



# SAR TEST REPORT

**Applicant** ecom instruments GmbH

**FCC ID** XAM500080GR01

**Product** Featurephone

**Brand** ecom

**Model** Ex-Handy 10

**Report No.** R1901A0001-S1

**Issue Date** July 5, 2019

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.

A handwritten signature in black ink.

Performed by: Yu Wang

A handwritten signature in black ink.

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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

#### **CNAS (accreditation number:L2264)**

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

#### **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 electromagnetic emissions measurements.

#### **IC (recognition number is 8510A)**

TA Technology (Shanghai) Co., Ltd. has been listed by industry Canada to perform electromagnetic emission measurement.

#### **VCCI (recognition number is C-4595, T-2154, R-4113, G-10766)**

TA Technology (Shanghai) Co., Ltd. has been listed by industry Japan to perform electromagnetic emission measurement.

#### **A2LA (Certificate Number: 3857.01)**

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



### 1.3 Testing Location

Company: TA Technology (Shanghai) Co., Ltd.  
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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
GSM 850	0.057	0.090	0.552
GSM 1900	0.314	0.156	1.199
WCDMA Band II	0.617	0.986	0.986
WCDMA Band IV	0.613	0.861	0.861
WCDMA Band V	0.041	0.129	0.129
LTE FDD 2	0.383	0.868	0.868
LTE FDD 4	0.383	0.763	0.763
LTE FDD 5	0.029	0.107	0.107
LTE FDD 7	0.437	0.628	0.628
LTE FDD 12	0.034	0.067	0.067
LTE FDD 13	0.027	0.058	0.058
LTE FDD 25	0.523	0.913	0.913
LTE FDD 26	0.037	0.125	0.125
LTE TDD 41	0.139	1.129	1.129
LTE FDD 66	0.336	0.737	0.737
LTE FDD 71	0.028	0.087	0.087
Wi-Fi (2.4G)	0.251	0.023	0.127
Wi-Fi (5G)	0.081	0.074	NA
BT	NA	NA	NA
Date of Testing:	May 17, 2019~ June 25, 2019		

Note: 1) Sand-alone SAR evaluation is not required for BT, more details information see section 10.2

Table 2: Highest Simultaneous Transmission SAR

Exposure Configuration	1g SAR Head	1g SAR Body-worn	1g SAR Hotspot
Highest Simultaneous Transmission SAR (W/kg)	0.991	1.254	1.386

Note: 1. The detail for simultaneous transmission consideration is described in chapter 10.3.



### 3 Description of Equipment under Test

#### Client Information

Applicant	ecom instruments GmbH
Applicant address	Industriestrasse 2, 97959 Assamstadt, Germany
Manufacturer	Pepperl+Fuchs GmbH
Manufacturer address	Lilienthalstrasse 200, 68307 Mannheim, Germany

#### General Technologies

Application Purpose:	Original Grant
EUT Stage:	Identical Prototype
Model:	Ex-Handy 10
IMEI:	004403100006271
Hardware Version:	HW3
Software Version:	SAIPH_ROW_M_018_260219
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/IV/V:3 LTE FDD 2/4/5/7/12/13/25/26/66/71:3 LTE TDD 41:3
Power Level:	GSM 850:level 5 GSM 1900:level 0 UMTS Band II/IV/V:all up bits LTE FDD 2/4/5/7/12/13/25/26/66/71:max power LTE TDD 41:max power
EUT Accessory	
Battery	Manufacturer: ecom instruments GmbH Model: EX-BP H10C
Adapter	Manufacturer: TEN PAO INTERNATIONAL LTD. Model: S008ACM0500200
USB Cable	Manufacturer: Dongguan YongGu Electronics Prouduction Co., Ltd. 120cm Cable, Shielded



## Wireless Technology and Frequency Range

Wireless Technology		Modulation	Operating mode	Tx (MHz)		
GSM	850	Voice(GMSK) GPRS(GMSK) EGPRS(GMSK,8PSK)	<input type="checkbox"/> Multi-slot Class:8-1UP <input type="checkbox"/> Multi-slot Class:10-2UP <input checked="" type="checkbox"/> Multi-slot Class:12-4UP <input type="checkbox"/> Multi-slot Class:33-4UP	824 ~ 849		
	1900			1850 ~ 1910		
	Does this device support DTM (Dual Transfer Mode)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
UMTS	Band II	QPSK	HSDPA UE Category:10 HSUPA UE Category:6 DC-HSDPA UE Category:24 HSPA+ Category:14	1850 ~ 1910		
	Band IV			1710 ~ 1755		
	Band V			824 ~ 849		
LTE	FDD 2	QPSK, 16QAM	Rel.10 /Category 4	1850 ~ 1910		
	FDD 4			1710 ~ 1755		
	FDD 5			824 ~ 849		
	FDD 7			2500 ~ 2570		
	FDD 12			699 ~ 716		
	FDD 13			777 ~ 787		
	FDD 25			1850 ~ 1915		
	FDD 26			814 ~ 849		
	TDD 41			2496 ~ 2690		
	FDD 66			1710 ~ 1780		
	FDD 71			663 ~ 698		
	Does this device support Carrier Aggregation (CA) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
	Does this device support SV-LTE (1xRTT-LTE)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
BT	2.4G	Version 4.2 LE		2402 ~2480		
Wi-Fi	2.4G	DSSS,OFDM	802.11b/g/n HT20	2412 ~ 2462		
	5G	OFDM	802.11a/n HT20/ HT40	5150 ~ 5350 5470 ~ 5850		
	Does this device support MIMO <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
NFC	13.56MHz					



## 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:

248227 D01 802.11Wi-Fi SAR v02r02  
447498 D01 General RF Exposure Guidance v06  
648474 D04 Handset SAR v01r03  
690783 D01 SAR Listings on Grants v01r03  
865664 D01 SAR measurement 100 MHz to 6 GHz v01r04  
865664 D02 RF Exposure Reporting v01r02  
941225 D01 3G SAR Procedures v03r01  
941225 D05 SAR for LTE Devices v02r05  
941225 D05A LTE Rel.10 KDB Inquiry Sheet v01r02  
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  $> 1.2 \text{ W/kg}$ , the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

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

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



## 5.2 Measurement Variability

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

SAR Measurement Variability was assessed using the following procedures for each frequency band:

- 1) When the original highest measured SAR is  $\geq 0.80$  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  $\geq 1.45$  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  $\geq 1.5$  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( $\beta_c$ ,  $\beta_d$ ), and HS-DPCCH power offset parameters ( $\Delta_{ACK}$ ,  $\Delta_{NACK}$ ,  $\Delta_{CQI}$ ) 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	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c/\beta_d$	$\beta_{hs}$ (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

Note1:  $\Delta_{ACK}$ ,  $\Delta_{NACK}$  and  $\Delta_{CQI}=8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$

Note2: CM=1 for  $\beta_c/\beta_d=12/15$ ,  $\beta_{hs}/\beta_c=24/15$ .

Note3: For subtest 2 the  $\beta_c\beta_d$  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  $\beta_c=11/15$  and  $\beta_d=15/15$ .

#### 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  $\beta$  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	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c/\beta_d$	$\beta_{hs}^{(1)}$	$\beta_{ec}$	$\beta_{ed}$	$\beta_{ed}$ (SF)	$\beta_{ed}$ (codes)	CM (2) (dB)	MPR (dB)	AG <sup>(4)</sup> Index	E-TFCI
1	11/15 <sup>(3)</sup>	15/15 <sup>(3)</sup>	64	11/15 <sup>(3)</sup>	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	$\beta_{ed1}:47/15$ $\beta_{ed2}:47/15$	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 <sup>(4)</sup>	15/15 <sup>(4)</sup>	64	15/15 <sup>(4)</sup>	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1:  $\Delta_{ACK}, \Delta_{NACK}$  and  $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$ .

Note 2: CM = 1 for  $\beta_c/\beta_d = 12/15$ ,  $\beta_{hs}/\beta_c = 24/15$ . 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  $\beta_c/\beta_d$  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  $\beta_c = 10/15$  and  $\beta_d = 15/15$ .

Note 4: For subtest 5 the  $\beta_c/\beta_d$  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  $\beta_c = 14/15$  and  $\beta_d = 15/15$ .

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:  $\beta_{ed}$  can not 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-DCH TTI (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	4	8	2	2 SF2 & 2 SF4	11484	5.76



(No DPDCH)	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.<sup>36</sup> 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.
  - i) 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  $\beta$  and  $\Delta$  values used to configure the device for testing, power setback procedures described in 3GGPP 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 5.1a: FDD HS-DSCH physical layer categories

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

### 5.3.3 LTE Test Configuration

LTE modes were tested according to FCC KDB 941225 D05 publication. Please see notes after the tabulated SAR data for required test configurations. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. 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  $\leq 0.8$  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  $\leq 0.8$  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  $> \frac{1}{2}$  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  $> \frac{1}{2}$  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

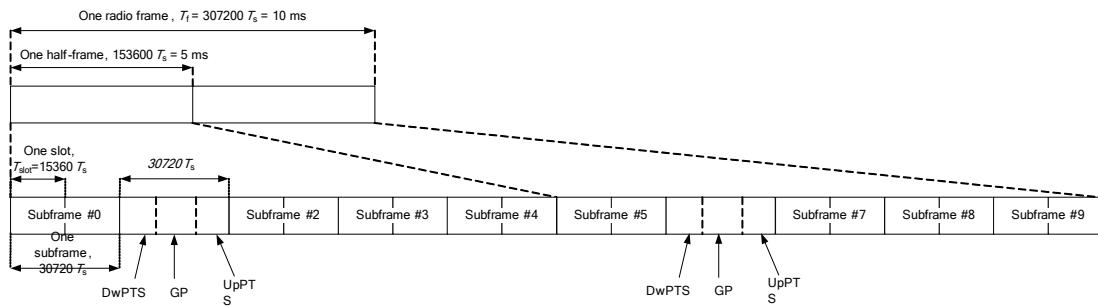


Table 8: Configuration of special subframe (lengths of DwPTS/GP/UpPTS)

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	$6592 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$	$7680 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$
1	$19760 \cdot T_s$			$20480 \cdot T_s$		
2	$21952 \cdot T_s$			$23040 \cdot T_s$		
3	$24144 \cdot T_s$			$25600 \cdot T_s$		
4	$26336 \cdot T_s$			$7680 \cdot T_s$		
5	$6592 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$20480 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			$12800 \cdot T_s$		
8	$24144 \cdot T_s$			-		
9	$13168 \cdot T_s$			-		

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:

$$\text{Duty cycle} = (30720T_s * \text{Ups} + \text{Uplink Component} * \text{Specials}) / (307200T_s)$$

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

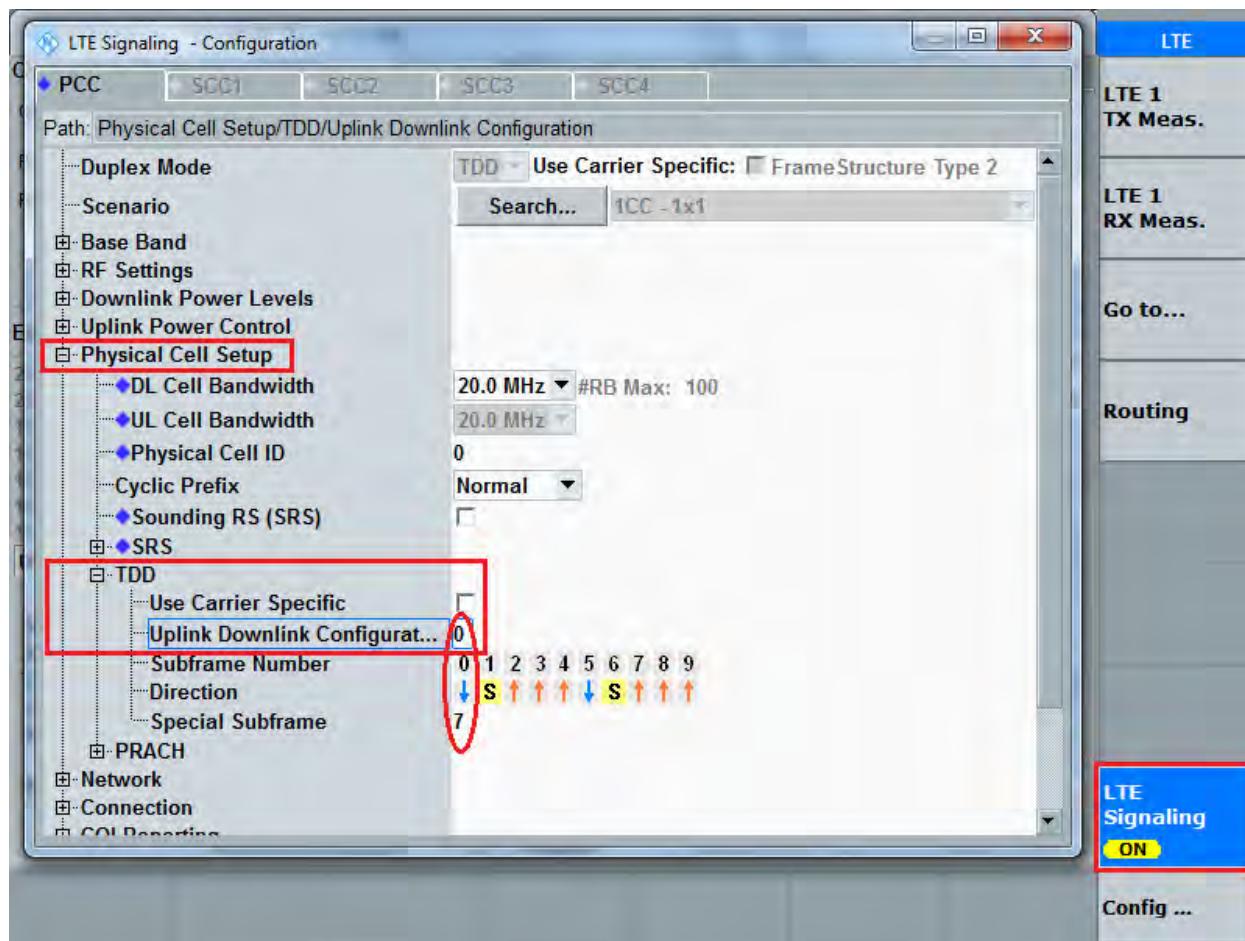
In conclusion, for the TDD LTE Band, Duty Cycle can be calculated with formula as below .all these sets are ok when we test, or we can set as below.

$$\text{Duty cycle} = [(30720\text{Ts} * \text{Ups}) + \text{UpPTS} * \text{Specials}] / (307200\text{Ts})$$

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





### 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:

- $\leq 0.4 \text{ W/kg}$ , 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.
- $0.4 \text{ W/kg}$ , SAR is repeated using the same wireless mode test configuration tested in the *initial test position* to measure the subsequent next closest/smallest test separation distance and maximum coupling test position, on the highest maximum output power channel, until the *reported SAR* is  $\leq 0.8 \text{ W/kg}$  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  $> 0.8 \text{ W/kg}$ , measure the SAR for these positions/configurations on the subsequent next highest measured output power channel(s) until the *reported SAR* is  $\leq 1.2 \text{ W/kg}$  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.

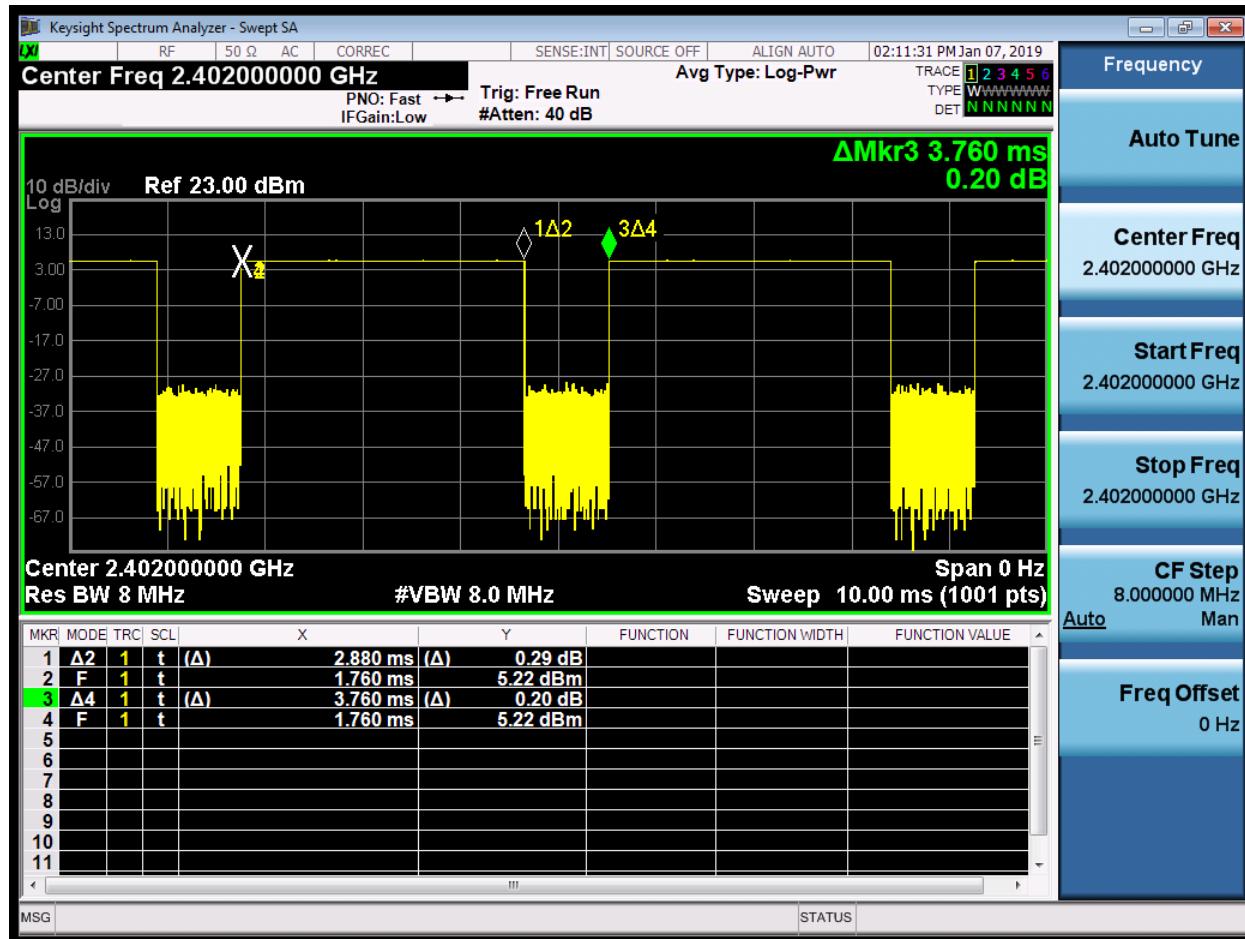
A Wi-Fi device must be configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools for SAR measurement.



### 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 hopping off and data rate set for DH5.

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

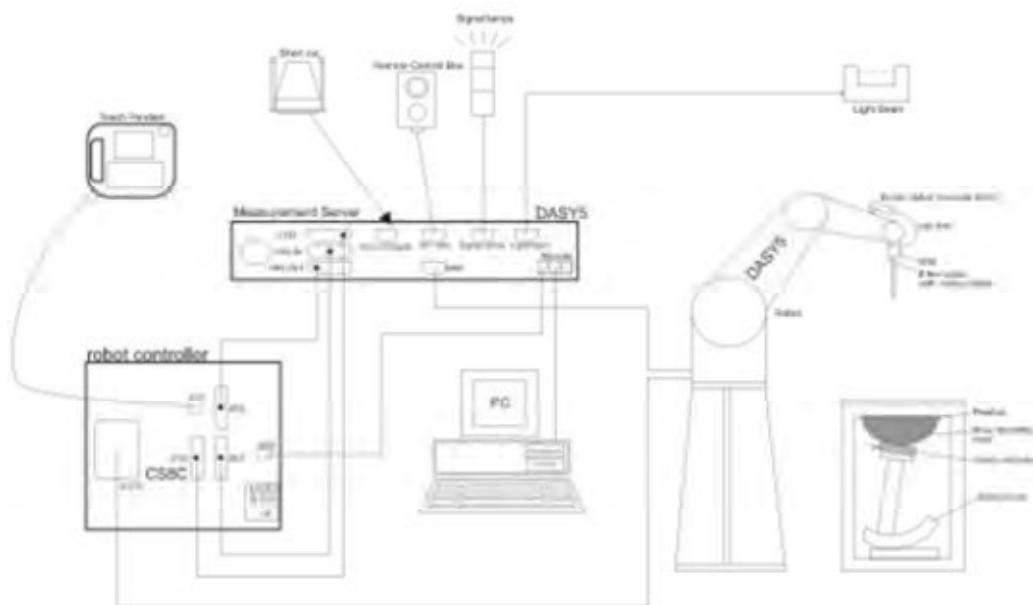


Note: Duty factor= Ton (ms)/ T(on+off) (ms)=2.880/3.760=76.6%

## 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: $\pm 0.2$ dB (30 MHz to 6 GHz)
Directivity	$\pm 0.3$ dB in HSL (rotation around probe axis) $\pm 0.5$ dB in tissue material (rotation normal to probe axis)
Dynamic Range	10 $\mu$ W/g to > 100 mW/g Linearity: $\pm 0.2$ dB (noise: typically < 1 $\mu$ W/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  $\pm 10\%$ . The spherical isotropy was evaluated and found to be better than  $\pm 0.25$ dB. 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.



$$\text{SAR} = C\Delta T/\Delta t$$

Where:  $\Delta t$  = Exposure time (30 seconds),  
 $C$  = Heat capacity of tissue (brain or muscle),  
 $\Delta T$  = Temperature increase due to RF exposure.

Or

$$\text{SAR} = IEI^2 \sigma / \rho$$

Where:  $\sigma$  = Simulated tissue conductivity,  
 $\rho$  = Tissue density ( $\text{kg}/\text{m}^3$ ).

## 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.

	$\leq 3 \text{ GHz}$	$> 3 \text{ GHz}$
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	$5 \pm 1 \text{ mm}$	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5 \text{ mm}$
Maximum probe angle from probe axis to phantom surface normal at the measurement location	$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
Maximum area scan spatial resolution: $\Delta x_{\text{Area}}, \Delta y_{\text{Area}}$	$\leq 2 \text{ GHz}: \leq 15 \text{ mm}$ $2 - 3 \text{ GHz}: \leq 12 \text{ mm}$	$3 - 4 \text{ GHz}: \leq 12 \text{ mm}$ $4 - 6 \text{ GHz}: \leq 10 \text{ mm}$
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	



## Zoom Scan

Zoom scans are used to 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 whose 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.

		≤3GHz	> 3 GHz
Maximum zoom scan spatial resolution: $\Delta x_{zoom}$ , $\Delta y_{zoom}$		≤2GHz: ≤8mm 2 – 3GHz: ≤5mm*	3 – 4GHz: ≤5mm* 4 – 6GHz: ≤4mm*
Maximum zoom scan spatial resolution, normal to phantom surface	Uniform grid: $\Delta z_{zoom}(n)$		3 – 4GHz: ≤4mm 4 – 5GHz: ≤3mm 5 – 6GHz: ≤2mm
	Graded grid	$\Delta z_{zoom}(1)$ : between 1 <sup>st</sup> two points closest to phantom surface	3 – 4GHz: ≤3mm 4 – 5GHz: ≤2.5mm 5 – 6GHz: ≤2mm
		$\Delta z_{zoom}(n > 1)$ : between subsequent points	≤1.5• $\Delta z_{zoom}(n-1)$
Minimum zoom scan volume	X, y, z	≥30mm	3 – 4GHz: ≥28mm 4 – 5GHz: ≥25mm 5 – 6GHz: ≥22mm

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

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

## Volume Scan Procedures

The volume scan is used to 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 remains in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

## Power Drift Monitoring

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



## 7 Main Test Equipment

Name of Equipment	Manufacturer	Type/Model	Serial Number	Last Cal.	Cal. Due Date
Network analyzer	Agilent	E5071B	MY42404014	2019-05-19	2020-05-18
Dielectric Probe Kit	HP	85070E	US44020115	2019-05-19	2020-05-18
Power meter	Agilent	E4417A	GB41291714	2019-05-19	2020-05-18
Power sensor	Agilent	N8481H	MY50350004	2019-05-19	2020-05-18
Power sensor	Agilent	E9327A	US40441622	2019-05-19	2020-05-18
Dual directional coupler	Agilent	778D-012	50519	2019-05-19	2020-05-18
Dual directional coupler	Agilent	777D	50146	2019-05-19	2020-05-18
Amplifier	INDEXSAR	IXA-020	0401	2019-05-19	2020-05-18
Wideband radio communication tester	R&S	CMW 500	113645	2019-05-19	2020-05-18
E-field Probe	SPEAG	EX3DV4	3801	2018-06-26	2019-06-25
DAE	SPEAG	DAE4	1291	2018-12-04	2019-12-03
Validation Kit 750MHz	SPEAG	D750V3	1045	2017-08-27	2020-08-26
Validation Kit 835MHz	SPEAG	D835V2	4d020	2017-08-28	2020-08-27
Validation Kit 1750MHz	SPEAG	D1750V2	1033	2017-01-10	2020-01-09
Validation Kit 1900MHz	SPEAG	D1900V2	5d060	2017-08-26	2020-08-25
Validation Kit 2450MHz	SPEAG	D2450V2	786	2017-08-29	2020-08-28
Validation Kit 2600MHz	SPEAG	D2600V2	1025	2018-05-02	2021-05-01
Validation Kit 5GHz	SPEAG	D5GHzV2	1151	2017-01-05	2020-01-04
Temperature Probe	Tianjin jinming	JM222	AA1009129	2019-05-19	2020-05-18
Hygrothermograph	Anymetr	NT-311	20150731	2019-05-19	2020-05-18
Software for Test	Speag	DASY5	52.8.8.1222	/	/
Software for Tissue	Agilent	85070	E06.01.36	/	/



## 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  $\pm 2^\circ\text{C}$  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 3 – 4 days of use; or earlier if the dielectric parameters can become out of tolerance.

#### Target values

Frequency (MHz)		Water (%)	Salt (%)	Sugar (%)	Glycol (%)	Preventol (%)	Cellulose (%)	$\epsilon_r$	$\sigma(\text{s/m})$
Head	750	41.448	1.452	56	0	0.1	1.0	41.9	0.89
	835	41.45	1.45	56	0	0.1	1.0	41.5	0.90
	1750	55.24	0.31	0	44.45	0	0	40.1	1.37
	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
Body	750	52.49	1.41	45	0	0.1	1.0	55.5	0.96
	835	52.5	1.4	45	0	0.1	1.0	55.2	0.97
	1750	69.91	0.12	0	29.97	0	0	53.4	1.49
	1900	69.91	0.13	0	29.96	0	0	53.3	1.52
	2450	73.2	0.1	0	26.7	0	0	52.7	1.95
	2600	72.6	0.1	0	27.3	0	0	52.5	2.16
Frequency (MHz)		Water (%)	Diethylenglycol monohexylether			Triton X-100		$\epsilon_r$	$\sigma(\text{s/m})$
Head	5250	65.53	17.24			17.23		35.9	4.71
	5600	65.53	17.24			17.23		35.5	5.07
	5750	65.53	17.24			17.23		35.4	5.22
Body	5250	72.52	13.74			13.74		48.9	5.36
	5600	72.52	13.74			13.74		48.5	5.77
	5750	72.52	13.74			13.74		48.3	5.94



## Measurements results

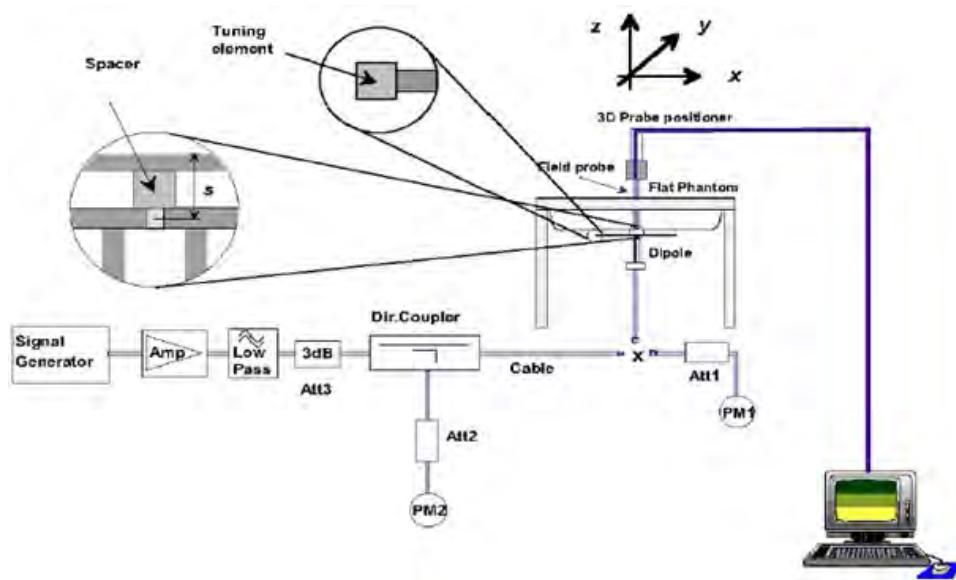
Frequency (MHz)		Test Date	Temp °C	Measured Dielectric Parameters		Target Dielectric Parameters		Limit (Within ±5%)	
				$\epsilon_r$	$\sigma(\text{s/m})$	$\epsilon_r$	$\sigma(\text{s/m})$	Dev $\epsilon_r(\%)$	Dev $\sigma(\%)$
750	Head	5/20/2019	21.5	42.3	0.88	41.9	0.89	0.95	-1.12
	Body	5/31/2019	21.5	56.9	0.95	55.5	0.96	2.52	-1.04
835	Head	5/17/2019	21.5	41.4	0.88	41.5	0.90	-0.24	-2.22
	Body	5/23/2019	21.5	54.2	0.96	55.2	0.97	-1.81	-1.03
1750	Head	5/21/2019	21.5	40.2	1.34	40.1	1.37	0.25	-2.19
	Body	6/3/2019	21.5	51.9	1.46	53.4	1.49	-2.81	-2.01
1900	Head	6/13/2019	21.5	40.1	1.41	40.0	1.40	0.25	0.71
	Body	5/19/2019	21.5	52.6	1.51	53.3	1.52	-1.31	-0.66
2450	Head	6/25/2019	21.5	38.6	1.81	39.2	1.80	-1.53	0.56
	Body	6/25/2019	21.5	52.5	1.98	52.7	1.95	-0.38	1.54
2600	Head	6/12/2019	21.5	38.2	2.01	39.0	1.96	-2.05	2.55
	Body	6/12/2019	21.5	51.5	2.23	52.5	2.16	-1.90	3.24
5250	Head	5/27/2019	21.5	35.5	4.80	35.9	4.71	-1.11	1.91
	Body	5/27/2019	21.5	48.1	5.32	48.9	5.36	-1.64	-0.75
5600	Head	5/29/2019	21.5	34.2	5.21	35.5	5.07	-3.66	2.76
	Body	5/29/2019	21.5	47.9	5.78	48.5	5.77	-1.24	0.17
5750	Head	5/29/2019	21.5	34.9	5.21	35.4	5.22	-1.41	-0.19
	Body	5/29/2019	21.5	47.6	6.14	48.3	5.94	-1.45	3.37

Note: The depth of tissue-equivalent liquid in a phantom must be  $\geq 15.0$  cm for SAR measurements  $\leq 3$  GHz and  $\geq 10.0$  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 1 System 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 D750V3 SN: 1045	Head	8/27/2017	-28.5	/	52.5	/
	Liquid	8/26/2018	-27.6	3.36	53.2	0.7
	Body	8/27/2017	-24.2	/	47.5	/
	Liquid	8/26/2018	-24.0	0.83	45.6	1.9
Dipole D835V2 SN: 4d020	Head	8/28/2017	-31.9	/	50.3	/
	Liquid	8/27/2018	-29.0	9.09	46.6	-3.7
	Body	8/28/2017	-24.8	/	46.8	/
	Liquid	8/27/2018	-27.4	-10.48	48.1	1.3
Dipole D1750V2 SN: 1033	Head	1/10/2017	-40.3	/	49.8	/
	Liquid	1/9/2018	-40.0	0.74	49.9	0.1
	Body	1/8/2019	-40.2	-0.50	49.6	0.3
	Liquid	1/10/2017	-35.0	/	44.7	/
	Body	1/9/2018	-34.7	0.86	44.9	-0.2
	Liquid	1/8/2019	-35.2	-1.44	44.6	0.3
Dipole D1900V2 SN: 5d060	Head	8/26/2017	-23.4	/	52.0	/
	Liquid	8/25/2018	-24.7	-5.56	54.4	2.4
	Body	8/26/2017	-21.4	/	52.7	/
	Liquid	8/25/2018	-24.6	-14.95	55.6	2.9
Dipole D2450V2 SN: 786	Head	8/29/2017	-25.5	/	53.4	/
	Liquid	8/28/2018	-23.0	9.80	57.2	3.8
	Body	8/29/2017	-23.6	/	51.0	/
	Liquid	8/28/2018	-23.7	-0.42	55.2	4.2
Dipole D5GHzV2 SN: 1151 (5250MHz)	Head	1/5/2017	-24.5	/	48.4	/
	Liquid	1/4/2018	-23.8	2.86	50.0	1.6
	Body	1/3/2019	-24.3	-2.10	49.3	0.7
	Liquid	1/5/2017	-24.7	/	50.4	/
	Body	1/4/2018	-23.8	3.64	50.0	0.4
	Liquid	1/3/2019	-23.4	1.68	50.4	-0.4
Dipole D5GHzV2 SN: 1151 (5600MHz)	Head	1/5/2017	-22.8	/	55.5	/
	Liquid	1/4/2018	-21.5	5.70	55.6	0.1
	Body	1/3/2019	-21.8	-1.40	55.3	0.3
	Liquid	1/5/2017	-23.3	/	57.2	/
	Body	1/4/2018	-22.5	3.43	55.6	1.6
	Liquid	1/3/2019	-22.8	-1.33	56.4	-0.8
Dipole D5GHzV2 SN: 1151 (5750MHz)	Head	1/5/2017	-26.5	/	52.4	/
	Liquid	1/4/2018	-26.8	-1.13	52.5	0.1
	Body	1/3/2019	-26.9	-0.37	52.1	0.4
	Liquid	1/5/2017	-24.9	/	56.0	/
	Body	1/4/2018	-25.2	-1.20	56.4	-0.4
	Liquid	1/3/2019	-25.7	-1.98	56.7	-0.3



## System Check results

Frequency (MHz)		Test Date	Temp °C	250mW Measured SAR <sub>1g</sub> (W/kg)	1W Normalized SAR <sub>1g</sub> (W/kg)	1W Target SAR <sub>1g</sub> (W/kg)	Δ % (Limit ±10%)	Plot No.
750	Head	5/20/2019	21.5	2.13	8.52	8.34	2.16	1
	Body	5/31/2019	21.5	2.22	8.88	8.78	1.14	2
835	Head	5/17/2019	21.5	2.44	9.76	9.45	3.28	3
	Body	5/23/2019	21.5	2.41	9.64	9.75	-1.13	4
1750	Head	5/21/2019	21.5	8.95	35.80	37.20	-3.76	5
	Body	6/3/2019	21.5	9.24	36.96	37.60	-1.70	6
1900	Head	6/13/2019	21.5	9.88	39.52	40.10	-1.45	7
	Body	5/19/2019	21.5	9.93	39.72	39.50	0.56	8
2450	Head	6/25/2019	21.5	13.70	54.80	52.60	4.18	9
	Body	6/25/2019	21.5	12.50	50.00	50.80	-1.57	10
2600	Head	6/12/2019	21.5	13.90	55.60	54.10	2.77	11
	Body	6/12/2019	21.5	13.50	54.00	54.50	-0.92	12
Frequency (MHz)		Test Date	Temp °C	100mW Measured SAR <sub>1g</sub> (W/kg)	1W Normalized SAR <sub>1g</sub> (W/kg)	1W Target SAR <sub>1g</sub> (W/kg)	Δ % (Limit ±10%)	Plot No.
5250	Head	5/27/2019	21.5	7.87	78.70	78.40	0.38	13
	Body	5/27/2019	21.5	7.46	74.60	75.60	-1.32	14
5600	Head	5/29/2019	21.5	7.67	76.70	81.50	-5.89	15
	Body	5/29/2019	21.5	8.10	81.00	80.20	1.00	16
5750	Head	5/29/2019	21.5	7.66	76.60	80.50	-4.84	17
	Body	5/29/2019	21.5	7.15	71.50	74.60	-4.16	18

Note: Target Values used derive from the calibration certificate Data Storage and Evaluation.



## 9 Normal and Maximum Output Power

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

### 9.1 GSM Mode

GSM 850		Burst-Averaged output power(dBm)				Division Factors	Frame-Averaged output power(dBm)				
		Tune-up	Channel/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	33.00	32.31	32.28	32.52	9.03	23.97	23.28	23.25	23.49	
GPRS/ EGPRS (GMSK)	1 Tx Slot	33.00	32.29	32.40	32.49	9.03	23.97	23.26	23.37	23.46	
	2 Tx Slots	32.50	31.79	31.89	32.06	6.02	26.48	25.77	25.87	26.04	
	3 Tx Slots	32.00	31.41	31.44	31.65	4.26	27.74	27.15	27.18	27.39	
	4 Tx Slots	31.50	30.94	30.98	31.12	3.01	<b>28.49</b>	<b>27.93</b>	<b>27.97</b>	<b>28.11</b>	
EGPRS (8PSK)	1 Tx Slot	28.50	28.32	28.31	28.33	9.03	19.47	19.29	19.28	19.30	
	2 Tx Slots	28.00	27.76	27.78	27.82	6.02	21.98	21.74	21.76	21.80	
	3 Tx Slots	27.50	27.19	27.28	27.29	4.26	23.24	22.93	23.02	23.03	
	4 Tx Slots	27.00	26.88	26.90	26.89	3.01	23.99	23.87	23.89	23.88	
GSM 1900		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	30.50	29.69	29.80	29.83	9.03	21.47	20.66	20.77	20.80	
GPRS/ EGPRS (GMSK)	1 Tx Slot	30.50	29.71	29.75	29.76	9.03	21.47	20.68	20.72	20.73	
	2 Tx Slots	30.10	29.31	29.43	29.44	6.02	24.08	23.29	23.41	23.42	
	3 Tx Slots	29.80	29.04	29.11	29.18	4.26	25.54	24.78	24.85	24.92	
	4 Tx Slots	29.50	28.84	28.92	28.94	3.01	<b>26.49</b>	<b>25.83</b>	<b>25.91</b>	<b>25.93</b>	
EGPRS (8PSK)	1 Tx Slot	27.50	26.59	26.57	26.58	9.03	18.47	17.56	17.54	17.55	
	2 Tx Slots	27.00	26.13	26.12	26.03	6.02	20.98	20.11	20.10	20.01	
	3 Tx Slots	26.50	25.80	25.81	25.73	4.26	22.24	21.54	21.55	21.47	
	4 Tx Slots	26.00	25.32	25.38	25.35	3.01	22.99	22.31	22.37	22.34	

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 4 time slots for Max power,based on the output power measurements above..



## 9.2 WCDMA Mode

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

WCDMA		Band II(dBm)				Band IV(dBm)				Band V(dBm)			
Tx Channel	9262	9400	9538	Tune-up Limit	1312	1413	1513	Tune-up Limit	4132	4183	4233	Tune-up Limit	
Frequency(MHz)	1852.4	1880	1907.6		1712.4	1732.6	1752.6		826.4	836.6	846.6		
RMC	12.2kbps	23.87	23.92	23.88	24.50	23.54	23.51	23.58	24.00	23.84	24.08	23.90	24.50
AMR	12.2kbps	23.71	23.75	23.73	24.50	23.44	23.42	23.45	24.00	23.74	23.99	23.77	24.50
HSDPA	Sub 1	23.29	23.34	23.30	24.50	22.96	22.93	23.00	24.00	23.26	23.50	23.32	24.50
	Sub 2	23.28	23.33	23.29	24.50	22.95	22.92	22.99	24.00	23.25	23.49	23.31	24.50
	Sub 3	22.77	22.82	22.78	24.50	22.44	22.41	22.48	24.00	22.74	22.98	22.80	24.50
	Sub 4	22.76	22.81	22.77	24.50	22.43	22.40	22.47	24.00	22.73	22.97	22.79	24.50
HSUPA	Sub 1	23.25	23.30	23.26	24.50	22.92	22.89	22.96	24.00	23.22	23.46	23.28	24.50
	Sub 2	22.24	22.29	22.25	24.50	21.91	21.88	21.95	24.00	22.21	22.45	22.27	24.50
	Sub 3	22.72	22.78	22.74	24.50	22.39	22.37	22.44	24.00	22.69	22.94	22.76	24.50
	Sub 4	22.21	22.27	22.23	24.50	21.88	21.86	21.93	24.00	22.18	22.43	22.25	24.50
	Sub 5	23.20	23.26	23.22	24.50	22.87	22.85	22.92	24.00	23.17	23.42	23.24	24.50
DC-HSDPA	Sub 1	23.21	23.28	23.22	24.50	22.68	22.67	22.72	24.00	22.98	23.24	23.04	24.50
	Sub 2	23.20	23.27	23.21	24.50	22.67	22.66	22.71	24.00	22.97	23.23	23.03	24.50
	Sub 3	22.78	22.76	22.72	24.50	22.25	22.15	22.22	24.00	22.55	22.72	22.54	24.50
	Sub 4	22.77	22.75	22.71	24.50	22.24	22.14	22.21	24.00	22.54	22.71	22.53	24.50
HSPA+	16QAM	22.76	22.83	22.79	24.50	22.73	22.72	22.79	24.00	23.03	23.29	23.11	24.50

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 <sub>RB</sub> )						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

LTE FDD Band 2				Conducted Power(dBm)			Tune-up Limit	
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)				
				18607/1850.7	18900/1880	19193/1909.3		
1.4MHz	QPSK	1	0	22.64	22.23	22.52	23.00	
		1	2	22.76	22.38	22.51	23.00	
		1	5	22.38	22.30	22.47	23.00	
		3	0	22.54	22.23	22.29	23.00	
		3	2	22.29	22.27	22.14	23.00	
		3	3	22.22	22.17	22.21	23.00	
		6	0	21.53	21.23	21.26	22.00	
	16QAM	1	0	21.34	20.95	21.53	22.00	
		1	2	21.32	21.18	21.55	22.00	
		1	5	21.26	20.76	20.92	22.00	
		3	0	21.55	21.27	21.33	22.00	
		3	2	21.50	21.23	21.06	22.00	
		3	3	21.31	21.14	21.09	22.00	
		6	0	20.20	20.17	20.08	21.00	
3MHz	QPSK	1	0	22.66	22.27	22.55	23.00	
		1	7	22.74	22.41	22.55	23.00	
		1	14	22.41	22.35	22.51	23.00	
		8	0	21.64	21.35	21.42	22.00	
		8	4	21.41	21.37	21.26	22.00	
		8	7	21.32	21.28	21.31	22.00	
		15	0	21.53	21.27	21.29	22.00	
	16QAM	1	0	21.37	20.97	21.56	22.00	
		1	7	21.35	21.18	21.59	22.00	
		1	14	21.28	20.80	20.95	22.00	
		8	0	20.66	20.40	20.45	21.00	
		8	4	20.61	20.36	20.18	21.00	



		8	7	20.41	20.26	20.22	21.00
		15	0	20.23	20.21	20.11	21.00
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				18625/1852.5	18900/1880	19175/1907.5	
5MHz	QPSK	1	0	22.63	22.25	22.51	23.00
		1	13	22.72	22.37	22.52	23.00
		1	24	22.38	22.30	22.47	23.00
		12	0	21.61	21.30	21.38	22.00
		12	6	21.39	21.33	21.21	22.00
		12	13	21.30	21.26	21.27	22.00
		25	0	21.53	21.26	21.27	22.00
	16QAM	1	0	21.34	20.93	21.53	22.00
		1	13	21.32	21.16	21.56	22.00
		1	24	21.25	20.78	20.91	22.00
		12	0	20.64	20.36	20.42	21.00
		12	6	20.58	20.31	20.14	21.00
		12	13	20.38	20.21	20.18	21.00
		25	0	20.21	20.17	20.06	21.00
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				18650/1855	18900/1880	19150/1905	
10MHz	QPSK	1	0	22.65	22.26	22.54	23.00
		1	25	22.75	22.42	22.56	23.00
		1	49	22.40	22.34	22.50	23.00
		25	0	21.64	21.35	21.42	22.00
		25	13	21.42	21.38	21.25	22.00
		25	25	21.32	21.30	21.32	22.00
		50	0	21.57	21.28	21.31	22.00
	16QAM	1	0	21.36	20.96	21.55	22.00
		1	25	21.35	21.20	21.59	22.00
		1	49	21.28	20.80	20.94	22.00
		25	0	20.67	20.41	20.46	21.00
		25	13	20.60	20.35	20.17	21.00
		25	25	20.41	20.26	20.22	21.00
		50	0	20.24	20.22	20.10	21.00
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				18675/1857.5	18900/1880	19125/1902.5	
15MHz	QPSK	1	0	22.64	22.22	22.52	23.00
		1	38	22.73	22.41	22.53	23.00
		1	74	22.37	22.29	22.46	23.00
		36	0	21.62	21.31	21.39	22.00
		36	18	21.39	21.33	21.21	22.00
		36	39	21.29	21.27	21.28	22.00
		75	0	21.55	21.24	21.26	22.00



			1	0	21.46	20.94	21.53	22.00
			1	38	21.33	21.17	21.57	22.00
			1	74	21.25	20.76	20.91	22.00
			36	0	20.64	20.39	20.43	21.00
			36	18	20.57	20.30	20.13	21.00
			36	39	20.39	20.22	20.19	21.00
			75	0	20.21	20.17	20.06	21.00
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit	
				18700/1860	18900/1880	19100/1900		
20MHz	QPSK	1	0	22.61	22.18	22.49	23.00	
		1	50	22.72	22.37	22.51	23.00	
		1	99	22.35	22.28	22.43	23.00	
		50	0	21.59	21.26	21.35	22.00	
		50	25	21.37	21.29	21.18	22.00	
		50	50	21.26	21.22	21.24	22.00	
		100	0	21.52	21.19	21.22	22.00	
	16QAM	1	0	21.44	20.90	21.48	22.00	
		1	50	21.29	21.15	21.53	22.00	
		1	99	21.23	20.73	20.89	22.00	
		50	0	20.41	20.35	20.40	21.00	
		50	25	20.44	20.28	20.10	21.00	
		50	50	20.36	20.17	20.15	21.00	
		100	0	20.19	20.13	20.03	21.00	

LTE FDD Band 4				Conducted Power(dBm)			Tune-up Limit	
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)				
				19957/1710.7	20175/1732.5	20393/1754.3		
1.4MHz	QPSK	1	0	22.29	22.61	22.36	23.00	
		1	2	22.51	22.65	22.60	23.00	
		1	5	22.16	22.60	22.32	23.00	
		3	0	22.27	22.08	22.17	23.00	
		3	2	22.11	22.00	22.05	23.00	
		3	3	22.02	21.87	22.08	23.00	
		6	0	21.23	21.01	21.07	22.00	
	16QAM	1	0	21.27	21.17	21.11	22.00	
		1	2	21.25	20.94	21.05	22.00	
		1	5	20.92	20.93	21.22	22.00	
		3	0	21.23	21.14	21.06	22.00	
		3	2	21.32	21.11	21.11	22.00	
		3	3	21.19	21.09	21.07	22.00	
		6	0	20.19	20.08	20.17	21.00	



Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				19965/1711.5	20175/1732.5	20385/1753.5	
3MHz	QPSK	1	0	22.31	22.65	22.39	23.00
		1	7	22.49	22.68	22.64	23.00
		1	14	22.19	22.65	22.36	23.00
		8	0	21.37	21.20	21.30	22.00
		8	4	21.23	21.10	21.17	22.00
		8	7	21.12	20.98	21.18	22.00
		15	0	21.23	21.05	21.10	22.00
	16QAM	1	0	21.30	21.19	21.14	22.00
		1	7	21.28	20.94	21.09	22.00
		1	14	20.94	20.97	21.25	22.00
		8	0	20.34	20.17	20.08	21.00
		8	4	20.43	20.14	20.13	21.00
		8	7	20.29	20.11	20.10	21.00
		15	0	20.22	20.12	20.20	21.00
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				19975/1712.5	20175/1732.5	20375/1752.5	
5MHz	QPSK	1	0	22.28	22.63	22.35	23.00
		1	13	22.47	22.64	22.61	23.00
		1	24	22.16	22.60	22.32	23.00
		12	0	21.34	21.15	21.26	22.00
		12	6	21.21	21.06	21.12	22.00
		12	13	21.10	20.96	21.14	22.00
		25	0	21.23	21.04	21.08	22.00
	16QAM	1	0	21.27	21.15	21.11	22.00
		1	13	21.25	20.92	21.06	22.00
		1	24	20.91	20.95	21.21	22.00
		12	0	20.32	20.13	20.05	21.00
		12	6	20.40	20.09	20.09	21.00
		12	13	20.26	20.06	20.06	21.00
		25	0	20.20	20.08	20.15	21.00
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				20000/1715	20175/1732.5	20350/1750	
10MHz	QPSK	1	0	22.30	22.64	22.38	23.00
		1	25	22.50	22.69	22.65	23.00
		1	49	22.18	22.64	22.35	23.00
		25	0	21.37	21.20	21.30	22.00
		25	13	21.24	21.11	21.16	22.00
		25	25	21.12	21.00	21.19	22.00
		50	0	21.27	21.06	21.12	22.00
	16QAM	1	0	21.29	21.18	21.13	22.00
		1	25	21.28	20.96	21.09	22.00



		1	49	20.94	20.97	21.24	22.00
		25	0	20.35	20.18	20.09	21.00
		25	13	20.42	20.13	20.12	21.00
		25	25	20.29	20.11	20.10	21.00
		50	0	20.23	20.13	20.19	21.00
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				20025/1717.5	20175/1732.5	20325/1747.5	
15MHz	QPSK	1	0	22.29	22.60	22.36	23.00
		1	38	22.48	22.68	22.62	23.00
		1	74	22.15	22.59	22.31	23.00
		36	0	21.35	21.16	21.27	22.00
		36	18	21.21	21.06	21.12	22.00
		36	39	21.09	20.97	21.15	22.00
		75	0	21.25	21.02	21.07	22.00
	16QAM	1	0	21.24	21.16	21.11	22.00
		1	38	21.26	20.93	21.07	22.00
		1	74	20.91	20.93	21.21	22.00
		36	0	20.32	20.16	20.06	21.00
		36	18	20.39	20.08	20.08	21.00
		36	39	20.27	20.07	20.07	21.00
		75	0	20.20	20.08	20.15	21.00
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				20050/1720	20175/1732.5	20300/1745	
20MHz	QPSK	1	0	22.26	22.56	22.33	23.00
		1	50	22.47	22.64	22.60	23.00
		1	99	22.13	22.58	22.28	23.00
		50	0	21.32	21.11	21.23	22.00
		50	25	21.19	21.02	21.09	22.00
		50	50	21.06	20.92	21.11	22.00
		100	0	21.22	20.97	21.03	22.00
	16QAM	1	0	21.08	21.12	21.06	22.00
		1	50	21.22	20.91	21.03	22.00
		1	99	20.89	20.90	21.19	22.00
		50	0	20.29	20.22	20.13	21.00
		50	25	20.36	20.16	20.15	21.00
		50	50	20.24	20.12	20.13	21.00
		100	0	20.18	20.04	20.12	21.00

LTE FDD Band 5				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	22.01	22.10	22.03	23.00	
		1	2	21.95	22.07	22.22	23.00	



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	22.03	22.14	22.06	23.00
		1	7	21.93	22.10	22.26	23.00
		1	14	21.70	22.04	22.16	23.00
		8	0	21.11	21.05	20.92	22.00
		8	4	21.00	21.02	20.90	22.00
		8	7	20.96	20.90	20.74	22.00
		15	0	20.99	20.86	20.91	22.00
	16QAM	1	0	21.30	21.34	20.15	22.00
		1	7	21.28	20.48	20.64	22.00
		1	14	20.23	20.67	20.22	22.00
		8	0	20.13	20.11	20.10	21.00
		8	4	20.23	20.18	20.15	21.00
		8	7	20.17	20.36	20.10	21.00
		15	0	20.04	19.93	19.92	21.00
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	22.00	22.12	22.02	23.00
		1	13	21.91	22.06	22.23	23.00
		1	24	21.67	21.99	22.12	23.00
		12	0	21.08	21.00	20.88	22.00
		12	6	20.98	20.98	20.85	22.00
		12	13	20.94	20.88	20.70	22.00
		25	0	20.99	20.85	20.89	22.00
	16QAM	1	0	21.27	21.30	20.12	22.00
		1	13	21.25	20.46	20.61	22.00
		1	24	20.20	20.65	20.18	22.00
		12	0	20.11	20.07	20.07	21.00
		12	6	20.20	20.13	20.11	21.00
		12	13	20.14	20.31	20.06	21.00



		25	0	20.02	19.89	19.87	21.00
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				20450/829	20525/836.5	20600/844	
10MHz	QPSK	1	0	21.98	22.05	22.00	23.00
		1	25	21.91	22.06	22.22	23.00
		1	49	21.64	21.97	22.08	23.00
		25	0	21.06	20.96	20.85	22.00
		25	13	20.96	20.94	20.82	22.00
		25	25	20.90	20.84	20.67	22.00
		50	0	20.98	20.78	20.84	22.00
	16QAM	1	0	21.24	21.27	21.07	22.00
		1	25	21.22	21.15	21.18	22.00
		1	49	21.18	20.90	21.16	22.00
		25	0	20.08	20.06	20.05	21.00
		25	13	20.16	20.10	20.07	21.00
		25	25	20.12	20.27	20.03	21.00
		50	0	20.00	19.85	19.84	21.00

