SAR TEST REPORT

HCT CO., LTD

EUT Type:	Cellular/PCS BC10 CDMA and LTE Phone with Bluetooth and WLAN
FCC ID:	ZNFLS840
Model:	LS840, LGLS840, LG-LS840
Date of Issue:	Mar. 06, 2012
Test report No.:	HCTA1203FS01
Test Laboratory:	**HCT CO., LTD.** 105-1, Jangam-ri, Majang-myeon, Icheon-si,Gyeonggi-do,Korea 467-811 TEL: +82 31 645 6485 FAX: +82 31 645 6401
Applicant :	**LG Electronics, Inc.** 60-39, Gasan-Dong, Gumchon-Gu, Seoul 153-023, Korea
Testing has been carried out in accordance with:	RSS-102 Issue 4; Health Canada Safety Code 6 47CFR §2.1093 FCC OET Bulletin 65(Edition 97-01), Supplement C (Edition 01-01) ANSI/ IEEE C95.1 – 1992 IEEE 1528-2003
Test result:	The tested device complies with the requirements in respect of all parameters subject to the test. The test results and statements relate only to the items tested. The test report shall not be reproduced except in full, without written approval of the laboratory.
Signature	Report prepared by : Young-Soo Jang Test Engineer of SAR Part Approved by : Jae-Sang So Manager of SAR Part

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1. INTRODUCTION

The FCC has adopted the guidelines for evaluating the environmental effects of radio frequency radiation in ET Docket 93-62 on Aug. 6, 1996 to protect the public and workers from the potential hazards of RF emissions due to FCC-regulated portable devices.

The safety limits used for the environmental evaluation measurements are based on the criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (SAR) in IEEE/ANSI C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz. 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017. The measurement procedure described in IEEE/ANSI C95.3-1992 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave is used for guidance in measuring SAR due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields," NCRP Report No. 86 NCRP, 1986, Bethesda, MD 20814. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

SAR Definition

Specific Absorption Rate (SAR) is defined as the time derivative of the incremental electromagnetic energy (d*W*) absorbed by (dissipated in) an incremental mass (d*m*) contained in a volume element (d*V*) of a given density (*r*). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body.

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

Figure 2. SAR Mathematical Equation

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

$$SAR = \sigma E^2 / \rho$$

where:

σ = conductivity of the tissue-simulant material (S/m)

ρ = mass density of the tissue-simulant material (kg/m^3)

E = Total RMS electric field strength (V/m)

NOTE:

The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relations to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane.

2. DESCRIPTION OF DEVICE

Environmental evaluation measurements of specific absorption rate (SAR) distributions in emulated human head and body tissues exposed to radio frequency (RF) radiation from wireless portable devices for compliance with the rules and regulations of the U.S. Federal Communications Commission (FCC).

2.1 General Information

<table>
<tr><td>EUT Type</td><td colspan="4">Cellular/PCS BC10 CDMA and LTE Phone with Bluetooth and WLAN</td></tr>
<tr><td>FCC ID:</td><td colspan="4">ZNFLS840</td></tr>
<tr><td>Model:</td><td colspan="4">LS840, LGLS840, LG-LS840</td></tr>
<tr><td>Trade Name</td><td>LG</td><td colspan="2">Serial Number(s)</td><td>#1</td></tr>
<tr><td>Mode(s)of Operation</td><td colspan="4">BC0/ BC1/ BC10 /802.11bgn/LTE Band25</td></tr>
<tr><td>Application Type</td><td colspan="4">Permissive Change Class II</td></tr>
<tr><td>Tx Frequency</td><td colspan="4">824.70 - 848.31 MHz (CDMA835) / 816-824 (BC10) / 1 851.25 – 1 908.75 MHz (PCS CDMA)
2 412- 2 462 MHz (WLAN)/ 1850-1915 MHz (LTE Band25)</td></tr>
<tr><td>Rx Frequency</td><td colspan="4">869.70 - 893.31 MHz (CDMA835) / 861-869 (BC10) / 1 931.25 – 1 988.75 MHz (PCS CDMA)
2 412- 2 462 MHz (WLAN)/ 1930 –1995 MHz (LTE Band25)</td></tr>
<tr><td>FCC Classification</td><td colspan="4">Licensed Portable Transmitter Held to Ear (PCE)/ DSS/ DTS</td></tr>
<tr><td>Production Unit</td><td colspan="4">Prototype</td></tr>
<tr><td rowspan="7">Max SAR</td><td rowspan="2">Band</td><td colspan="3">1g SAR (W/kg)</td></tr>
<tr><td>Head</td><td>Body-worn</td><td>Hotspot</td></tr>
<tr><td>CDMA835</td><td>0.494</td><td>0.922</td><td>0.713</td></tr>
<tr><td>PCS1900</td><td>1.16</td><td>0.966</td><td>0.888</td></tr>
<tr><td>BC10</td><td>0.470</td><td>1.05</td><td>-</td></tr>
<tr><td>LTE Band 25</td><td>0.762</td><td>0.830</td><td>0.83</td></tr>
<tr><td>802.11b</td><td>0.116</td><td>0.239</td><td>0.303</td></tr>
<tr><td>Date(s) of Tests</td><td colspan="4">Feb. 20, 2012 ~ Mar.02, 2012</td></tr>
<tr><td>Antenna Type</td><td colspan="4">Integral Antenna</td></tr>
<tr><td>EVDO</td><td colspan="4">Rev.0, A</td></tr>
<tr><td>Key Features;</td><td colspan="4">Mobile Hotspot support (BC 10 does not support EVDO),
SVDO & SVLTE support, Power reduction implement</td></tr>
</table>

2.2 KDB 941225 LTE information

<table>
<tr><th>#</th><th>Description</th><th>Parameter</th></tr>
<tr><td>1</td><td>Identify the operating grequency range of each LTE Transmission band used by the device</td><td>Band 25: 1852.5-1912.5 MHz</td></tr>
<tr><td>2</td><td>Identify the channel bandwidths used in each frequency band; 1.4, 3, 5, 10, 15, 20 MHz etc</td><td>Band 25:5 MHz</td></tr>
<tr><td>3</td><td>Identify the high, middle and low channel numbers and frequencies in each LTE frequency band</td><td>Please refer to section 9.3</td></tr>
<tr><td>4</td><td>Specify the UE category and uplink modulations used</td><td>The UE Category is 3/ QPSK, 16QAM</td></tr>
<tr><td>5</td><td>Descriptions of the LTE transmitter and antenna implementation & identify whether it is a standalone transmitter operating independently of other wireless transmitters in the device or sharing hardware components and/or antenna(s) with other transmitters etc.</td><td>Please refer to the antenna description and distance at section 10.</td></tr>
<tr><td>6</td><td>Identify the LTE voice/data requirements in each operating mode and exposure condition with respect to head and body test configurations, antenna locations, handset flip-cover or slide positions, antenna diversity conditions, etc.</td><td>Please refer to Tables in section 10.3.</td></tr>
<tr><td>7</td><td>Identify if Maximum Power Reduction (MPR) is optional or mandatory, i.e. built-in by design: a) only mandatory MPR may be considered during SAR testing, when the maximum output power is permanently limited by the MPR implemented within the UE; and only for the applicable RB (resource block) configurations specified in LTE standards b) A-MPR (additional MPR) must be disabled.</td><td><table>
<tr><th rowspan="2">Modulation</th><th colspan="3">Channel bandwidth / Transmission bandwidth configuration (RB)</th><th rowspan="2">MPR (dB)</th></tr>
<tr><th>1.4 MHz</th><th>3.0 MHz</th><th>5.0 MHz</th></tr>
<tr><td>QPSK</td><td>> 5</td><td>> 4</td><td>> 8</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>≤ 1</td></tr>
</table></td></tr>
<tr><td>8</td><td>Include the maximum average conducted output power measured on the required test channels for each channel bandwidth and UL modulation used in each frequency band: a) with 1 RB allocated at the upper edge of a channel b) with 1 RB allocated at the lower edge of a channel c) using 50% RB allocation centered within a channel d) using 100% RB allocation</td><td>Refer to section 9 RF output power table.</td></tr>
</table>

<table>
<tr><td>9</td><td>Identify all other U.S. wireless operating modes (3G, Wi-Fi, WiMax, Bluetooth etc), device/exposure configurations (head and body, antenna and handset flip-cover or slide positions, antenna diversity conditions etc.) and frequency bands used for these modes</td><td>Please refer to the tables in section 10.</td></tr>
<tr><td>10</td><td>Include the maximum average conducted output power measured for the other wireless mode and freq. bands</td><td>See section 9 RF output power measurements in SAR report.</td></tr>
<tr><td>11</td><td>Identify the simultaneous transmission conditions for the voice and data configurations supported by all wireless modes, device configurations and frequency bands, for the head and body exposure conditions and device operating configurations (handset flip or cover positions, antenna diversity conditions etc.)</td><td>Please refer to the table in section 11</td></tr>
<tr><td>12</td><td>When power reduction is applied to certain wireless modes to satisfy SAR compliance for simultaneous transmission conditions, other equipment certification or operating requirements, include the maximum average conducted output power measured in each power reduction mode applicable to the simultaneous voice/data transmission configurations for such wireless configurations and frequency bands; and also include details of the power reduction implementation and measurement setup</td><td>1. Power Reduction operation table for SVDO Mode
<table>
<tr><th>Mode</th><th>CDMA Current Voice Power for BC0, BC1 & BC10
CDMA voice Max Power: 24.3 dBm</th><th>CDMA EVDO Max. Power for BC0 & BC1</th></tr>
<tr><td rowspan="2">SVDO</td><td>P < 15.5 dBm</td><td>23.8 dBm (Limited)</td></tr>
<tr><td>P ≥ 15.5 dBm</td><td>18.8 dBm (Limited)</td></tr>
</table>
2. Power Reduction operation table for SVLTE Mode
<table>
<tr><th>Mode</th><th>CDMA Current Voice Power for BC0, BC1 & BC10</th><th>LTE Max. Power for B25</th></tr>
<tr><td rowspan="2">SVLTE</td><td>P < 18.5 dBm</td><td>23.0 dBm (Limited)</td></tr>
<tr><td>P ≥ 18.5 dBm</td><td>19.0 dBm (Limited)</td></tr>
</table></td></tr>
<tr><td>13</td><td>Include descriptions of the test equipment, test software, built-in test firmware etc. required to support testing the device when power reduction is applied to one or more transmitters/antennas for simultaneous voice/data transmission</td><td>* Power reduction is implemented on EVDO in SVDO mode
* Power reduction is implemented on LTE in SVLTE mode</td></tr>
<tr><td>14</td><td>When appropriate, include a SAR test plan proposal with respect to the above</td><td>Not Applicable</td></tr>
<tr><td>15</td><td>If applicable, include preliminary SAR test data and/or supporting information in laboratory testing inquiries to address specific issues and concerns or for requesting further test reduction considerations appropriate for the device; for example, simultaneous transmission configurations</td><td>Not Applicable</td></tr>
</table>

3. DESCRIPTION OF TEST EQUIPMENT

3.1 SAR MEASUREMENT SETUP

These measurements are performed using the DASY4 automated dosimetric assessment system. It is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland. It consists of high precision robotics system (Staubli), robot controller, Pentium III computer, near-field probe, probe alignment sensor, and the generic twin phantom containing the brain equivalent material. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of mMaximum electromagnetic field (EMF) (see Figure.3.1).

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The PC consists of the HP Pentium IV 3.0 GHz computer with Windows XP system and SAR Measurement Software DASY4, A/D interface card, monitor, mouse, and keyboard. The Staubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.

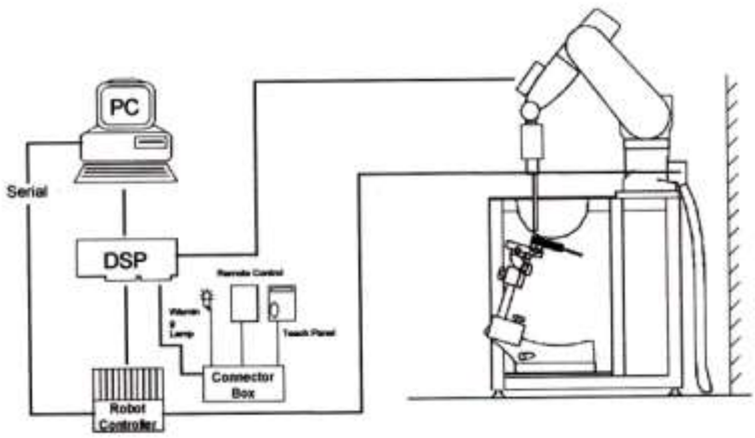


Figure 3.1 HCT SAR Lab. Test Measurement Set-up

The DAE4 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 PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer. The system is described in detail in.

3.2 DASY4 E-FIELD PROBE SYSTEM

3.1 ES3DV3 Probe Specification

Construction	Symmetrical design with triangular core Interleaved sensors
	Built-in shielding against static charges
	PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	Basic Broad Band Calibration in air
	Conversion Factors (CF) for HSL 900 and HSL 1810
	Additional CF for other liquids and frequencies upon request
Frequency	10 MHz to 4 GHz; Linearity: ± 0.2 dB (30 MHz to 4 GHz)
Directivity	± 0.2 dB in HSL (rotation around probe axis)
	± 0.3 dB in tissue material (rotation normal to probe axis)
Dynamic Range	5 µW/g to > 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 330 mm (Tip: 20 mm)
	Tip diameter: 3.9 mm (Body: 12 mm)
	Distance from probe tip to dipole centers: 2.0 mm
Application	General dosimetry up to 4 GHz
	Dosimetry in strong gradient fields
	Compliance tests of mobile phones

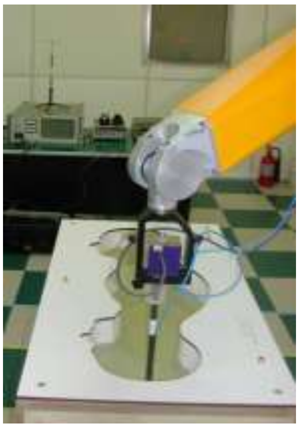


Figure 3.1 Photograph of the probe and the Phantom

Figure 3.2 EX3DV4 E-field Probe

The SAR measurements were conducted with the dosimetric probe EX3DV4, designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multifiber line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches a maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY4 software reads the reflection during a software approach and looks for the maximum using a 2nd order fitting. The approach is stopped at reaching the maximum.

3.3 PROBE CALIBRATION PROCESS

3.3.1 E-Probe Calibration

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

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

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

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

where:

Δt = exposure time (30 seconds),

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

ΔT = temperature increase due to RF exposure.

SAR is proportional to $\Delta T / \Delta t$, the initial rate of tissue heating, before thermal diffusion takes place. Now it's possible to quantify the electric field in the simulated tissue by equating the thermally derived SAR to the E- field;

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

where:

σ = simulated tissue conductivity,

ρ = Tissue density (1.25 g/cm³ for brain tissue)

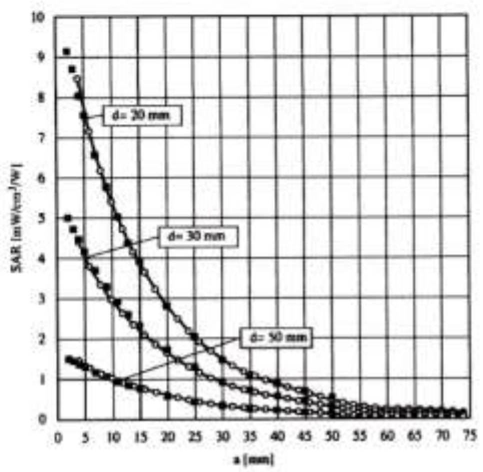


Figure 3.4 E-Field and Temperature measurements at 900 MHz

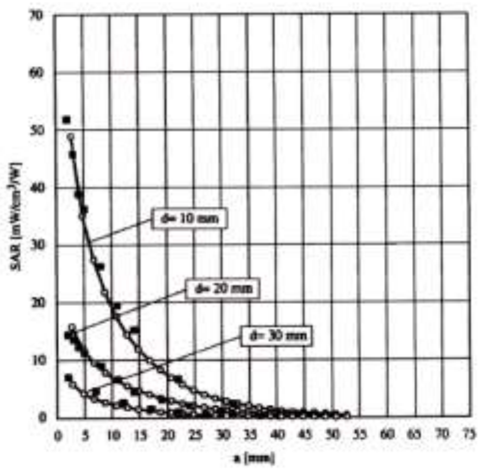


Figure 3.5 E-Field and temperature measurements at 1.8 GHz

3.3.2 Data Extrapolation

The DASY4 software automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power. The formula for each channel can be given like below;

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

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

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

E-field probes:

$$E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$$

with V_i = compensated signal of channel i (i = x,y,z)
$Norm_i$ = sensor sensitivity of channel i (i = x,y,z) $\mu V/(V/m)^2$ for E-field probes
ConvF = sensitivity of enhancement in solution
E_i = electric field strength of channel i in V/m

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

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

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

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

with SAR = local specific absorption rate in W/g
E_{tot} = total field strength in V/m
σ = conductivity in [mho/m] or [Siemens/m]
ρ = equivalent tissue density in g/cm^3

The power flow density is calculated assuming the excitation field to be a free space field.

$$P_{pwe} = \frac{E_{tot}^2}{3770}$$

with P_{pwe} = equivalent power density of a plane wave in W/cm^2
E_{tot} = total electric field strength in V/m

3.4 SAM Phantom

The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.

Figure 3.6 SAM Phantom

Shell Thickness	2.0 mm ± 0.2 mm (6 ± 0.2 mm at ear point)
Filling Volume	about 25 L
Dimensions	1 000 mm x 500 mm (L x W)

3.5 Device Holder for Transmitters

In combination with the SAM Phantom V 4.0, the Mounting Device (POM) enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation points is the ear opening. The devices can be easily, accurately, and repeatable positioned according to the FCC and CENELEC specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom).

Note: A simulating human hand is not used due to the complex anatomical and geometrical structure of the hand that may produced infinite number of configurations. To produce the Worst-case condition (the hand absorbs antenna output power), the hand is omitted during the tests.

