SAR TEST REPORT

No. I21Z70460-SEM01

For

Samsung Electronics Co., Ltd.

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

Model Name: SM-A035F/DS, SM-A035F

with

Hardware Version: REV1.0

Software Version: A035F.001

FCC ID: ZCASMA035F

Issued Date: 2021-11-25

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of CTTL.

Test Laboratory:

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REPORT HISTORY

Report Number	Revision	Issue Date	Description
I21Z70460-SEM01	Rev.0	2021-11-22	Initial creation of test report
I21Z70460-SEM01	Rev.1	2021-11-25	Update section 4.3 Update Chapter 11 Update Chapter 13

TABLE OF CONTENT

1 Test Laboratory

1.1 Testing Location

Company Name:	CTTL(Shouxiang)
Address:	No. 51 Shouxiang Science Building, Xueyuan Road, Haidian District, Beijing, P. R. China100191

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

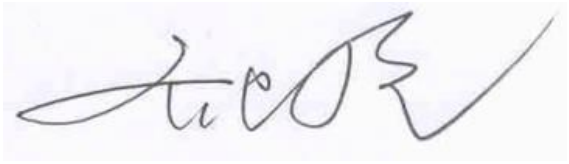
1.3 Project Data

Project Leader:	Qi Dianyuan
Test Engineer:	Lin Xiaojun
Testing Start Date:	September 9, 2021
Testing End Date:	November 20, 2021

1.4 Signature

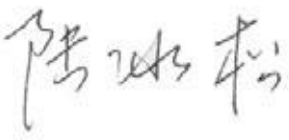
Lin Xiaojun

(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 SAR found during testing for Samsung Electronics Co., Ltd. Multi-band GSM/WCDMA/LTE phone with Blutooth, WLAN, WLAN SM-A035F/DS, SM-A035F are as follows:

Table 2.1: Highest Reported SAR -Standalone(1g)

Mode		Highest Reported SAR (1g) W/kg	
		1g SAR Head	1g SAR Body 10mm
GSM	GSM 850	0.34	0.36
WCDMA	UMTS FDD 5	0.19	0.31
LTE	LTE Band 5	0.22	0.36
	LTE Band 7	0.33	0.54
	LTE Band 41	0.24	0.52
WLAN	WLAN 2.4 GHz	0.13	0.12
	WLAN 5 GHz	0.57	0.61

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 10 mm for body 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. 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**:**

Head:0.57 W/kg(1g)

Body:0.61 W/kg(1g)

Table 2.2: Highest Reported SAR -Simultaneous transmission

reported SAR 1g (W/kg)				
Head		LTE Band7	WIFI5G	Cellular+WiFi5G
Tilt	Right	0.33	0.57	0.90

Body		LTE Band7	WIFI5G	Cellular+WiFi5G+BT
Rear	10mm	0.54	0.34	0.88

Note:

1. Estimated SAR for Bluetooth (see the section 12.3)
2. The detail for simultaneous transmission consideration is described in chapter 15.

The highest reported SAR for Head, Body and Simultaneous transmission exposure conditions are 0.57W/kg, 0.61W/kg and 0.90W/kg.

3 Client Information

3.1 Applicant Information

Company Name:	Samsung Electronics Co., Ltd.
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Contact Person:	Jenni Chun
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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:	Sunghoon Cho
Contact Email:	ggobi.cho@samsung.com
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4 Equipment Under Test (EUT) and Ancillary Equipment (AE)

4.1 About EUT

Description:	Multi-band GSM/WCDMA/LTE phone with Blutooth, WLAN
Model name:	SM-A035F/DS, SM-A035F
Operating mode(s):	GSM850/900/1800,WCDMA850/900/2100, BT, Wi-Fi 2.4G/5G, LTE Band 1/3/5/7/8/20/28/38/40/41
Tested Tx Frequency:	824 – 849 MHz (GSM 850)
	824–849 MHz (WCDMA 850 Band V)
	824 – 849 MHz (LTE Band 5)
	2500 – 2570 MHz(LTE Band 7)
	2498.5 – 2687.5 MHz (LTE Band41)
	2412 – 2462 MHz (Wi-Fi 2.4G)
	5150-5825 MHz (Wi-Fi 5G)
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	HW	SW Version
EUT1	70431UT13a	REV1.0	A035F.001
EUT2	70431UT50a	REV1.0	A035F.001
EUT3	70431UT20a	REV1.0	A035F.001
EUT4	70431UT22a	REV1.0	A035F.001

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

Note: It is performed to test SAR with the EUT3-4 and conducted power with the EUT1-2.

4.3 Internal Identification of AE used during the test

AE ID*	Description	Model	SN	Manufacturer
AE1	Battery	HQ-50SD	/	SCUD(Fujian）Electronics Co,.Ltd
AE2	Battery	HQ-50N	/	/
AE3	Headset	EHS61ASFWE	/	Cresyn
AE4	Headset	EHS61ASFWE		ALMUS

*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.

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 D01SAR measurement 100 MHz to 6 GHz v01r04: SAR Measurement Requirements for 100 MHz to 6 GHz.

KDB865664 D02RF 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

The temperature of the tissue-equivalent medium used during measurement must also be within 18 ºC to 25 ºC and within ± 2 ºC of the temperature when the tissue parameters are characterized. The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after each 3 – 4 days of use; or earlier if the dielectric parameters can become out of tolerance; for example, when the parameters are marginal at the beginning of the measurement series.

The dielectric constant (εr) and conductivity (σ) of typical tissue-equivalent media recipes are expected to be within ± 5% of the required target values; but for SAR measurement systems that have implemented the SAR error compensation algorithms documented in IEEE Std 1528-2013, to automatically compensate the measured SAR results for deviations between the measured and required tissue dielectric parameters, the tolerance for εr and σ may be relaxed to ± 10%. This is limited to frequencies ≤ 3 GHz.

The below measured tissue parameters were used in the DASY software. The DASY software was used to perform interpolation to determine the dielectric parameters at the SAR test device frequencies. The tissue parameters listed in the SAR test plots may slightly differ from the table above due to significant digit rounding in the software.

7.1 Targets for tissue simulating liquid

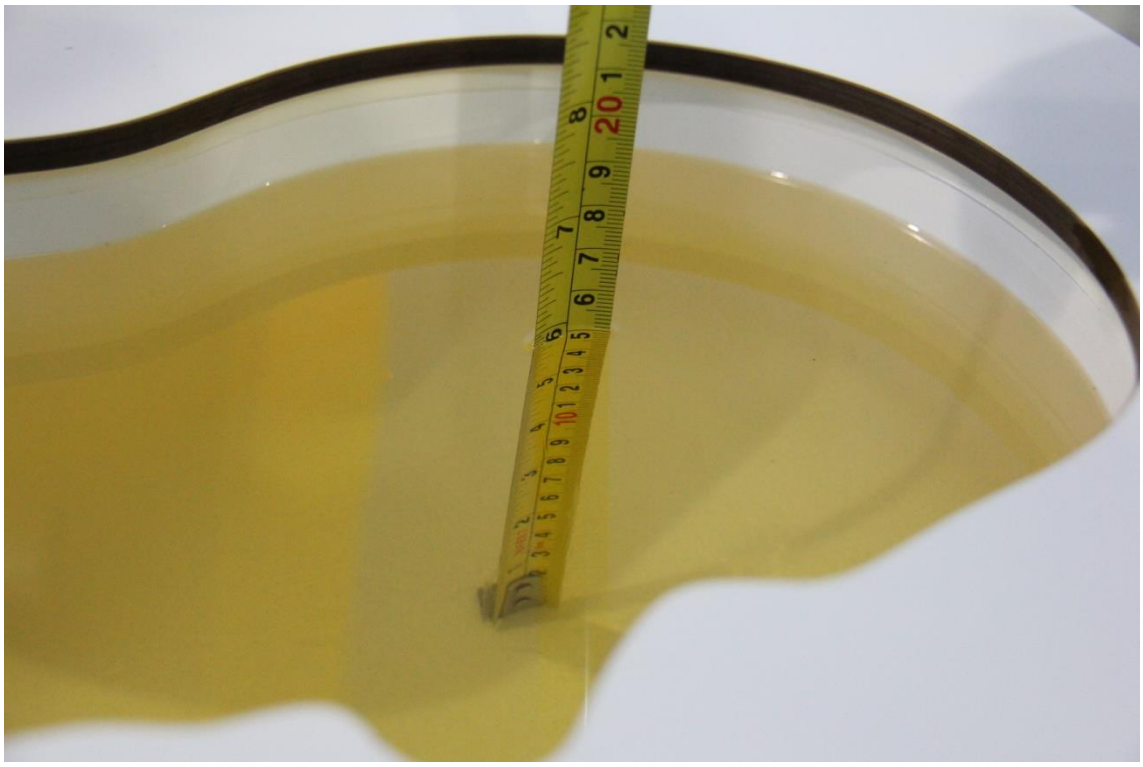
Table 7.1: Targets for tissue simulating liquid

Frequency(MHz)	Liquid Type	Conductivity(σ)	±10% Range	Permittivity(ε)	± 10% Range
750	Head	0.89	0.80～0.98	41.94	37.75～46.13
835	Head	0.90	0.81～0.99	41.5	37.35～45.65
1750	Head	1.37	1.26～1.54	40.0	36～44
1900	Head	1.40	1.26～1.54	40.0	36～44
2450	Head	1.80	1.62～1.98	39.2	35.28～43.12
2600	Head	1.96	1.76～2.16	39.01	35.11～42.91
Frequency(MHz)	Liquid Type	Conductivity(σ)	±5% Range	Permittivity(ε)	± 5% Range
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

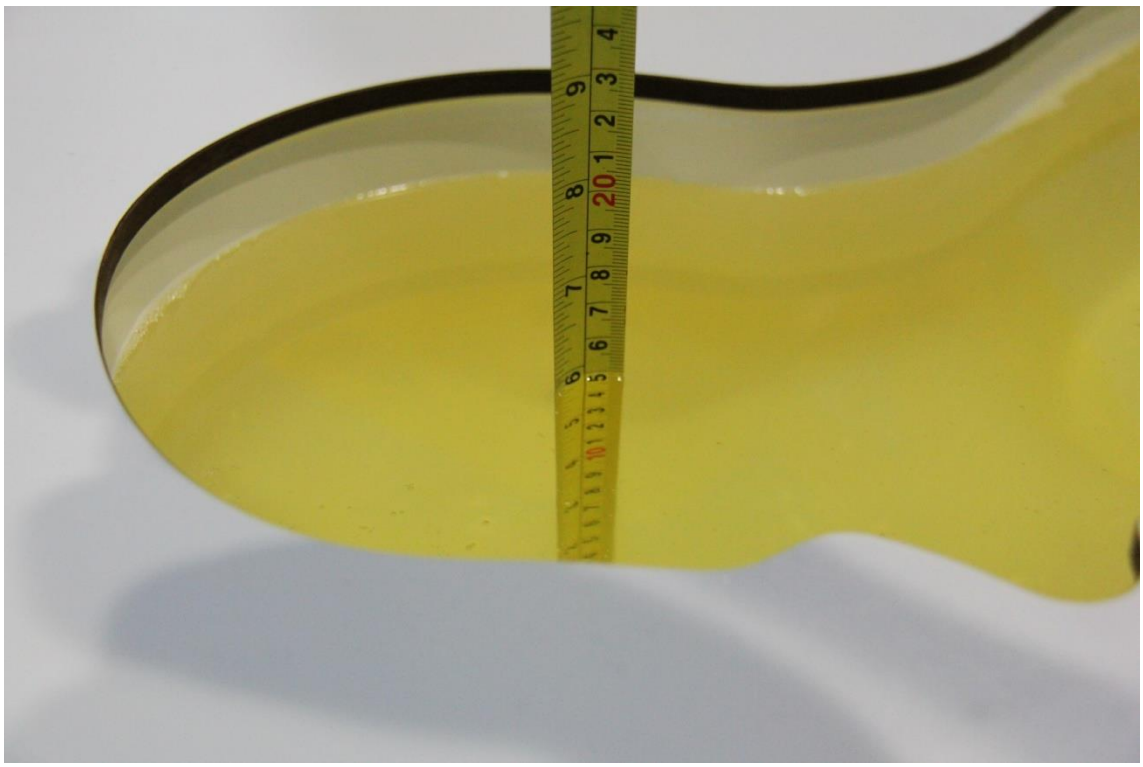
7.2 Dielectric Performance

Table 7.2: Dielectric Performance of Tissue Simulating Liquid

Measurement Date (yyyy-mm-dd)	Type	Frequency	Permittivity ε	Drift (%)	Conductivity σ (S/m)	Drift (%)
2021/9/9	Head	835 MHz	45.15	8.80%	0.888	-1.33%
2021/10/31	Head	835 MHz	43.95	5.90%	0.9164	1.82%
2021/11/4	Head	835 MHz	43.95	5.90%	0.909	1.00%
2021/11/10	Head	2450MHz	40.85	4.21%	1.884	4.67%
2021/9/13	Head	2600 MHz	40.78	4.54%	1.95	-0.51%
2021/11/4	Head	2600 MHz	40.62	4.13%	2.033	3.72%
2021/11/13	Head	5250 MHz	35.63	-0.83%	4.673	-0.79%
2021/11/13	Head	5600 MHz	34.94	-1.66%	5.061	-0.18%
2021/11/13	Head	5750 MHz	34.7	-1.87%	5.221	0.02%

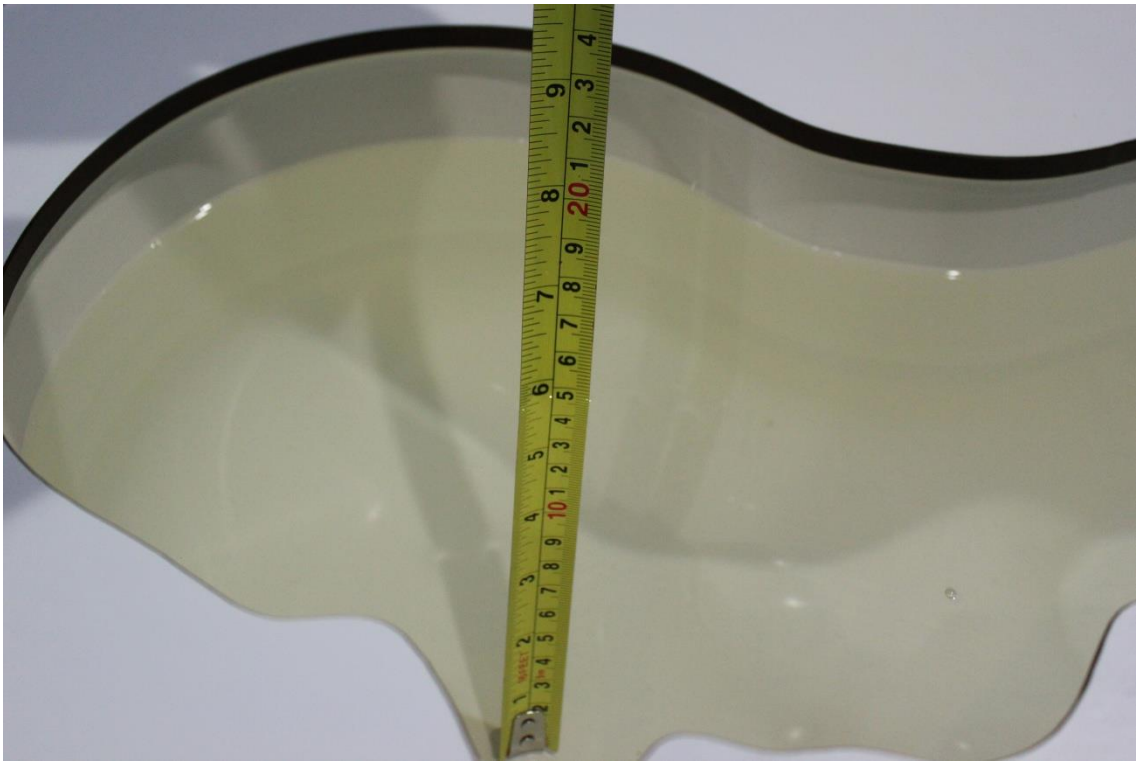


Picture 7-2 Liquid depth in the Head Phantom (835 MHz)



Picture 7-5 Liquid depth in the Head Phantom (2450MHz)

Picture 7-6 Liquid depth in the Head Phantom (2600 MHz)

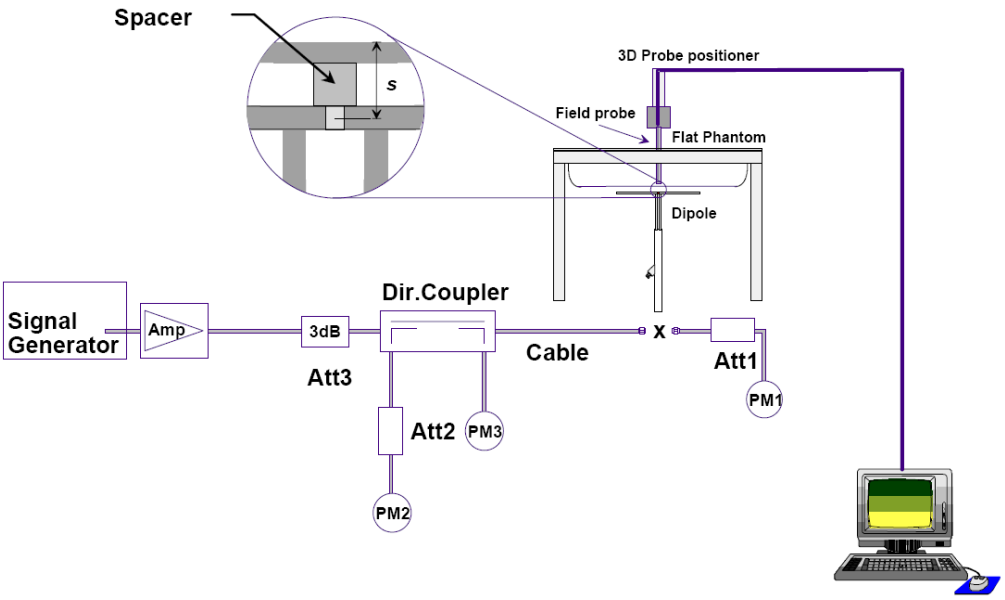


Picture 7-7 Liquid depth in the Head Phantom (5GHz)

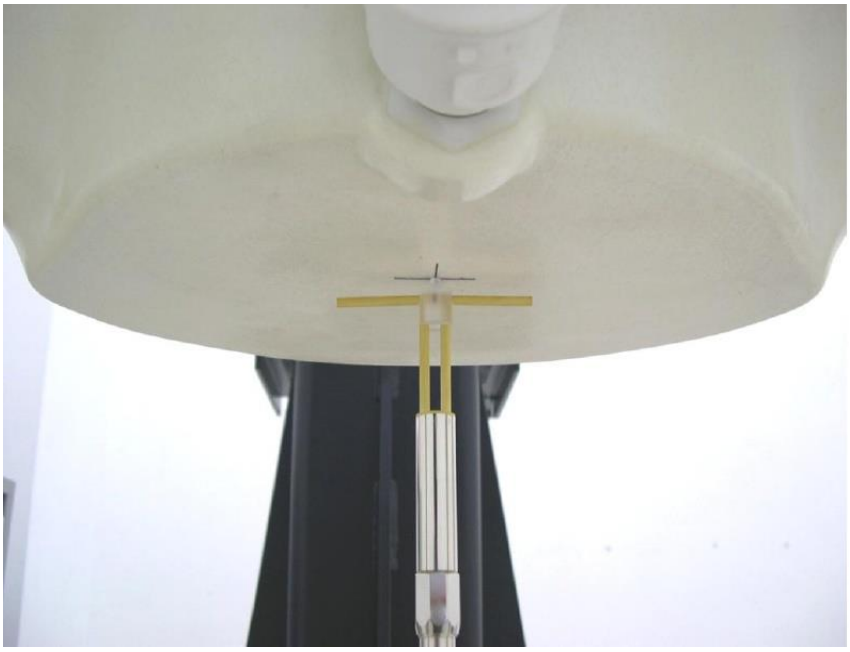
8 System verification

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.

