SAR TEST REPORT

Applicant	TCL Communication Ltd.
FCC ID	2ACCJH154
Product	GSM/UMTS/LTE Mobile phone
Model	6165H
Report No.	R2112A1154-S1
Issue Date	January 13, 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.

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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
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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-worn	1g SAR Hotspot	Product Specific 10-g SAR
GSM 850	0.102	0.159	0.269	NA
GSM 1900	0.065	0.250	**0.819**	NA
WCDMA Band II	0.149	0.519	0.753	2.183
WCDMA Band V	**0.920**	0.180	0.180	NA
LTE FDD 5	0.659	0.191	0.191	NA
LTE FDD 7	0.116	**0.704**	0.704	**2.751**
LTE TDD 41	0.077	0.455	0.570	NA
Wi-Fi (2.4G)	0.499	0.200	0.200	NA
BT	0.151	NA	NA	NA
Date of Testing: (Original) November 24, 2021~ December 8, 2021 (Variant) December 29, 2021 Date of Sample Received: (Original) November 18, 2021 (Variant) November 26, 2021				
Note: 1. The device is in compliance with SAR for Uncontrolled Environment /General Population exposure limits (1.6 W/kg and 4.0 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-worn	1g SAR Hotspot	Product Specific 10-g SAR
Highest Simultaneous Transmission SAR (W/kg)	1.142	0.904	1.083	2.962
Note: The detail for simultaneous transmission consideration is described in chapter 10.4.				

6165H (Report No.: R2112A1154-S1) is a variant model of 6102H (Report No.: R2111A1006-S1). Product changed Software Version. The detailed product change description please refers to the *Declaration of changes from 6102H to 6165H.*

Tested band refer to the following table.

<table>
<tr><th>Band</th><th>Original</th><th>Variant</th></tr>
<tr><td>GSM 850</td><td>Pass</td><td rowspan="8">Only tested with worst case of Original</td></tr>
<tr><td>GSM 1900</td><td>Pass</td></tr>
<tr><td>WCDMA Band II</td><td>Pass</td></tr>
<tr><td>WCDMA Band V</td><td>Pass</td></tr>
<tr><td>LTE FDD 5</td><td>Pass</td></tr>
<tr><td>LTE FDD 7</td><td>Pass</td></tr>
<tr><td>LTE FDD 41</td><td>Pass</td></tr>
<tr><td>Wi-Fi (2.4G)</td><td>Pass</td></tr>
<tr><td>BT</td><td>/</td><td>/</td></tr>
</table>

3 Description of Equipment under Test

Client Information

Applicant	TCL Communication Ltd.
Applicant address	5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
Manufacturer	TCL Communication Ltd.
Manufacturer address	5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong

General Technologies

Application Purpose	Class II Permissive Change (C2PC)	
EUT Stage	Identical Prototype	
Model	6165H	
IMEI	Original	IMEI1:359920710201696 IMEI2:359920710201704
	Variant	IMEI1:352555500003634 IMEI2: 352555500003642
Hardware Version	05	
Software Version	1A50	
Antenna Type	Internal Antenna	
Device Class	B	
Wi-Fi Hotspot	Wi-Fi 2.4G	
Power Class	GSM 850: 4 GSM 1900: 1 UMTS Band II/V: 3 LTE FDD 5/7: 3 LTE TDD 41:3	
Power Level	GSM 850: level 5 GSM 1900: level 0 UMTS Band II/ V: all up bits LTE FDD 5/7: max power LTE TDD 41: max power	
EUT Accessory		
Battery 1	Manufacturer: Ningbo Veken Battery Company Limited Model: CAC4850002C7	
Battery 2	Manufacturer: Huizhou BYD Electronic Co., Ltd. Model: CAC4850000C1	
Earphone 1	Manufacturer: JUWEI ELECTRONICS CO., LTD Model: CCB0046A15C1	

Earphone 2	Manufacturer: JUWEI ELECTRONICS CO., LTD Model: CCB0049A12C1
Note: The EUT is sent from the applicant to TA and the information of the EUT is declared by the applicant.	

Wireless Technology and Frequency Range

<table>
<tr><th colspan="2">Wireless Technology</th><th>Modulation</th><th>Operating mode</th><th>Tx (MHz)</th></tr>
<tr><td rowspan="3">GSM</td><td>850</td><td rowspan="2">Voice(GMSK)
GPRS(GMSK)
EGPRS(GMSK,8PSK)</td><td rowspan="2">☐Multi-slot Class:8-1UP
☐Multi-slot Class:10-2UP
☒Multi-slot Class:12-4UP
☐Multi-slot Class:33-4UP</td><td>824 ~ 849</td></tr>
<tr><td>1900</td><td>1850 ~ 1910</td></tr>
<tr><td colspan="4">Does this device support DTM (Dual Transfer Mode)? ☐Yes ☒No</td></tr>
<tr><td rowspan="2">UMTS</td><td>Band II</td><td rowspan="2">QPSK, 16QAM</td><td rowspan="2">HSUPA UE Category:7
HSDPA UE Category:24
DC-HSDPA UE Category:24
HSPA+ Category:14</td><td>1850 ~ 1910</td></tr>
<tr><td>Band V</td><td>824 ~ 849</td></tr>
<tr><td rowspan="5">LTE</td><td>FDD 5</td><td rowspan="3">QPSK, 16QAM,
64QAM</td><td rowspan="3">Rel.11 /Category4</td><td>824 ~ 849</td></tr>
<tr><td>FDD 7</td><td>2500 ~ 2570</td></tr>
<tr><td>TDD 41</td><td>2496 ~ 2690</td></tr>
<tr><td colspan="4">Does this device support Carrier Aggregation (CA) ☐Yes ☒No</td></tr>
<tr><td colspan="4">Does this device support SV-LTE (1xRTT-LTE)? ☐Yes ☒No</td></tr>
<tr><td>BT</td><td>2.4G</td><td colspan="2">Version 5.0 BR/EDR + LE</td><td>2402 ~2480</td></tr>
<tr><td rowspan="3">Wi-Fi</td><td rowspan="2">2.4G</td><td>DSSS, OFDM</td><td>802.11b/g/n HT20</td><td>2412 ~ 2462</td></tr>
<tr><td>OFDM</td><td>802.11n HT40</td><td>2422 ~ 2452</td></tr>
<tr><td colspan="4">Does this device support MIMO ☐Yes ☒No</td></tr>
<tr><td>NFC</td><td colspan="4">13.56MHz</td></tr>
</table>

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:

IEC 62209-1

Reference Standards

KDB 248227 D01 802.11Wi-Fi SAR v02r02
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
KDB 941225 D05A LTE Rel.10 KDB Inquiry Sheet v01r02
KDB 941225 D06 Hotspot Mode v02r01

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 Repeateded 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.

5.1.3 Phablet SAR test considerations

For smart phones, with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm, that can provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets and support voice calls next to the ear, unless it is confirmed otherwise through KDB inquiries, the following phablet procedures should be applied to evaluate SAR compliance for each applicable wireless modes and frequency band. Devices marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance.

a) The normally required head and body-worn accessory SAR test procedures for handsets, including hotspot mode, must be applied.

b) The UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge, in direct contact with a flat phantom, for product specific 10-g SAR according to the body-equivalent tissue dielectric parameters in KDB Publication 865664 D01 to address interactive hand use exposure conditions. The 1-g SAR at 5 mm for UMPC mini-tablets is not required. When hotspot mode applies, product specific 10-g SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg; however, when power reduction applies to hotspot mode the measured SAR must be scaled to the maximum output power, including tolerance, allowed for phablet modes to compare with the 1.2 W/kg SAR test reduction threshold. The normal tablet procedures in KDB Publication 616217 are required when the overall diagonal dimension of the device is > 20.0 cm. Hotspot mode SAR is not required when normal tablet procedures are applied. Product specific 10-g SAR is also not required for the front (top) surface of larger form factor full size tablets. The more conservative normal tablet SAR results can be used to support phablet mode product specific 10-g SAR.

c) The simultaneous transmission operating configurations applicable to voice and data transmissions for both phone and mini-tablet modes must be taken into consideration separately for 1-g and 10-g SAR to determine the simultaneous transmission SAR test exclusion and measurement requirements for the relevant wireless modes and exposure conditions.

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⇔A_{hs} = β_{hs}/β_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.

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} = β_{hs}/β_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)						

5.3.2.6 HSPA, HSPA+ and DC-HSDPA Test Configuration

SAR test exclusion may apply to 3GPP Rel. 6 HSPA and Rel. 8 DC-HSDPA. When SAR measurement is required for HSPA or DC-HSDPA, a KDB inquiry is required to confirm that the wireless mode configurations in the test setup have remained stable throughout the SAR measurements. Without prior KDB confirmation to determine the SAR results are acceptable, a PAG is required for equipment approval.

SAR test exclusion for HSPA, HSPA+ and DC-HSDPA is determined according to the following:

1) The HSPA procedures are applied to configure 3GPP Rel. 6 HSPA devices in the required sub-test mode(s) to determine SAR test exclusion.

2) SAR is required for Rel. 7 HSPA+ when SAR is required for Rel. 6 HSPA; otherwise, the 3G SAR test reduction procedure is applied to (uplink) HSPA+ with 12.2 kbps RMC as the primary mode. Power is measured for HSPA+ that supports uplink 16 QAM according to configurations in Table C.11.1.4 of 3GPP TS 34.121-1 to determine SAR test reduction.

3) SAR is required for Rel. 8 DC-HSDPA when SAR is required for Rel. 5 HSDPA; otherwise, the 3G SAR test reduction procedure is applied to DC-HSDPA with 12.2 kbps RMC as the primary mode. Power is measured for DC-HSDPA according to the H-Set 12, FRC configuration in Table C.8.1.12 of 3GPP TS 34.121-1 to determine SAR test reduction. A primary and a secondary serving HS-DSCH Cell are required to perform the power measurement and for the results to be acceptable.

4) Regardless of whether a PBA is required, the following information must be verified and included in the SAR report for devices supporting HSPA, HSPA+ or DC-HSDPA:

a) The output power measurement results and applicable release version(s) of 3GPP TS 34.121. Power measurement difficulties due to test equipment setup or availability must be resolved between the grantee and its test lab.

b) The power measurement results are in agreement with the individual device implementation and specifications. When Enhanced MPR (E-MPR) applies, the normal MPR targets may be modified according to the Cubic Metric (CM) measured by the device, which must be taken into consideration.

c) The UE category, operating parameters, such as the β and Δ values used to configure the device for testing, power setback procedures described in 3GPP TS 34.121 for the power measurements, and HSPA/HSPA+ channel conditions (active and stable) for the entire duration of the measurement according to the required E-TFCI and AG index values.

5) When SAR measurement is required, the test configurations, procedures and power measurement

results must be clearly described to confirm that the required test parameters are used, including E-TFCI and AG index stability and output power conditions.

Table 7: HS-DSCH UE category

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

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 Additional requirements for TDD LTE specification

For Time-Division Duplex (TDD) systems, SAR must be tested using a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by the defined 3GPP LTE TDD configurations.

TDD LTE Band supports 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table:

Uplink-downlink configurations for uplink-downlink configurations and Table: Configuration of special subframe (lengths of DwPTS/GP/UpPTS) for Special subframe configurations.

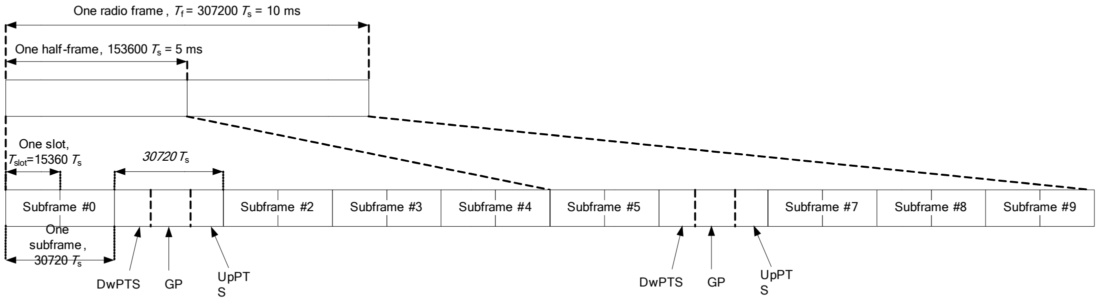


Figure 1: Frame structure type 2

Table 8: Configuration of special subframe (lengths of DwPTS/GP/UpPTS)

<table>
<tr><th rowspan="3">Special subframe configuration</th><th colspan="3">Normal cyclic prefix in downlink</th><th colspan="3">Extended cyclic prefix in downlink</th></tr>
<tr><th rowspan="2">DwPTS</th><th colspan="2">UpPTS</th><th rowspan="2">DwPTS</th><th colspan="2">UpPTS</th></tr>
<tr><th>Normal cyclic prefix in uplink</th><th>Extended cyclic prefix in uplink</th><th>Normal cyclic prefix in uplink</th><th>Extended cyclic prefix in uplink</th></tr>
<tr><td>0</td><td>$6592 \cdot T_s$</td><td rowspan="5">$2192 \cdot T_s$</td><td rowspan="5">$2560 \cdot T_s$</td><td>$7680 \cdot T_s$</td><td rowspan="4">$2192 \cdot T_s$</td><td rowspan="4">$2560 \cdot T_s$</td></tr>
<tr><td>1</td><td>$19760 \cdot T_s$</td><td>$20480 \cdot T_s$</td></tr>
<tr><td>2</td><td>$21952 \cdot T_s$</td><td>$23040 \cdot T_s$</td></tr>
<tr><td>3</td><td>$24144 \cdot T_s$</td><td>$25600 \cdot T_s$</td></tr>
<tr><td>4</td><td>$26336 \cdot T_s$</td><td>$7680 \cdot T_s$</td><td rowspan="4">$4384 \cdot T_s$</td><td rowspan="4">$5120 \cdot T_s$</td></tr>
<tr><td>5</td><td>$6592 \cdot T_s$</td><td rowspan="5">$4384 \cdot T_s$</td><td rowspan="5">$5120 \cdot T_s$</td><td>$20480 \cdot T_s$</td></tr>
<tr><td>6</td><td>$19760 \cdot T_s$</td><td>$23040 \cdot T_s$</td></tr>
<tr><td>7</td><td>$21952 \cdot T_s$</td><td>$12800 \cdot T_s$</td></tr>
<tr><td>8</td><td>$24144 \cdot T_s$</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>9</td><td>$13168 \cdot T_s$</td><td>-</td><td>-</td><td>-</td></tr>
</table>

Table 9: Uplink-downlink configurations

Uplink-downlink configuration	Downlink-to-Uplink Switch-point periodicity	Subframe number									
		0	1	2	3	4	5	6	7	8	9
0	5 ms	D	S	U	U	U	D	S	U	U	U
1	5 ms	D	S	U	U	D	D	S	U	U	D
2	5 ms	D	S	U	D	D	D	S	U	D	D
3	10 ms	D	S	U	U	U	D	D	D	D	D
4	10 ms	D	S	U	U	D	D	D	D	D	D
5	10 ms	D	S	U	D	D	D	D	D	D	D
6	5 ms	D	S	U	U	U	D	S	U	U	D

According to Figure 1, one radio frame is configured by 10 subframes, which consist of Uplink-subframe, Downlink-subframe and Special subframe. For TDD-LTE, the Duty Cycle should be calculated on Uplink-subframes and Special subframes, due to Special subframe containing both Uplink transmissions. So for one radio frame, Duty Cycle can be calculated with formula as below. The count of Uplink subframes are according to Table: Uplink-downlink configurations:

Duty cycle = (30720Ts*Ups + Uplink Component*Specials)/(307200Ts)

About the uplink component of Special subframes, we can figure out by Table: Configuration of special subframe (lengths of DwPTS/GP/UpPTS):

Uplink Component = UpPTS

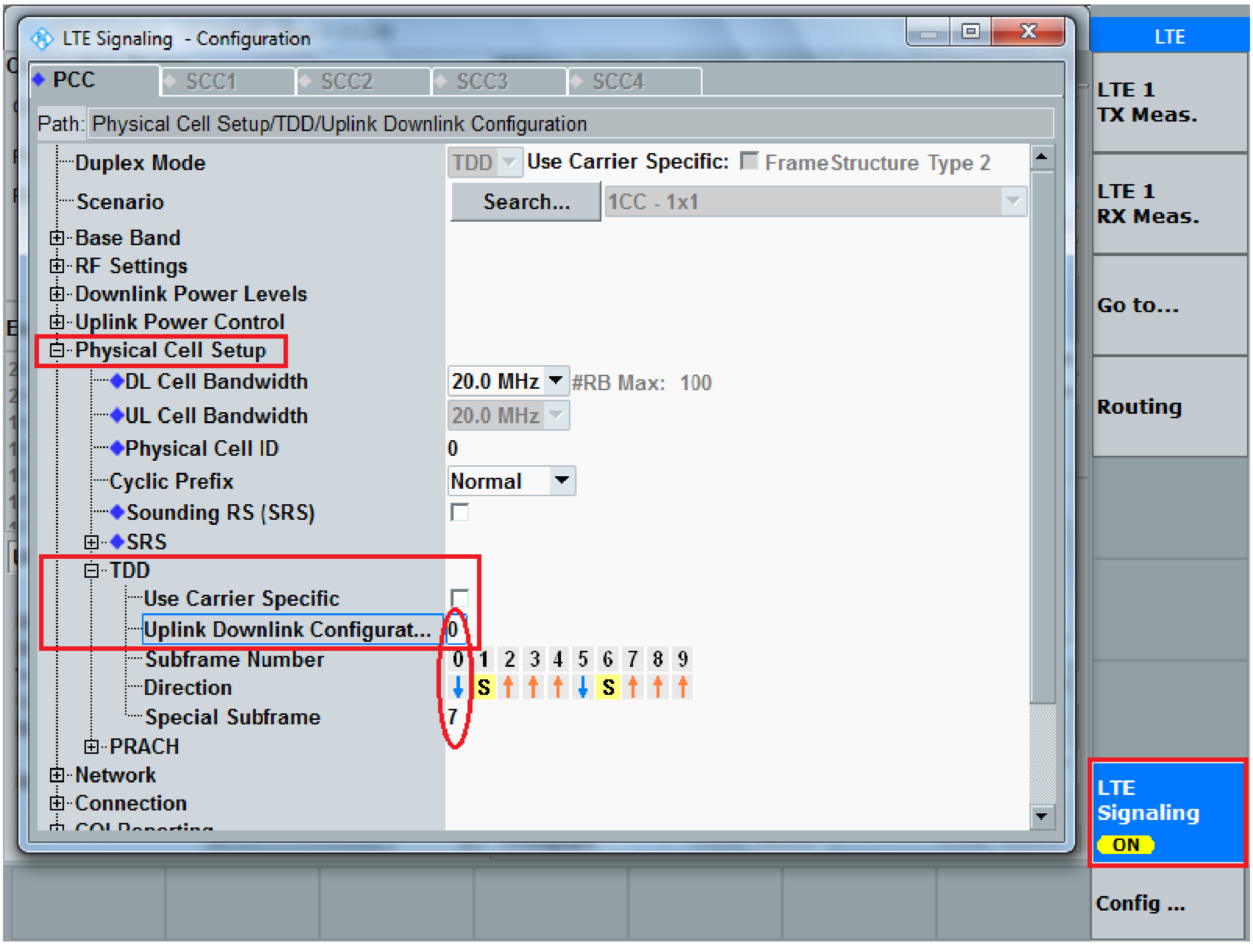
In conclusion, for the TDD LTE Band, Duty Cycle can be calculated with formula as below. All these sets are ok when we test, or we can set as below.

Duty cycle = [(30720Ts*Ups) + UpPTS *Specials]/(307200Ts)

And we can get different Duty cycles under different configurations:

Uplink-downlink configuration	Subframe number			Configuration of special subframe							
				Normal cyclic prefix in downlink				Extended cyclic prefix in downlink			
				Normal cyclic prefix in uplink		Extended cyclic prefix in uplink		Normal cyclic prefix in uplink		Extended cyclic prefix in uplink	
	D	S	U	configuration 0~4	configuration 5~9	configuration 0~4	configuration 5~9	configuration 0~3	configuration 4~7	configuration 0~3	configuration 4~7
0	2	2	6	61.43%	62.85%	61.67%	63.33%	61.43%	62.85%	61.67%	63.33%
1	4	2	4	41.43%	42.85%	41.67%	43.33%	41.43%	42.85%	41.67%	43.33%
2	6	2	2	21.43%	22.85%	21.67%	23.33%	21.43%	22.85%	21.67%	23.33%
3	6	1	3	30.71%	31.43%	30.83%	31.67%	30.71%	31.43%	30.83%	31.67%
4	7	1	2	20.71%	21.43%	20.83%	21.67%	20.71%	21.43%	20.83%	21.67%
5	8	1	1	10.71%	11.43%	10.83%	11.67%	10.71%	11.43%	10.83%	11.67%
6	3	2	5	51.43%	52.85%	51.67%	53.33%	51.43%	52.85%	51.67%	53.33%

SAR test Plan: For TDD LTE, SAR should be tested with the highest transmission duty factor (63.33%) using Uplink-downlink configuration 0 and Special subframe configuration 7 for Frame structure type


LTE Signaling - Configuration
PCC
SCC1
SCC2
SCC3
SCC4
Path: Physical Cell Setup/TDD/Uplink Downlink Configuration
Duplex Mode
TDD
Use Carrier Specific:
Frame Structure Type 2
Scenario
Search...
1CC - 1x1
Base Band
RF Settings
Downlink Power Levels
Uplink Power Control
Physical Cell Setup
DL Cell Bandwidth
20.0 MHz
#RB Max: 100
UL Cell Bandwidth
20.0 MHz
Physical Cell ID
0
Cyclic Prefix
Normal
Sounding RS (SRS)
SRS
TDD
Use Carrier Specific
Uplink Downlink Configurat...
0
Subframe Number
0 1 2 3 4 5 6 7 8 9
Direction
S
S
Special Subframe
7
PRACH
Network
Connection
LTE
LTE 1 TX Meas.
LTE 1 RX Meas.
Go to...
Routing
LTE Signaling
ON
Config ...

5.3.5 Wi-Fi Test Configuration

SAR test reduction for 802.11 Wi-Fi transmission mode configurations are considered separately for DSSS and OFDM. An initial test position is determined to reduce the number of tests required for certain exposure configurations with multiple test positions. An initial test configuration is determined for each frequency band and aggregated band according to maximum output power, channel bandwidth, wireless mode configurations and other operating parameters to streamline the measurement requirements. For 2.4 GHz DSSS, either the initial test position or DSSS procedure is applied to reduce the number of SAR tests; These are mutually exclusive. For OFDM, an initial test position is only applicable to next to the ear, UMPC mini-tablet and hotspot mode configurations, which is tested using the initial test configuration to facilitate test reduction. For other exposure conditions with a fixed test position, SAR test reduction is determined using only the initial test configuration.

The multiple test positions require SAR measurements in head, hotspot mode or UMPC mini-tablet configurations may be reduced according to the highest reported SAR determined using the *initial test position(s)* by applying the DSSS or OFDM SAR measurement procedures in the required wireless mode test configuration(s). The *initial test position(s)* is measured using the highest measured maximum output power channel in the required wireless mode test configuration(s). When the *reported* SAR for the *initial test position* is:

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

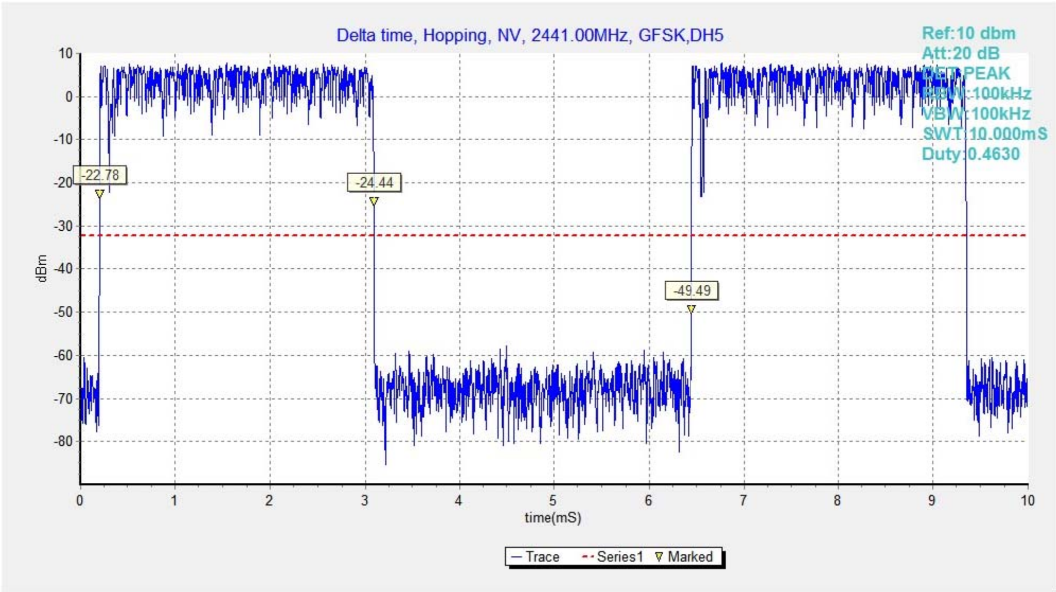
To determine the initial test position, Area Scans were performed to determine the position with the Maximum Value of SAR (measured). The position that produced the highest Maximum Value of SAR is considered the worst case position; thus used as the initial test position.

A Wi-Fi device must be configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools for SAR measurement.

5.3.6 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:



5.3.7 Power reduction detection mechanism specification

This device support the receiver detection mechanism, the main purpose is to minimize triggering associated with power reduction scenarios by receiver detection mechanisms and provide enhanced user experience. It uses the receiver to indicate whether the user is making a call in head scenario or not. The selection between head and body power levels is based on the receiver detection mechanism. It can determine proximity to head or body and set the relevant power level for 2G&3G&4G and Wi-Fi antennas accordingly.

In addition, when WWAN ANT and Wi-Fi ANT are transmitted at the same time, the power of the Wi-Fi ant is reduced.

More details information followings:

Main Antenna			Power Reduction Level Amount (dBm)				
Power Reduction Scenario		Receiver	GSM850	GSM1900	UMTS B2	LTE B7	LTE B41
Full power			33.30	30.30	25.50	24.00	24.00
Standalone		on	0.00	0.00	0.00	0.00	0.00
		off	0.00	0.00	3.00	3.00	0.00
Simultaneous	Wi-Fi on	on	0.00	0.00	0.00	0.00	0.00
		off	0.00	0.00	3.00	3.00	0.00

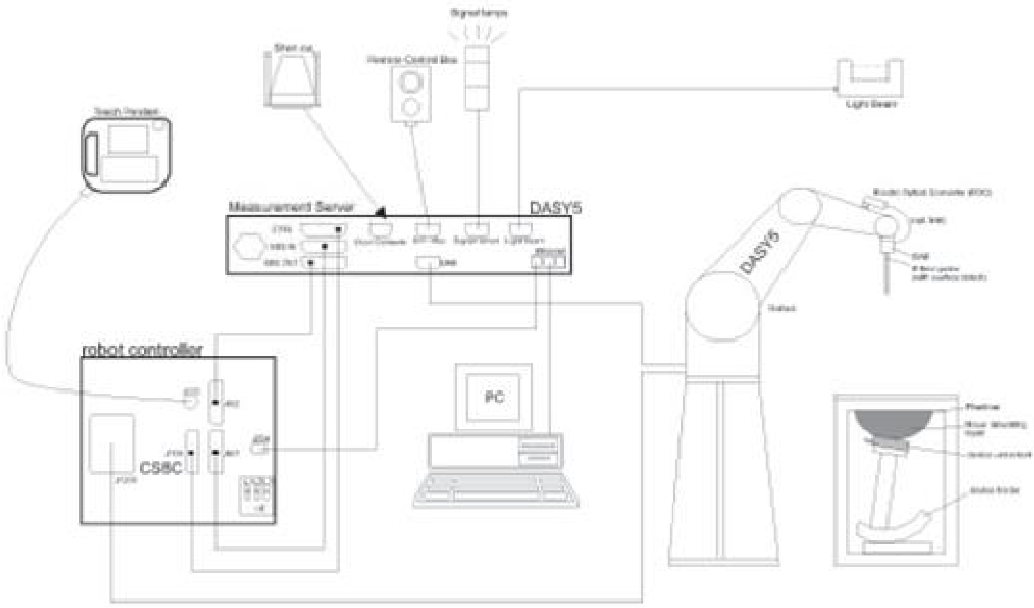
Div Antenna			Power Reduction Level Amount (dBm)	
Power Reduction Scenario		Receiver	UMTS B5	LTE B5
Full power			25.00	24.30
Standalone		on	0.00	0.00
		off	0.00	0.00
Simultaneous	Wi-Fi on	on	0.00	0.00
		off	0.00	0.00

Wi-Fi Antenna		Power Reduction Level Amount (dBm)			
Power Reduction Scenario	Cellular TX	WiFi 2.4G 11b	WiFi 2.4G 11g	WiFi 2.4G 11n HT20	WiFi 2.4G 11n HT40
Full power		18.00	15.50	15.50	15.00
Standalone	off	0.00	0.00	0.00	0.00
Simultaneous with 2G&3G&4G	on	6.00	6.00	6.00	6.00
	off	0.00	0.00	0.00	0.00

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.

