SAR TEST REPORT

Applicant	SAGETEL (HONG KONG) CO. LIMITED
FCC ID	2AT2L-HINTO-LITE
Product	4G Feature Phone
Brand	altice; Sagetel
Model	altice F4; Sagetel Hinto lite
Report No.	R2205A0384-S1
Issue Date	June 1, 2022

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **IEEE 1528- 2013, ANSI C95.1: 1992, IEEE C95.1: 1991.** The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Fangying Wei Guangchang Fan

Prepared by: Fangying Wei *Approved by: Guangchang Fan*

TA Technology (Shanghai) Co., Ltd.

No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China
TEL: +86-021-50791141/2/3
FAX: +86-021-50791141/2/3-8000

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1 Test Laboratory

1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein .Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

1.2 Test facility

FCC (Designation number: CN1179, Test Firm Registration Number: 446626)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform measurements.

A2LA (Certificate Number: 3857.01)

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform measurement.

1.3 Testing Location

Company:	TA Technology (Shanghai) Co., Ltd.
Address:	No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China
City:	Shanghai
Post code:	201201
Country:	P. R. China
Contact:	Fan Guangchang
Telephone:	+86-021-50791141/2/3
Fax:	+86-021-50791141/2/3-8000
Website:	http://www.ta-shanghai.com
E-mail:	fanguangchang@ta-shanghai.com

1.4 Laboratory Environment

Temperature	Min. = 18°C, Max. = 25 °C
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

2 Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for the EUT are as follows:

Table 1: Highest Reported SAR

Mode	Highest Reported SAR (W/kg)	
	1g SAR Head	1g SAR Body SAR
GSM 850	**1.159**	0.922
GSM 1900	1.013	**1.108**
WCDMA Band II	0.875	0.781
WCDMA Band V	0.720	0.563
LTE FDD 2	0.739	0.948
LTE FDD 4	0.434	0.821
LTE FDD 5	0.777	0.919
BT	0.173	0.143
Date of Testing: May 23, 2022 ~May 26, 2022 Date of Sample Received: May 6, 2022		
Note: 1. The device is in compliance with SAR for Uncontrolled Environment /General Population exposure limits (1.6 W/kg) specified in ANSI C95.1: 1992/IEEE C95.1: 1991, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013. 2.All indications of Pass/Fail in this report are opinions expressed by TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.		

Table 2: Highest Simultaneous Transmission SAR

Exposure Configuration	1g SAR Head	1g SAR Body SAR
Highest Simultaneous Transmission SAR (W/kg)	1.332	1.108
Note: The detail for simultaneous transmission consideration is described in chapter 10.3.		

3 Description of Equipment under Test

Client Information

Applicant	SAGETEL (HONG KONG) CO. LIMITED
Applicant address	FLAT D39. 8/F WAH LOK IND CTR PHASE 2，31-35 SHAN MEI ST FO TAN SHATIN NT
Manufacturer	SAGETEL (HONG KONG) CO. LIMITED
Manufacturer address	FLAT D39. 8/F WAH LOK IND CTR PHASE 2，31-35 SHAN MEI ST FO TAN SHATIN NT

General Technologies

Application Purpose	Original Grant
EUT Stage	Identical Prototype
Model	altice F4; Sagetel Hinto lite
IMEI	1#:352847500227283 2#:352847500227788 3#:352847500227960
Hardware Version	V01E
Software Version	ALTICE_GX2421L_SS_L_V01_FCC_220428
Antenna Type	PIFA Antenna
Device Class	B
Power Class	GSM 850: 4 GSM 1900: 1 UMTS Band II/ V: 3 LTE FDD 2/4/5: 3
Power Level	GSM 850: level 5 GSM 1900: level 0 UMTS Band II/V: all up bits LTE FDD 2/4/5: max power
EUT Accessory	
Adapter	Manufacturer: DongGuan AoHai Power Technology Co.Ltd. Model: A31A-050055U-US1
Battery	Manufacturer: Shenzhen Aerospace Electronic.Co.Ltd Model: 178245411
Earphone	Manufacturer: Baoshan Dahuahaihan Technology Co.,Ltd. Model: 3.5_balck_stereophony without mic_HTC
Note: 1.The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant. 2. The customer claims that altice F4 and Sagetel Hinto lite are only different in model, and the others are the same.	

Wireless Technology and Frequency Range

Wireless Technology		Modulation	Operating mode	Tx (MHz)
GSM	850	Voice(GMSK) GPRS(GMSK) EGPRS(GMSK,8PSK)	☐Multi-slot Class:8-1UP ☐Multi-slot Class:10-2UP ☒Multi-slot Class:12-4UP ☐Multi-slot Class:33-4UP	824 ~ 849
	1900			1850 ~ 1910
	Does this device support DTM (Dual Transfer Mode)? ☐Yes ☒No			
UMTS	Band II	QPSK	HSDPA UE Category:24 HSUPA UE Category:6	1850 ~ 1910
	Band V			824 ~ 849
LTE	FDD 2	QPSK, 16QAM	Category 4	1850 ~ 1910
	FDD 4			1710 ~ 1755
	FDD 5			824 ~ 849
	Does this device support SV-LTE (1xRTT-LTE)? ☐Yes ☒No			
BT	2.4G	Version 5.1 BR/EDR		2402 ~2480

4 Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1093, IEEE 1528- 2013, ANSI C95.1: 1992, IEEE C95.1: 1991, the following FCC Published RF exposure KDB procedures:

Reference Standards

KDB 447498 D01 General RF Exposure Guidance v06
KDB 648474 D04 Handset SAR v01r03
KDB 690783 D01 SAR Listings on Grants v01r03
KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
KDB 865664 D02 RF Exposure Reporting v01r02
KDB 941225 D01 3G SAR Procedures v03r01
KDB 941225 D05 SAR for LTE Devices v02r05

5 Operational Conditions during Test

5.1 Test Positions

5.1.1 Against Phantom Head

Measurements were made in “cheek” and “tilt” positions on both the left hand and right hand sides of the phantom.

The positions used in the measurements were according to IEEE 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".

5.1.2 Body Worn Configuration

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations.

Per FCC KDB Publication 648474 D04, Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB Publication 447498 D01 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are tested with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

Body-worn accessories may not always be supplied or available as options for some devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used. Test position spacing was documented. Transmitters that are designed to operate in front of a person’s face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom in head fluid. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessories, including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

5.2 Measurement Variability

Per FCC KDB Publication 865664 D01, SAR measurement variability was assessed for each frequency band, which was determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media were required for SAR measurements in a frequency band, the variability measurement procedures were applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. These additional measurements were repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR Measurement Variability was assessed using the following procedures for each frequency band:
1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.
2) A second repeated measurement was preformed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.
4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.

5.3 Test Configuration

5.3.1 GSM Test Configuration

According to specification 3GPP TS 51.010, the maximum power of the GSM can do the power reduction for the multi-slot. The allowed power reduction in the multi-slot configuration is as following:

Output power of reductions:

Table 3: The allowed power reduction in the multi-slot configuration

Number of timeslots in uplink assignment	Permissible nominal reduction of maximum output power (dB)
1	0
2	0 to 3,0
3	1,8 to 4,8
4	3,0 to 6,0

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. GSM voice and GPRS data use GMSK, which is a constant amplitude modulation with minimal peak to average power difference within the time-slot burst. For EDGE, GMSK is used for MCS 1 – MCS 4 and 8-PSK is used for MCS 5 – MCS 9; where 8-PSK has an inherently higher peak-to-average power ratio. The GMSK and 8-PSK EDGE configurations are considered separately for SAR compliance. The GMSK EDGE configurations are grouped with GPRS and considered with respect to time-averaged maximum output power to determine compliance. The 3G SAR test reduction procedure is applied to 8-PSK EDGE with GMSK GPRS/EDGE as the primary mode.

5.3.2 UMTS Test Configuration

5.3.2.1 3G SAR Test Reduction Procedure

The default test configuration is to measure SAR with an established radio link between the EUT and a communication test set using a 12.2 kbps RMC (reference measurement channel) configured in Test Loop Mode 1. SAR is selectively confirmed for other physical channel configurations modes according to output power, exposure conditions and device operating capabilities. Maximum output power is verified by applying the applicable versions of 3GPP TS 34.121.

5.3.2.2 Head SAR

SAR for next to the ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all “1’s”. The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for 12.2 kbps AMR in 3.4 kbps SRB (signaling radio bearer) using the highest SAR configuration in 12.2 kbps RMC for head exposure.

5.3.2.3 Body-worn accessory SAR

SAR for body-worn accessory configurations is measured using a 12.2 kbps RMC with TPC bits configured to all “1’s”. The 3G SAR test reduction procedure is applied to other spreading codes and multiple DPDCHn configurations supported by the EUT with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured using an applicable RMC configuration with the corresponding spreading code or DPDCHn, for the highest reported body-worn accessory exposure SAR configuration in 12.2 kbps RMC. When more than 2 DPDCHn are supported by the EUT, it may be necessary to configure additional DPDCHn using FTM (Factory Test Mode) or other chipset based test approaches with parameters similar to those used in 384 kbps and 768 kbps RMC

5.3.2.4 Release 5 HSDPA Test Configuration

The 3G SAR test reduction procedure is applied to HSDPA body-worn accessory configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for HSDPA using the HSDPA body SAR procedures in the “Release 5 HSDPA Data Devices” section of this document, for the highest SAR body-worn accessory exposure configuration in 12.2 kbps RMC. EUT with both HSDPA and HSUPA are tested according to Release 6 HSPA test procedures.

HSDPA should be configured according to the UE category of a test device. The number of HSDSCH/HS-PDSCHs, HARQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the H-set. To maintain a consistent test configuration and stable transmission conditions, QPSK is used in the H-set for SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 4 ms with a CQI repetition factor of 2 to maintain a constant rate of active CQI slots. DPCCH and DPDCH gain factors (βc, βd), and HS-DPCCH power offset parameters (ΔACK, ΔNACK, ΔCQI) should be set according to values indicated in the Table below. The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the H-set.

Table 4: Subtests for UMTS Release 5 HSDPA

Sub-set	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (note 1, note 2)	CM(dB) (note 3)	MPR(dB)
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}= 8$\Leftrightarrow$$A_{hs}$ = β_{hs}/β_c=30/15$\Leftrightarrow$$\beta_{hs}$=30/15*$\beta_c$

Note 2: CM=1 for β_c/β_d =12/15, β_{hs}/β_c=24/15.

Note 3: 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 signaled gain factors for the reference TFC (TFC1, TF1) to β_c=11/15 and β_d=15/15.

5.3.2.5 Release 6 HSUPA Test Configuration

The 3G SAR test reduction procedure is applied to HSPA (HSUPA/HSDPA with RMC) body-worn accessory configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for HSPA using the HSPA body SAR procedures in the “Release 6 HSPA Data Devices” section of this document, for the highest body-worn accessory exposure SAR configuration in 12.2 kbps RMC. When VOIP is applicable for next to the ear head exposure in HSPA, the 3G SAR test reduction procedure is applied to HSPA with 12.2 kbps RMC as the primary mode; otherwise, the same HSPA configuration used for body-worn accessory measurements is tested for next to the ear head exposure.

Due to inner loop power control requirements in HSPA, a communication test set is required for output power and SAR tests. The 12.2 kbps RMC, FRC H-set 1 and E-DCH configurations for HSPA are configured according to the β values indicated in Table 2 and other applicable procedures described in the ‘WCDMA EUT’ and ‘Release 5 HSDPA Data Devices’ sections of this document

Table 5: Sub-Test 5 Setup for Release 6 HSUPA

Sub-set	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM (2) (dB)	MPR (dB)	AG (4) Index	E-TFCI
1	11/15 (3)	15/15 (3)	64	11/15 (3)	22/15	209/225	1039/225	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_{ed1}:47/15 β_{ed2}:47/15	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 (4)	15/15 (4)	64	15/15 (4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, ΔNACK and Δ_{CQI} = 8 ⇔ $A_{hs} = \beta_{hs}/\beta_c$ = 30/15 ⇔β_{hs}= 30/15 *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 signaled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.
Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 14/15 and β_d = 15/15.
Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Figure 5.1g.
Note 6: β_{ed} cannot be set directly; it is set by Absolute Grant Value.

Table 6: HSUPA UE category

UE E-DCH Category	Maximum E-DCH Codes Transmitted	Number of HARQ Processes	E-DCHTTI (ms)	Minimum Spreading Factor	Maximum E-DCH Transport Block Bits	Max Rate (Mbps)
1	1	4	10	4	7110	0.7296
2	2	8	2	4	2798	1.4592
	2	4	10	4	14484	
3	2	4	10	4	14484	1.4592
4	2	8	2	2	5772	2.9185

	2	4	10	2	20000	2.00
5	2	4	10	2	20000	2.00
6 (No DPDCH)	4	8	2	2 SF2 & 2 SF4	11484	5.76
	4	4	10		20000	2.00
7 (No DPDCH)	4	8	2	2 SF2 & 2 SF4	22996	?
	4	4	10		20000	?

NOTE: When 4 codes are transmitted in parallel, two codes shall be transmitted with SF2 and two with SF4.
UE Categories 1 to 6 supports QPSK only. UE Category 7 supports QPSK and 16QAM. (TS25.306-7.3.0)

Table 7: HS-DSCH UE category

HS-DSCH category	Maximum number of HS-DSCH codes received	Minimum inter-TTI interval	Maximum number of bits of an HS-DSCH transport block received within an HS-DSCH TTI NOTE 1	Total number of soft channel bits	Supported modulations without MIMO operation or dual cell operation	Supported modulations with MIMO operation and without dual cell operation	Supported modulations with dual cell operation
Category 1	5	3	7298	19200	QPSK, 16QAM	Not applicable (MIMO not supported)	Not applicable (dual cell operation not supported)
Category 2	5	3	7298	28800			
Category 3	5	2	7298	28800			
Category 4	5	2	7298	38400			
Category 5	5	1	7298	57600			
Category 6	5	1	7298	67200			
Category 7	10	1	14411	115200			
Category 8	10	1	14411	134400			
Category 9	15	1	20251	172800			
Category 10	15	1	27952	172800			
Category 11	5	2	3630	14400	QPSK		
Category 12	5	1	3630	28800			
Category 13	15	1	35280	259200	QPSK, 16QAM, 64QAM		
Category 14	15	1	42192	259200			
Category 15	15	1	23370	345600	QPSK, 16QAM		
Category 16	15	1	27952	345600			
Category 17 NOTE 2	15	1	35280	259200	QPSK, 16QAM, 64QAM	–	
			23370	345600	–	QPSK, 16QAM	
Category 18 NOTE 3	15	1	42192	259200	QPSK, 16QAM, 64QAM	–	
			27952	345600	–	QPSK, 16QAM	
Category 19	15	1	35280	518400	QPSK, 16QAM, 64QAM		
Category 20	15	1	42192	518400			
Category 21	15	1	23370	345600	-	-	QPSK, 16QAM
Category 22	15	1	27952	345600			
Category 23	15	1	35280	518400			QPSK, 16QAM, 64QAM
Category 24	15	1	42192	518400			

5.3.3 LTE Test Configuration

LTE modes were tested according to FCC KDB 941225 D05 publication. Please see notes after the tabulated SAR data for required test configurations. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR. The R&S CMW500 was used for LTE output power measurements and SAR testing. Max power control was used so the UE transmits with maximum output power during SAR testing. SAR must be measured with the maximum TTI (transmit time interval) supported by the device in each LTE configuration.

A) Spectrum Plots for RB Configurations

A properly configured base station simulator was used for SAR tests and power measurements. Therefore, spectrum plots for RB configurations were not required to be included in this report.

B) MPR

MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.

C) A-MPR

A-MPR (Additional MPR) has been disabled for all SAR tests by setting NS=01 on the base station simulator.

D) Largest channel bandwidth standalone SAR test requirements

1) QPSK with 1 RB allocation

Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.

2) QPSK with 50% RB allocation

The procedures required for 1 RB allocation in 1) are applied to measure the SAR for QPSK with 50% RB allocation.

3) QPSK with 100% RB allocation

For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100% RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation in 1) and 2) are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.

4) Higher order modulations

For each modulation besides QPSK; e.g., 16-QAM, 64-QAM, apply the QPSK procedures in above sections to determine the QAM configurations that may need SAR measurement. For each configuration identified as required for testing, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is > ½ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg.

E) Other channel bandwidth standalone SAR test requirements

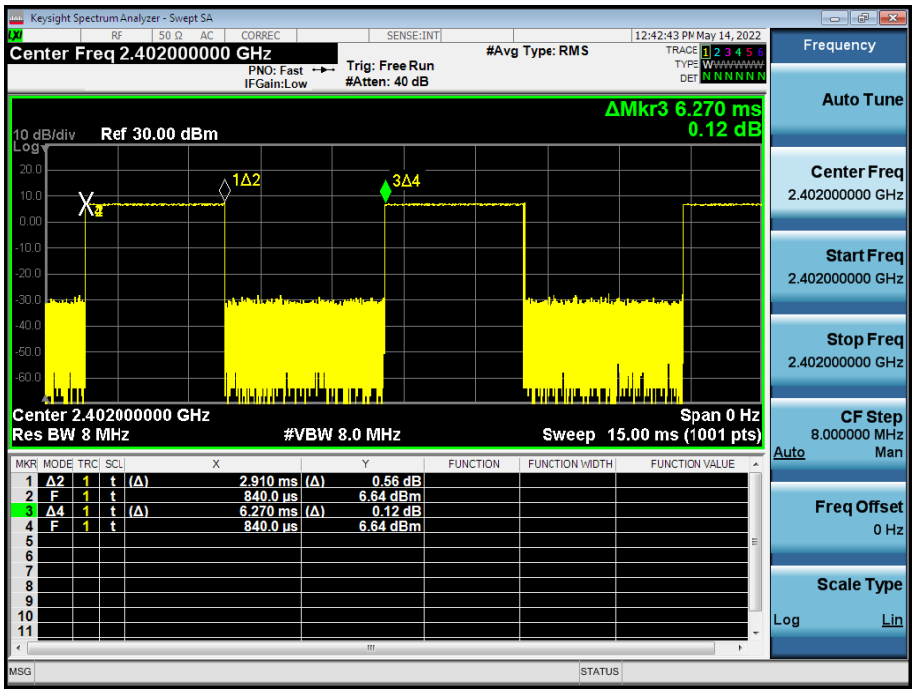
For the other channel bandwidths used by the device in a frequency band, apply all the procedures

required for the largest channel bandwidth in section A) to determine the channels and RB configurations that need SAR testing and only measure SAR when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > ½ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the reported SAR of a configuration for the largest channel bandwidth is > 1.45 W/kg.

5.3.4 BT Test Configuration

For BT SAR testing, BT engineering testing software installed on the EUT can provide continuous transmitting RF signal with maximum output power. And the CBT control the EUT operating with hoping off and data rate set for DH5.

The SAR measurement takes full account of the BT duty cycle and is reflected in the report, and the duty factor of the device is as follow:

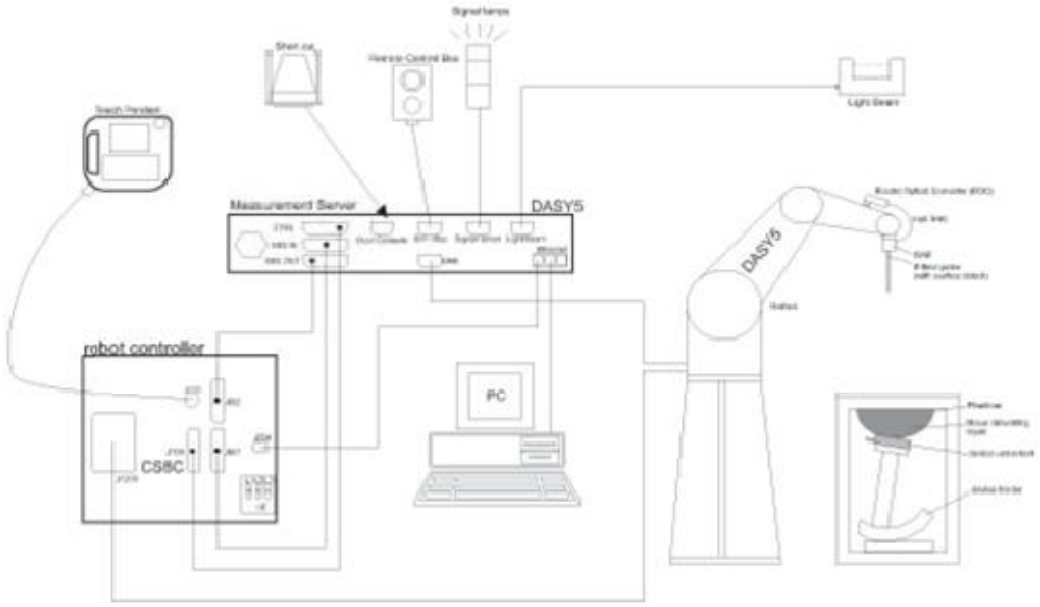


Note: Duty factor= Ton (ms)/ T(on+off) (ms)=2.910/6.270=0.46

6 SAR Measurements System Configuration

6.1 SAR Measurement Set-up

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



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP or Win7 and the DASY software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

6.2 DASY5 E-field Probe System

The SAR measurements were conducted with the dosimetric probe EX3DV4 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation.

EX3DV4 Probe Specification

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available
Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	10 μW/g to > 100 mW/g Linearity: ± 0.2dB (noise: typically < 1 μW/g)
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Application	High precision dosimetric measurements in any exposure Scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.

E-field Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure with accuracy better than ± 10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested.