Table 8.1: System Verification of Head

Measurement Date (yyyy-mm-dd)	Frequency	Target value (W/kg)	Measured value(W/kg)	Deviation
		1 g Average	1 g Average	1 g Average
2021/9/9	835 MHz	9.63	8.92	-7.37%
2021/10/31	835 MHz	9.63	9.48	-1.56%
2021/11/4	835 MHz	9.63	9.16	-4.88%
2021/11/10	2450 MHz	53.3	54.8	2.81%
2021/9/13	2600 MHz	57.1	59.2	3.68%
2021/11/4	2600 MHz	57.1	56.4	-1.23%
2021/11/13	5250 MHz	79.5	82.5	3.77%
2021/11/13	5600 MHz	83.8	82.6	-1.43%
2021/11/13	5750 MHz	81.0	81.7	0.86%

9 General Measurement Procedure

9.1 *Power Reference Measurement*

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

9.2 *Area Scan*

The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum found in the scanned area, within a range of the global maximum. The range (in dB0 is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan), if only one zoom scan follows the area scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of zoom scans has to be increased accordingly.
Area scan parameters extracted from FCC KDB 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz.

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

9.3 *Zoom Scan*

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

Zoom Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

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 *reported* 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.

9.4 *Power drift measurement*

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as 9.1.

10 Measurement Procedure for different technologies

10.1 GSM/GPRS Measurement Procedures for SAR

GSM / GPRS / EDGE modes is determined by the source-based time-averaged output power including tune-up tolerance. The mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested. Other configurations of GSM / GPRS / EDGE are considered as secondary modes. The 3G SAR test reduction procedure is applied, when the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode, SAR measurement is not required for the secondary mode.

10.2 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.7 Release 7 HSPA+ Data Devices

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

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

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

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.

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

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	Processes	6
Information Bit Payload (N_{INF})	Bits	120
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	960
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	3200
Coding Rate		0.15
Number of Physical Channel Codes	Codes	1
Modulation		QPSK

Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table.
Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.

10.3 LTE Measurement Procedures for SAR

SAR tests for LTE are performed with a base station simulator, Rohde & Rchwarz CMW500 or . Anritsu MT8821C Closed loop power control was used so the UE transmits with maximum output power during SAR testing.

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 v02r05 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 v02r05. SAR testing is performed using the extended cyclic prefix listed in 3GPP TS 36.211.

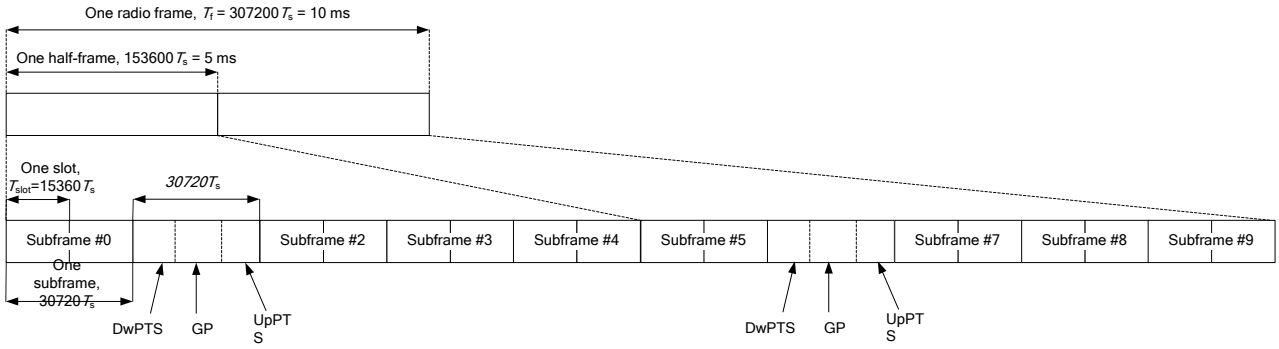


Figure 10.2: Frame structure type 2 (for 5 ms switch-point periodicity)

Table 10.1: 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 10.2: 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

According to the KDB 447498 D01, SAR should be evaluated at more than 3 frequencies for devices supporting transmit bands wider than 100MHz. Oct.2014 FCC-TCB conference notes (Dec. 2014 rev.) specifies the 5 test channels to use for 3GPP band 38/41 SAR evaluation.

10.4 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.

11 Conducted Output Power

11.1 GSM Measurement result

GSM850

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	31.70	31.72	31.76	33.50	-9.03	22.67	22.69	22.73
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	31.64	31.65	31.68	33.50	-9.03	22.61	22.62	22.65
2 Txslots	29.63	29.70	29.77	31.50	-6.02	23.61	23.68	23.75
3Txslots	**28.10**	**28.16**	**28.21**	**30.00**	**-4.26**	**23.84**	**23.90**	**23.95**
4 Txslots	26.54	26.59	26.60	28.50	-3.01	23.53	23.58	23.59
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	31.59	31.61	31.65	33.50	-9.03	22.56	22.58	22.62
2 Txslots	29.60	29.68	29.74	31.50	-6.02	23.58	23.66	23.72
3Txslots	**28.06**	**28.14**	**28.19**	**30.00**	**-4.26**	**23.80**	**23.88**	**23.93**
4 Txslots	26.51	26.57	26.57	28.50	-3.01	23.50	23.56	23.56
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	25.98	25.96	25.85	27.00	-9.03	16.95	16.93	16.82
2 Txslots	23.99	24.02	23.90	25.00	-6.02	17.97	18.00	17.88
3Txslots	21.56	21.59	21.47	23.00	-4.26	17.30	17.33	17.21
4 Txslots	20.35	20.40	20.28	21.50	-3.01	17.34	17.39	17.27

11.2 WCDMA Measurement result

WCDMA850

Item	band	FDDV result			
	ARFCN	4233 (846.6MHz)	4183 (836.6MHz)	4132 (826.4MHz)	Tune up
WCDMA	\	23.85	23.88	23.88	25.00
HSUPA	1	20.02	20.26	20.33	22.00
	2	20.32	20.51	20.34	22.00
	3	20.26	20.44	20.50	22.00
	4	20.01	20.20	20.32	22.00
	5	22.25	22.21	22.28	23.00
HSPA+		22.13	22.39	22.33	23.50
DC-HSDPA	1	21.93	21.81	21.89	23.50
	2	21.63	21.56	21.72	23.50
	3	21.38	21.40	21.34	23.00
	4	21.36	21.43	21.43	23.00

11.3 LTE Measurement result

The maximum output power(Tune-up Limit)=Target power+ Tolerance

Band	Mode	Target Power(dBm)	Tolerance(dBm)
LTE Band 5	QPSK	24	(±1)
LTE Band 7	QPSK	22.5	(±1)
LE Band41	QPSK	23.5	(±1)

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

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

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

LTE B5

Band 5					
Bandwidth (MHz)	RB allocation RB offset	Frequency (MHz)	Actual output power (dBm)		
			QPSK	16QAM	64QAM
1.4MHz	1RB-High (5)	848.3	23.91	23.49	21.87
		836.5	23.91	23.39	22.39
		824.7	24.08	23.03	21.86
	1RB-Middle (3)	848.3	23.90	23.45	21.92
		836.5	23.98	23.39	22.49
		824.7	24.10	22.98	22.02
	1RB-Low (0)	848.3	23.89	23.35	21.92
		836.5	23.97	23.06	21.81
		824.7	24.13	22.97	22.03
	3RB-High (3)	848.3	23.98	23.10	21.94
		836.5	24.06	23.67	22.39
		824.7	24.19	23.23	21.91
	3RB-Middle (1)	848.3	23.96	23.22	22.12
		836.5	23.99	23.77	22.61
		824.7	24.10	23.31	22.02
	3RB-Low (0)	848.3	23.82	23.37	21.98
		836.5	24.09	23.74	22.43
		824.7	24.23	23.43	22.01
	6RB (0)	848.3	23.10	21.81	21.03
		836.5	23.58	22.35	21.51
		824.7	23.06	21.90	21.45
3MHz	1RB-High (14)	847.5	23.94	22.89	21.92
		836.5	23.88	23.86	22.39
		825.5	23.94	23.56	21.75
	1RB-Middle (7)	847.5	23.93	23.05	22.02
		836.5	23.96	23.83	22.58
		825.5	23.99	23.44	21.83
	1RB-Low (0)	847.5	23.86	22.93	22.08
		836.5	23.98	23.57	21.89
		825.5	24.15	23.48	21.98
	8RB-High (7)	847.5	23.03	22.18	21.02
		836.5	23.54	22.68	21.45
		825.5	23.03	22.15	20.99
	8RB-Middle (4)	847.5	23.03	22.24	21.10
		836.5	23.48	22.66	21.44
		825.5	23.08	22.23	21.42
	8RB-Low (0)	847.5	23.00	22.21	21.09
		836.5	23.01	22.16	21.52
		825.5	23.08	22.34	21.46
	15RB (0)	847.5	23.04	22.07	21.28
		836.5	23.58	22.55	21.65
		825.5	23.07	22.06	21.66
5MHz	1RB-High (24)	846.5	23.68	22.73	22.24
		836.5	24.16	23.06	21.96
		826.5	24.05	23.18	22.00
	1RB-Middle (12)	846.5	23.73	23.10	22.12
		836.5	24.03	23.41	22.54
		826.5	24.09	23.17	22.03
	1RB-Low (0)	846.5	23.86	23.03	22.26
		836.5	24.04	23.15	22.12

		826.5	24.26	23.16	22.13
	12RB-High (13)	846.5	23.02	22.07	21.05
		836.5	23.43	22.49	21.52
		826.5	23.11	22.13	21.13
	12RB-Middle (6)	846.5	23.00	22.10	21.12
		836.5	23.46	22.52	21.60
		826.5	23.12	22.19	21.19
	12RB-Low (0)	846.5	23.01	22.12	21.07
		836.5	23.09	22.08	21.58
		826.5	23.15	22.17	21.63
	25RB (0)	846.5	23.09	22.33	21.15
		836.5	23.49	22.68	21.54
		826.5	23.15	22.35	21.16
10MHz	1RB-High (49)	844	23.97	23.06	21.90
		836.5	23.84	23.44	21.90
		829	23.90	23.57	22.04
	1RB-Middle (24)	844	23.89	22.96	22.39
		836.5	23.84	23.89	22.49
		829	23.96	23.65	22.03
	1RB-Low (0)	844	24.18	23.02	22.07
		836.5	23.99	23.59	22.11
		829	24.02	23.73	22.15
	25RB-High (25)	844	23.13	22.36	21.12
		836.5	23.03	21.96	21.60
		829	23.03	22.05	21.61
	25RB-Middle (12)	844	23.54	22.69	21.53
		836.5	22.96	22.39	21.57
		829	23.05	22.09	21.22
	25RB-Low (0)	844	23.17	22.21	21.59
		836.5	22.94	22.08	21.57
		829	23.08	22.08	21.23
	50RB (0)	844	23.41	22.47	21.68
		836.5	22.86	22.45	21.58
		829	23.06	22.04	21.16

LTE B7

Band 7					
Bandwidth (MHz)	RB allocation RB offset	Frequency (MHz)	Actual output power (dBm)		
			QPSK	16QAM	64QAM
5MHz	1RB-High (24)	2567.5	22.10	21.80	19.88
		2535	21.93	21.61	19.89
		2502.5	22.04	21.65	20.10
	1RB-Middle (12)	2567.5	22.12	21.79	20.18
		2535	21.90	21.55	20.35
		2502.5	22.02	21.55	20.47
	1RB-Low (0)	2567.5	22.20	21.81	19.85
		2535	22.00	21.61	19.82
		2502.5	22.04	21.79	19.53
	12RB-High (13)	2567.5	21.11	19.67	19.76
		2535	21.05	20.01	20.09
		2502.5	21.09	20.14	20.22
	12RB-Middle (6)	2567.5	21.26	19.95	20.01
		2535	20.98	20.13	20.22
		2502.5	21.11	20.16	20.22

	12RB-Low (0)	2567.5	21.22	19.90	19.97
		2535	21.02	20.00	20.03
		2502.5	21.11	19.87	19.91
	25RB (0)	2567.5	21.21	19.81	19.86
		2535	21.05	20.01	19.94
		2502.5	21.12	19.99	20.04
10MHz	1RB-High (49)	2565	22.09	21.51	20.17
		2535	22.02	21.03	20.56
		2505	21.92	21.19	20.53
	1RB-Middle (24)	2565	22.16	21.41	20.38
		2535	22.02	21.09	20.18
		2505	21.94	21.00	19.94
	1RB-Low (0)	2565	22.18	21.11	20.35
		2535	21.87	21.08	19.91
		2505	21.96	21.24	19.99
	25RB-High (25)	2565	21.32	20.19	20.23
		2535	21.00	20.40	20.31
		2505	21.09	20.30	20.20
	25RB-Middle (12)	2565	21.33	20.21	20.23
		2535	21.01	20.19	20.08
		2505	20.95	19.92	19.80
	25RB-Low (0)	2565	21.23	20.27	20.25
		2535	21.10	20.07	19.96
		2505	21.09	19.60	19.48
	50RB (0)	2565	21.37	20.24	20.19
		2535	21.10	20.20	20.14
		2505	21.11	19.97	19.85
15MHz	1RB-High (74)	2562.5	21.99	21.76	20.23
		2535	21.89	21.11	20.59
		2507.5	21.78	21.56	20.97
	1RB-Middle (37)	2562.5	22.24	21.87	20.34
		2535	21.87	21.08	20.20
		2507.5	21.87	21.60	20.15
	1RB-Low (0)	2562.5	22.16	21.93	21.11
		2535	21.77	21.06	20.63
		2507.5	21.92	21.70	19.89
	36RB-High (38)	2562.5	21.33	19.98	20.04
		2535	20.99	20.13	20.18
		2507.5	21.00	20.32	20.28
	36RB-Middle (19)	2562.5	21.32	20.12	20.16
		2535	21.05	20.00	20.03
		2507.5	21.03	19.99	19.96
	36RB-Low (0)	2562.5	21.25	20.44	20.49
		2535	21.16	20.08	20.13
		2507.5	21.03	19.82	19.78
	75RB (0)	2562.5	21.16	20.22	20.26
		2535	21.12	20.25	20.14
		2507.5	20.99	20.10	20.01
20MHz	1RB-High (99)	2560	22.10	21.89	19.91
		2535	22.11	21.51	20.38
		2510	22.01	21.55	20.47
	1RB-Middle (50)	2560	22.18	21.99	20.34
		2535	21.96	21.34	20.11
		2510	21.87	21.61	20.08
	1RB-Low (0)	2560	22.19	21.84	20.86

		2535	22.02	21.33	20.40
		2510	21.95	21.79	20.40
	50RB-High (50)	2560	21.35	20.07	20.11
		2535	21.11	20.16	20.19
		2510	21.06	20.19	20.24
	50RB-Middle (25)	2560	21.12	20.25	20.26
		2535	20.96	20.02	20.02
		2510	21.05	19.94	19.96
	50RB-Low (0)	2560	21.21	20.56	20.17
		2535	21.08	20.15	20.14
		2510	21.02	19.71	19.71
	100RB (0)	2560	21.20	20.30	20.31
		2535	21.08	20.12	20.13
		2510	21.09	19.92	19.95

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Band 41					
Bandwidth (MHz)	RB allocation RB offset	Frequency (MHz)	Actual output power (dBm)		
			QPSK	16QAM	64QAM
5MHz	1RB-High (24)	2687.5	23.53	22.22	20.94
		2640.3	23.48	22.11	21.11
		2593	23.17	21.75	20.69
		2545.8	23.30	21.88	20.57
		2498.5	23.19	21.92	20.58
	1RB-Middle (12)	2687.5	23.49	22.18	21.42
		2640.3	23.44	22.07	21.08
		2593	23.33	21.83	21.07
		2545.8	23.27	21.84	20.52
		2498.5	23.30	21.92	21.18
	1RB-Low (0)	2687.5	23.51	22.26	21.43
		2640.3	23.28	22.01	21.10
		2593	23.21	21.89	21.08
		2545.8	23.15	21.92	21.11
		2498.5	23.32	22.01	21.17
	12RB-High (13)	2687.5	22.50	21.69	20.32
		2640.3	22.39	21.52	20.38
		2593	22.23	21.30	20.15
		2545.8	22.24	21.29	20.24
		2498.5	22.24	21.35	20.01
	12RB-Middle (6)	2687.5	22.53	21.60	20.46
		2640.3	22.36	21.57	20.53
		2593	22.21	21.28	20.35
		2545.8	22.23	21.29	20.39
		2498.5	22.26	21.38	20.13
	12RB-Low (0)	2687.5	22.52	21.63	20.32
		2640.3	22.41	21.44	20.36
		2593	22.25	21.27	20.22
		2545.8	22.25	21.30	20.27
		2498.5	22.23	21.34	19.99
	25RB (0)	2687.5	22.52	21.74	20.36
		2640.3	22.42	21.56	20.39
		2593	22.22	21.35	20.22
		2545.8	22.25	21.35	20.27
		2498.5	22.23	21.45	20.03

10MHz	1RB-High (49)	2685	23.58	22.24	20.87
		2639	23.45	22.16	21.18
		2593	23.21	21.83	20.55
		2547	23.34	22.17	21.16
		2501	23.17	21.79	20.58
	1RB-Middle (24)	2685	23.67	22.19	20.82
		2639	23.42	22.21	20.94
		2593	23.30	21.82	21.03
		2547	23.24	22.14	21.11
		2501	23.25	21.88	21.07
	1RB-Low (0)	2685	23.61	22.32	21.45
		2639	22.90	22.24	20.98
		2593	23.31	21.98	21.07
		2547	23.18	22.13	21.10
		2501	23.36	21.97	21.18
	25RB-High (25)	2685	22.72	21.67	20.89
		2639	22.55	21.63	20.66
		2593	22.34	21.31	20.49
		2547	22.31	21.62	20.60
		2501	22.26	21.36	20.23
	25RB-Middle (12)	2685	22.58	21.75	20.73
		2639	22.40	21.65	20.49
		2593	22.41	21.31	20.40
		2547	22.17	21.55	20.45
		2501	22.28	21.40	20.06
	25RB-Low (0)	2685	22.62	21.76	20.65
		2639	22.51	21.64	20.42
		2593	22.38	21.42	20.37
		2547	22.19	21.55	20.37
		2501	22.31	21.41	19.96
	50RB (0)	2685	22.62	21.69	20.74
		2639	22.43	21.49	20.51
		2593	22.28	21.36	20.40
		2547	22.30	21.52	20.45
		2501	22.15	21.33	20.06
15MHz	1RB-High (74)	2682.5	23.52	22.41	20.87
		2637.8	23.23	22.47	21.04
		2593	23.09	21.79	20.59
		2548.3	23.25	22.24	20.60
		2503.5	23.14	22.10	20.67
	1RB-Middle (37)	2682.5	23.68	22.52	20.90
		2637.8	23.20	22.46	20.92
		2593	23.32	21.83	20.59
		2548.3	23.25	22.02	21.12
		2503.5	23.20	22.03	20.52
	1RB-Low (0)	2682.5	23.62	22.51	21.48
		2637.8	23.29	22.32	20.86
		2593	23.30	21.99	21.17
		2548.3	23.26	22.15	21.04
		2503.5	23.24	22.14	21.10
	36RB-High (38)	2682.5	22.62	21.69	20.78
		2637.8	22.37	21.62	20.58
		2593	22.20	21.29	20.36
		2548.3	22.46	21.51	20.49
		2503.5	22.27	21.29	20.16