<table>
<tr><th></th><th>≤3 GHz</th><th>> 3 GHz</th></tr>
<tr><td>Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 ± 1 mm</td><td>½·δ·ln(2) ± 0.5 mm</td></tr>
<tr><td>Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td rowspan="2">Maximum area scan spatial resolution: ΔxArea, ΔyArea</td><td>≤ 2 GHz: ≤ 15 mm
2 – 3 GHz: ≤ 12 mm</td><td>3 – 4 GHz: ≤ 12 mm
4 – 6 GHz: ≤ 10 mm</td></tr>
<tr><td colspan="2">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.</td></tr>
</table>

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><th colspan="3"></th><th>≤3GHz</th><th>> 3 GHz</th></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">$\leq 1.5 \cdot \triangle z_{zoom}(n-1)$</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

Original

Name of Equipment	Manufacturer	Type/Model	Serial Number	Last Cal.	Cal. Due Date
Network analyzer	Agilent	E5071B	MY42404014	2021-05-15	2022-05-14
Dielectric Probe Kit	Agilent	85070E	US44020115	/	/
Power meter	Agilent	E4417A	GB41291714	2021-05-15	2022-05-14
Power sensor	Agilent	N8481H	MY50350004	2021-05-15	2022-05-14
Power sensor	Agilent	E9327A	US40441622	2021-05-15	2022-05-14
Dual directional coupler	Agilent	778D-012	50519	/	/
Dual directional coupler	Agilent	777D	50146	/	/
Amplifier	INDEXSAR	TPA-005060 G01	13030502	2021-05-15	2022-05-14
Wireless communication tester	Anritsu	MT8820C	6201342015	2020-12-13	2021-12-12
Wireless communication tester	Key sight	E5515C	MY48360988	2020-12-13	2021-12-12
Wideband radio communication tester	R&S	CMW 500	113645	2021-05-15	2022-05-14
Base Station Simulator	R&S	CMW270	100673	2021-05-15	2022-05-14
E-field Probe	SPEAG	EX3DV4	3677	2021-08-12	2022-08-11
DAE	SPEAG	DAE4	1317	2021-02-23	2022-02-22
Validation Kit 835MHz	SPEAG	D835V2	4d020	2020-08-28	2023-08-27
Validation Kit 1900MHz	SPEAG	D1900V2	5d060	2020-08-27	2023-08-26
Validation Kit 2450MHz	SPEAG	D2450V2	786	2020-08-27	2023-08-26
Validation Kit 2600MHz	SPEAG	D2600V2	1025	2021-04-23	2024-04-22
Temperature Probe	Tianjin jinming	JM222	381	2021-05-15	2022-05-14
Hygrothermograph	Anymetr	HTC - 1	TY2020A001	2021-05-15	2022-05-14
Twin SAM Phantom	Speag	SAM1	1534	/	/
Software for Test	Speag	DASY52	/	/	/
Softwarefor Tissue	Agilent	85070	/	/	/

Variant

Name of Equipment	Manufacturer	Type/Model	Serial Number	Last Cal.	Cal. Due Date
Network analyzer	Agilent	E5071B	MY42404014	2021-05-15	2022-05-14
Dielectric Probe Kit	Agilent	85070E	US44020115	/	/
Power meter	Agilent	E4417A	GB41291714	2021-05-15	2022-05-14
Power sensor	Agilent	N8481H	MY50350004	2021-05-15	2022-05-14
Power sensor	Agilent	E9327A	US40441622	2021-05-15	2022-05-14
Dual directional coupler	Agilent	778D-012	50519	/	/
Dual directional coupler	Agilent	777D	50146	/	/
Amplifier	INDEXSAR	TPA-005060 G01	13030502	2021-05-15	2022-05-14
Wireless communication tester	Anritsu	MT8820C	6201342015	2021-12-12	2022-12-11
Wireless communication tester	Key sight	E5515C	MY48360988	2021-12-12	2022-12-11
Wideband radio communication tester	R&S	CMW 500	113645	2021-05-15	2022-05-14
Base Station Simulator	R&S	CMW270	100673	2021-05-15	2022-05-14
E-field Probe	SPEAG	EX3DV4	3677	2021-08-12	2022-08-11
DAE	SPEAG	DAE4	1317	2021-02-23	2022-02-22
Validation Kit 835MHz	SPEAG	D835V2	4d020	2020-08-28	2023-08-27
Validation Kit 1900MHz	SPEAG	D1900V2	5d060	2020-08-27	2023-08-26
Validation Kit 2450MHz	SPEAG	D2450V2	786	2020-08-27	2023-08-26
Validation Kit 2600MHz	SPEAG	D2600V2	1025	2021-04-23	2024-04-22
Temperature Probe	Tianjin jinming	JM222	381	2021-05-15	2022-05-14
Hygrothermograph	Anymetr	HTC - 1	TY2020A001	2021-05-15	2022-05-14
Twin SAM Phantom	Speag	SAM2	1524	/	/
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)	Water (%)	Salt (%)	Sugar (%)	Glycol (%)	Preventol (%)	Cellulose (%)	ε_r	σ(s/m)
835	41.45	1.45	56	0	0.1	1.0	41.5	0.90
1900	55.242	0.306	0	44.452	0	0	40.0	1.40
2450	62.7	0.5	0	36.8	0	0	39.2	1.80
2600	55.242	0.306	0	44.452	0	0	39.0	1.96

Measurements results

Original

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	2021/11/26	21.5	41.6	0.89	41.5	0.90	0.24	-1.11
1900	2021/12/8	21.5	40.3	1.43	40.0	1.40	0.75	2.14
2450	2021/11/24	21.5	39.5	1.80	39.2	1.80	0.77	0.00
2600	2021/12/5	21.5	39.2	2.00	39.0	1.96	0.51	2.04
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.								

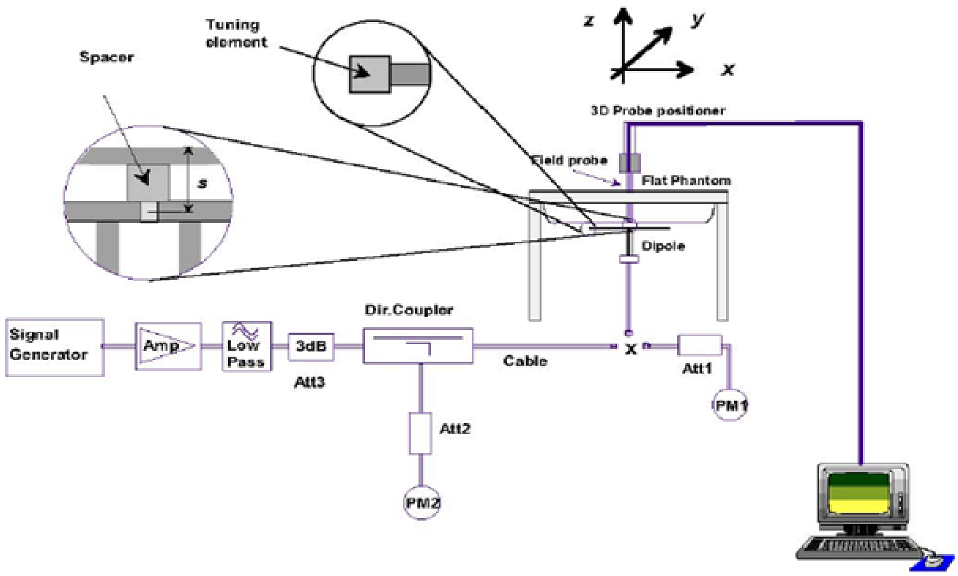
Variant

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	2021/12/29	21.5	41.3	0.87	41.5	0.90	-0.48	-3.33
1900	2021/12/29	21.5	40.2	1.43	40.1	1.37	0.25	4.38
2450	2021/12/29	21.5	38.2	1.35	40.0	1.40	-4.50	-3.57
2600	2021/12/29	21.5	38.3	1.99	39.0	1.96	-1.79	1.53
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 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

Original

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	2021/11/26	21.5	2.44	9.76	9.65	1.14	1
1900	2021/12/8	21.5	9.88	39.52	39.50	0.05	2
2450	2021/11/24	21.5	13.70	54.80	52.30	4.78	3
2600	2021/12/5	21.5	13.90	55.60	56.10	-0.89	4
Note: Target Values used derive from the calibration certificate Data Storage and Evaluation.							

Variant

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	2021/12/29	21.5	2.46	9.84	9.65	1.97	5
1900	2021/12/29	21.5	9.85	39.40	39.50	-0.25	6
2450	2021/12/29	21.5	13.90	55.60	52.30	6.31	7
2600	2021/12/29	21.5	13.94	55.76	56.10	-0.61	8
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
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
2600	8/12/2021	3677	EX3DV4	2600	Head	37.60	1.99	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 Full Power & Receiver on & Receiver off		Burst-Averaged output power(dBm)				Division Factors	Frame-Averaged output power(dBm)			
		Tune-up	Channel/Frenqucy(MHz)				Tune-up	Channel/Frenqucy(MHz)		
		MAX	128 /824.2	190 /836.6	251 /848.8		MAX	128 /824.2	190 /836.6	251 /848.8
GSM	CS	33.30	32.87	32.72	32.49	9.03	24.27	23.84	23.69	23.46
GPRS/ EGPRS (GMSK)	1 Tx Slot	33.30	32.75	32.73	32.45	9.03	24.27	23.72	23.70	23.42
	2 Tx Slots	31.00	30.21	30.17	29.94	6.02	24.98	24.19	24.15	23.92
	3 Tx Slots	29.00	28.15	27.91	27.60	4.26	24.74	23.89	23.65	23.34
	4 Tx Slots	28.00	27.04	26.72	26.32	3.01	**24.99**	24.03	23.71	23.31
EGPRS (8PSK)	1 Tx Slot	27.00	26.54	25.90	26.27	9.03	17.97	17.51	16.87	17.24
	2 Tx Slots	24.50	23.65	23.11	23.09	6.02	18.48	17.63	17.09	17.07
	3 Tx Slots	22.50	21.57	21.65	21.17	4.26	18.24	17.31	17.39	16.91
	4 Tx Slots	21.50	20.31	20.57	20.13	3.01	18.49	17.30	17.56	17.12
GSM 1900 Full Power & Receiver on &Receiver off		Burst-Averaged output power(dBm)				Division Factors	Frame-Averaged output power(dBm)			
		Tune-up	Channel/Frenqucy(MHz)				Tune-up	Channel/Frenqucy(MHz)		
		MAX	512 /1850.2	661 /1880	810 /1909.8		MAX	512 /1850.2	661 /1880	810 /1909.8
GSM	CS	30.30	29.39	29.16	28.76	9.03	21.27	20.36	20.13	19.73
GPRS/ EGPRS (GMSK)	1 Tx Slot	30.30	29.52	28.92	28.93	9.03	21.27	20.49	19.89	19.90
	2 Tx Slots	28.00	27.01	26.43	26.42	6.02	**21.98**	20.99	20.41	20.40
	3 Tx Slots	25.00	24.32	24.31	24.17	4.26	20.74	20.06	20.05	19.91
	4 Tx Slots	24.00	23.28	23.25	23.01	3.01	20.99	20.27	20.24	20.00
EGPRS (8PSK)	1 Tx Slot	26.00	24.94	24.85	24.73	9.03	16.97	15.91	15.82	15.70
	2 Tx Slots	23.00	22.22	22.06	21.75	6.02	16.98	16.20	16.04	15.73
	3 Tx Slots	21.00	20.29	20.23	19.94	4.26	16.74	16.03	15.97	15.68
	4 Tx Slots	20.00	19.15	19.01	18.93	3.01	16.99	16.14	16.00	15.92

Notes: The worst-case configuration and mode for SAR testing is determined to be as follows:
1. Standalone: GSM 850 GMSK (GPRS) mode with 4 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) Full Power / receiver on				Band V(dBm) Full Power / receiver on /receiver off			
Tx Channel		9262	9400	9538	Tune-up Limit	4132	4183	4233	Tune-up Limit
Frequency(MHz)		1852.4	1880	1907.6		826.4	836.6	846.6	
RMC	12.2kbps	**24.79**	24.70	24.68	25.50	24.01	**24.11**	24.00	25.00
AMR	12.2kbps	24.89	24.72	24.74	25.50	23.91	24.19	23.92	25.00
HSDPA	Sub 1	23.65	23.62	23.58	24.50	22.89	23.07	23.12	24.00
	Sub 2	23.81	23.58	23.60	24.50	22.87	22.97	22.96	24.00
	Sub 3	23.13	23.32	23.24	24.00	22.41	22.55	22.50	23.50
	Sub 4	23.27	23.34	23.10	24.00	22.41	22.63	22.54	23.50
HSUPA	Sub 1	21.77	21.60	21.68	22.50	20.91	21.25	21.14	22.00
	Sub 2	21.75	21.68	21.68	22.50	21.11	21.03	21.06	22.00
	Sub 3	22.85	22.70	22.52	23.50	22.09	21.99	21.84	23.00
	Sub 4	21.23	21.24	21.28	22.00	20.51	20.51	20.44	21.50
	Sub 5	22.75	22.78	22.62	23.50	22.01	21.97	21.90	23.00
DC-HSDPA	Sub 1	23.63	23.68	23.58	24.50	23.17	23.27	22.98	24.00
	Sub 2	23.63	23.70	23.68	24.50	22.95	23.19	22.86	24.00
	Sub 3	23.17	23.24	23.04	24.00	22.35	22.63	22.52	23.50
	Sub 4	23.17	23.22	23.10	24.00	22.57	22.45	22.46	23.50
HSPA+	16QAM	22.75	22.72	22.68	23.50	21.95	21.91	21.90	22.50
Note: 1.Per KDB 941225 D01, SAR for each exposure is measured using a 12.2 kbps RMC with TPC bits configured to all "1's".									

WCDMA		Band II(dBm) receiver off			
Tx Channel		9262	9400	9538	Tune-up Limit
Frequency(MHz)		1852.4	1880	1907.6	
RMC	12.2kbps	**21.77**	21.71	21.65	22.50
AMR	12.2kbps	21.75	21.61	21.77	22.50
HSDPA	Sub 1	20.85	20.63	20.55	21.50
	Sub 2	20.63	20.63	20.77	21.50
	Sub 3	20.31	20.27	20.25	21.00
	Sub 4	20.19	20.17	19.99	21.00
HSUPA	Sub 1	18.73	18.57	18.75	19.50
	Sub 2	18.77	18.67	18.51	19.50
	Sub 3	19.73	19.81	19.81	20.50
	Sub 4	18.41	18.15	18.25	19.00
	Sub 5	19.89	19.59	19.77	20.50
DC-HSDPA	Sub 1	20.89	20.57	20.67	21.50
	Sub 2	20.77	20.55	20.57	21.50
	Sub 3	20.15	20.37	20.21	21.00
	Sub 4	20.19	20.09	20.31	21.00
HSPA+	16QAM	19.55	19.45	19.59	20.50

Note: 1.Per KDB 941225 D01, SAR for each exposure is measured using a 12.2 kbps RMC with TPC bits configured to all “1’s”.

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
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3

LTE FDD Band 5 Full Power & Receiver on & Receiver off				Conducted Power(dBm)			Tune-up Limit
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			
				20407/824.7	20525/836.5	20643/848.3	
1.4MHz	QPSK	1	0	23.28	23.31	23.32	24.30
		1	2	23.41	23.45	23.38	24.30
		1	5	23.29	23.31	23.26	24.30
		3	0	23.20	23.48	23.26	24.30
		3	2	23.26	23.48	23.34	24.30
		3	3	23.21	23.52	23.44	24.30
		6	0	22.25	21.89	22.46	23.30
	16QAM	1	0	22.67	21.95	22.66	23.30
		1	2	22.65	21.59	22.61	23.30
		1	5	22.52	22.70	22.48	23.30
		3	0	22.19	22.47	22.30	23.30
		3	2	22.33	22.37	22.43	23.30
		3	3	22.16	22.36	22.40	23.30
		6	0	21.32	21.52	21.50	22.30
	64QAM	1	0	21.58	21.64	21.61	22.30
		1	2	21.64	21.68	21.63	22.30
		1	5	21.65	21.70	21.54	22.30
		3	0	21.29	21.54	21.40	22.30
		3	2	21.44	21.48	21.49	22.30
		3	3	21.32	21.52	21.53	22.30
		6	0	20.36	20.59	20.58	21.30
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				20415/825.5	20525/836.5	20635/847.5	
3MHz	QPSK	1	0	23.30	23.35	23.35	24.30

		1	7	23.39	23.48	23.42	24.30
		1	14	23.32	23.36	23.30	24.30
		8	0	22.30	22.60	22.39	23.30
		8	4	22.38	22.58	22.46	23.30
		8	7	22.31	22.63	22.54	23.30
		15	0	22.25	21.93	22.49	23.30
	16QAM	1	0	22.70	21.97	22.69	23.30
		1	7	22.68	21.59	22.65	23.30
		1	14	22.54	22.74	22.51	23.30
		8	0	21.30	21.60	21.42	22.30
		8	4	21.44	21.50	21.55	22.30
		8	7	21.26	21.48	21.53	22.30
		15	0	21.35	21.56	21.53	22.30
	64QAM	1	0	21.61	21.66	21.64	22.30
		1	7	21.67	21.68	21.65	22.30
		1	14	21.67	21.69	21.57	22.30
		8	0	20.40	20.67	20.52	21.30
		8	4	20.55	20.61	20.61	21.30
		8	7	20.42	20.64	20.66	21.30
		15	0	20.39	20.63	20.61	21.30
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				20425/826.5	20525/836.5	20625/846.5	
5MHz	QPSK	1	0	23.27	23.33	23.31	24.30
		1	13	23.37	23.44	23.39	24.30
		1	24	23.29	23.31	23.26	24.30
		12	0	22.27	22.55	22.35	23.30
		12	6	22.36	22.54	22.41	23.30
		12	13	22.29	22.61	22.50	23.30
		25	0	22.25	21.92	22.47	23.30
	16QAM	1	0	22.67	21.93	22.66	23.30
		1	13	22.65	21.57	22.62	23.30
		1	24	22.51	22.72	22.47	23.30
		12	0	21.28	21.56	21.39	22.30
		12	6	21.41	21.45	21.51	22.30
		12	13	21.23	21.43	21.49	22.30
		25	0	21.33	21.52	21.48	22.30
	64QAM	1	0	21.58	21.66	21.61	22.30
		1	13	21.64	21.70	21.62	22.30
		1	24	21.68	21.67	21.53	22.30
		12	0	20.38	20.63	20.53	21.30
		12	6	20.52	20.56	20.57	21.30
		12	13	20.39	20.59	20.62	21.30
		25	0	20.37	20.59	20.56	21.30

Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				20450/829	20525/836.5	20600/844	
10MHz	QPSK	1	0	23.25	23.26	23.29	24.30
		1	25	**23.37**	**23.44**	**23.38**	24.30
		1	49	23.26	23.29	23.22	24.30
		25	0	22.25	22.51	22.32	23.30
		25	13	**22.34**	22.50	22.38	23.30
		25	25	22.25	**22.57**	**22.47**	23.30
		50	0	22.24	21.85	**22.42**	23.30
	16QAM	1	0	22.45	21.90	22.61	23.30
		1	25	22.62	21.56	22.59	23.30
		1	49	22.49	22.67	22.45	23.30
		25	0	21.25	21.55	21.37	22.30
		25	13	21.37	21.42	21.47	22.30
		25	25	21.21	21.39	21.46	22.30
		50	0	21.31	21.48	21.45	22.30
	64QAM	1	0	21.53	21.59	21.56	22.30
		1	25	21.61	21.65	21.59	22.30
		1	49	21.62	21.62	21.51	22.30
		25	0	20.35	20.62	20.47	21.30
		25	13	20.48	20.53	20.53	21.30
		25	25	20.37	20.55	20.59	21.30
		50	0	20.35	20.55	20.53	21.30

LTE FDD Band 7 Full Power & Receiver on				Conducted Power(dBm)			Tune-up Limit
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			
				20775/2502.5	21100/2535	21425/2567.5	
5MHz	QPSK	1	0	23.31	23.52	23.12	24.00
		1	13	23.51	23.75	23.47	24.00
		1	24	23.36	23.28	23.31	24.00
		12	0	22.45	22.85	22.76	23.00
		12	6	22.67	22.70	22.65	23.00
		12	13	22.63	22.67	22.66	23.00
		25	0	22.43	22.74	22.73	23.00
	16QAM	1	0	22.92	22.65	22.59	23.00
		1	13	22.90	22.82	22.93	23.00
		1	24	22.71	22.64	22.67	23.00
		12	0	21.50	21.55	21.69	22.00
		12	6	21.76	21.72	21.74	22.00
		12	13	21.59	21.86	21.71	22.00
		25	0	21.50	21.71	21.72	22.00
	64QAM	1	0	21.78	21.83	21.67	22.00

		1	13	21.93	21.95	21.92	22.00
		1	24	21.83	21.84	21.76	22.00
		12	0	20.57	20.73	20.89	21.00
		12	6	20.78	20.82	20.85	21.00
		12	13	20.69	20.92	20.82	21.00
		25	0	20.67	20.83	20.84	21.00
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				20800/2505	21100/2535	21400/2565	
10MHz	QPSK	1	0	23.33	23.53	23.15	24.00
		1	25	23.54	23.80	23.51	24.00
		1	49	23.38	23.32	23.34	24.00
		25	0	22.48	22.90	22.80	23.00
		25	13	22.70	22.75	22.69	23.00
		25	25	22.65	22.71	22.71	23.00
		50	0	22.47	22.76	22.77	23.00
	16QAM	1	0	22.94	22.68	22.61	23.00
		1	25	22.93	22.86	22.96	23.00
		1	49	22.74	22.66	22.70	23.00
		25	0	21.53	21.60	21.73	22.00
		25	13	21.78	21.76	21.77	22.00
		25	25	21.62	21.91	21.75	22.00
		50	0	21.53	21.76	21.76	22.00
	64QAM	1	0	21.80	21.82	21.69	22.00
		1	25	21.96	21.95	21.95	22.00
		1	49	21.82	21.86	21.79	22.00
		25	0	20.60	20.78	20.89	21.00
		25	13	20.80	20.86	20.88	21.00
		25	25	20.72	20.97	20.86	21.00
		50	0	20.70	20.88	20.88	21.00
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				20825/2507.5	21100/2535	21375/2562.5	
15MHz	QPSK	1	0	23.32	23.49	23.13	24.00
		1	38	23.52	23.79	23.48	24.00
		1	74	23.35	23.27	23.30	24.00
		36	0	22.46	22.86	22.77	23.00
		36	18	22.67	22.70	22.65	23.00
		36	39	22.62	22.68	22.67	23.00
		75	0	22.45	22.72	22.72	23.00
	16QAM	1	0	22.89	22.66	22.59	23.00
		1	38	22.91	22.83	22.94	23.00
		1	74	22.71	22.62	22.67	23.00
		36	0	21.50	21.58	21.70	22.00
		36	18	21.75	21.71	21.73	22.00

		36	39	21.60	21.87	21.72	22.00
		75	0	21.50	21.71	21.72	22.00
	64QAM	1	0	21.75	21.80	21.67	22.00
		1	38	21.94	21.92	21.93	22.00
		1	74	21.83	21.85	21.80	22.00
		36	0	20.59	20.80	20.90	21.00
		36	18	20.78	20.83	20.87	21.00
		36	39	20.70	20.93	20.83	21.00
		75	0	20.67	20.83	20.84	21.00
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				20850/2510	21100/2535	21350/2560	
20MHz	QPSK	1	0	23.29	23.45	23.10	24.00
		1	50	**23.51**	**23.75**	**23.46**	24.00
		1	99	23.33	23.26	23.27	24.00
		50	0	22.43	**22.81**	**22.73**	23.00
		50	25	**22.65**	22.66	22.62	23.00
		50	50	22.59	22.63	22.63	23.00
		100	0	22.42	22.67	**22.68**	23.00
	16QAM	1	0	22.89	22.62	22.54	23.00
		1	50	22.87	22.81	22.90	23.00
		1	99	22.69	22.59	22.65	23.00
		50	0	21.47	21.54	21.67	22.00
		50	25	21.72	21.69	21.70	22.00
		50	50	21.57	21.82	21.68	22.00
		100	0	21.48	21.67	21.69	22.00
	64QAM	1	0	21.73	21.76	21.62	22.00
		1	50	21.90	21.90	21.89	22.00
		1	99	21.77	21.79	21.74	22.00
		50	0	20.54	20.72	20.83	21.00
		50	25	20.74	20.79	20.81	21.00
		50	50	20.67	20.88	20.79	21.00
		100	0	20.65	20.79	20.81	21.00

LTE FDD Band 7 Receiver off				**Conducted Power(dBm)**			Tune-up Limit
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			
				20775/2502.5	21100/2535	21425/2567.5	
5MHz	QPSK	1	0	19.58	19.63	19.84	21.00
		1	13	19.74	19.94	20.00	21.00
		1	24	19.75	19.71	19.87	21.00
		12	0	19.66	19.97	20.29	21.00
		12	6	19.79	20.09	20.07	21.00
		12	13	19.85	20.09	20.22	21.00

Bandwidth	Modulation	RB size	RB offset	20800/2505	21100/2535	21400/2565	Tune-up Limit
		25	0	19.74	20.04	20.27	21.00
	16QAM	1	0	20.34	19.81	19.97	21.00
		1	13	20.32	20.27	20.36	21.00
		1	24	20.16	20.17	20.23	21.00
		12	0	19.99	19.94	20.06	21.00
		12	6	20.04	19.99	20.12	21.00
		12	13	20.15	20.15	20.23	21.00
		25	0	20.08	20.08	20.18	21.00
	64QAM	1	0	19.73	19.70	19.80	21.00
		1	13	20.30	20.29	20.33	21.00
		1	24	20.33	20.26	20.32	21.00
		12	0	20.03	19.98	20.14	21.00
		12	6	20.03	19.98	20.11	21.00
		12	13	20.17	20.17	20.28	21.00
		25	0	20.17	20.17	20.27	21.00

Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				20800/2505	21100/2535	21400/2565	
10MHz	QPSK	1	0	19.60	19.64	19.87	21.00
		1	25	19.77	19.99	20.04	21.00
		1	49	19.77	19.75	19.90	21.00
		25	0	19.69	20.02	20.33	21.00
		25	13	19.82	20.14	20.11	21.00
		25	25	19.87	20.13	20.27	21.00
		50	0	19.78	20.06	20.31	21.00
	16QAM	1	0	20.36	19.84	19.99	21.00
		1	25	20.35	20.31	20.39	21.00
		1	49	20.19	20.19	20.26	21.00
		25	0	20.02	19.99	20.10	21.00
		25	13	20.06	20.03	20.15	21.00
		25	25	20.18	20.20	20.27	21.00
		50	0	20.11	20.13	20.22	21.00
	64QAM	1	0	19.75	19.69	19.82	21.00
		1	25	20.33	20.29	20.36	21.00
		1	49	20.32	20.28	20.35	21.00
		25	0	20.06	20.03	20.14	21.00
		25	13	20.05	20.02	20.14	21.00
		25	25	20.20	20.22	20.32	21.00
		50	0	20.20	20.22	20.31	21.00

Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				20825/2507.5	21100/2535	21375/2562.5	
15MHz	QPSK	1	0	19.59	19.60	19.85	21.00
		1	38	19.75	19.98	20.01	21.00
		1	74	19.74	19.70	19.86	21.00

		36	0	19.67	19.98	20.30	21.00
		36	18	19.79	20.09	20.07	21.00
		36	39	19.84	20.10	20.23	21.00
		75	0	19.76	20.02	20.26	21.00
	16QAM	1	0	20.31	19.82	19.97	21.00
		1	38	20.33	20.28	20.37	21.00
		1	74	20.16	20.15	20.23	21.00
		36	0	19.99	19.97	20.07	21.00
		36	18	20.03	19.98	20.11	21.00
		36	39	20.16	20.16	20.24	21.00
		75	0	20.08	20.08	20.18	21.00
	64QAM	1	0	19.70	19.67	19.80	21.00
		1	38	20.31	20.26	20.34	21.00
		1	74	20.33	20.27	20.36	21.00
		36	0	20.05	20.05	20.15	21.00
		36	18	20.03	19.99	20.13	21.00
		36	39	20.18	20.18	20.29	21.00
		75	0	20.17	20.17	20.27	21.00
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				20850/2510	21100/2535	21350/2560	
20MHz	QPSK	1	0	19.56	19.56	19.82	21.00
		1	50	**19.95**	**20.10**	**20.26**	21.00
		1	99	19.72	19.69	19.83	21.00
		50	0	19.64	19.93	**20.26**	21.00
		50	25	19.77	**20.05**	20.04	21.00
		50	50	**19.81**	**20.05**	20.19	21.00
		100	0	19.73	19.97	**20.22**	21.00
	16QAM	1	0	20.31	19.78	19.92	21.00
		1	50	20.29	20.26	20.33	21.00
		1	99	20.14	20.12	20.21	21.00
		50	0	19.96	19.93	20.04	21.00
		50	25	20.00	19.96	20.08	21.00
		50	50	20.13	20.11	20.20	21.00
		100	0	20.06	20.04	20.15	21.00
	64QAM	1	0	19.68	19.63	19.75	21.00
		1	50	20.27	20.24	20.30	21.00
		1	99	20.27	20.21	20.30	21.00
		50	0	20.00	19.97	20.08	21.00
		50	25	19.99	19.95	20.07	21.00
		50	50	20.15	20.13	20.25	21.00
		100	0	20.15	20.13	20.24	21.00

LTE TDD Band 41 Full Power & Receiver on & Receiver off				Conducted Power(dBm)					Tune-up Limit
				Channel/Frequency (MHz)					
Bandwidth	Modulation	RB size	RB offset	39675/ 2498.5	40148/ 2545.8	40620/ 2593	41093/ 2640.3	41565/ 2687.5	
5MHz	QPSK	1	0	23.45	23.53	23.46	23.40	23.40	24.50
		1	13	23.74	23.66	23.77	23.75	23.71	24.50
		1	24	23.55	23.50	23.48	23.50	23.39	24.50
		12	0	22.78	22.74	22.87	22.82	22.73	23.50
		12	6	22.81	22.87	22.92	22.82	22.86	23.50
		12	13	22.87	22.88	22.88	22.85	22.84	23.50
		25	0	22.76	22.85	22.85	22.84	22.88	23.50
	16QAM	1	0	22.76	22.65	22.77	22.57	22.63	23.50
		1	13	22.74	22.76	22.59	22.55	22.44	23.50
		1	24	22.59	22.69	22.62	22.58	22.59	23.50
		12	0	21.80	21.86	21.90	21.63	21.64	22.50
		12	6	21.80	21.83	21.81	21.67	21.63	22.50
		12	13	21.74	21.63	21.55	21.54	21.52	22.50
		25	0	21.72	21.77	21.86	21.58	21.54	22.50
	64QAM	1	0	21.59	21.58	21.63	21.62	21.75	22.50
		1	13	21.82	21.80	21.84	21.81	21.85	22.50
		1	24	21.61	21.57	21.63	21.68	21.78	22.50
		12	0	20.75	20.65	20.77	20.80	20.80	21.50
		12	6	20.81	20.73	20.79	20.87	20.84	21.50
		12	13	20.81	20.77	20.78	20.83	20.89	21.50
		25	0	20.74	20.71	20.73	20.83	20.89	21.50
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)					Tune-up Limit
				39700/ 2501	40160/ 2547	40620/ 2593	41080/ 2639	41540/ 2685	
10MHz	QPSK	1	0	23.47	23.54	23.49	23.42	23.41	24.50
		1	25	23.77	23.71	23.81	23.78	23.76	24.50
		1	49	23.57	23.54	23.51	23.52	23.43	24.50
		25	0	22.81	22.79	22.91	22.85	22.78	23.50
		25	13	22.84	22.92	22.96	22.85	22.91	23.50
		25	25	22.89	22.92	22.93	22.87	22.88	23.50
		50	0	22.80	22.87	22.89	22.88	22.90	23.50
	16QAM	1	0	22.78	22.68	22.79	22.59	22.66	23.50
		1	25	22.77	22.80	22.62	22.58	22.48	23.50
		1	49	22.62	22.71	22.65	22.61	22.61	23.50
		25	0	21.83	21.91	21.94	21.66	21.69	22.50
		25	13	21.82	21.87	21.84	21.69	21.67	22.50
		25	25	21.77	21.68	21.59	21.57	21.57	22.50
		50	0	21.75	21.82	21.90	21.61	21.59	22.50

Bandwidth	Modulation	RB size	RB offset						Tune-up Limit
	64QAM	1	0	21.61	21.57	21.65	21.64	21.74	22.50
		1	25	21.85	21.80	21.87	21.84	21.85	22.50
		1	49	21.60	21.59	21.66	21.67	21.80	22.50
		25	0	20.78	20.70	20.77	20.83	20.85	21.50
		25	13	20.83	20.77	20.82	20.89	20.88	21.50
		25	25	20.84	20.82	20.82	20.86	20.94	21.50
		50	0	20.77	20.76	20.77	20.86	20.94	21.50
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)					Tune-up Limit
				39725/ 2503.5	40173/ 2548.3	40620/ 2593	41068/ 2637.8	41515/ 2682.5	
15MHz	QPSK	1	0	23.46	23.50	23.47	23.41	23.37	24.50
		1	38	23.75	23.70	23.78	23.76	23.75	24.50
		1	74	23.54	23.49	23.47	23.49	23.38	24.50
		36	0	22.79	22.75	22.88	22.83	22.74	23.50
		36	18	22.81	22.87	22.92	22.82	22.86	23.50
		36	39	22.86	22.89	22.89	22.84	22.85	23.50
		75	0	22.78	22.83	22.84	22.86	22.86	23.50
	16QAM	1	0	22.73	22.66	22.77	22.54	22.64	23.50
		1	38	22.75	22.77	22.60	22.56	22.45	23.50
		1	74	22.59	22.67	22.62	22.58	22.57	23.50
		36	0	21.80	21.89	21.91	21.63	21.67	22.50
		36	18	21.79	21.82	21.80	21.66	21.62	22.50
		36	39	21.75	21.64	21.56	21.55	21.53	22.50
		75	0	21.72	21.77	21.86	21.58	21.54	22.50
	64QAM	1	0	21.56	21.55	21.63	21.59	21.72	22.50
		1	38	21.83	21.77	21.85	21.82	21.82	22.50
		1	74	21.61	21.58	21.67	21.68	21.79	22.50
		36	0	20.77	20.72	20.78	20.82	20.87	21.50
		36	18	20.81	20.74	20.81	20.87	20.85	21.50
		36	39	20.82	20.78	20.79	20.84	20.90	21.50
		75	0	20.74	20.71	20.73	20.83	20.89	21.50
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)					Tune-up Limit (dBm)
				39750/ 2506	40185/ 2549.5	40620/ 2593	41055/ 2636.5	41490/ 2680	
20MHz	QPSK	1	0	23.43	23.46	23.44	23.38	23.33	24.50
		1	50	**23.74**	**23.66**	**23.76**	**23.75**	**23.71**	24.50
		1	99	23.52	23.48	23.44	23.47	23.37	24.50
		50	0	22.76	22.70	22.84	22.80	22.69	23.50
		50	25	22.79	22.83	**22.89**	22.80	**22.82**	23.50
		50	50	**22.83**	**22.84**	22.85	**22.81**	22.80	23.50
		100	0	22.75	22.78	22.80	**22.83**	**22.81**	23.50
	16QAM	1	0	22.68	22.62	22.72	22.62	22.60	23.50
		1	50	22.71	22.75	22.56	22.52	22.43	23.50

		1	99	22.57	22.64	22.60	22.56	22.54	23.50
		50	0	21.77	21.85	21.88	21.60	21.63	22.50
		50	25	21.76	21.80	21.77	21.63	21.60	22.50
		50	50	21.72	21.59	21.52	21.52	21.48	22.50
		100	0	21.70	21.73	21.83	21.56	21.50	22.50
	64QAM	1	0	21.54	21.51	21.58	21.57	21.68	22.50
		1	50	21.79	21.75	21.81	21.78	21.80	22.50
		1	99	21.55	21.52	21.61	21.62	21.73	22.50
		50	0	20.72	20.64	20.71	20.77	20.79	21.50
		50	25	20.77	20.70	20.75	20.83	20.81	21.50
		50	50	20.79	20.73	20.75	20.81	20.85	21.50
		100	0	20.72	20.67	20.70	20.81	20.85	21.50

9.4 WLAN Mode

Wi-Fi 2.4G Mode	Channel /Frequency(MHz)	Maximum Output Power (dBm)	
Full Power & Receiver on & Receiver off		Tune-up	Meas.
802.11b (1M)	1/2412	18.00	17.21
	6/2437	18.00	**17.70**
	11/2462	18.00	17.50
802.11g (6M)	1/2412	15.50	15.21
	6/2437	15.50	15.48
	11/2462	15.50	15.46
802.11n-HT20 (MCS0)	1/2412	15.50	15.14
	6/2437	15.50	15.43
	11/2462	15.50	15.38
802.11n-HT40 (MCS0)	3/2422	15.00	14.72
	6/2437	15.00	14.88
	9/2452	15.00	14.77
Note: Initial test configuration is 802.11b mode.			

Wi-Fi 2.4G Mode	Channel /Frequency(MHz)	Maximum Output Power (dBm)	
WWAN+WLAN Receiver off		Tune-up	Meas.
802.11b (1M)	1/2412	12.00	10.59
	6/2437	12.00	**11.34**
	11/2462	12.00	11.17
802.11g (6M)	1/2412	9.50	7.80
	6/2437	9.50	8.66
	11/2462	9.50	8.36
802.11n-HT20 (MCS0)	1/2412	9.50	7.74
	6/2437	9.50	8.55
	11/2462	9.50	8.15
802.11n-HT40 (MCS0)	3/2422	9.00	7.92
	6/2437	9.00	8.02
	9/2452	9.00	7.98
Note: Initial test configuration is 802.11b mode.			

9.5 Bluetooth Mode

BT	Conducted Power(dBm)					
	Channel/Frequency(MHz)					
	Ch 0/ 2402 MHz	Tune-up Limit (dBm)	Ch 39/ 2441 MHz	Tune-up Limit (dBm)	Ch 78/ 2480 MHz	Tune-up Limit (dBm)
GFSK	8.79	10.00	9.59	11.00	9.75	11.00
π/4DQPSK	7.94	9.00	8.75	10.00	8.92	10.00
8DPSK	7.93	9.00	8.76	10.00	8.93	10.00
BLE	Ch 0/ 2402 MHz	Tune-up Limit (dBm)	Ch 39/ 2441 MHz	Tune-up Limit (dBm)	Ch 78/ 2480 MHz	Tune-up Limit (dBm)
GFSK(1M)	-4.17	-3.00	-2.72	-2.00	-3.15	-2.00
GFSK(2M)	-4.25	-3.00	-2.81	-2.00	-3.22	-2.00

10 Measured and Reported (Scaled) SAR Results

10.1 EUT Antenna Locations

The Detailed Antenna Locations refer to *Antenna Locations.*

Overall (Length x Width): 164mm x 74 mm Overall Diagonal: 173mm/Display Diagonal: 170mm						
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
Div Antenna	＜25mm	＜25mm	＜25mm	＜25mm	＜25mm	＞25mm
Wi-Fi 2.4G/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
Div Antenna	Yes	Yes	Yes	Yes	Yes	N/A
Wi-Fi 2.4G/BT Antenna	Yes	Yes	Yes	N/A	Yes	N/A

10.2 Standalone SAR test exclusion considerations

Per KDB 447498 D01, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] ·[√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for product specific 10-g SAR

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

Per KDB 447498 D01, when the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

Bluetooth	Distance (mm)	MAX. Power (dBm)	Frequency (MHz)	Ratio	Evaluation
Head	5	11	2480	3.97	Yes
Body-worn	15	11	2480	1.32	No
Hotspot	10	11	2480	1.98	No
Product Specific 10-g SAR	5	11	2480	3.97	No

10.3 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).

5. Accessories that do not contain RF transmitters and have been proven to increase the peak SAR by less than 5 %, such as hands-free kits, do not need SAR tests separate from the SAR tests attached to a main EUT configuration.

Head SAR

Band	Test Position	Dist. (mm)	Mode	Power Reduction	RB	offset	Ch./Freq. (MHz)	Tune-up (dBm)	Measured power (dBm)	Measured SAR1g	Power Drift (dB)	Scaling Factor	Report SAR1g	Plot No.
GSM 850 (Original)	Left cheek	0	GSM	Receiver on	-	-	190/836.6	33.30	32.72	0.067	0.010	1.14	0.077	/
	Left Tilt	0	GSM	Receiver on	-	-	190/836.6	33.30	32.72	0.068	-0.069	1.14	0.078	/
	Right cheek	0	GSM	Receiver on	-	-	190/836.6	33.30	32.72	0.089	-0.028	1.14	0.102	9
	Right Tilt	0	GSM	Receiver on	-	-	190/836.6	33.30	32.72	0.078	0.030	1.14	0.089	/
	Right cheek Battery2	0	GSM	Receiver on	-	-	190/836.6	33.30	32.72	0.075	0.012	1.14	0.086	/
GSM1900 (Original)	Left cheek	0	GSM	Receiver on	-	-	661/1880	30.30	29.16	0.050	0.185	1.30	0.065	10
	Left Tilt	0	GSM	Receiver on	-	-	661/1880	30.30	29.16	0.039	0.022	1.30	0.051	/
	Right cheek	0	GSM	Receiver on	-	-	661/1880	30.30	29.16	0.034	0.000	1.30	0.044	/
	Right Tilt	0	GSM	Receiver on	-	-	661/1880	30.30	29.16	0.021	0.030	1.30	0.027	/
	Left cheek Battery2	0	GSM	Receiver on	-	-	661/1880	30.30	29.16	0.042	0.100	1.30	0.055	/
WCDMA II (Original)	Left cheek	0	RMC 12.2K	Receiver on	-	-	9400/1880	25.50	24.70	0.069	0.050	1.20	0.083	/
	Left Tilt	0	RMC 12.2K	Receiver on	-	-	9400/1880	25.50	24.70	0.116	0.072	1.20	0.139	/
	Right cheek	0	RMC 12.2K	Receiver on	-	-	9400/1880	25.50	24.70	0.086	-0.016	1.20	0.103	/
	Right Tilt	0	RMC 12.2K	Receiver on	-	-	9400/1880	25.50	24.70	0.073	0.080	1.20	0.088	/
	Left Tilt Battery2	0	RMC 12.2K	Receiver on	-	-	9400/1880	25.50	24.70	0.124	0.038	1.20	0.149	11
WCDMA V (Original)	Left cheek	0	RMC 12.2K	Receiver on	-	-	4183/836.6	25.00	24.11	0.569	-0.020	1.23	0.698	/
	Left Tilt	0	RMC 12.2K	Receiver on	-	-	4183/836.6	25.00	24.11	0.378	0.026	1.23	0.464	/
	Right cheek	0	RMC 12.2K	Receiver on	-	-	4183/836.6	25.00	24.11	0.524	0.100	1.23	0.643	/
	Right Tilt	0	RMC 12.2K	Receiver on	-	-	4183/836.6	25.00	24.11	0.375	0.033	1.23	0.460	/
	Left cheek Battery2	0	RMC 12.2K	Receiver on	-	-	4183/836.6	25.00	24.11	0.515	0.000	1.23	0.632	/
	Left cheek SIM2	0	RMC 12.2K	Receiver on	-	-	4183/836.6	25.00	24.11	0.486	0.012	1.23	0.597	/

WCDMA V (Variant)	Left cheek	0	RMC 12.2K	Receiver on	-	-	4183/836.6	25.00	24.85	0.889	0.020	1.04	0.920	12
LTE 5 (Original)	Left cheek	0	QPSK	Receiver on	1	25	20525/836.5	24.30	23.44	0.485	-0.030	1.22	0.591	/
		0	QPSK	Receiver on	50%	25	20525/836.5	23.30	22.57	0.440	-0.080	1.18	0.521	/
	Left Tilt	0	QPSK	Receiver on	1	25	20525/836.5	24.30	23.44	0.290	0.019	1.22	0.354	/
		0	QPSK	Receiver on	50%	25	20525/836.5	23.30	22.57	0.230	0.099	1.18	0.272	/
	Right cheek	0	QPSK	Receiver on	1	25	20525/836.5	24.30	23.44	0.440	0.024	1.22	0.536	/
		0	QPSK	Receiver on	50%	25	20525/836.5	23.30	22.57	0.350	0.060	1.18	0.414	/
	Right Tilt	0	QPSK	Receiver on	1	25	20525/836.5	24.30	23.44	0.330	0.100	1.22	0.402	/
		0	QPSK	Receiver on	50%	25	20525/836.5	23.30	22.57	0.260	-0.015	1.18	0.308	/
	Left cheek Battery2	0	QPSK	Receiver on	1	25	20525/836.5	24.30	23.44	0.541	0.000	1.22	0.659	13
LTE 7 (Original)	Left cheek	0	QPSK	Receiver on	1	50	21100/2535	24.00	23.75	0.090	0.130	1.12	0.101	/
		0	QPSK	Receiver on	50%	0	21100/2535	23.00	22.81	0.070	0.027	1.11	0.078	/
	Left Tilt	0	QPSK	Receiver on	1	50	21100/2535	24.00	23.75	0.050	0.061	1.12	0.056	/
		0	QPSK	Receiver on	50%	0	21100/2535	23.00	22.81	0.060	0.011	1.11	0.067	/
	Right cheek	0	QPSK	Receiver on	1	50	21100/2535	24.00	23.75	0.104	0.074	1.12	0.116	14
		0	QPSK	Receiver on	50%	0	21100/2535	23.00	22.81	0.080	-0.020	1.11	0.089	/
	Right Tilt	0	QPSK	Receiver on	1	50	21100/2535	24.00	23.75	0.030	0.025	1.12	0.034	/
		0	QPSK	Receiver on	50%	0	21100/2535	23.00	22.81	0.040	0.010	1.11	0.044	/
	Right cheek Battery2	0	QPSK	Receiver on	1	50	21100/2535	24.00	23.75	0.103	0.034	1.06	0.109	/
LTE 41 (Original)	Left cheek	0	QPSK	Receiver on	1	50	40620/2593	24.50	23.76	0.023	0.093	1.19	0.027	/
		0	QPSK	Receiver on	50%	25	40620/2593	23.50	22.89	0.023	0.113	1.15	0.026	/
	Left Tilt	0	QPSK	Receiver on	1	50	40620/2593	24.50	23.76	0.048	0.098	1.19	0.057	/
		0	QPSK	Receiver on	50%	25	40620/2593	23.50	22.89	0.047	0.066	1.15	0.054	/
	Right cheek	0	QPSK	Receiver on	1	50	40620/2593	24.50	23.76	0.065	0.090	1.19	0.077	15
		0	QPSK	Receiver on	50%	25	40620/2593	23.50	22.89	0.044	0.097	1.15	0.051	/
	Right Tilt	0	QPSK	Receiver on	1	50	40620/2593	24.50	23.76	0.009	0.010	1.19	0.011	/
		0	QPSK	Receiver on	50%	25	40620/2593	23.50	22.89	0.008	0.043	1.15	0.009	/
	Right cheek Battery2	0	QPSK	Receiver on	1	50	40620/2593	24.50	23.76	0.052	0.034	1.19	0.062	/

Band	Test Position	Dist. (mm)	Mode	Power Reduction	Duty Cycle	Ch./Freq. (MHz)	Tune-up (dBm)	Measured power (dBm)	Measured SAR1g	Power Drift (dB)	Scaling Factor	Report SAR1g	Plot No.
Wi-Fi 2.4G (Original)	Left cheek	0	802.11b	Full power	98.0%	6/2437	18.00	17.70	0.183	-0.010	1.09	0.200	/
	Left Tilt	0	802.11b	Full power	98.0%	6/2437	18.00	17.70	0.260	-0.010	1.09	0.284	/
	Right cheek	0	802.11b	Full power	98.0%	6/2437	18.00	17.70	0.456	0.020	1.09	0.499	16
	Right Tilt	0	802.11b	Full power	98.0%	6/2437	18.00	17.70	0.286	-0.060	1.09	0.313	/
	Right cheek Battery2	0	802.11b	Full power	98.0%	6/2437	18.00	17.70	0.372	0.011	1.09	0.407	/
Wi-Fi 2.4G (Variant)	Right cheek	0	802.11b	Full power	98.0%	6/2437	18.00	17.72	0.363	-0.024	1.09	0.395	/
Bluetooth (Original)	Left cheek	0	DH5	--	46.3%	78/2480	11.00	9.75	0.029	-0.058	2.88	0.084	/
	Left Tilt	0	DH5	--	46.3%	78/2480	11.00	9.75	0.032	0.026	2.88	0.092	/
	Right cheek	0	DH5	--	46.3%	78/2480	11.00	9.75	0.052	0.056	2.88	0.151	17
	Right Tilt	0	DH5	--	46.3%	78/2480	11.00	9.75	0.039	-0.015	2.88	0.112	/
	Right cheek Battery2	0	DH5	--	46.3%	78/2480	11.00	9.75	0.044	0.025	2.88	0.127	/

Body-worn SAR

Band	Test Position	Dist. (mm)	Mode	Power Reduction	RB	offset	Ch./Freq. (MHz)	Tune-up (dBm)	Measured power (dBm)	Measured SAR1g	Power Drift (dB)	Scaling Factor	Report SAR1g	Plot No.
GSM 850 (Original)	Back Side	15	GSM	Receiver off	-	-	190/836.6	33.30	32.72	0.139	0.020	1.14	0.159	18
	Front Side	15	GSM	Receiver off	-	-	190/836.6	33.30	32.72	0.107	0.017	1.14	0.122	/
	Back Side Battery2	15	GSM	Receiver off	-	-	190/836.6	33.30	32.72	0.083	0.034	1.14	0.095	/
GSM1900 (Original)	Back Side	15	GSM	Receiver off	-	-	661/1880	30.30	29.16	0.167	-0.033	1.30	0.217	/
	Front Side	15	GSM	Receiver off	-	-	661/1880	30.30	29.16	0.082	-0.090	1.30	0.107	/
	Back Side Battery2	15	GSM	Receiver off	-	-	661/1880	30.30	29.16	0.158	-0.011	1.30	0.205	/
	Back Side SIM2	15	GSM	Receiver off	-	-	661/1880	30.30	29.16	0.116	-0.050	1.30	0.151	/
GSM1900 (Variant)	Back Side	15	GSM	Receiver off	-	-	661/1880	30.30	29.52	0.209	-0.160	1.20	0.250	19

Hotspot SAR

Band	Test Position	Dist. (mm)	Mode	Power Reduction	RB	offset	Ch./Freq. (MHz)	Tune-up (dBm)	Measured power (dBm)	Measured SAR1g	Power Drift (dB)	Scaling Factor	Report SAR1g	Plot No.
GSM850 (Original)	Back Side	10	4TX Slots	Receiver off	-	-	190/836.6	28.00	26.72	0.200	-0.030	1.34	0.269	20
	Front Side	10	4TX Slots	Receiver off	-	-	190/836.6	28.00	26.72	0.131	0.020	1.34	0.176	/
	Left Edge	10	4TX Slots	Receiver off	-	-	190/836.6	28.00	26.72	0.093	0.018	1.34	0.125	/
	Right Edge	10	4TX Slots	Receiver off	-	-	190/836.6	28.00	26.72	0.099	-0.100	1.34	0.133	/
	Top Edge	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	/
	Bottom Edge	10	4TX Slots	Receiver off	-	-	190/836.6	28.00	26.72	0.065	0.036	1.34	0.087	/
	Back Side Battery2	10	4TX Slots	Receiver off	-	-	190/836.6	28.00	26.72	0.187	0.010	1.34	0.251	/
GSM1900 (Original)	Back Side	10	2TX Slots	Receiver off	-	-	661/1880	28.00	26.43	0.357	0.020	1.44	0.512	/
	Front Side	10	2TX Slots	Receiver off	-	-	661/1880	28.00	26.43	0.175	0.061	1.44	0.251	/
	Left Edge	10	2TX Slots	Receiver off	-	-	661/1880	28.00	26.43	0.048	0.049	1.44	0.069	/
	Right Edge	10	2TX Slots	Receiver off	-	-	661/1880	28.00	26.43	0.000	0.000	1.44	0.000	/
	Top Edge	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	/
	Bottom Edge	10	2TX Slots	Receiver off	-	-	661/1880	28.00	26.43	0.561	-0.020	1.44	0.805	/
		10	2TX Slots	Receiver off	-	-	512/1850.2	28.00	27.01	0.652	0.050	1.26	0.819	21
		10	2TX Slots	Receiver off	-	-	810/1909.8	28.00	26.42	0.559	0.024	1.44	0.804	/
	Bottom Edge Battery2	10	2TX Slots	Receiver off	-	-	512/1850.2	28.00	27.01	0.587	0.000	1.26	0.737	/
	Bottom Edge SIM2	10	2TX Slots	Receiver off	-	-	512/1850.2	28.00	27.01	0.546	0.168	1.26	0.686	/
GSM1900 (Variant)	Bottom Edge	10	2TX Slots	Receiver off	-	-	512/1850.2	28.00	27.05	0.544	0.190	1.24	0.677	/
WCDMA II (Original)	Back Side	10	RMC	Receiver off	-	-	9400/1880	22.50	21.71	0.433	0.038	1.20	0.519	/
	Front Side	10	RMC	Receiver off	-	-	9400/1880	22.50	21.71	0.222	0.021	1.20	0.266	/
	Left Edge	10	RMC	Receiver off	-	-	9400/1880	22.50	21.71	0.056	0.050	1.20	0.067	/
	Right Edge	10	RMC	Receiver off	-	-	9400/1880	22.50	21.71	0.000	0.000	1.20	0.000	/
	Top Edge	10	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	/
	Bottom Edge	10	RMC	Receiver off	-	-	9400/1880	22.50	21.71	0.628	0.030	1.20	0.753	22
	Bottom Edge Battery2	10	RMC	Receiver off	-	-	9400/1880	22.50	21.71	0.573	-0.012	1.20	0.687	/
WCDMA V (Original)	Back Side	10	RMC	Receiver off	-	-	4183/836.6	25.00	24.11	0.120	0.024	1.23	0.147	/
	Front Side	10	RMC	Receiver off	-	-	4183/836.6	25.00	24.11	0.081	-0.030	1.23	0.099	/
	Left Edge	10	RMC	Receiver off	-	-	4183/836.6	25.00	24.11	0.000	0.000	1.23	0.000	/
	Right Edge	10	RMC	Receiver off	-	-	4183/836.6	25.00	24.11	0.059	0.043	1.23	0.072	/
	Top Edge	10	RMC	Receiver off	-	-	9400/1880	25.00	24.11	0.100	0.028	1.23	0.123	/
	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	/
	Back Side Battery2	10	RMC	Receiver off	-	-	4183/836.6	25.00	24.11	0.147	-0.031	1.23	0.180	23
LTE 5 (Original)	Back Side	10	QPSK	Receiver off	1	25	20525/836.5	24.30	23.44	0.157	0.120	1.22	0.191	24
		10	QPSK	Receiver off	50%	25	20525/836.5	23.30	22.57	0.109	0.035	1.18	0.129	/

