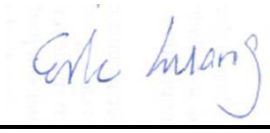
FCC SAR Test Report

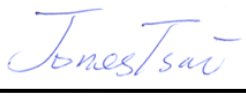
APPLICANT	:	ZTE CORPORATION
EQUIPMENT	:	CDMA LTE multi-mode Digital Mobile Phone
BRAND NAME	:	ZTE
MODEL NAME	:	ZTE N9835
FCC ID	:	SRQ-ZTEN9835
STANDARD	:	FCC 47 CFR Part 2 (2.1093) ANSI/IEEE C95.1-1992 IEEE 1528-2003

The testing was completed on Feb. 11, 2014. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL (KUNSHAN) INC., the test report shall not be reproduced except in full.



Reviewed by: Eric Huang / Deputy Manager



Approved by: Jones Tsai / Manager

SPORTON INTERNATIONAL (KUNSHAN) INC.
No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C.

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA3D2003	Rev. 01	Initial issue of report	Apr. 07, 2014

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **ZTE CORPORATION CDMA LTE multi-mode Digital Mobile Phone, ZTE N9835** are as follows.

<Highest SAR Summary>

Exposure Position	Frequency Band	Reported 1g-SAR (W/kg)	Equipment Class	Highest Reported 1g-SAR (W/kg)
Head	CDMA 2000 BC0	0.46	PCE	1.25
	CDMA 2000 BC1	0.88		
	LTE Band 2	0.80		
	LTE Band 4	0.60		
	LTE Band 5	1.25		
	LTE Band 12	0.51		
	LTE Band 17	0.57		
	WLAN 2.4GHz Band	0.07	DTS	
	WLAN 5.8GHz Band	0.08		
	WLAN 5.2GHz Band	0.18	NII	
Hotspot (Separation 1cm)	CDMA 2000 BC0	0.89	PCE	1.27
	CDMA 2000 BC1	1.10		
	LTE Band 2	1.25		
	LTE Band 4	1.27		
	LTE Band 5	0.44		
	LTE Band 12	0.69		
	LTE Band 17	0.78		
	WLAN 2.4GHz Band	0.06	DTS	
	WLAN 5.8GHz Band	0.07		
Body-Worn (Separation 1cm)	CDMA 2000 BC0	0.61	PCE	1.40
	CDMA 2000 BC1	1.14		
	LTE Band 2	1.35		
	LTE Band 4	1.40		
	LTE Band 5	0.44		
	LTE Band 12	0.56		
	LTE Band 17	0.70		
	WLAN 2.4GHz Band	0.06	DTS	
	WLAN 5.8GHz Band	0.07		
	WLAN 5.2GHz Band	0.28	NII	

<Highest Simultaneous transmission SAR>

Exposure Position	Frequency Band	Equipment Class	Highest Reported Simultaneous Transmission 1g-SAR (W/kg)
Body-Worn (Separation 1cm)	CDMA 2000 BC0	PCE	1.56
	LTE Band 4	PCE	
	WLAN 2.4GHz Band	DTS	
Head	CDMA 2000 BC1	PCE	1.58
	LTE Band 17	PCE	
	WLAN 5.2GHz Band	NII	
Body-Worn (Separation 1cm)	CDMA 2000 BC0	PCE	1.59
	LTE Band 4	PCE	
	Bluetooth	DSS	

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2003.

2. Administration Data

2.1 Testing Laboratory

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C. TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958

2.2 Applicant

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

2.3 Manufacturer

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

2.4 Application Details

Test dates	Jan. 13, 2014 ~ Feb. 11, 2014

3. General Information

3.1 Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT	CDMA LTE multi-mode Digital Mobile Phone
Brand Name	ZTE
Model Name	ZTE N9835
FCC ID	SRQ-ZTEN9835
MEID Code	99000222900650
Wireless Technology and Frequency Range	CDMA2000 BC0: 824.7 MHz ~ 848.31 MHz CDMA 2000 BC1: 1851.25 MHz ~ 1908.75 MHz LTE Band 2: 1850.7 MHz ~ 1909.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 12: 699.7 MHz ~ 715.3 MHz LTE Band 17: 706.5 MHz ~ 713.5 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz NFC : 13.56 MHz
Mode	・CDMA2000 : 1xRTT/1xEv-Do(Rel.0)/1xEv-Do(Rev.A) ・LTE: QPSK, 16QAM ・802.11a/b/g/n HT20 ・802.11ac VHT80 ・Bluetooth v3.0 + EDR, Bluetooth v4.0 LE ・NFC:ASK
Antenna Type	CDMA: PIFA Antenna LTE: PIFA Antenna WLAN: PIFA Antenna Bluetooth: PIFA Antenna NFC: Coil Antenna
HW Version	cxhA
SW Version	N9835V1.0.0B01
EUT Stage	Identical Prototype
Remark: 1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description. 2. This device 2.4GHz WLAN supports hotspot operation, and 2.4GHz / 5.8GHz WLAN supports WiFi Direct (GC/GO), and 5.2GHz supports WiFi Direct (GC only). 3. 802.11n HT40 is not supported in 2.4GHz/5GHz frequency band. 4. This device supports VoIP in CDMA and LTE (e.g. 3rd party VoIP).	

3.2 Maximum RF output power among production units

Average Power (dBm)		
Band	CDMA2000 BC0	CDMA2000 BC1
Mode	Normal	Normal
1xRTT RC1 SO55	25.0	24.5
1xRTT RC3 SO55	25.0	24.5
1xRTT RC3 SO32 (+ F-SCH)	25.0	24.5
1xRTT RC3 SO32 (+SCH)	25.0	24.5
1xEV-DO Rev 0 (RTAP 153.6kbps)	25.0	24.5
1xEV-DO Rev A (RETAP 4096bits)	25.0	24.5

LTE Band 2					
Modulation	BW (MHz)	RB size	Target MPR	Normal Power	Reduced Power
QPSK	20	≤ 18	0	24.5	17.0
QPSK	20	> 18	1	23.5	16.0
16QAM	20	≤ 18	1	23.5	16.0
16QAM	20	> 18	2	22.5	15.0
QPSK	15	≤ 16	0	24.5	17.0
QPSK	15	> 16	1	23.5	16.0
16QAM	15	≤ 16	1	23.5	16.0
16QAM	15	> 16	2	22.5	15.0
QPSK	10	≤ 12	0	24.5	17.0
QPSK	10	> 12	1	23.5	16.0
16QAM	10	≤ 12	1	23.5	16.0
16QAM	10	> 12	2	22.5	15.0
QPSK	5	≤ 8	0	24.5	17.0
QPSK	5	> 8	1	23.5	16.0
16QAM	5	≤ 8	1	23.5	16.0
16QAM	5	> 8	2	22.5	15.0
QPSK	3	≤ 4	0	24.5	17.0
QPSK	3	> 4	1	23.5	16.0
16QAM	3	≤ 4	1	23.5	16.0
16QAM	3	> 4	2	22.5	15.0
QPSK	1.4	≤ 5	0	24.5	17.0
QPSK	1.4	> 5	1	23.5	16.0
16QAM	1.4	≤ 5	1	23.5	16.0
16QAM	1.4	> 5	2	22.5	15.0

LTE Band 4					
Modulation	BW (MHz)	RB size	Target MPR	Normal Power	Reduced Power
QPSK	20	≤ 18	0	24.5	17.0
QPSK	20	> 18	1	23.5	16.0
16QAM	20	≤ 18	1	23.5	16.0
16QAM	20	> 18	2	22.5	15.0
QPSK	15	≤ 16	0	24.5	17.0
QPSK	15	> 16	1	23.5	16.0
16QAM	15	≤ 16	1	23.5	16.0
16QAM	15	> 16	2	22.5	15.0
QPSK	10	≤ 12	0	24.5	17.0
QPSK	10	> 12	1	23.5	16.0
16QAM	10	≤ 12	1	23.5	16.0
16QAM	10	> 12	2	22.5	15.0
QPSK	5	≤ 8	0	24.5	17.0
QPSK	5	> 8	1	23.5	16.0
16QAM	5	≤ 8	1	23.5	16.0
16QAM	5	> 8	2	22.5	15.0
QPSK	3	≤ 4	0	24.5	17.0
QPSK	3	> 4	1	23.5	16.0
16QAM	3	≤ 4	1	23.5	16.0
16QAM	3	> 4	2	22.5	15.0
QPSK	1.4	≤ 5	0	24.5	17.0
QPSK	1.4	> 5	1	23.5	16.0
16QAM	1.4	≤ 5	1	23.5	16.0
16QAM	1.4	> 5	2	22.5	15.0

LTE Band 5					
Modulation	BW (MHz)	RB size	Target MPR	Normal Power	Reduced Power
QPSK	10	≤ 12	0	24.5	17.0
QPSK	10	> 12	1	23.5	16.0
16QAM	10	≤ 12	1	23.5	16.0
16QAM	10	> 12	2	22.5	15.0
QPSK	5	≤ 8	0	24.5	17.0
QPSK	5	> 8	1	23.5	16.0
16QAM	5	≤ 8	1	23.5	16.0
16QAM	5	> 8	2	22.5	15.0
QPSK	3	≤ 4	0	24.5	17.0
QPSK	3	> 4	1	23.5	16.0
16QAM	3	≤ 4	1	23.5	16.0
16QAM	3	> 4	2	22.5	15.0
QPSK	1.4	≤ 5	0	24.5	17.0
QPSK	1.4	> 5	1	23.5	16.0
16QAM	1.4	≤ 5	1	23.5	16.0
16QAM	1.4	> 5	2	22.5	15.0

LTE Band 12					
Modulation	BW (MHz)	RB size	Target MPR	Normal Power	Reduced Power
QPSK	10	≤ 12	0	24.5	17.0
QPSK	10	> 12	1	23.5	16.0
16QAM	10	≤ 12	1	23.5	16.0
16QAM	10	> 12	2	22.5	15.0
QPSK	5	≤ 8	0	24.5	17.0
QPSK	5	> 8	1	23.5	16.0
16QAM	5	≤ 8	1	23.5	16.0
16QAM	5	> 8	2	22.5	15.0
QPSK	3	≤ 4	0	24.5	17.0
QPSK	3	> 4	1	23.5	16.0
16QAM	3	≤ 4	1	23.5	16.0
16QAM	3	> 4	2	22.5	15.0
QPSK	1.4	≤ 5	0	24.5	17.0
QPSK	1.4	> 5	1	23.5	16.0
16QAM	1.4	≤ 5	1	23.5	16.0
16QAM	1.4	> 5	2	22.5	15.0

LTE Band 17					
Modulation	BW (MHz)	RB size	Target MPR	Normal Power	Reduced Power
QPSK	10	≤ 12	0	25.0	17.0
QPSK	10	> 12	1	24.0	16.0
16QAM	10	≤ 12	1	24.0	16.0
16QAM	10	> 12	2	23.0	15.0
QPSK	5	≤ 8	0	25.0	17.0
QPSK	5	> 8	1	24.0	16.0
16QAM	5	≤ 8	1	24.0	16.0
16QAM	5	> 8	2	23.0	15.0

Remark:

1. LTE mode power reduction is triggered when the device in SVLTE mode
2. By design, other RB configurations and higher-order modulation RF output power will never exceed maximum output power listed above; detailed information is included in “tune-up procedure” exhibit.
3. LTE MPR implementation is the same for normal mode and power reduction mode.

Average Power (dBm)					
Mode / Band	IEEE 802.11				
	11a	11b	11g	11n-HT20	11 ac VHT80
WLAN 2.4 GHz Band		15.0	14.0	13.5	
WLAN 5.2GHz Band	13.0			13.0	12.0
WLAN 5.8GHz Band	12.5			12.5	12.5

Average Power (dBm)				
Mode / Band	1Mbps (GFSK)	2Mbps (π/4-DQPSK)	3Mbps (8-DPSK)	BT v4.0 LE (GFSK)
Bluetooth	0.5	-3.0	-3.0	6

The table below summarized necessary items addressed in KDB 941225 D05 v02r03.

FCC ID	SRQ-ZTEN9835
EUT	CDMA LTE multi-mode Digital Mobile Phone
Operating Frequency Range of each LTE transmission band	LTE Band 2: 1850.7 MHz ~ 1909.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 12: 699.7 MHz ~ 715.3 MHz LTE Band 17: 706.5 MHz ~ 713.5 MHz
Channel Bandwidth	1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz (LTE Band 2/4) 1.4MHz, 3MHz, 5MHz, 10MHz (LTE Band 5/12) 5MHz, 10MHz (LTE Band 17)

Transmission (H, M, L) channel numbers and frequencies in each LTE band

LTE Band 2

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	18607	1850.7	18615	1851.5	18625	1852.5	18650	1855	18675	1857.5	18700	1860
M	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880
H	19193	1909.3	19185	1908.5	19175	1907.5	19150	1905	19125	1902.5	19100	1900

LTE Band 4

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	19957	1710.7	19965	1711.5	19975	1712.5	20000	1715	20025	1717.5	20050	1720
M	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5
H	20393	1754.3	20385	1753.5	20375	1752.5	20350	1750	20325	1747.5	20300	1745

LTE Band 5

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20407	824.7	20415	825.5	20425	826.5	20450	829
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5
H	20643	848.3	20635	847.5	20625	846.5	20600	844

LTE Band 12

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	23017	699.7	23025	700.5	23035	701.5	23060	704
M	23095	707.5	23095	707.5	23095	707.5	23095	707.5
H	23173	715.3	23165	714.5	23155	713.5	23130	711

Band 17

	Bandwidth 5 MHz		Bandwidth 10 MHz	
	Channel #	Frequency (MHz)	Channel #	Frequency (MHz)
L	23755	706.5	23780	709
M	23790	710	23790	710
H	23825	713.5	23800	711

<table>
<tr><td>LTE uplink modulations used</td><td>QPSK, and 16QAM</td></tr>
<tr><td>LTE transmitter and antenna implementation (standalone or sharing hardware components / antennas)</td><td>Two primary antennas are used for LTE transmitting and receiving, standalone.
Two 2nd antennas are used for LTE receiving only, standalone.</td></tr>
<tr><td>LTE Voice / Data requirements</td><td>Data only</td></tr>
<tr><td>LTE MPR permanently built-in by design</td><td>Yes, per 3GPP TS 36.101
Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3
<table>
<tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth (RB)</th><th rowspan="2">MPR (dB)</th></tr>
<tr><th>1.4 MHz</th><th>3.0 MHz</th><th>5 MHz</th><th>10 MHz</th><th>15 MHz</th><th>20 MHz</th></tr>
<tr><td>QPSK</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 2</td></tr>
</table></td></tr>
<tr><td>LTE A-MPR</td><td>In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing and the LTE SAR tests was transmitting on all TTI frames (Maximum TTI)</td></tr>
<tr><td>Base station simulator used for Testing</td><td>Anritsu MT8820C</td></tr>
<tr><td>Power reduction applied to satisfy SAR compliance</td><td>Yes, LTE mode power reduction is triggered when the device in SVLTE mode</td></tr>
</table>

The SVLTE operating mode, which means CDMA 1x RTT(voice) and LTE (data) transmitting simultaneously. In power reduction for LTE mode is implemented on this device and cannot be changed by end users or overridden by power control command from base stations.
The power reduction implementation is defined as following table.

CDMA2000 1x voice BC0-Output power level	CDMA2000 1x voice BC1-Output power level	LTE data mode Band 2/4/5/12	LTE data mode Band 17	Remark
P ≥ 18.5	P ≥ 16.0	17	17	LTE Power reduction triggered
P < 18.5	P < 16.0	24.5	25.0	LTE in normal full power mode

Table 3.1: Power Reduction Implementation (Unit: dBm)

3.3 Applied Standard

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

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2003
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r03
- FCC KDB 865664 D02 SAR Reporting v01r01
- FCC KDB 447498 D01 General RF Exposure Guidance v05r02
- FCC KDB 648474 D04 Handset SAR v01r02
- FCC KDB 248227 D01 SAR meas for 802 11abg v01r02
- FCC KDB 644545 D01 Guidance for IEEE 802 11ac v01r02
- FCC KDB 941225 D01 SAR test for 3G devices v02
- FCC KDB 941225 D05 SAR for LTE Devices v02r03
- FCC KDB 941225 D06 Hotspot Mode SAR v01r01

3.4 Device Category and SAR Limits

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

3.5 Test Conditions

3.5.1 Ambient Condition

Ambient Temperature	20 to 24 ℃
Humidity	< 60 %

3.5.2 Test Configuration

For WWAN SAR testing, the device was controlled by using a base station emulator. Communication between the device and the emulator was established by air link. The distance between the EUT and the antenna of the emulator is larger than 50 cm and the output power radiated from the emulator antenna is at least 30 dB smaller than the output power of EUT.

During WLAN SAR testing EUT is configured with the WLAN continuous TX tool, and the transmission duty factor was monitored on the spectrum analyzer with zero-span setting

Duty factor observed as below:

802.11b, 1Mbps: 98.62%

WLAN 5.2GHz 802.11a, 6Mbps: 93.34%

WLAN 5.2GHz 802.11ac, MCS0: 76.50%

WLAN 5.8GHz 802.11a, 6Mbps: 93.34%

WLAN 5.8GHz 802.11ac, MCS0: 76.50%

For WLAN SAR testing, WLAN engineering testing software installed on the EUT can provide continuous transmitting RF signal.

4. Specific Absorption Rate (SAR)

4.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

4.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

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

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

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

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

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

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

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

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

5. SAR Measurement System

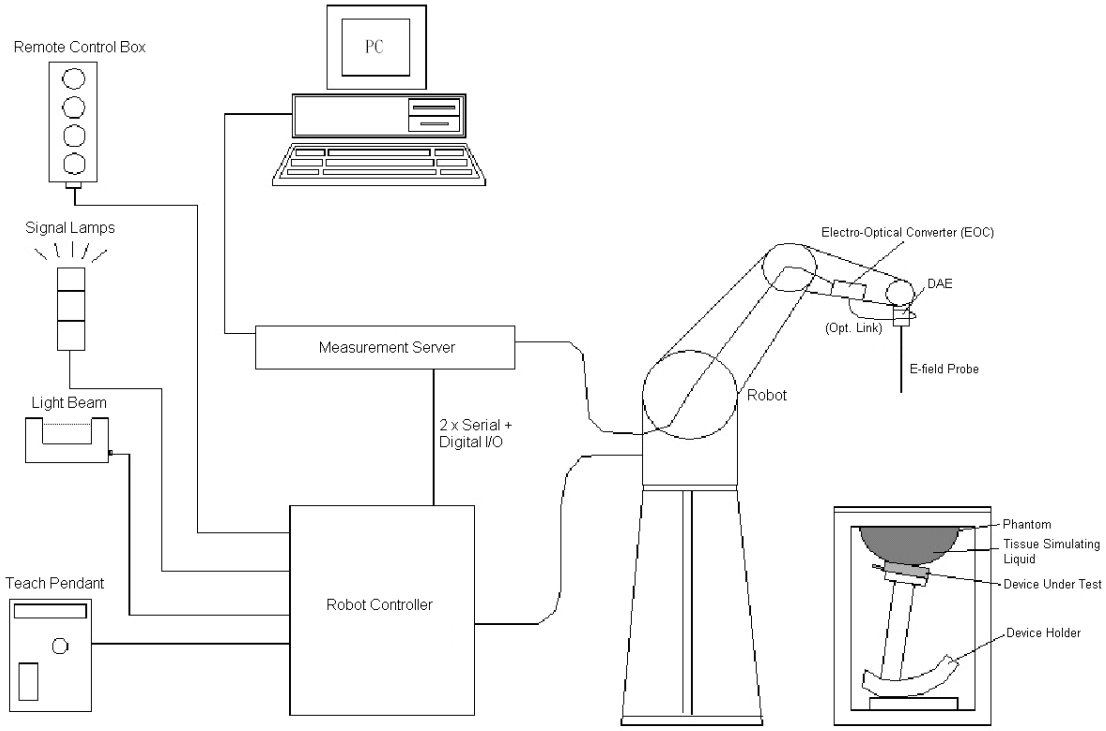


Fig 5.1 SPEAG DASY System Configurations

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

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

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

5.1 E-Field Probe

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

<EX3DV4 Probe>

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

Fig 5.2 Photo of EX3DV4

5.1.1 E-Field Probe Calibration

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

5.2 Data Acquisition Electronics (DAE)

The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.
The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Fig 5.3 Photo of DAE

5.3 Robot

The SPEAG DASY system uses the high precision robots (DASY5: TX90XL) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version (DASY5: CS8c) from Stäubli is used. The Stäubli robot series have many features that are important for our application:

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

Fig 5.4 Photo of DASY5

5.4 Measurement Server

The measurement server is based on a PC/104 CPU board with CPU (DASY5: 400 MHz, Intel Celeron), chipdisk (DASY5: 128 MB), RAM (DASY5: 128 MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY I/O board, which is directly connected to the PC/104 bus of the CPU board.

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

Fig 5.5 Photo of Server for DASY5

5.5 Phantom

<SAM Twin Phantom>

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

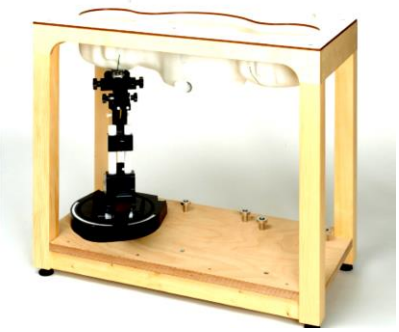


Fig 5.6 Photo of SAM Phantom

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

5.6 Device Holder

<Device Holder for SAM Twin Phantom>

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5 mm distance, a positioning uncertainty of ± 0.5 mm would produce a SAR uncertainty of ± 20 %. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.

The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation center for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity ε = 3 and loss tangent δ = 0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

Fig 5.7 Device Holder

5.7 Data Storage and Evaluation

5.7.1 Data Storage

The DASY software stores the assessed data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all the necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files. The post-processing software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of erroneous parameter settings. For example, if a measurement has been performed with an incorrect crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be reevaluated.

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

5.7.2 Data Evaluation

The DASY post-processing software (SEMCAD) automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software：

Probe parameters：	- Sensitivity	$Norm_i$, a_{i0}, a_{i1}, a_{i2}
	- Conversion factor	$ConvF_i$
	- Diode compression point	dcp_i
Device parameters：	- Frequency	f
	- Crest factor	cf
Media parameters：	- Conductivity	σ
	- Density	ρ

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multi-meter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

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

The formula for each channel can be given as：

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

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

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

E-field Probes：$$\mathbf{E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}}$$

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

with V_i = compensated signal of channel i, (i = x, y, z)
$Norm_i$ = sensor sensitivity of channel i, (i = x, y, z), μV/(V/m)^2 for E-field Probes
ConvF = sensitivity enhancement in solution
a_{ij} = sensor sensitivity factors for H-field probes
f = carrier frequency [GHz]
E_i = electric field strength of channel i in V/m
H_i = magnetic field strength of channel i in A/m

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

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

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

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

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

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

5.8 Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	735MHz System Validation Kit	D750V3	1087	Apr. 09, 2013	Apr. 08, 2014
SPEAG	835MHz System Validation Kit	D835V2	4d091	Nov. 18, 2011	Nov. 14, 2014
SPEAG	1750MHz System Validation Kit	D1750V2	1090	Mar. 27, 2013	Mar. 26, 2014
SPEAG	1900MHz System Validation Kit	D1900V2	5d118	Nov. 21, 2011	Nov. 14, 2014
SPEAG	2450MHz System Validation Kit	D2450V2	840	Mar. 26, 2013	Mar. 25, 2014
SPEAG	5000MHz System Validation Kit	D5GHzV2	1128	Jul. 24, 2013	Jul. 23, 2014
SPEAG	Data Acquisition Electronics	DAE4	1210	Jun. 19, 2013	Jun. 18, 2014
SPEAG	Dosimetric E-Field Probe	EX3DV4	3857	Jun. 20, 2013	Jun. 19, 2014
SPEAG	SAM Twin Phantom	QD 000 P40 CB	TP-1477	NCR	NCR
SPEAG	SAM Twin Phantom	QD 000 P40 CB	TP-1479	NCR	NCR
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
Agilent	Wireless Communication Test Set	E5515C	MY52102706	May 04, 2013	May 03, 2014
Anritsu	Radio communication analyzer	MT8820C	6201107506	Apr. 01, 2013	Mar. 31, 2014
R&S	Signal Generator	SMB 100A	105413	Aug. 13, 2013	Aug. 12, 2014
Agilent	Dielectric Probe Kit	85070E	MY44300475	NCR	NCR
Agilent	ENA Series Network Analyzer	E5071C	MY46111157	Apr. 22, 2013	Apr. 21, 2014
Anritsu	Power Meter	ML2495A	1005002	Feb. 28, 2013	Feb. 27, 2014
Anritsu	Power Senor	MA2411B	0917070	Feb. 28, 2013	Feb. 27, 2014
ARRA	Power Divider	A3200-2	N/A	NA	NA
Agilent	Dual Directional Coupler	778D	50422	Note 4	
Woken	Attenuator 1	WK0602-XX	N/A	Note 4	
PE	Attenuator 2	PE7005-10	N/A	Note 4	
PE	Attenuator 3	PE7005- 3	N/A	Note 4	
AR	Power Amplifier	5S1G4M2	328767	Note 5	
R&S	Spectrum Analyzer	FSP30	101399	May 23, 2013	May 22, 2014

Table 5.1 Test Equipment List

Note:

1. The calibration certificate of DASY can be referred to appendix C of this report.
2. Referring to KDB 865664 D01v01r03, the dipole calibration interval can be extended to 3 years with justification. The dipoles are also not physically damaged, or repaired during the interval.
3. The justification data of dipole D835V2, SN: 4d091 and D1900V2, SN: 5d118 can be found in appendix C. The return loss is < -20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration.
4. The Insertion Loss calibration of Dual Directional Coupler and Attenuator were characterized via the network analyzer and compensated during system check.
5. In system check we need to monitor the level on the power meter, and adjust the power amplifier level to have precise power level to the dipole; the measured SAR will be normalized to 1W input power according to the ratio of 1W to the input power to the dipole. For system check, the calibration of the power amplifier is deemed not critically required for correct measurement; the power meter is critical and we do have calibration for it
6. Attenuator 1 insertion loss is calibrated by the network Analyzer, which the calibration is valid, before system check.

6. Tissue Simulating Liquids

For the measurement of the field distribution inside the SAM phantom with DASY, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 6.1. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 6.2.

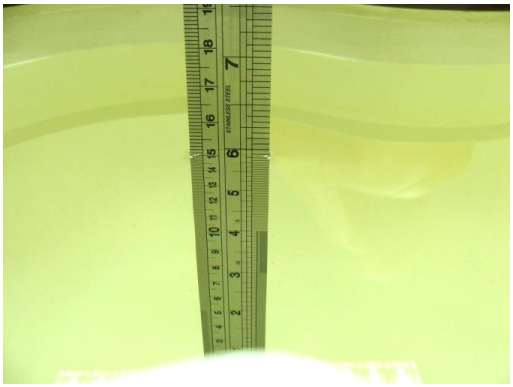


Fig 6.1 Photo of Liquid Height for Head SAR

Fig 6.2 Photo of Liquid Height for Body SAR

The following table gives the recipes for tissue simulating liquid.

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (ε_r)
For Head								
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
1800, 1900, 2000	55.2	0	0	0.3	0	44.5	1.40	40.0
2450	55.0	0	0	0	0	45.0	1.80	39.2
For Body								
750	51.7	47.2	0	0.9	0.1	0	0.96	55.5
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
1800, 1900, 2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0	0	31.4	1.95	52.7

Table 6.1 Recipes of Tissue Simulating Liquid

Simulating Liquid for 5G, Manufactured by SPEAG

Ingredients	(% by weight)
Water	64~78%
Mineral oil	11~18%
Emulsifiers	9~15%
Additives and Salt	2~3%

The dielectric parameters of the liquids were verified prior to the SAR evaluation using an Agilent 85070E Dielectric Probe Kit and an Agilent E5071C Network Analyzer.

The following table shows the measuring results for simulating liquid.

