Mode			
Test Position	LTE B26	BTLE	Sum of SAR (1g/Wkg)	Remarks
Front	0.347	0.000	0.347	-
Rear	0.507	0.030	0.537	-
Left	0.177	0.000	0.177	-
Right	0.228	0.005	0.233	-
Top	0.008	0.001	0.009	-
Bottom	0.140	0.001	0.141	-

LTE and WLAN 5.3GHz

Sum of the SAR for LTE B2 & WLAN 5.3GHz

	Mode			
Test Position	LTE B2	WLAN 5.3GHz	Sum of SAR (1g/Wkg)	Remarks
Front	0.290	0.000	0.290	-
Rear	0.715	0.623	1.338	-
Left	0.102	0.000	0.102	-
Right	0.495	0.112	0.607	-
Top	0.057	0.003	0.060	-
Bottom	0.401	0.000	0.401	-

Sum of the SAR for LTE B7 & WLAN 5.3GHz

	Mode			
Test Position	LTE B7	WLAN 5.3GHz	Sum of SAR (1g/Wkg)	Remarks
Front	0.265	0.000	0.265	-
Rear	0.827	0.623	1.450	-
Left	0.131	0.000	0.131	-
Right	0.071	0.112	0.183	-
Top	0.034	0.003	0.037	-
Bottom	0.340	0.000	0.340	-

Sum of the SAR for LTE B26 & WLAN 5.3GHz

	Mode			
Test Position	LTE B26	WLAN 5.3GHz	Sum of SAR (1g/Wkg)	Remarks
Front	0.347	0.000	0.347	-
Rear	0.507	0.623	1.130	-
Left	0.177	0.000	0.177	-
Right	0.228	0.112	0.340	-
Top	0.008	0.003	0.011	-
Bottom	0.140	0.000	0.140	-

LTE and WLAN 5.6GHz

Sum of the SAR for LTE B2 & WLAN 5.6GHz

	Mode			
Test Position	LTE B2	WLAN 5.6GHz	Sum of SAR (1g/Wkg)	Remarks
Front	0.290	0.000	0.290	-
Rear	0.715	0.550	1.265	-
Left	0.102	0.000	0.102	-
Right	0.495	0.126	0.621	-
Top	0.057	0.000	0.057	-
Bottom	0.401	0.000	0.401	-

Sum of the SAR for LTE B7 & WLAN 5.6GHz

	Mode			
Test Position	LTE B7	WLAN 5.6GHz	Sum of SAR (1g/Wkg)	Remarks
Front	0.265	0.000	0.265	-
Rear	0.827	0.550	1.377	-
Left	0.131	0.000	0.131	-
Right	0.071	0.126	0.197	-
Top	0.034	0.000	0.034	-
Bottom	0.340	0.000	0.340	-

Sum of the SAR for LTE B26 & WLAN 5.6GHz

	Mode			
Test Position	LTE B26	WLAN 5.6GHz	Sum of SAR (1g/Wkg)	Remarks
Front	0.347	0.000	0.347	-
Rear	0.507	0.550	1.057	-
Left	0.177	0.000	0.177	-
Right	0.228	0.126	0.354	-
Top	0.008	0.000	0.008	-
Bottom	0.140	0.000	0.140	-

Note(s):

1. All Simultaneous transmission SAR analysis applies scaling in accordance with the scaled values documented in this report.
2. Simultaneous transmission SAR measurement (Volume Scan) is not required because the either sum of the 1-g SAR is < 1.6 W/kg.

SECTION12: Test instruments

Test Name	Local Id	Description	Manufacturer	Model	Serial	Last Cal Date	Cal Interval
SAR	SSDA-08	Dipole Antenna	Schmid&Partner Engineering AG	D1900V2	5d169	2019/03/12	24
SAR	MDA-07	Dipole Antenna	Schmid&Partner Engineering AG	D2450V2	713	2019/09/09	12
SAR	MDA-19	Dipole Antenna	Schmid&Partner Engineering AG	D2600V2	1030	2019/03/14	24
SAR	MDA-08	Dipole Antenna	Schmid&Partner Engineering AG	D5GHzV2	1020	2019/11/19	12
SAR	SSDA-04	Dipole Antenna	Schmid&Partner Engineering AG	D835V2	4d149	2019/03/13	24
SAR	COTS-MSAR-03	Dasy5	Schmid&Partner Engineering AG	DASY5	-	Pre-Check	-
SAR	MHSL1900	Tissue simulation liquid (Head)	Schmid & Partner Engineering AG	HSL1900V2	SL AAH 190 AA	Pre-Check	-
SAR	MHBBL600-10000	Head Simulating Liquid	Schmid & Partner Engineering AG	HBBL600-10000V6	SL AAH U16 BC	Pre-Check	-
SAR	MRENT-S01	Vector Reflectometer	COPPER MOUNTAIN TECHNOLOGIES	PLANAR R140	110614	Pre-Check	-
SAR	MRENT-S17	Dielectric assessment kit	Schmid&Partner Engineering AG	DAK-3.5	1058	Pre-Check	-
SAR	MOS-37	Digital thermometer	LKM electronic	DTM3000	-	2020/7/10	12
SAR	COTS-MSAR-04	Dielectric assessment software	Schmid&Partner Engineering AG	DAK	-	Pre-Check	-
SAR	MDAE-02	Data Acquisition Electronics	Schmid&Partner Engineering AG	DAE4	1369	2020/5/26	12
SAR	MPB-08	Dosimetric E-Field Probe	Schmid&Partner Engineering AG	EX3DV4	3917	2020/5/29	12
SAR	MPF-03	2mm Oval Flat Phantom	Schmid&Partner Engineering AG	QDOVA001BB	1203	2020/5/25	12
SAR	MDH-04	Device holder	Schmid&Partner Engineering AG	Mounting device for transmitter	-	2019/11/28	12
SAR	MOS-35	Digital thermometer	HANNA	Checktemp 4	-	2020/7/10	12
SAR	MRBT-03	SAR robot	Schmid&Partner Engineering AG	TX60 Lspeag	F13/5PPLD1/A/01	Pre-Check	-
SAR	MDAE-01	Data Acquisition Electronics	Schmid&Partner Engineering AG	DAE4	509	2020/7/8	12
SAR	MPB-07	Dosimetric E-Field Probe	Schmid&Partner Engineering AG	EX3DV4	3825	2019/12/13	12
SAR	MPF-02	2mm Oval Flat Phantom	Schmid&Partner Engineering AG	QDOVA001BB	1045	2020/5/21	12
SAR	MDH-01	Device holder	Schmid&Partner Engineering AG	Mounting device for transmitter	-	2019/11/28	12
SAR	MOS-33	Thermo-Hygrometer	CUSTOM	CTH-201	-	2020/7/10	12
SAR	MRBT-02	SAR robot	Schmid&Partner Engineering AG	TX60 Lspeag	F10/5E3LA1/A/01	Pre-Check	-
SAR	MPM-11	Dual Power Meter	Keysight Technologies Inc	E4419B	MY45102060	2019/08/02	12
SAR	MPSE-20	Power sensor	Keysight Technologies Inc	N8482H	MY53050001	2020/6/10	12
SAR	MRFA-24	Pre Amplifier	R&K	R&K CGA020M602-2633R	B30550	2020/6/10	12
SAR	MSG-10	Signal Generator	Keysight Technologies Inc	N5181A	MY47421098	2019/11/25	12
SAR	MAT-78	Attenuator	Telegrartner	J01156A0011	42294119	-	-
SAR	MPSE-24	Power sensor	Anritsu Limited	MA24106A	1026164	2019/08/02	12
SAR	MPSE-25	Power sensor	ANRITSU	MA24106A	1031504	2019/08/02	12
SAR	COTS-MPSE-02	Software for MA24106A	Anritsu Limited	Anritsu PowerXpert	-	Pre-Check	-
SAR	MHDC-12	Dual Directional Coupler	Hewlett Packard	772D	2839A0016	Pre-Check	-
SAR	MMSL1900	Tissue simulation liquid (1900MHz,body)	Schmid&Partner Engineering AG	SL AAM 190 AA	-	Pre-Check	-
Power	MPSE-11	Power sensor	ANRITSU	MA2411B	11737	2019/10/03	12
Power	MPM-08	Power Meter	ANRITSU	ML2495A	6K00003338	2019/10/03	12
Power	MURC-05	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	127576	2019/12/09	12
Power	MAT-88	Attenuator	Weinschel Associates	WA56-10	56100304	2020/5/27	12
Power	MHDC-30	Directional Coupler	Agilent Technologies	87300B	MY39500119	2020/02/13	12

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.

SAR room is checked before every testing and ambient noise is <0.012W/kg

APPENDIX 1 : System Check

20200424 1900MHz System Check

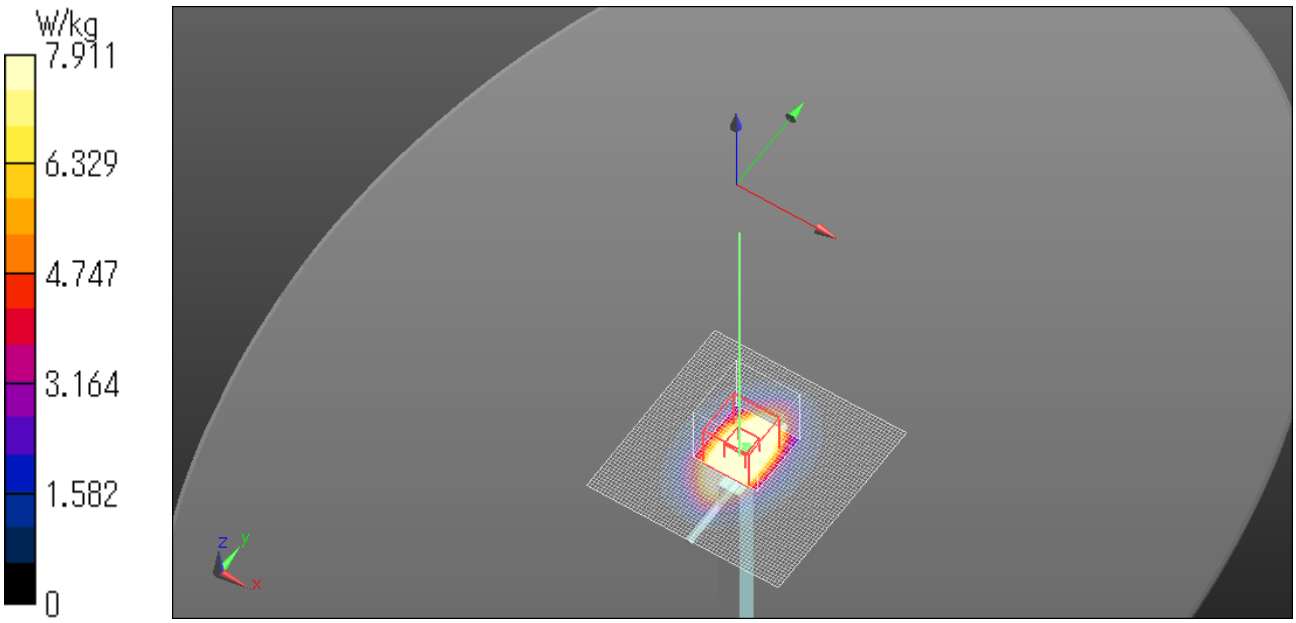
Communication System: UID 0, #CW (0); Communication System Band: D1900 (1900.0 MHz); ; Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.409 S/m; ε_r = 39.734; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration
Probe: EX3DV4 - SN3825; ConvF(8.33, 8.33, 8.33) @ 1900 MHz;
Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)
Electronics: DAE4 Sn509;
Phantom: ELI v4.0 (20deg probe tilt); Type: QDOVA001BB;Serial: TP:1045
Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

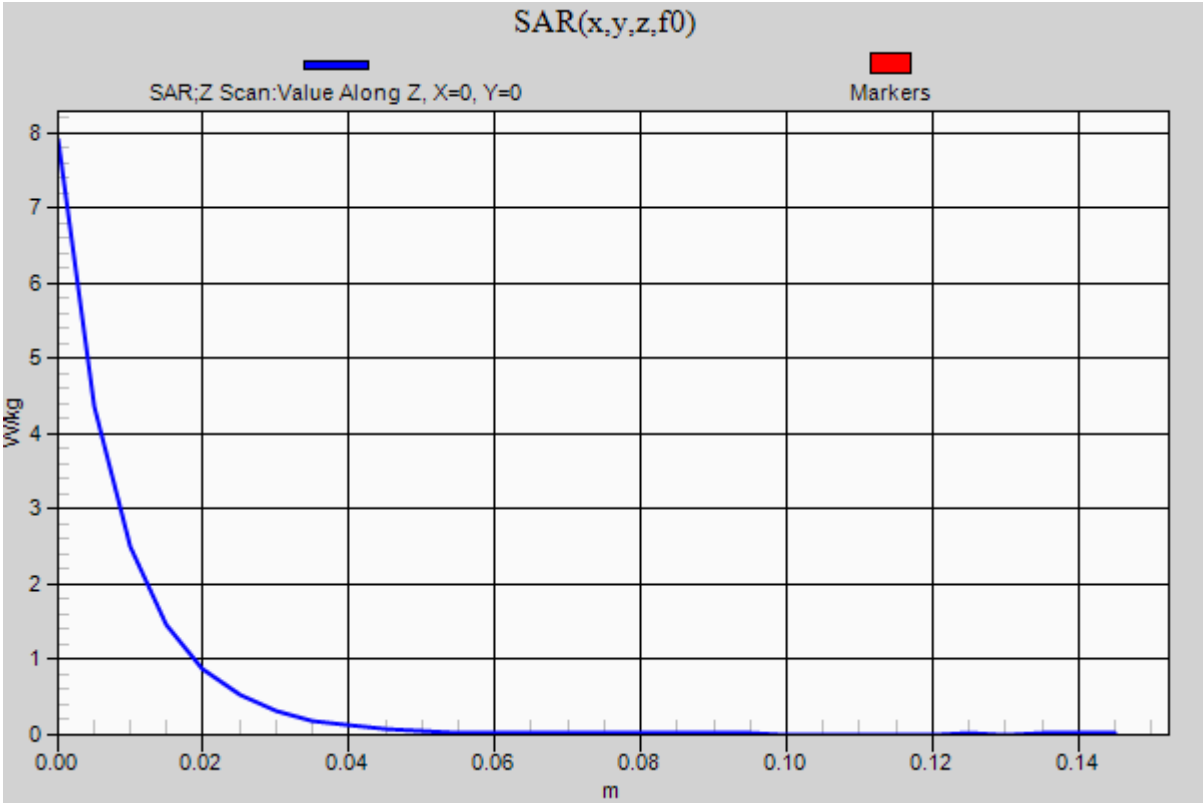
Pin/250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 15.1 W/kg

Pin/250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 105.6 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 17.6 W/kg
SAR(1 g) = 9.44 W/kg; SAR(10 g) = 4.87 W/kg
Smallest distance from peaks to all points 3 dB below = 10 mm
Ratio of SAR at M2 to SAR at M1 = 53.5%
Maximum value of SAR (measured) = 14.8 W/kg

Pin/250mW/Z Scan (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 7.91 W/kg

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.3 degree.C.
Liquid temp. is kept within the 2 degree.C. during the test.
Date: 2020/04/24




SAR(x,y,z,f0)
SAR;Z Scan:Value Along Z, X=0, Y=0
Markers
W/kg
8
7
6
5
4
3
2
1
0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
m

20200427 1900MHz System Check

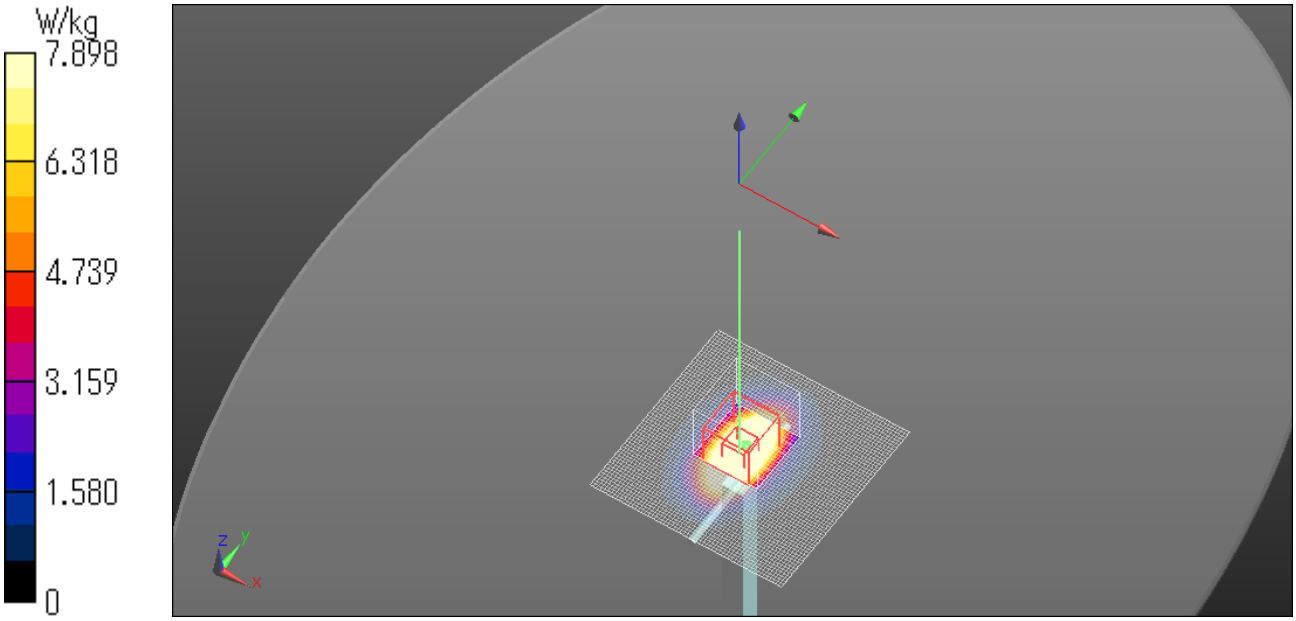
Communication System: UID 0, #CW (0); Communication System Band: D1900 (1900.0 MHz); ; Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.406 S/m; ε_r = 39.968; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration
Probe: EX3DV4 - SN3825; ConvF(8.33, 8.33, 8.33) @ 1900 MHz;
Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)
Electronics: DAE4 Sn509;
Phantom: ELI v4.0 (20deg probe tilt); Type: QDOVA001BB;Serial: TP:1045
Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

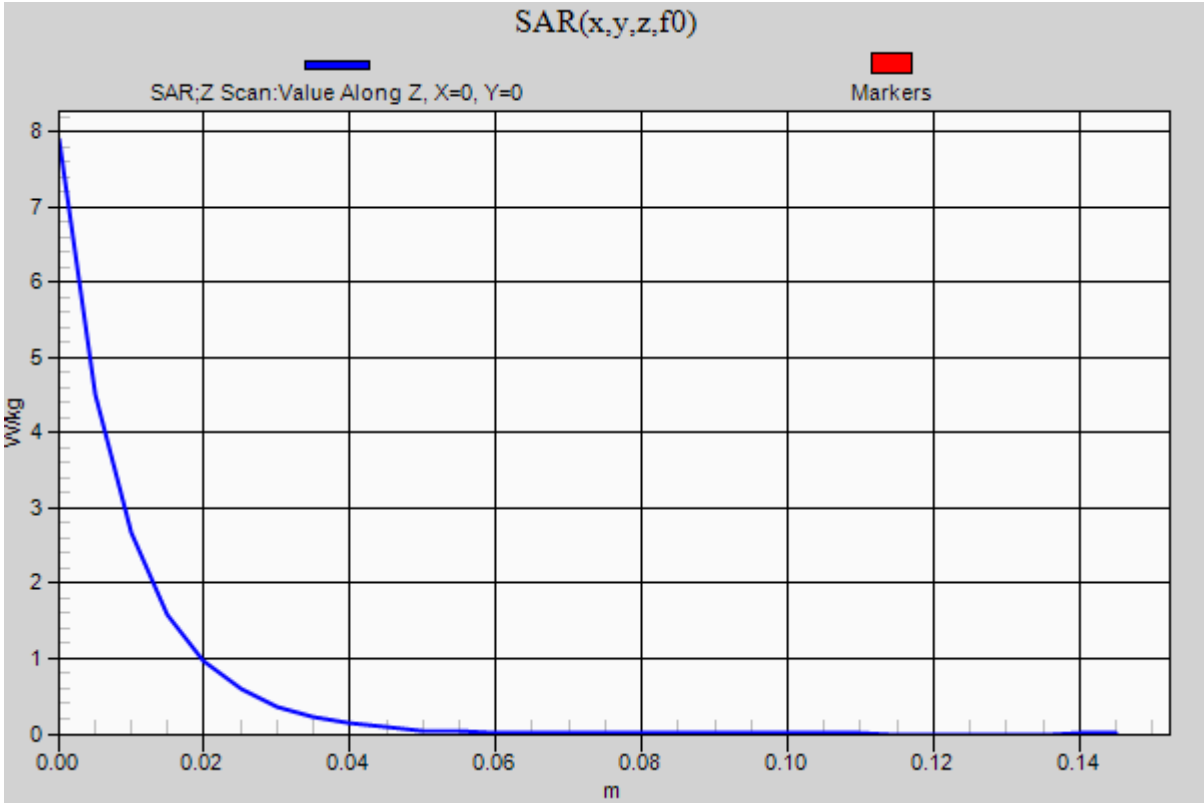
Pin/250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 14.5 W/kg

Pin/250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 104.1 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 17.0 W/kg
SAR(1 g) = 9.32 W/kg; SAR(10 g) = 4.9 W/kg
Smallest distance from peaks to all points 3 dB below = 10 mm
Ratio of SAR at M2 to SAR at M1 = 55.1%
Maximum value of SAR (measured) = 14.4 W/kg

Pin/250mW/Z Scan (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 7.90 W/kg

Ambient Temp. : 25.0 degree.C. Liquid Temp.; 24.3 degree.C.
Liquid temp. is kept within the 2 degree.C. during the test.
Date: 2020/04/27




SAR(x,y,z,f0)
SAR;Z Scan:Value Along Z, X=0, Y=0
Markers
W/kg
8
7
6
5
4
3
2
1
0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
m

