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DOKE COMMUNICATION (HK) LIMITED

TEST REPORT

SCOPE OF WORK
FCC TESTING– FORT 1

REPORT NUMBER
250522061SZN-007

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SAR TEST REPORT

For

DOKE COMMUNICATION (HK) LIMITED

Smart phone

FCC ID: 2A7DX-FORT1

Model No.: FORT 1

Brand Name: Blackview

Sample ID: Z250522061-002

Report No.: 250522061SZN-007

Issue Date: 17 July 2025

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17 July 2025

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1. GENERAL INFORMATION

Applicant:	DOKE COMMUNICATION (HK) LIMITED 19H MAXGRAND PLAZA NO 3 TAI YAU STREET SAN PO KONG KL
Manufacturer:	Shenzhen DOKE Electronic Co., Ltd 801, Building3, 7th Industrial Zone, Yulv Community, Yutang Road, Guangming District, Shenzhen, China.
Product Description:	Smart phone
Model Number:	FORT 1
File Number:	250522061SZN-007
Date of Test:	22 May 2025 to 02 June 2025

The above equipment was tested by Intertek Testing Services Shenzhen Ltd. Longhua Branch. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in IEEE 1528-2013 and KDB 865664. This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in ANSI/IEEE C95.1-1992.

The test results of this report relate only to the tested sample identified in this report

2. STATEMENT OF COMPLIANCE

The Maximum reported SAR 1g

Band	Max reported SAR Value(W/kg)		
	1-g Head	1-g Body-Worn (Separation distance of 10mm)	1-g Hotspot (Separation distance of 10mm)
GSM 850	0.133	0.476	0.476
GSM 1900	0.152	0.709	0.709
WCDMA Band 2	0.111	0.535	0.535
WCDMA Band 4	0.061	0.415	0.415
WCDMA Band 5	0.126	0.92	0.692
LTE Band 2	0.177	0.724	0.724
LTE Band 4	0.153	0.857	0.857
LTE Band 5	0.163	0.593	0.593
LTE Band 7	0.115	0.388	0.388
LTE Band 12	0.134	0.454	0.454
LTE Band 17	0.135	0.472	0.472
LTE Band 41	0.054	0.651	0.651
LTE Band 66	0.164	0.781	0.781
WLAN 2.4G	1.230	0.704	0.704
WLAN 5.2G	0.889	0.791	0.791
WLAN 5.8G	0.747	0.666	0.666
Bluetooth	0.120	0.120	0.120
NFC	0.000	0.000	0.000

The SAR values found for the Smart phone are below the maximum recommended levels of 1.6W/kg as averaged over any 1g tissue according to the ANSI C95.1-1992.

The maximum reported SAR value is: 0.857 + 0.698 = 1.56W/kg (1g) in the Back side position.

3. EQUIPMENT UNDER TEST (EUT) TECHNICAL DESCRIPTION

Characteristics	Description		
Product Name:	Smart phone		
Device type:	Portable device		
Exposure Category:	Uncontrolled Environment/General Population		
Test Mode(s):	GSM/TM1 (GSM system, GSM/GPRS, GMSK modulation)		
	GSM/TM2 (GSM system, EDGE, 8PSK modulation)		
	UMTS/TM1 (WCDMA system, QPSK modulation)		
	UMTS/TM2 (HSDPA system, QPSK modulation)		
	UMTS/TM3 (HSUPA system, QPSK modulation)		
	LTE/TM1 (LTE system, QPSK modulation)		
	LTE/TM2 (LTE system, 16QAM modulation)		
	WiFi 2.4G (DSSS/OFDM) WiFi 5G (OFDM)		
	Bluetooth (GFSK, Pi/4 DQPSK, 8DPSK)		
	NFC (ASK)		
Device Class:	B		
Antenna Type:	Internal Antenna		
Antenna Gain:	GSM850: -3.8dBi PCS1900: 1.8dBi UMTS850: -3.7dBi UMTS1700: 1.3dBi UMTS1900: 1.7dBi LTE BAND2: 2.1dBi LTE BAND4: 1.7dBi LTE BAND5: -3.9dBi LTE BAND7: 1.4dBi LTE BAND12: -4.3dBi LTE BAND17: -4.46dBi LTE BAND41: 1.4dBi LTE BAND66: 1.9dBi 2.4G Wi-Fi/BT: 1.3dBi 5G Wi-Fi: 1.8dBi		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	GSM850	824-849	869-894
	GSM1900	1850-1910	1930-1990
	UMTS 850	824 - 849	869 - 894
	UMTS 1700	824 - 849	869 - 894
	UMTS 1900	1850 - 1910	1930 - 1990
	LTE Band 2	1850 - 1910	1930 - 1990
	LTE Band 4	1710 - 1755	2110 - 2155
	LTE Band 5	824 - 849	869 - 894
	LTE Band 7	2500 - 2570	2620 - 2690
	LTE Band 12	699 - 716	729 - 746
	LTE Band 17	704 - 716	734 - 746

Characteristics	Description		
	LTE Band 41	2496 - 2690	2496 - 2690
	LTE Band 66	1710 - 1780	2110 - 2180
	BT	2400-2483.5	
	2.4G Wi-Fi	2412-2462	
	5 G Wi-Fi	5150MHz~5250 MHz, 5725MHz~5850MHz	
	NFC	13.56MHz	
GPRS Multislot Class(12)	Max Number of Timeslots in Uplink:	4	
	Max Number of Timeslots in Downlink:	4	
	Max Total Timeslot:	5	
EGPRS Multislot Class(12)	Max Number of Timeslots in Uplink:	4	
	Max Number of Timeslots in Downlink:	4	
	Max Total Timeslot:	5	
HSUPA UE Category:	6		
HSDPA UE Category:	14		
Power Class:	GSM850: 4 GSM1900: 1 UMTS Band II: 3 UMTS Band IV: 3 UMTS Band V: 3 LTE Band 2: 3 LTE Band 4: 3 LTE Band 5: 3 LTE Band 7: 3 LTE Band 12: 3 LTE Band 17: 3 LTE Band 41: 3 LTE Band 66: 3		
Test Channels (low-mid-high):	128-190-251(GSM850)		
	512-661-810(GSM1900)		
	9262-9400-9538(UMTS Band II)		
	1312-1413-1513(UMTS Band IV)		
	4132-4182-4233(UMTS Band V)		
	18607-18900-19193(LTE Band 2 BW=1.4MHz)		
	18615-18900-19185(LTE Band 2 BW=3MHz)		
	18625-18900-19175(LTE Band 2 BW=5MHz)		
	18650-18900-19150(LTE Band 2 BW=10MHz)		
	18675-18900-19125(LTE Band 2 BW=15MHz)		
	18700-18900-19100(LTE Band 2 BW=20MHz)		
	19957-20175-20393(LTE Band 4 BW=1.4MHz)		
	19965-20175-20385(LTE Band 4 BW=3MHz)		
	19975-20175-20375(LTE Band 4 BW=5MHz)		
	20000-20175-20350(LTE Band 4 BW=10MHz)		
	20025-20175-20325(LTE Band 4 BW=15MHz)		
	20050-20175-20300(LTE Band 4 BW=20MHz)		

Characteristics	Description
	20407-20525-20643(LTE Band 5 BW=1.4MHz)
	20415-20525-20635(LTE Band 5 BW=3MHz)
	20425-20525-20625(LTE Band 5 BW=5MHz)
	20450-20525-20600(LTE Band 5 BW=10MHz)
	20775-21100-21425(LTE Band 7 BW=5MHz)
	20800-21100-21400(LTE Band 7 BW=10MHz)
	20825-21100-21375(LTE Band 7 BW=15MHz)
	20850-21100-21350(LTE Band 7 BW=20MHz)
	23017-23095-23173(LTE Band 12 BW=1.4MHz)
	23025-23095-23165(LTE Band 12 BW=3MHz)
	23035-23095-23155(LTE Band 12 BW=5MHz)
	23060-23095-23130(LTE Band 12 BW=10MHz)
	23755-23790-23825(LTE Band 17 BW=5MHz)
	23780-23790-23800(LTE Band 17 BW=10MHz)
	39675-40620-41565 (LTE Band 41 BW=5MHz)
	39700-40620-41540 (LTE Band 41 BW=10MHz)
	39725-40620-41515 (LTE Band 41 BW=15MHz)
	39750-40620-41490 (LTE Band 41 BW=20MHz)
	131979-132322-132665(LTE Band 66 BW=1.4MHz)
	131987-132322-132657(LTE Band 66 BW=3MHz)
	131997-132322-132647(LTE Band 66 BW=5MHz)
	132022-132322-132622(LTE Band 66 BW=10MHz)
	132047-132322-132597(LTE Band 66 BW=15MHz)
	132072-132322-132572(LTE Band 66 BW=20MHz)
	NFC: 13.56MHz
	BT (EDR): 0-39-78
	BT (BLE): 0-19-39
	2.4G Wi-Fi: 802.11b/g/n 20M: 1-6-11 802.11n 40M: 3-6-9
	5G Wi-Fi: 802.11a/n/ac 20M: 36-40-48, 149-157-165 802.11n/ac 40M: 38-N/A-46, 151-N/A-159 802.11ac 80M: 42, 155 (There is only one channel per band.)
Power supply:	DC 3.85V,1000mAh(38.5Wh) from battery
Product Software Version:	FORT1_EEA_Z665_V1.0_A15
Product Hardware Version:	HCT-Z665MB-C1

Note:
1. N/A is Not Applicable
2. For more details, please refer to the User's manual of the EUT.
3. The sample under test was selected by the applicant.

4. AUXILIARY EQUIPMENT DETAILS

Description	Manufacturer	Description
Power Adapter	(Provided by Applicant)	Model: QZ-0180AAA00 Input: 100-240V~, 50/60Hz, 0.5A Output: 5.0V⎓3.0A, 9.0V⎓2.0A, 12.0V⎓1.5A
USB cable	(Provided by Applicant)	Shielded, Length: 100cm

5. TEST FACILITY

Site Description	
EMC Lab.	The Laboratory has been assessed and proved to be in compliance with CNAS/CL01: 2006(identical to ISO/IEC17025: 2005) The Certificate Registration Number is L0327
	Accredited by FCC The Certificate Registration Number is CN1188
Name of Firm	Intertek Testing Services Shenzhen Ltd. Longhua Branch
Site Location	101, 201, Building B, No. 308 Wuhe Avenue, Zhangkengjing Community, GuanHu Subdistrict, LongHua District, ShenZhen, P.R. China

6. GUIDANCE STANDARD

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards:

☒FCC 47CFR §2.1093 Radiofrequency Radiation Exposure Evaluation: Portable Devices

☒NSI C95.1, 1992: Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz. (IEEE Std C95.1-1991)

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

☒KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04

☒KDB 865664 D02 RF Exposure Reporting v01r02

☒KDB 690783 D01 SAR Listings on Grants v01r03

☒KDB 447498 D01 General RF Exposure Guidance v06

☒KDB 648474 D04 Handset SAR v01r03

☒KDB 941225 D01 SAR test for 3G Devices v03r01

☒KDB 941225 D05 SAR for LTE Devices v02r05

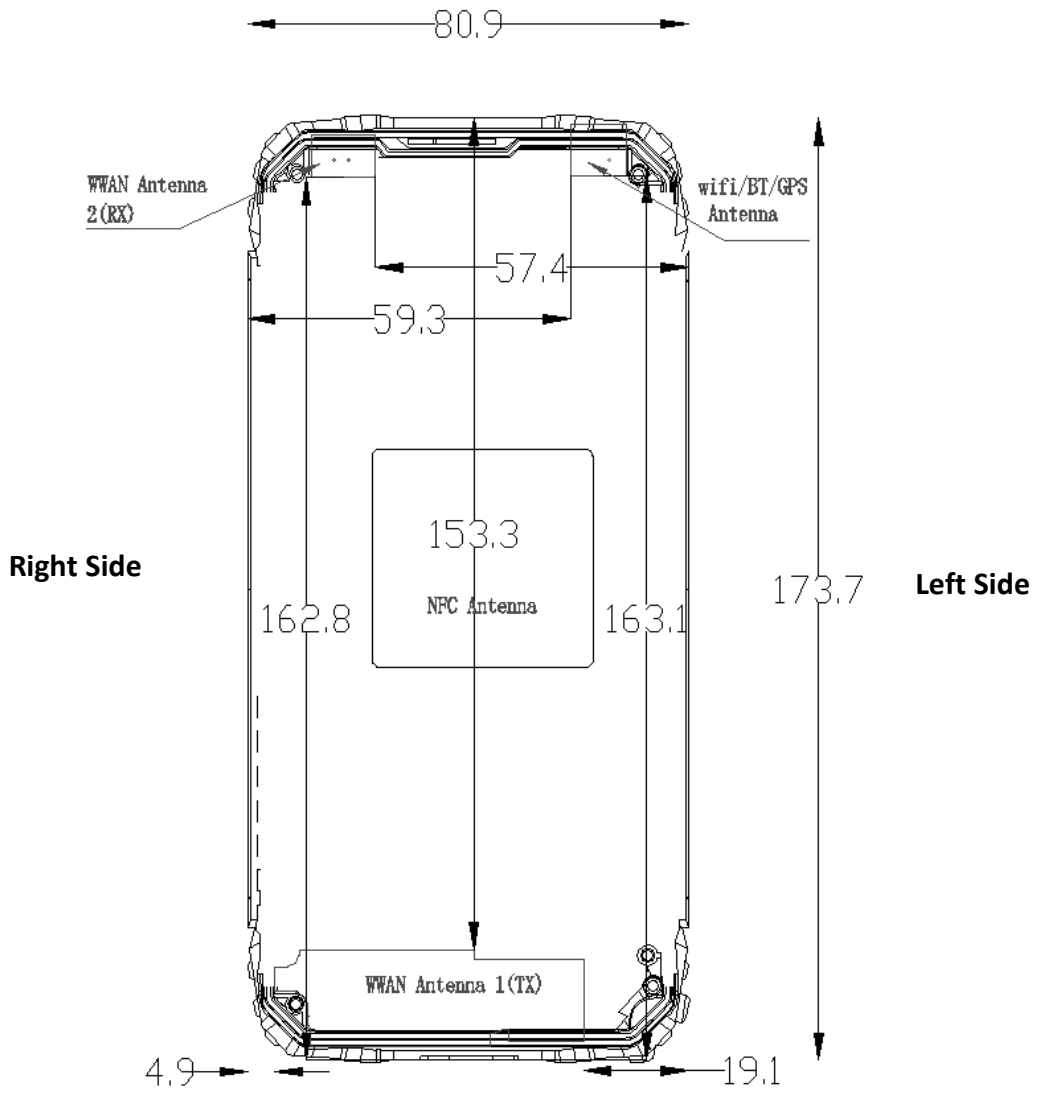
☒KDB 941225 D06 Hotspot Mode v02r01

☒KDB248227 D01 802.11 Wi-Fi SAR v02r02

Remark:
This portable wireless equipment has been measured in all cases requested by the relevant standards. Test results in Chapter 12 of this test report are below limits specified in the relevant standards for the tested bands only.

7. EUT ANTENNA LOCATIONS

Top side



Bottom side

Test position consideration:

Distance of EUT antenna-to-edge/surface(mm), Test distance:10mm						
Antennas	Rear Face	Front Face	Left Side	Right Side	Top	Bottom
WWAN 1	≤25mm	≤25mm	≤25mm	≤25mm	>25mm	≤25mm
WLAN	≤25mm	≤25mm	≤25mm	>25mm	≤25mm	>25mm
Bluetooth	≤25mm	≤25mm	≤25mm	>25mm	≤25mm	>25mm

Test distance:10mm						
Antennas	Rear Face	Front Face	Left Side	Right Side	Top	Bottom
WWAN 1	YES	YES	YES	YES	NO	YES
WLAN	YES	YES	YES	NO	YES	NO
Bluetooth	YES	YES	YES	NO	YES	NO

Note:

1. Head/Body-worn/Hotspot SAR assessments are required.
2. Referring to KDB 941225 D06v02r01, when the overall device length and width are ≥ 9cm * 5cm, the test distance is 10mm. SAR must be measured for all sides and surfaces with a transmitting antenna located within 25mm from that surface or edge.
3. Per KDB 447498 D01v06, for handsets the test separation distance is determined by the smallest distance between the outer surface of the device and the user, which is 0 mm for head SAR, 10 mm for body-worn SAR and hotspot SAR.

