FCC SAR Test Report
FCC ID: FKGX11BKB

Report No.	:	BTL-FCC SAR-1-2304T012C
Equipment	:	Radio Module
Model Name	:	EM7565
Applicant	:	Twinhead International Corporation
Address	:	9F, No. 550, Rueiguang Rd, Neihu,Taipei, Taiwan 11492
Radio Function	:	LTE Band 48
Standard(s)	:	**KDB447498 D04** Interim General RF Exposure Guidance v01 **KDB865664 D01** SAR measurement 100 MHz to 6 GHz v01r04 **KDB865664 D02** SAR Reporting v01r02 **KDB616217 D04** SAR for laptop and Tablets **KDB941225 D05** SAR for LTE Devices v02r05 **FCC§2.1093** Radiofrequency radiation exposure evaluation: portable devices **IEEE C95.1:2019** Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz. **IEEE Std 1528:2013** Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
Date of Receipt	:	Dec. 26, 2023
Date of Test	:	Jan. 4, 2024
Issued Date	:	Mar. 26, 2024

The above equipment has been tested and found in compliance with the requirement of the above standards by BTL Inc.

Prepared by :

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Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

This report is the confidential property of the client. As a mutual protection to the clients, the public and ourselves, the test report shall not be reproduced, except in full, without our written approval.

BTL's laboratory quality assurance procedures are in compliance with the **ISO/IEC 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

BTL is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

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REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue.	2024/1/10
R01	Add Simultaneous transmission conditions	2024/3/19
R02	Revise Host device's Model Name	2024/3/26

1. GENERAL INFORMATION

1.1. GENERAL DESCRIPTION OF EUT

<table>
<tr><td>Equipment</td><td colspan="3">Radio Module</td></tr>
<tr><td>Model Name</td><td colspan="3">EM7565</td></tr>
<tr><td colspan="4">Host device information</td></tr>
<tr><td>Equipment</td><td colspan="3">Tablet</td></tr>
<tr><td>Model Name</td><td colspan="3">X11XXXXXX; U11XXXXXX(X=0-9, A-Z,a-z, Blank)</td></tr>
<tr><td>Brand Name</td><td colspan="3">DURABOOK</td></tr>
<tr><td>Model Difference</td><td colspan="3">Different model distribute to different area.</td></tr>
<tr><td>Power Rating</td><td colspan="3">Brand: FSP TECHNOLOGY INC.
M/N : FSP065-RBBN3
I/P : 100-240Vac, 1.5A 50-60Hz
O/P : 19Vdc ,3.42A</td></tr>
<tr><td>Battery Information</td><td colspan="3">Model Name : X11BA-M
Rating : 7.6VDC / 4800mAh / 36.48Wh</td></tr>
<tr><td>WWAN Module</td><td colspan="3">EM7565</td></tr>
<tr><td rowspan="2">Operation Frequency</td><td>Function</td><td>Band</td><td>Frequency (MHz)</td></tr>
<tr><td>LTE</td><td>Band 48</td><td>TX : 3550 - 3700</td></tr>
<tr><td>Test Model</td><td colspan="3">EM7565</td></tr>
<tr><td>Sample Status</td><td colspan="3">Engineering Sample</td></tr>
<tr><td>EUT Modification(s)</td><td colspan="3">N/A</td></tr>
</table>

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.
The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FCC-SAR-1-2304T012C) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

2. SUMMARY OF SAR MEASUREMENT

2.1. TEST FACILITY

The test locations stated below are under the TAF Accreditation Number 0659.
The test facilities used to collect the test data in this report is SAR Test room at the location of No. 68-1, Ln. 169, Sec.2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan.
(FCC DN: TW0659)

☐ SAR 01 ☒ SAR 02 ☐ SAR 03

2.2. MEASUREMENT UNCERTAINTY

Uncertainty Budget for Frequency range of 3 GHz to 6 GHz

Error Description	Uncertainty Value (± %)	Probability Distribution	Divisor	Ci (1g)	Ci (10g)	Standard Uncertainty (1g)	Standard Uncertainty (10g)	Vi V_{eff}
Measurement System								
Probe Calibration	7.00	Normal	1	1	1	± 7.0 %	± 7.00 %	∞
Axial Isotropy	4.7	Rectangular	$\sqrt{3}$	0.7	0.7	± 1.9 %	± 1.9 %	∞
Hemispherical Isotropy	9.6	Rectangular	$\sqrt{3}$	0.7	0.7	± 3.9 %	± 3.9 %	∞
Boundary Effects	2	Rectangular	$\sqrt{3}$	1	1	± 1.2 %	± 1.2 %	∞
Linearity	4.7	Rectangular	$\sqrt{3}$	1	1	± 2.7 %	± 2.7 %	∞
Detection Limits	1	Rectangular	$\sqrt{3}$	1	1	± 0.6 %	± 0.6 %	∞
Modulation response	2.4	Rectangular	$\sqrt{3}$	1	1	±1.4 %	±1.4 %	∞
Readout Electronics	0.3	Normal	1	1	1	± 0.3 %	± 0.3 %	∞
Response Time	0.8	Rectangular	$\sqrt{3}$	1	1	± 0.5%	± 0.5 %	∞
Integration Time	2.6	Rectangular	$\sqrt{3}$	1	1	± 1.5 %	± 1.5 %	∞
RF Ambient – Noise	3	Rectangular	$\sqrt{3}$	1	1	± 1.7 %	± 1.7 %	∞
RF Ambient– Reflections	3	Rectangular	$\sqrt{3}$	1	1	± 1.7 %	± 1.7 %	∞
Probe Positioner	0.04	Rectangular	$\sqrt{3}$	1	1	± 0.0 %	± 0.0 %	∞
Probe Positioning	0.8	Rectangular	$\sqrt{3}$	1	1	± 0.5 %	± 0.5 %	∞
Max.SAR Evaluation	4	Rectangular	$\sqrt{3}$	1	1	± 2.3 %	± 2.3 %	∞
Test Sample Related								
Device Positioning	2.9	Normal	1	1	1	± 2.9 %	± 2.9 %	145
Device Holder	3.6	Normal	1	1	1	± 3.6 %	± 3.6 %	5
Power Drift	5.0	Rectangular	$\sqrt{3}$	1	1	± 2.9 %	± 2.9 %	∞
Phantom and Setup								
Phantom Production Tolerances	6.6	Rectangular	$\sqrt{3}$	1	1	± 3.8 %	± 3.8 %	∞
SAR correction	1.9	Rectangular	$\sqrt{3}$	1	0.84	± 1.9 %	± 1.6 %	
Liquid Conductivity (mea.)	2.5	Rectangular	$\sqrt{3}$	0.78	0.71	± 2.0 %	± 1.8 %	∞
Liquid Permittivity (mea.)	2.5	Rectangular	$\sqrt{3}$	0.26	0.26	± 0.6 %	± 0.7 %	∞
Temp. unc. - Conductivity	3.4	Rectangular	$\sqrt{3}$	0.78	0.71	± 1.5 %	± 1.4 %	∞
Temp. unc. - Permittivity	0.4	Rectangular	$\sqrt{3}$	0.23	0.26	± 0.1 %	± 0.1 %	∞
Combined Standard Uncertainty (K = 1)						± 12.14 %	± 12.06 %	361
Expanded Uncertainty (K = 2)						**± 24.28 %**	**± 24.12 %**	

2.3. WWAN Antenna Information

Antenna	Manufacture	P/N	Type	Gain (dBi)	Band
Main	Sinbon Technology Co.,Ltd	22+600761+00	Monopole	-2.69	LTE Band 48
Aux	Sinbon Technology Co.,Ltd	22+600762+00	Monopole	-	RX only

2.4. The Maximum SAR 1g Values

Mode	Distance(mm)	Highest Body Reported SAR-1g(W/kg)
LTE Band 48	**0**	**0.470**

Note:

1.The device is in compliance with Specific Absorption Rate(SAR)for general population uncontrolled exposure limits according to the FCC rule §2.1093, the ANSI C95.1:2019/IEEE C95.1:2019, the NCRP Report Number 86 for uncontrolled environment and had been tested in accordance with the measurement methods and procedures specified in IEEE Std 1528:2013