20200428 1900MHz System Check

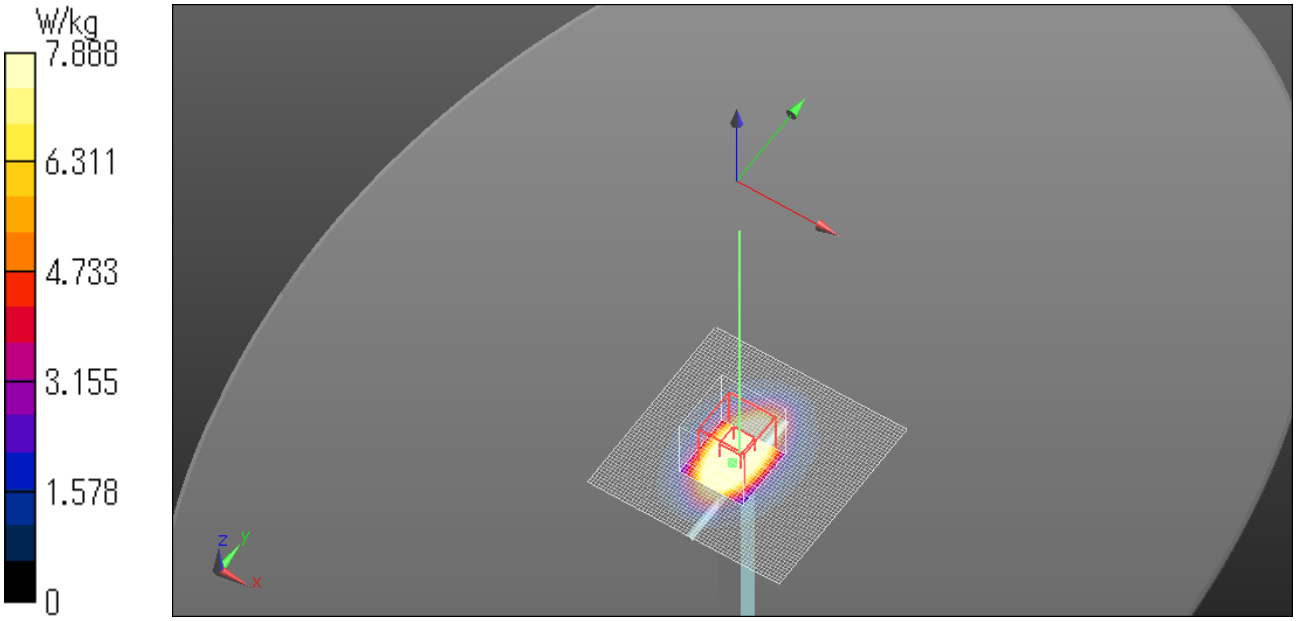
Communication System: UID 0, #CW (0); Communication System Band: D1900 (1900.0 MHz); ; Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.41 S/m; ε_r = 39.926; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration
Probe: EX3DV4 - SN3825; ConvF(8.33, 8.33, 8.33) @ 1900 MHz;
Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)
Electronics: DAE4 Sn509;
Phantom: ELI v4.0 (20deg probe tilt); Type: QDOVA001BB;Serial: TP:1045
Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

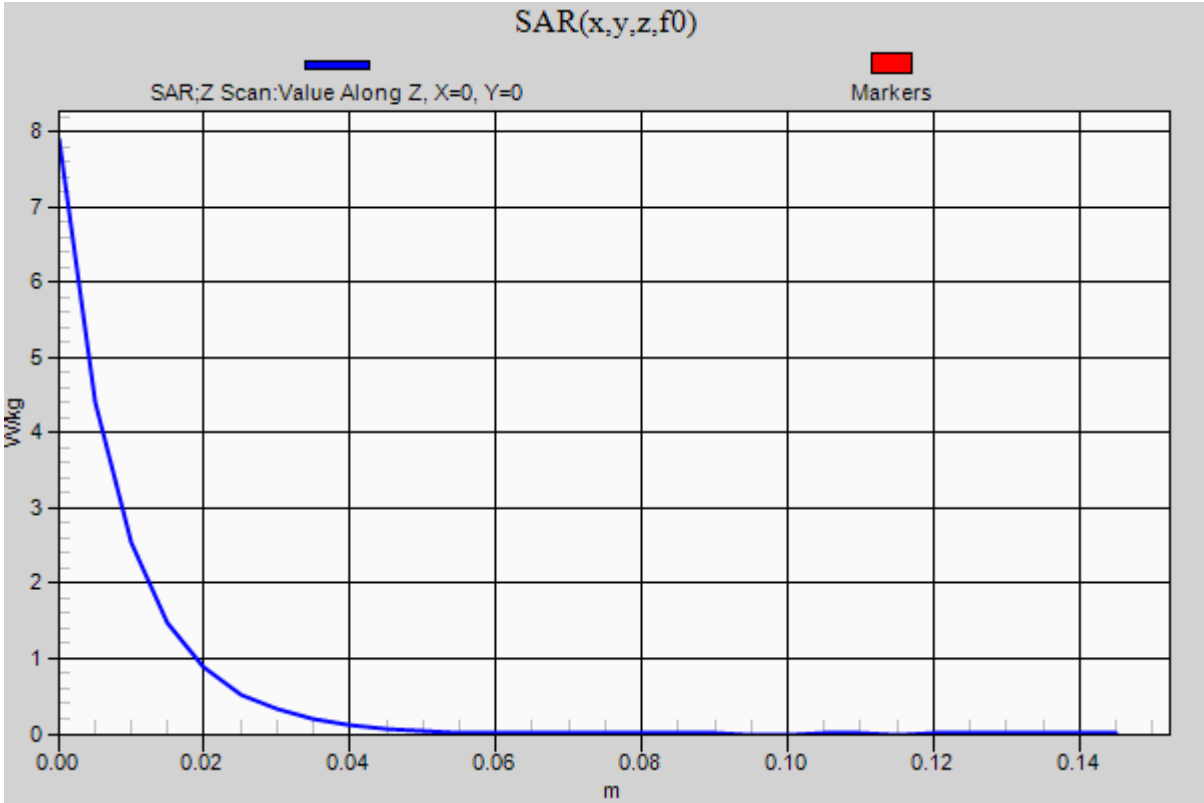
Pin/250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 14.9 W/kg

Pin/250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 104.3 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 17.4 W/kg
SAR(1 g) = 9.34 W/kg; SAR(10 g) = 4.83 W/kg
Smallest distance from peaks to all points 3 dB below = 10 mm
Ratio of SAR at M2 to SAR at M1 = 53.9%
Maximum value of SAR (measured) = 14.6 W/kg

Pin/250mW/Z Scan (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 7.89 W/kg

Ambient Temp. : 23.5 degree.C. Liquid Temp.; 22.8 degree.C.
Liquid temp. is kept within the 2 degree.C. during the test.
Date: 2020/04/28




SAR(x,y,z,f0)
SAR;Z Scan:Value Along Z, X=0, Y=0
Markers
W/kg
8
7
6
5
4
3
2
1
0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
m

20200507 2600MHz System Check

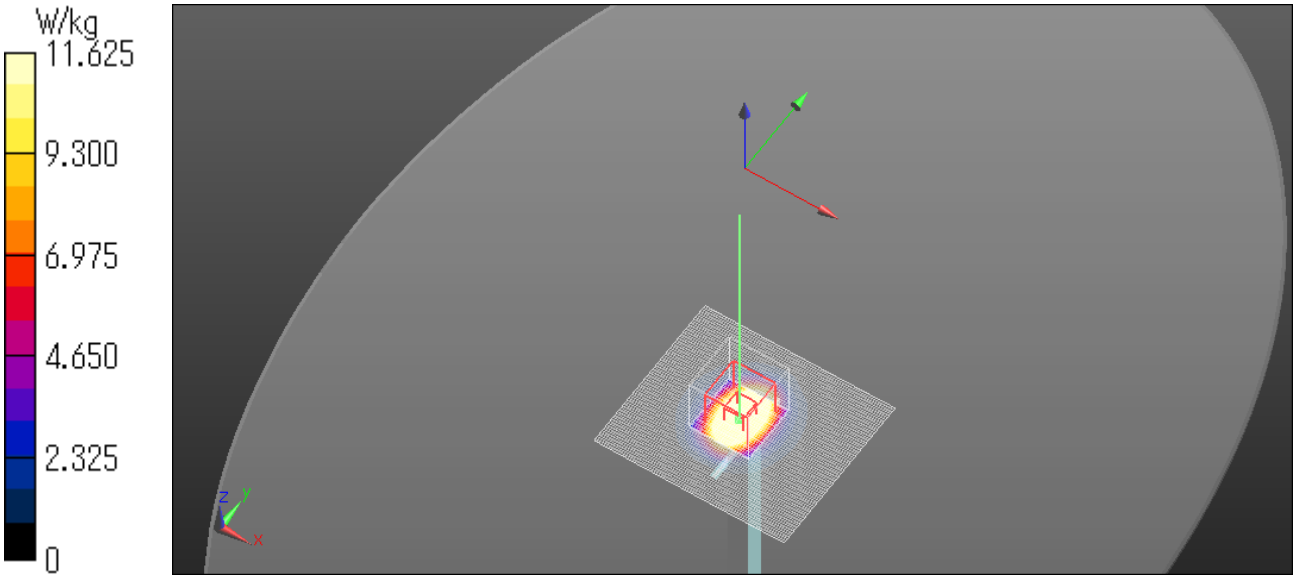
Communication System: UID 0, #CW (0); Communication System Band: D2600 (2600.0 MHz); ; Duty Cycle: 1:1
Medium parameters used: f = 2600 MHz; σ = 1.943 S/m; ε_r = 38.885; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration
Probe: EX3DV4 - SN3917; ConvF(7.2, 7.2, 7.2) @ 2600 MHz;
Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)
Electronics: DAE4 Sn1369;
Phantom: ELI v5.0 (20deg probe tilt); Type: QDOVA001BB;Serial: TP:1203
Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

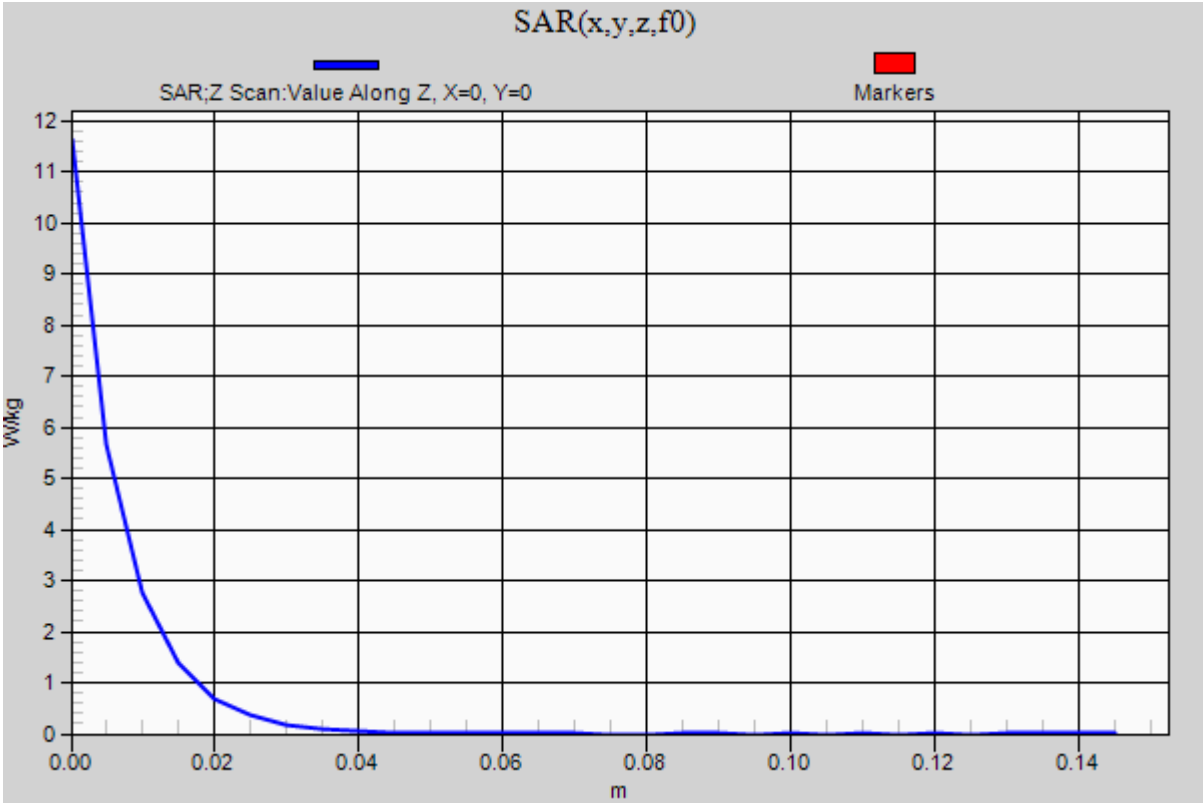
Pin/250mW/Area Scan (81x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 25.5 W/kg

Pin/250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 117.7 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 30.9 W/kg
SAR(1 g) = 14.4 W/kg; SAR(10 g) = 6.47 W/kg
Smallest distance from peaks to all points 3 dB below = 8.9 mm
Ratio of SAR at M2 to SAR at M1 = 46.8%
Maximum value of SAR (measured) = 24.8 W/kg

Pin/250mW/Z Scan (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 11.6 W/kg

Ambient Temp. : 22.5 degree.C. Liquid Temp.; 21.8 degree.C.
Liquid temp. is kept within the 2 degree.C. during the test.
Date: 2020/05/07




SAR(x,y,z,f0)
SAR;Z Scan:Value Along Z, X=0, Y=0
Markers
W/kg
12
11
10
9
8
7
6
5
4
3
2
1
0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
m

20200512 2450MHz System Check

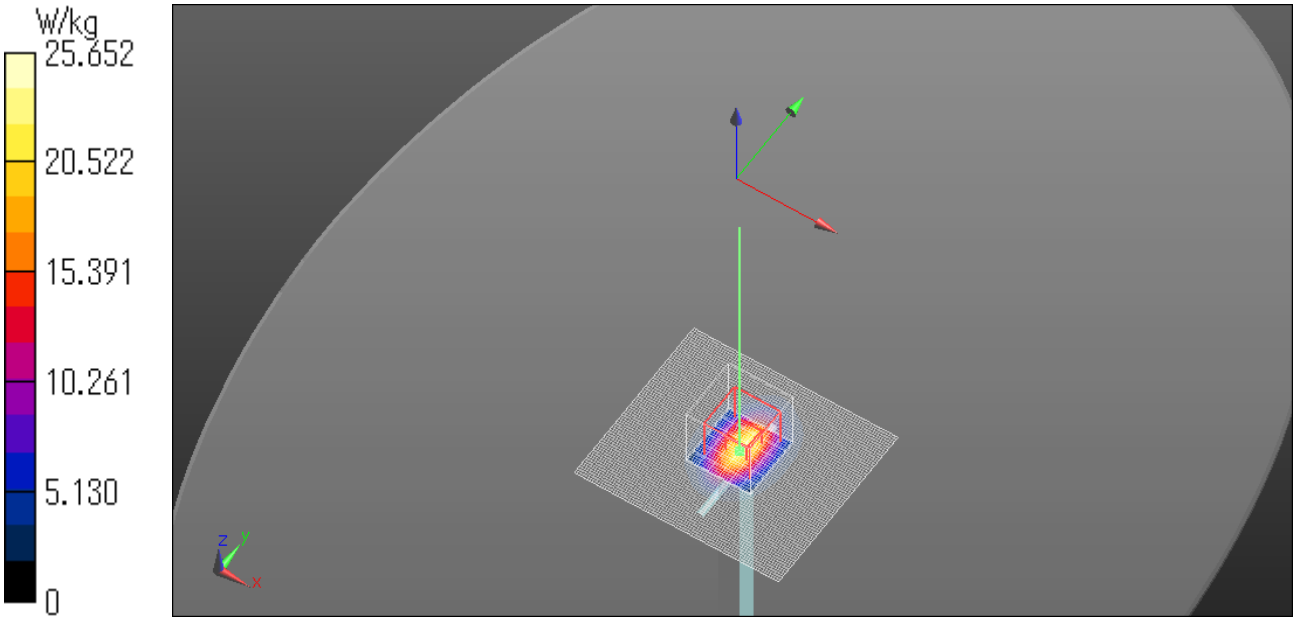
Communication System: UID 0, #CW (0); Communication System Band: D2450 (2450.0 MHz); ; Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.828 S/m; ε_r = 39.156; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration
Probe: EX3DV4 - SN3825; ConvF(7.65, 7.65, 7.65) @ 2450 MHz;
Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)
Electronics: DAE4 Sn509;
Phantom: ELI v4.0 (20deg probe tilt); Type: QDOVA001BB;Serial: TP:1045
Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

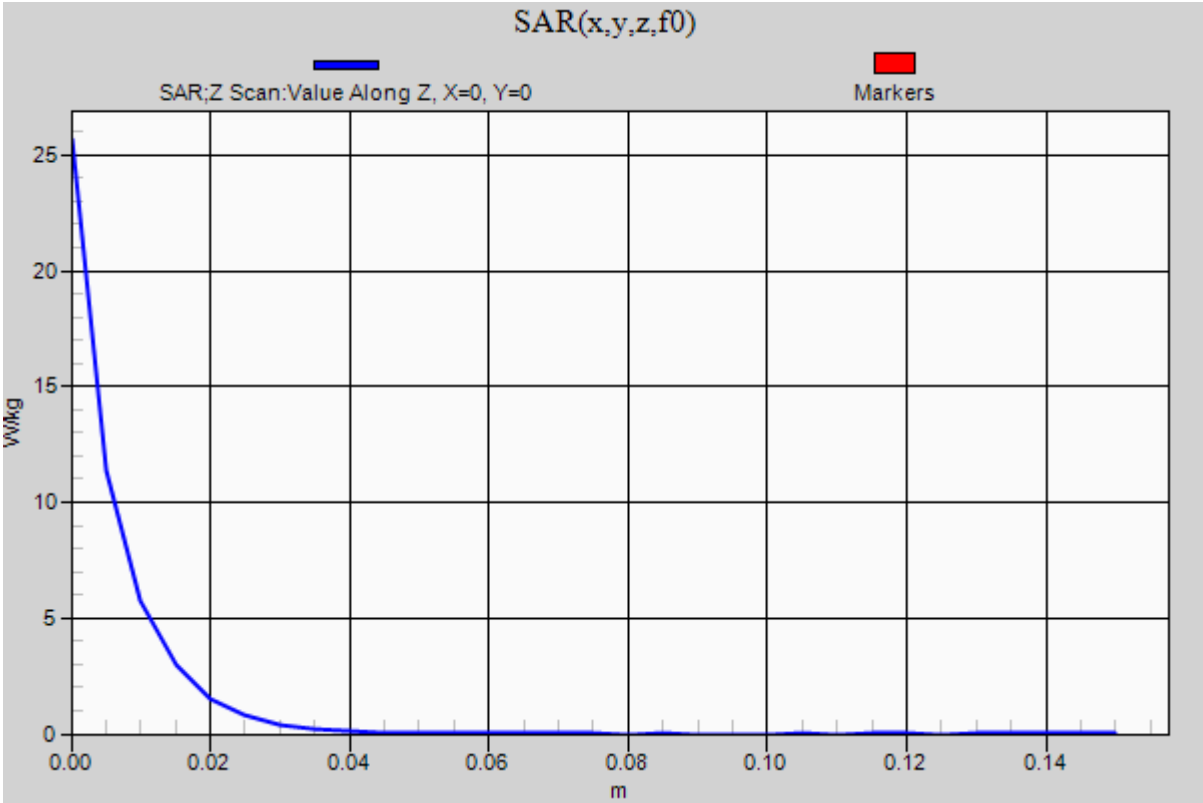
Pin/250mW/Area Scan (81x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 23.8 W/kg

Pin/250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 118.0 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 29.5 W/kg
SAR(1 g) = 13.8 W/kg; SAR(10 g) = 6.29 W/kg
Smallest distance from peaks to all points 3 dB below = 9 mm
Ratio of SAR at M2 to SAR at M1 = 46.8%
Maximum value of SAR (measured) = 23.2 W/kg

Pin/250mW/Z Scan (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 25.7 W/kg

Ambient Temp. : 23.5 degree.C. Liquid Temp.; 22.7 degree.C.
Liquid temp. is kept within the 2 degree.C. during the test.
Date: 2020/05/12




SAR(x,y,z,f0)
SAR;Z Scan:Value Along Z, X=0, Y=0
Markers
W/kg
25
20
15
10
5
0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
m

20200513 2450MHz System Check

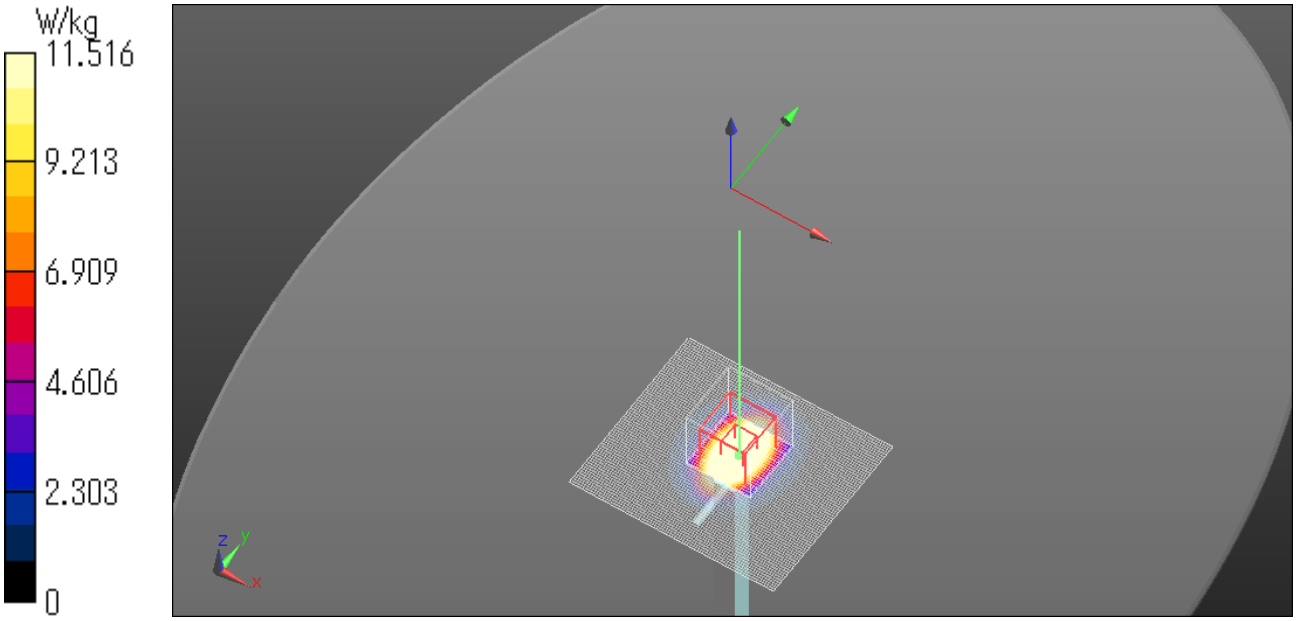
Communication System: UID 0, #CW (0); Communication System Band: D2450 (2450.0 MHz); ; Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.801 S/m; ε_r = 38.819; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration
Probe: EX3DV4 - SN3825; ConvF(7.65, 7.65, 7.65) @ 2450 MHz;
Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)
Electronics: DAE4 Sn509;
Phantom: ELI v4.0 (20deg probe tilt); Type: QDOVA001BB;Serial: TP:1045
Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

