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FCC SAR TEST REPORT

Test File No : F690501-RF-SAR000386-A1

Equipment Under Test	Telematics
Model Name	TFGMEIBBCD1
Applicant	LG Electronics Inc.
Address of Applicant	10, Magokjungang 10-ro, Gangseo-gu, Seoul, Korea
FCC ID	BEJTFGMEIBBCD1
Exposure Category	General Population/Uncontrolled Exposure
Standards	FCC 47 CFR Part 2 (2.1093) IEEE 1528, 2013
Receipt No.	GPRI2309000623SR
Date of Receipt	2023-09-07
Date of Test(s)	2023-09-30 ~2023-10-25
Date of Issue	2023-11-30
Test Result	Refer to the Page 06 ~ 07

In the configuration tested, the EUT complied with the standards specified above.

This test report does not assure KOLAS accreditation.

Remarks:

1) The results of this test report are effective only to the items tested.
2) The SGS Korea is not responsible for the sampling, the results of this test report apply to the sample as received.

Report prepared by /
Jane Lee
Test Engineer

Approved by /
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Revision history

Revision	Date of issue	Revisions	Revised By
-	October 27, 2023	Initial issue	
A1	November 30, 2023	Revision Update 3 Clause Antenna Information Added	Jane Lee

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1 Testing Laboratory

Company Name	SGS Korea Co., Ltd. (Gunpo Laboratory)
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2 Details of Manufacturer

Applicant	LG Electronics Inc.
Address	10, Magokjungang 10-ro, Gangseo-gu, Seoul, Korea
Email	serin.pyo@lge.com
Phone No.	+82-10-7610-2198

3 Description of EUT(s)

EUT Type	Telematics
Model Name	TFGMEIBBCD1
External Antenna Information (Type / Manufacturer)	87832572 / Molex
Software Version	SW170
Hardware Version	REV.D
Serial Number	EBR42280006K_#32, EBR42280006K_#41, EBR42280006K_#42
Mode of Operation	WCDMA II / WCDMA IV / WCDMA V / LTE Band 2 / LTE Band 4 / LTE Band 5 / LTE Band 7 / LTE Band 12 / LTE Band 13 / LTE Band 14 / LTE Band 66 / 5G NR n2 / 5G NR n5 / 5G NR n7 / 5G NR n12 / 5G NR n13 / 5G NR n14 / 5G NR n25 / 5G NR n26 / 5G NR n66 / 5G NR n71 / 5G NR n41 / 5G NR n77 / 5G NR n78
Tx Frequency Range	WCDMA II : 1850.0 ~ 1910 MHz WCDMA IV : 1710.0 ~ 1755.0 MHz WCDMA V : 824.0 ~ 849.0 MHz LTE Band 2 : 1850.0 ~ 1910.0 MHz LTE Band 4 : 1710.0 ~ 1755.0 MHz LTE Band 5 : 824.0 ~ 849.0 MHz LTE Band 7 : 2500.0 ~ 2570.0 MHz LTE Band 12 : 699.0 ~ 716.0 MHz LTE Band 13 : 777.0 ~ 787.0 MHz LTE Band 14 : 788.0 ~ 798.0 MHz LTE Band 66 : 1710.0 ~ 1780.0 MHz 5G NR n2 : 1850 ~ 1910 MHz 5G NR n5 : 824.0 ~ 849.0 MHz 5G NR n7 : 2500.0 ~ 2570.0 MHz 5G NR n12 : 699 ~ 716 MHz 5G NR n13 : 777.0 ~ 787.0 MHz 5G NR n14 : 788.0 ~ 798.0 MHz 5G NR n25 : 1850 ~ 1915 MHz 5G NR n26 : 815 ~ 850 MHz 5G NR n66 : 1710 ~ 1780 MHz 5G NR n71 : 663 ~ 698 MHz 5G NR n41 : 2496 ~ 2690 MHz 5G NR n77 DoD : 3450 ~ 3550 MHz 5G NR n77 : 3700 ~ 3980 MHz 5G NR n78 DoD : 3450 ~ 3550 MHz 5G NR n78 : 3700 ~ 3800 MHz

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4 The Highest Reported SAR Values

Equipment Class	Band	Highest Reported SAR 1g (W/kg)
PCE	WCDMA II Internal	0.246
PCE	WCDMA II External	0.007
PCE	WCDMA IV Internal	0.594
PCE	WCDMA IV External	0.022
PCE	WCDMA V Internal	0.260
PCE	WCDMA V External	0.014
PCE	LTE Band 2 Internal	0.348
PCE	LTE Band 2 External	0.010
PCE	LTE Band 5 Internal	0.252
PCE	LTE Band 5 External	0.006
PCE	LTE Band 7 Internal	0.573
PCE	LTE Band 7 External	0.026
PCE	LTE Band 12 Internal	0.146
PCE	LTE Band 12 External	0.005
PCE	LTE Band 13 Internal	0.243
PCE	LTE Band 13 External	0.006
PCE	LTE Band 14 Internal	0.242
PCE	LTE Band 14 External	0.012
PCE	LTE Band 66 Internal	0.703
PCE	LTE Band 66 External	0.010
PCE	5G NR n7 Internal	0.651
PCE	5G NR n7 External	0.032
PCE	5G NR n12 Internal	0.201
PCE	5G NR n12 External	0.008
PCE	5G NR n13 Internal	0.359
PCE	5G NR n13 External	0.068
PCE	5G NR n14 Internal	0.325
PCE	5G NR n14 External	0.025
PCE	5G NR n25 Internal	0.405
PCE	5G NR n25 External	0.014
PCE	5G NR n26 Internal	0.299
PCE	5G NR n26 External	0.024
PCE	5G NR n66 Internal	0.705
PCE	5G NR n66 External	0.017
PCE	5G NR n71 Internal	0.179
PCE	5G NR n71 External	0.008
PCE	5G NR n41 Internal	0.442
PCE	5G NR n41 External	0.012
PCE	5G NR n77 DoD Internal	0.246
PCE	5G NR n77 DoD External	0.187
PCE	5G NR n77 Internal	0.476
PCE	5G NR n77 External	0.033

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Equipment Class	Band	Highest Reported SAR 1g (W/kg)
PCE	5G NR n41 MIMO Internal	0.410
PCE	5G NR n41 MIMO External	0.005
PCE	5G NR n77 DoD MIMO Internal	0.434
PCE	5G NR n77 DoD MIMO External	0.030
PCE	5G NR n77 MIMO Internal	**0.847**
PCE	5G NR n77 MIMO External	0.060
Simultaneous SAR per KDB 690783 D01v01r03 :		1.377

5 Test Methodology

ANSI/IEEE C95.1–1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency

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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.

Test tests documented in this report were performed in accordance with IEEE Standard 1528-2013 and the following published KDB procedures.

In additions;

☒	**KDB 865664 D01v01r04**	**SAR Measurement Requirements for 100 MHz to 6 GHz**
☒	**KDB 865664 D02v01r02**	**RF Exposure Compliance Reporting and Documentation Considerations**
☐	KDB 447498 D01v06	Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies
☒	**KDB 447498 D04v01**	**Interim General RF Exposure Guidance**
☐	KDB 447498 D02v02r01	SAR Measurement Procedures for USB Dongle Transmitters
☐	KDB 248227 D01v02r02	SAR Guidance For IEEE 802.11 (Wi-Fi) Transmitters
☐	KDB 615223 D01v01r01	802.16e/WiMax SAR Measurement Guidance
☐	KDB 616217 D04v01r02	SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers
☐	KDB 643646 D01v01r03	SAR Test Considerations for Occupational PTT Radios
☐	KDB 648474 D03v01r04	Evaluation and Approval Considerations for Handsets with Specific Wireless Charging Battery Covers
☐	KDB 648474 D04v01r03	SAR Evaluation Considerations for Wireless Handsets
☐	KDB 680106 D01v03r01	RF Exposure Considerations for Low Power Consumer Wireless Power Transfer Applications
☒	**KDB 941225 D01v03r01**	**3G SAR Measurement Procedures**
☒	**KDB 941225 D05v02r05**	**SAR Evaluation Considerations for LTE Devices**
☐	KDB 941225 D06v02r01	SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities
☐	KDB 941225 D07v01r02	SAR Evaluation Procedures for UMPC Mini-Tablet Devices

6 Testing Environment

Ambient temperature	: 18°C ~ 25°C
Relative humidity	: 30% ~ 70%
Liquid temperature of during the test	: <± 2°C
Ambient noise & Reflection	: < 0.012 W/kg

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7 Specific Absorption Rate (SAR)

7.1 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

7.2 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:

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

SAR is expressed in units of Watts per kilogram (W/kg)

SAR measurement can be either related to the temperature elevation in tissue by

$$\mathbf{SAR} = \mathbf{C}\left(\frac{\boldsymbol{\delta}\mathbf{T}}{\boldsymbol{\delta}\mathbf{t}}\right)$$

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

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

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength. However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

7.3 Test Standards and Limits

According to FCC 47CFR §2.1093(d) The limits to be used for evaluation are based generally on criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate ("SAR") in Section 4.2 of "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 ㎑ to 300 ㎓," ANSI/IEEE C95.3–2003, Copyright 2003 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017. These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in "Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields," NCRP Report No. 86, Section 17.4.5. Copyright NCRP, 1986, Bethesda, Maryland 20814. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards. The criteria to be used are specified

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in paragraphs (d)(1) and (d)(2) of this section and shall apply for portable devices transmitting in the frequency range from 100 ㎑ to 6 ㎓. Portable devices that transmit at frequencies above 6 ㎓ are to be evaluated in terms of the MPE limits specified in § 1.1310 of this chapter. Measurements and calculations to demonstrate compliance with MPE field strength or power density limits for devices operating above 6 ㎓ should be made at a minimum distance of 5 cm from the radiating source.

(1) Limits for Occupational/Controlled exposure: 0.4 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 8 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 20 W/kg, as averaged over an 10 grams of tissue (defined as a tissue volume in the shape of a cube). Occupational/Controlled limits apply when persons are exposed as a consequence of their employment provided these persons are fully aware of and exercise control over their exposure. Awareness of exposure can be accomplished by use of warning labels or by specific training or education through appropriate means, such as an RF safety program in a work environment.

(2) Limits for General Population/Uncontrolled exposure: 0.08 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 1.6 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 4 W/kg, as averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). General Population/Uncontrolled limits apply when the general public may be exposed, or when persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or do not exercise control over their exposure. Warning labels placed on consumer devices such as cellular telephones will not be sufficient reason to allow these devices to be evaluated subject to limits for occupational/controlled exposure in paragraph (d)(1) of this section.

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Partial Peak SAR (Partial)	1.60 mW/g	8.00 mW/g
Partial Average SAR (Whole Body)	0.08 mW/g	0.40 mW/g
Partial Peak SAR (Hands/Feet/Ankle/Wrist)	4.00 mW/g	20.00 mW/g

1. The spatial Peak value of the SAR averaged over any 1g gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
2. The spatial Average value of the SAR averaged over the whole body.
3. The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

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8 The SAR Measurement System

A block diagram of the SAR measurement System is given in Fig. 1. This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY system). The model EX3DV4 field probe is used to determine the internal electric fields. The SAR can be obtained from the equation SAR= σ ($|Ei|^2$)/ ρ where σ and ρ are the conductivity and mass density of the tissue-simulant.

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

- A standard high precision 6-axis robot (Staubli TX family) with controller, teach pendant and software. An arm extension is for accommodating the data acquisition electronics (DAE).
- A dosimeter probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- Data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

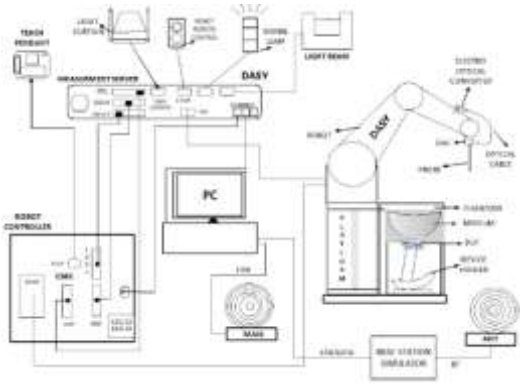

Fig a. The microwave circuit arrangement used for SAR system verification

- The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows.
- DASY software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Verification dipole kits allowing to validate the proper functioning of the system.

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9 System Components

9.1 Probe

Construction : Symmetrical design with triangular core.
Built-in shielding against static charges.
PEEK enclosure material (resistant to organic solvents, e.g., DGBE)

Calibration : Basic Broad Band Calibration in air Conversion Factors (CF) for HSL 835 and HSL1900.
Additional CF-Calibration for other liquids and frequencies upon request.

Frequency : 10 ㎒ to 6 ㎓; Linearity: ± 0.2 ㏈ (30 ㎒ to 6 ㎓)

Directivity : ± 0.3 ㏈ in HSL (rotation around probe axis)
± 0.5 ㏈ in tissue material (rotation normal to probe axis)

Dynamic Range : 10μW/g to > 100 m W/g;
Linearity: ± 0.2 ㏈(noise: typically < 1 μW/g)

Dimensions : Overall length: 337 ㎜ (Tip length: 20 ㎜)
Tip diameter: 2.5 ㎜ (Body diameter: 12 ㎜)
Distance from probe tip to dipole centers: 1 ㎜

Application : High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 ㎓ with precision of better 30%

EX3DV4 E-Field Probe

NOTE:

1. The Probe parameters have been calibrated by the SPEAG. Please reference “APPENDIX C” for the Calibration Certification Report.

