TEST REPORT

Applicant Name :	Teleworld FZCO
Address :	C16 Warehouse Dubai Airport Free Zone
Report Number :	SZNS220908-40742E-SA
FCC ID:	2A8I7DG10

Test Standard (s)

FCC 47 CFR part 2.1093

Sample Description

Product Type:	CBRS USB Dongle
Model No.:	DG10
Multiple Model(s) No.:	N/A
Trade Mark:	Horizon
Date Received:	2022/09/10
Date of Test:	2022/10/08~2022/10/09
Report Date:	2022/10/18

Test Result:	Pass*

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

Prepared and Checked By:

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EMC Engineer

Approved By:

Candy Li

EMC Engineer

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<tr><td>Multiple Model(s) No.:</td><td colspan="2">N/A</td></tr>
<tr><td>Trade Mark</td><td colspan="2">Horizon</td></tr>
<tr><td>FCC ID:</td><td colspan="2">2A8I7DG10</td></tr>
<tr><td>Serial Number</td><td colspan="2">SZNS220908-40742E-SA-S1</td></tr>
<tr><td colspan="2">MODE</td><td>Max. SAR Level(s) Reported(W/kg)</td><td>Limit (W/kg)</td></tr>
<tr><td>LTE Band 41</td><td>1g Body SAR</td><td>0.56</td><td rowspan="2">1.6</td></tr>
<tr><td>LTE Band 48</td><td>1g Body SAR</td><td>0.69</td></tr>
<tr><td rowspan="4">Applicable Standards</td><td colspan="3">FCC 47 CFR part 2.1093
Radiofrequency radiation exposure evaluation: portable devices</td></tr>
<tr><td colspan="3">IEEE1528:2013
IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques</td></tr>
<tr><td colspan="3">IEC 62209-1:2016
Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Part 1: Devices used next to the ear (Frequency range of 300 MHz to 6 GHz)</td></tr>
<tr><td colspan="3">KDB procedures
KDB 447498 D04 Interim General RF Exposure Guidance v01
KDB 941225 D05 SAR for LTE Devices v02r05
KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
KDB 865664 D02 RF Exposure Reporting v01r02
KDB 447498 D02 SAR Procedures for Dongle Xmtr v02r01.</td></tr>
<tr><td colspan="4">Note: This wireless device has been shown to be capable of compliance for localized specific absorption rate (SAR) for General Population/Uncontrolled Exposure limits specified in FCC 47 CFR part 2.1093 and has been tested in accordance with the measurement procedures specified in IEEE 1528-2013 and RF exposure KDB procedures.
The results and statements contained in this report pertain only to the device(s) evaluated.</td></tr>
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	SZNS220908-40742E-SA	Original Report	2022/10/18

EUT DESCRIPTION

This report has been prepared on behalf of ***Teleworld FZCO*** and their product ***CBRS USB Dongle***, Model: ***DG10***, FCC ID: ***2A8I7DG10*** or the EUT (Equipment under Test) as referred to in the rest of this report.

Technical Specification

Device Type:	Portable
Exposure Category:	Population / Uncontrolled
Antenna Type(s):	Internal Antenna
Proximity sensor for SAR reduction:	None
Modulation Technique :	QPSK, 16QAM
Carrier Aggregation	Only supports downlink carrier aggregation
Frequency Band:	LTE Band 41: 2496-2690MHz(TX/RX) LTE Band 48: 3550-3700MHz (TX/RX)
Voltage Range:	DC 5V from USB

REFERENCE, STANDARDS, AND GUIDELINES

FCC:

The Report and Order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 1.6 mW/g as recommended by the ANSI/IEEE standard C95.1-1992 [6] for an uncontrolled environment (Paragraph 65). According to the Supplement C of OET Bulletin 65 “Evaluating Compliance with FCC Guide-lines for Human Exposure to Radio frequency Electromagnetic Fields", released on Jun 29, 2001 by the FCC, the device should be evaluated at maximum output power (radiated from the antenna) under “worst-case” conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling.

This report describes the methodology and results of experiments performed on wireless data terminal. The objective was to determine if there is RF radiation and if radiation is found, what is the extent of radiation with respect to safety limits. SAR (Specific Absorption Rate) is the measure of RF exposure determined by the amount of RF energy absorbed by human body (or its parts) – to determine how the RF energy couples to the body or head which is a primary health concern for body worn devices. The limit below which the exposure to RF is considered safe by regulatory bodies in North America is 1.6 mW/g average over 1 gram of tissue mass.

CE:

The order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 2 mW/g as recommended by EN62209-1 for an uncontrolled environment. According to the Standard, the device should be evaluated at maximum output power (radiated from the antenna) under “worst-case” conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling.

This report describes the methodology and results of experiments performed on wireless data terminal. The objective was to determine if there is RF radiation and if radiation is found, what is the extent of radiation with respect to safety limits. SAR (Specific Absorption Rate) is the measure of RF exposure determined by the amount of RF energy absorbed by human body (or its parts) – to determine how the RF energy couples to the body or head which is a primary health concern for body worn devices. The limit below which the exposure to RF is considered safe by regulatory bodies in Europe is 2 mW/g average over 10 gram of tissue mass.

The test configurations were laid out on a specially designed test fixture to ensure the reproducibility of measurements. Each configuration was scanned for SAR. Analysis of each scan was carried out to characterize the above effects in the device.

SAR Limits

FCC Limit(1g Tissue)

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 1 g of tissue)	**1.6**	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0

CE Limit(10g Tissue)

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 10 g of tissue)	2.0	10
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0

Population/Uncontrolled Environments are defined as locations where there is the exposure of individual who have no knowledge or control of their exposure.

Occupational/Controlled Environments are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure (i.e. as a result of employment or occupation).

General Population/Uncontrolled environments Spatial Peak limit 1.6W/kg (FCC) & 2 W/kg (CE) applied to the EUT.

FACILITIES

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358,the FCC Designation No.: CN1189.
Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 4297.01 .

Listed by Innovation, Science and Economic Development Canada (ISEDC), the Registration Number is 5077A.

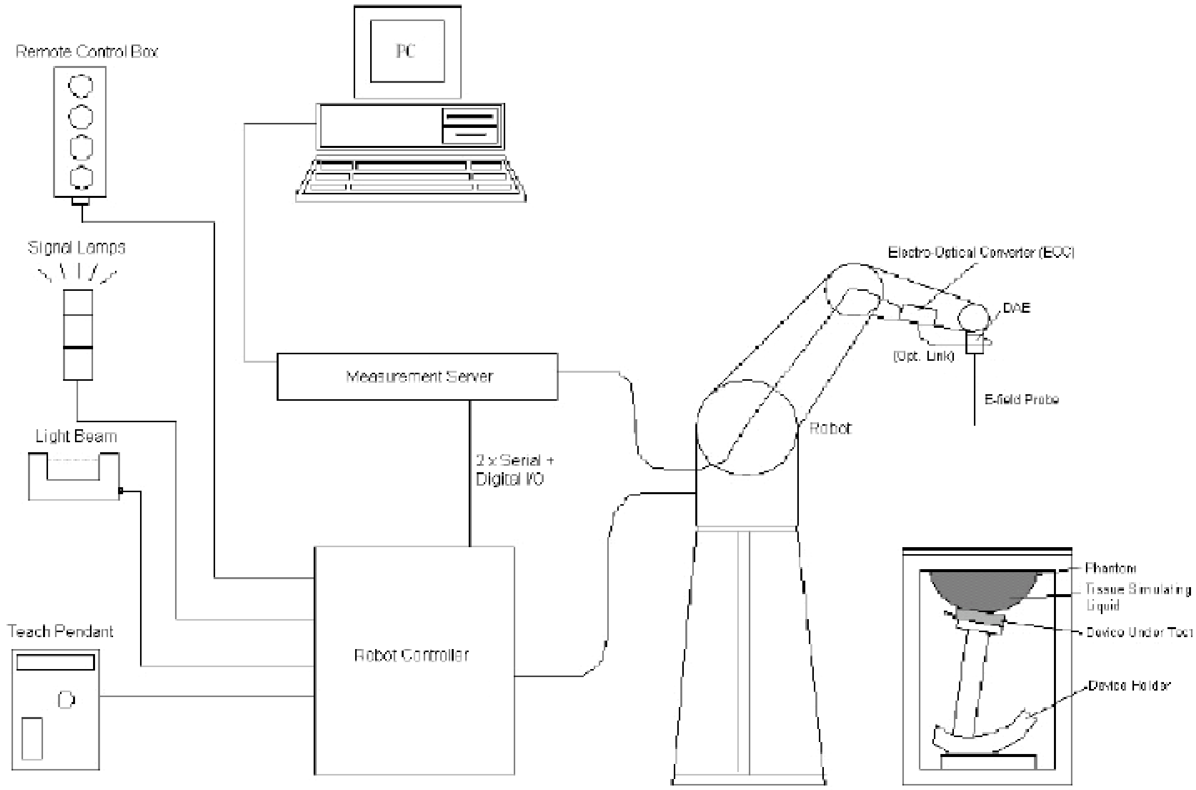
The test site has been registered with ISED Canada under ISED Canada Registration Number CN0016.