LTE FDD Band 7				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	21.96	21.93	21.89	23.00	
		1	13	22.37	22.03	22.40	23.00	
		1	24	22.11	22.00	21.86	23.00	
		12	0	20.97	20.90	21.02	22.00	
		12	6	21.05	20.99	21.09	22.00	
		12	13	20.90	21.08	20.96	22.00	
		25	0	20.98	21.05	21.07	22.00	
	16QAM	1	0	20.57	20.47	20.40	22.00	
		1	13	20.55	20.50	20.35	22.00	
		1	24	20.61	20.40	20.35	22.00	
		12	0	20.11	20.06	20.13	22.00	
		12	6	20.21	20.26	20.13	22.00	
		12	13	20.12	20.17	20.11	22.00	
		25	0	20.05	20.03	20.05	21.00	
10MHz	QPSK	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit	
				20800/2505	21100/2535	21400/2565		
				21.98	21.94	21.92	23.00	
				22.40	22.08	22.44	23.00	
				22.13	22.04	21.89	23.00	
				21.00	20.95	21.06	22.00	



		50	0	21.02	21.07	21.11	22.00
16QAM	16QAM	1	0	20.59	20.50	20.42	22.00
		1	25	20.58	20.54	20.38	22.00
		1	49	20.64	20.42	20.38	22.00
		25	0	20.14	20.11	20.17	21.00
		25	13	20.23	20.30	20.16	21.00
		25	25	20.15	20.22	20.15	21.00
		50	0	20.08	20.08	20.09	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	21.97	21.90	21.90	23.00
		1	38	22.38	22.07	22.41	23.00
		1	74	22.10	21.99	21.85	23.00
		36	0	20.98	20.91	21.03	22.00
		36	18	21.05	20.99	21.09	22.00
		36	39	20.89	21.09	20.97	22.00
		75	0	21.00	21.03	21.06	22.00
	16QAM	1	0	20.54	20.48	20.40	22.00
		1	38	20.56	20.51	20.36	22.00
		1	74	20.61	20.38	20.35	22.00
		36	0	20.11	20.09	20.14	21.00
		36	18	20.20	20.25	20.12	21.00
		36	39	20.13	20.18	20.12	21.00
		75	0	20.05	20.03	20.05	21.00
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				20850/2510	21100/2535	21350/2560	
20MHz	QPSK	1	0	21.94	21.86	21.87	23.00
		1	50	22.37	22.03	22.39	23.00
		1	99	22.08	21.98	21.82	23.00
		50	0	20.95	20.86	20.99	22.00
		50	25	21.03	20.95	21.06	22.00
		50	50	20.86	21.04	20.93	22.00
		100	0	20.97	20.98	21.02	22.00
	16QAM	1	0	20.54	20.44	20.35	22.00
		1	50	20.52	20.49	20.32	22.00
		1	99	20.59	20.35	20.33	22.00
		50	0	20.08	20.05	20.11	21.00
		50	25	20.17	20.23	20.09	21.00
		50	50	20.10	20.13	20.08	21.00
		100	0	20.03	19.99	20.02	21.00



LTE FDD Band 12				Conducted Power(dBm)			Tune-up Limit	
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)				
				23017/699.7	23095/707.5	23173/715.3		
1.4MHz	QPSK	1	0	21.93	22.15	22.14	23.00	
		1	2	22.29	22.52	22.65	23.00	
		1	5	22.23	22.05	22.08	23.00	
		3	0	21.92	21.86	22.01	23.00	
		3	2	21.82	22.04	22.04	23.00	
		3	3	21.91	21.92	21.96	23.00	
		6	0	21.13	21.07	21.08	22.00	
	16QAM	1	0	20.77	20.68	20.69	22.00	
		1	2	20.75	20.81	20.90	22.00	
		1	5	20.59	20.97	20.65	22.00	
		3	0	20.12	20.03	20.09	21.00	
		3	2	20.18	20.11	20.30	21.00	
		3	3	20.08	20.18	20.16	21.00	
		6	0	20.01	20.11	20.15	21.00	
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit	
				23025/700.5	23095/707.5	23165/714.5		
3MHz	QPSK	1	0	21.95	22.19	22.17	23.00	
		1	7	22.27	22.55	22.69	23.00	
		1	14	22.26	22.10	22.12	23.00	
		8	0	21.02	20.98	21.14	22.00	
		8	4	20.94	21.14	21.16	22.00	
		8	7	21.01	21.03	21.06	22.00	
		15	0	21.13	21.11	21.11	22.00	
	16QAM	1	0	20.80	20.70	20.72	22.00	
		1	7	20.78	20.81	20.94	22.00	
		1	14	20.61	21.01	20.68	22.00	
		8	0	20.23	20.16	20.21	21.00	
		8	4	20.29	21.22	20.42	21.00	
		8	7	20.18	20.30	20.29	21.00	
		15	0	20.04	20.15	20.18	21.00	
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit	
				23035/701.5	23095/707.5	23155/713.5		
5MHz	QPSK	1	0	21.92	22.17	22.13	23.00	
		1	13	22.25	22.51	22.66	23.00	
		1	24	22.23	22.05	22.08	23.00	
		12	0	20.99	20.93	21.10	22.00	
		12	6	20.92	21.10	21.11	22.00	
		12	13	20.99	21.01	21.02	22.00	
		25	0	21.13	21.10	21.09	22.00	
	16QAM	1	0	20.77	20.66	20.69	22.00	



		1	13	20.75	20.79	20.91	22.00
		1	24	20.58	20.99	20.64	22.00
		12	0	20.21	20.12	20.18	21.00
		12	6	20.26	20.17	20.38	21.00
		12	13	20.15	20.25	20.25	21.00
		25	0	20.02	20.11	20.13	21.00
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				23060/704	23095/707.5	23130/711	
10MHz	QPSK	1	0	21.90	22.10	22.11	23.00
		1	25	22.25	22.51	22.65	23.00
		1	49	22.20	22.03	22.04	23.00
		25	0	20.97	20.89	21.07	22.00
		25	13	20.90	21.06	21.08	22.00
		25	25	20.95	20.97	20.99	22.00
		50	0	21.12	21.03	21.04	22.00
	16QAM	1	0	20.61	20.63	20.64	22.00
		1	25	20.72	20.78	20.88	22.00
		1	49	20.56	20.94	20.62	22.00
		25	0	20.18	20.11	20.16	21.00
		25	13	20.22	20.14	20.34	21.00
		25	25	20.13	20.21	20.22	21.00
		50	0	20.00	20.07	20.10	21.00

LTE FDD Band 13				Conducted Power(dBm)			Tune-up Limit	
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)				
				23205/779.5	23230/782	23255/784.5		
5MHz	QPSK	1	0	22.21	22.24	22.19	23.00	
		1	13	22.40	22.37	22.38	23.00	
		1	24	22.40	22.37	22.39	23.00	
		12	0	21.35	21.34	21.33	22.00	
		12	6	21.16	21.15	21.14	22.00	
		12	13	21.18	21.16	21.15	22.00	
		25	0	21.31	21.33	21.31	22.00	
	16QAM	1	0	21.14	21.00	21.02	22.00	
		1	13	21.13	21.08	21.10	22.00	
		1	24	21.04	21.04	21.01	22.00	
		12	0	20.37	20.32	20.33	21.00	
		12	6	20.22	20.19	20.20	21.00	
		12	13	20.16	20.15	20.14	21.00	
		25	0	20.18	20.17	20.16	21.00	
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit	
				/	23230/782	/		
10MHz	QPSK	1	0	/	22.17	/	23.00	



	16QAM	1	25	/	22.37	/	23.00
		1	49	/	22.35	/	23.00
		25	0	/	21.30	/	22.00
		25	13	/	21.11	/	22.00
		25	25	/	21.12	/	22.00
		50	0	/	21.26	/	22.00
		1	0	/	20.97	/	22.00
		1	25	/	21.07	/	22.00
		1	49	/	20.99	/	22.00
		25	0	/	20.31	/	21.00
		25	13	/	20.16	/	21.00
		25	25	/	20.11	/	21.00
		50	0	/	20.13	/	21.00

LTE FDD Band 25				Conducted Power(dBm)			Tune-up Limit	
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)				
				26047/1850.7	26365/1882.5	26683/1914.3		
1.4MHz	QPSK	1	0	22.80	22.64	22.78	23.50	
		1	2	22.83	22.82	22.77	23.50	
		1	5	22.49	22.57	22.68	23.50	
		3	0	22.75	22.56	22.56	23.50	
		3	2	22.65	22.58	22.54	23.50	
		3	3	22.42	22.44	22.64	23.50	
		6	0	21.73	21.55	21.61	22.50	
	16QAM	1	0	21.64	21.23	21.88	22.50	
		1	2	21.62	21.20	21.44	22.50	
		1	5	21.25	21.13	21.28	22.50	
		3	0	21.81	21.70	21.72	22.50	
		3	2	21.81	21.71	21.83	22.50	
		3	3	21.56	21.66	21.77	22.50	
		6	0	21.14	21.10	21.26	22.00	
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit	
				26055/1851.5	26365/1882.5	26675/1913.5		
3MHz	QPSK	1	0	22.82	22.68	22.81	23.50	
		1	7	22.81	22.85	22.81	23.50	
		1	14	22.52	22.62	22.72	23.50	
		8	0	21.85	21.68	21.69	22.50	
		8	4	21.77	21.68	21.66	22.50	
		8	7	21.52	21.55	21.74	22.50	
		15	0	21.73	21.59	21.64	22.50	
	16QAM	1	0	21.67	21.25	21.91	22.50	
		1	7	21.65	21.20	21.48	22.50	
		1	14	21.27	21.17	21.31	22.50	



		8	0	20.92	20.83	20.84	22.00
		8	4	20.92	20.84	20.95	22.00
		8	7	20.66	20.78	20.90	22.00
		15	0	20.57	20.54	20.49	22.00
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				26065/1852.5	26365/1882.5	26665/1912.5	
5MHz	QPSK	1	0	22.79	22.66	22.77	23.50
		1	13	22.79	22.81	22.78	23.50
		1	24	22.49	22.57	22.68	23.50
		12	0	21.82	21.63	21.65	22.50
		12	6	21.75	21.64	21.61	22.50
		12	13	21.50	21.53	21.70	22.50
		25	0	21.73	21.58	21.62	22.50
	16QAM	1	0	21.64	21.21	21.88	22.50
		1	13	21.62	21.18	21.45	22.50
		1	24	21.24	21.15	21.27	22.50
		12	0	20.90	20.79	20.81	22.00
		12	6	20.89	20.79	20.91	22.00
		12	13	20.63	20.73	20.86	22.00
		25	0	20.55	20.50	20.44	22.00
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				26090/1855	26365/1882.5	26640/1910	
10MHz	QPSK	1	0	22.81	22.67	22.80	23.50
		1	25	22.82	22.86	22.82	23.50
		1	49	22.51	22.61	22.71	23.50
		25	0	21.85	21.68	21.69	22.50
		25	13	21.78	21.69	21.65	22.50
		25	25	21.52	21.57	21.75	22.50
		50	0	21.77	21.60	21.66	22.50
	16QAM	1	0	21.66	21.24	21.90	22.50
		1	25	21.65	21.22	21.48	22.50
		1	49	21.27	21.17	21.30	22.50
		25	0	20.93	20.84	20.85	22.00
		25	13	20.91	20.83	20.94	22.00
		25	25	20.66	20.78	20.90	22.00
		50	0	20.58	20.55	20.48	22.00
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				26115/1857.5	26365/1882.5	26615/1907.5	
15MHz	QPSK	1	0	22.80	22.63	22.78	23.50
		1	38	22.80	22.85	22.79	23.50
		1	74	22.48	22.56	22.67	23.50
		36	0	21.83	21.64	21.66	22.50
		36	18	21.75	21.64	21.61	22.50



	16QAM	36	39	21.49	21.54	21.71	22.50
		75	0	21.75	21.56	21.61	22.50
		1	0	21.61	21.22	21.88	22.50
		1	38	21.63	21.19	21.46	22.50
		1	74	21.24	21.13	21.27	22.50
		36	0	20.90	20.82	20.82	22.00
		36	18	20.88	20.78	20.90	22.00
		36	39	20.64	20.74	20.87	22.00
		75	0	20.55	20.50	20.44	22.00
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				26140/1860	26365/1882.5	26590/1905	
20Hz	QPSK	1	0	22.77	22.59	22.75	23.50
		1	50	22.79	22.81	22.77	23.50
		1	99	22.46	22.55	22.64	23.50
		50	0	21.80	21.59	21.62	22.50
		50	25	21.73	21.60	21.58	22.50
		50	50	21.46	21.49	21.67	22.50
		100	0	21.72	21.51	21.57	22.50
	16QAM	1	0	21.73	21.18	21.83	22.50
		1	50	21.59	21.17	21.42	22.50
		1	99	21.22	21.10	21.25	22.50
		50	0	20.87	20.78	20.79	22.00
		50	25	20.85	20.76	20.87	22.00
		50	50	20.61	20.69	20.83	22.00
		100	0	20.53	20.46	20.41	22.00

LTE FDD Band 26				Conducted Power(dBm)			Tune-up Limit	
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)				
				26697/814.7	26865/831.5	27033/848.3		
1.4MHz	QPSK	1	0	22.45	22.42	22.45	23.50	
		1	2	22.71	22.51	22.65	23.50	
		1	5	22.55	22.89	22.16	23.50	
		3	0	22.44	22.40	22.25	23.50	
		3	2	22.34	22.38	22.26	23.50	
		3	3	22.28	22.50	22.28	23.50	
		6	0	21.32	21.32	21.32	22.50	
	16QAM	1	0	21.06	21.18	21.19	22.50	
		1	2	21.04	20.73	21.33	22.50	
		1	5	21.00	20.98	20.08	22.50	
		3	0	21.59	21.33	21.31	22.50	
		3	2	21.53	21.33	21.25	22.50	
		3	3	21.36	21.30	21.36	22.50	
		6	0	20.43	20.45	20.43	21.50	



Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				26705/815.5	26865/831.5	27025/847.5	
3MHz	QPSK	1	0	22.47	22.46	22.48	23.50
		1	7	22.69	22.54	22.69	23.50
		1	14	22.58	22.94	22.20	23.50
		8	0	21.54	21.52	21.38	22.50
		8	4	21.46	21.48	21.38	22.50
		8	7	21.38	21.61	21.38	22.50
		15	0	21.32	21.36	21.35	22.50
	16QAM	1	0	21.09	21.20	21.22	22.50
		1	7	21.07	20.73	21.37	22.50
		1	14	21.02	21.02	20.11	22.50
		8	0	20.70	20.46	20.43	21.50
		8	4	20.64	20.46	20.37	21.50
		8	7	20.46	20.42	20.49	21.50
		15	0	20.46	20.49	20.46	21.50
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				26715/816.5	26865/831.5	27015/846.5	
5MHz	QPSK	1	0	22.46	22.45	22.47	23.50
		1	13	22.70	22.55	22.70	23.50
		1	24	22.57	22.93	22.19	23.50
		12	0	21.54	21.52	21.38	22.50
		12	6	21.47	21.49	21.37	22.50
		12	13	21.38	21.63	21.39	22.50
		25	0	21.36	21.37	21.37	22.50
	16QAM	1	0	21.08	21.19	21.21	22.50
		1	13	21.07	20.75	21.37	22.50
		1	24	21.02	21.02	20.10	22.50
		12	0	20.71	20.47	20.44	21.50
		12	6	20.63	20.45	20.36	21.50
		12	13	20.46	20.42	20.49	21.50
		25	0	20.47	20.50	20.45	21.50
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				26750/820	26865/831.5	26990/844	
10MHz	QPSK	1	0	22.45	22.41	22.45	23.50
		1	25	22.68	22.54	22.67	23.50
		1	49	22.54	22.88	22.15	23.50
		25	0	21.52	21.48	21.35	22.50
		25	13	21.44	21.44	21.33	22.50
		25	25	21.35	21.60	21.35	22.50
		50	0	21.34	21.33	21.32	22.50
	16QAM	1	0	21.03	21.17	21.19	22.50
		1	25	21.05	20.72	21.35	22.50



		1	49	20.99	20.98	20.07	22.50
		25	0	20.68	20.45	20.41	21.50
		25	13	20.60	20.40	20.32	21.50
		25	25	20.44	20.38	20.46	21.50
		50	0	20.44	20.45	20.41	21.50
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				26775/822.5	26865/831.5	26965/841.5	
15MHz	QPSK	1	0	22.42	22.37	22.42	23.50
		1	38	22.67	22.50	22.65	23.50
		1	74	22.52	22.87	22.48	23.50
		36	0	21.49	21.43	21.31	22.50
		36	18	21.42	21.40	21.30	22.50
		36	39	21.32	21.55	21.31	22.50
		75	0	21.31	21.28	21.28	22.50
	16QAM	1	0	21.39	21.13	21.14	22.50
		1	38	21.01	20.80	21.31	22.50
		1	74	20.97	20.95	20.05	22.50
		36	0	20.65	20.41	20.38	21.50
		36	18	20.57	20.38	20.29	21.50
		36	39	20.41	20.33	20.42	21.50
		75	0	20.42	20.41	20.38	21.50

LTE TDD Band 41				Conducted Power(dBm)					Tune-up Limit	
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)						
				39675/2498.5	40148/2545.8	40620/2593	41093/2640.3	41565/2687.5		
5MHz	QPSK	1	0	22.93	23.07	23.16	23.20	23.46	24.50	
		1	13	23.13	23.27	23.42	23.49	23.67	24.50	
		1	24	23.15	23.05	23.17	23.25	23.49	24.50	
		12	0	22.33	22.40	22.28	22.17	22.49	23.50	
		12	6	22.15	22.18	22.27	22.53	22.35	23.50	
		12	13	22.07	22.17	22.25	22.25	22.28	23.50	
		25	0	22.08	22.15	22.31	22.26	22.36	23.50	
	16QAM	1	0	22.11	22.15	21.89	21.96	22.18	23.50	
		1	13	22.09	22.13	22.18	22.28	22.41	23.50	
		1	24	21.60	21.72	21.87	21.84	21.94	23.50	
		12	0	21.19	21.05	21.22	21.07	21.45	22.50	
		12	6	21.18	21.23	21.41	21.14	21.55	22.50	
		12	13	21.04	21.07	21.27	21.15	21.37	22.50	
		25	0	21.05	21.06	21.30	21.17	21.39	22.50	
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	22.95	23.09	23.17	23.23	23.49	24.50	
		1	25	23.16	23.30	23.47	23.53	23.71	24.50	



		1	49	23.17	23.07	23.21	23.28	23.52	24.50
		25	0	22.36	22.43	22.33	22.21	22.53	23.50
		25	13	22.18	22.21	22.32	22.57	22.39	23.50
		25	25	22.09	22.19	22.29	22.30	22.33	23.50
		50	0	22.12	22.19	22.33	22.30	22.40	23.50
		1	0	22.13	22.17	21.92	21.98	22.20	23.50
		1	25	22.12	22.16	22.22	22.31	22.44	23.50
		1	49	21.63	21.75	21.89	21.87	21.97	23.50
		25	0	21.22	21.08	21.27	21.11	21.49	22.50
		25	13	21.20	21.25	21.45	21.17	21.58	22.50
		25	25	21.07	21.10	21.32	21.19	21.41	22.50
		50	0	21.08	21.09	21.35	21.21	21.43	22.50
<b>Bandwidth</b>	<b>Modulation</b>	<b>RB size</b>	<b>RB offset</b>	<b>Channel/Frequency (MHz)</b>					<b>Tune-up Limit</b>
				39725/2503.5	40173/2548.3	40620/2593	41068/2637.8	41515/2682.5	
<b>15MHz</b>	QPSK	1	0	22.94	23.08	23.13	23.21	23.47	24.50
		1	38	23.14	23.28	23.46	23.50	23.68	24.50
		1	74	23.14	23.04	23.16	23.24	23.48	24.50
		36	0	22.34	22.41	22.29	22.18	22.50	23.50
		36	18	22.15	22.18	22.27	22.53	22.35	23.50
		36	39	22.06	22.16	22.26	22.26	22.29	23.50
		75	0	22.10	22.17	22.29	22.25	22.35	23.50
	16QAM	1	0	22.08	22.12	21.90	21.96	22.18	23.50
		1	38	22.10	22.14	22.19	22.29	22.42	23.50
		1	74	21.60	21.72	21.85	21.84	21.94	23.50
		36	0	21.19	21.05	21.25	21.08	21.46	22.50
		36	18	21.17	21.22	21.40	21.13	21.54	22.50
		36	39	21.05	21.08	21.28	21.16	21.38	22.50
		75	0	21.05	21.06	21.30	21.17	21.39	22.50
<b>Bandwidth</b>	<b>Modulation</b>	<b>RB size</b>	<b>RB offset</b>	<b>Channel/Frequency (MHz)</b>					<b>Tune-up Limit</b>
				39750/2506	40185/2549.5	40620/2593	41055/2636.5	41490/2680	
<b>20MHz</b>	QPSK	1	0	22.91	23.05	23.09	23.18	23.44	24.50
		1	50	23.13	23.27	23.42	23.48	23.66	24.50
		1	99	23.12	23.02	23.15	23.21	23.45	24.50
		50	0	22.31	22.38	22.24	22.14	22.46	23.50
		50	25	22.13	22.16	22.23	22.50	22.32	23.50
		50	50	22.03	22.13	22.21	22.22	22.25	23.50
		100	0	22.07	22.14	22.24	22.21	22.31	23.50
	16QAM	1	0	21.70	21.64	21.86	21.91	22.13	23.50
		1	50	22.06	22.10	22.17	22.25	22.38	23.50
		1	99	21.58	21.70	21.82	21.82	21.92	23.50
		50	0	21.16	21.02	21.21	21.05	21.43	22.50
		50	25	21.14	21.19	21.38	21.10	21.51	22.50
		50	50	21.02	21.05	21.23	21.12	21.34	22.50



		100	0	21.03	21.04	21.26	21.14	21.36	22.50
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LTE FDD Band 66				Conducted Power(dBm)			Tune-up Limit	
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)				
				131979/1710.7	132322/1745	132665/1779.3		
1.4MHz	QPSK	1	0	22.71	22.81	22.91	23.50	
		1	2	22.98	22.90	23.11	23.50	
		1	5	22.65	22.66	22.97	23.50	
		3	0	22.81	22.84	22.82	23.50	
		3	2	22.85	22.87	22.77	23.50	
		3	3	22.97	22.86	22.73	23.50	
		6	0	21.92	21.87	21.89	22.50	
	16QAM	1	0	21.76	22.03	21.87	22.50	
		1	2	21.74	22.00	21.75	22.50	
		1	5	22.36	21.99	21.93	22.50	
		3	0	21.92	21.85	21.88	22.50	
		3	2	22.01	21.98	21.90	22.50	
		3	3	22.08	21.84	21.79	22.50	
		6	0	21.03	21.01	20.95	21.50	
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit	
				1319871711.5	132322/1745	132657/1778.5		
3MHz	QPSK	1	0	22.73	22.85	22.94	23.50	
		1	7	22.96	22.93	23.15	23.50	
		1	14	22.68	22.71	23.01	23.50	
		8	0	21.91	21.96	21.95	22.50	
		8	4	21.97	21.97	21.89	22.50	
		8	7	22.07	21.97	21.83	22.50	
		15	0	21.92	21.91	21.92	22.50	
	16QAM	1	0	21.79	22.05	21.90	22.50	
		1	7	21.77	22.00	21.79	22.50	
		1	14	22.38	22.03	21.96	22.50	
		8	0	21.03	20.98	21.00	21.50	
		8	4	21.12	21.11	21.02	21.50	
		8	7	21.18	20.96	20.92	21.50	
		15	0	21.06	21.05	20.98	21.50	
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit	
				131997/1712.5	132322/1745	132647/1777.5		
5MHz	QPSK	1	0	22.70	22.83	22.90	23.50	
		1	13	22.94	22.89	23.12	23.50	
		1	24	22.65	22.66	22.97	23.50	
		12	0	21.88	21.91	21.91	22.50	
		12	6	21.95	21.93	21.84	22.50	
		12	13	22.05	21.95	21.79	22.50	



	16QAM	25	0	21.92	21.90	21.90	22.50
		1	0	21.76	22.01	21.87	22.50
		1	13	21.74	21.98	21.76	22.50
		1	24	22.35	22.01	21.92	22.50
		12	0	21.01	20.94	20.97	21.50
		12	6	21.09	21.06	20.98	21.50
		12	13	21.15	20.91	20.88	21.50
		25	0	21.04	21.01	20.93	21.50
		RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
10MHz	QPSK			132022/1715	132322/1745	132622/1775	
	1	0	22.72	22.84	22.93	23.50	
	1	25	22.97	22.94	23.16	23.50	
	1	49	22.67	22.70	23.00	23.50	
	25	0	21.91	21.96	21.95	22.50	
	25	13	21.98	21.98	21.88	22.50	
	25	25	22.07	21.99	21.84	22.50	
	16QAM	50	0	21.96	21.92	21.94	22.50
		1	0	21.78	22.04	21.89	22.50
		1	25	21.77	22.02	21.79	22.50
		1	49	22.38	22.03	21.95	22.50
		25	0	21.04	20.99	21.01	21.50
		25	13	21.11	21.10	21.01	21.50
		25	25	21.18	20.96	20.92	21.50
		50	0	21.07	21.06	20.97	21.50
15MHz	QPSK	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				132047/1717.5	132322/1745	132597/1772.5	
		1	0	22.71	22.80	22.91	23.50
		1	38	22.95	22.93	23.13	23.50
		1	74	22.64	22.65	22.96	23.50
		36	0	21.89	21.92	21.92	22.50
		36	18	21.95	21.93	21.84	22.50
	16QAM	36	39	22.04	21.96	21.80	22.50
		75	0	21.94	21.88	21.89	22.50
		1	0	21.73	22.02	21.87	22.50
		1	38	21.75	21.99	21.77	22.50
		1	74	22.35	21.99	21.92	22.50
		36	0	21.01	20.97	20.98	21.50
		36	18	21.08	21.05	20.97	21.50
		36	39	21.16	20.92	20.89	21.50
20MHz	QPSK	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				132072/1720	132322/1745	132572/1770	
		1	0	22.68	22.76	22.88	23.50



		1	50	22.94	22.89	23.11	23.50
		1	99	22.62	22.64	22.93	23.50
		50	0	21.86	21.87	21.88	22.50
		50	25	21.93	21.89	21.81	22.50
		50	50	22.01	21.91	21.76	22.50
		100	0	21.91	21.83	21.85	22.50
16QAM		1	0	21.93	21.98	21.82	22.50
		1	50	21.71	21.97	21.73	22.50
		1	99	21.95	21.96	21.90	22.50
		50	0	20.98	20.93	20.95	21.50
		50	25	21.05	21.03	20.94	21.50
		50	50	21.13	20.87	20.85	21.50
		100	0	20.82	20.77	20.70	21.50

LTE FDD Band 71				Conducted Power(dBm)			Tune-up Limit	
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)				
				133147/665.5	133297/680.5	133447/695.5		
5MHz	QPSK	1	0	22.54	22.78	22.68	23.50	
		1	13	22.81	23.10	22.86	23.50	
		1	24	22.61	23.02	22.65	23.50	
		12	0	21.63	21.72	21.77	22.50	
		12	6	21.71	21.74	21.84	22.50	
		12	13	21.83	21.76	21.89	22.50	
		25	0	21.71	21.85	21.84	22.50	
	16QAM	1	0	21.33	21.57	21.77	22.50	
		1	13	21.31	21.74	21.68	22.50	
		1	24	21.16	21.64	21.71	22.50	
		12	0	20.70	20.83	20.79	21.50	
		12	6	20.76	20.80	20.89	21.50	
		12	13	20.83	20.78	21.02	21.50	
		25	0	20.79	20.85	20.89	21.50	
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit	
				133172/668	133297/680.5	133422/693		
10MHz	QPSK	1	0	22.56	22.79	22.71	23.50	
		1	25	22.84	23.15	22.90	23.50	
		1	49	22.63	23.06	22.68	23.50	
		25	0	21.66	21.77	21.81	22.50	
		25	13	21.74	21.79	21.88	22.50	
		25	25	21.85	21.80	21.94	22.50	
		50	0	21.75	21.87	21.88	22.50	
	16QAM	1	0	21.35	21.60	21.79	22.50	
		1	25	21.34	21.78	21.71	22.50	
		1	49	21.19	21.66	21.74	22.50	



		25	0	20.73	20.88	20.83	21.50
		25	13	20.78	20.84	20.92	21.50
		25	25	20.86	20.83	21.06	21.50
		50	0	20.82	20.90	20.93	21.50
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				133197/670.5	133297/680.5	133397/690.5	
15MHz	QPSK	1	0	22.55	22.75	22.69	23.50
		1	38	22.82	23.14	22.87	23.50
		1	74	22.60	23.01	22.64	23.50
		36	0	21.64	21.73	21.78	22.50
		36	18	21.71	21.74	21.84	22.50
		36	39	21.82	21.77	21.90	22.50
		75	0	21.73	21.83	21.83	22.50
	16QAM	1	0	21.30	21.58	21.77	22.50
		1	38	21.32	21.75	21.69	22.50
		1	74	21.16	21.62	21.71	22.50
		36	0	20.70	20.86	20.80	21.50
		36	18	20.75	20.79	20.88	21.50
		36	39	20.84	20.79	21.03	21.50
		75	0	20.79	20.85	20.89	21.50
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency (MHz)			Tune-up Limit
				133222/673	133322/683	133372/688	
20MHz	QPSK	1	0	22.52	22.71	22.66	23.50
		1	50	22.81	23.10	22.85	23.50
		1	99	22.58	23.00	22.61	23.50
		50	0	21.61	21.68	21.74	22.50
		50	25	21.69	21.70	21.81	22.50
		50	50	21.79	21.72	21.86	22.50
		100	0	21.70	21.78	21.79	22.50
	16QAM	1	0	21.39	21.54	21.72	22.50
		1	50	21.28	21.73	21.65	22.50
		1	99	21.14	21.59	21.69	22.50
		50	0	20.67	20.82	20.77	21.50
		50	25	20.72	20.77	20.85	21.50
		50	50	20.81	20.74	20.99	21.50
		100	0	20.77	20.81	20.86	21.50



## 9.4 WLAN Mode

Wi-Fi 2.4G	Channel /Frequency(MHz)	Maximum Output Power (dBm)		
		Tune-up	Meas.	TP Set Level
Mode				
802.11b (1M)	1/2412	17.00	16.39	16.5
	6/2437	17.00	15.66	16.5
	11/2462	17.00	16.30	16.5
802.11g (6M)	1/2412	17.00	16.64	16
	6/2437	17.00	16.11	16
	11/2462	17.00	16.66	16
802.11n-HT20 (MCS0)	1/2412	15.00	14.64	15
	6/2437	15.00	14.39	15
	11/2462	15.00	14.61	15

Wi-Fi 5G (U-NII-1)	Channel /Frequency(MHz)	Maximum Output Power (dBm)		
		Tune-up	Meas.	TP Set Level
Mode				
802.11a (6M)	36/5180	15.00	14.31	14.5
	40/5200	15.00	14.33	14.5
	44/5220	15.00	14.35	14.5
	48/5240	15.00	14.36	14.5
802.11n-HT20 (MCS0)	36/5180	15.00	14.38	14.5
	40/5200	15.00	14.30	14.5
	44/5220	15.00	14.34	14.5
	48/5240	15.00	14.39	14.5
802.11n-HT40 (MCS0)	38/5190	15.50	15.06	14.5
	46/5230	15.50	14.98	14.5

Note. Initial test configuration is 802.11n-HT40 mode, since the highest maximum output power.

Wi-Fi 5G (U-NII-2A)	Channel /Frequency(MHz)	Maximum Output Power (dBm)		
		Tune-up	Meas.	TP Set Level
Mode				
802.11a (6M)	52/5260	14.50	14.05	14
	56/5280	14.50	13.96	14
	60/5300	14.50	13.87	14
	64/5320	14.50	13.81	14
802.11n-HT20 (MCS0)	52/5260	14.50	13.98	14
	56/5280	14.50	13.91	14



	60/5300	14.50	13.83	14
	64/5320	14.50	13.89	14
802.11n-HT40 (MCS0)	54/5270	15.00	14.50	14
	62/5310	15.00	14.37	14

Note. Initial test configuration is 802.11n-HT40 mode, since the highest maximum output power.

Wi-Fi 5G (U-NII-2C)	Channel /Frequency(MHz)	Maximum Output Power (dBm)		
		Tune-up	Meas.	TP Set Level
802.11a (6M)	100/5500	14.00	13.24	15
	116/5580	14.00	13.34	15
	132/5660	14.00	13.52	15
	140/5700	14.00	13.38	15
802.11n-HT20 (MCS0)	100/5500	14.00	13.35	15
	116/5580	14.00	13.41	15
	132/5660	14.00	13.51	15
	140/5700	14.00	13.34	15
802.11n-HT40 (MCS0)	102/5510	14.50	14.03	15
	110/5550	14.50	14.06	15
	118/5590	14.50	14.13	15
	134/5670	14.50	14.15	15

Note. Initial test configuration is 802.11n-HT40 mode, since the highest maximum output power.

Wi-Fi 5G (U-NII-3)	Channel /Frequency(MHz)	Maximum Output Power (dBm)		
		Tune-up	Meas.	TP Set Level
802.11a (6M)	149/5745	14.00	13.94	15
	157/5785	14.00	13.60	15
	165/5825	14.00	13.65	15
802.11n-HT20 (MCS0)	149/5745	14.00	13.95	15
	157/5785	14.00	13.66	15
	165/5825	14.00	13.69	15
802.11n-HT40 (MCS0)	151/5755	14.50	14.44	15
	159/5795	14.50	14.24	15

Note. Initial test configuration is 802.11n-HT40 mode, since the highest maximum output power.



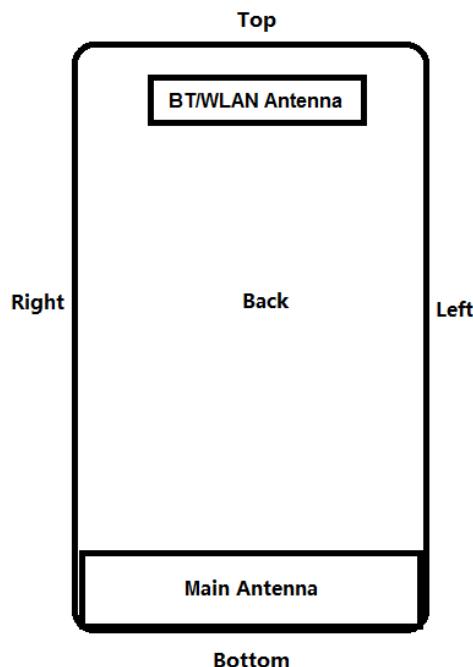
## 9.5 Bluetooth Mode

BT	Conducted Power(dBm)			Tune-up Limit (dBm)	
	Channel/Frequency(MHz)				
	Ch 0/2402 MHz	Ch 39/2441 MHz	Ch 78/2480 MHz		
GFSK	8.26	9.38	9.18	9.5	
$\pi/4$ DQPSK	5.59	6.88	6.30	7.5	
8DPSK	5.49	6.95	6.93	7.5	
BLE	Ch 0/2402 MHz	Ch 19/2440 MHz	Ch 39/2480 MHz	Tune-up Limit (dBm)	
GFSK	-2.60	-0.70	-1.53	0	



## 10 Measured and Reported (Scaled) SAR Results

### 10.1 EUT Antenna Locations



Overall (Length x Width): 147 mm x 65 mm

Overall Diagonal: 152 mm/Display Diagonal: 67 mm

#### Distance of the Antenna to the EUT surface/edge

Antenna	Back Side	Front side	Left Edge	Right Edge	Top Edge	Bottom Edge
Main-Antenna	<25mm	<25mm	<25mm	<25mm	>25mm	<25mm
BT/Wi-Fi Antenna	<25mm	<25mm	<25mm	<25mm	<25mm	>25mm

#### Hotspot mode, Positions for SAR tests

Mode	Back Side	Front side	Left Edge	Right Edge	Top Edge	Bottom Edge
Main-Antenna	Yes	Yes	Yes	Yes	N/A	Yes
BT/Wi-Fi Antenna	Yes	Yes	Yes	Yes	Yes	N/A

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

2. Per FCC KDB 447498 D01,

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

- $\leq 0.8 \text{ W/kg}$  or  $2.0 \text{ W/kg}$ , for 1-g or 10-g respectively, when the transmission band is  $\leq 100\text{MHz}$
- $\leq 0.6 \text{ W/kg}$  or  $1.5 \text{ W/kg}$ , for 1-g or 10-g respectively, when the transmission band is between  $100 \text{ MHz}$  and  $200 \text{ MHz}$ .
- $\leq 0.4 \text{ W/kg}$  or  $1.0 \text{ W/kg}$ , for 1-g or 10-g respectively, when the transmission band is  $\geq 200 \text{ MHz}$ .

3. When the original highest measured SAR is  $\geq 0.80 \text{ W/kg}$ , the measurement was repeated once.



## 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  $\leq$  50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for product specific 10-g SAR}$

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

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)	MAXPower (dBm)	Frequency (MHz)	Ratio	Evaluation
Head	5	9.50	2480	2.81	No
Body-worn	15	9.50	2480	0.94	No
Hotspot	10	9.50	2480	1.40	No



## 10.3 Measured SAR Results

**Table 10: GSM 850**

Test Position	Cover Type	Time slot	Duty Cycle	Channel/ Frequency (MHz)	Tune-up (dBm)	Measured power (dBm)	Limit of SAR 1.6 W/kg (mW/g)				Plot No.
							Measured SAR1g	Power Drift (dB)	Scaling Factor	Report SAR1g	
<b>Head SAR</b>											
Left Cheek	standard	GSM	1:8.3	128/824.2	33.00	32.31	0.048	0.094	1.17	0.057	19
		GSM	1:8.3	190/836.6	33.00	32.28	0.045	0.101	1.18	0.054	/
		GSM	1:8.3	251/848.8	33.00	32.52	0.041	0.023	1.12	0.046	/
Left Tilt	standard	GSM	1:8.3	190/836.6	33.00	32.28	0.016	0.013	1.18	0.019	/
Right Cheek	standard	GSM	1:8.3	190/836.6	33.00	32.28	0.037	-0.034	1.18	0.044	/
Right Tilt	standard	GSM	1:8.3	190/836.6	33.00	32.28	0.012	-0.085	1.18	0.014	/
<b>Body-worn SAR (Distance 15mm)</b>											
Back Side	standard	GSM	1:8.3	190/836.6	33.00	32.28	0.063	-0.026	1.18	0.074	/
Front Side	standard	GSM	1:8.3	128/824.2	33.00	32.31	0.073	0.020	1.17	0.086	/
		GSM	1:8.3	190/836.6	33.00	32.28	0.076	0.170	1.18	0.090	/
		GSM	1:8.3	251/848.8	33.00	32.52	0.079	-0.090	1.12	0.088	20
<b>Hotspot SAR(Distance 10mm)</b>											
Back Side	standard	4Txslots	1:8.3	190/836.6	31.50	30.98	0.393	-0.060	1.13	0.443	/
Front Side	standard	4Txslots	1:8.3	128/824.2	31.50	30.94	0.417	-0.190	1.14	0.474	/
		4Txslots	1:8.3	190/836.6	31.50	30.98	0.461	0.110	1.13	0.520	/
		4Txslots	1:8.3	251/848.8	31.50	31.12	0.506	-0.050	1.09	0.552	21
Left Edge	standard	4Txslots	1:8.3	190/836.6	31.50	30.98	0.143	0.070	1.13	0.161	/
Right Edge	standard	4Txslots	1:8.3	190/836.6	33.00	30.98	0.115	-0.010	1.59	0.183	/
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Edge	standard	4Txslots	1:8.3	190/836.6	31.50	30.98	0.364	0.150	1.13	0.410	/

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

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



Table 11: GSM 1900

Test Position	Cover Type	Time slot	Duty Cycle	Channel/ Frequency (MHz)	Tune-up (dBm)	Measured power (dBm)	Limit of SAR 1.6 W/kg (mW/g)				Plot No.
							Measured SAR <sub>1g</sub>	Power Drift (dB)	Scaling Factor	Report SAR <sub>1g</sub>	
<b>Head SAR</b>											
Left Cheek	standard	GSM	1:8.3	661/1880	30.50	29.80	0.196	0.100	1.17	0.230	/
Left Tilt	standard	GSM	1:8.3	661/1880	30.50	29.80	0.150	0.140	1.17	0.176	/
Right Cheek	standard	GSM	1:8.3	512/1850.2	30.50	29.69	0.186	0.023	1.21	0.224	/
		GSM	1:8.3	661/1880	30.50	29.80	0.267	-0.030	1.17	0.314	22
		GSM	1:8.3	810/1909.8	30.50	29.83	0.165	-0.060	1.17	0.193	/
Right Tilt	standard	GSM	1:8.3	661/1880	30.50	29.80	0.104	0.130	1.17	0.122	/
<b>Body-worn SAR (Distance 15mm)</b>											
Back Side	standard	GSM	1:8.3	512/1850.2	30.50	29.69	0.126	0.060	1.21	0.152	/
		GSM	1:8.3	661/1880	30.50	29.80	0.133	0.030	1.17	0.156	23
		GSM	1:8.3	810/1909.8	30.50	29.83	0.102	0.150	1.17	0.119	/
Front Side	standard	GSM	1:8.3	661/1880	30.50	29.80	0.072	-0.022	1.17	0.085	/
<b>Hotspot SAR (Distance 10mm)</b>											
Back Side	standard	4Txslots	1:8.3	512/1850.2	29.50	28.84	1.030	-0.080	1.16	1.199	24
		4Txslots	1:8.3	661/1880	29.50	28.92	0.988	0.020	1.14	1.129	/
		4Txslots	1:8.3	810/1909.8	29.50	28.94	0.977	-0.010	1.14	1.111	/
Front Side	standard	4Txslots	1:8.3	661/1880	29.50	28.92	0.494	0.080	1.14	0.565	/
Left Edge	standard	4Txslots	1:8.3	661/1880	29.50	28.92	0.214	0.021	1.14	0.245	/
Right Edge	standard	4Txslots	1:8.3	661/1880	29.50	28.92	0.382	-0.130	1.14	0.437	/
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Edge	standard	4Txslots	1:8.3	661/1880	29.50	28.92	0.261	0.000	1.14	0.298	/
Back Side	Repeated	4Txslots	1:8.3	512/1850.2	29.50	28.84	1.010	-0.020	1.16	1.176	/
Note: 1.The value with blue color is the maximum SAR Value of each test band.											
2.When multiple slots are used, SAR should be tested to account for the maximum source-based time-averaged output power.											

**Measurement Variability**

Test Position	Channel/ Frequency(MHz)	MAX Measured SAR <sub>1g</sub> (W/kg)	1 <sup>st</sup> Repeated SAR <sub>1g</sub> (W/kg)	Ratio
Back Side	512/1850.2	1.030	1.010	1.02

Note: 1) 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).

2) 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.



Table 12: UMTS Band II

Test Position	Cover Type	Channel Type	Duty Cycle	Channel/ Frequency (MHz)	Tune-up (dBm)	Measured power (dBm)	Limit of SAR 1.6 W/kg (mW/g)				Plot No.
							Measured SAR <sub>1g</sub>	Power Drift (dB)	Scaling Factor	Report SAR <sub>1g</sub>	
<b>Head SAR</b>											
Left Cheek	standard	RMC 12.2K	1:1	9262/1852.4	24.50	23.87	0.507	0.025	1.16	0.586	/
		RMC 12.2K	1:1	9400/1880	24.50	23.92	0.540	0.090	1.14	0.617	25
		RMC 12.2K	1:1	9538/1907.6	24.50	23.88	0.485	0.050	1.15	0.559	/
Left Tilt	standard	RMC 12.2K	1:1	9400/1880	24.50	23.92	0.221	0.029	1.14	0.253	/
Right Cheek	standard	RMC 12.2K	1:1	9400/1880	24.50	23.92	0.416	-0.040	1.14	0.475	/
Right Tilt	standard	RMC 12.2K	1:1	9400/1880	24.50	23.92	0.321	-0.110	1.14	0.367	/
<b>Body SAR(Distance 10mm)</b>											
Back Side	standard	RMC 12.2K	1:1	9262/1852.4	24.50	23.87	0.709	0.050	1.16	0.820	/
		RMC 12.2K	1:1	9400/1880	24.50	23.92	0.863	0.040	1.14	0.986	26
		RMC 12.2K	1:1	9538/1907.6	24.50	23.88	0.753	0.130	1.15	0.869	/
Front Side	standard	RMC 12.2K	1:1	9400/1880	24.50	23.92	0.545	0.160	1.14	0.623	/
Left Edge	standard	RMC 12.2K	1:1	9400/1880	24.50	23.92	0.063	0.130	1.14	0.072	/
Right Edge	standard	RMC 12.2K	1:1	9400/1880	24.50	23.92	0.796	0.080	1.14	0.910	/
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Edge	standard	RMC 12.2K	1:1	9400/1880	24.50	23.92	0.380	-0.090	1.14	0.434	/
Back Side	Repeated	RMC 12.2K	1:1	9400/1880	24.50	23.92	0.843	0.190	1.14	0.963	/
<p>Note: 1. The value with blue color is the maximum SAR Value of each test band.</p> <p>2. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is <math>\leq \frac{1}{4}</math> 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 <math>\leq 1.2</math> W/kg, SAR measurement is not required for the secondary mode.</p>											

**Measurement Variability**

Test Position	Channel/ Frequency(MHz)	MAX Measured SAR <sub>1g</sub> (W/kg)	1 <sup>st</sup> Repeated SAR <sub>1g</sub> (W/kg)	Ratio
Back Side	9400/1880	0.863	0.843	1.02
<p>Note: 1) A second repeated measurement was preformed only if the ratio of largest to smallest SAR for the original and first repeated measurements was <math>&gt; 1.20</math> or when the original or repeated measurement was <math>\geq 1.45</math> W/kg (~ 10% from the 1-g SAR limit).</p> <p>2) A third repeated measurement was performed only if the original, first or second repeated measurement was <math>\geq 1.5</math> W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is <math>&gt; 1.20</math>.</p>				



Table 13: UMTS Band IV

Test Position	Cover Type	Channel Type	Duty Cycle	Channel/ Frequency (MHz)	Tune-up (dBm)	Measured power (dBm)	Limit of SAR 1.6 W/kg (mW/g)			
							Measured SAR1g	Power Drift (dB)	Scaling Factor	Report SAR1g
<b>Head SAR</b>										
Left Cheek	standard	RMC 12.2K	1:1	1312/1712.4	24.00	23.54	0.426	0.170	1.11	0.474
		RMC 12.2K	1:1	1413/1732.6	24.00	23.51	0.548	0.060	1.12	0.613
		RMC 12.2K	1:1	1513/1752.6	24.00	23.58	0.447	-0.040	1.10	0.492
Left Tilt	standard	RMC 12.2K	1:1	1413/1732.6	24.00	23.51	0.388	-0.050	1.12	0.434
Right Cheek	standard	RMC 12.2K	1:1	1413/1732.6	24.00	23.51	0.518	-0.041	1.12	0.580
Right Tilt	standard	RMC 12.2K	1:1	1413/1732.6	24.00	23.51	0.486	0.010	1.12	0.544
<b>Body SAR(Distance 10mm)</b>										
Back Side	standard	RMC 12.2K	1:1	1312/1712.4	24.00	23.54	0.761	0.150	1.11	0.846
		RMC 12.2K	1:1	1413/1732.6	24.00	23.51	0.764	-0.040	1.12	0.855
		RMC 12.2K	1:1	1513/1752.6	24.00	23.58	0.782	0.040	1.10	0.861
Front Side	standard	RMC 12.2K	1:1	1413/1732.6	24.00	23.51	0.361	-0.170	1.12	0.404
Left Edge	standard	RMC 12.2K	1:1	1413/1732.6	24.00	23.51	0.175	0.034	1.12	0.196
Right Edge	standard	RMC 12.2K	1:1	1413/1732.6	24.00	23.51	0.625	0.010	1.12	0.700
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Edge	standard	RMC 12.2K	1:1	1413/1732.6	24.00	23.51	0.267	-0.050	1.12	0.299

Note: 1.The value with blue color is the maximum SAR Value of each test band.  
2. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is  $\leq \frac{1}{4}$  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  $\leq 1.2$  W/kg, SAR measurement is not required for the secondary mode.



Table 14: UMTS Band V

Test Position	Cover Type	Channel Type	Duty Cycle	Channel/ Frequency (MHz)	Tune-up (dBm)	Measured power (dBm)	Limit of SAR 1.6 W/kg (mW/g)				Plot No.
							Measured SAR1g	Power Drift (dB)	Scaling Factor	Report SAR1g	
<b>Head SAR</b>											
Left Cheek	standard	RMC 12.2K	1:1	4132/826.4	24.50	23.84	0.032	-0.087	1.16	0.037	/
		RMC 12.2K	1:1	4183/836.6	24.50	24.08	0.037	0.024	1.10	0.041	29
		RMC 12.2K	1:1	4233/846.6	24.50	23.90	0.035	0.046	1.15	0.041	/
Left Tilt	standard	RMC 12.2K	1:1	4183/836.6	24.50	24.08	0.013	-0.080	1.10	0.014	/
Right Cheek	standard	RMC 12.2K	1:1	4183/836.6	24.50	24.08	0.025	-0.039	1.10	0.027	/
Right Tilt	standard	RMC 12.2K	1:1	4183/836.6	24.50	24.08	0.008	-0.056	1.10	0.009	/
<b>Body SAR(Distance 10mm)</b>											
Back Side	standard	RMC 12.2K	1:1	4183/836.6	24.50	24.08	0.097	-0.021	1.10	0.107	/
Front Side	standard	RMC 12.2K	1:1	4132/826.4	24.50	23.84	0.093	0.010	1.16	0.108	/
		RMC 12.2K	1:1	4183/836.6	24.50	24.08	0.117	-0.050	1.10	0.129	30
		RMC 12.2K	1:1	4233/846.6	24.50	23.90	0.112	0.038	1.15	0.129	/
Left Edge	standard	RMC 12.2K	1:1	4183/836.6	24.50	24.08	0.036	-0.090	1.10	0.039	/
Right Edge	standard	RMC 12.2K	1:1	4183/836.6	24.50	24.08	0.021	-0.073	1.10	0.023	/
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Edge	standard	RMC 12.2K	1:1	4183/836.6	24.50	24.08	0.075	0.026	1.10	0.083	/
<p>Note: 1. The value with blue color is the maximum SAR Value of each test band.</p> <p>2. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is <math>\leq \frac{1}{4}</math> 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 <math>\leq 1.2</math> W/kg, SAR measurement is not required for the secondary mode.</p>											



Table 15: LTE Band 2 (20MHz)

Test Position	Cover Type	Duty Cycle	RB alloc ation	RB offset	Channel/ Frequency (MHz)	Tune-up (dBm)	Measured power (dBm)	Limit of SAR 1.6 W/kg (mW/g)				Plot No.
								Measured SAR1g	Power Drift (dB)	Scaling Factor	Report SAR1g	
<b>Head SAR (QPSK)</b>												
Left Cheek	standard	1:1	1	50	18700/1860	23.00	22.72	0.323	-0.020	1.07	0.345	/
		1:1	1	50	18900/1880	23.00	22.37	0.331	-0.030	1.16	0.383	31
		1:1	1	50	19100/1900	23.00	22.51	0.327	0.040	1.12	0.366	/
Left Tilt	standard	1:1	1	50	18700/1860	23.00	22.72	0.150	0.031	1.07	0.160	/
Right Cheek	standard	1:1	1	50	18700/1860	23.00	22.72	0.251	0.130	1.07	0.268	/
Right Tilt	standard	1:1	1	50	18700/1860	23.00	22.72	0.229	0.040	1.07	0.244	/
Left Cheek	standard	1:1	50%	0	18700/1860	22.00	21.59	0.252	0.030	1.10	0.277	/
Left Tilt	standard	1:1	50%	0	18700/1860	22.00	21.59	0.116	0.180	1.10	0.127	/
Right Cheek	standard	1:1	50%	0	18700/1860	22.00	21.59	0.196	0.047	1.10	0.215	/
Right Tilt	standard	1:1	50%	0	18700/1860	22.00	21.59	0.174	-0.029	1.10	0.191	/
<b>Body SAR(QPSK, Distance 10mm)</b>												
Back Side	standard	1:1	1	50	18700/1860	23.00	22.72	0.524	0.010	1.07	0.559	/
		1:1	1	50	18900/1880	23.00	22.37	0.713	0.110	1.16	0.824	/
		1:1	1	50	19100/1900	23.00	22.51	0.775	0.040	1.12	0.868	32
Front Side	standard	1:1	1	50	18700/1860	23.00	22.72	0.220	0.142	1.07	0.235	/
Left Edge	standard	1:1	1	50	18700/1860	23.00	22.72	0.136	0.025	1.07	0.145	/
Right Edge	standard	1:1	1	50	18700/1860	23.00	22.72	0.350	0.050	1.07	0.373	/
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Bottom Edge	standard	1:1	1	50	18700/1860	23.00	22.72	0.192	-0.130	1.07	0.205	/
Back Side	standard	1:1	50%	0	18700/1860	22.00	21.59	0.383	0.000	1.10	0.421	/
Front Side	standard	1:1	50%	0	18700/1860	22.00	21.59	0.160	0.032	1.10	0.176	/
Left Edge	standard	1:1	50%	0	18700/1860	22.00	21.59	0.104	0.020	1.10	0.114	/
Right Edge	standard	1:1	50%	0	18700/1860	22.00	21.59	0.257	0.140	1.10	0.282	/
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Bottom Edge	standard	1:1	50%	0	18700/1860	22.00	21.59	0.125	0.050	1.10	0.137	/
Back Side	Standard	1:1	100%	0	18700/1860	22.00	21.52	0.469	0.030	1.12	0.524	/

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

2. For QPSK with 100% RB allocation, SAR is required when and the highest reported SAR for 1 RB and 50% RB allocation in are  $\geq 50\%$  limit(1g).



