PCTEST ENGINEERING LABORATORY, INC.
6660-B Dobbin Road, Columbia, MD 21045 USA
Tel. +1.410.290.6652 / Fax +1.410.290.6654
http://www.pctestlab.com

SAR EVALUATION REPORT

Applicant Name:
Samsung Electronics Co., Ltd.
416, Maetan 3-dong, Yeongtong-gu, Suwon-si
Gyeonggi-do, 443-742
Republic of Korea

Date of Testing:
08/14/12 - 09/10/12
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Document Serial No.:
0Y1207311080-R1.A3L

FCC ID: **A3LSPHL900**

APPLICANT: **SAMSUNG ELECTRONICS CO., LTD.**

DUT Type: Portable Handset
Application Type: Certification
FCC Rule Part(s): CFR §2.1093
Model(s): SPH-L900

Band & Mode	Tx Frequency	Conducted Power [dBm]	SAR		
			1 gm Head (W/kg)	1 gm Body-Worn (W/kg)	1 gm Hotspot (W/kg)
Cell. CDMA/EVDO - FCC Rule Part 90S	817.90 - 823.10 MHz	25.24	0.17	0.40	0.45
Cell. CDMA/EVDO - FCC Rule Part 22H	824.70 - 848.31 MHz	25.10	0.26	0.50	0.51
GSM/GPRS/EDGE 850 - FCC Rule Part 22H	824.20 - 848.80 MHz	32.84	0.17	0.35	0.41
PCS CDMA/EVDO - FCC Rule Part 24E	1851.25 - 1908.75 MHz	25.25	0.34	1.04	1.04
GSM/GPRS/EDGE 1900 - FCC Rule Part 24E	1850.20 - 1909.80 MHz	29.96	0.15	0.44	0.44
WCDMA/HSPA 1900 - FCC Rule Part 24E	1852.4 - 1907.6 MHz	23.77	0.12	0.15	0.41
LTE Band 25 - FCC Rule Part 24E	1852.5 - 1912.5 MHz	23.18	0.26	0.48	0.79
2.4 GHz WLAN - FCC Rule Part 15C	2412 - 2462 MHz	15.98	< 0.10	0.14	0.18
5.8 GHz WLAN - FCC Rule Part 15C	5745 - 5825 MHz	14.14	< 0.10	< 0.10	
5.2 GHz WLAN - FCC Rule Part 15E	5180 - 5240 MHz	13.49	< 0.10	< 0.10	
5.3 GHz WLAN - FCC Rule Part 15E	5260 - 5320 MHz	13.31	< 0.10	0.14	
5.5 GHz WLAN - FCC Rule Part 15E	5500 - 5700 MHz	14.57	< 0.10	< 0.10	
Bluetooth - FCC Rule Part 15C	2402 - 2480 MHz	7.95	N/A		
Simultaneous SAR per KDB 690783 D01:			0.43	1.30	1.30

Note: Powers in the above table represent output powers for the SAR test configurations and may not represent the highest output powers for all configurations for each mode.

Note: This revised Test Report (S/N: 0Y1207311080-R1.A3L) supersedes and replaces the previously issued test report on the same subject EUT for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE C95.1-1992 and has been tested in accordance with the measurement procedures specified in FCC/OET Bulletin 65 Supplement C (2001), IEEE 1528-2003 and in applicable Industry Canada Radio Standards Specifications (RSS); for North American frequency bands only.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them. Test results reported herein relate only to the item(s) tested.

PCTEST certifies that no party to this application has been subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.

Randy Ortanez
President

ACCREDITED
TESTING LABORATORY
CERTIFICATE #2041.01

TABLE OF CONTENTS

1 DEVICE UNDER TEST

1.1 Device Overview

Band & Mode	Tx Frequency
Cell. CDMA/EVDO - FCC Rule Part 90S	817.90 - 823.10 MHz
Cell. CDMA/EVDO - FCC Rule Part 22H	824.70 - 848.31 MHz
GSM/GPRS/EDGE 850 - FCC Rule Part 22H	824.20 - 848.80 MHz
PCS CDMA/EVDO - FCC Rule Part 24E	1851.25 - 1908.75 MHz
GSM/GPRS/EDGE 1900 - FCC Rule Part 24E	1850.20 - 1909.80 MHz
WCDMA/HSPA 1900 - FCC Rule Part 24E	1852.4 - 1907.6 MHz
LTE Band 25 - FCC Rule Part 24E	1852.5 - 1912.5 MHz
2.4 GHz WLAN - FCC Rule Part 15C	2412 - 2462 MHz
5.8 GHz WLAN - FCC Rule Part 15C	5745 - 5825 MHz
5.2 GHz WLAN - FCC Rule Part 15E	5180 - 5240 MHz
5.3 GHz WLAN - FCC Rule Part 15E	5260 - 5320 MHz
5.5 GHz WLAN - FCC Rule Part 15E	5500 - 5700 MHz
Bluetooth - FCC Rule Part 15C	2402 - 2480 MHz
NFC - FCC Rule Part 15C	13.56 MHz

1.2 Near Field Communications (NFC) Antenna

This DUT has NFC operations. The NFC antenna is integrated into the battery cover and will be the only battery cover available from the manufacturer for this model. Therefore all SAR tests were performed with the standard battery cover which already integrates the NFC antenna.

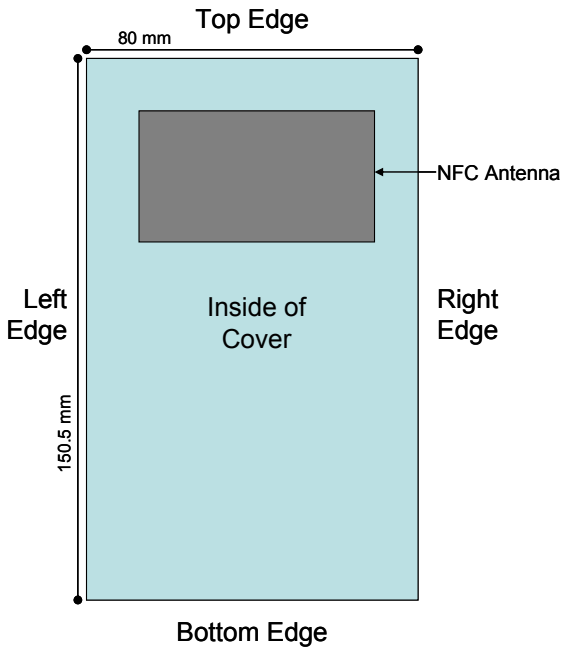

Figure 1-1
NFC Antenna Locations

1.3 DUT Antenna Locations

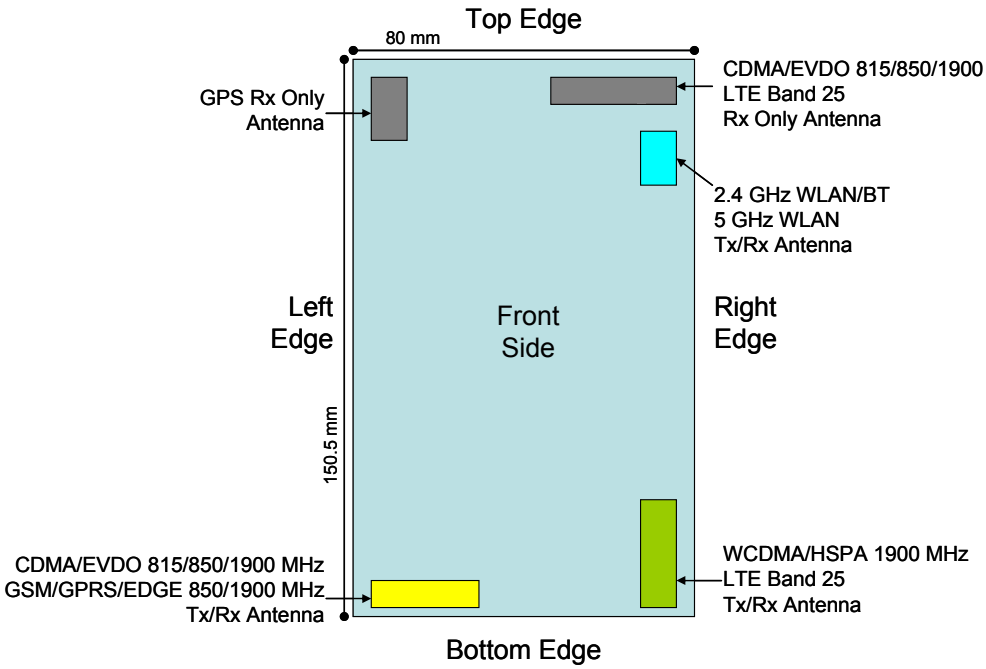

Figure 1-2
DUT Antenna Locations

Table 1-1
Mobile Hotspot Sides for SAR Testing

Mobile Hotspot Sides for SAR Testing						
Mode	Back	Front	Top	Bottom	Right	Left
Cell. CDMA/EVDO - FCC Rule Part 90S	Yes	Yes	No	Yes	No	Yes
Cell. CDMA/EVDO - FCC Rule Part 22H	Yes	Yes	No	Yes	No	Yes
PCS CDMA/EVDO - FCC Rule Part 24E	Yes	Yes	No	Yes	No	Yes
GPRS 850 - FCC Rule Part 22H	Yes	Yes	No	Yes	No	Yes
GPRS 1900 - FCC Rule Part 24E	Yes	Yes	No	Yes	No	Yes
WCDMA 1900 - FCC Rule Part 24E	Yes	Yes	No	Yes	Yes	No
LTE Band 25 - FCC Rule Part 24E	Yes	Yes	No	Yes	Yes	No
2.4 GHz WLAN - FCC Rule Part 15C	Yes	Yes	Yes	No	Yes	No

Note: Particular DUT edges were not required to be evaluated for Wireless Router SAR if the edges were greater than 2.5 cm from the transmitting antenna according to FCC KDB Publication 941225 D06 guidance, page 2. The antenna document shows the distances between the transmit antennas and the edges of the device. When the wireless router mode is enabled, all 5 GHz bands are disabled. Therefore 5 GHz WIFI is not considered in this section.

1.4 Power Reduction for SAR

This device uses power reduction mechanisms for LTE during SVLTE operations (1x-RTT CDMA voice + LTE data) for SAR compliance. See Section 11 for more details.

1.5 Simultaneous Transmission Capabilities

According to KDB 648474, transmitters are considered to be transmitting simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds. Possible transmission paths for the DUT are shown in Figure 1-3 and are color-coded to indicate communication modes which share the same path. Modes which share the same transmission path cannot transmit simultaneously with one another.

Figure 1-3
Simultaneous Transmission Paths

This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to KDB 447498 3) procedures.

Table 1-2
Possible Simultaneous Transmission Scenarios Transmission Supported by DUT

Ref.	Simultaneous Transmit Configurations	Power Reduction	Head	Body-Worn Accessory	Hot Spot	Note
			IEEE 1528, Supp C	Supplement C	FCC KDB 941225 D06 edges/sides	
A	BC0/BC1/BC10 850/1900 MHz 1x-RTT CDMA Voice + LTE B25 Data	LTE	√	√	-	SVLTE
B	BC0/BC1/BC10 850/1900 MHz 1x-RTT CDMA Voice + 2.4 GHz WIFI	None	√	√	-	
C	BC0/BC1/BC10 850/1900 MHz 1x-RTT CDMA Voice + 5 GHz WIFI		√	√	-	
D	GSM850/1900/ WCDMA1900 Voice + 2.4 GHz WIFI		√	√	-	
E	GSM850/1900/ WCDMA1900 Voice + 5 GHz WIFI		√	√	-	
F	BC0/BC1/BC10 850/1900 MHz 1x-RTT CDMA Voice + LTE B25 Data + 2.4 GHz WIFI	LTE	√	√	√	SVLTE + WIFI Hotspot
G	BC0/BC1/BC10 850/1900 MHz 1x-RTT CDMA / EVDO + 2.4 GHz WIFI	None	√	√	√	1X CDMA / EVDO +WIFI Hotspot
H	GSM 850/1900 GPRS/EDGE Data + 2.4 GHz WIFI		-	-	√	GSM DATA+WIFI Hotspot
I	WCDMA 1900 Data + 2.4 GHz WIFI		√	√	√	WCDMA +WIFI Hotspot
J	LTE B25 Data + 2.4 GHz WIFI		√	√	√	LTE+WIFI Hotspot
K	BC0/BC1/BC10 850/1900 CDMA Voice + 850/1900 MHz EVDO Data					SVDO Not support by HW
L	BC0/BC1/BC10 850/1900 CDMA Voice + 850/1900 MHz EVDO Data + 2.4/5GHz WIFI					SVDO Not support by HW
M	GSM850/1900 Voice + 850/1900 1x-RTT CDMA / EVDO					Not supported by the HW
N	WCDMA 1900 Voice + 850/1900 1x-RTT CDMA / EVDO					Not supported by the SW
O	GSM850/1900 Voice + LTE/GPRS/EDGE Data					Not supported by the SW
P	WCDMA 1900 Voice + LTE Data					Not supported by the HW
Q	GSM850/1900 Voice + 850/1900 1x-RTT CDMA / EVDO +2.4/5GHz WIFI					Not supported by the HW
R	WCDMA 1900 Voice + 850/1900 1x-RTT CDMA / EVDO +2.4/5GHz WIFI					Not supported by the SW
S	GSM850/1900 Voice + LTE/GPRS/EDGE Data +2.4/5GHz WIFI					Not supported by the SW
T	WCDMA 1900 Voice + LTE Data +2.4/5GHz WIFI					Not supported by the HW
U	WCDMA 1900 Voice + GPRS/EDGE Data +2.4/5GHz WIFI					Not supported by the SW
V	BC0/BC1/BC10 850/1900 MHz 1x-RTT CDMA Voice + LTE B25 Data + 5GHz WIFI					Not supported by the SW
W	BC0/BC1/BC10 850/1900 MHz 1x-RTT CDMA / EVDO + 5GHz WIFI					Not supported by the SW
X	GSM 850/1900 GPRS/EDGE Data + 5GHz WIFI					Not supported by the SW
Y	WCDMA 1900 Data + 5GHz WIFI					Not supported by the SW
Z	LTE B25 Data + 5GHz WIFI					Not supported by the SW
AA	GSM 850/1900 GPRS/EDGE Data + LTE B25 Data					Not supported by the SW
AB	850/1900 EVDO data + GSM 850/1900 GPRS/EDGE Data					Not supported by the HW
AC	850/1900 EVDO data + LTE B25 Data					Not supported by the SW
AD	GSM850/1900 Voice + BC0/BC1/BC10 850/1900 1x-RTT Voice					Not supported by the HW
AE	WCDMA Voice + BC0/BC1/BC10 850/1900 1x-RTT Voice					Not supported by the SW
AF	GSM850/1900 Voice + WCDMA Voice					Not supported by the SW
AG	BC0/BC1/BC10 850/1900 1x-RTT Voice + GPRS/EDGE Data					Not supported by the HW
AH	BC0/BC1/BC10 850/1900 1x-RTT Voice + GPRS/EDGE Data +2.4/5GHz WIFI					Not supported by the HW
AI	BC0/BC1/BC10 850/1900 1x-RTT Voice + WCDMA Data					Not supported by the SW
AJ	BC0/BC1/BC10 850/1900 1x-RTT Voice + WCDMA Data +2.4/5GHz WIFI					Not supported by the SW
AK	GSM850/1900 Voice + WCDMA DATA					Not supported by the SW
AL	GSM850/1900 Voice + WCDMA DATA + 2.4/5GHz WIFI					Not supported by the SW
AM	WCDMA 1900 Voice + GSM850/1900 GPRS/EDGE DATA					Not supported by the SW
AN	WCDMA 1900 Voice + GSM850/1900 GPRS/EDGE DATA + 2.4/5GHz WIFI					Not supported by the SW

Note: When the user utilizes multiple services in WCDMA 3G mode it uses multi-Radio Access Bearer or multi-RAB. The power control is based on a physical control channel (Dedicated Physical Control Channel [DPCCH]) and power control will be adjusted to meet the needs of both services. Therefore, the WCDMA+WLAN scenario also represents the WCDMA Voice/DATA + WLAN Hotspot scenario.

1.6 SAR Test Exclusions Applied

(A) WIFI/BT

Since Wireless Router operations are not allowed by the chipset firmware using 5 GHz WIFI, only 2.4 GHz WIFI Hotspot SAR tests and combinations are considered for SAR with respect to Wireless Router configurations in KDB 941225 D06.

The separation distance between the GSM/CDMA Antenna and the BT/WLAN antenna is 90mm.
The separation distance between the UMTS/LTE Antenna and the BT/WLAN antenna is 59mm.

The maximum RF conducted power of Bluetooth Tx is 6.237 mW (See DSS report for a full set of Bluetooth powers).

Per KDB Publication 648474, **Bluetooth SAR was not required** based on the maximum conducted power, the Bluetooth/WLAN to main antenna separation distance and Body-SAR of the main antenna.

This device supports 20 MHz and 40 MHz Bandwidths for IEEE 802.11n for 5 GHz WIFI only. 802.11n was not evaluated for SAR since the average output power of 20 MHz and 40 MHz bandwidths was not more than 0.25 dB higher than the average output power of 802.11a.

(B) Licensed Transmitter(s)

GSM/GPRS/EDGE DTM is not supported. Therefore GSM Voice cannot transmit simultaneously with GPRS/EDGE Data.

This device is only capable of QPSK HSUPA in the uplink, but is capable of HSPA+ in the downlink. Therefore, no additional SAR tests are required beyond that described for devices with HSUPA in KDB 941225 D01.

1.7 Guidance Applied

- FCC OET Bulletin 65 Supplement C [June 2001]
- IEEE 1528-2003
- FCC KDB 941225 (2G/3G/4G and Hotspot)
- FCC KDB 248227 (802.11)
- FCC KDB 648474 (Simultaneous)
- FCC KDB 865664 (5 GHz)
- October 2011 TCB/FCC Workshop (1x Advanced)

1.8 Samples used for SAR testing

Several samples were used with identical hardware. Reduced power levels were configured by the manufacturer via software to support SAR test cases. The software used by the manufacturer to configure power levels is only available to the manufacturer.

Mode	Cell. CDMA		PCS CDMA		LTE	
Target Power (dBm)	25	18	25	18	23	19
Serial No.	32386, 11	322E0	32209, 11	322F0	3220A, 15	320EB

Mode	GSM 850	GSM 1900	WCDMA1900	WLAN
Serial No.	32388	3238B	323C2	321C4, 21

2 LTE CHECKLIST PER KDB 941225 D05

KDB 941225 Pub LTE Information				
KDB 941225 Section	FCC ID	A3LSPHL900		
	Form Factor	Portable Handset		
1)	Frequency Range of each LTE transmission band	LTE Band 25: 1852.5 ~ 1912.5 MHz		
2)	Channel Bandwidths	LTE Band 25: 5MHz BW		
3)	Channel Numbers and Frequencies (MHz)	Low	Mid	High
	Band25, 5MHz BW	26065 (1852.5MHz)	26365 (1882.5MHz)	26665 (1912.5MHz)
4)(a)	UE Category	3		
(b)	Modulations Supported in UL	QPSK, 16QAM		
	LTE Transmitter and Antenna Implementation	CDMA/EVDO/GSM/GPRS/EDGE and LTE/UMTS have separate transmission paths		
5)	Description of LTE Tx and Ant. Implementation	1 TX/RX Ant, 1 RX Ant		
6)	LTE Voice available?	No		
	Hotspot with LTE+WIFI	Yes		
	Hotspot with LTE+WIFI active with 1XVoice sessions?	Yes		
7)	LTE MPR Permanently implemented per 3GPP TS 36.101 section 6.2.3~6.2.5? (manufacturer attestation to be provided)	See Section 9.4 and Section 11.3		
	A-MPR (Additional MPR) disabled for SAR Testing?	Yes		
8)	Conducted power Table provided for 1RB (low and high offset), 50% RB (centered), 100% RB	Yes		
9-10)	Non-LTE US Wireless Operating Modes/Band	RF Output Power [dBm]	RF Exposure Configurations	
	Cell. CDMA/EVDO - FCC Rule Part 90S	See Page 1		
	Cell. CDMA/EVDO - FCC Rule Part 22H			
	GSM/GPRS/EDGE 850 - FCC Rule Part 22H			
	PCS CDMA/EVDO - FCC Rule Part 24E			
	GSM/GPRS/EDGE 1900 - FCC Rule Part 24E			
	UMTS 1900 - FCC Rule Part 24E			
	Bluetooth - FCC Rule Part 15			
	2.4 GHz WLAN - FCC Rule Part 15			
	5 GHz WLAN - FCC Rule Part 15			
11)	Simultaneous Tx Conditions (Voice and Data Configurations)	See Section 1.5		
12)	Power Reduction used for SAR Compliance?	Yes		
13)	Describe Power Reduction (LTE Modes)	SVLTE: See Section 11		
14)	SAR Test Plan	See Section 11		
15)	SAR test data	See Section 13		

3 INTRODUCTION

The FCC has adopted the guidelines for evaluating the environmental effects of radio frequency (RF) 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. [1]

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 [3] and Health Canada RF Exposure Guidelines Safety Code 6 [24]. The measurement procedure described in IEEE/ANSI C95.3-2002 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave [4] is used for guidance in measuring the Specific Absorption Rate (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 International Committee for Non-Ionizing Radiation Protection (ICNIRP) in Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields," Report No. Vol 74. 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.

3.1 SAR Definition

Specific Absorption Rate is defined as the time derivative (rate) of the incremental energy (dU) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density (ρ). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Equation 3-1).

Equation 3-1
SAR Mathematical Equation

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

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

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

where:

σ = conductivity of the tissue-simulating material (S/m)
ρ = mass density of the tissue-simulating 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 relation 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.[6]

4 SAR MEASUREMENT SETUP

4.1 Automated SAR Measurement System

Measurements are performed using the DASY automated dosimetric SAR assessment system. The DASY is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland and consists of a high precision robotics system (Staubli), robot controller, desktop computer, near-field probe, probe alignment sensor, and the SAM phantom containing the head or body equivalent material. The robot is a six-axis industrial robot, performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). See www.speag.com for more information about the specification of the SAR assessment system.

Figure 4-1
SAR Measurement System

Figure 4-2
Near-Field Probe

Table 4-1
Composition of the Tissue Equivalent Matter

Frequency (MHz)	835	835	1900	1900	2450	2450	5200-5800	5200-5800
Tissue	Head	Body	Head	Body	Head	Body	Head	Body
Ingredients (% by weight)								
Bactericide	0.1	0.1						
DGBE			44.92	29.44	7.99	26.7		
HEC	1	1						
NaCl	1.45	0.94	0.18	0.39	0.16	0.1		
Sucrose	57	44.9						
Triton X-100					19.97		17.24	
Diethylenglycol monohexylether							17.24	
Polysorbate (Tween) 80								20
Water	40.45	53.06	54.9	70.17	71.88	73.2	65.52	80

5 DOSIMETRIC ASSESSMENT

5.1 Measurement Procedure

The evaluation was performed using the following procedure:

1. The SAR distribution at the exposed side of the head or body was measured at a distance no greater than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the device-head interface and the horizontal grid resolution was 15mm and 15mm for frequencies < 3 GHz in the x and y directions respectively. When applicable, for frequencies above 3 GHz, a 10 mm by 10 mm resolution was used.
2. The point SAR measurement was taken at the maximum SAR region determined from Step 1 to enable the monitoring of SAR fluctuations/drifts during the 1 gram cube evaluation. SAR at this fixed point was measured and used as a reference value.

