TESTING
NVLAP LAB CODE 600118-0

SAR TEST REPORT

No. I22Z70189-SEM01

For

Samsung Electronics Co., Ltd

Multi-band GSM/WCDMA/LTE Tablet with Bluetooth, WLAN

Model Name: SM-T509

with

Hardware Version: REV 1.0

Software Version: T509.001

FCC ID: ZCASMT509

Issued Date: 2022-8-26

Note:

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Test Laboratory:

CTTL, Telecommunication Technology Labs, CAICT

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REPORT HISTORY

Report Number	Revision	Issue Date	Description
I22Z70189-SEM01	Rev.0	2022-8-18	Initial creation of test report
I22Z70189-SEM01	Rev.1	2022-8-26	Revise the equipment class from PCE to PCB on page6.

TABLE OF CONTENT

1 Test Laboratory

1.1 Testing Location

Company Name:	CTTL(Shouxiang)
Address:	No. 51, Xueyuan Road, Haidian District, Beijing, P. R. China 100191.

1.2 Testing Environment

Temperature:	18°C~25°C,
Relative humidity:	30%~ 70%
Ground system resistance:	< 0.5 Ω
Ambient noise & Reflection:	< 0.012 W/kg

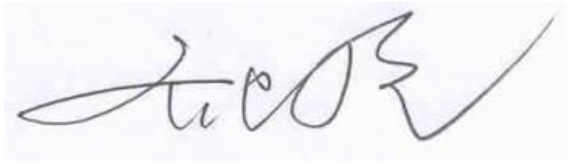
1.3 Project Data

Project Leader:	Qi Dianyuan
Test Engineer:	Yao Juming
Testing Start Date:	July 18, 2022
Testing End Date:	August 4, 2022

1.4 Signature

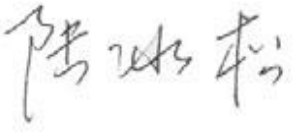
Yao Juming

(Prepared this test report)



Qi Dianyuan

(Reviewed this test report)



Lu Bingsong

Deputy Director of the laboratory

(Approved this test report)

2 Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for Samsung Electronics Co., Ltd Multi-band GSM/WCDMA/LTE Tablet with Bluetooth, WLAN SM-T509 are as follows:

Table 2.1: Highest Reported SAR (1g)

Technology Band	Body SAR 1g (W/kg)	Equipment Class
GSM850	**0.75**	PCB
GSM1900	**0.69**	
WCDMA1900	**0.99**	
WCDMA1700	**0.71**	
WCDMA 850	**0.62**	
LTE Band2	**0.86**	
LTE Band4	**0.67**	
LTE Band5	**0.50**	
LTE Band7	**0.76**	
LTE Band12	**0.55**	
LTE Band41	**0.77**	
LTE Band66	**0.65**	
WLAN 2.4GHz	**0.51**	DTS
WLAN 5GHz	**0.56**	NII
BT	**0.12**	DSS

The SAR values found for the Mobile Phone are below the maximum recommended levels of 1.6 W/kg as averaged over any 1g tissue according to the ANSI C95.1-1992.
For body operation, this device has been tested and meets FCC RF exposure guidelines when used with any accessory that contains no metal and which provides a minimum separation distance of 0mm/13mm/15mm/19mm between this device and the body of the user. Use of other accessories may not ensure compliance with FCC RF exposure guidelines.
The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power output.
The measurement together with the test system set-up is described in annex C of this test report. A detailed description of the equipment under test can be found in chapter 4 of this test report. The highest reported SAR value is obtained at the case of **(Table 2.1),** and the values are**:**
Body: 0.99 W/kg(1g)

Remark：
This device supports both LTE B17/B38 and LTE B12/B41.Since the supported frequency span for LTE B17/B38 falls completely within the supports frequency span for LTE B12/B41, both LTE bands have the same target power, and both LTE bands share the same transmission path; therefore, SAR was only assessed for LTE B12/B41.

Table 2.2: The sum of SAR values for Main antenna + WiFi-2.4G

	Position	Main antenna	WiFi-2.4G	Sum
Highest SAR value for Body	Rear 0mm (LTE B41)	0.77	0.51	**1.28**

Table 2.3: The sum of SAR values for Main antenna + WiFi-5G + BT

	Position	Main antenna	WiFi-5G	BT	Sum
Highest SAR value for Body	Rear 0mm (LTE B41)	0.77	0.57	0.12	**1.46**

According to the above tables, the highest sum of reported SAR values is **1.46 W/kg (1g)**. The detail for simultaneous transmission consideration is described in chapter 13.

Conclusion:

According to the above tables, the sum of reported SAR values is<1.6W/kg. So the simultaneous transmission SAR with volume scans is not required.

3 Client Information

3.1 Applicant Information

Company Name:	Samsung Electronics Co., Ltd.
Address/Post:	19 Chapin Rd.,Building D Pine Brook, NJ 07058
Contact Person:	Jenni Chun
Contact Email:	j1.chun@samsung.com
Telephone:	+1-201-937-4203

3.2 Manufacturer Information

Company Name:	Samsung Electronics Co., Ltd
Address/Post:	Samsung R5, Maetan dong 129, Samsung ro Youngtong gu, Suwon city 443 742, Korea
Contact Person:	조성훈 (Sunghoon Cho)
Contact Email:	ggobi.cho@samsung.com
Telephone:	+82-10-2722-4159
Fax:	/

4 Equipment Under Test (EUT) and Ancillary Equipment (AE)

4.1 About EUT

Description:	Multi-band GSM/WCDMA/LTE Tablet with Bluetooth, WLAN
Model name:	SM-T509
Operating mode(s):	GSM850/900/1800/1900, WCDMA850/900/1700/1900/2100 LTEBand1/2/3/4/5/7/8/12/17/20/28/38/40/41/66,BT, Wi-Fi(2.4G&5G)
Tested Tx Frequency:	824 – 849 MHz (GSM 850)
	1850 – 1910 MHz (GSM 1900)
	824 – 849 MHz (WCDMA 850 Band V)
	1850 – 1910 MHz (WCDMA1900 Band IV)
	1710-1755 MHz (WCDMA1700 Band II)
	1850.7 – 1909.3 MHz (LTE Band 2)
	1710.7 – 1754.3 MHz (LTE Band 4)
	824.7 – 848.3 MHz (LTE Band 5)
	2500 – 2570 MHz (LTE Band 7)
	699.7 – 715.3 MHz (LTE Band 12)
	2537.5 – 2652.5 MHz (LTE Band41)
	1710.7 –1779.3 MHz (LTE Band 66)
	2412 – 2462 MHz (Wi-Fi 2.4G)
	2400 – 2483.5 MHz (Bluetooth)
	5180 – 5240 MHz (Wi-Fi 5.2G)
	5260 – 5320 MHz (Wi-Fi 5.3G)
	5500 – 5720 MHz (Wi-Fi 5.5G)
	5745 – 5825 MHz (Wi-Fi 5.8G)
GPRS/EGPRS Multislot Class:	12
Test device production information:	Production unit
Device type:	Portable device
Antenna type:	Integrated antenna
Hotspot mode:	Support

4.2 Internal Identification of EUT used during the test

EUT ID*	IMEI/SN	HW Version	SW Version
EUT1	UT70189-01a	REV1.0	T509.001
EUT2	UT70189-02a	REV1.0	T509.001
EUT3	UT70189-03a	REV1.0	T509.001
EUT4	UT70189-04a	REV1.0	T509.001
EUT5	UT70189-17a	REV1.0	T509.001
EUT5	UT70189-18a	REV1.0	T509.001

*EUT ID: is used to identify the test sample in the lab internally.

Note: It is performed to test SAR with the EUT1~4 and conducted power with the EUT5~6.

4.3 Internal Identification of AE used during the test

AE ID*	Description	Model	SN	Manufacturer
AE1	Battery	SCUD-WT-N19	/	SCUD (Fujian) Electronics CO.,LTD
AE2	Headset	EHS64AVFWE	/	DONGGUAN YOUNGBO ELECTRONICS CO.,LTD
AE3	Headset	EHS61ASFWE	/	DONGGUAN YOUNGBO ELECTRONICS CO.,LTD

*AE ID: is used to identify the test sample in the lab internally.

5 TEST METHODOLOGY

5.1 Applicable Limit Regulations

ANSI C95.1–1992:IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

It specifies the maximum exposure limit of **1.6 W/kg** as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

5.2 Applicable Measurement Standards

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

KDB447498 D01: General RF Exposure Guidance v06: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

KDB616217 D04 SAR for laptop and tablets v01r02 SAR Evaluation Considerations for Laptop, Notebook, Notebook and Tablet Computers.

KDB648474 D04 Handset SAR v01r03: SAR Evaluation Considerations for Wireless Handsets.

KDB941225 D01 SAR test for 3G devices v03r01: SAR Measurement Procedures for 3G Devices

KDB941225 D05 SAR for LTE Devices v02r05: SAR Evaluation Considerations for LTE Devices

KDB941225 D06 Hotspot Mode SAR v02r01: SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities

KDB248227 D01 802.11 Wi-Fi SAR v02r02: SAR GUIDANCE FOR IEEE 802.11 (Wi-Fi) TRANSMITTERS

KDB865664 D01 SAR measurement 100 MHz to 6 GHz v01r04: SAR Measurement Requirements for 100 MHz to 6 GHz.

KDB865664 D02 RF Exposure Reporting v01r02: RF Exposure Compliance Reporting and Documentation Considerations

6 Specific Absorption Rate (SAR)

6.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

6.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ) . The equation description is as below:

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

SAR is expressed in units of Watts per kilogram (W/kg)
SAR measurement can be either related to the temperature elevation in tissue by

$$SAR = c\left(\frac{\delta T}{\delta t}\right)$$

Where: C is the specific head capacity, δT is the temperature rise and δt is the exposure duration, or related to the electrical field in the tissue by

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

Where: σ is the conductivity of the tissue, ρ is the mass density of tissue and E is the RMS electrical field strength.

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

7 Tissue Simulating Liquids

7.1 Targets for tissue simulating liquid

Table 7.1: Targets for tissue simulating liquid

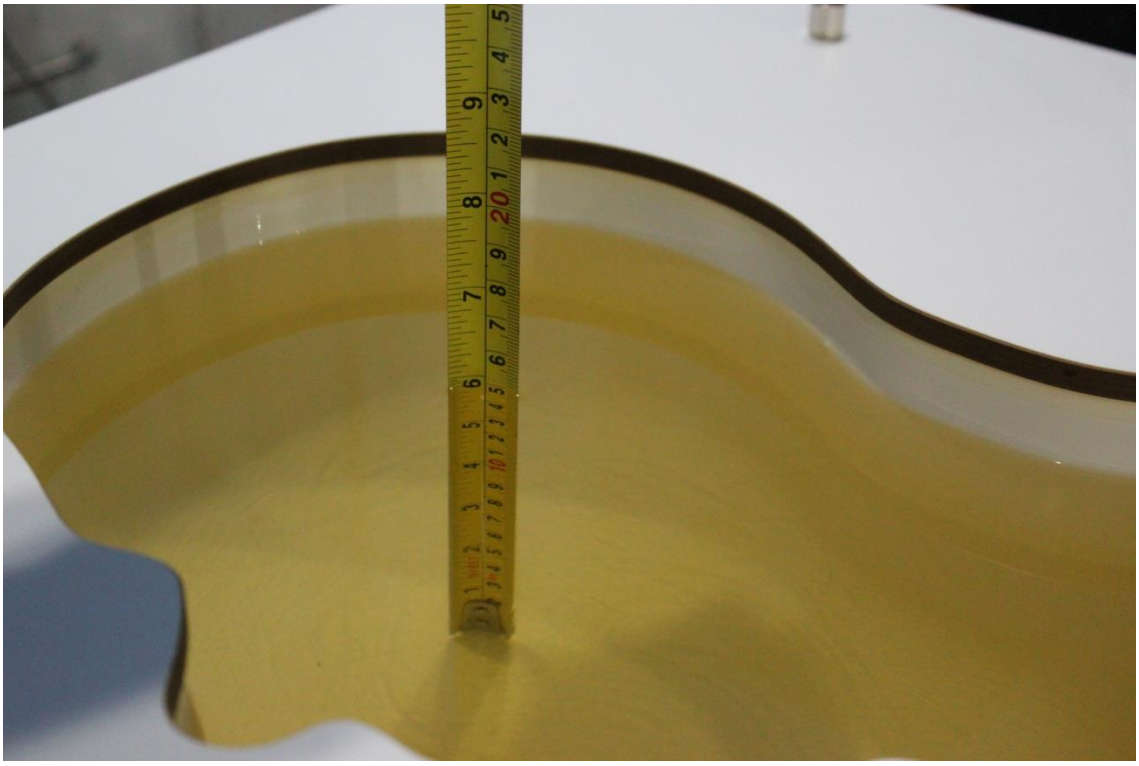
Frequency(MHz)	Liquid Type	Conductivity(σ)	± 5% Range	Permittivity(ε)	± 5% Range
750	Head	0.89	0.85～0.93	41.94	39.8～44.0
835	Head	0.90	0.86～0.95	41.5	39.4～43.6
1750	Head	1.37	1.30～1.44	40.08	38.1～42.1
1900	Head	1.40	1.33～1.47	40.0	38.0～42.0
2450	Head	1.67	1.59～1.75	39.47	37.5～41.4
2600	Head	1.96	1.86～2.06	39.01	37.1～41.0
5250	Head	4.71	4.47～4.95	35.93	34.13～37.73
5600	Head	5.07	4.82～5.32	35.53	33.8～37.3
5750	Head	5.22	4.96～5.48	35.36	33.59～37.13

7.2 Dielectric Performance

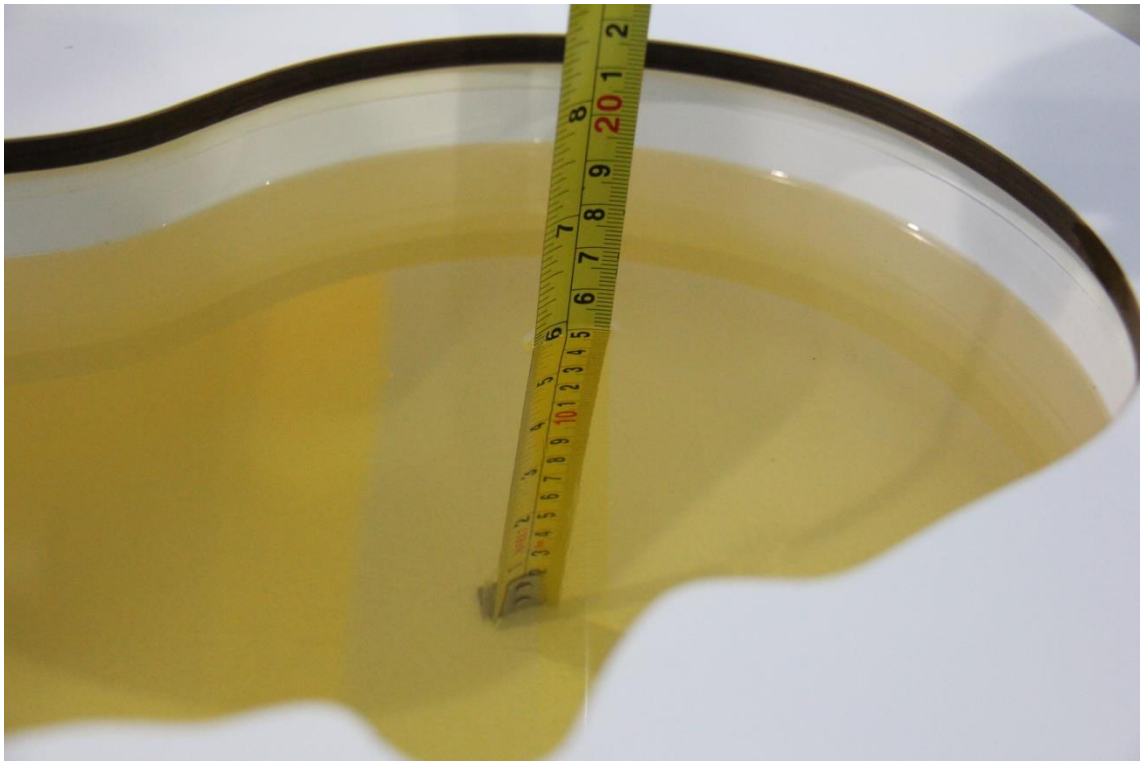
Table 7.2: Dielectric Performance of Tissue Simulating Liquid

Measurement Date (yyyy-mm-dd)	Type	Frequency	Permittivity ε	Drift (%)	Conductivity σ (S/m)	Drift (%)
2022-7-18	Head	750 MHz	41.47	-1.12	0.885	-0.56
2022-7-19	Head	835 MHz	40.87	-1.52	0.906	0.67
2022-7-23	Head	1750 MHz	39.69	-0.97	1.384	1.02
2022-7-24	Head	1900 MHz	40.25	0.63	1.427	1.93
2022-7-27	Head	2450 MHz	39.55	0.89	1.825	1.39
2022-7-28	Head	2600 MHz	39.56	1.41	1.96	0.00
2022-8-2	Head	5250 MHz	35.67	-0.72	4.751	0.87
2022-8-3	Head	5600 MHz	35.77	0.68	5.049	-0.41
2022-8-4	Head	5750 MHz	35.12	-0.68	5.323	1.97

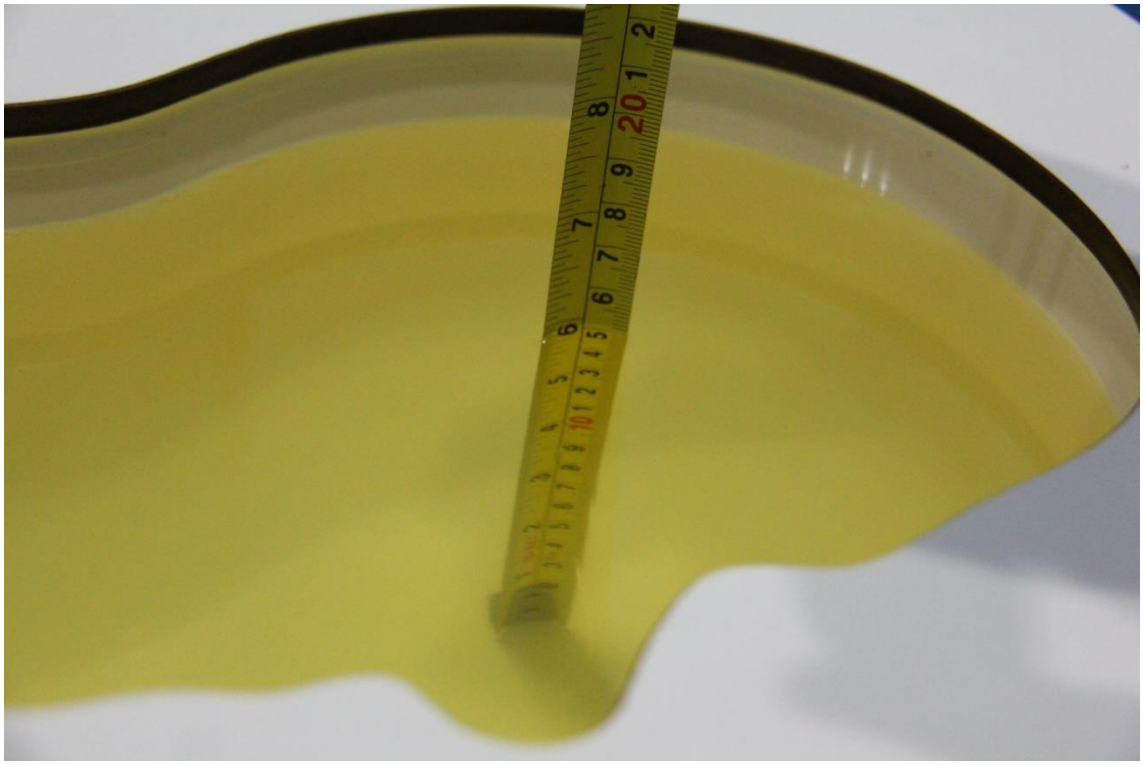
Note: The liquid temperature is 22.0℃



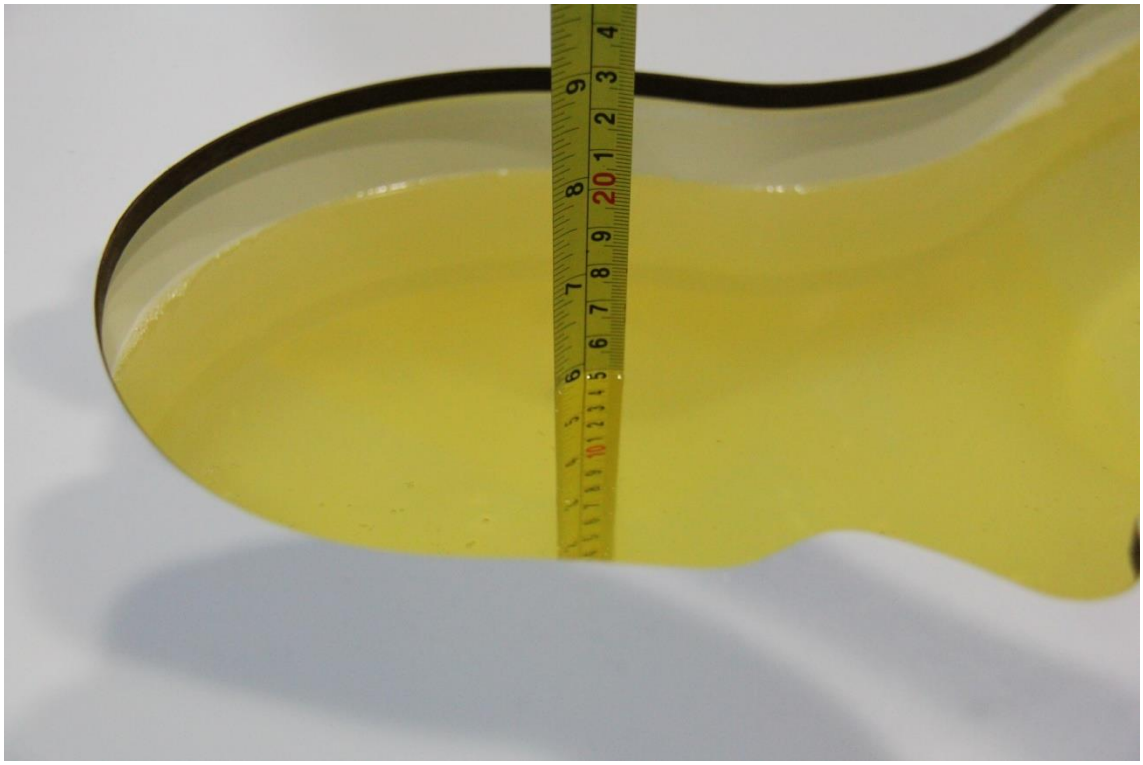
Picture 7-1 Liquid depth in the Head Phantom (750MHz)



Picture 7-2 Liquid depth in the Head Phantom (835 MHz)

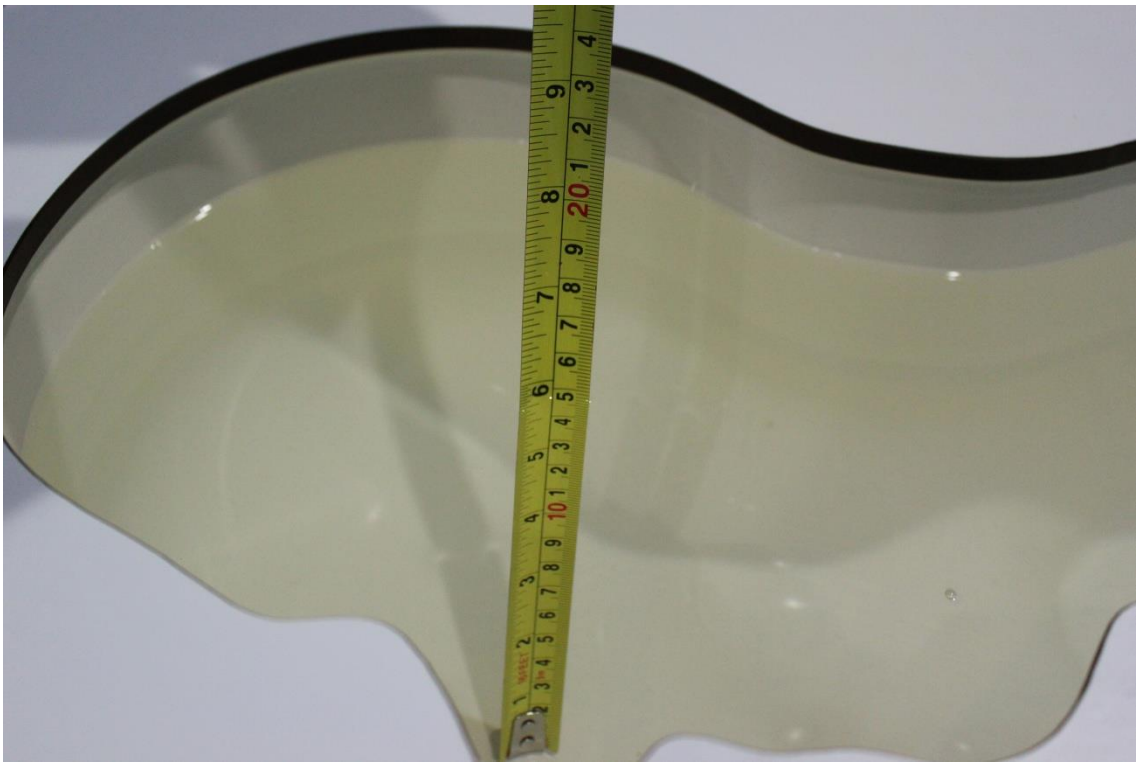


Picture 7-3 Liquid depth in the Head Phantom (1900 MHz)



Picture 7-4 Liquid depth in the Head Phantom (2450MHz)

Picture 7-5 Liquid depth in the Head Phantom (2600 MHz)

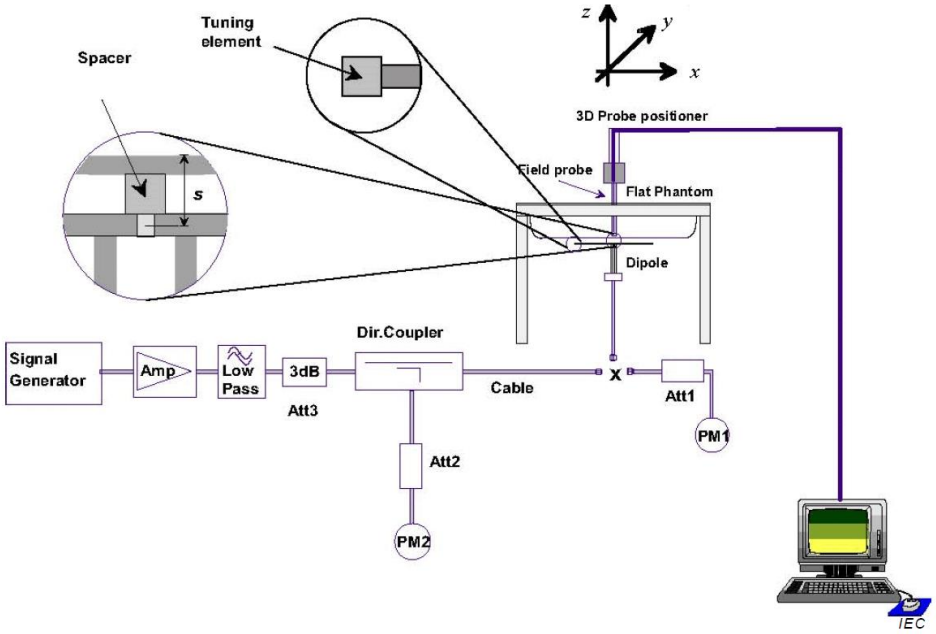


Picture 7-6 Liquid depth in the Head Phantom (5GHz)

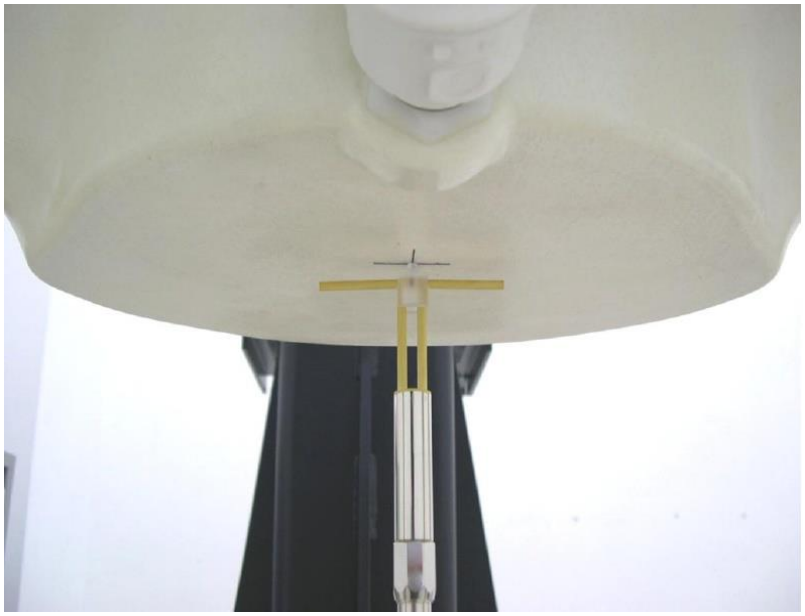
8 System verification

8.1 System Setup

In the simplified setup for system evaluation, the DUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave that comes from a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The equipment setup is shown below:



Picture 8.1 System Setup for System Evaluation



Picture 8.2 Photo of Dipole Setup

8.2 System Verification

SAR system verification is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device.

The system verification results are required that the area scan estimated 1-g SAR is within 3% of the zoom scan 1-g SAR. The details are presented in annex B.

Table 8.1: System Verification of Head

Measurement Date (yyyy-mm-dd)	Frequency	Target value (W/kg)		Measured value(W/kg)		Deviation	
		10 g Average	1 g Average	10 g Average	1 g Average	10 g Average	1 g Average
2022-7-18	750 MHz	5.65	8.68	5.56	8.68	-1.59%	0.00%
2022-7-19	835 MHz	6.21	9.65	6.40	9.52	3.06%	-1.35%
2022-7-23	1750 MHz	19.4	36.9	19.5	36.4	0.41%	-1.25%
2022-7-24	1900 MHz	20.6	39.9	20.8	40.0	1.17%	0.15%
2022-7-27	2450 MHz	24.9	53.3	25.1	53.8	0.88%	0.86%
2022-7-28	2600 MHz	25.5	57.1	25.4	57.8	-0.39%	1.30%
2022-8-2	5250 MHz	22.7	79.5	22.4	79.1	-1.32%	-0.50%
2022-8-3	5600 MHz	23.7	83.8	23.3	83.4	-1.69%	-0.48%
2022-8-4	5750 MHz	22.7	81.0	22.8	81.4	0.44%	0.49%

9 Measurement Procedures

9.1 Tests to be performed

In order to determine the highest value of the peak spatial-average SAR of a handset, all device positions, configurations and operational modes shall be tested for each frequency band according to steps 1 to 3 below. A flowchart of the test process is shown in picture 9.1.

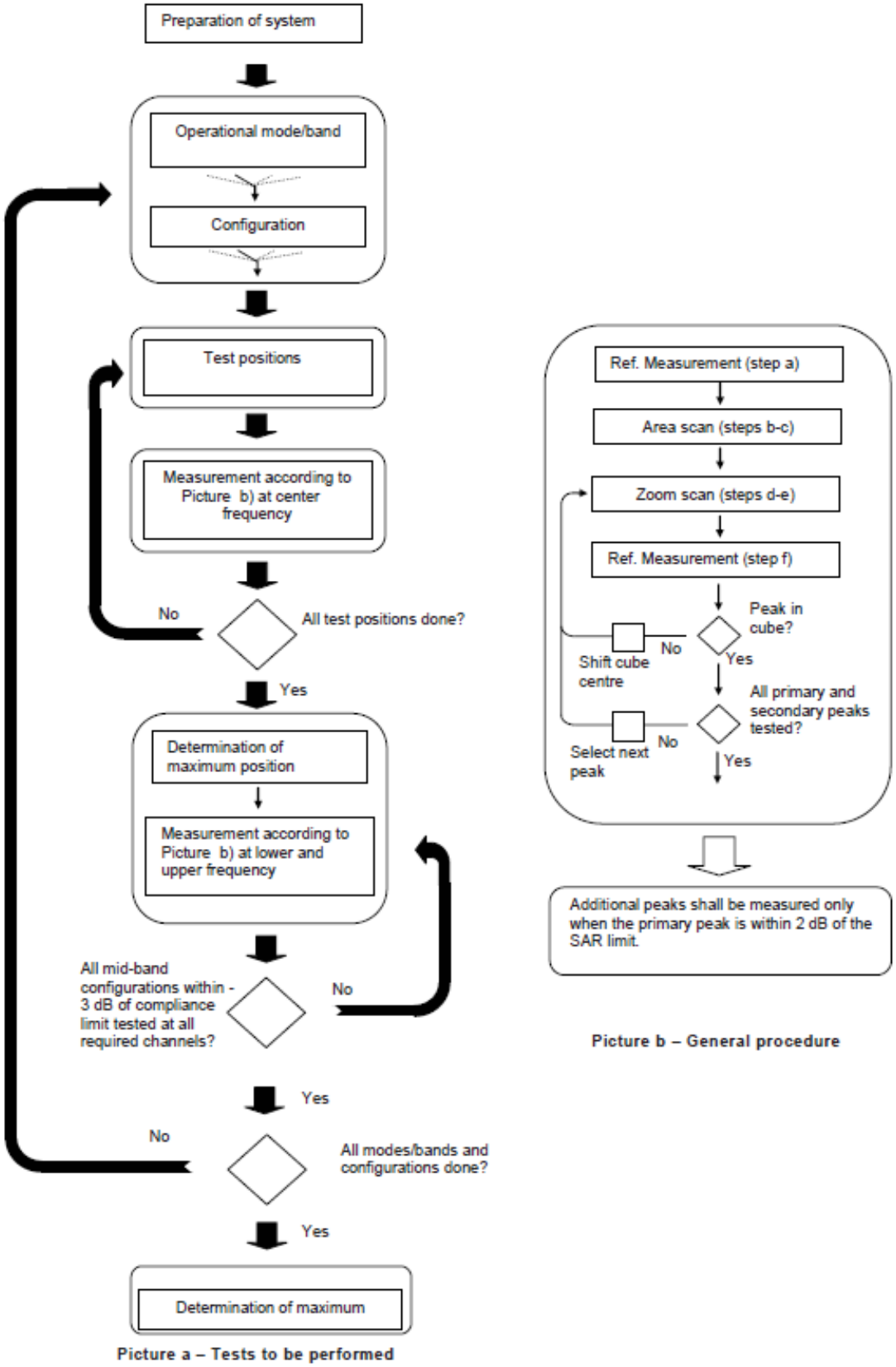
Step 1: The tests described in 9.2 shall be performed at the channel that is closest to the centre of the transmit frequency band (f_c) for:

a) all device positions (cheek and tilt, for both left and right sides of the SAM phantom, as described in annex D),
b) all configurations for each device position in a), e.g., antenna extended and retracted, and
c) all operational modes, e.g., analogue and digital, for each device position in a) and configuration in b) in each frequency band.

If more than three frequencies need to be tested according to 11.1 (i.e., N_c > 3), then all frequencies, configurations and modes shall be tested for all of the above test conditions.

Step 2: For the condition providing highest peak spatial-average SAR determined in Step 1,perform all tests described in 9.2 at all other test frequencies, i.e., lowest and highest frequencies. In addition, for all other conditions (device position, configuration and operational mode) where the peak spatial-average SAR value determined in Step 1 is within3 dB of the applicable SAR limit, it is recommended that all other test frequencies shall be tested as well.

Step 3: Examine all data to determine the highest value of the peak spatial-average SAR found in Steps 1 to 2.



Picture a – Tests to be performed

Picture b – General procedure

Picture 9.1Block diagram of the tests to be performed

9.2 General Measurement Procedure

The area and zoom scan resolutions specified in the table below must be applied to the SAR measurements and fully documented in SAR reports to qualify for TCB approval. Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Both the probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1-g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in IEEE Std 1528-2003. The results should be documented as part of the system validation records and may be requested to support test results when all the measurement parameters in the following table are not satisfied.

<table>
<tr><td colspan="3"></td><td>≤ 3 GHz</td><td>> 3 GHz</td></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 ± 1 mm</td><td>½·δ·ln(2) ± 0.5 mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>≤ 2 GHz: ≤ 15 mm
2 – 3 GHz: ≤ 12 mm</td><td>3 – 4 GHz: ≤ 12 mm
4 – 6 GHz: ≤ 10 mm</td></tr>
<tr><td colspan="2">When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>≤ 2 GHz: ≤ 8 mm
2 – 3 GHz: ≤ 5 mm*</td><td>3 – 4 GHz: ≤ 5 mm*
4 – 6 GHz: ≤ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>≤ 5 mm</td><td>3 – 4 GHz: ≤ 4 mm
4 – 5 GHz: ≤ 3 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>≤ 4 mm</td><td>3 – 4 GHz: ≤ 3 mm
4 – 5 GHz: ≤ 2.5 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">≤ 1.5·$\Delta z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥ 30 mm</td><td>3 – 4 GHz: ≥ 28 mm
4 – 5 GHz: ≥ 25 mm
5 – 6 GHz: ≥ 22 mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.
* When zoom scan is required and the <u>reported</u> SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

9.3 WCDMA Measurement Procedures for SAR

The following procedures are applicable to WCDMA handsets operating under 3GPP Release99, Release 5 and Release 6. The default test configuration is to measure SAR with an established radio link between the DUT and a communication test set using a 12.2kbps RMC (reference measurement channel) configured in Test Loop Mode 1. SAR is selectively confirmed for other physical channel configurations (DPCCH & $DPDCH_n$), HSDPA and HSPA (HSUPA/HSDPA) modes according to output power, exposure conditions and device operating capabilities. Both uplink and downlink should be configured with the same RMC or AMR, when required. SAR for Release 5 HSDPA and Release 6 HSPA are measured using the applicable FRC (fixed reference channel) and E-DCH reference channel configurations. Maximum output power is verified according to applicable versions of 3GPP TS 34.121 and SAR must be measured according to these maximum output conditions. When Maximum Power Reduction (MPR) is not implemented according to Cubic Metric (CM) requirements for Release 6 HSPA, the following procedures do not apply.

For Release 5 HSDPA Data Devices:

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs}	CM/dB
1	2/15	15/15	64	2/15	4/15	0.0
2	12/15	15/15	64	12/15	24/25	1.0
3	15/15	8/15	64	15/8	30/15	1.5
4	15/15	4/15	64	15/4	30/15	1.5

For Release 6 HSPA Data Devices

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs}	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM (dB)	MPR (dB)	AG Index	E-TFCI
1	11/15	15/15	64	11/15	22/15	209/225	1039/225	4	1	1.5	1.5	20	75
2	6/15	15/15	64	6/15	12/15	12/15	12/15	4	1	1.5	1.5	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1}:47/15 β_{ed2}:47/15	4	2	1.5	1.5	15	92
4	2/15	15/15	64	2/15	4/15	4/15	56/75	4	1	1.5	1.5	17	71
5	15/15	15/15	64	15/15	24/15	30/15	134/15	4	1	1.5	1.5	21	81

Rel.8 DC-HSDPA (Cat 24)

SAR test exclusion for Rel.8 DC-HSDPA must satisfy the SAR test exclusion requirements of Rel.5 HSDPA. SAR test exclusion for DC-HSDPA devices is determined by power measurements according to the H-Set 12, Fixed Reference Channel (FRC) configuration in Table C.8.1.12 of 3GPP TS 34.121-1. A primary and a secondary serving HS-DSCH Cell are required to perform the power measurement and for the results to qualify for SAR test exclusion.

9.4 SAR Measurement for LTE

SAR tests for LTE are performed with a base station simulator, Rohde & Rchwarz CMW500. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. All powers were measured with the CMW 500.
It is performed for conducted power and SAR based on the KDB941225 D05.
SAR is evaluated separately according to the following procedures for the different test positions in each exposure condition – head, body, body-worn accessories and other use conditions. The procedures in the following subsections are applied separately to test each LTE frequency band.

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 among RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.
2) QPSK with 50% RB allocation
   The procedures required for 1 RB allocation in 1) are applied to measure the SAR for QPSK with 50% RB allocation.
3) QPSK with 100% RB allocation
   For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation in 1) and 2) are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.

TDD test:

TDD testing is performed using guidance from FCC KDB 941225 D05 and the SAR test guidance provided in April 2013 TCB works hop notes. TDD is tested at the highest duty factor using UL-DL configuration 0 with special subframe configuration 6 and applying the FDD LTE procedures in KDB 941225 D05. SAR testing is performed using the extended cyclic prefix listed in 3GPP TS 36.211.

