REPORT No. : SZ17070185S01

FCC SAR TEST REPORT

APPLICANT	:	Honeywell International Inc Honeywell Sensing & Productivity Solutions
PRODUCT NAME	:	Mobile Computer
MODEL NAME	:	EDA50-211
TRADE NAME	:	N/A
BRAND NAME	:	Honeywell
FCC ID	:	HD5-EDA50211
STANDARD(S)	:	47CFR 2.1093 IEEE 1528-2013
ISSUE DATE	:	2017-08-25

SHENZHEN MORLAB COMMUNICATIONS TECHNOLOGY Co., Ltd.

DIRECTORY

Change History		
Issue	Date	Reason for change
1.0	2017-08-25	First edition

TEST REPORT DECLARATION

Applicant	Honeywell International Inc Honeywell Sensing & Productivity Solutions		
Applicant Address	9680 Old Bailes Rd. Fort Mill, SC 29707 United States		
Manufacturer	Honeywell International Inc Honeywell Sensing & Productivity Solutions		
Manufacturer Address	9680 Old Bailes Rd. Fort Mill, SC 29707 United States		
Product Name	Mobile Computer		
Model Name	EDA50-211		
Brand Name	Honeywell		
HW Version	V2.0		
SW Version	205.01.00.0006.eng		
Test Standards	47CFR 2.1093; IEEE 1528-2013		
Test Date	2017-08-01 to 2017-08-03		
The Highest Reported 1g-SAR(W/kg)	Head	0.390W/kg	Limit(W/kg): 1.6W/kg
	Body-worn	1.122W/kg	
	Hotspot	1.122W/kg	
	Simultaneous	1.500W/kg	

Tested by : Peng Fuwei

Peng Fuwei (Test engineer)

Approved by : Peng Huarui

Peng Huarui (Supervisor)

1. SUMMARY OF MAXIMUM SAR VALUE

Mode/Band	Test Position	Measurement SAR-1g(W/kg)	Scaled SAR-1g(W/Kg)	Plot
GSM850	Head	0.213	0.237	1#
	Body-worn (10mm Gap)	0.763	0.819	31#
GSM1900	Head	0.133	0.149	9#
	Body-worn (10mm Gap)	0.415	0.457	37#
WCDMA II	Head	0.289	0.306	17#
	Body-worn (10mm Gap)	0.553	0.586	26#
WCDMA V	Head	0.254	0.277	15#
	Body-worn (10mm Gap)	0.470	0.512	18#
LTE Band 2	Head	0.322	0.325	46#
	Body-worn (10mm Gap)	0.625	0.631	51#
LTE Band 4	Head	0.378	0.390	64#
	Body-worn (10mm Gap)	0.734	0.758	71#
LTE Band 7	Head	0.174	0.191	82#
	Body-worn (10mm Gap)	1.028	1.122	91#
WLAN 2.4GHz	Head	0.194	0.204	125#
	Body-worn (10mm Gap)	0.370	0.390	129#
WLAN 5GHz	Head	0.680	0.845	103#
	Body-worn (10mm Gap)	0.304	0.378	121#

Note:

1. The SAR limit(1.6W/kg) for general population/uncontrolled exposure is specified in FCC 47 CFR part2(2.1093) and ANSI/IEEE C95.1-1991.
2. Since the Bluetooth maximum power is less than P_{Ref} and maximum SAR for others transmitter is less than 1.2W/kg,SAR testing for Bluetooth is not required.

2 TECHNICAL INFORMATION

Note: the Following data is based on the information by the applicant.

2.1 Identification of Applicant

Company Name:	Honeywell International Inc Honeywell Sensing & Productivity Solutions
Address:	9680 Old Bailes Rd. Fort Mill, SC 29707 United States

2.2 Identification of Manufacturer

Company Name:	Honeywell International Inc Honeywell Sensing & Productivity Solutions
Address:	9680 Old Bailes Rd. Fort Mill, SC 29707 United States

2.3 EquipmentUnder Test (EUT)

Model Name:	EDA50-211
Trade Name:	N/A
Brand Name:	Honeywell
Hardware Version:	V2.0
Software Version:	205.01.00.0006.eng
Tx Frequency Bands:	GSM 850: 824-849 MHz; GSM 1900: 1850-1910 MHz; WCDMA Band II : 1850-1910MHz; WCDMA Band V: 824-849 MHz; LTE Band 2: 1850-1910MHz; LTE Band 4: 1710-1755MHz; LTE Band 7: 824-849 MHz; 802.11 b/g/n20/n40/a: 2412-2462 MHz;5.15-5.85GHz Bluetooth4.0: 2402-2480 MHz;
Uplink Modulations:	GSM/GPRS: GSMK; EDGE: GMSK/8PSK; WCDMA/HSDPA/HSUPA/:QPSK; FDD-LTE:QPSK/16QAM; WI-FI : 802.11b: DSSS, 802.11 a/g/n-20/n-40: OFDM Bluetooth4.0: FHSS(GFSK, Π/4 DQPSK, 8DPSK)
Hotspot function:	Support

2.3.1 Photographs of the EUT

Please refer to the External Photos for the Photos of the EUT

2.3.2 Identification of all used EUT

The EUT identity consists of numerical and letter characters, the letter character indicates the test sample, and the Following two numerical characters indicate the software version of the test sample.

EUT Identity	Hardware Version	Software Version
1#	V2.0	205.01.00.0006.eng

2.4 Applied Reference Documents

Leading reference documents for testing:

No.	Identity	Document Title
1	**47 CFR§2.1093**	Radiofrequency Radiation Exposure Evaluation: Portable Devices
2	**IEEE 1528-2013**	IEEE Recommended Practice forDetermining the Peak Spatial-AverageSpecific Absorption Rate (SAR) in theHuman Head from WirelessCommunications Devices: Measurement Techniques
3	**KDB 447498 D01v06**	General RF Exposure Guidance
4	**KDB 248227 D01v02r02**	SAR Measurement Procedures for 802.11 Transmitters
5	**KDB 865664 D01v01r04**	SAR Measurement 100 MHz to 6 GHz
6	**KDB 865664 D02v01r02**	RF Exposure Reporting
7	**KDB 648474 D04v01r03**	Handset SAR
8	**KDB 941225 D01v03r01**	3G SAR MEAUREMENT PROCEDURES
9	**KDB 941225 D05v02r05**	SAR Evaluation Consideratoin for LTE Devices
10	**KDB 941225 D06v02r01**	SAR Evaluation Procedures For Portable Devices With Wireless Router Capabilities

2.5 Device Category and SAR Limits

Uncontrolled Environment

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

Controlled Environment

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

Limits for Occupational/Controlled Exposure (W/kg)

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

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

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

Note: 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. SPECIFIC ABSORPTION RATE (SAR)

3.1 Introduction

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

3.2 SAR Definition

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

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

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 head capacity, δT is the temperature rise and δt 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.

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4. SAR MEASUREMENT SETUP

4.1 The Measurement System

Comosar is a system that is able to determine the SAR distribution inside a phantom of human being according to different standards. The Comosar system consists of the Following items:

- Main computer to control all the system
- 6 axis robot
- Data acquisition system
- Miniature E-field probe
- Phone holder
- Head simulating tissue

The Following figure shows the system.

The EUT under test operating at the maximum power level is placed in the phone holder, under the phantom, which is filled with head simulating liquid. The E-Field probe measures the electric field inside the phantom. The OpenSAR software computes the results to give a SAR value in a 1g or 10g mass.

4.2 Probe

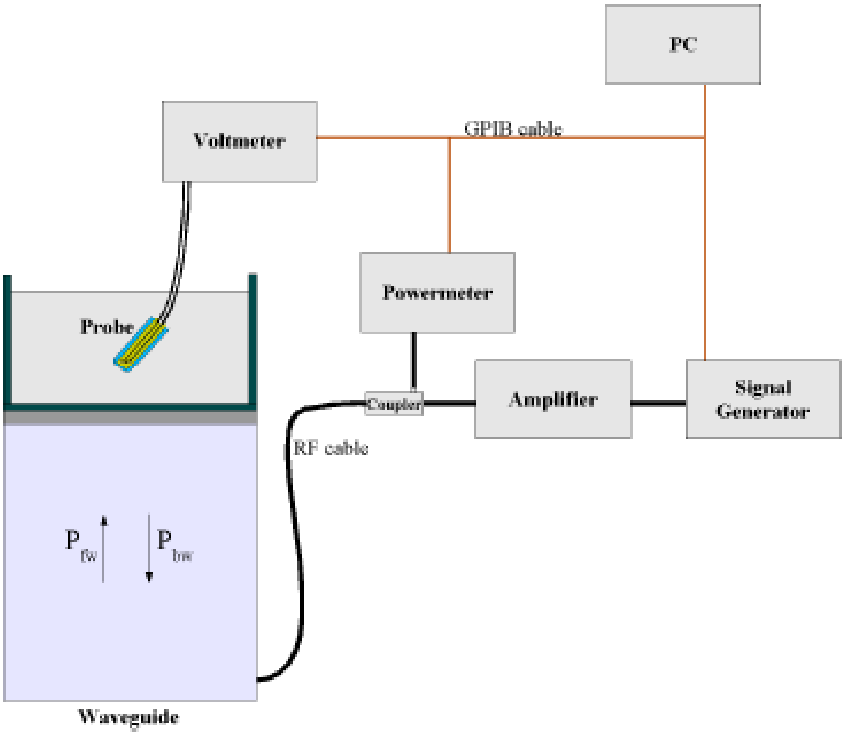
For the measurements the Specific Dosimetric E-Field Probe SN 37/08 EP80 with Following specifications is used

- Dynamic range: 0.01-100 W/kg
- Tip Diameter: 6.5 mm

- Distance between probe tip and sensor center: 2.5mm
- Distance between sensor center and the inner phantom surface: 4 mm (repeatability better than +/- 1mm)
- Probe linearity: <0.25 dB
- Axial Isotropy: <0.25 dB
- Spherical Isotropy: <0.25 dB
- Calibration range: 835to 2500MHz for head & body simulating liquid.

Angle between probe axis (evaluation axis) and surface normal line: less than 30°

Probe calibration is realized, in compliance with CENELEC EN 62209 and IEEE 1528 std, with CALISAR, Antennessa proprietary calibration system. The calibration is performed with the EN 622091 annex technique using reference guide at the five frequencies.



$$SAR = \frac{4\left(P_{fw} - P_{bw}\right)}{ab\delta} \cos^2\left(\pi \frac{y}{a}\right) e^{(2z/\delta)}$$

Where :

Pfw = Forward Power

Pbw = Backward Power

a and b = Waveguide dimensions

ı = Skin depth

Keithley configuration:

Rate = Medium; Filter =ON; RDGS=10; FILTER TYPE =MOVING AVERAGE; RANGE AUTO
After each calibration, a SAR measurement is performed on a validation dipole and compared with aNPL calibrated probe, to verify it.

The calibration factors, CF(N), for the 3 sensors corresponding to dipole 1, dipole 2 and dipole 3 are:

CF(N)=SAR(N)/Vlin(N)   (N=1,2,3)

The linearised output voltage Vlin(N) is obtained from the displayed output voltage V(N) using

Vlin(N)=V(N)*(1+V(N)/DCP(N))   (N=1,2,3)

Where DCP is the diode compression point in mV.

4.3 Probe Calibration Process

4.3.1 Dosimetric Assessment Procedure

Each E-Probe/Probe Amplifier combination has unique calibration parameters. SATIMO Probe calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm^2) using an with CALISAR, Antenna proprietary calibration system.

4.3.2 Free Space Assessment Procedure

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and in a waveguide or other methodologies above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1 mW/cm^2.

4.3.3 Temperature Assessment Procedure

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulating head tissue. The E-field in the medium correlates with the temperature rise in the dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

Where:

δt = exposure time (30 seconds), C = heat capacity of tissue (brainor muscle),

δT = temperature increase due to RF exposure.