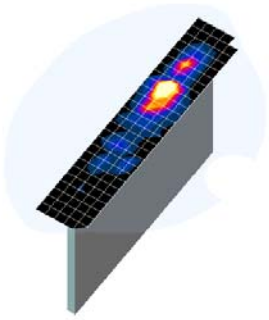

Figure 5-1
Sample SAR Area Scan

3. Based on the area scan data, the peak area of the maximum absorption was determined by spline interpolation. Around this point, a volume of 32mm x 32mm x 30mm (fine resolution volume scan, zoom scan) was assessed by measuring at least 5 x 5 x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see references or the DASY manual online for more details):

   a. The data was extrapolated to the surface of the outer-shell of the phantom. The combined distance extrapolated was the combined distance from the center of the dipoles 2.7mm away from the tip of the probe housing plus the 1.2 mm distance between the surface and the lowest measuring point. The extrapolation was based on a least-squares algorithm. A polynomial of the fourth order was calculated through the points in the z-axis (normal to the phantom shell).

   b. After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the “Not a knot” condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were obtained through interpolation, in order to calculate the averaged SAR.

   c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan was complete to calculate the SAR drift. If the drift deviated by more than 5%, the SAR test and drift measurements were repeated.
5. For testing 5 GHz devices, finer resolution zoom scans were performed as specified by FCC SAR Measurement Requirements for 3 – 6 GHz, KDB 865664 publication. The 5 GHz zoom scan requires a minimum volume of 24mm x 24mm x 20mm and 7 x 7 x 11 points.

6 DEFINITION OF REFERENCE POINTS

6.1 EAR REFERENCE POINT

Figure 6-2 shows the front, back and side views of the SAM Twin Phantom. The point "M" is the reference point for the center of the mouth, "LE" is the left ear reference point (ERP), and "RE" is the right ERP. The ERP is 15mm posterior to the entrance to the ear canal (EEC) along the B-M line (Back-Mouth), as shown in Figure 6-1. The plane passing through the two ear canals and M is defined as the Reference Plane. The line N-F (Neck-Front) is perpendicular to the reference plane and passing through the RE (or LE) is called the Reference Pivoting Line (see Figure 6-2). Line B-M is perpendicular to the N-F line. Both N-F and B-M lines are marked on the external phantom shell to facilitate handset positioning [5].

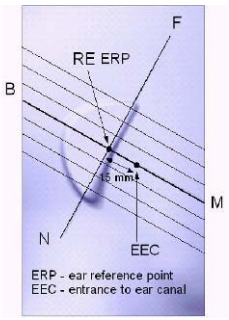

Figure 6-1
Close-Up Side view of ERP

6.2 HANDSET REFERENCE POINTS

Two imaginary lines on the handset were established: the vertical centerline and the horizontal line. The test device was placed in a normal operating position with the "test device reference point" located along the "vertical centerline" on the front of the device aligned to the "ear reference point" (See Figure 6-3). The "test device reference point" was than located at the same level as the center of the ear reference point. The test device was positioned so that the "vertical centerline" was bisecting the front surface of the handset at it's top and bottom edges, positioning the "ear reference point" on the outer surface of the both the left and right head phantoms on the ear reference point.

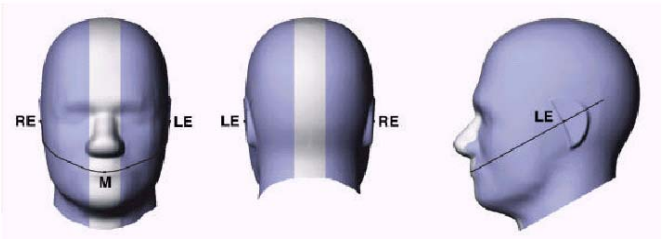

Figure 6-2
Front, back and side view of SAM Twin Phantom

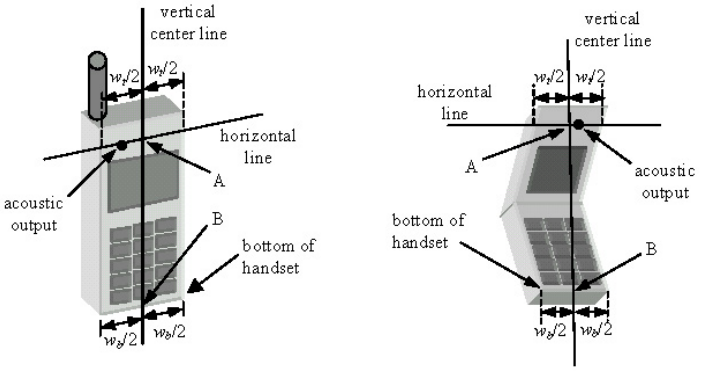

Figure 6-3
Handset Vertical Center & Horizontal Line Reference Points

7 TEST CONFIGURATION POSITIONS FOR HANDSETS

7.1 Device Holder

The DASY device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity ε = 3 and loss tangent δ = 0.02.

7.2 Positioning for Cheek/Touch

1. The test device was positioned with the handset close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 7-1), such that the plane defined by the vertical center line and the horizontal line of the phone is approximately parallel to the sagittal plane of the phantom.

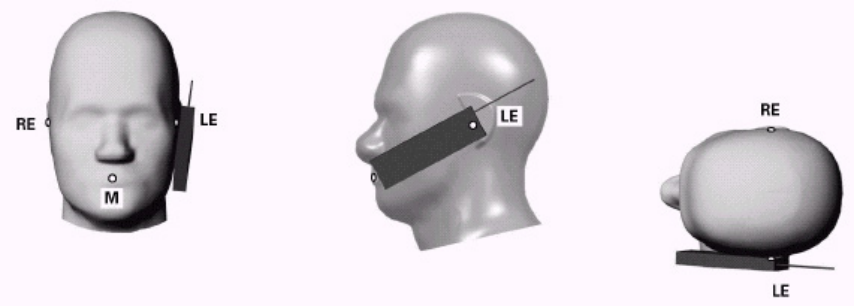

Figure 7-1 Front, Side and Top View of Cheek/Touch Position

2. The handset was translated towards the phantom along the line passing through RE & LE until the handset touches the ear.
3. While maintaining the handset in this plane, the handset was rotated around the LE-RE line until the vertical centerline was in the plane normal to MB-NF including the line MB (reference plane).
4. The phone was then rotated around the vertical centerline until the phone (horizontal line) was symmetrical was respect to the line NF.
5. While maintaining the vertical centerline in the reference plane, keeping point A on the line passing through RE and LE, and maintaining the phone contact with the ear, the handset was rotated about the line NF until any point on the handset made contact with a phantom point below the ear (cheek) (See Figure 7-2).

7.3 Positioning for Ear / 15º Tilt

With the test device aligned in the “Cheek/Touch Position”:

1. While maintaining the orientation of the phone, the phone was retracted parallel to the reference plane far enough to enable a rotation of the phone by 15degree.
2. The phone was then rotated around the horizontal line by 15 degree.
3. While maintaining the orientation of the phone, the phone was moved parallel to the reference plane until any part of the phone touches the head. (In this position, point A was located on the line RE-LE). The tilted position is obtained when the contact is on the pinna. If the contact was at any location other than the pinna, the angle of the phone would then be reduced. The tilted position was obtained when any part of the phone was in contact of the ear as well as a second part of the phone was in contact with the head (see Figure 7-2).

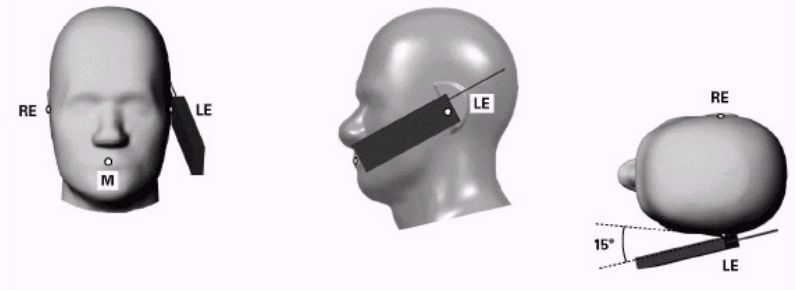

Figure 7-2 Front, Side and Top View of Ear/15º Tilt Position

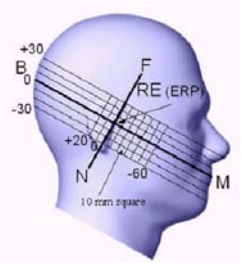

Figure 7-3
Side view w/ relevant markings

Figure 7-4 Body SAR Sample Photo
(Not Actual EUT)

7.4 SAR Evaluations near the Mouth/Jaw Regions of the SAM Phantom

Antennas located near the bottom of a phone may require SAR measurements around the mouth and jaw regions of the SAM head phantom. This typically applies to clam-shell style phones that are generally longer in the unfolded normal use positions or to certain older style long rectangular phones.

Under these circumstances, the following procedures apply, adopted from the FCC guidance on SAR handsets document publication 648474. The SAR required in these regions of SAM should be measured using a flat phantom. **Rectangular shaped phones** should be positioned with its bottom edge positioned from the flat phantom with the same distance provided by the cheek touching position using SAM. The ear reference point (ERP, as defined for SAM) of the phone should be positioned ½ cm from the flat phantom shell. **Clam-shell phones** should be positioned with the hinge against a smooth edge of the flat phantom where the upper half of the phone is unfolded and extended beyond the phantom side wall. The lower half of the phone is secured in the test device holder at a fixed distance below the flat phantom determined by the minimum separation along the lower edge of the phone in the cheek touching position using SAM. Any case with substantial variation in separation distance along the lower edge of a clam shell is discussed with the FCC for best-to-use methodology.

The latest IEEE 1528 committee developments propose the usage of a tilted phantom when the antenna of the phone is mounted at the bottom or in all cases the peak absorption is in the chin region. Both SAM heads of the TwinSAM-Chin20 are rotated 20 degrees around the NF line. Each head can be removed individually from the table for emptying and cleaning.

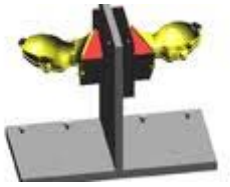

Figure 7-5 Twin SAM Chin20

7.5 Body-Worn Accessory 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 (see Figure 7-4). A device with a headset output is tested with a headset connected to the device.

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components. 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 the device with each accessory. If multiple accessories 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. Test position spacing was documented. 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 in head fluid. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessories, including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

7.6 Wireless Router Configurations

Some battery-operated handsets have the capability to transmit and receive internet connectivity through simultaneous transmission of WIFI in conjunction with a separate licensed transmitter. The FCC has provided guidance in KDB Publication 941225 D06 where SAR test considerations for handsets (L x W ≥ 9 cm x 5 cm) are based on a composite test separation distance of 10 mm from the front, back and edges of the device with antennas 2.5 cm or closer to the edge of the device, determined from general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions. Therefore, SAR must be evaluated for each frequency transmission and mode separately and summed with the WIFI transmitter according to KDB 648474 publication procedures. The "Portable Hotspot" feature on the handset was NOT activated, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal.

8 FCC RF EXPOSURE LIMITS

8.1 Uncontrolled Environment

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

8.2 Controlled Environment

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

Table 8-1
SAR Human Exposure Specified in ANSI/IEEE C95.1-1992 and Health Canada Safety Code 6

HUMAN EXPOSURE LIMITS		
	UNCONTROLLED ENVIRONMENT *General Population* (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT *Occupational* (W/kg) or (mW/g)
SPATIAL PEAK SAR Brain	1.6	8.0
SPATIAL AVERAGE SAR Whole Body	0.08	0.4
SPATIAL PEAK SAR Hands, Feet, Ankles, Wrists	4.0	20

1. The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
2. The Spatial Average value of the SAR averaged over the whole body.
3. The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

9 FCC MEASUREMENT PROCEDURES

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

9.1 Procedures Used to Establish RF Signal for SAR

The following procedures are according to FCC KDB Publication 941225 D01 "SAR Measurement Procedures for 3G Devices" v02, October 2007.

The device was placed into a simulated call using a base station simulator in a RF shielded chamber. Establishing connections in this manner ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. Devices under test were evaluated prior to testing, with a fully charged battery and were configured to operate at maximum output power. In order to verify that the device was tested throughout the SAR test at maximum output power, the SAR measurement system measures a "point SAR" at an arbitrary reference point at the start and end of the 1 gram SAR evaluation, to assess for any power drifts during the evaluation. If the power drift deviated by more than 5%, the SAR test and drift measurements were repeated.

9.2 SAR Measurement Conditions for CDMA2000

The following procedures were performed according to FCC KDB Publication 941225 D01 "SAR Measurement Procedures for 3G Devices" v02, October 2007.

9.2.1 Output Power Verification

See 3GPP2 C.S0011/TIA-98-E as recommended by "SAR Measurement Procedures for 3G Devices" v02, October 2007. Maximum output power is verified on the High, Middle and Low channels according to procedures in section 4.4.5.2 of 3GPP2 C.S0011/TIA-98-E. SO55 tests were measured with power control bits in the "All Up" condition.

1. If the mobile station (MS) supports Reverse TCH RC 1 and Forward TCH RC 1, set up a call using Fundamental Channel Test Mode 1 (RC=1/1) with 9600 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 SCH_0 and demodulation of RC 3,4, or 5, set up a call using Supplemental Channel Test Mode 3 (RC 3/3) with 9600 bps Fundamental Channel and 9600 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 maximum SAR with "All Up" power control bits.

Table 9-1
Parameters for Max. Power for RC1

Parameter	Units	Value
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 9-2
Parameters for Max. Power for RC3

Parameter	Units	Value
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

9.2.2 CDMA2000 1x Advanced

This device additionally supports 1x Advanced. Conducted powers were measured using SO75 with RC8 on the uplink and RC11 on the downlink per Oct 2011 TCB Workshop notes. Smart blanking was disabled for all measurements. The EUT was configured with forward power control Mode 000 and reverse power control at 400 bps. Conducted powers were measured on an Agilent 8960 Series 10

Wireless Communications Test Set, Model E5515C using the CDMA2000 1x Advanced application, Option E1962B-410.

Based on the maximum output power measured for 1x Advanced, SAR would have to be evaluated for 1x advanced if the maximum output for 1x Advanced is more than 0.25 dB higher than the maximum measured for 1x. Also, if the measured SAR in any 1x mode exposure conditions (head, body etc.) is larger than 1.2 W/kg, the highest of those configurations above 1.2 W/kg for each exposure condition in 1x Advanced has to be repeated. All measured SAR in 1x mode higher than 1.5 W/kg must be repeated for 1x Advanced.

9.2.3 Head SAR Measurements

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 maximum average output of each channel is less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum output channel in RC1 using the exposure configuration that results in the highest SAR for that channel in RC3.

Note: Head SAR was additionally evaluated using EVDO Rev. A to support compliance using VoIP over EVDO. Please see Section 9.2.5 for EVDO configuration parameters.

9.2.4 Body SAR Measurements

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 + SCH_n) is not required when the maximum average output of each RF channel is less than ¼ dB higher than that measured with FCH only. Otherwise, SAR is measured on the maximum output channel (FCH + SCH_n) with FCH at full rate and SCH_0 enabled at 9600 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 was measured using TDSO / SO32 with power control bits in the “All Up”

Body SAR in RC1 is not required when the maximum average output of each channel is less than ¼ dB higher than that measured in RC3. Otherwise, SAR is measured on the maximum 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.

9.2.5 Handsets with EVDO

For handsets with Ev-Do capabilities, when the maximum 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 maximum 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 maximum 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 maximum output channel for Rev. A using a Reverse Data Channel payload size of 4096 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 would be configured in the downlink for both Rev. 0 and Rev. A.

9.2.6 Body SAR Measurements for EVDO Hotspot

Hotspot Body SAR is measured using Subtype 0/1 Physical Layer configurations for Rev. 0 per KDB Publication 941225 D01 procedures for “1x Ev-Do data Devices”. SAR for Subtype 2 Physical layer configurations is not required for Rev. A when the maximum average output of

each RF channels is less than that measured in Subtype 0/1 Physical layer configurations. Otherwise, SAR is measured on the maximum output channel for Rev. A using the exposure configuration that results in the highest SAR for the RF channels in Rev. 0. The AT is tested with a Reverse Data Channel rate of 153.6 kbps in Subtype 0/1 Physical Layer configurations; and a Reverse Data Channel payload size of 4096 bits and Termination Target of 16 slots in Subtype 2 Physical Layer configurations. Both FTAP and FETAP are configured with a Forward Traffic Channel data rate corresponding to the 2-slot version of 307.2 kbps with the ACK Channel transmitting in all slots. AT power control should be in "All Bits Up" conditions for TAP/ETAP

9.3 SAR Measurement Conditions for WCDMA

9.3.1 Output Power Verification

Maximum output power is measured on the High, Middle and Low channels for each applicable transmission band according to the general descriptions in section 5.2 of 3GPP TS 34.121, using the appropriate RMC or AMR with TPC (transmit power control) set to all "1s".

Maximum output power is verified on the High, Middle and Low channels according to the general descriptions in section 5.2 of 3GPP TS 34.121 (release 5), using the appropriate RMC with TPC (transmit power control) set to all "1s". Results for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HS-DPCCH) are tabulated in the test report. All configurations that are not supported by the DUT or cannot be measured due to technical or equipment limitations is identified.

9.3.2 Head SAR Measurements for Handsets

SAR for head exposure configurations is measured using the 12.2 kbps RMC with TPC bits configured to all "1s". SAR in AMR configurations is not required when the maximum average output of each RF channel for 12.2 kbps AMR is less than 0.25 dB higher than that measured in 12.2 kbps RMC. Otherwise, SAR is measured on the maximum output channel in 12.2 AMR with a 3.4 kbps SRB (signaling radio bearer) using the exposure configuration that resulted in the highest SAR for that RF channel in the 12.2 kbps RMC mode.

9.3.3 Body SAR Measurements

SAR for body exposure configurations is measured using the 12.2 kbps RMC with the TPC bits all "1s".

9.3.4 SAR Measurements for Handsets with Rel 5 HSDPA

Body SAR for HSDPA is not required for handsets with HSDPA capabilities when the maximum average output power of each RF channel with HSDPA active is less than 0.25 dB higher than that measured without HSDPA using 12.2 kbps RMC and the maximum SAR for 12.2 kbps RMC is $\leq$ 75% of the SAR limit. Otherwise, SAR is measured for HSDPA, using an FRC with H-Set 1 in Sub-test 1 and a 12.2 kbps RMC configured in Test Loop Mode 1, using the highest body SAR configuration measured in 12.2 kbps RMC without HSDPA, on the maximum output channel with the body exposure configuration that resulted in the highest SAR in 12.2 kbps RMC mode for that RF channel.

The H-set used in FRC for HSDPA should be configured according to the UE category of a test device. The number of HS-DSCH/HSPDSCHs, HARQ processes, minimum inter-TTI interval, transport block sizes and RV coding sequence are defined by the applicable H-set. To maintain a consistent test configuration and stable transmission conditions, QPSK is used in the FRC for

SAR testing. HS-DPCCH should be configured with a CQI feedback cycle of 2 ms to maintain a constant rate of active CQI slots. DPCCH and DPDCH gain factors of βc=9 and βd=15, and power offset parameters of ΔACK= ΔNACK =5 and ΔCQI=2 is used. The CQI value is determined by the UE category, transport block size, number of HS-PDSCHs and modulation used in the FRC.

9.3.5 SAR Measurements for Handsets with Rel 6 HSUPA

Body SAR for HSUPA is not required when the maximum average output of each RF channel with HSUPA/HSDPA active is less than 0.25 dB higher than as measured without HSUPA/HSDPA using 12.2 kbps RMC and maximum SAR for 12.2 kbps RMC is ≤ 75 % of the SAR limit. Otherwise SAR is measured on the maximum output channel for the body exposure configuration produced highest SAR in 12.2 kbps RMC for that RF channel, using the additional procedures under "Release 6 HSPA data devices"

Head SAR for VOIP operations under HSPA is not required when maximum average output of each RF channel with HSPA is less than 0.25 dB higher than as measured using 12.2 kbps RMC. Otherwise SAR is measured using same HSPA configuration as used for body SAR.

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM (2) (dB)	MPR (dB)	AG (4) Index	E-TFCI
1	11/15 (3)	15/15 (3)	64	11/15 (3)	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1}: 47/15 β_{ed2}: 47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (4)	15/15 (4)	64	15/15 (4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$.
Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.
Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 14/15 and β_d = 15/15.
Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g.
Note 6: β_{ed} can not be set directly; it is set by Absolute Grant Value.

9.4 SAR Measurement Conditions for LTE

LTE modes were tested according to FCC KDB 941225 D05 publication. Please see notes following SAR data for required test configurations. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluating SAR [4]. The R&S CMW500 was used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing.

9.4.1 MPR

MPR is permanently implemented for this device by the manufacturer when the device is operating at max power in LTE mode. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1. There is no MPR implemented for this device when LTE is operating at reduced power levels.

9.4.2 A-MPR

A-MPR (Additional MPR) has been disabled for all SAR tests by setting NS=01 on the base station simulator.

9.4.3 Required RB Size and RB Offsets for SAR Testing

According to FCC KDB 941225 D05:

a. Per Page 4, 3) A), QPSK with 50% RB is required for the highest bandwidth.
b. Per Page 4, footnote 2, when the maximum output power across high, mid., and low channels is < 0.5 dB, mid channel is tested. Low and high channel SAR tests are not required for QPSK, 50% RB allocation when the SAR is < 0.8 W/kg. Per Page 4, 3) B), QPSK with 1 RB for both channel edges are required for the highest bandwidth.
c. Per Page 4, footnote 6, QPSK 1 RB allocation SAR tests were performed on the highest output power channel for the RB allocation when the average output power of the 1 RB allocation was > 0.5 dB higher than the 50% RB allocation for QPSK. Otherwise, SAR tests are performed on the channel that produced the highest SAR for QPSK with 50% RB.
d. Per Page 4, 3) B), I), when the SAR for QPSK 1 RB allocation tests is <1.45 W/kg, testing on the other channels is not required. Otherwise, SAR tests are performed on the channel that produced the highest SAR for QPSK with 50% RB. 1 RB low and high offset configurations are considered together for a single channel selection.
e. Per Page 4, 4) A), 16QAM with 50% RB is required for the highest bandwidth on the channel with the highest measured SAR for QPSK with 50% RB allocation.
f. Per Page 4, 4) A), I), when the SAR for 16 QAM, 50 % allocation tests is <1.45 W/kg, testing on the other channels is not required.
g. Per Page 4, 4) B) and Page 5 footnote 9, 16QAM with 1RB for both channel edges are required for the highest bandwidth on the highest output power channel for the 1 RB allocation when the average output power of the 1 RB allocation is >0.5 dB higher than the 50% allocation for 16 QAM. Otherwise, SAR tests are performed on the channel that produced the highest SAR for 16 QAM with 50% RB.
h. Per Page 5, 4) B), I), when the SAR for 16 QAM 1 RB allocation tests is <1.45 W/kg, testing on the other channels is not required. Otherwise, SAR tests are performed on the channel that produced the highest SAR for 16 QAM with 50% RB. 1 RB low and high offset configurations are considered together for a single channel selection.
i. Per Page 4, 4), A) I) and Page 5, 4), A) I), 100% RB Allocation is not required to be tested when the SAR is not > 1.45 W/kg for the highest bandwidth.
j. Per Page 5, 5) B) I), smaller bandwidths are not required to be tested when SAR is not > 1.45 W/kg for the highest bandwidth and the maximum average output power of the smaller bandwidths across all channels and configurations is not more than 0.5 dB higher than the higher bandwidths.

9.5 SAR Testing with 802.11 Transmitters

Normal network operating configurations are not suitable for measuring the SAR of 802.11 a/b/g/n 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. See KDB Publication 248227 for more details.

9.5.1 General Device Setup

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.

9.5.2 Frequency Channel Configurations [27]

For 2.4 GHz, the highest average RF output power channel between the low, mid and high channel at the lowest data rate was selected for SAR evaluation in 802.11b mode. 802.11g/n modes and higher data rates for 802.11b were additionally evaluated for SAR if the output power of the respective mode was 0.25 dB or higher than the powers of the SAR configurations tested in the 802.11b mode.

For 5 GHz, the highest average RF output power channel across the default test channels at the lowest data rate was selected for SAR evaluation in 802.11a. When the adjacent channels are higher in power then the default channels, these “required channels” were considered instead of the default channels for SAR testing. 802.11n modes and higher data rates for 802.11a/n were evaluated only if the respective mode was 0.25 dB or higher than the 802.11a mode.