Figure 3.7 Device Holder

3.6 Brain & Muscle Simulating Mixture Characterization

The brain and muscle mixtures consist of a viscous gel using hydrox-ethyl cellulose (HEC) gelling agent and saline solution (see Table 3.1). Preservation with a bacteriacide is added and visual inspection is made to make sure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. The mixture characterizations used for the brain and muscle tissue simulating liquids are according to the data by C. Gabriel and G. Hartsgrove.

Ingredients (% by weight)	Frequency (MHz)											
	450		750		835		915		1 900		2 450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.2	51.7	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.4	1.0	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	57	47.2	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	0.2	0.0	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.2	0.1	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7

Salt: 99 % Pure Sodium Chloride Sugar: 98 % Pure Sucrose

Water: De-ionized, 16M resistivity HEC: Hydroxyethyl Cellulose

DGBE: 99 % Di(ethylene glycol) butyl ether,[2-(2-butoxyethoxy) ethanol]

Triton X-100(ultra pure): Polyethylene glycol mono[4-(1,1,3,3-tetramethylbutyl)phenyl] ether

Table 3.1 Composition of the Tissue Equivalent Matter

3.7 SAR TEST EQUIPMENT

Manufacturer	Type / Model	S/N	Calib. Date	Calib.Interval	Calib.Due
SPEAG	SAM Phantom	-	N/A	N/A	N/A
Staubli	Robot RX90L	F01/5K09A1/A/01	N/A	N/A	N/A
Staubli	Robot ControllerCS7MB	F99/5A82A1/C/01	N/A	N/A	N/A
HP	Pavilion t000_puffer	KRJ51201TV	N/A	N/A	N/A
SPEAG	Light Alignment Sensor	265	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	D221340.01	N/A	N/A	N/A
SPEAG	DAE4	869	Sep 22, 2011	Annual	Sep 22, 2012
SPEAG	E-Field Probe EX3DV4	3797	July 25, 2011	Annual	July 25, 2012
SPEAG	Validation Dipole D835V2	441	May 16, 2011	Annual	May 16, 2012
SPEAG	Validation Dipole D1900V2	5d032	July 22, 2011	Annual	July 22, 2012
SPEAG	Validation Dipole D2450V2	743	Aug. 29, 2011	Annual	Aug. 29, 2012
Agilent	Power Meter(F) E4419B	MY41291386	Nov. 04, 2011	Annual	Nov. 04, 2012
Agilent	Power Sensor(G) 8481	MY41090870	Nov. 04, 2011	Annual	Nov. 04, 2012
HP	Dielectric Probe Kit	00721521	N/A	N/A	N/A
HP	Dual Directional Coupler	16072	Nov. 04, 2011	Annual	Nov. 04, 2012
R&S	Base Station CMU200	110740	July 26, 2011	Annual	July 26, 2012
Agilent	Base Station E5515C	GB44400269	Feb. 10, 2012	Annual	Feb. 10, 2013
HP	Signal Generator E4438C	MY42082646	Nov. 11, 2011	Annual	Nov. 11, 2012
HP	Network Analyzer 8753ES	JP39240221	Mar. 30, 2011	Annual	Mar. 30, 2012
R&S	Base Station CMW500	101901	Aug.5,2011	Annual	Aug. 5,2012

NOTE:

The E-field probe was calibrated by SPEAG, by the waveguide technique procedure. Dipole Validation measurement is performed by HCT Lab. before each test. The brain simulating material is calibrated by HCT using the dielectric probe system and network analyzer to determine the conductivity and permittivity (dielectric constant) of the brain-equivalent material.

4. SAR MEASUREMENT PROCEDURE

The evaluation was performed with the following procedure:

1. The SAR value at a fixed location above the ear point was measured and was used as a reference value for assessing the power drop.

2. The SAR distribution at the exposed side of the head was measured at a distance of 3.9 mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 15 mm x 15 mm. Based on this data, the area of the mMaximum absorption was determined by spline interpolation.

3. Around this point, a volume of 32 mm x 32 mm x 30 mm was assessed by measuring 5 x 5 x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure:

   a. The data at the surface were extrapolated, since the center of the dipoles is 2.7 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.
   b. The mMaximum interpolated value was searched with a straight-forward algorithm. Around this mMaximum the SAR values averaged over the spatial volumes (1 g or 10 g) were computed using the 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the “Not a knot” condition (in x, y, and z directions. The volume was integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.
   c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

4. The SAR value, at the same location as procedure #1, was re-measured. If the value changed by more than 5 %, the evaluation is repeated.

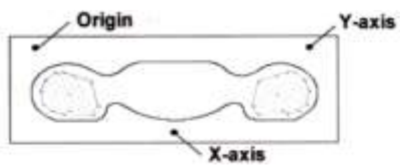


Figure 4.1 SAR Measurement Point in Area Scan

5. DESCRIPTION OF TEST POSITION

5.1 HEAD POSITION

The device was placed in a normal operating position with the Point A on the device, as illustrated in following drawing, aligned with the location of the RE(ERP) on the phantom. With the ear-piece pressed against the head, the vertical center line of the body of the handset was aligned with an imaginary plane consisting of the RE, LE and M. While maintaining these alignments, the body of the handset was gradually moved towards the cheek until any point on the mouth-piece or keypad contacted the cheek. This is a cheek/touch position. For ear/tilt position, while maintain the device aligned with the BM and FN lines, the device was pivot against ERP back for 15º or until the device antenna touch the phantom. Please refer to IEEE 1528-2003 illustration below.

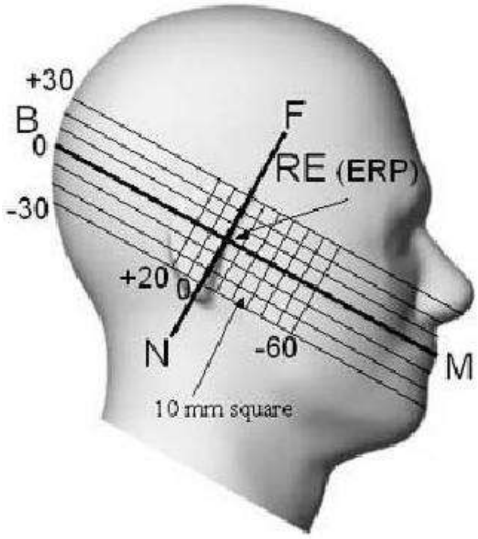


Figure 5.1 Side view of the phantom

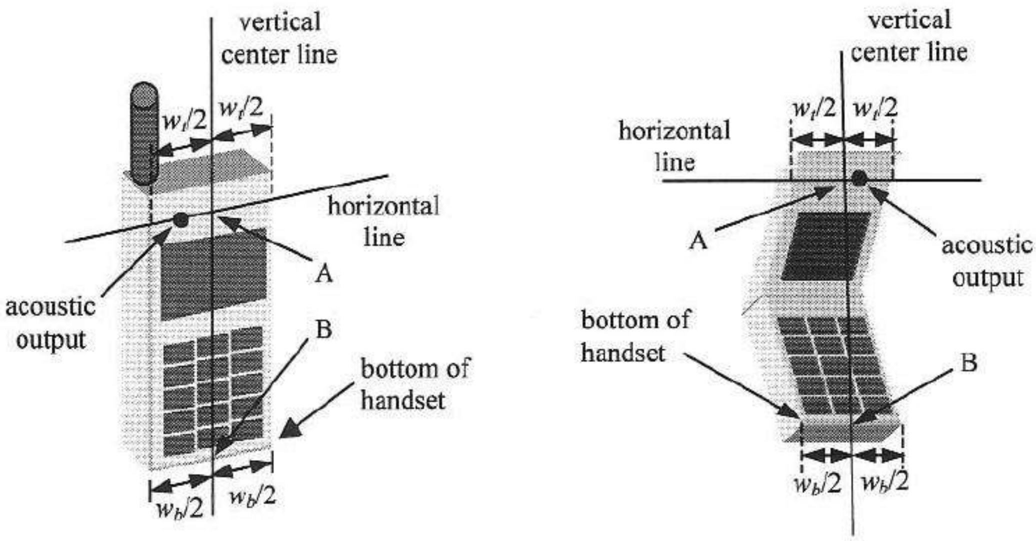


Figure 5.2 Handset vertical and horizontal reference lines

5.2 Body Holster/Belt Clip Configurations

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration. A device with a headset output is tested with a headset connected to the device. Body dielectric parameters are used.

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

Body-worn accessories may not always be supplied or available as options for some Devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used.

Since this EUT does not supply any body worn accessory to the end user a distance of 1.0 cm from the EUT back surface to the liquid interface is configured for the generic test.

"See the Test SET-UP Photo"

Transmitters that are designed to operate in front of a person’s face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessory(ies), Including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

In all cases SAR measurements are performed to investigate the worst-case positioning. Worstcase positioning is then documented and used to perform Body SAR testing.

6. MEASUREMENT UNCERTAINTY

Error Description	Tol (± %)	Prob. dist.	Div.	c_i	Standard Uncertainty (± %)	v_{eff}
1. Measurement System						
Probe Calibration	6.00	N	1	1	6.00	∞
Axial Isotropy	4.70	R	1.73	0.7	1.90	∞
Hemispherical Isotropy	9.60	R	1.73	0.7	3.88	∞
Boundary Effects	1.00	R	1.73	1	0.58	∞
Linearity	4.70	R	1.73	1	2.71	∞
System Detection Limits	1.00	R	1.73	1	0.58	∞
Readout Electronics	0.30	N	1.00	1	0.30	∞
Response Time	0.8	R	1.73	1	0.46	∞
Integration Time	2.6	R	1.73	1	1.50	∞
RF Ambient Conditions	3.00	R	1.73	1	1.73	∞
Probe Positioner	0.40	R	1.73	1	0.23	∞
Probe Positioning	2.90	R	1.73	1	1.67	∞
Max SAR Eval	1.00	R	1.73	1	0.58	∞
2.Test Sample Related						
Device Positioning	2.90	N	1.00	1	2.90	145
Device Holder	3.60	N	1.00	1	3.60	5
Power Drift	5.00	R	1.73	1	2.89	∞
3.Phantom and Setup						
Phantom Uncertainty	4.00	R	1.73	1	2.31	∞
Liquid Conductivity(target)	5.00	R	1.73	0.64	1.85	∞
Liquid Conductivity(meas.)	2.07	N	1	0.64	1.32	9
Liquid Permitivity(target)	5.00	R	1.73	0.6	1.73	∞
Liquid Permitivity(meas.)	5.02	N	1	0.6	3.01	9
Combind Standard Uncertainty					11.13	
Coverage Factor for 95 %					k=2	
Expanded STD Uncertainty					22.25	

Table 6.1 Uncertainty (750 MHz- 2600 MHz)

7. ANSI/ IEEE C95.1 - 1992 RF EXPOSURE LIMITS

HUMAN EXPOSURE	UNCONTROLLED ENVIRONMENT General Population (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT Occupational (W/kg) or (mW/g)
SPATIAL PEAK SAR * (Brain)	1.60	8.00
SPATIAL AVERAGE SAR ** (Whole Body)	0.08	0.40
SPATIAL PEAK SAR *** (Hands / Feet / Ankle / Wrist)	4.00	20.00

Table 7.1 Safety Limits for Partial Body Exposure

NOTES:

* The Spatial Peak value of the SAR averaged over any 1 g of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

** The Spatial Average value of the SAR averaged over the whole-body.

******* The Spatial Peak value of the SAR averaged over any 10 g of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

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).

8. SYSTEM VERIFICATION

8.1 Tissue Verification

Band	Freq. [MHz]	Date	Liquid	Liquid Temp.[°C]	Parameters	Target Value	Measured Value	Deviation [%]	Limit [%]
BC0, 10	835	Feb. 20, 2012	Head	21.2	ε r	41.5	43.1	+ 3.86	± 5
					σ	0.90	0.909	+ 1.00	± 5
	835	Feb. 24, 2012	Body	21.1	ε r	55.2	55.3	+ 0.18	± 5
					σ	0.97	1.01	+ 4.12	± 5
BC 1	1 900	Feb. 21, 2012	Head	21.3	ε r	40.0	40.9	+ 2.25	± 5
					σ	1.40	1.4	0.00	± 5
	1 900	Feb. 27, 2012	Body	21.1	ε r	53.3	55.4	+ 3.94	± 5
					σ	1.52	1.48	- 2.63	± 5
WLAN	2 450	Feb. 23, 2012	Head	21.2	ε r	39.2	38.8	- 1.02	± 5
					σ	1.80	1.8	0.00	± 5
	2 450	Feb. 29, 2012	Body	21.2	ε r	52.7	50.6	- 3.98	± 5
					σ	1.95	2.01	+ 3.08	± 5
LTE B25	1900	Feb. 22, 2012	Head	21.2	ε ρ	40.0	39.5	- 1.25	± 5
					σ	1.40	1.41	+ 0.71	± 5
	1900	Feb. 28, 2012	Body	21.3	ε r	53.3	55.4	+ 3.94	± 5
					σ	1.52	1.48	- 2.63	± 5
Volume	835	Mar.02, 2012	Head	21.3	ε r	41.5	41.6	+ 0.24	± 5
					σ	0.90	0.866	- 3.78	± 5
	1 900	Mar.02, 2012	Head	21.3	ε r	40.0	39.3	- 1.75	± 5
					σ	1.40	1.44	+ 2.86	± 5
	2 450	Mar.02, 2012	Head	21.3	ε r	39.2	38.8	- 1.02	± 5
					σ	1.80	1.8	0.00	± 5

The dielectronic parameters of the liquids were verified prior to the SAR evaluation using an Agilent 85070C Dielectronic Probe Kit and Agilent Network Analyzer.

8.2 System Validation

Prior to assessment, the system is verified to the ± 10 % of the specifications at 835 MHz / 1 900 MHz/ 2 450 MHz by using the system validation kit. (Graphic Plots Attached) ** Input Power: 100 m W

Band	Freq. [MHz]	Probe (SN)	Dipole (SN)	Date	Liquid	Liquid Temp. [°C]	SAR Average	Target Value (SPEAG) (mW/g)	*Measured Value (mW/g)	Deviation [%]	Limit [%]
BC0, 10	835	3797	441	Feb. 20, 2012	Head	21.2	1 g	9.34	0.946	+ 1.28	± 10
	835		441	Feb. 24, 2012	Body	21.3	1 g	9.45	0.957	+ 1.27	± 10
BC 1	1 900		5d032	Feb. 21, 2012	Head	21.3	1 g	39.9	4.09	+ 2.51	± 10
	1 900		5d032	Feb. 27, 2012	Body	21.1	1 g	41.5	4.07	- 1.93	± 10
WLAN	2 450		743	Feb. 23, 2012	Head	21.2	1 g	53.8	5.26	- 2.23	± 10
	2 450		743	Feb. 29, 2012	Body	21.2	1 g	51.7	5.1	- 1.35	± 10
LTE B25	1 900		1014	Feb. 22, 2012	Head	21.2	1 g	39.9	3.92	- 1.75	± 10
	1 900		1014	Feb. 28, 2012	Body	21.3	1 g	41.5	4.1	- 1.20	± 10
Volume	835		441	Mar.02, 2012	Head	21.3	1 g	9.34	0.934	0.00	± 10
	1 900		5d032	Mar.02, 2012	Head	21.3	1 g	39.9	3.99	0.00	± 10
	2 450		743	Mar.02, 2012	Head	21.3	1 g	53.8	5.36	- 0.37	± 10

8.3 System Validation Procedure

SAR measurement was Prior to assessment, the system is verified to the ± 10 % of the specifications at target frequency by using the system validation kit. (Graphic Plots Attached)

- Cabling the system, using the validation kit equipments.
- Generate about 100 mW Input Level from the Signal generator to the Dipole Antenna.
- Dipole Antenna was placed below the Flat phantom.
- The measured one-gram SAR at the surface of the phantom above the dipole feed-point should be within 10 % of the target reference value.

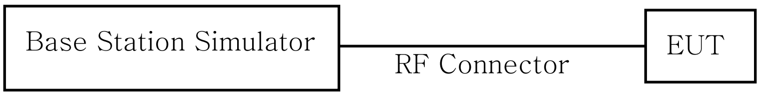
Note;

SAR Verification was performed according to the FCC KDB 450824.

9. RF CONDUCTED POWER MEASUREMENT

Power measurements were performed using a base station simulator under digital average power.
The handset was placed into a simulated call using a base station simulator in a shielded chamber.
Such test signals offer a consistent means for testing SAR and are recommended for evaluation SAR
SAR measurements were taken with a fully charged battery. In order to verify that the device was tested and maintained at full power, this was configured with the base station simulator. The SAR measurement Software calculates a reference point at the start and end of the test to check for power drifts. If conducted Power deviations of more then 5 % occurred, the tests were repeated.

Conducted output power measurements were performed using a base station simulator under digital average power.



SAR Test for WWAN & LTE were performed with a base station simulator Agilent E5515C & CMW500. Communication between the device and the emulator was established by air link. Set base station emulator to allow DUT to radiate maximum output power during all tests.

9.1 CDMA & EVDO

The handset was placed into a simulated call using a base station simulator in a shielded chamber. Such test signals offer a consistent means for testing SAR and are recommended for evaluating SAR. SAR measurements were taken with a fully charged battery. In order to verify that the device was tested and maintained at full power, this was configured with the base station simulator. The SAR measurement software calculates a reference point at the start and end of the test to check for power drifts. If conducted power deviations of more then 5% occurred, the tests were repeated.

9.2 SAR Measurement Conditions for CDMA2000 1x

These procedures were followed according to FCC "SAR Measurement Procedures for 3G Devices", May 2006.

9.1.1 Output Power Verification

See 3GPP2 C.S0011/TIA-98-E as recommended by "SAR Measurement Procedures for 3G Devices", May 2006. MMaximum output power is verified on the High, Middle and Low channels according to procedures defined in section 4.4.5.2 of 3GPP2 C.S0011/TIA-98-E. SO55 tests were measured with power control bits in “All Up” condition.

