FCC SAR Test Report

APPLICANT	:	ZTE CORPORATION
EQUIPMENT	:	USB Modem
BRAND NAME	:	ZTE
MODEL NAME	:	MF833CA
FCC ID	:	SRQ-MF833CA
STANDARD	:	FCC 47 CFR Part 2 (2.1093) ANSI/IEEE C95.1-1992 IEEE 1528-2013

The product was received on Oct. 21, 2019 and testing was started from Oct. 31, 2019 and completed on Nov. 04, 2019. We, Sporton International (Kunshan) Inc., would like to declare that the tested sample has been evaluated in accordance with the procedures and had been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.

Rose Wang

Reviewed by: Rose Wang / Supervisor

Kat Yin

Approved by: Kat Yin / Manager

ACCREDITED Cert #5145.02

Sporton International (Kunshan) Inc.
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China

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History of this test report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA9O2111	Rev. 01	Initial issue of report	Nov. 13, 2019

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **ZTE CORPORATION, USB Modem, MF833CA,** are as follows.

Highest 1g SAR Summary			
Equipment Class	Frequency Band		Body 1g SAR (W/kg)
Licensed	GSM	GSM850	**1.17**
		GSM1900	1.08
	WCDMA	Band V	0.91
		Band IV	1.03
		Band II	1.13
	LTE	Band 12	0.83
		Band 5	1.06
		Band 4	1.01
		Band 2	1.06
		Band 7	1.07
Date of Testing:			2019/10/31 ~ 2019/11/4

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg for Partial-Body 1g SAR) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications.

2. Administration Data

Sporton International (Kunshan) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Testing Laboratory		
Test Firm	Sporton International (Kunshan) Inc.	
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958	
Test Site No.	FCC Designation No.	FCC Test Firm Registration No.
	CN1257	314309

Applicant	
Company Name	ZTE CORPORATION
Address	ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R. China

Manufacturer	
Company Name	ZTE CORPORATION
Address	ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R. China

3. Guidance Applied

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

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2013
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB 865664 D02 SAR Reporting v01r02
- FCC KDB 447498 D01 General RF Exposure Guidance v06
- FCC KDB 447498 D02 SAR Procedures for Dongle Xmtr v02r01
- FCC KDB 941225 D01 3G SAR Procedures v03r01
- FCC KDB 941225 D05 SAR for LTE Devices v02r05

4. Equipment Under Test (EUT) Information

4.1 General Information

Product Feature & Specification	
Equipment Name	USB Modem
Brand Name	ZTE
Model Name	MF833CA
FCC ID	SRQ-MF833CA
IMEI Code	867156040000657
Wireless Technology and Frequency Range	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz WCDMA Band IV: 1712.4 MHz ~ 1752.6 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz LTE Band 2: 1850.7 MHz ~ 1909.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 7: 2502.5 MHz ~ 2567.5 MHz LTE Band 12: 699.7 MHz ~ 715.3 MHz
Mode	GPRS/EGPRS RMC 12.2Kbps HSDPA HSUPA HSPA+ (16QAM uplink is not supported) LTE: QPSK, 16QAM
HW Version	MF833CAHW1.0
SW Version	MF833CAV1.0
EUT Stage	Identical Prototype
Remark: 1. This device does not support DTM operation and support GRPS mode up to multi-slot class 10 and EGRPS mode up to multi-slot class 12. 2. The device employs proximity sensor that detect the presence of the user's body also a finger or hand at the Horizontal Down or Up faces, Vertical Back or Front faces of the device. When Horizontal Down or Up faces, Vertical Back or Front faces of body condition is detected, GSM1900, WCDMA band 2/4, LTE band 2/4 reduced power will be active.	

4.2 General LTE SAR Test and Reporting Considerations

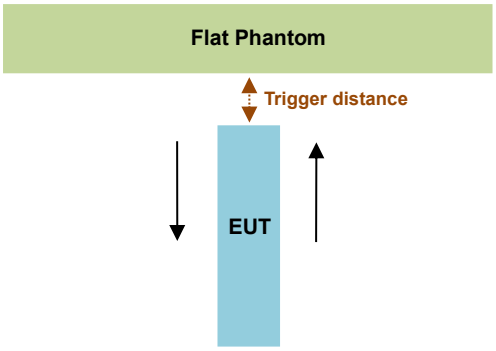
<table>
<tr><th colspan="2">Summarized necessary items addressed in KDB 941225 D05 v02r05</th></tr>
<tr><td>FCC ID</td><td>SRQ-MF833CA</td></tr>
<tr><td>Equipment Name</td><td>USB Modem</td></tr>
<tr><td>Operating Frequency Range of each LTE transmission band</td><td>LTE Band 2: 1850.7 MHz ~ 1909.3 MHz
LTE Band 4: 1710.7 MHz ~ 1754.3 MHz
LTE Band 5: 824.7 MHz ~ 848.3 MHz
LTE Band 7: 2502.5 MHz ~ 2567.5 MHz
LTE Band 12: 699.7 MHz ~ 715.3 MHz</td></tr>
<tr><td>Channel Bandwidth</td><td>LTE Band 2:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 4:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 5:1.4MHz, 3MHz, 5MHz, 10MHz
LTE Band 7: 5MHz, 10MHz, 15MHz, 20MHz
LTE Band 12:1.4MHz, 3MHz, 5MHz, 10MHz</td></tr>
<tr><td>uplink modulations used</td><td>QPSK / 16QAM</td></tr>
<tr><td>LTE Voice / Data requirements</td><td>Data only</td></tr>
<tr><td>LTE Release Version</td><td>R9, Cat4</td></tr>
<tr><td>CA Support</td><td>Not Supported</td></tr>
<tr><td>LTE MPR permanently built-in by design</td><td>
Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3
<table>
<tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth (N_{RB})</th><th rowspan="2">MPR (dB)</th></tr>
<tr><th>1.4 MHz</th><th>3.0 MHz</th><th>5 MHz</th><th>10 MHz</th><th>15 MHz</th><th>20 MHz</th></tr>
<tr><td>QPSK</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 2</td></tr>
<tr><td>64 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 2</td></tr>
<tr><td>64 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 3</td></tr>
<tr><td>256 QAM</td><td colspan="6">≥ 1</td><td>≤ 5</td></tr>
</table>
</td></tr>
<tr><td>LTE A-MPR</td><td>In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing and the LTE SAR tests was transmitting on all TTI frames (Maximum TTI)</td></tr>
<tr><td>Spectrum plots for RB configuration</td><td>A properly configured base station simulator was used for the SAR and power measurement; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.</td></tr>
<tr><td>Power reduction applied to satisfy SAR compliance</td><td>Yes, Proximity Sensor. Power reduction will be active at LTE band 2/4.</td></tr>
</table>

Transmission (H, M, L) channel numbers and frequencies in each LTE band												
LTE Band 2												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	18607	1850.7	18615	1851.5	18625	1852.5	18650	1855	18675	1857.5	18700	1860
M	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880
H	19193	1909.3	19185	1908.5	19175	1907.5	19150	1905	19125	1902.5	19100	1900
LTE Band 4												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	19957	1710.7	19965	1711.5	19975	1712.5	20000	1715	20025	1717.5	20050	1720
M	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5
H	20393	1754.3	20385	1753.5	20375	1752.5	20350	1750	20325	1747.5	20300	1745
LTE Band 5								
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20407	824.7	20415	825.5	20425	826.5	20450	829
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5
H	20643	848.3	20635	847.5	20625	846.5	20600	844
LTE Band 7								
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20775	2502.5	20800	2505	20825	2507.5	20850	2510
M	21100	2535	21100	2535	21100	2535	21100	2535
H	21425	2567.5	21400	2565	21375	2562.5	21350	2560
LTE Band 12								
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	23017	699.7	23025	700.5	23035	701.5	23060	704
M	23095	707.5	23095	707.5	23095	707.5	23095	707.5
H	23173	715.3	23165	714.5	23155	713.5	23130	711

5. Proximity Sensor Triggering Test

<Proximity Sensor Triggering Distance (KDB 616217 D04 section 6.2)>:

1. Proximity sensor triggering distance testing was performed according to the procedures outlined in KDB 616217 D04 section 6.2, and EUT moving further away from the flat phantom and EUT moving toward the flat phantom were both assessed and the tissue-equivalent medium for highest frequency (WWAN 1900MHz) and lowest (WWAN 1750MHz) frequency was used for proximity sensor triggering testing.
2. Capacitive proximity sensor placed coincident with WWAN antenna, utilized to trigger reduced power when the device comes in proximity of the user's body at the Horizontal Up or Down, Vertical Front or Back of the device.
3. There is no need to do sensor coverage testing for the proximity sensor is designed to support sufficient detection range and sensitivity to cover regions of the sensors in all applicable directions since the proximity sensor entirely covers the antenna.
4. When the sensor is active, power reduction will be active at GSM1900, WCDMA band 2/4, LTE band 2/4.
5. The sensors used to detect the proximity of the user's body and device use a detection threshold distance. The data shown in the sections below shows the distance(s).



<WWAN Frequency Bands>

Proximity Sensor Triggering Distance (mm)								
Position	Horizontal Up		Horizontal Down		Vertical Front		Vertical Back	
	Moving towards	Moving away	Moving towards	Moving away	Moving towards	Moving away	Moving towards	Moving away
Minimum	18	18	16	16	11	11	16	16

Proximity sensor power reduction

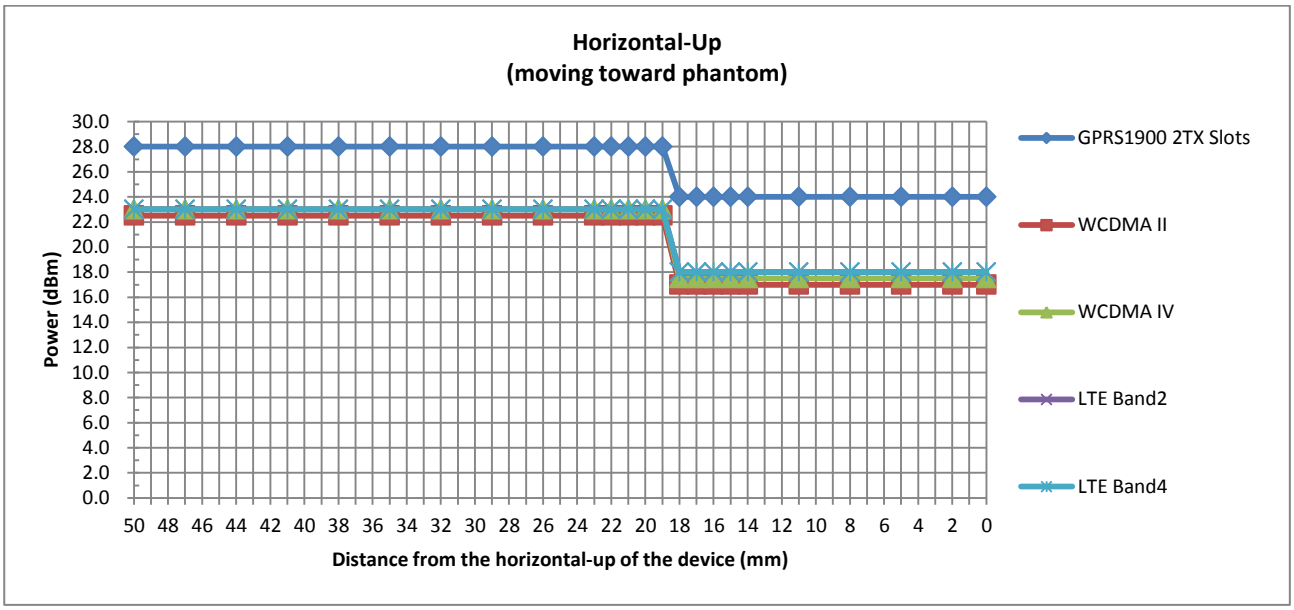
Exposure Position / wireless mode	Horizontal Up & Down	Vertical Front & Back
GPRS1900 2 Tx slots	4.0 dB	4.0 dB
WCDMA II	5.5 dB	5.5 dB
WCDMA IV	5.5 dB	5.5 dB
LTE Band2	5.0 dB	5.0 dB
LTE Band4	5.0 dB	5.0 dB

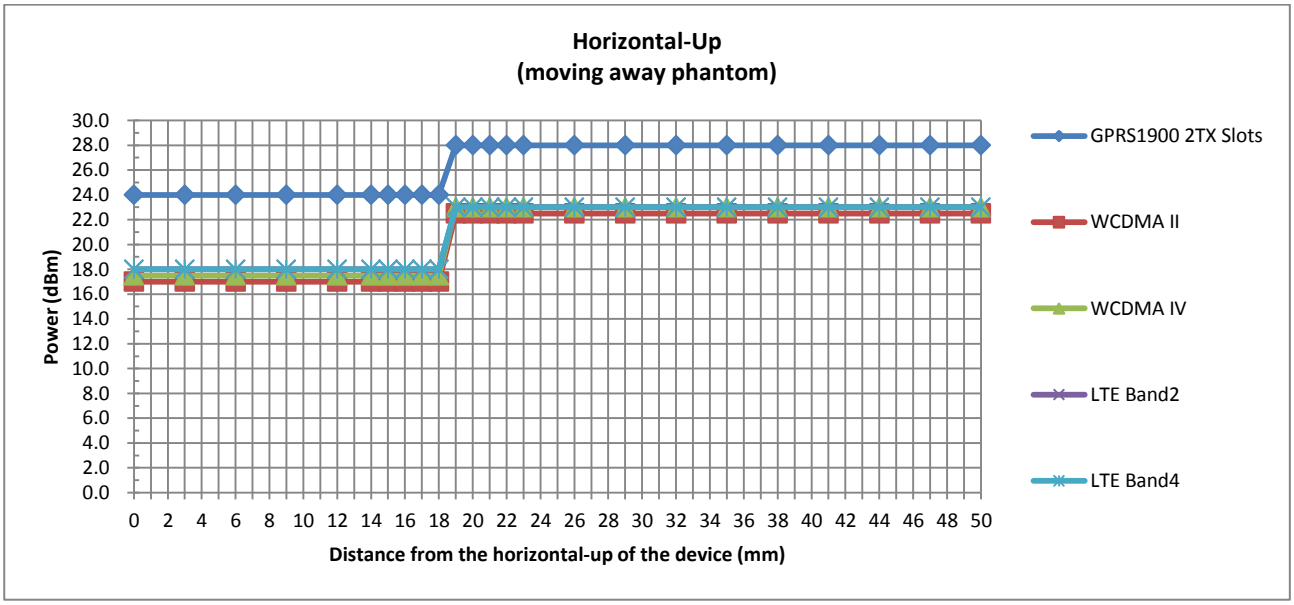
Remark:

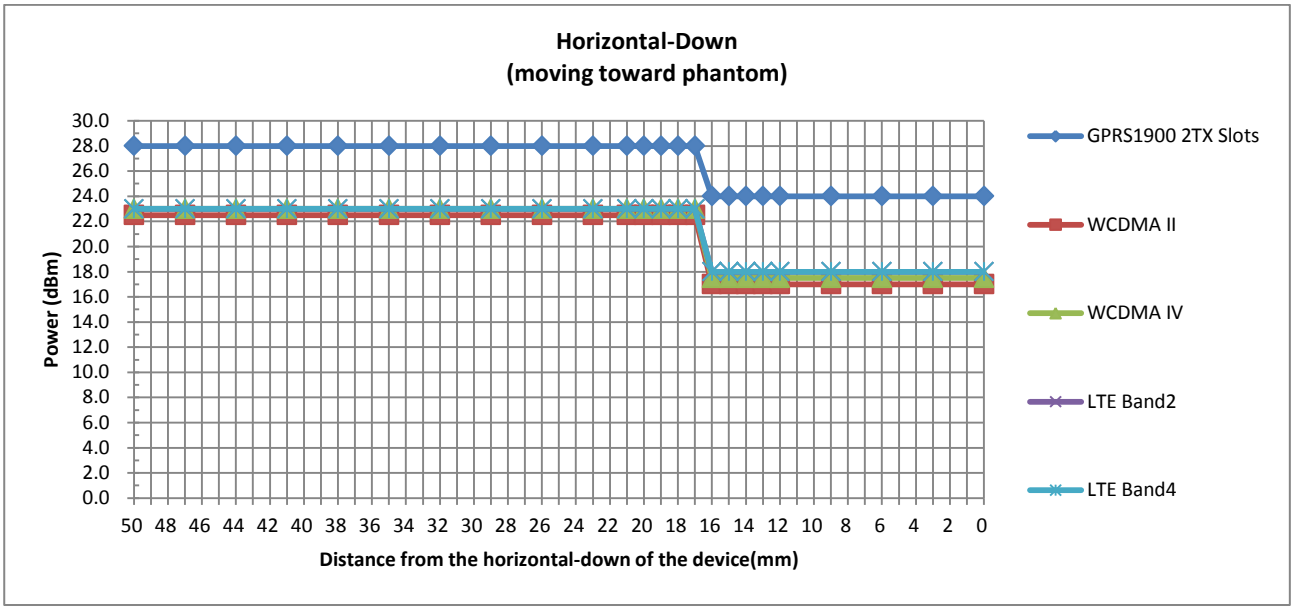
1. Tests were performed in accordance with KDB 616217 D04 section 6.2 and compliant results are shown and described in exhibit “P-Sensor operational description
2. For verification of compliance of power reduction scheme, additional SAR testing with EUT transmitting at full RF power at a conservative trigger distance was performed:
   - Horizontal Up: 17 mm
   - Horizontal Down & Vertical Back: 15 mm
   - Vertical Front: 10 mm

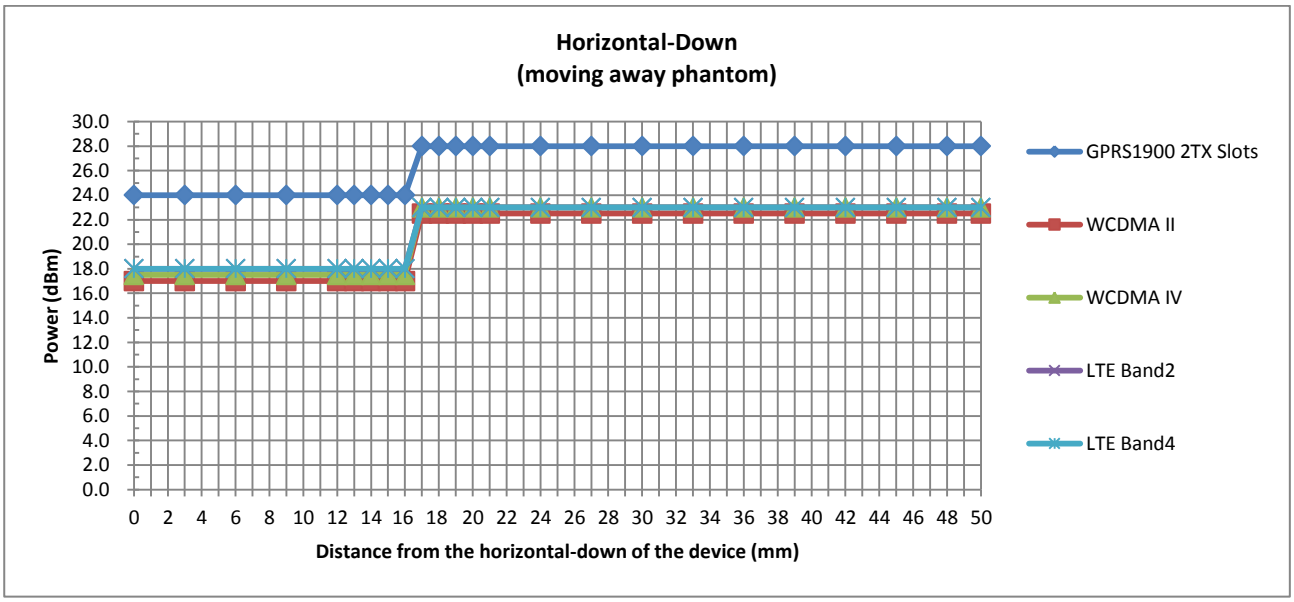
Power Measurement during Sensor Trigger distance testing

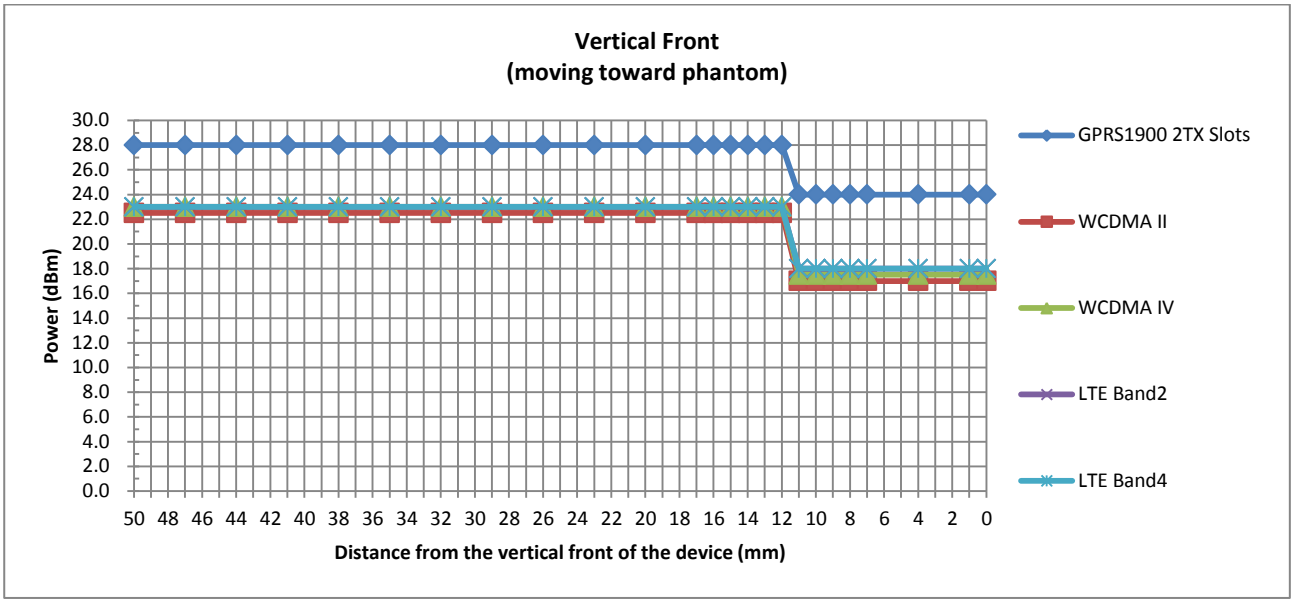
Band/Mode	Ch #	Measured power reduction (dBm)		Reduction Levels
		w/o power back-off	w/ power back-off	(dB)
GSM1900 GPRS 2Tx slots	661	27.24	23.96	3.28
WCDMA Band II (RMC 12.2Kbps)	9400	21.68	16.79	4.89
WCDMA Band IV (RMC 12.2Kbps)	1413	21.48	16.86	4.62
LTE Band 2 20MHz 1RB 0offset	18900	22.30	17.96	4.34
LTE Band 4 20MHz 1RB 0offset	20050	22.31	17.92	4.39

