

FCC SAR Test Report

Applicant : Eugeria

Address : 4020 Saint-Ambroise office 497 Montreal,
Quebec H4C2C7 Canada

Product Name : Idem Smart Display

Report Date : Dec. 07, 2023

Shenzhen Anbotek Compliance Laboratory Limited



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TEST REPORT

Applicant : Eugeria
Manufacturer : Eugeria
Product Name : Idem Smart Display
Model No. : T30
Listed Models : T50, T60, T80, T80 Plus
Trade Mark : Idem
Rating(s) : DC 3.7V From battery and DC 5.0V From external circuit

Test Standard(s) : IEEE 1528:2013; FCC 47 CFR Part 2.1093;

ANSI/IEEE C95.1:2005; Reference FCC KDB 447498; KDB 248227; KDB 616217; KDB 941225; KDB 865664

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the IEEE 1528-2013, FCC 47 CFR Part 2.1093, ANSI/IEEE C95.1:2005 requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Receipt

Oct. 2, 2023

Date of Test

Nov. 2, 2023 – Nov. 8, 2023

Prepared By

Ella Liang
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Approved & Authorized Signer

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Version

Version No.	Date	Description
R00	Dec. 07, 2023	Original



1 Statement of Compliance

<Highest SAR Summary>

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-2005, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013. The maximum results of Specific Absorption Rate (SAR) found during testing are as follows.

<Highest SAR Summary>

Frequency Band	Highest Reported 1g-SAR(W/Kg)	Simultaneous Reported SAR (W/Kg)
	Body	
GSM 850	0.584	1.491
PCS1900	0.906	
WCDMA Band II	1.21	
WCDMA Band V	0.733	
LTE Band 2	1.10	
LTE Band 5	0.597	
LTE Band 7	0.784	
LTE Band 17	0.469	
LTE Band 40A	0.465	
LTE Band 40B	0.447	
LTE Band 41&Band 38	0.419	
WLAN2.4G	0.281	
SAR Test Limit (W/Kg)	1.60	
Test Result	PASS	

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-2005, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013.



2 General Information

2.1 Client Information

Applicant	:	Eugeria
Address	:	4020 Saint-Ambroise office 497 Montreal, Quebec H4C2C7 Canada
Manufacturer	:	Eugeria
Address	:	4020 Saint-Ambroise office 497 Montreal, Quebec H4C2C7 Canada

2.2 Description of Equipment Under Test (EUT)

Product Name	:	Idem Smart Display
Model No.	:	T30
Listed Models	:	T50, T60, T80, T80 Plus
Trade Mark	:	Idem
Test Power Supply	:	DC 3.7V battery inside
Test Sample No.	:	18220WC302361-2-1 (Engineering sample)
Tx Frequency	:	BT/2.4GWIFI: BT:2402~2480MHz 2.4G WIFI: 2412~2462MHz GSM: GSM850 TX: 824.2~848.8MHz PCS1900 TX: 1850.2~1909.8MHz WCDMA: Band 2: TX: 1852.4~1907.6MHz Band 5: TX: 826.40~846.60MHz LTE: FDD Band 2: TX: 1850~1909MHz FDD Band 5: TX: 824~849MHz FDD Band 7: TX: 2500~2570MHz FDD Band 17: TX: 704~716MHz TDD Band 38: TX: 2570~2620MHz TDD Band 40: TX: 2305~2315MHz&2350MHz~2360MHz TDD Band 41: TX: 2496 ~2690MHz
Type of Modulation	:	BT: GFSK, $\pi/4$ DQPSK, 8DPSK 2.4G WIFI: BPSK,QPSK,16QAM,64QAM GSM:GMSK WCDMA:QPSK,16QAM LTE:QPSK,16QAM



Category of device	:	Portable device
Remark: The above DUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.		

2.3 Description of Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: **434132** Designation Number: **CN1339**

Shenzhen Anbotek Compliance Laboratory Limited has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

A2LA-Lab Cert. No.: **7035.01**

Shenzhen Anbotek Compliance Laboratory Limited has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

2.4 Device Category and SAR Limits

This device belongs to portable device category because its radiating structure is allowed to be used within 20 centimeters of the body of the user. Limit for General Population/Uncontrolled exposure should be applied for this device, it is 1.6 W/kg as averaged over any 1 gram of tissue.

2.5 Applied Standard

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

- FCC 47 CFR Part 2 (2.1093:2013)
- ANSI/IEEE C95.1:2005
- IEEE Std 1528:2013
- KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- KDB 865664 D02 RF Exposure Reporting v01r02
- KDB 447498 D01 General RF Exposure Guidance v06
- KDB 248227 D01 802.11 Wi-Fi SAR v02r02
- KDB 941225 D01 3G SAR Procedures v03r01
- KDB 941225 D05 SAR for LTE Devices v02r05
- KDB 616217 D04 SAR for laptop and tablets v01r02

2.6 Environment of Test Site

Items	Required	Actual
Temperature (°C)	18-25	22~23
Humidity (%RH)	30-70	55~65



2.7 Test Configuration

The device was controlled by using a base station emulator. Communication between the device and the emulator was established by air link. The distance between the EUT and the antenna of the emulator is larger than 50 cm and the output power radiated from the emulator antenna is at least 30 dB smaller than the output power of EUT. The EUT was set from the emulator to radiate maximum output power during all tests. For WLAN SAR testing, WLAN engineering testing software installed on the EUT can provide continuous transmitting RF signal.



3 Specific Absorption Rate (SAR)

3.1 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.

3.2 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:

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

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

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

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

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

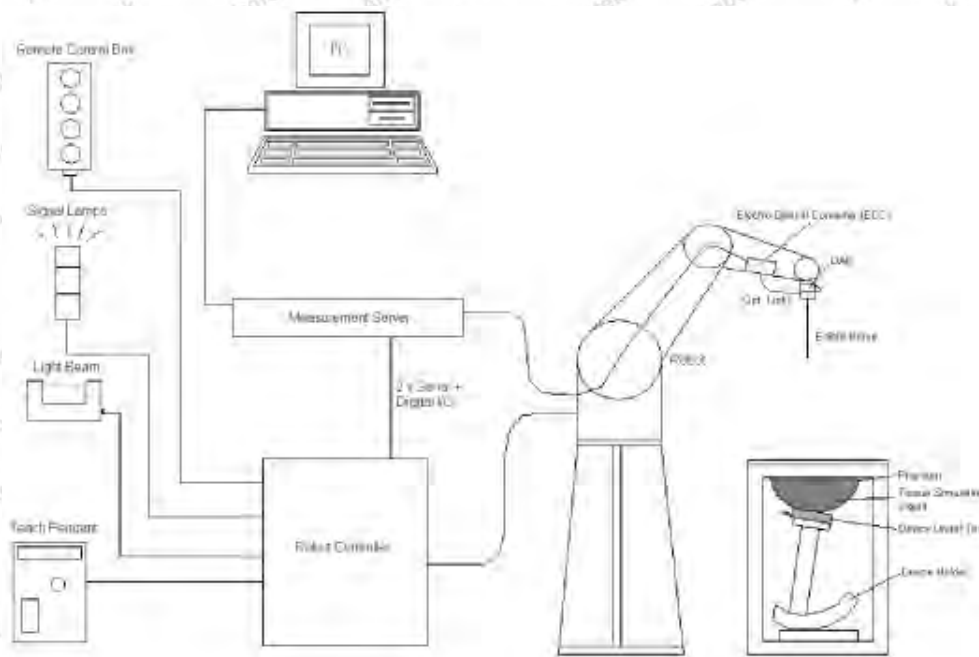
$$\text{SAR} = \frac{\sigma |E|^2}{\rho}$$

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

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



4 SAR Measurement System



DASY System Configurations

The DASY system for performance compliance tests is illustrated above graphically. This system consists of the following items:

- A standard high precision 6-axis robot with controller, a teach pendant and software
- A data acquisition electronic (DAE) attached to the robot arm extension
- A dosimetric probe equipped with an optical surface detector system
- The electro-optical converter (EOC) performs the conversion between optical and electrical signals
- A measurement server performs the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the accuracy of the probe positioning
- A computer operating Windows XP
- DASY software
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom
- A device holder
- Tissue simulating liquid
- Dipole for evaluating the proper functioning of the system

components are described in details in the following sub-sections.



4.1 E-Field Probe

The SAR measurement is conducted with the dosimetric probe (manufactured by SPEAG). The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. This probe has a built in optical surface detection system to prevent from collision with phantom.

➤ E-Field Probe Specification

<EX3DV4 Probe>

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	10 MHz to 6 GHz; Linearity: ± 0.2 dB	
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)	
Dynamic Range	10 μ W/g to 100 W/kg; Linearity: ± 0.2 dB (noise: typically < 1 μ W/g)	
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	

Photo of EX3DV4

➤ E-Field Probe Calibration

Each probe needs to be calibrated according to a dosimetric assessment procedure with accuracy better than $\pm 10\%$. The spherical isotropy shall be evaluated and within ± 0.25 dB. The sensitivity parameters (NormX, NormY, and NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested. The calibration data can be referred to appendix C of this report.

4.2 Data Acquisition Electronics (DAE)

The data acquisition electronics (DAE) consists 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 and 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 input impedance of the DAE is 200M Ω ; the inputs are symmetrical and floating. Common mode rejection is above 80dB.



**Photo of DAE**

4.3 Robot

The SPEAG DASY system uses the high precision robots (DASY5: TX60XL) type from Stäubli SA (France). For the 6-axis controllersystem, the robot controller version (DASY5: CS8c) from Stäubli is used. The Stäublirobot series have many features that are important for our application:

- High precision (repeatability ± 0.035 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)

**Photo of DASY5**

4.4 Measurement Server

The measurement server is based on a PC/104 CPU board with CPU (DASY5: 400 MHz, Intel Celeron), chipdisk (DASY5: 128 MB), RAM (DASY5: 128 MB). 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 board, which is directly connected to the PC/104 bus of the CPU board.

The measurement server performs all the real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operations.





Photo of Server for DASY5

4.5 Phantom

<SAM Twin Phantom>

Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet
Measurement Areas	Left Hand, Right Hand, Flat Phantom



Photo of SAM Phantom

The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

<ELI4 Phantom>

Shell Thickness	2 ± 0.2 mm (sagging: <1%)
Filling Volume	Approx. 30 liters
Dimensions	Major ellipse axis: 600 mm Minor axis: 400 mm

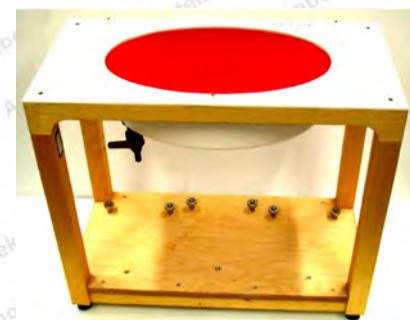


Photo of ELI4 Phantom

The ELI4 phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with standard and all known tissue simulating liquids.



4.6 Device Holder

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 5 mm distance, a positioning uncertainty of $\pm 0.5\text{mm}$ would produce a SAR uncertainty of $\pm 20\%$. 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 different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation center for both scales is 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 $\epsilon = 3$ and loss tangent $\delta = 0.02$. 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.



Device Holder

4.7 Data Storage and Evaluation

➤ Data Storage

The DASY software stores the assessed data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all the necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files. The post-processing 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 erroneous parameter settings. For example, if a measurement has been performed with an



incorrect crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be reevaluated.

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

➤ Data Evaluation

The DASY post-processing software (SEMCAD) 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	σ
	- Density	ρ

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 DASY components. In the direct measuring mode of the multi-meter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power.

The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}$$

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

U_i = input signal of channel i, (i = x, y, z)

cf = crest factor of exciting field (DASY parameter)

dcp_i = diode compression point (DASY parameter)

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



$$\text{E-field Probes: } E_i = \frac{V_i}{\text{Norm}_i \cdot \text{ConvF}}$$

$$\text{H-field Probes: } H_i = \sqrt{V_i} \cdot \frac{a_{i0} + a_{i1}f + a_{i2}f^2}{f}$$

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

Norm_i = sensor sensitivity of channel i , ($i = x, y, z$), $\mu\text{V}/(\text{V/m})^2$ for E-field Probes

ConvF = sensitivity enhancement in solution

a_{ij} = sensor sensitivity factors for H-field probes

f = carrier frequency [GHz]

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

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

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

$$E_{\text{tot}} = \sqrt{E_x^2 + E_y^2 + E_z^2}$$

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

$$\text{SAR} = E_{\text{tot}}^2 \cdot \frac{\sigma}{\rho \cdot 1000}$$

with SAR = local specific absorption rate in W/kg

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 set to 1, to account for actual head tissue density rather than the density of the tissue simulating liquid.