DESCRIPTION OF TEST SYSTEM

These measurements were performed with the automated near-field scanning system DASY5 from Schmid & Partner Engineering AG (SPEAG) which is the Fifth generation of the system shown in the figure hereinafter:

DASY5 System Description

The DASY5 system for performing compliance tests consists of the following items:



- A standard high precision 6-axis robot (Staubli TX=RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal application, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Win7 professional operating system and the DASY52 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

DASY5 Measurement Server

The DASY5 measurement server is based on a PC/104 CPU board with a 400 MHz Intel ULV Celeron, 128 MB chip-disk and 128 MB RAM. The necessary circuits for communication with the DAE4 (or DAE3) electronics box, as well as the 16-bit AD converter system for optical detection and digital I/O interface are contained on the DASY5 I/O board, which is directly connected to the PC/104 bus of the CPU board.

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

Data Acquisition Electronics

The data acquisition electronics (DAE4) consist of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder with a control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information, as well as an optical uplink for commands and the clock.

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

The input impedance of both the DAE4 as well as of the DAE3 box is 200MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

EX3DV4 E-Field Probes

Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in TSL (rotation around probe axis) ± 0.5 dB in TSL (rotation normal to probe axis)
Dynamic Range	10 µW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better 30%.
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

SAM Twin Phantom

The SAM Twin Phantom (shown in front of DASY5) is a fiberglass shell phantom with shell thickness 2 mm, except in the ear region where the thickness is increased to 6 mm..

When the phantom is mounted inside allocated slot of the DASY5 platform, phantom reference points can be taught directly in the DASY5 V5.2 software. When the DASY5 platform is used to mount the

Phantom, some of the phantom teaching points cannot be reached by the robot in DASY5 V5.2. A special tool called P1a-P2aX-Former is provided to transform two of the three points, P1 and P2, to reachable locations. To use these new teaching points, a revised phantom configuration file is required.

In addition to our standard broadband liquids, the phantom can be used with the following tissue simulating liquids:

Sugar-water-based liquids can be left permanently in the phantom. Always cover the liquid when the system is not in use to prevent changes in liquid parameters due to water evaporation.

DGBE-based liquids should be used with care. As DGBE is a softener for most plastics, the liquid should be taken out of the phantom, and the phantom should be dried when the system is not in use (desirable at least once a week).

Do not use other organic solvents without previously testing the solvent resistivity of the phantom. Approximately 25 liters of liquid is required to fill the SAM Twin phantom.

Calibration Frequency Points for EX3DV4 E-Field Probes SN: 7441 Calibrated: 2022/05/16

Calibration Frequency Point(MHz)	Frequency Range(MHz)		Conversion Factor		
	From	To	X	Y	Z
750 Head	650	850	10.04	10.04	10.04
900 Head	850	1000	9.61	9.61	9.61
1450 Head	1350	1550	8.52	8.52	8.52
1750 Head	1650	1850	8.32	8.32	8.32
1900 Head	1850	1950	7.94	7.94	7.94
2000 Head	1950	2100	7.99	7.99	7.99
2300 Head	2200	2400	7.78	7.78	7.78
2450 Head	2400	2550	7.54	7.54	7.54
2600 Head	2550	2700	7.30	7.30	7.30
3300 Head	3200	3400	7.09	7.09	7.09
3500 Head	3400	3600	6.89	6.89	6.89
3700 Head	3600	3800	6.55	6.55	6.55
3900 Head	3800	4000	6.60	6.60	6.60
4400 Head	4300	4500	6.34	6.34	6.34
4600 Head	4500	4700	6.26	6.26	6.26
4800 Head	4700	4900	6.16	6.16	6.16
4950 Head	4900	5050	5.85	5.85	5.85
5250 Head	5140	5360	5.35	5.35	5.35
5600 Head	5490	5700	4.85	4.85	4.85
5750 Head	5700	5860	4.83	4.83	4.83

Area Scans

Area scans are defined prior to the measurement process being executed with a user defined variable spacing between each measurement point (integral) allowing low uncertainty measurements to be conducted. Scans defined for FCC applications utilize a 15mm 2 step integral, with 1.5mm interpolation used to locate the peak SAR area used for zoom scan assessments.

Where the system identifies multiple SAR peaks (which are within 25% of peak value) the system will provide the user with the option of assessing each peak location individually for zoom scan averaging.

Zoom Scan (Cube Scan Averaging)

The averaging zoom scan volume utilized in the DASY5 software is in the shape of a cube and the side dimension of a 1 g or 10 g mass is dependent on the density of the liquid representing the simulated tissue. A density of 1000 kg/m^3 is used to represent the head and body tissue density and not the phantom liquid density, in order to be consistent with the definition of the liquid dielectric properties, i.e. the side length of the 1g cube is 10mm,with the side length of the 10g cube is 21.5mm.

When the cube intersects with the surface of the phantom, it is oriented so that 3 vertices touch the surface of the shell or the center of a face is tangent to the surface. The face of the cube closest to the surface is modified in order to conform to the tangent surface.

The zoom scan integer steps can be user defined so as to reduce uncertainty, but normal practice for typical test applications (including FCC) utilize a physical step of 7 x7 x 7 (5mmx5mmx5mm) providing a volume of 30 mm in the X & Y & Z axis.

Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEC 62209-1:2016

Recommended Tissue Dielectric Parameters for Head

Table A.3 – Dielectric properties of the head tissue-equivalent liquid

Frequency MHz	**Relative permittivity** ε_r	**Conductivity (σ)** S/m
300	45,3	0,87
450	43,5	0,87
750	*41,9*	*0,89*
835	41,5	0,90
900	41,5	0,97
1 450	40,5	1,20
1 500	*40,4*	*1,23*
1 640	*40,2*	*1,31*
1 750	*40,1*	*1,37*
1 800	40,0	1,40
1 900	40,0	1,40
2 000	40,0	1,40
2 100	*39,8*	*1,49*
2 300	*39,5*	*1,67*
2 450	39,2	1,80
2 600	*39,0*	*1,96*
3 000	38,5	2,40
3 500	*37,9*	*2,91*
4 000	*37,4*	*3,43*
4 500	*36,8*	*3,94*
5 000	*36,2*	*4,45*
5 200	*36,0*	*4,66*
5 400	*35,8*	*4,86*
5 600	*35,5*	*5,07*
5 800	*35,3*	*5,27*
6 000	*35,1*	*5,48*

NOTE For convenience, permittivity and conductivity values at those frequencies which are not part of the original data provided by Drossos et al. [33] or the extension to 5 800 MHz are provided (i.e. the values shown *in italics*). These values were linearly interpolated between the values in this table that are immediately above and below these values, except the values at 6 000 MHz that were linearly extrapolated from the values at 3 000 MHz and 5 800 MHz.

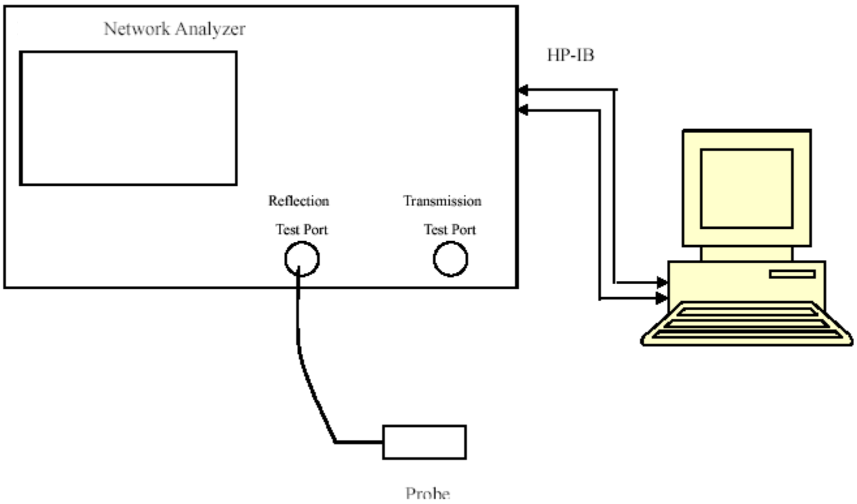
EQUIPMENT LIST AND CALIBRATION

Equipments List & Calibration Information

Equipment	Model	S/N	Calibration Date	Calibration Due Date
DASY5 Test Software	DASY52 52.10.4	N/A	NCR	NCR
DASY5 Measurement Server	DASY5 6.0.31	N/A	NCR	NCR
Data Acquisition Electronics	DAE4	1211	2022/03/01	2023/02/28
E-Field Probe	EX3DV4	7441	2022/05/16	2023/05/15
Mounting Device	MD4HHTV5	SD 000 H01 KA	NCR	NCR
SAM Twin Phantom	SAM-Twin V5.0	1744	NCR	NCR
Dipole,2450MHz	D2450V2	751	2020/10/13	2023/10/12
Dipole,2600MHz	D2600V2	1073	2019/12/18	2022/12/7
Dipole, 3500MHz	D3500V2	1113	2020/11/11	2023/11/10
Dipole, 3700MHz	D3700V2	1084	2020/11/12	2023/11/11
Simulated Tissue Liquid Head	HBBL600-10000V6	SL AAH U16 BC	Each Time	
Network Analyzer	8753D	3410A08288	2022/7/05	2023/7/04
Dielectric Assessment Kit	DAK-3.5	1320	NCR	NCR
Signal Generator	SMB100A	108362	2021/12/24	2022/12/23
USB wideband power sensor	U2021XA	MY52350001	2021/12/23	2022/12/22
Power Amplifier	CBA 1G-070	T44328	2021/12/24	2022/12/23
Linear Power Amplifier	AS0860-40/45	1060913	2021/12/24	2022/12/23
Directional Coupler	4223-20	3.113.277	2021/12/24	2022/12/23
6dB Attenuator	8493B 6dB Attenuator	2708A 04769	2021/12/24	2022/12/23
Wideband Radio Communication Tester	CMW500	143458	2022/03/02	2023/03/01
Radio Communication Analyzer	MT8821C	6262287697	2022/04/25	2023/04/24