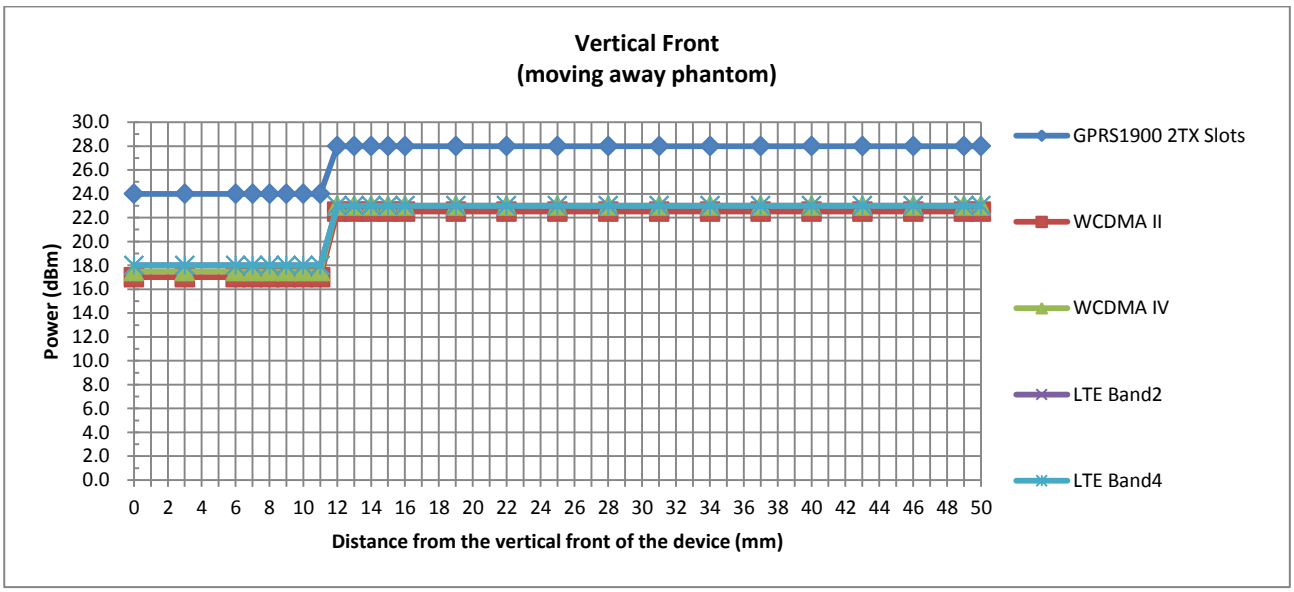

Horizontal-Up
(moving toward phantom)
Power (dBm)
30.0
28.0
26.0
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
50 48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 8 6 4 2 0
Distance from the horizontal-up of the device (mm)
GPRS1900 2TX Slots
WCDMA II
WCDMA IV
LTE Band2
LTE Band4

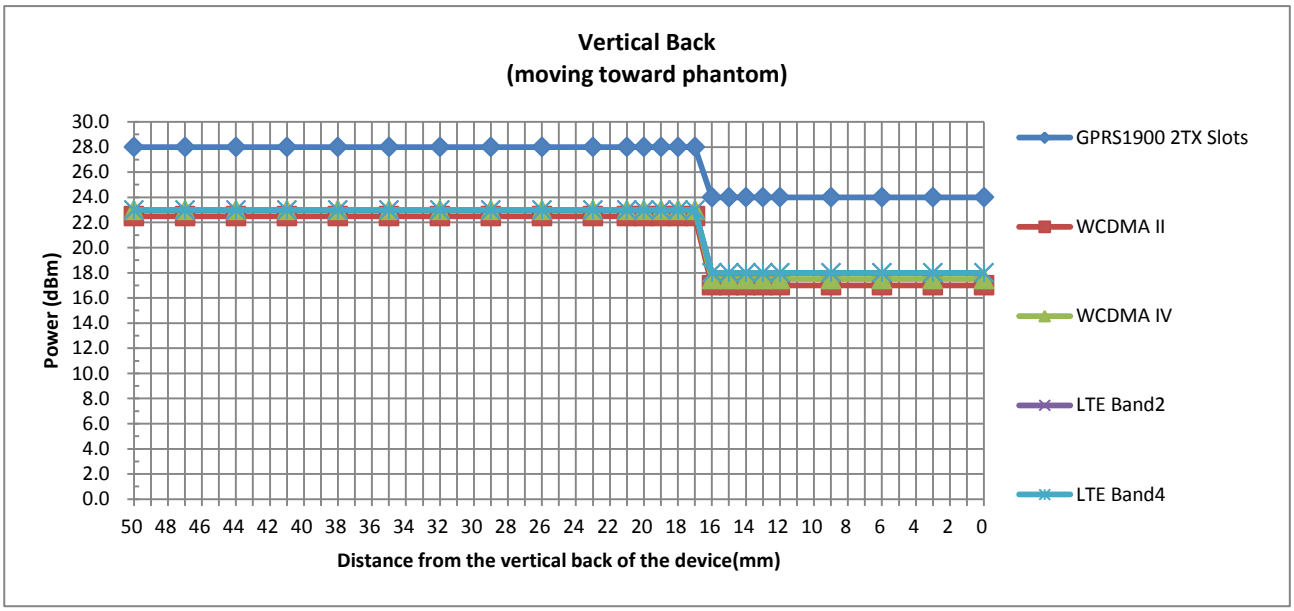

Horizontal-Up
(moving away phantom)
Power (dBm)
30.0
28.0
26.0
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50
Distance from the horizontal-up of the device (mm)
GPRS1900 2TX Slots
WCDMA II
WCDMA IV
LTE Band2
LTE Band4

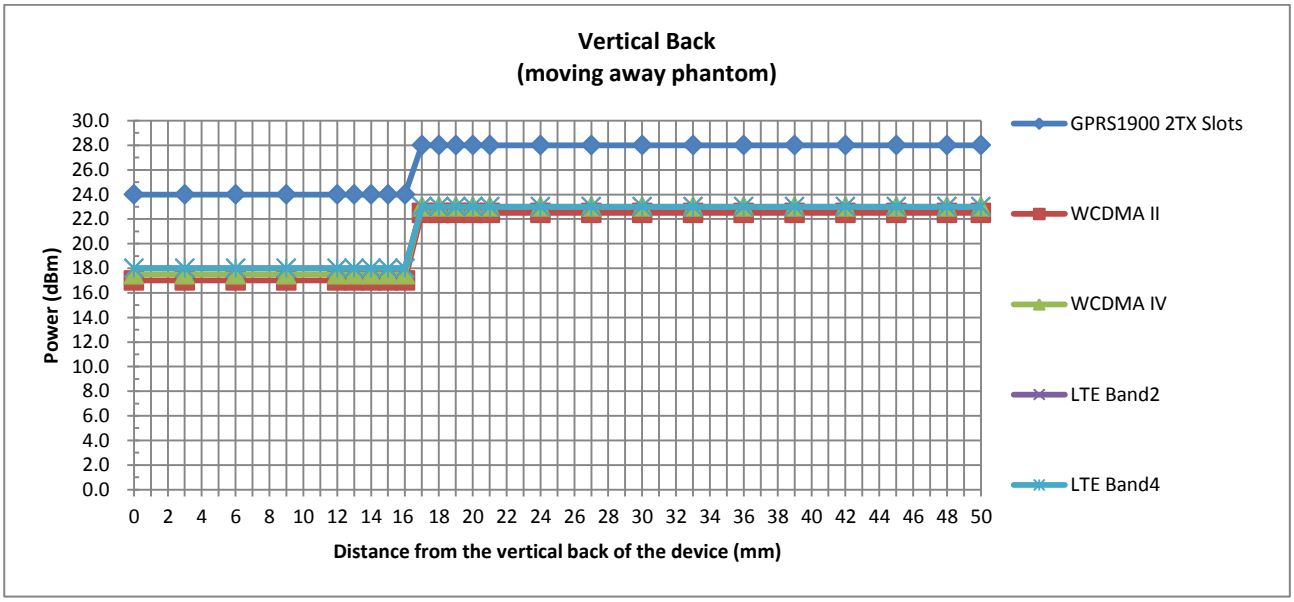

Horizontal-Down
(moving toward phantom)
Power (dBm)
30.0
28.0
26.0
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
50 48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 8 6 4 2 0
Distance from the horizontal-down of the device(mm)
GPRS1900 2TX Slots
WCDMA II
WCDMA IV
LTE Band2
LTE Band4


Horizontal-Down
(moving away phantom)
Power (dBm)
30.0
28.0
26.0
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50
Distance from the horizontal-down of the device (mm)
GPRS1900 2TX Slots
WCDMA II
WCDMA IV
LTE Band2
LTE Band4


Vertical Front
(moving toward phantom)
Power (dBm)
30.0
28.0
26.0
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
50 48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 8 6 4 2 0
Distance from the vertical front of the device (mm)
GPRS1900 2TX Slots
WCDMA II
WCDMA IV
LTE Band2
LTE Band4


Vertical Front
(moving away phantom)
Power (dBm)
30.0
28.0
26.0
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50
Distance from the vertical front of the device (mm)
GPRS1900 2TX Slots
WCDMA II
WCDMA IV
LTE Band2
LTE Band4


Vertical Back
(moving toward phantom)
Power (dBm)
30.0
28.0
26.0
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
50 48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 8 6 4 2 0
Distance from the vertical back of the device(mm)
GPRS1900 2TX Slots
WCDMA II
WCDMA IV
LTE Band2
LTE Band4


Vertical Back
(moving away phantom)
Power (dBm)
30.0
28.0
26.0
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50
Distance from the vertical back of the device (mm)
GPRS1900 2TX Slots
WCDMA II
WCDMA IV
LTE Band2
LTE Band4

6. RF Exposure Limits

6.1 Uncontrolled Environment

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

6.2 Controlled Environment

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. The exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	20.0

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

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

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

7. Specific Absorption Rate (SAR)

7.1 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.

7.2 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:

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

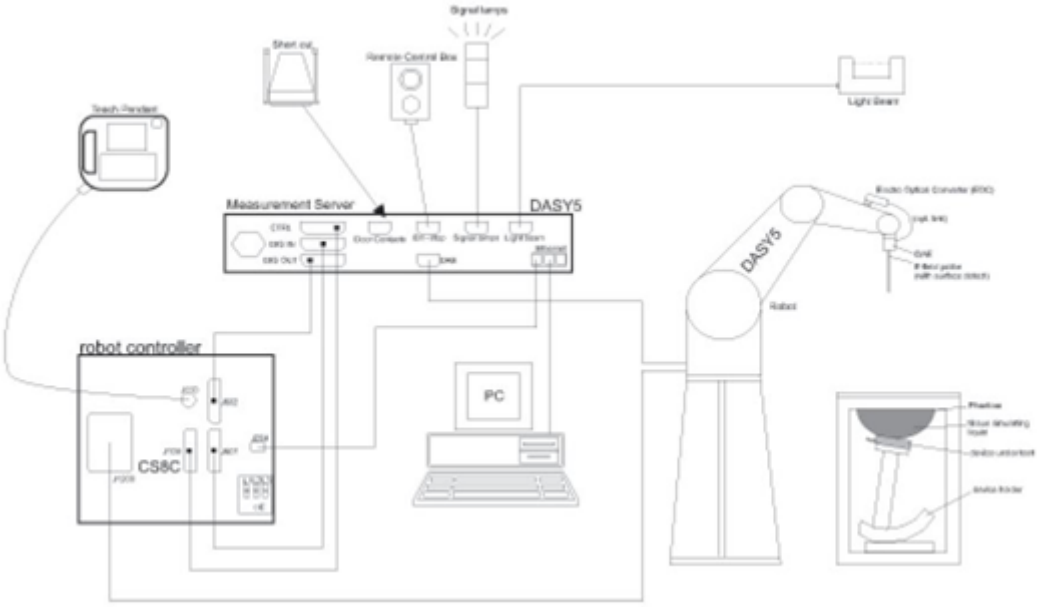
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

8. System Description and Setup

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



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP or Win7 and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

8.1 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.

<EX3DV4 Probe>

Construction	Symmetric design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Frequency	10 MHz – >6 GHz Linearity: ±0.2 dB (30 MHz – 6 GHz)
Directivity	±0.3 dB in TSL (rotation around probe axis) ±0.5 dB in TSL (rotation normal to probe axis)
Dynamic Range	10 µW/g – >100 mW/g Linearity: ±0.2 dB (noise: typically <1 µW/g)
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 2.5 mm (body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm

8.2 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.

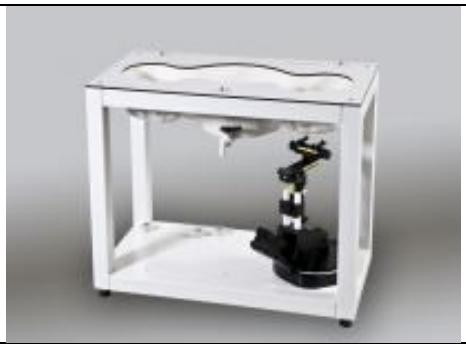
The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Photo of DAE

8.3 Phantom

<SAM Twin Phantom>

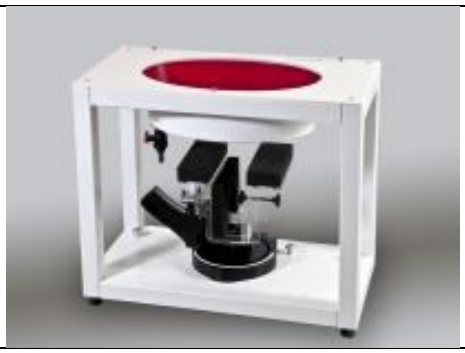
Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet
Measurement Areas	Left Hand, Right Hand, Flat Phantom



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.

<ELI Phantom>

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



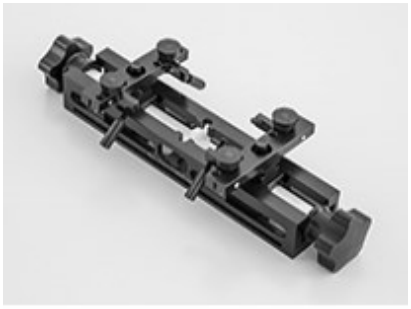
The ELI phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with standard and all known tissue simulating liquids.

8.4 Device Holder

<Mounting Device for Hand-Held Transmitter>

In combination with the Twin SAM V5.0/V5.0c or ELI phantoms, the Mounting Device for Hand-Held Transmitters enables rotation of the mounted transmitter device to specified spherical coordinates. At the heads, the rotation axis is at the ear opening. Transmitter devices can be easily and accurately positioned according to IEC 62209-1, IEEE 1528, FCC, or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat). And upgrade kit to Mounting Device to enable easy mounting of wider devices like big smart-phones, e-books, small tablets, etc. It holds devices with width up to 140 mm.

Mounting Device for Hand-Held Transmitters



Mounting Device Adaptor for Wide-Phones

<Mounting Device for Laptops and other Body-Worn Transmitters>

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

Mounting Device for Laptops

9. Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

(a) For WWAN power measurement, use base station simulator to configure EUT WWAN transmission in conducted connection with RF cable, at maximum power in each supported wireless interface and frequency band.
(b) Read the WWAN RF power level from the base station simulator.
(c) For WLAN/BT power measurement, use engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power in each supported wireless interface and frequency band
(d) Connect EUT RF port through RF cable to the power meter, and measure WLAN/BT output power

<SAR measurement>

(a) Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power, in the highest power channel.
(b) Place the EUT in the positions as Appendix D demonstrates.
(c) Set scan area, grid size and other setting on the DASY software.
(d) Measure SAR results for the highest power channel on each testing position.
(e) Find out the largest SAR result on these testing positions of each band
(f) Measure SAR results for other channels in worst SAR testing position if the reported SAR of highest power channel is larger than 0.8 W/kg

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 form 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 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

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 dB0 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 D01v01r04 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	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

9.4 Zoom Scan

Zoom scans are used assess the peak spatial SAR values within a cubic averaging volume containing 1 gram and 10 gram of simulated tissue. The zoom scan measures points (refer to table below) within a cube shoes 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 D01v01r04 SAR measurement 100 MHz to 6 GHz.

			≤ 3 GHz	> 3 GHz
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{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: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
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 *reported* SAR from the *area scan based 1-g SAR estimation* 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 drifts more than 5%, the SAR will be retested.

10. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	1087	2019/3/27	2020/3/26
SPEAG	835MHz System Validation Kit	D835V2	4d151	2019/3/27	2020/3/26
SPEAG	1750MHz System Validation Kit	D1750V2	1090	2019/3/27	2020/3/26
SPEAG	1900MHz System Validation Kit	D1900V2	5d170	2019/3/26	2020/3/25
SPEAG	2600MHz System Validation Kit	D2600V2	1061	2018/12/7	2019/12/6
SPEAG	Data Acquisition Electronics	DAE4	690	2019/1/23	2020/1/22
SPEAG	Dosimetric E-Field Probe	EX3DV4	3843	2019/9/26	2020/9/25
SPEAG	SAM Twin Phantom	QD 000 P40 CB	TP-1503	NCR	NCR
SPEAG	SAM Twin Phantom	QD 000 P40 CB	TP-1697	NCR	NCR
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
Anritsu	Radio Communication Analyzer	MT8821C	6201432831	2019/4/17	2020/4/16
Agilent	Wireless Communication Test Set	E5515C	MY52102706	2019/4/17	2020/4/16
Agilent	ENA Series Network Analyzer	E5071C	MY46111157	2019/4/17	2020/4/16
SPEAG	Dielectric Probe Kit	DAK-3.5	1138	2018/11/20	2019/11/19
Anritsu	Vector Signal Generator	MG3710A	6201682672	2019/1/14	2020/1/13
Rohde & Schwarz	Power Meter	NRVD	102081	2019/8/15	2020/8/14
Rohde & Schwarz	Power Sensor	NRV-Z5	100538	2019/8/14	2020/8/13
Rohde & Schwarz	Power Sensor	NRV-Z5	100539	2019/8/14	2020/8/13
R&S	CBT BLUETOOTH TESTER	CBT	101641	2019/1/14	2020/1/13
EXA	Spectrum Analyzer	FSV7	101631	2019/1/14	2020/1/13
Testo	Hygrometer	608-H1	1241332088	2019/1/11	2020/1/10
FLUKE	DIGITAC THERMOMETER	51II	97240029	2019/8/15	2020/8/14
ARRA	Power Divider	A3200-2	N/A	Note	
MCL	Attenuation1	BW-S10W5+	N/A	Note	
MCL	Attenuation2	BW-S10W5+	N/A	Note	
MCL	Attenuation3	BW-S10W5+	N/A	Note	
BONN	POWER AMPLIFIER	BLMA 0830-3	087193A	Note	
BONN	POWER AMPLIFIER	BLMA 2060-2	087193B	Note	
Agilent	Dual Directional Coupler	778D	20500	Note	
Agilent	Dual Directional Coupler	11691D	MY48151020	Note	

Note: Prior to system verification and validation, the path loss from the signal generator to the system check source and the power meter, which includes the amplifier, cable, attenuator and directional coupler, was measured by the network analyzer. The reading of the power meter was offset by the path loss difference between the path to the power meter and the path to the system check source to monitor the actual power level fed to the system check source.

11. System Verification

11.1 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 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 in Fig. 11.1

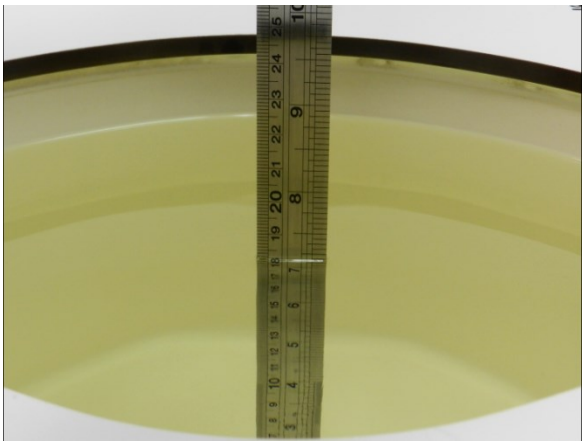


Fig 11.1Photo of Liquid Height for Body SAR

11.2 Tissue Verification

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (εr)
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
1800, 1900	55.2	0	0	0.3	0	44.5	1.40	40.0
2600	54.8	0	0	0.1	0	45.1	1.96	39.0

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Tissue Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
750	Head	22.8	0.895	41.699	0.89	41.90	0.56	-0.48	±5	2019/11/3
835	Head	22.7	0.929	42.242	0.90	41.50	3.22	1.79	±5	2019/11/1
1750	Head	22.7	1.382	39.700	1.37	40.10	0.88	-1.00	±5	2019/10/31
1900	Head	22.6	1.397	39.035	1.40	40.00	-0.21	-2.41	±5	2019/11/2
2600	Head	22.9	2.027	37.857	1.96	39.00	3.42	-2.93	±5	2019/11/4

11.3 System Performance Check Results

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

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)
2019/11/3	750	Head	250	1087	3843	690	2.16	8.36	8.64	3.35
2019/11/1	835	Head	250	4d151	3843	690	2.52	9.30	10.08	8.39
2019/10/31	1750	Head	250	1090	3843	690	9.32	36.40	37.28	2.42
2019/11/2	1900	Head	250	5d170	3843	690	9.92	39.00	39.68	1.74
2019/11/4	2600	Head	250	1061	3843	690	14.00	57.70	56	-2.95

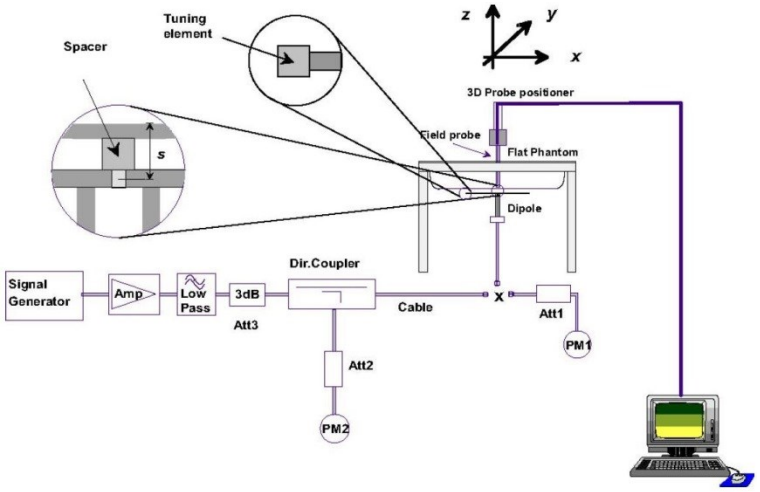


Fig 11.3.1 System Performance Check Setup

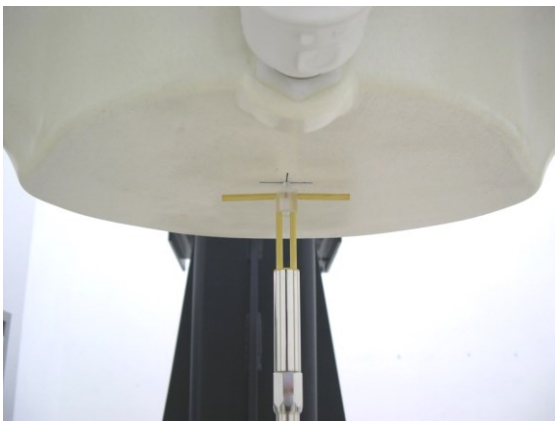


Fig 11.3.2 Setup Photo

12. RF Exposure Positions

This EUT was tested in four different USB configurations. They are “direct laptop plug-in for configuration 1 and 3”, “USB cable plug-in for configuration 2 and 4”, and “USB cable plug-in for Tip Mode (the tip of the EUT)” shown as below. Both direct laptop plug-in and USB cable plug-in test configurations are tested with 5 cm separation between the particular dongle orientation and the flat phantom. Please refer to Appendix D for the test setup photos.