5 Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	1118	Jun. 08,2021	Jun. 07,2024
SPEAG	835MHz System Validation Kit	D835V2	4d154	Jun. 16,2021	Jun. 15,2024
SPEAG	1900MHz System Validation Kit	D1900V2	5d175	Jun. 15,2022	Jun. 14,2025
SPEAG	2300MHz System Validation Kit	D2300V2	1059	Sep.22,2021	Sep.21,2024
SPEAG	2450MHz System Validation Kit	D2450V2	910	Jun. 15,2021	Jun. 14,2024
SPEAG	2600MHz System Validation Kit	D2600V2	1058	Jun. 19,2021	Jun. 18,2024
Rohde & Schwarz	UNIVERSAL RADIO COMMUNICATION TESTER	CMW500	1201.0002K50-104209-JC	Aug.30,2022	Aug.29,2023
SPEAG	Data Acquisition Electronics	DAE3	428	Aug.30,2023	Aug.29,2024
SPEAG	Dosimetric E-Field Probe	EX3DV4	7396	May 06,2023	May 05,2024
Agilent	ENA Series Network Analyzer	E5071C	MY46317418	Oct. 25,2023	Oct. 24,2024
SPEAG	DAK	DAK-3.5	1226	NCR	NCR
SPEAG	SAM Twin Phantom	QD000P40CD	1802	NCR	NCR
SPEAG	ELI Phantom	QDOVA004AA	2058	NCR	NCR
AR	Amplifier	ZHL-42W	QA1118004	NCR	NCR
Agilent	Power Meter	N1914A	MY50001102	Oct. 25,2023	Oct. 24,2024
Agilent	Power Sensor	N8481H	MY51240001	Oct. 25,2023	Oct. 24,2024
R&S	Spectrum Analyzer	N9020A	MY51170037	Oct. 25,2023	Oct. 24,2024
Agilent	Signal Generation	N5182A	MY48180656	Oct. 25,2023	Oct. 24,2024
Worken	Directional Coupler	0110A05601O-10	COM5BNW1A2	Oct. 25,2023	Oct. 24,2024

Note:

1. The calibration certificate of DASY can be referred to appendix C of this report.
2. The dipole calibration interval can be extended to 3 years with justification. The dipoles are also not physically damaged, or repaired during the interval.
3. The Insertion Loss calibration of Dual Directional Coupler and Attenuator were characterized via the network analyzer and compensated during system check.
4. The dielectric probe kit was calibrated via the network analyzer, with the specified procedure (calibrated in pure water) and calibration kit (standard) short circuit, before the dielectric measurement. The specific procedure and calibration kit are provided by Agilent.
5. In system check we need to monitor the level on the power meter, and adjust the power amplifier level to have precise power level to the dipole; the measured SAR will be normalized to 1W input power according to the ratio of 1W to the input power to the dipole. For system check, the calibration of the power amplifier is deemed not critically required for correct measurement; the power meter is critical and we do have calibration for it



6 Tissue Simulating Liquids

For the measurement of the field distribution inside the SAM phantom with DASY, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 6.1. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm, which is shown as followed:

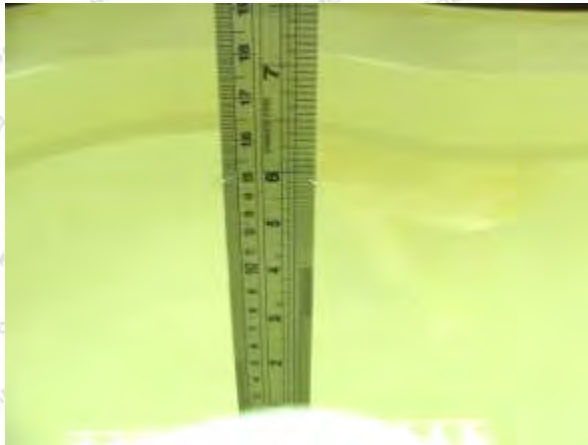


Photo of Liquid Height for Head SAR

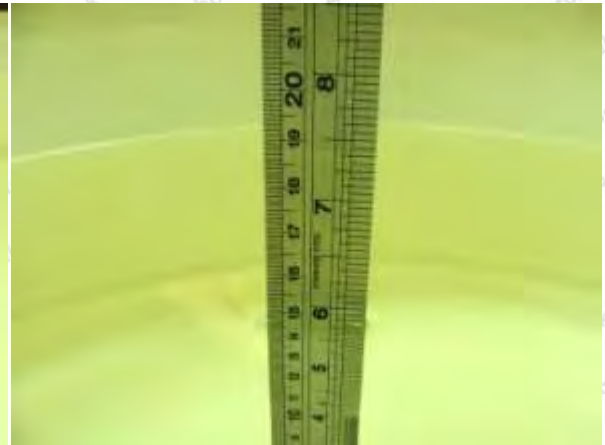


Photo of Liquid Height for Body SAR

The following table gives the recipes for tissue simulating liquid.

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (ϵ_r)
For Head								
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
1800,1900,2000	55.2	0	0	0.3	0	44.5	1.40	40.0
2450	55.0	0	0	0	0	45.0	1.80	39.2
2600	54.8	0	0	0.1	0	45.1	1.96	39.0
For Body								
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
1800,1900,2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0	0	31.4	1.95	52.7
2600	65.5	0	0	0	0	31.5	2.16	52.5



The following table shows the measuring results for simulating liquid.

Measured Frequency (MHz)	Target Tissue		Measured Tissue				Liquid Temp.	Test Data
	ϵ_r	σ	ϵ_r	Dev.	σ	Dev.		
750	41.9	0.89	41.10	-1.91%	0.89	0.00%	22.5	11/02/2023
835	41.5	0.90	41.65	0.36%	0.905	0.56%	22.6	11/03/2023
1900	40.0	1.40	40.2	0.50%	1.42	1.43%	22.5	11/05/2023
2300	39.5	1.67	38.41	-2.76%	1.63	-2.40%	22.4	11/06/2023
2450	39.2	1.80	38.2	-1.91%	1.83	0.00%	22.3	11/07/2023
2600	39.0	1.96	38.83	0.36%	1.93	0.56%	22.5	11/08/2023



7 System Verification Procedures

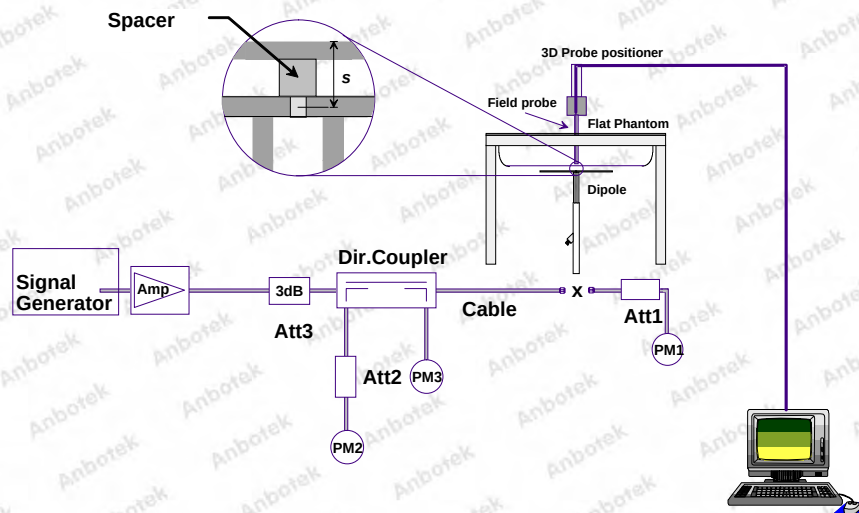
Each DASY system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the DASY software, enable the user to conduct the system performance check and system validation. System validation kit includes a dipole, tripod holder to fix it underneath the flat phantom and a corresponding distance holder.

➤ **Purpose of System Performance check**

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results. The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

➤ System Setup

In the simplified setup for system evaluation, the EUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave that comes from a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The equipment setup is shown below:



System Setup for System Evaluation



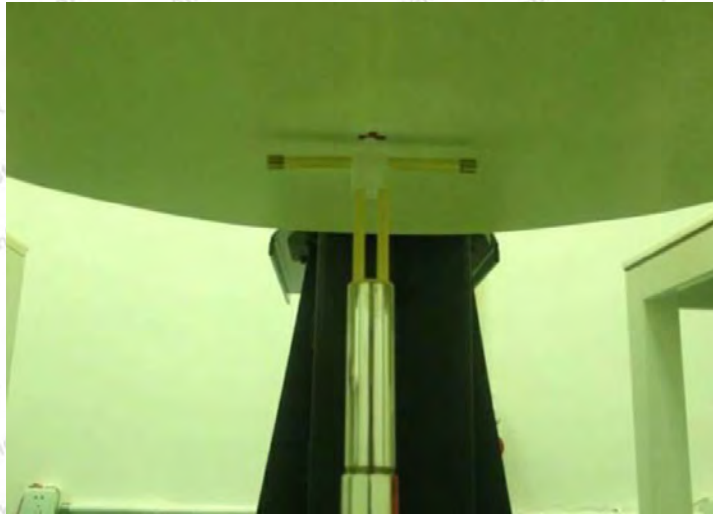


Photo of Dipole Setup

➤ Validation Results

Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10%. The table below shows the target SAR and measured SAR after normalized to 1W input power. It indicates that the system performance check can meet the variation criterion and the plots can be referred to Appendix A of this report.

Date	Frequency (MHz)	Power fed onto reference dipole (mW)	Targeted SAR (W/kg)	Measured SAR (W/kg)	Normalized SAR (W/kg)	Deviation
11/02/2023	750	250	8.31	2.08	8.32	0.12%
11/03/2023	835	250	9.24	2.48	9.92	7.36%
11/05/2023	1900	250	40.4	9.86	39.44	-2.38%
11/06/2023	2300	250	48.3	12.33	49.32	2.11%
11/07/2023	2450	250	52.4	13.30	53.2	1.53%
11/08/2023	2600	250	57.2	14.20	56.8	-0.70%

Target and Measurement SAR after Normalized



8 EUT Testing Position

8.1 Body-Supported Device Configurations

According to KDB 616217 section 4.3, SAR should be separately assessed with each surface and separation distance positioned against the flat phantom that correspond to the intended use as specified by the manufacturer. The antennas in tablets are typically located near the back (bottom) surface and/or along the edges of the devices; therefore, SAR evaluation is required for these configurations. Exposures from antennas through the front (top) surface of the display section of a full-size tablet, away from the edges, are generally limited to the user's hands. Exposures to hands for typical consumer transmitters used in tablets are not expected to exceed the extremity SAR limit; therefore, SAR evaluation for the front surface of tablet display screens are generally not necessary, except for tablets that are designed to require continuous operations with the hand(s) next to the antenna(s).

- To position the device parallel to the phantom surface with either keypad up or down.
- To adjust the device parallel to the flat phantom.
- To adjust the distance between the device surface and the flat phantom to 0 mm.
- When each surface is measurement, the SAR Test Exclusion Threshold in KDB 447498 should be applied.

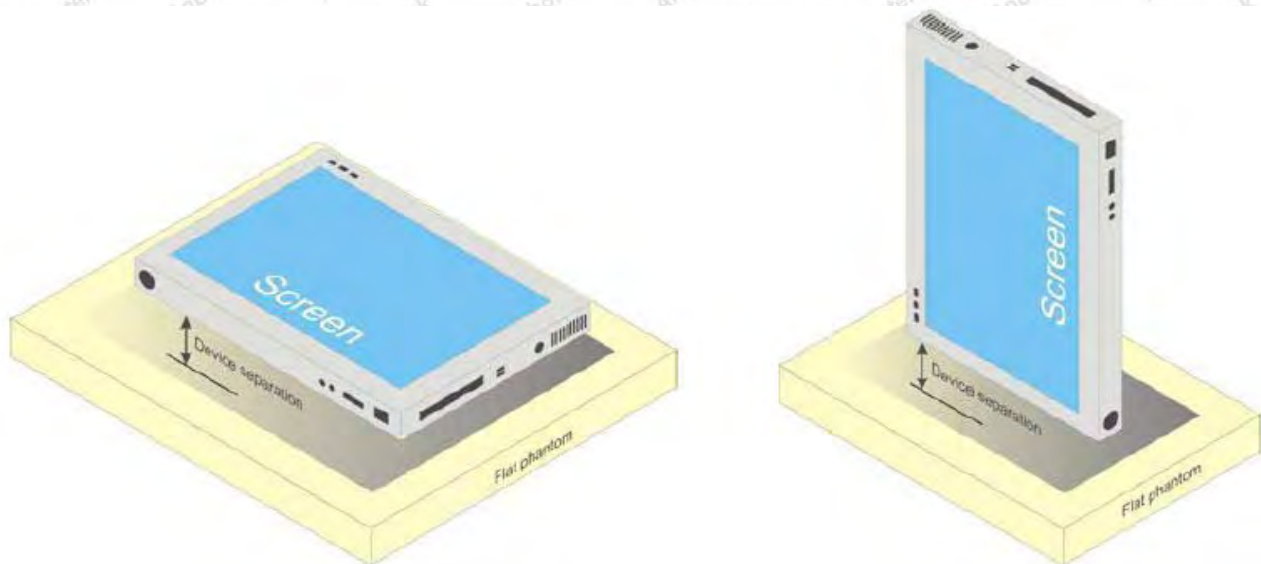


Fig.8.1 Illustration for Body Position



8.2 Wireless Router (Hotspot) Configurations

Wireless Router (Hotspot) Configurations Some battery-operated handsets have the capability to transmit and receive internet connectivity through simultaneous transmission of WIFI in conjunction with a separate licensed transmitter. The FCC has provided guidance in KDB Publication 941225 D06 where SAR test considerations for handsets ($L \times W \geq 9 \text{ cm} \times 5 \text{ cm}$) 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-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. Therefore, SAR must be evaluated for each frequency transmission and mode separately and summed with the WIFI transmitter according to KDB 648474 publication procedures. The “Portable Hotspot” feature on the handset was NOT activated, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal.

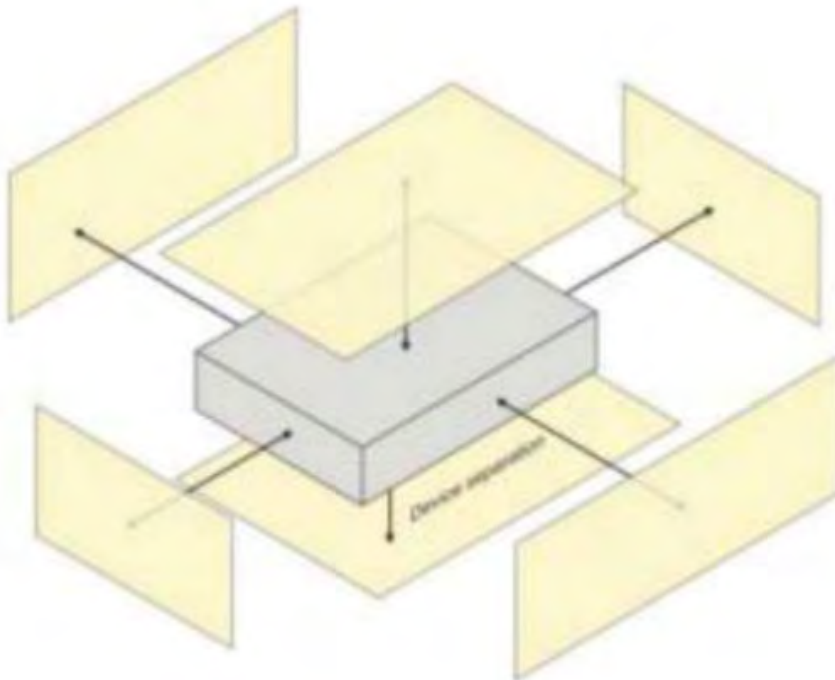


Fig.8.2 Illustration for Hotspot Position



9 Measurement Procedures

The measurement procedures are as follows:

- Use base station simulator (if applicable) or engineering software to transmit RF power continuously (continuous Tx) in the middle channel.
- Keep EUT to radiate maximum output power or 100% duty factor (if applicable)
- Measure output power through RF cable and power meter.
- Place the EUT in the positions as setup photos demonstrates.
- Set scan area, grid size and other setting on the DASY software.
- Measure SAR transmitting at the middle channel for all applicable exposure positions.
- Identify the exposure position and device configuration resulting the highest SAR
- Measure SAR at the lowest and highest channels at the worst exposure position and device configuration if applicable.