	36RB-Middle (19)	2682.5	22.66	21.81	20.64
		2637.8	22.24	21.52	20.43
		2593	22.21	21.26	20.34
		2548.3	22.40	21.41	20.39
		2503.5	22.27	21.35	19.99
	36RB-Low (0)	2682.5	22.74	21.70	20.75
		2637.8	22.40	21.50	20.63
		2593	22.27	21.35	20.59
		2548.3	22.35	21.43	20.57
		2503.5	22.21	21.38	20.14
	75RB (0)	2682.5	22.62	21.75	20.79
		2637.8	22.39	21.51	20.63
		2593	22.17	21.43	20.50
		2548.3	22.32	21.42	20.55
		2503.5	22.22	21.41	20.18
20MHz	1RB-High (99)	2680	23.50	22.24	21.39
		2636.5	23.33	22.35	21.07
		2593	23.10	21.83	20.94
		2549.5	23.38	21.96	20.61
		2506	23.11	21.68	20.54
	1RB-Middle (50)	2680	23.54	22.18	21.42
		2636.5	23.28	22.32	20.84
		2593	23.21	21.87	21.03
		2549.5	23.31	21.85	21.12
		2506	23.13	21.81	20.62
	1RB-Low (0)	2680	23.61	22.33	21.51
		2636.5	23.27	22.21	20.85
		2593	23.37	21.95	21.14
		2549.5	23.22	21.90	21.09
		2506	22.81	21.97	21.16
	50RB-High (50)	2680	22.60	21.68	20.95
		2636.5	22.33	21.55	20.78
		2593	22.19	21.31	20.50
		2549.5	22.30	21.44	20.64
		2506	22.22	21.29	20.24
	50RB-Middle (25)	2680	22.50	21.73	20.77
		2636.5	22.29	21.50	20.61
		2593	22.26	21.46	20.49
		2549.5	22.19	21.45	20.53
		2506	22.12	21.36	20.02
	50RB-Low (0)	2680	22.52	21.84	20.86
		2636.5	22.38	21.47	20.82
		2593	22.28	21.40	20.76
		2549.5	22.26	21.36	20.72
		2506	22.30	21.35	20.15
	100RB (0)	2680	22.61	21.73	20.89
		2636.5	22.40	21.54	20.77
		2593	22.29	21.42	20.62
		2549.5	22.20	21.44	20.66
		2506	22.16	21.37	20.18

11.4 Wi-Fi and BT Measurement result

When the same transmission mode configurations have the same maximum output power on the same channel for the 802.11 a/n/ac/ax modes, the channel in the lower order/sequence 802.11 mode (i.e. a, n, ac then ax) is selected. Therefore the SAR measurements performed for the 802.11n/ac modes, as the lowest order modulation, cover 802.11ax modes.

When the specified maximum output power is the same for both UNII 1 and UNII 2A, begin SAR measurements in UNII 2A with the channel with the highest measured output power. If the reported SAR for UNII 2A is ≤ 1.2 W/kg, SAR is not required for UNII 1; otherwise treat the remaining bands separately and test them independently for SAR.

According to KDB 248227 D01, simultaneous SAR provisions in KDB 447498 D01 apply to determine simultaneous transmission SAR test exclusion for Wi-Fi MIMO. If the sum of 1-g single transmission chain SAR measurements is<1.6W/kg and/or the MIMO output power is equal or less than a single chain, then no additional SAR measurements for simultaneously at the specified maximum output power of MIMO operation.

When antennas are spatially separated to the extent that SAR distributions do not overlap and can be treated independently, SAR compliance for simultaneous transmission is determined separately for each individual antenna.

The maximum output power for WiFi 2.4G

	Mode	Channel	Frequency (MHz)	power setting	tune up
2.4GHz WLAN	802.11b 1Mbps	1	2412	16	**17**
		6	2437	**16**	**17**
		11	2462	16	**17**
	802.11b 2Mbps	1	2412	16	**17**
		6	2437	16	**17**
		11	2462	16	**17**
	802.11b 5.5Mbps	1	2412	16	**17**
		6	2437	16	**17**
		11	2462	16	**17**
	802.11b 11Mbps	1	2412	16	**17**
		6	2437	16	**17**
		11	2462	16	**17**
	802.11g 6Mbps	1	2412	14	**15**
		6	2437	14	**15**
		11	2462	14	**15**
	802.11g 9Mbps	1	2412	14	**15**
		6	2437	14	**15**
		11	2462	14	**15**
	802.11g 12Mbps	1	2412	14	**15**
		6	2437	14	**15**
		11	2462	14	**15**
	802.11g 18Mbps	1	2412	14	**14.5**

		6	2437	14	**14.5**
		11	2462	14	**14.5**
	802.11g 24Mbps	1	2412	14	**14.5**
		6	2437	14	**14.5**
		11	2462	14	**14.5**
	802.11g 36Mbps	1	2412	14	**14.5**
		6	2437	14	**14.5**
		11	2462	14	**14.5**
	802.11g 48Mbps	1	2412	14	**14.5**
		6	2437	14	**14.5**
		11	2462	14	**14.5**
	802.11g 54Mbps	1	2412	14	**14.5**
		6	2437	14	**14.5**
		11	2462	14	**14.5**
	802.11n-HT20 MCS0	1	2412	14	**16**
		6	2437	14	**16**
		11	2462	14	**16**
	802.11n-HT20 MCS1	1	2412	14	**16**
		6	2437	14	**16**
		11	2462	14	**16**
	802.11n-HT20 MCS2	1	2412	14	**16**
		6	2437	14	**16**
		11	2462	14	**16**
	802.11n-HT20 MCS3	1	2422	14	**14.5**
		6	2442	14	**14.5**
		11	2462	14	**14.5**
	802.11n-HT20 MCS4	1	2412	14	**14.5**
		6	2437	14	**14.5**
		11	2462	14	**14.5**
	802.11n-HT20 MCS5	1	2412	14	**14.5**
		6	2437	14	**14.5**
		11	2462	14	**14.5**
	802.11n-HT20 MCS6	1	2412	14	**14.5**
		6	2437	14	**14.5**
		11	2462	14	**14.5**
	802.11n-HT20 MCS7	1	2412	14	**14.5**
		6	2437	14	**14.5**
		11	2462	14	**14.5**

The maximum output power for WiFi 5G

	Mode	Channel	Frequency (MHz)	power setting(dBm)	tune up (dBm)
5GHz WLAN	802.11a 6Mbps	36-64	5180-5320	16	**17**
		100-144	5500-5720	16	**17**
		149-165	5745-5825	16	**17**
	802.11a 9Mbps	36-64	5180-5320	16	**16.5**
		100-144	5500-5720	16	**16.5**
		149-165	5745-5825	16	**16.5**
	802.11a 12Mbps	36-64	5180-5320	16	**16.5**
		100-144	5500-5720	16	**16.5**
		149-165	5745-5825	16	**16.5**
	802.11a 18Mbps	36-64	5180-5320	16	**16.5**
		100-144	5500-5720	16	**16.5**
		149-165	5745-5825	16	**16.5**
	802.11a 24Mbps	36-64	5180-5320	16	**16**
		100-144	5500-5720	16	**16**
		149-165	5745-5825	16	**16**
	802.11a 36Mbps	36-64	5180-5320	14	**15**
		100-144	5500-5720	14	**15**
		149-165	5745-5825	14	**15**
	802.11a 48Mbps	36-64	5180-5320	14	**15**
		100-144	5500-5720	14	**15**
		149-165	5745-5825	14	**15**
	802.11a 54Mbps	36-64	5180-5320	14	**15**
		100-144	5500-5720	14	**15**
		149-165	5745-5825	14	**15**
	802.11n-HT20 MCS0	36-64	5180-5320	16	**17**
		100-144	5500-5720	16	**17**
		149-165	5745-5825	16	**17**
	802.11n-HT20 MCS1	36-64	5180-5320	16	**16.5**
		100-144	5500-5720	16	**16.5**
		149-165	5745-5825	16	**16.5**
	802.11n-HT20 MCS2	36-64	5180-5320	16	**16.5**
		100-144	5500-5720	16	**16.5**
		149-165	5745-5825	16	**16.5**
	802.11n-HT20 MCS3	36-64	5180-5320	16	**16.5**
		100-144	5500-5720	16	**16.5**
		149-165	5745-5825	16	**16.5**
	802.11n-HT20 MCS4	36-64	5180-5320	16	**16**
		100-144	5500-5720	16	**16**

		149-165	5745-5825	16	**16**
	802.11n-HT20 MCS5	36-64	5180-5320	14	**15**
		100-144	5500-5720	14	**15**
		149-165	5745-5825	14	**15**
	802.11n-HT20 MCS6	36-64	5180-5320	14	**15**
		100-144	5500-5720	14	**15**
		149-165	5745-5825	14	**15**
	802.11n-HT20 MCS7	36-64	5180-5320	14	**15**
		100-144	5500-5720	14	**15**
		149-165	5745-5825	14	**15**
	802.11n-HT40 MCS0	36-64	5180-5320	16	**17**
		100-144	5500-5720	16	**17**
		149-165	5745-5825	16	**17**
	802.11n-HT40 MCS1	36-64	5180-5320	16	**16**
		100-144	5500-5720	16	**16**
		149-165	5745-5825	16	**16**
	802.11n-HT40 MCS2	36-64	5180-5320	16	**16**
		100-144	5500-5720	16	**16**
		149-165	5745-5825	16	**16**
	802.11n-HT40 MCS3	36-64	5180-5320	16	**16**
		100-144	5500-5720	16	**16**
		149-165	5745-5825	16	**16**
	802.11n-HT40 MCS4	36-64	5180-5320	16	**16**
		100-144	5500-5720	16	**16**
		149-165	5745-5825	16	**16**
	802.11n-HT40 MCS5	36-64	5180-5320	14	**14**
		100-144	5500-5720	14	**14**
		149-165	5745-5825	14	**14**
	802.11n-HT40 MCS6	36-64	5180-5320	14	**14**
		100-144	5500-5720	14	**14**
		149-165	5745-5825	14	**14**
	802.11n-HT40 MCS7	36-64	5180-5320	14	**14**
		100-144	5500-5720	14	**14**
		149-165	5745-5825	14	**14**
	802.11AC-HT20 MCS0	36-64	5180-5320	15	**16**
		100-144	5500-5720	15	**16**
		149-165	5745-5825	15	**16**
	802.11AC-HT20 MCS1	36-64	5180-5320	15	**16**
		100-144	5500-5720	15	**16**
		149-165	5745-5825	15	**16**
	802.11AC-HT20	36-64	5180-5320	15	**16**

	MCS2	100-144	5500-5720	15	**16**
		149-165	5745-5825	15	**16**
	802.11AC-HT20 MCS3	36-64	5180-5320	15	**15**
		100-144	5500-5720	15	**15**
		149-165	5745-5825	15	**15**
	802.11AC-HT20 MCS4	36-64	5180-5320	15	**15**
		100-144	5500-5720	15	**15**
		149-165	5745-5825	15	**15**
	802.11AC-HT20 MCS5	36-64	5180-5320	14	**14.5**
		100-144	5500-5720	14	**14.5**
		149-165	5745-5825	14	**14.5**
	802.11AC-HT20 MCS6	36-64	5180-5320	14	**14.5**
		100-144	5500-5720	14	**14.5**
		149-165	5745-5825	14	**14.5**
	802.11AC-HT20 MCS7	36-64	5180-5320	14	**14.5**
		100-144	5500-5720	14	**14.5**
		149-165	5745-5825	14	**14.5**
	802.11AC-HT20 MCS8	36-64	5180-5320	14	**14.5**
		100-144	5500-5720	14	**14.5**
		149-165	5745-5825	14	**14.5**
	802.11AC-HT40 MCS0	36-64	5180-5320	15	**16**
		100-144	5500-5720	15	**16**
		149-165	5745-5825	15	**16**
	802.11AC-HT40 MCS1	36-64	5180-5320	15	**15**
		100-144	5500-5720	15	**15**
		149-165	5745-5825	15	**15**
	802.11AC-HT40 MCS2	36-64	5180-5320	15	**15**
		100-144	5500-5720	15	**15**
		149-165	5745-5825	15	**15**
	802.11AC-HT40 MCS3	36-64	5180-5320	15	**14.5**
		100-144	5500-5720	15	**14.5**
		149-165	5745-5825	15	**14.5**
	802.11AC-HT40 MCS4	36-64	5180-5320	15	**14**
		100-144	5500-5720	15	**14**
		149-165	5745-5825	15	**14**
	802.11AC-HT40 MCS5	36-64	5180-5320	13	**13.5**
		100-144	5500-5720	13	**13.5**
		149-165	5745-5825	13	**13.5**
	802.11AC-HT40 MCS6	36-64	5180-5320	13	**13.5**
		100-144	5500-5720	13	**13.5**
		149-165	5745-5825	13	**13.5**

	802.11AC-HT40 MCS7	36-64	5180-5320	13	**13.5**
		100-144	5500-5720	13	**13.5**
		149-165	5745-5825	13	**13.5**
	802.11AC-HT40 MCS8	36-64	5180-5320	13	**13.5**
		100-144	5500-5720	13	**13.5**
		149-165	5745-5825	13	**13.5**
	802.11AC-HT40 MCS9	36-64	5180-5320	13	**13.5**
		100-144	5500-5720	13	**13.5**
		149-165	5745-5825	13	**13.5**
	802.11AC-HT80 MCS0	36-64	5180-5320	15	**16**
		100-144	5500-5720	15	**16**
		149-165	5745-5825	15	**16**
	802.11AC-HT80 MCS1	36-64	5180-5320	15	**14**
		100-144	5500-5720	15	**14**
		149-165	5745-5825	15	**14**
	802.11AC-HT80 MCS2	36-64	5180-5320	15	**13.5**
		100-144	5500-5720	15	**13.5**
		149-165	5745-5825	15	**13.5**
	802.11AC-HT80 MCS3	36-64	5180-5320	15	**13**
		100-144	5500-5720	15	**13**
		149-165	5745-5825	15	**13**
	802.11AC-HT80 MCS4	36-64	5180-5320	15	**12.5**
		100-144	5500-5720	15	**12.5**
		149-165	5745-5825	15	**12.5**
	802.11AC-HT80 MCS5	36-64	5180-5320	13	**14**
		100-144	5500-5720	13	**14**
		149-165	5745-5825	13	**14**
	802.11AC-HT80 MCS6	36-64	5180-5320	13	**14**
		100-144	5500-5720	13	**14**
		149-165	5745-5825	13	**14**
	802.11AC-HT80 MCS7	36-64	5180-5320	13	**14**
		100-144	5500-5720	13	**14**
		149-165	5745-5825	13	**14**
	802.11AC-HT80 MCS8	36-64	5180-5320	13	**14**
		100-144	5500-5720	13	**14**
		149-165	5745-5825	13	**14**
	802.11AC-HT80 MCS9	36-64	5180-5320	13	**14**
		100-144	5500-5720	13	**14**
		149-165	5745-5825	13	**13**

The average conducted power for Wi-Fi is as following:

2.4G normal power

FCC 2.4G									
802.11b	Channel\data rate	1Mbps	2Mbps	5.5Mbps	11Mbps				
WLAN2450	11(2462MHz)	16.50	16.47	16.40	16.34				
	6(2437(MHz)	15.52	/	/	/				
	1(2412MHz)	15.43	/	/	/				
	Tune up	17.00	17.00	17.00	17.00				
802.11g	Channel\data rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
WLAN2450	11(2462MHz)	14.96	14.93	14.28	14.26	14.14	14.03	13.71	13.70
	6(2437(MHz)	13.98	/	/	/	/	/	/	/
	1(2412MHz)	13.89	/	/	/	/	/	/	/
	Tune up	15.00	15.00	15.00	14.50	14.50	14.50	14.50	14.50
802.11n-20MHz	Channel\data rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
WLAN2450	11(2462MHz)	15.67	15.56	15.19	14.09	14.03	14.02	14.14	13.86
	6(2437(MHz)	14.73	/	/	/	/	/	/	/
	1(2412MHz)	14.60	/	/	/	/	/	/	/
	Tune up	16.00	16.00	16.00	14.50	14.50	14.50	14.50	14.50

2.4G low power

FCC 2.4G									
802.11b	Channel\data rate	1Mbps	2Mbps	5.5Mbps	11Mbps				
WLAN2450	11(2462MHz)	12.46	12.11	12.14	11.97				
	6(2437(MHz)	12.32	/	/	/				
	1(2412MHz)	11.77	/	/	/				
	Tune up	13.50	13.50	13.50	13.50				
802.11g	Channel\data rate	6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
WLAN2450	11(2462MHz)	11.57	11.37	11.33	11.26	11.18	11.12	9.62	9.55
	6(2437(MHz)	11.52	/	/	/	/	/	/	/
	1(2412MHz)	11.01	/	/	/	/	/	/	/
	Tune up	11.57	11.37	11.33	11.26	11.18	11.12	9.62	9.55
802.11n-20MHz	Channel\data rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
WLAN2450	11(2462MHz)	12.30	11.21	10.70	10.18	10.03	8.85	8.79	8.76
	6(2437(MHz)	12.29	/	/	/	/	/	/	/
	1(2412MHz)	11.73	/	/	/	/	/	/	/
	Tune up	12.50	12.00	12.00	11.00	11.00	10.00	10.50	10.00

5G normal power

802.11n(dBm)-40MHz								
Channel\data rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
38(5190 MHz)	16.63	15.41	15.36	15.22	15.20	14.01	14.03	13.51
46(5230 MHz)	16.55	/	/	/	/	/	/	/
54(5270 MHz)	16.62	15.96	15.91	15.82	15.71	13.47	13.45	13.31
62(5310 MHz)	16.52	/	/	/	/	/	/	/
102(5510 MHz)	16.29	/	/	/	/	/	/	/
110(5550 MHz)	16.09	/	/	/	/	/	/	/
118(5590 MHz)	16.17	/	/	/	/	/	/	/
126(5630 MHz)	16.44	14.94	14.87	14.73	14.68	13.40	13.42	12.87
134(5670 MHz)	16.22	/	/	/	/	/	/	/
142(5710 MHz)	15.85	/	/	/	/	/	/	/
151(5755 MHz)	16.47	/	/	/	/	/	/	/
159(5795 MHz)	16.85	15.58	15.45	15.24	15.20	13.98	14.00	13.43
Tune up	**17.00**	**16.00**	**16.00**	**16.00**	**16.00**	**14.00**	**14.00**	**14.00**

5G Low power

802.11n(dBm)-40MHz								
Channel\data rate	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
38(5190 MHz)	11.53	9.83	10.47	10.39	10.13	10.08	10.05	9.52
46(5230 MHz)	10.69							
54(5270 MHz)	11.07	10.28	11.40	11.35	10.55	10.54	10.52	9.00
62(5310 MHz)	10.46							
102(5510 MHz)	11.01							
110(5550 MHz)	11.02							
118(5590 MHz)	10.97							
126(5630 MHz)	11.35	9.85	10.35	10.25	9.92	9.91	9.89	8.09
134(5670 MHz)	10.96							
142(5710 MHz)	10.53							
151(5755 MHz)	10.14							
159(5795 MHz)	11.23	10.53	11.07	11.00	10.75	10.70	10.66	9.58
Tune up	**12.00**	**11.50**	**11.50**	**11.50**	**11.50**	**11.50**	**11.50**	**10.00**

12 Antenna Location

12.1 Transmit Antenna Separation Distances

The detail for transmit antenna separation distances is described in the additional document: Appendix to test report No.I21Z70460-SEM01 The photos of SAR test

12.2 SAR Measurement Positions

According to the KDB941225 D06 Hot Spot SAR v01, 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
Main	Yes	Yes	Yes	Yes	No	Yes
WIFI	Yes	Yes	No	Yes	Yes	No

12.3 Standalone SAR Test Exclusion Considerations

Standalone 1-g head or body SAR evaluation by measurement or numerical simulation is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied.
The 1-g SAR test exclusion threshold for 100 MHz to 6 GHz at test separation distances≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR, where

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

Standalone SAR test exclusion considerations

Band/Mode	F(GHz)	Position	SAR test exclusion threshold(mW)	RF output power		SAR test exclusion
				dBm	mW	
2.4GHz WLAN	2.45	Head	9.58	12	15.85	No
		Body	19.17	16	39.81	No
5GHz WLAN	5.2	Head	6.58	12	15.85	No
		Body	13.16	16	39.81	No
	5.3	Head	6.52	12	15.85	No
		Body	13.03	16	39.81	No
	5.6	Head	6.34	12	15.85	No
		Body	12.68	16	39.81	No
	5.8	Head	6.23	12	15.85	No
		Body	12.46	16	39.81	No

When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance,mm)]·[√f(GHz)/x] W/kg for test separation distances ≤ 50 mm;

where x = 7.5 for 1-g SAR.