12.1 SAR Testing for USB Dongle

Test all USB orientations [see figure below: (A) Horizontal-Up, (B) Horizontal-Down, (C) Vertical-Front, and (D) Vertical-Back] with a device-to-phantom separation distance of 5 mm or less, according to KDB Publication 447498 D02 requirements. These test orientations are intended for the exposure conditions found in typical laptop/notebook/netbook or tablet computers with either horizontal or vertical USB connector configurations at various locations in the keyboard section of the computer. Current generation portable host computers should be used to establish the required SAR measurement separation distance. The same test separation distance must be used to test all frequency bands and modes in each USB orientation. The typical Horizontal-Up USB connection (A), found in the majority of host computers, must be tested using an appropriate host computer. A host computer with either Vertical-Front (C) or Vertical Back (D) USB connection should be used to test one of the vertical USB orientations. If a suitable host computer is not available for testing the Horizontal-Down (B) or the remaining Vertical USB orientation, a high quality USB cable, 12 inches or less, may be used for testing these other orientations. It must be documented that the USB cable does not influence the radiating characteristics and output power of the transmitter.

			
Configuration 1 (Horizontal Up)	Configuration 2 (Horizontal Down)	Configuration 3 (Vertical Front)	Configuration 4 (Vertical Back)

13. Conducted RF Output Power (Unit: dBm)

<GSM Conducted Power>

General Note:

1. Per KDB 447498 D01v06, the maximum output power channel is used for SAR testing and for further SAR test reduction.
2. Per KDB 941225 D01v03r01, for SAR test reduction for GPRS / EDGE modes is determined by the source-based time-averaged output power including tune-up tolerance. The mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested. Therefore, the GPRS (2Tx slots) for GSM850/ GSM1900 is considered as the primary mode.
3. Other configurations of GPRS / EDGE are considered as secondary modes. The 3G SAR test reduction procedure is applied, when the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode, SAR measurement is not required for the secondary mode.

<Full Power Mode>

GSM850	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
Tx Channel	128	189	251		128	189	251	
Frequency (MHz)	824.2	836.4	848.8		824.2	836.4	848.8	
GPRS 1 Tx slot	32.11	32.14	31.83	33.00	23.11	23.14	22.83	24.00
GPRS 2 Tx slots	29.97	30.00	29.93	31.00	23.97	24.00	23.93	**25.00**
EDGE 1 Tx slot	25.79	25.81	25.88	27.00	16.79	16.81	16.88	18.00
EDGE 2 Tx slots	25.69	25.69	25.78	27.00	19.69	19.69	19.78	21.00
EDGE 3 Tx slots	24.06	24.10	24.19	25.00	19.80	19.84	19.93	20.74
EDGE 4 Tx slots	22.46	22.51	22.50	24.00	19.46	19.51	19.50	21.00
GSM1900	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
Tx Channel	512	661	810		512	661	810	
Frequency (MHz)	1850.2	1880	1909.8		1850.2	1880	1909.8	
GPRS 1 Tx slot	29.16	29.11	29.01	30.00	20.16	20.11	20.01	21.00
GPRS 2 Tx slots	27.16	27.24	27.12	28.00	21.16	21.24	21.12	**22.00**
EDGE 1 Tx slot	25.68	25.67	25.77	27.00	16.68	16.67	16.77	18.00
EDGE 2 Tx slots	24.01	24.07	24.16	25.00	18.01	18.07	18.16	19.00
EDGE 3 Tx slots	22.32	22.37	22.40	23.00	18.06	18.11	18.14	18.74
EDGE 4 Tx slots	20.66	20.71	20.74	22.00	17.66	17.71	17.74	19.00

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 dB
Frame-averaged power = Maximum burst averaged power (2 Tx Slots) - 6 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 dB

<Reduced Power Mode for P-Sensor On>

GSM1900	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
Tx Channel	512	661	810		512	661	810	
Frequency (MHz)	1850.2	1880	1909.8		1850.2	1880	1909.8	
GPRS 1 Tx slot	25.99	26.13	26.81	27.00	16.99	17.13	17.81	18.00
GPRS 2 Tx slots	23.76	23.96	23.91	24.00	17.76	17.96	17.91	**18.00**
EDGE 1 Tx slot	24.57	24.73	24.98	26.00	15.57	15.73	15.98	17.00
EDGE 2 Tx slots	21.98	22.18	22.17	23.00	15.98	16.18	16.17	17.00
EDGE 3 Tx slots	20.27	20.51	20.68	21.00	16.01	16.25	16.42	16.74
EDGE 4 Tx slots	18.47	18.74	18.89	19.00	15.47	15.74	15.89	16.00

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 dB
Frame-averaged power = Maximum burst averaged power (2 Tx Slots) - 6 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 dB

<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} (Note1, 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 Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_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 Δ_{NACK} = 30/15 with β_{hs} = 30/15 * β_c, and Δ_{CQI} = 24/15 with β_{hs} = 24/15 * β_c.

Note 3: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, 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 β_c = 11/15 and β_d = 15/15.

Setup Configuration

HSUPA Setup Configuration:

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

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

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (Note 4) (Note 5)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2) (Note 6)	AG Index (Note 5)	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_{ed}1: 47/15 β_{ed}2: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	0	-	-	5/15	5/15	47/15	4	1	1.0	0.0	12	67

Note 1: For sub-test 1 to 4, Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c. For sub-test 5, Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 5/15 with β_{hs} = 5/15 * β_c.

Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.

Note 4: 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 5: β_{ed} can not be set directly; it is set by Absolute Grant Value.

Note 6: For subtests 2, 3 and 4, UE may perform E-DPDCH power scaling at max power which could results in slightly smaller MPR values.

Setup Configuration

<WCDMA Conducted Power>

General Note:

1. Per KDB 941225 D01v03r01, for SAR testing is measured using a 12.2 kbps RMC with TPC bits configured to all "1's".
2. Per KDB 941225 D01v03r01, RMC 12.2kbps setting is used to evaluate SAR. The maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA, and according to the following RF output power, the output power results of the secondary modes (HSUPA, HSDPA) are less than ¼ dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA.

<Full Power Mode>

Band		WCDMA II			Tune-up Limit (dBm)	WCDMA IV			Tune-up Limit (dBm)	WCDMA V			Tune-up Limit (dBm)
TX Channel		9262	9400	9538		1312	1413	1513		4132	4182	4233	
Rx Channel		9662	9800	9938		1537	1638	1738		4357	4407	4458	
Frequency (MHz)		1852.4	1880	1907.6		1712.4	1732.6	1752.6		826.4	836.4	846.6	
3GPP Rel 99	RMC 12.2Kbps	21.39	**21.68**	21.66	22.50	21.37	**21.48**	21.35	23.00	21.93	**21.98**	21.94	23.00
3GPP Rel 6	HSDPA Subtest-1	20.36	20.68	20.70	21.50	20.67	20.57	20.72	22.00	21.14	21.13	21.18	22.00
3GPP Rel 6	HSDPA Subtest-2	20.43	20.74	20.84	21.50	20.71	20.60	20.70	22.00	20.78	21.18	21.08	22.00
3GPP Rel 6	HSDPA Subtest-3	19.91	20.24	20.36	21.00	20.22	20.11	20.22	21.50	20.57	20.69	20.60	21.50
3GPP Rel 6	HSDPA Subtest-4	19.98	20.23	20.35	21.00	20.22	20.11	20.22	21.50	20.56	20.68	20.59	21.50
3GPP Rel 6	HSUPA Subtest-1	20.10	20.49	20.38	21.50	20.37	20.23	20.05	22.00	20.86	21.09	21.05	22.00
3GPP Rel 6	HSUPA Subtest-2	18.81	18.86	18.91	19.50	18.48	18.46	18.45	20.00	19.45	19.35	19.42	20.00
3GPP Rel 6	HSUPA Subtest-3	19.10	19.02	19.03	19.50	19.17	18.94	19.35	20.00	18.67	18.79	18.72	20.00
3GPP Rel 6	HSUPA Subtest-4	18.79	18.89	18.98	19.50	18.89	18.87	18.62	20.00	19.36	19.41	19.41	20.00
3GPP Rel 6	HSUPA Subtest-5	20.40	20.70	20.70	21.50	20.80	20.70	20.70	22.00	20.81	20.78	20.80	22.00

<Reduced Power Mode for P-Sensor On>

Band		WCDMA II			Tune-up Limit (dBm)	WCDMA IV			Tune-up Limit (dBm)
TX Channel		9262	9400	9538		1312	1413	1513	
Rx Channel		9662	9800	9938		1537	1638	1738	
Frequency (MHz)		1852.4	1880	1907.6		1712.4	1732.6	1752.6	
3GPP Rel 99	RMC 12.2Kbps	16.49	**16.79**	16.71	17.00	16.72	**16.86**	16.77	17.50
3GPP Rel 6	HSDPA Subtest-1	15.22	15.58	15.62	16.00	15.58	15.42	15.89	16.50
3GPP Rel 6	HSDPA Subtest-2	15.43	15.74	15.78	16.00	15.62	15.51	15.85	16.50
3GPP Rel 6	HSDPA Subtest-3	15.05	15.18	15.21	15.50	15.14	15.20	15.18	16.00
3GPP Rel 6	HSDPA Subtest-4	15.01	15.33	15.24	15.50	15.09	15.01	15.12	16.00
3GPP Rel 6	HSUPA Subtest-1	14.92	15.33	15.28	16.00	15.26	15.24	15.01	16.50
3GPP Rel 6	HSUPA Subtest-2	13.72	13.72	13.84	14.00	13.51	13.52	13.42	14.50
3GPP Rel 6	HSUPA Subtest-3	13.80	14.09	13.98	14.00	13.76	13.66	13.43	14.50
3GPP Rel 6	HSUPA Subtest-4	13.59	13.82	13.84	14.00	13.77	13.61	13.41	14.50
3GPP Rel 6	HSUPA Subtest-5	15.22	15.62	15.59	16.00	15.51	15.62	15.62	16.50

<LTE Conducted Power>

General Note:

1. Anritsu MT8820C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r05, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
6. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
8. For LTE B4 / B5 / B12 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

<Full Power Mode>

<LTE Band 2>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				18700	18900	19100		
Frequency (MHz)				1860	1880	1900		
20	QPSK	1	0	22.08	22.30	22.12	23	0
20	QPSK	1	49	22.25	22.21	22.14		
20	QPSK	1	99	22.15	21.93	21.82		
20	QPSK	50	0	21.38	21.43	21.14	22	1
20	QPSK	50	24	21.38	21.29	21.11		
20	QPSK	50	50	21.21	21.22	21.06		
20	QPSK	100	0	21.27	21.27	21.15		
20	16QAM	1	0	21.24	21.13	21.12	22	1
20	16QAM	1	49	21.33	21.11	21.14		
20	16QAM	1	99	21.01	20.95	20.95		
20	16QAM	50	0	20.25	20.19	20.07	21	2
20	16QAM	50	24	20.13	20.26	20.08		
20	16QAM	50	50	20.23	20.19	20.03		
20	16QAM	100	0	20.17	20.13	20.13		
Channel				18675	18900	19125	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1857.5	1880	1902.5		
15	QPSK	1	0	22.22	21.91	22.05	23	0
15	QPSK	1	37	22.14	22.07	22.15		
15	QPSK	1	74	22.04	21.91	22.08		
15	QPSK	36	0	21.23	21.13	21.12	22	1
15	QPSK	36	20	21.22	21.09	21.25		
15	QPSK	36	39	21.01	21.03	21.22		
15	QPSK	75	0	21.15	21.11	21.03		
15	16QAM	1	0	21.12	20.97	20.89	22	1
15	16QAM	1	37	21.08	20.87	20.99		
15	16QAM	1	74	20.99	20.92	20.92		
15	16QAM	36	0	20.13	20.05	20.10	21	2
15	16QAM	36	20	20.15	20.07	20.10		
15	16QAM	36	39	20.01	20.01	20.22		
15	16QAM	75	0	20.09	20.07	20.01		

Channel				18650	18900	19150	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1855	1880	1905		
10	QPSK	1	0	21.98	21.98	22.07	23	0
10	QPSK	1	25	21.98	22.03	22.05		
10	QPSK	1	49	21.88	21.86	22.12		
10	QPSK	25	0	21.24	21.05	21.14	22	1
10	QPSK	25	12	21.18	21.12	21.09		
10	QPSK	25	25	21.07	21.04	21.13		
10	QPSK	50	0	21.10	21.03	21.08		
10	16QAM	1	0	21.11	21.18	21.07	22	1
10	16QAM	1	25	20.99	20.95	21.00		
10	16QAM	1	49	20.96	20.89	20.90		
10	16QAM	25	0	20.17	20.24	20.17	21	2
10	16QAM	25	12	20.21	20.30	20.09		
10	16QAM	25	25	20.19	20.03	20.21		
10	16QAM	50	0	20.21	20.03	20.03		
Channel				18625	18900	19175	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1852.5	1880	1907.5		
5	QPSK	1	0	22.05	21.89	22.04	23	0
5	QPSK	1	12	22.00	22.04	22.05		
5	QPSK	1	24	22.02	21.92	21.89		
5	QPSK	12	0	21.05	21.07	21.17	22	1
5	QPSK	12	7	21.13	21.15	21.03		
5	QPSK	12	13	21.11	21.02	21.16		
5	QPSK	25	0	21.13	21.07	21.19		
5	16QAM	1	0	20.95	20.88	20.94	22	1
5	16QAM	1	12	20.67	20.85	20.71		
5	16QAM	1	24	20.83	20.98	20.83		
5	16QAM	12	0	20.02	19.95	19.91	21	2
5	16QAM	12	7	19.98	19.94	19.88		
5	16QAM	12	13	20.13	19.92	19.89		
5	16QAM	25	0	20.34	19.95	19.97		

Channel				18615	18900	19185	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1851.5	1880	1908.5		
3	QPSK	1	0	22.26	22.13	22.15	23	0
3	QPSK	1	8	22.16	22.10	21.81		
3	QPSK	1	14	22.21	22.14	21.86		
3	QPSK	8	0	21.24	21.21	21.21	22	1
3	QPSK	8	4	21.26	21.25	21.13		
3	QPSK	8	7	21.23	21.22	21.19		
3	QPSK	15	0	21.22	21.20	21.18		
3	16QAM	1	0	21.05	20.92	20.98	22	1
3	16QAM	1	8	20.70	20.88	20.73		
3	16QAM	1	14	21.06	21.01	20.99		
3	16QAM	8	0	20.21	20.25	20.14	21	2
3	16QAM	8	4	20.31	20.15	20.17		
3	16QAM	8	7	20.27	20.16	20.14		
3	16QAM	15	0	20.24	20.11	20.03		
Channel				18607	18900	19193	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1850.7	1880	1909.3		
1.4	QPSK	1	0	22.25	21.94	22.11	23	0
1.4	QPSK	1	3	22.31	22.01	22.21		
1.4	QPSK	1	5	22.31	21.93	21.99		
1.4	QPSK	3	0	22.29	22.13	22.22		
1.4	QPSK	3	1	22.26	22.27	22.21		
1.4	QPSK	3	3	22.21	22.23	22.15		
1.4	QPSK	6	0	21.22	21.19	21.16	22	1
1.4	16QAM	1	0	21.05	21.02	21.02	22	1
1.4	16QAM	1	3	21.27	21.09	21.17		
1.4	16QAM	1	5	21.09	21.19	20.92		
1.4	16QAM	3	0	21.18	21.07	21.31		
1.4	16QAM	3	1	21.20	21.15	21.35		
1.4	16QAM	3	3	21.17	21.11	21.39		
1.4	16QAM	6	0	20.21	20.05	20.13	21	2

<LTE Band 4>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20050	20175	20300		
Frequency (MHz)				1720	1732.5	1745		
20	QPSK	1	0	22.31	22.09	22.04	23	0
20	QPSK	1	49	22.10	22.17	22.16		
20	QPSK	1	99	22.13	21.86	21.88		
20	QPSK	50	0	21.31	21.11	21.23	22	1
20	QPSK	50	24	21.26	21.23	21.11		
20	QPSK	50	50	21.11	21.10	20.94		
20	QPSK	100	0	21.22	21.21	21.15		
20	16QAM	1	0	20.93	21.23	20.94	22	1
20	16QAM	1	49	21.22	21.22	20.89		
20	16QAM	1	99	20.89	21.20	20.88		
20	16QAM	50	0	20.27	20.15	20.09	21	2
20	16QAM	50	24	20.23	20.20	19.96		
20	16QAM	50	50	20.18	20.07	20.02		
20	16QAM	100	0	20.17	20.16	20.12		
Channel				20025	20175	20325	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1717.5	1732.5	1747.5		
15	QPSK	1	0	22.18	21.95	22.21	23	0
15	QPSK	1	37	22.14	21.97	21.97		
15	QPSK	1	74	21.83	21.88	22.15		
15	QPSK	36	0	21.29	21.10	21.07	22	1
15	QPSK	36	20	21.17	21.12	21.06		
15	QPSK	36	39	21.21	21.17	20.94		
15	QPSK	75	0	21.28	21.09	21.06		
15	16QAM	1	0	20.96	20.96	21.35	22	1
15	16QAM	1	37	21.07	20.86	21.27		
15	16QAM	1	74	20.87	20.85	20.92		
15	16QAM	36	0	20.17	20.09	20.10	21	2
15	16QAM	36	20	20.13	20.08	20.14		
15	16QAM	36	39	20.11	20.04	20.03		
15	16QAM	75	0	20.18	20.06	19.97		

Channel				20000	20175	20350	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1715	1732.5	1750		
10	QPSK	1	0	21.90	21.88	21.84	23	0
10	QPSK	1	25	22.01	21.95	21.83		
10	QPSK	1	49	21.80	21.64	21.79		
10	QPSK	25	0	21.30	21.13	21.05	22	1
10	QPSK	25	12	21.21	21.15	21.01		
10	QPSK	25	25	21.21	21.15	21.01		
10	QPSK	50	0	21.16	21.13	21.06		
10	16QAM	1	0	20.94	21.22	20.87	22	1
10	16QAM	1	25	20.98	20.92	20.79		
10	16QAM	1	49	20.87	20.76	20.94		
10	16QAM	25	0	20.19	20.20	20.07	21	2
10	16QAM	25	12	20.31	20.13	20.11		
10	16QAM	25	25	20.16	20.15	20.01		
10	16QAM	50	0	20.02	20.11	19.93		
Channel				19975	20175	20375	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1712.5	1732.5	1752.5		
5	QPSK	1	0	21.90	22.03	22.00	23	0
5	QPSK	1	12	22.12	22.06	22.13		
5	QPSK	1	24	21.91	21.91	21.88		
5	QPSK	12	0	20.99	21.10	20.97	22	1
5	QPSK	12	7	21.13	21.13	21.00		
5	QPSK	12	13	21.13	21.12	21.00		
5	QPSK	25	0	20.96	21.10	20.96		
5	16QAM	1	0	20.67	20.73	20.78	22	1
5	16QAM	1	12	20.68	20.81	20.83		
5	16QAM	1	24	20.79	20.87	20.93		
5	16QAM	12	0	19.87	19.97	19.79	21	2
5	16QAM	12	7	19.93	19.86	19.85		
5	16QAM	12	13	19.93	19.83	19.99		
5	16QAM	25	0	19.83	19.99	19.89		

Channel				19965	20175	20385	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1732.5	1753.5		
3	QPSK	1	0	21.85	22.25	21.77	23	0
3	QPSK	1	8	21.87	22.03	21.87		
3	QPSK	1	14	22.10	22.22	22.15		
3	QPSK	8	0	21.03	21.13	20.92	22	1
3	QPSK	8	4	21.02	21.17	21.12		
3	QPSK	8	7	21.08	21.13	21.03		
3	QPSK	15	0	21.12	21.12	21.10		
3	16QAM	1	0	20.67	20.94	20.81	22	1
3	16QAM	1	8	20.88	20.84	20.81		
3	16QAM	1	14	20.92	20.75	21.03		
3	16QAM	8	0	20.16	20.16	19.77	21	2
3	16QAM	8	4	20.13	20.11	19.91		
3	16QAM	8	7	20.24	20.16	20.07		
3	16QAM	15	0	20.14	20.13	19.84		
Channel				19957	20175	20393	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1732.5	1754.3		
1.4	QPSK	1	0	21.79	22.13	22.06	23	0
1.4	QPSK	1	3	21.87	22.19	22.16		
1.4	QPSK	1	5	21.94	21.92	22.25		
1.4	QPSK	3	0	22.00	22.22	22.24		
1.4	QPSK	3	1	22.05	22.24	22.26		
1.4	QPSK	3	3	22.04	22.23	22.28		
1.4	QPSK	6	0	21.08	21.27	21.09	22	1
1.4	16QAM	1	0	20.87	20.93	21.34	22	1
1.4	16QAM	1	3	21.02	21.09	21.36		
1.4	16QAM	1	5	20.88	20.97	21.29		
1.4	16QAM	3	0	21.08	21.14	21.10		
1.4	16QAM	3	1	21.13	21.19	21.13		
1.4	16QAM	3	3	21.08	21.15	21.21		
1.4	16QAM	6	0	20.12	20.22	20.05	21	2