SAR is proportional to $\Delta T/\Delta t$, the initial rate of tissue heating, before thermal diffusion takes place. The electric field in the simulated tissue can be used to estimate SAR by equating the thermally derived SAR to that with the E- field component.

Where:

σ = simulated tissue conductivity,

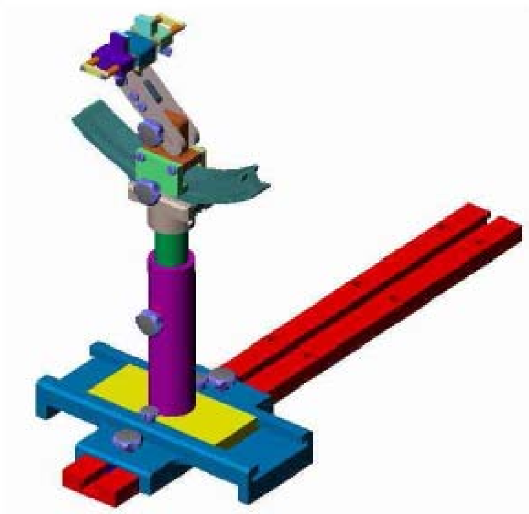
ρ = Tissue density (1.25 g/cm³ for brain tissue)

4.4 Phantom

For the measurements the Specific Anthropomorphic Mannequin (SAM) defined by the IEEE SCC-34/SC2 group is used. The phantom is a polyurethane shell integrated in a wooden table. The thickness of the phantom amounts to 2mm +/- 0.2mm. It enables the dosimetric evaluation of left and right phone usage and includes an additional flat phantom part for the simplified performance check. The phantom set-up includes a cover, which prevents the evaporation of the liquid.

4.5 Device Holder

The positioning system allows obtaining cheek and tilting position with a very good accuracy. In compliance with CENELEC, the tilt angle uncertainty is Middle than 1°.



Device holder

System Material	Permittivity	Loss Tangent
Delrin	3.7	0.005

5. TISSUE SIMULATING LIQUIDS

For SAR measurement of the field distribution inside the phantom, the phantom must be filled with homogeneous tissue simulating liquid to a depth of at least 15 cm. 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. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm. The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 5% are listed in below table.

The following table gives the recipes for tissue simulating liquids

Frequency Band (MHz)	900		1800	2000		2450	2600	5200-5800	
Tissue Type	Head	Body	Body	Head	Body	Body	Body	Head	Body
Ingredients(% by weight)									
DeionisedWater	50.36	50.20	68.80	54.90	40.40	73.20	68.1	65.53	78.60
Salt(NaCl)	1.25	0.90	0.20	0.18	0.50	0.10	0.10	0.00	0.00
Sugar	0.00	48.50	0.00	0.00	58.00	0.00	0.00	0.00	0.00
Tween 20	48.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HEC	0.00	0.20	0.00	0.00	1.00	0.00	0.00	0.00	0.00
Bactericide	0.00	0.20	0.00	0.00	0.10	0.00	0.00	0.00	0.00
Triton X-100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.24	10.70
DGBE	0.00	0.00	31.00	44.92	0.00	26.70	31.8	0.00	0.00
Diethylenglycol monohexylether	0.00	0.00	0.00	0.00	0.00	0.00	0.00	17.24	10.70
Target dielectric parameters									
Dielectric Constant	41.50	56.10	53.40	39.90	53.30	52.70	52.5	35.3	48.7
Conductivity (S/m)	0.90	0.95	1.49	1.42	1.52	1.95	2.16	5.07	5.53

Note: Please refer to the validation results for dielectric parameters of each frequency band.

The dielectric properties of the tissue simulating liquids were verified prior to the SAR evaluation using an Agilent 85033E Dielectric Probe Kit and an Agilent Network Analyzer.

Table 1: Dielectric Performance of Tissue Simulating Liquid

Temperature: 22.0~23.8°C, humidity: 54~60%.						
Date	**Freq.(MHz)**	**Liquid Parameters**	**Meas.**	**Target**	**Delta(%)**	**Limit±(%)**
2017/08/01	Head 835	Relative Permittivity(εr):	41.18	41.5	-0.77	5
		Conductivity(σ):	0.89	0.90	-1.11	5
2017/08/01	Body 835	Relative Permittivity(εr):	55.28	55.2	0.14	5
		Conductivity(σ):	0.97	0.97	0.00	5
2017/08/02	Head 1800	Relative Permittivity(εr):	40.10	40.0	0.25	5
		Conductivity(σ):	1.37	1.40	-2.14	5
2017/08/02	Body 1800	Relative Permittivity(εr):	53.30	53.3	0.00	5
		Conductivity(σ):	1.52	1.52	0.00	5
2017/08/01	Head 2000	Relative Permittivity(εr):	39.98	39.90	0.20	5
		Conductivity(σ):	1.41	1.42	-0.70	5
2017/08/01	Body 2000	Relative Permittivity(εr):	53.29	53.3	-0.02	5
		Conductivity(σ):	1.52	1.52	0.00	5
2017/08/03	Head 2450	Relative Permittivity(εr):	39.28	39.20	0.20	5
		Conductivity(σ):	1.83	1.80	1.67	5
2017/08/03	Body 2450	Relative Permittivity(εr):	52.88	52.70	0.34	5
		Conductivity(σ):	1.97	1.95	1.03	5
2017/08/02	Head 2600	Relative Permittivity(εr):	39.02	39.0	0.05	5
		Conductivity(σ):	1.98	1.96	1.02	5
2017/08/02	Body 2600	Relative Permittivity(εr):	52.36	52.5	-0.27	5
		Conductivity(σ):	2.11	2.16	-2.31	5
2017/08/03	Head 5200	Relative Permittivity(εr):	36.12	36.0	0.33	5
		Conductivity(σ):	4.67	4.66	0.21	5
2017/08/03	Body 5200	Relative Permittivity(εr):	48.27	49.0	-1.49	5
		Conductivity(σ):	5.54	5.30	4.53	5
2017/08/03	Head 5600	Relative Permittivity(εr):	35.56	35.5	0.17	5
		Conductivity(σ):	5.10	5.07	0.59	5
2017/08/03	Body 5600	Relative Permittivity(εr):	48.39	48.5	-0.23	5
		Conductivity(σ):	5.74	5.77	-0.52	5
2017/08/03	Head 5800	Relative Permittivity(εr):	35.33	35.3	0.08	5
		Conductivity(σ):	5.31	5.27	0.76	5
2017/08/03	Body 5800	Relative Permittivity(εr):	48.09	48.2	-0.23	5
		Conductivity(σ):	5.93	6.00	-1.17	5

6. UNCERTAINTY ASSESSMENT

The Following table includes the uncertainty table of the IEEE 1528. The values are determined by Antennessa.

6.1 UNCERTAINTY EVALUATION FOR EUT SAR TEST

a	b	c	d	e= f(d,k)	f	g	h= c*f/e	i= c*g/e	k
Uncertainty Component	Sec.	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	Vi
Measurement System									
Probe calibration	E.2.1	5.83	N	1	1	1	5.83	5.83	∞
Axial Isotropy	E.2.2	3.5	R	$\sqrt{3}$	1	1	2.02	2.02	∞
Hemispherical Isotropy	E.2.2	5.9	R	$\sqrt{3}$	1	1	3.41	3.41	∞
Boundary effect	E.2.3	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	E.2.4	4.7	R	$\sqrt{3}$	1	1	2.71	2.71	∞
System detection limits	E.2.5	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Readout Electronics	E.2.6	0.5	N	1	1	1	0.5	0.5	∞
Reponse Time	E.2.7	3.0	R	$\sqrt{3}$	1	1	3.0	3.0	∞
Integration Time	E.2.8	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
RF ambient Conditions	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Probe positioner Mechanical Tolerance	E.6.2	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Probe positioning with respect to Phantom Shell	E.6.3	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	E.5.2	2.3	R	$\sqrt{3}$	1	1	1.33	1.33	∞
Test sample Related									
Test sample positioning	E.4.2.1	2.6	N	1	1	1	2.6	2.6	N-1
Device Holder Uncertainty	E.4.1.1	3.0	N	1	1	1	3.0	3.0	N-1
Output power Power drift -	6.6.2	5.0	R	$\sqrt{3}$	1	1	2.89	2.89	∞

SAR drift measurement									
Phantom and Tissue Parameters									
Phantom Uncertainty (Shape and thickness tolerances)	E.3.1	4.0	R	$\sqrt{3}$	1	1	2.31	2.31	∞
Liquid conductivity - deviation from target value	E.3.2	2.0	R	$\sqrt{3}$	0.64	0.43	1.69	1.13	∞
Liquid conductivity - measurement uncertainty	E.3.3	2.5	N	1	0.64	0.43	3.20	2.15	M
Liquid permittivity - deviation from target value	E.3.2	2.5	R	$\sqrt{3}$	0.6	0.49	1.28	1.04	∞
Liquid permittivity - measurement uncertainty	E.3.3	5.0	N	1	0.6	0.49	6.00	4.90	M
Liquid conductivity –temperature uncertainty	E.3.4		R	$\sqrt{3}$	0.78	0.41			∞
Liquid permittivity –temperature uncertainty	E.3.4		R	$\sqrt{3}$	0.23	0.26			∞
Combined Standard Uncertainty			RSS				11.55	12.07	
Expanded Uncertainty (95% Confidence interval)			K=2				±23.20	±24.17	

6.2 UNCERTAINTY FOR SYSTEM PERFORMANCE CHECK

a	b	c	d	e= f(d,k)	f	g	h= c*f/e	i= c*g/e	k
Uncertainty Component	Sec.	Tol (+-%)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	Vi
Measurement System									
Probe calibration	E.2.1	4.76	N	1	1	1	4.76	4.7	∞
Axial Isotropy	E.2.2	2.5	R	$\sqrt{3}$	0.7	0.7	1.01	1.0	∞
Hemispherical Isotropy	E.2.2	4.0	R	$\sqrt{3}$	0.7	0.7	1.62	1.6	∞
Boundary effect	E.2.3	1.0	R	$\sqrt{3}$	1	1	0.58	0.5	∞
Linearity	E.2.4	5.0	R	$\sqrt{3}$	1	1	2.89	2.8	∞