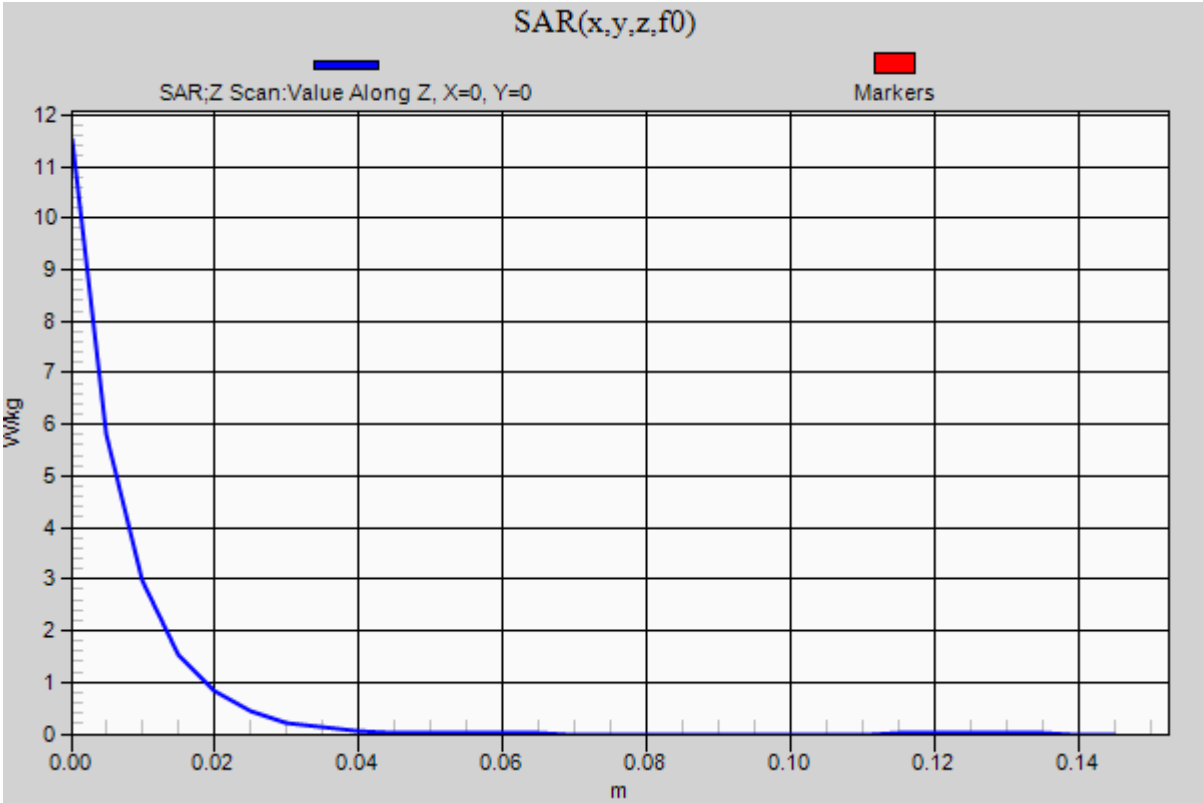
Pin/250mW/Area Scan (81x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 23.9 W/kg

Pin/250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 118.1 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 29.9 W/kg
SAR(1 g) = 14.1 W/kg; SAR(10 g) = 6.53 W/kg
Smallest distance from peaks to all points 3 dB below = 8.9 mm
Ratio of SAR at M2 to SAR at M1 = 46.6%
Maximum value of SAR (measured) = 23.8 W/kg

Pin/250mW/Z Scan (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 11.1 W/kg

Ambient Temp. : 23.5 degree.C. Liquid Temp.; 22.5 degree.C.
Liquid temp. is kept within the 2 degree.C. during the test.
Date: 2020/05/13




SAR(x,y,z,f0)
SAR;Z Scan:Value Along Z, X=0, Y=0
Markers
W/kg
12
11
10
9
8
7
6
5
4
3
2
1
0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
m

20200514 5250MHz System Check

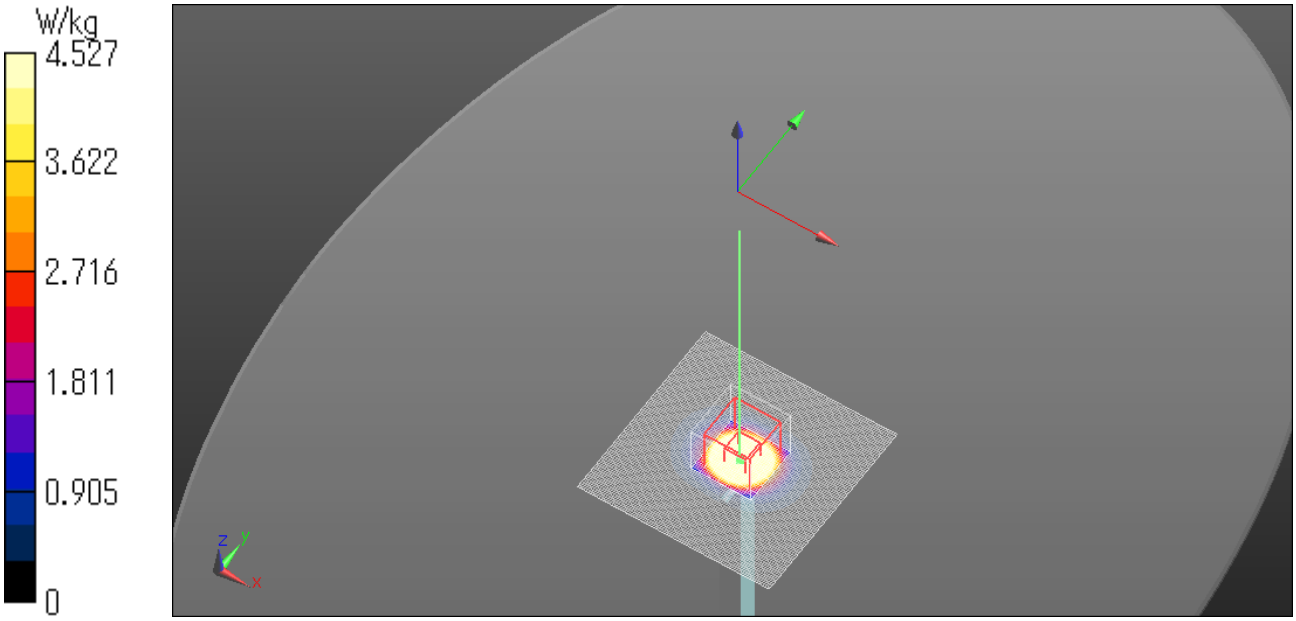
Communication System: UID 0, CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); ; Duty Cycle: 1:1
Medium parameters used: f = 5250 MHz; σ = 4.651 S/m; ε_r = 35.678; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration
Probe: EX3DV4 - SN3825; ConvF(5.02, 5.02, 5.02) @ 5250 MHz;
Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)
Electronics: DAE4 Sn509;
Phantom: ELI v4.0 (20deg probe tilt); Type: QDOVA001BB;Serial: TP:1045
Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

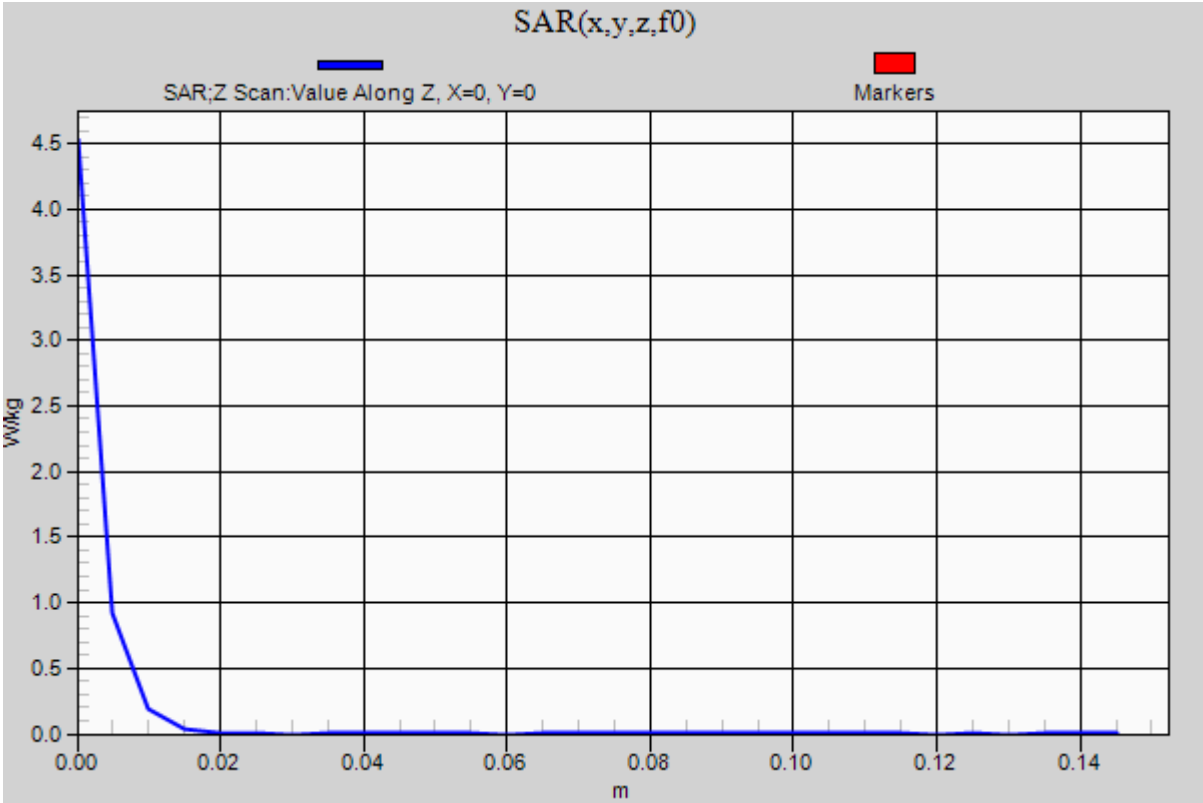
Pin/100mW/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 22.2 W/kg

Pin/100mW/Zoom Scan (4x4x1.4mm, graded), dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 75.09 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 33.6 W/kg
SAR(1 g) = 8.42 W/kg; SAR(10 g) = 2.39 W/kg
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 65.9%
Maximum value of SAR (measured) = 19.9 W/kg

Pin/100mW/Z Scan (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 4.53 W/kg

Ambient Temp. : 23.0 degree.C. Liquid Temp.; 22.0 degree.C.
Liquid temp. is kept within the 2 degree.C. during the test.
Date: 2020/05/14




SAR(x,y,z,f0)
SAR;Z Scan:Value Along Z, X=0, Y=0
Markers
W/kg
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
m

20200518 5600MHz System Check

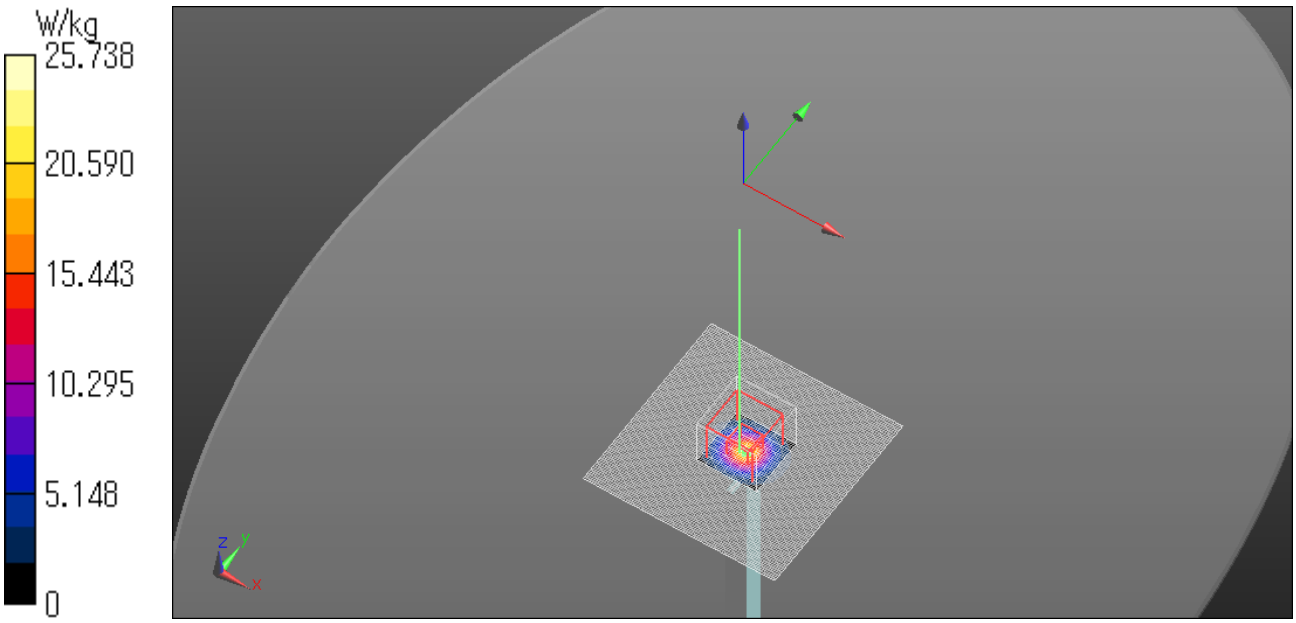
Communication System: UID 0, #CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); ; Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; σ = 4.92 S/m; ε_r = 34.879; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration
Probe: EX3DV4 - SN3825; ConvF(4.61, 4.61, 4.61) @ 5600 MHz;
Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)
Electronics: DAE4 Sn509;
Phantom: ELI v4.0 (20deg probe tilt); Type: QDOVA001BB;Serial: TP:1045
Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

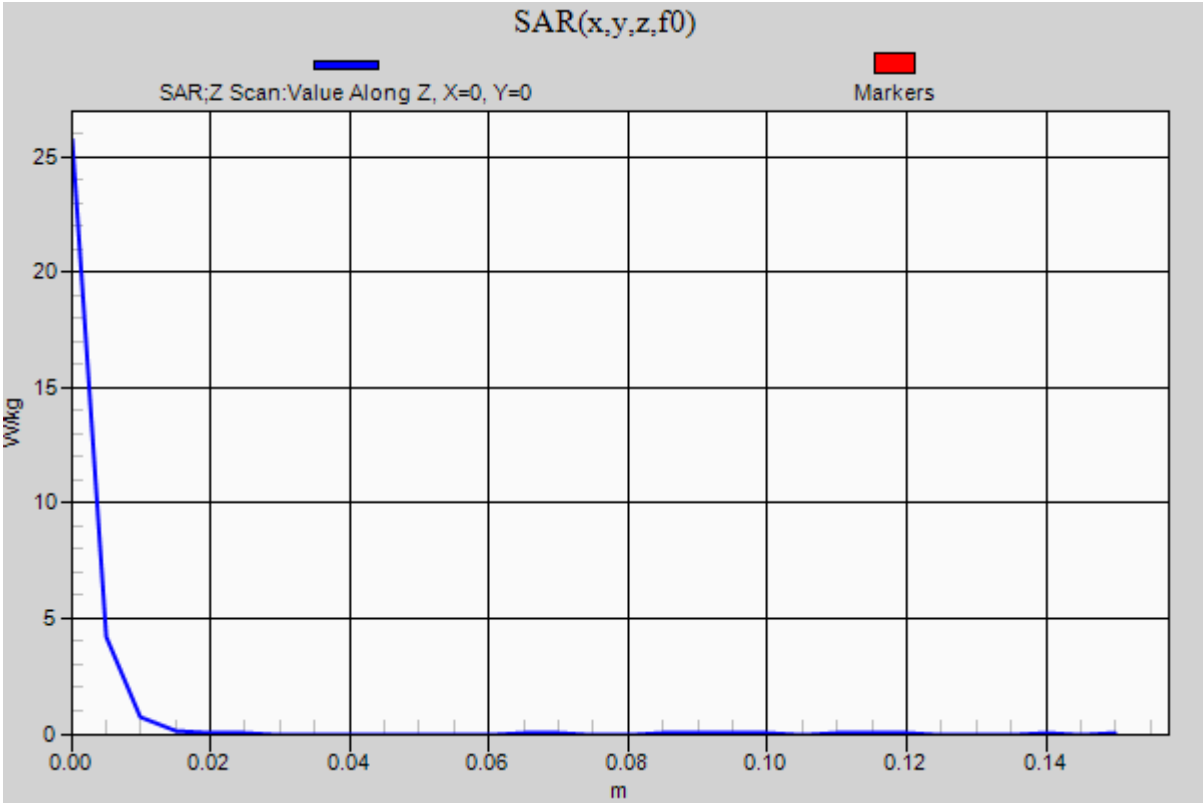
Pin/100mW/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 20.8 W/kg

Pin/100mW/Zoom Scan (4x4x1.4mm, graded), dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 74.39 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 36.8 W/kg
SAR(1 g) = 8.56 W/kg; SAR(10 g) = 2.4 W/kg
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 63.1%
Maximum value of SAR (measured) = 21.2 W/kg

Pin/100mW/Z Scan (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 25.7 W/kg

Ambient Temp. : 22.0 degree.C. Liquid Temp.; 21.0 degree.C.
Liquid temp. is kept within the 2 degree.C. during the test.
Date: 2020/05/18




SAR(x,y,z,f0)
SAR;Z Scan:Value Along Z, X=0, Y=0
Markers
W/kg
25
20
15
10
5
0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
m

20200827 835MHz System Check

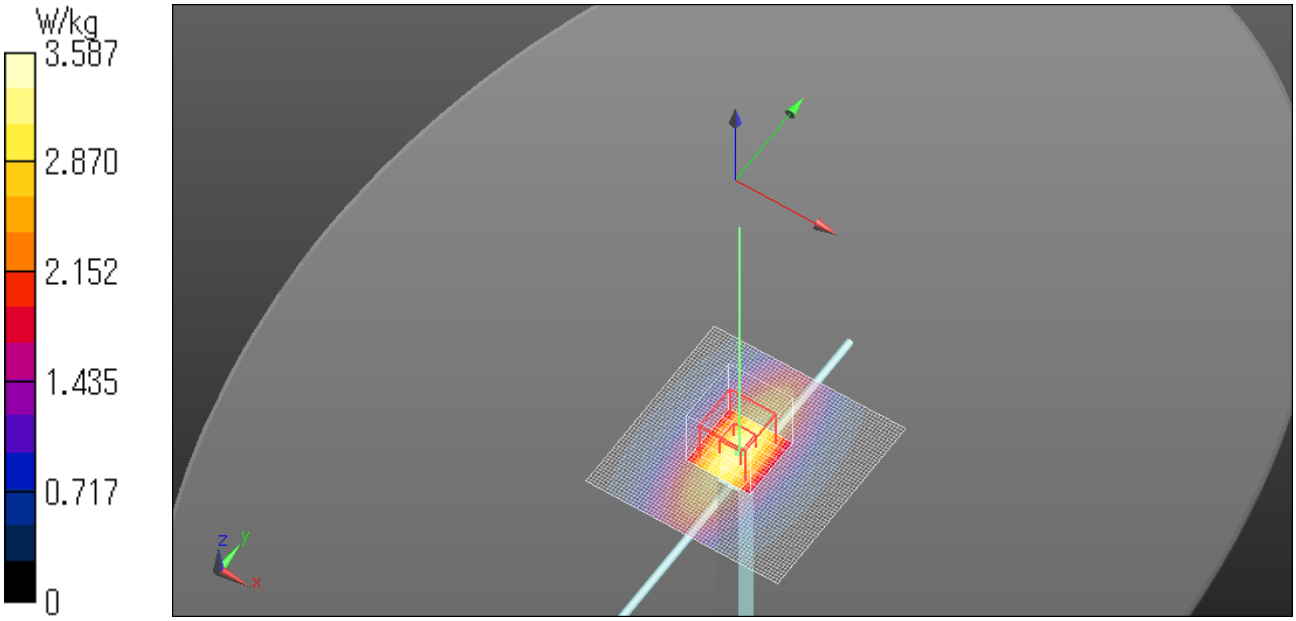
Communication System: UID 0, #CW (0); Communication System Band: D835 (835.0 MHz); ; Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.929 S/m; ε_r = 42.304; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration
Probe: EX3DV4 - SN3917; ConvF(9.9, 9.9, 9.9) @ 835 MHz;
Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)
Electronics: DAE4 Sn1369;
Phantom: ELI v4.0 (20deg probe tilt); Type: QDOVA001BB;Serial: TP:1045
Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

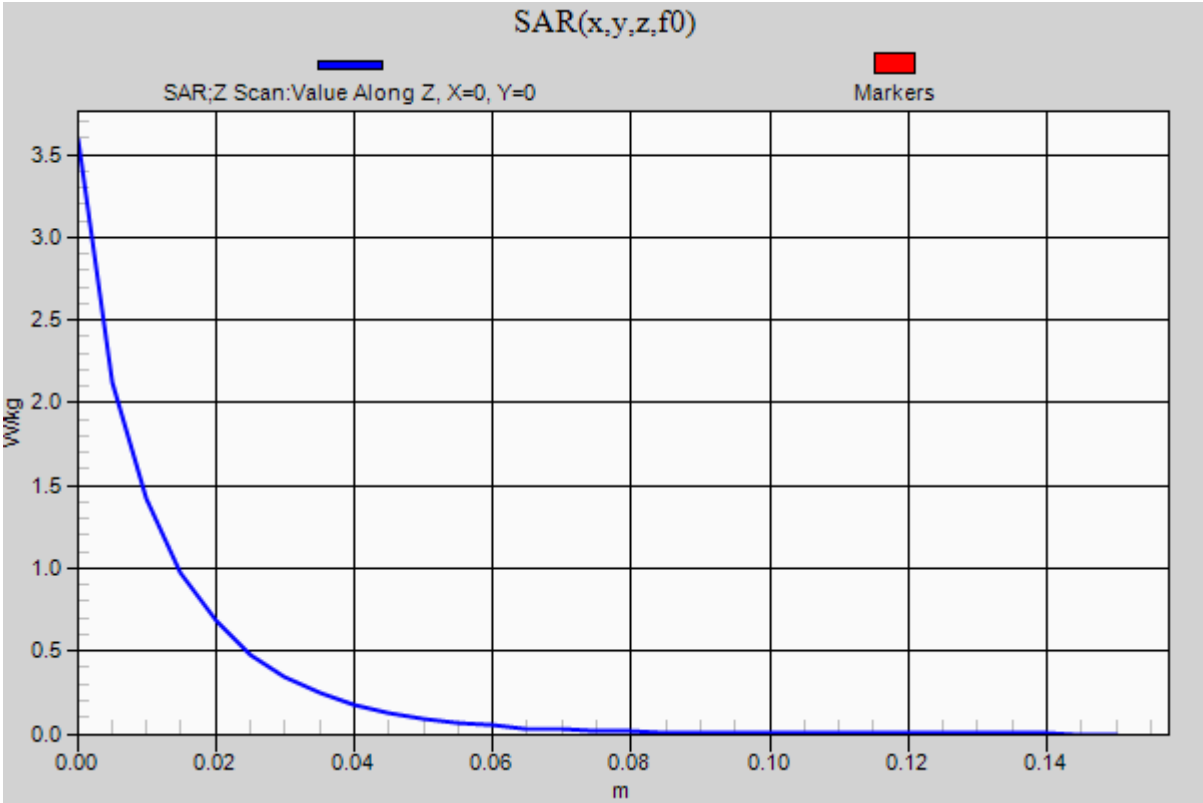
Pin/250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 3.29 W/kg