1. If the mobile station supports Reverse TCH RC 1 and Forward TCH RC 1, set up a call using Fundamental Channel Test Mode 1 (RC=1/1) with 9 600 bps data rate only.
2. Under RC1, C.S0011 Table 4.4.5.2-1 (Table 9.1) parameters were applied.
3. If the MS supports the RC 3 Reverse FCH, RC3 Reverse SCH0 and demodulation of RC 3, 4, or 5, set up a call using Supplemental Channel Test Mode 3 (RC 3/3) with 9 600 bps Fundamental

Channel and 9 600 bps SCH0 data rate Channel and 9 600 bps SCH0 data rate.

4. Under RC3, C.S0011 Table 4.4.5.2-2(Table 9.2) was applied.
5. FCHs were configured at full rate for mMaximum SAR with "All Up" power control bits.

Parameters for Max. Power for RC1

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-104
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

Table. 9.1

Parameters for Max. Power for RC3

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-86
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

Table. 9.2

9.1.2 Head SAR Measurement

SAR for head exposure configurations is measured in RC3 with the DUT configured to transmit at full rate using Loopback Service Option SO55. SAR for RC1 is not required when the mMaximum average output of each channel is less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the mMaximum output channel in RC1 using the exposure configuration that results in the highest SAR for that channel in RC3.

9.1.3 Body SAR Measurement

SAR for body exposure configurations is measured in RC3 with the DUT configured to transmit at full rate on FCH with all other code channels disabled using TDSO / SO32. SAR for multiple code channels (FCH + SCHn) is not required when the mMaximum average output of each RF channel is less than ¼ dB higher than that measured with FCH only. Otherwise, SAR is measured on the mMaximum output channel (FCH + SCHn) with FCH at full rate and SCH0 enabled at 9 600 bps using the exposure configuration that results in the highest SAR for that channel with FCH only. When multiple code channels are enabled, the DUT output may shift by more than 0.5 dB and lead to higher SAR drifts and SCH dropouts.

Body SAR in RC1 is not required when the mMaximum average output of each channel is less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the mMaximum output channel in RC1; with Loopback Service Option SO55, at full rate, using the body exposure configuration that results in the highest SAR for that channel in RC3.

9.1.4 Handsets with EV-DO

For handsets with Ev-Do capabilities, when the mMaximum average output of each channel in Rev. 0 is less than ¼ dB higher than that measured in RC3 (1x RTT), body SAR for Ev-Do is not required. Otherwise, SAR for Rev. 0 is measured on the mMaximum output channel at 153.6 kbps using the body exposure configuration that results in the highest SAR for that channel in RC3. SAR for Rev. A is not required when the mMaximum average output of each channel is less than that measured in Rev. 0 or less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the mMaximum output channel for Rev. A using a Reverse Data Channel payload size of 4 096 bits and a Termination Target of 16 slots defined for Subtype 2 Physical Layer configurations. A Forward Traffic Channel data rate corresponding to the 2-slot version of 307.2 kbps with the ACK Channel transmitting in all slots should be configured in the downlink for both Rev. 0 and Rev. A.

9.1.4.1 EVDO Release 0 (RTAP)

Application Config > Enhanced Test Application Protocol > RTAP

RTAP Rate > 153.6 kbps

Protocol Rev > 0 (1x EVDO)

Power: All Up bits

9.1.4.2 EVDO Release 0 (FTAP)

Application Config > Enhanced Test Application Protocol > FTAP

RTAP Rate > 307.2 kbps

Protocol Rev > 0 (1x EVDO)

Power: All Up bits

9.1.4.3 EVDO Release A (RETAP)

Protocol Rev > A (1x EVDO A)

Application Config > Enhanced Test Application Protocol > RETAP

R-Data Pkt Size > 4096

Power: All Up bits

9.1.4.4 EVDO Release A (FETAP)

Protocol Rev > A (1x EVDO A)

Application Config > Enhanced Test Application Protocol > FETAP

F-Traffic Format > 4 (1024, 2, 128) Canonical (307.2k, QPSK)

Power: All Up bits

Maximum Average Output Power Measurement for FCC ID: ZNFLS840

Band	CH.No	SO2	SO2	SO55	SO55	TDSO SO32	SO75	1xEvDO Rev.0	1xEvDO Rev.0	1xEvDO Rev.A	1xEvDO Rev.A
		RC1/1	RC3/3	RC1/1	RC3/3	RC3/3	RC11 /RC8	(FTAP)	(RTAP)	(FETAP)	(RETAP)
BC10	476	24.92	24.78	24.93	24.71	24.70	24.77	-	-	-	-
	580	24.76	24.72	24.96	24.76	24.78	24.82	-	-	-	-
	684	24.85	24.69	24.93	24.77	24.84	24.76	-	-	-	-
CDMA	1013	24.89	24.76	24.89	24.97	24.70	24.85	24.20	24.20	24.27	24.25
	384	24.90	24.76	24.88	24.94	24.77	24.99	24.17	24.18	24.16	24.19
	777	24.81	24.87	24.87	24.72	24.74	24.86	24.27	24.22	24.24	24.21
PCS	25	24.80	24.76	24.84	24.86	24.75	24.96	24.12	24.14	24.14	24.11
	600	24.81	24.64	24.65	24.84	24.82	24.84	24.13	24.18	24.21	24.18
	1175	24.83	24.79	24.85	24.87	24.74	24.96	24.19	24.17	24.16	24.15

CDMA Avergae Conducted output powers (dBm)

9.2 WiFi & BT

9.2.1 SAR Testing for 802.11a/b/g/n modes

General Device Setup

Normal Network operating configurations are not suitable for measuring the SAR of 802.11 a/b/g transmitters. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure the results are consistent and reliable.

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters. The test frequencies should correspond to actual channel frequencies defined for domestic use. SAR for devices with switched diversity should be measured with only one antenna transmitting at a time during each SAR measurement, according to a fixed modulation and data rate. The same data pattern should be used for all measurements.

Frequency Channel Configurations

80.11 a/b/g and 4.9 GHz operating modes are tested independently according to the service requirements in each frequency band. 80.211 b/g modes are tested on channels 1, 6 and 11.802.11a is tested for UNII operations on channels 36 and 48 in the 5.15-5.25 GHz band; channels 52 and 64 in the 5.25-5.35 GHz band; Channels 104, 116, 124 and 136 in the 5.470-5.725 GHz band; and channels 149 and 161 in the 5.8 GHz band. When 5.8 GHz § 15.247 is also available, channels 149, 157 and 165 should be tested instead of the UNII channels. 4.9 GHz is tested on channels 1, 10 and 5 or 6, whichever has the higher output power, for 5 MHz channels; channels 11,15 and 19 for 10 MHz channels; and channels 21 and 25 for 20 MHz channels.

These are referred to as the "default test channels". 802.11g mode was evaluated only if the output power was 0.25 dB higher than the 802.11b mode.

Mode		GHz	Channel	Turbo Channel	"Default Test Channels" §15.247 802.11b	"Default Test Channels" §15.247 802.11g	"Default Test Channels" UNII	
802.11 b/g		2.412	1		√	∇		
		2.437	6	6	√	∇		
		2.462	11		√	∇		
802.11a	UNII	5.18	36				√	
		5.20	40	42 (5.21 GHz)				*
		5.22	44					*
		5.24	48	50 (5.25 GHz)			√	
		5.26	52				√	
		5.28	56	58 (5.29 GHz)				*
		5.30	60					*
		5.32	64				√	
		5.500	100	Unknown				*
		5.520	104				√	
		5.540	108					*
		5.560	112					*
		5.580	116				√	
		5.600	120					*
		5.620	124				√	
		5.640	128					*
		5.660	132					*
		5.680	136				√	
		5.700	140					*
	UNII or §15.247	5.745	149		√		√	
		5.765	153	152 (5.76 GHz)		*		*
		5.785	157		√			*
		5.805	161	160 (5.80 GHz)		*	√	
	§15.247	5.825	165		√			

802.11 Test Channels per FCC Requirements

Band	Channel	Conducted Power (dBm)	
		(dBm)	(mW)
IEEE 802.11b	1	14.5	28.2
	6	14.6	28.8
	11	14.85	30.5
IEEE 802.11g	1	11.10	12.9
	6	11.25	13.3
	11	11.50	14.1
IEEE 802.11n	1	9.90	9.8
	6	10.05	10.1
	11	10.25	10.6

Average IEEE 802.11b Conducted output power

Note;
SAR testing was performed according to the FCC KDB 248227.

Bluetooth

Band	Channel	Conducted Power (dBm)	
		(dBm)	(mW)
GFSK	0	9.2	8.3
	39	9.2	8.3
	78	9.2	8.3
8PSK	0	6.8	4.8
	39	6.9	4.9
	78	6.9	4.9

9.3 LTE

SAR testing was performed according to the FCC KDB 941225 D05 publication.

The device has been developed base on MPR. The MPR is mandatory.

The device will not operate with any other MPR setting than that stated in the table as indicated.

SAR Testing was performed using a CMW500. UE transmits with Maximum output power during SAR testing.

A-MPR has been disabled for all SAR tests by setting NS=01 on the R&S CMW500.

9.3.1 LTE25 5MHz

Bandwidth	UL Channel	UL Freq.(MHz)	Modulation	RB Size	RB Offset	Max.Average Power (dBm)	Target MPR (dB)	Measured Power reduction (dB)
5 MHz	26065	1852.5	QPSK	1	0	23.14	0	0.11
				1	24	23.25	0	0.00
				12	6	22.36	1	0.89
				25	0	22.41	1	0.84
			16QAM	1	0	22.28	1	0.97
				1	24	22.38	1	0.87
				12	6	21.2	2	2.05
				25	0	21.48	2	1.77
5 MHz	26365	1882.5	QPSK	1	0	23.3	0	0.00
				1	24	23.38	0	-0.08
				12	6	22.24	1	1.06
				25	0	22.34	1	0.96
			16QAM	1	0	22.4	1	0.90
				1	24	22.41	1	0.89
				12	6	21.18	2	2.12
				25	0	21.36	2	1.94
5 MHz	26665	1912.5	QPSK	1	0	23.25	0	0.00
				1	24	23.05	0	0.20
				12	6	22.1	1	1.15
				25	0	22.07	1	1.18
			16QAM	1	0	22.37	1	0.88
				1	24	22.05	1	1.20
				12	6	21.06	2	2.19
				25	0	21.22	2	2.03

LTE Conducted output powers

Note;

The EUT enables maximum power reduction in accordance with 3GPP 36.101. The LTE MPR targets are document in the tune up procedure. The MPR settings are configured during the manufacture process and are not configurable by the network, carrier, or end user.

9.4. SVLTE/SVDO RF Conducted Power

The EUT uses a power reduction technique where the data mode transmit power is reduced a predetermined amount based on the voice transmit power. As voice 1x power approaches maximum transmit power, the data mode transmit power is reduced a configured magnitude. For low voice 1x power levels, there is no restriction on the data mode transmit power. Although this device supports SVDO/SVLTE power reduction, initial SAR evaluation will use the max. output power without power reduction. If the SVDO and SVLTE mode of operation can achieve SAR compliance without power reduction, SVDO and SVLTE with reduced power will not be performed. However, if during SAR evaluation, it is determined that power reduction is required to achieve SAR compliance; test report will include the output power used during final SAR evaluation.

Mode	**CDMA Current Voice Power for BC0, BC1 & BC10 Average Power 1x(dBm)**	**Maximum EVDO Average Power for BC0 & BC1 (dBm)**
SVDO	P<15.5	23.8 (Limited)
	P≥15.5	18.8 (Limited)
Mode	**Voice Average Power 1x for BC0, BC1 & BC10 (dBm)**	**Maximum LTE Average Power for B25 (dBm)**
SVLTE	P<18.5	23.0 (Limited)
	P≥18.5	19.0 (Limited)

Power reduction Settings

9.4.1 SVDO

SV-DO: CDMA 1xRTT(BC0) to 1xEVDO(BC0 & BC1)

CDAM BC0 850 1xRTT		BC0 850 1xEVDO Output Power[dBm]			BC1 1900 1xEVDO Output Power[dBm]		
ch #	Output Power [dBm]	low 1013	Middle 384	high 777	low 25	Middle 600	high 1175
low-1013	11	24.02	23.97	24.07	24.00	24.01	24.05
	15	24.02	23.97	24.07	24.00	24.01	24.05
	16	18.95	18.97	18.89	19.01	19.00	19.02
	24	18.95	18.97	18.89	19.01	19.00	19.02
Middle_384	11	24.06	23.99	24.02	24.03	24.01	24.02
	15	24.06	23.99	24.02	24.03	24.01	24.02
	16	19.01	19.03	19.04	19.02	19.01	19.02
	24	19.01	19.03	19.04	19.02	19.01	19.02
High_777	11	24.05	23.98	24.07	24.02	24.01	24.05
	15	24.05	23.98	24.07	24.02	24.01	24.05
	16	19.01	18.92	19.05	19.03	19.02	19.03
	24	19.01	18.92	19.05	19.03	19.02	19.03

SV-DO: CDMA 1xRTT(BC1) to 1xEVDO(BC0 & BC1)

CDAM BC1 1900 1xRTT		BC0 850 1xEVDO Output Power[dBm]			BC1 1900 1xEVDO Output Power[dBm]		
ch #	Output Power [dBm]	low 1013	Middle 384	high 777	low 25	Middle 600	high 1175
low-25	11	24.10	23.98	24.10	24.03	24.01	24.02
	15	24.10	23.98	24.10	24.03	24.01	24.02
	16	18.89	18.87	19.00	19.01	19.00	19.03
	24	18.89	18.87	19.00	19.01	19.00	19.03
Middle_600	11	24.05	23.99	24.14	24.02	24.01	24.02
	15	24.05	23.99	24.14	24.02	24.01	24.02
	16	18.90	18.81	19.00	19.02	19.00	19.03
	24	18.90	18.81	19.00	19.02	19.00	19.03
High_1175	11	24.11	23.97	24.13	24.03	24.00	24.02
	15	24.11	23.97	24.13	24.03	24.00	24.02
	16	18.90	18.78	18.97	19.02	18.98	19.01
	24	18.90	18.78	18.97	19.02	18.98	19.01

SV-DO: CDMA 1xRTT(BC10) to 1xEVDO(BC0 & BC1)

CDAM BC10 1900 1xRTT		BC0 850 1xEVDO Output Power[dBm]			BC1 1900 1xEVDO Output Power[dBm]		
ch #	Output Power [dBm]	low 1013	Middle 384	high 777	low 25	Middle 600	high 1175
Middle_580	11	24.01	23.96	24.04	23.99	24.01	24.05
	15	24.01	23.96	24.04	23.99	24.01	24.05
	16	18.90	18.74	19.01	18.92	18.93	18.95
	24	18.90	18.74	19.01	18.92	18.93	18.95

9.4.2 SVLTE

SV-LTE: CDMA 1xRTT(BC0) to SV-LTE Band 25(QPSK,16QAM)

CDAM BC0 850 1xRTT		QPSK Output Power[dBm]				16QAM Output Power[dBm]			
ch #	Output Power [dBm]	1RB, 0 offset	1RB,24 offset	12RB,6 offset	25RB,	1RB, 0 offset	1RB,24 offset	12RB,6 offset	25RB,
low-1013	11	23.77	23.90	22.70	22.81	22.80	23.04	21.58	22.18
	18	23.77	23.90	22.70	22.81	22.80	23.04	21.58	22.18
	19	19.30	19.40	18.89	19.31	19.00	19.30	19.21	19.42
	24	19.30	19.40	18.89	19.31	19.00	19.30	19.21	19.42
Middle_384	11	23.78	23.90	22.70	22.80	22.79	23.03	21.59	22.19
	18	23.78	23.90	22.70	22.80	22.79	23.03	21.59	22.19
	19	19.20	19.30	19.01	19.20	19.10	19.20	19.20	19.50
	24	19.20	19.30	19.01	19.20	19.10	19.20	19.20	19.50
High_777	11	23.79	23.89	22.69	22.80	22.79	23.02	21.58	22.19
	18	23.79	23.89	22.69	22.80	22.79	23.02	21.58	22.19
	19	19.10	19.20	19.10	19.20	19.20	19.31	19.11	19.42
	24	19.10	19.20	19.10	19.20	19.20	19.31	19.11	19.42

SV-DO: CDMA 1xRTT(BC1) to SV-LTE Band 25(QPSK,16QAM)

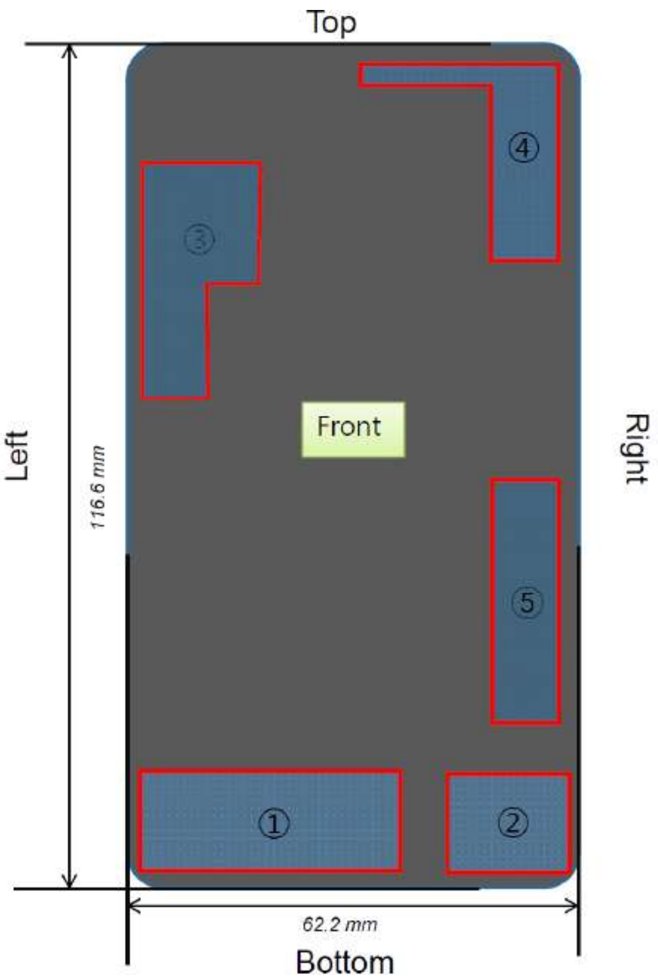
CDAM BC1 1900 1xRTT		QPSK Output Power[dBm]				16QAM Output Power[dBm]			
ch #	Output Power [dBm]	1RB, 0 offset	1RB,24 offset	12RB,6 offset	25RB,	1RB, 0 offset	1RB,24 offset	12RB,6 offset	25RB,
low-25	11	23.79	23.89	22.71	22.81	22.80	23.02	21.58	22.18
	18	23.79	23.89	22.71	22.81	22.80	23.02	21.58	22.18
	19	19.30	19.45	19.01	19.10	19.40	19.51	19.24	19.42
	24	19.30	19.45	19.01	19.10	19.40	19.51	19.24	19.42
Middle_600	11	23.78	23.89	22.71	22.82	22.99	23.03	21.58	21.17
	18	23.78	23.89	22.71	22.82	22.99	23.03	21.58	21.17
	19	19.28	19.48	18.99	19.11	19.40	19.54	19.23	19.38
	24	19.28	19.48	18.99	19.11	19.40	19.54	19.23	19.38
High_1175	11	23.78	23.91	22.71	22.81	23.00	23.03	21.58	22.19
	18	23.78	23.91	22.71	22.81	23.00	23.03	21.58	22.19
	19	19.31	19.51	19.01	19.12	19.41	19.53	19.23	19.41
	24	19.31	19.51	19.01	19.12	19.41	19.53	19.23	19.41