9.2 ELI Phantom

Construction : Phantom for compliance testing of handheld and bodymounted wireless devices in the frequency range of 30 ㎒ to 6 ㎓. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.

ELI V5.0 has the same shell geometry and is manufactured from the same material as ELI4, but has reinforced top structure

ELI Phantom

Shell Thickness : 2.0 ㎜ ± 0.1 ㎜

Dimensions : Major axis : 600 ㎜
Minor axis : 400 ㎜

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9.3 Device Holder

Construction: : In combination with the Twin SAM PhantomV4.0/V4.0C or Twin SAM, the Mounting Device (made from POM) enables the rotation of the mounted transmitter in spherical coordinates, whereby the rotation point is the ear opening. The devices can be easily and accurately positioned according to IEC, IEEE, CENELEC, FCC or other specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

Device Holder

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10 SAR Measurement Procedures

10.1 Normal SAR Measurement Procedure

Step 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. The minimum distance of probe sensors to surface is 1.4 ㎜. This distance cannot be smaller than the Distance of sensor calibration points to probe tip as defined in the probe properties.

Step 2 and 3: Area Scan & Zoom Scan Procedures

The entire evaluation of the spatial peak values is performed within the Post-processing engine (SEMCAD). The system always gives the maximum values for the 1 g and 10 g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

1. The extraction of the measured data (grid and values) from the Zoom Scan.
2. The calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
3. The generation of a high-resolution mesh within the measured volume
4. The interpolation of all measured values from the measurement grid to the high-resolution grid
5. The extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
6. The calculation of the averaged SAR within masses of 1 g and 10 g.

Step 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 Step 1. SAR drift shall be kept within ± 5 % and if it without ± 5 %, SAR retest according to measurement procedure step 1~4.

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< Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v01r04 >

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 mm ± 1 mm	½·δ·ln(2) mm ± 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.	
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·$\Delta z_{Zoom}(n-1)$ mm	
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 IEEE Std 1528-2013 for details.

* When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB Publication 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.

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11 Definition of Reference

11.1 Other consumer electronic devices

The exposure conditions of transmitters and modules incorporated in certain consumer electronic devices, such as printers, cameras, and camcorders may vary according to the installation and operating configurations required by the host products. Details of the transmitter and antenna configurations, antenna to user test separation distance, device operating configurations, etc., are required to determine SAR test exclusion or SAR measurement requirements for each host product. When SAR tests are required, a KDB inquiry is recommended to confirm the test setup. Unless the transmitter is used in a specific/dedicated host device, the standalone and simultaneous transmission SAR procedures for transmitters and modules should be applied. These must be fully explained in the permissive change documentation or equipment approval filing, whichever is applicable.

"Intended use distance" specified by the manufacturer: When there is no regulatory requirement, the intended use condition or distance specified by the manufacturer shall be used. This information shall be acquired from the user documentation accompanying the DUT. This device is mounted on the vehicle, and the physical distance from the device is 30mm. By manufacturer declaration, the test distance is 30mm. Testing of all six faces of the DUT might not be required; justification shall be provided when omitting testing of some faces.

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12 SAR System Verification

The microwave circuit arrangement for system verification is sketched in Fig 1. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR values. These tests were done at 750 / 835 / 1750 / 1900 / 2600 / 3500 / 3900 ㎒. The tests were conducted on the same days as the measurement of the DUT. The obtained results from the system accuracy verification are displayed in the table 1. (SAR values are normalized to 1W forward power delivered to the dipole). During the tests, the ambient temperature of the laboratory was in the range (22 ± 2) ° C, the relative humidity was in the range (55 ± 5) % R.H and the liquid depth above the ear reference points was ≥ 15 cm ± 5 mm (frequency ≤ 3 GHz) or ≥ 10 cm ± 5 mm (frequency > 3 G Hz)in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.

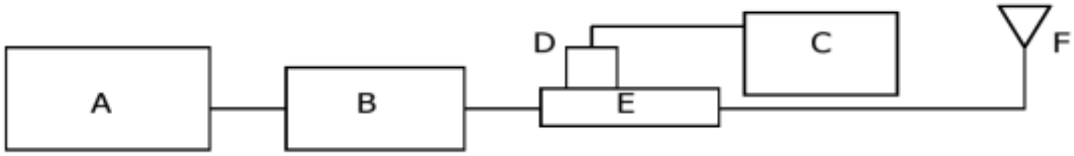

Fig 1. The microwave circuit arrangement used for SAR system verification

A. Signal Generator
B. RF Amplifier
C. Power Meter
D. Power Sensor
E. Dual Directional Coupler
F. Reference dipole Antenna

Photo of the dipole Antenna

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SAR System Verification

Dipole Validation Kits		Probe S/N	Freq. (MHz)	Input Power (W)	Target SAR values (W/Kg)	1 W normalized Measured SAR (W/Kg)	SAR Deviation (%)	Date	Temperature (°C)	
Model	S/N				1g	1g	1g		Ambient	Liquid
D750V2	1085	3791	750	0.10	8.49	8.67	2.12	2023-09-30	21.5	21.5
D750V2	1085	3791	750	0.10	8.49	8.37	-1.41	2023-10-01	22.1	21.5
D750V2	1085	3791	750	0.10	8.49	8.50	0.12	2023-10-02	22.0	21.2
D750V2	1085	3791	750	0.10	8.49	8.30	-2.24	2023-10-04	22.0	21.2
D750V2	1085	3791	750	0.10	8.49	8.34	-1.77	2023-10-13	22.2	21.6
D750V2	1085	3791	750	0.10	8.49	8.30	-2.24	2023-10-17	21.9	21.3
D750V2	1085	3791	750	0.10	8.49	8.76	3.18	2023-10-19	21.7	21.2
D835V2	4d138	3791	835	0.10	9.81	9.52	-2.96	2023-10-03	21.6	21.2
D835V2	4d138	3791	835	0.10	9.81	9.65	-1.63	2023-10-10	22.0	21.5
D835V2	4d138	3791	835	0.10	9.81	9.69	-1.22	2023-10-16	21.8	21.2
D835V2	4d138	3791	835	0.10	9.81	9.37	-4.49	2023-10-18	22.0	21.1
D1750V2	1116	3791	1750	0.10	35.50	36.40	2.54	2023-10-07	22.1	21.1
D1750V2	1116	3791	1750	0.10	35.50	36.10	1.69	2023-10-13	22.2	21.6
D1750V2	1116	3791	1750	0.10	35.50	35.90	1.13	2023-10-14	22.2	21.0
D1750V2	1116	3791	1750	0.10	35.50	36.30	2.25	2023-10-20	21.5	21.6
D1900V2	5d158	3791	1900	0.10	39.80	40.50	1.76	2023-10-05	22.0	21.3
D1900V2	5d158	3791	1900	0.10	39.80	39.20	-1.51	2023-10-06	22.3	21.4
D1900V2	5d158	3791	1900	0.10	39.80	39.70	-0.25	2023-10-12	22.4	21.8
D2600V2	1038	7574	2600	0.10	55.70	55.80	0.18	2023-10-06	21.8	21.1
D2600V2	1038	7574	2600	0.10	55.70	54.90	-1.44	2023-10-14	22.1	21.8
D2600V2	1038	7574	2600	0.10	55.70	58.40	4.85	2023-10-16	21.9	21.6
D2600V2	1038	3986	2600	0.10	55.70	55.40	-0.54	2023-10-20	21.9	21.7
D2600V2	1038	3986	2600	0.10	55.70	58.30	4.67	2023-10-23	21.7	21.2
D2600V2	1038	3986	2600	0.10	55.70	56.10	0.72	2023-10-25	21.8	21.4
D3500V2	1058	7574	3500	0.10	65.30	65.40	0.15	2023-10-18	22.2	21.7
D3500V2	1058	7574	3500	0.10	65.30	67.00	2.60	2023-10-19	22.2	21.8
D3500V2	1058	7574	3500	0.10	65.30	67.40	3.22	2023-10-21	22.3	21.7
D3500V2	1058	7574	3500	0.10	65.30	63.60	-2.60	2023-10-22	22.9	21.9
D3900V2	1036	7574	3900	0.10	68.00	67.80	-0.29	2023-10-18	22.2	21.7
D3900V2	1036	7574	3900	0.10	68.00	67.10	-1.32	2023-10-20	22.5	21.9

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Dipole Validation Kits		Probe S/N	Freq. (MHz)	Input Power (W)	Target SAR values (W/Kg)	1 W normalized Measured SAR (W/Kg)	SAR Deviation (%)	Date	Temperature (°C)	
Model	S/N				1g	1g	1g		Ambient	Liquid
D3900V2	1036	7574	3900	0.10	68.00	66.80	-1.76	2023-10-21	22.3	21.7
D3900V2	1036	7574	3900	0.10	68.00	66.60	-2.06	2023-10-23	22.8	21.6

Table 1 Results system verification

(All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx.)

13 Tissue Simulant Fluid for the Frequency Band

The dielectric properties for this simulant fluid were measured by using the Speag Model DAK-3.5 & DAKS-3.5 Dielectric Probe in conjunction with Keysight E5063A Network Analyze & Speag Model Performance Check for Vector Network Analyzer and Vector Reflectometer by using a procedure.

Freq. (MHz)	Target Value		Measure Value		Deviation (%)		Date	Liquid Temperature (°C)
	Permitivity	Conductivity (S/m)	Permittivity	Conductivity (S/m)	Permittivity	Conductivity (S/m)		
750*	41.90	0.89	40.47	0.93	-3.41	4.49	2023-09-30	21.5
704.00	41.90	0.89	40.63	0.91	-3.03	2.25		
750*	41.90	0.89	41.36	0.92	-1.29	3.37	2023-10-01	21.5
782.00	41.90	0.89	41.23	0.93	-1.60	4.49		
750*	41.90	0.89	41.88	0.92	-0.05	3.37	2023-10-02	21.2
793.00	41.90	0.89	41.69	0.93	-0.50	4.49		
750*	41.90	0.89	41.46	0.92	-1.05	3.37	2023-10-04	21.2
704.00	41.90	0.89	41.62	0.90	-0.67	1.12		
782.00	41.90	0.89	41.34	0.93	-1.34	4.49		
793.00	41.90	0.89	41.27	0.93	-1.50	4.49		
750*	41.90	0.89	41.67	0.88	-0.56	-1.46	2023-10-13	21.6
680.50	41.90	0.89	43.46	0.89	3.72	-0.45		
750*	41.90	0.89	42.99	0.88	2.59	-1.57	2023-10-17	21.3
707.50	41.90	0.89	43.12	0.86	2.92	-3.37		
750*	41.90	0.89	43.54	0.90	3.91	1.01	2023-10-19	21.2
782.00	41.90	0.89	43.47	0.91	3.75	2.13		
835*	41.50	0.90	41.39	0.91	-0.27	1.22	2023-10-03	21.2
829.00	41.50	0.90	41.47	0.90	-0.07	0.44		
835*	41.50	0.90	40.45	0.94	-2.54	3.89	2023-10-10	21.5
836.60	41.50	0.90	40.43	0.94	-2.58	4.44		
835*	41.50	0.90	43.44	0.88	4.66	-1.89	2023-10-16	21.2
831.50	41.50	0.90	43.44	0.88	4.67	-2.11		
835*	41.50	0.90	41.80	0.88	0.73	-2.33	2023-10-18	21.1
793.30	41.50	0.90	41.97	0.86	1.12	-4.22		

Note: The data marked (*) in this table was Permittivity/Conductivity results of Verification

(All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx.)

Freq. (MHz)	Target Value		Measure Value		Deviation (%)		Date	Liquid Temperature (°C)
	Permitivity	Conductivity (S/m)	Permittivity	Conductivity (S/m)	Permittivity	Conductivity (S/m)		
1750*	40.10	1.37	39.65	1.39	-1.13	1.68	2023-10-07	21.2
1732.60	40.10	1.37	39.61	1.37	-1.21	0.00		
1750*	40.10	1.37	41.25	1.40	2.87	2.19	2023-10-13	21.6
1745.00	40.10	1.37	41.26	1.40	2.89	2.19		
1750*	40.10	1.37	40.98	1.36	2.18	-1.02	2023-10-14	21.0
1745.00	40.10	1.37	41.05	1.36	2.36	-1.09		
1750*	40.10	1.37	38.57	1.38	-3.83	0.73	2023-10-20	21.6
1745.00	40.10	1.37	38.58	1.38	-3.78	0.51		
1900*	40.00	1.40	41.01	1.46	2.53	4.29	2023-10-05	21.3
1860.00	40.00	1.40	41.00	1.44	2.50	2.86		
1900*	40.00	1.40	40.85	1.40	2.12	-0.36	2023-10-06	21.4
1880.00	40.00	1.40	40.82	1.39	2.04	-1.07		
1900*	40.00	1.40	41.27	1.40	3.17	0.00	2023-10-12	21.8
1882.50	40.00	1.40	41.27	1.39	3.17	-0.79		
2600*	39.00	1.96	39.51	2.03	1.31	3.57	2023-10-06	21.1
2535.00	39.00	1.96	39.86	1.97	2.21	0.51		
2600*	39.00	1.96	37.13	2.03	-4.79	3.57	2023-10-14	21.8
2535.00	39.00	1.96	37.42	1.96	-4.05	0.00		
2600*	39.00	1.96	40.47	1.99	3.77	1.53	2023-10-16	21.6
2535.00	39.00	1.96	40.66	1.92	4.26	-2.04		
2600*	39.00	1.96	39.89	1.94	2.28	-1.02	2023-10-20	21.7
2592.99	39.00	1.96	39.90	1.93	2.31	-1.53		
2600*	39.00	1.96	40.55	1.96	3.97	0.00	2023-10-23	21.2
2592.99	39.00	1.96	40.57	1.95	4.03	-0.51		
2600*	39.00	1.96	38.36	2.01	-1.64	2.55	2023-10-25	21.4
2592.99	39.00	1.96	38.37	2.00	-1.62	2.04		
3500*	37.90	2.91	38.35	2.85	1.19	-2.06	2023-10-18	21.7
3500.01	37.90	2.91	38.35	2.85	1.19	-2.06		
3500*	37.90	2.91	39.63	2.93	4.56	0.69	2023-10-19	21.8
3500.01	37.90	2.91	39.63	2.93	4.56	0.69		

(All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx.)