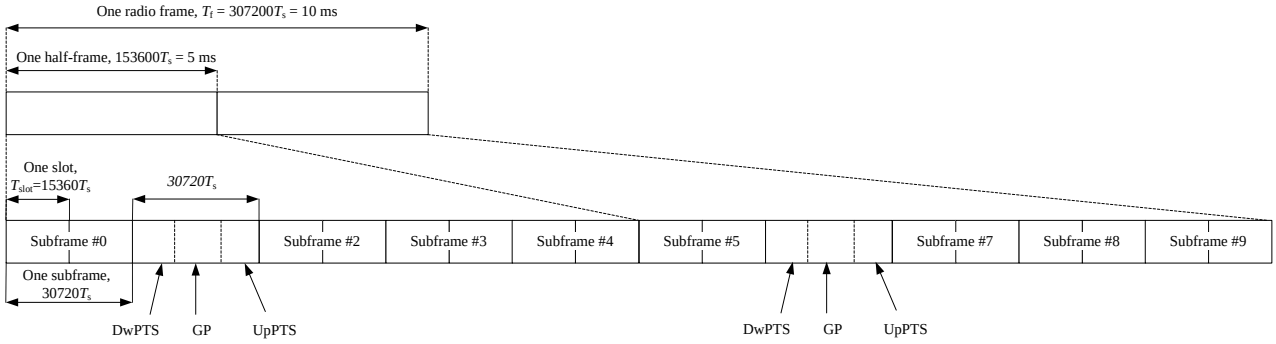


Figure 9.2: Frame structure type 2 (for 5 ms switch-point periodicity)

Table 9.1: 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	$26336 \cdot T_s$			$7680 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
5	$6592 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$20480 \cdot T_s$		
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 9.2: 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

Duty factor is calculated by:

Duty factor = uplink frame*6+UpPTS*2/one frame length

= (30720.T_s * 6+5120. T_s*2)/307200.T_s

= 0.633

9.5 Bluetooth & Wi-Fi Measurement Procedures for SAR

Normal network operating configurations are not suitable for measuring the SAR of 802.11 transmitters in general. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure that the results are consistent and reliable.

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in a test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters. The test frequencies should correspond to actual channel frequencies defined for domestic use. SAR for devices with switched diversity should be measured with only one antenna transmitting at a time during each SAR measurement, according to a fixed modulation and data rate. The same data pattern should be used for all measurements.

9.6 Power Drift

To control the output power stability during the SAR test, DASY5 system calculates the power drift by measuring the E-field at the same location at the beginning and at the end of the measurement for each test position. These drift values can be found in section14 labeled as: (Power Drift [dB]). This ensures that the power drift during one measurement is within 5%.

10 Area Scan Based 1-g SAR

10.1 Requirement of KDB

According to the KDB447498 D01, when the implementation is based the specific polynomial fit algorithm as presented at the 29th Bioelectromagnetics Society meeting (2007) and the estimated 1-gSAR is ≤ 1.2 W/kg, a zoom scan measurement is not required provided it is also not needed for any other purpose; for example, if the peak SAR location required for simultaneous transmission SAR test exclusion can be determined accurately by the SAR system or manually to discriminate between distinctive peaks and scattered noisy SAR distributions from area scans.

There must not be any warning or alert messages due to various measurement concerns identified by the SAR system; for example, noise in measurements, peaks too close to scan boundary, peaks are too sharp, spatial resolution and uncertainty issues etc. The SAR system verification must also demonstrate that the area scan estimated 1-g SAR is within 3% of the zoom scan 1-g SAR (See Annex B). When all the SAR results for each exposure condition in a frequency band and wireless mode are based on estimated 1-g SAR, the 1-g SAR for the highest SAR configuration must be determined by a zoom scan.

10.2 Fast SAR Algorithms

The approach is based on the area scan measurement applying a frequency dependent attenuation parameter. This attenuation parameter was empirically determined by analyzing a large number of phones. The MOTOROLA FAST SAR was developed and validated by the MOTOROLA Research Group in Ft. Lauderdale.

In the initial study, an approximation algorithm based on Linear fit was developed. The accuracy of the algorithm has been demonstrated across a broad frequency range (136-2450 MHz)and for both 1- and 10-g averaged SAR using a sample of 264 SAR measurements from 55wireless handsets. For the sample size studied, the root-mean-squared errors of the algorithm mare 1.2% and 5.8% for 1- and 10-g averaged SAR, respectively. The paper describing the algorithm in detail is expected to be published in August 2004 within the Special Issue of Transactions on MTT.

In the second step, the same research group optimized the fitting algorithm to an Polynomial fit whereby the frequency validity was extended to cover the range 30-6000MHz. Details of this study can be found in the BEMS 2007 Proceedings.

Both algorithms are implemented in DASY software.

11 Conducted Output Power

There are two sets of tune-up power, Normal power and Low power, for all bands by proximity sensor. The detail of proximity sensor is presented in Annex I.

11.1 GSM Measurement result

Table 11.1-1: The conducted power measurement results–GSM850 Normal power

GSM 850 Speech (GMSK)	Measured timeslot-averaged output power (dBm)			Tune up	calculation	Source-based time-averaged output power (dBm)		
	251	190	128			251	190	128
1 Txslot	31.98	32.11	32.19	33.50	/	/	/	/
GSM 850 GPRS (GMSK)	Measured timeslot-averaged output power (dBm)				calculation	Source-based time-averaged output power (dBm)		
	251	190	128			251	190	128
1 Txslot	31.93	32.19	32.24	33.50	-9.03	22.90	23.16	23.21
2 Txslots	30.02	30.11	30.16	31.50	-6.02	24.00	24.09	24.14
3 Txslots	28.22	28.34	28.36	29.50	-4.26	23.96	24.08	24.10
4 Txslots	26.23	26.32	26.32	27.50	-3.01	23.22	23.31	23.31
GSM 850 EGPRS (GMSK)	Measured timeslot-averaged output power (dBm)				calculation	Source-based time-averaged output power (dBm)		
	251	190	128			251	190	128
1 Txslot	31.94	32.21	32.26	33.50	-9.03	22.91	23.18	23.23
2 Txslots	30.04	30.13	30.18	31.50	-6.02	24.02	24.11	24.16
3 Txslots	28.23	28.35	28.39	29.50	-4.26	23.97	24.09	24.13
4 Txslots	26.25	26.33	26.36	27.50	-3.01	23.24	23.32	23.35
GSM 850 EGPRS (8PSK)	Measured timeslot-averaged output power (dBm)				calculation	Source-based time-averaged output power (dBm)		
	251	190	128			251	190	128
1 Txslot	25.44	25.47	25.41	26.50	-9.03	16.41	16.44	16.38
2 Txslots	24.12	24.23	24.43	24.50	-6.02	18.10	18.21	18.41
3Txslots	21.83	22.47	22.00	22.50	-4.26	17.57	18.21	17.74
4 Txslots	20.10	19.56	19.53	21.50	-3.01	17.09	16.55	16.52

NOTES:

1) Division Factors

To average the power, the division factor is as follows:

1TX-slot = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB

2TX-slots = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB

3TX-slots = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB

4TX-slots = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB

According to the conducted power as above, the body measurements are performed with 2Txslots for GSM850.

Table 11.1-2: The conducted power measurement results–GSM850 Low power

GSM 850 Speech (GMSK)	Measured timeslot-averaged output power (dBm)			Tune up	calculation	Source-based time-averaged output power (dBm)		
	251	190	128			251	190	128
1 Txslot	26.08	26.07	26.09	27.00	/	/	/	/
GSM 850 GPRS (GMSK)	Measured timeslot-averaged output power (dBm)				calculation	Source-based time-averaged output power (dBm)		
	251	190	128			251	190	128
1 Txslot	26.03	26.04	26.02	27.00	-9.03	17.00	17.01	16.99
2 Txslots	22.02	22.02	21.97	23.00	-6.02	16.00	16.00	15.95
3 Txslots	20.97	20.97	20.91	22.00	-4.26	16.71	16.71	16.65
4 Txslots	19.92	19.91	19.85	21.00	-3.01	16.91	16.90	16.84
GSM 850 EGPRS (GMSK)	Measured timeslot-averaged output power (dBm)				calculation	Source-based time-averaged output power (dBm)		
	251	190	128			251	190	128
1 Txslot	26.01	26.04	26.03	27.00	-9.03	16.98	17.01	17.00
2 Txslots	22.01	22.01	21.97	23.00	-6.02	15.99	15.99	15.95
3 Txslots	20.97	20.97	20.93	22.00	-4.26	16.71	16.71	16.67
4 Txslots	19.92	19.92	19.86	21.00	-3.01	16.91	16.91	16.85
GSM 850 EGPRS (8PSK)	Measured timeslot-averaged output power (dBm)				calculation	Source-based time-averaged output power (dBm)		
	251	190	128			251	190	128
1 Txslot	19.32	19.57	19.53	20.50	-9.03	10.29	10.54	10.50
2 Txslots	14.82	15.22	15.05	16.50	-6.02	8.80	9.20	9.03
3Txslots	14.56	14.91	14.25	16.00	-4.26	10.30	10.65	9.99
4 Txslots	12.13	12.82	12.88	14.00	-3.01	9.12	9.81	9.87

NOTES:

1) Division Factors

To average the power, the division factor is as follows:

1TX-slot = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB

2TX-slots = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB

3TX-slots = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB

4TX-slots = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB

According to the conducted power as above, the body measurements are performed with 1Txslots for GSM850.

Table 11.1-3: The conducted power measurement results-GSM1900 Normal power

PCS1900 Speech (GMSK)	Measured timeslot-averaged output power (dBm)			Tune up	calculation	Source-based time-averaged output power (dBm)		
	810	661	512			810	661	512
1 Txslot	27.82	27.93	28.27	29.50	/	/	/	/
PCS1900 GPRS (GMSK)	Measured timeslot-averaged output power (dBm)				calculation	Source-based time-averaged output power (dBm)		
	810	661	512			810	661	512
1 Txslot	27.80	27.95	28.31	29.50	-9.03	18.77	18.92	19.28
2 Txslots	25.57	25.77	26.08	27.50	-6.02	19.55	19.75	20.06
3 Txslots	24.07	24.27	24.57	25.50	-4.26	19.81	20.01	20.31
4 Txslots	22.57	22.58	22.56	24.50	-3.01	19.56	19.57	19.55
PCS1900 EGPRS (GMSK)	Measured timeslot-averaged output power (dBm)				calculation	Source-based time-averaged output power (dBm)		
	810	661	512			810	661	512
1 Txslot	27.73	27.87	28.25	29.50	-9.03	18.70	18.84	19.22
2 Txslots	25.50	25.68	26.03	27.50	-6.02	19.48	19.66	20.01
3 Txslots	24.00	24.18	24.52	25.50	-4.26	19.74	19.92	20.26
4 Txslots	21.52	22.59	22.51	24.50	-3.01	18.51	19.58	19.50
PCS1900 EGPRS (8PSK)	Measured timeslot-averaged output power (dBm)				calculation	Source-based time-averaged output power (dBm)		
	810	661	512			810	661	512
1 Txslot	24.94	24.87	24.94	25.50	-9.03	15.91	15.84	15.91
2 Txslots	23.27	23.26	23.33	23.50	-6.02	17.25	17.24	17.31
3Txslots	21.30	21.14	21.21	21.50	-4.26	17.04	16.88	16.95
4 Txslots	19.37	19.17	19.32	20.50	-3.01	16.36	16.16	16.31

NOTES:

1) Division Factors

To average the power, the division factor is as follows:

1TX-slot = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB

2TX-slots = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB

3TX-slots = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB

4TX-slots = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB

According to the conducted power as above, the body measurements are performed with 3Txslots for GSM1900.

Table 11.1-4: The conducted power measurement results-GSM1900 Low power

PCS1900 Speech (GMSK)	Measured timeslot-averaged output power (dBm)			Tune up	calculation	Source-based time-averaged output power (dBm)		
	810	661	512			810	661	512
1 Txslot	20.81	20.75	20.78	21.50	/	/	/	/
PCS1900 GPRS (GMSK)	Measured timeslot-averaged output power (dBm)				calculation	Source-based time-averaged output power (dBm)		
	810	661	512			810	661	512
1 Txslot	20.79	20.72	20.86	21.50	-9.03	11.76	11.69	11.83
2 Txslots	17.82	17.76	17.89	18.50	-6.02	11.80	11.74	11.87
3 Txslots	15.78	15.72	15.86	16.50	-4.26	11.52	11.46	11.60
4 Txslots	14.83	14.77	14.90	15.50	-3.01	11.82	11.76	11.89
PCS1900 EGPRS (GMSK)	Measured timeslot-averaged output power (dBm)				calculation	Source-based time-averaged output power (dBm)		
	810	661	512			810	661	512
1 Txslot	20.80	20.72	20.86	21.50	-9.03	11.77	11.69	11.83
2 Txslots	17.83	17.78	17.90	18.50	-6.02	11.81	11.76	11.88
3 Txslots	15.79	15.75	15.87	16.50	-4.26	11.53	11.49	11.61
4 Txslots	14.83	14.78	14.91	15.50	-3.01	11.82	11.77	11.90
PCS1900 EGPRS (8PSK)	Measured timeslot-averaged output power (dBm)				calculation	Source-based time-averaged output power (dBm)		
	810	661	512			810	661	512
1 Txslot	13.92	13.75	13.95	14.50	-9.03	4.89	4.72	4.92
2 Txslots	8.81	9.18	9.34	10.00	-6.02	2.79	3.16	3.32
3Txslots	8.86	9.02	9.15	9.50	-4.26	4.60	4.76	4.89
4 Txslots	5.66	5.79	5.90	6.50	-3.01	2.65	2.78	2.89

NOTES:

1) Division Factors

To average the power, the division factor is as follows:

1TX-slot = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB

2TX-slots = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB

3TX-slots = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB

4TX-slots = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB

According to the conducted power as above, the body measurements are performed with 4Txslots for GSM1900.

11.2 WCDMA Measurement result

Table 11.2-1: The conducted Power for WCDMA B5-Normal power

WCDMA850	FDDV result (dBm)			Tune up
	4233/4458	4183/4408	4132/4357	
	(846.6MHz)	(836.6MHz)	(826.4MHz)	
	23.62	23.71	23.69	24.50
HSUPA	19.64	19.66	19.63	21.50
	19.71	19.71	19.68	21.50
	19.95	19.94	20.04	22.50
	19.75	19.76	19.70	21.00
	21.96	22.01	22.03	22.50
HSPA+	21.55	21.69	21.93	22.50
DC-HSDPA	21.68	21.25	21.53	22.50
	21.43	21.10	21.29	22.50
	20.99	20.62	20.75	22.50
	20.26	19.93	20.05	21.50

Table 11.2-2: The conducted Power for WCDMA B4-Normal power

WCDMA1700	FDDIV result (dBm)			Tune up
	1513/1738	1412/1637	1312/1537	
	(1752.6MHz)	(1732.4MHz)	(1712.4MHz)	
	23.19	23.03	22.81	24.50
HSUPA	21.29	21.30	20.96	21.00
	21.3	21.31	20.94	21.00
	21.54	21.56	21.16	22.00
	21.81	21.83	21.46	22.00
	21.95	21.89	21.86	22.00
HSPA+	21.59	21.57	21.16	22.50
DC-HSDPA	21.87	21.75	21.67	22.00
	21.86	21.99	21.55	22.00
	21.86	21.98	21.53	22.00
	21.07	21.22	20.78	21.50

Table 11.2-3: The conducted Power for WCDMA B2-Normal power

WCDMA1900	FDDII result (dBm)			Tune up
	9538/9938	9400/9800	9262/9662	
	(1907.6MHz)	(1880MHz)	(1852.4MHz)	
	23.25	23.17	23.24	24.50
HSUPA	18.74	19.03	19.15	21.00
	19.06	19.35	19.39	21.00
	19.33	19.57	19.69	20.50
	19.48	19.88	19.87	20.50
	21.65	21.93	21.95	22.00
HSPA+	21.08	21.41	21.56	22.50
DC-HSDPA	21.55	21.82	21.96	22.00
	21.19	21.51	21.67	22.00
	20.89	21.24	21.36	21.50
	20.23	20.50	20.65	21.50

Table 11.2-4: The conducted Power for WCDMA B5-Low power

WCDMA850	FDDV result (dBm)			Tune up
	4233/4458	4183/4408	4132/4357	
	(846.6MHz)	(836.6MHz)	(826.4MHz)	
	17.89	17.94	17.87	18.00
HSUPA	15.32	15.06	15.20	16.50
	15.36	15.18	15.31	16.50
	15.57	15.37	15.53	16.50
	15.36	15.21	15.34	16.50
	17.69	17.79	17.55	18.00
HSPA+	16.45	16.86	16.63	17.60
DC-HSDPA	17.16	17.37	17.05	18.00
	16.15	16.10	16.12	17.00
	15.78	15.75	15.72	16.50
	15.8	15.75	15.72	16.50

Table 11.2-5: The conducted Power for WCDMA B4-Low power

WCDMA1700	FDDIV result (dBm)			Tune up
	1513/1738	1412/1637	1312/1537	
	(1752.6MHz)	(1732.4MHz)	(1712.4MHz)	
	12.65	12.50	12.42	13.00
HSUPA	12.27	12.15	12.20	13.50
	12.35	12.23	12.26	13.50
	12.53	12.41	12.44	13.50
	12.82	12.73	12.75	13.50
	13.12	13.01	13.06	14.00
HSPA+	11.79	11.70	11.70	13.00
DC-HSDPA	12.88	12.60	12.70	13.00
	12.9	12.76	12.79	13.00
	12.91	12.73	12.76	13.00
	12.13	11.94	12.02	13.00

Table 11.2-6: The conducted Power for WCDMA B2-Low power

WCDMA1900	FDDII result (dBm)			Tune up
	9538/9938	9400/9800	9262/9662	
	(1907.6MHz)	(1880MHz)	(1852.4MHz)	
	12.46	12.47	12.46	12.50
HSUPA	9.79	9.74	9.84	11.00
	10.09	10.24	10.04	11.50
	10.21	10.16	10.22	11.50
	10.45	10.42	10.46	11.50
	12.45	12.45	12.45	13.50
HSPA+	11.09	11.14	11.06	12.00
DC-HSDPA	11.54	11.38	11.36	12.50
	10.53	10.45	10.34	11.50
	11.89	11.89	11.86	12.50
	11.1	11.09	11.03	12.00

11.3 LTE Measurement result

Table 11.3-1: Maximum Power Reduction (MPR) for LTE

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

Table 11.3-2: The tune up for LTE

Band	**Tune up**	
	Normal power	**Low power**
LTE Band 2	24.5	14
LTE Band 4	25.5	15
LTE Band 5	25	20.5
LTE Band 7	24.5	12.5
LTE Band 12	24.5	20
LTE Band 41	25	16
LTE Band 66	24	15

LTE BAND2-Normal power					
BANDWIDTH	**Number of RBs**	**Frequency**	**QPSK**	**16QAM**	**64QAM**
1.4MHz	1RB-High (5)	1909.3 (19193)	23.56	23.28	21.81
		1880 (18900)	23.81	22.14	21.61
		1850.7 (18607)	23.71	22.93	21.97
	1RB-Middle (3)	1909.3 (19193)	23.59	23.20	21.83
		1880 (18900)	23.71	22.29	21.55
		1850.7 (18607)	23.74	22.78	21.94
	1RB-Low (0)	1909.3 (19193)	23.55	23.33	21.91
		1880 (18900)	23.75	22.82	21.64
		1850.7 (18607)	23.78	22.88	21.97
	3RB-High (3)	1909.3 (19193)	23.76	22.95	21.63
		1880 (18900)	23.79	22.89	21.47
		1850.7 (18607)	23.91	23.08	21.75
	3RB-Middle (1)	1909.3 (19193)	23.81	23.01	21.55
		1880 (18900)	23.81	22.78	21.52
		1850.7 (18607)	23.86	23.08	21.78
	3RB-Low (0)	1909.3 (19193)	23.76	23.03	21.64
		1880 (18900)	23.73	22.91	21.57
		1850.7 (18607)	23.82	22.99	21.72
	6RB (0)	1909.3 (19193)	22.69	21.57	21.10
		1880 (18900)	22.78	21.60	21.10
		1850.7 (18607)	22.86	21.77	20.78
3MHz	1RB-High (14)	1908.5 (19185)	23.72	22.71	21.88
		1880 (18900)	23.78	22.76	21.52
		1851.5 (18615)	23.73	23.37	21.97
	1RB-Middle (7)	1908.5 (19185)	23.75	22.93	21.91
		1880 (18900)	23.78	22.65	21.62
		1851.5 (18615)	23.68	23.48	22.07
	1RB-Low (0)	1908.5 (19185)	23.77	22.80	21.80
		1880 (18900)	23.72	22.74	21.78
		1851.5 (18615)	23.78	23.49	22.07
	8RB-High (7)	1908.5 (19185)	22.80	21.99	21.08
		1880 (18900)	22.79	21.94	21.09
		1851.5 (18615)	22.86	21.98	21.14
	8RB-Middle (4)	1908.5 (19185)	22.79	21.97	21.19
		1880 (18900)	22.81	21.84	21.09
		1851.5 (18615)	22.96	21.83	20.75
	8RB-Low (0)	1908.5 (19185)	22.81	21.96	21.10
		1880 (18900)	22.77	21.80	21.06
		1851.5 (18615)	22.95	21.95	20.90

	15RB (0)	1908.5 (19185)	22.76	21.90	21.22
		1880 (18900)	22.79	21.78	21.20
		1851.5 (18615)	22.80	21.90	20.98
5MHz	1RB-High (24)	1907.5 (19175)	23.71	22.67	21.85
		1880 (18900)	23.63	22.73	21.99
		1852.5 (18625)	23.87	22.80	21.79
	1RB-Middle (12)	1907.5 (19175)	23.66	22.79	21.87
		1880 (18900)	23.54	22.72	21.96
		1852.5 (18625)	23.81	23.03	21.90
	1RB-Low (0)	1907.5 (19175)	23.51	22.68	21.75
		1880 (18900)	23.62	22.81	21.98
		1852.5 (18625)	23.83	22.90	21.90
	12RB-High (13)	1907.5 (19175)	22.71	21.95	21.21
		1880 (18900)	22.76	21.86	21.26
		1852.5 (18625)	22.90	21.93	21.27
	12RB-Middle (6)	1907.5 (19175)	22.71	21.89	21.23
		1880 (18900)	22.75	21.84	21.17
		1852.5 (18625)	22.80	22.01	21.26
	12RB-Low (0)	1907.5 (19175)	22.85	21.87	21.16
		1880 (18900)	22.75	21.94	21.25
		1852.5 (18625)	22.88	21.96	20.82
	25RB (0)	1907.5 (19175)	22.79	21.68	21.27
		1880 (18900)	22.76	22.12	21.23
		1852.5 (18625)	22.83	22.11	21.32
10MHz	1RB-High (49)	1905 (19150)	23.68	22.91	21.89
		1880 (18900)	23.79	23.29	21.82
		1855 (18650)	23.70	23.44	21.81
	1RB-Middle (24)	1905 (19150)	23.60	22.76	21.68
		1880 (18900)	23.56	23.27	21.86
		1855 (18650)	23.67	23.29	21.97
	1RB-Low (0)	1905 (19150)	23.59	22.62	21.72
		1880 (18900)	23.65	23.49	21.98
		1855 (18650)	23.76	23.49	22.15
	25RB-High (25)	1905 (19150)	22.76	22.09	21.26
		1880 (18900)	22.83	21.84	21.03
		1855 (18650)	22.84	21.89	20.76
	25RB-Middle (12)	1905 (19150)	22.73	21.96	21.26
		1880 (18900)	22.76	21.81	21.20
		1855 (18650)	22.88	21.90	21.21
	25RB-Low (0)	1905 (19150)	22.78	21.99	21.15
		1880 (18900)	22.77	21.84	21.11
		1855 (18650)	22.87	21.80	21.25

	50RB (0)	1905 (19150)	22.77	21.83	21.33
		1880 (18900)	22.81	21.85	21.28
		1855 (18650)	22.93	21.85	21.28
15MHz	1RB-High (74)	1902.5 (19125)	23.83	23.44	21.96
		1880 (18900)	23.64	23.45	21.83
		1857.5 (18675)	23.72	23.43	22.00
	1RB-Middle (37)	1902.5 (19125)	23.76	22.91	21.83
		1880 (18900)	23.66	23.30	21.67
		1857.5 (18675)	23.73	23.46	22.11
	1RB-Low (0)	1902.5 (19125)	23.74	22.82	21.69
		1880 (18900)	23.80	23.43	22.32
		1857.5 (18675)	23.76	23.45	22.24
	36RB-High (38)	1902.5 (19125)	22.86	21.88	21.21
		1880 (18900)	22.83	21.88	20.89
		1857.5 (18675)	22.93	21.93	20.89
	36RB-Middle (19)	1902.5 (19125)	22.84	21.89	21.16
		1880 (18900)	22.82	21.81	21.16
		1857.5 (18675)	22.82	21.85	20.90
	36RB-Low (0)	1902.5 (19125)	22.70	21.78	21.10
		1880 (18900)	22.86	21.89	21.16
		1857.5 (18675)	22.85	22.01	21.25
	75RB (0)	1902.5 (19125)	22.87	21.95	21.27
		1880 (18900)	22.91	21.92	21.28
		1857.5 (18675)	22.93	21.98	20.95
20MHz	1RB-High (99)	1900 (19100)	23.67	22.73	21.63
		1880 (18900)	23.93	22.74	21.64
		1860 (18700)	23.44	22.66	21.69
	1RB-Middle (50)	1900 (19100)	23.73	22.77	21.94
		1880 (18900)	23.79	22.59	21.30
		1860 (18700)	23.61	22.75	21.71
	1RB-Low (0)	1900 (19100)	23.82	22.90	21.97
		1880 (18900)	23.70	22.65	21.43
		1860 (18700)	23.55	22.59	21.60
	50RB-High (50)	1900 (19100)	22.75	21.77	21.19
		1880 (18900)	22.87	21.78	20.70
		1860 (18700)	22.66	21.71	21.11
	50RB-Middle (25)	1900 (19100)	22.73	21.80	21.23
		1880 (18900)	22.69	21.83	21.10
		1860 (18700)	22.61	21.68	21.14
	50RB-Low (0)	1900 (19100)	22.86	21.89	20.95
		1880 (18900)	22.74	21.67	20.69
		1860 (18700)	22.61	21.76	20.81

	100RB (0)	1900 (19100)	22.79	21.80	21.21
		1880 (18900)	22.66	21.70	21.11
		1860 (18700)	22.61	21.75	21.02

LTE BAND2-Low Power					
BANDWIDTH	**Number of RBs**	**Frequency**	**QPSK**	**16QAM**	**64QAM**
1.4MHz	1RB-High (5)	1909.3 (19193)	12.75	11.92	10.77
		1880 (18900)	13.38	12.30	11.14
		1850.7 (18607)	13.23	12.83	11.68
	1RB-Middle (3)	1909.3 (19193)	12.50	11.80	10.59
		1880 (18900)	12.20	11.73	10.36
		1850.7 (18607)	12.37	11.83	10.74
	1RB-Low (0)	1909.3 (19193)	12.81	11.92	10.93
		1880 (18900)	12.71	11.99	10.71
		1850.7 (18607)	12.91	12.16	11.19
	3RB-High (3)	1909.3 (19193)	11.76	10.54	9.52
		1880 (18900)	12.32	10.74	9.78
		1850.7 (18607)	12.04	11.17	10.07
	3RB-Middle (1)	1909.3 (19193)	11.60	10.45	9.47
		1880 (18900)	11.58	10.44	9.51
		1850.7 (18607)	11.74	10.67	9.64
	3RB-Low (0)	1909.3 (19193)	11.66	10.59	9.55
		1880 (18900)	11.61	10.60	9.64
		1850.7 (18607)	11.88	10.80	9.79
	6RB (0)	1909.3 (19193)	11.70	10.66	9.49
		1880 (18900)	11.77	10.62	9.68
		1850.7 (18607)	11.93	10.95	9.90
3MHz	1RB-High (14)	1908.5 (19185)	12.76	11.99	10.62
		1880 (18900)	13.44	12.23	11.16
		1851.5 (18615)	13.17	12.87	11.66
	1RB-Middle (7)	1908.5 (19185)	12.41	11.86	10.52
		1880 (18900)	12.34	11.68	10.40
		1851.5 (18615)	12.42	11.77	10.65
	1RB-Low (0)	1908.5 (19185)	12.90	11.88	10.93
		1880 (18900)	12.74	12.05	10.71
		1851.5 (18615)	12.82	12.29	11.13
	8RB-High (7)	1908.5 (19185)	11.72	10.67	9.59
		1880 (18900)	12.29	10.82	9.75
		1851.5 (18615)	12.09	11.17	10.13

	8RB-Middle (4)	1908.5 (19185)	11.58	10.49	9.54
		1880 (18900)	11.59	10.46	9.39
		1851.5 (18615)	11.83	10.68	9.63
	8RB-Low (0)	1908.5 (19185)	11.72	10.54	9.63
		1880 (18900)	11.62	10.59	9.57
		1851.5 (18615)	11.88	10.78	9.68
	15RB (0)	1908.5 (19185)	11.74	10.58	9.55
		1880 (18900)	11.66	10.74	9.69
		1851.5 (18615)	12.05	10.93	9.81
5MHz	1RB-High (24)	1907.5 (19175)	12.69	11.91	10.62
		1880 (18900)	13.45	12.24	11.12
		1852.5 (18625)	13.15	12.80	11.63
	1RB-Middle (12)	1907.5 (19175)	12.50	11.76	10.59
		1880 (18900)	12.20	11.60	10.43
		1852.5 (18625)	12.35	11.89	10.71
	1RB-Low (0)	1907.5 (19175)	12.84	11.91	10.79
		1880 (18900)	12.68	12.03	10.82
		1852.5 (18625)	12.87	12.15	11.15
	12RB-High (13)	1907.5 (19175)	11.76	10.52	9.61
		1880 (18900)	12.25	10.70	9.87
		1852.5 (18625)	11.99	11.05	10.13
	12RB-Middle (6)	1907.5 (19175)	11.55	10.48	9.46
		1880 (18900)	11.51	10.54	9.52
		1852.5 (18625)	11.79	10.61	9.66
	12RB-Low (0)	1907.5 (19175)	11.75	10.55	9.58
		1880 (18900)	11.69	10.53	9.57
		1852.5 (18625)	11.88	10.81	9.76
	25RB (0)	1907.5 (19175)	11.69	10.51	9.57
		1880 (18900)	11.70	10.75	9.64
		1852.5 (18625)	12.05	10.85	9.89
10MHz	1RB-High (49)	1905 (19150)	12.74	11.86	10.67
		1880 (18900)	13.35	12.25	11.11
		1855 (18650)	13.21	12.89	11.65
	1RB-Middle (24)	1905 (19150)	12.35	11.83	10.48
		1880 (18900)	12.27	11.60	10.49
		1855 (18650)	12.40	11.84	10.66
	1RB-Low (0)	1905 (19150)	12.89	11.96	10.93
		1880 (18900)	12.80	11.97	10.81
		1855 (18650)	12.81	12.21	11.16
	25RB-High (25)	1905 (19150)	11.78	10.59	9.54

		1880 (18900)	12.35	10.84	9.78
		1855 (18650)	12.05	11.05	10.10
	25RB-Middle (12)	1905 (19150)	11.55	10.42	9.50
		1880 (18900)	11.57	10.53	9.47
		1855 (18650)	11.82	10.66	9.61
	25RB-Low (0)	1905 (19150)	11.62	10.63	9.64
		1880 (18900)	11.62	10.57	9.62
		1855 (18650)	11.87	10.79	9.67
	50RB (0)	1905 (19150)	11.62	10.64	9.49
		1880 (18900)	11.70	10.62	9.62
		1855 (18650)	12.07	10.89	9.87
15MHz	1RB-High (74)	1902.5 (19125)	12.61	11.95	10.70
		1880 (18900)	13.42	12.27	11.18
		1857.5 (18675)	13.19	12.86	11.69
	1RB-Middle (37)	1902.5 (19125)	12.50	11.74	10.52
		1880 (18900)	12.32	11.59	10.44
		1857.5 (18675)	12.40	11.81	10.69
	1RB-Low (0)	1902.5 (19125)	12.93	11.94	10.93
		1880 (18900)	12.71	11.97	10.72
		1857.5 (18675)	12.81	12.15	11.16
	36RB-High (38)	1902.5 (19125)	11.75	10.55	9.64
		1880 (18900)	12.25	10.72	9.76
		1857.5 (18675)	12.01	11.05	10.13
	36RB-Middle (19)	1902.5 (19125)	11.62	10.55	9.42
		1880 (18900)	11.49	10.55	9.48
		1857.5 (18675)	11.76	10.65	9.69
	36RB-Low (0)	1902.5 (19125)	11.71	10.55	9.59
		1880 (18900)	11.57	10.63	9.58
		1857.5 (18675)	11.82	10.78	9.68
	75RB (0)	1902.5 (19125)	11.73	10.51	9.50
		1880 (18900)	11.71	10.75	9.59
		1857.5 (18675)	12.05	10.93	9.87
20MHz	1RB-High (99)	1900 (19100)	12.71	11.94	10.72
		1880 (18900)	13.55	12.32	11.13
		1860 (18700)	13.24	12.84	11.72
	1RB-Middle (50)	1900 (19100)	12.45	11.83	10.57
		1880 (18900)	12.29	11.68	10.44
		1860 (18700)	12.39	11.86	10.71
	1RB-Low (0)	1900 (19100)	12.91	11.93	10.89
		1880 (18900)	12.76	12.07	10.81

		1860 (18700)	12.88	12.25	11.18
	50RB-High (50)	1900 (19100)	11.75	10.62	9.60
		1880 (18900)	12.35	10.80	9.82
		1860 (18700)	12.08	11.12	10.08
	50RB-Middle (25)	1900 (19100)	11.60	10.51	9.49
		1880 (18900)	11.54	10.52	9.47
		1860 (18700)	11.79	10.71	9.70
	50RB-Low (0)	1900 (19100)	11.71	10.64	9.63
		1880 (18900)	11.65	10.62	9.60
		1860 (18700)	11.86	10.80	9.76
	100RB (0)	1900 (19100)	11.70	10.61	9.58
		1880 (18900)	11.72	10.70	9.64
		1860 (18700)	12.02	10.94	9.89

LTE BAND4-Normal Power					
BANDWIDTH	**Number of RBs**	**Frequency**	**QPSK**	**16QAM**	**64QAM**
1.4MHz	1RB-High (5)	1754.3 (20393)	24.07	23.71	22.50
		1732.5 (20175)	24.22	23.18	22.11
		1710.7 (19957)	24.09	23.34	22.42
	1RB-Middle (3)	1754.3 (20393)	24.14	23.74	22.33
		1732.5 (20175)	24.28	23.64	22.22
		1710.7 (19957)	24.27	23.71	22.36
	1RB-Low (0)	1754.3 (20393)	24.05	23.85	22.46
		1732.5 (20175)	24.14	23.82	22.41
		1710.7 (19957)	24.23	23.80	22.45
	3RB-High (3)	1754.3 (20393)	24.29	23.34	21.93
		1732.5 (20175)	24.34	23.53	22.10
		1710.7 (19957)	24.34	23.48	22.17
	3RB-Middle (1)	1754.3 (20393)	24.32	23.35	22.03
		1732.5 (20175)	24.33	23.45	22.01
		1710.7 (19957)	24.34	23.58	22.06
	3RB-Low (0)	1754.3 (20393)	24.29	23.53	21.98
		1732.5 (20175)	24.32	23.37	22.20
		1710.7 (19957)	24.26	23.44	22.16
	6RB (0)	1754.3 (20393)	23.21	21.83	21.54
		1732.5 (20175)	23.14	21.92	21.63
		1710.7 (19957)	23.23	21.98	21.19
3MHz	1RB-High (14)	1753.5 (20385)	24.15	23.38	22.38
		1732.5 (20175)	24.14	23.80	22.31

		1711.5 (19965)	24.09	23.83	22.24
	1RB-Middle (7)	1753.5 (20385)	24.20	23.29	22.39
		1732.5 (20175)	24.08	23.64	22.29
		1711.5 (19965)	24.13	23.81	22.51
	1RB-Low (0)	1753.5 (20385)	24.16	23.41	22.40
		1732.5 (20175)	24.07	23.85	22.52
		1711.5 (19965)	24.10	23.82	22.39
	8RB-High (7)	1753.5 (20385)	23.26	22.36	21.67
		1732.5 (20175)	23.19	22.32	21.71
		1711.5 (19965)	23.20	22.44	21.63
	8RB-Middle (4)	1753.5 (20385)	23.28	22.41	21.34
		1732.5 (20175)	23.25	22.42	21.63
		1711.5 (19965)	23.31	22.42	21.18
	8RB-Low (0)	1753.5 (20385)	23.23	22.53	21.34
		1732.5 (20175)	23.24	22.39	21.27
		1711.5 (19965)	23.26	22.44	21.21
	15RB (0)	1753.5 (20385)	23.20	22.38	21.30
		1732.5 (20175)	23.22	22.34	21.82
		1711.5 (19965)	23.33	22.35	21.39
5MHz	1RB-High (24)	1752.5 (20375)	24.12	23.11	22.13
		1732.5 (20175)	24.27	23.30	22.33
		1712.5 (19975)	24.10	23.12	22.24
	1RB-Middle (12)	1752.5 (20375)	24.16	23.20	22.20
		1732.5 (20175)	24.21	23.13	22.24
		1712.5 (19975)	24.21	23.16	22.36
	1RB-Low (0)	1752.5 (20375)	24.15	23.30	22.31
		1732.5 (20175)	24.24	23.32	22.46
		1712.5 (19975)	24.15	23.20	22.48
	12RB-High (13)	1752.5 (20375)	23.22	22.39	21.13
		1732.5 (20175)	23.22	22.25	21.68
		1712.5 (19975)	23.23	22.40	21.79
	12RB-Middle (6)	1752.5 (20375)	23.28	22.39	21.22
		1732.5 (20175)	23.18	22.34	21.75
		1712.5 (19975)	23.27	22.34	21.67
	12RB-Low (0)	1752.5 (20375)	23.23	22.38	21.33
		1732.5 (20175)	23.31	22.37	21.29
		1712.5 (19975)	23.24	22.36	21.30
	25RB (0)	1752.5 (20375)	23.14	22.51	21.34
		1732.5 (20175)	23.28	22.44	21.70
		1712.5 (19975)	23.27	22.22	21.78

10MHz	1RB-High (49)	1750 (20350)	24.08	24.01	22.19
		1732.5 (20175)	24.14	23.89	22.38
		1715 (20000)	24.25	23.83	22.35
	1RB-Middle (24)	1750 (20350)	24.13	23.92	22.28
		1732.5 (20175)	24.29	23.75	22.48
		1715 (20000)	24.25	23.84	22.49
	1RB-Low (0)	1750 (20350)	24.12	24.05	22.24
		1732.5 (20175)	24.30	23.85	22.36
		1715 (20000)	24.21	23.96	22.39
	25RB-High (25)	1750 (20350)	23.28	22.30	21.26
		1732.5 (20175)	23.39	22.31	21.36
		1715 (20000)	23.20	22.23	21.79
	25RB-Middle (12)	1750 (20350)	23.27	22.36	21.31
		1732.5 (20175)	23.22	22.24	21.76
		1715 (20000)	23.27	22.34	21.38
	25RB-Low (0)	1750 (20350)	23.20	22.25	21.74
		1732.5 (20175)	23.21	22.48	21.39
		1715 (20000)	23.33	22.30	21.72
	50RB (0)	1750 (20350)	23.36	22.31	21.48
		1732.5 (20175)	23.26	22.27	21.81
		1715 (20000)	23.23	22.28	21.45
15MHz	1RB-High (74)	1747.5 (20325)	24.17	23.87	22.30
		1732.5 (20175)	24.14	23.75	22.22
		1717.5 (20025)	24.34	23.86	22.31
	1RB-Middle (37)	1747.5 (20325)	24.11	23.98	22.28
		1732.5 (20175)	24.16	23.73	22.24
		1717.5 (20025)	24.19	23.65	22.20
	1RB-Low (0)	1747.5 (20325)	24.16	24.11	22.42
		1732.5 (20175)	24.18	23.93	22.48
		1717.5 (20025)	24.22	23.88	22.44
	36RB-High (38)	1747.5 (20325)	23.31	22.28	21.28
		1732.5 (20175)	23.34	22.36	21.29
		1717.5 (20025)	23.28	22.32	21.70
	36RB-Middle (19)	1747.5 (20325)	23.34	22.45	21.76
		1732.5 (20175)	23.26	22.22	21.71
		1717.5 (20025)	23.24	22.20	21.70
	36RB-Low (0)	1747.5 (20325)	23.29	22.42	21.33
		1732.5 (20175)	23.35	22.28	21.31
		1717.5 (20025)	23.33	22.30	21.34
	75RB (0)	1747.5 (20325)	23.28	22.26	21.83

		1732.5 (20175)	23.33	22.35	21.77
		1717.5 (20025)	23.26	22.34	21.72
20MHz	1RB-High (99)	1745 (20300)	24.14	23.77	22.45
		1732.5 (20175)	24.09	23.47	22.37
		1720 (20050)	24.15	23.18	22.30
	1RB-Middle (50)	1745 (20300)	24.13	23.88	22.33
		1732.5 (20175)	24.15	23.22	22.17
		1720 (20050)	24.06	23.24	22.24
	1RB-Low (0)	1745 (20300)	24.23	23.90	22.43
		1732.5 (20175)	24.09	23.25	22.42
		1720 (20050)	24.16	23.19	22.44
	50RB-High (50)	1745 (20300)	23.26	22.40	21.42
		1732.5 (20175)	23.31	22.27	21.44
		1720 (20050)	23.31	22.44	21.42
	50RB-Middle (25)	1745 (20300)	23.21	22.40	21.44
		1732.5 (20175)	23.27	22.30	21.84
		1720 (20050)	23.15	22.34	21.39
	50RB-Low (0)	1745 (20300)	23.34	22.45	21.46
		1732.5 (20175)	23.32	22.40	21.33
		1720 (20050)	23.31	22.31	21.35
	100RB (0)	1745 (20300)	23.21	22.36	21.24
		1732.5 (20175)	23.24	22.31	21.73
		1720 (20050)	23.18	22.26	21.30