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

- Power reference measurement
- Area scan
- Zoom scan
- Power drift measurement

9.1 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

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

- Extraction of the measured data (grid and values) from the Zoom Scan
- Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
- Generation of a high-resolution mesh within the measured volume
- Interpolation of all measured values from the measurement grid to the high-resolution grid
- Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
- Calculation of the averaged SAR within masses of 1g and 10g



9.2 Power Reference Measurement

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

9.3 Area Scan Procedures

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

Area scan parameters extracted from FCC KDB 865664 D01 SAR measurement 100 MHz to 6 GHz.

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

9.4 Zoom Scan Procedures

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

Zoom scan parameters extracted from FCC KDB 865664 D01 SAR measurement 100 MHz to 6 GHz.



			≤ 3 GHz	> 3 GHz
Maximum zoom scan spatial resolution: $\Delta x_{\text{Zoom}}, \Delta y_{\text{Zoom}}$			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm *	3 – 4 GHz: ≤ 5 mm * 4 – 6 GHz: ≤ 4 mm *
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{\text{Zoom}}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{\text{Zoom}}(1)$: between 1 st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{\text{Zoom}}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{\text{Zoom}}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.				
* When zoom scan is required and the <u>reported</u> SAR from the <i>area scan based 1-g SAR estimation</i> procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

9.5 Volume Scan Procedures

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

9.6 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In DASY measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drift more than 5%, the SAR will be retested.



10 TEST CONDITIONS AND RESULTS

10.1 Conducted Power

<GSM Conducted power>

Conducted power measurement results (GSM850/1900)

Band GSM850	Burst Average Power (dBm)				Frame-Average Power (dBm)		
TX Channel	Tune-up	128	190	251	128	190	251
Frequency (MHz)		824.2	836.6	848.8	824.2	836.6	848.6
GSM	32±1	32.63	32.43	32.61	--	--	--
GPRS (GMSK, 1 Tx slot)	32±1	32.61	32.4	32.61	23.58	23.37	23.58
GPRS (GMSK, 2 Tx slots)	30±1	30.06	29.94	30.08	24.04	23.92	24.06
GPRS (GMSK, 3 Tx slots)	28±1	28.36	28.11	28.27	24.1	23.85	24.01
GPRS (GMSK, 4 Tx slots)	27±1	27.12	26.95	27.10	24.11	23.94	24.09
Band PCS1900	Burst Average Power (dBm)				Frame-Average Power (dBm)		
TX Channel	Tune-up	512	661	810	512	661	810
Frequency (MHz)	power	1850.2	1880.0	1909.8	1850.2	1880.0	1909.8
GSM	30±1	30.15	29.76	29.82	--	--	--
GPRS (GMSK, 1 Tx slot)	30±1	30.13	29.73	29.81	21.1	20.7	20.78
GPRS (GMSK, 2 Tx slots)	27±1	27.78	27.48	27.53	21.76	21.46	21.51
GPRS (GMSK, 3 Tx slots)	26±1	26.2	25.88	25.91	21.94	21.62	21.65
GPRS (GMSK, 4 Tx slots)	25±1	25.06	24.73	24.77	22.05	21.72	21.76

Remark: The frame-averaged power is linearly scaled the maximum burst averaged power over 8 time slots.
The calculated method are shown as below:

Frame-averaged power = Maximum burst averaged power (1 Tx Slot) – 9.03 dB

Frame-averaged power = Maximum burst averaged power (2 Tx Slots) – 6.02 dB

Frame-averaged power = Maximum burst averaged power (3 Tx Slots) - 4.26 dB

Frame-averaged power = Maximum burst averaged power (4 Tx Slots) – 3.01 dB

Note:

1. Per KDB 447498 D01, the maximum output power channel is used for SAR testing and for further SAR test reduction
2. For Data mode SAR testing, GPRS should be evaluated, therefore the EUT was set in **GPRS 4Tx slots** due to its highest frame-average power.



<WCDMA Conducted Power>

The following tests were conducted according to the test requirements outlines in 3GPP TS 34.121 specification.

A summary of these settings are illustrated below:

HSDPA Setup Configuration:

- a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
- b. The RF path losses were compensated into the measurements.
- c. A call was established between EUT and Base Station with following setting:
 - i. Set Gain Factors (β_c and β_d) and parameters were set according to each
 - ii. Specific sub-test in the following table, C10.1.4, quoted from the TS 34.121
 - iii. Set RMC 12.2Kbps + HSDPA mode.
 - iv. Set Cell Power = -86 dBm
 - v. Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)
 - vi. Select HSDPA Uplink Parameters
 - vii. Set Delta ACK, Delta NACK and Delta CQI = 8
 - viii. Set Ack-Nack Repetition Factor to 3
 - ix. Set CQI Feedback Cycle (k) to 4 ms
 - x. Set CQI Repetition Factor to 2
 - xi. Power Ctrl Mode = All Up bits
- d. The transmitted maximum output power was recorded.

Table C.10.1.4: β values for transmitter characteristics tests with HS-DPCCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (Note 1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$.

Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and $\Delta_{NACK} = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$, and $\Delta_{CQI} = 24/15$ with $\beta_{hs} = 24/15 * \beta_c$.

Note 3: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 11/15$ and $\beta_d = 15/15$.

Setup Configuration

HSUPA Setup Configuration:

- a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
- b. The RF path losses were compensated into the measurements.
- c. A call was established between EUT and Base Station with following setting * :
 - i. Call Configs = 5.2B, 5.9B, 5.10B, and 5.13.2B with QPSK
 - ii. Set the Gain Factors (β_c and β_d) and parameters (AG Index) were set according to each specific sub-test in the following table, C11.1.3, quoted from the TS 34.121
 - iii. Set Cell Power = -86 dBm
 - iv. Set Channel Type = 12.2k + HSPA
 - v. Set UE Target Power
 - vi. Power Ctrl Mode= Alternating bits
 - vii. Set and observe the E-TFCI
 - viii. Confirm that E-TFCI is equal to the target E-TFCI of 75 for sub-test 1, and other subtest's E-TFCI
- d. The transmitted maximum output power was recorded.

Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note 1)	β_{ec}	β_{ed} (Note 5) (Note 6)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 6)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/25	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1} : 47/15 β_{ed2} : 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (Note 4)	15/15 (Note 4)	64	15/15 (Note 4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81
Note 1: Δ_{ACK} , Δ_{NACK} and $\Delta_{CQI} = 30/15$ with $\beta_{HS} = 30/15 * \beta_c$. Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{HS}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference. Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$. Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 14/15$ and $\beta_d = 15/15$. Note 5: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g. Note 6: β_{ed} can not be set directly, it is set by Absolute Grant Value.													

Setup Configuration

<WCDMA Conducted Power>

WCDMA	Band II (dBm)				Band V (dBm)			
TX Channel	Tune-up	9262	9400	9538	Tune-up	4132	4183	4233
Frequency (MHz)		1852.4	1880.0	1907.6		826.4	836.6	846.6
RMC 12.2Kbps	23±1	23.62	23.59	23.50	23±1	23.56	23.54	23.51
RMC AMR	23±1	23.59	23.57	23.5	23±1	23.55	23.52	23.5
HSDPA Subtest-1	22±1	22.61	22.52	22.57	22±1	22.6	22.67	22.59
HSDPA Subtest-2	21±1	21.37	21.43	21.44	21±1	21.41	21.35	21.43
HSDPA Subtest-3	21±1	20.58	20.54	20.6	21±1	20.67	20.63	20.55
HSDPA Subtest-4	21±1	21.64	21.69	21.54	21±1	21.7	21.69	21.66
HSUPA Subtest-1	21±1	21.02	21.17	21.19	21±1	21.08	21.14	21.11
HSUPA Subtest-2	20±1	20.29	20.23	20.17	20±1	20.11	20.12	20.13
HSUPA Subtest-3	19±1	19.62	19.64	19.7	19±1	19.68	19.69	19.71
HSUPA Subtest-4	19±1	19.19	19.05	19.14	19±1	19.01	19.03	19.05
HSUPA Subtest-5	19±1	18.63	18.52	18.67	19±1	18.59	18.54	18.61

General Note

1. Per KDB 941225 D01 v02, RMC 12.2kbps setting is used to evaluate SAR. If AMR 12.2kbps power is < 0.25dB higher than RMC 12.2kbps, SAR tests with AMR 12.2kbps can be excluded.
2. By design, AMR and HSDPA/HSUPA RF power will not be larger than RMC 12.2kbps, detailed information is included in Tune-up Procure exhibit.
3. It is expected by the manufacturer that MPR for some HSDPA/HSUPA subtests may differ from the specification of 3GPP, according to the chipset implementation in this model. The implementation and expected deviation are detailed in tune-up procedure exhibit.



<LTE Conducted Power>

LTE-FDD Band 2				Actual output Power (dBm)		
Band-width	RBallocation	RBoffset	Modulation	Low	Middle	High
1.4 MHz				1850.7MHz	1880MHz	1909.3MHz
	1RB	High	QPSK	22.74	22.78	22.75
			16QAM	21.77	21.8	21.78
		Middle	QPSK	22.73	22.77	22.72
			16QAM	21.78	21.82	21.79
		Low	QPSK	22.75	22.74	22.72
			16QAM	21.8	21.82	21.8
	3RB	High	QPSK	22.62	22.67	22.62
			16QAM	21.54	21.56	21.53
		Middle	QPSK	22.63	22.65	22.63
			16QAM	21.56	21.59	21.54
		Low	QPSK	22.62	22.68	22.65
16QAM			21.54	21.58	21.55	
6RB	/	QPSK	21.79	21.84	21.78	
		16QAM	20.63	20.67	20.64	
3 MHz				1851.5MHz	1880MHz	1908.5MHz
	1RB	High	QPSK	22.72	22.75	22.73
			16QAM	21.81	21.83	21.81
		Middle	QPSK	22.7	22.75	22.71
			16QAM	21.82	21.86	21.82
		Low	QPSK	22.72	22.76	22.73
			16QAM	21.8	21.83	21.8
	8RB	High	QPSK	22.07	22.1	22.06
			16QAM	20.92	20.95	20.93
		Middle	QPSK	22.02	22.03	22.03
			16QAM	20.91	20.95	20.91
		Low	QPSK	22.03	22.06	22.04
			16QAM	20.93	20.95	20.95
	15RB	/	QPSK	21.99	22.04	22.01
16QAM			20.9	20.96	20.89	
5 MHz				1852.5MHz	1880MHz	1907.5MHz
	1RB	High	QPSK	22.69	22.72	22.70
			16QAM	21.79	21.82	21.80
		Middle	QPSK	22.71	22.75	22.72
			16QAM	21.81	21.85	21.80
		Low	QPSK	22.70	22.72	22.69



	12RB	High	16QAM	21.79	21.82	21.80
			QPSK	22.07	22.12	22.05
		Middle	16QAM	20.96	21.03	20.97
			QPSK	22.07	22.11	22.08
		Low	16QAM	20.97	21.01	20.96
			QPSK	22.06	22.09	22.07
		25RB	16QAM	20.99	21.02	21.00
			QPSK	22.04	22.08	22.05
10 MHz	1RB	High	16QAM	20.93	20.96	20.93
			QPSK	22.04	22.08	22.05
		Middle	16QAM	21.80	21.84	21.79
			QPSK	22.71	22.75	22.71
		Low	16QAM	21.80	21.82	21.80
			QPSK	22.71	22.75	22.71
	25RB	High	16QAM	20.96	21.00	20.97
			QPSK	22.03	22.08	22.05
		Middle	16QAM	21.00	21.02	20.99
			QPSK	22.03	22.08	22.05
		Low	16QAM	20.98	21.01	20.99
			QPSK	22.02	22.06	22.03
	50RB	/	16QAM	20.94	20.97	20.93
			QPSK	22.05	22.08	22.04
15 MHz	1RB	High	16QAM	21.79	21.82	21.80
			QPSK	22.73	22.76	22.74
		Middle	16QAM	21.80	21.85	21.80
			QPSK	22.70	22.76	22.70
		Low	16QAM	21.81	21.84	21.82
			QPSK	22.72	22.75	22.73
	36RB	High	16QAM	20.96	20.98	20.96
			QPSK	22.05	22.09	22.06
		Middle	16QAM	20.98	21.01	20.97
			QPSK	22.03	22.08	22.02
		Low	16QAM	20.94	20.98	20.95
			QPSK	22.06	22.11	22.08
	75RB	/	16QAM	20.89	20.94	20.90
			QPSK	21.96	22.00	21.97



20 MHz				1860MHz	1880MHz	1900MHz
	1RB	High	QPSK	22.69	22.75	22.70
			16QAM	21.79	21.84	21.81
		Middle	QPSK	22.72	22.76	22.73
			16QAM	21.82	21.84	21.80
		Low	QPSK	22.74	22.77	22.75
			16QAM	21.82	21.85	21.83
	50RB	High	QPSK	22.06	22.12	21.98
			16QAM	20.94	21.00	20.95
		Middle	QPSK	22.05	22.09	22.06
			16QAM	21.00	21.04	21.01
		Low	QPSK	22.06	22.09	22.07
			16QAM	21.01	21.04	21.02
	100RB	/	QPSK	21.99	22.05	21.98
			16QAM	20.88	20.94	20.87