Pin/250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 62.12 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 3.79 W/kg
SAR(1 g) = 2.43 W/kg; SAR(10 g) = 1.57 W/kg
Smallest distance from peaks to all points 3 dB below = 19.4 mm
Ratio of SAR at M2 to SAR at M1 = 64.1%
Maximum value of SAR (measured) = 3.31 W/kg

Pin/250mW/Z Scan (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 3.59 W/kg

Ambient Temp. : 22.0 degree.C. Liquid Temp.; 21.2 degree.C.
Liquid temp. is kept within the 2 degree.C. during the test.
Date: 2020/08/27




SAR(x,y,z,f0)
SAR;Z Scan:Value Along Z, X=0, Y=0
Markers
W/kg
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
m

20200828 835MHz System Check

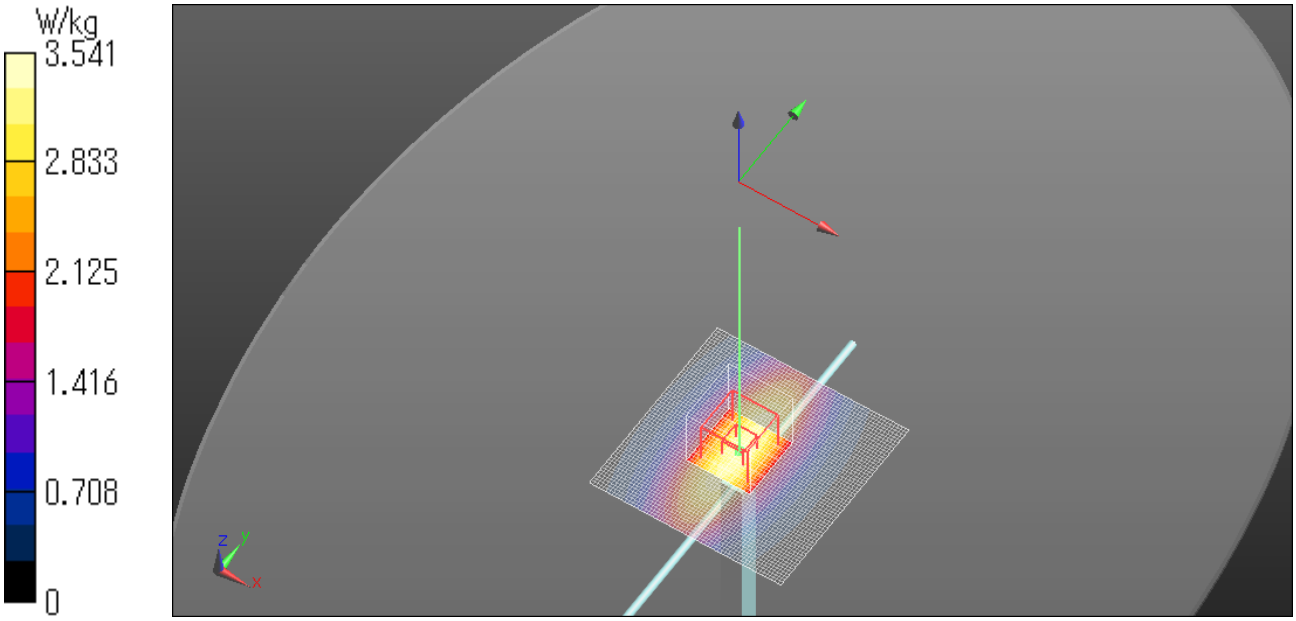
Communication System: UID 0, #CW (0); Communication System Band: D835 (835.0 MHz); ; Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.917 S/m; ε_r = 41.898; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration
Probe: EX3DV4 - SN3917; ConvF(9.9, 9.9, 9.9) @ 835 MHz;
Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)
Electronics: DAE4 Sn1369;
Phantom: ELI v4.0 (20deg probe tilt); Type: QDOVA001BB;Serial: TP:1045
Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

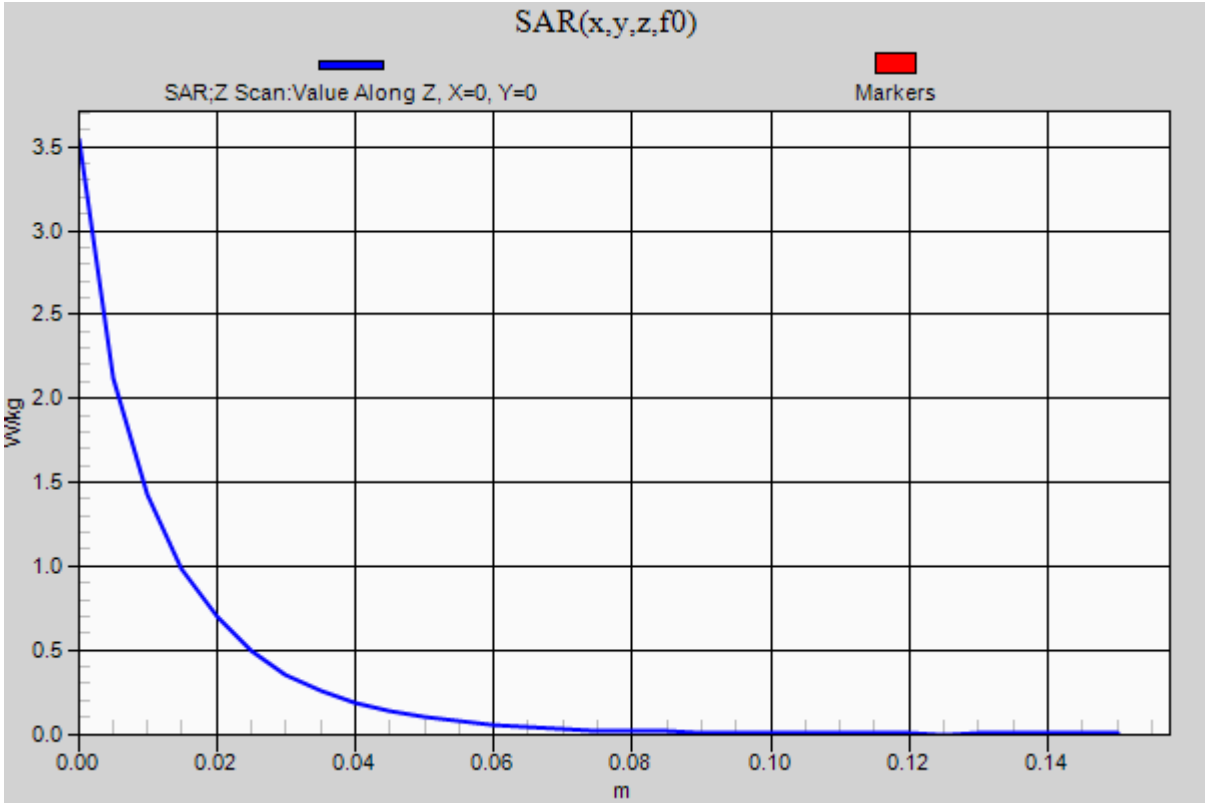
Pin/250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 3.54 W/kg

Pin/250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 63.94 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 3.84 W/kg
SAR(1 g) = 2.46 W/kg; SAR(10 g) = 1.6 W/kg
Smallest distance from peaks to all points 3 dB below = 20.5 mm
Ratio of SAR at M2 to SAR at M1 = 64%
Maximum value of SAR (measured) = 3.36 W/kg

Pin/250mW/Z Scan (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 3.54 W/kg

Ambient Temp. : 21.5 degree.C. Liquid Temp.; 20.8 degree.C.
Liquid temp. is kept within the 2 degree.C. during the test.
Date: 2020/08/28




SAR(x,y,z,f0)
SAR;Z Scan:Value Along Z, X=0, Y=0
Markers
W/kg
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
m

20200902 835MHz System Check

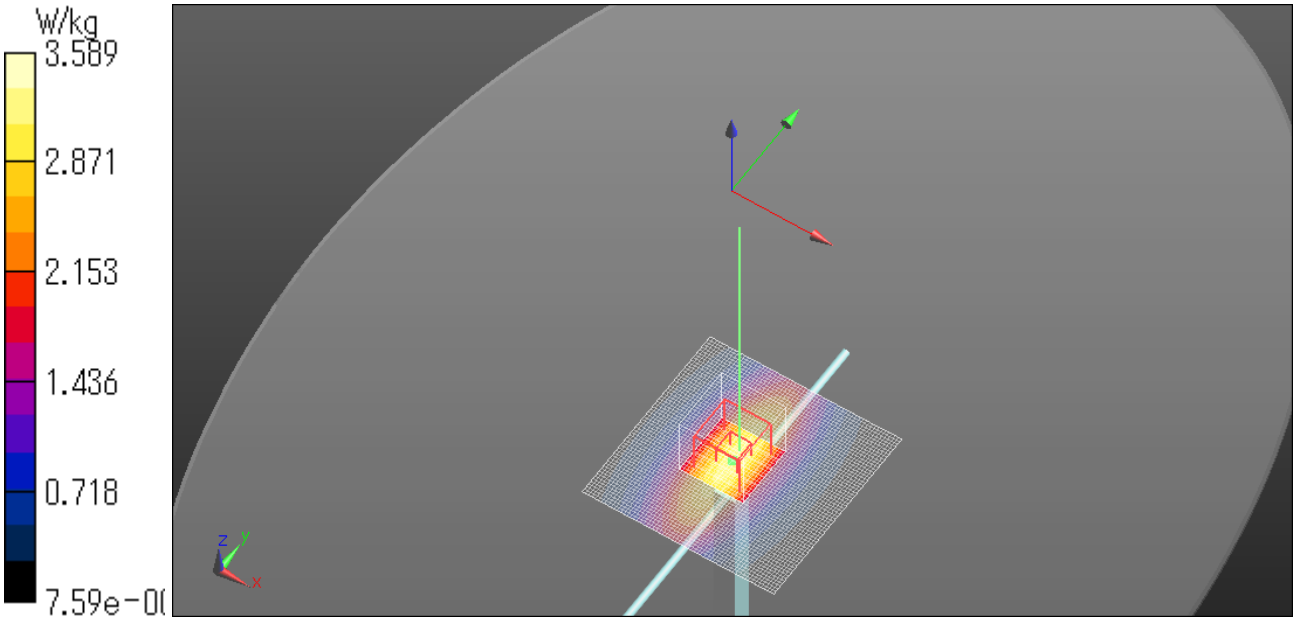
Communication System: UID 0, #CW (0); Communication System Band: D835 (835.0 MHz); ; Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.915 S/m; ε_r = 41.828; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration
Probe: EX3DV4 - SN3917; ConvF(9.9, 9.9, 9.9) @ 835 MHz;
Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)
Electronics: DAE4 Sn1369;
Phantom: ELI v4.0 (20deg probe tilt); Type: QDOVA001BB;Serial: TP:1045
Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

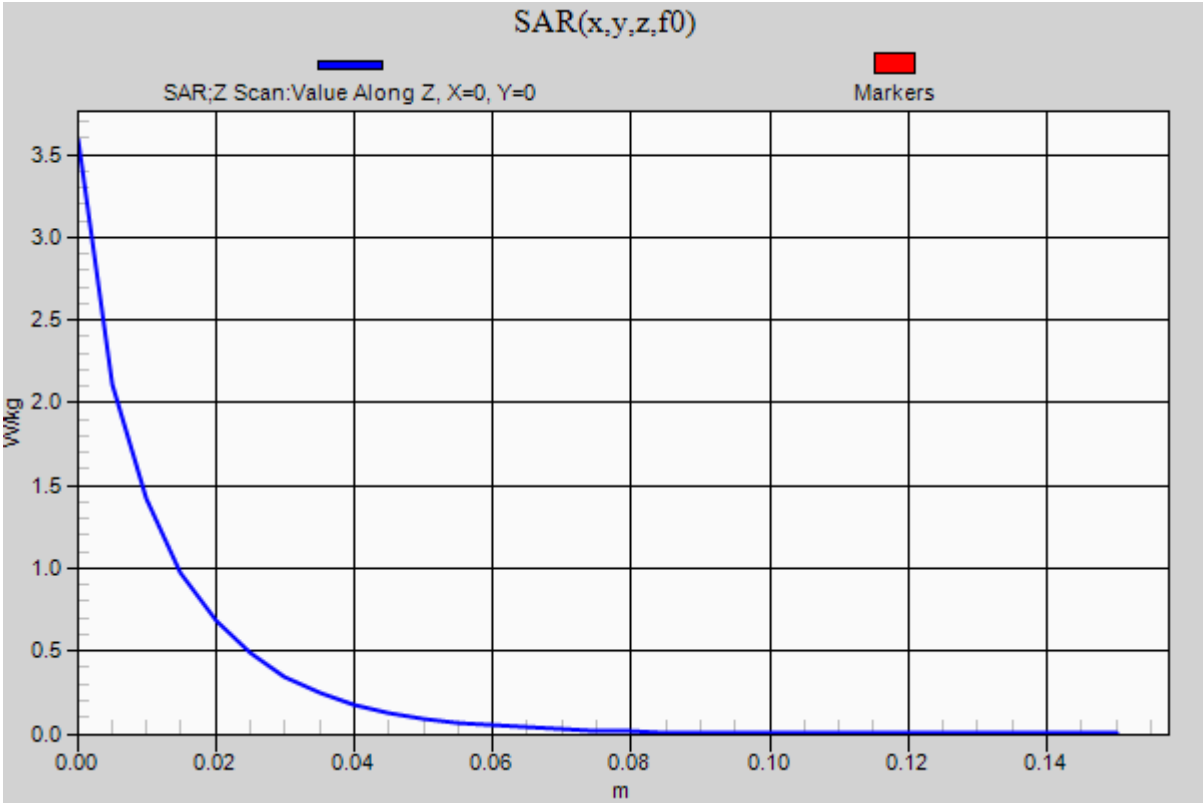
Pin/250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 3.30 W/kg

Pin/250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 62.70 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.83 W/kg
SAR(1 g) = 2.44 W/kg; SAR(10 g) = 1.58 W/kg
Smallest distance from peaks to all points 3 dB below = 18.6 mm
Ratio of SAR at M2 to SAR at M1 = 63.5%
Maximum value of SAR (measured) = 3.34 W/kg

Pin/250mW/Z Scan (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 3.59 W/kg

Ambient Temp. : 21.0 degree.C. Liquid Temp.; 20.3 degree.C.
Liquid temp. is kept within the 2 degree.C. during the test.
Date: 2020/09/02




SAR(x,y,z,f0)
SAR;Z Scan:Value Along Z, X=0, Y=0
Markers
W/kg
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
m

APPENDIX 2 : SAR Measurement data

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.

***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.

Step 4: Re-measurement of the E-field at the same location as in Step 1.
Confirmation after SAR testing
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] =20log(Ea)/(Eb)
Before SAR testing : Eb[V/m]
After SAR testing : Ea[V/m]

Limit of power drift[W] =+/-5%
X[dB]=10log[P]=10log(1.05/1)=10log(1.05)-10log(1)=0.212dB

from E-filed relations with power.
p=E^2/η=E^2/
Therefore, The correlation of power and the E-filed
XdB=10log(P)=10log(E)^2=20log(E)

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

Measurement data

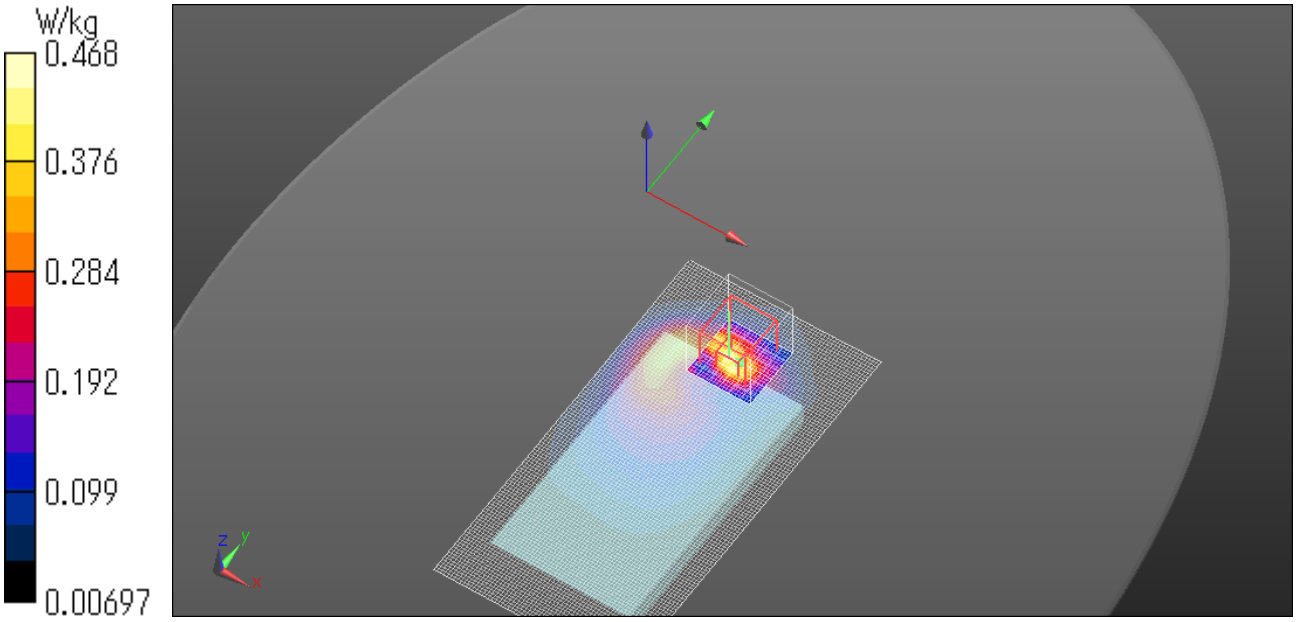
GSM850 836.6MHz/Rear 5mm GPRS 4 time slots

Communication System: UID 0, #Generic GSM (0); Communication System Band: GSM 850 (824.0 - 849.0 MHz); ; Duty Cycle: 1:2.09991
Medium parameters used: f = 837 MHz; σ = 0.929 S/m; ε_r = 42.304; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration
Probe: EX3DV4 - SN3917; ConvF(9.9, 9.9, 9.9) @ 836.6 MHz;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1369;
Phantom: ELI v4.0 (20deg probe tilt); Type: QDOVA001BB;Serial: TP:1045
Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

GSM850/Rear 5mm GPRS 4 time slots/Area Scan (61x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.410 W/kg

GSM850/Rear 5mm GPRS 4 time slots/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 22.97 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.697 W/kg
SAR(1 g) = 0.252 W/kg; SAR(10 g) = 0.119 W/kg
Smallest distance from peaks to all points 3 dB below = 5.7 mm
Ratio of SAR at M2 to SAR at M1 = 38.4%
Maximum value of SAR (measured) = 0.468 W/kg

Ambient Temp. : 22.0 degree.C. Liquid Temp.; 21.2 degree.C.
Liquid temp. is kept within the 2 degree.C. during the test.
Date: 2020/08/27



Plot No.: 1

PCS1900 1909.8MHz/Rear 5mm GPRS 4 time slots

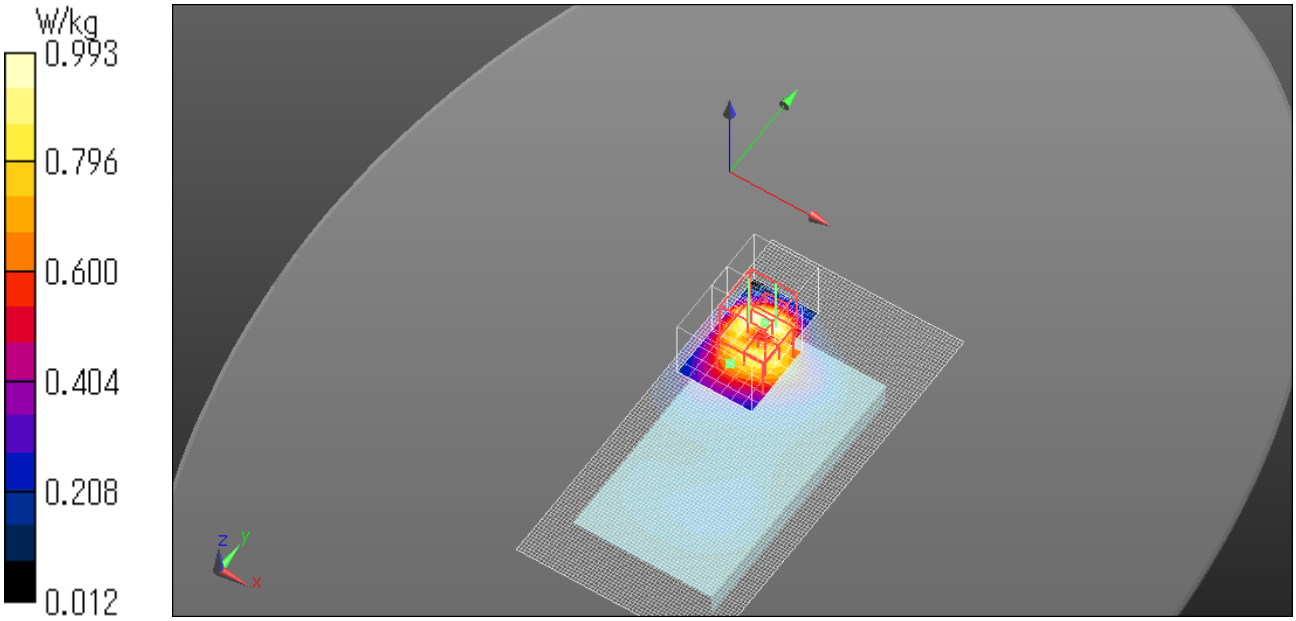
Communication System: UID 0, #Generic GSM (0); Communication System Band: PCS 1900 (1850.0 - 1910.0 MHz); ; Duty Cycle: 1:8.30042
Medium parameters used: f = 1909.8 MHz; σ = 1.42 S/m; ε_r = 39.71; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration
Probe: EX3DV4 - SN3825; ConvF(8.33, 8.33, 8.33) @ 1909.8 MHz;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn509;
Phantom: ELI v4.0 (20deg probe tilt); Type: QDOVA001BB;Serial: TP:1045
Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

PCS1900/Rear 5mm GPRS 4 time slots/Area Scan (61x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.11 W/kg

PCS1900/Rear 5mm GPRS 4 time slots/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 27.94 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.38 W/kg
SAR(1 g) = 0.573 W/kg; SAR(10 g) = 0.297 W/kg
Smallest distance from peaks to all points 3 dB below = 8 mm
Ratio of SAR at M2 to SAR at M1 = 40.7%
Maximum value of SAR (measured) = 1.04 W/kg