2.5. Laboratory Environment

Temperature	Min. = 18ºC, Max. = 25ºC
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

2.6. Main Test Instruments

Item	Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Interval
1	DASY5	Speag	DASY 5(Version 52.10.4.1535)	N/A	N/A	N/A
2	Data Acquisition Electronics	Speag	DAE4	1289	Jun. 16, 2023	1 Year
3	E-field Probe	Speag	EX3DV4	7678	Aug. 17, 2023	1 Year
4	System Validation Dipole	Speag	D3500V2	1096	Aug. 15, 2023	3 Year
5	System Validation Dipole	Speag	D3700V2	1065	Aug. 15, 2023	3 Year
6	ELI4 Phantom	Speag	ELI4 Phantom V8.0	2149	N/A	N/A
7	ENA Network Analyzer	Agilent	E5071C	MY46524658	Mar. 17, 2023	1 Year
8	Signal Generator	R&S	SMR40	100502	Feb. 23, 2023	1 Year
9	Spectrum Analyzer	R&S	FSV7	103032	Aug. 10, 2023	1 Year
10	Wideband Radio	R&S	CMW 500	154121	Jan. 12, 2023	1 Year
11	Power Meter	Anritsu	ML2495A	1128008	May. 12, 2023	1 Year
12	Power Sensor	Anritsu	MA2411B	1126001	May. 12, 2023	1 Year
13	Dielectric Probe Kit	Agilent	85070E	2593	N/A	N/A
14	Low pass filter	Mini-Circuits	SLP-2950+	M108294	N/A	N/A
15	Power Amplifier	Mini-Circuits	ZVE-2W-272+	N650001538	N/A	N/A
16	Power Amplifier	Mini-Circuits	ZVE-8G+	N628801631	N/A	N/A
17	Power Amplifier	EMCI	EMC053035	980869	N/A	N/A
18	Thermometer	kolin	KGM-DVB03	01	Oct. 19, 2023	1 Year
19	Directional Coupler	Woken	50W Coupler	DOM5CIW3E2	N/A	N/A
20	Attenuator	Woken	WATT-518FS-10	N/A	N/A	N/A

Remark: “N/A” denotes no model name, serial No. or calibration specified.

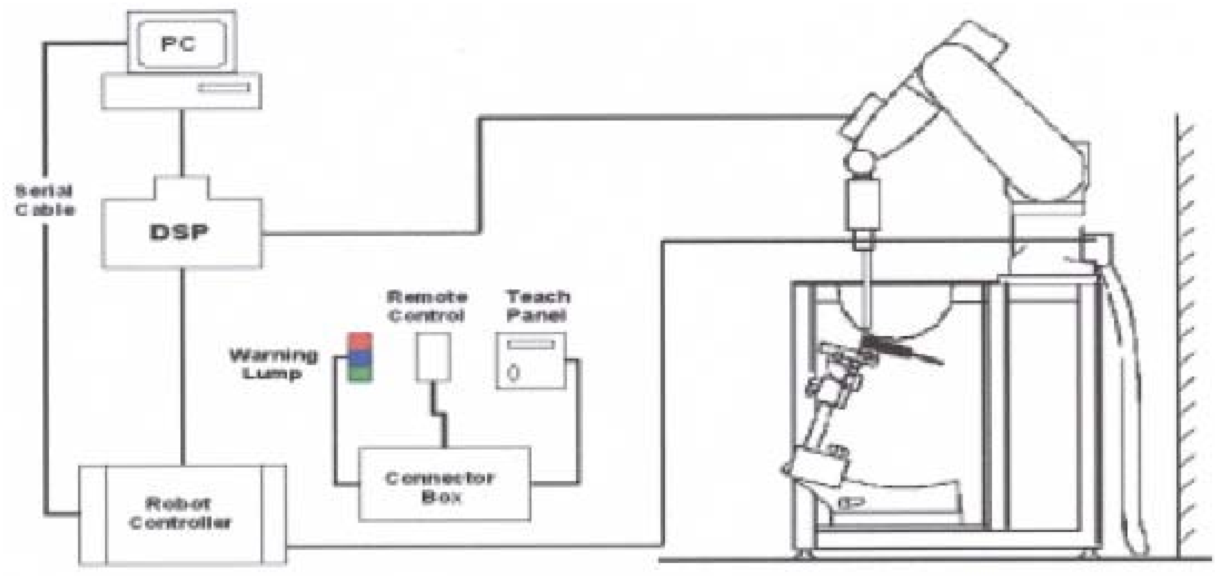
3. SAR MEASUREMENTS SYSTEM CONFIGURATION

3.1. SAR Measurement Setup

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

1. A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).
2. A dosimetric 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.
3. A data acquisition electronic (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.
4. A unit to operate the optical surface detector which is connected to the EOC.
5. The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY5 measurement server.
6. The DASY5 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows.
7. DASY5 software and SEMCAD data evaluation software.
8. Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.
9. The generic twin phantom enabling the testing of left-hand and right-hand usage.
10. The device holder for handheld mobile phones.
11. Tissue simulating liquid mixed according to the given recipes.
12. System validation dipoles allowing to validate the proper functioning of the system.

3.1.1. TEST SETUP LAYOUT

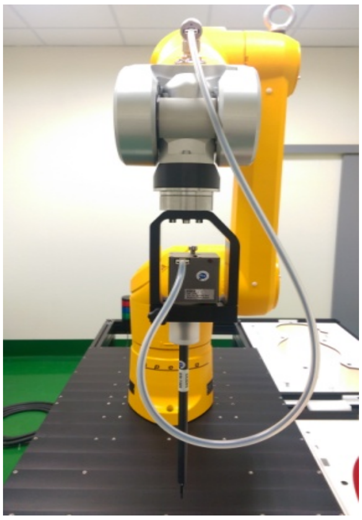


3.2. DASY5 E-field Probe System

The SAR measurements were conducted with the dosimetric probe EX3DV4 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation.

3.2.1. EX3DV4 PROBE SPECIFICATION

Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available
Frequency	10 MHz to 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	10 µW/g to > 100 mW/g Linearity: ± 0.2dB
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Distance from probe tip to dipole centers: 1.0 mm



EX3DV4 E-field Probe

3.2.2. E-FIELD PROBE CALIBRATION

Each probe is calibrated according to a dosimetric assessment procedure with accuracy better than ±10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested.

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies bellow 1 GHz, and in a wave guide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

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

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

Where: Δt = Exposure time (30 seconds),

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

ΔT = Temperature increase due to RF exposure.

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

Where: σ = Simulated tissue conductivity,

ρ = Tissue density (kg/m3).

3.2.3. OTHER TEST EQUIPMENT

3.2.3.1. DEVICE HOLDER FOR TRANSMITTERS

Construction: Simple but effective and easy-to-use extension for Mounting Device that facilitates the testing of larger devices according to IEC 62209-2 (e.g., laptops, cameras, etc.) It is lightweight and fits easily on the upper part of the Mounting Device in place of the phone positioner. The extension is fully compatible with the Twin SAM, ELI4 and SAM v6.0 Phantoms.
Material: POM, Acrylic glass, Foam