8. RF EXPOSURE

8.1 LIMITS

Uncontrolled Environment

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

Limits for General Population/Uncontrolled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and ankles
0.08	1.6	4.0

Whole-Body SAR is averaged over the entire body, partial-body SAR is averaged over any 1gram of tissue defined as a tissue volume in the shape of a cube. SAR for hands, wrists, feet and ankles is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

8.2 EVALUATION

☒According to FCC KDB447498 D01 and §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

1) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:

   [(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] · [$\sqrt{f_{(GHz)}}$] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR,[16] where

   - $f_{(GHz)}$ is the RF channel transmit frequency in GHz
   - Power and distance are rounded to the nearest mW and mm before calculation[17]
   - The result is rounded to one decimal place for comparison

   The test exclusions are applicable only when the minimum *test separation distance* is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum *test separation distance* is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

Routine SAR evaluation refers to that specifically required by § 2.1093, using measurements or computer simulation. Portable transmitters with output power greater than the applicable low threshold require SAR testing to qualify for TCB approval.

Exclusion Thresholds = $P\sqrt{F}/D$

P= Maximum turn-up power in mW

F= Channel frequency in GHz

D= Minimum test separation distance in mm

Test Distance (5mm)

Mode	MAX Power (dBm)	Tune Up Power (dBm)	Max Tune Up Power (dBm)	Max Tune Up Power (mW)	Exclusion Thresholds	Limit
Wi-Fi	13.96	13.0±1	14.0	25.12	12.13	3
Bluetooth	7.05	6.5±1	7.5	5.62	1.74	3
BLE	3.00	2.00±1	3.00	2.00	0.62	3

Result: SAR measurement for Wi-Fi is required.

9. SPECIFIC ABSORPTION RATE (SAR)

9.1 INTRODUCTION

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

9.2 SAR DEFINITION

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

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

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

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

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

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

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

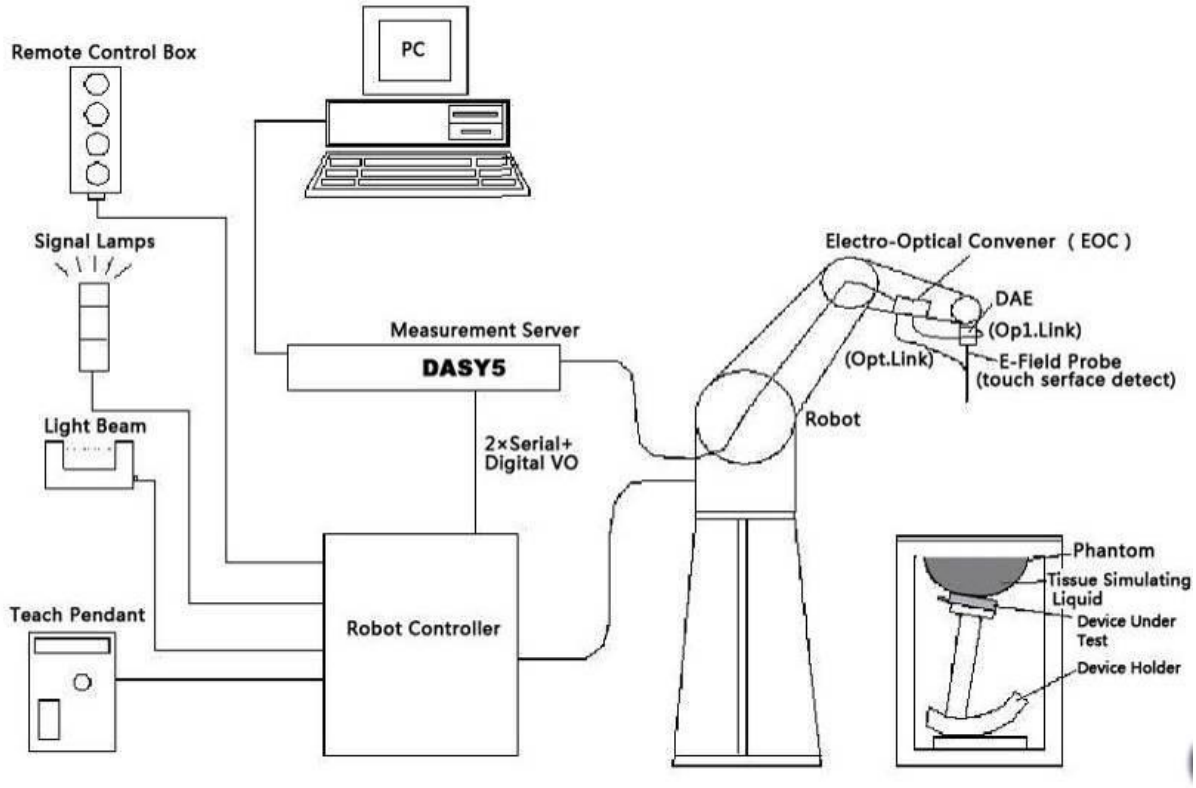
However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

10. SAR MEASUREMENTS SYSTEM CONFIGURATION

10.1 SAR MEASUREMENT SET-UP

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

- A standard high precision 6-axis robot (Stäubli 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 amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running Win 7 profesional operating system and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.



Picture 1. SAR Lab Test Measurement Set-up

10.2 DASY5 E-FIELD PROBE SYSTEM

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

Probe Specifications:

Model:	EX3DV4
Calibration:	ISO/IEC 17025 calibration service available
Probe Length:	337 mm
Probe Tip Length:	9 mm
Body Diameter:	10 mm
Tip Diameter:	2.5 mm
Application:	High Precision dosimetric measurements in any exposure scenario (e.g., very strong Picture 2 E-field Probe gradient fields).

Picture 2 E-field Probe

10.3 E-FIELD PROBE CALIBRATION

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

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and inn a waveguide or other methodologies above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees until the three channels show the maximum reading. The power density readings equate to 1 mw/ cm^2.

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

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

Where:
Δt = Exposure time (30 seconds),
C = Heat capacity of tissue (brain or muscle),
ΔT = Temperature increase due to RF exposure.

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

Where:
σ = Simulated tissue conductivity,
ρ = Tissue density (kg/m^3).

10.4 OTHER TEST EQUIPMENT

10.4.1 Data Acquisition Electronics (DAE)

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

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

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

Picture 3: DAE

10.4.2 Robot

The SPEAG DASY system uses the high precision robots (DASY5: TX90XL) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version from Stäubli is used. The Stäubli robot series have many features that are important for our application:

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

Picture 4 DASY 5

10.4.3 Measurement Server

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

Picture 5 Server for DASY 5

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

10.4.4 Device Holder for Phantom

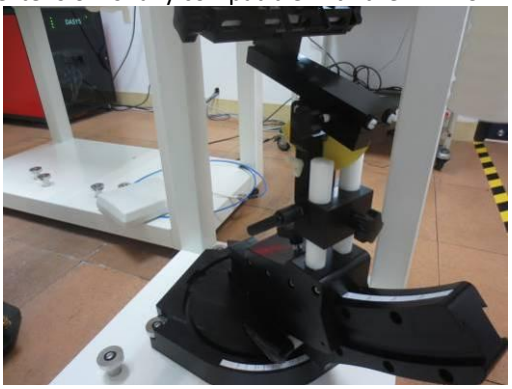
The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5mm distance, a positioning uncertainty of ±0.5mm would produce a SAR uncertainty of ±20%. Accurate device positioning is therefore crucial for accurate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

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

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

<Laptop Extension Kit>

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



Picture 6: Device Holder

10.4.5 Phantom

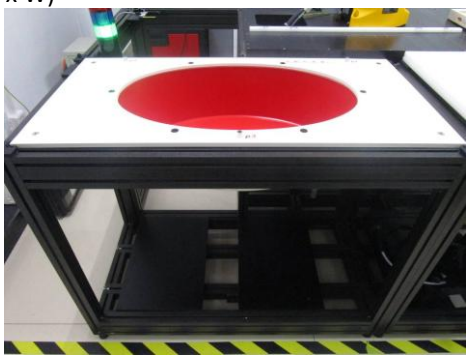
The SAM Twin Phantom V4.0 is constructed of a fiberglass shell integrated in a table. The shape of the shell is based on data from an anatomical study designed to Represent the 90th percentile of the population. The phantom enables the dissymmetric evaluation of SAR for both left and right handed handset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

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

Picture 7: SAM Twin Phantom

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±0.2 mm
Filling Volume: Approx. 30 liters
Dimensions: 190×600×0 mm (H x L x W)



Picture 8.ELI Phantom

10.5 SCANNING PROCEDURE

The DASY5 installation includes predefined files with recommended procedures for measurements and validation. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.

The “reference” and “drift” measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT’s output power and should vary max. ± 5 %.

The “surface check” measurement tests the optical surface detection system of the DASY5 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above ± 0.1mm). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe. (It does not depend on the surface reflectivity or the probe angle to the surface within ± 30°.)

Area Scan
The Area Scan is used as a fast scan in two dimensions to find the area of high field values before running a detailed measurement around the hot spot. Before starting the area scan a grid spacing is set according to FCC KDB Publication 865664. During scan the distance of the probe to the phantom remains unchanged. After finishing area scan, the field maxima within a range of 2 dB will be ascertained.

Zoom Scan
After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 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 then integrated with the trapezoidal algorithm.

Spatial Peak Detection
The procedure for spatial peak SAR evaluation has been implemented and can determine values of masses of 1g and 10g, as well as for user-specific masses. The DASY5 system allows evaluations that combine measured data and robot positions, such as:
• maximum search
• extrapolation
• boundary correction
• peak search for averaged SAR

During a maximum search, global and local maxima searches are automatically performed in 2-D after each Area Scan measurement with at least 6 measurement points. It is based on the evaluation of the local SAR gradient calculated by the Quadratic Shepard’s method. The algorithm will find the global maximum and all local maxima within -2 dB of the global maxima for all SAR distributions.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation. Extrapolation routines require at least 10 measurement points in 3-D space.

They are used in the Zoom Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard's method for extrapolation.

A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 5mm steps.

Table 1: Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01

Frequency	Maximum Area Scan Resolution (mm) (Δxarea, Δyarea)	Maximum Zoom Scan Resolution (mm) (Δxzoom, Δyzoom)	Maximum Zoom Scan Spatial Resolution (mm) Δzzoom(n)	Minimum Zoom Scan Volume (mm) (x,y,z)
≤2 GHz	≤15	≤8	≤5	≥30
2-3 GHz	≤12	≤5	≤5	≥30
3-4 GHz	≤12	≤5	≤4	≥28
4-5 GHz	≤10	≤4	≤3	≥25
5-6 GHz	≤10	≤4	≤2	≥22

10.6 DATA STORAGE AND EVALUATION

10.6.1 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 set up, 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 loss less media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

10.6.2 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 $Norm_i$, 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:

$$\mathbf{V_i = U_i + U_i^2 \cdot c\,f / dcp_i}$$

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

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

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

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

With $\mathbf{V_i}$ = compensated signal of channel i (i = x, y, z)
$\mathbf{Norm_i}$ = sensor sensitivity of channel i (i = x, y, z)
[mV/(V/m)2] for E-field Probes
ConvF = sensitivity enhancement in solution
$\mathbf{a_{ij}}$ **=** sensor sensitivity factors for H-field probes
f = carrier frequency [GHz]
$\mathbf{E_i}$ = electric field strength of channel i in V/m
$\mathbf{H_i}$ = magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):
$\mathbf{E_{tot} = (E_x^2 + E_Y^2 + E_z^2)^{1/2}}$

The primary field data are used to calculate the derived field units.
$\mathbf{SAR = (E_{tot})\ 2 \cdot \sigma / (\rho \cdot 1000)}$
with **SAR** = local specific absorption rate in mW/g
$\mathbf{E_{tot}}$ = total field strength in V/m
σ = conductivity in [mho/m] or [Siemens/m]
ρ = 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.
$\mathbf{P_{pwe} = E_{tot}^2 / 3770}$ **or** $\mathbf{P_{pwe} = H_{tot}^2 \cdot 37.7}$
with $\mathbf{P_{pwe}}$ = equivalent power density of a plane wave in mW/cm^2
$\mathbf{E_{tot}}$ = total electric field strength in V/m ; $\mathbf{H_{tot}}$ = total magnetic field strength in A/m

10.7 TISSUE-EQUIVALENT LIQUID

10.7.1 Tissue-equivalent Liquid Ingredients

The liquid is consisted of water, salt and Glycol etc. The liquid has previously been proven to be suited for worst-case. The Table 2 & 3 shows the detail solution. It's satisfying the latest tissue dielectric parameters requirements proposed by the KDB 865664 D01.

Table 2: The following recipe(s) were used for Head (H) and Body (B) Tissue-equivalent liquid(s)

Tissue Type	Bactericide	DGBE	HEC	NaCl	Sucrose	Triton X-100	Water	Diethylene Glycol Mono-hexylether
H750	0.2	-	0.2	1.4	57.0	-	41.1	-
H835	0.1	-	1.0	1.4	57.0	-	40.5	-
H900	0.1	-	1.0	1.5	56.5	-	40.9	-
H1450	-	45.5	-	0.7	-	-	53.8	-
H1640	-	45.8	-	0.5	-	-	53.7	-
H1750	-	44.5	-	0.3	-	-	55.2	-
H1800	-	44.9	-	0.2	-	-	54.9	-
H1900	-	44.9	-	0.2	-	-	54.9	-
H2000	-	50	-	-	-	-	50	-
H2300	-	44.9	-	0.1	-	-	55.0	-
H2450	-	45.0	-	0.1	-	-	54.9	-
H2600	-	45.1	-	0.1	-	-	54.8	-
H3500	-	8.0	-	0.2	-	20.0	71.8	-
H5G	-	-	-	-	-	17.2	65.52	17.3
B750	0.2	-	0.2	0.8	48.8	-	50.0	-
B835	0.2	-	0.2	0.9	48.5	-	50.2	-
B900	0.2	-	0.2	0.9	48.2	-	50.5	-
B1450	-	34.0	-	0.3	-	-	65.7	-
B1640	-	32.5	-	0.3	-	-	67.2	-
B1750	-	29.4	-	0.4	-	-	70.2	-
B1800	-	29.5	-	0.4	-	-	70.1	-
B1900	-	29.5	-	0.3	-	-	70.2	-
B2000	-	30.0	-	0.2	-	-	69.8	-
B2300	-	31.0	-	0.1	-	-	68.9	-
B2450	-	31.4	-	0.1	-	-	68.5	-
B2600	-	31.8	-	0.1	-	-	68.1	-
B3500	-	28.8	-	0.1	-	-	71.1	-
B5G	-	-	-	-	-	10.7	78.6	10.7

Table 3: Targets of Tissue Simulating Liquid

Frequency (MHz)	Relative permittivity ε_r	Conductivity (σ) S/m
750	41.9	0.89
835	41.5	0.90
900	41.5	0.97
1750	40.1	1.37
1800	40.0	1.40
1900	40.0	1.40
2000	40.0	1.40
2300	39.5	1.67
2450	39.2	1.80
2600	39.0	1.96
5200	36.0	4.66
5300	35.9	4.76
5500	35.6	4.96
5600	35.5	5.07
5800	35.3	5.27