Note: The data marked (*) in this table was Permittivity/Conductivity results of Verification

Freq. (MHz)	Target Value		Measure Value		Deviation (%)		Date	Liquid Temperature (°C)
	Permitivity	Conductivity (S/m)	Permittivity	Conductivity (S/m)	Permittivity	Conductivity (S/m)		
3500*	37.90	2.91	37.88	2.99	-0.05	2.75	2023-10-21	21.7
3500.01	37.90	2.91	37.88	2.99	-0.05	2.75		
3500*	37.90	2.91	37.54	2.94	-0.95	1.03	2023-10-22	21.9
3500.01	37.90	2.91	37.54	2.94	-0.95	1.03		
3900*	37.50	3.33	37.76	3.28	0.69	-1.50	2023-10-18	21.7
3840.00	37.50	3.33	37.81	3.21	0.83	-3.60		
3900*	37.50	3.33	38.36	3.31	2.29	-0.60	2023-10-20	21.9
3840.00	37.50	3.33	38.46	3.25	2.56	-2.40		
3900*	37.50	3.33	36.83	3.31	-1.79	-0.60	2023-10-21	21.7
3840.00	37.50	3.33	36.94	3.25	-1.49	-2.40		
3900*	37.50	3.33	36.59	3.28	-2.43	-1.50	2023-10-23	21.6
3840.00	37.50	3.33	36.69	3.22	-2.16	-3.30		

Note: The data marked (*) in this table was Permittivity/Conductivity results of Verification

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The brain mixtures consist of a viscous gel using hydroxethlcellullose(HEC) gelling agent and saline solution. Preservation with a bacteriacide is added and visual inspection is made to make sure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation. The dielectric properties of the liquid material required to fill the phantom shell shall be target. For 3.4 to 10.0 GHz, the tests were done with using stimulating liquid made by SPEAG.

Frequency (㎒)	**450**	**835**	**900**	**1800-2000**	**2450**	**2600**
Tissue Type	**Body**					
Ingredient (% by weight)						
Water	38.91	40.29	40.29	55.24	45.0	45.0
Salt (NaCl)	3.79	1.38	1.38	0.31	0	0
Sugar	56.93	57.90	57.90	0	0	0
HEC	0.25	0.24	0.24	0	0	0
Bactericide	0.12	0.18	0.18	0	0	0
Triton X-100	0	0	0	0	0	0
DGBE	0	0	0	44.45	55.0	55.0
Tissue parameter target by IEEE 1528-2013						
Dielectric Constant	43.5	41.5	41.5	40.0	39.2	39.0
Conductivity (S/m)	0.87	0.90	0.97	1.40	1.80	1.96
Salt: 99+% Pure Sodium Chloride Water: De-ionized, 16 M + resistivity				Sucrose: 98+% Pure Sucrose HEC: Hydroxyethyl Cellulose		
DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]						

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14 Instruments List

Test Platform	SPEAG DASY System				
Manufacture	SPEAG				
Description	SAR Test System (Frequency range 300 MHz −6 GHz)				
Software Reference	DASY52: 52.10.4(1527) SEMCAD X: 14.6.14(7483)				
Equipment	**Type**	**Serial Number**	**Cal Date**	**Cal Interval**	**Cal Due**
Phantom	ELI Phantom	TP-1169	N/A	N/A	N/A
Phantom	ELI Phantom	TP-1200	N/A	N/A	N/A
Phantom	ELI Phantom	TP-1244	N/A	N/A	N/A
Verification Dipole	D750V3	1085	2023-03-21	Biennial	2025-03-21
Verification Dipole	D835V2	4d138	2023-04-24	Biennial	2025-04-24
Verification Dipole	D1750V2	1116	2023-07-12	Biennial	2025-07-12
Verification Dipole	D1900V2	5d158	2023-04-26	Biennial	2025-04-26
Verification Dipole	D2600V2	1038	2023-06-16	Biennial	2025-06-16
Verification Dipole	D3500V2	1058	2023-09-28	Biennial	2025-09-28
Verification Dipole	D3900V2	1036	2023-09-27	Biennial	2025-09-27
Dielectric Assessment Kit	DAKS-3.5	1068	2023-02-20	Annual	2024-02-20
Dielectric Assessment Kit	DAK-3.5	1228	2022-11-14	Annual	2023-11-14
DAE	DAE4	1430	2023-03-22	Annual	2024-03-22
DAE	DAE4	1503	2023-08-28	Annual	2024-08-28
DAE	DAE4	1504	2023-01-23	Annual	2024-01-23
E-Field Probe	EX3DV4	3986	2023-01-26	Annual	2024-01-26
E-Field Probe	EX3DV4	3791	2023-05-23	Annual	2024-05-23
E-Field Probe	EX3DV4	7574	2023-07-18	Annual	2024-07-18
Network Analyzer	E5063A	MY54706220	2023-01-17	Annual	2024-01-17
Network Analyzer	DAKS_VNA R140	160115	2023-03-13	Annual	2024-03-13
Power Meter	E4419B	GB43311715	2023-03-06	Annual	2024-03-06
Power Meter	E4416A	GB41292123	2023-06-29	Annual	2024-06-29
Power Meter	N1914A	MY63210027	2023-07-07	Annual	2024-07-07
Power Meter	N1914A	MY56120017	2023-06-09	Annual	2024-06-09
Power Sensor	E9300H	MY41495307	2023-04-18	Annual	2024-04-18
Power Sensor	N8481A	MY56120026	2022-11-30	Annual	2023-11-30
Power Sensor	N8481A	MY56120030	2023-02-24	Annual	2024-02-24
Signal Generator	E4421B	MY43350132	2023-02-21	Annual	2024-02-21
Signal Generator	E4438C	MY44270498	2023-02-21	Annual	2024-02-21
Signal Generator	E8247C	MY43321024	2023-06-07	Annual	2024-06-07
Signal Generator	SMBV100A	262093	2023-05-10	Annual	2024-05-10
Signal Generator	SMF100A	102098	2023-02-23	Annual	2024-02-23
Power Amplifier	AMP2027	10008	2023-03-06	Annual	2024-03-06
Power Amplifier	2002-BBS2C4AEL	1029 D/C 0341	2022-11-30	Annual	2023-11-30
Power Amplifier	BLMA1060-10	1711221	2023-03-17	Annual	2024-03-17
Power Amplifier	AMP2027ADB	10006	2023-01-13	Annual	2024-01-13
RF Amplifier	AMP2027ADB	10001	2023-09-01	Annual	2024-09-01
Dual Directional Coupler	778D	MY52180578	2023-06-07	Annual	2024-06-07
Dual Directional Coupler	772D	MY52180259	2023-06-07	Annual	2024-06-07
Dual Directional Coupler	777D	50128	2023-06-07	Annual	2024-06-07
Dual Directional Coupler	778D	MY52180497	2023-03-08	Annual	2024-03-08
Dual Directional Coupler	772D	MY52180226	2023-03-08	Annual	2024-03-08

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Equipment	Type	Serial Number	Cal Date	Cal Interval	Cal Due
Hygro-Thermometer	303C	210609816	2023-02-02	Annual	2024-02-02
Hygro-Thermometer	303	210700048	2023-02-02	Annual	2024-02-02
Digital Thermometer	SDT25	16031500243	2023-06-05	Annual	2024-06-05
Digital Thermometer	SDT25	19041500179	2023-09-01	Annual	2024-09-01
Communication Tester	MT8821C	6201502996	2023-08-24	Annual	2024-08-24
Communication Tester	MT8821C	6262044721	2022-12-07	Annual	2023-12-07
Communication Tester	MT8821C	6261760829	2023-08-24	Annual	2024-08-24
Communication Tester	MT8821C	6262094325	2023-03-07	Annual	2024-03-07
Radio Communication Test Station	MT8000A	6262093281	2023-02-21	Annual	2024-02-21
Radio Communication Test Station	MT8000A	6262036831	2023-02-21	Annual	2024-02-21
Spectrum Analyzer	FSV7	103082	2023-02-22	Annual	2024-02-22
LP Filter	WLJ5-1500-2355-6000-60EF	1	2023-06-09	Annual	2024-06-09
LP Filter	WLJ4-3000-5850-8000-60EF	1	2023-06-09	Annual	2024-06-09
LP Filter	WLJ8-6000-7440-8000-60EF	1	2023-06-09	Annual	2024-06-09
LP Filter	LA-15N	LF02	2023-03-03	Annual	2024-03-03
LP Filter	LA-30N	LF03	2023-03-03	Annual	2024-03-03
LP Filter	LA-60N	LF04	2023-03-03	Annual	2024-03-03
Attenuator	18N-03	18	2022-12-02	Annual	2023-12-02
Attenuator	18N-03	17	2022-12-02	Annual	2023-12-02
Attenuator	18N-10	19	2022-12-02	Annual	2023-12-02
Attenuator	18N-10	20	2022-12-02	Annual	2023-12-02
Attenuator	18N-20	24	2022-12-02	Annual	2023-12-02
Attenuator	18N-20	25	2022-12-02	Annual	2023-12-02
Hygro-Thermometer	HTC-1	14032782-1	2023-03-03	Annual	2024-03-03

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15 FCC Power Measurement Procedures

The SAR measurement Software calculates a reference point at the start and end of the test to check for power drifts. If conducted power deviations of more than 5 % occurred, the tests were repeated.

16 Measured and Reported SAR

Per FCC KDB Publication 447498 D04v01, When SAR is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance. For simultaneous transmission, the measured aggregate SAR must be scaled according to the sum of the differences between the maximum tune-up tolerance and actual power used to test each transmitter. When SAR is measured at or scaled to the maximum tune-up tolerance limit, the results are referred to as reported SAR. Test highest reported SAR results are identified on the grant of equipment authorization according to procedures in KDB 690783 D01v01r03.

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17 5G NR FR1※

17.1 5G NR FR1 Test Application

This device supports 5G NR FR1 Band n2, n5, n7, n12, n13, n25, n66, n71, n41, n77 and n78 is declared by the manufacturer used to configuration for frequency, SCS, Bandwidth, Target power, and etc. The RB Configuration was evaluated all using reference to SCS / Bandwidth / Modulation supported by Section 6.1-1 of TS38.521-1.

MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to MPR is 3GPP TS38.101-1 Section 6.2.2.

NR test was evaluated under Maximum power in NR single mode. In NR standalone mode, NR power states in the highest power, and the SAR measurement is determined by measuring LTE and 5G NR respectively.

5G NR Band	Mode	SCS (kHz)	Bandwidth (MHz)	Waveform	UL Modulation	RB Configuration	EN-DC (LTE Band)
n2	NSA/SA	15	5, 10, 15, 20	DFT-s-OFDM CP OFDM	PI/2 BPSK QPSK 16QAM 64QAM	Inner 1RB left Inner 1RB Right Inner Full Outer Full Edge 1RB Left Edge Full Left Edge 1RB Right Edge Full Right	5, 12, 13, 14
n5	NSA/SA	15	5, 10, 15, 20				2, 7, 66
n7	NSA/SA	15	5, 10, 15, 20				5, 12
n12	NSA/SA	15	5, 10, 15				2, 66
n13	NSA/SA	15	5, 10				66
n25	NSA/SA	15	5, 10, 15, 20				12
n66	NSA/SA	15	5, 10, 15, 20, 40				5, 12, 13, 14
n71	NSA/SA	15	5, 10, 15, 20				2, 7, 66
n41	NSA/SA	30	20, 30, 40, 50, 60, 80, 90, 100				5
n77	NSA/SA		20, 30, 40, 50, 60, 70, 80, 90, 100				7
n78	NSA/SA		20, 30, 40, 50, 60, 70, 80, 90, 100				2, 5, 7, 12, 66
n41 MIMO	SA	30	20, 30, 40, 50, 60, 80, 90, 100	CP OFDM	QPSK 16QAM 64QAM		-
n77 MIMO	SA		20, 30, 40, 50, 60, 70, 80, 90, 100				-
n78 MIMO	SA		20, 30, 40, 50, 60, 70, 80, 90, 100				-

- The data marked ※ in this report was provided by the customer and may affect the validity of the test results.

We are responsible for all the information of this test report except for the data(※) provided by the customer.