	Front Side	10	QPSK	Receiver off	1	25	20525/836.5	24.30	23.44	0.080	0.090	1.22	0.098	/
		10	QPSK	Receiver off	50%	25	20525/836.5	23.30	22.57	0.061	0.080	1.18	0.072	/
	Left Edge	10	QPSK	Receiver off	1	25	20525/836.5	24.30	23.44	0.046	0.032	1.22	0.056	/
		10	QPSK	Receiver off	50%	25	20525/836.5	23.30	22.57	0.034	0.011	1.18	0.040	/
	Right Edge	10	QPSK	Receiver off	1	25	20525/836.5	24.30	23.44	0.057	0.023	1.22	0.069	/
		10	QPSK	Receiver off	50%	25	20525/836.5	23.30	22.57	0.047	0.016	1.18	0.056	/
	Top Edge	10	QPSK	Receiver off	1	25	20525/836.5	24.30	23.44	0.102	0.044	1.22	0.124	/
		10	QPSK	Receiver off	50%	25	20525/836.5	23.30	22.57	0.078	0.099	1.18	0.092	/
	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	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	/
	Back Side Battery2	10	QPSK	Receiver off	1	25	20525/836.5	24.30	23.44	0.141	0.031	1.22	0.172	/
LTE 7 (Original)	Back Side	10	QPSK	Receiver off	1	50	21350/2560	21.00	20.26	0.594	0.100	1.19	0.704	25
		10	QPSK	Receiver off	50%	50	21350/2560	21.00	20.26	0.461	0.021	1.19	0.547	/
	Front Side	10	QPSK	Receiver off	1	50	21350/2560	21.00	20.26	0.154	0.014	1.19	0.183	/
		10	QPSK	Receiver off	50%	50	21350/2560	21.00	20.26	0.147	-0.033	1.19	0.174	/
	Left Edge	10	QPSK	Receiver off	1	50	21350/2560	21.00	20.26	0.038	0.100	1.19	0.045	/
		10	QPSK	Receiver off	50%	50	21350/2560	21.00	20.26	0.043	0.040	1.19	0.051	/
	Right Edge	10	QPSK	Receiver off	1	50	21350/2560	21.00	20.26	0.083	0.028	1.19	0.098	/
		10	QPSK	Receiver off	50%	50	21350/2560	21.00	20.26	0.073	0.015	1.19	0.087	/
	Top 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	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	/
	Bottom Edge	10	QPSK	Receiver off	1	50	21350/2560	21.00	20.26	0.424	0.033	1.19	0.503	/
		10	QPSK	Receiver off	50%	50	21350/2560	21.00	20.26	0.395	0.080	1.19	0.468	/
	Back Side Battery2	10	QPSK	Receiver off	1	50	21350/2560	21.00	20.26	0.556	0.032	1.19	0.659	/
LTE 41 (Original)	Back Side	10	QPSK	Receiver off	1	50	40620/2593	24.50	23.76	0.384	-0.012	1.19	0.455	/
		10	QPSK	Receiver off	50%	25	40620/2593	23.50	22.89	0.317	0.034	1.15	0.365	/
	Front Side	10	QPSK	Receiver off	1	50	40620/2593	24.50	23.76	0.123	0.019	1.19	0.146	/
		10	QPSK	Receiver off	50%	25	40620/2593	23.50	22.89	0.103	-0.022	1.15	0.119	/
	Left Edge	10	QPSK	Receiver off	1	50	40620/2593	24.50	23.76	0.066	0.020	1.19	0.078	/
		10	QPSK	Receiver off	50%	25	40620/2593	23.50	22.89	0.000	0.000	1.15	0.000	/
	Right Edge	10	QPSK	Receiver off	1	50	40620/2593	24.50	23.76	0.000	0.000	1.19	0.000	/
		10	QPSK	Receiver off	50%	25	40620/2593	23.50	22.89	0.000	0.000	1.15	0.000	/
	Top 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	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	/
	Bottom Edge	10	QPSK	Receiver off	1	50	40620/2593	24.50	23.76	0.432	0.105	1.19	0.512	/
		10	QPSK	Receiver off	50%	25	40620/2593	23.50	22.89	0.293	0.095	1.15	0.337	/
	Bottom Edge Battery2	10	QPSK	Receiver off	1	50	40620/2593	24.50	23.76	0.481	0.011	1.19	0.570	26

Band	Test Position	Dist. (mm)	Mode	Power Reduction	Duty Cycle	Ch./Freq. (MHz)	Tune-up (dBm)	Measured power (dBm)	Measured SAR1g	Power Drift (dB)	Scaling Factor	Report SAR1g	Plot No.
Wi-Fi 2.4G (Original)	Back Side	10	802.11b	Full power	98.0%	6/2437	18.00	17.70	0.160	0.160	1.09	0.175	/
	Front Side	10	802.11b	Full power	98.0%	6/2437	18.00	17.70	0.093	0.040	1.09	0.102	/
	Left Edge	10	802.11b	Full power	98.0%	6/2437	18.00	17.70	0.129	0.018	1.09	0.141	/
	Right Edge	10	802.11b	Full power	98.0%	6/2437	18.00	17.70	0.000	0.000	1.09	0.000	/
	Top Edge	10	802.11b	Full power	98.0%	6/2437	18.00	17.70	0.112	0.021	1.09	0.122	/
	Bottom Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	/
	Back Side Battery2	10	802.11b	Full power	98.0%	6/2437	18.00	17.70	0.164	0.021	1.09	0.179	/
Wi-Fi 2.4G (Variant)	Back Side	10	11b	Full power	98.0%	6/2437	18.00	17.72	0.184	0.056	1.09	0.200	27

Product-specific 10g SAR Evaluate

Band	Test Position	Mode	Power Reduction	RB	offset	Channel Frequency(MHz)	Tune-up (dBm)	Measured power (dBm)	Measured SAR1g	Scaling Factor	Report SAR1g	0mm SAR
WCDMA II (Original)	Back Side	RMC	Receiver off	-	-	9400/1880	25.50	22.50	0.519	2.00	1.036	NO
	Front Side	RMC	Receiver off	-	-	9400/1880	25.50	22.50	0.266	2.00	0.531	NO
	Left Edge	RMC	Receiver off	-	-	9400/1880	25.50	22.50	0.067	2.00	0.134	NO
	Right Edge	RMC	Receiver off	-	-	9400/1880	25.50	22.50	0.000	2.00	0.000	NO
	Bottom Edge	RMC	Receiver off	-	-	9400/1880	25.50	22.50	0.753	2.00	1.503	YES
LTE 7 (Original)	Back Side	QPSK	Receiver off	1	50	21350/2560	24.00	21.00	0.704	2.00	1.405	YES
		QPSK	Receiver off	50%	50	21350/2560	23.00	21.00	0.547	1.58	0.866	NO
	Front Side	QPSK	Receiver off	1	50	21350/2560	24.00	21.00	0.183	2.00	0.364	NO
		QPSK	Receiver off	50%	50	21350/2560	23.00	21.00	0.174	1.58	0.276	NO
	Left Edge	QPSK	Receiver off	1	50	21350/2560	24.00	21.00	0.045	2.00	0.090	NO
		QPSK	Receiver off	50%	50	21350/2560	23.00	21.00	0.051	1.58	0.081	NO
	Right Edge	QPSK	Receiver off	1	50	21350/2560	24.00	21.00	0.098	2.00	0.196	NO
		QPSK	Receiver off	50%	50	21350/2560	23.00	21.00	0.087	1.58	0.137	NO
	Bottom Edge	QPSK	Receiver off	1	50	21350/2560	24.00	21.00	0.503	2.00	1.003	NO
		QPSK	Receiver off	50%	50	21350/2560	23.00	21.00	0.468	1.58	0.742	NO

Product-specific 10g SAR

Band	Test Position	Dist. (mm)	Mode	Power Reduction	RB	offset	Ch./Freq. (MHz)	Tune-up (dBm)	Measured power (dBm)	Measured SAR10g	Power Drift (dB)	Scaling Factor	Report SAR10g	Plot No.
WCDMA II (Original)	Bottom Edge	0	RMC	Receiver off	-	-	9400/1880	22.50	21.71	1.700	0.100	1.20	2.039	/
	Bottom Edge	0	RMC	Receiver off	-	-	9262/1852.4	22.50	21.77	1.550	0.040	1.18	1.834	/
	Bottom Edge	0	RMC	Receiver off	-	-	9538/1907.6	22.50	21.65	1.590	-0.028	1.22	1.934	/
	Bottom Edge Battery2	0	RMC	Receiver off	-	-	9400/1880	22.50	21.71	1.820	0.021	1.20	2.183	28
	Bottom Edge SIM2	0	RMC	Receiver off	-	-	9400/1880	22.50	21.71	1.630	0.065	1.20	1.955	/

LTE 7 (Original)	Back Side	0	QPSK	Receiver off	1	50	21350/2560	21.00	20.26	2.320	0.099	1.19	2.751	29
		0	QPSK	Receiver off	1	50	20850/2510	21.00	19.95	2.150	0.030	1.27	2.738	/
		0	QPSK	Receiver off	1	50	21100/2535	21.00	20.10	2.130	0.100	1.23	2.620	/
		0	QPSK	Receiver off	50%	50	21350/2560	21.00	20.26	2.230	0.028	1.19	2.644	/
		0	QPSK	Receiver off	50%	50	20850/2510	21.00	19.81	1.920	0.017	1.32	2.525	/
		0	QPSK	Receiver off	50%	50	21100/2535	21.00	20.05	2.060	0.030	1.24	2.564	/
		0	QPSK	Receiver off	100%	0	21350/2560	21.00	20.22	2.030	0.040	1.20	2.429	/
		0	QPSK	Receiver off	100%	0	20850/2510	21.00	19.73	1.940	0.000	1.34	2.599	/
		0	QPSK	Receiver off	100%	0	21100/2535	21.00	19.97	2.110	-0.060	1.27	2.675	/
	Back Side Battery2	0	QPSK	Receiver off	1	50	21350/2560	21.00	20.26	2.010	0.015	1.19	2.383	/
	Back Side SIM2	0	QPSK	Receiver off	1	50	21350/2560	21.00	20.26	2.130	0.020	1.19	2.526	/
LTE 7 (Variant)	Back Side	0	QPSK	Receiver off	1	50	21350/2560	21.00	20.56	1.940	0.099	1.11	2.147	/

BT

Band	Configuration	Frequency (MHz)	Maximum Power (dBm)	Separation Distance (mm)	Estimated SAR (W/kg)
Bluetooth	Body-worn	2480	11	15	0.176
	Hotspot	2480	11	10	0.264
	Product Specific 10-g SAR	2480	11	5	0.211
For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01 based on the formula below. (max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]·[√f(GHz)/x] W/kg for test separation distances ≤ 50 mm; where x = 7.5 for 1-g SAR, and x = 18.75 for 10-g SAR.					

10.4 Simultaneous Transmission Analysis

Simultaneous Transmission Configurations	Head	Body-worn	Hotspot	Product Specific 10-g SAR
WWAN + Bluetooth	Yes	Yes	Yes	Yes
WWAN + Wi-Fi 2.4GHz	Yes	Yes	Yes	Yes
Wi-Fi 2.4GHz + Bluetooth	N/A	N/A	N/A	N/A

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 $SAR_{1g/10g}$ Value for WWAN-antenna

Test Position	$SAR_{1g/10g}$(W/kg)	GSM 850	GSM 1900	WCDMA II	WCDMA V	LTE 5	LTE 7	LTE 41	MAX. $SAR_{1g/10g}$
Head	Left Cheek	0.077	0.065	0.083	0.920	0.659	0.101	0.027	0.920
	Left Tilt	0.078	0.051	0.149	0.464	0.354	0.067	0.057	0.464
	Right Cheek	0.102	0.044	0.103	0.643	0.536	0.116	0.077	0.643
	Right Tilt	0.089	0.027	0.088	0.460	0.402	0.044	0.011	0.460
Body worn	Back Side	0.159	0.250	0.519	0.180	0.191	0.704	0.455	0.704
	Front Side	0.122	0.107	0.266	0.099	0.098	0.183	0.146	0.266
Hotspot	Back Side	0.269	0.512	0.519	0.180	0.191	0.704	0.455	0.704
	Front Side	0.176	0.251	0.266	0.099	0.098	0.183	0.146	0.266
	Left Edge	0.125	0.069	0.067	0.000	0.056	0.051	0.078	0.125
	Right Edge	0.133	0.000	0.000	0.072	0.069	0.098	0.000	0.133
	Top Edge	N/A	N/A	N/A	0.123	0.124	N/A	N/A	0.124
	Bottom Edge	0.087	0.819	0.753	N/A	N/A	0.503	0.570	0.819
Product Specific 10-g SAR	Back Side	N/A	N/A	N/A	N/A	N/A	2.751	N/A	2.751
	Front Side	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Left Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Right Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Bottom Edge	N/A	N/A	2.183	N/A	N/A	N/A	N/A	2.183

About BT and WWAN-antenna

Test Position / $SAR_{1g/10g}$(W/kg)		WWAN-antenna	BT	MAX. $\Sigma SAR_{1g/10g}$
Head	Left, Cheek	0.920	0.084	1.004
	Left, Tilt	0.464	0.092	0.556
	Right, Cheek	0.643	0.151	0.794
	Right, Tilt	0.460	0.112	0.572
Body worn	Back Side	0.704	0.176	0.880
	Front Side	0.266	0.176	0.442
Hotspot	Back Side	0.704	0.264	0.968
	Front Side	0.266	0.264	0.530
	Left Edge	0.125	0.264	0.389
	Right Edge	0.133	0.264	0.397
	Top Edge	0.124	0.264	0.388
	Bottom Edge	0.819	0.264	1.083
Product Specific 10-g SAR	Back Side	2.751	0.211	2.962
	Front Side	N/A	0.211	0.211
	Left Edge	N/A	0.211	0.211
	Right Edge	N/A	0.211	0.211
	Top Edge	N/A	0.211	0.211
	Bottom Edge	2.183	0.211	2.394

Note: 1. The value with blue color is the maximum $\Sigma SAR_{1g/10g}$ Value.
2.MAX. $\Sigma SAR_{1g/10g}$ =Unlicensed SAR_{MAX} +Licensed SAR_{MAX}

MAX. ΣSAR_{1g} =1.083W/kg<1.6W/kg and MAX. ΣSAR_{10g} =2.962W/kg<4 W/kg, so the Simultaneous transimition SAR with volum scan are not required for BT and WWAN-antenna

About Wi-Fi and WWAN-antenna

Test Position \ $SAR_{1g/10g}$(W/kg)		WWAN-antenna	Wi-Fi 2.4G	MAX. $\Sigma SAR_{1g/10g}$
Head	Left, Cheek	0.920	0.200	1.120
	Left, Tilt	0.464	0.284	0.748
	Right, Cheek	0.643	0.499	1.142
	Right, Tilt	0.460	0.313	0.773
Body worn	Back Side	0.704	0.200	0.904
	Front Side	0.266	0.102	0.368
Hotspot	Back Side	0.704	0.200	0.904
	Front Side	0.266	0.102	0.368
	Left Edge	0.125	0.141	0.266
	Right Edge	0.133	0.000	0.133
	Top Edge	0.124	0.122	0.246
	Bottom Edge	0.819	N/A	0.819
Product Specific 10-g SAR	Back Side	2.751	N/A	2.751
	Front Side	N/A	N/A	0.000
	Left Edge	N/A	N/A	0.000
	Right Edge	N/A	N/A	0.000
	Top Edge	N/A	N/A	0.000
	Bottom Edge	2.183	N/A	2.183

Note: 1. The value with blue color is the maximum $\Sigma SAR_{1g/10g}$ Value.
2.MAX. $\Sigma SAR_{1g/10g}$ =Unlicensed SAR_{MAX} +Licensed SAR_{MAX}

MAX. ΣSAR_{1g} = 1.142 W/kg<1.6W/kg and MAX. ΣSAR_{10g} = 2.751 W/kg<4 W/kg, so the Simultaneous transimition SAR with volum scan are not required for Wi-Fi and WWAN-antenna

11 Measurement Uncertainty

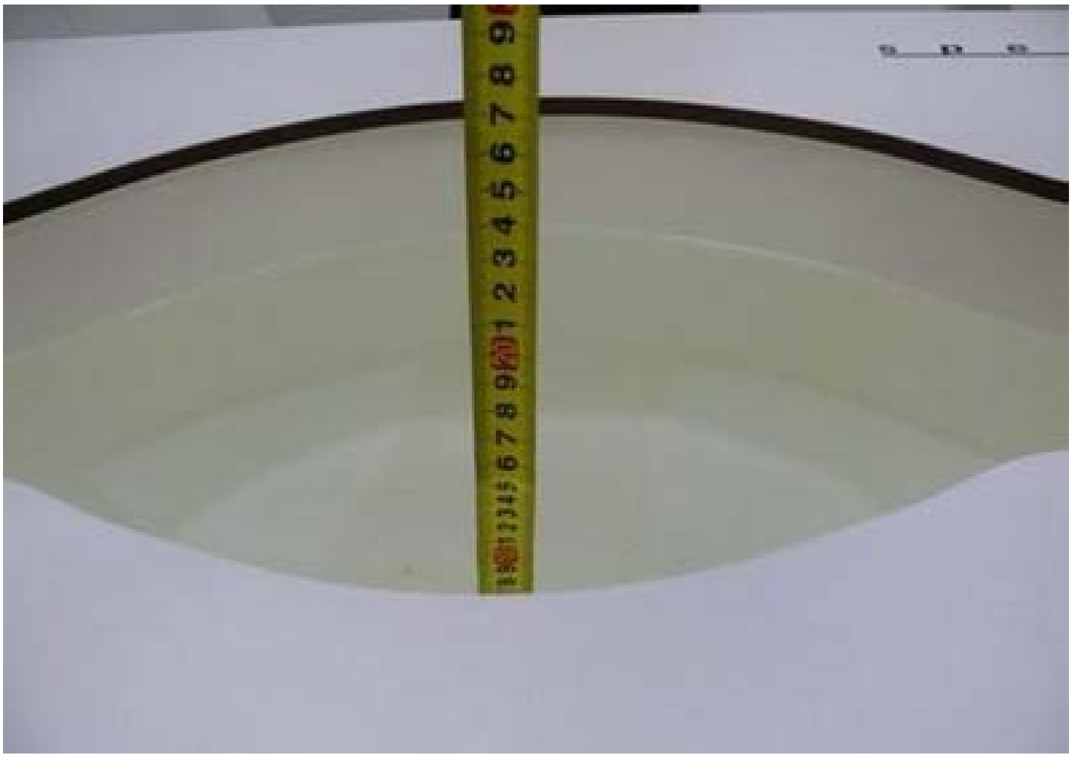
Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528- 2013 is not required in SAR reports submitted for equipment approval.

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

Original

Plot 1 System Performance Check at 835 MHz TSL

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

Date: 2021/11/26

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

Medium parameters used: f = 835 MHz; σ = 0.89 S/m; ε_r = 41.6; 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(9.30, 9.30, 9.30); Calibrated: 2021/8/12

Electronics: DAE4 SN1317; Calibrated: 2021/2/23

Phantom: SAM1; Type: SAM; Serial: TP-1534

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

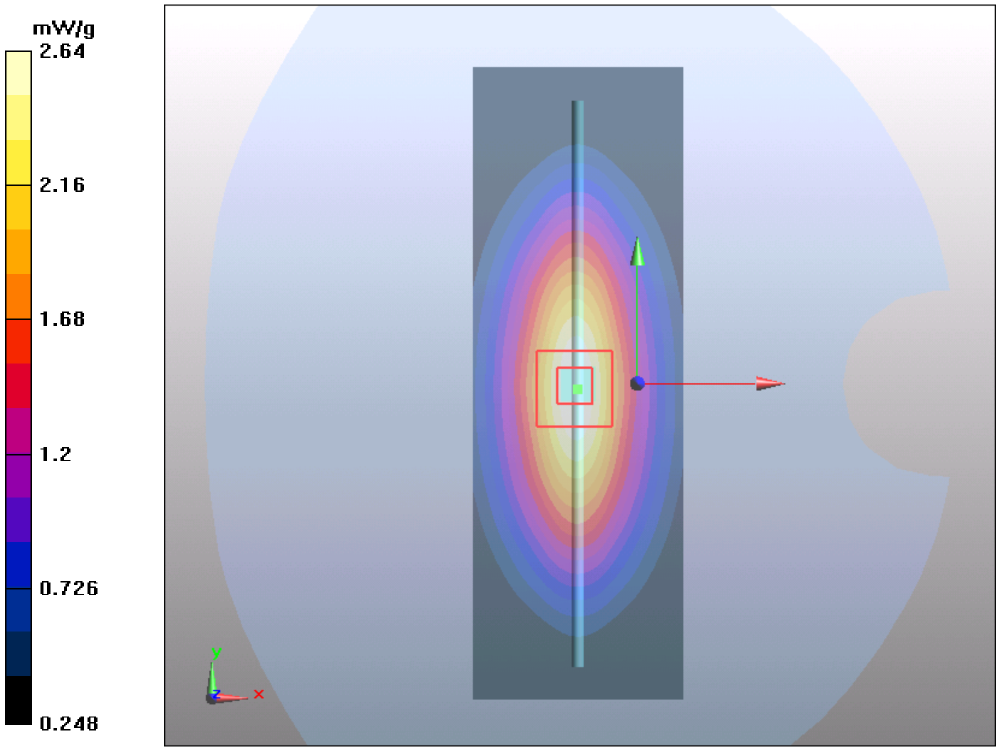
d=15mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

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 1900 MHz TSL

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d060

Date: 2021/12/8

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; σ = 1.43 S/m; ε_r = 40.3; 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 SN1317; Calibrated: 2021/2/23

Phantom: SAM1; Type: SAM; Serial: TP-1534

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

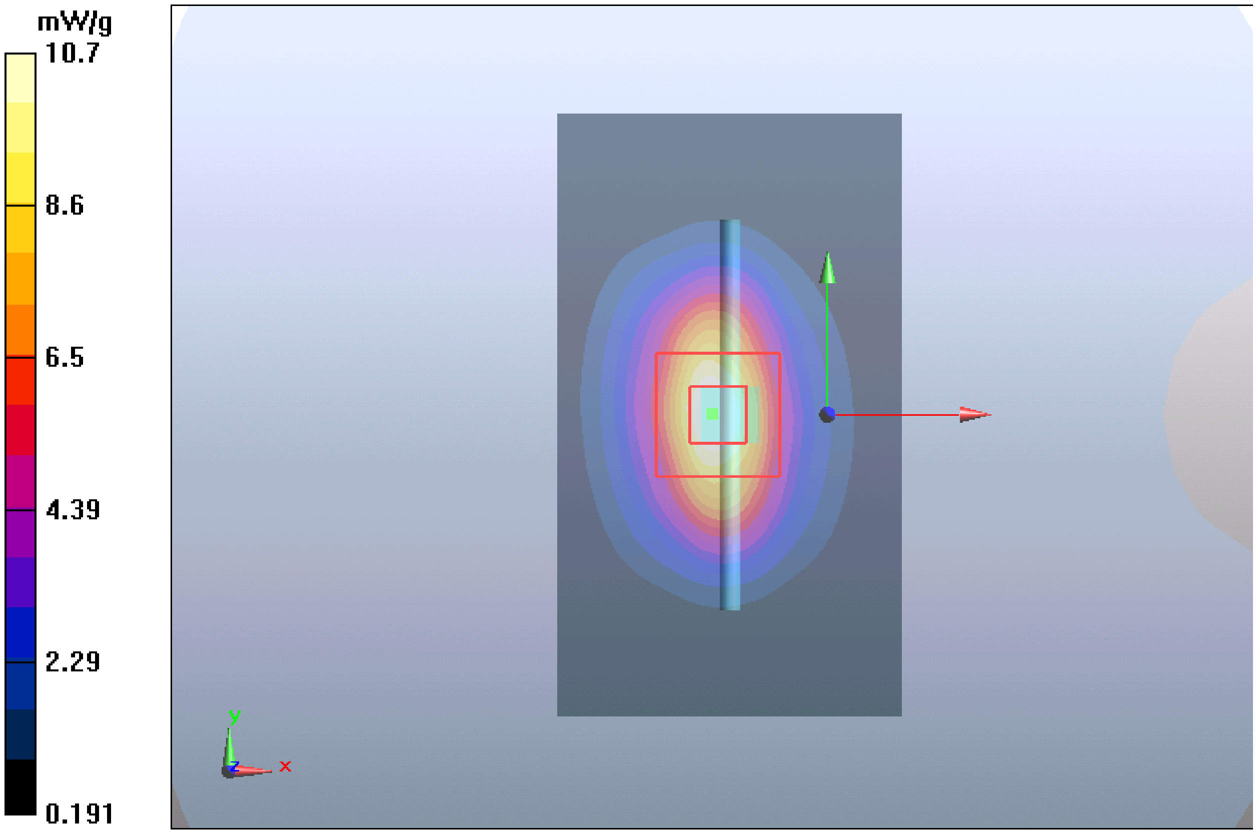
d=10mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

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 3 System Performance Check at 2450 MHz TSL

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

Date: 2021/11/24

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

Medium parameters used: f = 2450 MHz; σ = 1.80 S/m; ε_r = 39.5; 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 SN1317; Calibrated: 2021/2/23