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion

13 SAR Test Result

Note:

KDB 447498 D01 General RF Exposure Guidance:

For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor

For BT/WLAN: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor

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

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

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

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

KDB 648474 D04 Handset SAR:

With headset attached, when the reported SAR for body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a headset attached to the handset.

KDB 941225 D01 SAR test for 3G devices:

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

KDB 941225 D05 SAR for LTE Devices:

SAR test reduction is applied using the following criteria:

Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB, and 50% 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 for other Channels is performed at the highest output power level for 1RB, and 50% RB configuration for that channel.

Testing for 100% RB configuration is performed at the highest output power level for 100% RB configuration across the Low,Mid and High Channel when the highest reported SAR for 1 RB and 50% RB are > 0.8 W/kg. Testing for the remaining required channels is not needed because the reported SAR for 100% RB Allocation < 1.45 W/kg.

Testing for 16-QAM modulation is not required because the reported SAR for QPSK is < 1.45 W/Kg and its output power is not more than 0.5 dB higher than that of QPSK.

Testing for the other channel bandwidths is not required because the reported SAR for the highest channel bandwidth is <1.45 W/Kg and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.

For LTE bands that do not support at least three non-overlapping channels in certain channel bandwidths, test the available non-overlapping channels instead. When a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the

group of overlapping channels should be selected for testing; therefore, the requirement for H, M and L channels may not fully apply.

KDB 248227 D01 SAR meas for 802.11:

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

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

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

When the reported SAR for the initial test position is:

≤ 0.4 W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and wireless mode combination within the frequency band or aggregated band. DSSS and OFDM configurations are considered separately according to the required SAR procedures.

> 0.4 W/kg, SAR is repeated using the same wireless mode test configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position, on the highest maximum output power channel, until the reported SAR is ≤ 0.8 W/kg or all required test positions are tested.

- For subsequent test positions with equivalent test separation distance or when exposure is dominated by coupling conditions, the position for maximum coupling condition should be tested.
- When it is unclear, all equivalent conditions must be tested.

For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is > 0.8 W/kg, measure the SAR for these positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required test channels are considered.

- The additional power measurements required for this step should be limited to those necessary for identifying subsequent highest output power channels to apply the test reduction.

When the specified maximum output power is the same for both UNII 1 and UNII 2A, begin SAR measurements in UNII 2A with the channel with the highest measured output power. If the reported SAR for UNII 2A is ≤ 1.2 W/kg, SAR is not required for UNII 1; otherwise treat the remaining bands separately and test them independently for SAR.

When the specified maximum output power is different between UNII 1 and UNII 2A, begin SAR

with the band that has the higher specified maximum output. If the highest reported SAR for the band with the highest specified power is ≤ 1.2 W/kg, testing for the band with the lower specified output power is not required; otherwise test the remaining bands independently for SAR.

Duty Cycle

Mode	Duty Cycle
Speech for GSM	1:8.3
GPRS&EGPRS 1 Slot	1:8.3
GPRS&EGPRS 2 Slot	1:4
GPRS&EGPRS 3 Slot	1:2.67
GPRS&EGPRS 4 Slot	1:2
WCDMA&LTE FDD	1:1
TDD PC3	1:1.58
TDD PC2	1:2.309

Ambient Temperature: 21.5-23.5 ℃ Liquid Temperature: 21.5-23.5 ℃

The evaluation of multi-SIM cards:

We'll perform the head measurement in all bands with the primary SIM depending on the evaluation of multi-SIM cards and retest on highest value point with other SIM. Then, repeat the measurement in the Body test.

Frequency		Side	Test Position	SIM cards	SAR(1g) (W/kg)	Power Drift(dB)
MHz	Ch.					
836.6	190	Left	Cheek	S1	0.197	-0.11
836.6	190	Left	Cheek	S2	0.192	0.01

Note: According to the values in the above table, the **S1** is the primary SIM card.

We'll perform the head measurement with the **S1** and retest on highest value point with others.

Frequency		Test Position	Spacing (mm)	SIM cards	SAR(1g) (W/kg)	Power Drift(dB)
MHz	Ch.					
836.6	190	Front	10	S1	0.143	0.12
836.6	190	Front	10	S2	0.139	0.02

Note: According to the values in the above table, the **S1** is the primary SIM card.

We'll perform the body measurement with the **S1** and retest on highest value point with others.

The evaluation of multi-Batteries:

We'll perform the head measurement in all bands with the primary battery depending on the evaluation of multi-batteries and retest on highest value point with other batteries. Then, repeat the measurement in the Body test.

Frequency		Side	Test Position	Battery	SAR(1g) (W/kg)	Power Drift(dB)
MHz	Ch.					
836.6	190	Left	Cheek	B1	0.197	-0.11
836.6	190	Left	Cheek	B2	0.189	0.05

Note: According to the values in the above table, the **B1** is the primary battery.

We'll perform the head measurement with the **B1** and retest on highest value point with others.

Frequency		Mode/Band	Position	Battery	SAR(1g) (W/kg)	Power Drift
MHz	Channel					
836.6	190	Front	10	B1	0.143	0.12
836.6	190	Front	10	B2	0.139	-0.14

Note: According to the values in the above table, the **B1** is the primary battery.
We'll perform the head measurement with the **B1** and retest on highest value point with others.

Note

S1: SIM1

S2: SIM2

S3: Single SIM card slot.

B1: The Battery of HQ-50SD

B2: The Battery of HQ-50N

13.1 SAR results for Cellular

Head

RF Exposure Conditions	Frequency Band	Channel Number	Frequency (MHz)	Mode/RB	Test Position	Distance	Figure No./Note	EUT Measured Power (dBm)	Tune up (dBm)	Measured SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Reported SAR 10g (W/kg)	Power Drift
Head	GSM850	251	848.8	VOIP(3TX)	Cheek Left	0mm	A.1	28.10	30	0.219	**0.34**	0.171	**0.27**	0.03
Head	GSM850	190	836.6	VOIP(3TX)	Cheek Left	0mm	\	28.16	30	0.197	**0.30**	0.154	**0.23**	-0.11
Head	GSM850	128	824.2	VOIP(3TX)	Cheek Left	0mm	\	28.21	30	0.153	**0.23**	0.122	**0.18**	-0.17
Head	GSM850	190	836.6	VOIP(3TX)	Tilt Left	0mm	\	28.16	30	0.09	**0.14**	0.019	**0.03**	0.09
Head	GSM850	190	836.6	VOIP(3TX)	Cheek Right	0mm	\	28.16	30	0.189	**0.29**	0.149	**0.23**	0.06
Head	GSM850	190	836.6	VOIP(3TX)	Tilt Right	0mm	\	28.16	30	0.14	**0.21**	0.112	**0.17**	-0.08
Head	GSM850	190	836.6	VOIP(3TX)	Cheek Left	0mm	S2	28.10	30	0.21	**0.33**	0.168	**0.26**	-0.01
Head	GSM850	190	836.6	VOIP(3TX)	Cheek Left	0mm	S3	28.10	30	0.206	**0.32**	0.159	**0.25**	0.14
Head	GSM850	190	836.6	VOIP(3TX)	Cheek Left	0mm	B2	28.10	30	0.209	**0.32**	0.165	**0.26**	0.02
Head	WCDMA 850	4233	846.6	RMC	Cheek Left	0mm	A.2	23.85	25	0.146	**0.19**	0.112	**0.15**	0.06
Head	WCDMA 850	4183	836.6	RMC	Cheek Left	0mm	\	23.88	25	0.138	**0.18**	0.107	**0.14**	-0.15
Head	WCDMA 850	4132	826.4	RMC	Cheek Left	0mm	\	23.88	25	0.111	**0.14**	0.085	**0.11**	-0.16
Head	WCDMA 850	4183	836.6	RMC	Tilt Left	0mm	\	23.88	25	0.073	**0.09**	0.059	**0.08**	0.02
Head	WCDMA 850	4183	836.6	RMC	Cheek Right	0mm	\	23.88	25	0.133	**0.17**	0.104	**0.13**	0.12
Head	WCDMA 850	4183	836.6	RMC	Tilt Right	0mm	\	23.88	25	0.093	**0.12**	0.075	**0.10**	0.00
Head	WCDMA 850	4233	846.6	RMC	Cheek Left	0mm	S2	23.85	25	0.142	**0.19**	0.109	**0.14**	0.16
Head	WCDMA 850	4233	846.6	RMC	Cheek Left	0mm	B2	23.85	25	0.134	**0.17**	0.103	**0.13**	-0.04
Head	LTE Band5	20600	844	1RB-Low	Cheek Left	0mm	A.3	24.18	25	0.18	**0.22**	0.14	**0.17**	-0.07
Head	LTE Band5	20600	844	1RB-Low	Tilt Left	0mm	\	24.18	25	0.103	**0.12**	0.084	**0.10**	0.14
Head	LTE Band5	20600	844	1RB-Low	Cheek Right	0mm	\	24.18	25	0.161	**0.19**	0.127	**0.15**	-0.10
Head	LTE Band5	20600	844	1RB-Low	Tilt Right	0mm	\	24.18	25	0.096	**0.12**	0.077	**0.09**	-0.17
Head	LTE Band5	20600	844	25RB-Middle	Cheek Left	0mm	\	23.54	24	0.166	**0.18**	0.128	**0.14**	0.02
Head	LTE Band5	20600	844	25RB-Middle	Tilt Left	0mm	\	23.54	24	0.095	**0.11**	0.078	**0.09**	-0.03
Head	LTE Band5	20600	844	25RB-Middle	Cheek Right	0mm	\	23.54	24	0.167	**0.19**	0.133	**0.15**	-0.16
Head	LTE Band5	20600	844	25RB-Middle	Tilt Right	0mm	\	23.54	24	0.112	**0.12**	0.089	**0.10**	-0.10
Head	LTE Band5	20600	844	1RB-Low	Cheek Left	0mm	S2	24.18	25	0.164	**0.20**	0.125	**0.15**	-0.13
Head	LTE Band5	20600	844	1RB-Low	Cheek Left	0mm	B2	24.18	25	0.15	**0.18**	0.112	**0.14**	0.05
Head	LTE Band7	21350	2560	1RB-Low	Cheek Left	0mm	\	22.19	23.5	0.205	**0.28**	0.126	**0.17**	-0.12
Head	LTE Band7	21350	2560	1RB-Low	Tilt Left	0mm	A.4	22.19	23.5	0.244	**0.33**	0.137	**0.19**	0.16
Head	LTE Band7	21350	2560	1RB-Low	Cheek Right	0mm	\	22.19	23.5	0.159	**0.21**	0.095	**0.13**	-0.16
Head	LTE Band7	21350	2560	1RB-Low	Tilt Right	0mm	\	22.19	23.5	0.163	**0.22**	0.099	**0.13**	0.16
Head	LTE Band7	21350	2560	50RB-High	Cheek Left	0mm	\	21.35	22.5	0.162	**0.21**	0.1	**0.13**	-0.01
Head	LTE Band7	21350	2560	50RB-High	Tilt Left	0mm	\	21.35	22.5	0.176	**0.23**	0.097	**0.13**	0.19
Head	LTE Band7	21350	2560	50RB-High	Cheek Right	0mm	\	21.35	22.5	0.135	**0.18**	0.083	**0.11**	0.01
Head	LTE Band7	21350	2560	50RB-High	Tilt Right	0mm	\	21.35	22.5	0.132	**0.17**	0.739	**0.96**	-0.02
Head	LTE Band7	21350	2560	1RB-Low	Tilt Left	0mm	S2	22.19	23.5	0.225	**0.30**	0.113	**0.15**	0.04
Head	LTE Band7	21350	2560	1RB-Low	Tilt Left	0mm	B2	22.19	23.5	0.231	**0.31**	0.124	**0.17**	0.01
Head	LTE Band41	41490	2680	1RB-Low	Cheek Left	0mm	\	23.61	24.5	0.174	**0.21**	0.1	**0.12**	-0.01
Head	LTE Band41	41490	2680	1RB-Low	Tilt Left	0mm	A.5	23.61	24.5	0.195	**0.24**	0.106	**0.13**	0.06
Head	LTE Band41	41490	2680	1RB-Low	Cheek Right	0mm	\	23.61	24.5	0.085	**0.10**	0.056	**0.07**	-0.11
Head	LTE Band41	41490	2680	1RB-Low	Tilt Right	0mm	\	23.61	24.5	0.069	**0.08**	0.043	**0.05**	-0.03
Head	LTE Band41	41490	2680	50RB-High	Cheek Left	0mm	\	22.60	23.5	0.141	**0.17**	0.082	**0.10**	0.01
Head	LTE Band41	41490	2680	50RB-High	Tilt Left	0mm	\	22.60	23.5	0.169	**0.21**	0.093	**0.11**	0.18
Head	LTE Band41	41490	2680	50RB-High	Cheek Right	0mm	\	22.60	23.5	0.076	**0.09**	0.046	**0.06**	-0.03
Head	LTE Band41	41490	2680	50RB-High	Tilt Right	0mm	\	22.60	23.5	0.062	**0.08**	0.034	**0.04**	-0.12
Head	LTE Band41	41490	2680	1RB-Low	Tilt Left	0mm	S2	23.61	24.5	0.175	**0.21**	0.101	**0.12**	0.08
Head	LTE Band41	41490	2680	1RB-Low	Tilt Left	0mm	B2	23.61	24.5	0.168	**0.21**	0.098	**0.12**	0.04