PCS1900/Rear 5mm GPRS 4 time slots 3/Zoom Scan (7x7x7) 2 (8x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 27.94 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.33 W/kg
SAR(1 g) = 0.612 W/kg; SAR(10 g) = 0.351 W/kg
Smallest distance from peaks to all points 3 dB below = 8 mm
Ratio of SAR at M2 to SAR at M1 = 40.3%
Maximum value of SAR (measured) = 0.993 W/kg

Ambient Temp. : 24.0 degree.C. Liquid Temp.; 23.3 degree.C.
Liquid temp. is kept within the 2 degree.C. during the test.
Date: 2020/04/24



Plot No.: 2

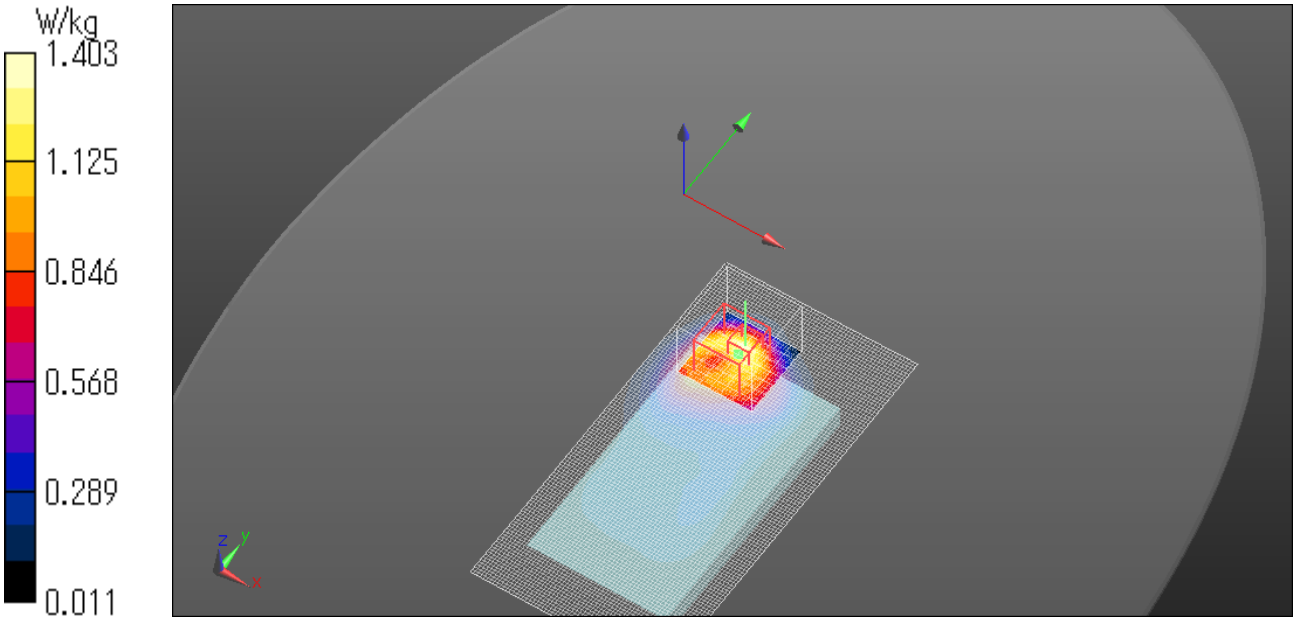
WCDMA B2 1852.4MHz/Rear 5mm RMC12.2k

Communication System: UID 0, #WCDMA (0); Communication System Band: Band II; ; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.355 S/m; ε_r = 40.162; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration
Probe: EX3DV4 - SN3825; ConvF(8.33, 8.33, 8.33) @ 1852.4 MHz;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn509;
Phantom: ELI v4.0 (20deg probe tilt); Type: QDOVA001BB;Serial: TP:1045
Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

WCDMA B2/Rear 5mm RMC12.2k/Area Scan (61x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.79 W/kg

WCDMA B2/Rear 5mm RMC12.2k/Zoom Scan (7x7x7) (8x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 32.02 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 1.80 W/kg
SAR(1 g) = 0.831 W/kg; SAR(10 g) = 0.442 W/kg
Smallest distance from peaks to all points 3 dB below = 8 mm
Ratio of SAR at M2 to SAR at M1 = 46.9%
Maximum value of SAR (measured) = 1.40 W/kg

Ambient Temp. : 25.0 degree.C. Liquid Temp.; 24.3 degree.C.
Liquid temp. is kept within the 2 degree.C. during the test.
Date: 2020/04/27



Plot No.: 3

WCDMA B5 826.4MHz/Rear 5mm RMC12.2k

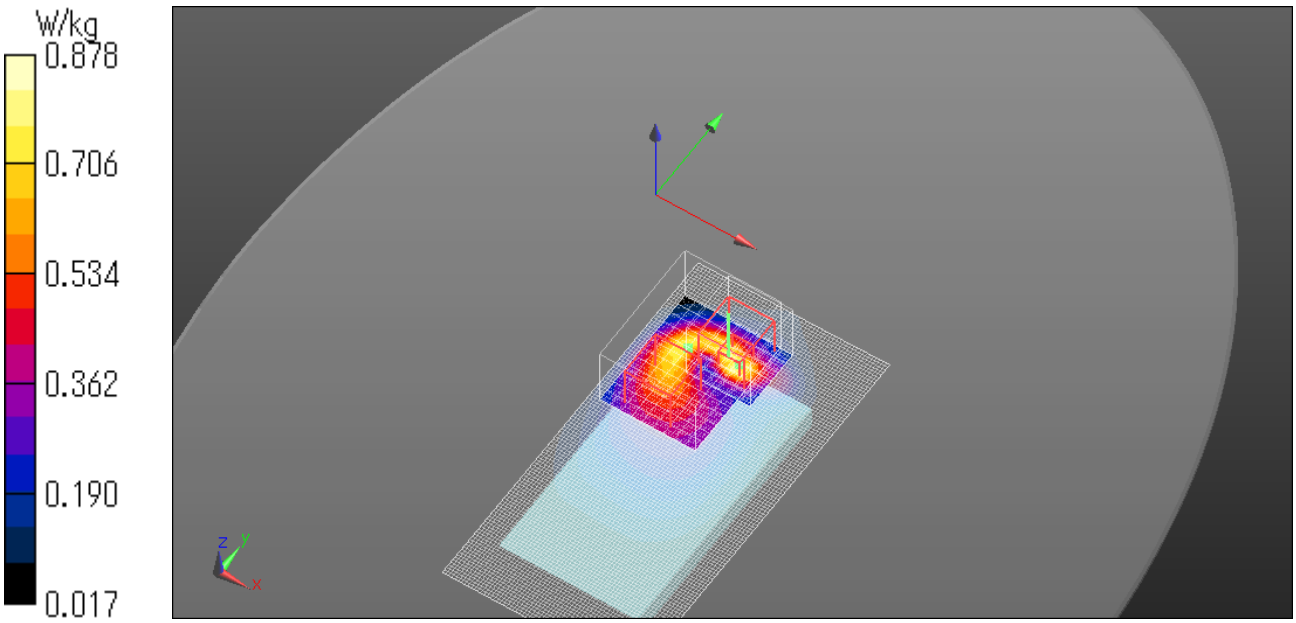
Communication System: UID 0, #WCDMA (0); Communication System Band: Band V; ; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 826.4 MHz; σ = 0.915 S/m; ε_r = 41.939; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration
Probe: EX3DV4 - SN3917; ConvF(9.9, 9.9, 9.9) @ 826.4 MHz;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1369;
Phantom: ELI v4.0 (20deg probe tilt); Type: QDOVA001BB;Serial: TP:1045
Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

WCDMA B5/Rear 5mm RMC12.2k 2/Area Scan (61x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.784 W/kg

WCDMA B5/Rear 5mm RMC12.2k/Zoom Scan (7x7x7) (10x13x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 25.70 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 1.27 W/kg
SAR(1 g) = 0.461 W/kg; SAR(10 g) = 0.255 W/kg
Smallest distance from peaks to all points 3 dB below = 5.4 mm
Ratio of SAR at M2 to SAR at M1 = 37.4%
Maximum value of SAR (measured) = 0.859 W/kg

WCDMA B5/Rear 5mm RMC12.2k/Zoom Scan (7x7x7) 2 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 25.70 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 1.29 W/kg
SAR(1 g) = 0.463 W/kg; SAR(10 g) = 0.221 W/kg
Smallest distance from peaks to all points 3 dB below = 5.8 mm
Ratio of SAR at M2 to SAR at M1 = 37.2%
Maximum value of SAR (measured) = 0.878 W/kg

Ambient Temp. : 21.5 degree.C. Liquid Temp.; 20.8 degree.C.
Liquid temp. is kept within the 2 degree.C. during the test.
Date: 2020/08/28



Plot No.: 4

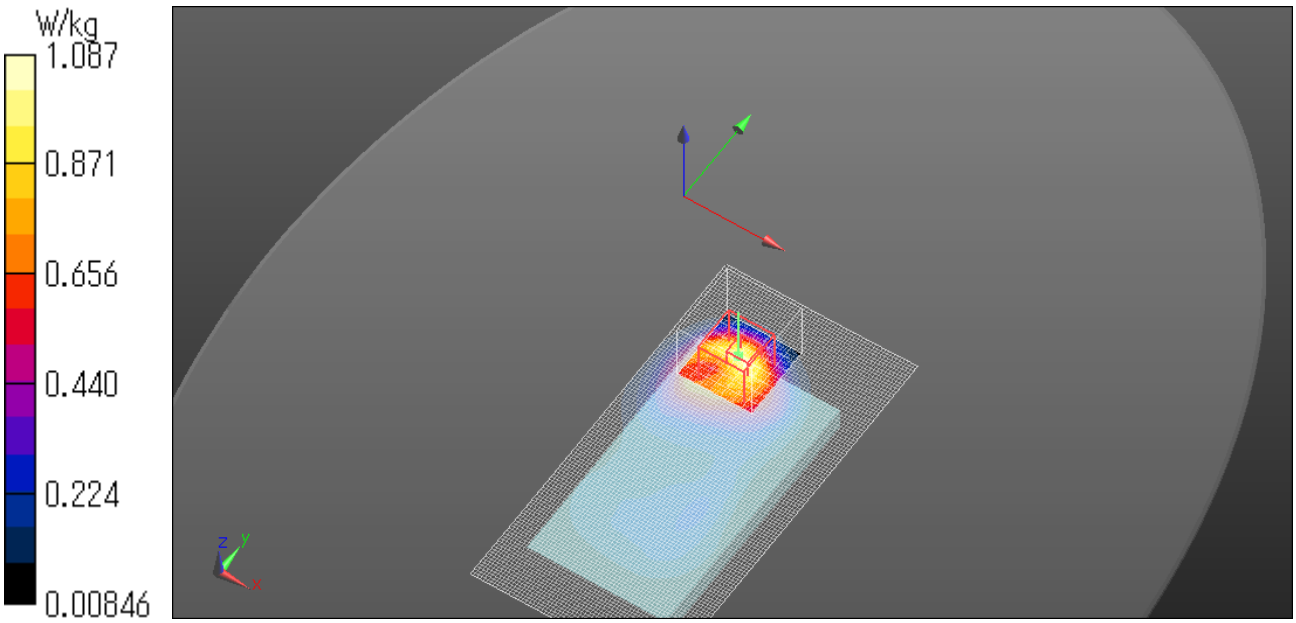
LTE B2 1860MHz/Rear 5mm QPSK RB1-49

Communication System: UID 0, #Generic LTE (0); Communication System Band: Band 2, E-UTRA/FDD (1850.0 - 1910.0 MHz); ; Duty Cycle: 1:1
Medium parameters used: f = 1860 MHz; σ = 1.363 S/m; ε_r = 40.049; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration
Probe: EX3DV4 - SN3825; ConvF(8.33, 8.33, 8.33) @ 1860 MHz;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn509;
Phantom: ELI v4.0 (20deg probe tilt); Type: QDOVA001BB;Serial: TP:1045
Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

LTE B2/Rear 5mm QPSK RB1-49/Area Scan (61x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.25 W/kg

LTE B2/Rear 5mm QPSK RB1-49/Zoom Scan (7x7x7) (8x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 29.59 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.38 W/kg
SAR(1 g) = 0.660 W/kg; SAR(10 g) = 0.347 W/kg
Smallest distance from peaks to all points 3 dB below = 8.9 mm
Ratio of SAR at M2 to SAR at M1 = 47.2%
Maximum value of SAR (measured) = 1.09 W/kg

Ambient Temp. : 23.5 degree.C. Liquid Temp.; 22.8 degree.C..
Liquid temp. is kept within the 2 degree.C. during the test.
Date: 2020/04/28



Plot No.: 5

LTE B7 2535MHz/Rear 5mm QPSK RB1-49

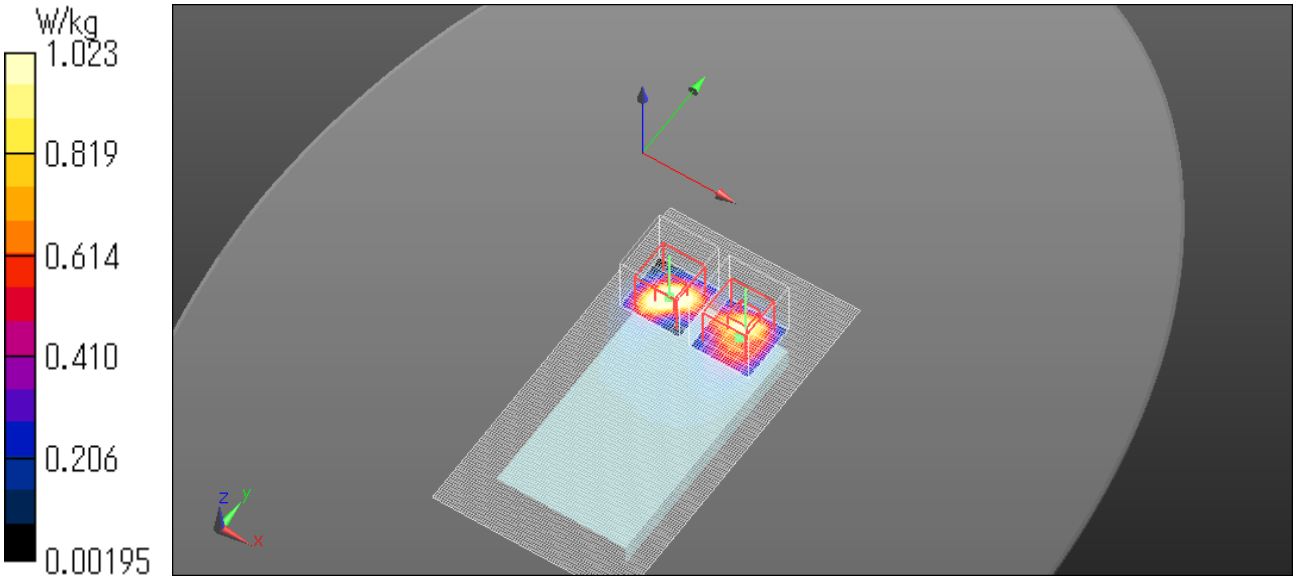
Communication System: UID 0, #Generic LTE (0); Communication System Band: Band 7, E-UTRA/FDD (2500.0 - 2570.0 MHz); ; Duty Cycle: 1:1
Medium parameters used: f = 2535 MHz; σ = 1.896 S/m; ε_r = 39.019; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration
Probe: EX3DV4 - SN3917; ConvF(7.2, 7.2, 7.2) @ 2535 MHz;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1369;
Phantom: ELI v5.0 (20deg probe tilt); Type: QDOVA001BB;Serial: TP:1203
Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

LTE B7/Rear 5mm QPSK RB1-49/Area Scan (81x151x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 1.51 W/kg

LTE B7/Rear 5mm QPSK RB1-49/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 29.92 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 2.02 W/kg
SAR(1 g) = 0.797 W/kg; SAR(10 g) = 0.304 W/kg
Smallest distance from peaks to all points 3 dB below = 5.8 mm
Ratio of SAR at M2 to SAR at M1 = 41.6%
Maximum value of SAR (measured) = 1.55 W/kg

LTE B7/Rear 5mm QPSK RB1-49/Zoom Scan (7x7x7) 2 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 29.92 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 1.43 W/kg
SAR(1 g) = 0.543 W/kg; SAR(10 g) = 0.244 W/kg
Smallest distance from peaks to all points 3 dB below = 6.3 mm
Ratio of SAR at M2 to SAR at M1 = 36.8%
Maximum value of SAR (measured) = 1.02 W/kg

Ambient Temp. : 22.5 degree.C. Liquid Temp.; 21.8 degree.C.
Liquid temp. is kept within the 2 degree.C. during the test.
Date: 2020/05/07



Plot No.:6

LTE B26 819MHz/Rear 5mm QPSK RB1-0

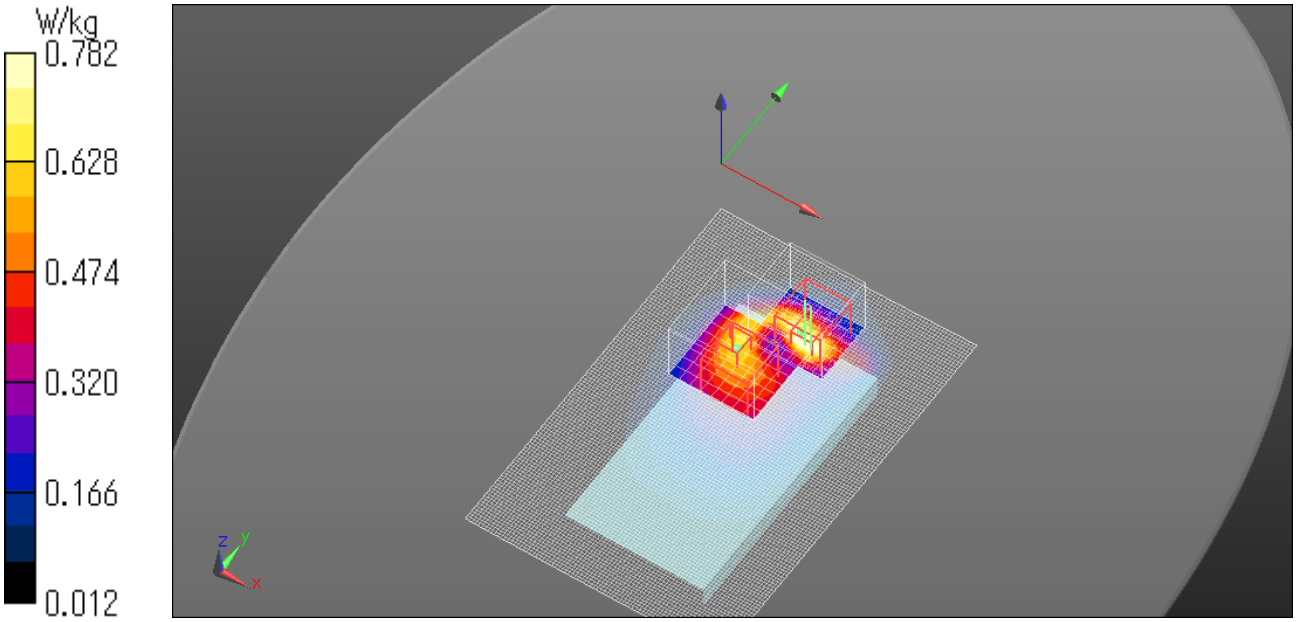
Communication System: UID 0, #Generic LTE (0); Communication System Band: Band 26, E-UTRA/FDD (814.0 - 849.0MHz); ; Duty Cycle: 1:1
Medium parameters used: f = 819 MHz; σ = 0.912 S/m; ε_r = 41.964; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration
Probe: EX3DV4 - SN3917; ConvF(9.9, 9.9, 9.9) @ 819 MHz;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1369;
Phantom: ELI v4.0 (20deg probe tilt); Type: QDOVA001BB;Serial: TP:1045
Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

LTE B26/Rear 5mm QPSK RB1-0/Area Scan (81x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.735 W/kg

LTE B26/Rear 5mm QPSK RB1-0/Zoom Scan (7x7x7) (8x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 30.90 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 1.24 W/kg
SAR(1 g) = 0.473 W/kg; SAR(10 g) = 0.228 W/kg
Smallest distance from peaks to all points 3 dB below = 6.3 mm
Ratio of SAR at M2 to SAR at M1 = 38.9%
Maximum value of SAR (measured) = 0.857 W/kg

LTE B26/Rear 5mm QPSK RB1-0/Zoom Scan (7x7x7) 2 (9x9x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 30.90 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 1.17 W/kg
SAR(1 g) = 0.413 W/kg; SAR(10 g) = 0.255 W/kg
Smallest distance from peaks to all points 3 dB below = 5 mm
Ratio of SAR at M2 to SAR at M1 = 41.2%
Maximum value of SAR (measured) = 0.782 W/kg

Ambient Temp. : 21.5 degree.C. Liquid Temp.; 20.8 degree.C.
Liquid temp. is kept within the 2 degree.C. during the test.
Date: 2020/08/28



Plot No.: 7

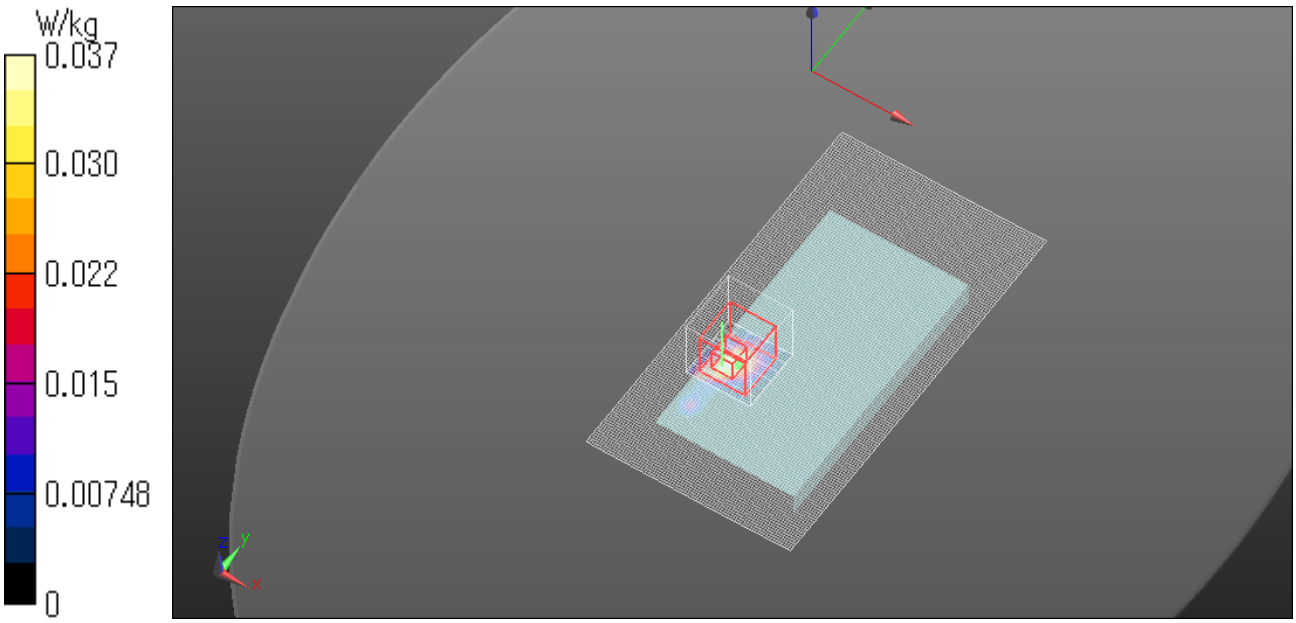
Bluetooth DH5 2402MHz/Rear 5mm

Communication System: UID 0, #Bluetooth (0); Communication System Band: Bluetooth; ; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2402 MHz; σ = 1.772 S/m; ε_r = 38.793; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration
Probe: EX3DV4 - SN3825; ConvF(7.65, 7.65, 7.65) @ 2402 MHz;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn509;
Phantom: ELI v4.0 (20deg probe tilt); Type: QDOVA001BB;Serial: TP:1045
Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