LTE BAND4-Low Power					
BANDWIDTH	**Number of RBs**	**Frequency**	**QPSK**	**16QAM**	**64QAM**
1.4MHz	1RB-High (5)	1754.3 (20393)	14.60	13.76	12.55
		1732.5 (20175)	13.66	13.14	11.81
		1710.7 (19957)	13.84	13.02	11.97
	1RB-Middle (3)	1754.3 (20393)	13.49	12.63	11.55
		1732.5 (20175)	13.30	12.55	11.62
		1710.7 (19957)	13.36	12.59	11.43
	1RB-Low (0)	1754.3 (20393)	14.30	13.25	12.19
		1732.5 (20175)	14.39	13.53	12.31
		1710.7 (19957)	13.81	12.29	11.05
	3RB-High (3)	1754.3 (20393)	13.17	12.04	11.26
		1732.5 (20175)	13.49	12.46	11.24
		1710.7 (19957)	13.19	12.23	11.40
	3RB-Middle (1)	1754.3 (20393)	13.16	12.20	11.30

		1732.5 (20175)	13.09	12.08	11.13
		1710.7 (19957)	13.04	12.00	11.12
	3RB-Low (0)	1754.3 (20393)	13.23	12.22	11.34
		1732.5 (20175)	13.02	12.90	11.07
		1710.7 (19957)	13.06	12.86	11.86
	6RB (0)	1754.3 (20393)	12.95	11.94	11.02
		1732.5 (20175)	12.85	11.69	10.79
		1710.7 (19957)	12.53	11.53	10.61
3MHz	1RB-High (14)	1753.5 (20385)	14.58	13.75	12.50
		1732.5 (20175)	13.80	13.05	11.80
		1711.5 (19965)	13.94	13.05	12.06
	1RB-Middle (7)	1753.5 (20385)	13.49	12.71	11.60
		1732.5 (20175)	13.40	12.55	11.54
		1711.5 (19965)	13.39	12.60	11.55
	1RB-Low (0)	1753.5 (20385)	14.19	13.32	12.23
		1732.5 (20175)	14.25	13.44	12.32
		1711.5 (19965)	13.72	12.22	11.09
	8RB-High (7)	1753.5 (20385)	13.04	12.13	11.30
		1732.5 (20175)	12.56	11.41	10.59
		1711.5 (19965)	12.75	11.79	10.89
	8RB-Middle (4)	1753.5 (20385)	12.62	11.70	10.87
		1732.5 (20175)	12.51	11.50	10.66
		1711.5 (19965)	12.44	11.55	10.71
	8RB-Low (0)	1753.5 (20385)	12.74	11.75	10.89
		1732.5 (20175)	13.04	11.98	11.09
		1711.5 (19965)	12.32	11.29	10.41
	15RB (0)	1753.5 (20385)	12.95	11.90	11.09
		1732.5 (20175)	12.85	11.65	10.90
		1711.5 (19965)	12.50	11.47	10.60
5MHz	1RB-High (24)	1752.5 (20375)	14.64	13.70	12.59
		1732.5 (20175)	13.68	13.09	11.82
		1712.5 (19975)	13.85	13.03	12.04
	1RB-Middle (12)	1752.5 (20375)	13.63	12.70	11.51
		1732.5 (20175)	13.43	12.67	11.48
		1712.5 (19975)	13.47	12.48	11.50
	1RB-Low (0)	1752.5 (20375)	14.26	13.36	12.18
		1732.5 (20175)	14.32	13.54	12.24
		1712.5 (19975)	13.84	12.33	11.10
	12RB-High (13)	1752.5 (20375)	13.15	12.07	11.31
		1732.5 (20175)	12.63	11.54	10.60

		1712.5 (19975)	12.64	11.75	10.91
	12RB-Middle (6)	1752.5 (20375)	12.62	11.71	10.76
		1732.5 (20175)	12.55	11.50	10.67
		1712.5 (19975)	12.52	11.47	10.57
	12RB-Low (0)	1752.5 (20375)	12.68	11.71	10.94
		1732.5 (20175)	12.96	11.91	11.16
		1712.5 (19975)	12.33	11.36	10.39
	25RB (0)	1752.5 (20375)	12.91	11.90	11.06
		1732.5 (20175)	12.79	11.65	10.79
		1712.5 (19975)	12.48	11.59	10.68
10MHz	1RB-High (49)	1750 (20350)	14.66	13.67	12.53
		1732.5 (20175)	13.69	13.18	11.72
		1715 (20000)	13.93	13.11	11.95
	1RB-Middle (24)	1750 (20350)	13.56	12.63	11.64
		1732.5 (20175)	13.28	12.56	11.49
		1715 (20000)	13.35	12.50	11.47
	1RB-Low (0)	1750 (20350)	14.16	13.29	12.22
		1732.5 (20175)	14.35	13.47	12.33
		1715 (20000)	13.79	12.19	11.10
	25RB-High (25)	1750 (20350)	13.11	12.14	11.29
		1732.5 (20175)	12.63	11.52	10.70
		1715 (20000)	12.74	11.80	10.84
	25RB-Middle (12)	1750 (20350)	12.70	11.60	10.78
		1732.5 (20175)	12.59	11.53	10.73
		1715 (20000)	12.38	11.49	10.72
	25RB-Low (0)	1750 (20350)	12.73	11.65	10.81
		1732.5 (20175)	12.97	11.89	11.06
		1715 (20000)	12.22	11.34	10.38
	50RB (0)	1750 (20350)	12.94	11.94	11.03
		1732.5 (20175)	12.83	11.75	10.80
		1715 (20000)	12.55	11.46	10.61
15MHz	1RB-High (74)	1747.5 (20325)	14.62	13.77	12.62
		1732.5 (20175)	13.78	13.10	11.72
		1717.5 (20025)	13.90	13.14	11.97
	1RB-Middle (37)	1747.5 (20325)	13.53	12.70	11.62
		1732.5 (20175)	13.38	12.53	11.55
		1717.5 (20025)	13.49	12.53	11.43
	1RB-Low (0)	1747.5 (20325)	14.22	13.28	12.11
		1732.5 (20175)	14.28	13.56	12.35
		1717.5 (20025)	13.75	12.31	11.08

	36RB-High (38)	1747.5 (20325)	13.09	12.07	11.26
		1732.5 (20175)	12.57	11.45	10.65
		1717.5 (20025)	12.66	11.76	10.86
	36RB-Middle (19)	1747.5 (20325)	12.58	11.65	10.86
		1732.5 (20175)	12.53	11.56	10.76
		1717.5 (20025)	12.43	11.51	10.68
	36RB-Low (0)	1747.5 (20325)	12.67	11.61	10.86
		1732.5 (20175)	12.99	11.88	11.09
		1717.5 (20025)	12.33	11.31	10.48
	75RB (0)	1747.5 (20325)	12.84	11.83	10.99
		1732.5 (20175)	12.80	11.72	10.89
		1717.5 (20025)	12.47	11.47	10.61
20MHz	1RB-High (99)	1745 (20300)	14.65	13.75	12.58
		1732.5 (20175)	13.76	13.14	11.80
		1720 (20050)	13.93	13.10	12.03
	1RB-Middle (50)	1745 (20300)	13.58	12.73	11.60
		1732.5 (20175)	13.38	12.63	11.57
		1720 (20050)	13.44	12.58	11.51
	1RB-Low (0)	1745 (20300)	14.25	13.33	12.21
		1732.5 (20175)	14.34	13.54	12.33
		1720 (20050)	13.80	12.28	11.15
	50RB-High (50)	1745 (20300)	13.14	12.13	11.29
		1732.5 (20175)	12.59	11.49	10.69
		1720 (20050)	12.73	11.80	10.92
	50RB-Middle (25)	1745 (20300)	12.66	11.66	10.84
		1732.5 (20175)	12.60	11.53	10.71
		1720 (20050)	12.47	11.52	10.67
	50RB-Low (0)	1745 (20300)	12.72	11.71	10.89
		1732.5 (20175)	13.04	11.95	11.14
		1720 (20050)	12.28	11.35	10.46
	100RB (0)	1745 (20300)	12.92	11.91	11.07
		1732.5 (20175)	12.81	11.71	10.89
		1720 (20050)	12.50	11.55	10.68

LTE BAND5-Normal Power					
BANDWIDTH	**Number of RBs**	**Frequency**	**QPSK**	**16QAM**	**64QAM**
1.4MHz	1RB-High (5)	848.3 (20643)	23.86	22.71	22.27
		836.5 (20525)	23.71	22.86	21.84
		824.7 (20407)	23.71	22.98	21.89

	1RB-Middle (3)	848.3 (20643)	23.97	22.79	22.09
		836.5 (20525)	23.71	22.83	21.87
		824.7 (20407)	23.85	22.96	21.95
	1RB-Low (0)	848.3 (20643)	23.82	22.63	22.21
		836.5 (20525)	23.63	22.51	22.01
		824.7 (20407)	23.74	22.87	22.07
	3RB-High (3)	848.3 (20643)	24.11	23.31	21.99
		836.5 (20525)	23.81	23.23	21.75
		824.7 (20407)	24.05	23.37	21.98
	3RB-Middle (1)	848.3 (20643)	24.09	23.43	22.01
		836.5 (20525)	23.83	23.18	21.80
		824.7 (20407)	23.95	23.38	21.93
	3RB-Low (0)	848.3 (20643)	24.06	23.34	21.89
		836.5 (20525)	23.75	23.17	21.78
		824.7 (20407)	23.92	23.39	21.87
	6RB (0)	848.3 (20643)	23.05	21.79	21.03
		836.5 (20525)	22.74	21.67	20.96
		824.7 (20407)	22.94	21.91	21.03
3MHz	1RB-High (14)	847.5 (20635)	23.94	23.34	22.21
		836.5 (20525)	23.66	23.50	22.11
		825.5 (20415)	23.71	22.92	22.31
	1RB-Middle (7)	847.5 (20635)	23.89	23.24	22.26
		836.5 (20525)	23.70	23.43	22.23
		825.5 (20415)	23.84	22.97	22.28
	1RB-Low (0)	847.5 (20635)	23.84	23.44	22.23
		836.5 (20525)	23.69	23.50	22.21
		825.5 (20415)	23.84	23.02	22.35
	8RB-High (7)	847.5 (20635)	22.94	22.24	21.06
		836.5 (20525)	22.82	22.10	20.76
		825.5 (20415)	22.84	22.08	20.89
	8RB-Middle (4)	847.5 (20635)	23.04	22.21	20.99
		836.5 (20525)	22.82	22.00	20.76
		825.5 (20415)	22.88	22.12	20.89
	8RB-Low (0)	847.5 (20635)	22.91	22.20	21.01
		836.5 (20525)	22.73	21.99	20.82
		825.5 (20415)	22.84	22.20	20.96
	15RB (0)	847.5 (20635)	23.03	22.21	21.19
		836.5 (20525)	22.79	21.99	21.02
		825.5 (20415)	22.98	22.07	21.10
5MHz	1RB-High (24)	846.5 (20625)	23.95	23.11	22.17
		836.5 (20525)	23.76	22.87	22.16
		826.5 (20425)	23.78	22.95	21.95

	1RB-Middle (12)	846.5 (20625)	23.80	22.93	22.11
		836.5 (20525)	23.73	22.86	22.00
		826.5 (20425)	23.85	22.88	22.08
	1RB-Low (0)	846.5 (20625)	23.75	22.96	22.07
		836.5 (20525)	23.67	22.89	22.03
		826.5 (20425)	23.83	22.91	22.32
	12RB-High (13)	846.5 (20625)	22.95	22.08	21.09
		836.5 (20525)	22.78	21.95	20.90
		826.5 (20425)	22.75	22.13	21.00
	12RB-Middle (6)	846.5 (20625)	22.87	22.16	21.18
		836.5 (20525)	22.82	21.96	20.91
		826.5 (20425)	22.78	22.06	21.11
	12RB-Low (0)	846.5 (20625)	22.81	22.06	20.96
		836.5 (20525)	22.74	22.01	20.87
		826.5 (20425)	22.82	22.10	21.10
	25RB (0)	846.5 (20625)	22.96	22.11	21.15
		836.5 (20525)	22.73	21.90	20.80
		826.5 (20425)	22.94	21.98	21.30
10MHz	1RB-High (49)	844 (20600)	24.04	23.06	22.32
		836.5 (20525)	23.68	23.27	21.83
		829 (20450)	23.72	23.29	22.10
	1RB-Middle (24)	844 (20600)	23.86	23.00	21.98
		836.5 (20525)	23.73	23.26	22.00
		829 (20450)	23.81	23.42	22.13
	1RB-Low (0)	844 (20600)	23.82	22.88	22.07
		836.5 (20525)	23.82	23.30	22.08
		829 (20450)	23.85	23.34	22.21
	25RB-High (25)	844 (20600)	23.02	22.38	21.19
		836.5 (20525)	22.90	21.94	20.96
		829 (20450)	22.88	21.96	21.12
	25RB-Middle (12)	844 (20600)	22.90	22.17	21.11
		836.5 (20525)	22.86	21.90	20.94
		829 (20450)	22.88	22.01	21.11
	25RB-Low (0)	844 (20600)	22.84	22.18	20.99
		836.5 (20525)	22.76	22.22	21.06
		829 (20450)	23.00	22.07	21.18
	50RB (0)	844 (20600)	22.78	21.99	21.12
		836.5 (20525)	22.80	22.05	21.05
		829 (20450)	22.82	22.02	21.14

LTE BAND5-Low Power					
BANDWIDTH	**Number of RBs**	**Frequency**	**QPSK**	**16QAM**	**64QAM**
1.4MHz	1RB-High (5)	848.3 (20643)	18.77	18.28	17.05
		836.5 (20525)	19.32	18.76	17.70
		824.7 (20407)	19.34	18.87	17.80
	1RB-Middle (3)	848.3 (20643)	19.09	18.46	17.35
		836.5 (20525)	19.50	18.91	17.82
		824.7 (20407)	19.58	19.04	18.08
	1RB-Low (0)	848.3 (20643)	18.90	18.32	17.16
		836.5 (20525)	19.27	18.62	17.65
		824.7 (20407)	19.41	18.78	17.82
	3RB-High (3)	848.3 (20643)	19.02	18.12	17.20
		836.5 (20525)	19.46	18.58	17.71
		824.7 (20407)	19.51	18.72	17.86
	3RB-Middle (1)	848.3 (20643)	19.08	18.19	17.26
		836.5 (20525)	19.50	18.63	17.76
		824.7 (20407)	19.61	18.76	17.93
	3RB-Low (0)	848.3 (20643)	19.02	18.15	17.28
		836.5 (20525)	19.42	18.56	17.74
		824.7 (20407)	19.55	18.80	17.91
	6RB (0)	848.3 (20643)	18.05	17.23	16.01
		836.5 (20525)	18.48	17.70	16.58
		824.7 (20407)	18.69	17.89	16.71
3MHz	1RB-High (14)	847.5 (20635)	18.83	18.24	17.09
		836.5 (20525)	19.43	18.85	17.71
		825.5 (20415)	19.12	18.63	17.52
	1RB-Middle (7)	847.5 (20635)	19.09	18.62	17.39
		836.5 (20525)	19.55	19.00	17.85
		825.5 (20415)	19.51	18.94	17.83
	1RB-Low (0)	847.5 (20635)	19.23	18.64	17.34
		836.5 (20525)	19.28	18.61	17.59
		825.5 (20415)	19.45	18.95	17.84
	8RB-High (7)	847.5 (20635)	18.07	17.27	16.07
		836.5 (20525)	18.55	17.69	16.67
		825.5 (20415)	18.49	17.64	16.52
	8RB-Middle (4)	847.5 (20635)	18.16	17.28	16.17
		836.5 (20525)	18.56	17.73	16.70
		825.5 (20415)	18.64	17.77	16.67
	8RB-Low (0)	847.5 (20635)	18.29	17.38	16.23
		836.5 (20525)	18.49	17.66	16.55
		825.5 (20415)	18.71	17.86	16.72

	15RB (0)	847.5 (20635)	18.19	17.24	16.12
		836.5 (20525)	18.52	17.66	16.59
		825.5 (20415)	18.61	17.69	16.61
5MHz	1RB-High (24)	846.5 (20625)	18.50	17.94	16.77
		836.5 (20525)	19.16	18.50	17.31
		826.5 (20425)	18.61	17.93	16.90
	1RB-Middle (12)	846.5 (20625)	19.37	18.65	17.58
		836.5 (20525)	19.54	18.84	17.75
		826.5 (20425)	19.19	18.64	17.59
	1RB-Low (0)	846.5 (20625)	19.34	18.69	17.53
		836.5 (20525)	18.97	18.43	17.15
		826.5 (20425)	19.12	18.53	17.32
	12RB-High (13)	846.5 (20625)	18.02	17.03	16.06
		836.5 (20525)	18.48	17.46	16.45
		826.5 (20425)	18.08	17.13	16.28
	12RB-Middle (6)	846.5 (20625)	18.39	17.39	16.43
		836.5 (20525)	18.53	17.54	16.53
		826.5 (20425)	18.38	17.45	16.56
	12RB-Low (0)	846.5 (20625)	18.48	17.50	16.50
		836.5 (20525)	18.40	17.33	16.37
		826.5 (20425)	18.39	17.46	16.57
	25RB (0)	846.5 (20625)	18.22	17.27	16.26
		836.5 (20525)	18.36	17.41	16.39
		826.5 (20425)	18.25	17.32	16.40
10MHz	1RB-High (49)	844 (20600)	19.32	18.63	17.62
		836.5 (20525)	19.62	19.33	18.29
		829 (20450)	19.65	19.20	18.17
	1RB-Middle (24)	844 (20600)	19.77	19.12	18.04
		836.5 (20525)	19.64	19.03	18.05
		829 (20450)	19.68	19.15	17.99
	1RB-Low (0)	844 (20600)	19.68	19.20	18.01
		836.5 (20525)	19.50	18.95	17.82
		829 (20450)	19.64	19.39	18.30
	25RB-High (25)	844 (20600)	18.69	17.64	16.73
		836.5 (20525)	18.95	18.20	17.28
		829 (20450)	19.02	18.03	17.11
	25RB-Middle (12)	844 (20600)	18.92	17.89	16.97
		836.5 (20525)	18.89	17.89	16.97
		829 (20450)	18.94	17.95	17.03
	25RB-Low (0)	844 (20600)	19.06	18.03	17.10
		836.5 (20525)	19.05	17.80	16.89
		829 (20450)	19.03	18.03	17.13

	50RB (0)	844 (20600)	18.87	17.85	16.93
		836.5 (20525)	19.02	18.02	17.09
		829 (20450)	19.03	18.04	17.14

LTE BAND7-Normal Power					
BANDWIDTH	**Number of RBs**	**Frequency**	**QPSK**	**16QAM**	**64QAM**
5MHz	1RB-High (24)	2567.5 (21425)	23.57	22.64	22.11
		2535 (21100)	23.15	22.86	21.71
		2502.5 (20775)	23.22	22.80	21.58
	1RB-Middle (12)	2567.5 (21425)	23.55	22.62	22.04
		2535 (21100)	23.16	23.03	21.53
		2502.5 (20775)	23.04	22.87	21.58
	1RB-Low (0)	2567.5 (21425)	23.51	22.71	22.18
		2535 (21100)	23.08	22.85	21.56
		2502.5 (20775)	23.10	22.90	21.75
	12RB-High (13)	2567.5 (21425)	22.71	21.79	20.69
		2535 (21100)	22.42	21.39	20.38
		2502.5 (20775)	22.23	21.43	20.30
	12RB-Middle (6)	2567.5 (21425)	22.68	21.86	20.75
		2535 (21100)	22.27	21.45	20.35
		2502.5 (20775)	22.14	21.31	20.24
	12RB-Low (0)	2567.5 (21425)	22.59	21.75	20.72
		2535 (21100)	22.23	21.41	20.31
		2502.5 (20775)	22.25	21.36	20.24
	25RB (0)	2567.5 (21425)	22.57	21.75	20.89
		2535 (21100)	22.19	21.49	20.46
		2502.5 (20775)	22.21	21.33	20.33
10MHz	1RB-High (49)	2565 (21400)	23.59	22.79	21.99
		2535 (21100)	23.18	22.41	21.63
		2505 (20800)	23.01	22.34	21.50
	1RB-Middle (24)	2565 (21400)	23.47	22.66	21.99
		2535 (21100)	23.19	22.25	21.62
		2505 (20800)	23.15	22.32	21.52
	1RB-Low (0)	2565 (21400)	23.49	22.58	21.93
		2535 (21100)	23.09	22.37	21.60
		2505 (20800)	23.16	22.22	21.66
	25RB-High (25)	2565 (21400)	22.61	21.91	20.80
		2535 (21100)	22.23	21.36	20.36
		2505 (20800)	22.22	21.33	20.33

	25RB-Middle (12)	2565 (21400)	22.60	21.67	20.84
		2535 (21100)	22.31	21.37	20.39
		2505 (20800)	22.13	21.31	20.40
	25RB-Low (0)	2565 (21400)	22.62	21.68	20.74
		2535 (21100)	22.24	21.28	20.37
		2505 (20800)	22.16	21.18	20.31
	50RB (0)	2565 (21400)	22.65	21.73	20.77
		2535 (21100)	22.26	21.47	20.50
		2505 (20800)	22.23	21.25	20.39
15MHz	1RB-High (74)	2562.5 (21375)	23.45	22.86	21.82
		2535 (21100)	23.18	22.48	21.61
		2507.5 (20825)	22.91	22.98	21.30
	1RB-Middle (37)	2562.5 (21375)	23.41	23.34	21.69
		2535 (21100)	23.07	22.34	21.42
		2507.5 (20825)	23.04	23.08	21.31
	1RB-Low (0)	2562.5 (21375)	23.28	23.22	21.54
		2535 (21100)	23.08	22.30	21.49
		2507.5 (20825)	23.06	23.05	21.29
	36RB-High (38)	2562.5 (21375)	22.68	21.66	20.74
		2535 (21100)	22.30	21.49	20.38
		2507.5 (20825)	22.28	21.50	20.29
	36RB-Middle (19)	2562.5 (21375)	22.64	21.60	20.66
		2535 (21100)	22.39	21.58	20.35
		2507.5 (20825)	22.34	21.55	20.27
	36RB-Low (0)	2562.5 (21375)	22.63	21.61	20.62
		2535 (21100)	22.29	21.46	20.36
		2507.5 (20825)	22.17	21.53	20.33
	75RB (0)	2562.5 (21375)	22.61	21.64	20.77
		2535 (21100)	22.32	21.29	20.47
		2507.5 (20825)	22.25	21.40	20.40
20MHz	1RB-High (99)	2560 (21350)	23.88	22.83	22.01
		2535 (21100)	23.94	22.91	22.34
		2510 (20850)	23.58	22.94	21.75
	1RB-Middle (50)	2560 (21350)	23.95	22.60	22.12
		2535 (21100)	23.88	22.87	22.04
		2510 (20850)	23.64	22.71	21.80
	1RB-Low (0)	2560 (21350)	23.93	22.79	22.20
		2535 (21100)	23.81	22.94	22.08
		2510 (20850)	23.57	22.73	21.87
	50RB-High (50)	2560 (21350)	22.98	22.10	21.09

		2535 (21100)	22.82	21.92	21.01
		2510 (20850)	22.70	21.89	20.82
	50RB-Middle (25)	2560 (21350)	23.12	22.12	21.22
		2535 (21100)	22.84	21.86	20.86
		2510 (20850)	22.61	21.75	20.70
	50RB-Low (0)	2560 (21350)	22.94	22.21	21.13
		2535 (21100)	22.72	22.05	20.91
		2510 (20850)	22.56	21.70	20.80
	100RB (0)	2560 (21350)	22.89	22.04	20.95
		2535 (21100)	22.82	21.87	20.75
		2510 (20850)	22.67	21.81	20.62

LTE BAND7-Low Power					
BANDWIDTH	**Number of RBs**	**Frequency**	**QPSK**	**16QAM**	**64QAM**
5MHz	1RB-High (24)	2567.5 (21425)	11.08	10.19	9.46
		2535 (21100)	11.44	10.48	9.81
		2502.5 (20775)	11.49	10.65	9.89
	1RB-Middle (12)	2567.5 (21425)	11.47	10.76	9.81
		2535 (21100)	11.40	10.51	9.63
		2502.5 (20775)	11.00	10.14	9.09
	1RB-Low (0)	2567.5 (21425)	11.95	11.11	10.09
		2535 (21100)	11.81	10.91	10.01
		2502.5 (20775)	11.82	10.93	9.94
	12RB-High (13)	2567.5 (21425)	10.34	9.60	8.60
		2535 (21100)	10.44	9.52	8.68
		2502.5 (20775)	10.22	9.34	8.36
	12RB-Middle (6)	2567.5 (21425)	10.46	9.67	8.66
		2535 (21100)	10.43	9.42	8.63
		2502.5 (20775)	10.07	9.14	8.14
	12RB-Low (0)	2567.5 (21425)	10.81	9.84	8.95
		2535 (21100)	10.70	9.71	8.95
		2502.5 (20775)	10.34	9.44	8.50
	25RB (0)	2567.5 (21425)	10.54	9.68	8.72
		2535 (21100)	10.53	9.52	8.66
		2502.5 (20775)	10.35	9.36	8.38
10MHz	1RB-High (49)	2565 (21400)	11.03	10.19	9.35
		2535 (21100)	11.50	10.47	9.72
		2505 (20800)	11.49	10.60	9.90
	1RB-Middle (24)	2565 (21400)	11.46	10.78	9.82

		2535 (21100)	11.28	10.63	9.55
		2505 (20800)	11.01	10.19	9.08
	1RB-Low (0)	2565 (21400)	11.88	11.05	10.14
		2535 (21100)	11.71	10.81	9.95
		2505 (20800)	11.84	10.96	10.02
	25RB-High (25)	2565 (21400)	10.43	9.62	8.58
		2535 (21100)	10.37	9.42	8.65
		2505 (20800)	10.22	9.38	8.38
	25RB-Middle (12)	2565 (21400)	10.58	9.64	8.70
		2535 (21100)	10.42	9.50	8.59
		2505 (20800)	10.00	9.19	8.14
	25RB-Low (0)	2565 (21400)	10.79	9.93	8.95
		2535 (21100)	10.60	9.70	8.93
		2505 (20800)	10.34	9.43	8.59
	50RB (0)	2565 (21400)	10.53	9.73	8.78
		2535 (21100)	10.48	9.58	8.81
		2505 (20800)	10.26	9.44	8.49
15MHz	1RB-High (74)	2562.5 (21375)	11.07	10.18	9.45
		2535 (21100)	11.41	10.47	9.78
		2507.5 (20825)	11.49	10.59	9.88
	1RB-Middle (37)	2562.5 (21375)	11.42	10.67	9.81
		2535 (21100)	11.29	10.52	9.61
		2507.5 (20825)	10.91	10.06	9.03
	1RB-Low (0)	2562.5 (21375)	11.87	11.11	10.18
		2535 (21100)	11.83	10.91	10.07
		2507.5 (20825)	11.83	10.97	10.02
	36RB-High (38)	2562.5 (21375)	10.43	9.58	8.52
		2535 (21100)	10.39	9.55	8.67
		2507.5 (20825)	10.21	9.40	8.35
	36RB-Middle (19)	2562.5 (21375)	10.58	9.63	8.72
		2535 (21100)	10.42	9.44	8.64
		2507.5 (20825)	10.00	9.18	8.14
	36RB-Low (0)	2562.5 (21375)	10.77	9.96	8.89
		2535 (21100)	10.64	9.74	8.92
		2507.5 (20825)	10.41	9.51	8.51
	75RB (0)	2562.5 (21375)	10.53	9.74	8.65
		2535 (21100)	10.48	9.59	8.72
		2507.5 (20825)	10.36	9.32	8.37
20MHz	1RB-High (99)	2560 (21350)	11.12	10.24	9.45
		2535 (21100)	11.45	10.56	9.76

		2510 (20850)	11.59	10.68	9.85
	1RB-Middle (50)	2560 (21350)	11.46	10.76	9.84
		2535 (21100)	11.35	10.60	9.58
		2510 (20850)	10.96	10.15	9.12
	1RB-Low (0)	2560 (21350)	11.90	11.10	10.18
		2535 (21100)	11.78	10.89	10.03
		2510 (20850)	11.80	10.97	9.98
	50RB-High (50)	2560 (21350)	10.42	9.59	8.58
		2535 (21100)	10.40	9.52	8.67
		2510 (20850)	10.24	9.35	8.39
	50RB-Middle (25)	2560 (21350)	10.56	9.69	8.72
		2535 (21100)	10.41	9.49	8.66
		2510 (20850)	10.08	9.17	8.24
	50RB-Low (0)	2560 (21350)	10.77	9.93	8.92
		2535 (21100)	10.65	9.77	8.90
		2510 (20850)	10.40	9.51	8.54
	100RB (0)	2560 (21350)	10.59	9.73	8.74
		2535 (21100)	10.52	9.62	8.76
		2510 (20850)	10.32	9.41	8.44

LTE BAND12-Normal Power					
BANDWIDTH	**Number of RBs**	**Frequency**	**QPSK**	**16QAM**	**64QAM**
1.4MHz	1RB-High (5)	715.3	23.54	22.77	21.75
		707.5	23.75	23.34	21.89
		699.7	23.60	22.75	21.85
	1RB-Middle (3)	715.3	23.54	22.72	21.95
		707.5	23.68	23.46	21.93
		699.7	23.61	22.70	21.86
	1RB-Low (0)	715.3	23.61	22.82	21.79
		707.5	23.68	22.80	21.73
		699.7	23.55	22.90	22.05
	3RB-High (3)	715.3	23.86	23.08	21.70
		707.5	23.82	23.16	21.70
		699.7	23.82	23.24	21.75
	3RB-Middle (1)	715.3	23.72	22.87	21.64
		707.5	23.87	23.03	21.76
		699.7	23.77	23.29	21.67
	3RB-Low (0)	715.3	23.84	23.04	21.61
		707.5	23.81	23.17	21.84

		699.7	23.86	23.21	21.80
	6RB (0)	715.3	22.62	21.61	20.80
		707.5	22.79	21.58	21.20
		699.7	22.72	21.64	20.80
3MHz	1RB-High (14)	714.5	23.52	23.49	21.81
		707.5	23.67	23.43	21.80
		700.5	23.62	22.93	21.69
	1RB-Middle (7)	714.5	23.67	23.39	21.85
		707.5	23.71	23.38	21.78
		700.5	23.61	22.80	21.67
	1RB-Low (0)	714.5	23.73	23.48	21.98
		707.5	23.73	23.46	21.58
		700.5	23.54	22.94	21.95
	8RB-High (7)	714.5	22.69	21.97	20.73
		707.5	22.67	22.05	21.16
		700.5	22.83	21.95	20.90
	8RB-Middle (4)	714.5	22.81	21.92	20.76
		707.5	22.75	21.98	21.12
		700.5	22.78	21.87	20.87
	8RB-Low (0)	714.5	22.81	21.93	20.84
		707.5	22.83	21.95	21.08
		700.5	22.82	21.98	20.79
	15RB (0)	714.5	22.71	21.90	20.96
		707.5	22.81	22.00	21.43
		700.5	22.72	21.97	20.93
5MHz	1RB-High (24)	713.5	23.51	23.30	21.80
		707.5	23.69	22.95	21.87
		701.5	23.84	22.85	22.10
	1RB-Middle (12)	713.5	23.63	23.37	21.74
		707.5	23.70	22.80	21.64
		701.5	23.75	22.78	21.84
	1RB-Low (0)	713.5	23.66	23.42	21.75
		707.5	23.73	22.84	21.83
		701.5	23.74	22.64	21.94
	12RB-High (13)	713.5	22.61	21.93	20.86
		707.5	22.66	21.90	21.17
		701.5	22.65	21.85	20.82
	12RB-Middle (6)	713.5	22.65	21.81	20.83
		707.5	22.75	21.96	21.16
		701.5	22.80	21.99	20.95

	12RB-Low (0)	713.5	22.71	21.92	20.89
		707.5	22.73	21.94	21.34
		701.5	22.78	21.94	20.85
	25RB (0)	713.5	22.76	22.09	20.90
		707.5	22.85	21.77	21.31
		701.5	22.72	22.07	20.94
10MHz	1RB-High (49)	711	23.48	22.68	21.75
		707.5	23.54	23.38	21.83
		704	23.57	23.42	21.67
	1RB-Middle (24)	711	23.59	22.81	21.85
		707.5	23.58	23.31	21.62
		704	23.57	23.46	21.53
	1RB-Low (0)	711	23.59	22.68	22.08
		707.5	23.65	23.40	21.58
		704	23.64	23.42	21.79
	25RB-High (25)	711	22.62	21.95	20.89
		707.5	22.68	21.80	20.73
		704	22.75	21.83	20.81
	25RB-Middle (12)	711	22.59	21.91	20.89
		707.5	22.78	21.78	20.93
		704	22.69	21.71	21.14
	25RB-Low (0)	711	22.74	22.06	20.95
		707.5	22.76	21.91	20.92
		704	22.64	21.80	20.77
	50RB (0)	711	22.60	21.76	20.81
		707.5	22.69	21.86	21.04
		704	22.66	21.90	21.19

LTE BAND12-Low Power					
BANDWIDTH	**Number of RBs**	**Frequency**	**QPSK**	**16QAM**	**64QAM**
1.4MHz	1RB-High (5)	715.3	18.90	18.32	17.02
		707.5	19.18	18.60	17.38
		699.7	19.01	18.30	17.24
	1RB-Middle (3)	715.3	19.16	18.59	17.37
		707.5	19.37	18.79	17.59
		699.7	19.15	18.47	17.33
	1RB-Low (0)	715.3	18.99	18.43	17.26
		707.5	19.15	18.47	17.30
		699.7	18.82	18.25	17.04

	3RB-High (3)	715.3	19.06	18.13	17.23
		707.5	19.33	18.39	17.44
		699.7	19.12	18.22	17.28
	3RB-Middle (1)	715.3	19.18	18.28	17.35
		707.5	19.38	18.44	17.52
		699.7	19.11	18.21	17.23
	3RB-Low (0)	715.3	19.14	18.20	17.24
		707.5	19.31	18.37	17.43
		699.7	19.01	18.13	17.13
	6RB (0)	715.3	18.14	17.23	16.15
		707.5	18.36	17.42	16.38
		699.7	18.11	17.17	16.15
3MHz	1RB-High (14)	714.5	18.92	18.24	17.09
		707.5	19.08	18.48	17.40
		700.5	19.24	18.70	17.48
	1RB-Middle (7)	714.5	19.25	18.62	17.45
		707.5	19.41	18.77	17.67
		700.5	19.31	18.63	17.58
	1RB-Low (0)	714.5	19.08	18.50	17.32
		707.5	19.09	18.44	17.37
		700.5	18.85	18.30	17.04
	8RB-High (7)	714.5	18.18	17.21	16.27
		707.5	18.36	17.39	16.42
		700.5	18.38	17.42	16.47
	8RB-Middle (4)	714.5	18.27	17.31	16.33
		707.5	18.42	17.45	16.48
		700.5	18.36	17.40	16.43
	8RB-Low (0)	714.5	18.24	17.26	16.29
		707.5	18.34	17.37	16.41
		700.5	18.18	17.23	16.26
	15RB (0)	714.5	18.21	17.20	16.25
		707.5	18.35	17.35	16.42
		700.5	18.29	17.28	16.33
5MHz	1RB-High (24)	713.5	18.56	17.89	16.76
		707.5	18.57	18.05	16.77
		701.5	18.86	18.28	17.04
	1RB-Middle (12)	713.5	19.21	18.68	17.45
		707.5	19.38	18.81	17.63
		701.5	19.42	18.75	17.65
	1RB-Low (0)	713.5	18.81	18.13	17.03

		707.5	18.87	18.19	17.03
		701.5	18.53	17.97	16.78
	12RB-High (13)	713.5	18.10	17.09	16.20
		707.5	18.18	17.14	16.25
		701.5	18.31	17.30	16.39
	12RB-Middle (6)	713.5	18.33	17.32	16.41
		707.5	18.42	17.42	16.48
		701.5	18.45	17.44	16.54
	12RB-Low (0)	713.5	18.21	17.21	16.31
		707.5	18.23	17.22	16.30
		701.5	18.17	17.16	16.25
	25RB (0)	713.5	18.17	17.15	16.22
		707.5	18.22	17.20	16.27
		701.5	18.26	17.23	16.31
10MHz	1RB-High (49)	711	19.01	18.42	17.02
		707.5	19.16	18.63	17.43
		704	19.06	18.74	17.53
	1RB-Middle (24)	711	19.09	18.49	17.35
		707.5	19.08	18.48	17.70
		704	19.01	18.41	17.48
	1RB-Low (0)	711	19.03	18.46	17.32
		707.5	18.84	18.21	17.36
		704	18.63	18.09	16.95
	25RB-High (25)	711	18.32	17.24	16.32
		707.5	18.36	17.33	16.37
		704	18.33	17.37	16.49
	25RB-Middle (12)	711	18.30	17.22	16.26
		707.5	18.23	17.19	16.42
		704	18.24	17.20	16.53
	25RB-Low (0)	711	18.32	17.23	16.33
		707.5	18.16	17.11	16.40
		704	18.17	17.11	16.29
	50RB (0)	711	18.33	17.24	16.33
		707.5	18.26	17.22	16.35
		704	18.30	17.25	16.32

LTE BAND41-Normal Power					
BANDWIDTH	**Number of RBs**	**Frequency**	**QPSK**	**16QAM**	**64QAM**
5MHz	1RB-High (24)	2652.5 (41215)	24.06	22.62	21.96

		2623.8 (40928)	24.09	22.66	21.96
		2595 (40640)	24.12	22.70	21.97
		2567.5 (40365)	24.01	22.57	21.86
		2540 (40090)	23.91	22.44	21.75
	1RB-Middle (12)	2652.5 (41215)	24.06	23.07	21.94
		2623.8 (40928)	24.09	22.92	21.97
		2595 (40640)	24.12	22.78	22.01
		2567.5 (40365)	24.00	22.81	21.86
		2540 (40090)	23.89	22.84	21.71
	1RB-Low (0)	2652.5 (41215)	24.05	23.16	21.96
		2623.8 (40928)	24.11	23.21	22.05
		2595 (40640)	24.18	23.26	22.14
		2567.5 (40365)	24.00	23.05	21.92
		2540 (40090)	23.82	22.84	21.70
	12RB-High (13)	2652.5 (41215)	23.07	22.12	21.25
		2623.8 (40928)	23.10	22.13	21.30
		2595 (40640)	23.13	22.14	21.36
		2567.5 (40365)	22.97	22.05	21.18
		2540 (40090)	22.82	21.96	21.00
	12RB-Middle (6)	2652.5 (41215)	23.09	22.05	21.20
		2623.8 (40928)	23.12	22.14	21.32
		2595 (40640)	23.16	22.23	21.44
		2567.5 (40365)	23.07	22.09	21.24
		2540 (40090)	22.99	21.95	21.05
	12RB-Low (0)	2652.5 (41215)	23.16	22.09	21.43
		2623.8 (40928)	23.15	22.24	21.44
		2595 (40640)	23.15	22.39	21.45
		2567.5 (40365)	23.01	22.19	21.30
		2540 (40090)	22.87	22.00	21.16
	25RB (0)	2652.5 (41215)	23.09	22.24	21.27
		2623.8 (40928)	23.13	22.28	21.30
		2595 (40640)	23.17	22.32	21.33
		2567.5 (40365)	23.01	22.17	21.19
		2540 (40090)	22.86	22.02	21.06
10MHz	1RB-High (49)	2650 (41190)	24.13	23.02	21.54
		2622.5 (40915)	24.12	23.10	21.77
		2595 (40640)	24.12	23.18	22.00
		2567.5 (40365)	24.01	23.03	21.90
		2540 (40090)	23.90	22.89	21.80
	1RB-Middle (24)	2650 (41190)	24.19	23.01	21.88

