

FCC SAR TEST REPORT

Client Name : Powerwifi, Inc.

Address : Delaware, 2035 Sunset Lake road, Suite B-2, City of
Newark, Zip Code 19702, county New Castle, USA

Product Name : Nommi-Power

Date : Nov. 04, 2019

Shenzhen Anbotech Compliance Laboratory Limited

Shenzhen Anbotech Compliance Laboratory Limited

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TEST REPORT

Applicant : Powerwifi, Inc.
Manufacturer : Powerwifi, Inc.
Product Name : Nommi-Power
Model No. : Power
Trade Mark : N/A
Rating(s) : Input: DC 5V, 1.5A(With DC 3.8V, 10000mAh Battery inside)

Test Standard(s) : IEEE 1528-2013; IEC 62209-2:2010;
ANSI/IEEE C95.1:2005; FCC 47 CFR Part 2 ;

The device described above is tested by Shenzhen Anbotech 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 Anbotech 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, IEC 62209-2:2010, ANSI/IEEE C95.1:2005 and FCC 47 CFR Part 2 (2.1093:2013) requirements.

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

Date of Receipt
Date of Test

Sept. 09, 2019
Sept. 09~ Oct. 25, 2019



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Version

Version No.	Date	Description
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1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing are as follows.

Frequency Band	Highest Reported 1g-SAR(W/Kg)	SAR Test Limit (W/Kg)
	Body	
GSM 850	0.721	1.6
PCS 1900	0.411	
WCDMA Band 2	0.511	
WCDMA Band 5	0.485	
LTE Band 2	0.736	
LTE Band 4	0.359	
LTE Band 5	0.522	
LTE Band 7	0.578	
LTE Band 12	0.774	
LTE Band 17	0.449	
LTE Band 41		
WIFI 2.4G	0.366	
Simultaneous SAR	1.140	
Test Result	PASS	

<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 and IEC 62209-2:2010

2. General Information

2.1. Client Information

Applicant	:	Powerwifi, Inc.
Address	:	Delaware, 2035 Sunset Lake road, Suite B-2, City of Newark, Zip Code 19702, county New Castle, USA
Manufacturer	:	Powerwifi, Inc.
Address	:	Delaware, 2035 Sunset Lake road, Suite B-2, City of Newark, Zip Code 19702, county New Castle, USA
Factory	:	Powerwifi, Inc.
Address	:	Delaware, 2035 Sunset Lake road, Suite B-2, City of Newark, Zip Code 19702, county New Castle, USA

2.2. Description of Equipment Under Test (EUT)

Product Name	:	Nommi-Power
Model No.	:	Power
Trade Mark	:	N/A
Test Power Supply	:	DC 3.8V Battery inside
Test Sample No.	:	1-2-1(Normal Sample), 1-2-2(Normal Sample)
Product Description	:	Operation Frequency: GPRS/EGPRS 850 TX:824.2~848.8 MHz GPRS/EGPRS 1900 TX:1850.2~1909.8 MHz UMTS-FDD Band 5 TX: 826.4 ~ 846.6 MHz UMTS-FDD Band 2 TX:1852.4~1907.6 MHz LTE-FDD Band 2 TX: 1850.7 ~ 1909.3 MHz LTE-FDD Band 4 TX:1710.7 ~ 1754.3 MHz LTE-FDD Band 5

		TX:824.7 ~ 848.3 MHz LTE-FDD Band 7 TX:2502.5 ~ 2567.5 MHz LTE-FDD Band 12 TX:699.7 ~ 715.3 MHz LTE-FDD Band 17 TX:706.5 ~ 713.5 MHz LTE-TDD Band 41 TX:2555 ~ 2655 MHz
	GPRS Class:	8/10/12
	Modulation Type:	GPRS/EGPRS: GMSK, 8PSK WCDMA: BPSK, 16QAM; LTE: QPSK, 16QAM
	Antenna Type:	GPRS/EGPRS: PIFA Antenna WCDMA: PIFA Antenna LTE: PIFA Antenna
	Antenna Gain(Peak):	GSM 850: -1.45 dBi PCS 1900: -1.45 dBi UMTS-FDD Band 2: 0.17 dBi UMTS-FDD Band 5: 0.17 dBi LTE-FDD Band 2: 1.38 dBi LTE-FDD Band 4: 1.38 dBi LTE-FDD Band 5: 1.38 dBi LTE-FDD Band 7: 1.38 dBi LTE-FDD Band 12: 1.38 dBi LTE-FDD Band 17: 1.38 dBi LTE-TDD Band 41: 1.38 dBi
Remark: 1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.		

2. 3. 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. 4. Applied Standard

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

- IEEE 1528-2013
- FCC 47 CFR Part 2 (2.1093:2013)
- ANSI/IEEE C95.1:2005
- KDB 248227 D01
- KDB 447498 D01
- KDB 648474 D04
- KDB 865664 D01
- KDB 941225 D01
- KDB 941225 D05
- KDB 941225 D06

2. 5. Environment of Test Site

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

2. 6. 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.

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

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

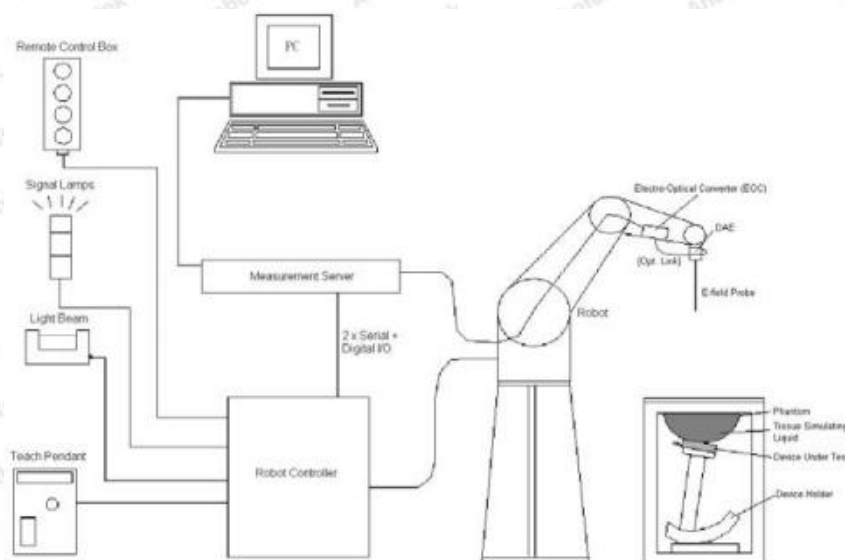
Where: C is the specific heat capacity, δT is the temperature rise and δt is the exposure duration, or related to the electrical field in the tissue by

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

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)	 Photo of EX3DV4
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 mW/g; 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	

➤ 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.

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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 controller system, the robot controller version (DASY5: CS8c) from Stäubli is used. The Stäubli robot 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), chip disk (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	 Photo of SAM Phantom
Filling Volume	Approx. 25 liters	
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet	
Measurement Areas	Left Hand, Right Hand, Flat 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%)	 Photo of ELI4 Phantom
Filling Volume	Approx. 30 liters	
Dimensions	Major ellipse axis: 600 mm Minor axis: 400 mm	

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], [mW/g]). 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	$\text{Norm}_i, a_{i0}, a_{i1}, a_{i2}$
	- 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:

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

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

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 mW/g

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

σ = conductivity in [mho/m] or [Siemens/m]

ρ = equivalent tissue density in g/cm³

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. 08,2018	Jun. 07,2021
SPEAG	835MHz System Validation Kit	D835V2	4d154	Jun. 16,2018	Jun. 15,2021
SPEAG	1750MHz System Validation Kit	D1750V2	1021	Jul. 03, 2019	Jul. 02, 2022
SPEAG	1900MHz System Validation Kit	D1900V2	5d175	Jun. 15,2019	Jun. 14,2022
SPEAG	2450MHz System Validation Kit	D2450V2	910	Jun. 15,2018	Jun. 14,2021
SPEAG	2600MHz System Validation Kit	D2600V2	1058	Jun. 19,2018	Jun. 18,2021
SPEAG	Data Acquisition Electronics	DAE4	387	Sept. 03, 2019	Sept. 02, 2019
SPEAG	Dosimetric E-Field Probe	EX3DV4	7396	May 06,2019	May 05,2020
R&S	UNIVERSAL RADIO COMMUNICATION TESTER	CMU 200	117888	Nov. 05, 2018	Nov. 04, 2019
Agilent	ENA Series Network Analyzer	E5071C	MY46317418	May 22, 2019	May 21, 2020
SPEAG	DAK	DAK-3.5	1226	NCR	NCR
SPEAG	SAM Twin Phantom	QD000P40CD	1802	NCR	NCR
AR	Amplifier	ZHL-42W	QA1118004	NCR	NCR
Agilent	Power Meter	N1914A	MY50001102	Dec. 06, 2018	Nov. 06, 2019
Agilent	Power Sensor	N8481H	MY51240001	Dec. 06, 2018	Nov. 06, 2019
R&S	Spectrum Analyzer	N9020A	MY51170037	May.22, 2019	May. 21, 2020
Agilent	Signal Generation	N5182A	MY48180656	May.22, 2019	May. 21, 2020
Worken	Directional Coupler	0110A05601O-10	COM5BNW1A2	May.22, 2019	May. 21, 2020

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

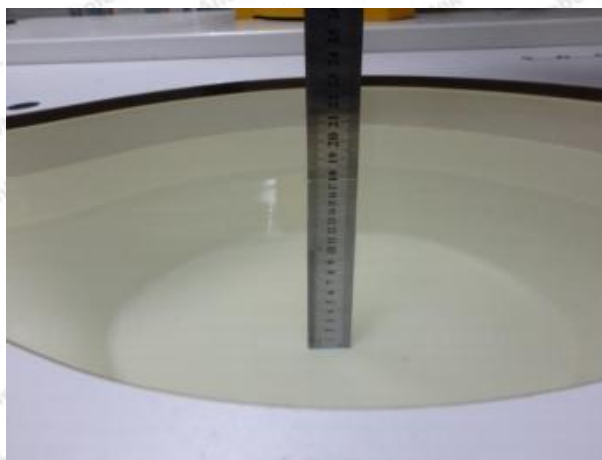
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6. Tissue Simulating Liquids

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:



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								
900	40.3	57.9	0.2	1.4	0.2	0	0.97	41.5
1750	55.2	0	0	0.3	0	44.5	1.37	40.1
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
5000	65.5	0	17.2	0	17.3	0	6.00	48.2
For Body								
900	50.8	48.2	0	0.9	0.1	0	0.97	55.2
1750	70.2	0	0	0.4	0	29.4	1.49	53.4
1800,1900,2000	70.2	0	0	0.4	0	29.4	1.52	53.3

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2450	68.6	0	0	0	0	31.4	1.95	52.7
2600	68.1	0	0	0.1	0	31.8	2.16	52.5
5000	78.6	0	10.7	0	10.7	0	6.00	48.2

The following table shows the measuring results for simulating liquid.

Tissue Type	Measured Frequency (MHz)	Target Tissue		Measured Tissue				Liquid Temp.	Test Data
		ϵ_r	σ	ϵ_r	Dev. (%)	σ	Dev. (%)		
900MSL	850	55.00	1.05	55.34	0.62	1.07	1.90	22.4	09/09/2019
1900MSL	1900	53.30	1.52	53.26	-0.08	1.51	-0.66	21.8	09/11/2019
1750MSL	1750	53.40	1.49	53.21	-0.36	1.51	1.34	22.3	09/13/2019
750MSL	750	55.5	0.96	55.37	-0.23	0.98	2.08	22.4	09/15/2019
2600MSL	2600	52.50	2.16	54.37	3.56	2.15	-0.46	21.6	09/23/2019
2450MSL	2450	52.70	1.95	51.97	-1.39	1.89	-3.08	221.9	09/24/2019

7. System Verification Procedures

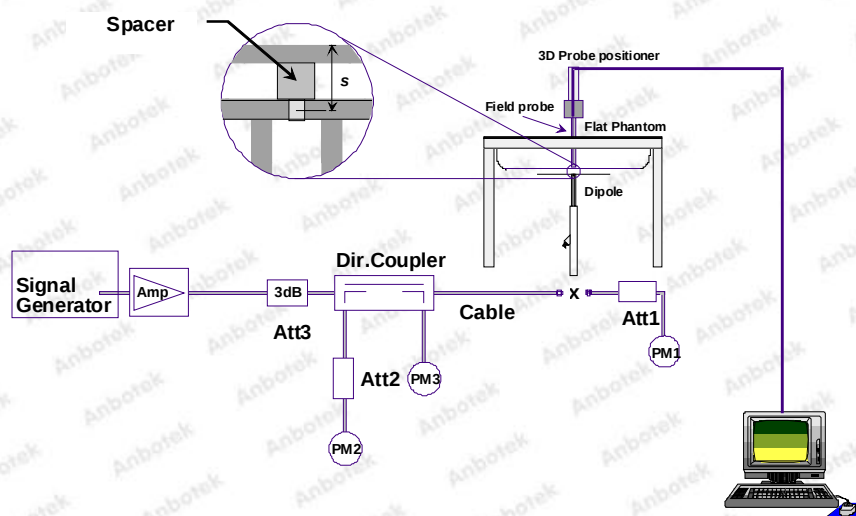
Each DASY system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the DASY software, enable the user to conduct the system performance check and system validation. System validation kit includes a dipole, tripod holder to fix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

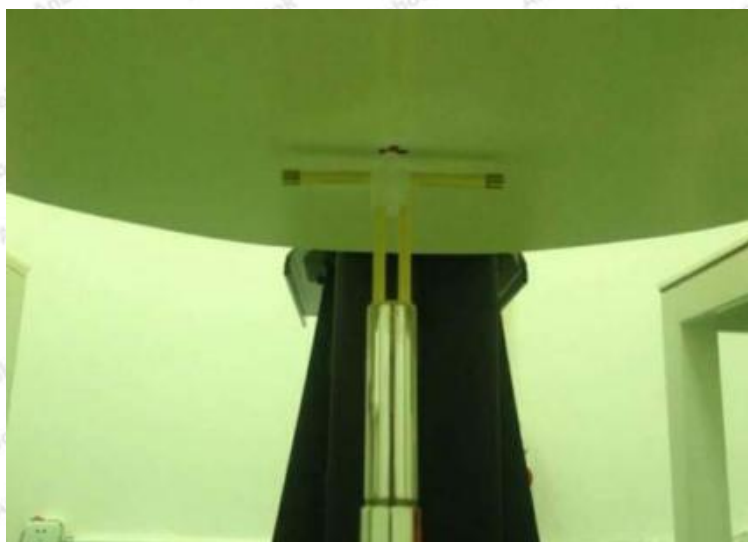


Photo of Dipole Setup

➤ 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.

Frequency (MHz)	Liquid Type	Power fed onto reference dipole (mW)	Targeted SAR (W/kg)	Measured SAR (W/kg)	Normalized SAR (W/kg)	Deviation (%)	Date
850	Body	250	9.52	2.31	9.24	-0.54	09/09/2019
1900	Body	250	39.60	9.26	37.04	-6.46	09/11/2019
1750	Body	250	36.70	9.06	36.24	-1.25	09/13/2019
750	Body	250	8.51	2.31	8.33	2.12	09/15/2019
2600	Body	250	54.10	13.72	54.88	1.44	09/23/2019
2450	Body	250	51.10	12.10	48.40	-5.28	09/24/2019

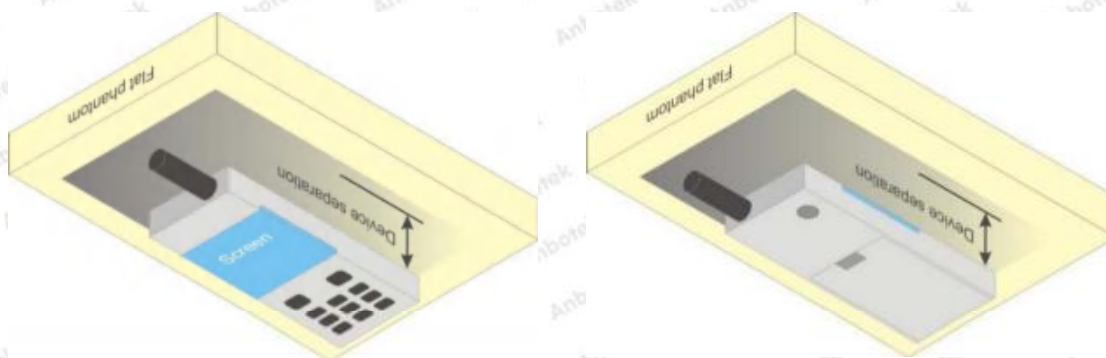
Target and Measurement SAR after Normalized

8. EUT Testing Position

8.1. Body Worn Position

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration. Per KDB 648474 D04, body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB 447498 D01 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for body-worn accessory, measured without a headset connected to the handset is < 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a handset attached to the handset.

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



Body Worn Position

9. Measurement Procedures

The measurement procedures are as follows:

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

- (a) Power reference measurement
- (b) Area scan
- (c) Zoom scan
- (d) 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:

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

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sensor to surface

- (f) 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	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5 \text{ mm}$
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: $\Delta x_{\text{Area}}, \Delta y_{\text{Area}}$	$\leq 2 \text{ GHz}: \leq 15 \text{ mm}$ $2 - 3 \text{ GHz}: \leq 12 \text{ mm}$	$3 - 4 \text{ GHz}: \leq 12 \text{ mm}$ $4 - 6 \text{ GHz}: \leq 10 \text{ mm}$
	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. Conducted Power

<GSM Conducted power>

GSM850	Burst Average Power (dBm)			Frame-Average Power (dBm)		
TX Channel	128	190	251	128	190	251
Frequency (MHz)	824.2	836.6	848.6	824.2	836.6	848.6
GSM (GMSK, 1 Tx slot)	30.52	30.68	30.71	21.49	21.68	21.68
GPRS (GMSK, 1 Tx slot) – CS1	29.76	29.75	30.08	20.73	21.05	21.05
GPRS (GMSK, 2 Tx slots) – CS1	27.17	27.23	27.62	21.15	21.21	21.60
GPRS (GMSK, 3 Tx slots) – CS1	25.89	26.02	26.01	21.63	21.76	21.75
GPRS (GMSK, 4 Tx slots) – CS1	24.44	24.57	24.58	21.43	21.56	21.57
EGPRS (GMSK, 1 Tx slot) – CS1	26.73	26.66	26.62	17.70	17.59	17.59
EGPRS (GMSK, 2 Tx slots) – CS1	26.46	26.45	26.47	20.44	20.43	20.45
EGPRS (GMSK, 3 Tx slots) – CS1	26.22	26.14	26.14	21.96	21.88	21.88
EGPRS (GMSK, 4 Tx slots) – CS1	25.92	25.73	25.94	22.91	22.72	22.93
PCS1900	Burst Average Power (dBm)			Frame-Average Power (dBm)		
TX Channel	512	661	810	512	661	810
Frequency (MHz)	1850.2	1880.0	1909.8	1850.2	1880.0	1909.8
GSM (GMSK, 1 Tx slot)	29.84	29.12	29.17	20.81	20.09	20.14
GPRS (GMSK, 1 Tx slot) – CS1	28.78	28.46	28.23	19.75	19.43	19.20
GPRS (GMSK, 2 Tx slots) – CS1	28.64	28.34	28.12	22.62	22.32	22.10
GPRS (GMSK, 3 Tx slots) – CS1	26.28	26.42	26.09	22.02	22.16	21.83
GPRS (GMSK, 4 Tx slots) – CS1	25.04	25.10	24.75	22.03	22.09	21.74
EGPRS (GMSK, 1 Tx slot) – CS1	28.47	28.28	27.99	19.44	19.25	18.96
EGPRS (GMSK, 2 Tx slots) – CS1	28.37	28.30	27.95	22.35	22.28	21.93
EGPRS (GMSK, 3 Tx slots) – CS1	28.24	28.16	27.74	23.98	23.90	23.48
EGPRS (GMSK, 4 Tx slots) – CS1	28.09	28.04	27.63	25.08	25.03	24.62

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 Head SAR testing, GSM should be evaluated, therefore the EUT was set in GSM Voice for GSM850 and PCS1900.
3. For Body SAR testing, GPRS should be evaluated, therefore the EUT was set in GPRS 3 Tx slots for GSM850 and GPRS 2 Tx slots for PCS1900 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:

- The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
- The RF path losses were compensated into the measurements.
- A call was established between EUT and Base Station with following setting * :
 - Call Configs = 5.2B, 5.9B, 5.10B, and 5.13.2B with QPSK
 - 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
 - Set Cell Power = -86 dBm
 - Set Channel Type = 12.2k + HSPA
 - Set UE Target Power
 - Power Ctrl Mode= Alternating bits
 - Set and observe the E-TFCI
 - Confirm that E-TFCI is equal to the target E-TFCI of 75 for sub-test 1, and other subtest's E-TFCI
- 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_d (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	209/225	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	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 $\beta_{isc} = 30/15 \cdot \beta_c$.

Note 2: CM = 1 for $\beta_d/\beta_c = 12/15$, $\beta_{HS}/\beta_c = 24/15$. 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_d/β_c 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_d/β_c 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>

Band	WCDMA Band 2			WCDMA Band 5		
TX Channel	9262	9400	9538	4132	4183	4233
Frequency (MHz)	1852.4	1880.0	1907.6	826.4	836.6	846.6
RMC 12.2Kbps	22.83	23.28	23.08	20.59	20.73	20.87
HSDPA Subtest-1	22.13	22.01	22.13	20.76	20.28	21.67
HSDPA Subtest-2	20.98	21.21	22.12	20.79	22.01	20.90
HSDPA Subtest-3	21.60	20.26	20.51	20.34	21.04	22.73
HSDPA Subtest-4	22.41	21.33	20.83	21.35	21.31	21.05
HSUPA Subtest-1	20.29	21.78	20.40	20.44	21.03	21.75
HSUPA Subtest-2	21.25	20.97	20.58	20.54	21.39	20.44
HSUPA Subtest-3	21.60	20.78	21.12	20.23	21.26	20.70
HSUPA Subtest-4	21.32	21.55	20.78	21.46	21.29	20.84
HSUPA Subtest-5	21.26	20.96	21.39	20.53	20.39	21.81

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>

Band	Bandwidth	Modulation	Channel	RB Configuration	Result(dBm)	Verdict
Band2	1.4MHz	QPSK	18607	1RB#0	24.46	PASS
Band2	1.4MHz	QPSK	18607	1RB#2	24.45	PASS
Band2	1.4MHz	QPSK	18607	1RB#5	24.50	PASS
Band2	1.4MHz	QPSK	18607	3RB#0	24.20	PASS
Band2	1.4MHz	QPSK	18607	3RB#1	24.23	PASS
Band2	1.4MHz	QPSK	18607	3RB#3	24.12	PASS
Band2	1.4MHz	QPSK	18607	6RB#0	23.22	PASS
Band2	1.4MHz	QPSK	18900	1RB#5	24.13	PASS
Band2	1.4MHz	QPSK	18900	1RB#2	24.48	PASS
Band2	1.4MHz	QPSK	18900	1RB#0	24.51	PASS
Band2	1.4MHz	QPSK	18900	3RB#3	24.36	PASS
Band2	1.4MHz	QPSK	18900	3RB#1	24.26	PASS
Band2	1.4MHz	QPSK	18900	3RB#0	24.41	PASS
Band2	1.4MHz	QPSK	18900	6RB#0	23.33	PASS
Band2	1.4MHz	QPSK	19193	1RB#5	24.46	PASS
Band2	1.4MHz	QPSK	19193	1RB#2	24.70	PASS
Band2	1.4MHz	QPSK	19193	1RB#0	24.45	PASS
Band2	1.4MHz	QPSK	19193	3RB#1	24.69	PASS
Band2	1.4MHz	QPSK	19193	3RB#0	24.91	PASS
Band2	1.4MHz	QPSK	19193	3RB#3	24.66	PASS
Band2	1.4MHz	QPSK	19193	6RB#0	23.73	PASS
Band2	1.4MHz	16QAM	18607	1RB#0	23.86	PASS
Band2	1.4MHz	16QAM	18607	1RB#2	23.83	PASS
Band2	1.4MHz	16QAM	18607	1RB#5	23.58	PASS
Band2	1.4MHz	16QAM	18607	3RB#0	24.27	PASS
Band2	1.4MHz	16QAM	18607	3RB#1	24.06	PASS
Band2	1.4MHz	16QAM	18607	3RB#3	24.08	PASS
Band2	1.4MHz	16QAM	18607	6RB#0	22.41	PASS
Band2	1.4MHz	16QAM	18900	1RB#5	23.20	PASS
Band2	1.4MHz	16QAM	18900	1RB#2	23.45	PASS
Band2	1.4MHz	16QAM	18900	1RB#0	23.20	PASS
Band2	1.4MHz	16QAM	18900	3RB#1	24.33	PASS
Band2	1.4MHz	16QAM	18900	3RB#0	24.38	PASS

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Band2	1.4MHz	16QAM	18900	3RB#3	24.34	PASS
Band2	1.4MHz	16QAM	18900	6RB#0	22.36	PASS
Band2	1.4MHz	16QAM	19193	1RB#0	23.64	PASS
Band2	1.4MHz	16QAM	19193	1RB#2	23.90	PASS
Band2	1.4MHz	16QAM	19193	1RB#5	24.02	PASS
Band2	1.4MHz	16QAM	19193	3RB#3	24.67	PASS
Band2	1.4MHz	16QAM	19193	3RB#1	24.65	PASS
Band2	1.4MHz	16QAM	19193	3RB#0	24.65	PASS
Band2	1.4MHz	16QAM	19193	6RB#0	23.03	PASS
Band2	3MHz	QPSK	18615	1RB#0	24.31	PASS
Band2	3MHz	QPSK	18615	1RB#8	24.36	PASS
Band2	3MHz	QPSK	18615	1RB#14	24.42	PASS
Band2	3MHz	QPSK	18615	8RB#4	22.88	PASS
Band2	3MHz	QPSK	18615	8RB#0	23.15	PASS
Band2	3MHz	QPSK	18615	8RB#7	23.80	PASS
Band2	3MHz	QPSK	18615	15RB#0	23.16	PASS
Band2	3MHz	QPSK	18900	1RB#8	24.22	PASS
Band2	3MHz	QPSK	18900	1RB#14	24.41	PASS
Band2	3MHz	QPSK	18900	1RB#0	24.31	PASS
Band2	3MHz	QPSK	18900	8RB#0	23.09	PASS
Band2	3MHz	QPSK	18900	8RB#7	23.49	PASS
Band2	3MHz	QPSK	18900	8RB#4	23.35	PASS
Band2	3MHz	QPSK	18900	15RB#0	23.38	PASS
Band2	3MHz	QPSK	19185	1RB#14	23.78	PASS
Band2	3MHz	QPSK	19185	1RB#0	24.56	PASS
Band2	3MHz	QPSK	19185	1RB#8	24.22	PASS
Band2	3MHz	QPSK	19185	8RB#4	23.44	PASS
Band2	3MHz	QPSK	19185	8RB#0	23.91	PASS
Band2	3MHz	QPSK	19185	8RB#7	22.98	PASS
Band2	3MHz	QPSK	19185	15RB#0	24.06	PASS
Band2	3MHz	16QAM	18615	1RB#14	23.12	PASS
Band2	3MHz	16QAM	18615	1RB#8	22.86	PASS
Band2	3MHz	16QAM	18615	1RB#0	23.23	PASS
Band2	3MHz	16QAM	18615	8RB#7	23.13	PASS
Band2	3MHz	16QAM	18615	8RB#4	23.05	PASS
Band2	3MHz	16QAM	18615	8RB#0	23.13	PASS

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Band2	3MHz	16QAM	18615	15RB#0	22.12	PASS
Band2	3MHz	16QAM	18900	1RB#8	23.34	PASS
Band2	3MHz	16QAM	18900	1RB#14	23.25	PASS
Band2	3MHz	16QAM	18900	1RB#0	23.35	PASS
Band2	3MHz	16QAM	18900	8RB#0	23.10	PASS
Band2	3MHz	16QAM	18900	8RB#7	23.25	PASS
Band2	3MHz	16QAM	18900	8RB#4	23.47	PASS
Band2	3MHz	16QAM	18900	15RB#0	22.36	PASS
Band2	3MHz	16QAM	19185	1RB#0	23.74	PASS
Band2	3MHz	16QAM	19185	1RB#8	23.62	PASS
Band2	3MHz	16QAM	19185	1RB#14	23.06	PASS
Band2	3MHz	16QAM	19185	8RB#0	23.83	PASS
Band2	3MHz	16QAM	19185	8RB#4	23.50	PASS
Band2	3MHz	16QAM	19185	8RB#7	22.96	PASS
Band2	3MHz	16QAM	19185	15RB#0	22.76	PASS
Band2	5MHz	QPSK	18625	1RB#24	24.32	PASS
Band2	5MHz	QPSK	18625	1RB#12	24.25	PASS
Band2	5MHz	QPSK	18625	1RB#0	24.30	PASS
Band2	5MHz	QPSK	18625	12RB#0	23.19	PASS
Band2	5MHz	QPSK	18625	12RB#6	23.25	PASS
Band2	5MHz	QPSK	18625	12RB#13	23.20	PASS
Band2	5MHz	QPSK	18625	25RB#0	23.10	PASS
Band2	5MHz	QPSK	18900	1RB#24	24.41	PASS
Band2	5MHz	QPSK	18900	1RB#12	24.23	PASS
Band2	5MHz	QPSK	18900	1RB#0	24.37	PASS
Band2	5MHz	QPSK	18900	12RB#6	23.32	PASS
Band2	5MHz	QPSK	18900	12RB#0	23.21	PASS
Band2	5MHz	QPSK	18900	12RB#13	23.10	PASS
Band2	5MHz	QPSK	18900	25RB#0	23.31	PASS
Band2	5MHz	QPSK	19175	1RB#24	24.61	PASS
Band2	5MHz	QPSK	19175	1RB#12	24.50	PASS
Band2	5MHz	QPSK	19175	1RB#0	24.57	PASS
Band2	5MHz	QPSK	19175	12RB#6	23.81	PASS
Band2	5MHz	QPSK	19175	12RB#13	23.77	PASS
Band2	5MHz	QPSK	19175	12RB#0	23.80	PASS
Band2	5MHz	QPSK	19175	25RB#0	23.85	PASS

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Band2	5MHz	16QAM	18625	1RB#0	23.56	PASS
Band2	5MHz	16QAM	18625	1RB#12	22.93	PASS
Band2	5MHz	16QAM	18625	1RB#24	23.00	PASS
Band2	5MHz	16QAM	18625	12RB#0	23.17	PASS
Band2	5MHz	16QAM	18625	12RB#6	23.23	PASS
Band2	5MHz	16QAM	18625	12RB#13	23.19	PASS
Band2	5MHz	16QAM	18625	25RB#0	22.26	PASS
Band2	5MHz	16QAM	18900	1RB#24	23.69	PASS
Band2	5MHz	16QAM	18900	1RB#12	23.33	PASS
Band2	5MHz	16QAM	18900	1RB#0	23.53	PASS
Band2	5MHz	16QAM	18900	12RB#0	23.32	PASS
Band2	5MHz	16QAM	18900	12RB#6	23.31	PASS
Band2	5MHz	16QAM	18900	12RB#13	23.48	PASS
Band2	5MHz	16QAM	18900	25RB#0	22.42	PASS
Band2	5MHz	16QAM	19175	1RB#12	23.23	PASS
Band2	5MHz	16QAM	19175	1RB#0	23.51	PASS
Band2	5MHz	16QAM	19175	1RB#24	23.24	PASS
Band2	5MHz	16QAM	19175	12RB#6	23.80	PASS
Band2	5MHz	16QAM	19175	12RB#13	23.72	PASS
Band2	5MHz	16QAM	19175	12RB#0	23.73	PASS
Band2	5MHz	16QAM	19175	25RB#0	22.81	PASS
Band2	10MHz	QPSK	18650	1RB#49	24.39	PASS
Band2	10MHz	QPSK	18650	1RB#0	24.14	PASS
Band2	10MHz	QPSK	18650	1RB#24	24.12	PASS
Band2	10MHz	QPSK	18650	25RB#25	23.21	PASS
Band2	10MHz	QPSK	18650	25RB#0	23.39	PASS
Band2	10MHz	QPSK	18650	25RB#12	23.35	PASS
Band2	10MHz	QPSK	18650	50RB#0	23.31	PASS
Band2	10MHz	QPSK	18900	1RB#0	24.49	PASS
Band2	10MHz	QPSK	18900	1RB#24	24.73	PASS
Band2	10MHz	QPSK	18900	1RB#49	24.72	PASS
Band2	10MHz	QPSK	18900	25RB#0	23.45	PASS
Band2	10MHz	QPSK	18900	25RB#12	23.48	PASS
Band2	10MHz	QPSK	18900	25RB#25	23.65	PASS
Band2	10MHz	QPSK	18900	50RB#0	23.49	PASS
Band2	10MHz	QPSK	19150	1RB#0	24.49	PASS