Bluetooth DH5/Rear 5mm/Area Scan (81x151x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.0963 W/kg

Bluetooth DH5/Rear 5mm/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.522 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 0.138 W/kg
SAR(1 g) = 0.020 W/kg; SAR(10 g) = 0.00565 W/kg
Ratio of SAR at M2 to SAR at M1 = 37.1%
Maximum value of SAR (measured) = 0.0372 W/kg

Ambient Temp. : 23.5 degree.C. Liquid Temp.; 22.5 degree.C.
Liquid temp. is kept within the 2 degree.C. during the test.
Date: 2020/05/13



Plot No.: 8

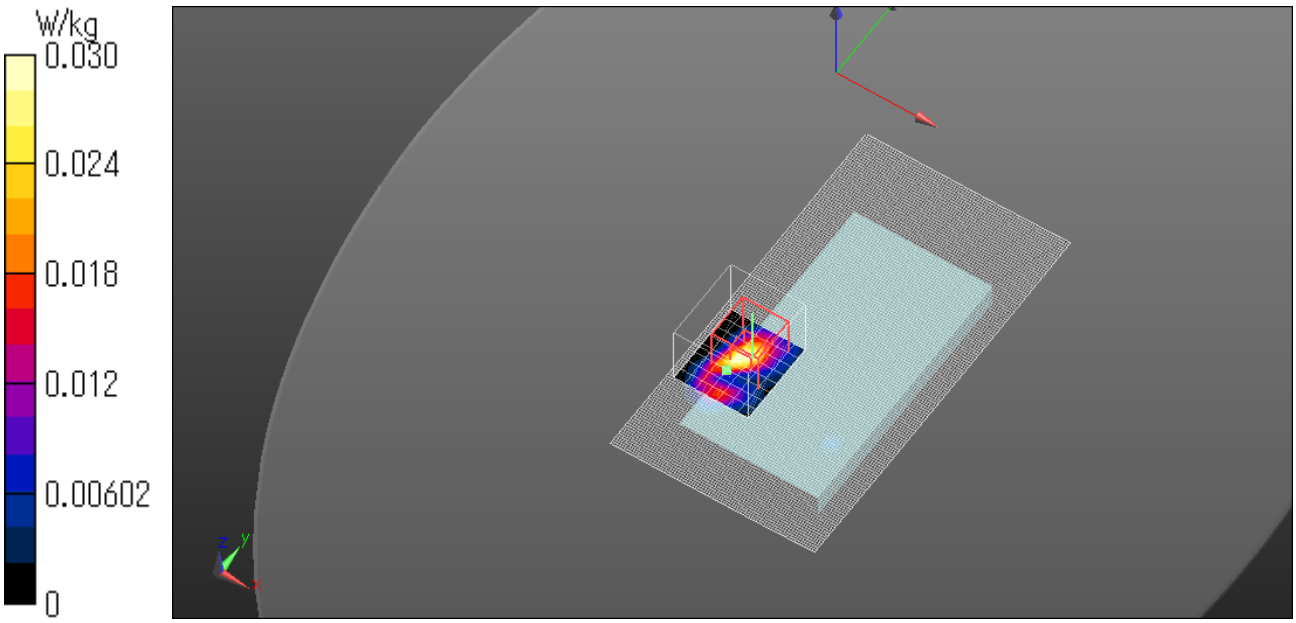
BTLE 2402MHz/Rear 5mm

Communication System: UID 0, #Bluetooth (0); Communication System Band: Bluetooth LE; ; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2402 MHz; σ = 1.772 S/m; ε_r = 38.793; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration
Probe: EX3DV4 - SN3825; ConvF(7.65, 7.65, 7.65) @ 2402 MHz;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn509;
Phantom: ELI v4.0 (20deg probe tilt); Type: QDOVA001BB;Serial: TP:1045
Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

BTLE/Rear 5mm/Area Scan (81x151x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.0586 W/kg

BTLE/Rear 5mm/Zoom Scan (7x7x7) (8x9x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.244 V/m; Power Drift = 0.20 dB
Peak SAR (extrapolated) = 0.0420 W/kg
SAR(1 g) = 0.015 W/kg; SAR(10 g) = 0.00332 W/kg
Ratio of SAR at M2 to SAR at M1 = 32%
Maximum value of SAR (measured) = 0.0299 W/kg

Ambient Temp. : 23.5 degree.C. Liquid Temp.; 22.5 degree.C.
Liquid temp. is kept within the 2 degree.C. during the test.
Date: 2020/05/13



Plot No.: 9

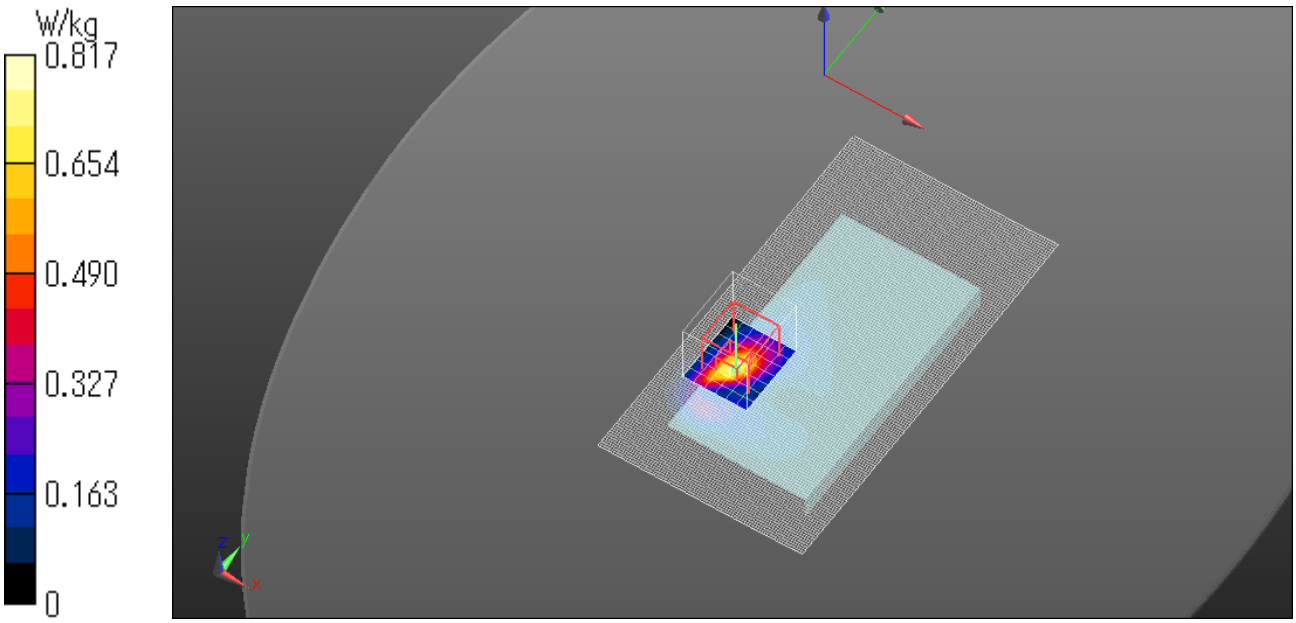
WLAN 11b 1Mbps 2462MHz/Rear 5mm

Communication System: UID 0, #WLAN 11a/b/g/n (0); Communication System Band: 11b/g/n (2.4G); ; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.838 S/m; ε_r = 39.143; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration
Probe: EX3DV4 - SN3825; ConvF(7.65, 7.65, 7.65) @ 2462 MHz;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn509;
Phantom: ELI v4.0 (20deg probe tilt); Type: QDOVA001BB;Serial: TP:1045
Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

WLAN 11b 1Mbps/Rear 5mm/Area Scan (81x151x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.824 W/kg

WLAN 11b 1Mbps/Rear 5mm/Zoom Scan (7x7x7) (7x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 21.11 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 1.06 W/kg
SAR(1 g) = 0.435 W/kg; SAR(10 g) = 0.168 W/kg
Smallest distance from peaks to all points 3 dB below = 6.4 mm
Ratio of SAR at M2 to SAR at M1 = 43.3%
Maximum value of SAR (measured) = 0.812 W/kg

Ambient Temp. : 23.5 degree.C. Liquid Temp.; 22.7 degree.C.
Liquid temp. is kept within the 2 degree.C. during the test.
Date: 2020/05/12



Plot No.: 10

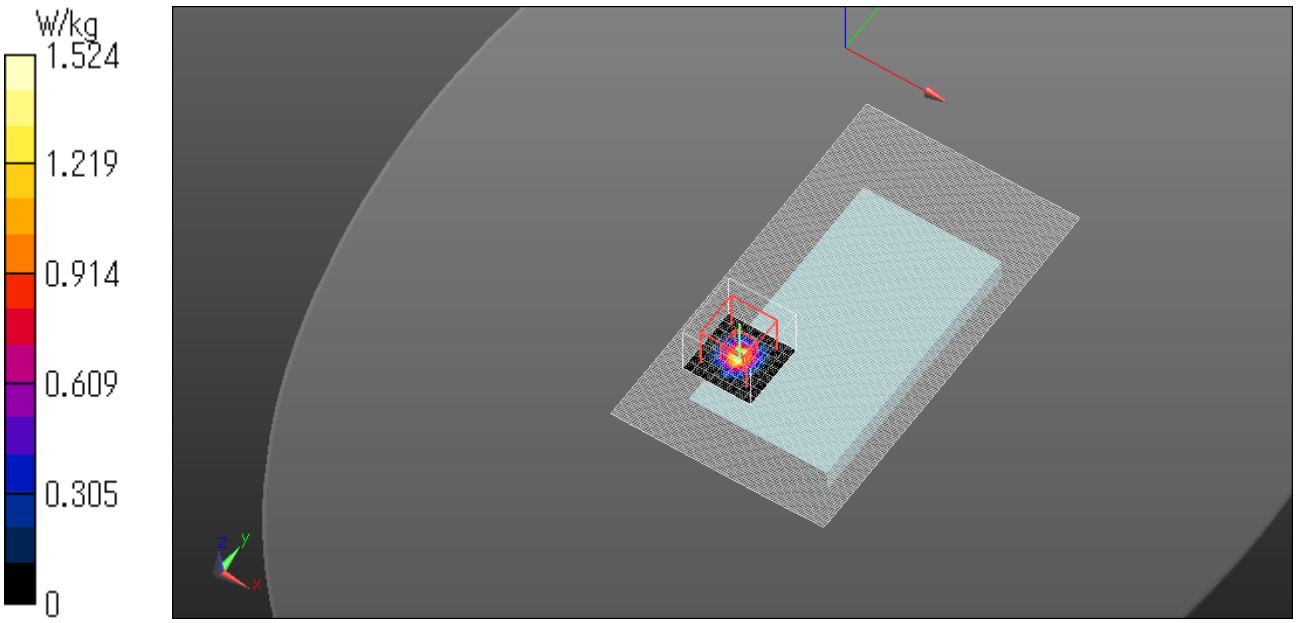
WLAN 11n-40 MCS0 5270MHz/Rear 5mm

Communication System: UID 0, #WLAN 11a/b/g/n (0); Communication System Band: 11a/n (W52 53); ; Duty Cycle: 1:1
Medium parameters used: f = 5270 MHz; σ = 4.69 S/m; ε_r = 35.608; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration
Probe: EX3DV4 - SN3825; ConvF(5.02, 5.02, 5.02) @ 5270 MHz;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn509;
Phantom: ELI v4.0 (20deg probe tilt); Type: QDOVA001BB;Serial: TP:1045
Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

WLAN 11n-40 MCS0/Rear 5mm/Area Scan (101x181x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 2.78 W/kg

WLAN 11n-40 MCS0/Rear 5mm/Zoom Scan (7x7x7) (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 19.99 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 2.73 W/kg
SAR(1 g) = 0.535 W/kg; SAR(10 g) = 0.100 W/kg
Smallest distance from peaks to all points 3 dB below = 4.9 mm
Ratio of SAR at M2 to SAR at M1 = 63.3%
Maximum value of SAR (measured) = 1.52 W/kg

Ambient Temp. : 23.0 degree.C. Liquid Temp.; 22.0 degree.C.
Liquid temp. is kept within the 2 degree.C. during the test.
Date: 2020/05/14



Plot No.: 11

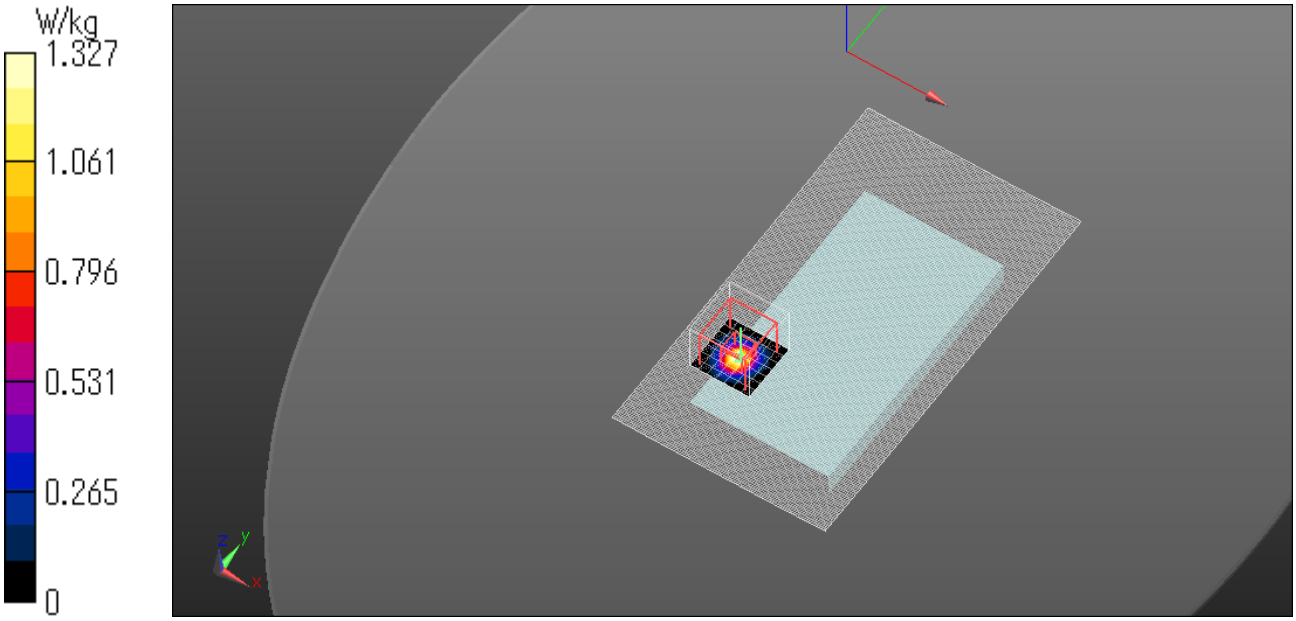
WLAN 11n-40 MCS0 5550MHz/Rear 5mm

Communication System: UID 0, #WLAN 11a/b/g/n (0); Communication System Band: 11a/n (W56); ; Duty Cycle: 1:1
Medium parameters used: f = 5550 MHz; σ = 4.85 S/m; ε_r = 35.282; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration
Probe: EX3DV4 - SN3825; ConvF(4.61, 4.61, 4.61) @ 5550 MHz;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn509;
Phantom: ELI v4.0 (20deg probe tilt); Type: QDOVA001BB;Serial: TP:1045
Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

WLAN 11n-40 MCS0/Rear 5mm/Area Scan (101x181x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 2.05 W/kg

WLAN 11n-40 MCS0/Rear 5mm/Zoom Scan (7x7x7) (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 18.93 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 2.57 W/kg
SAR(1 g) = 0.485 W/kg; SAR(10 g) = 0.096 W/kg
Smallest distance from peaks to all points 3 dB below = 4.8 mm
Ratio of SAR at M2 to SAR at M1 = 61.3%
Maximum value of SAR (measured) = 1.33 W/kg

Ambient Temp. : 22.0 degree.C. Liquid Temp.; 21.0 degree.C.
Liquid temp. is kept within the 2 degree.C. during the test.
Date: 2020/05/18



Plot No.: 12

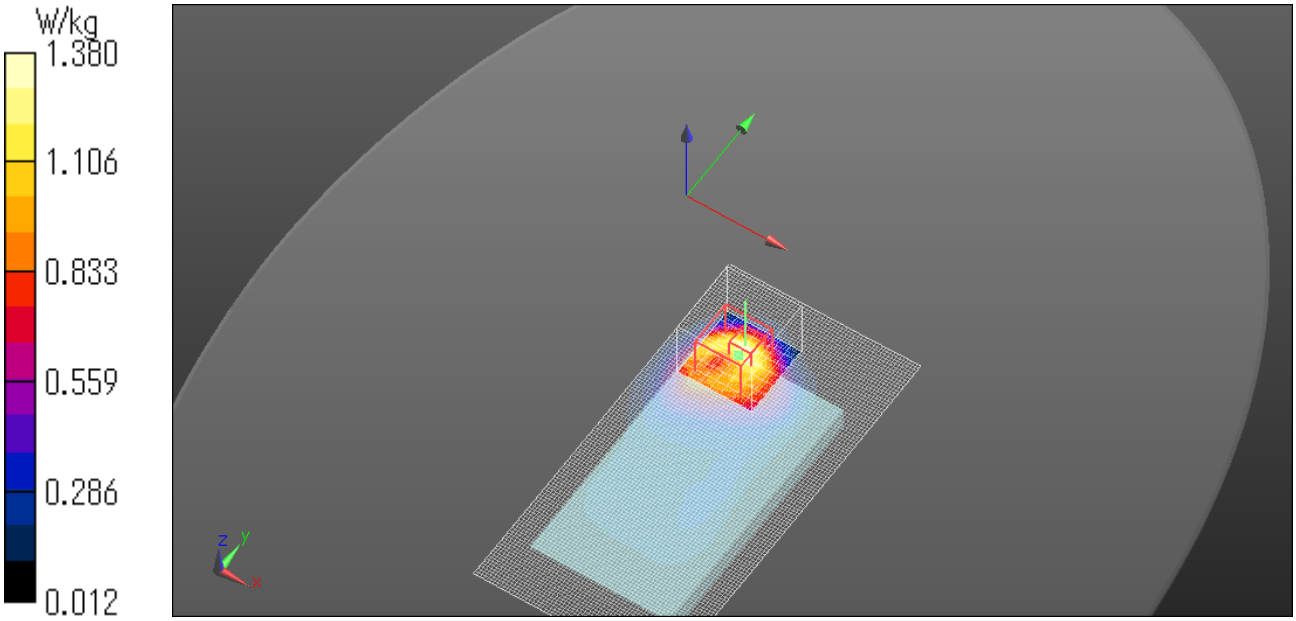
Repeat WCDMA B2 1852.4MHz/Rear 5mm RMC12.2k

Communication System: UID 0, #WCDMA (0); Communication System Band: Band II; ; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.355 S/m; ε_r = 40.162; ρ = 1000 kg/m^3
Phantom section: Flat Section
DASY5 Configuration
Probe: EX3DV4 - SN3825; ConvF(8.33, 8.33, 8.33) @ 1852.4 MHz;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn509;
Phantom: ELI v4.0 (20deg probe tilt); Type: QDOVA001BB;Serial: TP:1045
Measurement SW: DASY52, Version 52.10 (3);SEMCAD X Version 14.6.13 (7474)

Repeat WCDMA B2/Rear 5mm RMC12.2k/Area Scan (61x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.79 W/kg

Repeat WCDMA B2/Rear 5mm RMC12.2k/Zoom Scan (7x7x7) (8x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 31.33 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 1.78 W/kg
SAR(1 g) = 0.823 W/kg; SAR(10 g) = 0.437 W/kg
Smallest distance from peaks to all points 3 dB below = 8 mm
Ratio of SAR at M2 to SAR at M1 = 46.6%
Maximum value of SAR (measured) = 1.38 W/kg

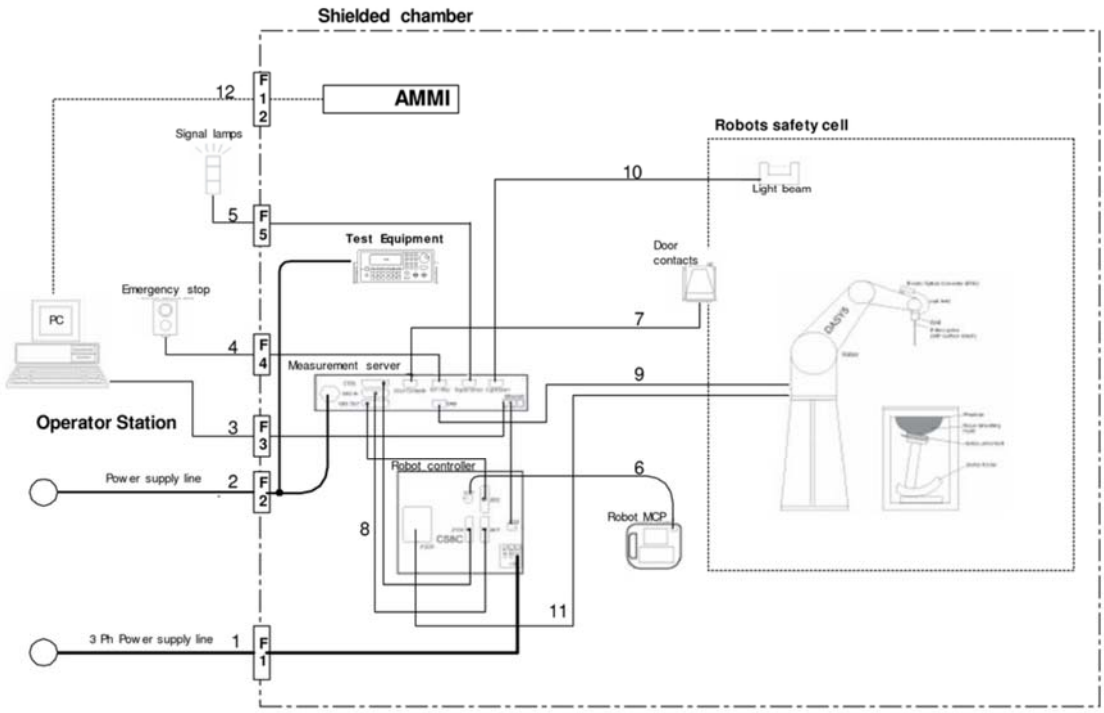
Ambient Temp. : 25.0 degree.C. Liquid Temp.; 24.3 degree.C.
Liquid temp. is kept within the 2 degree.C. during the test.
Date: 2020/04/27



Plot No.: 13

APPENDIX 3 : System specifications

Configuration and peripherals



The DASY5 system for performing compliance tests consist of the following items:
Our system is DASY6; however, it behaves as DASY5.

a) A standard high precision 6-axis robot (Stäubli RX family) with controller and software.
An arm extension for accommodating the data acquisition electronics (DAE).

b) An isotropic field probe optimized and calibrated for the targeted measurement.

c) A data acquisition electronic (DAE), which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

d) The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection.
The EOC is connected to the measurement server.

e) The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.

f) The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.

g) A computer running Windows 10 or 7 and the DASY5/6 software.

h) Remote control with teaches pendant and additional circuitry for robot safety such as warning lamps, etc.

i) The phantom, the device holder and other accessories according to the targeted measurement.