		2622.5 (40915)	24.17	23.10	21.65
		2595 (40640)	24.16	23.19	21.42
		2567.5 (40365)	24.05	23.04	21.56
		2540 (40090)	23.87	22.90	21.71
	1RB-Low (0)	2650 (41190)	24.00	23.07	21.90
		2622.5 (40915)	24.08	23.15	22.00
		2595 (40640)	24.16	23.24	22.10
		2567.5 (40365)	24.01	23.01	21.88
		2540 (40090)	23.86	22.79	21.67
	25RB-High (25)	2650 (41190)	23.06	22.19	21.25
		2622.5 (40915)	23.17	22.19	21.28
		2595 (40640)	23.29	22.20	21.32
		2567.5 (40365)	23.11	22.14	21.19
		2540 (40090)	22.93	22.08	21.07
	25RB-Middle (12)	2650 (41190)	23.17	22.53	21.22
		2622.5 (40915)	23.21	22.41	21.27
		2595 (40640)	23.25	22.29	21.33
		2567.5 (40365)	23.06	22.15	21.21
		2540 (40090)	22.87	21.96	21.10
	25RB-Low (0)	2650 (41190)	23.09	22.28	21.31
		2622.5 (40915)	23.14	22.31	21.33
		2595 (40640)	23.19	22.35	21.36
		2567.5 (40365)	23.01	22.31	21.20
		2540 (40090)	22.83	22.27	21.05
	50RB (0)	2650 (41190)	23.05	22.30	21.23
		2622.5 (40915)	23.11	22.36	21.27
		2595 (40640)	23.17	22.43	21.32
		2567.5 (40365)	23.03	22.25	21.19
		2540 (40090)	22.90	22.08	21.07
15MHz	1RB-High (74)	2647.5 (41165)	24.12	23.07	21.87
		2621.3 (40903)	24.12	22.85	21.63
		2595 (40640)	24.12	22.64	21.39
		2568.8 (40378)	24.05	22.79	21.30
		2542.5 (40115)	23.98	22.95	21.22
	1RB-Middle (37)	2647.5 (41165)	24.04	23.00	21.81
		2621.3 (40903)	24.12	23.09	21.91
		2595 (40640)	24.20	23.18	22.01
		2568.8 (40378)	24.06	23.07	21.62
		2542.5 (40115)	23.93	22.97	21.23
	1RB-Low (0)	2647.5 (41165)	24.02	23.08	21.85

		2621.3 (40903)	24.11	23.17	21.98
		2595 (40640)	24.21	23.26	22.12
		2568.8 (40378)	24.01	23.08	21.93
		2542.5 (40115)	23.82	22.90	21.74
	36RB-High (38)	2647.5 (41165)	23.14	22.21	21.16
		2621.3 (40903)	23.21	22.21	21.26
		2595 (40640)	23.29	22.21	21.36
		2568.8 (40378)	23.14	22.12	21.28
		2542.5 (40115)	22.99	22.03	21.20
	36RB-Middle (19)	2647.5 (41165)	23.08	22.23	21.31
		2621.3 (40903)	23.17	22.22	21.35
		2595 (40640)	23.27	22.21	21.40
		2568.8 (40378)	23.06	22.12	21.26
		2542.5 (40115)	22.85	22.04	21.13
	36RB-Low (0)	2647.5 (41165)	23.18	22.14	21.38
		2621.3 (40903)	23.19	22.23	21.34
		2595 (40640)	23.21	22.33	21.31
		2568.8 (40378)	23.12	22.14	21.19
		2542.5 (40115)	23.03	21.96	21.08
	75RB (0)	2647.5 (41165)	23.18	22.27	21.21
		2621.3 (40903)	23.23	22.31	21.28
		2595 (40640)	23.29	22.35	21.36
		2568.8 (40378)	23.09	22.23	21.27
		2542.5 (40115)	22.89	22.12	21.18
20MHz	1RB-High (99)	2645 (41140)	23.94	23.09	21.71
		2620 (40890)	24.00	23.07	21.54
		2595 (40640)	24.06	23.06	21.37
		2570 (40390)	23.99	23.02	21.32
		2545 (40140)	23.93	22.99	21.28
	1RB-Middle (50)	2645 (41140)	23.93	23.04	21.70
		2620 (40890)	24.03	23.10	21.87
		2595 (40640)	24.14	23.17	22.04
		2570 (40390)	24.02	23.07	21.61
		2545 (40140)	23.91	22.97	21.19
	1RB-Low (0)	2645 (41140)	23.97	23.06	21.83
		2620 (40890)	24.12	23.17	21.99
		2595 (40640)	24.28	23.28	22.16
		2570 (40390)	24.08	23.06	21.92
		2545 (40140)	23.88	22.85	21.69
	50RB-High (50)	2645 (41140)	23.15	22.24	21.22

		2620 (40890)	23.11	22.28	21.22
		2595 (40640)	23.08	22.32	21.23
		2570 (40390)	23.00	22.25	21.18
		2545 (40140)	22.93	22.18	21.13
	50RB-Middle (25)	2645 (41140)	23.02	22.29	21.26
		2620 (40890)	23.10	22.34	21.25
		2595 (40640)	23.18	22.40	21.25
		2570 (40390)	23.12	22.29	21.24
		2545 (40140)	23.07	22.19	21.23
	50RB-Low (0)	2645 (41140)	23.09	22.30	21.24
		2620 (40890)	23.15	22.36	21.32
		2595 (40640)	23.22	22.43	21.41
		2570 (40390)	23.13	22.27	21.32
		2545 (40140)	23.04	22.11	21.23
	100RB (0)	2645 (41140)	23.06	22.23	21.33
		2620 (40890)	23.13	22.28	21.35
		2595 (40640)	23.21	22.33	21.38
		2570 (40390)	23.06	22.22	21.31
		2545 (40140)	22.92	22.12	21.24

LTE BAND41-Low Power					
BANDWIDTH	**Number of RBs**	**Frequency**	**QPSK**	**16QAM**	**64QAM**
5MHz	1RB-High (24)	2652.5 (41215)	15.22	14.17	12.65
		2623.8 (40928)	14.90	13.80	12.41
		2595 (40640)	15.60	14.64	12.99
		2567.5 (40365)	15.63	14.53	13.11
		2540 (40090)	15.57	14.37	12.82
	1RB-Middle (12)	2652.5 (41215)	14.86	13.83	12.38
		2623.8 (40928)	14.90	13.82	12.55
		2595 (40640)	14.91	14.06	12.59
		2567.5 (40365)	14.96	14.11	12.50
		2540 (40090)	15.43	14.47	12.95
	1RB-Low (0)	2652.5 (41215)	15.40	14.79	13.62
		2623.8 (40928)	14.93	13.77	12.35
		2595 (40640)	15.19	14.35	12.78
		2567.5 (40365)	15.66	14.60	12.99
		2540 (40090)	15.60	14.73	13.39
	12RB-High (13)	2652.5 (41215)	13.96	12.90	11.97
		2623.8 (40928)	13.93	12.94	12.08

		2595 (40640)	14.42	13.20	12.25
		2567.5 (40365)	14.30	13.15	12.17
		2540 (40090)	14.43	13.22	12.34
	12RB-Middle (6)	2652.5 (41215)	13.97	13.01	12.00
		2623.8 (40928)	13.81	12.89	12.16
		2595 (40640)	14.12	12.94	12.05
		2567.5 (40365)	14.02	13.05	12.01
		2540 (40090)	14.33	13.43	12.51
	12RB-Low (0)	2652.5 (41215)	14.24	13.52	12.59
		2623.8 (40928)	13.89	12.92	12.07
		2595 (40640)	14.46	13.08	12.17
		2567.5 (40365)	14.21	13.23	12.17
		2540 (40090)	14.38	13.68	12.85
	25RB (0)	2652.5 (41215)	14.22	13.11	12.19
		2623.8 (40928)	13.93	12.90	12.18
		2595 (40640)	14.27	13.09	12.27
		2567.5 (40365)	14.26	13.17	12.27
		2540 (40090)	14.53	13.43	12.63
10MHz	1RB-High (49)	2650 (41190)	15.29	14.08	12.71
		2622.5 (40915)	14.85	13.69	12.39
		2595 (40640)	15.69	14.59	13.09
		2567.5 (40365)	15.56	14.61	12.97
		2540 (40090)	15.63	14.32	12.84
	1RB-Middle (24)	2650 (41190)	14.91	13.86	12.41
		2622.5 (40915)	14.88	13.92	12.61
		2595 (40640)	14.95	14.16	12.62
		2567.5 (40365)	14.96	13.97	12.57
		2540 (40090)	15.35	14.47	12.91
	1RB-Low (0)	2650 (41190)	15.45	14.83	13.50
		2622.5 (40915)	14.85	13.73	12.45
		2595 (40640)	15.24	14.42	12.79
		2567.5 (40365)	15.55	14.54	13.04
		2540 (40090)	15.47	14.73	13.42
	25RB-High (25)	2650 (41190)	14.03	12.99	12.09
		2622.5 (40915)	13.87	12.98	12.09
		2595 (40640)	14.40	13.22	12.26
		2567.5 (40365)	14.24	13.28	12.31
		2540 (40090)	14.39	13.21	12.37
	25RB-Middle (12)	2650 (41190)	13.91	13.01	12.06
		2622.5 (40915)	13.79	13.00	12.10

		2595 (40640)	14.04	13.02	12.18
		2567.5 (40365)	13.98	12.97	11.98
		2540 (40090)	14.26	13.35	12.45
	25RB-Low (0)	2650 (41190)	14.29	13.41	12.46
		2622.5 (40915)	13.89	12.96	12.18
		2595 (40640)	14.57	13.11	12.10
		2567.5 (40365)	14.25	13.10	12.21
		2540 (40090)	14.34	13.70	12.70
	50RB (0)	2650 (41190)	14.25	13.12	12.29
		2622.5 (40915)	13.88	12.98	12.20
		2595 (40640)	14.28	13.13	12.22
		2567.5 (40365)	14.18	13.12	12.23
		2540 (40090)	14.63	13.47	12.55
15MHz	1RB-High (74)	2647.5 (41165)	15.17	14.15	12.64
		2621.3 (40903)	14.80	13.79	12.30
		2595 (40640)	15.67	14.71	12.98
		2568.8 (40378)	15.62	14.54	13.07
		2542.5 (40115)	15.59	14.39	12.71
	1RB-Middle (37)	2647.5 (41165)	14.78	13.96	12.50
		2621.3 (40903)	14.79	13.87	12.64
		2595 (40640)	14.93	14.01	12.50
		2568.8 (40378)	14.91	13.97	12.52
		2542.5 (40115)	15.33	14.51	12.83
	1RB-Low (0)	2647.5 (41165)	15.39	14.80	13.54
		2621.3 (40903)	14.87	13.73	12.41
		2595 (40640)	15.29	14.42	12.79
		2568.8 (40378)	15.64	14.60	12.95
		2542.5 (40115)	15.50	14.74	13.53
	36RB-High (38)	2647.5 (41165)	13.91	12.99	12.03
		2621.3 (40903)	13.78	12.98	12.20
		2595 (40640)	14.41	13.27	12.28
		2568.8 (40378)	14.31	13.25	12.20
		2542.5 (40115)	14.34	13.33	12.40
	36RB-Middle (19)	2647.5 (41165)	13.98	12.90	11.99
		2621.3 (40903)	13.79	12.93	12.13
		2595 (40640)	14.03	13.00	12.07
		2568.8 (40378)	14.11	12.92	11.97
		2542.5 (40115)	14.26	13.39	12.38
	36RB-Low (0)	2647.5 (41165)	14.27	13.47	12.50
		2621.3 (40903)	13.89	13.02	12.20

		2595 (40640)	14.48	13.04	12.15
		2568.8 (40378)	14.25	13.18	12.21
		2542.5 (40115)	14.33	13.67	12.70
	75RB (0)	2647.5 (41165)	14.25	13.22	12.21
		2621.3 (40903)	13.78	13.02	12.20
		2595 (40640)	14.34	13.07	12.29
		2568.8 (40378)	14.27	13.11	12.21
		2542.5 (40115)	14.53	13.45	12.57
20MHz	1RB-High (99)	2645 (41140)	15.25	14.18	12.71
		2620 (40890)	14.89	13.75	12.39
		2595 (40640)	15.66	14.69	13.04
		2570 (40390)	15.65	14.59	13.06
		2545 (40140)	15.61	14.39	12.80
	1RB-Middle (50)	2645 (41140)	14.87	13.93	12.46
		2620 (40890)	14.89	13.90	12.63
		2595 (40640)	15.00	14.11	12.58
		2570 (40390)	15.01	14.06	12.53
		2545 (40140)	15.41	14.50	12.93
	1RB-Low (0)	2645 (41140)	15.41	14.78	13.60
		2620 (40890)	14.94	13.80	12.41
		2595 (40640)	15.27	14.43	12.77
		2570 (40390)	15.62	14.56	12.99
		2545 (40140)	15.55	14.77	13.48
	50RB-High (50)	2645 (41140)	14.01	12.99	12.05
		2620 (40890)	13.88	13.01	12.16
		2595 (40640)	14.37	13.27	12.35
		2570 (40390)	14.29	13.23	12.27
		2545 (40140)	14.41	13.30	12.38
	50RB-Middle (25)	2645 (41140)	14.00	12.98	12.04
		2620 (40890)	13.84	12.99	12.11
		2595 (40640)	14.11	13.03	12.15
		2570 (40390)	14.08	13.01	12.06
		2545 (40140)	14.32	13.39	12.47
	50RB-Low (0)	2645 (41140)	14.34	13.48	12.54
		2620 (40890)	13.89	13.01	12.16
		2595 (40640)	14.52	13.11	12.19
		2570 (40390)	14.26	13.19	12.23
		2545 (40140)	14.43	13.72	12.80
	100RB (0)	2645 (41140)	14.25	13.21	12.29
		2620 (40890)	13.88	12.99	12.15

		2595 (40640)	14.29	13.16	12.25
		2570 (40390)	14.27	13.19	12.24
		2545 (40140)	14.62	13.49	12.58

LTE BAND66-Normal Power					
BANDWIDTH	**Number of RBs**	**Frequency**	**QPSK**	**16QAM**	**64QAM**
1.4MHz	1RB-High (5)	1779.3 (132665)	22.92	22.64	21.45
		1745 (132322)	22.87	22.20	21.39
		1710.7 (131979)	22.59	22.21	20.75
	1RB-Middle (3)	1779.3 (132665)	22.89	22.73	21.45
		1745 (132322)	22.88	22.14	21.28
		1710.7 (131979)	22.54	22.26	20.82
	1RB-Low (0)	1779.3 (132665)	23.04	22.65	21.41
		1745 (132322)	22.87	22.12	21.55
		1710.7 (131979)	22.58	22.15	20.79
	3RB-High (3)	1779.3 (132665)	23.11	22.28	20.98
		1745 (132322)	23.00	22.10	20.84
		1710.7 (131979)	22.63	21.86	20.68
	3RB-Middle (1)	1779.3 (132665)	23.15	22.36	21.06
		1745 (132322)	23.05	22.13	20.86
		1710.7 (131979)	22.61	21.89	20.65
	3RB-Low (0)	1779.3 (132665)	23.15	22.32	21.03
		1745 (132322)	23.00	22.18	20.89
		1710.7 (131979)	22.64	21.81	20.70
	6RB (0)	1779.3 (132665)	22.07	21.05	20.06
		1745 (132322)	21.98	20.70	20.52
		1710.7 (131979)	21.63	20.56	19.75
3MHz	1RB-High (14)	1778.5 (132657)	22.92	22.60	21.33
		1745 (132322)	22.89	22.62	21.06
		1711.5 (131987)	22.45	22.19	21.06
	1RB-Middle (7)	1778.5 (132657)	22.96	22.71	21.43
		1745 (132322)	22.89	22.50	21.50
		1711.5 (131987)	22.38	22.24	20.74
	1RB-Low (0)	1778.5 (132657)	22.92	22.41	21.49
		1745 (132322)	22.87	22.51	21.15
		1711.5 (131987)	22.49	22.24	20.76
	8RB-High (7)	1778.5 (132657)	22.11	21.29	20.17
		1745 (132322)	22.00	21.11	20.42

		1711.5 (131987)	21.60	21.17	20.12
	8RB-Middle (4)	1778.5 (132657)	22.17	21.36	20.16
		1745 (132322)	22.05	21.22	20.38
		1711.5 (131987)	21.64	20.86	19.71
	8RB-Low (0)	1778.5 (132657)	22.07	21.35	20.17
		1745 (132322)	22.01	21.11	20.39
		1711.5 (131987)	21.59	20.95	19.81
	15RB (0)	1778.5 (132657)	22.14	21.31	20.33
		1745 (132322)	22.01	21.08	20.58
		1711.5 (131987)	21.59	20.78	19.92
5MHz	1RB-High (24)	1777.5 (132647)	23.07	22.60	21.37
		1745 (132322)	23.00	22.56	21.36
		1712.5 (131997)	22.62	22.14	20.71
	1RB-Middle (12)	1777.5 (132647)	23.15	22.46	21.46
		1745 (132322)	22.92	22.49	21.33
		1712.5 (131997)	22.66	22.09	20.97
	1RB-Low (0)	1777.5 (132647)	23.20	22.82	21.63
		1745 (132322)	22.73	22.59	21.24
		1712.5 (131997)	22.60	22.16	20.66
	12RB-High (13)	1777.5 (132647)	22.07	21.20	20.19
		1745 (132322)	22.04	21.11	20.06
		1712.5 (131997)	21.74	21.13	20.27
	12RB-Middle (6)	1777.5 (132647)	22.08	21.29	20.28
		1745 (132322)	21.96	20.98	20.43
		1712.5 (131997)	21.73	21.13	20.24
	12RB-Low (0)	1777.5 (132647)	22.12	21.23	20.22
		1745 (132322)	21.93	21.11	20.06
		1712.5 (131997)	21.60	20.76	19.87
	25RB (0)	1777.5 (132647)	22.06	21.42	20.27
		1745 (132322)	21.95	21.39	20.39
		1712.5 (131997)	21.69	21.09	20.03
10MHz	1RB-High (49)	1775 (132622)	23.10	22.53	21.48
		1745 (132322)	22.98	22.82	21.49
		1715 (132022)	22.65	22.48	21.15
	1RB-Middle (24)	1775 (132622)	23.17	22.52	21.45
		1745 (132322)	22.86	22.66	21.40
		1715 (132022)	22.55	22.18	20.94
	1RB-Low (0)	1775 (132622)	23.24	22.78	21.53
		1745 (132322)	22.92	22.62	21.10
		1715 (132022)	22.46	22.21	20.92

	25RB-High (25)	1775 (132622)	22.14	21.41	20.28
		1745 (132322)	22.13	21.12	20.17
		1715 (132022)	21.80	20.86	19.68
	25RB-Middle (12)	1775 (132622)	22.12	21.53	20.34
		1745 (132322)	22.10	21.16	20.49
		1715 (132022)	21.73	20.74	20.12
	25RB-Low (0)	1775 (132622)	22.16	21.55	20.77
		1745 (132322)	21.96	21.02	20.12
		1715 (132022)	21.66	21.08	20.12
	50RB (0)	1775 (132622)	22.15	21.21	20.37
		1745 (132322)	22.12	21.06	20.50
		1715 (132022)	21.73	20.86	20.35
15MHz	1RB-High (74)	1772.5 (132597)	23.05	22.75	21.35
		1745 (132322)	22.96	22.43	21.54
		1717.5 (132047)	22.74	22.46	21.30
	1RB-Middle (37)	1772.5 (132597)	23.19	22.81	21.48
		1745 (132322)	22.98	22.26	21.39
		1717.5 (132047)	22.64	22.25	21.08
	1RB-Low (0)	1772.5 (132597)	23.44	22.94	21.75
		1745 (132322)	22.85	22.63	21.26
		1717.5 (132047)	22.46	22.23	20.93
	36RB-High (38)	1772.5 (132597)	22.23	21.23	20.33
		1745 (132322)	22.17	21.12	20.22
		1717.5 (132047)	21.86	20.98	20.09
	36RB-Middle (19)	1772.5 (132597)	22.17	21.15	20.80
		1745 (132322)	22.00	21.07	20.48
		1717.5 (132047)	21.76	20.85	20.08
	36RB-Low (0)	1772.5 (132597)	22.23	21.32	20.43
		1745 (132322)	21.97	20.93	20.45
		1717.5 (132047)	21.74	20.72	20.22
	75RB (0)	1772.5 (132597)	22.20	21.25	20.88
		1745 (132322)	22.02	21.10	20.59
		1717.5 (132047)	21.81	20.92	19.98
20MHz	1RB-High (99)	1770 (132572)	23.77	22.85	21.79
		1745 (132322)	23.58	22.88	21.69
		1720 (132072)	23.27	22.93	21.51
	1RB-Middle (50)	1770 (132572)	23.69	22.87	21.93
		1745 (132322)	23.39	22.44	21.58
		1720 (132072)	23.05	22.63	21.26
	1RB-Low (0)	1770 (132572)	23.62	22.86	21.94

		1745 (132322)	23.35	22.80	21.64
		1720 (132072)	22.85	22.55	21.14
	50RB-High (50)	1770 (132572)	22.72	21.76	20.89
		1745 (132322)	22.55	22.00	20.79
		1720 (132072)	22.45	21.55	20.59
	50RB-Middle (25)	1770 (132572)	22.64	21.81	20.88
		1745 (132322)	22.43	21.56	20.66
		1720 (132072)	22.35	21.34	20.72
	50RB-Low (0)	1770 (132572)	22.82	21.97	20.86
		1745 (132322)	22.39	21.50	20.94
		1720 (132072)	22.16	21.16	20.30
	100RB (0)	1770 (132572)	22.77	21.92	20.89
		1745 (132322)	22.37	21.60	20.45
		1720 (132072)	22.23	21.30	20.88

LTE BAND41-Low Power					
BANDWIDTH	**Number of RBs**	**Frequency**	**QPSK**	**16QAM**	**64QAM**
5MHz	1RB-High (24)	2652.5 (41215)	15.22	14.17	12.65
		2623.8 (40928)	14.90	13.80	12.41
		2595 (40640)	15.60	14.64	12.99
		2567.5 (40365)	15.63	14.53	13.11
		2540 (40090)	15.57	14.37	12.82
	1RB-Middle (12)	2652.5 (41215)	14.86	13.83	12.38
		2623.8 (40928)	14.90	13.82	12.55
		2595 (40640)	14.91	14.06	12.59
		2567.5 (40365)	14.96	14.11	12.50
		2540 (40090)	15.43	14.47	12.95
	1RB-Low (0)	2652.5 (41215)	15.40	14.79	13.62
		2623.8 (40928)	14.93	13.77	12.35
		2595 (40640)	15.19	14.35	12.78
		2567.5 (40365)	15.66	14.60	12.99
		2540 (40090)	15.60	14.73	13.39
	12RB-High (13)	2652.5 (41215)	13.96	12.90	11.97
		2623.8 (40928)	13.93	12.94	12.08
		2595 (40640)	14.42	13.20	12.25
		2567.5 (40365)	14.30	13.15	12.17
		2540 (40090)	14.43	13.22	12.34
	12RB-Middle (6)	2652.5 (41215)	13.97	13.01	12.00
		2623.8 (40928)	13.81	12.89	12.16

		2595 (40640)	14.12	12.94	12.05
		2567.5 (40365)	14.02	13.05	12.01
		2540 (40090)	14.33	13.43	12.51
	12RB-Low (0)	2652.5 (41215)	14.24	13.52	12.59
		2623.8 (40928)	13.89	12.92	12.07
		2595 (40640)	14.46	13.08	12.17
		2567.5 (40365)	14.21	13.23	12.17
		2540 (40090)	14.38	13.68	12.85
	25RB (0)	2652.5 (41215)	14.22	13.11	12.19
		2623.8 (40928)	13.93	12.90	12.18
		2595 (40640)	14.27	13.09	12.27
		2567.5 (40365)	14.26	13.17	12.27
		2540 (40090)	14.53	13.43	12.63
10MHz	1RB-High (49)	2650 (41190)	15.29	14.08	12.71
		2622.5 (40915)	14.85	13.69	12.39
		2595 (40640)	15.69	14.59	13.09
		2567.5 (40365)	15.56	14.61	12.97
		2540 (40090)	15.63	14.32	12.84
	1RB-Middle (24)	2650 (41190)	14.91	13.86	12.41
		2622.5 (40915)	14.88	13.92	12.61
		2595 (40640)	14.95	14.16	12.62
		2567.5 (40365)	14.96	13.97	12.57
		2540 (40090)	15.35	14.47	12.91
	1RB-Low (0)	2650 (41190)	15.45	14.83	13.50
		2622.5 (40915)	14.85	13.73	12.45
		2595 (40640)	15.24	14.42	12.79
		2567.5 (40365)	15.55	14.54	13.04
		2540 (40090)	15.47	14.73	13.42
	25RB-High (25)	2650 (41190)	14.03	12.99	12.09
		2622.5 (40915)	13.87	12.98	12.09
		2595 (40640)	14.40	13.22	12.26
		2567.5 (40365)	14.24	13.28	12.31
		2540 (40090)	14.39	13.21	12.37
	25RB-Middle (12)	2650 (41190)	13.91	13.01	12.06
		2622.5 (40915)	13.79	13.00	12.10
		2595 (40640)	14.04	13.02	12.18
		2567.5 (40365)	13.98	12.97	11.98
		2540 (40090)	14.26	13.35	12.45
	25RB-Low (0)	2650 (41190)	14.29	13.41	12.46
		2622.5 (40915)	13.89	12.96	12.18

		2595 (40640)	14.57	13.11	12.10
		2567.5 (40365)	14.25	13.10	12.21
		2540 (40090)	14.34	13.70	12.70
	50RB (0)	2650 (41190)	14.25	13.12	12.29
		2622.5 (40915)	13.88	12.98	12.20
		2595 (40640)	14.28	13.13	12.22
		2567.5 (40365)	14.18	13.12	12.23
		2540 (40090)	14.63	13.47	12.55
15MHz	1RB-High (74)	2647.5 (41165)	15.17	14.15	12.64
		2621.3 (40903)	14.80	13.79	12.30
		2595 (40640)	15.67	14.71	12.98
		2568.8 (40378)	15.62	14.54	13.07
		2542.5 (40115)	15.59	14.39	12.71
	1RB-Middle (37)	2647.5 (41165)	14.78	13.96	12.50
		2621.3 (40903)	14.79	13.87	12.64
		2595 (40640)	14.93	14.01	12.50
		2568.8 (40378)	14.91	13.97	12.52
		2542.5 (40115)	15.33	14.51	12.83
	1RB-Low (0)	2647.5 (41165)	15.39	14.80	13.54
		2621.3 (40903)	14.87	13.73	12.41
		2595 (40640)	15.29	14.42	12.79
		2568.8 (40378)	15.64	14.60	12.95
		2542.5 (40115)	15.50	14.74	13.53
	36RB-High (38)	2647.5 (41165)	13.91	12.99	12.03
		2621.3 (40903)	13.78	12.98	12.20
		2595 (40640)	14.41	13.27	12.28
		2568.8 (40378)	14.31	13.25	12.20
		2542.5 (40115)	14.34	13.33	12.40
	36RB-Middle (19)	2647.5 (41165)	13.98	12.90	11.99
		2621.3 (40903)	13.79	12.93	12.13
		2595 (40640)	14.03	13.00	12.07
		2568.8 (40378)	14.11	12.92	11.97
		2542.5 (40115)	14.26	13.39	12.38
	36RB-Low (0)	2647.5 (41165)	14.27	13.47	12.50
		2621.3 (40903)	13.89	13.02	12.20
		2595 (40640)	14.48	13.04	12.15
		2568.8 (40378)	14.25	13.18	12.21
		2542.5 (40115)	14.33	13.67	12.70
	75RB (0)	2647.5 (41165)	14.25	13.22	12.21
		2621.3 (40903)	13.78	13.02	12.20

		2595 (40640)	14.34	13.07	12.29
		2568.8 (40378)	14.27	13.11	12.21
		2542.5 (40115)	14.53	13.45	12.57
20MHz	1RB-High (99)	2645 (41140)	15.25	14.18	12.71
		2620 (40890)	14.89	13.75	12.39
		2595 (40640)	15.66	14.69	13.04
		2570 (40390)	15.65	14.59	13.06
		2545 (40140)	15.61	14.39	12.80
	1RB-Middle (50)	2645 (41140)	14.87	13.93	12.46
		2620 (40890)	14.89	13.90	12.63
		2595 (40640)	15.00	14.11	12.58
		2570 (40390)	15.01	14.06	12.53
		2545 (40140)	15.41	14.50	12.93
	1RB-Low (0)	2645 (41140)	15.41	14.78	13.60
		2620 (40890)	14.94	13.80	12.41
		2595 (40640)	15.27	14.43	12.77
		2570 (40390)	15.62	14.56	12.99
		2545 (40140)	15.55	14.77	13.48
	50RB-High (50)	2645 (41140)	14.01	12.99	12.05
		2620 (40890)	13.88	13.01	12.16
		2595 (40640)	14.37	13.27	12.35
		2570 (40390)	14.29	13.23	12.27
		2545 (40140)	14.41	13.30	12.38
	50RB-Middle (25)	2645 (41140)	14.00	12.98	12.04
		2620 (40890)	13.84	12.99	12.11
		2595 (40640)	14.11	13.03	12.15
		2570 (40390)	14.08	13.01	12.06
		2545 (40140)	14.32	13.39	12.47
	50RB-Low (0)	2645 (41140)	14.34	13.48	12.54
		2620 (40890)	13.89	13.01	12.16
		2595 (40640)	14.52	13.11	12.19
		2570 (40390)	14.26	13.19	12.23
		2545 (40140)	14.43	13.72	12.80
	100RB (0)	2645 (41140)	14.25	13.21	12.29
		2620 (40890)	13.88	12.99	12.15
		2595 (40640)	14.29	13.16	12.25
		2570 (40390)	14.27	13.19	12.24
		2545 (40140)	14.62	13.49	12.58

SAR test is not required since maximum output power when downlink carrier aggregation active is not more than ¼ dB higher than the maximum output power measured when downlink carrier aggregation inactive.

The conducted power measurement results of LTE downlink CA are as below：

DL LTE CA Class	PCC								SCC			Power		
	PCC Band	PCC Band width (MHz)	PCC UL RB size	PCC UL RB offset	PCC DL RB size	PCC DL RB offset	PCC UL Channel	PCC DL Channel	SCC Band	SCC Band width (MHz)	SCC DL Channel	Rel 8 LTETx Power(dBm)	Rel 10 DL LTE CA Tx Power(dBm)	Tune -up
2A-12A	2	20	1	99	100	0	18900	900	12	10	5095	23.93	23.72	24.5
2A-12A	12	10	1	0	50	0	23095	5095	2	20	900	23.65	23.4	24.5
4A-7A	4	20	1	0	100	0	20300	2300	7	20	3100	24.23	23.41	25.5
4A-7A	7	20	1	50	100	0	21350	3350	4	20	2175	23.95	11.56	24.5
4A-12A	4	20	1	0	100	0	20300	2300	12	10	5095	23.95	23.22	25.5
4A-12A	12	10	1	0	50	0	23095	5095	4	20	2175	23.65	23.62	24.5
5A-7A	5	10	1	49	50	0	20600	2600	7	20	3100	24.04	23.83	25
5A-7A	7	20	1	50	100	0	21350	3350	5	10	2525	23.95	23.37	24.5
7A-7A	7	20	1	50	100	0	21350	3350	7	20	3100	23.95	23.66	24.5
7C	7	20	1	50	100	0	21001	3001	7	20	3199	23.95	23.6	24.5
12A-66A	12	10	1	0	50	0	23095	5095	66	20	66786	23.65	23.62	24.5
12A-66A	66	20	1	99	100	0	132572	66736	12	10	5095	23.77	23.49	24
66A-66A	66	20	1	99	100	0	132572	66736	66	20	66786	23.77	23.25	24
66B	66	20	1	99	100	0	132622	67086	66	20	67185	23.77	22.8	24
66C	66	20	1	99	100	0	132572	67036	66	20	67234	23.77	22.88	24

Note: Testing is not required in bands or modes not intended/allowed for operation.

11.4 Wi-Fi and BT Measurement result

The maximum output power of BT antenna is 9.76dBm.
The maximum tune up of BT antenna is 11.2dBm.

The average conducted power for Wi-Fi 2.4G is as following-Normal power

802.11b								
Channel\data rate	1Mbps	2Mbps	5.5Mbps	11Mbps				
11(2462MHz)	17.95	/	/	/				
6(2437(MHz)	18.53	18.52	18.56	18.43				
1(2412MHz)	18.47	/	/	/				
Tune up	19	19	19	19				
802.11g								
Channel\data rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
11(2462MHz)	15.34	/	/	/	/	/	/	/
6(2437(MHz)	16.92	16.94	16.86	15.97	15.86	15.76	14.75	14.65
1(2412MHz)	16.81	/	/	/	/	/	/	/
Tune up	17/18/18	18	18	17	17	17	16	16
802.11n-20MHz								
Channel\data rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
11(2462MHz)	15.64	/	/	/	/	/	/	/
6(2437(MHz)	17.16	/	/	/	/	/	/	/
1(2412MHz)	17.64	17.54	17.47	15.98	15.88	15.78	14.74	14.68
Tune up	17/18/18	18	18	18	17	17	16	16

The average conducted power for Wi-Fi 2.4G is as following-Low power by sensor

802.11b								
Channel\data rate	1Mbps	2Mbps	5.5Mbps	11Mbps				
11(2462MHz)	10.11	/	/	/				
6(2437(MHz)	10.41	/	/	/				
1(2412MHz)	11.47	11.44	11.33	11.27				
Tune up	12	12	12	12				
802.11g								
Channel\data rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
11(2462MHz)	10.05	/	/	/	/	/	/	/
6(2437(MHz)	10.33	/	/	/	/	/	/	/
1(2412MHz)	10.86	10.84	10.83	10.85	10.65	10.59	10.64	10.14
Tune up	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
802.11n-20MHz								
Channel\data rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
11(2462MHz)	10.24	/	/	/	/	/	/	/
6(2437(MHz)	10.40	/	/	/	/	/	/	/
1(2412MHz)	11.21	11.08	11.05	10.97	10.86	10.81	10.80	10.49
Tune up	12	12	12	11.5	11.5	11.5	11.5	11.5

The tune up power for Wi-Fi 5G is as following:

Mode	Rate	Ch #	Freq.	Output Power Tolerance (dBm)		Reduced Power(dBm)	
						Body	
			(MHz)	Target	Maximum	Target	Maximum
802.11a 20M	6Mbps	36-64	5180-5320	17	18	5	6.5
		100-136	5500-5680	17	18	5	6.5
		140	5700	12	13	5	6.5
		149-165	5745-5825	15	17	5	6.5
	9Mbps	36-64	5180-5320	17	18	5	6.5
		100-136	5500-5680	17	18	5	6.5
		140	5700	12	13	5	6.5
		149-165	5745-5825	15	17	5	6.5
	12Mbps	36-64	5180-5320	16	17	5	6.5
		100-136	5500-5680	16	17	5	6.5
		140	5700	12	13	5	6.5
		149-165	5745-5825	15	17	5	6.5
	18Mbps	36-64	5180-5320	16	17	5	6.5
		100-136	5500-5680	16	17	5	6.5
		140	5700	12	13	5	6.5
		149-165	5745-5825	15	17	5	6.5
	24Mbps	36-64	5180-5320	15	15.5	5	6.5
		100-136	5500-5680	15	16	5	6.5
		140	5700	12	13	5	6.5
		149-165	5745-5825	15	16	5	6.5
	36Mbps	36-64	5180-5320	15	15.5	5	6.5
		100-136	5500-5680	15	16	5	6.5
		140	5700	12	13	5	6.5
		149-165	5745-5825	15	16	5	6.5
	48Mbps	36-64	5180-5320	14	14.5	5	6.5
		100-136	5500-5680	14	15	5	6.5
		140	5700	12	13	5	6.5
		149-165	5745-5825	14	15	5	6.5
	54Mbps	36-64	5180-5320	14	14.5	5	6.5
		100-136	5500-5680	14	15	5	6.5
		140	5700	12	13	5	6.5
		149-165	5745-5825	14	15	5	6.5
802.11n 20M	MCS0	36-64	5180-5320	16	17	5	6.5
		100-136	5500-5680	16	17	5	6.5
		140	5700	8	11	5	6.5
		149-165	5745-5825	15	17	5	6.5
	MCS1	36-64	5180-5320	16	17	5	6.5

		100-136	5500-5680	16	17	5	6.5
		140	5700	8	9	5	6.5
		149-165	5745-5825	16	17	5	6.5
	MCS2	36-64	5180-5320	16	17	5	6.5
		100-136	5500-5680	16	17	5	6.5
		140	5700	8	9	5	6.5
		149-165	5745-5825	15	16	5	6.5
	MCS3	36-64	5180-5320	16	17	5	6.5
		100-136	5500-5680	16	17	5	6.5
		140	5700	8	9	5	6.5
		149-165	5745-5825	15	16	5	6.5
	MCS4	36-64	5180-5320	15	16	5	6.5
		100-136	5500-5680	15	16	5	6.5
		140	5700	8	9	5	6.5
		149-165	5745-5825	15	16	5	6.5
	MCS5	36-64	5180-5320	15	16	5	6.5
		100-136	5500-5680	15	16	5	6.5
		140	5700	8	9	5	6.5
		149-165	5745-5825	15	16	5	6.5
	MCS6	36-64	5180-5320	14	15	5	6.5
		100-136	5500-5680	14	15	5	6.5
		140	5700	8	9	5	6.5
		149-165	5745-5825	14	15	5	6.5
	MCS7	36-64	5180-5320	14	15	5	6.5
		100-136	5500-5680	14	15	5	6.5
		140	5700	8	9	5	6.5
		149-165	5745-5825	14	15	5	6.5
802.11n 40M	MCS0	36-64	5180-5320	15	16	5	6.5
		100-140	5500-5700	16	17	5	6.5
		149-165	5745-5825	15	17	5	6.5
	MCS1	36-64	5180-5320	16	17	5	6.5
		100-140	5500-5700	16	17	5	6.5
		149-165	5745-5825	15	16	5	6.5
	MCS2	36-64	5180-5320	16	17	5	6.5
		100-140	5500-5700	16	17	5	6.5
		149-165	5745-5825	15	16	5	6.5
	MCS3	36-64	5180-5320	15	16	5	6.5
		100-140	5500-5700	15	16	5	6.5
		149-165	5745-5825	15	16	5	6.5
	MCS4	36-64	5180-5320	15	16	5	6.5
		100-140	5500-5700	15	16	5	6.5

		149-165	5745-5825	15	16	5	6.5
	MCS5	36-64	5180-5320	14	15	5	6.5
		100-140	5500-5700	14	15	5	6.5
		149-165	5745-5825	14	15	5	6.5
	MCS6	36-64	5180-5320	14	15	5	6.5
		100-140	5500-5700	14	15	5	6.5
		149-165	5745-5825	14	15	5	6.5
	MCS7	36-64	5180-5320	14	15	5	6.5
		100-140	5500-5700	14	15	5	6.5
		149-165	5745-5825	14	15	5	6.5
802.11ac 20M	MCS0	36-64	5180-5320	16	18	5	6.5
		100-136	5500-5680	16	18	5	6.5
		140	5700	8	12	5	6.5
		149-165	5745-5825	15	18	5	6.5
	MCS1	36-64	5180-5320	15	17	5	6.5
		100-136	5500-5680	15	16	5	6.5
		140	5700	8	9	5	6.5
		149-165	5745-5825	15	18	5	6.5
	MCS2	36-64	5180-5320	14	17	5	6.5
		100-136	5500-5680	14	15	5	6.5
		140	5700	8	9	5	6.5
		149-165	5745-5825	14	18	5	6.5
	MCS3	36-64	5180-5320	14	15	5	6.5
		100-136	5500-5680	14	15	5	6.5
		140	5700	8	9	5	6.5
		149-165	5745-5825	14	15	5	6.5
	MCS4	36-64	5180-5320	13	14	5	6.5
		100-136	5500-5680	13	14	5	6.5
		140	5700	8	9	5	6.5
		149-165	5745-5825	13	15	5	6.5
	MCS5	36-64	5180-5320	13	14	5	6.5
		100-136	5500-5680	13	14	5	6.5
		140	5700	8	9	5	6.5
		149-165	5745-5825	13	14	5	6.5
	MCS6	36-64	5180-5320	13	14	5	6.5
		100-136	5500-5680	13	14	5	6.5
		140	5700	8	9	5	6.5
		149-165	5745-5825	13	14	5	6.5
	MCS7	36-64	5180-5320	12	13	5	6.5
		100-136	5500-5680	**12**	**13**	5	6.5
		140	5700	8	9	5	6.5

		149-165	5745-5825	12	13	5	6.5
	MCS8	36-64	5180-5320	12	13	5	6.5
		100-136	5500-5680	12	13	5	6.5
		140	5700	8	9	5	6.5
		149-165	5745-5825	12	13	5	6.5
802.11ac 40M	MCS0	36-64	5180-5320	14	17	5	6.5
		100-140	5500-5700	16	17	5	6.5
		149-165	5745-5825	15	18	5	6.5
	MCS1	36-64	5180-5320	15	17	5	6.5
		100-140	5500-5700	15	17	5	6.5
		149-165	5745-5825	15	18	5	6.5
	MCS2	36-64	5180-5320	14	17	5	6.5
		100-140	5500-5700	14	17	5	6.5
		149-165	5745-5825	14	18	5	6.5
	MCS3	36-64	5180-5320	14	15	5	6.5
		100-140	5500-5700	14	15	5	6.5
		149-165	5745-5825	14	15	5	6.5
	MCS4	36-64	5180-5320	13	14	5	6.5
		100-140	5500-5700	13	14	5	6.5
		149-165	5745-5825	13	15	5	6.5
	MCS5	36-64	5180-5320	13	14	5	6.5
		100-140	5500-5700	13	14	5	6.5
		149-165	5745-5825	13	14	5	6.5
	MCS6	36-64	5180-5320	13	14	5	6.5
		100-140	5500-5700	13	14	5	6.5
		149-165	5745-5825	13	14	5	6.5
	MCS7	36-64	5180-5320	12	13	5	6.5
		100-140	5500-5700	12	13	5	6.5
		149-165	5745-5825	12	13	5	6.5
	MCS8	36-64	5180-5320	12	13	5	6.5
		100-140	5500-5700	12	13	5	6.5
		149-165	5745-5825	12	13	5	6.5
	MCS9	36-64	5180-5320	11	12	5	6.5
		100-140	5500-5700	11	12	5	6.5
		149-165	5745-5825	11	13	5	6.5
802.11ac 80M	MCS0	36-64	5180-5320	15	17	5	6.5
		100-140	5500-5700	16	17	5	6.5
		149-165	5745-5825	15	18	5	6.5
	MCS1	36-64	5180-5320	15	17	5	6.5
		100-140	5500-5700	15	17	5	6.5
		149-165	5745-5825	15	18	5	6.5

	MCS2	36-64	5180-5320	14	17	5	6.5
		100-140	5500-5700	14	17	5	6.5
		149-165	5745-5825	14	16	5	6.5
	MCS3	36-64	5180-5320	14	15	5	6.5
		100-140	5500-5700	14	15	5	6.5
		149-165	5745-5825	14	15	5	6.5
	MCS4	36-64	5180-5320	13	14	5	6.5
		100-140	5500-5700	13	14	5	6.5
		149-165	5745-5825	13	14	5	6.5
	MCS5	36-64	5180-5320	13	14	5	6.5
		100-140	5500-5700	13	14	5	6.5
		149-165	5745-5825	13	14	5	5.5
	MCS6	36-64	5180-5320	13	14	5	6.5
		100-140	5500-5700	13	14	5	6.5
		149-165	5745-5825	13	14	5	5.5
	MCS7	36-64	5180-5320	12	13	5	6.5
		100-140	5500-5700	12	13	5	6.5
		149-165	5745-5825	12	13	5	5.5
	MCS8	36-64	5180-5320	12	13	5	6.5
		100-140	5500-5700	12	13	5	6.5
		149-165	5745-5825	12	13	5	5.5
	MCS9	36-64	5180-5320	11	12	5	6.5
		100-140	5500-5700	11	12	5	6.5
		149-165	5745-5825	11	12	5	5.5

The average conducted power for Wi-Fi 5G is as following-Normal power

802.11a (dBm)								
Channel\data rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
36(5180 MHz)	16.77	/	/	/	/	/	/	/
40(5200 MHz)	16.65	/	/	/	/	/	/	/
44(5220 MHz)	16.84	16.14	15.44	15.10	13.93	13.69	12.69	12.63
48(5240 MHz)	16.22	/	/	/	/	/	/	/
52(5260 MHz)	16.52	/	/	/	/	/	/	/
56(5280 MHz)	16.95	/	/	/	/	/	/	/
60(5300 MHz)	17.05	/	/	/	/	/	/	/
64(5320 MHz)	17.18	17.14	16.20	15.80	14.81	14.54	13.50	13.23
100(5500 MHz)	17.36	/	/	/	/	/	/	/
104(5520 MHz)	17.22	/	/	/	/	/	/	/
108(5540 MHz)	16.95	/	/	/	/	/	/	/
112(5560 MHz)	16.44	/	/	/	/	/	/	/
116(5580 MHz)	16.79	/	/	/	/	/	/	/
120(5600 MHz)	16.72	/	/	/	/	/	/	/
124(5620 MHz)	16.95	/	/	/	/	/	/	/
128(5640 MHz)	17.13	/	/	/	/	/	/	/
132(5660 MHz)	17.48	17.42	16.45	16.30	15.25	15.02	13.82	13.65
136(5680 MHz)	17.33	/	/	/	/	/	/	/
140(5700 MHz)	12.89	/	/	/	/	/	/	/
Tune up	18	18	17	17	15.5	15.5	14.5	14.5

Remark: The tune up power for CH140 is 13dBm

802.11ac(dBm)-80MHz										
Channel\data rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
155(5775 MHz)	16.21	16.05	14.45	14.22	12.47	12.26	12.22	11.26	11.04	10.21
Tune up	18	18	16	15	14	14	14	13	13	12

The average conducted power for Wi-Fi 5G is as following-Low power by sensor

802.11ac(dBm)-80MHz										
Channel\data rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
42(5210 MHz)	5.78	5.45	5.42	5.39	5.35	5.33	5.27	5.16	5.10	5.04
58(5290 MHz)	5.34	5.37	5.30	5.27	5.18	5.19	5.17	5.14	5.09	5.02
106(5530 MHz)	5.64	5.46	5.63	5.55	5.51	5.44	5.47	5.41	5.37	5.33
122(5610 MHz)	5.48	/	/	/	/	/	/	/	/	/
138(5690 MHz)	6.03	/	/	/	/	/	/	/	/	/
Tune up	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
155(5775 MHz)	6.05	5.56	5.27	5.10	4.74	4.20	3.97	3.85	3.77	3.66
Tune up	6.5	6.5	6.5	6.5	6.5	5.5	5.5	5.5	5.5	5.5

12 Simultaneous TX SAR Considerations

12.1 Introduction

The following procedures adopted from “FCC SAR Considerations for Cell Phones with Multiple Transmitters” are applicable to handsets with built-in unlicensed transmitters such as 802.11 a/b/g and Bluetooth devices which may simultaneously transmit with the licensed transmitter.
For this device, the BT and Wi-Fi can transmit simultaneous with other transmitters.