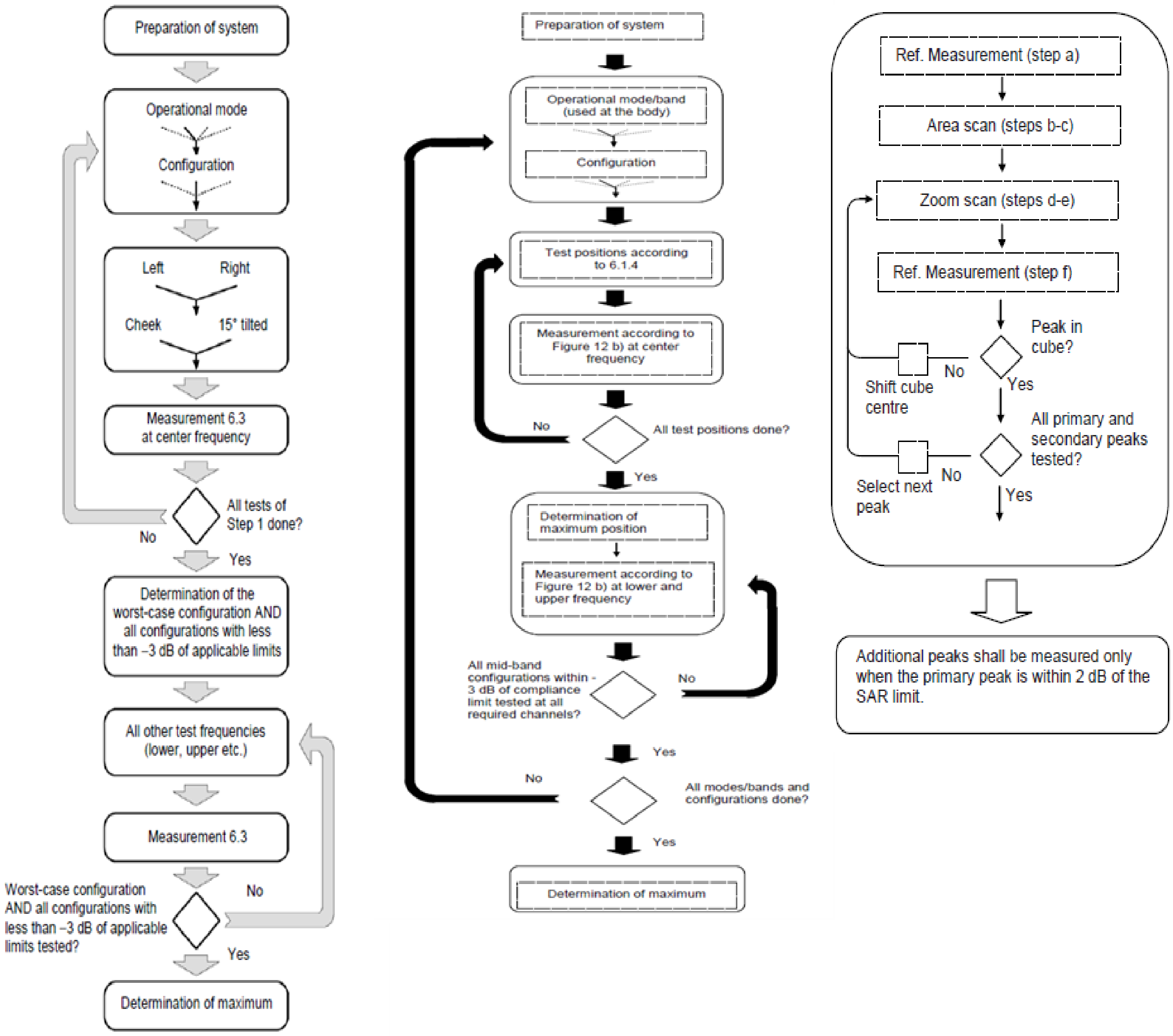
3.2.3.2. PHANTOM

Model	ELI4 Phantom	
Construction	Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. 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.	
Shell Thickness	2±0.1 mm	
Filling Volume	Approx. 30 liters	
Dimensions	Length: 600 mm ; Width: 190mm Height: adjustable feet	
Aailable	Special	

Model	Twin SAM	
Construction	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.	
Shell Thickness	2 ± 0.2 mm	
Filling Volume	Approx. 25 liters	
Dimensions	Length:1000mm; Width: 500mm Height: adjustable feet	
Aailable	Special	

3.2.4. SCANNING PROCEDURE

The SAR test against the head and body-worn phantom was carried out as follow:



After an area scan has been done at a fixed distance of 1.4mm from the surface of the phantom on the source side, a 3D scan is set up around the location of the maximum spot SAR. First, a point within the scan area is visited by the probe and a SAR reading taken at the start of testing. At the end of testing, the probe is returned to the same point and a second reading is taken. Comparison between these start and end readings enables the power drift during measurement to be assessed.

Above is the scanning procedure flow chart and table from the IEEE1528 standard.

This is the procedure for which all compliant testing should be carried out to ensure that all variations of the device position and transmission behavior are tested.

3.2.5. DATA STORAGE AND EVALUATION

3.2.5.1. DATA STORAGE

The DASY5 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension “DAE4”. The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [mW/g], [mW/cm²], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

3.2.6. DATA EVALUATION BY SEMCAD

The SEMCAD software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe parameters:	Sensitivity	Normi, a_{i0}, a_{i1}, a_{i2}
	Conversion factor	$ConvF_i$
	Diode compression point	Dcp_i
Device parameters:	Frequency	f
	Crest factor	cf
Media parameters:	Conductivity	
	Density	

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY5 components. In the direct measuring mode of the multimeter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics.

If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot cf / dcpi$$

With
V_i = compensated signal of channel i (i = x, y, z)
U_i = input signal of channel i (i = x, y, z)
cf = crest factor of exciting field (DASY parameter)
dcp_i = diode compression point (DASY parameter)

From the compensated input signals the primary field data for each channel can be evaluated:

E-field probes: $E_i = (V_i / Norm_i \cdot ConvF)^{1/2}$

H-field probes: $H_i = (V_i)^{1/2} \cdot (a_{i0} + a_{i1} f + a_{i2} f^2) / f$

With V_i = compensated signal of channel i (i = x, y, z)

$Norm_i$ = sensor sensitivity of channel i (i = x, y, z)
[mV/(V/m)^2] for E-field Probes

ConvF = sensitivity enhancement in solution

aij = sensor sensitivity factors for H-field probes

f = carrier frequency [GHz]

E_i = electric field strength of channel i in V/m

H_i = magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = (E_X^2 + E_Y^2 + E_Z^2)^{1/2}$$

The primary field data are used to calculate the derived field units.

$$SAR = (E_{tot})^2 \cdot \sigma / (\rho \cdot 1000)$$

With SAR = local specific absorption rate in mW/g

E_{tot} = total field strength in V/m
= conductivity in [mho/m] or [Siemens/m]
= equivalent tissue density in g/cm^3

Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid. The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = E_{tot}^2 / 3770 \text{ or } Ppwe = H_{tot}^2 \cdot 37.7$$

With P_{pwe} = equivalent power density of a plane wave in mW/cm^2

E_{tot} = total field strength in V/m
H_{tot} = total magnetic field strength in A/m

4. TISSUE-EQUIVALENT LIQUID

4.1. Tissue-equivalent Liquid Ingredients

The liquid is consisted of water, salt and Glycol, Sugar, Preventol and Cellulose. The liquid has previously been proven to be suited for worst-case. The measured conductivity and relative permittivity should be within ±5% of the target values. The below table shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the IEC 62209.

Composition of the Tissue Equivalent Matter

Tissue Type	Bactericide	DGBE	HEC	NaCl	Sucrose	Triton X-100	Water	Diethylene Glycol Mono-hexylether
Head 3500	-	8.0	-	0.2	-	20.0	71.8	-
Head 3700	-	8.1	-	0.2	-	20.0	71.7	-

4.2. Tissue-equivalent Liquid Properties

Dielectric Performance of Tissue Simulating Liquid

Date	Tissue Type	Frequency (MHz)	Conductivity (σ)	Permittivity (εr)	Targeted Conductivity (σ)	Targeted Permittivity (εr)	Deviation Conductivity (σ) (%)	Deviation Permittivity (εr) (%)	Limit (%) ±5
2024/1/4	Head	3500	2.83	36.49	2.91	37.93	-2.73	-3.78	±5
2024/1/4	Head	3700	3.06	35.90	3.12	37.70	-1.75	-4.77	±5

Note:
1)The dielectric parameters of the tissue-equivalent liquid should be measured under similar ambient conditions and within 2 °C of the conditions expected during the SAR evaluation to satisfy protocol requirements.
2)KDB 865664 was ensured to be applied for probe calibration frequencies greater than or equal to 50MHz of the EUT frequencies.
3)The above measured tissue parameters were used in the DASY software to perform interpolation via the DASY software to determine actual dielectric parameters at the test frequencies. The SAR test plots may slightly differ from the table above since the DASY rounds to three significant digits.
4) According to FCC TCB workshop April, 2019 RF Exposure Procedures Update(Effective February 19,2019, FCC has permitted the use of single head-tissue simulating liquid specified in IEEE 62209-1- for all SAR tests.