Specifications

a)Robot TX60L

Number of Axes	:	6
Nominal Load	:	2 kg
Maximum Load	:	5kg
Reach	:	920mm
Repeatability	:	+/-0.03mm
Control Unit	:	CS8c
Programming Language	:	VAL3
Weight	:	52.2kg
Manufacture	:	Stäubli Robotics

b)E-Field Probe

Model	:	EX3DV4
Construction	:	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., glycol ether)
Frequency	:	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	:	+/-0.3 dB in HSL (rotation around probe axis) +/-0.5 dB in tissue material (rotation normal probe axis)
Dynamic Range	:	10uW/g to > 100 mW/g;Linearity +/-0.2 dB(noise: typically < 1uW/g)
Dimensions	:	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Application	:	Highprecision dosimetric measurement in any exposure scenario (e.g., very strong gradient fields).Only probe which enables compliance testing for frequencies up to 6GHz with precision of better 30%.
Manufacture	:	Schmid & Partner Engineering AG

EX3DV4 E-field Probe

c)Data Acquisition Electronic (DAE4)

Features	:	Signal amplifier, multiplexer, A/D converter and control logic Serial optical link for communication with DASY5 embedded system (fully remote controlled) Two step probe touch detector for mechanical surface detection and emergency robot stop
Measurement Range	:	-100 to +300 mV (16 bit resolution and two range settings: 4mV, 400mV)
Input Offset voltage	:	< 5 µV (with auto zero)
Input Resistance	:	200 MΩ
Input Bias Current	:	< 50 fA
Battery Power	:	> 10 h of operation (with two 9.6 V NiMH accus)
Dimension	:	60 x 60 x 68 mm
Manufacture	:	Schmid & Partner Engineering AG

d)Electro-Optic Converter (EOC)

Version	:	EOC 61
Description	:	for TX60 robot arm, including proximity sensor
Manufacture	:	Schmid & Partner Engineering AG

e)DASY5 Measurement server

Features	:	Intel ULV Celeron 400MHz 128MB chip disk and 128MB RAM 16 Bit A/D converter for surface detection system Vacuum Fluorescent Display Robot Interface Serial link to DAE (with watchdog supervision) Door contact port (Possibility to connect a light curtain) Emergency stop port (to connect the remote control) Signal lamps port Light beam port Three Ethernet connection ports Two USB 2.0 Ports Two serial links Expansion port for future applications
Dimensions (L x W x H)	:	440 x 241 x 89 mm
Manufacture	:	Schmid & Partner Engineering AG

f) Light Beam Switches

Version	:	LB5
Dimensions (L x H)	:	110 x 80 mm
Thickness	:	12 mm
Beam-length	:	80 mm
Manufacture	:	Schmid & Partner Engineering AG

g)Software

Item	:	Dosimetric Assessment System DASY5
Type No.	:	SD 000 401A, SD 000 402A
Software version No.	:	DASY52, Version 52.6 (1)
Manufacture / Origin	:	Schmid & Partner Engineering AG

h)Robot Control Unit

Weight	:	70 Kg
AC Input Voltage	:	selectable
Manufacturer	:	Stäubli Robotics

i)Phantom and Device Holder

Phantom

Type	:	SAM Twin Phantom V4.0
Description	:	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.
Material	:	Vinylester, glass fiber reinforced (VE-GF)
Shell Material	:	Fiberglass
Thickness	:	2.0 +/-0.2 mm
Dimensions	:	Length: 1000 mm Width: 500 mm Height: adjustable feet
Volume	:	Approx. 25 liters
Manufacture	:	Schmid & Partner Engineering AG

Type	:	2mm Flat phantom ELI4.0 or 5
Description	:	Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with the latest draft of the standard IEC 62209 Part II and all known tissue simulating liquids. ELI4 has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is supported by software version DASY4.5 and higher and is compatible with all SPEAG dosimetric probes and dipoles.
Material	:	Vinylester, glass fiber reinforced (VE-GF)
Shell Thickness	:	2.0 ± 0.2 mm (sagging: <1%)
Filling Volume	:	approx. 30 liters
Dimensions	:	Major ellipse axis: 600 mm Minor axis: 400 mm
Manufacture	:	Schmid & Partner Engineering AG

Device Holder

In combination with the Twin SAM Phantom V4.0/V4.0c or ELI4, the Mounting Device enables the rotation of the mounted transmitter device in spherical coordinates. Rotation point is the ear opening point. Transmitter devices can be easily and accurately positioned according to IEC, IEEE, FCC or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat).

Material : POM

Laptio Extensions kit

Simple but effective and easy-to-use extension for Mounting Device that facilitates the testing of larger devices according to IEC 62209-2 (e.g., laptops, cameras, etc.). It is lightweight and fits easily on the upper part of the Mounting Device in place of the phone positioner. The extension is fully compatible with the Twin-SAM, ELI4 Phantoms.

Material : POM, Acrylic glass, Foam

Urethane

For this measurement, the urethane foam was used as device holder.

j)Simulated Tissues (Liquid)

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for required for routine SAR evaluation.

Product identifier

Trade name	Broad Band Tissue Simulation Liquid HBBL600-10000V6, MBBL600-6000V6, HU16B, MU16B
Manufacturer/Supplier	Schmid & Partner Engineering AG

Declarable components:

CAS: 107-21-1 EINECS: 203-473-3 Reg.nr.: 01-2119456816-28-0000	**Ethanediol** STOT RE 2, H373; Acute Tox. 4, H302	< 5.2%
CAS: 68608-26-4 EINECS: 271-781-5 Reg.nr.: 01-2119527859-22-0000	**Sodium petroleum sulfonate** Eye Irrit. 2, H319	< 2.9%
CAS: 107-41-5 EINECS: 203-489-0 Reg.nr.: 01-2119539582-35-0000	**Hexylene Glycol / 2-Methyl-pentane-2,4-diol** Skin Irrit. 2, H315; Eye Irrit. 2, H319	< 2.9%
CAS: 68920-66-1 NLP: 500-236-9 Reg.nr.: 01-2119489407-26-0000	**Alkoxylated alcohol, > C_{16}** Aquatic Chronic 2, H411; Skin Irrit. 2, H315; Eye Irrit. 2, H319	< 2.0%

System Check Dipole SAR Calibration Certificate -Dipole 835MHz(D835V2,S/N:4d149)

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

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Accreditation No.: SCS 0108

Client UL Japan (Vitec)

Certificate No: D835V2-4d149_Mar19

CALIBRATION CERTIFICATE

Object: D835V2 - SN:4d149

Calibration procedure(s): QA CAL-05.v11
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz

Calibration date: March 13, 2019

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 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	31-Dec-18 (No. EX3-7349_Dec18)	Dec-19
DAE4	SN: 601	04-Oct-18 (No. DAE4-601_Oct18)	Oct-19

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	07-Oct-15 (in house check Feb-19)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

	Name	Function	Signature
Calibrated by:	Manu Seitz	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: March 18, 2019

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

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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:

a) 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
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) 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	V52.10.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.9 ± 6 %	0.91 mho/m ± 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	2.39 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.50 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.56 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.21 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.3 ± 6 %	1.01 mho/m ± 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	2.46 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.51 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.61 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.27 W/kg ± 16.5 % (k=2)**

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Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone: +81 596 24 8999
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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.6 Ω - 5.3 jΩ
Return Loss	- 25.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.3 Ω - 7.1 jΩ
Return Loss	- 22.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.391 ns

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

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Facsimile: +81 596 24 8124

DASY5 Validation Report for Head TSL

Date: 13.03.2019

Test Laboratory: SPEAG, Zurich, Switzerland

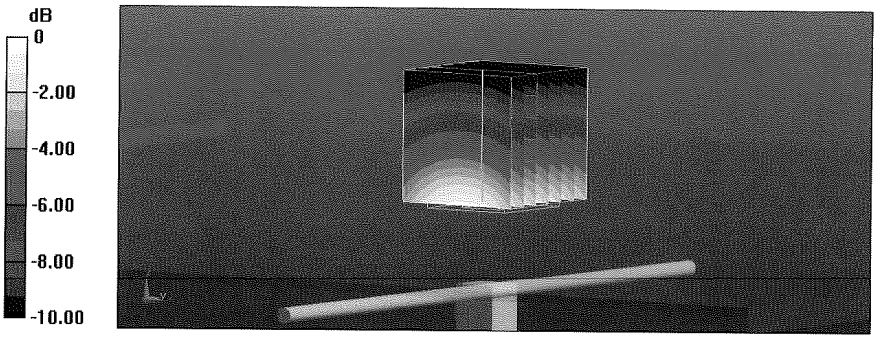
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d149

Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.91 S/m; ε_r = 41.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

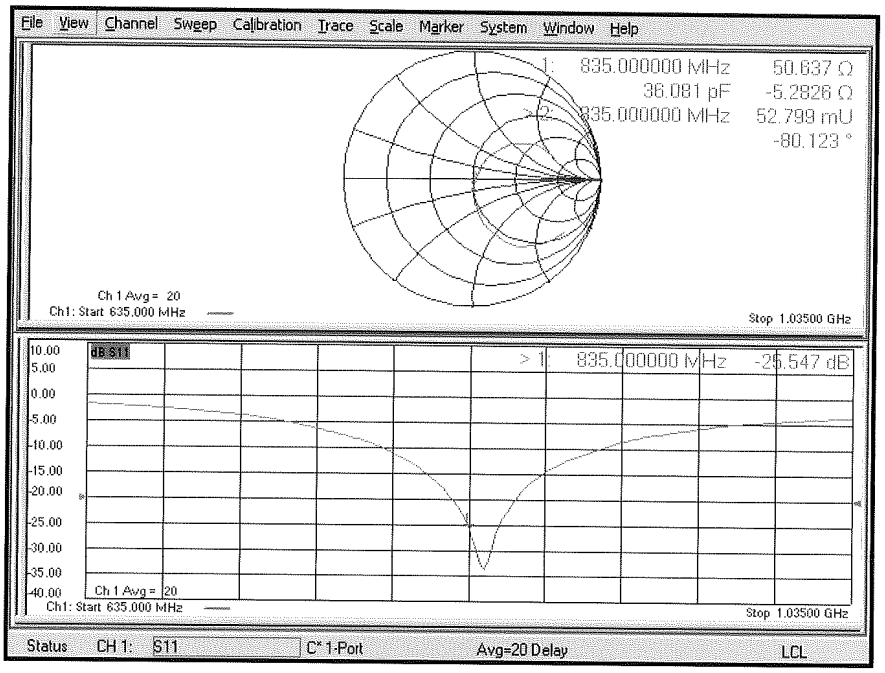
- Probe: EX3DV4 - SN7349; ConvF(10, 10, 10) @ 835 MHz; Calibrated: 31.12.2018
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 62.30 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 3.61 W/kg
SAR(1 g) = 2.39 W/kg; SAR(10 g) = 1.56 W/kg
Maximum value of SAR (measured) = 3.20 W/kg



0 dB = 3.20 W/kg = 5.05 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 13.03.2019

Test Laboratory: SPEAG, Zurich, Switzerland

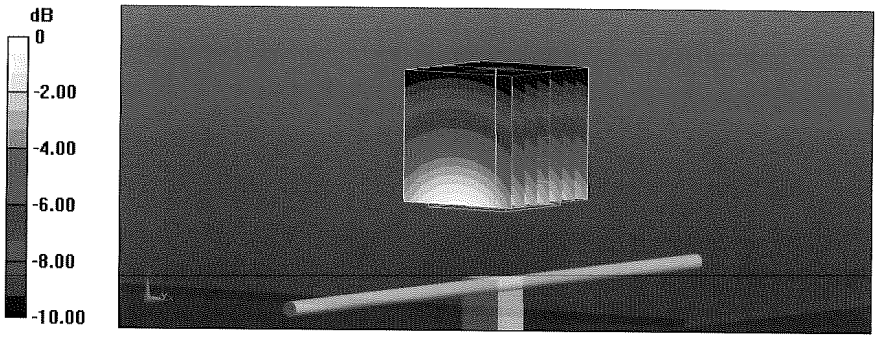
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d149

Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 1.01 S/m; ε_r = 54.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

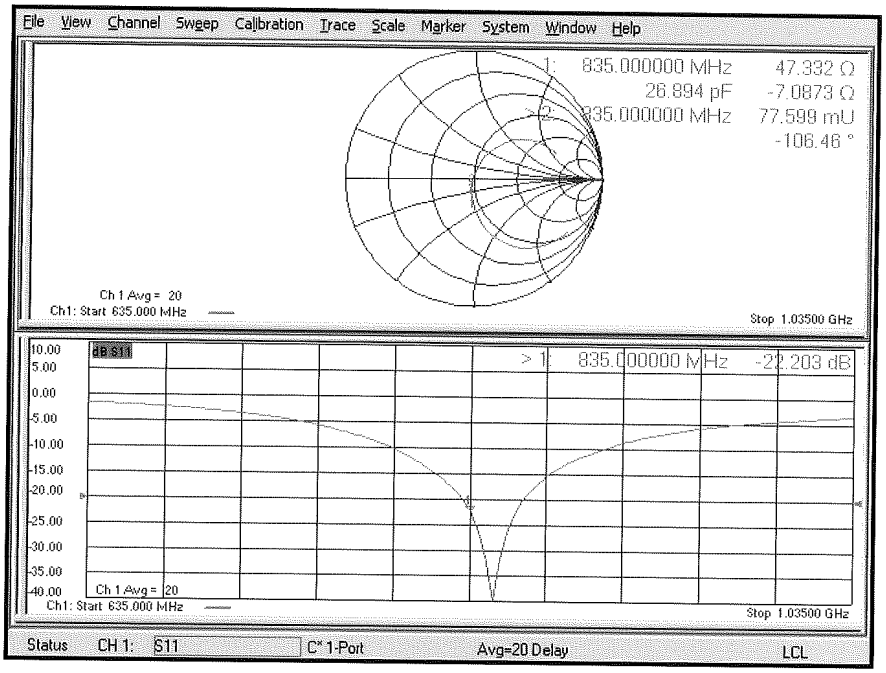
- Probe: EX3DV4 - SN7349; ConvF(10.15, 10.15, 10.15) @ 835 MHz; Calibrated: 31.12.2018
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 60.01 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.61 W/kg
SAR(1 g) = 2.46 W/kg; SAR(10 g) = 1.61 W/kg
Maximum value of SAR (measured) = 3.24 W/kg



0 dB = 3.24 W/kg = 5.11 dBW/kg

Impedance Measurement Plot for Body TSL



D835V2 Calibration for Impedance and Return-loss

1. Test environment

Date	March 31, 2020		
Ambient Temperature	24.0 deg.C	Relative humidity	47%RH

2. Equipment used

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
EST-63	Network Analyzer	Keysight Technologies Inc	E5071C	MY46523746	SAR	2019/04/13 * 12
EST-64	Calibration Kit	Keysight Technologies Inc	85032F	MY53200995	SAR	2019/04/16 * 12
MPF-03	2mm Oval Flat Phantom	Schmid&Partner Engineering AG	QDOVA001BB	1203	SAR	2019/05/14 * 12
MPSAM-03	SAM Phantom	Schmid&Partner Engineering AG	QD000P40CD	1764	SAR	2019/05/13 * 12
MOS-30	Thermo-Hygrometer	CUSTOM	CTH-201	3001	SAR	2019/07/03 * 12
MHBBL600-10000	Head Simulating Liquid	Schmid & Partner Engineering AG	HBBL600-10000V6	SL AAH U16 BC		-
MMBBL600-6000	Body Simulating Liquid	Schmid & Partner Engineering AG	MBBL600-6000	SL AAM U16 BC		-

3. Test Result

Impeadance,Transformed to feed point	cal day	Head (real part) [Ω]	Head (img part) [jΩ]	Deviation (real part) [Ω]	Deviation (img part) [jΩ]	Tolerance	Result
Calibration (SPEAG)	2019/3/13	50.60	-5.30	-	-	-	-
Calibration(ULJ)	2020/3/31	53.03	-2.81	2.43	2.49	+/-5Ω+/-5jΩ	Complied

Return loss	cal day	Head [dB]	Deviation [dB]	Tolerance [+/-dB]	Result
Calibration (SPEAG)	2019/3/13	-25.50	-	-	-
Calibration(ULJ)	2020/3/31	-27.93	-2.43	5.10	Complied

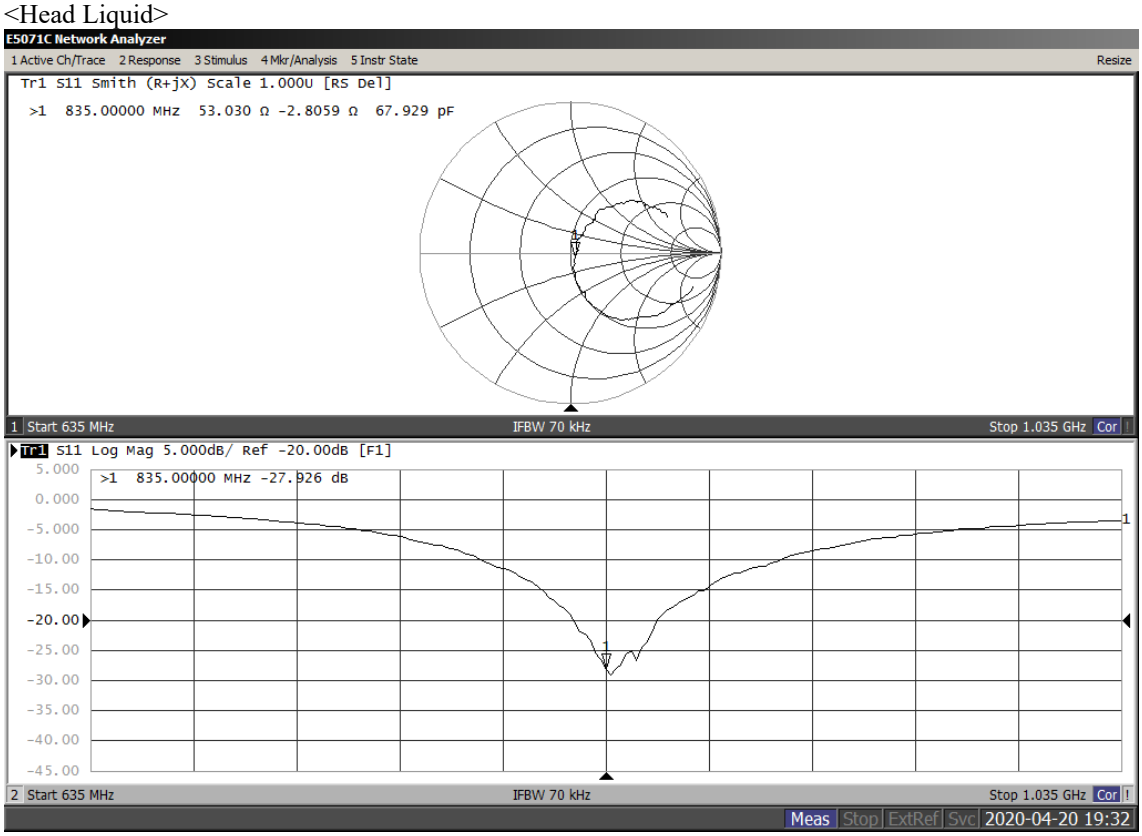
Impeadance,Transformed to feed point	cal day	Body (real part) [Ω]	Body (img part) [jΩ]	Deviation (real part) [Ω]	Deviation (img part) [jΩ]	Tolerance	Result
Calibration (SPEAG)	2019/3/13	47.30	-7.10	-	-	-	-
Calibration(ULJ)	2020/3/31	47.895	-5.56	0.60	1.54	+/-5Ω+/-5jΩ	Complied

Return loss	cal day	Body [dB]	Deviation [dB]	Tolerance [+/-dB]	Result
Calibration (SPEAG)	2019/3/13	-22.20	-	-	-
Calibration(ULJ)	2020/3/31	-24.128	-1.93	4.44	Complied

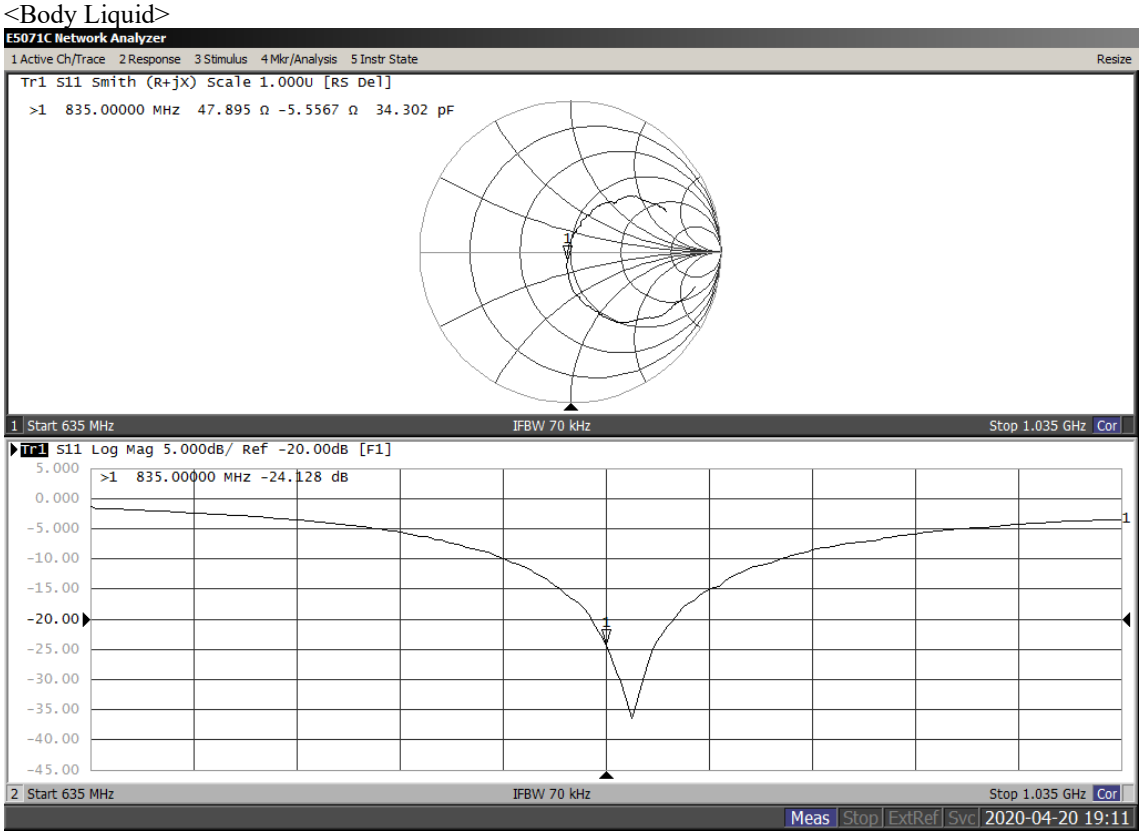
Tolerance: According to the KDB865664 D1