10.7.2 Tissue-equivalent Liquid Properties

Table 4: Dielectric Performance of Head Tissue Simulating Liquid

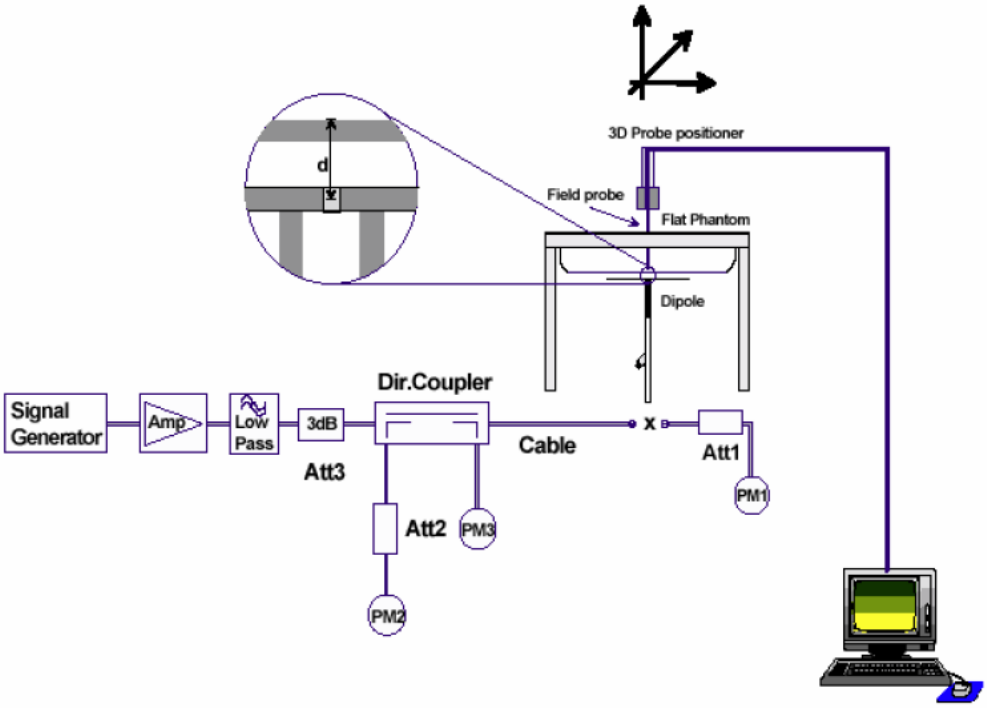
Tissue Verification								
Tissue Type	Frequency (MHz)	Conductivity (σ)	Permittivity (εr)	Targeted Conductivity (σ)	Targeted Permittivity (εr)	Deviation Conductivity (σ)	Deviation Permittivity (εr)	Date
Head	750	0.892	42.340	0.89	41.9	0.22	1.05	5/22/2025
Head	835	0.892	42.223	0.90	41.5	-0.89	1.74	5/23/2025
Head	900	0.990	41.301	0.97	41.5	2.06	-0.48	5/24/2025
Head	1750	1.408	40.565	1.37	40.1	2.77	1.16	5/26/2025
Head	1900	1.386	40.388	1.40	40.0	-1.00	0.97	5/27/2025
Head	2450	1.887	38.220	1.80	39.2	4.83	-2.50	5/28/2025
Head	2600	2.052	37.628	1.96	39.0	4.69	-3.52	5/29/2025
Head	5200	4.568	34.803	4.66	36.0	-1.97	-3.33	5/30/2025
Head	5800	5.124	33.938	5.27	35.3	-2.77	-3.86	6/2/2025

Note: The dielectric properties have been measured using the contact probe method at 22±2°C.

10.8 SYSTEM CHECK

10.8.1 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 was supplied to the dipole antenna, 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 table 5. 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.



Picture 10. System Check Set-up

Justification for Extended SAR Dipole Calibrations
Usage of SAR dipoles calibrated less than 3 years ago but more than 1 year ago were confirmed in maintaining return loss (< - 20 dB, within 20% of prior calibration) and impedance (within 5 ohm from prior calibration) requirements per extended calibrations in KDB 865664 D01

10.8.2 System Check Results

Table 5: System Check for Simulating Liquid

Frequency (MHz)	Targeted SAR 1g (W/kg)	Measured SAR 1g (W/kg)	Normalized SAR 1g (W/kg)	Deviation SAR 1g (%)	Date
750	8.47	2.11	8.44	-0.35	5/22/2025
835	9.56	2.39	9.56	0.00	5/23/2025
900	10.7	2.68	10.72	0.19	5/24/2025
1750	36.2	9.05	36.20	0.00	5/26/2025
1900	39.5	9.84	39.36	-0.35	5/27/2025
2450	52.5	12.9	51.60	-1.71	5/28/2025
2600	55.3	13.9	55.60	0.54	5/29/2025
5200	77.6	7.78	77.80	0.26	5/30/2025
5800	78.7	7.81	78.10	-0.76	6/2/2025

Note: Below 5GHz system check input power: 250mW, above 5GHz system check input power: 100mW

11. MEASUREMENT PROCEDURES

11.1 GENERAL DESCRIPTION OF TEST PROCEDURES

A communication link is set up with a System Simulator (SS) by air link, and a call is established. Then EUT is commanded to operate at maximum transmitting power.

Connection to the EUT is established via air interface with CMW500, and the EUT is set to maximum output power. The EUT battery must be fully charged and checked periodically during the test to as certain uniform power output. The antenna connected to the output of the base station simulator shall be placed at least 50 cm 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 30 dB.

11.2 MEASUREMENT VARIABILITY

Per FCC KDB Publication 865664 D01, SAR measurement variability was assessed for each frequency band, which was determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media were required for SAR measurements in a frequency band, the variability measurement procedures were applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. These additional measurements were repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

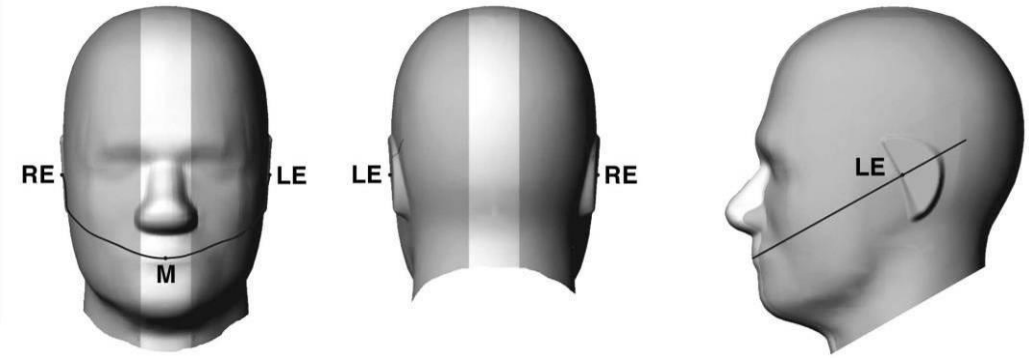
SAR Measurement Variability was assessed using the following procedures for each frequency band:

1. 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.

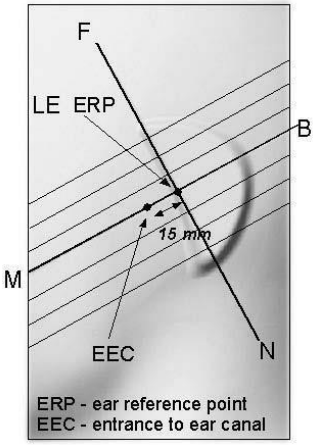
11.3 Test Positions Requirements

11.3.1 Ear and handset reference point

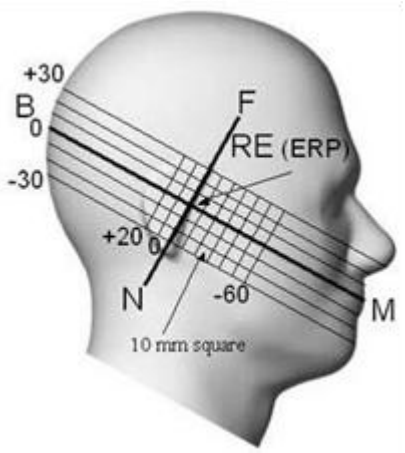
Picture11 shows the front, back, and side views of the SAM phantom. The center-of-mouth reference point is labeled “M,” the left ear reference point (ERP) is marked “LE,” and the right ERP is marked “RE.” Each ERP is 15 mm along the B-M (back-mouth) line behind the entrance-to-ear-canal (EEC) point, as shown in Picture12.The Reference Plane is defined as passing through the two ear reference points and point M. The line N-F (neck-front), also called the reference pivoting line, is normal to the Reference Plane and perpendicular to both a line passing through RE and LE and the B-M line (see Picture13). Both N-F and B-M lines should be marked on the exterior of the phantom shell to facilitate handset positioning. Posterior to the N-F line the ear shape is a flat surface with 6 mm thickness at each ERP, and forward of the N-F line the ear is truncated, as illustrated in Picture12. The ear truncation is introduced to preclude the ear lobe from interfering with handset tilt, which could lead to unstable positioning at the cheek.



Picture11 Front, back, and side views of SAM twin phantom



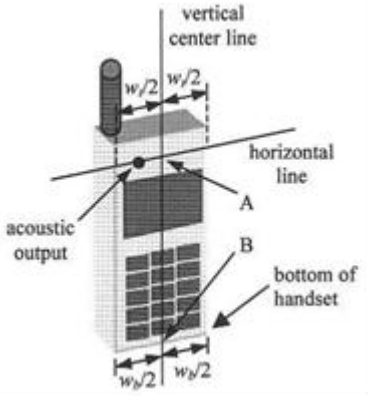
Picture12 Close-up side view of phantom showing the ear region.



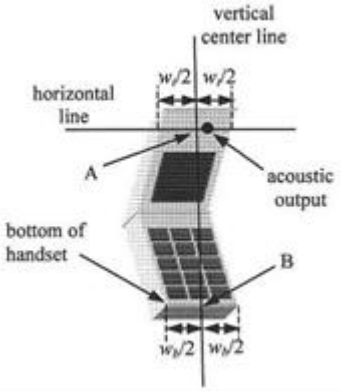
Picture13 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

11.3.2 Definition of the cheek position

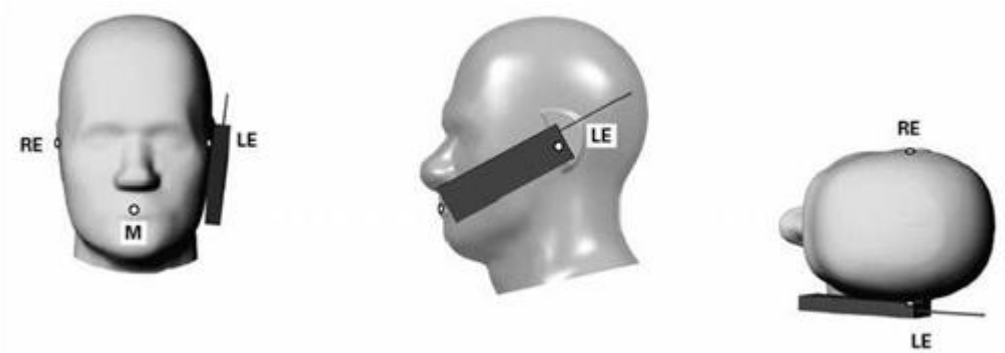
1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. Define two imaginary lines on the handset—the vertical centerline and the horizontal line. The vertical centerline passes through two points on the Phantom Side of the handset—the midpoint of the width wt of the handset at the level of the acoustic output (point A in Picture 14 and Picture 15), and the midpoint of the width wb of the bottom of the handset (point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output (see Picture 14). The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset (see Picture 15), especially for clamshell handsets, handsets with flip covers, and other irregularly-shaped handsets.
3. Position the handset close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Picture 16), such that the plane defined by the vertical centerline and the horizontal line of the handset is approximately parallel to the sagittal plane of the phantom.
4. Translate the handset towards the phantom along the line passing through RE and LE until handset point A touches the pinna at the ERP.
5. While maintaining the handset in this plane, rotate it around the LE-RE line until the vertical centerline is in the plane normal to the plane containing B-M and N-F lines, i.e., the Reference Plane.
6. Rotate the handset around the vertical centerline until the handset (horizontal line) is parallel to the N-F line.
7. While maintaining the vertical centerline in the Reference Plane, keeping point A on the line passing through RE and LE, and maintaining the handset contact with the pinna, rotate the handset about the N-F line until any point on the handset is in contact with a phantom point below the pinna on the cheek. See Picture 16. The actual rotation angles should be documented in the test report.



Picture14 Handset vertical and horizontal reference lines—“fixed case



Picture15 Handset vertical and horizontal reference lines—“clam-shell case”



Picture16 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

11.3.3 Definition of the tilt position

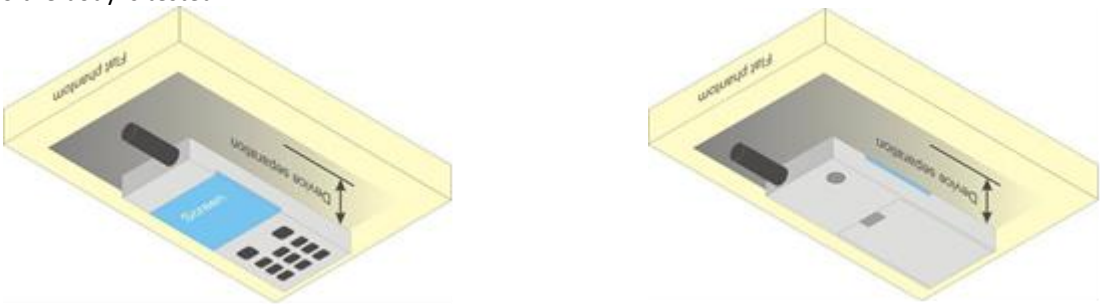
1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. While maintaining the orientation of the handset, move the handset away from the pinna along the line passing through RE and LE far enough to allow a rotation of the handset away from the cheek by 15°.
3. Rotate the handset around the horizontal line by 15°.
4. While maintaining the orientation of the handset, move the handset towards the phantom on the line passing through RE and LE until any part of the handset touches the ear. The tilt position is obtained when the contact point is on the pinna. See Picture 17. If contact occurs at any location other than the pinna, e.g., the antenna at the back of the phantom head, the angle of the handset should be reduced. In this case, the tilt position is obtained if any point on the handset is in contact with the pinna and a second point

Picture17 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.

11.3.4 Body Worn Accessory

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Picture 18). Per KDB 648474 D04v01r02, body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB 447498 D01v05r02 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for body-worn accessory, measured without a headset connected to the handset is < 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a handset attached to the handset.

Accessories for body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are test with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-chip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

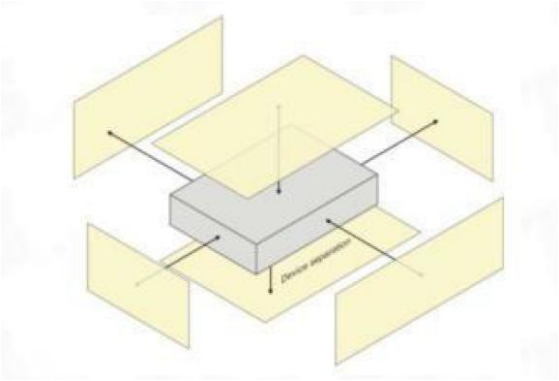


Picture18 Body Worn Position

11.3.5 Wireless Router

Some battery-operated handsets have the capability to transmit and receive user through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06v01r01 where SAR test considerations for handsets (L x W ≥ 9 cm x 5 cm) are based on a composite test separation distance of 10mm from the front, back and edges of the device containing transmitting antennas within 2.5cm of their edges, determined form general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions due to the limitations of the SAR assessment probes. Therefore, SAR must be evaluated for each frequency transmission and mode separately and spatially summed with the WIFI transmitter according to FCC KDB Publication 447498 D01v05r02 publication procedures. The “Portable Hotspot” feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.