SAR MEASUREMENT SYSTEM VERIFICATION

Liquid Verification



Liquid Verification Setup Block Diagram

Liquid Verification Results

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	Δσ (S/m)	
2450	Simulated Tissue Liquid Head	38.438	1.82	39.20	1.80	-1.94	1.11	±5
2505	Simulated Tissue Liquid Head	39.644	1.872	39.13	1.86	1.31	0.65	±5
2549.5	Simulated Tissue Liquid Head	39.714	1.934	39.07	1.91	1.65	1.26	±5
2593	Simulated Tissue Liquid Head	39.583	1.979	39.02	1.96	1.44	0.97	±5
2600	Simulated Tissue Liquid Head	39.716	1.978	39.01	1.96	1.81	0.92	±5
2636.5	Simulated Tissue Liquid Head	39.872	2.018	38.96	2.00	2.34	0.9	±5
2680	Simulated Tissue Liquid Head	39.439	2.031	38.91	2.05	1.36	-0.93	±5

**Liquid Verification above was performed on 2022/10/08.*

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	Δσ	
3500	Simulated Tissue Liquid Head	37.885	2.889	37.93	2.913	-0.12	-0.82	±5
3560	Simulated Tissue Liquid Head	37.597	2.927	37.86	2.97	-0.69	-1.45	±5
3603.3	Simulated Tissue Liquid Head	37.464	2.972	37.81	3.02	-0.92	-1.59	±5
3646.7	Simulated Tissue Liquid Head	37.226	3.025	37.76	3.06	-1.41	-1.14	±5
3690	Simulated Tissue Liquid Head	37.105	3.079	37.71	3.11	-1.6	-1	±5
3700	Simulated Tissue Liquid Head	36.923	3.101	37.70	3.12	-2.06	-0.61	±5

**Liquid Verification above was performed on 2022/10/09.*

System Accuracy Verification

Prior to the assessment, the system validation kit was used to test whether the system was operating within its specifications of ±10%. The validation results are tabulated below. And also the corresponding SAR plot is attached as well in the SAR plots files.

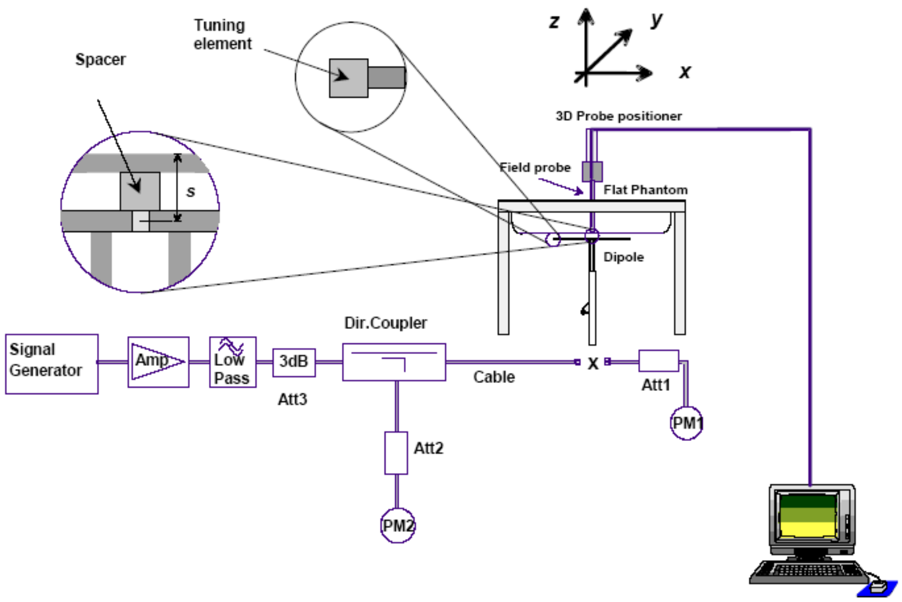
The spacing distances in the **System Verification Setup Block Diagram** is given by the following:

a) s = 15 mm ± 0,2 mm for 300 MHz ≤ f ≤ 1 000 MHz;

b) s = 10 mm ± 0,2 mm for 1 000 MHz < f ≤ 3 000 MHz;

c) s = 10 mm ± 0,2 mm for 3 000 MHz < f ≤ 6 000 MHz.

System Verification Setup Block Diagram



System Accuracy Check Results

Date	Frequency Band	Liquid Type	Input Power (mW)	Measured SAR (W/kg)		Normalized to 1W (W/kg)	Target Value (W/kg)	Delta (%)	Tolerance (%)
2022/10/08	2450 MHz	Head	100	1g	5.11	51.1	53.0	-3.585	±10
2022/10/08	2600 MHz	Head	100	1g	5.75	56.7	53.0	6.981	±10
2022/10/09	3500 MHz	Head	100	1g	6.19	61.9	65.8	-5.927	±10
2022/10/09	3700 MHz	Head	100	1g	6.25	62.5	65.8	-5.015	±10

*The SAR values above are normalized to 1 Watt forward power.

SAR SYSTEM VALIDATION DATA

System Performance 2450MHz

DUT: D2450V2; Type: 2450 MHz; Serial: 751

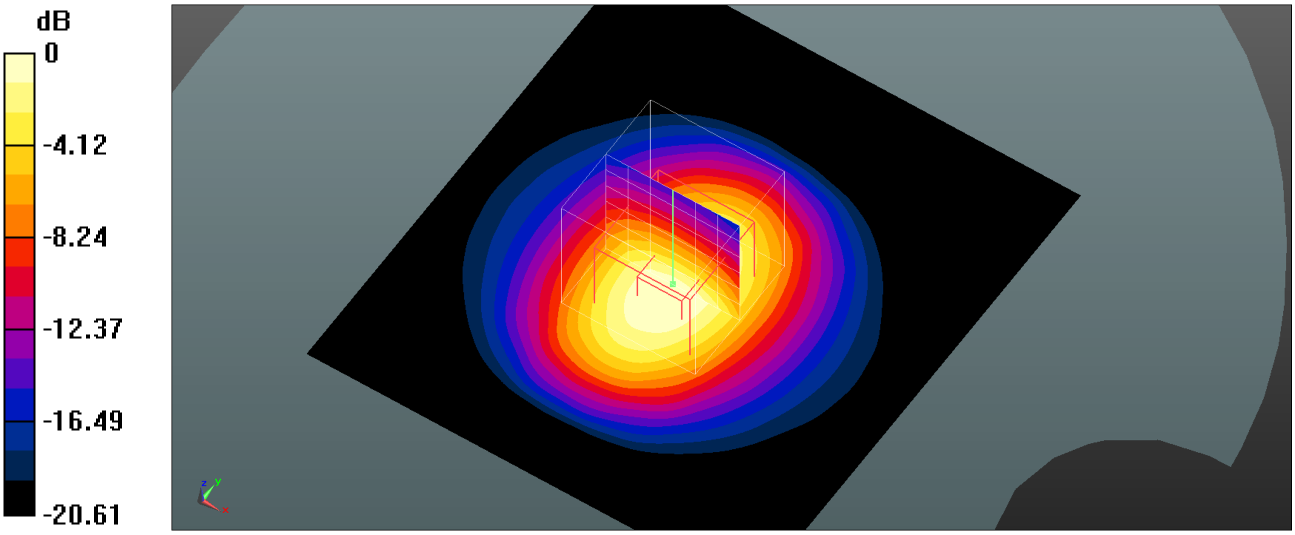
Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.82 S/m; ε_r = 38.438; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4- SN7441; ConvF(7.54, 7.54, 7.54); Calibrated: 2022/05/16
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1211; Calibrated: 2022/03/01
- Phantom: Twin SAM; Type: QD000P40CD; Serial: 1744
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

Pin=100mw/Area Scan (101x111x1): Measurement grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 5.39 W/kg

Pin=100mw/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.35 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 6.85 W/kg
SAR(1 g) = 5.11 W/kg; SAR(10 g) = 2.56 W/kg
Maximum value of SAR (measured) = 5.48 W/kg