5. SYSTEM CHECK

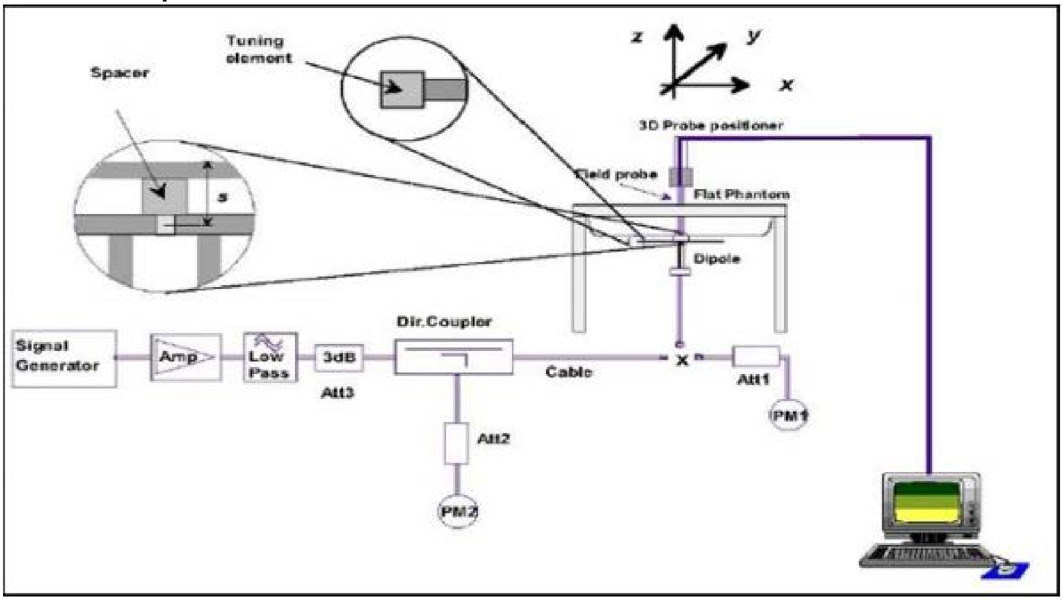
5.1. DESCRIPTION OF SYSTEM CHECK

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulants were measured every day using the dielectric probe kit and the network analyzer. A system check measurement was made following the determination of the dielectric parameters of the simulant, using the dipole validation kit. A power level of 250 mW(below 3GHz) or 100mW(3-6GHz), which was placed under the flat section of the twin SAM phantom. The system check results (dielectric parameters and SAR values) are given in the 6.2.

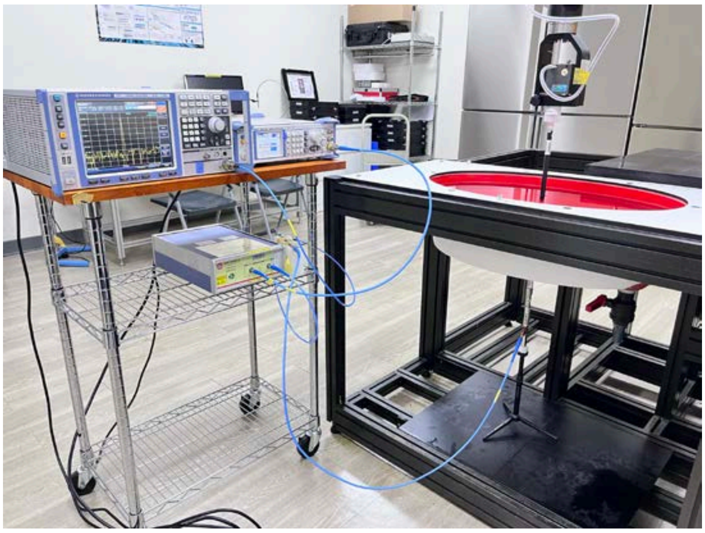
System check results have to be equal or near the values determined during dipole calibration with the relevant liquids and test system (±10 %).

System check is performed regularly on all frequency bands where tests are performed with the DASY5 system.

System Check Set-up



System Check photo



5.2. DESCRIPTION OF SYSTEM CHECK

System Check in Tissue Simulating Liquid

The system check is performed for verifying the accuracy of the complete measurement system and performance of the software. The system check is performed with tissue equivalent material according to IEEE P1528 (described above). The following table shows system check results for all frequency bands and tissue liquids used during the tests.

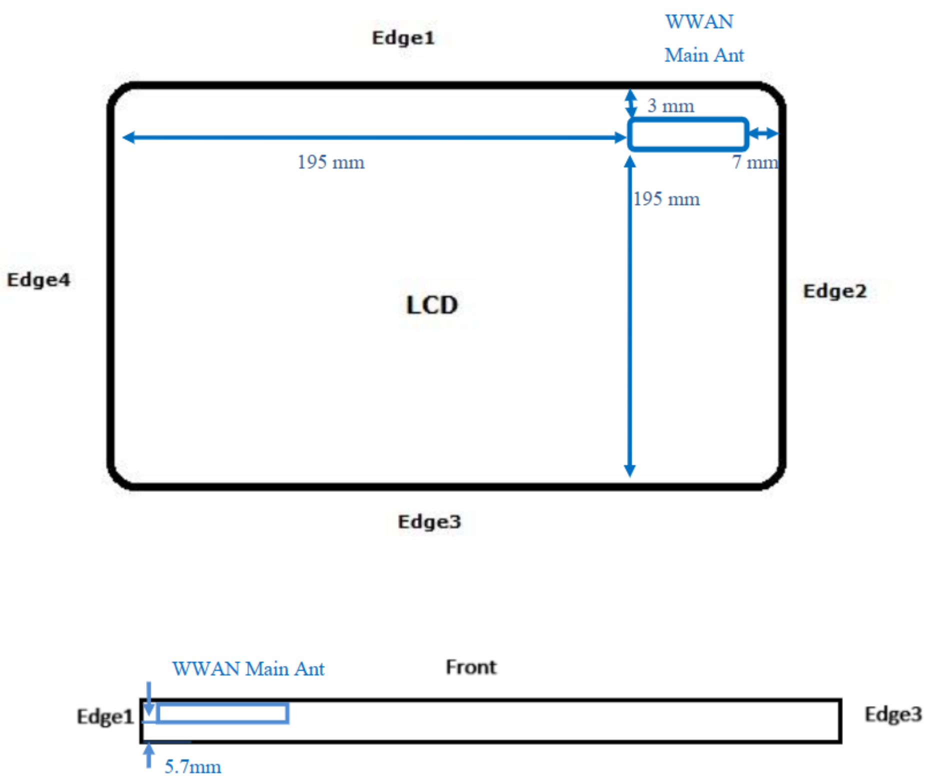
Date	System Dipole			Parameters	Target [W/kg]	Measured [W/kg]	Normalized to1W [W/kg]	Deviation [%]	Limited [%]
	Type	Serial No.	Liquid						
2024/1/4	D3500V2	1096	Head	1g SAR	66.5	6.45	64.5	-3.01	± 10
2024/1/4	D3700V2	1065	Head	1g SAR	67.7	6.89	68.9	1.77	± 10

6. OPERATIONAL CONDITIONS DURING TEST

6.1. General Description of Test Procedures

Connection to the EUT is established via air interface with base station An, and the EUT is Set to maximum output power by base station. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power output. The antenna connected to the output of the base station simulator shall be placed at least 50cm away from the EUT. The signal transmitted by the simulator to the antenna feeding point shall be lower than the output power level of the EUT by at least 30dB.