LTE-FDD Band 5				Actual output Power (dBm)		
Band-width	RBallocation	RBoffset	Modulation	Low	Middle	High
1.4 MHz	1RB	High	QPSK	824.7MHz	836.5MHz	848.3MHz
			16QAM	22.7	22.73	22.68
		Middle	QPSK	21.91	21.93	21.86
			16QAM	22.72	22.74	22.71
		Low	QPSK	21.91	21.95	21.9
			16QAM	22.69	22.74	22.72
	3RB	High	QPSK	21.9	21.91	21.89
			16QAM	22.53	22.52	22.5
		Middle	QPSK	21.6	21.62	21.63
			16QAM	22.53	22.52	22.5
		Low	QPSK	21.6	21.62	21.63
			16QAM	21.5	22.52	22.51
	6RB	/	QPSK	21.66	21.67	21.62
			16QAM	21.52	21.56	21.52
3 MHz	1RB	High	QPSK	825.5MHz	836.5MHz	847.5MHz
			16QAM	22.69	22.73	22.68
		Middle	QPSK	21.91	21.91	21.9
			16QAM	22.72	22.76	22.71
		Low	QPSK	21.9	21.92	21.91
			16QAM	22.68	22.75	22.71
	8RB	High	QPSK	21.9	21.94	21.88
			16QAM	21.55	21.54	21.53
		Middle	QPSK	20.63	20.64	20.67
			16QAM	21.53	21.55	21.53
		Low	QPSK	20.67	20.66	20.66
			16QAM	21.52	21.57	21.51
	15RB	/	QPSK	20.61	20.68	20.6
			16QAM	21.54	21.53	21.51
5 MHz	1RB	High	QPSK	826.5MHz	836.5MHz	846.5MHz
			16QAM	22.64	22.66	22.66
		Middle	QPSK	21.88	21.88	21.87
			16QAM	22.7	22.72	22.67
		Low	QPSK	21.88	21.9	21.91
			16QAM	22.7	22.73	22.71
	12RB	High	QPSK	21.91	21.9	21.91
				21.58	21.56	21.57



		Middle	16QAM	20.68	20.65	20.69
			QPSK	21.59	21.61	21.56
		Low	16QAM	20.63	20.67	20.68
			QPSK	21.62	21.64	21.59
		25RB	16QAM	20.67	20.68	20.62
			QPSK	21.58	21.57	21.52
10 MHz		/	16QAM	20.68	20.69	20.65
		High	829MHz	836.5MHz	844MHz	
			QPSK	22.72	22.75	22.68
		Middle	16QAM	21.93	21.94	21.91
			QPSK	22.72	22.76	22.72
		Low	16QAM	21.9	21.93	21.88
			QPSK	22.71	22.73	22.7
		25RB	16QAM	21.9	21.94	21.89
			QPSK	21.61	21.62	21.57
		High	16QAM	20.62	20.64	20.6
			QPSK	21.59	21.61	21.57
		Middle	16QAM	20.66	20.71	20.66
			QPSK	21.58	21.62	21.58
		Low	16QAM	20.69	20.66	20.64
			QPSK	21.63	21.59	21.52
		50RB	16QAM	20.69	20.71	20.66



LTE-FDD Band 7				Actual output Power (dBm)		
Band-width	RBAallocation	RBOffset	Modulation	Low	Middle	High
5 MHz				2502.5MHz	2535MHz	2567.5MHz
	1RB	High	QPSK	22.5	22.57	22.52
			16QAM	21.49	21.53	21.48
		Middle	QPSK	22.52	22.57	22.51
			16QAM	21.54	21.59	21.55
		Low	QPSK	22.52	22.52	22.53
			16QAM	21.53	21.55	21.55
	12RB	High	QPSK	21.38	21.4	21.34
			16QAM	20.19	20.24	20.18
		Middle	QPSK	21.41	21.45	21.41
			16QAM	20.2	20.26	20.18
		Low	QPSK	21.41	21.42	21.34
			16QAM	20.28	20.29	20.16
	25RB		QPSK	21.4	21.48	21.36
			16QAM	20.25	20.29	20.21
10 MHz				2505MHz	2535MHz	2565MHz
	1RB	High	QPSK	22.55	22.57	22.49
			16QAM	21.52	21.56	21.51
		Middle	QPSK	22.55	22.53	22.46
			16QAM	21.56	21.57	21.51
		Low	QPSK	22.50	22.50	22.47
			16QAM	21.53	21.55	21.52
	25RB	High	QPSK	21.35	21.39	21.36
			16QAM	20.37	20.38	20.34
		Middle	QPSK	21.42	21.42	21.36
			16QAM	20.43	20.44	20.41
		Low	QPSK	21.41	21.45	21.32
			16QAM	20.37	20.40	20.38
	50RB		QPSK	21.41	21.41	21.35
			16QAM	20.39	20.42	20.37
15 MHz				2507.5MHz	2535MHz	2562.5MHz
	1RB	High	QPSK	22.50	22.55	22.49
			16QAM	21.52	21.55	21.52
		Middle	QPSK	22.48	22.58	22.51
			16QAM	21.54	21.58	21.54
		Low	QPSK	22.53	22.55	22.49
			16QAM	21.51	21.55	21.54



	36RB	High	QPSK	21.33	21.42	21.35
			16QAM	20.38	20.42	20.35
		Middle	QPSK	21.37	21.43	21.37
			16QAM	20.39	20.44	20.36
		Low	QPSK	21.38	21.38	21.35
			16QAM	20.45	20.47	20.34
		75RB	QPSK	21.39	21.45	21.39
			16QAM	20.42	20.44	20.36
20 MHz				2510MHz	2535MHz	2560MHz
	1RB	High	QPSK	22.51	22.59	22.52
			16QAM	21.55	21.57	21.52
		Middle	QPSK	22.53	22.61	22.57
			16QAM	21.54	21.60	21.55
		Low	QPSK	22.54	22.59	22.54
			16QAM	21.52	21.55	21.51
	50RB	High	QPSK	21.57	21.60	21.55
			16QAM	20.39	20.45	20.36
		Middle	QPSK	21.39	21.44	21.39
			16QAM	20.41	20.45	20.38
		Low	QPSK	21.37	21.40	21.41
			16QAM	20.38	20.45	20.38
	100RB	QPSK	21.42	21.48	21.41	
		16QAM	20.41	20.47	20.50	



LTE-FDD Band 17				Actual output Power (dBm)		
Band-width	RBAallocation	RBOffset	Modulation	High	Middle	Low
5 MHz				706.5MHz	710MHz	713.5MHz
	1RB	High	QPSK	22.56	22.56	22.54
			16QAM	21.62	21.65	21.61
		Middle	QPSK	22.52	22.54	22.55
			16QAM	21.59	21.63	21.61
		Low	QPSK	22.52	22.55	22.55
			16QAM	21.6	21.63	21.59
	12RB	High	QPSK	21.56	21.54	21.55
			16QAM	20.77	20.78	20.77
		Middle	QPSK	21.54	21.56	21.54
			16QAM	20.75	20.76	20.74
		Low	QPSK	21.54	21.57	21.54
			16QAM	20.73	20.77	20.76
	25RB	/	QPSK	21.51	21.52	21.51
16QAM			20.72	20.73	20.72	
10 MHz				709MHz	710MHz	711MHz
	1RB	High	QPSK	22.56	22.60	22.53
			16QAM	21.64	21.66	21.63
		Middle	QPSK	22.52	22.54	22.53
			16QAM	21.62	21.64	21.61
		Low	QPSK	22.54	22.56	22.55
			16QAM	21.61	21.64	21.6
	25RB	High	QPSK	21.59	21.65	21.6
			16QAM	20.77	20.78	20.77
		Middle	QPSK	21.54	21.56	21.55
			16QAM	20.73	20.77	20.78
		Low	QPSK	21.54	21.55	21.55
			16QAM	20.73	20.72	20.76
	50RB	/	QPSK	21.51	21.54	21.54
			16QAM	20.71	20.75	20.76



LTE-TDD Band 38				Actual output Power (dBm)		
Band-width	RBAallocation	RBOffset	Modulation	Low	Middle	High
5 MHz				2572.5	2595	2617.5
	1RB	High	QPSK	22.63	22.7	22.6
			16QAM	21.58	21.65	21.55
		Middle	QPSK	22.65	22.73	22.62
			16QAM	21.6	21.68	21.55
		Low	QPSK	22.64	22.7	22.59
			16QAM	21.58	21.65	21.55
	12RB	High	QPSK	21.73	21.82	21.66
			16QAM	20.47	20.58	20.43
		Middle	QPSK	21.73	21.81	21.69
			16QAM	20.48	20.56	20.42
		Low	QPSK	21.72	21.79	21.68
			16QAM	20.5	20.57	20.46
	25RB		QPSK	21.7	21.78	21.66
			16QAM	20.44	20.51	20.39
10 MHz				2575	2595	2615
	1RB	High	QPSK	22.62	22.69	22.59
			16QAM	21.57	21.64	21.54
		Middle	QPSK	22.64	22.72	22.61
			16QAM	21.59	21.67	21.54
		Low	QPSK	22.63	22.69	22.58
			16QAM	21.57	21.64	21.54
	25RB	High	QPSK	21.72	21.81	21.65
			16QAM	20.46	20.57	20.42
		Middle	QPSK	21.72	21.8	21.68
			16QAM	20.47	20.55	20.41
		Low	QPSK	21.71	21.78	21.67
			16QAM	20.49	20.56	20.45
	50RB		QPSK	21.69	21.77	21.65
			16QAM	20.43	20.5	20.38
15 MHz				2577.5	2595	2612.5
	1RB	High	QPSK	22.66	22.73	22.63
			16QAM	21.57	21.64	21.54
		Middle	QPSK	22.63	22.73	22.59
			16QAM	21.58	21.67	21.54
		Low	QPSK	22.65	22.72	22.62
			16QAM	21.59	21.66	21.56



	36RB	High	QPSK	21.7	21.78	21.66
			16QAM	20.46	20.52	20.41
		Middle	QPSK	21.68	21.77	21.62
			16QAM	20.48	20.55	20.42
		Low	QPSK	21.71	21.8	21.68
			16QAM	20.44	20.52	20.4
	75RB		QPSK	21.61	21.69	21.57
			16QAM	20.39	20.48	20.35
20 MHz				2580	2595	2610
	1RB	High	QPSK	22.62	22.72	22.69
			16QAM	21.57	21.66	21.65
		Middle	QPSK	22.65	22.73	22.72
			16QAM	21.6	21.66	21.64
		Low	QPSK	22.67	22.74	22.74
			16QAM	21.6	21.67	21.67
	50RB	High	QPSK	21.71	21.81	21.68
			16QAM	20.44	20.54	20.5
		Middle	QPSK	21.7	21.78	21.76
			16QAM	20.5	20.58	20.56
		Low	QPSK	21.71	21.78	21.77
			16QAM	20.51	20.58	20.57
	100RB		QPSK	21.64	21.74	21.68
			16QAM	20.38	20.48	20.42



LTE-TDD Band 40A				Actual output Power (dBm)		
BW(MHz)	Modulation	RB Size	RB Offset	Low	Middle	High
Channel number:				38725	38750	38775
5	QPSK	1	0	22.24	22.27	22.19
		1	12	22.17	22.20	22.12
		1	24	22.15	22.18	22.10
		12	0	21.19	21.22	21.15
		12	6	21.15	21.18	21.10
		12	11	21.19	21.22	21.15
		25	0	21.13	21.16	21.08
	16QAM	1	0	21.11	21.13	21.06
		1	12	21.08	21.11	21.04
		1	24	21.04	21.07	20.99
		12	0	20.24	20.27	20.19
		12	6	20.31	20.33	20.26
		12	11	20.26	20.29	20.22
		25	0	20.28	20.31	20.24
Channel number:				/	39150	/
10	QPSK	1	0	/	22.20	/
		1	24	/	22.18	/
		1	49	/	22.16	/
		25	0	/	21.20	/
		25	12	/	21.16	/
		25	24	/	21.20	/
		50	0	/	21.14	/
	16QAM	1	0	/	21.11	/
		1	24	/	21.09	/
		1	49	/	21.05	/
		25	0	/	20.25	/
		25	12	/	20.31	/
		25	24	/	20.27	/
		50	0	/	20.29	/

LTE-TDD Band 40B				Actual output Power (dBm)		
BW(MHz)	Modulation	RB Size	RB Offset	Low	Middle	High
Channel number:				39175	39200	39225
5	QPSK	1	0	22.20	22.23	22.15
		1	12	22.13	22.16	22.08
		1	24	22.11	22.14	22.06



		12	0	21.15	21.18	21.11
		12	6	21.11	21.14	21.06
		12	11	21.15	21.18	21.11
		25	0	21.09	21.12	21.04
	16QAM	1	0	21.07	21.09	21.02
		1	12	21.04	21.07	21.00
		1	24	21.00	21.03	20.95
		12	0	20.20	20.23	20.15
		12	6	20.27	20.29	20.22
		12	11	20.22	20.25	20.18
		25	0	20.24	20.27	20.20
	Channel number:			/	39200	/
10	QPSK	1	0	/	22.16	/
		1	24	/	22.14	/
		1	49	/	22.12	/
		25	0	/	21.16	/
		25	12	/	21.12	/
		25	24	/	21.16	/
		50	0	/	21.10	/
	16QAM	1	0	/	21.07	/
		1	24	/	21.05	/
		1	49	/	21.01	/
		25	0	/	20.21	/
		25	12	/	22.16	/
		25	24	/	22.14	/
		50	0	/	22.12	/