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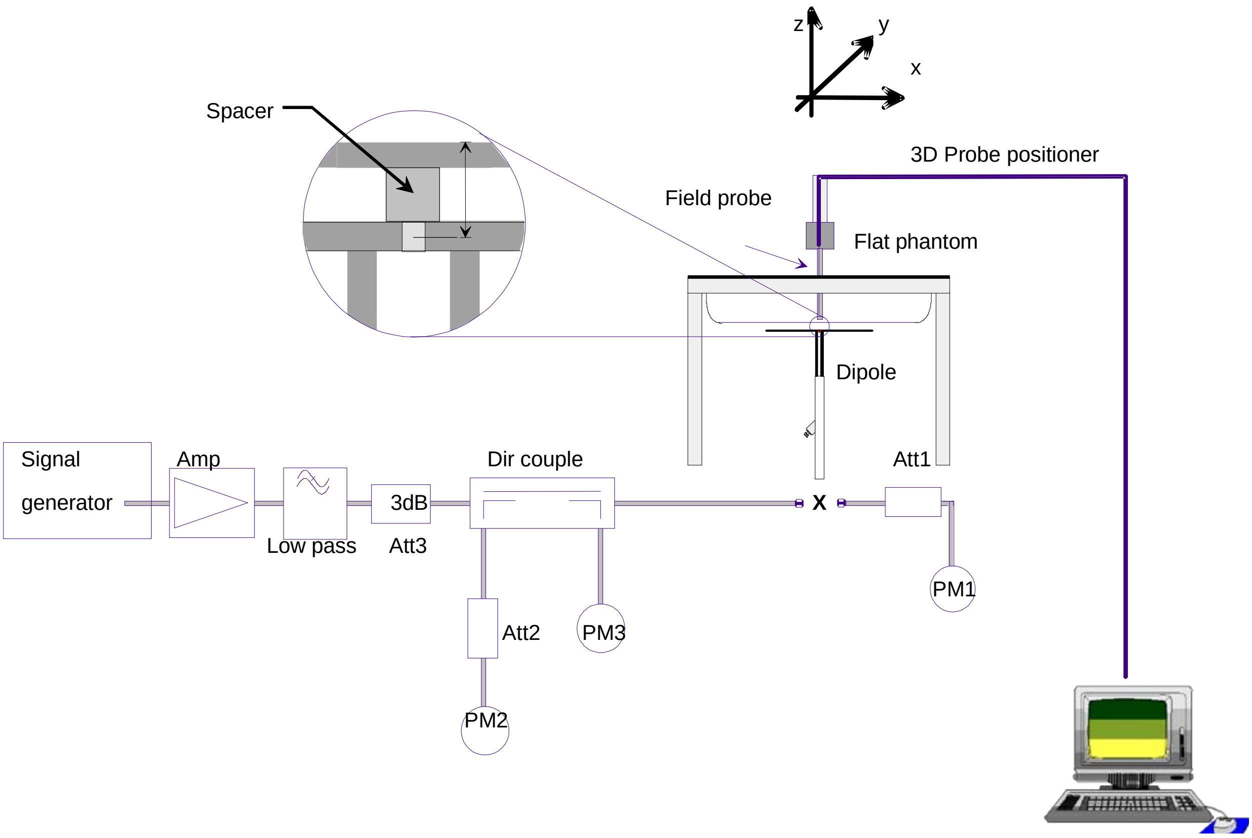
System detection limits	E.2.5	1.0	R	$\sqrt{3}$	1	1	0.58	0.5	∞
Readout Electronics	E.2.6	0.02	N	1	1	1	0.02	0.0	∞
Reponse Time	E.2.7	3.0	R	$\sqrt{3}$	1	1	1.73	1.7	∞
Integration Time	E.2.8	2.0	R	$\sqrt{3}$	1	1	1.15	1.1	∞
RF ambient Conditions	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.73	1.7	∞
Probe positioner Mechanical Tolerance	E.6.2	2.0	R	$\sqrt{3}$	1	1	1.15	1.15	∞
Probe positioning with respect to Phantom Shell	E.6.3	0.05	R	$\sqrt{3}$	1	1	0.03	0.03	∞
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	E.5.2	5.0	R	$\sqrt{3}$	1	1	2.89	2.89	∞
Dipole									
Dipole axis to liquid Distance	8,E.4.2	1.00	N	$\sqrt{3}$	1	1	0.58	0.58	∞
Input power and SAR drift measurement	8,6.6.2	4.04	R	$\sqrt{3}$	1	1	2.33	2.33	∞
Phantom and Tissue Parameters									
Phantom Uncertainty (Shape and thickness tolerances)	E.3.1	0.05	R	$\sqrt{3}$	1	1	0.03	0.03	∞
Liquid conductivity - deviation from target value	E.3.2	4.57	R	$\sqrt{3}$	0.64	0.43	1.69	1.13	∞
Liquid conductivity - measurement uncertainty	E.3.3	5.00	N	$\sqrt{3}$	0.64	0.43	1.85	1.24	M
Liquid permittivity - deviation from target value	E.3.2	3.69	R	$\sqrt{3}$	0.6	0.49	1.28	1.04	∞
Liquid permittivity - measurement uncertainty	E.3.3	10.00	N	$\sqrt{3}$	0.6	0.49	3.46	2.83	M
Combined Standard Uncertainty			RSS				8.83	8.37	
Expanded Uncertainty (95% Confidence interval)			K=2				17.66	16.73	

7. SAR MEASUREMENT EVALUATION

7.1 System Setup

In the simplified setup for system evaluation, the DUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave which 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 system check verifies that the system operates within its specifications. It is performed daily or before every SAR measurement. The system check uses normal SAR measurements in the flat section of the phantom with a matched dipole at a specified distance. The system verification setup is shown as below



The validation dipole is placed beneath the flat phantom with the specific spacer in place. The distance spacer is touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The power meter PM1 measures the forward power at the location of the system check dipole connector. The signal generator is adjusted for the desired forward power (250 mW is used for 700 MHz to 3 GHz,100 mW is used for 3.5 GHz to

6 GHz) at the dipole connector and the power meter PM2 is read at that level. After connecting the cable to the dipole, the signal generator is readjusted for the same reading at power meter

7.2 Validation Results

After system check testing, the SAR result will be normalized to 1W forward input power and compared with the reference SAR value derived from validation dipole certificate report. The deviation of system check should be within 10 %.

Frequency	835MHz(H)	835MHz(B)	1800MHz(H)	1800MHz(B)	2000MHz(H)	2000MHz(B)
Target value 1W (1g)	9.61W/Kg	9.88W/Kg	37.05W/Kg	37.78 W/Kg	42.70 W/Kg	41.43W/Kg
Test value 1g (100 mW input power)	0.968W/Kg	0.975W/Kg	3.698 W/Kg	3.753 W/Kg	4.256W/Kg	4.120 W/Kg
Normalized to 1W value(1g)	9.68 W/Kg	9.75 W/Kg	36.98 W/Kg	37.53 W/Kg	42.56 W/Kg	41.20 W/Kg
Deviation	0.81%	0.52%	0.19%	0.66%	0.33%	0.56%

Frequency	2450MHz(H)	2450MHz(B)	2600MHz(H)	2600MHz(B)
Target value 1W (1g)	53.34W/Kg	50.93W/Kg	56.94W/Kg	54.07W/Kg
Test value 1g (100 mW input power)	5.326 W/Kg	5.081 W/Kg	5.681W/Kg	5.386 W/Kg
Normalized to 1W value(1g)	53.26 W/Kg	50.81 W/Kg	56.81W/Kg	53.86W/Kg
Deviation	0.15%	0.24%	0.15%	0.24%

Frequency	5200MHz(H)	5200MHz(B)	5600MHz(H)	5600MHz(B)	5800MHz(H)	5800MHz(B)
Target value 1W (1g)	164.05W/Kg	163.36W/Kg	171.66W/Kg	172.11W/Kg	177.81W/Kg	177.10W/Kg
Test value 1g (100 mW input power)	16.399 W/Kg	16.284W/Kg	17.144 W/Kg	17.196W/Kg	17.711 W/Kg	17.695W/Kg
Normalized to 1W value(1g)	163.99W/Kg	162.84W/Kg	171.44W/Kg	171.96W/Kg	177.11 W/Kg	17695W/Kg
Deviation	0.04%	0.32%	0.13%	0.09%	0.39%	0.08%

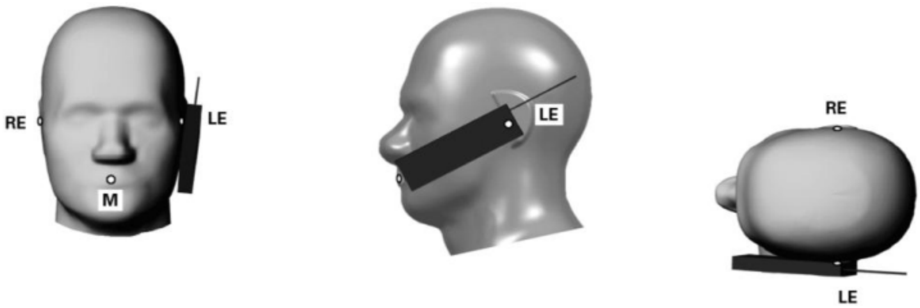
Note: System checks the specific test data please see Annex C

8. OPERATIONAL CONDITIONS DURING TEST

8.1 Information on the testing

The mobile phone antenna and battery are those specified by the manufacturer. The battery is fully charged before each measurement. The output power and frequency are controlled using a base station simulator. The mobile phone is set to transmit at its highest output peak power level.

The mobile phone is test in the “cheek” and “tilted” positions on the left and right sides of the phantom. The mobile phone is placed with the vertical centre line of the body of the mobile phone and the horizontal line crossing the centre of the earpiece in a plane parallel to the sagittal plane of the phantom.



IllustrationforCheekPosition

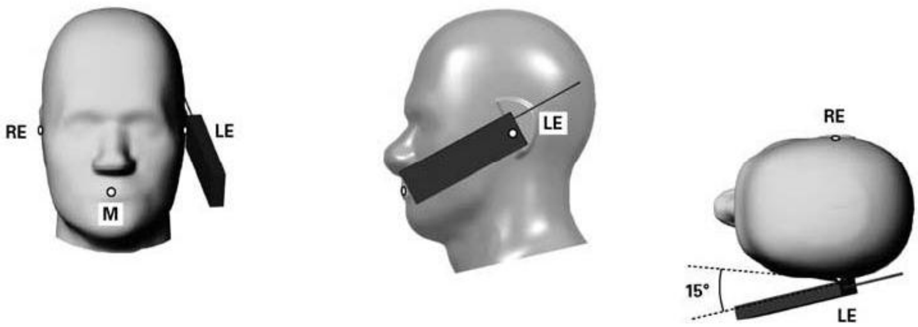


Illustration for Tilted Position

Description of the “cheek” position:

The mobile phone is well placed in the reference plane and the earpiece is in contact with the ear. Then the mobile phone is moved until any point on the front side get in contact with the cheek of the phantom or until contact with the ear is lost.

Description of the “tilted” position:

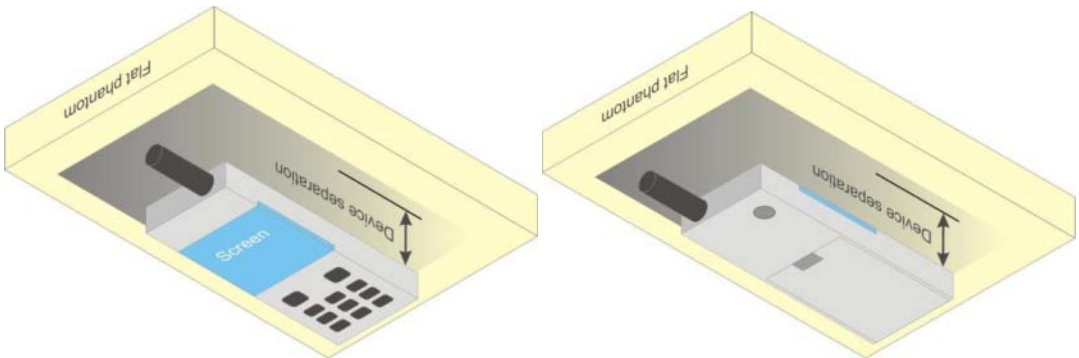
The mobile phone is well placed in the "cheek" position as described above. Then the mobile phone is moved outward away from the month by an angle of 15 degrees or until contact with the ear lost.

Remark: Please refer to Appendix B for the test setup photos.

8.2 Body-worn Configurations

The body-worn configurations shall be tested with the supplied accessories (belt-clips, holsters, etc.) attached to the device in normal use configuration.

For body-worn and other configurations a flat phantom shall be used which is comprised of material with electrical properties similar to the corresponding tissues.



IllustrationforBodyWornPosition

8.3 Measurement procedure

The Following steps are used for each test position

1. Establish a call with the maximum output power with a base station simulator. The connection between the mobile and the base station simulator is established via air interface.
2. Measurement of the local E-field value at a fixed location. This value serves as a reference value for calculating a possible power drift.
3. Measurement of the SAR distribution with a grid of 8 to 16mm * 8 to16 mm and a constant distance to the inner surface of the phantom. Since the sensors cannot directly measure at the inner phantom surface, the values between the sensors and the inner phantom surface are extrapolated. With these values the area of the maximum SAR is calculated by an interpolation scheme.
4. Around this point, a cube of 30 * 30 * 30 mm or 32 * 32 * 32 mm is assessed by measuring 5 or

8 * 5 or 8*4 or 5 mm. With these data, the peak spatial-average SAR value can be calculated.