Body

RF Exposure Conditions	Frequency Band	Channel Number	Frequency (MHz)	Mode/RB	Test Position	Distance	Figure No./Note	EUT Measured Power (dBm)	Tune up (dBm)	Measured SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Reported SAR 10g (W/kg)	Power Drift
Body	GSM850	190	836.6	GPRS(3TX)	Front	10mm	\	28.16	30	0.143	**0.22**	0.113	**0.17**	0.12
Body	GSM850	251	848.8	GPRS(3TX)	Rear	10mm	\	28.10	30	0.23	**0.36**	0.184	**0.29**	-0.05
Body	GSM850	190	836.6	GPRS(3TX)	Rear	10mm	\	28.16	30	0.217	**0.33**	0.178	**0.27**	-0.06
Body	GSM850	128	824.2	GPRS(3TX)	Rear	10mm	A.6	28.21	30	0.204	**0.31**	0.184	**0.28**	-0.12
Body	GSM850	190	836.6	GPRS(3TX)	Left	10mm	\	28.16	30	0.114	**0.17**	0.095	**0.14**	0.00
Body	GSM850	190	836.6	GPRS(3TX)	Right	10mm	\	28.16	30	0.157	**0.24**	0.118	**0.18**	0.02
Body	GSM850	190	836.6	GPRS(3TX)	Bottom	10mm	\	28.16	30	0.109	**0.17**	0.079	**0.12**	-0.05
Body	GSM850	251	848.8	EGPRS(3TX)	Rear	10mm	\	28.06	30	0.22	**0.34**	0.179	**0.28**	-0.03
Body	GSM850	251	848.8	GPRS(3TX)	Rear	10mm	S2	28.10	30	0.221	**0.34**	0.176	**0.27**	-0.14
Body	GSM850	251	848.8	GPRS(3TX)	Rear	10mm	B2	28.10	30	0.225	**0.35**	0.18	**0.28**	0.03
Body	WCDMA 850	4183	836.6	RMC	Front	10mm	\	23.88	25	0.126	**0.16**	0.084	**0.11**	-0.13
Body	WCDMA 850	4233	846.6	RMC	Rear	10mm	\	23.85	25	0.234	**0.30**	0.144	**0.19**	0.02
Body	WCDMA 850	4183	836.6	RMC	Rear	10mm	A.7	23.88	25	0.241	**0.31**	0.155	**0.20**	0.04
Body	WCDMA 850	4132	826.4	RMC	Rear	10mm	\	23.88	25	0.225	**0.29**	0.137	**0.18**	-0.19
Body	WCDMA 850	4183	836.6	RMC	Left	10mm	\	23.88	25	0.062	**0.08**	0.049	**0.06**	-0.07
Body	WCDMA 850	4183	836.6	RMC	Right	10mm	\	23.88	25	0.102	**0.13**	0.071	**0.09**	0.12
Body	WCDMA 850	4183	836.6	RMC	Bottom	10mm	\	23.88	25	0.176	**0.23**	0.093	**0.12**	0.01
Body	WCDMA 850	4183	836.6	RMC	Rear	10mm	S2	23.88	25	0.237	**0.31**	0.148	**0.19**	-0.14
Body	WCDMA 850	4183	836.6	RMC	Rear	10mm	B2	23.88	25	0.227	**0.29**	0.142	**0.18**	0.11
Body	LTE Band5	20600	844	1RB-Low	Front	10mm	\	24.18	25	0.177	**0.21**	0.127	**0.15**	0.06
Body	LTE Band5	20600	844	1RB-Low	Rear	10mm	A.8	24.18	25	0.298	**0.36**	0.182	**0.22**	0.04
Body	LTE Band5	20600	844	1RB-Low	Left	10mm	\	24.18	25	0.153	**0.18**	0.101	**0.12**	-0.17
Body	LTE Band5	20600	844	1RB-Low	Right	10mm	\	24.18	25	0.202	**0.24**	0.133	**0.16**	0.14
Body	LTE Band5	20600	844	1RB-Low	Bottom	10mm	\	24.18	25	0.146	**0.18**	0.086	**0.10**	-0.10
Body	LTE Band5	20600	844	25RB-Middle	Front	10mm	\	23.54	24	0.152	**0.17**	0.094	**0.10**	0.13
Body	LTE Band5	20600	844	25RB-Middle	Rear	10mm	\	23.54	24	0.274	**0.30**	0.163	**0.18**	0.02
Body	LTE Band5	20600	844	25RB-Middle	Left	10mm	\	23.54	24	0.136	**0.15**	0.09	**0.10**	0.00
Body	LTE Band5	20600	844	25RB-Middle	Right	10mm	\	23.54	24	0.176	**0.20**	0.116	**0.13**	-0.10
Body	LTE Band5	20600	844	25RB-Middle	Bottom	10mm	\	23.54	24	0.132	**0.15**	0.076	**0.08**	-0.06
Body	LTE Band5	20600	844	1RB-Low	Rear	10mm	S2	24.18	25	0.285	**0.34**	0.175	**0.21**	0.00
Body	LTE Band5	20600	844	1RB-Low	Rear	10mm	B2	24.18	25	0.291	**0.35**	0.178	**0.21**	0.10
Body	LTE Band7	21350	2560	1RB-Low	Front	10mm	\	22.19	23.5	0.22	**0.30**	0.129	**0.17**	0.11
Body	LTE Band7	21350	2560	1RB-Low	Rear	10mm	A.9	22.19	23.5	0.396	**0.54**	0.226	**0.31**	0.02
Body	LTE Band7	21350	2560	1RB-Low	Left	10mm	\	22.19	23.5	0.259	**0.35**	0.148	**0.20**	-0.18
Body	LTE Band7	21350	2560	1RB-Low	Right	10mm	\	22.19	23.5	0.075	**0.10**	0.045	**0.06**	-0.12
Body	LTE Band7	21350	2560	1RB-Low	Bottom	10mm	\	22.19	23.5	0.375	**0.51**	0.191	**0.26**	0.06
Body	LTE Band7	21350	2560	50RB-High	Front	10mm	\	21.35	22.5	0.19	**0.25**	0.108	**0.14**	0.18
Body	LTE Band7	21350	2560	50RB-High	Rear	10mm	\	21.35	22.5	0.291	**0.38**	0.167	**0.22**	-0.13
Body	LTE Band7	21350	2560	50RB-High	Left	10mm	\	21.35	22.5	0.217	**0.28**	0.121	**0.16**	-0.13
Body	LTE Band7	21350	2560	50RB-High	Right	10mm	\	21.35	22.5	0.066	**0.09**	0.035	**0.05**	-0.16
Body	LTE Band7	21350	2560	50RB-High	Bottom	10mm	\	21.35	22.5	0.269	**0.35**	0.141	**0.18**	0.00
Body	LTE Band7	21100	2535	1RB-Low	Rear	10mm	S2	22.19	23.5	0.38	**0.51**	0.216	**0.29**	-0.04
Body	LTE Band7	21100	2535	1RB-Low	Rear	10mm	S3	22.19	23.5	0.374	**0.51**	0.208	**0.28**	0.03
Body	LTE Band7	21100	2535	1RB-Low	Rear	10mm	B2	22.19	23.5	0.383	**0.52**	0.22	**0.30**	-0.07
Body	LTE Band41	41490	2680	1RB-Low	Front	10mm	\	23.61	24.5	0.267	**0.33**	0.15	**0.18**	0.05
Body	LTE Band41	41490	2680	1RB-Low	Rear	10mm	A.10	23.61	24.5	0.427	**0.52**	0.231	**0.28**	0.07
Body	LTE Band41	41490	2680	1RB-Low	Left	10mm	\	23.61	24.5	0.288	**0.35**	0.167	**0.20**	-0.05
Body	LTE Band41	41490	2680	1RB-Low	Right	10mm	\	23.61	24.5	0.097	**0.12**	0.055	**0.07**	0.02
Body	LTE Band41	41490	2680	1RB-Low	Bottom	10mm	\	23.61	24.5	0.327	**0.40**	0.164	**0.20**	-0.08
Body	LTE Band41	41490	2680	50RB-High	Front	10mm	\	22.60	23.5	0.23	**0.28**	0.128	**0.16**	-0.17
Body	LTE Band41	41490	2680	50RB-High	Rear	10mm	\	22.60	23.5	0.331	**0.41**	0.184	**0.23**	0.07
Body	LTE Band41	41490	2680	50RB-High	Left	10mm	\	22.60	23.5	0.229	**0.28**	0.128	**0.16**	-0.15
Body	LTE Band41	41490	2680	50RB-High	Right	10mm	\	22.60	23.5	0.083	**0.10**	0.04	**0.05**	0.17
Body	LTE Band41	41490	2680	50RB-High	Bottom	10mm	\	22.60	23.5	0.283	**0.35**	0.142	**0.17**	-0.18
Body	LTE Band41	41490	2680	1RB-Low	Rear	10mm	S2	23.61	24.5	0.415	**0.51**	0.218	**0.27**	0.01
Body	LTE Band41	41490	2680	1RB-Low	Rear	10mm	B2	23.61	24.5	0.418	**0.51**	0.225	**0.28**	-0.13

13.2 SAR results for WLAN

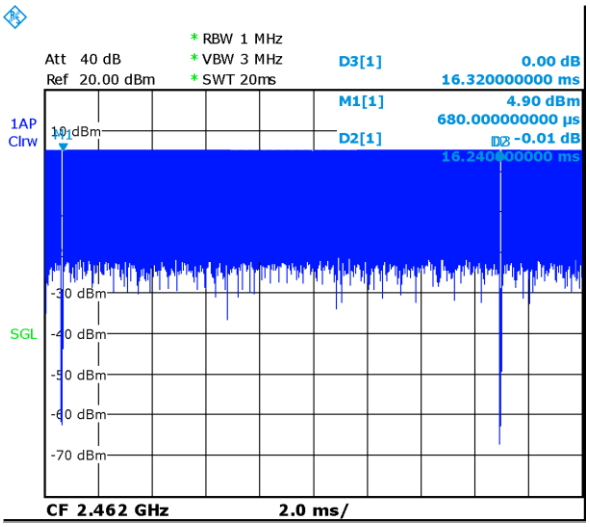
The maximum output power specified for production units are determined for all applicable 802.11 transmission modes in each standalone and aggregated frequency band. Maximum output power is measured for the highest maximum output power configuration(s) in each frequency band according to the default power measurement procedures.

When the same transmission mode configurations have the same maximum output power on the same channel for the 802.11 a/g/n/ac/ax modes, the channel in the lower order/sequence 802.11 mode (i.e. a, g, n ac then ax) is selected.

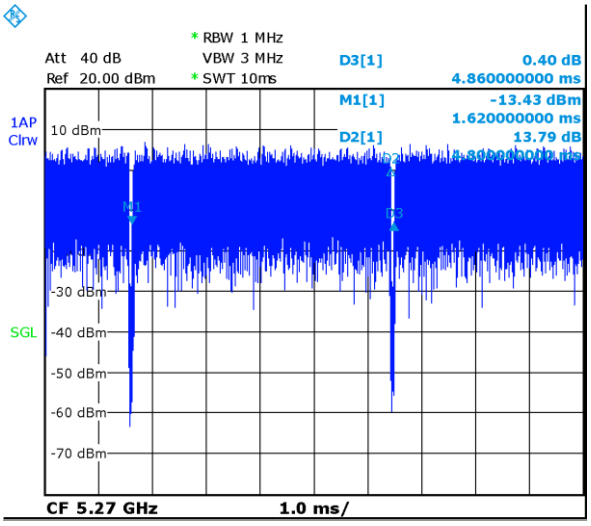
SAR Test reduction was applied from KDB 248227 guidance, when the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel in the initial test configuration, for each frequency band. Additional output power measurements were not deemed necessary.

Duty factor plot

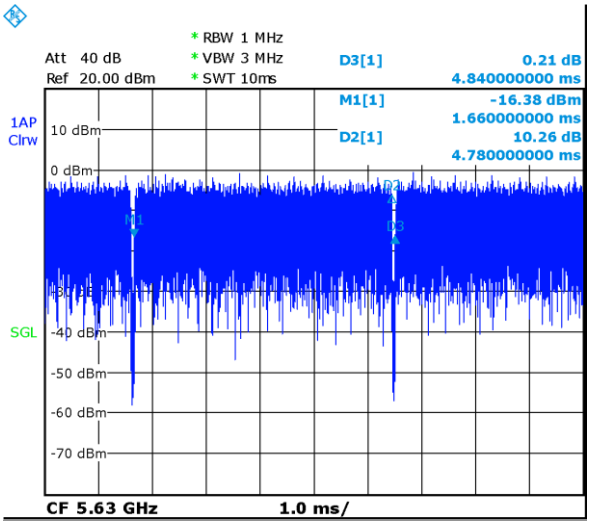
CH11



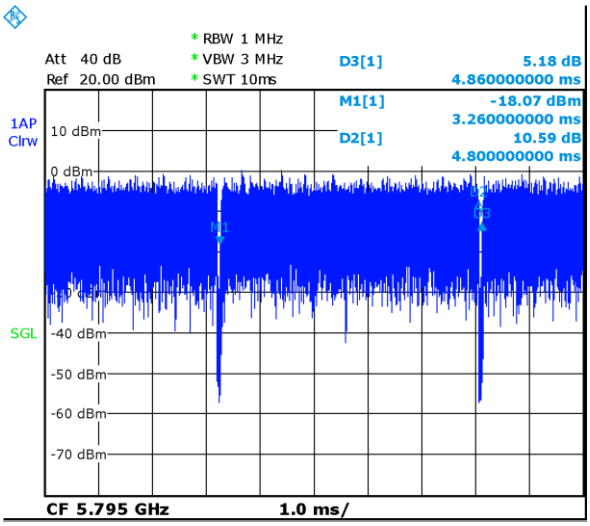
CH54



CH126



CH159



WLAN 2.4G

Test Position	Frequency Band	Channel Number	Frequency (MHz)	Mode/RB	Test Position	Distance	Figure No./Note	EUT Measured Power (dBm)	Tune up (dBm)	Duty Cycle	Duty Cycle scaling factor	Measured SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Reported SAR 10g (W/kg)	Power Drift
Head	WLAN 2.4G	11	2462	11b	Cheek Left	0mm	A.11	12.46	13.5	99.5%	1.01	0.099	**0.13**	0.052	**0.07**	0.14
Head	WLAN 2.4G	11	2462	11b	Tilt Left	0mm	\	12.46	13.5	99.5%	1.01	0.084	**0.11**	0.042	**0.05**	0.09
Head	WLAN 2.4G	11	2462	11b	Cheek Right	0mm	\	12.46	13.5	99.5%	1.01	0.038	**0.05**	0.022	**0.03**	0.1
Head	WLAN 2.4G	11	2462	11b	Tilt Right	0mm	\	12.46	13.5	99.5%	1.01	<0.01	**<0.01**	<0.01	**<0.01**	/
Head	WLAN 2.4G	11	2462	11b	Cheek Left	0mm	B2	12.46	13.5	99.5%	1.01	0.092	**0.12**	0.047	**0.06**	0.16
Body	WLAN 2.4G	11	2462	11b	Front	10mm	\	16.5	17	99.5%	1.01	0.065	**0.07**	0.036	**0.04**	0.12
Body	WLAN 2.4G	11	2462	11b	Rear	10mm	\	16.5	17	99.5%	1.01	0.088	**0.10**	0.046	**0.05**	-0.1
Body	WLAN 2.4G	11	2462	11b	Right	10mm	A.12	16.5	17	99.5%	1.01	0.102	**0.12**	0.053	**0.06**	0.09
Body	WLAN 2.4G	11	2462	11b	Top	10mm	\	16.5	17	99.5%	1.01	0.062	**0.07**	0.029	**0.03**	-0.18
Body	WLAN 2.4G	11	2462	11b	Rear	10mm	B2	16.5	17	99.5%	1.01	.0.094	**0.11**	0.047	**0.05**	0.04

WLAN 5G

Test Position	Frequency Band	Channel Number	Frequency (MHz)	Mode/RB	Test Position	Distance	Figure No./Note	EUT Measured Power (dBm)	Tune up (dBm)	Duty Cycle	Duty Cycle scaling factor	Measured SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Reported SAR 10g (W/kg)	Power Drift
Head	WLAN 5G	54	5270	11n 40M	Cheek Left	0mm	\	11.07	12	98.8%	1.01	0.285	**0.36**	0.086	**0.11**	0.08
Head	WLAN 5G	54	5270	11n 40M	Tilt Left	0mm	A.13	11.07	12	98.8%	1.01	0.378	**0.47**	0.107	**0.13**	0.07
Head	WLAN 5G	54	5270	11n 40M	Cheek Right	0mm	\	11.07	12	98.8%	1.01	0.246	**0.31**	0.074	**0.09**	-0.16
Head	WLAN 5G	54	5270	11n 40M	Tilt Right	0mm	\	11.07	12	98.8%	1.01	0.311	**0.39**	0.091	**0.11**	-0.18
Head	WLAN 5G	126	5630	11n 40M	Cheek Left	0mm	\	11.35	12	98.8%	1.01	0.155	**0.18**	0.040	**0.05**	-0.18
Head	WLAN 5G	126	5630	11n 40M	Tilt Left	0mm	\	11.35	12	98.8%	1.01	0.211	**0.25**	0.053	**0.06**	0.08
Head	WLAN 5G	126	5630	11n 40M	Cheek Right	0mm	\	11.35	12	98.8%	1.01	0.144	**0.17**	0.041	**0.05**	-0.08
Head	WLAN 5G	126	5630	11n 40M	Tilt Right	0mm	\	11.35	12	98.8%	1.01	0.175	**0.21**	0.049	**0.06**	0.02
Head	WLAN 5G	159	5795	11n 40M	Cheek Left	0mm	\	11.23	12	98.8%	1.01	0.194	**0.23**	0.045	**0.05**	-0.1
Head	WLAN 5G	159	5795	11n 40M	Tilt Left	0mm	\	11.23	12	98.8%	1.01	0.233	**0.28**	0.055	**0.07**	0.06
Head	WLAN 5G	159	5795	11n 40M	Cheek Right	0mm	\	11.23	12	98.8%	1.01	0.193	**0.23**	0.045	**0.05**	0.06
Head	WLAN 5G	159	5795	11n 40M	Tilt Right	0mm	\	11.23	12	98.8%	1.01	0.229	**0.28**	0.052	**0.06**	-0.02
Head	WLAN 5G	54	5270	11n 40M	Tilt Left	0mm	B2	11.07	12	98.8%	1.01	0.364	**0.46**	0.100	**0.13**	0.19
Body	WLAN 5G	54	5270	11n 40M	Front	10mm	\	16.62	17	98.8%	1.01	0.140	**0.15**	0.054	**0.06**	0.01
Body	WLAN 5G	54	5270	11n 40M	Rear	10mm	\	16.62	17	98.8%	1.01	0.307	**0.34**	0.117	**0.13**	-0.16
Body	WLAN 5G	54	5270	11n 40M	Right	10mm	\	16.62	17	98.8%	1.01	0.075	**0.08**	0.032	**0.04**	-0.14
Body	WLAN 5G	54	5270	11n 40M	Top	10mm	A.14	16.62	17	98.8%	1.01	0.548	**0.61**	0.188	**0.21**	0.01
Body	WLAN 5G	126	5630	11n 40M	Front	10mm	\	16.44	17	98.8%	1.01	0.085	**0.10**	0.030	**0.03**	-0.19
Body	WLAN 5G	126	5630	11n 40M	Rear	10mm	\	16.44	17	98.8%	1.01	0.248	**0.29**	0.089	**0.10**	0.12
Body	WLAN 5G	126	5630	11n 40M	Right	10mm	\	16.44	17	98.8%	1.01	0.058	**0.07**	0.020	**0.02**	-0.02
Body	WLAN 5G	126	5630	11n 40M	Top	10mm	\	16.44	17	98.8%	1.01	0.378	**0.44**	0.131	**0.15**	0.03
Body	WLAN 5G	159	5795	11n 40M	Front	10mm	\	16.85	17	98.8%	1.01	0.094	**0.10**	0.034	**0.04**	0.03
Body	WLAN 5G	159	5795	11n 40M	Rear	10mm	\	16.85	17	98.8%	1.01	0.200	**0.21**	0.076	**0.08**	-0.11
Body	WLAN 5G	159	5795	11n 40M	Right	10mm	\	16.85	17	98.8%	1.01	0.051	**0.05**	0.019	**0.02**	-0.14
Body	WLAN 5G	159	5795	11n 40M	Top	10mm	\	16.85	17	98.8%	1.01	0.336	**0.35**	0.119	**0.12**	0.12
Body	WLAN 5G	54	5270	11n 40M	Top	10mm	B2	16.62	17	98.8%	1.01	0.521	**0.55**	0.169	**0.19**	0.13

13.3 SAR Evaluation for Phablet

According to the KDB648474 D04, for smart phones, with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm, that can provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets and support voice calls next to the ear, unless it is confirmed otherwise through KDB inquiries, the following phablet procedures should be applied to evaluate SAR compliance for each applicable wireless modes and frequency band. Devices marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance.

1. The normally required head and body-worn accessory SAR test procedures for handsets, including hotspot mode, must be applied.
2. The UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge, in direct contact with a flat phantom, for 10-g extremity SAR according to the body-equivalent tissue dielectric parameters in KDB Publication 865664 D01 to address interactive hand use exposure conditions. When hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg; however, when power reduction applies to hotspot mode the measured SAR must be scaled to the maximum output power, including tolerance, allowed for phablet modes to compare with the 1.2 W/kg SAR test reduction threshold. The normal tablet procedures in KDB Publication 616217 are required when the overall diagonal dimension of the device is > 20.0 cm. Hotspot mode SAR is not required when normal tablet procedures are applied. Extremity 10-g SAR is also not required for the front (top) surface of larger form factor full size tablets. The more conservative normal tablet SAR results can be used to support phablet mode 10-g extremity SAR.
3. The simultaneous transmission operating configurations applicable to voice and data transmissions for both phone and mini-tablet modes must be taken into consideration separately for 1-g and 10-g SAR to determine the simultaneous transmission SAR test exclusion and measurement requirements for the relevant wireless modes and exposure conditions

14 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.

15 Evaluation of Simultaneous

15.1 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 WLAN and Bluetooth devices which may simultaneously transmit with the licensed transmitter. KDB 447498 D01 provides two procedures for determining simultaneous transmission SAR test exclusion: Sum of SAR and SAR to Peak Location Ratio (SPLSR)

15.1.1 Sum of SAR

To qualify for simultaneous transmission SAR test exclusion based upon Sum of SAR the sum of the reported standalone SARs for all simultaneously transmitting antennas shall be below the applicable standalone SAR limit. If the sum of the SARs is above the applicable limit then simultaneous transmission SAR test exclusion may still apply if the requirements of the SAR to Peak Location Ratio (SPLSR) evaluation are met.

15.1.2 SAR to Peak Location Ratio (SPLSR)

KDB 447498 D01 General RF Exposure Guidance explains how to calculate the SAR to Peak Location Ratio (SPLSR) between pairs of simultaneously transmitting antennas:

$SPLSR = (SAR1 + SAR2)^{1.5} / Ri$

Where:

SAR1 is the highest reported or estimated SAR for the first of a pair of simultaneous transmitting antennas, in a specific test operating mode and exposure condition.

SAR2 is the highest reported or estimated SAR for the second of a pair of simultaneous transmitting antennas, in the same test operating mode and exposure condition as the first .