LTE-TDD Band 41				Actual output Power (dBm)				
BW	RAllocation	ROffset	Modulation	Low	Middle1	Middle2	Middle3	High
5 MHz				2498.5 MHz	2545.8 MHz	2593 MHz	2640.3 MHz	2687.5 MHz
	1RB	High	QPSK	22.52	22.46	22.55	22.53	22.55
			16QAM	21.51	21.4	21.46	21.44	21.46
		Middle	QPSK	22.54	22.48	22.55	22.52	22.54
			16QAM	21.5	21.45	21.52	21.51	21.53
		Low	QPSK	22.55	22.48	22.5	22.54	22.56
			16QAM	21.48	21.44	21.48	21.51	21.53
	12RB	High	QPSK	21.64	21.62	21.66	21.64	21.37
			16QAM	20.38	20.38	20.45	20.43	20.36
		Middle	QPSK	21.63	21.65	21.71	21.71	21.64
			16QAM	20.4	20.39	20.47	20.43	20.36
		Low	QPSK	21.61	21.65	21.68	21.64	21.57
			16QAM	20.37	20.47	20.5	20.41	20.34
	25RB		QPSK	21.66	21.64	21.74	21.66	21.59
			16QAM	20.4	20.44	20.5	20.46	20.39
10 MHz				2501 MHz	2547 MHz	2593 MHz	2639 MHz	2685 MHz
	1RB	High	QPSK	22.59	22.54	22.56	22.51	22.53
			16QAM	21.51	21.46	21.5	21.48	21.5
		Middle	QPSK	22.59	22.54	22.52	22.48	22.5
			16QAM	21.55	21.5	21.51	21.48	21.5
		Low	QPSK	22.54	22.49	22.49	22.49	22.51
			16QAM	21.52	21.47	21.49	21.49	21.51
	25RB	High	QPSK	21.59	21.62	21.66	21.67	21.6
			16QAM	20.36	20.39	20.4	20.4	20.33
		Middle	QPSK	21.66	21.69	21.69	21.67	21.6
			16QAM	20.42	20.45	20.46	20.47	20.4
		Low	QPSK	21.65	21.68	21.72	21.63	21.56
			16QAM	20.36	20.39	20.42	20.44	20.37
	50RB		QPSK	21.65	21.68	21.68	21.66	21.59
			16QAM	20.38	20.41	20.44	20.43	20.36
15 MHz				2503.5 MHz	2548.3 MHz	2593 MHz	2637.8 MHz	2682.5 MHz
	1RB	High	QPSK	22.53	22.48	22.53	22.5	22.52
			16QAM	21.5	21.45	21.48	21.48	21.5
		Middle	QPSK	22.51	22.46	22.56	22.52	22.54

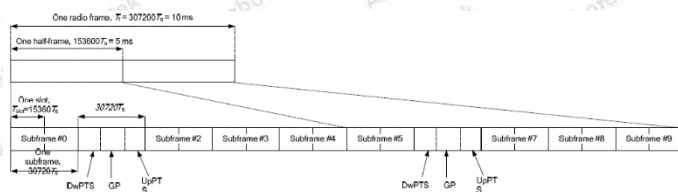


		Low	16QAM	21.52	21.47	21.51	21.5	21.52
			QPSK	22.56	22.51	22.53	22.5	22.52
			16QAM	21.49	21.44	21.48	21.5	21.52
	36RB	High	QPSK	21.56	21.59	21.68	21.65	21.58
			16QAM	20.36	20.39	20.43	20.4	20.33
		Middle	QPSK	21.6	21.63	21.69	21.67	21.6
			16QAM	20.37	20.4	20.45	20.41	20.34
		Low	QPSK	21.61	21.64	21.64	21.65	21.58
			16QAM	20.43	20.46	20.48	20.39	20.32
	75RB		QPSK	21.62	21.65	21.71	21.69	21.62
			16QAM	20.4	20.43	20.45	20.41	20.34

20 MHz	1RB	High	QPSK	2506 MHz	2549.5 MHz	2593 MHz	2636.5 MHz	2680 MHz
			16QAM	22.53	22.49	22.57	22.53	22.52
		Middle	QPSK	21.5	21.48	21.5	21.48	21.5
			16QAM	22.51	22.51	22.59	22.58	22.54
		Low	QPSK	21.52	21.47	21.53	21.51	21.52
			16QAM	22.56	22.52	22.57	22.55	22.52
	50RB	High	QPSK	21.49	21.45	21.48	21.47	21.52
			16QAM	21.56	21.72	21.74	21.7	21.58
		Middle	QPSK	20.36	20.4	20.46	20.41	20.33
			16QAM	21.6	21.65	21.7	21.69	21.6
		Low	QPSK	20.37	20.42	20.46	20.43	20.34
			16QAM	21.61	21.63	21.66	21.71	21.58
	100RB		QPSK	20.43	20.39	20.46	20.43	20.32
			16QAM	21.62	21.68	21.74	21.71	21.62
			QPSK	20.4	20.42	20.48	20.55	20.34
			16QAM	21.62	21.68	21.74	21.71	21.62

TDD test:

TDD testing is performed using guidance from FCC KDB 941225 D05v02r03 and the SAR test guidance provided in April 2013 TCB works hop notes. TDD is tested at the highest duty factor using UL-DL configuration 0 with special subframe configuration 6 and applying the FDD LTE procedures in KDB 941225 D05v02r03. SAR testing is performed using the extended cyclic prefix listed in 3GPP TS 36.211. Frame structure type 2 (for 5 ms switch-point periodicity)



Configuration of special subframe (lengths of DwPTS/GP/UpPTS)

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

Uplink-downlink configurations

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

Duty factor is calculated by:

Duty factor = uplink frame*6+UpPTS*2/one frame length

= (30720.Ts * 6+5120. Ts*2)/307200.Ts

= 0.633

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

LTE Band 2			
Channel	Channel 19100	Channel 18900	Channel 18700
Tune-up(dB)	22.5±1.0	22.5±1.0	22.5±1.0
LTE Band 5			
Channel	Channel 20600	Channel 20525	Channel 20450
Tune-up(dB)	22±1.0	22±1.0	22±1.0
LTE Band 7			
Channel	Channel 21350	Channel 21100	Channel 20850
Tune-up(dB)	22±1.0	22±1.0	22±1.0
LTE Band 17			
Channel	Channel 23800	Channel 23790	Channel 23780
Tune-up(dB)	22±1.0	22±1.0	22±1.0
LTE Band 38			
Channel	Channel 23800	Channel 23790	Channel 23780



Tune-up(dB)	22±1.0		22±1.0		22±1.0	
LTE Band 40						
Channel	Channel 38750			Channel 39200		
Tune-up(dB)	22±1.0			22±1.0		
LTE Band 41						
Channel	Channel 39750	Channel 40185	Channel 40620	Channel 41055	Channel 41490	
Tune-up(dB)	22±1.0	22±1.0	22±1.0	22±1.0	22±1.0	

LTE MPR will follow up 3GPP setting as below:

Modulation	Channel bandwidth / Transmission bandwidth (NRB)						MPR (dB)
	1.4MHz	3.0MHz	5MHz	10MHz	15MHz	20MHz	
QPSK	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	0
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



<WLAN 2.4GHz Conducted Power>

Mode	Channel	Frequency (MHz)	Conducted Peak Output Power(dBm)	Conducted Average Output Power(dBm)	Tune-up
802.11b	1	2412	14.76	12.59	12±1.0
	6	2437	14.17	12.09	12±1.0
	11	2462	14.93	12.72	12±1.0
802.11g	1	2412	13.67	10.71	11±1.0
	6	2437	14.55	11.37	11±1.0
	11	2462	13.82	10.81	11±1.0
802.11n(HT20)	1	2412	13.48	10.28	11±1.0
	6	2437	12.55	9.55	10±1.0
	11	2462	13.32	10.14	12±1.0

<Bluetooth Conducted Power>

Mode	Channel	Frequency (MHz)	Conducted Peak Output Power(dBm)	Conducted Average Output Power(dBm)	Tune-up
GFSK	0	2402	-0.72	-1.71	-1±1.0
	39	2441	0.15	-0.87	-1±1.0
	78	2480	0.82	-0.21	-1±1.0
π/4DQPSK	0	2402	0.95	-0.07	-1±1.0
	39	2441	1.80	0.72	0±1.0
	78	2480	2.69	1.63	1±1.0
8DPSK	0	2402	1.32	0.35	0±1.0
	39	2441	2.18	1.12	1±1.0
	78	2480	3.02	1.96	2±1.0

Note:

1. Per KDB 447498 D01, the 1-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR, where}$$

$f(\text{GHz})$ is the RF channel transmit frequency in GHz

Power and distance are rounded to the nearest mW and mm before calculation

The result is rounded to one decimal place for comparison

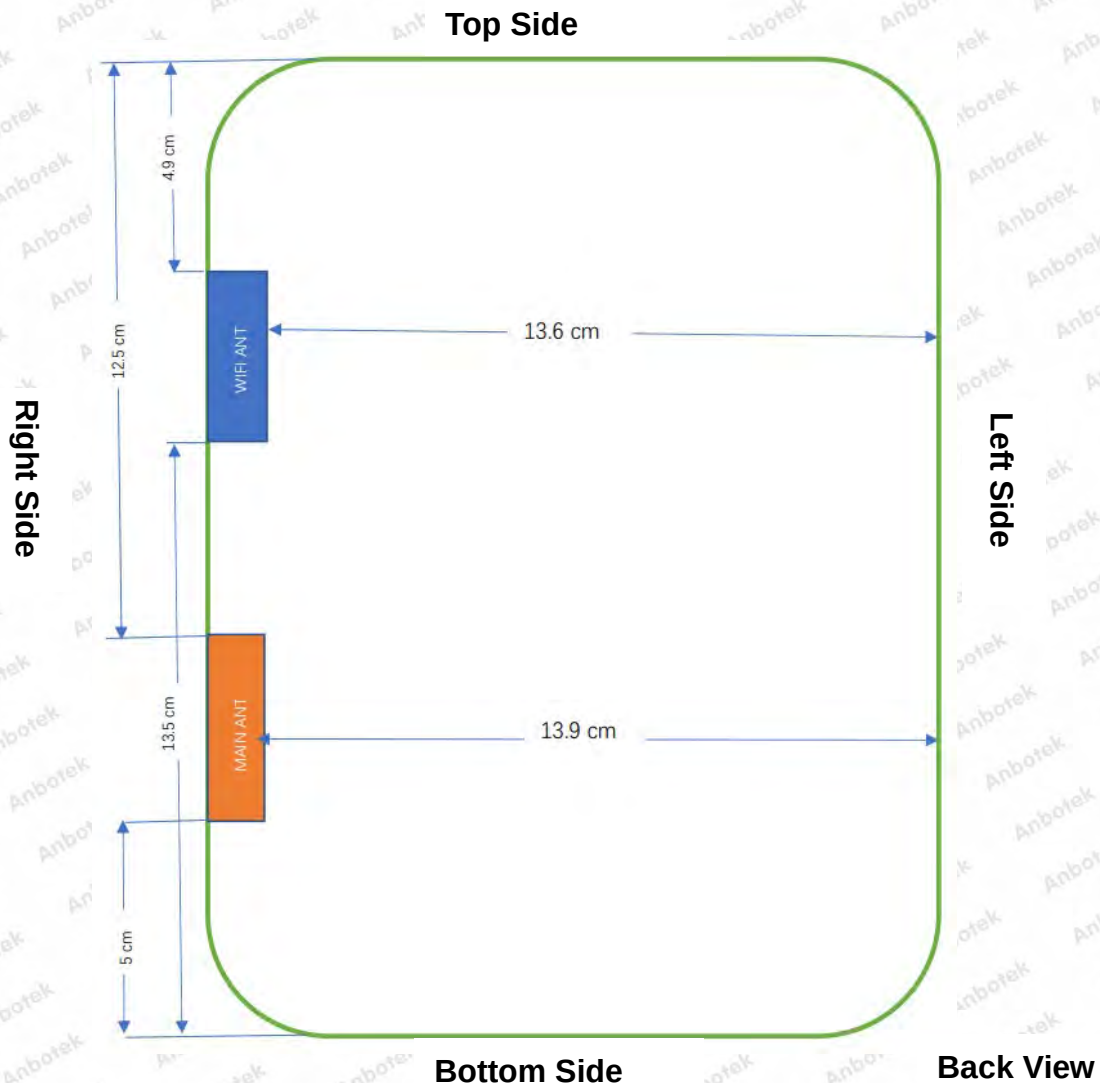
2. Per KDB 248227 D01, choose the highest output power channel to test SAR and determine further SAR exclusion.

3. Per KDB 248227 D01, In the 2.4 GHz band, separate SAR procedures are applied to DSSS and OFDM configurations to simplify DSSS test requirements. SAR is not required for the following 2.4 GHz OFDM conditions:

- 1) When KDB Publication 447498 SAR test exclusion applies to the OFDM configuration.
- 2) When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.



10.2 Transmit Antennas and SAR Measurement Position



Distance of The Antenna to the EUT surface and edge						
Antennas	Front	Back	Top Side	Bottom Side	Left Side	Right Side
WWAN	<25mm	<25mm	>25mm	>25mm	>25mm	<25mm
WLAN	<25mm	<25mm	>25mm	>25mm	>25mm	<25mm

Positions for SAR tests; Hotspot mode						
Antennas	Front	Back	Top Side	Bottom Side	Left Side	Right Side
WWAN	Yes	Yes	No	No	No	Yes
WLAN	Yes	Yes	No	No	No	Yes

Note:

1). According to the KDB941225 D06 Hot Spot SAR v02, the edges with less than 2.5 cm distance to the antennas need to be tested for SAR.



10.3 Standalone SAR Test Exclusion Considerations

Per KDB447498 for standalone 1-g head or body SAR evaluation by measurement or numerical simulation is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied.

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

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

- $f(\text{GHz})$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

Standalone SAR test exclusion considerations							
Modulation	Frequency (MHz)	Configuration	Maximum Average Power (dBm)	Separation Distance (mm)	Calculation Result	SAR Exclusion Thresholds	Standalone SAR Exclusion
WIFI 2.4G	2462	Body	13	0	6.26	3.0	no
Bluetooth	2480	Body	3	0	0.628	3.0	Yes

Remark:

1. Maximum average power including tune-up tolerance;
2. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion
3. Body including Hotspot mode as body use distance is 0mm from manufacturer declaration of user manual.