11.4 TEST COFIGURATION

11.4.1 GSM Test Configuration

SAR tests for GSM 850 and GSM 1900, a communication link is set up with a System Simulator (SS) by air link. Using CMW500 the power level is set to “5” for GSM 850, set to “0” for GSM 1900. Since the GPRS class is 12 for this EUT, it has at most 4 timeslots in uplink and at most 4 timeslots in downlink, the maximum total timeslots is 5.

11.4.2 UMTS Test Configuration

11.4.2.1 3G SAR Test Reduction Procedure

In the following procedures, the mode tested for SAR is referred to as the primary mode. The equivalent modes considered for SAR test reduction are denoted as secondary modes. Both primary and secondary modes must be in the same frequency band. When the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for the secondary mode.3 This is referred to as the 3G SAR test reduction procedure in the following SAR test guidance, where the primary mode is identified in the applicable wireless mode test procedures and the secondary mode is wireless mode being considered for SAR test reduction by that procedure. When the 3G SAR test reduction procedure is not satisfied, it is identified as “otherwise” in the applicable procedures; SAR measurement is required for the secondary mode.

11.4.2.2 Output power Verification

Maximum output power is verified on the high, middle and low channels according to procedures described in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC (transmit power control) set to all "1's" for WCDMA/HSDPA or by applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Results for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HSDPA, HSPA) are required in the SAR report. All configurations that are not supported by the handset or cannot be measured due to technical or equipment limitations must be clearly identified.

11.4.2.3 Head SAR

SAR for next to the ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all "1's". The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for 12.2 kbps AMR in 3.4 kbps SRB (signaling radio bearer) using the highest reported SAR configuration in 12.2 kbps RMC for head exposure.

11.4.2.4 Body-Worn Accessory SAR

SAR for body-worn accessory configurations is measured using a 12.2 kbps RMC with TPC bits configured to all "1's". The 3G SAR test reduction procedure is applied to other spreading codes and multiple DPDCHn configurations supported by the handset with 12.2 kbps RMC as the primary mode.

Otherwise, SAR is measured using an applicable RMC configuration with the corresponding spreaing code or DPDCHn, for the highest reported body-worn accessory exposure SAR configuration in 12.2 kbps RMC. When more than 2 DPDCHn are supported by the handset, it may be necessary to configure additional DPDCHn using FTM (Factory Test Mode) or other chipset based test approaches with parameters similar to those used in 384 kbps and 768 kbps RMC.

11.4.3 LTE Test Configuration

This device contains LTE transmitter which follows 3GPP standards, is category 3, supports both QPSK and 16QAM modulations. The output power was tested per 3GPP TS 36.521-1 maximum transmit procedures for both QPSK and 16QAM modulation.

During LTE SAR testing, the related parameters of operating band, channel bandwidth, uplink channel number, modulation type, and RB was set in base station simulator. When the EUT has registered and communicated to base station simulator, the simulator set to make EUT transmitting the maximum radiated power.

11.4.3.1 General

The general test requirements of VoIP support for handsets are described in KDB Publication 648474 D04. The head, body, body-worn accessories and other required test considerations in KDB Publication 447498 D01 and other published RF exposure KDB procedures should be applied to configure LTE devices for standalone and simultaneous transmission in voice and data modes for the required exposure conditions.
Based on the design specifications and other information available from the device manufacturer, typically through measurement and analysis during product development, when the maximum output power specifications for the different RB allocations and RB offset conditions within a channel bandwidth, modulation, or across the channels in a frequency band varies by more than 1 dB, a KDB inquiry is required to determine whether the required test channels are acceptable for SAR testing or if a different set of required test channels should be used. The maximum average conducted output power measured according to the following configurations, for the required test channels, channel bandwidthsand uplink modulations, in each frequency band, are used to support the SAR test reduction and exclusion.
a) 100% RB allocation
b) 1 RB, and also 50% RB allocation, offset to the upper edge, middle, and lower edge of the channel bandwidth of each required test channel
Based on the power measurements, the SAR test reduction and exclusion provisions in KDB Publication 447498 D01 should be applied to determine SAR measurement requirements. SAR is evaluated separately according to the following procedures for the different test positions in each exposure condition – head, body, body-worn accessories, and other use

conditions. The configurations and conditions that qualify for SAR test exclusion or require testing must be clearly explained in the SAR report. The procedures in the following subsections are applied separately to test each LTE frequency band. SAR must be measured with the maximum TTI (transmit time interval) supported by the device in each LTE configuration. The TTI configurations supported and tested must be described in the SAR report.

11.4.3.2 Largest channel bandwidth standalone SAR test requirements

1. QPSK with 1 RB allocation

Start with the largest channel bandwidth then measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle, and lower edge of each required test channel. When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel.6 When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.

2. QPSK with 50% RB allocation

The procedures required for 1 RB allocation in 5.2.1 are applied to measure the SAR for QPSK with 50% RB allocation.

3. QPSK with 100% RB allocation

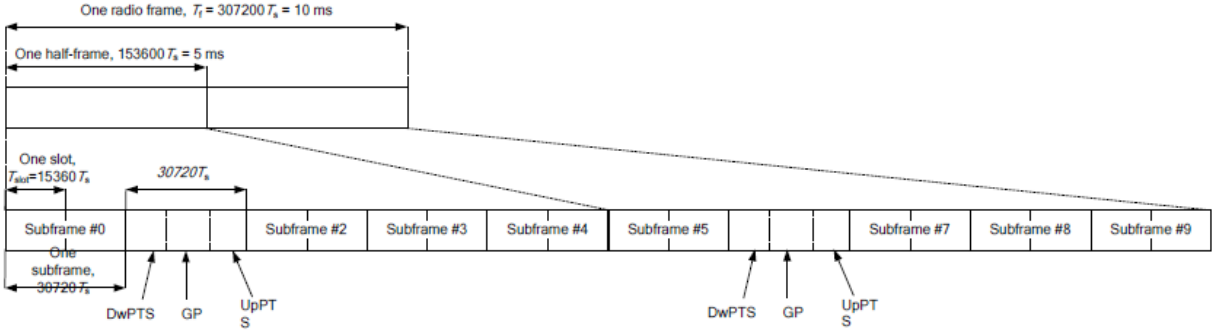
For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations, and the highest reported SAR for 1 RB and 50% RB allocation in 5.2.1 and 5.2.2 are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.

4. Higher order modulations

For each modulation besides QPSK; e.g., 16-QAM, 64-QAM, apply the QPSK procedures in 5.2.1, 5.2.2, and 5.2.3 to determine the QAM configurations that may need SAR measurement. For each configuration identified as required for testing, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is > ½ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg.

11.4.3.3 TDD-LTE test configurations

According to KDB 941225 D05, SAR testing for TDD-LTE device must be tested using a fixed periodic duty factoraccording to the highest transmission duty factor implemented for the device and supported by the defined 3GPP TDD-LTE configurations. The TDD-LTE of this device supports frame structure type 2 defined in 3GPP TS 36.211 section 4.2, and the frame structure configuration can be referred to below.



3GPP TS 36.211 Figure 4.2-1: Frame Structure Type 2

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 • Ts	2192 • Ts	2560 • Ts	7680 • Ts	2192 • Ts	2560 • Ts
1	19760 • Ts			20480 • Ts		
2	21952 • Ts			23040 • Ts		
3	24144 • Ts			25600 • Ts		
4	26336 • Ts			7680 • Ts	4384 • Ts	5120 • Ts
5	6592 • Ts	4384 • Ts	5120 • Ts	20480 • Ts		
6	19760 • Ts			23040 • Ts		
7	21952 • Ts			12800 • Ts		
8	24144 • Ts			-	-	-
9	13168 • Ts			-	-	-

3GPP TS 36.211 Table 4.2-1: Configuration of Special Subframe

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

3GPP TS 36.211 Table 4.2-2: Uplink-Downlink Configurations

The variety of different TD-LTE uplink-downlink configurations allows a network operator to allocate the network's capacity between uplink and downlink traffic to meet the needs of the network. The uplink duty cycle of these seven configurations can readily be computed and shown in below.

UL-DL Configuration	0	1	2	3	4	5	6
Highest Duty-Cycle	63.33%	43.33%	23.33%	31.67%	21.67%	11.67%	53.33%

Considering the highest transmission duty cycle, TDD-LTE was tested using Uplink-Downlink Configuration 0 with 6 uplink subframe and 2 special subframe. The special subframe was set to special subframe configuration 7 using extended cyclic prefix uplink. Therefore, SAR testing for TDD-LTE was performed at the maximum output power with highest transmission duty cycle of 63.33%.

12. TEST RESULTS

12.1 Conducted Power Results

Test Condition:

1. Conducted Measurement
   EUT was set for low, mid, high channel with modulated mode and highest RF output power.
   The base station simulator was connected to the antenna terminal.

2 Conducted Emissions Measurement Uncertainty
All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2, in the range 30MHz – 40GHz is ±1.5dB.

3 Environmental Conditions

Temperature	22°C
Relative Humidity	55%
Atmospheric Pressure	1009mbar

4 Test Date: 22 May 2025
Tested By: Bruce Zheng

Test Procedures:

Mobile Phone radio output power measurement

1. The transmitter output port was connected to base station emulator.
2. Establish communication link between emulator and EUT and set EUT to operate at maximum output power all the time.
3. Select lowest, middle, and highest channels for each band and different possible test mode.
4. Measure the conducted peak burst power and conducted average burst power from EUT antenna port.

Source-based Time Averaged Burst Power Calculation:

For TDMA, the following duty cycle factor was used to calculate the source-based time average power

Number of Time slot	1	2	3	4
Duty Cycle	1:8	1:4	1:2.66	1:2
Duty cycle factor	-9.03 dB	-6.02 dB	-4.26 dB	-3.01 dB
Crest Factor	8	4	2.66	2

Remark: Time slot duty cycle factor = 10 * log (Time Slot Duty Cycle)
Source based time averaged power = Maximum burst averaged power (1 Uplink) – 9.03 dB
Source based time averaged power = Maximum burst averaged power (2 Uplink) – 6.02 dB
Source based time averaged power = Maximum burst averaged power (3 Uplink) – 4.26 dB
Source based time averaged power = Maximum burst averaged power (4 Uplink) – 3.01 dB

12.1.1 GSM

Per KDB 941225 D01 3G SAR Procedures:
SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power specified for production units, including tune-up tolerance. The data mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested.

When different maximum output power applies to GSM voice or GPRS/EDGE time slots, GSM voice and GPRS/EDGE time slots should be tested separately to determine compliance by summing the corresponding reported SAR.

The GMSK EDGE configurations are grouped with GPRS and considered with respect to time-averaged maximum output power to determine compliance

Maximum Output Power for GSM

GSM850	Burst-Averaged output Power (dBm)				Frame-Averaged output Power (dBm)			
Tx Channel	Tune up Power tolerant (dBm)	128	190	251	Time Average factor	128	190	251
Frequency (MHz)	/	824.2	836.6	848.8	/	824.2	836.6	848.8
GSM (GMSK)	32.0	31.70	31.91	31.97	-9.03	22.67	22.88	22.94
GPRS (GMSK,1 Tx slot)	32.0	31.75	31.89	31.94	-9.03	22.72	22.86	22.91
GPRS (GMSK,2 Tx slot)	30.0	29.26	29.45	29.55	-6.02	23.24	23.43	23.53
GPRS (GMSK,3 Tx slot)	28.0	27.52	27.69	27.79	-4.26	23.26	23.43	23.53
GPRS (GMSK,4 Tx slot)	26.0	25.48	25.59	25.66	-3.01	22.47	22.58	22.65
EGPRS (8PSK,1 Tx slot)	26.0	25.49	25.51	25.12	-9.03	16.46	16.48	16.09
EGPRS (8PSK,2 Tx slot)	24.5	24.19	24.30	24.00	-6.02	18.17	18.28	17.98
EGPRS (8PSK,3 Tx slot)	22.5	22.20	22.27	21.96	-4.26	17.94	18.01	17.70
EGPRS (8PSK,4 Tx slot)	20.0	19.92	19.93	19.65	-3.01	16.91	16.92	16.64

Notes:
1. Time average factor = 1 uplink, 10*log(1/8) =-9.03dB, 2 uplink, 10*log(2/8) = -6.02dB, 3 uplink, 10*log(3/8) = -4.26dB, 4 uplink, 10*log(4/8) =-3.01 dB
2. Frame-Averaged output Power = Burst-Averaged output Power + Time Average factor
3. SAR is not required for EDGE (8PSK) mode because the maximum output power is ≤ 1/4dB higher than GPRS/EDGE (GMSK) or the adjusted SAR of the highest reported SAR of GPRS/EDGE (GMSK) is ≤ 1.2W/kg.

GSM1900	Burst-Averaged output Power (dBm)				Frame-Averaged output Power (dBm)			
Tx Channel	Tune up Power tolerant (dBm)	512	661	810	Time Average factor	512	661	810
Frequency (MHz)	/	1850.2	1880	1909.8	/	1850.2	1880	1909.8
GSM (GMSK)	30.0	29.55	29.64	29.46	-9.03	20.52	20.61	20.43
GPRS (GMSK,1 Tx slot)	30.0	29.40	29.62	29.44	-9.03	20.37	20.59	20.41
GPRS (GMSK,2 Tx slot)	27.0	26.62	26.72	26.49	-6.02	20.60	20.70	20.47
GPRS (GMSK,3 Tx slot)	25.5	25.18	25.32	25.10	-4.26	20.92	21.06	20.84
GPRS (GMSK,4 Tx slot)	23.5	23.05	23.24	23.04	-3.01	20.04	20.23	20.03
EGPRS (8PSK,1 Tx slot)	26.0	25.88	25.97	25.39	-9.03	16.85	16.94	16.36
EGPRS (8PSK,2 Tx slot)	24.5	24.07	24.22	23.65	-6.02	18.05	18.20	17.63
EGPRS (8PSK,3 Tx slot)	23.0	22.55	22.81	22.44	-4.26	18.29	18.55	18.18
EGPRS (8PSK,4 Tx slot)	21.0	20.57	20.75	20.23	-3.01	17.56	17.74	17.22

Notes:
1. Time average factor = 1 uplink, 10*log(1/8) = -9.03dB, 2 uplink, 10*log(2/8) = -6.02dB, 3 uplink, 10*log(3/8) = -4.26dB, 4 uplink, 10*log(4/8) = -3.01 dB
2. Frame-Averaged output Power = Burst-Averaged output Power + Time Average factor
3. SAR is not required for EDGE (8PSK) mode because the maximum output power is ≤ 1/4dB higher than GPRS/EDGE (GMSK) or the adjusted SAR of the highest reported SAR of GPRS/EDGE (GMSK) is ≤ 1.2W/kg.