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Band2	10MHz	QPSK	19150	1RB#24	24.57	PASS
Band2	10MHz	QPSK	19150	1RB#49	23.77	PASS
Band2	10MHz	QPSK	19150	25RB#12	23.93	PASS
Band2	10MHz	QPSK	19150	25RB#25	23.82	PASS
Band2	10MHz	QPSK	19150	25RB#0	24.03	PASS
Band2	10MHz	QPSK	19150	50RB#0	23.92	PASS
Band2	10MHz	16QAM	18650	1RB#24	23.24	PASS
Band2	10MHz	16QAM	18650	1RB#49	23.61	PASS
Band2	10MHz	16QAM	18650	1RB#0	23.43	PASS
Band2	10MHz	16QAM	18650	25RB#0	23.36	PASS
Band2	10MHz	16QAM	18650	25RB#12	23.34	PASS
Band2	10MHz	16QAM	18650	25RB#25	23.21	PASS
Band2	10MHz	16QAM	18650	50RB#0	22.44	PASS
Band2	10MHz	16QAM	18900	1RB#24	23.96	PASS
Band2	10MHz	16QAM	18900	1RB#0	23.78	PASS
Band2	10MHz	16QAM	18900	1RB#49	24.38	PASS
Band2	10MHz	16QAM	18900	25RB#12	23.48	PASS
Band2	10MHz	16QAM	18900	25RB#25	23.63	PASS
Band2	10MHz	16QAM	18900	25RB#0	23.48	PASS
Band2	10MHz	16QAM	18900	50RB#0	22.52	PASS
Band2	10MHz	16QAM	19150	1RB#49	23.09	PASS
Band2	10MHz	16QAM	19150	1RB#0	23.81	PASS
Band2	10MHz	16QAM	19150	1RB#24	23.88	PASS
Band2	10MHz	16QAM	19150	25RB#25	23.98	PASS
Band2	10MHz	16QAM	19150	25RB#12	23.93	PASS
Band2	10MHz	16QAM	19150	25RB#0	23.95	PASS
Band2	10MHz	16QAM	19150	50RB#0	22.79	PASS
Band2	15MHz	QPSK	18675	1RB#74	24.22	PASS
Band2	15MHz	QPSK	18675	1RB#0	24.15	PASS
Band2	15MHz	QPSK	18675	1RB#38	24.07	PASS
Band2	15MHz	QPSK	18675	38RB#0	23.06	PASS
Band2	15MHz	QPSK	18675	38RB#37	22.75	PASS
Band2	15MHz	QPSK	18675	38RB#18	23.15	PASS
Band2	15MHz	QPSK	18675	75RB#0	23.16	PASS
Band2	15MHz	QPSK	18900	1RB#38	24.13	PASS
Band2	15MHz	QPSK	18900	1RB#74	24.22	PASS

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Band2	15MHz	QPSK	18900	1RB#0	24.38	PASS
Band2	15MHz	QPSK	18900	38RB#18	23.61	PASS
Band2	15MHz	QPSK	18900	38RB#0	24.34	PASS
Band2	15MHz	QPSK	18900	38RB#37	24.14	PASS
Band2	15MHz	QPSK	18900	75RB#0	23.52	PASS
Band2	15MHz	QPSK	19125	1RB#74	23.77	PASS
Band2	15MHz	QPSK	19125	1RB#38	24.46	PASS
Band2	15MHz	QPSK	19125	1RB#0	24.22	PASS
Band2	15MHz	QPSK	19125	38RB#18	23.48	PASS
Band2	15MHz	QPSK	19125	38RB#0	23.60	PASS
Band2	15MHz	QPSK	19125	38RB#37	23.12	PASS
Band2	15MHz	QPSK	19125	75RB#0	23.87	PASS
Band2	15MHz	16QAM	18675	1RB#38	23.36	PASS
Band2	15MHz	16QAM	18675	1RB#0	23.18	PASS
Band2	15MHz	16QAM	18675	1RB#74	22.83	PASS
Band2	15MHz	16QAM	18675	38RB#37	22.76	PASS
Band2	15MHz	16QAM	18675	38RB#18	23.23	PASS
Band2	15MHz	16QAM	18675	38RB#0	23.02	PASS
Band2	15MHz	16QAM	18675	75RB#0	22.15	PASS
Band2	15MHz	16QAM	18900	1RB#0	23.69	PASS
Band2	15MHz	16QAM	18900	1RB#38	23.77	PASS
Band2	15MHz	16QAM	18900	1RB#74	24.17	PASS
Band2	15MHz	16QAM	18900	38RB#0	24.30	PASS
Band2	15MHz	16QAM	18900	38RB#18	23.59	PASS
Band2	15MHz	16QAM	18900	38RB#37	23.85	PASS
Band2	15MHz	16QAM	18900	75RB#0	22.47	PASS
Band2	15MHz	16QAM	19125	1RB#0	23.58	PASS
Band2	15MHz	16QAM	19125	1RB#38	23.57	PASS
Band2	15MHz	16QAM	19125	1RB#74	23.10	PASS
Band2	15MHz	16QAM	19125	38RB#0	23.48	PASS
Band2	15MHz	16QAM	19125	38RB#18	23.49	PASS
Band2	15MHz	16QAM	19125	38RB#37	23.08	PASS
Band2	15MHz	16QAM	19125	75RB#0	22.88	PASS
Band2	20MHz	QPSK	18700	1RB#0	24.17	PASS
Band2	20MHz	QPSK	18700	1RB#49	24.66	PASS
Band2	20MHz	QPSK	18700	1RB#99	24.56	PASS

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Band2	20MHz	QPSK	18700	50RB#0	23.18	PASS
Band2	20MHz	QPSK	18700	50RB#25	23.18	PASS
Band2	20MHz	QPSK	18700	50RB#50	23.30	PASS
Band2	20MHz	QPSK	18700	100RB#0	23.21	PASS
Band2	20MHz	QPSK	18900	1RB#0	24.10	PASS
Band2	20MHz	QPSK	18900	1RB#99	24.62	PASS
Band2	20MHz	QPSK	18900	1RB#49	24.54	PASS
Band2	20MHz	QPSK	18900	50RB#25	23.39	PASS
Band2	20MHz	QPSK	18900	50RB#50	23.69	PASS
Band2	20MHz	QPSK	18900	50RB#0	23.31	PASS
Band2	20MHz	QPSK	18900	100RB#0	23.52	PASS
Band2	20MHz	QPSK	19100	1RB#0	24.75	PASS
Band2	20MHz	QPSK	19100	1RB#49	24.82	PASS
Band2	20MHz	QPSK	19100	1RB#99	23.92	PASS
Band2	20MHz	QPSK	19100	50RB#25	23.86	PASS
Band2	20MHz	QPSK	19100	50RB#50	23.81	PASS
Band2	20MHz	QPSK	19100	50RB#0	23.87	PASS
Band2	20MHz	QPSK	19100	100RB#0	23.86	PASS
Band2	20MHz	16QAM	18700	1RB#99	23.69	PASS
Band2	20MHz	16QAM	18700	1RB#0	23.57	PASS
Band2	20MHz	16QAM	18700	1RB#49	23.88	PASS
Band2	20MHz	16QAM	18700	50RB#50	23.29	PASS
Band2	20MHz	16QAM	18700	50RB#25	23.16	PASS
Band2	20MHz	16QAM	18700	50RB#0	23.27	PASS
Band2	20MHz	16QAM	18700	100RB#0	22.27	PASS
Band2	20MHz	16QAM	18900	1RB#0	23.26	PASS
Band2	20MHz	16QAM	18900	1RB#49	23.27	PASS
Band2	20MHz	16QAM	18900	1RB#99	23.50	PASS
Band2	20MHz	16QAM	18900	50RB#0	23.39	PASS
Band2	20MHz	16QAM	18900	50RB#25	23.45	PASS
Band2	20MHz	16QAM	18900	50RB#50	23.66	PASS
Band2	20MHz	16QAM	18900	100RB#0	22.53	PASS
Band2	20MHz	16QAM	19100	1RB#0	24.08	PASS
Band2	20MHz	16QAM	19100	1RB#49	24.21	PASS
Band2	20MHz	16QAM	19100	1RB#99	23.09	PASS
Band2	20MHz	16QAM	19100	50RB#0	23.86	PASS

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Band2	20MHz	16QAM	19100	50RB#25	23.85	PASS
Band2	20MHz	16QAM	19100	50RB#50	23.78	PASS
Band2	20MHz	16QAM	19100	100RB#0	22.92	PASS
Band4	1.4MHz	QPSK	19957	1RB#2	25.29	PASS
Band4	1.4MHz	QPSK	19957	1RB#0	24.96	PASS
Band4	1.4MHz	QPSK	19957	1RB#5	25.21	PASS
Band4	1.4MHz	QPSK	19957	3RB#3	25.19	PASS
Band4	1.4MHz	QPSK	19957	3RB#1	25.32	PASS
Band4	1.4MHz	QPSK	19957	3RB#0	25.30	PASS
Band4	1.4MHz	QPSK	19957	6RB#0	24.12	PASS
Band4	1.4MHz	QPSK	20175	1RB#5	25.22	PASS
Band4	1.4MHz	QPSK	20175	1RB#2	25.26	PASS
Band4	1.4MHz	QPSK	20175	1RB#0	25.26	PASS
Band4	1.4MHz	QPSK	20175	3RB#1	25.09	PASS
Band4	1.4MHz	QPSK	20175	3RB#3	25.08	PASS
Band4	1.4MHz	QPSK	20175	3RB#0	25.05	PASS
Band4	1.4MHz	QPSK	20175	6RB#0	24.02	PASS
Band4	1.4MHz	QPSK	20393	1RB#0	24.47	PASS
Band4	1.4MHz	QPSK	20393	1RB#2	24.50	PASS
Band4	1.4MHz	QPSK	20393	1RB#5	24.64	PASS
Band4	1.4MHz	QPSK	20393	3RB#0	24.63	PASS
Band4	1.4MHz	QPSK	20393	3RB#1	24.83	PASS
Band4	1.4MHz	QPSK	20393	3RB#3	24.71	PASS
Band4	1.4MHz	QPSK	20393	6RB#0	23.63	PASS
Band4	1.4MHz	16QAM	19957	1RB#5	24.41	PASS
Band4	1.4MHz	16QAM	19957	1RB#2	24.09	PASS
Band4	1.4MHz	16QAM	19957	1RB#0	23.86	PASS
Band4	1.4MHz	16QAM	19957	3RB#3	25.17	PASS
Band4	1.4MHz	16QAM	19957	3RB#1	25.29	PASS
Band4	1.4MHz	16QAM	19957	3RB#0	25.27	PASS
Band4	1.4MHz	16QAM	19957	6RB#0	23.15	PASS
Band4	1.4MHz	16QAM	20175	1RB#5	24.12	PASS
Band4	1.4MHz	16QAM	20175	1RB#2	24.39	PASS
Band4	1.4MHz	16QAM	20175	1RB#0	24.39	PASS
Band4	1.4MHz	16QAM	20175	3RB#3	24.98	PASS
Band4	1.4MHz	16QAM	20175	3RB#1	25.07	PASS

Band4	1.4MHz	16QAM	20175	3RB#0	25.11	PASS
Band4	1.4MHz	16QAM	20175	6RB#0	23.58	PASS
Band4	1.4MHz	16QAM	20393	1RB#2	23.59	PASS
Band4	1.4MHz	16QAM	20393	1RB#5	23.32	PASS
Band4	1.4MHz	16QAM	20393	1RB#0	23.25	PASS
Band4	1.4MHz	16QAM	20393	3RB#0	24.55	PASS
Band4	1.4MHz	16QAM	20393	3RB#1	24.81	PASS
Band4	1.4MHz	16QAM	20393	3RB#3	24.64	PASS
Band4	1.4MHz	16QAM	20393	6RB#0	22.58	PASS
Band4	3MHz	QPSK	19965	1RB#0	25.27	PASS
Band4	3MHz	QPSK	19965	1RB#8	24.77	PASS
Band4	3MHz	QPSK	19965	1RB#14	25.03	PASS
Band4	3MHz	QPSK	19965	8RB#0	24.09	PASS
Band4	3MHz	QPSK	19965	8RB#4	23.57	PASS
Band4	3MHz	QPSK	19965	8RB#7	24.19	PASS
Band4	3MHz	QPSK	19965	15RB#0	24.23	PASS
Band4	3MHz	QPSK	20175	1RB#14	24.83	PASS
Band4	3MHz	QPSK	20175	1RB#0	24.90	PASS
Band4	3MHz	QPSK	20175	1RB#8	24.99	PASS
Band4	3MHz	QPSK	20175	8RB#0	23.92	PASS
Band4	3MHz	QPSK	20175	8RB#4	23.54	PASS
Band4	3MHz	QPSK	20175	8RB#7	23.68	PASS
Band4	3MHz	QPSK	20175	15RB#0	23.95	PASS
Band4	3MHz	QPSK	20385	1RB#0	24.70	PASS
Band4	3MHz	QPSK	20385	1RB#14	24.61	PASS
Band4	3MHz	QPSK	20385	1RB#8	24.45	PASS
Band4	3MHz	QPSK	20385	8RB#7	23.19	PASS
Band4	3MHz	QPSK	20385	8RB#4	23.40	PASS
Band4	3MHz	QPSK	20385	8RB#0	23.51	PASS
Band4	3MHz	QPSK	20385	15RB#0	23.54	PASS
Band4	3MHz	16QAM	19965	1RB#8	23.92	PASS
Band4	3MHz	16QAM	19965	1RB#0	23.85	PASS
Band4	3MHz	16QAM	19965	1RB#14	24.18	PASS
Band4	3MHz	16QAM	19965	8RB#7	24.16	PASS
Band4	3MHz	16QAM	19965	8RB#4	23.64	PASS
Band4	3MHz	16QAM	19965	8RB#0	24.08	PASS

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Band4	3MHz	16QAM	19965	15RB#0	23.24	PASS
Band4	3MHz	16QAM	20175	1RB#14	23.74	PASS
Band4	3MHz	16QAM	20175	1RB#0	24.00	PASS
Band4	3MHz	16QAM	20175	1RB#8	23.40	PASS
Band4	3MHz	16QAM	20175	8RB#4	23.54	PASS
Band4	3MHz	16QAM	20175	8RB#0	23.90	PASS
Band4	3MHz	16QAM	20175	8RB#7	23.68	PASS
Band4	3MHz	16QAM	20175	15RB#0	23.10	PASS
Band4	3MHz	16QAM	20385	1RB#0	23.55	PASS
Band4	3MHz	16QAM	20385	1RB#8	23.26	PASS
Band4	3MHz	16QAM	20385	1RB#14	23.21	PASS
Band4	3MHz	16QAM	20385	8RB#4	23.21	PASS
Band4	3MHz	16QAM	20385	8RB#0	23.43	PASS
Band4	3MHz	16QAM	20385	8RB#7	23.19	PASS
Band4	3MHz	16QAM	20385	15RB#0	22.38	PASS
Band4	5MHz	QPSK	19975	1RB#24	25.19	PASS
Band4	5MHz	QPSK	19975	1RB#12	24.77	PASS
Band4	5MHz	QPSK	19975	1RB#0	25.11	PASS
Band4	5MHz	QPSK	19975	12RB#0	24.02	PASS
Band4	5MHz	QPSK	19975	12RB#6	24.23	PASS
Band4	5MHz	QPSK	19975	12RB#13	23.97	PASS
Band4	5MHz	QPSK	19975	25RB#0	23.89	PASS
Band4	5MHz	QPSK	20175	1RB#24	25.45	PASS
Band4	5MHz	QPSK	20175	1RB#12	24.92	PASS
Band4	5MHz	QPSK	20175	1RB#0	25.15	PASS
Band4	5MHz	QPSK	20175	12RB#13	23.94	PASS
Band4	5MHz	QPSK	20175	12RB#0	24.11	PASS
Band4	5MHz	QPSK	20175	12RB#6	24.05	PASS
Band4	5MHz	QPSK	20175	25RB#0	24.07	PASS
Band4	5MHz	QPSK	20375	1RB#0	24.56	PASS
Band4	5MHz	QPSK	20375	1RB#12	24.84	PASS
Band4	5MHz	QPSK	20375	1RB#24	24.61	PASS
Band4	5MHz	QPSK	20375	12RB#6	23.69	PASS
Band4	5MHz	QPSK	20375	12RB#13	23.74	PASS
Band4	5MHz	QPSK	20375	12RB#0	23.63	PASS
Band4	5MHz	QPSK	20375	25RB#0	23.71	PASS

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Band4	5MHz	16QAM	19975	1RB#24	23.95	PASS
Band4	5MHz	16QAM	19975	1RB#12	23.50	PASS
Band4	5MHz	16QAM	19975	1RB#0	24.35	PASS
Band4	5MHz	16QAM	19975	12RB#0	24.32	PASS
Band4	5MHz	16QAM	19975	12RB#6	23.81	PASS
Band4	5MHz	16QAM	19975	12RB#13	24.00	PASS
Band4	5MHz	16QAM	19975	25RB#0	23.07	PASS
Band4	5MHz	16QAM	20175	1RB#0	23.73	PASS
Band4	5MHz	16QAM	20175	1RB#24	23.46	PASS
Band4	5MHz	16QAM	20175	1RB#12	23.57	PASS
Band4	5MHz	16QAM	20175	12RB#6	24.04	PASS
Band4	5MHz	16QAM	20175	12RB#13	23.93	PASS
Band4	5MHz	16QAM	20175	12RB#0	24.07	PASS
Band4	5MHz	16QAM	20175	25RB#0	23.05	PASS
Band4	5MHz	16QAM	20375	1RB#0	23.57	PASS
Band4	5MHz	16QAM	20375	1RB#12	23.75	PASS
Band4	5MHz	16QAM	20375	1RB#24	23.61	PASS
Band4	5MHz	16QAM	20375	12RB#0	23.70	PASS
Band4	5MHz	16QAM	20375	12RB#13	23.72	PASS
Band4	5MHz	16QAM	20375	12RB#6	23.78	PASS
Band4	5MHz	16QAM	20375	25RB#0	22.79	PASS
Band4	10MHz	QPSK	20000	1RB#0	25.29	PASS
Band4	10MHz	QPSK	20000	1RB#49	25.30	PASS
Band4	10MHz	QPSK	20000	1RB#24	25.33	PASS
Band4	10MHz	QPSK	20000	25RB#12	23.96	PASS
Band4	10MHz	QPSK	20000	25RB#0	24.14	PASS
Band4	10MHz	QPSK	20000	25RB#25	24.17	PASS
Band4	10MHz	QPSK	20000	50RB#0	24.02	PASS
Band4	10MHz	QPSK	20175	1RB#49	24.87	PASS
Band4	10MHz	QPSK	20175	1RB#0	25.09	PASS
Band4	10MHz	QPSK	20175	1RB#24	25.13	PASS
Band4	10MHz	QPSK	20175	25RB#25	24.07	PASS
Band4	10MHz	QPSK	20175	25RB#12	24.22	PASS
Band4	10MHz	QPSK	20175	25RB#0	24.29	PASS
Band4	10MHz	QPSK	20175	50RB#0	23.93	PASS
Band4	10MHz	QPSK	20350	1RB#49	25.20	PASS

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Band4	10MHz	QPSK	20350	1RB#24	24.95	PASS
Band4	10MHz	QPSK	20350	1RB#0	24.59	PASS
Band4	10MHz	QPSK	20350	25RB#12	23.75	PASS
Band4	10MHz	QPSK	20350	25RB#0	23.76	PASS
Band4	10MHz	QPSK	20350	25RB#25	23.72	PASS
Band4	10MHz	QPSK	20350	50RB#0	23.71	PASS
Band4	10MHz	16QAM	20000	1RB#49	24.58	PASS
Band4	10MHz	16QAM	20000	1RB#24	24.32	PASS
Band4	10MHz	16QAM	20000	1RB#0	24.71	PASS
Band4	10MHz	16QAM	20000	25RB#12	23.93	PASS
Band4	10MHz	16QAM	20000	25RB#0	23.79	PASS
Band4	10MHz	16QAM	20000	25RB#25	24.21	PASS
Band4	10MHz	16QAM	20000	50RB#0	23.10	PASS
Band4	10MHz	16QAM	20175	1RB#49	23.81	PASS
Band4	10MHz	16QAM	20175	1RB#0	24.08	PASS
Band4	10MHz	16QAM	20175	1RB#24	23.63	PASS
Band4	10MHz	16QAM	20175	25RB#0	24.25	PASS
Band4	10MHz	16QAM	20175	25RB#25	23.96	PASS
Band4	10MHz	16QAM	20175	25RB#12	24.20	PASS
Band4	10MHz	16QAM	20175	50RB#0	23.18	PASS
Band4	10MHz	16QAM	20350	1RB#24	24.33	PASS
Band4	10MHz	16QAM	20350	1RB#49	24.01	PASS
Band4	10MHz	16QAM	20350	1RB#0	23.57	PASS
Band4	10MHz	16QAM	20350	25RB#12	23.73	PASS
Band4	10MHz	16QAM	20350	25RB#0	23.75	PASS
Band4	10MHz	16QAM	20350	25RB#25	23.78	PASS
Band4	10MHz	16QAM	20350	50RB#0	22.80	PASS
Band4	15MHz	QPSK	20025	1RB#74	21.98	PASS
Band4	15MHz	QPSK	20025	1RB#0	21.85	PASS
Band4	15MHz	QPSK	20025	1RB#38	21.87	PASS
Band4	15MHz	QPSK	20025	38RB#0	21.00	PASS
Band4	15MHz	QPSK	20025	38RB#18	21.01	PASS
Band4	15MHz	QPSK	20025	38RB#37	21.14	PASS
Band4	15MHz	QPSK	20025	75RB#0	21.03	PASS
Band4	15MHz	QPSK	20175	1RB#38	21.87	PASS
Band4	15MHz	QPSK	20175	1RB#74	21.73	PASS

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Band4	15MHz	QPSK	20175	1RB#0	21.90	PASS
Band4	15MHz	QPSK	20175	38RB#37	20.89	PASS
Band4	15MHz	QPSK	20175	38RB#0	21.06	PASS
Band4	15MHz	QPSK	20175	38RB#18	21.00	PASS
Band4	15MHz	QPSK	20175	75RB#0	21.02	PASS
Band4	15MHz	QPSK	20325	1RB#0	21.81	PASS
Band4	15MHz	QPSK	20325	1RB#38	21.75	PASS
Band4	15MHz	QPSK	20325	1RB#74	21.68	PASS
Band4	15MHz	QPSK	20325	38RB#37	20.90	PASS
Band4	15MHz	QPSK	20325	38RB#0	21.02	PASS
Band4	15MHz	QPSK	20325	38RB#18	20.97	PASS
Band4	15MHz	QPSK	20325	75RB#0	20.83	PASS
Band4	15MHz	16QAM	20025	1RB#74	21.15	PASS
Band4	15MHz	16QAM	20025	1RB#38	21.02	PASS
Band4	15MHz	16QAM	20025	1RB#0	21.00	PASS
Band4	15MHz	16QAM	20025	38RB#0	21.00	PASS
Band4	15MHz	16QAM	20025	38RB#18	21.01	PASS
Band4	15MHz	16QAM	20025	38RB#37	21.15	PASS
Band4	15MHz	16QAM	20025	75RB#0	21.59	PASS
Band4	15MHz	16QAM	20175	1RB#74	20.90	PASS
Band4	15MHz	16QAM	20175	1RB#38	20.99	PASS
Band4	15MHz	16QAM	20175	1RB#0	21.05	PASS
Band4	15MHz	16QAM	20175	38RB#37	20.90	PASS
Band4	15MHz	16QAM	20175	38RB#0	21.05	PASS
Band4	15MHz	16QAM	20175	38RB#18	21.01	PASS
Band4	15MHz	16QAM	20175	75RB#0	21.38	PASS
Band4	15MHz	16QAM	20325	1RB#74	20.90	PASS
Band4	15MHz	16QAM	20325	1RB#0	21.03	PASS
Band4	15MHz	16QAM	20325	1RB#38	20.98	PASS
Band4	15MHz	16QAM	20325	38RB#18	20.97	PASS
Band4	15MHz	16QAM	20325	38RB#37	20.91	PASS
Band4	15MHz	16QAM	20325	38RB#0	21.03	PASS
Band4	15MHz	16QAM	20325	75RB#0	21.49	PASS
Band4	20MHz	QPSK	20050	1RB#0	22.10	PASS
Band4	20MHz	QPSK	20050	1RB#49	22.12	PASS
Band4	20MHz	QPSK	20050	1RB#99	22.25	PASS

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Band4	20MHz	QPSK	20050	50RB#50	21.15	PASS
Band4	20MHz	QPSK	20050	50RB#25	21.02	PASS
Band4	20MHz	QPSK	20050	50RB#0	21.02	PASS
Band4	20MHz	QPSK	20050	100RB#0	21.09	PASS
Band4	20MHz	QPSK	20175	1RB#99	21.93	PASS
Band4	20MHz	QPSK	20175	1RB#49	22.08	PASS
Band4	20MHz	QPSK	20175	1RB#0	22.08	PASS
Band4	20MHz	QPSK	20175	50RB#25	21.04	PASS
Band4	20MHz	QPSK	20175	50RB#0	21.03	PASS
Band4	20MHz	QPSK	20175	50RB#50	20.94	PASS
Band4	20MHz	QPSK	20175	100RB#0	21.00	PASS
Band4	20MHz	QPSK	20300	1RB#0	22.04	PASS
Band4	20MHz	QPSK	20300	1RB#49	21.94	PASS
Band4	20MHz	QPSK	20300	1RB#99	21.84	PASS
Band4	20MHz	QPSK	20300	50RB#25	20.89	PASS
Band4	20MHz	QPSK	20300	50RB#0	20.89	PASS
Band4	20MHz	QPSK	20300	50RB#50	20.83	PASS
Band4	20MHz	QPSK	20300	100RB#0	20.86	PASS
Band4	20MHz	16QAM	20050	1RB#49	21.11	PASS
Band4	20MHz	16QAM	20050	1RB#99	21.21	PASS
Band4	20MHz	16QAM	20050	1RB#0	21.07	PASS
Band4	20MHz	16QAM	20050	50RB#0	21.02	PASS
Band4	20MHz	16QAM	20050	50RB#25	21.03	PASS
Band4	20MHz	16QAM	20050	50RB#50	21.14	PASS
Band4	20MHz	16QAM	20050	100RB#0	21.46	PASS
Band4	20MHz	16QAM	20175	1RB#49	21.03	PASS
Band4	20MHz	16QAM	20175	1RB#0	21.07	PASS
Band4	20MHz	16QAM	20175	1RB#99	20.91	PASS
Band4	20MHz	16QAM	20175	50RB#0	21.04	PASS
Band4	20MHz	16QAM	20175	50RB#25	21.04	PASS
Band4	20MHz	16QAM	20175	50RB#50	20.93	PASS
Band4	20MHz	16QAM	20175	100RB#0	20.99	PASS
Band4	20MHz	16QAM	20300	1RB#99	20.94	PASS
Band4	20MHz	16QAM	20300	1RB#49	21.03	PASS
Band4	20MHz	16QAM	20300	1RB#0	21.12	PASS
Band4	20MHz	16QAM	20300	50RB#50	20.83	PASS

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Band4	20MHz	16QAM	20300	50RB#25	20.89	PASS
Band4	20MHz	16QAM	20300	50RB#0	20.89	PASS
Band4	20MHz	16QAM	20300	100RB#0	20.06	PASS
Band5	1.4MHz	QPSK	20407	1RB#0	23.22	PASS
Band5	1.4MHz	QPSK	20407	1RB#5	23.20	PASS
Band5	1.4MHz	QPSK	20407	1RB#2	23.27	PASS
Band5	1.4MHz	QPSK	20407	3RB#1	23.24	PASS
Band5	1.4MHz	QPSK	20407	3RB#3	23.26	PASS
Band5	1.4MHz	QPSK	20407	3RB#0	23.23	PASS
Band5	1.4MHz	QPSK	20407	6RB#0	22.24	PASS
Band5	1.4MHz	QPSK	20525	1RB#5	23.27	PASS
Band5	1.4MHz	QPSK	20525	1RB#0	23.28	PASS
Band5	1.4MHz	QPSK	20525	1RB#2	23.31	PASS
Band5	1.4MHz	QPSK	20525	3RB#0	23.33	PASS
Band5	1.4MHz	QPSK	20525	3RB#3	23.31	PASS
Band5	1.4MHz	QPSK	20525	3RB#1	23.34	PASS
Band5	1.4MHz	QPSK	20525	6RB#0	22.30	PASS
Band5	1.4MHz	QPSK	20643	1RB#0	23.44	PASS
Band5	1.4MHz	QPSK	20643	1RB#2	23.51	PASS
Band5	1.4MHz	QPSK	20643	1RB#5	23.45	PASS
Band5	1.4MHz	QPSK	20643	3RB#1	23.49	PASS
Band5	1.4MHz	QPSK	20643	3RB#3	23.51	PASS
Band5	1.4MHz	QPSK	20643	3RB#0	23.50	PASS
Band5	1.4MHz	QPSK	20643	6RB#0	22.47	PASS
Band5	1.4MHz	16QAM	20407	1RB#2	22.37	PASS
Band5	1.4MHz	16QAM	20407	1RB#5	22.34	PASS
Band5	1.4MHz	16QAM	20407	1RB#0	22.31	PASS
Band5	1.4MHz	16QAM	20407	3RB#1	23.23	PASS
Band5	1.4MHz	16QAM	20407	3RB#0	23.24	PASS
Band5	1.4MHz	16QAM	20407	3RB#3	23.25	PASS
Band5	1.4MHz	16QAM	20407	6RB#0	21.10	PASS
Band5	1.4MHz	16QAM	20525	1RB#2	22.51	PASS
Band5	1.4MHz	16QAM	20525	1RB#5	22.38	PASS
Band5	1.4MHz	16QAM	20525	1RB#0	22.38	PASS
Band5	1.4MHz	16QAM	20525	3RB#0	23.34	PASS
Band5	1.4MHz	16QAM	20525	3RB#1	23.33	PASS