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies bellow 1 GHz, and in a wave guide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$SAR=C\Delta T/\Delta t$$

Where: Δt = Exposure time (30 seconds),

C = Heat capacity of tissue (brain or muscle),

ΔT = Temperature increase due to RF exposure.

Or

$$SAR=|E|^2\sigma/\rho$$

Where: σ = Simulated tissue conductivity,

ρ = Tissue density (kg/m^3).

6.3 SAR Measurement Procedure

Power Reference Measurement

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

Area Scan

The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan), if only one zoom scan follows the area scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of zoom scans has to be increased accordingly.
Area scan parameters extracted from FCC KDB 865664 D01 SAR measurement 100 MHz to 6 GHz.

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

Zoom Scan

Zoom scans are used assess the peak spatial SAR values within a cubic averaging volume containing 1 gram and 10 gram of simulated tissue. The zoom scan measures points (refer to table below) within a cube shoes base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the zoom scan evaluates the averaged SAR for 1 gram and 10 gram and displays these values next to the job's label.

Zoom scan parameters extracted from FCC KDB 865664 D01 SAR measurement 100 MHz to 6 GHz.

<table>
<tr><td colspan="3"></td><td>≤3GHz</td><td>> 3 GHz</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: $\triangle x_{zoom} \triangle y_{zoom}$</td><td>≤2GHz: ≤8mm
2 – 3GHz: ≤5mm*</td><td>3 – 4GHz: ≤5mm*
4 – 6GHz: ≤4mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">Uniform grid: $\triangle z_{zoom}(n)$</td><td>≤5mm</td><td>3 – 4GHz: ≤4mm
4 – 5GHz: ≤3mm
5 – 6GHz: ≤2mm</td></tr>
<tr><td rowspan="2">Graded grid</td><td>$\triangle z_{zoom}(1)$: between 1st two points closest to phantom surface</td><td>≤4mm</td><td>3 – 4GHz: ≤3mm
4 – 5GHz: ≤2.5mm
5 – 6GHz: ≤2mm</td></tr>
<tr><td>$\triangle z_{zoom}(n>1)$: between subsequent points</td><td colspan="2">≤1.5•$\triangle z_{zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">X, y, z</td><td>≥30mm</td><td>3 – 4GHz: ≥28mm
4 – 5GHz: ≥25mm
5 – 6GHz: ≥22mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.
* When zoom scan is required and the <u>reported</u> SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is ≤ 1.4W/kg, ≤8mm, ≤7mm and ≤5mm zoom scan resolution may be applied, respectively, for 2GHz to 3GHz, 3GHz to 4GHz and 4GHz to 6GHz.</td></tr>
</table>

Volume Scan Procedures

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In DASY measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drifts more than 5%, the SAR will be retested.

7 Main Test Equipment

Name of Equipment	Manufacturer	Type/Model	Serial Number	Last Cal.	Cal. Due Date
Signal Generator	R&S	SBM100A	102594	2022-05-14	2023-05-13
Network analyzer	Agilent	E5071B	MY42404014	2022-05-14	2023-05-13
Dielectric Probe Kit	Agilent	85070E	US44020115	/	/
Power meter	R&S	NRP R&S	102186	2022-05-13	2023-05-14
Power sensor	R&S	NRP18S	101954	2022-05-13	2023-05-14
Dual directional coupler	UCL	UCL-DDC056G-S	20010600118	/	/
Amplifier	INDEXSAR	TPA-005060G01	13030502	2022-05-13	2023-05-14
Wireless communication tester	Anritsu	MT8820C	6201342015	2021-12-12	2022-12-11
Wireless communication tester	Agilent	E5515C	MY48360988	2021-12-12	2022-12-11
Wideband radio communication tester	R&S	CMW 500	113645	2022-05-13	2023-05-14
E-field Probe	SPEAG	EX3DV4	3677	2021-08-12	2022-08-11
DAE	SPEAG	DAE4	1692	2021-10-04	2022-10-03
Validation Kit 835MHz	SPEAG	D835V2	4d020	2020-08-28	2023-08-27
Validation Kit 1750MHz	SPEAG	D1750V2	1033	2020-02-25	2023-02-24
Validation Kit 1900MHz	SPEAG	D1900V2	5d060	2020-08-27	2023-08-26
Validation Kit 2450MHz	SPEAG	D2450V2	786	2020-08-27	2023-08-26
Temperature Probe	Tianjin jinming	JM222	381	2022-05-14	2023-05-13
Hygrothermograph	Anymetr	HTC - 1	TY2020A001	2022-05-14	2023-05-13
Twin SAM Phantom	Speag	SAM1	1666	/	/
Software for Test	Speag	DASY52	/	/	/
Softwarefor Tissue	Agilent	85070	/	/	/

8 Tissue Dielectric Parameter Measurements & System Verification

8.1 Tissue Verification

The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within ± 2°C of the temperature when the tissue parameters are characterized. The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after each 24 hours of use; or earlier if the dielectric parameters can become out of tolerance.

Target values

Frequency (MHz)	ε_r	σ(s/m)
835	41.5	0.90
1750	40.1	1.37
1900	40.0	1.40
2450	39.2	1.80

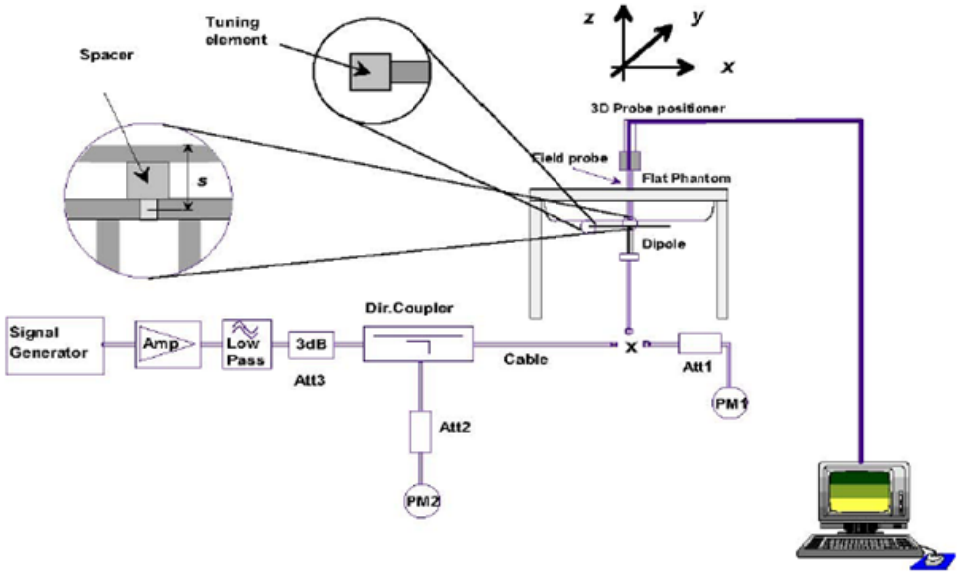
Measurements results

Frequency (MHz)	Test Date	Temp ℃	Measured Dielectric Parameters		Target Dielectric Parameters		Limit (Within ±5%)	
			ε_r	σ(s/m)	ε_r	σ(s/m)	Dev ε_r(%)	Dev σ(%)
835	2022/5/23	21.5	41.4	0.88	41.5	0.90	-0.24	-2.22
1750	2022/5/24	21.5	40.2	1.34	40.1	1.37	0.25	-2.19
1900	2022/5/25	21.5	40.1	1.41	40.0	1.40	0.25	0.71
2450	2022/5/26	21.5	38.6	1.81	39.2	1.80	-1.53	0.56
Note: The depth of tissue-equivalent liquid in a phantom must be ≥ 15.0 cm for SAR measurements ≤ 3 GHz and ≥ 10.0 cm for measurements > 3 GHz.								

8.2 System Performance Check

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulates were measured using the dielectric probe kit and the network analyzer. A system check measurement for every day was made following the determination of the dielectric parameters of the Tissue simulates, using the dipole validation kit. The dipole antenna was placed under the flat section of the twin SAM phantom.

System check is performed regularly on all frequency bands where tests are performed with the DASY system.



Picture 1System Performance Check setup

Picture 2 Setup Photo

Justification for Extended SAR Dipole Calibrations

Usage of SAR dipoles calibrated less than 3 years ago but more than 1 year ago were confirmed in maintaining return loss (< - 20 dB, within 20% of prior calibration) and impedance (within 5 ohm from prior calibration) requirements per extended calibrations in KDB 865664 D01:

Dipole		Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
Dipole D835V2 SN: 4d020	Head Liquid	8/28/2020	-26.2	/	54.8	/
		8/27/2021	-26.5	1.1	55.2	0.4
Dipole D1750V2 SN: 1033	Head Liquid	2/25/2020	-38.3	/	48.8	/
		2/24/2021	-40.0	4.4	49.9	1.1
		2/23/2022	-40.6	1.5	51.1	1.2
Dipole D1900V2 SN: 5d060	Head Liquid	8/27/2020	-23.3	/	52.5	/
		8/26/2021	-23.0	-1.3	51.9	-0.6
Dipole D2450V2 SN: 786	Head Liquid	8/27/2020	-26.9	/	54.5	/
		8/26/2021	-27.1	0.7	53.8	-0.7

System Check results

Frequency (MHz)	Test Date	Temp ℃	250mW Measured SAR_{1g} (W/kg)	1W Normalized SAR_{1g} (W/kg)	1W Target SAR_{1g} (W/kg)	Δ % (Limit ±10%)	Plot No.
835	2022/5/23	21.5	2.44	9.76	9.65	1.14	1
1750	2022/5/24	21.5	8.95	35.80	35.90	-0.28	2
1900	2022/5/25	21.5	9.88	39.52	39.50	0.05	3
2450	2022/5/26	21.5	13.70	54.80	52.30	4.78	4
Note: Target Values used derive from the calibration certificate Data Storage and Evaluation.							

8.3 SAR System Validation

Per FCC KDB 865664 D02v01, SAR system verification is required to confirm measurement accuracy. The SAR systems (including SAR probes, system components and software versions) used for this device were validated against its performance specifications prior to the SAR measurements. Reference dipoles are used with the required tissue-equivalent media for system validation, according to the procedures outlined in FCC KDB 865664 D01 and IEEE 1528-2013. Since SAR probe calibrations are frequency dependent, each probe calibration point must be validated at a frequency within the valid frequency range of the probe calibration point, using the system that normally operates with the probe for routine SAR measurements and according to the required tissue-equivalent media.

A tabulated summary of the system validation status, measurement frequencies, SAR probes, calibrated signal type(s) and tissue dielectric parameters has been included.

Frequency [MHz]	Date	Probe SN	Probe Type	Probe Cal Point		PERM (Er)	COND (Σ)	CW Validation		
								Sensitivity	Probe Linearity	Probe Isotropy
835	8/12/2021	3677	EX3DV4	835	Head	42.22	0.90	PASS	PASS	PASS
1750	8/12/2021	3677	EX3DV4	1750	Head	39.91	1.32	PASS	PASS	PASS
1900	8/12/2021	3677	EX3DV4	1900	Head	39.43	1.42	PASS	PASS	PASS
2450	8/12/2021	3677	EX3DV4	2450	Head	38.19	1.83	PASS	PASS	PASS
835	8/12/2021	3677	EX3DV4	835	Body	54.88	0.98	PASS	PASS	PASS
1750	8/12/2021	3677	EX3DV4	1750	Body	51.24	1.44	PASS	PASS	PASS
1900	8/12/2021	3677	EX3DV4	1900	Body	50.98	1.56	PASS	PASS	PASS
2450	8/12/2021	3677	EX3DV4	2450	Body	50.59	1.95	PASS	PASS	PASS

NOTE: While the probes have been calibrated for both CW and modulated signals, all measurements were performed using communication systems calibrated for CW signals only. Modulations in the table above represent test configurations for which the measurement system has been validated per FCC KDB Publication 865664D01v01 for scenarios when CW probe calibrations are used with other signal types. SAR systems were validated for modulated signals with a periodic duty cycle, such as GMSK, or with a high peak to average ratio (>5dB), such as OFDM according to KDB 865664.

9 Normal and Maximum Output Power

KDB 447498 D01 at the maximum rated output power and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance limit.

9.1 GSM Mode

GSM 850		Burst-Averaged output power(dBm)				Division Factors	Frame-Averaged output power(dBm)			
		Tune-up	Channel/Frequency(MHz)				Tune-up	Channel/Frequency(MHz)		
		MAX	128 /824.2	190 /836.6	251 /848.8		MAX	128 /824.2	190 /836.6	251 /848.8
GSM	CS	33.00	32.05	32.04	32.07	9.03	23.97	23.02	23.01	23.04
GPRS/ EGPRS (GMSK)	1 Tx Slot	33.00	32.08	32.05	32.05	9.03	23.97	23.05	23.02	23.02
	2 Tx Slots	30.00	29.55	29.47	29.47	6.02	**23.98**	23.53	23.45	23.45
	3 Tx Slots	28.00	27.32	27.30	27.30	4.26	23.74	23.06	23.04	23.04
	4 Tx Slots	26.00	25.13	25.16	25.15	3.01	22.99	22.12	22.15	22.14
EGPRS (8PSK)	1 Tx Slot	27.00	26.16	26.49	26.00	9.03	17.97	17.13	17.46	16.97
	2 Tx Slots	26.00	25.12	25.51	24.92	6.02	19.98	19.10	19.49	18.90
	3 Tx Slots	23.50	22.73	23.01	22.50	4.26	19.24	18.47	18.75	18.24
	4 Tx Slots	21.50	20.84	21.10	20.48	3.01	18.49	17.83	18.09	17.47
GSM 1900		Burst-Averaged output power(dBm)				Division Factors	Frame-Averaged output power(dBm)			
		Tune-up	Channel/Frequency(MHz)				Tune-up	Channel/Frequency(MHz)		
		MAX	512 /1850.2	661 /1880	810 /1909.8		MAX	512 /1850.2	661 /1880	810 /1909.8
GSM	CS	30.00	28.90	28.90	28.85	9.03	20.97	19.87	19.87	19.82
GPRS/ EGPRS (GMSK)	1 Tx Slot	30.00	28.87	28.92	28.81	9.03	20.97	19.84	19.89	19.78
	2 Tx Slots	28.50	27.71	27.51	27.29	6.02	**22.48**	21.69	21.49	21.27
	3 Tx Slots	26.50	25.60	25.40	25.15	4.26	22.24	21.34	21.14	20.89
	4 Tx Slots	24.50	23.72	23.48	23.16	3.01	21.49	20.71	20.47	20.15
EGPRS (8PSK)	1 Tx Slot	27.00	25.91	26.18	25.81	9.03	17.97	16.88	17.15	16.78
	2 Tx Slots	26.00	24.58	24.91	24.31	6.02	19.98	18.56	18.89	18.29
	3 Tx Slots	23.50	22.40	22.76	22.06	4.26	19.24	18.14	18.50	17.80
	4 Tx Slots	21.50	20.27	20.70	19.90	3.01	18.49	17.26	17.69	16.89
Notes:The worst-case configuration and mode for SAR testing is determined to be as follows: 1. Standalone: GSM 850 GMSK (GPRS) mode with 2 time slots for Max power, GSM 1900 GMSK (GPRS) mode with 2 time slots for Max power,based on the output power measurements above..										

9.2 WCDMA Mode

The following tests were completed according to the test requirements outlined in the 3GPP TS34.121 specification.

WCDMA		Band II(dBm)				Band V(dBm)			
Tx Channel		9262	9400	9538	Tune-up Limit	1312	1413	1513	Tune-up Limit
Frequency(MHz)		1852.4	1880	1907.6		1712.4	1732.6	1752.6	
RMC	12.2kbps	22.15	22.23	**22.32**	23.50	22.21	22.24	**22.27**	23.50
AMR	12.2kbps	22.21	22.16	22.18	23.50	22.42	22.30	22.35	23.50
HSDPA	Sub 1	22.61	22.69	22.65	23.00	22.63	22.49	22.71	23.00
	Sub 2	21.87	22.50	22.44	23.00	21.96	21.86	22.08	23.00
	Sub 3	20.92	21.53	21.44	22.00	21.19	21.03	20.97	22.00
	Sub 4	20.20	20.16	20.52	22.00	20.66	20.49	20.44	22.00
HSUPA	Sub 1	18.99	19.36	19.42	20.50	19.71	19.70	19.80	20.50
	Sub 2	19.75	19.19	19.22	20.00	19.56	19.23	19.37	20.00
	Sub 3	19.23	19.66	19.66	20.50	19.75	19.76	19.81	20.50
	Sub 4	19.26	19.70	19.72	20.50	19.14	19.24	19.37	20.50
	Sub 5	21.53	21.72	21.63	23.00	22.70	22.55	22.76	23.00

9.3 LTE Mode

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 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

LTE Band 2							
Full Power-Main Ant				Maximum Output Power (dBm)			Tune-up
Bandwidth	Modulation	RB allocation	offset	Channel/Frequency(MHz)			
				18607/1850.7	18900/1880	19193/1909.3	
1.4MHz	QPSK	1	0	21.15	21.27	21.37	22.00
		1	2	21.25	21.27	21.32	22.00
		1	5	21.13	21.23	21.31	22.00
		3	0	20.96	21.03	20.99	22.00
		3	2	20.92	20.92	21.11	22.00
		3	3	21.10	20.89	21.07	22.00
		6	0	20.09	19.98	20.07	21.00
	16QAM	1	0	19.78	19.67	19.72	21.00
		1	2	19.61	19.57	19.58	21.00
		1	5	19.97	19.82	19.88	21.00
		3	0	20.31	20.16	20.22	21.00
		3	2	20.22	20.07	20.12	21.00
		3	3	20.37	20.21	20.24	21.00
		6	0	19.28	19.19	19.21	20.00
Bandwidth	Modulation	RB allocation	offset	Channel/Frequency(MHz)			Tune-up
				18615/1851.5	18900/1880	19185/1908.5	
3MHz	QPSK	1	0	21.17	21.31	21.40	22.00
		1	7	21.23	21.30	21.36	22.00
		1	14	21.16	21.28	21.35	22.00
		8	0	20.06	20.15	20.12	21.00
		8	4	20.04	20.02	20.23	21.00
		8	7	20.20	20.00	20.17	21.00
		15	0	20.09	20.02	20.10	21.00
	16QAM	1	0	19.78	19.69	19.75	21.00
		1	7	19.61	19.57	19.62	21.00
		1	14	19.99	19.86	19.91	21.00
		8	0	19.42	19.29	19.34	20.00

		8	4	19.33	19.20	19.24	20.00
		8	7	19.47	19.33	19.37	20.00
		15	0	19.31	19.23	19.24	20.00
Bandwidth	Modulation	RB allocation	offset	Channel/Frequency(MHz)			Tune-up
				18625/1852.5	18900/1880	19175/1907.5	
5MHz	QPSK	1	0	21.14	21.29	21.36	22.00
		1	13	21.21	21.26	21.33	22.00
		1	24	21.13	21.23	21.31	22.00
		12	0	20.03	20.10	20.08	21.00
		12	6	20.02	19.98	20.18	21.00
		12	13	20.18	19.98	20.13	21.00
		25	0	20.09	20.01	20.08	21.00
	16QAM	1	0	19.78	19.65	19.72	21.00
		1	13	19.61	19.55	19.59	21.00
		1	24	19.96	19.84	19.87	21.00
		12	0	19.40	19.25	19.31	20.00
		12	6	19.30	19.15	19.20	20.00
		12	13	19.44	19.28	19.33	20.00
		25	0	19.29	19.19	19.19	20.00
Bandwidth	Modulation	RB allocation	offset	Channel/Frequency(MHz)			Tune-up
				18650/1855	18900/1880	19150/1905	
10MHz	QPSK	1	0	21.16	21.30	21.39	22.00
		1	25	21.24	21.31	21.37	22.00
		1	49	21.15	21.27	21.34	22.00
		25	0	20.06	20.15	20.12	21.00
		25	13	20.05	20.03	20.22	21.00
		25	25	20.20	20.02	20.18	21.00
		50	0	20.13	20.03	20.12	21.00
	16QAM	1	0	19.82	19.68	19.74	21.00
		1	25	19.65	19.59	19.62	21.00
		1	49	19.99	19.86	19.90	21.00
		25	0	19.43	19.30	19.35	20.00
		25	13	19.32	19.19	19.23	20.00
		25	25	19.47	19.33	19.37	20.00
		50	0	19.32	19.24	19.23	20.00
Bandwidth	Modulation	RB allocation	offset	Channel/Frequency(MHz)			Tune-up
				18675/1857.5	18900/1880	19125/1902.5	
15MHz	QPSK	1	0	21.15	21.26	21.37	22.00
		1	38	21.22	21.30	21.34	22.00
		1	74	21.12	21.22	21.30	22.00
		36	0	20.04	20.11	20.09	21.00
		36	18	20.02	19.98	20.18	21.00
		36	39	20.17	19.99	20.14	21.00

		75	0	20.11	19.99	20.07	21.00
	16QAM	1	0	19.80	19.66	19.72	21.00
		1	38	19.63	19.56	19.60	21.00
		1	74	19.97	19.82	19.87	21.00
		36	0	19.40	19.28	19.32	20.00
		36	18	19.29	19.14	19.19	20.00
		36	39	19.45	19.29	19.34	20.00
		75	0	19.29	19.19	19.19	20.00
Bandwidth	Modulation	RB allocation	offset	Channel/Frequency(MHz)			Tune-up
				18700/1860	18900/1880	19100/1900	
20MHz	QPSK	1	0	21.12	21.22	**21.34**	22.00
		1	50	**21.21**	**21.26**	21.32	22.00
		1	99	21.10	21.21	21.27	22.00
		50	0	20.01	**20.06**	20.05	21.00
		50	25	20.00	19.94	**20.15**	21.00
		50	50	**20.14**	19.94	20.10	21.00
		100	0	**20.08**	19.94	20.03	21.00
	16QAM	1	0	19.77	19.62	19.67	21.00
		1	50	19.60	19.54	19.56	21.00
		1	99	19.94	19.79	19.85	21.00
		50	0	19.37	19.24	19.29	20.00
		50	25	19.26	19.12	19.16	20.00
		50	50	19.42	19.24	19.30	20.00
		100	0	19.27	19.15	19.16	20.00