0 dB = 5.48 W/kg = 7.39 dBW/kg

System Performance 2600MHz

DUT: D2600V2; Type: 2600 MHz; Serial: 1073

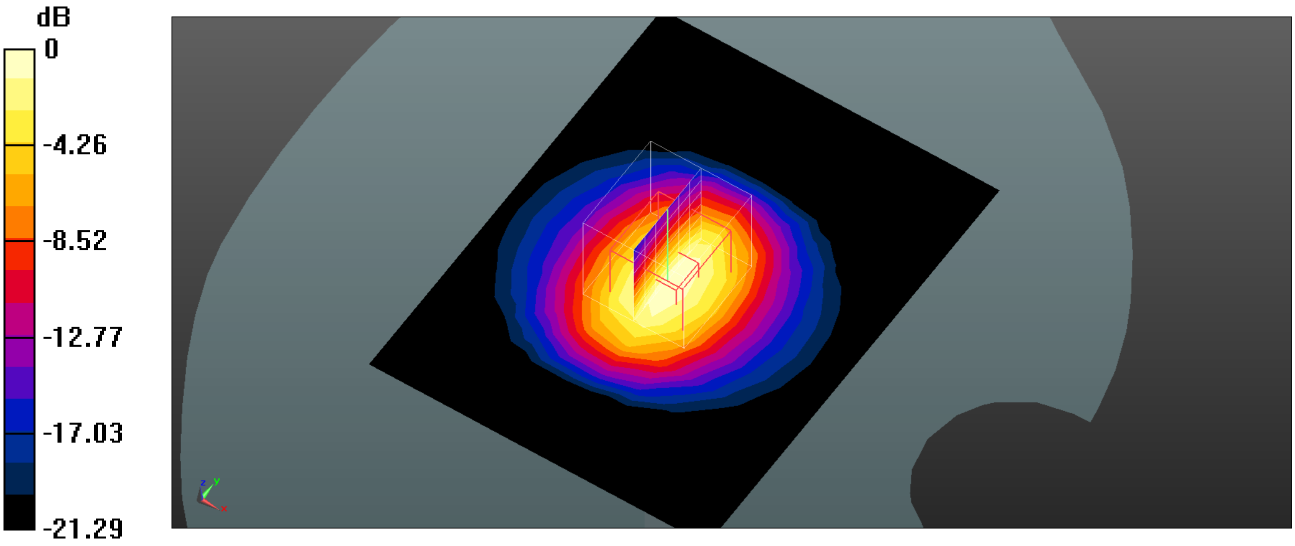
Communication System: UID 0, CW (0); Frequency: 2600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2600 MHz; σ = 1.978 S/m; ε_r = 39.716; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4- SN7441; ConvF(7.3, 7.3, 7.3); Calibrated: 2022/05/16
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1211; Calibrated: 2022/03/01
- Phantom: Twin SAM; Type: QD000P40CD; Serial: 1744
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

Pin=100mw/Area Scan (101x131x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 6.84 W/kg

Pin=100mw/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.02 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 12.1 W/kg
SAR(1 g) = 5.75 W/kg; SAR(10 g) = 2.56 W/kg
Maximum value of SAR (measured) = 6.53 W/kg



0 dB = 6.53 W/kg = 8.15 dBW/kg

System Performance 3500MHz Head

DUT: Dipole 3500 MHz; Type: D3500V2; Serial: 1113

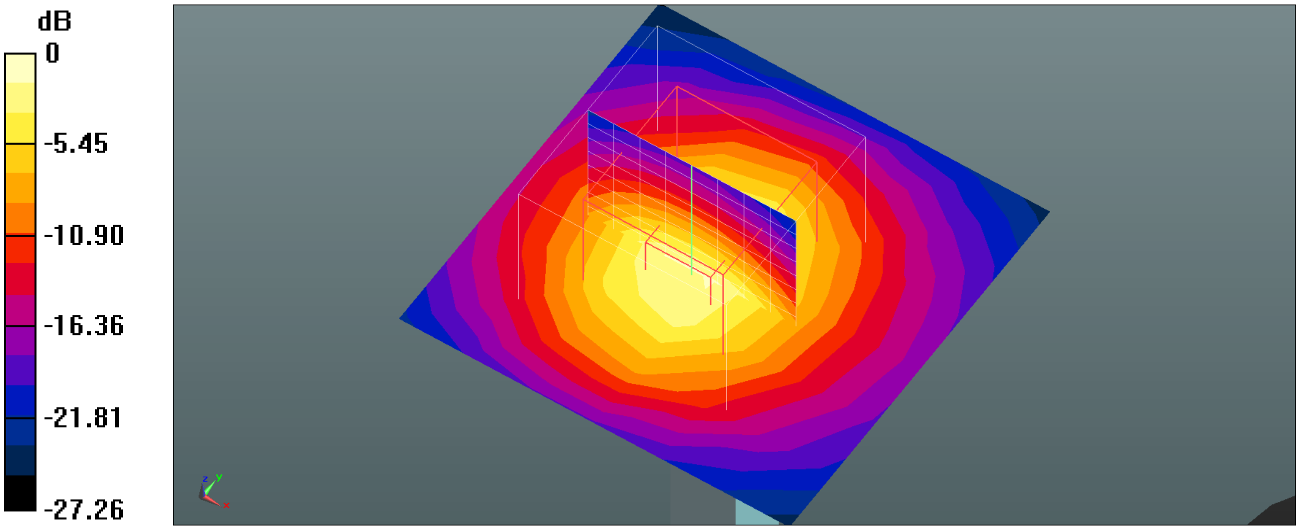
Communication System: UID 0, CW (0); Frequency: 3500 MHz;Duty Cycle: 1:1
Medium parameters used: f = 3500 MHz; σ = 2.889 S/m; ε_r = 37.885; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7441; ConvF(6.89, 6.89, 6.89) @ 3500 MHz; Calibrated: 2022/05/16
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1211; Calibrated: 2022/03/01
- Phantom: Twin SAM; Type: QD000P40CD; Serial: 1744
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

Pin=100mw/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 6.41 W/kg

Pin=100mw/Zoom Scan (7x7x8)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=4mm
Reference Value = 49.12 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 15.6 W/kg
SAR(1 g) = 6.19 W/kg; SAR(10 g) = 2.37 W/kg
Maximum value of SAR (measured) = 8.44 W/kg



0 dB = 8.44 W/kg = 9.26 dBW/kg

System Performance 3700MHz Head

DUT: Dipole 3700 MHz; Type: D3700V2; Serial: 1084

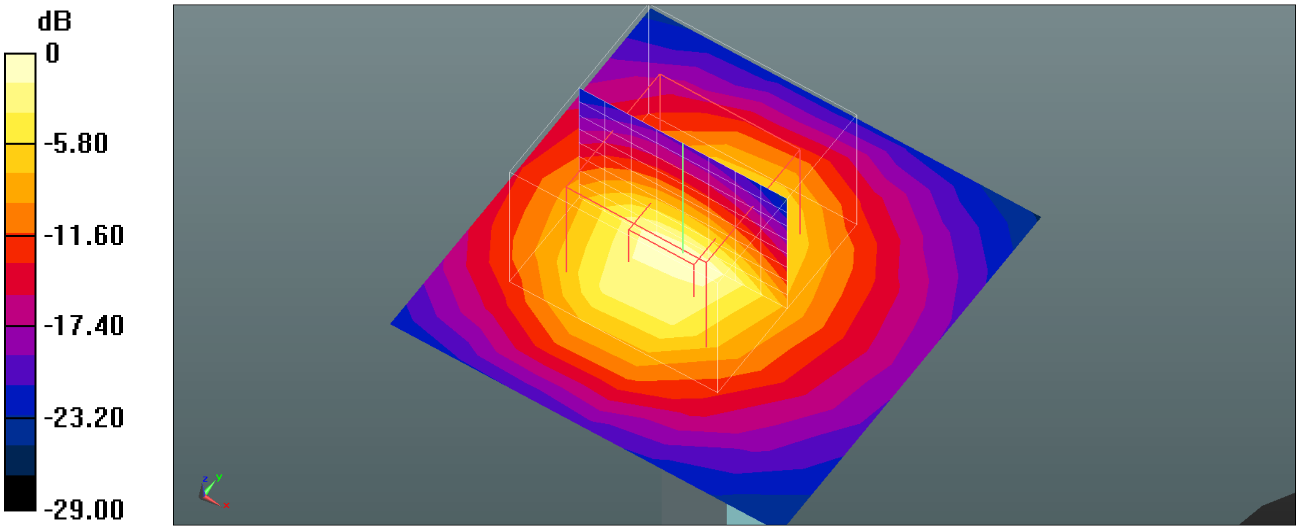
Communication System: UID 0, CW (0); Frequency: 3700 MHz;Duty Cycle: 1:1
Medium parameters used: f = 3700 MHz; σ = 3.101 S/m; ε_r = 36.923; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7441; ConvF(6.55, 6.55, 6.55) @ 3700 MHz; Calibrated: 2022/05/16
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1211; Calibrated: 2022/03/01
- Phantom: Twin SAM; Type: QD000P40CD; Serial: 1744
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

Pin=100mw/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 6.89 W/kg

Pin=100mw/Zoom Scan (7x7x8)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=4mm
Reference Value = 43.63 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 16.3 W/kg
SAR(1 g) = 6.25 W/kg; SAR(10 g) = 2.3 W/kg
Maximum value of SAR (measured) = 8.75 W/kg