12.1.2 W-CDMA

Per KDB 941225 D01 3G SAR Procedures for W-CDMA:
Maximum output power is verified on the high, middle, and low channels and using the appropriate 12.2 kbps RMC with TPC (transmit power control) set to all "1's"

Release 99 Setup Procedures used to establish the test signals
The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1. A summary of these settings is illustrated below:

Mode	Subtest	Rel99
WCDMA General Settings	Loopback Mode	Test Mode 2
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	βc/βd	8/15

Maximum Output Power for W-CDMA
SAR measurement is not required for the HSDPA, HSUPA, DC-HSDPA and HSPA*. When primary mode and the adjusted SAR is ≤ 1.2 W/kg and secondary mode is ≤ ¼ dB higher than the primary mode

WCDMA - Average Power (dBm)												
Band	WCDMA Band II				WCDMA Band IV				WCDMA Band V			
Channel	9262	9400	9538	Tune up Power tolerant	1312	1413	1513	Tune up Power tolerant	4132	4183	4233	Tune up Power tolerant
Frequency (MHz)	1852.4	1880	1907.6	/	1712.4	1732.6	1752.6	/	826.4	836.6	846.6	/
RMC 12.2k	22.12	21.97	21.87	22.5	21.80	21.90	22.00	22.0	22.74	22.78	22.54	23.0
HSDPA Subtest-1	21.19	20.76	21.15	21.5	20.99	21.14	21.04	21.5	21.17	20.79	20.23	21.5
HSDPA Subtest-2	20.72	20.35	20.80	21.0	21.17	21.27	21.17	21.5	21.35	20.81	20.41	21.5
HSDPA Subtest-3	20.49	20.08	20.61	21.0	21.16	21.26	21.14	21.5	20.59	20.47	20.09	21.0
HSDPA Subtest-4	20.57	20.26	20.63	21.0	21.35	21.23	21.18	21.5	20.91	20.32	20.06	21.0
HSUPA Subtest-1	18.80	18.55	19.10	19.5	20.97	20.83	21.08	21.5	19.42	19.27	19.17	19.5
HSUPA Subtest-2	19.14	18.98	19.39	19.5	20.85	21.26	21.12	21.5	19.66	19.38	19.50	20.0
HSUPA Subtest-3	18.88	18.79	19.21	19.5	20.69	20.92	20.82	21.0	20.19	19.18	19.02	20.5
HSUPA Subtest-4	19.23	18.84	19.25	19.5	20.87	20.89	20.79	21.0	19.75	19.38	19.20	20.0
HSUPA Subtest-5	21.09	20.71	21.14	21.5	21.24	21.28	21.16	21.5	21.88	21.37	21.43	22.0

12.1.3 LTE

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

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

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

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signalling Value of "NS_01".

Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)

Network Signalling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	NA
NS_03	6.6.2.2.1	2, 4,10, 23, 25, 35, 36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2	41	5	>6	≤ 1
			10, 15, 20	See Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10,15,20	≥ 50	≤ 1
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	n/a
NS_07	6.6.2.2.3 6.6.3.3.2	13	10	Table 6.2.4-2	Table 6.2.4-2
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23[1]	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
..					
NS_32	-	-	-	-	-
Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.					

Maximum Output Power for LTE

LTE QPSK configuration has the highest maximum average output power per 3GPP standard.
SAR measurement is not required for the 16QAM and 64QAM. When the highest maximum output power for 16QAM and 64QAM is ≤ ½ dB higher than the QPSK or when the reported SAR for the QPSK configuration is ≤ 1.45 W/kg.
Please refer to section 3. for LTE detail test channels.

Band	Bandwidth	Modulation	Channel	RB Configuration	Result (dBm)	Tune up limited (dBm)
Band2	20MHz	QPSK	18700	1RB#0	21.36	20.5±1
				1RB#49	21.41	20.5±1
				1RB#99	21.37	20.5±1
				50RB#0	20.37	19.5±1
				50RB#25	20.37	19.5±1
				50RB#50	20.20	19.5±1
				100RB#0	20.32	19.5±1
			18900	1RB#0	21.30	20.5±1
				1RB#49	21.34	20.5±1
				1RB#99	21.36	20.5±1
				50RB#0	20.34	19.5±1
				50RB#25	20.29	19.5±1
				50RB#50	20.10	19.5±1
				100RB#0	20.33	19.5±1
			19100	1RB#0	21.02	20.5±1
				1RB#49	21.00	20.5±1
				1RB#99	20.92	20.5±1
				50RB#0	20.15	19.5±1
				50RB#25	20.13	19.5±1
				50RB#50	19.98	19.5±1
				100RB#0	20.09	19.5±1
Band	Bandwidth	Modulation	Channel	RB Configuration	Result (dBm)	Tune up limited (dBm)
Band4	20MHz	QPSK	20050	1RB#0	21.20	22.0±2
				1RB#49	21.22	22.0±2
				1RB#99	21.34	22.0±2
				50RB#0	20.08	22.0±2
				50RB#25	20.03	22.0±2
				50RB#50	20.09	22.0±2
				100RB#0	20.08	22.0±2
			20175	1RB#0	21.24	22.0±2
				1RB#49	23.29	22.0±2
				1RB#99	23.32	22.0±2
				50RB#0	22.07	22.0±2
				50RB#25	22.01	22.0±2
				50RB#50	22.22	22.0±2
				100RB#0	22.21	22.0±2

			20300	1RB#0	23.29	22.0±2
				1RB#49	23.44	22.0±2
				1RB#99	23.57	22.0±2
				50RB#0	22.15	22.0±2
				50RB#25	22.13	22.0±2
				50RB#50	22.27	22.0±2
				100RB#0	22.33	22.0±2
Band	Bandwidth	Modulation	Channel	RB Configuration	Result (dBm)	Tune up limited (dBm)
Band5	10MHz	QPSK	20450	1RB#0	22.19	21.5±1
				1RB#24	22.17	21.5±1
				1RB#49	21.73	21.5±1
				25RB#0	21.23	21.5±1
				25RB#12	21.28	21.5±1
				25RB#25	21.11	21.5±1
				50RB#0	21.24	20.5±1
			20525	1RB#0	22.04	21.5±1
				1RB#24	22.07	21.5±1
				1RB#49	22.07	21.5±1
				25RB#0	21.32	21.5±1
				25RB#12	21.26	21.5±1
				25RB#25	20.76	21.5±1
				50RB#0	21.22	20.5±1
			20600	1RB#0	21.74	21.5±1
				1RB#24	22.10	21.5±1
				1RB#49	21.76	21.5±1
				25RB#0	21.08	21.5±1
				25RB#12	21.15	21.5±1
				25RB#25	21.10	21.5±1
				50RB#0	21.18	20.5±1
Band	Bandwidth	Modulation	Channel	RB Configuration	Result (dBm)	Tune up limited (dBm)
Band7	20MHz	QPSK	20850	1RB#0	20.69	21.5±2
				1RB#49	20.74	21.5±2
				1RB#99	20.81	21.5±2
				50RB#0	19.71	21.5±2
				50RB#25	21.86	21.5±2
				50RB#50	21.81	21.5±2
				100RB#0	21.84	21.5±2
			21100	1RB#0	22.86	21.5±2
				1RB#49	23.01	21.5±2
				1RB#99	22.91	21.5±2
				50RB#0	20.92	21.5±2

				50RB#25	19.72	21.5±2
				50RB#50	19.58	21.5±2
				100RB#0	19.64	21.5±2
			21350	1RB#0	20.52	20.5±2
				1RB#49	20.52	20.5±2
				1RB#99	20.53	20.5±2
				50RB#0	19.58	20.5±2
				50RB#25	19.47	20.5±2
				50RB#50	19.51	20.5±2
				100RB#0	19.57	20.5±2
Band	Bandwidth	Modulation	Channel	RB Configuration	Result (dBm)	Tune up limited (dBm)
Band12	10MHz	QPSK	23060	1RB#0	21.65	21.5±1
				1RB#24	21.67	21.5±1
				1RB#49	22.21	21.5±1
				25RB#0	21.09	21.5±1
				25RB#12	21.13	21.5±1
				25RB#25	21.21	21.5±1
				50RB#0	21.27	21.5±1
			23095	1RB#0	21.98	21.5±1
				1RB#24	22.03	21.5±1
				1RB#49	22.02	21.5±1
				25RB#0	21.13	21.5±1
				25RB#12	21.13	21.5±1
				25RB#25	21.15	21.5±1
				50RB#0	21.23	21.5±1
			23130	1RB#0	22.17	21.5±1
				1RB#24	22.25	21.5±1
				1RB#49	22.36	21.5±1
				25RB#0	21.13	21.5±1
				25RB#12	21.15	21.5±1
				25RB#25	21.07	21.5±1
				50RB#0	21.19	21.5±1
Band	Bandwidth	Modulation	Channel	RB Configuration	Result (dBm)	Tune up limited (dBm)
Band17	10MHz	QPSK	23780	1RB#0	21.76	21.5±1
				1RB#24	22.17	21.5±1
				1RB#49	22.21	21.5±1
				25RB#0	21.19	21.5±1
				25RB#12	21.18	21.5±1
				25RB#25	21.22	21.5±1
				50RB#0	21.17	21.5±1
			23790	1RB#0	22.00	21.5±1

				1RB#24	22.00	21.5±1
				1RB#49	22.05	21.5±1
				25RB#0	21.16	21.5±1
				25RB#12	21.23	21.5±1
				25RB#25	21.13	21.5±1
				50RB#0	21.20	21.5±1
			23800	1RB#0	22.19	21.5±1
				1RB#24	22.27	21.5±1
				1RB#49	22.30	21.5±1
				25RB#0	21.17	21.5±1
				25RB#12	21.19	21.5±1
				25RB#25	21.26	21.5±1
				50RB#0	21.18	21.5±1
Band	Bandwidth	Modulation	Channel	RB Configuration	Result (dBm)	Tune up limited (dBm)
Band41	20MHz	QPSK	39750	1RB#0	23.10	22.5±1
				1RB#49	23.13	22.5±1
				1RB#99	23.00	22.5±1
				50RB#0	21.85	21.5±1
				50RB#25	21.86	21.5±1
				50RB#50	21.94	21.5±1
				100RB#0	21.59	21.5±1
			40185	1RB#0	22.54	22.0±1
				1RB#49	22.54	22.0±1
				1RB#99	22.59	22.0±1
				50RB#0	21.39	22.0±1
				50RB#25	21.40	22.0±1
				50RB#50	21.29	22.0±1
				100RB#0	21.02	22.0±1
			40620	1RB#0	22.71	22.5±1
				1RB#49	22.53	22.5±1
				1RB#99	22.70	22.5±1
				50RB#0	21.76	21.5±1
				50RB#25	21.65	21.5±1
				50RB#50	21.59	21.5±1
				100RB#0	21.28	21.5±1
			41055	1RB#0	22.38	22.0±1
				1RB#49	22.40	22.0±1
				1RB#99	22.53	22.0±1
				50RB#0	21.58	22.0±1
				50RB#25	21.53	22.0±1
				50RB#50	21.51	22.0±1
				100RB#0	21.14	22.0±1
			41490	1RB#0	22.70	22.5±1

				1RB#49	22.86	22.5±1
				1RB#99	22.92	22.5±1
				50RB#0	21.81	21.5±1
				50RB#25	21.73	21.5±1
				50RB#50	21.88	21.5±1
				100RB#0	21.46	21.5±1
Band	Bandwidth	Modulation	Channel	RB Configuration	Result (dBm)	Tune up limited (dBm)
Band66	20MHz	QPSK	132072	1RB#0	23.22	23.0±1
				1RB#49	23.41	23.0±1
				1RB#99	23.39	23.0±1
				50RB#0	22.09	23.0±1
				50RB#25	22.07	23.0±1
				50RB#50	22.28	23.0±1
				100RB#0	22.13	23.0±1
			132322	1RB#0	23.40	23.0±1
				1RB#49	23.52	23.0±1
				1RB#99	23.62	23.0±1
				50RB#0	22.29	23.0±1
				50RB#25	22.28	23.0±1
				50RB#50	22.51	23.0±1
				100RB#0	22.48	23.0±1
			132572	1RB#0	23.21	23.0±1
				1RB#49	23.34	23.0±1
				1RB#99	23.47	23.0±1
				50RB#0	22.44	23.0±1
				50RB#25	22.56	23.0±1
				50RB#50	22.62	23.0±1
				100RB#0	22.45	23.0±1

12.1.4 Wi-Fi 2.4 GHz

Maximum Output Power for Wi-Fi 2.4 GHz

Mode	Channel number	Frequency (MHz)	Data rate (Mbps)	Average Output Power(dBm)	Average Tune up limited(dBm)
802.11b	1	2412	1	18.0	17.0±1
	6	2437	1	17.1	17.0±1
	11	2462	1	19.0	18.0±1
802.11g	1	2412	6	17.3	17.5±1
	6	2437	6	16.6	17.5±1
	11	2462	6	18.3	17.5±1
802.11n(HT20)	1	2412	MCS0	16.0	16.0±1
	6	2437	MCS0	15.4	16.0±1
	11	2462	MCS0	17.0	16.0±1
802.11n(HT40)	3	2422	MCS0	14.4	13.5±1
	6	2437	MCS0	14.5	13.5±1
	9	2452	MCS0	14.3	13.5±1

12.1.5 Bluetooth

Maximum Output Power for Bluetooth

Mode	Frequency (MHz)	Output Power(dBm)	Tune up limited(dBm)
GFSK	2402	7.05	6.5±1
	2441	6.29	6.5±1
	2480	6.01	6.5±1
π/4DQPSK	2402	7.03	6.5±1
	2441	6.25	6.5±1
	2480	6.01	6.5±1
8DPSK	2402	7.04	6.5±1
	2441	6.23	6.5±1
	2480	5.99	6.5±1

Maximum Output Power for BLE

Data Rates	Channel number	Frequency (MHz)	Output Power(dBm)	Tune up limited(dBm)
1 Mbps	0	2402	3.00	2.0±1
	19	2440	2.43	2.0±1
	39	2480	2.28	2.0±1
2 Mbps	0	2402	2.95	2.0±1
	19	2440	2.42	2.0±1
	39	2480	2.21	2.0±1

12.1.6 Wi-Fi 5 GHz

Maximum Output Power for Wi-Fi 5 GHz

Mode	Frequency (MHz)	Data rate (Mbps)	Output Power(dBm)	Tune up limited(dBm)
11A	5180	MCS0	10.99	11.0±1
	5200	MCS0	10.22	11.0±1
	5240	MCS0	8.82	8.0±1
	5745	MCS0	11.68	11.0±1
	5785	MCS0	12.61	13.0±1
	5825	MCS0	13.93	13.0±1
11N20	5180	MCS0	10.34	10.0±1
	5200	MCS0	9.67	9.0±1
	5240	MCS0	8.34	9.0±1
	5745	MCS0	10.90	10.0±1
	5785	MCS0	12.44	11.5±1
	5825	MCS0	13.96	13.0±1
11N40	5190	MCS0	10.53	10.0±1
	5230	MCS0	8.94	8.0±1
	5755	MCS0	11.53	11.0±1
	5795	MCS0	12.80	12.0±1
11AC20	5180	MCS0	10.50	9.5±1
	5200	MCS0	9.91	9.5±1
	5240	MCS0	8.52	9.5±1
	5745	MCS0	10.86	10.0±1
	5785	MCS0	11.97	11.0±1
	5825	MCS0	13.54	13.0±1
11AC40	5190	MCS0	10.79	10.0±1
	5230	MCS0	9.19	8.5±1
	5755	MCS0	11.56	11.0±1
	5795	MCS0	12.97	12.0±1
11AC80	5210	MCS0	9.72	9.0±1
	5775	MCS0	11.91	11.0±1

12.2 SAR TEST RESULTS

Table 6: SAR Values of GSM 850MHz Band

Test Positions		Channel		Test Mode	Power(dBm)		SAR 1g(W/Kg), Limit (1.6W/kg)		Plot No.
		CH.	MHz		Maximum Turn-up Power(dBm)	Measured output power(dBm)	Measured SAR 1g(W/kg)	Scaled SAR 1g(W/kg)	
Right Head	Cheek	128	824.2	GPRS 3 slot	28.0	27.52	0.118	0.132	--
	Cheek	190	836.6	GPRS 3 slot	28.0	27.69	0.123	0.132	--
	Cheek	251	848.8	GPRS 3 slot	28.0	27.79	**0.127**	0.133	**1**
	Tilt	251	848.8	GPRS 3 slot	28.0	27.79	0.062	0.065	--
Left Head	Cheek	251	848.8	GPRS 3 slot	28.0	27.79	0.122	0.128	--
	Tilt	251	848.8	GPRS 3 slot	28.0	27.79	0.057	0.060	--
Body & Hotspot (10mm Separation)	Front side	251	848.8	GPRS 3 slot	28.0	27.79	0.287	0.301	--
	Back side	128	824.2	GPRS 3 slot	28.0	27.52	0.422	0.471	--
	Back side	190	836.6	GPRS 3 slot	28.0	27.69	0.431	0.463	--
	Back side	251	848.8	GPRS 3 slot	28.0	27.79	**0.454**	0.476	**2**
Hotspot (10mm Separation)	Left Side	251	848.8	GPRS 3 slot	28.0	27.79	0.264	0.277	--
	Right Side	251	848.8	GPRS 3 slot	28.0	27.79	0.125	0.131	--
	Bottom Side	251	848.8	GPRS 3 slot	28.0	27.79	0.322	0.338	--