12.2 Transmit Antenna Separation Distances

Please refer to the picture of antenna locations in the document: “The Photos of SAR test - I22Z70189”

12.3 SAR Measurement Positions

According to the KDB941225 D06 Hot Spot SAR, the edges with less than 2.5 cm distance to the antennas need to be tested for SAR.

SAR measurement positions						
Mode	Front	Rear	Left edge	Right edge	Top edge	Bottom edge
WWAN-Main LMB	Yes	Yes	No	Yes	Yes	No
WWAN-Main HB	Yes	Yes	No	No	Yes	No
WIFI ANT	Yes	Yes	No	No	Yes	No

13 Evaluation of Simultaneous

Table 13.1: The sum of SAR values for Main antenna + WiFi-2.4G

	Position	Main antenna	WiFi-2.4G	Sum
Highest SAR value for Body	Rear 0mm (LTE B41)	0.77	0.51	**1.28**

Table 13.2: The sum of SAR values for Main antenna + WiFi-5G + BT

	Position	Main antenna	WiFi-5G	BT	Sum
Highest SAR value for Body	Rear 0mm (LTE B41)	0.77	0.57	0.12	**1.46**

Conclusion:

According to the above tables, the sum of reported SAR values is<1.6W/kg. So the simultaneous transmission SAR with volume scans is not required.

14 SAR Test Result

It is determined by user manual for the distance between the EUT and the phantom bottom.
The distance is 10 mm and just applied to the condition of body worn accessory.
It is performed for all SAR measurements with area scan based 1-g SAR estimation (Fast SAR). A zoom scan measurement is added when the estimated 1-g SAR is the highest measured SAR in each exposure configuration, wireless mode and frequency band combination or more than 1.2W/kg.
The calculated SAR is obtained by the following formula:

$$\text{Reported SAR} = \text{Measured SAR} \times 10^{(P_{Target}-P_{Measured})/10}$$

Where P_{Target} is the power of manufacturing upper limit;
$P_{Measured}$ is the measured power in chapter 11.

Table 14.1: Duty Cycle

Mode	Duty Cycle
GPRS/EGPRS 850/1900	1:2.67 or 1:4 or 1:2 or 1:8.3
WCDMA&LTE FDD	1:1
LTE TDD	1:1.58

14.1 SAR results for 2G/3G/4G

Table 14.1-1: SAR Values (GSM 850 MHz Band-Body)

Ambient Temperature: 22.5 °C Liquid Temperature: 22.3 °C											
Frequency		Mode	Test Position	Figure No./Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
251	848.8	GPRS(2)	Front	15mm	30.02	31.5	0.306	**0.43**	0.385	**0.54**	-0.18
190	836.6	GPRS(2)	Front	15mm	30.11	31.5	0.271	**0.37**	0.374	**0.52**	-0.14
128	824.2	GPRS(2)	Front	15mm	30.16	31.5	0.309	**0.42**	0.41	**0.56**	-0.07
190	836.6	GPRS(2)	Rear	19mm	30.11	31.5	0.148	**0.20**	0.187	**0.26**	0.19
190	836.6	GPRS(2)	Right	13mm	30.11	31.5	0.162	**0.22**	0.219	**0.30**	0.16
190	836.6	GPRS(2)	Top	19mm	30.11	31.5	0.08	**0.11**	0.112	**0.15**	-0.12
190	836.6	GPRS(1)	Front	/	26.04	27	0.183	**0.23**	0.368	**0.46**	0.18
251	848.8	GPRS(1)	Rear	Fig.1	26.03	27	0.249	**0.31**	0.598	**0.75**	0.16
190	836.6	GPRS(1)	Rear	/	26.04	27	0.251	**0.31**	0.555	**0.69**	0.02
128	824.2	GPRS(1)	Rear	/	26.02	27	0.204	**0.26**	0.477	**0.60**	-0.10
190	836.6	GPRS(1)	Right	/	26.04	27	0.107	**0.13**	0.222	**0.28**	-0.11
190	836.6	GPRS(1)	Top	/	26.04	27	0.096	**0.12**	0.234	**0.29**	0.14
251	848.8	EGPRS(1)	Rear	/	26.01	27	0.241	**0.30**	0.59	**0.74**	-0.09

Note1: The distance between the EUT and the phantom bottom is 13mm/15mm/19mm by sensor, the distance for other results is 0mm.

Table 14.1-2: SAR Values (GSM 1900 MHz Band - Body)

Ambient Temperature: 22.5 °C Liquid Temperature: 22.3 °C											
Frequency		Mode	Test Position	Figure No./Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
810	1909.8	GPRS(3)	Front	15mm	24.07	25.5	0.136	**0.19**	0.253	**0.35**	0.01
661	1880	GPRS(3)	Front	15mm	24.27	25.5	0.183	**0.24**	0.348	**0.46**	-0.07
512	1850.2	GPRS(3)	Front	15mm	24.57	25.5	0.165	**0.20**	0.307	**0.38**	-0.14
661	1880	GPRS(3)	Rear	19mm	24.27	25.5	0.021	**0.03**	0.036	**0.05**	0.00
661	1880	GPRS(3)	Right	13mm	24.27	25.5	0.122	**0.16**	0.203	**0.27**	-0.08
661	1880	GPRS(3)	Top	19mm	24.27	25.5	0.132	**0.18**	0.237	**0.31**	-0.07
661	1880	GPRS(4)	Front	/	14.77	15.5	0.196	**0.23**	0.383	**0.45**	0.12
810	1909.8	GPRS(4)	Rear	/	14.83	15.5	0.246	**0.29**	0.583	**0.68**	-0.13
661	1880	GPRS(4)	Rear	/	14.77	15.5	0.244	**0.29**	0.572	**0.68**	-0.12
512	1850.2	GPRS(4)	Rear	Fig.2	14.9	15.5	0.263	**0.30**	0.597	**0.69**	0.05
661	1880	GPRS(4)	Right	/	14.77	15.5	0.242	**0.29**	0.571	**0.68**	-0.10
661	1880	GPRS(4)	Top	/	14.77	15.5	0.077	**0.09**	0.186	**0.22**	0.01
512	1850.2	EGPRS(4)	Rear	/	14.91	15.5	0.251	**0.29**	0.585	**0.67**	-0.06

Note1: The distance between the EUT and the phantom bottom is 13mm/15mm/19mm by sensor, the distance for other results is 0mm.

Table 14.1-3: SAR Values (WCDMA 1900 MHz Band - Body)

Ambient Temperature: 22.5 °C Liquid Temperature: 22.3 °C											
Frequency		Mode	Test Position	Figure No./Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
9538	1907.6	RMC	Front	15mm	23.25	24.5	0.337	**0.45**	0.628	**0.84**	-0.19
9400	1880	RMC	Front	15mm/ Fig.3	23.17	24.5	0.385	**0.52**	0.732	**0.99**	-0.19
9262	1852.4	RMC	Front	15mm	23.24	24.5	0.367	**0.49**	0.676	**0.90**	0.15
9400	1880	RMC	Rear	19mm	23.17	24.5	0.213	**0.29**	0.381	**0.52**	0.06
9400	1880	RMC	Right	13mm	23.17	24.5	0.348	**0.47**	0.584	**0.79**	-0.03
9400	1880	RMC	Top	19mm	23.17	24.5	0.337	**0.46**	0.622	**0.84**	-0.15
9400	1880	RMC	Front	/	12.47	12.5	0.17	**0.17**	0.364	**0.37**	-0.07
9538	1907.6	RMC	Rear	/	12.46	12.5	0.256	**0.26**	0.587	**0.59**	0.10
9400	1880	RMC	Rear	/	12.47	12.5	0.212	**0.21**	0.472	**0.48**	-0.12
9262	1852.4	RMC	Rear	/	12.46	12.5	0.275	**0.28**	0.612	**0.62**	-0.08
9400	1880	RMC	Right	/	12.47	12.5	0.15	**0.15**	0.365	**0.37**	0.14
9400	1880	RMC	Top	/	12.47	12.5	0.1	**0.10**	0.279	**0.28**	-0.05

Note1: The distance between the EUT and the phantom bottom is 13mm/15mm/19mm by sensor, the distance for other results is 0mm.

Table 14.1-4: SAR Values (WCDMA 1700 MHz Band - Body)

Ambient Temperature: 22.5 °C Liquid Temperature: 22.3 °C											
Frequency		Mode	Test Position	Figure No./Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
1513	1752.6	RMC	Front	15mm	23.19	24.5	0.297	**0.40**	0.505	**0.68**	-0.09
1412	1732.4	RMC	Front	15mm	23.03	24.5	0.283	**0.40**	0.478	**0.67**	-0.16
1312	1712.4	RMC	Front	15mm	22.81	24.5	0.288	**0.43**	0.483	**0.71**	0.10
1412	1732.4	RMC	Rear	19mm	23.03	24.5	0.062	**0.09**	0.107	**0.15**	0.19
1412	1732.5	RMC	Right	13mm	23.03	24.5	0.156	**0.22**	0.267	**0.37**	0.10
1412	1732.5	RMC	Top	19mm	23.03	24.5	0.114	**0.16**	0.198	**0.28**	-0.09
1412	1732.4	RMC	Front	/	12.5	13	0.231	**0.26**	0.448	**0.50**	-0.01
1513	1752.6	RMC	Rear	/	12.65	13	0.224	**0.24**	0.446	**0.48**	-0.04
1412	1732.4	RMC	Rear	Fig.4	12.5	13	0.28	**0.31**	0.63	**0.71**	0.03
1312	1712.4	RMC	Rear	/	12.42	13	0.294	**0.34**	0.588	**0.67**	0.12
1412	1732.4	RMC	Right	/	12.5	13	0.198	**0.22**	0.45	**0.50**	-0.11
1412	1732.4	RMC	Top	/	12.5	13	0.088	**0.10**	0.217	**0.24**	0.08

Note1: The distance between the EUT and the phantom bottom is 13mm/15mm/19mm by sensor, the distance for other results is 0mm.

Table 14.1-5: SAR Values (WCDMA 850 MHz Band - Body)

Ambient Temperature: 22.5 °C Liquid Temperature: 22.3 °C											
Frequency		Mode	Test Position	Figure No./Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
4233	846.6	RMC	Front	15mm	23.62	24.5	0.247	**0.30**	0.327	**0.40**	0.02
4183	836.6	RMC	Front	15mm	23.71	24.5	0.258	**0.31**	0.344	**0.41**	0.07
4132	826.4	RMC	Front	15mm	23.69	24.5	0.251	**0.30**	0.334	**0.40**	-0.18
4183	836.6	RMC	Rear	19mm	23.69	24.5	0.144	**0.17**	0.217	**0.26**	0.08
4183	836.6	RMC	Right	13mm	23.69	24.5	0.157	**0.19**	0.222	**0.27**	-0.15
4183	836.6	RMC	Top	19mm	23.69	24.5	0.085	**0.10**	0.128	**0.15**	-0.11
4183	836.6	RMC	Front	/	17.94	18	0.153	**0.16**	0.307	**0.31**	0.18
4233	846.6	RMC	Rear	Fig.5	17.89	18	0.263	**0.27**	0.601	**0.62**	-0.18
4183	836.6	RMC	Rear	/	17.94	18	0.243	**0.25**	0.553	**0.56**	0.13
4132	826.4	RMC	Rear	/	17.87	18	0.24	**0.25**	0.547	**0.56**	0.14
4183	836.6	RMC	Right	/	17.94	18	0.127	**0.13**	0.291	**0.30**	-0.13
4183	836.6	RMC	Top	/	17.94	18	0.069	**0.07**	0.146	**0.15**	-0.06

Note1: The distance between the EUT and the phantom bottom is 13mm/15mm/19mm by sensor, the distance for other results is 0mm.

Table 14.1-6: SAR Values (LTE Band2 - Body)

Ambient Temperature: 22.5 ºC Liquid Temperature: 22.3 ºC											
Frequency		Mode	Test Position	Figure No./Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
18900	1880	1RB_High	Front	15mm	23.93	24.5	0.336	**0.38**	0.608	**0.69**	-0.19
18900	1880	1RB_High	Rear	19mm	23.93	24.5	0.122	**0.14**	0.203	**0.23**	-0.11
18900	1880	1RB_High	Right	13mm	23.93	24.5	0.083	**0.09**	0.132	**0.15**	0.03
19100	1900	1RB_Low	Top	19mm	23.82	24.5	0.311	**0.36**	0.571	**0.67**	-0.06
18900	1880	1RB_High	Top	19mm / Fig.6	23.93	24.5	0.415	**0.47**	0.754	**0.86**	-0.07
18700	1860	1RB_Mid	Top	19mm	23.61	24.5	0.371	**0.46**	0.67	**0.82**	-0.07
18900	1880	100RB	Top	19mm	22.66	23.5	0.265	**0.32**	0.498	**0.60**	0.11
18900	1880	50RB_High	Front	15mm	22.87	23.5	0.252	**0.29**	0.456	**0.53**	0.04
18900	1880	50RB_High	Rear	19mm	22.87	23.5	0.086	**0.10**	0.14	**0.16**	0.15
18900	1880	50RB_High	Right	13mm	22.87	23.5	0.064	**0.07**	0.102	**0.12**	-0.13
18900	1880	50RB_High	Top	19mm	22.87	23.5	0.327	**0.38**	0.59	**0.68**	-0.03
18900	1880	1RB_High	Front	/	13.55	14	0.207	**0.23**	0.416	**0.46**	-0.13
18900	1880	1RB_High	Rear	/	13.55	14	0.297	**0.33**	0.689	**0.76**	-0.07
18900	1880	1RB_High	Right	/	13.55	14	0.279	**0.31**	0.657	**0.73**	0.11
18900	1880	1RB_High	Top	/	13.55	14	0.093	**0.10**	0.226	**0.25**	-0.18
18900	1880	50RB_High	Front	/	12.35	13	0.113	**0.13**	0.228	**0.26**	-0.04
18900	1880	50RB_High	Rear	/	12.35	13	0.195	**0.23**	0.439	**0.51**	0.12
18900	1880	50RB_High	Right	/	12.35	13	0.179	**0.21**	0.424	**0.49**	0.14
18900	1880	50RB_High	Top	/	12.35	13	0.073	**0.08**	0.191	**0.22**	0.04

Note1: The distance between the EUT and the phantom bottom is 13mm/15mm/19mm by sensor, the distance for other results is 0mm.

Note2: The LTE mode is QPSK_20MHz.

Table 14.1-7: SAR Values (LTE Band4 - Body)

Ambient Temperature: 22.5 °C Liquid Temperature: 22.3 °C											
Frequency		Mode	Test Position	Figure No./Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
20300	1745	1RB_Low	Front	15mm / Fig.7	24.23	25.5	0.3	**0.40**	0.501	**0.67**	-0.01
20300	1745	1RB_Low	Rear	19mm	24.23	25.5	0.196	**0.26**	0.324	**0.43**	-0.08
20300	1745	1RB_Low	Right	13mm	24.23	25.5	0.277	**0.37**	0.461	**0.62**	0.11
20300	1745	1RB_Low	Top	19mm	24.23	25.5	0.123	**0.16**	0.209	**0.28**	0.07
20300	1745	50RB_Low	Front	15mm	23.34	24.5	0.187	**0.24**	0.318	**0.42**	-0.06
20300	1745	50RB_Low	Rear	19mm	23.34	24.5	0.099	**0.13**	0.173	**0.23**	0.08
20300	1745	50RB_Low	Right	13mm	23.34	24.5	0.22	**0.29**	0.366	**0.48**	-0.01
20300	1745	50RB_Low	Top	19mm	23.34	24.5	0.099	**0.13**	0.17	**0.22**	0.14
20300	1745	1RB_High	Front	/	14.65	15	0.14	**0.15**	0.282	**0.31**	-0.13
20300	1745	1RB_High	Rear	/	14.65	15	0.135	**0.15**	0.261	**0.28**	0.04
20300	1745	1RB_High	Right	/	14.65	15	0.088	**0.10**	0.184	**0.20**	0.01
20300	1745	1RB_High	Top	/	14.65	15	0.058	**0.06**	0.148	**0.16**	0.08
20300	1745	50RB_High	Front	/	13.14	14	0.096	**0.12**	0.195	**0.24**	0.13
20300	1745	50RB_High	Rear	/	13.14	14	0.111	**0.14**	0.213	**0.26**	0.04
20300	1745	50RB_High	Right	/	13.14	14	0.043	**0.05**	0.099	**0.12**	-0.06
20300	1745	50RB_High	Top	/	13.14	14	0.044	**0.05**	0.112	**0.14**	0.1

Note1: The distance between the EUT and the phantom bottom is 13mm/15mm/19mm by sensor, the distance for other results is 0mm.

Note2: The LTE mode is QPSK_20MHz.

Table 14.1-8: SAR Values (LTE Band5 - Body)

Ambient Temperature: 22.5 °C Liquid Temperature: 22.3 °C											
Frequency		Mode	Test Position	Figure No./Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
20600	844	1RB_Low	Front	15mm	24.04	25	0.256	**0.32**	0.342	**0.43**	-0.14
20600	844	1RB_Low	Rear	19mm	24.04	25	0.125	**0.16**	0.175	**0.22**	0.11
20600	844	1RB_Low	Right	13mm	24.04	25	0.173	**0.22**	0.234	**0.29**	-0.06
20600	844	1RB_Low	Top	19mm	24.04	25	0.096	**0.12**	0.137	**0.17**	0.12
20600	844	25RB_Mid	Front	15mm	23.02	24	0.203	**0.25**	0.274	**0.34**	0.06
20600	844	25RB_Mid	Rear	19mm	23.02	24	0.098	**0.12**	0.138	**0.17**	-0.12
20600	844	25RB_Mid	Right	13mm	23.02	24	0.135	**0.17**	0.182	**0.23**	-0.07
20600	844	25RB_Mid	Top	19mm	23.02	24	0.078	**0.10**	0.11	**0.14**	-0.12
20600	844	1RB_Mid	Front	/	19.77	20.5	0.146	**0.17**	0.307	**0.36**	-0.08
20600	844	1RB_Mid	Rear	Fig.8	19.77	20.5	0.192	**0.23**	0.42	**0.50**	-0.02
20600	844	1RB_Mid	Right	/	19.77	20.5	0.15	**0.18**	0.313	**0.37**	0.10
20600	844	1RB_Mid	Top	/	19.77	20.5	0.074	**0.09**	0.148	**0.18**	-0.15
20600	844	25RB_Mid	Front	/	19.06	19.5	0.156	**0.17**	0.33	**0.37**	0.13
20600	844	25RB_Mid	Rear	/	19.06	19.5	0.176	**0.19**	0.388	**0.43**	-0.13
20600	844	25RB_Mid	Right	/	19.06	19.5	0.107	**0.12**	0.203	**0.22**	-0.14
20600	844	25RB_Mid	Top	/	19.06	19.5	0.059	**0.07**	0.122	**0.14**	0.07

Note1: The distance between the EUT and the phantom bottom is 13mm/15mm/19mm by sensor, the distance for other results is 0mm.

Note2: The LTE mode is QPSK_10MHz.

Table 14.1-9: SAR Values (LTE Band7 - Body)

Ambient Temperature: 22.5 °C Liquid Temperature: 22.3 °C											
Frequency		Mode	Test Position	Figure No./Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
21350	2560	1RB_Mid	Front	15mm / Fig.9	23.95	24.5	0.345	**0.39**	0.667	**0.76**	0.03
21350	2560	1RB_Mid	Rear	19mm	23.95	24.5	0.219	**0.25**	0.425	**0.48**	-0.13
21350	2560	1RB_Mid	Top	19mm	23.95	24.5	0.239	**0.27**	0.466	**0.53**	0.05
21350	2560	50RB_Mid	Front	15mm	23.12	23.5	0.266	**0.29**	0.514	**0.56**	-0.07
21350	2560	50RB_Mid	Rear	19mm	23.12	23.5	0.169	**0.18**	0.326	**0.36**	0.16
21350	2560	50RB_Mid	Top	19mm	23.12	23.5	0.182	**0.20**	0.355	**0.39**	-0.19
21350	2560	1RB_Low	Front	/	11.9	12.5	0.189	**0.22**	0.422	**0.48**	-0.06
21350	2560	1RB_Low	Rear	/	11.9	12.5	0.215	**0.25**	0.477	**0.55**	0.11
21350	2560	1RB_Low	Top	/	11.9	12.5	0.131	**0.15**	0.31	**0.36**	-0.13
21350	2560	50RB_Low	Front	/	10.77	11.5	0.222	**0.26**	0.566	**0.67**	0.15
21350	2560	50RB_Low	Rear	/	10.77	11.5	0.181	**0.21**	0.389	**0.46**	-0.04
21350	2560	50RB_Low	Top	/	10.77	11.5	0.107	**0.13**	0.251	**0.30**	0.03

Note1: The distance between the EUT and the phantom bottom is 15mm/19mm by sensor, the distance for other results is 0mm.

Note2: The LTE mode is QPSK_20MHz.

Table 14.1-10: SAR Values (LTE Band12 - Body)

Ambient Temperature: 22.5 °C Liquid Temperature: 22.3 °C											
Frequency		Mode	Test Position	Figure No./Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
23095	707.5	1RB_Low	Front	15mm	23.65	24.5	0.141	**0.17**	0.19	**0.23**	-0.07
23095	707.5	1RB_Low	Rear	19mm	23.65	24.5	0.112	**0.14**	0.148	**0.18**	0.18
23095	707.5	1RB_Low	Right	13mm	23.65	24.5	0.105	**0.13**	0.147	**0.18**	0.12
23095	707.5	1RB_Low	Top	19mm	23.65	24.5	0.053	**0.06**	0.07	**0.09**	0.07
23095	707.5	25RB_Mid	Front	15mm	22.78	23.5	0.117	**0.14**	0.158	**0.19**	0.16
23095	707.5	25RB_Mid	Rear	19mm	22.78	23.5	0.092	**0.11**	0.122	**0.14**	0.10
23095	707.5	25RB_Mid	Right	13mm	22.78	23.5	0.082	**0.10**	0.115	**0.14**	0.13
23095	707.5	25RB_Mid	Top	19mm	22.78	23.5	<0.01	<0.01	<0.01	<0.01	/
23095	707.5	1RB_High	Front	/	19.16	20	0.149	**0.18**	0.303	**0.37**	-0.11
23095	707.5	1RB_High	Rear	Fig.10	19.16	20	0.203	**0.25**	0.454	**0.55**	-0.05
23095	707.5	1RB_High	Right	/	19.16	20	0.064	**0.08**	0.151	**0.18**	0.01
23095	707.5	1RB_High	Top	/	19.16	20	0.1	**0.12**	0.249	**0.30**	0.07
23095	707.5	25RB_High	Front	/	18.36	19	0.073	**0.08**	0.15	**0.17**	-0.06
23095	707.5	25RB_High	Rear	/	18.36	19	0.159	**0.18**	0.373	**0.43**	0.12
23095	707.5	25RB_High	Right	/	18.36	19	0.054	**0.06**	0.113	**0.13**	0.08
23095	707.5	25RB_High	Top	/	18.36	19	0.077	**0.09**	0.183	**0.21**	0.12

Note1: The distance between the EUT and the phantom bottom is 13mm/15mm/19mm by sensor, the distance for other results is 0mm.

Note2: The LTE mode is QPSK_10MHz.

Table 14.1-11: SAR Values (LTE Band41 - Body)

Ambient Temperature: 22.5 °C Liquid Temperature: 22.3 °C											
Frequency		Mode	Test Position	Figure No./Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
41490	2680	1RB_High	Front	15mm	23.96	23.5	0.155	**0.14**	0.312	**0.28**	0.09
41490	2680	1RB_High	Rear	19mm	23.96	23.5	0.082	**0.07**	0.158	**0.14**	0.03
41490	2680	1RB_High	Top	19mm	23.96	23.5	0.134	**0.12**	0.248	**0.22**	0.16
41490	2680	50RB_Low	Front	15mm	22.97	23.5	0.133	**0.15**	0.256	**0.29**	-0.05
41490	2680	50RB_Low	Rear	19mm	22.97	23.5	0.11	**0.12**	0.206	**0.23**	0.10
41490	2680	50RB_Low	Top	19mm	22.97	23.5	0.117	**0.13**	0.226	**0.26**	0.11
40640	2595	1RB_High	Front	/	15.66	16	0.146	**0.16**	0.425	**0.46**	-0.08
40640	2595	1RB_High	Rear	Fig.11	15.66	16	0.265	**0.29**	0.716	**0.77**	0.01
40640	2595	1RB_High	Top	/	15.66	16	0.173	**0.19**	0.511	**0.55**	-0.16
40640	2595	50RB_Low	Front	/	14.52	15	0.112	**0.13**	0.354	**0.40**	0.15
40640	2595	50RB_Low	Rear	/	14.52	15	0.163	**0.18**	0.53	**0.59**	0.17
40640	2595	50RB_Low	Top	/	14.52	15	0.094	**0.10**	0.33	**0.37**	-0.12

Note1: The distance between the EUT and the phantom bottom is 15mm/19mm by sensor, the distance for other results is 0mm.

Note2: The LTE mode is QPSK_20MHz.

Table 14.1-12: SAR Values (LTE Band66 - Body)

Ambient Temperature: 22.5 °C Liquid Temperature: 22.3 °C											
Frequency		Mode	Test Position	Figure No./Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz										
132572	1770	1RB_High	Front	15mm	22.37	24	0.201	**0.29**	0.33	**0.48**	-0.18
132572	1770	1RB_High	Rear	19mm	22.37	24	0.158	**0.23**	0.257	**0.37**	0.11
132572	1770	1RB_High	Right	13mm /Fig.12	22.37	24	0.272	**0.40**	0.449	**0.65**	0.05
132572	1770	1RB_High	Top	19mm	22.37	24	0.125	**0.18**	0.225	**0.33**	0.04
132572	1770	50RB_Low	Front	15mm	22.82	23	0.211	**0.22**	0.348	**0.36**	-0.03
132572	1770	50RB_Low	Rear	19mm	22.82	23	0.124	**0.13**	0.199	**0.21**	-0.14
132572	1770	50RB_Low	Right	13mm	22.82	23	0.198	**0.21**	0.327	**0.34**	0.16
132572	1770	50RB_Low	Top	19mm	22.82	23	0.079	**0.08**	0.141	**0.15**	0.09
132322	1745	1RB_High	Front	/	14.59	15	0.204	**0.22**	0.445	**0.49**	-0.15
132322	1745	1RB_High	Rear	/	14.59	15	0.266	**0.29**	0.577	**0.63**	0.18
132322	1745	1RB_High	Right	/	14.59	15	0.193	**0.21**	0.437	**0.48**	-0.03
132322	1745	1RB_High	Top	/	14.59	15	0.085	**0.09**	0.233	**0.26**	-0.15
132322	1745	50RB_High	Front	/	13.13	14	0.171	**0.21**	0.348	**0.43**	-0.06
132322	1745	50RB_High	Rear	/	13.13	14	0.17	**0.21**	0.355	**0.43**	-0.06
132322	1745	50RB_High	Right	/	13.13	14	0.15	**0.18**	0.323	**0.39**	-0.1
132322	1745	50RB_High	Top	/	13.13	14	0.064	**0.08**	0.194	**0.24**	-0.14

Note1: The distance between the EUT and the phantom bottom is 13mm/15mm/19mm by sensor, the distance for other results is 0mm.

Note2: The LTE mode is QPSK_20MHz.

14.2 WLAN Evaluation for 2.4G

Table 14.2-1: SAR Values (WiFi 2.4G – Body)

Frequency		Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g)(W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz									
6	2437	Front	15mm	18.53	19	0.102	**0.11**	0.193	**0.22**	0.17
6	2437	Rear	18mm	18.53	19	0.077	**0.09**	0.144	**0.16**	0.04
6	2437	Top	18mm	18.53	19	0.095	**0.11**	0.185	**0.21**	0.08
1	2412	Front	/	11.47	12	0.114	**0.13**	0.312	**0.35**	0.09
1	2412	Rear	Fig.13	11.47	12	0.159	**0.18**	0.449	**0.51**	0.12
1	2412	Top	/	11.47	12	0.068	**0.08**	0.215	**0.24**	-0.11

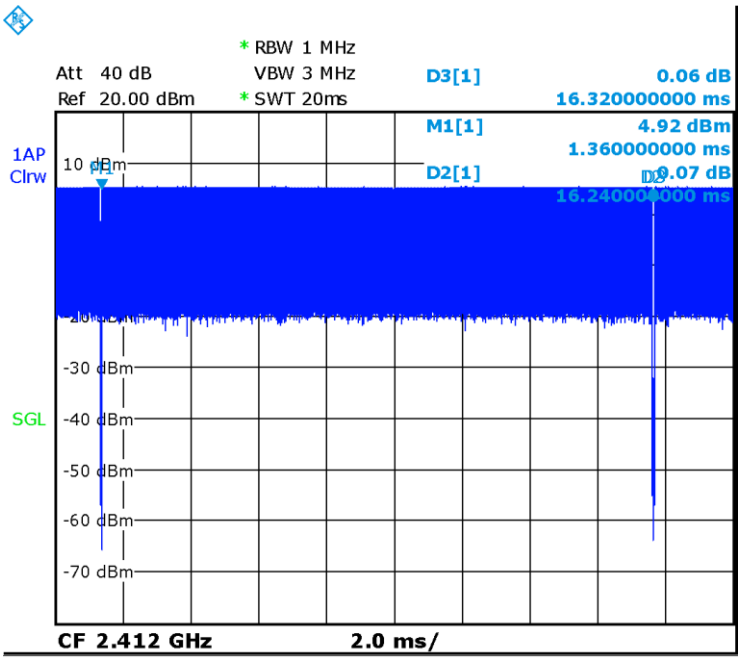
Note1: The distance between the EUT and the phantom bottom is 15mm/18mm by sensor, the distance for other results is 0mm.

According to the KDB248227 D01, The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. The scaled reported SAR is presented as below.

Table 14.2-2: SAR Values (WLAN - Head) – 802.11b (Scaled Reported SAR)

Ambient Temperature: 22.9 ℃ Liquid Temperature: 22.5℃						
Frequency		Test Position	Actual duty factor	maximum duty factor	Reported SAR (1g)(W/kg)	Scaled reported SAR (1g)(W/kg)
Ch.	MHz					
1	2412	Rear 0mm	99.5%	100%	**0.51**	**0.51**

SAR is not required for OFDM because the 802.11b adjusted SAR ≤ 1.2 W/kg.



Picture 14.2-1 Duty factor plot

14.3 WLAN Evaluation For 5G

Table 14.3-1: SAR Values (WiFi 5G - Body)

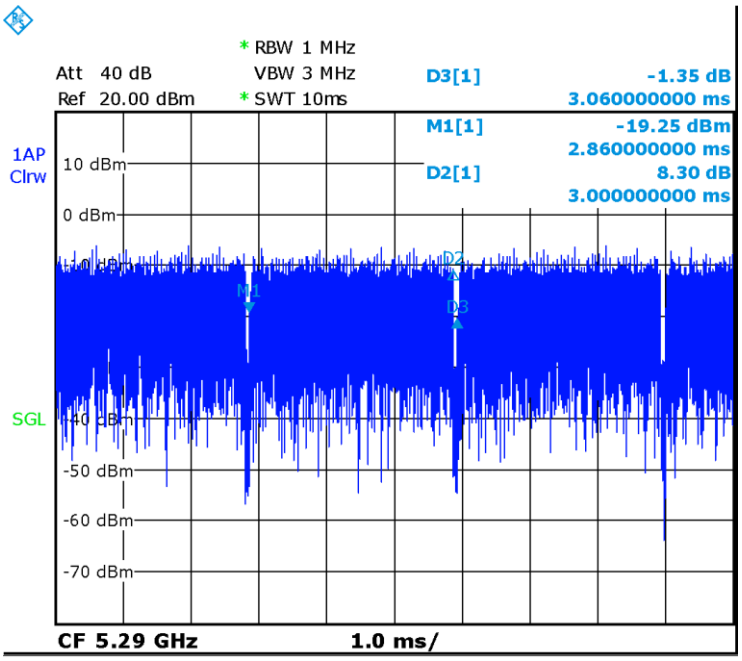
Ambient Temperature: 22.5 ºC Liquid Temperature: 22.3 ºC										
Frequency		Test Position	Figure No.	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g) (W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g) (W/kg)	Power Drift (dB)
Ch.	MHz									
60	5300	Front	15mm	17.01	18	0.058	**0.07**	0.148	**0.19**	0.17
60	5300	Rear	18mm	17.01	18	0.077	**0.10**	0.197	**0.25**	-0.05
60	5300	Top	18mm	17.01	18	0.097	**0.12**	0.238	**0.30**	0.15
100	5500	Front	15mm	16.52	18	0.047	**0.07**	0.115	**0.16**	0.03
100	5500	Rear	18mm	16.52	18	0.049	**0.07**	0.114	**0.16**	0.02
100	5500	Top	18mm	16.52	18	0.074	**0.10**	0.181	**0.25**	-0.17
155	5775	Front	15mm	14.27	17	0.029	**0.05**	0.074	**0.14**	-0.06
155	5775	Rear	18mm	14.27	17	0.037	**0.07**	0.092	**0.17**	-0.06
155	5775	Top	18mm	14.27	17	0.042	**0.08**	0.106	**0.20**	0.01
58	5290	Front	/	5.34	6.5	0.062	**0.08**	0.185	**0.24**	0.09
58	5290	Rear	Fig.14	5.34	6.5	0.088	**0.11**	0.428	**0.56**	0.03
58	5290	Top	/	5.34	6.5	0.065	**0.08**	0.373	**0.49**	0.1
138	5690	Front	/	5.64	6.5	0.03	**0.04**	0.137	**0.17**	-0.07
138	5690	Rear	/	5.64	6.5	0.074	**0.09**	0.366	**0.45**	-0.11
138	5690	Top	/	5.64	6.5	0.043	**0.05**	0.166	**0.20**	0.11
155	5775	Front	/	6.05	6.5	0.073	**0.08**	0.203	**0.23**	-0.04
155	5775	Rear	/	6.05	6.5	0.093	**0.10**	0.456	**0.51**	0.15
155	5775	Top	/	6.05	6.5	0.052	**0.06**	0.213	**0.24**	-0.08

Note1: The distance between the EUT and the phantom bottom is 15mm/18mm by sensor, the distance for other results is 0mm.

According to the KDB248227 D01, The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. The scaled reported SAR is presented as below.

Table 14.3-2 SAR Values (WLAN 5G - Body) (Scaled Reported SAR)

Frequency		Test Position	Distance (mm)	Actual duty factor	maximum duty factor	Reported SAR (1g) (W/kg)	Scaled reported SAR (1g) (W/kg)
Ch.	MHz						
58	5290	Rear	0	98%	100%	**0.56**	**0.57**



Picture 14.3-1 Duty factor plot for CH58

14.4 WLAN Evaluation For BT

Table 14.4-1: SAR Values (BT - Body)

Frequency		Test Position	Figure No./ Note	Conducted Power (dBm)	Max. tune-up Power (dBm)	Measured SAR(10g) (W/kg)	Reported SAR(10g)(W/kg)	Measured SAR(1g) (W/kg)	Reported SAR(1g)(W/kg)	Power Drift (dB)
Ch.	MHz									
78	2480	Front	/	9.76	11.2	0.022	**0.03**	0.055	**0.08**	0.06
78	2480	Rear	Fig.15	9.76	11.2	0.028	**0.04**	0.083	**0.12**	-0.13
78	2480	Top	/	9.76	11.2	0.013	**0.02**	0.042	**0.06**	0.03

Note: The distance between the EUT and the phantom bottom is 0mm.

15 SAR Measurement Variability

SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium.

The following procedures are applied to determine if repeated measurements are required.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps2) through 4) do not apply.