If the maximum extrapolated peak SAR of the zoom scan for the highest output channel was less than 1.6 W/kg or if the 1g averaged SAR was less than 0.8 W/kg, SAR testing was not required for the other test channels in the band.

10 RF CONDUCTED POWERS

10.1 CDMA Conducted Powers

Table 10-1
Maximum CDMA RF Conducted Power

Band	FCC Rule Part	Channel	Frequency	SO55 [dBm]	SO55 [dBm]	SO75 [dBm]	TDSO SO32 [dBm]	TDSO SO32 [dBm]	1x EvDO Rev. 0 [dBm]	1x EvDO Rev. A [dBm]
		F-RC	MHz	RC1	RC3	RC11	FCH+SCH	FCH	(RTAP)	(RETAP)
Cellular	90S	564	820.1	24.98	25.13	25.31	25.00	25.12	25.24	25.12
	22H	1013	824.7	25.06	25.15	24.97	24.94	25.10	25.09	24.98
		384	836.52	25.11	25.00	24.96	25.13	25.07	25.10	25.03
		777	848.31	24.98	24.84	25.00	24.87	24.88	24.94	24.92
PCS	24E	25	1851.25	25.20	25.18	25.19	25.14	25.25	25.23	25.19
		600	1880	25.11	25.08	25.18	25.22	25.20	25.08	25.07
		1175	1908.75	25.12	25.02	25.13	25.05	25.10	25.09	25.07

Note: RC1 is only applicable for IS-95 compatibility.

Per KDB Publication 941225 D01:
1. Head SAR was tested with SO55 RC3. SO55 RC1 was not required since the average output power was not more than 0.25 dB than the SO55 RC3 powers.
2. Body-Worn SAR was tested with 1x RTT with TDSO / SO32 FCH Only. Ev-Do and TDSO / SO32 FCH+SCH SAR tests were not required since the average output power was not more than 0.25 dB higher than the TDSO / SO32 FCH only powers.
3. Hotspot SAR is measured using Subtype 0/1 Physical Layer configurations for Rev. 0. Since the average output power of Subtype 2 for Rev. A is less than the Rev. 0 power levels, Rev. A SAR is not required. SAR was additionally tested for 1x RTT hotspot to support simultaneous transmission scenarios.
4. EVDO Rev. A head SAR was additionally evaluated to show compliance for simultaneous transmission scenarios.

Per FCC KDB Publication 447498 D01:
1. Only one channel is required for Cell. CDMA Rule Part 90S since the device operates within the transmission range of 817.90 – 823.10 MHz.

Per October 2011 TCB Workshop
1. CDMA 1X Advanced technology was not required for SAR since the maximum output powers for 1x Advanced was not more than 0.25 dB higher than the maximum measured powers for 1x and the measured SAR in any 1x mode exposure conditions was not greater than 1.2 W/kg. See Section 9.2.2 for 1x Advanced test set up.

Figure 10-1
Power Measurement Setup

10.2 GSM Conducted Powers

Table 10-3
GSM/GPRS/EDGE RF Conducted Power

		Maximum Burst-Averaged Output Power				
		Voice	*GPRS/EDGE Data (GMSK)*		*EDGE Data (8-PSK)*	
Band	**Channel**	**GSM [dBm] CS (1 Slot)**	**GPRS [dBm] 1 Tx Slot**	**GPRS [dBm] 2 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**
Cellular	128	32.93	32.98	**30.40**	25.89	25.75
	190	32.84	32.87	**30.74**	26.06	25.92
	251	33.02	33.06	**30.91**	26.08	25.98
PCS	512	30.04	30.03	**27.68**	24.66	24.48
	661	29.96	29.98	**27.82**	24.70	24.58
	810	30.12	30.14	**28.02**	24.82	24.75

		Calculated Maximum Frame-Averaged Output Power				
		Voice	*GPRS/EDGE Data (GMSK)*		*EDGE Data (8-PSK)*	
Band	**Channel**	**GSM [dBm] CS (1 Slot)**	**GPRS [dBm] 1 Tx Slot**	**GPRS [dBm] 2 Tx Slot**	**EDGE [dBm] 1 Tx Slot**	**EDGE [dBm] 2 Tx Slot**
Cellular	128	23.90	23.95	**24.38**	16.86	19.73
	190	23.81	23.84	**24.72**	17.03	19.90
	251	23.99	24.03	**24.89**	17.05	19.96
PCS	512	21.01	21.00	**21.66**	15.63	18.46
	661	20.93	20.95	**21.80**	15.67	18.56
	810	21.09	21.11	**22.00**	15.79	18.73

Notes:

1. Both burst-averaged and calculated frame-averaged powers are included. Frame-averaged power was calculated from the measured burst-averaged power by converting the slot powers into linear units and calculating the energy over 8 timeslots.
2. The bolded GPRS modes were selected for SAR testing according to the highest frame-averaged output power table according to KDB 941225 D03.
3. GPRS/EDGE (GMSK) output powers were measured with CS1 on the base station simulator. CS1 coding scheme was used in GPRS output power measurements and SAR testing as a condition where GMSK modulation was ensured. It was investigated that CS1-CS4 settings do not have an impact on the output levels in GPRS modes. MCS7 coding scheme was used to measure the output powers for EDGE since It was investigated that choosing MCS7 coding scheme will ensure 8-PSK modulation, MCS levels that produce 8PSK modulation do not have an impact on output power.

GSM Class: B
GPRS Multislot Class: 10 (max 2 Tx Uplink slots)
EDGE Multislot Class: 10 (max 2 Tx Uplink slots)
DTM Multislot Class: N/A

Figure 10-2
Power Measurement Setup

10.3 WCDMA Conducted Powers

Table 10-4
WCDMA/HSPA RF Conducted Power

3GPP Release Version	Mode	3GPP 34.121 Subtest	PCS Band [dBm]			MPR [dB]
			9262	9400	9538	
99	WCDMA	12.2 kbps RMC	23.31	**23.77**	23.46	-
99		12.2 kbps AMR	23.26	23.54	23.40	-
6	HSDPA	Subtest 1	22.18	22.68	22.26	0
6		Subtest 2	22.17	22.60	22.46	0
6		Subtest 3	21.64	22.07	21.82	0.5
6		Subtest 4	21.66	22.02	21.97	0.5
6	HSUPA	Subtest 1	21.18	21.56	21.53	0
6		Subtest 2	19.05	19.64	19.38	2
6		Subtest 3	20.66	20.87	20.57	1
6		Subtest 4	21.66	21.86	21.31	2
6		Subtest 5	20.22	20.45	20.34	0

WCDMA SAR was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.

It is expected by the manufacturer that MPR for some HSUPA subtests may be up to 1 dB more than specified by 3GPP, but also as low as 0 dB according to the chipset implementation in this model. Detailed information is included in the operational description explaining how the MPR is applied for this model.

Figure 10-3
Power Measurement Setup

10.4 LTE Conducted Powers

Table 10-5
Maximum LTE Band 25 RF Conducted Power

Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
1852.5	26065	5	QPSK	1	0	23.13	0	0
1852.5	26065	5	QPSK	1	24	22.95	0	0
1852.5	26065	5	QPSK	12	6	21.95	1	0-1
1852.5	26065	5	QPSK	25	0	21.78	1	0-1
1852.5	26065	5	16-QAM	1	0	**22.32**	1	0-1
1852.5	26065	5	16-QAM	1	24	**22.13**	1	0-1
1852.5	26065	5	16-QAM	12	6	20.88	2	0-2
1852.5	26065	5	16-QAM	25	0	20.84	2	0-2
1882.5	26365	5	QPSK	1	0	**23.18**	0	0
1882.5	26365	5	QPSK	1	24	**22.93**	0	0
1882.5	26365	5	QPSK	12	6	**22.00**	1	0-1
1882.5	26365	5	QPSK	25	0	21.84	1	0-1
1882.5	26365	5	16-QAM	1	0	22.03	1	0-1
1882.5	26365	5	16-QAM	1	24	21.86	1	0-1
1882.5	26365	5	16-QAM	12	6	**20.75**	2	0-2
1882.5	26365	5	16-QAM	25	0	20.71	2	0-2
1912.5	26665	5	QPSK	1	0	22.90	0	0
1912.5	26665	5	QPSK	1	24	22.80	0	0
1912.5	26665	5	QPSK	12	6	21.75	1	0-1
1912.5	26665	5	QPSK	25	0	21.72	1	0-1
1912.5	26665	5	16-QAM	1	0	22.12	1	0-1
1912.5	26665	5	16-QAM	1	24	22.02	1	0-1
1912.5	26665	5	16-QAM	12	6	20.75	2	0-2
1912.5	26665	5	16-QAM	25	0	20.71	2	0-2

LTE Notes:
1. Please reference section 9.4.3 for LTE testing requirements per FCC KDB 941225 D05.
2. The bolded powers were tested for SAR.

Figure 10-4
Power Measurement Setup

10.5 WLAN Conducted Powers

Table 10-6
IEEE 802.11b Average RF Power

Mode	Freq [MHz]	Channel	Conducted Power [dBm] Data Rate [Mbps]			
			1	**2**	**5.5**	**11**
802.11b	2412	1	15.37	15.48	15.47	15.41
802.11b	2437	6	15.87	15.73	15.86	15.80
802.11b	2462	11	**15.98**	16.02	16.09	16.08

Table 10-7
IEEE 802.11g Average RF Power

Mode	Freq [MHz]	Channel	Conducted Power [dBm] Data Rate [Mbps]							
			6	**9**	**12**	**18**	**24**	**36**	**48**	**54**
802.11g	2412	1	12.27	12.23	12.24	12.25	12.19	12.21	12.22	12.24
802.11g	2437	6	12.62	12.61	12.56	12.58	12.58	12.59	12.54	12.47
802.11g	2462	11	12.82	12.80	12.84	12.83	12.83	12.82	12.79	12.85

Table 10-8
IEEE 802.11n Average RF Power

Mode	Freq [MHz]	Channel	Conducted Power [dBm] Data Rate [Mbps]							
			6.5	13	20	26	39	52	58	65
802.11n	2412	1	11.23	11.17	11.22	11.15	11.13	11.26	11.20	11.13
802.11n	2437	6	11.64	11.55	11.53	11.52	11.59	11.54	11.56	11.57
802.11n	2462	11	11.83	11.70	11.72	11.78	11.78	11.88	11.74	11.70

Table 10-9
IEEE 802.11a Average RF Power

Mode	Freq	Channel	Conducted Power [dBm]							
			Data Rate [Mbps]							
	[MHz]		6	9	12	18	24	36	48	54
802.11a	5180	36*	**13.49**	13.43	13.50	13.46	13.59	13.51	13.38	13.46
802.11a	5200	40	13.40	13.41	13.55	13.38	13.41	13.43	13.41	13.47
802.11a	5220	44	13.27	13.39	13.37	13.30	13.49	13.46	13.32	13.45
802.11a	5240	48*	13.46	13.42	13.34	13.37	13.24	13.39	13.38	13.37
802.11a	5260	52*	13.25	13.36	13.26	13.44	13.37	13.31	13.36	13.30
802.11a	5280	56	**13.31**	13.43	13.38	13.26	13.25	13.29	13.38	13.24
802.11a	5300	60	13.31	13.29	13.36	13.35	13.33	13.47	13.27	13.27
802.11a	5320	64*	13.28	13.28	13.30	13.33	13.42	13.30	13.34	13.46
802.11a	5500	100	14.13	14.16	14.22	14.30	14.22	14.18	14.38	14.34
802.11a	5520	104*	14.18	14.24	14.22	14.13	14.27	14.20	14.31	14.25
802.11a	5540	108	14.24	14.26	14.27	14.28	14.33	14.25	14.29	14.31
802.11a	5560	112	14.26	14.34	14.28	14.32	14.27	14.31	14.33	14.34
802.11a	5580	116*	14.28	14.34	14.26	14.36	14.36	14.37	14.35	14.31
802.11a	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5620	124	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5660	132	14.43	14.32	14.46	14.43	14.45	14.42	14.55	14.49
802.11a	5680	136*	**14.57**	14.50	14.53	14.55	14.53	14.56	14.52	14.60
802.11a	5700	140	14.46	14.55	14.51	14.56	14.54	14.54	14.49	14.45
802.11a	5745	149*	13.95	14.11	14.01	13.98	14.14	14.09	14.10	14.03
802.11a	5765	153	13.97	14.02	14.10	14.10	14.05	14.09	14.12	14.02
802.11a	5785	157*	14.09	14.05	14.11	14.09	14.09	14.21	14.19	14.11
802.11a	5805	161*	**14.14**	14.08	14.13	14.15	14.12	14.19	14.20	14.13
802.11a	5825	165	14.11	14.18	14.12	14.08	14.15	14.25	14.23	14.16

Per FCC KDB Publication 443999 and RSS-210 A9.2(3), transmission on channels which overlap the 5600-5650 MHz is prohibited as a client. This device does not transmit any beacons or initiate any transmissions in 5.3 and 5.5 GHz Band. (*) – indicates default channels per KDB Publication 248227. When the adjacent channels are higher in power then the default channels, these “required channels” are considered instead of the default channels for SAR testing.

Table 10-10
IEEE 802.11n (20 MHz Bandwidth) Average RF Power

Mode	Freq	Channel	Conducted Power [dBm]							
			Data Rate [Mbps]							
	[MHz]		6.5	13	20	26	39	52	58	65
802.11n	5180	36*	12.26	12.22	12.21	12.32	12.35	12.28	12.36	12.41
802.11n	5200	40	12.13	12.23	12.18	12.21	12.33	12.32	12.28	12.26
802.11n	5220	44	12.11	12.23	12.11	12.35	12.19	12.29	12.32	12.18
802.11n	5240	48*	12.14	12.17	12.16	12.23	12.14	12.23	12.26	12.10
802.11n	5260	52*	12.20	12.24	12.10	12.07	12.31	12.20	12.14	12.18
802.11n	5280	56	12.03	12.12	12.14	12.15	12.25	12.16	12.26	12.37
802.11n	5300	60	12.18	12.11	12.12	12.10	12.12	12.12	12.10	12.09
802.11n	5320	64*	12.18	12.08	12.26	12.13	12.15	12.15	12.18	12.28
802.11n	5500	100	12.18	12.24	12.14	12.15	12.08	12.18	12.11	12.05
802.11n	5520	104*	12.13	12.09	12.15	12.22	12.02	12.20	12.10	12.21
802.11n	5540	108	12.15	12.20	12.19	12.17	12.18	12.30	12.06	12.28
802.11n	5560	112	12.22	12.23	12.18	12.25	12.22	12.25	12.31	12.29
802.11n	5580	116*	12.09	12.20	12.16	12.30	12.31	12.30	12.29	12.27
802.11a	5600	120	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5620	124	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5640	128	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5660	132	12.32	12.37	12.36	12.42	12.41	12.38	12.37	12.37
802.11n	5680	136	12.26	12.37	12.37	12.33	12.32	12.41	12.47	12.51
802.11n	5700	140	12.42	12.39	12.51	12.45	12.47	12.60	12.32	12.47
802.11n	5745	149*	11.81	11.87	11.94	11.88	12.06	11.84	11.91	11.94
802.11n	5765	153	11.94	11.93	11.92	11.96	11.93	12.03	11.98	11.93
802.11n	5785	157*	11.93	11.95	11.98	11.90	12.03	12.08	12.04	11.89
802.11n	5805	161*	12.01	11.92	11.94	12.01	11.95	11.90	11.92	11.98
802.11n	5825	165	11.98	12.00	11.99	12.03	11.89	12.02	12.08	11.82

Per FCC KDB Publication 443999 and RSS-210 A9.2(3), transmission on channels which overlap the 5600-5650 MHz is prohibited as a client. This device does not transmit any beacons or initiate any transmissions in 5.3 and 5.5 GHz Bands. (*) – indicates default channels per KDB Publication 248227. When the adjacent channels are higher in power then the default channels, these “required channels” are considered instead of the default channels for SAR testing.

Table 10-11
IEEE 802.11n (40 MHz Bandwidth) Average RF Power

Mode	Freq [MHz]	Channel	802.11n (40MHz Bandwidth) Conducted Power [dBm] Data Rate [Mbps]							
			13.5/15	27/30	40.5/45	54/60	81/90	108/120	121.5/135	135/150
802.11n	5190	38*	11.40	11.43	11.59	11.47	11.45	11.48	11.49	11.52
802.11n	5230	46	11.51	11.52	11.33	11.34	11.35	11.52	11.45	11.47
802.11n	5270	54	11.38	11.45	11.40	11.29	11.47	11.35	11.50	11.40
802.11n	5310	62*	11.29	11.35	11.44	11.33	11.42	11.34	11.51	11.40
802.11n	5510	102*	11.35	11.50	11.33	11.46	11.41	11.48	11.39	11.27
802.11n	5550	110	11.40	11.53	11.49	11.48	11.49	11.49	11.57	11.47
802.11n	5590	118	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5630	126	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5670	134	11.68	11.59	11.53	11.66	11.77	11.74	11.75	11.67
802.11n	5755	151*	11.18	11.25	11.15	11.29	11.22	11.37	11.26	11.28
802.11n	5795	159	11.31	11.27	11.24	11.27	11.37	11.35	11.37	11.32

Justification for reduced test configurations for WIFI channels per KDB Publication 248227 and April 2010 FCC/TCB Meeting Notes:

- For 2.4 GHz, highest average RF output power channel for the lowest data rate for IEEE 802.11b were selected for SAR evaluation. Other IEEE 802.11 modes (including 802.11g/n) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11b mode.
- For 5 GHz, highest average RF output power channel for the lowest data rate for IEEE 802.11a were selected for SAR evaluation. Other IEEE 802.11 modes (including 802.11n 20 MHz bandwidth and 802.11n 40 MHz bandwidth) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11a mode.
- When the maximum extrapolated peak SAR of the zoom scan for the maximum output channel is <1.6 W/kg and the 1g averaged SAR is <0.8 W/kg, SAR testing on other channels is not required. Otherwise, the other default (or corresponding required) test channels were additionally tested using the lowest data rate.
- The bolded data rates and channels above were tested for SAR.

Figure 10-5
Power Measurement Setup

11 LTE POWER REDUCTION

11.1 Introduction to LTE Power Reduction

This DUT is capable of Simultaneous Voice and LTE (SVLTE) calls, with the voice call supported by a CDMA 1xRTT transmitter and the data connection supported by a LTE transmitter. The transmitters have separate transmit antennas and RF circuitry; however a LTE power reduction scheme is applied during a LTE connection with 1xRTT voice calls. The maximum transmit power of LTE is limited by the CDMA 1x voice power level. When CDMA 1x Voice is operating with high power levels, LTE transmit power is limited. When CDMA 1x Voice power is low, LTE can transmit at maximum power. Target levels of power reduction and CDMA voice triggering levels are provided in Table 11-1.

Table 11-1
SVLTE Power Reduction Scheme

Mode	Voice Avg Power(P) 1x 815/850/1900 MHz (dBm)	Max. B25 LTE Data Avg Power (dBm)
SVLTE	P ≥ 18	19
	P < 18	23

11.2 Output Power Verification

Per KDB Publication 941225 D05, 5) B), output powers were measured in SVLTE mode to determine that the power reduction mechanism was operating reliably and consistently. The power reduction was investigated by simultaneously connecting the EUT to both LTE and CDMA base station simulators. LTE output powers were measured through conducted RF connections by first connecting the device in a LTE data call and then a CDMA 1xRTT call. CDMA powers were controlled by setting the CDMA base station simulator to active bits and monitoring the output power while changing the cell output power level.

The power reduction targets and triggering level described in Table 11-1 were confirmed. Please see results in Table 11-2.

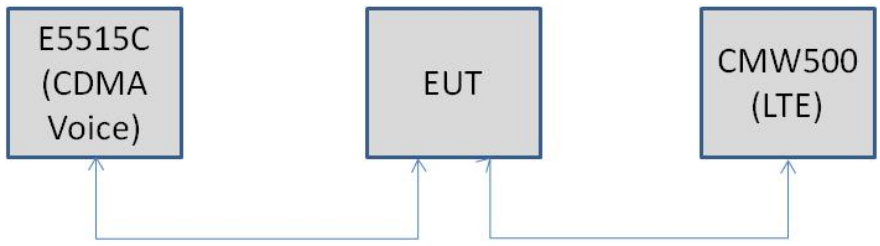

Figure 11-1
SVLTE Conducted Test Setup Diagram

Table 11-2
SVLTE Power Reduction Verification Results

1x-RTT CDMA Voice Band	BC10 1x-RTT CDMA Voice Channel	BC10 1x-RTT CDMA Voice Tx (dBm)	LTE Band 25 Conducted Power (dBm)							
			Low.ch							
			QPSK 12 RB 6 RB Offset	QPSK 1 RB 0 RB Offset	QPSK 1 RB 24 RB Offset	QPSK 25 RB 0 RB Offset	16QAM 12 RB 6 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 24 RB Offset	16QAM 25 RB 0 RB Offset
835 MHz	564	25	19.30	19.10	19.20	19.30	19.10	19.00	19.30	18.90
		24	19.30	19.10	19.20	19.30	19.10	19.00	19.30	18.90
		23	19.30	19.10	19.20	19.30	19.10	19.00	19.30	18.90
		22	19.30	19.10	19.20	19.30	19.10	19.00	19.30	18.90
		21	19.30	19.10	19.20	19.30	19.10	19.00	19.30	18.90
		20	19.30	19.10	19.20	19.30	19.10	19.00	19.30	18.90
		19	19.30	19.10	19.20	19.30	19.10	19.00	19.30	18.90
		18	19.30	19.10	19.20	19.30	19.10	19.00	19.30	18.90
		17	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		16	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		15	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		14	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		13	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		12	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		11	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20

1x-RTT CDMA Voice Band	BC10 1x-RTT CDMA Voice Channel	BC10 1x-RTT CDMA Voice Tx (dBm)	LTE Band 25 Conducted Power (dBm)							
			Mid.ch							
			QPSK 12 RB 6 RB Offset	QPSK 1 RB 0 RB Offset	QPSK 1 RB 24 RB Offset	QPSK 25 RB 0 RB Offset	16QAM 12 RB 6 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 24 RB Offset	16QAM 25 RB 0 RB Offset
835 MHz	564	25	19.00	19.00	19.07	18.80	19.00	18.80	18.90	18.80
		24	19.00	19.00	19.07	18.80	19.00	18.80	18.90	18.80
		23	19.00	19.00	19.07	18.80	19.00	18.80	18.90	18.80
		22	19.00	19.00	19.07	18.80	19.00	18.80	18.90	18.80
		21	19.00	19.00	19.07	18.80	19.00	18.80	18.90	18.80
		20	19.00	19.00	19.07	18.80	19.00	18.80	18.90	18.80
		19	19.00	19.10	19.01	18.80	19.00	18.70	19.00	18.90
		18	19.00	19.10	19.00	18.90	19.00	18.70	19.00	18.80
		17	22.30	23.00	22.80	22.10	21.20	22.00	22.00	21.20
		16	22.30	23.00	22.80	22.10	21.20	22.00	22.00	21.20
		15	22.30	23.00	22.80	22.10	21.20	22.00	22.00	21.20
		14	22.30	23.00	22.80	22.10	21.20	22.00	22.00	21.20
		13	22.30	23.00	22.80	22.10	21.20	22.00	22.00	21.20
		12	22.30	23.00	22.80	22.10	21.20	22.00	22.00	21.20
		11	22.30	23.00	22.80	22.10	21.20	22.00	22.00	21.20

1x-RTT CDMA Voice Band	BC10 1x-RTT CDMA Voice Channel	BC10 1x-RTT CDMA Voice Tx (dBm)	LTE Band 25 Conducted Power (dBm)							
			High.ch							
			QPSK 12 RB 6 RB Offset	QPSK 1 RB 0 RB Offset	QPSK 1 RB 24 RB Offset	QPSK 25 RB 0 RB Offset	16QAM 12 RB 6 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 24 RB Offset	16QAM 25 RB 0 RB Offset
835 MHz	564	25	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		24	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		23	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		22	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		21	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		20	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		19	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		18	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		17	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		16	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		15	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		14	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		13	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		12	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		11	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90