6.2. Test Position of Portable Devices



Test Position of Portable Devices

Minimum Separation Distance					
P-Sensor	Mode	Antenna	Position	Distance (mm)	Evaluation Test
on	WWAN	Main	Rear	5.7	Yes
			Edge1	3	Yes
			Edge3	195	No
			Edge4	195	No
off	WWAN	Main	Rear	14.7	Yes
			Edge1	11	Yes
			Edge2	7	Yes

6.3. TEST CONFIGURATION

The SAR Exclusion Threshold in KDB 447498 D01 can be applied to determine SAR test exclusion for adjacent edge configurations. The closest distance from the antenna to an EUT edge is used to determine if SAR testing is required for the adjacent edges, with the adjacent edge positioned adjacent the phantom and the edge containing the antenna positioned perpendicular to the phantom.

SAR test reduction and exclusion guidance

(1)The SAR exclusion threshold for is defined by the following equation:

$$P_{\text{th}}\ (\text{mW}) = \begin{cases} ERP_{20\ \text{cm}}(d/20\ \text{cm})^{x} & d \le 20\ \text{cm} \\ ERP_{20\ \text{cm}} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases} \qquad (\text{B}.2)$$

where

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

and f is in GHz, d is the separation distance (cm), and $ERP_{20\text{cm}}$ is per Formula (B.1).

Example values shown in Table B.2 are for illustration only.

Table B.2—Example Power Thresholds (mW)

	Distance (mm)										
		5	10	15	20	25	30	35	40	45	50
Frequency (MHz)	300	39	65	88	110	129	148	166	184	201	217
	450	22	44	67	89	112	135	158	180	203	226
	835	9	25	44	66	90	116	145	175	207	240
	1900	3	12	26	44	66	92	122	157	195	236
	2450	3	10	22	38	59	83	111	143	179	219
	3600	2	8	18	32	49	71	96	125	158	195
	5800	1	6	14	25	40	58	80	106	136	169

6.4. SAR Exclusion Calculations for WWAN Antenna

P-Sensor off

Mode	Ant	Position	Distance (mm)	f (MHz)	Max Power(dBm)	Max Power(mW)	SAR Exclusion threshold(mW)	Test required
LTE Band 48	Main	Rear	5.70	3650	22.00	158.49	2	Yes
LTE Band 48	Main	Edge 1	3.00	3650	22.00	158.49	2	Yes
LTE Band 48	Main	Edge 2	7.50	3650	22.00	158.49	2	Yes
LTE Band 48	Main	Edge 3	195.00	3650	22.00	158.49	195	No
LTE Band 48	Main	Edge 4	195.00	3650	22.00	158.49	195	No

P-Sensor on

Mode	Ant	Position	Distance (mm)	f (MHz)	Max Power(dBm)	Max Power(mW)	SAR Exclusion threshold(mW)	Test required
LTE Band 48	Main	Rear	5.70	3650	21.50	141.25	2	Yes
LTE Band 48	Main	Edge 1	3.00	3650	21.50	141.25	2	Yes
LTE Band 48	Main	Edge 3	195.00	3650	21.50	141.25	195	No
LTE Band 48	Main	Edge 4	195.00	3650	21.50	141.25	195	No

7. SAR MEASUREMENT VARIABILITY AND UNCERTAINTY

7.1. SAR measurement variability

Per KDB865664 D01 SAR measurement 100 MHz to 6 GHz, 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. The 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 same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.

The detailed repeated measurement results are shown in Section 8.2.

7.2. LTE Test Configuration

Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR. The RS CMW500 was used for LTE output power measurements and SAR testing. Max power control was used so the UE transmits with maximum output power during SAR testing. SAR must be measured with the maximum TTI(transmit time interval) supported by the device in each LTE configuration.

1)Spectrum Plots for RB configurations
A properly configured base station simulator was used for LTE output power measurements and SAR testing. Therefore, spectrum plots for RB configurations were not required to be included in this report.

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

3)A-MPR
A-MPR(Additional MPR) has been disabled for all SAR tests by using Network Signaling Value of “NS=01”on the base station simulator.

4)SAR test requirements
The LTE SAR test is choice the max power mode and start with the max power channel.
A) Largest channel bandwidth standalone SAR test requirements
i) QPSK with 1 RB allocation
When the SAR is ≤ 1 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel. When the 10-g SAR of a required test channel is > 1.8 W/kg, SAR is required for all three RB offset configurations for that required test channel.

8. POWER REDUCTION BY PROXIMITY SENSING

A proximity sensor for power reduction is implemented in this device to address RF exposure compliance when the cellular antenna is positioned close to the user's body. The sensor's mechanical structure is designed to fit within the enclosure design used in this device and also extended around the edge and top of the antenna element in order to optimize sensitivity in these orientations. This design combines the antenna printed directly on a plastic part and proximity sensor FPC (Flexible Printed Circuit) bonded together into one piece. According to KDB 616217 D04 SAR for laptop and tablets v01r02)

8.1. procedures for detrmining proximity sensor triggering distances

The following procedures should be applied to determine proximity sensor triggering distances for the back surface and individual edges of a tablet. Conducted power is monitored qualitatively to identify the general triggering characteristics and recorded quantitatively, versus spacing, as required by the procedures. Unless there is built-in test software that reports the triggering conditions and enables the power levels to be confirmed separately, monitoring of conducted power during the triggering tests typically requires internal access to the antenna ports inside the tablet, which may interfere with the triggering tests.

1. The relevant transmitter should be set to operate at its normal maximum output power.
2. The entire back surface or edge of the tablet is positioned below a flat phantom filled with the required tissue-equivalent medium, and positioned at least 20 mm further than the distance that triggers power reduction.
3. It should be ensured that the cables required for power measurements are not interfering with the proximity sensor. Cable losses should be properly compensated to report the measured power results.
4. The back surface or edge is moved toward the phantom in 3 mm steps until the sensor triggers.
5. The back surface or edge is then moved back (further away) from the phantom by at least 5 mm or until maximum output power is returned to the normal maximum level.
6. The back surface or edge is again moved toward the phantom, but in 1 mm steps, until it is at least 5 mm past the triggering point or touching the phantom. If 1 mm resolution is not suitable for the sensor triggering sensitivity, a KDB inquiry should be submitted to determine alternative test configurations.
7. If the tablet is not touching the phantom, it is moved in 3 mm steps until it touches the phantom to confirm that the sensor remains triggered and the maximum power stays reduced.
8. The process is then reversed by moving the tablet away from the phantom according to steps 4) to 7), to determine triggering release, until it is at least 10 mm beyond the point that triggers the return of normal maximum power.
9. The measured output power within ± 5 mm of the triggering points, or until the tablet is touching the phantom, for movements to and from the phantom should be tabulated in the SAR report.
10. If the sensor design and implementation allow additional variations for triggering distance tolerances, multiple samples should be tested to determine the most conservative distance required for SAR evaluation.
11. To ensure all production units are compliant, it is generally necessary to reduce the triggering distance determined from the triggering tests by 1 mm, or more if it is necessary, and use the smallest distance for movements to and from the phantom, minus 1 mm, as the sensor triggering distance for determining the SAR measurement distance.

8.2. procedures for detrmining antenna and proximity sensor coverage

The sensing regions are usually limited to areas near the sensor element. If a sensor is spatially offset from the antenna(s), it is necessary to verify sensor triggering for conditions where the antenna is next to the user but the sensor is laterally further away to ensure sensor coverage is sufficient for reducing the power to maintain compliance. The following are used to determine if additional SAR measurements may be necessary due to sensor and antenna offset. 25 These procedures do not apply and are not required for configurations where the antenna and sensor are collocated and the peak SAR location is overlapping with the sensor.

1. The back surface or edge of the tablet is positioned at a test separation distance less than or equal to the distance required for back surface or edge triggering, with both the antenna and sensor pad located at least 20 mm laterally outside the edge (boundary) of the phantom, along the direction of maximum antenna and sensor offset. For the back surface, if the direction of maximum offset is not aligned with the tablet coordinates (physical edges) the tablet test position would not be aligned with the phantom coordinates (orientations). Each applicable tablet edge should be positioned perpendicularly to the phantom to determine sensor coverage. For antennas and/or sensors located near the corner of a tablet, both adjacent edges must be considered.