8.4 Description of interpolation/extrapolation scheme

The local SAR inside the phantom is measured using small dipole sensing elements inside a probe body. The probe tip must not be in contact with the phantom surface in order to minimize measurements errors, but the highest local SAR will occur at the surface of the phantom.

An extrapolation is using to determinate this highest local SAR values. The extrapolation is based on a fourth-order least-square polynomial fit of measured data. The local SAR value is then extrapolated from the liquid surface with a 1mm step.

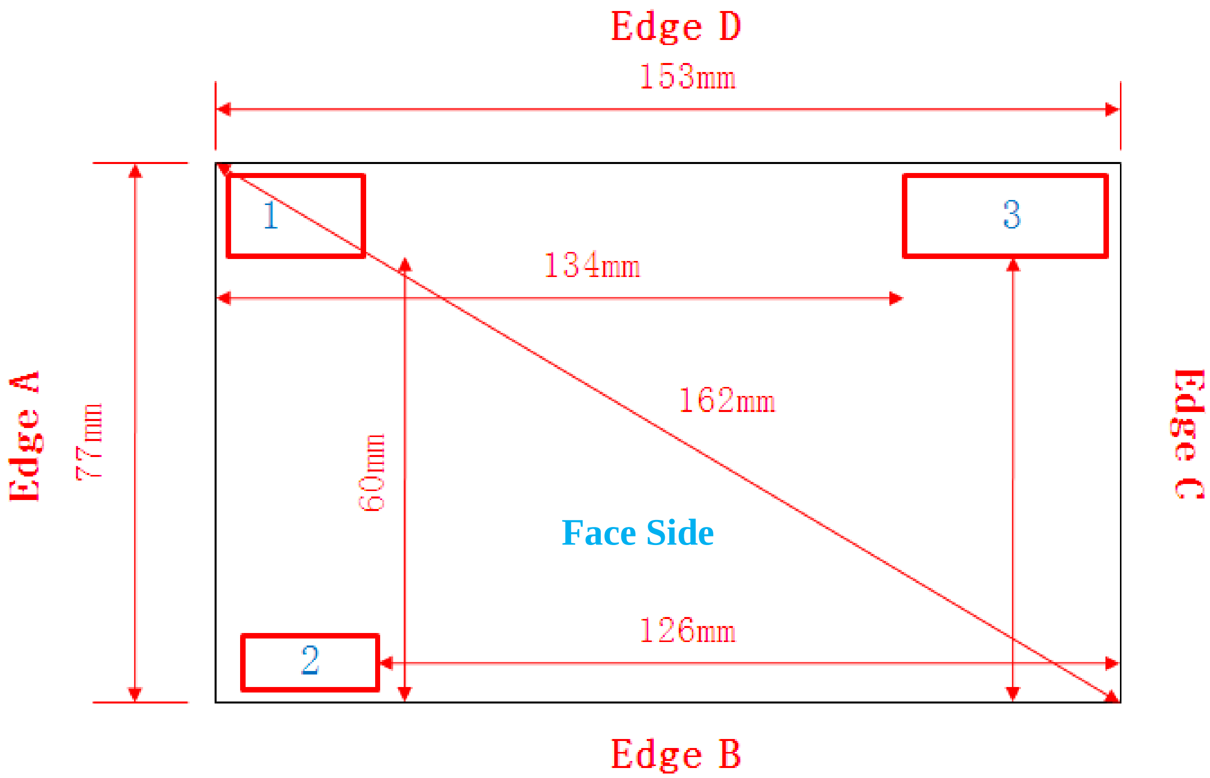
The measurements have to be performed over a limited time (due to the duration of the battery) so the step of measurement is high. It could vary between 5 and 8 mm. To obtain an accurate assessment of the maximum SAR averaged over 10 grams and 1 gram requires a very fine resolution in the three dimensional scanned data array.

9. HOTSPOT MODE EVALUATION PROCEDURE

The SAR evaluation procedures for Portable Devices with Wireless Router function is according to KDB 941225 D06 HotSpot SAR v02r01.

SAR must be tested for all surfaces and edges (side) with a transmitting antenna with in 2.5 cm from that surface or edge, at a test separation distance of 10 mm, in the wireless mode that support wireless routing.

Edge configurations:



1. WLAN/BT Antenna
2. GPS Antenna
3. WWAN Antenna

Assessment	Hotspot side for SAR Test distance: 10mm					
Antennas	**Back**	**Front**	**Edge A**	**Edge B**	**Edge C**	**Edge D**
LTE/WCDMA/GSM	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**
WLAN&BT	**Yes**	**Yes**	No	**Yes**	**Yes**	**Yes**

10. Information Related to LTE Test parameter(Per 941225 D05v02r04)

1	Identify the operating frequency range of each LTE transmission FCC band used by the device	Band 2 Tx:1850-1910MHz Band 4 Tx:1710-1755MHz Band 7 Tx:2510-2560MHz						
2	Identify the high, middle and low (L, M, H) channel numbers and frequencies tested in each LTE frequency band	**Band2**	**Channel Bandwidth**					
			20Mhz	**15MHz**	**10MHz**	**5MHz**	**3MHz**	**1.4MHz**
		Low	20050/ 1720	20025/ 1717.5	20000/ 1715	19975/ 1712.5	19965/ 1711.5	19957/ 1710.7
		Middle	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5
		High	20300/ 1745	20325/ 1747.5	20350/ 1750	20375/ 1752.5	20384/ 1753.5	20392/ 1754.2
		Band4	**Channel Bandwidth**					
			20Mhz	**15MHz**	**10MHz**	**5MHz**	**3MHz**	**1.4MHz**
		Low	20050/ 1720	20025/ 1717.5	20000/ 1715	19975/ 1712.5	19965/ 1711.5	19957/ 1710.7
		Middle	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5	20175/ 1732.5
		High	20300/ 1745	20325/ 1747.5	20350/ 1750	20375/ 1752.5	20384/ 1753.5	20392/ 1754.2
		Band7	**Channel Bandwidth**					
			20Mhz	**15MHz**	**10MHz**	**5MHz**	**3MHz**	**1.4MHz**
		Low	20850/ 2510	20825/ 2507.2	20800/ 2505	20775/ 2502.5	/	/
		Middle	21100/ 2535	21100/ 2535	21100/ 2535	21100/ 2535	/	/
		High	21350/ 2560	21375/ 2562.5	21400/ 2565	21425/ 2567.5	/	/
3	Specify the UE category and uplink modulations used	The UE Category is 4 and the uplink modulations used are QPSK and 16QAM.						
4	Descriptions of the LTE transmitter and antenna implementation & identify	The module has a primary antenna for all LTE&UMTS bands, a Wi-Fi Tx/Rx antenna.						

<table>
<tr><td></td><td>whether it is a standalone transmitter operating independently of other wireless transmitters in the device or sharing hardware components and/or antenna(s) with other transmitters etc.</td><td></td></tr>
<tr><td>5</td><td>Identify the LTE Band Voice/data requirements in each operating mode and exposure condition with respect to head and body test configurations, antenna locations, handset flip-cover or slide positions, antenna diversity conditions, etc.</td><td>Mobile Hotspot Mode will be tested according to Section 9 of this report.</td></tr>
<tr><td>6</td><td>Identify if Maximum Power Reduction (MPR) is optional or mandatory, i.e. built-in by design:
only mandatory MPR may be considered during SAR testing, when the maximum output power is permanently limited by the MPR implemented within the UE; and only for the applicable RB (resource block) configurations specified in LTE standards
b) A-MPR (additional MPR) must be disabled.</td><td>As per 3GPP TS 36.101 v11.0.0 (2012-03)
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 (N_{RB})</th><th rowspan="2">MPR (dB)</th></tr>
<tr><th>1.4 MHz</th><th>3.0 MHz</th><th>5 MHz</th><th>10 MHz</th><th>15 MHz</th><th>20 MHz</th></tr>
<tr><td>QPSK</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 2</td></tr>
</table>
A-MPR is supported by design, but disable for SAR testing.</td></tr>
<tr><td>7</td><td>Include the maximum average conducted output power measured on the required test channels for each channel bandwidth and</td><td>This is included in the section 11 of this report.</td></tr>
</table>

<table>
<tr><td></td><td>UL modulation used in each frequency band:
a) with 1 RB allocated at the low, centred, high end of a channel
b) using 50% RB allocation low, centered, high end within a channel
c) using 100% RB allocation</td><td></td></tr>
<tr><td>8</td><td>Include the maximum average conducted output power measured for the other wireless mode and frequency bands</td><td>This is included in the section 13 of this report.</td></tr>
<tr><td>10</td><td>Identify the simultaneous transmission conditions for the voice and data configurations supported by all wireless modes, device configurations and frequency bands, for the head and body exposure conditions and device operating configurations (handset flip or cover positions, antenna diversity conditions etc.)</td><td>
<table>
<tr><td rowspan="2"></td><td colspan="5">Simultaneous transmission conditions</td></tr>
<tr><td colspan="2">WWAN</td><td colspan="2">WLAN</td><td rowspan="2">Sum of WWAN& WLAN</td></tr>
<tr><td>#</td><td>LTE Data</td><td>UMTS</td><td>802.11b/g/n</td><td>BT</td></tr>
<tr><td>1</td><td>×</td><td></td><td>×</td><td></td><td>×</td></tr>
<tr><td>2</td><td></td><td>×</td><td>×</td><td></td><td>×</td></tr>
<tr><td>3</td><td>×</td><td></td><td></td><td>×</td><td>×</td></tr>
<tr><td>4</td><td></td><td>×</td><td></td><td>×</td><td>×</td></tr>
</table>
</td></tr>
<tr><td>11</td><td>When power reduction is applied to certain wireless modes to satisfy SAR compliance for simultaneous transmission conditions, other equipment certification or operating requirements, include the maximum average conducted output power measured in each power reduction mode applicable to the</td><td>Not applicable.</td></tr>
</table>

	simultaneous voice/data transmission configurations for such wireless configurations and frequency bands; and also include details of the power reduction implementation and measurement setup	

11. SAR EVALUATION PROCEDURES&POWER MEASUREMENT FOR LTE

“1. QPSK with 1 RB allocation

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*. When the *reported* SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and *required test channels* is not required for 1 RB allocation; otherwise, SAR is required for the remainingr*equired test channels* and only for the RB offset configuration with the highest output power for that channel.6 When the *reported* SAR of a *required test channel* is > 1.45 W/kg, SAR is requiredfor all three RB offset configurations for that *required test channel*.

2. QPSK with 50% RB allocation

The procedures required for 1 RB allocation in 1. are applied to measure the SAR for QPSK with50% RB allocation.

3. QPSK with 100% RB allocation

For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest *reported* SAR for 1 RB and 50% RB allocation in 1. and 2. are ≤ 0.8W/kg. Otherwise, SAR is measured for the highest output power channel and if the *reported* SAR is > 1.45 W/kg, the remaining *required test channels* must also be tested.

<u>Higher order modulations</u>

For each modulation besides QPSK; e.g., 16-QAM, 64-QAM, apply the QPSK procedures in sections 1. and 2.and 3. to determine the QAM configurations that may need SAR measurement. For each configurationidentified as required for testing, SAR is required only when the highest maximum output powerfor the configuration in the higher order modulation is > ½ dB higher than the same configurationin QPSK or when the *reported* SAR for the QPSK configuration is > 1.45 W/kg.