1x-RTT CDMA Voice Band	BC0 1x-RTT CDMA Voice Channel	BC0 1x-RTT CDMA Voice Tx (dBm)	LTE Band 25 Conducted Power (dBm)							
			Low.ch							
			QPSK 12 RB 6 RB Offset	QPSK 1 RB 0 RB Offset	QPSK 1 RB 24 RB Offset	QPSK 25 RB 0 RB Offset	16QAM 12 RB 6 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 24 RB Offset	16QAM 25 RB 0 RB Offset
835 MHz	1013	25	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		24	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		23	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		22	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		21	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		20	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		19	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		18	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		17	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		16	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		15	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		14	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		13	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		12	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		11	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20

1x-RTT CDMA Voice Band	BC0 1x-RTT CDMA Voice Channel	BC0 1x-RTT CDMA Voice Tx (dBm)	LTE Band 25 Conducted Power (dBm)							
			Mid.ch							
			QPSK 12 RB 6 RB Offset	QPSK 1 RB 0 RB Offset	QPSK 1 RB 24 RB Offset	QPSK 25 RB 0 RB Offset	16QAM 12 RB 6 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 24 RB Offset	16QAM 25 RB 0 RB Offset
835 MHz	1013	25	18.90	19.00	19.00	18.90	18.90	18.70	18.70	18.80
		24	18.90	19.00	19.00	18.90	18.90	18.70	18.70	18.80
		23	18.90	19.00	19.00	18.90	18.90	18.70	18.70	18.80
		22	18.90	19.00	19.00	18.90	18.90	18.70	18.70	18.80
		21	18.90	19.00	19.00	18.90	18.90	18.70	18.70	18.80
		20	18.90	19.00	19.00	18.90	18.90	18.70	18.70	18.80
		19	18.90	19.00	19.00	18.90	18.90	18.70	18.70	18.80
		18	18.90	19.00	18.90	19.00	18.90	18.80	18.80	18.90
		17	22.20	23.00	22.80	22.20	21.20	22.10	21.90	21.20
		16	22.20	23.00	22.80	22.20	21.20	22.10	21.90	21.20
		15	22.20	23.00	22.80	22.20	21.20	22.10	21.90	21.20
		14	22.20	23.00	22.80	22.20	21.20	22.10	21.90	21.20
		13	22.20	23.00	22.80	22.20	21.20	22.10	21.90	21.20
		12	22.20	23.00	22.80	22.20	21.20	22.10	21.90	21.20
		11	22.20	23.00	22.80	22.20	21.20	22.10	21.90	21.20

1x-RTT CDMA Voice Band	BC0 1x-RTT CDMA Voice Channel	BC0 1x-RTT CDMA Voice Tx (dBm)	LTE Band 25 Conducted Power (dBm)							
			High.ch							
			QPSK 12 RB 6 RB Offset	QPSK 1 RB 0 RB Offset	QPSK 1 RB 24 RB Offset	QPSK 25 RB 0 RB Offset	16QAM 12 RB 6 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 24 RB Offset	16QAM 25 RB 0 RB Offset
835 MHz	1013	25	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		24	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		23	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		22	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		21	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		20	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		19	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		18	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		17	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		16	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		15	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		14	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		13	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		12	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		11	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90

1x-RTT CDMA Voice Band	BC0 1x-RTT CDMA Voice Channel	BC0 1x-RTT CDMA Voice Tx (dBm)	LTE Band 25 Conducted Power (dBm)							
			Low.ch							
			QPSK 12 RB 6 RB Offset	QPSK 1 RB 0 RB Offset	QPSK 1 RB 24 RB Offset	QPSK 25 RB 0 RB Offset	16QAM 12 RB 6 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 24 RB Offset	16QAM 25 RB 0 RB Offset
835 MHz	384	25	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		24	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		23	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		22	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		21	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		20	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		19	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		18	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		17	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		16	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		15	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		14	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		13	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		12	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		11	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20

1x-RTT CDMA Voice Band	BC0 1x-RTT CDMA Voice Channel	BC0 1x-RTT CDMA Voice Tx (dBm)	LTE Band 25 Conducted Power (dBm)							
			Mid.ch							
			QPSK 12 RB 6 RB Offset	QPSK 1 RB 0 RB Offset	QPSK 1 RB 24 RB Offset	QPSK 25 RB 0 RB Offset	16QAM 12 RB 6 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 24 RB Offset	16QAM 25 RB 0 RB Offset
835 MHz	384	25	18.90	19.00	19.10	19.00	18.80	18.70	19.00	18.90
		24	18.90	19.00	19.10	19.00	18.80	18.70	19.00	18.90
		23	18.90	19.00	19.10	19.00	18.80	18.70	19.00	18.90
		22	18.90	19.00	19.10	19.00	18.80	18.70	19.00	18.90
		21	18.90	19.00	19.10	19.00	18.80	18.70	19.00	18.90
		20	18.90	19.00	19.10	19.00	18.80	18.70	19.00	18.90
		19	18.90	19.00	19.10	19.00	18.80	18.70	19.00	18.90
		18	19.00	19.00	19.10	18.90	18.80	18.70	19.00	18.80
		17	22.20	23.00	22.80	22.10	21.10	22.10	22.00	21.00
		16	22.20	23.00	22.70	22.00	21.00	22.10	22.00	21.10
		15	22.20	23.00	22.70	22.00	21.00	22.10	22.00	21.10
		14	22.20	23.00	22.70	22.00	21.00	22.10	22.00	21.10
		13	22.20	23.00	22.70	22.00	21.00	22.10	22.00	21.10
		12	22.20	23.00	22.70	22.00	21.00	22.10	22.00	21.10
		11	22.20	23.00	22.70	22.00	21.00	22.10	22.00	21.10

1x-RTT CDMA Voice Band	BC0 1x-RTT CDMA Voice Channel	BC0 1x-RTT CDMA Voice Tx (dBm)	LTE Band 25 Conducted Power (dBm)							
			High.ch							
			QPSK 12 RB 6 RB Offset	QPSK 1 RB 0 RB Offset	QPSK 1 RB 24 RB Offset	QPSK 25 RB 0 RB Offset	16QAM 12 RB 6 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 24 RB Offset	16QAM 25 RB 0 RB Offset
835 MHz	384	25	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		24	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		23	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		22	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		21	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		20	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		19	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		18	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		17	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		16	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		15	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		14	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		13	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		12	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		11	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90

1x-RTT CDMA Voice Band	BC0 1x-RTT CDMA Voice Channel	BC0 1x-RTT CDMA Voice Tx (dBm)	LTE Band 25 Conducted Power (dBm)							
			Low.ch							
			QPSK 12 RB 6 RB Offset	QPSK 1 RB 0 RB Offset	QPSK 1 RB 24 RB Offset	QPSK 25 RB 0 RB Offset	16QAM 12 RB 6 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 24 RB Offset	16QAM 25 RB 0 RB Offset
835 MHz	777	25	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		24	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		23	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		22	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		21	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		20	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		19	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		18	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		17	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		16	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		15	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		14	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		13	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		12	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		11	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20

1x-RTT CDMA Voice Band	BC0 1x-RTT CDMA Voice Channel	BC0 1x-RTT CDMA Voice Tx (dBm)	LTE Band 25 Conducted Power (dBm)							
			Mid.ch							
			QPSK 12 RB 6 RB Offset	QPSK 1 RB 0 RB Offset	QPSK 1 RB 24 RB Offset	QPSK 25 RB 0 RB Offset	16QAM 12 RB 6 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 24 RB Offset	16QAM 25 RB 0 RB Offset
835 MHz	777	25	18.90	19.00	19.10	19.00	18.80	18.70	19.00	18.90
		24	18.90	19.00	19.10	19.00	18.80	18.70	19.00	18.90
		23	18.90	19.00	19.10	19.00	18.80	18.70	19.00	18.90
		22	18.90	19.00	19.10	19.00	18.80	18.70	19.00	18.90
		21	18.90	19.00	19.10	19.00	18.80	18.70	19.00	18.90
		20	18.90	19.00	19.10	19.00	18.80	18.70	19.00	18.90
		19	18.90	19.00	19.10	19.00	18.80	18.70	19.00	18.90
		18	18.90	19.00	19.10	19.00	18.80	18.70	19.00	18.90
		17	22.20	23.00	22.80	22.10	21.10	22.10	22.00	21.00
		16	22.20	23.00	22.80	22.10	21.10	22.10	22.00	21.00
		15	22.20	23.00	22.80	22.10	21.10	22.10	22.00	21.00
		14	22.20	23.00	22.80	22.10	21.10	22.10	22.00	21.00
		13	22.20	23.00	22.80	22.10	21.10	22.10	22.00	21.00
		12	22.20	23.00	22.80	22.10	21.10	22.10	22.00	21.00
		11	22.20	23.00	22.80	22.10	21.10	22.10	22.00	21.00

1x-RTT CDMA Voice Band	BC0 1x-RTT CDMA Voice Channel	BC0 1x-RTT CDMA Voice Tx (dBm)	LTE Band 25 Conducted Power (dBm)							
			High.ch							
			QPSK 12 RB 6 RB Offset	QPSK 1 RB 0 RB Offset	QPSK 1 RB 24 RB Offset	QPSK 25 RB 0 RB Offset	16QAM 12 RB 6 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 24 RB Offset	16QAM 25 RB 0 RB Offset
835 MHz	777	25	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		24	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		23	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		22	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		21	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		20	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		19	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		18	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		17	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		16	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		15	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		14	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		13	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		12	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		11	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90

1x-RTT CDMA Voice Band	BC1 1x-RTT CDMA Voice Channel	BC1 1x-RTT CDMA Voice Tx (dBm)	LTE Band 25 Conducted Power (dBm)							
			Low.ch							
			QPSK 12 RB 6 RB Offset	QPSK 1 RB 0 RB Offset	QPSK 1 RB 24 RB Offset	QPSK 25 RB 0 RB Offset	16QAM 12 RB 6 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 24 RB Offset	16QAM 25 RB 0 RB Offset
1900 MHz	25	25	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		24	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		23	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		22	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		21	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		20	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		19	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		18	19.10	19.30	19.30	19.40	19.00	19.30	19.20	19.30
		17	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		16	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		15	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		14	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		13	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		12	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		11	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20

1x-RTT CDMA Voice Band	BC1 1x-RTT CDMA Voice Channel	BC1 1x-RTT CDMA Voice Tx (dBm)	LTE Band 25 Conducted Power (dBm)							
			Mid.ch							
			QPSK 12 RB 6 RB Offset	QPSK 1 RB 0 RB Offset	QPSK 1 RB 24 RB Offset	QPSK 25 RB 0 RB Offset	16QAM 12 RB 6 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 24 RB Offset	16QAM 25 RB 0 RB Offset
1900 MHz	25	25	19.00	19.00	19.00	18.90	18.80	18.70	18.70	18.80
		24	19.00	19.00	19.00	18.90	18.80	18.70	18.70	18.80
		23	18.90	19.00	19.10	18.90	18.80	18.70	18.70	18.90
		22	18.90	19.00	19.10	18.90	18.80	18.70	18.70	18.90
		21	18.90	19.00	19.10	18.90	18.80	18.70	18.70	18.90
		20	19.00	19.00	19.00	18.90	18.80	18.70	18.70	18.80
		19	18.90	19.00	19.10	18.90	18.80	18.70	18.70	18.90
		18	18.90	19.00	19.10	18.90	18.80	18.70	18.70	18.90
		17	22.20	23.00	22.80	22.20	21.20	22.10	21.90	21.20
		16	22.20	23.00	22.80	22.20	21.20	22.10	21.90	21.20
		15	22.20	23.00	22.80	22.20	21.20	22.10	21.90	21.20
		14	22.20	23.00	22.80	22.20	21.20	22.10	21.90	21.20
		13	22.20	23.00	22.80	22.20	21.20	22.10	21.90	21.20
		12	22.20	23.00	22.80	22.20	21.20	22.10	21.90	21.20
		11	22.20	23.00	22.80	22.20	21.20	22.10	21.90	21.20

1x-RTT CDMA Voice Band	BC1 1x-RTT CDMA Voice Channel	BC1 1x-RTT CDMA Voice Tx (dBm)	LTE Band 25 Conducted Power (dBm)							
			High.ch							
			QPSK 12 RB 6 RB Offset	QPSK 1 RB 0 RB Offset	QPSK 1 RB 24 RB Offset	QPSK 25 RB 0 RB Offset	16QAM 12 RB 6 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 24 RB Offset	16QAM 25 RB 0 RB Offset
1900 MHz	25	25	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		24	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		23	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		22	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		21	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		20	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		19	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		18	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		17	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		16	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		15	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		14	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		13	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		12	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		11	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90

1x-RTT CDMA Voice Band	BC1 1x-RTT CDMA Voice Channel	BC1 1x-RTT CDMA Voice Tx (dBm)	LTE Band 25 Conducted Power (dBm)							
			Low.ch							
			QPSK 12 RB 6 RB Offset	QPSK 1 RB 0 RB Offset	QPSK 1 RB 24 RB Offset	QPSK 25 RB 0 RB Offset	16QAM 12 RB 6 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 24 RB Offset	16QAM 25 RB 0 RB Offset
1900 MHz	600	25	19.30	19.10	19.20	19.30	19.10	19.00	19.30	18.90
		24	19.30	19.10	19.20	19.30	19.10	19.00	19.30	18.90
		23	19.30	19.10	19.20	19.30	19.10	19.00	19.30	18.90
		22	19.30	19.10	19.20	19.30	19.10	19.00	19.30	18.90
		21	19.30	19.10	19.20	19.30	19.10	19.00	19.30	18.90
		20	19.30	19.10	19.20	19.30	19.10	19.00	19.30	18.90
		19	19.30	19.10	19.20	19.30	19.10	19.00	19.30	18.90
		18	19.30	19.10	19.20	19.30	19.10	19.00	19.30	18.90
		17	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		16	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		15	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		14	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		13	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		12	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		11	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20

1x-RTT CDMA Voice Band	BC1 1x-RTT CDMA Voice Channel	BC1 1x-RTT CDMA Voice Tx (dBm)	LTE Band 25 Conducted Power (dBm)							
			Mid.ch							
			QPSK 12 RB 6 RB Offset	QPSK 1 RB 0 RB Offset	QPSK 1 RB 24 RB Offset	QPSK 25 RB 0 RB Offset	16QAM 12 RB 6 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 24 RB Offset	16QAM 25 RB 0 RB Offset
1900 MHz	600	25	18.90	19.00	19.00	19.00	18.80	18.70	18.80	18.80
		24	18.90	19.00	19.00	19.00	18.80	18.70	18.80	18.80
		23	18.90	19.00	19.00	19.00	18.80	18.70	18.80	18.80
		22	18.90	19.00	19.00	19.00	18.80	18.70	18.80	18.80
		21	18.90	19.00	19.00	19.00	18.80	18.70	18.80	18.80
		20	18.90	19.00	19.00	19.00	18.80	18.70	18.80	18.80
		19	18.90	19.00	19.00	19.00	18.80	18.70	18.80	18.80
		18	18.90	19.10	19.10	19.00	18.80	18.70	18.80	19.00
		17	22.20	23.00	22.80	22.10	21.20	22.10	22.00	21.20
		16	22.20	23.00	22.80	22.10	21.20	22.10	22.00	21.20
		15	22.20	23.00	22.80	22.10	21.20	22.10	22.00	21.20
		14	22.20	23.00	22.80	22.10	21.20	22.10	22.00	21.20
		13	22.20	23.00	22.80	22.10	21.20	22.10	22.00	21.20
		12	22.20	23.00	22.80	22.10	21.20	22.10	22.00	21.20
		11	22.20	23.00	22.80	22.10	21.20	22.10	22.00	21.20

1x-RTT CDMA Voice Band	BC1 1x-RTT CDMA Voice Channel	BC1 1x-RTT CDMA Voice Tx (dBm)	LTE Band 25 Conducted Power (dBm)							
			High.ch							
			QPSK 12 RB 6 RB Offset	QPSK 1 RB 0 RB Offset	QPSK 1 RB 24 RB Offset	QPSK 25 RB 0 RB Offset	16QAM 12 RB 6 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 24 RB Offset	16QAM 25 RB 0 RB Offset
1900 MHz	600	25	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		24	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		23	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		22	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		21	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		20	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		19	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		18	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		17	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		16	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		15	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		14	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		13	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		12	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		11	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90

1x-RTT CDMA Voice Band	BC1 1x-RTT CDMA Voice Channel	BC1 1x-RTT CDMA Voice Tx (dBm)	LTE Band 25 Conducted Power (dBm)							
			Low.ch							
			QPSK 12 RB 6 RB Offset	QPSK 1 RB 0 RB Offset	QPSK 1 RB 24 RB Offset	QPSK 25 RB 0 RB Offset	16QAM 12 RB 6 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 24 RB Offset	16QAM 25 RB 0 RB Offset
1900 MHz	1175	25	19.30	19.10	19.20	19.30	19.10	19.00	19.30	18.90
		24	19.30	19.10	19.20	19.30	19.10	19.00	19.30	18.90
		23	19.30	19.10	19.20	19.30	19.10	19.00	19.30	18.90
		22	19.30	19.10	19.20	19.30	19.10	19.00	19.30	18.90
		21	19.30	19.10	19.20	19.30	19.10	19.00	19.30	18.90
		20	19.30	19.10	19.20	19.30	19.10	19.00	19.30	18.90
		19	19.30	19.10	19.20	19.30	19.10	19.00	19.30	18.90
		18	19.30	19.10	19.20	19.30	19.10	19.00	19.30	18.90
		17	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		16	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		15	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		14	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		13	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		12	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20
		11	22.30	22.90	22.92	22.10	21.20	22.10	22.10	21.20

1x-RTT CDMA Voice Band	BC1 1x-RTT CDMA Voice Channel	BC1 1x-RTT CDMA Voice Tx (dBm)	LTE Band 25 Conducted Power (dBm)							
			Mid.ch							
			QPSK 12 RB 6 RB Offset	QPSK 1 RB 0 RB Offset	QPSK 1 RB 24 RB Offset	QPSK 25 RB 0 RB Offset	16QAM 12 RB 6 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 24 RB Offset	16QAM 25 RB 0 RB Offset
1900 MHz	1175	25	18.90	19.00	19.00	18.90	18.70	18.70	18.80	18.80
		24	18.90	19.00	19.00	18.90	18.70	18.70	18.80	18.80
		23	18.90	19.00	19.00	18.90	18.70	18.70	18.80	18.80
		22	18.90	19.00	19.00	18.90	18.70	18.70	18.80	18.80
		21	18.90	19.00	19.00	18.90	18.70	18.70	18.80	18.80
		20	18.90	19.00	19.00	18.90	18.70	18.70	18.80	18.80
		19	18.90	19.00	19.00	18.90	18.70	18.70	18.80	18.80
		18	18.90	19.10	19.00	19.00	18.80	18.80	18.90	18.90
		17	22.20	23.00	22.80	22.10	21.10	22.20	22.00	21.20
		16	22.20	23.00	22.80	22.10	21.10	22.20	22.00	21.20
		15	22.20	23.00	22.80	22.10	21.10	22.20	22.00	21.20
		14	22.20	23.00	22.80	22.10	21.10	22.20	22.00	21.20
		13	22.20	23.00	22.80	22.10	21.10	22.20	22.00	21.20
		12	22.20	23.00	22.80	22.10	21.10	22.20	22.00	21.20
		11	22.20	23.00	22.80	22.10	21.10	22.20	22.00	21.20

1x-RTT CDMA Voice Band	BC1 1x-RTT CDMA Voice Channel	BC1 1x-RTT CDMA Voice Tx (dBm)	LTE Band 25 Conducted Power (dBm)							
			High.ch							
			QPSK 12 RB 6 RB Offset	QPSK 1 RB 0 RB Offset	QPSK 1 RB 24 RB Offset	QPSK 25 RB 0 RB Offset	16QAM 12 RB 6 RB Offset	16QAM 1 RB 0 RB Offset	16QAM 1 RB 24 RB Offset	16QAM 25 RB 0 RB Offset
1900 MHz	600	25	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		24	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		23	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		22	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		21	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		20	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		19	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		18	18.90	18.70	19.30	19.00	18.90	18.80	19.10	19.00
		17	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		16	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		15	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		14	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		13	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		12	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90
		11	22.10	22.70	23.10	22.00	20.90	21.90	22.20	20.90

11.3 SVLTE SAR Testing Procedures

Per KDB 941225 D05 5) B), SAR testing was additionally performed at the reduced CDMA and LTE power levels with respect to the simultaneous transmission scenarios. Additional samples were tuned to a fixed reduced power levels to represent the SVLTE condition in a standalone environment. While the power reduction mechanism is activated at the CDMA Voice power level of 18 dBm, simultaneous SAR summations of maximum power LTE were evaluated at this reduced fixed CDMA voice power level. SAR was additionally evaluated at reduced power LTE levels to perform simultaneous SAR analysis when CDMA voice is at maximum output power.

11.3.1 Reduced LTE Conducted Powers

Table 11-3
Reduced LTE Conducted Powers

Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]	Target MPR [dB]	MPR Allowed per 3GPP [dB]
1852.5	26065	5	QPSK	1	0	18.93	0	0
1852.5	26065	5	QPSK	1	24	19.04	0	0
1852.5	26065	5	QPSK	12	6	19.50	0	0-1
1852.5	26065	5	QPSK	25	0	19.44	0	0-1
1852.5	26065	5	16-QAM	1	0	18.66	0	0-1
1852.5	26065	5	16-QAM	1	24	19.24	0	0-1
1852.5	26065	5	16-QAM	12	6	19.12	0	0-2
1852.5	26065	5	16-QAM	25	0	19.08	0	0-2
1882.5	26365	5	QPSK	1	0	**18.86**	0	0
1882.5	26365	5	QPSK	1	24	**19.04**	0	0
1882.5	26365	5	QPSK	12	6	**19.07**	0	0-1
1882.5	26365	5	QPSK	25	0	18.73	0	0-1
1882.5	26365	5	16-QAM	1	0	**18.72**	0	0-1
1882.5	26365	5	16-QAM	1	24	**18.81**	0	0-1
1882.5	26365	5	16-QAM	12	6	**18.69**	0	0-2
1882.5	26365	5	16-QAM	25	0	18.55	0	0-2
1912.5	26665	5	QPSK	1	0	19.18	0	0
1912.5	26665	5	QPSK	1	24	19.43	0	0
1912.5	26665	5	QPSK	12	6	19.31	0	0-1
1912.5	26665	5	QPSK	25	0	19.04	0	0-1
1912.5	26665	5	16-QAM	1	0	19.10	0	0-1
1912.5	26665	5	16-QAM	1	24	19.20	0	0-1
1912.5	26665	5	16-QAM	12	6	19.27	0	0-2
1912.5	26665	5	16-QAM	25	0	19.18	0	0-2

LTE Notes:
1. Please reference section 9.4.3 for LTE testing requirements per FCC KDB 941225 D05.
2. The bolded powers were tested for SAR.

11.3.2 Fixed CDMA Conducted Powers

Table 11-4
Fixed CDMA Conducted Powers

Band	FCC Rule Part	Channel	Frequency	SO55 [dBm]	SO55 [dBm]	SO75 [dBm]	TDSO SO32 [dBm]	TDSO SO32 [dBm]
		F-RC	MHz	RC1	RC3	RC11	FCH+SCH	FCH
Cellular	90S	564	820.1	17.84	17.90	17.87	17.88	17.91
	22H	1013	824.7	18.13	18.18	18.26	18.23	18.24
		384	836.52	18.03	18.00	18.07	18.09	18.12
		777	848.31	18.02	18.02	18.14	18.07	18.10
PCS	24E	25	1851.25	18.37	18.40	18.42	18.38	18.41
		600	1880	18.34	18.33	18.31	18.35	18.39
		1175	1908.75	18.47	18.49	18.41	18.47	18.50

Note: RC1 is only applicable for IS-95 compatibility.