SV-DO: CDMA 1xRTT(BC10) to SV-LTE Band 25(QPSK,16QAM)

CDAM BC10 1900 1xRTT		QPSK Output Power[dBm]				16QAM Output Power[dBm]			
ch #	Output Power [dBm]	1RB, 0 offset	1RB,24 offset	12RB,6 offset	25RB,	1RB, 0 offset	1RB,24 offset	12RB,6 offset	25RB,
Middle_580	11	23.77	23.90	22.73	22.73	22.99	23.03	21.58	22.17
	18	23.77	23.90	22.73	22.73	22.99	23.03	21.58	22.17
	19	19.37	19.41	19.22	19.20	19.10	19.32	19.20	19.28
	24	19.37	19.41	19.22	19.20	19.10	19.32	19.20	19.28

10. Antenna Information &SAR Testing Confogurations

10.1 Antenna and Device Information



① CDMA 1x BC0, BC1, BC10 Rx/Tx

MODE	BAND	TX(MHz)	RX(MHz)
CDMA	BC0	824 ~ 849	869 ~ 894
	BC1	1850 ~ 1910	1930 ~ 1990
	BC10	816 ~ 824	861 ~ 869

② LTE Band 25 2nd RX, EVDO BC1 Rx Diversity

MODE	BAND	TX(MHz)	RX(MHz)
LTE	B25	2nd Rx	1930 ~ 1995
EVDO	BC1	Diversity	1930 ~ 1990

③ LTE Band 25 Rx/Tx , EVDO BC1 Rx/Tx

MODE	BAND	TX(MHz)	RX(MHz)
LTE	B25	1850 ~ 1915	1930 ~ 1995
EVDO	BC1	1850 ~ 1910	1930 ~ 1990

④ EVDO BC0 Rx/Tx , GPS

MODE	TX(MHz)	RX(MHz)
GPS	x	1575.42
EVDO BC0	824 ~ 849	869~894

⑤ BT/Wifi

MODE	TX(MHz)	RX(MHz)
BT & WiFi (802.11b/g/n)	BT : 2402 (1ch) ~ 2480 (79ch) Wifi : 2412(1ch) ~ 2462(11ch)	BT : 2402 (1ch) ~ 2480 (79ch) Wifi : 2412(1ch) ~ 2462(11ch)

10.2 Antenna Separation Distance

Antennas	Physical Separation Distance (mm)				
	ANT ①	ANT ②	ANT ③	ANT ④	ANT ⑤
ANT ①		4.7	61.1	68.1	20.0
ANT ②	4.7		73.5	68.5	13.2
ANT ③	61.1	73.5		21.0	55.5
ANT ④	68.1	68.5	21.0		27.8
ANT ⑤	20.0	13.2	55.5	27.8	

Note;

Per KDB 941225 D06 hotspot procedures, we performed the SAR testing at 1 cm from the top & bottom surfaces and also from side edges with a transmitting antenna ≤ 2.5 cm from an edge.

10.3 SAR Test configurations

Head Operation						
Mode	Band	ANT ①	ANT ②	ANT ③	ANT ④	ANT⑤
CDMA Voice(1xRTT)	BC0	Yes	No	No	No	No
CDMA Voice(1xRTT)	BC1	Yes	No	No	No	No
CDMA Voice(1xRTT)	BC10	Yes	No	No	No	No
EVDO(VOIP)	BC0	No	No	No	Yes	No
EVDO(VOIP)	BC1	No	No	Yes	No	No
EVDO(VOIP)	BC10	No	No	No	No	No
LTE Data	25	No	No	Yes	No	No
SVDO(Voice & Data)	BC0	Yes	No	No	Yes	No
SVDO(Voice & Data)	BC1	Yes	No	Yes	No	No
SVLTE(Voice & Data)	BC0/ LTE25	Yes	No	Yes	No	No
SVLTE(Voice & Data)	BC1/ LTE25	Yes	No	Yes	No	No
SVLTE(Voice & Data)	BC10/ LTE25	Yes	No	Yes	No	No
Wi-Fi(VOIP)	2400	No	No	No	No	Yes
BT	2400	No	No	No	No	Yes

Body-worn Operation						
Mode	Band	ANT ①	ANT ②	ANT ③	ANT ④	ANT⑤
CDMA Voice(1xRTT)	BC0	Yes	No	No	No	No
CDMA Voice(1xRTT)	BC1	Yes	No	No	No	No
CDMA Voice(1xRTT)	BC10	Yes	No	No	No	No
EVDO (VOIP)	BC0	No	No	No	Yes	No
EVDO (VOIP)	BC1	No	No	Yes	No	No
EVDO (VOIP)	BC10	No	No	No	No	No
LTE Data	25	No	No	Yes	No	No
SVDO(Voice & Data)	BC0	Yes	No	No	Yes	No
SVDO(Voice & Data)	BC1	Yes	No	Yes	No	No
SVLTE(Voice & Data)	BC0/ LTE25	Yes	No	Yes	No	No
SVLTE(Voice & Data)	BC1/ LTE25	Yes	No	Yes	No	No
SVLTE(Voice & Data)	BC10/ LTE25	Yes	No	Yes	No	No
Wi-Fi(VOIP)	2400	No	No	No	No	Yes
BT	2400	No	No	No	No	Yes

Wireless Router/ Hotspot Operation Separation Distance = 1 cm						
Mode	Band	ANT ①	ANT ②	ANT ③	ANT ④	ANT⑤
EVDO Data+Wi-Fi	BC0	No	No	No	Yes	Yes
EVDO Data+Wi-Fi	BC1	No	No	Yes	No	Yes
LTE Data+Wi-Fi	LTE25	No	No	Yes	No	Yes
SVDO(Voice & Data)+Wi-Fi	BC0/BC0	Yes	No	No	No	Yes
SVDO(Voice & Data)+Wi-Fi	BC0/BC1	Yes	No	Yes	Yes	Yes
SVDO(Voice & Data)+Wi-Fi	BC1/BC0	Yes	No	No	No	Yes
SVDO(Voice & Data)+Wi-Fi	BC/BC1	Yes	No	Yes	No	Yes
SVLTE(Voice & Data)+Wi-F	BC0 & B25	Yes	No	Yes	No	Yes
SVLTE(Voice & Data)+Wi-F	BC10 & B25	Yes	No	Yes	No	Yes
SVLTE(Voice & Data)+Wi-F	BC1 & B25	Yes	No	Yes	No	Yes

11. SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas

11.1 SAR Evaluation Considerations

These procedures were followed according to FCC "SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas", May 2008. The procedures are applicable to phones with built-in unlicensed transmitters, such as 802.11 a/b/g and Bluetooth devices.

	2.45	5.15 - 5.35	5.47 - 5.85	GHz
P_{Ref}	12	6	5	mW
Device output power should be rounded to the nearest mW to compare with values specified in this				

Table. 11.1 Output Power Thresholds for Unlicensed Transmitters

	Individual Transmitter	Simultaneous Transmission
Licensed Transmitters	Routine evaluation required	SAR not required: Unlicensed only ○ when stand-alone 1-g SAR is not required and antenna is ≥ 5 cm from other antennas Licensed & Unlicensed ○ when the sum of the 1-g SAR is < 1.6 W/kg for all simultaneous transmitting antennas ○ when SAR to peak location separation ratio of simultaneous transmitting antenna pair is < 0.3 SAR required: Licensed & Unlicensed antenna pairs with SAR to peak location separation ratio ≥ 0.3; test is only required for the configuration that results in the highest SAR in stand-alone configuration for each wireless mode and exposure condition Note: simultaneous transmission exposure conditions for head and body can be different for different style phones; therefore, different test requirements may apply
Unlicensed Transmitters	When there is no simultaneous transmission – ○ output ≤ 60/f: SAR not required ○ output > 60/f: stand-alone SAR required When there is simultaneous transmission – Stand-alone SAR not required when ○ output ≤ 2·P_{Ref} and antenna is ≥ 5.0 cm from other antennas ○ output ≤ P_{Ref} and antenna is ≥ 2.5 cm from other antennas ○ output ≤ P_{Ref} and antenna is < 2.5 cm from other antennas, each with either output power ≤ P_{Ref} or 1-g SAR < 1.2 W/kg Otherwise stand-alone SAR is required When stand-alone SAR is required ○ test SAR on highest output channel for each wireless mode and exposure condition ○ if SAR for highest output channel is > 50% of SAR limit, evaluate all channels according to normal procedures	
Jaw, Mouth and Nose	Flat phantom SAR required ○ when measurement is required in tight regions of SAM and it is not feasible or the results can be questionable due to probe tilt, calibration, positioning and orientation issues ○ position rectangular and clam-shell phones according to flat phantom procedures and conduct SAR measurements for these specific locations	When simultaneous transmission SAR testing is required, contact the FCC Laboratory for interim guidance.

Table. 11.2 SAR Evaluation Requirements for Cellphones with Multiple Transmitters

FCC ID: ZNFLS840/ BT Max. RF output power: 8.3 mW

WLAN Max. RF output power: 30.5 mW (802.11b)

11.2 Simultaneous Transmission Conditions

Summary of Simultaneous

No.	Capable TX Configuration	Head SAR	Body SAR	Hotspot SAR	Power Reduction (CDMA EVDO)	Power Reduction (LTE)	Note
1	CDMA Voice	O	O	x	x	x	Stand-alone CDMA Voice
2	CDMA EVDO	O	O	x	x	x	Stand-alone CDMA EVDO
3	LTE	O	O	x	x	O	Stand-alone LTE
4	Wi-Fi	O	O	x	x	x	Stand-alone Wi-Fi
5	BT	x	x	x	x	x	
6	CDMA Voice + CDMA EVDO	O	O	x	O	x	SVDO
7	CDMA Voice + LTE	O	O	x	x	O	SVLTE
8	CDMA Voice + CDMA EVDO + WLAN	O	O	O	O	x	WI-FI Hotspot
9	CDMA Voice + LTE + WLAN	O	O	O	x	O	WI-FI Hotspot

* BT and WLAN are not simultaneous transmission.
* CDMA EVDO and LTE are not simultaneous transmission.
* VOIP support (LTE, EVDO).
* SVLTE, SVDO is supported
* Power reduction is implemented on EVDO in SVDO mode
* Power reduction is implemented on LTE in SVLTE mode.

All Simultaneous case

No.	Capable TX Configuration	Head SAR	Body SAR	Hotspot SAR	Power Reduction (CDMA EVDO)	Power Reduction (LTE)	Note
1	CDMA BC0 Voice	O	O	x	x	x	Stand-alone CDMA BC0 Voice
2	CDMA BC1 Voice	O	O	x	x	x	Standalone CDMA BC1 Voice
3	CDMA BC10 Voice	O	O	x	x	x	Stand-alone CDMA EVDO BC0
4	CDMA BC0 EVDO	O	O	x	x	x	Stand-alone CDMA EVDO BC1
5	CDMA BC1 EVDO	O	O	x	x	x	
6	LTE B25	O	O	x	x	x	Stand-alone LTE B13 data
7	Wi-Fi	O	O	x	x	x	Stand-alone Wi-Fi
8	BT	x	x	x	x	x	N/A
9	CDMA BC0 Voice + Wi-Fi data	O	O	x	x	x	
10	CDMA BC1 Voice + Wi-Fi data	O	O	x	x	x	
11	CDMA BC10 Voice + Wi-Fi data	O	O	x	x	x	
12	CDMA BC0 EVDO+ Wi-Fi data	x	O	O	x	x	WI-FI Hotspot
13	CDMA BC1 EVDO+ Wi-Fi data	x	O	O	x	x	WI-FI Hotspot
14	LTE B25 + Wi-Fi data	x	O	O	x	x	WI-FI Hotspot
15	CDMA BC0 Voice + CDMA BC0 EVDO	O	O	x	O	x	SVDO
16	CDMA BC0 Voice + CDMA BC1 EVDO	O	O	x	O	x	SVDO
17	CDMA BC0 Voice + LTE B25	O	O	x	x	O	SVLTE
18	CDMA BC1 Voice + CDMA BC0 EVDO	O	O	x	O	x	SVDO
19	CDMA BC1 Voice + CDMA BC1 EVDO	O	O	x	O	x	SVDO
20	CDMA BC1 Voice + LTE B25	O	O	x	x		SVLTE
21	CDMA BC10 Voice + CDMA BC0 EVDO	O	O	x			WI-FI Hotspot + SVDO
22	CDMA BC10 Voice + CDMA BC1 EVDO	O	O	x			
23	CDMA BC0 Voice + CDMA BC0 EVDO + WLAN	O	O				WI-FI Hotspot + SVDO
24	CDMA BC0 Voice + CDMA BC1 EVDO + WLAN	O	O				
25	CDMA BC0 Voice + LTE B25 + WLAN	O	O	O		O	WI-FI Hotspot + SVLTE
26	CDMA BC1 Voice + CDMA BC0 EVDO+ WLAN	O	O	O	O		WI-FI Hotspot + SVDO
27	CDMA BC1 Voice + CDMA BC1 EVDO+ WLAN	O	O	O	O		WI-FI Hotspot + SVDO
28	CDMA BC1 Voice + LTE B25 + WLAN	O	O	O		O	
29	CDMA BC10 Voice + CDMA BC1 EVDO+ WLAN	O	O	O	O		
30	CDMA BC10 Voice + CDMA BC1 EVDO+ WLAN	O	O	O	O		
31	CDMA BC10 Voice + LTE B25+ WLAN	O	O	O		O	WI-FI Hotspot + SVLTE

* BT and WLAN are not simultaneous transmission.

* CDMA EVDO and LTE are not simultaneous transmission.

* VOIP support (LTE, EVDO).

*Hotspot support (LTE, EVDO).

* SVLTE, SVDO is supported.

11.3 SAR Summation Scenario

11.3.1 SV-DO Head Exposure Condition

Position	Voice		Data			∑ 1g SAR
	CDMA850 1xRTT	CDMA1900 1xRTT	CDMA850 1xEVDO	CDMA1900 1xEVDO	WiFi	
Left Touch	0.442	-	0.453	-	0.042	0.937
Left Tilt	0.227	-	0.309	-	0.024	0.56
Right Touch	0.494	-	0.346	-	0.116	0.956
Right Tilt	0.222	-	0.226	-	0.019	0.467
Left Touch	0.442	-	-	0.536	0.042	1.02
Left Tilt	0.227	-	-	0.534	0.024	0.785
Right Touch	0.494	-	-	1.16	0.116	1.77
Right Tilt	0.222	-	-	0.557	0.019	0.798
Left Touch	-	1.13	0.453	-	0.042	1.625
Left Tilt	-	0.36	0.309	-	0.024	0.693
Right Touch	-	0.921	0.346	-	0.116	1.383
Right Tilt	-	0.358	0.226	-	0.019	0.603
Left Touch	-	1.13	-	0.536	0.042	1.708
Left Tilt	-	0.36	-	0.534	0.024	0.918
Right Touch	-	0.921	-	1.16	0.116	2.197
Right Tilt	-	0.358	-	0.557	0.019	0.934

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	worst-case combination			Σ1g SAR	3D distance (cm)	SPLSR
	CDMA850 1xRTT	PCS1900 EVDO	WiFi			
Right touch	0.494	1.16	0.116	1.77		
	0.494	1.16		1.654	5.6	0.30
	0.494		0.116	0.61	n/a	n/a
		1.16	0.116	1.276	n/a	n/a

Test Position	worst-case combination			Σ1g SAR	3D distance (cm)	SPLSR
	PCS1900 1xRTT	CDMA850 EVDO	WiFi			
Left touch	1.13	0.453	0.042	1.625		
	1.13	0.453		1.583	n/a	n/a
	1.13		0.042	1.172	n/a	n/a
		0.453	0.042	0.495	n/a	n/a

Test Position	worst-case combination			Σ1g SAR	3D distance (cm)	SPLSR
	PCS1900 1xRTT	PCS1900 EVDO	WiFi			
Left touch	1.13	0.536	0.042	1.708		
	1.13	0.536		1.666	5.8	0.29
	1.13		0.042	1.172	n/a	n/a
		0.536	0.042	0.578	n/a	n/a

Test Position	worst-case combination			Σ1g SAR	3D distance (cm)	SPLSR
	PCS1900 1xRTT	PCS1900 EVDO	WiFi			
Right touch	0.921	1.16	0.116	2.197		
	0.921	1.16		2.081	7.4	0.28
	0.921		0.116	1.037	n/a	n/a
		1.16	0.116	1.276	n/a	n/a

Conclusions:

Volume scan SAR is required because the sum of the 1-g SAR is > 1.6 W/kg.