4. Other channel bandwidth standalone SAR test requirements

For the other channel bandwidths used by the device in a frequency band, apply all the proceduresrequired for the largest channel bandwidth in section 5.2 to determine the channels and RBconfigurations that need SAR testing and only measure SAR when the highest maximum outputpower of a configuration requiring testing in the smaller channel bandwidth is > ½ dB higher thanthe equivalent channel configurations in the largest channel bandwidth configuration or the*reported* SAR of a configuration for the largest channel bandwidth is > 1.45 W/kg.

The equivalent channel configuration for the RB allocation, RB offset and modulation etc. Is determined for the smaller channel bandwidth according to the same number of RB allocated in Thelargest channel bandwidth. For example, 50 RB in 10 MHz channel bandwidth does not apply to5MHz channel bandwidth; therefore, this cannot be tested in the smaller channel bandwidth. However, 50% RB allocation in 10 MHz channel bandwidthis equivalent to 100% RB allocation in 5 MHz channel bandwidth; therefore, these are theequivalent configurations to be compared to determine the specific channel and configuration inthe smaller channel bandwidth that need SAR testing."

LTE BAND 2

Band Width	Channel	Freq.(MHZ)	Modulation	RB Configuration		Average Power (dBm)
				RB Size	RB Offset	
20MHz	L 18700	1860	QPSK	1	0	23.46
				1	49	22.66
				1	99	22.64
				50	0	22.44
				50	25	22.35
				50	49	22.33
				100	0	22.12
			16-QAM	1	0	23.18
				1	49	23.09
				1	99	22.78
				50	0	22.47
				50	25	22.18
				50	49	22.16
				100	0	21.96
	M 18900	1880	QPSK	1	0	23.18
				1	49	23.20
				1	99	22.88
				50	0	22.69
				50	25	22.46
				50	49	22.36
				100	0	22.19
			16-QAM	1	0	22.83
				1	49	22.84
				1	99	22.67
				50	0	22.62

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				50	25	22.47
				50	49	22.40
				100	0	22.15
	H 19100	1900	QPSK	1	0	23.37
				1	49	23.38
				1	99	23.27
				50	0	23.19
				50	25	22.92
				50	49	22.77
				100	0	22.45
			16-QAM	1	0	23.56
				1	49	23.51
				1	99	23.24
				50	0	23.04
				50	25	22.78
				50	49	22.75
				100	0	22.74

LTE BAND 2 (Continue)

Band Width	Channel	Freq.(MHZ)	Modulation	RB Configuration		Average Power (dBm)
				RB Size	RB Offset	
15MHz	L 18675	1857.5	QPSK	1	0	22.85
				1	37	22.87
				1	74	22.59
				36	0	22.28
				36	18	22.04
				36	35	21.83
				75	0	21.81
			16-QAM	1	0	21.76
				1	37	21.88
				1	74	21.78
				36	0	21.76
				36	18	21.66
				36	35	21.52
				75	0	21.33
	M 18900	1880	QPSK	1	0	22.53
				1	37	22.51
				1	74	22.39
				36	0	22.13
				36	18	21.71
				36	35	21.58
				75	0	21.55
			16-QAM	1	0	21.54
				1	37	21.63
				1	74	21.42
				36	0	21.12

				36	18	20.83
				36	35	20.80
				75	0	20.59
	H 19125	1902.5	QPSK	1	0	23.03
				1	37	23.01
				1	74	22.90
				36	0	22.76
				36	18	22.67
				36	35	22.59
				75	0	22.47
			16-QAM	1	0	21.76
				1	37	21.89
				1	74	21.83
				36	0	21.72
				36	18	21.48
				36	35	21.33
				75	0	21.01

LTE BAND 2 (Continue)

Band Width	Channel	Freq.(MHZ)	Modulation	RB Configuration		Average Power (dBm)
				RB Size	RB Offset	
10MHz	L 18650	1855	QPSK	1	0	23.03
				1	24	23.04
				1	49	22.76
				25	0	22.60
				25	12	22.28
				25	24	22.25
				50	0	22.14
			16-QAM	1	0	21.98
				1	24	21.84
				1	49	21.51
				25	0	21.40
				25	12	21.37
				25	24	21.12
				50	0	21.00
	M 18900	1880	QPSK	1	0	22.56
				1	24	22.57
				1	49	22.37
				25	0	22.18
				25	12	22.15
				25	24	21.87
				50	0	21.62
			16-QAM	1	0	21.65
				1	24	21.58
				1	49	21.35
				25	0	21.24

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				25	12	21.19
				25	24	20.98
				50	0	20.71
	H 19150	1905	QPSK	1	0	23.04
				1	24	23.03
				1	49	22.89
				25	0	22.73
				25	12	22.67
				25	24	22.63
				50	0	22.41
			16-QAM	1	0	22.06
				1	24	21.99
				1	49	21.88
				25	0	21.83
				25	12	21.51
				25	24	21.27
				50	0	21.17

LTE BAND 2 (Continue)

Band Width	Channel	Freq.(MHZ)	Modulation	RB Configuration		Average Power (dBm)
				RB Size	RB Offset	
5MHz	L 18625	1852.5	QPSK	1	0	23.01
				1	12	22.99
				1	24	22.95
				12	0	22.62
				12	6	22.43
				12	11	22.39
				25	0	22.17
			16-QAM	1	0	22.13
				1	12	22.11
				1	24	21.97
				12	0	21.90
				12	6	21.58
				12	11	21.44
				25	0	21.41
	M 18900	1880	QPSK	1	0	22.48
				1	12	22.46
				1	24	22.16
				12	0	21.89
				12	6	21.84
				12	11	21.70
				25	0	21.40
			16-QAM	1	0	21.59
				1	12	21.50
				1	24	21.48
				12	0	21.47

				12	6	21.42
				12	11	21.19
				25	0	21.17
	H 19175	1907.5	QPSK	1	0	23.12
				1	12	23.13
				1	24	22.84
				12	0	22.77
				12	6	22.59
				12	11	22.41
				25	0	22.11
			16-QAM	1	0	22.08
				1	12	22.30
				1	24	22.12
				12	0	21.97
				12	6	21.76
				12	11	21.67
				25	0	21.55

LTE BAND 2 (Continue)

Band Width	Channel	Freq.(MHZ)	Modulation	RB Configuration		Average Power (dBm)
				RB Size	RB Offset	
3MHz	L 18615	1851.5	QPSK	1	0	23.09
				1	7	23.12
				1	14	22.88
				8	0	22.84
				8	4	22.80
				8	7	22.75
				15	0	22.54
			16-QAM	1	0	21.98
				1	7	22.09
				1	14	21.98
				8	0	21.81
				8	4	21.78
				8	7	21.49
				15	0	21.28
	M 18900	1880	QPSK	1	0	22.49
				1	7	22.50
				1	14	22.42
				8	0	22.40
				8	4	22.11
				8	7	21.88
				15	0	21.82
			16-QAM	1	0	21.69
				1	7	21.71
				1	14	21.67
				8	0	21.50

				8	4	21.46
				8	7	21.31
				15	0	21.06
	H 19185	1908.5	QPSK	1	0	23.13
				1	7	23.14
				1	14	23.09
				8	0	22.94
				8	4	22.73
				8	7	22.47
				15	0	22.17
			16-QAM	1	0	22.11
				1	7	22.08
				1	14	21.92
				8	0	21.65
				8	4	21.35
				8	7	21.30
				15	0	20.99

LTE BAND 2 (Continue)

Band Width	Channel	Freq.(MHZ)	Modulation	RB Configuration		Average Power (dBm)
				RB Size	RB Offset	
1.4MHz	L 18607	1850.7	QPSK	1	0	23.01
				1	2	22.99
				1	5	22.79
				3	0	22.65
				3	1	22.60
				3	2	22.53
				6	0	22.28
			16-QAM	1	0	22.01
				1	2	22.02
				1	5	21.85
				3	0	21.61
				3	1	21.40
				3	2	21.30
				6	0	21.07
	M 18900	1880	QPSK	1	0	22.45
				1	2	22.44
				1	5	22.33
				3	0	22.20
				3	1	22.07
				3	2	21.97
				6	0	21.87
			16-QAM	1	0	21.81
				1	2	21.71
				1	5	21.59
				3	0	21.31

				3	2	21.04
				3	5	20.95
				6	0	20.82
	H 19193	1909.3	QPSK	1	0	23.15
				1	2	23.13
				1	5	22.94
				3	0	22.86
				3	1	22.75
				3	2	22.47
				6	0	22.27
			16-QAM	1	0	21.91
				1	2	21.95
				1	5	21.83
				3	0	21.79
				3	1	21.58
				3	2	21.33
				6	0	21.27

LTE BAND 4

Band Width	Channel	Freq.(MHZ)	Modulation	RB Configuration		Average Power (dBm)
				RB Size	RB Offset	
20MHz	L 20050	1720.0	QPSK	1	0	23.81
				1	49	23.80
				1	99	23.77
				50	0	23.55
				50	25	23.45
				50	49	23.20
				100	0	23.11
			16-QAM	1	0	21.80
				1	49	21.91
				1	99	21.82
				50	0	21.74
				50	25	21.56
				50	49	21.23
				100	0	21.01
	M 20175	1732.5	QPSK	1	0	23.84
				1	49	23.86
				1	99	23.55
				50	0	23.41
				50	25	23.28
				50	49	23.20
				100	0	22.88
			16-QAM	1	0	22.04
				1	49	21.97
				1	99	21.87
				50	0	21.69

				50	25	21.51
				50	49	21.43
				100	0	21.14
	H 20300	1745.0	QPSK	1	0	23.45
				1	49	23.44
				1	99	23.27
				50	0	23.08
				50	25	23.06
				50	49	23.06
				100	0	22.80
			16-QAM	1	0	22.36
				1	49	22.40
				1	99	22.17
				50	0	22.17
				50	25	21.98
				50	49	21.86
				100	0	21.79

LTE BAND 4 (Continue)

Band Width	Channel	Freq.(MHZ)	Modulation	RB Configuration		Average Power (dBm)
				RB Size	RB Offset	
15MHz	L 20025	1717.5	QPSK	1	0	22.74
				1	37	22.73
				1	74	22.58
				36	0	22.41
				36	18	22.10
				36	35	22.02
				75	0	21.97
			16-QAM	1	0	21.76
				1	37	21.74
				1	74	21.44
				36	0	21.41
				36	18	21.26
				36	35	21.14
				75	0	20.90
	M 20175	1732.5	QPSK	1	0	22.87
				1	37	22.90
				1	74	22.88
				36	0	22.72
				36	18	22.42
				36	35	22.14
				75	0	21.94
			16-QAM	1	0	21.93
				1	37	21.92
				1	74	21.89
				36	0	21.56

				36	18	21.39
				36	35	21.16
				75	0	21.07
	H 20325	1747.5	QPSK	1	0	22.81
				1	37	22.82
				1	74	22.81
				36	0	22.49
				36	18	22.39
				36	35	22.16
				75	0	21.89
			16-QAM	1	0	22.34
				1	37	22.35
				1	74	22.25
				36	0	22.12
				36	18	22.01
				36	35	21.79
				75	0	21.67

LTE BAND 4 (Continue)

Band Width	Channel	Freq.(MHZ)	Modulation	RB Configuration		Average Power (dBm)
				RB Size	RB Offset	
10MHz	L 20000	1715.0	QPSK	1	0	22.59
				1	24	22.60
				1	49	22.42
				25	0	22.41
				25	12	22.36
				25	24	22.05
				50	0	22.02
			16-QAM	1	0	21.65
				1	24	21.64
				1	49	21.59
				25	0	21.42
				25	12	21.15
				25	24	21.12
				50	0	21.11
	M 20175	1732.5	QPSK	1	0	22.92
				1	24	22.91
				1	49	22.69
				25	0	22.42
				25	12	22.37
				25	24	22.06
				50	0	22.04
			16-QAM	1	0	21.92
				1	24	21.83
				1	49	21.77
				25	0	21.52