Ri is the separation distance between the pair of simultaneous transmitting antennas. When the SAR is measured, for both antennas in the pair, it is determined by the actual x, y and z coordinates in the 1-g SAR for each SAR peak location, based on the extrapolated and interpolated result in the zoom scan measurement, using the formula of

$[(x1-x2)^2 + (y1-y2)^2 + (z1-z2)^2]$

In order for a pair of simultaneous transmitting antennas with the sum of 1-g SAR > 1.6 W/kg to qualify for exemption from Simultaneous Transmission SAR measurements, it has to satisfy the condition of:

$(SAR1 + SAR2)^{1.5} / Ri \leqslant 0.04$

When an individual antenna transmits at on two bands simultaneously, the sum of the highest reported SAR for the frequency bands should be used to determine SAR1 or SAR2. When SPLSR is necessary, the smallest distance between the peak SAR locations for the antenna pair with respect to the peaks from each antenna should be used.

15.2 Simultaneous Transmission Capabilities

The simultaneous transmission possibilities for this device are listed as below:

Capable Transmit Conf igurations	Head	Body
GSM/WCDMA/LTE + Wi-Fi 2.4G	Yes	Yes
GSM/WCDMA/LTE + Wi-Fi 5G	Yes	Yes

Note:

1. Wi-Fi 2.4GHz can transmit simultaneously.
2. Wi-Fi 2.4GHz & Wi-Fi 5GHz cannot transmit simultaneously.
3. WWAN cannot transmit simultaneously.
4. The reported SAR summation is calculated based on the same configuration and test position.
5. For the devices edges with antennas more than 2.5 cm from edge are not required to be evaluated for SAR, we determined the SAR of this edges were less than 0.01. For the convenience of simultaneous transmission calculation, all SAR values less than 0.01 are uniformly written as 0.00

15.3 SAR Simultaneous Transmission Analysis

Simultaneous Transmission Scenario

reported SAR 1g (W/kg)										
Head		GSM850	WCDMA 850	LTE Band5	LTE Band7	LTE Band41 PC3	2.4G	5G	Cellular+WiFi2.4G	Cellular+WiFi5G
Cheek	L	0.34	0.19	0.22	0.28	0.21	0.13	0.43	0.47	0.77
Tilt	L	0.14	0.09	0.12	0.33	0.24	0.11	0.57	0.44	0.90
Cheek	R	0.29	0.17	0.19	0.21	0.10	0.05	0.37	0.34	0.66
Tilt	R	0.21	0.12	0.12	0.22	0.08	<0.01	0.47	0.22	0.69

Body		GSM850	WCDMA 850	LTE Band5	LTE Band7	LTE Band41 PC3	2.4G	5G	Cellular+WiFi2.4G	Cellular+WiFi5G
Front	10mm	0.22	0.16	0.21	0.30	0.33	0.07	0.15	0.52	0.48
Rear	10mm	0.36	0.31	0.36	0.54	0.52	0.10	0.34	0.96	0.88
Left	10mm	0.17	0.08	0.18	0.35	0.35	/	/	0.35	0.35
Right	10mm	0.24	0.13	0.24	0.10	0.12	0.12	0.08	0.47	0.32
Bottom	10mm	0.17	0.23	0.18	0.51	0.40	/	/	0.63	0.51
Top	10mm	/	/	/	/	/	0.07	0.61	0.07	0.61

Note:

3. Estimated SAR for Bluetooth (see the section 12.3)

15.4 Conclusion

According to the above tables, the highest simultaneous transmission reported SAR values is **0.90W/kg (1g).** The sum of reported SAR values is<1.6W/kg. So the simultaneous transmission SAR with volume scans is not required.

16 Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be ≤ 30%, for a confidence interval of k = 2. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval.

Therefore, the measurement uncertainty is not required.

17 MAIN TEST INSTRUMENTS

No.	Name	Type	Serial Number	Calibration Date	Valid Period
01	Network analyzer	E5071C	MY46110673	January 14, 2021	One year
02	Power meter	NRP2	106276	May 11, 2021	One year
03	Power sensor	NRP6A	101369		
04	Signal Generator	E4438C	MY49070393	May 14, 2021	One Year
05	Amplifier	60S1G4	0331848	No Calibration Requested	
06	BTS	CMW500	159890	January 25 2021	One year
07	BTS	CMW500	166370	June 25, 2021	One year
08	E-field Probe	SPEAG EX3DV4	7464	December 18,2020	One year
09	DAE	SPEAG DAE4	549	January 08, 2021	One year
10	Dipole Validation Kit	SPEAG D835V2	4d069	July 12,,2021	One year
11	Dipole Validation Kit	SPEAG D2450V2	853	July 26,2021	One year
12	Dipole Validation Kit	SPEAG D2600V2	1012	July 26,2021	One year
13	Dipole Validation Kit	SPEAG D5GHzV2	1060	June 22,2021	One year

END OF REPORT BODY

Appendixes

Refer to separated files for the following appendixes

ANNEX A Graph Results

ANNEX B System Verification Results

ANNEX C SAR Measurement Setup

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

ANNEX E Equivalent Media Recipes

ANNEX F System Validation

ANNEX G Probe Calibration Certificate

ANNEX H Dipole Calibration Certificate

ANNEX I Accreditation Certificate

ANNEX A Graph Results

GSM850 Head

Date/Time: 11/4/2021

Electronics: DAE4 Sn549

Medium: H700-6000

Medium parameters used (interpolated): f = 848.8 MHz; σ = 0.915 S/m; ε_r = 43.893; ρ = 1000 kg/m^3

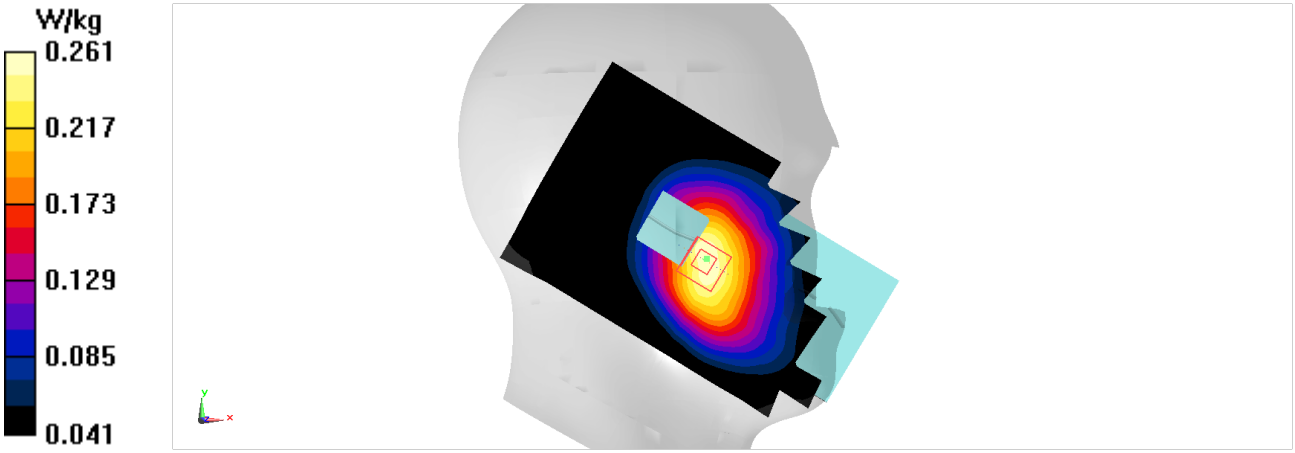
Ambient Temperature:23.3^{o}C Liquid Temperature: 22.5^{o}C

Communication System: UID 0, GSM 850 GPRS-3 (0) Frequency: 848.8 MHz Duty Cycle: 1:2.66993

Probe: EX3DV4 - SN7464 ConvF(10.43, 10.43, 10.43); Calibrated: 12/18/2020

Area Scan (81x141x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.259 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.146 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 0.282 W/kg
SAR(1 g) = 0.219 W/kg; SAR(10 g) = 0.171 W/kg
Maximum value of SAR (measured) = 0.261 W/kg



WCDMA850 Head

Date/Time: 9/9/2021

Electronics: DAE4 Sn549

Medium: H700-6000

Medium parameters used (interpolated): f = 846.6 MHz; σ = 0.893 S/m; ε_r = 45.113; ρ = 1000 kg/m^3

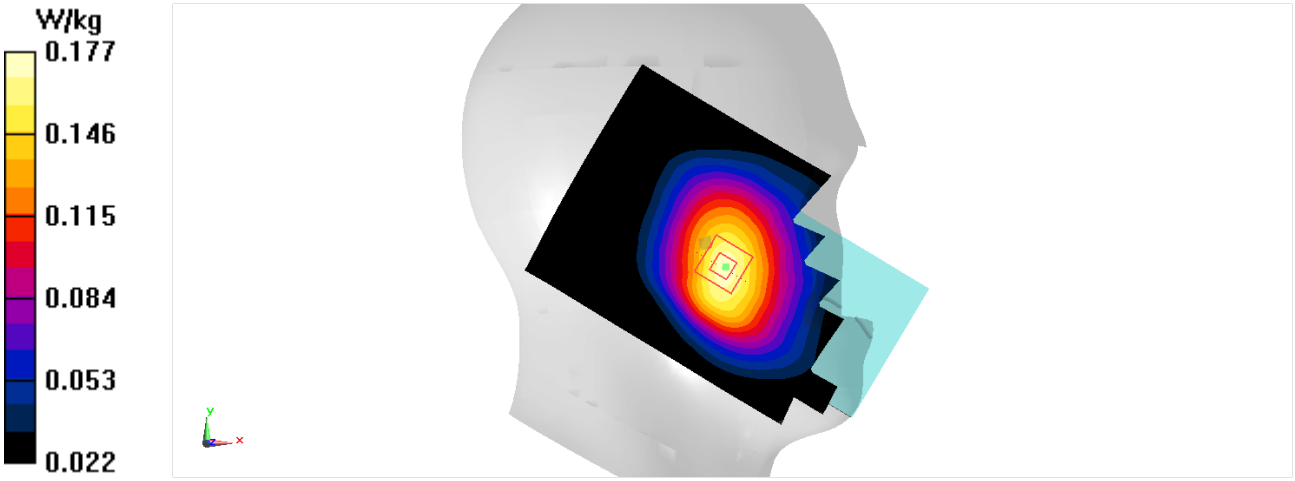
Ambient Temperature:23.3^{o}C Liquid Temperature: 22.5^{o}C

Communication System: UID 0, WCDMA 850 (0) Frequency: 846.6 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7464 ConvF(10.43, 10.43, 10.43); Calibrated: 12/18/2020

Area Scan (81x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.172 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.495 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.193 W/kg
SAR(1 g) = 0.146 W/kg; SAR(10 g) = 0.112 W/kg
Maximum value of SAR (measured) = 0.177 W/kg



LTE Band5 Head

Date/Time: 9/9/2021

Electronics: DAE4 Sn549

Medium: H700-6000

Medium parameters used (interpolated): f = 844 MHz; σ = 0.892 S/m; ε_r = 45.121; ρ = 1000 kg/m^3

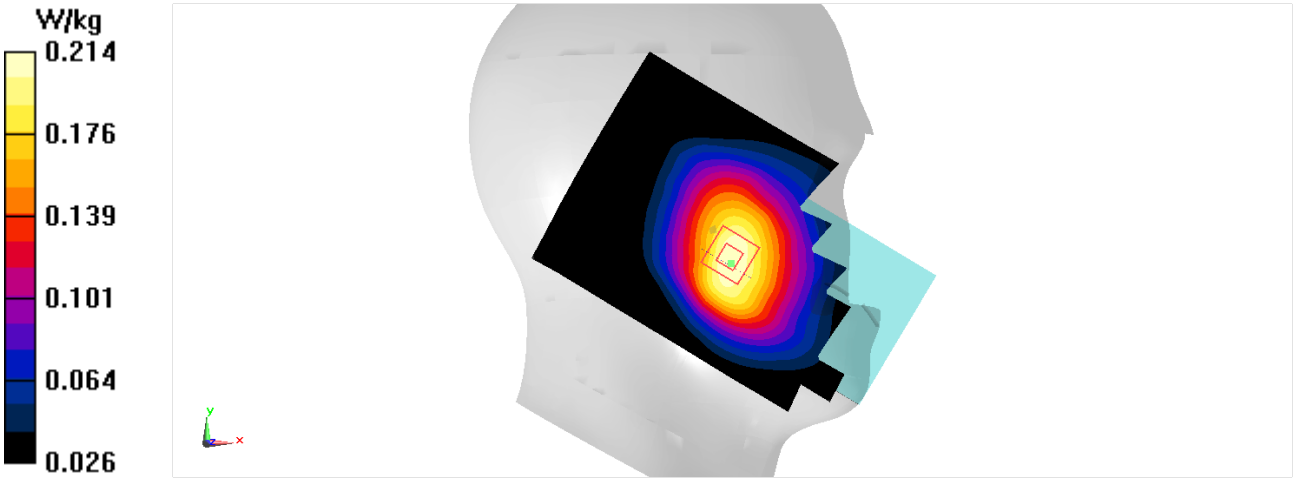
Ambient Temperature:23.3^{o}C Liquid Temperature: 22.5^{o}C

Communication System: UID 0, LTE Band5 (0) Frequency: 844 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7464 ConvF(10.43, 10.43, 10.43); Calibrated: 12/18/2020

Area Scan (81x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.215 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.686 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.232 W/kg
SAR(1 g) = 0.180 W/kg; SAR(10 g) = 0.140 W/kg
Maximum value of SAR (measured) = 0.214 W/kg



LTE Band7 Head

Date/Time: 9/13/2021

Electronics: DAE4 Sn549

Medium: H700-6000

Medium parameters used: f = 2535 MHz; σ = 1.909 S/m; ε_r = 40.891; ρ = 1000 kg/m^3

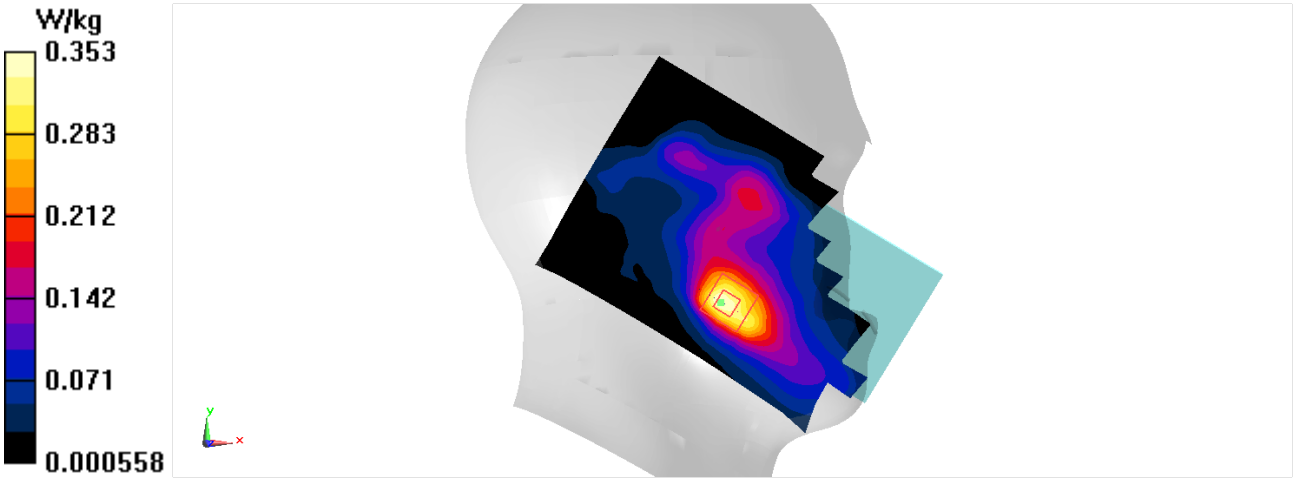
Ambient Temperature:23.3^{o}C Liquid Temperature: 22.5^{o}C

Communication System: UID 0, LTE Band7-20M (0) Frequency: 2535 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7464 ConvF(7.75, 7.75, 7.75); Calibrated: 12/18/2020

Area Scan (101x161x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.355 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.970 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 0.413 W/kg
SAR(1 g) = 0.244 W/kg; SAR(10 g) = 0.137 W/kg
Maximum value of SAR (measured) = 0.353 W/kg



LTE Band41

Date/Time: 9/13/2021

Electronics: DAE4 Sn549

Medium: H700-6000

Medium parameters used: f = 2680 MHz; σ = 2.013 S/m; ε_r = 40.722; ρ = 1000 kg/m^3

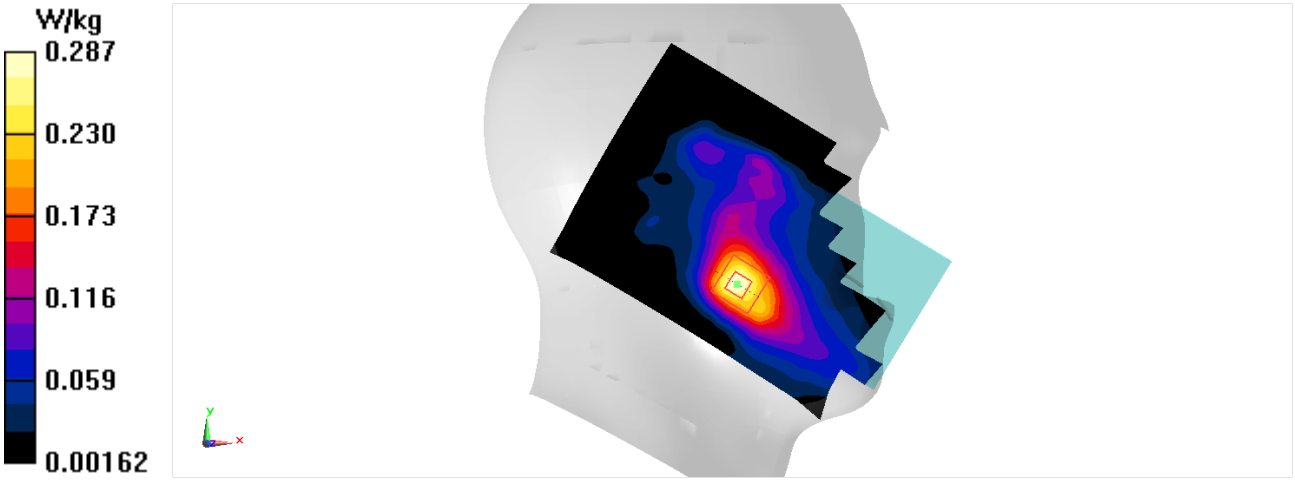
Ambient Temperature:23.3^{o}C Liquid Temperature: 22.5^{o}C

Communication System: UID 0, LTE Band41 (0) Frequency: 2680 MHz Duty Cycle: 1:1.5787

Probe: EX3DV4 - SN7464 ConvF(7.47, 7.47, 7.47); Calibrated: 12/18/2020

Area Scan (101x161x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.285 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.421 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.342 W/kg
SAR(1 g) = 0.195 W/kg; SAR(10 g) = 0.106 W/kg
Maximum value of SAR (measured) = 0.287 W/kg



GSM850 Body

Date/Time: 10/31/2021

Electronics: DAE4 Sn549

Medium: H700-6000

Medium parameters used (interpolated): f = 848.8 MHz; σ = 0.922 S/m; ε_r = 43.897; ρ = 1000 kg/m^3