Table 7: SAR Values of GSM 1900MHz Band

Test Positions		Channel		Test Mode	Power(dBm)		SAR 1g(W/Kg), Limit (1.6W/kg)		Plot No.
		CH.	MHz		Maximum Turn-up Power (dBm)	Measured output power (dBm)	Measured SAR 1g(W/kg)	Scaled SAR 1g(W/kg)	
Right Head	Cheek	512	1850.2	GPRS 3 slots	25.5	25.18	0.140	0.151	--
	Cheek	661	1880.0	GPRS 3 slots	25.5	25.32	**0.146**	0.152	**3**
	Cheek	810	1909.8	GPRS 3 slots	25.5	25.10	0.135	0.148	
	Tilt	661	1880.0	GPRS 3 slots	25.5	25.32	0.084	0.088	--
Left Head	Cheek	661	1880.0	GPRS 3 slots	25.5	25.32	0.144	0.150	--
	Tilt	661	1880.0	GPRS 3 slots	25.5	25.32	0.081	0.084	--
Body & Hotspot (10mm Separation)	Front side	661	1880.0	GPRS 3 slots	25.5	25.32	0.337	0.351	--
	Back side	512	1850.2	GPRS 3 slots	25.5	25.18	0.632	0.680	--
	Back side	661	1880.0	GPRS 3 slots	25.5	25.32	**0.680**	0.709	**4**
	Back side	810	1909.8	GPRS 3 slots	25.5	25.10	0.628	0.689	--
Hotspot (10mm Separation)	Left Side	661	1880.0	GPRS 3 slots	25.5	25.32	0.308	0.321	--
	Right Side	661	1880.0	GPRS 3 slots	25.5	25.32	0.134	0.140	--
	Bottom Side	661	1880.0	GPRS 3 slots	25.5	25.32	0.451	0.470	--

Table 8: SAR Values of WCDMA BAND II

Test Positions		Channel		Test Mode	Power(dBm)		SAR 1g(W/Kg), Limit (1.6W/kg)		Plot No.
		CH.	MHz		Maximum Turn-up Power(dBm)	Measured output power(dBm)	Measured SAR 1g(W/kg)	Scaled SAR 1g(W/kg)	
Right Head	Cheek	9262	1852.4	RMC 12.2kbps	22.5	22.12	**0.102**	0.111	**5**
	Cheek	9400	1880.0	RMC 12.2kbps	22.5	21.97	0.096	0.108	--
	Cheek	9538	1907.6	RMC 12.2kbps	22.5	21.87	0.094	0.109	
	Tilt	9262	1852.4	RMC 12.2kbps	22.5	22.12	0.067	0.073	--
Left Head	Cheek	9262	1852.4	RMC 12.2kbps	22.5	22.12	0.099	0.108	--
	Tilt	9262	1852.4	RMC 12.2kbps	22.5	22.12	0.061	0.067	--
Body & Hotspot (10mm Separation)	Front side	9262	1852.4	RMC 12.2kbps	22.5	22.12	0.216	0.236	--
	Back side	9262	1852.4	RMC 12.2kbps	22.5	22.12	**0.490**	0.535	**6**
	Back side	9400	1880.0	RMC 12.2kbps	22.5	21.97	0.469	0.530	--
	Back side	9538	1907.6	RMC 12.2kbps	22.5	21.87	0.461	0.533	--
Hotspot (10mm Separation)	Left Side	9262	1852.4	RMC 12.2kbps	22.5	22.12	0.207	0.226	--
	Right Side	9262	1852.4	RMC 12.2kbps	22.5	22.12	0.113	0.123	--
	Bottom Side	9262	1852.4	RMC 12.2kbps	22.5	22.12	0.378	0.413	--

Table 9: SAR Values of WCDMA BAND IV

Test Positions		Channel		Test Mode	Power(dBm)		SAR 1g(W/Kg), Limit (1.6W/kg)		Plot No.
		CH.	MHz		Maximum Turn-up Power(dBm)	Measured output power(dBm)	Measured SAR 1g(W/kg)	Scaled SAR 1g(W/kg)	
Right Head	Cheek	1312	1712.4	RMC 12.2kbps	22.0	21.80	0.056	0.059	--
	Cheek	1413	1732.6	RMC 12.2kbps	22.0	21.90	0.059	0.060	--
	Cheek	1513	1752.6	RMC 12.2kbps	22.0	22.00	**0.061**	0.061	**7**
	Tilt	1513	1752.6	RMC 12.2kbps	22.0	22.00	0.038	0.038	--
Left Head	Cheek	1513	1752.6	RMC 12.2kbps	22.0	22.00	0.059	0.059	--
	Tilt	1513	1752.6	RMC 12.2kbps	22.0	22.00	0.033	0.033	--
Body & Hotspot (10mm Separation)	Front side	1513	1752.6	RMC 12.2kbps	22.0	22.00	0.187	0.187	--
	Back side	1312	1712.4	RMC 12.2kbps	22.0	21.80	0.391	0.409	--
	Back side	1413	1732.6	RMC 12.2kbps	22.0	21.90	0.397	0.406	--
	Back side	1513	1752.6	RMC 12.2kbps	22.0	22.00	**0.415**	0.415	**8**
Hotspot (10mm Separation)	Left Side	1513	1752.6	RMC 12.2kbps	22.0	22.00	0.135	0.135	--
	Right Side	1513	1752.6	RMC 12.2kbps	22.0	22.00	0.076	0.076	--
	Bottom Side	1513	1752.6	RMC 12.2kbps	22.0	22.00	0.201	0.201	--

Table 10: SAR Values of WCDMA BAND V

Test Positions		Channel		Test Mode	Power(dBm)		SAR 1g(W/Kg), Limit (1.6W/kg)		Plot No.
		CH.	MHz		Maximum Turn-up Power(dBm)	Measured output power(dBm)	Measured SAR 1g(W/kg)	Scaled SAR 1g(W/kg)	
Right Head	Cheek	4132	826.4	RMC 12.2kbps	23.0	22.74	0.118	0.125	--
	Cheek	4182	836.4	RMC 12.2kbps	23.0	22.78	**0.120**	0.126	**9**
	Cheek	4233	846.6	RMC 12.2kbps	23.0	22.54	0.108	0.120	--
	Tilt	4182	846.4	RMC 12.2kbps	23.0	22.78	0.079	0.083	--
Left Head	Cheek	4182	846.4	RMC 12.2kbps	23.0	22.78	0.115	0.121	--
	Tilt	4182	846.4	RMC 12.2kbps	23.0	22.78	0.074	0.078	--
Body & Hotspot (10mm Separation)	Front side	4182	836.4	RMC 12.2kbps	23.0	22.78	0.324	0.341	--
	Back side	4132	826.4	RMC 12.2kbps	23.0	22.74	0.649	0.689	--
	Back side	4182	836.4	RMC 12.2kbps	23.0	22.78	**0.658**	0.692	**10**
	Back side	4233	846.6	RMC 12.2kbps	23.0	22.54	0.614	0.683	--
Hotspot (10mm Separation)	Left Side	4182	836.4	RMC 12.2kbps	23.0	22.78	0.295	0.310	--
	Right Side	4182	836.4	RMC 12.2kbps	23.0	22.78	0.155	0.163	--
	Bottom Side	4182	836.4	RMC 12.2kbps	23.0	22.78	0.542	0.570	--

Table 11: SAR Values of LTE BAND 2, 20MHz, QPSK

Test Mode	Test Positions		Channel		Power(dBm)		SAR 1g(W/Kg), Limit (1.6W/kg)		Plot No.
			CH.	MHz	Maximum Turn-up Power(dBm)	Measured output power(dBm)	Measured SAR 1g(W/kg)	Scaled SAR 1g(W/kg)	
1RB #49	Right Head	Cheek	18700	1860	21.5	21.41	**0.173**	0.177	**11**
		Cheek	18900	1880	21.5	21.34	0.170	0.176	--
		Cheek	19100	1900	21.5	21.00	0.153	0.172	--
		Tilt	18900	1880	21.5	21.41	0.112	0.114	--
	Left Head	Cheek	18700	1860	21.5	21.41	0.169	0.173	--
		Tilt	18700	1860	21.5	21.41	0.108	0.110	--
	Body & Hotspot (10mm Separation)	Front side	18700	1860	21.5	21.41	0.477	0.487	--
		Back side	18700	1860	21.5	21.41	**0.709**	0.724	**12**
		Back side	18900	1880	21.5	21.34	0.697	0.723	--
		Back side	19100	1900	21.5	21.00	0.623	0.699	--
	Hotspot (10mm Separation)	Left Side	18700	1860	21.5	21.41	0.494	0.504	--
		Right Side	18700	1860	21.5	21.41	0.246	0.251	--
		Bottom Side	18700	1860	21.5	21.41	0.546	0.557	--
50%RB #0	Right Head	Cheek	18700	1860	20.5	20.37	0.105	0.108	--
		Cheek	18900	1880	20.5	20.34	0.106	0.110	--
		Cheek	19100	1900	20.5	20.15	0.095	0.103	--
		Tilt	18900	1880	21.5	20.37	0.072	0.093	--
	Left Head	Cheek	18700	1860	20.5	20.37	0.101	0.104	--
		Tilt	18700	1860	20.5	20.37	0.064	0.066	--
	Body & Hotspot (10mm Separation)	Front side	18700	1860	20.5	20.37	0.312	0.321	--
		Back side	18700	1860	20.5	20.37	0.662	0.682	--
		Back side	18900	1880	20.5	20.34	0.657	0.682	--
		Back side	19100	1900	20.5	20.15	0.641	0.695	--
	Hotspot (10mm Separation)	Left Side	18700	1860	20.5	20.37	0.334	0.344	--
		Right Side	18700	1860	20.5	20.37	0.128	0.132	--
		Bottom Side	18700	1860	20.5	20.37	0.327	0.337	--

Table 12: SAR Values of LTE BAND 4, 20MHz, QPSK

Test Mode	Test Positions		Channel		Power(dBm)		SAR 1g(W/Kg), Limit(1.6W/kg)		Plot No.
			CH.	MHz	Maximum Turn-up Power(dBm)	Measured output power(dBm)	Measured SAR 1g(W/kg)	Scaled SAR 1g(W/kg)	
1RB #99	Right Head	Cheek	20050	1720	24.0	21.34	0.076	0.140	--
		Cheek	20175	1732.5	24.0	23.32	0.124	0.145	--
		Cheek	20300	1745	24.0	23.57	**0.139**	0.153	**13**
		Tilt	20300	1745	24.0	23.57	0.088	0.097	--
	Left Head	Cheek	20300	1745	24.0	23.57	0.133	0.147	--
		Tilt	20300	1745	24.0	23.57	0.081	0.089	--
	Body & Hotspot (10mm Separation)	Front side	20300	1745	24.0	23.57	0.354	0.391	--
		Back side	20050	1720	24.0	21.34	0.423	0.780	--
		Back side	20175	1732.5	24.0	23.32	0.712	0.833	--
		Back side	20300	1745	24.0	23.57	**0.776**	0.857	**14**
	Hotspot (10mm Separation)	Left Side	20300	1745	24.0	23.57	0.349	0.385	--
		Right Side	20300	1745	24.0	23.57	0.146	0.161	--
		Bottom Side	20300	1745	24.0	23.57	0.356	0.393	--
50%RB #50	Right Head	Cheek	20050	1720	24.0	20.09	0.053	0.130	--
		Cheek	20175	1732.5	24.0	22.27	0.087	0.130	--
		Cheek	20300	1745	24.0	22.22	0.081	0.122	--
		Tilt	20175	1732.5	24.0	22.27	0.052	0.077	--
	Left Head	Cheek	20175	1732.5	24.0	22.27	0.082	0.122	--
		Tilt	20175	1732.5	24.0	22.27	0.046	0.069	--
	Body & Hotspot (10mm Separation)	Front side	20175	1732.5	24.0	22.27	0.185	0.276	--
		Back side	20050	1720	24.0	20.09	0.232	0.571	--
		Back side	20175	1732.5	24.0	22.27	0.487	0.725	--
		Back side	20300	1745	24.0	22.22	0.481	0.725	--
	Hotspot (10mm Separation)	Left Side	20175	1732.5	24.0	22.27	0.182	0.271	--
		Right Side	20175	1732.5	24.0	22.27	0.103	0.153	--
		Bottom Side	20175	1732.5	24.0	22.27	0.192	0.286	--
100%RB #0	Body & Hotspot (10mm Separation)	Back side	20300	1745	24.0	22.33	0.4720	0.693	--

Table 13: SAR Values of LTE BAND 5, 10MHz, QPSK

Test Mode	Test Positions		Channel		Power(dBm)		SAR 1g(W/Kg), Limit(1.6W/kg)		Plot No.
			CH.	MHz	Maximum Turn-up Power(dBm)	Measured output power(dBm)	Measured SAR 1g(W/kg)	Scaled SAR 1g(W/kg)	
1RB #0	Right Head	Cheek	20450	829	22.5	22.19	**0.152**	0.163	**15**
		Cheek	20525	836.5	22.5	22.04	0.143	0.159	--
		Cheek	20600	844	22.5	21.74	0.132	0.157	--
		Tilt	20450	829	22.5	22.19	0.098	0.105	--
	Left Head	Cheek	20450	829	22.5	22.19	0.146	0.157	--
		Tilt	20450	829	22.5	22.19	0.091	0.098	--
	Body & Hotspot (10mm Separation)	Front side	20450	829	22.5	22.19	0.203	0.218	--
		Back side	20450	829	22.5	22.19	**0.552**	0.593	**16**
		Back side	20525	836.5	22.5	22.04	0.532	0.591	--
		Back side	20600	844	22.5	21.74	0.497	0.592	--
	Hotspot (10mm Separation)	Left Side	20450	829	22.5	22.19	0.192	0.206	--
		Right Side	20450	829	22.5	22.19	0.117	0.126	--
		Bottom Side	20450	829	22.5	22.19	0.227	0.244	--
50%RB #0	Right Head	Cheek	20450	829	21.5	21.23	0.102	0.109	--
		Cheek	20525	836.5	21.5	21.32	0.107	0.112	--
		Cheek	20600	844	21.5	21.08	0.089	0.098	--
		Tilt	20525	836.5	21.5	21.32	0.052	0.054	--
	Left Head	Cheek	20525	836.5	21.5	21.32	0.098	0.102	--
		Tilt	20525	836.5	21.5	21.32	0.046	0.048	--
	Body & Hotspot (10mm Separation)	Front side	20525	836.5	21.5	21.32	0.179	0.187	--
		Back side	20450	829	21.5	21.23	0.311	0.331	--
		Back side	20525	836.5	21.5	21.32	0.322	0.336	--
		Back side	20600	844	21.5	21.08	0.289	0.318	--
	Hotspot (10mm Separation)	Left Side	20525	836.5	21.5	21.32	0.164	0.171	--
		Right Side	20525	836.5	21.5	21.32	0.075	0.078	--
		Bottom Side	20525	836.5	21.5	21.32	0.182	0.190	--