Frequency (MHz)	Tissue Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
750	Head	22.8	0.886	41.534	0.89	41.90	-0.45	-0.87	±5	2014/1/18
835	Head	22.8	0.905	42.264	0.90	41.50	0.56	1.84	±5	2014/1/15
835	Head	22.6	0.893	41.404	0.90	41.50	-0.78	-0.23	±5	2014/1/29
1750	Head	22.9	1.383	41.300	1.37	40.10	0.95	2.99	±5	2014/1/19
1900	Head	22.9	1.424	38.891	1.40	40.00	1.71	-2.77	±5	2014/1/19
1900	Head	22.8	1.425	39.048	1.40	40.00	1.79	-2.38	±5	2014/1/30
2450	Head	22.6	1.812	39.835	1.80	39.20	0.67	1.62	±5	2014/1/19
5200	Head	22.7	4.813	35.431	4.66	36.00	3.28	-1.58	±5	2014/1/20
5800	Head	22.7	5.423	34.316	5.27	35.30	2.90	-2.79	±5	2014/1/20
750	Body	22.7	0.963	54.242	0.96	55.50	0.31	-2.27	±5	2014/1/16
750	Body	22.5	0.971	54.634	0.96	55.50	1.15	-1.56	±5	2014/1/27
835	Body	22.7	0.982	54.866	0.97	55.20	1.24	-0.61	±5	2014/1/16
835	Body	22.9	0.983	55.183	0.97	55.20	1.34	-0.03	±5	2014/1/27
835	Body	22.8	0.980	54.478	0.97	55.20	1.03	-1.31	±5	2014/2/10
1750	Body	22.8	1.502	51.015	1.49	53.40	0.81	-4.47	±5	2014/1/13
1750	Body	22.6	1.539	54.578	1.49	53.40	3.29	2.21	±5	2014/1/28
1750	Body	22.6	1.522	54.439	1.49	53.40	2.15	1.95	±5	2014/2/11
1900	Body	22.6	1.551	53.270	1.52	53.30	2.04	-0.06	±5	2014/1/13
1900	Body	22.7	1.538	52.792	1.52	53.30	1.18	-0.95	±5	2014/1/28
1900	Body	22.5	1.552	53.309	1.52	53.30	2.11	0.02	±5	2014/2/11
2450	Body	22.5	1.943	51.453	1.95	52.70	-0.36	-2.37	±5	2014/1/19
5200	Body	22.9	5.264	48.303	5.30	49.00	-0.68	-1.42	±5	2014/1/21
5200	Body	22.5	5.287	48.755	5.30	49.00	-0.25	-0.50	±5	2014/2/11
5800	Body	22.9	6.096	46.929	6.00	48.20	1.60	-2.64	±5	2014/1/21
5800	Body	22.5	6.120	47.381	6.00	48.20	2.00	-1.70	±5	2014/2/11

Table 6.2 Measuring Results for Simulating Liquid

7. System Verification Procedures

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

7.1 Purpose of System Performance check

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

7.2 System Setup

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

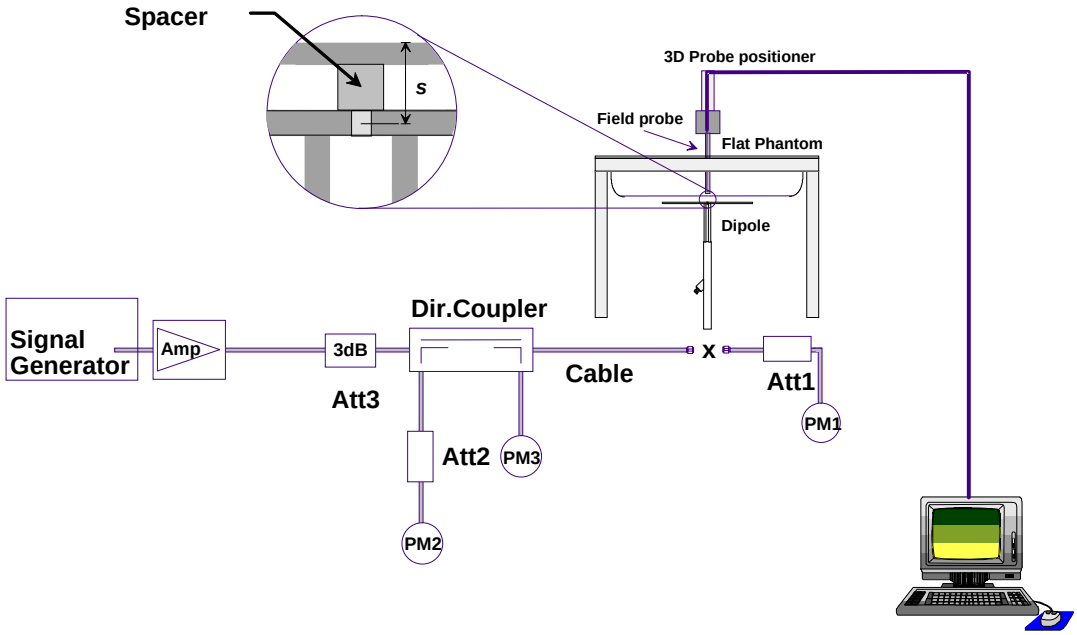


Fig 7.1 System Setup for System Evaluation

1. Signal Generator
2. Amplifier
3. Directional Coupler
4. Power Meter
5. Calibrated Dipole

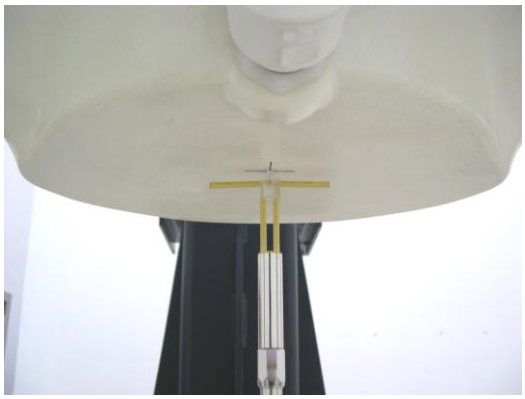


Fig 7.2 Photo of Dipole Setup

7.3 SAR System Verification Results

Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10 %. Table 7.1 shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance check can meet the variation criterion and the plots can be referred to Appendix A of this report.

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured SAR (W/kg)	Targeted SAR (W/kg)	Normalized SAR (W/kg)	Deviation (%)
2014/1/18	750	Head	250	1087	3857	1210	2.04	8.42	8.16	-3.09
2014/1/15	835	Head	250	4d091	3857	1210	2.47	9.40	9.88	5.11
2014/1/29	835	Head	250	4d091	3857	1210	2.39	9.40	9.56	1.70
2014/1/19	1750	Head	250	1090	3857	1210	9.57	36.90	38.28	3.74
2014/1/19	1900	Head	250	5d118	3857	1210	10.30	40.30	41.20	2.23
2014/1/30	1900	Head	250	5d118	3857	1210	10.00	40.30	40.00	-0.74
2014/1/19	2450	Head	250	840	3857	1210	13.10	53.60	52.40	-2.24
2014/1/20	5200	Head	100	1128	3857	1210	8.04	78.20	80.40	2.81
2014/1/20	5800	Head	100	1128	3857	1210	7.82	77.20	78.20	1.30
2014/1/16	750	Body	250	1087	3857	1210	2.08	8.58	8.32	-3.03
2014/1/27	750	Body	250	1087	3857	1210	2.08	8.58	8.32	-3.03
2014/1/16	835	Body	250	4d091	3857	1210	2.25	9.42	9.00	-4.46
2014/1/27	835	Body	250	4d091	3857	1210	2.25	9.42	9.00	-4.46
2014/2/10	835	Body	250	4d091	3857	1210	2.25	9.42	9.00	-4.46
2014/1/13	1750	Body	250	1090	3857	1210	8.95	38.10	35.80	-6.04
2014/1/28	1750	Body	250	1090	3857	1210	9.20	38.10	36.80	-3.41
2014/2/11	1750	Body	250	1090	3857	1210	8.80	38.10	35.20	-7.61
2014/1/13	1900	Body	250	5d118	3857	1210	10.20	41.80	40.80	-2.39
2014/1/28	1900	Body	250	5d118	3857	1210	10.20	41.80	40.80	-2.39
2014/2/11	1900	Body	250	5d118	3857	1210	10.40	41.80	41.60	-0.48
2014/1/19	2450	Body	250	840	3857	1210	12.40	50.40	49.60	-1.59
2014/1/21	5200	Body	100	1128	3857	1210	7.15	73.40	71.50	-2.59
2014/2/11	5200	Body	100	1128	3857	1210	7.27	73.40	72.70	-0.95
2014/1/21	5800	Body	100	1128	3857	1210	7.13	72.20	71.30	-1.25
2014/2/11	5800	Body	100	1128	3857	1210	7.16	72.20	71.60	-0.83

Table 7.1 Target and Measurement SAR after Normalized

8. EUT Testing Position

8.1 Define two imaginary lines on the handset

(a) The vertical centerline passes through two points on the front side of the handset - the midpoint of the width w_t of the handset at the level of the acoustic output, and the midpoint of the width w_b of the bottom of the handset.

(b) The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output. The horizontal line is also tangential to the face of the handset at point A.

(c) The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset, especially for clamshell handsets, handsets with flip covers, and other irregularly shaped handsets.

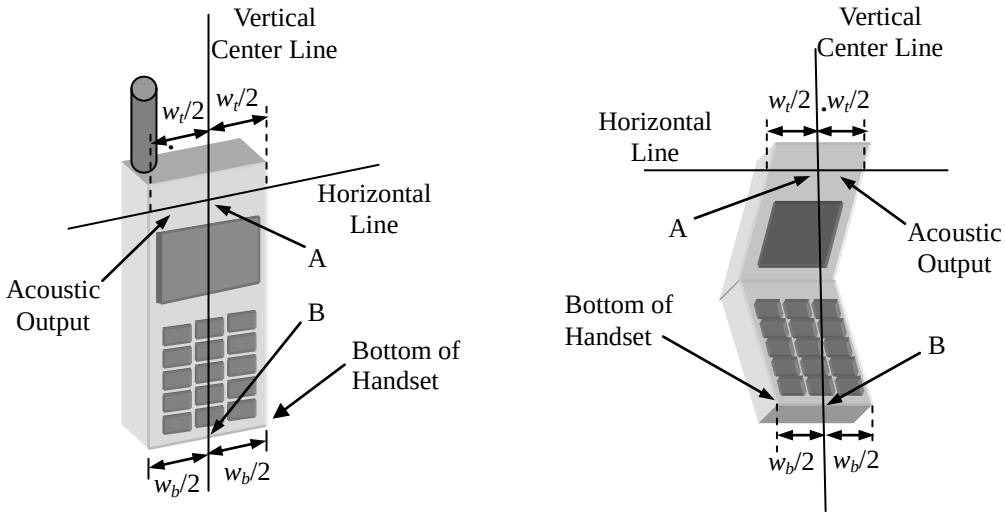


Fig 8.1 Illustration for Handset Vertical and Horizontal Reference Lines

8.2 Cheek Position

(a) To position the device with the vertical center line of the body of the device and the horizontal line crossing the center piece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, align the vertical center line with the reference plane containing the three ear and mouth reference point (M: Mouth, RE: Right Ear, and LE: Left Ear) and align the center of the ear piece with the line RE-LE.

(b) To move the device towards the phantom with the ear piece aligned with the line LE-RE until the phone touched the ear. While maintaining the device in the reference plane and maintaining the phone contact with the ear, move the bottom of the phone until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost (see Fig. 8.2).

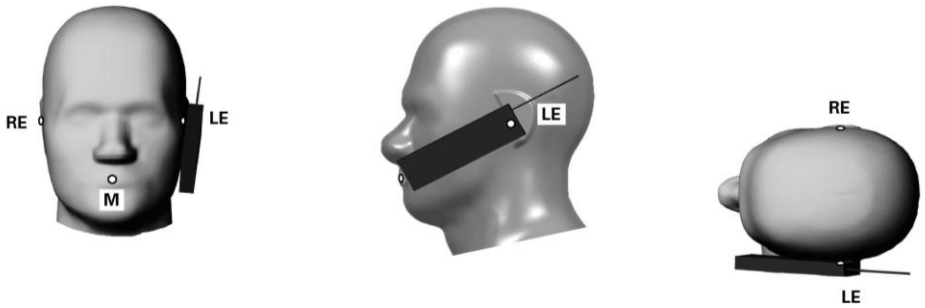


Fig 8.2 Illustration for Cheek Position

8.3 Tilted Position

(a) To position the device in the "cheek" position described above.

(b) While maintaining the device the reference plane described above and pivoting against the ear, moves it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost (see Fig. 8.3).

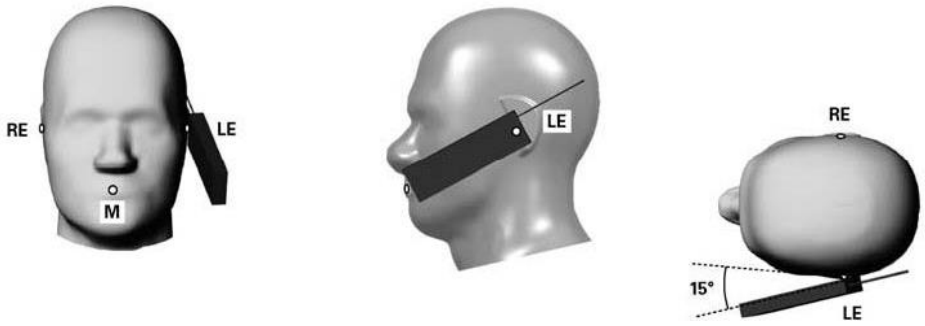


Fig 8.3 Illustration for Tilted Position

8.4 Body Worn Position

(a) To position the device parallel to the phantom surface with either keypad up or down.
(b) To adjust the device parallel to the flat phantom.
(c) To adjust the distance between the device surface and the flat phantom to 1 cm.

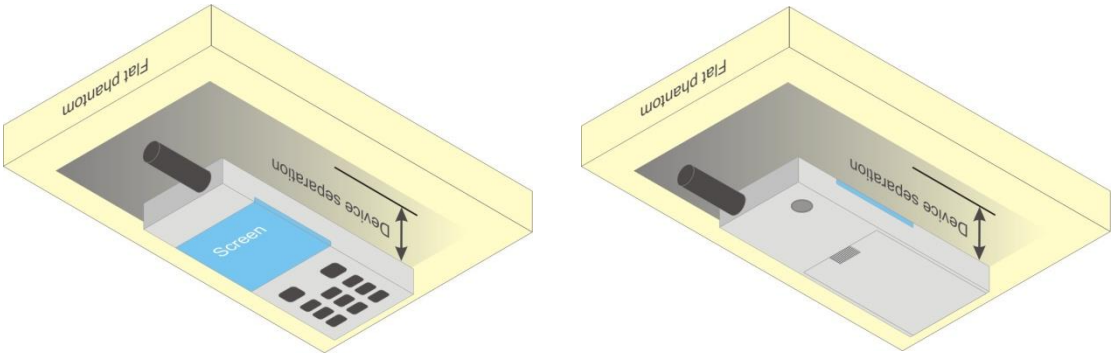


Fig 8.4 Illustration for Body Worn Position

8.5 Hotspot Position

(a) To position the device parallel to the phantom surface with all sides and either keypad up or down.
(b) To adjust the device parallel to the flat phantom.
(c) To adjust the distance between the device and the flat phantom to 1 cm.

<EUT Setup Photos>

Please refer to Appendix D for the test setup photos.

9. Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

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

<SAR measurement>

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

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

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

9.1 Spatial Peak SAR Evaluation

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

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

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

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

9.2 Power Reference Measurement

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

9.3 Area & Zoom Scan Procedures

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g. Area scan and zoom scan resolution setting follows KDB 865664 D01v01r03 quoted below.

When the 1-g SAR of the highest peak is within 2 dB of the SAR limit, additional zoom scans are required for other peaks within 2 dB of the highest peak that have not been included in any zoom scan to ensure there is no increase in SAR.

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}			≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
			When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

* When zoom scan is required and the *reported* SAR from the area scan based *1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

9.4 Volume Scan Procedures

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

9.5 SAR Averaged Methods

In DASY, the interpolation and extrapolation are both based on the modified Quadratic Shepard's method. The interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5 mm.

9.6 Power Drift Monitoring

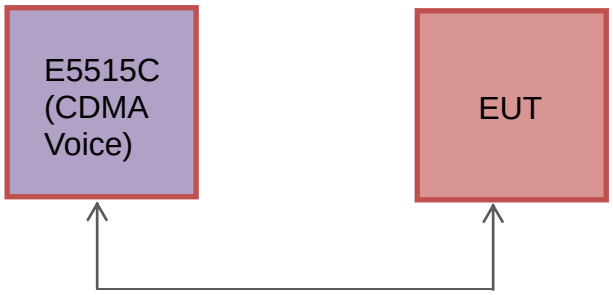
All SAR testing is under the EUT install full charged battery and transmit maximum output power. In DASY measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field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

10. Conducted RF Output Power (Unit: dBm)

10.1 CDMA2000 Conducted Power

General Note:

1. Referring to KDB 941225 D01v02, the data device SAR is tested with Ev-Do Rev 0 (RTAP 153.6kbps). If 1xRTT and Ev-Do Rev A (RETAP 4096 bits) power is less than 1/4dB higher than Re v0, SAR tests with those settings are not necessary.
2. According to KDB 941225 D01v02, head SAR for RC1+SO55 is not required because the maximum average output power of RC1 is less than 1/4 dB higher than RC3+SO55.
3. Referring to KDB 941225 D01v02, in Hotspot mode EUT is treated as data device and SAR is tested with Ev-Do Rev 0 (RTAP 153.6kbps). If 1xRTT and Ev-Do Rev A (RETAP 4096 bits) power is less than 1/4dB higher than Re v0, SAR tests with those settings are not necessary.
4. Considering VOIP capability, 1xEv-Do Rev. A SAR was repeated on the worst position of 1xRTT head SAR and body-worn SAR testing.
5. There is no power reduction applied to the CDMA voice mode, the device with fixed power in the below table is to analyze simultaneous SAR in the SVLTE condition where LTE is operating with maximum output power in conjunction with a lower CDMA voice power.



Conducted Power Measurement Setup

<1xRTT>

Band	CDMA2000 BC0			CDMA2000 BC1		
Channel	1013	384	777	25	600	1175
Frequency	824.7	836.52	848.31	1851.25	1880	1908.75
1x Voice Mode	Full Power (25.0dBm)			Full Power (24.5dBm)		
1xRTT RC1+SO55	24.72	24.55	24.66	24.07	24.11	24.02
1xRTT RC3+SO55	**24.73**	24.51	24.57	24.08	**24.14**	24.02
1xRTT RC3+SO32(+F-SCH)	24.65	24.47	24.52	23.95	23.98	23.90
1xRTT RC3+SO32(+SCH)	24.54	24.48	24.50	23.95	23.91	23.88
1x Voice Mode	Fixed Power (18.5dBm)			Fixed Power (16.0dBm)		
1xRTT RC1+SO55	17.94	17.88	18.13	15.35	15.56	15.74
1xRTT RC3+SO55	17.92	17.89	18.14	15.30	15.50	15.66
1xRTT RC3+SO32(+F-SCH)	18.01	17.95	18.21	15.35	15.55	15.72
1xRTT RC3+SO32(+SCH)	18.02	17.97	**18.26**	15.72	15.56	**15.75**

<1xEVDO>

Band	CDMA2000 BC0			CDMA2000 BC1		
Channel	1013	384	777	25	600	1175
Frequency	824.7	836.52	848.31	1851.25	1880	1908.75
1x Voice Mode	Full Power (25.0dBm)			Full Power (24.5dBm)		
1xEVDO RTAP 153.6	24.66	24.43	24.52	24.05	24.06	23.92
1xEVDO RETAP 4096	24.68	24.48	24.56	24.06	24.10	23.96

10.2 LTE Power Reduction

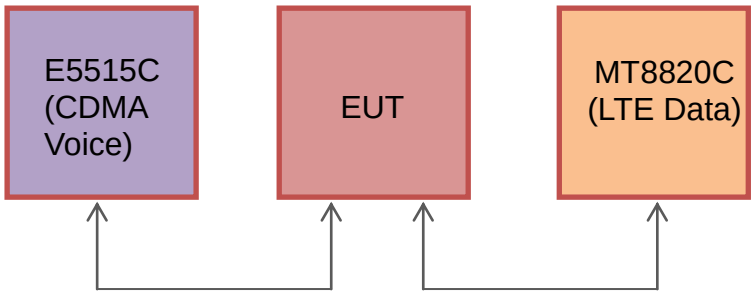
This device is capable of Simultaneous Voice and LTE (SVLTE) calls, with the voice call supported by a CDMA 1x-RTT transmitter and the data connection supported by a separate LTE transmitter. A LTE power reduction scheme is applied during a LTE connection operating simultaneously with 1x-RTT voice calls. The maximum transmit power of LTE is limited depending on the CDMA 1x voice transmit power level. When CDMA 1x Voice is operation at a certain range of high power levels, the maximum LTE transmit power is limited. When CDMA 1x Voice transmit power is below a certain threshold transmit power level, LTE can transmit at the maximum power. Target levels of power reduction and CDMA voice threshold levels are provided in Table 10-1.

Table 10-1
SVLTE Power Reduction Scheme

CDMA2000 1x voice BC0-Output power level	CDMA2000 1x voice BC1-Output power level	LTE data mode Band 2/4/5/12	LTE data mode Band 17	Remark
P ≥ 18.5	P ≥ 16.0	17	17	LTE Power reduction triggered
P < 18.5	P < 16.0	24.5	25.0	LTE in normal full power mode

10.3 Output Power Verification

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 device 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 subsequently a CDMA 1x-RTT call. CDMA powers were controlled by configuring the CDMA base station simulator to active bits. The LTE output power was monitored while changing the cell output power level. The power reduction targets and threshold level described in Table 10-1 were confirmed. Please see results in Table 10-2.



SVLTE Conducted Power Measurement Setup

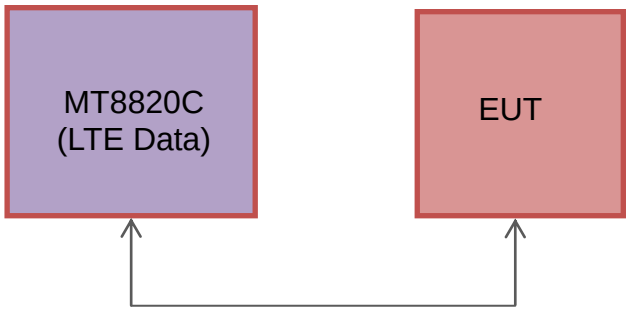
1X CDMA_BC0 RC3 SO55_Voice Channel	1X CDM_BC0 RC3 SO55 Voice Power level (dBm)	LTE Conducted Power (dBm)				
		LTE Band 2 1RB,0RB offest Middle channel	LTE Band 4 1RB,0RB offest Middle channel	LTE Band 5 1RB,0RB offest Middle channel	LTE Band 12 1RB,0RB offest Middle channel	LTE Band 17 1RB,0RB offest Middle channel
	24	16.85	16.69	16.63	16.66	16.62
	23	16.84	16.72	16.62	16.75	16.58
	22	16.82	16.58	16.52	16.63	16.63
	21	16.85	16.82	16.71	16.81	16.60
	20	16.78	16.72	16.75	16.72	16.51
	19	16.84	16.75	16.74	16.69	16.63
	18.5	24.32	24.32	24.28	24.28	24.28
	18	24.36	24.38	24.22	24.25	24.25
	17.5	24.29	24.3	24.31	24.27	24.27
	17	24.29	24.28	24.26	24.24	24.24
1X CDMA_BC1 RC3 SO55_Voice Channel	1X CDMA_BC1 RC3 SO55 Voice Power level (dBm)	LTE Conducted Power (dBm)				
		LTE Band 2 1RB,0RB offest Middle channel	LTE Band 4 1RB,0RB offest Middle channel	LTE Band 5 1RB,0RB offest Middle channel	LTE Band 12 1RB,0RB offest Middle channel	LTE Band 25 1RB,0RB offest Middle channel
Middle channel	23	16.83	16.65	16.68	16.69	16..61
	22	16.81	16.75	16.69	16.76	16.60
	21	16.80	16.56	16.72	16.83	16.53
	20	16.71	16.83	16.71	16.82	16.55
	19	16.75	16.78	16.68	16.73	16.52
	18	16.83	16.72	16.69	16.66	16.58
	17	16.84	16.65	16.69	16.68	16.51
	16	24.33	24.35	24.31	24.29	24.67
	15.5	24.34	24.36	24.21	24.24	24.66
	15	24.28	24.32	24.30	24.25	24.64
	14.5	24.29	24.29	24.28	24.22	24.62

Table 10-2
SVLTE Power Reduction Verification Results

10.4 LTE Conducted Power

General Note:

1. Anritsu MT8820C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r03, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r03, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each *required test channel*.
4. Per KDB 941225 D05v02r03, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r03, when reported SAR of 1RB and 50%RB allocation for QPSK >0.8W/kg for any exposure position, SAR testing of 100%RB allocation for QPSK is performed at the highest power channel. And if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
6. 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, 16QAM SAR testing is not required.
7. Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, smaller bandwidth SAR testing is not required.