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

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

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

16 Measurement Uncertainty

16.1 Measurement Uncertainty for Normal SAR Tests (300MHz~3GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	6.0	N	1	1	1	6.0	6.0	∞
2	Isotropy	B	4.7	R	√3	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	1.0	R	√3	1	1	0.6	0.6	∞
4	Linearity	B	4.7	R	√3	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	N	1	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	√3	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	√3	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	√3	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	√3	1	1	0	0	∞
10	RFambient conditions-reflection	B	0	R	√3	1	1	0	0	∞
11	Probe positioned mech. restrictions	B	0.4	R	√3	1	1	0.2	0.2	∞
12	Probe positioning with respect to phantom shell	B	2.9	R	√3	1	1	1.7	1.7	∞
13	Post-processing	B	1.0	R	√3	1	1	0.6	0.6	∞
Test sample related										
14	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
15	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
16	Drift of output power	B	5.0	R	√3	1	1	2.9	2.9	∞
Phantom and set-up										
17	Phantom uncertainty	B	4.0	R	√3	1	1	2.3	2.3	∞
18	Liquid conductivity (target)	B	5.0	R	√3	0.64	0.43	1.8	1.2	∞
19	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
20	Liquid permittivity (target)	B	5.0	R	√3	0.6	0.49	1.7	1.4	∞
21	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521

Combined standard uncertainty	$u_c^{'} = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$					9.55	9.43	257
Expanded uncertainty (confidence interval of 95 %)	$u_e = 2u_c$					19.1	18.9	

16.2 Measurement Uncertainty for Normal SAR Tests (3~6GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	6.55	N	1	1	1	6.55	6.55	∞
2	Isotropy	B	4.7	R	√3	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	2.0	R	√3	1	1	1.2	1.2	∞
4	Linearity	B	4.7	R	√3	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	R	√3	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	√3	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	√3	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	√3	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	√3	1	1	0	0	∞
10	RFambient conditions-reflection	B	0	R	√3	1	1	0	0	∞
11	Probe positioned mech. restrictions	B	0.8	R	√3	1	1	0.5	0.5	∞
12	Probe positioning with respect to phantom shell	B	6.7	R	√3	1	1	3.9	3.9	∞
13	Post-processing	B	4.0	R	√3	1	1	2.3	2.3	∞
Test sample related										
14	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
15	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
16	Drift of output power	B	5.0	R	√3	1	1	2.9	2.9	∞
Phantom and set-up										
17	Phantom uncertainty	B	4.0	R	√3	1	1	2.3	2.3	∞
18	Liquid conductivity (target)	B	5.0	R	√3	0.64	0.43	1.8	1.2	∞
19	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
20	Liquid permittivity (target)	B	5.0	R	√3	0.6	0.49	1.7	1.4	∞

21	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521
Combined standard uncertainty		$u_c^{'} = \sqrt{\sum_{i=1}^{21} c_i^2 u_i^2}$						10.7	10.6	257
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						21.4	21.1	

16.3 Measurement Uncertainty for Fast SAR Tests (300MHz~3GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	6.0	N	1	1	1	6.0	6.0	∞
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	∞
10	RFambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	∞
11	Probe positioned mech. Restrictions	B	0.4	R	$\sqrt{3}$	1	1	0.2	0.2	∞
12	Probe positioning with respect to phantom shell	B	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
13	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
14	Fast SAR z-Approximation	B	7.0	R	$\sqrt{3}$	1	1	4.0	4.0	∞
Test sample related										
15	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
16	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5
17	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
18	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
19	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞

20	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
21	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
22	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521
Combined standard uncertainty		$u_c^{'} = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$						10.4	10.3	257
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						20.8	20.6	

16.4 Measurement Uncertainty for Fast SAR Tests (3~6GHz)

No.	Error Description	Type	Uncertainty value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement system										
1	Probe calibration	B	6.55	N	1	1	1	6.55	6.55	∞
2	Isotropy	B	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
3	Boundary effect	B	2.0	R	$\sqrt{3}$	1	1	1.2	1.2	∞
4	Linearity	B	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
5	Detection limit	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
6	Readout electronics	B	0.3	R	$\sqrt{3}$	1	1	0.3	0.3	∞
7	Response time	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
8	Integration time	B	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
9	RF ambient conditions-noise	B	0	R	$\sqrt{3}$	1	1	0	0	∞
10	RFambient conditions-reflection	B	0	R	$\sqrt{3}$	1	1	0	0	∞
11	Probe positioned mech. Restrictions	B	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
12	Probe positioning with respect to phantom shell	B	6.7	R	$\sqrt{3}$	1	1	3.9	3.9	∞
13	Post-processing	B	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
14	Fast SAR z-Approximation	B	14.0	R	$\sqrt{3}$	1	1	8.1	8.1	∞
Test sample related										
15	Test sample positioning	A	3.3	N	1	1	1	3.3	3.3	71
16	Device holder uncertainty	A	3.4	N	1	1	1	3.4	3.4	5

17	Drift of output power	B	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up										
18	Phantom uncertainty	B	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
19	Liquid conductivity (target)	B	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
20	Liquid conductivity (meas.)	A	2.06	N	1	0.64	0.43	1.32	0.89	43
21	Liquid permittivity (target)	B	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.4	∞
22	Liquid permittivity (meas.)	A	1.6	N	1	0.6	0.49	1.0	0.8	521
Combined standard uncertainty		$u_c^{'} = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$						13.5	13.4	257
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$						27.0	26.8	

17 MAIN TEST INSTRUMENTS

Table 17.1: List of Main Instruments

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	E5071C	MY46110673	January 14, 2022	One year
02	Power sensor	NRP110T	101139	January 13, 2022	One year
03	Power sensor	NRP110T	101159	January 13, 2022	One year
04	Signal Generator	E4438C	MY49071430	January 13, 2022	One year
05	Amplifier	60S1G4	0331848	No Calibration Requested	
06	BTS	CMW500	159850	January 24, 2022	One year
07	E-field Probe	EX3DV4	7464	January 26, 2022	One year
08	DAE	SPEAG DAE4	1331	September 1, 2021	One year
09	Dipole Validation Kit	SPEAG D750V3	1017	July 12,,2021	Three years
10	Dipole Validation Kit	SPEAG D835V2	4d092	July 5,,2022	One year
11	Dipole Validation Kit	SPEAG D1750V2	1003	July 12,,2021	Three years
12	Dipole Validation Kit	SPEAG D1900V2	5d142	July 6,2022	One year
13	Dipole Validation Kit	SPEAG D2450V2	853	July 26,2021	Three years
14	Dipole Validation Kit	SPEAG D2600V2	1012	July 26,2021	Three years
15	Dipole Validation Kit	SPEAG D5GHzV2	1262	January 27, 2022	One year

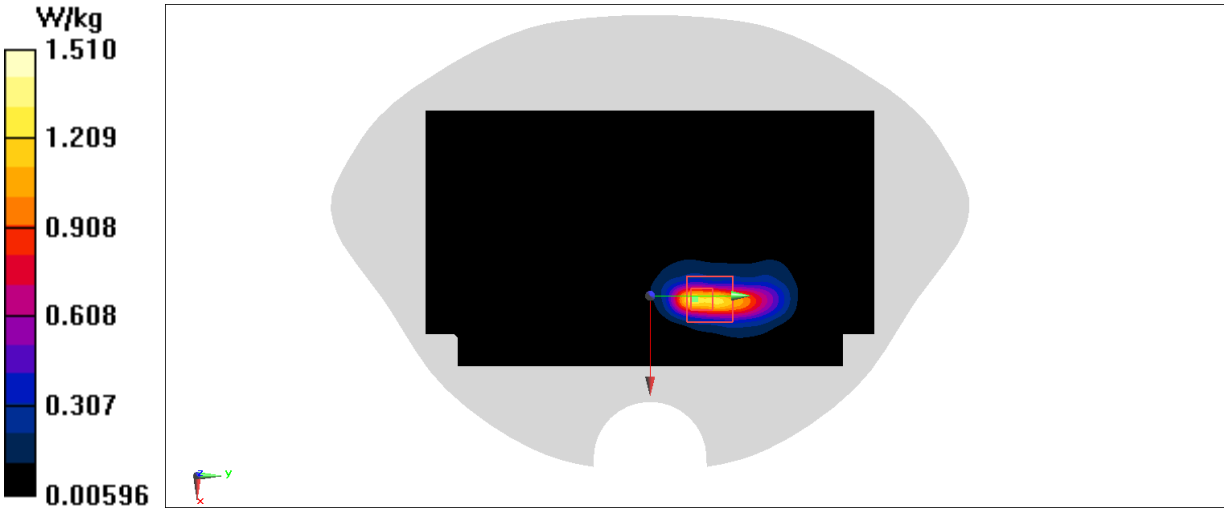
END OF REPORT BODY

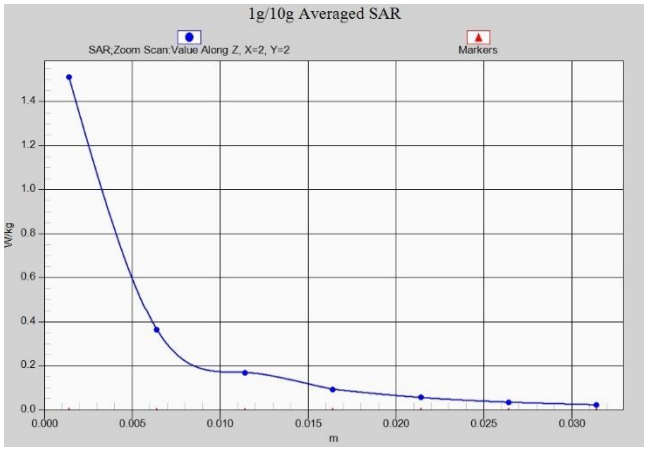
ANNEX A Graph Results

GSM850 Body
Date: 7/19/2022
Electronics: DAE4 Sn1331
Medium: Head 835M
Medium parameters used: f = 848.8 MHz; σ = 0.913 S/m; ε_r = 40.879; ρ = 1000 kg/m^3
Ambient Temperature:22.5ºC Liquid Temperature: 22.3ºC
Communication System: GSM850 1TX 848.8 MHz Duty Cycle: 1:8.3
Probe: EX3DV4 - SN7464 ConvF(9.96, 9.96, 9.96)

Area Scan (81x141x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.28 W/kg

Zoom Scan (5x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.580 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 2.32 W/kg
SAR(1 g) = 0.598 W/kg; SAR(10 g) = 0.249 W/kg
Maximum value of SAR (measured) = 1.51 W/kg

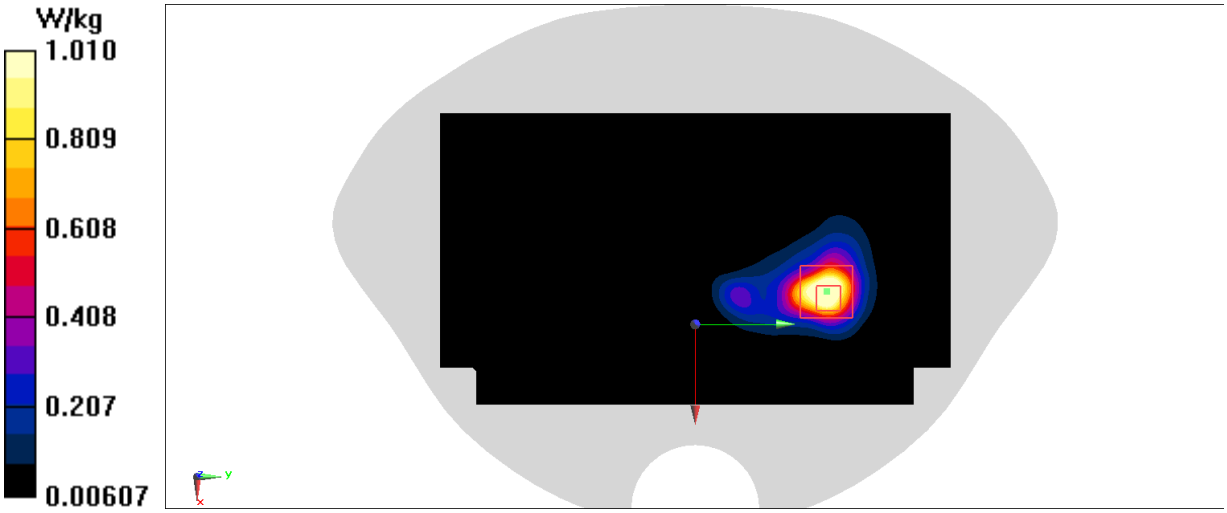


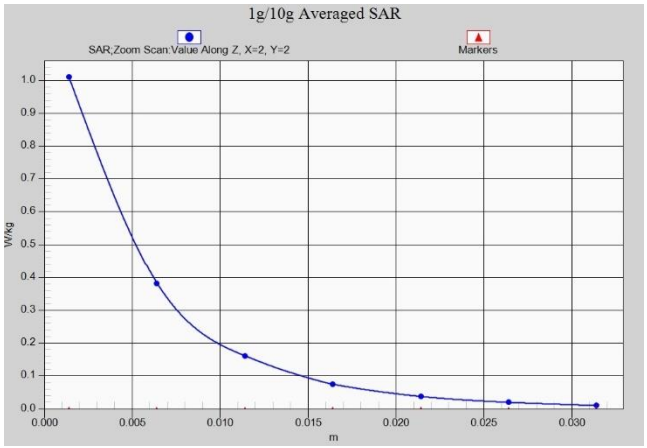


GSM1900 Body
Date: 7/24/2022
Electronics: DAE4 Sn1331
Medium: Head 1900M
Medium parameters used: f =1850.2 MHz; σ =1.392 S/m; ε_r =40.339; ρ =1000 kg/m^3
Ambient Temperature:22.5ºC Liquid Temperature: 22.3ºC
Communication System: GSM1900 4TX 1850.2 MHz Duty Cycle: 1:2
Probe: EX3DV4 - SN7464 ConvF(8.18, 8.18, 8.18)

Area Scan (81x141x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.32 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.272 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 1.69 W/kg
SAR(1 g) = 0.597 W/kg; SAR(10 g) = 0.263 W/kg
Maximum value of SAR (measured) = 1.01 W/kg

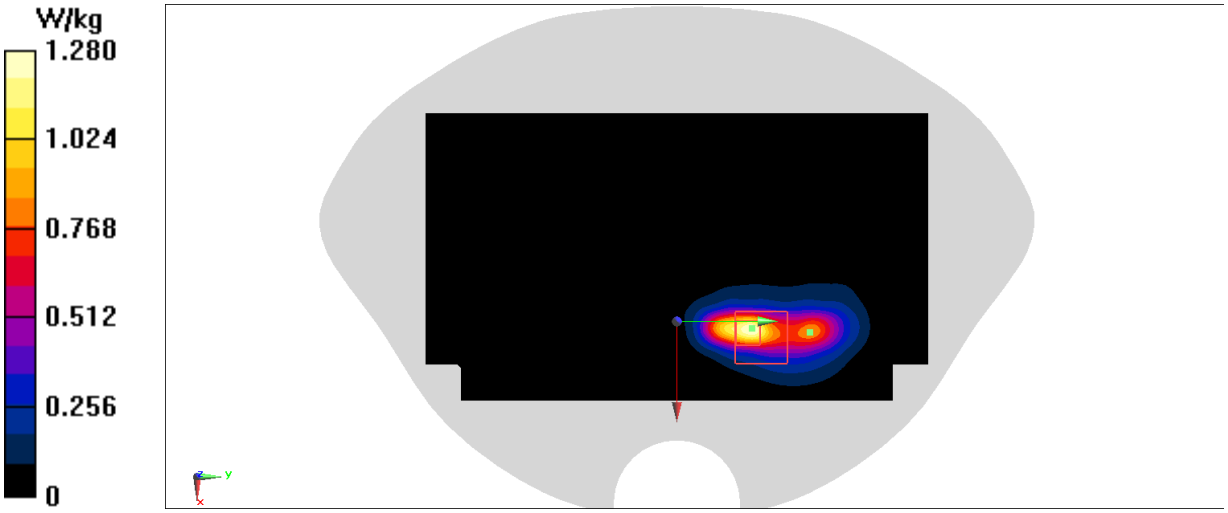


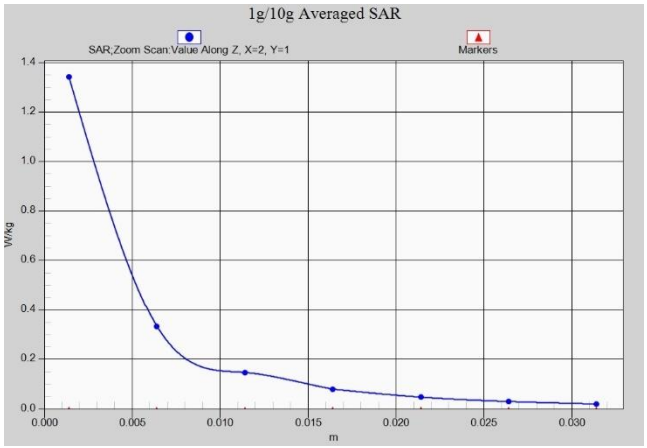


WCDMA850 Body
Date: 7/19/2022
Electronics: DAE4 Sn1331
Medium: Head 835M
Medium parameters used: f = 846.6 MHz; σ = 0.911 S/m; ε_r = 40.878; ρ = 1000 kg/m^3
Ambient Temperature:22.5ºC Liquid Temperature: 22.3ºC
Communication System: WCDMA850(B5) 846.6 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7464 ConvF(9.96, 9.96, 9.96)

Area Scan (81x141x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.28 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.755 V/m; Power Drift = -0.19 dB
Peak SAR (extrapolated) = 2.17 W/kg
SAR(1 g) = 0.601 W/kg; SAR(10 g) = 0.263 W/kg
Maximum value of SAR (measured) = 1.34 W/kg

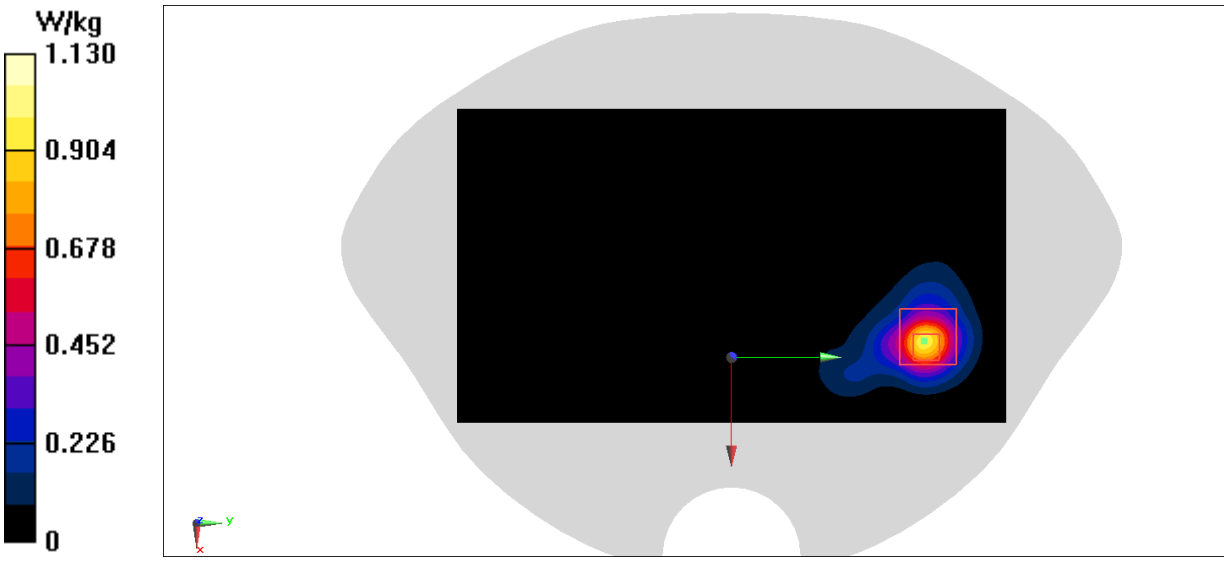


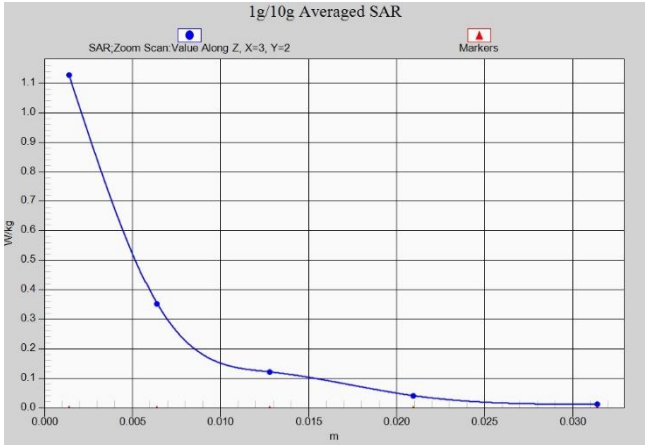


WCDMA1700 Body
Date: 7/23/2022
Electronics: DAE4 Sn1331
Medium: Head 1750M
Medium parameters used: f = 1732.4 MHz; σ = 1.372 S/m; εr = 39.718;ρ =1000 kg/m^3
Ambient Temperature:22.5ºC Liquid Temperature: 22.3ºC
Communication System: WCDMA1700(B4) 1732.4 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7464 ConvF(8.52, 8.52, 8.52)

Area Scan (81x141x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.970 W/kg

Zoom Scan (7x7x5)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.6410 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.86 W/kg
SAR(1 g) = 0.630 W/kg; SAR(10 g) = 0.280 W/kg
Maximum value of SAR (measured) = 1.13 W/kg

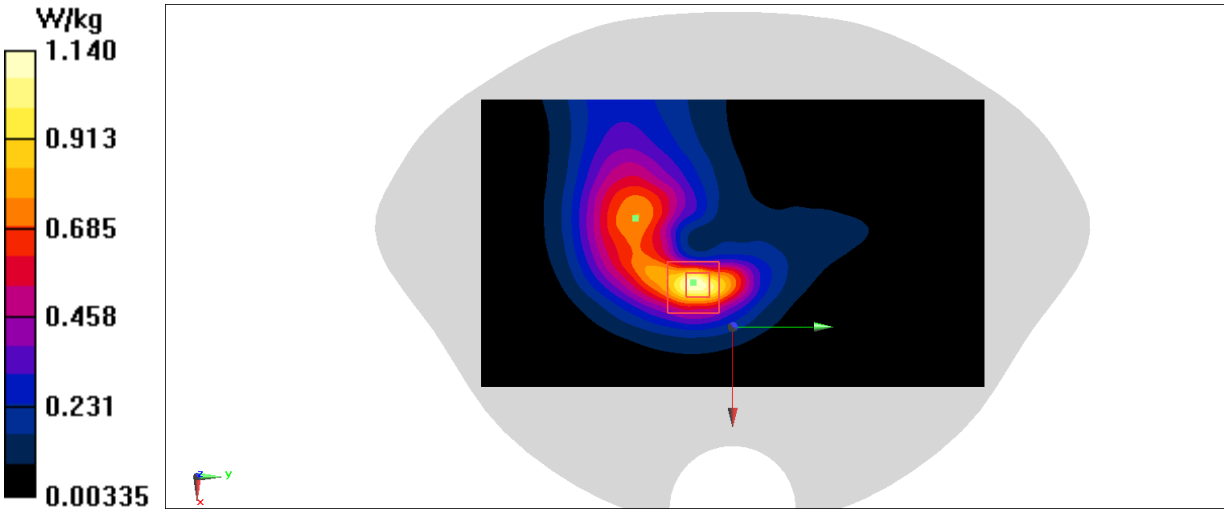


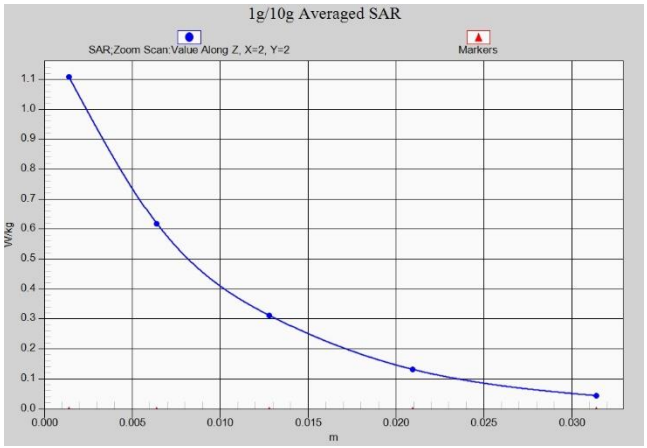


WCDMA1900 Body
Date: 7/24/2022
Electronics: DAE4 Sn1331
Medium: Head 1900M
Medium parameters used: f = 1880 MHz; σ = 1.412 S/m; ε_r = 40.312; ρ = 1000 kg/m^3
Ambient Temperature:22.5ºC Liquid Temperature: 22.3ºC
Communication System: WCDMA1900(B2) 1880 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7464 ConvF(8.18, 8.18, 8.18)

Area Scan (81x141x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.14 W/kg

Zoom Scan (5x5x5)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.99 V/m; Power Drift = -0.19 dB
Peak SAR (extrapolated) = 1.34 W/kg
SAR(1 g) = 0.732 W/kg; SAR(10 g) = 0.385 W/kg
Maximum value of SAR (measured) = 1.11 W/kg

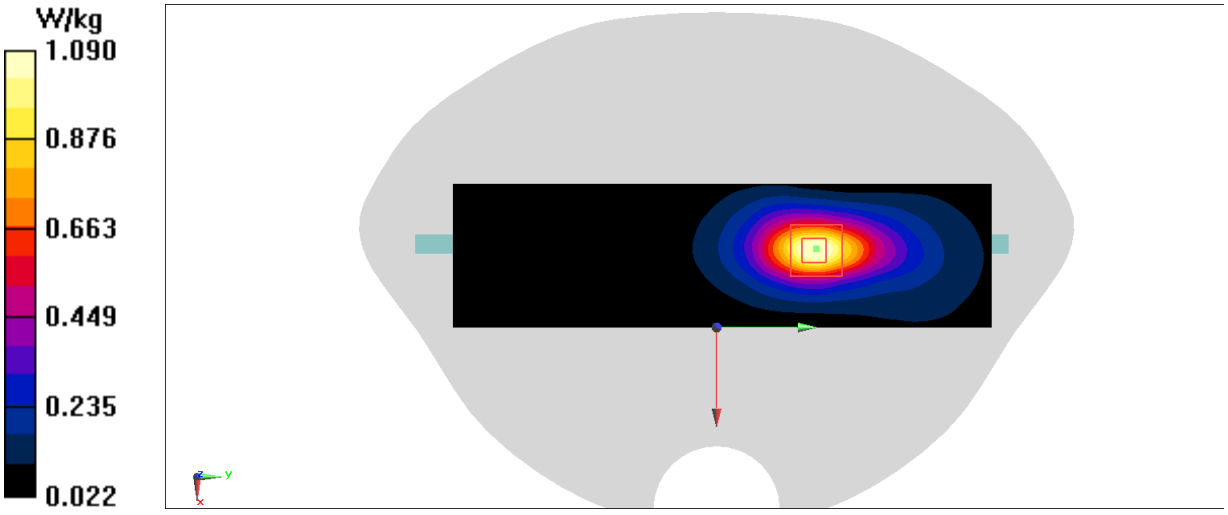


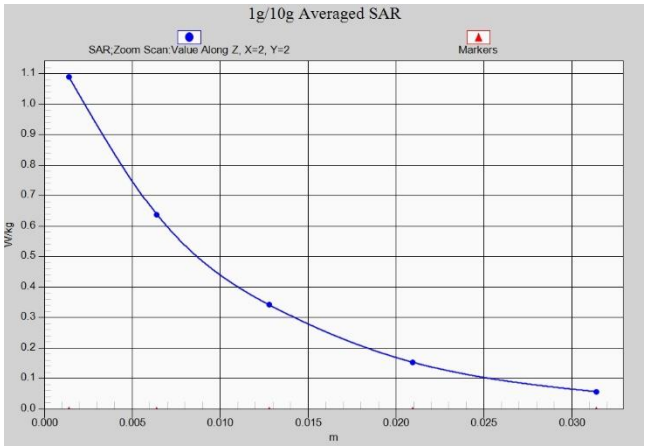


LTE Band2 Body
Date: 7/24/2022
Electronics: DAE4 Sn1331
Medium: Head 1900M
Medium parameters used: f = 1880 MHz; σ = 1.412 S/m; ε_r = 40.312; ρ = 1000 kg/m^3
Ambient Temperature:22.5ºC Liquid Temperature: 22.3ºC
Communication System: LTE Band2 (0) Frequency: 1880 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7464 ConvF(8.18, 8.18, 8.18)

Area Scan (41x151x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.13 W/kg

Zoom Scan (5x5x5)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.03 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 1.32 W/kg
SAR(1 g) = 0.754 W/kg; SAR(10 g) = 0.415 W/kg
Maximum value of SAR (measured) = 1.09 W/kg

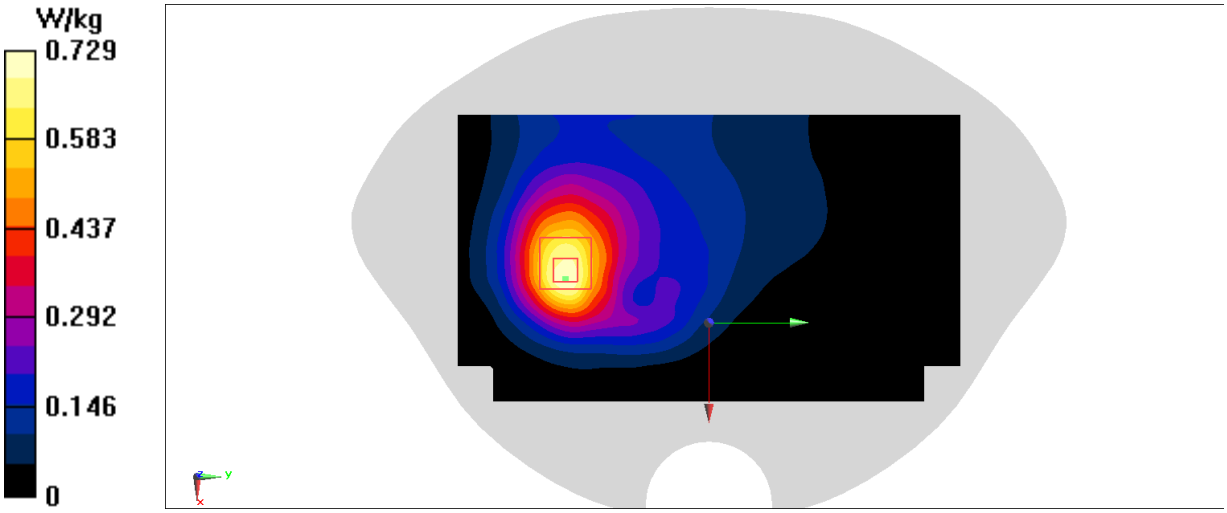


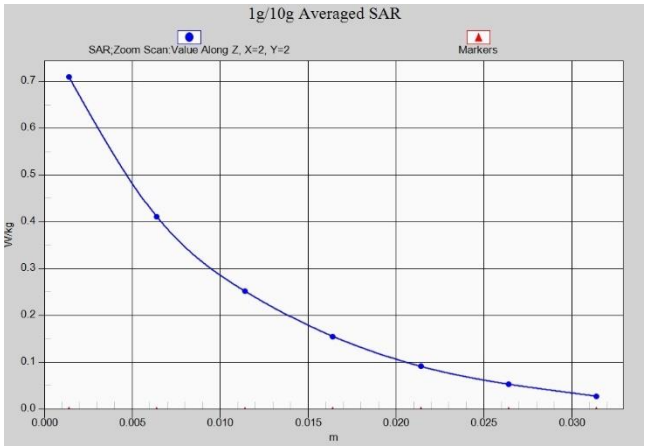


LTE Band4 Body
Date: 7/23/2022
Electronics: DAE4 Sn1331
Medium: Head 1750M
Medium parameters used: f = 1745 MHz; σ = 1.379 S/m; ε_r = 39.699; ρ = 1000 kg/m^3
Ambient Temperature:22.5ºC Liquid Temperature: 22.3ºC
Communication System: LTE Band4 1745 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN3617 ConvF(8.52, 8.52, 8.52)

Area Scan (81x141x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.729 W/kg

Zoom Scan (6x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.55 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.858 W/kg
SAR(1 g) = 0.501 W/kg; SAR(10 g) = 0.300 W/kg
Maximum value of SAR (measured) = 0.709 W/kg

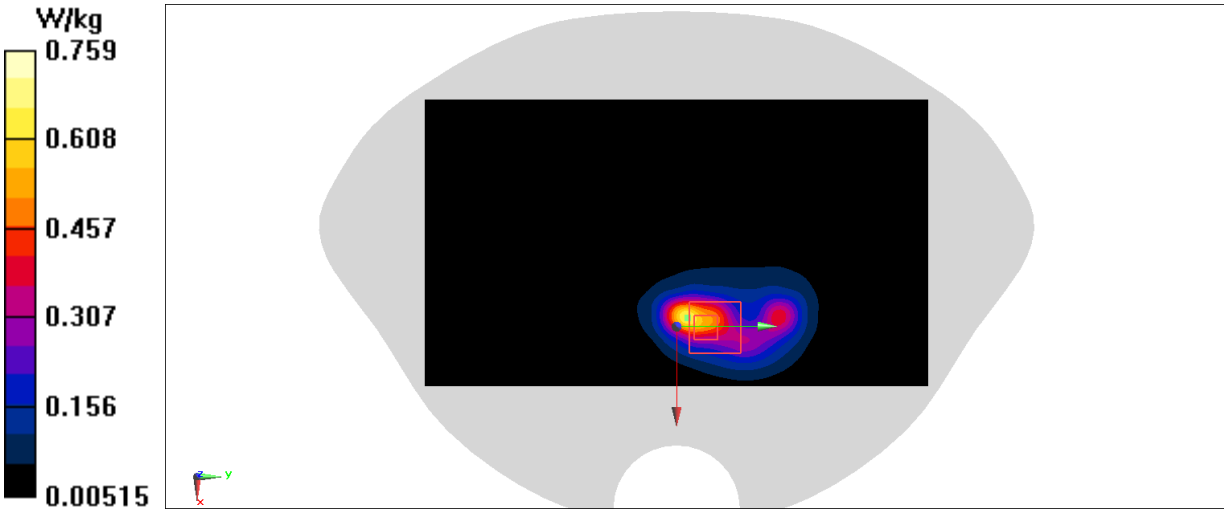


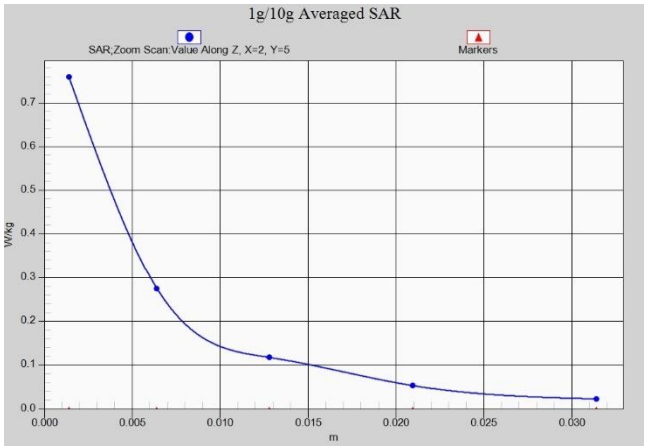


LTE Band5 Body
Date: 7/19/2022
Electronics: DAE4 Sn1331
Medium: Head 835M
Medium parameters used: f = 844 MHz; σ = 0.91 S/m; ε_r = 40.876; ρ = 1000 kg/m^3
Ambient Temperature:22.5ºC Liquid Temperature: 22.3ºC
Communication System: LTE Band5 844 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7464 ConvF(9.96, 9.96, 9.96)

Area Scan (81x141x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.672 W/kg

Zoom Scan (6x6x5)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.963 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.38 W/kg
SAR(1 g) = 0.420 W/kg; SAR(10 g) = 0.192 W/kg
Maximum value of SAR (measured) = 0.759 W/kg

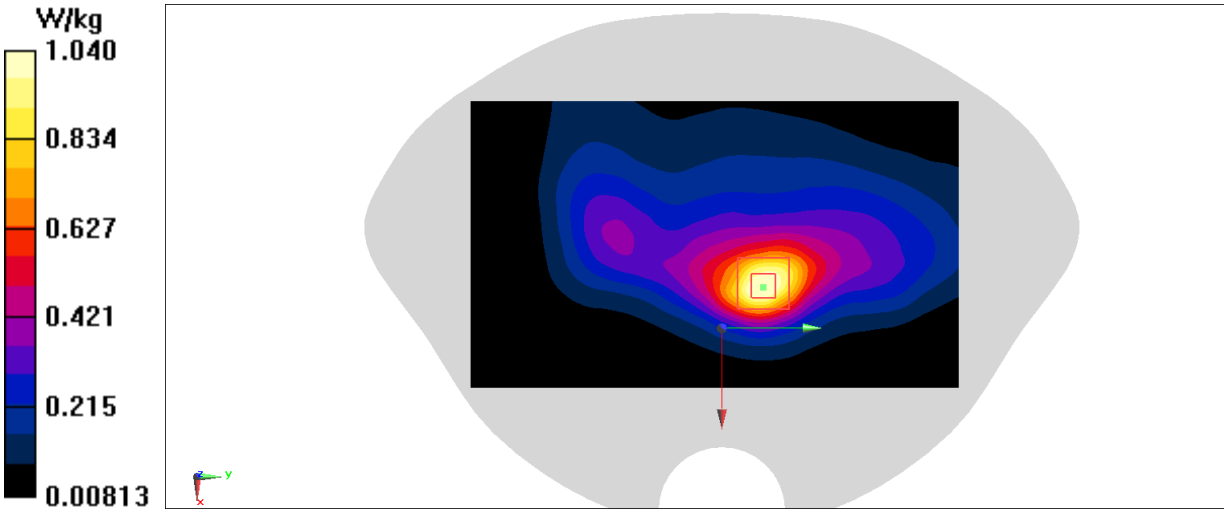


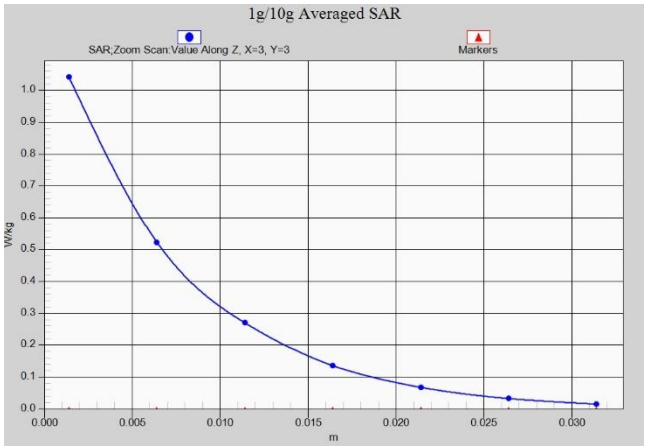


LTE Band7 Body
Date: 7/28/2022
Electronics: DAE4 Sn1331
Medium: Head 2600M
Medium parameters used: f = 2560 MHz; σ = 2.04 S/m; ε_r = 41.681; ρ = 1000 kg/m^3
Ambient Temperature:22.5ºC Liquid Temperature: 22.3ºC
Communication System: LTE Band7 2560 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7464 ConvF(7.64, 7.64, 7.64)

Area Scan (101x171x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 1.08 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.67 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.30 W/kg
SAR(1 g) = 0.667 W/kg; SAR(10 g) = 0.346 W/kg
Maximum value of SAR (measured) = 1.04 W/kg

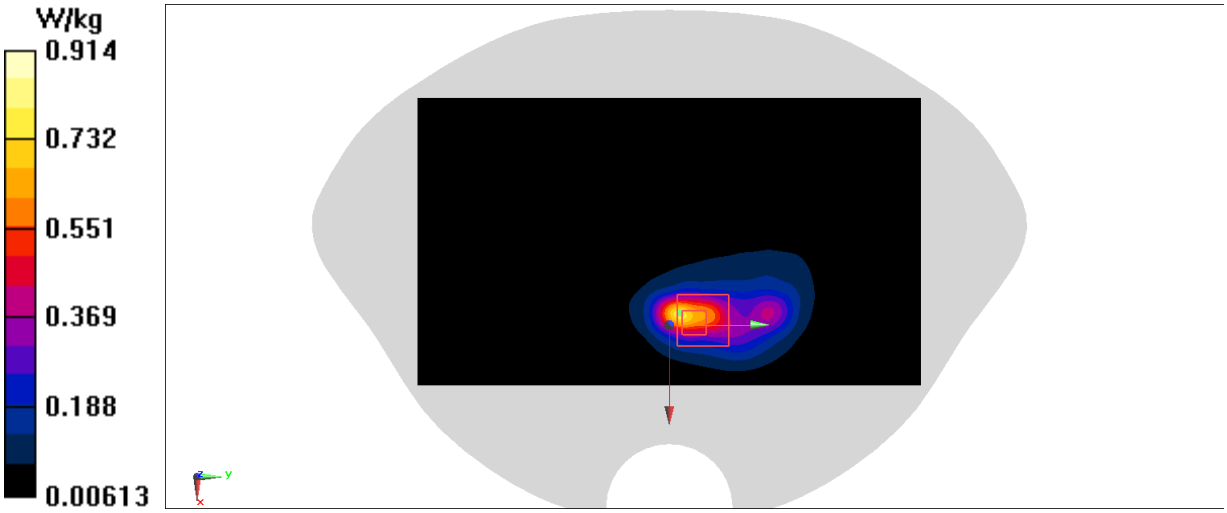


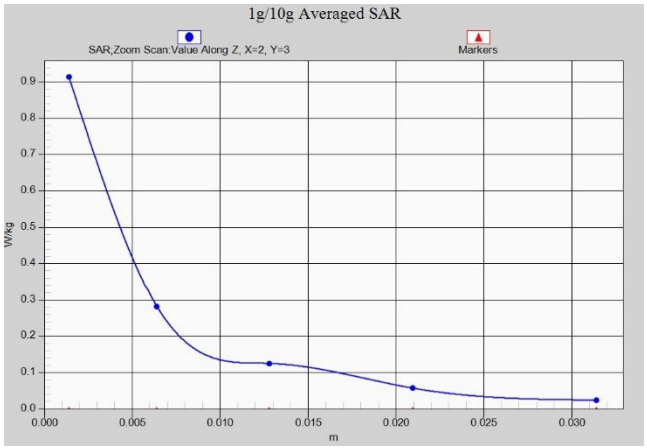


LTE Band12 Body
Date: 7/18/2022
Electronics: DAE4 Sn1331
Medium: Head 750M
Medium parameters used: f = 707.5 MHz; σ = 0.865 S/m; ε_r = 41.633; ρ = 1000 kg/m^3
Ambient Temperature:22.5ºC Liquid Temperature: 22.3ºC
Communication System: LTE Band12 707.5 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7464 ConvF(10.26, 10.26, 10.26)