LTE Band 4							
Full Power-Main Ant				Maximum Output Power (dBm)			Tune-up
Bandwidth	Modulation	RB allocation	offset	Channel/Frequency(MHz)			
				19957/1710.7	20175/1732.5	20393/1754.3	
1.4MHz	QPSK	1	0	21.35	21.31	21.17	22.00
		1	2	21.37	21.22	21.07	22.00
		1	5	21.25	21.07	21.17	22.00
		3	0	21.07	21.15	21.11	22.00
		3	2	21.02	20.95	21.08	22.00
		3	3	20.86	20.94	21.10	22.00
		6	0	20.14	20.09	20.23	21.00
	16QAM	1	0	20.02	20.10	19.88	21.00
		1	2	19.84	19.83	20.01	21.00
		1	5	19.68	19.66	19.65	21.00
		3	0	20.07	20.13	20.01	21.00
		3	2	20.14	20.20	19.95	21.00
		3	3	20.01	20.06	19.79	21.00
		6	0	19.22	19.29	19.18	20.00

Bandwidth	Modulation	RB allocation	offset	Channel/Frequency(MHz)			Tune-up
				19965/1711.5	20175/1732.5	20385/1753.5	
3MHz	QPSK	1	0	21.37	21.35	21.20	22.00
		1	7	21.35	21.25	21.11	22.00
		1	14	21.28	21.12	21.21	22.00
		8	0	20.17	20.27	20.24	21.00
		8	4	20.14	20.05	20.20	21.00
		8	7	19.96	20.05	20.20	21.00
		15	0	20.14	20.13	20.26	21.00
	16QAM	1	0	20.02	20.12	19.91	21.00
		1	7	19.84	19.83	20.05	21.00
		1	14	19.70	19.70	19.68	21.00
		8	0	19.18	19.26	19.13	20.00
		8	4	19.25	19.33	19.07	20.00
		8	7	19.11	19.18	18.92	20.00
		15	0	19.25	19.33	19.21	20.00
Bandwidth	Modulation	RB allocation	offset	Channel/Frequency(MHz)			Tune-up
				19975/1712.5	20175/1732.5	20375/1752.5	
5MHz	QPSK	1	0	21.34	21.33	21.16	22.00
		1	13	21.33	21.21	21.08	22.00
		1	24	21.25	21.07	21.17	22.00
		12	0	20.14	20.22	20.20	21.00
		12	6	20.12	20.01	20.15	21.00
		12	13	19.94	20.03	20.16	21.00
		25	0	20.14	20.12	20.24	21.00
	16QAM	1	0	20.02	20.08	19.88	21.00
		1	13	19.84	19.81	20.02	21.00
		1	24	19.67	19.68	19.64	21.00
		12	0	19.16	19.22	19.10	20.00
		12	6	19.22	19.28	19.03	20.00
		12	13	19.08	19.13	18.88	20.00
		25	0	19.23	19.29	19.16	20.00
Bandwidth	Modulation	RB allocation	offset	Channel/Frequency(MHz)			Tune-up
				20000/1715	20175/1732.5	20350/1750	
10MHz	QPSK	1	0	21.36	21.34	21.19	22.00
		1	25	21.36	21.26	21.12	22.00
		1	49	21.27	21.11	21.20	22.00
		25	0	20.17	20.27	20.24	21.00
		25	13	20.15	20.06	20.19	21.00
		25	25	19.96	20.07	20.21	21.00
		50	0	20.18	20.14	20.28	21.00
	16QAM	1	0	20.06	20.11	19.90	21.00
		1	25	19.88	19.85	20.05	21.00

		1	49	19.70	19.70	19.67	21.00
		25	0	19.19	19.27	19.14	20.00
		25	13	19.24	19.32	19.06	20.00
		25	25	19.11	19.18	18.92	20.00
		50	0	19.26	19.34	19.20	20.00
Bandwidth	Modulation	RB allocation	offset	Channel/Frequency(MHz)			Tune-up
				20025/1717.5	20175/1732.5	20325/1747.5	
15MHz	QPSK	1	0	21.35	21.30	21.17	22.00
		1	38	21.34	21.25	21.09	22.00
		1	74	21.24	21.06	21.16	22.00
		36	0	20.15	20.23	20.21	21.00
		36	18	20.12	20.01	20.15	21.00
		36	39	19.93	20.04	20.17	21.00
		75	0	20.16	20.10	20.23	21.00
	16QAM	1	0	20.04	20.09	19.88	21.00
		1	38	19.86	19.82	20.03	21.00
		1	74	19.68	19.66	19.64	21.00
		36	0	19.16	19.25	19.11	20.00
		36	18	19.21	19.27	19.02	20.00
		36	39	19.09	19.14	18.89	20.00
		75	0	19.23	19.29	19.16	20.00
Bandwidth	Modulation	RB allocation	offset	Channel/Frequency(MHz)			Tune-up
				20050/1720	20175/1732.5	20300/1745	
20MHz	QPSK	1	0	21.32	**21.26**	**21.14**	22.00
		1	50	**21.33**	21.21	21.07	22.00
		1	99	21.22	21.05	21.13	22.00
		50	0	**20.12**	**20.18**	**20.17**	21.00
		50	25	20.10	19.97	20.12	21.00
		50	50	19.90	19.99	20.13	21.00
		100	0	20.13	20.05	**20.19**	21.00
	16QAM	1	0	20.01	20.05	19.83	21.00
		1	50	19.83	19.80	19.99	21.00
		1	99	19.65	19.63	19.62	21.00
		50	0	19.13	19.21	19.08	20.00
		50	25	19.18	19.25	18.99	20.00
		50	50	19.06	19.09	18.85	20.00
		100	0	19.21	19.25	19.13	20.00

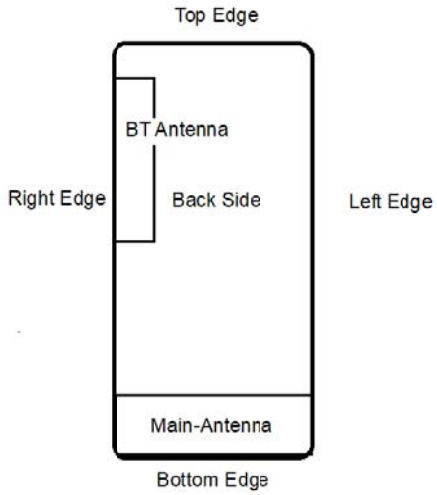
LTE Band 5							
Full Power-Main Ant				Maximum Output Power (dBm)			Tune-up
Bandwidth	Modulation	RB allocation	offset	Channel/Frequency(MHz)			
				20407/824.7	20525/836.5	20643/848.3	
1.4MHz	QPSK	1	0	22.68	22.71	22.62	23.50
		1	2	22.75	22.62	22.80	23.50
		1	5	22.64	22.61	22.76	23.50
		3	0	22.39	22.40	22.38	23.50
		3	2	22.37	22.52	22.38	23.50
		3	3	22.42	22.32	22.80	23.50
		6	0	21.47	21.51	21.52	22.50
	16QAM	1	0	21.39	21.37	21.55	22.50
		1	2	21.45	21.33	21.28	22.50
		1	5	21.29	21.19	21.33	22.50
		3	0	21.81	21.84	21.78	22.50
		3	2	21.68	21.79	21.88	22.50
		3	3	21.75	21.78	21.65	22.50
		6	0	20.81	21.01	20.74	21.50
Bandwidth	Modulation	RB allocation	offset	Channel/Frequency(MHz)			Tune-up
				20415/825.5	20525/836.5	20635/847.5	
3MHz	QPSK	1	0	22.70	22.75	22.65	23.50
		1	7	22.73	22.65	22.84	23.50
		1	14	22.67	22.66	22.80	23.50
		8	0	21.49	21.52	21.51	22.50
		8	4	21.49	21.62	21.50	22.50
		8	7	21.52	21.43	21.90	22.50
		15	0	21.47	21.55	21.55	22.50
	16QAM	1	0	21.39	21.39	21.58	22.50
		1	7	21.45	21.33	21.32	22.50
		1	14	21.31	21.23	21.36	22.50
		8	0	20.92	20.97	20.90	21.50
		8	4	20.79	20.92	21.00	21.50
		8	7	20.85	20.90	20.78	21.50
		15	0	20.84	21.05	20.77	21.50
Bandwidth	Modulation	RB allocation	offset	Channel/Frequency(MHz)			Tune-up
				20425/826.5	20525/836.5	20625/846.5	
5MHz	QPSK	1	0	22.67	22.73	22.61	23.50
		1	13	22.71	22.61	22.81	23.50
		1	24	22.64	22.61	22.76	23.50
		12	0	21.46	21.47	21.47	22.50
		12	6	21.47	21.58	21.45	22.50
		12	13	21.50	21.41	21.86	22.50

		25	0	21.47	21.54	21.53	22.50
	16QAM	1	0	21.39	21.35	21.55	22.50
		1	13	21.45	21.31	21.29	22.50
		1	24	21.28	21.21	21.32	22.50
		12	0	20.90	20.93	20.87	21.50
		12	6	20.76	20.87	20.96	21.50
		12	13	20.82	20.85	20.74	21.50
		25	0	20.82	21.01	20.72	21.50
Bandwidth	Modulation	RB allocation	offset	Channel/Frequency(MHz)			Tune-up
				20450/829	20525/836.5	20600/844	
10MHz	QPSK	1	0	22.65	**22.66**	22.59	23.50
		1	25	**22.71**	22.61	**22.80**	23.50
		1	49	22.61	22.59	22.72	23.50
		25	0	21.44	21.43	21.44	22.50
		25	13	21.45	**21.54**	21.42	22.50
		25	25	**21.46**	21.37	**21.83**	22.50
		50	0	21.46	21.47	**21.48**	22.50
	16QAM	1	0	21.38	21.32	21.50	22.50
		1	25	21.44	21.30	21.26	22.50
		1	49	21.26	21.16	21.30	22.50
		25	0	20.87	20.92	20.85	21.50
		25	13	20.72	20.84	20.92	21.50
		25	25	20.80	20.81	20.71	21.50
		50	0	20.80	20.97	20.69	21.50

9.4 Bluetooth Mode

BT	Conducted Power(dBm)			Tune-up Limit (dBm)
	Channel/Frequency(MHz)			
	Ch 0/2402 MHz	Ch 39/2441 MHz	Ch 78/2480 MHz	
GFSK	9.22	9.01	9.09	10.50
π/4DQPSK	10.07	9.86	9.87	10.50
8DPSK	10.39	10.10	10.10	10.50

10 Measured and Reported (Scaled) SAR Results



Overall (Length x Width): 120 mm x 50mm Overall Diagonal: 60mm						
Distance of the Antenna to the EUT surface/edge						
Antenna	Back Side	Front side	Left Edge	Right Edge	Top Edge	Bottom Edge
Main-Antenna	＜25mm	＜25mm	＜25mm	＜25mm	＞25mm	＜25mm
BT Antenna	＜25mm	＜25mm	＞25mm	＜25mm	＜25mm	＞25mm
Hotspot mode, Positions for SAR tests						
Mode	Back Side	Front side	Left Edge	Right Edge	Top Edge	Bottom Edge
Main-Antenna	Yes	Yes	Yes	Yes	N/A	Yes
BT/Wi-Fi Antenna	Yes	Yes	N/A	Yes	Yes	N/A

Note: 1. Per KDB 941225 D06, when the overall device length and width are ≥ 9cm*5cm, the test distance is 10mm. SAR must be measured for all sides and surfaces with a transmitting antenna located within 25mm from that surface or edge.

2.For smart phones with an overall diagonal dimension is 60mm. Per KDB 648474 D04, for smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm, product specific 10-g SAR must be tested as a phablet to determine SAR compliance.

3. Per FCC KDB 447498 D01, for each exposure position, testing of other requised 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:

a) ≤0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100MHz

b) ≤0.6 W/kg or 1.5 W/kg, for1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz.

c) ≤ 0.4 W/kg or 1.0 Wkg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz.

4.When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.

5. Per FCC KDB Publication 648474 D04, SAR was evaluated without a headset connected to the device. Since the reported SAR was ≤ 1.2 W/kg, no additional SAR evaluations using a headset cable were required.

10.1 Measured SAR Results

Note: 1.The value with blue color is the maximum SAR Value of each test band.

2. For GSM, when multiple slots are used, SAR should be tested to account for the maximum source-based time-averaged output power.

3. For WCDMA, When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.

4. For LTE, QPSK with 100% RB allocation, SAR is required when and the highest reported SAR for 1 RB and 50% RB allocation in are≥ 50% limit (1g).

Head

Band	Test Position	Dist. (mm)	Mode	Power Reduction	RB	offset	Ch./Freq. (MHz)	Tune-up (dBm)	Measured power (dBm)	Measured SAR1g (W/kg)	Power Drift (dB)	Scaling Factor	Report SAR1g (W/kg)	Plot No.	EUT No.
GSM 850	Left cheek	0	GSM	Full Power	-	-	190/836.6	33.00	32.04	0.783	-0.030	1.25	0.977	/	1#
	Left cheek	0	GSM	Full Power	-	-	128/824.2	33.00	32.05	0.795	0.010	1.24	0.989	/	1#
	Left cheek	0	GSM	Full Power	-	-	251/848.8	33.00	32.07	0.825	0.060	1.24	1.022	/	1#
	Left Tilt	0	GSM	Full Power	-	-	190/836.6	33.00	32.04	0.348	-0.037	1.25	0.434	/	1#
	Right cheek	0	GSM	Full Power	-	-	190/836.6	33.00	32.04	0.786	0.011	1.25	0.980	/	1#
	Right Tilt	0	GSM	Full Power	-	-	190/836.6	33.00	32.04	0.275	0.000	1.25	0.343	/	1#
	Right cheek	0	GSM	Full Power	-	-	128/824.2	33.00	32.05	0.931	0.181	1.24	1.159	5	1#
	Right cheek	0	GSM	Full Power	-	-	128/824.2	33.00	32.05	0.924	0.014	1.24	1.150	/	1#
	Right cheek	0	GSM	Full Power	-	-	251/848.8	33.00	32.07	0.847	-0.090	1.24	1.049	/	1#
GSM 1900	Left cheek	0	GSM	Full Power	-	-	661/1880	30.00	29.10	0.646	-0.024	1.23	0.795	/	2#
	Left Tilt	0	GSM	Full Power	-	-	661/1880	30.00	29.10	0.358	0.070	1.23	0.440	/	2#
	Right cheek	0	GSM	Full Power	-	-	661/1880	30.00	29.10	0.711	0.021	1.23	0.875	/	2#
	Right Tilt	0	GSM	Full Power	-	-	661/1880	30.00	29.10	0.454	0.140	1.23	0.559	/	2#
	Right cheek	0	GSM	Full Power	-	-	512/1850.2	30.00	28.90	0.653	0.190	1.29	0.841	/	1#
	Right cheek	0	GSM	Full Power	-	-	810/1909.8	30.00	28.85	0.777	0.024	1.30	1.013	6	1#
WCDMA II	Left cheek	0	RMC 12.2K	Full Power	-	-	9400/1880	23.50	22.23	0.653	0.150	1.34	0.875	/	2#
	Left Tilt	0	RMC 12.2K	Full Power	-	-	9400/1880	23.50	22.23	0.378	0.023	1.34	0.506	/	2#
	Right cheek	0	RMC 12.2K	Full Power	-	-	9400/1880	23.50	22.23	0.553	-0.110	1.34	0.741	/	2#
	Right Tilt	0	RMC 12.2K	Full Power	-	-	9400/1880	23.50	22.23	0.305	-0.090	1.34	0.409	/	2#
	Left cheek	0	RMC 12.2K	Full Power	-	-	9262/1852.4	23.50	22.15	0.516	0.180	1.36	0.704	/	1#
	Left cheek	0	RMC 12.2K	Full Power	-	-	9538/1907.6	23.50	22.32	0.656	0.028	1.31	0.861	7	1#
WCDMA V	Left cheek	0	RMC 12.2K	Full Power	-	-	4183/836.6	23.50	22.24	0.455	0.019	1.34	0.608	/	1#
	Left Tilt	0	RMC 12.2K	Full Power	-	-	4183/836.6	23.50	22.24	0.217	0.050	1.34	0.290	/	1#
	Right cheek	0	RMC 12.2K	Full Power	-	-	4183/836.6	23.50	22.24	0.396	0.010	1.34	0.529	/	1#
	Right Tilt	0	RMC 12.2K	Full Power	-	-	4183/836.6	23.50	22.24	0.124	0.090	1.34	0.166	/	1#
	Left cheek	0	RMC 12.2K	Full Power	-	-	4132/826.4	23.50	22.21	0.535	-0.020	1.35	0.720	8	1#
	Left cheek	0	RMC 12.2K	Full Power	-	-	4233/846.6	23.50	22.27	0.490	0.023	1.33	0.650	/	1#
LTE	Left cheek	0	QPSK	Full Power	1	0	19100/1900	22.00	21.34	0.633	-0.053	1.16	0.737	/	3#

2		0	QPSK	Full Power	50%	25	19100/1900	21.00	20.15	0.429	0.160	1.22	0.522	/	3#
	Left Tilt	0	QPSK	Full Power	1	0	19100/1900	22.00	21.34	0.461	0.090	1.16	0.537	/	3#
		0	QPSK	Full Power	50%	25	19100/1900	21.00	20.15	0.304	0.010	1.22	0.370	/	3#
	Right cheek	0	QPSK	Full Power	1	0	19100/1900	22.00	21.34	0.635	0.023	1.16	0.739	9	3#
		0	QPSK	Full Power	50%	25	19100/1900	21.00	20.15	0.447	-0.010	1.22	0.544	/	3#
	Right Tilt	0	QPSK	Full Power	1	0	19100/1900	22.00	21.34	0.419	0.166	1.16	0.488	/	3#
		0	QPSK	Full Power	50%	25	19100/1900	21.00	20.15	0.293	0.060	1.22	0.356	/	3#
LTE 4	Left cheek	0	QPSK	Full Power	1	50	20050/1720	22.00	21.33	0.372	0.160	1.17	0.434	10	3#
		0	QPSK	Full Power	50%	0	20175/1732.5	21.00	20.18	0.255	0.032	1.21	0.308	/	3#
	Left Tilt	0	QPSK	Full Power	1	50	20050/1720	22.00	21.33	0.257	0.090	1.17	0.300	/	3#
		0	QPSK	Full Power	50%	0	20175/1732.5	21.00	20.18	0.179	0.024	1.21	0.216	/	3#
	Right cheek	0	QPSK	Full Power	1	50	20050/1720	22.00	21.33	0.369	0.090	1.17	0.431	/	3#
		0	QPSK	Full Power	50%	0	20175/1732.5	21.00	20.18	0.196	0.030	1.21	0.237	/	3#
	Right Tilt	0	QPSK	Full Power	1	50	20050/1720	22.00	21.33	0.222	0.130	1.17	0.259	/	3#
		0	QPSK	Full Power	50%	0	20175/1732.5	21.00	20.18	0.138	0.031	1.21	0.167	/	3#
LTE 5	Left cheek	0	QPSK	Full Power	1	25	20600/844	23.50	22.80	0.661	0.013	1.17	0.777	11	1#
		0	QPSK	Full Power	50%	25	20600/844	22.50	21.83	0.479	-0.020	1.17	0.559	/	1#
	Left Tilt	0	QPSK	Full Power	1	25	20600/844	23.50	22.80	0.402	0.019	1.17	0.472	/	1#
		0	QPSK	Full Power	50%	25	20600/844	22.50	21.83	0.294	0.060	1.17	0.343	/	1#
	Right cheek	0	QPSK	Full Power	1	25	20600/844	23.50	22.80	0.644	-0.020	1.17	0.757	/	1#
		0	QPSK	Full Power	50%	25	20600/844	22.50	21.83	0.489	0.050	1.17	0.571	/	1#
	Right Tilt	0	QPSK	Full Power	1	25	20600/844	23.50	22.80	0.403	0.030	1.17	0.473	/	1#
		0	QPSK	Full Power	50%	25	20600/844	22.50	21.83	0.307	0.016	1.17	0.358	/	1#

Band	Antenna	Test Position	Dist. (mm)	Mode	Duty Cycle	Power Reduction	Ch./Freq. (MHz)	Tune-up (dBm)	Measured power (dBm)	Measured SAR1g (W/kg)	Power Drift (dB)	Scaling Factor	Report SAR1g (W/kg)	Plot No.	EUT No.
Bluetooth	BT	Left cheek	0	3DH5	46.0%	Full Power	0/2402	10.50	10.39	0.038	0.097	2.23	0.084	/	3#
		Left Tilt	0	3DH5	46.0%	Full Power	0/2402	10.50	10.39	0.013	0.101	2.23	0.028	/	3#
		Right cheek	0	3DH5	46.0%	Full Power	0/2402	10.50	10.39	0.078	0.047	2.23	0.173	12	3#
		Right Tilt	0	3DH5	46.0%	Full Power	0/2402	10.50	10.39	0.004	0.073	2.23	0.009	/	3#