Note: There is no power reduction applied to the CDMA Voice modes, however the device with output powers represented in the table above was tuned down (for SAR Test purposes only) to analyze simultaneous SAR scenarios in the SVLTE condition where LTE is operating at maximum output power in conjunction with a lower CDMA voice level (See Table 11-1).

CDMA 1x Test Notes:

Per KDB Publication 941225 D01:
1. Head SAR was tested with SO55 RC3. SO55 RC1 was not required since the average output power was not more than 0.25 dB than the SO55 RC3 powers.
2. Body-Worn and Hotspot SAR was tested with 1x RTT with TDSO / SO32 FCH Only. TDSO / SO32 FCH+SCH SAR tests were not required since the average output power was not more than 0.25 dB higher than the TDSO / SO32 FCH only powers.

Per FCC KDB Publication 447498 D01:
1. Only one channel is required for Cell. CDMA Rule Part 90S since the device operates within the transmission range of 817.90 – 823.10 MHz.

Per October 2011 TCB Workshop
1. CDMA 1X Advanced technology was not required for SAR since the maximum output powers for 1x Advanced was not more than 0.25 dB higher than the maximum measured powers for 1x and the measured SAR in any 1x mode exposure conditions was not greater than 1.2 W/kg. See Section 9.2.2 for 1x Advanced test set up.

12 SYSTEM VERIFICATION

12.1 Tissue Verification

Table 12-1
Measured Tissue Properties

Calibrated for Tests Performed on:	Tissue Type	Tissue Temp During Calibration (C°)	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
8/15/2012	835H	22.5	820	0.867	40.07	0.898	41.571	-3.45%	-3.61%
			835	0.880	39.90	0.900	41.500	-2.22%	-3.86%
			850	0.895	39.71	0.916	41.500	-2.29%	-4.31%
9/10/2012	835H	23.5	820	0.888	41.49	0.898	41.571	-1.11%	-0.19%
			835	0.903	41.51	0.900	41.500	0.33%	0.02%
			850	0.915	40.99	0.916	41.500	-0.11%	-1.23%
8/16/2012	1900H	22.8	1850	1.367	39.37	1.400	40.000	-2.36%	-1.58%
			1880	1.419	39.36	1.400	40.000	1.36%	-1.60%
			1910	1.439	39.17	1.400	40.000	2.79%	-2.08%
8/23/2012	1900H	23.0	1850	1.331	38.70	1.400	40.000	-4.93%	-3.25%
			1880	1.397	38.79	1.400	40.000	-0.21%	-3.03%
			1910	1.421	38.55	1.400	40.000	1.50%	-3.63%
8/21/2012	2450H	23.9	2401	1.816	39.10	1.758	39.298	3.30%	-0.50%
			2450	1.860	39.12	1.800	39.200	3.33%	-0.20%
			2499	1.939	38.93	1.852	39.135	4.70%	-0.52%
08/16/2012	5200H-5800H	24.6	5180	4.441	37.29	4.639	36.020	-4.27%	3.53%
			5200	4.438	37.28	4.660	36.000	-4.76%	3.56%
			5280	4.547	37.14	4.740	35.920	-4.07%	3.40%
			5500	4.734	36.78	4.965	35.650	-4.65%	3.17%
			5680	4.937	36.62	5.150	35.420	-4.14%	3.39%
			5800	5.060	36.49	5.270	35.300	-3.98%	3.37%
			5805	5.069	36.49	5.275	35.295	-3.91%	3.39%
8/14/2012	835B	24.5	820	0.985	54.32	0.969	55.284	1.65%	-1.74%
			835	1.004	54.38	0.970	55.200	3.51%	-1.49%
			850	1.021	54.07	0.988	55.154	3.34%	-1.97%
8/14/2012	1900B	23.2	1850	1.486	52.93	1.520	53.300	-2.24%	-0.69%
			1880	1.507	52.82	1.520	53.300	-0.86%	-0.90%
			1910	1.540	52.68	1.520	53.300	1.32%	-1.16%
8/15/2012	1900B	23.3	1850	1.455	52.68	1.520	53.300	-4.28%	-1.16%
			1880	1.467	52.59	1.520	53.300	-3.49%	-1.33%
			1910	1.529	52.44	1.520	53.300	0.59%	-1.61%
8/21/2012	1900B	22.8	1850	1.466	55.22	1.520	53.300	-3.55%	3.60%
			1880	1.479	54.85	1.520	53.300	-2.70%	2.91%
			1910	1.510	54.87	1.520	53.300	-0.66%	2.95%
9/6/2012	1900B	21.7	1850	1.515	53.76	1.520	53.300	-0.33%	0.86%
			1880	1.523	53.51	1.520	53.300	0.20%	0.39%
			1910	1.558	53.49	1.520	53.300	2.50%	0.36%
8/20/2012	2450B	23.4	2401	1.910	51.23	1.903	52.765	0.37%	-2.91%
			2450	1.974	51.08	1.950	52.700	1.23%	-3.07%
			2499	2.039	50.87	2.019	52.638	0.99%	-3.36%
09/10/2012	5200B-5800B	22.4	5180	5.173	47.80	5.276	49.041	-1.95%	-2.53%
			5200	5.182	47.72	5.299	49.014	-2.21%	-2.64%
			5280	5.393	47.60	5.393	48.879	0.00%	-2.62%
			5500	5.667	46.83	5.650	48.580	0.30%	-3.60%
			5680	5.962	46.65	5.860	48.336	1.74%	-3.49%
			5800	6.157	46.29	6.000	48.200	2.62%	-3.96%
			5805	6.167	46.31	6.005	48.166	2.70%	-3.85%

The above measured tissue parameters were used in the DASY software to perform interpolation via the DASY software to determine actual dielectric parameters at the test frequencies (per IEEE 1528 6.6.1.2). The SAR test plots may slightly differ from the table above since the DASY software rounds to three significant digits.

Probe calibration used within ±100 MHz of the test frequency in either 5.725 - 5.85 or 5.47-5.725 GHz is acceptable per KDB Publication 865664 since the design of the SAR probe supports the extended frequency, provided the DASY software version recommended is used for the tests, and the expanded calibration uncertainty (k=2) is less than or equal to 15% (See SAR probe calibration certificate for this information). The dielectric and conductivities measured are within 10% and 5% respectively of the target parameters specified in Supplement C 01-01.

12.2 Measurement Procedure for Tissue verification

1) The network analyzer and probe system was configured and calibrated.
2) The probe was immersed in the sample which was placed in a nonmetallic container. Trapped air bubbles beneath the flange were minimized by placing the probe at a slight angle.
3) The complex admittance with respect to the probe aperture was measured
4) The complex relative permittivity ε_r' can be calculated from the below equation (Pournaropoulos and Misra):

$$Y = \frac{j2\omega\varepsilon_r\varepsilon_0}{\left[\ln(b/a)\right]^2}\int_a^b\int_a^b\int_0^\pi \cos\phi' \frac{\exp\left[-j\omega r(\mu_0\varepsilon_r'\varepsilon_0)^{1/2}\right]}{r} d\phi' d\rho' d\rho$$

where *Y* is the admittance of the probe in contact with the sample, the primed and unprimed coordinates refer to source and observation points, respectively, $r^2 = \rho^2 + \rho'^2 - 2\rho\rho'\cos\phi'$, ω is the angular frequency, and $j = \sqrt{-1}$.

12.3 Test System Verification

Prior to assessment, the system is verified to ±10% of the manufacturer SAR measurement on the reference dipole at the time of calibration.

Table 12-2
System Verification Results

System Verification TARGET & MEASURED											
Tissue Frequency (MHz)	Tissue Type	Date:	Amb. Temp (°C)	Liquid Temp (°C)	Input Power (W)	Dipole SN	Probe SN	Measured SAR_{1g} (W/kg)	1 W Target SAR_{1g} (W/kg)	1 W Normalized SAR_{1g} (W/kg)	Deviation (%)
835	Head	08/15/2012	24.8	23.0	0.100	4d119	3258	0.947	9.420	9.470	0.53%
835	Head	09/10/2012	23.3	22.9	0.100	4d047	3213	0.927	9.410	9.270	-1.49%
1900	Head	08/16/2012	23.9	23.0	0.100	5d148	3213	4.13	40.500	41.300	1.98%
1900	Head	08/23/2012	22.8	22.1	0.100	5d148	3213	3.97	40.500	39.700	-1.98%
2450	Head	08/21/2012	24.6	22.7	0.100	882	3288	5.75	53.500	57.500	7.48%
5200	Head	08/16/2012	23.8	22.7	0.100	1057	3589	7.48	79.100	74.800	-5.44%
5500	Head	08/16/2012	23.8	22.9	0.100	1057	3589	7.98	84.900	79.800	-6.01%
5800	Head	08/16/2012	23.9	22.9	0.100	1057	3589	7.48	79.500	74.800	-5.91%
835	Body	08/14/2012	24.8	24.0	0.100	4d119	3258	1.01	9.560	10.100	5.65%
1900	Body	08/14/2012	23.4	23.2	0.100	502	3561	3.84	38.900	38.400	-1.29%
1900	Body	08/15/2012	21.9	22.1	0.100	5d149	3287	3.83	39.300	38.300	-2.54%
1900	Body	08/21/2012	24.6	23.2	0.100	5d148	3288	3.77	39.100	37.700	-3.58%
1900	Body	09/06/2012	22.6	21.8	0.100	5d149	3288	4.05	39.300	40.500	3.05%
2450	Body	08/20/2012	23.5	23.2	0.040	797	3209	2.15	50.800	53.750	5.81%
5200	Body	09/10/2012	24.8	23.8	0.100	1057	3589	7.82	73.400	78.200	6.54%
5500	Body	09/10/2012	24.4	23.8	0.100	1057	3589	8.46	78.900	84.600	7.22%
5800	Body	09/10/2012	24.6	23.6	0.100	1057	3589	7.65	74.300	76.500	2.96%

Note: Per KDB Publication 865664, when a reference dipole is not defined within ±100MHz of the test frequency, the system verification may be conducted within ± 200 MHz of the center frequency of the measurement frequencies if the SAR probe calibration is valid and the same tissue-equivalent matter is used for verification and test measurements.

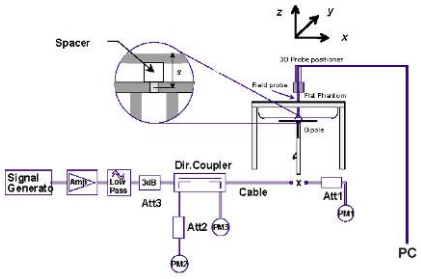

Figure 12-1
System Verification Setup Diagram

Figure 12-2
System Verification Setup Photo

13 SAR DATA SUMMARY

13.1 Standalone Head SAR Data

Table 13-1
Cell. CDMA Head SAR Data

MEASUREMENT RESULTS										
FREQUENCY		Mode/Band	Service	Target Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	SAR (1g)
MHz	Ch.									(W/kg)
820.10	564	Cell. CDMA - FCC Rule Part 90S	SO55	25.00	25.13	0.09	Right	Cheek	32386	0.148
820.10	564	Cell. CDMA - FCC Rule Part 90S	SO55	25.00	25.13	-0.04	Right	Tilt	32386	0.079
820.10	564	Cell. CDMA - FCC Rule Part 90S	SO55	25.00	25.13	0.05	Left	Cheek	32386	**0.166**
820.10	564	Cell. CDMA - FCC Rule Part 90S	SO55	25.00	25.13	0.02	Left	Tilt	32386	0.087
820.10	564	Cell. CDMA - FCC Rule Part 90S	SO55	18.00	17.90	0.05	Right	Cheek	322E0	**0.041**
820.10	564	Cell. CDMA - FCC Rule Part 90S	SO55	18.00	17.90	-0.06	Right	Tilt	322E0	0.022
820.10	564	Cell. CDMA - FCC Rule Part 90S	SO55	18.00	17.90	0.15	Left	Cheek	322E0	0.038
820.10	564	Cell. CDMA - FCC Rule Part 90S	SO55	18.00	17.90	-0.06	Left	Tilt	322E0	0.023
820.10	564	Cell. CDMA - FCC Rule Part 90S	EVDO Rev. A	25.00	25.12	0.03	Right	Cheek	11	0.166
820.10	564	Cell. CDMA - FCC Rule Part 90S	EVDO Rev. A	25.00	25.12	-0.18	Right	Tilt	11	0.097
820.10	564	Cell. CDMA - FCC Rule Part 90S	EVDO Rev. A	25.00	25.12	0.14	Left	Cheek	11	**0.167**
820.10	564	Cell. CDMA - FCC Rule Part 90S	EVDO Rev. A	25.00	25.12	0.14	Left	Tilt	11	0.106
836.52	384	Cell. CDMA - FCC Rule Part 22H	SO55	25.00	25.00	-0.14	Right	Cheek	32386	0.222
836.52	384	Cell. CDMA - FCC Rule Part 22H	SO55	25.00	25.00	0.02	Right	Tilt	32386	0.114
836.52	384	Cell. CDMA - FCC Rule Part 22H	SO55	25.00	25.00	0.10	Left	Cheek	32386	**0.255**
836.52	384	Cell. CDMA - FCC Rule Part 22H	SO55	25.00	25.00	-0.04	Left	Tilt	32386	0.139
836.52	384	Cell. CDMA - FCC Rule Part 22H	SO55	18.00	18.00	0.02	Right	Cheek	322E0	0.044
836.52	384	Cell. CDMA - FCC Rule Part 22H	SO55	18.00	18.00	0.06	Right	Tilt	322E0	0.024
836.52	384	Cell. CDMA - FCC Rule Part 22H	SO55	18.00	18.00	-0.05	Left	Cheek	322E0	**0.048**
836.52	384	Cell. CDMA - FCC Rule Part 22H	SO55	18.00	18.00	-0.03	Left	Tilt	322E0	0.028
836.52	384	Cell. CDMA - FCC Rule Part 22H	EVDO Rev. A	25.00	25.03	0.11	Right	Cheek	11	**0.199**
836.52	384	Cell. CDMA - FCC Rule Part 22H	EVDO Rev. A	25.00	25.03	-0.01	Right	Tilt	11	0.107
836.52	384	Cell. CDMA - FCC Rule Part 22H	EVDO Rev. A	25.00	25.03	-0.02	Left	Cheek	11	0.173
836.52	384	Cell. CDMA - FCC Rule Part 22H	EVDO Rev. A	25.00	25.03	-0.13	Left	Tilt	11	0.092
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**							**Head** **1.6 W/kg (mW/g)** averaged over 1 gram			

Table 13-2
PCS CDMA Head SAR Data

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Target Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	SAR (1g)
MHz	Ch.									(W/kg)
1880.00	600	PCS CDMA - FCC Rule Part 24E	SO55	25.00	25.08	-0.05	Right	Cheek	32209	0.257
1880.00	600	PCS CDMA - FCC Rule Part 24E	SO55	25.00	25.08	0.08	Right	Tilt	32209	0.125
1880.00	600	PCS CDMA - FCC Rule Part 24E	SO55	25.00	25.08	-0.04	Left	Cheek	32209	**0.337**
1880.00	600	PCS CDMA - FCC Rule Part 24E	SO55	25.00	25.08	-0.03	Left	Tilt	32209	0.168
1880.00	600	PCS CDMA - FCC Rule Part 24E	SO55	18.00	18.33	-0.02	Right	Cheek	322F0	0.039
1880.00	600	PCS CDMA - FCC Rule Part 24E	SO55	18.00	18.33	0.09	Right	Tilt	322F0	0.025
1880.00	600	PCS CDMA - FCC Rule Part 24E	SO55	18.00	18.33	0.17	Left	Cheek	322F0	**0.065**
1880.00	600	PCS CDMA - FCC Rule Part 24E	SO55	18.00	18.33	0.02	Left	Tilt	322F0	0.032
1880.00	600	PCS CDMA - FCC Rule Part 24E	EVDO Rev. A	25.00	25.07	0.04	Right	Cheek	11	0.067
1880.00	600	PCS CDMA - FCC Rule Part 24E	EVDO Rev. A	25.00	25.07	0.10	Right	Tilt	11	0.070
1880.00	600	PCS CDMA - FCC Rule Part 24E	EVDO Rev. A	25.00	25.07	0.19	Left	Cheek	11	**0.141**
1880.00	600	PCS CDMA - FCC Rule Part 24E	EVDO Rev. A	25.00	25.07	0.01	Left	Tilt	11	0.047
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population							**Head 1.6 W/kg (mW/g) averaged over 1 gram**			

Table 13-3
GSM/WCDMA Head SAR Data

MEASUREMENT RESULTS								
FREQUENCY		Mode/Band	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	SAR (1g)
MHz	Ch.							(W/kg)
836.60	190	GSM 850 - FCC Rule Part 22H	32.84	-0.10	Right	Cheek	32388	0.156
836.60	190	GSM 850 - FCC Rule Part 22H	32.84	-0.07	Right	Tilt	32388	0.084
836.60	190	GSM 850 - FCC Rule Part 22H	32.84	0.04	Left	Cheek	32388	**0.167**
836.60	190	GSM 850 - FCC Rule Part 22H	32.84	0.04	Left	Tilt	32388	0.093
1880.00	661	GSM 1900 - FCC Rule Part 24E	29.96	0.02	Right	Cheek	3238B	0.124
1880.00	661	GSM 1900 - FCC Rule Part 24E	29.96	0.08	Right	Tilt	3238B	0.069
1880.00	661	GSM 1900 - FCC Rule Part 24E	29.96	0.20	Left	Cheek	3238B	**0.149**
1880.00	661	GSM 1900 - FCC Rule Part 24E	29.96	-0.02	Left	Tilt	3238B	0.082
1880.00	9400	WCDMA 1900 - FCC Rule Part 24E	23.77	-0.08	Right	Cheek	323C2	**0.117**
1880.00	9400	WCDMA 1900 - FCC Rule Part 24E	23.77	0.05	Right	Tilt	323C2	0.040
1880.00	9400	WCDMA 1900 - FCC Rule Part 24E	23.77	0.00	Left	Cheek	323C2	0.060
1880.00	9400	WCDMA 1900 - FCC Rule Part 24E	23.77	0.13	Left	Tilt	323C2	0.055
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**Head 1.6 W/kg (mW/g) averaged over 1 gram**			

Table 13-4
LTE Band 25 Head SAR Data

MEASUREMENT RESULTS															
FREQUENCY			Mode	Bandwidth [MHz]	Target Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Side	Test Position	Modulation	# of RB	RB Offset	Device Serial Number	SAR (1g)
MHz	Ch.														(W/kg)
1882.50	26365	Mid	LTE Band 25	5	22.00	22.00	0.05	1	Right	Cheek	QPSK	12	6	3220A	0.186
1882.50	26365	Mid	LTE Band 25	5	23.00	23.18	-0.11	0	Right	Cheek	QPSK	1	0	3220A	**0.262**
1882.50	26365	Mid	LTE Band 25	5	23.00	22.93	0.14	0	Right	Cheek	QPSK	1	24	3220A	0.201
1882.50	26365	Mid	LTE Band 25	5	21.00	20.75	-0.13	2	Right	Cheek	16 QAM	12	6	3220A	0.147
1852.50	26065	Low	LTE Band 25	5	22.00	22.32	0.20	1	Right	Cheek	16 QAM	1	0	3220A	0.201
1852.50	26065	Low	LTE Band 25	5	22.00	22.13	-0.03	1	Right	Cheek	16 QAM	1	24	3220A	0.161
1882.50	26365	Mid	LTE Band 25	5	22.00	22.00	0.05	1	Right	Tilt	QPSK	12	6	3220A	0.071
1882.50	26365	Mid	LTE Band 25	5	23.00	23.18	0.17	0	Right	Tilt	QPSK	1	0	3220A	0.092
1882.50	26365	Mid	LTE Band 25	5	23.00	22.93	0.11	0	Right	Tilt	QPSK	1	24	3220A	0.079
1882.50	26365	Mid	LTE Band 25	5	21.00	20.75	0.13	2	Right	Tilt	16 QAM	12	6	3220A	0.056
1852.50	26065	Low	LTE Band 25	5	22.00	22.32	-0.18	1	Right	Tilt	16 QAM	1	0	3220A	0.075
1852.50	26065	Low	LTE Band 25	5	22.00	22.13	0.12	1	Right	Tilt	16 QAM	1	24	3220A	0.062
1882.50	26365	Mid	LTE Band 25	5	22.00	22.00	0.17	1	Left	Cheek	QPSK	12	6	3220A	0.116
1882.50	26365	Mid	LTE Band 25	5	23.00	23.18	0.00	0	Left	Cheek	QPSK	1	0	3220A	0.162
1882.50	26365	Mid	LTE Band 25	5	23.00	22.93	0.04	0	Left	Cheek	QPSK	1	24	3220A	0.139
1882.50	26365	Mid	LTE Band 25	5	21.00	20.75	0.03	2	Left	Cheek	16 QAM	12	6	3220A	0.092
1852.50	26065	Low	LTE Band 25	5	22.00	22.32	-0.14	1	Left	Cheek	16 QAM	1	0	3220A	0.111
1852.50	26065	Low	LTE Band 25	5	22.00	22.13	-0.05	1	Left	Cheek	16 QAM	1	24	3220A	0.110
1882.50	26365	Mid	LTE Band 25	5	22.00	22.00	0.20	1	Left	Tilt	QPSK	12	6	3220A	0.089
1882.50	26365	Mid	LTE Band 25	5	23.00	23.18	0.03	0	Left	Tilt	QPSK	1	0	3220A	0.101
1882.50	26365	Mid	LTE Band 25	5	23.00	22.93	0.05	0	Left	Tilt	QPSK	1	24	3220A	0.097
1882.50	26365	Mid	LTE Band 25	5	21.00	20.75	0.15	2	Left	Tilt	16 QAM	12	6	3220A	0.069
1852.50	26065	Low	LTE Band 25	5	22.00	22.32	0.13	1	Left	Tilt	16 QAM	1	0	3220A	0.084
1852.50	26065	Low	LTE Band 25	5	22.00	22.13	0.02	1	Left	Tilt	16 QAM	1	24	3220A	0.087
1882.50	26365	Mid	LTE Band 25	5	19.00	19.07	-0.10	0	Right	Cheek	QPSK	12	6	320EB	0.082
1882.50	26365	Mid	LTE Band 25	5	19.00	18.86	0.06	0	Right	Cheek	QPSK	1	0	320EB	**0.084**
1882.50	26365	Mid	LTE Band 25	5	19.00	19.04	0.01	0	Right	Cheek	QPSK	1	24	320EB	0.072
1882.50	26365	Mid	LTE Band 25	5	19.00	18.69	0.00	0	Right	Cheek	16 QAM	12	6	320EB	0.079
1882.50	26365	Mid	LTE Band 25	5	19.00	18.72	-0.02	0	Right	Cheek	16 QAM	1	0	320EB	0.082
1882.50	26365	Mid	LTE Band 25	5	19.00	18.81	0.02	0	Right	Cheek	16 QAM	1	24	320EB	0.064
1882.50	26365	Mid	LTE Band 25	5	19.00	19.07	0.03	0	Right	Tilt	QPSK	12	6	320EB	0.031
1882.50	26365	Mid	LTE Band 25	5	19.00	18.86	0.07	0	Right	Tilt	QPSK	1	0	320EB	0.016
1882.50	26365	Mid	LTE Band 25	5	19.00	19.04	-0.14	0	Right	Tilt	QPSK	1	24	320EB	0.028
1882.50	26365	Mid	LTE Band 25	5	19.00	18.69	0.08	0	Right	Tilt	16 QAM	12	6	320EB	0.031
1882.50	26365	Mid	LTE Band 25	5	19.00	18.72	0.02	0	Right	Tilt	16 QAM	1	0	320EB	0.029
1882.50	26365	Mid	LTE Band 25	5	19.00	18.81	-0.02	0	Right	Tilt	16 QAM	1	24	320EB	0.026
1882.50	26365	Mid	LTE Band 25	5	19.00	19.07	-0.06	0	Left	Cheek	QPSK	12	6	320EB	0.048
1882.50	26365	Mid	LTE Band 25	5	19.00	18.86	0.04	0	Left	Cheek	QPSK	1	0	320EB	0.052
1882.50	26365	Mid	LTE Band 25	5	19.00	19.04	0.05	0	Left	Cheek	QPSK	1	24	320EB	0.049
1882.50	26365	Mid	LTE Band 25	5	19.00	18.69	-0.01	0	Left	Cheek	16 QAM	12	6	320EB	0.047
1882.50	26365	Mid	LTE Band 25	5	19.00	18.72	0.07	0	Left	Cheek	16 QAM	1	0	320EB	0.053
1882.50	26365	Mid	LTE Band 25	5	19.00	18.81	-0.14	0	Left	Cheek	16 QAM	1	24	320EB	0.044
1882.50	26365	Mid	LTE Band 25	5	19.00	19.07	0.04	0	Left	Tilt	QPSK	12	6	320EB	0.035
1882.50	26365	Mid	LTE Band 25	5	19.00	18.86	-0.01	0	Left	Tilt	QPSK	1	0	320EB	0.032
1882.50	26365	Mid	LTE Band 25	5	19.00	19.04	0.13	0	Left	Tilt	QPSK	1	24	320EB	0.035
1882.50	26365	Mid	LTE Band 25	5	19.00	18.69	0.16	0	Left	Tilt	16 QAM	12	6	320EB	0.034
1882.50	26365	Mid	LTE Band 25	5	19.00	18.72	0.14	0	Left	Tilt	16 QAM	1	0	320EB	0.031
1882.50	26365	Mid	LTE Band 25	5	19.00	18.81	0.02	0	Left	Tilt	16 QAM	1	24	320EB	0.037
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population									Head 1.6 W/kg (mW/g) averaged over 1 gram						

Per FCC KDB 941225 D05 Page 4, 4) B) and Page 5 footnote 9, 16QAM with 1RB for both channel edges are required for the highest bandwidth on the highest output power channel for the 1 RB allocation when the average output power of the 1 RB allocation is >0.5 dB higher than the 50% allocation for 16 QAM, thus low channel was tested to 16QAM 1RB configurations.