				25	12	21.40
				25	24	21.11
				50	0	21.05
	H 20350	1750.0	QPSK	1	0	23.40
				1	24	23.30
				1	49	23.05
				25	0	22.79
				25	12	22.56
				25	24	22.32
				50	0	22.13
			16-QAM	1	0	22.21
				1	24	22.39
				1	49	22.29
				25	0	22.16
				25	12	22.09
				25	24	21.79
				50	0	21.62

LTE BAND 4 (Continue)

Band Width	Channel	Freq.(MHZ)	Modulation	RB Configuration		Average Power (dBm)
				RB Size	RB Offset	
5MHz	L 19975	1712.5	QPSK	1	0	22.46
				1	12	22.45
				1	24	22.28
				12	0	22.22
				12	6	21.93
				12	11	21.89
				25	0	21.66
			16-QAM	1	0	21.63
				1	12	21.65
				1	24	21.39
				12	0	21.33
				12	6	21.02
				12	11	20.82
				25	0	20.64
	M 20175	1732.5	QPSK	1	0	22.88
				1	12	22.86
				1	24	22.58
				12	0	22.55
				12	6	22.39
				12	11	22.08
				25	0	21.95
			16-QAM	1	0	21.89
				1	12	21.92
				1	24	21.89

				12	0	21.63
				12	6	21.34
				12	11	21.12
				25	0	20.88
	H 20375	1752.5	QPSK	1	0	23.37
				1	12	23.36
				1	24	23.23
				12	0	23.04
				12	6	22.96
				12	11	22.36
				25	0	22.37
			16-QAM	1	0	22.53
				1	12	22.32
				1	24	22.20
				12	0	22.02
				12	6	21.86
				12	11	21.57
				25	0	21.44

LTE BAND 4 (Continue)

Band Width	Channel	Freq.(MHZ)	Modulation	RB Configuration		Average Power (dBm)
				RB Size	RB Offset	
3MHz	L 19965	1711.5	QPSK	1	0	22.43
				1	7	22.57
				1	14	22.28
				8	0	22.13
				8	4	22.08
				8	7	21.92
				15	0	21.68
			16-QAM	1	0	21.59
				1	7	21.58
				1	14	21.30
				8	0	21.03
				8	4	20.96
				8	7	20.71
				15	0	20.70
	M 20175	1732.5	QPSK	1	0	22.89
				1	7	22.88
				1	14	22.86
				8	0	22.79
				8	4	22.75
				8	7	22.53
				15	0	22.36
			16-QAM	1	0	21.69
				1	7	21.68
				1	14	21.40
				8	0	21.10

				8	4	20.89
				8	7	20.75
				15	0	20.66
	H 20384	1753.4	QPSK	1	0	23.33
				1	7	23.32
				1	14	23.05
				8	0	22.96
				8	4	22.66
				8	7	22.34
				15	0	22.34
			16-QAM	1	0	22.40
				1	7	22.37
				1	14	22.27
				8	0	22.07
				8	4	21378
				8	7	21.48
				15	0	21.20

LTE BAND 4 (Continue)

Band Width	Channel	Freq.(MHZ)	Modulation	RB Configuration		Average Power (dBm)
				RB Size	RB Offset	
1.4MHz	L 19957	1710.7	QPSK	1	0	22.56
				1	2	22.54
				1	5	22.34
				3	0	21.19
				3	1	21.94
				3	2	21.64
				6	0	21.38
			16-QAM	1	0	21.69
				1	2	21.89
				1	5	21.89
				3	0	21.84
				3	1	21.53
				3	2	21.29
				6	0	21.02
	M 20175	1732.5	QPSK	1	0	22.75
				1	2	22.74
				1	5	22.50
				3	0	22.35
				3	1	22.20
				3	2	22.15
				6	0	21.83
			16-QAM	1	0	22.07
				1	2	22.08
				1	5	21.76
				3	0	21.53

				3	2	21.38
				3	5	21.15
				6	0	21.09
	H 20392	1754.2	QPSK	1	0	23.31
				1	2	23.30
				1	5	23.00
				3	0	22.74
				3	1	22.66
				3	2	22.62
				6	0	22.26
			16-QAM	1	0	22.03
				1	2	22.22
				1	5	22.14
				3	0	21.83
				3	1	21.79
				3	2	21.70
				6	0	21.52

LTE BAND 7

Band Width	Channel	Freq.(MHZ)	Modulation	RB Configuration		Average Power (dBm)
				RB Size	RB Offset	
2MHz	L 20850	2510	QPSK	1	0	21.06
				1	49	20.62
				1	99	20.45
				50	0	19.62
				50	24	19.51
				50	49	19.49
				100	0	19.56
			16-QAM	1	0	20.02
				1	49	19.81
				1	99	19.37
				50	0	18.68
				50	24	18.65
				50	49	18.55
				100	0	18.61
	M 21100	2535	QPSK	1	0	21.12
				1	49	21.2
				1	99	20.98
				50	0	20.22
				50	24	20.21
				50	49	20.18
				100	0	20.28
			16-QAM	1	0	19.85
				1	49	20.15
				1	99	19.67
				50	0	18.83

				50	24	18.84
				50	49	18.79
				100	0	18.78
	H 21350	2560	QPSK	1	0	21.18
				1	49	21.08
				1	99	21.02
				50	0	20.02
				50	24	19.91
				50	49	19.86
				100	0	19.93
			16-QAM	1	0	20.62
				1	49	20.42
				1	99	20.37
				50	0	18.94
				50	24	18.92
				50	49	18.89
				100	0	18.88

LTE BAND 7(Continue)

Band Width	Channel	Freq.(MHZ)	Modulation	RB Configuration		Average Power (dBm)
				RB Size	RB Offset	
15MHz	L 20850	2510	QPSK	1	0	20.71
				1	37	20.81
				1	74	20.42
				36	0	19.68
				36	18	19.54
				36	37	19.51
				75	0	19.55
			16-QAM	1	0	19.97
				1	37	20.06
				1	74	19.73
				36	0	18.72
				36	18	18.56
				36	37	18.41
				75	0	18.55
	M 21100	2535	QPSK	1	0	20.58
				1	37	20.39
				1	74	20.82
				36	0	19.24
				36	18	19.89
				36	37	19.72
				75	0	19.36
			16-QAM	1	0	19.62
				1	37	19.58
				1	74	19.64
				36	0	18.85

				36	18	18.88
				36	37	18.91
				75	0	18.71
	H 21350	2560	QPSK	1	0	20.98
				1	37	20.85
				1	74	20.81
				36	0	19.46
				36	18	19.41
				36	37	19.36
				75	0	19.18
			16-QAM	1	0	20.07
				1	37	20.01
				1	74	19.95
				36	0	18.87
				36	18	18.85
				36	37	18.76
				75	0	18.82

LTE BAND 7(Continue)

Band Width	Channel	Freq.(MHZ)	Modulation	RB Configuration		Average Power (dBm)
				RB Size	RB Offset	
10Hz	L 20850	2510	QPSK	1	0	20.74
				1	24	20.56
				1	49	20.22
				25	0	19.72
				25	12	19.41
				25	24	19.35
				50	0	19.73
			16-QAM	1	0	19.35
				1	24	19.65
				1	49	19.03
				25	0	18.61
				25	12	18.33
				25	24	18.25
				50	0	18.45
	M 21100	2535	QPSK	1	0	21.04
				1	24	20.86
				1	49	20.84
				25	0	20.06
				25	12	20.05
				25	24	20.03
				50	0	20.02
			16-QAM	1	0	19.24
				1	24	19.15
				1	49	19.73
				25	0	18.44

				25	12	18.31
				25	24	18.22
				50	0	18.35
	H 21350	2560	QPSK	1	0	20.47
				1	24	20.17
				1	49	20.21
				25	0	19.86
				25	12	19.45
				25	24	19.01
				50	0	19.88
			16-QAM	1	0	19.81
				1	24	19.54
				1	49	19.76
				25	0	18.45
				25	12	18.43
				25	24	18.42
				50	0	18.54

LTE BAND 7(Continue)

Band Width	Channel	Freq.(MHZ)	Modulation	RB Configuration		Average Power (dBm)
				RB Size	RB Offset	
5MHz	L 20425	2510	QPSK	1	0	20.23
				1	12	19.86
				1	24	19.57
				12	0	19.32
				12	6	18.87
				12	11	18.56
				25	0	18.35
			16-QAM	1	0	19.46
				1	12	19.19
				1	24	19.34
				12	0	18.42
				12	6	18.23
				12	11	18.22
				25	0	18.39
	M 20525	2535	QPSK	1	0	20.52
				1	12	20.32
				1	24	20.24
				12	0	19.39
				12	6	19.31
				12	11	19.23
				25	0	19.18
			16-QAM	1	0	20.01
				1	12	19.78
				1	24	19.77
				12	0	18.88

				12	6	18.78
				12	11	18.72
				25	0	18.6
	H 20625	2560	QPSK	1	0	20.12
				1	12	19.87
				1	24	19.71
				12	0	19.36
				12	6	19.16
				12	11	18.61
				25	0	18.31
			16-QAM	1	0	19.56
				1	12	19.31
				1	24	19.22
				12	0	18.98
				12	6	18.71
				12	11	18.56
				25	0	18.82

12. MEASUREMENT OF CONDUCTED OUTPUT POWER

1. WCDMA mode conducted output power values

Item	band	WCDMA 850			WCDMA 1900		
	ARFCN	4132	4175	4233	9262	9400	9538
	subtest	dBm			dBm		
5.2(WCDMA)	non	22.18	22.25	22.21	23.56	23.63	23.53
HSDPA	1	22.20	22.18	22.23	21.56	22.04	21.14
	2	21.92	21.95	21.97	21.42	21.64	21.19
	3	21.75	21.70	21.73	21.10	21.14	21.58
	4	21.58	21.43	21.53	21.69	21.67	21.75
HSUPA	1	22.26	22.24	22.21	21.75	21.54	21.43
	2	21.95	21.97	21.93	21.53	21.35	21.26
	3	21.73	21.70	21.75	21.15	21.09	21.08
	4	21.49	21.52	21.47	21.02	20.97	20.96
	5	21.38	21.36	21.39	20.87	20.86	20.85
Note:	The Conducted RF Output Power test of WCDMA /HSDPA /HSUPA was tested by power meter.						

2. GSM Mode

Band	Channel	Frequency (MHz)	Output Power(dBm)
GSM 850	128	824.2	32.53
	190	836.6	32.50
	251	848.8	32.51
PCS 1900	512	1850.2	29.51
	661	1880.0	29.49
	810	1909.8	29.47

3. GPRS Mode Conducted peak output power

Band	Channel	Frequency (MHz)	Output Power(dBm)			
			Slot 1	Slot 2	Slot 3	Slot 4
GSM 850	128	824.2	32.54	30.69	28.20	23.94
	190	836.6	32.53	30.38	28.24	23.98
	251	848.8	32.50	30.40	28.16	23.90
PCS 1900	512	1850.2	29.54	27.08	25.05	23.86
	661	1880.0	29.41	26.97	25.03	23.67
	810	1909.8	29.28	26.93	24.96	23.48

GPRS Time-based Average Power

Band	Channel	Frequency (MHz)	Output Power(dBm)			
			Slot 1	Slot 2	Slot 3	Slot 4
GSM 850	128	824.2	23.51	24.67	23.94	20.93
	190	836.6	23.50	24.36	23.98	20.97
	251	848.8	23.47	24.38	23.90	20.89
PCS 1900	512	1850.2	20.51	21.06	20.79	20.85
	661	1880.0	20.38	20.95	20.77	20.66
	810	1909.8	20.25	20.91	20.70	20.47

Timeslot consignations:

No. Of Slots	Slot 1	Slot 2	Slot 3	Slot 4
Slot Consignation	1Up4Down	2Up3Down	3Up2Down	4Up1Down
Duty Cycle	1:8	1:4	1:2.67	1:2
Correct Factor	-9.03dB	-6.02dB	-4.26dB	-3.01dB

Note: The Max Average Power at Slot 2,so it is used for test.