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Band5	1.4MHz	16QAM	20525	3RB#3	23.33	PASS
Band5	1.4MHz	16QAM	20525	6RB#0	21.34	PASS
Band5	1.4MHz	16QAM	20643	1RB#5	22.51	PASS
Band5	1.4MHz	16QAM	20643	1RB#2	22.57	PASS
Band5	1.4MHz	16QAM	20643	1RB#0	22.49	PASS
Band5	1.4MHz	16QAM	20643	3RB#3	23.52	PASS
Band5	1.4MHz	16QAM	20643	3RB#0	23.50	PASS
Band5	1.4MHz	16QAM	20643	3RB#1	23.49	PASS
Band5	1.4MHz	16QAM	20643	6RB#0	21.33	PASS
Band5	3MHz	QPSK	20415	1RB#14	23.19	PASS
Band5	3MHz	QPSK	20415	1RB#0	23.18	PASS
Band5	3MHz	QPSK	20415	1RB#8	23.23	PASS
Band5	3MHz	QPSK	20415	8RB#0	22.35	PASS
Band5	3MHz	QPSK	20415	8RB#7	22.31	PASS
Band5	3MHz	QPSK	20415	8RB#4	22.38	PASS
Band5	3MHz	QPSK	20415	15RB#0	22.27	PASS
Band5	3MHz	QPSK	20525	1RB#14	23.29	PASS
Band5	3MHz	QPSK	20525	1RB#8	23.32	PASS
Band5	3MHz	QPSK	20525	1RB#0	23.27	PASS
Band5	3MHz	QPSK	20525	8RB#0	22.44	PASS
Band5	3MHz	QPSK	20525	8RB#7	22.42	PASS
Band5	3MHz	QPSK	20525	8RB#4	22.46	PASS
Band5	3MHz	QPSK	20525	15RB#0	22.35	PASS
Band5	3MHz	QPSK	20635	1RB#8	23.49	PASS
Band5	3MHz	QPSK	20635	1RB#0	23.47	PASS
Band5	3MHz	QPSK	20635	1RB#14	23.46	PASS
Band5	3MHz	QPSK	20635	8RB#0	22.56	PASS
Band5	3MHz	QPSK	20635	8RB#4	22.56	PASS
Band5	3MHz	QPSK	20635	8RB#7	22.50	PASS
Band5	3MHz	QPSK	20635	15RB#0	22.51	PASS
Band5	3MHz	16QAM	20415	1RB#14	22.33	PASS
Band5	3MHz	16QAM	20415	1RB#0	22.35	PASS
Band5	3MHz	16QAM	20415	1RB#8	22.38	PASS
Band5	3MHz	16QAM	20415	8RB#0	22.35	PASS
Band5	3MHz	16QAM	20415	8RB#7	22.31	PASS
Band5	3MHz	16QAM	20415	8RB#4	22.38	PASS

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Band5	3MHz	16QAM	20415	15RB#0	21.28	PASS
Band5	3MHz	16QAM	20525	1RB#0	22.43	PASS
Band5	3MHz	16QAM	20525	1RB#8	22.45	PASS
Band5	3MHz	16QAM	20525	1RB#14	22.42	PASS
Band5	3MHz	16QAM	20525	8RB#7	22.42	PASS
Band5	3MHz	16QAM	20525	8RB#0	22.44	PASS
Band5	3MHz	16QAM	20525	8RB#4	22.46	PASS
Band5	3MHz	16QAM	20525	15RB#0	21.39	PASS
Band5	3MHz	16QAM	20635	1RB#14	22.49	PASS
Band5	3MHz	16QAM	20635	1RB#8	22.56	PASS
Band5	3MHz	16QAM	20635	1RB#0	22.56	PASS
Band5	3MHz	16QAM	20635	8RB#0	22.56	PASS
Band5	3MHz	16QAM	20635	8RB#4	22.56	PASS
Band5	3MHz	16QAM	20635	8RB#7	22.49	PASS
Band5	3MHz	16QAM	20635	15RB#0	21.44	PASS
Band5	5MHz	QPSK	20425	1RB#24	23.27	PASS
Band5	5MHz	QPSK	20425	1RB#12	23.36	PASS
Band5	5MHz	QPSK	20425	1RB#0	23.37	PASS
Band5	5MHz	QPSK	20425	12RB#13	22.34	PASS
Band5	5MHz	QPSK	20425	12RB#6	22.34	PASS
Band5	5MHz	QPSK	20425	12RB#0	22.35	PASS
Band5	5MHz	QPSK	20425	25RB#0	22.29	PASS
Band5	5MHz	QPSK	20525	1RB#24	23.41	PASS
Band5	5MHz	QPSK	20525	1RB#12	23.44	PASS
Band5	5MHz	QPSK	20525	1RB#0	23.48	PASS
Band5	5MHz	QPSK	20525	12RB#0	22.42	PASS
Band5	5MHz	QPSK	20525	12RB#13	22.46	PASS
Band5	5MHz	QPSK	20525	12RB#6	22.44	PASS
Band5	5MHz	QPSK	20525	25RB#0	22.38	PASS
Band5	5MHz	QPSK	20625	1RB#0	23.64	PASS
Band5	5MHz	QPSK	20625	1RB#12	23.54	PASS
Band5	5MHz	QPSK	20625	1RB#24	23.51	PASS
Band5	5MHz	QPSK	20625	12RB#6	22.58	PASS
Band5	5MHz	QPSK	20625	12RB#13	22.55	PASS
Band5	5MHz	QPSK	20625	12RB#0	22.58	PASS
Band5	5MHz	QPSK	20625	25RB#0	22.52	PASS

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Band5	5MHz	16QAM	20425	1RB#0	22.38	PASS
Band5	5MHz	16QAM	20425	1RB#12	22.34	PASS
Band5	5MHz	16QAM	20425	1RB#24	22.27	PASS
Band5	5MHz	16QAM	20425	12RB#13	22.34	PASS
Band5	5MHz	16QAM	20425	12RB#0	22.35	PASS
Band5	5MHz	16QAM	20425	12RB#6	22.35	PASS
Band5	5MHz	16QAM	20425	25RB#0	21.30	PASS
Band5	5MHz	16QAM	20525	1RB#24	22.41	PASS
Band5	5MHz	16QAM	20525	1RB#0	22.45	PASS
Band5	5MHz	16QAM	20525	1RB#12	22.44	PASS
Band5	5MHz	16QAM	20525	12RB#0	22.42	PASS
Band5	5MHz	16QAM	20525	12RB#13	22.46	PASS
Band5	5MHz	16QAM	20525	12RB#6	22.44	PASS
Band5	5MHz	16QAM	20525	25RB#0	21.40	PASS
Band5	5MHz	16QAM	20625	1RB#0	22.81	PASS
Band5	5MHz	16QAM	20625	1RB#12	22.71	PASS
Band5	5MHz	16QAM	20625	1RB#24	22.64	PASS
Band5	5MHz	16QAM	20625	12RB#0	22.57	PASS
Band5	5MHz	16QAM	20625	12RB#13	22.55	PASS
Band5	5MHz	16QAM	20625	12RB#6	22.59	PASS
Band5	5MHz	16QAM	20625	25RB#0	21.47	PASS
Band5	10MHz	QPSK	20450	1RB#0	23.36	PASS
Band5	10MHz	QPSK	20450	1RB#24	23.31	PASS
Band5	10MHz	QPSK	20450	1RB#49	23.33	PASS
Band5	10MHz	QPSK	20450	25RB#0	22.34	PASS
Band5	10MHz	QPSK	20450	25RB#12	22.33	PASS
Band5	10MHz	QPSK	20450	25RB#25	22.35	PASS
Band5	10MHz	QPSK	20450	50RB#0	22.34	PASS
Band5	10MHz	QPSK	20525	1RB#24	23.44	PASS
Band5	10MHz	QPSK	20525	1RB#0	23.38	PASS
Band5	10MHz	QPSK	20525	1RB#49	23.46	PASS
Band5	10MHz	QPSK	20525	25RB#12	22.40	PASS
Band5	10MHz	QPSK	20525	25RB#25	22.43	PASS
Band5	10MHz	QPSK	20525	25RB#0	22.41	PASS
Band5	10MHz	QPSK	20525	50RB#0	22.42	PASS
Band5	10MHz	QPSK	20600	1RB#49	23.50	PASS

Band5	10MHz	QPSK	20600	1RB#0	23.53	PASS
Band5	10MHz	QPSK	20600	1RB#24	23.60	PASS
Band5	10MHz	QPSK	20600	25RB#25	22.53	PASS
Band5	10MHz	QPSK	20600	25RB#0	22.53	PASS
Band5	10MHz	QPSK	20600	25RB#12	22.53	PASS
Band5	10MHz	QPSK	20600	50RB#0	22.53	PASS
Band5	10MHz	16QAM	20450	1RB#49	22.49	PASS
Band5	10MHz	16QAM	20450	1RB#0	22.55	PASS
Band5	10MHz	16QAM	20450	1RB#24	22.50	PASS
Band5	10MHz	16QAM	20450	25RB#0	22.34	PASS
Band5	10MHz	16QAM	20450	25RB#12	22.33	PASS
Band5	10MHz	16QAM	20450	25RB#25	22.35	PASS
Band5	10MHz	16QAM	20450	50RB#0	21.33	PASS
Band5	10MHz	16QAM	20525	1RB#0	22.55	PASS
Band5	10MHz	16QAM	20525	1RB#49	22.57	PASS
Band5	10MHz	16QAM	20525	1RB#24	22.59	PASS
Band5	10MHz	16QAM	20525	25RB#0	22.40	PASS
Band5	10MHz	16QAM	20525	25RB#25	22.43	PASS
Band5	10MHz	16QAM	20525	25RB#12	22.40	PASS
Band5	10MHz	16QAM	20525	50RB#0	21.44	PASS
Band5	10MHz	16QAM	20600	1RB#49	22.41	PASS
Band5	10MHz	16QAM	20600	1RB#24	22.51	PASS
Band5	10MHz	16QAM	20600	1RB#0	22.41	PASS
Band5	10MHz	16QAM	20600	25RB#25	22.53	PASS
Band5	10MHz	16QAM	20600	25RB#12	22.54	PASS
Band5	10MHz	16QAM	20600	25RB#0	22.54	PASS
Band5	10MHz	16QAM	20600	50RB#0	21.53	PASS
Band7	5MHz	QPSK	20775	1RB#12	22.99	PASS
Band7	5MHz	QPSK	20775	1RB#0	23.29	PASS
Band7	5MHz	QPSK	20775	1RB#24	22.94	PASS
Band7	5MHz	QPSK	20775	12RB#13	21.95	PASS
Band7	5MHz	QPSK	20775	12RB#0	21.97	PASS
Band7	5MHz	QPSK	20775	12RB#6	22.01	PASS
Band7	5MHz	QPSK	20775	25RB#0	22.02	PASS
Band7	5MHz	QPSK	21100	1RB#0	23.38	PASS
Band7	5MHz	QPSK	21100	1RB#12	23.38	PASS

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Band7	5MHz	QPSK	21100	1RB#24	23.16	PASS
Band7	5MHz	QPSK	21100	12RB#0	22.18	PASS
Band7	5MHz	QPSK	21100	12RB#13	22.18	PASS
Band7	5MHz	QPSK	21100	12RB#6	22.19	PASS
Band7	5MHz	QPSK	21100	25RB#0	22.37	PASS
Band7	5MHz	QPSK	21425	1RB#24	22.80	PASS
Band7	5MHz	QPSK	21425	1RB#0	22.91	PASS
Band7	5MHz	QPSK	21425	1RB#12	22.85	PASS
Band7	5MHz	QPSK	21425	12RB#6	21.91	PASS
Band7	5MHz	QPSK	21425	12RB#0	21.93	PASS
Band7	5MHz	QPSK	21425	12RB#13	21.93	PASS
Band7	5MHz	QPSK	21425	25RB#0	21.97	PASS
Band7	5MHz	16QAM	20775	1RB#0	21.77	PASS
Band7	5MHz	16QAM	20775	1RB#24	21.47	PASS
Band7	5MHz	16QAM	20775	1RB#12	21.50	PASS
Band7	5MHz	16QAM	20775	12RB#6	22.00	PASS
Band7	5MHz	16QAM	20775	12RB#13	21.99	PASS
Band7	5MHz	16QAM	20775	12RB#0	22.04	PASS
Band7	5MHz	16QAM	20775	25RB#0	21.15	PASS
Band7	5MHz	16QAM	21100	1RB#24	21.94	PASS
Band7	5MHz	16QAM	21100	1RB#12	22.11	PASS
Band7	5MHz	16QAM	21100	1RB#0	22.52	PASS
Band7	5MHz	16QAM	21100	12RB#6	22.18	PASS
Band7	5MHz	16QAM	21100	12RB#13	22.18	PASS
Band7	5MHz	16QAM	21100	12RB#0	22.19	PASS
Band7	5MHz	16QAM	21100	25RB#0	21.23	PASS
Band7	5MHz	16QAM	21425	1RB#12	21.72	PASS
Band7	5MHz	16QAM	21425	1RB#0	22.06	PASS
Band7	5MHz	16QAM	21425	1RB#24	21.74	PASS
Band7	5MHz	16QAM	21425	12RB#0	21.92	PASS
Band7	5MHz	16QAM	21425	12RB#6	21.90	PASS
Band7	5MHz	16QAM	21425	12RB#13	21.92	PASS
Band7	5MHz	16QAM	21425	25RB#0	21.13	PASS
Band7	10MHz	QPSK	20800	1RB#24	22.99	PASS
Band7	10MHz	QPSK	20800	1RB#49	23.11	PASS
Band7	10MHz	QPSK	20800	1RB#0	23.45	PASS

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Band7	10MHz	QPSK	20800	25RB#0	22.12	PASS
Band7	10MHz	QPSK	20800	25RB#12	22.10	PASS
Band7	10MHz	QPSK	20800	25RB#25	22.21	PASS
Band7	10MHz	QPSK	20800	50RB#0	22.16	PASS
Band7	10MHz	QPSK	21100	1RB#0	23.21	PASS
Band7	10MHz	QPSK	21100	1RB#49	23.19	PASS
Band7	10MHz	QPSK	21100	1RB#24	23.72	PASS
Band7	10MHz	QPSK	21100	25RB#0	22.28	PASS
Band7	10MHz	QPSK	21100	25RB#25	22.47	PASS
Band7	10MHz	QPSK	21100	25RB#12	22.29	PASS
Band7	10MHz	QPSK	21100	50RB#0	22.33	PASS
Band7	10MHz	QPSK	21400	1RB#24	23.09	PASS
Band7	10MHz	QPSK	21400	1RB#49	23.03	PASS
Band7	10MHz	QPSK	21400	1RB#0	23.00	PASS
Band7	10MHz	QPSK	21400	25RB#12	21.92	PASS
Band7	10MHz	QPSK	21400	25RB#25	22.05	PASS
Band7	10MHz	QPSK	21400	25RB#0	21.87	PASS
Band7	10MHz	QPSK	21400	50RB#0	21.95	PASS
Band7	10MHz	16QAM	20800	1RB#24	21.96	PASS
Band7	10MHz	16QAM	20800	1RB#49	21.95	PASS
Band7	10MHz	16QAM	20800	1RB#0	22.57	PASS
Band7	10MHz	16QAM	20800	25RB#12	22.09	PASS
Band7	10MHz	16QAM	20800	25RB#0	22.10	PASS
Band7	10MHz	16QAM	20800	25RB#25	22.11	PASS
Band7	10MHz	16QAM	20800	50RB#0	21.04	PASS
Band7	10MHz	16QAM	21100	1RB#49	22.09	PASS
Band7	10MHz	16QAM	21100	1RB#24	23.00	PASS
Band7	10MHz	16QAM	21100	1RB#0	22.44	PASS
Band7	10MHz	16QAM	21100	25RB#25	22.46	PASS
Band7	10MHz	16QAM	21100	25RB#12	22.28	PASS
Band7	10MHz	16QAM	21100	25RB#0	22.27	PASS
Band7	10MHz	16QAM	21100	50RB#0	21.32	PASS
Band7	10MHz	16QAM	21400	1RB#0	21.95	PASS
Band7	10MHz	16QAM	21400	1RB#24	22.50	PASS
Band7	10MHz	16QAM	21400	1RB#49	21.83	PASS
Band7	10MHz	16QAM	21400	25RB#25	22.03	PASS

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Band7	10MHz	16QAM	21400	25RB#0	21.91	PASS
Band7	10MHz	16QAM	21400	25RB#12	21.92	PASS
Band7	10MHz	16QAM	21400	50RB#0	20.93	PASS
Band7	15MHz	QPSK	20825	1RB#0	23.19	PASS
Band7	15MHz	QPSK	20825	1RB#38	23.13	PASS
Band7	15MHz	QPSK	20825	1RB#74	23.25	PASS
Band7	15MHz	QPSK	20825	38RB#37	22.41	PASS
Band7	15MHz	QPSK	20825	38RB#0	23.04	PASS
Band7	15MHz	QPSK	20825	38RB#18	22.40	PASS
Band7	15MHz	QPSK	20825	75RB#0	22.07	PASS
Band7	15MHz	QPSK	21100	1RB#38	23.17	PASS
Band7	15MHz	QPSK	21100	1RB#0	23.23	PASS
Band7	15MHz	QPSK	21100	1RB#74	22.95	PASS
Band7	15MHz	QPSK	21100	38RB#37	21.98	PASS
Band7	15MHz	QPSK	21100	38RB#18	22.15	PASS
Band7	15MHz	QPSK	21100	38RB#0	21.89	PASS
Band7	15MHz	QPSK	21100	75RB#0	22.16	PASS
Band7	15MHz	QPSK	21375	1RB#0	22.80	PASS
Band7	15MHz	QPSK	21375	1RB#74	22.90	PASS
Band7	15MHz	QPSK	21375	1RB#38	22.89	PASS
Band7	15MHz	QPSK	21375	38RB#37	21.95	PASS
Band7	15MHz	QPSK	21375	38RB#18	21.77	PASS
Band7	15MHz	QPSK	21375	38RB#0	21.62	PASS
Band7	15MHz	QPSK	21375	75RB#0	21.85	PASS
Band7	15MHz	16QAM	20825	1RB#0	22.48	PASS
Band7	15MHz	16QAM	20825	1RB#74	22.35	PASS
Band7	15MHz	16QAM	20825	1RB#38	22.40	PASS
Band7	15MHz	16QAM	20825	38RB#0	23.02	PASS
Band7	15MHz	16QAM	20825	38RB#18	22.33	PASS
Band7	15MHz	16QAM	20825	38RB#37	22.40	PASS
Band7	15MHz	16QAM	20825	75RB#0	21.12	PASS
Band7	15MHz	16QAM	21100	1RB#74	21.80	PASS
Band7	15MHz	16QAM	21100	1RB#38	22.09	PASS
Band7	15MHz	16QAM	21100	1RB#0	22.22	PASS
Band7	15MHz	16QAM	21100	38RB#37	21.99	PASS
Band7	15MHz	16QAM	21100	38RB#18	22.15	PASS

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Band7	15MHz	16QAM	21100	38RB#0	21.98	PASS
Band7	15MHz	16QAM	21100	75RB#0	21.16	PASS
Band7	15MHz	16QAM	21375	1RB#0	21.90	PASS
Band7	15MHz	16QAM	21375	1RB#38	21.72	PASS
Band7	15MHz	16QAM	21375	1RB#74	21.88	PASS
Band7	15MHz	16QAM	21375	38RB#0	21.66	PASS
Band7	15MHz	16QAM	21375	38RB#18	21.76	PASS
Band7	15MHz	16QAM	21375	38RB#37	21.96	PASS
Band7	15MHz	16QAM	21375	75RB#0	20.97	PASS
Band7	20MHz	QPSK	20850	1RB#49	23.16	PASS
Band7	20MHz	QPSK	20850	1RB#0	23.35	PASS
Band7	20MHz	QPSK	20850	1RB#99	23.20	PASS
Band7	20MHz	QPSK	20850	50RB#0	22.22	PASS
Band7	20MHz	QPSK	20850	50RB#25	22.21	PASS
Band7	20MHz	QPSK	20850	50RB#50	22.30	PASS
Band7	20MHz	QPSK	20850	100RB#0	22.33	PASS
Band7	20MHz	QPSK	21100	1RB#99	22.75	PASS
Band7	20MHz	QPSK	21100	1RB#49	23.41	PASS
Band7	20MHz	QPSK	21100	1RB#0	22.85	PASS
Band7	20MHz	QPSK	21100	50RB#50	22.08	PASS
Band7	20MHz	QPSK	21100	50RB#25	22.24	PASS
Band7	20MHz	QPSK	21100	50RB#0	22.26	PASS
Band7	20MHz	QPSK	21100	100RB#0	22.12	PASS
Band7	20MHz	QPSK	21350	1RB#49	23.13	PASS
Band7	20MHz	QPSK	21350	1RB#0	22.73	PASS
Band7	20MHz	QPSK	21350	1RB#99	23.09	PASS
Band7	20MHz	QPSK	21350	50RB#25	21.86	PASS
Band7	20MHz	QPSK	21350	50RB#0	21.90	PASS
Band7	20MHz	QPSK	21350	50RB#50	22.07	PASS
Band7	20MHz	QPSK	21350	100RB#0	21.94	PASS
Band7	20MHz	16QAM	20850	1RB#49	22.66	PASS
Band7	20MHz	16QAM	20850	1RB#99	22.67	PASS
Band7	20MHz	16QAM	20850	1RB#0	22.51	PASS
Band7	20MHz	16QAM	20850	50RB#25	22.21	PASS
Band7	20MHz	16QAM	20850	50RB#50	22.29	PASS
Band7	20MHz	16QAM	20850	50RB#0	22.22	PASS

Band7	20MHz	16QAM	20850	100RB#0	21.37	PASS
Band7	20MHz	16QAM	21100	1RB#99	21.93	PASS
Band7	20MHz	16QAM	21100	1RB#49	22.23	PASS
Band7	20MHz	16QAM	21100	1RB#0	22.30	PASS
Band7	20MHz	16QAM	21100	50RB#50	22.09	PASS
Band7	20MHz	16QAM	21100	50RB#25	22.23	PASS
Band7	20MHz	16QAM	21100	50RB#0	22.25	PASS
Band7	20MHz	16QAM	21100	100RB#0	21.22	PASS
Band7	20MHz	16QAM	21350	1RB#49	22.35	PASS
Band7	20MHz	16QAM	21350	1RB#99	22.21	PASS
Band7	20MHz	16QAM	21350	1RB#0	22.09	PASS
Band7	20MHz	16QAM	21350	50RB#25	21.87	PASS
Band7	20MHz	16QAM	21350	50RB#50	22.02	PASS
Band7	20MHz	16QAM	21350	50RB#0	21.93	PASS
Band7	20MHz	16QAM	21350	100RB#0	21.08	PASS
Band12	1.4MHz	QPSK	23017	1RB#0	24.05	PASS
Band12	1.4MHz	QPSK	23017	1RB#2	24.28	PASS
Band12	1.4MHz	QPSK	23017	1RB#5	24.24	PASS
Band12	1.4MHz	QPSK	23017	3RB#0	24.00	PASS
Band12	1.4MHz	QPSK	23017	3RB#1	24.03	PASS
Band12	1.4MHz	QPSK	23017	3RB#3	24.16	PASS
Band12	1.4MHz	QPSK	23017	6RB#0	23.06	PASS
Band12	1.4MHz	QPSK	23095	1RB#5	24.01	PASS
Band12	1.4MHz	QPSK	23095	1RB#0	23.97	PASS
Band12	1.4MHz	QPSK	23095	1RB#2	24.09	PASS
Band12	1.4MHz	QPSK	23095	3RB#0	24.01	PASS
Band12	1.4MHz	QPSK	23095	3RB#3	24.03	PASS
Band12	1.4MHz	QPSK	23095	3RB#1	24.04	PASS
Band12	1.4MHz	QPSK	23095	6RB#0	23.13	PASS
Band12	1.4MHz	QPSK	23173	1RB#0	23.84	PASS
Band12	1.4MHz	QPSK	23173	1RB#2	24.11	PASS
Band12	1.4MHz	QPSK	23173	1RB#5	24.14	PASS
Band12	1.4MHz	QPSK	23173	3RB#1	24.01	PASS
Band12	1.4MHz	QPSK	23173	3RB#0	24.11	PASS
Band12	1.4MHz	QPSK	23173	3RB#3	24.32	PASS
Band12	1.4MHz	QPSK	23173	6RB#0	23.10	PASS

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Band12	1.4MHz	16QAM	23017	1RB#0	23.21	PASS
Band12	1.4MHz	16QAM	23017	1RB#2	23.46	PASS
Band12	1.4MHz	16QAM	23017	1RB#5	23.27	PASS
Band12	1.4MHz	16QAM	23017	3RB#3	24.14	PASS
Band12	1.4MHz	16QAM	23017	3RB#0	23.97	PASS
Band12	1.4MHz	16QAM	23017	3RB#1	24.12	PASS
Band12	1.4MHz	16QAM	23017	6RB#0	22.33	PASS
Band12	1.4MHz	16QAM	23095	1RB#5	22.94	PASS
Band12	1.4MHz	16QAM	23095	1RB#0	23.03	PASS
Band12	1.4MHz	16QAM	23095	1RB#2	22.82	PASS
Band12	1.4MHz	16QAM	23095	3RB#3	24.25	PASS
Band12	1.4MHz	16QAM	23095	3RB#1	24.01	PASS
Band12	1.4MHz	16QAM	23095	3RB#0	23.98	PASS
Band12	1.4MHz	16QAM	23095	6RB#0	21.86	PASS
Band12	1.4MHz	16QAM	23173	1RB#5	23.23	PASS
Band12	1.4MHz	16QAM	23173	1RB#2	23.33	PASS
Band12	1.4MHz	16QAM	23173	1RB#0	23.09	PASS
Band12	1.4MHz	16QAM	23173	3RB#1	24.00	PASS
Band12	1.4MHz	16QAM	23173	3RB#3	24.05	PASS
Band12	1.4MHz	16QAM	23173	3RB#0	24.02	PASS
Band12	1.4MHz	16QAM	23173	6RB#0	22.18	PASS
Band12	3MHz	QPSK	23025	1RB#0	24.27	PASS
Band12	3MHz	QPSK	23025	1RB#8	24.37	PASS
Band12	3MHz	QPSK	23025	1RB#14	24.34	PASS
Band12	3MHz	QPSK	23025	8RB#4	23.47	PASS
Band12	3MHz	QPSK	23025	8RB#7	23.49	PASS
Band12	3MHz	QPSK	23025	8RB#0	23.47	PASS
Band12	3MHz	QPSK	23025	15RB#0	23.29	PASS
Band12	3MHz	QPSK	23095	1RB#0	24.16	PASS
Band12	3MHz	QPSK	23095	1RB#14	24.51	PASS
Band12	3MHz	QPSK	23095	1RB#8	24.43	PASS
Band12	3MHz	QPSK	23095	8RB#7	23.97	PASS
Band12	3MHz	QPSK	23095	8RB#0	23.35	PASS
Band12	3MHz	QPSK	23095	8RB#4	23.58	PASS
Band12	3MHz	QPSK	23095	15RB#0	23.20	PASS
Band12	3MHz	QPSK	23165	1RB#0	24.24	PASS

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Band12	3MHz	QPSK	23165	1RB#14	24.22	PASS
Band12	3MHz	QPSK	23165	1RB#8	23.78	PASS
Band12	3MHz	QPSK	23165	8RB#7	23.08	PASS
Band12	3MHz	QPSK	23165	8RB#0	23.22	PASS
Band12	3MHz	QPSK	23165	8RB#4	22.96	PASS
Band12	3MHz	QPSK	23165	15RB#0	23.23	PASS
Band12	3MHz	16QAM	23025	1RB#14	23.47	PASS
Band12	3MHz	16QAM	23025	1RB#8	23.55	PASS
Band12	3MHz	16QAM	23025	1RB#0	23.47	PASS
Band12	3MHz	16QAM	23025	8RB#7	23.50	PASS
Band12	3MHz	16QAM	23025	8RB#4	23.50	PASS
Band12	3MHz	16QAM	23025	8RB#0	23.62	PASS
Band12	3MHz	16QAM	23025	15RB#0	22.13	PASS
Band12	3MHz	16QAM	23095	1RB#14	23.87	PASS
Band12	3MHz	16QAM	23095	1RB#8	23.58	PASS
Band12	3MHz	16QAM	23095	1RB#0	23.25	PASS
Band12	3MHz	16QAM	23095	8RB#0	23.66	PASS
Band12	3MHz	16QAM	23095	8RB#4	23.56	PASS
Band12	3MHz	16QAM	23095	8RB#7	23.95	PASS
Band12	3MHz	16QAM	23095	15RB#0	22.25	PASS
Band12	3MHz	16QAM	23165	1RB#14	23.13	PASS
Band12	3MHz	16QAM	23165	1RB#0	23.40	PASS
Band12	3MHz	16QAM	23165	1RB#8	22.95	PASS
Band12	3MHz	16QAM	23165	8RB#0	23.23	PASS
Band12	3MHz	16QAM	23165	8RB#4	22.97	PASS
Band12	3MHz	16QAM	23165	8RB#7	23.07	PASS
Band12	3MHz	16QAM	23165	15RB#0	22.15	PASS
Band12	5MHz	QPSK	23035	1RB#12	24.35	PASS
Band12	5MHz	QPSK	23035	1RB#24	24.11	PASS
Band12	5MHz	QPSK	23035	1RB#0	24.40	PASS
Band12	5MHz	QPSK	23035	12RB#6	23.27	PASS
Band12	5MHz	QPSK	23035	12RB#0	23.38	PASS
Band12	5MHz	QPSK	23035	12RB#13	23.11	PASS
Band12	5MHz	QPSK	23035	25RB#0	23.28	PASS
Band12	5MHz	QPSK	23095	1RB#12	24.20	PASS
Band12	5MHz	QPSK	23095	1RB#24	24.27	PASS

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Band12	5MHz	QPSK	23095	1RB#0	24.19	PASS
Band12	5MHz	QPSK	23095	12RB#0	23.20	PASS
Band12	5MHz	QPSK	23095	12RB#6	23.20	PASS
Band12	5MHz	QPSK	23095	12RB#13	23.27	PASS
Band12	5MHz	QPSK	23095	25RB#0	23.22	PASS
Band12	5MHz	QPSK	23155	1RB#24	24.12	PASS
Band12	5MHz	QPSK	23155	1RB#12	24.19	PASS
Band12	5MHz	QPSK	23155	1RB#0	24.32	PASS
Band12	5MHz	QPSK	23155	12RB#0	23.26	PASS
Band12	5MHz	QPSK	23155	12RB#6	23.26	PASS
Band12	5MHz	QPSK	23155	12RB#13	23.10	PASS
Band12	5MHz	QPSK	23155	25RB#0	23.18	PASS
Band12	5MHz	16QAM	23035	1RB#24	23.02	PASS
Band12	5MHz	16QAM	23035	1RB#12	23.10	PASS
Band12	5MHz	16QAM	23035	1RB#0	23.38	PASS
Band12	5MHz	16QAM	23035	12RB#6	23.27	PASS
Band12	5MHz	16QAM	23035	12RB#13	23.05	PASS
Band12	5MHz	16QAM	23035	12RB#0	23.28	PASS
Band12	5MHz	16QAM	23035	25RB#0	22.29	PASS
Band12	5MHz	16QAM	23095	1RB#0	23.15	PASS
Band12	5MHz	16QAM	23095	1RB#24	23.38	PASS
Band12	5MHz	16QAM	23095	1RB#12	23.31	PASS
Band12	5MHz	16QAM	23095	12RB#13	23.34	PASS
Band12	5MHz	16QAM	23095	12RB#6	23.26	PASS
Band12	5MHz	16QAM	23095	12RB#0	23.20	PASS
Band12	5MHz	16QAM	23095	25RB#0	22.33	PASS
Band12	5MHz	16QAM	23155	1RB#24	22.76	PASS
Band12	5MHz	16QAM	23155	1RB#12	22.98	PASS
Band12	5MHz	16QAM	23155	1RB#0	23.58	PASS
Band12	5MHz	16QAM	23155	12RB#13	23.11	PASS
Band12	5MHz	16QAM	23155	12RB#0	23.26	PASS
Band12	5MHz	16QAM	23155	12RB#6	23.26	PASS
Band12	5MHz	16QAM	23155	25RB#0	22.34	PASS
Band12	10MHz	QPSK	23060	1RB#0	24.14	PASS
Band12	10MHz	QPSK	23060	1RB#24	24.07	PASS
Band12	10MHz	QPSK	23060	1RB#49	24.06	PASS