10.4 Estimated SAR

Per KDB447498 requires when the standalone SAR test exclusion of section 4.3.1 is applied to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to the 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.
- 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distances is > 50 mm

Per FCC KD B447498 D01, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR for all the transmitting antenna in a specific a physical test configuration is ≤1.6 W/Kg. When the sum is greater than the SAR limit, SAR test exclusion is determined by the SAR to peak location separation ratio.

$$\text{Ratio} = \frac{(\text{SAR}_1 + \text{SAR}_2)^{1.5}}{(\text{peak location separation, mm})} < 0.04$$

Estimated stand alone SAR					
Communication system	Frequency (MHz)	Configuration	Maximum Power (dBm)	Separation Distance (mm)	Estimated SAR _{1-g} (W/kg)
Bluetooth	2480	Body	3	5	0.084
/	/	/	/	/	/

Remark:

1. Maximum average power including tune-up tolerance;
2. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion
3. Body including Hotspot mode as body use distance is 10mm from manufacturer declaration of user manual.



10.5 SAR Test Results Summary

General Note:

1.Per KDB 447498 D01v05r01, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.

Scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.

Reported SAR(W/kg)= Measured SAR(W/kg) Scaling Factor*

2.Per KDB 447498 D01v05r01, for each exposure position, if the highest output channel reported $SAR \leq 0.8W/kg$, other channels SAR testing are not necessary

3.Per KDB 941225 D05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.

4.Per KDB 941225 D05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.

5.Per KDB 941225 D05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are $\leq 0.8 W/kg$. 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.

6.Per KDB 941225 D05, 16QAM output power for each RB allocation configuration is $>$ not $\frac{1}{2}$ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is $\leq 1.45 W/kg$; Per KDB 941225 D05, 16QAM SAR testing is not required.

7.Per KDB 941225 D05, Smaller bandwidth output power for each RB allocation configuration is $>$ not $\frac{1}{2}$ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is $\leq 1.45 W/kg$; Per KDB 941225 D05, smaller bandwidth SAR testing is not required.

8.Per KDB865664 D01, for each frequency band, repeated SAR measurement is required only when the measured SAR is $\geq 0.8W/Kg$; if the deviation among the repeated measurement is $\leq 20\%$, and the measured SAR $< 1.45W/Kg$, only one repeated measurement is required.

9.When the user enables the personal Wireless router functions for the handsets, actual operations include simultaneous transmission of both the Wi-Fi transmitting frequency and thus cannot be evaluated for SAR under actual use conditions. The "Portable Hotspot" feature on the handset was NOT activated, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal.



10.6 SAR Results

Body SAR

SAR Values [GSM 850]

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
Measured / Reported SAR numbers-Body distance 0mm										
	GPRS 4Tx slots	Front Side	128	824.2	27.12	28.00	1.225	0.05	0.273	0.334
#1	GPRS 4Tx slots	Rear Side	128	824.2	27.12	28.00	1.225	0.12	0.477	0.584
	GPRS 4Tx slots	Right Edge	128	824.2	27.12	28.00	1.225	0.11	0.425	0.520
	GSM Voice	Rear Side	128	824.2	32.63	33.00	1.089	0.07	0.336	0.366

SAR Values [PCS 1900]

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
Measured / Reported SAR numbers-Body distance 0mm										
	GPRS 4Tx slots	Front Side	512	1850.2	25.06	26.00	1.242	0.03	0.463	0.575
#2	GPRS 4Tx slots	Rear Side	512	1850.2	25.06	26.00	1.242	0.01	0.730	0.906
	GPRS 4Tx slots	Right Edge	512	1850.2	25.06	26.00	1.242	-0.05	0.511	0.634
	GSM Voice	Rear Side	512	1850.2	30.15	31.00	1.216	0.06	0.489	0.595
	GPRS 4Tx slots	Rear Side	661	1880	24.73	26.00	1.340	0.07	0.661	0.886
	GPRS 4Tx slots	Rear Side	810	1909.8	24.77	26.00	1.327	0.02	0.657	0.872

SAR Values [WCDMA II]

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
Measured / Reported SAR numbers-Body distance 0mm										
	RMC 12.2Kbps	Front Side	9262	1852.4	23.62	24.00	1.156	0.02	0.683	0.745
#3	RMC 12.2Kbps	Rear Side	9262	1852.4	23.62	24.00	1.156	0.05	1.11	1.21
	RMC 12.2Kbps	Right Edge	9262	1852.4	23.62	24.00	1.156	-0.07	0.791	0.863
	RMC 12.2Kbps	Rear Side	9400	1880.0	23.59	24.00	1.189	-0.05	1.06	1.17
	RMC 12.2Kbps	Rear Side	9538	1907.6	23.50	24.00	1.222	-0.10	1.05	1.18



SAR Values [WCDMA V]

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
Measured / Reported SAR numbers-Body distance 0mm										
	RMC 12.2Kbps	Front Side	4132	826.4	23.56	24.00	1.107	-0.03	0.539	0.596
#4	RMC 12.2Kbps	Rear Side	4132	826.4	23.56	24.00	1.107	0.06	0.662	0.733
	RMC 12.2Kbps	Right Edge	4132	826.4	23.56	24.00	1.107	-0.05	0.585	0.647

SAR Values [LTE Band 2]

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
Measured / Reported SAR numbers-Body distance 0mm										
	20MHz/1RB	Front Side	18900	1880.0	22.77	23.50	1.183	0.11	0.553	0.654
#5	20MHz/1RB	Rear Side	18900	1880.0	22.77	23.50	1.183	0.05	0.932	1.10
	20MHz/1RB	Right Edge	18900	1880.0	22.77	23.50	1.183	-0.02	0.588	0.696
	20MHz/1RB	Rear Side	18700	1860.0	22.74	23.50	1.191	0.03	0.912	1.09
	20MHz/1RB	Rear Side	19100	1900.0	22.75	23.50	1.189	0.03	0.916	1.09
	20MHz/50RB	Front Side	18900	1880.0	22.12	22.50	1.091	-0.14	0.432	0.472
	20MHz/50RB	Rear Side	18900	1880.0	22.12	22.50	1.091	0.19	0.723	0.789
	20MHz/50RB	Right Edge	18900	1880.0	22.12	22.50	1.091	-0.03	0.465	0.508
	20MHz/100RB	Front Side	18900	1880.0	22.05	22.50	1.109	-0.19	0.419	0.465
	20MHz/100RB	Rear Side	18900	1880.0	22.05	22.50	1.109	0.04	0.706	0.783
	20MHz/100RB	Right Edge	18900	1880.0	22.05	22.50	1.109	-0.03	0.453	0.502

SAR Values [LTE Band 5]

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
Measured / Reported SAR numbers-Body distance 0mm										
	10MHz/1RB	Front Side	20525	836.5	22.76	23.00	1.057	0.13	0.316	0.334



#6	10MHz/1RB	Rear Side	20525	836.5	22.76	23.00	1.057	-0.03	0.565	0.597
	10MHz/1RB	Right Edge	20525	836.5	22.76	23.00	1.057	-0.06	0.413	0.436
	10MHz/25RB	Front Side	20525	836.5	21.62	22.00	1.091	-0.11	0.247	0.270
	10MHz/25RB	Rear Side	20525	836.5	21.62	22.00	1.091	0.19	0.444	0.485
	10MHz/25RB	Right Edge	20525	836.5	21.62	22.00	1.091	-0.17	0.327	0.357

SAR Values [LTE Band 7]

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
Measured / Reported SAR numbers-Body distance 0mm										
	20MHz/1RB	Front Side	21100	2535	22.61	23.00	1.094	0.10	0.436	0.477
#7	20MHz/1RB	Rear Side	21100	2535	22.61	23.00	1.094	-0.06	0.717	0.784
	20MHz/1RB	Right Edge	21100	2535	22.61	23.00	1.094	-0.06	0.583	0.638
	20MHz/50RB	Front Side	21100	2535	21.60	22.00	1.096	-0.11	0.341	0.374
	20MHz/50RB	Rear Side	21100	2535	21.60	22.00	1.096	0.09	0.564	0.618
	20MHz/50RB	Right Edge	21100	2535	21.60	22.00	1.096	-0.07	0.461	0.505

SAR Values [LTE Band 17]

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
Measured / Reported SAR numbers-Body distance 0mm										
	10MHz/1RB	Front Side	23790	710	22.60	23.00	1.096	0.05	0.336	0.368
#8	10MHz/1RB	Rear Side	23790	710	22.60	23.00	1.096	0.10	0.428	0.469
	10MHz/1RB	Right Edge	23790	710	22.60	23.00	1.096	-0.03	0.307	0.337
	10MHz/25RB	Front Side	23790	710	21.65	22.00	1.084	-0.11	0.262	0.284
	10MHz/25RB	Rear Side	23790	710	21.65	22.00	1.084	0.05	0.336	0.364
	10MHz/25RB	Right Edge	23790	710	21.65	22.00	1.084	-0.07	0.243	0.263



SAR Values [LTE Band 40A]

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
Measured / Reported SAR numbers-Body distance 0mm										
	10MHz/1RB	Front Side	38750	2310	22.20	23.00	1.096	0.05	0.262	0.315
#9	10MHz/1RB	Rear Side	38750	2310	22.20	23.00	1.096	0.05	0.387	0.465
	10MHz/1RB	Right Edge	38750	2310	22.20	23.00	1.096	-0.03	0.306	0.368
	10MHz/25RB	Front Side	38750	2310	21.20	22.00	1.084	-0.11	0.205	0.246
	10MHz/25RB	Rear Side	38750	2310	21.20	22.00	1.084	0.05	0.304	0.365
	10MHz/25RB	Right Edge	38750	2310	21.20	22.00	1.084	-0.07	0.242	0.291

SAR Values [LTE Band 40B]

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
Measured / Reported SAR numbers-Body distance 0mm										
	10MHz/1RB	Front Side	39200	2355	22.16	23.00	1.096	0.05	0.256	0.311
#10	10MHz/1RB	Rear Side	39200	2355	22.16	23.00	1.096	0.03	0.368	0.447
	10MHz/1RB	Right Edge	39200	2355	22.16	23.00	1.096	-0.03	0.303	0.368
	10MHz/25RB	Front Side	39200	2355	21.16	22.00	1.084	-0.11	0.200	0.243
	10MHz/25RB	Rear Side	39200	2355	21.16	22.00	1.084	0.05	0.289	0.351
	10MHz/25RB	Right Edge	39200	2355	21.16	22.00	1.084	-0.07	0.240	0.291

SAR Values [LTE Band 41]

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
Measured / Reported SAR numbers-Body distance 0mm										
	20MHz/1RB	Front Side	40620	2593	22.59	23.00	1.099	0.05	0.203	0.223
#11	20MHz/1RB	Rear Side	40620	2593	22.59	23.00	1.099	-0.13	0.381	0.419
	20MHz/1RB	Right Edge	40620	2593	22.59	23.00	1.099	-0.07	0.303	0.333



	20MHz/50RB	Front Side	40620	2593	21.74	22.00	1.062	0.05	0.159	0.169
	20MHz/50RB	Rear Side	40620	2593	21.74	22.00	1.062	-0.06	0.299	0.317
	20MHz/50RB	Right Edge	40620	2593	21.74	22.00	1.062	0.03	0.240	0.255

SAR Values [WIFI 2.4G]

Plot No.	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR _{1g} (W/kg)	Reported SAR _{1g} (W/kg)
Measured / Reported SAR numbers-Body distance 0mm										
	802.11b	Front Side	11	2462	12.72	13.00	1.067	0.03	0.179	0.191
#12	802.11b	Rear Side	11	2462	12.72	13.00	1.067	-0.12	0.263	0.281
	802.11b	Right Edge	11	2462	12.72	13.00	1.067	-0.11	0.226	0.241

Note: Per KDB 248227 D01v02r02, for 2.4GHz 802.11g/n SAR testing is not required when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

WLAN- Scaled Reported SAR							
Mode	Test Position	Frequency		Actual duty factor	maximum duty factor	Reported SAR (1g)(W/kg)	Scaled reported SAR (1g)(W/kg)
		CH	MHz				
802.11b 1Mbps	Front Side	11	2462	99.93%	100%	0.191	0.191
	Rear Side	11	2462	99.93%	100%	0.281	0.281
	Right Edge	11	2462	99.93%	100%	0.241	0.241

10.7 SAR Measurement Variability

SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. The following procedures are applied to determine if repeated measurements are required.

- 1 Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; 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 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 .



SAR Measurement Variability

Band	Mode	Test Position	Spacing (mm)	Ch.	Original SAR (W/kg)	First Repeated SAR (W/kg)	The Ratio	Second Repeated SAR (W/kg)
WCDMA Band II	RMC 12.2Kbps	Body	0	9262	1.11	1.09	1.02	--
LTE Band 2	20MHz/1RB	Body	0	18900	0.932	0.926	1.01	--



10.8 Simultaneous Transmission Analysis

10.8.1 Introduction

The following procedures adopted from “FCC SAR Considerations for Cell Phones with Multiple Transmitters” are applicable to handsets with built-in unlicensed transmitters such as 802.11 a/b/g/n and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

Application Simultaneous Transmission information:

No.	Simultaneous Transmission Configurations	Body-worn
1	WWAN (2/3/4G) + WLAN 2.4GHz	Yes
2	WWAN (2/3/4G) + Bluetooth	Yes

10.8.2 Evaluation of Simultaneous SAR

Body Simultaneous transmission SAR for WLAN/BT and GSM/WCDMA/ LTE

Exposure Position	1	2	3	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)	SPLSR
	MAX. WWAN Reported SAR	MAX. WLAN2.4G Reported SAR	Bluetooth			
	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)			
Front Side	0.745	0.197	0.084	0.942	0.829	N/A
Rear Side	1.21	0.281	0.084	1.491	1.294	N/A
Right Edge	0.863	0.248	0.084	1.111	0.947	N/A

MAX. $\Sigma\text{SAR}_{1g} = 1.491 \text{ W/kg} < 1.6 \text{ W/kg}$, so the Simultaneous transmission SAR with volume scan are not required.