2. The similar sequence of steps applied to determine sensor triggering distance in section 6.2 are used to verify back surface and edge sensor coverage by moving the tablet (sensor and antenna) horizontally toward the phantom while maintaining the same vertical separation between the back surface or edge and the phantom.

3. After the exact location where triggering of power reduction is determined, with respect to the sensor and antenna, the tablet movement should be continued, in 3 mm increments, until both the sensor and antenna(s) are fully under the phantom and at least 20 mm inside the phantom edge.

4. The process is then repeated from the opposite direction, starting at the other end of the maximum antenna and sensor offset, by rotating the tablet 180° along the vertical axis.

5. The triggering points should be documented graphically, with the antenna and sensor clearly identified, along with all relevant dimensions.

If the subsequently measured peak SAR location for the antenna is not between the triggering points, established by the sensor coverage tests from opposite ends of the antenna and sensor, additional SAR tests may be required for conditions where only part of the back surface or edge of a tablet corresponding to the antenna is in proximity to the user and the sensor may not be triggering as desired. A KDB inquiry must be submitted by the test lab to determine if additional tests are required and the proper test configurations to use for testing. This may include situations where the sensor coverage region is too small for the antenna, the sensor is located too far away from the antenna, the sensor location is insufficient to cover multiple antennas or the antenna is at the corner of a tablet etc.

8.3. proximity sensor status table of trigger distance

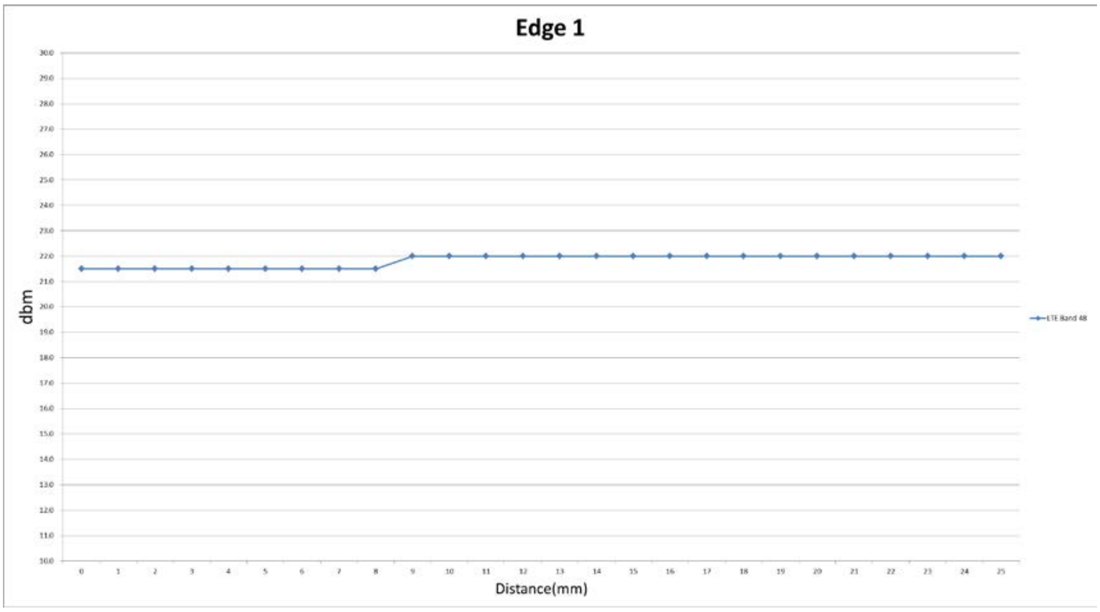
As per the KDB 616217 D04 SAR for laptop and tablets v01r02, section 6.2, the following procedure is used to determine the triggering distances.

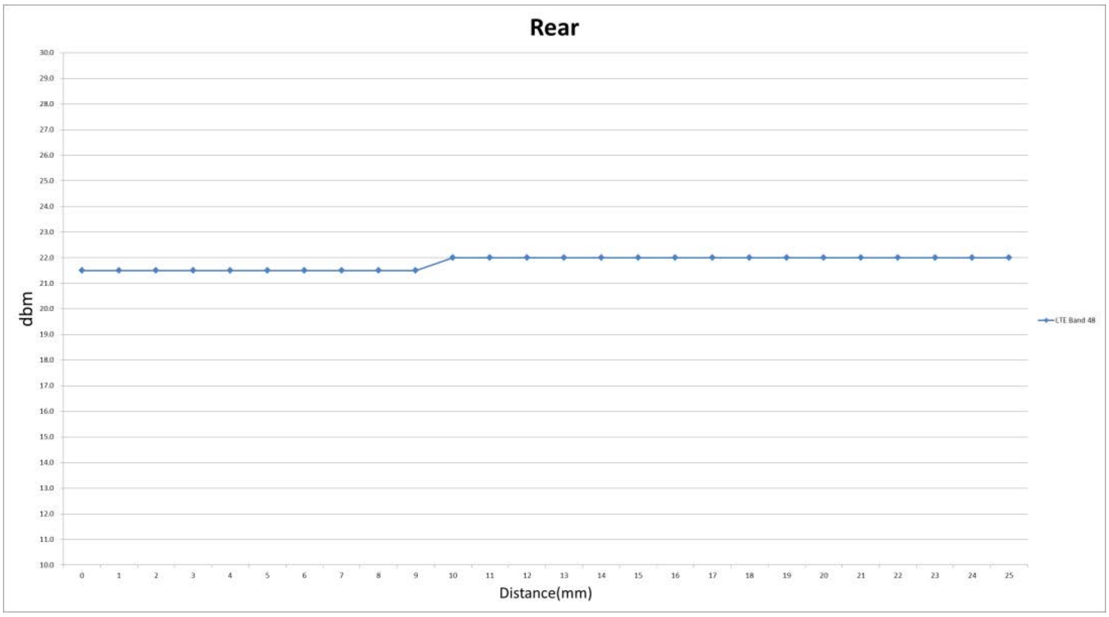
Proximity Sensor Status Table when DUT is moving towards the phantom

Distance to the DUT (mm)	Proximity Sensor Status – Rear	Distance to the DUT (mm)	Proximity Sensor Status – Edge1
25	OFF	25	OFF
24	OFF	24	OFF
23	OFF	23	OFF
22	OFF	22	OFF
21	OFF	21	OFF
20	OFF	20	OFF
19	OFF	19	OFF
18	OFF	18	OFF
17	OFF	17	OFF
16	OFF	16	OFF
15	OFF	15	OFF
14	OFF	14	OFF
13	OFF	13	OFF
12	OFF	12	OFF
11	OFF	11	OFF
10	ON	10	OFF
9	ON	9	ON
8	ON	8	ON
7	ON	7	ON
6	ON	6	ON
5	ON	5	ON
4	ON	4	ON
3	ON	3	ON
2	ON	2	ON
1	ON	1	ON
0	ON	0	ON

8.4. power reduction per air-interface

The following graphs show the power level and the distance from the DUT to the flat phantom for the Rear,Edge1 and Edge 2 Mode Surface.