Conducted Power Measurement Setup

LTE Band 2 Average Power (dBm)										
BW [MHz]	Modulation	RB Size	RB Offset	Full Power (24.5dBm)			Reduced Power (17dBm)			Target MPR (dB)
				Low Ch. / Freq.	Middle Ch. / Freq.	High Ch. / Freq.	Low Ch. / Freq.	Middle Ch. / Freq.	High Ch. / Freq.	
Channel				18700	18900	19100	18700	18900	19100	
Frequency (MHz)				1860	1880	1900	1860	1880	1900	
20	QPSK	1	0	24.12	24.36	24.09	16.63	16.57	16.52	0
20	QPSK	1	49	24.10	24.13	24.00	16.60	15.99	16.42	
20	QPSK	1	99	23.96	24.23	23.99	16.62	16.41	16.20	
20	QPSK	50	0	22.99	23.34	23.32	15.67	15.72	15.44	1
20	QPSK	50	24	23.16	23.13	23.20	15.26	15.61	15.33	
20	QPSK	50	49	23.32	23.30	23.15	15.45	15.32	15.38	
20	QPSK	100	0	23.15	23.18	23.10	15.17	15.63	15.40	
20	16QAM	1	0	23.34	23.40	23.30	15.27	15.57	15.19	1
20	16QAM	1	49	23.20	23.17	23.25	15.28	15.65	15.46	
20	16QAM	1	99	23.10	23.38	23.05	15.26	15.17	14.92	
20	16QAM	50	0	22.05	22.32	22.25	14.70	13.99	14.26	2
20	16QAM	50	24	22.29	22.22	22.17	14.32	14.67	14.54	
20	16QAM	50	49	22.40	22.12	22.20	14.15	14.04	14.30	
20	16QAM	100	0	22.16	22.18	22.19	14.85	14.61	14.30	
Channel				18675	18900	19125	18675	18900	19125	Target MPR (dB)
Frequency (MHz)				1857.5	1880	1902.5	1857.5	1880	1902.5	
15	QPSK	1	0	23.96	24.30	24.19	16.45	16.43	16.46	0
15	QPSK	1	37	23.96	24.05	24.05	16.38	16.43	16.16	
15	QPSK	1	74	24.35	24.23	24.23	16.15	16.44	16.10	
15	QPSK	36	0	23.07	23.38	23.16	15.48	15.48	15.38	1
15	QPSK	36	18	23.08	23.15	23.21	15.36	15.52	15.24	
15	QPSK	36	37	23.23	23.16	23.10	15.36	15.60	15.17	
15	QPSK	75	0	23.07	23.23	23.27	15.44	15.57	15.27	
15	16QAM	1	0	23.39	23.25	23.16	15.73	15.65	15.46	1
15	16QAM	1	37	23.41	23.12	23.17	15.40	15.06	15.44	
15	16QAM	1	74	23.09	23.15	23.19	15.40	15.29	14.79	
15	16QAM	36	0	22.13	22.33	22.15	14.19	14.19	14.10	2
15	16QAM	36	18	22.17	22.35	22.09	14.26	14.29	14.33	
15	16QAM	36	37	22.29	22.33	22.11	14.36	14.18	14.34	
15	16QAM	75	0	22.16	22.33	22.10	14.24	14.36	14.33	
Channel				18650	18900	19150	18650	18900	19150	Target MPR (dB)
Frequency (MHz)				1855	1880	1905	1855	1880	1905	
10	QPSK	1	0	23.98	24.03	24.05	16.60	16.53	16.25	0
10	QPSK	1	24	24.07	23.82	23.70	16.44	16.50	16.21	
10	QPSK	1	49	24.14	23.88	23.58	16.23	16.51	16.21	
10	QPSK	25	0	23.03	22.94	22.89	15.52	15.47	15.32	1
10	QPSK	25	12	23.08	22.97	22.81	15.47	15.48	15.41	
10	QPSK	25	24	23.17	23.10	22.75	15.40	15.54	15.32	
10	QPSK	50	0	23.07	23.08	22.79	15.44	15.39	15.17	
10	16QAM	1	0	23.16	23.26	23.09	15.40	15.52	15.76	1
10	16QAM	1	24	23.17	23.46	22.93	14.92	15.51	15.61	
10	16QAM	1	49	22.83	23.48	23.13	15.50	15.67	15.53	
10	16QAM	25	0	21.93	22.14	21.92	14.07	14.01	13.55	2
10	16QAM	25	12	21.92	22.11	21.72	14.24	14.18	13.90	
10	16QAM	25	24	21.92	22.06	21.81	14.46	14.10	14.00	
10	16QAM	50	0	21.84	22.02	21.81	14.23	14.20	13.96	

LTE Band 2 Average Power (dBm)										
BW [MHz]	Modulation	RB Size	RB Offset	Full Power (24.5dBm)			Reduced Power (17dBm)			Target MPR (dB)
				Low Ch. / Freq.	Middle Ch. / Freq.	High Ch. / Freq.	Low Ch. / Freq.	Middle Ch. / Freq.	High Ch. / Freq.	
Channel				18625	18900	19175	18625	18900	19175	
Frequency (MHz)				1852.5	1880	1907.5	1852.5	1880	1907.5	
5	QPSK	1	0	23.83	24.19	23.92	16.45	16.34	16.12	0
5	QPSK	1	12	23.87	23.93	24.02	16.50	16.29	16.12	
5	QPSK	1	24	24.08	24.03	24.14	16.46	16.45	16.18	
5	QPSK	12	0	22.96	23.18	23.00	15.90	15.45	15.16	1
5	QPSK	12	6	22.97	23.05	23.15	15.54	15.51	15.14	
5	QPSK	12	11	22.97	23.01	23.19	15.50	15.36	15.18	
5	QPSK	25	0	22.95	23.10	23.09	15.39	15.42	15.12	
5	16QAM	1	0	22.90	23.26	23.09	15.78	15.46	15.20	1
5	16QAM	1	12	23.23	22.92	23.20	15.21	15.17	15.41	
5	16QAM	1	24	23.10	22.80	23.41	15.61	15.35	15.35	
5	16QAM	12	0	21.83	22.39	22.08	14.33	14.19	13.97	2
5	16QAM	12	6	22.00	22.24	22.23	14.42	14.23	14.11	
5	16QAM	12	11	21.98	22.15	22.29	14.32	14.11	14.23	
5	16QAM	25	0	21.93	22.16	22.25	14.25	14.30	14.25	
Channel				18615	18900	19185	18615	18900	19185	Target MPR (dB)
Frequency (MHz)				1851.5	1880	1908.5	1851.5	1880	1908.5	
3	QPSK	1	0	23.82	24.17	24.01	16.47	16.40	16.14	0
3	QPSK	1	7	23.90	24.11	23.98	16.52	16.23	16.19	
3	QPSK	1	14	23.91	24.15	24.16	16.50	16.49	16.18	
3	QPSK	8	0	22.79	23.10	23.00	15.31	15.54	15.23	1
3	QPSK	8	4	22.90	23.07	23.07	15.30	15.55	15.26	
3	QPSK	8	7	22.88	23.10	23.09	15.37	15.53	15.20	
3	QPSK	15	0	22.82	23.05	23.04	15.46	15.41	15.30	
3	16QAM	1	0	22.63	23.12	23.48	15.42	15.35	15.40	1
3	16QAM	1	7	23.15	23.16	23.10	15.18	15.33	14.98	
3	16QAM	1	14	23.39	23.24	23.33	15.23	15.51	15.17	
3	16QAM	8	0	22.00	22.18	22.19	14.35	14.05	13.85	2
3	16QAM	8	4	22.04	22.12	22.14	14.35	14.11	14.04	
3	16QAM	8	7	22.00	22.08	22.15	14.20	14.11	13.83	
3	16QAM	15	0	21.80	21.98	22.17	14.20	14.09	13.94	
Channel				18607	18900	19193	18607	18900	19193	Target MPR (dB)
Frequency (MHz)				1850.7	1880	1909.3	1850.7	1880	1909.3	
1.4	QPSK	1	0	23.66	24.05	23.94	16.81	16.50	16.08	0
1.4	QPSK	1	2	23.81	24.03	24.07	16.84	16.55	16.18	
1.4	QPSK	1	5	23.76	23.94	24.00	16.78	16.50	16.24	
1.4	QPSK	3	0	23.70	23.98	23.94	16.32	16.54	16.18	
1.4	QPSK	3	1	23.78	24.03	24.04	16.81	16.51	16.14	
1.4	QPSK	3	2	23.77	23.98	24.09	16.43	16.45	16.19	
1.4	QPSK	6	0	22.79	23.01	23.05	15.89	15.21	15.13	1
1.4	16QAM	1	0	22.99	23.11	23.23	15.52	15.38	15.33	1
1.4	16QAM	1	2	22.91	23.08	23.27	15.39	15.59	15.19	
1.4	16QAM	1	5	22.80	23.03	22.90	15.23	15.53	15.18	
1.4	16QAM	3	0	22.81	23.05	23.20	15.47	15.51	15.23	
1.4	16QAM	3	1	22.77	22.93	23.22	15.36	15.33	15.18	
1.4	16QAM	3	2	22.94	23.06	23.18	15.50	15.56	15.12	
1.4	16QAM	6	0	21.87	22.21	22.00	14.21	14.53	13.92	2

LTE Band 4 Average Power (dBm)										
BW [MHz]	Modulation	RB Size	RB Offset	Full Power (24.5dBm)			Reduced Power (17dBm)			Target MPR (dB)
				Low Ch. / Freq.	Middle Ch. / Freq.	High Ch. / Freq.	Low Ch. / Freq.	Middle Ch. / Freq.	High Ch. / Freq.	
Channel				20050	20175	20300	20050	20175	20300	
Frequency (MHz)				1720	1732.5	1745	1720	1732.5	1745	
20	QPSK	1	0	24.03	24.14	24.06	16.38	16.31	16.40	0
20	QPSK	1	49	24.37	24.38	24.18	16.43	16.54	16.85	
20	QPSK	1	99	23.98	23.82	23.52	16.37	16.40	16.37	
20	QPSK	50	0	23.25	23.18	23.03	15.42	15.47	15.80	1
20	QPSK	50	24	23.30	23.31	23.05	15.47	15.82	15.78	
20	QPSK	50	49	23.27	23.04	22.79	15.38	15.13	15.61	
20	QPSK	100	0	23.07	23.15	22.83	15.34	15.57	15.51	
20	16QAM	1	0	23.17	23.42	23.34	15.74	15.32	15.53	1
20	16QAM	1	49	23.31	23.46	23.37	15.38	15.24	15.42	
20	16QAM	1	99	23.19	22.92	23.00	15.60	14.95	15.33	
20	16QAM	50	0	22.19	22.15	21.98	14.60	14.32	14.44	2
20	16QAM	50	24	22.40	22.19	22.03	14.77	14.39	14.42	
20	16QAM	50	49	22.21	22.07	21.76	14.38	14.45	14.61	
20	16QAM	100	0	22.17	22.01	21.84	14.59	14.48	14.58	
Channel				20025	20175	20325	20025	20175	20325	Target MPR (dB)
Frequency (MHz)				1717.5	1732.5	1747.5	1717.5	1732.5	1747.5	
15	QPSK	1	0	24.17	24.26	24.09	16.53	16.75	16.98	0
15	QPSK	1	37	24.29	24.02	23.90	16.37	16.76	16.37	
15	QPSK	1	74	24.31	24.10	23.62	16.35	16.26	16.69	
15	QPSK	36	0	23.26	23.21	23.01	15.53	15.51	15.80	1
15	QPSK	36	18	23.35	23.17	22.95	15.42	15.59	15.36	
15	QPSK	36	37	23.35	23.12	22.81	15.53	15.79	15.69	
15	QPSK	75	0	23.23	23.11	22.86	15.48	15.39	15.77	
15	16QAM	1	0	23.16	23.41	23.18	15.23	15.28	15.46	1
15	16QAM	1	37	23.43	23.25	23.06	15.05	15.49	15.74	
15	16QAM	1	74	23.17	23.24	23.04	15.31	15.71	15.59	
15	16QAM	36	0	22.26	22.25	21.96	14.56	14.47	14.77	2
15	16QAM	36	18	22.43	22.23	21.88	14.60	14.27	14.82	
15	16QAM	36	37	22.41	22.13	21.77	14.54	14.09	14.67	
15	16QAM	75	0	22.38	22.15	21.82	14.52	14.41	14.74	
Channel				20000	20175	20350	20000	20175	20350	Target MPR (dB)
Frequency (MHz)				1715	1732.5	1750	1715	1732.5	1750	
10	QPSK	1	0	23.94	24.21	24.06	16.41	16.59	16.47	0
10	QPSK	1	24	24.14	24.02	23.90	16.54	16.36	16.66	
10	QPSK	1	49	24.20	24.05	23.61	16.30	16.41	16.75	
10	QPSK	25	0	23.12	23.16	22.94	15.48	15.50	15.29	1
10	QPSK	25	12	23.17	23.11	22.85	15.49	15.39	15.68	
10	QPSK	25	24	23.25	23.10	22.77	15.57	15.53	15.64	
10	QPSK	50	0	23.14	23.07	22.83	15.45	15.42	15.70	
10	16QAM	1	0	23.21	23.41	23.17	15.34	15.50	15.14	1
10	16QAM	1	24	23.40	23.25	22.71	15.73	15.49	15.51	
10	16QAM	1	49	23.34	22.99	22.83	15.49	15.18	15.23	
10	16QAM	25	0	22.13	22.15	21.95	14.49	14.41	14.37	2
10	16QAM	25	12	22.17	22.06	21.89	14.35	14.15	14.77	
10	16QAM	25	24	22.30	22.06	21.79	14.43	14.23	14.69	
10	16QAM	50	0	22.15	22.14	21.83	14.42	14.20	14.75	

LTE Band 4 Average Power (dBm)										
BW [MHz]	Modulation	RB Size	RB Offset	Full Power (24.5dBm)			Reduced Power (17dBm)			Target MPR (dB)
				Low Ch. / Freq.	Middle Ch. / Freq.	High Ch. / Freq.	Low Ch. / Freq.	Middle Ch. / Freq.	High Ch. / Freq.	
Channel				19975	20175	20375	19975	20175	20375	
Frequency (MHz)				1712.5	1732.5	1752.5	1712.5	1732.5	1752.5	
5	QPSK	1	0	23.87	23.87	23.72	16.42	16.44	16.47	
5	QPSK	1	12	23.93	23.97	23.67	16.33	16.46	16.72	0
5	QPSK	1	24	23.99	23.84	23.53	16.52	16.34	16.52	
5	QPSK	12	0	22.91	23.00	22.71	15.58	15.45	15.45	
5	QPSK	12	6	22.95	23.01	22.68	15.48	15.40	15.41	1
5	QPSK	12	11	22.98	22.98	22.61	15.42	15.30	15.65	
5	QPSK	25	0	22.93	22.98	22.65	15.56	15.42	15.41	
5	16QAM	1	0	22.88	23.42	22.89	15.68	15.73	15.58	
5	16QAM	1	12	23.32	23.12	22.80	15.12	15.66	15.55	1
5	16QAM	1	24	23.15	23.04	22.41	15.22	15.83	15.50	
5	16QAM	12	0	21.93	22.09	21.75	14.83	14.47	14.62	
5	16QAM	12	6	21.92	22.07	21.62	14.50	14.26	14.69	2
5	16QAM	12	11	22.05	21.96	21.62	14.45	14.12	14.63	
5	16QAM	25	0	21.89	21.94	21.61	14.37	14.22	14.69	
Channel				19965	20175	20385	19965	20175	20385	Target MPR (dB)
Frequency (MHz)				1711.5	1732.5	1753.5	1711.5	1732.5	1753.5	
3	QPSK	1	0	23.69	23.93	23.55	16.44	16.61	16.26	
3	QPSK	1	7	23.72	23.83	23.58	16.46	16.65	16.34	0
3	QPSK	1	14	23.79	23.87	23.45	16.34	16.75	16.25	
3	QPSK	8	0	22.81	22.93	22.57	15.45	15.61	15.27	
3	QPSK	8	4	22.89	22.94	22.58	15.40	15.59	15.34	1
3	QPSK	8	7	22.88	22.92	22.51	15.30	15.61	15.31	
3	QPSK	15	0	22.82	22.94	22.54	15.48	15.60	15.37	
3	16QAM	1	0	22.84	23.43	22.81	15.97	15.45	15.45	
3	16QAM	1	7	23.17	22.99	22.63	15.94	15.45	15.50	1
3	16QAM	1	14	23.01	23.07	22.63	15.83	15.67	15.16	
3	16QAM	8	0	21.82	22.04	21.70	14.47	14.33	13.92	
3	16QAM	8	4	21.99	21.92	21.73	14.26	14.47	14.09	2
3	16QAM	8	7	21.82	22.00	21.55	14.12	14.29	14.13	
3	16QAM	15	0	21.98	22.00	21.59	14.22	14.55	14.24	
Channel				19957	20175	20393	19957	20175	20393	Target MPR (dB)
Frequency (MHz)				1710.7	1732.5	1754.3	1710.7	1732.5	1754.3	
1.4	QPSK	1	0	23.62	23.81	23.41	16.44	16.64	16.61	
1.4	QPSK	1	2	23.73	23.85	23.46	16.46	16.39	16.71	
1.4	QPSK	1	5	23.62	23.78	23.29	16.48	16.77	16.56	0
1.4	QPSK	3	0	23.64	23.80	23.41	16.42	16.71	16.65	
1.4	QPSK	3	1	23.66	23.82	23.44	16.38	16.44	16.73	
1.4	QPSK	3	2	23.70	23.88	23.48	16.47	16.36	16.72	
1.4	QPSK	6	0	22.73	22.84	22.45	15.52	15.66	15.59	1
1.4	16QAM	1	0	22.77	23.18	22.64	15.06	15.34	15.42	
1.4	16QAM	1	2	22.80	23.08	22.55	15.33	15.31	15.27	
1.4	16QAM	1	5	23.01	22.88	22.52	15.66	15.85	15.43	1
1.4	16QAM	3	0	22.72	22.90	22.37	15.46	15.53	15.63	
1.4	16QAM	3	1	22.64	22.91	22.55	15.64	15.46	15.67	
1.4	16QAM	3	2	22.81	22.90	22.36	15.45	15.30	15.68	
1.4	16QAM	6	0	21.78	21.99	21.48	14.58	14.42	14.54	2

LTE Band 5 Average Power (dBm)										
BW [MHz]	Modulation	RB Size	RB Offset	Full Power (24.5dBm)			Reduced Power (17dBm)			Target MPR (dB)
				Low Ch. / Freq.	Middle Ch. / Freq.	High Ch. / Freq.	Low Ch. / Freq.	Middle Ch. / Freq.	High Ch. / Freq.	
Channel				20450	20525	20600	20450	20525	20600	
Frequency (MHz)				829	836.5	844	829	836.5	844	
10	QPSK	1	0	24.24	24.28	24.17	16.68	16.83	16.51	0
10	QPSK	1	24	24.14	23.95	24.15	16.79	16.85	16.71	
10	QPSK	1	49	23.97	23.96	23.94	16.69	16.75	16.69	
10	QPSK	25	0	23.21	23.28	23.16	15.58	15.67	15.69	1
10	QPSK	25	12	23.18	23.12	23.10	15.67	15.75	15.61	
10	QPSK	25	24	23.20	23.10	23.15	15.71	15.66	15.67	
10	QPSK	50	0	23.21	23.25	23.23	15.63	15.76	15.67	
10	16QAM	1	0	23.28	23.29	22.96	15.60	15.55	15.63	1
10	16QAM	1	24	23.15	22.96	22.85	15.95	15.56	15.75	
10	16QAM	1	49	23.20	22.89	22.86	15.80	15.35	15.71	
10	16QAM	25	0	22.21	22.13	22.15	14.59	14.71	14.71	2
10	16QAM	25	12	22.25	22.10	22.20	14.74	14.65	14.69	
10	16QAM	25	24	22.24	22.15	22.28	14.77	14.35	14.84	
10	16QAM	50	0	22.18	22.02	22.22	14.57	14.81	14.68	
Channel				20425	20525	20625	20425	20525	20625	Target MPR (dB)
Frequency (MHz)				826.5	836.5	846.5	826.5	836.5	846.5	
5	QPSK	1	0	24.25	24.04	23.92	16.89	16.67	16.52	0
5	QPSK	1	12	24.11	23.93	24.04	16.69	16.54	16.43	
5	QPSK	1	24	24.14	24.03	24.12	16.77	16.57	16.64	
5	QPSK	12	0	23.21	23.08	23.19	15.70	15.67	15.69	1
5	QPSK	12	6	23.20	23.17	23.18	15.75	15.73	15.71	
5	QPSK	12	11	23.21	23.12	23.24	15.63	15.58	15.75	
5	QPSK	25	0	23.14	23.16	23.19	15.65	15.27	15.68	
5	16QAM	1	0	23.17	23.14	23.13	15.90	15.67	15.55	1
5	16QAM	1	12	23.16	23.15	22.91	15.89	15.68	15.53	
5	16QAM	1	24	23.00	23.10	22.70	15.67	15.61	15.40	
5	16QAM	12	0	22.24	22.10	22.22	14.81	14.63	14.76	2
5	16QAM	12	6	22.28	22.12	22.06	14.91	14.57	14.81	
5	16QAM	12	11	22.19	22.26	22.22	14.72	14.64	14.85	
5	16QAM	25	0	22.22	22.09	22.22	14.79	14.71	14.71	

LTE Band 5 Average Power (dBm)										
BW [MHz]	Modulation	RB Size	RB Offset	Full Power (24.5dBm)			Reduced Power (17dBm)			Target MPR (dB)
				Low Ch. / Freq.	Middle Ch. / Freq.	High Ch. / Freq.	Low Ch. / Freq.	Middle Ch. / Freq.	High Ch. / Freq.	
Channel				20415	20525	20635	20415	20525	20635	
Frequency (MHz)				825.5	836.5	847.5	825.5	836.5	847.5	
3	QPSK	1	0	24.26	24.01	24.17	16.89	16.71	16.63	0
3	QPSK	1	7	24.18	23.95	23.96	16.88	16.70	16.71	
3	QPSK	1	14	24.08	24.08	24.01	16.73	16.83	16.77	
3	QPSK	8	0	23.21	23.07	23.20	15.75	15.60	15.74	1
3	QPSK	8	4	23.29	23.06	23.21	15.75	15.72	15.67	
3	QPSK	8	7	23.27	23.07	23.15	15.68	15.59	15.58	
3	QPSK	15	0	23.24	23.10	23.26	15.77	15.61	15.70	
3	16QAM	1	0	23.42	23.11	22.91	15.59	15.19	15.74	1
3	16QAM	1	7	23.18	22.72	23.24	15.83	15.32	15.38	
3	16QAM	1	14	22.92	23.36	23.22	15.86	15.39	15.57	
3	16QAM	8	0	22.34	22.09	22.22	14.92	14.66	14.81	2
3	16QAM	8	4	22.41	22.12	22.32	14.76	14.68	14.87	
3	16QAM	8	7	22.35	22.09	22.18	14.90	14.69	14.76	
3	16QAM	15	0	22.38	22.11	22.20	14.86	14.79	14.70	
Channel				20407	20525	20643	20407	20525	20643	Target MPR (dB)
Frequency (MHz)				824.7	836.5	848.3	824.7	836.5	848.3	
1.4	QPSK	1	0	24.17	23.97	24.05	16.96	16.67	16.72	0
1.4	QPSK	1	2	24.18	24.03	24.03	16.86	16.34	16.70	
1.4	QPSK	1	5	24.16	23.92	24.12	16.92	16.55	16.72	
1.4	QPSK	3	0	24.19	23.95	24.11	16.94	16.74	16.73	
1.4	QPSK	3	1	24.15	23.99	24.05	16.87	16.75	16.69	
1.4	QPSK	3	2	24.15	23.95	23.99	16.76	16.29	16.69	
1.4	QPSK	6	0	23.18	23.11	23.15	15.83	15.38	15.64	1
1.4	16QAM	1	0	23.22	22.65	23.13	15.85	15.65	15.73	1
1.4	16QAM	1	2	22.87	22.83	22.99	15.52	15.69	15.22	
1.4	16QAM	1	5	22.90	22.86	22.80	15.72	15.14	15.90	
1.4	16QAM	3	0	23.27	23.03	23.08	15.83	15.31	15.56	
1.4	16QAM	3	1	23.17	23.06	22.92	15.84	15.52	15.57	
1.4	16QAM	3	2	23.10	22.94	23.11	15.67	15.72	15.53	
1.4	16QAM	6	0	22.36	21.92	21.98	14.74	14.51	14.72	2

LTE Band 12 Average Power (dBm)										
BW [MHz]	Modulation	RB Size	RB Offset	Full Power (24.5dBm)			Reduced Power (17dBm)			Target MPR (dB)
				Low Ch. / Freq.	Middle Ch. / Freq.	High Ch. / Freq.	Low Ch. / Freq.	Middle Ch. / Freq.	High Ch. / Freq.	
Channel				23060	23095	23130	23060	23095	23130	
Frequency (MHz)				704	707.5	711	704	707.5	711	
10	QPSK	1	0	24.10	23.95	24.16	16.70	16.46	16.55	0
10	QPSK	1	24	24.19	24.28	24.18	16.72	16.75	16.69	
10	QPSK	1	49	24.07	24.13	24.15	16.61	16.55	16.60	
10	QPSK	25	0	22.83	22.60	22.66	15.66	15.71	15.63	1
10	QPSK	25	12	22.90	23.04	22.88	15.22	15.75	15.66	
10	QPSK	25	24	22.69	22.72	22.57	15.74	15.66	15.63	
10	QPSK	50	0	23.00	23.03	22.87	15.73	15.75	15.70	
10	16QAM	1	0	22.79	23.29	23.18	15.85	15.56	15.90	1
10	16QAM	1	24	22.71	23.34	23.33	15.72	15.38	15.52	
10	16QAM	1	49	23.12	23.39	23.36	15.79	15.43	15.25	
10	16QAM	25	0	21.62	21.62	21.52	14.79	14.55	14.68	2
10	16QAM	25	12	21.59	21.64	21.49	14.98	14.63	14.88	
10	16QAM	25	24	21.54	21.67	21.51	14.74	14.80	14.76	
10	16QAM	50	0	21.76	21.75	21.61	14.86	14.77	14.81	
Channel				23035	23095	23155	23035	23095	23155	Target MPR (dB)
Frequency (MHz)				701.5	707.5	713.5	701.5	707.5	713.5	
5	QPSK	1	0	24.20	24.04	24.12	16.33	16.32	16.69	0
5	QPSK	1	12	24.07	24.02	24.15	16.53	16.13	16.46	
5	QPSK	1	24	24.07	24.21	24.10	16.61	16.78	16.72	
5	QPSK	12	0	22.87	22.91	22.83	15.69	15.97	15.51	1
5	QPSK	12	6	23.11	23.06	22.80	15.67	15.66	15.54	
5	QPSK	12	11	23.04	23.03	22.53	15.35	15.63	15.42	
5	QPSK	25	0	22.88	22.98	22.60	15.73	15.72	15.63	
5	16QAM	1	0	22.95	22.72	23.13	15.61	15.63	15.78	1
5	16QAM	1	12	23.37	22.68	23.32	15.16	15.70	15.62	
5	16QAM	1	24	22.87	22.57	23.31	15.35	15.17	15.73	
5	16QAM	12	0	21.69	21.89	21.86	14.63	14.87	14.83	2
5	16QAM	12	6	21.88	21.79	21.82	14.74	14.77	14.76	
5	16QAM	12	11	22.13	21.85	21.54	14.35	14.77	14.35	
5	16QAM	25	0	21.84	21.66	21.53	14.69	14.79	14.73	

LTE Band 12 Average Power (dBm)										
BW [MHz]	Modulation	RB Size	RB Offset	Full Power (24.5dBm)			Reduced Power (17dBm)			Target MPR (dB)
				Low Ch. / Freq.	Middle Ch. / Freq.	High Ch. / Freq.	Low Ch. / Freq.	Middle Ch. / Freq.	High Ch. / Freq.	
Channel				23025	23095	23165	23025	23095	23165	
Frequency (MHz)				700.5	707.5	714.5	700.5	707.5	714.5	
3	QPSK	1	0	24.19	24.25	24.17	16.41	16.48	16.90	0
3	QPSK	1	7	24.23	24.04	24.03	16.30	16.11	16.80	
3	QPSK	1	14	24.01	24.19	24.12	16.28	16.51	16.30	
3	QPSK	8	0	22.89	23.15	22.88	15.68	15.52	15.77	1
3	QPSK	8	4	23.13	23.07	22.73	15.58	15.43	15.83	
3	QPSK	8	7	23.02	23.05	22.49	15.80	15.40	15.98	
3	QPSK	15	0	22.89	23.01	22.68	15.71	15.68	15.76	
3	16QAM	1	0	23.20	23.12	23.19	15.88	15.86	15.89	1
3	16QAM	1	7	23.25	23.14	23.07	15.81	15.62	15.92	
3	16QAM	1	14	23.08	23.10	23.05	15.57	15.82	15.82	
3	16QAM	8	0	21.79	22.29	21.54	14.86	14.92	14.76	2
3	16QAM	8	4	22.00	22.07	21.56	14.91	14.82	14.77	
3	16QAM	8	7	22.04	22.13	21.62	14.33	14.87	14.66	
3	16QAM	15	0	21.88	21.68	21.49	14.83	14.71	14.82	
Channel				23017	23095	23173	23017	23095	23173	Target MPR (dB)
Frequency (MHz)				699.7	707.5	715.3	699.7	707.5	715.3	
1.4	QPSK	1	0	24.24	24.22	24.21	16.80	16.89	16.73	0
1.4	QPSK	1	2	24.18	24.19	23.97	16.38	16.86	16.68	
1.4	QPSK	1	5	24.04	24.13	23.94	16.40	16.78	16.29	
1.4	QPSK	3	0	24.23	24.21	24.25	16.51	16.74	16.39	
1.4	QPSK	3	1	24.18	24.15	24.21	16.83	16.76	16.41	
1.4	QPSK	3	2	24.15	24.10	24.02	16.41	16.88	16.62	
1.4	QPSK	6	0	23.04	22.99	22.60	15.74	15.76	15.43	1
1.4	16QAM	1	0	23.21	23.06	23.02	15.78	15.85	15.46	1
1.4	16QAM	1	2	22.73	23.05	23.31	15.54	15.78	15.69	
1.4	16QAM	1	5	23.08	23.17	23.15	15.69	15.78	15.56	
1.4	16QAM	3	0	23.10	23.25	23.18	15.40	15.87	15.38	
1.4	16QAM	3	1	22.89	22.90	23.13	15.42	15.92	15.60	
1.4	16QAM	3	2	23.12	23.16	23.10	15.74	15.93	15.41	
1.4	16QAM	6	0	21.81	21.78	21.84	14.66	14.87	14.12	2

LTE Band 17 Average Power (dBm)										
BW [MHz]	Modulation	RB Size	RB Offset	Full Power (25.0dBm)			Reduced Power (17dBm)			Target MPR (dB)
				Low Ch. / Freq.	Middle Ch. / Freq.	High Ch. / Freq.	Low Ch. / Freq.	Middle Ch. / Freq.	High Ch. / Freq.	
Channel				23780	23790	23800	23780	23790	23800	
Frequency (MHz)				709	710	711	709	710	711	
10	QPSK	1	0	24.64	24.57	24.58	16.77	16.68	16.62	0
10	QPSK	1	24	24.71	24.76	24.73	16.87	16.81	16.71	
10	QPSK	1	49	24.61	24.41	24.64	16.66	16.54	16.65	
10	QPSK	25	0	23.69	23.74	23.69	15.76	15.87	15.73	1
10	QPSK	25	12	23.70	23.80	23.79	15.76	15.92	15.63	
10	QPSK	25	24	23.65	23.63	23.77	15.83	15.90	15.72	
10	QPSK	50	0	23.76	23.79	23.63	15.83	15.83	15.75	
10	16QAM	1	0	23.62	23.63	23.38	15.72	15.59	15.60	1
10	16QAM	1	24	23.69	23.65	23.68	15.76	15.85	15.78	
10	16QAM	1	49	23.66	23.63	23.12	15.72	15.73	15.72	
10	16QAM	25	0	22.76	22.76	22.89	14.45	14.38	14.53	2
10	16QAM	25	12	22.72	22.76	22.88	14.49	14.37	14.45	
10	16QAM	25	24	22.80	22.73	22.82	14.52	14.59	14.82	
10	16QAM	50	0	22.69	22.67	22.72	14.22	14.46	14.45	
Channel				23755	23790	23825	23755	23790	23825	Target MPR (dB)
Frequency (MHz)				706.5	710	713.5	706.5	710	713.5	
5	QPSK	1	0	24.61	24.64	24.71	16.76	16.65	16.79	0
5	QPSK	1	12	24.66	24.61	24.63	16.69	16.65	16.67	
5	QPSK	1	24	24.64	24.47	24.58	16.75	16.80	16.77	
5	QPSK	12	0	23.73	23.66	23.72	15.77	15.85	15.81	1
5	QPSK	12	6	23.76	23.71	23.60	15.75	15.85	15.81	
5	QPSK	12	11	23.75	23.73	23.56	15.52	15.64	15.82	
5	QPSK	25	0	23.75	23.64	23.78	15.79	15.56	15.81	
5	16QAM	1	0	23.84	23.73	23.56	15.81	15.49	15.75	1
5	16QAM	1	12	23.51	23.51	23.44	15.78	15.65	15.64	
5	16QAM	1	24	23.67	23.51	23.66	15.06	15.68	15.83	
5	16QAM	12	0	22.79	22.67	22.78	14.19	14.16	14.80	2
5	16QAM	12	6	22.71	22.81	22.56	14.20	14.58	14.83	
5	16QAM	12	11	22.70	22.82	22.73	14.09	14.36	14.84	
5	16QAM	25	0	22.84	22.72	22.75	14.23	14.19	14.93	

10.5 WLAN 2.4GHz Conducted Power

General Note:

1. Per KDB 248227 D01 v01r02, choose the highest output power channel to test SAR and determine further SAR exclusion.
2. For each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is less than 1/4dB higher than those measured at the lowest data rate.
3. Per KDB 248227 D01 v01r02, 11g and 11n-HT20 output power is less than 1/4dB higher than 11b mode, thus the SAR can be excluded.