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18 Maximum Output Power Specifications

This device operates using the following maximum output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v06

WCDMA Maximum Power

Mode	Maximum/Normal	Maximum Output Power (dBm)			
		3GPP WCDMA AMR / RMC	3GPP HSDPA	3GPP HSUPA	3GPP DC-HSDPA
WCDMA II	**Maximum**	**25.00**	**25.00**	**25.00**	**25.00**
	Normal	24.00	24.00	24.00	24.00
WCDMA IV	**Maximum**	**24.50**	**24.50**	**24.50**	**24.50**
	Normal	23.50	23.50	23.50	23.50
WCDMA V	**Maximum**	**25.00**	**25.00**	**25.00**	**25.00**
	Normal	24.00	24.00	24.00	24.00

LTE Maximum Power

Mode	Maximum / Normal	Maximum Output Power (dBm)
LTE Band 2	**Maximum**	**25.00**
	Nominal	24.00
LTE Band 4	**Maximum**	**24.50**
	Nominal	23.50
LTE Band 5	**Maximum**	**25.20**
	Nominal	24.20
LTE Band 7	**Maximum**	**25.00**
	Nominal	24.00
LTE Band 12	**Maximum**	**25.20**
	Nominal	24.20
LTE Band 13	**Maximum**	**25.00**
	Nominal	24.00
LTE Band 14	**Maximum**	**25.00**
	Nominal	24.00
LTE Band 66	**Maximum**	**24.50**
	Nominal	23.50

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5G NR Maximum Power

Mode	Maximum / Normal	Maximum Output Power (dBm)
5G NR n2	**Maximum**	**25.00**
	Normal	24.00
5G NR n4	**Maximum**	**25.00**
	Normal	24.00
5G NR n5	**Maximum**	**25.00**
	Normal	24.00
5G NR n7	**Maximum**	**25.00**
	Normal	24.00
5G NR n12	**Maximum**	**25.00**
	Normal	24.00
5G NR n13	**Maximum**	**25.00**
	Normal	24.00
5G NR n14	**Maximum**	**25.00**
	Normal	24.00
5G NR n25	**Maximum**	**25.00**
	Normal	24.00
5G NR n26	**Maximum**	**25.00**
	Normal	24.00
5G NR n66	**Maximum**	**24.50**
	Normal	23.50
5G NR n41	**Maximum**	**26.00**
	Normal	25.00
5G NR n77 DoD	**Maximum**	**26.00**
	Normal	25.00
5G NR n77	**Maximum**	**26.00**
	Normal	25.00
5G NR n78 DoD	**Maximum**	**26.00**
	Normal	25.00
5G NR n78	**Maximum**	**26.00**
	Normal	25.00
5G NR n41 MIMO	**Maximum**	**26.00**
	Normal	25.00
5G NR n77 DoD MIMO	**Maximum**	**26.00**
	Normal	25.00
5G NR n77 MIMO	**Maximum**	**26.00**
	Normal	25.00
5G NR n78 DoD MIMO	**Maximum**	**26.00**
	Normal	25.00
5G NR n78 MIMO	**Maximum**	**26.00**
	Normal	25.00

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19 RF Conducted Power Measurement

19.1 WCDMA

19.1.1 Output Power Verification

Maximum output power is measured on the High, Middle and Low channels for each applicable transmission band according to the general descriptions in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC (transmit power control) set to all "1s".

19.1.2 Body SAR Measurements

SAR for body exposure configurations is measured using the 12.2 kbps RMC with the TPC bits all "1s".

19.1.3 Procedures Used to Establish RF Signal for SAR HSDPA Data Devices

Body SAR is not required for handsets with HSDPA capabilities when the maximum average output of each RF channel with HSDPA active is less than ¼ dB higher than that measured without HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2 kbps RMC is ≤ 75 % of the SAR limit. Otherwise, SAR is Measured for HSDPA, using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, using the highest body SAR configuration in 12.2 kbps RMC without HSDPA, on the maximum output channel with the body exposure configuration that results in the highest SAR in 12.2 kbps RMC for that RF channel.

Sub-Test 1 Setup for Release 5 HSDPA

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

Note 1: Δ_{ACK}, Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$
Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15.
Note 3: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 11/15 and β_d = 15/15.

19.1.4 SAR Measurements for Conditions for HSUPA Data Devices

Body SAR is not required for handsets with HSPA capabilities when the maximum average output of each RF channel with HSUPA/HSDPA active is less than ¼ dB higher than that measured without HSUPA/HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2 kbps RMC is ≤ 75 % of the SAR limit. Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set 1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 with power control algorithm 2, according to the highest body SAR configuration in 12.1 kbps RMC without HSPA. When VOIP is applicable for head exposure, SAR is not required when the maximum output of each RF channel with HSPA is less than ¼ dB higher than that measured using 12.2 kbps RMC; otherwise, the same HSPA configuration used for body measurement should be used to test for head exposure.

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Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM(2) (dB)	MPR (dB)	AG(4) Index	E-TFCI
1	11/15(3)	15/15(3)	64	11/15(3)	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1}: 47/15 β_{ed2}: 47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15(4)	15/15(4)	64	15/15(4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$.
Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.
Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 14/15 and β_d = 15/15.
Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g.
Note 6: β_{ed} can not be set directly; it is set by Absolute Grant Value.

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19.2 LTE

19.2.1 SAR measurement Conditions for LTE

LTE modes were tested according to FCC KDB 941225 D05v02r05 publication. Please see notes after the tabulated SAR data for required test configurations. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluation SAR. Anritsu MT8821C was used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).

19.2.2 Spectrum Plots for RB Configurations

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

19.2.3 MPR

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

19.2.4 A-MPR

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

19.2.5 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05V02r05

a. Per Section 5.2.1, SAR is required for QPSK 1 RB Allocation for the largest bandwidth
   i. The required channel and offset combination with the highest maximum output power is required for SAR.
   ii. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the RB offset configuration with highest output power for that channel
   iii. When the reported SAR for a required test channel is > 1.45 W/kg, SAR is required for all RB offset configurations for that channel.

b. Per Section 5.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Section 5.2.1.

c. Per Section 5.2.3, QPSK SAR is not required for the 100% allocation when the highest maximum output power for the 100% allocation is less than the highest maximum output power of the 1 RB and 50% RB allocations and the reported SAR for the 1 RB and 50% RB allocations is < 0.8 W/kg.

d. Per Section 5.2.4 and 5.3, SAR tests for higher order modulations and lower bandwidths configurations are not required when the conducted power of the required test configurations determined by Section 5.2.1, through 5.2.3 is less than or equal to 1/2 dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is < 1.45 W/kg.

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19.2.6 TDD

LTE TDD testing is performed using the SAR test guidance provided in FCC KDB 941225 D05V02r04.

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 D05v02r04. SAR testing is performed using the extended cyclic prefix listed in 3GPP TS 36.211 Section 4.

19.2.7 Downlink Only Carrier Aggregation

Conducted power measurements with LTE Carrier Aggregation (CA) (downlink only) active are made in accordance to KDB 941225 D05Av01r02. The RRC connection is only handle by one cell, the primary component carrier(PCC) for downlink and uplink communications. After making a data connection to the PCC, the UE device adds secondary component carrier(s) (SCC) on the downlink only. All uplink communications and acknowledgements remain identical to specifications when downlink carrier aggregation is inactive on the PCC. Additional conducted output powers are measured with the downlink carrier aggregation active for the configuration with highest measured maximum conducted power with downlink carrier aggregation inactive measured among the channel bandwidth, modulation and RB combinations in each frequency band. Per FCC KDB 941125 D05Av01r02, no SAR measurements are required for downlink only carrier aggregation configurations when the average output power with downlink only carrier aggregation active is not more than 0.25 dB higher than the average output power with downlink only carrier aggregation inactive.

19.3 5G NR

According to October 2020 TCB Workshop Guidance, NR FR1 SAR evaluations are being generally based on adapting the existing LTE SAR procedures (FCC KDB 941225 D05V02r05). Therefore, NR SAR for the lower bandwidths was not required for testing based on the measured output power and the reported NR SAR for the highest bandwidth.

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS38.521-1 specification.

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 TS38.521-1.

The allowed A-MPR values specified Table 6.2.3.3.1-1 of 3GPP TS38.521-1 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS_01"

Uplink RB allocations were used to Table 6.1-1 of the 3GPP TS38.521-1.

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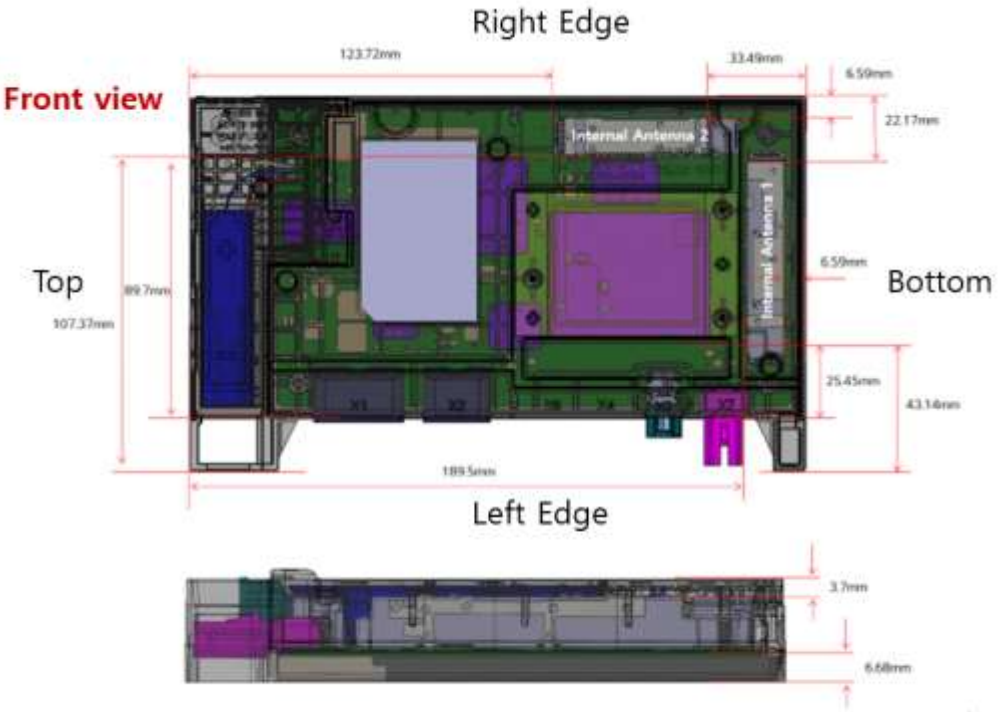
20 RF Conducted Power

- Refer to Appendix E.

21 DUT Antenna Locations※



<The Distance information of Antenna to Edges of Car Telematics Modem>

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22 SAR Test Exclusion Applied

Based on the maximum tune-up tolerance limit of FDD, TDD, and the antenna to use separation distance, Table "Exempt" SAR was not required and Table "Measure" SAR was required.

Band	Frequency(MHz)	Output power		Separation distances(mm)					SAR Exemption				
		dbm	mw	Front	Right Edge	Left Edge	Top	Bottom	Front	Right Edge	Left Edge	Top	Bottom
WCDMA Internal Antenna 1													
WCDMA II	1880.00	25.00	316.2	3.7	22.17	43.14	189.5	6.59	Measure	Measure	Measure	Exempt	Measure
WCDMA IV	1732.60	24.50	281.8	3.7	22.17	43.14	189.5	6.59	Measure	Measure	Measure	Exempt	Measure
WCDMA V	836.60	25.00	316.2	3.7	22.17	43.14	189.5	6.59	Measure	Measure	Measure	Exempt	Measure
LTE Internal Antenna 1													
LTE 2	1860.00	25.0	316.2	3.7	22.17	43.14	189.5	6.59	Measure	Measure	Measure	Exempt	Measure
LTE 5	829.00	25.0	316.2	3.7	22.17	43.14	189.5	6.59	Measure	Measure	Measure	Exempt	Measure
LTE 7	2535.00	25.0	316.2	3.7	22.17	43.14	189.5	6.59	Measure	Measure	Measure	Exempt	Measure
LTE 12	704.00	25.2	331.1	3.7	22.17	43.14	189.5	6.59	Measure	Measure	Measure	Exempt	Measure
LTE 13	782.00	25.0	316.2	3.7	22.17	43.14	189.5	6.59	Measure	Measure	Measure	Exempt	Measure
LTE 14	793.00	25.0	316.2	3.7	22.17	43.14	189.5	6.59	Measure	Measure	Measure	Exempt	Measure
LTE 66	1745.00	24.5	281.8	3.7	22.17	43.14	189.5	6.59	Measure	Measure	Measure	Exempt	Measure
5G NR FDD Internal Antenna 1													
5G NR n7	2535.00	25.0	316.2	3.7	22.17	43.14	189.5	6.59	Measure	Measure	Measure	Exempt	Measure
5G NR n12	707.50	25.0	316.2	3.7	22.17	43.14	189.5	6.59	Measure	Measure	Measure	Exempt	Measure
5G NR n13	782.00	25.0	316.2	3.7	22.17	43.14	189.5	6.59	Measure	Measure	Measure	Exempt	Measure
5G NR n14	793.00	25.0	316.2	3.7	22.17	43.14	189.5	6.59	Measure	Measure	Measure	Exempt	Measure
5G NR n25	1882.50	25.0	316.2	3.7	22.17	43.14	189.5	6.59	Measure	Measure	Measure	Exempt	Measure
5G NR n26	831.50	25.0	316.2	3.7	22.17	43.14	189.5	6.59	Measure	Measure	Measure	Exempt	Measure
5G NR n66	1745.00	24.5	281.8	3.7	22.17	43.14	189.5	6.59	Measure	Measure	Measure	Exempt	Measure
5G NR n71	680.50	25.0	316.2	3.7	22.17	43.14	189.5	6.59	Measure	Measure	Measure	Exempt	Measure
5G NR TDD Internal Antenna 2													
5G NR n41	2592.99	26.0	398.1	3.7	6.59	107.37	123.7	33.49	Measure	Measure	Exempt	Exempt	Measure
5G NR n77 DoD	3500.01	26.0	398.1	3.7	6.59	107.37	123.7	33.49	Measure	Measure	Exempt	Exempt	Measure
5G NR n77	3840.00	26.0	398.1	3.7	6.59	107.37	123.7	33.49	Measure	Measure	Exempt	Exempt	Measure