Table 13-5
2.4 GHz WLAN Head SAR Data

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	SAR (1g)
MHz	Ch.									(W/kg)
2462	11	IEEE 802.11b	DSSS	15.98	0.05	Right	Cheek	321C4	1	0.022
2462	11	IEEE 802.11b	DSSS	15.98	0.03	Right	Tilt	321C4	1	0.016
2462	11	IEEE 802.11b	DSSS	15.98	0.13	Left	Cheek	321C4	1	**0.043**
2462	11	IEEE 802.11b	DSSS	15.98	-0.13	Left	Tilt	321C4	1	0.036
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Head 1.6 W/kg (mW/g) averaged over 1 gram				

Note: WIFI transmission was verified with a spectrum analyzer during SAR tests.

Table 13-6
5 GHz WLAN Head SAR Data

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Side	Test Position	Device Serial Number	Data Rate (Mbps)	SAR (1g)
MHz	Ch.									(W/kg)
5805	161	IEEE 802.11a	OFDM	14.14	0.00	Right	Cheek	321C4	6	0.000
5805	161	IEEE 802.11a	OFDM	14.14	0.00	Right	Tilt	321C4	6	0.000
5805	161	IEEE 802.11a	OFDM	14.14	0.00	Left	Cheek	321C4	6	0.000
5805	161	IEEE 802.11a	OFDM	14.14	0.00	Left	Tilt	321C4	6	0.000
5180	36	IEEE 802.11a	OFDM	13.49	0.12	Right	Cheek	321C4	6	0.000
5180	36	IEEE 802.11a	OFDM	13.49	0.00	Right	Tilt	321C4	6	0.000
5180	36	IEEE 802.11a	OFDM	13.49	0.16	Left	Cheek	321C4	6	0.000
5180	36	IEEE 802.11a	OFDM	13.49	0.00	Left	Tilt	321C4	6	0.000
5280	56	IEEE 802.11a	OFDM	13.31	0.00	Right	Cheek	321C4	6	0.000
5280	56	IEEE 802.11a	OFDM	13.31	0.00	Right	Tilt	321C4	6	0.000
5280	56	IEEE 802.11a	OFDM	13.31	0.00	Left	Cheek	321C4	6	0.000
5280	56	IEEE 802.11a	OFDM	13.31	0.00	Left	Tilt	321C4	6	0.000
5680	136	IEEE 802.11a	OFDM	14.57	0.00	Right	Cheek	321C4	6	0.000
5680	136	IEEE 802.11a	OFDM	14.57	0.00	Right	Tilt	321C4	6	0.000
5680	136	IEEE 802.11a	OFDM	14.57	0.00	Left	Cheek	321C4	6	0.000
5680	136	IEEE 802.11a	OFDM	14.57	0.00	Left	Tilt	321C4	6	0.000
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Head 1.6 W/kg (mW/g) averaged over 1 gram				

Note: WIFI transmission was verified with a spectrum analyzer during SAR tests.

13.2 Standalone Body-Worn SAR Data

Table 13-7
CDMA Body-Worn SAR Data

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Target Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Side	SAR (1g)
MHz	Ch.									(W/kg)
820.10	564	Cell. CDMA - FCC Rule Part 90S	TDSO / SO32	25.00	25.12	0.03	1.0 cm	32386	back	**0.404**
820.10	564	Cell. CDMA - FCC Rule Part 90S	TDSO / SO32	18.00	17.91	0.00	1.0 cm	322E0	back	0.089
836.52	384	Cell. CDMA - FCC Rule Part 22H	TDSO / SO32	25.00	25.07	-0.01	1.0 cm	32386	back	**0.500**
836.52	384	Cell. CDMA - FCC Rule Part 22H	TDSO / SO32	18.00	18.12	0.00	1.0 cm	322E0	back	0.095
1851.25	25	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	25.00	25.25	0.06	1.0 cm	32209	back	0.905
1880.00	600	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	25.00	25.20	0.07	1.0 cm	32209	back	0.947
1908.75	1175	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	25.00	25.10	-0.01	1.0 cm	32209	back	**1.040**
1880.00	600	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	18.00	18.39	-0.02	1.0 cm	322F0	back	0.175
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**								**Body** **1.6 W/kg (mW/g)** averaged over 1 gram		

Note: For CDMA 1x mode, when the measured SAR is < 1.2 W/kg, separate body-worn accessory data measured with a headset cable is not required, per FCC guidance. CDMA 1x-RTT SAR was required to be evaluated for Hotspot exposure conditions to support simultaneous capabilities per Table 1-2.

Table 13-8
GSM/WCDMA Body-Worn SAR Data

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	# of Time Slots	Side	SAR (1g)
MHz	Ch.									(W/kg)
836.60	190	GSM 850 - FCC Rule Part 22H	GSM	32.84	0.03	1.0 cm	32388	1	back	0.332
848.80	251	GSM 850 - FCC Rule Part 22H	GPRS	30.91	-0.01	1.0 cm	32388	2	back	**0.345**
1880.00	661	GSM 1900 - FCC Rule Part 24E	GSM	29.96	-0.08	1.0 cm	3238B	1	back	0.397
1880.00	661	GSM 1900 - FCC Rule Part 24E	GPRS	27.82	-0.02	1.0 cm	3238B	2	back	**0.442**
1880.00	9400	WCDMA 1900 - FCC Rule Part 24E	RMC	23.77	0.02	1.0 cm	323C2	N/A	back	**0.150**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**								**Body** **1.6 W/kg (mW/g)** averaged over 1 gram		

Note: For GPRS and WCDMA modes, when the measured SAR is < 1.2 W/kg, separate body-worn accessory data measured with a headset cable is not required, per FCC guidance. GSM voice modes were evaluated for SAR using headset cable.

Note: Per October 2010 TCB Workshop, the mid. channel may be used as a default test channel when the output power deviation across the channels is <0.5 dB, otherwise the maximum output power must be used; therefore GPRS 850 was tested with high channel.

Table 13-9
LTE Band 25 Body-Worn SAR Data

MEASUREMENT RESULTS															
FREQUENCY			Mode	Bandwidth [MHz]	Target Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	# of RB	RB Offset	Spacing	Side	SAR (1g)
MHz	Ch.														(W/kg)
1882.50	26365	Mid	LTE Band 25	5	22.00	22.00	0.01	1	15	QPSK	12	6	1.0 cm	back	0.296
1882.50	26365	Mid	LTE Band 25	5	23.00	23.18	0.06	0	15	QPSK	1	0	1.0 cm	back	0.367
1882.50	26365	Mid	LTE Band 25	5	23.00	22.93	-0.17	0	15	QPSK	1	24	1.0 cm	back	**0.480**
1882.50	26365	Mid	LTE Band 25	5	21.00	20.75	-0.19	2	15	16 QAM	12	6	1.0 cm	back	0.229
1852.50	26065	Low	LTE Band 25	5	22.00	22.32	-0.05	1	15	16 QAM	1	0	1.0 cm	back	0.344
1852.50	26065	Low	LTE Band 25	5	22.00	22.13	0.00	1	15	16 QAM	1	24	1.0 cm	back	0.366
1882.50	26365	Mid	LTE Band 25	5	19.00	19.07	0.11	0	320EB	QPSK	12	6	1.0 cm	back	0.117
1882.50	26365	Mid	LTE Band 25	5	19.00	18.86	-0.03	0	320EB	QPSK	1	0	1.0 cm	back	**0.122**
1882.50	26365	Mid	LTE Band 25	5	19.00	19.04	-0.02	0	320EB	QPSK	1	24	1.0 cm	back	0.104
1882.50	26365	Mid	LTE Band 25	5	19.00	18.69	-0.07	0	320EB	16 QAM	12	6	1.0 cm	back	0.117
1882.50	26365	Mid	LTE Band 25	5	19.00	18.72	0.03	0	320EB	16 QAM	1	0	1.0 cm	back	0.122
1882.50	26365	Mid	LTE Band 25	5	19.00	18.81	0.01	0	320EB	16 QAM	1	24	1.0 cm	back	0.105
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Body 1.6 W/kg (mW/g) averaged over 1 gram					

Per FCC KDB 941225 D05 Page 4, 4) B) and Page 5 footnote 9, 16QAM with 1RB for both channel edges are required for the highest bandwidth on the highest output power channel for the 1 RB allocation when the average output power of the 1 RB allocation is >0.5 dB higher than the 50% allocation for 16 QAM, thus low channel was tested to 16QAM 1RB configurations.

Note: For LTE mode, when the measured SAR is < 1.2 W/kg, separate body-worn accessory data measured with a headset cable is not required, per FCC guidance.

Table 13-10
WLAN Body-Worn SAR Data

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	SAR (1g)
MHz	Ch.									(W/kg)
2462	11	IEEE 802.11b	DSSS	15.98	0.02	1.0 cm	321C4	1	back	**0.135**
5805	161	IEEE 802.11a	OFDM	14.14	0.16	1.0 cm	21	6	back	0.004
5180	36	IEEE 802.11a	OFDM	13.49	-0.05	1.0 cm	21	6	back	0.072
5280	56	IEEE 802.11a	OFDM	13.31	0.02	1.0 cm	21	6	back	**0.139**
5680	136	IEEE 802.11a	OFDM	14.57	-0.12	1.0 cm	21	6	back	0.008
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Body 1.6 W/kg (mW/g) averaged over 1 gram				

Note:

- For IEE 802.11b mode, when the measured SAR is < 1.2 W/kg, separate body-worn accessory data measured with a headset cable is not required, per FCC guidance. IEEE 802.11a modes were evaluated for SAR using headset cable.
- WIFI transmission was verified with a spectrum analyzer during SAR tests.

Standalone Wireless Router SAR Data

Table 13-11
CDMA Hotspot SAR data

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Target Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Side	SAR (1g)
MHz	Ch.									(W/kg)
820.10	564	Cell. CDMA - FCC Rule Part 90S	TDSO / SO32	25.00	25.12	0.03	1.0 cm	32386	back	0.404
820.10	564	Cell. CDMA - FCC Rule Part 90S	TDSO / SO32	25.00	25.12	-0.05	1.0 cm	32386	front	0.294
820.10	564	Cell. CDMA - FCC Rule Part 90S	TDSO / SO32	25.00	25.12	-0.06	1.0 cm	32386	bottom	0.285
820.10	564	Cell. CDMA - FCC Rule Part 90S	TDSO / SO32	25.00	25.12	-0.07	1.0 cm	32386	left	0.322
820.10	564	Cell. CDMA - FCC Rule Part 90S	TDSO / SO32	18.00	17.91	0.00	1.0 cm	322E0	back	0.089
820.10	564	Cell. CDMA - FCC Rule Part 90S	TDSO / SO32	18.00	17.91	-0.01	1.0 cm	322E0	front	0.056
820.10	564	Cell. CDMA - FCC Rule Part 90S	TDSO / SO32	18.00	17.91	-0.03	1.0 cm	322E0	bottom	0.091
820.10	564	Cell. CDMA - FCC Rule Part 90S	TDSO / SO32	18.00	17.91	-0.02	1.0 cm	322E0	left	0.084
820.10	564	Cell. CDMA - FCC Rule Part 90S	EVDO Rev. 0	25.00	25.24	-0.02	1.0 cm	32386	back	**0.454**
820.10	564	Cell. CDMA - FCC Rule Part 90S	EVDO Rev. 0	25.00	25.24	-0.01	1.0 cm	32386	front	0.238
820.10	564	Cell. CDMA - FCC Rule Part 90S	EVDO Rev. 0	25.00	25.24	-0.07	1.0 cm	32386	bottom	0.424
820.10	564	Cell. CDMA - FCC Rule Part 90S	EVDO Rev. 0	25.00	25.24	-0.04	1.0 cm	32386	left	0.396
836.52	384	Cell. CDMA - FCC Rule Part 22H	TDSO / SO32	25.00	25.07	-0.01	1.0 cm	32386	back	0.500
836.52	384	Cell. CDMA - FCC Rule Part 22H	TDSO / SO32	25.00	25.07	-0.01	1.0 cm	32386	front	0.294
836.52	384	Cell. CDMA - FCC Rule Part 22H	TDSO / SO32	25.00	25.07	-0.08	1.0 cm	32386	bottom	0.443
836.52	384	Cell. CDMA - FCC Rule Part 22H	TDSO / SO32	25.00	25.07	-0.09	1.0 cm	32386	left	0.407
836.52	384	Cell. CDMA - FCC Rule Part 22H	TDSO / SO32	18.00	18.12	0.00	1.0 cm	322E0	back	0.095
836.52	384	Cell. CDMA - FCC Rule Part 22H	TDSO / SO32	18.00	18.12	0.02	1.0 cm	322E0	front	0.067
836.52	384	Cell. CDMA - FCC Rule Part 22H	TDSO / SO32	18.00	18.12	0.03	1.0 cm	322E0	bottom	0.099
836.52	384	Cell. CDMA - FCC Rule Part 22H	TDSO / SO32	18.00	18.12	-0.18	1.0 cm	322E0	left	0.091
836.52	384	Cell. CDMA - FCC Rule Part 22H	EVDO Rev. 0	25.00	25.10	-0.02	1.0 cm	32386	back	**0.507**
836.52	384	Cell. CDMA - FCC Rule Part 22H	EVDO Rev. 0	25.00	25.10	-0.03	1.0 cm	32386	front	0.337
836.52	384	Cell. CDMA - FCC Rule Part 22H	EVDO Rev. 0	25.00	25.10	0.02	1.0 cm	32386	bottom	0.436
836.52	384	Cell. CDMA - FCC Rule Part 22H	EVDO Rev. 0	25.00	25.10	-0.05	1.0 cm	32386	left	0.462
1851.25	25	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	25.00	25.25	0.06	1.0 cm	32209	back	0.905
1880.00	600	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	25.00	25.20	0.07	1.0 cm	32209	back	0.947
1908.75	1175	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	25.00	25.10	-0.01	1.0 cm	32209	back	**1.040**
1880.00	600	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	25.00	25.20	-0.02	1.0 cm	32209	front	0.509
1880.00	600	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	25.00	25.20	-0.02	1.0 cm	32209	bottom	0.528
1880.00	600	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	25.00	25.20	0.00	1.0 cm	32209	left	0.464
1880.00	600	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	18.00	18.39	-0.02	1.0 cm	322F0	back	0.175
1880.00	600	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	18.00	18.39	0.06	1.0 cm	322F0	front	0.104
1880.00	600	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	18.00	18.39	0.03	1.0 cm	322F0	bottom	0.116
1880.00	600	PCS CDMA - FCC Rule Part 24E	TDSO / SO32	18.00	18.39	0.08	1.0 cm	322F0	left	0.077
1851.25	25	PCS CDMA - FCC Rule Part 24E	EVDO Rev. 0	25.00	25.23	0.13	1.0 cm	32209	back	0.784
1880.00	600	PCS CDMA - FCC Rule Part 24E	EVDO Rev. 0	25.00	25.08	0.16	1.0 cm	32209	back	0.811
1908.75	1175	PCS CDMA - FCC Rule Part 24E	EVDO Rev. 0	25.00	25.09	-0.07	1.0 cm	32209	back	0.867
1880.00	600	PCS CDMA - FCC Rule Part 24E	EVDO Rev. 0	25.00	25.08	0.08	1.0 cm	32209	front	0.628
1880.00	600	PCS CDMA - FCC Rule Part 24E	EVDO Rev. 0	25.00	25.08	0.17	1.0 cm	32209	bottom	0.600
1880.00	600	PCS CDMA - FCC Rule Part 24E	EVDO Rev. 0	25.00	25.08	-0.10	1.0 cm	32209	left	0.485
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**								**Body** **1.6 W/kg (mW/g)** averaged over 1 gram		

Table 13-12
GSM/WCDMA Hotspot SAR Data

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	# of GPRS Slots	Side	SAR (1g)
MHz	Ch.									(W/kg)
848.80	251	GSM 850 - FCC Rule Part 22H	GPRS	30.91	-0.01	1.0 cm	32388	2	back	0.345
848.80	251	GSM 850 - FCC Rule Part 22H	GPRS	30.91	-0.08	1.0 cm	32388	2	front	0.240
848.80	251	GSM 850 - FCC Rule Part 22H	GPRS	30.91	-0.12	1.0 cm	32388	2	bottom	**0.408**
848.80	251	GSM 850 - FCC Rule Part 22H	GPRS	30.91	0.05	1.0 cm	32388	2	left	0.381
1880.00	661	GSM 1900 - FCC Rule Part 24E	GPRS	27.82	-0.02	1.0 cm	3238B	2	back	**0.442**
1880.00	661	GSM 1900 - FCC Rule Part 24E	GPRS	27.82	-0.11	1.0 cm	3238B	2	front	0.270
1880.00	661	GSM 1900 - FCC Rule Part 24E	GPRS	27.82	-0.05	1.0 cm	3238B	2	bottom	0.278
1880.00	661	GSM 1900 - FCC Rule Part 24E	GPRS	27.82	-0.07	1.0 cm	3238B	2	left	0.192
1880.00	9400	WCDMA 1900 - FCC Rule Part 24E	RMC	23.77	0.02	1.0 cm	323C2	N/A	back	0.150
1880.00	9400	WCDMA 1900 - FCC Rule Part 24E	RMC	23.77	0.04	1.0 cm	323C2	N/A	front	0.148
1880.00	9400	WCDMA 1900 - FCC Rule Part 24E	RMC	23.77	0.09	1.0 cm	323C2	N/A	bottom	0.029
1880.00	9400	WCDMA 1900 - FCC Rule Part 24E	RMC	23.77	0.05	1.0 cm	323C2	N/A	right	**0.412**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General Population**						**Body** **1.6 W/kg (mW/g)** averaged over 1 gram				

Note: Per October 2010 TCB Workshop, the mid. channel may be used as a default test channel when the output power deviation across the channels is <0.5 dB, otherwise the maximum output power must be used; therefore GPRS 850 was tested with high channel.

Table 13-13
LTE Band 25 Hotspot SAR Data

MEASUREMENT RESULTS																
FREQUENCY			Mode	Bandwidth [MHz]	Target Power [dBm]	Conducted Power [dBm]	Power Drift [dB]	MPR [dB]	Device Serial Number	Modulation	# of RB	RB Offset	Spacing	Side	SAR (1g)
MHz	Ch.														(W/kg)
1882.50	26365	Mid	LTE Band 25	5	22.00	22.00	0.01	1	15	QPSK	12	6	1.0 cm	back	0.296
1882.50	26365	Mid	LTE Band 25	5	23.00	23.18	0.06	0	15	QPSK	1	0	1.0 cm	back	0.367
1882.50	26365	Mid	LTE Band 25	5	23.00	22.93	-0.17	0	15	QPSK	1	24	1.0 cm	back	**0.480**
1882.50	26365	Mid	LTE Band 25	5	21.00	20.75	-0.19	2	15	16 QAM	12	6	1.0 cm	back	0.229
1852.50	26065	Low	LTE Band 25	5	22.00	22.32	-0.05	1	15	16 QAM	1	0	1.0 cm	back	0.344
1852.50	26065	Low	LTE Band 25	5	22.00	22.13	0.00	1	15	16 QAM	1	24	1.0 cm	back	0.366
1882.50	26365	Mid	LTE Band 25	5	22.00	22.00	0.03	1	3220A	QPSK	12	6	1.0 cm	front	0.247
1882.50	26365	Mid	LTE Band 25	5	23.00	23.18	-0.07	0	3220A	QPSK	1	0	1.0 cm	front	**0.297**
1882.50	26365	Mid	LTE Band 25	5	23.00	22.93	0.20	0	3220A	QPSK	1	24	1.0 cm	front	0.218
1882.50	26365	Mid	LTE Band 25	5	21.00	20.75	-0.08	2	3220A	16 QAM	12	6	1.0 cm	front	0.192
1852.50	26065	Low	LTE Band 25	5	22.00	22.32	0.20	1	3220A	16 QAM	1	0	1.0 cm	front	0.244
1852.50	26065	Low	LTE Band 25	5	22.00	22.13	-0.08	1	3220A	16 QAM	1	24	1.0 cm	front	0.174
1882.50	26365	Mid	LTE Band 25	5	22.00	22.00	0.05	1	3220A	QPSK	12	6	1.0 cm	bottom	0.053
1852.50	26065	Low	LTE Band 25	5	23.00	23.18	-0.13	0	3220A	QPSK	1	0	1.0 cm	bottom	**0.071**
1852.50	26065	Low	LTE Band 25	5	23.00	22.93	0.00	0	3220A	QPSK	1	24	1.0 cm	bottom	0.058
1882.50	26365	Mid	LTE Band 25	5	21.00	20.75	-0.01	2	3220A	16 QAM	12	6	1.0 cm	bottom	0.040
1852.50	26065	Low	LTE Band 25	5	22.00	22.32	0.11	1	3220A	16 QAM	1	0	1.0 cm	bottom	0.048
1852.50	26065	Low	LTE Band 25	5	22.00	22.13	0.06	1	3220A	16 QAM	1	24	1.0 cm	bottom	0.038
1882.50	26365	Mid	LTE Band 25	5	22.00	22.00	-0.01	1	3220A	QPSK	12	6	1.0 cm	right	0.571
1852.50	26065	Low	LTE Band 25	5	23.00	23.18	-0.02	0	3220A	QPSK	1	0	1.0 cm	right	**0.792**
1852.50	26065	Low	LTE Band 25	5	23.00	22.93	-0.05	0	3220A	QPSK	1	24	1.0 cm	right	0.680
1882.50	26365	Mid	LTE Band 25	5	21.00	20.75	-0.04	2	3220A	16 QAM	12	6	1.0 cm	right	0.457
1852.50	26065	Low	LTE Band 25	5	22.00	22.32	0.12	1	3220A	16 QAM	1	0	1.0 cm	right	0.462
1852.50	26065	Low	LTE Band 25	5	22.00	22.13	0.01	1	3220A	16 QAM	1	24	1.0 cm	right	0.396
1882.50	26365	Mid	LTE Band 25	5	19.00	19.07	0.11	0	320EB	QPSK	12	6	1.0 cm	back	0.117
1882.50	26365	Mid	LTE Band 25	5	19.00	18.86	-0.03	0	320EB	QPSK	1	0	1.0 cm	back	**0.122**
1882.50	26365	Mid	LTE Band 25	5	19.00	19.04	-0.02	0	320EB	QPSK	1	24	1.0 cm	back	0.104
1882.50	26365	Mid	LTE Band 25	5	19.00	18.69	-0.07	0	320EB	16 QAM	12	6	1.0 cm	back	0.117
1882.50	26365	Mid	LTE Band 25	5	19.00	18.72	0.03	0	320EB	16 QAM	1	0	1.0 cm	back	0.122
1882.50	26365	Mid	LTE Band 25	5	19.00	18.81	0.01	0	320EB	16 QAM	1	24	1.0 cm	back	0.105
1882.50	26365	Mid	LTE Band 25	5	19.00	19.07	0.06	0	320EB	QPSK	12	6	1.0 cm	front	0.112
1882.50	26365	Mid	LTE Band 25	5	19.00	18.86	-0.04	0	320EB	QPSK	1	0	1.0 cm	front	**0.116**
1882.50	26365	Mid	LTE Band 25	5	19.00	19.04	-0.02	0	320EB	QPSK	1	24	1.0 cm	front	0.098
1882.50	26365	Mid	LTE Band 25	5	19.00	18.69	0.00	0	320EB	16 QAM	12	6	1.0 cm	front	0.114
1882.50	26365	Mid	LTE Band 25	5	19.00	18.72	0.02	0	320EB	16 QAM	1	0	1.0 cm	front	0.116
1882.50	26365	Mid	LTE Band 25	5	19.00	18.81	-0.01	0	320EB	16 QAM	1	24	1.0 cm	front	0.101
1882.50	26365	Mid	LTE Band 25	5	19.00	19.07	-0.05	0	320EB	QPSK	12	6	1.0 cm	bottom	0.025
1882.50	26365	Mid	LTE Band 25	5	19.00	18.86	-0.01	0	320EB	QPSK	1	0	1.0 cm	bottom	**0.027**
1882.50	26365	Mid	LTE Band 25	5	19.00	19.04	0.08	0	320EB	QPSK	1	24	1.0 cm	bottom	0.023
1882.50	26365	Mid	LTE Band 25	5	19.00	18.69	0.07	0	320EB	16 QAM	12	6	1.0 cm	bottom	0.027
1882.50	26365	Mid	LTE Band 25	5	19.00	18.72	0.02	0	320EB	16 QAM	1	0	1.0 cm	bottom	0.026
1882.50	26365	Mid	LTE Band 25	5	19.00	18.81	-0.17	0	320EB	16 QAM	1	24	1.0 cm	bottom	0.022
1882.50	26365	Mid	LTE Band 25	5	19.00	19.07	-0.09	0	320EB	QPSK	12	6	1.0 cm	right	0.261
1882.50	26365	Mid	LTE Band 25	5	19.00	18.86	0.15	0	320EB	QPSK	1	0	1.0 cm	right	**0.267**
1882.50	26365	Mid	LTE Band 25	5	19.00	19.04	-0.02	0	320EB	QPSK	1	24	1.0 cm	right	0.236
1882.50	26365	Mid	LTE Band 25	5	19.00	18.69	-0.11	0	320EB	16 QAM	12	6	1.0 cm	right	0.259
1882.50	26365	Mid	LTE Band 25	5	19.00	18.72	-0.04	0	320EB	16 QAM	1	0	1.0 cm	right	0.267
1882.50	26365	Mid	LTE Band 25	5	19.00	18.81	-0.03	0	320EB	16 QAM	1	24	1.0 cm	right	0.237
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population										Body 1.6 W/kg (mW/g) averaged over 1 gram					