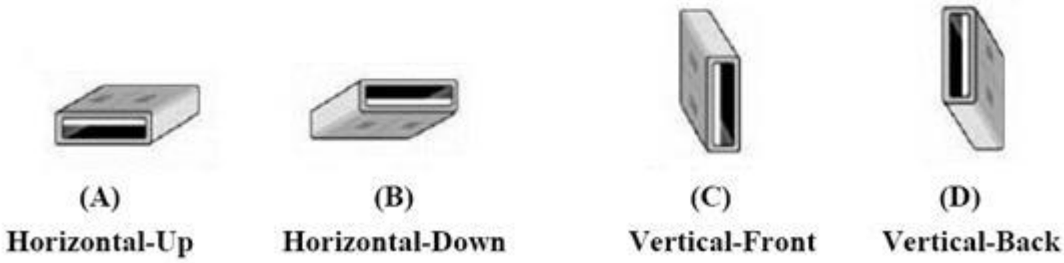
0 dB = 8.75 W/kg = 9.42 dBW/kg

EUT TEST STRATEGY AND METHODOLOGY

SIMPLE DONGLE PROCEDURES

Test all USB orientations [see figure below: (A) Horizontal-Up, (B) Horizontal-Down, (C) Vertical-Front,and (D) Vertical-Back] with a device-to-phantom separation distance of 5 mm or less, according to KDB Publication 447498 D01 requirements. These test orientations are intended for the exposure conditions found in typical laptop/notebook/netbook or tablet computers with either horizontal or vertical USB connector configurations at various locations in the keyboard section of the computer. Current generation portable host computers should be used to establish the required SAR measurement separation distance. The same test separation distance must be used to test all frequency bands and modes in each USB orientation. The typinal Horizontal-Up USB connection (A), found in the majority of host computers, must be tested using an appropriate host computer. A host computer with either Vertical-Front (C) or Vertical-Back (D) USB connection should be used to test one of the vertical USB orientations. If a suitable host computer is not available for testing the Horizontal-Down (B) or the remaining Vertical USB orientation,a high quality USB cable, 12 inches or less, may be used for testing these other orientations. It must be documented that the USB cable does not influence the radiating characteristics and output power of the transmitter.

When the antenna is located near the tip of a dongle, it may operate at closer proximity to users in certain connector orientations where dongle tip testing may be required.



Test Distance for SAR Evaluation

For this case the EUT(Equipment Under Test) is set 5mm away from the phantom, the test distance is 5mm.

SAR Evaluation Procedure

The evaluation was performed with the following procedure:

Step 1: Measurement of the SAR value at a fixed location above the ear point or central position was used as a reference value for assessing the power drop. The SAR at this point is measured at the start of the test and then again at the end of the testing.

Step 2: The SAR distribution at the exposed side of the head was measured at a distance of 4 mm from the inner surface of the shell. The area covered the entire dimension of the head or radiating structures of the EUT, the horizontal grid spacing was 15 mm x 15 mm, and the SAR distribution was determined by integrated grid of 1.5mm x 1.5mm. Based on these data, the area of the maximum absorption was determined by spline interpolation. The first Area Scan covers the entire dimension of the EUT to ensure that the hotspot was correctly identified.

Step 3: Around this point, a volume of 30 mm x 30 mm x 30 mm was assessed by measuring 7x 7 x 7 points. On the basis of this data set, the spatial peak SAR value was evaluated under the following procedure:

1) The data at the surface were extrapolated, since the center of the dipoles is 1.2 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.3 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

2) The maximum interpolated value was searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g or 10 g) were computed by the 3D-Spline interpolation algorithm. The 3D-Spline is composed of three one dimensional splines with the “Not a knot"-condition (in x, y and z-directions). The volume was integrated with the trapezoidal-algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the averages.

All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

Step 4: Re-measurement of the SAR value at the same location as in Step 1. If the value changed by more than 5%, the evaluation was repeated.

TDD-LTE

LTE TDD Band 41 supports 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations and Table 4.2-1 for Special subframe configurations.

Table 4.2-1: Configuration of special subframe (lengths of DwPTS/GP/UpPTS).

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

Table 4.2-2: Uplink-downlink configurations.

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

Calculated Duty Cycle

Uplink-Downlink Configuration	Downlink-to-Uplink Switch-point Periodicity	Subframe Number										Calculated Duty Cycle (%)
		0	1	2	3	4	5	6	7	8	9	
0	5 ms	D	S	U	U	U	D	S	U	U	U	63.33
1	5 ms	D	S	U	U	D	D	S	U	U	D	43.33
2	5 ms	D	S	U	D	D	D	S	U	D	D	23.33
3	10 ms	D	S	U	U	U	D	D	D	D	D	31.67
4	10 ms	D	S	U	U	D	D	D	D	D	D	21.67
5	10 ms	D	S	U	D	D	D	D	D	D	D	11.67
6	5 ms	D	S	U	U	U	D	S	U	U	D	53.33

Note: This device supports uplink-downlink configurations 0-6. The configuration with highest duty cycle was used for SAR Testing: configuration 0 at 63.33% duty cycle.

CONDUCTED OUTPUT POWER MEASUREMENT

Maximum Target Output Power

Max Target Power(dBm)					
Mode/Band	Channel				
	Low	Low-Mid	Middle	Mid-High	High
LTE Band 41	19.0	19.0	19.0	19.0	19.0

Max Target Power(dBm)				
Mode/Band	Channel			
	Low	Low-Mid	Mid-High	High
LTE Band 48	20.0	20.0	20.0	20.0

Test Results:

LTE Band 41:

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel 2506MHz (dBm)	Low-Mid Channel 2549.5MHz (dBm)	Mid Channel 2593MHz (dBm)	Mid-High Channel 2636.5MHz (dBm)	High Channel 2680MHz (dBm)
5M	QPSK	RB1#0	0	0	18.44	18.43	18.31	18.53	18.30
		RB1#13	0	0	18.64	18.48	18.57	18.58	18.56
		RB1#24	0	0	18.47	18.40	18.23	18.47	18.32
		RB15#0	1	1	17.43	17.49	17.46	17.40	17.38
		RB15#10	1	1	17.48	17.35	17.45	17.40	17.46
		RB25#0	1	1	17.30	17.30	17.35	17.42	17.35
	16-QAM	RB1#0	1	1	17.36	17.51	17.38	17.43	17.46
		RB1#13	1	1	17.58	17.49	17.53	17.52	17.60
		RB1#24	1	1	17.29	17.35	17.46	17.30	17.48
		RB15#0	2	2	16.48	16.44	16.35	16.44	16.33
		RB15#10	2	2	16.48	16.34	16.55	16.34	16.46
		RB25#0	2	2	16.52	16.52	16.49	16.61	16.54
10M	QPSK	RB1#0	0	0	18.42	18.29	18.44	18.40	18.45
		RB1#25	0	0	18.71	18.69	18.85	18.77	18.84
		RB1#49	0	0	18.40	18.48	18.27	18.50	18.37
		RB25#0	1	1	17.45	17.40	17.45	17.50	17.47
		RB25#25	1	1	17.49	17.45	17.43	17.55	17.37
		RB50#0	1	1	17.43	17.55	17.51	17.53	17.46
	16-QAM	RB1#0	1	1	17.69	17.58	17.49	17.66	17.62
		RB1#25	1	1	17.81	17.81	17.85	17.78	17.89
		RB1#49	1	1	17.72	17.67	17.65	17.66	17.60
		RB25#0	2	2	16.46	16.39	16.43	16.50	16.46
		RB25#25	2	2	16.49	16.62	16.52	16.58	16.49
		RB50#0	2	2	16.58	16.50	16.57	16.61	16.53
15M	QPSK	RB1#0	0	0	18.39	18.42	18.31	18.33	18.30
		RB1#38	0	0	18.44	18.28	18.51	18.35	18.48
		RB1#74	0	0	18.37	18.41	18.28	18.40	18.24
		RB36#0	1	1	17.43	17.31	17.33	17.45	17.37
		RB36#39	1	1	17.53	17.60	17.36	17.56	17.42
		RB75#0	1	1	17.55	17.41	17.52	17.53	17.50
	16-QAM	RB1#0	1	1	17.51	17.59	17.65	17.50	17.58
		RB1#38	1	1	17.61	17.55	17.62	17.56	17.65
		RB1#74	1	1	17.58	17.47	17.59	17.51	17.54
		RB36#0	2	2	16.50	16.41	16.39	16.43	16.52
		RB36#39	2	2	16.50	16.44	16.53	16.47	16.57
		RB75#0	2	2	16.44	16.44	16.48	16.48	16.46
20M	QPSK	RB1#0	0	0	18.59	18.51	18.64	18.56	18.62
		RB1#50	0	0	18.63	18.62	18.61	18.65	18.70
		RB1#99	0	0	18.42	18.33	18.33	18.37	18.39
		RB50#0	1	1	17.41	17.35	17.45	17.40	17.35
		RB50#50	1	1	17.35	17.39	17.27	17.29	17.25
		RB100#0	1	1	17.36	17.29	17.29	17.32	17.36

	16-QAM	RB1#0	1	1	17.29	17.26	17.38	17.35	17.47
		RB1#50	1	1	17.80	17.74	17.82	17.69	17.78
		RB1#99	1	1	17.40	17.42	17.48	17.40	17.42
		RB50#0	2	2	16.41	16.52	16.57	16.54	16.46
		RB50#50	2	2	16.47	16.45	16.52	16.36	16.54
		RB100#0	2	2	16.32	16.32	16.50	16.39	16.56

The frequency range of LTE Band 41 is 2496 ~ 2690MHz. Per KDB 447498 D04, according to the following formula Calculate N_c is 5, We chose to test 5 frequency points.