<LTE Band 5>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20450	20525	20600		
Frequency (MHz)				829	836.5	844		
10	QPSK	1	0	23.54	23.56	23.73	24	0
10	QPSK	1	25	23.51	23.52	23.67		
10	QPSK	1	49	23.53	23.35	23.69		
10	QPSK	25	0	22.71	22.76	22.80	23	1
10	QPSK	25	12	22.77	22.72	22.68		
10	QPSK	25	25	22.76	22.72	22.77		
10	QPSK	50	0	22.65	22.69	22.76		
10	16QAM	1	0	22.52	22.56	22.59	23	1
10	16QAM	1	25	22.61	22.52	22.62		
10	16QAM	1	49	22.51	22.38	22.65		
10	16QAM	25	0	21.70	21.80	21.68	22	2
10	16QAM	25	12	21.74	21.67	21.71		
10	16QAM	25	25	21.90	21.74	21.71		
10	16QAM	50	0	21.64	21.53	21.69		
Channel				20425	20525	20625	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				826.5	836.5	846.5		
5	QPSK	1	0	23.32	23.58	23.25	24	0
5	QPSK	1	12	23.48	23.57	23.69		
5	QPSK	1	24	23.32	23.26	23.70		
5	QPSK	12	0	22.57	22.71	22.67	23	1
5	QPSK	12	7	22.59	22.75	22.72		
5	QPSK	12	13	22.58	22.62	22.68		
5	QPSK	25	0	22.65	22.62	22.65		
5	16QAM	1	0	22.31	22.51	22.47	23	1
5	16QAM	1	12	22.38	22.39	22.49		
5	16QAM	1	24	22.34	22.23	22.49		
5	16QAM	12	0	21.39	21.63	21.51	22	2
5	16QAM	12	7	21.45	21.62	21.46		
5	16QAM	12	13	21.48	21.53	21.51		
5	16QAM	25	0	21.58	21.44	21.58		

Channel				20415	20525	20635	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				825.5	836.5	847.5		
3	QPSK	1	0	23.41	23.72	23.69	24	0
3	QPSK	1	8	23.41	23.48	23.68		
3	QPSK	1	14	23.40	23.44	23.63		
3	QPSK	8	0	22.53	22.87	22.77	23	1
3	QPSK	8	4	22.63	22.75	22.83		
3	QPSK	8	7	22.57	22.69	22.84		
3	QPSK	15	0	22.52	22.68	22.70		
3	16QAM	1	0	22.33	22.61	22.58	23	1
3	16QAM	1	8	22.31	22.49	22.45		
3	16QAM	1	14	22.39	22.35	22.57		
3	16QAM	8	0	21.70	21.64	21.71	22	2
3	16QAM	8	4	21.53	21.71	21.81		
3	16QAM	8	7	21.56	21.65	21.80		
3	16QAM	15	0	21.48	21.62	21.64		
Channel				20407	20525	20643	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				824.7	836.5	848.3		
1.4	QPSK	1	0	23.38	23.35	23.64	24	0
1.4	QPSK	1	3	23.42	23.48	23.66		
1.4	QPSK	1	5	23.42	23.33	23.56		
1.4	QPSK	3	0	23.48	23.65	23.65		
1.4	QPSK	3	1	23.60	23.66	23.65		
1.4	QPSK	3	3	23.43	23.71	23.57		
1.4	QPSK	6	0	22.49	22.67	22.69	23	1
1.4	16QAM	1	0	22.31	22.43	22.80	23	1
1.4	16QAM	1	3	22.46	22.52	22.79		
1.4	16QAM	1	5	22.38	22.47	22.75		
1.4	16QAM	3	0	22.38	22.63	22.79		
1.4	16QAM	3	1	22.65	22.68	22.79		
1.4	16QAM	3	3	22.43	22.63	22.68		
1.4	16QAM	6	0	21.43	21.64	21.67	22	2

<LTE Band 7>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20850	21100	21350		
Frequency (MHz)				2510	2535	2560		
20	QPSK	1	0	22.80	22.90	22.54	23	0
20	QPSK	1	49	22.47	22.51	22.41		
20	QPSK	1	99	22.51	22.64	22.47		
20	QPSK	50	0	21.79	21.93	21.87	22	1
20	QPSK	50	24	21.81	21.78	21.69		
20	QPSK	50	50	21.85	21.87	21.82		
20	QPSK	100	0	21.82	21.92	21.89		
20	16QAM	1	0	21.61	21.73	21.54	22	1
20	16QAM	1	49	21.77	21.73	21.76		
20	16QAM	1	99	21.72	21.63	21.65		
20	16QAM	50	0	20.84	20.76	20.79	21	2
20	16QAM	50	24	20.80	20.86	20.74		
20	16QAM	50	50	20.76	20.83	20.93		
20	16QAM	100	0	20.74	20.79	20.80		
Channel				20825	21100	21375	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2507.5	2535	2562.5		
15	QPSK	1	0	22.64	22.50	22.73	23	0
15	QPSK	1	37	22.56	22.69	22.67		
15	QPSK	1	74	22.61	22.50	22.80		
15	QPSK	36	0	21.71	21.73	21.90	22	1
15	QPSK	36	20	21.83	21.75	21.87		
15	QPSK	36	39	21.75	21.90	21.92		
15	QPSK	75	0	21.74	21.75	21.96		
15	16QAM	1	0	21.63	21.66	21.24	22	1
15	16QAM	1	37	21.61	21.62	21.59		
15	16QAM	1	74	21.71	21.59	21.74		
15	16QAM	36	0	20.71	20.83	20.87	21	2
15	16QAM	36	20	20.75	20.76	20.78		
15	16QAM	36	39	20.79	20.71	20.97		
15	16QAM	75	0	20.77	20.70	20.89		

Channel				20800	21100	21400	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2505	2535	2565		
10	QPSK	1	0	22.77	22.51	22.58	23	0
10	QPSK	1	25	22.43	22.58	22.82		
10	QPSK	1	49	22.38	22.72	22.87		
10	QPSK	25	0	21.83	21.75	21.95	22	1
10	QPSK	25	12	21.84	21.75	21.88		
10	QPSK	25	25	21.83	21.83	21.95		
10	QPSK	50	0	21.86	21.79	21.89		
10	16QAM	1	0	21.44	21.53	21.75	22	1
10	16QAM	1	25	21.50	21.53	21.71		
10	16QAM	1	49	21.66	21.61	21.71		
10	16QAM	25	0	20.94	20.89	20.82	21	2
10	16QAM	25	12	20.88	20.80	20.81		
10	16QAM	25	25	20.91	20.97	20.95		
10	16QAM	50	0	20.99	20.93	20.89		
Channel				20775	21100	21425	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2502.5	2535	2567.5		
5	QPSK	1	0	22.70	22.34	22.67	23	0
5	QPSK	1	12	22.76	22.59	22.81		
5	QPSK	1	24	22.54	22.42	22.72		
5	QPSK	12	0	21.75	21.78	21.83	22	1
5	QPSK	12	7	21.77	21.83	21.87		
5	QPSK	12	13	21.71	21.80	21.96		
5	QPSK	25	0	21.82	21.80	21.86		
5	16QAM	1	0	21.60	21.53	21.45	22	1
5	16QAM	1	12	21.50	21.53	21.58		
5	16QAM	1	24	21.55	21.51	21.12		
5	16QAM	12	0	20.88	20.50	20.72	21	2
5	16QAM	12	7	20.73	20.70	20.69		
5	16QAM	12	13	20.75	20.77	20.68		
5	16QAM	25	0	20.97	20.81	20.93		

<LTE Band 12>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				23060	23095	23130		
Frequency (MHz)				704	707.5	711		
10	QPSK	1	0	23.49	23.52	23.69	24	0
10	QPSK	1	25	23.44	23.41	23.50		
10	QPSK	1	49	23.61	23.49	23.64		
10	QPSK	25	0	22.62	22.63	22.76	23	1
10	QPSK	25	12	22.52	22.59	22.66		
10	QPSK	25	25	22.64	22.67	22.76		
10	QPSK	50	0	22.57	22.69	22.75		
10	16QAM	1	0	22.35	22.33	22.55	23	1
10	16QAM	1	25	22.39	22.42	22.50		
10	16QAM	1	49	22.46	22.51	22.41		
10	16QAM	25	0	21.58	21.51	21.82	22	2
10	16QAM	25	12	21.57	21.73	21.72		
10	16QAM	25	25	21.75	21.81	21.82		
10	16QAM	50	0	21.64	21.76	21.73		
Channel				23035	23095	23155	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				701.5	707.5	713.5		
5	QPSK	1	0	23.43	23.54	23.32	24	0
5	QPSK	1	12	23.46	23.49	23.59		
5	QPSK	1	24	23.24	23.33	23.42		
5	QPSK	12	0	22.75	22.61	22.70	23	1
5	QPSK	12	7	22.58	22.63	22.67		
5	QPSK	12	13	22.50	22.66	22.64		
5	QPSK	25	0	22.55	22.68	22.70		
5	16QAM	1	0	22.38	22.41	22.32	23	1
5	16QAM	1	12	22.07	22.33	22.24		
5	16QAM	1	24	22.23	22.35	22.34		
5	16QAM	12	0	21.54	21.67	21.51	22	2
5	16QAM	12	7	21.44	21.62	21.58		
5	16QAM	12	13	21.59	21.56	21.54		
5	16QAM	25	0	21.52	21.84	21.85		

Channel				23025	23095	23165	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				700.5	707.5	714.5		
3	QPSK	1	0	23.33	23.44	23.62	24	0
3	QPSK	1	8	23.34	23.55	23.59		
3	QPSK	1	14	23.30	23.50	23.57		
3	QPSK	8	0	22.56	22.56	22.66	23	1
3	QPSK	8	4	22.61	22.64	22.78		
3	QPSK	8	7	22.43	22.61	22.71		
3	QPSK	15	0	22.57	22.67	22.72		
3	16QAM	1	0	22.42	22.28	22.62	23	1
3	16QAM	1	8	22.45	22.37	22.42		
3	16QAM	1	14	22.32	22.39	22.51		
3	16QAM	8	0	21.41	21.72	21.50	22	2
3	16QAM	8	4	21.61	21.80	21.78		
3	16QAM	8	7	21.62	21.70	21.87		
3	16QAM	15	0	21.77	21.62	21.79		
Channel				23017	23095	23173	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				699.7	707.5	715.3		
1.4	QPSK	1	0	23.51	23.49	23.41	24	0
1.4	QPSK	1	3	23.46	23.61	23.58		
1.4	QPSK	1	5	23.34	23.51	23.63		
1.4	QPSK	3	0	23.58	23.60	23.46		
1.4	QPSK	3	1	23.68	23.64	23.56		
1.4	QPSK	3	3	23.64	23.60	23.59		
1.4	QPSK	6	0	22.56	22.66	22.49	23	1
1.4	16QAM	1	0	22.47	22.43	22.51	23	1
1.4	16QAM	1	3	22.62	22.68	22.63		
1.4	16QAM	1	5	22.34	22.53	22.50		
1.4	16QAM	3	0	22.57	22.60	22.52		
1.4	16QAM	3	1	22.69	22.78	22.87		
1.4	16QAM	3	3	22.61	22.78	22.96		
1.4	16QAM	6	0	21.60	21.78	21.58	22	2

<Reduced Power Mode for P-Sensor On>

<LTE Band 2>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				18700	18900	19100		
Frequency (MHz)				1860	1880	1900		
20	QPSK	1	0	17.61	17.96	17.65	18	0
20	QPSK	1	49	17.51	17.89	17.65		
20	QPSK	1	99	17.57	17.55	17.52		
20	QPSK	50	0	17.70	17.85	17.75	18	0
20	QPSK	50	24	17.68	17.66	17.73		
20	QPSK	50	50	17.53	17.57	17.71		
20	QPSK	100	0	17.58	17.79	17.70		
20	16QAM	1	0	17.82	17.80	17.91	18	0
20	16QAM	1	49	17.73	17.53	17.93		
20	16QAM	1	99	17.48	17.55	17.52		
20	16QAM	50	0	17.63	17.83	17.66	18	0
20	16QAM	50	24	17.66	17.83	17.63		
20	16QAM	50	50	17.61	17.66	17.77		
20	16QAM	100	0	17.47	17.68	17.70		
Channel				18675	18900	19125	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1857.5	1880	1902.5		
15	QPSK	1	0	17.75	17.71	17.86	18	0
15	QPSK	1	37	17.56	17.88	17.85		
15	QPSK	1	74	17.39	17.57	17.49		
15	QPSK	36	0	17.71	17.75	17.73	18	0
15	QPSK	36	20	17.60	17.72	17.70		
15	QPSK	36	39	17.58	17.56	17.68		
15	QPSK	75	0	17.62	17.68	17.78		
15	16QAM	1	0	17.38	17.44	17.63	18	0
15	16QAM	1	37	17.41	17.68	17.80		
15	16QAM	1	74	17.45	17.41	17.36		
15	16QAM	36	0	17.52	17.66	17.81	18	0
15	16QAM	36	20	17.67	17.78	17.65		
15	16QAM	36	39	17.57	17.70	17.73		
15	16QAM	75	0	17.52	17.78	17.79		

Channel				18650	18900	19150	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1855	1880	1905		
10	QPSK	1	0	17.71	17.58	17.76	18	0
10	QPSK	1	25	17.68	17.58	17.75		
10	QPSK	1	49	17.46	17.44	17.59		
10	QPSK	25	0	17.68	17.64	17.59	18	0
10	QPSK	25	12	17.60	17.53	17.73		
10	QPSK	25	25	17.63	17.53	17.72		
10	QPSK	50	0	17.72	17.70	17.68		
10	16QAM	1	0	17.45	17.19	17.58	18	0
10	16QAM	1	25	17.67	17.39	17.43		
10	16QAM	1	49	17.37	17.44	17.61		
10	16QAM	25	0	17.67	17.62	17.71	18	0
10	16QAM	25	12	17.68	17.65	17.74		
10	16QAM	25	25	17.68	17.64	17.69		
10	16QAM	50	0	17.75	17.70	17.77		
Channel				18625	18900	19175	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1852.5	1880	1907.5		
5	QPSK	1	0	17.66	17.57	17.65	18	0
5	QPSK	1	12	17.53	17.72	17.69		
5	QPSK	1	24	17.37	17.60	17.37		
5	QPSK	12	0	17.73	17.69	17.93	18	0
5	QPSK	12	7	17.68	17.60	17.76		
5	QPSK	12	13	17.63	17.63	17.79		
5	QPSK	25	0	17.64	17.67	17.74		
5	16QAM	1	0	17.47	17.76	17.52	18	0
5	16QAM	1	12	17.48	17.35	17.69		
5	16QAM	1	24	17.44	17.32	17.41		
5	16QAM	12	0	17.68	17.78	17.78	18	0
5	16QAM	12	7	17.72	17.89	17.82		
5	16QAM	12	13	17.77	17.90	17.86		
5	16QAM	25	0	17.74	17.63	17.77		

Channel				18615	18900	19185	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1851.5	1880	1908.5		
3	QPSK	1	0	17.80	17.65	17.52	18	0
3	QPSK	1	8	17.79	17.62	17.52		
3	QPSK	1	14	17.43	17.40	17.38		
3	QPSK	8	0	17.67	17.62	17.58	18	0
3	QPSK	8	4	17.64	17.54	17.47		
3	QPSK	8	7	17.62	17.57	17.47		
3	QPSK	15	0	17.72	17.66	17.64		
3	16QAM	1	0	17.57	17.39	17.23	18	0
3	16QAM	1	8	17.66	17.61	17.33		
3	16QAM	1	14	17.30	17.31	17.38		
3	16QAM	8	0	17.75	17.61	17.56	18	0
3	16QAM	8	4	17.59	17.62	17.59		
3	16QAM	8	7	17.67	17.62	17.58		
3	16QAM	15	0	17.73	17.69	17.64		
Channel				18607	18900	19193	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1850.7	1880	1909.3		
1.4	QPSK	1	0	17.59	17.65	17.59	18	0
1.4	QPSK	1	3	17.63	17.75	17.59		
1.4	QPSK	1	5	17.31	17.51	17.46		
1.4	QPSK	3	0	17.87	17.69	17.69		
1.4	QPSK	3	1	17.70	17.66	17.67		
1.4	QPSK	3	3	17.73	17.50	17.65		
1.4	QPSK	6	0	17.68	17.62	17.66	18	0
1.4	16QAM	1	0	17.46	17.38	17.83	18	0
1.4	16QAM	1	3	17.63	17.62	17.80		
1.4	16QAM	1	5	17.35	17.35	17.46		
1.4	16QAM	3	0	17.72	17.60	17.60		
1.4	16QAM	3	1	17.76	17.72	17.57		
1.4	16QAM	3	3	17.80	17.64	17.71		
1.4	16QAM	6	0	17.71	17.72	17.64	18	0

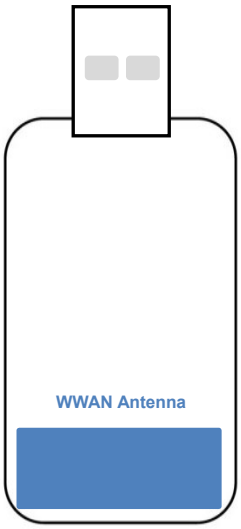
<LTE Band 4>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20050	20175	20300		
Frequency (MHz)				1720	1732.5	1745		
20	QPSK	1	0	17.92	17.60	17.86	18	0
20	QPSK	1	49	17.90	17.86	17.54		
20	QPSK	1	99	17.52	17.50	17.46		
20	QPSK	50	0	17.73	17.64	17.86	18	0
20	QPSK	50	24	17.67	17.66	17.71		
20	QPSK	50	50	17.68	17.60	17.49		
20	QPSK	100	0	17.72	17.71	17.64		
20	16QAM	1	0	17.47	17.50	17.42	18	0
20	16QAM	1	49	17.36	17.63	17.56		
20	16QAM	1	99	17.45	17.33	17.44		
20	16QAM	50	0	17.73	17.67	17.86	18	0
20	16QAM	50	24	17.64	17.70	17.66		
20	16QAM	50	50	17.63	17.60	17.51		
20	16QAM	100	0	17.68	17.58	17.58		
Channel				20025	20175	20325	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1717.5	1732.5	1747.5		
15	QPSK	1	0	17.56	17.57	17.77	18	0
15	QPSK	1	37	17.61	17.59	17.34		
15	QPSK	1	74	17.53	17.39	17.61		
15	QPSK	36	0	17.65	17.61	17.72	18	0
15	QPSK	36	20	17.57	17.67	17.54		
15	QPSK	36	39	17.65	17.62	17.71		
15	QPSK	75	0	17.50	17.63	17.67		
15	16QAM	1	0	17.50	17.58	17.73	18	0
15	16QAM	1	37	17.78	17.38	17.57		
15	16QAM	1	74	17.51	17.34	17.48		
15	16QAM	36	0	17.71	17.60	17.70	18	0
15	16QAM	36	20	17.61	17.51	17.49		
15	16QAM	36	39	17.69	17.66	17.69		
15	16QAM	75	0	17.46	17.58	17.56		

Channel				20000	20175	20350	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1715	1732.5	1750		
10	QPSK	1	0	17.28	17.34	17.45	18	0
10	QPSK	1	25	17.41	17.43	17.46		
10	QPSK	1	49	17.15	17.22	17.47		
10	QPSK	25	0	17.64	17.59	17.63	18	0
10	QPSK	25	12	17.64	17.61	17.56		
10	QPSK	25	25	17.67	17.55	17.58		
10	QPSK	50	0	17.58	17.59	17.62		
10	16QAM	1	0	17.22	17.42	17.29	18	0
10	16QAM	1	25	17.17	17.41	17.32		
10	16QAM	1	49	17.64	17.18	17.66		
10	16QAM	25	0	17.63	17.62	17.56	18	0
10	16QAM	25	12	17.70	17.50	17.80		
10	16QAM	25	25	17.67	17.60	17.45		
10	16QAM	50	0	17.56	17.58	17.54		
Channel				19975	20175	20375	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1712.5	1732.5	1752.5		
5	QPSK	1	0	17.26	17.52	17.61	18	0
5	QPSK	1	12	17.47	17.50	17.56		
5	QPSK	1	24	17.25	17.32	17.68		
5	QPSK	12	0	17.36	17.53	17.61	18	0
5	QPSK	12	7	17.57	17.52	17.62		
5	QPSK	12	13	17.45	17.54	17.75		
5	QPSK	25	0	17.40	17.63	17.52		
5	16QAM	1	0	17.23	17.59	17.65	18	0
5	16QAM	1	12	17.23	17.70	17.29		
5	16QAM	1	24	17.20	17.22	17.35		
5	16QAM	12	0	17.51	17.67	17.38	18	0
5	16QAM	12	7	17.45	17.67	17.41		
5	16QAM	12	13	17.33	17.75	17.62		
5	16QAM	25	0	17.21	17.48	17.53		

Channel				19965	20175	20385	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1732.5	1753.5		
3	QPSK	1	0	17.49	17.42	17.53	18	0
3	QPSK	1	8	17.47	17.43	17.58		
3	QPSK	1	14	17.29	17.44	17.50		
3	QPSK	8	0	17.50	17.60	17.62	18	0
3	QPSK	8	4	17.49	17.53	17.54		
3	QPSK	8	7	17.51	17.55	17.62		
3	QPSK	15	0	17.60	17.59	17.47		
3	16QAM	1	0	17.56	17.26	17.47	18	0
3	16QAM	1	8	17.67	17.29	17.69		
3	16QAM	1	14	17.29	17.63	17.48		
3	16QAM	8	0	17.64	17.53	17.68	18	0
3	16QAM	8	4	17.64	17.77	17.58		
3	16QAM	8	7	17.72	17.42	17.66		
3	16QAM	15	0	17.45	17.51	17.43		
Channel				19957	20175	20393	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1732.5	1754.3		
1.4	QPSK	1	0	17.23	17.54	17.31	18	0
1.4	QPSK	1	3	17.44	17.31	17.40		
1.4	QPSK	1	5	17.22	17.58	17.19		
1.4	QPSK	3	0	17.33	17.69	17.56		
1.4	QPSK	3	1	17.54	17.51	17.58		
1.4	QPSK	3	3	17.42	17.68	17.52		
1.4	QPSK	6	0	17.37	17.64	17.56	18	0
1.4	16QAM	1	0	17.20	17.58	17.39	18	0
1.4	16QAM	1	3	17.20	17.54	17.38		
1.4	16QAM	1	5	17.17	17.45	17.15		
1.4	16QAM	3	0	17.48	17.67	17.59		
1.4	16QAM	3	1	17.42	17.46	17.47		
1.4	16QAM	3	3	17.30	17.66	17.57		
1.4	16QAM	6	0	17.18	17.53	17.55	18	0

14. Antenna Location



Front View

Antennas	DUT Test Position				
	Horizontal Up	Horizontal Down	Vertical Front	Vertical Back	Tip Mode
WWAN Main Antenna	Yes	Yes	Yes	Yes	Yes

15. SAR Test Results

General Note:

1. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
2. Per KDB 447498 D01v06, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
   - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
   - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
   - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
4. The device employs proximity sensor that detect the presence of the user's body also a finger or hand at the Horizontal Down or Up faces, Vertical Back or Front faces of the device. When Horizontal Down or Up faces, Vertical Back or Front faces of body condition is detected, GSM1900, WCDMA band 2/4 ,LTE band 2/4 reduced power will be active.
5. For verification of compliance of power reduction scheme, additional SAR testing with EUT transmitting at full RF power at a conservative trigger distance was performed:
   - Horizontal Up: 17 mm
   - Horizontal Down & Vertical Back: 15 mm
   - Vertical Front: 10 mm

GSM Note:

1. Per KDB 447498 D01v06, the maximum output power channel is used for SAR testing and for further SAR test reduction.
2. Per KDB 941225 D01v03r01, for SAR test reduction for GPRS / EDGE modes is determined by the source-based time-averaged output power including tune-up tolerance. The mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested. Therefore, the GPRS (2Tx slots) for GSM850/ GSM1900 is considered as the primary mode.
3. Other configurations of GPRS / EDGE are considered as secondary modes. The 3G SAR test reduction procedure is applied, when the maximum output power and tune-up tolerance specified for production units in a secondary mode is ≤ ¼ dB higher than the primary mode, SAR measurement is not required for the secondary mode.