Band12	10MHz	QPSK	23060	25RB#25	23.17	PASS
Band12	10MHz	QPSK	23060	25RB#12	23.20	PASS
Band12	10MHz	QPSK	23060	25RB#0	23.26	PASS
Band12	10MHz	QPSK	23060	50RB#0	23.27	PASS
Band12	10MHz	QPSK	23095	1RB#24	24.38	PASS
Band12	10MHz	QPSK	23095	1RB#0	24.29	PASS
Band12	10MHz	QPSK	23095	1RB#49	24.54	PASS
Band12	10MHz	QPSK	23095	25RB#12	23.25	PASS
Band12	10MHz	QPSK	23095	25RB#25	23.25	PASS
Band12	10MHz	QPSK	23095	25RB#0	23.24	PASS
Band12	10MHz	QPSK	23095	50RB#0	23.21	PASS
Band12	10MHz	QPSK	23130	1RB#0	24.22	PASS
Band12	10MHz	QPSK	23130	1RB#24	24.48	PASS
Band12	10MHz	QPSK	23130	1RB#49	24.32	PASS
Band12	10MHz	QPSK	23130	25RB#25	23.18	PASS
Band12	10MHz	QPSK	23130	25RB#12	23.32	PASS
Band12	10MHz	QPSK	23130	25RB#0	23.28	PASS
Band12	10MHz	QPSK	23130	50RB#0	23.24	PASS
Band12	10MHz	16QAM	23060	1RB#49	22.92	PASS
Band12	10MHz	16QAM	23060	1RB#0	23.40	PASS
Band12	10MHz	16QAM	23060	1RB#24	23.00	PASS
Band12	10MHz	16QAM	23060	25RB#12	23.20	PASS
Band12	10MHz	16QAM	23060	25RB#0	23.20	PASS
Band12	10MHz	16QAM	23060	25RB#25	23.15	PASS
Band12	10MHz	16QAM	23060	50RB#0	22.19	PASS
Band12	10MHz	16QAM	23095	1RB#49	24.17	PASS
Band12	10MHz	16QAM	23095	1RB#24	23.53	PASS
Band12	10MHz	16QAM	23095	1RB#0	23.49	PASS
Band12	10MHz	16QAM	23095	25RB#12	23.25	PASS
Band12	10MHz	16QAM	23095	25RB#25	23.22	PASS
Band12	10MHz	16QAM	23095	25RB#0	23.25	PASS
Band12	10MHz	16QAM	23095	50RB#0	22.22	PASS
Band12	10MHz	16QAM	23130	1RB#24	23.78	PASS
Band12	10MHz	16QAM	23130	1RB#49	23.01	PASS
Band12	10MHz	16QAM	23130	1RB#0	23.10	PASS
Band12	10MHz	16QAM	23130	25RB#12	23.31	PASS

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Band12	10MHz	16QAM	23130	25RB#25	23.29	PASS
Band12	10MHz	16QAM	23130	25RB#0	23.34	PASS
Band12	10MHz	16QAM	23130	50RB#0	22.13	PASS
Band17	5MHz	QPSK	23755	1RB#0	23.67	PASS
Band17	5MHz	QPSK	23755	1RB#12	23.93	PASS
Band17	5MHz	QPSK	23755	1RB#24	23.75	PASS
Band17	5MHz	QPSK	23755	12RB#13	22.83	PASS
Band17	5MHz	QPSK	23755	12RB#6	22.78	PASS
Band17	5MHz	QPSK	23755	12RB#0	22.68	PASS
Band17	5MHz	QPSK	23755	25RB#0	22.75	PASS
Band17	5MHz	QPSK	23790	1RB#0	23.76	PASS
Band17	5MHz	QPSK	23790	1RB#12	23.70	PASS
Band17	5MHz	QPSK	23790	1RB#24	23.66	PASS
Band17	5MHz	QPSK	23790	12RB#13	22.71	PASS
Band17	5MHz	QPSK	23790	12RB#6	22.69	PASS
Band17	5MHz	QPSK	23790	12RB#0	22.72	PASS
Band17	5MHz	QPSK	23790	25RB#0	22.62	PASS
Band17	5MHz	QPSK	23825	1RB#24	23.64	PASS
Band17	5MHz	QPSK	23825	1RB#12	23.55	PASS
Band17	5MHz	QPSK	23825	1RB#0	23.58	PASS
Band17	5MHz	QPSK	23825	12RB#0	22.64	PASS
Band17	5MHz	QPSK	23825	12RB#13	22.64	PASS
Band17	5MHz	QPSK	23825	12RB#6	22.65	PASS
Band17	5MHz	QPSK	23825	25RB#0	22.66	PASS
Band17	5MHz	16QAM	23755	1RB#0	22.90	PASS
Band17	5MHz	16QAM	23755	1RB#12	22.60	PASS
Band17	5MHz	16QAM	23755	1RB#24	22.70	PASS
Band17	5MHz	16QAM	23755	12RB#13	22.81	PASS
Band17	5MHz	16QAM	23755	12RB#0	22.70	PASS
Band17	5MHz	16QAM	23755	12RB#6	22.71	PASS
Band17	5MHz	16QAM	23755	25RB#0	21.73	PASS
Band17	5MHz	16QAM	23790	1RB#24	23.04	PASS
Band17	5MHz	16QAM	23790	1RB#12	23.08	PASS
Band17	5MHz	16QAM	23790	1RB#0	22.85	PASS
Band17	5MHz	16QAM	23790	12RB#6	22.69	PASS
Band17	5MHz	16QAM	23790	12RB#13	22.73	PASS

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Band17	5MHz	16QAM	23790	12RB#0	22.70	PASS
Band17	5MHz	16QAM	23790	25RB#0	21.82	PASS
Band17	5MHz	16QAM	23825	1RB#12	22.21	PASS
Band17	5MHz	16QAM	23825	1RB#0	22.84	PASS
Band17	5MHz	16QAM	23825	1RB#24	22.01	PASS
Band17	5MHz	16QAM	23825	12RB#0	22.64	PASS
Band17	5MHz	16QAM	23825	12RB#6	22.65	PASS
Band17	5MHz	16QAM	23825	12RB#13	22.65	PASS
Band17	5MHz	16QAM	23825	25RB#0	21.63	PASS
Band17	10MHz	QPSK	23780	1RB#24	24.07	PASS
Band17	10MHz	QPSK	23780	1RB#49	23.94	PASS
Band17	10MHz	QPSK	23780	1RB#0	23.52	PASS
Band17	10MHz	QPSK	23780	25RB#0	22.68	PASS
Band17	10MHz	QPSK	23780	25RB#12	22.72	PASS
Band17	10MHz	QPSK	23780	25RB#25	22.65	PASS
Band17	10MHz	QPSK	23780	50RB#0	22.75	PASS
Band17	10MHz	QPSK	23790	1RB#49	23.51	PASS
Band17	10MHz	QPSK	23790	1RB#24	23.76	PASS
Band17	10MHz	QPSK	23790	1RB#0	23.74	PASS
Band17	10MHz	QPSK	23790	25RB#12	22.70	PASS
Band17	10MHz	QPSK	23790	25RB#0	22.66	PASS
Band17	10MHz	QPSK	23790	25RB#25	22.81	PASS
Band17	10MHz	QPSK	23790	50RB#0	22.77	PASS
Band17	10MHz	QPSK	23800	1RB#0	23.54	PASS
Band17	10MHz	QPSK	23800	1RB#49	23.50	PASS
Band17	10MHz	QPSK	23800	1RB#24	23.63	PASS
Band17	10MHz	QPSK	23800	25RB#0	22.81	PASS
Band17	10MHz	QPSK	23800	25RB#12	22.77	PASS
Band17	10MHz	QPSK	23800	25RB#25	22.65	PASS
Band17	10MHz	QPSK	23800	50RB#0	22.82	PASS
Band17	10MHz	16QAM	23780	1RB#0	22.88	PASS
Band17	10MHz	16QAM	23780	1RB#24	22.76	PASS
Band17	10MHz	16QAM	23780	1RB#49	22.95	PASS
Band17	10MHz	16QAM	23780	25RB#25	22.69	PASS
Band17	10MHz	16QAM	23780	25RB#12	22.74	PASS
Band17	10MHz	16QAM	23780	25RB#0	22.75	PASS

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Band17	10MHz	16QAM	23780	50RB#0	21.83	PASS
Band17	10MHz	16QAM	23790	1RB#49	22.72	PASS
Band17	10MHz	16QAM	23790	1RB#24	22.99	PASS
Band17	10MHz	16QAM	23790	1RB#0	22.79	PASS
Band17	10MHz	16QAM	23790	25RB#12	22.69	PASS
Band17	10MHz	16QAM	23790	25RB#25	22.74	PASS
Band17	10MHz	16QAM	23790	25RB#0	22.71	PASS
Band17	10MHz	16QAM	23790	50RB#0	21.83	PASS
Band17	10MHz	16QAM	23800	1RB#24	23.30	PASS
Band17	10MHz	16QAM	23800	1RB#0	22.70	PASS
Band17	10MHz	16QAM	23800	1RB#49	22.28	PASS
Band17	10MHz	16QAM	23800	25RB#0	22.78	PASS
Band17	10MHz	16QAM	23800	25RB#12	22.76	PASS
Band17	10MHz	16QAM	23800	25RB#25	22.58	PASS
Band17	10MHz	16QAM	23800	50RB#0	21.78	PASS
Band41	5MHz	QPSK	40265	1RB#0	1.42	PASS
Band41	5MHz	QPSK	40265	25RB#0	2.17	PASS
Band41	5MHz	QPSK	40690	1RB#0	1.10	PASS
Band41	5MHz	QPSK	40690	25RB#0	1.75	PASS
Band41	5MHz	QPSK	41215	1RB#0	1.59	PASS
Band41	5MHz	QPSK	41215	25RB#0	1.44	PASS
Band41	5MHz	16QAM	40265	1RB#0	2.74	PASS
Band41	5MHz	16QAM	40265	25RB#0	3.13	PASS
Band41	5MHz	16QAM	40690	1RB#0	2.26	PASS
Band41	5MHz	16QAM	40690	25RB#0	2.69	PASS
Band41	5MHz	16QAM	41215	1RB#0	2.08	PASS
Band41	5MHz	16QAM	41215	25RB#0	1.96	PASS
Band41	10MHz	QPSK	40290	1RB#0	2.84	PASS
Band41	10MHz	QPSK	40290	50RB#0	2.77	PASS
Band41	10MHz	QPSK	40690	1RB#0	2.13	PASS
Band41	10MHz	QPSK	40690	50RB#0	2.18	PASS
Band41	10MHz	QPSK	41190	1RB#0	1.12	PASS
Band41	10MHz	QPSK	41190	50RB#0	1.45	PASS
Band41	10MHz	16QAM	40290	1RB#0	2.72	PASS
Band41	10MHz	16QAM	40290	50RB#0	3.59	PASS
Band41	10MHz	16QAM	40690	1RB#0	3.27	PASS
Band41	10MHz	16QAM	40690	50RB#0	3.07	PASS
Band41	10MHz	16QAM	41190	1RB#0	1.97	PASS

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Band41	10MHz	16QAM	41190	50RB#0	2.03	PASS
Band41	15MHz	QPSK	40315	1RB#0	3.63	PASS
Band41	15MHz	QPSK	40315	75RB#0	5.02	PASS
Band41	15MHz	QPSK	40690	1RB#0	4.78	PASS
Band41	15MHz	QPSK	40690	75RB#0	5.82	PASS
Band41	15MHz	QPSK	41165	1RB#0	4.51	PASS
Band41	15MHz	QPSK	41165	75RB#0	4.91	PASS
Band41	15MHz	16QAM	40315	1RB#0	5.48	PASS
Band41	15MHz	16QAM	40315	75RB#0	5.81	PASS
Band41	15MHz	16QAM	40690	1RB#0	5.50	PASS
Band41	15MHz	16QAM	40690	75RB#0	6.04	PASS
Band41	15MHz	16QAM	41165	1RB#0	5.32	PASS
Band41	15MHz	16QAM	41165	75RB#0	5.68	PASS
Band41	20MHz	QPSK	40340	1RB#0	3.77	PASS
Band41	20MHz	QPSK	40340	100RB#0	4.76	PASS
Band41	20MHz	QPSK	40690	1RB#0	4.40	PASS
Band41	20MHz	QPSK	40690	100RB#0	4.94	PASS
Band41	20MHz	QPSK	41140	1RB#0	4.38	PASS
Band41	20MHz	QPSK	41140	100RB#0	4.66	PASS
Band41	20MHz	16QAM	40340	1RB#0	4.17	PASS
Band41	20MHz	16QAM	40340	100RB#0	5.62	PASS
Band41	20MHz	16QAM	40690	1RB#0	5.10	PASS
Band41	20MHz	16QAM	40690	100RB#0	5.79	PASS
Band41	20MHz	16QAM	41140	1RB#0	5.20	PASS
Band41	20MHz	16QAM	41140	100RB#0	5.60	PASS

<WIFI 2.4GHz Conducted Power>

Antenna A:

Mode	Channel	Frequency (MHz)	Conducted Average Power (dBm)	Test Rate Data
802.11b	1	2412	15.20	1 Mbps
	6	2437	14.80	1 Mbps
	11	2462	14.11	1 Mbps
802.11g	1	2412	13.97	6 Mbps
	6	2437	15.78	6 Mbps
	11	2462	15.26	6 Mbps
802.11n(20MHz)	1	2412	14.37	MCS0
	6	2437	15.86	MCS0
	11	2462	15.16	MCS0
802.11n(40MHz)	3	2422	15.68	MCS0
	6	2437	15.48	MCS0
	9	2452	15.21	MCS0

Antenna B:

Mode	Channel	Frequency (MHz)	Conducted Average Power (dBm)	Test Rate Data
802.11b	1	2412	15.18	1 Mbps
	6	2437	14.83	1 Mbps
	11	2462	14.09	1 Mbps
802.11g	1	2412	14.09	6 Mbps
	6	2437	15.63	6 Mbps
	11	2462	15.22	6 Mbps
802.11n(20MHz)	1	2412	13.91	MCS0
	6	2437	15.82	MCS0
	11	2462	15.15	MCS0
802.11n(40MHz)	3	2422	15.73	MCS0
	6	2437	15.57	MCS0
	9	2452	15.10	MCS0

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:

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

f(GHz) is the RF channel transmit frequency in GHz

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

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The result is rounded to one decimal place for comparison

Antenna A:

Mode	Frequency (GHz)	Tune-up Power (dBm)	Max. Power (mW)	Test distance (mm)	Result	exclusion thresholds for 1-g SAR
802.11b	2.412	15.20	33.11	5	10.29	3.0
802.11g	2.437	15.78	37.84	5	11.82	3.0
802.11n(20M)	2.437	15.86	38.55	5	12.04	3.0
802.11n(40M)	2.422	15.68	36.98	5	11.51	3.0

Antenna B:

Mode	Frequency (GHz)	Tune-up Power (dBm)	Max. Power (mW)	Test distance (mm)	Result	exclusion thresholds for 1-g SAR
802.11b	2.412	15.18	32.96	5	10.24	3.0
802.11g	2.437	15.63	36.56	5	11.41	3.0
802.11n(20M)	2.437	15.82	38.19	5	11.92	3.0
802.11n(40M)	2.422	15.73	37.41	5	11.64	3.0

2. Base on the result of note1, RF exposure evaluation of 802.11 b and g modes are required.

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

4. 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.

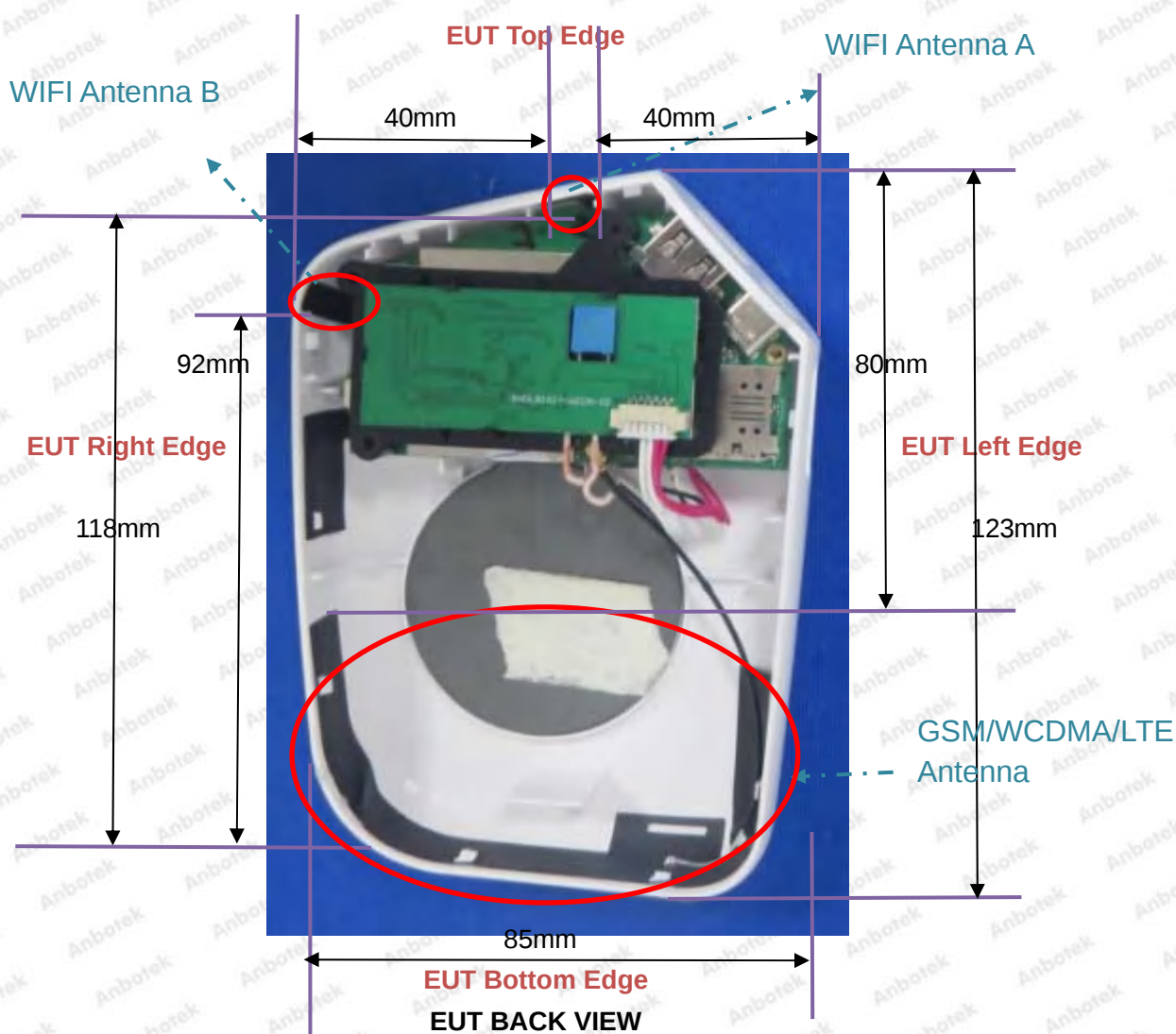
5. According to chapter 12 of this report, the max report SAR of 802.11b mode is 0.366 W/Kg, and

$$0.366\text{W/Kg} \times \frac{37.84}{33.11} = 0.418\text{W/Kg}$$

which is smaller than 1.2W/Kg, so SAR evaluation of 802.11g mode

is not required. And the same for 802.11n and that of Antenna B.

11. Antenna Location



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
WIFI Antenna A	/	/	<25mm	>25mm	>25mm	>25mm
WIFI Antenna B	/	/	<25mm	>25mm	>25mm	<25mm

General Note:

Referring to KDB 941225 D06, When the overall device length and width are $\geq 9\text{cm} \times 5\text{cm}$, the test distance is 10mm, SAR must be measured for all sides and surfaces with transmitting antenna located with 25mm from that surface or edge.

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12. SAR Test Results Summary

General Note:

- 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*

- Per KDB 447498 D01v05r01, for each exposure position, if the highest output channel reported SAR≤0.8W/kg, other channels SAR testing are not necessary

12.1. Body SAR Results

<GSM>

Plot No.	Band	Mode	Test Position	Gap (cm)	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)
#1	GSM850	GPRS(3 Tx slots)	Front	0.5	190	836.6	26.02	26.50	1.12	0.05	0.425	0.475
	GSM850	GPRS(3 Tx slots)	Back	0.5	190	836.6	26.02	26.50	1.12	-0.02	0.646	0.721
	GSM850	GPRS(3 Tx slots)	Left Side	0.5	190	836.6	26.02	26.50	1.12	0.03	0.537	0.600
	GSM850	GPRS(3 Tx slots)	Right Side	0.5	190	836.6	26.02	26.50	1.12	-0.01	0.516	0.576
	GSM850	GPRS(3 Tx slots)	Top Side	0.5	190	836.6	26.02	26.50	1.12	N/A	N/A	N/A
#2	GSM850	GPRS(3 Tx slots)	Bottom Side	0.5	190	836.6	26.02	26.50	1.12	0.06	0.551	0.615
	PCS1900	GPRS(2 Tx slots)	Front	0.5	512	1850.2	28.64	29.00	1.09	0.03	0.256	0.278
	PCS1900	GPRS(2 Tx slots)	Back	0.5	885	1909.8	28.64	29.00	1.09	0.00	0.378	0.411
	PCS1900	GPRS(2 Tx slots)	Left Side	0.5	885	1909.8	28.64	29.00	1.09	-0.05	0.293	0.318
	PCS1900	GPRS(4 Tx slots)	Right Side	0.5	885	1909.8	28.64	29.00	1.09	-0.07	0.309	0.336
	PCS1900	GPRS(4 Tx slots)	Top Side	0.5	885	1909.8	28.64	29.00	1.09	N/A	N/A	N/A

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		slots)										
	PCS1900	GPRS(4 Tx slots)	Bottom Side	0.5	885	1909.8	28.64	29.00	1.09	0.03	0.316	0.343

<WCDMA>

Plot No.	Band	Mode	Test Position	Gap (cm)	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)
	WCDMA Band 2	RMC 12.2K	Front	0.5	9400	1880.0	23.28	23.50	1.05	0.03	0.355	0.373
#3	WCDMA Band 2	RMC 12.2K	Back	0.5	9400	1880.0	23.28	23.50	1.05	0.05	0.486	0.511
	WCDMA Band 2	RMC 12.2K	Left Side	0.5	9400	1880.0	23.28	23.50	1.05	0.06	0.394	0.414
	WCDMA Band 2	RMC 12.2K	Right Side	0.5	9400	1880.0	23.28	23.50	1.05	-0.02	0.413	0.434
	WCDMA Band 2	RMC 12.2K	Top Side	0.5	9400	1880.0	23.28	23.50	1.05	N/A	N/A	N/A
	WCDMA Band 2	RMC 12.2K	Bottom Side	0.5	9400	1880.0	23.28	23.50	1.05	-0.05	0.422	0.444
	WCDMA Band 5	RMC 12.2K	Front	0.5	4233	846.6	20.87	21.00	1.03	0.02	0.324	0.334
#4	WCDMA Band 5	RMC 12.2K	Back	0.5	4233	846.6	20.87	21.00	1.03	0.04	0.471	0.485
	WCDMA Band 5	RMC 12.2K	Left Side	0.5	4233	846.6	20.87	21.00	1.03	-0.04	0.385	0.397
	WCDMA Band 5	RMC 12.2K	Right Side	0.5	4233	846.6	20.87	21.00	1.03	0.07	0.391	0.403
	WCDMA Band 5	RMC 12.2K	Top Side	0.5	4233	846.6	20.87	21.00	1.03	N/A	N/A	N/A
	WCDMA Band 5	RMC 12.2K	Bottom Side	0.5	4233	846.6	20.87	21.00	1.03	0.04	0.411	0.423

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<LTE>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR ₁₀ (W/kg)	Reported SAR ₁₀ (W/kg)
	LTE Band 2	20MHz/1RB	Front	0	19100	1900.0	24.82	25.00	1.04	0.05	0.597	0.622
#5	LTE Band 2	20MHz/1RB	Back	0	19100	1900.0	24.82	25.00	1.04	0.03	0.706	0.736
	LTE Band 2	20MHz/1RB	Left Side	0	19100	1900.0	24.82	25.00	1.04	-0.11	0.632	0.659
	LTE Band 2	20MHz/1RB	Right Side	0	19100	1900.0	24.82	25.00	1.04	0.08	0.618	0.644
	LTE Band 2	20MHz/1RB	Top Side	0	19100	1900.0	24.82	25.00	1.04	N/A	N/A	N/A
	LTE Band 2	20MHz/1RB	Bottom Side	0	19100	1900.0	24.82	25.00	1.04	-0.03	0.641	0.668
	LTE Band 4	20MHz/1RB	Front	0	20050	1720.0	22.25	22.50	1.06	0.13	0.211	0.224
#6	LTE Band 4	20MHz/1RB	Back	0	20050	1720.0	22.25	22.50	1.06	-0.06	0.339	0.359
	LTE Band 4	20MHz/1RB	Left Side	0	20050	1720.0	22.25	22.50	1.06	0.07	0.285	0.302
	LTE Band 4	20MHz/1RB	Right Side	0	20050	1720.0	22.25	22.50	1.06	-0.05	0.277	0.293
	LTE Band 4	20MHz/1RB	Top Side	0	20050	1720.0	22.25	22.50	1.06	N/A	N/A	N/A
	LTE Band 4	20MHz/1RB	Bottom Side	0	20050	1720.0	22.25	22.50	1.06	0.02	0.294	0.311
	LTE Band 5	10MHz/1RB	Front	0	20600	824.0	23.60	24.00	1.10	0.07	0.402	0.441
#7	LTE Band 5	10MHz/1RB	Back	0	20600	824.0	23.60	24.00	1.10	-0.04	0.493	0.522
	LTE Band 5	10MHz/1RB	Left Side	0	20600	824.0	23.60	24.00	1.10	-0.06	0.438	0.464
	LTE Band 5	10MHz/1RB	Right Side	0	20600	824.0	23.60	24.00	1.10	0.05	0.425	0.450
	LTE Band 5	10MHz/1RB	Top Side	0	20600	824.0	23.60	24.00	1.10	N/A	N/A	N/A
	LTE Band 5	10MHz/1RB	Bottom	0	20600	824.0	23.60	24.00	1.10	0.11	0.452	0.479

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	Band 5	1RB	Side									
	LTE Band 7	20MHz/ 1RB	Front	0	20850	2510.0	23.35	23.50	1.04	-0.08	0.468	0.487
#8	LTE Band 7	20MHz/ 1RB	Back	0	20850	2510.0	23.35	23.50	1.04	-0.07	0.556	0.578
	LTE Band 7	20MHz/ 1RB	Left Side	0	20850	2510.0	23.35	23.50	1.04	0.06	0.493	0.513
	LTE Band 7	20MHz/ 1RB	Right Side	0	20850	2510.0	23.35	23.50	1.04	0.02	0.507	0.527
	LTE Band 7	20MHz/ 1RB	Top Side	0	20850	2510.0	23.35	23.50	1.04	N/A	N/A	N/A
	LTE Band 7	20MHz/ 1RB	Bottom Side	0	20850	2510.0	23.35	23.50	1.04	-0.01	0.524	0.545
	LTE Band 12	10MHz/ 1RB	Front	0	23095	707.5	24.54	25.00	1.11	0.05	0.533	0.592
#9	LTE Band 12	10MHz/ 1RB	Back	0	23095	707.5	24.54	25.00	1.11	-0.04	0.697	0.774
	LTE Band 12	10MHz/ 1RB	Left Side	0	23095	707.5	24.54	25.00	1.11	0.01	0.613	0.680
	LTE Band 12	10MHz/ 1RB	Right Side	0	23095	707.5	24.54	25.00	1.11	-0.04	0.625	0.694
	LTE Band 12	10MHz/ 1RB	Top Side	0	23095	707.5	24.54	25.00	1.11	N/A	N/A	N/A
	LTE Band 12	10MHz/ 1RB	Bottom Side	0	23095	707.5	24.54	25.00	1.11	-0.06	0.634	0.704
	LTE Band 17	10MHz/ 1RB	Front	0	23780	709.0	24.07	24.50	1.10	0.08	0.296	0.326
#10	LTE Band 17	10MHz/ 1RB	Back	0	23780	709.0	24.07	24.50	1.10	0.05	0.408	0.449
	LTE Band 17	10MHz/ 1RB	Left Side	0	23780	709.0	24.07	24.50	1.10	-0.04	0.321	0.353
	LTE Band 17	10MHz/ 1RB	Right Side	0	23780	709.0	24.07	24.50	1.10	0.06	0.346	0.381
	LTE Band 17	10MHz/ 1RB	Top Side	0	23780	709.0	24.07	24.50	1.10	N/A	N/A	N/A
	LTE Band 17	10MHz/ 1RB	Bottom Side	0	23780	709.0	24.07	24.50	1.10	-0.03	0.352	0.387
	LTE Band 41	15MHz/ 38RB	Front	0	40690	2600.0	25.63	26.00	1.09	-0.05	0.315	0.343
#11	LTE	15MHz/	Back	0	40690	2600.0	25.63	26.00	1.09	-0.02	0.582	0.634

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	Band 41	38RB										
	LTE Band 41	15MHz/ 38RB	Left Side	0	40690	2600.0	25.63	26.00	1.09	-0.01	0.361	0.393
	LTE Band 41	15MHz/ 38RB	Right Side	0	40690	2600.0	25.63	26.00	1.09	-0.06	0.413	0.450
	LTE Band 41	15MHz/ 38RB	Top Side	0	40690	2600.0	25.63	26.00	1.09	N/A	N/A	N/A
	LTE Band 41	15MHz/ 38RB	Bottom Side	0	40690	2600.0	25.63	26.00	1.09	0.05	0.435	0.474

<WIFI 2.4GHz>

Antenna A:

Plot No.	Band	Mode	Test Position	Gap (cm)	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)
	WIFI 2.4GHz	802.11b	Front	0.5	1	2412	15.20	15.50	1.07	-0.09	0.265	0.284
#12	WIFI 2.4GHz	802.11b	Back	0.5	1	2412	15.20	15.50	1.07	0.06	0.342	0.366
	WIFI 2.4GHz	802.11b	Left Side	0.5	1	2412	15.20	15.50	1.07	N/A	N/A	N/A
	WIFI 2.4GHz	802.11b	Right Side	0.5	1	2412	15.20	15.50	1.07	N/A	N/A	N/A
	WIFI 2.4GHz	802.11b	Top Side	0.5	1	2412	15.20	15.50	1.07	0.11	0.218	0.234
	WIFI 2.4GHz	802.11b	Bottom Side	0.5	1	2412	15.20	15.50	1.07	N/A	N/A	N/A

Antenna B:

Plot No.	Band	Mode	Test Position	Gap (cm)	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)
	WIFI 2.4GHz	802.11b	Front	0.5	1	2412	15.18	15.50	1.08	-0.09	0.216	0.233
#13	WIFI 2.4GHz	802.11b	Back	0.5	1	2412	15.18	15.50	1.08	-0.01	0.293	0.315
	WIFI 2.4GHz	802.11b	Left Side	0.5	1	2412	15.18	15.50	1.08	N/A	N/A	N/A
	WIFI 2.4GHz	802.11b	Right Side	0.5	1	2412	15.18	15.50	1.08	0.03	0.224	0.241
	WIFI 2.4GHz	802.11b	Top Side	0.5	1	2412	15.18	15.50	1.08	0.11	0.138	0.149
	WIFI 2.4GHz	802.11b	Bottom Side	0.5	1	2412	15.18	15.50	1.08	N/A	N/A	N/A

Note:

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

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13. Simultaneous Transmission Analysis

13.1. Simultaneous TX SAR Considerations

No.	Applicable Simultaneous Transmission
1.	GSM+WIFI 2.4GHz Antenna A
2.	WCDMA+WIFI2.4GHz Antenna A
3.	LTE+WIFI2.4G Antenna A
4.	GSM+WIFI2.4G Antenna B
5.	WCDMA+WIFI2.4G Antenna B
6.	LTE+WIFI2.4G Antenna B

Note:

For that SAR for WIFI2.4G Antenna A is bigger than that of Antenna B, so only Simultaneous Transmission of WIFI2.4G Antenna A is evaluated.