KDB procedures, the following should be applied to determine the number of required test channels. The test channels should be evenly spread across the transmission frequency band of each wireless mode.[14]

$$N_c = Round\left\{\left[100\left(f_{high} - f_{low}\right)/f_c\right]^{0.5} \times \left(f_c/100\right)^{0.2}\right\},$$

where

- N_c is the number of test channels, rounded to the nearest integer,
- f_{high} and f_{low} are the highest and lowest channel frequencies within the transmission band,
- f_c is the mid-band channel frequency,
- all frequencies are in MHz.

LTE Band 48:

Test Bandwidth	Test Modulation	Resource Block & RB offset	Target MPR	Meas MPR	Low Channel 2560MHz (dBm)	Low-Mid Channel 3603.3MHz (dBm)	Mid-High Channel 3646.7MHz (dBm)	High Channel 3690MHz (dBm)
5M	QPSK	RB1#0	0	0	19.62	19.61	19.71	19.48
		RB1#13	0	0	19.82	19.66	19.76	19.74
		RB1#24	0	0	19.65	19.58	19.65	19.50
		RB15#0	1	1	18.61	18.67	18.58	18.56
		RB15#10	1	1	18.66	18.53	18.58	18.64
		RB25#0	1	1	18.48	18.48	18.60	18.53
	16-QAM	RB1#0	1	1	18.54	18.69	18.61	18.64
		RB1#13	1	1	18.76	18.67	18.70	18.78
		RB1#24	1	1	18.47	18.53	18.48	18.66
		RB15#0	2	2	17.66	17.62	17.62	17.51
		RB15#10	2	2	17.66	17.52	17.52	17.64
		RB25#0	2	2	17.70	17.70	17.79	17.72
10M	QPSK	RB1#0	0	0	19.60	19.47	19.58	19.63
		RB1#25	0	0	19.89	19.87	19.95	20.02
		RB1#49	0	0	19.58	19.66	19.68	19.55
		RB25#0	1	1	18.63	18.58	18.68	18.65
		RB25#25	1	1	18.67	18.63	18.73	18.55
		RB50#0	1	1	18.61	18.73	18.71	18.64
	16-QAM	RB1#0	1	1	18.87	18.76	18.84	18.80
		RB1#25	1	1	18.99	18.99	18.96	19.07
		RB1#49	1	1	18.90	18.85	18.84	18.78
		RB25#0	2	2	17.64	17.57	17.68	17.64
		RB25#25	2	2	17.67	17.80	17.76	17.67

		RB50#0	2	2	17.76	17.68	17.79	17.71
15M	QPSK	RB1#0	0	0	19.57	19.60	19.51	19.48
		RB1#38	0	0	19.62	19.46	19.53	19.66
		RB1#74	0	0	19.55	19.59	19.58	19.42
		RB36#0	1	1	18.61	18.49	18.63	18.55
		RB36#39	1	1	18.71	18.78	18.74	18.60
		RB75#0	1	1	18.73	18.59	18.71	18.68
	16-QAM	RB1#0	1	1	18.69	18.77	18.68	18.76
		RB1#38	1	1	18.79	18.73	18.74	18.83
		RB1#74	1	1	18.76	18.65	18.69	18.72
		RB36#0	2	2	17.68	17.59	17.61	17.70
		RB36#39	2	2	17.68	17.62	17.65	17.75
		RB75#0	2	2	17.62	17.62	17.66	17.64
20M	QPSK	RB1#0	0	0	19.77	19.69	19.74	19.80
		RB1#50	0	0	19.81	19.80	19.83	19.88
		RB1#99	0	0	19.60	19.51	19.55	19.57
		RB50#0	1	1	18.59	18.53	18.58	18.53
		RB50#50	1	1	18.53	18.57	18.47	18.43
		RB100#0	1	1	18.54	18.47	18.50	18.54
	16-QAM	RB1#0	1	1	18.47	18.44	18.53	18.65
		RB1#50	1	1	18.98	18.92	18.87	18.96
		RB1#99	1	1	18.58	18.60	18.58	18.60
		RB50#0	2	2	17.59	17.70	17.72	17.64
		RB50#50	2	2	17.65	17.63	17.54	17.72
		RB100#0	2	2	17.50	17.50	17.57	17.74

The frequency range of LTE Band 48 is 3550 ~ 3700MHz. Per KDB 447498 D04, according to the following formula Calculate N_c is 4, We chose to test 4 frequency points.

KDB procedures, the following should be applied to determine the number of required test channels. The test channels should be evenly spread across the transmission frequency band of each wireless mode.[14]

$$N_c = Round\left\{\left[100\left(f_{high} - f_{low}\right)/f_c\right]^{0.5} \times \left(f_c/100\right)^{0.2}\right\},$$

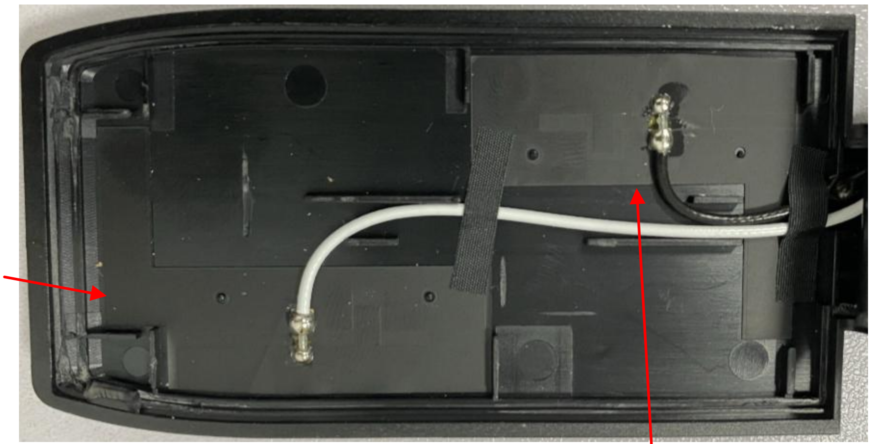
where

- N_c is the number of test channels, rounded to the nearest integer,
- f_{high} and f_{low} are the highest and lowest channel frequencies within the transmission band,
- f_c is the mid-band channel frequency,
- all frequencies are in MHz.

Standalone SAR test exclusion considerations

Antennas Location:

Main Antenna



DIV Antenna

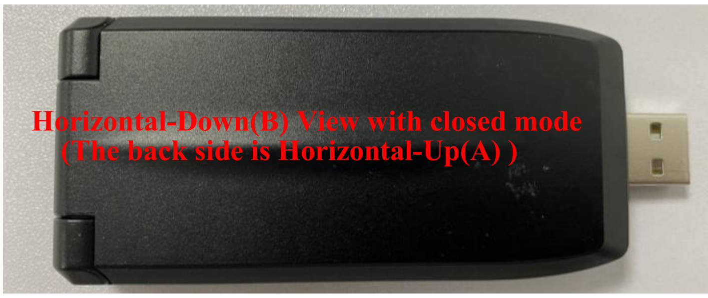
Vertical-Back (D)

Tip

Port

Note：EUT Size information, Length *Width: 40*177mm (Antenna Open mode)
Length *Width: 40*97mm (Antenna Close mode)
At the antenna open mode, the antenna board cannot be extended 180 degrees

Tip



Port

Vertical-Front (C)

Note: The DIV antenna is only responsible for receiving

Antenna Distance To Edge

Antenna Distance To Edge(mm)						
Mode	Horizontal-Up	Horizontal-Down	Vertical-Front	Vertical-Back	Tip	Port
Open	< 5	< 5	< 5	10	< 5	121
Close	< 5	14	< 5	10	33	6

Mode	Frequency (MHz)	Max Target Power (dBm)	Antenna gain (dBi)	P_{Max} (dBm)	P_{Max} (mW)	Exclusion distance (mm)
LTE Band 41	2690	19.0	3.6	20.45	110.92	35.6
LTE Band 48	3700	20.0	2.8	20.65	116.14	38.7

Note:

1. Exclusion distance(mm)=200*(P_{th}/ERP_{20cm})$^{1/x}$.
2. ERP= Max Target Power+ Antenna gain-2.15
3. P_{Max} refers to the greater value in the Max Target Power and ERP.