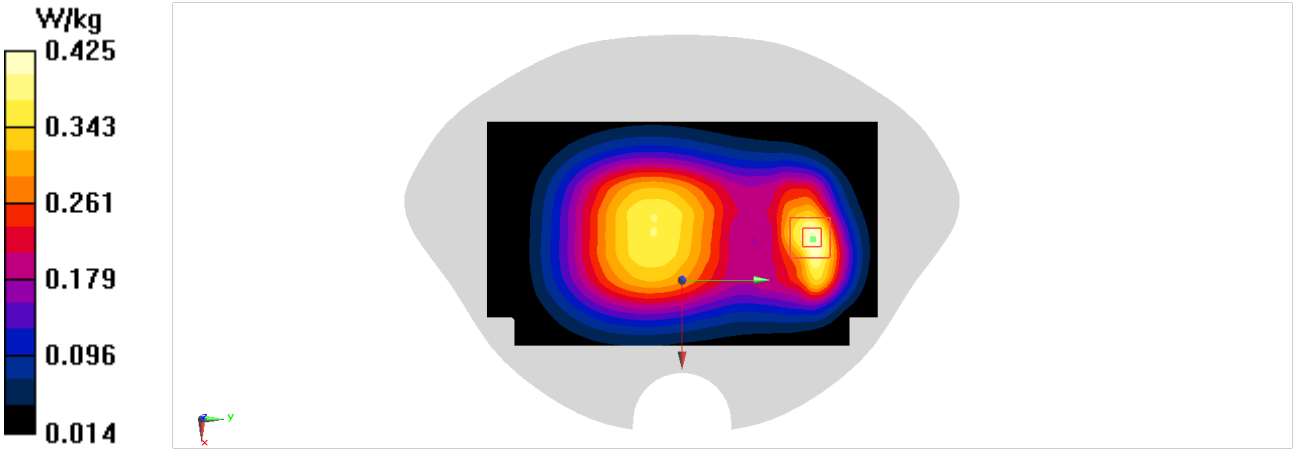
Ambient Temperature:23.3^{o}C Liquid Temperature: 22.5^{o}C

Communication System: UID 0, GSM 850 GPRS-3 (0) Frequency: 848.8 MHz Duty Cycle: 1:2.66993

Probe: EX3DV4 - SN7464 ConvF(10.43, 10.43, 10.43); Calibrated: 12/18/2020

Area Scan (81x141x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.433 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.76 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.509 W/kg
SAR(1 g) = 0.295 W/kg; SAR(10 g) = 0.178 W/kg
Maximum value of SAR (measured) = 0.425 W/kg



WCDMA850 Body

Date/Time: 10/31/2021

Electronics: DAE4 Sn549

Medium: H700-6000

Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.917 S/m; ε_r = 43.946; ρ = 1000 kg/m^3

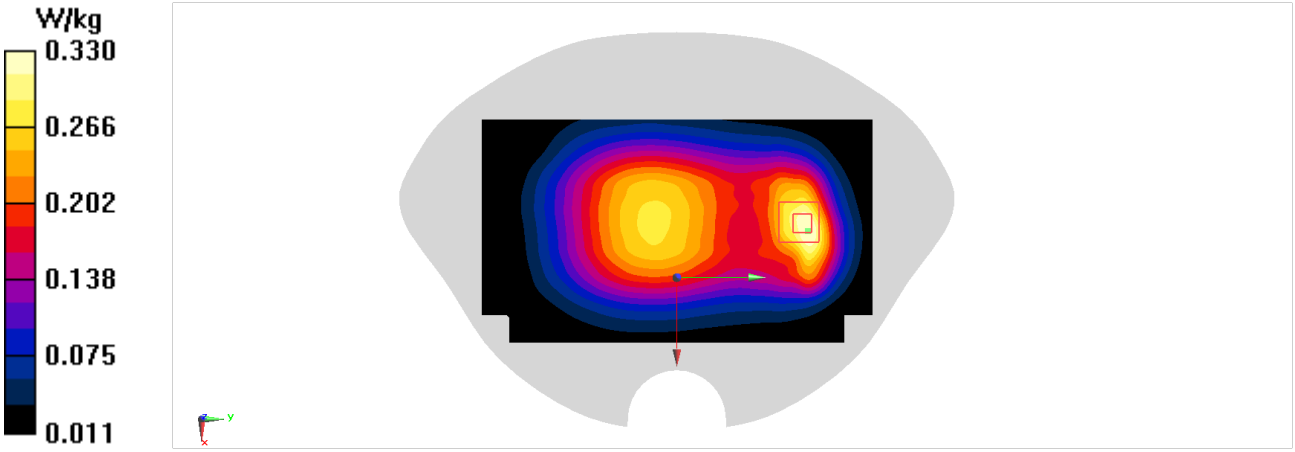
Ambient Temperature:23.3^{o}C Liquid Temperature: 22.5^{o}C

Communication System: UID 0, WCDMA 850 (0) Frequency: 836.6 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7464 ConvF(10.43, 10.43, 10.43); Calibrated: 12/18/2020

Area Scan (81x141x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.345 W/kg

Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 15.52 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.400 W/kg
SAR(1 g) = 0.232 W/kg; SAR(10 g) = 0.143 W/kg
Maximum value of SAR (measured) = 0.330 W/kg



LTE Band5 Body

Date/Time: 10/31/2021

Electronics: DAE4 Sn549

Medium: H700-6000

Medium parameters used (interpolated): f = 844 MHz; σ = 0.92 S/m; ε_r = 43.914; ρ = 1000 kg/m^3

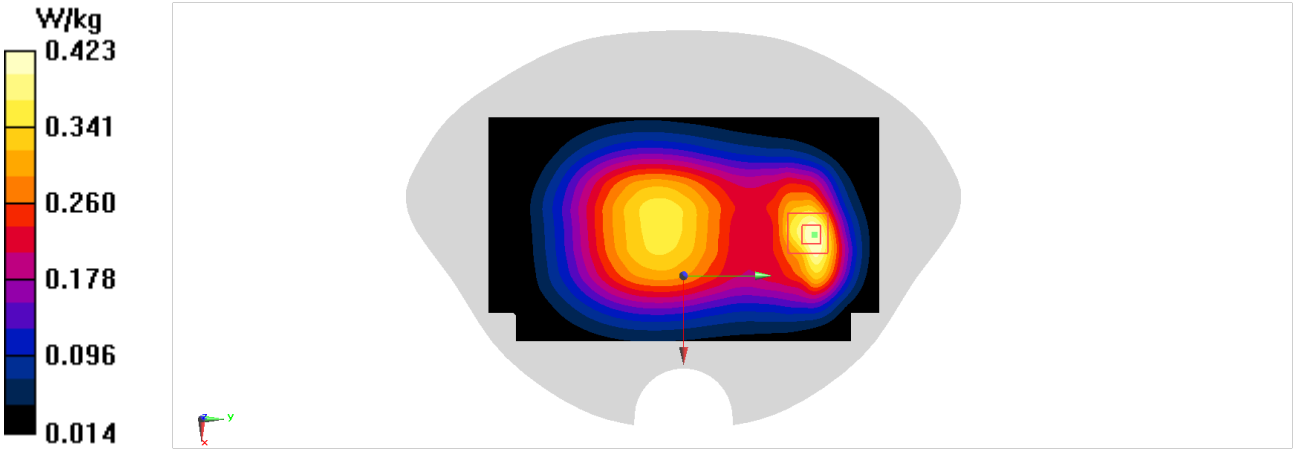
Ambient Temperature:23.3^{o}C Liquid Temperature: 22.5^{o}C

Communication System: UID 0, LTE Band5 (0) Frequency: 844 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7464 ConvF(10.43, 10.43, 10.43); Calibrated: 12/18/2020

Area Scan (81x141x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.432 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.56 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.512 W/kg
SAR(1 g) = 0.298 W/kg; SAR(10 g) = 0.182 W/kg
Maximum value of SAR (measured) = 0.423 W/kg



LTE Band7 Body

Date/Time: 11/4/2021

Electronics: DAE4 Sn549

Medium: H700-6000

Medium parameters used: f = 2535 MHz; σ = 1.976 S/m; ε_r = 40.726; ρ = 1000 kg/m^3

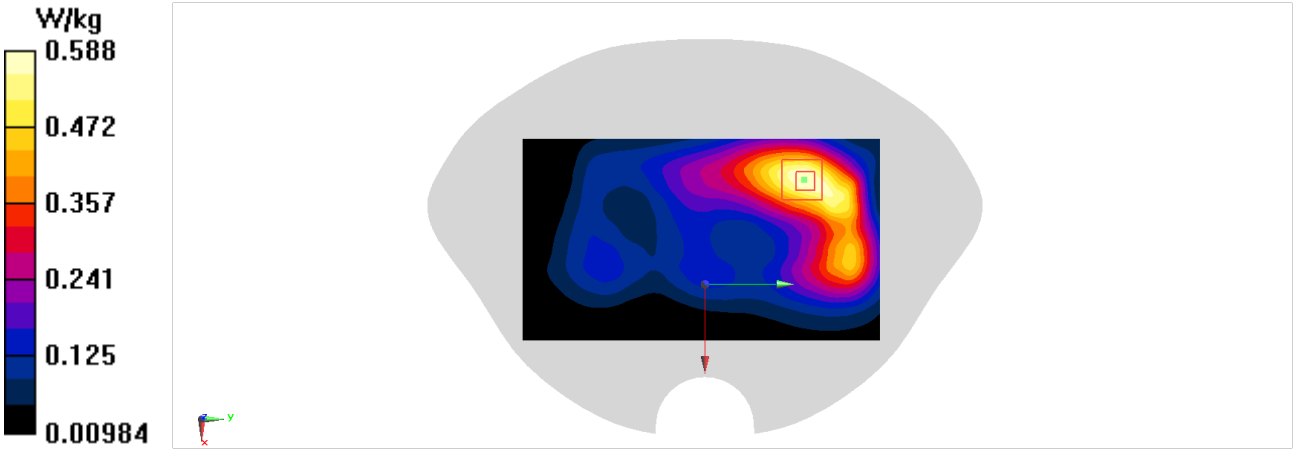
Ambient Temperature:23.3^{o}C Liquid Temperature: 22.5^{o}C

Communication System: UID 0, LTE Band7-20M (0) Frequency: 2535 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7464 ConvF(7.75, 7.75, 7.75); Calibrated: 12/18/2020

Area Scan (91x161x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.584 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.990 V/m; Power Drift = 0.02dB
Peak SAR (extrapolated) = 0.703 W/kg
SAR(1 g) = 0.396 W/kg; SAR(10 g) = 0.226 W/kg
Maximum value of SAR (measured) = 0.588 W/kg



LTE Band41 Body

Date/Time: 11/4/2021

Electronics: DAE4 Sn549

Medium: H700-6000

Medium parameters used: f = 2680 MHz; σ = 2.104 S/m; ε_r = 40.436; ρ = 1000 kg/m^3

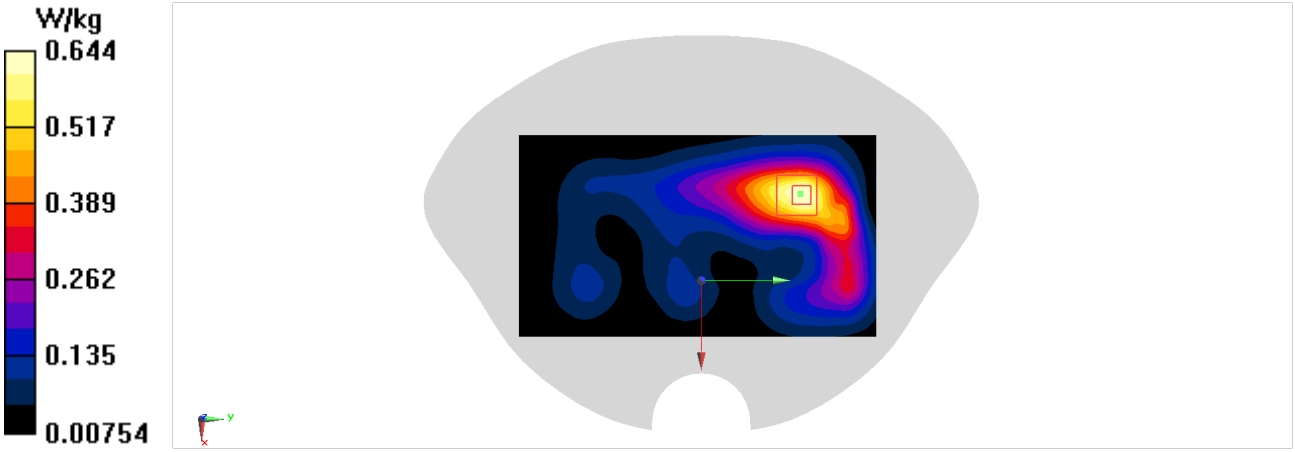
Ambient Temperature:23.3^{o}C Liquid Temperature: 22.5^{o}C

Communication System: UID 0, LTE Band41 (0) Frequency: 2680 MHz Duty Cycle: 1:1.5787

Probe: EX3DV4 - SN7464 ConvF(7.47, 7.47, 7.47); Calibrated: 12/18/2020

Area Scan (91x161x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.657 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.365 V/m; Power Drift = 0.07dB
Peak SAR (extrapolated) = 0.779 W/kg
SAR(1 g) = 0.427 W/kg; SAR(10 g) = 0.231 W/kg
Maximum value of SAR (measured) = 0.644 W/kg



WIFI2.4G Head

Date/Time: 11/11/2021

Electronics: DAE4 Sn549

Medium: H700-6000

Medium parameters used (interpolated): f = 2462 MHz; σ = 1.9 S/m; ε_r = 40.867; ρ = 1000 kg/m^3

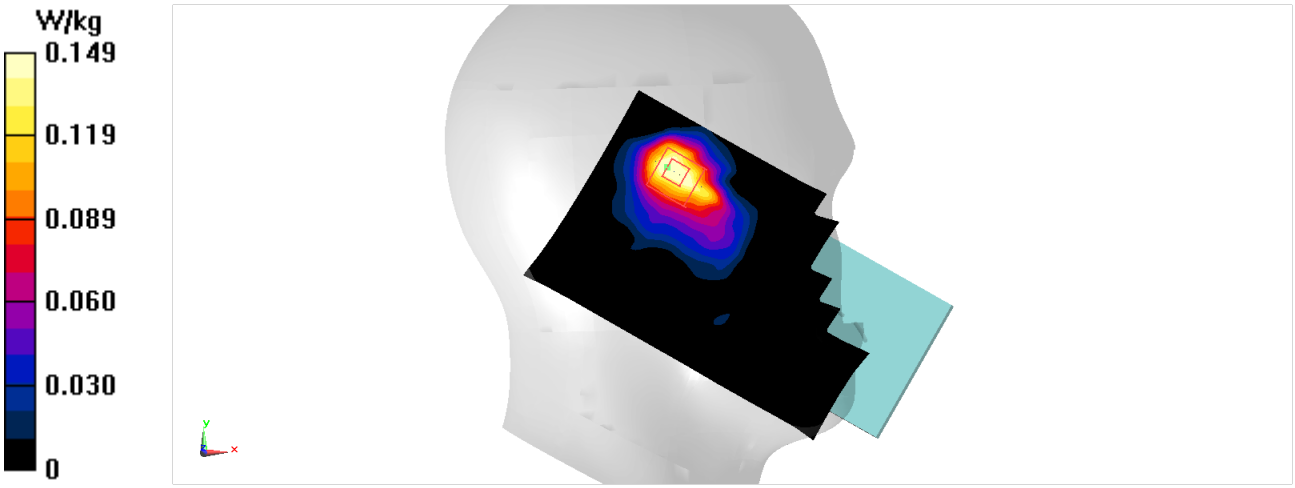
Ambient Temperature:23.3^{o}C Liquid Temperature: 22.5^{o}C

Communication System: UID 0, WLan 2450 (0) Frequency: 2462 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7464 ConvF(7.75, 7.75, 7.75); Calibrated: 12/18/2020

Area Scan (91x171x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.155 W/kg

Zoom Scan (7x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.450 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 0.184 W/kg
SAR(1 g) = 0.099 W/kg; SAR(10 g) = 0.052 W/kg
Maximum value of SAR (measured) = 0.149 W/kg



WIFI2.4G Body

Date/Time: 11/11/2021

Electronics: DAE4 Sn549

Medium: H700-6000

Medium parameters used (interpolated): f = 2462 MHz; σ = 1.9 S/m; ε_r = 40.867; ρ = 1000 kg/m^3

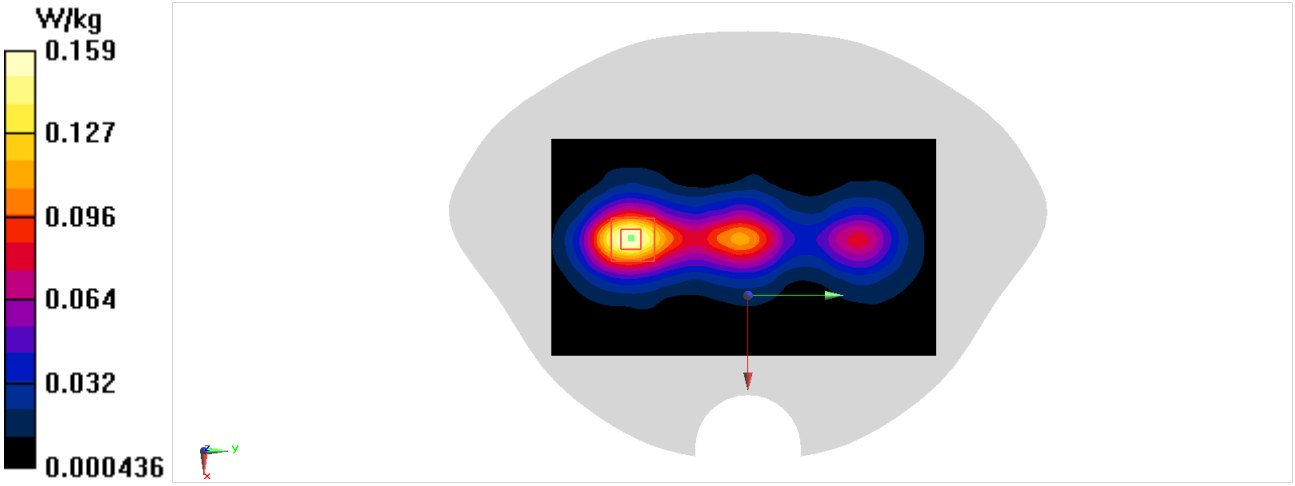
Ambient Temperature:23.3^{o}C Liquid Temperature: 22.5^{o}C

Communication System: UID 0, WLan 2450 (0) Frequency: 2462 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7464 ConvF(7.75, 7.75, 7.75); Calibrated: 12/18/2020

Area Scan (91x161x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.162 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.250 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.193 W/kg
SAR(1 g) = 0.102 W/kg; SAR(10 g) = 0.053 W/kg
Maximum value of SAR (measured) = 0.159 W/kg



WIFI5G Head

Date/Time: 11/13/2021

Electronics: DAE4 Sn549

Medium: H700-6000

Medium parameters used: f = 5270 MHz; σ = 4.697 S/m; ε_r = 35.578; ρ = 1000 kg/m^3