Table 16: LTE Band 4 (20MHz)

Test Position	Cover Type	Duty Cycle	RB alloc ation	RB offset	Channel/ Frequency (MHz)	Tune-up (dBm)	Measured power (dBm)	Limit of SAR 1.6 W/kg (mW/g)			
								Measured SAR1g	Power Drift (dB)	Scaling Factor	Report SAR1g
<b>Head SAR (QPSK)</b>											
Left Cheek	standard	1:1	1	50	20175/1732.5	23.00	22.64	0.226	0.089	1.09	0.246
Left Tilt	standard	1:1	1	50	20175/1732.5	23.00	22.64	0.119	0.150	1.09	0.129
Right Cheek	standard	1:1	1	50	20050/1720	23.00	22.44	0.337	0.084	1.14	0.383
		1:1	1	50	20175/1732.5	23.00	22.64	0.315	0.022	1.09	0.342
		1:1	1	50	20300/1745	23.00	22.60	0.297	-0.010	1.10	0.326
Right Tilt	standard	1:1	1	50	20175/1732.5	23.00	22.64	0.180	0.023	1.09	0.196
Left Cheek	standard	1:1	50%	0	20050/1720	22.00	21.32	0.218	0.070	1.17	0.255
Left Tilt	standard	1:1	50%	0	20050/1720	22.00	21.32	0.115	0.070	1.17	0.134
Right Cheek	standard	1:1	50%	0	20050/1720	22.00	21.32	0.263	0.040	1.17	0.308
Right Tilt	standard	1:1	50%	0	20050/1720	22.00	21.32	0.174	0.020	1.17	0.203
<b>Body SAR(QPSK, Distance 10mm)</b>											
Back Side	standard	1:1	1	50	20050/1720	23.00	22.44	0.640	0.090	1.14	0.728
		1:1	1	50	20175/1732.5	23.00	22.64	0.633	0.100	1.09	0.688
		1:1	1	50	20300/1745	23.00	22.60	0.696	0.020	1.10	0.763
Front Side	standard	1:1	1	50	20175/1732.5	23.00	22.64	0.253	-0.140	1.09	0.275
Left Edge	standard	1:1	1	50	20175/1732.5	23.00	22.64	0.100	0.100	1.09	0.108
Right Edge	standard	1:1	1	50	20175/1732.5	23.00	22.64	0.418	0.140	1.09	0.454
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Edge	standard	1:1	1	50	20175/1732.5	23.00	22.64	0.185	0.033	1.09	0.201
Back Side	standard	1:1	50%	0	20050/1720	22.00	21.32	0.492	0.020	1.17	0.575
Front Side	standard	1:1	50%	0	20050/1720	22.00	21.32	0.185	0.100	1.17	0.216
Left Edge	standard	1:1	50%	0	20050/1720	22.00	21.32	0.090	0.026	1.17	0.105
Right Edge	standard	1:1	50%	0	20050/1720	22.00	21.32	0.304	0.130	1.17	0.356
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Edge	standard	1:1	50%	0	20050/1720	22.00	21.32	0.144	0.100	1.17	0.168

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

2. For QPSK with 100% RB allocation, SAR is required when and the highest reported SAR for 1 RB and 50% RB allocation in area  $\geq 50\%$  limit(1g).



Table 17: LTE Band 5 (10MHz)

Test Position	Cover Type	Duty Cycle	RB alloc ation	RB offset	Channel/ Frequency (MHz)	Tune-up (dBm)	Measured power (dBm)	Limit of SAR 1.6 W/kg (mW/g)			
								Measured SAR1g	Power Drift (dB)	Scaling Factor	Report SAR1g
<b>Head SAR (QPSK)</b>											
Left Cheek	standard	1:1	1	0	20450/829	23.00	21.98	0.021	0.022	1.26	0.026
		1:1	1	25	20525/836.5	23.00	22.06	0.021	-0.024	1.24	0.026
		1:1	1	25	20600/844	23.00	22.22	0.024	-0.187	1.20	0.029
Left Tilt	standard	1:1	1	25	20600/844	23.00	22.22	0.008	0.041	1.20	0.010
Right Cheek	standard	1:1	1	25	20600/844	23.00	22.22	0.019	-0.116	1.20	0.022
Right Tilt	standard	1:1	1	25	20600/844	23.00	22.22	0.008	0.050	1.20	0.010
Left Cheek	standard	1:1	50%	0	20450/829	22.00	21.06	0.017	-0.062	1.24	0.021
Left Tilt	standard	1:1	50%	0	20450/829	22.00	21.06	0.006	-0.061	1.24	0.008
Right Cheek	standard	1:1	50%	0	20450/829	22.00	21.06	0.009	0.085	1.24	0.012
Right Tilt	standard	1:1	50%	0	20450/829	22.00	21.06	0.005	-0.082	1.24	0.006
<b>Body SAR(QPSK, Distance 10mm)</b>											
Back Side	standard	1:1	1	25	20600/844	23.00	22.22	0.076	-0.010	1.20	0.091
Front Side	standard	1:1	1	0	20450/829	23.00	21.98	0.061	0.043	1.26	0.077
		1:1	1	25	20525/836.5	23.00	22.06	0.077	0.034	1.24	0.096
		1:1	1	25	20600/844	23.00	22.22	0.089	0.056	1.20	0.107
Left Edge	standard	1:1	1	25	20600/844	23.00	22.22	0.021	0.039	1.20	0.025
Right Edge	standard	1:1	1	25	20600/844	23.00	22.22	0.018	0.051	1.20	0.021
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Edge	standard	1:1	1	25	20600/844	23.00	22.22	0.066	0.120	1.20	0.079
Back Side	standard	1:1	50%	0	20450/829	22.00	21.06	0.061	-0.150	1.24	0.076
Front Side	standard	1:1	50%	0	20450/829	22.00	21.06	0.051	0.051	1.24	0.063
Left Edge	standard	1:1	50%	0	20450/829	22.00	21.06	0.015	0.025	1.24	0.019
Right Edge	standard	1:1	50%	0	20450/829	22.00	21.06	0.009	0.069	1.24	0.011
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Edge	standard	1:1	50%	0	20450/829	22.00	21.06	0.039	0.130	1.24	0.049

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

2. For QPSK with 100% RB allocation, SAR is required when and the highest reported SAR for 1 RB and 50% RB allocation in are  $\geq 50\%$  limit(1g).



Table 18: LTE Band 7 (20MHz)

Test Position	Cover Type	Duty Cycle	RB alloc ation	RB offset	Channel/ Frequency (MHz)	Tune-up (dBm)	Measured power (dBm)	Limit of SAR 1.6 W/kg (mW/g)			
								Measured SAR1g	Power Drift (dB)	Scaling Factor	Report SAR1g
<b>Head SAR (QPSK)</b>											
Left Cheek	standard	1:1	1	50	21350/2560	23.00	22.39	0.228	0.146	1.15	0.262
Left Tilt	standard	1:1	1	50	21350/2560	23.00	22.39	0.132	0.053	1.15	0.152
Right Cheek	standard	1:1	1	50	20850/2510	23.00	22.37	0.313	0.051	1.16	0.362
		1:1	1	50	21100/2535	23.00	22.03	0.282	0.103	1.25	0.353
		1:1	1	50	21350/2560	23.00	22.39	0.380	0.061	1.15	0.437
Right Tilt	standard	1:1	1	50	21350/2560	23.00	22.39	0.148	-0.025	1.15	0.170
Left Cheek	standard	1:1	50%	25	21350/2560	22.00	21.06	0.172	-0.122	1.24	0.214
Left Tilt	standard	1:1	50%	25	21350/2560	22.00	21.06	0.108	0.038	1.24	0.134
Right Cheek	standard	1:1	50%	25	21350/2560	22.00	21.06	0.186	-0.056	1.24	0.231
Right Tilt	standard	1:1	50%	25	21350/2560	22.00	21.06	0.017	-0.044	1.24	0.021
<b>Body SAR(QPSK, Distance 10mm)</b>											
Back Side	standard	1:1	1	50	20850/2510	23.00	22.37	0.543	0.021	1.16	0.628
		1:1	1	50	21100/2535	23.00	22.03	0.439	-0.020	1.25	0.549
		1:1	1	50	21350/2560	23.00	22.39	0.444	0.130	1.15	0.511
Front Side	standard	1:1	1	50	21350/2560	23.00	22.39	0.449	0.048	1.15	0.517
Left Edge	standard	1:1	1	50	21350/2560	23.00	22.39	0.117	0.063	1.15	0.135
Right Edge	standard	1:1	1	50	21350/2560	23.00	22.39	0.281	0.160	1.15	0.323
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Edge	standard	1:1	1	50	21350/2560	23.00	22.39	0.245	-0.090	1.15	0.282
Back Side	standard	1:1	50%	25	21350/2560	22.00	21.06	0.328	0.027	1.24	0.407
Front Side	standard	1:1	50%	25	21350/2560	22.00	21.06	0.351	0.040	1.24	0.436
Left Edge	standard	1:1	50%	25	21350/2560	22.00	21.06	0.087	0.027	1.24	0.108
Right Edge	standard	1:1	50%	25	21350/2560	22.00	21.06	0.212	0.040	1.24	0.263
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Edge	standard	1:1	50%	25	21350/2560	22.00	21.06	0.250	-0.110	1.24	0.310

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

2. For QPSK with 100% RB allocation, SAR is required when and the highest reported SAR for 1 RB and 50% RB allocation in area  $\geq 50\%$  limit(1g).



Table 19: LTE Band 12 (10MHz)

Test Position	Cover Type	Duty Cycle	RB alloc ation	RB offset	Channel/ Frequency (MHz)	Tune-up (dBm)	Measured power (dBm)	Limit of SAR 1.6 W/kg (mW/g)			
								Measured SAR1g	Power Drift (dB)	Scaling Factor	Report SAR1g
<b>Head SAR (QPSK)</b>											
Left Cheek	standard	1:1	1	25	23060/704	23.00	22.25	0.029	-0.150	1.19	0.034
		1:1	1	25	23095/707.5	23.00	22.51	0.029	-0.038	1.12	0.033
		1:1	1	25	23130/711	23.00	22.65	0.028	0.023	1.08	0.030
Left Tilt	standard	1:1	1	25	23130/711	23.00	22.65	0.015	-0.020	1.08	0.016
Right Cheek	standard	1:1	1	25	23130/711	23.00	22.65	0.023	0.021	1.08	0.025
Right Tilt	standard	1:1	1	25	23130/711	23.00	22.65	0.015	-0.040	1.08	0.016
Left Cheek	standard	1:1	50%	13	23130/711	22.00	21.08	0.022	0.089	1.24	0.027
Left Tilt	standard	1:1	50%	13	23130/711	22.00	21.08	0.012	0.031	1.24	0.014
Right Cheek	standard	1:1	50%	13	23130/711	22.00	21.08	0.018	0.023	1.24	0.022
Right Tilt	standard	1:1	50%	13	23130/711	22.00	21.08	0.017	0.000	1.24	0.021
<b>Body SAR(QPSK, Distance 10mm)</b>											
Back Side	standard	1:1	1	25	23130/711	23.00	22.65	0.026	-0.050	1.08	0.029
Front Side	standard	1:1	1	25	23130/711	23.00	22.65	0.019	-0.147	1.08	0.020
Left Edge	standard	1:1	1	25	23130/711	23.00	22.65	0.024	0.000	1.08	0.026
Right Edge	standard	1:1	1	25	23130/711	23.00	22.65	0.031	0.120	1.08	0.034
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Edge	standard	1:1	1	25	23130/711	23.00	22.65	0.016	-0.026	1.08	0.017
Back Side	standard	1:1	50%	0	23060/704	22.00	20.97	0.053	-0.020	1.27	0.067
		1:1	50%	13	23095/707.5	22.00	21.06	0.054	0.030	1.24	0.067
		1:1	50%	13	23130/711	22.00	21.08	0.051	0.150	1.24	0.063
Front Side	standard	1:1	50%	13	23130/711	22.00	21.08	0.021	0.010	1.24	0.026
Left Edge	standard	1:1	50%	13	23130/711	22.00	21.08	0.019	-0.060	1.24	0.023
Right Edge	standard	1:1	50%	13	23130/711	22.00	21.08	0.024	-0.190	1.24	0.030
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Edge	standard	1:1	50%	13	23130/711	22.00	21.08	0.012	-0.081	1.24	0.015

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

2. For QPSK with 100% RB allocation, SAR is required when and the highest reported SAR for 1 RB and 50% RB allocation in are  $\geq 50\%$  limit(1g).



Table 20: LTE Band 13 (10MHz)

Test Position	Cover Type	Duty Cycle	RB alloc ation	RB offset	Channel/ Frequency (MHz)	Tune-up (dBm)	Measured power (dBm)	Limit of SAR 1.6 W/kg (mW/g)			
								Measured SAR1g	Power Drift (dB)	Scaling Factor	Report SAR1g
<b>Head SAR (QPSK)</b>											
Left Cheek	standard	1:1	1	25	23230/782	23.00	22.37	0.022	0.025	1.16	0.026
Left Tilt	standard	1:1	1	25	23230/782	23.00	22.37	0.008	-0.078	1.16	0.009
Right Cheek	standard	1:1	1	25	23230/782	23.00	22.37	0.015	0.057	1.16	0.018
Right Tilt	standard	1:1	1	25	23230/782	23.00	22.37	0.009	0.046	1.16	0.010
Left Cheek	standard	1:1	50%	0	23230/782	23.00	21.30	0.018	0.150	1.48	0.027
Left Tilt	standard	1:1	50%	0	23230/782	23.00	21.30	0.005	0.004	1.48	0.008
Right Cheek	standard	1:1	50%	0	23230/782	23.00	21.30	0.012	0.048	1.48	0.018
Right Tilt	standard	1:1	50%	0	23230/782	23.00	21.30	0.007	0.188	1.48	0.010
<b>Body SAR(QPSK, Distance 10mm)</b>											
Back Side	standard	1:1	1	25	23230/782	23.00	22.37	0.051	0.037	1.16	0.058
Front Side	standard	1:1	1	25	23230/782	23.00	22.37	0.047	0.050	1.16	0.054
Left Edge	standard	1:1	1	25	23230/782	23.00	22.37	0.028	0.180	1.16	0.032
Right Edge	standard	1:1	1	25	23230/782	23.00	22.37	0.019	0.150	1.16	0.022
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Edge	standard	1:1	1	25	23230/782	23.00	22.37	0.033	0.110	1.16	0.038
Back Side	standard	1:1	50%	0	23230/782	22.00	21.30	0.037	0.040	1.17	0.044
Front Side	standard	1:1	50%	0	23230/782	22.00	21.30	0.029	0.190	1.17	0.034
Left Edge	standard	1:1	50%	0	23230/782	22.00	21.30	0.021	0.110	1.17	0.025
Right Edge	standard	1:1	50%	0	23230/782	22.00	21.30	0.015	0.160	1.17	0.018
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Edge	standard	1:1	50%	0	23230/782	22.00	21.30	0.026	0.026	1.17	0.030

Note: 1. The value with blue color is the maximum SAR Value of each test band.  
2. For QPSK with 100% RB allocation, SAR is required when and the highest reported SAR for 1 RB and 50% RB allocation in are  $\geq 50\%$  limit(1g).



Table 21: LTE Band 25 (20MHz)

Test Position	Cover Type	Duty Cycle	RB alloc ation	RB offset	Channel/ Frequency (MHz)	Tune-up (dBm)	Measured power (dBm)	Limit of SAR 1.6 W/kg (mW/g)			
								Measured SAR1g	Power Drift (dB)	Scaling Factor	Report SAR1g
<b>Head SAR (QPSK)</b>											
Left Cheek	standard	1:1	1	50	26140/1860	23.50	22.79	0.427	0.028	1.18	0.503
		1:1	1	50	26365/1882.5	23.50	22.81	0.446	0.160	1.17	0.523
		1:1	1	50	26590/1905	23.50	22.77	0.374	0.019	1.18	0.442
Left Tilt	standard	1:1	1	50	26365/1882.5	23.50	22.81	0.209	0.022	1.17	0.245
Right Cheek	standard	1:1	1	50	26365/1882.5	23.50	22.81	0.297	-0.033	1.17	0.348
Right Tilt	standard	1:1	1	50	26365/1882.5	23.50	22.81	0.270	-0.020	1.17	0.316
Left Cheek	standard	1:1	50%	0	26140/1860	22.50	21.80	0.306	0.140	1.17	0.360
Left Tilt	standard	1:1	50%	0	26140/1860	22.50	21.80	0.153	0.060	1.17	0.180
Right Cheek	standard	1:1	50%	0	26140/1860	22.50	21.80	0.208	0.070	1.17	0.244
Right Tilt	standard	1:1	50%	0	26140/1860	22.50	21.80	0.165	0.026	1.17	0.194
<b>Body SAR(QPSK, Distance 10mm)</b>											
Back Side	standard	1:1	1	50	26140/1860	23.50	22.79	0.694	-0.026	1.18	0.817
		1:1	1	50	26365/1882.5	23.50	22.81	0.655	0.021	1.17	0.768
		1:1	1	50	26590/1905	23.50	22.77	0.772	-0.140	1.18	0.913
Front Side	standard	1:1	1	50	26365/1882.5	23.50	22.81	0.311	0.190	1.17	0.365
Left Edge	standard	1:1	1	50	26365/1882.5	23.50	22.81	0.169	0.110	1.17	0.198
Right Edge	standard	1:1	1	50	26365/1882.5	23.50	22.81	0.283	0.043	1.17	0.332
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Edge	standard	1:1	1	50	26365/1882.5	23.50	22.81	0.208	0.070	1.17	0.244
Back Side	standard	1:1	50%	0	26140/1860	22.50	21.80	0.558	0.100	1.17	0.656
Front Side	standard	1:1	50%	0	26140/1860	22.50	21.80	0.255	0.020	1.17	0.300
Left Edge	standard	1:1	50%	0	26140/1860	22.50	21.80	0.112	0.037	1.17	0.132
Right Edge	standard	1:1	50%	0	26140/1860	22.50	21.80	0.277	0.090	1.17	0.325
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Edge	standard	1:1	50%	0	26140/1860	22.50	21.80	0.155	0.070	1.17	0.182
Back Side	standard	1:1	100%	0	26140/1860	22.50	21.72	0.559	-0.030	1.20	0.669

Note: 1. The value with blue color is the maximum SAR Value of each test band.  
2. For QPSK with 100% RB allocation, SAR is required when and the highest reported SAR for 1 RB and 50% RB allocation in are  $\geq 50\%$  limit(1g).



Table 22: LTE Band 26 (15MHz)

Test Position	Cover Type	Duty Cycle	RB alloc ation	RB offset	Channel/ Frequency (MHz)	Tune-up (dBm)	Measured power (dBm)	Limit of SAR 1.6 W/kg (mW/g)			
								Measured SAR1g	Power Drift (dB)	Scaling Factor	Report SAR1g
<b>Head SAR (QPSK)</b>											
Left Cheek	standard	1:1	1	38	26765/821.5	23.50	22.67	0.028	-0.094	1.21	0.034
		1:1	1	74	26865/831.5	23.50	22.87	0.030	-0.150	1.16	0.035
		1:1	1	38	26965/841.5	23.50	22.65	0.031	0.050	1.22	0.037
Left Tilt	standard	1:1	1	74	26865/831.5	23.50	22.87	0.011	-0.026	1.16	0.013
Right Cheek	standard	1:1	1	74	26865/831.5	23.50	22.87	0.024	-0.022	1.16	0.028
Right Tilt	standard	1:1	1	74	26865/831.5	23.50	22.87	0.007	-0.060	1.16	0.008
Left Cheek	standard	1:1	50%	39	26865/831.5	22.50	21.55	0.018	-0.183	1.24	0.022
Left Tilt	standard	1:1	50%	39	26865/831.5	22.50	21.55	0.008	-0.130	1.24	0.010
Right Cheek	standard	1:1	50%	39	26865/831.5	22.50	21.55	0.018	-0.050	1.24	0.022
Right Tilt	standard	1:1	50%	39	26865/831.5	22.50	21.55	0.005	-0.075	1.24	0.007
<b>Body SAR(QPSK, Distance 10mm)</b>											
Back Side	standard	1:1	1	74	26865/831.5	23.50	22.87	0.070	0.024	1.16	0.080
Front Side	standard	1:1	1	38	26765/821.5	23.50	22.67	0.077	0.120	1.21	0.093
		1:1	1	74	26865/831.5	23.50	22.87	0.086	0.190	1.16	0.099
		1:1	1	38	26965/841.5	23.50	22.65	0.103	0.026	1.22	0.125
Left Edge	standard	1:1	1	74	26865/831.5	23.50	22.87	0.018	0.032	1.16	0.021
Right Edge	standard	1:1	1	74	26865/831.5	23.50	22.87	0.016	0.064	1.16	0.018
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Edge	standard	1:1	1	74	26865/831.5	23.50	22.87	0.074	0.020	1.16	0.086
Back Side	standard	1:1	50%	39	26865/831.5	22.50	21.55	0.046	0.024	1.24	0.057
Front Side	standard	1:1	50%	39	26865/831.5	22.50	21.55	0.066	0.130	1.24	0.082
Left Edge	standard	1:1	50%	39	26865/831.5	22.50	21.55	0.014	0.045	1.24	0.018
Right Edge	standard	1:1	50%	39	26865/831.5	22.50	21.55	0.012	0.105	1.24	0.014
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Edge	standard	1:1	50%	39	26865/831.5	22.50	21.55	0.042	0.090	1.24	0.052

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

2. For QPSK with 100% RB allocation, SAR is required when and the highest reported SAR for 1 RB and 50% RB allocation in are  $\geq 50\%$  limit(1g).



Table 23: LTE Band 41 (20MHz)

Test Position	Cover Type	Duty Cycle	RB alloc ation	RB offset	Channel/ Frequency (MHz)	Tune-up (dBm)	Measured power (dBm)	Limit of SAR 1.6 W/kg (mW/g)				Plot No.
								Measured SAR1g	Power Drift (dB)	Scaling Factor	Report SAR1g	
<b>Head SAR (QPSK)</b>												
Left Cheek	standard	1:1.58	1	50	41490/2680	24.50	23.66	0.050	0.055	1.21	0.060	/
Left Tilt	standard	1:1.58	1	50	41490/2680	24.50	23.66	0.026	0.113	1.21	0.032	/
Right Cheek	standard	1:1.58	1	50	40185/2549.5	24.50	23.27	0.105	0.127	1.33	0.139	47
		1:1.58	1	50	41055/2636.5	24.50	23.48	0.088	0.039	1.26	0.112	/
		1:1.58	1	50	41490/2680	24.50	23.66	0.076	0.022	1.21	0.093	/
Right Tilt	standard	1:1.58	1	50	41490/2680	24.50	23.66	0.016	0.028	1.21	0.019	/
Left Cheek	standard	1:1.58	50%	25	41055/2636.5	23.50	22.50	0.043	0.046	1.26	0.055	/
Left Tilt	standard	1:1.58	50%	25	41055/2636.5	23.50	22.50	0.018	0.111	1.26	0.023	/
Right Cheek	standard	1:1.58	50%	25	41055/2636.5	23.50	22.50	0.061	0.064	1.26	0.076	/
Right Tilt	standard	1:1.58	50%	25	41055/2636.5	23.50	22.50	0.014	0.039	1.26	0.018	/
<b>Body SAR(QPSK, Distance 10mm)</b>												
Back Side	standard	1:1.58	1	50	41490/2680	24.50	23.66	0.785	0.142	1.21	0.953	/
Front Side	standard	1:1.58	1	50	41490/2680	24.50	23.66	0.105	0.170	1.21	0.127	/
Left Edge	standard	1:1.58	1	50	41490/2680	24.50	23.66	0.023	0.050	1.21	0.028	/
Right Edge	standard	1:1.58	1	50	41490/2680	24.50	23.66	0.199	0.027	1.21	0.241	/
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Edge	standard	1:1.58	1	50	41490/2680	24.50	23.66	0.335	0.026	1.21	0.406	/
Back Side	standard	1:1.58	50%	0	40185/2549.5	23.50	22.38	0.761	0.028	1.29	0.985	/
		1:1.58	50%	25	41055/2636.5	23.50	22.50	0.897	0.065	1.26	1.129	48
		1:1.58	50%	0	41490/2680	23.50	22.46	0.863	0.054	1.27	1.097	/
Front Side	standard	1:1.58	50%	25	41055/2636.5	23.50	22.50	0.093	0.046	1.26	0.118	/
Left Edge	standard	1:1.58	50%	25	41055/2636.5	23.50	22.50	0.027	0.058	1.26	0.034	/
Right Edge	standard	1:1.58	50%	25	41055/2636.5	23.50	22.50	0.196	0.050	1.26	0.247	/
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Edge	standard	1:1.58	50%	25	41055/2636.5	23.50	22.50	0.258	0.130	1.26	0.325	/
Back Side	Standard	1:1.58	100%	0	41490/2680	23.50	22.31	0.710	0.034	1.32	0.934	/
Back Side	Repeated	1:1.58	50%	25	41055/2636.5	23.50	22.50	0.877	-0.105	1.26	1.104	/

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

2. For QPSK with 100% RB allocation, SAR is required when and the highest reported SAR for 1 RB and 50% RB allocation in are  $\geq$  50% limit(1g).



Measurement Variability				
Test Position	Channel/ Frequency(MHz)	MAX Measured SAR <sub>1g</sub> (W/kg)	1 <sup>st</sup> Repeated SAR <sub>1g</sub> (W/kg)	Ratio
Back Side	41055/2636.5	0.897	0.877	1.02

Note: 1) 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  $\geq$  1.45 W/kg (~ 10% from the 1-g SAR limit).  
2) A third repeated measurement was performed only if the original, first or second repeated measurement was  $\geq$  1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.



Table 24: LTE Band 66 (20MHz)

Test Position	Cover Type	Duty Cycle	RB allocation	RB offset	Channel/ Frequency (MHz)	Tune-up (dBm)	Measured power (dBm)	Limit of SAR 1.6 W/kg (mW/g)			
								Measured SAR1g	Power Drift (dB)	Scaling Factor	Report SAR1g
<b>Head SAR (QPSK)</b>											
Left Cheek	standard	1:1	1	50	132572/1770	23.50	23.11	0.272	-0.030	1.09	0.298
Left Tilt	standard	1:1	1	50	132572/1770	23.50	23.11	0.099	0.029	1.09	0.108
Right Cheek	standard	1:1	1	50	132572/1770	23.50	23.11	0.250	-0.020	1.09	0.273
Right Tilt	standard	1:1	1	50	132572/1770	23.50	23.11	0.162	-0.090	1.09	0.177
Left Cheek	standard	1:1	50%	50	132072/1720	22.50	22.01	0.250	0.021	1.12	0.280
Left Tilt	standard	1:1	50%	50	132072/1720	22.50	22.01	0.143	-0.040	1.12	0.160
Right Cheek	standard	1:1	50%	50	132072/1720	22.50	22.01	0.300	0.074	1.12	0.336
		1:1	50%	50	132322/1745	22.50	21.91	0.248	0.033	1.15	0.284
		1:1	50%	0	132572/1770	22.50	21.88	0.196	0.022	1.15	0.226
Right Tilt	standard	1:1	50%	50	132072/1720	22.50	22.01	0.212	0.160	1.12	0.237
<b>Body SAR(QPSK, Distance 10mm)</b>											
Back Side	standard	1:1	1	50	132072/1720	23.50	22.94	0.595	0.037	1.14	0.677
		1:1	1	50	132322/1745	23.50	22.89	0.632	0.016	1.15	0.727
		1:1	1	50	132572/1770	23.50	23.11	0.674	-0.023	1.09	0.737
Front Side	standard	1:1	1	50	132572/1770	23.50	23.11	0.406	0.030	1.09	0.444
Left Edge	standard	1:1	1	50	132572/1770	23.50	23.11	0.104	0.060	1.09	0.114
Right Edge	standard	1:1	1	50	132572/1770	23.50	23.11	0.424	0.070	1.09	0.464
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Edge	standard	1:1	1	50	132572/1770	23.50	23.11	0.201	0.110	1.09	0.220
Back Side	standard	1:1	50%	50	132072/1720	22.50	22.01	0.503	0.000	1.12	0.563
Front Side	standard	1:1	50%	50	132072/1720	22.50	22.01	0.209	0.040	1.12	0.234
Left Edge	standard	1:1	50%	50	132072/1720	22.50	22.01	0.120	0.110	1.12	0.134
Right Edge	standard	1:1	50%	50	132072/1720	22.50	22.01	0.318	0.020	1.12	0.356
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Edge	standard	1:1	50%	50	132072/1720	22.50	22.01	0.169	-0.040	1.12	0.189

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

2. For QPSK with 100% RB allocation, SAR is required when and the highest reported SAR for 1 RB and 50% RB allocation in are  $\geq$  50% limit(1g).



Table 25: LTE Band 71 (20MHz)

Test Position	Cover Type	Duty Cycle	RB allocation	RB offset	Channel/Frequency (MHz)	Tune-up (dBm)	Measured power (dBm)	Limit of SAR 1.6 W/kg (mW/g)			
								Measured SAR1g	Power Drift (dB)	Scaling Factor	Report SAR1g
<b>Head SAR (QPSK)</b>											
Left Cheek	standard	1:1	1	50	133322/683	23.50	23.10	0.020	0.032	1.10	0.021
Left Tilt	standard	1:1	1	50	133322/683	23.50	23.10	0.011	0.072	1.10	0.012
Right Cheek	standard	1:1	1	50	133222/673	23.50	22.81	0.022	-0.077	1.17	0.026
		1:1	1	50	133322/683	23.50	23.10	<b>0.026</b>	0.034	1.10	<b>0.028</b>
Right Tilt	standard	1:1	1	50	133322/683	23.50	23.10	0.014	0.124	1.10	0.015
Left Cheek	standard	1:1	50%	50	133372/688	22.50	21.86	0.016	0.074	1.16	0.019
Left Tilt	standard	1:1	50%	50	133372/688	22.50	21.86	0.009	0.072	1.16	0.010
Right Cheek	standard	1:1	50%	50	133372/688	22.50	21.86	0.019	0.124	1.16	0.022
Right Tilt	standard	1:1	50%	50	133372/688	22.50	21.86	0.011	0.129	1.16	0.013
<b>Body SAR(QPSK, Distance 10mm)</b>											
Back Side	standard	1:1	1	50	133222/673	23.50	22.81	0.072	0.080	1.17	0.084
		1:1	1	50	133322/683	23.50	23.10	<b>0.077</b>	0.032	1.10	0.084
		1:1	1	50	133372/688	23.50	22.85	0.075	-0.030	1.16	<b>0.087</b>
Front Side	standard	1:1	1	50	133322/683	23.50	23.10	0.023	0.020	1.10	0.025
Left Edge	standard	1:1	1	50	133322/683	23.50	23.10	0.022	0.140	1.10	0.024
Right Edge	standard	1:1	1	50	133322/683	23.50	23.10	0.034	-0.130	1.10	0.038
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Edge	standard	1:1	1	50	133322/683	23.50	23.10	0.014	-0.090	1.10	0.015
Back Side	standard	1:1	50%	50	133372/688	22.50	21.86	0.058	-0.058	1.16	0.068
Front Side	standard	1:1	50%	50	133372/688	22.50	21.86	0.020	0.130	1.16	0.023
Left Edge	standard	1:1	50%	50	133372/688	22.50	21.86	0.021	-0.100	1.16	0.024
Right Edge	standard	1:1	50%	50	133372/688	22.50	21.86	0.029	0.030	1.16	0.033
Top Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bottom Edge	standard	1:1	50%	50	133372/688	22.50	21.86	0.012	-0.140	1.16	0.014

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

2. For QPSK with 100% RB allocation, SAR is required when and the highest reported SAR for 1 RB and 50% RB allocation in are  $\geq$  50% limit(1g).



Table 26: Wi-Fi (2.4G)

Test Position	Cover Type	Mode 802.11b	Duty Cycle	Channel/ Frequency (MHz)	Tune-up dBm)	Measured power (dBm)	Limit of SAR 1.6 W/kg (mW/g)					Plot No.
							Area Scan SAR 1g	Zoom Scan SAR 1g	Power Drift (dB)	Scaling Factor	Report SAR 1g	
<b>Head SAR</b>												
Left Cheek	standard	DSSS	97.0%	1/2412	17.00	16.39	0.095	0.101	0.055	1.19	0.120	/
Left Tilt	standard	DSSS	97.0%	1/2412	17.00	16.39	0.113	0.118	0.033	1.19	0.140	/
Right Cheek	standard	DSSS	97.0%	1/2412	17.00	16.39	0.170	0.187	0.072	1.19	0.222	/
		DSSS	97.0%	6/2437	17.00	15.66	0.155	0.175	0.023	1.40	0.245	/
		DSSS	97.0%	11/2462	17.00	16.30	0.179	0.207	0.037	1.21	0.251	53
Right Tilt	standard	DSSS	97.0%	1/2412	17.00	16.39	0.115	0.115	0.029	1.19	0.136	/
<b>Body-worn SAR (Distance 15mm)</b>												
Back Side	standard	DSSS	97.0%	1/2412	17.00	16.39	0.013	0.012	0.050	1.19	0.015	/
Front Side	standard	DSSS	97.0%	1/2412	17.00	16.39	0.014	0.014	-0.110	1.19	0.016	/
		DSSS	97.0%	6/2437	17.00	15.66	0.013	0.013	0.068	1.40	0.018	/
		DSSS	97.0%	11/2462	17.00	16.30	0.018	0.019	-0.036	1.21	0.023	54
<b>Body SAR(Distance 10mm)</b>												
Back Side	standard	DSSS	97.0%	1/2412	17.00	16.39	0.020	0.020	-0.190	1.24	0.024	/
Front Side	standard	DSSS	97.0%	1/2412	17.00	16.39	0.026	0.029	0.035	1.19	0.034	/
Left Edge	standard	DSSS	97.0%	1/2412	17.00	16.39	0.085	0.088	0.080	1.19	0.104	/
		DSSS	97.0%	6/2437	17.00	15.66	0.074	0.074	-0.030	1.40	0.103	/
		DSSS	97.0%	11/2462	17.00	16.30	0.103	0.105	-0.190	1.21	0.127	55
Right Edge	standard	DSSS	97.0%	1/2412	17.00	16.39	0.009	0.008	-0.190	1.19	0.009	/
Top Edge	standard	DSSS	97.0%	1/2412	17.00	16.39	0.031	0.031	0.032	1.19	0.037	/
Bottom Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Note: 1. The value with blue color is the maximum SAR Value of each test band.												

MAX Adjusted SAR							
Mode	Test Position	Channel/ Frequency (MHz)	MAX Reported SAR <sub>1g</sub> (W/kg)	802.11b Tune-up limit (dBm)	Tune-up limit (dBm)	Scaling Factor	Adjusted SAR <sub>1g</sub> (W/kg)
802.11g	Right Cheek	1/2412	0.251	17.00	17.00	1.00	0.251
802.11n HT20	Right Cheek	1/2412	0.251	17.00	15.00	0.63	0.158

Note: SAR is not required for OFDM when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

**Table 27: Wi-Fi (5G,U-NII-2A)**

Per 248227, for band U-NII-1 and U-NII-2A, when the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. If the highest reported SAR for a test configuration is  $\leq 1.2$  W/kg, SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition); otherwise, each band is tested independently for SAR.

Test Position	Cover Type	Mode 802.11n HT40	Duty Cycle	Channel/ Frequency (MHz)	Tune-up dBm)	Measured power (dBm)	Limit of SAR 1.6 W/kg (mW/g)					Plot No.
							Area Scan SAR 1g	Zoom Scan SAR 1g	Power Drift (dB)	Scaling Factor	Report SAR 1g	
<b>Head SAR</b>												
Left Cheek	standard	OFDM	76.0%	54/5270	15.00	14.50	0.052	0.034	-0.190	1.48	0.049	/
Left Tilt	standard	OFDM	76.0%	54/5270	15.00	14.50	0.060	0.055	0.046	1.48	0.081	/
Right Cheek	standard	OFDM	76.0%	54/5270	15.00	14.50	0.056	0.050	0.000	1.48	0.073	/
Right Tilt	standard	OFDM	76.0%	54/5270	15.00	14.50	0.061	0.055	0.150	1.48	0.081	56
		OFDM	76.0%	62/5310	15.00	14.37	0.053	0.035	-0.160	1.52	0.052	/
<b>Body-worn SAR (Distance 15mm)</b>												
Back Side	standard	OFDM	76.0%	54/5270	15.00	14.50	0.031	0.022	0.000	1.48	0.032	57
		OFDM	76.0%	62/5310	15.00	14.37	0.018	0.015	0.000	1.52	0.022	/
Front Side	standard	OFDM	76.0%	54/5270	15.00	14.50	0.016	0.008	0.000	1.48	0.011	/

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



Table 28: Wi-Fi (5G,U-NII-2C)

Test Position	Cover Type	Mode 802.11n HT40	Duty Cycle	Channel/ Frequency (MHz)	Tune-up dBm	Measured power (dBm)	Limit of SAR 1.6 W/kg (mW/g)					Plot No.
							Area Scan SAR 1g	Zoom Scan SAR 1g	Power Drift (dB)	Scaling Factor	Report SAR 1g	
<b>Head SAR</b>												
Left Cheek	standard	OFDM	76.0%	134/5670	14.50	14.15	0.010	0.014	0.110	1.43	0.020	/
Left Tilt	standard	OFDM	76.0%	134/5670	14.50	14.15	0.021	0.015	-0.030	1.43	0.022	/
Right Cheek	standard	OFDM	76.0%	134/5670	14.50	14.15	0.009	0.016	0.170	1.43	0.022	/
Right Tilt	standard	OFDM	76.0%	102/5510	14.50	14.03	0.014	0.014	0.150	1.47	0.020	/
		OFDM	76.0%	110/5550	14.50	14.06	0.023	0.017	0.110	1.46	0.025	/
		OFDM	76.0%	118/5590	14.50	14.13	0.021	0.019	0.190	1.43	0.027	58
		OFDM	76.0%	134/5670	14.50	14.15	0.027	0.016	0.020	1.43	0.023	/
<b>Body-worn SAR (Distance 15mm)</b>												
Back Side	standard	OFDM	76.0%	102/5510	14.50	14.03	0.017	0.010	0.000	1.47	0.015	/
		OFDM	76.0%	110/5550	14.50	14.06	0.020	0.012	0.000	1.46	0.017	/
		OFDM	76.0%	118/5590	14.50	14.13	0.021	0.014	0.000	1.43	0.021	/
		OFDM	76.0%	134/5670	14.50	14.15	0.035	0.030	-0.057	1.43	0.043	59
Front Side	standard	OFDM	76.0%	134/5670	14.50	14.15	0.002	0.004	0.000	1.43	0.005	/

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



Table 29: Wi-Fi (5G,U-NII-3)

Test Position	Cover Type	Mode 802.11n HT40	Duty Cycle	Channel/ Frequency (MHz)	Tune-up dBm)	Measured power (dBm)	Limit of SAR 1.6 W/kg (mW/g)					Plot No.
							Area Scan SAR 1g	Zoom Scan SAR 1g	Power Drift (dB)	Scaling Factor	Report SAR 1g	
<b>Head SAR</b>												
Left Cheek	standard	OFDM	76.0%	151/5755	14.50	14.44	0.017	0.016	0.010	1.33	0.021	/
		OFDM	76.0%	159/5795	14.50	14.24	0.032	0.018	0.000	1.40	0.024	60
Left Tilt	standard	OFDM	76.0%	151/5755	14.50	14.44	0.013	0.015	0.170	1.33	0.020	/
Right Cheek	standard	OFDM	76.0%	151/5755	14.50	14.44	0.008	0.015	0.000	1.33	0.020	/
Right Tilt	standard	OFDM	76.0%	151/5755	14.50	14.44	0.028	0.015	-0.320	1.33	0.020	/
<b>Body-worn SAR (Distance 15mm)</b>												
Back Side	standard	OFDM	76.0%	151/5755	14.50	14.44	0.041	0.039	0.000	1.33	0.052	/
		OFDM	76.0%	159/5795	14.50	14.24	0.057	0.053	0.000	1.40	0.074	61
Front Side	standard	OFDM	76.0%	151/5755	14.50	14.44	0.005	0.007	0.000	1.33	0.010	/

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



Table 30: BT

Band	Configuration	Frequency (MHz)	Maximum Power (dBm)	Separation Distance (mm)	Estimated SAR (W/kg)
Bluetooth	Head	2480	9.5	5	0.374
	Body-worn	2480	9.5	15	0.125
	Hotspot	2480	9.5	10	0.187

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)]·[ $\sqrt{f(\text{GHz})/x}$ ] W/kg  
for test separation distances  $\leq$  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
GSM + Bluetooth	Yes	Yes	Yes
WCDMA + Bluetooth	Yes	Yes	Yes
LTE + Bluetooth	Yes	Yes	Yes
GSM + Wi-Fi-2.4GHz	Yes	Yes	Yes
WCDMA + Wi-Fi-2.4GHz	Yes	Yes	Yes
LTE + Wi-Fi-2.4GHz	Yes	Yes	Yes
GSM + Wi-Fi-5GHz	Yes	Yes	N/A
WCDMA + Wi-Fi-5GHz	Yes	Yes	N/A
LTE + Wi-Fi-5GHz	Yes	Yes	N/A
Wi-Fi-2.4GHz + Bluetooth	N/A	N/A	N/A
Wi-Fi-5GHz + Bluetooth	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 =  $(\text{SAR1} + \text{SAR2})^{1.5} / (\text{min. separation distance, mm})$ , and the peak separation distance is determined from the square root of  $[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$ , where  $(x_1, y_1, z_1)$  and  $(x_2, y_2, z_2)$  are the coordinates of the extrapolated peak SAR locations in the zoom scan.
  - iii) If SPLSR  $\leq 0.04$ , simultaneously transmission SAR measurement is not necessary.

The maximum SAR<sub>1g</sub> Value for Main-Antenna

SAR <sub>1g</sub> (W/kg)	GSM 850	GSM 1900	WCDMA 2	WCDMA 4	WCDMA 5	LTE 2	LTE 4	LTE 5	LTE 7	LTE 12	LTE 13	LTE 25	LTE26	LTE41	LTE66	LTE 71	MAX. SAR <sub>1g</sub>	
<b>Test Position</b>																		
<b>Left Cheek</b>	0.057	0.230	0.617	0.613	0.041	0.383	0.255	0.029	0.262	0.034	0.027	0.523	0.037	0.060	0.298	0.021	0.617	
<b>Left Tilt</b>	0.019	0.176	0.253	0.434	0.014	0.160	0.134	0.010	0.152	0.016	0.009	0.245	0.013	0.032	0.160	0.012	0.434	
<b>Right Cheek</b>	0.044	0.314	0.475	0.580	0.027	0.268	0.383	0.022	0.437	0.025	0.018	0.348	0.028	0.139	0.336	0.028	0.58	
<b>Right Tilt</b>	0.014	0.122	0.367	0.544	0.009	0.244	0.203	0.010	0.170	0.021	0.010	0.316	0.008	0.019	0.237	0.015	0.544	
<b>Body worn</b>	<b>Back Side</b>	0.074	0.156	0.986	0.861	0.107	0.868	0.763	0.091	0.628	0.067	0.058	0.913	0.080	1.129	0.737	0.087	1.129
	<b>Front Side</b>	0.090	0.085	0.623	0.404	0.129	0.235	0.275	0.107	0.517	0.026	0.054	0.365	0.125	0.127	0.444	0.025	0.623
<b>Hotspot</b>	<b>Back Side</b>	0.443	1.199	0.986	0.861	0.107	0.868	0.763	0.091	0.628	0.067	0.058	0.913	0.080	1.129	0.737	0.087	1.199
	<b>Front Side</b>	0.552	0.565	0.623	0.404	0.129	0.235	0.275	0.107	0.517	0.026	0.054	0.365	0.125	0.127	0.444	0.025	0.623
	<b>Left Edge</b>	0.161	0.245	0.072	0.196	0.039	0.145	0.108	0.025	0.135	0.026	0.032	0.198	0.021	0.034	0.134	0.024	0.245
	<b>Right Edge</b>	0.183	0.437	0.910	0.700	0.023	0.373	0.454	0.021	0.323	0.034	0.022	0.332	0.018	0.247	0.464	0.038	0.91
	<b>Top Edge</b>	N/A	N/A	N/A	N/A	N/A	N/A	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	
	<b>Bottom Edge</b>	0.410	0.298	0.434	0.299	0.083	0.205	0.201	0.079	0.310	0.017	0.038	0.244	0.086	0.406	0.220	0.015	0.434

**About BT and Main- Antenna**

Test Position		Main-antenna	BT	MAX. $\Sigma$ SAR <sub>1g</sub>
Left, Cheek		0.617	0.374	0.991
Left, Tilt		0.434	0.374	0.808
Right, Cheek		0.580	0.374	0.954
Right, Tilt		0.544	0.374	0.918
Body worn	Back Side	1.129	0.125	1.254
	Front Side	0.623	0.125	0.748
Hotspot	Back Side	1.199	0.187	1.386
	Front Side	0.623	0.187	0.810
	Left Edge	0.245	0.187	0.432
	Right Edge	0.910	0.187	1.097
	Top Edge	0	0.187	0.187
	Bottom Edge	0.434	0.187	0.621

Note: 1.The value with blue color is the maximum  $\Sigma$ SAR<sub>1g</sub>Value.2.MAX.  $\Sigma$ SAR<sub>1g</sub>=Unlicensed SAR<sub>MAX</sub> +Licensed SAR<sub>MAX</sub>

MAX.  $\Sigma$ SAR<sub>1g</sub> =1.386 W/kg<1.6W/kg, so the Simultaneous transimition SAR with volum scan are not required for BT and Main-Antenna.

**About Wi-Fi and Main-Antenna**

Test Position		Main-antenna	Wi-Fi 2.4G	Wi-Fi (U-NII-2A)	Wi-Fi (U-NII-2C)	Wi-Fi (U-NII-3)	MAX. $\Sigma$ SAR <sub>1g</sub>
Left, Cheek		0.617	0.120	0.049	0.020	0.024	0.737
Left, Tilt		0.434	0.140	0.081	0.022	0.020	0.574
Right, Cheek		0.580	0.251	0.073	0.022	0.020	0.831
Right, Tilt		0.544	0.136	0.081	0.027	0.020	0.680
Body worn	Back Side	1.129	0.015	0.032	0.043	0.074	1.203
	Front Side	0.623	0.023	0.011	0.005	0.010	0.646
Hotspot	Back Side	1.199	0.024	N/A	N/A	N/A	1.223
	Front Side	0.623	0.034	N/A	N/A	N/A	0.657
	Left Edge	0.245	0.127	N/A	N/A	N/A	0.372
	Right Edge	0.910	0.009	N/A	N/A	N/A	0.919
	Top Edge	0	0.037	N/A	N/A	N/A	0.037
	Bottom Edge	0.434	N/A	N/A	N/A	N/A	0.434

Note: 1.The value with blue color is the maximum  $\Sigma$ SAR<sub>1g</sub> Value.2.MAX.  $\Sigma$ SAR<sub>1g</sub>=Unlicensed SAR<sub>MAX</sub> +Licensed SAR<sub>MAX</sub>

MAX.  $\Sigma$ SAR<sub>1g</sub> =1.223 W/kg<1.6W/kg, so the Simultaneous transimition SAR with volum scan are not required for Wi-Fi and Main-Antenna.