SAR test exclusion for the EUT edge considerations Result

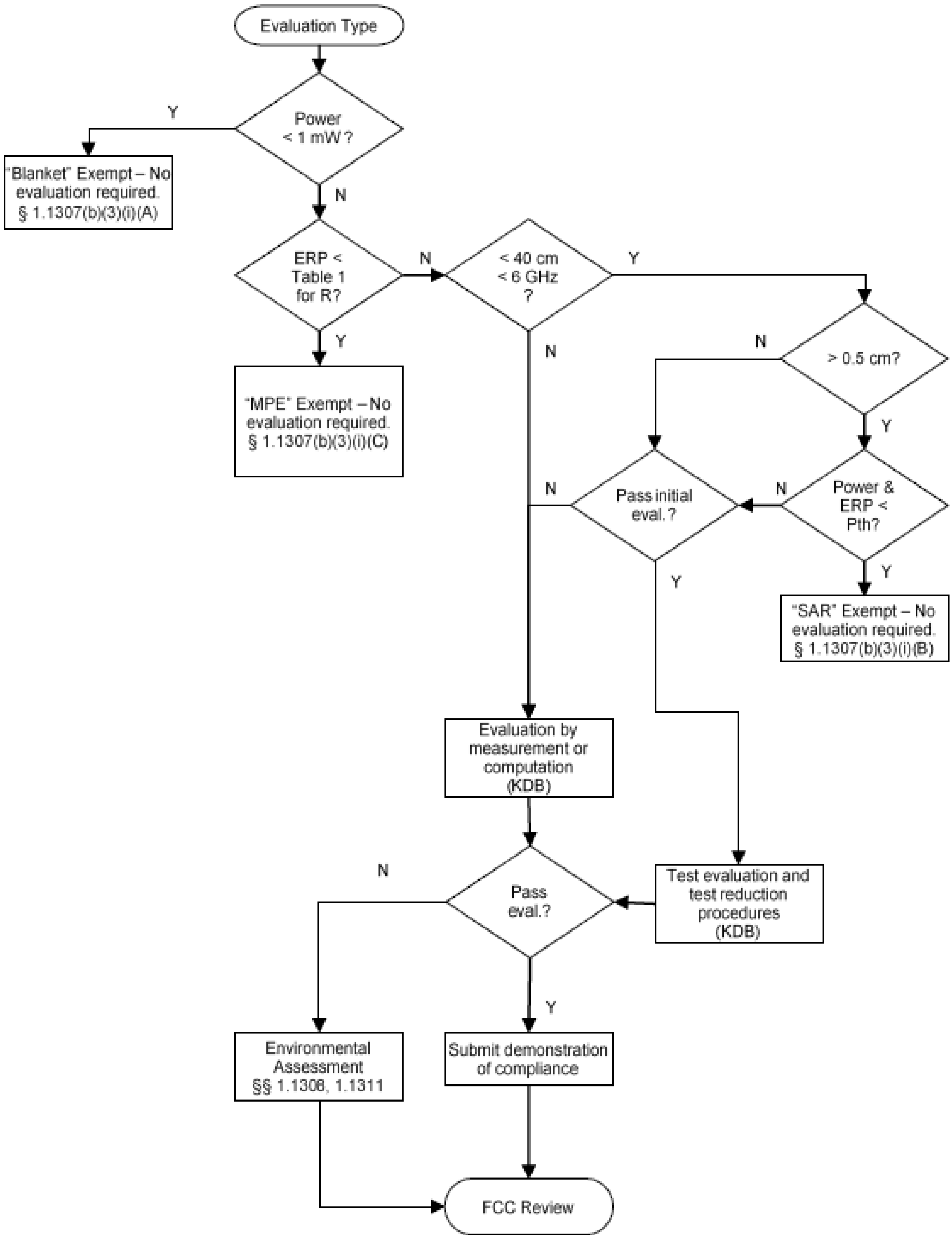
Antenna Distance To Edge(mm)						
Mode	Horizontal-Up	Horizontal-Down	Vertical-Front	Vertical-Back	Tip	Port
Open	**Required**	**Required**	**Required**	**Required**	**Required**	Exclusion
Close	**Required**	**Required**	**Required**	**Required**	**Required**	**Required**

Note:

Required: The distance to Edge is less than Exclusion distance, testing is required.
Exclusion: The distance to Edge is more than Exclusion distance, testing is not required.

Standalone SAR test exclusion considerations:

General Sequence for Determination of Procedure (exemption or evaluation) to Establish Compliance with Exposure Limits for a Single RF Source:



Mode	Frequency (MHz)	Max Target Power (dBm)	Antenna gain (dBi)	P_{Max} (dBm)	P_{Max} (mW)	Distance (mm)	P_{th} (mW)	SAR Test Exclusion?
LTE Band 41	2690	19.0	3.8	20.65	116.14	< 5	2.55	No
LTE Band 48	3700	20.0	3.8	21.65	146.22	< 5	1.97	No

Note:
1. ERP= Max Target Power+ Antenna gain-2.15
2. P_{Max} refers to the greater value in the Max Target Power and ERP.
3. The formula for calculating P_{th} is given below, with distances ranging from 20cm to 40cm.

$$P_{th}\ (\text{mW}) = ERP_{20\ cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$

4. The formula for calculating P_{th} is given below, with distances ranging from 0.5cm to 40cm.

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

where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\ cm}\sqrt{f}}\right)$$

and *f* is in GHz, *d* is the separation distance (cm), and ERP_{20cm} is per Formula (Note 3).
5. When the separation distance is less than 0.5cm, 0.5cm is used as the calculation distance

SAR MEASUREMENT RESULTS

This page summarizes the results of the performed dosimetric evaluation.

SAR Test Data

Environmental Conditions

Temperature:	22.6-23.4 ℃	22.2-23.7 ℃
Relative Humidity:	46-55%	52-61%
ATM Pressure:	101.3 kPa	101.7 kPa
Test Date:	2022/10/08	2022/10/09

Testing was performed by Seven Liang.

Antenna Closed mode:

LTE Band 41:

EUT Position	Frequency (MHz)	Bandwidth (MHz)	Test Mode	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/kg)			
						Scaled Factor	Meas. SAR	Scaled SAR	Plot
Horizontal-UP (5mm)	2506	20	1RB	/	/	/	/	/	/
	2549.5	20	1RB	/	/	/	/	/	/
	2593	20	1RB	18.64	19.0	1.086	0.185	0.20	1#
	2636.5	20	1RB	/	/	/	/	/	/
	2680	20	1RB	/	/	/	/	/	/
	2593	20	50%RB	18.61	19.0	1.094	0.175	0.19	2#
Horizontal-Down (5mm)	2506	20	1RB	/	/	/	/	/	/
	2549.5	20	1RB	/	/	/	/	/	/
	2593	20	1RB	18.64	19.0	1.086	0.179	0.19	3#
	2636.5	20	1RB	/	/	/	/	/	/
	2680	20	1RB	/	/	/	/	/	/
	2593	20	50%RB	18.61	19.0	1.094	0.164	0.18	4#
Vertical-Front (5mm)	2506	20	1RB	/	/	/	/	/	/
	2549.5	20	1RB	/	/	/	/	/	/
	2593	20	1RB	18.64	19.0	1.086	0.386	0.42	5#
	2636.5	20	1RB	/	/	/	/	/	/
	2680	20	1RB	/	/	/	/	/	/
	2593	20	50%RB	18.61	19.0	1.094	0.349	0.38	6#
Vertical-Back (5mm)	2506	20	1RB	/	/	/	/	/	/
	2549.5	20	1RB	/	/	/	/	/	/
	2593	20	1RB	18.64	19.0	1.086	0.112	0.12	7#
	2636.5	20	1RB	/	/	/	/	/	/
	2680	20	1RB	/	/	/	/	/	/
	2593	20	50%RB	18.61	19.0	1.094	0.101	0.11	8#
Tip (5mm)	2506	20	1RB	/	/	/	/	/	/
	2549.5	20	1RB	/	/	/	/	/	/

	2593	20	1RB	18.64	19.0	1.086	0.024	0.03	9#
	2636.5	20	1RB	/	/	/	/	/	/
	2680	20	1RB	/	/	/	/	/	/
	2593	20	50%RB	18.61	19.0	1.094	0.021	0.02	10#
Port (5mm)	2506	20	1RB	/	/	/	/	/	/
	2549.5	20	1RB	/	/	/	/	/	/
	2593	20	1RB	18.64	19.0	1.086	0.085	0.09	11#
	2636.5	20	1RB	/	/	/	/	/	/
	2680	20	1RB	/	/	/	/	/	/
	2593	20	50%RB	18.61	19.0	1.094	0.078	0.09	12#

LTE Band 48:

EUT Position	Frequency (MHz)	Bandwidth (MHz)	Test Mode	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/kg)			
						Scaled Factor	Meas. SAR	Scaled SAR	Plot
Horizontal-UP (5mm)	3560	20	1RB	/	/	/	/	/	/
	3603.3	20	1RB	/	/	/	/	/	/
	3646.7	20	1RB	19.74	20.0	1.062	0.532	0.56	13#
	3690	20	1RB	/	/	/	/	/	/
	3646.7	20	50%RB	19.83	20.0	1.040	0.521	0.54	14#
Horizontal-Down (5mm)	3560	20	1RB	/	/	/	/	/	/
	3603.3	20	1RB	/	/	/	/	/	/
	3646.7	20	1RB	19.74	20.0	1.062	0.207	0.22	15#
	3690	20	1RB	/	/	/	/	/	/
	3646.7	20	50%RB	19.83	20.0	1.040	0.188	0.20	16#
Vertical-Front (5mm)	3560	20	1RB	/	/	/	/	/	/
	3603.3	20	1RB	/	/	/	/	/	/
	3646.7	20	1RB	19.74	20.0	1.062	0.469	0.50	17#
	3690	20	1RB	/	/	/	/	/	/
	3646.7	20	50%RB	19.83	20.0	1.040	0.432	0.45	18#
Vertical-Back (5mm)	3560	20	1RB	/	/	/	/	/	/
	3603.3	20	1RB	/	/	/	/	/	/
	3646.7	20	1RB	19.74	20.0	1.062	0.061	0.06	19#
	3690	20	1RB	/	/	/	/	/	/
	3646.7	20	50%RB	19.83	20.0	1.040	0.051	0.05	20#
Tip (5mm)	3560	20	1RB	/	/	/	/	/	/
	3603.3	20	1RB	/	/	/	/	/	/
	3646.7	20	1RB	19.74	20.0	1.062	0.057	0.06	21#
	3690	20	1RB	/	/	/	/	/	/
	3646.7	20	50%RB	19.83	20.0	1.040	0.046	0.05	22#
Port (5mm)	3560	20	1RB	/	/	/	/	/	/
	3603.3	20	1RB	/	/	/	/	/	/
	3646.7	20	1RB	19.74	20.0	1.062	0.386	0.41	23#
	3690	20	1RB	/	/	/	/	/	/
	3646.7	20	50%RB	19.83	20.0	1.040	0.322	0.33	24#