8.5. Conducted Power Results

LTE Band 48

P-sensor off

LTE B48/BW=5M		Average Conducted Power(dBm)				LTE B48/BW=10M		Average Conducted Power(dBm)			
Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)			Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)		
			55265/ 3552.5	55990/ 3625	56715/ 3697.5				55290/ 3555	55990/ 3625	56690/ 3695
QPSK	1/0	22.00	20.86	21.68	21.47	QPSK	1/0	22.00	20.98	21.81	21.56
	1/12	22.00	20.78	21.61	21.34		1/24	22.00	20.87	21.70	21.47
	1/24	22.00	20.63	21.33	21.22		1/49	22.00	20.71	21.46	21.30
	12/0	21.00	19.77	20.62	20.27		25/0	21.00	19.79	20.63	20.49
	12/6	21.00	19.60	20.40	20.19		25/12	21.00	19.62	20.44	20.33
	12/11	21.00	19.48	20.36	20.11		25/24	21.00	19.53	20.39	20.22
	25/0	21.00	19.65	20.59	20.28		50/0	21.00	19.80	20.67	20.31
16QAM	1/0	21.00	19.81	20.98	20.65	16QAM	1/0	21.00	20.19	20.97	20.85
	1/12	21.00	19.72	20.96	20.48		1/24	21.00	19.99	20.85	20.71
	1/24	21.00	19.54	20.94	20.33		1/49	21.00	19.85	20.73	20.60
	12/0	20.00	18.65	19.92	19.47		25/0	20.00	19.10	19.88	19.77
	12/6	20.00	18.57	19.85	19.26		25/12	20.00	18.84	19.72	19.61
	12/11	20.00	18.41	19.71	19.15		25/25	20.00	18.75	19.54	19.45
	25/0	20.00	18.66	19.97	19.50		50/0	20.00	19.06	19.79	19.73
64QAM	1/0	20.00	18.79	19.96	19.61	64QAM	1/0	20.00	19.18	19.96	19.74
	1/12	20.00	18.64	19.94	19.40		1/24	20.00	19.06	19,83	19.62
	1/24	20.00	18.58	19.78	19.33		1/49	20.00	18.89	19.74	19.50
	12/0	19.00	17.53	18.86	18.45		25/0	19.00	18.05	18.88	18.61
	12/6	19.00	17.50	18.74	18.28		25/12	19.00	17.90	18.69	18.39
	12/11	19.00	17.44	18.59	18.17		25/25	19.00	17.86	18.58	18.30
	25/0	19.00	17.62	18.93	18.44		50/0	19.00	17.94	18.82	18.54

LTE B48/BW=15M		Average Conducted Power(dBm)				LTE B48/BW=20M		Average Conducted Power(dBm)			
Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)			Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)		
			55315/ 3557.5	55990/ 3625	56665/ 3692.5				55340/ 3560	55990/ 3625	56640/ 3690
QPSK	1/0	22.00	21.02	21.85	21.62	QPSK	1/0	22.00	21.09	21.91	21.68
	1/37	22.00	20.86	21.73	21.50		1/49	22.00	20.97	21.75	21.50
	1/74	22.00	20.78	21.48	21.23		1/99	22.00	20.78	21.67	21.44
	36/0	18.50	17.92	18.41	18.02		50/0	18.50	17.88	18.49	18.19
	36/18	18.50	17.90	18.27	17.92		50/24	18.50	17.82	18.47	18.16
	36/35	18.50	17.88	18.32	17.95		50/49	18.50	17.71	18.46	18.10
	75/0	18.50	18.13	18.54	17.68		100/0	18.50	17.77	18.44	18.07
16QAM	1/0	18.50	17.82	18.62	18.30	16QAM	1/0	18.50	17.89	18.48	18.31
	1/37	18.50	17.73	18.57	18.27		1/49	18.50	17.82	18.41	18.25
	1/74	18.50	17.68	18.55	18.19		1/99	18.50	17.76	18.33	18.22
	36/0	17.50	15.52	16.79	16.74		50/0	17.50	15.54	16.82	16.51
	36/18	17.50	15.50	16.67	16.70		50/24	17.50	15.55	16.78	16.47
	36/35	17.50	15.56	16.64	16.77		50/49	17.50	15.52	16.73	16.43
	75/0	17.50	15.44	16.65	16.60		100/0	17.50	15.51	16.69	16.39
64QAM	1/0	17.50	16.62	17.48	17.10	64QAM	1/0	17.50	16.67	17.61	17.21
	1/37	17.50	16.52	17.40	17.01		1/49	17.50	16.52	17.50	17.06
	1/74	17.50	16.29	17.23	16.83		1/99	17.50	16.31	17.23	16.94
	36/0	16.50	15.55	16.49	15.96		50/0	16.50	15.58	16.50	16.01
	36/18	16.50	15.30	16.30	15.77		50/24	16.50	16.39	16.32	15.88
	36/35	16.50	15.26	16.19	15.60		50/49	16.50	15.33	16.19	15.72
	75/0	16.50	15.50	16.46	16.08		100/0	16.50	15.54	16.44	16.03

LTE Band 48

P-sensor on

LTE B48/BW=5M		Average Conducted Power(dBm)				LTE B48/BW=10M		Average Conducted Power(dBm)			
Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)			Modula-tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)		
			55265/ 3552.5	55990/ 3625	56715/ 3697.5				55290/ 3555	55990/ 3625	56690/ 3695
QPSK	1/0	21.50	20.36	21.15	20.96	QPSK	1/0	21.50	20.44	21.29	20.98
	1/12	21.50	20.26	21.09	20.74		1/24	21.50	20.31	21.17	20.94
	1/24	21.50	20.09	20.80	20.68		1/49	21.50	20.18	20.91	20.77
	12/0	20.50	19.24	20.10	20.63		25/0	20.50	19.25	20.10	19.93
	12/6	20.50	19.03	19.89	20.57		25/12	20.50	19.11	19.93	19.81
	12/11	20.50	18.99	19.84	20.50		25/24	20.50	19.00	19.82	19.69
	25/0	20.50	19.14	20.03	20.62		50/0	20.50	19.26	20.15	19.76
16QAM	1/0	20.50	19.30	20.46	20.14	16QAM	1/0	20.50	19.64	20.44	20.32
	1/12	20.50	19.26	20.44	19.95		1/24	20.50	19.41	20.28	20.18
	1/24	20.50	19.02	20.41	19.80		1/49	20.50	19.33	20.20	20.07
	12/0	19.50	18.17	19.40	18.95		25/0	19.50	19.52	19.33	19.24
	12/6	19.50	18.04	19.33	18.72		25/12	19.50	18.34	19.21	19.09
	12/11	19.50	17.98	19.20	19.61		25/25	19.50	18.20	18.98	18.91
	25/0	19.50	18.12	19.25	18.98		50/0	19.50	18.51	19.25	19.19
64QAM	1/0	19.50	18.26	19.44	19.10	64QAM	1/0	19.50	18.60	19.41	19.22
	1/12	19.50	18.12	19.39	18.88		1/24	19.50	18.49	19.28	19.09
	1/24	19.50	18.05	19.22	18.79		1/49	19.50	18.33	19.20	18.96
	12/0	18.50	17.01	18.32	17.90		25/0	18.50	17.51	18.34	18.07
	12/6	18.50	16.96	18.21	17.73		25/12	18.50	17.37	18.15	17.84
	12/11	18.50	16.91	18.04	17.62		25/25	18.50	17.28	18.07	17.78
	25/0	18.50	17.09	18.31	17.93		50/0	18.50	17.42	18.27	18.01

LTE B48/BW=15M		Average Conducted Power(dBm)				LTE B48/BW=20M		Average Conducted Power(dBm)			
Modula -tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)			Modula -tion	RB Size/ Offset	Max. Tune-up	Channel/Frequency(MHz)		
			55315/ 3557.5	55990/ 3625	56665/ 3692.5				55340/ 3560	55990/ 3625	56640/ 3690
QPSK	1/0	21.50	20.48	21.31	21.11	QPSK	1/0	21.50	20.52	21.39	21.23
	1/37	21.50	20.34	21.18	20.95		1/49	21.50	20.44	21.22	20.96
	1/74	21.50	20.21	20.93	20.68		1/99	21.50	20.21	21.14	20.88
	36/0	18.00	17.38	17.88	17.47		50/0	18.00	17.32	17.94	17.63
	36/18	18.00	17.33	17.71	17.39		50/24	18.00	17.28	17.91	17.58
	36/35	18.00	17.29	17.76	17.41		50/49	18.00	17.19	17.88	17.55
	75/0	18.00	17.55	18.02	17.14		100/0	18.00	17.25	17.81	17.51
16QAM	1/0	18.00	17.27	18.09	17.76	16QAM	1/0	18.00	17.36	17.97	17.79
	1/37	18.00	17.18	17.98	17.73		1/49	18.00	17.27	17.86	17.72
	1/74	18.00	17.15	17.94	17.62		1/99	18.00	17.23	17.79	17.67
	36/0	17.00	15.11	16.21	16.20		50/0	17.00	15.14	16.30	15.98
	36/18	17.00	15.08	16.12	16.15		50/24	17.00	15.06	16.21	15.94
	36/35	17.00	15.10	16.09	16.24		50/49	17.00	15.08	16.18	15.88
	75/0	17.00	15.14	16.13	16.08		100/0	17.00	15.12	16.15	15.84
64QAM	1/0	17.00	16.10	16.97	16.57	64QAM	1/0	17.00	16.15	16.98	16.67
	1/37	17.00	15.97	16.88	16.48		1/49	17.00	15.99	16.93	16.49
	1/74	17.00	15.73	16.65	16.31		1/99	17.00	15.77	16.71	16.41
	36/0	16.00	15.01	15.99	15.39		50/0	16.00	14.98	15.99	15.87
	36/18	16.00	14.76	15.78	15.22		50/24	16.00	15.82	15.80	15.32
	36/35	16.00	14.72	15.63	15.06		50/49	16.00	14.76	15.62	15.19
	75/0	16.00	14.99	15.93	15.51		100/0	16.00	14.97	15.88	15.51