Measurement Plots

<Head Liquid>



<Body Liquid>



System Check Dipole SAR Calibration Certificate -Dipole 1900MHz(D1900V2,S/N:5d169)

Calibration Laboratory of
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Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accreditation No.: SCS 0108

Client UL Japan (Vitec)

Certificate No: D1900V2-5d169_Mar19

CALIBRATION CERTIFICATE

Object	D1900V2 - SN:5d169
Calibration procedure(s)	QA CAL-05.v11 Calibration Procedure for SAR Validation Sources between 0.7-3 GHz
Calibration date:	March 12, 2019

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 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	31-Dec-18 (No. EX3-7349_Dec18)	Dec-19
DAE4	SN: 601	04-Oct-18 (No. DAE4-601_Oct18)	Oct-19

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	07-Oct-15 (in house check Feb-19)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: March 14, 2019

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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:

a) 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
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) 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.
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- *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	V52.10.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.1 ± 6 %	1.37 mho/m ± 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	9.87 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**40.2 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.16 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.9 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.7 ± 6 %	1.48 mho/m ± 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	9.87 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**40.2 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.22 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.1 W/kg ± 16.5 % (k=2)**

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.6 Ω + 3.8 jΩ
Return Loss	- 27.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.9 Ω + 5.3 jΩ
Return Loss	- 24.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.202 ns

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

DASY5 Validation Report for Head TSL

Date: 11.03.2019

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d169

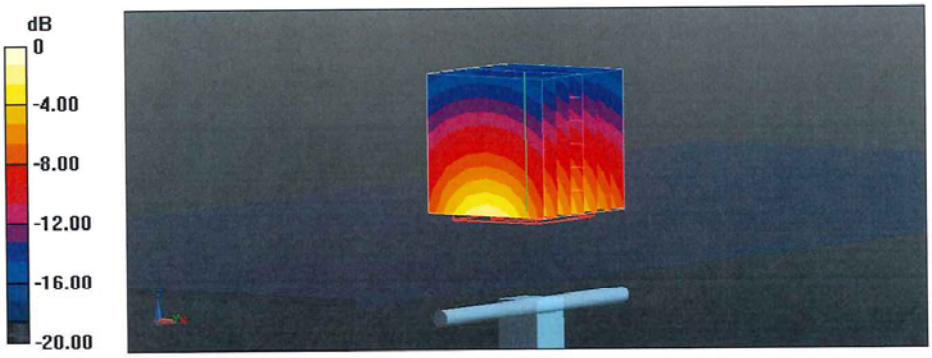
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.37 S/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.26, 8.26, 8.26) @ 1900 MHz; Calibrated: 31.12.2018
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

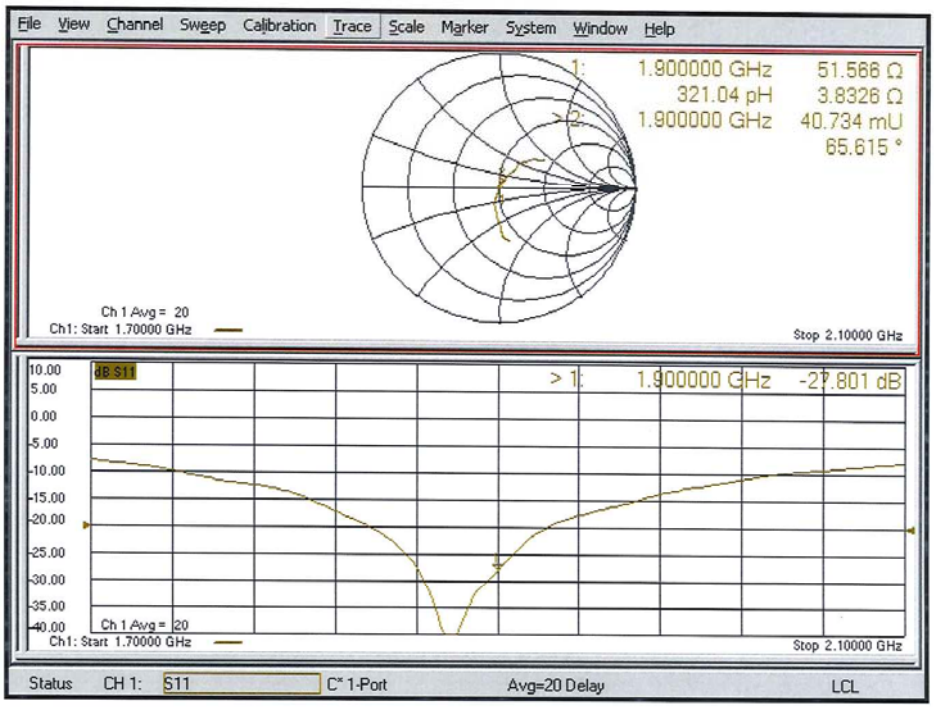
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 110.3 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 18.2 W/kg
SAR(1 g) = 9.87 W/kg; SAR(10 g) = 5.16 W/kg
Maximum value of SAR (measured) = 15.3 W/kg



0 dB = 15.3 W/kg = 11.85 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 12.03.2019

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d169

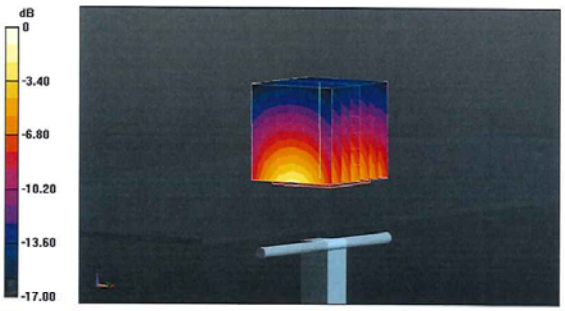
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.48 S/m; ε_r = 53.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.23, 8.23, 8.23) @ 1900 MHz; Calibrated: 31.12.2018
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.10.2018
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

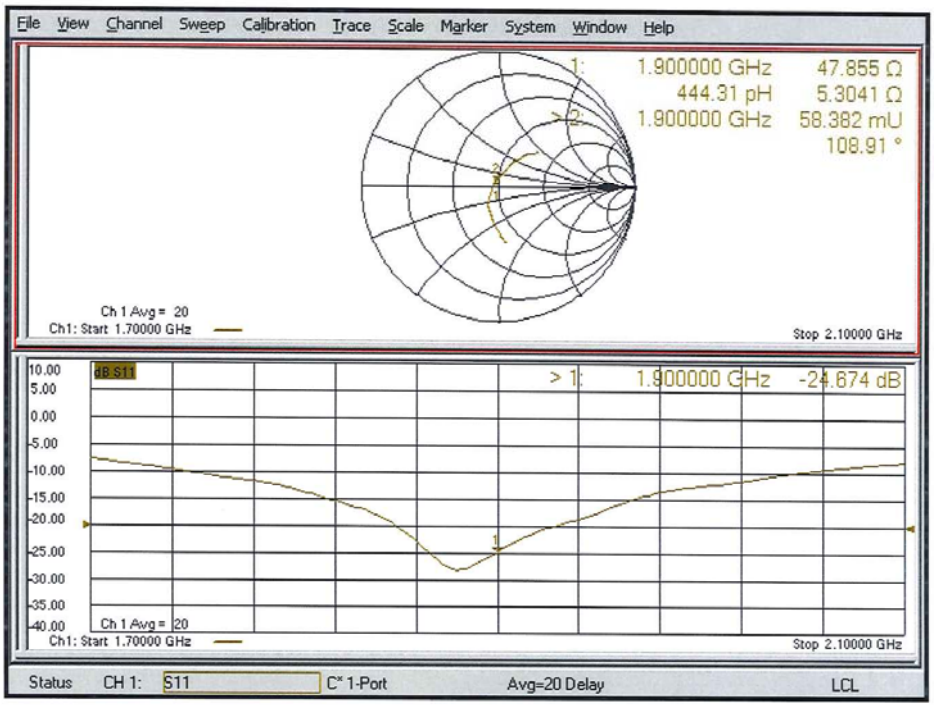
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 105.2 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 17.5 W/kg
SAR(1 g) = 9.87 W/kg; SAR(10 g) = 5.22 W/kg
Maximum value of SAR (measured) = 15.0 W/kg



0 dB = 15.0 W/kg = 11.76 dBW/kg

Impedance Measurement Plot for Body TSL



D1900V2 Calibration for Impedance and Return-loss

1. Test environment

Date	March 31, 2020		
Ambient Temperature	24.0 deg.C	Relative humidity	47%RH

2. Equipment used

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
EST-57	2.4mm Calibration Kit	Keysight Technologies Inc	85056A	MY44300225	SAR	2019/08/21 * 12
EST-30	Network Analyzer	AGILENT	N5230A	MY46400314	SAR	2019/08/28 * 12
MPF-03	2mm Oval Flat Phantom	Schmid&Partner Engineering AG	QDOVA001BB	1203	SAR	2019/05/14 * 12
MPSAM-03	SAM Phantom	Schmid&Partner Engineering AG	QD000P40CD	1764	SAR	2019/05/13 * 12
MOS-30	Thermo-Hygrometer	CUSTOM	CTH-201	3001	SAR	2019/07/03 * 12
MHBBL600-10000	Head Simulating Liquid	Schmid & Partner Engineering AG	HBBL600-10000V6	SL AAH U16 BC		-
MMBBL600-6000	Body Simulating Liquid	Schmid & Partner Engineering AG	MBBL600-6000	SL AAM U16 BC		-

3. Test Result

Impeadance,Transformed to feed point	cal day	Head (real part) [Ω]	Head (img part) [jΩ]	Deviation (real part) [Ω]	Deviation (img part) [jΩ]	Tolerance	Result
Calibration (SPEAG)	2019/3/19	51.60	3.80	-	-	-	-
Calibration(ULJ)	2020/3/31	51.39	4.32	-0.21	0.52	+/-5Ω+/-5jΩ	Complied

Return loss	cal day	Head [dB]	Deviation [dB]	Tolerance [+/-dB]	Result
Calibration (SPEAG)	2019/3/19	-27.80	-	-	-
Calibration(ULJ)	2020/3/31	-26.99	0.81	5.56	Complied

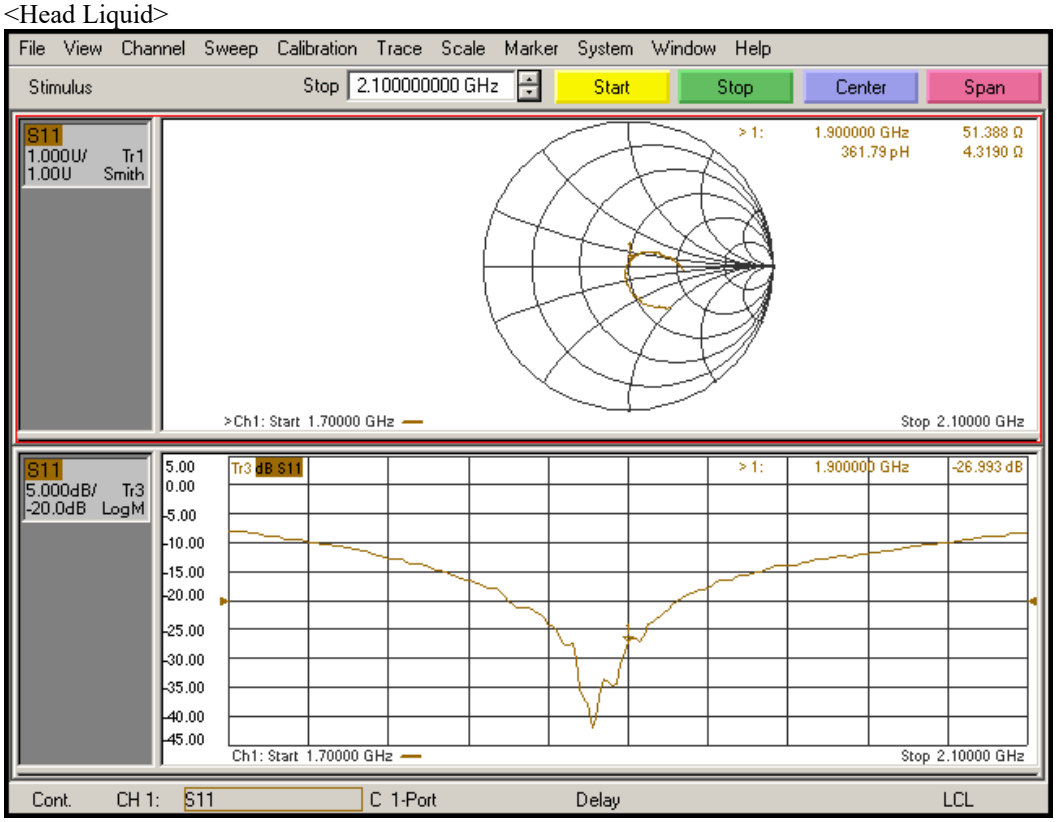
Impeadance,Transformed to feed point	cal day	Body (real part) [Ω]	Body (img part) [jΩ]	Deviation (real part) [Ω]	Deviation (img part) [jΩ]	Tolerance	Result
Calibration (SPEAG)	2019/3/19	47.90	5.30	-	-	-	-
Calibration(ULJ)	2020/3/31	44.708	1.90	-3.19	-3.40	+/-5Ω+/-5jΩ	Complied

Return loss	cal day	Body [dB]	Deviation [dB]	Tolerance [+/-dB]	Result
Calibration (SPEAG)	2019/3/19	-24.70	-	-	-
Calibration(ULJ)	2020/3/31	-24.528	0.17	4.94	Complied

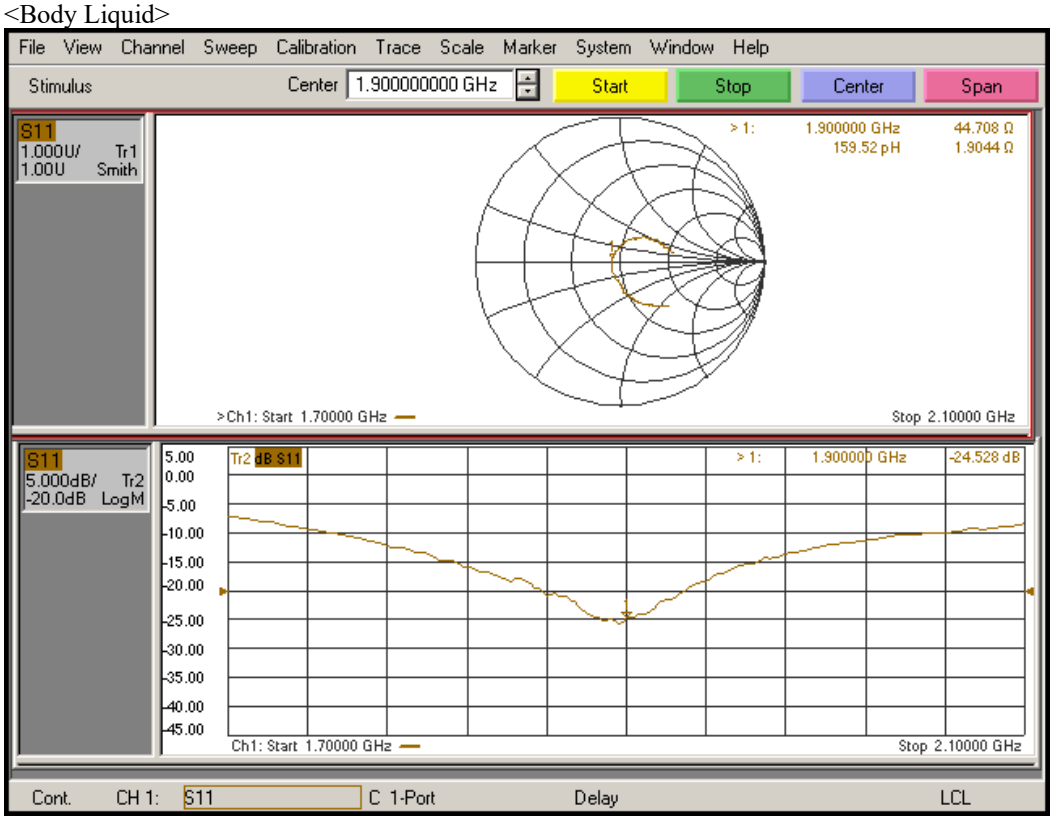
Tolerance: According to the KDB865664 D1

Measurement Plots

<Head Liquid>



<Body Liquid>



System Check Dipole SAR Calibration Certificate -Dipole 2450MHz (D2450V2 S/N:713)

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

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

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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 (KYCOM)

Certificate No: D2450V2-713_Sep19

CALIBRATION CERTIFICATE

Object: D2450V2 - SN:713

Calibration procedure(s): QA CAL-05.v11
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz

Calibration date: September 09, 2019

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 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	03-Apr-19 (No. 217-02892/02893)	Apr-20
Power sensor NRP-Z91	SN: 103244	03-Apr-19 (No. 217-02892)	Apr-20
Power sensor NRP-Z91	SN: 103245	03-Apr-19 (No. 217-02893)	Apr-20
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-19 (No. 217-02894)	Apr-20
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-19 (No. 217-02895)	Apr-20
Reference Probe EX3DV4	SN: 7349	29-May-19 (No. EX3-7349_May19)	May-20
DAE4	SN: 601	30-Apr-19 (No. DAE4-601_Apr19)	Apr-20

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Feb-19)	In house check: Oct-20
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-18)	In house check: Oct-20
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-18)	In house check: Oct-20
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-18)	In house check: Oct-19

	Name	Function	Signature
Calibrated by:	Leif Klysner	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 13, 2019

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

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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:

a) 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
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) 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	V52.10.2
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 ± 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 ± 0.2) °C	37.9 ± 6 %	1.86 mho/m ± 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	13.7 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**53.5 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.35 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**25.1 W/kg ± 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 ± 0.2) °C	50.7 ± 6 %	2.04 mho/m ± 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	13.3 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**51.6 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.18 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**24.3 W/kg ± 16.5 % (k=2)**

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.5 Ω + 1.6 jΩ
Return Loss	- 28.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.6 Ω + 4.0 jΩ
Return Loss	- 27.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.159 ns

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

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DASY5 Validation Report for Head TSL

Date: 09.09.2019

Test Laboratory: SPEAG, Zurich, Switzerland

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

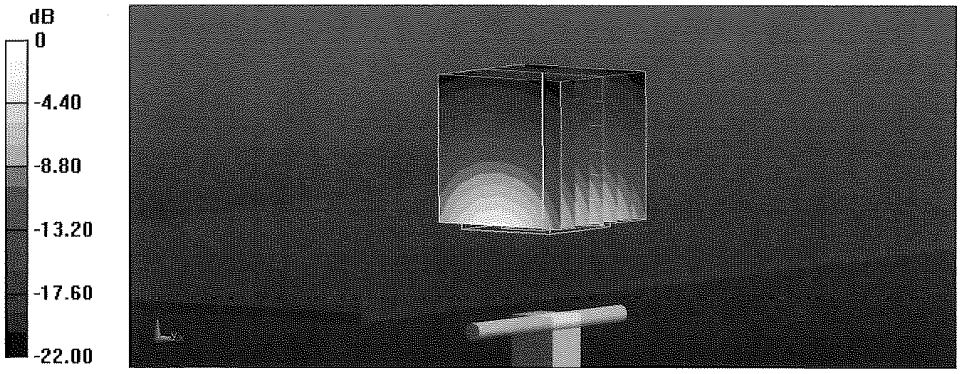
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.86 S/m; ε_r = 37.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.9, 7.9, 7.9) @ 2450 MHz; Calibrated: 29.05.2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2019
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.2(1504); SEMCAD X 14.6.12(7470)

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 = 118.4 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 27.2 W/kg
SAR(1 g) = 13.7 W/kg; SAR(10 g) = 6.35 W/kg
Maximum value of SAR (measured) = 22.5 W/kg



0 dB = 22.5 W/kg = 13.52 dBW/kg

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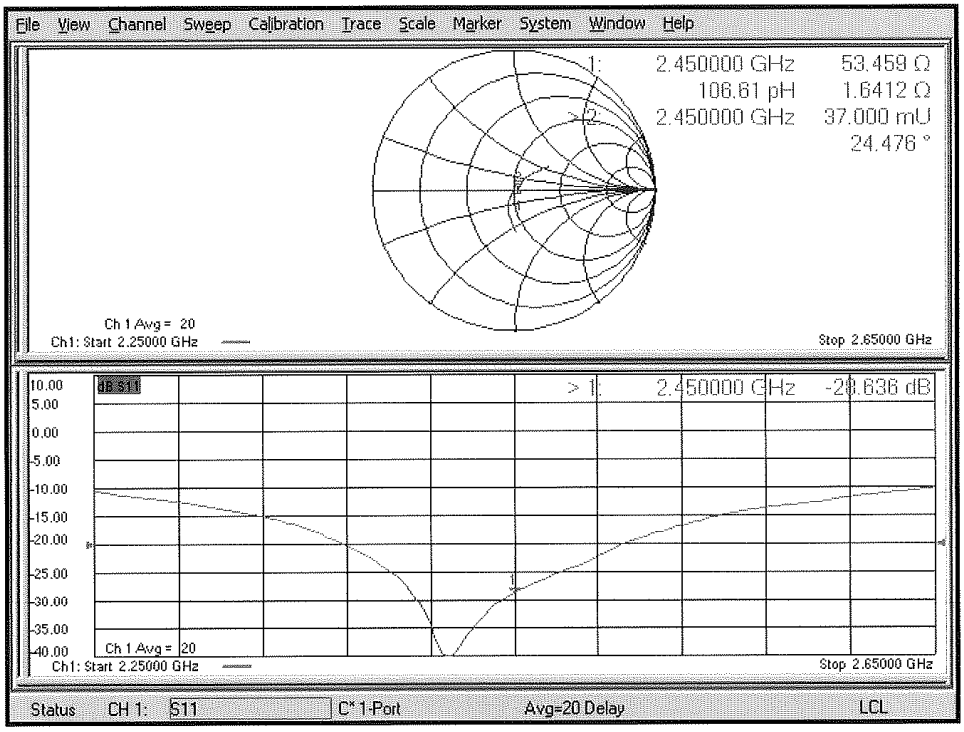
Impedance Measurement Plot for Head TSL