Body SAR

Band	Test Position	Dist. (mm)	Mode	Power Reduction	RB	offset	Ch./Freq. (MHz)	Tune-up (dBm)	Measured power (dBm)	Measured SAR1g (W/kg)	Power Drift (dB)	Scaling Factor	Report SAR1g (W/kg)	Plot No.	EUT No.
GSM 850	Back Side	10	GPRS 2TX Slots	Full Power	-	-	190/836.6	30.00	29.47	0.548	-0.018	1.13	0.619	/	2#
	Front Side	10	GPRS 2TX Slots	Full Power	-	-	190/836.6	30.00	29.47	0.497	0.030	1.13	0.562	/	2#
	Left Edge	10	GPRS 2TX Slots	Full Power	-	-	190/836.6	30.00	29.47	0.255	0.090	1.13	0.288	/	2#
	Right Edge	10	GPRS 2TX Slots	Full Power	-	-	190/836.6	30.00	29.47	0.263	-0.042	1.13	0.297	/	2#
	Top Edge	10	N/A	Full Power	-	-	N/A	N/A	N/A	N/A	NA	N/A	N/A	/	/
	Bottom Edge	10	GPRS 2TX Slots	Full Power	-	-	190/836.6	30.00	29.47	0.101	0.020	1.13	0.114	/	2#
	Back Side	10	CS	Full Power	-	-	190/836.6	33.00	32.04	0.739	-0.017	1.25	0.922	/	1#
	Back Side	10	CS	Full Power	-	-	128/824.2	33.00	32.05	0.658	0.042	1.24	0.819	/	1#
	Back Side	10	CS	Full Power	-	-	251/848.8	33.00	32.07	0.694	-0.010	1.24	0.860	/	1#
GSM 1900	Back Side	10	GPRS 2TX Slots	Full Power	-	-	661/1880	28.50	27.51	0.882	0.110	1.26	1.108	/	1#
	Back Side	10	GPRS 2TX Slots	Full Power	-	-	661/1880	28.50	27.51	0.875	0.017	1.26	1.099	/	1#
	Back Side	10	GPRS 2TX Slots	Full Power	-	-	512/1850.2	28.50	27.71	0.836	-0.050	1.20	1.003	/	1#
	Back Side	10	GPRS 2TX Slots	Full Power	-	-	810/1909.8	28.50	27.29	0.819	0.038	1.32	1.082	/	1#
	Front Side	10	GPRS 2TX Slots	Full Power	-	-	661/1880	28.50	27.51	0.569	0.100	1.26	0.715	/	2#
	Left Edge	10	GPRS 2TX Slots	Full Power	-	-	661/1880	28.50	27.51	0.348	0.023	1.26	0.437	/	2#
	Right Edge	10	GPRS 2TX Slots	Full Power	-	-	661/1880	28.50	27.51	0.162	0.060	1.26	0.203	/	2#
	Top Edge	10	N/A	Full Power	-	-	N/A	N/A	N/A	N/A	NA	N/A	N/A	/	/
	Bottom Edge	10	GPRS TX Slots	Full Power	-	-	661/1880	28.50	27.51	0.306	0.080	1.26	0.384	/	2#
	Back Side	10	CS	Full Power	-	-	661/1880	30.00	28.90	0.818	0.034	1.29	1.054	/	2#
	Back Side	10	CS	Full Power	-	-	512/1850.2	28.50	27.71	0.769	-0.032	1.20	0.922	/	2#
	Back Side	10	CS	Full Power	-	-	810/1909.8	28.50	27.29	0.804	0.000	1.32	1.062	/	2#
WCDMA II	Back Side	10	RMC	Full Power	-	-	9400/1880	23.50	22.23	0.583	-0.014	1.34	0.781	/	2#
	Front Side	10	RMC	Full Power	-	-	9400/1880	23.50	22.23	0.434	0.027	1.34	0.581	/	2#
	Left Edge	10	RMC	Full Power	-	-	9400/1880	23.50	22.23	0.267	-0.098	1.34	0.358	/	2#
	Right Edge	10	RMC	Full Power	-	-	9400/1880	23.50	22.23	0.128	0.034	1.34	0.171	/	2#
	Top Edge	10	N/A	Full Power	-	-	N/A	N/A	N/A	N/A	NA	N/A	N/A	/	/
	Bottom Edge	10	RMC	Full Power	-	-	9400/1880	23.50	22.23	0.275	0.028	1.34	0.368	/	2#
WCDMA V	Back Side	10	RMC	Full Power	-	-	4183/836.6	23.50	22.24	0.421	-0.016	1.34	0.563	/	2#
	Front Side	10	RMC	Full Power	-	-	4183/836.6	23.50	22.24	0.362	0.023	1.34	0.484	/	2#
	Left Edge	10	RMC	Full Power	-	-	4183/836.6	23.50	22.24	0.153	-0.090	1.34	0.204	/	/
	Right Edge	10	RMC	Full Power	-	-	4183/836.6	23.50	22.24	0.197	0.012	1.34	0.263	/	2#
	Top Edge	10	N/A	Full Power	-	-	N/A	N/A	N/A	N/A	NA	N/A	N/A	/	/
	Bottom Edge	10	RMC	Full Power	-	-	4183/836.6	23.50	22.24	0.078	0.050	1.34	0.104	/	2#
LTE 2	Back Side	10	QPSK	Full Power	1	0	19100/1900	22.00	21.34	0.814	-0.020	1.16	0.948	/	3#
		10	QPSK	Full Power	50%	25	19100/1900	21.00	20.15	0.551	-0.010	1.22	0.670	/	3#
		10	QPSK	Full Power	100%	0	18700/1860	21.00	20.08	0.623	0.070	1.24	0.770	/	3#
	Back Side	10	QPSK	Full Power	1	0	19100/1900	22.00	21.34	0.806	0.090	1.16	0.938	/	3#
	Front Side	10	QPSK	Full Power	1	0	19100/1900	22.00	21.34	0.504	-0.030	1.16	0.587	/	3#
		10	QPSK	Full Power	50%	25	19100/1900	21.00	20.15	0.365	-0.090	1.22	0.444	/	3#

	Left Edge	10	QPSK	Full Power	1	0	19100/1900	22.00	21.34	0.255	0.020	1.16	0.297	/	3#
		10	QPSK	Full Power	50%	25	19100/1900	21.00	20.15	0.196	0.012	1.22	0.238	/	3#
	Right Edge	10	QPSK	Full Power	1	0	19100/1900	22.00	21.34	0.056	-0.080	1.16	0.065	/	3#
		10	QPSK	Full Power	50%	25	19100/1900	21.00	20.15	0.000	0.070	1.22	0.000	/	3#
	Top Edge	10	N/A	Full Power	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	/	/
		10	N/A	Full Power	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	/	/
	Bottom Edge	10	QPSK	Full Power	1	0	19100/1900	22.00	21.34	0.286	0.057	1.16	0.333	/	3#
		10	QPSK	Full Power	50%	25	19100/1900	21.00	20.15	0.233	0.039	1.22	0.283	/	3#
	Back Side	10	QPSK	Full Power	1	50	18700/1860	22.00	21.21	0.660	0.029	1.20	0.792	/	3#
	Back Side	10	QPSK	Full Power	1	50	18900/1880	22.00	21.26	0.618	0.020	1.19	0.733	/	3#
LTE 4	Back Side	10	QPSK	Full Power	1	50	20050/1720	22.00	21.33	0.688	0.150	1.17	0.803	/	3#
		10	QPSK	Full Power	50%	0	20175/1732.5	21.00	20.18	0.551	0.035	1.21	0.666	/	3#
		10	QPSK	Full Power	100%	0	20300/1745	21.00	20.19	0.584	0.080	1.21	0.704	/	3#
	Front Side	10	QPSK	Full Power	1	50	20050/1720	22.00	21.33	0.323	-0.120	1.17	0.377	/	3#
		10	QPSK	Full Power	50%	0	20175/1732.5	21.00	20.18	0.214	-0.140	1.21	0.258	/	3#
	Left Edge	10	QPSK	Full Power	1	50	20050/1720	22.00	21.33	0.236	-0.110	1.17	0.275	/	3#
		10	QPSK	Full Power	50%	0	20175/1732.5	21.00	20.18	0.160	-0.053	1.21	0.193	/	3#
	Right Edge	10	QPSK	Full Power	1	50	20050/1720	22.00	21.33	0.053	-0.097	1.17	0.062	/	3#
		10	QPSK	Full Power	50%	0	20175/1732.5	21.00	20.18	0.000	0.000	1.21	0.000	/	3#
	Top Edge	10	N/A	Full Power	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	/	/
		10	N/A	Full Power	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	/	/
	Bottom Edge	10	QPSK	Full Power	1	50	20050/1720	22.00	21.33	0.265	0.043	1.17	0.309	/	3#
		10	QPSK	Full Power	50%	0	20175/1732.5	21.00	20.18	0.152	-0.050	1.21	0.184	/	3#
	Back Side	10	QPSK	Full Power	1	0	20175/1732.5	22.00	21.26	0.692	0.020	1.19	0.821	/	3#
	Back Side	10	QPSK	Full Power	1	0	20300/1745	22.00	21.14	0.537	0.014	1.22	0.655	/	3#
LTE 5	Back Side	10	QPSK	Full Power	1	25	20600/844	23.50	22.80	0.782	0.120	1.17	0.919	/	2#
		10	QPSK	Full Power	1	25	20450/829	23.50	22.71	0.734	-0.010	1.20	0.880	/	2#
		10	QPSK	Full Power	1	0	20525/836.5	23.50	22.66	0.725	0.035	1.21	0.880	/	2#
		10	QPSK	Full Power	50%	25	20600/844	22.50	21.83	0.609	0.090	1.17	0.711	/	2#
		10	QPSK	Full Power	100%	0	20600/844	22.50	21.48	0.587	-0.010	1.26	0.742	/	2#
	Front Side	10	QPSK	Full Power	1	25	20600/844	23.50	22.80	0.673	0.023	1.17	0.791	/	2#
		10	QPSK	Full Power	50%	25	20600/844	22.50	21.83	0.517	0.018	1.17	0.603	/	2#
	Left Edge	10	QPSK	Full Power	1	25	20600/844	23.50	22.80	0.360	-0.027	1.17	0.423	/	2#
		10	QPSK	Full Power	50%	25	20600/844	22.50	21.83	0.158	0.040	1.17	0.184	/	2#
	Right Edge	10	QPSK	Full Power	1	25	20600/844	23.50	22.80	0.440	0.028	1.17	0.517	/	2#
		10	QPSK	Full Power	50%	25	20600/844	22.50	21.83	0.290	0.090	1.17	0.338	/	2#
	Top Edge	10	N/A	Full Power	N/A	N/A	N/A	N/A	N/A	N/A	NA	N/A	N/A	/	/
		10	N/A	Full Power	N/A	N/A	N/A	N/A	N/A	N/A	NA	N/A	N/A	/	/
	Bottom Edge	10	QPSK	Full Power	1	25	20600/844	23.50	22.80	0.120	0.014	1.17	0.141	/	2#
		10	QPSK	Full Power	50%	25	20600/844	22.50	21.83	0.089	0.016	1.17	0.104	/	2#

Antenna	Test Position	Dist. (mm)	Mode	Duty Cycle	Power Reduction	Ch./Freq. (MHz)	Tune-up (dBm)	Measured power (dBm)	Measured SAR1g (W/kg)	Power Drift (dB)	Scaling Factor	Report SAR1g (W/kg)	Plot No.	EUT No.
BT	Back Side	10	3DH5	46.0%	Full Power	0/2402	10.50	10.39	0.000	0.000	2.23	0.000	/	3#
	Front Side	10	3DH5	46.0%	Full Power	0/2402	10.50	10.39	0.000	0.070	2.23	0.000	/	3#
	Left Edge	10	3DH5	46.0%	Full Power	0/2402	10.50	10.39	0.000	-0.022	2.23	0.000	/	3#
	Right Edge	10	3DH5	46.0%	Full Power	0/2402	10.50	10.39	0.064	0.110	2.23	0.143	13	3#
	Top Edge	10	3DH5	46.0%	Full Power	0/2402	10.50	10.39	0.000	0.130	2.23	0.000	/	3#
	Bottom Edge	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	/	N/A

10.2 Simultaneous Transmission Analysis

Simultaneous Transmission Configurations	Head	Body SAR
Main- Antenna + Bluetooth	Yes	Yes

General Note:

1. The Scaled SAR summation is calculated based on the same configuration and test position.
2. Per KDB 447498 D01, simultaneous transmission SAR is compliant if,

i) Scalar SAR summation < 1.6W/kg, simultaneously transmission SAR measurement is not necessary.

ii) SPLSR = (SAR1 + SAR2)^1.5 / (min. separation distance, mm), and the peak separation distance is determined from the square root of $[(x1-x2)^2 + (y1-y2)^2 + (z1-z2)^2]$, where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the extrapolated peak SAR locations in the zoom scan.

iii) If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary.

The maximum SAR_{1g} Value for Main-Antenna

Test Position \ SAR_{1g}(W/kg)		GSM 850	GSM 1900	WCDMA Band II	WCDMA Band V	LTE FDD 2	LTE FDD 4	LTE FDD 5	MAX. SAR_{1g}
Head	Left Cheek	1.022	0.795	0.875	0.720	0.737	0.434	0.777	1.022
	Left Tilt	0.434	0.440	0.506	0.290	0.537	0.300	0.472	0.537
	Right Cheek	1.159	1.013	0.741	0.529	0.739	0.431	0.757	1.159
	Right Tilt	0.343	0.559	0.409	0.166	0.488	0.259	0.473	0.559
Body SAR	Back Side	0.922	1.108	0.781	0.563	0.948	0.821	0.919	1.108
	Front Side	0.562	0.715	0.581	0.484	0.587	0.377	0.791	0.791
	Left Edge	0.288	0.437	0.358	0.204	0.297	0.275	0.423	0.437
	Right Edge	0.297	0.203	0.171	0.263	0.065	0.062	0.517	0.517
	Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Bottom Edge	0.114	0.384	0.368	0.104	0.333	0.309	0.141	0.384

About BT and Main- Antenna

Test Position \ SAR_{1g} (W/kg)		Main-antenna	BT	MAX. ΣSAR_{1g}
Head	Left, Cheek	1.022	0.084	1.106
	Left, Tilt	0.537	0.028	0.565
	Right, Cheek	1.159	0.173	1.332
	Right, Tilt	0.559	0.009	0.568
Body SAR	Back Side	1.108	0.000	1.108
	Front Side	0.791	0.000	0.791
	Left Edge	0.437	0.000	0.437
	Right Edge	0.517	0.143	0.660
	Top Edge	N/A	0.000	0.000
	Bottom Edge	0.384	N/A	0.384

Note: 1.The value with blue color is the maximum ΣSAR_{1g} Value.
2.MAX. ΣSAR_{1g}=Unlicensed SAR_{MAX} +Licensed SAR_{MAX}

MAX. ΣSAR_{1g} =1.332W/kg<1.6W/kg and MAX., so the Simultaneous transimition SAR with volum scan are not required for BT and Main-Antenna.

11 Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528- 2013 is not required in SAR reports submitted for equipment approval.

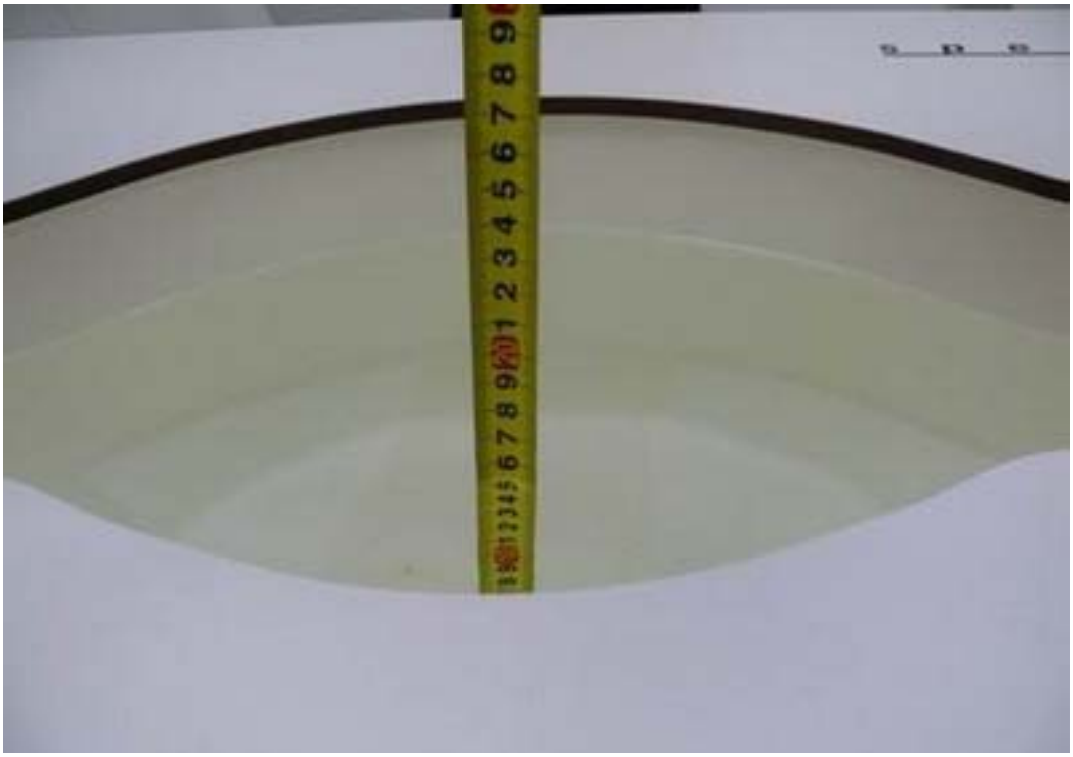
********END OF REPORT ********

ANNEX A: Test Layout

Tissue Simulating Liquids

For the measurement of the field distribution inside the flat phantom with DASY, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For Head and Body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm, which is shown in Picture 3 and Picture 4.

Picture 3: liquid depth in the head Phantom



Picture 4: Liquid depth in the flat Phantom

ANNEX B: System Check Results

Plot 1 System Performance Check at 835 MHz TSL

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d020

Date: 2022/5/23

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1

Medium parameters used: f = 835 MHz; σ = 0.88 S/m; ε_r = 41.4; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(9.30, 9.30, 9.30); Calibrated: 2021/8/12

Electronics: DAE4 SN1692; Calibrated: 2021/10/4

Phantom: SAM 1; Type: QD000P40CD; Serial: TP:1666

Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

d=15mm, Pin=250mW/Area Scan (4x12x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 2.64 mW/g

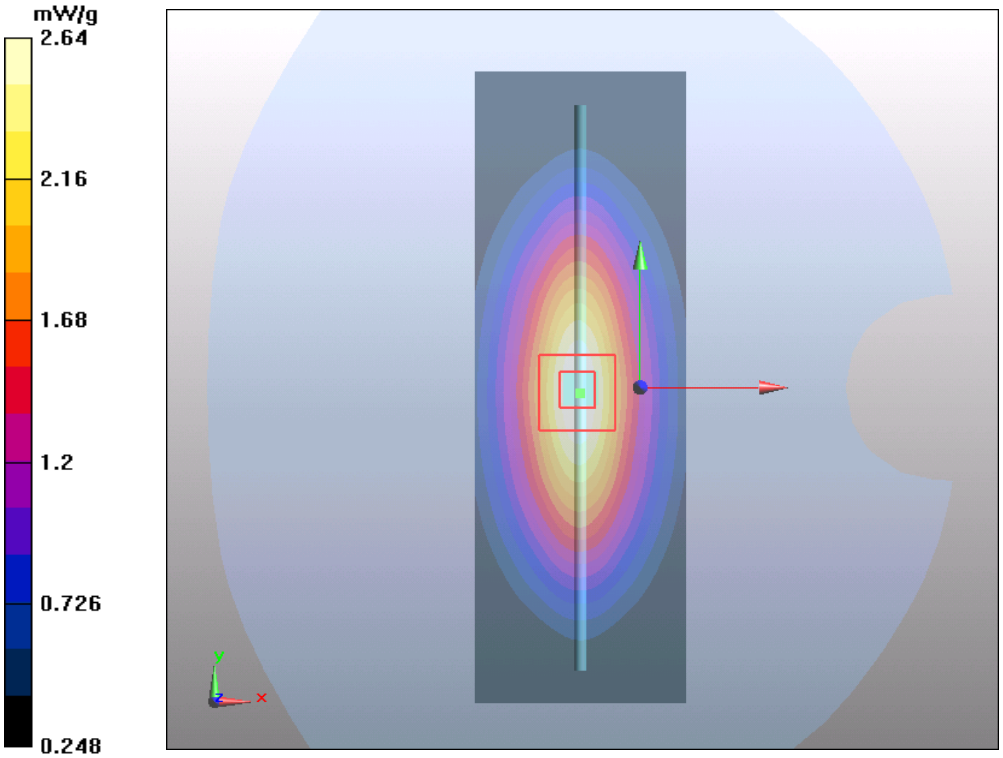
d=15mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 54.4 V/m; Power Drift = -0.076 dB