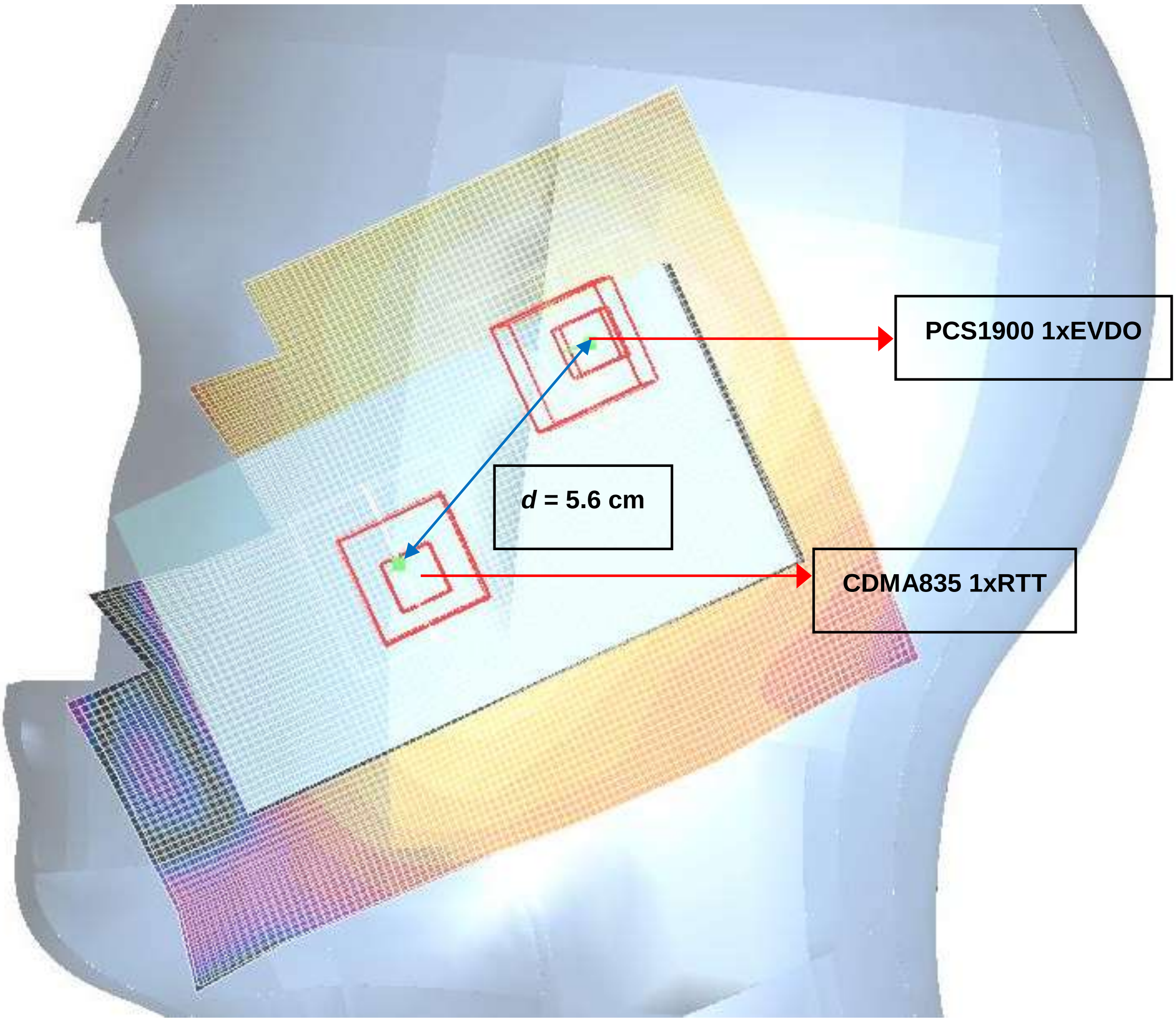
We performed Volume scan SAR since the SPLSR > 0.3.

Notes:

With 3 simultaneously transmitting antennas, it is not possible to calculate the 3D distance.

SAR to Peak Location Separation Ratio (SPLSR)

"CDMA835 1xRTT" to "PCS1900 1xEVDO"



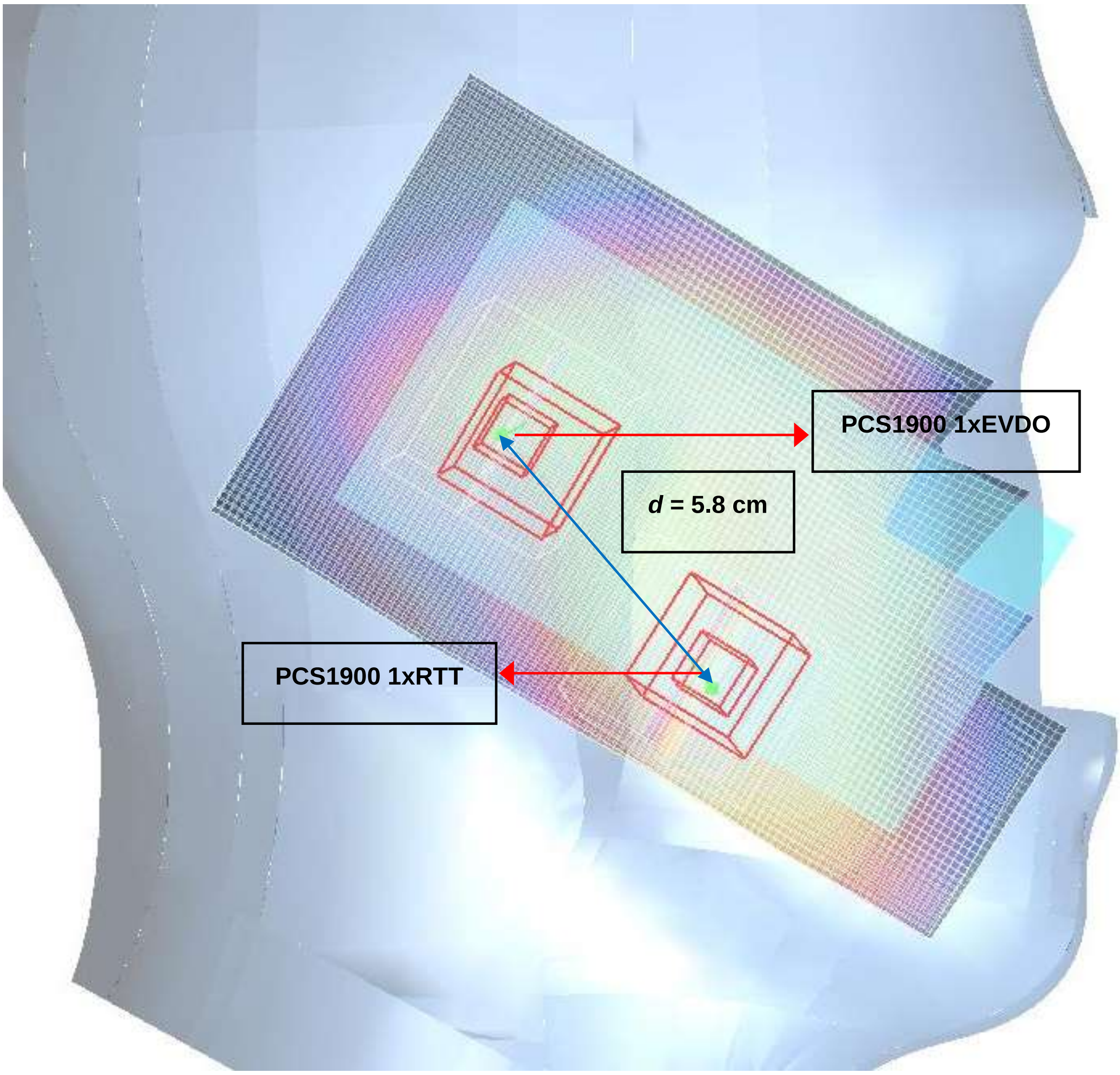
	Value of SAR	X	Y	Z
	mW/g	m	m	m
CDMA835 1xRTT	0.494	0.0718	-0.274	-0.17
PCS1900 1xEVDO	1.16	0.0404	-0.32	-0.173

Separation Distance $d = \sqrt[2]{(X1 - X2)^2 + (Y1 - Y2)^2 + (Z1 - Z2)^2}$

= 5.6 cm

SAR to Peak Location Separation Ratio (SPLSR)

"PCS1900 1xRTT" to "PCS1900 1xEVDO"



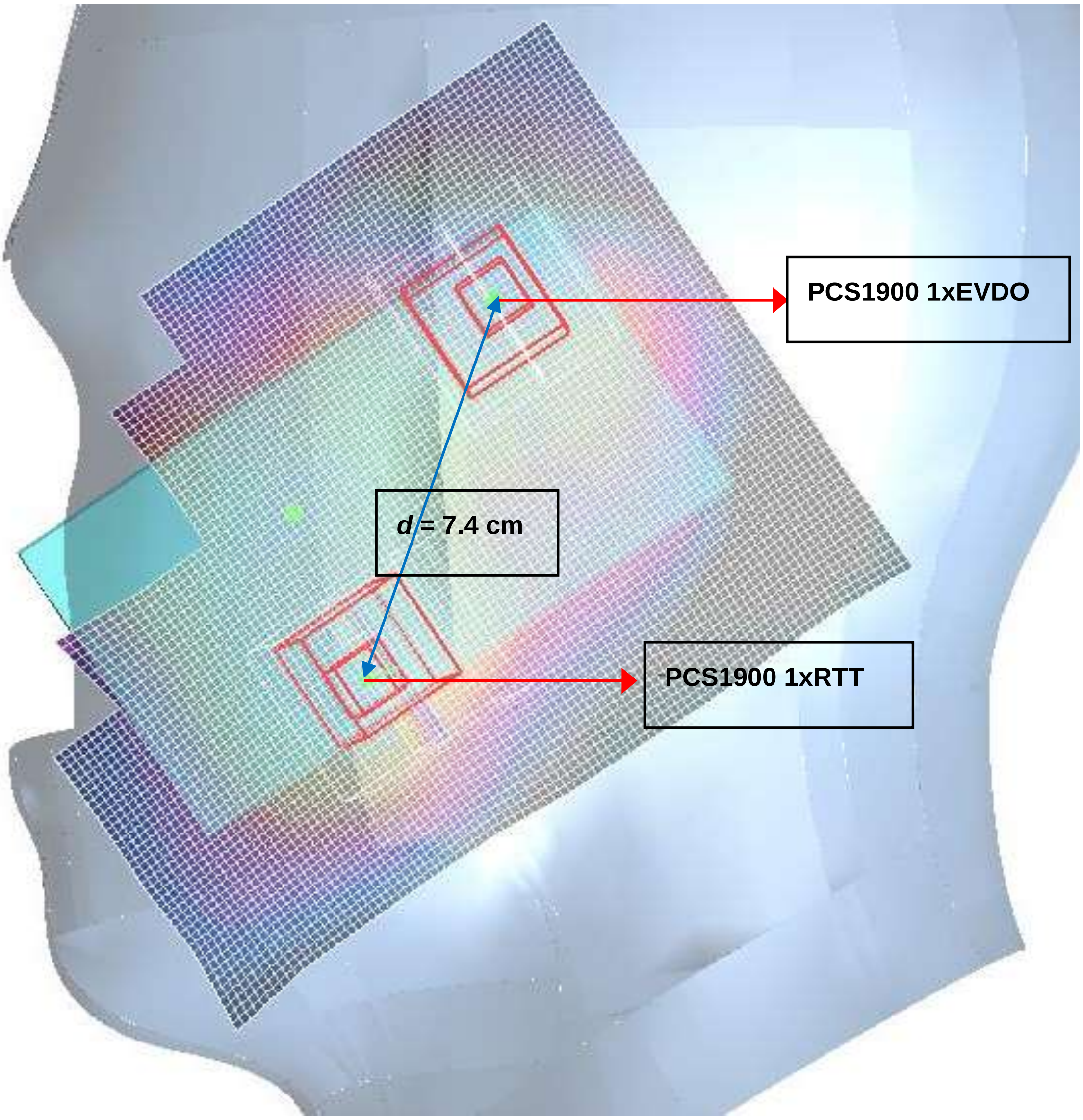
	Value of SAR	X	Y	Z
	mW/g	m	m	m
PCS1900 1xRTT	1.13	0.0639	0.25	-0.17
PCS1900 1xEVDO	0.536	0.027	0.295	-0.171

Separation Distance $d = \sqrt[2]{(X1 - X2)^2 + (Y1 - Y2)^2 + (Z1 - Z2)^2}$

= 5.8 cm

SAR to Peak Location Separation Ratio (SPLSR)

"PCS1900 1xRTT" to "PCS1900 1xEVDO"



	Value of SAR	X	Y	Z
	mW/g	M	m	m
PCS1900 1xRTT	0.921	0.067	-0.251	-0.171
PCS1900 1xEVDO	1.16	0.0404	-0.32	-0.173

Separation Distance $d = \sqrt[2]{(X1 - X2)^2 + (Y1 - Y2)^2 + (Z1 - Z2)^2}$

= 7.4 cm

SV-DO Head Volume Scans & Combined Results

Test position	Multi-band	Ch.#	Freq(MHz)	Zoom scan	Test Results(W/kg)		
					Volume scan	Multi Band (Combined)Results	
Right touch	CDMA835 1xRTT	384	836.52	0.494	0.493	1.23	1.23
	PCS1900 1xEVDO	25	1851.25	1.16	1.17		
	802.11b	11	2462.00	0.116	0.119		

Test position	Multi-band	Ch.#	Freq(MHz)	Zoom scan	Test Results(W/kg)		
					Volume scan	Multi Band (Combined)Results	
Right touch	PCS1900 1xRTT	600	1880.00	0.921	0.935	1.29	1.29
	PCS1900 1xEVDO	25	1851.25	1.16	1.17		
	802.11b		2462.00	0.116	0.119		

11.3.2 SV-DO Body-worn and Body-hotspot Exposure Condition

Position	Voice		Data			∑ 1g SAR
	CDMA850 1xRTT	CDMA1900 1xRTT	CDMA850 1xEVDO	CDMA1900 1xEVDO	WiFi	
Rear	0.922	-	0.713	-	0.239	1.874
	0.922	-	-	0.888	0.239	2.049
Front	0.728	-	0.244	-	0.045	1.017
	0.728	-	-	0.463	0.045	1.236
Rear	-	0.915	0.713	-	0.239	1.867
	-	0.915	-	0.888	0.239	2.042
Front	-	0.966	0.244	-	0.045	1.255
	-	0.966	-	0.463	0.045	1.474

SAR to Peak Location Separation Ratio (SPLSR)

Test Position	worst-case combination			Σ1g SAR	3D distance (cm)	SPLSR
	CDMA850 1xRTT	CDMA850 EVDO	WiFi			
Rear	0.922	0.713	0.239	1.874		
	0.922	0.713		1.635	5.6	0.29
	0.922		0.239	1.161	n/a	n/a
		0.713	0.239	0.952	n/a	n/a

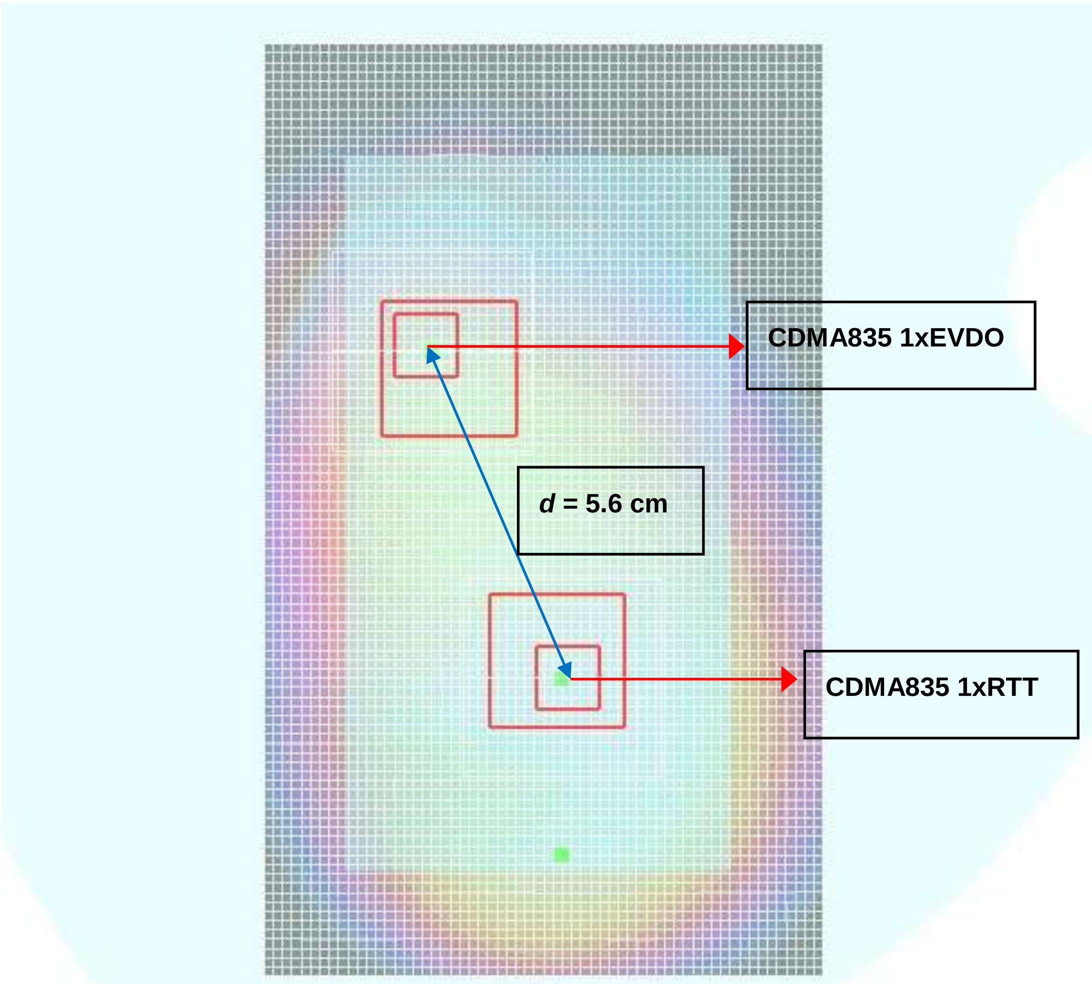
Test Position	worst-case combination			Σ1g SAR	3D distance (cm)	SPLSR
	CDMA850 1xRTT	PCS1900 EVDO	WiFi			
Rear	0.922	0.888	0.239	2.049		
	0.922	0.888		1.81	6.6	0.27
	0.922		0.239	1.161	n/a	n/a
		0.888	0.239	1.127	n/a	n/a