## 11 Measurement Uncertainty

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

## ANNEX A: Test Layout

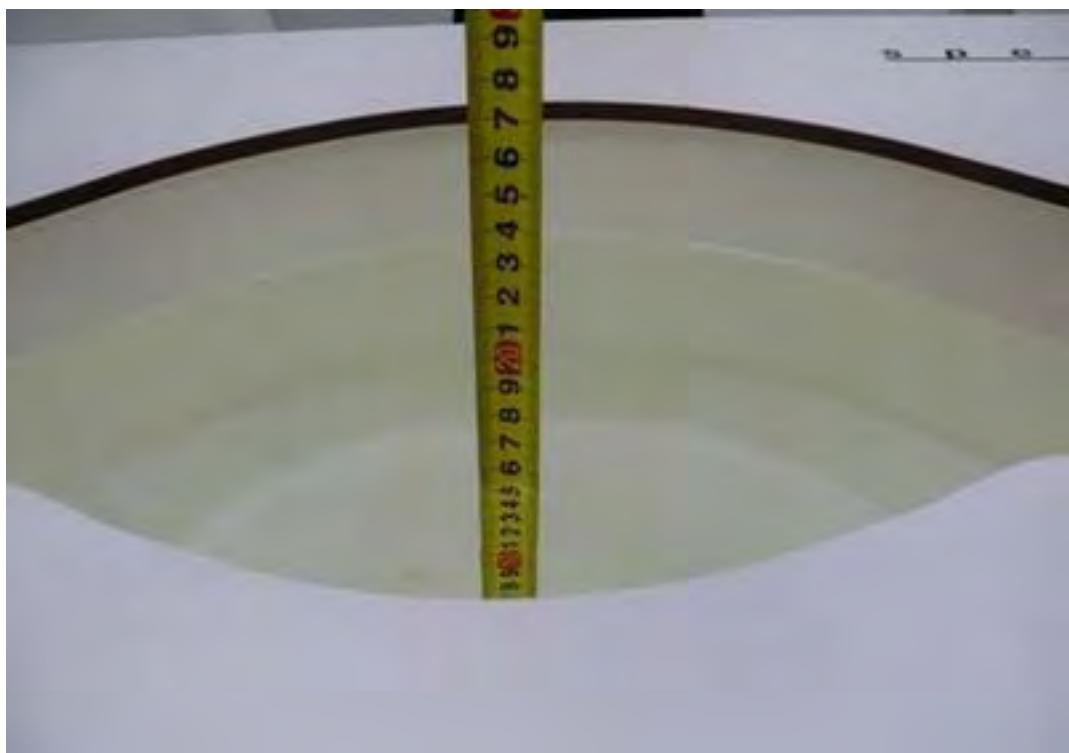


### Tissue Simulating Liquids

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



Picture 3: liquid depth in the head Phantom



Picture 4: Liquid depth in the flat Phantom

## ANNEX B: System Check Results

### Plot 1 System Performance Check at 750 MHz Head TSL

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3

Date: 5/20/2019

Communication System:CW (0); Frequency: 750 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 750$  MHz;  $\sigma = 0.88$  S/m;  $\epsilon_r = 42.3$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(9.50, 9.50, 9.50); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**d=15mm,Pin=250mW/Area Scan (41x121x1):** Interpolated grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 2.29 W/kg

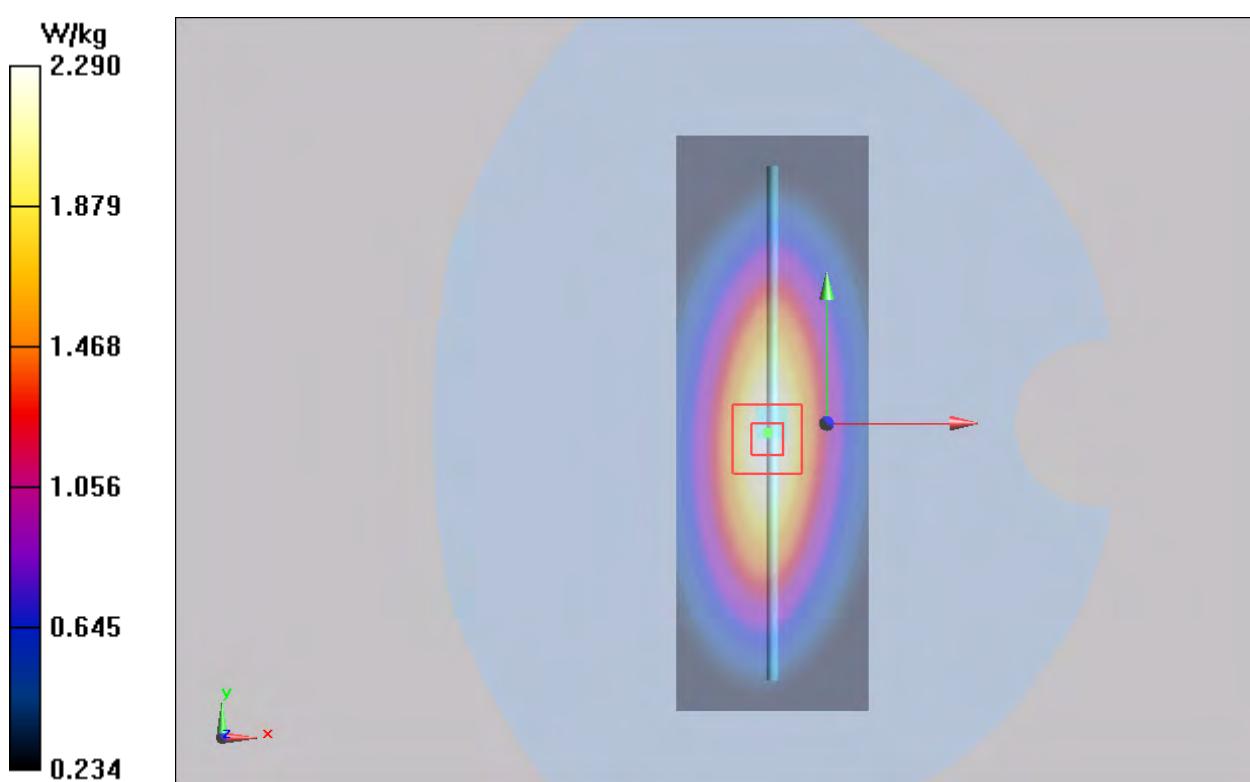
**d=15mm,Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 50.653 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 3.16 W/kg

**SAR(1 g) = 2.13 W/kg; SAR(10 g) = 1.41 W/kg**

Maximum value of SAR (measured) = 2.29 W/kg



## Plot 2 System Performance Check at 750 MHz Body TSL

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3

Date: 5/31/2019

Communication System: CW (0); Frequency: 750 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 750 \text{ MHz}$ ;  $\sigma = 0.95 \text{ S/m}$ ;  $\epsilon_r = 56.9$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(9.19, 9.19, 9.19); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**d=15mm, Pin=250mW/Area Scan (41x121x1):** Interpolated grid: dx=15mm, dy=15mm

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

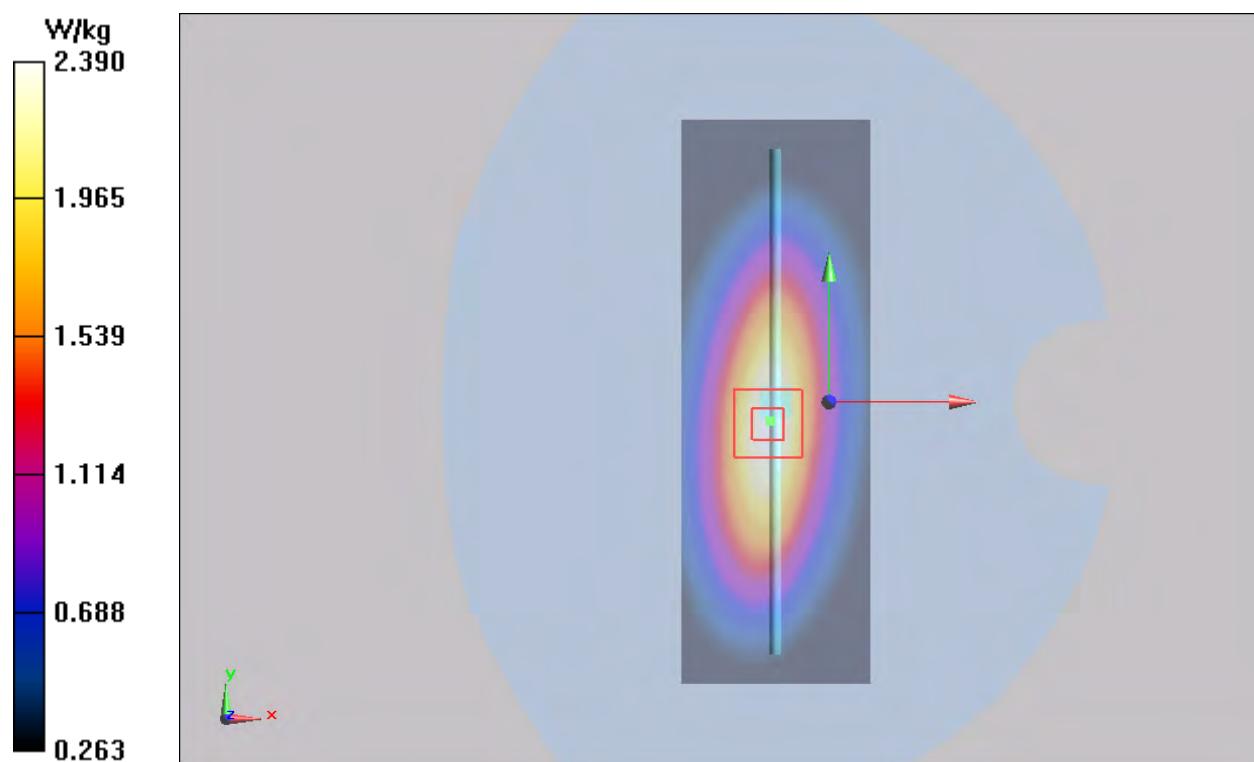
**d=15mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 48.998 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 3.24 W/kg

**SAR(1 g) = 2.22 W/kg; SAR(10 g) = 1.49 W/kg**

Maximum value of SAR (measured) = 2.39 W/kg



### Plot 3 System Performance Check at 835 MHz Head TSL

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

Date: 5/17/2019

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

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.88 \text{ S/m}$ ;  $\epsilon_r = 41.4$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(9.08, 9.08, 9.08); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**d=15mm, Pin=250mW/Area Scan (41x121x1):** Measurement grid: dx=15mm, dy=15mm

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

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

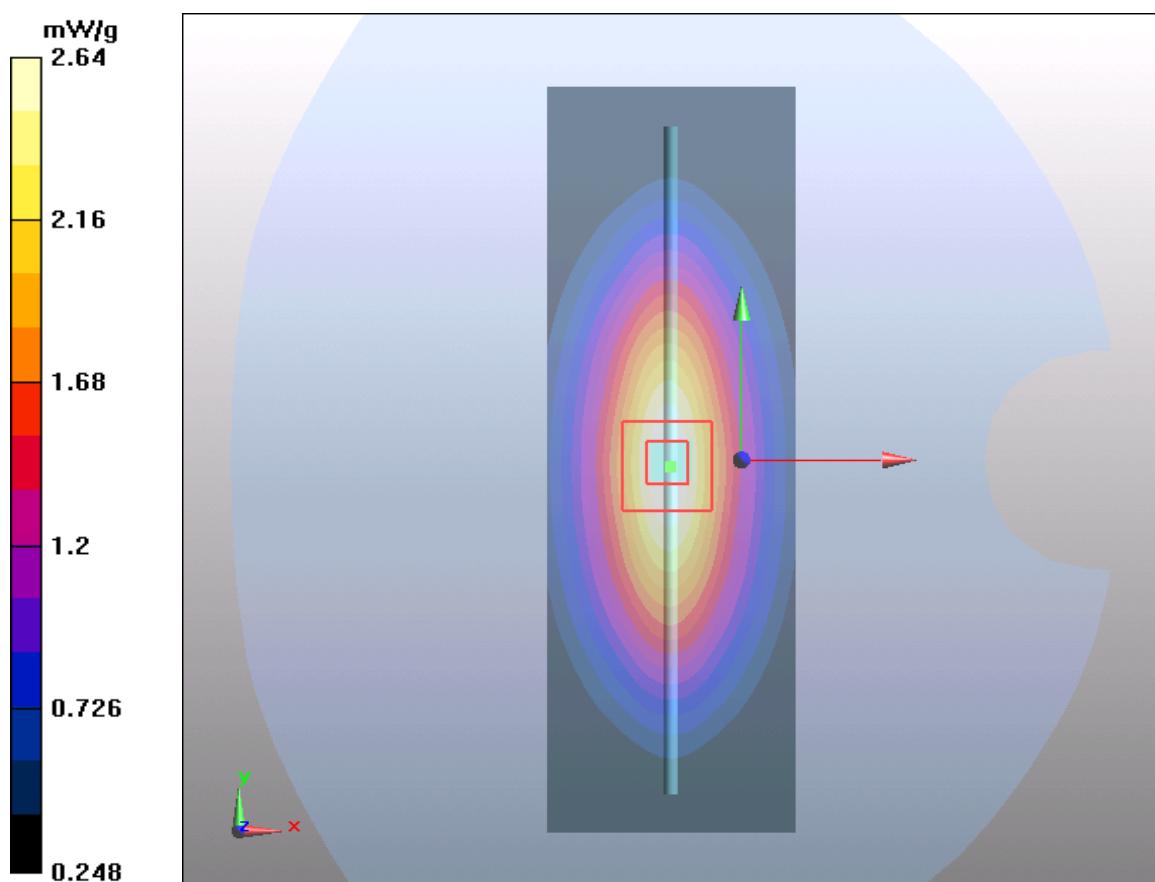
dz=5mm

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 4 System Performance Check at 835 MHz Body TSL

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

Date: 5/23/2019

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

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.96 \text{ S/m}$ ;  $\epsilon_r = 54.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(9.04, 9.04, 9.04); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**d=15mm, Pin=250mW/Area Scan (41x121x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 2.58 mW/g

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

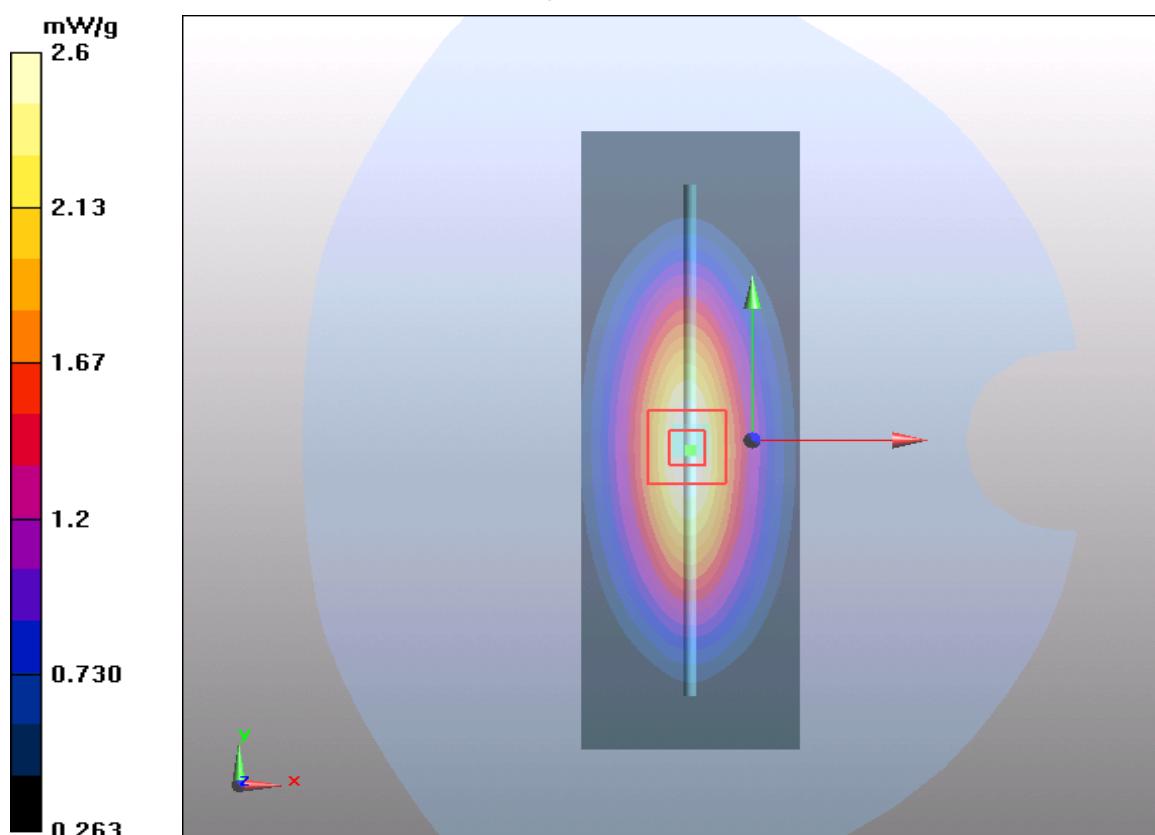
dz=5mm

Reference Value = 51.9 V/m; Power Drift = -0.058 dB

Peak SAR (extrapolated) = 3.5 W/kg

**SAR(1 g) = 2.41 mW/g; SAR(10 g) = 1.6 mW/g**

Maximum value of SAR (measured) = 2.6 mW/g



## Plot 5 System Performance Check at 1750 MHz Head TSL

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2

Date: 5/21/2019

Communication System: CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1750 \text{ MHz}$ ;  $\sigma = 1.34 \text{ S/m}$ ;  $\epsilon_r = 40.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(8.10, 8.10, 8.10); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**d=10mm, Pin=250mW/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 9.78 mW/g

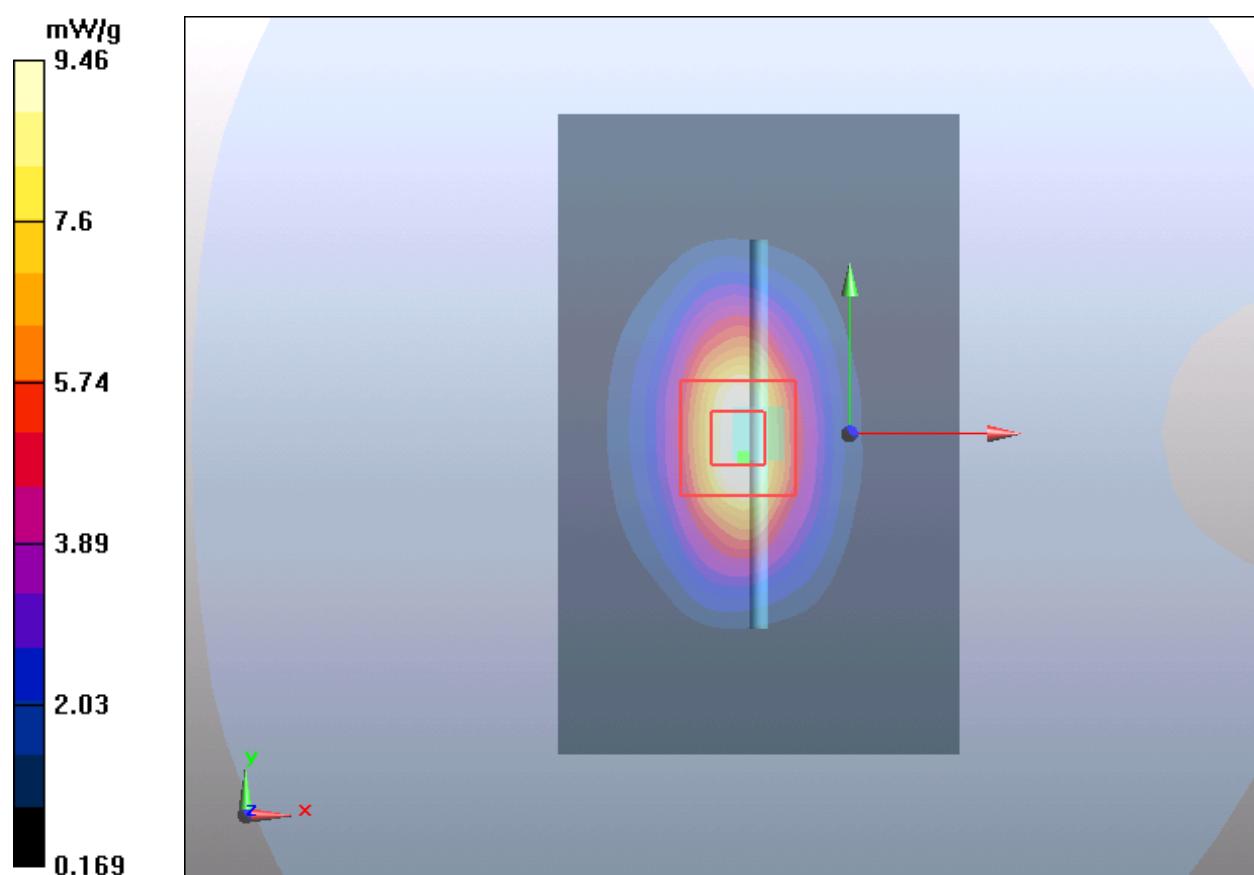
**d=10mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 80 V/m; Power Drift = 0.075 dB

Peak SAR (extrapolated) = 15.5 W/kg

**SAR(1 g) = 8.95 mW/g; SAR(10 g) = 4.5 mW/g**

Maximum value of SAR (measured) = 9.46 mW/g



## Plot 6 System Performance Check at 1750 MHz Body TSL

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2

Date: 6/3/2019

Communication System: CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1750 \text{ MHz}$ ;  $\sigma = 1.46 \text{ S/m}$ ;  $\epsilon_r = 51.9$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.7 °C

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(7.68, 7.68, 7.68); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**d=10mm, Pin=250mW/Area Scan (51x81x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 10.6 mW/g

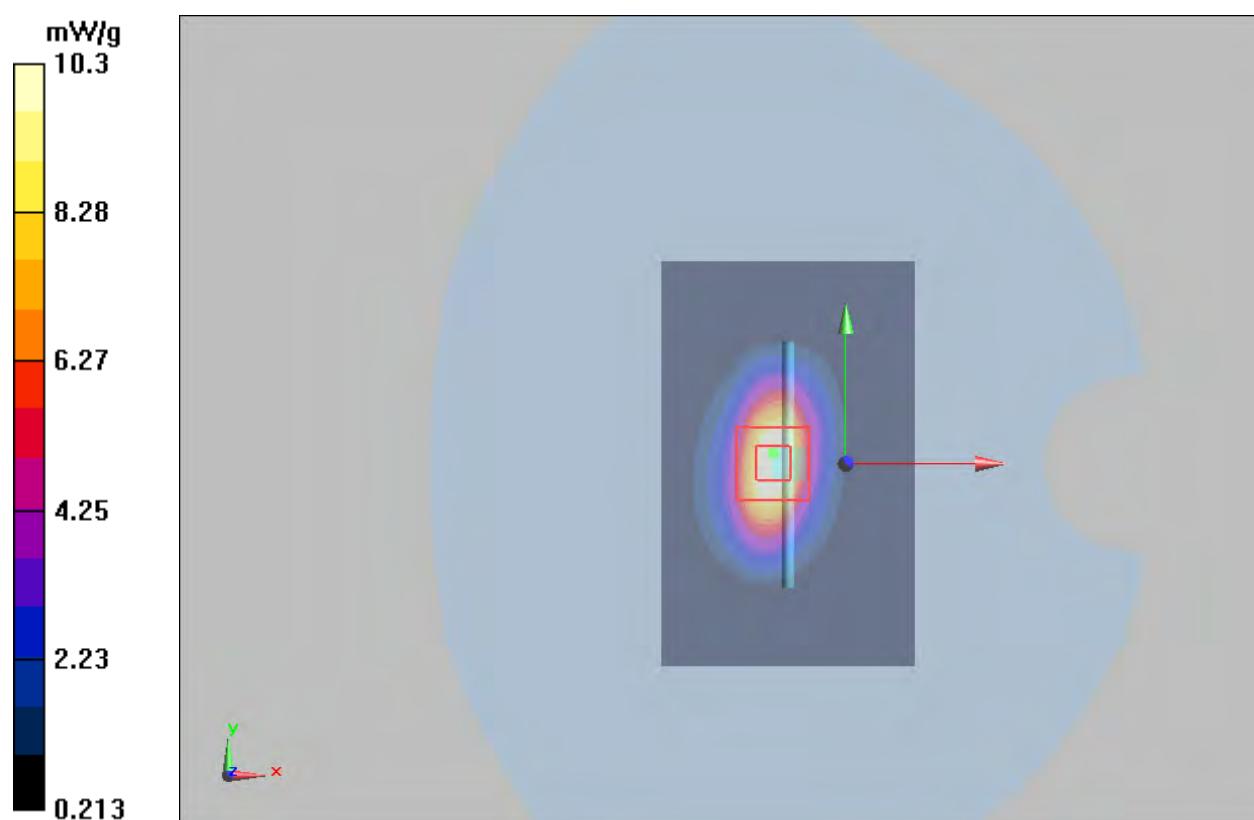
**d=10mm, Pin=250mW/Area Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 77.7 V/m; Power Drift = 0.097 dB

Peak SAR (extrapolated) = 16.8 W/kg

**SAR(1 g) = 9.24 mW/g; SAR(10 g) = 4.9 mW/g**

Maximum value of SAR (measured) = 10.3 mW/g



## Plot 7 System Performance Check at 1900 MHz Head TSL

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

Date: 6/13/2019

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

Medium parameters used:  $f = 1900 \text{ MHz}$ ;  $\sigma = 1.41 \text{ S/m}$ ;  $\epsilon_r = 40.1$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(7.78, 7.78, 7.78); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**d=10mm, Pin=250mW/Area Scan (41x71x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 11.3 mW/g

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

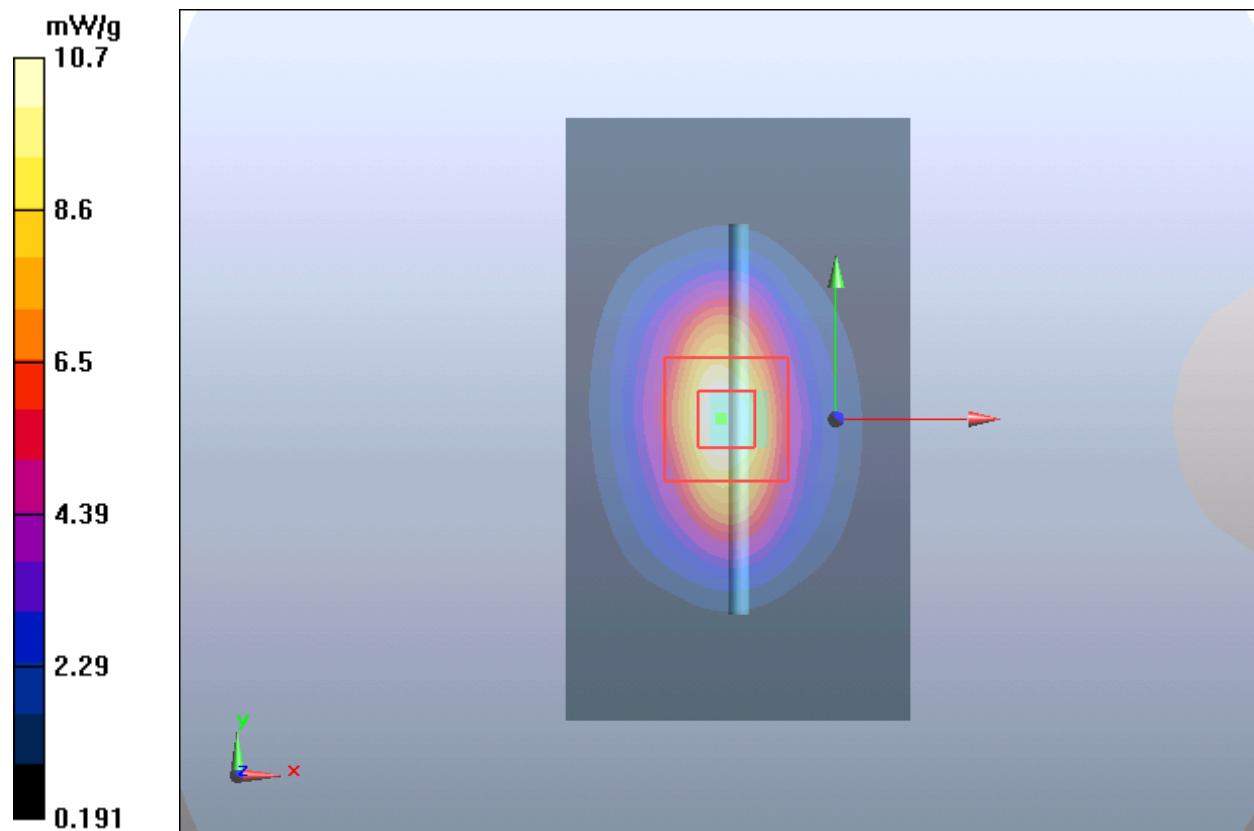
dz=5mm

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 8 System Performance Check at 1900 MHz Body TSL

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

Date: 5/19/2019

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

Medium parameters used:  $f = 1900 \text{ MHz}$ ;  $\sigma = 1.51 \text{ S/m}$ ;  $\epsilon_r = 52.6$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(7.37, 7.37, 7.37); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**d=10mm, Pin=250mW/Area Scan (41x71x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 12.2 mW/g

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

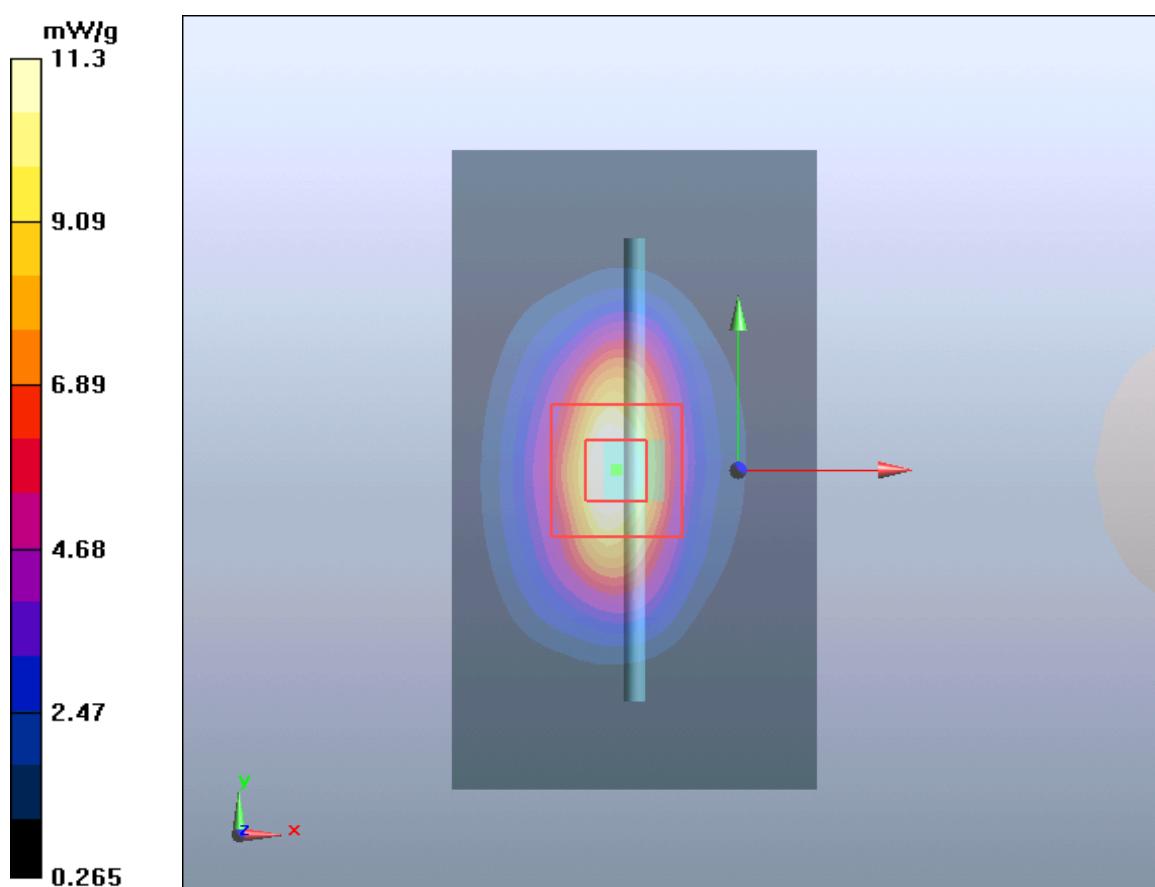
dz=5mm

Reference Value = 82.3 V/m; Power Drift = 0.068 dB

Peak SAR (extrapolated) = 17.8 W/kg

**SAR(1 g) = 9.93 mW/g; SAR(10 g) = 5.25 mW/g**

Maximum value of SAR (measured) = 11.3 mW/g



## Plot 9 System Performance Check at 2450 MHz Head TSL

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

Date: 6/25/2019

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

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.81 \text{ S/m}$ ;  $\epsilon_r = 38.6$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(7.08, 7.08, 7.08); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**d=10mm, Pin=250mW/Area Scan (41x71x1):** Measurement grid: dx=12mm, dy=12mm

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

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

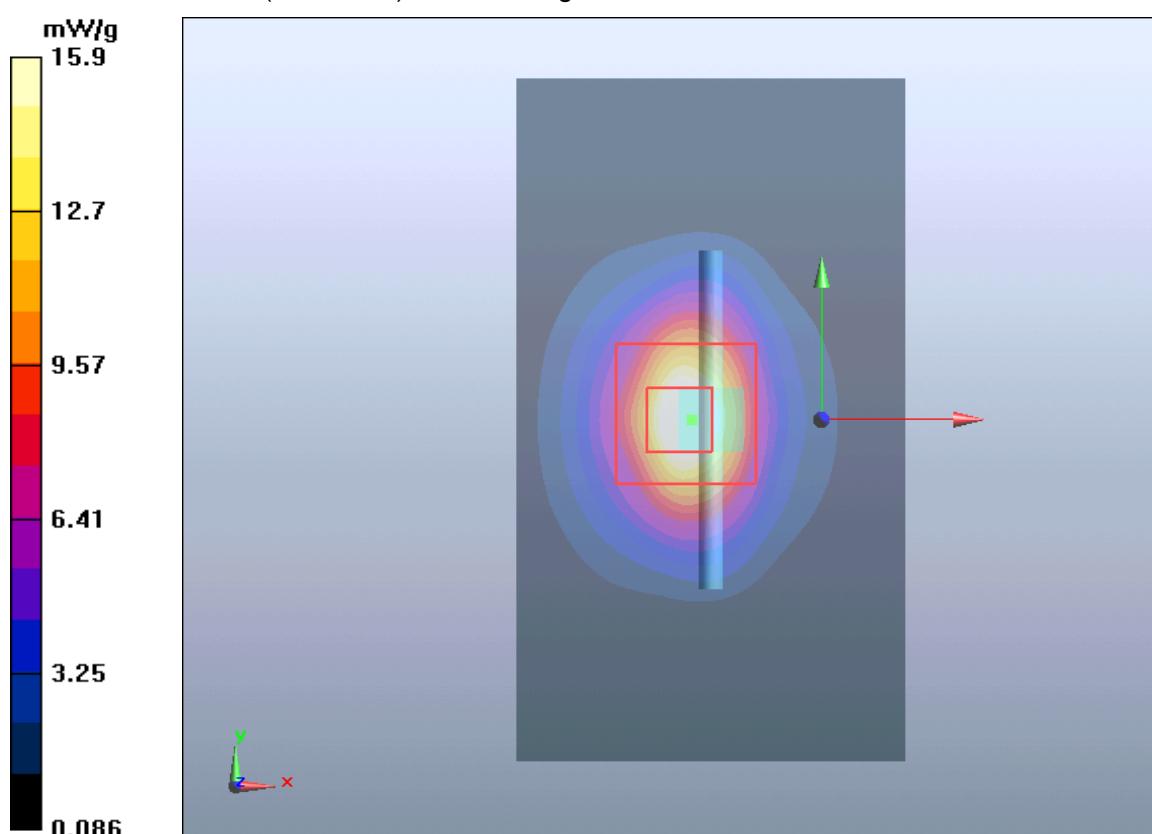
dz=5mm

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 10 System Performance Check at 2450 MHz Body TSL

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

Date: 6/25/2019

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

Medium parameters used:  $f = 2450 \text{ MHz}$ ;  $\sigma = 1.98 \text{ S/m}$ ;  $\epsilon_r = 52.5$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(7.19, 7.19, 7.19); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**d=10mm, Pin=250mW/Area Scan (41x71x1):** Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (interpolated) = 16 mW/g

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

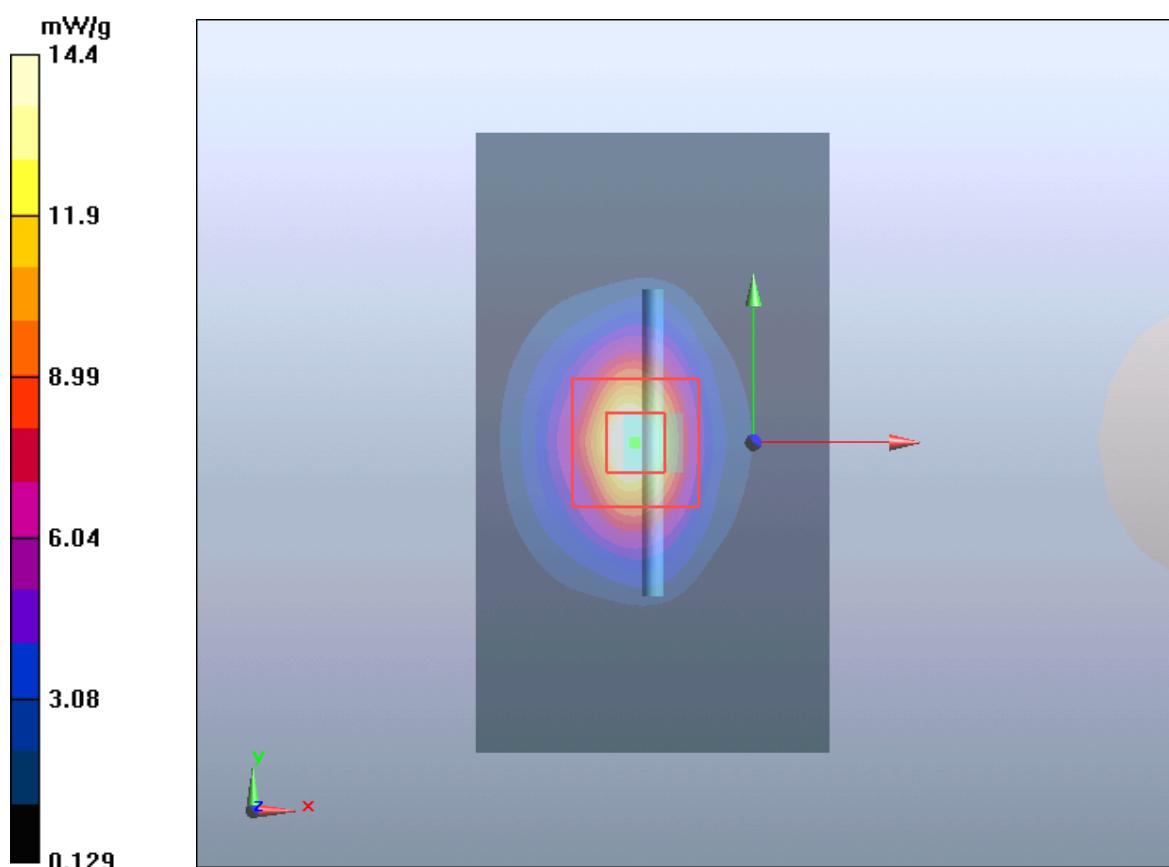
dz=5mm

Reference Value = 81.2 V/m; Power Drift = 0.003 dB

Peak SAR (extrapolated) = 25.4 W/kg

**SAR(1 g) = 12.5 mW/g; SAR(10 g) = 6.20 mW/g**

Maximum value of SAR (measured) = 14.4 mW/g



## Plot 11 System Performance Check at 2600 MHz Head TSL

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

Date: 6/12/2019

Communication System: CW; Frequency: 2600 MHz

Medium parameters used:  $f = 2600 \text{ MHz}$ ;  $\sigma = 2.01 \text{ S/m}$ ;  $\epsilon_r = 38.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(6.94, 6.94, 6.94); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**d=10mm, Pin=250mW/Area Scan (41x71x1):** Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (interpolated) = 17.439 mW/g

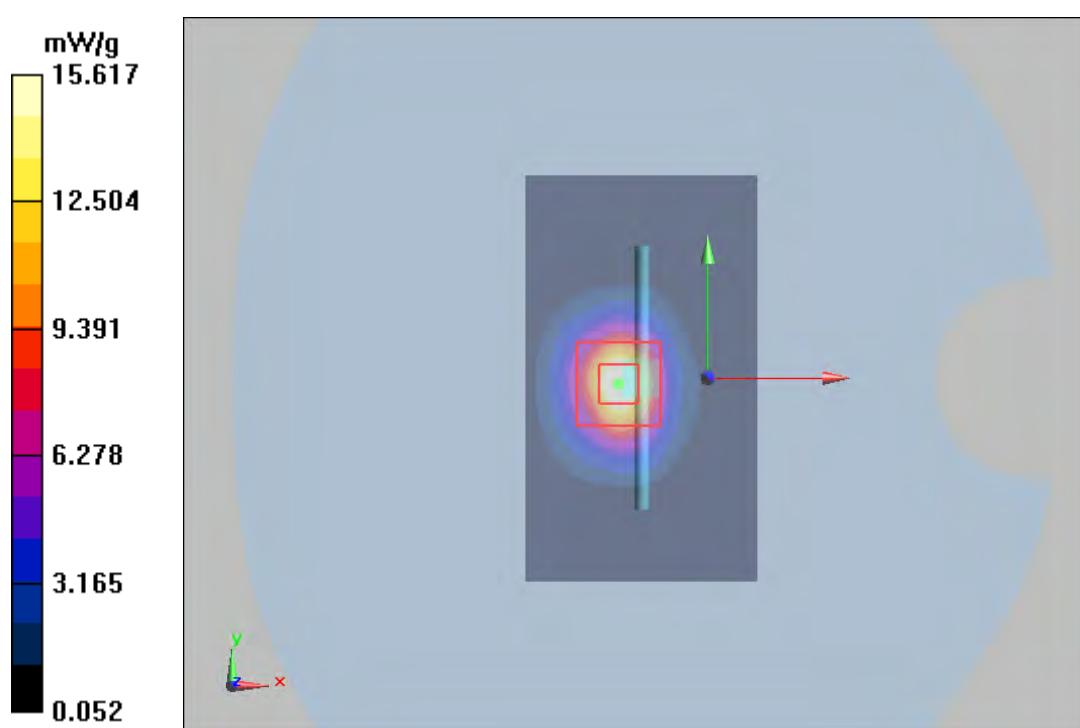
**d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

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 12 System Performance Check at 2600 MHz Body TSL

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

Date: 6/12/2019

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

Medium parameters used:  $f = 2600 \text{ MHz}$ ;  $\sigma = 2.23 \text{ S/m}$ ;  $\epsilon_r = 51.5$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(7.01, 7.01, 7.01); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**d=10mm, Pin=250mW /Area Scan (41x71x1):** Measurement grid: dx=12mm, dy=12mm

Maximum value of SAR (interpolated) = 17.7 mW/g

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

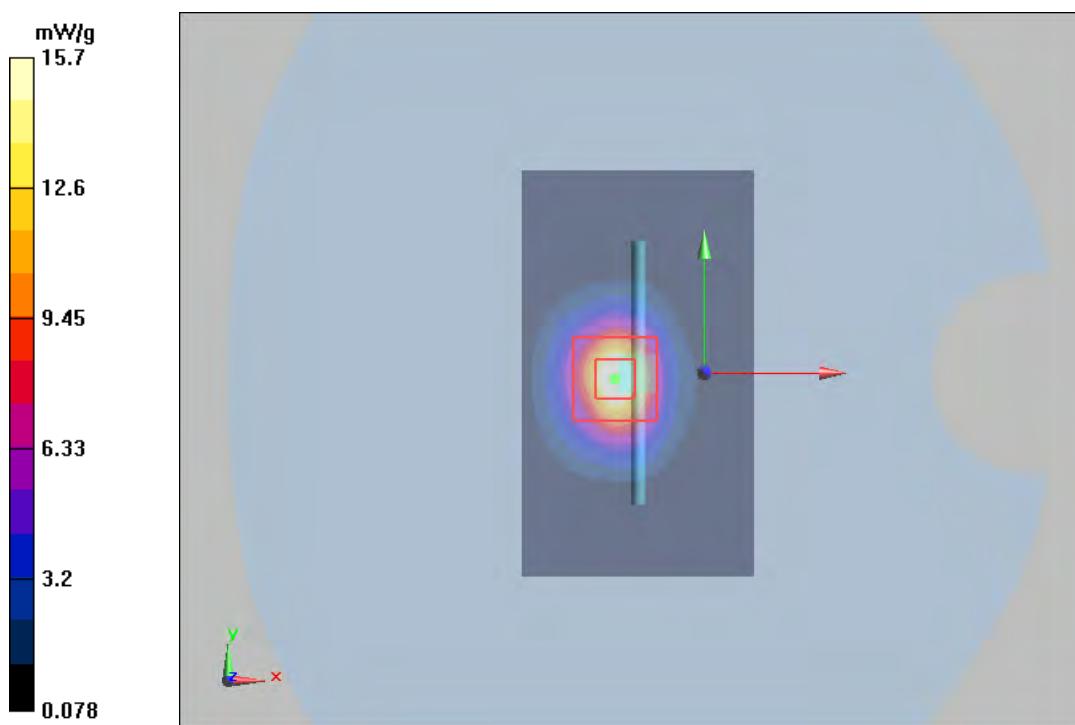
dz=5mm

Reference Value = 74 V/m; Power Drift = -0.0027 dB

Peak SAR (extrapolated) = 28.5 W/kg

**SAR(1 g) = 13.5 mW/g; SAR(10 g) = 5.99 mW/g**

Maximum value of SAR (measured) = 15.7 mW/g



## Plot 13 System Performance Check at 5250 MHz Head TSL

DUT: Dipole 5250 MHz; Type: D5GHzV2; Serial: D5GHzV2

Date: 5/27/2019

Communication System: CW; Frequency: 5250 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 5250 \text{ MHz}$ ;  $\sigma = 4.80 \text{ S/m}$ ;  $\epsilon_r = 35.5$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(4.70, 4.70, 4.70); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**d=10mm, Pin=100mW/Area Scan (61x101x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 9.14 mW/g

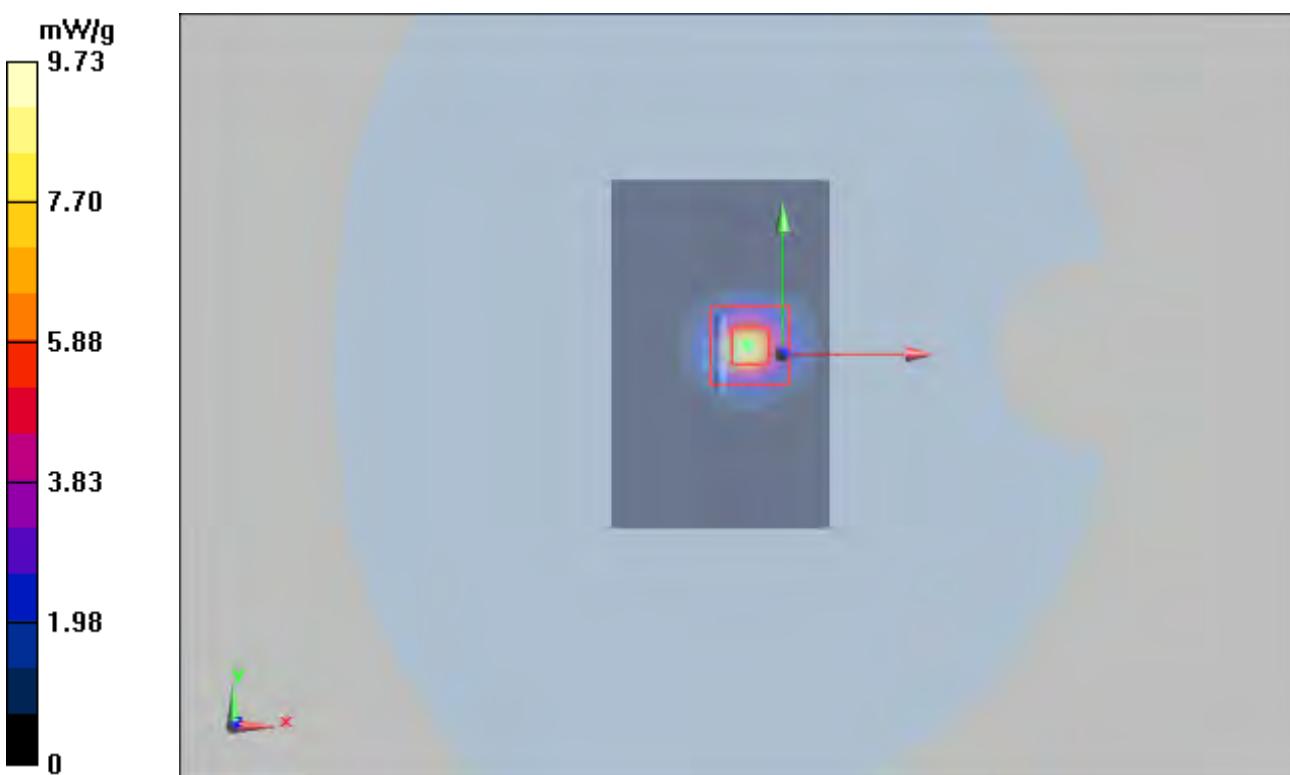
**d=10mm, Pin=100mW/Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 33.6 V/m; Power Drift = -0.095 dB

Peak SAR (extrapolated) = 52.2 W/kg

**SAR(1 g) = 7.87 mW/g; SAR(10 g) = 2.25 mW/g**

Maximum value of SAR (measured) = 9.73 mW/g



**Plot 14 System Performance Check at 5250 MHz Body TSL****DUT: Dipole 5250 MHz; Type: D5GHzV2; Serial: D5GHzV2**

Date: 5/27/2019

Communication System: CW; Frequency: 5250 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 5250 \text{ MHz}$ ;  $\sigma = 5.32 \text{ S/m}$ ;  $\epsilon_r = 48.1$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(4.09, 4.09, 4.09); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**d=10mm, Pin=100mW/Area Scan (61x101x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 7.69 mW/g

**d=10mm, Pin=100mW/Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm,

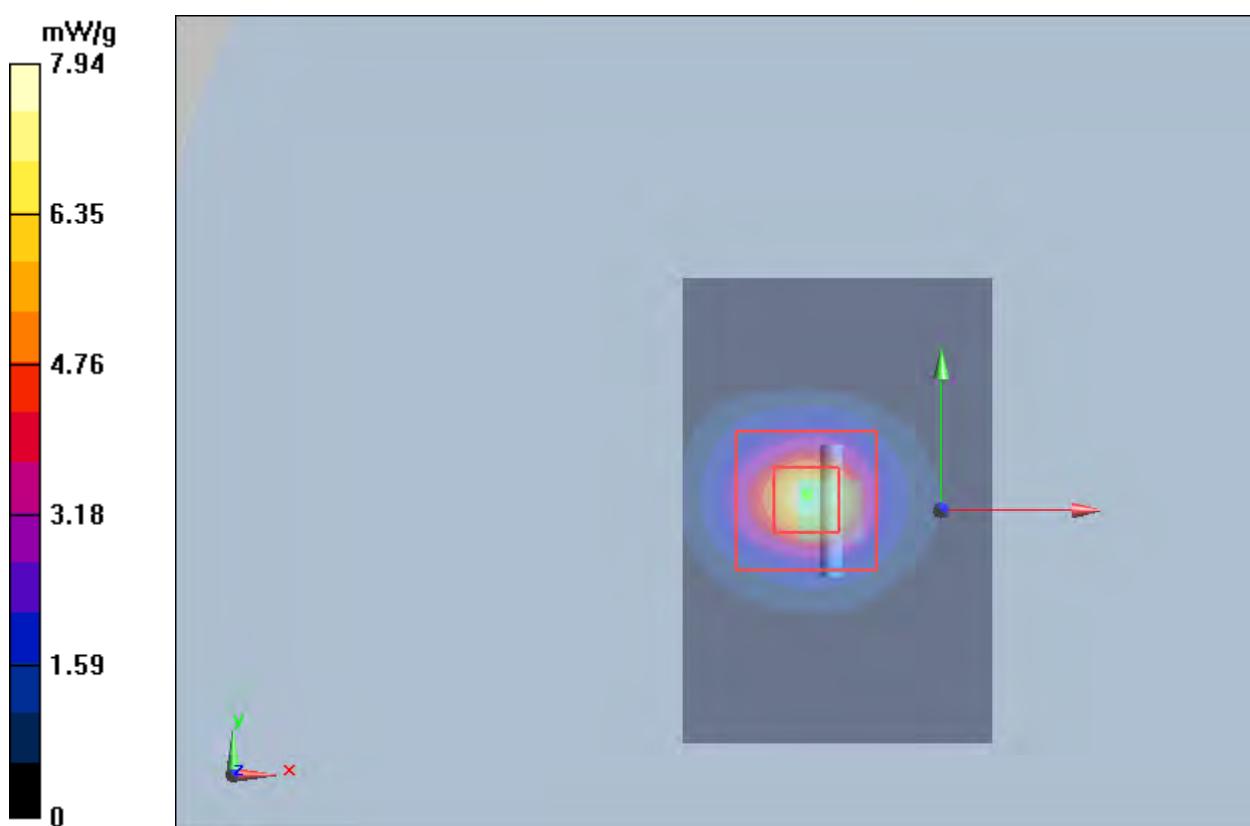
dz=2mm

Reference Value = 36.3 V/m; Power Drift = 0.0277 dB

Peak SAR (extrapolated) = 47.7 W/kg

**SAR(1 g) = 7.46 mW/g; SAR(10 g) = 2.26 mW/g**

Maximum value of SAR (measured) = 7.94 mW/g



## Plot 15 System Performance Check at 5600 MHz Head TSL

DUT: Dipole 5600 MHz; Type: D5GHzV2; Serial: D5GHzV2

Date: 5/29/2019

Communication System: CW; Frequency: 5600 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 5600 \text{ MHz}$ ;  $\sigma = 5.21 \text{ S/m}$ ;  $\epsilon_r = 34.2$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(4.69, 4.69, 4.69); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**d=10mm, Pin=100mW/Area Scan (61x101x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 8.25 mW/g

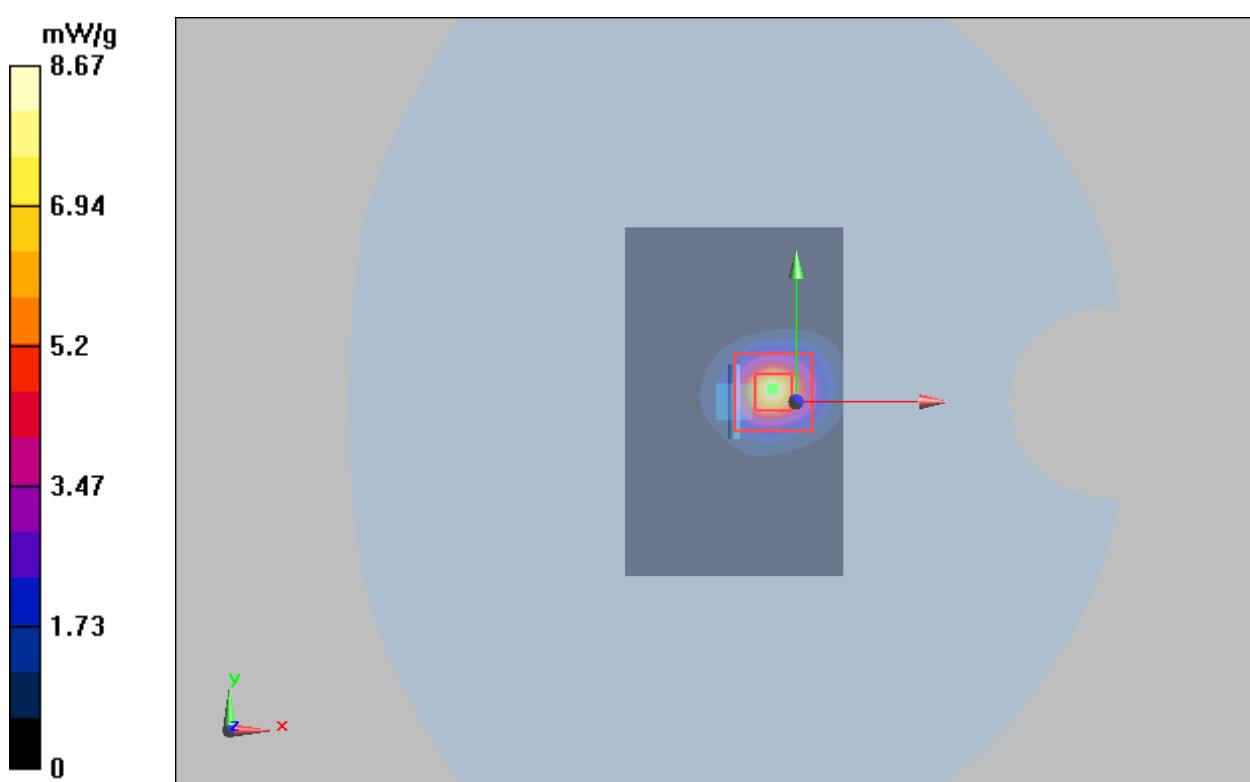
**d=10mm, Pin=100mW/Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 23.1 V/m; Power Drift = -0.028 dB

Peak SAR (extrapolated) = 22.9 W/kg

**SAR(1 g) = 7.67 mW/g; SAR(10 g) = 2.27 mW/g**

Maximum value of SAR (measured) = 8.67 mW/g



**Plot 16 System Performance Check at 5600 MHz Body TSL****DUT: Dipole 5600 MHz; Type: D5GHzV2; Serial: D5GHzV2**

Date: 5/29/2019

Communication System: CW; Frequency: 5600 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 5600 \text{ MHz}$ ;  $\sigma = 5.78 \text{ S/m}$ ;  $\epsilon_r = 47.9$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(3.80, 3.80, 3.80); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**d=10mm, Pin=100mW/Area Scan (61x101x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 7.84 mW/g