Phantom: SAM1; Type: SAM; Serial: TP-1534

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

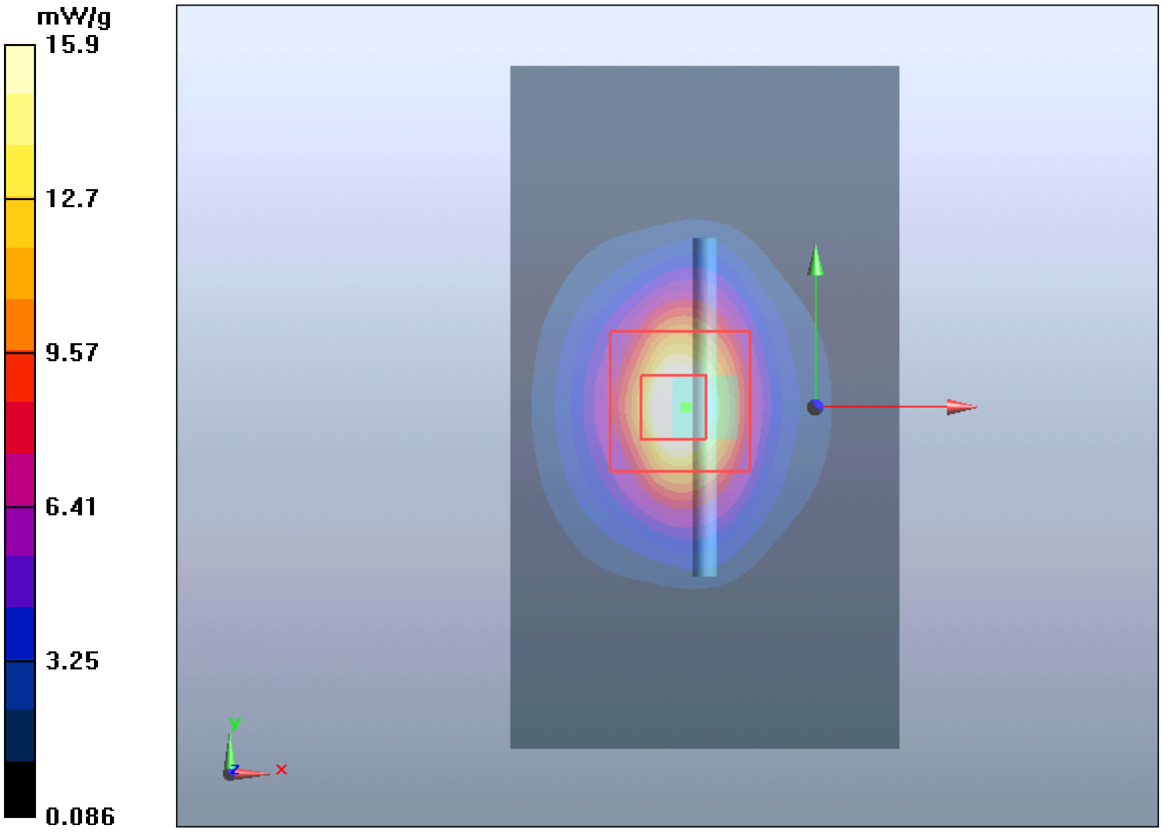
d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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



Plot 4 System Performance Check at 2600 MHz TSL

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1025

Date: 2021/12/5

Communication System: CW; Frequency: 2600 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2600 MHz; σ = 2.00 S/m; ε_r = 39.2; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.25, 7.25, 7.25); Calibrated: 2021/8/12

Electronics: DAE4 SN1317; Calibrated: 2021/2/23

Phantom: SAM1; Type: SAM; Serial: TP-1534

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) = 17.439 mW/g

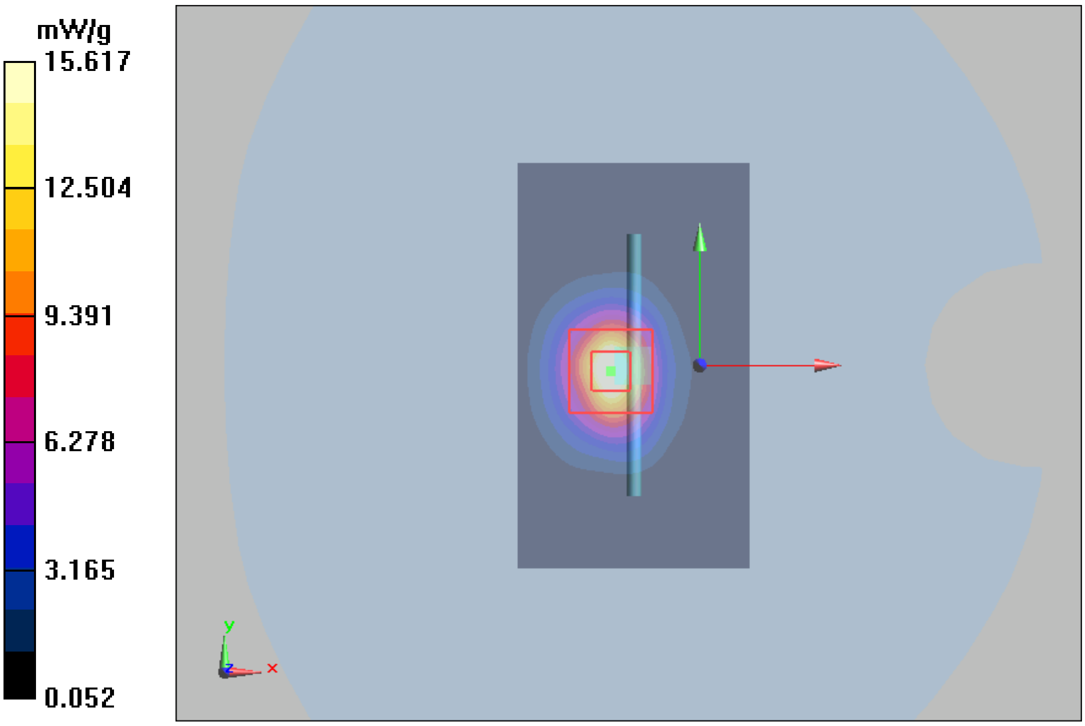
d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 87.998 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 31.858 W/kg

SAR(1 g) = 13.9 mW/g; SAR(10 g) = 6.07 mW/g

Maximum value of SAR (measured) = 15.617 mW/g



Variant

Plot 5 System Performance Check at 835 MHz TSL

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

Date: 2021/12/29

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

Medium parameters used: f = 835 MHz; σ =0.87 S/m; ε_r = 41.3; 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 SN1317; Calibrated: 2021/2/23

Phantom: SAM 2; Type: SAM

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) = 2.59 mW/g

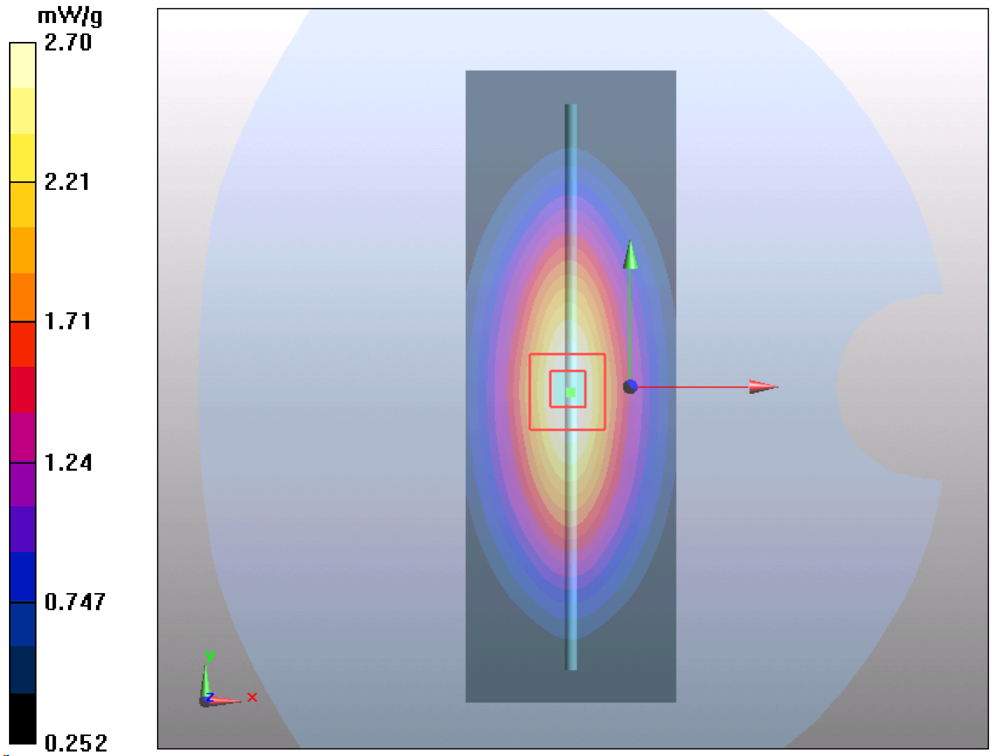
d=15mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 54.3 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 3.67 W/kg

SAR(1 g) = 2.46 mW/g; SAR(10 g) = 1.65 mW/g

Maximum value of SAR (measured) = 2.70 mW/g



Plot 6 System Performance Check at 1900 MHz TSL

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d060

Date: 2021/12/29

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; σ = 1.43 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(7.88, 7.88, 7.88); Calibrated: 2021/8/12

Electronics: DAE4 SN1317; Calibrated: 2021/2/23

Phantom: SAM 2; Type: SAM

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) = 11.23 mW/g

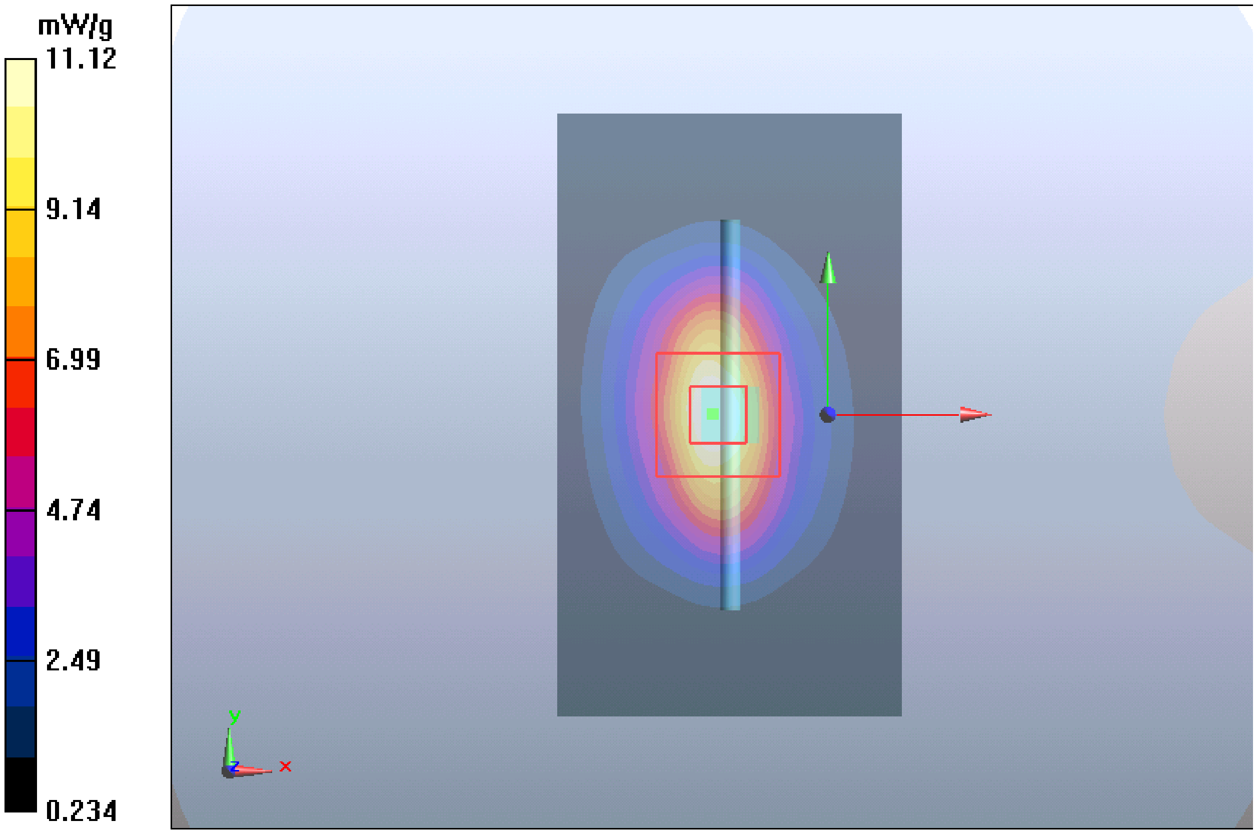
d=10mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 85.0 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 17.8 W/kg

SAR(1 g) = 9.85 mW/g; SAR(10 g) = 4.93 mW/g

Maximum value of SAR (measured) = 11.12 mW/g



Plot 7 System Performance Check at 2450 MHz TSL

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

Date: 2021/12/29

Communication System: CW; Frequency: 2600 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2600 MHz; σ = 1.35 S/m; ε_r = 38.2; ρ = 1000 kg/m^3

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 SN1317; Calibrated: 2021/2/23

Phantom: SAM 2; Type: SAM

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) = 17.439 mW/g

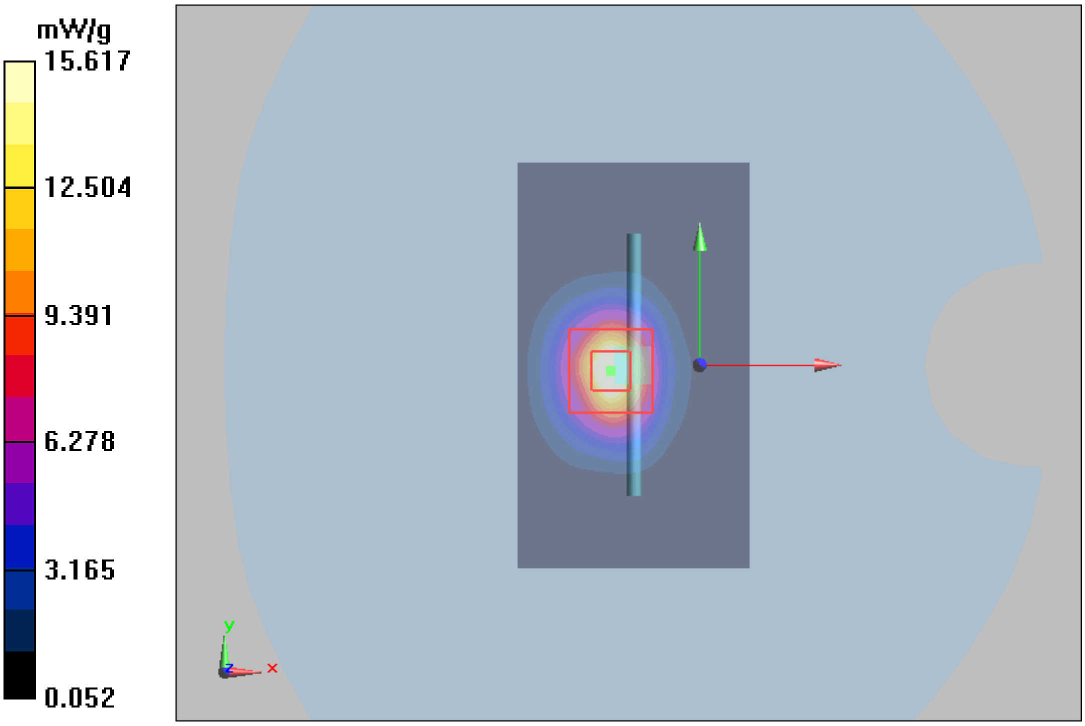
d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 87.998 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 31.858 W/kg

SAR(1 g) = 13.9 mW/g; SAR(10 g) = 6.07 mW/g

Maximum value of SAR (measured) = 15.617 mW/g



Plot 8 System Performance Check at 2600 MHz TSL

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1025

Date: 2021/12/29

Communication System: CW; Frequency: 2600 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2600 MHz; σ = 1.99 mho/m; ε_r = 38.3; ρ = 1000 kg/m^3

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.25, 7.25, 7.25); Calibrated: 2021/8/12

Electronics: DAE4 SN1317; Calibrated: 2021/2/23

Phantom: SAM 2; Type: SAM

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) = 17.32 mW/g

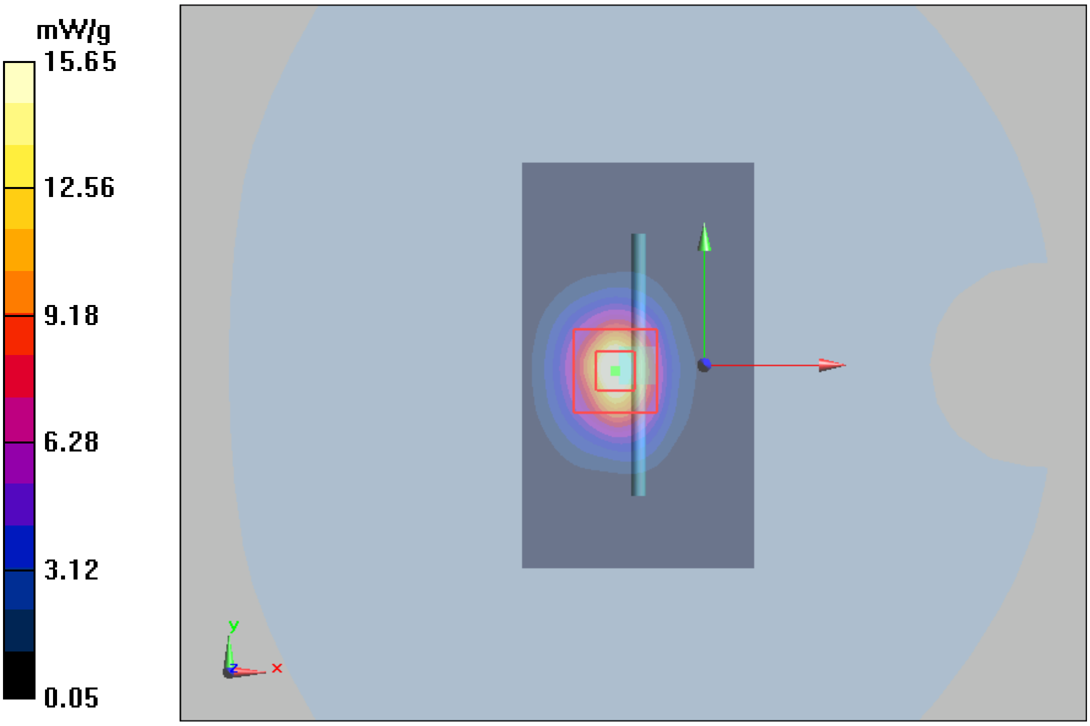
d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 87.465 V/m; Power Drift = 0.146 dB

Peak SAR (extrapolated) = 31.85 W/kg

SAR(1 g) = 13.94 mW/g; SAR(10 g) = 6.11 mW/g

Maximum value of SAR (measured) = 15.65 mW/g



ANNEX C: Highest Graph Results

Plot 9 GSM 850 Right Cheek Middle

Date: 2021/11/26

Communication System: UID 0, GSM (0); Frequency: 836.6 MHz;Duty Cycle: 1:8.3

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: 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 SN1317; Calibrated: 2021/2/23

Phantom: SAM1; Type: SAM; Serial: TP-1534

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

Right Cheek Middle/Area Scan (8x14x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.104 W/kg

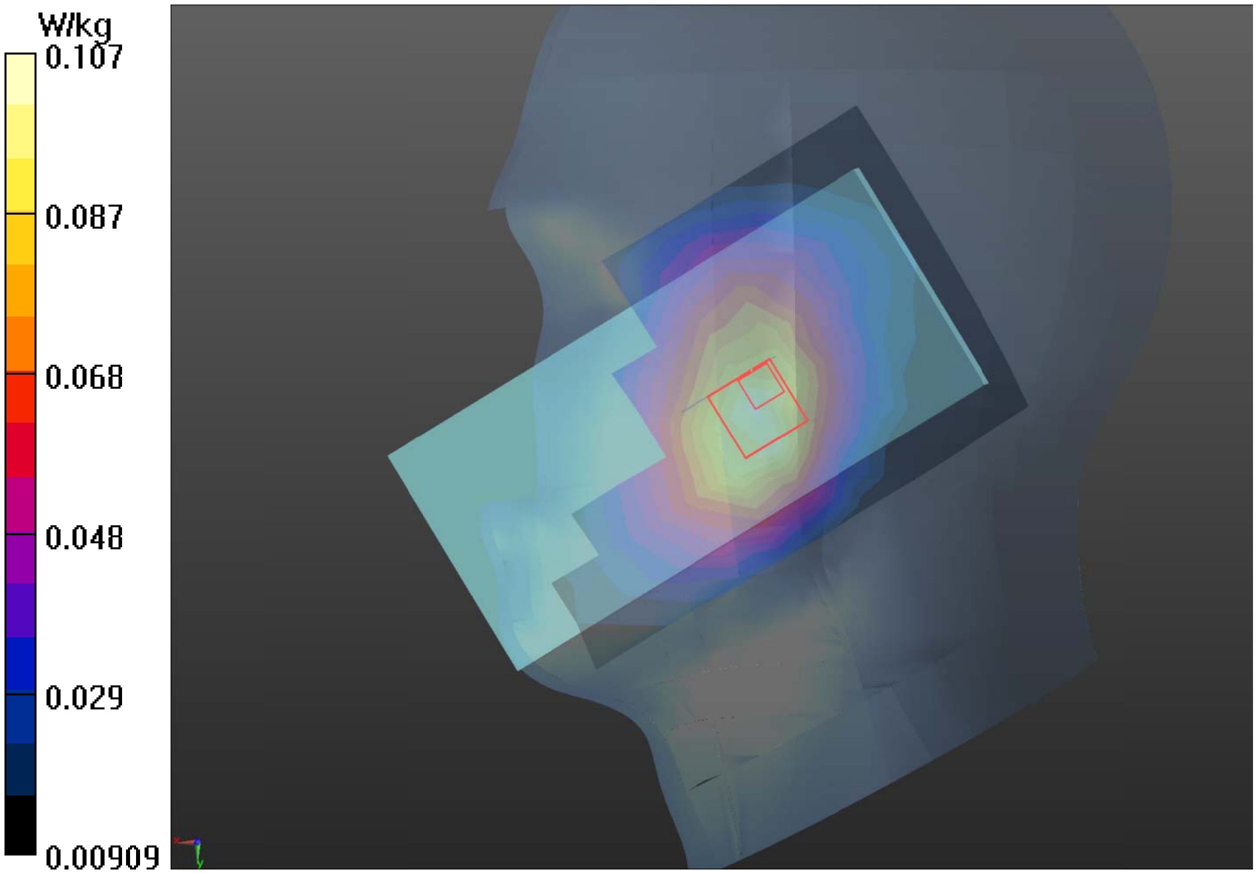
Right Cheek Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.528 V/m; Power Drift = -0.028 dB

Peak SAR (extrapolated) = 0.151 W/kg

SAR(1 g) = 0.089 W/kg; SAR(10 g) = 0.066 W/kg

Maximum value of SAR (measured) = 0.107 W/kg



Plot 10 GSM 1900 Left Cheek Middle

Date: 2021/12/8

Communication System: UID 0, GSM (0); Frequency: 1880 MHz;Duty Cycle: 1:8.3

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: 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 SN1317; Calibrated: 2021/2/23

Phantom: SAM1; Type: SAM; Serial: TP-1534

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

Left Cheek Middle/Area Scan (8x14x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.053 W/kg

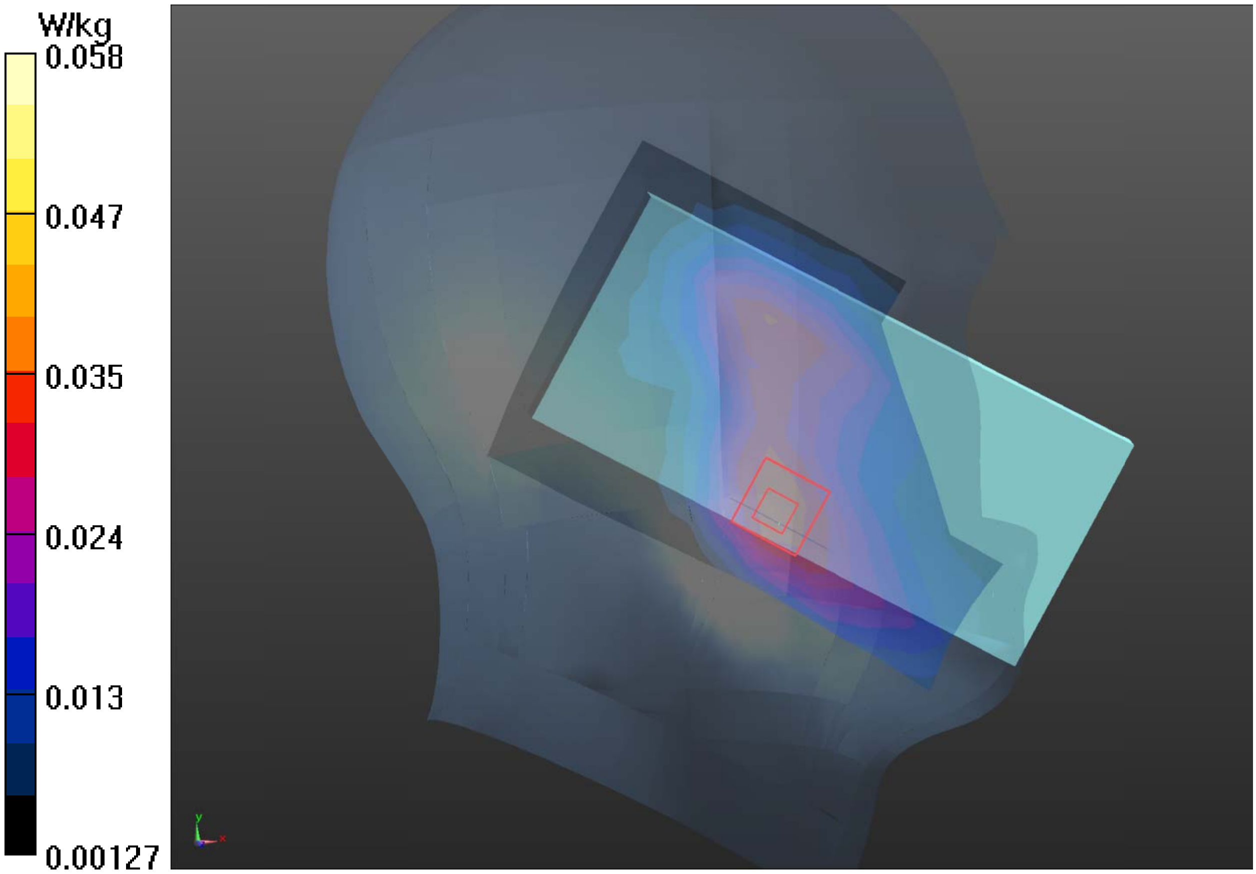
Left Cheek Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.700 V/m; Power Drift = 0.185 dB

Peak SAR (extrapolated) = 0.065 W/kg

SAR(1 g) = 0.05 W/kg; SAR(10 g) = 0.032 W/kg

Maximum value of SAR (measured) = 0.058 W/kg



Plot 11 UMTS Band II Left Tilt Middle

Date: 2021/12/8

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: 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 SN1317; Calibrated: 2021/2/23

Phantom: SAM1; Type: SAM; Serial: TP-1534

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

Left Tilt Middle/Area Scan (8x14x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.125 W/kg