Test Position	worst-case combination			Σ1g SAR	3D distance (cm)	SPLSR
	PCS1900 1xRTT	CDMA850 EVDO	WiFi			
Rear	0.915	0.713	0.239	1.867		
	0.915	0.713		1.628	7.3	0.22
	0.915		0.239	1.154	n/a	n/a
		0.713	0.239	0.952	n/a	n/a

Test Position	worst-case combination			Σ1g SAR	3D distance (cm)	SPLSR
	PCS1900 1xRTT	PCS1900 EVDO	WiFi			
Rear	0.915	0.888	0.239	2.042		
	0.915	0.888		1.803	8.0	0.23
	0.915		0.239	1.154	n/a	n/a
		0.888	0.239	1.127	n/a	n/a

SAR to Peak Location Separation Ratio (SPLSR)

“CDMA835 1xRTT” to “CDMA835 1xEVDO”



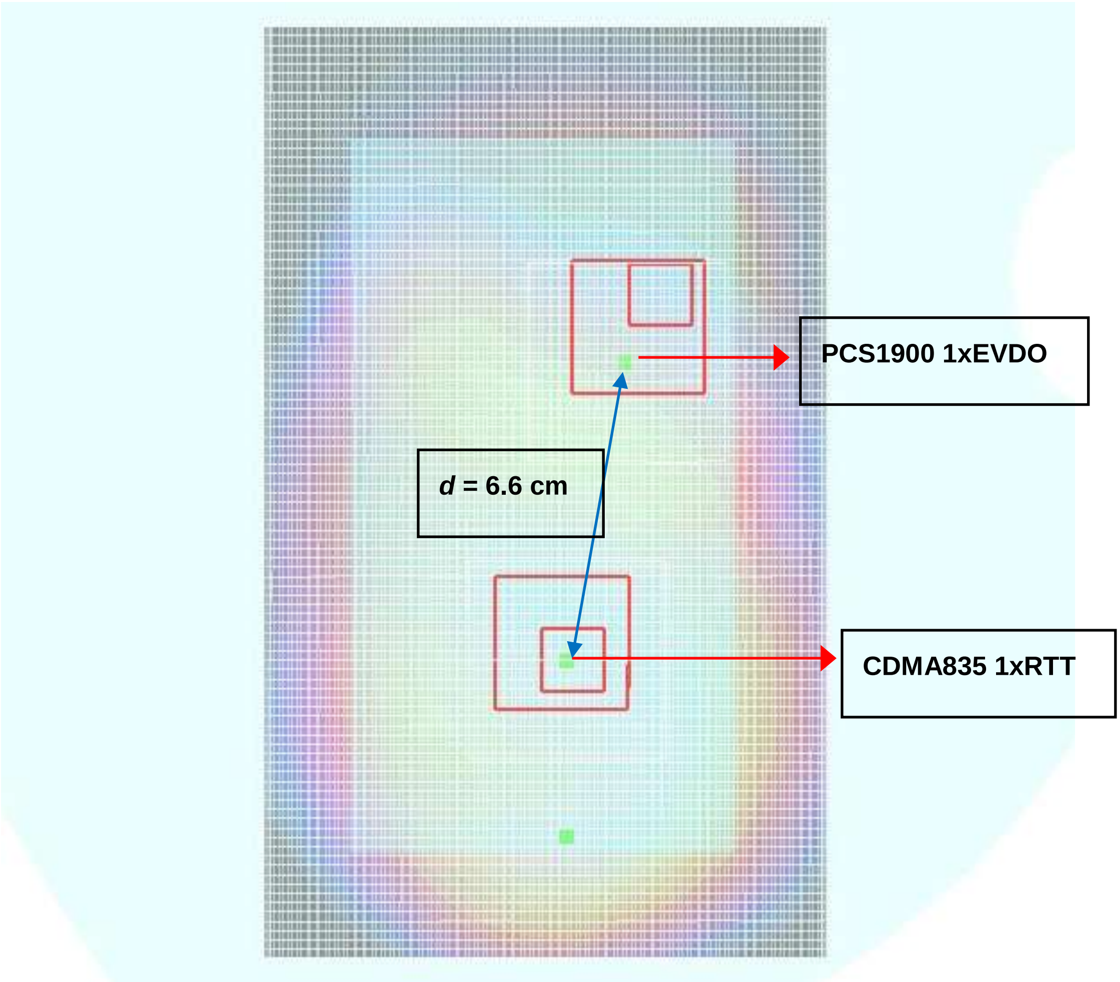
	Value of SAR	X	Y	Z
	mW/g	m	m	m
CDMA835 1xRTT	0.922	-0.0129	-0.0619	-0.203
CDMA835 1xEVDO	0.713	-0.0339	-0.00945	-0.203

Separation Distance $d = \sqrt[2]{(X1 - X2)^2 + (Y1 - Y2)^2 + (Z1 - Z2)^2}$

= 5.6 cm

SAR to Peak Location Separation Ratio (SPLSR)

“CDMA835 1xRTT” to “PCS1900 1xEVDO”



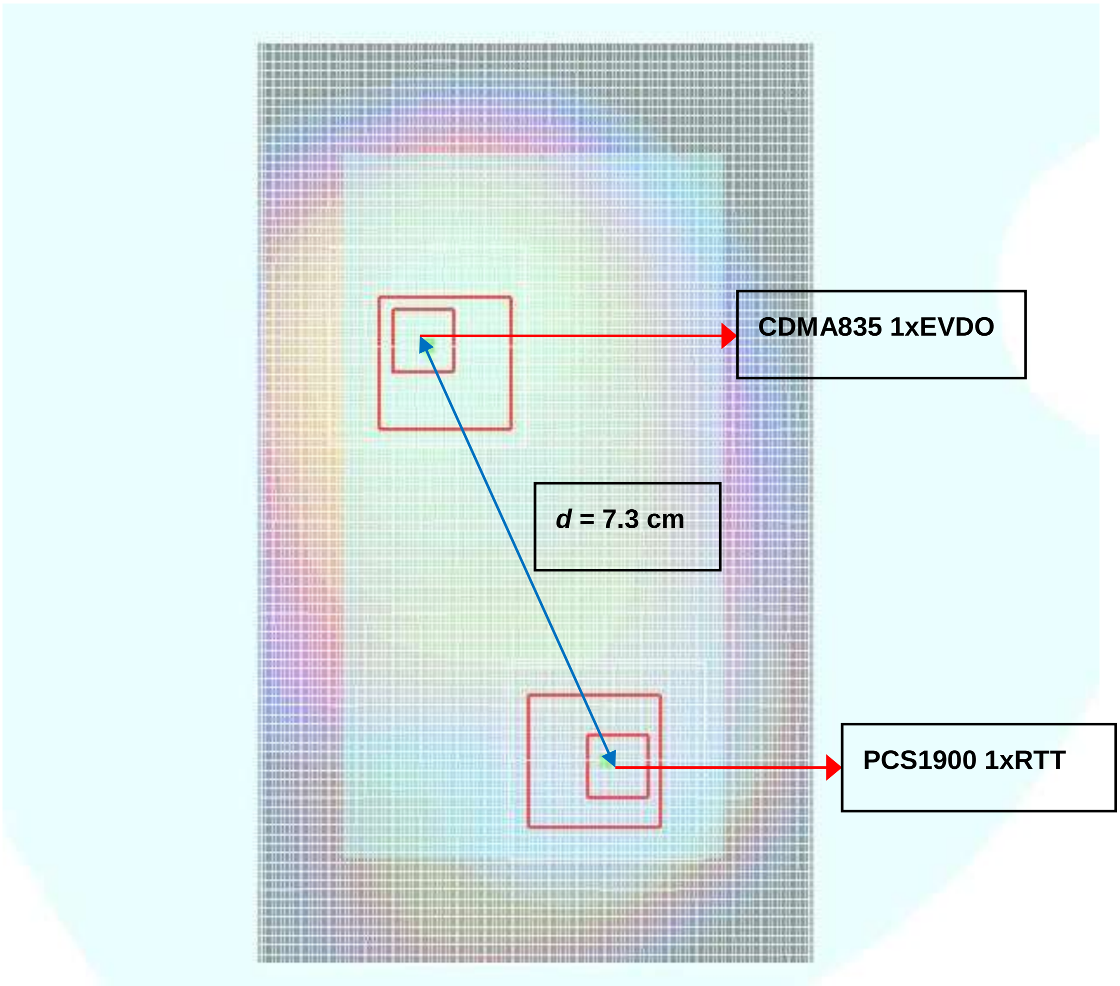
	Value of SAR	X	Y	Z
	mW/g	m	m	m
CDMA835 1xRTT	0.922	-0.0129	-0.0619	-0.203
PCS1900 1xEVDO	0.888	0.00457	0.002	-0.202

Separation Distance $d = \sqrt[2]{(X1 - X2)^2 + (Y1 - Y2)^2 + (Z1 - Z2)^2}$

= 6.6 cm

SAR to Peak Location Separation Ratio (SPLSR)

"PCS1900 1xRTT" to "CDMA835 1xEVDO"



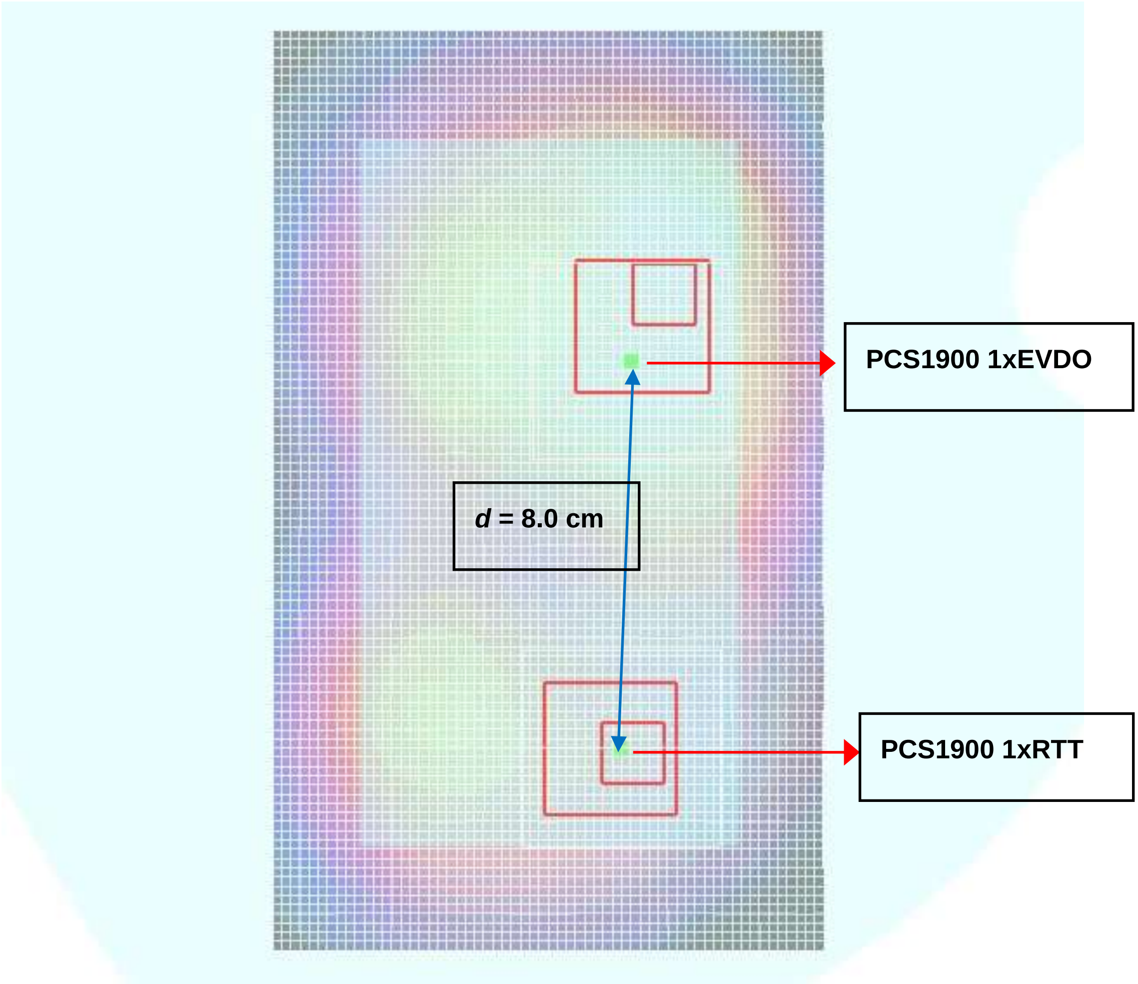
	Value of SAR	X	Y	Z
	mW/g	m	m	m
PCS1900 1xRTT	0.915	-0.00496	-0.077	-0.202
CDMA835 1xEVDO	0.713	-0.0339	-0.00945	-0.203

Separation Distance $d = \sqrt[2]{(X1 - X2)^2 + (Y1 - Y2)^2 + (Z1 - Z2)^2}$

= 7.3 cm

SAR to Peak Location Separation Ratio (SPLSR)

“PCS1900 1xRTT” to “PCS1900 1xEVDO”



	Value of SAR	X	Y	Z
	mW/g	m	m	m
PCS1900 1xRTT	0.915	-0.00496	-0.077	-0.202
PCS1900 1xEVDO	0.888	0.00457	0.002	-0.202

Separation Distance $d = \sqrt[2]{(X1 - X2)^2 + (Y1 - Y2)^2 + (Z1 - Z2)^2}$

= 8.0 cm

11.3.3 SV-LTE Head Exposure Condition

Band 25

Position	Voice		Data		∑ 1g SAR
	CDMA850 1xRTT	CDMA1900 1xRTT	LTE Band 13	WiFi	
Left Touch	0.442		0.488	0.042	0.972
Left Tilt	0.227		0.503	0.024	0.754
Right Touch	0.494		0.762	0.116	1.372
Right Tilt	0.222		0.53	0.019	0.771
Left Touch		1.13	0.488	0.042	1.66
Left Tilt		0.36	0.503	0.024	0.887
Right Touch		0.921	0.762	0.116	1.799
Right Tilt		0.358	0.53	0.019	0.907

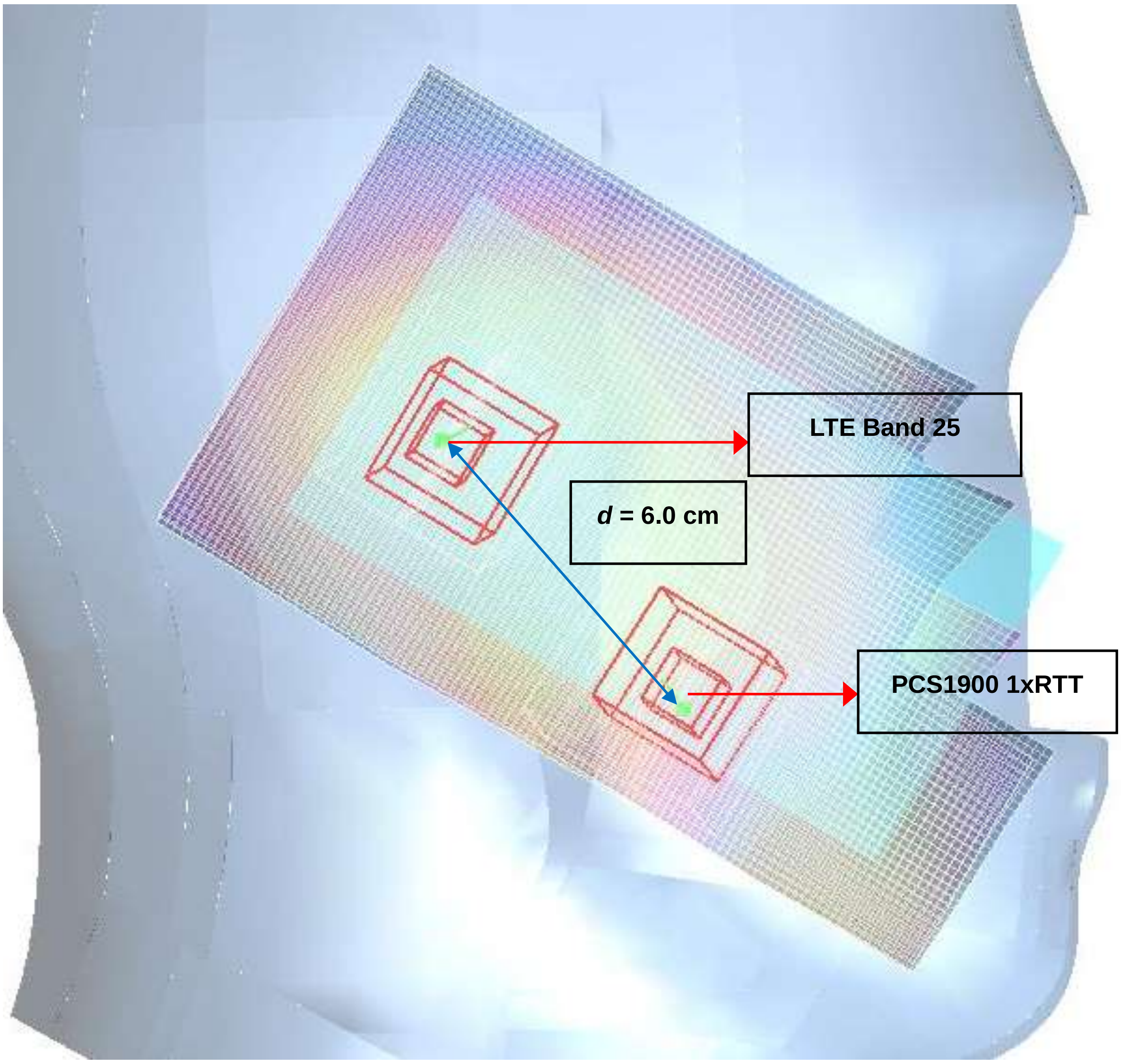
SAR to Peak Location Separation Ratio (SPLSR)