13. 2. Evaluation of Simultaneous SAR

<Body Exposure Conditions>

Simultaneous transmission SAR for WIFI2.4G and GSM

Test Position	GSM850 SAR _{1-g} (W/Kg)	GSM1900 SAR _{1-g} (W/Kg)	WIFI2.4G SAR _{1-g} (W/Kg)	MAX. ΣSAR _{1-g} (W/Kg)	SAR _{1-g} Limit (W/Kg)	Simut. Meas. Required
Front	0.475	0.278	0.284	0.759	1.6	NO
Back	0.721	0.411	0.366	1.087	1.6	NO
Left Side	0.600	0.318	N/A	N/A	1.6	NO
Right Side	0.576	0.336	N/A	N/A	1.6	NO
Top Side	N/A	N/A	0.234	N/A	1.6	NO
Bottom Side	0.615	0.343	N/A	N/A	1.6	NO

Simultaneous transmission SAR for WIFI2.4G and WCDMA

Test Position	WCDMA Band2 SAR _{1-g} (W/Kg)	WCDMA Band5 SAR _{1-g} (W/Kg)	WIFI2.4G SAR _{1-g} (W/Kg)	MAX. ΣSAR _{1-g} (W/Kg)	SAR _{1-g} Limit (W/Kg)	Simut. Meas. Required
Front	0.373	0.334	0.284	0.657	1.6	NO
Back	0.511	0.485	0.366	0.877	1.6	NO
Left Side	0.414	0.397	N/A	N/A	1.6	NO
Right Side	0.434	0.403	N/A	N/A	1.6	NO
Top Side	N/A	N/A	0.234	N/A	1.6	NO
Bottom Side	0.444	0.423	N/A	N/A	1.6	NO

Simultaneous transmission SAR for WIFI2.4G and LTE

Test Position	LTE Band 2 SAR _{1-g} (W/Kg)	LTE Band4 SAR _{1-g} (W/Kg)	LTE Band5 SAR _{1-g} (W/Kg)	LTE Band7 SAR _{1-g} (W/Kg)	LTE Band 12 SAR _{1-g} (W/Kg)	LTE Band 17 SAR _{1-g} (W/Kg)	LTE Band 41 SAR _{1-g} (W/Kg)	WIFI2.4G SAR _{1-g} (W/Kg)	MAX. ΣSAR _{1-g} (W/Kg)	SAR _{1-g} Limit (W/Kg)	Simut. Meas. Required
Front	0.622	0.224	0.441	0.487	0.592	0.326	0.343	0.284	0.906	1.6	NO
Back	0.736	0.359	0.522	0.578	0.774	0.449	0.634	0.366	1.140	1.6	NO

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Left Side	0.659	0.302	0.464	0.513	0.680	0.353	0.393	N/A	N/A	1.6	NO
Right Side	0.644	0.293	0.450	0.527	0.694	0.381	0.450	N/A	N/A	1.6	NO
Top Side	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.234	N/A	1.6	NO
Bottom Side	0.668	0.311	0.479	0.545	0.704	0.387	0.474	N/A	N/A	1.6	NO

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14. Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/Kg, the extensive SAR measurement uncertainty analysis described in IEC 62209-2:2010 is not required in SAR reports submitted for equipment approval.

Appendix A. SAR Test Setup Photos



Body Front(5mm)



Body Back(5mm)



Top Side(5mm)



Bottom Side(5mm)



Left Side(5mm)



Right Side(5mm)

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Appendix B. Plots of SAR System Check

Date: 09/09/2019

835MHz Body System Check

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

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 1.06 \text{ S/m}$; $\epsilon_r = 55.26$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(9.88, 9.88, 9.88); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Configuration/Pin=250mW/Area Scan (7x7x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 2.97 W/kg

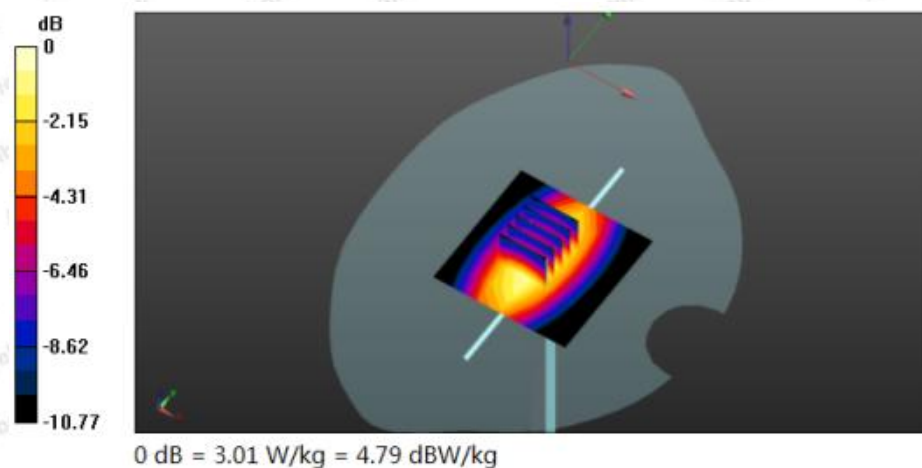
Configuration/Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 60.007 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 4.02 W/kg

SAR(1 g) = 2.31W/kg; SAR(10 g) = 1.57 W/kg

Maximum value of SAR (measured) = 3.58 W/kg



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Date: 09/11/2019

1900MHz Body System Check

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

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.51$ S/m; $\epsilon_r = 53.26$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(7.97, 7.97, 7.97); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Configuration/Pin=250mW/Area Scan (7x7x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 10.7 W/kg

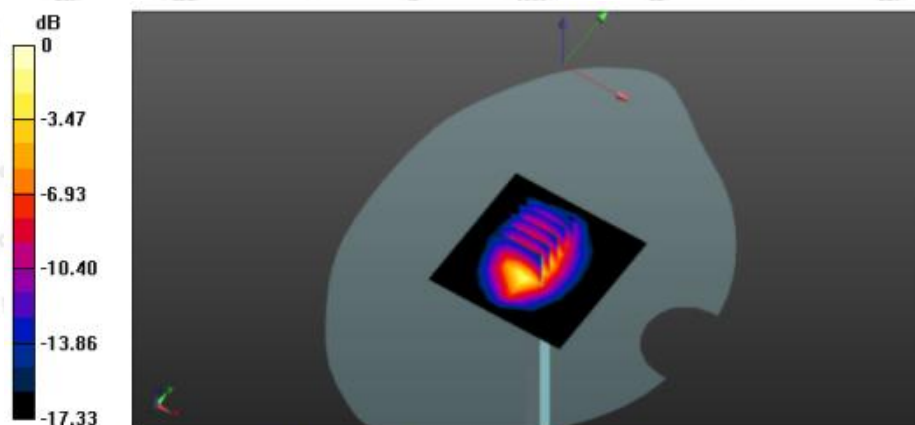
Configuration/Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 86.92 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 17.0 W/kg

SAR(1 g) = 9.26 W/kg; SAR(10 g) = 4.84 W/kg

Maximum value of SAR (measured) = 10.4 W/kg



0 dB = 14.7 W/kg = 11.67 dBW/kg

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Date: 09/13/2019

1750MHz Body System Check

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1021

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.51$ S/m; $\epsilon_r = 53.21$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(8.24, 8.24, 8.24); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Maximum value of SAR (interpolated) = 10.9 W/kg

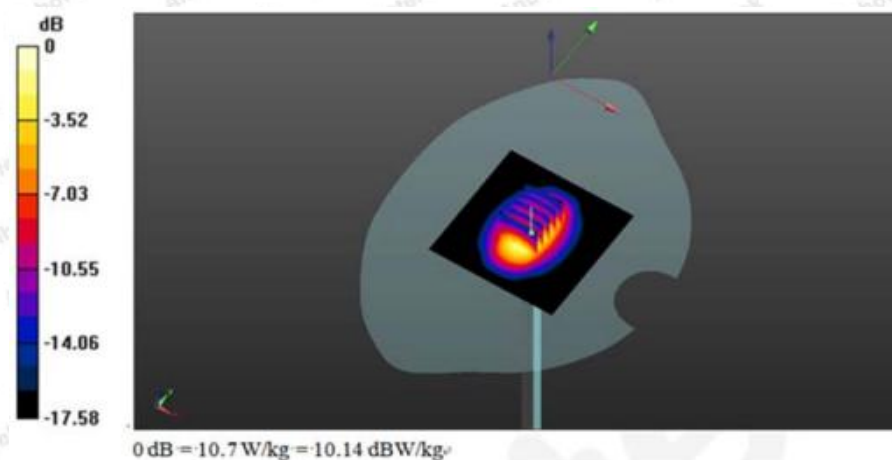
Configuration/Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 87.593 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 17.9 W/kg

SAR(1 g) = 9.06 W/kg; SAR(10 g) = 4.75 W/kg

Maximum value of SAR (measured) = 10.7 W/kg



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750MHz Body System Check

DUT: Dipole 750 MHz; Type: D835V2; Serial: D750V3 - SN:4d1118

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.98 \text{ S/m}$; $\epsilon_r = 55.37$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(9.71, 9.71, 9.71); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM1; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Configuration/Pin=250mW/Area Scan (7x7x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (measured) = 2.80 W/kg

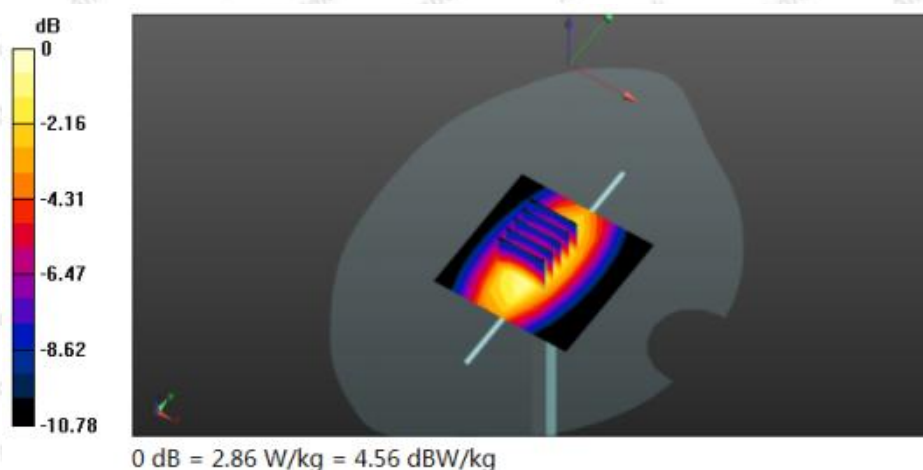
Configuration/Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 56.553 V/m ; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.39 W/kg

SAR(1 g) = 2.31 W/kg ; SAR(10 g) = 1.62 W/kg

Maximum value of SAR (measured) = 2.86 W/kg



2600MHz Body System Check

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

Communication System: UID 0, CW (0); Frequency: 2600 MHz

Medium parameters used: $f = 2600$ MHz; $\sigma = 2.15$ S/m; $\epsilon_r = 54.37$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(7.38, 7.38, 7.38); Calibrated: 6.5.2019;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM ; Type: QD000P40CD; Serial: TP: 1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Configuration/Pin=250mW/Area Scan (71x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 23.2 W/kg

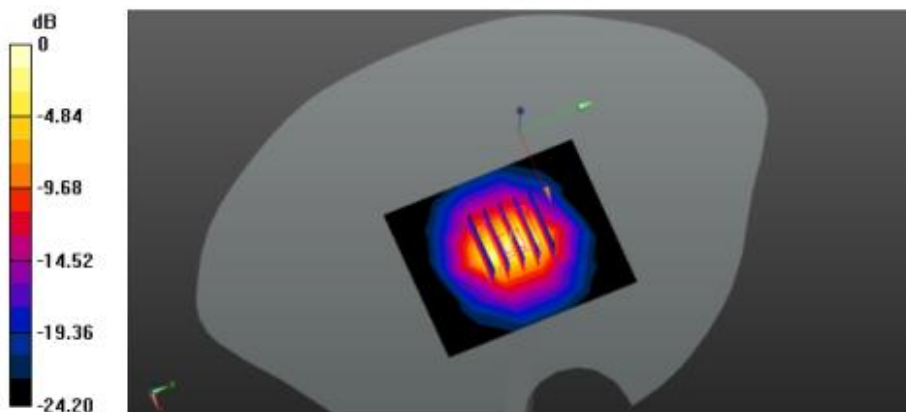
Configuration/Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 97.87 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 28.3 W/kg

SAR(1 g) = 13.72 W/kg; SAR(10 g) = 6.22 W/kg

Maximum value of SAR (measured) = 22.4 W/kg



0 dB = 22.4 W/kg = 11.12 dBW/kg

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Date:09/24/2019

2450MHz Body System Check

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

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.89$ S/m; $\epsilon_r = 51.97$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(7.53, 7.53, 7.53); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Configuration/Pin=250mW/Area Scan (81x81x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 17.2 W/kg

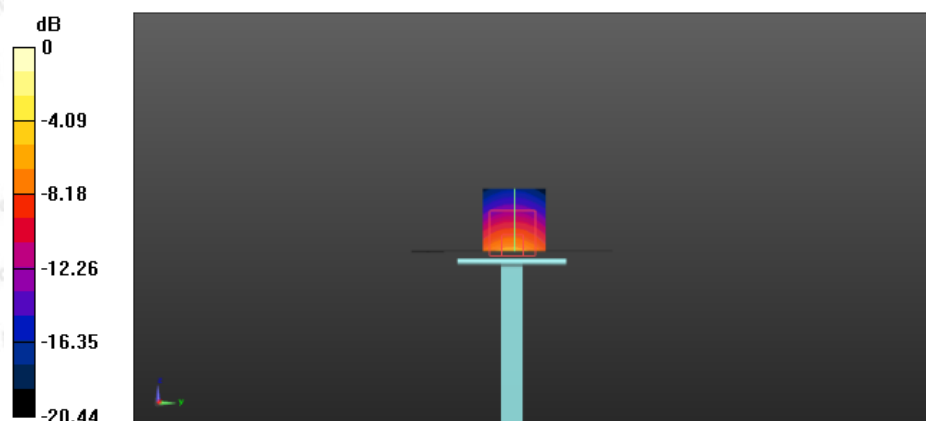
Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 82.205 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 24.5 W/kg

SAR(1 g) = 12.1 W/kg; SAR(10 g) = 5.68 W/kg

Maximum value of SAR (measured) = 18.3 W/kg



0 dB = 18.3 W/kg = 12.62 dBW/kg

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Appendix C. Plots of SAR Test Data

#1

Date: 09/09/2019

GSM850_GPRS_3TX_Body Back_Ch190

Communication System: UID 0, GPRS(3 Tx slots) (0); Frequency: 836.6 MHz; Duty Cycle: 1:1.99986

Medium parameters used (interpolated): $f = 836.6$ MHz; $\sigma = 0.96$ S/m; $\epsilon_r = 55.858$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(9.88, 9.88, 9.88); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

BODY/3ST-BACK/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.17 W/kg

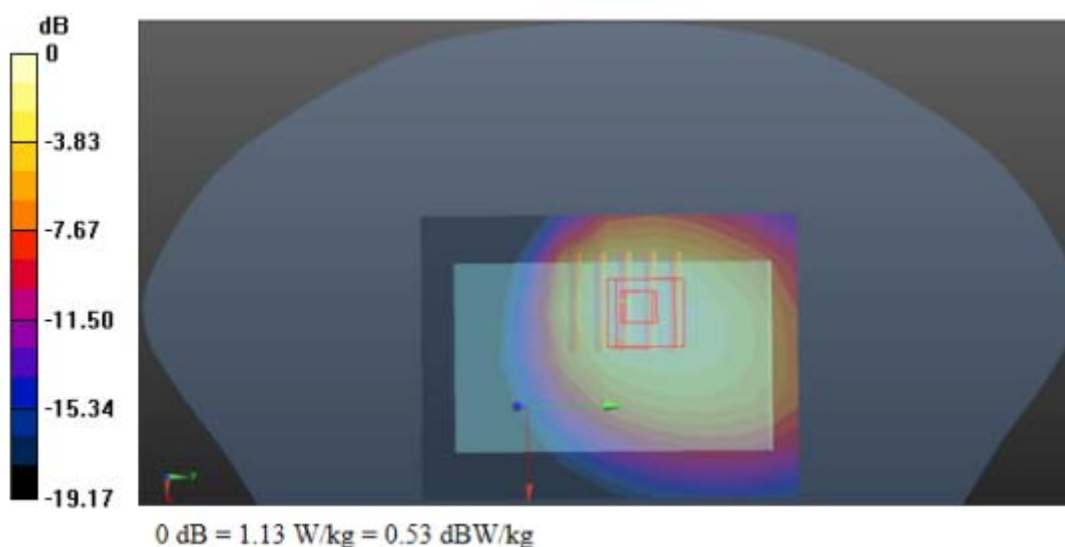
BODY/3ST-BACK/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 30.932 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 1.55 W/kg

SAR(1 g) = 0.646 W/kg; SAR(10 g) = 0.387 W/kg

Maximum value of SAR (measured) = 1.13 W/kg



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#2

Date: 09/11/2019

GSM1900_GPRS_4TX_Body Back_Ch885

Communication System: UID 0, GPRS(2 Tx slots) (0); Frequency: 1909.8 MHz; Duty Cycle: 1:1.99986

Medium parameters used: $f = 1909.8$ MHz; $\sigma = 1.57$ S/m; $\epsilon_r = 51.14$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(7.97, 7.97, 7.97); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

BODY/2ST-BACK/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.510 W/kg

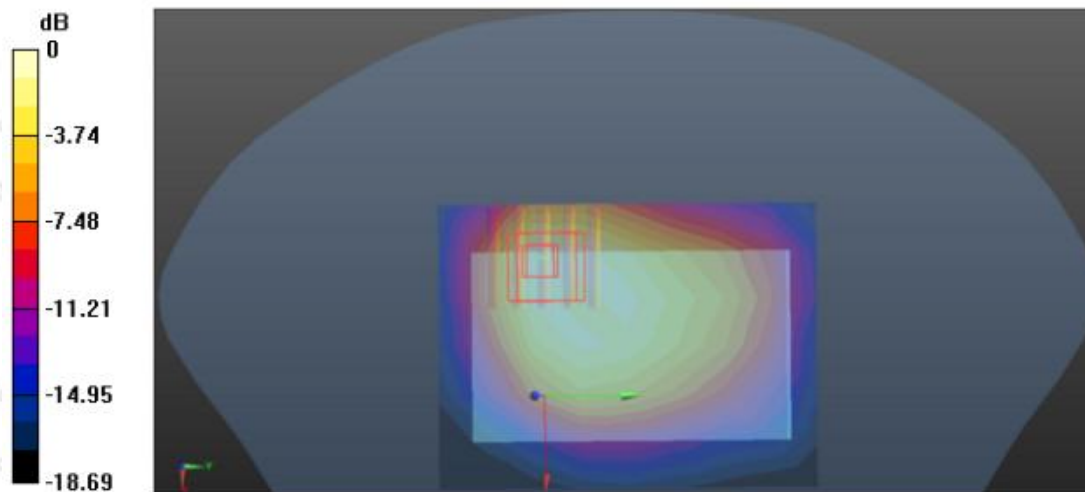
BODY/2ST-BACK/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 17.209 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.695 W/kg

SAR(1 g) = 0.378 W/kg; SAR(10 g) = 0.201 W/kg

Maximum value of SAR (measured) = 0.526 W/kg



0 dB = 0.526 W/kg = -2.79 dBW/kg

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#3

Date: 09/11/2019

WCDMA 1900_RMC 12.2K_Body Back_Ch9400

Communication System: UID 0, Generic WCDMA (0); Frequency: 1880.0 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1880.0$ MHz; $\sigma = 1.57$ S/m; $\epsilon_r = 51.14$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(7.97, 7.97, 7.97); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

BODY/BACK/Area Scan (9x15x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.686 W/kg

BODY/BACK/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

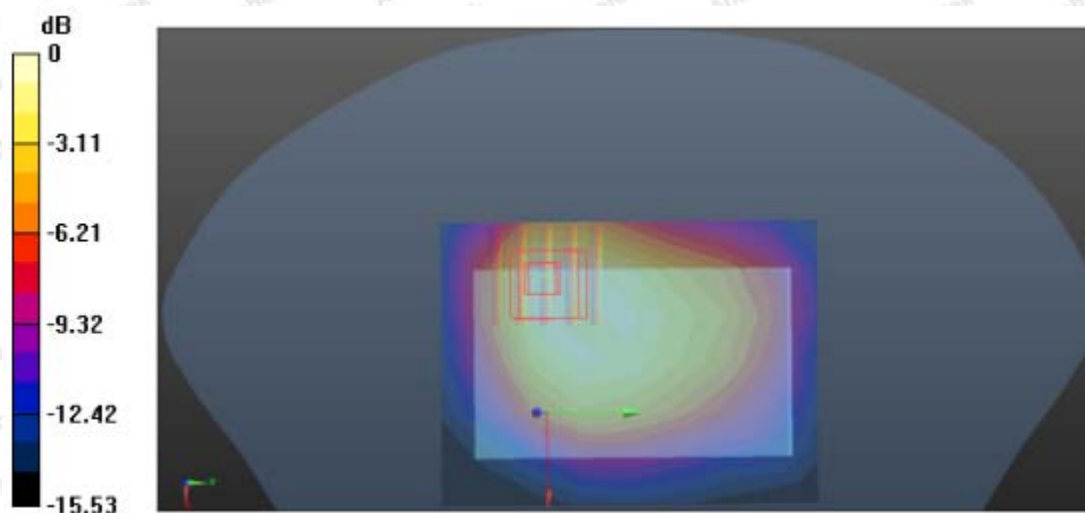
Reference Value = 17.627 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.630 W/kg

Peak SAR (extrapolated) = 0.882 W/kg

SAR(1 g) = 0.486 W/kg; SAR(10 g) = 0.264 W/kg

Maximum value of SAR (measured) = 0.649 W/kg



0 dB = 0.649 W/kg = -1.88 dBW/kg

#4

Date: 09/09/2019

WCDMA 850_RMC 12.2K_Body Back_Ch4233

Communication System: UID 0, Generic WCDMA (0); Frequency: 846.6 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 846.6$ MHz; $\sigma = 0.96$ S/m; $\epsilon_r = 55.858$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(9.88, 9.88, 9.88); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

BODY/BACK/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.637 W/kg

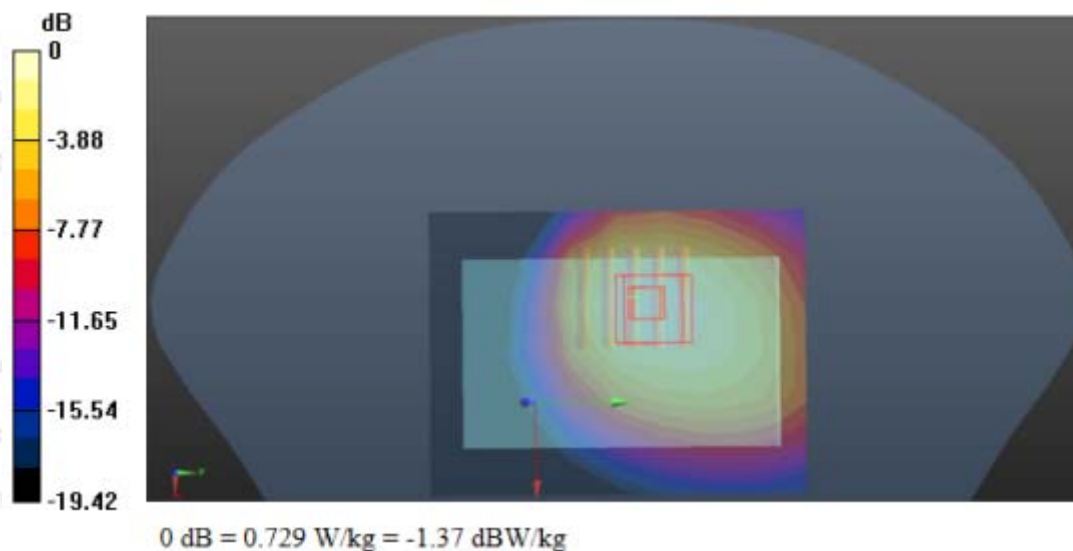
BODY/BACK/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 21.769 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.953 W/kg

SAR(1 g) = 0.471 W/kg; SAR(10 g) = 0.256 W/kg

Maximum value of SAR (measured) = 0.729 W/kg



#5

Date: 09/11/2019

LTE Band2_1RB_Body Back_Ch19100

Communication System: UID 0, Generic LTE (0); Frequency: 1900.0 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1900.0$ MHz; $\sigma = 1.51$ S/m; $\epsilon_r = 53.26$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(7.97, 7.97, 7.97); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

BODY/BACK/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 1.14 W/kg

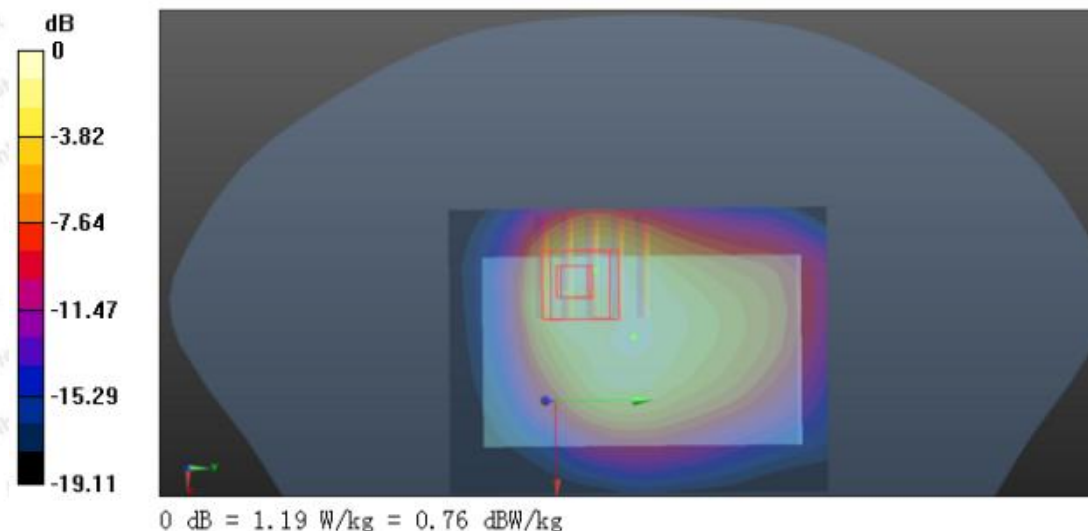
BODY/BACK/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 21.416 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 1.60 W/kg

SAR(1 g) = 0.706 W/kg; SAR(10 g) = 0.381 W/kg

Maximum value of SAR (measured) = 1.19 W/kg



#6

Date: 09/13/2019

LTE Band4_1RB_Body Back_Ch20050

Communication System: UID 0, Generic LTE (0); Frequency: 1720.0 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1720.0$ MHz; $\sigma = 1.52$ S/m; $\epsilon_r = 53.23$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(8.24, 8.24, 8.24); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

BODY/BACK/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.444 W/kg

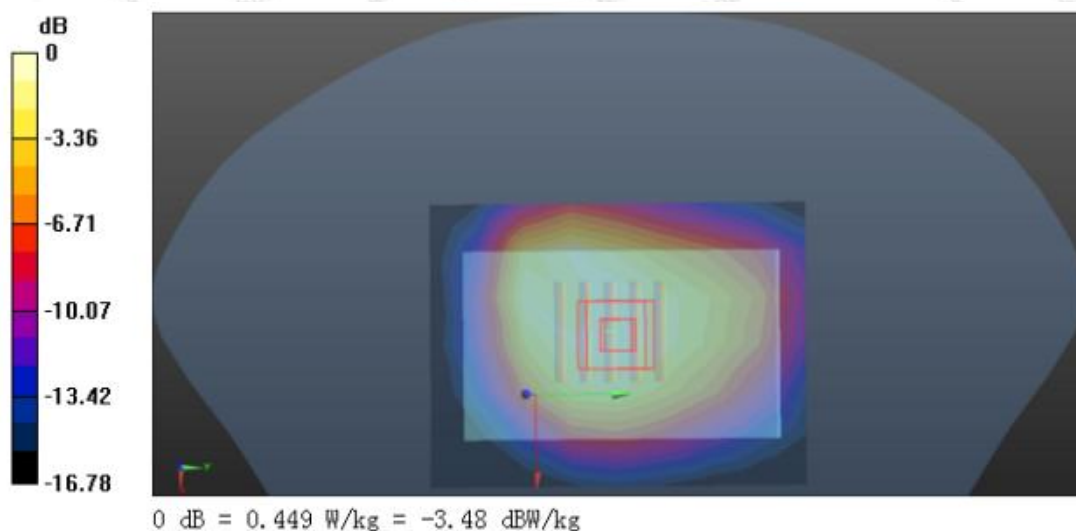
BODY/BACK/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.525 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.567 W/kg

SAR(1 g) = 0.339 W/kg; SAR(10 g) = 0.196 W/kg

Maximum value of SAR (measured) = 0.449 W/kg



#7

Date: 09/09/2019

LTE Band5_1RB_Body Back_Ch20600

Communication System: UID 0, Generic LTE (0); Frequency: 824.0.0 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 824.0$ MHz; $\sigma = 1.05$ S/m; $\epsilon_r = 55.66$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(9.88, 9.88, 9.88); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

BODY/BACK/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.628 W/kg

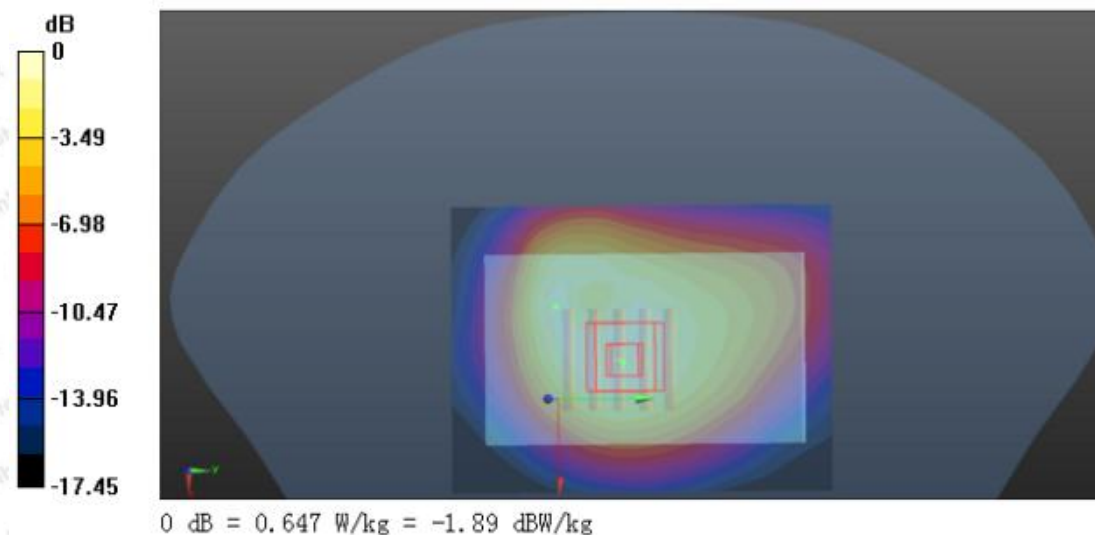
BODY/BACK/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 18.590 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 0.812 W/kg