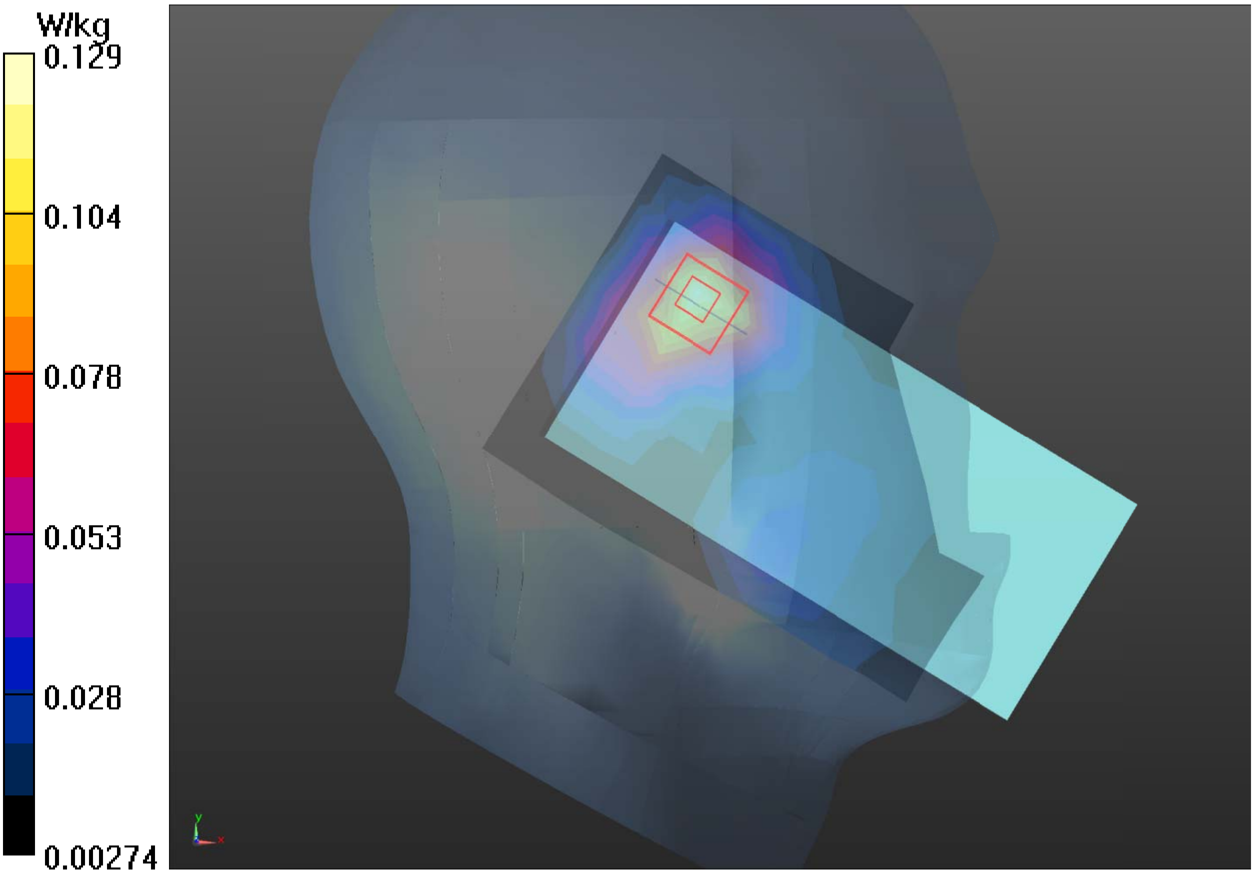
Left Tilt Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.325 V/m; Power Drift = 0.038 dB

Peak SAR (extrapolated) = 0.176 W/kg

SAR(1 g) = 0.124 W/kg; SAR(10 g) = 0.081 W/kg

Maximum value of SAR (measured) = 0.129 W/kg



Plot 12 UMTS Band V Left Cheek Middle

Date: 2021/12/29

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

Medium parameters used: f = 837 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: 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 SN1317; Calibrated: 2021/2/23

Phantom: SAM 2; Type: SAM

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

Left Cheek Middle/Area Scan (8x14x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.921 W/kg

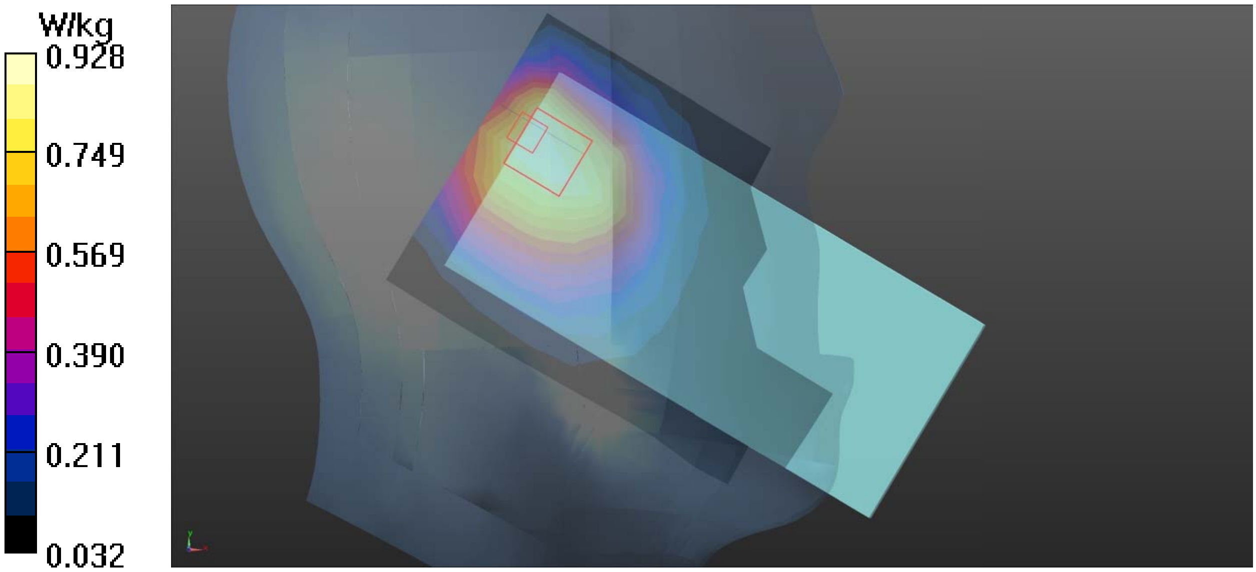
Left Cheek Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 29.11 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 1.62 W/kg

SAR(1 g) = 0.889 W/kg; SAR(10 g) = 0.612 W/kg

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



Plot 13 LTE Band 5 1RB Left Cheek Middle

Date: 2021/11/26

Communication System: UID 0, LTE (0); Frequency: 836.5 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 836.5 MHz; σ = 0.953 S/m; ε_r = 39.767; 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 SN1317; Calibrated: 2021/2/23

Phantom: SAM1; Type: SAM; Serial: TP-1534

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

Left Cheek Middle/Area Scan (8x14x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.55 W/kg

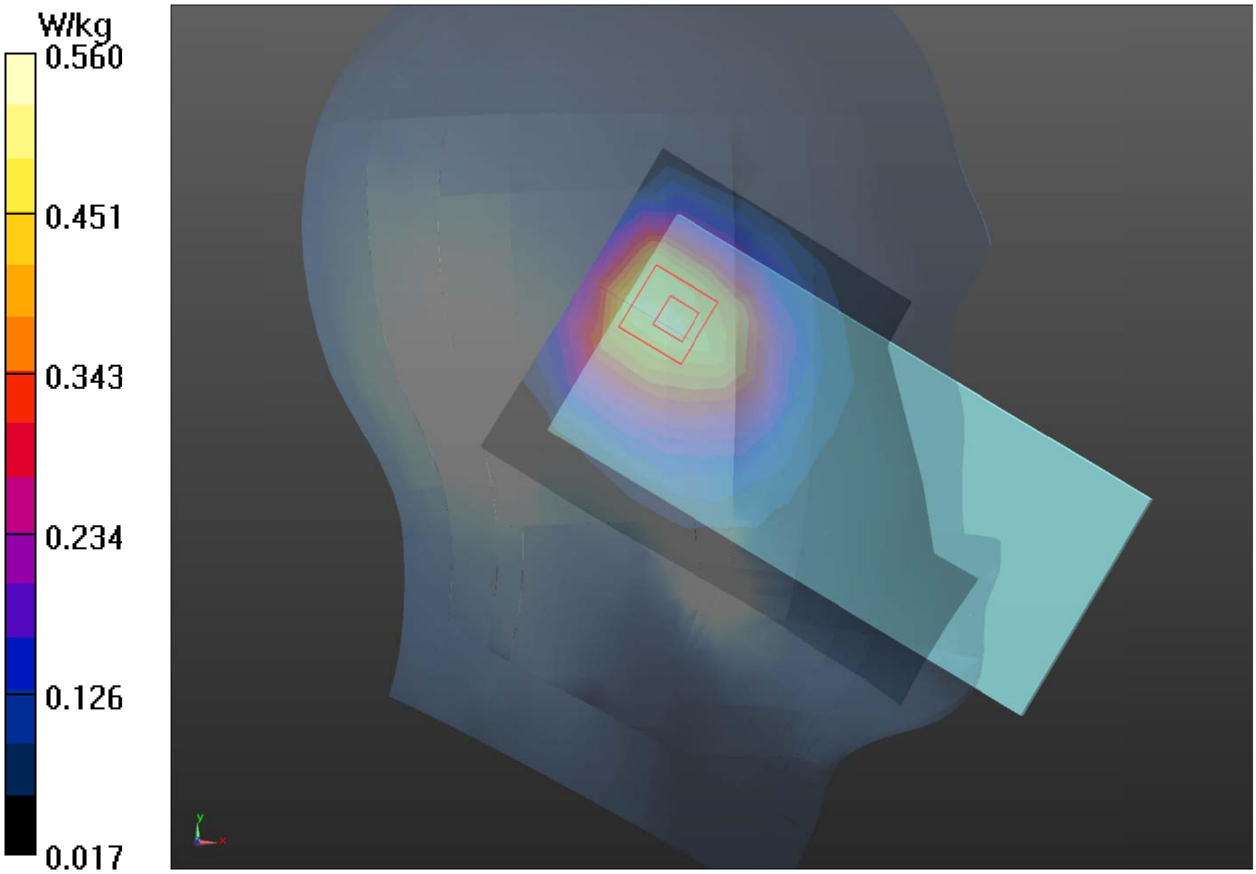
Left Cheek Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 21.54 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.771 W/kg

SAR(1 g) = 0.541 W/kg; SAR(10 g) = 0.372 W/kg

Maximum value of SAR (measured) = 0.560 W/kg



Plot 14 LTE Band 7 1RB Right Cheek Middle

Date: 2021/12/5

Communication System: UID 0, LTE (0); Frequency: 2535 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2535 MHz; σ = 1.94 S/m; ε_r = 37.31; 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(7.25, 7.25, 7.25); Calibrated: 2021/8/12

Electronics: DAE4 SN1317; Calibrated: 2021/2/23

Phantom: SAM1; Type: SAM; Serial: TP-1534

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

Right Cheek Middle/Area Scan (10x18x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.118 W/kg

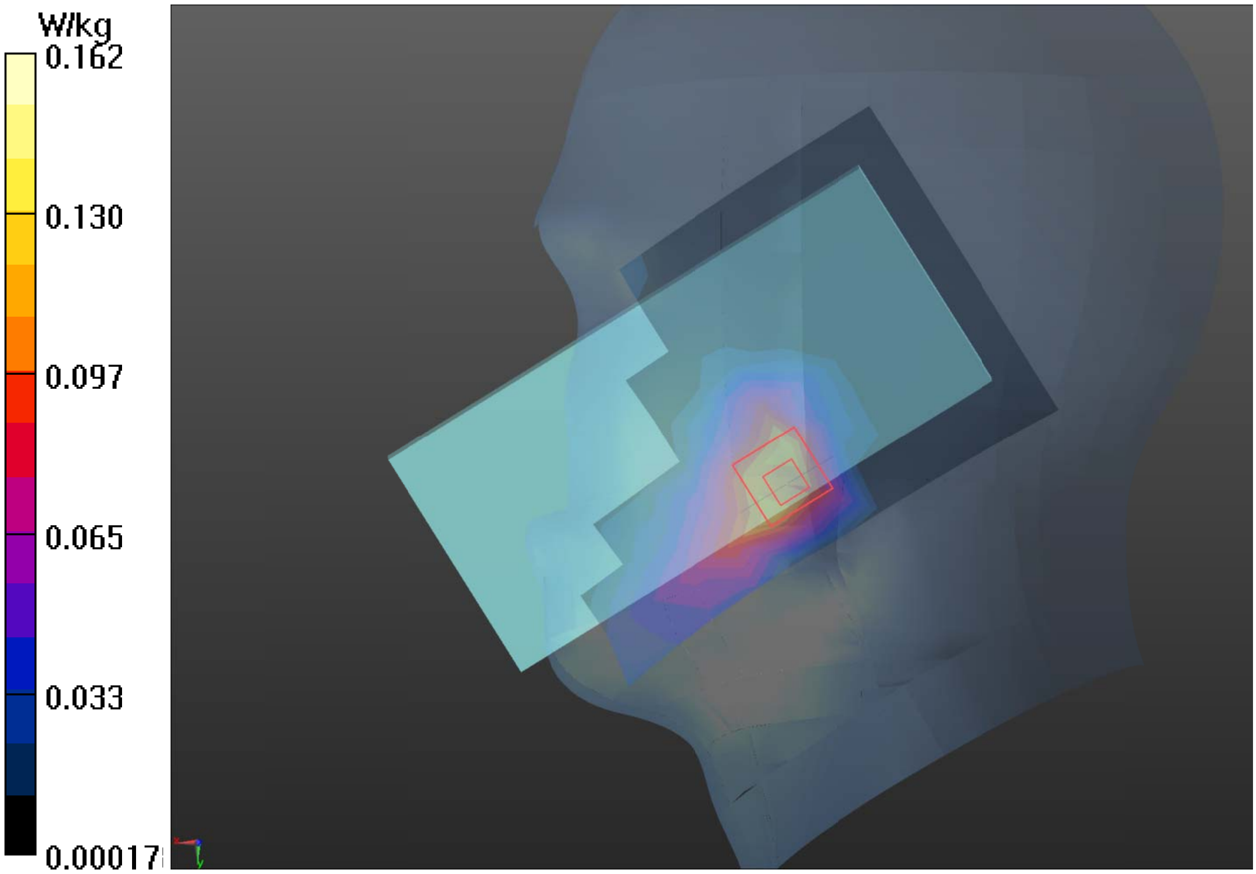
Right Cheek Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 0.9480 V/m; Power Drift = 0.074 dB

Peak SAR (extrapolated) = 0.200 W/kg

SAR(1 g) = 0.104 W/kg; SAR(10 g) = 0.054 W/kg

Maximum value of SAR (measured) = 0.162 W/kg



Plot 15 LTE Band 41 1RB Right Cheek Middle

Date: 2021/12/5

Communication System: UID 0, LTE (0); Frequency: 2593 MHz;Duty Cycle: 1:1.58

Medium parameters used: f = 2593 MHz; σ = 2.009 S/m; ε_r = 37.118; 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(7.25, 7.25, 7.25); Calibrated: 2021/8/12

Electronics: DAE4 SN1317; Calibrated: 2021/2/23

Phantom: SAM1; Type: SAM; Serial: TP-1534

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

Right Cheek Middle/Area Scan(10x18x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.068 W/kg

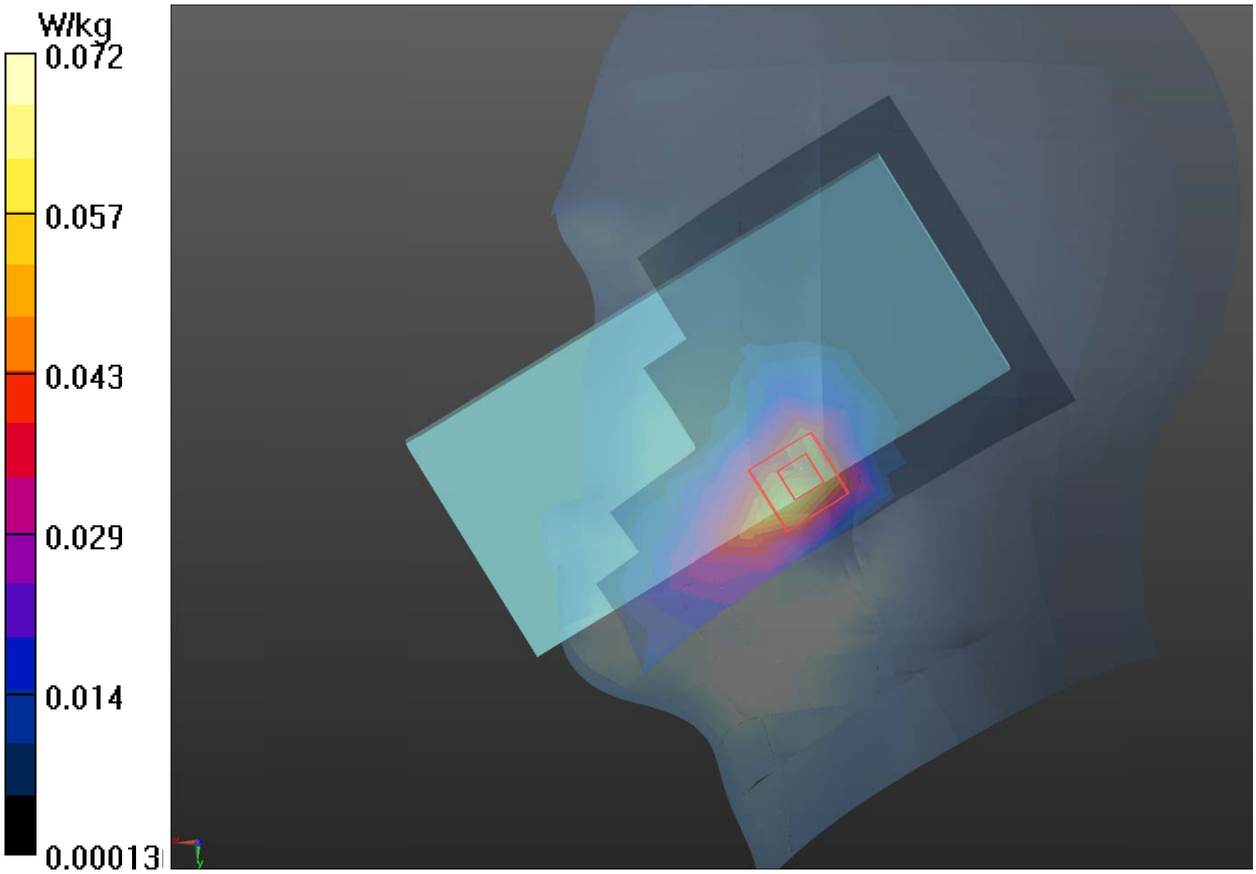
Right Cheek Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 0.6200 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.094 W/kg

SAR(1 g) = 0.065 W/kg; SAR(10 g) = 0.028 W/kg

Maximum value of SAR (measured) = 0.072 W/kg



Plot 16 802.11b Right Cheek Middle

Date: 2021/11/24

Communication System: UID 0, 802.11b (0); Frequency: 2437 MHz;Duty Cycle: 1:1.02

Medium parameters used: f = 2437 MHz; σ = 1.831 S/m; ε_r = 37.663; 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 SN1317; Calibrated: 2021/2/23

Phantom: SAM1; Type: SAM; Serial: TP-1534

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

Right Cheek Middle/Area Scan (10x18x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.593 W/kg

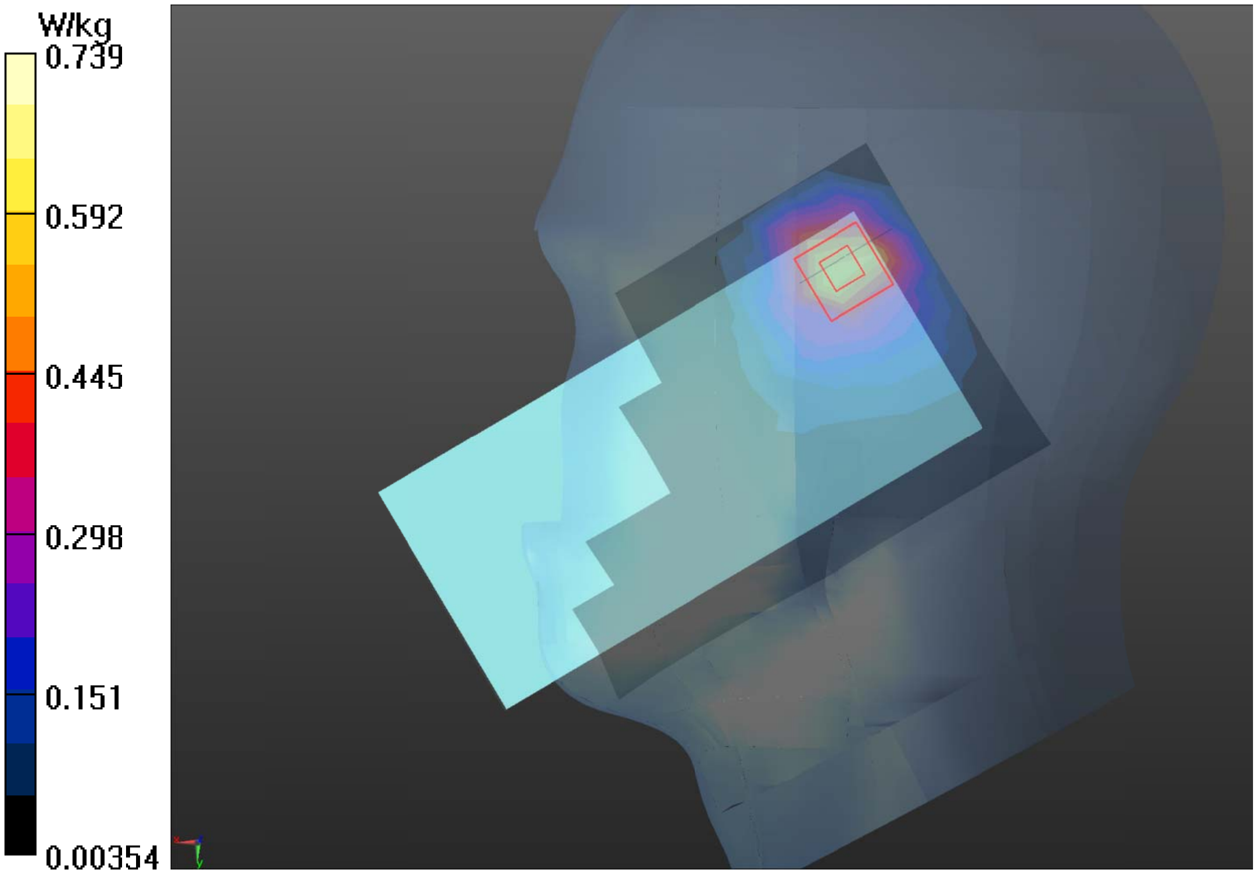
Right Cheek Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.737 V/m; Power Drift = 0.020 dB

Peak SAR (extrapolated) = 0.936 W/kg

SAR(1 g) = 0.456 W/kg; SAR(10 g) = 0.226 W/kg

Maximum value of SAR (measured) = 0.739 W/kg



Plot 17 Bluetooth Right Cheek High

Date: 2021/11/24

Communication System: UID 0, BT (0); Frequency: 2480 MHz;Duty Cycle: 1:2.16

Medium parameters used: f = 2480 MHz; σ = 1.878 S/m; ε_r = 37.511; 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 SN1317; Calibrated: 2021/2/23

Phantom: SAM1; Type: SAM; Serial: TP-1534

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

Right Cheek High/Area Scan (10x18x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.072 W/kg

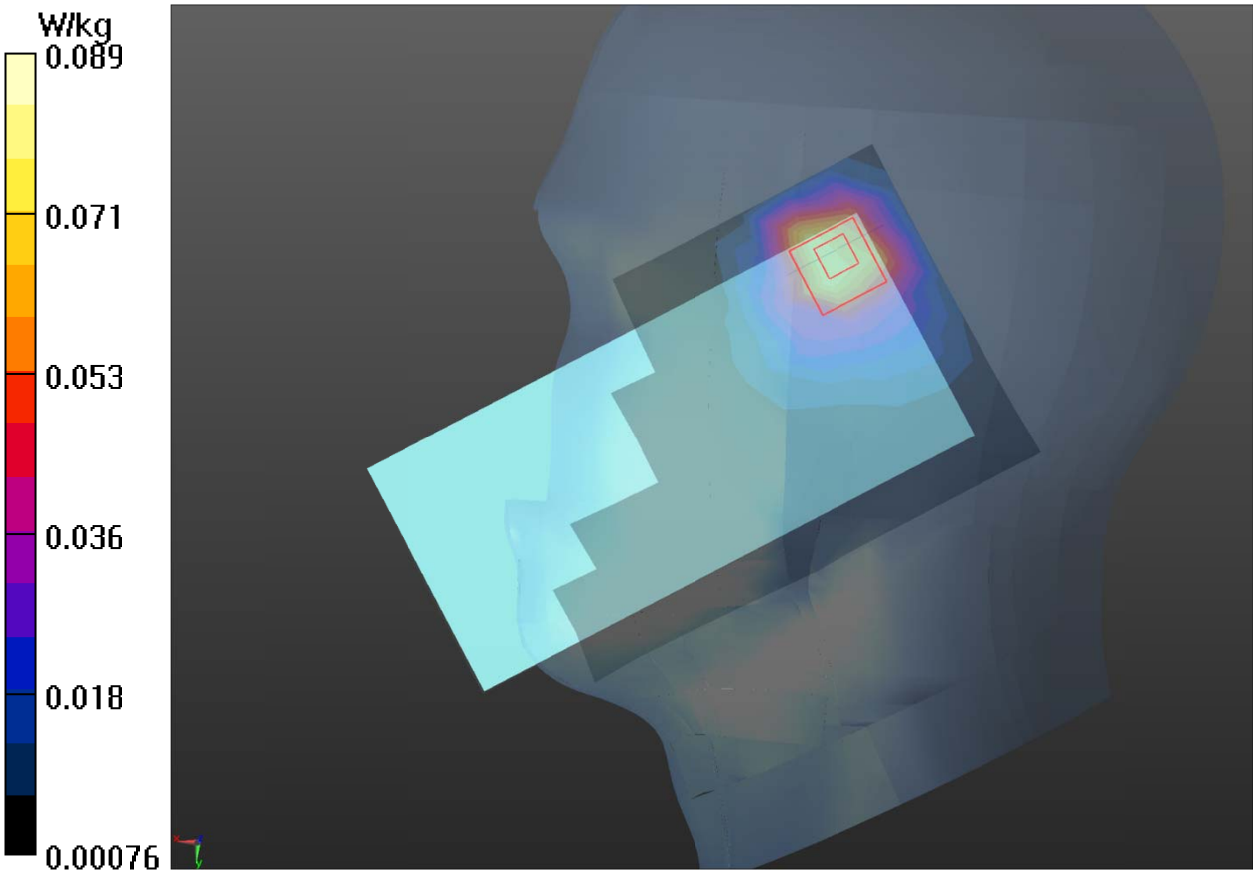
Right Cheek High/Zoom Scan(7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.884 V/m; Power Drift = 0.056 dB

Peak SAR (extrapolated) = 0.113 W/kg

SAR(1 g) = 0.052 W/kg; SAR(10 g) = 0.026 W/kg

Maximum value of SAR (measured) = 0.089 W/kg



Plot 18 GSM 850 Back Side Middle (Distance 15mm)

Date: 2021/11/26

Communication System: UID 0, GSM (0); Frequency: 836.6 MHz;Duty Cycle: 1:8.3

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 SN1317; Calibrated: 2021/2/23

Phantom: SAM1; Type: SAM; Serial: TP-1534

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

Back Side Middle/Area Scan (8x14x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.168 W/kg