Area Scan (81x141x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.775 W/kg

Zoom Scan (6x6x5)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.165 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 1.66 W/kg
SAR(1 g) = 0.454 W/kg; SAR(10 g) = 0.203 W/kg
Maximum value of SAR (measured) = 0.914 W/kg

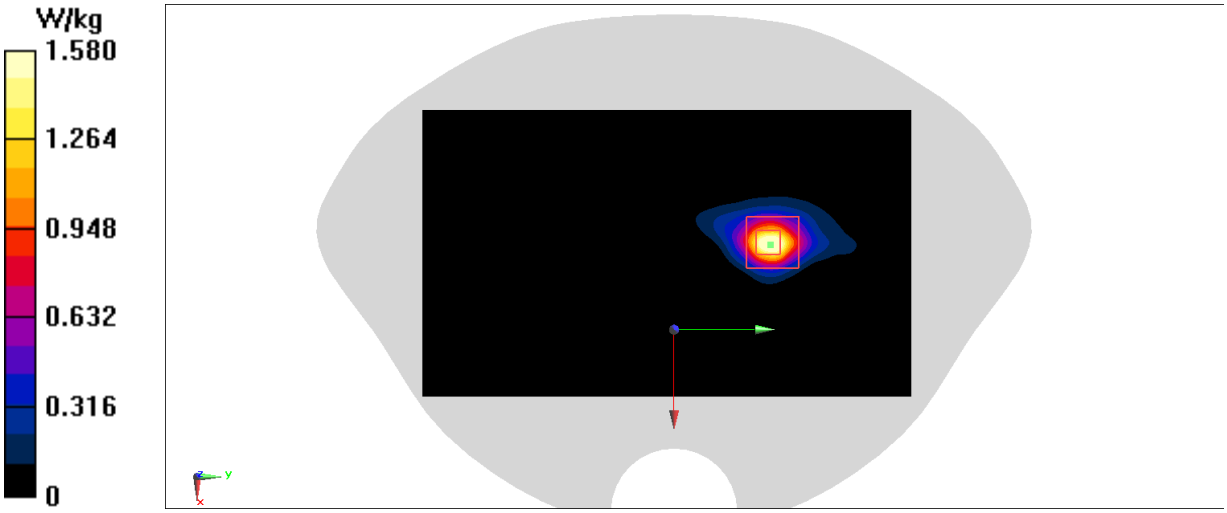


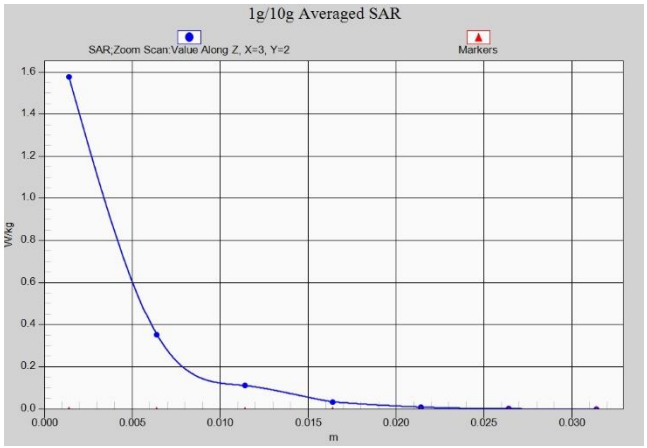


LTE Band41 Body
Date: 7/28/2022
Electronics: DAE4 Sn1331
Medium: Head 2600M
Medium parameters used: f = 2595 MHz; σ = 1.956 S/m; ε_r = 39.584; ρ = 1000 kg/m^3
Ambient Temperature:22.5ºC Liquid Temperature: 22.3ºC
Communication System: LTE Band41 2595 MHz Duty Cycle: 1:1.5787
Probe: EX3DV4 - SN3617 ConvF(7.64, 7.64, 7.64)

Area Scan (101x171x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 1.81 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =5.26 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 2.65 W/kg
SAR(1 g) = 0.716 W/kg; SAR(10 g) = 0.265 W/kg
Maximum value of SAR (measured) = 1.58 W/kg

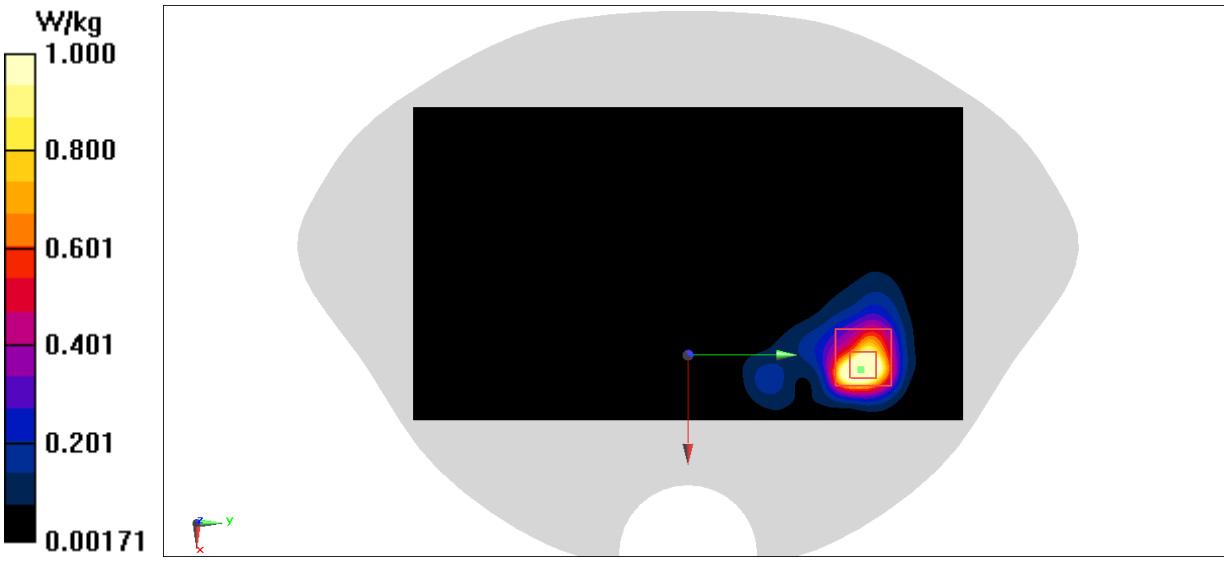


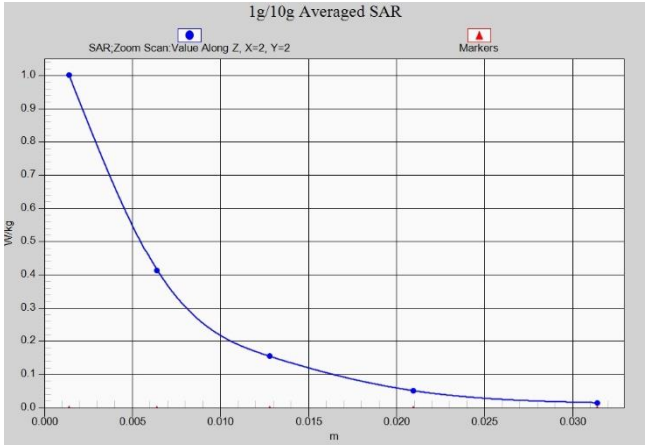


LTE Band66 Body
Date: 7/23/2022
Electronics: DAE4 Sn1331
Medium: Head 1750M
Medium parameters used: f = 1745 MHz; σ = 1.379 S/m; εr =39.699;ρ = 1000 kg/m^3
Ambient Temperature:22.5ºC Liquid Temperature: 22.3ºC
Communication System: LTE Band66 1745 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7464 ConvF(8.52, 8.52, 8.52)

Area Scan (81x141x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.41 W/kg

Zoom Scan (5x5x5)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.9200 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 1.45 W/kg
SAR(1 g) = 0.577 W/kg; SAR(10 g) = 0.266 W/kg
Maximum value of SAR (measured) = 1.00 W/kg

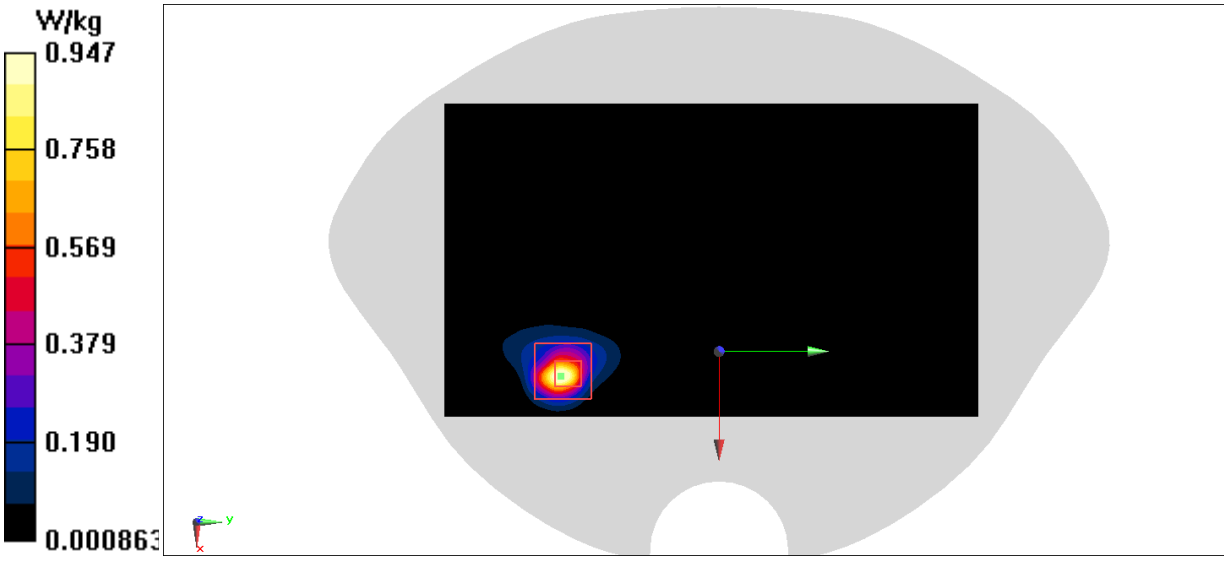


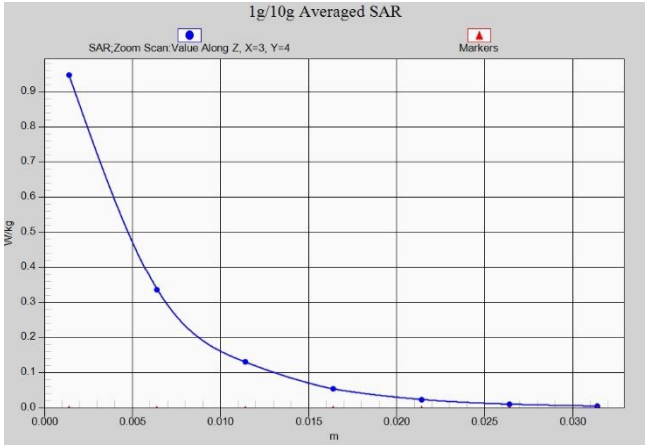


WLAN 2.4G 11b 1M Body
Date: 7/15/2022
Electronics: DAE4 Sn1331
Medium: Head 2450M
Medium parameters used: f = 2412 MHz; σ = 1.794 S/m; εr = 39.627; ρ = 1000 kg/m^3
Ambient Temperature:22.5ºC Liquid Temperature: 22.3ºC
Communication System: wifi 2450 2412 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7464 ConvF(7.77, 7.77, 7.77)

Area Scan (101x171x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 1.03 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 0 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 1.42 W/kg
SAR(1 g) = 0.449 W/kg; SAR(10 g) = 0.159 W/kg
Maximum value of SAR (measured) = 0.947 W/kg

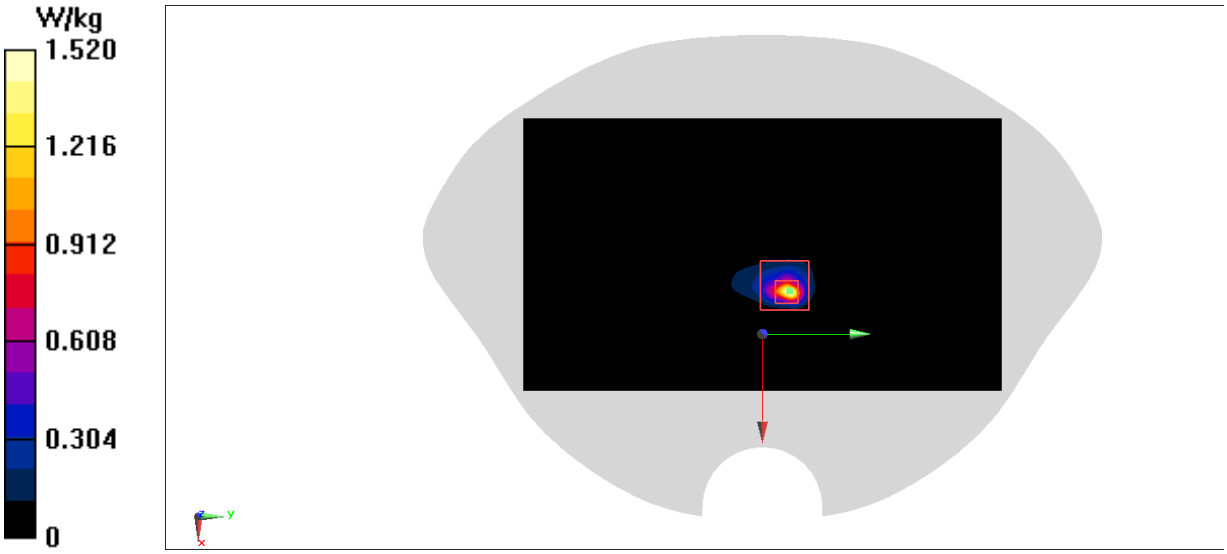


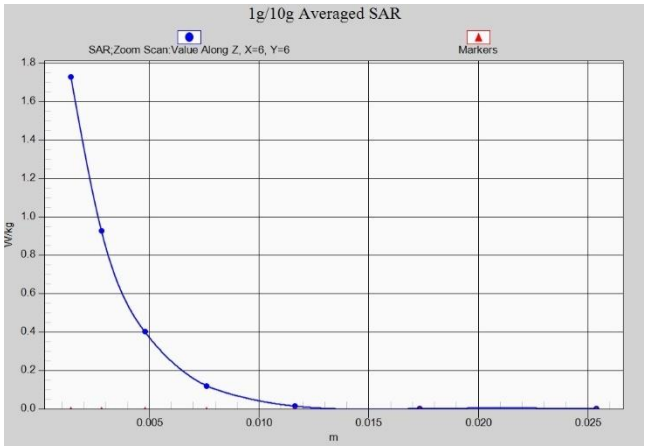


WLAN 5G 11ac 80M MCS0 Body
Date: 8/4/2022
Electronics: DAE4 Sn1331
Medium: Head 5750M
Medium parameters used: f = 5775 MHz; σ = 5.354 S/m; ε_r = 35.101; ρ = 1000 kg/m^3
Ambient Temperature:22.5ºC Liquid Temperature: 22.3ºC
Communication System: WIFI 5G 5775 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7464 ConvF(4.85, 4.85, 4.85);

Area Scan (121x211x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.52 W/kg

Zoom Scan (11x10x7) /Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 8.096 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 3.68 W/kg
SAR(1 g) = 0.456 W/kg; SAR(10 g) = 0.093 W/kg
Maximum value of SAR (measured) = 1.73 W/kg

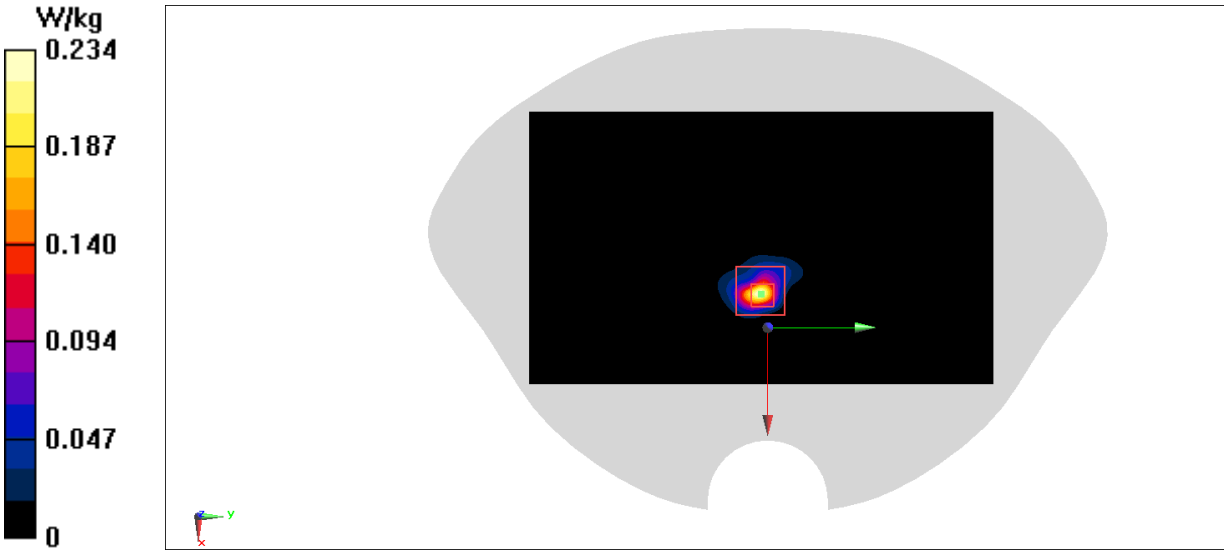


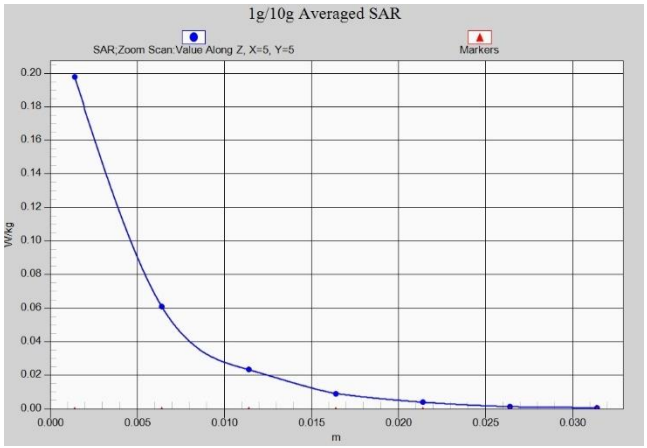


BT 2-DH5 Body
Date: 8/5/2022
Electronics: DAE4 Sn1331
Medium: Head 2450M
Medium parameters used: f = 2480 MHz; σ = 1.845 S/m; ε_r = 39.482; ρ = 1000 kg/m^3
Ambient Temperature:22.5ºC Liquid Temperature: 22.3ºC
Communication System: BT 2480 MHz Duty Cycle: 1:1
Probe: EX3DV4 - SN7464 ConvF(7.77, 7.77, 7.77)

Area Scan (101x171x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.234 W/kg

Zoom Scan (9x9x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.281 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 0.275 W/kg
SAR(1 g) = 0.083 W/kg; SAR(10 g) = 0.028 W/kg
Maximum value of SAR (measured) = 0.198 W/kg





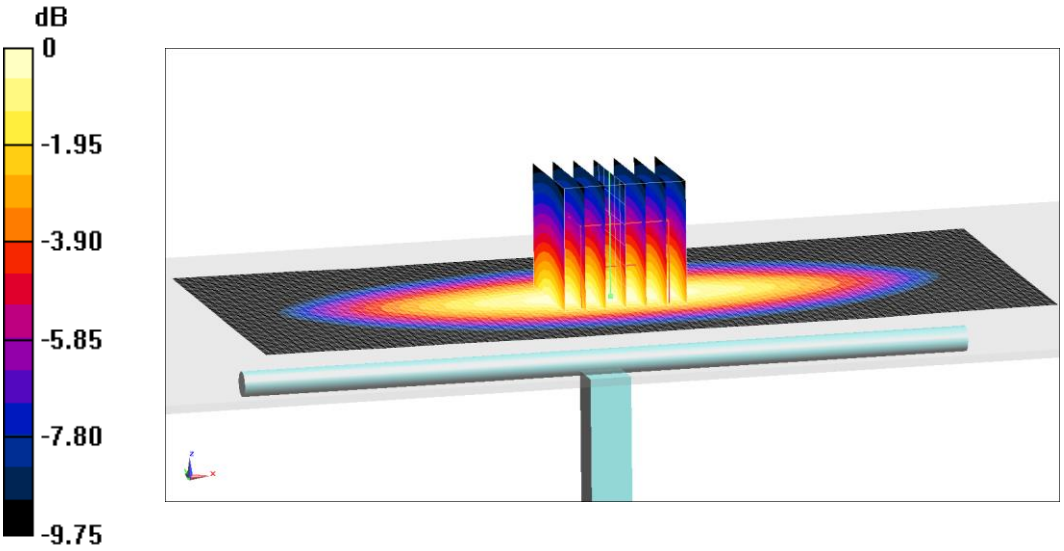
ANNEX B System Verification Results

750 MHz

Date: 7/18/2022
Electronics: DAE4 Sn1331
Medium: Head 750 MHz
Medium parameters used: f = 750 MHz; σ =0.885 mho/m; ε_r = 41.47; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC Liquid Temperature: 22.3ºC
Communication System: CW Frequency: 750 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7464 ConvF(10.26,10.26,10.26)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 60.66 V/m; Power Drift = 0.08
Fast SAR: SAR(1 g) = 2.13 W/kg; SAR(10 g) = 1.41 W/kg
Maximum value of SAR (interpolated) = 2.83 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =60.66 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 3.26 W/kg
SAR(1 g) = 2.17 W/kg; SAR(10 g) = 1.39 W/kg
Maximum value of SAR (measured) = 2.79 W/kg



0 dB = 2.79 W/kg = 4.46 dB W/kg

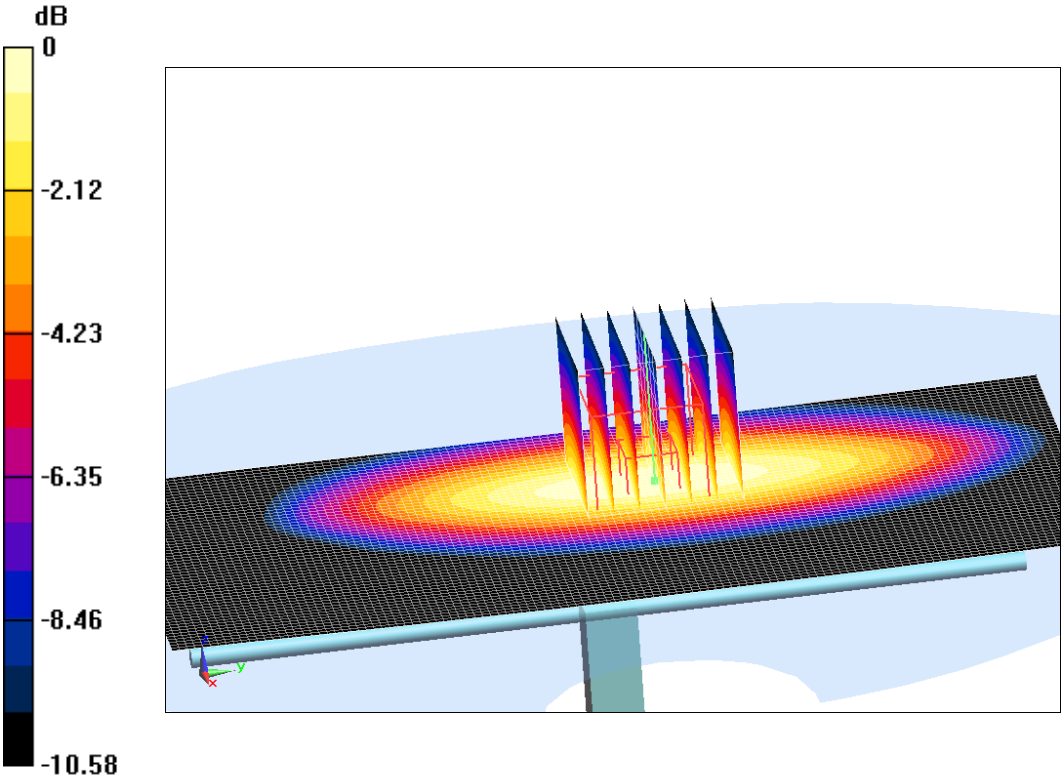
Fig.B.1 validation 750 MHz 250mW

835 MHz

Date: 7/19/2022
Electronics: DAE4 Sn1331
Medium: Head 835 MHz
Medium parameters used: f = 835 MHz; σ =0.906 mho/m; ε_r = 40.87; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC Liquid Temperature: 22.3ºC
Communication System: CW Frequency: 835 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7464 ConvF(9.96,9.96,9.96)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 63.46 V/m; Power Drift = -0.07
Fast SAR: SAR(1 g) = 2.35 W/kg; SAR(10 g) = 1.57 W/kg
Maximum value of SAR (interpolated) = 3.06 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =63.46 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 3.6 W/kg
SAR(1 g) = 2.38 W/kg; SAR(10 g) = 1.6 W/kg
Maximum value of SAR (measured) = 3.27 W/kg



0 dB = 3.27 W/kg = 5.15 dB W/kg

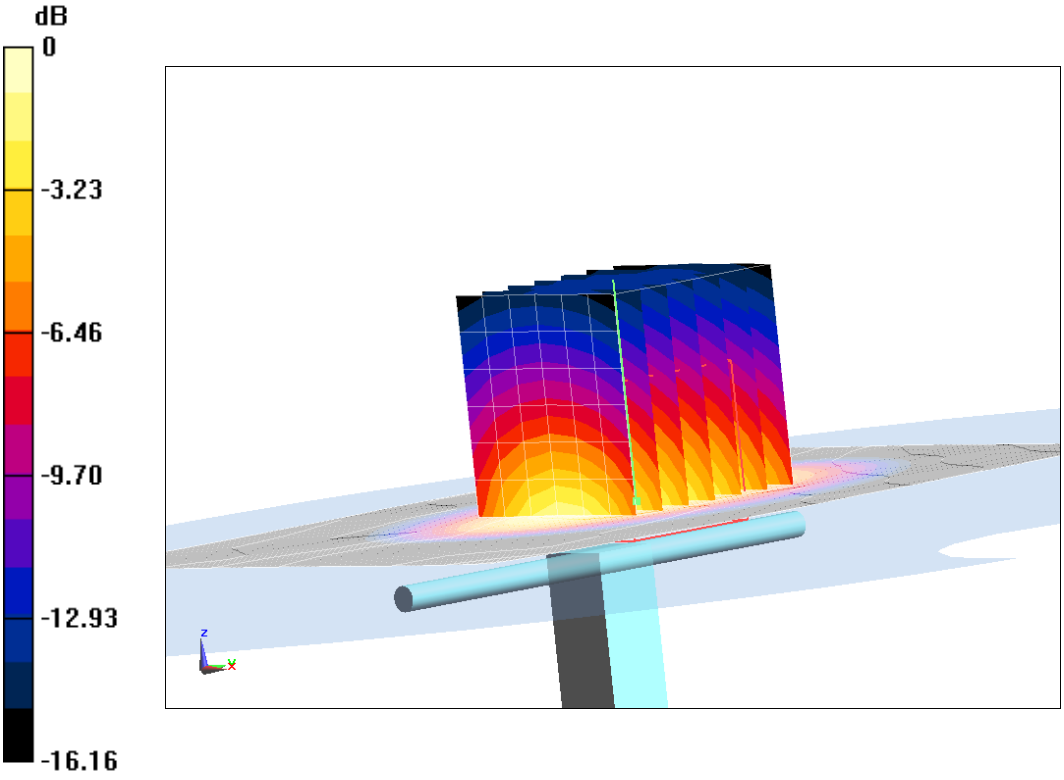
Fig.B.2 validation 835 MHz 250mW

1750 MHz

Date: 7/23/2022
Electronics: DAE4 Sn1331
Medium: Head 1750 MHz
Medium parameters used: f = 1750 MHz; σ =1.384 mho/m; ε_r = 39.69; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC Liquid Temperature: 22.3ºC
Communication System: CW Frequency: 1750 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7464 ConvF(8.52,8.52,8.52)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 107.66 V/m; Power Drift = -0.02
Fast SAR: SAR(1 g) = 9.06 W/kg; SAR(10 g) = 4.79 W/kg
Maximum value of SAR (interpolated) = 13.95 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =107.66 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 16.39 W/kg
SAR(1 g) = 9.11 W/kg; SAR(10 g) = 4.87 W/kg
Maximum value of SAR (measured) = 13.72 W/kg



0 dB = 13.72 W/kg = 11.37 dB W/kg

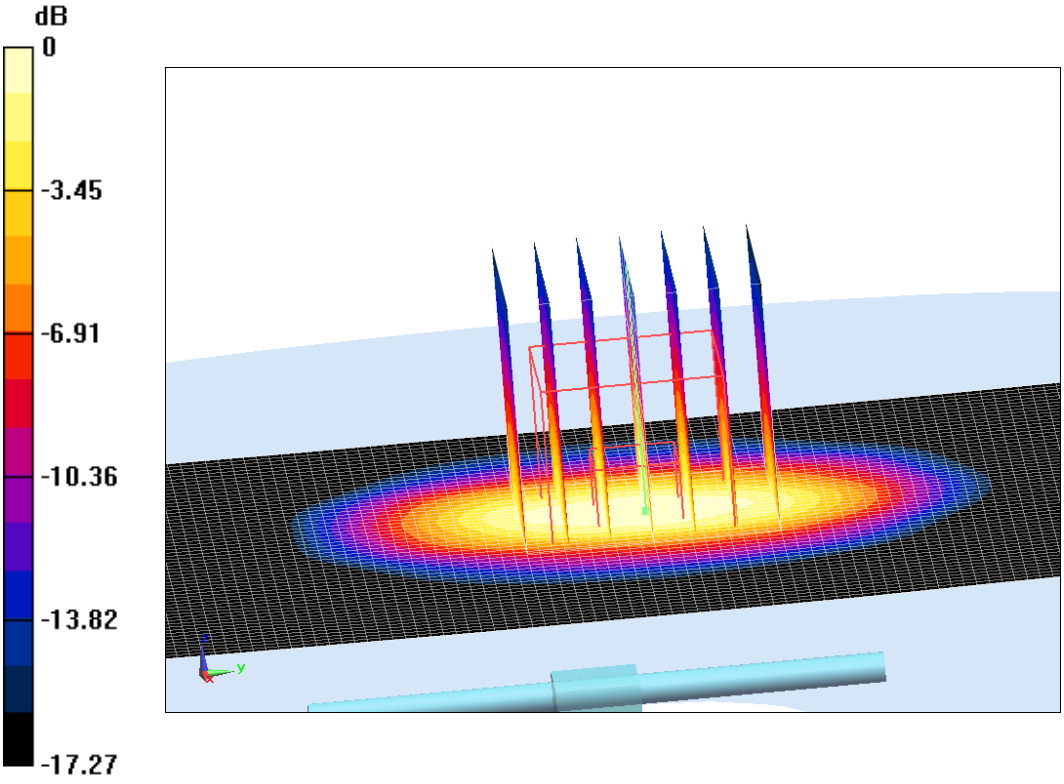
Fig.B.3 validation 1750 MHz 250mW

1900 MHz

Date: 7/24/2022
Electronics: DAE4 Sn1331
Medium: Head 1900 MHz
Medium parameters used: f = 1900 MHz; σ =1.427 mho/m; ε_r = 40.25; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC Liquid Temperature: 22.3ºC
Communication System: CW Frequency: 1900 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7464 ConvF(8.18,8.18,8.18)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 107.41 V/m; Power Drift = 0.05
Fast SAR: SAR(1 g) = 9.95 W/kg; SAR(10 g) = 5.15 W/kg
Maximum value of SAR (interpolated) = 15.46 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =107.41 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 17.52 W/kg
SAR(1 g) = 9.99 W/kg; SAR(10 g) = 5.21 W/kg
Maximum value of SAR (measured) = 14.61 W/kg



0 dB = 14.61 W/kg = 11.65 dB W/kg

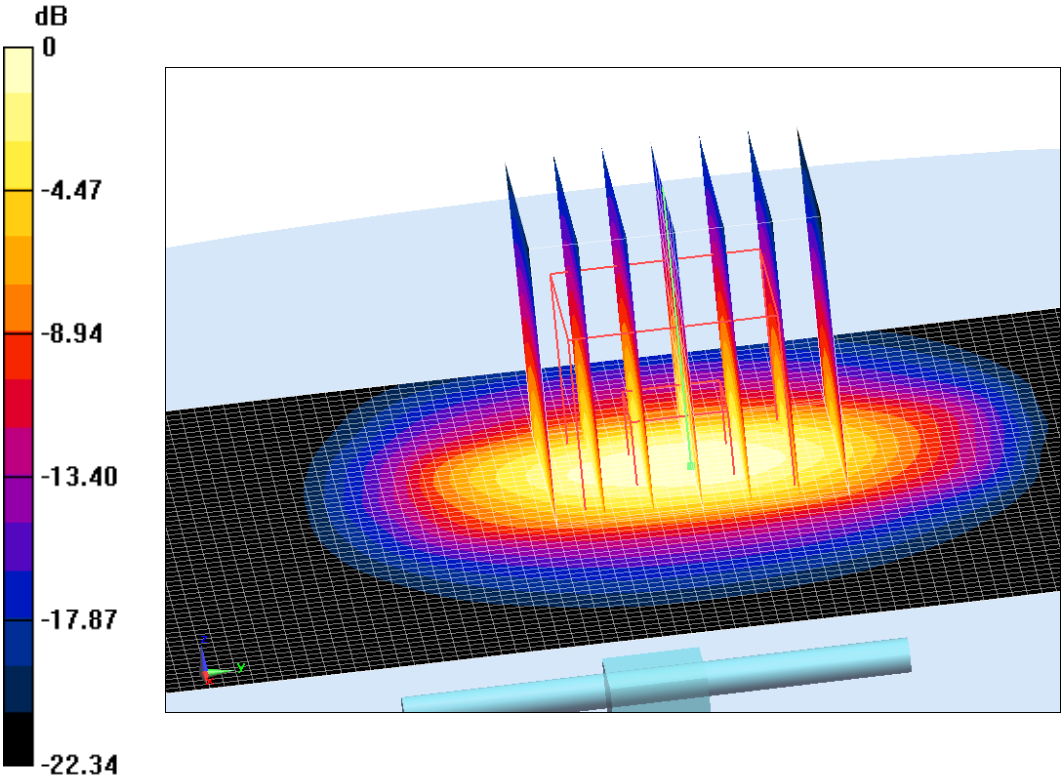
Fig.B.4 validation 1900 MHz 250mW

2450 MHz

Date: 7/27/2022
Electronics: DAE4 Sn1331
Medium: Head 2450 MHz
Medium parameters used: f = 2450 MHz; σ =1.825 mho/m; ε_r = 39.55; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC Liquid Temperature: 22.3ºC
Communication System: CW Frequency: 2450 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7464 ConvF(7.77,7.77,7.77)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 117.51 V/m; Power Drift = 0.02
Fast SAR: SAR(1 g) = 13.38 W/kg; SAR(10 g) = 6.25 W/kg
Maximum value of SAR (interpolated) = 22.07 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =117.51 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 26.09 W/kg
SAR(1 g) = 13.44 W/kg; SAR(10 g) = 6.28W/kg
Maximum value of SAR (measured) = 21.19 W/kg



0 dB = 21.19 W/kg = 13.26 dB W/kg

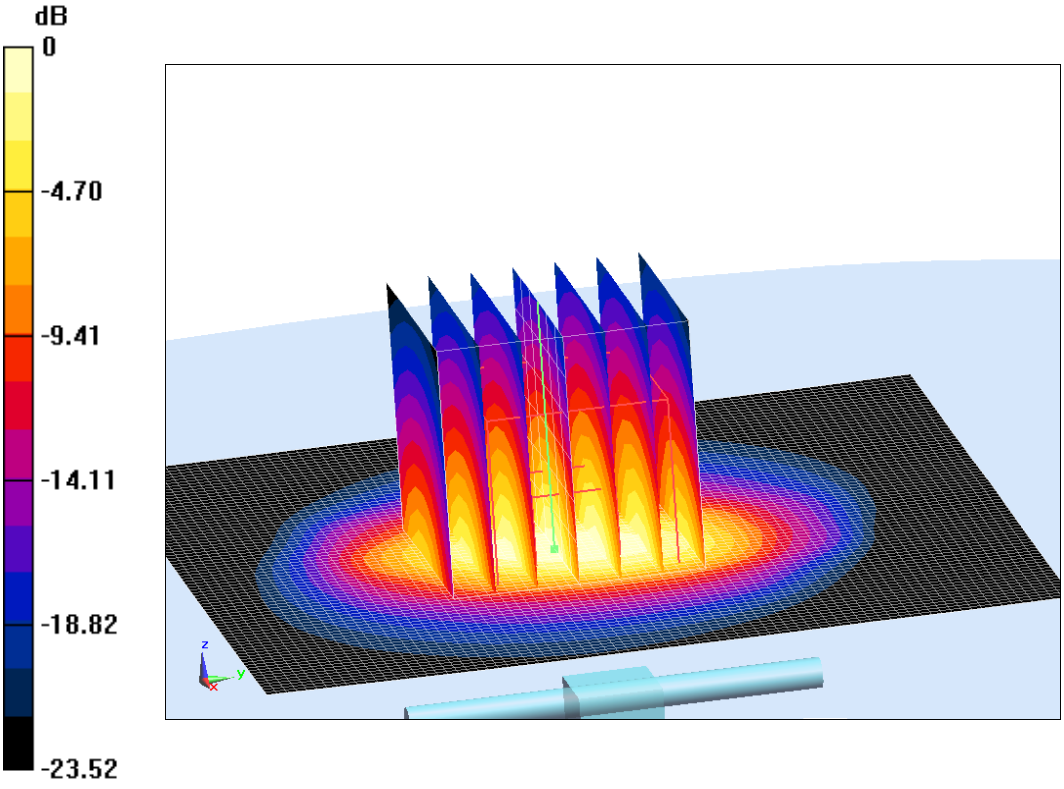
Fig.B.5 validation 2450 MHz 250mW

2600 MHz

Date: 7/28/2022
Electronics: DAE4 Sn1331
Medium: Head 2600 MHz
Medium parameters used: f = 2600 MHz; σ =1.96 mho/m; ε_r = 39.56; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC Liquid Temperature: 22.3ºC
Communication System: CW Frequency: 2600 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7464 ConvF(7.64,7.64,7.64)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 119.38 V/m; Power Drift = 0.07
Fast SAR: SAR(1 g) = 14.42 W/kg; SAR(10 g) = 6.32 W/kg
Maximum value of SAR (interpolated) = 24.51 W/kg

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value =119.38 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 28.68 W/kg
SAR(1 g) = 14.46 W/kg; SAR(10 g) = 6.35 W/kg
Maximum value of SAR (measured) = 24.33 W/kg



0 dB = 24.33 W/kg = 13.86 dB W/kg

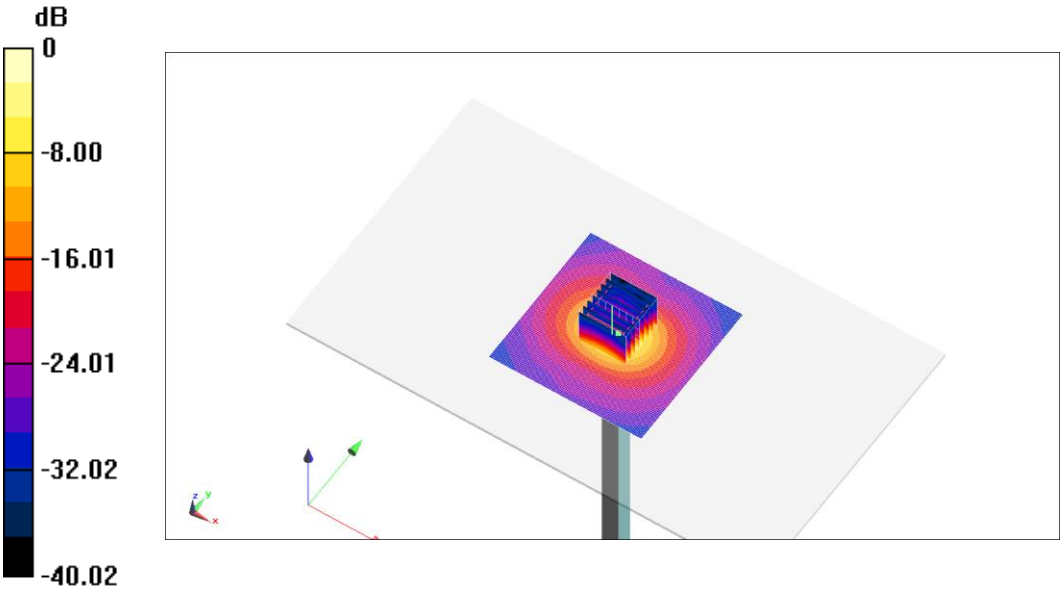
Fig.B.6 validation 2600 MHz 250mW

5250 MHz

Date: 8/2/2022
Electronics: DAE4 Sn1331
Medium: Head 5250 MHz
Medium parameters used: f = 5250 MHz; σ =4.751 mho/m; ε_r = 35.67; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC Liquid Temperature: 22.3ºC
Communication System: CW Frequency: 5250 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7464 ConvF(5.60,5.60,5.60)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value =75.54 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 27.32 W/kg
SAR(1 g) = 7.91 W/kg; SAR(10 g) = 2.24 W/kg
Maximum value of SAR (measured) = 17.62 W/kg