**d=10mm, Pin=100mW/Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm,

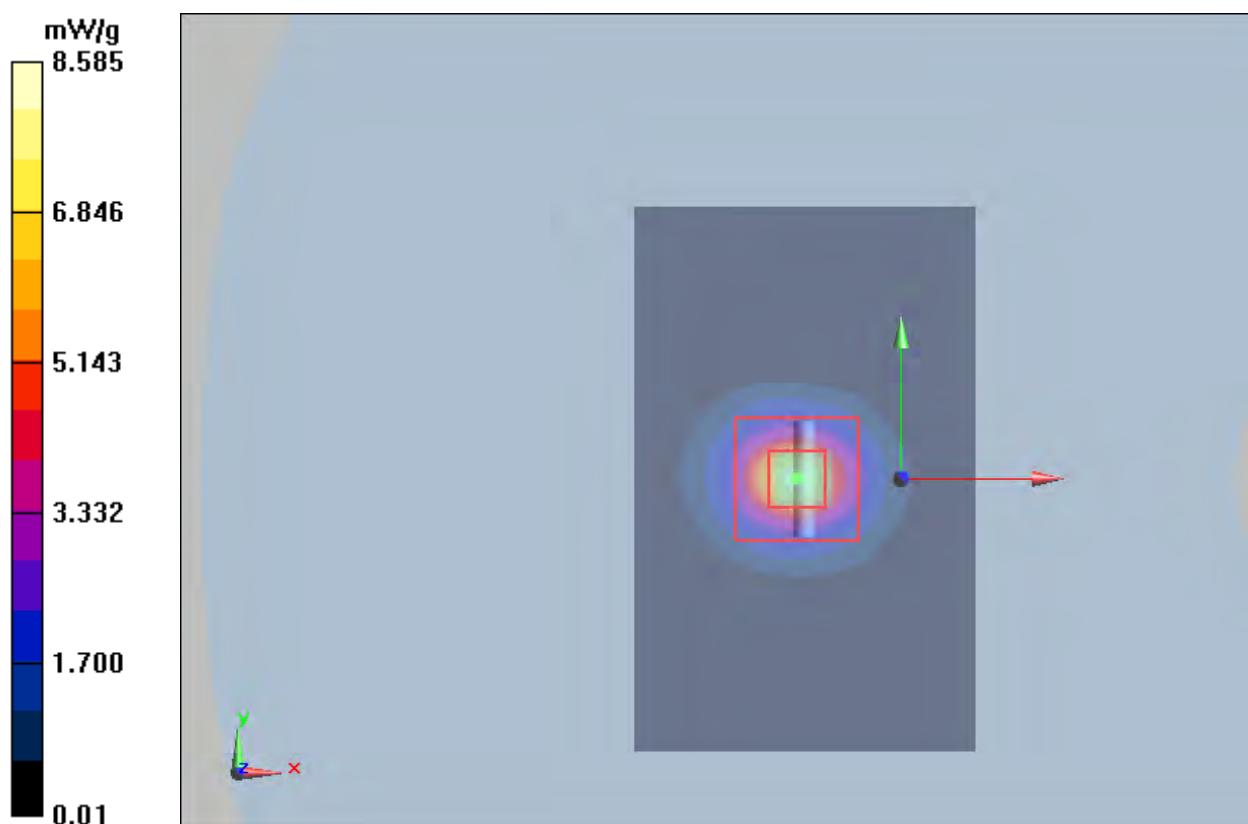
dz=2mm

Reference Value = 38 V/m; Power Drift = -0.018 dB

Peak SAR (extrapolated) = 22.6 W/kg

**SAR(1 g) = 8.10 mW/g; SAR(10 g) = 2.11 mW/g**

Maximum value of SAR (measured) = 8.585 mW/g



## Plot 17 System Performance Check at 5750 MHz Head TSL

DUT: Dipole 5750 MHz; Type: D5GHzV2; Serial: D5GHzV2

Date: 5/29/2019

Communication System: CW; Frequency: 5750 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 5750 \text{ MHz}$ ;  $\sigma = 5.21 \text{ S/m}$ ;  $\epsilon_r = 34.9$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(4.61, 4.61, 4.61); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**d=10mm, Pin=100mW/Area Scan (61x101x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 8.31 mW/g

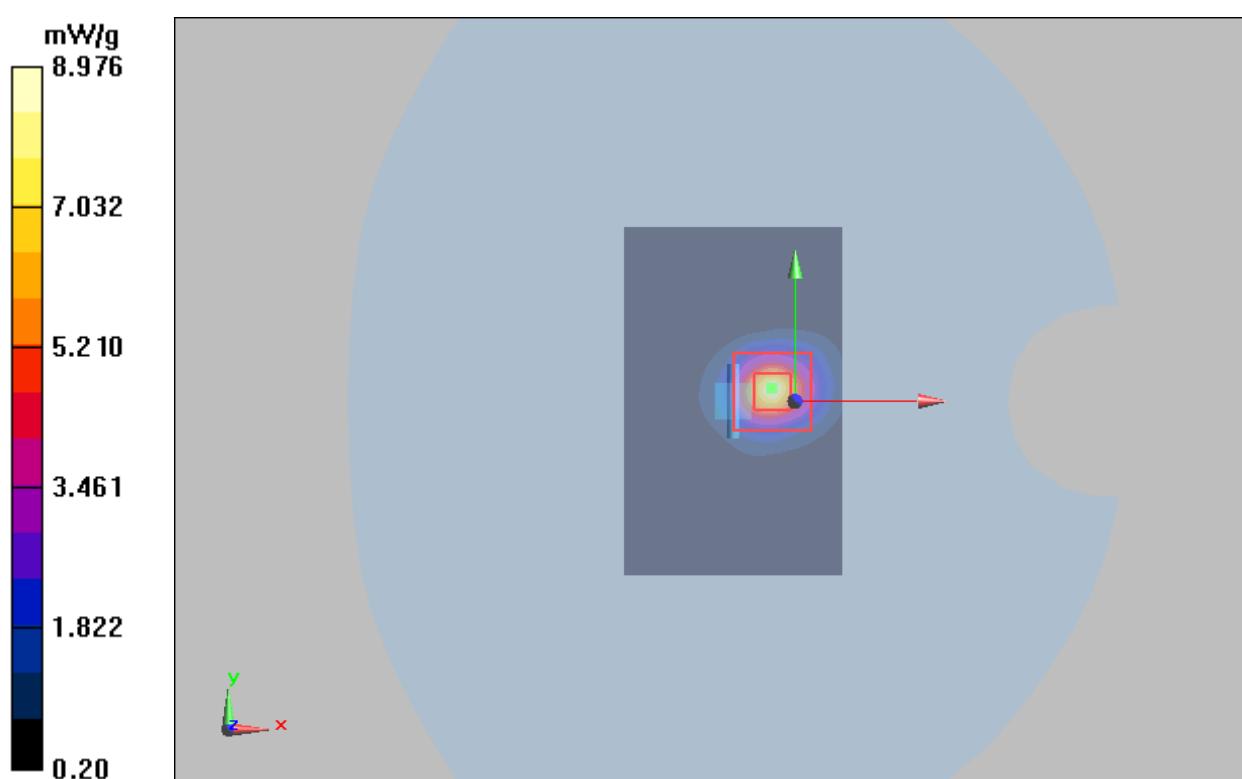
**d=10mm, Pin=100mW/Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 23.1 V/m; Power Drift = 0.044 dB

Peak SAR (extrapolated) = 23.4 W/kg

**SAR(1 g) = 7.66 mW/g; SAR(10 g) = 2.27 mW/g**

Maximum value of SAR (measured) = 8.976 mW/g



**Plot 18 System Performance Check at 5750 MHz Body TSL****DUT: Dipole 5750 MHz; Type: D5GHzV2; Serial: D5GHzV2**

Date: 5/29/2019

Communication System: CW; Frequency: 5750 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 5750 \text{ MHz}$ ;  $\sigma = 6.14 \text{ S/m}$ ;  $\epsilon_r = 47.6$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(3.95, 3.95, 3.95); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**d=10mm, Pin=100mW/Area Scan (61x101x1):** Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 7.84 mW/g

**d=10mm, Pin=100mW/Zoom Scan (7x7x12)/Cube 0:** Measurement grid: dx=4mm, dy=4mm,

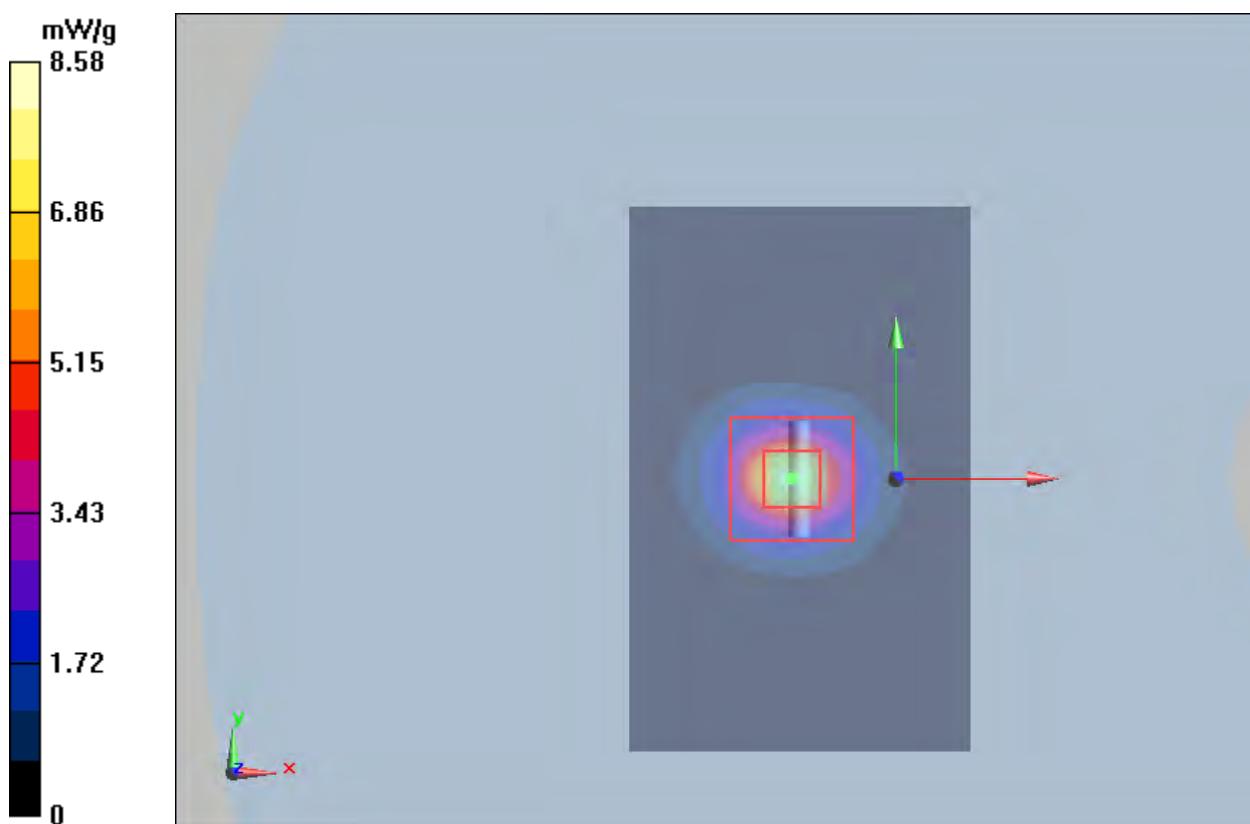
dz=2mm

Reference Value = 38 V/m; Power Drift = -0.018 dB

Peak SAR (extrapolated) = 22.6 W/kg

**SAR(1 g) = 7.15 mW/g; SAR(10 g) = 1.99 mW/g**

Maximum value of SAR (measured) = 8.58 mW/g



## ANNEX C: Highest Graph Results

### Plot 19 GSM 850 Left Cheek Low

Date: 5/17/2019

Communication System: UID 0, GSM (0); Frequency: 824.2 MHz; Duty Cycle: 1:8.30042

Medium parameters used (interpolated):  $f = 824.2 \text{ MHz}$ ;  $\sigma = 0.934 \text{ S/m}$ ;  $\epsilon_r = 41.739$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(9.08, 9.08, 9.08); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Left Cheek Low/Area Scan (71x121x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.056 W/kg

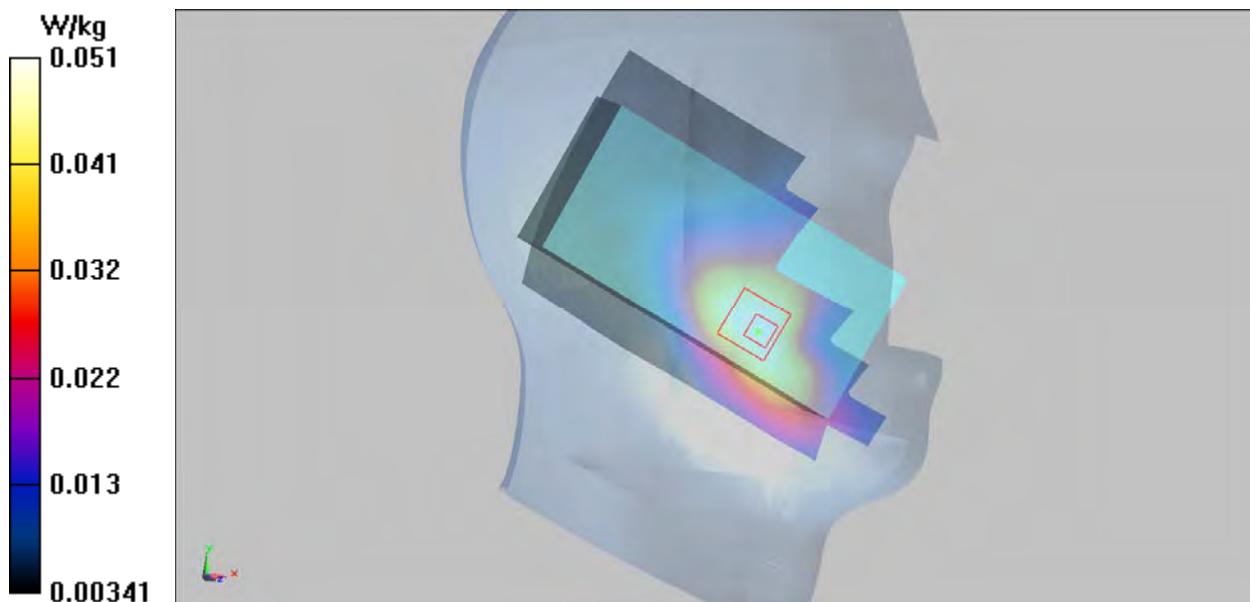
**Left Cheek Low/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.923 V/m; Power Drift = 0.094 dB

Peak SAR (extrapolated) = 0.0640 W/kg

**SAR(1 g) = 0.048 W/kg; SAR(10 g) = 0.036 W/kg**

Maximum value of SAR (measured) = 0.051 W/kg



## Plot 20 GSM 850 Front Side High (Distance 15mm)

Date: 5/23/2019

Communication System: UID 0, GSM (0); Frequency: 848.8 MHz; Duty Cycle: 1:8.30042

Medium parameters used:  $f = 849$  MHz;  $\sigma = 1.003$  S/m;  $\epsilon_r = 54.563$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(9.04, 9.04, 9.04); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Front Side High/Area Scan (71x121x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.0842 W/kg

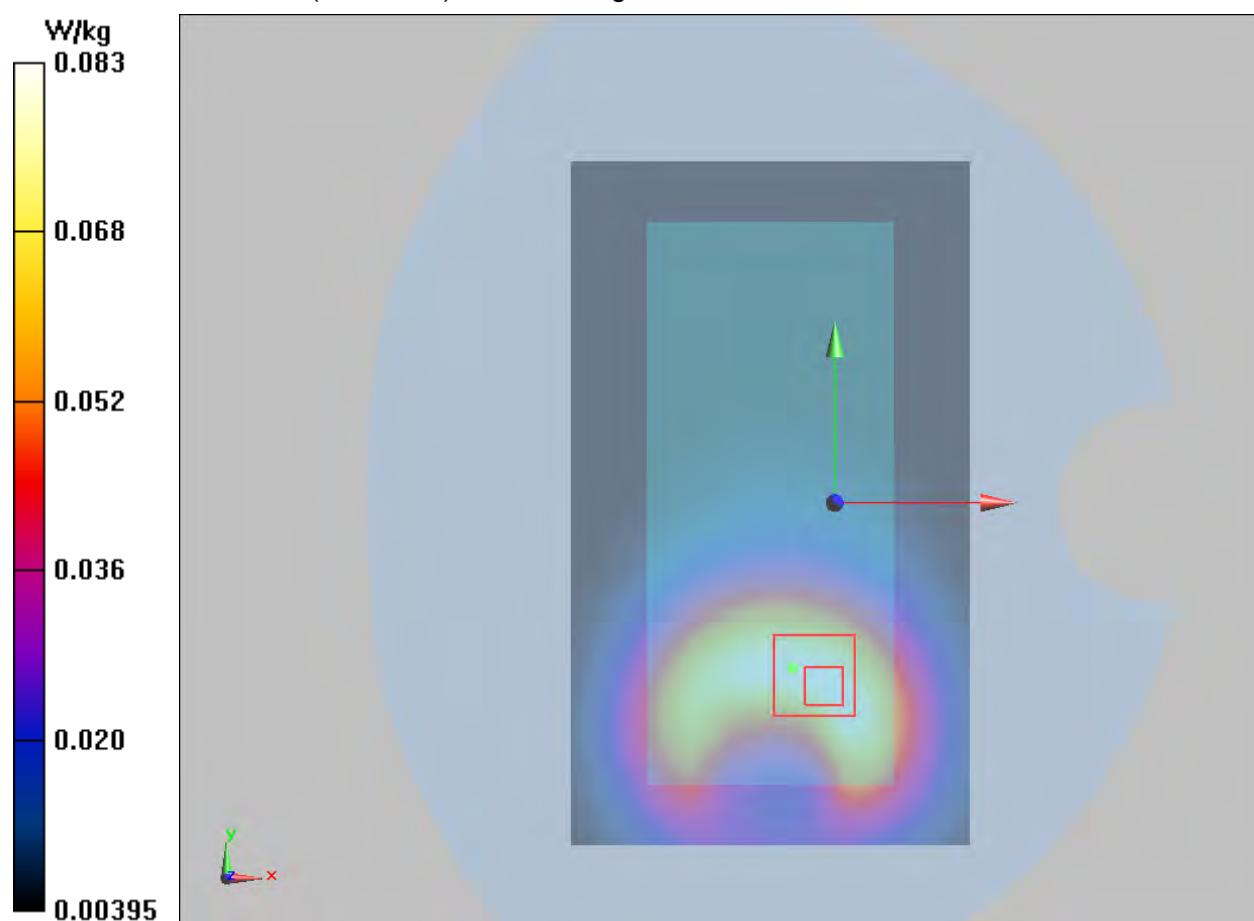
**Front Side High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.557 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 0.116 W/kg

**SAR(1 g) = 0.079 W/kg; SAR(10 g) = 0.052 W/kg**

Maximum value of SAR (measured) = 0.083 W/kg



**Plot 21 GSM 850 GPRS (4Txslots) Front Side High (Distance 10mm)**

Date: 5/23/2019

Communication System: UID 0, GPRS 4TX (0); Frequency: 848.8 MHz; Duty Cycle: 1:2.07491

Medium parameters used:  $f = 849$  MHz;  $\sigma = 0.985$  S/m;  $\epsilon_r = 53.673$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(9.04, 9.04, 9.04); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Front Side High/Area Scan (71x121x1):** Interpolated grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.542 W/kg

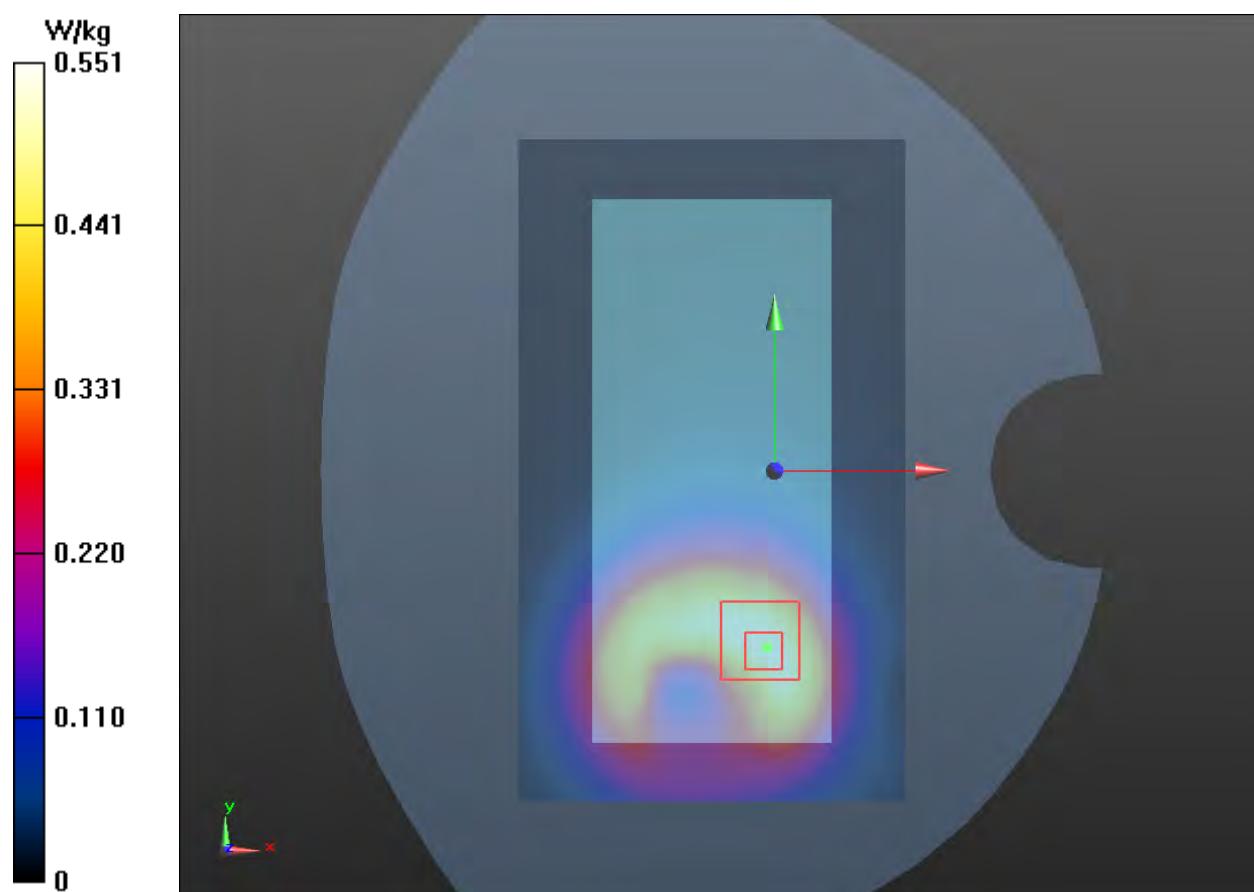
**Front Side High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.707 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.786 W/kg

**SAR(1 g) = 0.506 W/kg; SAR(10 g) = 0.315 W/kg**

Maximum value of SAR (measured) = 0.551 W/kg



## Plot 22 GSM 1900 Right Cheek Middle

Date: 6/13/2019

Communication System: UID 0, GSM 1900 (0); Frequency: 1880 MHz; Duty Cycle: 1:8.30042

Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.393 \text{ S/m}$ ;  $\epsilon_r = 38.344$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Right Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(7.78, 7.78, 7.78); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Right Cheek Middle/Area Scan (71x121x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.29 W/kg

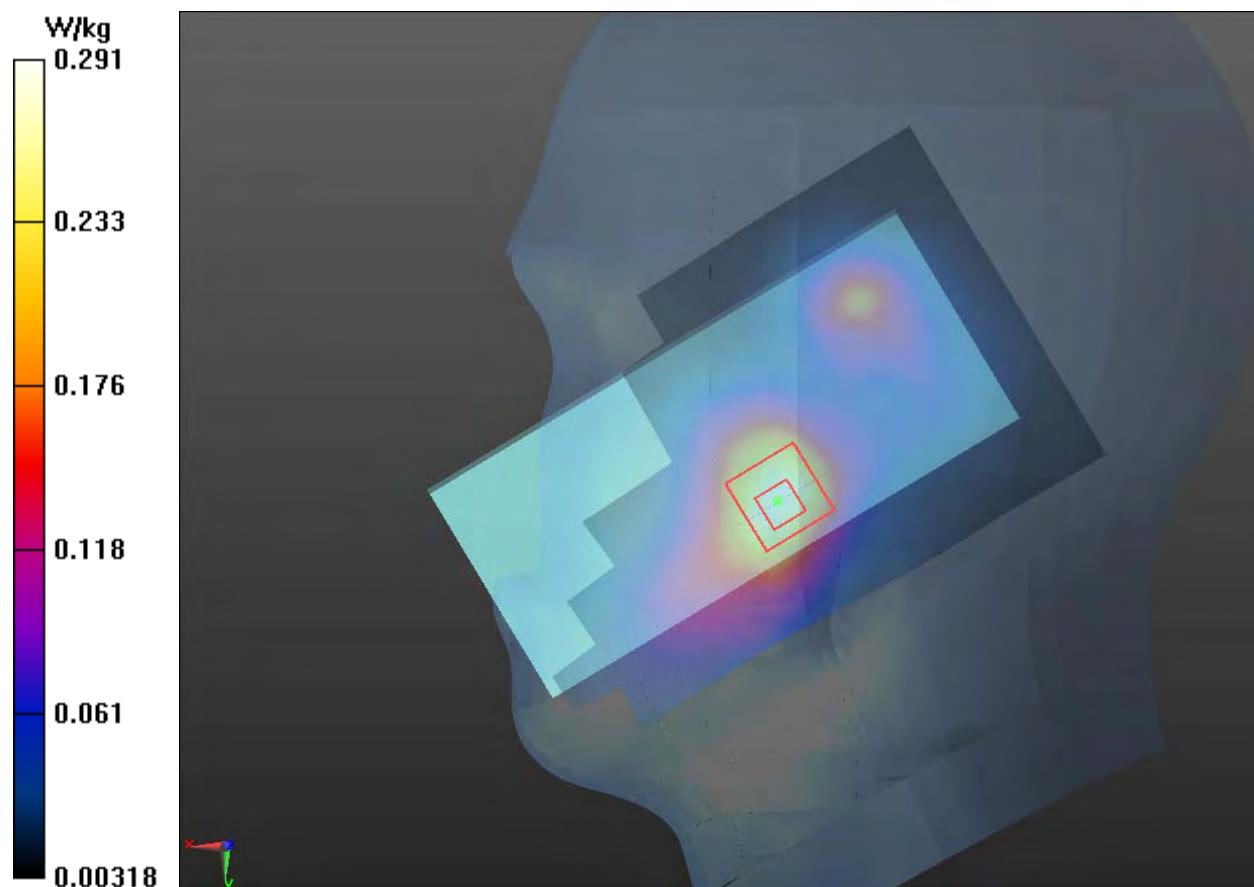
**Right Cheek Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.884 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.399 W/kg

**SAR(1 g) = 0.267 W/kg; SAR(10 g) = 0.164 W/kg**

Maximum value of SAR (measured) = 0.291 W/kg



**Plot 23 GSM 1900 Back Side Middle (Distance 15mm)**

Date: 5/19/2019

Communication System: UID 0, GSM 1900 (0); Frequency: 1880 MHz; Duty Cycle: 1:8.30042

Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.489 \text{ S/m}$ ;  $\epsilon_r = 52.896$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(7.37, 7.37, 7.37); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Back Side Middle/Area Scan (71x121x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.14 W/kg

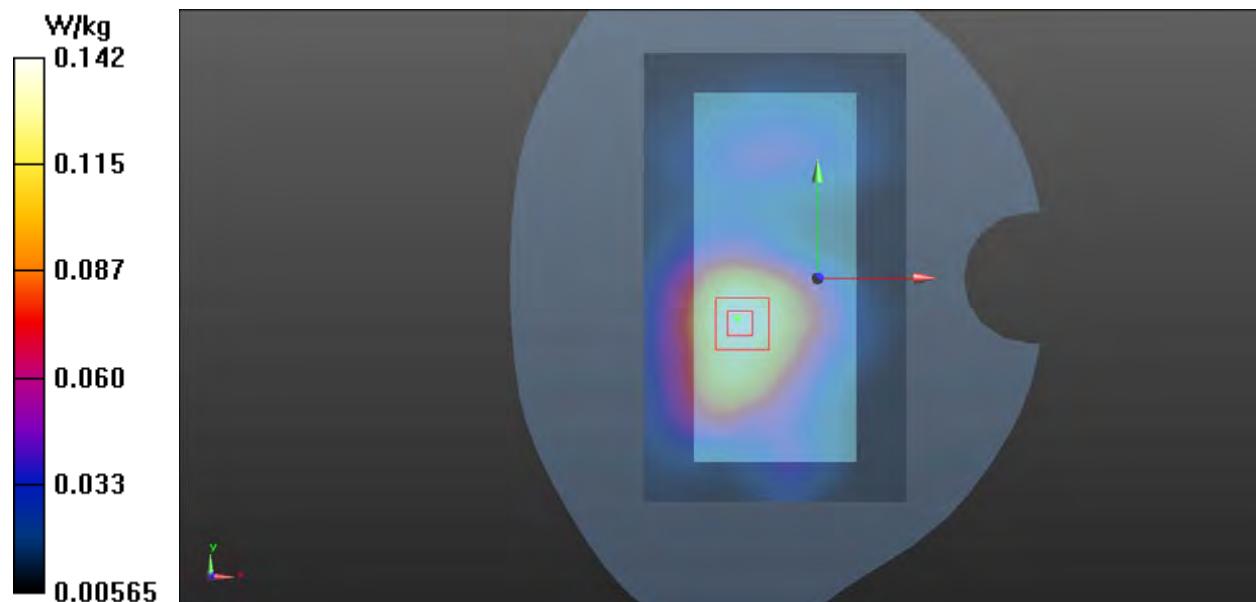
**Back Side Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.644 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.206 W/kg

**SAR(1 g) = 0.133 W/kg; SAR(10 g) = 0.086 W/kg**

Maximum value of SAR (measured) = 0.142 W/kg



**Plot 24 GSM 1900 GPRS (4Txslots) Back Side Low (Distance 10mm)**

Date: 5/19/2019

Communication System: UID 0, GPRS 4TX (0); Frequency: 1850.2 MHz; Duty Cycle: 1:2.07491

Medium parameters used (interpolated):  $f = 1850.2 \text{ MHz}$ ;  $\sigma = 1.463 \text{ S/m}$ ;  $\epsilon_r = 53.002$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(7.37, 7.37, 7.37); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Back Side Low/Area Scan (71x121x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 1.10 W/kg

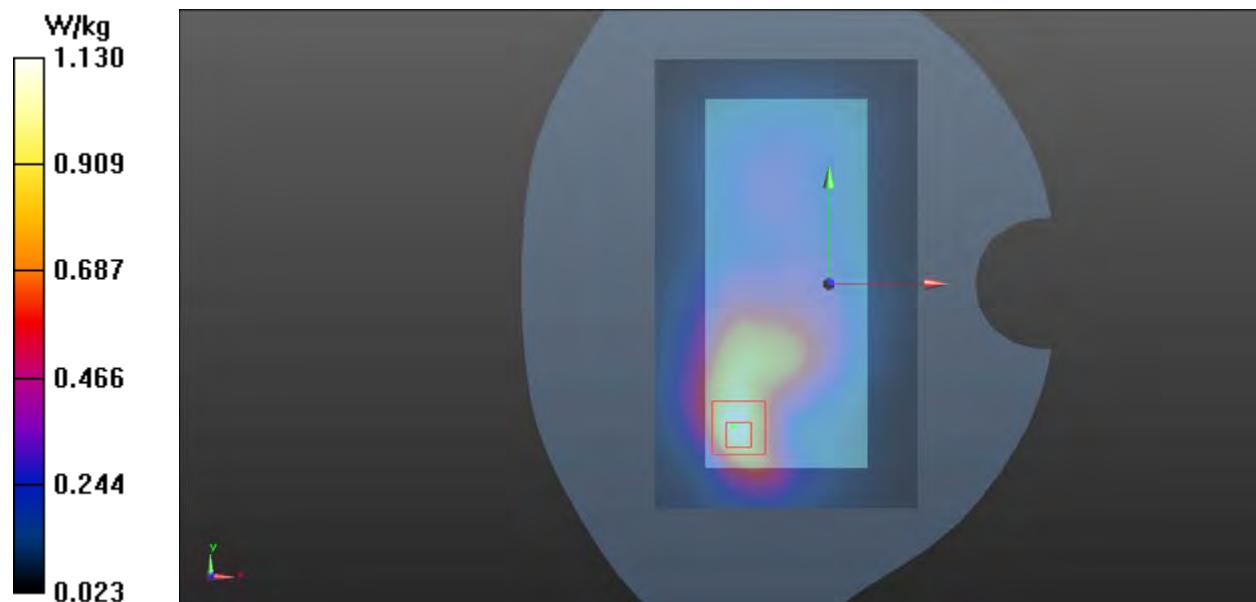
**Back Side Low/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.45 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 1.80 W/kg

**SAR(1 g) = 1.03 W/kg; SAR(10 g) = 0.565 W/kg**

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





## Plot 25 UMTS Band II Left Cheek Middle

Date: 6/13/2019

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

Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.393 \text{ S/m}$ ;  $\epsilon_r = 38.344$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(7.78, 7.78, 7.78); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Left Cheek Middle/Area Scan (71x121x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.57 W/kg

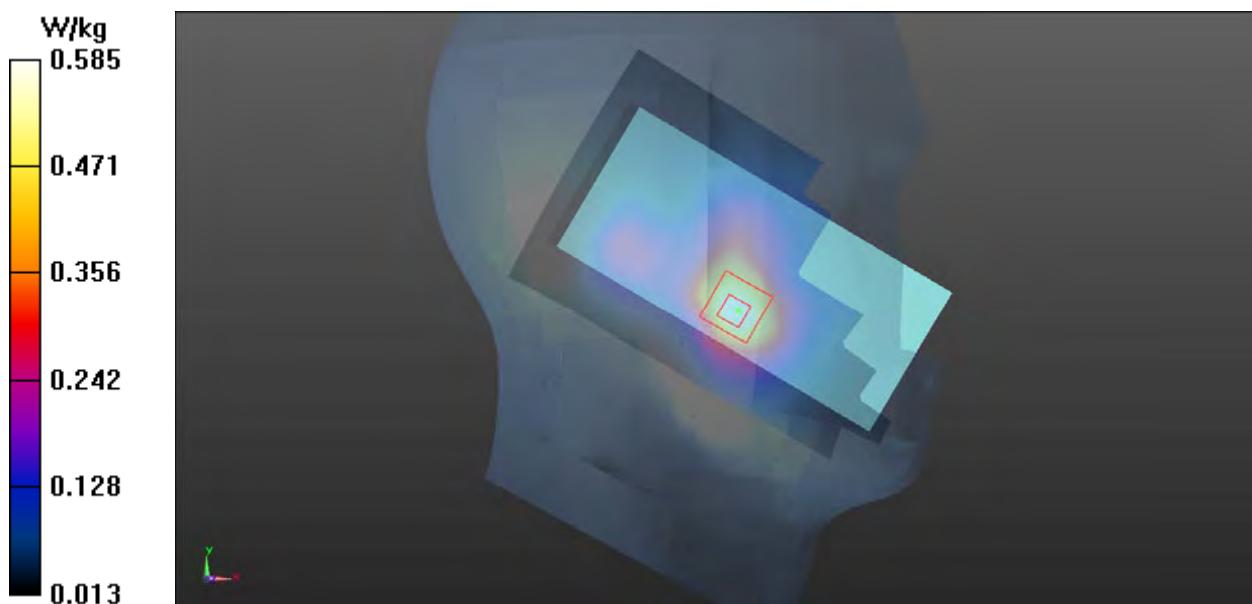
**Left Cheek Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.298 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 0.844 W/kg

**SAR(1 g) = 0.540 W/kg; SAR(10 g) = 0.320 W/kg**

Maximum value of SAR (measured) = 0.585 W/kg



## Plot 26 UMTS Band II Back Side Middle (Distance 10mm)

Date: 5/19/2019

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

Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.489 \text{ S/m}$ ;  $\epsilon_r = 52.896$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(7.37, 7.37, 7.37); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Back Side Middle/Area Scan (71x121x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.961 W/kg

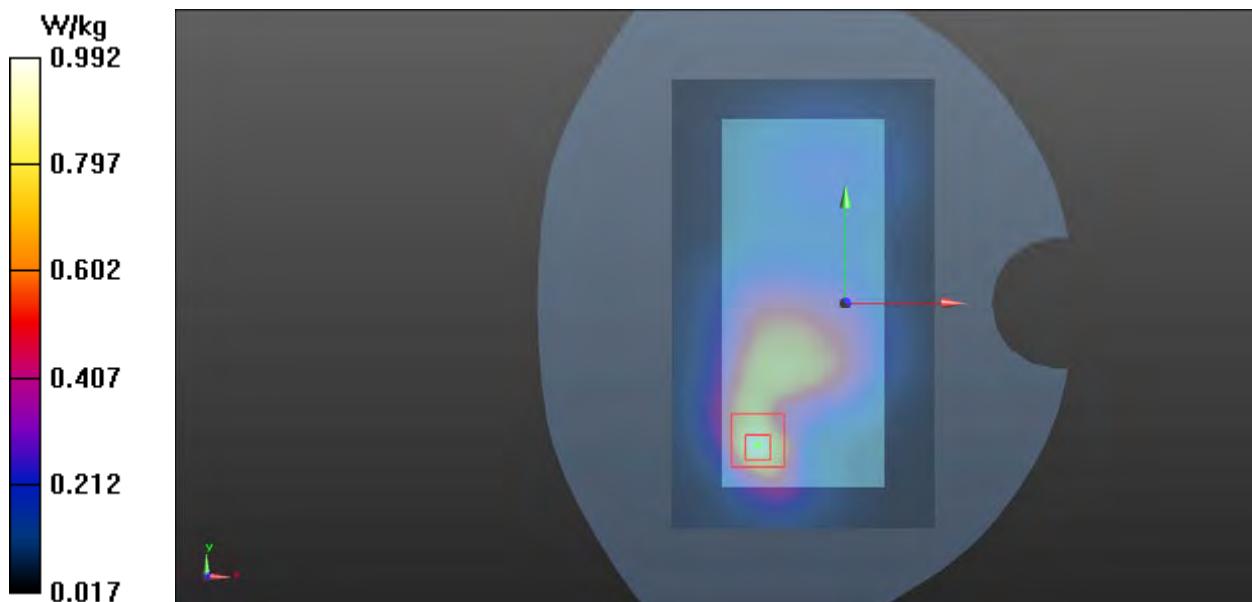
**Back Side Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.87 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 1.52 W/kg

**SAR(1 g) = 0.863 W/kg; SAR(10 g) = 0.456 W/kg**

Maximum value of SAR (measured) = 0.992 W/kg





## Plot 27 UMTS Band IV Left Cheek Middle

Date: 5/21/2019

Communication System: UID 0, WCDMA IV (0); Frequency: 1732.6 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1733 \text{ MHz}$ ;  $\sigma = 1.293 \text{ S/m}$ ;  $\epsilon_r = 38.782$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(8.10, 8.10, 8.10); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Left Cheek Middle/Area Scan (71x121x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.56 W/kg

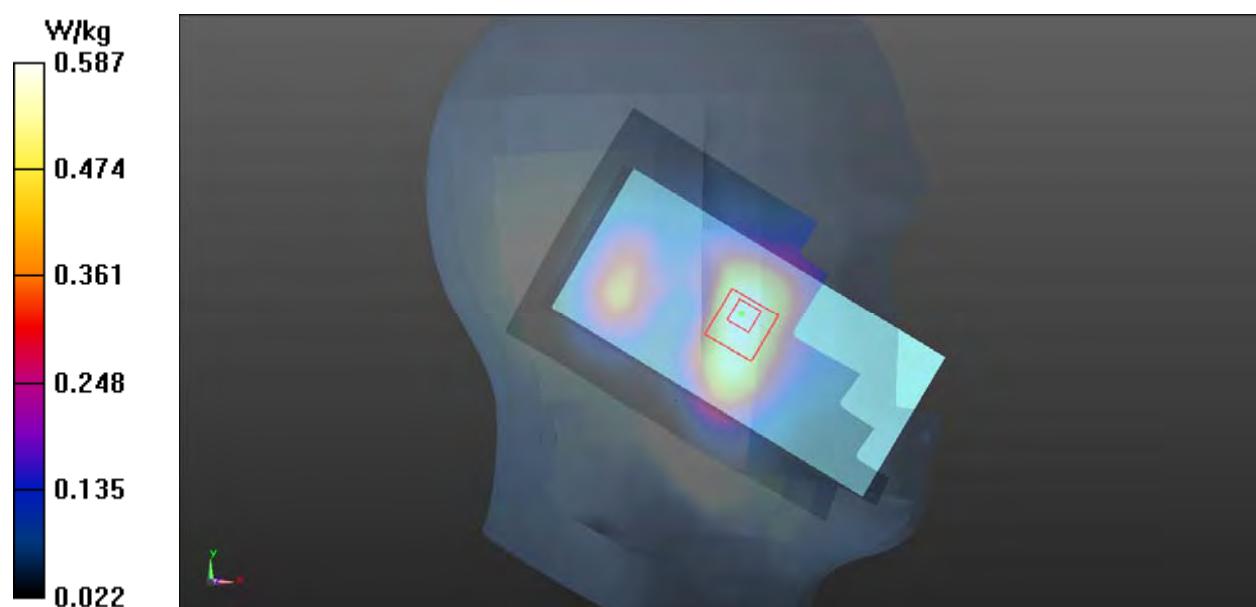
**Left Cheek Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 14.81 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.787 W/kg

**SAR(1 g) = 0.548 W/kg; SAR(10 g) = 0.361 W/kg**

Maximum value of SAR (measured) = 0.587 W/kg



**Plot 28 UMTS Band IV Back Side High(Distance 10mm)**

Date: 6/3/2019

Communication System: UID 0, WCDMA IV (0); Frequency: 1752.6 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1753$  MHz;  $\sigma = 1.44$  S/m;  $\epsilon_r = 51.424$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(7.68, 7.68, 7.68); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Back Side High/Area Scan (71x121x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.831 W/kg

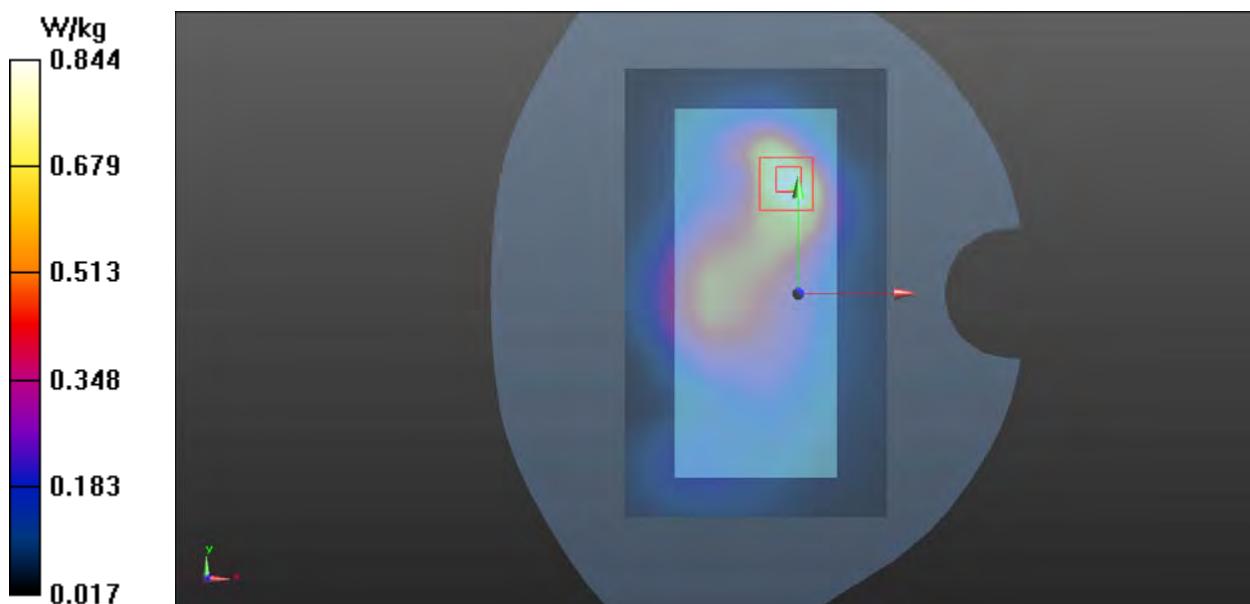
**Back Side High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 17.72 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 1.33 W/kg

**SAR(1 g) = 0.782 W/kg; SAR(10 g) = 0.440 W/kg**

Maximum value of SAR (measured) = 0.844 W/kg



## Plot 29 UMTS Band V Left Cheek Middle

Date: 5/17/2019

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

Medium parameters used:  $f = 837 \text{ MHz}$ ;  $\sigma = 0.943 \text{ S/m}$ ;  $\epsilon_r = 41.658$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(9.08, 9.08, 9.08); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Left Cheek Middle/Area Scan (71x121x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.04 W/kg

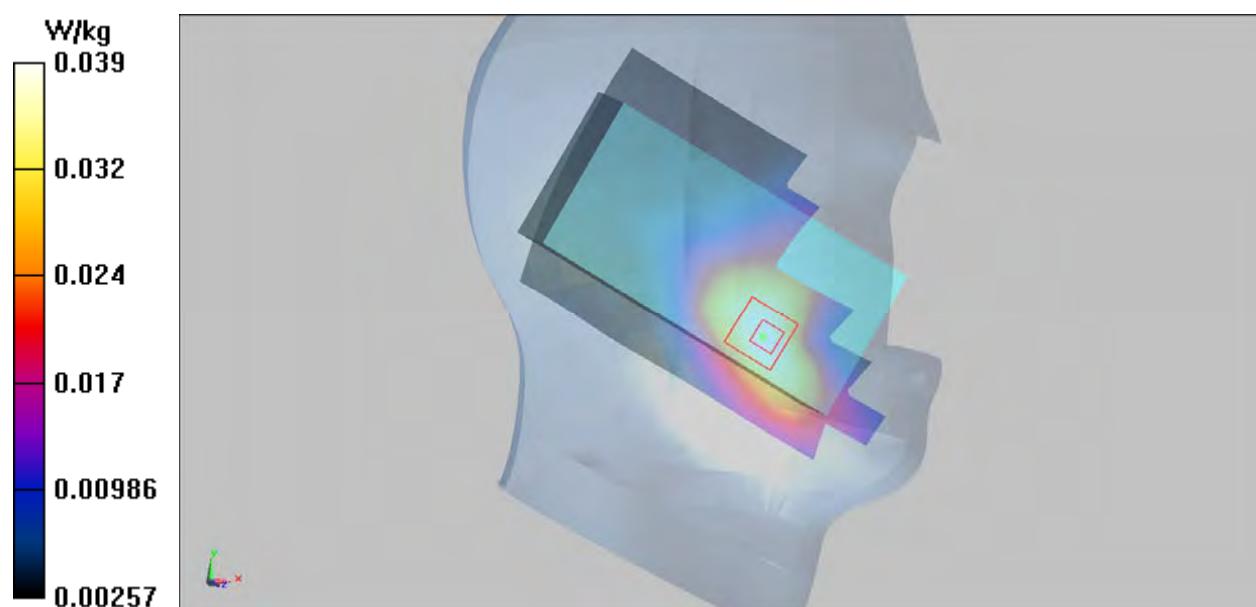
**Left Cheek Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.601 V/m; Power Drift = 0.024 dB

Peak SAR (extrapolated) = 0.0500 W/kg

**SAR(1 g) = 0.037 W/kg; SAR(10 g) = 0.026 W/kg**

Maximum value of SAR (measured) = 0.039 W/kg



**Plot 30 UMTS Band V Front Side Middle (Distance 10mm)**

Date: 5/23/2019

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

Medium parameters used:  $f = 837 \text{ MHz}$ ;  $\sigma = 0.974 \text{ S/m}$ ;  $\epsilon_r = 53.795$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5 °C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(9.04, 9.04, 9.04); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Front Side Middle/Area Scan (71x121x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.127 W/kg

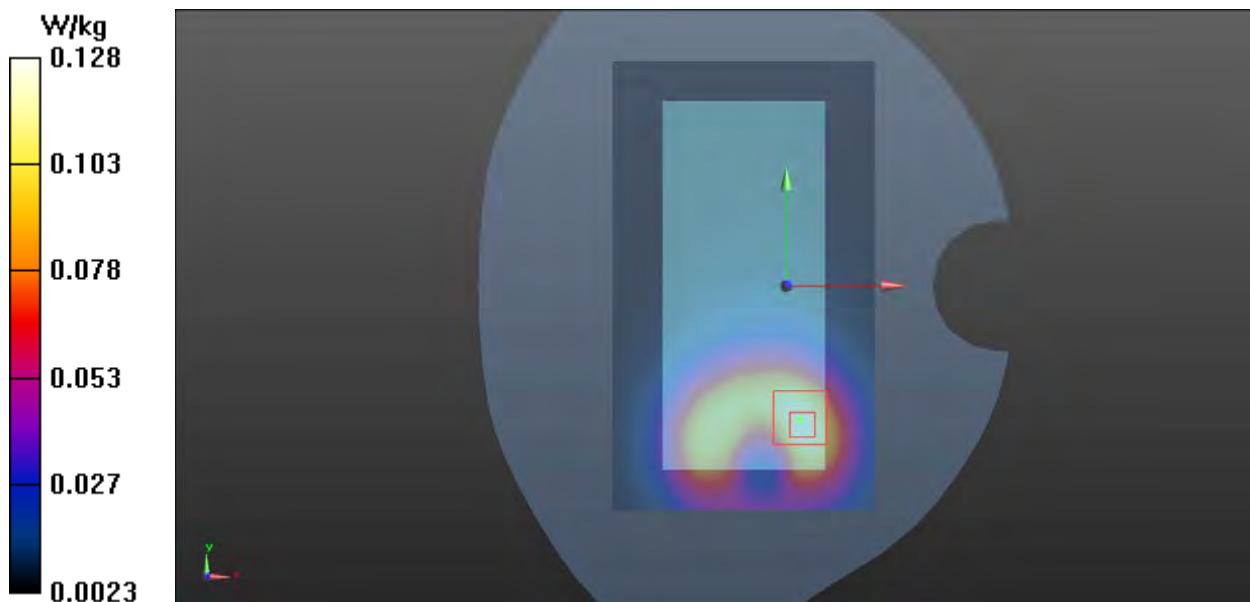
**Front Side Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.230 V/m; Power Drift = -0.050 dB

Peak SAR (extrapolated) = 0.184 W/kg

**SAR(1 g) = 0.117 W/kg; SAR(10 g) = 0.072 W/kg**

Maximum value of SAR (measured) = 0.128 W/kg



**Plot 31 LTE Band 2 1RB Left Cheek Middle**

Date: 6/13/2019

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

Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.393 \text{ S/m}$ ;  $\epsilon_r = 38.344$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(7.78, 7.78, 7.78); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Left Cheek Middle/Area Scan (71x121x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.380 W/kg

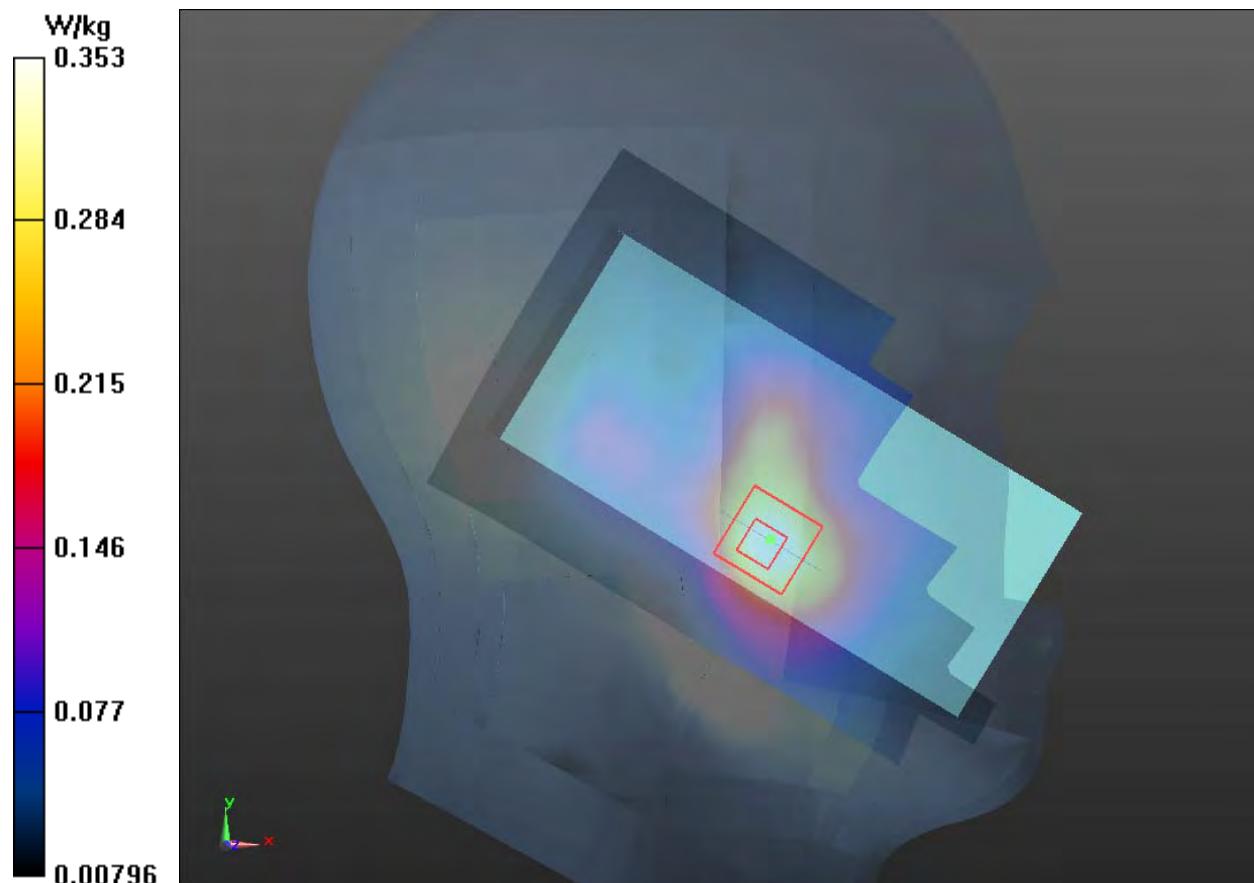
**Left Cheek Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 5.700 V/m; Power Drift = -0.030 dB