9. SAR TEST RESULTS

9.1. LTE Test result

P-sensor	Band	Mode	channel	RB	Offset	distance (mm)	Test Position	Max Tune-up (dBm)	AVG Power (dBm)	Area Scan	SAR 1g	Reported SAR 1g	Note
on	LTE Band 48	QPSK20M	55990	1	0	0	Rear	21.50	21.39	0.098	0.096	0.099	
		QPSK20M	55990	50	0	0	Rear	21.50	21.39	0.060	0.046	0.047	
off		QPSK20M	55990	1	0	9	Rear	22.00	21.91	0.030	0.036	0.037	
		QPSK20M	55990	50	0	9	Rear	18.50	18.49	0.018	0.015	0.015	
on		QPSK20M	55990	1	0	0	Edge1	21.50	21.39	**0.417**	**0.458**	**0.470**	
		QPSK20M	55990	50	0	0	Edge1	21.50	21.39	0.201	0.217	0.223	
off		QPSK20M	55990	1	0	8	Edge1	22.00	21.91	0.128	0.123	0.126	
		QPSK20M	55990	50	0	8	Edge1	18.50	18.49	0.049	0.053	0.053	
off		QPSK20M	55990	1	0	0	Edge2	21.50	21.91	0.014	0.006	0.005	
		QPSK20M	55990	50	0	0	Edge2	18.50	18.49	<0.001	<0.001	<0.001	

10. SIMULTANEOUS TRANSMISSION CONDITIONS

10.1. STAND-ALONE SAR TEST EXCLUSION

SAR compliance for simultaneous transmission must be considered when the maximum duration of overlapping transmissions, including network hand-offs, is greater than 30 seconds. This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis.

The Simultaneous Transmission Possibilities of this device are as below:

No.	Configuration	Body
1	WWAN + WiFi2.4G	Yes
2	WWAN + BT	Yes
3	WWAN + WiFi5G	Yes
4	WWAN + WiFi6G	Yes
5	WiFi2.4G(Main) +BT	Yes
6	WiFi5G(Main) + BT	Yes
7	WiFi6G(Main) + BT	Yes
8	WiFi2.4G(Main) + WiFi2.4G(Aux)	Yes
9	WiFi5G(Main) + WiFi5G(Aux)	Yes
10	WiFi6G(Main) + WiFi 6G(Aux)	Yes

10.2. SIMULTANEOUS TRANSMISSION CONDITIONS

KDB 447498 D04 Interim General RF Exposure Guidance v01, introduces a new formula for calculating the SAR to Peak Location Ratio (SPLSR) between pairs of simultaneously transmitting antennas:

$SPLSR = (SAR_1 + SAR_2)^{1.5} / R_i$
Where:

SAR_1 is the highest Reported or estimated SAR for the first of a pair of simultaneous transmitting antennas, in a specific test operating mode and exposure condition

SAR_2 is the highest Reported or estimated SAR for the second of a pair of simultaneous transmitting antennas, in the same test operating mode and exposure condition as the first

R_i is the separation distance between the pair of simultaneous transmitting antennas. When the SAR is measured, for both antennas in the pair, it is determined by the actual x, y and z coordinates in the 1-g SAR for each SAR peak location, based on the extrapolated and interpolated result in the zoom scan measurement, using the formula of $[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$

A new threshold of 0.04 is also introduced in the KDB. Thus, in order for a pair of simultaneous transmitting antennas with the sum of 1-g SAR > 1.6 W/kg to qualify for exemption from Simultaneous Transmission SAR measurements, it has to satisfy the condition of:
$(SAR_1 + SAR_2)^{1.5} / R_i \leq 0.04$

10.3. SIMULTANEOUS TRANSMISSION CONDITIONS

SAR1g(W/kg) \ Test Position	Rear	Edge 1	Edge 2	Edge 3	Edge 4
WLAN 2.4G WiFi_Main	0.188			0.165	0.592
WLAN 2.4G WiFi_Aux	0.302		0.943	0.254	
UNII_1 & 2a WiFi_Main	0.040				0.070
UNII_1 & 2a WiFi_Aux	0.258		0.713	0.188	
UNII_2c WiFi_Main	0.051				0.165
UNII_2c WiFi_Aux	0.333		0.608	0.159	
UNII_3 WiFi_Main	0.083				0.176
UNII_3 WiFi_Aux	0.391		0.710	0.123	
UNII_5 WiFi_Main					0.100
UNII_5 WiFi_Aux			0.337		
UNII_6 WiFi_Main					0.100
UNII_6 WiFi_Aux			0.351		
UNII_7 WiFi_Main					0.068
UNII_7 WiFi_Aux			0.413		
UNII_8 WiFi_Main					0.048
UNII_8 WiFi_Aux			0.358		
Bluetooth_DH5	0.002		0.048	0.005	
LTE Band 48	0.099	0.470	0.005		
WWAN+WLAN MAX∑SAR_{1g}	0.490	0.470	0.948	0.254	0.592
WWAN+BT MAX∑SAR_{1g}	0.101	0.470	0.053	0.005	
WLAN_Main+WLAN_Aux MAX∑SAR_{1g}	0.579		0.943	0.419	0.592
WLAN+BT MAX∑SAR_{1g}	0.391		0.991	0.259	0.592

Note:

1. For the WLAN test result that we reference WLAN report BTL-FCC SAR-1-2304T012 R01 (WLAN FCC ID: FKGU1101).

2. MAX. ∑SAR_{1g}= 0.991 W/Kg<1.6 W/Kg, so Peak location SAR are not required

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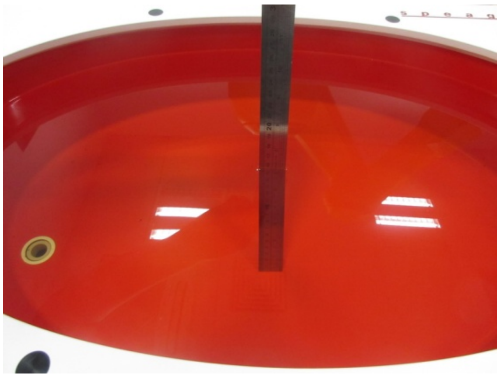
11. Test Layout

Specific Absorption Rate Test Layout

Liquid depth in the flat Phantom (≥15cm depth)

HSL(3500~3700MHz)



Appendix A. SAR Plots of System Verification

(Pls See BTL-FCC SAR-1-2304T012C_Appendix A.)

Appendix B. SAR Plots of SAR Measurement

(Pls See BTL-FCC SAR-1-2304T012C_Appendix B.)

Appendix C. Calibration Certificate

(Pls See BTL-FCC SAR-1-2304T012C_Appendix C.)

Appendix D. Photographs of the Test Set-Up

(Pls See BTL-FCC SAR-1-2304T012C_Appendix D.)

End of Test Report