Per FCC KDB 941225 D05 Page 4, 4) B) and Page 5 footnote 9, 16QAM with 1RB for both channel edges are required for the highest bandwidth on the highest output power channel for the 1 RB allocation when the average output power of the 1 RB allocation is >0.5 dB higher than the 50% allocation for 16 QAM, thus low channel was tested to 16QAM 1RB configurations.

Table 13-14
2.4 GHz WLAN Hotspot SAR Data

MEASUREMENT RESULTS										
FREQUENCY		Mode	Service	Conducted Power [dBm]	Power Drift [dB]	Spacing	Device Serial Number	Data Rate (Mbps)	Side	SAR (1g)
MHz	Ch.									(W/kg)
2462	11	2.4 GHz WLAN - FCC Rule Part 15C	DSSS	15.98	0.02	1.0 cm	321C4	1	back	0.135
2462	11	2.4 GHz WLAN - FCC Rule Part 15C	DSSS	15.98	0.09	1.0 cm	321C4	1	front	0.016
2462	11	2.4 GHz WLAN - FCC Rule Part 15C	DSSS	15.98	0.05	1.0 cm	321C4	1	top	0.182
2462	11	2.4 GHz WLAN - FCC Rule Part 15C	DSSS	15.98	-0.01	1.0 cm	321C4	1	right	0.061
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Body 1.6 W/kg (mW/g) averaged over 1 gram				

Note: WIFI transmission was verified with a spectrum analyzer during SAR tests.

13.3 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001].
2. Batteries are fully charged for all readings. The standard battery was used.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Liquid tissue depth was at least 15.0 cm. To confirm the proper SAR liquid depth, the z-axis plots from the system verifications were included since the system verifications were performed using the same liquid, probe and DAE as the SAR tests in the same time period.
5. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
6. Per FCC/OET Bulletin 65 Supplement C and Public Notice DA-02-1438, if the SAR measured at the middle channel for each test configuration 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).
7. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 10 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance.

GSM Test Notes:

1. Body-Worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn SAR using headphones.
2. Per FCC guidance, GPRS Data Mode is additionally required for body-worn configuration. When the measured SAR is <1.2 W/kg, separate body-worn accessory data measured with a headset cable is not required, per FCC Guidance.
3. Per October 2010 TCB Workshop, the mid. channel may be used as a default test channel when the output power deviation across the channels is <0.5 dB, otherwise the maximum output power must be used; therefore GPRS 850 was tested with high channel. If the SAR measured at for each test configuration for the default channel is at least 3.0 dB lower than the SAR limit, testing at the other channels is optional for such test configuration(s)
4. Justification for reduced test configurations per KDB Publication 941225 D03: The source-based time-averaged output power was evaluated for all multi-slot operations. In addition to the worst-case reported, all source-based time-averaged powers within 10% of the worst-case were additionally included in the evaluation for data modes.

CDMA Notes:

1. Head SAR for CDMA2000 mode was tested under RC3/SO55 per KDB Publication 941225 D01.
2. Body-Worn SAR was tested with 1x RTT with TDSO / SO32 FCH Only. Ev-Do and TDSO / SO32 FCH+SCH SAR tests were not required since the average output power was not more than 0.25 dB higher than the TDSO / SO32 FCH only powers.
3. CDMA Wireless Router SAR is measured using Subtype 0/1 Physical Layer configurations for Rev. 0 according to KDB 941225 D01 procedures for data devices. If the average output power of Subtype 2 for Rev. A is less than the Rev. 0 power levels, then Rev. A SAR is not required. Otherwise, SAR is measured on the maximum output channel for Rev. A using the exposure configuration that results in the highest SAR for that RF channel in Rev. 0. 1x RTT hotspot was additionally evaluated for SAR to support simultaneous transmission scenarios. When the measured SAR is <1.2 W/kg, separate body-worn accessory data measured with a headset cable is not required, per FCC Guidance.
4. CDMA 1X Advanced technology was not required for SAR since the maximum output powers for 1x Advanced was not more than 0.25 dB higher than the maximum measured powers for 1x and the measured SAR in any 1x mode exposure conditions was not greater than 1.2 W/kg. See Section 9.2.2 for 1x Advanced test set up.
5. EVDO Rev. A was additionally tested for head SAR to show compliance for simultaneous transmission scenarios.

WCDMA Notes:

1. WCDMA mode in Body SAR was tested under RMC 12.2 kbps with HSPA Inactive per KDB Publication 941225 D01. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.
2. When the measured SAR is <1.2 W/kg, separate body-worn accessory data measured with a headset cable is not required, per FCC Guidance.

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Test Considerations for LTE handsets and Data Modems KDB 941225 D05 Publication and were evaluated independently of testing positions. General test procedures can be found in Section 9.4.3.
2. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36.101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.
3. A-MPR was disabled for all SAR tests by setting NS=01 on the base station simulator.
4. When the measured SAR is <1.2 W/kg, separate body-worn accessory data measured with a headset cable is not required, per FCC Guidance.

WLAN Notes:

1. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 and April 2010 FCC/TCB Meeting Notes for 2.4 GHz WIFI: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11b. Other IEEE 802.11 modes (including 802.11g/n) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11b mode.
2. Justification for reduced test configurations for WIFI channels per KDB Publication 248227 and April 2010 FCC/TCB Meeting Notes for 5 GHz WIFI: Highest average RF output power channel for the lowest data rate was selected for SAR evaluation in 802.11a. Other IEEE 802.11 modes (including 802.11n 20 MHz bandwidth and 802.11n 40 MHz bandwidth) were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of IEEE 802.11a mode.
3. When Hotspot is enabled, all 5 GHz bands are disabled.
4. WLAN transmission was verified using an uncalibrated spectrum analyzer.

5. Since the maximum extrapolated peak SAR of the zoom scan for the maximum output channel was <1.6 W/kg and the 1g averaged SAR is <0.8 W/kg, SAR testing on other channels was not required
6. When the measured SAR is <1.2 W/kg for IEEE 802.11b, separate body-worn accessory data measured with a headset cable is not required, per FCC Guidance.

Hotspot Notes:

1. Top Edge and Right Edge for the GSM/CDMA transmitter was not tested since the antenna distance from the edge was greater than 2.5 cm per FCC KDB Publication 941225 D06 guidance (see Section 1.3).
2. Top Edge and Left Edge for the WCDMA/LTE transmitter was not tested since the antenna distance from the edge was greater than 2.5 cm per FCC KDB Publication 941225 D06 guidance (see Section 1.3).
3. Bottom Edge and Left Edge for the WLAN transmitter was not tested since the antenna distance from the edge was greater than 2.5 cm per FCC KDB Publication 941225 D06 (see Section 1.3).
4. During SAR Testing for the Wireless Router conditions per KDB 941225 D06, the actual Portable Hotspot operation (with actual simultaneous transmission of a transmitter with WIFI) was not activated (See Section 7.6.)

14 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

14.1 Introduction

The following procedures adopted from "FCC SAR Considerations for Cell Phones with Multiple Transmitters" FCC KDB Publication 648474 are applicable to handsets with built-in unlicensed transmitters such as 802.11a/b/g/n and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

14.2 FCC Power Tables & Conditions

	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.				

Figure 14-1
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	

Figure 14-2
SAR Evaluation Requirements for Multiple Transmitter Handsets

According to Figure 14-1 and Figure 14-2, simultaneous transmission analysis of SAR may be required for this device for the licensed and unlicensed transmitters. Possible simultaneous transmissions for this device indicated in Table 1-2 were numerically summed using stand-alone SAR data and are shown in the following tables.

Per KDB Publication 648474, standalone Bluetooth SAR tests were not required. Standalone SAR tests for WLAN were required. See Section 1.6(A) for more information.

14.3 Head SAR Simultaneous Transmission Analysis

Table 14-1
Simultaneous Transmission Scenario (Held to Ear)

Simult Tx Ref.	Configuration	Cell. CDMA - FCC Rule Part 90S SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
B	Target Power (dBm)	25	-	
	Reference	Table 13-1	Table 13-5	
	Right Cheek	0.148	0.022	0.170
	Right Tilt	0.079	0.016	0.095
	Left Cheek	0.166	0.043	**0.209**
	Left Tilt	0.087	0.036	0.123

Simult Tx Ref.	Configuration	Cell. CDMA - FCC Rule Part 22H SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
B	Target Power (dBm)	25	-	
	Reference	Table 13-1	Table 13-5	
	Right Cheek	0.222	0.022	0.244
	Right Tilt	0.114	0.016	0.130
	Left Cheek	0.255	0.043	**0.298**
	Left Tilt	0.139	0.036	0.175

Simult Tx Ref.	Configuration	PCS CDMA - FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
B	Target Power (dBm)	25	-	
	Reference	Table 13-2	Table 13-5	
	Right Cheek	0.257	0.022	0.279
	Right Tilt	0.125	0.016	0.141
	Left Cheek	0.337	0.043	**0.380**
	Left Tilt	0.168	0.036	0.204

Simult Tx Ref.	Configuration	GSM 850 - FCC Rule Part 22H SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
D	Target Power (dBm)	33	-	
	Reference	Table 13-3	Table 13-5	
	Right Cheek	0.156	0.022	0.178
	Right Tilt	0.084	0.016	0.100
	Left Cheek	0.167	0.043	**0.210**
	Left Tilt	0.093	0.036	0.129

Simult Tx Ref.	Configuration	GSM 1900 - FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
D	Target Power (dBm)	30	-	
	Reference	Table 13-3	Table 13-5	
	Right Cheek	0.124	0.022	0.146
	Right Tilt	0.069	0.016	0.085
	Left Cheek	0.149	0.043	**0.192**
	Left Tilt	0.082	0.036	0.118

Simult Tx Ref.	Configuration	WCDMA 1900 - FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
D	Target Power (dBm)	23.5	-	
	Reference	Table 13-3	Table 13-5	
	Right Cheek	0.117	0.022	**0.139**
	Right Tilt	0.040	0.016	0.056
	Left Cheek	0.060	0.043	0.103
	Left Tilt	0.055	0.036	0.091

Simult Tx Ref.	Configuration	Cell. EVDO Rev. A - FCC Rule Part 90S SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
G	Target Power (dBm)	25	-	
	Reference	Table 13-1	Table 13-5	
	Right Cheek	0.166	0.022	0.188
	Right Tilt	0.097	0.016	0.113
	Left Cheek	0.167	0.043	**0.210**
	Left Tilt	0.106	0.036	0.142

Simult Tx Ref.	Configuration	Cell. EVDO Rev. A - FCC Rule Part 22H SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
G	Target Power (dBm)	25	-	
	Reference	Table 13-1	Table 13-5	
	Right Cheek	0.199	0.022	**0.221**
	Right Tilt	0.107	0.016	0.123
	Left Cheek	0.173	0.043	0.216
	Left Tilt	0.092	0.036	0.128

Simult Tx Ref.	Configuration	PCS EVDO Rev. A - FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
G	Target Power (dBm)	25	-	
	Reference	Table 13-2	Table 13-5	
	Right Cheek	0.067	0.022	0.089
	Right Tilt	0.070	0.016	0.086
	Left Cheek	0.141	0.043	**0.184**
	Left Tilt	0.047	0.036	0.083

Simult Tx Ref.	Configuration	LTE Band 25 SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
J	Target Power (dBm)	23	-	
	Reference	Table 13-4	Table 13-5	
	Right Cheek	0.262	0.022	**0.284**
	Right Tilt	0.092	0.016	0.108
	Left Cheek	0.162	0.043	0.205
	Left Tilt	0.101	0.036	0.137

Table 14-2
Simultaneous Transmission Scenario (Held to Ear)

Simult Tx Ref.	Configuration	Cell. CDMA - FCC Rule Part 90S SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
C	Target Power (dBm)	25	-	
	Reference	Table 13-1	Table 13-6	
	Right Cheek	0.148	0.000	0.148
	Right Tilt	0.079	0.000	0.079
	Left Cheek	0.166	0.000	**0.166**
	Left Tilt	0.087	0.000	0.087

Simult Tx Ref.	Configuration	Cell. CDMA - FCC Rule Part 22H SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
C	Target Power (dBm)	25	-	
	Reference	Table 13-1	Table 13-6	
	Right Cheek	0.222	0.000	0.222
	Right Tilt	0.114	0.000	0.114
	Left Cheek	0.255	0.000	**0.255**
	Left Tilt	0.139	0.000	0.139

Simult Tx Ref.	Configuration	PCS CDMA - FCC Rule Part 24E SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
C	Target Power (dBm)	25	-	
	Reference	Table 13-2	Table 13-6	
	Right Cheek	0.257	0.000	0.257
	Right Tilt	0.125	0.000	0.125
	Left Cheek	0.337	0.000	**0.337**
	Left Tilt	0.168	0.000	0.168

Simult Tx Ref.	Configuration	GSM 850 - FCC Rule Part 22H SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
E	Target Power (dBm)	33	-	
	Reference	Table 13-3	Table 13-6	
	Right Cheek	0.156	0.000	0.156
	Right Tilt	0.084	0.000	0.084
	Left Cheek	0.167	0.000	**0.167**
	Left Tilt	0.093	0.000	0.093

Simult Tx Ref.	Configuration	GSM 1900 - FCC Rule Part 24E SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
E	Target Power (dBm)	30	-	
	Reference	Table 13-3	Table 13-6	
	Right Cheek	0.124	0.000	0.124
	Right Tilt	0.069	0.000	0.069
	Left Cheek	0.149	0.000	**0.149**
	Left Tilt	0.082	0.000	0.082

Simult Tx Ref.	Configuration	WCDMA 1900 - FCC Rule Part 24E SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
E	Target Power (dBm)	23.5	-	
	Reference	Table 13-3	Table 13-6	
	Right Cheek	0.117	0.000	**0.117**
	Right Tilt	0.040	0.000	0.040
	Left Cheek	0.060	0.000	0.060
	Left Tilt	0.055	0.000	0.055

14.4 Body-Worn SAR Simultaneous Transmission Analysis

Table 14-3
Simultaneous Transmission Scenario (Body-Worn at 1.0 cm)

Simult. Tx Ref.	Mode		CDMA SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
		Target Power (dBm)	Table 13-7	Table 13-10	
B	Cell. CDMA - FCC Rule Part 90S	25	0.404	0.135	0.539
	Cell. CDMA - FCC Rule Part 22H	25	0.500	0.135	0.635
	PCS CDMA - FCC Rule Part 24E	25	1.040	0.135	**1.175**

Simult. Tx Ref.	Mode		2G/3G SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
		Target Power (dBm)	Table 13-8	Table 13-10	
D	GSM 850 - FCC Rule Part 22H	33	0.332	0.135	0.467
	GSM 1900 - FCC Rule Part 24E	30	0.397	0.135	0.532
	WCDMA 1900 - FCC Rule Part 24E	23.5	0.150	0.135	0.285

Table 14-4
Simultaneous Transmission Scenario (Body-Worn at 1.0 cm)

Simult. Tx Ref.	Mode		CDMA SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		Target Power (dBm)	Table 13-7	Table 13-10	
C	Cell. CDMA - FCC Rule Part 90S	25	0.404	0.139	0.543
	Cell. CDMA - FCC Rule Part 22H	25	0.500	0.139	0.639
	PCS CDMA - FCC Rule Part 24E	25	1.040	0.139	**1.179**

Simult. Tx Ref.	Mode		2G/3G SAR (W/kg)	5 GHz WLAN SAR (W/kg)	Σ SAR (W/kg)
		Target Power (dBm)	Table 13-8	Table 13-10	
E	GSM 850 - FCC Rule Part 22H	33	0.332	0.139	0.471
	GSM 1900 - FCC Rule Part 24E	30	0.397	0.139	0.536
	WCDMA 1900 - FCC Rule Part 24E	23.5	0.150	0.139	0.289

14.5 Hotspot SAR Simultaneous Transmission Analysis

Table 14-5
Simultaneous Transmission Scenario (Hotspot at 1.0 cm)

Simult Tx Ref.	Configuration	Cell. EVDO - FCC Rule Part 90S SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
G	Target Power (dBm)	25	-	
	Reference	Table 13-11	Table 13-14	
	Back	0.454	0.135	**0.589**
	Front	0.238	0.016	0.254
	Top	-	0.182	0.182
	Bottom	0.424	-	0.424
	Right	-	0.061	0.061
	Left	0.396	-	0.396

Simult Tx Ref.	Configuration	Cell. EVDO - FCC Rule Part 22H SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
G	Target Power (dBm)	25	-	
	Reference	Table 13-11	Table 13-14	
	Back	0.507	0.135	**0.642**
	Front	0.337	0.016	0.353
	Top	-	0.182	0.182
	Bottom	0.436	-	0.436
	Right	-	0.061	0.061
	Left	0.462	-	0.462

Simult Tx Ref.	Configuration	PCS EVDO - FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
G	Target Power (dBm)	25	-	
	Reference	Table 13-11	Table 13-14	
	Back	0.867	0.135	**1.002**
	Front	0.628	0.016	0.644
	Top	-	0.182	0.182
	Bottom	0.600	-	0.600
	Right	-	0.061	0.061
	Left	0.485	-	0.485

Simult Tx Ref.	Configuration	GPRS 850 - FCC Rule Part 22H SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
H	Target Power (dBm)	30.5	-	
	Reference	Table 13-12	Table 13-14	
	Back	0.345	0.135	**0.480**
	Front	0.240	0.016	0.256
	Top	-	0.182	0.182
	Bottom	0.408	-	0.408
	Right	-	0.061	0.061
	Left	0.381	-	0.381

Simult Tx Ref.	Configuration	GPRS 1900 - FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
H	Target Power (dBm)	28	-	
	Reference	Table 13-12	Table 13-14	
	Back	0.442	0.135	**0.577**
	Front	0.270	0.016	0.286
	Top	-	0.182	0.182
	Bottom	0.278	-	0.278
	Right	-	0.061	0.061
	Left	0.192	-	0.192

Simult Tx Ref.	Configuration	WCDMA 1900 - FCC Rule Part 24E SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
I	Target Power (dBm)	23.5	-	
	Reference	Table 13-12	Table 13-14	
	Back	0.150	0.135	0.285
	Front	0.148	0.016	0.164
	Top	-	0.182	0.182
	Bottom	0.029	-	0.029
	Right	0.412	0.061	**0.473**
	Left	-	-	0.000

Simult Tx Ref.	Configuration	LTE Band 25 SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
J	Target Power (dBm)	23	-	
	Reference	Table 13-13	Table 13-14	
	Back	0.480	0.135	0.615
	Front	0.297	0.016	0.313
	Top	-	0.182	0.182
	Bottom	0.071	-	0.071
	Right	0.792	0.061	**0.853**
	Left	-	-	0.000

Note: Per FCC KDB Publication 941225 D06, the edges with antennas more than 2.5 cm are not required to be evaluated for SAR ("-"). The above tables represent a portable hotspot condition.