Note

1. Maximum power is the source-based time-average power and represents the maximum RF output power among production units.
2. For distances < 5mm, a distance of 5mm is used to determine SAR exclusion and estimated SAR value.
3. Output power is the maximum rated power (including tune-up or manufacturing tolerances).
4. If the antenna separation distance is > 50mm then the value listed is the output power threshold, above which SAR measurement is required. For separation ≤ 50mm the value is the KDB 447498 D04v01 calculated value and must be less than 7.5 for SAR exemption.
5. Formulas round separation distance to nearest mm and power to nearest mW before calculating thresholds or exemption values.

$$P_{\text{th}}\ (\text{mW}) = \begin{cases} ERP_{20\ \text{cm}}(d/20\ \text{cm})^x & d \le 20\ \text{cm} \\ ERP_{20\ \text{cm}} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases}$$

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22. SAR Data Summary

22.1 SAR data

WCDMA II Body SAR				Ambient Temperature (°C)			22.3			
				Liquid Temperature (°C)			21.4			
				Date			2023-10-06			
Position	**Mode**	**Freq (MHz)**	**Ch.**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1g SAR (W/kg)**
Front	RMC	1880.00	9400	N/A	30	24.25	0.207	25.00	1.189	**0.246**
Right Edge	RMC	1880.00	9400	N/A	30	24.25	0.048	25.00	1.189	0.057
Left Edge	RMC	1880.00	9400	N/A	30	24.25	0.027	25.00	1.189	0.032
Bottom	RMC	1880.00	9400	N/A	30	24.25	0.146	25.00	1.189	0.174

WCDMA II Body SAR_External				Ambient Temperature (°C)			22.3			
				Liquid Temperature (°C)			21.4			
				Date			2023-10-06			
Position	**Mode**	**Freq (MHz)**	**Ch.**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1g SAR (W/kg)**
Front	RMC	1880.00	9400	N/A	30	24.25	0.006	25.00	1.189	**0.007**

WCDMA IV Body SAR				Ambient Temperature (°C)			22.1			
				Liquid Temperature (°C)			21.2			
				Date			2023-10-07			
Position	**Mode**	**Freq (MHz)**	**Ch.**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1g SAR (W/kg)**
Front	RMC	1732.60	1413	N/A	30	23.59	0.482	24.50	1.233	**0.594**
Right Edge	RMC	1732.60	1413	N/A	30	23.59	0.073	24.50	1.233	0.090
Left Edge	RMC	1732.60	1413	N/A	30	23.59	0.030	24.50	1.233	0.037
Bottom	RMC	1732.60	1413	N/A	30	23.59	0.457	24.50	1.233	0.563

WCDMA IV Body SAR_External				Ambient Temperature (°C)			22.1			
				Liquid Temperature (°C)			21.2			
				Date			2023-10-07			
Position	**Mode**	**Freq (MHz)**	**Ch.**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1g SAR (W/kg)**
Front	RMC	1732.60	1413	N/A	30	23.59	0.018	24.50	1.233	**0.022**

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WCDMA V Body SAR				Ambient Temperature (°C)			22.0			
				Liquid Temperature (°C)			21.5			
				Date			2023-10-10			
Position	**Mode**	**Freq (MHz)**	**Ch.**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1g SAR (W/kg)**
Front	RMC	836.60	4183	N/A	30	24.53	0.233	25.00	1.114	**0.260**
Right Edge	RMC	836.60	4183	N/A	30	24.53	0.104	25.00	1.114	0.116
Left Edge	RMC	836.60	4183	N/A	30	24.53	0.030	25.00	1.114	0.034
Bottom	RMC	836.60	4183	N/A	30	24.53	0.188	25.00	1.114	0.209

WCDMA V Body SAR_External				Ambient Temperature (°C)			22.0			
				Liquid Temperature (°C)			21.5			
				Date			2023-10-10			
Position	**Mode**	**Freq (MHz)**	**Ch.**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1g SAR (W/kg)**
Front	RMC	836.60	4183	N/A	30	24.53	0.013	25.00	1.114	**0.014**

LTE Band 2 Body SAR							Ambient Temperature (°C)			22.0			
							Liquid Temperature (°C)			21.3			
							Date			2023-10-05			
Position	**Mod.**	**BW (MHz)**	**Freq (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1g SAR (W/kg)**
Front	QPSK	20	1860.00	18700	1	0	N/A	30	24.12	0.223	25.00	1.225	0.273
Front	QPSK	20	1860.00	18700	50	13	N/A	30	23.11	0.204	25.00	1.545	0.315
Right Edge	QPSK	20	1860.00	18700	1	0	N/A	30	24.12	0.077	25.00	1.225	0.094
Right Edge	QPSK	20	1860.00	18700	50	13	N/A	30	23.11	0.058	25.00	1.545	0.090
Left Edge	QPSK	20	1860.00	18700	1	0	N/A	30	24.12	0.029	25.00	1.225	0.036
Left Edge	QPSK	20	1860.00	18700	50	13	N/A	30	23.11	0.025	24.00	1.227	0.031
Bottom	QPSK	20	1860.00	18700	1	0	N/A	30	24.12	0.284	25.00	1.225	**0.348**
Bottom	QPSK	20	1860.00	18700	50	13	N/A	30	23.11	0.207	25.00	1.545	0.320

LTE Band 2 Body SAR_External							Ambient Temperature (°C)			22.0			
							Liquid Temperature (°C)			21.3			
							Date			2023-10-05			
Position	**Mod.**	**BW (MHz)**	**Freq (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1g SAR (W/kg)**
Front	QPSK	20	1860.00	18700	1	0	N/A	30	24.12	0.008	25.00	1.225	0.010
Front	QPSK	20	1860.00	18700	50	13	N/A	30	23.11	0.008	24.00	1.227	**0.010**

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LTE Band 5 Body SAR													
							Ambient Temperature (°C)			22.5			
							Liquid Temperature (°C)			21.2			
							Date			2023-10-03			
Position	**Mod.**	**BW (MHz)**	**Freq (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1g SAR (W/kg)**
Front	QPSK	10	829.00	20450	1	25	N/A	30	24.57	0.218	25.20	1.156	**0.252**
Front	QPSK	10	829.00	20450	25	25	N/A	30	23.54	0.176	24.20	1.164	0.205
Right Edge	QPSK	10	829.00	20450	1	25	N/A	30	24.57	0.093	25.20	1.156	0.107
Right Edge	QPSK	10	829.00	20450	25	25	N/A	30	23.54	0.079	24.20	1.164	0.092
Left Edge	QPSK	10	829.00	20450	1	25	N/A	30	24.57	0.069	25.20	1.156	0.079
Left Edge	QPSK	10	829.00	20450	25	25	N/A	30	23.54	0.053	24.20	1.164	0.061
Bottom	QPSK	10	829.00	20450	1	25	N/A	30	24.57	0.172	25.20	1.156	0.199
Bottom	QPSK	10	829.00	20450	25	25	N/A	30	23.54	0.139	24.20	1.164	0.162

LTE Band 5 Body SAR_External													
							Ambient Temperature (°C)			22.5			
							Liquid Temperature (°C)			21.2			
							Date			2023-10-03			
Position	**Mod.**	**BW (MHz)**	**Freq (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1g SAR (W/kg)**
Front	QPSK	10	829.00	20450	1	25	N/A	30	24.57	0.006	25.20	1.156	**0.006**
Front	QPSK	10	829.00	20450	25	25	N/A	30	23.54	0.005	24.20	1.164	0.006

LTE Band 7 Body SAR													
							Ambient Temperature (°C)			21.8			
							Liquid Temperature (°C)			21.1			
							Date			2023-10-06			
Position	**Mod.**	**BW (MHz)**	**Freq (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1g SAR (W/kg)**
Front	QPSK	20	2535.00	21100	1	99	N/A	30	24.33	0.404	25.00	1.167	0.471
Front	QPSK	20	2535.00	21100	50	13	N/A	30	23.43	0.335	24.00	1.140	0.382
Right Edge	QPSK	20	2535.00	21100	1	99	N/A	30	24.33	0.197	25.00	1.167	0.230
Right Edge	QPSK	20	2535.00	21100	50	13	N/A	30	23.43	0.175	24.00	1.140	0.200
Left Edge	QPSK	20	2535.00	21100	1	99	N/A	30	24.33	0.035	25.00	1.167	0.041
Left Edge	QPSK	20	2535.00	21100	50	13	N/A	30	23.43	0.028	24.00	1.140	0.032
Bottom	QPSK	20	2535.00	21100	1	99	N/A	30	24.33	0.491	25.00	1.167	**0.573**
Bottom	QPSK	20	2535.00	21100	50	13	N/A	30	23.43	0.408	24.00	1.140	0.465

LTE Band 7 Body SAR_External													
							Ambient Temperature (°C)			21.8			
							Liquid Temperature (°C)			21.1			
							Date			2023-10-06			
Position	**Mod.**	**BW (MHz)**	**Freq (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1g SAR (W/kg)**
Front	QPSK	20	2535.00	21100	1	99	N/A	30	24.33	0.022	25.00	1.167	**0.026**
Front	QPSK	20	2535.00	21100	50	13	N/A	30	23.43	0.008	24.00	1.140	0.009

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LTE Band 12 Body SAR													
							Ambient Temperature (°C)			21.5			
							Liquid Temperature (°C)			21.5			
							Date			2023-09-30			
Position	**Mod.**	**BW (MHz)**	**Freq (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1g SAR (W/kg)**
Front	QPSK	10	704.00	23060	1	25	N/A	30	24.49	0.124	25.20	1.178	**0.146**
Front	QPSK	10	704.00	23060	25	0	N/A	30	23.48	0.100	24.20	1.180	0.118
Right Edge	QPSK	10	704.00	23060	1	25	N/A	30	24.49	0.040	25.20	1.178	0.047
Right Edge	QPSK	10	704.00	23060	25	0	N/A	30	23.48	0.032	24.20	1.180	0.038
Left Edge	QPSK	10	704.00	23060	1	25	N/A	30	24.49	0.085	25.20	1.178	0.100
Left Edge	QPSK	10	704.00	23060	25	0	N/A	30	23.48	0.071	24.20	1.180	0.084
Bottom	QPSK	10	704.00	23060	1	25	N/A	30	24.49	0.118	25.20	1.178	0.139
Bottom	QPSK	10	704.00	23060	25	0	N/A	30	23.48	0.095	24.20	1.180	0.112

LTE Band 12 Body SAR_External													
							Ambient Temperature (°C)			21.5			
							Liquid Temperature (°C)			21.2			
							Date			2023-10-04			
Position	**Mod.**	**BW (MHz)**	**Freq (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1g SAR (W/kg)**
Front	QPSK	10	704.00	23060	1	25	N/A	30	24.49	0.004	25.20	1.178	**0.005**
Front	QPSK	10	704.00	23060	25	0	N/A	30	23.48	0.003	24.20	1.180	0.004

LTE Band 13 Body SAR													
							Ambient Temperature (°C)			22.1			
							Liquid Temperature (°C)			21.5			
							Date			2023-10-01			
Position	**Mod.**	**BW (MHz)**	**Freq (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1g SAR (W/kg)**
Front	QPSK	10	782.00	23230	1	25	N/A	30	24.05	0.195	25.00	1.245	**0.243**
Front	QPSK	10	782.00	23230	25	0	N/A	30	23.11	0.159	24.00	1.227	0.195
Right Edge	QPSK	10	782.00	23230	1	25	N/A	30	24.05	0.093	25.00	1.245	0.116
Right Edge	QPSK	10	782.00	23230	25	0	N/A	30	23.11	0.073	24.00	1.227	0.090
Left Edge	QPSK	10	782.00	23230	1	25	N/A	30	24.05	0.065	25.00	1.245	0.081
Left Edge	QPSK	10	782.00	23230	25	0	N/A	30	23.11	0.043	24.00	1.227	0.053
Bottom	QPSK	10	782.00	23230	1	25	N/A	30	24.05	0.124	25.00	1.245	0.154
Bottom	QPSK	10	782.00	23230	25	0	N/A	30	23.11	0.104	24.00	1.227	0.128

LTE Band 13 Body SAR_External													
							Ambient Temperature (°C)			22.0			
							Liquid Temperature (°C)			21.2			
							Date			2023-10-04			
Position	**Mod.**	**BW (MHz)**	**Freq (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1g SAR (W/kg)**
Front	QPSK	10	782.00	23230	1	25	N/A	30	24.05	0.005	25.00	1.245	**0.006**
Front	QPSK	10	782.00	23230	25	0	N/A	30	23.11	0.004	24.00	1.227	0.005

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LTE Band 14 Body SAR													
							Ambient Temperature (°C)			22.0			
							Liquid Temperature (°C)			21.2			
							Date			2023-10-02			
Position	**Mod.**	**BW (MHz)**	**Freq (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1g SAR (W/kg)**
Front	QPSK	10	793.00	23330	1	25	N/A	30	24.04	0.194	25.00	1.247	**0.242**
Front	QPSK	10	793.00	23330	25	0	N/A	30	23.01	0.156	24.00	1.256	0.196
Right Edge	QPSK	10	793.00	23330	1	25	N/A	30	24.04	0.098	25.00	1.247	0.122
Right Edge	QPSK	10	793.00	23330	25	0	N/A	30	23.01	0.080	24.00	1.256	0.100
Left Edge	QPSK	10	793.00	23330	1	25	N/A	30	24.04	0.064	25.00	1.247	0.080
Left Edge	QPSK	10	793.00	23330	25	0	N/A	30	23.01	0.052	24.00	1.256	0.065
Bottom	QPSK	10	793.00	23330	1	25	N/A	30	24.04	0.120	25.00	1.247	0.150
Bottom	QPSK	10	793.00	23330	25	0	N/A	30	23.01	0.096	24.00	1.256	0.121