WCDMA Note:

1. Per KDB 941225 D01v03r01, for SAR testing is measured using a 12.2 kbps RMC with TPC bits configured to all "1's".
2. Per KDB 941225 D01v03r01, RMC 12.2kbps setting is used to evaluate SAR. The maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA, and according to the following RF output power, the output power results of the secondary modes (HSUPA, HSDPA) are less than ¼ dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA.

LTE Note:

1. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
2. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
3. Per KDB 941225 D05v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
4. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
5. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
6. For LTE B4 / B5 / B12 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.

15.1 Body SAR

<GSM SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Mode	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	GSM850	GPRS 2 Tx slots	Horizontal Up	5	Full	189	836.4	30.00	31.00	1.259	0.06	0.801	1.008
	GSM850	GPRS 2 Tx slots	Horizontal Up	5	Full	128	824.2	29.97	31.00	1.268	-0.06	0.731	0.927
	GSM850	GPRS 2 Tx slots	Horizontal Up	5	Full	251	848.8	29.93	31.00	1.279	0.02	0.713	0.912
	GSM850	GPRS 2 Tx slots	Horizontal Down	5	Full	189	836.4	30.00	31.00	1.259	-0.03	0.711	0.895
	GSM850	GPRS 2 Tx slots	Horizontal Down	5	Full	128	824.2	29.97	31.00	1.268	0.02	0.713	0.904
01	GSM850	GPRS 2 Tx slots	Horizontal Down	5	Full	251	848.8	29.93	31.00	1.279	0.04	0.917	**1.173**
	GSM850	GPRS 2 Tx slots	Vertical Front	5	Full	189	836.4	30.00	31.00	1.259	0.03	0.421	0.530
	GSM850	GPRS 2 Tx slots	Vertical Back	5	Full	189	836.4	30.00	31.00	1.259	-0.09	0.634	0.798
	GSM850	GPRS 2 Tx slots	Top Side	5	Full	189	836.4	30.00	31.00	1.259	-0.09	0.281	0.354
	GSM1900	GPRS 2 Tx slots	Horizontal Up	5	Reduced	661	1880	23.96	24.00	1.009	-0.04	0.967	0.976
02	GSM1900	GPRS 2 Tx slots	Horizontal Up	5	Reduced	512	1850.2	23.76	24.00	1.057	-0.05	1.020	**1.078**
	GSM1900	GPRS 2 Tx slots	Horizontal Up	5	Reduced	810	1909.8	23.91	24.00	1.021	0.05	0.917	0.936
	GSM1900	GPRS 2 Tx slots	Horizontal Down	5	Reduced	661	1880	23.96	24.00	1.009	0.17	0.640	0.646
	GSM1900	GPRS 2 Tx slots	Vertical Front	5	Reduced	661	1880	23.96	24.00	1.009	0.06	0.368	0.371
	GSM1900	GPRS 2 Tx slots	Vertical Back	5	Reduced	661	1880	23.96	24.00	1.009	0.04	0.675	0.681
	GSM1900	GPRS 2 Tx slots	Top Side	5	Full	661	1880	27.24	28.00	1.191	0.03	0.179	0.213
	GSM1900	GPRS 2 Tx slots	Horizontal Up	17	Full	661	1880	27.24	28.00	1.191	-0.03	0.721	0.859
	GSM1900	GPRS 2 Tx slots	Horizontal Up	17	Full	512	1850.2	27.16	28.00	1.213	0.01	0.785	0.953
	GSM1900	GPRS 2 Tx slots	Horizontal Up	17	Full	810	1909.8	27.12	28.00	1.225	0.02	0.631	0.773
	GSM1900	GPRS 2 Tx slots	Horizontal Down	15	Full	661	1880	27.24	28.00	1.191	0.06	0.680	0.810
	GSM1900	GPRS 2 Tx slots	Horizontal Down	15	Full	512	1850.2	27.16	28.00	1.213	0.03	0.720	0.874
	GSM1900	GPRS 2 Tx slots	Horizontal Down	15	Full	810	1909.8	27.12	28.00	1.225	0.01	0.680	0.833
	GSM1900	GPRS 2 Tx slots	Vertical Front	10	Full	661	1880	27.24	28.00	1.191	0.1	0.493	0.587
	GSM1900	GPRS 2 Tx slots	Vertical Back	15	Full	661	1880	27.24	28.00	1.191	0.06	0.522	0.622

<WCDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Mode	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WCDMA Band V	RMC 12.2Kbps	Horizontal Up	5	Full	4182	836.4	21.98	23.00	1.265	0.06	0.695	0.879
03	WCDMA Band V	RMC 12.2Kbps	Horizontal Up	5	Full	4132	826.4	21.93	23.00	1.279	-0.1	0.711	**0.910**
	WCDMA Band V	RMC 12.2Kbps	Horizontal Up	5	Full	4233	846.6	21.94	23.00	1.276	0.08	0.597	0.762
	WCDMA Band V	RMC 12.2Kbps	Horizontal Down	5	Full	4182	836.4	21.98	23.00	1.265	0.02	0.691	0.874
	WCDMA Band V	RMC 12.2Kbps	Horizontal Down	5	Full	4132	826.4	21.93	23.00	1.279	0.02	0.684	0.875
	WCDMA Band V	RMC 12.2Kbps	Horizontal Down	5	Full	4233	846.6	21.94	23.00	1.276	0.03	0.683	0.872
	WCDMA Band V	RMC 12.2Kbps	Vertical Front	5	Full	4182	836.4	21.98	23.00	1.265	-0.06	0.413	0.522
	WCDMA Band V	RMC 12.2Kbps	Vertical Back	5	Full	4182	836.4	21.98	23.00	1.265	0.03	0.482	0.610
	WCDMA Band V	RMC 12.2Kbps	Top Side	5	Full	4182	836.4	21.98	23.00	1.265	0.01	0.182	0.230
	WCDMA Band IV	RMC 12.2Kbps	Horizontal Up	5	Reduced	1413	1732.6	16.86	17.50	1.159	0.03	0.731	0.847
	WCDMA Band IV	RMC 12.2Kbps	Horizontal Up	5	Reduced	1312	1712.4	16.72	17.50	1.197	0.04	0.808	0.967
04	WCDMA Band IV	RMC 12.2Kbps	Horizontal Up	5	Reduced	1513	1752.6	16.77	17.50	1.183	0.12	0.869	**1.028**
	WCDMA Band IV	RMC 12.2Kbps	Horizontal Down	5	Reduced	1413	1732.6	16.86	17.50	1.159	0.02	0.506	0.586
	WCDMA Band IV	RMC 12.2Kbps	Vertical Front	5	Reduced	1413	1732.6	16.86	17.50	1.159	0.03	0.206	0.239
	WCDMA Band IV	RMC 12.2Kbps	Vertical Back	5	Reduced	1413	1732.6	16.86	17.50	1.159	0.01	0.468	0.542
	WCDMA Band IV	RMC 12.2Kbps	Top Side	5	Full	1413	1732.6	21.48	23.00	1.419	0.01	0.103	0.146
	WCDMA Band IV	RMC 12.2Kbps	Horizontal Up	17	Full	1413	1732.6	21.48	23.00	1.419	0.01	0.518	0.735
	WCDMA Band IV	RMC 12.2Kbps	Horizontal Down	15	Full	1413	1732.6	21.48	23.00	1.419	0.09	0.479	0.680
	WCDMA Band IV	RMC 12.2Kbps	Vertical Front	10	Full	1413	1732.6	21.48	23.00	1.419	0.07	0.315	0.447
	WCDMA Band IV	RMC 12.2Kbps	Vertical Back	15	Full	1413	1732.6	21.48	23.00	1.419	0.04	0.319	0.453
05	WCDMA Band II	RMC 12.2Kbps	Horizontal Up	5	Reduced	9400	1880	16.79	17.00	1.050	0.08	1.080	**1.134**
	WCDMA Band II	RMC 12.2Kbps	Horizontal Up	5	Reduced	9262	1852.4	16.49	17.00	1.125	0.02	1.000	1.125
	WCDMA Band II	RMC 12.2Kbps	Horizontal Up	5	Reduced	9538	1907.6	16.71	17.00	1.069	0.07	1.060	1.133
	WCDMA Band II	RMC 12.2Kbps	Horizontal Down	5	Reduced	9400	1880	16.79	17.00	1.050	0.09	0.731	0.767
	WCDMA Band II	RMC 12.2Kbps	Vertical Front	5	Reduced	9400	1880	16.79	17.00	1.050	0.03	0.389	0.408
	WCDMA Band II	RMC 12.2Kbps	Vertical Back	5	Reduced	9400	1880	16.79	17.00	1.050	0.07	0.786	0.825
	WCDMA Band II	RMC 12.2Kbps	Vertical Back	5	Reduced	9262	1852.4	16.49	17.00	1.125	0.03	0.718	0.807
	WCDMA Band II	RMC 12.2Kbps	Vertical Back	5	Reduced	9538	1907.6	16.71	17.00	1.069	0.18	0.800	0.855
	WCDMA Band II	RMC 12.2Kbps	Top Side	5	Full	9400	1880	21.68	22.50	1.208	0.01	0.199	0.240
	WCDMA Band II	RMC 12.2Kbps	Horizontal Up	17	Full	9400	1880	21.68	22.50	1.208	-0.06	0.935	1.129
	WCDMA Band II	RMC 12.2Kbps	Horizontal Up	17	Full	9262	1852.4	21.39	22.50	1.291	0.02	0.815	1.052
	WCDMA Band II	RMC 12.2Kbps	Horizontal Up	17	Full	9538	1907.6	21.66	22.50	1.213	-0.01	0.888	1.077
	WCDMA Band II	RMC 12.2Kbps	Horizontal Down	15	Full	9400	1880	21.68	22.50	1.208	0.03	0.932	1.126
	WCDMA Band II	RMC 12.2Kbps	Horizontal Down	15	Full	9262	1852.4	21.39	22.50	1.291	0.06	0.815	1.052
	WCDMA Band II	RMC 12.2Kbps	Horizontal Down	15	Full	9538	1907.6	21.66	22.50	1.213	0.03	0.929	1.127
	WCDMA Band II	RMC 12.2Kbps	Vertical Front	10	Full	9400	1880	21.68	22.50	1.208	0.17	0.618	0.746
	WCDMA Band II	RMC 12.2Kbps	Vertical Back	15	Full	9400	1880	21.68	22.50	1.208	0.02	0.773	0.934
	WCDMA Band II	RMC 12.2Kbps	Vertical Back	15	Full	9262	1852.4	21.39	22.50	1.291	-0.05	0.677	0.874
	WCDMA Band II	RMC 12.2Kbps	Vertical Back	15	Full	9538	1907.6	21.66	22.50	1.213	0.02	0.760	0.922

<LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB Offset	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
06	LTE Band 12	10M	QPSK	1	0	Horizontal Up	5	Full	23095	707.5	23.52	24.00	1.117	0.01	0.747	**0.834**
	LTE Band 12	10M	QPSK	25	0	Horizontal Up	5	Full	23095	707.5	22.63	23.00	1.089	0.03	0.620	0.675
	LTE Band 12	10M	QPSK	50	0	Horizontal Up	5	Full	23095	707.5	22.69	23.00	1.074	-0.06	0.641	0.688
	LTE Band 12	10M	QPSK	1	0	Horizontal Down	5	Full	23095	707.5	23.52	24.00	1.117	0.02	0.410	0.458
	LTE Band 12	10M	QPSK	25	0	Horizontal Down	5	Full	23095	707.5	22.63	23.00	1.089	-0.09	0.289	0.315
	LTE Band 12	10M	QPSK	1	0	Vertical Front	5	Full	23095	707.5	23.52	24.00	1.117	0.04	0.147	0.164
	LTE Band 12	10M	QPSK	25	0	Vertical Front	5	Full	23095	707.5	22.63	23.00	1.089	0.08	0.105	0.114
	LTE Band 12	10M	QPSK	1	0	Vertical Back	5	Full	23095	707.5	23.52	24.00	1.117	0.01	0.150	0.168
	LTE Band 12	10M	QPSK	25	0	Vertical Back	5	Full	23095	707.5	22.63	23.00	1.089	-0.01	0.163	0.177
	LTE Band 12	10M	QPSK	1	0	Top Side	5	Full	23095	707.5	23.52	24.00	1.117	-0.13	0.146	0.163
	LTE Band 12	10M	QPSK	25	0	Top Side	5	Full	23095	707.5	22.63	23.00	1.089	0.08	0.108	0.118
	LTE Band 5	10M	QPSK	1	0	Horizontal Up	5	Full	20525	836.5	23.56	24.00	1.107	-0.07	0.871	0.964
	LTE Band 5	10M	QPSK	25	0	Horizontal Up	5	Full	20525	836.5	22.76	23.00	1.057	-0.1	0.722	0.763
	LTE Band 5	10M	QPSK	50.	0	Horizontal Up	5	Full	20525	836.5	22.69	23.00	1.074	-0.06	0.691	0.742
07	LTE Band 5	10M	QPSK	1	0	Horizontal Down	5	Full	20525	836.5	23.56	24.00	1.107	-0.16	0.953	**1.055**
	LTE Band 5	10M	QPSK	25	0	Horizontal Down	5	Full	20525	836.5	22.76	23.00	1.057	-0.13	0.756	0.799
	LTE Band 5	10M	QPSK	50	0	Horizontal Down	5	Full	20525	836.5	22.69	23.00	1.074	0.02	0.826	0.887
	LTE Band 5	10M	QPSK	1	0	Vertical Front	5	Full	20525	836.5	23.56	24.00	1.107	0.03	0.609	0.674
	LTE Band 5	10M	QPSK	25	0	Vertical Front	5	Full	20525	836.5	22.76	23.00	1.057	0.01	0.502	0.531
	LTE Band 5	10M	QPSK	1	0	Vertical Back	5	Full	20525	836.5	23.56	24.00	1.107	-0.08	0.689	0.762
	LTE Band 5	10M	QPSK	25	0	Vertical Back	5	Full	20525	836.5	22.76	23.00	1.057	0.03	0.611	0.646
	LTE Band 5	10M	QPSK	1	0	Top Side	5	Full	20525	836.5	23.56	24.00	1.107	0.01	0.340	0.376
	LTE Band 5	10M	QPSK	25	0	Top Side	5	Full	20525	836.5	22.76	23.00	1.057	0.08	0.262	0.277

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB Offset	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
08	LTE Band 4	20M	QPSK	1	0	Horizontal Up	5	Reduced	20175	1732.5	17.60	18.00	1.096	0.01	0.924	**1.013**
	LTE Band 4	20M	QPSK	50	0	Horizontal Up	5	Reduced	20175	1732.5	17.64	18.00	1.086	0.13	0.919	0.998
	LTE Band 4	20M	QPSK	100	0	Horizontal Up	5	Reduced	20175	1732.5	17.71	18.00	1.069	0.06	0.944	1.009
	LTE Band 4	20M	QPSK	1	0	Horizontal Down	5	Reduced	20175	1732.5	17.60	18.00	1.096	0.03	0.674	0.739
	LTE Band 4	20M	QPSK	50	0	Horizontal Down	5	Reduced	20175	1732.5	17.64	18.00	1.086	0.09	0.615	0.668
	LTE Band 4	20M	QPSK	1	0	Vertical Front	5	Reduced	20175	1732.5	17.60	18.00	1.096	0.02	0.307	0.337
	LTE Band 4	20M	QPSK	50	0	Vertical Front	5	Reduced	20175	1732.5	17.64	18.00	1.086	0.01	0.305	0.331
	LTE Band 4	20M	QPSK	1	0	Vertical Back	5	Reduced	20175	1732.5	17.60	18.00	1.096	0.07	0.794	0.871
	LTE Band 4	20M	QPSK	50	0	Vertical Back	5	Reduced	20175	1732.5	17.64	18.00	1.086	0.03	0.744	0.808
	LTE Band 4	20M	QPSK	100	0	Vertical Back	5	Reduced	20175	1732.5	17.71	18.00	1.069	0.08	0.753	0.805
	LTE Band 4	20M	QPSK	1	0	Top Side	5	Full	20175	1732.5	22.09	23.00	1.233	0.01	0.281	0.347
	LTE Band 4	20M	QPSK	50	0	Top Side	5	Full	20175	1732.5	21.11	22.00	1.227	0.06	0.195	0.239
	LTE Band 4	20M	QPSK	1	0	Horizontal Up	17	Full	20175	1732.5	22.09	23.00	1.233	-0.02	0.801	0.988
	LTE Band 4	20M	QPSK	50	0	Horizontal Up	17	Full	20175	1732.5	21.11	22.00	1.227	0.04	0.682	0.837
	LTE Band 4	20M	QPSK	100	0	Horizontal Up	17	Full	20175	1732.5	21.21	22.00	1.199	-0.08	0.608	0.729
	LTE Band 4	20M	QPSK	1	0	Horizontal Down	15	Full	20175	1732.5	22.09	23.00	1.233	0.01	0.606	0.747
	LTE Band 4	20M	QPSK	50	0	Horizontal Down	15	Full	20175	1732.5	21.11	22.00	1.227	0.02	0.591	0.725
	LTE Band 4	20M	QPSK	1	0	Vertical Front	10	Full	20175	1732.5	22.09	23.00	1.233	0.05	0.340	0.419
	LTE Band 4	20M	QPSK	50	0	Vertical Front	10	Full	20175	1732.5	21.11	22.00	1.227	0.06	0.317	0.389
	LTE Band 4	20M	QPSK	1	0	Vertical Back	15	Full	20175	1732.5	22.09	23.00	1.233	0.01	0.574	0.708
	LTE Band 4	20M	QPSK	50	0	Vertical Back	15	Full	20175	1732.5	21.11	22.00	1.227	0.03	0.476	0.584
	LTE Band 2	20M	QPSK	1	0	Horizontal Up	5	Reduced	18900	1880	17.96	18.00	1.009	0.09	0.766	0.773
	LTE Band 2	20M	QPSK	1	0	Horizontal Up	5	Reduced	18700	1860	17.61	18.00	1.094	0.18	0.658	0.720
09	LTE Band 2	20M	QPSK	1	0	Horizontal Up	5	Reduced	19100	1900	17.65	18.00	1.084	-0.16	0.982	**1.064**
	LTE Band 2	20M	QPSK	50	0	Horizontal Up	5	Reduced	18900	1880	17.85	18.00	1.035	-0.18	0.741	0.767
	LTE Band 2	20M	QPSK	100	0	Horizontal Up	5	Reduced	18900	1880	17.79	18.00	1.050	-0.12	0.757	0.795
	LTE Band 2	20M	QPSK	1	0	Horizontal Down	5	Reduced	18900	1880	17.96	18.00	1.009	0.04	0.531	0.536
	LTE Band 2	20M	QPSK	50	0	Horizontal Down	5	Reduced	18900	1880	17.85	18.00	1.035	0.02	0.499	0.517
	LTE Band 2	20M	QPSK	1	0	Vertical Front	5	Reduced	18900	1880	17.96	18.00	1.009	0.13	0.278	0.281
	LTE Band 2	20M	QPSK	50	0	Vertical Front	5	Reduced	18900	1880	17.85	18.00	1.035	0.02	0.249	0.258
	LTE Band 2	20M	QPSK	1	0	Vertical Back	5	Reduced	18900	1880	17.96	18.00	1.009	0.09	0.469	0.473
	LTE Band 2	20M	QPSK	50	0	Vertical Back	5	Reduced	18900	1880	17.85	18.00	1.035	0.02	0.455	0.471
	LTE Band 2	20M	QPSK	1	0	Top Side	5	Full	18900	1880	22.30	23.00	1.175	0.05	0.234	0.275
	LTE Band 2	20M	QPSK	50	0	Top Side	5	Full	18900	1880	21.43	22.00	1.140	0.01	0.199	0.227
	LTE Band 2	20M	QPSK	1	0	Horizontal Up	17	Full	18900	1880	22.30	23.00	1.175	0.08	0.477	0.560
	LTE Band 2	20M	QPSK	50	0	Horizontal Up	17	Full	18900	1880	21.43	22.00	1.140	-0.03	0.407	0.464
	LTE Band 2	20M	QPSK	1	0	Horizontal Down	15	Full	18900	1880	22.30	23.00	1.175	-0.03	0.431	0.506
	LTE Band 2	20M	QPSK	50	0	Horizontal Down	15	Full	18900	1880	21.43	22.00	1.140	0.08	0.370	0.422
	LTE Band 2	20M	QPSK	1	0	Vertical Front	10	Full	18900	1880	22.30	23.00	1.175	-0.12	0.392	0.461
	LTE Band 2	20M	QPSK	50	0	Vertical Front	10	Full	18900	1880	21.43	22.00	1.140	0.08	0.316	0.360
	LTE Band 2	20M	QPSK	1	0	Vertical Back	15	Full	18900	1880	22.30	23.00	1.175	-0.04	0.367	0.431
	LTE Band 2	20M	QPSK	50	0	Vertical Back	15	Full	18900	1880	21.43	22.00	1.140	0.1	0.320	0.365

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB Offset	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
10	LTE Band 7	20M	QPSK	1	0	Horizontal Up	5	Full	21100	2535	22.90	23.00	1.023	-0.01	1.050	**1.074**
	LTE Band 7	20M	QPSK	1	0	Horizontal Up	5	Full	20850	2510	22.80	23.00	1.047	0.02	0.933	0.977
	LTE Band 7	20M	QPSK	1	0	Horizontal Up	5	Full	21350	2560	22.54	23.00	1.112	-0.07	0.945	1.051
	LTE Band 7	20M	QPSK	50	0	Horizontal Up	5	Full	21100	2535	21.93	22.00	1.016	-0.07	0.983	0.999
	LTE Band 7	20M	QPSK	50	0	Horizontal Up	5	Full	20850	2510	21.79	22.00	1.050	0.01	0.985	1.034
	LTE Band 7	20M	QPSK	50	0	Horizontal Up	5	Full	21350	2560	21.87	22.00	1.030	-0.02	0.976	1.006
	LTE Band 7	20M	QPSK	100	0	Horizontal Up	5	Full	21100	2535	21.92	22.00	1.019	-0.08	0.963	0.981
	LTE Band 7	20M	QPSK	1	0	Horizontal Down	5	Full	21100	2535	22.90	23.00	1.023	0.02	0.576	0.589
	LTE Band 7	20M	QPSK	50	0	Horizontal Down	5	Full	21100	2535	21.93	22.00	1.016	0.07	0.606	0.616
	LTE Band 7	20M	QPSK	1	0	Vertical Front	5	Full	21100	2535	22.90	23.00	1.023	0.03	0.403	0.412
	LTE Band 7	20M	QPSK	50	0	Vertical Front	5	Full	21100	2535	21.93	22.00	1.016	0.02	0.307	0.312
	LTE Band 7	20M	QPSK	1	0	Vertical Back	5	Full	21100	2535	22.90	23.00	1.023	0.11	0.622	0.636
	LTE Band 7	20M	QPSK	50	0	Vertical Back	5	Full	21100	2535	21.93	22.00	1.016	-0.14	0.546	0.555
	LTE Band 7	20M	QPSK	1	0	Top Side	5	Full	21100	2535	22.90	23.00	1.023	-0.12	0.162	0.166
	LTE Band 7	20M	QPSK	50	0	Top Side	5	Full	21100	2535	21.93	22.00	1.016	0.06	0.128	0.130

15.2 Repeated SAR Measurement

No.	Band	Mode	BW (MHz)	Modulation	RB Size	RB Offset	Test Position	Gap (mm)	Power Mode	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	WCDMA Band II	RMC 12.2Kbps	-	-	-	-	Horizontal Up	5	Reduced	9400	1880	16.79	17.00	1.050	0.08	1.080	1	1.134
2nd	WCDMA Band II	RMC 12.2Kbps	-	-	-	-	Horizontal Up	5	Reduced	9400	1880	16.79	17.00	1.050	-0.03	1.066	1.013	1.119
1st	LTE Band 5	-	10M	QPSK	1	0	Horizontal Down	5	Full	20525	836.5	23.56	24.00	1.107	-0.16	0.953	1	1.055
2nd	LTE Band 5	-	10M	QPSK	1	0	Horizontal Down	5	Full	20525	836.5	23.56	24.00	1.107	-0.06	0.948	1.005	1.049
1st	LTE Band 4	-	20M	QPSK	100	0	Horizontal Up	5	Reduced	20175	1732.5	17.71	18.00	1.069	0.06	0.944	1	1.009
2nd	LTE Band 4	-	20M	QPSK	100	0	Horizontal Up	5	Reduced	20175	1732.5	17.71	18.00	1.069	-0.01	0.911	1.036	0.974
1st	LTE Band 7	-	20M	QPSK	1	0	Horizontal Up	5	Full	21100	2535	22.90	23.00	1.023	-0.01	1.050	1	1.074
2nd	LTE Band 7	-	20M	QPSK	1	0	Horizontal Up	5	Full	21100	2535	22.90	23.00	1.023	-0.01	1.020	1.029	1.044

General Note:

1. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
2. Per KDB 865664 D01v01r04, if the ratio among the repeated measurement is ≤ 1.2 and the measured SAR <1.45W/kg, only one repeated measurement is required.
3. The ratio is the difference in percentage between original and repeated *measured SAR*.
4. All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.

16. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations
1.	None

General Note:

1. EUT will choose each GSM, WCDMA and LTE according to the network signal condition; therefore, they will not operate simultaneously at any moment.

Test Engineer： Nick Hu, Yuan Zhao, Jiaxing Chang, Yuankai Kong

17. Uncertainty Assessment

Per KDB 865664 D01 SAR measurement 100MHz to 6GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be ≤ 30%, for a confidence interval of k = 2. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. For this device, the highest measured1-g SAR is less 1.5W/kg. Therefore, the measurement uncertainty table is not required in this report.

18. References

[1] FCC 47 CFR Part 2 “Frequency Allocations and Radio Treaty Matters; General Rules and Regulations”

[2] ANSI/IEEE Std. C95.1-1992, “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”, September 1992

[3] IEEE Std. 1528-2013, “IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, Sep 2013

[4] SPEAG DASY System Handbook

[5] FCC KDB 447498 D01 v06, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, Oct 2015

[6] FCC KDB 447498 D02 v02r01, “SAR Measurement Procedures for USB Dongle Transmitters”, Oct 2015.

[7] FCC KDB 941225 D01 v03r01, “3G SAR MEAUREMENT PROCEDURES”, Oct 2015

[8] FCC KDB 941225 D05 v02r05, “SAR Evaluation Considerations for LTE Devices”, Dec 2015

[9] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.

[10] FCC KDB 865664 D02 v01r02, “RF Exposure Compliance Reporting and Documentation Considerations” Oct 2015.

------THE END------

Appendix A. Plots of System Performance Check

The plots are shown as follows.

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2019.11.3

System Check_Head_750MHz

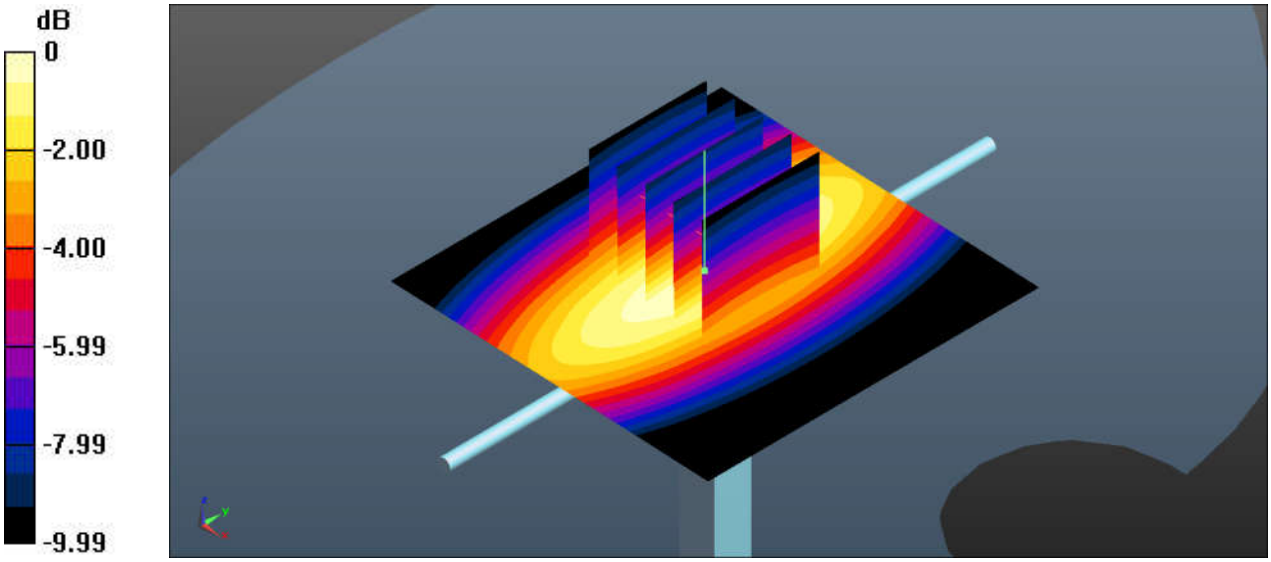
DUT: D750V3 - SN:1087

Communication System: UID 0, CW (0); Frequency: 750 MHz;Duty Cycle: 1:1
Medium: HSL_750 Medium parameters used: f = 750 MHz; σ = 0.895 S/m; ε_r = 41.699; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃； Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(9.37, 9.37, 9.37); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn690; Calibrated: 2019.1.23
- Phantom: SAM2; Type: SAM; Serial: TP-1503
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.70 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 49.70 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 3.20 W/kg
SAR(1 g) = 2.16 W/kg; SAR(10 g) = 1.44 W/kg
Maximum value of SAR (measured) = 2.72 W/kg



0 dB = 2.72 W/kg = 4.35 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2019.11.1

System Check_Head_835MHz

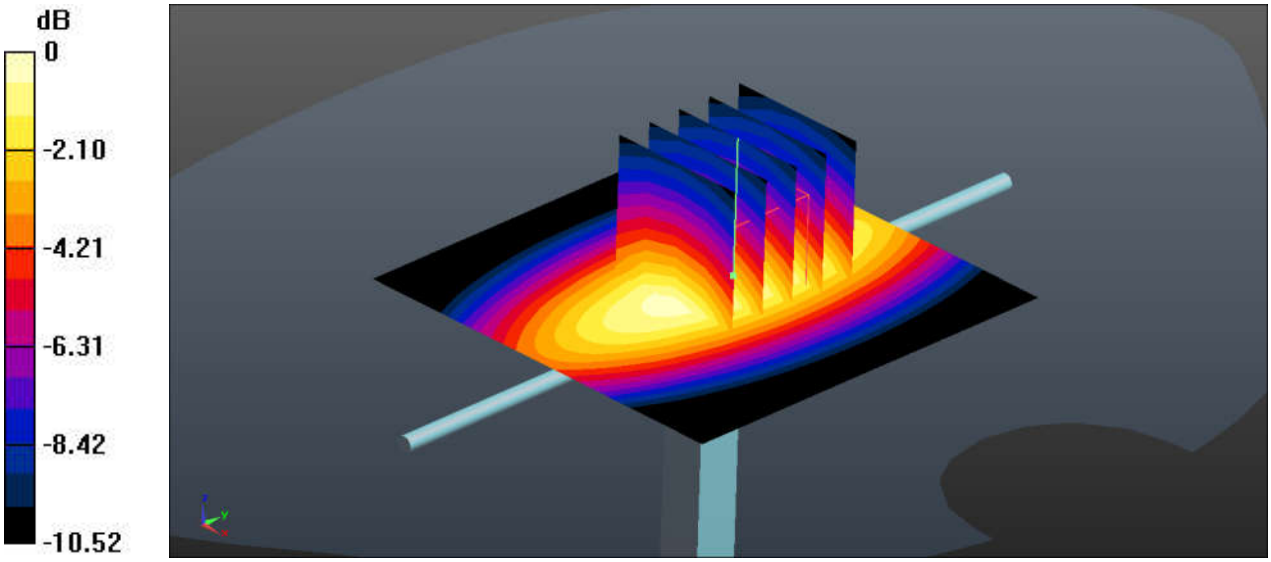
DUT: D835V2 - SN:4d151

Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1
Medium: HSL_835 Medium parameters used: f = 835 MHz; σ = 0.929 S/m; ε_r = 42.242; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃； Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(9.07, 9.07, 9.07); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn690; Calibrated: 2019.1.23
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 3.13 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 53.28 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 3.72 W/kg
SAR(1 g) = 2.52 W/kg; SAR(10 g) = 1.66 W/kg
Maximum value of SAR (measured) = 3.18 W/kg



0 dB = 3.18 W/kg = 5.02 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2019.10.31

System Check_Head_1750MHz

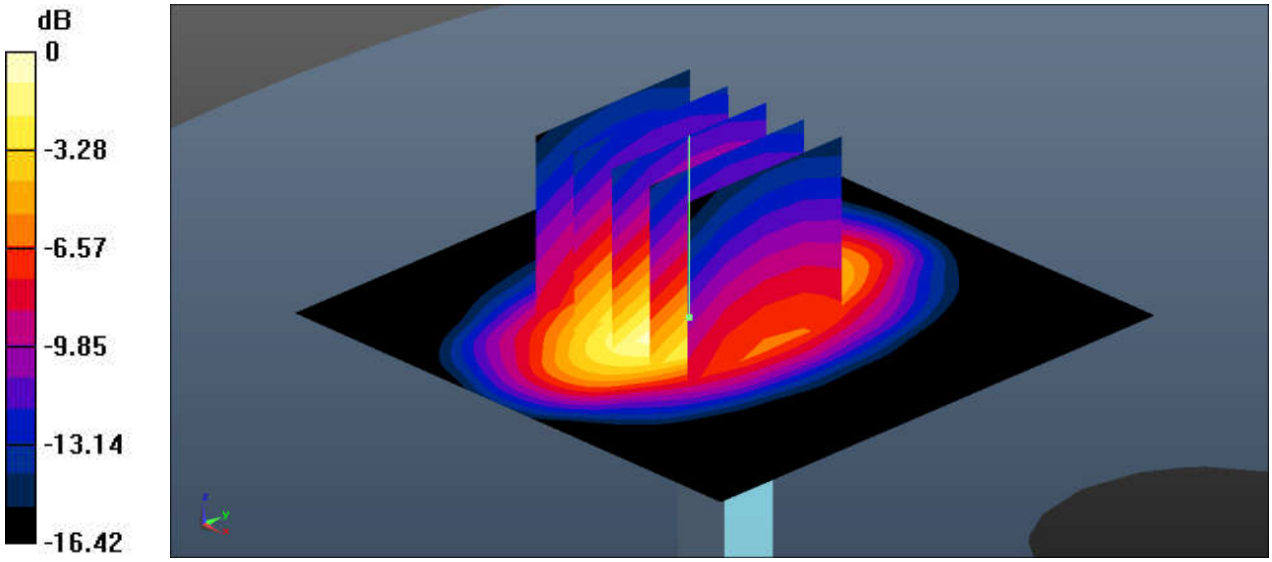
DUT: D1750V2 - SN:1090

Communication System: UID 0, CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium: HSL_1750 Medium parameters used: f = 1750 MHz; σ = 1.382 S/m; ε_r = 39.7; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃； Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(7.95, 7.95, 7.95); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn690; Calibrated: 2019.1.23
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 13.3 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 84.43 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 16.2 W/kg
SAR(1 g) = 9.32 W/kg; SAR(10 g) = 5.08 W/kg
Maximum value of SAR (measured) = 12.9 W/kg



0 dB = 12.9 W/kg = 11.11 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2019.11.2

System Check_Head_1900MHz

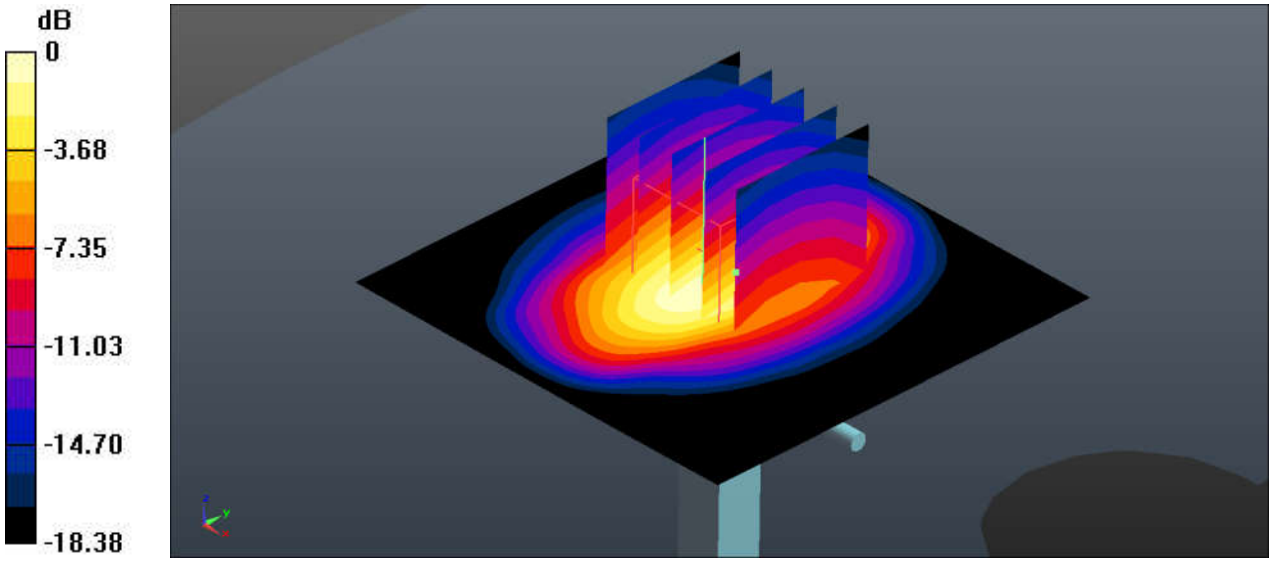
DUT: D1900V2 - SN:5d170

Communication System: UID 0, CW (0); Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: HSL_1900 Medium parameters used: f = 1900 MHz; σ = 1.397 S/m; ε_r = 39.035; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃； Liquid Temperature：22.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(7.67, 7.67, 7.67); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn690; Calibrated: 2019.1.23
- Phantom: SAM2; Type: SAM; Serial: TP-1503
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 14.2 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 106.0 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 18.3 W/kg
SAR(1 g) = 9.92 W/kg; SAR(10 g) = 5.22 W/kg
Maximum value of SAR (measured) = 13.8 W/kg



0 dB = 13.8 W/kg = 11.40 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2019.11.4

System Check_Head_2600MHz

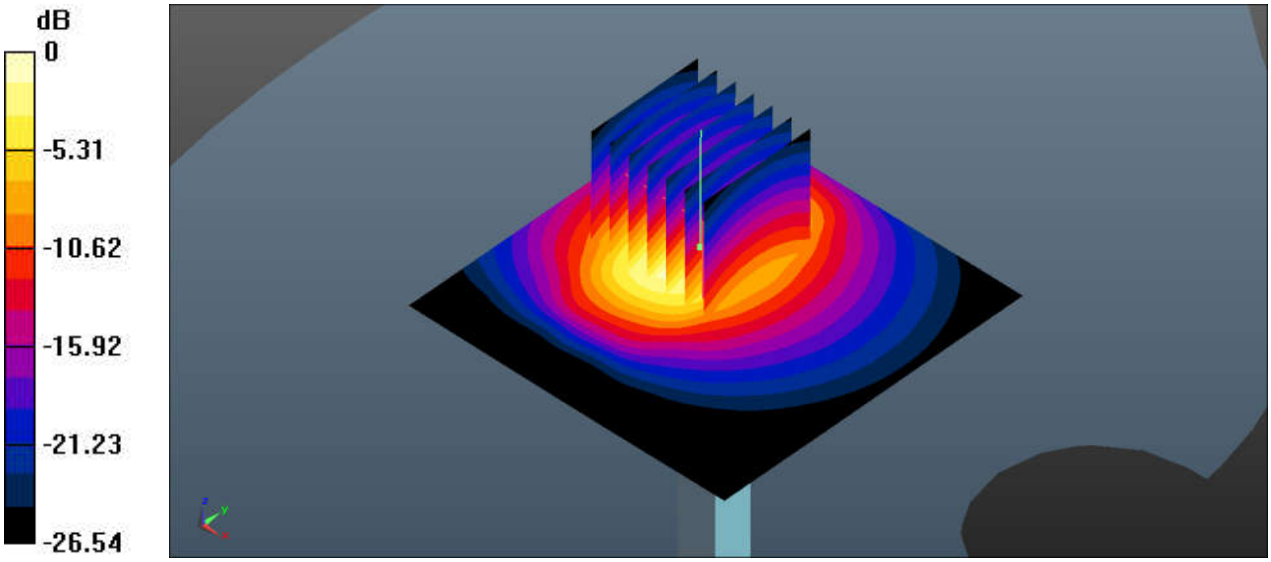
DUT: D2600V2 - SN:1061

Communication System: UID 0, CW; Frequency: 2600 MHz;Duty Cycle: 1:1
Medium: HSL_2600 Medium parameters used: f = 2600 MHz; σ = 2.027 S/m; ε_r = 37.857; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：22.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(6.9, 6.9, 6.9); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn690; Calibrated: 2019.1.23
- Phantom: SAM2; Type: SAM; Serial: TP-1503
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Pin=250mW/Area Scan (71x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 23.1 W/kg

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.60 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 34.1 W/kg
SAR(1 g) = 14 W/kg; SAR(10 g) = 5.96 W/kg
Maximum value of SAR (measured) = 23.0 W/kg



0 dB = 23.0 W/kg = 13.62 dBW/kg

Appendix B. Plots of SAR Measurement

The plots are shown as follows.

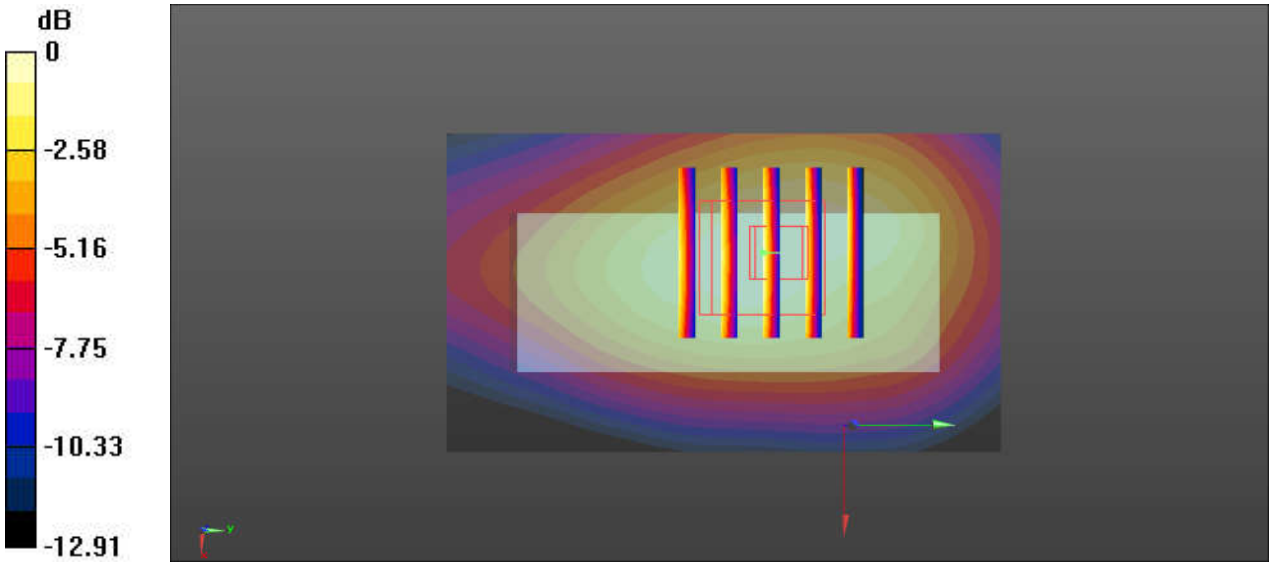
01_GSM850_GPRS 2 Tx slots_Horizontal Down_5mm_Ch251

Communication System: UID 0, GSM850 (0); Frequency: 848.8 MHz;Duty Cycle: 1:4.15
Medium: HSL_835 Medium parameters used: f = 849 MHz; σ = 0.943 S/m; ε_r = 42.103; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(9.07, 9.07, 9.07); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn690; Calibrated: 2019.1.23
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch251/Area Scan (41x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.05 W/kg

Ch251/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 30.00 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 1.44 W/kg
SAR(1 g) = 0.917 W/kg; SAR(10 g) = 0.577 W/kg
Maximum value of SAR (measured) = 1.07 W/kg



0 dB = 1.05 W/kg = 0.21 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2019.11.2