SAR(1 g) = 0.493 W/kg; SAR(10 g) = 0.277 W/kg

Maximum value of SAR (measured) = 0.647 W/kg



#8

Date: 09/23/2019

LTE Band7_1RB_Body Back_Ch20850

Communication System: UID 0, Generic LTE (0); Frequency: 2510.0 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2510.0$ MHz; $\sigma = 2.125$ S/m; $\epsilon_r = 52.655$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(7.38, 7.38, 7.38); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

BODY/BACK/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.739 W/kg

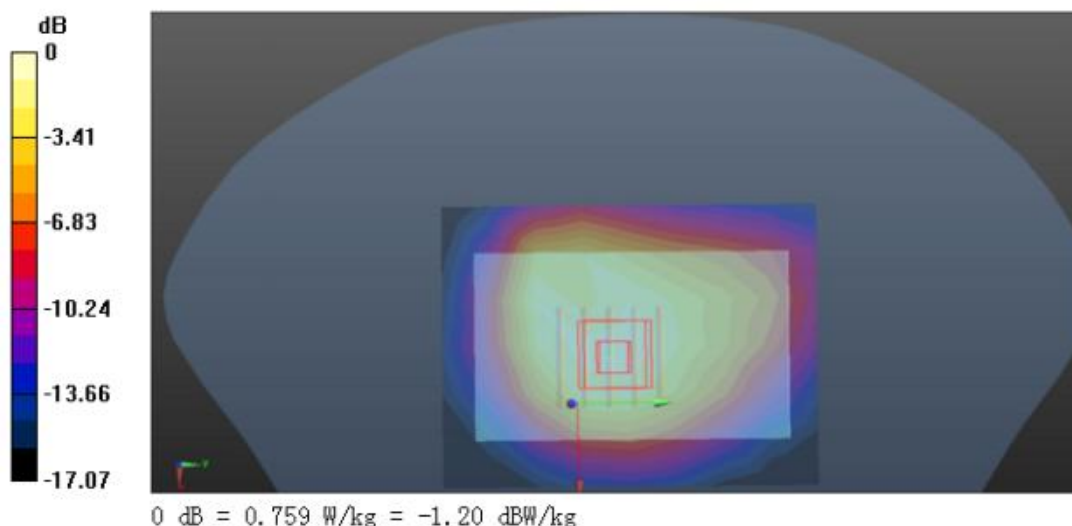
BODY/BACK/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 19.233 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 0.951 W/kg

SAR(1 g) = 0.556 W/kg; SAR(10 g) = 0.341 W/kg

Maximum value of SAR (measured) = 0.759 W/kg



#9

Date: 09/15/2019

LTE Band12_1RB_Body Back_Ch23095

Communication System: UID 0, Generic LTE (0); Frequency: 707.5 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 707.5$ MHz; $\sigma = 0.96$ S/m; $\epsilon_r = 55.39$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(10.10, 10.10, 10.10); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

BODY/BACK/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.997 W/kg

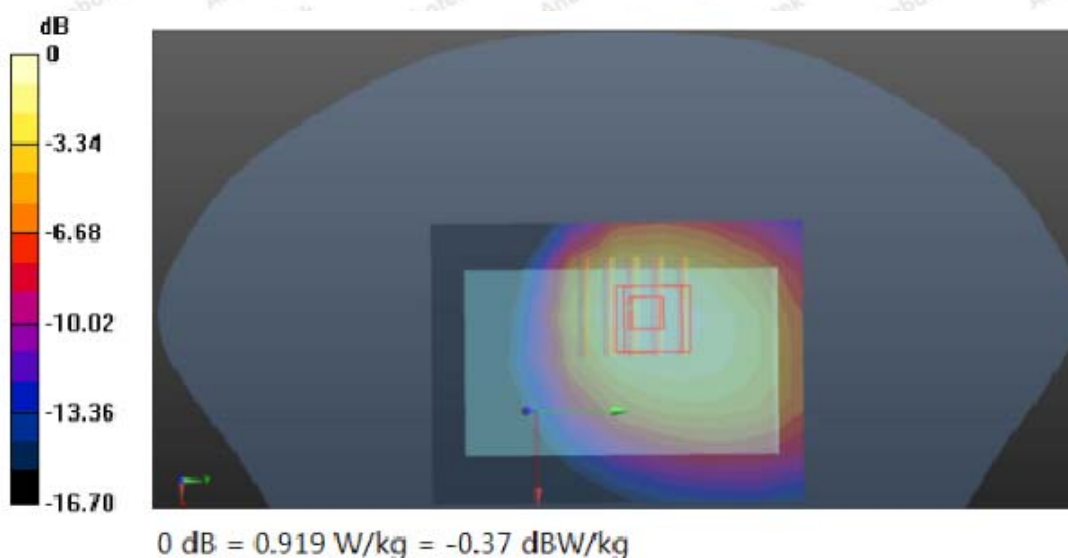
BODY/BACK/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 19.233 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 1.22 W/kg

SAR(1 g) = 0.697 W/kg; SAR(10 g) = 0.381 W/kg

Maximum value of SAR (measured) = 0.919 W/kg



#10

LTE Band17_1RB_Body Back_Ch23780

Communication System: UID 0, Generic LTE (0); Frequency: 709.0 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 709.0$ MHz; $\sigma = 0.96$ S/m; $\epsilon_r = 55.40$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(10.10, 10.10, 10.10); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

BODY/BACK/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.467 W/kg

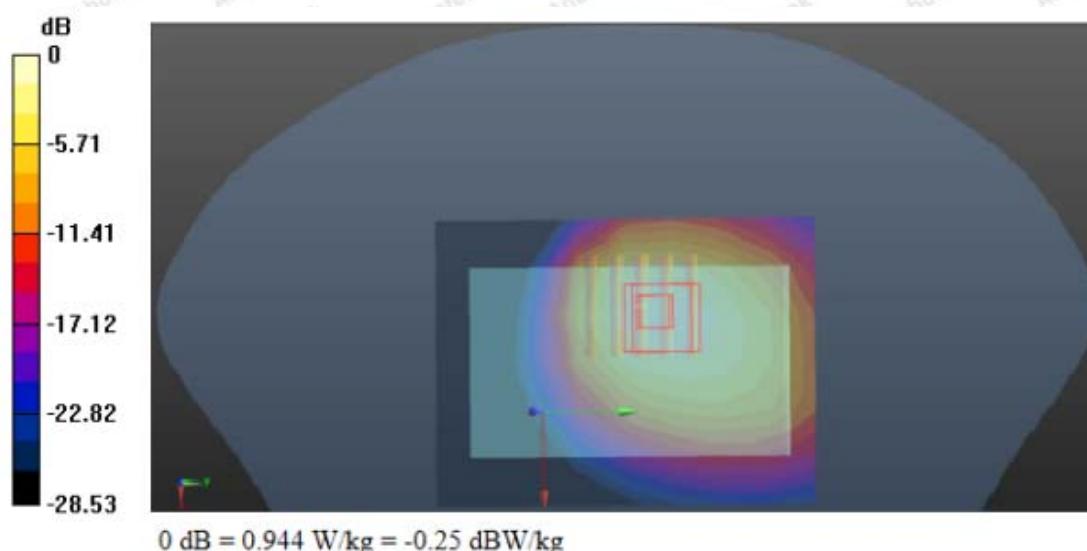
BODY/BACK/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 8.344 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 1.59 W/kg

SAR(1 g) = 0.408 W/kg; SAR(10 g) = 0.216 W/kg

Maximum value of SAR (measured) = 0.944 W/kg



#11

Date: 09/23/2019

LTE Band41_38RB_Body Back_Ch40690

Communication System: UID 0, Generic LTE (0); Frequency: 2600.0 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2600.0$ MHz; $\sigma = 2.150$ S/m; $\epsilon_r = 54.370$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7396; ConvF(7.38, 7.38, 7.38); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn387; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

BODY/BACK/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.763 W/kg

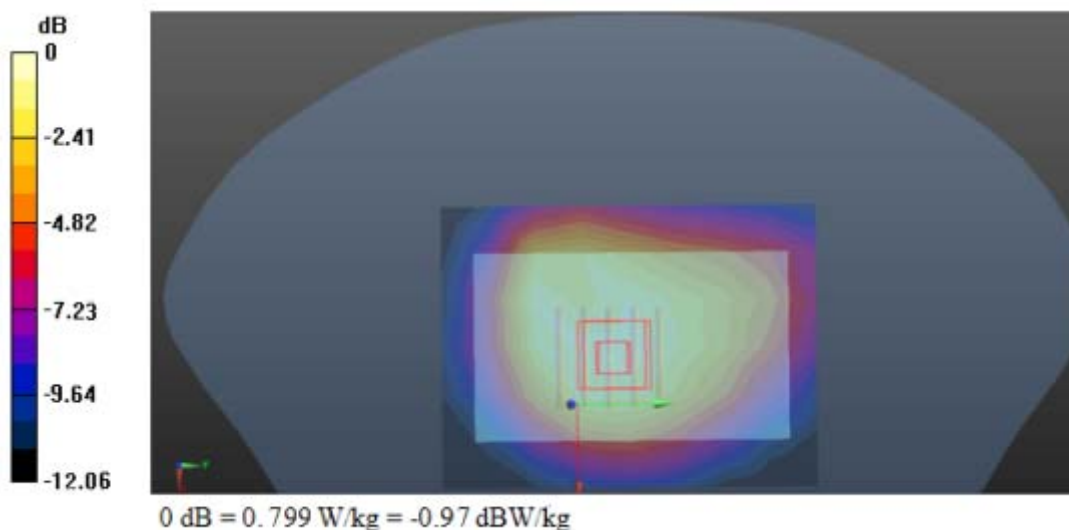
BODY/BACK/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 20.116 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.983 W/kg

SAR(1 g) = 0.582 W/kg; SAR(10 g) = 0.367 W/kg

Maximum value of SAR (measured) = 0.799 W/kg



#12

Date: 09/24/2019

WIFI 2.4G_Body Back_Ch1

Communication System: UID 0, wifi (fcc) (0); Frequency: 2412 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.963$ S/m; $\epsilon_r = 52.013$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(7.53, 7.53, 7.53); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

BODY/BACK/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.403 W/kg

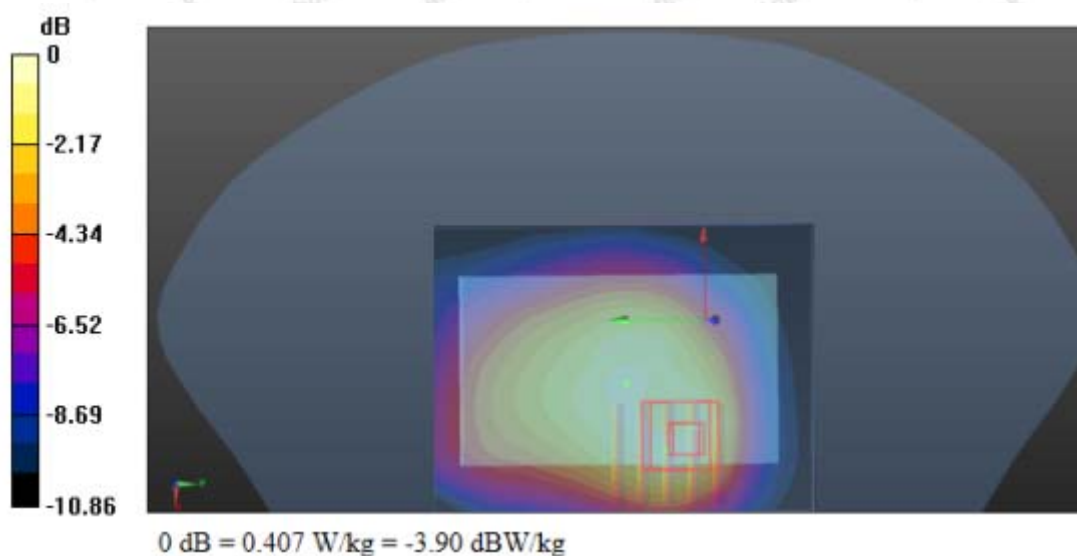
BODY/BACK/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 3.926 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.455 W/kg

SAR(1 g) = 0.342 W/kg; SAR(10 g) = 0.255 W/kg

Maximum value of SAR (measured) = 0.407 W/kg



#13

Date: 09/24/2019

WIFI 2.4G_Body Back_Ch1

Communication System: UID 0, wifi (fcc) (0); Frequency: 2412 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 2412$ MHz; $\sigma = 1.963$ S/m; $\epsilon_r = 52.013$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 – SN7396; ConvF(7.53, 7.53, 7.53); Calibrated: 6.5.2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 3.9.2019
- Phantom: SAM; Type: QD000P40CD; Serial: TP:1670
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.10 (7164)

Body/BACK/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.327 W/kg

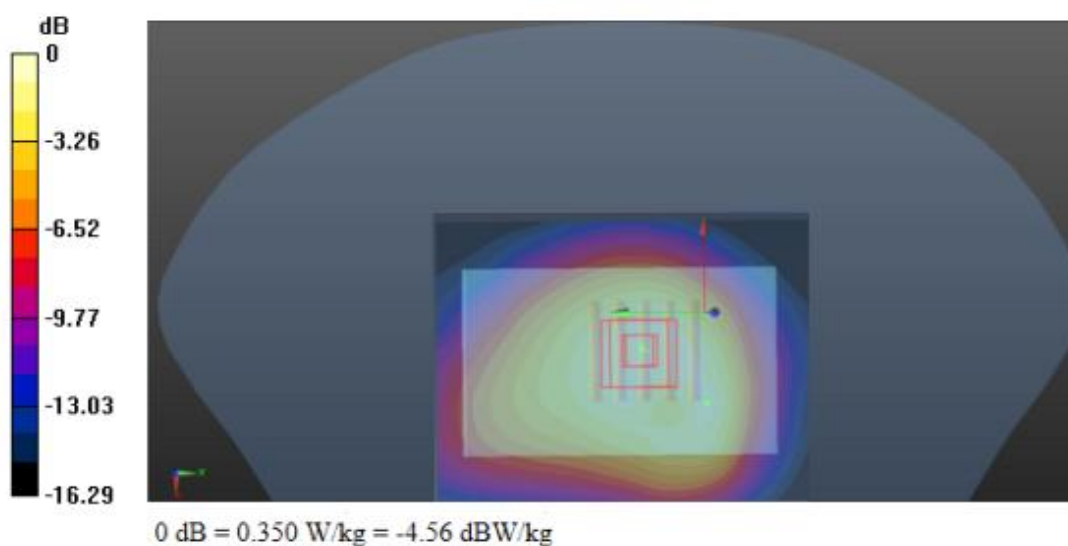
Body/BACK/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 4.192 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.430 W/kg

SAR(1 g) = 0.293 W/kg; SAR(10 g) = 0.161 W/kg

Maximum value of SAR (measured) = 0.350 W/kg



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Appendix D. DASY System Calibration Certificate

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Client: Anbotek (Auden)						Certificate No: Z18-97089							
CALIBRATION CERTIFICATE													
Object		D835V2 - SN: 4d154											
Calibration Procedure(s)		FD-Z11-2-003-01 Calibration Procedures for dipole validation kits											
Calibration date:		Jun 16, 2018											
This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.													
All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)°C and humidity<70%.													
Calibration Equipment used (M&TE critical for calibration)													
Primary Standards		ID #	Cal Date(Calibrated by, Certificate No.)		Scheduled Calibration								
Power Meter NRP2		101919	01-Jul-17 (CTTL, No.J17X04256)		Jun-18								
Power sensor NRP-Z91		101547	01-Jul-17 (CTTL, No.J17X04256)		Jun-18								
Reference Probe EX3DV4		SN 7307	19-Feb-18(SPEAG.No.EX3-7307_Feb18)		Feb-19								
DAE4		SN 771	02-Feb-18(CTTL-SPEAG.No.Z18-97011)		Feb-19								
Secondary Standards		ID #	Cal Date(Calibrated by, Certificate No.)		Scheduled Calibration								
Signal Generator E4438C		MY49071430	01-Feb-18 (CTTL, No.J18X00893)		Jan-19								
Network Analyzer E5071C		MY46110673	26-Jan-18 (CTTL, No.J18X00894)		Jan-19								
Name		Function		Signature									
Calibrated by:		Zhao Jing		SAR Test Engineer									
Reviewed by:		Qi Dianyuan		SAR Project Leader									
Approved by:		Lu Bingsong		Deputy Director of the laboratory									
Issued: Jun 17, 2018													
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.													

Certificate No: Z18-97089 Page 1 of 8

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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor $k=2$, which for a normal distribution Corresponds to a coverage probability of approximately 95%.





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Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY52	52.8.8.1258
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	41.0 $\pm$ 6 %	0.89 mho/m $\pm$ 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.30 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	9.24 mW / g $\pm$ 20.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.50 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	6.02 mW / g $\pm$ 20.4 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	55.4 $\pm$ 6 %	0.99 mho/m $\pm$ 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.43 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	9.57 mW / g $\pm$ 20.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.61 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	6.36 mW / g $\pm$ 20.4 % (k=2)

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.2Ω- 3.11jΩ
Return Loss	- 29.8dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.6Ω- 2.33jΩ
Return Loss	- 27.4dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.508 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
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DASY5 Validation Report for Head TSL

Date: 06.16.2018

Test Laboratory: CTTL, Beijing, China

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

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.891 \text{ S/m}$; $\epsilon_r = 40.97$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(10.01, 10.01, 10.01); Calibrated: 2/19/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2018-02-02
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

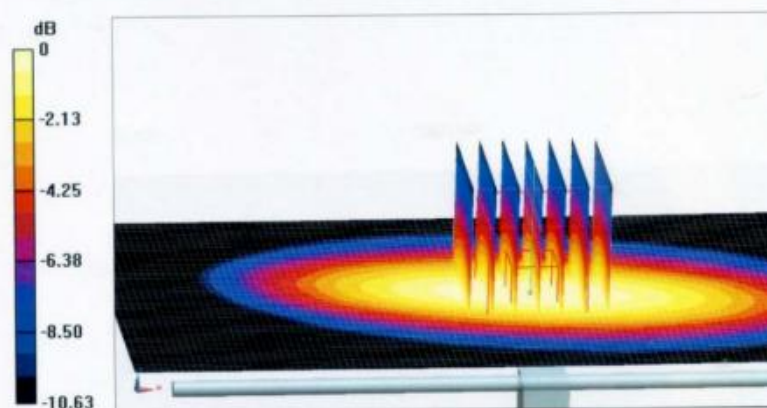
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 58.14V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 3.41 W/kg

SAR(1 g) = 2.3 W/kg; SAR(10 g) = 1.5 W/kg

Maximum value of SAR (measured) = 2.91 W/kg



0 dB = 2.91 W/kg = 4.64 dBW/kg

Certificate No: Z18-97089

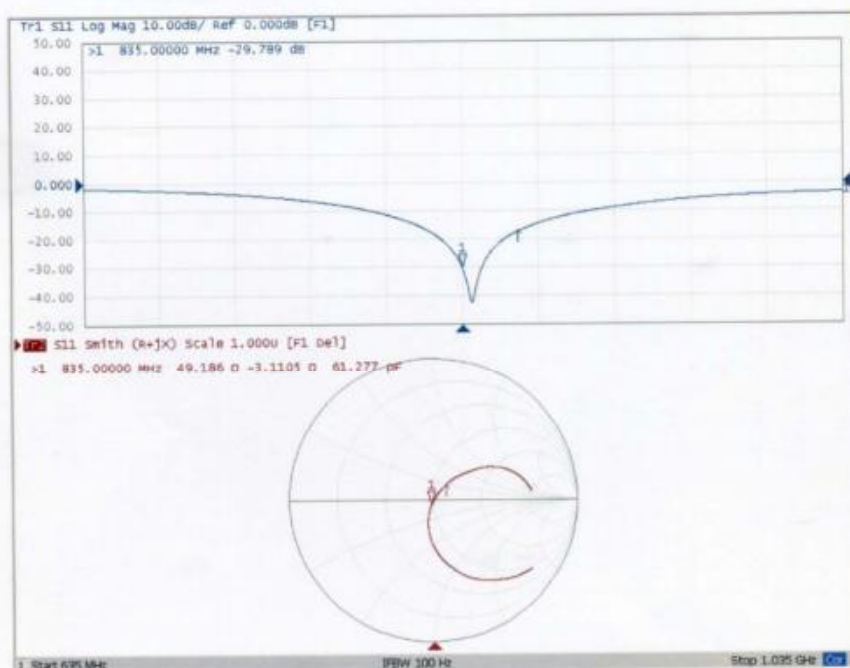
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Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date: 06.16.2018

Test Laboratory: CTTL, Beijing, China

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

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 835$ MHz; $\sigma = 0.991$ S/m; $\epsilon_r = 55.41$; $\rho = 1000$ kg/m³

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(9.83,9.83, 9.83); Calibrated: 2/19/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2018-02-02
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

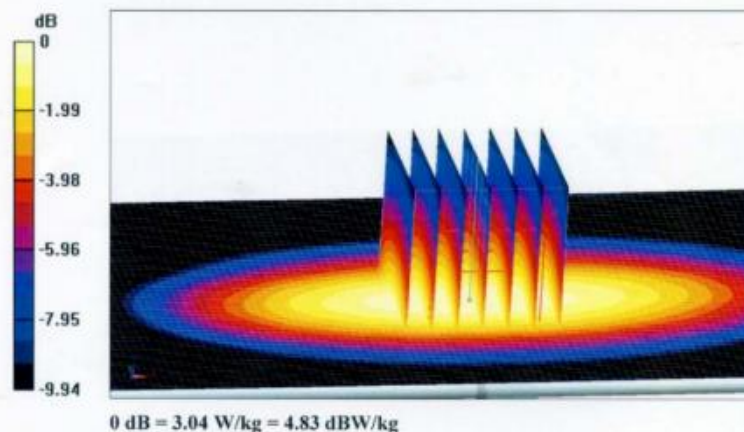
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.01 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.53 W/kg

SAR(1 g) = 2.43 W/kg; SAR(10 g) = 1.61 W/kg

Maximum value of SAR (measured) = 3.04 W/kg



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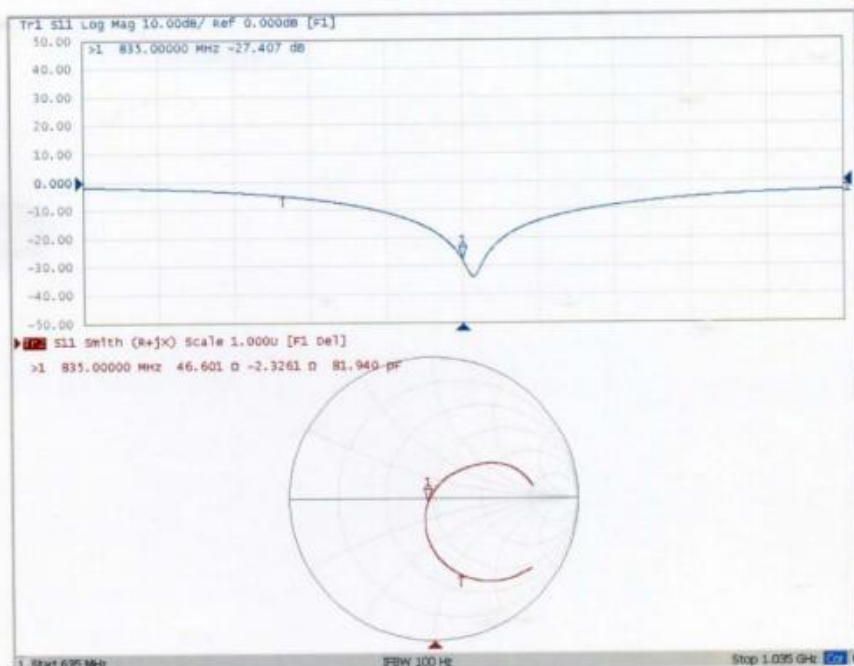
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Impedance Measurement Plot for Body TSL



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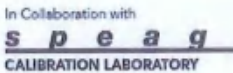
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Client: Anbotek (Auden) Certificate No: Z19-97103

CALIBRATION CERTIFICATE

Object: D1750V2 - SN: 1021

Calibration Procedure(s): FD-Z11-2-003-01
Calibration Procedures for dipole validation kits

Calibration date: July 3, 2019

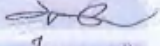
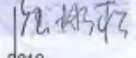
This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)°C and humidity<70%.

Calibration Equipment used (M&T critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	27-Jun-19 (CTTL, No.J19X04777)	Jun-20
Power sensor NRP-Z91	101547	27-Jun-19 (CTTL, No.J19X04777)	Jun-20
Reference Probe EX3DV4	SN 7307	19-Feb-19(SPEAG,No.EX3-7307_Feb19)	Feb-20
D4E4	SN 771	02-Feb-19(CTTL-SPEAG,No.Z19-97011)	Feb-20

Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	01-Feb-19 (CTTL, No.J19X00893)	Jan-20
Network Analyzer E5071C	MY46110873	26-Jan-19 (CTTL, No.J19X00894)	Jan-20

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: July 4, 2019

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Certificate No: Z19-97103

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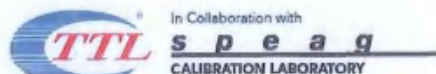
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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor $k=2$, which for a normal distribution Corresponds to a coverage probability of approximately 95%.



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Measurement Conditions

DASY system configuration, as far as given on page 1.

DASY Version	DASY52	52.8.8.1258
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	40.5 $\pm$ 6 %	1.36 mho/m $\pm$ 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.17 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	36.9 mW / g $\pm$ 20.8 % (k=2)
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	4.94 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	19.8 mW / g $\pm$ 20.4 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	53.1 $\pm$ 6 %	1.51 mho/m $\pm$ 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.25 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	36.7 mW / g $\pm$ 20.8 % (k=2)
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	4.94 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	19.7 mW / g $\pm$ 20.4 % (k=2)

Certificate No: Z19-97103

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Appendix**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	48.6Ω- 1.40jΩ
Return Loss	- 33.9dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.0Ω+ 0.61jΩ
Return Loss	- 27.5dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.318 ns
----------------------------------	----------

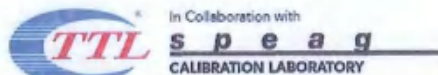
After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard. No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
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DASY5 Validation Report for Head TSL

Date: 07.01.2019

Test Laboratory: CTTT, Beijing, China

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1021

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.362$ S/m; $\epsilon_r = 40.49$; $\rho = 1000$ kg/m³

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(8.37, 8.37, 8.37); Calibrated: 2/19/2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2/2/2019
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

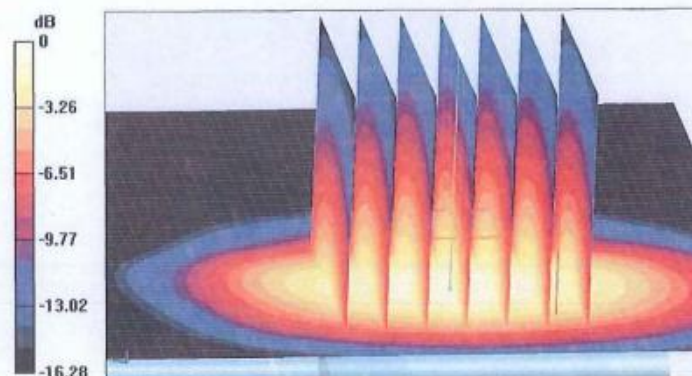
$dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 47.11V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 16.4W/kg

SAR(1 g) = 9.17 W/kg; SAR(10 g) = 4.94 W/kg

Maximum value of SAR (measured) = 13.0 W/kg



0 dB = 13.0 W/kg = 11.14 dBW/kg

Certificate No: Z19-97103

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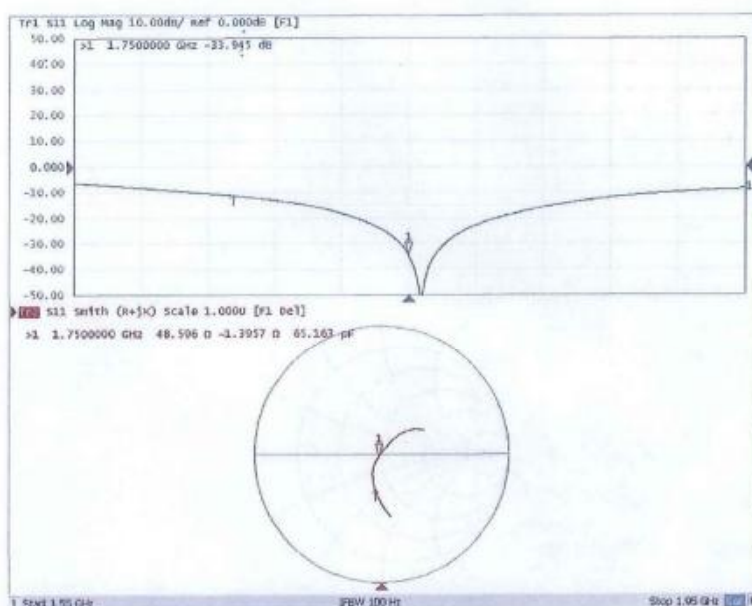


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Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date: 07.01.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1021

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.505$ S/m; $\epsilon_r = 53.06$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(8.18, 8.18, 8.18); Calibrated: 2/19/2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2/2/2019
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

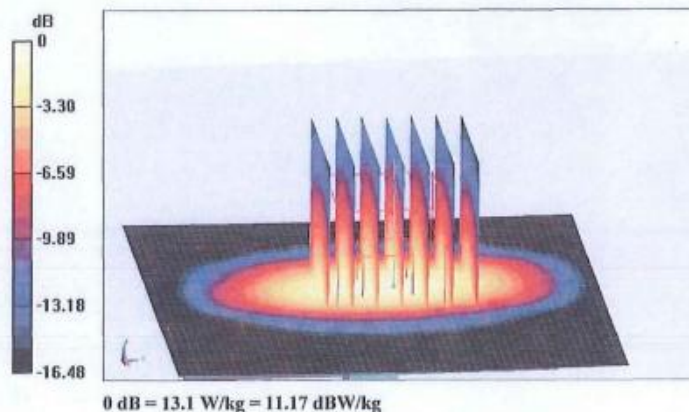
dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.11 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 16.4 W/kg

SAR(1 g) = 9.25 W/kg; SAR(10 g) = 4.94 W/kg

Maximum value of SAR (measured) = 13.1 W/kg



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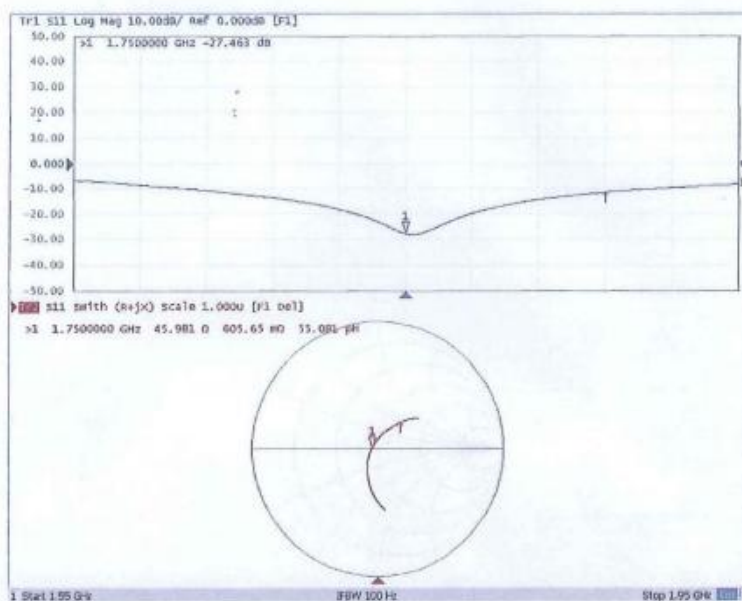




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Impedance Measurement Plot for Body TSL



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Client Anbotek (Auden)

Certificate No: Z19-97090

CALIBRATION CERTIFICATE

Object D1900V2 - SN: 5d175

Calibration Procedure(s) FD-Z11-2-003-01
Calibration Procedures for dipole validation kits

Calibration date: Jun 15, 2019

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)°C and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	01-Jul-18 (CTTL, No.J18X04256)	Jun-19
Power sensor NRP-Z91	101547	01-Jul-18 (CTTL, No.J18X04256)	Jun-19
Reference Probe EX3DV4	SN 7307	19-Feb-19(SPEAG,No.EX3-7307_Feb19)	Feb-20
DAE4	SN 771	02-Feb-19(CTTL-SPEAG,No.Z19-97011)	Feb-20

Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	01-Feb-19 (CTTL, No.J19X00893)	Jan-20
Network Analyzer E5071C	MY46110673	26-Jan-19 (CTTL, No.J19X00894)	Jan-20

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: Jun 17, 2019

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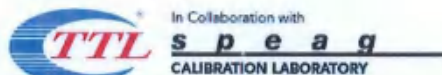
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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

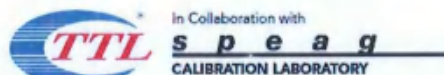
Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor $k=2$, which for a normal distribution Corresponds to a coverage probability of approximately 95%.