802.11b Average Power (dBm)					
Channel	Frequency (MHz)	Data Rate (bps)			
		1M bps	2M bps	5.5M bps	11M bps
CH 01	2412	**14.85**	14.40	14.34	14.75
CH 06	2437	13.64	13.54	13.78	13.91
CH 11	2462	13.68	13.46	13.44	13.81

802.11g Average Power (dBm)									
Channel	Frequency (MHz)	Data Rate (bps)							
		6M bps	9M bps	12M bps	18M bps	24M bps	36M bps	48M bps	54M bps
CH 01	2412	**13.86**	13.71	13.79	13.83	13.81	13.68	13.81	13.85
CH 06	2437	13.26	13.30	13.41	13.70	13.18	13.24	13.22	13.22
CH 11	2462	13.31	13.45	13.44	13.45	13.36	13.29	13.41	13.38

802.11n-HT20 Average Power (dBm)									
Channel	Frequency (MHz)	MCS Index							
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412	**13.06**	12.98	12.67	12.94	12.89	13.00	12.93	12.84
CH 06	2437	12.54	12.49	12.20	12.45	12.49	12.50	12.51	12.68
CH 11	2462	12.63	12.49	12.30	12.61	12.67	12.62	12.59	12.55

10.6 WLAN 5GHz Conducted Power

General Note:

1. Per KDB 248227 D01 v01r02, choose the highest output power channel to test SAR and determine further SAR exclusion
2. For each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is less than 1/4 dB higher than those measured at the lowest data rate. 5GHz WLAN SAR was tested on 802.11a 6Mbps.
3. Per KDB 248227 D01 v01r02, 11n-HT20 output power is less than 1/4dB higher than 802.11a mode, thus the SAR can be excluded.
4. Per April 2013 TCB Workshop notes, full SAR tests for IEEE 802.11ac configurations were not required because the average output power was not more than 0.25 dB higher than IEEE 802.11a mode. IEEE 802.11ac was evaluated for the highest IEEE 802.11a position in each 5 GHz band and exposure condition.

802.11a Average Power (dBm)									
Channel	Frequency (MHz)	Average Power (dBm)							
		Data Rate (bps)							
		6M	9M	12M	18M	24M	36M	48M	54M
CH 036	5180	11.42	11.79	11.93	11.85	11.98	11.86	11.79	11.74
CH 040	5200	11.73	11.89	11.95	11.93	12.00	11.91	11.83	11.78
CH 044	5220	11.71	11.87	11.92	11.96	11.95	11.94	11.91	11.83
CH 048	5240	**12.28**	11.95	11.89	11.97	12.01	12.00	11.88	11.87
CH 149	5745	**12.18**	11.63	10.64	10.73	10.77	10.88	11.06	11.01
CH 153	5765	12.12	11.56	10.57	10.69	10.72	10.89	10.97	10.92
CH 157	5785	11.89	11.71	10.43	10.64	10.61	10.64	10.75	10.57
CH 161	5805	11.56	11.59	10.69	10.80	10.52	10.58	10.69	10.37
CH 165	5825	11.59	11.49	10.79	10.51	10.50	10.68	10.63	10.43

WLAN 5GHz Band 802.11n-HT20 Average Power (dBm)									
Channel	Frequency (MHz)	Average Power (dBm)							
		Data Rate (bps)							
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 036	5180	12.09	12.10	12.12	12.22	12.11	11.88	11.75	11.70
CH 040	5200	12.12	12.17	12.05	12.19	12.07	11.78	11.72	11.63
CH 044	5220	11.95	12.00	11.91	11.98	11.96	11.67	11.66	11.77
CH 048	5240	**12.27**	12.07	12.06	12.20	12.06	11.85	11.73	11.67
CH 149	5745	**12.15**	12.14	11.97	12.08	12.12	12.13	12.06	12.03
CH 153	5765	12.00	12.00	11.90	12.04	12.07	12.11	12.08	11.94
CH 157	5785	11.94	11.82	11.76	11.76	11.88	11.96	11.80	11.89
CH 161	5805	11.55	11.77	11.52	11.64	11.73	11.95	11.78	11.59
CH 165	5825	11.73	11.65	10.75	11.74	11.68	11.80	11.65	11.70

WLAN 5GHz 802.11ac VHT80 Average Power (dBm)											
Channel	Frequency (MHz)	Average Power (dBm)									
		Data Rate (bps)									
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 042	5210	**11.43**	11.41	11.42	11.29	11.40	11.36	11.24	11.35	11.42	11.38
CH 155	5775	**11.95**	11.79	11.93	11.89	11.91	11.86	11.66	11.79	11.90	11.73

10.7 Bluetooth Conducted Power

Bluetooth Average Power (dBm)										
Channel	Frequency (MHz)	Data Rate								
		DH1	DH3	DH5	2DH1	2DH3	2DH5	3DH1	3DH3	3DH5
CH 00	2402	-0.79	-0.32	-0.39	-3.57	-4.16	-3.83	-3.27	-3.62	-3.78
CH 39	2441	-0.23	-0.17	**0.04**	-3.09	-3.90	-3.56	-3.06	-3.38	-3.51
CH 78	2480	-0.05	-0.21	-0.08	-3.26	-4.09	-3.70	-3.28	-4.01	-3.64

Bluetooth v4.0 LE Average power (dBm)		
Channel	Frequency (MHz)	Mode
		BT v4.0 LE, GFSK
CH 00	2402	**5.61**
CH 19	2440	4.96
CH 39	2480	4.67

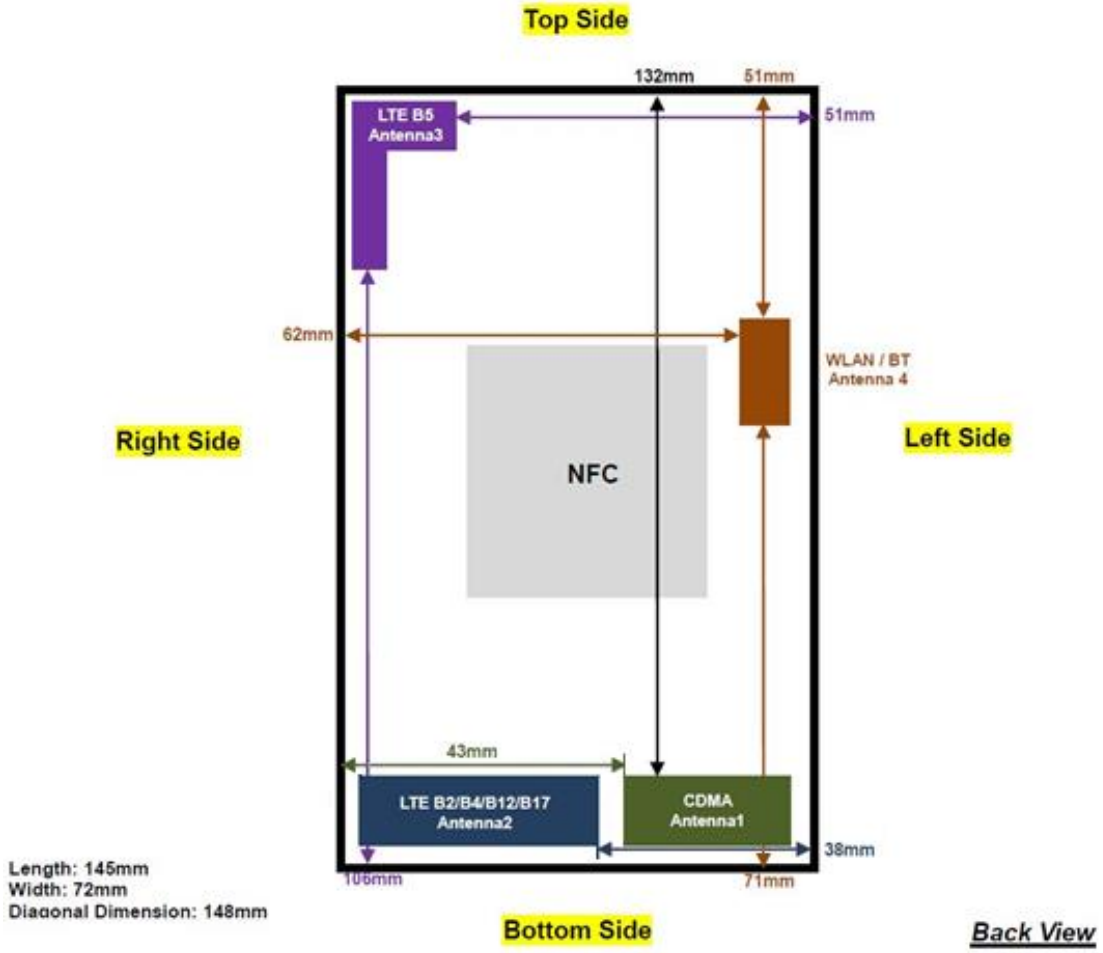
Note:

1. Per KDB 447498 D01v05r03, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:
   [(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] ·[√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR.
   - f(GHz) is the RF channel transmit frequency in GHz.
   - Power and distance are rounded to the nearest mW and mm before calculation.
   - The result is rounded to one decimal place for comparison.
   - If the test separation distance (antenna-user) is < 5mm, 5mm is used for excluded SAR calculation.

Bluetooth Max Power (dBm)	mW	Test Distance (mm)	Frequency (GHz)	Exclusion Thresholds
6	4.00	0	2.48	1.26

2. Per KDB 447498 D01v05r02 Bluetooth SAR exclusion thresholds is 1.26 < 3, **RF e**xposure evaluation is not required.

11. EUT Antenna Location



Distance of the Antenna to the EUT surface/edge						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
Antenna 1	≤ 25mm	≤ 25mm	132mm	≤ 25mm	43mm	≤ 25mm
Antenna 2	≤ 25mm	≤ 25mm	132mm	≤ 25mm	≤ 25mm	38mm
Antenna 3	≤ 25mm	≤ 25mm	≤ 25mm	106mm	≤ 25mm	51mm
Antenna 4	≤ 25mm	≤ 25mm	51mm	71mm	62mm	≤ 25mm
Positions for SAR tests; Hotspot mode						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
Antenna 1	Yes	Yes	No	Yes	No	Yes
Antenna 2	Yes	Yes	No	Yes	Yes	No
Antenna 3	Yes	Yes	Yes	No	Yes	No
Antenna 4	Yes	Yes	No	No	No	Yes

Note:

1. This product has five transmitter antenna paths, Antenna1 for 1xRTT and EVDO, antenna2 for LTE Band 2/4/12/17, antenna3 for LTE Band 5, antenna4 for BT/WLAN and one for NFC. Each antenna path can transmit simultaneously except for two LTE antenna paths.
2. Referring to KDB 941225 D06 v01r01, when the overall device length and width are ≥ 9cm*5cm, the test distance is 10 mm. SAR must be measured for all sides and surfaces with a transmitting antenna located within 25mm from that surface or edge.

12. SAR Test Results

12.1 SVLTE SAR Testing Procedures

General Note:

1. SAR testing was additionally performed as the reduced CDMA and LTE power levels with respect to the simultaneous transmission scenarios. QXDM NV parameters were used to configure the device maximum power limit during standalone SAR testing in reduced power mode. While the power reduction mechanism is activated, 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 power.
2. Per KDB 447498 D01v05r02, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a) Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b) For SAR testing of WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)"
   c) For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
   d) For WLAN: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor
3. Per KDB 447498 D01v05r02, for each exposure position, if the highest output channel reported SAR ≤ 0.8W/kg, other channels SAR testing is not necessary.
4. Considering the possibility of VOIP operation, LTE SAR & 1xEv-Do RevA (4096 bits) SAR for the head exposure positions and body-worn positions are performed.
5. In WLAN 5.8 GHz Band, this device did not support Hotspot mode (AP Router), but supported “Wifi direct owner” that this device must use hotspot test procedure perform SAR testing.
6. Per KDB 941225 D05v02r03, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
7. Per KDB 941225 D05v02r03, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
8. Per KDB 941225 D05v02r03, when reported SAR of 1RB and 50%RB allocation for QPSK >0.8W/kg for any exposure position, SAR testing of 100%RB allocation for QPSK is performed at the highest power channel. And if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
9. 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, 16QAM SAR testing is not required.
10. Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, smaller bandwidth SAR testing is not required.
11. Per KDB 648474 D04v01r02, when the reported SAR for a body-worn accessory measured without a headset connected to the handset is ≤ 1.2 W/kg, SAR testing with a headset connected to the handset is not required.
12. LTE band 2/4 body-worn accessory reported SAR > 1.2W/kg, according to KDB 648474 D04v01r02 SAR testing should be repeated at the same configuration for that body-worn accessory with a headset attached to the handset, and CDMA2000 BC0/1 and WLAN 2.4/5GHz SAR testing with headset connected were also performed for simultaneous transmission analysis.

12.2 Test Records for Head SAR Test

<CDMA2000 SAR>

Plot No.	Band	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)	Reduced Power (dB)
	CDMA2000 BC0	RC3 SO55	Right Cheek	1013	824.7	24.73	25	1.064	-0.11	0.349	0.371	0
	CDMA2000 BC0	RC3 SO55	Right Tilted	1013	824.7	24.73	25	1.064	-0.11	0.239	0.254	0
	CDMA2000 BC0	RC3 SO55	Left Cheek	1013	824.7	24.73	25	1.064	0.18	0.417	0.444	0
#01	CDMA2000 BC0	RETAP 4096	Left Cheek	1013	824.7	24.68	25	1.076	0.1	0.430	**0.463**	0
	CDMA2000 BC0	RC3 SO55	Left Tilted	1013	824.7	24.73	25	1.064	0.05	0.242	0.258	0
	CDMA2000 BC1	RC3 SO55	Right Cheek	600	1880	24.14	24.5	1.086	-0.08	0.402	0.437	0
	CDMA2000 BC1	RC3 SO55	Right Tilted	600	1880	24.14	24.5	1.086	-0.09	0.335	0.364	0
#02	CDMA2000 BC1	RC3 SO55	Left Cheek	600	1880	24.14	24.5	1.086	-0.04	0.810	**0.880**	0
	CDMA2000 BC1	RC3 SO55	Left Cheek	25	1851.25	24.08	24.5	1.102	0.07	0.669	0.737	0
	CDMA2000 BC1	RC3 SO55	Left Cheek	1175	1908.75	24.02	24.5	1.117	0.03	0.755	0.843	0
	CDMA2000 BC1	RETAP 4096	Left Cheek	600	1880	24.10	24.5	1.096	-0.09	0.799	0.876	0
	CDMA2000 BC1	RETAP 4096	Left Cheek	25	1851.25	24.06	24.5	1.107	-0.02	0.657	0.727	0
	CDMA2000 BC1	RETAP 4096	Left Cheek	1175	1908.75	23.96	24.5	1.132	-0.01	0.743	0.841	0
	CDMA2000 BC1	RC3 SO55	Left Cheek	600	1880	15.50	16.0	1.122	0.02	0.083	0.093	8.5
	CDMA2000 BC1	RC3 SO55	Left Tilted	600	1880	24.14	24.5	1.086	0.08	0.299	0.325	0

<LTE SAR>

Plot No.	Band	Mode	BW (MHz)	RB Size	RB Offset	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)	Reduced Power (dB)
#03	LTE Band 2	QPSK	20	1	0	Right Cheek	18900	1880	24.36	24.5	1.033	-0.17	0.770	**0.795**	0
	LTE Band 2	QPSK	20	50	0	Right Cheek	18900	1880	23.34	23.5	1.038	0.06	0.594	0.616	0
	LTE Band 2	QPSK	20	1	0	Right Tilted	18900	1880	24.36	24.5	1.033	-0.09	0.345	0.356	0
	LTE Band 2	QPSK	20	50	0	Right Tilted	18900	1880	23.34	23.5	1.038	-0.13	0.255	0.265	0
	LTE Band 2	QPSK	20	1	0	Left Cheek	18900	1880	24.36	24.5	1.033	-0.05	0.398	0.411	0
	LTE Band 2	QPSK	20	50	0	Left Cheek	18900	1880	23.34	23.5	1.038	-0.02	0.316	0.328	0
	LTE Band 2	QPSK	20	1	0	Left Tilted	18900	1880	24.36	24.5	1.033	0.06	0.356	0.368	0
	LTE Band 2	QPSK	20	50	0	Left Tilted	18900	1880	23.34	23.5	1.038	0.04	0.267	0.277	0
#04	LTE Band 4	QPSK	20	1	49	Right Cheek	20175	1732.5	24.38	24.5	1.028	-0.06	0.579	**0.595**	0
	LTE Band 4	QPSK	20	50	24	Right Cheek	20175	1732.5	23.31	23.5	1.045	-0.01	0.466	0.487	0
	LTE Band 4	QPSK	20	1	49	Right Tilted	20175	1732.5	24.38	24.5	1.028	-0.16	0.256	0.263	0
	LTE Band 4	QPSK	20	50	24	Right Tilted	20175	1732.5	23.31	23.5	1.045	-0.16	0.210	0.219	0
	LTE Band 4	QPSK	20	1	49	Left Cheek	20175	1732.5	24.38	24.5	1.028	-0.04	0.380	0.391	0
	LTE Band 4	QPSK	20	50	24	Left Cheek	20175	1732.5	23.31	23.5	1.045	-0.15	0.315	0.329	0
	LTE Band 4	QPSK	20	1	49	Left Tilted	20175	1732.5	24.38	24.5	1.028	0.08	0.28	0.288	0
	LTE Band 4	QPSK	20	50	24	Left Tilted	20175	1732.5	23.31	23.5	1.045	0.04	0.231	0.241	0

Plot No.	Band	Mode	BW (MHz)	RB Size	RB Offset	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)	Reduced Power (dB)
	LTE Band 5	QPSK	10	1	0	Right Cheek	20525	836.5	24.28	24.5	1.052	-0.06	0.625	0.657	0
	LTE Band 5	QPSK	10	25	0	Right Cheek	20525	836.5	23.28	23.5	1.052	-0.05	0.491	0.517	0
	LTE Band 5	QPSK	10	1	0	Right Tilted	20525	836.5	24.28	24.5	1.052	0.16	0.494	0.520	0
	LTE Band 5	QPSK	10	25	0	Right Tilted	20525	836.5	23.28	23.5	1.052	-0.02	0.375	0.394	0
	LTE Band 5	QPSK	10	1	0	Left Cheek	20525	836.5	24.28	24.5	1.052	0.17	1.070	1.126	0
#05	LTE Band 5	QPSK	10	1	0	Left Cheek	20450	829	24.24	24.5	1.062	0.06	1.180	**1.253**	0
	LTE Band 5	QPSK	10	1	0	Left Cheek	20600	844	24.17	24.5	1.079	0.08	1.030	1.111	0
	LTE Band 5	QPSK	10	1	0	Left Cheek	20450	829	16.68	17.0	1.076	0.05	0.00548	0.006	7.5
	LTE Band 5	QPSK	10	25	0	Left Cheek	20525	836.5	23.28	23.5	1.052	0.08	0.771	0.811	0
	LTE Band 5	QPSK	10	25	0	Left Cheek	20450	829	23.21	23.5	1.069	0.07	0.825	0.882	0
	LTE Band 5	QPSK	10	25	0	Left Cheek	20600	844	23.16	23.5	1.081	0.09	0.732	0.792	0
	LTE Band 5	QPSK	10	50	0	Left Cheek	20525	836.5	23.25	23.5	1.059	0.09	0.759	0.804	0
	LTE Band 5	QPSK	10	1	0	Left Tilted	20525	836.5	24.28	24.5	1.052	0.09	0.720	0.757	0
	LTE Band 5	QPSK	10	25	0	Left Tilted	20525	836.5	23.28	23.5	1.052	0.12	0.540	0.568	0
#06	LTE Band 12	QPSK	10	1	24	Right Cheek	23095	707.5	24.28	24.5	1.052	-0.02	0.480	**0.505**	0
	LTE Band 12	QPSK	10	25	12	Right Cheek	23095	707.5	23.04	23.5	1.112	-0.16	0.307	0.341	0
	LTE Band 12	QPSK	10	1	24	Right Tilted	23095	707.5	24.28	24.5	1.052	-0.01	0.219	0.230	0
	LTE Band 12	QPSK	10	25	12	Right Tilted	23095	707.5	23.04	23.5	1.112	-0.17	0.152	0.169	0
	LTE Band 12	QPSK	10	1	24	Left Cheek	23095	707.5	24.28	24.5	1.052	0.08	0.431	0.453	0
	LTE Band 12	QPSK	10	25	12	Left Cheek	23095	707.5	23.04	23.5	1.112	0.06	0.276	0.307	0
	LTE Band 12	QPSK	10	1	24	Left Tilted	23095	707.5	24.28	24.5	1.052	0.08	0.265	0.279	0
	LTE Band 12	QPSK	10	25	12	Left Tilted	23095	707.5	23.04	23.5	1.112	0.07	0.185	0.206	0
#07	LTE Band 17	QPSK	10	1	24	Right Cheek	23790	710	24.76	25	1.057	-0.08	0.537	**0.568**	0
	LTE Band 17	QPSK	10	25	12	Right Cheek	23790	710	23.80	24	1.047	-0.03	0.432	0.452	0
	LTE Band 17	QPSK	10	1	24	Right Tilted	23790	710	24.76	25	1.057	0.18	0.274	0.290	0
	LTE Band 17	QPSK	10	25	12	Right Tilted	23790	710	23.80	24	1.047	-0.11	0.205	0.215	0
	LTE Band 17	QPSK	10	1	24	Left Cheek	23790	710	24.76	25	1.057	0.08	0.489	0.517	0
	LTE Band 17	QPSK	10	25	12	Left Cheek	23790	710	23.80	24	1.047	0.16	0.371	0.388	0
	LTE Band 17	QPSK	10	1	24	Left Tilted	23790	710	24.76	25	1.057	0.04	0.334	0.353	0
	LTE Band 17	QPSK	10	25	12	Left Tilted	23790	710	23.80	24	1.047	0.04	0.244	0.255	0

<WLAN 2.4GHz Band SAR>

Plot No.	Band	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
	WLAN 2.4GHz	802.11b, 1Mbps	Right Cheek	1	2412	14.85	15	1.035	-0.03	0.041	0.042
	WLAN 2.4GHz	802.11b, 1Mbps	Right Tilted	1	2412	14.85	15	1.035	0.1	0.020	0.021
#08	WLAN 2.4GHz	802.11b, 1Mbps	Left Cheek	1	2412	14.85	15	1.035	-0.05	0.064	**0.066**
	WLAN 2.4GHz	802.11b, 1Mbps	Left Tilted	1	2412	14.85	15	1.035	0.1	0.018	0.019

<WLAN 5GHz Band SAR>

Plot No.	Band	Mode	Test Position	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Duty Cycle %	Duty Cycle Compensate Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
	WLAN 5.2GHz	802.11a, 6Mbps	Right Cheek	48	5240	12.28	13	1.180	93.34	1.071	0.02	0.109	0.138
	WLAN 5.2GHz	802.11a, 6Mbps	Right Tilted	48	5240	12.28	13	1.180	93.34	1.071	0.04	0.024	0.031
	WLAN 5.2GHz	802.11a, 6Mbps	Left Cheek	48	5240	12.28	13	1.180	93.34	1.071	0.01	0.115	0.145
	WLAN 5.2GHz	802.11a, 6Mbps	Left Tilted	48	5240	12.28	13	1.180	93.34	1.071	0.05	0.029	0.037
#09	WLAN 5.2GHz	802.11ac VTH80, MCS0	Left Cheek	42	5210	11.43	12	1.140	76.50	1.307	0.04	0.120	**0.179**
	WLAN 5.8GHz	802.11a, 6Mbps	Right Cheek	149	5745	12.18	12.5	1.076	93.34	1.071	0.01	0.012	0.014
	WLAN 5.8GHz	802.11a, 6Mbps	Right Tilted	149	5745	12.18	12.5	1.076	93.34	1.071	0.1	0.026	0.030
#10	WLAN 5.8GHz	802.11a, 6Mbps	Left Cheek	149	5745	12.18	12.5	1.076	93.34	1.071	0.02	0.066	**0.076**
	WLAN 5.8GHz	802.11a, 6Mbps	Left Tilted	149	5745	12.18	12.5	1.076	93.34	1.071	0.08	0.016	0.018
	WLAN 5.8GHz	802.11ac VTH80, MCS0	Left Cheek	155	5775	11.95	12.5	1.135	76.5	1.307	0.05	0.046	0.068

12.3 Test Records for Hotspot SAR Test

Distance of the Antenna to the EUT surface/edge						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
Antenna 1	≤ 25mm	≤ 25mm	132mm	≤ 25mm	43mm	≤ 25mm
Antenna 2	≤ 25mm	≤ 25mm	132mm	≤ 25mm	≤ 25mm	38mm
Antenna 3	≤ 25mm	≤ 25mm	≤ 25mm	106mm	≤ 25mm	51mm
Antenna 4	≤ 25mm	≤ 25mm	51mm	71mm	62mm	≤ 25mm
Positions for SAR tests; Hotspot mode						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
Antenna 1	Yes	Yes	No	Yes	No	Yes
Antenna 2	Yes	Yes	No	Yes	Yes	No
Antenna 3	Yes	Yes	Yes	No	Yes	No
Antenna 4	Yes	Yes	No	No	No	Yes

Note:

1. Referring to KDB 941225 D06 v01r01, when the overall device length and width are ≥ 9cm*5cm, the test distance is 10 mm. SAR must be measured for all sides and surfaces with a transmitting antenna located within 25mm from that surface or edge.

<CDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)	Reduced Power (dB)
	CDMA2000 BC0	RTAP153.6	Front	1	1013	824.7	24.66	25	1.081	-0.03	0.506	0.547	0
	CDMA2000 BC0	RTAP153.6	Back	1	1013	824.7	24.66	25	1.081	-0.02	0.561	0.607	0
#11	CDMA2000 BC0	RTAP153.6	Left Side	1	1013	824.7	24.66	25	1.081	0.07	0.826	**0.893**	0
	CDMA2000 BC0	RTAP153.6	Left Side	1	384	836.52	24.43	25	1.140	0.1	0.710	0.810	0
	CDMA2000 BC0	RTAP153.6	Left Side	1	777	848.31	24.52	25	1.117	0.1	0.725	0.810	0
	CDMA2000 BC0	RTAP153.6	Bottom Side	1	1013	824.7	24.66	25	1.081	0.05	0.387	0.419	0
	CDMA2000 BC1	RTAP153.6	Front	1	600	1880	24.06	24.5	1.107	-0.05	0.887	0.982	0
	CDMA2000 BC1	RTAP153.6	Front	1	25	1851.25	24.05	24.5	1.109	0.05	0.793	0.880	0
	CDMA2000 BC1	RTAP153.6	Front	1	1175	1908.75	23.92	24.5	1.143	0.08	0.790	0.903	0
	CDMA2000 BC1	RTAP153.6	Back	1	600	1880	24.06	24.5	1.107	-0.04	0.864	0.956	0
	CDMA2000 BC1	RTAP153.6	Back	1	25	1851.25	24.05	24.5	1.109	-0.18	0.707	0.784	0
	CDMA2000 BC1	RTAP153.6	Back	1	1175	1908.75	23.92	24.5	1.143	-0.06	0.784	0.896	0
	CDMA2000 BC1	RTAP153.6	Left Side	1	600	1880	24.06	24.5	1.107	0.13	0.401	0.444	0
#12	CDMA2000 BC1	RTAP153.6	Bottom Side	1	600	1880	24.06	24.5	1.107	0.18	0.995	**1.101**	0
	CDMA2000 BC1	RTAP153.6	Bottom Side	1	25	1851.25	24.05	24.5	1.109	0.14	0.929	1.030	0
	CDMA2000 BC1	RTAP153.6	Bottom Side	1	1175	1908.75	23.92	24.5	1.143	0.03	0.856	0.978	0

<LTE SAR>

Plot No.	Band	Mode	BW (MHz)	RB Size	RB Offset	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)	Reduced Power (dB)
	LTE Band 2	QPSK	20	1	0	Front	1	18900	1880	24.36	24.5	1.033	-0.1	0.915	0.945	0
	LTE Band 2	QPSK	20	1	0	Front	1	18700	1860	24.12	24.5	1.091	-0.06	0.768	0.838	0
	LTE Band 2	QPSK	20	1	0	Front	1	19100	1900	24.09	24.5	1.099	-0.14	0.943	1.036	0
	LTE Band 2	QPSK	20	50	0	Front	1	18900	1880	23.34	23.5	1.038	-0.1	0.694	0.720	0
	LTE Band 2	QPSK	20	100	0	Front	1	18900	1880	23.18	23.5	1.076	-0.03	0.657	0.707	0
	LTE Band 2	QPSK	20	1	0	Back	1	18900	1880	24.36	24.5	1.033	0.13	1.150	1.188	0
	LTE Band 2	QPSK	20	1	0	Back	1	18700	1860	24.12	24.5	1.091	0.025	0.936	1.022	0
#13	LTE Band 2	QPSK	20	1	0	Back	1	19100	1900	24.09	24.5	1.099	0.13	1.140	**1.253**	0
	LTE Band 2	QPSK	20	50	0	Back	1	18900	1880	23.34	23.5	1.038	0.13	0.860	0.892	0
	LTE Band 2	QPSK	20	50	0	Back	1	18700	1860	22.99	23.5	1.125	0.03	0.764	0.859	0
	LTE Band 2	QPSK	20	50	0	Back	1	19100	1900	23.32	23.5	1.042	0.14	0.944	0.984	0
	LTE Band 2	QPSK	20	100	0	Back	1	18900	1880	23.18	23.5	1.076	0.05	0.829	0.892	0
	LTE Band 2	QPSK	20	1	0	Right Side	1	18900	1880	24.36	24.5	1.033	-0.0035	0.655	0.676	0
	LTE Band 2	QPSK	20	50	0	Right Side	1	18900	1880	23.34	23.5	1.038	0.04	0.497	0.516	0
	LTE Band 2	QPSK	20	1	0	Bottom Side	1	18900	1880	24.36	24.5	1.033	0.13	0.363	0.375	0
	LTE Band 2	QPSK	20	50	0	Bottom Side	1	18900	1880	23.34	23.5	1.038	0.1	0.258	0.268	0
	LTE Band 4	QPSK	20	1	49	Front	1	20175	1732.5	24.38	24.5	1.028	-0.04	0.867	0.891	0
	LTE Band 4	QPSK	20	1	49	Front	1	20050	1720	24.37	24.5	1.030	-0.02	0.889	0.916	0
	LTE Band 4	QPSK	20	1	49	Front	1	20300	1745	24.18	24.5	1.104	-0.06	0.951	1.024	0
	LTE Band 4	QPSK	20	50	24	Front	1	20175	1732.5	23.31	23.5	1.045	-0.03	0.748	0.781	0
	LTE Band 4	QPSK	20	100	0	Front	1	20175	1732.5	23.15	23.5	1.084	0.04	0.731	0.792	0
	LTE Band 4	QPSK	20	1	49	Back	1	20175	1732.5	24.38	24.5	1.028	0.03	1.110	1.141	0
	LTE Band 4	QPSK	20	1	49	Back	1	20050	1720	24.37	24.5	1.030	0.05	1.070	1.103	0
#14	LTE Band 4	QPSK	20	1	49	Back	1	20300	1745	24.18	24.5	1.104	0.02	1.180	**1.270**	0
	LTE Band 4	QPSK	20	50	24	Back	1	20175	1732.5	23.31	23.5	1.045	0.03	0.913	0.954	0
	LTE Band 4	QPSK	20	50	24	Back	1	20050	1720	23.30	23.5	1.047	0.04	1.010	1.058	0
	LTE Band 4	QPSK	20	50	24	Back	1	20300	1745	23.05	23.5	1.109	0.08	1.010	1.120	0
	LTE Band 4	QPSK	20	100	0	Back	1	20175	1732.5	23.15	23.5	1.084	0.02	0.890	0.965	0
	LTE Band 4	QPSK	20	1	49	Right Side	1	20175	1732.5	24.38	24.5	1.028	0.02	0.405	0.416	0
	LTE Band 4	QPSK	20	50	24	Right Side	1	20175	1732.5	23.31	23.5	1.045	-0.0028	0.331	0.346	0
	LTE Band 4	QPSK	20	1	49	Bottom Side	1	20175	1732.5	24.38	24.5	1.028	0.041	0.342	0.352	0
	LTE Band 4	QPSK	20	50	24	Bottom Side	1	20175	1732.5	23.31	23.5	1.045	0.09	0.264	0.276	0

Plot No.	Band	Mode	BW (MHz)	RB Size	RB Offset	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)	Reduced Power (dB)
#15	LTE Band 5	QPSK	10	1	0	Front	1	20525	836.5	24.28	24.5	1.052	0.09	0.417	**0.439**	0
	LTE Band 5	QPSK	10	25	0	Front	1	20525	836.5	23.28	23.5	1.052	0.03	0.319	0.336	0
	LTE Band 5	QPSK	10	1	0	Back	1	20525	836.5	24.28	24.5	1.052	-0.02	0.406	0.427	0
	LTE Band 5	QPSK	10	25	0	Back	1	20525	836.5	23.28	23.5	1.052	-0.04	0.286	0.301	0
	LTE Band 5	QPSK	10	1	0	Right Side	1	20525	836.5	24.28	24.5	1.052	0.09	0.263	0.277	0
	LTE Band 5	QPSK	10	25	0	Right Side	1	20525	836.5	23.28	23.5	1.052	0.0051	0.189	0.199	0
	LTE Band 5	QPSK	10	1	0	Top Side	1	20525	836.5	24.28	24.5	1.052	0.06	0.245	0.258	0
	LTE Band 5	QPSK	10	25	0	Top Side	1	20525	836.5	23.28	23.5	1.052	0.05	0.191	0.201	0
	LTE Band 12	QPSK	10	1	24	Front	1	23095	707.5	24.28	24.5	1.052	0.01	0.532	0.560	0
	LTE Band 12	QPSK	10	25	12	Front	1	23095	707.5	23.04	23.5	1.112	-0.0059	0.382	0.425	0
	LTE Band 12	QPSK	10	1	24	Back	1	23095	707.5	24.28	24.5	1.052	0.03	0.465	0.489	0
	LTE Band 12	QPSK	10	25	12	Back	1	23095	707.5	23.04	23.5	1.112	0.0006	0.411	0.457	0
#16	LTE Band 12	QPSK	10	1	24	Right Side	1	23095	707.5	24.28	24.5	1.052	0.02	0.653	**0.687**	0
	LTE Band 12	QPSK	10	25	12	Right Side	1	23095	707.5	23.04	23.5	1.112	0.02	0.507	0.564	0
	LTE Band 12	QPSK	10	1	24	Bottom Side	1	23095	707.5	24.28	24.5	1.052	0.17	0.453	0.477	0
	LTE Band 12	QPSK	10	25	12	Bottom Side	1	23095	707.5	23.04	23.5	1.112	0.18	0.279	0.310	0
	LTE Band 17	QPSK	10	1	24	Front	1	23790	710	24.76	25	1.057	0.01	0.665	0.703	0
	LTE Band 17	QPSK	10	25	12	Front	1	23790	710	23.80	24	1.047	0.0037	0.485	0.508	0
	LTE Band 17	QPSK	10	1	24	Back	1	23790	710	24.76	25	1.057	0.02	0.638	0.674	0
	LTE Band 17	QPSK	10	25	12	Back	1	23790	710	23.80	24	1.047	0.01	0.518	0.542	0
#17	LTE Band 17	QPSK	10	1	24	Right Side	1	23790	710	24.76	25	1.057	0.02	0.740	**0.782**	0
	LTE Band 17	QPSK	10	25	12	Right Side	1	23790	710	23.80	24	1.047	-0.05	0.493	0.516	0
	LTE Band 17	QPSK	10	1	24	Bottom Side	1	23790	710	24.76	25	1.057	0.17	0.495	0.523	0
	LTE Band 17	QPSK	10	25	12	Bottom Side	1	23790	710	23.80	24	1.047	0.16	0.402	0.421	0

<WLAN 2.4GHz Band SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
	WLAN 2.4GHz	802.11b, 1Mbps	Front	1	1	2412	14.85	15	1.035	0.06	0.017	0.018
#18	WLAN 2.4GHz	802.11b, 1Mbps	Back	1	1	2412	14.85	15	1.035	-0.02	0.054	**0.056**
	WLAN 2.4GHz	802.11b, 1Mbps	Left Side	1	1	2412	14.85	15	1.035	-0.05	0.013	0.013

< WLAN 5GHz Band SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Duty Cycle %	Duty Cycle Compensate Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
	WLAN 5.8GHz	802.11a, 6Mbps	Front	1	149	5745	12.18	12.5	1.076	93.34	1.071	0.01	0.0063	0.008
	WLAN 5.8GHz	802.11a, 6Mbps	Back	1	149	5745	12.18	12.5	1.076	93.34	1.071	0.08	0.056	0.065
#19	WLAN 5.8GHz	802.11a, 6Mbps	Left Side	1	149	5745	12.18	12.5	1.076	93.34	1.071	0.09	0.057	**0.066**
	WLAN 5.8GHz	802.11ac VTH80, MCS0	Left Side	1	155	5775	11.95	12.5	1.135	76.5	1.307	-0.01	0.033	0.049

12.4 Test Records for Body Worn SAR Test

<CDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Headset	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)	Reduced Power (dB)
	CDMA2000 BC0	RC3 SO32	Front	1	-	1013	824.7	24.65	25	1.084	-0.02	0.465	0.504	0
	CDMA2000 BC0	RC3 SO32	Front	1	-	1013	824.7	18.01	18.5	1.119	0.04	0.083	0.093	6.5
#20	CDMA2000 BC0	RC3 SO32	Back	1	-	1013	824.7	24.65	25	1.084	-0.03	0.560	**0.607**	0
	CDMA2000 BC0	RC3 SO32	Back	1	-	1013	824.7	18.01	18.5	1.119	0.1	0.084	0.094	6.5
	CDMA2000 BC0	RETAP 4096	Back	1	-	1013	824.7	24.68	25	1.076	-0.0041	0.561	0.604	0
	CDMA2000 BC0	RC3 SO32	Back	1	Headset	1013	824.7	24.65	25	1.084	-0.01	0.542	0.587	0
	CDMA2000 BC0	RC3 SO32	Back	1	Headset	1013	824.7	18.01	18.5	1.119	-0.01	0.098	0.110	6.5
	CDMA2000 BC1	RC3 SO32	Front	1	-	600	1880	23.98	24.5	1.127	0.05	0.968	1.091	0
	CDMA2000 BC1	RC3 SO32	Front	1	-	600	1880	15.55	16	1.109	-0.024	0.102	0.113	8.5
	CDMA2000 BC1	RC3 SO32	Front	1	-	25	1851.25	23.95	24.5	1.135	-0.03	0.850	0.965	0
	CDMA2000 BC1	RC3 SO32	Front	1	-	1175	1908.75	23.9	24.5	1.148	0.04	0.801	0.920	0
	CDMA2000 BC1	RETAP 4096	Front	1	-	600	1880	24.1	24.5	1.096	-0.03	0.911	0.999	0
	CDMA2000 BC1	RETAP 4096	Front	1	-	25	1851.25	24.06	24.5	1.107	0.07	0.798	0.883	0
	CDMA2000 BC1	RETAP 4096	Front	1	-	1175	1908.75	23.96	24.5	1.132	0.1	0.786	0.890	0
	CDMA2000 BC1	RC3 SO32	Back	1	-	600	1880	23.98	24.5	1.127	-0.12	0.863	0.973	0
	CDMA2000 BC1	RC3 SO32	Back	1	-	600	1880	15.55	16	1.109	-0.04	0.114	0.126	8.5
	CDMA2000 BC1	RC3 SO32	Back	1	-	25	1851.25	23.95	24.5	1.135	-0.17	0.711	0.807	0
	CDMA2000 BC1	RC3 SO32	Back	1	-	1175	1908.75	23.9	24.5	1.148	-0.1	0.722	0.829	0
#21	CDMA2000 BC1	RC3 SO32	Back	1	Headset	600	1880	23.98	24.5	1.127	-0.02	1.010	**1.138**	0
	CDMA2000 BC1	RC3 SO32	Back	1	Headset	600	1880	15.55	16	1.109	-0.02	0.090	0.100	8.5
	CDMA2000 BC1	RC3 SO32	Back	1	Headset	25	1851.25	23.95	24.5	1.135	-0.05	0.896	1.017	0
	CDMA2000 BC1	RC3 SO32	Back	1	Headset	1175	1908.75	23.9	24.5	1.148	-0.01	0.893	1.025	0

<LTE SAR>

Plot No.	Band	Mode	BW (MHz)	RB Size	RB Offset	Test Position	Gap (cm)	Headset	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)	Reduced Power (dB)
	LTE Band 2	QPSK	20	1	0	Front	1	-	18900	1880	24.36	24.5	1.033	-0.1	0.915	0.945	0
	LTE Band 2	QPSK	20	1	0	Front	1	-	18700	1860	24.12	24.5	1.091	-0.06	0.768	0.838	0
	LTE Band 2	QPSK	20	1	0	Front	1	-	19100	1900	24.09	24.5	1.099	-0.14	0.943	1.036	0
	LTE Band 2	QPSK	20	1	0	Front	1	-	19100	1900	16.52	17	1.117	-0.023	0.149	0.166	7.5
	LTE Band 2	QPSK	20	50	0	Front	1	-	18900	1880	23.34	23.5	1.038	-0.1	0.694	0.720	0
	LTE Band 2	QPSK	20	100	0	Front	1	-	18900	1880	23.18	23.5	1.076	-0.03	0.657	0.707	0
	LTE Band 2	QPSK	20	1	0	Back	1	-	18900	1880	24.36	24.5	1.033	0.13	1.150	1.188	0
	LTE Band 2	QPSK	20	1	0	Back	1	-	18700	1860	24.12	24.5	1.091	0.025	0.936	1.022	0
	LTE Band 2	QPSK	20	1	0	Back	1	-	19100	1900	24.09	24.5	1.099	0.13	1.140	1.253	0
	LTE Band 2	QPSK	20	1	0	Back	1	-	19100	1900	16.52	17	1.117	0.08	0.18	0.201	7.5
	LTE Band 2	QPSK	20	50	0	Back	1	-	18900	1880	23.34	23.5	1.038	0.13	0.860	0.892	0
	LTE Band 2	QPSK	20	50	0	Back	1	-	18700	1860	22.99	23.5	1.125	0.03	0.764	0.859	0
	LTE Band 2	QPSK	20	50	0	Back	1	-	19100	1900	23.32	23.5	1.042	0.14	0.944	0.984	0
	LTE Band 2	QPSK	20	100	0	Back	1	-	18900	1880	23.18	23.5	1.076	0.05	0.829	0.892	0
#22	LTE Band 2	QPSK	20	1	0	Back	1	Headset	19100	1900	24.09	24.5	1.099	0.06	1.230	**1.352**	0
	LTE Band 2	QPSK	20	1	0	Back	1	Headset	19100	1900	16.52	17	1.117	-0.07	0.203	0.227	7.5
	LTE Band 2	QPSK	20	1	0	Back	1	Headset	18700	1860	24.12	24.5	1.091	0.03	1.030	1.124	0
	LTE Band 2	QPSK	20	1	0	Back	1	Headset	18900	1880	24.36	24.5	1.033	-0.05	1.280	1.322	0
	LTE Band 4	QPSK	20	1	49	Front	1	-	20175	1732.5	24.38	24.5	1.028	-0.04	0.867	0.891	0
	LTE Band 4	QPSK	20	1	49	Front	1	-	20050	1720	24.37	24.5	1.030	-0.02	0.889	0.916	0
	LTE Band 4	QPSK	20	1	49	Front	1	-	20300	1745	24.18	24.5	1.104	-0.06	0.951	1.024	0
	LTE Band 4	QPSK	20	1	49	Front	1	-	20300	1745	16.85	17	1.035	0.03	0.151	0.156	7.5
	LTE Band 4	QPSK	20	50	24	Front	1		20175	1732.5	23.31	23.5	1.045	-0.03	0.748	0.781	0
	LTE Band 4	QPSK	20	100	0	Front	1		20175	1732.5	23.15	23.5	1.084	0.04	0.731	0.792	0
	LTE Band 4	QPSK	20	1	49	Back	1	-	20175	1732.5	24.38	24.5	1.028	0.03	1.110	1.141	0
	LTE Band 4	QPSK	20	1	49	Back	1	-	20050	1720	24.37	24.5	1.030	0.05	1.070	1.103	0
	LTE Band 4	QPSK	20	1	49	Back	1	-	20300	1745	24.18	24.5	1.104	0.02	1.180	1.270	0
	LTE Band 4	QPSK	20	1	49	Back	1	-	20300	1745	16.85	17	1.035	0.022	0.212	0.219	7.5
	LTE Band 4	QPSK	20	50	24	Back	1		20175	1732.5	23.31	23.5	1.045	0.03	0.913	0.954	0
	LTE Band 4	QPSK	20	50	24	Back	1		20050	1720	23.30	23.5	1.047	0.04	1.010	1.058	0
	LTE Band 4	QPSK	20	50	24	Back	1		20300	1745	23.05	23.5	1.109	0.08	1.010	1.120	0
	LTE Band 4	QPSK	20	100	0	Back	1		20175	1732.5	23.15	23.5	1.084	0.02	0.890	0.965	0
#23	LTE Band 4	QPSK	20	1	49	Back	1	Headset	20300	1745	24.18	24.5	1.104	0.04	1.300	**1.399**	0
	LTE Band 4	QPSK	20	1	49	Back	1	Headset	20300	1745	16.85	17	1.035	-0.14	0.219	0.227	7.5
	LTE Band 4	QPSK	20	1	49	Back	1	Headset	20050	1720	24.37	24.5	1.030	0.01	1.250	1.288	0
	LTE Band 4	QPSK	20	1	49	Back	1	Headset	20175	1732.5	24.38	24.5	1.028	0.03	1.250	1.285	0

Plot No.	Band	Mode	BW (MHz)	RB Size	RB Offset	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)	Reduced Power (dB)
#15	LTE Band 5	QPSK	10	1	0	Front	1	20525	836.5	24.28	24.5	1.052	0.09	0.417	**0.439**	0
	LTE Band 5	QPSK	10	1	0	Front	1	20525	836.5	16.83	17	1.040	0.01	0.00929	0.010	7.5
	LTE Band 5	QPSK	10	25	0	Front	1	20525	836.5	23.28	23.5	1.052	0.03	0.319	0.336	0
	LTE Band 5	QPSK	10	1	0	Back	1	20525	836.5	24.28	24.5	1.052	-0.02	0.406	0.427	0
	LTE Band 5	QPSK	10	1	0	Back	1	20525	836.5	16.83	17	1.040	0.12	0.055	0.057	7.5
	LTE Band 5	QPSK	10	25	0	Back	1	20525	836.5	23.28	23.5	1.052	-0.04	0.286	0.301	0
#24	LTE Band 12	QPSK	10	1	24	Front	1	23095	707.5	24.28	24.5	1.052	0.01	0.532	**0.560**	0
	LTE Band 12	QPSK	10	1	24	Front	1	23095	707.5	16.75	17	1.059	0.01	0.090	0.095	7.5
	LTE Band 12	QPSK	10	25	12	Front	1	23095	707.5	23.04	23.5	1.112	-0.0059	0.382	0.425	0
	LTE Band 12	QPSK	10	1	24	Back	1	23095	707.5	24.28	24.5	1.052	0.03	0.465	0.489	0
	LTE Band 12	QPSK	10	1	24	Back	1	23095	707.5	16.75	17	1.059	-0.02	0.162	0.172	7.5
	LTE Band 12	QPSK	10	25	12	Back	1	23095	707.5	23.04	23.5	1.112	0.0006	0.411	0.457	0
#25	LTE Band 17	QPSK	10	1	24	Front	1	23790	710	24.76	25	1.057	0.01	0.665	**0.703**	0
	LTE Band 17	QPSK	10	1	24	Front	1	23790	710	16.81	17	1.045	0.09	0.091	0.095	8
	LTE Band 17	QPSK	10	25	12	Front	1	23790	710	23.8	24	1.047	0.0037	0.485	0.508	0
	LTE Band 17	QPSK	10	1	24	Back	1	23790	710	24.76	25	1.057	0.02	0.638	0.674	0
	LTE Band 17	QPSK	10	1	24	Back	1	23790	710	16.81	17	1.045	0.02	0.171	0.179	8
	LTE Band 17	QPSK	10	25	12	Back	1	23790	710	23.8	24	1.047	0.01	0.518	0.542	0

<WLAN 2.4GHz Band SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Headset	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
	WLAN 2.4GHz	802.11b, 1Mbps	Front	1	-	1	2412	14.85	15	1.035	0.06	0.017	0.018
#18	WLAN 2.4GHz	802.11b, 1Mbps	Back	1	-	1	2412	14.85	15	1.035	-0.02	0.054	**0.056**
	WLAN 2.4GHz	802.11b, 1Mbps	Back	1	Headset	1	2412	14.85	15	1.035	-0.1	0.052	0.054

< WLAN 5GHz Band SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Headset	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Duty Cycle %	Duty Cycle Compensate Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
	WLAN 5.2GHz	802.11a, 6Mbps	Front	1	-	48	5240	12.28	13	1.180	93.34	1.071	0.02	0.012	0.015
	WLAN 5.2GHz	802.11a, 6Mbps	Back	1	-	48	5240	12.28	13	1.180	93.34	1.071	-0.02	0.219	0.277
#26	WLAN 5.2GHz	802.11a, 6Mbps	Back	1	Headset	48	5240	12.28	13	1.180	93.34	1.071	-0.09	0.220	**0.279**
	WLAN 5.2GHz	802.11ac VTH80, MCS0	Back	1	Headset	42	5210	11.43	12	1.140	76.5	1.307	0.05	0.122	0.181
	WLAN 5.8GHz	802.11a, 6Mbps	Front	1	-	149	5745	12.18	12.5	1.076	93.34	1.071	0.01	0.0063	0.008
	WLAN 5.8GHz	802.11a, 6Mbps	Back	1	-	149	5745	12.18	12.5	1.076	93.34	1.071	0.08	0.056	0.065
#27	WLAN 5.8GHz	802.11a, 6Mbps	Back	1	Headset	149	5745	12.18	12.5	1.076	93.34	1.071	-0.01	0.064	**0.074**
	WLAN 5.8GHz	802.11ac VTH80, MCS0	Back	1	Headset	155	5775	11.95	12.5	1.135	76.5	1.307	-0.09	0.031	0.047

12.5 Repeated SAR Measurement

No.	Band	Mode	BW (MHz)	RB Size	RB Offset	Test Position	Gap (cm)	Headset	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Ratio	Reported SAR_{1g} (W/kg)	Reduced Power (dB)
1st	LTE Band 2	QPSK	20	1	0	Back	1	Headset	18900	1880	24.36	24.5	1.033	-0.05	1.280	-	1.322	0
2nd	LTE Band 2	QPSK	20	1	0	Back	1	Headset	18900	1880	24.36	24.5	1.033	0.02	1.270	1.008	1.312	0
1st	LTE Band 4	QPSK	20	1	49	Back	1	Headset	20300	1745	24.18	24.5	1.104	0.04	1.300	-	1.399	0
2nd	LTE Band 4	QPSK	20	1	49	Back	1	Headset	20300	1745	24.18	24.5	1.104	0.05	1.290	1.008	1.389	0
1st	LTE Band 5	QPSK	10	1	0	Left Cheek	-	-	20450	829	24.24	24.5	1.062	0.06	1.180	-	1.253	0
2nd	LTE Band 5	QPSK	10	1	0	Left Cheek	-	-	20450	829	24.24	24.5	1.062	0.06	1.170	1.009	1.242	0

Note:

1. Per KDB 865664 D01v01r03, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg
2. Per KDB 865664 D01v01r03, if the ratio among the repeated measurement is ≤ 1.2 and the measured SAR <1.45W/kg, only one repeated measurement is required.
3. The ratio is the largest SAR to the smallest SAR among original and repeated measurement.
4. All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.

13. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Portable Handset Exposure positions			Note
		Head	Body-worn	Hotspot	
1.	CDMA(voice) + LTE(data) + WLAN 2.4GHz	Yes	Yes	No(1)	SVLTE + 2.4GHz Hotspot
2.	CDMA(voice) + LTE(data) + WLAN 5GHz	Yes	Yes	No(1)	SVLTE + 5GHz WiFi Direct
3.	CDMA(voice) + LTE(data) + Bluetooth	No	Yes	No(1)	SVLTE + Bluetooth
4.	CDMA(voice) + LTE(data)	Yes	Yes	No	SVLTE
5.	CDMA(voice) + WLAN 2.4GHz	Yes	Yes	No	-
6.	CDMA(voice) + WLAN 5GHz	Yes	Yes	No	-
7.	CDMA(voice) + Bluetooth	No	Yes	No	-
8.	CDMA(data) + WLAN 2.4GHz	Yes	Yes	Yes	2.4GHz Hotspot
9.	CDMA(data) + WLAN 5.8GHz	Yes	Yes	Yes	5GHz WiFi Direct(GO/GC)
10.	CDMA(data) + WLAN 5.2GHz	Yes	Yes	No	5GHz WiFi Direct(GC)
11.	CDMA(data) + Bluetooth	No	Yes	Yes	-
12.	LTE(data) + WLAN 2.4GHz	Yes	Yes	Yes	2.4GHz Hotspot
13.	LTE(data) + WLAN 5.8GHz	Yes	Yes	Yes	5GHz WiFi Direct(GO/GC)
14.	LTE(data) + WLAN 5.2GHz	Yes	Yes	No	5GHz WiFi Direct(GC)
15.	LTE(data) + Bluetooth	No	Yes	Yes	-

Note:

1. SAR testing in hotspot mode exposure positions is for wireless router functions of data connection. According to KDB 941225 D06 v01r01, SAR compliance of simultaneous voice and hotspot mode data configurations was evaluated in head and body-worn accessory use conditions.
2. This device supports VoIP in CDMA and LTE (e.g. 3rd party VoIP).
3. This device 2.4GHz WLAN supports hotspot operation, and 2.4GHz / 5.8GHz WLAN supports WiFi Direct (GC/GO), and 5.2GHz supports WiFi Direct (GC only).
4. WLAN 2.4GHz and Bluetooth share the same antenna, and cannot transmit simultaneously.
5. EUT will choose either WLAN 2.4GHz or WLAN 5GHz according to the network signal condition; therefore, they will not transmit simultaneously.
6. The reported SAR summation is calculated based on the same configuration and test position.
7. Per KDB 447498 D01v05r02, simultaneous transmission SAR is compliant if,
   i) Scalar SAR summation < 1.6W/kg.
   ii) SPLSR = $(SAR_1 + SAR_2)^{1.5}$ / (*min. separation distance, mm*), and the peak separation distance is determined from the square root of $[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$, where (x_1, y_1, z_1) and (x_2, y_2, z_2) are the coordinates of the extrapolated peak SAR locations in the zoom scan
   If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary
   iii) Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg
8. For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D1v05r02 based on the formula below.
   i) (*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)]·[$\sqrt{}$f(GHz)/*x*] W/kg for *test separation distances* ≤ 50 mm; where *x* = 7.5 for 1-g SAR, and *x* = 18.75 for 10-g SAR.
   ii) When the minimum test separation distance is < 5mm, the distance is used 5mm to determine SAR test exclusion.
   iii) 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the *test separation distances* is > 50 mm.
   iv) If the test separation distance (antenna-user) is < 5mm, 5mm is used to determine Bluetooth estimated SAR.