Peak SAR (extrapolated) = 3.67 W/kg

SAR(1 g) = 2.44 mW/g; SAR(10 g) = 1.6 mW/g

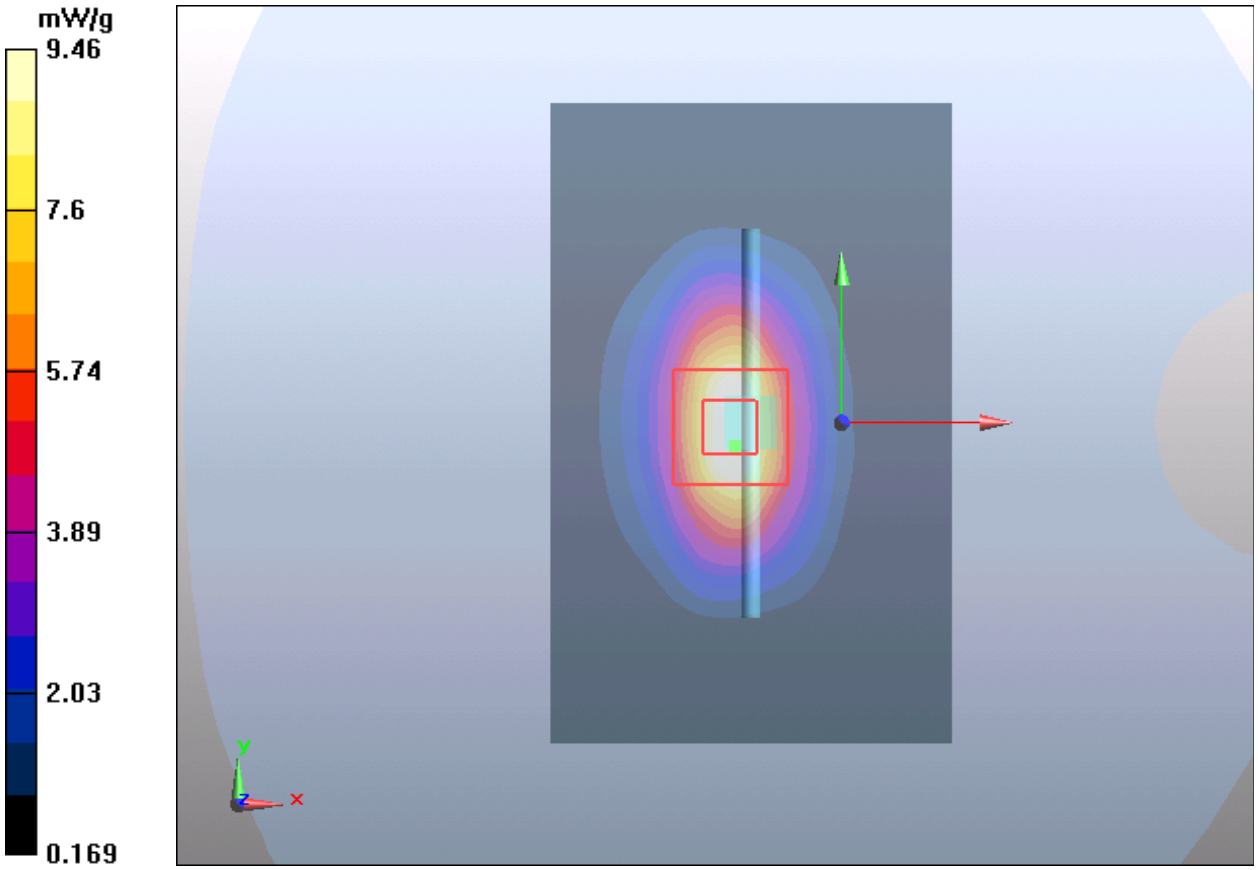
Maximum value of SAR (measured) = 2.64 mW/g



Plot 2 System Performance Check at 1750 MHz TSL
DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1033
Date: 2022/5/24
Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1750 MHz; σ = 1.34 S/m; ε_r = 40.2; ρ = 1000 kg/m^3
Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃
Phantom section: Flat Section
DASY5 Configuration:
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Probe: EX3DV4 - SN3677; ConvF(8.22, 8.22, 8.22); Calibrated: 2021/8/12
Electronics: DAE4 SN1692; Calibrated: 2021/10/4
Phantom: SAM 1; Type: QD000P40CD; Serial: TP:1666
Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

d=10mm, Pin=250mW/Area Scan (5x8x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 9.78 mW/g

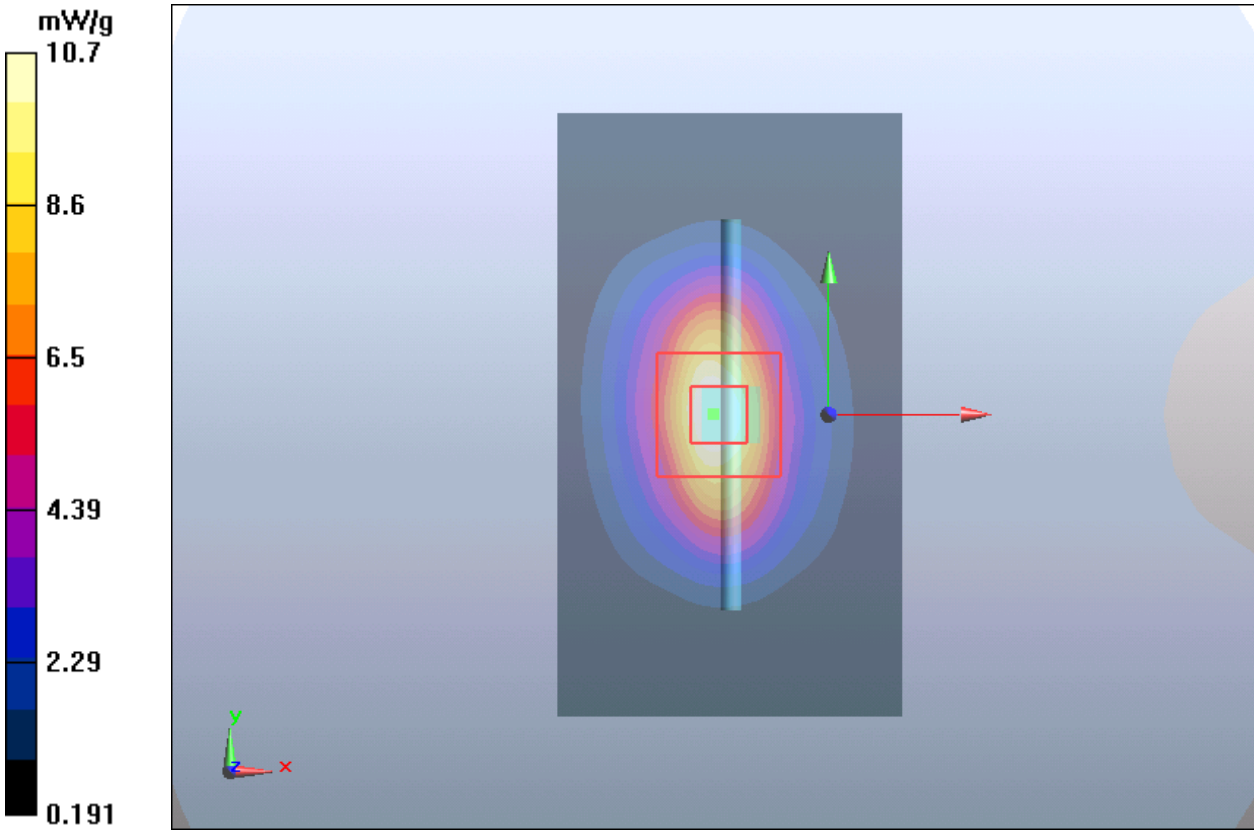
d=10mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 80 V/m; Power Drift = 0.075 dB
Peak SAR (extrapolated) = 15.5 W/kg
SAR(1 g) = 8.95 mW/g; SAR(10 g) = 4.5 mW/g
Maximum value of SAR (measured) = 9.46 mW/g



Plot 3 System Performance Check at 1900 MHz TSL
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d060
Date: 2022/5/25
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.41 S/m; ε_r = 40.1; ρ = 1000 kg/m^3
Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃
Phantom section: Flat Section
DASY5 Configuration:
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Probe: EX3DV4 - SN3677; ConvF(7.88, 7.88, 7.88); Calibrated: 2021/8/12
Electronics: DAE4 SN1692; Calibrated: 2021/10/4
Phantom: SAM 1; Type: QD000P40CD; Serial: TP:1666
Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

d=10mm, Pin=250mW/Area Scan (4x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 11.3 mW/g

d=10mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 85.5 V/m; Power Drift = 0.028 dB
Peak SAR (extrapolated) = 17.8 W/kg
SAR(1 g) = 9.88 mW/g; SAR(10 g) = 4.9 mW/g
Maximum value of SAR (measured) = 10.7 mW/g



Plot 4 System Performance Check at 2450 MHz TSL

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 786

Date: 2022/5/26

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2450 MHz; σ = 1.81 S/m; ε_r = 38.6; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.50, 7.50, 7.50); Calibrated: 2021/8/12

Electronics: DAE4 SN1692; Calibrated: 2021/10/4

Phantom: SAM 1; Type: QD000P40CD; Serial: TP:1666

Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

d=10mm, Pin=250mW/Area Scan (4x7x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 18.2 mW/g

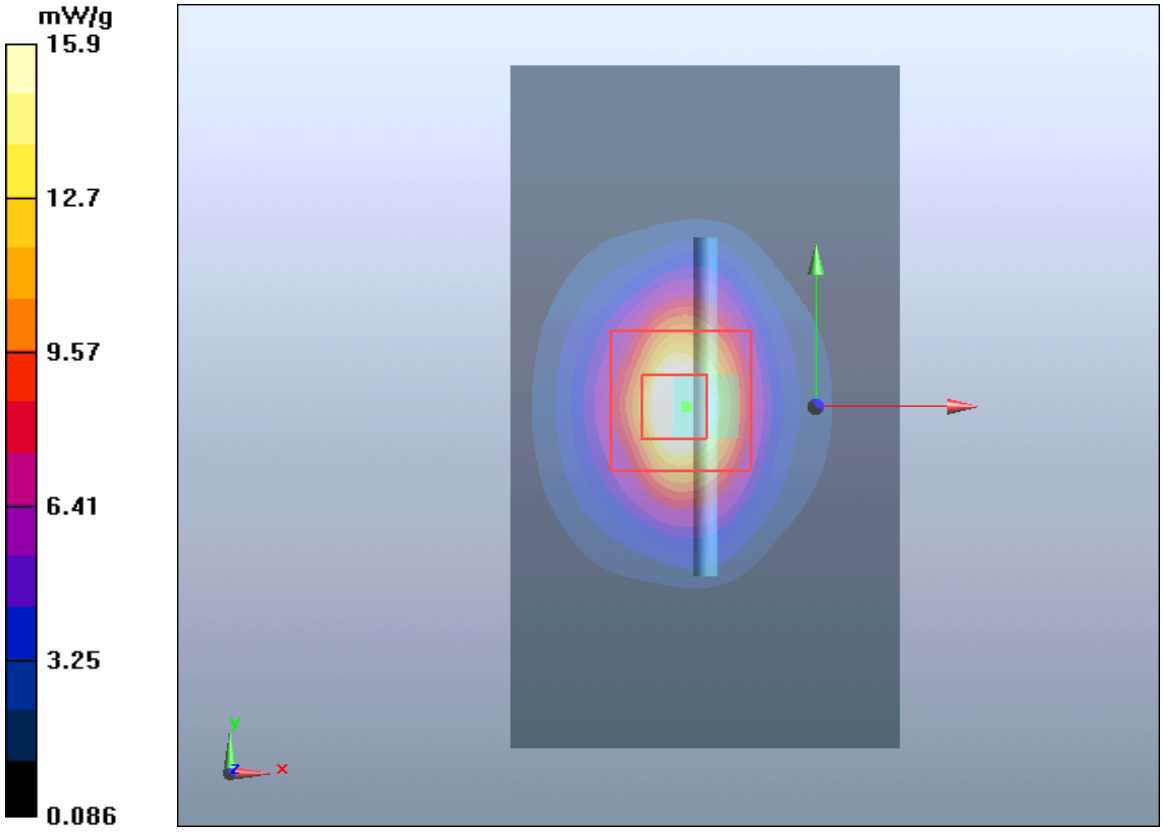
d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 88.8 V/m; Power Drift = 0.075 dB

Peak SAR (extrapolated) = 30 W/kg

SAR(1 g) = 13.7 mW/g; SAR(10 g) = 6.22 mW/g

Maximum value of SAR (measured) = 15.9 mW/g



ANNEX C: Highest Graph Results

Plot 5 GSM 850 Right Cheek Low

Date: 2022/5/23

Communication System: UID 0, GSM (0); Frequency: 824.2 MHz;Duty Cycle: 1:8.30

Medium parameters used (interpolated): f = 824.2 MHz; σ = 0.945 S/m; ε_r = 39.833; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Right Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(9.30, 9.30, 9.30); Calibrated: 2021/8/12

Electronics: DAE4 SN1692; Calibrated: 2021/10/4

Phantom: SAM 1; Type: QD000P40CD; Serial: TP:1666

Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Right Cheek Low/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.963 W/kg

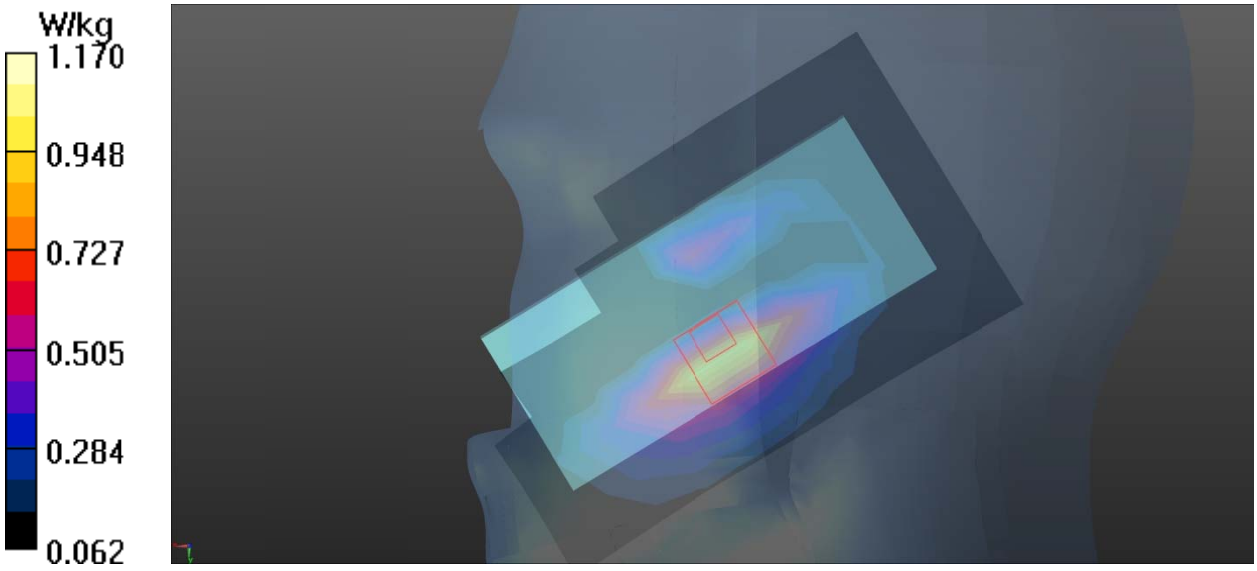
Right Cheek Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.638 V/m; Power Drift = 0.181 dB

Peak SAR (extrapolated) = 1.29 W/kg

SAR(1 g) = 0.931 W/kg; SAR(10 g) = 0.606 W/kg

Maximum value of SAR (measured) = 1.17 W/kg



Plot 6 GSM 1900 Right Cheek High

Date: 2022/5/25

Communication System: UID 0, GSM (0); Frequency: 1909.8 MHz;Duty Cycle: 1:8.30

Medium parameters used: f = 1909.8 MHz; σ = 1.417 S/m; ε_r = 38.262; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Right Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.88, 7.88, 7.88); Calibrated: 2021/8/12

Electronics: DAE4 SN1692; Calibrated: 2021/10/4

Phantom: SAM 1; Type: QD000P40CD; Serial: TP:1666

Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Right Cheek High/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.01 W/kg

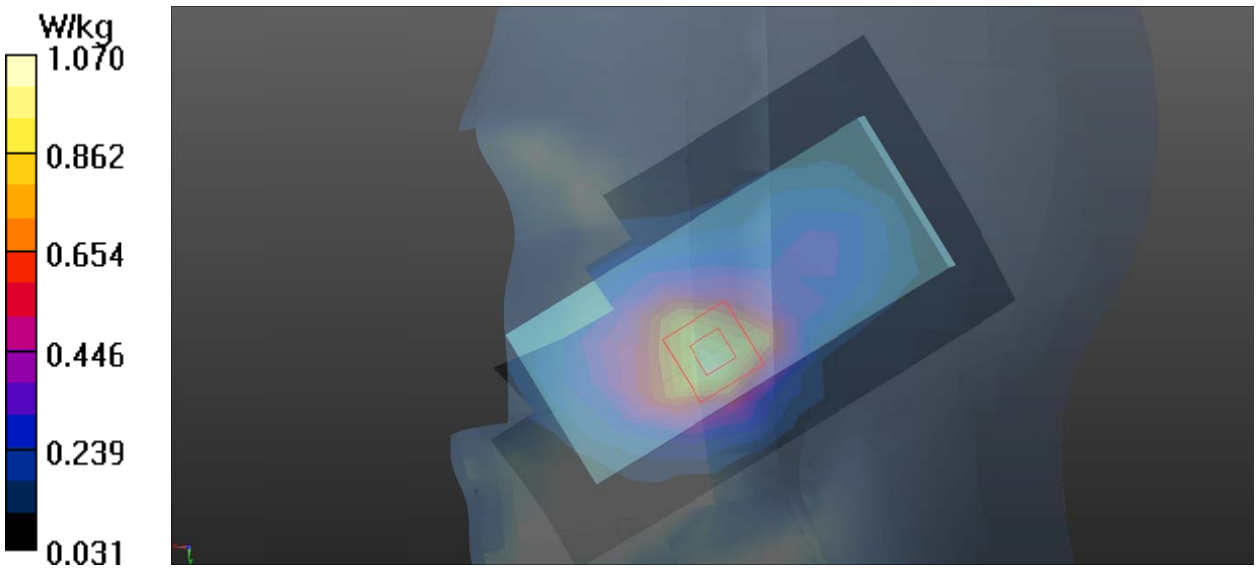
Right Cheek High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.296 V/m; Power Drift = 0.024 dB

Peak SAR (extrapolated) = 1.23 W/kg

SAR(1 g) = 0.777 W/kg; SAR(10 g) = 0.463 W/kg

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



Plot 7 UMTS Band II Left Cheek High

Date: 2022/5/25

Communication System: UID 0, WCDMA (0); Frequency: 1907.6 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1907.6 MHz; σ = 1.416 S/m; ε_r = 38.306; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.88, 7.88, 7.88); Calibrated: 2021/8/12

Electronics: DAE4 SN1692; Calibrated: 2021/10/4

Phantom: SAM 1; Type: QD000P40CD; Serial: TP:1666

Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Left Cheek High/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.815 W/kg

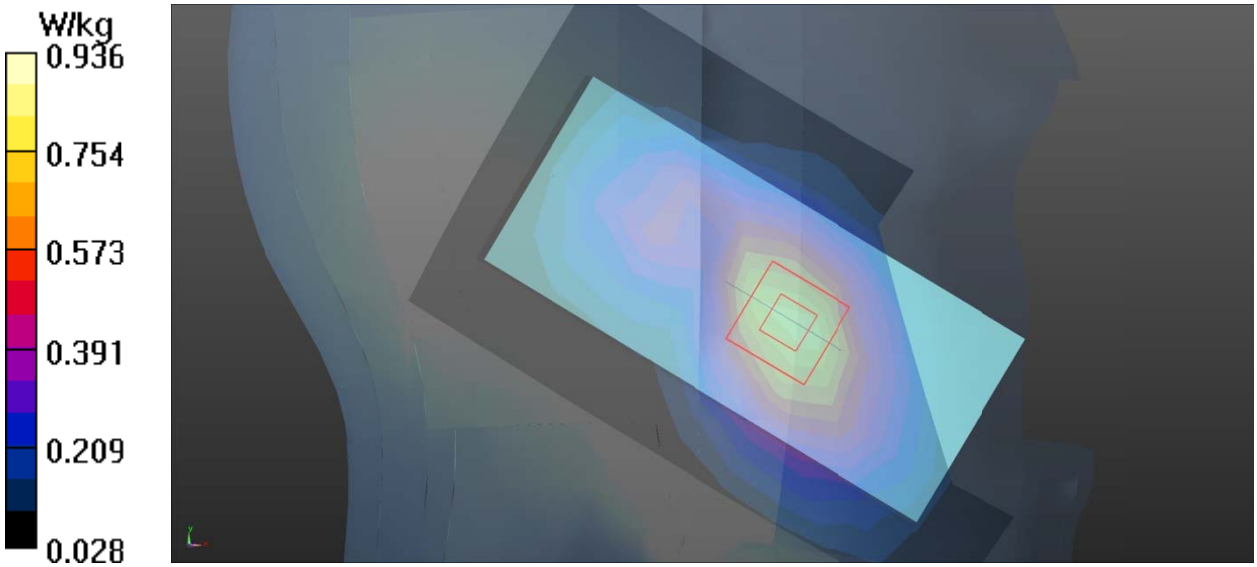
Left Cheek High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.129 V/m; Power Drift = 0.028 dB

Peak SAR (extrapolated) = 1.07 W/kg

SAR(1 g) = 0.656 W/kg; SAR(10 g) = 0.388 W/kg

Maximum value of SAR (measured) = 0.936 W/kg



Plot 8 UMTS Band V Left Cheek Low

Date: 2022/5/23

Communication System: UID 0, WCDMA (0); Frequency: 826.4 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 826.4 MHz; σ = 0.946 S/m; ε_r = 39.813; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(9.30, 9.30, 9.30); Calibrated: 2021/8/12