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Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY52	52.8.8.1258
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	40.3 $\pm$ 6 %	1.38 mho/m $\pm$ 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.99 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	40.4 mW / g $\pm$ 20.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.28 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	21.3 mW / g $\pm$ 20.4 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	53.3 $\pm$ 6 %	1.54 mho/m $\pm$ 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.1 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	40.1 mW / g $\pm$ 20.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.39 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	21.5 mW / g $\pm$ 20.4 % (k=2)

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	$53.2\Omega + 5.44j\Omega$
Return Loss	- 24.3dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$48.9\Omega + 5.75j\Omega$
Return Loss	- 24.6dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.304 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard. No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
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DASY5 Validation Report for Head TSL

Date: 06.15.2019

Test Laboratory: CTTL, Beijing, China

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

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.381$ S/m; $\epsilon_r = 40.33$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(8.1, 8.1, 8.1); Calibrated: 2/19/2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2/2/2019
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

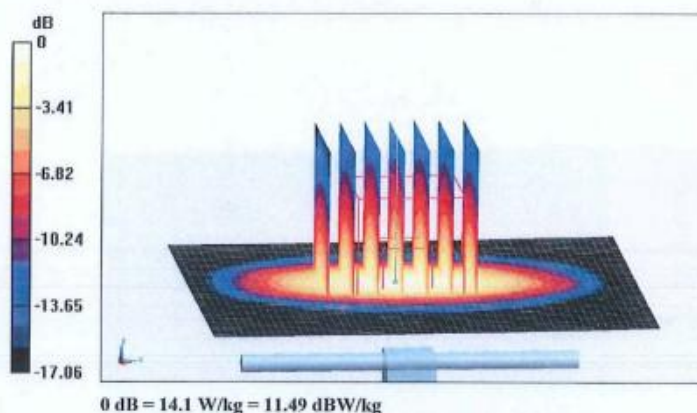
dx=5mm, dy=5mm, dz=5mm

Reference Value = 103.5V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 18.0W/kg

SAR(1 g) = 9.99 W/kg; SAR(10 g) = 5.28 W/kg

Maximum value of SAR (measured) = 14.1 W/kg



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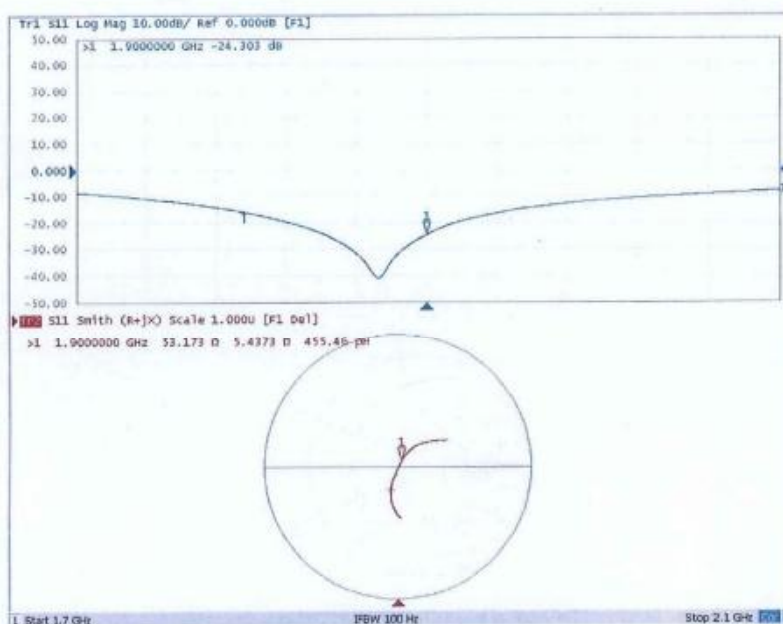
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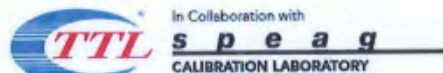
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date: 06.15.2019

Test Laboratory: CTTL, Beijing, China

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

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.537$ S/m; $\epsilon_r = 53.34$; $\rho = 1000$ kg/m³

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(7.67, 7.67, 7.67); Calibrated: 2/19/2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2/2/2019
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

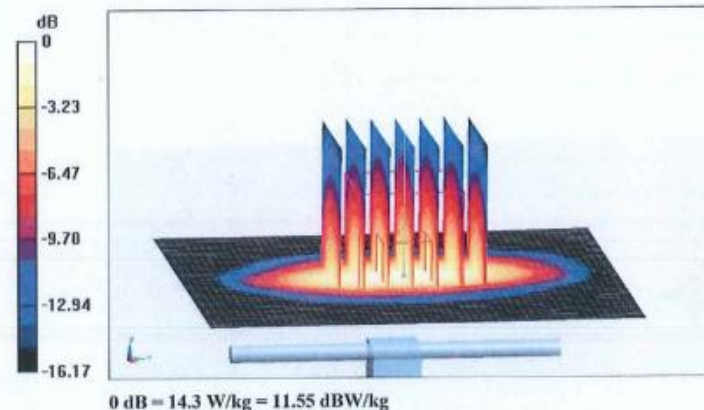
$dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 96.11 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 17.8 W/kg

SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.39 W/kg

Maximum value of SAR (measured) = 14.3 W/kg



Certificate No: Z19-97090

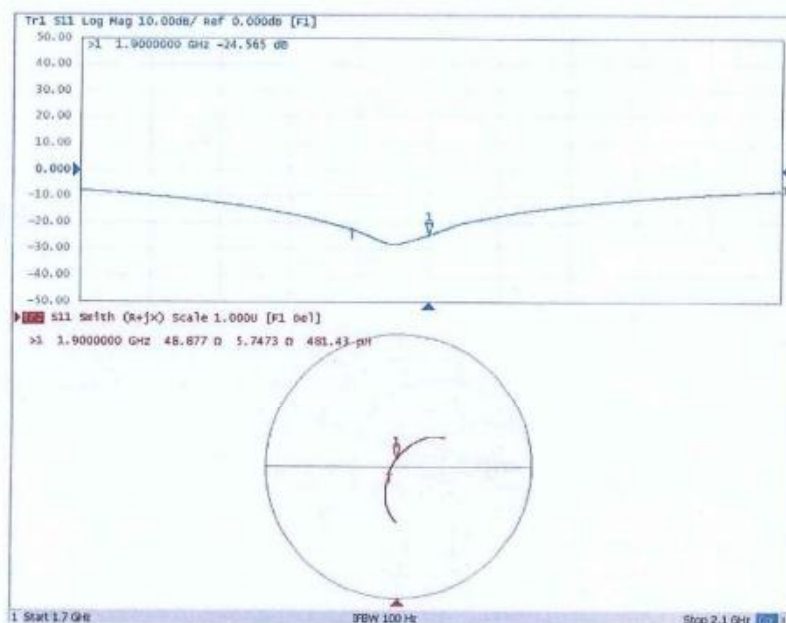
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Impedance Measurement Plot for Body TSL



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Client: Anbotek (Auden)

Certificate No: Z19-97103

CALIBRATION CERTIFICATE

Object: D1750V2 - SN: 1021

Calibration Procedure(s): FD-Z11-2-003-01
Calibration Procedures for dipole validation kits

Calibration date: July 3, 2019

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)°C and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	27-Jun-19 (CTTL, No.J19X04777)	Jun-20
Power sensor NRP-Z91	101547	27-Jun-19 (CTTL, No.J19X04777)	Jun-20
Reference Probe EX3DV4	SN 7307	19-Feb-19(SPEAG, No.EX3-7307_Feb19)	Feb-20
DAE4	SN 771	02-Feb-19(CTTL-SPEAG, No.Z19-97011)	Feb-20
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	01-Feb-19 (CTTL, No.J19X00893)	Jan-20
Network Analyzer E5071C	MY46110673	26-Jan-19 (CTTL, No.J19X00894)	Jan-20

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: July 4, 2019

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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor $k=2$, which for a normal distribution Corresponds to a coverage probability of approximately 95%.

Certificate No: Z19-97103

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Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY52	52.8.8.1258
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	40.5 $\pm$ 6 %	1.36 mho/m $\pm$ 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.17 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	36.9 mW / g $\pm$ 20.8 % (k=2)
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	4.94 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	19.8 mW / g $\pm$ 20.4 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	53.1 $\pm$ 6 %	1.51 mho/m $\pm$ 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.25 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	36.7 mW / g $\pm$ 20.8 % (k=2)
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	4.94 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	19.7 mW / g $\pm$ 20.4 % (k=2)

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Appendix**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	48.6Ω- 1.40jΩ
Return Loss	- 33.9dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.0Ω+ 0.61jΩ
Return Loss	- 27.5dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.318 ns
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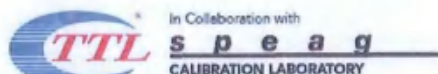
After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard. No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

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DASY5 Validation Report for Head TSL

Date: 07.01.2019

Test Laboratory: CTTT, Beijing, China

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1021

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.362$ S/m; $\epsilon_r = 40.49$; $\rho = 1000$ kg/m³

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(8.37, 8.37, 8.37); Calibrated: 2/19/2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2/2/2019
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

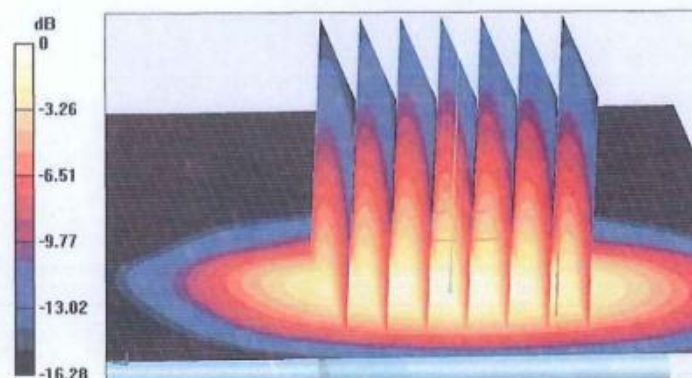
dx=5mm, dy=5mm, dz=5mm

Reference Value = 47.11V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 16.4W/kg

SAR(1 g) = 9.17 W/kg; SAR(10 g) = 4.94 W/kg

Maximum value of SAR (measured) = 13.0 W/kg



0 dB = 13.0 W/kg = 11.14 dBW/kg

Certificate No: Z19-97103

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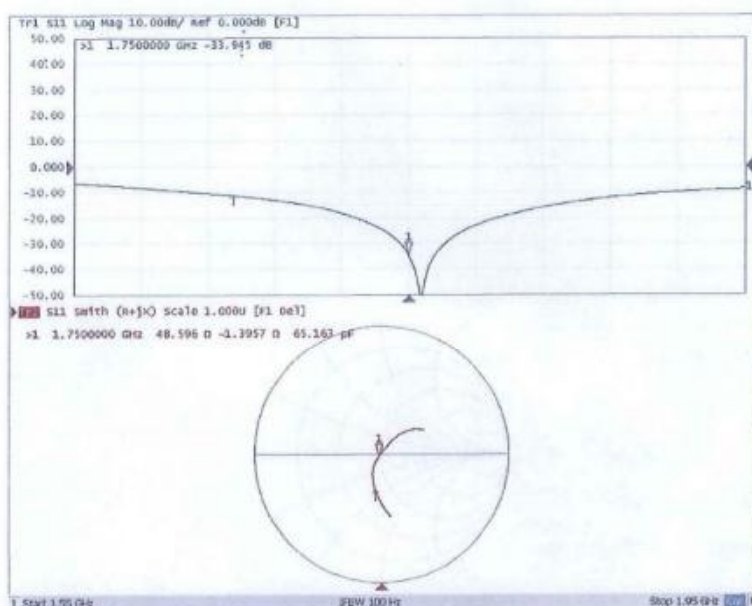


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Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date: 07.01.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1021

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1750$ MHz; $\sigma = 1.505$ S/m; $\epsilon_r = 53.06$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(8.18, 8.18, 8.18); Calibrated: 2/19/2019;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2/2/2019
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/I
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

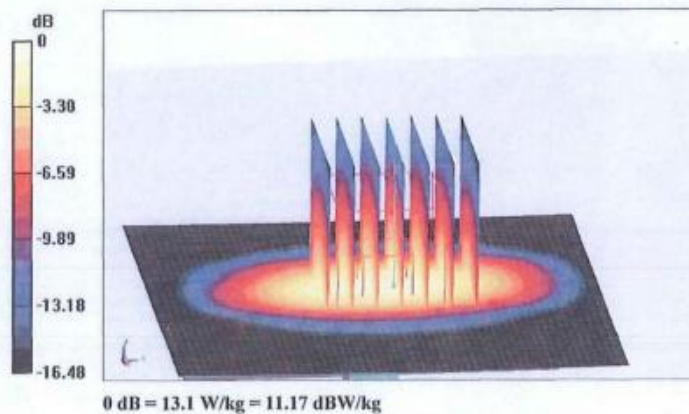
dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.11 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 16.4 W/kg

SAR(1 g) = 9.25 W/kg; SAR(10 g) = 4.94 W/kg

Maximum value of SAR (measured) = 13.1 W/kg



Certificate No: Z19-97103

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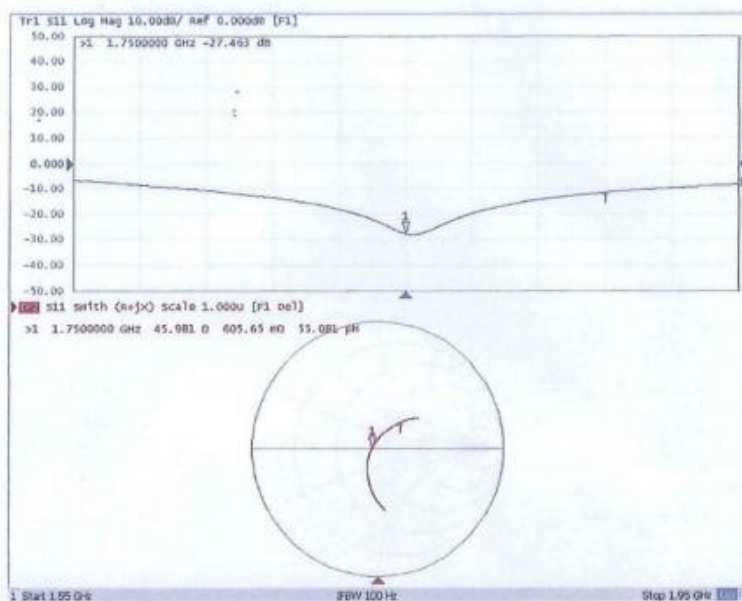




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Impedance Measurement Plot for Body TSL



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Client

Anbotek (Auden)

Certificate No: Z18-98076

CALIBRATION CERTIFICATE

Object D750V3 - SN: 1118

Calibration Procedure(s) FD-Z11-003-01
Calibration Procedures for dipole validation kits

Calibration date: June 08, 2018

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)°C and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	01-Jul-17 (CTTL, No.J17X04256)	Jun-18
Power sensor NRP-Z91	101547	01-Jul-17 (CTTL, No.J17X04256)	Jun-18
Reference Probe EX3DV4	SN 7307	19-Feb-18(SPEAG, No. EX3-7307_Feb18)	Feb-19
D4E4	SN 771	02-Feb-18(CTTL-SPEAG, No. Z18-97011)	Feb-19
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	01-Feb-18 (CTTL, No.J18X00893)	Jan-19
Network Analyzer E5071C	MY46110673	26-Jan-18 (CTTL, No.J18X00894)	Jan-19

	Name	Function
Calibrated by:	Zhao Jing	SAR Test Engineer
Reviewed by:	Lin Hao	SAR Test Engineer
Approved by:	Qi Dianyuan	SAR Project Leader

Signature

Issued: June 10, 2018

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: Z18-97076

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Shenzhen Anbotek Compliance Laboratory Limited

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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor $k=2$, which for a normal distribution Corresponds to a coverage probability of approximately 95%.





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Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY52	52.10.0.1442
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	42.1 $\pm$ 6 %	0.88 mho/m $\pm$ 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.06 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	8.31 mW / g $\pm$ 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.37 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	5.52 mW / g $\pm$ 18.7 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	55.7 $\pm$ 6 %	0.97 mho/m $\pm$ 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.21 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	8.76 mW / g $\pm$ 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.48 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	5.88 mW / g $\pm$ 18.7 % (k=2)

Certificate No: Z18-97076

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.3Ω- 4.83jΩ
Return Loss	- 24.9dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.5Ω- 6.11jΩ
Return Loss	- 23.9dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.135 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

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DASY5 Validation Report for Head TSL

Date: 06.08.2018

Test Laboratory: CTTL, Beijing, China

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

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.882 \text{ S/m}$; $\epsilon_r = 42.14$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(10.05, 10.05, 10.05); Calibrated: 2/19/2018;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2018-02-02
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/I
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7372)

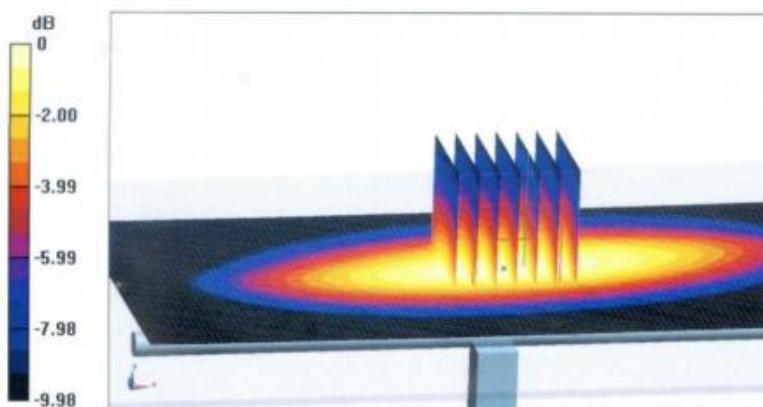
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 56.45 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 3.14 W/kg

SAR(1 g) = 2.06 W/kg; SAR(10 g) = 1.37 W/kg

Maximum value of SAR (measured) = 2.75 W/kg

**0 dB = 2.75 W/kg = 4.39 dBW/kg**

Certificate No: Z18-97076

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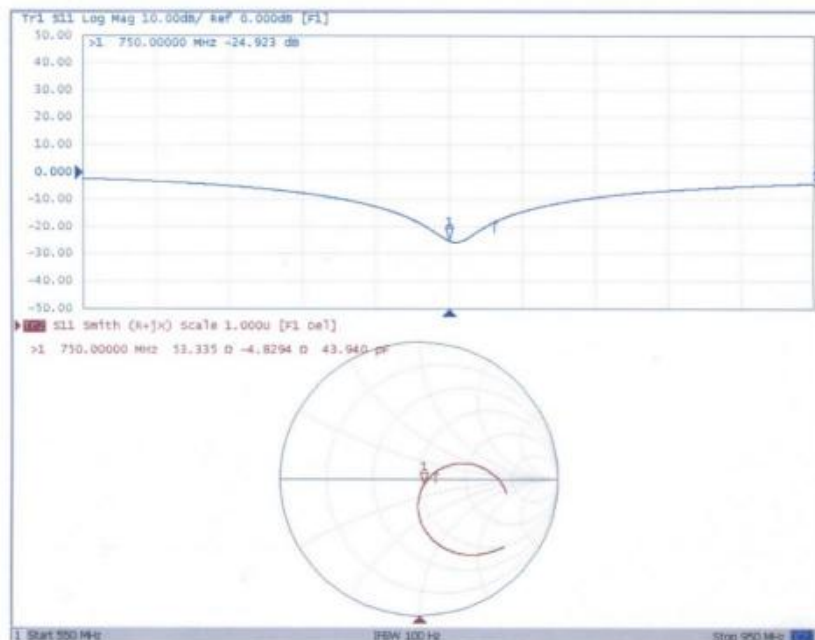




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Impedance Measurement Plot for Head TSL





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DASY5 Validation Report for Body TSL

Date: 06.08.2018

Test Laboratory: CTTL, Beijing, China

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

Communication System: UID 0, CW; Frequency: 750 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 750 \text{ MHz}$; $\sigma = 0.972 \text{ S/m}$; $\epsilon_r = 55.73$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(9.8, 9.8, 9.8); Calibrated: 2/19/2018;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2018-02-02
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.10 (0); SEMCAD X Version 14.6.10 (7372)

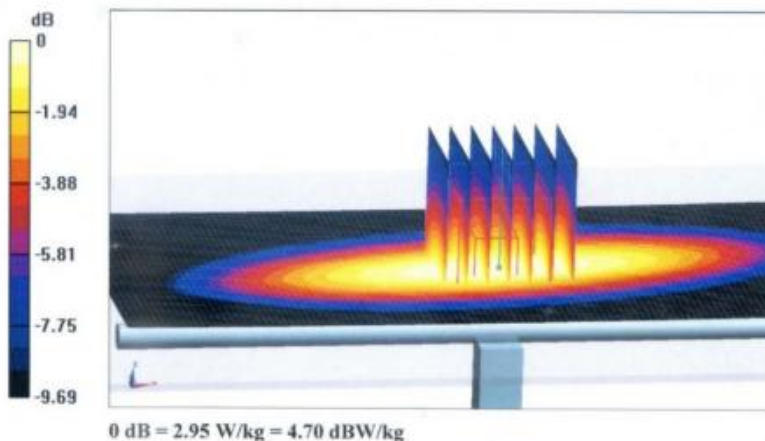
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.05 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 3.37 W/kg

SAR(1 g) = 2.21 W/kg; SAR(10 g) = 1.48 W/kg

Maximum value of SAR (measured) = 2.95 W/kg



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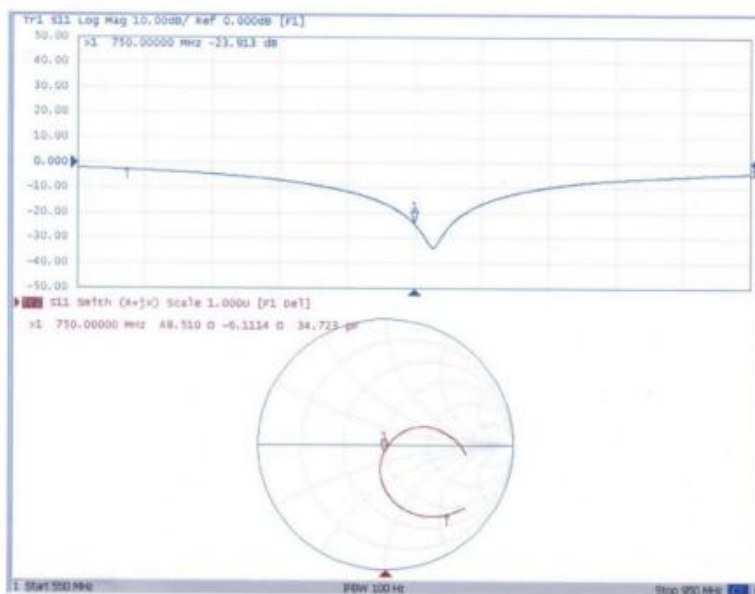
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Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 0108

Client Anbotech (Auden)

Certificate No: D2600V2-1058_Jun18

CALIBRATION CERTIFICATE

Object D2600V2 - SN: 1058

Calibration procedure(s) QA CAL-05.v9
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: June 19, 2018

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	07-Oct-17 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-17 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-17 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	01-Apr-17 (No. 217-02131)	Mar-16
Type-N mismatch combination	SN: 5047.2 / 06327	01-Apr-17 (No. 217-02134)	Mar-16
Reference Probe ES3DV3	SN: 3205	30-Dec-17 (No. ES3-3205_Dec14)	Dec-15
DAE4	SN: 601	18-Aug-17 (No. DAE4-601_Aug14)	Aug-15
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

Calibrated by:	Name Leif Klysner	Function Laboratory Technician	Signature
Approved by:	Katja Pokovic	Technical Manager	

Issued: June 22, 2018

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Certificate No: D2600V2-1058_Jun18

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C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Glossary:

TSL tissue simulating liquid
ConvF sensitivity in TSL / NORM x,y,z
N/A not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Certificate No: D2600V2-1058_Jun18

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Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2600 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	37.6 $\pm$ 6 %	2.05 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	14.7 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	57.2 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.57 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	25.9 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.5	2.16 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	50.4 $\pm$ 6 %	2.22 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	14.5 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	56.8 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.45 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	25.5 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)**Antenna Parameters with Head TSL**

Impedance, transformed to feed point	50.5 Ω - 6.3 j Ω
Return Loss	- 24.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.7 Ω - 5.2 j Ω
Return Loss	- 24.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.151 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	August 14, 2012

DASY5 Validation Report for Head TSL

Date: 19.06.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 2600 MHz

Medium parameters used: $f = 2600$ MHz; $\sigma = 2.05$ S/m; $\epsilon_r = 37.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.49, 4.49, 4.49); Calibrated: 30.12.2017;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

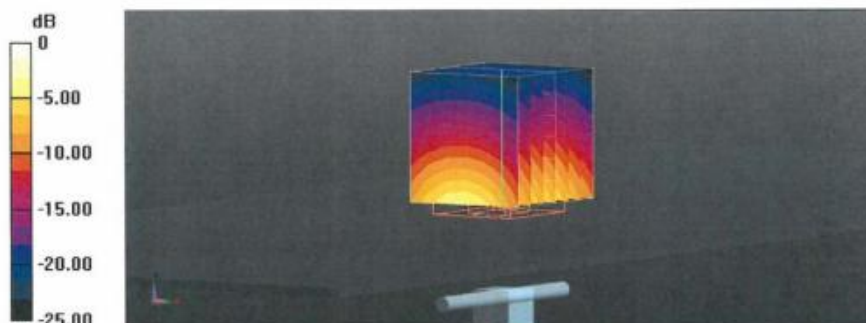
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 102.6 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 30.9 W/kg

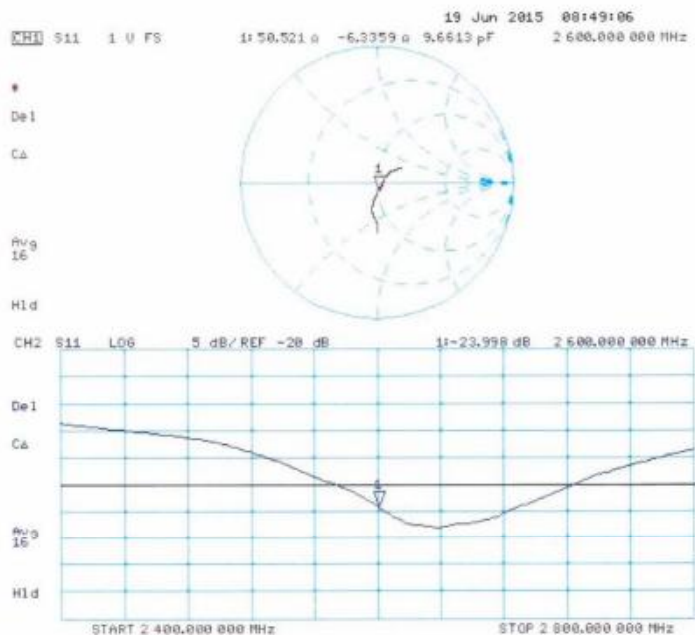
SAR(1 g) = 14.7 W/kg; SAR(10 g) = 6.57 W/kg

Maximum value of SAR (measured) = 19.6 W/kg



0 dB = 19.6 W/kg = 12.92 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 19.06.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 2600 MHz

Medium parameters used: $f = 2600$ MHz; $\sigma = 2.22$ S/m; $\epsilon_r = 50.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.13, 4.13, 4.13); Calibrated: 30.12.2017;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Body/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

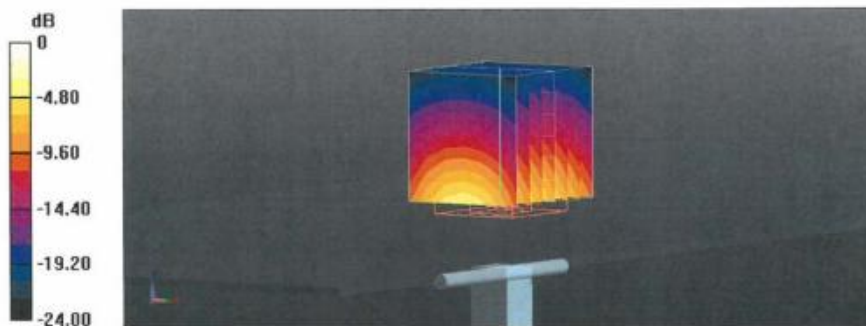
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.96 V/m; Power Drift = 0.00 dB

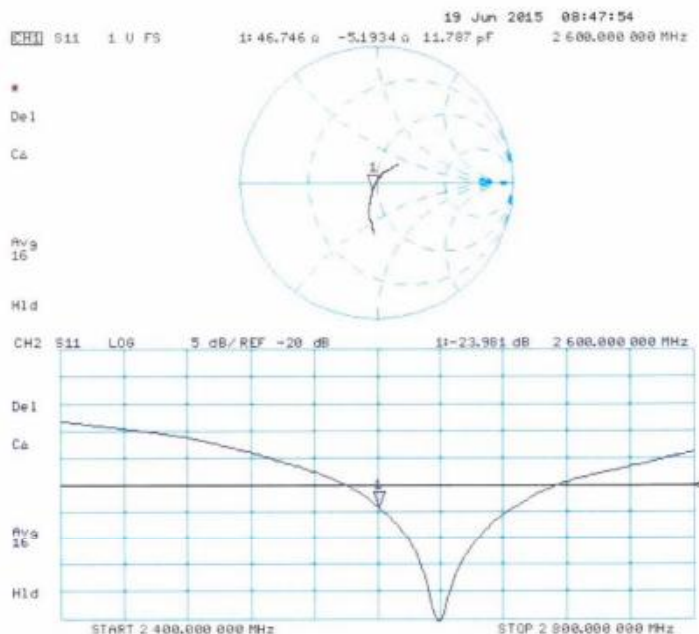
Peak SAR (extrapolated) = 30.1 W/kg

SAR(1 g) = 14.5 W/kg; SAR(10 g) = 6.45 W/kg

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



Impedance Measurement Plot for Body TSL





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Client

Anbotek (Auden)

Certificate No: Z18-97091

CALIBRATION CERTIFICATE

Object D2450V2 - SN: 910

Calibration Procedure(s) FD-Z11-2-003-01
Calibration Procedures for dipole validation kits

Calibration date: Jun 15, 2018

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	01-Jul-17 (CTTL, No.J17X04256)	Jun-18
Power sensor NRP-Z91	101547	01-Jul-17 (CTTL, No.J17X04256)	Jun-18
Reference Probe EX3DV4	SN 7307	19-Feb-18(SPEAG,No.EX3-7307_Feb18)	Feb-19
DAE4	SN 771	02-Feb-18(CTTL-SPEAG,No.Z18-97011)	Feb-19

Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	01-Feb-18 (CTTL, No.J18X00893)	Jan-19
Network Analyzer E5071C	MY46110673	26-Jan-18 (CTTL, No.J18X00894)	Jan-19

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Qi Dianyuan	SAR Project Leader	
Approved by:	Lu Bingsong	Deputy Director of the laboratory	

Issued: Jun 17, 2018

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Certificate No: Z18-97091

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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) For hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.