LTE Band 14 Body SAR_External													
							Ambient Temperature (°C)			22.0			
							Liquid Temperature (°C)			21.2			
							Date			2023-10-04			
Position	**Mod.**	**BW (MHz)**	**Freq (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1g SAR (W/kg)**
Front	QPSK	10	793.00	23330	1	25	N/A	30	24.04	0.010	25.00	1.247	**0.012**
Front	QPSK	10	793.00	23330	25	0	N/A	30	23.01	0.006	24.00	1.256	0.008

LTE Band 66 Body SAR													
							Ambient Temperature(°C)			21.5			
							Liquid Temperature (°C)			21.6			
							Date			2023-10-20			
Position	**Mod.**	**BW (MHz)**	**Freq (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1g SAR (W/kg)**
Front	QPSK	20	1745.00	132322	1	0	N/A	30	23.17	0.496	24.50	1.358	0.674
Front	QPSK	20	1745.00	132322	50	25	N/A	30	22.58	0.382	23.50	1.236	0.472
Right Edge	QPSK	20	1745.00	132322	1	0	N/A	30	23.17	0.086	24.50	1.358	0.117
Right Edge	QPSK	20	1745.00	132322	50	25	N/A	30	22.58	0.062	23.50	1.236	0.077
Left Edge	QPSK	20	1745.00	132322	1	0	N/A	30	23.17	0.100	24.50	1.358	0.136
Left Edge	QPSK	20	1745.00	132322	50	25	N/A	30	22.58	0.076	23.50	1.236	0.094
Bottom	QPSK	20	1745.00	132322	1	0	N/A	30	23.17	0.518	24.50	1.358	**0.703**
Bottom	QPSK	20	1745.00	132322	50	25	N/A	30	22.58	0.402	23.50	1.236	0.497

LTE Band 66 Body SAR_External													
							Ambient Temperature(°C)			22.2			
							Liquid Temperature (°C)			21.6			
							Date			2023-10-13			
Position	**Mod.**	**BW (MHz)**	**Freq (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1g SAR (W/kg)**
Front	QPSK	20	1745.00	132322	1	0	N/A	30	23.17	0.007	24.50	1.358	**0.010**
Front	QPSK	20	1745.00	132322	50	25	N/A	30	22.58	0.007	23.50	1.236	0.009

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5G NR n7 Body SAR									Ambient Temperature(°C)			22.1			
									Liquid Temperature (°C)			21.8			
									Date			2023-10-14			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	DFT-s-OFDM	QPSK	15	20	2535.00	507000	1	1	N/A	30	23.51	0.239	25.00	1.409	0.337
Front	DFT-s-OFDM	QPSK	15	20	2535.00	507000	50	25	N/A	30	23.41	0.249	25.00	1.442	0.359
Right Edge	DFT-s-OFDM	QPSK	15	20	2535.00	507000	1	1	N/A	30	23.51	0.228	25.00	1.409	0.321
Right Edge	DFT-s-OFDM	QPSK	15	20	2535.00	507000	50	25	N/A	30	23.41	0.227	25.00	1.442	0.327
Left Edge	DFT-s-OFDM	QPSK	15	20	2535.00	507000	1	1	N/A	30	23.51	0.042	25.00	1.409	0.059
Left Edge	DFT-s-OFDM	QPSK	15	20	2535.00	507000	50	25	N/A	30	23.41	0.049	25.00	1.442	0.071
Bottom	DFT-s-OFDM	QPSK	15	20	2535.00	507000	1	1	N/A	30	23.51	0.462	25.00	1.409	**0.651**
Bottom	DFT-s-OFDM	QPSK	15	20	2535.00	507000	50	25	N/A	30	23.41	0.449	25.00	1.442	0.647

5G NR n7 Body SAR_External									Ambient Temperature(°C)			21.9			
									Liquid Temperature (°C)			21.6			
									Date			2023-10-16			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	DFT-s-OFDM	QPSK	15	20	2535.00	507000	1	1	N/A	30	23.51	0.023	25.00	1.409	**0.032**
Front	DFT-s-OFDM	QPSK	15	20	2535.00	507000	50	25	N/A	30	23.41	0.019	25.00	1.442	0.027

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5G NR n12 Body SAR									Ambient Temperature(°C)			21.9			
									Liquid Temperature (°C)			21.3			
									Date			2023-10-17			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	DFT-s-OFDM	BPSK	15	15	707.50	141500	1	1	N/A	30	23.56	0.135	25.00	1.393	0.188
Front	DFT-s-OFDM	BPSK	15	15	707.50	141500	36	18	N/A	30	23.55	0.144	25.00	1.396	**0.201**
Right Edge	DFT-s-OFDM	BPSK	15	15	707.50	141500	1	1	N/A	30	23.56	0.041	25.00	1.393	0.057
Right Edge	DFT-s-OFDM	BPSK	15	15	707.50	141500	36	18	N/A	30	23.55	0.042	25.00	1.396	0.059
Left Edge	DFT-s-OFDM	BPSK	15	15	707.50	141500	1	1	N/A	30	23.56	0.056	25.00	1.393	0.078
Left Edge	DFT-s-OFDM	BPSK	15	15	707.50	141500	36	18	N/A	30	23.55	0.049	25.00	1.396	0.068
Bottom	DFT-s-OFDM	BPSK	15	15	707.50	141500	1	1	N/A	30	23.56	0.101	25.00	1.393	0.141
Bottom	DFT-s-OFDM	BPSK	15	15	707.50	141500	36	18	N/A	30	23.55	0.086	25.00	1.396	0.120

5G NR n12 Body SAR_External									Ambient Temperature(°C)			21.9			
									Liquid Temperature (°C)			21.3			
									Date			2023-10-17			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	DFT-s-OFDM	BPSK	15	15	707.50	141500	1	1	N/A	30	23.56	0.006	25.00	1.393	**0.008**
Front	DFT-s-OFDM	BPSK	15	15	707.50	141500	36	18	N/A	30	23.55	0.006	25.00	1.396	0.008

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5G NR n13 Body SAR									Ambient Temperature(°C)			21.7			
									Liquid Temperature (°C)			21.2			
									Date			2023-10-19			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	DFT-s-OFDM	BPSK	15	10	782.00	156400	1	1	N/A	30	23.14	0.203	25.00	1.535	0.312
Front	DFT-s-OFDM	BPSK	15	10	782.00	156400	25	12	N/A	30	23.07	0.230	25.00	1.560	**0.359**
Right Edge	DFT-s-OFDM	BPSK	15	10	782.00	156400	1	1	N/A	30	23.14	0.109	25.00	1.535	0.167
Right Edge	DFT-s-OFDM	BPSK	15	10	782.00	156400	25	12	N/A	30	23.07	0.136	25.00	1.560	0.212
Left Edge	DFT-s-OFDM	BPSK	15	10	782.00	156400	1	1	N/A	30	23.14	0.115	25.00	1.535	0.177
Left Edge	DFT-s-OFDM	BPSK	15	10	782.00	156400	25	12	N/A	30	23.07	0.119	25.00	1.560	0.186
Bottom	DFT-s-OFDM	BPSK	15	10	782.00	156400	1	1	N/A	30	23.14	0.141	25.00	1.535	0.216
Bottom	DFT-s-OFDM	BPSK	15	10	782.00	156400	25	12	N/A	30	23.07	0.128	25.00	1.560	0.200

5G NR n13 Body SAR_External									Ambient Temperature(°C)			21.7			
									Liquid Temperature (°C)			21.2			
									Date			2023-10-19			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	DFT-s-OFDM	BPSK	15	10	782.00	156400	1	1	N/A	30	23.14	0.044	25.00	1.535	**0.068**
Front	DFT-s-OFDM	BPSK	15	10	782.00	156400	25	12	N/A	30	23.07	0.042	25.00	1.560	0.066

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5G NR n14 Body SAR									Ambient Temperature(°C)			21.1			
									Liquid Temperature (°C)			22.0			
									Date			2023-10-18			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	DFT-s-OFDM	BPSK	15	10	793.00	158600	1	1	N/A	30	23.50	0.192	25.00	1.413	0.271
Front	DFT-s-OFDM	BPSK	15	10	793.00	158600	25	12	N/A	30	23.12	0.211	25.00	1.542	**0.325**
Right Edge	DFT-s-OFDM	BPSK	15	10	793.00	158600	1	1	N/A	30	23.50	0.117	25.00	1.413	0.165
Right Edge	DFT-s-OFDM	BPSK	15	10	793.00	158600	25	12	N/A	30	23.12	0.123	25.00	1.542	0.190
Left Edge	DFT-s-OFDM	BPSK	15	10	793.00	158600	1	1	N/A	30	23.50	0.083	25.00	1.413	0.117
Left Edge	DFT-s-OFDM	BPSK	15	10	793.00	158600	25	12	N/A	30	23.12	0.101	25.00	1.542	0.156
Bottom	DFT-s-OFDM	BPSK	15	10	793.00	158600	1	1	N/A	30	23.50	0.121	25.00	1.413	0.171
Bottom	DFT-s-OFDM	BPSK	15	10	793.00	158600	25	12	N/A	30	23.12	0.132	25.00	1.542	0.204

5G NR n14 Body SAR_External									Ambient Temperature(°C)			22.0			
									Liquid Temperature (°C)			21.1			
									Date			2023-10-18			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	DFT-s-OFDM	BPSK	15	10	793.00	158600	1	1	N/A	30	23.50	0.018	25.00	1.413	**0.025**
Front	DFT-s-OFDM	BPSK	15	10	793.00	158600	25	12	N/A	30	23.12	0.013	25.00	1.542	0.020

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5G NR n25 Body SAR									Ambient Temperature(°C)			22.4			
									Liquid Temperature (°C)			21.8			
									Date			2023-10-12			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	DFT-s-OFDM	BPSK	15	20	1882.50	376500	1	1	N/A	30	23.64	0.277	25.00	1.368	0.379
Front	DFT-s-OFDM	BPSK	15	20	1882.50	376500	50	25	N/A	30	23.57	0.151	25.00	1.390	0.210
Right Edge	DFT-s-OFDM	BPSK	15	20	1882.50	376500	1	1	N/A	30	23.64	0.074	25.00	1.368	0.102
Right Edge	DFT-s-OFDM	BPSK	15	20	1882.50	376500	50	25	N/A	30	23.57	0.045	25.00	1.390	0.063
Left Edge	DFT-s-OFDM	BPSK	15	20	1882.50	376500	1	1	N/A	30	23.64	0.066	25.00	1.368	0.091
Left Edge	DFT-s-OFDM	BPSK	15	20	1882.50	376500	50	25	N/A	30	23.57	0.061	25.00	1.390	0.084
Bottom	DFT-s-OFDM	BPSK	15	20	1882.50	376500	1	1	N/A	30	23.64	0.296	25.00	1.368	**0.405**
Bottom	DFT-s-OFDM	BPSK	15	20	1882.50	376500	50	25	N/A	30	23.57	0.220	25.00	1.390	0.306

5G NR n25 Body SAR_External									Ambient Temperature(°C)			22.4			
									Liquid Temperature (°C)			21.8			
									Date			2023-10-12			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	DFT-s-OFDM	BPSK	15	20	1882.50	376500	1	1	N/A	30	23.64	0.0004	25.00	1.368	0.001
Front	DFT-s-OFDM	BPSK	15	20	1882.50	376500	50	25	N/A	30	23.57	0.010	25.00	1.390	**0.014**

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5G NR n26 Body SAR									Ambient Temperature(°C)			21.8			
									Liquid Temperature (°C)			21.2			
									Date			2023-10-16			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	DFT-s-OFDM	QPSK	15	20	831.50	166300	1	1	N/A	30	23.92	0.233	25.00	1.282	**0.299**
Front	DFT-s-OFDM	QPSK	15	20	831.50	166300	50	25	N/A	30	23.78	0.186	25.00	1.324	0.246
Right Edge	DFT-s-OFDM	QPSK	15	20	831.50	166300	1	1	N/A	30	23.92	0.096	25.00	1.282	0.123
Right Edge	DFT-s-OFDM	QPSK	15	20	831.50	166300	50	25	N/A	30	23.78	0.103	25.00	1.324	0.136
Left Edge	DFT-s-OFDM	QPSK	15	20	831.50	166300	1	1	N/A	30	23.92	0.074	25.00	1.282	0.095
Left Edge	DFT-s-OFDM	QPSK	15	20	831.50	166300	50	25	N/A	30	23.78	0.073	25.00	1.324	0.097
Bottom	DFT-s-OFDM	QPSK	15	20	831.50	166300	1	1	N/A	30	23.92	0.125	25.00	1.282	0.160
Bottom	DFT-s-OFDM	QPSK	15	20	831.50	166300	50	25	N/A	30	23.78	0.137	25.00	1.324	0.181

5G NR n26 Body SAR_External									Ambient Temperature(°C)			21.8			
									Liquid Temperature (°C)			21.2			
									Date			2023-10-16			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	DFT-s-OFDM	QPSK	15	20	831.50	166300	1	1	N/A	30	23.92	0.019	25.00	1.282	**0.024**
Front	DFT-s-OFDM	QPSK	15	20	831.50	166300	50	25	N/A	30	23.78	0.017	25.00	1.324	0.023