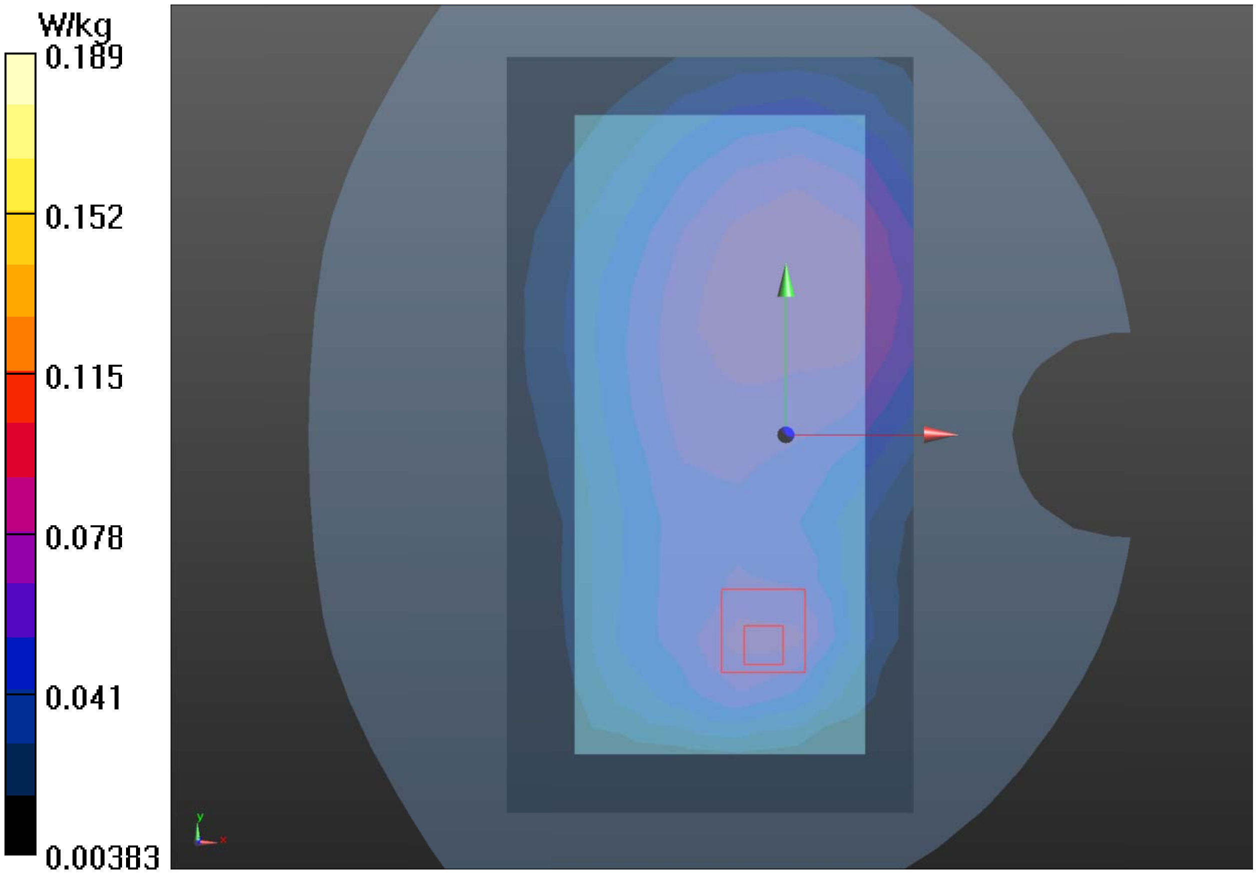
Back Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.810 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.229 W/kg

SAR(1 g) = 0.139 W/kg; SAR(10 g) = 0.098 W/kg

Maximum value of SAR (measured) = 0.189 W/kg



Plot 19 GSM 1900 Back Side Middle (Distance 15mm)

Date: 2021/12/29

Communication System: UID 0, GSM (0); Frequency: 1880 MHz;Duty Cycle: 1:8.300

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 SN1317; Calibrated: 2021/2/23

Phantom: SAM 2; Type: SAM

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

Back Side Middle/Area Scan (8x14x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.256 W/kg

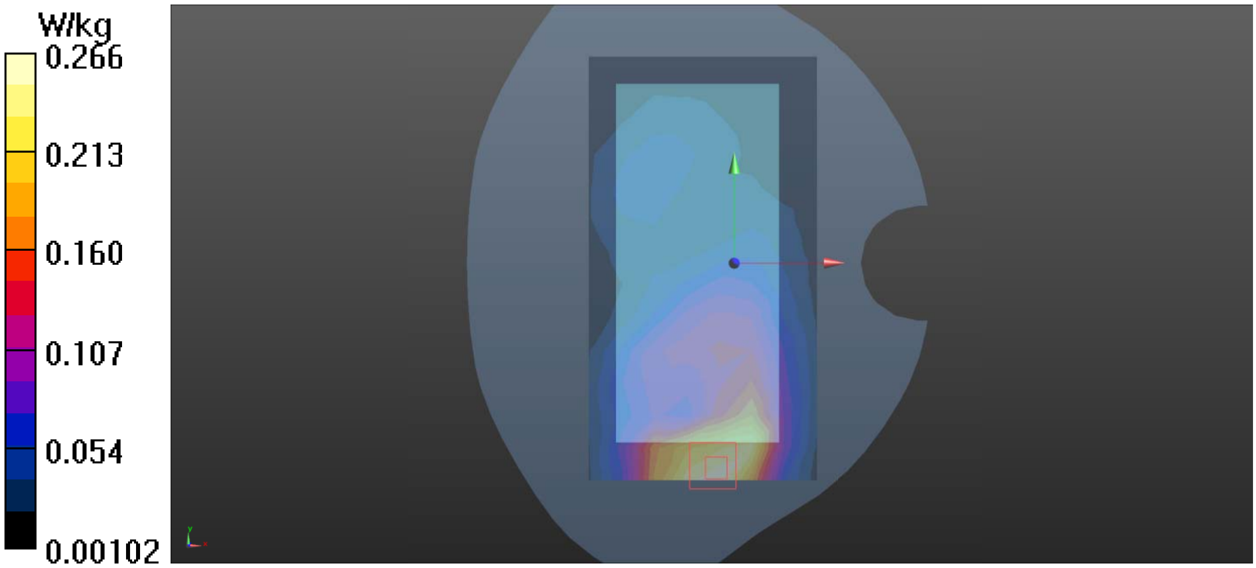
Back Side Middle /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.770 V/m; Power Drift = -0.160 dB

Peak SAR (extrapolated) = 0.456 W/kg

SAR(1 g) = 0.209 W/kg; SAR(10 g) = 0.122 W/kg

Maximum value of SAR (measured) = 0.266 W/kg



Plot 20 GSM 850 GPRS 4TX Back Side Middle (Distance 10mm)

Date: 2021/11/26

Communication System: UID 0, GPRS 4TX (0); Frequency: 836.6 MHz;Duty Cycle: 1:2.07

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 SN1317; Calibrated: 2021/2/23

Phantom: SAM1; Type: SAM; Serial: TP-1534

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

Back Side Middle/Area Scan (8x14x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.201 W/kg

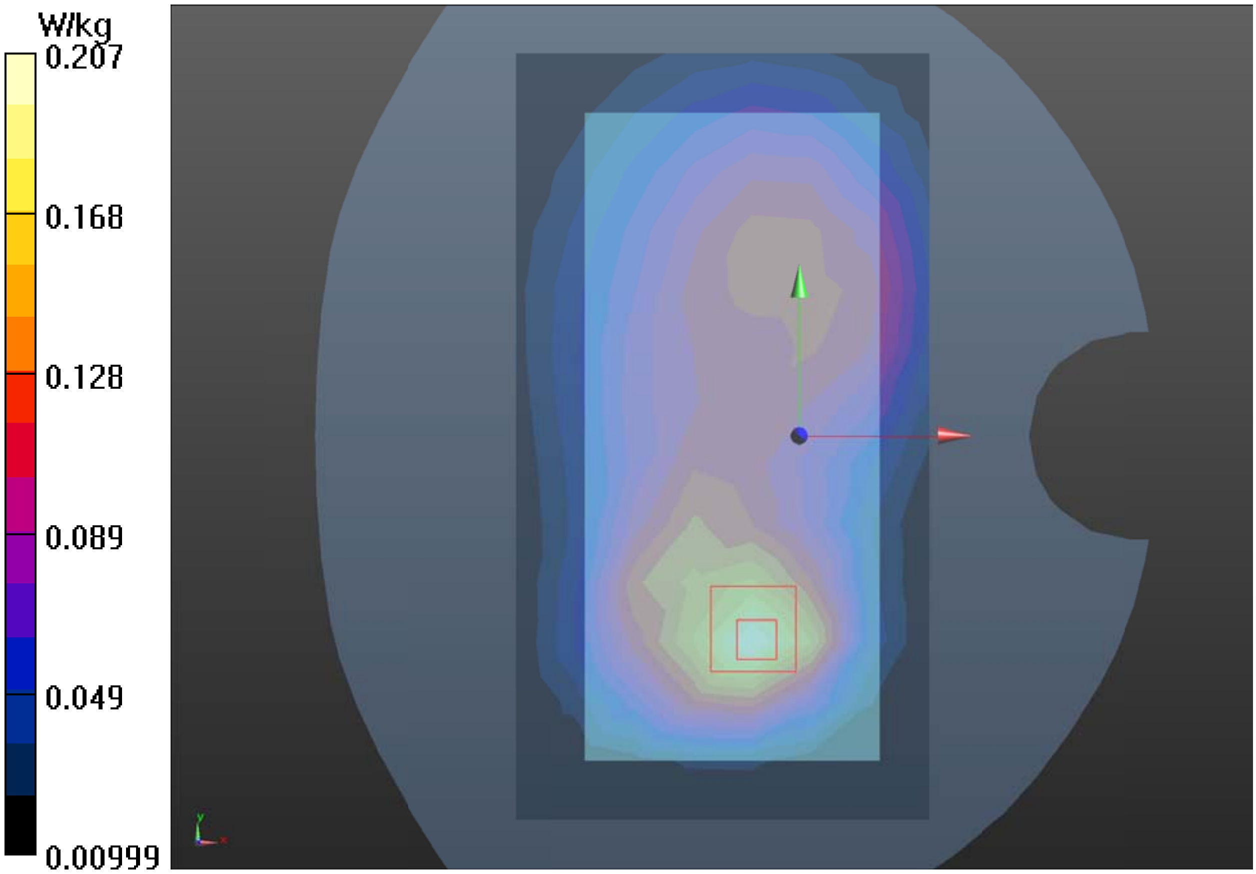
Back Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.18 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.299 W/kg

SAR(1 g) = 0.200 W/kg; SAR(10 g) = 0.126 W/kg

Maximum value of SAR (measured) = 0.207 W/kg



Plot 21 GSM 1900 Bottom Edge Low (Distance 10mm)

Date: 2021/12/8

Communication System: UID 0, GPRS 2TX (0); Frequency: 1850.2 MHz;Duty Cycle: 1:4.15

Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.398 S/m; ε_r = 39.043; 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 SN1317; Calibrated: 2021/2/23

Phantom: SAM1; Type: SAM; Serial: TP-1534

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

Bottom Edge Low/Area Scan (4x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.682 W/kg

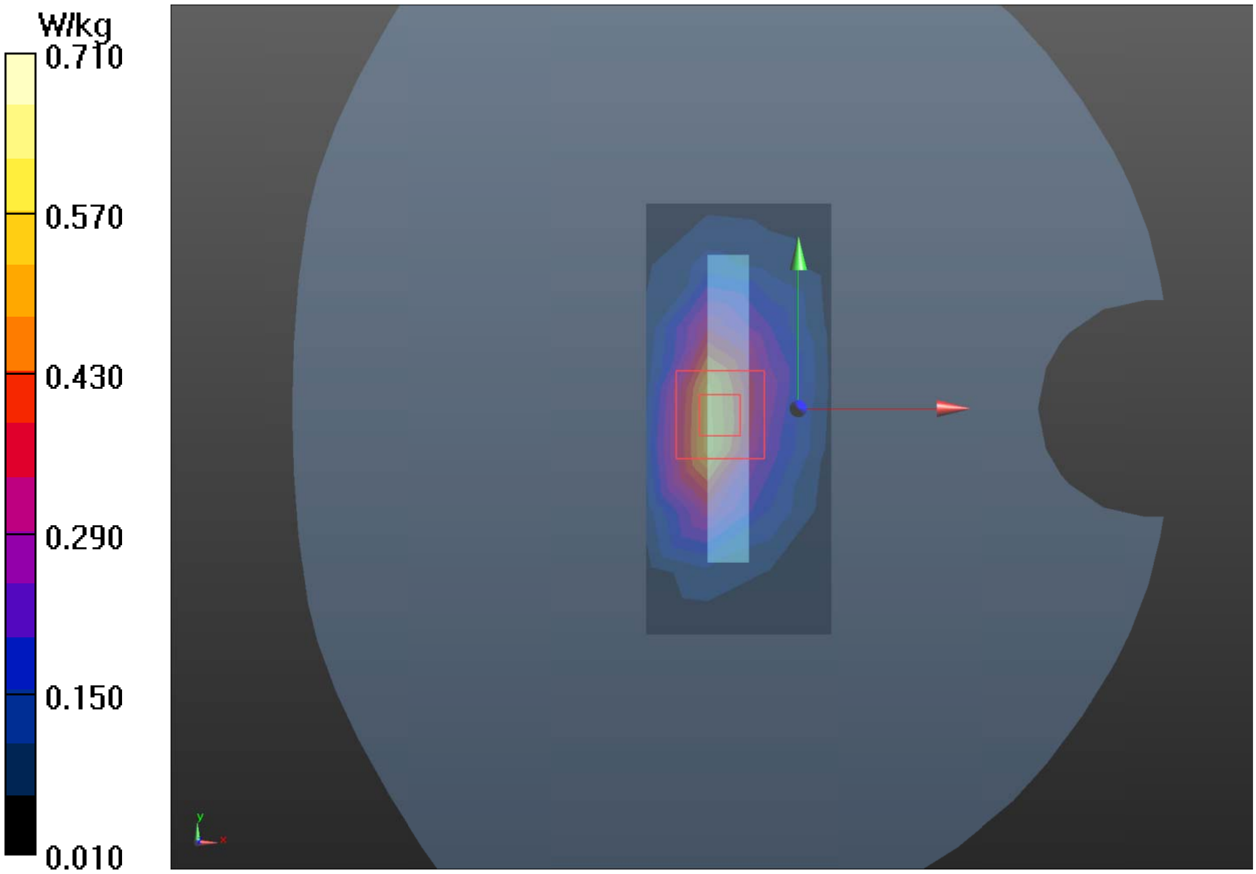
Bottom Edge Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 20.90 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.996 W/kg

SAR(1 g) = 0.652 W/kg; SAR(10 g) = 0.345 W/kg

Maximum value of SAR (measured) = 0.710 W/kg



Plot 22 UMTS Band II Bottom Edge Middle (Distance 10mm)

Date: 2021/12/8

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 SN1317; Calibrated: 2021/2/23

Phantom: SAM1; Type: SAM; Serial: TP-1534

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

Bottom Edge Middle/Area Scan (4x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.63 W/kg

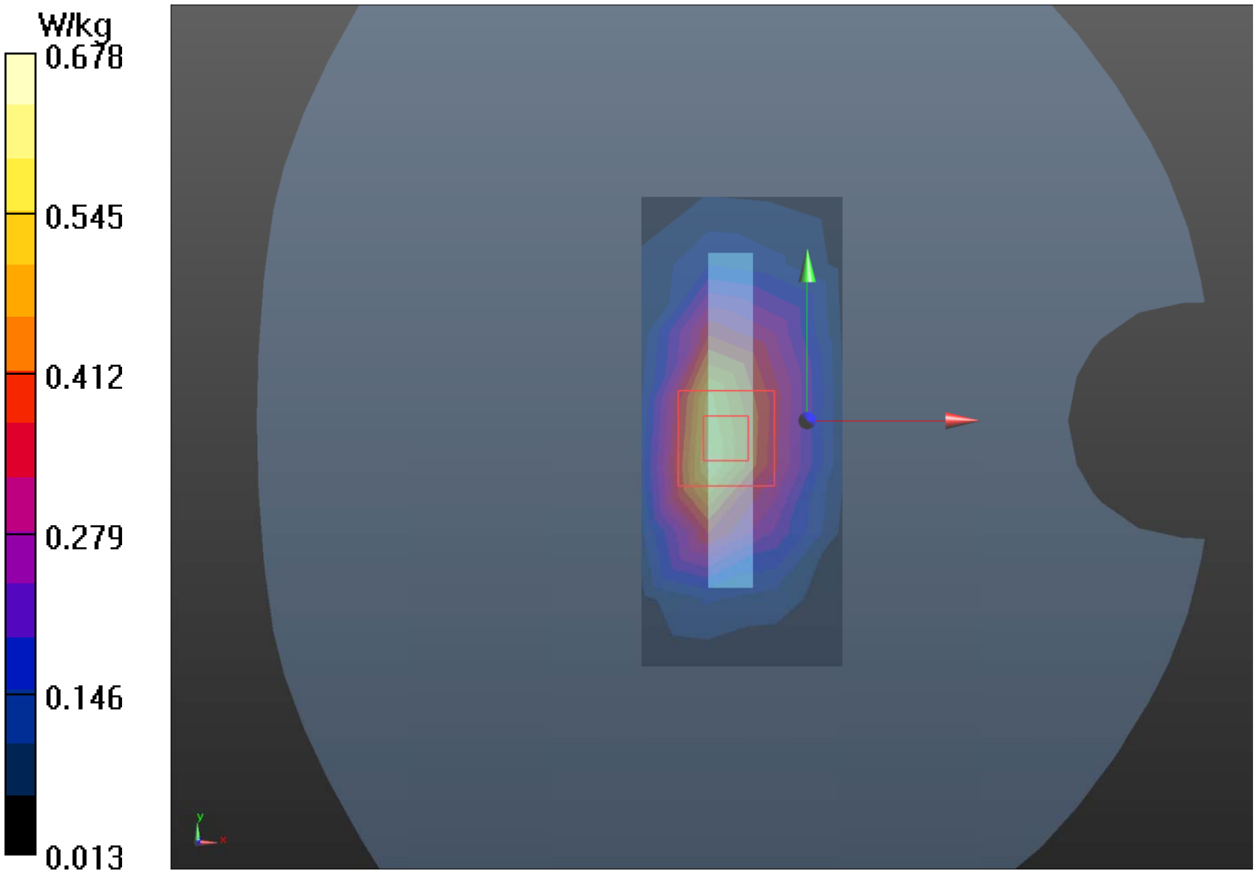
Bottom Edge Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 21.95 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 1.08 W/kg

SAR(1 g) = 0.628 W/kg; SAR(10 g) = 0.336 W/kg

Maximum value of SAR (measured) = 0.678 W/kg



Plot 23 UMTS Band V Back Side Middle (Distance 10mm)

Date: 2021/11/26

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 SN1317; Calibrated: 2021/2/23

Phantom: SAM1; Type: SAM; Serial: TP-1534

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

Back Side Middle/Area Scan (8x14x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.153 W/kg

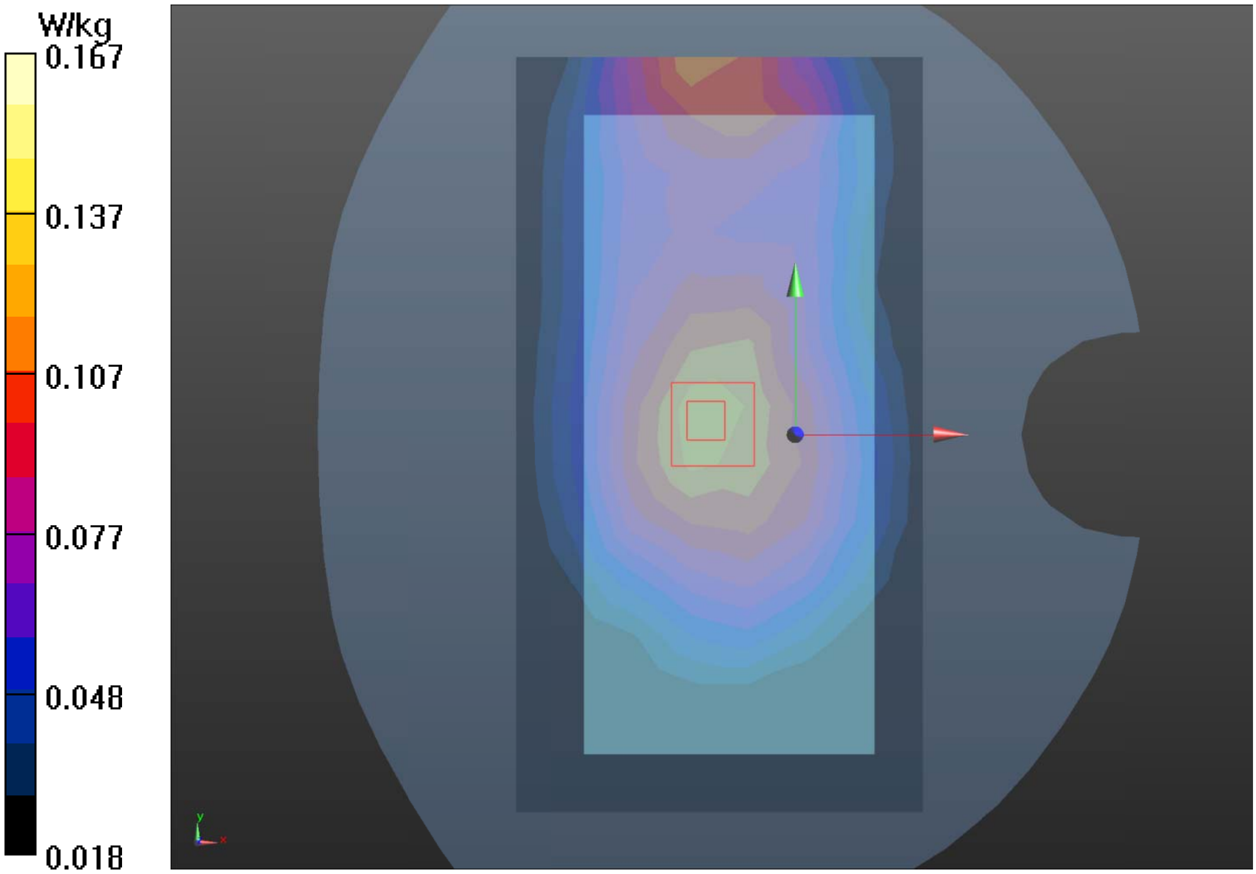
Back Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.32 V/m; Power Drift = -0.031 dB

Peak SAR (extrapolated) = 0.253 W/kg

SAR(1 g) = 0.147 W/kg; SAR(10 g) = 0.105 W/kg

Maximum value of SAR (measured) = 0.167 W/kg



Plot 24 LTE Band 5 1RB Back Side Middle (Distance 10mm)

Date: 2021/11/26

Communication System: UID 0, LTE (0); Frequency: 836.5 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 836.5 MHz; σ = 0.953 S/m; ε_r = 39.767; 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 SN1317; Calibrated: 2021/2/23

Phantom: SAM1; Type: SAM; Serial: TP-1534

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

Back Side Middle/Area Scan (8x14x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.163 W/kg

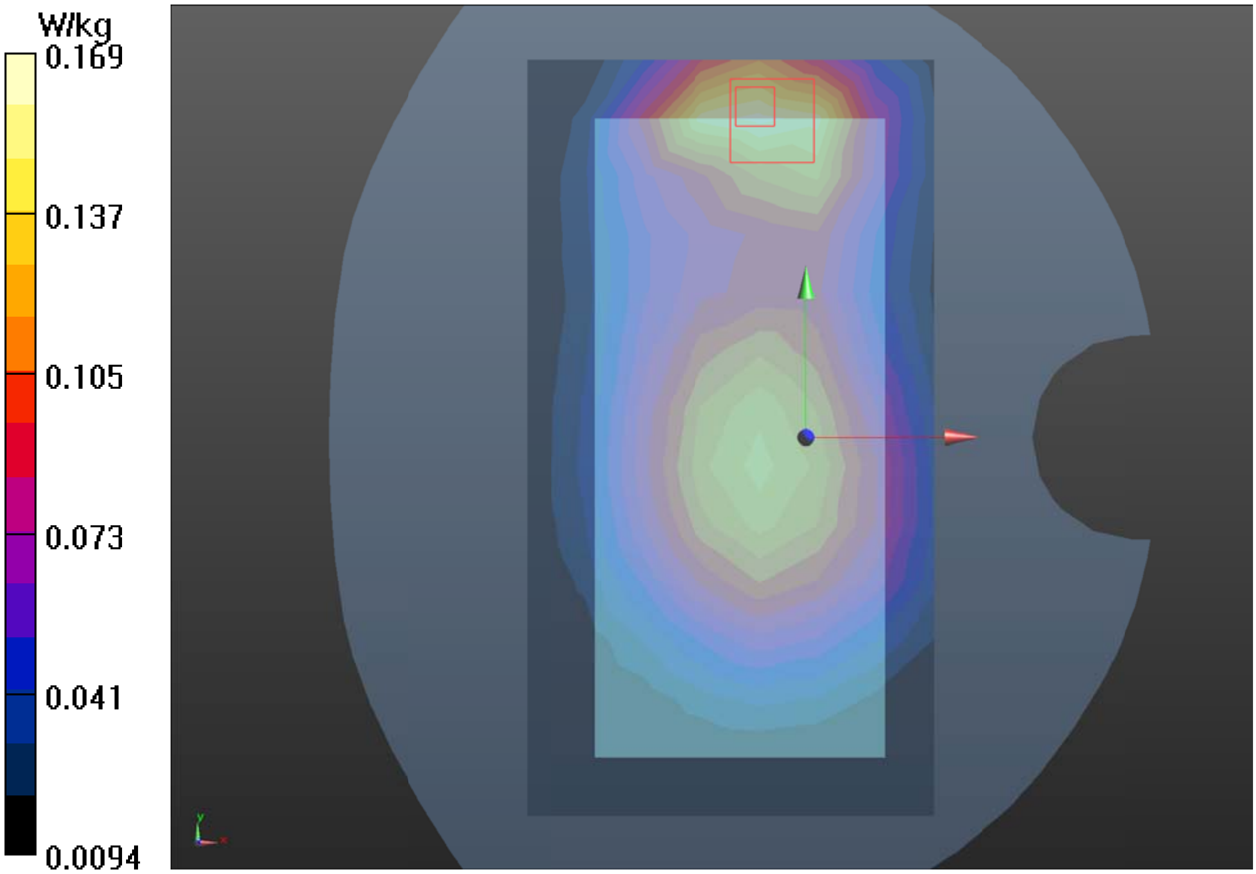
Back Side Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.03 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 0.244 W/kg

SAR(1 g) = 0.157 W/kg; SAR(10 g) = 0.102 W/kg

Maximum value of SAR (measured) = 0.169 W/kg



Plot 25 LTE Band 7 1RB Back Side High (Distance 10mm)

Date: 2021/12/5

Communication System: UID 0, LTE (0); Frequency: 2560 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2560 MHz; σ = 1.971 S/m; ε_r = 37.231; 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(7.25, 7.25, 7.25); Calibrated: 2021/8/12

Electronics: DAE4 SN1317; Calibrated: 2021/2/23

Phantom: SAM1; Type: SAM; Serial: TP-1534

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

Back Side High/Area Scan (10x18x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 1.02 W/kg

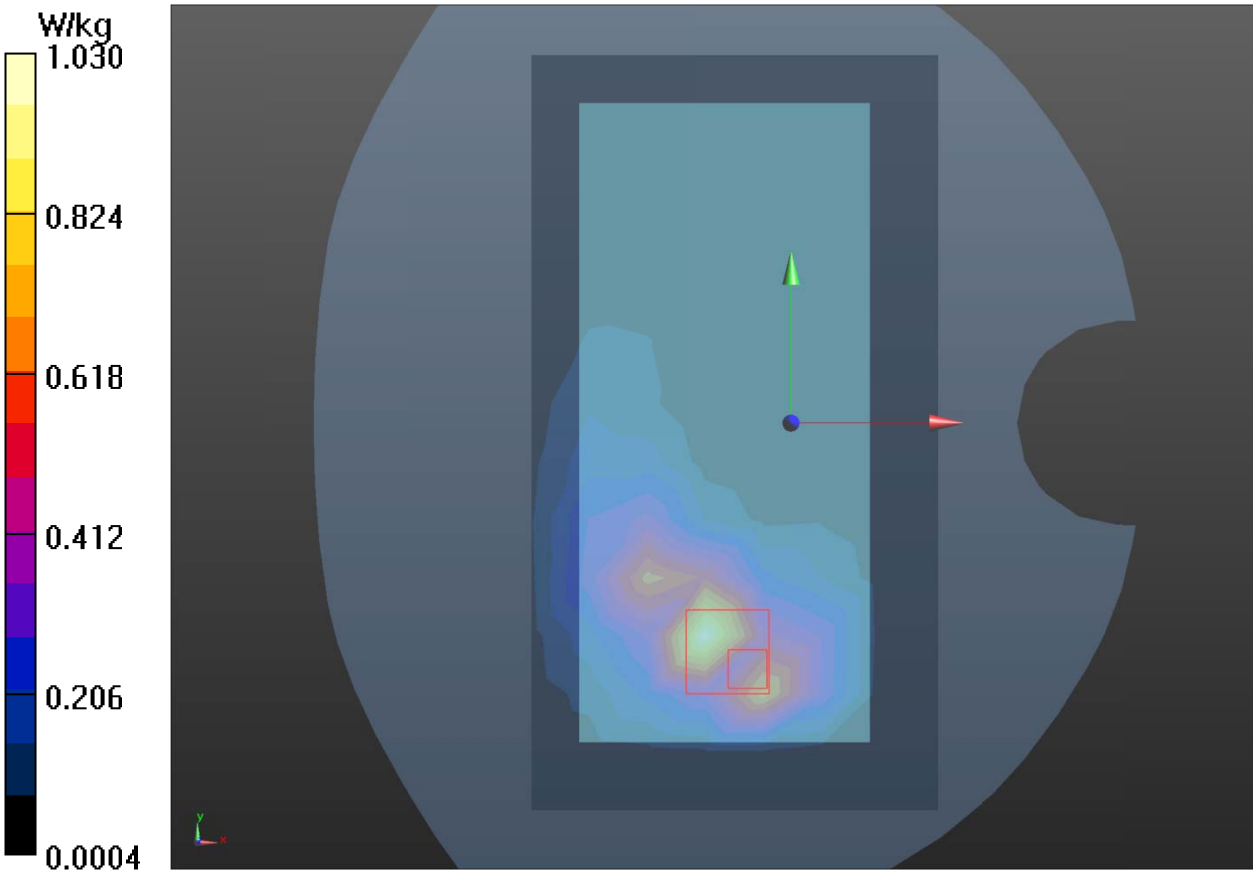
Back Side High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 0 V/m; Power Drift = 0.1 dB