Peak SAR (extrapolated) = 0.515 W/kg

**SAR(1 g) = 0.331 W/kg; SAR(10 g) = 0.200 W/kg**

Maximum value of SAR (measured) = 0.353 W/kg



## Plot 32 LTE Band 2 1RB Back Side High (Distance 10mm)

Date: 5/19/2019

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

Medium parameters used:  $f = 1900 \text{ MHz}$ ;  $\sigma = 1.508 \text{ S/m}$ ;  $\epsilon_r = 52.751$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(7.37, 7.37, 7.37); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Back Side High/Area Scan (71x121x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.910 W/kg

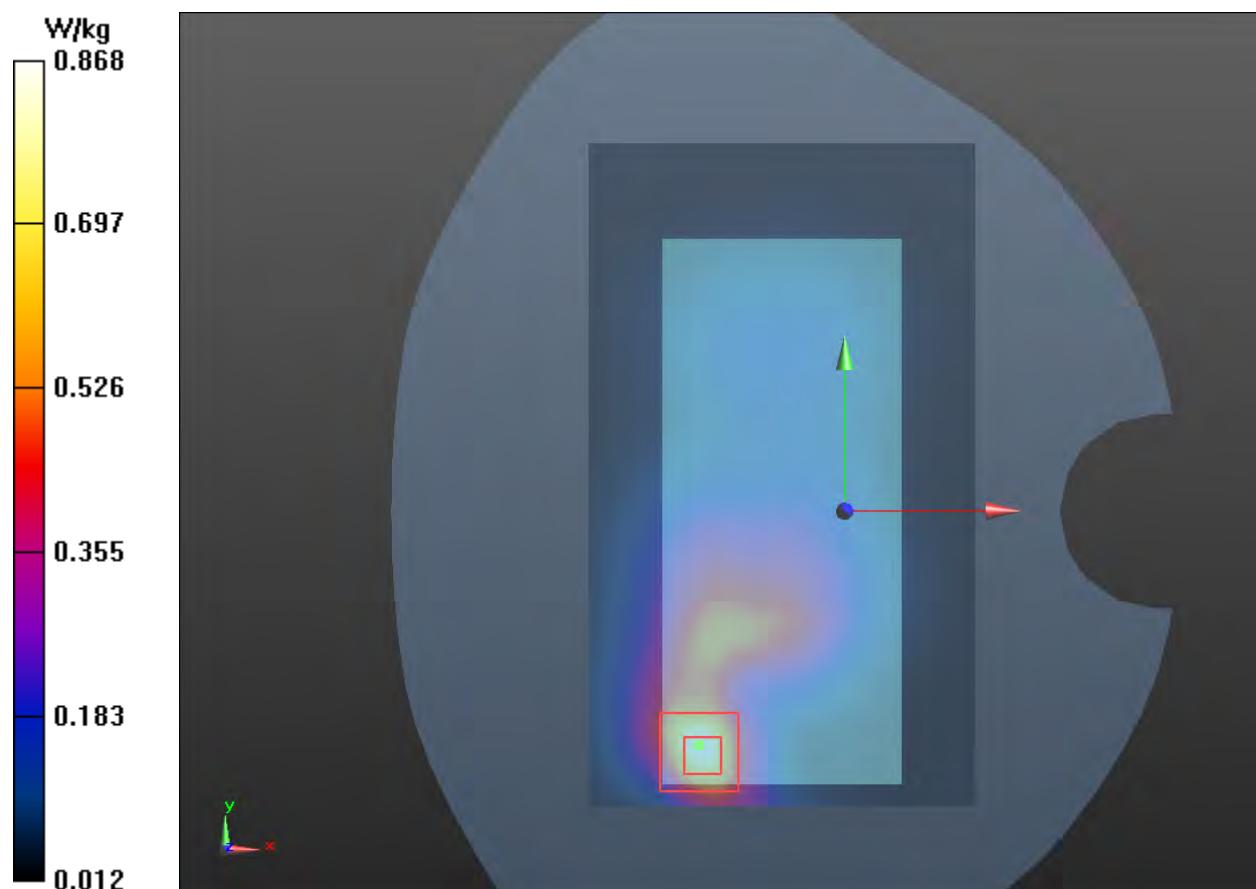
**Back Side High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 11.96 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 1.43 W/kg

**SAR(1 g) = 0.775 W/kg; SAR(10 g) = 0.388 W/kg**

Maximum value of SAR (measured) = 0.868 W/kg



## Plot 33 LTE Band 4 1RB Right Cheek Low

Date: 5/21/2019

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

Medium parameters used:  $f = 1720 \text{ MHz}$ ;  $\sigma = 1.284 \text{ S/m}$ ;  $\epsilon_r = 38.855$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Right Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(8.10, 8.10, 8.10); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Right Cheek Low/Area Scan (71x121x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.363 W/kg

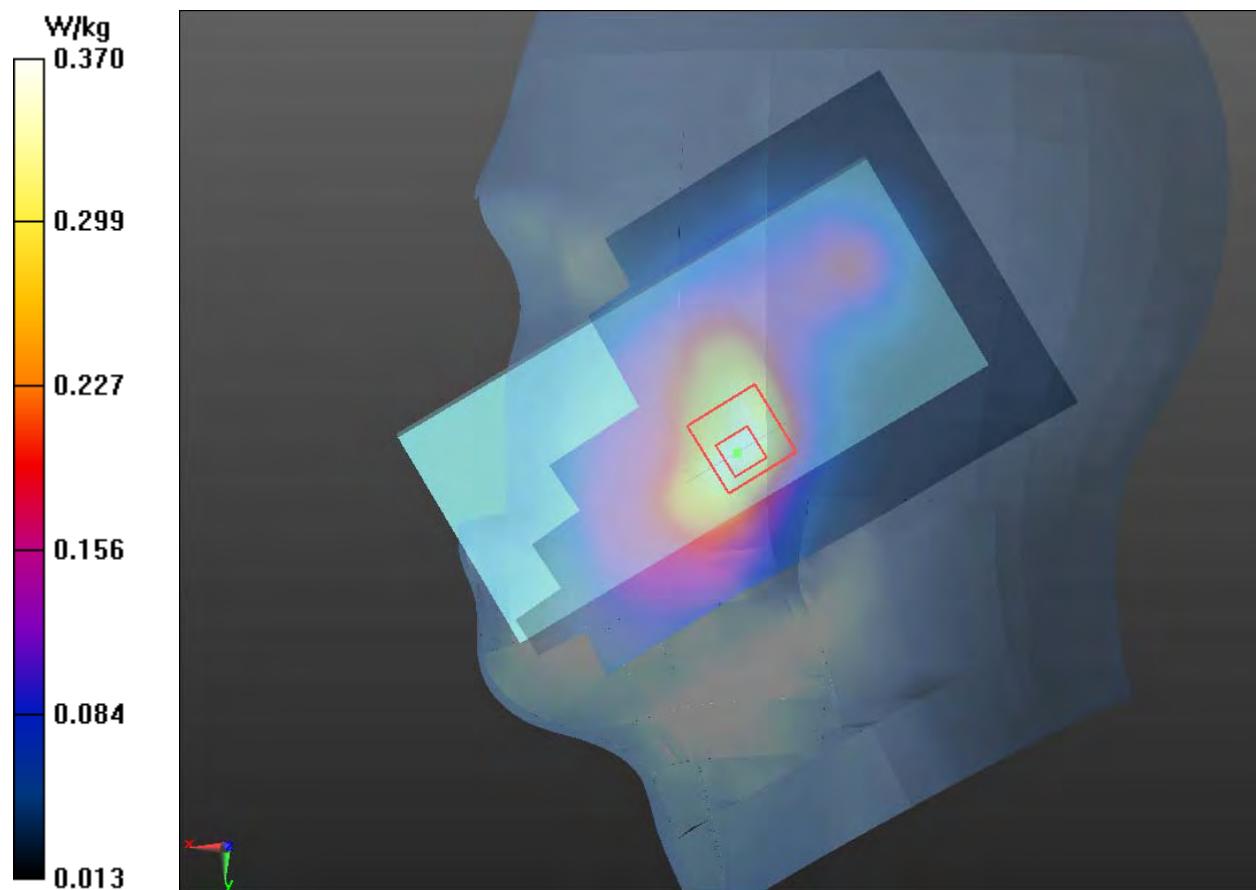
**Right Cheek Low/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.269 V/m; Power Drift = 0.084 dB

Peak SAR (extrapolated) = 0.507 W/kg

**SAR(1 g) = 0.337 W/kg; SAR(10 g) = 0.212 W/kg**

Maximum value of SAR (measured) = 0.370 W/kg



## Plot 34 LTE Band 4 1RB Back Side High (Distance 10mm)

Date: 6/3/2019

Communication System: UID 0, LTE (0); Frequency: 1745 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1745 \text{ MHz}$ ;  $\sigma = 1.432 \text{ S/m}$ ;  $\epsilon_r = 51.445$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(7.68, 7.68, 7.68); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Back Side High/Area Scan (71x121x1):** Interpolated grid: dx=15mm, dy=15mm

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

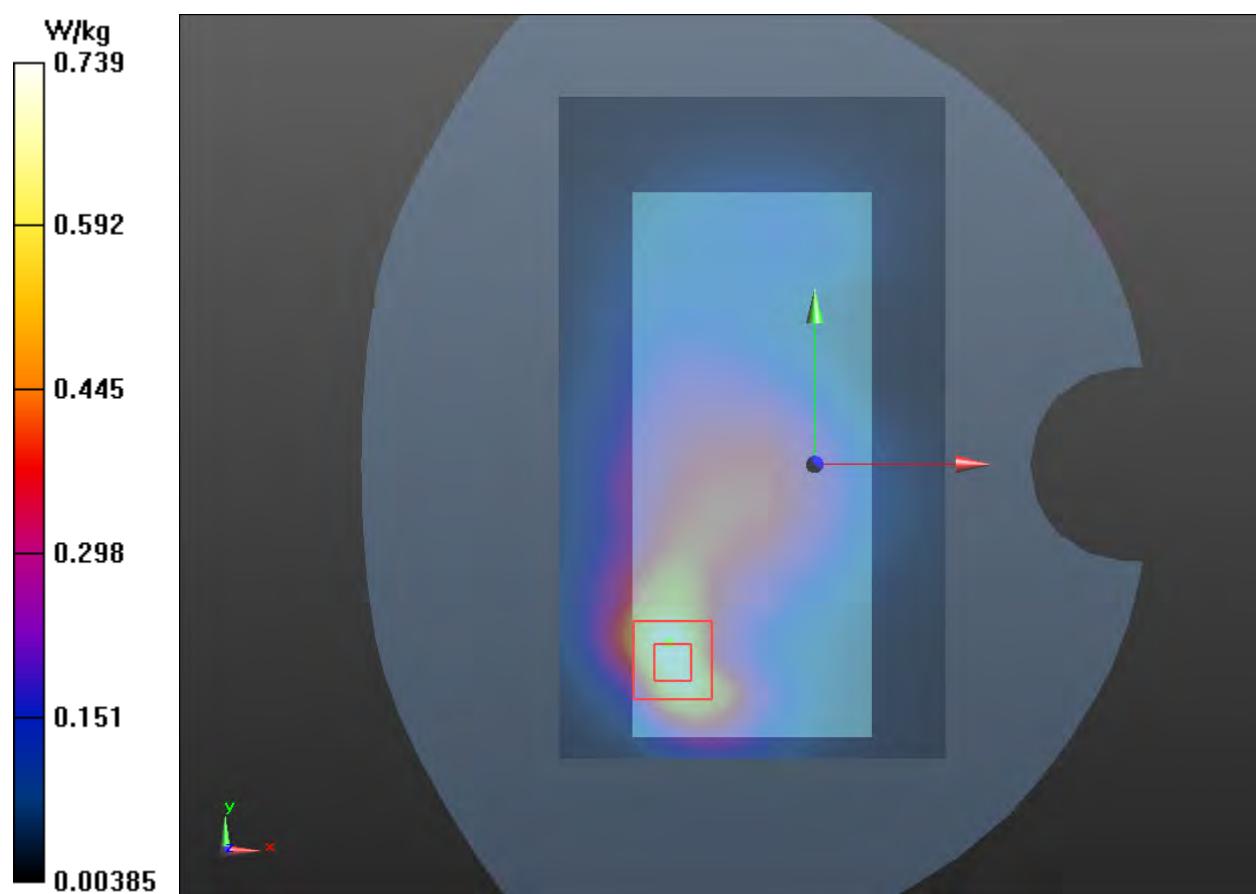
**Back Side High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 16.48 V/m; Power Drift = 0.020 dB

Peak SAR (extrapolated) = 1.21 W/kg

**SAR(1 g) = 0.696 W/kg; SAR(10 g) = 0.383 W/kg**

Maximum value of SAR (measured) = 0.780 W/kg



## Plot 35 LTE Band 5 1RB Left Cheek High

Date: 5/17/2019

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

Medium parameters used:  $f = 844 \text{ MHz}$ ;  $\sigma = 0.947 \text{ S/m}$ ;  $\epsilon_r = 41.617$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(9.08, 9.08, 9.08); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Left Cheek High/Area Scan (71x121x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.027 W/kg

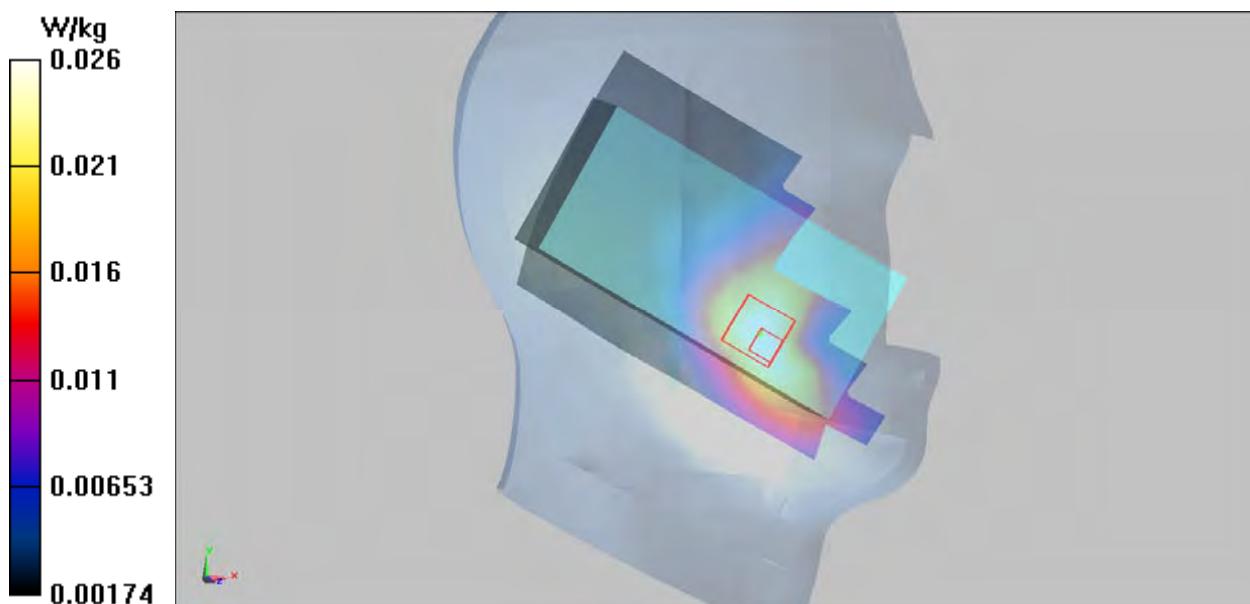
**Left Cheek High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.178 V/m; Power Drift = -0.187 dB

Peak SAR (extrapolated) = 0.0330 W/kg

**SAR(1 g) = 0.024 W/kg; SAR(10 g) = 0.018 W/kg**

Maximum value of SAR (measured) = 0.026 W/kg



## Plot 36 LTE Band 5 1RB Front Side High (Distance 10mm)

Date: 5/23/2019

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

Medium parameters used:  $f = 844 \text{ MHz}$ ;  $\sigma = 0.98 \text{ S/m}$ ;  $\epsilon_r = 53.721$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(9.04, 9.04, 9.04); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Front Side High/Area Scan (71x121x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.094 W/kg

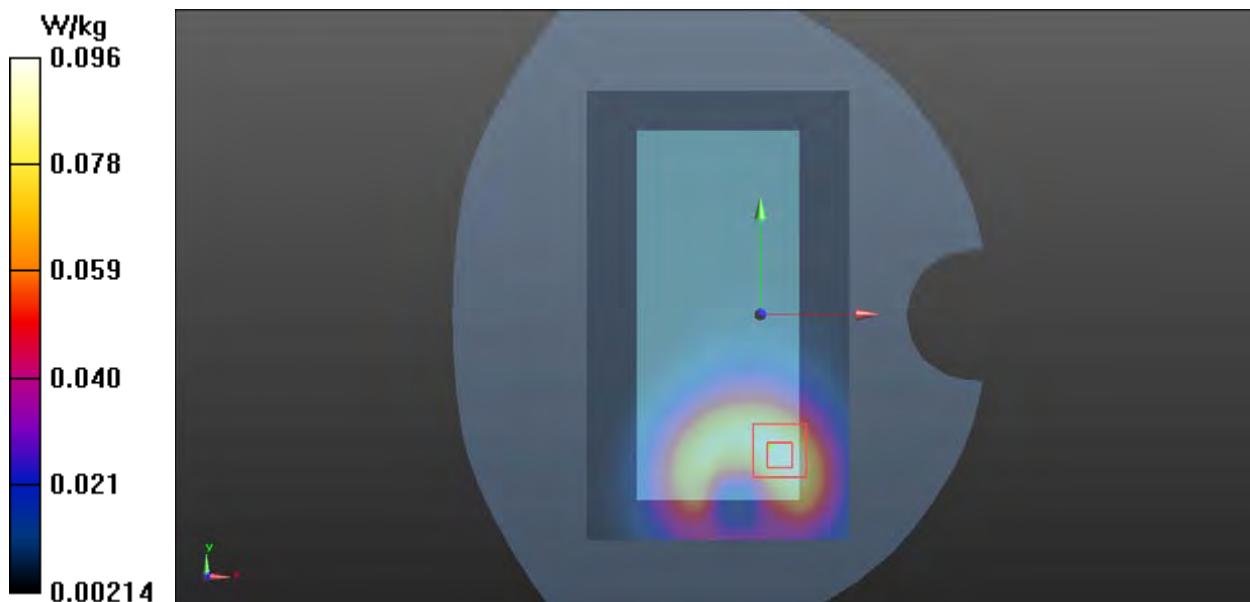
**Front Side High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 2.422 V/m; Power Drift = 0.056 dB

Peak SAR (extrapolated) = 0.142 W/kg

**SAR(1 g) = 0.089 W/kg; SAR(10 g) = 0.055 W/kg**

Maximum value of SAR (measured) = 0.096 W/kg



**Plot 37 LTE Band 7 1RB Right Cheek High**

Date: 6/12/2019

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

Medium parameters used:  $f = 2560$  MHz;  $\sigma = 1.997$  S/m;  $\epsilon_r = 40.391$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Right Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(6.94, 6.94, 6.94); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Right Cheek High/Area Scan (91x151x1):** Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 0.381 W/kg

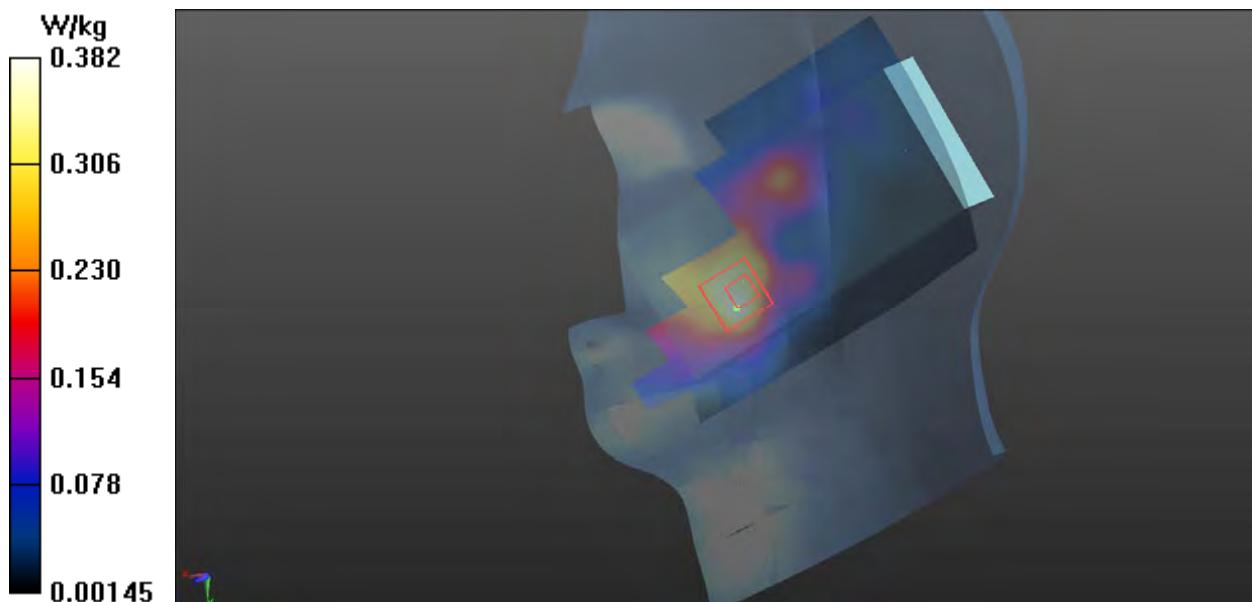
**Right Cheek High/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.147 V/m; Power Drift = 0.061 dB

Peak SAR (extrapolated) = 1.02 W/kg

**SAR(1 g) = 0.380 W/kg; SAR(10 g) = 0.189 W/kg**

Maximum value of SAR (measured) = 0.382 W/kg



**Plot 38 LTE Band 7 1RB Back Side Low(Distance 10mm)**

Date: 6/12/2019

Communication System: UID 0, LTE (0); Frequency: 2510 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 2510 \text{ MHz}$ ;  $\sigma = 2.045 \text{ S/m}$ ;  $\epsilon_r = 50.913$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(7.01, 7.01, 7.01); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Back Side Low/Area Scan (91x151x1):** Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 0.564 W/kg

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

Reference Value = 5.470 V/m; Power Drift = 0.021 dB

Peak SAR (extrapolated) = 1.18 W/kg

**SAR(1 g) = 0.543 W/kg; SAR(10 g) = 0.242 W/kg**

Maximum value of SAR (measured) = 0.580 W/kg





## Plot 39 LTE Band 12 1RB Left Cheek Middle

Date: 5/20/2019

Communication System: UID 0, LTE (0); Frequency: 707.5 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 707.5 \text{ MHz}$ ;  $\sigma = 0.867 \text{ S/m}$ ;  $\epsilon_r = 43.086$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(9.50, 9.50, 9.50); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Left Cheek Middle/Area Scan (71x121x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.0312 W/kg

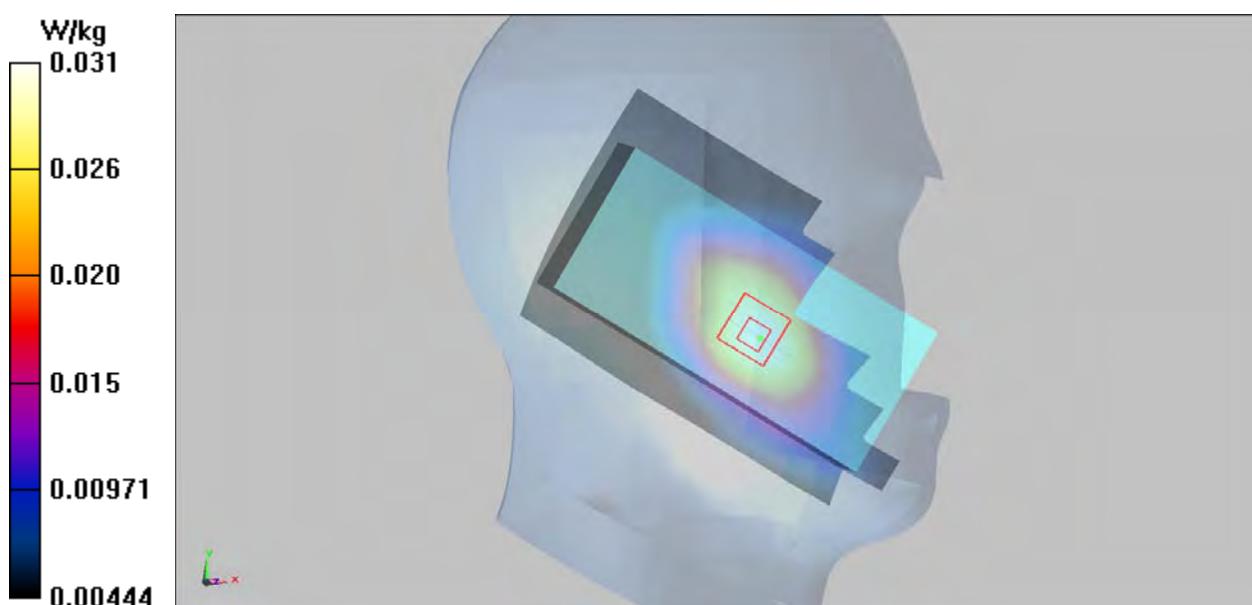
**Left Cheek Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.712 V/m; Power Drift = -0.038 dB

Peak SAR (extrapolated) = 0.0360 W/kg

**SAR(1 g) = 0.029 W/kg; SAR(10 g) = 0.022 W/kg**

Maximum value of SAR (measured) = 0.031 W/kg



**Plot 40 LTE Band 12 50%RB Back Side Middle (Distance 10mm)**

Date: 5/31/2019

Communication System: UID 0, LTE (0); Frequency: 707.5 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 707.5$  MHz;  $\sigma = 0.929$  S/m;  $\epsilon_r = 57.347$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(9.19, 9.19, 9.19); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Back Side Middle/Area Scan (71x121x1):** Interpolated grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.0561 W/kg

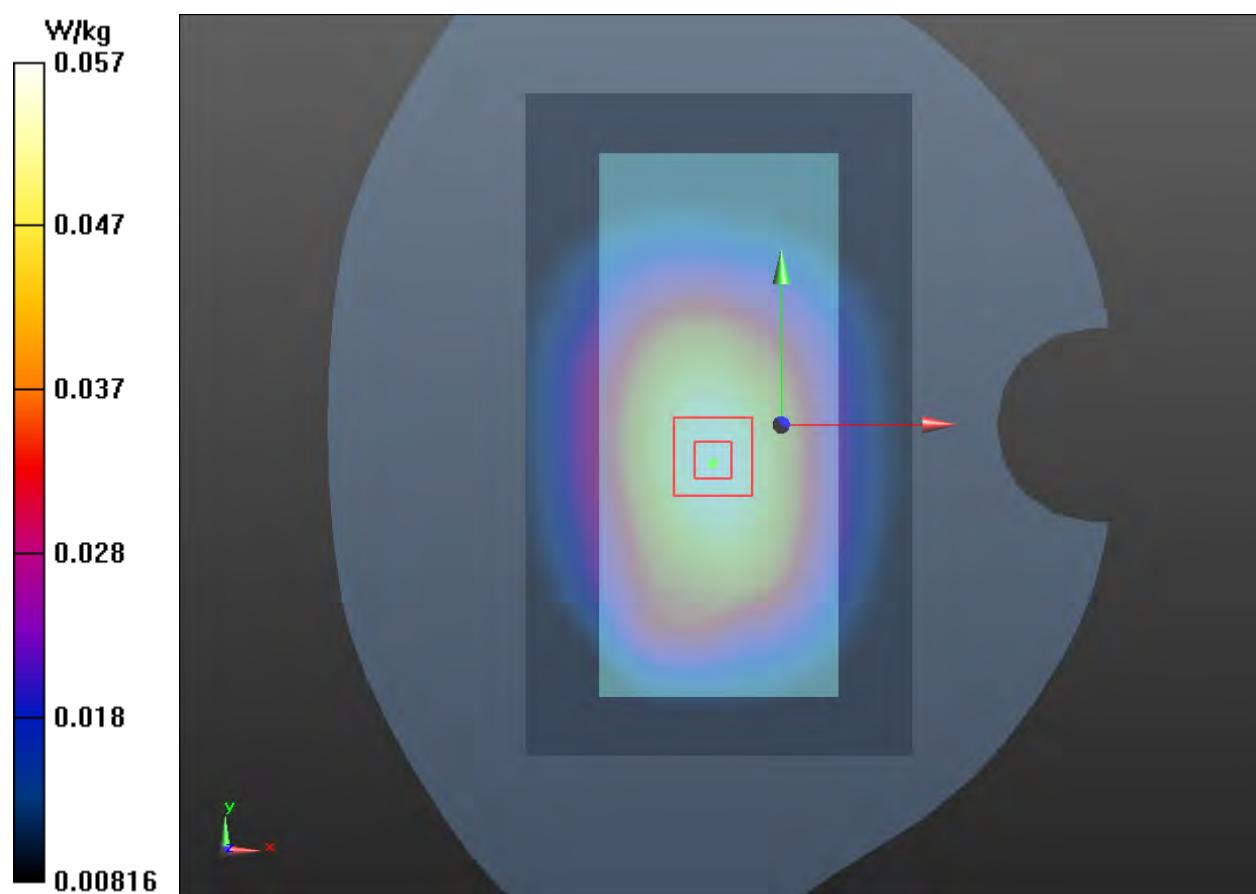
**Back Side Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.699 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.0700 W/kg

**SAR(1 g) = 0.054 W/kg; SAR(10 g) = 0.041 W/kg**

Maximum value of SAR (measured) = 0.057 W/kg



## Plot 41 LTE Band 13 1RB Left Cheek Middle

Date: 5/20/2019

Communication System: UID 0, LTE (0); Frequency: 782 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 782 \text{ MHz}$ ;  $\sigma = 0.905 \text{ S/m}$ ;  $\epsilon_r = 41.947$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(9.50, 9.50, 9.50); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Left Cheek Middle/Area Scan (71x121x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.0240 W/kg

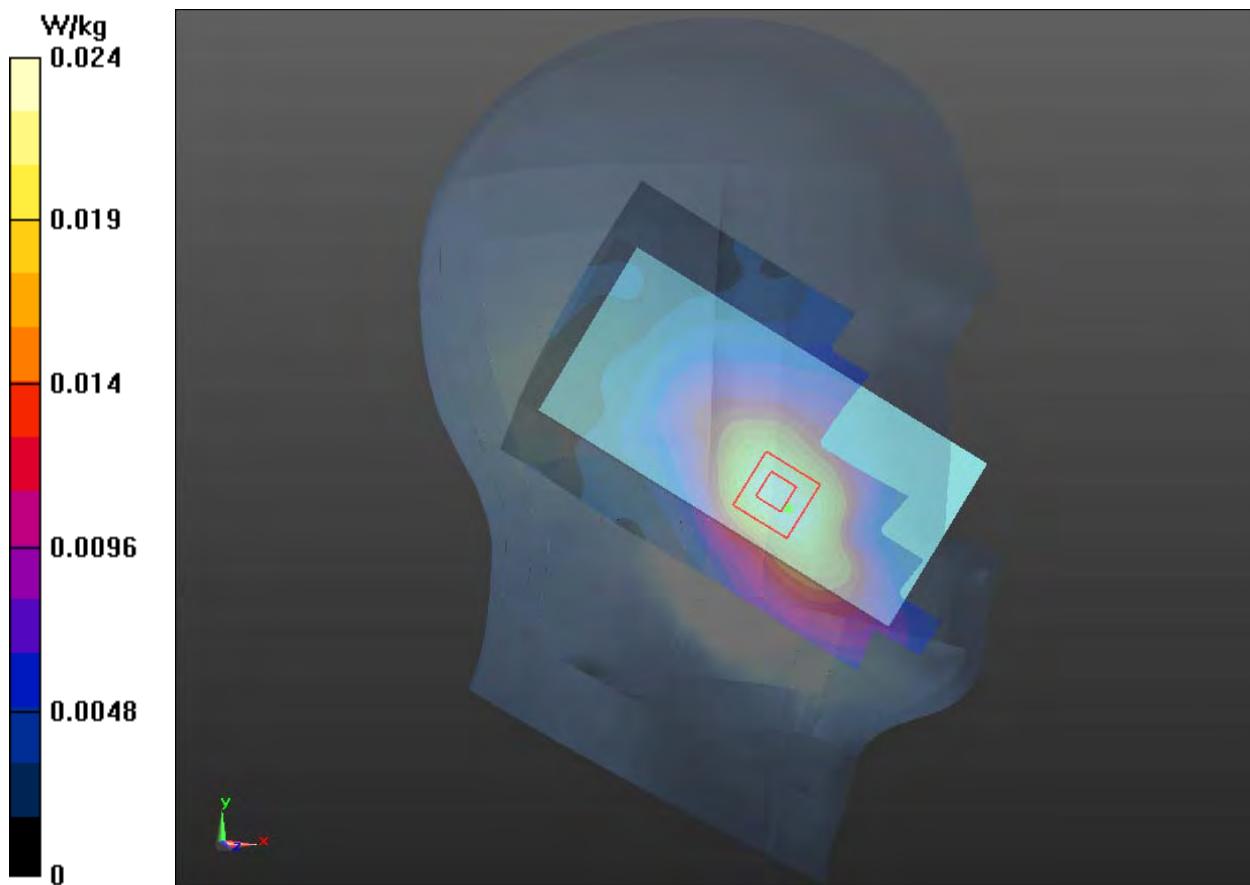
**Left Cheek Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.031 V/m; Power Drift = 0.025 dB

Peak SAR (extrapolated) = 0.0290 W/kg

**SAR(1 g) = 0.022 W/kg; SAR(10 g) = 0.017 W/kg**

Maximum value of SAR (measured) = 0.024 W/kg



**Plot 42 LTE Band 13 1RB Back Side Middle (Distance 10mm)**

Date: 5/31/2019

Communication System: UID 0, LTE (0); Frequency: 782 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 782$  MHz;  $\sigma = 0.999$  S/m;  $\epsilon_r = 56.755$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(9.19, 9.19, 9.19); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Back Side Middle/Area Scan (71x121x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.0551 W/kg

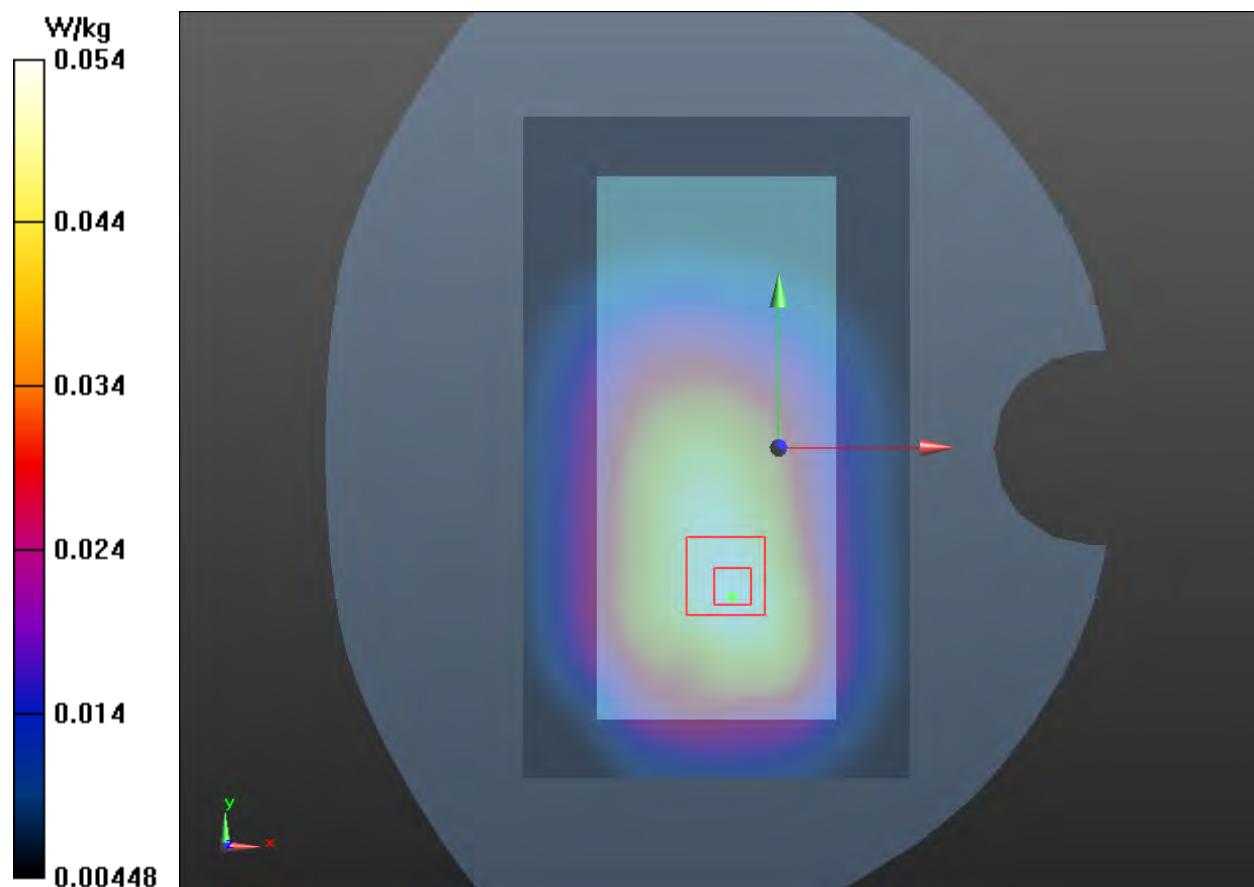
**Back Side Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.511 V/m; Power Drift = 0.037 dB

Peak SAR (extrapolated) = 0.0670 W/kg

**SAR(1 g) = 0.051 W/kg; SAR(10 g) = 0.037 W/kg**

Maximum value of SAR (measured) = 0.054 W/kg



**Plot 43 LTE Band 25 1RB Left Cheek Middle**

Date: 6/13/2019

Communication System: UID 0, LTE (0); Frequency: 1882.5 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 1882.5 \text{ MHz}$ ;  $\sigma = 1.395 \text{ S/m}$ ;  $\epsilon_r = 38.345$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(7.78, 7.78, 7.78); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Left Cheek Middle/Area Scan (71x121x1):** Interpolated grid: dx=15mm, dy=15mm

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

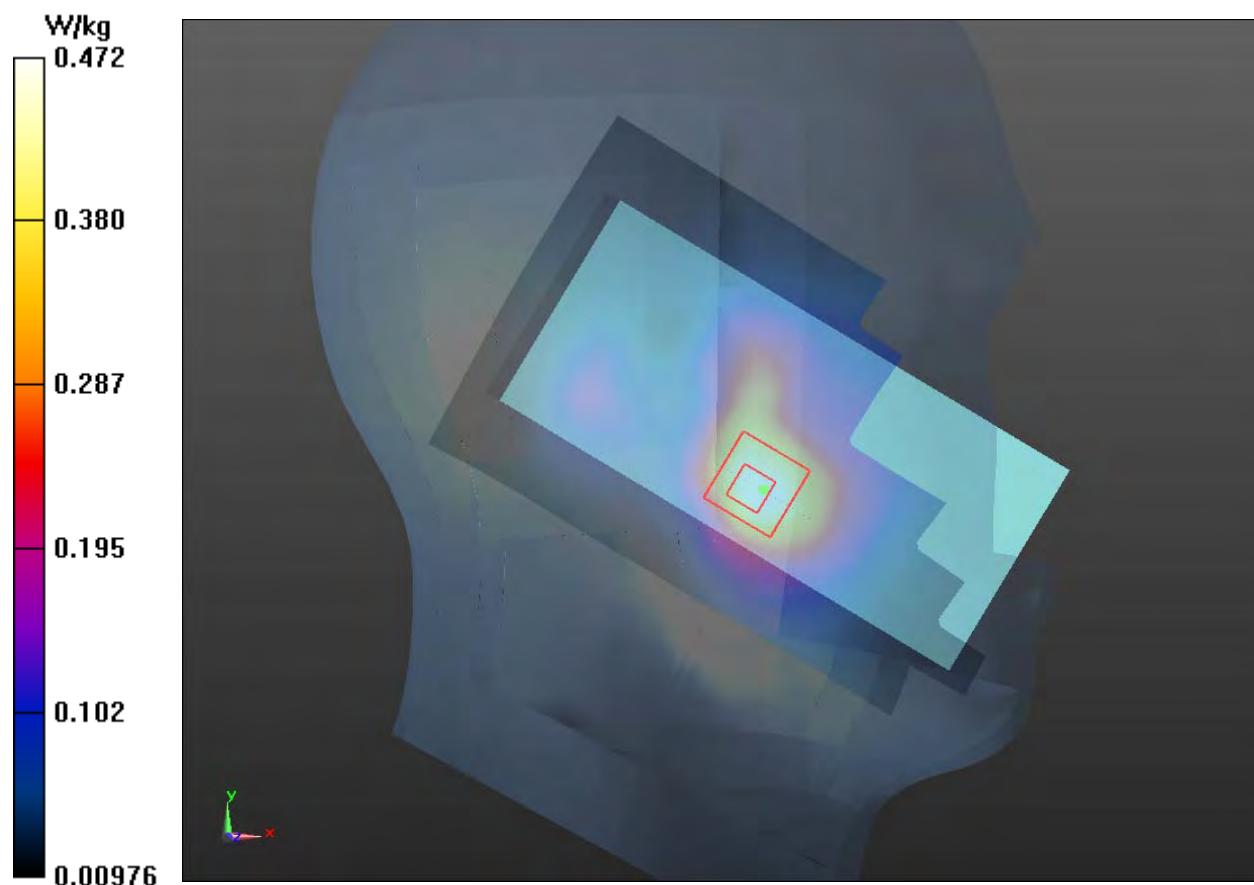
**Left Cheek Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.080 V/m; Power Drift = 0.16 dB

Peak SAR (extrapolated) = 0.691 W/kg

**SAR(1 g) = 0.446 W/kg; SAR(10 g) = 0.268 W/kg**

Maximum value of SAR (measured) = 0.472 W/kg



**Plot 44 LTE Band 25 1RB Back Side High (Distance 10mm)**

Date: 5/19/2019

Communication System: UID 0, LTE (0); Frequency: 1905 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1905 \text{ MHz}$ ;  $\sigma = 1.513 \text{ S/m}$ ;  $\epsilon_r = 52.804$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(7.37, 7.37, 7.37); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Back Side High/Area Scan (71x121x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.863 W/kg

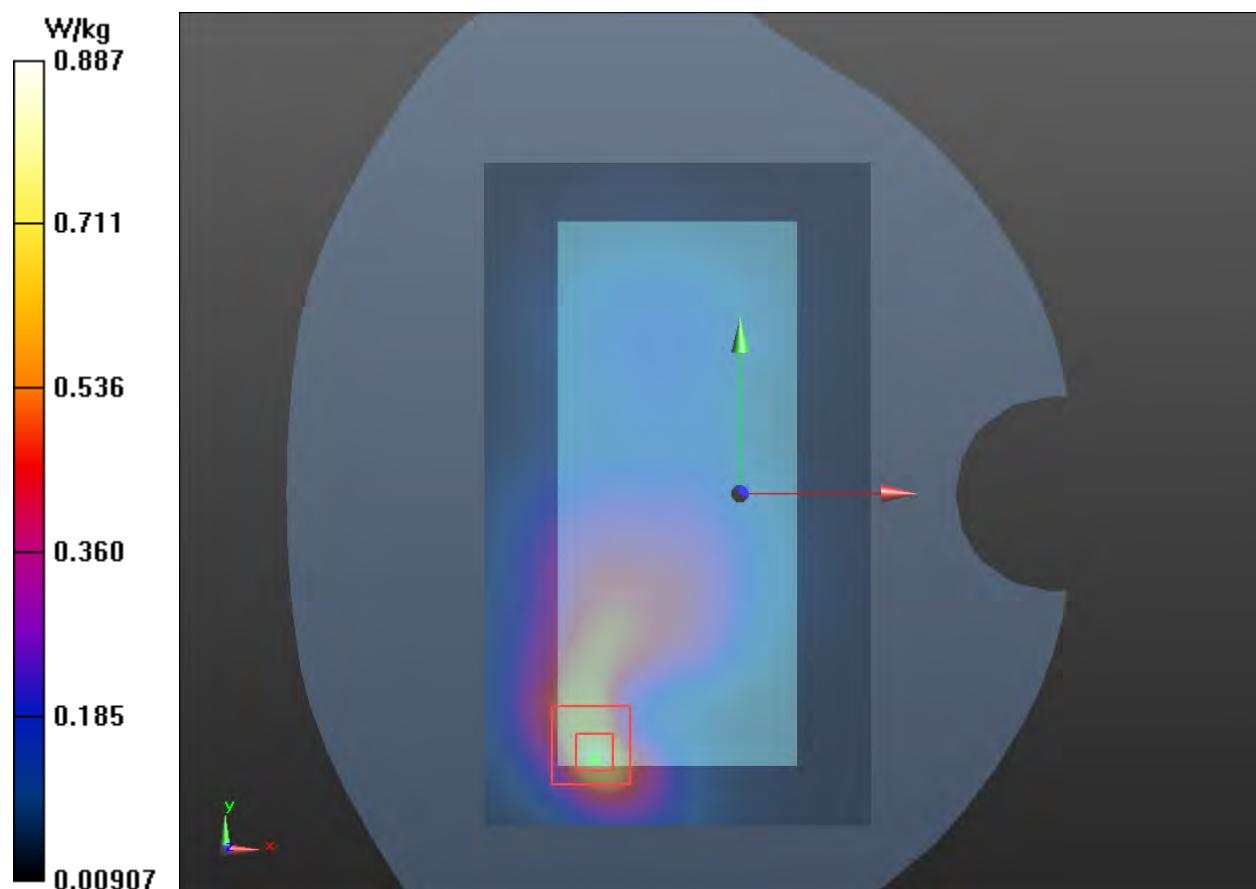
**Back Side High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 12.34 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 1.42 W/kg

**SAR(1 g) = 0.772 W/kg; SAR(10 g) = 0.401 W/kg**

Maximum value of SAR (measured) = 0.887 W/kg



## Plot 45 LTE Band 26 1RB Left Cheek High

Date: 5/17/2019

Communication System: UID 0, LTE (0); Frequency: 841.5 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 841.5 \text{ MHz}$ ;  $\sigma = 0.946 \text{ S/m}$ ;  $\epsilon_r = 41.631$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(9.08, 9.08, 9.08); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Left Cheek High/Area Scan (71x121x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.0345 W/kg

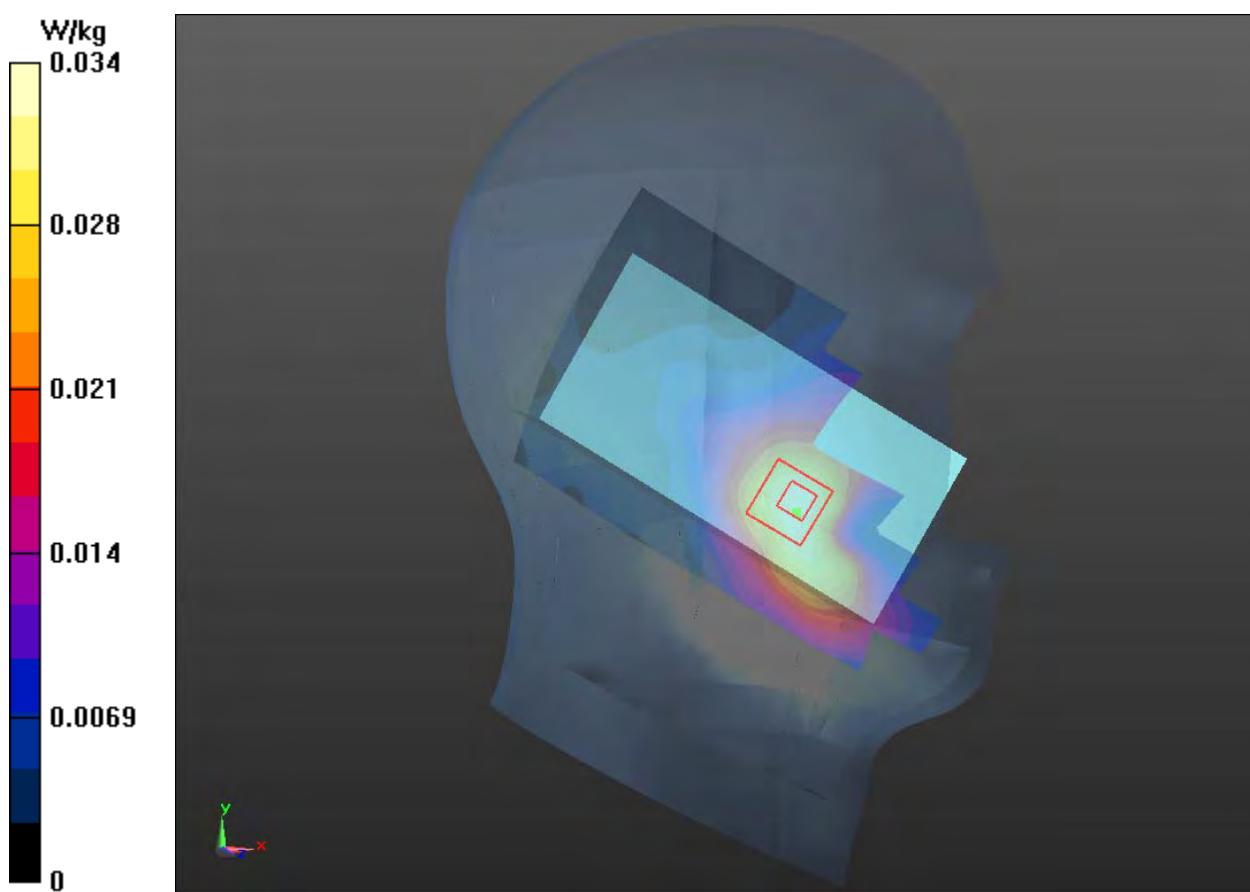
**Left Cheek High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.636 V/m; Power Drift = 0.050 dB

Peak SAR (extrapolated) = 0.0410 W/kg

**SAR(1 g) = 0.031 W/kg; SAR(10 g) = 0.022 W/kg**

Maximum value of SAR (measured) = 0.034 W/kg



**Plot 46 LTE Band 26 1RB Front Side High (Distance 10mm)**

Date: 5/23/2019

Communication System: UID 0, LTE (0); Frequency: 841.5 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 841.5$  MHz;  $\sigma = 0.978$  S/m;  $\epsilon_r = 53.749$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(9.04, 9.04, 9.04); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Front Side High/Area Scan (71x121x1):** Interpolated grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.112 W/kg

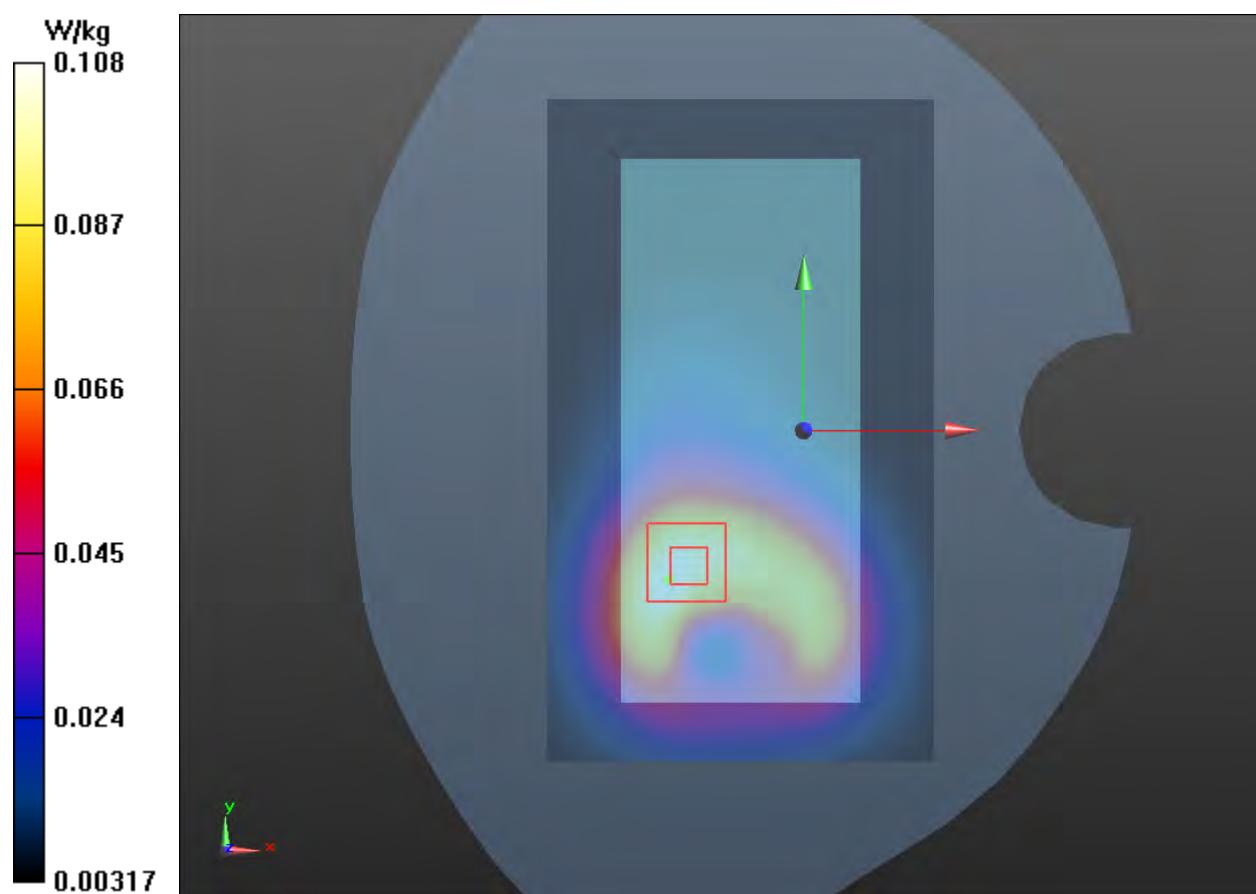
**Front Side High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.833 V/m; Power Drift = 0.026 dB