11 Measurement Uncertainty

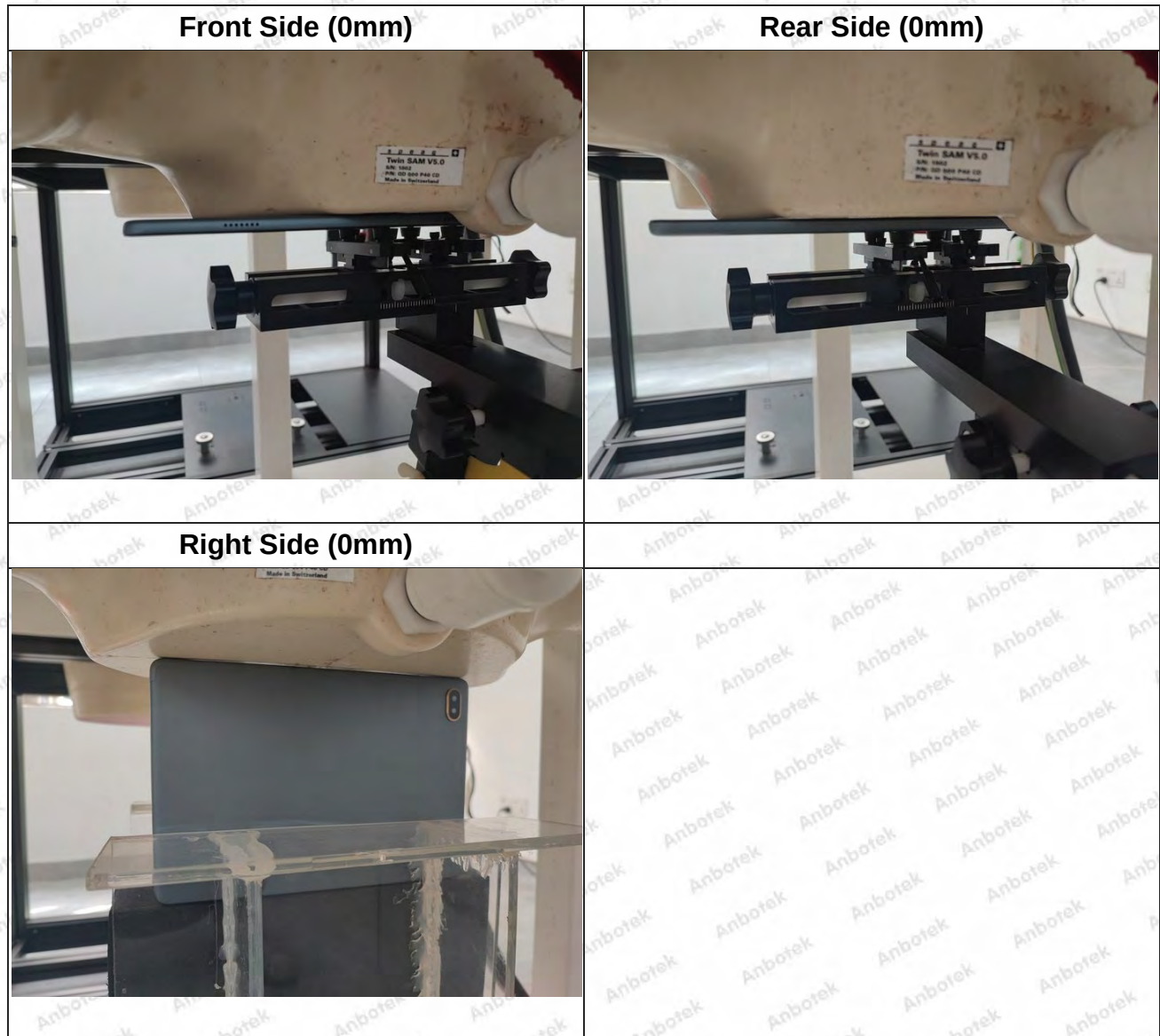
NO	Source	Uncert. ai (%)	Prob. Dist.	Div. k	ci (1g)	ci (10g)	Stand.U ncert. ui (1g)	Stand.U ncert. ui (10g)	Veff
1	Repeat	0.4	N	1	1	1	0.4	0.4	9
Instrument									
2	Probe calibration	7	N	2	1	1	3.5	3.5	∞
3	Axial isotropy	4.7	R	$\sqrt{3}$	0.7	0.7	1.9	1.9	∞
4	Hemispherical isotropy	9.4	R	$\sqrt{3}$	0.7	0.7	3.9	3.9	∞
5	Boundary effect	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
6	Linearity	4.7	R	$\sqrt{3}$	1	1	2.7	2.7	∞
7	Detection limits	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞
8	Readout electronics	0.3	N	1	1	1	0.3	0.3	∞
9	Response time	0.8	R	$\sqrt{3}$	1	1	0.5	0.5	∞
10	Integration time	2.6	R	$\sqrt{3}$	1	1	1.5	1.5	∞
11	Ambient noise	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
12	Ambient reflections	3.0	R	$\sqrt{3}$	1	1	1.7	1.7	∞
13	Probe positioner mech. restrictions	0.4	R	$\sqrt{3}$	1	1	0.2	0.2	∞
14	Probe positioning with respect to phantom shell	2.9	R	$\sqrt{3}$	1	1	1.7	1.7	∞
15	Max.SAR evaluation	1.0	R	$\sqrt{3}$	1	1	0.6	0.6	∞



Test sample related									
16	Device positioning	3.8	N	1	1	1	3.8	3.8	99
17	Device holder	5.1	N	1	1	1	5.1	5.1	5
18	Drift of output power	5.0	R	$\sqrt{3}$	1	1	2.9	2.9	∞
Phantom and set-up									
19	Phantom uncertainty	4.0	R	$\sqrt{3}$	1	1	2.3	2.3	∞
20	Liquid conductivity (target)	5.0	R	$\sqrt{3}$	0.64	0.43	1.8	1.2	∞
21	Liquid conductivity (meas)	2.5	N	1	0.64	0.43	1.6	1.2	∞
22	Liquid Permittivity (target)	5.0	R	$\sqrt{3}$	0.6	0.49	1.7	1.5	∞
23	Liquid Permittivity (meas)	2.5	N	1	0.6	0.49	1.5	1.2	∞
Combined standard		RSS		$U_c = \sqrt{\sum_{i=1}^n C_i^2 U_i^2}$			11.4%	11.3%	236
Expanded uncertainty(P=95%)		$U = k U_c$		$k=2$			22.8%	22.6%	



Appendix A. EUT Photos and Test Setup Photos



Appendix B. Plots of SAR System Check

750MHz System Check

Date: 11/02/2023

DUT: Dipole 750 MHz; Type: D750V3; Serial: 1118

Communication System: CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 750$ MHz; $\sigma = 0.89$ S/m; $\epsilon_r = 41.10$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(9.82, 9.82, 9.82); Calibrated: 05.06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (61x91x1): Measurement grid: dx=15.00 mm, dy=15.00 mm

Maximum value of SAR (interpolated) = 2.60 W/kg

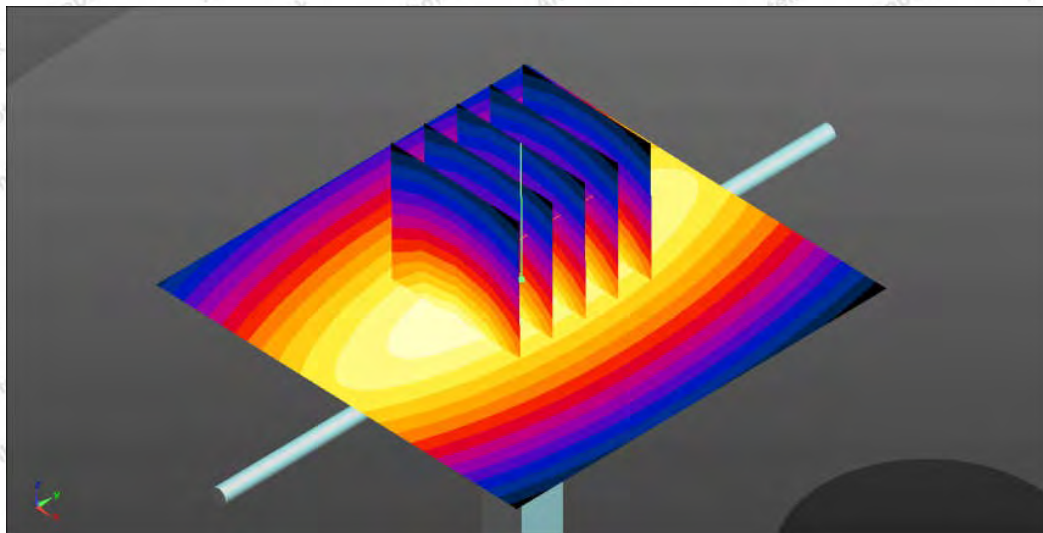
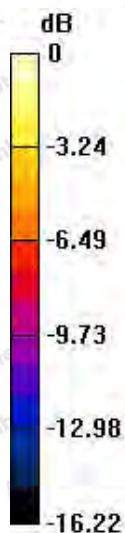
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7mm, dy=7mm, dz=5mm

Reference Value = 55.49 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 3.07 W/kg

SAR(1 g) = 2.08 W/kg; SAR(10 g) = 1.39 W/kg

Maximum value of SAR (measured) = 2.62 W/kg



0 dB = 2.62 W/kg = 4.18 dBW/kg

System Performance Check 750MHz 250mW



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835MHz System Check

Date: 11/03/2023

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d154

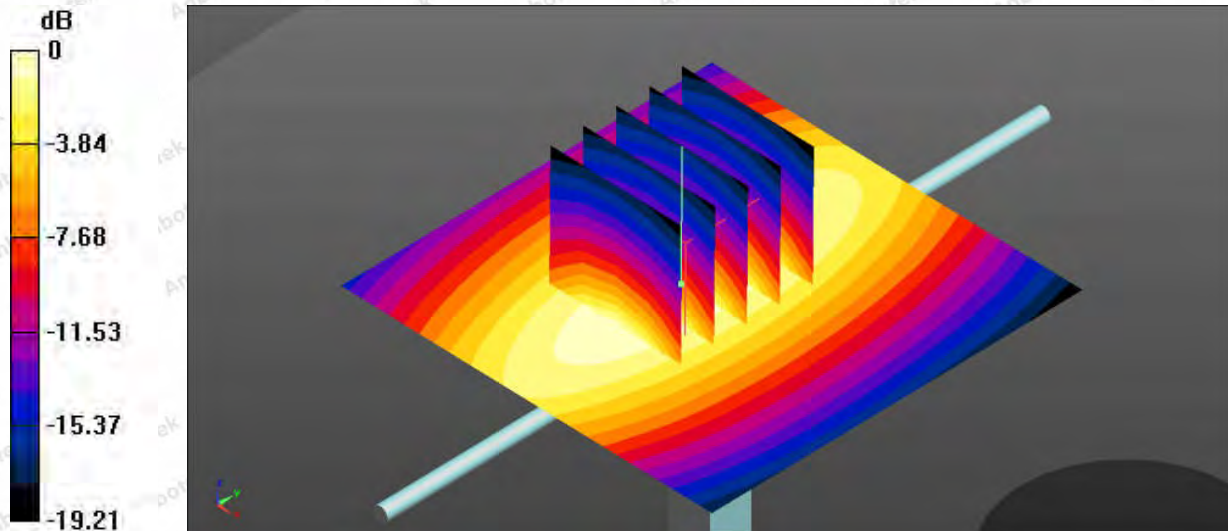
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 835 \text{ MHz}$; $\sigma = 0.905 \text{ S/m}$; $\epsilon_r = 41.65$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(9.71, 9.71, 9.71); Calibrated: 05.06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (61x61x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$ Maximum value of SAR (interpolated) = 3.49 W/kg **Zoom Scan (7x7x7)/Cube 0:** Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$ Reference Value = 62.47 V/m ; Power Drift = 0.07 dB Peak SAR (extrapolated) = 4.15 W/kg **SAR(1 g) = 2.48 W/kg ; SAR(10 g) = 1.57 W/kg** Maximum value of SAR (measured) = 3.52 W/kg  $0 \text{ dB} = 3.52 \text{ W/kg} = 5.47 \text{ dBW/kg}$

System Performance Check 835MHz 250mW



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1900MHz System Check

Date: 11/05/2023

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d175

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1900$ MHz; $\sigma = 1.42$ mho/m; $\epsilon_r = 40.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN7396; ConvF(8.13, 8.13, 8.13); Calibrated: 05.06.2023;

Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn428; Calibrated: Aug.30,2023;

Phantom: SAM 1; Type: SAM;

Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Area Scan (61x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 11.3 W/kg