Maximum Power	Exposure Position	Hotspot	Body-worn
	Test separation	10 mm	10 mm
6 dBm	Estimated SAR (W/kg)	0.084W/kg	0.084W/kg

The implemented power combinations (Unit: dBm)

SVLTE Mode			
Voice Mode		Data Mode	
1xRTT BC0	1xRTT BC1	LTE Band 2/4/5/12 QPSK 1RB	LTE Band 17 QPSK 1RB
P < 18.5 dBm	P < 16.0 dBm	24.5 dBm	25.0 dBm
P ≥ 18.5 dBm	P ≥ 16.0 dBm	17.0 dBm	17.0 dBm

Alternative combinations (Unit: dBm) – For analysis purpose only

Power combination	CDMA2000 1x voice	LTE data mode
#1	**Full Power** CDMA2000 BC0: 25.0dBm CDMA2000 BC1: 24.5 dBm	**Full Power** LTE Band 2/4/5/12: 24.5 dBm LTE Band 17: 25.0 dBm
#2	**Reduced Power** CDMA2000 BC0: 18.5dBm CDMA2000 BC1: 16.0 dBm	**Full Power** LTE Band 2/4/5/12: 24.5 dBm LTE Band 17: 25.0 dBm
#3	**Full Power** CDMA2000 BC0: 25.0dBm CDMA2000 BC1: 24.5 dBm	**Reduced Power** LTE Band 2/4/5/12/17: 17.0 dBm

Note:

1. For SVLTE mode which means LTE (data) and CDMA 1xRTT (voice) transmitting simultaneously, power reduction is implemented.
2. When EUT 1xRTT BC0 output power is ≥ 18.5dBm and 1xRTT BC1 output power is ≥ 16.0dBm, LTE maximum output power is limited to 17.0dBm regardless of the power control command from the base station.

Analysis Procedure:

Step1

1. Per KDB 941225 D05 v02r03, maximum power standalone SAR of 1xRTT/EVDO/LTE is used for simultaneous transmission analysis.
2. Start analysis from full power combination (Alternative Power combination #1).
3. If 1g-SAR scalar summation < 1.6W/kg, simultaneous SAR measurement and further evaluations are not necessary.
4. If 1g-SAR summation >1.6W/kg, SPLSR calculation is necessary.
5. If SPLSR ≤ 0.04, further evaluation is not required.

Step2

1. For the cases from step1, power combinations #2/#3 are used in further step2 analysis.
2. If 1g-SAR scalar summation < 1.6W/kg, simultaneous SAR measurement and further evaluations are not necessary.
3. If SPLSR ≤ 0.04, volume scan evaluation is not required.

13.1 Head Exposure Conditions

Table 13.1-A1: Head SAR analysis <Step1>

NO.	Simultaneous Transmission Configurations	Portable Handset Exposure position	Note
		Head	
1.	CDMA(voice) + LTE(data) + WLAN 2.4GHz	Yes	SVLTE + 2.4GHz Hotspot
2.	CDMA(voice) + LTE(data) + WLAN 5GHz	Yes	SVLTE + 5GHz WiFi Direct
3.	CDMA(voice) + LTE(data) + Bluetooth	No	-
4.	CDMA(voice) + LTE(data)	Yes	SVLTE
5.	CDMA(voice) + WLAN 2.4GHz	Yes	-
6.	CDMA(voice) + WLAN 5GHz	Yes	-
7.	CDMA(voice) + Bluetooth	No	-
8.	CDMA(data) + WLAN 2.4GHz	Yes	2.4GHz Hotspot
9.	CDMA(data) + WLAN 5.8GHz	Yes	5GHz WiFi Direct(GO/GC)
10.	CDMA(data) + WLAN 5.2GHz	Yes	5GHz WiFi Direct(GC)
11.	CDMA(data) + Bluetooth	No	-
12.	LTE(data) + WLAN 2.4GHz	Yes	2.4GHz Hotspot
13.	LTE(data) + WLAN 5.8GHz	Yes	5GHz WiFi Direct(GO/GC)
14.	LTE(data) + WLAN 5.2GHz	Yes	5GHz WiFi Direct(GC)
15.	LTE(data) + Bluetooth	No	-

<WWAN Voice + WWAN Data + WLAN 2.4GHz>

	CDMA (voice)			LTE (data)			WLAN 2.4GHz		Summed SAR (W/kg)	SPLSR	SPLSR Case No	Remark
Position	Band	Average Power (dBm)	Max. WWAN SAR (W/kg)	Band	Average Power (dBm)	Max. WWAN SAR (W/kg)	Average Power (dBm)	Max. WLAN SAR (W/kg)				
Right Cheek	BC0	24.73	0.371	Band 2	24.36	0.795	14.85	0.042	1.21			
	BC0	24.73	0.371	Band 4	24.38	0.595	14.85	0.042	1.01			
	BC0	24.73	0.371	Band 5	24.28	0.657	14.85	0.042	1.07			
	BC0	24.73	0.371	Band 12	24.28	0.505	14.85	0.042	0.92			
	BC0	24.73	0.371	Band 17	24.76	0.568	14.85	0.042	0.98			
	BC1	24.14	0.437	Band 2	24.36	0.795	14.85	0.042	1.27			
	BC1	24.14	0.437	Band 4	24.38	0.595	14.85	0.042	1.07			
	BC1	24.14	0.437	Band 5	24.28	0.657	14.85	0.042	1.14			
	BC1	24.14	0.437	Band 12	24.28	0.505	14.85	0.042	0.98			
	BC1	24.14	0.437	Band 17	24.76	0.568	14.85	0.042	1.05			
Right Tilted	BC0	24.73	0.254	Band 2	24.36	0.356	14.85	0.021	0.63			
	BC0	24.73	0.254	Band 4	24.38	0.263	14.85	0.021	0.54			
	BC0	24.73	0.254	Band 5	24.28	0.520	14.85	0.021	0.80			
	BC0	24.73	0.254	Band 12	24.28	0.230	14.85	0.021	0.51			
	BC0	24.73	0.254	Band 17	24.76	0.290	14.85	0.021	0.57			
	BC1	24.14	0.364	Band 2	24.36	0.356	14.85	0.021	0.74			
	BC1	24.14	0.364	Band 4	24.38	0.263	14.85	0.021	0.65			
	BC1	24.14	0.364	Band 5	24.28	0.520	14.85	0.021	0.91			
	BC1	24.14	0.364	Band 12	24.28	0.230	14.85	0.021	0.62			
	BC1	24.14	0.364	Band 17	24.76	0.290	14.85	0.021	0.68			
Left Cheek	BC0	24.68	0.463	Band 2	24.36	0.411	14.85	0.066	0.94			
	BC0	24.68	0.463	Band 4	24.38	0.391	14.85	0.066	0.92			
	BC0	24.68	0.463	Band 5	24.24	1.253	14.85	0.066	**1.78**	0.03	#A1-1	
	BC0	24.68	0.463	Band 12	24.28	0.453	14.85	0.066	0.98			
	BC0	24.68	0.463	Band 17	24.76	0.517	14.85	0.066	1.05			
	BC1	24.14	0.880	Band 2	24.36	0.411	14.85	0.066	1.36			
	BC1	24.14	0.880	Band 4	24.38	0.391	14.85	0.066	1.34			
	BC1	24.14	0.880	Band 5	24.24	1.253	14.85	0.066	**2.20**			Note1
	BC1	24.14	0.880	Band 12	24.28	0.453	14.85	0.066	1.40			
	BC1	24.14	0.880	Band 17	24.76	0.517	14.85	0.066	1.46			
Left Tilted	BC0	24.73	0.258	Band 2	24.36	0.368	14.85	0.019	0.65			
	BC0	24.73	0.258	Band 4	24.38	0.288	14.85	0.019	0.57			
	BC0	24.73	0.258	Band 5	24.28	0.757	14.85	0.019	1.03			
	BC0	24.73	0.258	Band 12	24.28	0.279	14.85	0.019	0.56			
	BC0	24.73	0.258	Band 17	24.76	0.353	14.85	0.019	0.63			
	BC1	24.14	0.325	Band 2	24.36	0.368	14.85	0.019	0.71			
	BC1	24.14	0.325	Band 4	24.38	0.288	14.85	0.019	0.63			
	BC1	24.14	0.325	Band 5	24.28	0.757	14.85	0.019	1.10			
	BC1	24.14	0.325	Band 12	24.28	0.279	14.85	0.019	0.62			
	BC1	24.14	0.325	Band 17	24.76	0.353	14.85	0.019	0.70			

Remark:

1. Further analysis in Table 13.1-A2
2. The analysis above will represent the compliance of the simultaneous transmission of a WWAN voice call and WWAN data transmission, since the possible WWAN output power configuration in SVLTE mode(2 transmitters) is exactly the same as the configuration in SVLTE+WLAN (3 transmitters).

<WWAN Voice + WWAN Data + WLAN 5GHz>

	CDMA (voice)			LTE (data)			WLAN 5GHz		Summed SAR (W/kg)	SPLSR	SPLSR Case No	Remark
Position	Band	Average Power (dBm)	Max. WWAN SAR (W/kg)	WWAN Band	Average Power (dBm)	Max. WWAN SAR (W/kg)	Average Power (dBm)	Max. WLAN SAR (W/kg)				
Right Cheek	BC0	24.73	0.371	Band 2	24.36	0.795	12.28	0.138	1.30			
	BC0	24.73	0.371	Band 4	24.38	0.595	12.28	0.138	1.10			
	BC0	24.73	0.371	Band 5	24.28	0.657	12.28	0.138	1.17			
	BC0	24.73	0.371	Band 12	24.28	0.505	12.28	0.138	1.01			
	BC0	24.73	0.371	Band 17	24.76	0.568	12.28	0.138	1.08			
	BC1	24.14	0.437	Band 2	24.36	0.795	12.28	0.138	1.37			
	BC1	24.14	0.437	Band 4	24.38	0.595	12.28	0.138	1.17			
	BC1	24.14	0.437	Band 5	24.28	0.657	12.28	0.138	1.23			
	BC1	24.14	0.437	Band 12	24.28	0.505	12.28	0.138	1.08			
	BC1	24.14	0.437	Band 17	24.76	0.568	12.28	0.138	1.14			
Right Tilted	BC0	24.73	0.254	Band 2	24.36	0.356	12.28	0.031	0.64			
	BC0	24.73	0.254	Band 4	24.38	0.263	12.28	0.031	0.55			
	BC0	24.73	0.254	Band 5	24.28	0.520	12.28	0.031	0.81			
	BC0	24.73	0.254	Band 12	24.28	0.230	12.28	0.031	0.52			
	BC0	24.73	0.254	Band 17	24.76	0.290	12.28	0.031	0.58			
	BC1	24.14	0.364	Band 2	24.36	0.356	12.28	0.031	0.75			
	BC1	24.14	0.364	Band 4	24.38	0.263	12.28	0.031	0.66			
	BC1	24.14	0.364	Band 5	24.28	0.520	12.28	0.031	0.92			
	BC1	24.14	0.364	Band 12	24.28	0.230	12.28	0.031	0.63			
	BC1	24.14	0.364	Band 17	24.76	0.290	12.28	0.031	0.69			
Left Cheek	BC0	24.68	0.463	Band 2	24.36	0.411	11.43	0.179	1.05			
	BC0	24.68	0.463	Band 4	24.38	0.391	11.43	0.179	1.03			
	BC0	24.68	0.463	Band 5	24.24	1.253	11.43	0.179	**1.90**	0.03	#A1-2	
	BC0	24.68	0.463	Band 12	24.28	0.453	11.43	0.179	1.10			
	BC0	24.68	0.463	Band 17	24.76	0.517	11.43	0.179	1.16			
	BC1	24.14	0.880	Band 2	24.36	0.411	11.43	0.179	1.47			
	BC1	24.14	0.880	Band 4	24.38	0.391	11.43	0.179	1.45			
	BC1	24.14	0.880	Band 5	24.24	1.253	11.43	0.179	**2.31**			Note1
	BC1	24.14	0.880	Band 12	24.28	0.453	11.43	0.179	1.51			
	BC1	24.14	0.880	Band 17	24.76	0.517	11.43	0.179	**1.58**			
Left Tilted	BC0	24.73	0.258	Band 2	24.36	0.368	12.28	0.037	0.66			
	BC0	24.73	0.258	Band 4	24.38	0.288	12.28	0.037	0.58			
	BC0	24.73	0.258	Band 5	24.28	0.757	12.28	0.037	1.05			
	BC0	24.73	0.258	Band 12	24.28	0.279	12.28	0.037	0.57			
	BC0	24.73	0.258	Band 17	24.76	0.353	12.28	0.037	0.65			
	BC1	24.14	0.325	Band 2	24.36	0.368	12.28	0.037	0.73			
	BC1	24.14	0.325	Band 4	24.38	0.288	12.28	0.037	0.65			
	BC1	24.14	0.325	Band 5	24.28	0.757	12.28	0.037	1.12			
	BC1	24.14	0.325	Band 12	24.28	0.279	12.28	0.037	0.64			
	BC1	24.14	0.325	Band 17	24.76	0.353	12.28	0.037	0.72			

Remark:

1. Further analysis in Table 13.1-A2
2. The analysis above will represent the compliance of the simultaneous transmission of a WWAN voice call and WWAN data transmission, since the possible WWAN output power configuration in SVLTE mode(2 transmitters) is exactly the same as the configuration in SVLTE+WLAN (3 transmitters).

Table 13.1-A2: Head SAR analysis <Step2>

<WWAN Voice + WWAN Data + WLAN 2.4GHz>

	CDMA (voice)			LTE (data)			WLAN 2.4GHz		Summed SAR (W/kg)	SPLSR	SPLSR Case No	Remark
Position	Band	Average Power (dBm)	Max. WWAN SAR (W/kg)	Band	Average Power (dBm)	Max. WWAN SAR (W/kg)	Average Power (dBm)	Max. WLAN SAR (W/kg)				
Left Cheek	BC1	24.14	0.880	Band 5	24.24	1.253	14.85	0.066	**2.20**			Note1
	BC1	15.50	0.093	Band 5	24.24	1.253	14.85	0.066	1.41			
	BC1	24.14	0.880	Band 5	16.68	0.006	14.85	0.066	0.95			

<WWAN Voice + WWAN Data + WLAN 5GHz>

	WWAN (voice)			WWAN (data)			WLAN 5GHz		Summed SAR (W/kg)	SPLSR	SPLSR Case No	Remark
Position	Band	Average Power (dBm)	Max. WWAN SAR (W/kg)	Band	Average Power (dBm)	Max. WWAN SAR (W/kg)	Average Power (dBm)	Max. WLAN SAR (W/kg)				
Left Cheek	BC1	24.14	0.880	Band 5	24.24	1.253	11.43	0.179	**2.31**			Note1
	BC1	15.50	0.093	Band 5	24.24	1.253	11.43	0.179	1.53			
	BC1	24.14	0.880	Band 5	16.68	0.006	11.43	0.179	1.07			

Remark:

1. In SVLTE mode, LTE operation will enter reduced power mode when CDMA power exceeds certain threshold. For these test cases that scalar SAR summation of both CDMA and LTE in full power mode exceeds 1.6W/kg, the analysis of the simultaneous operation of the actual transmit power level is illustrated in the row items below.
2. If 1g-SAR scalar summation < 1.6W/kg, simultaneous SAR measurement and further evaluations are not necessary.
3. If SPLSR ≤ 0.04, volume scan evaluation is not required.

13.2 Hotspot Exposure Conditions

Table 13.2-B1: Hotspot mode SAR analysis
Refer to Exposure Positions Consideration in section 11

Distance of the Antenna to the EUT surface/edge						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
Antenna 1	≤ 25mm	≤ 25mm	132mm	≤ 25mm	43mm	≤ 25mm
Antenna 2	≤ 25mm	≤ 25mm	132mm	≤ 25mm	≤ 25mm	38mm
Antenna 3	≤ 25mm	≤ 25mm	≤ 25mm	106mm	≤ 25mm	51mm
Antenna 4	≤ 25mm	≤ 25mm	51mm	71mm	62mm	≤ 25mm
Positions for SAR tests; Hotspot mode						
Antennas	Back	Front	Top Side	Bottom Side	Right Side	Left Side
Antenna 1	Yes	Yes	No	Yes	No	Yes
Antenna 2	Yes	Yes	No	Yes	Yes	No
Antenna 3	Yes	Yes	Yes	No	Yes	No
Antenna 4	Yes	Yes	No	No	No	Yes

NO.	Simultaneous Transmission Configurations	Portable Handset Exposure position	Note
		Hotspot	
1.	CDMA(data) + WLAN 2.4GHz	Yes	2.4GHz Hotspot
2.	CDMA(data) + WLAN 5.8GHz	Yes	5GHz WiFi Direct(GO/GC)
3.	CDMA(data) + Bluetooth	Yes	-
4.	LTE(data) + WLAN 2.4GHz	Yes	2.4GHz Hotspot
5.	LTE(data) + WLAN 5.8GHz	Yes	5GHz WiFi Direct(GO/GC)
6.	LTE(data) + Bluetooth	Yes	-

<WWAN Data + WLAN 2.4GHz>

	WWAN (data)			WLAN 2.4GHz		Summed SAR (W/kg)	SPLSR	SPLSR Case No	Remark
Position	Band	Average Power (dBm)	Max. WWAN SAR (W/kg)	Average Power (dBm)	Max. WLAN SAR (W/kg)				
Front	CDMA2000 BC0	24.66	0.547	14.85	0.018	0.57			
	CDMA2000 BC1	24.06	0.982	14.85	0.018	1.00			
	LTE Band 2	24.09	1.036	14.85	0.018	1.05			
	LTE Band 4	24.18	1.024	14.85	0.018	1.04			
	LTE Band 5	24.28	0.439	14.85	0.018	0.46			
	LTE Band 12	24.28	0.560	14.85	0.018	0.58			
	LTE Band 17	24.76	0.703	14.85	0.018	0.72			
Back	CDMA2000 BC0	24.66	0.607	14.85	0.056	0.66			
	CDMA2000 BC1	24.06	0.956	14.85	0.056	1.01			
	LTE Band 2	24.09	1.253	14.85	0.056	1.31			
	LTE Band 4	24.18	1.270	14.85	0.056	1.33			
	LTE Band 5	24.28	0.427	14.85	0.056	0.48			
	LTE Band 12	24.28	0.489	14.85	0.056	0.55			
	LTE Band 17	24.76	0.674	14.85	0.056	0.73			
Left Side	CDMA2000 BC0	24.66	0.893	14.85	0.013	0.91			
	CDMA2000 BC1	24.06	0.444	14.85	0.013	0.46			
Right Side	LTE Band 2	24.36	0.676			0.68			
	LTE Band 4	24.38	0.416			0.42			
	LTE Band 5	24.28	0.277			0.28			
	LTE Band 12	24.28	0.687			0.69			
	LTE Band 17	24.76	0.782			0.78			
Top Side	LTE Band 5	24.28	0.258			0.26			
Bottom Side	CDMA2000 BC0	24.66	0.419			0.42			
	CDMA2000 BC1	24.06	1.101			1.10			
	LTE Band 2	24.36	0.375			0.38			
	LTE Band 4	24.38	0.352			0.35			
	LTE Band 12	24.28	0.477			0.48			
	LTE Band 17	24.76	0.523			0.52			

<WWAN Data + WLAN 5.8GHz>

	WWAN (data)			WLAN 5.8GHz		Summed SAR (W/kg)	SPLSR	SPLSR Case No	Remark
Position	Band	Average Power (dBm)	Max. WWAN SAR (W/kg)	Average Power (dBm)	Max. WLAN SAR (W/kg)				
Front	CDMA2000 BC0	24.66	0.547	12.18	0.008	0.56			
	CDMA2000 BC1	24.06	0.982	12.18	0.008	0.99			
	LTE Band 2	24.09	1.036	12.18	0.008	1.04			
	LTE Band 4	24.18	1.024	12.18	0.008	1.03			
	LTE Band 5	24.28	0.439	12.18	0.008	0.45			
	LTE Band 12	24.28	0.560	12.18	0.008	0.57			
	LTE Band 17	24.76	0.703	12.18	0.008	0.71			
Back	CDMA2000 BC0	24.66	0.607	12.18	0.065	0.67			
	CDMA2000 BC1	24.06	0.956	12.18	0.065	1.02			
	LTE Band 2	24.09	1.253	12.18	0.065	1.32			
	LTE Band 4	24.18	1.270	12.18	0.065	1.34			
	LTE Band 5	24.28	0.427	12.18	0.065	0.49			
	LTE Band 12	24.28	0.489	12.18	0.065	0.55			
	LTE Band 17	24.76	0.674	12.18	0.065	0.74			
Left Side	CDMA2000 BC0	24.66	0.893	12.18	0.066	0.96			
	CDMA2000 BC1	24.06	0.444	12.18	0.066	0.51			
Right Side	LTE Band 2	24.36	0.676			0.68			
	LTE Band 4	24.38	0.416			0.42			
	LTE Band 5	24.28	0.277			0.28			
	LTE Band 12	24.28	0.687			0.69			
	LTE Band 17	24.76	0.782			0.78			
Top Side	LTE Band 5	24.28	0.258			0.26			
Bottom Side	CDMA2000 BC0	24.66	0.419			0.42			
	CDMA2000 BC1	24.06	1.101			1.10			
	LTE Band 2	24.36	0.375			0.38			
	LTE Band 4	24.38	0.352			0.35			
	LTE Band 12	24.28	0.477			0.48			
	LTE Band 17	24.76	0.523			0.52			

<WWAN Data + Bluetooth>

	WWAN (data)			Bluetooth		Summed SAR (W/kg)	SPLSR	SPLSR Case No	Remark
Position	Band	Average Power (dBm)	Max. WWAN SAR (W/kg)	Average Power (dBm)	Max. WLAN SAR (W/kg)				
Front	CDMA2000 BC0	24.66	0.547	5.61	0.084	0.63			
	CDMA2000 BC1	24.06	0.982	5.61	0.084	1.07			
	LTE Band 2	24.09	1.036	5.61	0.084	1.12			
	LTE Band 4	24.18	1.024	5.61	0.084	1.11			
	LTE Band 5	24.28	0.439	5.61	0.084	0.52			
	LTE Band 12	24.28	0.560	5.61	0.084	0.64			
	LTE Band 17	24.76	0.703	5.61	0.084	0.79			
Back	CDMA2000 BC0	24.66	0.607	5.61	0.084	0.69			
	CDMA2000 BC1	24.06	0.956	5.61	0.084	1.04			
	LTE Band 2	24.09	1.253	5.61	0.084	1.34			
	LTE Band 4	24.18	1.270	5.61	0.084	1.35			
	LTE Band 5	24.28	0.427	5.61	0.084	0.51			
	LTE Band 12	24.28	0.489	5.61	0.084	0.57			
	LTE Band 17	24.76	0.674	5.61	0.084	0.76			
Left Side	CDMA2000 BC0	24.66	0.893	5.61	0.084	0.98			
	CDMA2000 BC1	24.06	0.444	5.61	0.084	0.53			
Right Side	LTE Band 2	24.36	0.676			0.68			
	LTE Band 4	24.38	0.416			0.42			
	LTE Band 5	24.28	0.277			0.28			
	LTE Band 12	24.28	0.687			0.69			
	LTE Band 17	24.76	0.782			0.78			
Top Side	LTE Band 5	24.28	0.258			0.26			
Bottom Side	CDMA2000 BC0	24.66	0.419			0.42			
	CDMA2000 BC1	24.06	1.101			1.10			
	LTE Band 2	24.36	0.375			0.38			
	LTE Band 4	24.38	0.352			0.35			
	LTE Band 12	24.28	0.477			0.48			
	LTE Band 17	24.76	0.523			0.52			

13.3 Body-Worn Exposure Conditions

Table 13.3-C1: Body-worn mode SAR analysis <Step1>

NO.	Simultaneous Transmission Configurations	Portable Handset Exposure position	Note
		Body-Worn	
1.	CDMA(voice) + LTE(data) + WLAN 2.4GHz	Yes	SVLTE + 2.4GHz Hotspot
2.	CDMA(voice) + LTE(data) + WLAN 5GHz	Yes	SVLTE + 5GHz WiFi Direct
3.	CDMA(voice) + LTE(data) + Bluetooth	Yes	SVLTE + Bluetooth
4.	CDMA(voice) + LTE(data)	Yes	SVLTE
5.	CDMA(voice) + WLAN 2.4GHz	Yes	-
6.	CDMA(voice) + WLAN 5GHz	Yes	-
7.	CDMA(voice) + Bluetooth	Yes	-
8.	CDMA(data) + WLAN 2.4GHz	Yes	2.4GHz Hotspot
9.	CDMA(data) + WLAN 5.8GHz	Yes	5GHz WiFi Direct(GO/GC)
10.	CDMA(data) + WLAN 5.2GHz	Yes	5GHz WiFi Direct(GC)
11.	CDMA(data) + Bluetooth	Yes	-
12.	LTE(data) + WLAN 2.4GHz	Yes	2.4GHz Hotspot
13.	LTE(data) + WLAN 5.8GHz	Yes	5GHz WiFi Direct(GO/GC)
14.	LTE(data) + WLAN 5.2GHz	Yes	5GHz WiFi Direct(GC)
15.	LTE(data) + Bluetooth	Yes	-

<WWAN Voice + WWAN Data + WLAN 2.4GHz>

	CDMA (voice)			LTE (data)			WLAN 2.4GHz		Summed SAR (W/kg)	SPLSR	SPLSR Case No	Remark
Position	Band	Average Power (dBm)	Max. WWAN SAR (W/kg)	Band	Average Power (dBm)	Max. WWAN SAR (W/kg)	Average Power (dBm)	Max. WLAN SAR (W/kg)				
Front	BC0	24.65	0.504	Band 2	24.09	1.036	14.85	0.018	1.56			
	BC0	24.65	0.504	Band 4	24.18	1.024	14.85	0.018	1.55			
	BC0	24.65	0.504	Band 5	24.28	0.439	14.85	0.018	0.96			
	BC0	24.65	0.504	Band 12	24.28	0.560	14.85	0.018	1.08			
	BC0	24.65	0.504	Band 17	24.76	0.703	14.85	0.018	1.23			
	BC1	23.98	1.091	Band 2	24.09	1.036	14.85	0.018	**2.15**			Note1
	BC1	23.98	1.091	Band 4	24.18	1.024	14.85	0.018	**2.13**			Note1
	BC1	23.98	1.091	Band 5	24.28	0.439	14.85	0.018	1.55			
	BC1	23.98	1.091	Band 12	24.28	0.560	14.85	0.018	**1.67**			Note1
	BC1	23.98	1.091	Band 17	24.76	0.703	14.85	0.018	**1.81**			Note1
Back	BC0	24.65	0.607	Band 2	24.09	1.253	14.85	0.056	**1.92**			Note1
	BC0	24.65	0.607	Band 4	24.18	1.270	14.85	0.056	**1.93**			Note1
	BC0	24.65	0.607	Band 5	24.28	0.427	14.85	0.056	1.09			
	BC0	24.65	0.607	Band 12	24.28	0.489	14.85	0.056	1.15			
	BC0	24.65	0.607	Band 17	24.76	0.674	14.85	0.056	1.34			
	BC1	23.98	0.973	Band 2	24.09	1.253	14.85	0.056	**2.28**			Note1
	BC1	23.98	0.973	Band 4	24.18	1.270	14.85	0.056	**2.30**			Note1
	BC1	23.98	0.973	Band 5	24.28	0.427	14.85	0.056	1.46			
	BC1	23.98	0.973	Band 12	24.28	0.489	14.85	0.056	1.52			
	BC1	23.98	0.973	Band 17	24.76	0.674	14.85	0.056	**1.70**			Note1
Back (with / headset)	BC0	24.65	0.587	Band 2	24.09	1.352	14.85	0.054	**1.99**			Note1
	BC0	24.65	0.587	Band 4	24.18	1.399	14.85	0.054	**2.04**			Note1
	BC1	23.98	1.138	Band 2	24.09	1.352	14.85	0.054	**2.54**			Note1
	BC1	23.98	1.138	Band 4	24.18	1.399	14.85	0.054	**2.59**			Note1

Remark:

1. Further analysis in Table 13.3-C2
2. The analysis above will represent the compliance of the simultaneous transmission of a WWAN voice call and WWAN data transmission, since the possible WWAN output power configuration in SVLTE mode(2 transmitters) is exactly the same as the configuration in SVLTE+WLAN (3 transmitters).