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5G NR n66 Body SAR									Ambient Temperature(°C)			21.8			
									Liquid Temperature (°C)			21.0			
									Date			2023-10-14			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	DFT-s-OFDM	BPSK	15	40	1745.00	349000	1	1	N/A	30	23.50	0.560	24.50	1.259	**0.705**
Front	DFT-s-OFDM	BPSK	15	40	1745.00	349000	108	54	N/A	30	23.22	0.471	24.50	1.343	0.633
Right Edge	DFT-s-OFDM	BPSK	15	40	1745.00	349000	1	1	N/A	30	23.50	0.077	24.50	1.259	0.097
Right Edge	DFT-s-OFDM	BPSK	15	40	1745.00	349000	108	54	N/A	30	23.22	0.078	24.50	1.343	0.105
Left Edge	DFT-s-OFDM	BPSK	15	40	1745.00	349000	1	1	N/A	30	23.50	0.040	24.50	1.259	0.050
Left Edge	DFT-s-OFDM	BPSK	15	40	1745.00	349000	108	54	N/A	30	23.22	0.059	24.50	1.343	0.079
Bottom	DFT-s-OFDM	BPSK	15	40	1745.00	349000	1	1	N/A	30	23.50	0.442	24.50	1.259	0.556
Bottom	DFT-s-OFDM	BPSK	15	40	1745.00	349000	108	54	N/A	30	23.22	0.459	24.50	1.343	0.616

5G NR n66 Body SAR_External									Ambient Temperature(°C)			21.8			
									Liquid Temperature (°C)			21.0			
									Date			2023-10-14			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	DFT-s-OFDM	BPSK	15	40	1745.00	349000	1	1	N/A	30	23.50	0.0060	24.50	1.259	0.008
Front	DFT-s-OFDM	BPSK	15	40	1745.00	349000	108	54	N/A	30	23.22	0.0130	24.50	1.343	**0.017**

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5G NR n71 Body SAR									Ambient Temperature(°C)			22.2			
									Liquid Temperature (°C)			21.6			
									Date			2023-10-13			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	DFT-s-OFDM	BPSK	15	20	680.50	136100	1	1	N/A	30	23.97	0.118	25.00	1.268	0.150
Front	DFT-s-OFDM	BPSK	15	20	680.50	136100	50	25	N/A	30	23.81	0.136	25.00	1.315	**0.179**
Right Edge	DFT-s-OFDM	BPSK	15	20	680.50	136100	1	1	N/A	30	23.97	0.038	25.00	1.268	0.048
Right Edge	DFT-s-OFDM	BPSK	15	20	680.50	136100	50	25	N/A	30	23.81	0.040	25.00	1.315	0.053
Left Edge	DFT-s-OFDM	BPSK	15	20	680.50	136100	1	1	N/A	30	23.97	0.037	25.00	1.268	0.047
Left Edge	DFT-s-OFDM	BPSK	15	20	680.50	136100	50	25	N/A	30	23.81	0.042	25.00	1.315	0.055
Bottom	DFT-s-OFDM	BPSK	15	20	680.50	136100	1	1	N/A	30	23.97	0.074	25.00	1.268	0.094
Bottom	DFT-s-OFDM	BPSK	15	20	680.50	136100	50	25	N/A	30	23.81	0.089	25.00	1.315	0.117

5G NR n71 Body SAR_External									Ambient Temperature(°C)			22.2			
									Liquid Temperature (°C)			21.6			
									Date			2023-10-13			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	DFT-s-OFDM	BPSK	15	20	680.50	136100	1	1	N/A	30	23.97	0.006	25.00	1.268	**0.008**
Front	DFT-s-OFDM	BPSK	15	20	680.50	136100	50	25	N/A	30	23.81	0.004	25.00	1.315	0.005

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5G NR n41 Body SAR									Ambient Temperature(°C)			21.9			
									Liquid Temperature (°C)			21.7			
									Date			2023-10-20			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	DFT-s-OFDM	BPSK	30	100	2592.99	518598	1	1	N/A	30	25.89	0.296	26.00	1.026	0.304
Front	DFT-s-OFDM	BPSK	30	100	2592.99	518598	135	67	N/A	30	25.83	0.379	26.00	1.040	0.394
Right Edge	DFT-s-OFDM	BPSK	30	100	2592.99	518598	1	1	N/A	30	25.89	0.326	26.00	1.026	0.334
Right Edge	DFT-s-OFDM	BPSK	30	100	2592.99	518598	135	67	N/A	30	25.83	0.425	26.00	1.040	**0.442**
Bottom	DFT-s-OFDM	BPSK	30	100	2592.99	518598	1	1	N/A	30	25.89	0.261	26.00	1.026	0.268
Bottom	DFT-s-OFDM	BPSK	30	100	2592.99	518598	135	67	N/A	30	25.83	0.285	26.00	1.040	0.296

5G NR n41 Body SAR_External									Ambient Temperature(°C)			21.8			
									Liquid Temperature (°C)			21.4			
									Date			2023-10-25			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	DFT-s-OFDM	BPSK	30	100	2592.99	518598	1	1	N/A	30	25.89	0.006	26.00	1.026	0.006
Front	DFT-s-OFDM	BPSK	30	100	2592.99	518598	135	67	N/A	30	25.83	0.012	26.00	1.040	**0.012**

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5G NR n77 DoD Body SAR									Ambient Temperature(°C)			22.2			
									Liquid Temperature (°C)			21.8			
									Date			2023-10-19			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	DFT-s-OFDM	BPSK	30	100	3500.01	633334	1	1	N/A	30	25.55	0.096	26.00	1.109	0.106
Front	DFT-s-OFDM	BPSK	30	100	3500.01	633334	135	67	N/A	30	25.48	0.105	26.00	1.127	0.118
Right Edge	DFT-s-OFDM	BPSK	30	100	3500.01	633334	1	1	N/A	30	25.55	0.157	26.00	1.109	0.174
Right Edge	DFT-s-OFDM	BPSK	30	100	3500.01	633334	135	67	N/A	30	25.48	0.156	26.00	1.127	0.176
Bottom	DFT-s-OFDM	BPSK	30	100	3500.01	633334	1	1	N/A	30	25.55	0.222	26.00	1.109	**0.246**
Bottom	DFT-s-OFDM	BPSK	30	100	3500.01	633334	135	67	N/A	30	25.48	0.217	26.00	1.127	0.245

5G NR n77 DoD Body SAR_External									Ambient Temperature(°C)			22.2			
									Liquid Temperature (°C)			21.7			
									Date			2023-10-18			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	DFT-s-OFDM	BPSK	30	100	3500.01	633334	1	1	N/A	30	25.55	0.087	26.00	1.109	0.096
Front	DFT-s-OFDM	BPSK	30	100	3500.01	633334	135	67	N/A	30	25.48	0.166	26.00	1.127	**0.187**

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5G NR n77 Body SAR									Ambient Temperature(°C)			22.5			
									Liquid Temperature (°C)			21.9			
									Date			2023-10-20			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	DFT-s-OFDM	BPSK	30	100	3840.00	656000	1	1	N/A	30	25.78	0.077	26.00	1.052	0.081
Front	DFT-s-OFDM	BPSK	30	100	3840.00	656000	135	67	N/A	30	25.40	0.046	26.00	1.148	0.053
Right Edge	DFT-s-OFDM	BPSK	30	100	3840.00	656000	1	1	N/A	30	25.78	0.447	26.00	1.052	0.470
Right Edge	DFT-s-OFDM	BPSK	30	100	3840.00	656000	135	67	N/A	30	25.40	0.415	26.00	1.148	**0.476**
Bottom	DFT-s-OFDM	BPSK	30	100	3840.00	656000	1	1	N/A	30	25.78	0.151	26.00	1.052	0.159
Bottom	DFT-s-OFDM	BPSK	30	100	3840.00	656000	135	67	N/A	30	25.40	0.146	26.00	1.148	0.168

5G NR n77 Body SAR_External									Ambient Temperature(°C)			21.3			
									Liquid Temperature (°C)			21.7			
									Date			2023-10-18			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	DFT-s-OFDM	BPSK	30	100	3840.00	656000	1	1	N/A	30	25.78	0.031	26.00	1.052	**0.033**
Front	DFT-s-OFDM	BPSK	30	100	3840.00	656000	135	67	N/A	30	25.68	0.019	26.00	1.076	0.020

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5G NR n41 MIMO Body SAR									Ambient Temperature(°C)			21.7			
									Liquid Temperature (°C)			21.2			
									Date			2023-10-23			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	CP-OFDM	QPSK	30	100	2592.99	518598	1	1	N/A	30	24.90	0.231	26.00	1.288	0.298
Front	CP-OFDM	QPSK	30	100	2592.99	518598	137	68	N/A	30	24.79	0.248	26.00	1.321	0.328
Right Edge	CP-OFDM	QPSK	30	100	2592.99	518598	1	1	N/A	30	24.90	0.290	26.00	1.288	0.374
Right Edge	CP-OFDM	QPSK	30	100	2592.99	518598	137	68	N/A	30	24.79	0.310	26.00	1.321	**0.410**
Left Edge	CP-OFDM	QPSK	30	100	2592.99	518598	1	1	N/A	30	24.90	0.075	26.00	1.288	0.097
Left Edge	CP-OFDM	QPSK	30	100	2592.99	518598	137	68	N/A	30	24.79	0.049	26.00	1.321	0.065
Bottom	CP-OFDM	QPSK	30	100	2592.99	518598	1	1	N/A	30	24.90	0.222	26.00	1.288	0.286
Bottom	CP-OFDM	QPSK	30	100	2592.99	518598	137	68	N/A	30	24.79	0.214	26.00	1.321	0.283

5G NR n41 MIMO Body SAR_External									Ambient Temperature(°C)			21.8			
									Liquid Temperature (°C)			21.4			
									Date			2023-10-25			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	CP-OFDM	QPSK	30	100	2592.99	518598	1	1	N/A	30	24.90	N/A	26.00	1.288	N/A
Front	CP-OFDM	QPSK	30	100	2592.99	518598	137	68	N/A	30	24.79	0.004	26.00	1.321	**0.005**

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5G NR n77 DoD MIMO Body SAR									Ambient Temperature(°C)			22.9			
									Liquid Temperature (°C)			21.9			
									Date			2023-10-22			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	CP-OFDM	QPSK	30	100	3500.01	633334	1	1	N/A	30	24.82	0.254	26.00	1.312	0.333
Front	CP-OFDM	QPSK	30	100	3500.01	633334	137	68	N/A	30	24.80	0.256	26.00	1.318	0.337
Left Edge	CP-OFDM	QPSK	30	100	3500.01	633334	1	1	N/A	30	24.82	0.099	26.00	1.312	0.130
Left Edge	CP-OFDM	QPSK	30	100	3500.01	633334	137	68	N/A	30	24.80	0.094	26.00	1.318	0.124
Right Edge	CP-OFDM	QPSK	30	100	3500.01	633334	1	1	N/A	30	24.82	0.327	26.00	1.312	0.429
Right Edge	CP-OFDM	QPSK	30	100	3500.01	633334	137	68	N/A	30	24.80	0.329	26.00	1.318	**0.434**
Bottom	CP-OFDM	QPSK	30	100	3500.01	633334	1	1	N/A	30	24.82	0.249	26.00	1.312	0.327
Bottom	CP-OFDM	QPSK	30	100	3500.01	633334	137	68	N/A	30	24.80	0.274	26.00	1.318	0.361

5G NR n77 DoD MIMO Body SAR_External									Ambient Temperature(°C)			22.3			
									Liquid Temperature (°C)			21.7			
									Date			2023-10-21			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	CP-OFDM	QPSK	30	100	3500.01	633334	1	1	N/A	30	24.82	0.014	26.00	1.312	0.018
Front	CP-OFDM	QPSK	30	100	3500.01	633334	137	68	N/A	30	24.80	0.023	26.00	1.318	**0.030**

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5G NR n77 MIMO Body SAR									Ambient Temperature(°C)			22.8			
									Liquid Temperature (°C)			21.6			
									Date			2023-10-23			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	CP-OFDM	QPSK	30	100	3840.00	656000	1	1	N/A	30	24.82	0.442	26.00	1.312	0.580
Front	CP-OFDM	QPSK	30	100	3840.00	656000	137	68	N/A	30	24.80	0.520	26.00	1.318	0.685
Left Edge	CP-OFDM	QPSK	30	100	3840.00	656000	1	1	N/A	30	24.82	0.121	26.00	1.312	0.159
Left Edge	CP-OFDM	QPSK	30	100	3840.00	656000	137	68	N/A	30	24.80	0.173	26.00	1.318	0.228
Right Edge	CP-OFDM	QPSK	30	100	3840.00	656000	1	1	N/A	30	24.82	0.447	26.00	1.312	0.586
Right Edge	CP-OFDM	QPSK	30	100	3840.00	656000	137	68	N/A	30	24.80	0.415	26.00	1.318	0.547
Bottom	CP-OFDM	QPSK	30	100	3840.00	656000	1	1	N/A	30	24.82	0.566	26.00	1.312	0.743
Bottom	CP-OFDM	QPSK	30	100	3840.00	656000	137	68	N/A	30	24.80	0.643	26.00	1.318	**0.847**

5G NR n77 MIMO Body SAR_External									Ambient Temperature(°C)			22.3			
									Liquid Temperature (°C)			21.7			
									Date			2023-10-21			
Position	**Waveform**	**Mod.**	**SCS (kHz)**	**BW (MHz)**	**Freq. (MHz)**	**Ch.**	**RB Size**	**RB Offset**	**Sensor State (Grip)**	**Space (㎜)**	**Measure Power (dBm)**	**Measure 1 g SAR (W/kg)**	**Tune-Up Limit (dBm)**	**Power Scaling Factor**	**Scaling 1 g SAR (W/kg)**
Front	CP-OFDM	QPSK	30	100	3840.00	656000	1	1	N/A	30	24.82	0.046	26.00	1.312	**0.060**
Front	CP-OFDM	QPSK	30	100	3840.00	656000	137	68	N/A	30	24.80	0.040	26.00	1.318	0.053

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General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in FCC KDB Publication 447498 D04v01.
2. Liquid tissue depth was at least 15 cm for all frequencies.
3. All modes of operation were investigated, and worst-case results are reported.
4. The EUT is tested 2nd hot-spot peak, if it is less than 2 dB below the highest peak.
5. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
6. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D04v01.
7. The "N/A" means there is no SAR value or the SAR is too low to be measured.