3. EDGE Mode Conducted peak output power

Band	Channel	Frequency (MHz)	Average Output Power(dBm)			
			Slot 1	Slot 2	Slot 3	Slot 4
GSM 850	128	824.2	32.18	30.05	27.81	26.80
	190	836.6	32.28	30.06	27.83	26.81
	251	848.8	32.17	30.05	26.77	26.72
PCS 1900	512	1850.2	29.11	26.98	24.92	23.67
	661	1880.0	29.23	26.88	24.89	23.94
	810	1909.8	29.40	27.05	25.24	24.04

EDGE Time-based Average Power

Band	Channel	Frequency (MHz)	Average Output Power(dBm)			
			Slot 1	Slot 2	Slot 3	Slot 4
GSM 850	128	824.2	23.15	24.03	23.55	23.79
	190	836.6	23.25	24.04	23.57	23.80
	251	848.8	23.14	24.03	22.51	23.71
PCS 1900	512	1850.2	20.08	20.96	20.66	20.66
	661	1880.0	20.20	20.86	20.63	20.93
	810	1909.8	20.37	21.03	20.98	21.03

4. Wi-Fi Average output power

Band	Channel	Frequency (MHz)	Average Output Power(dBm)		
			802.11b (DSSS)	802.11g (OFDM)	802.11n20 (OFDM)
2.4G Wi-Fi	1	2412	18.17	15.32	13.13
	6	2437	18.36	15.19	13.48
	11	2462	15.76	10.45	10.91

Band	Channel	Frequency (MHz)	Output Power(dBm)	
			802.11a (DSSS)	802.11n20 (OFDM)
5.2G Wi-Fi	36	5180	10.07	9.97
	44	5220	10.70	10.46
	48	5240	10.48	9.91

Band	Channel	Frequency (MHz)	Output Power(dBm)
			802.11n40 (GFSK)
5.2GWi-Fi	38	519	9.85
	46	5230	10.32

Band	Channel	Frequency (MHz)	Output Power(dBm)	
			802.11a (DSSS)	802.11n20 (OFDM)
5.3G Wi-Fi	52	5260	10.61	10.32
	60	5300	10.42	10.05
	64	5320	10.25	9.84

Band	Channel	Frequency (MHz)	Output Power(dBm)
			802.11n40 (GFSK)
5.3G Wi-Fi	54	5270	9.91
	62	5310	9.84

Band	Channel	Frequency (MHz)	Output Power(dBm)	
			802.11a (DSSS)	802.11n20 (OFDM)
5.6G Wi-Fi	100	5500	11.32	11.22
	120	5600	11.51	11.26
	140	5700	9.35	8.88

Band	Channel	Frequency (MHz)	Output Power(dBm)
			802.11n40 (GFSK)
5.6G Wi-Fi	102	5510	9.26
	118	5590	11.27
	134	5670	9.35

Band	Channel	Frequency (MHz)	Output Power(dBm)	
			802.11a (DSSS)	802.11n20 (OFDM)
5.8G Wi-Fi	149	5745	10.51	10.12
	157	5785	10.54	10.20
	165	5825	10.39	9.91

Band	Channel	Frequency (MHz)	Output Power(dBm)
			802.11n40 (GFSK)
5.8G Wi-Fi	151	5755	10.24
	159	5795	10.24

5. BT average output power

Band	Channel	Frequency (MHz)	Output Power(dBm)		
			GFSK	π/4-DQPSK	8-DPSK
BT+EDR 2.1	0	2402	4.95	2.78	2.76
	39	2441	6.51	4.32	4.33
	78	2480	4.88	2.81	3.19

Band	Channel	Frequency (MHz)	Output Power(dBm)
			GFSK
BT4.0	0	2402	-4.07
	19	2441	-2.08
	39	2480	-6.63

13. TEST RESULTS LIST

Summary of Measurement Results (GSM 850MHz Band)

<table>
<tr><td colspan="8">Temperature: 21.0~23.8°C, humidity: 54~60%.</td></tr>
<tr><td colspan="2">Phantom Configurations</td><td>Device Test Positions</td><td>Device Test channel</td><td>SAR(W/Kg), 1g Peak</td><td>Scaling Factor</td><td>Scaled SAR (W/Kg), 1g</td><td>Plot No.</td></tr>
<tr><td colspan="2" rowspan="2">Right Side Of Head</td><td>Cheek/Touch</td><td rowspan="4">128</td><td>0.213</td><td rowspan="4">1.114</td><td>0.237</td><td>1#</td></tr>
<tr><td>Ear/Tilt</td><td>0.108</td><td>0.120</td><td></td></tr>
<tr><td colspan="2" rowspan="2">Left Side Of Head</td><td>Cheek/Touch</td><td>0.173</td><td>0.193</td><td></td></tr>
<tr><td>Ear/Tilt</td><td>0.086</td><td>0.096</td><td></td></tr>
<tr><td rowspan="11">Body (10mm Separation)</td><td rowspan="4">GSM</td><td rowspan="3">Back upward</td><td>128</td><td>0.678</td><td>1.114</td><td>0.755</td><td></td></tr>
<tr><td>190</td><td>0.731</td><td>1.122</td><td>0.820</td><td></td></tr>
<tr><td>251</td><td>0.669</td><td>1.119</td><td>0.749</td><td></td></tr>
<tr><td>Front upward</td><td>128</td><td>0.284</td><td>1.114</td><td>0.316</td><td></td></tr>
<tr><td rowspan="7">GPRS</td><td rowspan="3">Back upward</td><td>128</td><td>0.751</td><td>1.079</td><td>0.810</td><td></td></tr>
<tr><td>190</td><td>0.763</td><td>1.159</td><td>0.884</td><td>31#</td></tr>
<tr><td>251</td><td>0.712</td><td>1.153</td><td>0.821</td><td></td></tr>
<tr><td>Front upward</td><td rowspan="4">128</td><td>0.340</td><td rowspan="4">1.079</td><td>0.367</td><td></td></tr>
<tr><td>Edge B</td><td>0.264</td><td>0.285</td><td></td></tr>
<tr><td>Edge C</td><td>0.166</td><td>0.179</td><td></td></tr>
<tr><td>Edge D</td><td>0.168</td><td>0.181</td><td></td></tr>
</table>

Summary of Measurement Results (GSM 1900MHz Band)

<table>
<tr><td colspan="8">Temperature: 21.0~23.8°C, humidity: 54~60%.</td></tr>
<tr><td colspan="2">Phantom Configurations</td><td>Device Test Positions</td><td>Device Test channel</td><td>SAR(W/Kg), 1g Peak</td><td>Scaling Factor</td><td>Scaled SAR (W/Kg), 1g</td><td>Plot No.</td></tr>
<tr><td colspan="2" rowspan="2">Right Side Of Head</td><td>Cheek/Touch</td><td rowspan="11">512</td><td>0.084</td><td rowspan="6">1.119</td><td>0.094</td><td></td></tr>
<tr><td>Ear/Tilt</td><td>0.051</td><td>0.057</td><td></td></tr>
<tr><td colspan="2" rowspan="2">Left Side Of Head</td><td>Cheek/Touch</td><td>0.133</td><td>0.149</td><td>9#</td></tr>
<tr><td>Ear/Tilt</td><td>0.059</td><td>0.066</td><td></td></tr>
<tr><td rowspan="7">Body (10mm Separation)</td><td rowspan="2">GSM</td><td>Back upward</td><td>0.168</td><td>0.188</td><td></td></tr>
<tr><td>Front upward</td><td>0.168</td><td>0.188</td><td></td></tr>
<tr><td rowspan="5">GPRS</td><td>Back upward</td><td>0.256</td><td rowspan="5">1.102</td><td>0.282</td><td></td></tr>
<tr><td>Front upward</td><td>0.195</td><td>0.215</td><td></td></tr>
<tr><td>Edge B</td><td>0.175</td><td>0.193</td><td></td></tr>
<tr><td>Edge C</td><td>0.415</td><td>0.457</td><td>37#</td></tr>
<tr><td>Edge D</td><td>0.097</td><td>0.108</td><td></td></tr>
</table>

Note:

1. GPRS/EDGE test Scenario(Based on the Max. Time-based Average Power)

Band	Slots	Power level	Duty Cycle
GPRS850	2	5	1:4
GPRS1900	2	0	1:4

2. SAR is not required for EDGE mode because its output power is less than that of GPRS mode.

Summary of Measurement Results (WCDMA 850MHz Band)

Temperature: 21.0~23.8°C, humidity: 54~60%.						
Phantom Configurations	Device Test Positions	Device Test channel	SAR(W/Kg), 1g Peak	Scaling Factor	Scaled SAR (W/Kg), 1g	Plot No.
Right Side Of Head	Cheek/Touch	4183	0.289	1.059	**0.306**	22#
	Ear/Tilt		0.125		0.132	
Left Side Of Head	Cheek/Touch		0.247		0.262	
	Ear/Tilt		0.165		0.175	
Body (10mm Separation)	Back upward		0.553		**0.586**	26#
	Front upward		0.242		0.256	
	Edge B		0.200		0.212	
	Edge C		0.134		0.142	
	Edge D		0.104		0.110	

Summary of Measurement Results (WCDMA 1900Hz Band)

Temperature: 21.0~23.8°C, humidity: 54~60%.						
Phantom Configurations	Device Test Positions	Device Test channel	SAR(W/Kg), 1g Peak	Scaling Factor	Scaled SAR (W/Kg), 1g	Plot No.
Right Side Of Head	Cheek/Touch	9750	0.133	1.089	0.145	
	Ear/Tilt		0.033		0.036	
Left Side Of Head	Cheek/Touch		0.254		**0.277**	15#
	Ear/Tilt		0.058		0.063	
Body (10mm Separation)	Back upward		0.289		0.315	
	Front upward		0.270		0.294	
	Edge B		0.103		0.112	
	Edge C		0.470		**0.512**	18#
	Edge D		0.399		0.435	

Note:

1. When the 1-g SAR for the mid-band channel or the channel with the highest output power satisfy the following conditions, testing of the other channels in the band is not required. (Per KDB 447498 D01 General RF Exposure Guidance v06)

≤ 0.8 W/kg and transmission band ≤ 100 MHz
≤ 0.6 W/kg and, 100 MHz < transmission bandwidth ≤ 200 MHz
≤ 0.4 W/kg and transmission band > 200 MHz

2. The WCDMA mode is test with 12.2kbps RMC and TPC set to all "1", if maximum SAR for 12.2kbps RMC is ≤ 75% of the SAR limit (i.e. 1.2W/Kg 1g) and maximum average output of each RF channel with HSDPA/HSUPA active is less than 1/4 dB Middle than that measured without HSDPA/HSUPA using 12.2kbps RMC, according to KDB 941225D01v03, SAR is not required for this handset with HSPA capabilities.
5. BT & Wi-Fi SAR test is conducted according to section 12 stand-alone SAR evaluation of this report.
6. During 802.11 testing, engineering testing software installed on the EUT can provide continuous transmitting RF signal. The RF signal utilized in SAR measurement has almost 100% duty cycle, and its crest factor is 1.
7. IEEE Std 1528-2013 require the middle channel to be tested first. This generally applies to wireless devices that are designed to operate in technologies with tight tolerances for maximum output power variations across channels in the band. When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.

8. Per KDB 447498, when the SAR procedures require multiple channels to be tested and the 1-g SAR for the highest output channel is less than 0.8 W/kg and peak SAR is less than 1.6W/kg, where the transmission band corresponding to all channels is ≤ 100 MHz, testing for the other channels is not required.