<WWAN Voice + WWAN Data + WLAN 5GHz>

	CDMA (voice)			LTE (data)			WLAN 5GHz		Summed SAR (W/kg)	SPLSR	SPLSR Case No	Remark
Position	Band	Average Power (dBm)	Max. WWAN SAR (W/kg)	Band	Average Power (dBm)	Max. WWAN SAR (W/kg)	Average Power (dBm)	Max. WLAN SAR (W/kg)				
Front	BC0	24.65	0.504	Band 2	24.09	1.036	12.28	0.015	1.56			
	BC0	24.65	0.504	Band 4	24.18	1.024	12.28	0.015	1.54			
	BC0	24.65	0.504	Band 5	24.28	0.439	12.28	0.015	0.96			
	BC0	24.65	0.504	Band 12	24.28	0.560	12.28	0.015	1.08			
	BC0	24.65	0.504	Band 17	24.76	0.703	12.28	0.015	1.22			
	BC1	23.98	1.091	Band 2	24.09	1.036	12.28	0.015	**2.14**			Note1
	BC1	23.98	1.091	Band 4	24.18	1.024	12.28	0.015	**2.13**			Note1
	BC1	23.98	1.091	Band 5	24.28	0.439	12.28	0.015	1.55			
	BC1	23.98	1.091	Band 12	24.28	0.560	12.28	0.015	**1.67**			Note1
	BC1	23.98	1.091	Band 17	24.76	0.703	12.28	0.015	**1.81**			Note1
Back	BC0	24.65	0.607	Band 2	24.09	1.253	12.28	0.277	**2.14**			Note1
	BC0	24.65	0.607	Band 4	24.18	1.270	12.28	0.277	**2.15**			Note1
	BC0	24.65	0.607	Band 5	24.28	0.427	12.28	0.277	1.31			
	BC0	24.65	0.607	Band 12	24.28	0.489	12.28	0.277	1.37			
	BC0	24.65	0.607	Band 17	24.76	0.674	12.28	0.277	1.56			
	BC1	23.98	0.973	Band 2	24.09	1.253	12.28	0.277	**2.50**			Note1
	BC1	23.98	0.973	Band 4	24.18	1.270	12.28	0.277	**2.52**			Note1
	BC1	23.98	0.973	Band 5	24.28	0.427	12.28	0.277	**1.68**			Note1
	BC1	23.98	0.973	Band 12	24.28	0.489	12.28	0.277	**1.74**			Note1
	BC1	23.98	0.973	Band 17	24.76	0.674	12.28	0.277	**1.92**			Note1
Back (with / headset)	BC0	24.65	0.587	Band 2	24.09	1.352	12.28	0.279	**2.22**			Note1
	BC0	24.65	0.587	Band 4	24.18	1.399	12.28	0.279	**2.27**			Note1
	BC1	23.98	1.138	Band 2	24.09	1.352	12.28	0.279	**2.77**			Note1
	BC1	23.98	1.138	Band 4	24.18	1.399	12.28	0.279	**2.82**			Note1

Remark:

1. Further analysis in Table 13.3-C2
2. The analysis above will represent the compliance of the simultaneous transmission of a WWAN voice call and WWAN data transmission, since the possible WWAN output power configuration in SVLTE mode(2 transmitters) is exactly the same as the configuration in SVLTE+WLAN (3 transmitters)

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<WWAN Voice + WWAN Data + Bluetooth>

	WWAN (voice)			WWAN (data)			Bluetooth		Summed SAR (W/kg)	SPLSR	SPLSR Case No	Remark
Position	Band	Average Power (dBm)	Max. WWAN SAR (W/kg)	Band	Average Power (dBm)	Max. WWAN SAR (W/kg)	Average Power (dBm)	Max. WLAN SAR (W/kg)				
Front	BC0	24.65	0.504	Band 2	24.09	1.036	5.61	0.084	**1.62**			Note1
	BC0	24.65	0.504	Band 4	24.18	1.024	5.61	0.084	**1.61**			Note1
	BC0	24.65	0.504	Band 5	24.28	0.439	5.61	0.084	1.03			
	BC0	24.65	0.504	Band 12	24.28	0.560	5.61	0.084	1.15			
	BC0	24.65	0.504	Band 17	24.76	0.703	5.61	0.084	1.29			
	BC1	23.98	1.091	Band 2	24.09	1.036	5.61	0.084	**2.21**			Note1
	BC1	23.98	1.091	Band 4	24.18	1.024	5.61	0.084	**2.20**			Note1
	BC1	23.98	1.091	Band 5	24.28	0.439	5.61	0.084	**1.61**			Note1
	BC1	23.98	1.091	Band 12	24.28	0.560	5.61	0.084	**1.74**			Note1
	BC1	23.98	1.091	Band 17	24.76	0.703	5.61	0.084	**1.88**			Note1
Back	BC0	24.65	0.607	Band 2	24.09	1.253	5.61	0.084	**1.94**			Note1
	BC0	24.65	0.607	Band 4	24.18	1.270	5.61	0.084	**1.96**			Note1
	BC0	24.65	0.607	Band 5	24.28	0.427	5.61	0.084	1.12			
	BC0	24.65	0.607	Band 12	24.28	0.489	5.61	0.084	1.18			
	BC0	24.65	0.607	Band 17	24.76	0.674	5.61	0.084	1.37			
	BC1	23.98	0.973	Band 2	24.09	1.253	5.61	0.084	**2.31**			Note1
	BC1	23.98	0.973	Band 4	24.18	1.270	5.61	0.084	**2.33**			Note1
	BC1	23.98	0.973	Band 5	24.28	0.427	5.61	0.084	1.48			
	BC1	23.98	0.973	Band 12	24.28	0.489	5.61	0.084	1.55			
	BC1	23.98	0.973	Band 17	24.76	0.674	5.61	0.084	**1.73**			Note1
Back (with / headset)	BC0	24.65	0.587	Band 2	24.09	1.352	5.61	0.084	**2.02**			Note1
	BC0	24.65	0.587	Band 4	24.18	1.399	5.61	0.084	**2.07**			Note1
	BC1	23.98	1.138	Band 2	24.09	1.352	5.61	0.084	**2.57**			Note1
	BC1	23.98	1.138	Band 4	24.18	1.399	5.61	0.084	**2.62**			Note1

Remark:

1. Further analysis in Table 13.3-C2
2. The analysis above will represent the compliance of the simultaneous transmission of a WWAN voice call and WWAN data transmission, since the possible WWAN output power configuration in SVLTE mode(2 transmitters) is exactly the same as the configuration in SVLTE+WLAN (3 transmitters).

Table 13.3-C2: Body-worn SAR analysis <Step2>

<WWAN Voice + WWAN Data + WLAN 2.4GHz>

	CDMA (voice)			LTE (data)			WLAN 2.4GHz		Summed SAR (W/kg)	SPLSR	SPLSR Case No	Remark
Position	Band	Average Power (dBm)	Max. WWAN SAR (W/kg)	Band	Average Power (dBm)	Max. WWAN SAR (W/kg)	Average Power (dBm)	Max. WLAN SAR (W/kg)				
Front	BC1	23.98	1.091	Band 2	24.09	1.036	14.85	0.018	**2.15**			Note1
	BC1	15.55	0.113	Band 2	24.09	1.036	14.85	0.018	1.17			
	BC1	23.98	1.091	Band 2	16.52	0.166	14.85	0.018	1.28			
	BC1	23.98	1.091	Band 4	24.18	1.024	14.85	0.018	**2.13**			Note1
	BC1	15.55	0.113	Band 4	24.18	1.024	14.85	0.018	1.16			
	BC1	23.98	1.091	Band 4	16.85	0.156	14.85	0.018	1.27			
	BC1	23.98	1.091	Band 12	24.28	0.560	14.85	0.018	**1.67**			Note1
	BC1	15.55	0.113	Band 12	24.28	0.560	14.85	0.018	0.69			
	BC1	23.98	1.091	Band 12	16.75	0.095	14.85	0.018	1.20			
	BC1	23.98	1.091	Band 17	24.76	0.703	14.85	0.018	**1.81**			Note1
	BC1	15.55	0.113	Band 17	24.76	0.703	14.85	0.018	0.83			
	BC1	23.98	1.091	Band 17	16.81	0.095	14.85	0.018	1.20			
Back	BC0	24.65	0.607	Band 2	24.09	1.253	14.85	0.056	**1.92**			Note1
	BC0	18.01	0.094	Band 2	24.09	1.253	14.85	0.056	1.40			
	BC0	24.65	0.607	Band 2	16.52	0.201	14.85	0.056	0.86			
	BC0	24.65	0.607	Band 4	24.18	1.270	14.85	0.056	**1.93**			Note1
	BC0	18.01	0.094	Band 4	24.18	1.270	14.85	0.056	1.42			
	BC0	24.65	0.607	Band 4	16.85	0.219	14.85	0.056	0.88			
	BC1	23.98	0.973	Band 2	24.09	1.253	14.85	0.056	**2.28**			Note1
	BC1	15.55	0.126	Band 2	24.09	1.253	14.85	0.056	1.44			
	BC1	23.98	0.973	Band 2	16.52	0.201	14.85	0.056	1.23			
	BC1	23.98	0.973	Band 4	24.18	1.270	14.85	0.056	**2.30**			Note1
	BC1	15.55	0.126	Band 4	24.18	1.270	14.85	0.056	1.45			
	BC1	23.98	0.973	Band 4	16.85	0.219	14.85	0.056	1.25			
	BC1	23.98	0.973	Band 17	24.76	0.674	14.85	0.056	**1.70**			Note1
	BC1	15.55	0.126	Band 17	24.76	0.674	14.85	0.056	0.86			
	BC1	23.98	0.973	Band 17	16.81	0.179	14.85	0.056	1.21			
Back (with / headset)	BC0	24.65	0.587	Band 2	24.09	1.352	14.85	0.054	**1.99**			Note1
	BC0	18.01	0.110	Band 2	24.09	1.352	14.85	0.054	1.52			
	BC0	24.65	0.587	Band 2	16.52	0.227	14.85	0.054	0.87			
	BC0	24.65	0.587	Band 4	24.18	1.399	14.85	0.054	**2.04**			Note1
	BC0	18.01	0.110	Band 4	24.18	1.399	14.85	0.054	**1.56**			
	BC0	24.65	0.587	Band 4	16.85	0.227	14.85	0.054	0.87			
	BC1	23.98	1.138	Band 2	24.09	1.352	14.85	0.054	**2.54**			Note1
	BC1	15.55	0.100	Band 2	24.09	1.352	14.85	0.054	1.51			
	BC1	23.98	1.138	Band 2	16.52	0.227	14.85	0.054	1.42			
	BC1	23.98	1.138	Band 4	24.18	1.399	14.85	0.054	**2.59**			Note1
	BC1	15.55	0.100	Band 4	24.18	1.399	14.85	0.054	1.55			
	BC1	23.98	1.138	Band 4	16.85	0.227	14.85	0.054	1.42			

Remark:

1. In SVLTE mode, LTE operation will enter reduced power mode when CDMA power exceeds certain threshold. For these test cases that scalar SAR summation of both CDMA and LTE in full power mode exceeds 1.6W/kg, the analysis of the simultaneous operation of the actual transmit power level is illustrated in the row items below.
2. If 1g-SAR scalar summation < 1.6W/kg, simultaneous SAR measurement and further evaluations are not necessary.
3. If SPLSR ≤ 0.04, volume scan evaluation is not required.

<WWAN Voice + WWAN Data + WLAN 5GHz>

Position	CDMA (voice) Band	Average Power (dBm)	Max. WWAN SAR (W/kg)	LTE (data) WWAN Band	Average Power (dBm)	Max. WWAN SAR (W/kg)	WLAN 5GHz Average Power (dBm)	Max. WLAN SAR (W/kg)	Summed SAR (W/kg)	SPLSR	SPLSR Case No	Remark
Front	BC1	23.98	1.091	Band 2	24.09	1.036	12.28	0.015	**2.14**			Note1
	BC1	15.55	0.113	Band 2	24.09	1.036	12.28	0.015	1.16			
	BC1	23.98	1.091	Band 2	16.52	0.166	12.28	0.015	1.27			
	BC1	23.98	1.091	Band 4	24.18	1.024	12.28	0.015	**2.13**			Note1
	BC1	15.55	0.113	Band 4	24.18	1.024	12.28	0.015	1.15			
	BC1	23.98	1.091	Band 4	16.85	0.156	12.28	0.015	1.26			
	BC1	23.98	1.091	Band 12	24.28	0.560	12.28	0.015	**1.67**			Note1
	BC1	15.55	0.113	Band 12	24.28	0.560	12.28	0.015	0.69			
	BC1	23.98	1.091	Band 12	16.75	0.095	12.28	0.015	1.20			
	BC1	23.98	1.091	Band 17	24.76	0.703	12.28	0.015	**1.81**			Note1
	BC1	15.55	0.113	Band 17	24.76	0.703	12.28	0.015	0.83			
	BC1	23.98	1.091	Band 17	16.81	0.095	12.28	0.015	1.20			
Back	BC0	24.65	0.607	Band 2	24.09	1.253	12.28	0.277	**2.14**			Note1
	BC0	18.01	0.094	Band 2	24.09	1.253	12.28	0.277	**1.62**	0.02	#C3-1	
	BC0	24.65	0.607	Band 2	16.52	0.201	12.28	0.277	1.09			
	BC0	24.65	0.607	Band 4	24.18	1.270	12.28	0.277	**2.15**			Note1
	BC0	18.01	0.094	Band 4	24.18	1.270	12.28	0.277	**1.64**	0.03	#C3-2	
	BC0	24.65	0.607	Band 4	16.85	0.219	12.28	0.277	1.10			
	BC1	23.98	0.973	Band 2	24.09	1.253	12.28	0.277	**2.50**			Note1
	BC1	15.55	0.126	Band 2	24.09	1.253	12.28	0.277	**1.66**			Volume Scan #V-1
	BC1	23.98	0.973	Band 2	16.52	0.201	12.28	0.277	1.45			
	BC1	23.98	0.973	Band 4	24.18	1.270	12.28	0.277	**2.52**			Note1
	BC1	15.55	0.126	Band 4	24.18	1.270	12.28	0.277	**1.67**			Volume Scan #V-2
	BC1	23.98	0.973	Band 4	16.85	0.219	12.28	0.277	1.47			
	BC1	23.98	0.973	Band 5	24.28	0.427	12.28	0.277	**1.68**			Note1
	BC1	15.55	0.126	Band 5	24.28	0.427	12.28	0.277	0.83			
	BC1	23.98	0.973	Band 5	16.83	0.057	12.28	0.277	1.31			
	BC1	23.98	0.973	Band 12	24.28	0.489	12.28	0.277	**1.74**			Note1
	BC1	15.55	0.126	Band 12	24.28	0.489	12.28	0.277	0.89			
	BC1	23.98	0.973	Band 12	16.75	0.172	12.28	0.277	1.42			
	BC1	23.98	0.973	Band 17	24.76	0.674	12.28	0.277	**1.92**			Note1
	BC1	15.55	0.126	Band 17	24.76	0.674	12.28	0.277	1.08			
	BC1	23.98	0.973	Band 17	16.81	0.179	12.28	0.277	1.43			
Back (with / headset)	BC0	24.65	0.587	Band 2	24.09	1.352	12.28	0.279	**2.22**			Note1
	BC0	18.01	0.110	Band 2	24.09	1.352	12.28	0.279	**1.74**			Volume Scan #V-3
	BC0	24.65	0.587	Band 2	16.52	0.227	12.28	0.279	1.09			
	BC0	24.65	0.587	Band 4	24.18	1.399	12.28	0.279	**2.27**			Note1
	BC0	18.01	0.110	Band 4	24.18	1.399	12.28	0.279	**1.79**			Volume Scan #V-4
	BC0	24.65	0.587	Band 4	16.85	0.227	12.28	0.279	1.09			
	BC1	23.98	1.138	Band 2	24.09	1.352	12.28	0.279	**2.77**			Note1
	BC1	15.55	0.100	Band 2	24.09	1.352	12.28	0.279	**1.73**	0.04	#C3-3	
	BC1	23.98	1.138	Band 2	16.52	0.227	12.28	0.279	**1.64**	0.04	#C3-4	
	BC1	23.98	1.138	Band 4	24.18	1.399	12.28	0.279	**2.82**			Note1
	BC1	15.55	0.100	Band 4	24.18	1.399	12.28	0.279	**1.78**			Volume Scan #V-5
	BC1	23.98	1.138	Band 4	16.85	0.227	12.28	0.279	**1.64**	0.04	#C3-5	

Remark:

1. In SVLTE mode, LTE operation will enter reduced power mode when CDMA power exceeds certain threshold. For these test cases that scalar SAR summation of both CDMA and LTE in full power mode exceeds 1.6W/kg, the analysis of the simultaneous operation of the actual transmit power level is illustrated in the row items below.
2. If 1g-SAR scalar summation < 1.6W/kg, simultaneous SAR measurement and further evaluations are not necessary.
3. If SPLSR ≤ 0.04, volume scan evaluation is not required.

<WWAN Voice + WWAN Data + Bluetooth>

	CDMA (voice)			LTE (data)			Bluetooth					
Position	Band	Average Power (dBm)	Max. WWAN SAR (W/kg)	Band	Average Power (dBm)	Max. WWAN SAR (W/kg)	Average Power (dBm)	Max. WLAN SAR (W/kg)	Summed SAR (W/kg)	SPLSR	SPLSR Case No	Remark
Front	BC0	24.65	0.504	Band 2	24.09	1.036	5.61	0.084	**1.62**			Note1
	BC0	18.01	0.093	Band 2	24.09	1.036	5.61	0.084	1.21			
	BC0	24.65	0.504	Band 2	16.52	0.166	5.61	0.084	0.75			
	BC0	24.65	0.504	Band 4	24.18	1.024	5.61	0.084	**1.61**			Note1
	BC0	18.01	0.093	Band 4	24.18	1.024	5.61	0.084	1.20			
	BC0	24.65	0.504	Band 4	16.85	0.156	5.61	0.084	0.74			
	BC1	23.98	1.091	Band 2	24.09	1.036	5.61	0.084	**2.21**			Note1
	BC1	15.55	0.113	Band 2	24.09	1.036	5.61	0.084	1.23			
	BC1	23.98	1.091	Band 2	16.52	0.166	5.61	0.084	1.34			
	BC1	23.98	1.091	Band 4	24.18	1.024	5.61	0.084	**2.20**			Note1
	BC1	15.55	0.113	Band 4	24.18	1.024	5.61	0.084	1.22			
	BC1	23.98	1.091	Band 4	16.85	0.156	5.61	0.084	1.33			
	BC1	23.98	1.091	Band 5	24.28	0.439	5.61	0.084	**1.61**			Note1
	BC1	15.55	0.113	Band 5	24.28	0.439	5.61	0.084	0.64			
	BC1	23.98	1.091	Band 5	16.83	0.010	5.61	0.084	1.19			
	BC1	23.98	1.091	Band 12	24.28	0.560	5.61	0.084	**1.74**			Note1
	BC1	15.55	0.113	Band 12	24.28	0.560	5.61	0.084	0.76			
	BC1	23.98	1.091	Band 12	16.75	0.095	5.61	0.084	1.27			
	BC1	23.98	1.091	Band 17	24.76	0.703	5.61	0.084	**1.88**			Note1
	BC1	15.55	0.113	Band 17	24.76	0.703	5.61	0.084	0.90			
	BC1	23.98	1.091	Band 17	16.81	0.095	5.61	0.084	1.27			
Back	BC0	24.65	0.607	Band 2	24.09	1.253	5.61	0.084	**1.94**			Note1
	BC0	18.01	0.094	Band 2	24.09	1.253	5.61	0.084	1.43			
	BC0	24.65	0.607	Band 2	16.52	0.201	5.61	0.084	0.89			
	BC0	24.65	0.607	Band 4	24.18	1.270	5.61	0.084	**1.96**			Note1
	BC0	18.01	0.094	Band 4	24.18	1.270	5.61	0.084	1.45			
	BC0	24.65	0.607	Band 4	16.85	0.219	5.61	0.084	0.91			
	BC1	23.98	0.973	Band 2	24.09	1.253	5.61	0.084	**2.31**			Note1
	BC1	15.55	0.126	Band 2	24.09	1.253	5.61	0.084	1.46			
	BC1	23.98	0.973	Band 2	16.52	0.201	5.61	0.084	1.26			
	BC1	23.98	0.973	Band 4	24.18	1.270	5.61	0.084	**2.33**			Note1
	BC1	15.55	0.126	Band 4	24.18	1.270	5.61	0.084	1.48			
	BC1	23.98	0.973	Band 4	16.85	0.219	5.61	0.084	1.28			
	BC1	23.98	0.973	Band 17	24.76	0.674	5.61	0.084	**1.73**			Note1
	BC1	15.55	0.126	Band 17	24.76	0.674	5.61	0.084	0.88			
	BC1	23.98	0.973	Band 17	16.81	0.179	5.61	0.084	1.24			
Back (with / headset)	BC0	24.65	0.587	Band 2	24.09	1.352	5.61	0.084	**2.02**			Note1
	BC0	18.01	0.110	Band 2	24.09	1.352	5.61	0.084	1.55			
	BC0	24.65	0.587	Band 2	16.52	0.227	5.61	0.084	0.90			
	BC0	24.65	0.587	Band 4	24.18	1.399	5.61	0.084	**2.07**			Note1
	BC0	18.01	0.110	Band 4	24.18	1.399	5.61	0.084	**1.59**			
	BC0	24.65	0.587	Band 4	16.85	0.227	5.61	0.084	0.90			
	BC1	23.98	1.138	Band 2	24.09	1.352	5.61	0.084	**2.57**			Note1
	BC1	15.55	0.100	Band 2	24.09	1.352	5.61	0.084	1.54			
	BC1	23.98	1.138	Band 2	16.52	0.227	5.61	0.084	1.45			
	BC1	23.98	1.138	Band 4	24.18	1.399	5.61	0.084	**2.62**			Note1
	BC1	15.55	0.100	Band 4	24.18	1.399	5.61	0.084	1.58			
	BC1	23.98	1.138	Band 4	16.85	0.227	5.61	0.084	1.45			

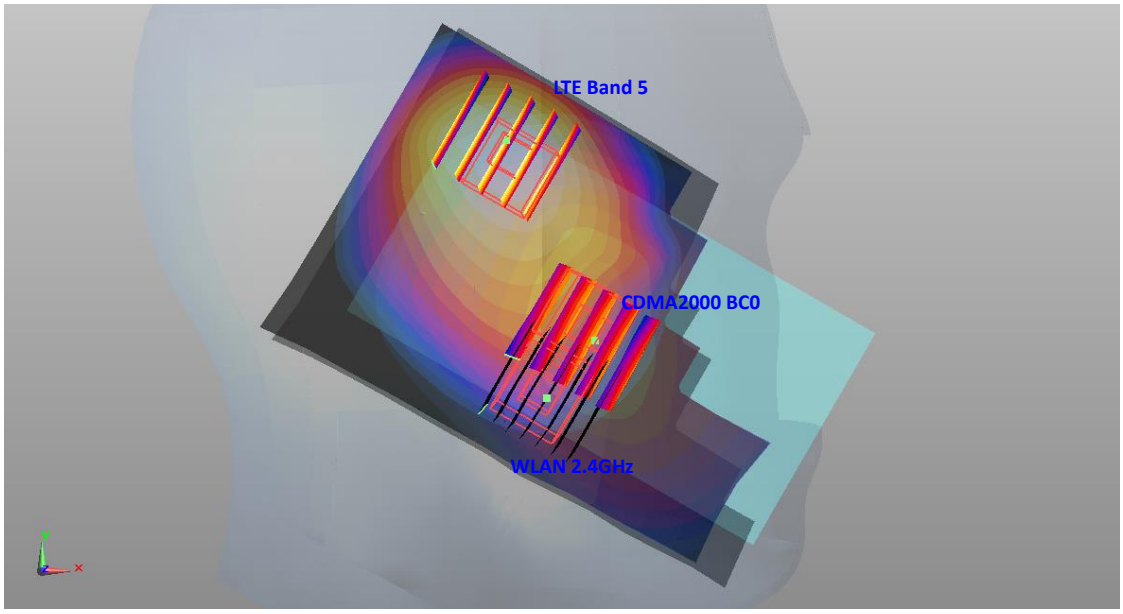
Remark:

1. In SVLTE mode, LTE operation will enter reduced power mode when CDMA power exceeds certain threshold. For these test cases that scalar SAR summation of both CDMA and LTE in full power mode exceeds 1.6W/kg, the analysis of the simultaneous operation of the actual transmit power level is illustrated in the row items below.
2. If 1g-SAR scalar summation < 1.6W/kg, simultaneous SAR measurement and further evaluations are not necessary.
3. If SPLSR ≤ 0.04, volume scan evaluation is not required.

13.4 SPLSR Evaluation and Analysis

13.4.1 SPLSR Evaluation and Analysis <Step 1>

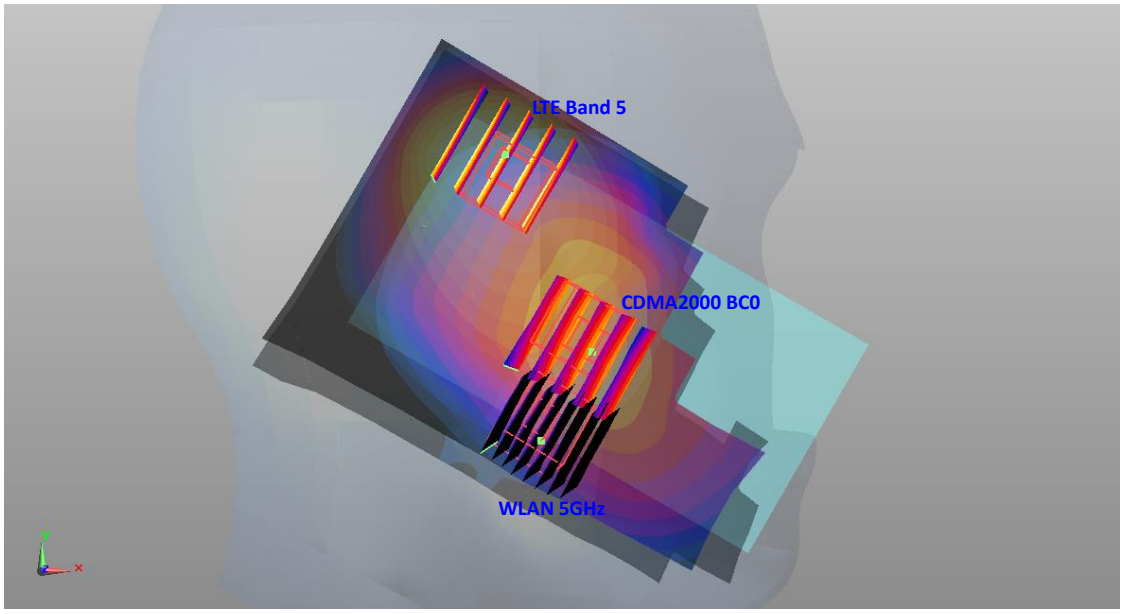
Case No #A1-1 / Position	Band	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (mm)	Pair SAR sum (W/kg)	SPLSR	Simultaneous SAR
				X	Y	Z				
Left Cheek	CDMA2000 BC0	0.463	-	0.0658	0.271	-0.173	65.8	1.72	0.03	Not required
	LTE Band 5	1.253	-	0.0389	0.331	-0.174				
	CDMA2000 BC0	0.463	-	0.0658	0.271	-0.173	23.2	0.53	0.02	Not required
	WLAN 2.4GHz	0.066	-	0.0512	0.253	-0.174				
	LTE Band 5	1.253	-	0.0389	0.331	-0.174	79.0	1.32	0.02	Not required
	WLAN 2.4GHz	0.066	-	0.0512	0.253	-0.174				



Remark:

1. Per KDB 447498 D01v05r02, SAR test exclusion is determined by the SAR to peak location separation ratio, SPLSR, SPLSR = $(SAR_1 + SAR_2)^{1.5}$ / (*min. separation distance, mm*).
2. Per KDB 447498 D01v05r02, if SPLSR ≤ 0.04, further evaluation is not required.
3. Per KDB 447498 D01v05r02, if SPLSR > 0.04, step2 analysis is required.