Test Position	worst-case combination			Σ1g SAR	3D distance (cm)	SPLSR
	PCS1900 1xRTT	LTE Band 13	WiFi			
Left touch	1.13	0.488	0.042	1.66		
	1.13	0.488		1.618	6	0.27
	1.13		0.042	1.172	n/a	n/a
		0.488	0.042	0.53	n/a	n/a

Test Position	worst-case combination			Σ1g SAR	3D distance (cm)	SPLSR
	PCS1900 1xRTT	LTE	WiFi			
Right touch	0.921	0.762	0.116	1.799		
	0.921	0.762		1.683	7.6	0.22
	0.921		0.116	1.037	n/a	n/a
		0.762	0.116	0.878	n/a	n/a

SAR to Peak Location Separation Ratio (SPLSR)

"PCS1900 1xRTT" to "LTE Band 25"



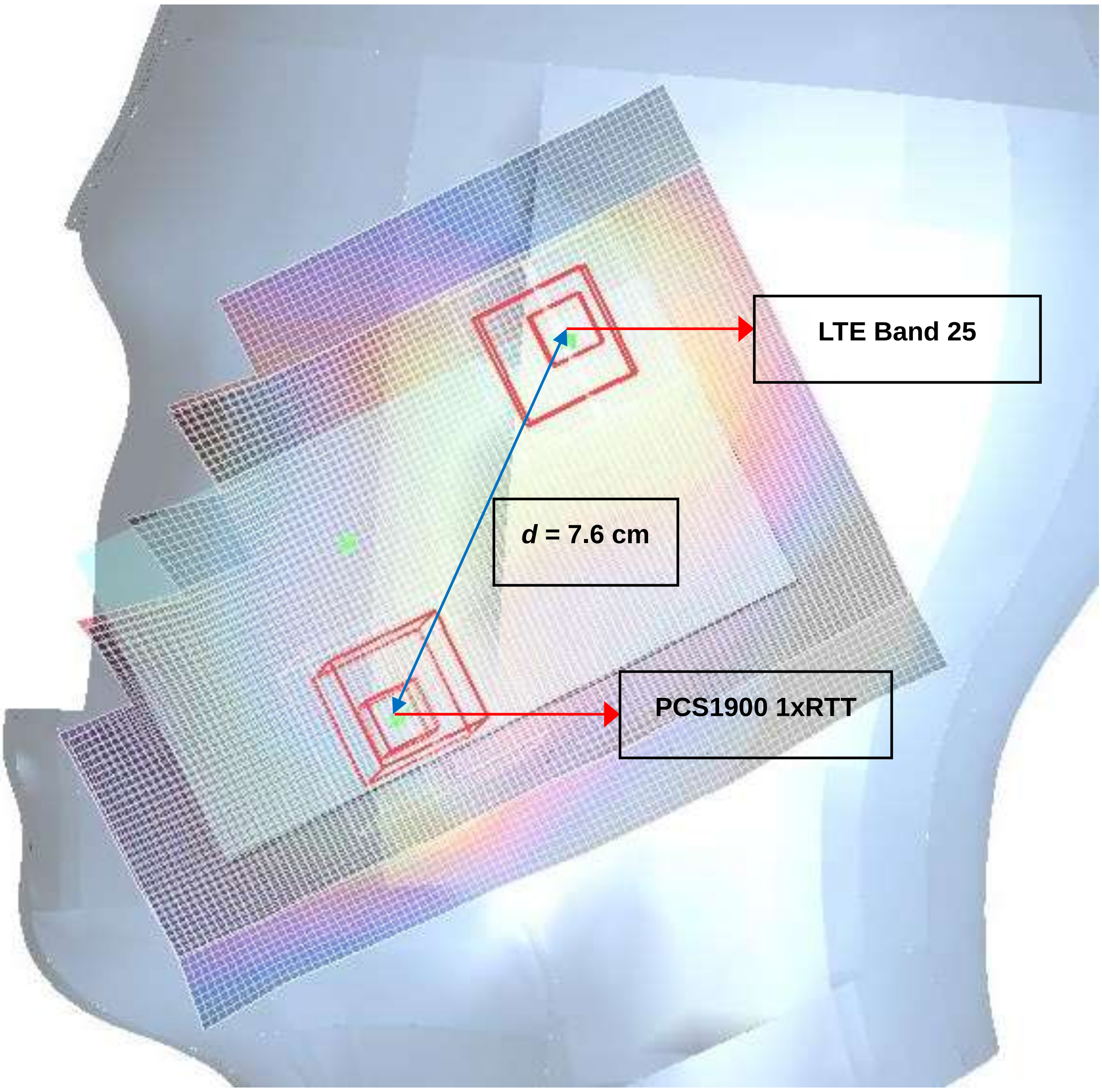
	Value of SAR	X	Y	Z
	mW/g	m	m	m
PCS1900 1xRTT	1.13	0.0639	0.25	-0.17
LTE Band 25	0.488	0.0236	0.295	-0.17

Separation Distance $d = \sqrt[2]{(X1 - X2)^2 + (Y1 - Y2)^2 + (Z1 - Z2)^2}$

= 6.0 cm

SAR to Peak Location Separation Ratio (SPLSR)

"PCS1900 1xRTT" to "LTE Band 25"



	Value of SAR	X	Y	Z
	mW/g	m	m	m
PCS1900 1xRTT	0.921	0.067	-0.251	-0.171
LTE Band 25	0.762	0.0421	-0.323	-0.171

Separation Distance $d = \sqrt[2]{(X1 - X2)^2 + (Y1 - Y2)^2 + (Z1 - Z2)^2}$

= 7.6 cm

11.3.4 SV-LTE Body-worn and Body-hotspot Exposure Condition

Band 25

Position	Voice		Data		∑ 1g SAR
	CDMA850 1xRTT	CDMA1900 1xRTT	LTE Band 25	WiFi	
Rear	0.922		0.83	0.239	1.991
Front	0.728		0.37	0.045	1.143
Rear		0.915	0.83	0.239	1.984
Front		0.966	0.37	0.045	1.381

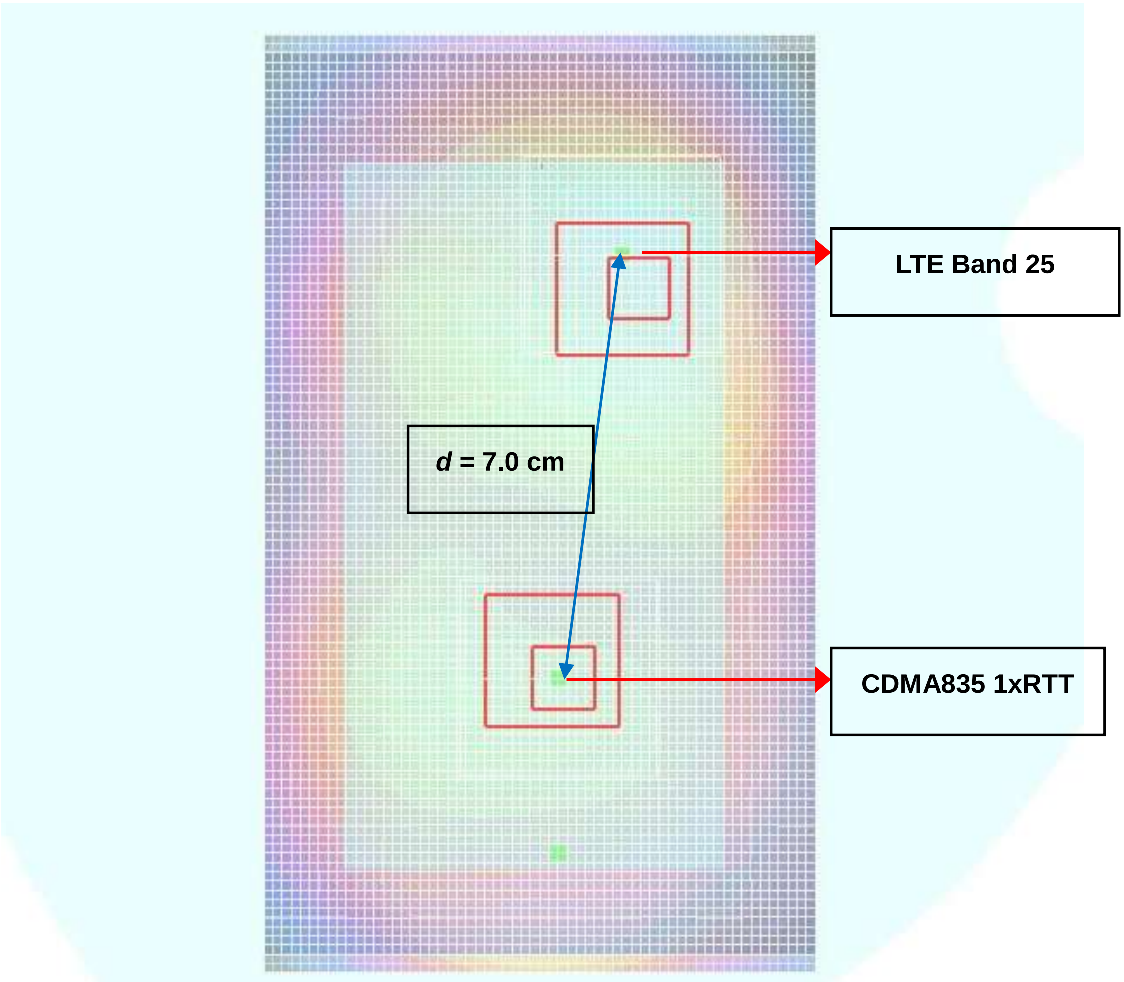
SAR to Peak Location Separation Ratio (SPLSR)

Test Position	worst-case combination			Σ1g SAR	3D distance (cm)	SPLSR
	CDMA850 1xRTT	LTE Band 25	WiFi			
Rear	0.922	0.83	0.239	1.991		
	0.922	0.83		1.752	7	0.25
	0.922		0.239	1.161	n/a	n/a
		0.83	0.239	1.069	n/a	n/a

Test Position	worst-case combination			Σ1g SAR	3D distance (cm)	SPLSR
	PCS1900 1xRTT	LTE Band 25	WiFi			
Rear	0.915	0.83	0.239	1.984		
	0.915	0.83		1.745	8.4	0.21
	0.915		0.239	1.154	n/a	n/a
		0.83	0.239	1.069	n/a	n/a

SAR to Peak Location Separation Ratio (SPLSR)

“CDMA835 1xRTT” to “LTE Band 25”



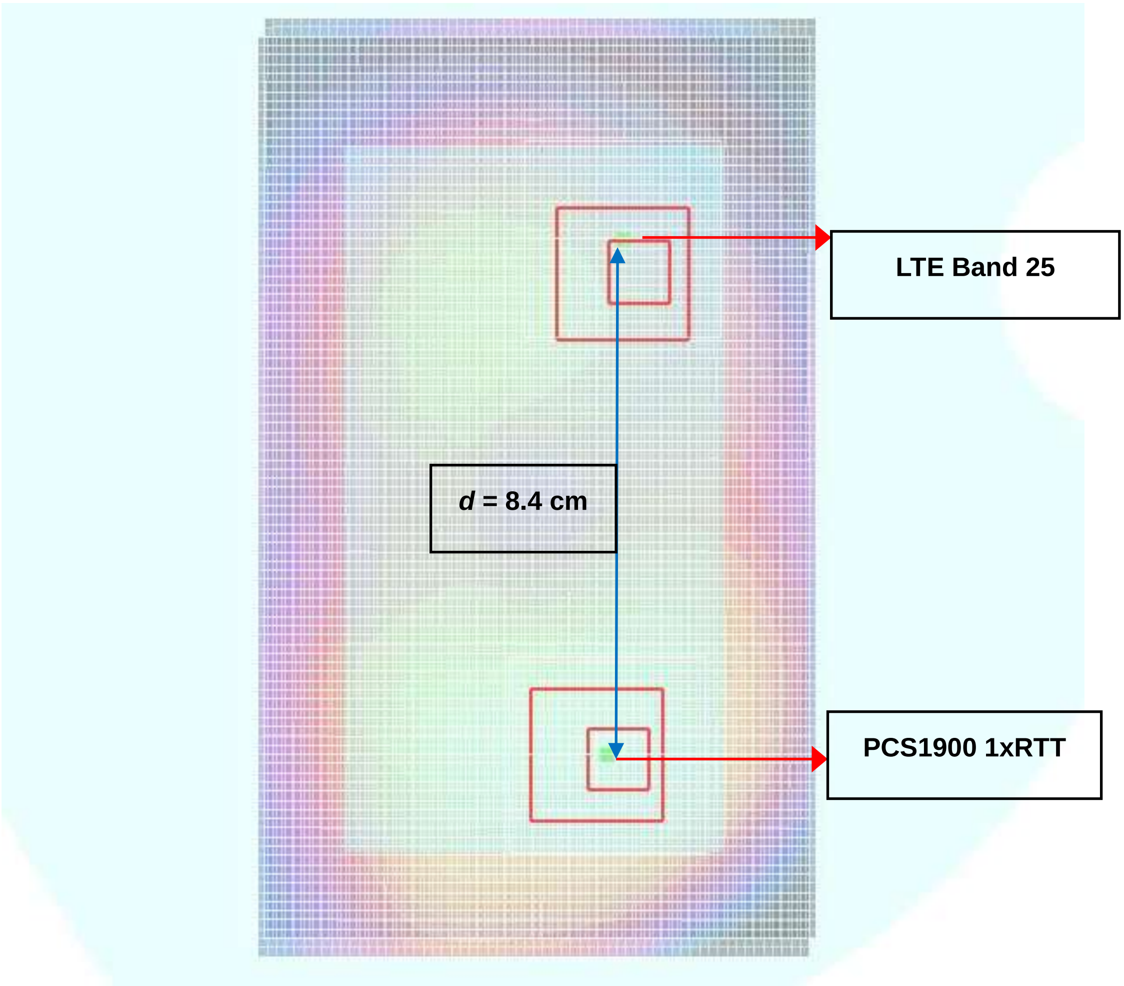
	Value of SAR	X	Y	Z
	mW/g	m	m	m
CDMA835 1xRTT	0.922	-0.0129	-0.0619	-0.203
LTE Band 25	0.83	-0.00247	0.00705	-0.203

Separation Distance $d = \sqrt[2]{(X1 - X2)^2 + (Y1 - Y2)^2 + (Z1 - Z2)^2}$

= 7.0 cm

SAR to Peak Location Separation Ratio (SPLSR)

“PCS1900 1xRTT” to “LTE Band 25”



	Value of SAR	X	Y	Z
	mW/g	m	m	m
PCS1900 1xRTT	0.915	-0.00496	-0.077	-0.202
LTE Band 25	0.83	-0.00247	0.00705	-0.203

Separation Distance $d = \sqrt[2]{(X1 - X2)^2 + (Y1 - Y2)^2 + (Z1 - Z2)^2}$

= 8.4 cm

12. SAR TEST DATA SUMMARY

12.1 Measurement Results (CDMA835/EVDO835 Head SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Battery	Phantom Position	SAR(mW/g)
MHz	Channel						
836.52	384 (Mid)	CDMA835	24.94	-0.07	Standard	Left Ear	0.442
836.52	384 (Mid)	CDMA835	24.94	-0.145	Standard	Left Tilt 15°	0.227
836.52	384 (Mid)	CDMA835	24.94	-0.178	Standard	Right Ear	0.494
836.52	384 (Mid)	CDMA835	24.94	-0.017	Standard	Right Tilt 15°	0.222
836.52	384 (Mid)	EVDO	24.18	-0.156	Standard	Left Ear	0.453
836.52	384 (Mid)	EVDO	24.18	-0.118	Standard	Left Tilt 15°	0.309
836.52	384 (Mid)	EVDO	24.18	0.156	Standard	Right Ear	0.346
836.52	384 (Mid)	EVDO	24.18	0.022	Standard	Right Tilt 15°	0.226
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population					**Head 1.6 W/kg (mW/g)** Averaged over 1 gram		

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2 All modes of operation were investigated and the worst-case are reported.
3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Battery Type ☒ Standard ☐ Extended ☐ Slim
Batteries are fully charged for all readings.
6 Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
7 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
8 EVDO SAR was tested under EVDO Rev.0 RTAP.
9 Head SAR was tested under RC3/SO55.

12.2 Measurement Results (PCS1900/EVDO1900 Head SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Battery	Phantom Position	SAR(mW/g)
MHz	Channel						
1851.25	25 (Low)	PCS1900	24.86	-0.071	Standard	Left Ear	0.926
1880.00	600 (Mid)	PCS1900	24.84	-0.024	Standard	Left Ear	1.13
1908.75	1175 (High)	PCS1900	24.87	-0.070	Standard	Left Ear	1.09
1880.00	600 (Mid)	PCS1900	24.84	0.079	Standard	Left Tilt 15°	0.36
1851.25	25 (Low)	PCS1900	24.86	0.063	Standard	Right Ear	0.829
1880.00	600 (Mid)	PCS1900	24.84	0.095	Standard	Right Ear	0.921
1908.75	1175 (High)	PCS1900	24.87	0.020	Standard	Right Ear	0.703
1880.00	600 (Mid)	PCS1900	24.84	0.134	Standard	Right Tilt 15°	0.358
1880.00	600 (Mid)	EVDO	24.18	-0.094	Standard	Left Ear	0.536
1880.00	600 (Mid)	EVDO	24.18	-0.049	Standard	Left Tilt 15°	0.534
1851.25	25 (Low)	EVDO	24.14	0.033	Standard	Right Ear	1.16
1880.00	600 (Mid)	EVDO	24.18	-0.029	Standard	Right Ear	1.15
1908.75	1175 (High)	EVDO	24.17	-0.057	Standard	Right Ear	0.812
1880.00	600 (Mid)	EVDO	24.18	-0.149	Standard	Right Tilt 15°	0.557
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population					**Head 1.6 W/kg (mW/g)** Averaged over 1 gram		

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2 All modes of operation were investigated and the worst-case are reported.
3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Battery Type ☒ Standard ☐ Extended ☐ Slim
Batteries are fully charged for all readings.
6 Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
7 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
8 EVDO SAR was tested under EVDO Rev.0 RTAP.
9 Head SAR was tested under RC3/SO55.