0 dB = 17.62 W/kg = 12.46 dB W/kg

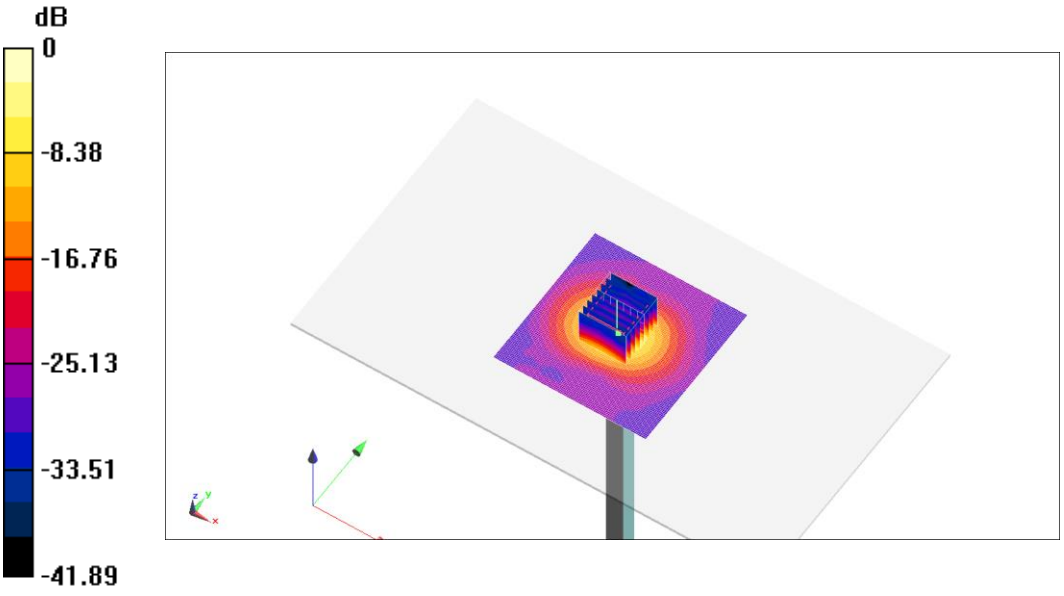
Fig.B.7 validation 5250 MHz 100mW

5600 MHz

Date: 8/3/2022
Electronics: DAE4 Sn1331
Medium: Head 5600 MHz
Medium parameters used: f = 5600 MHz; σ =5.049 mho/m; ε_r = 35.77; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC Liquid Temperature: 22.3ºC
Communication System: CW Frequency: 5600 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7464 ConvF(4.91,4.91,4.91)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value =75.61 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 30.72 W/kg
SAR(1 g) = 8.34 W/kg; SAR(10 g) = 2.33 W/kg
Maximum value of SAR (measured) = 19.37 W/kg



0 dB = 19.37 W/kg = 12.87 dB W/kg

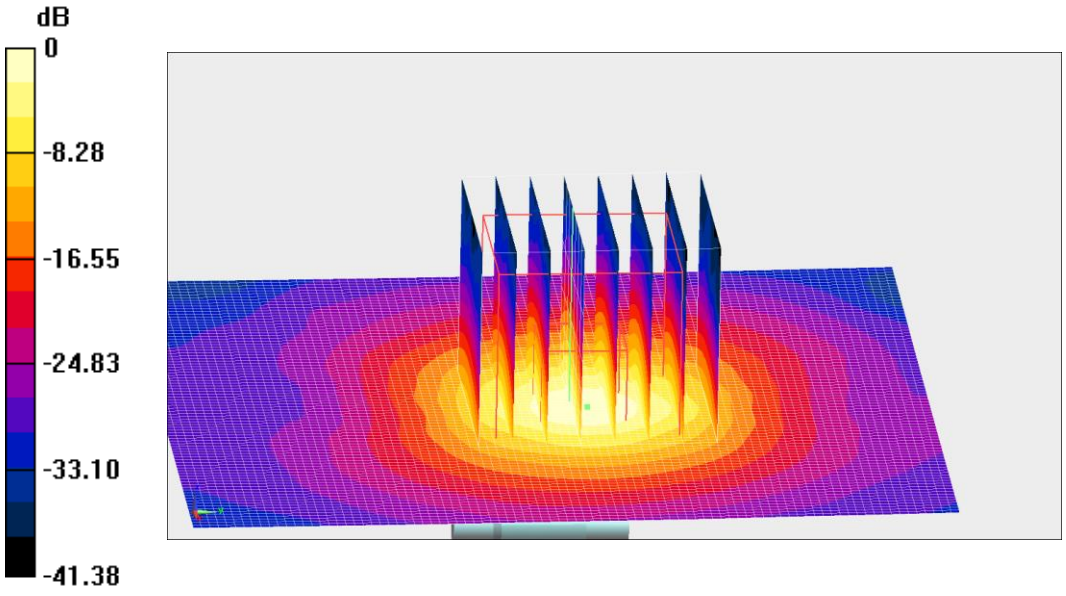
Fig.B.8 validation 5600 MHz 100mW

5750 MHz

Date: 8/4/2022
Electronics: DAE4 Sn1331
Medium: Head 5750 MHz
Medium parameters used: f = 5750 MHz; σ =5.323 mho/m; ε_r = 35.12; ρ = 1000 kg/m^3
Ambient Temperature: 22.5ºC Liquid Temperature: 22.3ºC
Communication System: CW Frequency: 5750 MHz Duty Cycle: 1:1
Probe: EX3DV4 – SN7464 ConvF(4.85,4.85,4.85)

System Validation /Area Scan (81x191x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

System Validation /Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value =71.28 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 31.07 W/kg
SAR(1 g) = 8.14 W/kg; SAR(10 g) = 2.28 W/kg
Maximum value of SAR (measured) = 18.55 W/kg



0 dB = 18.55 W/kg = 12.68 dB W/kg

Fig.B.9 validation 5750 MHz 100m

The SAR system verification must be required that the area scan estimated 1-g SAR is within 3% of the zoom scan 1-g SAR.

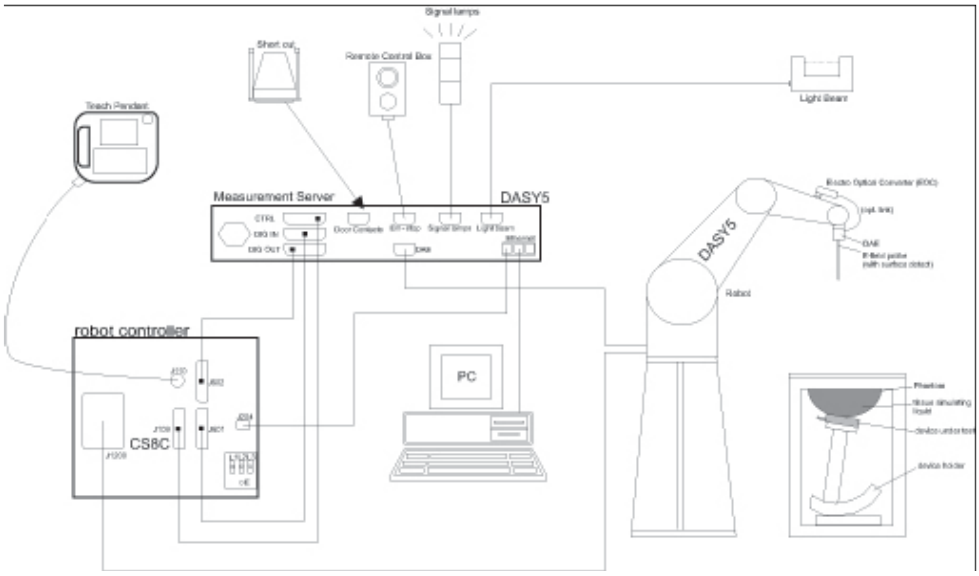
Table B.1 Comparison between area scan and zoom scan for system verification

Date	Band	Position	Area scan (1g)	Zoom scan (1g)	Drift (%)
2022-7-18	750 MHz	Head	2.13	2.17	-1.84
2022-7-19	835 MHz	Head	2.35	2.38	-1.26
2022-7-23	1750 MHz	Head	9.06	9.11	-0.55
2022-7-24	1900 MHz	Head	9.95	9.99	-0.40
2022-7-27	2450 MHz	Head	13.38	13.44	-0.45
2022-7-28	2600 MHz	Head	14.42	14.46	-0.28

ANNEX C SAR Measurement Setup

C.1 Measurement Set-up

The Dasy4 or DASY5 system for performing compliance tests is illustrated above graphically. This system consists of the following items:



Picture C.1SAR Lab Test Measurement Set-up

- A standard high precision 6-axis robot (StäubliTX=RX family) 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 and the DASY4 or DASY5 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.

C.2 Dasy4 or DASY5 E-field Probe System

The SAR measurements were conducted with the dosimetric probe designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multifiber line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY4 or DASY5 software reads the reflection durning a software approach and looks for the maximum using 2nd ord curve fitting. The approach is stopped at reaching the maximum.

Probe Specifications:

Model: ES3DV3, EX3DV4
Frequency 10MHz — 6.0GHz(EX3DV4)
Range: 10MHz — 4GHz(ES3DV3)
Calibration: In head and body simulating tissue at Frequencies from 835 up to 5800MHz
Linearity: ± 0.2 dB(30 MHz to 6 GHz) for EX3DV4
± 0.2 dB(30 MHz to 4 GHz) for ES3DV3
DynamicRange: 10 mW/kg — 100W/kg
Probe Length: 330 mm
Probe Tip
Length: 20 mm
Body Diameter: 12 mm
Tip Diameter: 2.5 mm (3.9 mm for ES3DV3)
Tip-Center: 1 mm (2.0mm for ES3DV3)
Application:SAR Dosimetry Testing
Compliance tests ofmobile phones
Dosimetry in strong gradient fields

Picture C.2Near-field Probe

Picture C.3E-field Probe

C.3 E-field Probe Calibration

Each E-Probe/Probe Amplifier combination has unique calibration parameters. A TEM cell calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm^2) using an RF Signal generator, TEM cell, and RF Power Meter.

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and inn a waveguide or

other methodologies 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 until the three channels show the maximum reading. The power density readings equates to 1 mW/cm^2.

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

$$SAR = C\frac{\Delta T}{\Delta t}$$

Where:

Δt = Exposure time (30 seconds),

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

ΔT = Temperature increase due to RF exposure.

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

Where:

σ = Simulated tissue conductivity,

ρ = Tissue density (kg/m^3).

C.4 Other Test Equipment

C.4.1 Data Acquisition Electronics(DAE)

The data acquisition electronics consist of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder with a control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information, as well as an optical uplink for commands and the clock.

The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

PictureC.4: DAE

C.4.2 Robot

The SPEAG DASY system uses the high precision robots (DASY4: RX90XL; DASY5: RX160L) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version from Stäubli is used. The Stäubli robot series have many features that are important for our application:

- High precision (repeatability 0.02mm)
- High reliability (industrial design)
- Low maintenance costs (virtually maintenance free due to direct drive gears; no belt drives)
- Jerk-free straight movements (brushless synchron motors; no stepper motors)
- Low ELF interference (motor control fields shielded via the closed metallic construction shields)

Picture C.5DASY 4

Picture C.6DASY 5

C.4.3 Measurement Server

The Measurement server is based on a PC/104 CPU broad with CPU (dasy4: 166 MHz, Intel Pentium; DASY5: 400 MHz, Intel Celeron), chipdisk (DASY4: 32 MB; DASY5: 128MB), RAM (DASY4: 64 MB, DASY5: 128MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY I/O broad, which is directly connected to the PC/104 bus of the CPU broad.

The measurement server performs all real-time data evaluation of field measurements and surface detection, controls robot movements and handles safety operation. The PC operating system cannot interfere with these time critical processes. All connections are supervised by a watchdog, and disconnection of any of the cables to the measurement server will automatically disarm the robot and disable all program-controlled robot movements. Furthermore, the measurement server is equipped with an expansion port which is reserved for future applications. Please note that this expansion port does not have a standardized pinout, and therefore only devices provided by SPEAG can be connected. Devices from any other supplier could seriously damage the measurement server.

Picture C.7 Server for DASY 4

Picture C.8 Server for DASY 5

C.4.4 Device Holder for Phantom

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5mm distance, a positioning uncertainty of ±0.5mm would produce a SAR uncertainty of ±20%. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.

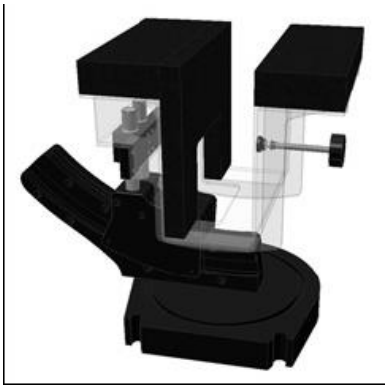
The DASY device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales are the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity ε=3 and loss tangent δ=0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

<Laptop Extension Kit>

The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the Mounting Device in place of the phone positioner. The extension is fully compatible with the Twin-SAM and ELI phantoms.

Picture C.9-1: Device Holder



Picture C.9-2: Laptop Extension Kit

C.4.5 Phantom

The SAM Twin Phantom V4.0 is constructed of a fiberglass shell integrated in a table. The shape of the shell is based on data from an anatomical study designed to
Represent the 90th percentile of the population. The phantom enables the dissymmetric evaluation of SAR for both left and right handed handset usage, as well as body-worn usage using the flat phantom region. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot. The shell phantom has a 2mm shell thickness (except the ear region where shell thickness increases to 6 mm).

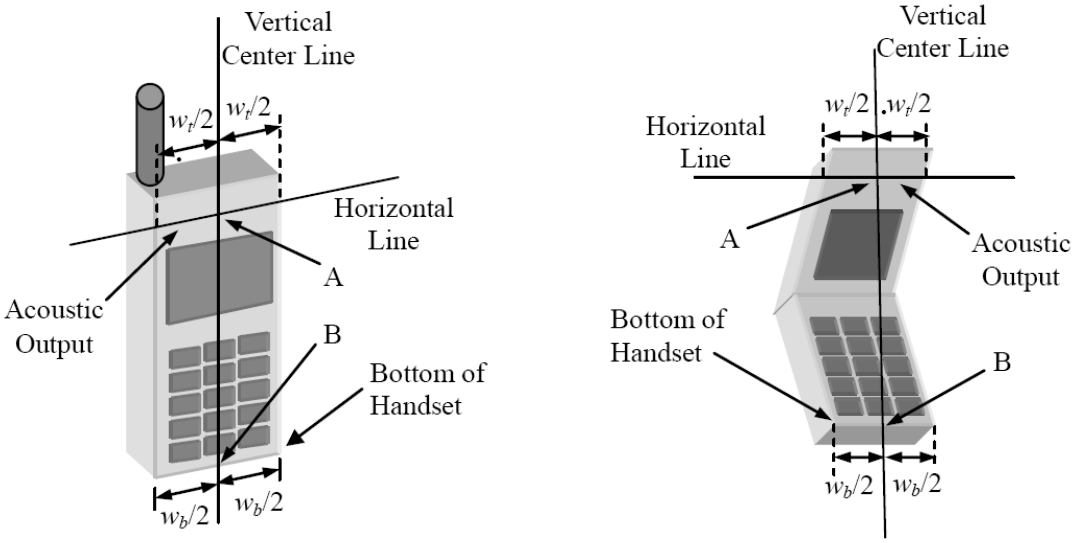
Shell Thickness: 2±0. 2 mm
Filling Volume: Approx. 25 liters
Dimensions: 810 x l000 x 500 mm (H x L x W)
Available: Special

Picture C.10: SAM Twin Phantom

ANNEX D Position of the wireless device in relation to the phantom

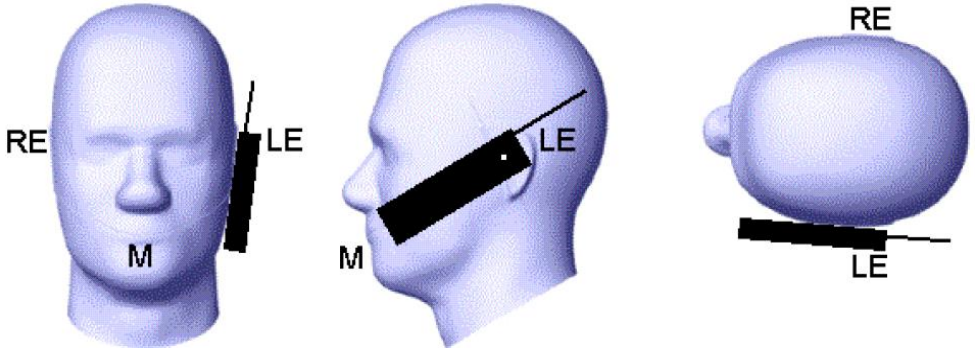
D.1 General considerations

This standard specifies two handset test positions against the head phantom – the “cheek” position and the “tilt” position.

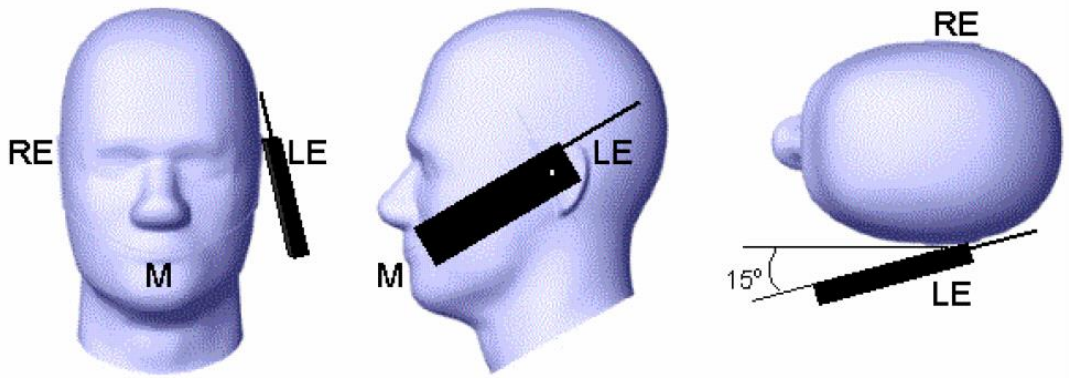


W_t	Width of the handset at the level of the acoustic
W_b	Width of the bottom of the handset
A	Midpoint of the width W_t of the handset at the level of the acoustic output
B	Midpoint of the width W_b of the bottom of the handset

Picture D.1-a Typical “fixed” case handset Picture D.1-b Typical “clam-shell” case handset



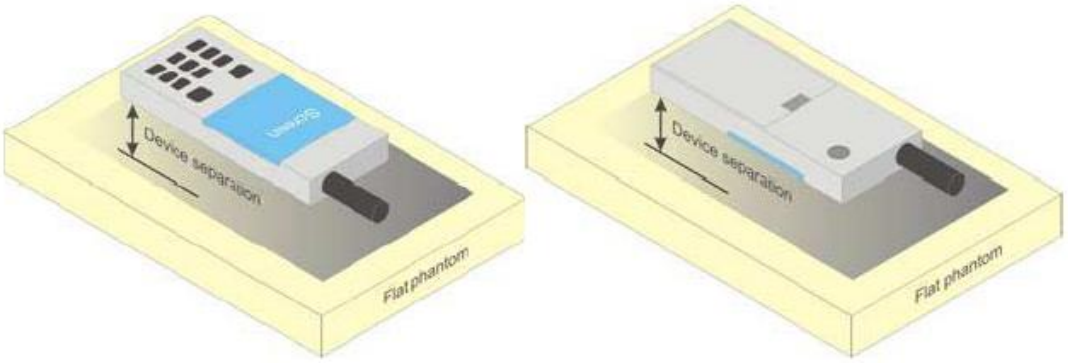
Picture D.2 Cheek position of the wireless device on the left side of SAM



Picture D.3 Tilt position of the wireless device on the left side of SAM

D.2 Body-worn device

A typical example of a body-worn device is a mobile phone, wireless enabled PDA or other battery operated wireless device with the ability to transmit while mounted on a person's body using a carry accessory approved by the wireless device manufacturer.

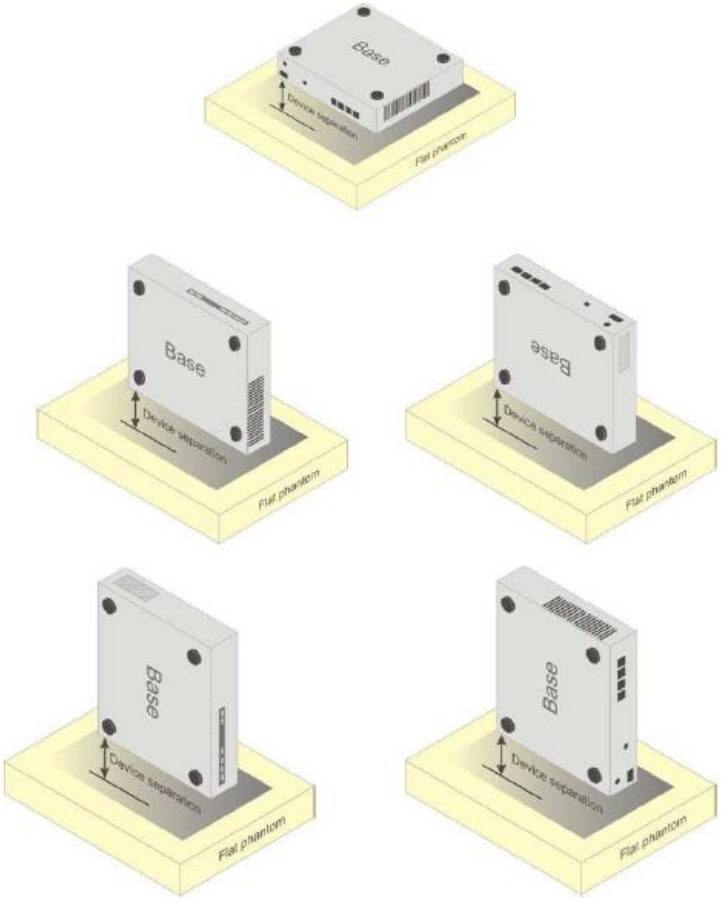


Picture D.4Test positions for body-worn devices

D.3 Desktop device

A typical example of a desktop device is a wireless enabled desktop computer placed on a table or desk when used.

The DUT shall be positioned at the distance and in the orientation to the phantom that corresponds to the intended use as specified by the manufacturer in the user instructions. For devices that employ an external antenna with variable positions, tests shall be performed for all antenna positions specified. Picture8.5 show positions for desktop device SAR tests. If the intended use is not specified, the device shall be tested directly against the flat phantom.



Picture D.5 Test positions for desktop devices

D.4 DUT Setup Photos

Picture D.6

ANNEX E Equivalent Media Recipes

The liquid used for the frequency range of 800-3000 MHz consisted of water, sugar, salt, preventol, glycol monobutyl and Cellulose. The liquid has been previously proven to be suited for worst-case. The Table E.1 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the IEEE 1528 and IEC 62209.

TableE.1: Composition of the Tissue Equivalent Matter

Frequency (MHz)	835Head	835Body	1900 Head	1900 Body	2450 Head	2450 Body	5800 Head	5800 Body
Ingredients (% by weight)								
Water	41.45	52.5	55.242	69.91	58.79	72.60	65.53	65.53
Sugar	56.0	45.0	\	\	\	\	\	\
Salt	1.45	1.4	0.306	0.13	0.06	0.18	\	\
Preventol	0.1	0.1	\	\	\	\	\	\
Cellulose	1.0	1.0	\	\	\	\	\	\
Glycol Monobutyl	\	\	44.452	29.96	41.15	27.22	\	\
Diethylenglycol monohexylether	\	\	\	\	\	\	17.24	17.24
Triton X-100	\	\	\	\	\	\	17.24	17.24
Dielectric Parameters Target Value	ε=41.5 σ=0.90	ε=55.2 σ=0.97	ε=40.0 σ=1.40	ε=53.3 σ=1.52	ε=39.2 σ=1.80	ε=52.7 σ=1.95	ε=35.3 σ=5.27	ε=48.2 σ=6.00

Note: There are a little adjustment respectively for 750, 1750, 2600, 5200, 5300 and 5600 based on the recipe of closest frequency in table E.1.

ANNEX F System Validation

The SAR system must be validated against its performance specifications before it is deployed. When SAR probes, system components or software are changed, upgraded or recalibrated, these must be validated with the SAR system(s) that operates with such components.

Table F.1: System Validation for 7464

Probe SN.	Liquid name	Validation date	Frequency point	Status (OK or Not)
7464	Head 750MHz	March.2,2021	750 MHz	OK
7464	Head 835MHz	March.2,2021	835 MHz	OK
7464	Head 900MHz	March.2,2021	900 MHz	OK
7464	Head 1450MHz	March.2,2021	1450 MHz	OK
7464	Head 1750MHz	March.3,2021	1750 MHz	OK
7464	Head 1880MHz	March.3,2021	1880 MHz	OK
7464	Head 1900MHz	March.3,2021	1900 MHz	OK
7464	Head 2000MHz	March.3,2021	2000 MHz	OK
7464	Head 2300MHz	March.3,2021	2300 MHz	OK
7464	Head 2450MHz	March.4,2021	2450 MHz	OK
7464	Head 2600MHz	March.4,2021	2600 MHz	OK
7464	Head 3300MHz	March.4,2021	3300 MHz	OK
7464	Head 3500MHz	March.4,2021	3500 MHz	OK
7464	Head 3700MHz	March.4,2021	3700 MHz	OK
7464	Head 3900MHz	March.4,2021	3900 MHz	OK
7464	Head 4100MHz	March.4,2021	4100 MHz	OK
7464	Head 5250MHz	March.5,2021	5250 MHz	OK
7464	Head 5600MHz	March.5,2021	5600 MHz	OK
7464	Head 5750MHz	March.5,2021	5750 MHz	OK
7464	Head 5800MHz	March.5,2021	5800 MHz	OK

ANNEX G Probe Calibration Certificate

Probe 7464 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 **CTTL-BJ (Auden)** Certificate No: **EX3-7464_Jan22**

CALIBRATION CERTIFICATE

Object EX3DV4 - SN:7464

Calibration procedure(s) QA CAL-01.v9, QA CAL-12.v9, QA CAL-14.v6, QA CAL-23.v5, QA CAL-25.v7
Calibration procedure for dosimetric E-field probes

Calibration date: January 26, 2022

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

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: CC2552 (20x)	09-Apr-21 (No. 217-03343)	Apr-22
DAE4	SN: 660	13-Oct-21 (No. DAE4-660_Oct21)	Oct-22
Reference Probe ES3DV2	SN: 3013	27-Dec-21 (No. ES3-3013_Dec21)	Dec-22
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-20)	In house check: Jun-22
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-22

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Sven Kühn	Deputy Manager	

Issued: January 28, 2022

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 φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

a) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices - Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep 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 ≤ 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 *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 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 *NORMx* (no uncertainty required).

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7464

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (μV/(V/m)²)[A]	0.46	0.44	0.45	± 10.1 %
DCP (mV)[B]	100.5	101.1	99.2	

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Max dev.	Max Unc[E] (k=2)
0	CW	X	0.00	0.00	1.00	0.00	129.8	± 2.7 %	± 4.7 %
		Y	0.00	0.00	1.00		143.1		
		Z	0.00	0.00	1.00		149.5		
10352-AAA	Pulse Waveform (200Hz, 10%)	X	20.00	93.08	21.80	10.00	60.0	± 3.7 %	± 9.6 %
		Y	20.00	91.15	21.40		60.0		
		Z	20.00	93.95	22.82		60.0		
10353-AAA	Pulse Waveform (200Hz, 20%)	X	20.00	94.89	21.67	6.99	80.0	± 2.0 %	± 9.6 %
		Y	20.00	91.07	20.01		80.0		
		Z	20.00	94.48	22.03		80.0		
10354-AAA	Pulse Waveform (200Hz, 40%)	X	20.00	100.94	23.29	3.98	95.0	± 1.1 %	± 9.6 %
		Y	20.00	91.64	18.69		95.0		
		Z	20.00	98.54	22.66		95.0		
10355-AAA	Pulse Waveform (200Hz, 60%)	X	20.00	111.81	26.93	2.22	120.0	± 1.2 %	± 9.6 %
		Y	20.00	91.67	17.31		120.0		
		Z	20.00	106.21	24.89		120.0		
10387-AAA	QPSK Waveform, 1 MHz	X	1.95	67.66	16.42	1.00	150.0	± 2.3 %	± 9.6 %
		Y	1.71	65.07	14.73		150.0		
		Z	1.98	67.42	16.43		150.0		
10388-AAA	QPSK Waveform, 10 MHz	X	2.73	71.10	17.33	0.00	150.0	± 0.9 %	± 9.6 %
		Y	2.26	67.69	15.37		150.0		
		Z	2.79	71.26	17.38		150.0		
10396-AAA	64-QAM Waveform, 100 kHz	X	3.50	72.58	19.72	3.01	150.0	± 0.7 %	± 9.6 %
		Y	3.46	71.32	18.87		150.0		
		Z	3.75	73.23	20.03		150.0		
10399-AAA	64-QAM Waveform, 40 MHz	X	3.79	68.38	16.54	0.00	150.0	± 2.0 %	± 9.6 %
		Y	3.52	66.93	15.61		150.0		
		Z	3.82	68.42	16.57		150.0		
10414-AAA	WLAN CCDF, 64-QAM, 40MHz	X	4.98	65.65	15.65	0.00	150.0	± 3.8 %	± 9.6 %
		Y	4.98	65.46	15.42		150.0		
		Z	5.02	65.62	15.64		150.0		

Note: For details on UID parameters see Appendix

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

[A] The uncertainties of Norm X,Y,Z do not affect the E²-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7464

Sensor Model Parameters

	C1 fF	C2 fF	α V^{-1}	T1 $ms.V^{-2}$	T2 $ms.V^{-1}$	T3 ms	T4 V^{-2}	T5 V^{-1}	T6
X	61.5	458.49	35.65	15.95	0.16	5.10	0.72	0.47	1.01
Y	63.7	481.59	36.30	14.98	0.81	5.06	0.73	0.58	1.01
Z	68.2	509.89	35.77	20.70	0.43	5.10	0.63	0.55	1.01

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-150.6
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

Note: Measurement distance from surface can be increased to 3-4 mm for an *Area Scan* job.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7464

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
64	54.2	0.75	13.80	13.80	13.80	0.00	1.00	± 13.3 %
150	52.3	0.76	11.94	11.94	11.94	0.00	1.00	± 13.3 %
300	45.3	0.87	11.78	11.78	11.78	0.09	1.00	± 13.3 %
450	43.5	0.87	11.02	11.02	11.02	0.16	1.30	± 13.3 %
750	41.9	0.89	10.26	10.26	10.26	0.56	0.81	± 12.0 %
835	41.5	0.90	9.96	9.96	9.96	0.41	0.91	± 12.0 %
900	41.5	0.97	9.72	9.72	9.72	0.52	0.80	± 12.0 %
1450	40.5	1.20	8.86	8.86	8.86	0.43	0.80	± 12.0 %
1640	40.2	1.31	8.64	8.64	8.64	0.33	0.86	± 12.0 %
1750	40.1	1.37	8.52	8.52	8.52	0.39	0.86	± 12.0 %
1810	40.0	1.40	8.20	8.20	8.20	0.37	0.86	± 12.0 %
1900	40.0	1.40	8.18	8.18	8.18	0.35	0.86	± 12.0 %
2000	40.0	1.40	8.20	8.20	8.20	0.34	0.86	± 12.0 %
2100	39.8	1.49	8.38	8.38	8.38	0.32	0.86	± 12.0 %
2300	39.5	1.67	8.36	8.36	8.36	0.32	0.90	± 12.0 %
2450	39.2	1.80	7.77	7.77	7.77	0.36	0.90	± 12.0 %
2600	39.0	1.96	7.64	7.64	7.64	0.40	0.90	± 12.0 %
3300	38.2	2.71	7.27	7.27	7.27	0.30	1.35	± 13.1 %
3500	37.9	2.91	7.20	7.20	7.20	0.30	1.35	± 13.1 %
3700	37.7	3.12	6.78	6.78	6.78	0.30	1.35	± 13.1 %
3900	37.5	3.32	6.76	6.76	6.76	0.40	1.60	± 13.1 %
4100	37.2	3.53	6.71	6.71	6.71	0.40	1.60	± 13.1 %
4200	37.1	3.63	6.60	6.60	6.60	0.40	1.70	± 13.1 %
4400	36.9	3.84	6.53	6.53	6.53	0.40	1.70	± 13.1 %
4600	36.7	4.04	6.40	6.40	6.40	0.40	1.70	± 13.1 %
4800	36.4	4.25	6.35	6.35	6.35	0.40	1.80	± 13.1 %
4950	36.3	4.40	6.00	6.00	6.00	0.40	1.80	± 13.1 %
5200	36.0	4.66	5.60	5.60	5.60	0.40	1.80	± 13.1 %
5250	35.9	4.71	5.43	5.43	5.43	0.40	1.80	± 13.1 %
5300	35.9	4.76	5.32	5.32	5.32	0.40	1.80	± 13.1 %
5500	35.6	4.96	5.11	5.11	5.11	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.91	4.91	4.91	0.40	1.80	± 13.1 %
5750	35.4	5.22	4.85	4.85	4.85	0.40	1.80	± 13.1 %
5800	35.3	5.27	5.00	5.00	5.00	0.40	1.80	± 13.1 %

[C] 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. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.

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

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7464

Calibration Parameter Determined in Head Tissue Simulating Media

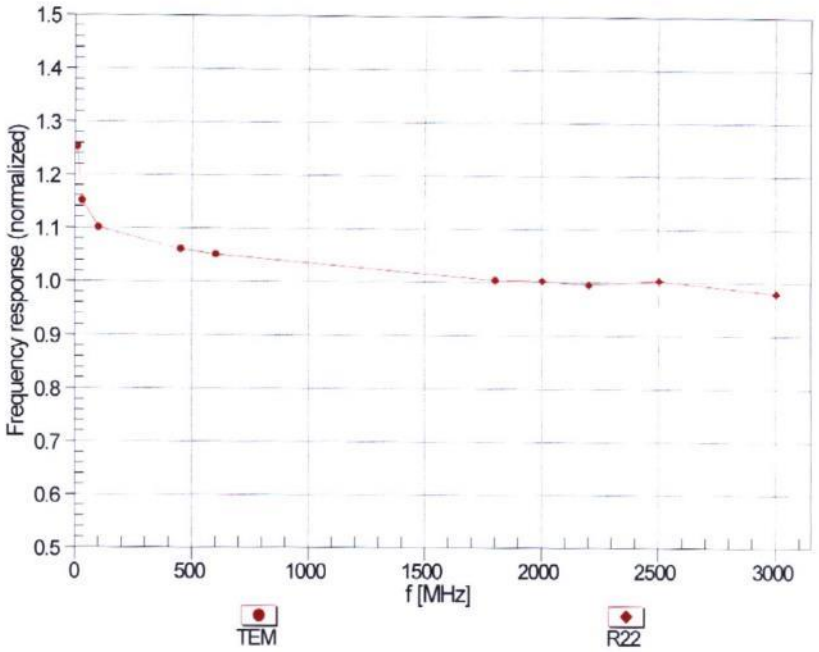
f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
6500	34.5	6.07	5.45	5.45	5.45	0.20	2.50	± 18.6 %
7000	33.9	6.65	5.75	5.75	5.75	0.20	2.00	± 18.6 %

[C] Frequency validity above 6GHz is ± 700 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies 6-10 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz; below ± 2% for frequencies between 3-6 GHz; and below ± 4% for frequencies between 6-10 GHz at any distance larger than half the probe tip diameter from the boundary.

EX3DV4– SN:7464

January 26, 2022

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



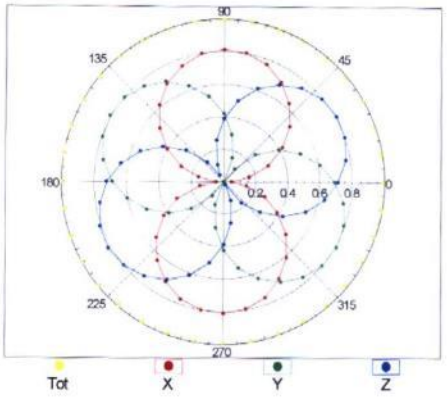
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

EX3DV4– SN:7464

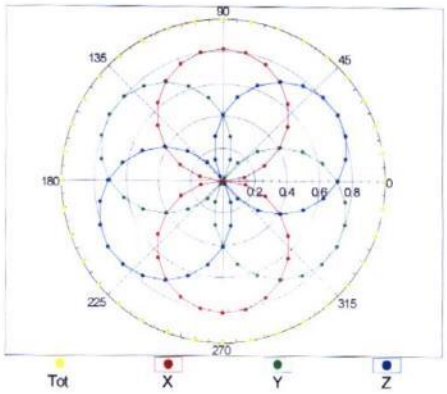
January 26, 2022

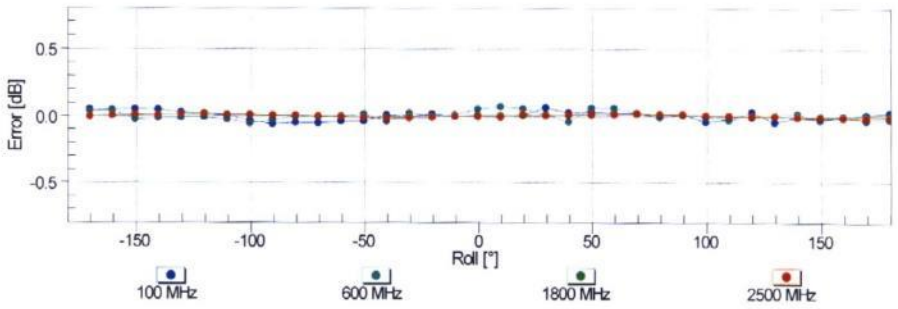
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



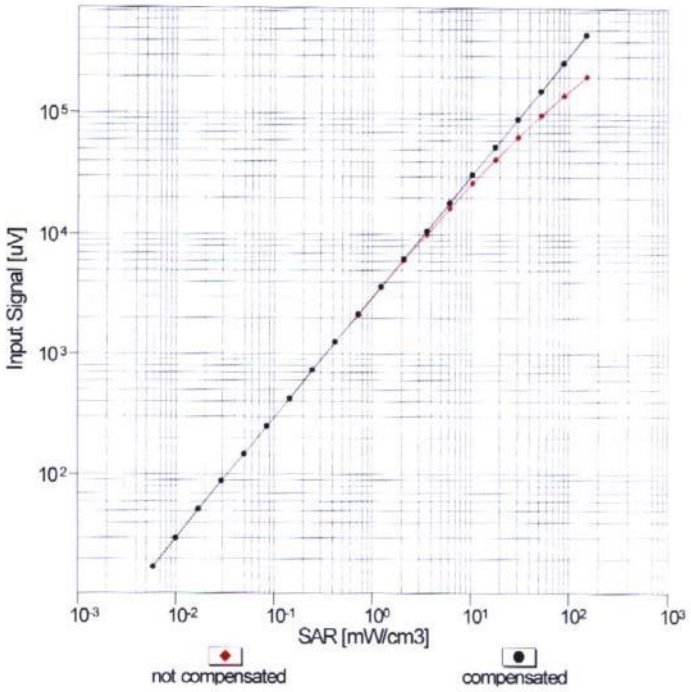
f=1800 MHz,R22

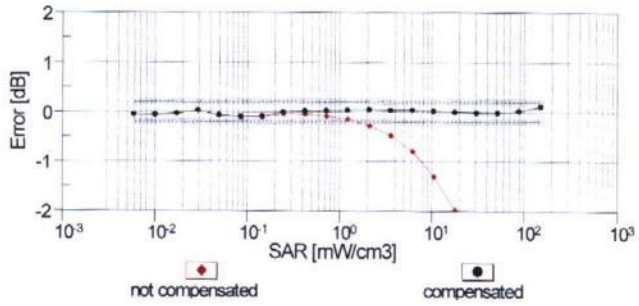




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR$_{head}$)
(TEM cell , f_{eval}= 1900 MHz)





Uncertainty of Linearity Assessment: ± 0.6% (k=2)