Peak SAR (extrapolated) = 0.156 W/kg

**SAR(1 g) = 0.103 W/kg; SAR(10 g) = 0.065 W/kg**

Maximum value of SAR (measured) = 0.108 W/kg



## Plot 47 LTE Band 41 1RB Right Cheek Low

Date: 6/12/2019

Communication System: UID 0, LTE (0); Frequency: 2549.5 MHz; Duty Cycle: 1:1.58

Medium parameters used:  $f = 2549.5 \text{ MHz}$ ;  $\sigma = 1.952 \text{ S/m}$ ;  $\epsilon_r = 39.367$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Right Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(6.94, 6.94, 6.94); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Right Cheek Low/Area Scan (91x151x1):** Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 0.124 W/kg

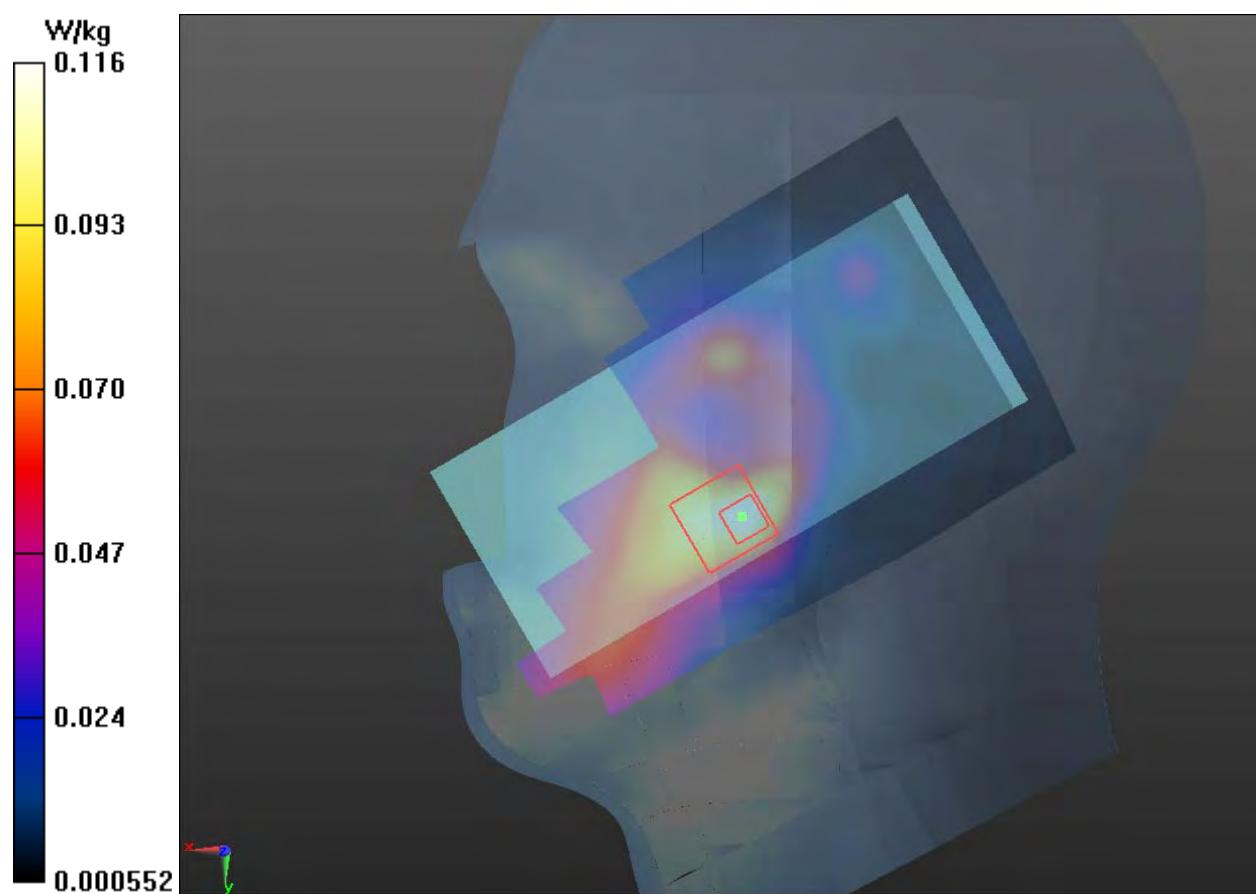
**Right Cheek Low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 1.931 V/m; Power Drift = 0.127 dB

Peak SAR (extrapolated) = 0.200 W/kg

**SAR(1 g) = 0.105 W/kg; SAR(10 g) = 0.056 W/kg**

Maximum value of SAR (measured) = 0.116 W/kg



**Plot 48 LTE Band 41 50%RB Back Side Middle (Distance 10mm)**

Date: 6/12/2019

Communication System: UID 0, LTE (0); Frequency: 2636.5 MHz; Duty Cycle: 1:1.58

Medium parameters used (interpolated):  $f = 2636.5$  MHz;  $\sigma = 2.201$  S/m;  $\epsilon_r = 50.553$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(7.01, 7.01, 7.01); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Back Side Middle/Area Scan (91x151x1):** Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 0.929 W/kg

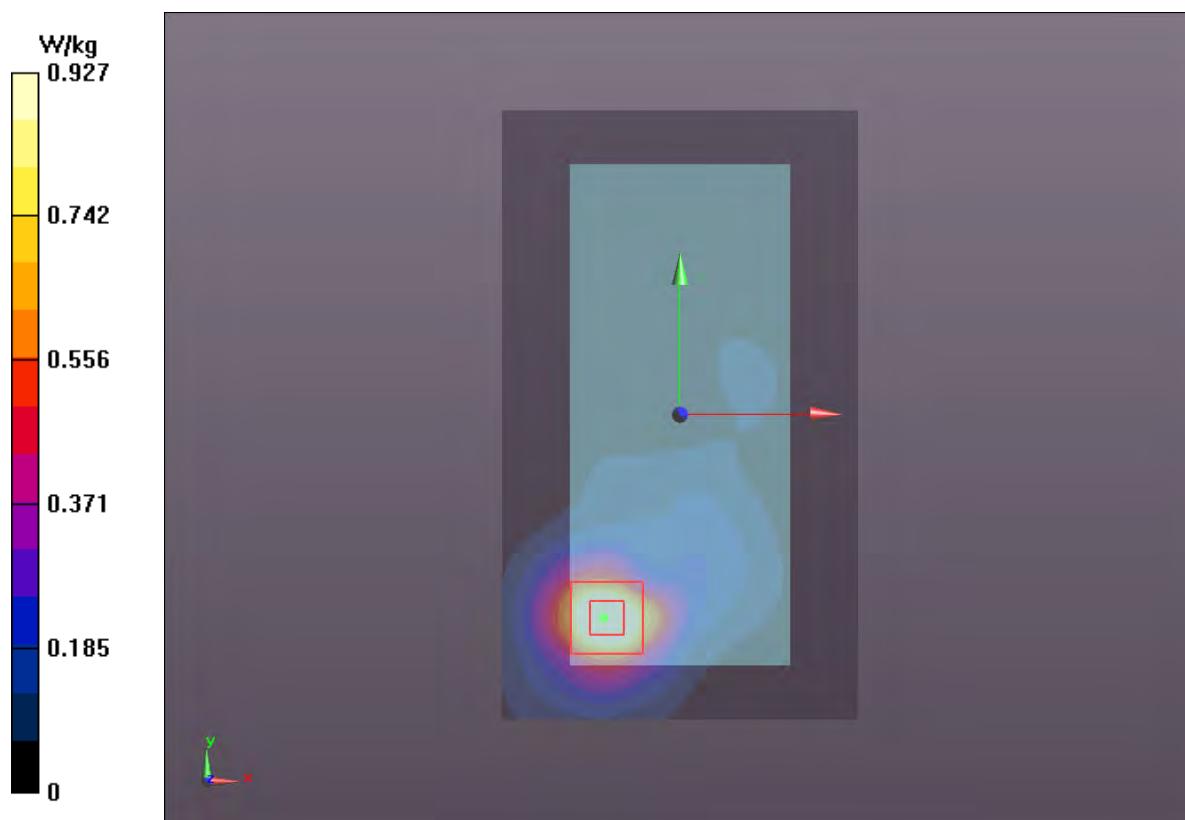
**Back Side Middle/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.475 V/m; Power Drift = 0.065 dB

Peak SAR (extrapolated) = 1.67 W/kg

**SAR(1 g) = 0.897 W/kg; SAR(10 g) = 0.497 W/kg**

Maximum value of SAR (measured) = 0.927 W/kg



**Plot 49 LTE Band 66 1RB Right Cheek Low**

Date: 5/21/2019

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

Medium parameters used:  $f = 1720 \text{ MHz}$ ;  $\sigma = 1.284 \text{ S/m}$ ;  $\epsilon_r = 38.855$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Right Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(8.10, 8.10, 8.10); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Right Cheek Low/Area Scan (71x121x1):** Interpolated grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.329 W/kg

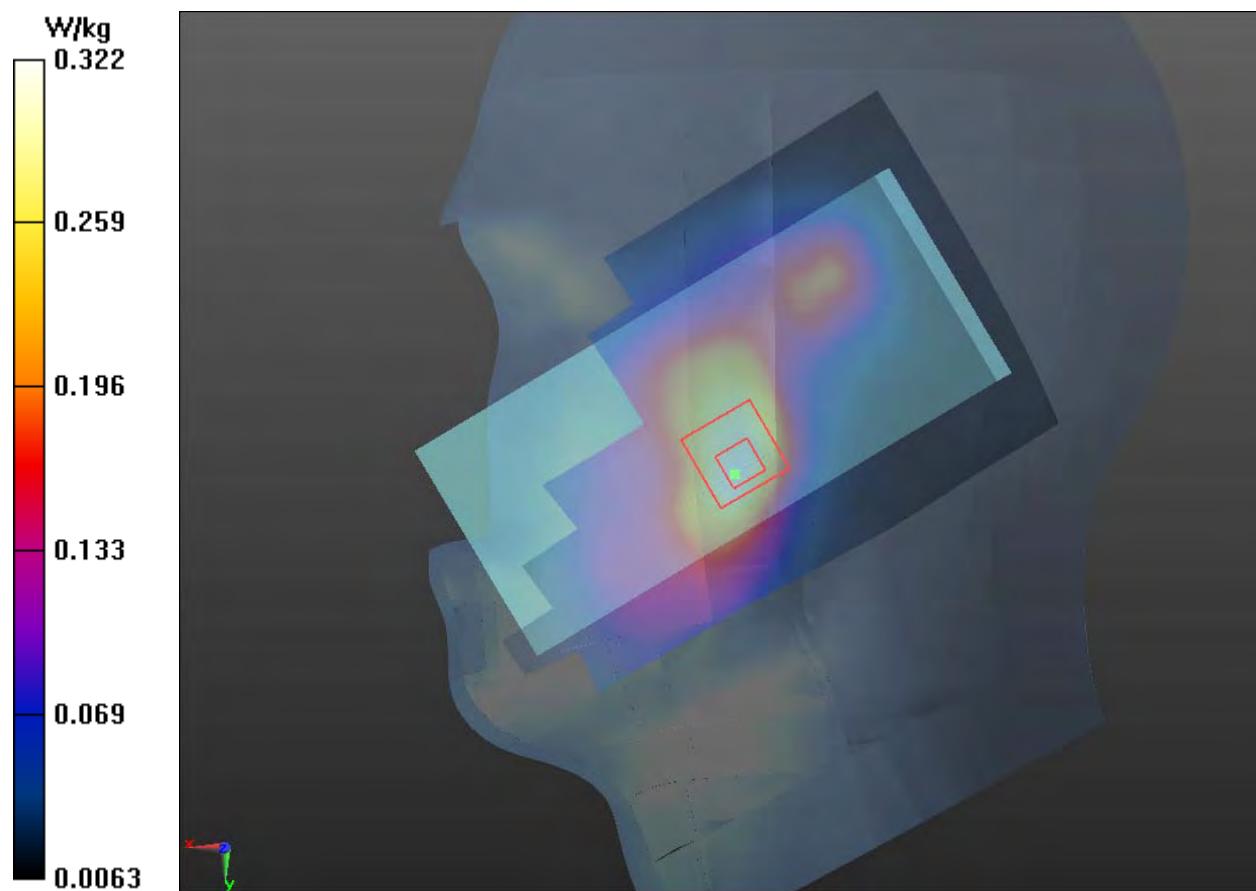
**Right Cheek Low/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.263 V/m; Power Drift = 0.074 dB

Peak SAR (extrapolated) = 0.439 W/kg

**SAR(1 g) = 0.300 W/kg; SAR(10 g) = 0.190 W/kg**

Maximum value of SAR (measured) = 0.322 W/kg



## Plot 50 LTE Band 66 1RB Back Side High (Distance 10mm)

Date: 6/3/2019

Communication System: UID 0, LTE (0); Frequency: 1770 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1770 \text{ MHz}$ ;  $\sigma = 1.456 \text{ S/m}$ ;  $\epsilon_r = 51.42$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(7.68, 7.68, 7.68); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Back Side High/Area Scan (71x121x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.730 W/kg

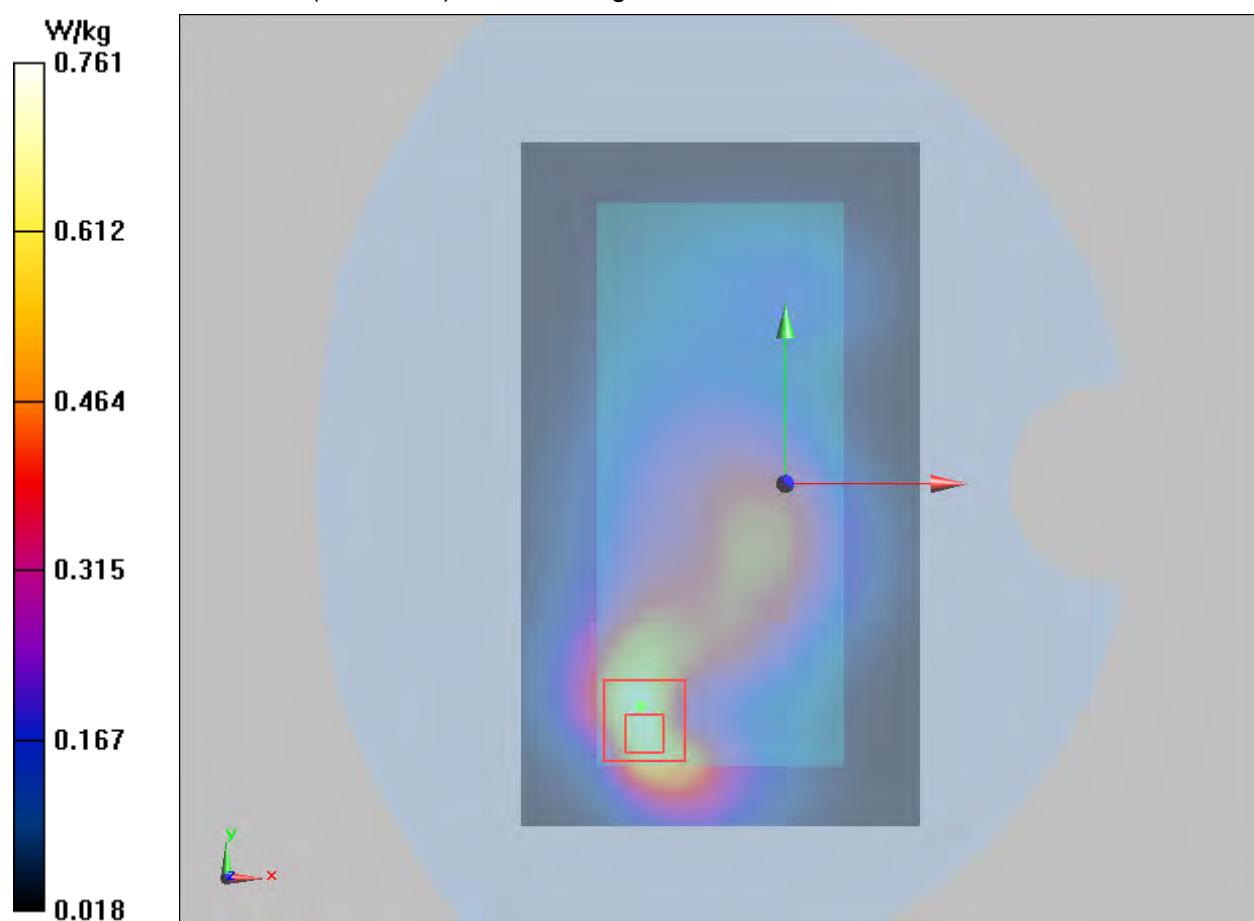
**Back Side High/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 15.97 V/m; Power Drift = -0.023 dB

Peak SAR (extrapolated) = 1.19 W/kg

**SAR(1 g) = 0.674 W/kg; SAR(10 g) = 0.372 W/kg**

Maximum value of SAR (measured) = 0.761 W/kg





## Plot 51 LTE Band 71 1RB Right Cheek Middle

Date: 5/20/2019

Communication System: UID 0, LTE (0); Frequency: 683 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 683 \text{ MHz}$ ;  $\sigma = 0.855 \text{ S/m}$ ;  $\epsilon_r = 42.676$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Right Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(9.50, 9.50, 9.50); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Right Cheek Middle/Area Scan (71x121x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.026 W/kg

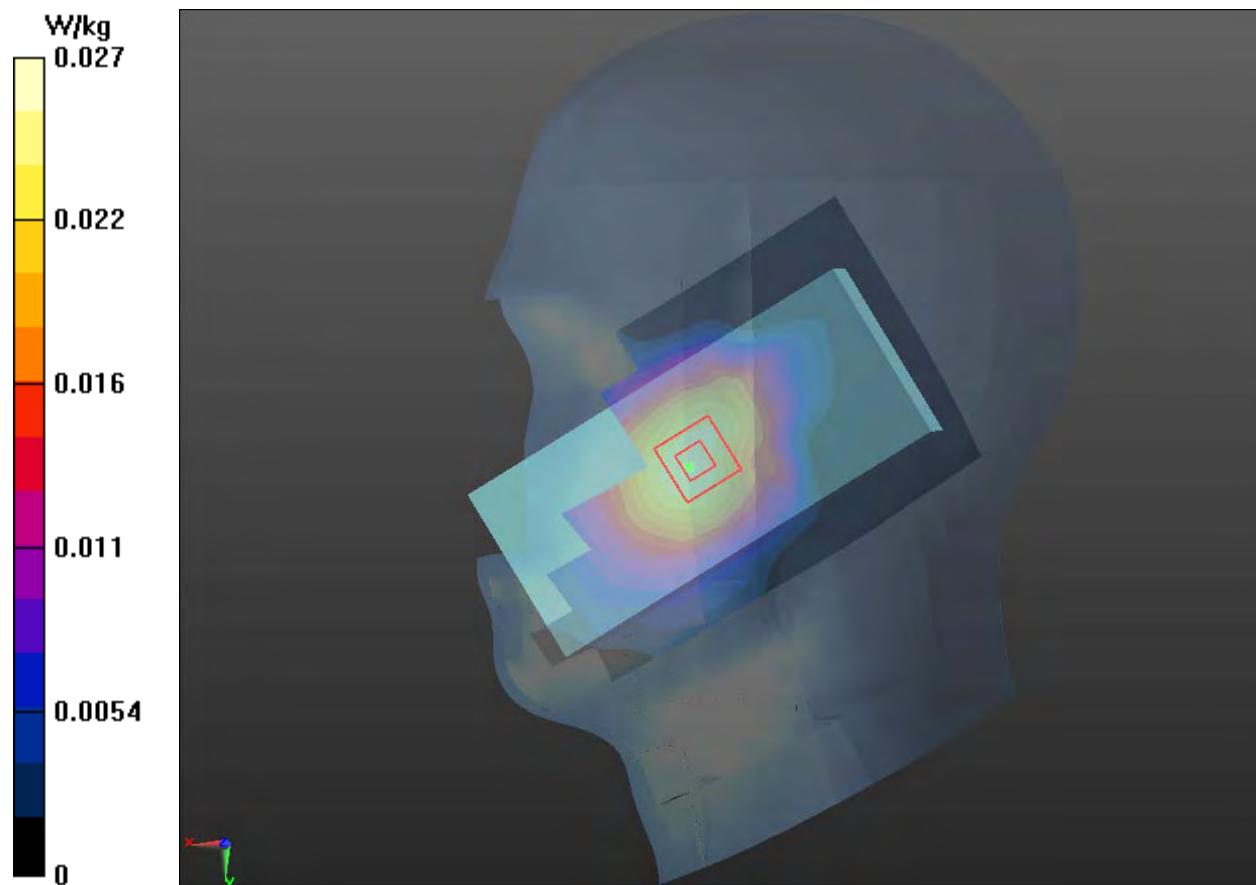
**Right Cheek Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 1.272 V/m; Power Drift = 0.034 dB

Peak SAR (extrapolated) = 0.0320 W/kg

**SAR(1 g) = 0.026 W/kg; SAR(10 g) = 0.019 W/kg**

Maximum value of SAR (measured) = 0.0270 W/kg



**Plot 52 LTE Band 71 1RB Back Side Middle (Distance 10mm)**

Date: 5/31/2019

Communication System: UID 0, LTE (0); Frequency: 683 MHz; Duty Cycle: 1:1

Medium parameters used (extrapolated):  $f = 683 \text{ MHz}$ ;  $\sigma = 0.917 \text{ S/m}$ ;  $\epsilon_r = 57.586$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(9.19, 9.19, 9.19); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Back Side Middle/Area Scan (71x121x1):** Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.0755 W/kg

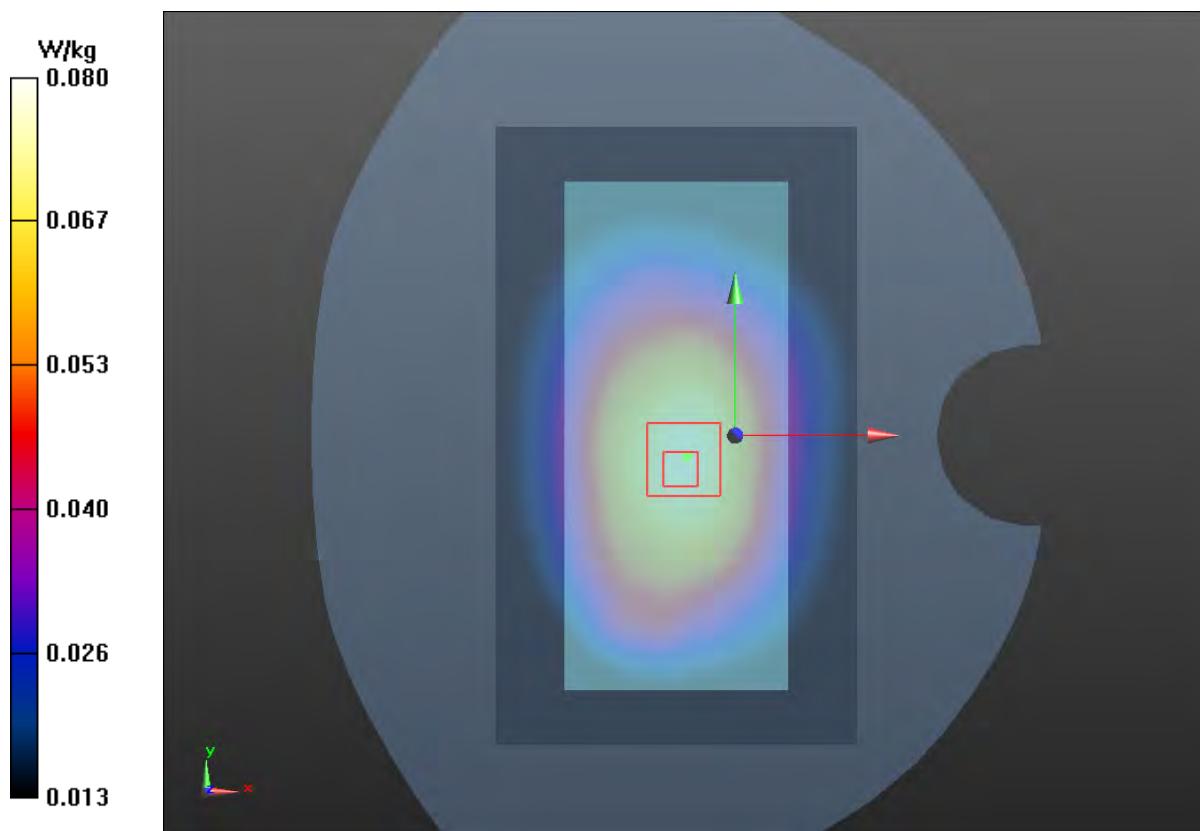
**Back Side Middle/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.029 V/m; Power Drift = 0.032 dB

Peak SAR (extrapolated) = 0.100 W/kg

**SAR(1 g) = 0.077 W/kg; SAR(10 g) = 0.057 W/kg**

Maximum value of SAR (measured) = 0.080 W/kg



## Plot 53 802.11b Right Cheek High

Date: 6/25/2019

Communication System: UID 0, 802.11b (0); Frequency: 2462 MHz; Duty Cycle: 1:1.0309

Medium parameters used:  $f = 2462 \text{ MHz}$ ;  $\sigma = 1.886 \text{ S/m}$ ;  $\epsilon_r = 40.724$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Right Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(7.08, 7.08, 7.08); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Right Cheek Low/Area Scan (81x151x1):** Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 0.227 W/kg

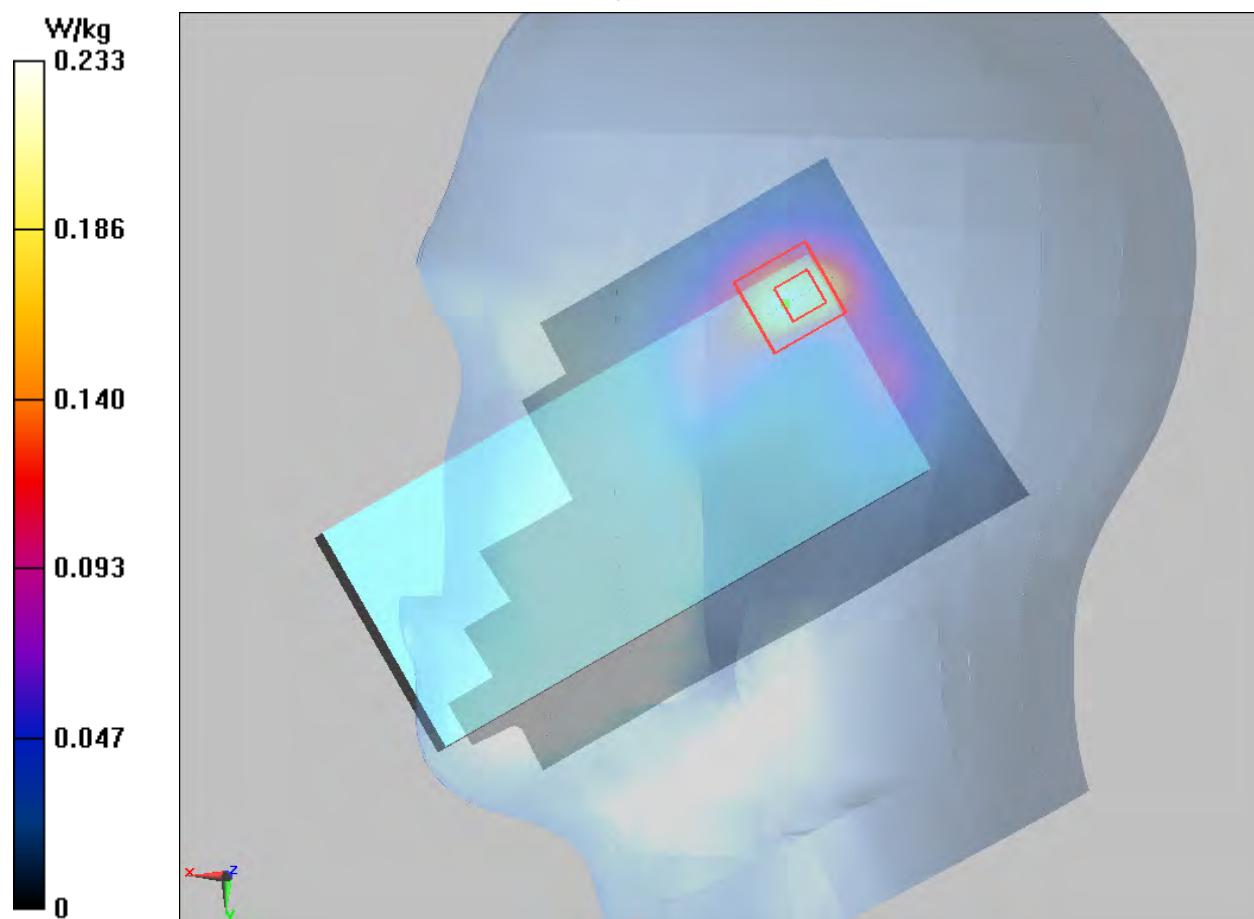
**Right Cheek Low/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.986 V/m; Power Drift = 0.037 dB

Peak SAR (extrapolated) = 0.585 W/kg

**SAR(1 g) = 0.207 W/kg; SAR(10 g) = 0.082 W/kg**

Maximum value of SAR (measured) = 0.233 W/kg



## Plot 54 802.11b Front Side High (Distance 15mm)

Date: 6/25/2019

Communication System: UID 0, 802.11b (0); Frequency: 2462 MHz; Duty Cycle: 1:1.0309

Medium parameters used:  $f = 2462 \text{ MHz}$ ;  $\sigma = 1.99 \text{ S/m}$ ;  $\epsilon_r = 51.059$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(7.19, 7.19, 7.19); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Front Side Low /Area Scan (81x151x1):** Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 0.120 W/kg

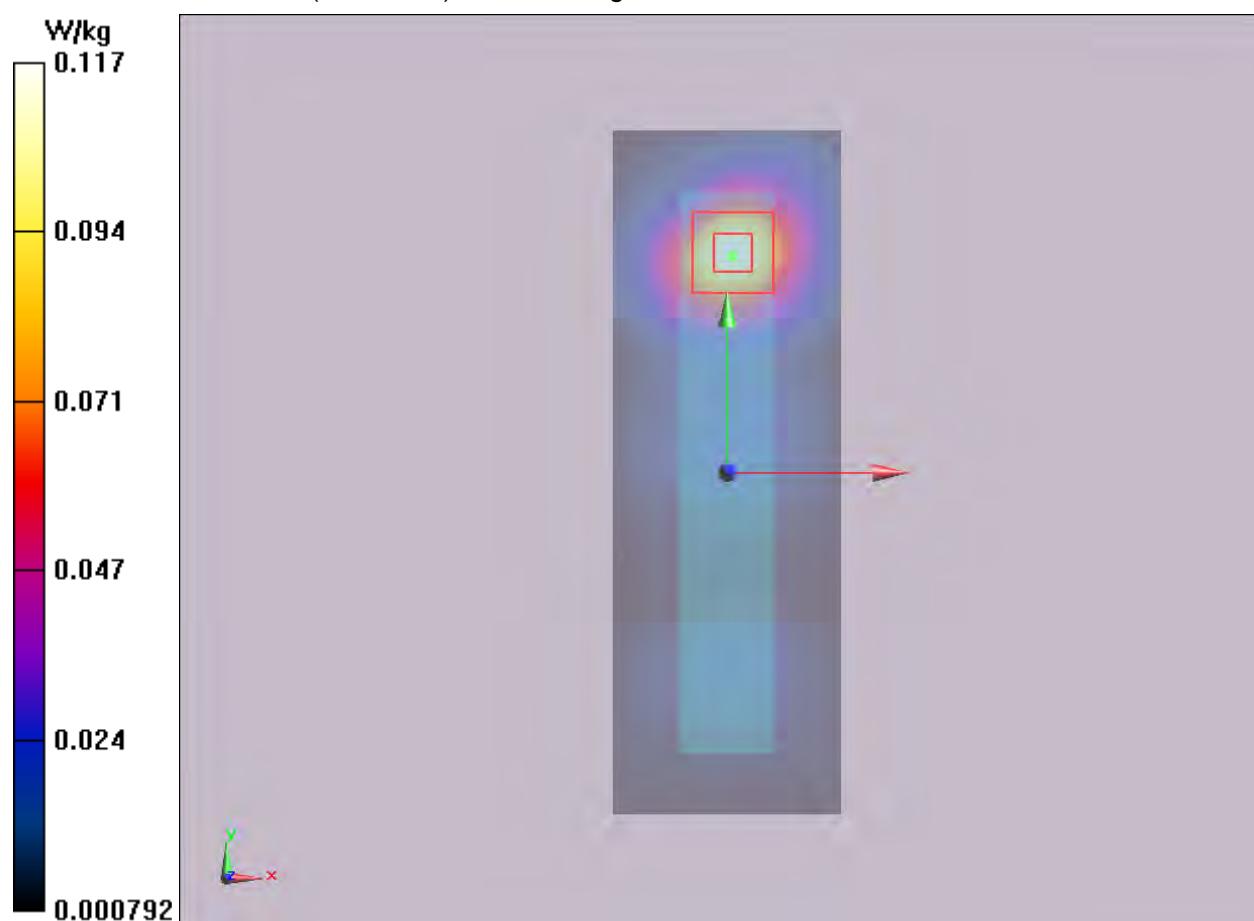
**Front Side Low /Zoom Scan (8x9x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.134 V/m; Power Drift = -0.19 dB

Peak SAR (extrapolated) = 0.209 W/kg

**SAR(1 g) = 0.105 W/kg; SAR(10 g) = 0.052 W/kg**

Maximum value of SAR (measured) = 0.117 W/kg



**Plot 55 802.11b Left Edge Low (Distance 10mm)**

Date: 6/25/2019

Communication System: UID 0, 802.11b (0); Frequency: 2412 MHz; Duty Cycle: 1:1.03093

Medium parameters used:  $f = 2412 \text{ MHz}$ ;  $\sigma = 1.949 \text{ S/m}$ ;  $\epsilon_r = 53.828$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(7.19, 7.19, 7.19); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Left Edge Low /Area Scan (41x151x1):** Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 0.0818 W/kg

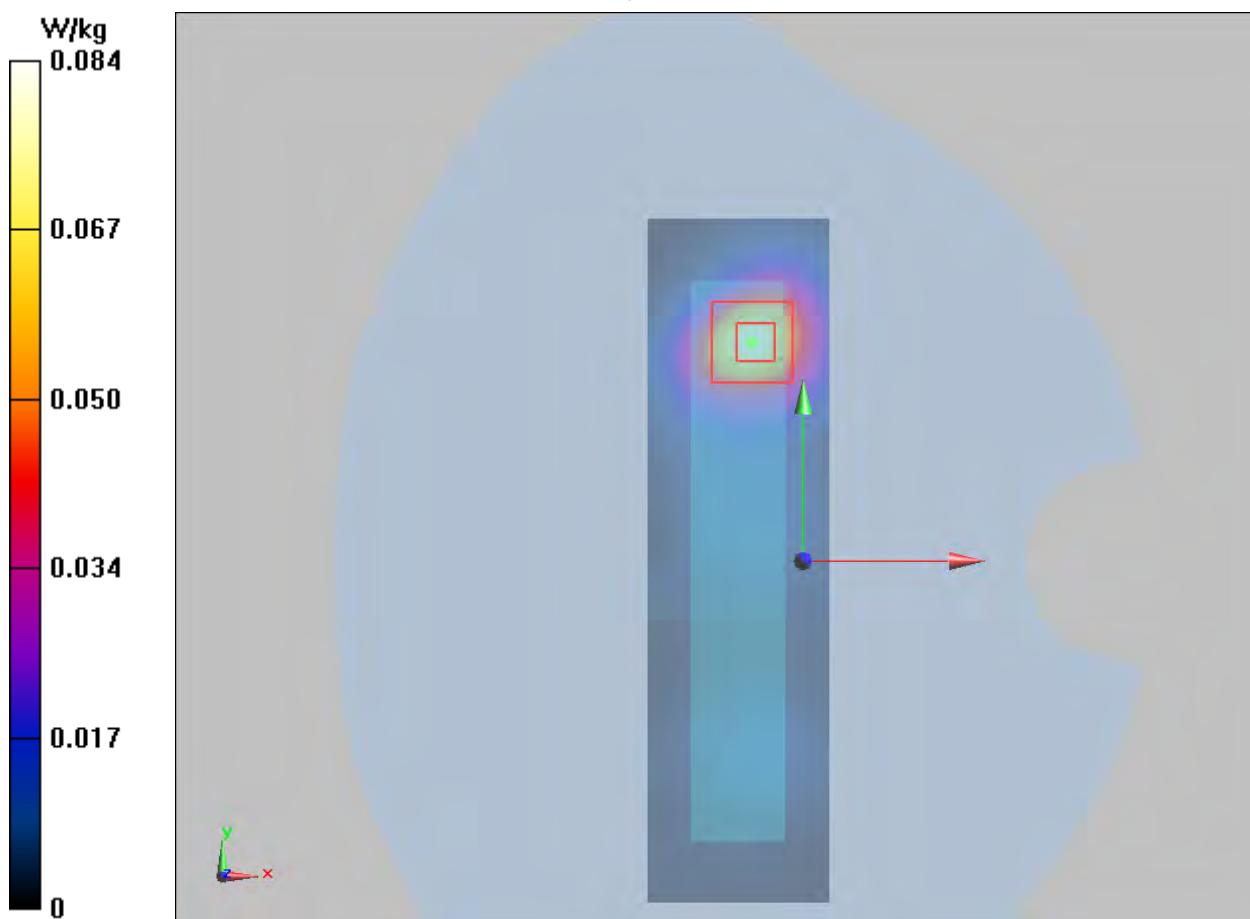
**Left Edge Low /Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 1.906 V/m; Power Drift = -0.18 dB

Peak SAR (extrapolated) = 0.102 W/kg

**SAR(1 g) = 0.053 W/kg; SAR(10 g) = 0.026 W/kg**

Maximum value of SAR (measured) = 0.0841 W/kg



**Plot 56 802.11a U-NII-2A Right Tilt CH54**

Date: 5/27/2019

Communication System: UID 0, 802.11nHT40 (0); Frequency: 5270 MHz; Duty Cycle: 1:1.31522

Medium parameters used:  $f = 5270 \text{ MHz}$ ;  $\sigma = 4.553 \text{ S/m}$ ;  $\epsilon_r = 36.056$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Right Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(4.70, 4.70, 4.70); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Right Tilt CH54/Area Scan (91x161x1):** Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 0.156 W/kg

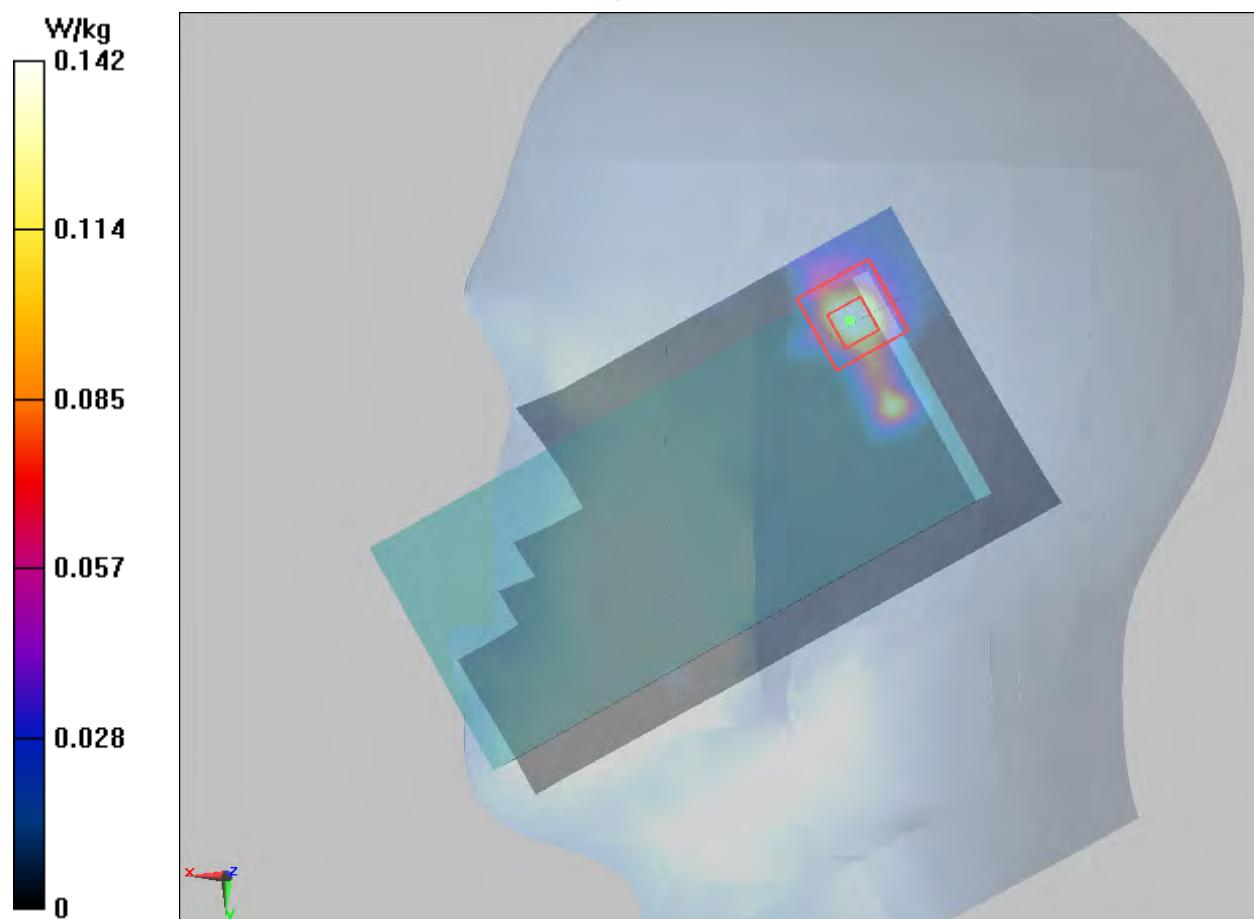
**Right Tilt CH54/Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 4.781 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 0.214 W/kg

**SAR(1 g) = 0.055 W/kg; SAR(10 g) = 0.016 W/kg**

Maximum value of SAR (measured) = 0.142 W/kg



**Plot 57 802.11a U-NII-2A Back Side CH54 (Distance 15mm)**

Date: 5/27/2019

Communication System: UID 0, 802.11nHT40 (0); Frequency: 5270 MHz; Duty Cycle: 1:1.31522

Medium parameters used:  $f = 5270 \text{ MHz}$ ;  $\sigma = 5.468 \text{ S/m}$ ;  $\epsilon_r = 48.207$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(4.09, 4.09, 4.09); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Back Side CH54/Area Scan (91x161x1):** Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 0.142 W/kg

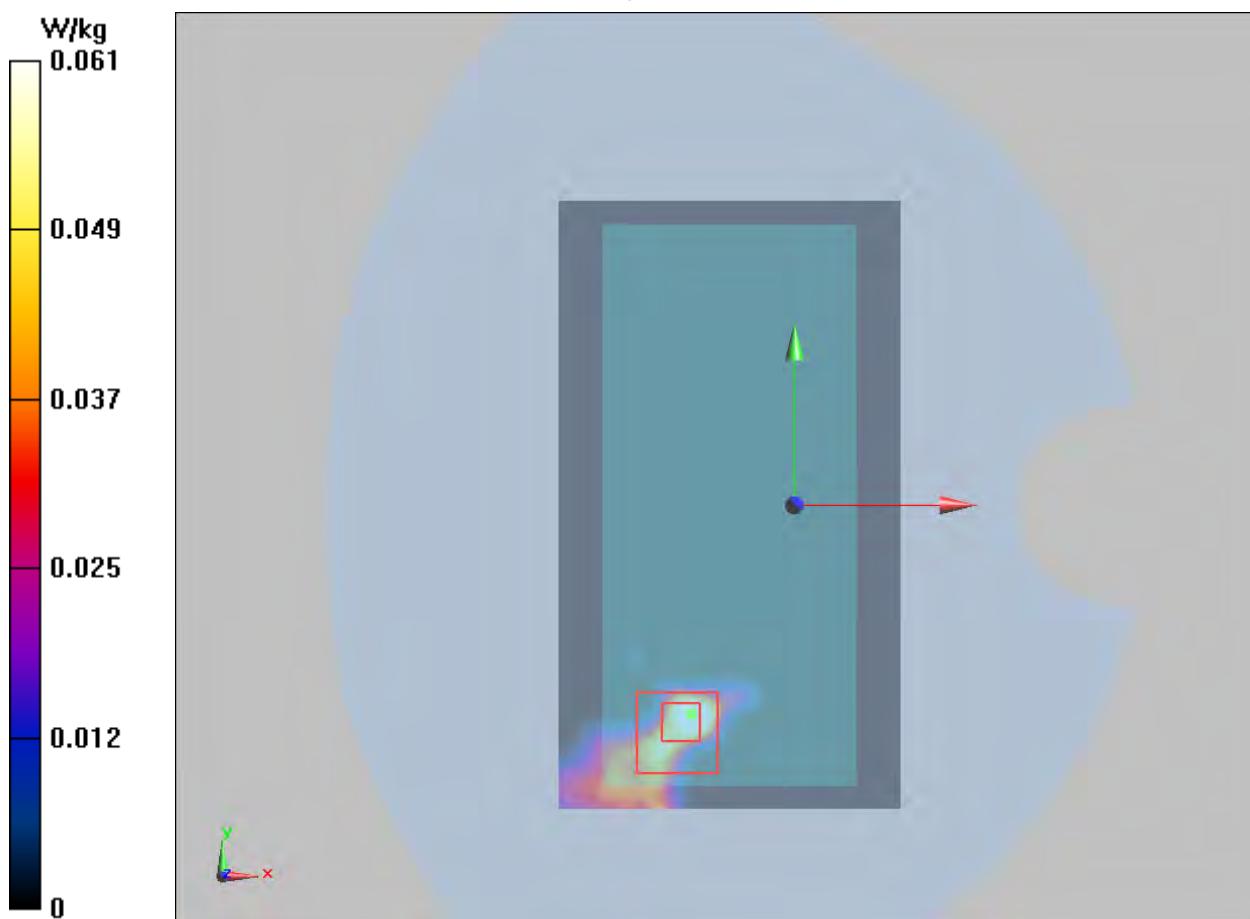
**Back Side CH54/Zoom Scan (9x9x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 0 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.157 W/kg

**SAR(1 g) = 0.022 W/kg; SAR(10 g) = 0.00662 W/kg**

Maximum value of SAR (measured) = 0.0613 W/kg



## Plot 58 802.11a U-NII-2C Right Tilt CH118

Date: 5/29/2019

Communication System: UID 0, 802.11nHT40 (0); Frequency: 5590 MHz; Duty Cycle: 1:1.31522

Medium parameters used:  $f = 5590 \text{ MHz}$ ;  $\sigma = 5.19 \text{ S/m}$ ;  $\epsilon_r = 35.09$ ;  $\rho = 1000 \text{ kg/m}^3$

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Right Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(4.69, 4.69, 4.69); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Right Tilt CH118/Area Scan (101x171x1):** Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 0.156 W/kg

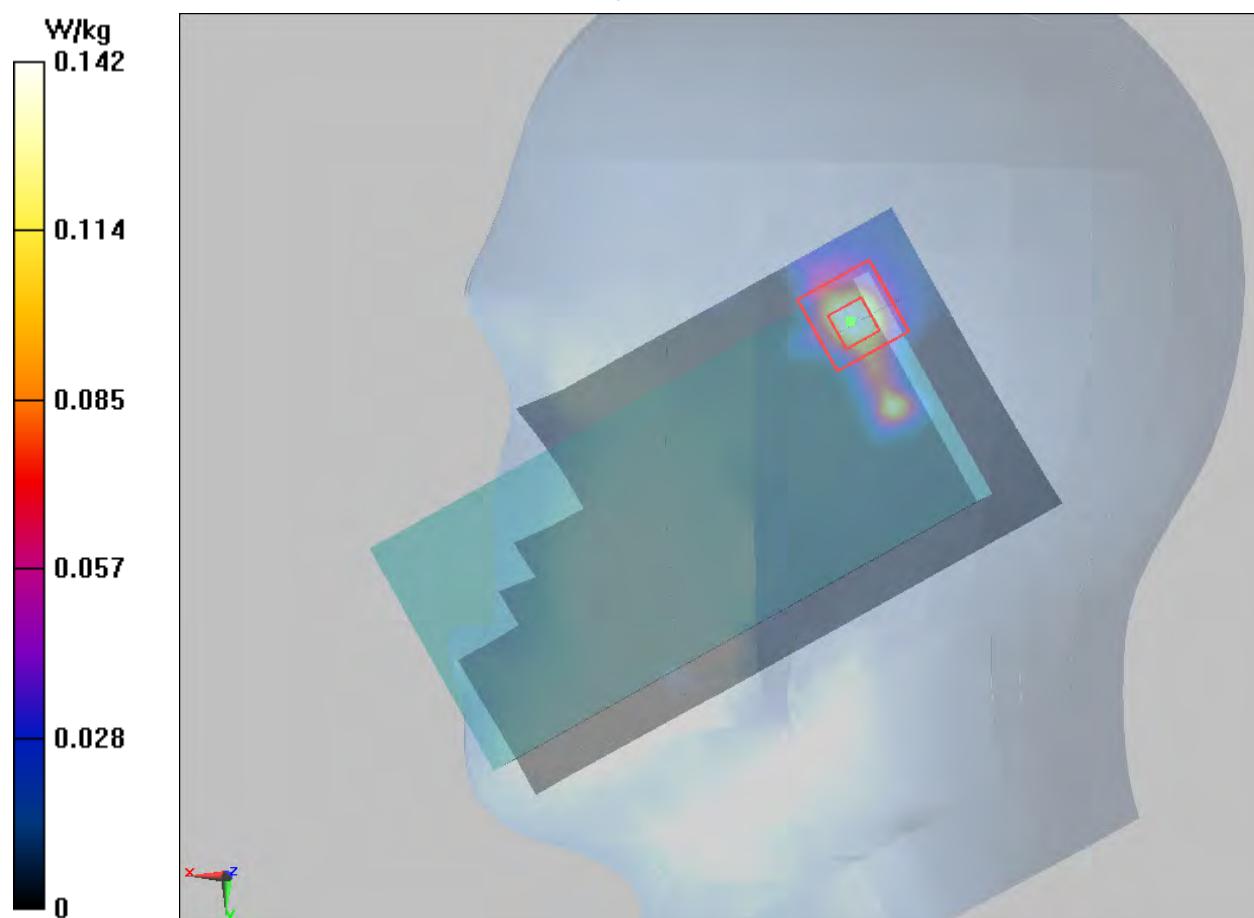
**Right Tilt CH118/Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 4.781 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 0.214 W/kg

**SAR(1 g) = 0.019 W/kg; SAR(10 g) = 0.016 W/kg**

Maximum value of SAR (measured) = 0.142 W/kg



**Plot 59 802.11a U-NII-2C Back Side CH134 (Distance 15mm)**

Date: 5/29/2019

Communication System: UID 0, 802.11nHT40 (0); Frequency: 5670 MHz; Duty Cycle: 1:1.31522

Medium parameters used:  $f = 5670 \text{ MHz}$ ;  $\sigma = 6.003 \text{ S/m}$ ;  $\epsilon_r = 47.551$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(3.80, 3.80, 3.80); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Back Side CH134/Area Scan (91x161x1):** Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 0.0846 W/kg