12.3 Measurement Results (CDMA BC10 Head SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Battery	Phantom Position	SAR(mW/g)
MHz	Channel						
820.50	580 (Mid)	CDMA800	24.76	-0.061	Standard	Left Ear	0.450
820.50	580 (Mid)	CDMA800	24.76	-0.032	Standard	Left Tilt 15°	0.242
820.50	580 (Mid)	CDMA800	24.76	0.139	Standard	Right Ear	0.470
820.50	580 (Mid)	CDMA800	24.76	-0.069	Standard	Right Tilt 15°	0.234
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population					**Head 1.6 W/kg (mW/g)** Averaged over 1 gram		

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2 All modes of operation were investigated and the worst-case are reported.
3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Battery Type ☒ Standard ☐ Extended ☐ Slim
Batteries are fully charged for all readings.
6 Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
7 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

12.4 Measurement Results (LTE Band25 5MHz Head SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	RB Size	RB Offset	Phantom Position	SAR(mW/g)	MPR
MHz	Channel								
1882.5	26365	QPSK	22.24	-0.058	12	6	Left Ear	0.373	1
1882.5	26365	QPSK	22.30	-0.092	1	0	Left Ear	0.441	0
1882.5	26365	QPSK	23.38	0.002	1	24	Left Ear	0.488	0
1882.5	26365	QPSK	22.24	0.107	12	6	Left Tilt 15°	0.379	1
1882.5	26365	QPSK	22.30	-0.040	1	0	Left Tilt 15°	0.468	0
1882.5	26365	QPSK	23.38	-0.009	1	24	Left Tilt 15°	0.503	0
1882.5	26365	QPSK	22.24	0.06	12	6	Right Ear	0.587	1
1882.5	26365	QPSK	22.30	0.017	1	0	Right Ear	0.693	0
1882.5	26365	QPSK	23.38	0.074	1	24	Right Ear	0.762	0
1882.5	26365	QPSK	22.24	0.152	12	6	Right Tilt 15°	0.385	1
1882.5	26365	QPSK	22.30	-0.057	1	0	Right Tilt 15°	0.520	0
1882.5	26365	QPSK	23.38	0.078	1	24	Right Tilt 15°	0.530	0
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						**Head 1.6 W/kg (mW/g)** Averaged over 1 gram			

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2 All modes of operation were investigated and the worst-case are reported.
3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Battery Type ☒ Standard ☐ Extended ☐ Slim
Batteries are fully charged for all readings.
6 Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
7 KDB 941225 D05 SAR for LTE Devices v01 was followed.
- QPSK with 50% RB is required for the largest channel Bandwidth.
- QPSK with 1 RB for both channel edges are required for the largest channel Bandwidth.
- 16QAM with 50% RB is required for the largest channel Bandwidth.
- 16QAM with 1 RB for both channel edges are required for the largest channel Bandwidth.
- 100% RB allocation is not required since SAR is not > 1.45 W/kg.
- The Low & High channel were not required for Band 5/4 since the power variation across all channels is 1/2 dB and SAR is ≤ 0.8 W/kg.

12.5 Measurement Results (LTE Band25 16QAM Head SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	RB Size	RB Offset	Phantom Position	SAR(mW/g)	MPR
MHz	Channel								
1882.5	26365	16QAM	21.18	-0.071	12	6	Left Ear	0.281	2
1882.5	26365	16QAM	22.40	0.018	1	0	Left Ear	0.373	1
1882.5	26365	16QAM	22.41	-0.032	1	24	Left Ear	0.396	1
1882.5	26365	16QAM	21.18	0.057	12	6	Left Tilt 15°	0.288	2
1882.5	26365	16QAM	22.40	0.025	1	0	Left Tilt 15°	0.385	1
1882.5	26365	16QAM	22.41	0.110	1	24	Left Tilt 15°	0.385	1
1882.5	26365	16QAM	21.18	0.013	12	6	Right Ear	0.461	2
1882.5	26365	16QAM	22.40	0.085	1	0	Right Ear	0.585	1
1882.5	26365	16QAM	22.41	-0.008	1	24	Right Ear	0.637	1
1882.5	26365	16QAM	21.18	-0.038	12	6	Right Tilt 15°	0.324	2
1882.5	26365	16QAM	22.40	0.192	1	0	Right Tilt 15°	0.436	1
1882.5	26365	16QAM	22.41	0.057	1	24	Right Tilt 15°	0.446	1
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population					**Head 1.6 W/kg (mW/g)** Averaged over 1 gram				

NOTES:

1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2. All modes of operation were investigated and the worst-case are reported.
3. Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
4. Tissue parameters and temperatures are listed on the SAR plot.
5. Battery Type ☒ Standard ☐ Extended ☐ Slim
   Batteries are fully charged for all readings.
6. Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
7. KDB 941225 D05 SAR for LTE Devices v01 was followed.
   - QPSK with 50% RB is required for the largest channel Bandwidth.
   - QPSK with 1 RB for both channel edges are required for the largest channel Bandwidth.
   - 16QAM with 50% RB is required for the largest channel Bandwidth.
   - 16QAM with 1 RB for both channel edges are required for the largest channel Bandwidth.
   - 100% RB allocation is not required since SAR is not > 1.45 W/kg.
   - The Low & High channel were not required for Band 5/4 since the power variation across all channels is 1/2 dB and SAR is ≤ 0.8 W/kg.

12.6 Measurement Results (802.11b/g/n Head SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Data Rate (Mbps)	Phantom Position	SAR(mW/g)
MHz	Channel						
2462	11(High)	802.11b	14.85	0.084	1	Left Ear	0.042
2462	11(High)	802.11b	14.85	0.015	1	Left Tilt 15^{o}	0.024
2462	11(High)	802.11b	14.85	-0.015	1	Right Ear	0.116
2462	11(High)	802.11b	14.85	0.027	1	Right Tilt 15	0.019
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						**Head 1.6 W/kg (mW/g)** Averaged over 1 gram	

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2 All modes of operation were investigated and the worst-case are reported.
3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Battery Type ☒ Standard ☐ Extended ☐ Slim
Batteries are fully charged for all readings.
6 Test Signal Call Mode ☒ Manual Test cord ☐ Base Station Simulator
7 IEEE 802.11g(including 802.11n) SAR testing is required when the conducted powers are equal to or greater than 0.25 dB Than the conducted powers in IEEE 802.11b.
8 For 2.4GHz WLAN, Highest average power channel for the lowest data rate was selected for SAR evaluation based on KDB 248227. Other channels are not necessary because 1g-average SAR < 0.8 W/Kg and peak SAR < 1.6W/Kg per KDB 248227.

12.7 Measurement Results (CDMA835/EVDO835 Hotspot SAR)

Frequency		Modulation	ConductedPower (dBm)	Power Drift (dB)	Configuration	Separation Distance	SAR(mW/g)
MHz	Channel						
824.70	1013 (Low)	CDMA835	24.70	-0.01	Rear	1.0 cm	0.917
836.52	384 (Mid)	CDMA835	24.77	-0.141	Rear	1.0 cm	0.874
848.31	777 (High)	CDMA835	24.74	-0.11	Rear	1.0 cm	0.922
835	384 (Mid)	CDMA835	24.77	0.082	Front	1.0 cm	0.728
835	384 (Mid)	EVDO	24.18	0.083	Rear	1.0 cm	0.713
835	384 (Mid)	EVDO	24.18	0.029	Front	1.0 cm	0.244
835	384 (Mid)	EVDO	24.18	-0.029	Left	1.0 cm	0.426
835	384 (Mid)	EVDO	24.18	0.084	Right	1.0 cm	0.149
835	384 (Mid)	EVDO	24.18	0.029	Top	1.0 cm	0.109
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						**Body 1.6 W/kg (mW/g)** Averaged over 1 gram	

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2 All modes of operation were investigated and the worst-case are reported.
3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Battery Type ☒ Standard ☐ Extended ☐ Slim
Batteries are fully charged for all readings.
6 Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
7 EVDO SAR was tested under EVDO Rev.0 RTAP.
8 Test Configuration ☐ With Holster ☒ Without Holster
9 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
9 CDMA Body SAR was tested under RC3/SO32 FCH only.

12.8 Measurement Results(PCS1900/ EVDO1900 Hotspot SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Configuration	Separation Distance	SAR(mW/g)
MHz	Channel						
1851.25	25 (Low)	PCS1900	24.75	0.120	Rear	1.0 cm	0.860
1880.00	600 (Mid)	PCS1900	24.82	-0.027	Rear	1.0 cm	0.915
1908.75	1175 (High)	PCS1900	24.74	0.032	Rear	1.0 cm	0.888
1851.25	25 (Low)	PCS1900	24.75	0.087	Front	1.0 cm	0.856
1880.00	600 (Mid)	PCS1900	24.82	0.040	Front	1.0 cm	0.966
1908.75	1175 (High)	PCS1900	24.74	0.100	Front	1.0 cm	0.941
1851.25	25 (Low)	EVDO	24.14	-0.120	Rear	1.0 cm	0.832
1880.00	600 (Mid)	EVDO	24.18	0.021	Rear	1.0 cm	0.882
1908.75	1175 (High)	EVDO	24.17	0.009	Rear	1.0 cm	0.888
1880.00	600 (Mid)	EVDO	24.18	0.122	Front	1.0 cm	0.463
1880.00	600 (Mid)	EVDO	24.18	0.023	Left	1.0 cm	0.454
1880.00	600 (Mid)	EVDO	24.18	0.003	Top	1.0 cm	0.210
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						**Body 1.6 W/kg (mW/g)** Averaged over 1 gram	

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].

2 All modes of operation were investigated and the worst-case are reported.

3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.

4 Tissue parameters and temperatures are listed on the SAR plot.

5 Battery Type ☒ Standard ☐ Extended ☐ Slim
Batteries are fully charged for all readings.

6 Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator

7 EVDO SAR was tested under EVDO Rev.0 RTAP.

8 Test Configuration ☐ With Holster ☒ Without Holster

9 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

9 PCS Body SAR was tested under RC3/SO32 FCH only.

12.9 Measurement Results (CDMA BC10 Body-worn SAR)

Frequency		Modulation	ConductedPower (dBm)	Power Drift (dB)	Configuration	Separation Distance	SAR(mW/g)
MHz	Channel						
817.9	476 (Low)	CDMA BC10	24.70	0.100	Rear	1.0 cm	1.05
820.5	580 (Mid)	CDMA BC10	24.78	-0.101	Rear	1.0 cm	0.978
823.1	684 (High)	CDMA BC10	24.84	0.114	Rear	1.0 cm	0.968
820.5	580 (Mid)	CDMA BC10	24.78	0.004	Front	1.0 cm	0.696
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						**Body 1.6 W/kg (mW/g)** Averaged over 1 gram	

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2 All modes of operation were investigated and the worst-case are reported.
3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Battery Type ☒ Standard ☐ Extended ☐ Slim
Batteries are fully charged for all readings.
6 Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
7 EVDO SAR was tested under EVDO Rev.0 RTAP.
8 Test Configuration ☐ With Holster ☒ Without Holster
9 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).

12.10 Measurement Results (LTE Band25 5 MHz QPSK Hotspot SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Configuration	RB Size	RB Offset	Separation Distance	SAR(mW/g)	MPR
MHz	Channel									
1882.5	26365	QPSK	22.24	-0.085	Rear	12	6	1.0 cm	0.622	1
1882.5	26365	QPSK	22.30	0.129	Rear	1	0	1.0 cm	0.814	0
1882.5	26365	QPSK	23.38	-0.002	Rear	1	24	1.0 cm	0.83	0
1882.5	26365	QPSK	22.24	0.125	Front	12	6	1.0 cm	0.288	1
1882.5	26365	QPSK	22.30	0.091	Front	1	0	1.0 cm	0.36	0
1882.5	26365	QPSK	23.38	0.137	Front	1	24	1.0 cm	0.37	0
1882.5	26365	QPSK	22.24	-0.026	Left	12	6	1.0 cm	0.265	1
1882.5	26365	QPSK	22.30	0.129	Left	1	0	1.0 cm	0.33	0
1882.5	26365	QPSK	23.38	0.046	Left	1	24	1.0 cm	0.356	0
1882.5	26365	QPSK	22.24	0.045	Top	12	6	1.0 cm	0.134	1
1882.5	26365	QPSK	22.30	0.053	Top	1	0	1.0 cm	0.154	0
1882.5	26365	QPSK	23.38	0.055	Top	1	24	1.0 cm	0.168	0
ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							**Body 1.6 W/kg (mW/g)** Averaged over 1 gram			

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2 All modes of operation were investigated and the worst-case are reported.
3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Battery Type ☒ Standard ☐ Extended ☐ Slim
Batteries are fully charged for all readings.
6 Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
7 Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
8 KDB 941225 D05 SAR for LTE Devices v01 was followed.
- QPSK with 50% RB is required for the largest channel Bandwidth.
- QPSK with 1 RB for both channel edges are required for the largest channel Bandwidth.
- 16QAM with 50% RB is required for the largest channel Bandwidth.
- 16QAM with 1 RB for both channel edges are required for the largest channel Bandwidth.
- 100% RB allocation is not required since SAR is not > 1.45 W/kg.
- The Low & High channel were not required for Band 5/4 since the power variation across all channels is 1/2 dB and SAR is ≤ 0.8 W/kg.

12.11 Measurement Results (LTE Band25 5 MHz 16QAM Hotspot SAR)

Frequency		Modulatio	Conducted Power (dBm)	Power Drift (dB)	Configuration	RB Size	RB Offset	Separation Distance	SAR(mW/g)	MPR
MHz	Channel									
1882.5	26365	16QAM	21.18	0.064	Rear	12	6	1.0 cm	0.491	2
1882.5	26365	16QAM	22.40	0.026	Rear	1	0	1.0 cm	0.646	1
1882.5	26365	16QAM	22.41	-0.007	Rear	1	24	1.0 cm	0.674	1
1882.5	26365	16QAM	21.18	0.103	Front	12	6	1.0 cm	0.219	2
1882.5	26365	16QAM	22.40	0.092	Front	1	0	1.0 cm	0.275	1
1882.5	26365	16QAM	22.41	-0.038	Front	1	24	1.0 cm	0.325	1
1882.5	26365	16QAM	21.18	0.013	Left	12	6	1.0 cm	0.195	2
1882.5	26365	16QAM	22.40	-0.118	Left	1	0	1.0 cm	0.248	1
1882.5	26365	16QAM	22.41	0.031	Left	1	24	1.0 cm	0.282	1
1882.5	26365	16QAM	21.18	0.109	Top	12	6	1.0 cm	0.114	2
1882.5	26365	16QAM	22.40	0.071	Top	1	0	1.0 cm	0.159	1
1882.5	26365	16QAM	22.41	0.041	Top	1	24	1.0 cm	0.168	1
\ANSI/ IEEE C95.1 - 1992– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						**Body 1.6 W/kg (mW/g)** Averaged over 1 gram				

NOTES:

1. The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2. All modes of operation were investigated and the worst-case are reported.
3. Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
4. Tissue parameters and temperatures are listed on the SAR plot.
5. Battery Type ☒ Standard ☐ Extended ☐ Slim
   Batteries are fully charged for all readings.
6. Test Signal Call Mode ☐ Manual Test cord ☒ Base Station Simulator
7. Justification for reduced test configurations: per FCC/OET Supplement C (July, 2001), if the SAR measured at the middle channel for each test configuration (Left, right, cheek/touch, tilt/ear, extended and retracted) is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
8. KDB 941225 D05 SAR for LTE Devices v01 was followed.
   - QPSK with 50% RB is required for the largest channel Bandwidth.
   - QPSK with 1 RB for both channel edges are required for the largest channel Bandwidth.
   - 16QAM with 50% RB is required for the largest channel Bandwidth.
   - 16QAM with 1 RB for both channel edges are required for the largest channel Bandwidth.
   - 100% RB allocation is not required since SAR is not > 1.45 W/kg.
   - The Low & High channel were not required for Band 5/4 since the power variation across all channels is 1/2 dB and SAR is ≤ 0.8 W/kg.

12.12 Measurement Results (802.11b/g/n Hotspot SAR)

Frequency		Modulation	Conducted Power (dBm)	Power Drift (dB)	Configuration	Separation Distance	Data Rate	SAR(mW/g)
MHz	Channel							
2 462	11(High)	802.11b	14.85	0.128	Rear	1.0 cm	1 Mbps	0.239
2 462	11(High)	802.11b	14.85	0.110	Front	1.0 cm	1 Mbps	0.045
2 462	11(High)	802.11b	14.85	-0.009	Right	1.0 cm	1 Mbps	0.303
ANSI/ IEEE C95.1 1992 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						**Body 1.6 W/kg (mW/g)** Averaged over 1 gram		

NOTES:

1 The test data reported are the worst-case SAR value with the antenna-head position set in a typical configuration. Test procedures used are according to FCC/OET Bulletin 65, Supplement C [July 2001].
2 All modes of operation were investigated and the worst-case are reported.
3 Measured Depth of Simulating Tissue is 15.0 cm ± 0.2 cm.
4 Tissue parameters and temperatures are listed on the SAR plot.
5 Battery Type ☒ Standard ☐ Extended ☐ Slim
Batteries are fully charged for all readings.
6 Test Signal Call Mode ☒ Manual Test code ☐ Base Station Simulator
7 IEEE 802.11g(including 802.11n) SAR testing is required when the conducted powers are equal to or greater than 0.25 dB Than the conducted powers in IEEE 802.11b.
8 For 2.4GHz WLAN, Highest average power channel for the lowest data rate was selected for SAR evaluation based on KDB 248227. Other channels are not necessary because 1g-average SAR < 0.8 W/Kg and peak SAR < 1.6W/Kg per KDB 248227.

13. CONCLUSION

The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the ANSI/ IEEE C95.1 1992.

These measurements are taken to simulate the RF effects exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests.

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