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Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY52	52.8.8.1258
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	39.0 $\pm$ 6 %	1.77 mho/m $\pm$ 6 %
Head TSL temperature change during test	<1.0 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.0 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	52.4 mW / g $\pm$ 20.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	6.06 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	24.3 mW / g $\pm$ 20.4 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	52.9 $\pm$ 6 %	1.97 mho/m $\pm$ 6 %
Body TSL temperature change during test	<1.0 °C	---	---

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.0 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	51.8 mW / g $\pm$ 20.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	6.18 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	24.7 mW / g $\pm$ 20.4 % (k=2)





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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.6Ω+ 2.77jΩ
Return Loss	- 25.8dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.7Ω+ 4.28jΩ
Return Loss	- 27.3dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.263 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
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DASY5 Validation Report for Head TSL

Date: 06.15.2018

Test Laboratory: CTTL, Beijing, China

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

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.767$ S/m; $\epsilon_r = 39.01$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(7.36, 7.36, 7.36); Calibrated: 2/19/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2018-02-02
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

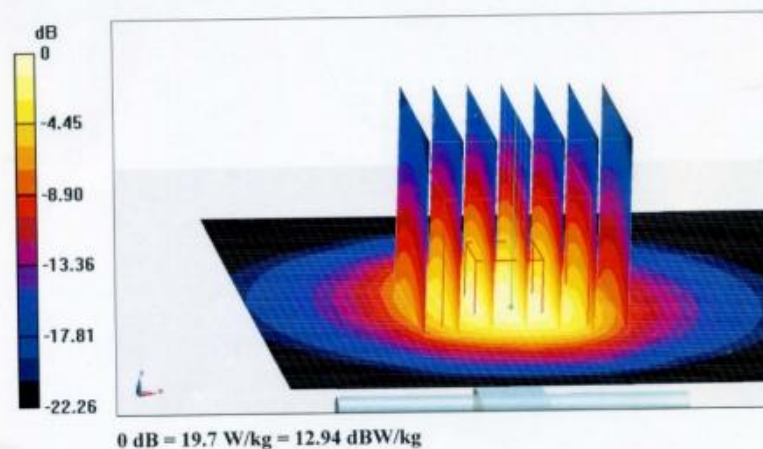
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 106.5 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 26.7 W/kg

SAR(1 g) = 13 W/kg; SAR(10 g) = 6.06 W/kg

Maximum value of SAR (measured) = 19.7 W/kg



Certificate No: Z18-97091

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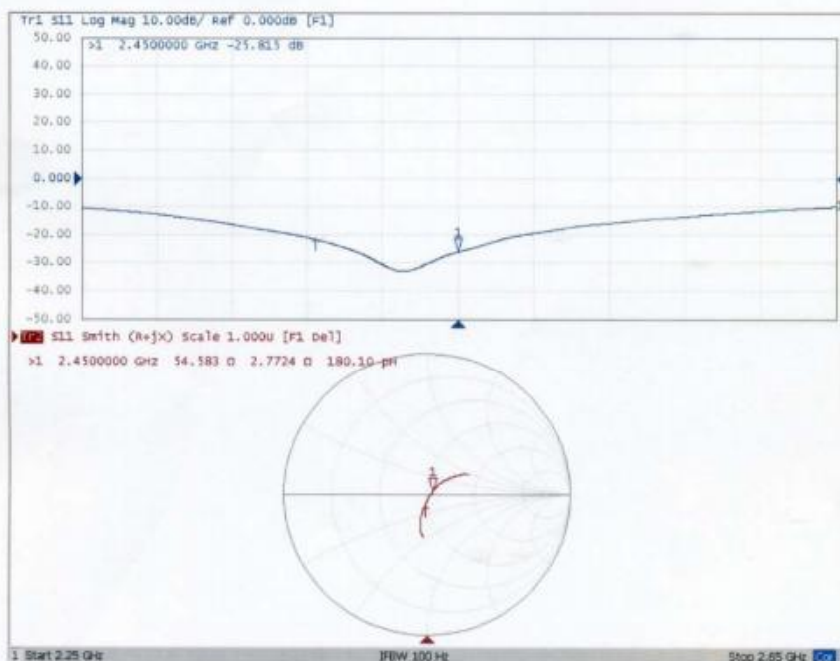
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Impedance Measurement Plot for Head TSL





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DASY5 Validation Report for Body TSL

Date: 06.15.2018

Test Laboratory: CCTL, Beijing, China

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

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.972$ S/m; $\epsilon_r = 52.92$; $\rho = 1000$ kg/m³

Phantom section: Center Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 - SN7307; ConvF(7.22, 7.22, 7.22); Calibrated: 2/19/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn771; Calibrated: 2018-02-02
- Phantom: Triple Flat Phantom 5.1C; Type: QD 000 P51 CA; Serial: 1161/1
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7372)

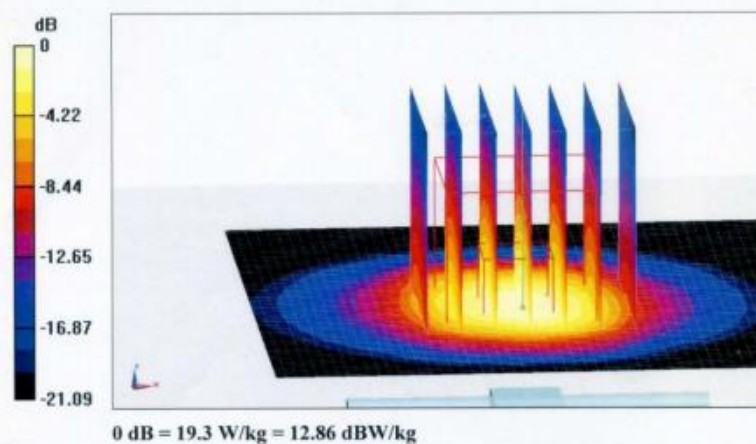
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.89 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 25.6 W/kg

SAR(1 g) = 13 W/kg; SAR(10 g) = 6.18 W/kg

Maximum value of SAR (measured) = 19.3 W/kg



Certificate No: Z18-97091

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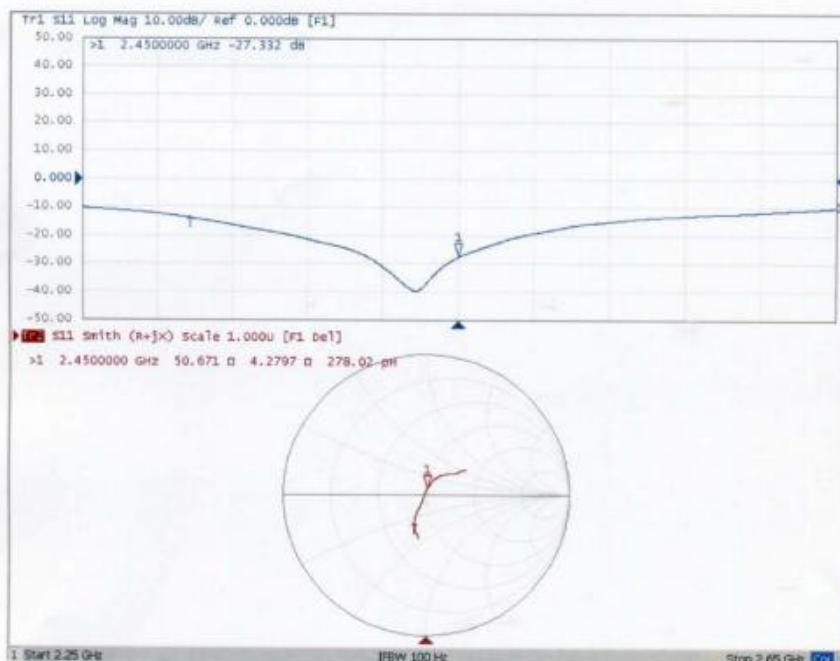
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Impedance Measurement Plot for Body TSL



Certificate No: Z18-97091

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IMPORTANT NOTICE

USAGE OF THE DAE 4

The DAE unit is a delicate, high precision instrument and requires careful treatment by the user. There are no serviceable parts inside the DAE. Special attention shall be given to the following points:

Battery Exchange: The battery cover of the DAE4 unit is closed using a screw, over tightening the screw may cause the threads inside the DAE to wear out.

Shipping of the DAE: Before shipping the DAE to SPEAG for calibration, remove the batteries and pack the DAE in an antistatic bag. This antistatic bag shall then be packed into a larger box or container which protects the DAE from impacts during transportation. The package shall be marked to indicate that a fragile instrument is inside.

E-Stop Failures: Touch detection may be malfunctioning due to broken magnets in the E-stop. Rough handling of the E-stop may lead to damage of these magnets. Touch and collision errors are often caused by dust and dirt accumulated in the E-stop. To prevent E-stop failure, the customer shall always mount the probe to the DAE carefully and keep the DAE unit in a non-dusty environment if not used for measurements.

Repair: Minor repairs are performed at no extra cost during the annual calibration. However, SPEAG reserves the right to charge for any repair especially if rough unprofessional handling caused the defect.

DASY Configuration Files: Since the exact values of the DAE input resistances, as measured during the calibration procedure of a DAE unit, are not used by the DASY software, a nominal value of 200 MOhm is given in the corresponding configuration file.

Important Note:

Warranty and calibration is void if the DAE unit is disassembled partly or fully by the Customer.

Important Note:

Never attempt to grease or oil the E-stop assembly. Cleaning and readjusting of the E-stop assembly is allowed by certified SPEAG personnel only and is part of the annual calibration procedure.

Important Note:

To prevent damage of the DAE probe connector pins, use great care when installing the probe to the DAE. Carefully connect the probe with the connector notch oriented in the mating position. Avoid any rotational movement of the probe body versus the DAE while turning the locking nut of the connector. The same care shall be used when disconnecting the probe from the DAE.

Schmid & Partner Engineering

TN_BR040315AD DAE4.doc

11.12.2009

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S Swiss Calibration Service

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The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **Anbotek (Auden)**

Certificate No: **DAE4-387_Sep03**

CALIBRATION CERTIFICATE

Object **DAE4 - SD 000 D04 BM - SN: 387**

Calibration procedure(s) **QA CAL-06.v29**
Calibration procedure for the data acquisition electronics (DAE)

Calibration date: **September 03, 2019**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^\circ\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	11-Aug-19 (No:21092)	Aug-20
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Auto DAE Calibration Unit	SE UWS 053 AA 1001	05-Jan-19 (in house check)	In house check: Jan-20
Calibrator Box V2.1	SE UMS 006 AA 1002	05-Jan-19 (in house check)	In house check: Jan-20

Calibrated by: **Name** **Function** **Signature**
Dominique Steffen **Laboratory Technician**

Approved by: **Sven Kühn** **Deputy Manager**

Issued: September 03, 2019

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Certificate No: DAE4-387_Sep03

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Accreditation No.: **SCS 0108**

Glossary

DAE data acquisition electronics
Connector angle information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- **DC Voltage Measurement:** Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- **Connector angle:** The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
 - **DC Voltage Measurement Linearity:** Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
 - **Common mode sensitivity:** Influence of a positive or negative common mode voltage on the differential measurement.
 - **Channel separation:** Influence of a voltage on the neighbor channels not subject to an input voltage.
 - **AD Converter Values with inputs shorted:** Values on the internal AD converter corresponding to zero input voltage
 - **Input Offset Measurement:** Output voltage and statistical results over a large number of zero voltage measurements.
 - **Input Offset Current:** Typical value for information; Maximum channel input offset current, not considering the input resistance.
 - **Input resistance:** Typical value for information; DAE input resistance at the connector, during internal auto-zeroing and during measurement.
 - **Low Battery Alarm Voltage:** Typical value for information. Below this voltage, a battery alarm signal is generated.
 - **Power consumption:** Typical value for information. Supply currents in various operating modes.



DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1μV, full range = -100...+300 mV

Low Range: 1LSB = 61nV, full range = -1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	404.489 ± 0.02% (k=2)	404.852 ± 0.02% (k=2)	404.862 ± 0.02% (k=2)
Low Range	3.97827 ± 1.50% (k=2)	3.95875 ± 1.50% (k=2)	3.97982 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	53.0 ° ± 1 °
---	--------------

Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range	Reading (μV)	Difference (μV)	Error (%)
Channel X + Input	200032.85	-3.31	-0.00
Channel X + Input	20007.64	1.88	0.01
Channel X - Input	-20003.48	1.18	-0.01
Channel Y + Input	200034.23	-1.43	-0.00
Channel Y + Input	20006.60	0.91	0.00
Channel Y - Input	-20004.04	0.72	-0.00
Channel Z + Input	200035.38	-0.83	-0.00
Channel Z + Input	20003.69	-2.11	-0.01
Channel Z - Input	-20006.38	-1.59	0.01

Low Range	Reading (μV)	Difference (μV)	Error (%)
Channel X + Input	2001.63	0.08	0.00
Channel X + Input	202.29	0.70	0.35
Channel X - Input	-197.90	0.60	-0.30
Channel Y + Input	2001.33	-0.07	-0.00
Channel Y + Input	200.86	-0.60	-0.30
Channel Y - Input	-199.87	-1.23	0.62
Channel Z + Input	2001.61	0.27	0.01
Channel Z + Input	200.60	-0.70	-0.35
Channel Z - Input	-199.51	-0.85	0.43

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	13.50	11.56
	- 200	-8.64	-11.18
Channel Y	200	-0.81	-1.28
	- 200	1.05	0.09
Channel Z	200	7.17	6.91
	- 200	-9.46	-9.01

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	-1.70	0.33
Channel Y	200	10.70	-	-0.38
Channel Z	200	7.11	7.89	-

4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	15969	17466
Channel Y	15661	16162
Channel Z	15990	16190

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Input 10M Ω

	Average (μ V)	min. Offset (μ V)	max. Offset (μ V)	Std. Deviation (μ V)
Channel X	0.73	-2.58	3.29	0.62
Channel Y	0.41	-0.49	1.23	0.40
Channel Z	-0.80	-1.88	0.30	0.42

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

8. Low Battery Alarm Voltage (Typical values for information)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	-0.01	-8	-9



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Client **Anbotech (Auden)**

Certificate No: **Z19-68716**

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:7396**

Calibration Procedure(s) **FF-Z11-007-03**
Calibration Procedures for Dosimetric E-field Probes

Calibration date: **May06, 2019**

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)°C and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	20-Jun-18 (CTTL, No.J18X07447)	Jun-19
Power sensor NRP-Z91	101547	20-Jun-18 (CTTL, No.J18X07447)	Jun-19
Power sensor NRP-Z91	101548	20-Jun-18 (CTTL, No.J18X07447)	Jun-19
Reference10dBAttenuator	18N50W-10dB	13-Mar-19(CTTL, No.J19X01547)	Mar-20
Reference20dBAttenuator	18N50W-20dB	13-Mar-19(CTTL, No.J19X01548)	Mar-20
Reference Probe EX3DV4	SN 7433	26-Sep-18(SPEAG, No.EX3-7433_Sep18)	Sep-19
DAE4	SN 549	13-Dec-18(SPEAG, No.DAE4-549_Dec18)	Dec -19
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
SignalGeneratorMG3700A	6201052605	27-Jun-18 (CTTL, No.J18X04776)	Jun-19
Network Analyzer E5071C	MY46110673	13-Jan-19 (CTTL, No.J19X00285)	Jan -20

	Name	Function	Signature
Calibrated by:	Yu Zongying	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: May07, 2019

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Certificate No: Z19-68716

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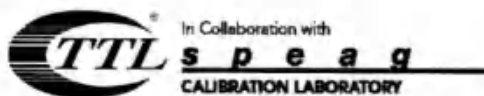
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Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A,B,C,D	modulation dependent linearization parameters
Polarization Φ	Φ rotation around probe axis
Polarization θ	θ rotation around an axis that is in the plane normal to probe axis (at measurement center), $\theta=0$ is normal to probe axis

Connector Angle information used in DASY system to align probe sensor X to the robot coordinate system

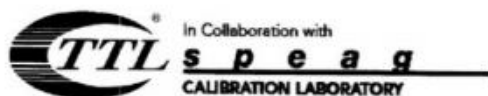
Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300MHz to 3GHz)", February 2005
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}: Assessed for E-field polarization $\theta=0$ ($f \leq 900\text{MHz}$ in TEM-cell; $f > 1800\text{MHz}$: waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E^2 -field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z} = NORM_{x,y,z} * frequency_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP_{x,y,z}: DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics.
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}; A,B,C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800\text{MHz}$) and inside waveguide using analytical field distributions based on power measurements for $f > 800\text{MHz}$. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty valued are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from $\pm 50\text{MHz}$ to $\pm 100\text{MHz}$.
- Spherical isotropy (3D deviation from isotropy): in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the NORM (no uncertainty required).





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Probe EX3DV4

SN: 7396

Calibrated: May 06, 2019

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

Certificate No: Z19-68716

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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7396

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm($\mu\text{V}/(\text{V/m})^2$) ^A	0.54	0.53	0.50	±10.0%
DCP(mV) ^B	97.8	104.5	102.5	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB· μV	C	D dB	VR mV	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	199.9	±2.4%
		Y	0.0	0.0	1.0		203.3	
		Z	0.0	0.0	1.0		195.0	

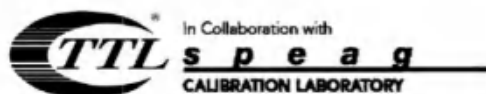
The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor k=2, which for a normal distribution Corresponds to a coverage probability of approximately 95%.

^A The uncertainties of Norm X, Y, Z do not affect the E²-field uncertainty inside TSL (see Page 5 and Page 6).

^B Numerical linearization parameter: uncertainty not required.

^E Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.





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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7396

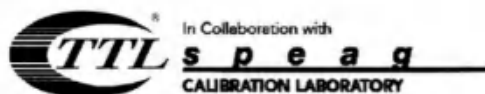
Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz] ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unc. (k=2)
750	41.9	0.89	9.82	9.82	9.82	0.30	0.85	±12.1%
835	41.5	0.90	9.71	9.71	9.71	0.15	1.36	±12.1%
900	41.5	0.97	9.87	9.87	9.87	0.16	1.37	±12.1%
1750	40.1	1.37	8.61	8.61	8.61	0.25	1.04	±12.1%
1900	40.0	1.40	8.13	8.13	8.13	0.24	1.01	±12.1%
2100	39.8	1.49	8.14	8.14	8.14	0.24	1.04	±12.1%
2300	39.5	1.67	7.85	7.85	7.85	0.40	0.75	±12.1%
2450	39.2	1.80	7.57	7.57	7.57	0.50	0.75	±12.1%
2600	39.0	1.96	7.38	7.38	7.38	0.64	0.68	±12.1%
5250	35.9	4.71	5.33	5.33	5.33	0.45	1.30	±13.3%
5600	35.5	5.07	4.89	4.89	4.89	0.45	1.35	±13.3%
5750	35.4	5.22	4.92	4.92	4.92	0.45	1.45	±13.3%

^C Frequency validity above 300 MHz of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

^F At frequency below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

^G Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.



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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7396

Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz] ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unct. (k=2)
750	55.5	0.96	10.09	10.09	10.09	0.30	0.90	±12.1%
835	55.2	0.97	9.88	9.88	9.88	0.19	1.32	±12.1%
900	55.0	1.05	9.82	9.82	9.82	0.23	1.15	±12.1%
1750	53.4	1.49	8.24	8.24	8.24	0.24	1.06	±12.1%
1900	53.3	1.52	7.97	7.97	7.97	0.19	1.24	±12.1%
2100	53.2	1.62	8.18	8.18	8.18	0.19	1.39	±12.1%
2300	52.9	1.81	7.88	7.88	7.88	0.55	0.80	±12.1%
2450	52.7	1.95	7.53	7.53	7.53	0.46	0.89	±12.1%
2600	52.5	2.16	7.38	7.38	7.38	0.52	0.80	±12.1%
5250	48.9	5.36	4.93	4.93	4.93	0.45	1.80	±13.3%
5600	48.5	5.77	4.19	4.19	4.19	0.48	1.90	±13.3%
5750	48.3	5.94	4.52	4.52	4.52	0.48	1.95	±13.3%

^C Frequency validity above 300 MHz of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

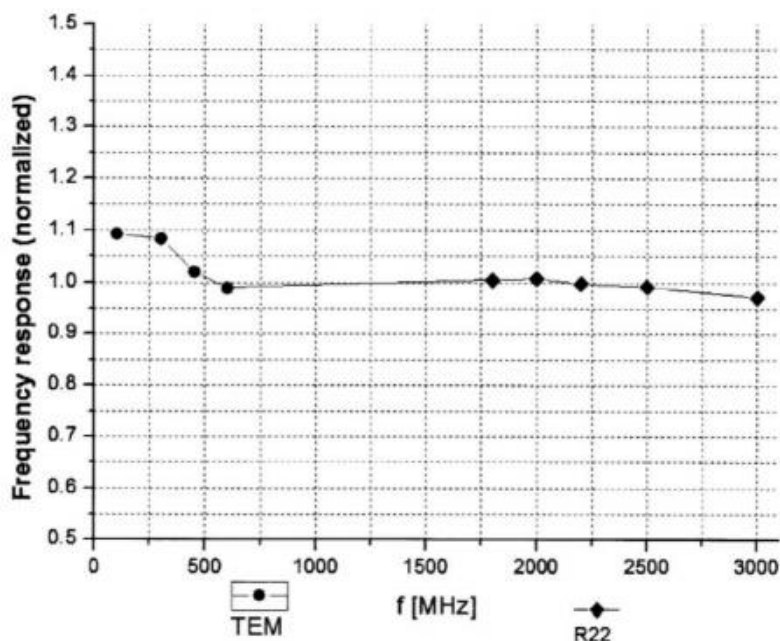
^F At frequency below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

^G Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

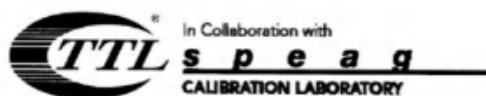


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Frequency Response of E-Field (TEM-Cell: ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: $\pm 7.4\%$ (k=2)

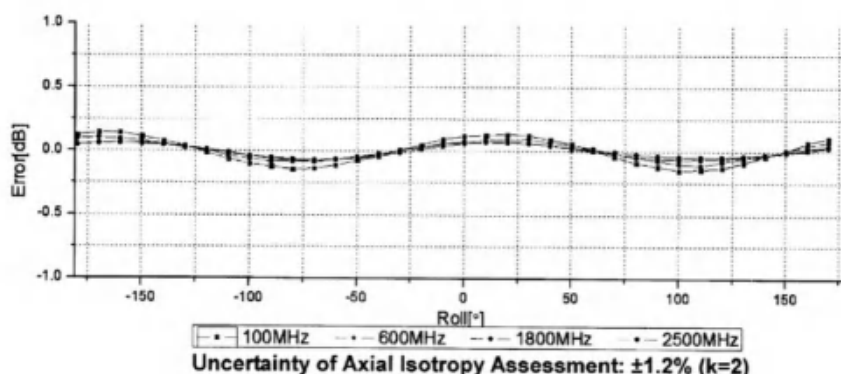
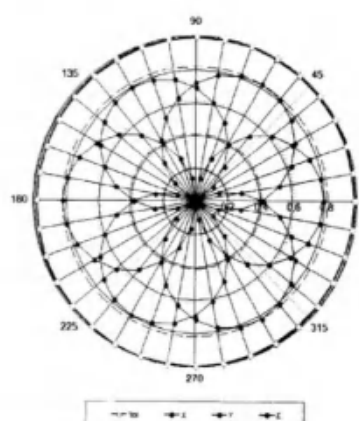
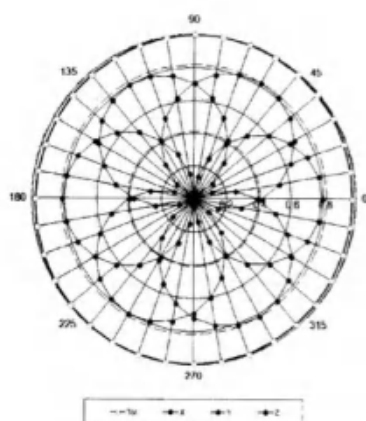


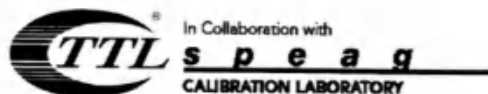
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E-mail: cttl@chinattl.com <http://www.chinattl.cn>

Receiving Pattern (Φ), $\theta=0^\circ$

f=600 MHz, TEM

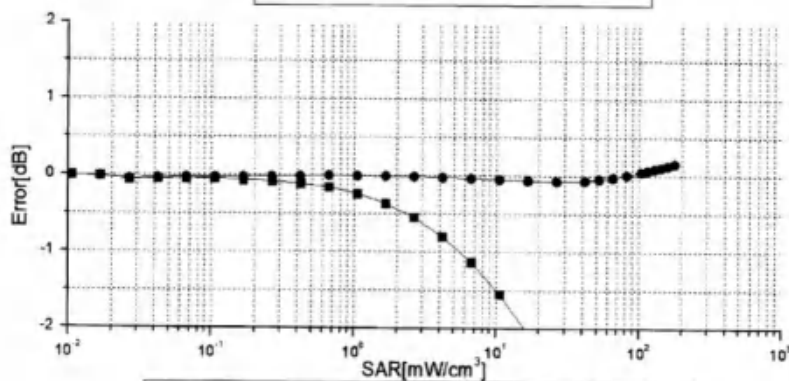
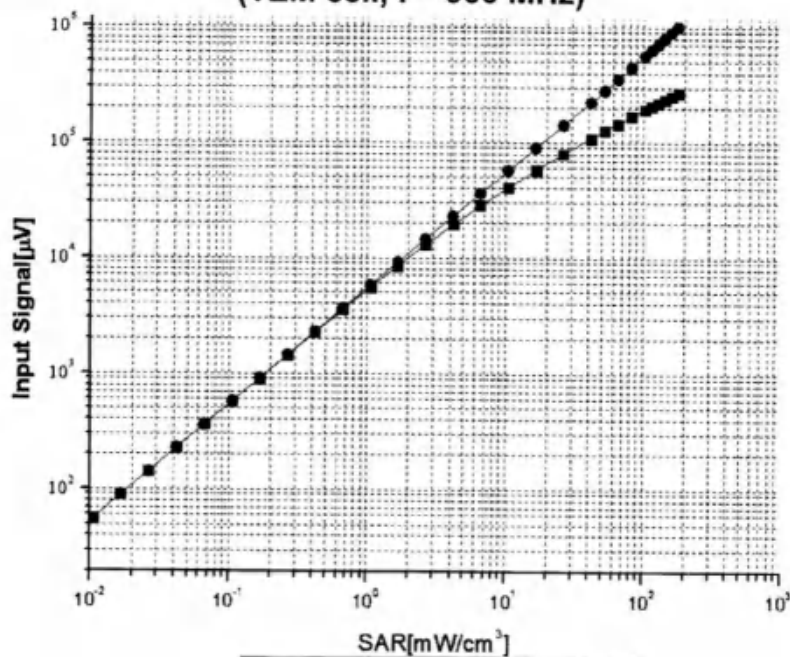
f=1800 MHz, R22





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Dynamic Range f(SAR_{head}) (TEM cell, f = 900 MHz)



Uncertainty of Linearity Assessment: $\pm 0.9\%$ ($k=2$)

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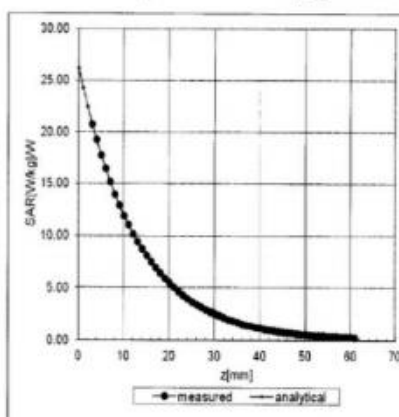
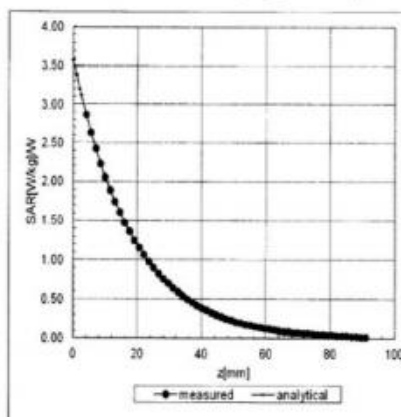


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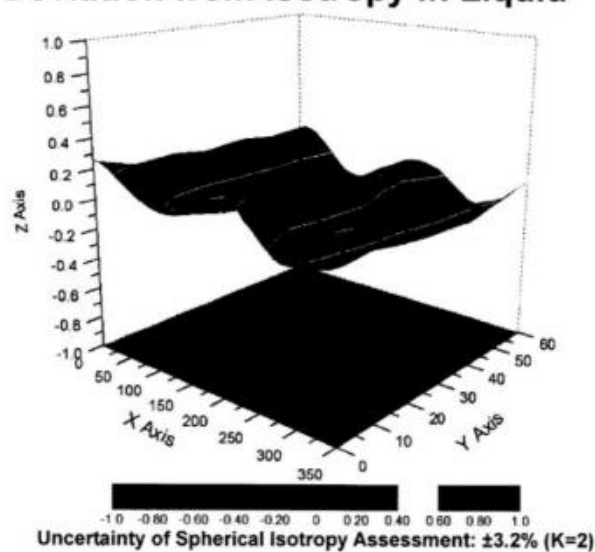
Conversion Factor Assessment

f=900 MHz, WGLS R9(H_convF)

f=1750 MHz, WGLS R22(H_convF)

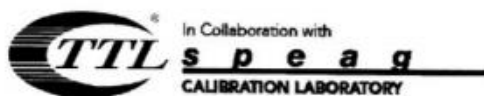


Deviation from Isotropy in Liquid



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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 7396**Other Probe Parameters**

Sensor Arrangement	Triangular
Connector Angle (°)	156.9
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disable
Probe Overall Length	337mm
Probe Body Diameter	10mm
Tip Length	9mm
Tip Diameter	2.5mm
Probe Tip to Sensor X Calibration Point	1mm
Probe Tip to Sensor Y Calibration Point	1mm
Probe Tip to Sensor Z Calibration Point	1mm
Recommended Measurement Distance from Surface	1.4mm

*******END OF REPORT*********Shenzhen Anbotek Compliance Laboratory Limited**

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