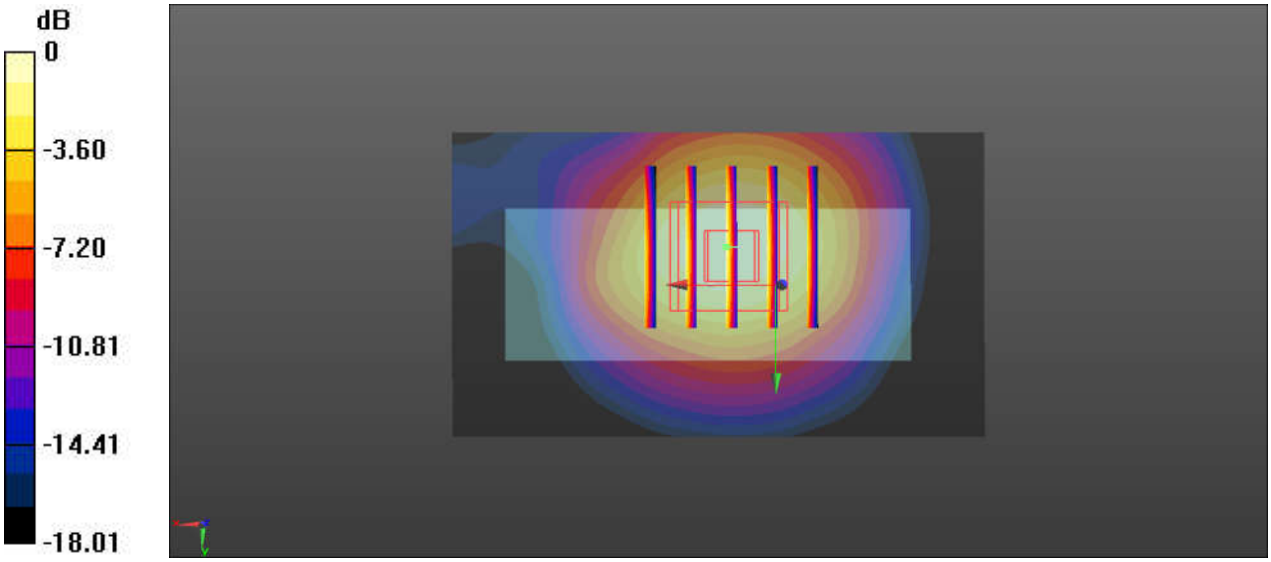
02_GSM1900_GPRS 2 Tx slots_Horizontal Up_5mm_Ch512

Communication System: UID 0, PCS (0); Frequency: 1850.2 MHz;Duty Cycle: 1:4.15
Medium: HSL_1900 Medium parameters used: f = 1850.2 MHz; σ = 1.347 S/m; ε_r = 39.244; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(7.67, 7.67, 7.67); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn690; Calibrated: 2019.1.23
- Phantom: SAM2; Type: SAM; Serial: TP-1503
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch512/Area Scan (41x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.33 W/kg

Ch512/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.34 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 1.71 W/kg
SAR(1 g) = 1.02 W/kg; SAR(10 g) = 0.570 W/kg
Maximum value of SAR (measured) = 1.24 W/kg



0 dB = 1.24 W/kg = 0.93 dBW/kg

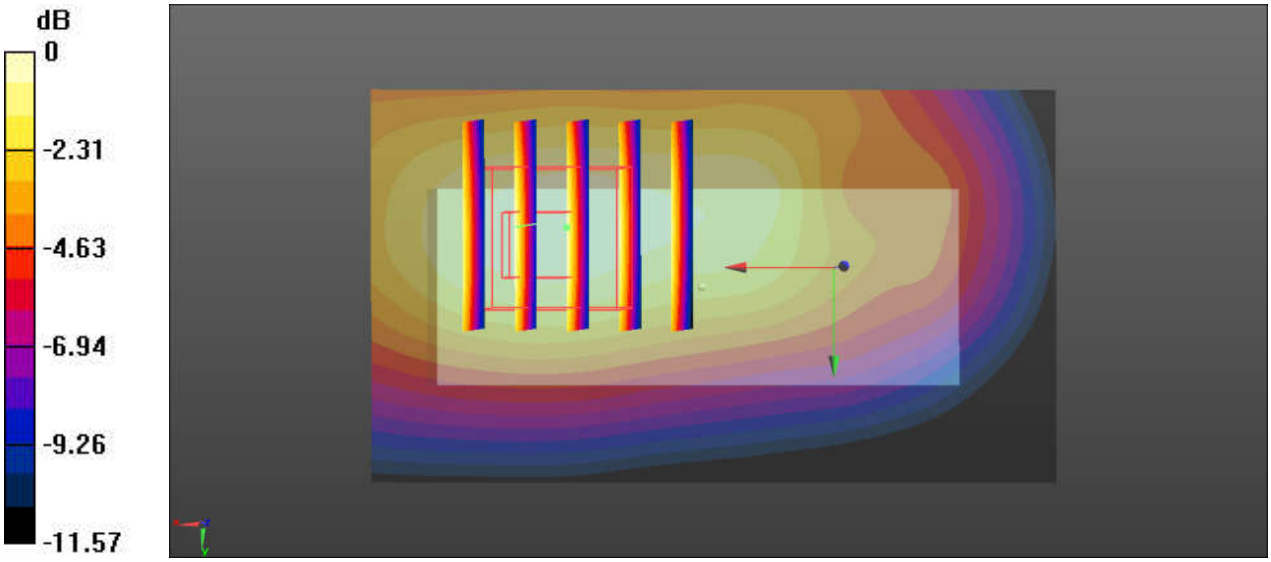
03_WCDMA V_RMC 12.2Kbps_Horizontal Up_5mm_Ch4132

Communication System: UID 0, WCDMA (0); Frequency: 826.4 MHz;Duty Cycle: 1:1
Medium: HSL_835 Medium parameters used: f = 826.4 MHz; σ = 0.92 S/m; ε_r = 42.338; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃； Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(9.07, 9.07, 9.07); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn690; Calibrated: 2019.1.23
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch4132/Area Scan (41x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.779 W/kg

Ch4132/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 25.00 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 1.03 W/kg
SAR(1 g) = 0.711 W/kg; SAR(10 g) = 0.468 W/kg
Maximum value of SAR (measured) = 0.800 W/kg



0 dB = 0.800 W/kg = -0.97 dBW/kg

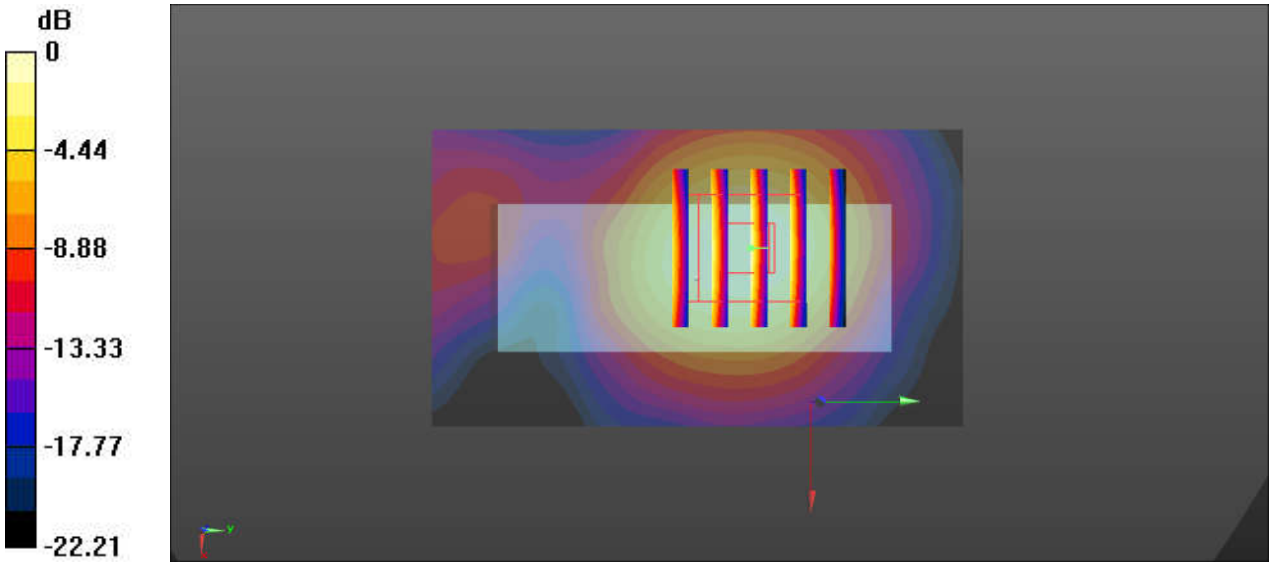
04_WCDMA IV_RMC 12.2Kbps_Horizontal Up_5mm_Ch1513

Communication System: UID 0, WCDMA (0); Frequency: 1752.6 MHz;Duty Cycle: 1:1
Medium: HSL_1750 Medium parameters used: f = 1753 MHz; σ = 1.385 S/m; ε_r = 39.687; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(7.95, 7.95, 7.95); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn690; Calibrated: 2019.1.23
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch1513/Area Scan (51x91x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.10 W/kg

Ch1513/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.19 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 1.49 W/kg
SAR(1 g) = 0.869 W/kg; SAR(10 g) = 0.472 W/kg
Maximum value of SAR (measured) = 1.07 W/kg



0 dB = 1.10 W/kg = 0.41 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2019.11.2

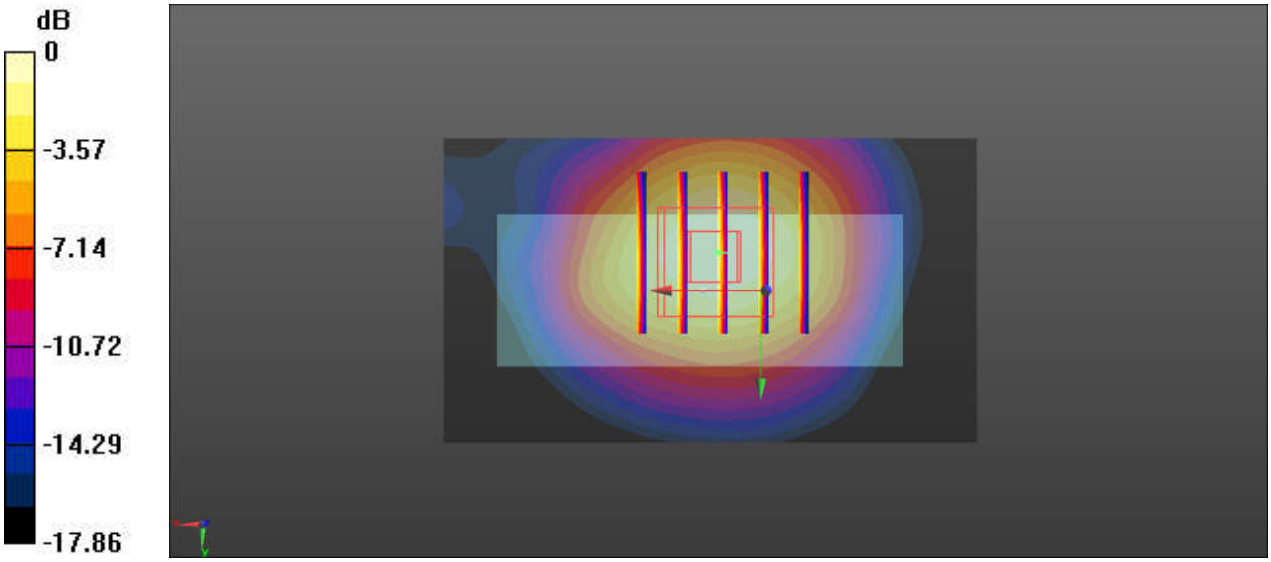
05_WCDMA II_RMC 12.2Kbps_Horizontal Up_5mm_Ch9400

Communication System: UID 0, WCDMA (0); Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: HSL_1900 Medium parameters used: f = 1880 MHz; σ = 1.376 S/m; ε_r = 39.139; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(7.67, 7.67, 7.67); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn690; Calibrated: 2019.1.23
- Phantom: SAM2; Type: SAM; Serial: TP-1503
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch9400/Area Scan (41x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.43 W/kg

Ch9400/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.84 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 1.80 W/kg
SAR(1 g) = 1.08 W/kg; SAR(10 g) = 0.602 W/kg
Maximum value of SAR (measured) = 1.31 W/kg



0 dB = 1.31 W/kg = 1.17 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2019.11.3

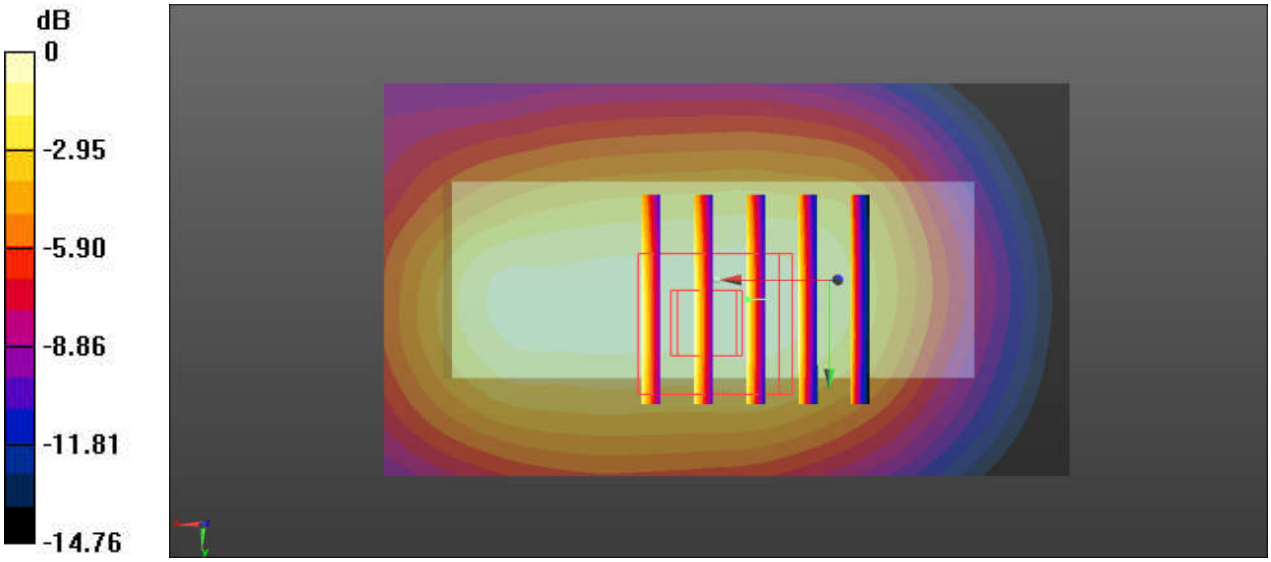
06_LTE Band 12_10M_QPSK_1RB_0Offset_Horizontal Up_5mm_Ch23095

Communication System: UID 0, LTE-FDD (0); Frequency: 707.5 MHz;Duty Cycle: 1:1
Medium: HSL_750 Medium parameters used: f = 707.5 MHz; σ = 0.852 S/m; ε_r = 42.279; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：22.8 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(9.37, 9.37, 9.37); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn690; Calibrated: 2019.1.23
- Phantom: SAM2; Type: SAM; Serial: TP-1503
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch23095/Area Scan (41x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.937 W/kg

Ch23095/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 34.26 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.20 W/kg
SAR(1 g) = 0.747 W/kg; SAR(10 g) = 0.474 W/kg
Maximum value of SAR (measured) = 0.992 W/kg



0 dB = 0.992 W/kg = -0.03 dBW/kg

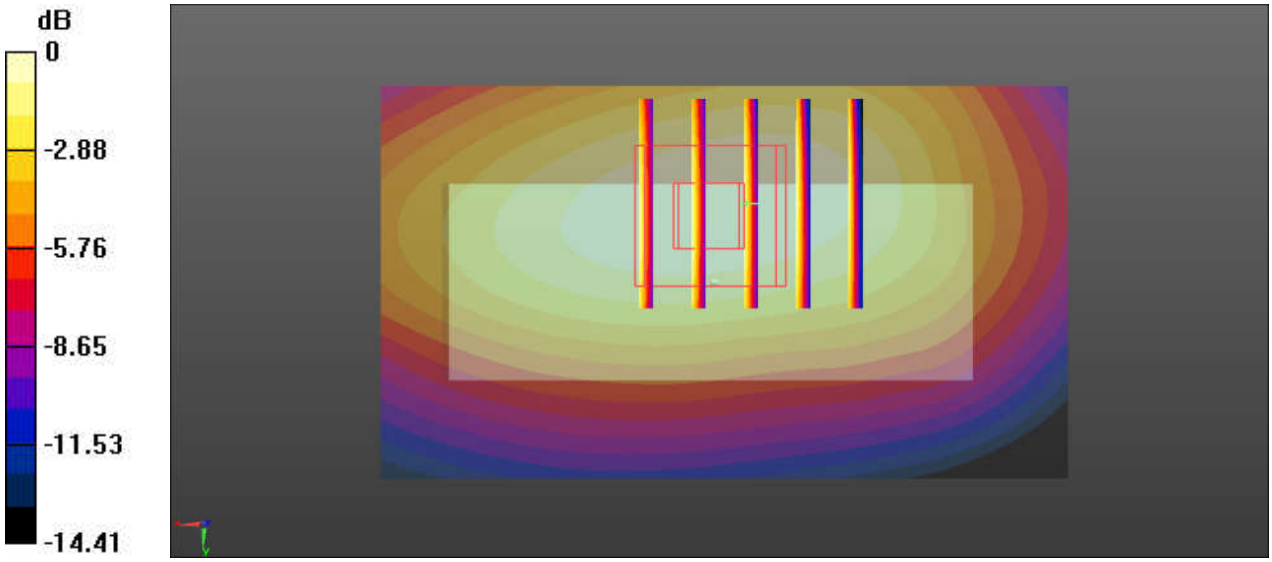
07_LTE Band 5_10M_QPSK_1RB_0Offset_Horizontal Down_5mm_Ch20525

Communication System: UID 0, LTE-FDD (0); Frequency: 836.5 MHz;Duty Cycle: 1:1
Medium: HSL_835 Medium parameters used: f = 836.5 MHz; σ = 0.931 S/m; ε_r = 42.228; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃； Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(9.07, 9.07, 9.07); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn690; Calibrated: 2019.1.23
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch20525/Area Scan (41x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.11 W/kg

Ch20525/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 31.02 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 1.38 W/kg
SAR(1 g) = 0.953 W/kg; SAR(10 g) = 0.630 W/kg
Maximum value of SAR (measured) = 1.09 W/kg



0 dB = 1.09 W/kg = 0.37 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2019.10.31

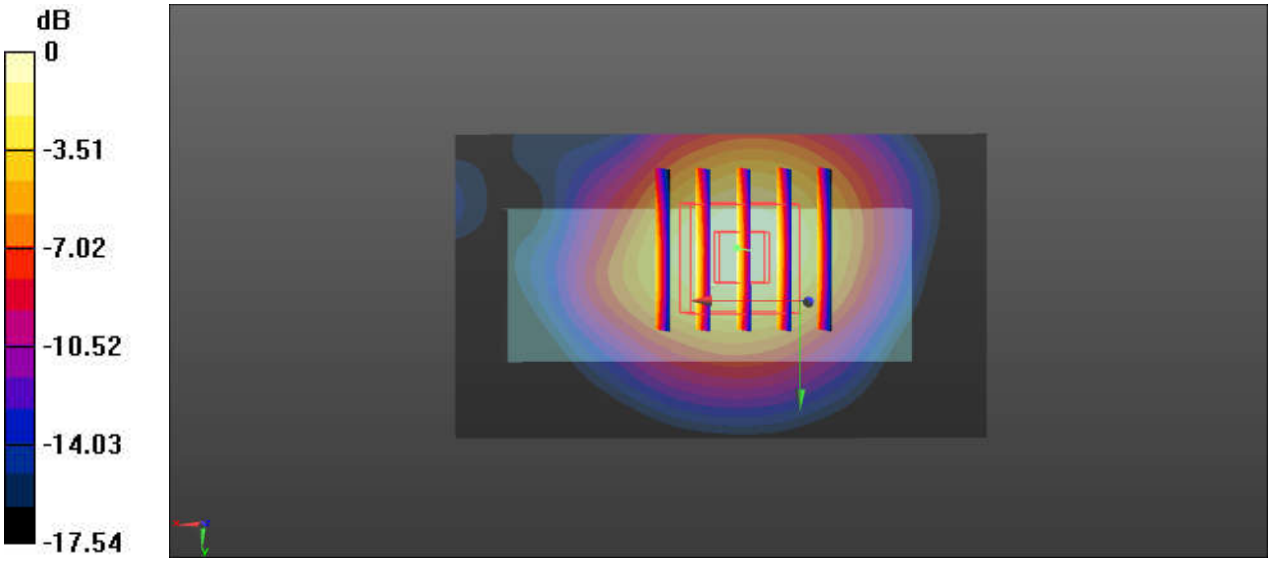
08_LTE Band 4_20M_QPSK_1RB_0Offset_Horizontal Up_5mm_Ch20175

Communication System: UID 0, LTE-FDD (0); Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium: HSL_1750 Medium parameters used: f = 1733 MHz; σ = 1.363 S/m; ε_r = 39.779; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃； Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(7.95, 7.95, 7.95); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn690; Calibrated: 2019.1.23
- Phantom: SAM1; Type: SAM; Serial: TP-1697
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch20175/Area Scan (41x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.14 W/kg

Ch20175/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.65 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.54 W/kg
SAR(1 g) = 0.924 W/kg; SAR(10 g) = 0.511 W/kg
Maximum value of SAR (measured) = 1.12 W/kg



0 dB = 1.12 W/kg = 0.49 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2019.11.2

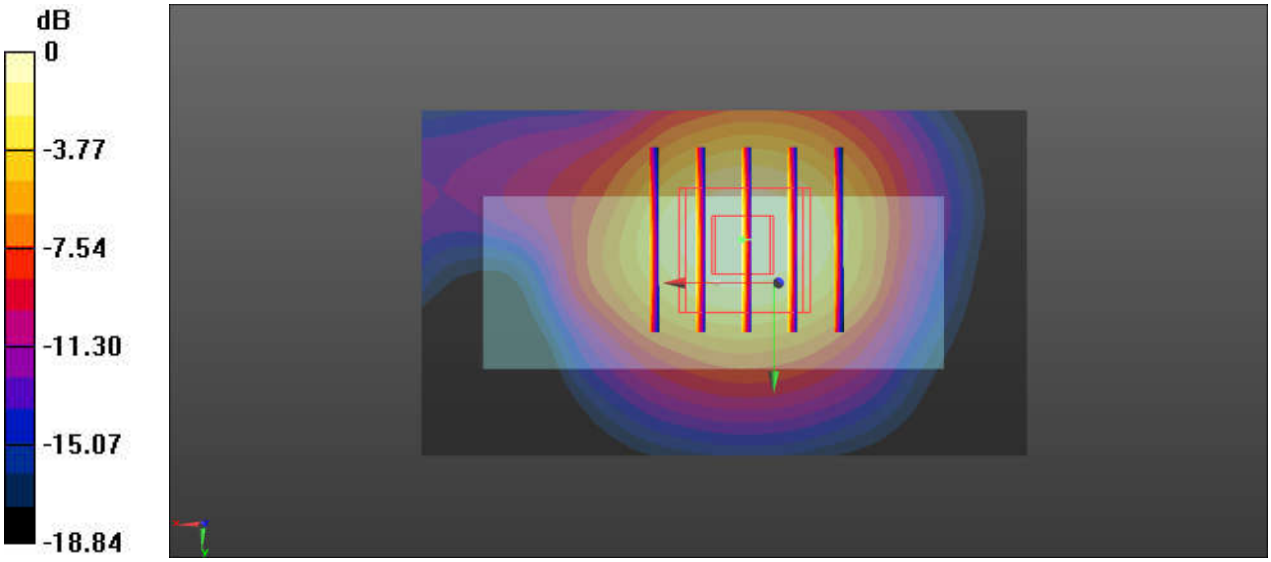
09_LTE Band 2_20M_QPSK_1RB_0Offset_Horizontal Up_5mm_Ch19100