Table 14: SAR Values of LTE BAND 7, 20MHz, QPSK

Test Mode	Test Positions		Channel		Power(dBm)		SAR 1g(W/Kg), Limit (1.6W/kg)		Plot No.
			CH.	MHz	Maximum Turn-up Power(dBm)	Measured output power(dBm)	Measured SAR 1g(W/kg)	Scaled SAR 1g(W/kg)	
1RB #49	Right Head	Cheek	20850	2510	23.5	20.74	0.058	0.110	--
		Cheek	21100	2535	23.5	23.01	**0.103**	0.115	**17**
		Cheek	21350	2560	23.5	20.52	0.055	0.109	--
		Tilt	21100	2535	23.5	23.01	0.062	0.069	--
	Left Head	Cheek	21100	2535	23.5	23.01	0.099	0.111	--
		Tilt	21100	2535	23.5	23.01	0.055	0.062	--
	Body & Hotspot (10mm Separation)	Front side	21100	2535	23.5	23.01	0.187	0.209	--
		Back side	20850	2510	23.5	20.74	0.198	0.374	--
		Back side	21100	2535	23.5	23.01	**0.347**	0.388	**18**
		Back side	21350	2560	23.5	20.52	0.178	0.354	--
	Hotspot (10mm Separation)	Left Side	21100	2535	23.5	23.01	0.174	0.195	--
		Right Side	21100	2535	23.5	23.01	0.099	0.111	--
		Bottom Side	21100	2535	23.5	23.01	0.193	0.216	--
50%RB #25	Right Head	Cheek	20850	2510	21.0	20.30	0.091	0.107	--
		Cheek	21100	2535	23.5	21.86	0.075	0.109	--
		Cheek	21350	2560	21.0	20.61	0.096	0.105	--
		Tilt	20850	2510	23.5	21.86	0.041	0.060	--
	Left Head	Cheek	20850	2510	23.5	21.86	0.071	0.104	--
		Tilt	20850	2510	23.5	21.86	0.033	0.048	--
	Body & Hotspot (10mm Separation)	Front side	20850	2510	23.5	21.86	0.097	0.142	--
		Back side	20850	2510	23.5	21.86	0.172	0.251	--
		Back side	21100	2535	23.5	19.72	0.103	0.246	--
		Back side	21350	2560	23.5	19.47	0.098	0.248	--
	Hotspot (10mm Separation)	Left Side	20850	2510	23.5	21.86	0.091	0.133	--
		Right Side	20850	2510	23.5	21.86	0.056	0.082	--
		Bottom Side	20850	2510	23.5	21.86	0.106	0.155	--

Table 15: SAR Values of LTE BAND 12, 10MHz, QPSK

Test Mode	Test Positions		Channel		Power(dBm)		SAR 1g(W/Kg), Limit (1.6W/kg)		Plot No.
			CH.	MHz	Maximum Turn-up Power(dBm)	Measured output power(dBm)	Measured SAR 1g(W/kg)	Scaled SAR 1g(W/kg)	
1RB #49	Right Head	Cheek	23060	704	22.5	22.21	0.122	0.130	--
		Cheek	23095	707.5	22.5	22.02	0.118	0.132	--
		Cheek	23130	711	22.5	22.36	**0.130**	0.134	**19**
		Tilt	23130	711	22.5	22.36	0.084	0.087	--
	Left Head	Cheek	23130	711	22.5	22.36	0.124	0.128	--
		Tilt	23130	711	22.5	22.36	0.081	0.084	--
	Body & Hotspot (10mm Separation)	Front side	23130	711	22.5	22.36	0.217	0.224	--
		Back side	23060	704	22.5	22.21	0.412	0.440	--
		Back side	23095	707.5	22.5	22.02	0.403	0.450	--
		Back side	23130	711	22.5	22.36	**0.440**	0.454	**20**
	Hotspot (10mm Separation)	Left Side	23130	711	22.5	22.36	0.208	0.215	--
		Right Side	23130	711	22.5	22.36	0.089	0.092	--
		Bottom Side	23130	711	22.5	22.36	0.308	0.318	--
50%RB #25	Right Head	Cheek	23060	704	22.5	21.15	0.095	0.130	--
		Cheek	23095	707.5	22.5	21.07	0.089	0.124	--
		Cheek	23130	711	22.5	21.21	0.098	0.132	--
		Tilt	23130	711	22.5	21.21	0.057	0.077	--
	Left Head	Cheek	23130	711	22.5	21.21	0.094	0.127	--
		Tilt	23130	711	22.5	21.21	0.052	0.070	--
	Body & Hotspot (10mm Separation)	Front side	23130	711	22.5	21.21	0.133	0.179	--
		Back side	23060	704	22.5	21.15	0.189	0.258	--
		Back side	23095	707.5	22.5	21.07	0.191	0.265	--
		Back side	23130	711	22.5	21.21	0.208	0.280	--
	Hotspot (10mm Separation)	Left Side	23130	711	22.5	21.21	0.112	0.151	--
		Right Side	23130	711	22.5	21.21	0.064	0.086	--
		Bottom Side	23130	711	22.5	21.21	0.156	0.210	--

Table 16: SAR Values of LTE BAND 17, 10MHz, QPSK

Test Mode	Test Positions		Channel		Power(dBm)		SAR 1g(W/Kg), Limit (1.6W/kg)		Plot No.
			CH.	MHz	Maximum Turn-up Power(dBm)	Measured output power(dBm)	Measured SAR 1g(W/kg)	Scaled SAR 1g(W/kg)	
1RB #0	Right Head	Cheek	23780	709	22.5	22.21	0.123	0.131	--
		Cheek	23790	710	22.5	22.05	0.114	0.126	--
		Cheek	23800	711	22.5	22.30	**0.129**	0.135	**21**
		Tilt	23800	711	22.5	22.30	0.081	0.085	--
	Left Head	Cheek	23800	711	22.5	22.30	0.119	0.125	--
		Tilt	23800	711	22.5	22.30	0.078	0.082	--
	Body & Hotspot (10mm Separation)	Front side	23800	711	22.5	22.30	0.213	0.223	--
		Back side	23780	709	22.5	22.21	0.421	0.450	--
		Back side	23790	710	22.5	22.05	0.406	0.450	--
		Back side	23800	711	22.5	22.30	**0.451**	0.472	**22**
	Hotspot (10mm Separation)	Left Side	23800	711	22.5	22.30	0.211	0.221	--
		Right Side	23800	711	22.5	22.30	0.088	0.092	--
		Bottom Side	23800	711	22.5	22.30	0.304	0.318	--
50%RB #0	Right Head	Cheek	23780	709	22.5	21.22	0.093	0.125	--
		Cheek	23790	710	22.5	21.13	0.082	0.112	--
		Cheek	23800	711	22.5	21.26	0.092	0.122	--
		Tilt	23800	711	22.5	21.26	0.051	0.068	--
	Left Head	Cheek	23800	711	22.5	21.26	0.095	0.126	--
		Tilt	23800	711	22.5	21.26	0.048	0.064	--
	Body & Hotspot (10mm Separation)	Front side	23800	711	22.5	21.26	0.135	0.180	--
		Back side	23780	709	22.5	21.22	0.191	0.256	--
		Back side	23790	710	22.5	21.13	0.189	0.259	--
		Back side	23800	711	22.5	21.26	0.208	0.277	--
	Hotspot (10mm Separation)	Left Side	23800	711	22.5	21.26	0.118	0.157	--
		Right Side	23800	711	22.5	21.26	0.062	0.082	--
		Bottom Side	23800	711	22.5	21.26	0.155	0.206	--

Table 17: SAR Values of LTE BAND 41, 20MHz, QPSK

Test Mode	Test Positions		Channel		Power(dBm)		SAR 1g(W/Kg), Limit (1.6W/kg)		Plot No.
			CH.	MHz	Maximum Turn-up Power(dBm)	Measured output power(dBm)	Measured SAR 1g(W/kg)	Scaled SAR 1g(W/kg)	
1RB #0	Right Head	Cheek	39750	2506	23.5	23.13	**0.050**	0.054	**23**
		Cheek	40620	2593	23.5	22.53	0.042	0.053	--
		Cheek	41490	2680	23.5	22.86	0.045	0.052	--
		Tilt	39750	2506	23.5	23.13	0.032	0.035	--
	Left Head	Cheek	39750	2506	23.5	23.13	0.048	0.052	--
		Tilt	39750	2506	23.5	23.13	0.029	0.032	--
	Body & Hotspot (10mm Separation)	Front side	39750	2506	23.5	23.13	0.254	0.277	--
		Back side	39750	2506	23.5	23.13	**0.598**	0.651	**24**
		Back side	40620	2593	23.5	22.53	0.513	0.641	--
		Back side	41490	2680	23.5	22.86	0.546	0.633	--
	Hotspot (10mm Separation)	Left Side	39750	2506	23.5	23.13	0.242	0.264	--
		Right Side	39750	2506	23.5	23.13	0.108	0.118	--
		Bottom Side	39750	2506	23.5	23.13	0.305	0.332	--
50%RB #50	Right Head	Cheek	39750	2506	22.5	21.94	0.043	0.049	--
		Cheek	40620	2593	22.5	21.59	0.039	0.048	--
		Cheek	41490	2680	22.5	21.88	0.041	0.047	--
		Tilt	39750	2506	22.5	21.94	0.021	0.024	--
	Left Head	Cheek	39750	2506	22.5	21.94	0.041	0.047	--
		Tilt	39750	2506	22.5	21.94	0.019	0.022	--
	Body & Hotspot (10mm Separation)	Front side	39750	2506	22.5	21.94	0.146	0.166	--
		Back side	39750	2506	22.5	21.94	0.264	0.300	--
		Back side	40620	2593	22.5	21.59	0.243	0.300	--
		Back side	41490	2680	22.5	21.88	0.247	0.285	--
	Hotspot (10mm Separation)	Left Side	39750	2506	22.5	21.94	0.132	0.150	--
		Right Side	39750	2506	22.5	21.94	0.075	0.085	--
		Bottom Side	39750	2506	22.5	21.94	0.204	0.232	--

Table 18: SAR Values of LTE BAND 66, 20MHz, QPSK

Test Mode	Test Positions		Channel		Power(dBm)		SAR 1g(W/Kg), Limit (1.6W/kg)		Plot No.
			CH.	MHz	Maximum Turn-up Power(dBm)	Measured output power(dBm)	Measured SAR 1g(W/kg)	Scaled SAR 1g(W/kg)	
1RB #99	Right Head	Cheek	132072	1720	24.0	23.39	0.141	0.162	--
		Cheek	132322	1745	24.0	23.62	**0.150**	0.164	**25**
		Cheek	132572	1770	24.0	23.47	0.142	0.160	--
		Tilt	132322	1745	24.0	23.62	0.095	0.104	--
	Left Head	Cheek	132322	1745	24.0	23.62	0.147	0.160	--
		Tilt	132322	1745	24.0	23.62	0.075	0.082	--
	Body & Hotspot (10mm Separation)	Front side	132322	1745	24.0	23.62	0.457	0.499	--
		Back side	132072	1720	24.0	23.39	0.675	0.777	--
		Back side	132322	1745	24.0	23.62	**0.716**	0.781	**26**
		Back side	132572	1770	24.0	23.47	0.681	0.769	--
	Hotspot (10mm Separation)	Left Side	132322	1745	24.0	23.62	0.406	0.443	--
		Right Side	132322	1745	24.0	23.62	0.143	0.156	--
		Bottom Side	132322	1745	24.0	23.62	0.612	0.668	--
50%RB #50	Right Head	Cheek	132072	1720	24.0	22.28	0.104	0.155	--
		Cheek	132322	1745	24.0	22.51	0.108	0.152	--
		Cheek	132572	1770	24.0	22.62	0.109	0.150	--
		Tilt	132572	1770	24.0	22.62	0.046	0.063	--
	Left Head	Cheek	132572	1770	24.0	22.62	0.102	0.140	--
		Tilt	132572	1770	24.0	22.62	0.043	0.059	--
	Body & Hotspot (10mm Separation)	Front side	132572	1770	24.0	22.62	0.275	0.378	--
		Back side	132072	1720	24.0	22.28	0.389	0.578	--
		Back side	132322	1745	24.0	22.51	0.403	0.568	--
		Back side	132572	1770	24.0	22.62	0.422	0.580	--
	Hotspot (10mm Separation)	Left Side	132572	1770	24.0	22.62	0.235	0.323	--
		Right Side	132572	1770	24.0	22.62	0.105	0.144	--
		Bottom Side	132572	1770	24.0	22.62	0.312	0.429	--

Table 19: SAR Values of Wi-Fi (DTS Band)

Test Positions		Channel		Test Mode	Power(dBm)		SAR 1g(W/Kg), Limit (1.6W/kg)		Plot No.
		CH.	MHz		Maximum Turn-up Power(dBm)	Measured output power(dBm)	Measured SAR 1g(W/kg)	Scaled SAR 1g(W/kg)	
Right Head	Cheek	11	2462	1Mbps	19.0	19.00	0.744	0.744	--
	Tilt	11	2462	1Mbps	19.0	19.00	0.523	0.523	--
Left Head	Cheek	1	2412	1Mbps	19.0	18.00	0.928	1.168	--
	Cheek	6	2437	1Mbps	19.0	17.10	0.748	1.159	--
	Cheek	11	2462	1Mbps	19.0	19.00	**1.230**	1.230	**27**
	Tilt	6	2437	1Mbps	12.5	12.4	0.412	0.422	--
Body & Hotspot (10mm Separation)	Front side	11	2462	1Mbps	19.0	19.00	0.624	0.624	--
	Back side	11	2462	1Mbps	19.0	19.00	0.698	0.698	--
Hotspot (10mm Separation)	Left Side	11	2462	1Mbps	19.0	19.00	0.511	0.511	--
	Top Side	1	2412	1Mbps	19.0	18.00	0.554	0.697	--
	Top Side	6	2437	1Mbps	19.0	17.10	0.403	0.624	--
	Top Side	11	2462	1Mbps	19.0	19.00	**0.704**	0.704	**28**

Table 20: SAR Values of Wi-Fi (UNII-1)

Test Positions		Channel		Test Mode	Power(dBm)		SAR 1g(W/Kg), Limit (1.6W/kg)		Plot No.
		CH.	MHz		Maximum Turn-up Power(dBm)	Measured output power(dBm)	Measured SAR 1g(W/kg)	Scaled SAR 1g(W/kg)	
Right Head	Cheek	36	5180	6Mbps	11.0	10.99	0.568	0.569	--
	Tilt	36	5180	6Mbps	11.0	10.99	0.326	0.327	--
Left Head	Cheek	36	5180	6Mbps	11.0	10.99	**0.887**	0.889	**29**
	Cheek	40	5200	6Mbps	11.0	10.22	0.736	0.785	--
	Cheek	48	5240	6Mbps	11.0	8.82	0.523	0.864	--
	Tilt	36	5180	6Mbps	11.0	10.99	0.684	0.686	--
Body & Hotspot (10mm Separation)	Front side	36	5180	6Mbps	11.0	10.99	0.546	0.547	--
	Back side	36	5180	6Mbps	11.0	10.99	0.603	0.604	--
Hotspot (10mm Separation)	Left Side	36	5180	6Mbps	11.0	10.99	0.447	0.448	--
	Top Side	36	5180	6Mbps	11.0	10.99	**0.789**	0.791	**30**
	Top Side	40	5200	6Mbps	11.0	10.22	0.648	0.691	
	Top Side	48	5240	6Mbps	11.0	8.82	0.452	0.747	

Table 21: SAR Values of Wi-Fi (UNII-3)