14.6 SVLTE Simultaneous Transmission Scenario Analysis

Table 14-6
Simultaneous Transmission Scenario (Held to Ear)

Simult. Tx Ref	CDMA Power Level (dBm)	Configuration	Cell. CDMA - FCC Rule Part 90S SAR (W/kg)	LTE Band 25 SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)	
		Tx Ant	1	2	3	1+2	1+2+3
A, F	P ≥ 18	Target Power (dBm)	25	19	-		
		Reference	Table 13-1	Table 13-4	Table 13-5		
		Right Cheek	0.148	0.084	0.022	0.232	0.254
		Right Tilt	0.079	0.031	0.016	0.110	0.126
		Left Cheek	0.166	0.053	0.043	0.219	0.262
		Left Tilt	0.087	0.037	0.036	0.124	0.160
	P < 18	Target Power (dBm)	18	23	-		
		Reference	Table 13-1	Table 13-4	Table 13-5		
		Right Cheek	0.041	0.262	0.022	0.303	**0.325**
		Right Tilt	0.022	0.092	0.016	0.114	0.130
		Left Cheek	0.038	0.162	0.043	0.200	0.243
		Left Tilt	0.023	0.101	0.036	0.124	0.160

Simult. Tx Ref	CDMA Power Level (dBm)	Configuration	Cell. CDMA - FCC Rule Part 22H SAR (W/kg)	LTE Band 25 SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)	
		Tx Ant	1	2	3	1+2	1+2+3
A, F	P ≥ 18	Target Power (dBm)	25	19	-		
		Reference	Table 13-1	Table 13-4	Table 13-5		
		Right Cheek	0.222	0.084	0.022	0.306	0.328
		Right Tilt	0.114	0.031	0.016	0.145	0.161
		Left Cheek	0.255	0.053	0.043	0.308	**0.351**
		Left Tilt	0.139	0.037	0.036	0.176	0.212
	P < 18	Target Power (dBm)	18	23	-		
		Reference	Table 13-1	Table 13-4	Table 13-5		
		Right Cheek	0.044	0.262	0.022	0.306	0.328
		Right Tilt	0.024	0.092	0.016	0.116	0.132
		Left Cheek	0.048	0.162	0.043	0.210	0.253
		Left Tilt	0.028	0.101	0.036	0.129	0.165

Simult. Tx Ref	CDMA Power Level (dBm)	Configuration	PCS CDMA - FCC Rule Part 24E SAR (W/kg)	LTE Band 25 SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)	
		Tx Ant	1	2	3	1+2	1+2+3
A, F	P ≥ 18	Target Power (dBm)	25	19	-		
		Reference	Table 13-2	Table 13-4	Table 13-5		
		Right Cheek	0.257	0.084	0.022	0.341	0.363
		Right Tilt	0.125	0.031	0.016	0.156	0.172
		Left Cheek	0.337	0.053	0.043	0.390	**0.433**
		Left Tilt	0.168	0.037	0.036	0.205	0.241
	P < 18	Target Power (dBm)	18	23	-		
		Reference	Table 13-2	Table 13-4	Table 13-5		
		Right Cheek	0.039	0.262	0.022	0.301	0.323
		Right Tilt	0.025	0.092	0.016	0.117	0.133
		Left Cheek	0.065	0.162	0.043	0.227	0.270
		Left Tilt	0.032	0.101	0.036	0.133	0.169

Table 14-7
Simultaneous Transmission Scenario (Body-Worn at 1.0 cm)

Simult. Tx Ref	CDMA Power Level (dBm)	Mode	CDMA SAR (W/kg)	LTE Band 25 SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)	
		Tx Ant	1	2	3	1+2	1+2+3
A,F	P ≥ 18	Target Power (dBm)	25	19	-		
		Reference	Table 13-7	Table 13-9	Table 13-10		
		Cell. CDMA - FCC Rule Part 90S	0.404	0.122	0.135	0.526	0.661
		Cell. CDMA - FCC Rule Part 22H	0.500	0.122	0.135	0.622	0.757
		PCS CDMA - FCC Rule Part 24E	1.040	0.122	0.135	1.162	**1.297**
	P < 18	Target Power (dBm)	18	23	-		
		Reference	Table 13-7	Table 13-9	Table 13-10		
		Cell. CDMA - FCC Rule Part 90S	0.089	0.480	0.135	0.569	0.704
		Cell. CDMA - FCC Rule Part 22H	0.095	0.480	0.135	0.575	0.710
		PCS CDMA - FCC Rule Part 24E	0.175	0.480	0.135	0.655	0.790

Table 14-8
Simultaneous Transmission Scenario (Hotspot at 1.0 cm)

Simult Tx Ref	CDMA Power Level (dBm)	Configuration	Cell. CDMA - FCC Rule Part 90S SAR (W/kg)	LTE Band 25 SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
		Tx Ant	1	2	3	1+2+3
F	P ≥ 18	Target Power (dBm)	25	19	-	
		Reference	Table 13-11	Table 13-13	Table 13-14	
		Back	0.404	0.122	0.135	0.661
		Front	0.294	0.116	0.016	0.426
		Top	-	-	0.182	0.182
		Bottom	0.285	0.027	-	0.312
		Right		0.267	0.061	0.328
		Left	0.322	-	-	0.322
	P < 18	Target Power (dBm)	18	23	-	
		Reference	Table 13-11	Table 13-13	Table 13-14	
		Back	0.089	0.480	0.135	0.704
		Front	0.056	0.297	0.016	0.369
		Top	-	-	0.182	0.182
		Bottom	0.091	0.071	-	0.162
		Right	-	0.792	0.061	**0.853**
		Left	0.084	-	-	0.084

Simult Tx Ref	CDMA Power Level (dBm)	Configuration	Cell. CDMA - FCC Rule Part 22H SAR (W/kg)	LTE Band 25 SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
		Tx Ant	1	2	3	1+2+3
F	P ≥ 18	Target Power (dBm)	25	19	-	
		Reference	Table 13-11	Table 13-13	Table 13-14	
		Back	0.500	0.122	0.135	0.757
		Front	0.294	0.116	0.016	0.426
		Top	-	-	0.182	0.182
		Bottom	0.443	0.027	-	0.470
		Right	-	0.267	0.061	0.328
		Left	0.407	-	-	0.407
	P < 18	Target Power (dBm)	18	23	-	
		Reference	Table 13-11	Table 13-13	Table 13-14	
		Back	0.095	0.480	0.135	0.710
		Front	0.067	0.297	0.016	0.380
		Top	-	-	0.182	0.182
		Bottom	0.099	0.071	-	0.170
		Right	-	0.792	0.061	**0.853**
		Left	0.091	-	-	0.091

Simult Tx Ref	CDMA Power Level (dBm)	Configuration	PCS CDMA - FCC Rule Part 24E SAR (W/kg)	LTE Band 25 SAR (W/kg)	2.4 GHz WLAN - FCC Rule Part 15C SAR (W/kg)	Σ SAR (W/kg)
		Tx Ant	1	2	3	1+2+3
F	P ≥ 18	Target Power (dBm)	25	19	-	
		Reference	Table 13-11	Table 13-13	Table 13-14	
		Back	1.040	0.122	0.135	**1.297**
		Front	0.509	0.116	0.016	0.641
		Top	-	-	0.182	0.182
		Bottom	0.528	0.027	-	0.555
		Right	-	0.267	0.061	0.328
		Left	0.464	-	-	0.464
	P < 18	Target Power (dBm)	18	23	-	
		Reference	Table 13-11	Table 13-13	Table 13-14	
		Back	0.175	0.480	0.135	0.790
		Front	0.104	0.297	0.016	0.417
		Top	-	-	0.182	0.182
		Bottom	0.116	0.071	-	0.187
		Right	-	0.792	0.061	0.853
		Left	0.077	-	-	0.077

Note: Per FCC KDB Publication 941225 D06, edges with antennas more than 2.5 cm away are not required to be evaluated for SAR ("-").

14.7 Simultaneous Transmission Conclusion

The above numerical summed SAR was below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit. No volumetric SAR summation is required per FCC KDB Publication 648474.

15 EQUIPMENT LIST

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8594A	(9kHz-2.9GHz) Spectrum Analyzer	N/A	N/A	N/A	3051A00187
Agilent	8648D	(9kHz-4GHz) Signal Generator	10/10/2011	Annual	10/10/2012	3613A00315
Agilent	8753E	(30kHz-6GHz) Network Analyzer	4/4/2012	Annual	4/4/2013	JP38020182
Agilent	E5515C	Wireless Communications Test Set	10/10/2011	Annual	10/10/2012	GB46110872
Agilent	E8257D	(250kHz-20GHz) Signal Generator	4/5/2012	Annual	4/5/2013	MY45470194
Agilent	8648D	Signal Generator	4/3/2012	Annual	4/3/2013	3629U00687
Agilent	E5515C	Wireless Communications Test Set	2/14/2012	Annual	2/14/2013	GB43304447
Agilent	8753E	(30kHz-6GHz) Network Analyzer	4/3/2012	Annual	4/3/2013	US37390350
Agilent	85070E	Dielectric Probe Kit	3/8/2012	Annual	3/8/2013	MY44300633
Agilent	E5515C	Wireless Communications Test Set	2/9/2012	Annual	2/9/2013	GB43460554
Agilent	85047A	S-Parameter Test Set	N/A	N/A	N/A	2904A00579
Amplifier Research	5S1G4	5W, 800MHz-4.2GHz	CBT	N/A	CBT	21910
Anritsu	ML2438A	Power Meter	2/14/2012	Annual	2/14/2013	98150041
Anritsu	MA2481A	Power Sensor	2/14/2012	Annual	2/14/2013	8013
Anritsu	MA2481A	Power Sensor	4/5/2012	Annual	4/5/2013	5605
Anritsu	MA2481A	Power Sensor	2/14/2012	Annual	2/14/2013	2400
Anritsu	MA2411B	Pulse Sensor	10/13/2011	Annual	10/13/2012	1027293
Anritsu	ML2495A	Power Meter	10/13/2011	Annual	10/13/2012	1039008
Anritsu	MT8820C	Radio Communication Tester	11/11/2011	Annual	11/11/2012	6200901190
COMTech	AR85729-5	Solid State Amplifier	CBT	N/A	CBT	M1S5A00-009
Control Company	61220-416	Long-Stem Thermometer	7/1/2011	Biennial	7/1/2013	111642941
Control Company	36934-158	Wall-Mounted Thermometer	1/4/2012	Biennial	1/4/2014	122014497
Gigatronics	80701A	(0.05-18GHz) Power Sensor	10/12/2011	Annual	10/12/2012	1833460
Gigatronics	8651A	Universal Power Meter	10/12/2011	Annual	10/12/2012	8650319
Intelligent Weigh	PD-3000	Electronic Balance	3/27/2012	Annual	3/27/2013	11081534
MCL	BW-N6W5+	6dB Attenuator	CBT	N/A	CBT	1139
MiniCircuits	SLP-2400+	Low Pass Filter	CBT	N/A	CBT	R8979500903
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
MiniCircuits	VLF-6000+	Low Pass Filter	CBT	N/A	CBT	N/A
Mini-Circuits	BW-N20W5+	DC to 18 GHz Precision Fixed 20 dB Attenuator	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-2950+	Low Pass Filter DC to 2700 MHz	CBT	N/A	CBT	N/A
Mini-Circuits	NLP-1200+	Low Pass Filter DC to 1000 MHz	CBT	N/A	CBT	N/A
Narda	4772-3	Attenuator (3dB)	CBT	N/A	CBT	9406
Narda	BW-S3W2	Attenuator (3dB)	CBT	N/A	CBT	120
Narda	4014C-6	4 - 8 GHz SMA 6 dB Directional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE2208-6	Bidirectional Coupler	CBT	N/A	CBT	N/A
Pasternack	PE2209-10	Bidirectional Coupler	CBT	N/A	CBT	N/A
Rohde & Schwarz	CMU200	Base Station Simulator	5/22/2012	Annual	5/22/2013	109892
Rohde & Schwarz	NRVD	Dual Channel Power Meter	4/8/2011	Biennial	4/8/2013	101695
Rohde & Schwarz	SMIQ03B	Signal Generator	4/5/2012	Annual	4/5/2013	DE27259
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	3/5/2012	Annual	3/5/2013	102060
Seekonk	NC-100	Torque Wrench (8" lb)	11/29/2011	Triennial	11/29/2014	21053
SPEAG	D1900V2	1900 MHz SAR Dipole	2/22/2012	Annual	2/22/2013	502
SPEAG	D2450V2	2450 MHz SAR Dipole	1/24/2012	Annual	1/24/2013	797
SPEAG	D5GHzV2	5 GHz SAR Dipole	1/19/2012	Annual	1/19/2013	1057
SPEAG	D835V2	835 MHz SAR Dipole	1/25/2012	Annual	1/25/2013	4d047
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/19/2012	Annual	4/19/2013	665
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/20/2012	Annual	2/20/2013	649
SPEAG	EX3DV4	SAR Probe	1/27/2012	Annual	1/27/2013	3589
SPEAG	EX3DV4	SAR Probe	6/26/2012	Annual	6/26/2013	3561
SPEAG	ES3DV3	SAR Probe	4/24/2012	Annual	4/24/2013	3213
SPEAG	ES3DV3	SAR Probe	3/16/2012	Annual	3/16/2013	3209
SPEAG	ES3DV3	SAR Probe	2/21/2012	Annual	2/21/2013	3258
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/18/2012	Annual	1/18/2013	1272
SPEAG	D1900V2	1900 MHz SAR Dipole	4/26/2012	Annual	4/26/2013	5d141
SPEAG	D835V2	835 MHz SAR Dipole	4/20/2012	Annual	4/20/2013	4d119
SPEAG	DAE4	Dasy Data Acquisition Electronics	2/15/2012	Annual	2/15/2013	1323
SPEAG	ES3DV3	SAR Probe	2/7/2012	Annual	2/7/2013	3288
SPEAG	D2450V2	2450 MHz SAR Dipole	2/7/2012	Annual	2/7/2013	882
SPEAG	D1900V2	1900 MHz SAR Dipole	2/22/2012	Annual	2/22/2013	5d149
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/12/2012	Annual	4/12/2013	1333
SPEAG	D1900V2	1900 MHz SAR Dipole	2/8/2012	Annual	2/8/2013	5d148
SPEAG	ES3DV3	SAR Probe	2/7/2012	Annual	2/7/2013	3287
SPEAG	DAE4	Dasy Data Acquisition Electronics	5/7/2012	Annual	5/7/2013	1334
Tektronix	RSA-6114A	Real Time Spectrum Analyzer	4/5/2012	Annual	4/5/2013	B010177
VWR	36934-158	Wall-Mounted Thermometer	1/21/2011	Biennial	1/21/2013	111286445
VWR	36934-158	Wall-Mounted Thermometer	1/21/2011	Biennial	1/21/2013	111286460
VWR	62344-925	Mini-Thermometer	10/24/2011	Biennial	10/24/2013	111886430

Note: CBT (Calibrated Before Testing). Prior to testing, the measurement paths containing a cable, attenuator, amplifier, coupler or filter were connected to a calibrated source (i.e. a signal generator) to determine the losses of the measurement path. The power meter offset was then adjusted to compensate for the measurement system losses. This level offset is stored within the power meter before measurements are made. This calibration verification procedure applies to the system verification and output power measurements. The calibrated reading is then taken directly from the power meter after compensation of the losses for all final power measurements.

16 MEASUREMENT UNCERTAINTIES

Applicable for frequencies less than 3000 MHz.

a	b	c	d	e= f(d,k)	f	g	h = c x f/e	i = c x g/e	k
Uncertainty Component	**IEEE 1528 Sec.**	**Tol. (± %)**	**Prob. Dist.**	**Div.**	**c_i 1gm**	**c_i 10 gms**	**1gm u_i (± %)**	**10gms u_i (± %)**	**v_i**
Measurement System									
Probe Calibration	E.2.1	6.0	N	1	1.0	1.0	6.0	6.0	∞
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	E.2.2	1.3	N	1	1.0	1.0	1.3	1.3	∞
Boundary Effect	E.2.3	0.4	N	1	1.0	1.0	0.4	0.4	∞
Linearity	E.2.4	0.3	N	1	1.0	1.0	0.3	0.3	∞
System Detection Limits	E.2.5	5.1	N	1	1.0	1.0	5.1	5.1	∞
Readout Electronics	E.2.6	1.0	N	1	1.0	1.0	1.0	1.0	∞
Response Time	E.2.7	0.8	R	1.73	1.0	1.0	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.73	1.0	1.0	1.5	1.5	∞
RF Ambient Conditions	E.6.1	3.0	R	1.73	1.0	1.0	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1.0	1.0	0.2	0.2	∞
Probe Positioning w/ respect to Phantom	E.6.3	2.9	R	1.73	1.0	1.0	1.7	1.7	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E.5	1.0	R	1.73	1.0	1.0	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	6.0	N	1	1.0	1.0	6.0	6.0	287
Device Holder Uncertainty	E.4.1	3.32	R	1.73	1.0	1.0	1.9	1.9	∞
Output Power Variation - SAR drift measurement	6.6.2	5.0	R	1.73	1.0	1.0	2.9	2.9	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E.3.1	4.0	R	1.73	1.0	1.0	2.3	2.3	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - measurement uncertainty	E.3.3	3.8	N	1	0.64	0.43	2.4	1.6	6
Liquid Permittivity - deviation from target values	E.3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Liquid Permittivity - measurement uncertainty	E.3.3	4.5	N	1	0.60	0.49	2.7	2.2	6
Combined Standard Uncertainty (k=1)			RSS				12.1	11.7	299
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				24.2	23.5	

The above measurement uncertainties are according to IEEE Std. 1528-2003

Applicable for frequencies up to 6 GHz.

a	b	c	d	e= f(d,k)	f	g	h = c x f/e	i = c x g/e	k
Uncertainty Component	**IEEE 1528 Sec.**	**Tol. (± %)**	**Prob. Dist.**	**Div.**	**c_i 1gm**	**c_i 10 gms**	**1gm u_i (± %)**	**10gms u_i (± %)**	**v_i**
Measurement System									
Probe Calibration	E.2.1	6.55	N	1	1.0	1.0	6.6	6.6	∞
Axial Isotropy	E.2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	E.2.2	1.3	N	1	1.0	1.0	1.3	1.3	∞
Boundary Effect	E.2.3	0.4	N	1	1.0	1.0	0.4	0.4	∞
Linearity	E.2.4	0.3	N	1	1.0	1.0	0.3	0.3	∞
System Detection Limits	E.2.5	5.1	N	1	1.0	1.0	5.1	5.1	∞
Readout Electronics	E.2.6	1.0	N	1	1.0	1.0	1.0	1.0	∞
Response Time	E.2.7	0.8	R	1.73	1.0	1.0	0.5	0.5	∞
Integration Time	E.2.8	2.6	R	1.73	1.0	1.0	1.5	1.5	∞
RF Ambient Conditions	E.6.1	3.0	R	1.73	1.0	1.0	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E.6.2	0.4	R	1.73	1.0	1.0	0.2	0.2	∞
Probe Positioning w/ respect to Phantom	E.6.3	2.9	R	1.73	1.0	1.0	1.7	1.7	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E.5	1.0	R	1.73	1.0	1.0	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E.4.2	6.0	N	1	1.0	1.0	6.0	6.0	287
Device Holder Uncertainty	E.4.1	3.32	R	1.73	1.0	1.0	1.9	1.9	∞
Output Power Variation - SAR drift measurement	6.6.2	5.0	R	1.73	1.0	1.0	2.9	2.9	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E.3.1	4.0	R	1.73	1.0	1.0	2.3	2.3	∞
Liquid Conductivity - deviation from target values	E.3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - measurement uncertainty	E.3.3	3.8	N	1	0.64	0.43	2.4	1.6	6
Liquid Permittivity - deviation from target values	E.3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Liquid Permittivity - measurement uncertainty	E.3.3	4.5	N	1	0.60	0.49	2.7	2.2	6
Combined Standard Uncertainty (k=1)			RSS				12.4	12.0	299
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				24.7	24.0	

The above measurement uncertainties are according to IEEE Std. 1528-2003

17 CONCLUSION

17.1 Measurement Conclusion

The SAR evaluation indicates that the EUT complies with the RF radiation exposure limits of the FCC and Industry Canada, with respect to all parameters subject to this test. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested.

Please note that the absorption and distribution of electromagnetic energy in the body are very complex phenomena that depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because various factors may interact with one another to vary the specific biological outcome of an exposure to electromagnetic fields, any protection guide should consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables. [3]

18 REFERENCES

[1] Federal Communications Commission, ET Docket 93-62, Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation, Aug. 1996.

[2] ANSI/IEEE C95.1-2005, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 3kHz to 300GHz, New York: IEEE, 2006.

[3] ANSI/IEEE C95.1-1992, American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 3kHz to 300GHz, New York: IEEE, Sept. 1992.

[4] ANSI/IEEE C95.3-2002, IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave, New York: IEEE, December 2002.

[5] Federal Communications Commission, OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01), Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields, June 2001.

[6] IEEE Standards Coordinating Committee 34 – IEEE Std. 1528-2003, Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Body Due to Wireless Communications Devices.

[7] NCRP, National Council on Radiation Protection and Measurements, Biological Effects and Exposure Criteria for RadioFrequency Electromagnetic Fields, NCRP Report No. 86, 1986. Reprinted Feb. 1995.

[8] T. Schmid, O. Egger, N. Kuster, Automated E-field scanning system for dosimetric assessments, IEEE Transaction on Microwave Theory and Techniques, vol. 44, Jan. 1996, pp. 105-113.

[9] K. Pokovic, T. Schmid, N. Kuster, Robust setup for precise calibration of E-field probes in tissue simulating liquids at mobile communications frequencies, ICECOM97, Oct. 1997, pp. 120-124.

[10] K. Pokovic, T. Schmid, and N. Kuster, E-field Probe with improved isotropy in brain simulating liquids, Proceedings of the ELMAR, Zadar, Croatia, June 23-25, 1996, pp. 172-175.

[11] Schmid & Partner Engineering AG, Application Note: Data Storage and Evaluation, June 1998, p2.

[12] V. Hombach, K. Meier, M. Burkhardt, E. Kuhn, N. Kuster, The Dependence of EM Energy Absorption upon Human Head Modeling at 900 MHz, IEEE Transaction on Microwave Theory and Techniques, vol. 44 no. 10, Oct. 1996, pp. 1865-1873.

[13] N. Kuster and Q. Balzano, Energy absorption mechanism by biological bodies in the near field of dipole antennas above 300MHz, IEEE Transaction on Vehicular Technology, vol. 41, no. 1, Feb. 1992, pp. 17-23.

[14] G. Hartsgrove, A. Kraszewski, A. Surowiec, Simulated Biological Materials for Electromagnetic Radiation Absorption Studies, University of Ottawa, Bioelectromagnetics, Canada: 1987, pp. 29-36.

[15] Q. Balzano, O. Garay, T. Manning Jr., Electromagnetic Energy Exposure of Simulated Users of Portable Cellular Telephones, IEEE Transactions on Vehicular Technology, vol. 44, no.3, Aug. 1995.

[16] W. Gander, Computermathematick, Birkhaeuser, Basel, 1992.

[17] W.H. Press, S.A. Teukolsky, W.T. Vetterling, and B.P. Flannery, Numerical Recipes in C, The Art of Scientific Computing, Second edition, Cambridge University Press, 1992.

[18] Federal Communications Commission, OET Bulletin 65, Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields. Supplement C, Dec. 1997.

[19] N. Kuster, R. Kastle, T. Schmid, Dosimetric evaluation of mobile communications equipment with known precision, IEEE Transaction on Communications, vol. E80-B, no. 5, May 1997, pp. 645-652.

[20] CENELEC CLC/SC111B, European Prestandard (prENV 50166-2), Human Exposure to Electromagnetic Fields High-frequency: 10kHz-300GHz, Jan. 1995.

[21] Prof. Dr. Niels Kuster, ETH, Eidgenössische Technische Hoschschule Zürich, Dosimetric Evaluation of the Cellular Phone.

[22] IEC 62209-1, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz), Feb. 2005.

[23] Industry Canada RSS-102 Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) Issue 4, March 2010.

[24] Health Canada Safety Code 6 Limits of Human Exposure to Radio Frequency Electromagnetic Fields in the Frequency Range from 3 kHz – 300 GHz, 2009

[25] FCC Public Notice DA-02-1438. Office of Engineering and Technology Announces a Transition Period for the Phantom Requirements of Supplement C to OET Bulletin 65, June 19, 2002

[26] FCC SAR Measurement Procedures for 3G Devices KDB Publication 941225

[27] SAR Measurement procedures for IEEE 802.11a/b/g KDB Publication 248227

[28] FCC SAR Considerations for Handsets with Multiple Transmitters and Antennas, KDB Publication 648474

[29] FCC Application Note for SAR Probe Calibration and System Verification Consideration for Measurements at 150 MHz – 3 GHz, KDB Publication 450824

[30] FCC SAR Evaluation Considerations for Laptop Computers with Antennas Built-in on Display Screens, KDB Publication 616217

[31] FCC SAR Measurement Requirements for 3 – 6 GHz, KDB Publication 865664

[32] FCC Mobile Portable RF Exposure Procedure, KDB Publication 447498

[33] FCC SAR Procedures for Dongle Transmitters, KDB Publication 447498

[34] Anexo à Resolução No. 533, de 10 de Septembro de 2009.

[35] FCC SAR Test Considerations for LTE Handsets and Data Modems, KDB Publication 941225.

[36] IEC 62209-2, Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz), Mar. 2010.

[37] FCC Hot Spot SAR v01, KDB Publication 941225 D06.