Antenna Opened mode:

LTE Band 41:

EUT Position	Frequency (MHz)	Bandwidth (MHz)	Test Mode	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/kg)			
						Scaled Factor	Meas. SAR	Scaled SAR	Plot
Horizontal-UP (5mm)	2506	20	1RB	/	/	/	/	/	/
	2549.5	20	1RB	/	/	/	/	/	/
	2593	20	1RB	18.64	19.0	1.086	0.517	0.56	25#
	2636.5	20	1RB	/	/	/	/	/	/
	2680	20	1RB	/	/	/	/	/	/
	2593	20	50%RB	18.61	19.0	1.094	0.487	0.53	26#
Horizontal-Down (5mm)	2506	20	1RB	/	/	/	/	/	/
	2549.5	20	1RB	/	/	/	/	/	/
	2593	20	1RB	18.64	19.0	1.086	0.195	0.21	27#
	2636.5	20	1RB	/	/	/	/	/	/
	2680	20	1RB	/	/	/	/	/	/
	2593	20	50%RB	18.61	19.0	1.094	0.169	0.18	28#
Vertical-Front (5mm)	2506	20	1RB	/	/	/	/	/	/
	2549.5	20	1RB	/	/	/	/	/	/
	2593	20	1RB	18.64	19.0	1.086	0.427	0.46	29#
	2636.5	20	1RB	/	/	/	/	/	/
	2680	20	1RB	/	/	/	/	/	/
	2593	20	50%RB	18.61	19.0	1.094	0.426	0.47	30#
Vertical-Back (5mm)	2506	20	1RB	/	/	/	/	/	/
	2549.5	20	1RB	/	/	/	/	/	/
	2593	20	1RB	18.64	19.0	1.086	0.2	0.22	31#
	2636.5	20	1RB	/	/	/	/	/	/
	2680	20	1RB	/	/	/	/	/	/
	2593	20	50%RB	18.61	19.0	1.094	0.194	0.21	32#
Tip (5mm)	2506	20	1RB	/	/	/	/	/	/
	2549.5	20	1RB	/	/	/	/	/	/
	2593	20	1RB	18.64	19.0	1.086	0.213	0.23	33#
	2636.5	20	1RB	/	/	/	/	/	/
	2680	20	1RB	/	/	/	/	/	/
	2593	20	50%RB	18.61	19.0	1.094	0.197	0.22	34#

LTE Band 48:

EUT Position	Frequency (MHz)	Bandwidth (MHz)	Test Mode	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/kg)			
						Scaled Factor	Meas. SAR	Scaled SAR	Plot
Horizontal-UP (5mm)	3560	20	1RB	/	/	/	/	/	/
	3603.3	20	1RB	/	/	/	/	/	/
	3646.7	20	1RB	19.74	20.0	1.062	0.389	0.41	35#
	3690	20	1RB	/	/	/	/	/	/
	3646.7	20	50%RB	19.83	20.0	1.040	0.387	0.40	36#
Horizontal-Down (5mm)	3560	20	1RB	/	/	/	/	/	/
	3603.3	20	1RB	/	/	/	/	/	/
	3646.7	20	1RB	19.74	20.0	1.062	0.523	0.56	37#
	3690	20	1RB	/	/	/	/	/	/
	3646.7	20	50%RB	19.83	20.0	1.040	0.533	0.55	38#
Vertical-Front (5mm)	3560	20	1RB	/	/	/	/	/	/
	3603.3	20	1RB	/	/	/	/	/	/
	3646.7	20	1RB	19.74	20.0	1.062	0.502	0.53	39#
	3690	20	1RB	/	/	/	/	/	/
	3646.7	20	50%RB	19.83	20.0	1.040	0.519	0.54	40#
Vertical-Back (5mm)	3560	20	1RB	/	/	/	/	/	/
	3603.3	20	1RB	/	/	/	/	/	/
	3646.7	20	1RB	19.74	20.0	1.062	0.242	0.26	41#
	3690	20	1RB	/	/	/	/	/	/
	3646.7	20	50%RB	19.83	20.0	1.040	0.223	0.23	42#
Tip (5mm)	3560	20	1RB	/	/	/	/	/	/
	3603.3	20	1RB	/	/	/	/	/	/
	3646.7	20	1RB	19.74	20.0	1.062	0.649	0.69	43#
	3690	20	1RB	/	/	/	/	/	/
	3646.7	20	50%RB	19.83	20.0	1.040	0.624	0.65	44#

Note:

1. SAR for LTE band exposure configurations is measured according to the procedures of KDB 941225 D05 SAR for LTE Devices v02.
2. KDB941225D05-SAR for higher order modulation is required only when the highest maximum output power for the configuration in the higher order modulation is > 0.5 dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg
3. KDB941225D05- For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg.
4. KDB941225D05- Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offset the upper edge, middle and lower edge of each required test channel.
5. KDB941225D05- other channel bandwidths SAR test is required when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > 0.5 dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the reported SAR of a configuration for the largest channel bandwidth is > 1.45 W/kg.
6. Worst case SAR for 50% RB allocation is selected to be tested.
7. KDB 648474 D04-When the peak SAR located in regions that probe is unable to access, a flat phantom is used for SAR measurement.
8. The USB cable used for the test was less than 12 inches.
9. The Vertical-Front and Vertical-Back tests were assisted by high quality USB cables, and the rest of the tests were directly connected to the laptop

SAR Measurement Variability

In accordance with published RF Exposure KDB procedure 865664 D01 SAR measurement 100 MHz to 6 GHz v01. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results

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

The Highest Measured SAR Configuration in Each Frequency Band

Body

SAR probe calibration point	Frequency Band	Freq.(MHz)	EUT Position	Meas. SAR (W/kg)		Largest to Smallest SAR Ratio
				Original	Repeated	
/	/	/	/	/	/	/

Note:

1. Second Repeated Measurement is not required since the ratio of the largest to smallest SAR for the original and first repeated measurement is not > 1.20.
2. The measured SAR results **do not** have to be scaled to the maximum tune-up tolerance to determine if repeated measurements are required.
3. SAR measurement variability must be assessed for each frequency band, which is determined by the **SAR probe calibration point and tissue-equivalent medium** used for the device measurements..

SAR SIMULTANEOUS TRANSMISSION DESCRIPTION

Simultaneous Transmission:

Note:

SAR simultaneous transmission does not exist

SAR Plots

Please Refer to the Attachment.

APPENDIX A MEASUREMENT UNCERTAINTY

The uncertainty budget has been determined for the measurement system and is given in the following Table.

Measurement uncertainty evaluation for IEEE1528-2013 SAR test

Source of uncertainty	Tolerance/ uncertainty ± %	Probability distribution	Divisor	ci (1 g)	ci (10 g)	Standard uncertainty ± %, (1 g)	Standard uncertainty ± %, (10 g)
Measurement system							
Probe calibration	6.55	N	1	1	1	6.6	6.6
Axial Isotropy	4.7	R	√3	1	1	2.7	2.7
Hemispherical Isotropy	9.6	R	√3	0	0	0.0	0.0
Boundary effect	1.0	R	√3	1	1	0.6	0.6
Linearity	4.7	R	√3	1	1	2.7	2.7
Detection limits	1.0	R	√3	1	1	0.6	0.6
Readout electronics	0.3	N	1	1	1	0.3	0.3
Response time	0.0	R	√3	1	1	0.0	0.0
Integration time	0.0	R	√3	1	1	0.0	0.0
RF ambient conditions – noise	1.0	R	√3	1	1	0.6	0.6
RF ambient conditions–reflections	1.0	R	√3	1	1	0.6	0.6
Probe positioner mech. Restrictions	0.8	R	√3	1	1	0.5	0.5
Probe positioning with respect to phantom shell	6.7	R	√3	1	1	3.9	3.9
Post-processing	2.0	R	√3	1	1	1.2	1.2
Test sample related							
Test sample positioning	2.8	N	1	1	1	2.8	2.8
Device holder uncertainty	6.3	N	1	1	1	6.3	6.3
Drift of output power	5.0	R	√3	1	1	2.9	2.9
Phantom and set-up							
Phantom uncertainty (shape and thickness tolerances)	4.0	R	√3	1	1	2.3	2.3
Liquid conductivity target)	5.0	R	√3	0.64	0.43	1.8	1.2
Liquid conductivity meas.)	2.5	N	1	0.64	0.43	1.6	1.1
Liquid permittivity target)	5.0	R	√3	0.6	0.49	1.7	1.4
Liquid permittivity meas.)	2.5	N	1	0.6	0.49	1.5	1.2
Combined standard uncertainty		RSS				12.2	12.0
Expanded uncertainty 95 % confidence interval)						24.3	23.9

APPENDIX B EUT TEST POSITION PHOTOS

Please Refer to the Attachment.

APPENDIX C PROBE CALIBRATION CERTIFICATES

Please Refer to the Attachment.

APPENDIX D DIPOLE CALIBRATION CERTIFICATES

Please Refer to the Attachment.

******* END OF REPORT *******