Communication System: UID 0, LTE-FDD (0); Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: HSL_1900 Medium parameters used: f = 1900 MHz; σ = 1.397 S/m; ε_r = 39.035; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(7.67, 7.67, 7.67); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn690; Calibrated: 2019.1.23
- Phantom: SAM2; Type: SAM; Serial: TP-1503
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch19100/Area Scan (41x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.56 W/kg

Ch19100/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 31.47 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 1.75 W/kg
SAR(1 g) = 0.982 W/kg; SAR(10 g) = 0.531 W/kg
Maximum value of SAR (measured) = 1.46 W/kg



0 dB = 1.46 W/kg = 1.64 dBW/kg

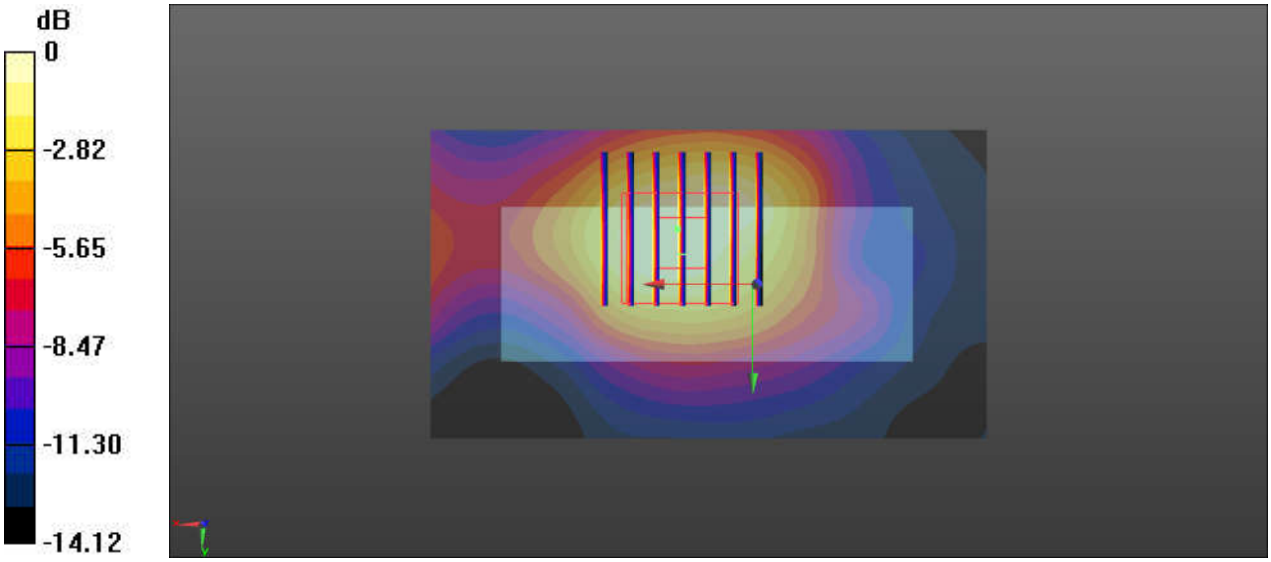
10_LTE Band 7_20M_QPSK_1RB_0Offset_Horizontal Up_5mm_Ch21100

Communication System: UID 0, LTE-FDD (0); Frequency: 2535 MHz;Duty Cycle: 1:1
Medium: HSL_2600 Medium parameters used: f = 2535 MHz; σ = 1.951 S/m; ε_r = 38.117; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：22.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(6.9, 6.9, 6.9); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn690; Calibrated: 2019.1.23
- Phantom: SAM2; Type: SAM; Serial: TP-1503
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

Ch21100/Area Scan (51x91x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 1.31 W/kg

Ch21100/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 22.99 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.87 W/kg
SAR(1 g) = 1.05 W/kg; SAR(10 g) = 0.575 W/kg
Maximum value of SAR (measured) = 1.28 W/kg



0 dB = 1.28 W/kg = 1.07 dBW/kg

Appendix C. DASY Calibration Certificate

The DASY calibration certificates are shown as follows.

In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

中国认可
国际互认
校准
CALIBRATION
CNAS L0570

Client **Sporton** **Certificate No: Z19-60081**

CALIBRATION CERTIFICATE

Object	D750V3 - SN: 1087
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	March 27, 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)℃ 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	106277	20-Aug-18 (CTTL, No.J18X06862)	Aug-19
Power sensor NRP8S	104291	20-Aug-18 (CTTL, No.J18X06862)	Aug-19
Reference Probe EX3DV4	SN 3617	31-Jan-19(SPEAG,No.EX3-3617_Jan19)	Jan-20
DAE4	SN 1331	06-Feb-19(SPEAG,No.DAE4-1331_Feb19)	Feb-20
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	23-Jan-19 (CTTL, No.J19X00336)	Jan-20
NetworkAnalyzer E5071C	MY46110673	24-Jan-19 (CTTL, No.J19X00547)	Jan-20

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

Issued: March 29, 2019

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

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:

a) 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
b) 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
c) 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
d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

e) 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%.

In Collaboration with
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CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

Measurement Conditions

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

DASY Version	DASY52	52.10.2.1495
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 ± 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 ± 0.2) °C	43.0 ± 6 %	0.90 mho/m ± 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	2.10 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.36 W/kg ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.42 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.65 W/kg ± 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 ± 0.2) °C	56.9 ± 6 %	0.94 mho/m ± 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	2.09 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.58 W/kg ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.41 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.75 W/kg ±18.7 % (k=2)**

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.4Ω- 2.59jΩ
Return Loss	- 29.3dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	51.6Ω- 3.86jΩ
Return Loss	- 27.7dB

General Antenna Parameters and Design

Electrical Delay (one direction)	0.898 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: 03.26.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1087

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

Medium parameters used: f = 750 MHz; σ = 0.903 S/m; ε_r = 43.01; ρ = 1000 kg/m3

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(10.03, 10.03, 10.03) @ 750 MHz; Calibrated: 1/31/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 2/6/2019
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

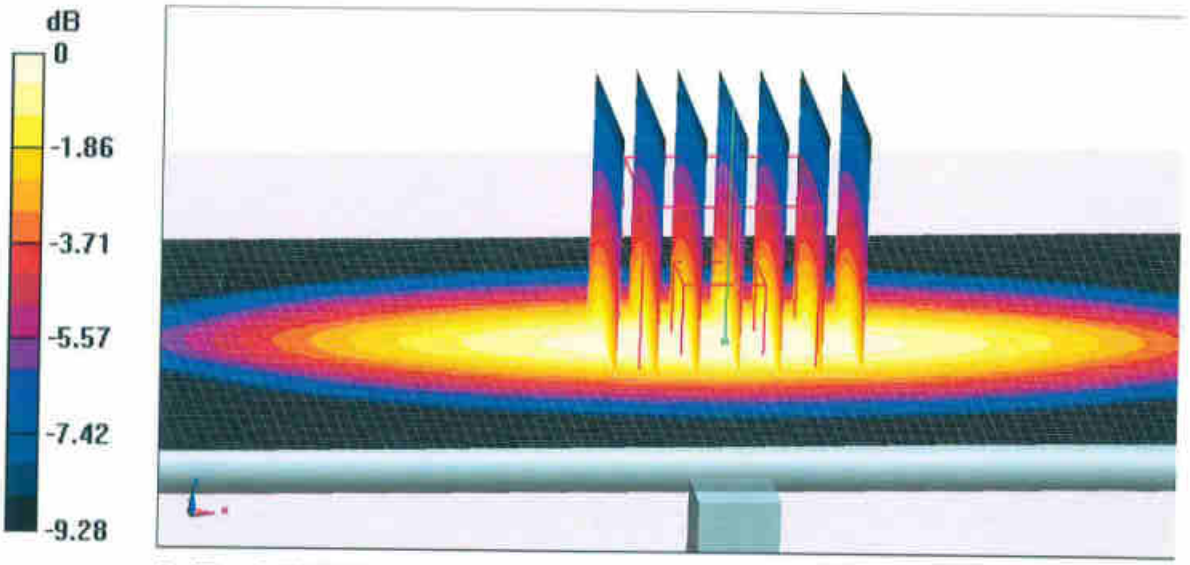
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 55.05 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.00 W/kg

SAR(1 g) = 2.1 W/kg; SAR(10 g) = 1.42 W/kg

Maximum value of SAR (measured) = 2.72 W/kg



0 dB = 2.72 W/kg = 4.35 dBW/kg

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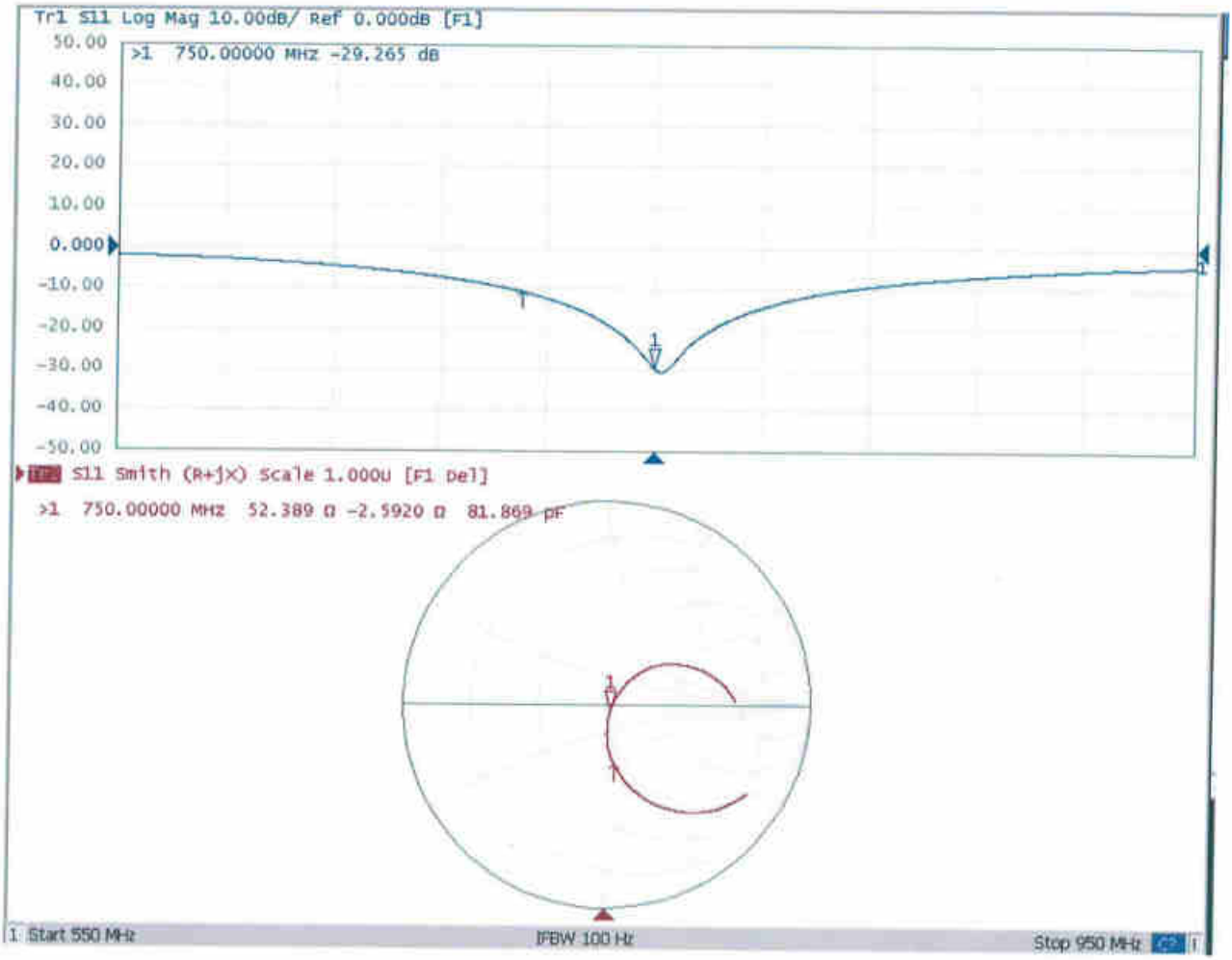
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL Date: 03.26.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1087

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

Medium parameters used: f = 750 MHz; σ = 0.935 S/m; ε_r = 56.85; ρ = 1000 kg/m3

Phantom section: Center Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(9.85, 9.85, 9.85) @ 750 MHz; Calibrated: 1/31/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 2/6/2019
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

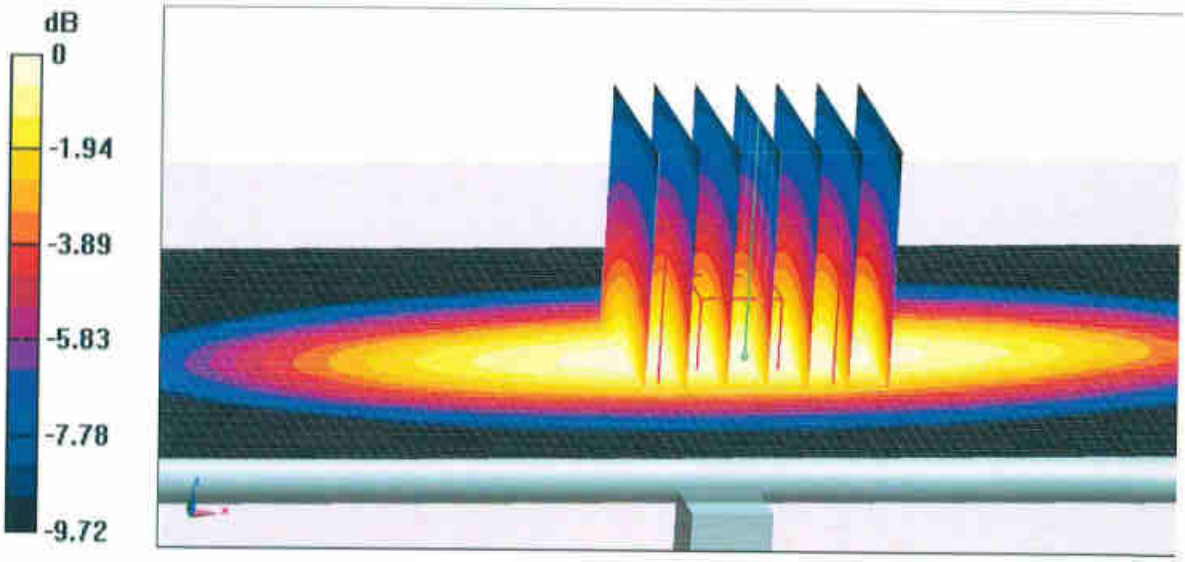
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 53.71 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.08 W/kg

SAR(1 g) = 2.09 W/kg; SAR(10 g) = 1.41 W/kg

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



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

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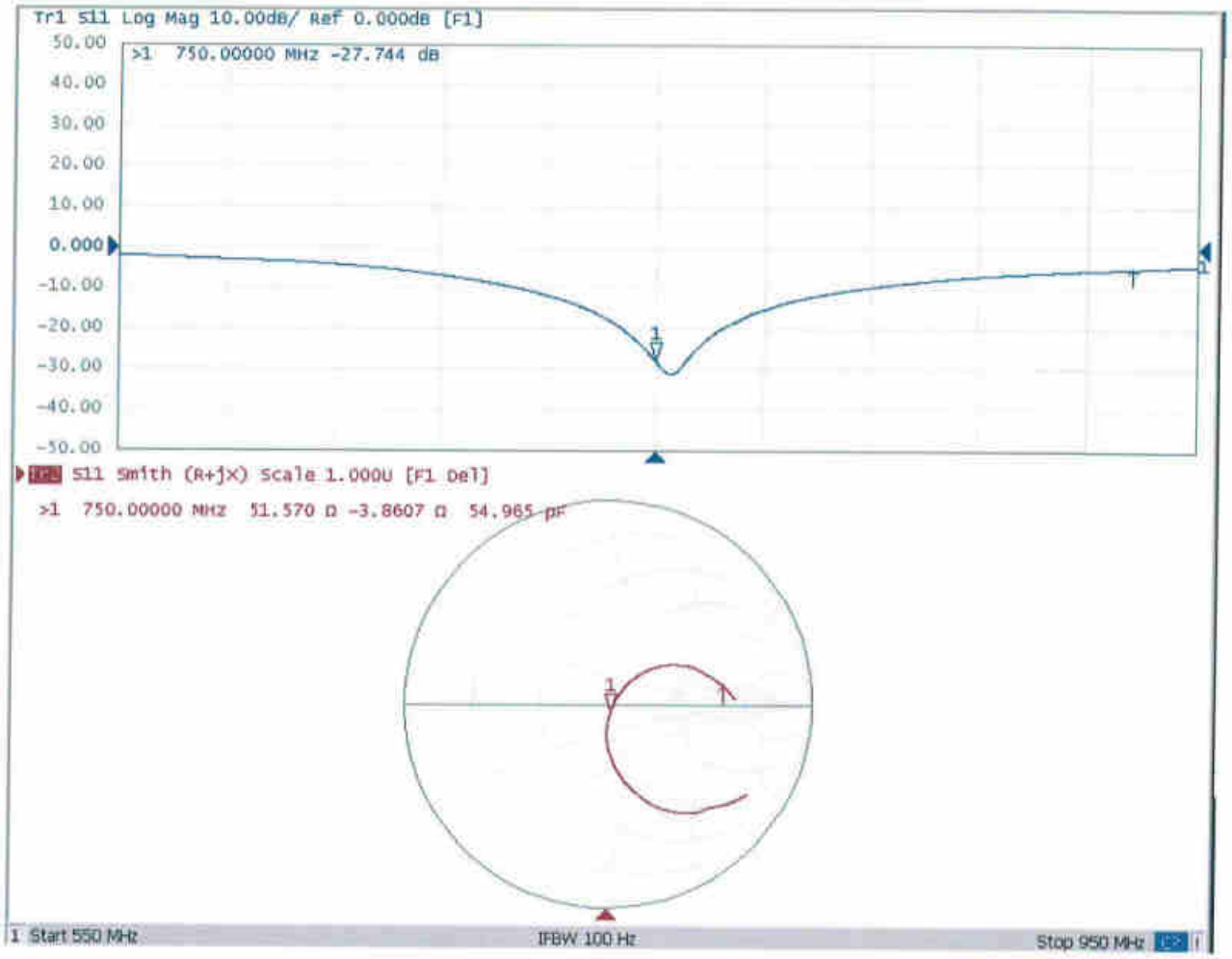
Impedance Measurement Plot for Body TSL



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Client **Sporton** **Certificate No: Z19-60082**

CALIBRATION CERTIFICATE

Object D835V2 - SN: 4d151

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

Calibration date: March 27, 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)℃ 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	106277	20-Aug-18 (CTTL, No.J18X06862)	Aug-19
Power sensor NRP8S	104291	20-Aug-18 (CTTL, No.J18X06862)	Aug-19
Reference Probe EX3DV4	SN 3617	31-Jan-19(SPEAG,No.EX3-3617_Jan19)	Jan-20
DAE4	SN 1331	06-Feb-19(SPEAG,No.DAE4-1331_Feb19)	Feb-20
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	23-Jan-19 (CTTL, No.J19X00336)	Jan-20
NetworkAnalyzer E5071C	MY46110673	24-Jan-19 (CTTL, No.J19X00547)	Jan-20

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

Issued: March 30, 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:

a) 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

b) 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

c) 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

d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

e) 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	52.10.2.1495
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 ± 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 ± 0.2) °C	42.7 ± 6 %	0.93 mho/m ± 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	2.36 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.30 W/kg ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.56 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.16 W/kg ± 18.7 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	56.7 ± 6 %	0.94 mho/m ± 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	2.32 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.53 W /kg ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.52 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.20 W/kg ± 18.7 % (k=2)**

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.8Ω- 3.28jΩ
Return Loss	- 29.5dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.7Ω- 3.98jΩ
Return Loss	- 25.5dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.253 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: 03.26.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d151

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

Medium parameters used: f = 835 MHz; σ = 0.925 S/m; ε_r = 42.68; ρ = 1000 kg/m3

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(9.75, 9.75, 9.75) @ 835 MHz; Calibrated: 1/31/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 2/6/2019
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

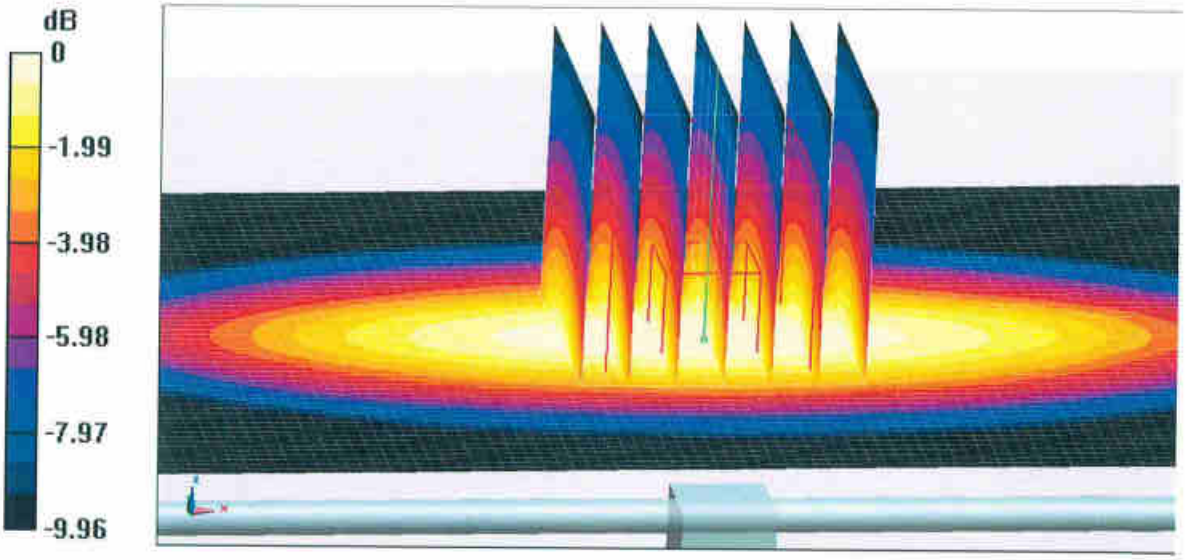
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.34 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 3.55 W/kg

SAR(1 g) = 2.36 W/kg; SAR(10 g) = 1.56 W/kg

Maximum value of SAR (measured) = 3.14 W/kg



0 dB = 3.14 W/kg = 4.97 dBW/kg

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Impedance Measurement Plot for Head TSL