Electronics: DAE4 SN1692; Calibrated: 2021/10/4

Phantom: SAM 1; Type: QD000P40CD; Serial: TP:1666

Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Left Cheek Low/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.648 W/kg

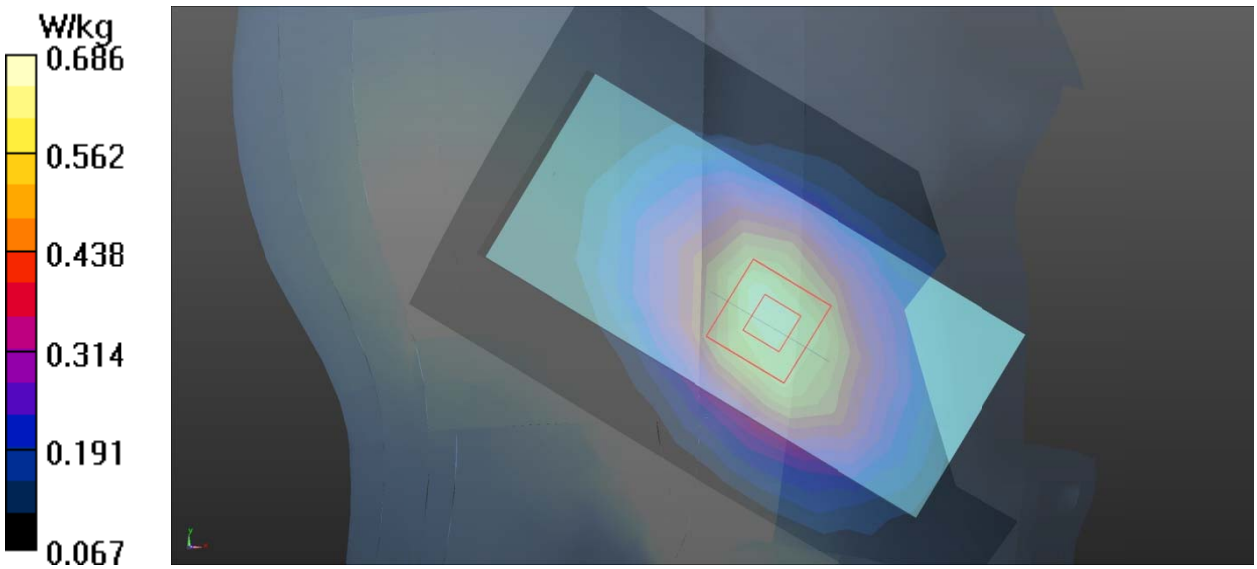
Left Cheek Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.005 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.761 W/kg

SAR(1 g) = 0.535 W/kg; SAR(10 g) = 0.372 W/kg

Maximum value of SAR (measured) = 0.686 W/kg



Plot 9 LTE Band 2 1RB Right Cheek High

Date: 2022/5/25

Communication System: UID 0, LTE (0); Frequency: 1900 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; σ = 1.434 S/m; ε_r = 38.861; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Right Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.88, 7.88, 7.88); Calibrated: 2021/8/12

Electronics: DAE4 SN1692; Calibrated: 2021/10/4

Phantom: SAM 1; Type: QD000P40CD; Serial: TP:1666

Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Right Cheek High/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.792 W/kg

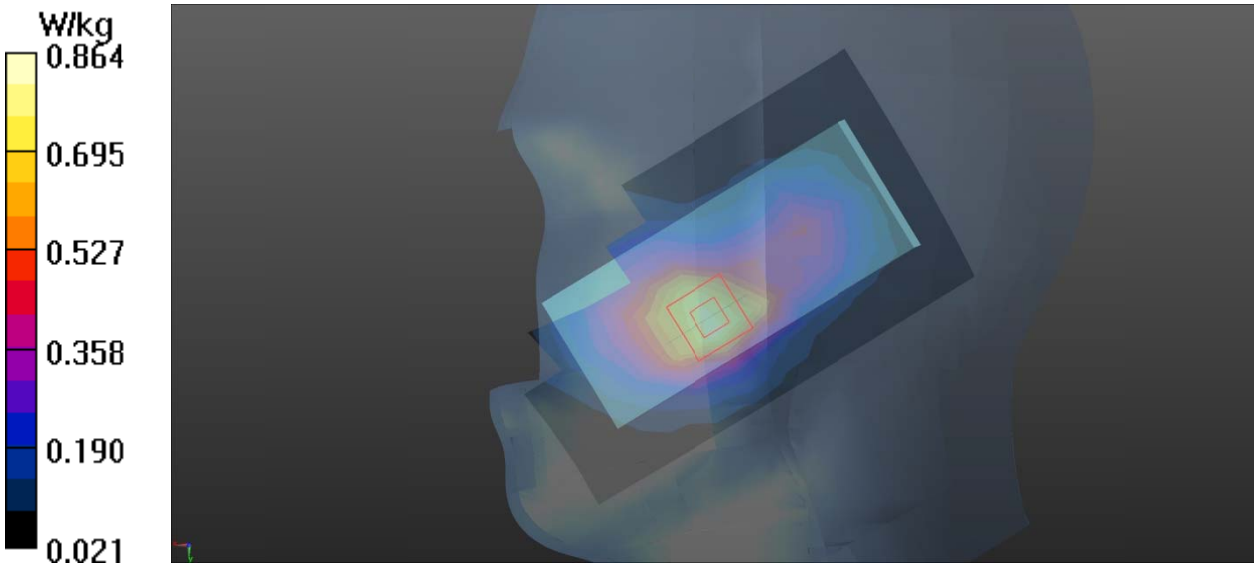
Right Cheek High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.247 V/m; Power Drift = 0.023 dB

Peak SAR (extrapolated) = 0.985 W/kg

SAR(1 g) = 0.635 W/kg; SAR(10 g) = 0.386 W/kg

Maximum value of SAR (measured) = 0.864 W/kg



Plot 10 LTE Band 4 1RB Left Cheek Low

Date: 2022/5/24

Communication System: UID 0, LTE (0); Frequency: 1720 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1720 MHz; σ = 1.303 S/m; ε_r = 39.467; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(8.22, 8.22, 8.22); Calibrated: 2021/8/12

Electronics: DAE4 SN1692; Calibrated: 2021/10/4

Phantom: SAM 1; Type: QD000P40CD; Serial: TP:1666

Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Left Cheek Low/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.471 W/kg

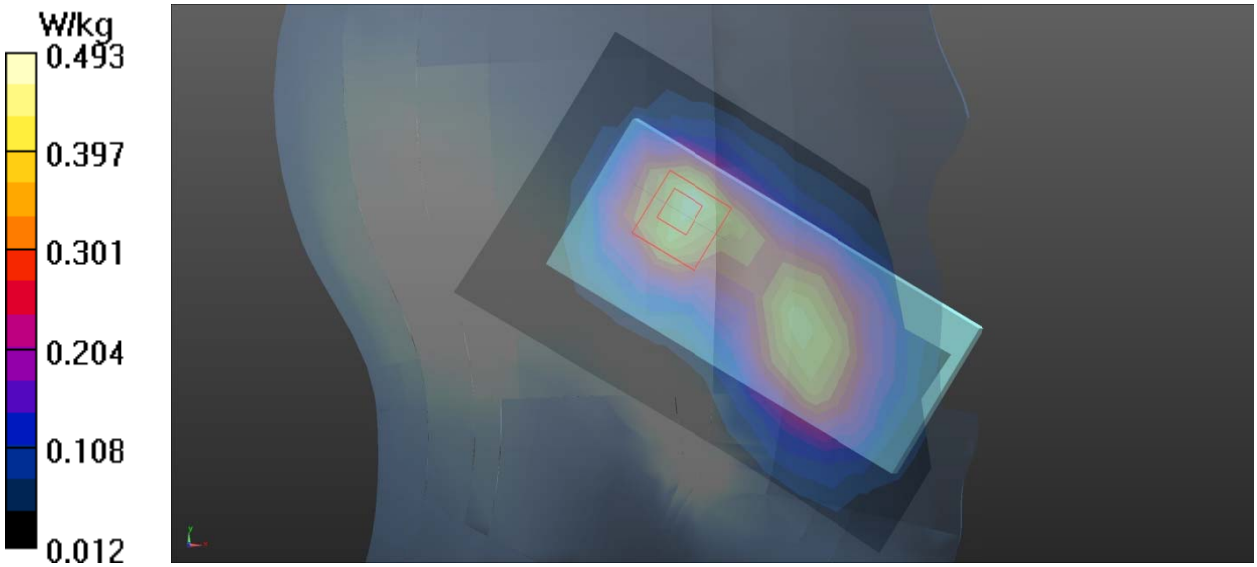
Left Cheek Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.051 V/m; Power Drift = 0.16 dB

Peak SAR (extrapolated) = 0.554 W/kg

SAR(1 g) = 0.372 W/kg; SAR(10 g) = 0.232 W/kg

Maximum value of SAR (measured) = 0.493 W/kg



Plot 11 LTE Band 5 1RB Left Cheek High

Date: 2022/5/23

Communication System: UID 0, LTE (0); Frequency: 844 MHz;Duty Cycle: 1:1

Medium parameters used: f = 844 MHz; σ = 0.958 S/m; ε_r = 39.728; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(9.30, 9.30, 9.30); Calibrated: 2021/8/12

Electronics: DAE4 SN1692; Calibrated: 2021/10/4

Phantom: SAM 1; Type: QD000P40CD; Serial: TP:1666

Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Left Cheek High/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.770 W/kg

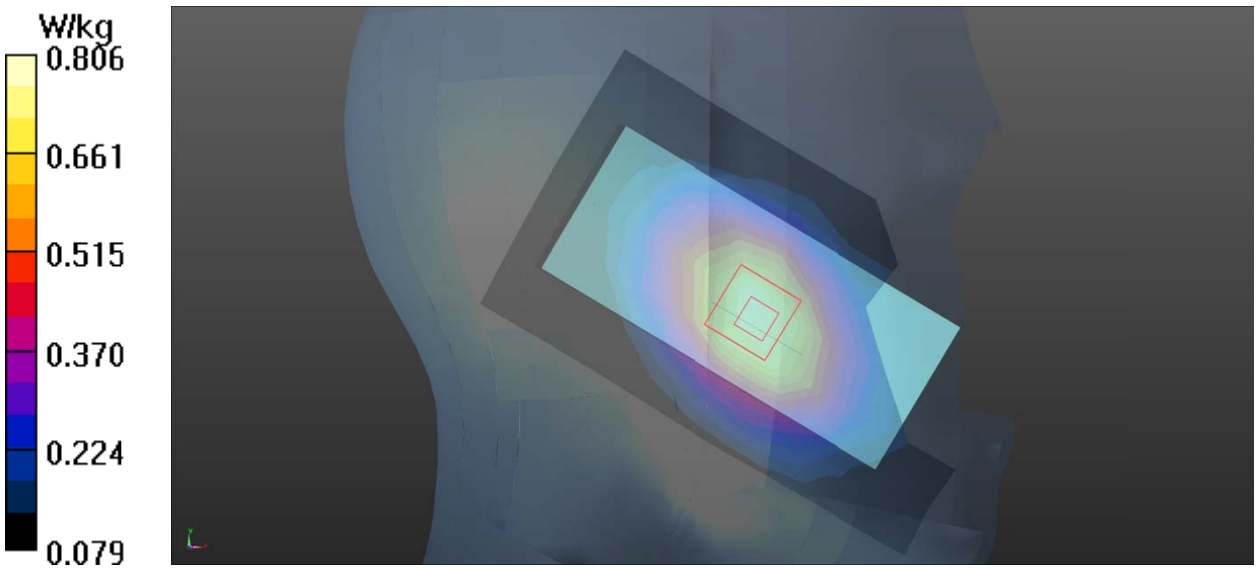
Left Cheek High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.935 V/m; Power Drift = 0.013 dB

Peak SAR (extrapolated) = 0.880 W/kg

SAR(1 g) = 0.661 W/kg; SAR(10 g) = 0.472 W/kg

Maximum value of SAR (measured) = 0.806 W/kg



Plot 12 Bluetooth Right Cheek Low

Date: 2022/5/26

Communication System: UID 0, BT (0); Frequency: 2402 MHz;Duty Cycle: 1:2.17

Medium parameters used: f = 2402 MHz; σ = 1.746 S/m; ε_r = 40.697; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Right Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.50, 7.50, 7.50); Calibrated: 2021/8/12

Electronics: DAE4 SN1692; Calibrated: 2021/10/4

Phantom: SAM 1; Type: QD000P40CD; Serial: TP:1666

Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Right Cheek Low/Area Scan (9x14x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.102 W/kg

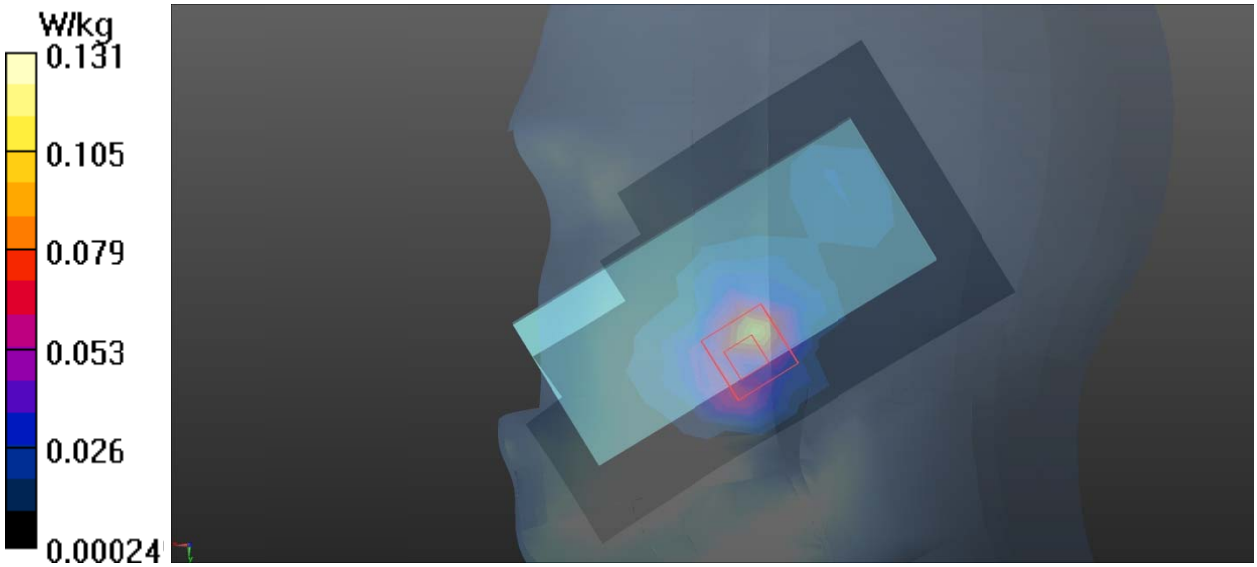
Right Cheek Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.406 V/m; Power Drift = 0.047 dB

Peak SAR (extrapolated) = 0.192 W/kg

SAR(1 g) = 0.078 W/kg; SAR(10 g) = 0.033 W/kg

Maximum value of SAR (measured) = 0.131 W/kg



Plot 13 GSM 850 GSM Back Side Middle (Distance 10mm)

Date: 2022/5/23

Communication System: UID 0, GSM (0); Frequency: 836.6 MHz;Duty Cycle: 1:8.30

Medium parameters used: f = 836.6 MHz; σ = 0.953 S/m; ε_r = 39.762; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(9.30, 9.30, 9.30); Calibrated: 2021/8/12

Electronics: DAE4 SN1692; Calibrated: 2021/10/4

Phantom: SAM 1; Type: QD000P40CD; Serial: TP:1666

Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Bake Side Middle/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.928 W/kg

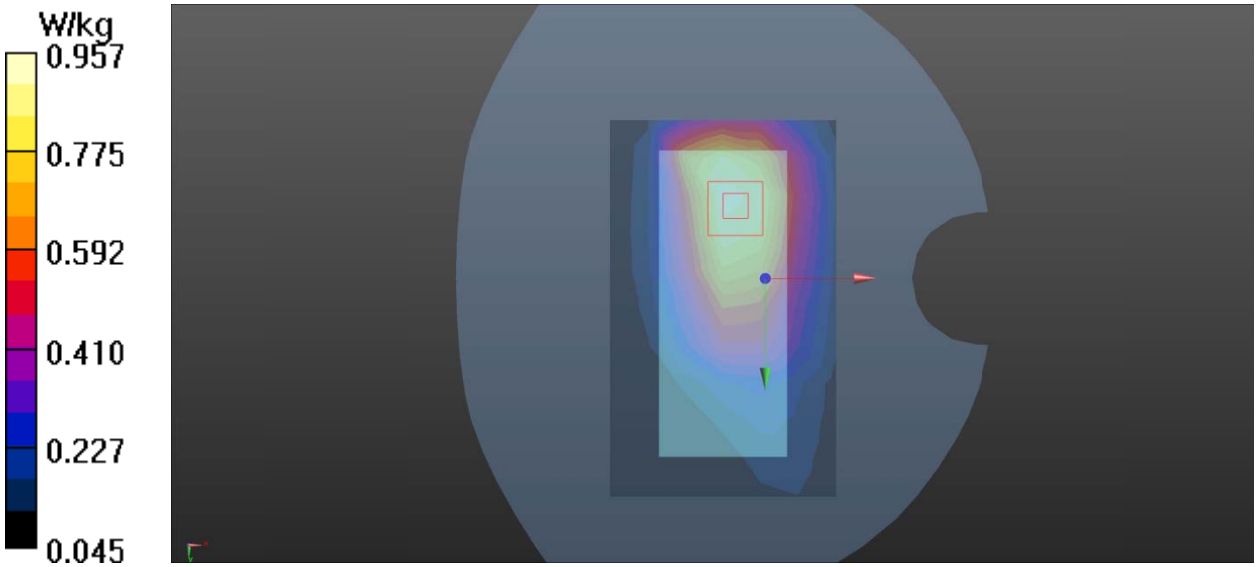
Bake Side Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 25.23 V/m; Power Drift = -0.017 dB

Peak SAR (extrapolated) = 1.13 W/kg

SAR(1 g) = 0.739 W/kg; SAR(10 g) = 0.513 W/kg

Maximum value of SAR (measured) = 0.957 W/kg



Plot 14 GSM 1900 GPRS (2Txslots) Back Side Middle (Distance 10mm)

Date: 2022/5/25

Communication System: UID 0, GPRS 2TX (0); Frequency: 1880 MHz;Duty Cycle: 1:4.15

Medium parameters used: f = 1880 MHz; σ = 1.42 S/m; ε_r = 38.948; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.88, 7.88, 7.88); Calibrated: 2021/8/12

Electronics: DAE4 SN1692; Calibrated: 2021/10/4

Phantom: SAM 1; Type: QD000P40CD; Serial: TP:1666

Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Back Side Middle 2/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm

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

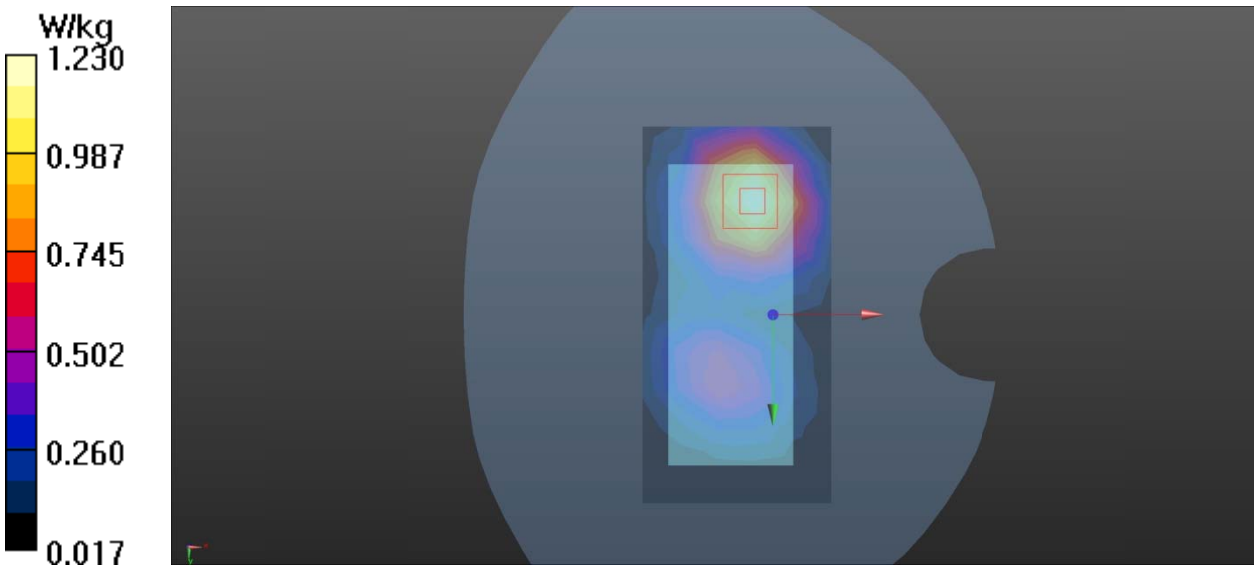
Back Side Middle 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 10.42 V/m; Power Drift = 0.110 dB