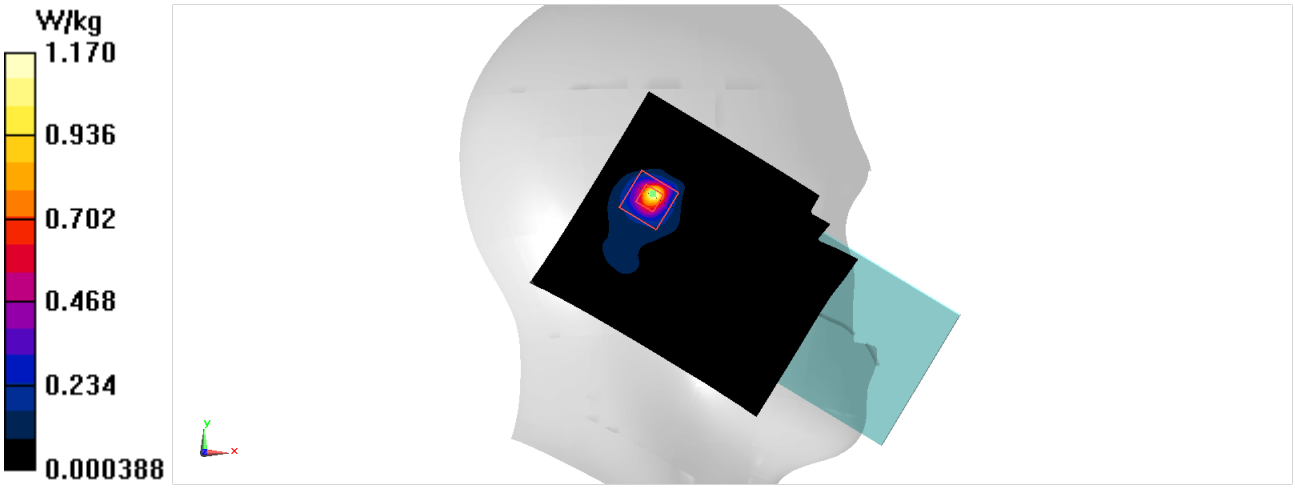
Ambient Temperature:23.3^{o}C Liquid Temperature: 22.5^{o}C

Communication System: UID 0, WLan 11a (0) Frequency: 5270 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7464 ConvF(5.55, 5.55, 5.55); Calibrated: 12/18/2020

Area Scan (111x131x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.15 W/kg

Zoom Scan (9x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 5.789 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 1.96 W/kg
SAR(1 g) = 0.451 W/kg; SAR(10 g) = 0.118 W/kg
Maximum value of SAR (measured) = 1.17 W/kg



WIFI5G Body

Date/Time: 11/13/2021

Electronics: DAE4 Sn549

Medium: H700-6000

Medium parameters used: f = 5270 MHz; σ = 4.697 S/m; ε_r = 35.578; ρ = 1000 kg/m^3

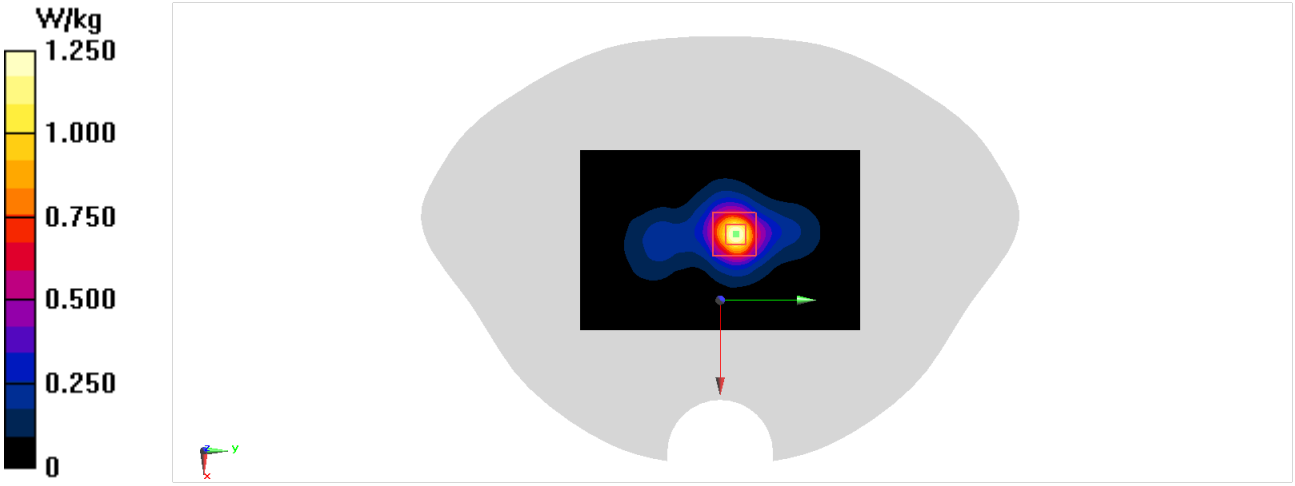
Ambient Temperature:23.3^{o}C Liquid Temperature: 22.5^{o}C

Communication System: UID 0, WLan 11a (0) Frequency: 5270 MHz Duty Cycle: 1:1

Probe: EX3DV4 - SN7464 ConvF(5.55, 5.55, 5.55); Calibrated: 12/18/2020

Area Scan (91x141x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.29 W/kg

Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 7.620 V/m; Power Drift = 0.01dB
Peak SAR (extrapolated) = 1.96 W/kg
SAR(1 g) = 0.548 W/kg; SAR(10 g) = 0.188 W/kg
Maximum value of SAR (measured) = 1.25 W/kg



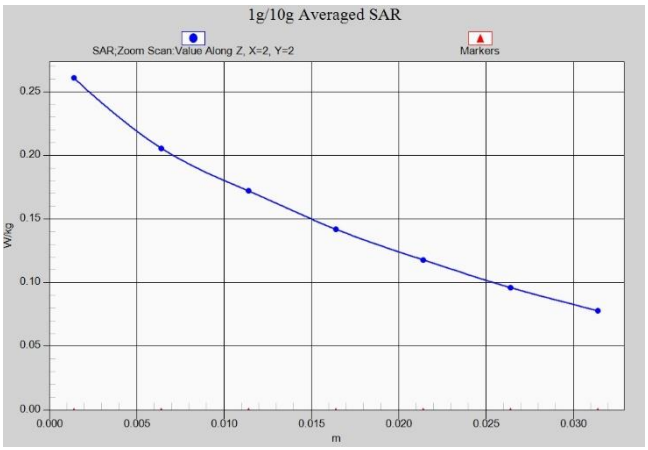


Fig.1 Z-Scan at power reference point (GSM850)

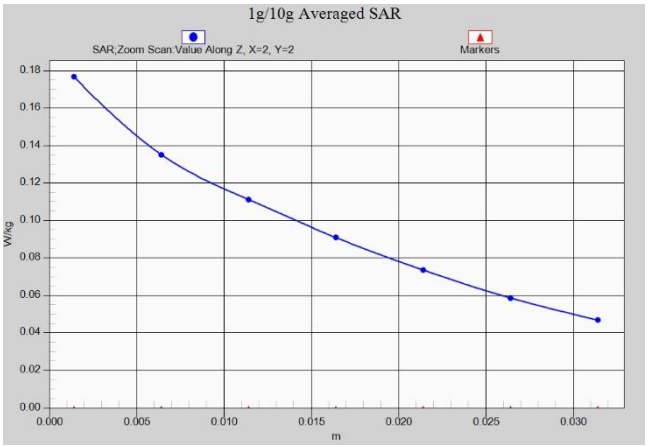


Fig.2 Z-Scan at power reference point (WCDMA850)

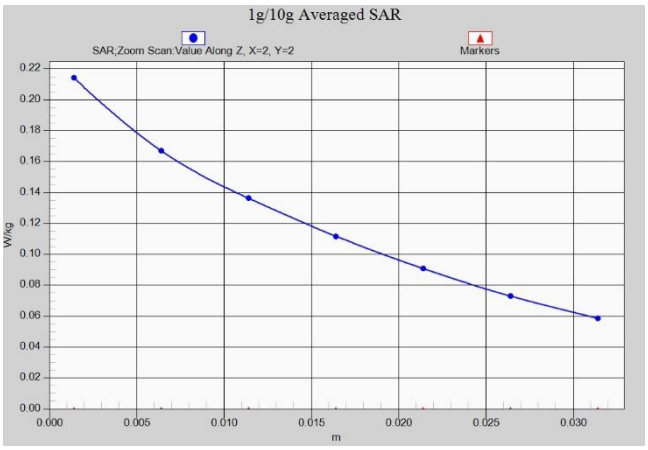


Fig.3 Z-Scan at power reference point (LTE Band5)

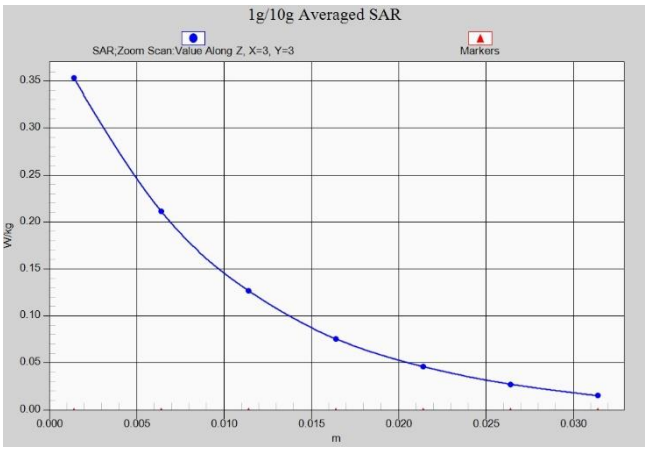


Fig.4 Z-Scan at power reference point (LTE Band7)

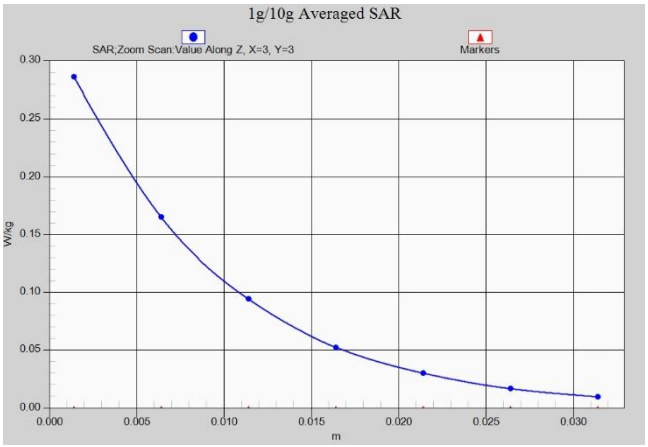


Fig.5 Z-Scan at power reference point (LTE Band41)

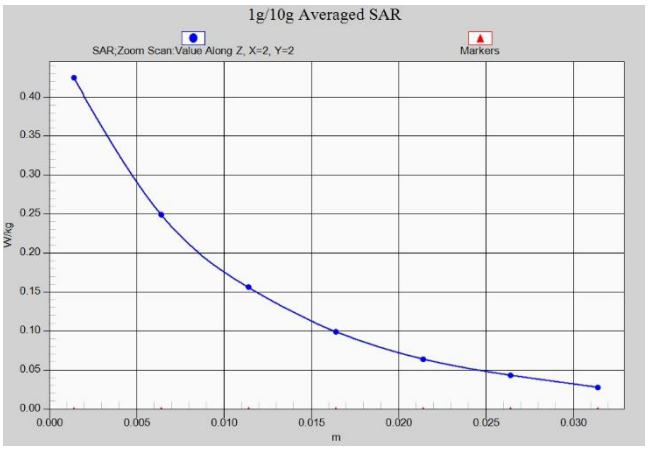


Fig.6 Z-Scan at power reference point (GSM850)

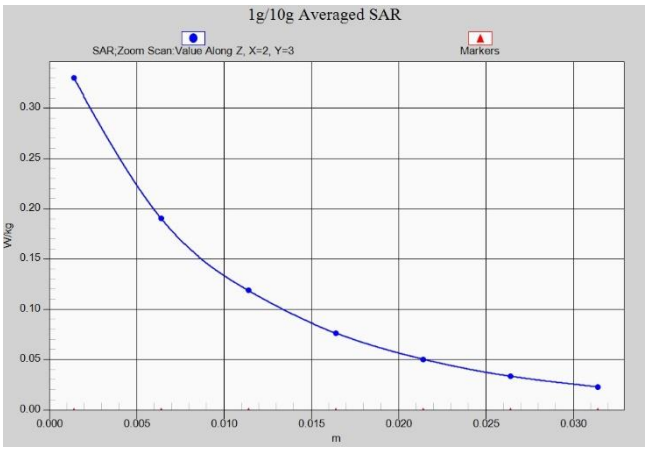


Fig.7 Z-Scan at power reference point (WCDMA850).

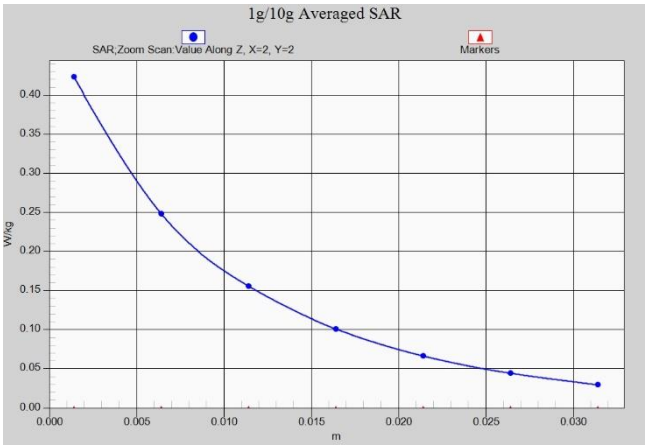


Fig.8 Z-Scan at power reference point (LTE Band5)

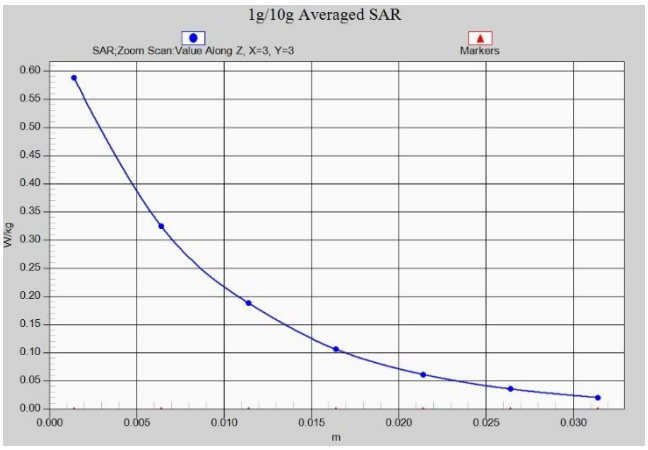


Fig.9 Z-Scan at power reference point (LTE Band7)

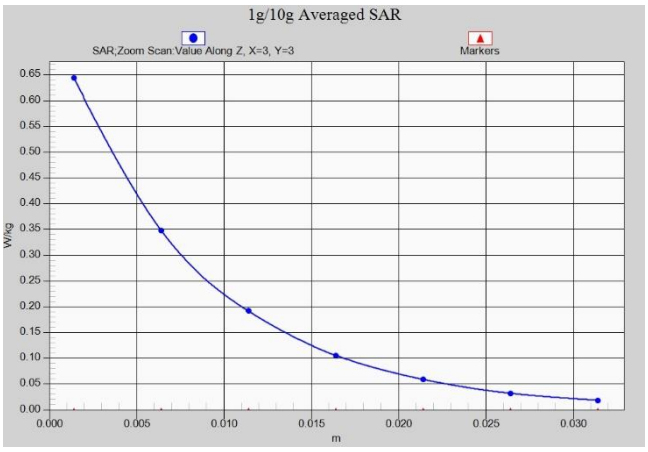


Fig.10 Z-Scan at power reference point (LTE Band41)

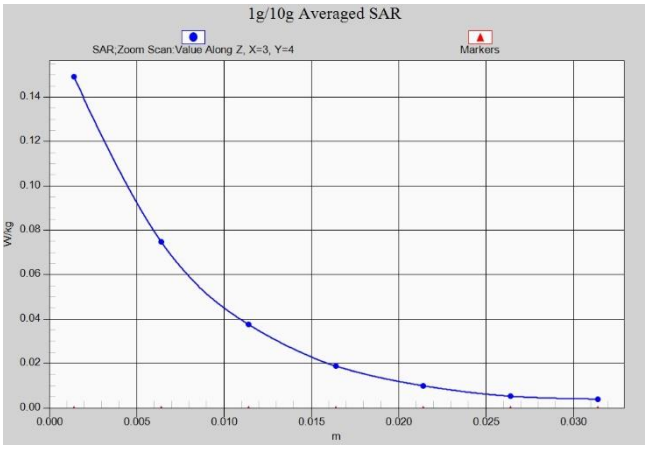


Fig.11 Z-Scan at power reference point (WIFI2.4G)

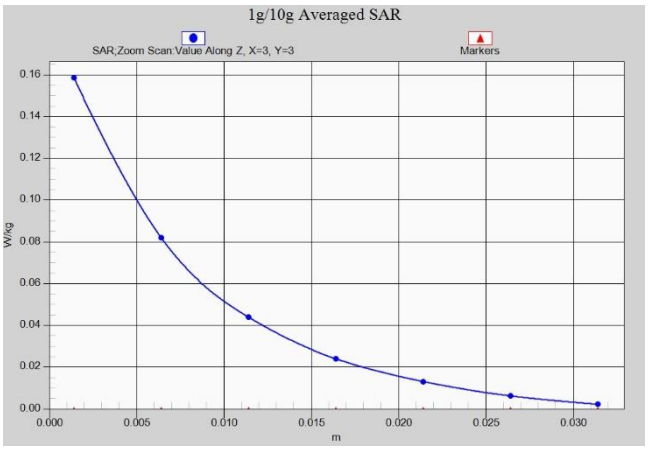


Fig.12 Z-Scan at power reference point (WIFI2.4G)

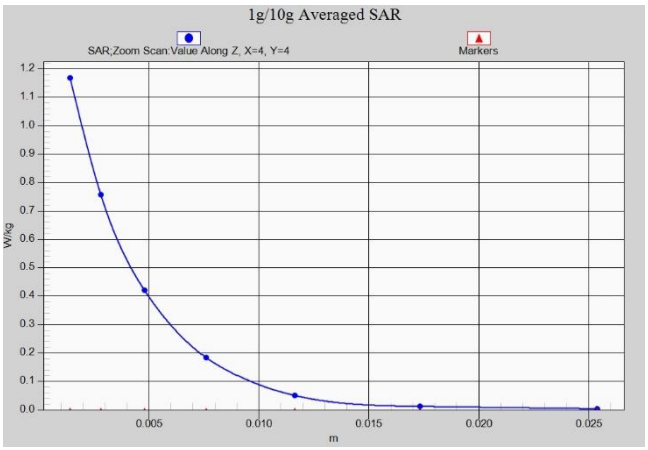


Fig.13 Z-Scan at power reference point (WIFI5G)

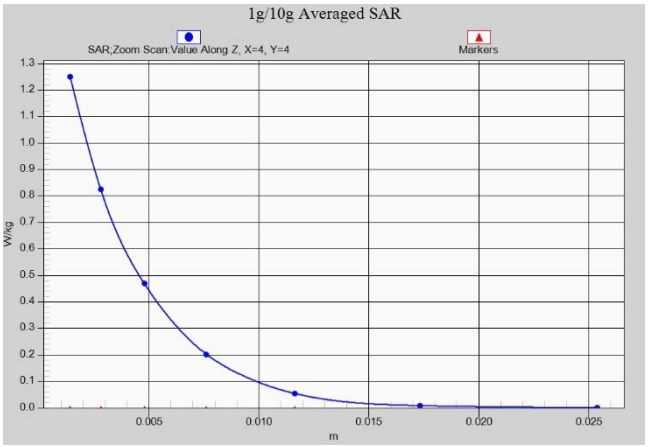


Fig.14 Z-Scan at power reference point (WIFI5G)