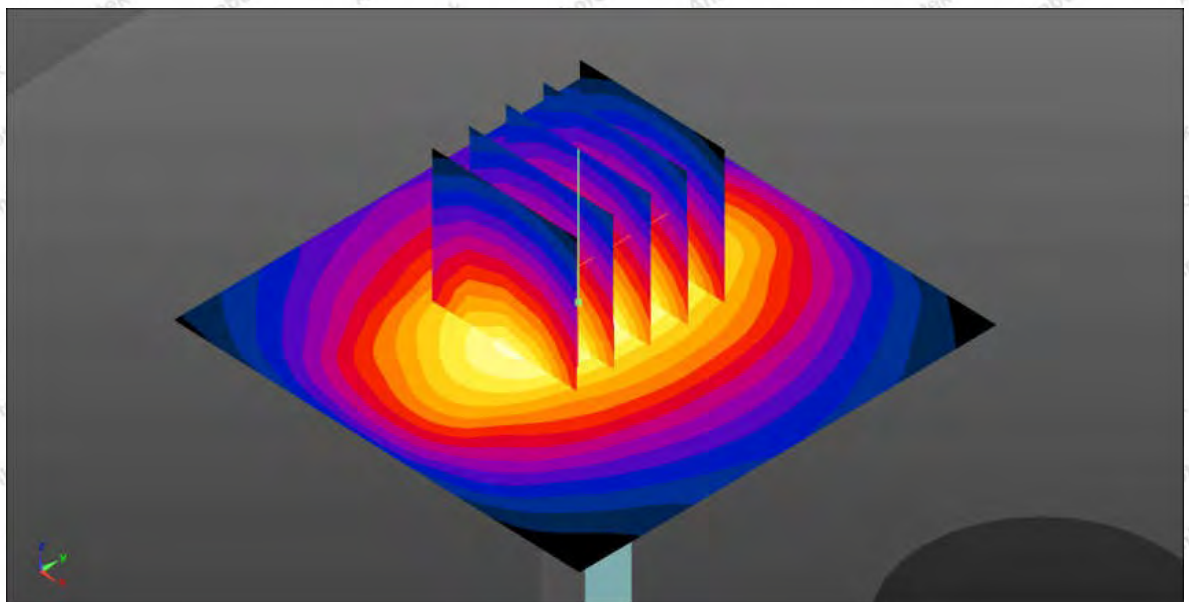
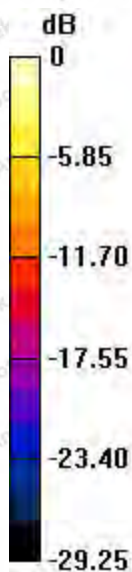
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 80.6 V/m; Power Drift = -0.005 dB

Peak SAR (extrapolated) = 17.5 W/kg

SAR(1 g) = 9.86 W/kg; SAR(10 g) = 5.24 W/kg

Maximum value of SAR (measured) = 11.2 W/kg



0 dB = 11.2W/kg = 10.49 dBW/kg

System Performance Check 1900MHz 250mW

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2300MHz System Check

Date: 11/06/2023

DUT: Dipole 2300 MHz; Type: D2300V2; Serial: 1059

Communication System: CW; Frequency: 2300 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 2300$ MHz; $\sigma = 1.629$ S/m; $\epsilon_r = 38.411$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(7.85, 7.85, 7.85); Calibrated: 05.06.2023;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn428; Calibrated: Aug.30,2023
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (71x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 19.5 W/kg

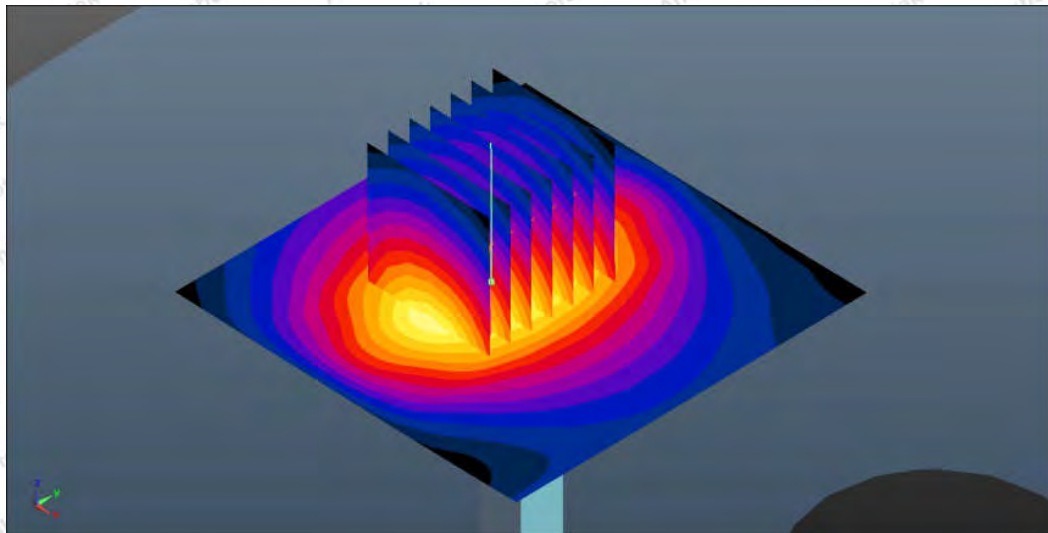
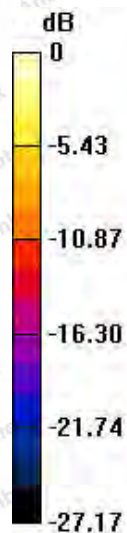
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 100.9 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 26.6 W/kg

SAR(1 g) = 12.33 W/kg; SAR(10 g) = 5.91 W/kg

Maximum value of SAR (measured) = 18.9 W/kg



0 dB = 18.9 W/kg = 12.76 dBW/kg

System Performance Check 2450MHz 250mW



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2450MHz System Check

Date: 11/07/2023

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 910

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 2450$ MHz; $\sigma = 1.83$ mho/m; $\epsilon_r = 38.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(7.57, 7.57, 7.57); Calibrated: 05.06.2023;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn428; Calibrated: Aug.30,2023
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (71x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 16.7 W/kg

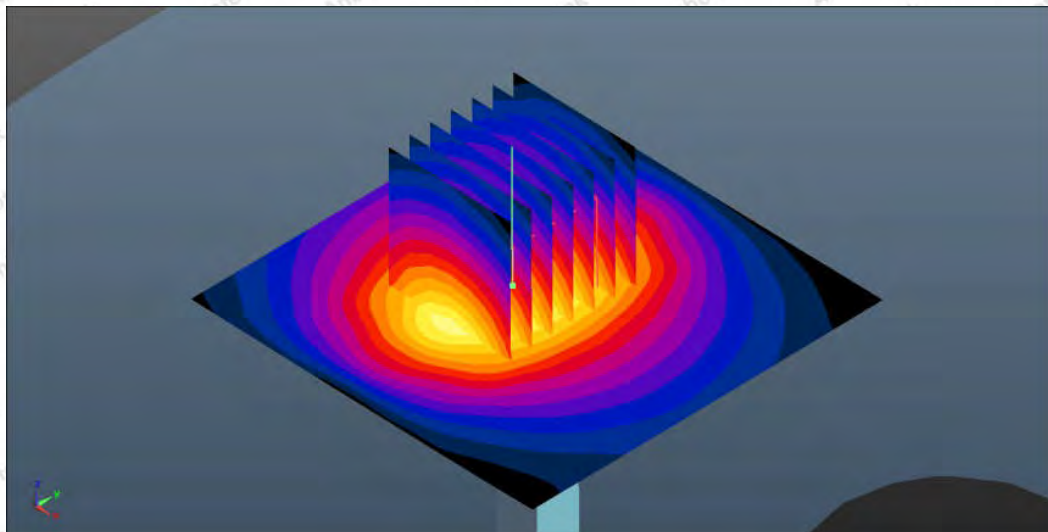
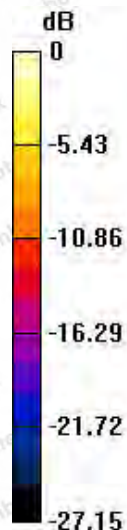
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 87.0 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 30.7 W/kg

SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.44 W/kg

Maximum value of SAR (measured) = 16.2 W/kg



0 dB = 16.2 W/kg = 12.10 dBW/kg

System Performance Check 2450MHz 250mW



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2600MHz System Check

Date: 11/08/2023

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1058

Communication System: CW; Frequency: 2600 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 2600$ MHz; $\sigma = 1.93$ S/m; $\epsilon_r = 38.83$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(7.38, 7.38, 7.38); Calibrated: 05.06.2023;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn428; Calibrated: Aug.30,2023
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (71x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 22.8 W/kg

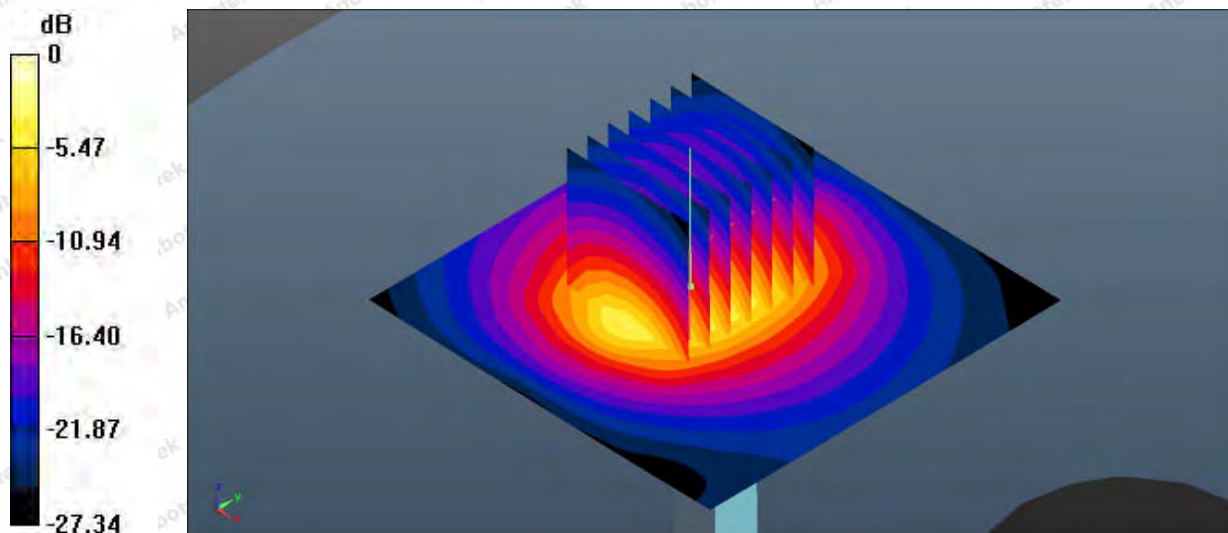
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 110.2 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 33.1 W/kg

SAR(1 g) = 14.2 W/kg; SAR(10 g) = 6.29 W/kg

Maximum value of SAR (measured) = 25.6 W/kg



0 dB = 22.8 W/kg = 13.58 dBW/kg

System Performance Check 2600MHz 250mW



Appendix C. Plots of SAR Test Data

#1

Date: 11/03/2023

GSM 850 _ GPRS _ Rear Side

Communication System: UID 0, GSM (0); Frequency: 824.2 MHz; Duty Cycle: 1:2.08

Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.901$ S/m; $\epsilon_r = 42.197$; $\rho = 1000$ kg/m³;

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(9.71, 9.71, 9.71); Calibrated: 05.06.2023;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Area Scan (51x151x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 0.617 W/kg

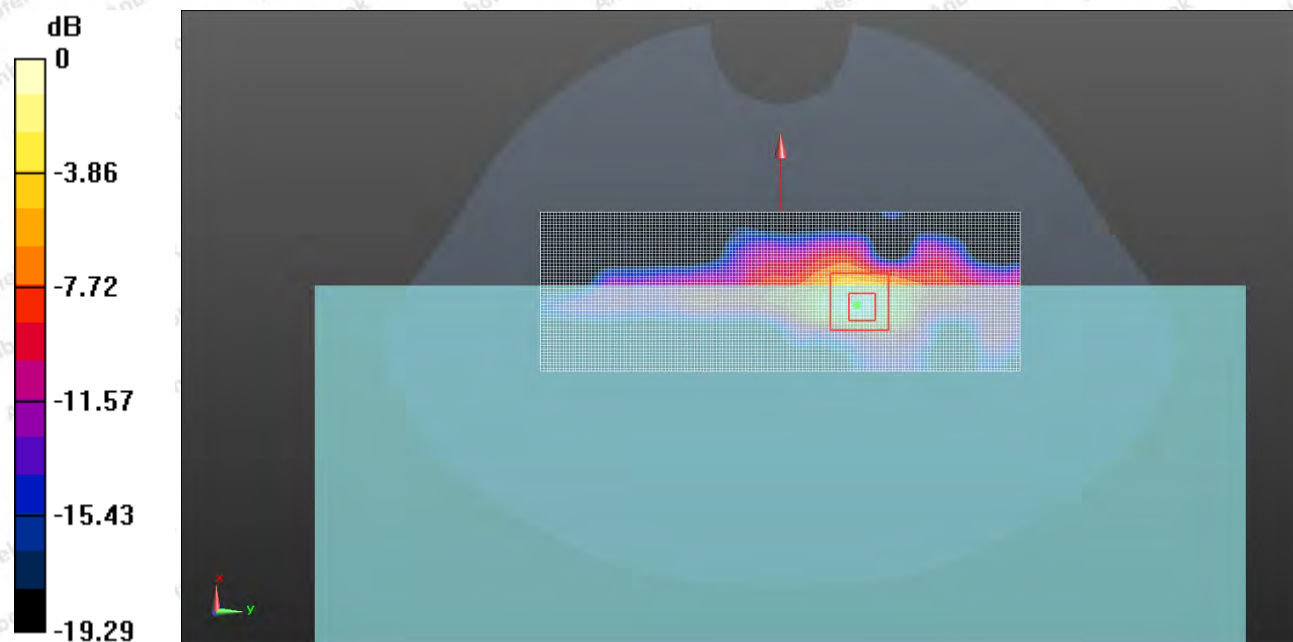
Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 8.208 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 1.34 W/kg

SAR(1 g) = 0.477 W/kg; SAR(10 g) = 0.275 W/kg

Maximum value of SAR (measured) = 0.518 W/kg



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#2

Date: 11/05/2023

GSM 1900 _GPRS

Communication System: GSM 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:2.08

Medium parameters used (interpolated): $f = 1850.2$ MHz; 1.404 S/m; $\epsilon_r = 40.846$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(8.13, 8.13, 8.13); Calibrated: 05.06.2023;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn428; Calibrated: Aug.30,2023;
- Phantom: SAM 1; Type: SAM;
- Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Area Scan (51x151x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mmMaximum value of SAR (interpolated) = 1.28 W/kg**Zoom Scan (7x7x7)/Cube 0:** Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mmReference Value = 12.36 V/m; Power Drift = 0.01 dBPeak SAR (extrapolated) = 1.19 W/kg**SAR(1 g) = 0.730 W/kg; SAR(10 g) = 0.412 W/kg**Maximum value of SAR (measured) = 0.897 W/kg