Peak SAR (extrapolated) = 1.50 W/kg

SAR(1 g) = 0.882 W/kg; SAR(10 g) = 0.531 W/kg

Maximum value of SAR (measured) = 1.23 W/kg



Plot 15 UMTS Band II Back Side Middle (Distance 10mm)

Date: 2022/5/25

Communication System: UID 0, WCDMA (0); Frequency: 1880 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1880 MHz; σ = 1.42 S/m; ε_r = 38.948; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.88, 7.88, 7.88); Calibrated: 2021/8/12

Electronics: DAE4 SN1692; Calibrated: 2021/10/4

Phantom: SAM 1; Type: QD000P40CD; Serial: TP:1666

Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Back Side Middle/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.13 W/kg

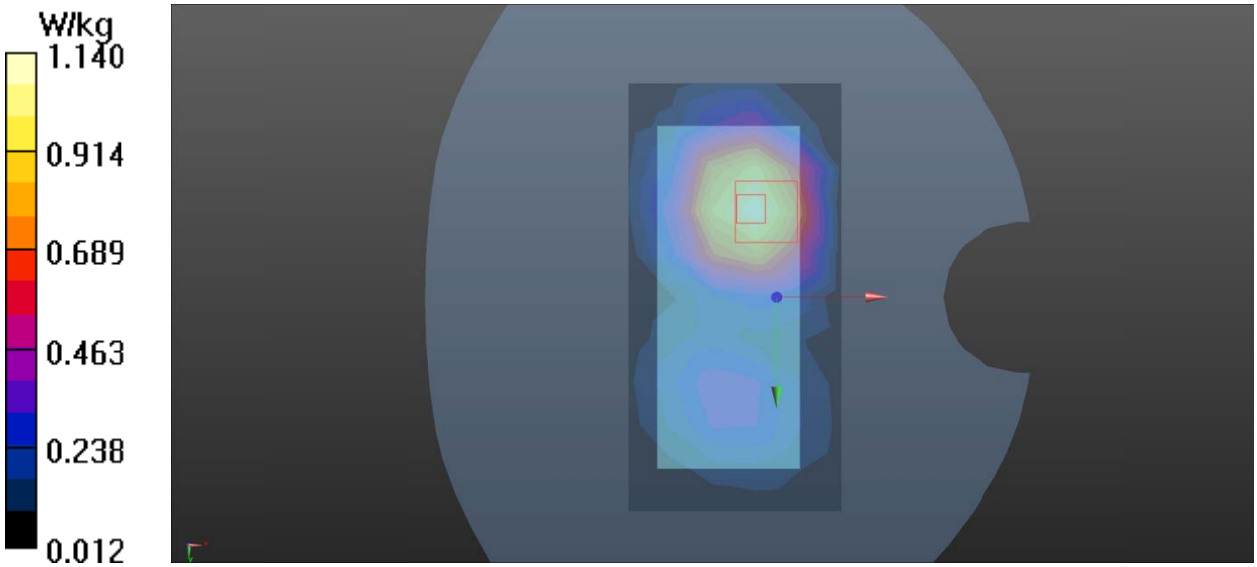
Back Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.86 V/m; Power Drift = -0.014 dB

Peak SAR (extrapolated) = 1.35 W/kg

SAR(1 g) = 0.583 W/kg; SAR(10 g) = 0.346 W/kg

Maximum value of SAR (measured) = 1.14 W/kg



Plot 16 UMTS Band V Back Side Middle (Distance 10mm)

Date: 2022/5/23

Communication System: UID 0, WCDMA (0); Frequency: 836.6 MHz;Duty Cycle: 1:1

Medium parameters used: f = 836.6 MHz; σ = 0.953 S/m; ε_r = 39.762; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(9.30, 9.30, 9.30); Calibrated: 2021/8/12

Electronics: DAE4 SN1692; Calibrated: 2021/10/4

Phantom: SAM 1; Type: QD000P40CD; Serial: TP:1666

Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Bake Side Middle/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.474 W/kg

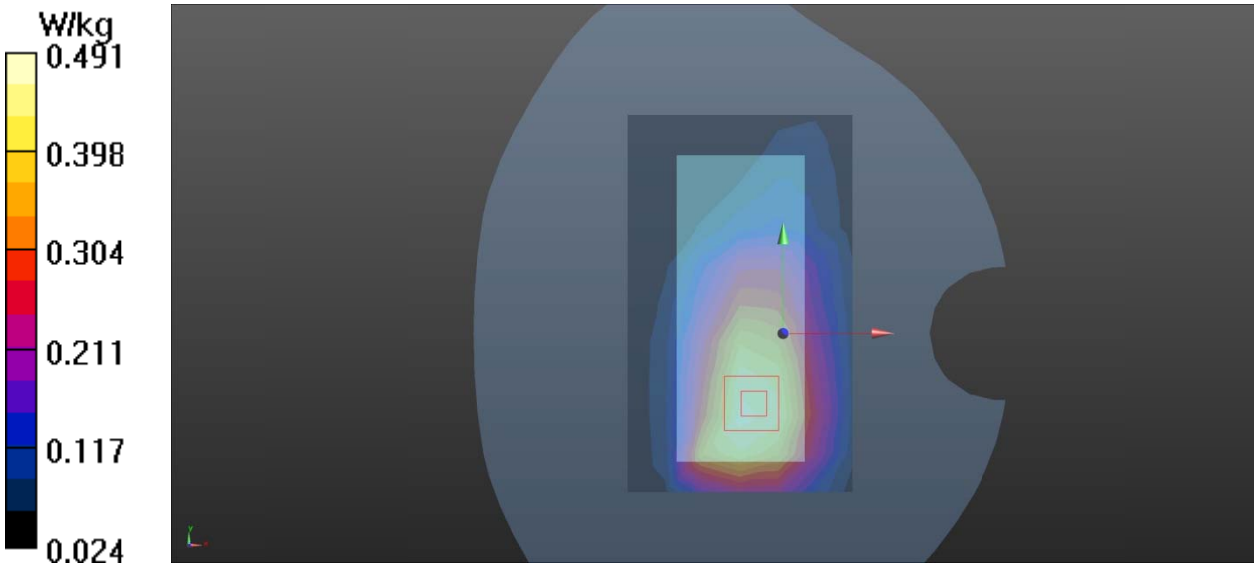
Bake Side Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 18.05 V/m; Power Drift = -0.016 dB

Peak SAR (extrapolated) = 0.599 W/kg

SAR(1 g) = 0.421 W/kg; SAR(10 g) = 0.287 W/kg

Maximum value of SAR (measured) = 0.491 W/kg



Plot 17 LTE Band 2 1RB Back Side High (Distance 10mm)

Date: 2022/5/25

Communication System: UID 0, LTE (0); Frequency: 1900 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; σ = 1.434 S/m; ε_r = 38.861; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.88, 7.88, 7.88); Calibrated: 2021/8/12

Electronics: DAE4 SN1692; Calibrated: 2021/10/4

Phantom: SAM 1; Type: QD000P40CD; Serial: TP:1666

Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Back Side High/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.15 W/kg

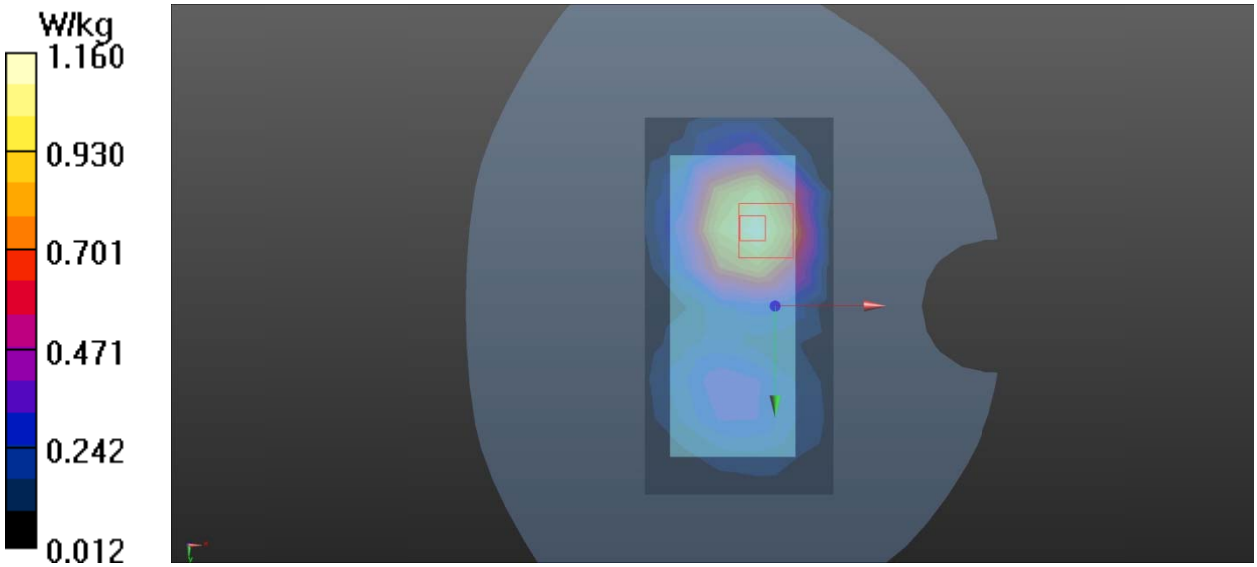
Back Side High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.90 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 1.37 W/kg

SAR(1 g) = 0.814 W/kg; SAR(10 g) = 0.487 W/kg

Maximum value of SAR (measured) = 1.16 W/kg



Plot 18 LTE Band 4 1RB Back Side Middle (Distance 10mm)

Date: 2022/5/24

Communication System: UID 0, LTE (0); Frequency: 1732.5 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 1732.5 MHz; σ = 1.313 S/m; ε_r = 39.384; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(8.22, 8.22, 8.22); Calibrated: 2021/8/12

Electronics: DAE4 SN1692; Calibrated: 2021/10/4

Phantom: SAM 1; Type: QD000P40CD; Serial: TP:1666

Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Back Side Middle/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.901 W/kg

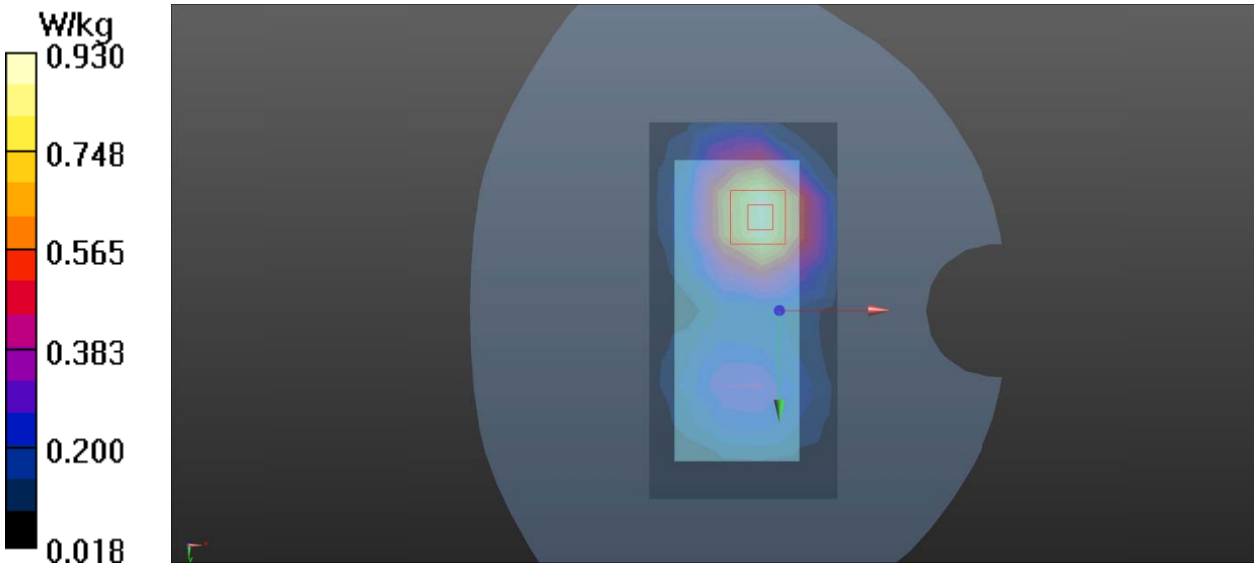
Back Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.578 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 1.11 W/kg

SAR(1 g) = 0.692 W/kg; SAR(10 g) = 0.411 W/kg

Maximum value of SAR (measured) = 0.930 W/kg



Plot 19 LTE Band 5 1RB Back Side High (Distance 10mm)

Date: 2022/5/23

Communication System: UID 0, LTE (0); Frequency: 844 MHz;Duty Cycle: 1:1

Medium parameters used: f = 844 MHz; σ = 0.958 S/m; ε_r = 39.728; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.50, 7.50, 7.50); Calibrated: 2021/8/12

Electronics: DAE4 SN1692; Calibrated: 2021/10/4

Phantom: SAM 1; Type: QD000P40CD; Serial: TP:1666

Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Back Side High/Area Scan (6x11x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.986 W/kg

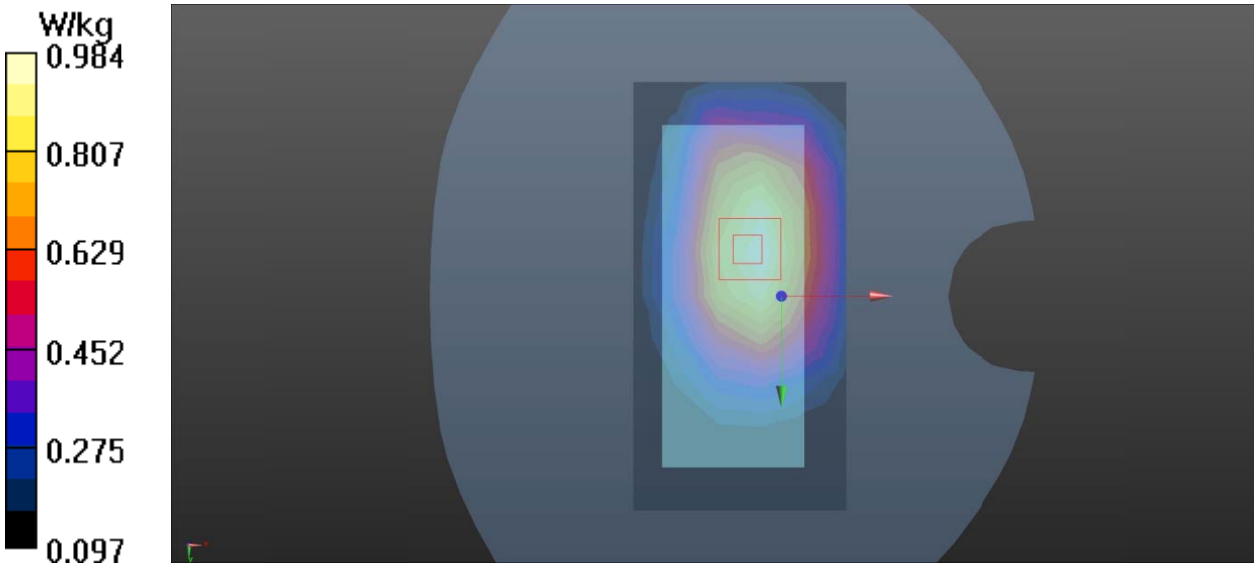
Back Side High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 27.01 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 1.13 W/kg

SAR(1 g) = 0.782 W/kg; SAR(10 g) = 0.558 W/kg

Maximum value of SAR (measured) = 0.984 W/kg



Plot 20 Bluetooth Right Edge Low (Distance 10mm)

Date: 2022/5/26

Communication System: UID 0, BT (0); Frequency: 2402 MHz;Duty Cycle: 1:2.17

Medium parameters used: f = 2402 MHz; σ = 1.789 S/m; ε_r = 37.77; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.50, 7.50, 7.50); Calibrated: 2021/8/12

Electronics: DAE4 SN1692; Calibrated: 2021/10/4

Phantom: SAM 1; Type: QD000P40CD; Serial: TP:1666

Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Right Edge Low/Area Scan (5x14x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.075 W/kg

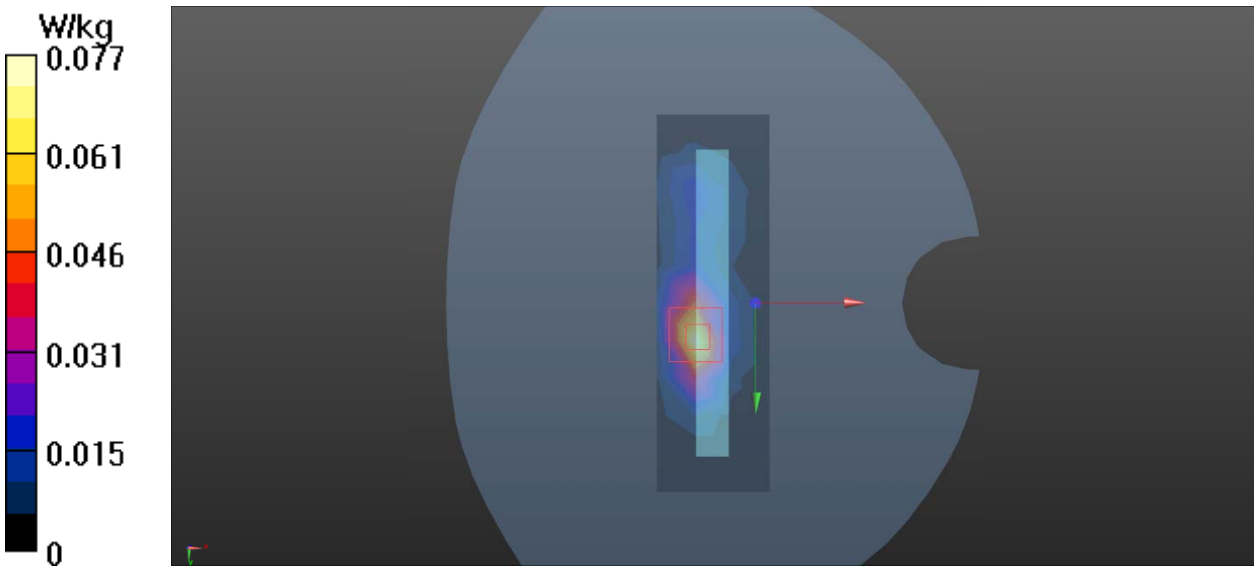
Right Edge Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.423 V/m; Power Drift = 0.110 dB

Peak SAR (extrapolated) = 0.152 W/kg

SAR(1 g) = 0.064 W/kg; SAR(10 g) = 0.027 W/kg

Maximum value of SAR (measured) = 0.077 W/kg



ANNEX D: Probe Calibration Certificate

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校准
CALIBRATION
CNAS L0570

Client TA(Shanghai) Certificate No: Z21-60285

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN : 3677
Calibration Procedure(s)	FF-Z11-004-02 Calibration Procedures for Dosimetric E-field Probes
Calibration date:	August 12, 2021

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)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	15-Jun-21(CTTL, No.J21X04466)	Jun-22
Power sensor NRP-Z91	101547	15-Jun-21(CTTL, No.J21X04466)	Jun-22
Power sensor NRP-Z91	101548	15-Jun-21(CTTL, No.J21X04466)	Jun-22
Reference 10dBAttenuator	18N50W-10dB	10-Feb-20(CTTL, No.J20X00525)	Feb-22
Reference 20dBAttenuator	18N50W-20dB	10-Feb-20(CTTL, No.J20X00526)	Feb-22
Reference Probe EX3DV4	SN 3617	27-Jan-21(SPEAG, No.EX3-3617_Jan21)	Jan-22
DAE4	SN 1556	15-Jan-21(SPEAG, No.DAE4-1556_Jan21)	Jan-22
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
SignalGenerator MG3700A	6201052605	16-Jun-21(CTTL, No.J21X04467)	Jun-22
Network Analyzer E5071C	MY46110673	21-Jan-21(CTTL, No.J20X00515)	Jan-22

	Name	Function	Signature
Calibrated by:	Yu Zongying	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: August 14, 2021

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

Certificate No: Z21-60285 Page 1 of 9

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Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A,B,C,D	modulation dependent linearization parameters
Polarization Φ	Φ rotation around probe axis
Polarization θ	θ rotation around an axis that is in the plane normal to probe axis (at measurement center), i θ=0 is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

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"

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization θ=0 (f≤900MHz in TEM-cell; f>1800MHz: waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below ConvF).
- *NORM(f)x,y,z = NORMx,y,z* frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics.
- *Ax,y,z; Bx,y,z; Cx,y,z;VRx,y,z:*A,B,C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f≤800MHz) and inside waveguide using analytical field distributions based on power measurements for f >800MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty valued are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from±50MHz to±100MHz.
- *Spherical isotropy (3D deviation from isotropy):* In a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset:* The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle:* The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

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DASY/EASY – Parameters of Probe: EX3DV4 – SN:3677

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (*k*=2)
Norm(μV/(V/m)²)[A]	0.41	0.46	0.40	±10.0%
DCP(mV)[B]	99.3	101.9	101.5	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (*k*=2)
0	CW	X	0.0	0.0	1.0	0.00	158.2	±2.0%
		Y	0.0	0.0	1.0		170.4	
		Z	0.0	0.0	1.0		156.9	

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%.