Peak SAR (extrapolated) = 1.39 W/kg

SAR(1 g) = 0.594 W/kg; SAR(10 g) = 0.277 W/kg

Maximum value of SAR (measured) = 1.03 W/kg



Plot 26 LTE Band 41 1RB Bottom Edge Middle (Distance 10mm)

Date: 2021/12/5

Communication System: UID 0, LTE (0); Frequency: 2593 MHz;Duty Cycle: 1:1.58

Medium parameters used: f = 2593 MHz; σ = 2.009 S/m; ε_r = 37.118; 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(7.25, 7.25, 7.25); Calibrated: 2021/8/12

Electronics: DAE4 SN1317; Calibrated: 2021/2/23

Phantom: SAM1; Type: SAM; Serial: TP-1534

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

Bottom Edge Middle/Area Scan (10x18x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.513 W/kg

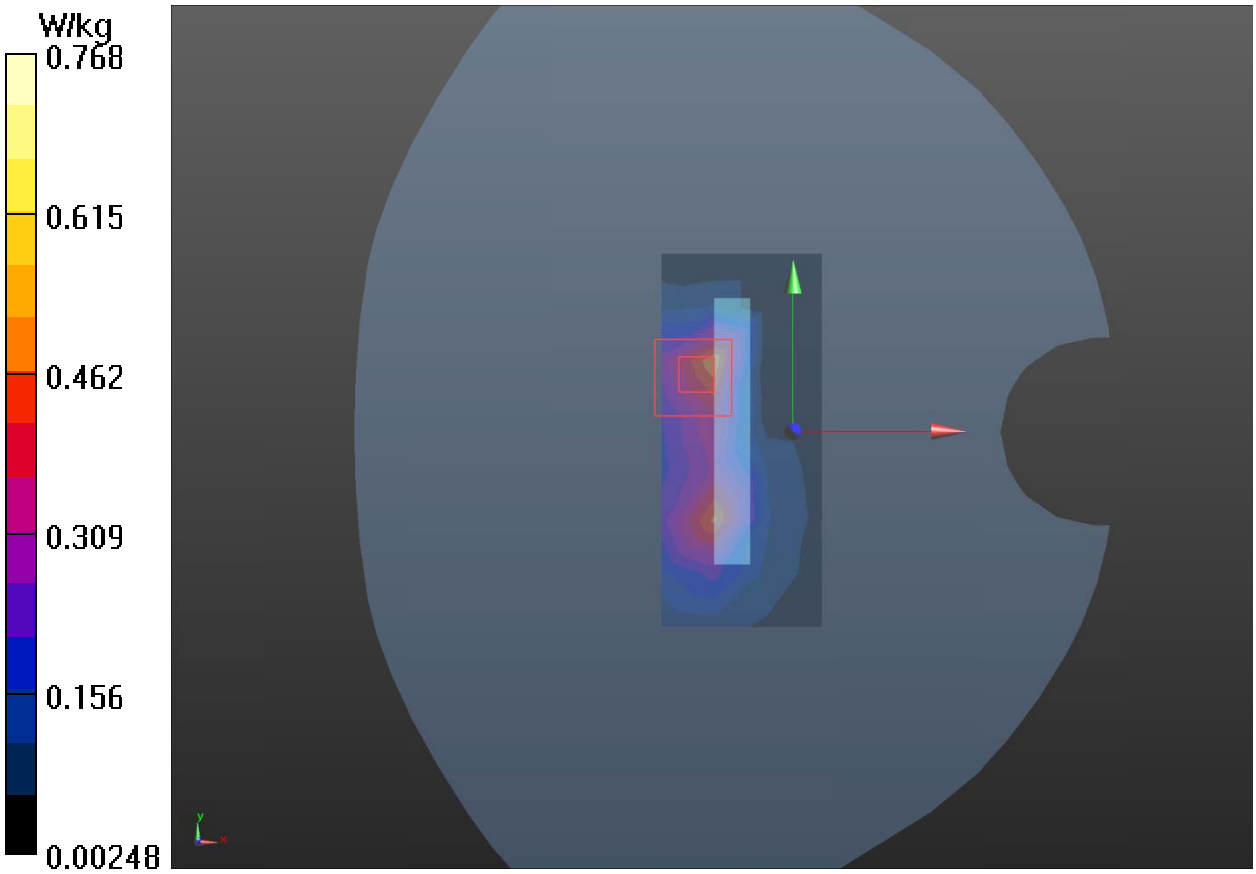
Bottom Edge Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.896 V/m; Power Drift = 0.011 dB

Peak SAR (extrapolated) = 1.00 W/kg

SAR(1 g) = 0.481 W/kg; SAR(10 g) = 0.176 W/kg

Maximum value of SAR (measured) = 0.768 W/kg



Plot 27 802.11b Back Side Middle (Distance 10mm)

Date: 2021/12/29

Communication System: UID 0, 802.11b (0); Frequency: 2437 MHz;Duty Cycle: 1:1.020

Medium parameters used: f = 2437 MHz; σ = 1.831 S/m; ε_r = 37.663; 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 SN1317; Calibrated: 2021/2/23

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 (10x18x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 0.277 W/kg

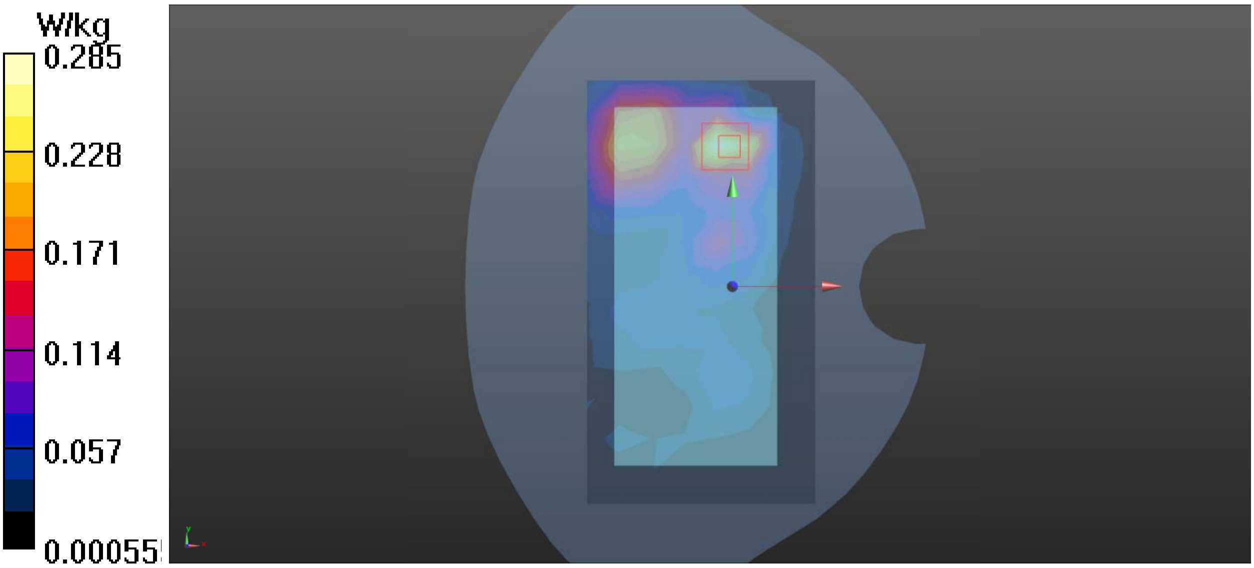
Back Side Middle/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.907 V/m; Power Drift = 0.056 dB

Peak SAR (extrapolated) = 0.427 W/kg

SAR(1 g) = 0.184 W/kg; SAR(10 g) = 0.083 W/kg

Maximum value of SAR (measured) = 0.285 W/kg



Plot 28 UMTS Band II Bottom Edge Middle (Distance 0mm)

Date: 2021/12/8

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 SN1317; Calibrated: 2021/2/23

Phantom: SAM1; Type: SAM; Serial: TP-1534

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

Bottom Edge Middle/Area Scan (4x8x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 4.20 W/kg

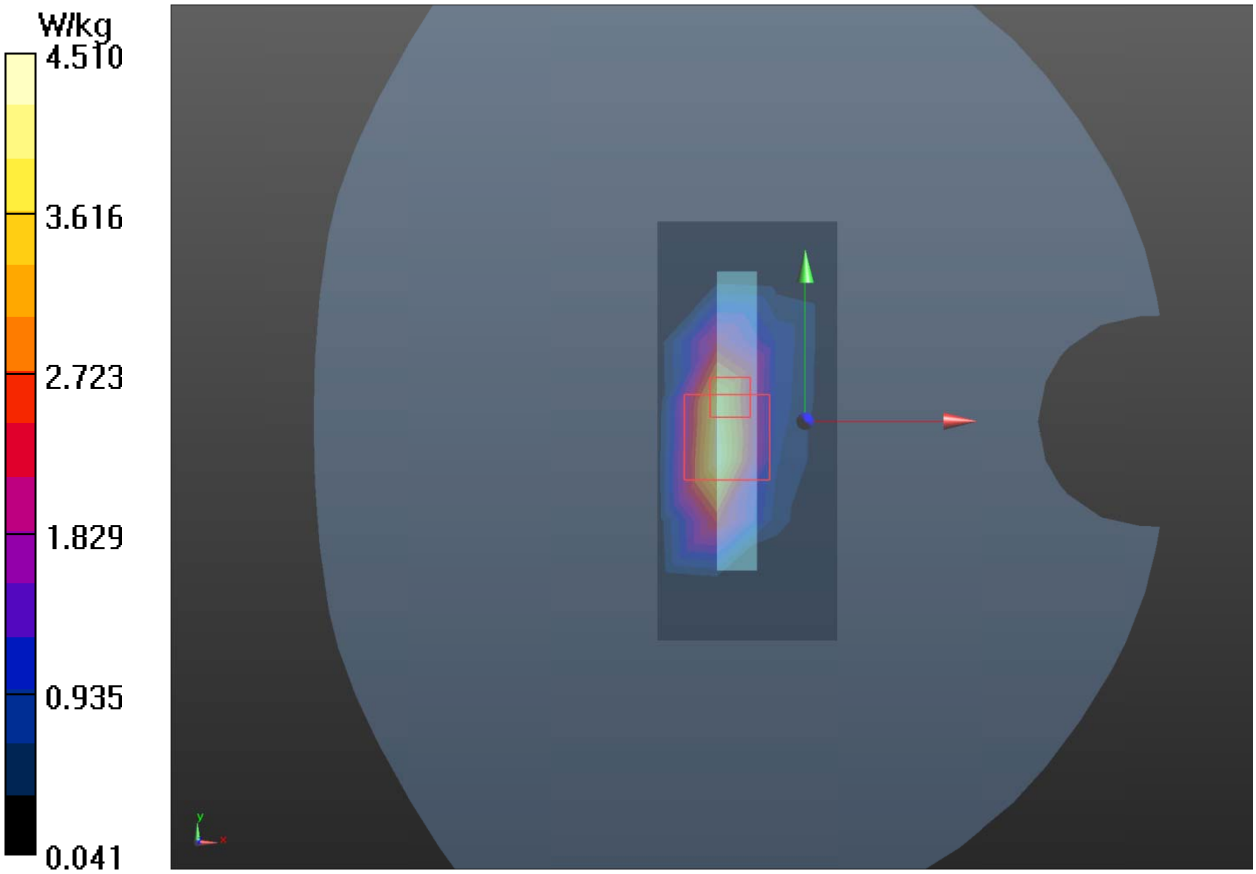
Bottom Edge Middle/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 56.02 V/m; Power Drift = 0.021 dB

Peak SAR (extrapolated) = 9.52 W/kg

SAR(1 g) = 4.11 W/kg; SAR(10 g) = 1.82 W/kg

Maximum value of SAR (measured) = 4.51 W/kg



Plot 29 LTE Band 7 1RB Back Side High (Distance 0mm)

Date: 2021/12/5

Communication System: UID 0, LTE (0); Frequency: 2560 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2560 MHz; σ = 1.971 S/m; ε_r = 37.231; 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(7.25, 7.25, 7.25); Calibrated: 2021/8/12

Electronics: DAE4 SN1317; Calibrated: 2021/2/23

Phantom: SAM1; Type: SAM; Serial: TP-1534

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

Back Side High/Area Scan (10x18x1): Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (measured) = 8.78 W/kg

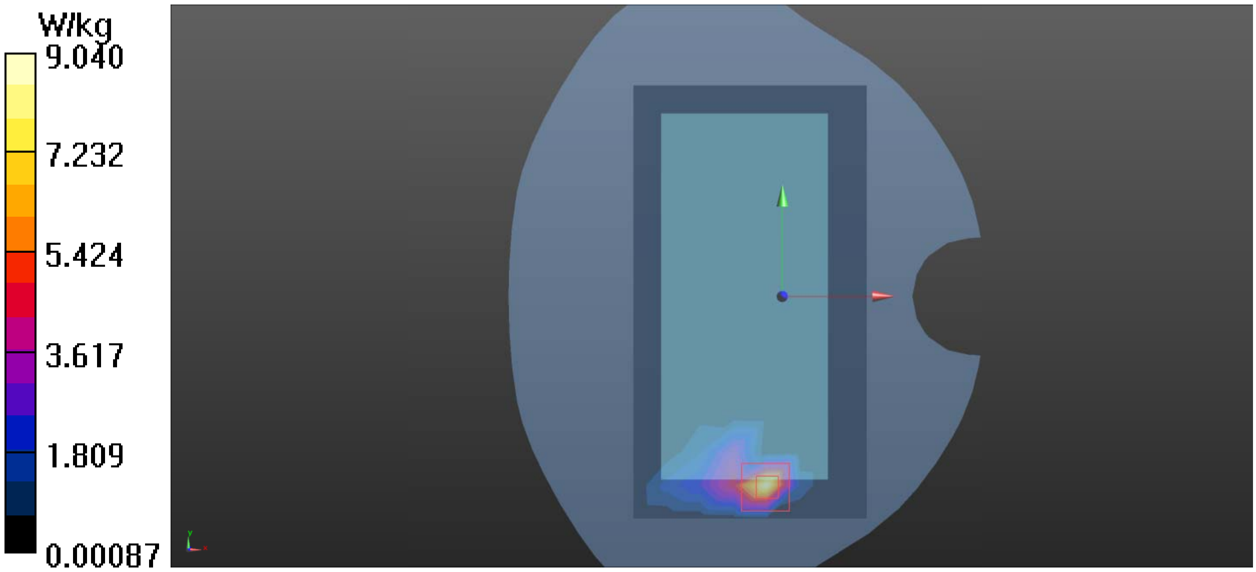
Back Side High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 0.5420 V/m; Power Drift = 0.099 dB

Peak SAR (extrapolated) = 11.3 W/kg

SAR(1 g) = 7.029 W/kg; SAR(10 g) = 2.32W/kg

Maximum value of SAR (measured) = 9.04 W/kg



ANNEX D: Probe Calibration Certificate

In Collaboration with s p e a g CALIBRATION LABORATORY

CNAS 中国认可 国际互认 校准 CALIBRATION CNAS L0570

Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China
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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

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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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CALIBRATION LABORATORY

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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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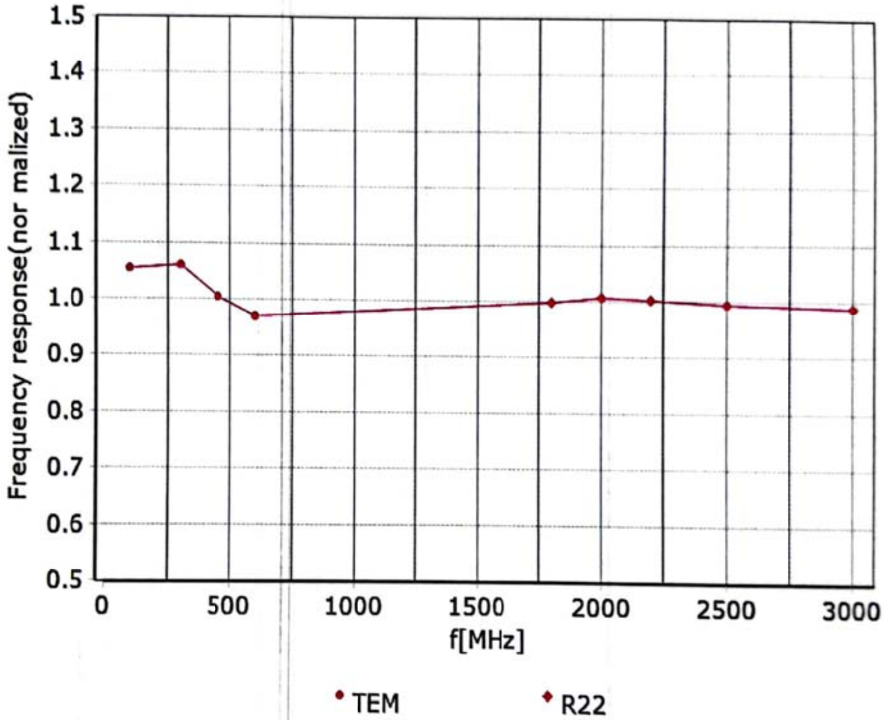
E-mail: cttl@chinattl.com Http://www.chinattl.cn

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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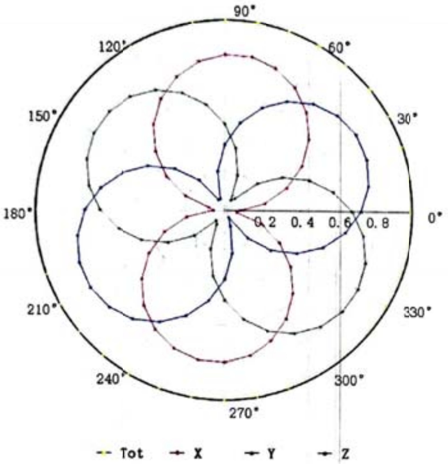
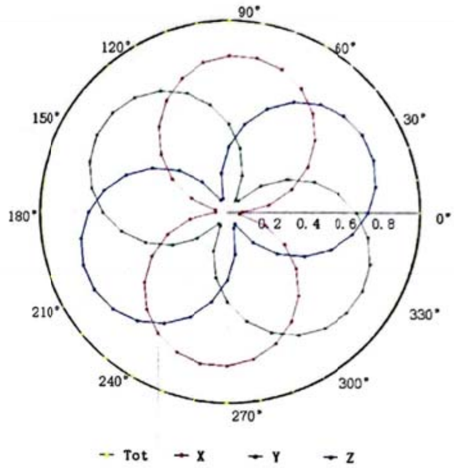
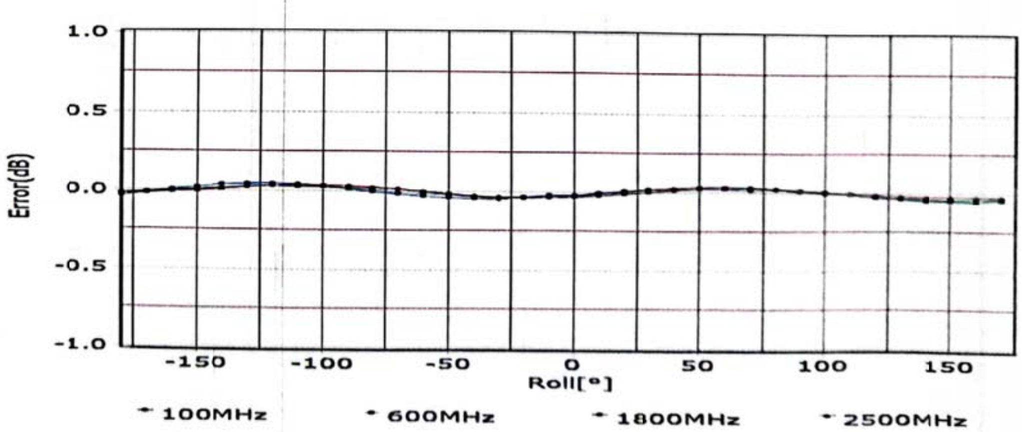
Receiving Pattern (Φ), θ=0°

f=600 MHz, TEM



f=1800 MHz, R22





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

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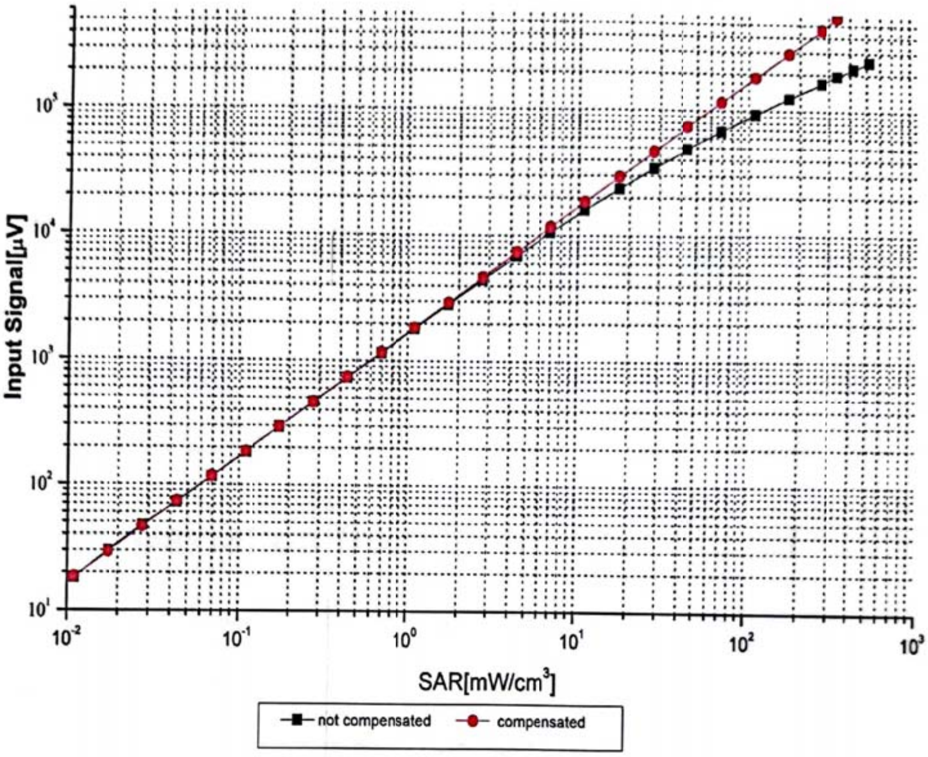
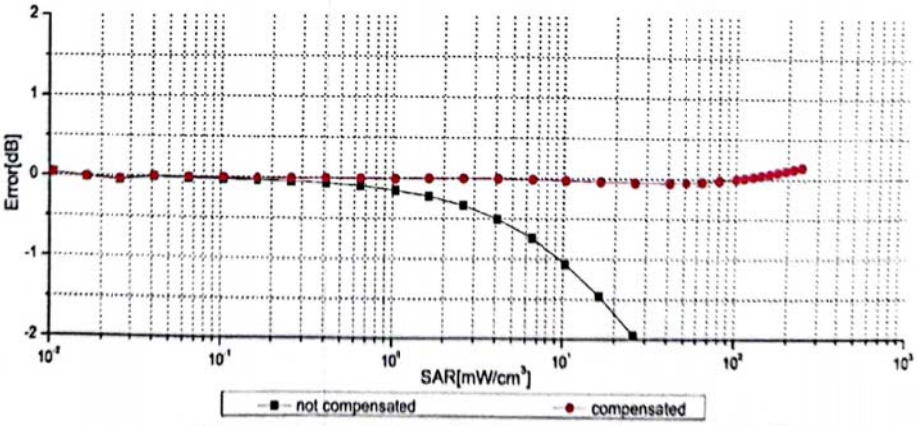
Dynamic Range f(SAR_{head})
(TEM cell, f = 900 MHz)





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

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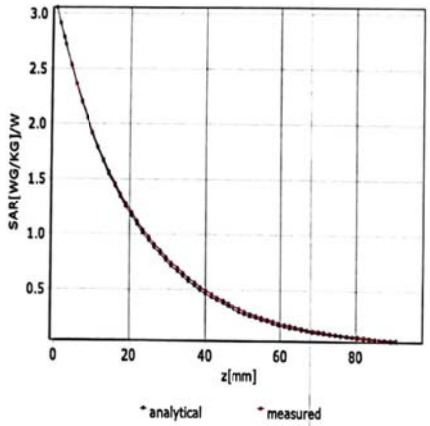
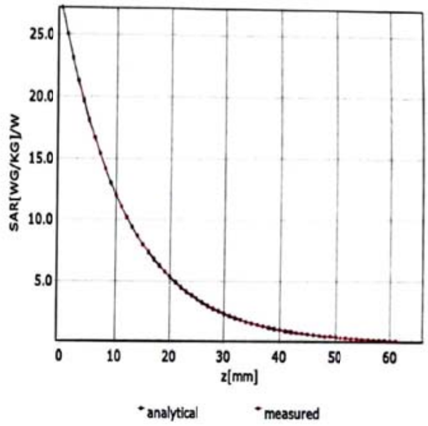
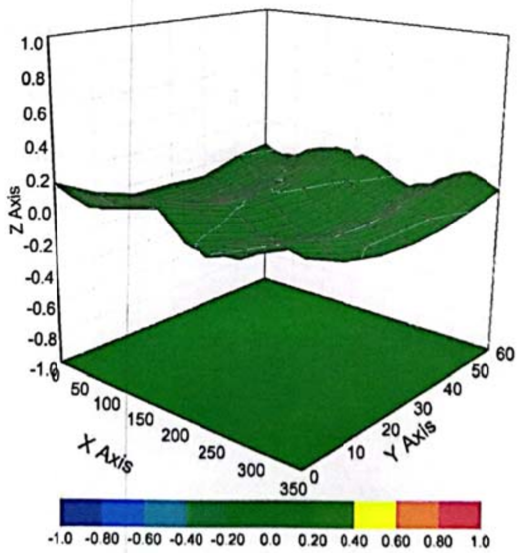
Conversion Factor Assessment

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: D835V2 Dipole Calibration Certificate

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中国认可
国际互认
校准
CALIBRATION
CNAS L0570
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Client TA(Shanghai) Certificate No: Z20-60296

CALIBRATION CERTIFICATE

Object D835V2 - SN: 4d020

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