Case No #A1-2 / Position	Band	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (mm)	Pair SAR sum (W/kg)	SPLSR	Simultaneous SAR
				X	Y	Z				
Left Cheek	CDMA2000 BC0	0.463	-	0.0658	0.271	-0.173	65.8	1.72	0.03	Not required
	LTE Band 5	1.253	-	0.0389	0.331	-0.174				
	CDMA2000 BC0	0.463	-	0.0658	0.271	-0.173	26.5	0.64	0.02	Not required
	WLAN 5GHz	0.179	-	0.0474	0.252	-0.175				
	LTE Band 5	1.253	-	0.0389	0.331	-0.174	79.5	1.43	0.02	Not required
	WLAN 5GHz	0.179	-	0.0474	0.252	-0.175				

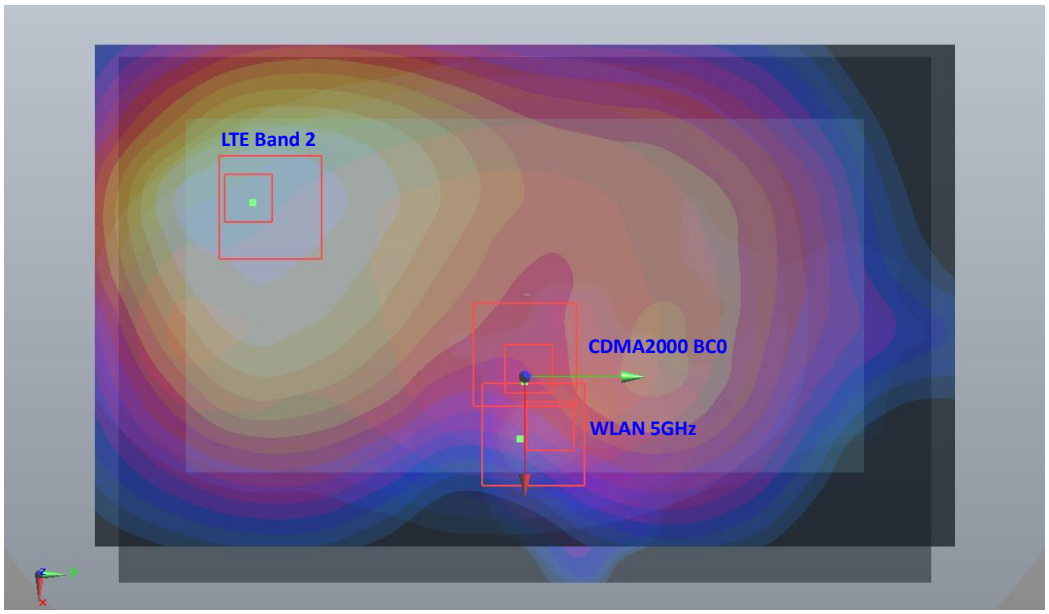


Remark:

1. Per KDB 447498 D01v05r02, SAR test exclusion is determined by the SAR to peak location separation ratio, SPLSR, SPLSR = $(SAR_1 + SAR_2)^{1.5}$ / (*min. separation distance, mm*).
2. Per KDB 447498 D01v05r02, if SPLSR ≤ 0.04, further evaluation is not required.
3. Per KDB 447498 D01v05r02, if SPLSR > 0.04, step2 analysis is required.

13.4.2 SPLSR Evaluation and Analysis <Step 2>

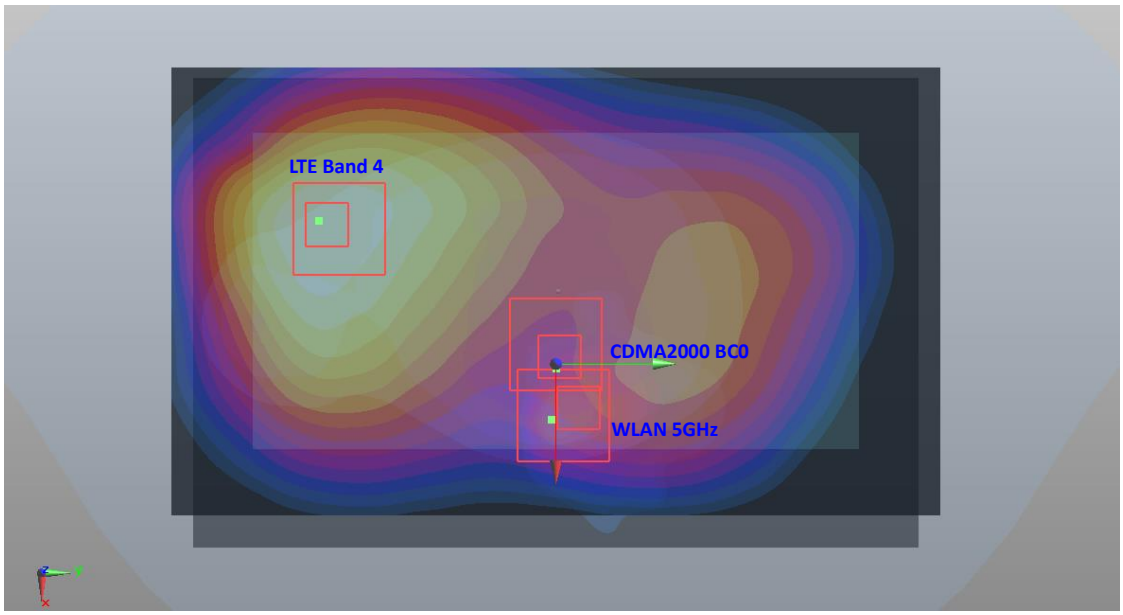
Case No #C3-1 Position	Band	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (mm)	Pair SAR sum (W/kg)	SPLSR	Volume Scan
				X	Y	Z				
Back	CDMA2000 BC0	0.094	1	0.001	0	-0.205	66.6	1.35	0.02	Not required
	LTE Band 2	1.253	1	-0.038	-0.054	-0.205				
	CDMA2000 BC0	0.094	1	0.001	0	-0.205	11.2	0.37	0.02	Not required
	WLAN 5GHz	0.277	1	0.011	0.005	-0.205				
	LTE Band 2	1.253	1	-0.038	-0.054	-0.205	76.7	1.53	0.02	Not required
	WLAN 5GHz	0.277	1	0.011	0.005	-0.205				



Remark:

1. Per KDB 447498 D01v05r02, SAR test exclusion is determined by the SAR to peak location separation ratio, SPLSR, SPLSR = $(SAR_1 + SAR_2)^{1.5}$ / (*min. separation distance, mm*).
2. Per KDB 447498 D01v05r02, if SPLSR ≤ 0.04, further evaluation is not required.
3. Per KDB 447498 D01v05r02, if SPLSR > 0.04, step2 analysis is required.

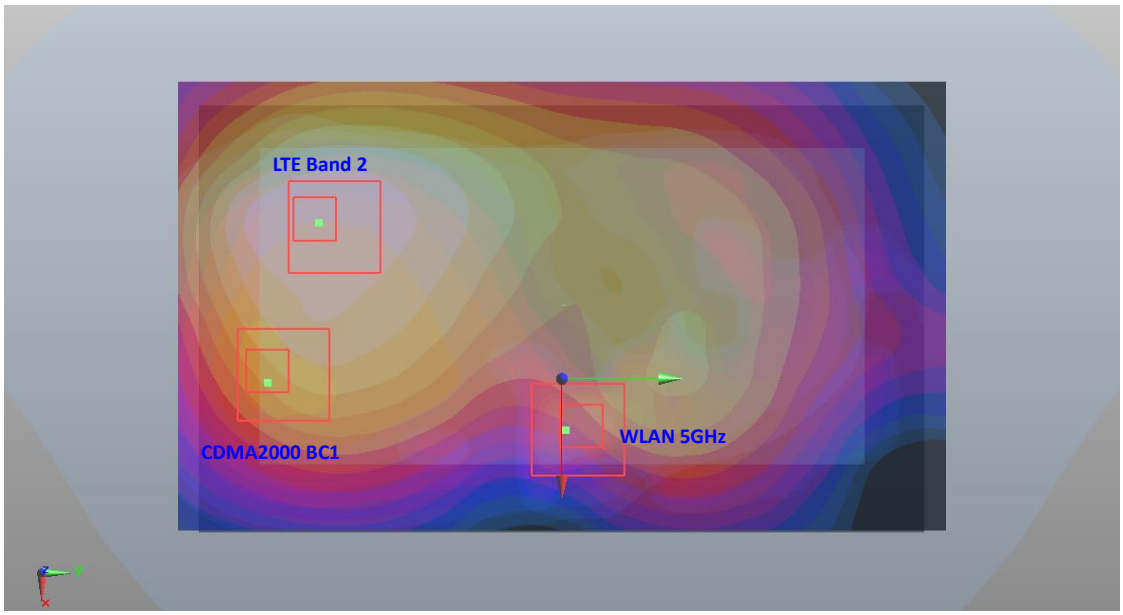
Case No #C3-2 / Position	Band	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (mm)	Pair SAR sum (W/kg)	SPLSR	Volume Scan
				X	Y	Z				
Back	CDMA2000 BC0	0.094	1	0.001	0	-0.205	65.3	1.36	0.03	Not required
	LTE Band 4	1.270	1	-0.0335	-0.0555	-0.205				
	CDMA2000 BC0	0.094	1	0.001	0	-0.205	11.2	0.37	0.02	Not required
	WLAN 5GHz	0.277	1	0.011	0.005	-0.205				
	LTE Band 4	1.270	1	-0.0335	-0.0555	-0.205	75.1	1.55	0.03	Not required
	WLAN 5GHz	0.277	1	0.011	0.005	-0.205				



Remark:

1. Per KDB 447498 D01v05r02, SAR test exclusion is determined by the SAR to peak location separation ratio, SPLSR, SPLSR = $(SAR_1 + SAR_2)^{1.5}$ / (*min. separation distance, mm*).
2. Per KDB 447498 D01v05r02, if SPLSR ≤ 0.04, further evaluation is not required.
3. Per KDB 447498 D01v05r02, if SPLSR > 0.04, step2 analysis is required.

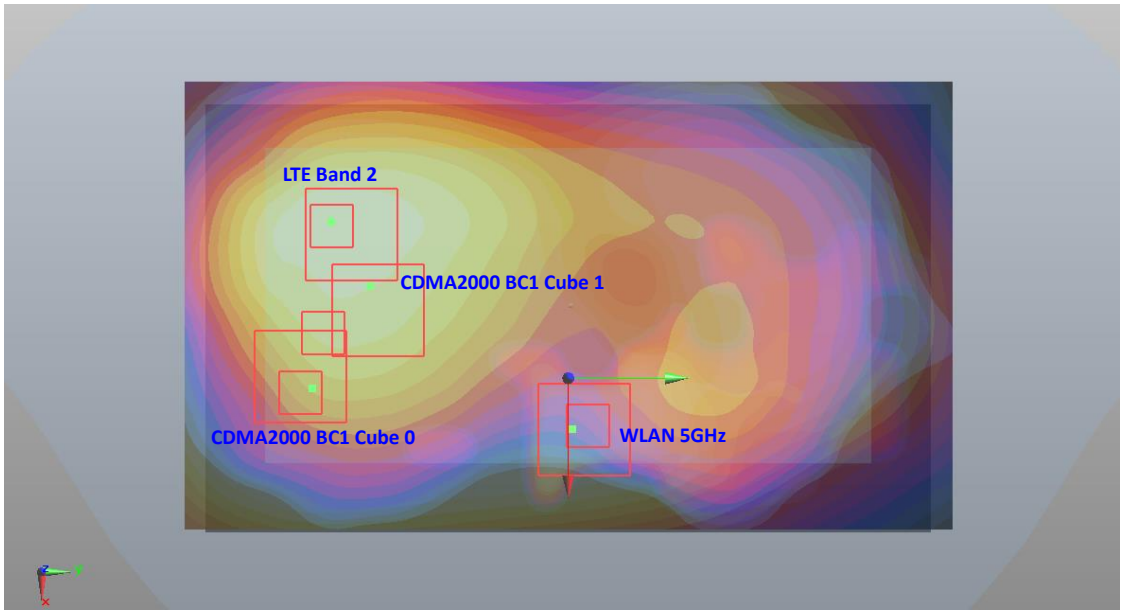
Case No #C3-3 / Position	Band	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (mm)	Pair SAR sum (W/kg)	SPLSR	Volume Scan
				X	Y	Z				
Back (with / headset)	CDMA2000 BC1	0.100	1	0.001	-0.069	-0.205	39.4	1.45	0.04	Not required
	LTE Band 2	1.352	1	-0.0365	-0.057	-0.205				
	CDMA2000 BC1	0.100	1	0.001	-0.069	-0.205	76.5	0.38	0.00	Not required
	WLAN 5GHz	0.279	1	0.01	0.007	-0.205				
	LTE Band 2	1.352	1	-0.0365	-0.057	-0.205	79.1	1.63	0.03	Not required
	WLAN 5GHz	0.279	1	0.01	0.007	-0.205				



Remark:

1. Per KDB 447498 D01v05r02, SAR test exclusion is determined by the SAR to peak location separation ratio, SPLSR, SPLSR = $(SAR_1 + SAR_2)^{1.5}$ / (*min. separation distance, mm*).
2. Per KDB 447498 D01v05r02, if SPLSR ≤ 0.04, further evaluation is not required.
3. Per KDB 447498 D01v05r02, if SPLSR > 0.04, step2 analysis is required.

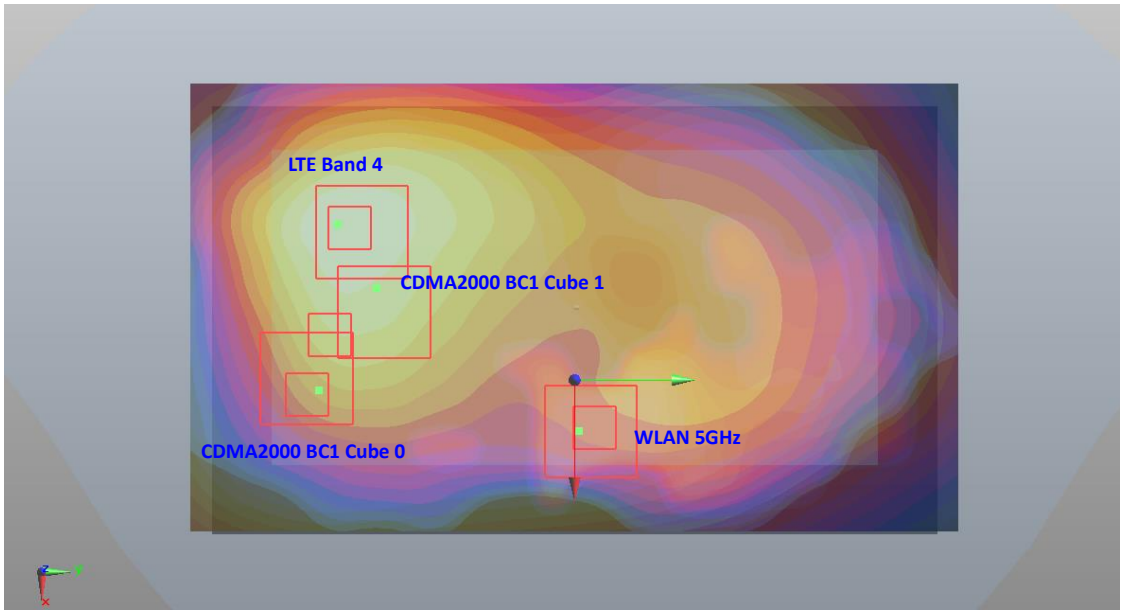
Case No #C3-4 / Position	Band	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (mm)	Pair SAR sum (W/kg)	SPLSR	Volume Scan
				X	Y	Z				
Back (with / headset)	LTE Band 2	0.227	1	-0.0365	-0.0555	-0.205	39.3	1.37	0.04	Not required
	CDMA2000 BC1 Cube 0	1.138	1	0.0025	-0.06	-0.205				
	LTE Band 2	0.227	1	-0.0365	-0.0555	-0.205	31.8	1.15	0.04	Not required
	CDMA2000 BC1 Cube 1	0.921	1	-0.0055	-0.0625	-0.205				
	LTE Band 2	0.227	1	-0.0365	-0.0555	-0.205	77.9	0.51	0.00	Not required
	WLAN 5GHz	0.279	1	0.01	0.007	-0.205				
	CDMA2000 BC1 Cube 0	1.138	1	0.0025	-0.06	-0.205	67.4	1.42	0.03	Not required
	WLAN 5GHz	0.279	1	0.01	0.007	-0.205				
	CDMA2000 BC1 Cube 1	0.921	1	-0.0055	-0.0625	-0.205	71.2	1.20	0.02	Not required
	WLAN 5GHz	0.279	1	0.01	0.007	-0.205				



Remark:

1. Per KDB 447498 D01v05r02, SAR test exclusion is determined by the SAR to peak location separation ratio, SPLSR, SPLSR = $(SAR_1 + SAR_2)^{1.5}$ / (*min. separation distance, mm*).
2. Per KDB 447498 D01v05r02, if SPLSR ≤ 0.04, further evaluation is not required.
3. Per KDB 447498 D01v05r02, if SPLSR > 0.04, step2 analysis is required.

Case No #C3-5 / Position	Band	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (mm)	Pair SAR sum (W/kg)	SPLSR	Volume Scan
				X	Y	Z				
Back (with / headset)	LTE Band 4	0.227	1	-0.0365	-0.0555	-0.205	39.3	1.37	0.04	Not required
	CDMA2000 BC1 Cube 0	1.138	1	0.0025	-0.06	-0.205				
	LTE Band 4	0.227	1	-0.0365	-0.0555	-0.205	31.8	1.15	0.04	Not required
	CDMA2000 BC1 Cube 1	0.921	1	-0.0055	-0.0625	-0.205				
	LTE Band 4	0.227	1	-0.0365	-0.0555	-0.205	77.9	0.51	0.00	Not required
	WLAN 5GHz	0.279	1	0.01	0.007	-0.205				
	CDMA2000 BC1 Cube 0	1.138	1	0.0025	-0.06	-0.205	67.4	1.42	0.03	Not required
	WLAN 5GHz	0.279	1	0.01	0.007	-0.205				
	CDMA2000 BC1 Cube 1	0.921	1	-0.0055	-0.0625	-0.205	71.2	1.20	0.02	Not required
	WLAN 5GHz	0.279	1	0.01	0.007	-0.205				



Remark:

1. Per KDB 447498 D01v05r02, SAR test exclusion is determined by the SAR to peak location separation ratio, SPLSR, SPLSR = $(SAR_1 + SAR_2)^{1.5}$ / (*min. separation distance, mm*).
2. Per KDB 447498 D01v05r02, if SPLSR ≤ 0.04, further evaluation is not required.
3. Per KDB 447498 D01v05r02, if SPLSR > 0.04, step2 analysis is required.

13.5 Volume scan test results

Case No	Band	Mode	BW (MHz)	RB Size	RB Offset	Test Position	Gap (cm)	Headset	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Duty Cycle %	Power Drift (dB)	Measured SAR1g (W/kg)	Scaling Factor	Multi Band Reported SAR1g (W/kg)	Remark
#V-1	CDMA2000 BC1	RC3 SO32	-	-	-	Back	1	-	600	1880	15.55	16.0	100	-0.01	0.109	1.109	1.270	Pass
	LTE Band 2	QPSK	20M	1	0		1	-	19100	1900	24.09	24.5	100	-0.06	1.060	1.099		
	WLAN 5.2GHz	802.11a 6Mbps	-	-	-		1	-	48	5240	12.28	13.0	93.34	0.04	0.192	1.264		
#V-2	CDMA2000 BC1	RC3 SO32	-	-	-	Back	1	-	600	1880	15.55	16.0	100	-0.01	0.109	1.109	1.400	Pass
	LTE Band 4	QPSK	20M	1	49		1	-	20300	1745	24.07	24.5	100	0.01	1.180	1.104		
	WLAN 5.2GHz	802.11a 6Mbps	-	-	-		1	-	48	5240	12.28	13.0	93.34	0.04	0.192	1.264		
#V-3	CDMA2000 BC0	RC3 SO32	-	-	-	Back	1	Headset	1013	824.7	18.01	18.5	100	-0.05	0.084	1.119	1.520	Pass
	LTE Band 2	QPSK	20M	1	0		1	Headset	19100	1900	24.09	24.5	100	-0.08	1.320	1.099		
	WLAN 5.2GHz	802.11a 6Mbps	-	-	-		1	Headset	48	5240	12.28	13.0	93.34	-0.04	0.217	1.264		
#V-4	CDMA2000 BC0	RC3 SO32	-	-	-	Back	1	Headset	1013	824.7	18.01	18.5	100	-0.05	0.084	1.119	1.490	Pass
	LTE Band 4	QPSK	20M	1	49		1	Headset	20300	1745	24.07	24.5	100	-0.01	1.290	1.104		
	WLAN 5.2GHz	802.11a 6Mbps	-	-	-		1	Headset	48	5240	12.28	13.0	93.34	-0.04	0.217	1.264		
#V-5	CDMA2000 BC1	RC3 SO32	-	-	-	Back	1	Headset	600	1880	15.55	16.0	100	-0.06	0.101	1.109	1.500	Pass
	LTE Band 4	QPSK	20M	1	49		1	Headset	20300	1745	24.07	24.5	100	-0.01	1.290	1.104		
	WLAN 5.2GHz	802.11a 6Mbps	-	-	-		1	Headset	48	5240	12.28	13.0	93.34	-0.04	0.217	1.264		

Note:

1. During multi-band SAR combination, the SAR scaling factors were input into the SEMCAD X software to account for tune-up tolerance.

Test Engineer： Fulu Hu and Jimmy Cheng

14. Uncertainty Assessment

The component of uncertainly may generally be categorized according to the methods used to evaluate them. The evaluation of uncertainly by the statistical analysis of a series of observations is termed a Type An evaluation of uncertainty. The evaluation of uncertainty by means other than the statistical analysis of a series of observation is termed a Type B evaluation of uncertainty. Each component of uncertainty, however evaluated, is represented by an estimated standard deviation, termed standard uncertainty, which is determined by the positive square root of the estimated variance.

A Type A evaluation of standard uncertainty may be based on any valid statistical method for treating data. This includes calculating the standard deviation of the mean of a series of independent observations; using the method of least squares to fit a curve to the data in order to estimate the parameter of the curve and their standard deviations; or carrying out an analysis of variance in order to identify and quantify random effects in certain kinds of measurement.

A type B evaluation of standard uncertainty is typically based on scientific judgment using all of the relevant information available. These may include previous measurement data, experience, and knowledge of the behavior and properties of relevant materials and instruments, manufacture's specification, data provided in calibration reports and uncertainties assigned to reference data taken from handbooks. Broadly speaking, the uncertainty is either obtained from an outdoor source or obtained from an assumed distribution, such as the normal distribution, rectangular or triangular distributions indicated in Table 14.1

Uncertainty Distributions	Normal	Rectangular	Triangular	U-Shape
Multi-plying Factor[(a)]	1/k[(b)]	1/√3	1/√6	1/√2

(a) standard uncertainty is determined as the product of the multiplying factor and the estimated range of variations in the measured quantity

(b) κ is the coverage factor

Table 14.1 Standard Uncertainty for Assumed Distribution

The combined standard uncertainty of the measurement result represents the estimated standard deviation of the result. It is obtained by combining the individual standard uncertainties of both Type A and Type B evaluation using the usual "root-sum-squares" (RSS) methods of combining standard deviations by taking the positive square root of the estimated variances.

Expanded uncertainty is a measure of uncertainty that defines an interval about the measurement result within which the measured value is confidently believed to lie. It is obtained by multiplying the combined standard uncertainty by a coverage factor. Typically, the coverage factor ranges from 2 to 3. Using a coverage factor allows the true value of a measured quantity to be specified with a defined probability within the specified uncertainty range. For purpose of this document, a coverage factor two is used, which corresponds to confidence interval of about 95 %. The DASY uncertainty Budget is shown in the following tables.

Error Description	Uncertainty Value (±%)	Probability Distribution	Divisor	Ci (1g)	Ci (10g)	Standard Uncertainty (1g)	Standard Uncertainty (10g)
Measurement System							
Probe Calibration	6.0	Normal	1	1	1	± 6.0 %	± 6.0 %
Axial Isotropy	4.7	Rectangular	√3	0.7	0.7	± 1.9 %	± 1.9 %
Hemispherical Isotropy	9.6	Rectangular	√3	0.7	0.7	± 3.9 %	± 3.9 %
Boundary Effects	1.0	Rectangular	√3	1	1	± 0.6 %	± 0.6 %
Linearity	4.7	Rectangular	√3	1	1	± 2.7 %	± 2.7 %
System Detection Limits	1.0	Rectangular	√3	1	1	± 0.6 %	± 0.6 %
Readout Electronics	0.3	Normal	1	1	1	± 0.3 %	± 0.3 %
Response Time	0.8	Rectangular	√3	1	1	± 0.5 %	± 0.5 %
Integration Time	2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %
RF Ambient Noise	3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
RF Ambient Reflections	3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
Probe Positioner	0.4	Rectangular	√3	1	1	± 0.2 %	± 0.2 %
Probe Positioning	2.9	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
Max. SAR Eval.	1.0	Rectangular	√3	1	1	± 0.6 %	± 0.6 %
Test Sample Related							
Device Positioning	2.9	Normal	1	1	1	± 2.9 %	± 2.9 %
Device Holder	3.6	Normal	1	1	1	± 3.6 %	± 3.6 %
Power Drift	5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %
Phantom and Setup							
Phantom Uncertainty	4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %
Liquid Conductivity (Target)	5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %
Liquid Conductivity (Meas.)	2.5	Normal	1	0.64	0.43	± 1.6 %	± 1.1 %
Liquid Permittivity (Target)	5.0	Rectangular	√3	0.6	0.49	± 1.7 %	± 1.4 %
Liquid Permittivity (Meas.)	2.5	Normal	1	0.6	0.49	± 1.5 %	± 1.2 %
Combined Standard Uncertainty						± 11.0 %	± 10.8 %
Coverage Factor for 95 %						K=2	
Expanded Uncertainty						**± 22.0 %**	**± 21.5 %**

Table 14.2 Uncertainty Budget for frequency range 300 MHz to 3 GHz

Error Description	Uncertainty Value (±%)	Probability Distribution	Divisor	Ci (1g)	Ci (10g)	Standard Uncertainty (1g)	Standard Uncertainty (10g)
Measurement System							
Probe Calibration	6.55	Normal	1	1	1	± 6.55 %	± 6.55 %
Axial Isotropy	4.7	Rectangular	√3	0.7	0.7	± 1.9 %	± 1.9 %
Hemispherical Isotropy	9.6	Rectangular	√3	0.7	0.7	± 3.9 %	± 3.9 %
Boundary Effects	2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %
Linearity	4.7	Rectangular	√3	1	1	± 2.7 %	± 2.7 %
System Detection Limits	1.0	Rectangular	√3	1	1	± 0.6 %	± 0.6 %
Readout Electronics	0.3	Normal	1	1	1	± 0.3 %	± 0.3 %
Response Time	0.8	Rectangular	√3	1	1	± 0.5 %	± 0.5 %
Integration Time	2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %
RF Ambient Noise	3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
RF Ambient Reflections	3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
Probe Positioner	0.8	Rectangular	√3	1	1	± 0.5 %	± 0.5 %
Probe Positioning	9.9	Rectangular	√3	1	1	± 5.7 %	± 5.7 %
Max. SAR Eval.	4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %
Test Sample Related							
Device Positioning	2.9	Normal	1	1	1	± 2.9 %	± 2.9 %
Device Holder	3.6	Normal	1	1	1	± 3.6 %	± 3.6 %
Power Drift	5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %
Phantom and Setup							
Phantom Uncertainty	4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %
Liquid Conductivity (Target)	5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %
Liquid Conductivity (Meas.)	2.5	Normal	1	0.64	0.43	± 1.6 %	± 1.1 %
Liquid Permittivity (Target)	5.0	Rectangular	√3	0.6	0.49	± 1.7 %	± 1.4 %
Liquid Permittivity (Meas.)	2.5	Normal	1	0.6	0.49	± 1.5 %	± 1.2 %
Combined Standard Uncertainty						± 12.8 %	± 12.6 %
Coverage Factor for 95 %						K=2	
Expanded Uncertainty						**± 25.6 %**	**± 25.2 %**

Table 14.3 Uncertainty Budget for frequency range 3 GHz to 6 GHz

15. References

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

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[3] IEEE Std. 1528-2003, “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, December 2003

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[5] FCC KDB 865664 D01 v01r03 "SAR Measurement Requirements for 100 MHz to 6 GHz", Feb 2014.

[6] FCC KDB 865664 D02 v01r01, “RF Exposure Compliance Reporting and Documentation Considerations”, May 2013

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[10] FCC KDB 644545 D01 v01r02, "Guidance for IEEE 802.11ac and Pre-ac Device Emission Testing", October 2013

[11] FCC KDB 941225 D01 v02, “SAR Measurement Procedures for 3G Devices – CDMA 2000 / Ev-Do / WCDMA / HSDPA / HSPA”, October 2007

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