[A] The uncertainties of Norm X, Y, Z do not affect the E^2-field uncertainty inside TSL (see Page 4).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainly is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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DASY/EASY – Parameters of Probe: EX3DV4 – SN:3677

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz][C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unct. (k=2)
750	41.9	0.89	9.64	9.64	9.64	0.40	0.80	±12.1%
835	41.5	0.90	9.30	9.30	9.30	0.16	1.29	±12.1%
1750	40.1	1.37	8.22	8.22	8.22	0.24	1.00	±12.1%
1900	40.0	1.40	7.88	7.88	7.88	0.24	1.10	±12.1%
2000	40.0	1.40	7.96	7.96	7.96	0.21	1.17	±12.1%
2300	39.5	1.67	7.67	7.67	7.67	0.66	0.68	±12.1%
2450	39.2	1.80	7.50	7.50	7.50	0.66	0.70	±12.1%
2600	39.0	1.96	7.25	7.25	7.25	0.62	0.73	±12.1%
3300	38.2	2.71	7.00	7.00	7.00	0.45	0.94	±13.3%
3500	37.9	2.91	6.92	6.92	6.92	0.45	0.98	±13.3%
3700	37.7	3.12	6.71	6.71	6.71	0.45	1.04	±13.3%
3900	37.5	3.32	6.62	6.62	6.62	0.40	1.25	±13.3%
4100	37.2	3.53	6.66	6.66	6.66	0.30	1.38	±13.3%
4400	36.9	3.84	6.43	6.43	6.43	0.35	1.35	±13.3%
4600	36.7	4.04	6.35	6.35	6.35	0.50	1.13	±13.3%
4800	36.4	4.25	6.30	6.30	6.30	0.45	1.25	±13.3%
4950	36.3	4.40	6.13	6.13	6.13	0.45	1.25	±13.3%
5250	35.9	4.71	5.45	5.45	5.45	0.50	1.30	±13.3%
5600	35.5	5.07	5.00	5.00	5.00	0.60	1.15	±13.3%
5750	35.4	5.22	5.04	5.04	5.04	0.55	1.26	±13.3%

[C] Frequency validity above 300 MHz of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[F] At frequency below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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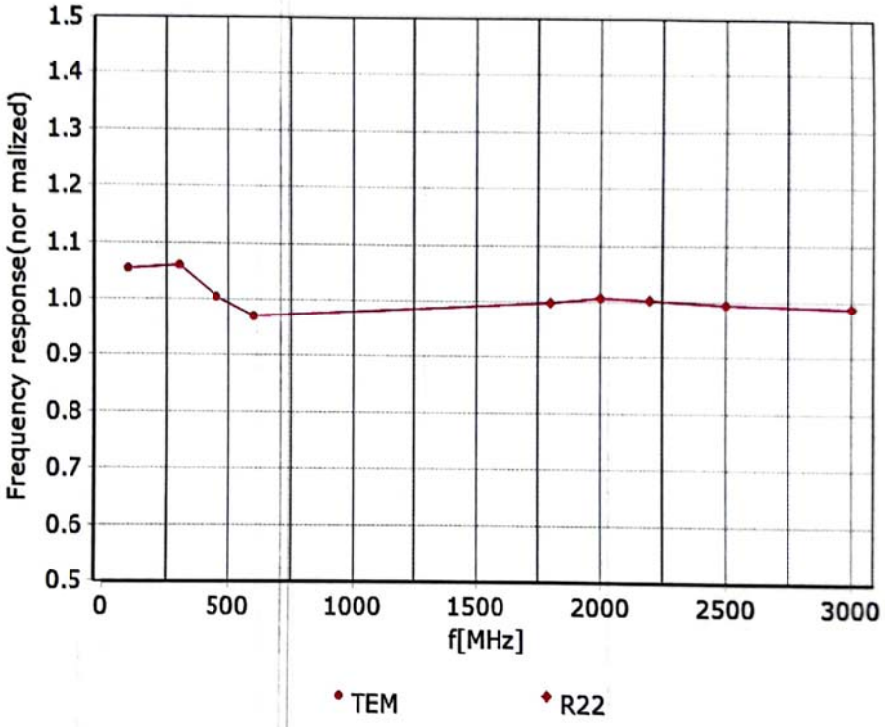
Frequency Response of E-Field
(TEM-Cell: ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ±7.4% (*k*=2)

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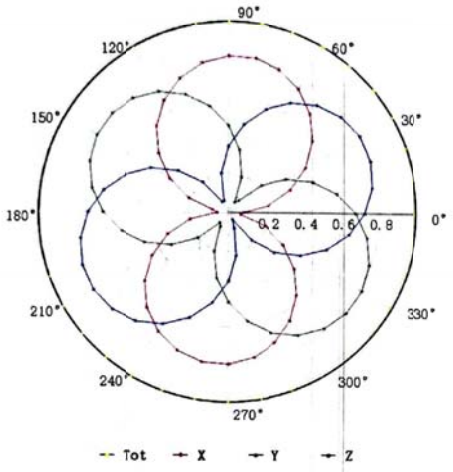
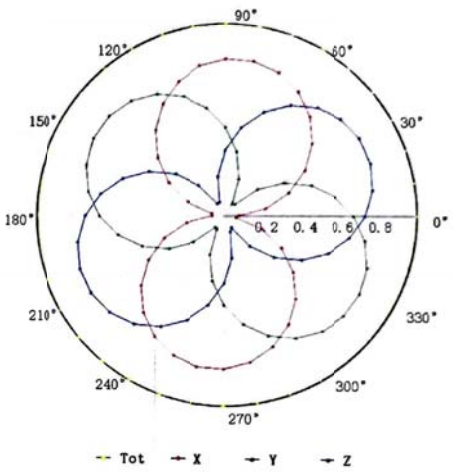
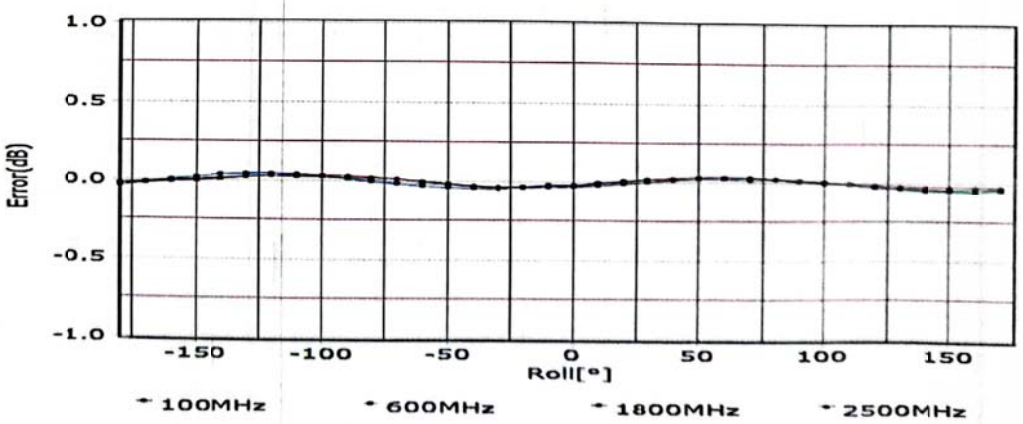
Receiving Pattern (Φ), θ=0°

f=600 MHz, TEM



f=1800 MHz, R22





Uncertainty of Axial Isotropy Assessment: ±1.2% (k=2)

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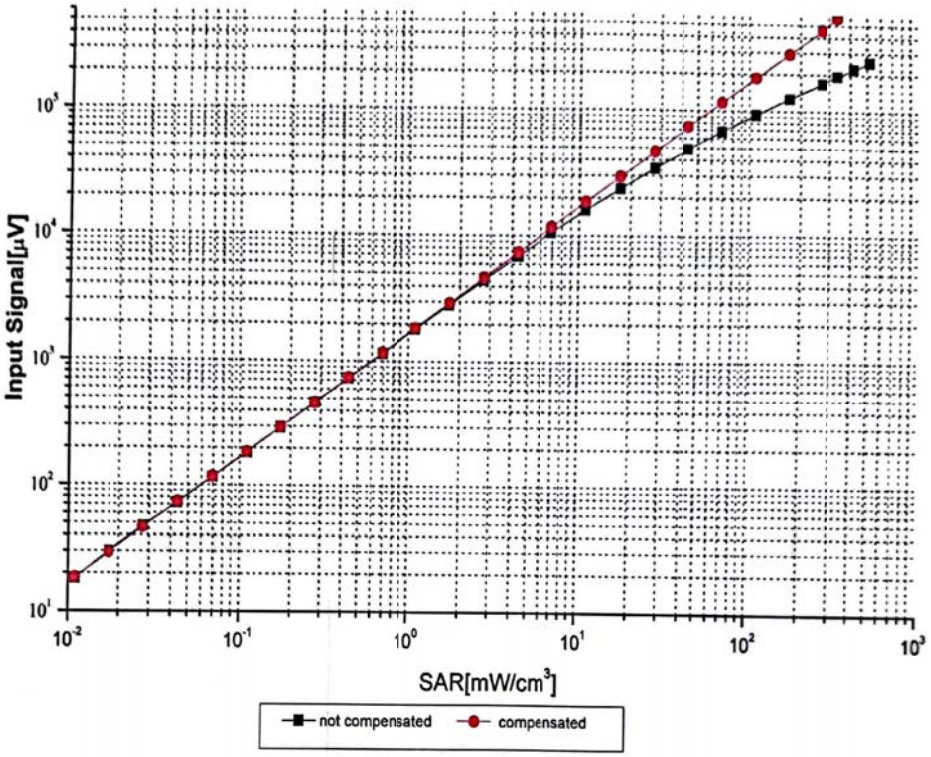
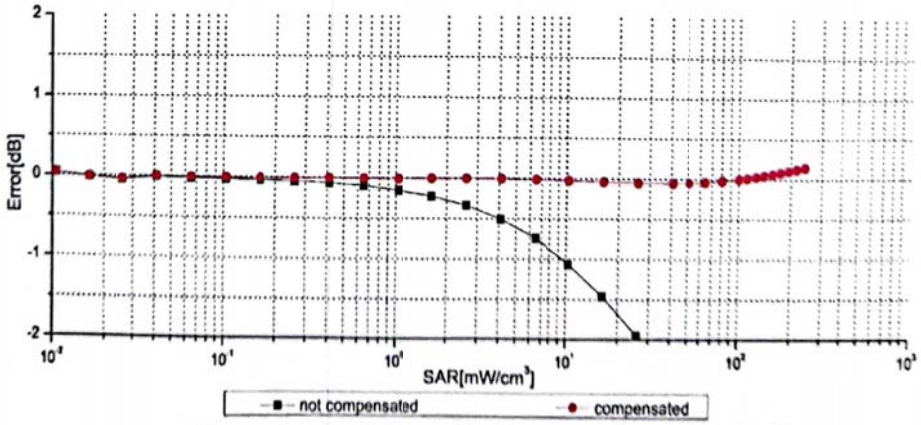
Dynamic Range f(SAR$_{head}$)
(TEM cell, f = 900 MHz)





Uncertainty of Linearity Assessment: ±0.9% (*k*=2)

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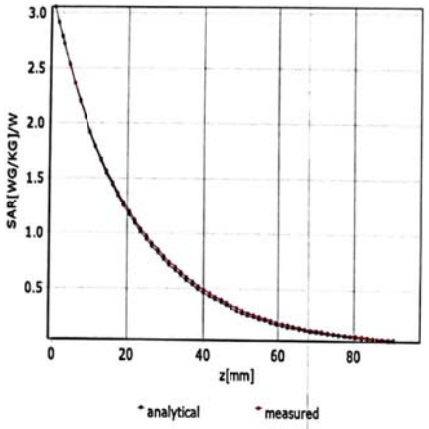
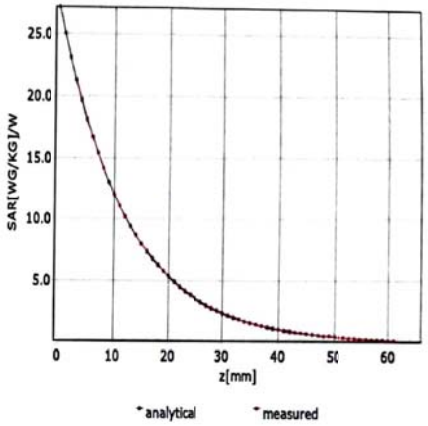
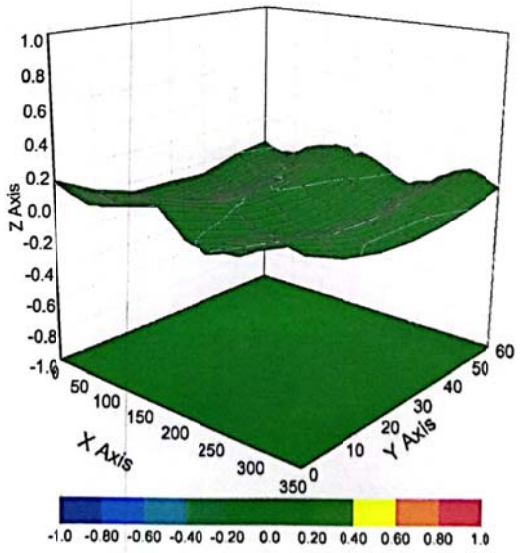
Conversion Factor Assessment

f=750 MHz,WGLS R9(H_convF) **f=1750 MHz,WGLS R22(H_convF)**





Deviation from Isotropy in Liquid



Uncertainty of Spherical Isotropy Assessment: ±3.2% (*k*=2)

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DASY/EASY – Parameters of Probe: EX3DV4 – SN:3677

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	117.4
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disable
Probe Overall Length	337mm
Probe Body Diameter	10mm
Tip Length	9mm
Tip Diameter	2.5mm
Probe Tip to Sensor X Calibration Point	1mm
Probe Tip to Sensor Y Calibration Point	1mm
Probe Tip to Sensor Z Calibration Point	1mm
Recommended Measurement Distance from Surface	1.4mm

ANNEX E: D750V3 Dipole Calibration Certificate

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Client TA(Shanghai) Certificate No: Z20-60299

CALIBRATION CERTIFICATE

Object	D750V3 - SN: 1045
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	August 28, 2020

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)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	106276	12-May-20 (CTTL, No.J20X02965)	May-21
Power sensor NRP6A	101369	12-May-20 (CTTL, No.J20X02965)	May-21
Reference Probe EX3DV4	SN 3617	30-Jan-20(SPEAG,No.EX3-3617_Jan20)	Jan-21
DAE4	SN 771	10-Feb-20(CTTL-SPEAG,No.Z20-60017)	Feb-21
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	25-Feb-20 (CTTL, No.J20X00516)	Feb-21
NetworkAnalyzer E5071C	MY46110673	10-Feb-20 (CTTL, No.J20X00515)	Feb-21

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: September 3, 2020

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Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,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 assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
d) KDB865664, 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%.

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Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
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Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.3 ± 6 %	0.87 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.07 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.37 W/kg ± 18.8 % (*k*=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.57 W/kg ± 18.7 % (*k*=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.4 ± 6 %	0.94 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.12 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.58 W/kg ± 18.8 % (*k*=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.41 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.70 W/kg ±18.7 % (*k*=2)**

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.3Ω- 2.29jΩ
Return Loss	- 26.6dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.7Ω- 4.58jΩ
Return Loss	- 25.6dB

General Antenna Parameters and Design

Electrical Delay (one direction)	0.900 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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E-mail: cttl@chinattl.com http://www.chinattl.cn

DASY5 Validation Report for Head TSL Date: 08.28.2020

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1045

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium parameters used: f = 750 MHz; σ = 0.873 S/m; ε_r = 41.28; ρ = 1000 kg/m^3

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(10.07, 10.07, 10.07) @ 750 MHz; Calibrated: 2020-01-30
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2020-02-10
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

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

Reference Value = 54.97 V/m; Power Drift = -0.02 dB

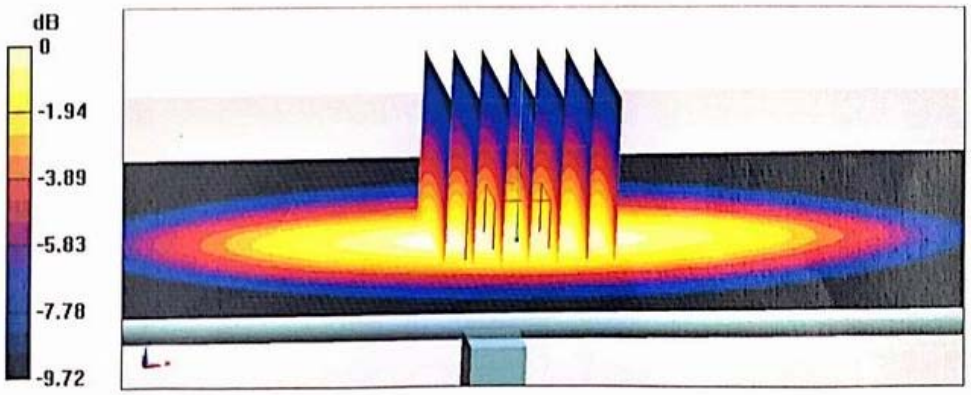
Peak SAR (extrapolated) = 3.00 W/kg

SAR(1 g) = 2.07 W/kg; SAR(10 g) = 1.38 W/kg

Smallest distance from peaks to all points 3 dB below: Larger than measurement grid

Ratio of SAR at M2 to SAR at M1 = 68.7%

Maximum value of SAR (measured) = 2.71 W/kg



0 dB = 2.71 W/kg = 4.33 dBW/kg

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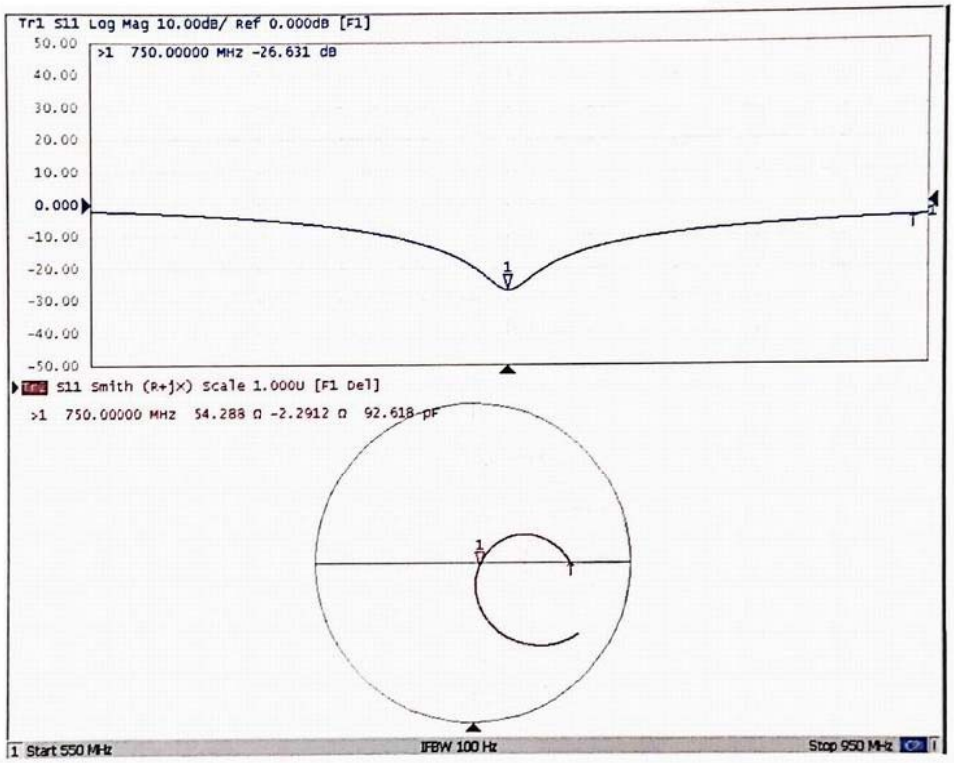
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL Date: 08.28.2020

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1045

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium parameters used: f = 750 MHz; σ = 0.94 S/m; ε_r = 54.36; ρ = 1000 kg/m^3

Phantom section: Center Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(9.8, 9.8, 9.8) @ 750 MHz; Calibrated: 2020-01-30
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2020-02-10
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

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

Reference Value = 53.84 V/m; Power Drift = -0.02 dB

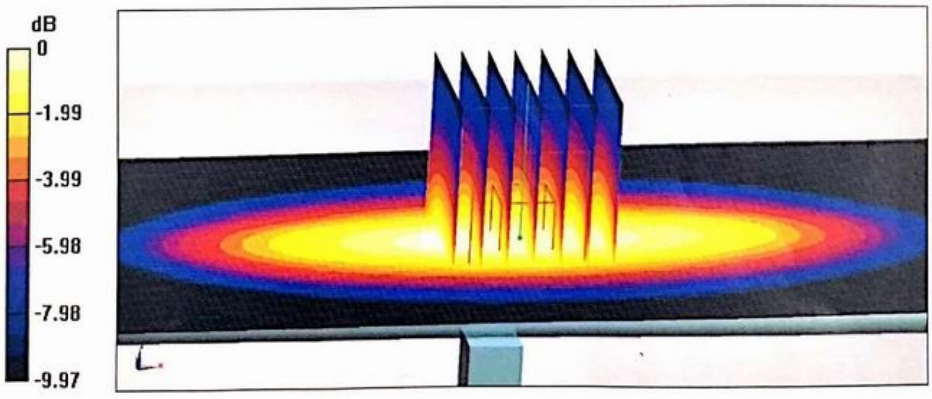
Peak SAR (extrapolated) = 3.14 W/kg

SAR(1 g) = 2.12 W/kg; SAR(10 g) = 1.41 W/kg

Smallest distance from peaks to all points 3 dB below = 18.4 mm

Ratio of SAR at M2 to SAR at M1 = 67.9%

Maximum value of SAR (measured) = 2.80 W/kg



0 dB = 2.80 W/kg = 4.47 dBW/kg

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