Test Positions		Channel		Test Mode	Power(dBm)		SAR 1g(W/Kg), Limit (1.6W/kg)		Plot No.
		CH.	MHz		Maximum Turn-up Power(dBm)	Measured output power(dBm)	Measured SAR 1g(W/kg)	Scaled SAR 1g(W/kg)	
Right Head	Cheek	165	5825	6Mbps	14.0	13.96	0.490	0.495	--
	Tilt	165	5825	6Mbps	14.0	13.96	0.284	0.287	--
Left Head	Cheek	149	5745	6Mbps	14.0	10.90	0.336	0.686	--
	Cheek	157	5785	6Mbps	14.0	12.44	0.519	0.743	--
	Cheek	165	5825	6Mbps	14.0	13.96	**0.738**	0.745	**31**
	Tilt	165	5825	6Mbps	14.0	13.96	0.512	0.517	--
Body & Hotspot (10mm Separation)	Front side	165	5825	6Mbps	14.0	13.96	0.406	0.410	--
	Back side	149	5745	6Mbps	14.0	10.90	0.317	0.647	--
	Back side	157	5785	6Mbps	14.0	12.44	0.457	0.655	--
	Back side	165	5825	6Mbps	14.0	13.96	0.488	0.493	--
Hotspot (10mm Separation)	Left Side	165	5825	6Mbps	14.0	13.96	0.337	0.340	--
	Top Side	165	5825	6Mbps	14.0	13.96	**0.660**	0.666	**32**

Notes:

1. According to FCC KDB 248227 D01v02r02 section 5.2.2, DSSS SAR value*(OFDM power/DSSS power) =1.230*(10^(18.3/10)/10^(19.0/10)) =1.04W/kg≤1.2W/kg, SAR for OFDM is not required.
2. Per KDB Publication 941225 D06 where SAR test considerations for handsets (L x W > 9 cm x 5 cm) are based on a composite test separation distance of 10 mm from the front, back and edges of the device with antennas 2.5 cm or closer to the edge of the device, determined from general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worm accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

12.3 Measurement variability consideration

In accordance with published RF Exposure KDB 865664 D01 SAR measurement 100 MHz to 6 GHz. 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 < 0.8 or 2 W/kg (1-g or 10-g respectively); steps 2) through 4) do not apply.
2. When the original highest measured SAR is ≥ 0.8 or 2 W/kg (1-g or 10-g respectively), 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 or 3.6 W/kg (~ 10% from the 1-g or 10-g respective SAR limit).
4. Perform a third repeated measurement only if the original, first, or second repeated measurement is ≥ 1.5 or 3.75 W/kg (1-g or 10-g respectively) and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

12.4 Repeated SAR

Band	Channel	Mode	RF Exposure	Test Position	Repeated SAR (Yes/No)	Highest Measured SAR (W/kg)	First Repeated	
							Measurement SAR (W/kg)	largest to smallest SAR Ratio
Wi-Fi(DTS Band)	1	1Mbps	Left Head	Check	Yes	0.928	0.917	1.01
Wi-Fi(DTS Band)	11	1Mbps	Left Head	Check	Yes	1.123	1.180	0.95
Wi-Fi (UNII-1)	36	6Mbps	Left Head	Check	Yes	0.887	0.881	1.01

Note: Second Repeated Measurement is not required since the ratio of the largest to smallest SAR for the original and first repeated measurement is < 1.20

12.5 Simultaneous Transmission SAR Analysis.

List of Mode for Simultaneous Multi-band Transmission:

Simultaneous TX Combination
WWAN + Wi-Fi 5GHz + NFC
WWAN + Wi-Fi 2.4GHz + NFC
WWAN + BT + NFC

Remark:

1. GSM/WCDMA/LTE share the same antenna and cannot transmit simultaneously.
2. Wi-Fi 2.4GHz and Bluetooth share the same antenna and cannot transmit simultaneously.
3. Wi-Fi 5GHz and Bluetooth share the same antenna and cannot transmit simultaneously.
4. Wi-Fi 2.4GHz and Wi-Fi 5GHz share the same antenna and cannot transmit simultaneously.
5. According to the KDB 447498 D01, when standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:
   (max. power of channel, including tune-up tolerance, mW)/ (min. test separation distance, mm)] ·[√f(GHz)/x] W/kg for test separation distances ≤50 mm;
   where x = 7.5 for 1-g SAR, and x = 18.75 for 10-g SAR.
6. The maximum SAR summation is calculated based on the same configuration and test position

For simultaneous transmission analysis, SAR is estimated per KDB 447498 D01 as below:

EDR:

Tune-Up Power (dBm)	Max. Power (mW)	Distance (mm)	Frequency (GHz)	X	SAR(1g)
7	5.01	10	2.48	7.5	0.11

BLE:

Tune-Up Power (dBm)	Max. Power (mW)	Distance (mm)	Frequency (GHz)	X	SAR(1g)
3	2	10	2.48	7.5	0.04

NFC:

Tune-Up Power (dBm)	Max. Power (mW)	Distance (mm)	Frequency (GHz)	X	SAR(1g)
-49	0.00	10	0.01356	7.5	0.00

12.6 Simultaneous Transmission SAR Value

	Right Cheek	Right Tilted	Left Cheek	Left Tilted	Front Face	Back Face	Left Side	Right Side	Bottom Side	Top Side
GSM850	0.133	0.065	0.128	0.060	0.301	0.476	0.277	0.131	0.338	-
GSM1900	0.152	0.088	0.150	0.084	0.351	0.709	0.321	0.140	0.470	-
UMTS B2	0.111	0.073	0.108	0.067	0.236	0.535	0.226	0.123	0.413	-
UMTS B4	0.061	0.038	0.059	0.033	0.187	0.415	0.135	0.076	0.201	-
UMTS B5	0.126	0.083	0.121	0.078	0.341	0.692	0.310	0.163	0.570	-
LTE B2	0.177	0.114	0.173	0.110	0.487	0.724	0.504	0.251	0.557	-
LTE B4	0.153	0.097	0.147	0.089	0.391	0.857	0.385	0.161	0.393	-
LTE B5	0.163	0.105	0.157	0.098	0.218	0.593	0.206	0.126	0.244	-
LTE B7	0.115	0.069	0.111	0.062	0.209	0.388	0.195	0.111	0.216	-
LTE B12	0.134	0.087	0.128	0.084	0.224	0.454	0.215	0.092	0.318	-
LTE B17	0.135	0.085	0.125	0.082	0.223	0.472	0.221	0.092	0.318	-
LTE B41	0.054	0.035	0.052	0.032	0.277	0.651	0.264	0.118	0.332	-
LTE B66	0.164	0.104	0.160	0.082	0.499	0.781	0.443	0.156	0.668	-
Wi-Fi 2.4G	0.744	0.523	1.230	0.422	0.624	0.698	0.511	-	-	0.704
Wi-Fi 5.2G	0.569	0.327	0.889	0.686	0.547	0.604	0.448	-	-	0.791
Wi-Fi 5.8G	0.495	0.287	0.745	0.517	0.410	0.655	0.340	-	-	0.666
BT	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120
NFC	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Maximum reported SAR	0.921	0.637	1.403	0.978	1.123	1.555	1.015	0.371	0.677	0.791

12.7 MAXIMUM GRAPH RESULTS

The graph results see ANNEX C.

13. MEASUREMENT UNCERTAINTY

13.1 Uncertainty for SAR Test

Uncertainty Component	Tol. (%)	Prob Dist.	Div	ci (10g)	ci.ui(%) (10g)	vi
Probe Calibration	±6.7	N	1	1	±6.7	∞
Axial Isotropy	±0.5	R	$\sqrt{3}$	1	±0.3	∞
Hemispherical Isotropy	±2.6	R	$\sqrt{3}$	1	±1.5	∞
Linearity	±0.6	R	$\sqrt{3}$	1	±0.3	∞
Probe modulation response	±2.4	R	$\sqrt{3}$	1	±1.4	∞
Detection Limits	±1.0	R	$\sqrt{3}$	1	±0.6	∞
Boundary Effect	±2.0	R	$\sqrt{3}$	1	±1.2	∞
Readout Electronics	±0.3	N	1	1	±0.3	∞
Response Time	±0.8	R	$\sqrt{3}$	1	±0.5	∞
Integration Time	±2.6	R	$\sqrt{3}$	1	±1.5	∞
RF Ambient Conditions - Noise	±3.0	R	$\sqrt{3}$	1	±1.7	∞
RF Ambient Conditions - Reflections	±3.0	R	$\sqrt{3}$	1	±1.7	∞
Probe Positioner Mech. Restrictions	±0.8	R	$\sqrt{3}$	1	±0.5	∞
Probe Positioning with respect to Phantom Shell	±6.7	R	$\sqrt{3}$	1	±3.9	∞
Post-processing	±4.0	R	$\sqrt{3}$	1	±2.3	∞
Test Sample Related						
Device Holder Uncertainty	±3.6	N	1	1	±3.6	M-1
Test Sample Positioning	±2.9	N	1	1	±2.9	M-1
Power scaling	±0.0	R	$\sqrt{3}$	1	±0.0	∞
Drift of output power (measured SAR drift)	±5.0	R	$\sqrt{3}$	1	±2.9	∞
Phantom and Tissue Parameters						
Phantom Uncertainty (shape and thickness tolerances)	±7.6	R	$\sqrt{3}$	1	±4.4	∞
Algorithm for correcting SAR for deviations in permittivity and conductivity	±1.9	N	1	0.84	±1.3	∞
Liquid conductivity(meas.)	±2.5	N	1	0.71	±1.3	M-1
Liquid permittivity(meas.)	±2.5	N	1	0.26	±0.2	M
Liquid permittivity - temperature uncertainty	±3.4	R	$\sqrt{3}$	0.71	±1.0	∞
Liquid conductivity - temperature uncertainty	±0.4	R	$\sqrt{3}$	0.26	±0.0	∞
Combined Standard Uncertainty	±11.6					
Expanded STD Uncertainty	±23.2					

13.2 Uncertainty for System Validation

Uncertainty Component	Tol. (%)	Prob Dist.	Div	Ci (10g)	ci.ui(%) (10g)	vi
Probe Calibration	±6.7	N	1	1	±6.7	∞
Axial Isotropy	±0.5	R	$\sqrt{3}$	1	±0.3	∞
Hemispherical Isotropy	±2.6	R	$\sqrt{3}$	1	±1.5	∞
Linearity	±0.6	R	$\sqrt{3}$	1	±0.3	∞
Modulation response	±0.0	R	$\sqrt{3}$	1	±0.0	∞
Detection Limits	±1.0	R	$\sqrt{3}$	1	±0.6	∞
Boundary Effect	±1.0	R	$\sqrt{3}$	1	±0.6	∞
Readout Electronics	±0.3	N	1	1	±0.3	∞
Response Time	±0.0	R	$\sqrt{3}$	1	±0.0	∞
Integration Time	±0.0	R	$\sqrt{3}$	1	±0.0	∞
RF Ambient Conditions - Noise	±1.0	R	$\sqrt{3}$	1	±0.6	∞
RF Ambient Conditions - Reflections	±1.0	R	$\sqrt{3}$	1	±0.6	∞
Probe Positioner Mech. Restrictions	±0.8	R	$\sqrt{3}$	1	±0.5	∞
Probe Positioning with respect to Phantom Shell	±6.7	R	$\sqrt{3}$	1	±3.9	∞
Post-processing	±4.0	R	$\sqrt{3}$	1	±2.3	∞
Field source						
Deviation of the experimental source from numerical source	±5.5	N	1	1	±5.5	∞
Source to liquid distance	±2.0	R	$\sqrt{3}$	1	±1.2	∞
Drift of output power (measured SAR drift)	±3.4	R	$\sqrt{3}$	1	±2.0	∞
Phantom and Setup						
Phantom Uncertainty (shape and thickness tolerances)	±4.0	R	$\sqrt{3}$	1	±2.3	∞
Algorithm for correcting SAR for deviations in permittivity and conductivity	±1.9	N	1	0.84	±1.3	∞
Liquid conductivity(meas.)	±2.5	N	1	0.21	±0.1	M
Liquid permittivity(meas.)	±2.5	N	1	0.26	±0.2	M
Liquid permittivity - temperature uncertainty	±1.7	R	$\sqrt{3}$	0.71	±0.5	1
Liquid conductivity - temperature uncertainty	±0.3	R	$\sqrt{3}$	0.26	±0.0	∞
Combined Std. Uncertainty	±10.2					
Expanded STD Uncertainty	±20.4					

14. MAIN TEST INSTRUMENT

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
SZ060-01	SAR Test System	SPEAG	DASY52 SAR TX90XL	F14/5YJ0B1 /A/01	2025-04-21	1 year
SZ060-01-01	E-Field Probe	SPEAG	EX3DV4	7322	2025-04-21	1 year
SZ060-01-03	System Validation Dipole	SPEAG	D750V3	1141	2024-03-14	3 year
SZ060-01-04	System Validation Dipole	SPEAG	D835V2	4d196	2024-03-14	3 year
SZ060-01-05	System Validation Dipole	SPEAG	D900V2	1d182	2024-11-06	3 year
SZ060-01-06	System Validation Dipole	SPEAG	D1750V2	1138	2024-11-06	3 year
SZ060-01-07	System Validation Dipole	SPEAG	D1900V2	5d203	2024-11-04	3 year
SZ060-01-10	System Validation Dipole	SPEAG	D2450V2	966	2024-11-06	3 year
SZ060-01-11	System Validation Dipole	SPEAG	D2600V2	1108	2024-11-08	3 year
SZ060-01-12	System Validation Dipole	SPEAG	D5GHzV2	1218	2024-11-05	3 year
SZ060-01-13	Data Acquisition Unit	SPEAG	DAE4	1473	2025-04-21	1 year
SZ060-01-14	Dielectric Assessment Kit	SPEAG	DAKS 3.5	1056	2024-11-01	1 year
SZ060-01-15	Vector Reflectometer	Copper Mountain Technologies	Planar R140	0090614	2024-11-01	1 year
SZ060-01-16	Thermometer	LKM electronics GmbH	DTM3000	3477	2024-12-26	1 year
SZ060-01-17	Power Amplifier	Mini Circuits	ZHL-42W+	QA1449003	2024-11-01	1 year
SZ060-01-18	Power Amplifier	Mini Circuits	ZVE-8G+	111701437	2024-11-01	1 year
SZ060-01-19	SAM Twin Phantom	SPEAG	SAM Twin Phantom V5.0	1888	N/A	N/A
SZ060-01-20	SAM Twin Phantom	SPEAG	SAM Twin Phantom V5.0	1891	N/A	N/A
SZ060-01-21	ELI Phantom	SPEAG	ELI Phantom V6.0	2033	N/A	N/A
SZ180-13	MXG Vector Signal Generator	Keysight	N5182B	MY53051328	2024-09-29	1 year
SZ070-04	Directional Bridge	Agilent	86205A	MY31402141	2024-12-05	1 year
SZ182-02	RF Power Meter	Anritsu	ML2496A	1302005	2025-04-21	1 year
SZ182-02-01	Pulse Power Sensor	Anritsu	MA2411B	1207429	2025-04-21	1 year
SZ182-03	Average power sensor	R&S	NRP-Z22	101689	2025-04-21	1 year
SZ065-06	Wideband Radio Communication Tester	R&S	CMW500	154161	2024-09-29	1 year
N/A	Device Holder	SPEAG	N/A	N/A	N/A	N/A

ANNEX A: TEST LAYOUT AND SETUP

The Test Layout and Setup are saved with filename: SAR Test Layout and Setup.pdf.

ANNEX B: SYSTEM CHECK RESULTS

The graph results see ANNEX B of 250522061SZN-007-Appendix A.

ANNEX C: MAXIMUM GRAPH RESULTS

The graph results see ANNEX C of 250522061SZN-007-Appendix A.

ANNEX D: SYSTEM VALIDATION

The graph results see ANNEX D of 250522061SZN-007-Appendix A.

ANNEX E: EUT PHOTO

The EUT photos are saved with filename: external photos.pdf & internal photos.pdf.

ANNEX F: PROBE CALIBRATION CERTIFICATE

The graph results see ANNEX F of 250522061SZN-007-Appendix B.

ANNEX G: DIPOLE CALIBRATION CERTIFICATE

The graph results see ANNEX G of 250522061SZN-007-Appendix B.

ANNEX H: DAE CALIBRATION CERTIFICATE

The graph results see ANNEX H of 250522061SZN-007-Appendix B.

**********End the Report**********