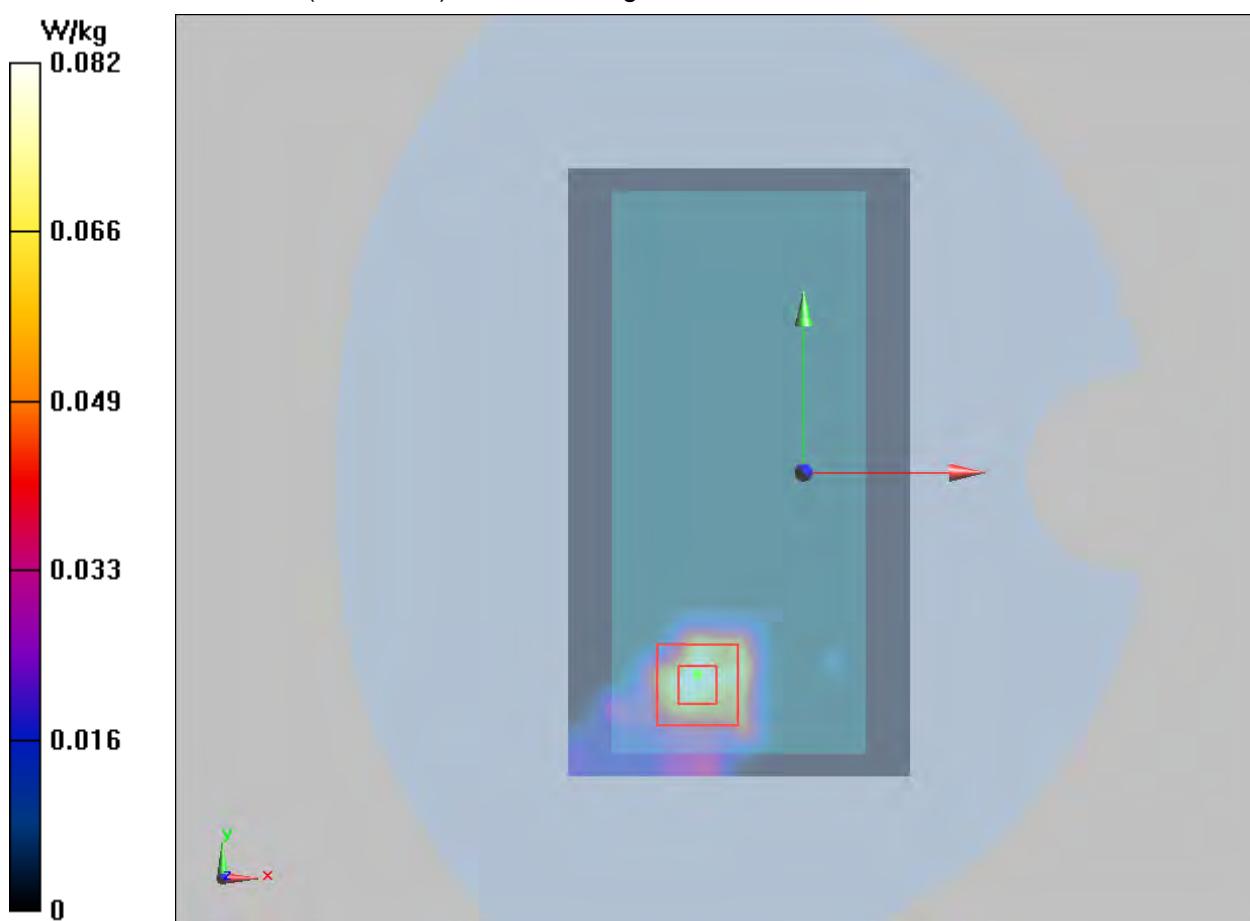
**Back Side CH134/Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 0.7460 V/m; Power Drift = -0.057 dB

Peak SAR (extrapolated) = 0.148 W/kg

**SAR(1 g) = 0.030 W/kg; SAR(10 g) = 0.00943 W/kg**

Maximum value of SAR (measured) = 0.0820 W/kg



**Plot 60 802.11a U-NII-3 Left Cheek CH159**

Date: 5/29/2019

Communication System: UID 0, 802.11nHT40 (0); Frequency: 5795 MHz; Duty Cycle: 1:1.31522

Medium parameters used (interpolated):  $f = 5795 \text{ MHz}$ ;  $\sigma = 5.105 \text{ S/m}$ ;  $\epsilon_r = 35.269$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Left Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(4.61, 4.61, 4.61); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Left Cheek CH159/Area Scan (91x161x1):** Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 0.0725 W/kg

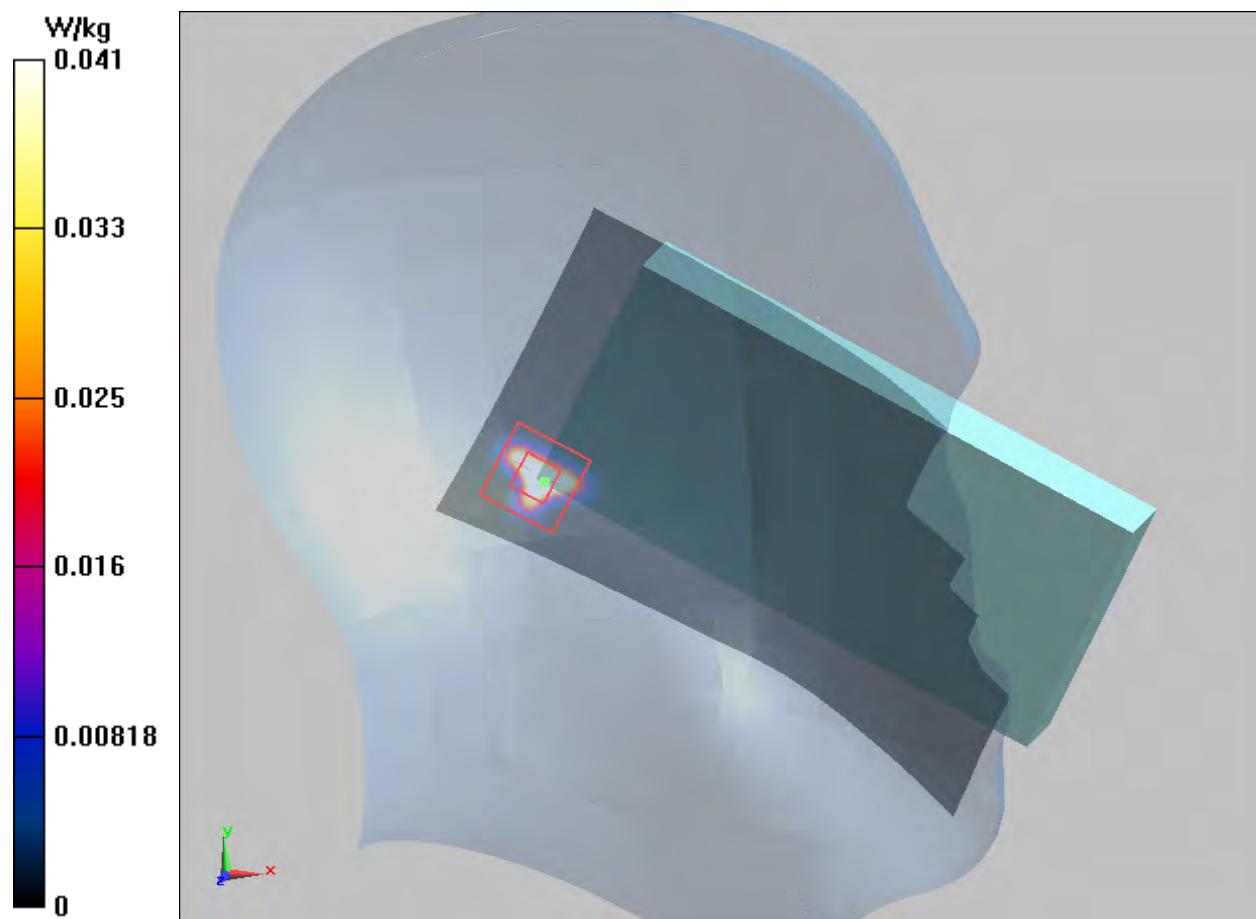
**Left Cheek CH159/Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 2.098 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.0970 W/kg

**SAR(1 g) = 0.018 W/kg; SAR(10 g) = 0.00455 W/kg**

Maximum value of SAR (measured) = 0.0409 W/kg



**Plot 61 802.11a U-NII-3 Front Side CH159 (Distance 15mm)**

Date: 5/29/2019

Communication System: UID 0, 802.11nHT40 (0); Frequency: 5795 MHz; Duty Cycle: 1:1.31522

Medium parameters used (interpolated):  $f = 5795 \text{ MHz}$ ;  $\sigma = 6.207 \text{ S/m}$ ;  $\epsilon_r = 47.294$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Ambient Temperature: 22.3 °C      Liquid Temperature: 21.5°C

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3801; ConvF(3.95, 3.95, 3.95); Calibrated: 6/26/2018;

Electronics: DAE4 SN1291; Calibrated: 12/4/2018

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

Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

**Front Side CH159/Area Scan (91x161x1):** Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 0.100 W/kg

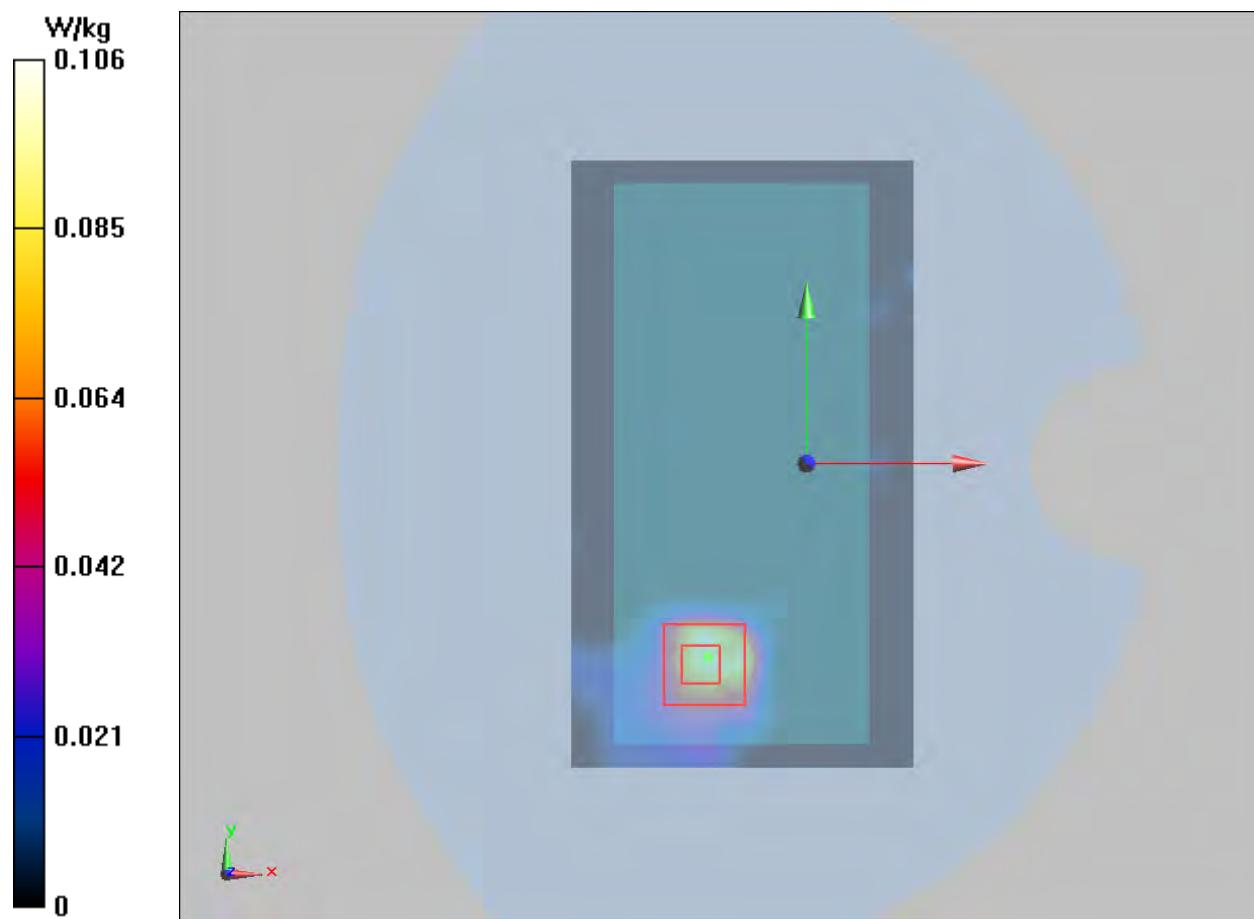
**Front Side CH159/Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 0 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.163 W/kg

**SAR(1 g) = 0.053 W/kg; SAR(10 g) = 0.013 W/kg**

Maximum value of SAR (measured) = 0.106 W/kg





## ANNEX D: Probe Calibration Certificate

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



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

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

Accreditation No.: SCS 0108

Client    **Auden**

Certificate No: EX3-3801\_Jun18

**CALIBRATION CERTIFICATE**

Object                    EX3DV4 - SN:3801

Calibration procedure(s)                    QA CAL-01.v9, QA CAL-12.v9, QA CAL-14.v4, QA CAL-23.v5,  
QA CAL-25.v6  
Calibration procedure for dosimetric E-field probes

Calibration date:                    June 26, 2018

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

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

Calibration Equipment used (M&amp;TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-18 (No. 217-02682)	Apr-19
Reference Probe ES3DV2	SN: 3013	30-Dec-17 (No. ES3-3013_Dec17)	Dec-18
DAE4	SN: 660	21-Dec-17 (No. DAE4-660_Dec17)	Dec-18
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-18)	In house check: Jun-20
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-17)	In house check: Oct-18

Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature 
Approved by:	Katja Pokovic	Technical Manager	

Issued: June 27, 2018

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



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



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

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

Accreditation No.: SCS 0108

#### 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 $\varphi$	$\varphi$ rotation around probe axis
Polarization $\theta$	$\theta$ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\theta = 0$ 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:

- 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
- 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
- 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
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

#### Methods Applied and Interpretation of Parameters:

- $NORM_{x,y,z}$ : Assessed for E-field polarization  $\theta = 0$  ( $f \leq 900$  MHz in TEM-cell;  $f > 1800$  MHz: R22 waveguide).  $NORM_{x,y,z}$  are only intermediate values, i.e., the uncertainties of  $NORM_{x,y,z}$  does not affect the E<sup>2</sup>-field uncertainty inside TSL (see below ConvF).
- $NORM(f)x,y,z = NORM_{x,y,z} * frequency\_response$  (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 with CW signal (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
- $Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z; A, B, C, D$  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  $f \leq 800$  MHz) and inside waveguide using analytical field distributions based on power measurements for  $f > 800$  MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to  $NORM_{x,y,z} * ConvF$  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  $\pm 50$  MHz to  $\pm 100$  MHz.
- 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  $NORM_x$  (no uncertainty required).



EX3DV4 – SN:3801

June 26, 2018

# Probe EX3DV4

## SN:3801

Manufactured: April 5, 2011  
Calibrated: June 26, 2018

Calibrated for DASY/EASY Systems  
(Note: non-compatible with DASY2 system!)



EX3DV4- SN:3801

June 26, 2018

## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3801

### Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ( $\mu\text{V}/(\text{V}/\text{m})^2$ ) <sup>A</sup>	0.53	0.57	0.52	$\pm 10.1 \%$
DCP (mV) <sup>B</sup>	101.8	101.3	96.8	

### Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Unc <sup>E</sup> (k=2)
0	CW	X	0.0	0.0	1.0	0.00	166.4	$\pm 3.0 \%$
		Y	0.0	0.0	1.0		173.4	
		Z	0.0	0.0	1.0		164.7	

Note: For details on UID parameters see Appendix.

### Sensor Model Parameters

	C1 fF	C2 fF	$\alpha$ $\text{V}^{-1}$	T1 ms. $\text{V}^{-2}$	T2 ms. $\text{V}^{-1}$	T3 ms	T4 $\text{V}^{-2}$	T5 $\text{V}^{-1}$	T6
X	43.02	327.9	36.76	18.19	0.894	5.085	0.000	0.523	1.011
Y	48.75	365.0	35.77	24.10	0.825	5.100	0.855	0.468	1.008
Z	43.58	332.6	36.84	15.47	0.783	5.090	0.000	0.516	1.010

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%.

<sup>A</sup> The uncertainties of Norm X,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Pages 5 and 6).

<sup>B</sup> Numerical linearization parameter: uncertainty not required.

<sup>E</sup> Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.



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**DASY/EASY - Parameters of Probe: EX3DV4 - SN:3801****Calibration Parameter Determined in Head Tissue Simulating Media**

f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>G</sup> (mm)	Unc (k=2)
150	52.3	0.76	11.05	11.05	11.05	0.00	1.00	± 13.3 %
450	43.5	0.87	9.90	9.90	9.90	0.15	1.30	± 13.3 %
750	41.9	0.89	9.50	9.50	9.50	0.43	0.96	± 12.0 %
835	41.5	0.90	9.08	9.08	9.08	0.51	0.85	± 12.0 %
900	41.5	0.97	8.95	8.95	8.95	0.51	0.87	± 12.0 %
1450	40.5	1.20	8.17	8.17	8.17	0.33	0.80	± 12.0 %
1750	40.1	1.37	8.10	8.10	8.10	0.39	0.84	± 12.0 %
1900	40.0	1.40	7.78	7.78	7.78	0.36	0.84	± 12.0 %
2100	39.8	1.49	7.90	7.90	7.90	0.35	0.80	± 12.0 %
2450	39.2	1.80	7.08	7.08	7.08	0.35	0.86	± 12.0 %
2600	39.0	1.96	6.94	6.94	6.94	0.40	0.86	± 12.0 %
3500	37.9	2.91	6.88	6.88	6.88	0.25	1.20	± 13.1 %
5200	36.0	4.66	4.93	4.93	4.93	0.40	1.80	± 13.1 %
5300	35.9	4.76	4.70	4.70	4.70	0.40	1.80	± 13.1 %
5500	35.6	4.96	4.82	4.82	4.82	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.69	4.69	4.69	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.61	4.61	4.61	0.40	1.80	± 13.1 %

<sup>C</sup> Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the 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.

<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) 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 ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>G</sup> 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 frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.



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## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3801

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>G</sup>	Depth <sup>G</sup> (mm)	Unc (k=2)
150	61.9	0.80	10.74	10.74	10.74	0.00	1.00	± 13.3 %
450	56.7	0.94	10.16	10.16	10.16	0.09	1.25	± 13.3 %
750	55.5	0.96	9.19	9.19	9.19	0.49	0.83	± 12.0 %
835	55.2	0.97	9.04	9.04	9.04	0.53	0.80	± 12.0 %
900	55.0	1.05	9.01	9.01	9.01	0.44	0.89	± 12.0 %
1450	54.0	1.30	7.93	7.93	7.93	0.33	0.80	± 12.0 %
1750	53.4	1.49	7.68	7.68	7.68	0.49	0.82	± 12.0 %
1900	53.3	1.52	7.37	7.37	7.37	0.38	0.86	± 12.0 %
2100	53.2	1.62	7.79	7.79	7.79	0.42	0.80	± 12.0 %
2450	52.7	1.95	7.19	7.19	7.19	0.41	0.84	± 12.0 %
2600	52.5	2.16	7.01	7.01	7.01	0.30	0.99	± 12.0 %
3500	51.3	3.31	6.90	6.90	6.90	0.25	1.25	± 13.1 %
5200	49.0	5.30	4.23	4.23	4.23	0.50	1.90	± 13.1 %
5300	48.9	5.42	4.09	4.09	4.09	0.50	1.90	± 13.1 %
5500	48.6	5.65	3.94	3.94	3.94	0.50	1.90	± 13.1 %
5600	48.5	5.77	3.80	3.80	3.80	0.50	1.90	± 13.1 %
5800	48.2	6.00	3.95	3.95	3.95	0.50	1.90	± 13.1 %

<sup>C</sup> Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the 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.

<sup>F</sup> At frequencies below 3 GHz, the validity of tissue parameters ( $\epsilon$  and  $\sigma$ ) 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 ( $\epsilon$  and  $\sigma$ ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

<sup>G</sup> 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 frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

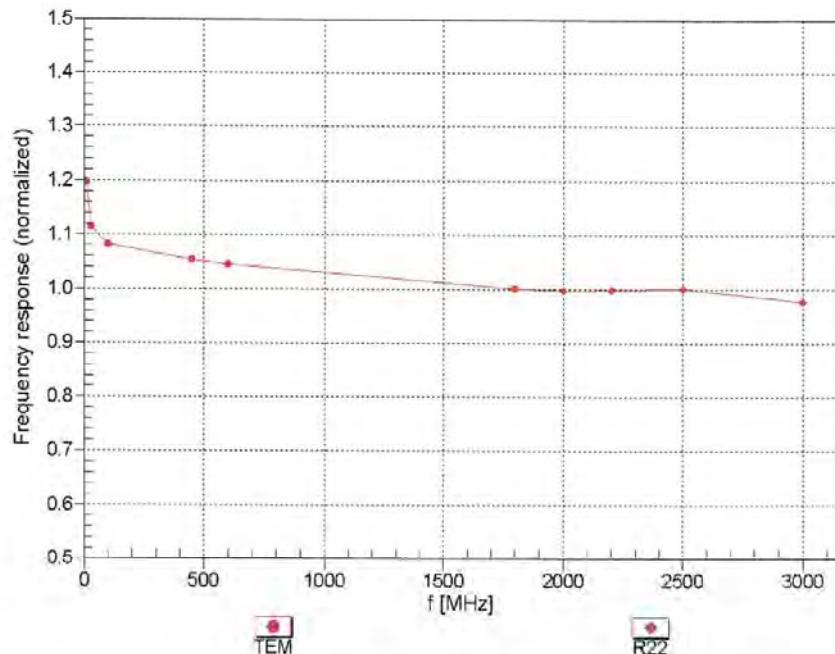


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## Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field:  $\pm 6.3\%$  ( $k=2$ )

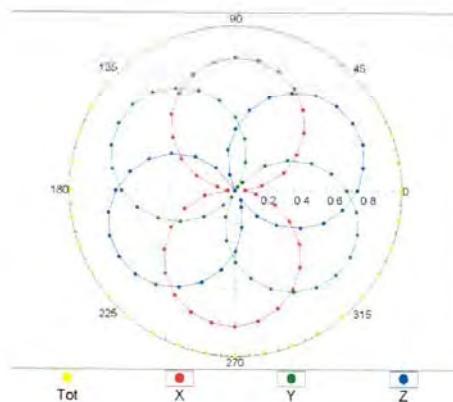


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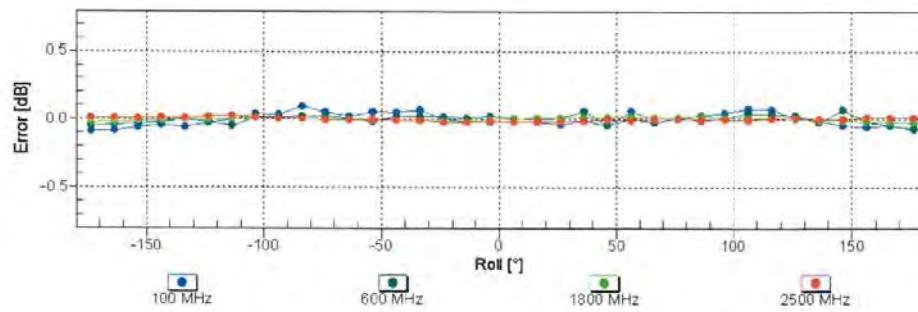
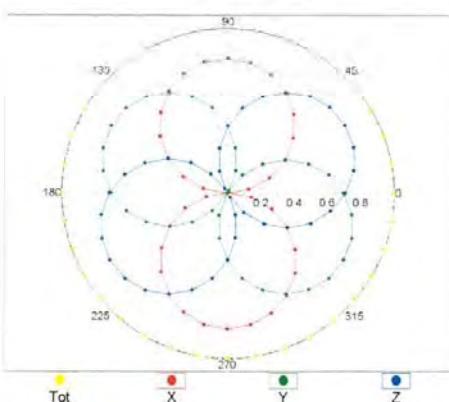
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### Receiving Pattern ( $\phi$ ), $\theta = 0^\circ$

f=600 MHz, TEM



f=1800 MHz, R22

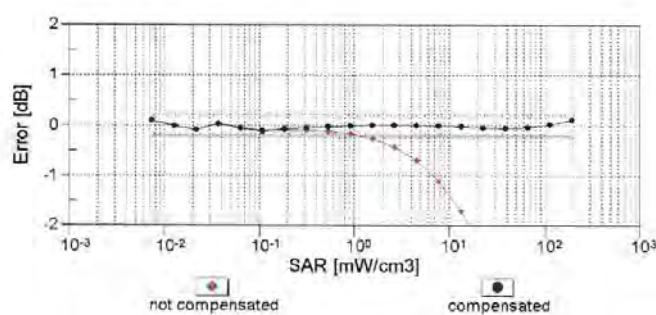
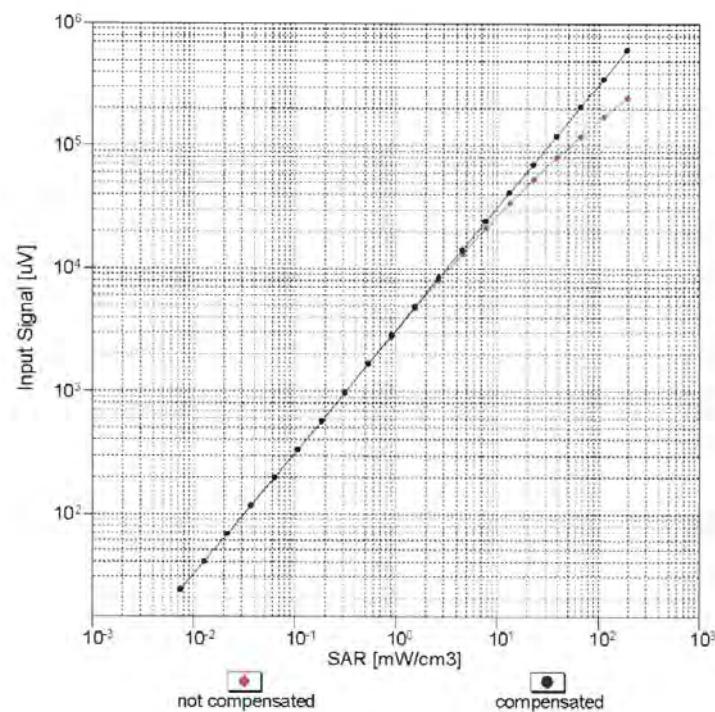




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### Dynamic Range f(SAR<sub>head</sub>) (TEM cell , f<sub>eval</sub>= 1900 MHz)



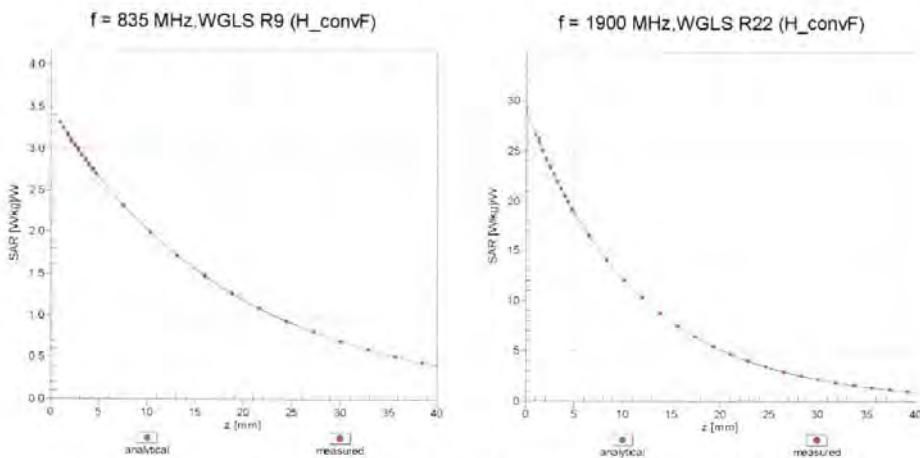
Uncertainty of Linearity Assessment:  $\pm 0.6\%$  ( $k=2$ )



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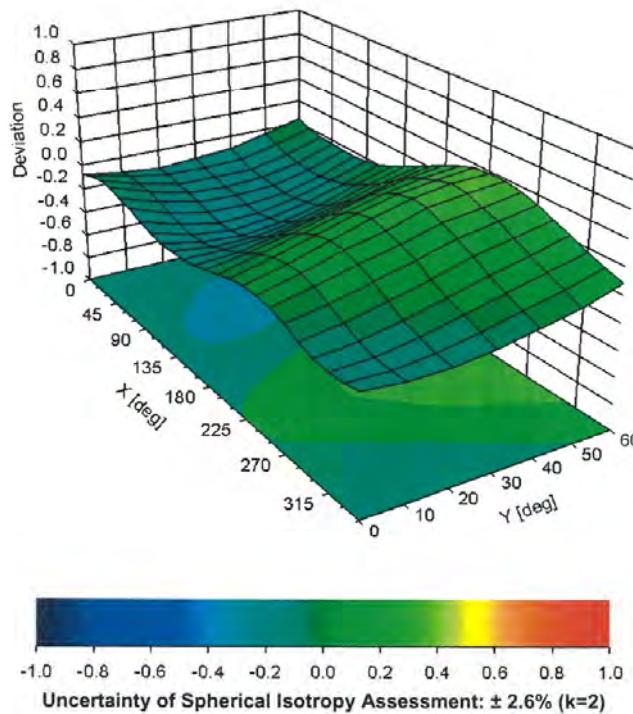
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## Conversion Factor Assessment



## Deviation from Isotropy in Liquid

Error ( $\phi, \theta$ ), f = 900 MHz





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## DASY/EASY - Parameters of Probe: EX3DV4 - SN:3801

### Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	126.3
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm



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**Appendix: Modulation Calibration Parameters**

UID	Communication System Name		A dB	B dB/ $\mu$ V	C	D dB	VR mV	Max Unc <sup>E</sup> (k=2)
0	CW	X	0.00	0.00	1.00	0.00	166.4	$\pm 3.0\%$
		Y	0.00	0.00	1.00		173.4	
		Z	0.00	0.00	1.00		164.7	
10010-CAA	SAR Validation (Square, 100ms, 10ms)	X	3.37	69.78	12.74	10.00	20.0	$\pm 9.6\%$
		Y	6.44	76.86	15.76		20.0	
		Z	3.21	69.39	12.43		20.0	
10011-CAB	UMTS-FDD (WCDMA)	X	0.83	64.38	12.95	0.00	150.0	$\pm 9.6\%$
		Y	0.99	67.13	14.98		150.0	
		Z	0.83	64.35	12.93		150.0	
10012-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 1 Mbps)	X	1.10	62.97	14.26	0.41	150.0	$\pm 9.6\%$
		Y	1.20	64.42	15.48		150.0	
		Z	1.09	62.83	14.21		150.0	
10013-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS-OFDM, 6 Mbps)	X	4.80	66.58	16.95	1.46	150.0	$\pm 9.6\%$
		Y	4.93	66.87	17.23		150.0	
		Z	4.79	66.54	16.94		150.0	
10021-DAC	GSM-FDD (TDMA, GMSK)	X	100.00	116.48	28.92	9.39	50.0	$\pm 9.6\%$
		Y	100.00	116.87	29.39		50.0	
		Z	100.00	116.44	28.77		50.0	
10023-DAC	GPRS-FDD (TDMA, GMSK, TN 0)	X	100.00	116.20	28.84	9.57	50.0	$\pm 9.6\%$
		Y	100.00	116.71	29.35		50.0	
		Z	100.00	116.08	28.65		50.0	
10024-DAC	GPRS-FDD (TDMA, GMSK, TN 0-1)	X	100.00	113.53	26.55	6.56	60.0	$\pm 9.6\%$
		Y	100.00	114.45	27.34		60.0	
		Z	100.00	114.34	26.74		60.0	
10025-DAC	EDGE-FDD (TDMA, 8PSK, TN 0)	X	4.69	72.18	26.92	12.57	50.0	$\pm 9.6\%$
		Y	15.97	110.85	44.06		50.0	
		Z	4.44	71.01	26.44		50.0	
10026-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1)	X	11.01	95.24	33.64	9.56	60.0	$\pm 9.6\%$
		Y	27.30	117.67	41.25		60.0	
		Z	9.87	93.32	33.15		60.0	
10027-DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2)	X	100.00	112.38	25.28	4.80	80.0	$\pm 9.6\%$
		Y	100.00	114.07	26.45		80.0	
		Z	100.00	113.67	25.65		80.0	
10028-DAC	GPRS-FDD (TDMA, GMSK, TN 0-1-2-3)	X	100.00	111.82	24.34	3.55	100.0	$\pm 9.6\%$
		Y	100.00	114.73	26.07		100.0	
		Z	100.00	113.39	24.82		100.0	
10029-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2)	X	6.96	84.53	28.40	7.80	80.0	$\pm 9.6\%$
		Y	12.11	97.00	33.17		80.0	
		Z	6.28	82.79	27.89		80.0	
10030-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH1)	X	100.00	111.17	25.02	5.30	70.0	$\pm 9.6\%$
		Y	100.00	112.86	26.19		70.0	
		Z	100.00	112.10	25.26		70.0	
10031-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH3)	X	100.00	105.29	20.26	1.88	100.0	$\pm 9.6\%$
		Y	100.00	113.55	24.19		100.0	
		Z	100.00	105.78	20.26		100.0	

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10032-CAA	IEEE 802.15.1 Bluetooth (GFSK, DH5)	X	100.00	101.22	17.75	1.17	100.0	± 9.6 %
		Y	100.00	116.20	24.29		100.0	
		Z	100.00	100.56	17.31		100.0	
10033-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH1)	X	18.92	99.43	26.35	5.30	70.0	± 9.6 %
		Y	100.00	126.11	33.82		70.0	
		Z	20.67	102.09	27.36		70.0	
10034-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH3)	X	3.06	75.57	16.71	1.88	100.0	± 9.6 %
		Y	9.98	92.25	23.17		100.0	
		Z	2.90	75.55	16.88		100.0	
10035-CAA	IEEE 802.15.1 Bluetooth (PI/4-DQPSK, DH5)	X	1.83	70.29	14.26	1.17	100.0	± 9.6 %
		Y	4.00	80.96	19.27		100.0	
		Z	1.74	70.11	14.32		100.0	
10036-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH1)	X	30.39	106.85	28.45	5.30	70.0	± 9.6 %
		Y	100.00	126.44	33.98		70.0	
		Z	35.81	110.82	29.76		70.0	
10037-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH3)	X	2.84	74.70	16.36	1.88	100.0	± 9.6 %
		Y	8.90	90.73	22.69		100.0	
		Z	2.69	74.65	16.52		100.0	
10038-CAA	IEEE 802.15.1 Bluetooth (8-DPSK, DH5)	X	1.85	70.62	14.50	1.17	100.0	± 9.6 %
		Y	4.14	81.72	19.65		100.0	
		Z	1.75	70.43	14.57		100.0	
10039-CAB	CDMA2000 (1xRTT, RC1)	X	1.12	65.78	11.74	0.00	150.0	± 9.6 %
		Y	1.72	71.14	15.18		150.0	
		Z	1.13	65.83	11.81		150.0	
10042-CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Halfrate)	X	100.00	111.21	25.70	7.78	50.0	± 9.6 %
		Y	100.00	112.25	26.50		50.0	
		Z	100.00	111.42	25.65		50.0	
10044-CAA	IS-91/EIA/TIA-553 FDD (FDMA, FM)	X	0.04	119.18	11.18	0.00	150.0	± 9.6 %
		Y	0.01	110.75	9.59		150.0	
		Z	0.04	119.30	10.88		150.0	
10048-CAA	DECT (TDD, TDMA/FDM, GFSK, Full Slot, 24)	X	100.00	116.95	30.57	13.80	25.0	± 9.6 %
		Y	100.00	118.90	31.58		25.0	
		Z	100.00	115.50	29.86		25.0	
10049-CAA	DECT (TDD, TDMA/FDM, GFSK, Double Slot, 12)	X	100.00	116.02	29.07	10.79	40.0	± 9.6 %
		Y	100.00	116.75	29.64		40.0	
		Z	100.00	115.45	28.70		40.0	
10056-CAA	UMTS-TDD (TD-SCDMA, 1.28 Mcps)	X	26.45	101.81	27.79	9.03	50.0	± 9.6 %
		Y	95.09	123.36	33.94		50.0	
		Z	35.26	107.00	29.30		50.0	
10058-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-1-2-3)	X	5.27	78.98	25.36	6.55	100.0	± 9.6 %
		Y	7.85	87.34	28.81		100.0	
		Z	4.82	77.53	24.91		100.0	
10059-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 2 Mbps)	X	1.16	64.21	14.95	0.61	110.0	± 9.6 %
		Y	1.31	66.27	16.46		110.0	
		Z	1.14	63.97	14.87		110.0	
10060-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 5.5 Mbps)	X	8.60	97.03	24.51	1.30	110.0	± 9.6 %
		Y	100.00	133.40	34.07		110.0	
		Z	7.00	95.42	24.31		110.0	



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10061-CAB	IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps)	X	3.49	81.85	22.13	2.04	110.0	± 9.6 %
		Y	10.88	100.68	28.62		110.0	
		Z	3.06	80.49	21.85		110.0	
10062-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 6 Mbps)	X	4.56	66.41	16.26	0.49	100.0	± 9.6 %
		Y	4.69	66.72	16.55		100.0	
		Z	4.56	66.38	16.26		100.0	
10063-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 9 Mbps)	X	4.58	66.53	16.38	0.72	100.0	± 9.6 %
		Y	4.72	66.85	16.68		100.0	
		Z	4.58	66.50	16.38		100.0	
10064-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 12 Mbps)	X	4.86	66.80	16.63	0.86	100.0	± 9.6 %
		Y	5.01	67.14	16.92		100.0	
		Z	4.86	66.78	16.63		100.0	
10065-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 18 Mbps)	X	4.75	66.74	16.76	1.21	100.0	± 9.6 %
		Y	4.90	67.11	17.07		100.0	
		Z	4.75	66.71	16.76		100.0	
10066-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 24 Mbps)	X	4.77	66.80	16.95	1.46	100.0	± 9.6 %
		Y	4.93	67.18	17.28		100.0	
		Z	4.77	66.76	16.95		100.0	
10067-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 36 Mbps)	X	5.09	67.08	17.46	2.04	100.0	± 9.6 %
		Y	5.24	67.39	17.76		100.0	
		Z	5.08	67.03	17.46		100.0	
10068-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 48 Mbps)	X	5.14	67.13	17.70	2.55	100.0	± 9.6 %
		Y	5.32	67.54	18.04		100.0	
		Z	5.13	67.08	17.69		100.0	
10069-CAC	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	X	5.22	67.17	17.91	2.67	100.0	± 9.6 %
		Y	5.40	67.53	18.24		100.0	
		Z	5.22	67.11	17.90		100.0	
10071-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 9 Mbps)	X	4.91	66.72	17.29	1.99	100.0	± 9.6 %
		Y	5.04	67.03	17.58		100.0	
		Z	4.90	66.67	17.29		100.0	
10072-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 12 Mbps)	X	4.90	67.07	17.53	2.30	100.0	± 9.6 %
		Y	5.05	67.46	17.86		100.0	
		Z	4.89	67.01	17.52		100.0	
10073-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 18 Mbps)	X	4.99	67.32	17.91	2.83	100.0	± 9.6 %
		Y	5.14	67.73	18.26		100.0	
		Z	4.97	67.24	17.90		100.0	
10074-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 24 Mbps)	X	5.00	67.29	18.10	3.30	100.0	± 9.6 %
		Y	5.15	67.70	18.46		100.0	
		Z	4.97	67.19	18.08		100.0	
10075-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 36 Mbps)	X	5.05	67.46	18.45	3.82	90.0	± 9.6 %
		Y	5.22	67.96	18.86		90.0	
		Z	5.02	67.34	18.42		90.0	
10076-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 48 Mbps)	X	5.08	67.31	18.60	4.15	90.0	± 9.6 %
		Y	5.23	67.75	18.99		90.0	
		Z	5.05	67.18	18.57		90.0	
10077-CAB	IEEE 802.11g WiFi 2.4 GHz (DSSS/OFDM, 54 Mbps)	X	5.11	67.39	18.71	4.30	90.0	± 9.6 %
		Y	5.26	67.83	19.09		90.0	
		Z	5.08	67.25	18.67		90.0	

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10081-CAB	CDMA2000 (1xRTT, RC3)	X	0.58	62.15	9.26	0.00	150.0	± 9.6 %
		Y	0.79	65.29	12.01		150.0	
		Z	0.59	62.18	9.31		150.0	
10082-CAB	IS-54 / IS-136 FDD (TDMA/FDM, PI/4-DQPSK, Fullrate)	X	0.89	60.00	5.00	4.77	80.0	± 9.6 %
		Y	1.06	60.10	5.42		80.0	
		Z	0.82	60.00	4.83		80.0	
10090-DAC	GPRS-FDD (TDMA, GMSK, TN 0-4)	X	100.00	113.61	26.61	6.56	60.0	± 9.6 %
		Y	100.00	114.52	27.40		60.0	
		Z	100.00	114.43	26.80		60.0	
10097-CAB	UMTS-FDD (HSDPA)	X	1.61	65.84	14.20	0.00	150.0	± 9.6 %
		Y	1.79	67.45	15.49		150.0	
		Z	1.61	65.80	14.19		150.0	
10098-CAB	UMTS-FDD (HSUPA, Subtest 2)	X	1.57	65.77	14.15	0.00	150.0	± 9.6 %
		Y	1.75	67.41	15.45		150.0	
		Z	1.57	65.73	14.14		150.0	
10099-DAC	EDGE-FDD (TDMA, 8PSK, TN 0-4)	X	11.08	95.35	33.68	9.56	60.0	± 9.6 %
		Y	27.49	117.79	41.28		60.0	
		Z	9.94	93.45	33.20		60.0	
10100-CAD	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	2.79	68.48	15.57	0.00	150.0	± 9.6 %
		Y	3.10	70.20	16.56		150.0	
		Z	2.79	68.46	15.56		150.0	
10101-CAD	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	X	3.04	66.54	15.23	0.00	150.0	± 9.6 %
		Y	3.21	67.43	15.84		150.0	
		Z	3.04	66.53	15.23		150.0	
10102-CAD	LTE-FDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	X	3.15	66.58	15.37	0.00	150.0	± 9.6 %
		Y	3.32	67.39	15.93		150.0	
		Z	3.15	66.57	15.36		150.0	
10103-CAD	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, QPSK)	X	6.94	77.02	20.93	3.98	65.0	± 9.6 %
		Y	8.30	79.59	21.98		65.0	
		Z	6.60	76.51	20.82		65.0	
10104-CAD	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 16-QAM)	X	6.60	74.37	20.62	3.98	65.0	± 9.6 %
		Y	7.74	76.89	21.76		65.0	
		Z	6.34	73.90	20.51		65.0	
10105-CAD	LTE-TDD (SC-FDMA, 100% RB, 20 MHz, 64-QAM)	X	6.43	73.76	20.67	3.98	65.0	± 9.6 %
		Y	7.21	75.46	21.47		65.0	
		Z	6.12	73.09	20.46		65.0	
10108-CAE	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, QPSK)	X	2.42	67.75	15.36	0.00	150.0	± 9.6 %
		Y	2.70	69.42	16.38		150.0	
		Z	2.42	67.73	15.35		150.0	
10109-CAE	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 16-QAM)	X	2.68	66.30	15.02	0.00	150.0	± 9.6 %
		Y	2.87	67.25	15.73		150.0	
		Z	2.69	66.28	15.02		150.0	
10110-CAE	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, QPSK)	X	1.93	66.75	14.78	0.00	150.0	± 9.6 %
		Y	2.19	68.51	15.97		150.0	
		Z	1.93	66.73	14.77		150.0	
10111-CAE	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 16-QAM)	X	2.36	66.83	15.03	0.00	150.0	± 9.6 %
		Y	2.58	67.98	15.96		150.0	
		Z	2.36	66.80	15.03		150.0	



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10112-CAE	LTE-FDD (SC-FDMA, 100% RB, 10 MHz, 64-QAM)	X	2.81	66.38	15.13	0.00	150.0	± 9.6 %
		Y	2.99	67.24	15.78		150.0	
		Z	2.82	66.36	15.13		150.0	
10113-CAE	LTE-FDD (SC-FDMA, 100% RB, 5 MHz, 64-QAM)	X	2.51	67.07	15.23	0.00	150.0	± 9.6 %
		Y	2.73	68.12	16.09		150.0	
		Z	2.52	67.04	15.23		150.0	
10114-CAC	IEEE 802.11n (HT Greenfield, 13.5 Mbps, BPSK)	X	4.99	66.82	16.16	0.00	150.0	± 9.6 %
		Y	5.10	67.13	16.38		150.0	
		Z	5.00	66.82	16.16		150.0	
10115-CAC	IEEE 802.11n (HT Greenfield, 81 Mbps, 16-QAM)	X	5.25	66.91	16.21	0.00	150.0	± 9.6 %
		Y	5.40	67.27	16.46		150.0	
		Z	5.26	66.91	16.22		150.0	
10116-CAC	IEEE 802.11n (HT Greenfield, 135 Mbps, 64-QAM)	X	5.07	66.99	16.17	0.00	150.0	± 9.6 %
		Y	5.20	67.33	16.40		150.0	
		Z	5.08	66.99	16.17		150.0	
10117-CAC	IEEE 802.11n (HT Mixed, 13.5 Mbps, BPSK)	X	4.96	66.69	16.10	0.00	150.0	± 9.6 %
		Y	5.07	67.00	16.33		150.0	
		Z	4.96	66.68	16.10		150.0	
10118-CAC	IEEE 802.11n (HT Mixed, 81 Mbps, 16-QAM)	X	5.33	67.12	16.33	0.00	150.0	± 9.6 %
		Y	5.48	67.48	16.57		150.0	
		Z	5.34	67.12	16.33		150.0	
10119-CAC	IEEE 802.11n (HT Mixed, 135 Mbps, 64-QAM)	X	5.06	66.96	16.16	0.00	150.0	± 9.6 %
		Y	5.17	67.27	16.38		150.0	
		Z	5.07	66.96	16.16		150.0	
10140-CAD	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 16-QAM)	X	3.18	66.58	15.28	0.00	150.0	± 9.6 %
		Y	3.35	67.40	15.85		150.0	
		Z	3.18	66.57	15.28		150.0	
10141-CAD	LTE-FDD (SC-FDMA, 100% RB, 15 MHz, 64-QAM)	X	3.31	66.74	15.49	0.00	150.0	± 9.6 %
		Y	3.48	67.49	16.02		150.0	
		Z	3.31	66.73	15.48		150.0	
10142-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, QPSK)	X	1.67	66.36	14.09	0.00	150.0	± 9.6 %
		Y	1.96	68.43	15.60		150.0	
		Z	1.68	66.34	14.10		150.0	
10143-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 16-QAM)	X	2.13	66.92	14.26	0.00	150.0	± 9.6 %
		Y	2.43	68.64	15.63		150.0	
		Z	2.14	66.91	14.27		150.0	
10144-CAD	LTE-FDD (SC-FDMA, 100% RB, 3 MHz, 64-QAM)	X	1.95	64.98	12.78	0.00	150.0	± 9.6 %
		Y	2.21	66.44	14.07		150.0	
		Z	1.96	64.98	12.81		150.0	
10145-CAE	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, QPSK)	X	0.89	61.84	8.95	0.00	150.0	± 9.6 %
		Y	1.18	64.72	11.53		150.0	
		Z	0.90	61.92	9.05		150.0	
10146-CAE	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 16-QAM)	X	1.50	63.67	9.83	0.00	150.0	± 9.6 %
		Y	2.10	66.97	12.06		150.0	
		Z	1.48	63.51	9.75		150.0	
10147-CAE	LTE-FDD (SC-FDMA, 100% RB, 1.4 MHz, 64-QAM)	X	1.66	64.83	10.55	0.00	150.0	± 9.6 %
		Y	2.53	69.23	13.24		150.0	
		Z	1.63	64.59	10.43		150.0	

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10149-CAD	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	X	2.69	66.35	15.07	0.00	150.0	± 9.6 %
		Y	2.88	67.31	15.77		150.0	
		Z	2.70	66.34	15.06		150.0	
10150-CAD	LTE-FDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	X	2.82	66.43	15.17	0.00	150.0	± 9.6 %
		Y	3.00	67.30	15.82		150.0	
		Z	2.82	66.41	15.17		150.0	
10151-CAD	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, QPSK)	X	7.29	79.43	21.93	3.98	65.0	± 9.6 %
		Y	9.32	83.12	23.40		65.0	
		Z	6.94	78.98	21.87		65.0	
10152-CAD	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 16-QAM)	X	6.14	74.36	20.27	3.98	65.0	± 9.6 %
		Y	7.37	77.20	21.60		65.0	
		Z	5.87	73.88	20.17		65.0	
10153-CAD	LTE-TDD (SC-FDMA, 50% RB, 20 MHz, 64-QAM)	X	6.57	75.50	21.13	3.98	65.0	± 9.6 %
		Y	7.80	78.18	22.37		65.0	
		Z	6.29	74.99	21.02		65.0	
10154-CAE	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, QPSK)	X	1.96	67.07	14.99	0.00	150.0	± 9.6 %
		Y	2.23	68.90	16.22		150.0	
		Z	1.97	67.05	14.99		150.0	
10155-CAE	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 16-QAM)	X	2.36	66.85	15.05	0.00	150.0	± 9.6 %
		Y	2.58	68.00	15.98		150.0	
		Z	2.37	66.82	15.05		150.0	
10156-CAE	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, QPSK)	X	1.49	66.02	13.56	0.00	150.0	± 9.6 %
		Y	1.80	68.47	15.37		150.0	
		Z	1.50	66.01	13.58		150.0	
10157-CAE	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 16-QAM)	X	1.74	65.03	12.45	0.00	150.0	± 9.6 %
		Y	2.04	66.94	14.07		150.0	
		Z	1.75	65.04	12.50		150.0	
10158-CAE	LTE-FDD (SC-FDMA, 50% RB, 10 MHz, 64-QAM)	X	2.52	67.13	15.27	0.00	150.0	± 9.6 %
		Y	2.73	68.18	16.14		150.0	
		Z	2.52	67.10	15.27		150.0	
10159-CAE	LTE-FDD (SC-FDMA, 50% RB, 5 MHz, 64-QAM)	X	1.82	65.36	12.68	0.00	150.0	± 9.6 %
		Y	2.15	67.39	14.35		150.0	
		Z	1.83	65.38	12.73		150.0	
10160-CAD	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, QPSK)	X	2.49	67.29	15.33	0.00	150.0	± 9.6 %
		Y	2.71	68.48	16.17		150.0	
		Z	2.50	67.27	15.32		150.0	
10161-CAD	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 16-QAM)	X	2.71	66.34	15.05	0.00	150.0	± 9.6 %
		Y	2.90	67.23	15.75		150.0	
		Z	2.71	66.32	15.05		150.0	
10162-CAD	LTE-FDD (SC-FDMA, 50% RB, 15 MHz, 64-QAM)	X	2.82	66.54	15.20	0.00	150.0	± 9.6 %
		Y	3.01	67.37	15.86		150.0	
		Z	2.82	66.52	15.19		150.0	
10166-CAE	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, QPSK)	X	3.40	69.00	18.89	3.01	150.0	± 9.6 %
		Y	3.70	70.05	19.33		150.0	
		Z	3.38	68.85	18.78		150.0	
10167-CAE	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 16-QAM)	X	4.04	71.48	19.17	3.01	150.0	± 9.6 %
		Y	4.70	73.38	19.92		150.0	
		Z	4.01	71.26	19.04		150.0	

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10168-CAE	LTE-FDD (SC-FDMA, 50% RB, 1.4 MHz, 64-QAM)	X	4.52	73.94	20.64	3.01	150.0	± 9.6 %
		Y	5.25	75.73	21.26		150.0	
		Z	4.48	73.68	20.49		150.0	
10169-CAD	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	2.77	67.75	18.34	3.01	150.0	± 9.6 %
		Y	3.18	70.11	19.36		150.0	
		Z	2.75	67.60	18.22		150.0	
10170-CAD	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	3.59	72.80	20.42	3.01	150.0	± 9.6 %
		Y	4.67	76.93	21.92		150.0	
		Z	3.54	72.56	20.26		150.0	
10171-AAD	LTE-FDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	X	2.99	69.00	17.71	3.01	150.0	± 9.6 %
		Y	3.76	72.40	19.07		150.0	
		Z	2.96	68.80	17.56		150.0	
10172-CAD	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, QPSK)	X	9.91	94.44	29.85	6.02	65.0	± 9.6 %
		Y	26.96	112.91	35.22		65.0	
		Z	8.39	91.68	29.04		65.0	
10173-CAD	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 16-QAM)	X	17.47	101.05	30.02	6.02	65.0	± 9.6 %
		Y	73.48	124.50	35.94		65.0	
		Z	15.60	99.60	29.69		65.0	
10174-CAD	LTE-TDD (SC-FDMA, 1 RB, 20 MHz, 64-QAM)	X	14.33	96.21	27.96	6.02	65.0	± 9.6 %
		Y	38.46	111.23	31.91		65.0	
		Z	12.63	94.55	27.54		65.0	
10175-CAE	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, QPSK)	X	2.74	67.47	18.09	3.01	150.0	± 9.6 %
		Y	3.14	69.79	19.11		150.0	
		Z	2.72	67.32	17.97		150.0	
10176-CAE	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 16-QAM)	X	3.59	72.83	20.43	3.01	150.0	± 9.6 %
		Y	4.68	76.96	21.93		150.0	
		Z	3.55	72.58	20.27		150.0	
10177-CAG	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, QPSK)	X	2.76	67.60	18.18	3.01	150.0	± 9.6 %
		Y	3.17	69.94	19.20		150.0	
		Z	2.74	67.46	18.06		150.0	
10178-CAE	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 16-QAM)	X	3.56	72.65	20.32	3.01	150.0	± 9.6 %
		Y	4.63	76.72	21.81		150.0	
		Z	3.52	72.40	20.17		150.0	
10179-CAE	LTE-FDD (SC-FDMA, 1 RB, 10 MHz, 64-QAM)	X	3.26	70.78	18.93	3.01	150.0	± 9.6 %
		Y	4.17	74.53	20.35		150.0	
		Z	3.22	70.55	18.78		150.0	
10180-CAE	LTE-FDD (SC-FDMA, 1 RB, 5 MHz, 64-QAM)	X	2.99	68.95	17.67	3.01	150.0	± 9.6 %
		Y	3.75	72.33	19.02		150.0	
		Z	2.95	68.75	17.52		150.0	
10181-CAD	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, QPSK)	X	2.75	67.59	18.17	3.01	150.0	± 9.6 %
		Y	3.17	69.93	19.20		150.0	
		Z	2.73	67.44	18.06		150.0	
10182-CAD	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 16-QAM)	X	3.56	72.62	20.31	3.01	150.0	± 9.6 %
		Y	4.62	76.70	21.80		150.0	
		Z	3.51	72.38	20.16		150.0	
10183-AAC	LTE-FDD (SC-FDMA, 1 RB, 15 MHz, 64-QAM)	X	2.98	68.93	17.66	3.01	150.0	± 9.6 %
		Y	3.74	72.31	19.01		150.0	
		Z	2.95	68.73	17.51		150.0	

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