WCDMA Notes:

1. WCDMA mode in Body SAR was tested under RMC 12.2 kbps with HSPA inactive per KDB Publication 941225 D01v03r01. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.
2. Per FCC KDB Publication 447498 D04v01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is > 1/2 dB, instead of the middle channel, the highest output power channel must be used.

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Considerations for LTE Devices in FCC KDB Publication 941225 D05v02r05. The general test procedures used for testing can be found in Section 5.
2. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3-6.2.5 under Table 6.2.3-1.
3. A-MPR was disabled for all SAR tests by setting NS=01 on the base station simulator.
4. This device supports LTE capabilities with overlapping transmission frequency rages. When the supported frequency range of an LTE Band falls completely within an LTE band with a larger transmission frequency range, both LTE bands have the same target power (or the band with the larger transmission frequency range has a higher target power), and both LTE bands share the same transmission path and signal characteristics, SAR was only assessed for the band with larger transmission frequency range.

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5G NR Notes:

1. According to FCC guidance, SAR test for NR bands and LTE anchor Bands were performed separately due to limitations in SAR probe calibration factors. And, Due to test setup limitations, SAR testing for NR was performed using test mode software to establish the connection.
2. NR configurations of SAR test were determined according to Section 5.2 of KDB 941225 D05.
3. A-MPR was disabled for all SAR tests by setting NS=01 on the base station simulator.
4. According to FCC guidance, NR modulations and RB sizes/offsets were selected for testing such that configurations with the highest output power were evaluated for SAR tests.
5. This device supports 5G FR1 capabilities with overlapping transmission frequency ranges. When the supported frequency range of an NR band falls completely within an NR band with a larger transmission frequency range, both NR bands have the same target power (or the band with the larger transmission frequency range has a higher target power), and both NR bands share the same transmission path and signal characteristics, SAR was only assessed for the band with the larger transmission frequency range.
6. 5G NR n41, n77 and n78 MIMO only support CP-OFDM.
7. 5G NR n41, n77 and n78 is synchronized using maximum duty cycle of 100 %. SAR testing was performed using FTM mode with a 100 % duty cycle applied to match final duty cycle.

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23 LTE Downlink Carrier Aggregation

- Refer to Appendix F

24 Simultaneous SAR Results

24.1 5G NR EN-DC

Configuration		Body	Body	Body	Body	Body
		Front	Right Edge	Left Edge	Top	Bottom
LTE2 Antenna1	NR n5 Antenna1	0.572	0.230	0.133	0.688	0.529
LTE2 Antenna1	NR n12 Antenna1	0.474	0.153	0.114	0.735	0.489
LTE2 Antenna1	NR n71 Antenna1	0.452	0.147	0.091	0.751	0.465
LTE2 Antenna1	NR n78 Antenna2	0.391	0.570	1.277	1.239	0.594
LTE5 Antenna1	NR n2 Antenna1	0.631	0.209	0.170	0.689	0.604
LTE5 Antenna1	NR n7 Antenna1	0.611	0.434	0.150	0.710	0.850
LTE5 Antenna1	NR n66 Antenna1	0.957	0.212	0.158	0.720	0.815
LTE5 Antenna1	NR n41 Antenna2	0.646	0.549	1.297	1.312	0.495
LTE5 Antenna1	NR n78 Antenna2	0.370	0.583	1.320	1.318	0.445
LTE7 Antenna1	NR n5 Antenna1	0.770	0.366	0.138	0.709	0.754
LTE7 Antenna1	NR n71 Antenna1	0.650	0.283	0.096	0.772	0.690
LTE7 Antenna1	NR n77 Antenna2	0.589	0.706	1.282	1.260	0.819
LTE7 Antenna1	NR n78 Antenna2	0.589	0.706	1.282	1.260	0.819
LTE12 Antenna1	NR n2 Antenna1	0.525	0.149	0.191	0.757	0.544
LTE12 Antenna1	NR n7 Antenna1	0.505	0.374	0.171	0.778	0.790
LTE12 Antenna1	NR n25 Antenna1	0.525	0.149	0.191	0.757	0.544
LTE12 Antenna1	NR n66 Antenna1	0.851	0.152	0.179	0.788	0.755
LTE12 Antenna1	NR n78 Antenna2	0.264	0.523	1.341	1.386	0.385
LTE13 Antenna1	NR n2 Antenna1	0.622	0.218	0.172	0.683	0.559
LTE13 Antenna1	NR n66 Antenna1	0.948	0.221	0.160	0.714	0.770
LTE14 Antenna1	NR n2 Antenna1	0.621	0.224	0.171	0.678	0.555
LTE14 Antenna1	NR n66 Antenna1	0.947	0.227	0.159	0.709	0.766
LTE66 Antenna1	NR n5 Antenna1	0.973	0.253	0.233	0.719	0.884
LTE66 Antenna1	NR n12 Antenna1	0.875	0.176	0.214	0.766	0.844
LTE66 Antenna1	NR n13 Antenna1	1.033	0.329	0.322	0.714	0.919
LTE66 Antenna1	NR n71 Antenna1	0.853	0.170	0.191	0.782	0.820
LTE66 Antenna1	NR n78 Antenna2	0.792	0.593	1.377	1.270	0.949

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24.2 LTE Inter band ULCA

Configuration		Body	Body	Body	Body	Body
		Front	Right Edge	Left Edge	Top	Bottom
LTE2 Antenna1	LTE5 Antenna1	0.525	0.201	0.115	0.689	0.547
LTE2 Antenna1	LTE12 Antenna1	0.419	0.141	0.136	0.757	0.487
LTE2 Antenna1	LTE13 Antenna1	0.516	0.210	0.117	0.683	0.502
LTE4 Antenna1	LTE12 Antenna1	0.820	0.164	0.236	0.788	0.842
LTE5 Antenna1	LTE66 Antenna1	0.926	0.224	0.215	0.720	0.902
LTE12 Antenna1	LTE66 Antenna1	0.820	0.164	0.236	0.788	0.842
LTE13 Antenna1	LTE66 Antenna1	0.917	0.233	0.217	0.714	0.857

- Note

Per FCC KDB 447498 D04v01, The estimated SAR value was calculated for the exempted position.

(Internal Antenna 1 : Top / Internal Antenna 2 : Left Edge, Top)

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25 LTE Uplink Carrier Aggregation

This device supports LTE Carrier Aggregation in the uplink for LTE Band 5B, 7C, 66B, 66C. In the supported uplink Carrier Aggregation, additional uplink Carrier Aggregation band conducted power and SAR were evaluated for the worst-case SAR band in the Single Carrier. Since LTE Band 66B does not support BW 20 MHz, according to the 3GPP TS 36.521 document, it was tested at BW 10 MHz with using the next highest conducted power.

25.1 Intra band ULCA

The configuration of the worst-case SAR result Band:

LTE Band 5B / Front / Test Distance, 30 mm

PCC						SCC						CA Total (dBm)	Single Carrier (dBm)
BW (MHz)	Uplink Channel	Uplink Frequency (MHz)	Modulation	RB Size	RB Offset	Band width (MHz)	Uplink Channel	Uplink Frequency (MHz)	Modulation	RB Size	RB Offset		
10	20450	829.00	QPSK	1	49	10	20549	838.90	QPSK	1	0	Conducted Power	
												23.96	24.57
												Measure 1g SAR	
												0.205	0.218
												Scaling 1g SAR	
												0.273	0.252

LTE Band 7C / Bottom / Test Distance, 30 mm

PCC						SCC						CA Total (dBm)	Single Carrier (dBm)
BW (MHz)	Uplink Channel	Uplink Frequency (MHz)	Modulation	RB Size	RB Offset	Band width (MHz)	Uplink Channel	Uplink Frequency (MHz)	Modulation	RB Size	RB Offset		
20	21100	2535.00	QPSK	1	0	20	20902	2512.20	QPSK	1	99	Conducted Power	
												23.09	24.33
												Measure 1g SAR	
												0.237	0.491
												Scaling 1g SAR	
												0.368	0.573

LTE Band 66B / Bottom / Test Distance, 30 mm

PCC						SCC						CA Total (dBm)	Single Carrier (dBm)
BW (MHz)	Uplink Channel	Uplink Frequency (MHz)	Modulation	RB Size	RB Offset	Band width (MHz)	Uplink Channel	Uplink Frequency (MHz)	Modulation	RB Size	RB Offset		
10	132322	1745.00	QPSK	1	49	10	132421	1754.90	QPSK	1	0	Conducted Power	
												23.09	23.17
												Measure 1g SAR	
												0.464	0.526
												Scaling 1g SAR	
												0.642	0.714

LTE Band 66C / Bottom / Test Distance, 30 mm

PCC						SCC						CA Total (dBm)	Single Carrier (dBm)
BW (MHz)	Uplink Channel	Uplink Frequency (MHz)	Modulation	RB Size	RB Offset	Band width (MHz)	Uplink Channel	Uplink Frequency (MHz)	Modulation	RB Size	RB Offset		
20	132322	1745.00	QPSK	1	99	20	132520	1764.80	QPSK	1	0	Conducted Power	
												23.07	23.17
												Measure 1g SAR	
												0.457	0.526
												Scaling 1g SAR	
												0.635	0.714

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26 SAR Measurement Variability

26.1 Measurement Variability

Per FCC KDB Publication 865664 D01v01r04, SAR measurement variability was assessed for each frequency band, which was determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media were required for SAR measurements in a frequency band, the variability measurement procedures were applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. These additional measurements were repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device was returned to ambient conditions (normal room temperature) with the power supply before it was re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

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

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

26.2 Measurement Uncertainty

The measured SAR was < 1.5 W/kg for all frequency bands. Therefore, per KDB Publication 865664 D01v01r04, the extended measurement uncertainty analysis per IEEE 1528-2013 was not required.

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27 Uncertainty Analysis

a	c	d	e = f(d,k)	f	g	h = cxg/e	i = cxg/e	k
Uncertainty Component	Tol (%)	Prob . Dist.	Div.	Ci (1g)	Ci (10g)	1g ui (%)	10g ui (%)	Vi (Veff)
Probe calibration	6.55	N	1.00	1.00	1.00	6.55	6.55	∞
Axial Isotropy	4.70	R	1.73	0.71	0.71	1.92	1.92	∞
Hemispherical Isotropy	9.60	R	1.73	0.71	0.71	3.92	3.92	∞
Boundary Effects	2.00	R	1.73	1.00	1.00	1.15	1.15	∞
Linearity	4.70	R	1.73	1.00	1.00	2.71	2.71	∞
System Detection Limits	0.25	R	1.73	1.00	1.00	0.14	0.14	∞
Modulation Response	4.80	R	1.73	1.00	1.00	2.77	2.77	∞
Readout Electronics	0.30	N	1.00	1.00	1.00	0.30	0.30	∞
Response Time	0.80	R	1.73	1.00	1.00	0.46	0.46	∞
Integration Time	2.60	R	1.73	1.00	1.00	1.50	1.50	∞
RF Ambient Noise	3.00	R	1.73	1.00	1.00	1.73	1.73	∞
RF Ambient Reflections	3.00	R	1.73	1.00	1.00	1.73	1.73	∞
Probe Positioner mechanical tolerance	0.40	R	1.73	1.00	1.00	0.23	0.23	∞
Probe Positioning with respect to phantom shell	6.70	R	1.73	1.00	1.00	3.87	3.87	∞
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	4.00	R	1.73	1.00	1.00	2.31	2.31	∞
Test sample positioning	1.88/1.97	N	1.00	1.00	1.00	1.88	1.97	35
Device holder uncertainty	3.07/3.21	N	1.00	1.00	1.00	3.07	3.21	3
Output power variation - SAR drift measurement	5.00	R	1.73	1.00	1.00	2.89	2.89	∞
Phantom uncertainty	6.60	R	1.73	1.00	1.00	3.81	3.81	∞
Liquid conductivity−Target	5.00	N	1.00	0.78	0.71	3.90	3.55	∞
Liquid conductivity−measurement	3.10	N	1.00	0.78	0.71	2.42	2.20	71
Liquid permittivity−Target	5.00	N	1.00	0.23	0.26	1.15	1.30	∞
Liquid permittivity−measurement	2.86	N	1.00	0.23	0.26	0.66	0.74	71
Liquid conductivity-temperature	2.46	R	1.73	0.78	0.71	1.11	1.01	20
Liquid permittivity − temperature	0.59	R	1.73	0.23	0.26	0.08	0.09	20
Combined standard uncertainty			RSS			12.93	12.85	854/502
Expanded uncertainty (95% CONFIDENCE INTERVAL)			*k*=2			**25.86**	**25.70**	

(All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx.)

Appendixes List

Appendix A	Appendix A Verification Plots
Appendix B	Appendix B Test Plots
Appendix C	Appendix C Photograph
Appendix D	Appendix D Probe, DAE and Dipole Calibration Certificates
Appendix E	Appendix E RF Conducted Power
Appendix F	Appendix F LTE Downlink Carrier Aggregation

-THE END-

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