9. The WCDMA mode is test with 12.2kbps RMC and TPC set to all “1”, if maximum SAR for 12.2kbps RMC is≤ 75% of the SAR limit (i.e. 1.2W/Kg 1g) and maximum average output of each RF channel with HSDPA/HSUPA active is less than 1/4 dB higher than that measured without HSDPA/HSUPA using 12.2kbps RMC, according to KDB 941225D01v03, SAR is not required for this handset with HSPA capabilities. This module supports 3GPP release R7 HSPA+ using QPSK only without 16QAM in the uplink. So PBA is not required for HSPA+.

Summary of Measurement Results (WLAN 802.11b Band)

Temperature: 21.0~23.8°C, humidity: 54~60%.								
Phantom Configurations	Device Test Positions	Device Test channel	SAR(W/Kg), 1g Peak	Duty Cycle	Scaling Factor (Duty Cycle)	Scaling Factor (Power)	Scaled SAR (W/Kg), 1g	Plot No.
Right Side Of Head	Cheek/Touch	6	0.194	97.7	1.02	1.033	**0.204**	125#
	Ear/Tilt		0.085				0.090	
Left Side Of Head	Cheek/Touch		0.105				0.111	
	Ear/Tilt		0.077				0.081	
Body (10mm Separation)	Back upward		0.216				0.228	
	Front upward		0.188				0.198	
	Edge C		0.116				0.122	
	Edge D		0.370				**0.390**	129#

Summary of Measurement Results (WLAN 802.11a Band)

Temperature: 21.0~23.8°C, humidity: 54~60%.								
Phantom Configurations	Device Test Positions	Device Test channel	SAR(W/Kg), 1g Peak	Duty Cycle	Scaling Factor (Duty Cycle)	Scaling Factor (Power)	Scaled SAR (W/Kg), 1g	Plot No.
Right Side Of Head	Cheek/Touch	44	0.680	90.18	1.11	1.119	**0.845**	103#
	Ear/Tilt		0.514				0.638	
Left Side Of Head	Cheek/Touch		0.457				0.568	
	Ear/Tilt		0.451				0.560	
Body (10mm Separation)	Back upward		0.200				0.248	
	Front upward		0.236				0.293	
	Edge C		0.250				0.311	
	Edge D		0.304				**0.378**	121#

Temperature: 21.0~23.8°C, humidity: 54~60%.								
Phantom Configurations	Device Test Positions	Device Test channel	SAR(W/Kg), 1g Peak	Duty Cycle	Scaling Factor (Duty Cycle)	Scaling Factor (Power)	Scaled SAR (W/Kg), 1g	Plot No.
Right Side Of Head	Cheek/Touch	157	0.276	90.18	1.11	1.119	**0.343**	102#
	Ear/Tilt		0.220				0.273	
Left Side Of Head	Cheek/Touch		0.165				0.205	
	Ear/Tilt		0.181				0.225	
Body (10mm Separation)	Back upward		0.078				0.097	
	Front upward		0.186				0.231	
	Edge C		0.060				0.075	
	Edge D		0.206				**0.256**	120#

Temperature: 21.0~23.8°C, humidity: 54~60%.								
Phantom Configurations	Device Test Positions	Device Test channel	SAR(W/Kg), 1g Peak	Duty Cycle	Scaling Factor (Duty Cycle)	Scaling Factor (Power)	Scaled SAR (W/Kg), 1g	Plot No.
Right Side Of Head	Cheek/Touch	120	0.357	90.18	1.11	1.119	**0.443**	101#
	Ear/Tilt		0.257				0.319	
Left Side Of Head	Cheek/Touch		0.150				0.186	
	Ear/Tilt		0.210				0.261	
Body (10mm Separation)	Back upward		0.094				0.117	
	Front upward		0.150				0.186	
	Edge C		0.081				0.101	
	Edge D		0.183				**0.227**	

Notes:

1. SAR is measured for 2.4 GHz 802.11b DSSS using either the fixed test position or, when applicable,the initial test position procedure. SAR test reduction is determined according to the following:
   1) When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS inthat exposure configuration.

2) When the reported SAR is > 0.8 W/kg, SAR is required for that position using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

2. 2.4 GHz 802.11 g/n OFDM are additionally evaluated for SAR if the highest reported SAR for 802.11b, adjusted by the ratio of the OFDM to DSSS specified maximum output power, is > 1.2 W/kg.When SAR is required for OFDM modes in 2.4 GHz band, the Initial Test Configuration Proceduresshould be followed.

3. For held-to-ear and hotspot operations, the initial test position procedures were applied. The testposition with the highest extrapolated peak SAR will be used as the initial test position. Whenreported SAR for the initial test position is ⩽ 0.4 W/kg, no additional testing for the remaining testpositions was required. Otherwise, SAR is evaluated at the subsequent highest peak SARpositions until the reported SAR result is ⩽ 0.8 W/kg or all test positions are measured.

4. Justification for test configurations for WLAN per KDB Publication 248227 D02DR02-41929 for 2.4 GHz WI-FI single transmission chain operations, the highest measured maximum output power channel for DSSS was selected for SAR measurement. SAR for OFDM modes (2.4 GHz802.11g/n) was not required due to the maximum allowed powers and the highest reported DSSSSAR.

Summary of Measurement Results (LTE Band 2bandwidth 20MHz with QPSK 1RB)

Temperature: 21.0~23.8°C, humidity: 50~60%. Power Drift limit:-5%~+5% SAR Limit: 1.6W/Kg averaged over 1gram, Spatial Peak							
Phantom Configurations	Test Mode	Device Test Positions	Device Test channel	SAR (W/Kg)	Scaling Factor	Scaled SAR	Plot No.
Right Side Of Head	QPSK 20MHz 1RB	Cheek/Touch	19100	0.138	1.009	0.139	
		Ear/Tilt		0.107		0.108	
Left Side Of Head		Cheek/Touch		0.322		**0.325**	46#
		Ear/Tilt		0.095		0.096	
Body (10mm Separation)		Back upward		0.312		0.315	
		Front upward		0.306		0.309	
		Edge B		0.412		0.416	
		Edge C		0.625		**0.631**	51#
		Edge D		0.126		0.127	

Summary of Measurement Results (LTE Band 2 bandwidth 20MHz with QPSK 50RB)

Temperature: 21.0~23.8°C, humidity: 50~60%. Power Drift limit:-5%~+5% SAR Limit: 1.6W/Kg averaged over 1gram, Spatial Peak							
Phantom Configurations	Test Mode	Device Test Positions	Device Test channel	SAR (W/Kg)	Scaling Factor	Scaled SAR	Plot No.
Right Side Of Head	QPSK 20MHz 50RB	Cheek/Touch	19100	0.084	1.074	0.090	
		Ear/Tilt		0.072		0.077	
Left Side Of Head		Cheek/Touch		0.260		**0.279**	47#
		Ear/Tilt		0.073		0.078	
Body (10mm Separation)		Back upward		0.274		0.294	
		Front upward		0.212		0.228	
		Edge A		0.237		0.255	
		Edge B		0.451		**0.484**	59#
		Edge D		0.085		0.091	

Additional LTE test requirement for bandwidth 20MHz with QPSK 100RB

Not required.

Additional LTE test requirement for 16QAM

Not required.

Additional LTE test requirement for other bandwidth

Not required.

Summary of Measurement Results (LTE Band 4 bandwidth 20MHz with QPSK 1RB)

Temperature: 21.0~23.8°C, humidity: 50~60%.
Power Drift limit:-5%~+5% SAR Limit: 1.6W/Kg averaged over 1gram, Spatial Peak

Phantom Configurations	Test Mode	Device Test Positions	Device Test channel	SAR (W/Kg)	Scaling Factor	Scaled SAR	Plot No.
Right Side Of Head	QPSK 20MHz 1RB	Cheek/Touch	20175	0.211	1.033	0.218	
		Ear/Tilt		0.104		0.107	
Left Side Of Head		Cheek/Touch		0.378		**0.390**	64#
		Ear/Tilt		0.146		0.151	
Body (10mm Separation)		Back upward		0.435		0.449	
		Front upward		0.398		0.411	
		Edge B		0.552		0.570	
		Edge C		0.734		**0.758**	71#
		Edge D		0.243		0.251	

Summary of Measurement Results (LTE Band 4 bandwidth 20MHz with QPSK 50RB)

Temperature: 21.0~23.8°C, humidity: 50~60%.
Power Drift limit:-5%~+5% SAR Limit: 1.6W/Kg averaged over 1gram, Spatial Peak

Phantom Configurations	Test Mode	Device Test Positions	Device Test channel	SAR (W/Kg)	Scaling Factor	Scaled SAR	Plot No.
Right Side Of Head	QPSK 20MHz 50RB	Cheek/Touch	20175	0.217	1.109	0.241	
		Ear/Tilt		0.046		0.051	
Left Side Of Head		Cheek/Touch		0.305		**0.338**	65#
		Ear/Tilt		0.139		0.154	
Body (10mm Separation)		Back upward		0.404		0.448	
		Front upward		0.342		0.379	
		Edge A		0.321		0.356	
		Edge B		0.508		**0.563**	72#
		Edge D		0.163		0.181	

Additional LTE test requirement for 16QAM
Not required.
Additional LTE test requirement for other bandwidth
Not required.

Summary of Measurement Results (LTE Band 7 bandwidth 20MHz with QPSK 1RB)

Temperature: 21.0~23.8°C, humidity: 50~60%. Power Drift limit:-5%~+5% SAR Limit: 1.6W/Kg averaged over 1gram, Spatial Peak							
Phantom Configurations	Test Mode	Device Test Positions	Device Test channel	SAR (W/Kg)	Scaling Factor	Scaled SAR	Plot No.
Right Side Of Head	QPSK 10MHz 1RB	Cheek/Touch	21100	0.055	1.091	0.060	
		Ear/Tilt		0.025		0.027	
Left Side Of Head		Cheek/Touch		0.174		**0.190**	82#
		Ear/Tilt		0.091		0.099	
Body (10mm Separation)		Back upward	20850	0.829	1.107	0.918	
			21100	1.028	1.091	**1.122**	91#
			21350	0.848	1.076	0.912	
		Front upward	21100	0.206	1.091	0.225	
		Edge A		0.042		0.046	
		Edge B		0.605		0.660	
		Edge D		0.218		0.238	

Summary of Measurement Results (LTE Band 7 bandwidth 20MHz with QPSK 25RB)

Temperature: 21.0~23.8°C, humidity: 50~60%. Power Drift limit:-5%~+5% SAR Limit: 1.6W/Kg averaged over 1gram, Spatial Peak							
Phantom Configurations	Test Mode	Device Test Positions	Device Test channel	SAR (W/Kg)	Scaling Factor	Scaled SAR	Plot No.
Right Side Of Head	QPSK 10MHz 50RB	Cheek/Touch	21100	0.032	1.091	0.035	
		Ear/Tilt		0.023		0.025	
Left Side Of Head		Cheek/Touch		0.104		**0.113**	83#
		Ear/Tilt		0.027		0.029	
Body (10mm Separation)		Back upward		0.675		**0.736**	90#
		Front upward		0.139		0.152	
		Edge A		0.176		0.192	
		Edge B		0.398		0.434	
		Edge D		0.021		0.023	

Additional LTE test requirement for bandwidth 10MHz with QPSK 50RB

Not required.

Additional LTE test requirement for 16QAM

Not required.

Additional LTE test requirement for other bandwidth

Not required.

Note :

1. IEEE Std 1528-2013 require the middle channel to be tested first. This generally applies to wireless devices that are designed to operate in technologies with tight tolerances for maximum output power variations across channels in the band. When the maximum output power variation across the required test channels is > ½ dB, instead of the middle channel, the highest output power channel must be used.

2. Per KDB 447498, when the SAR procedures require multiple channels to be tested and the 1-g SAR for the highest output channel is less than 0.8 W/kg and peak SAR is less than 1.6W/kg, where the transmission band corresponding to all channels is ≤ 100 MHz, testing for the other channels is not required.

3. The WCDMA mode is test with 12.2kbps RMC and TPC set to all "1", if maximum SAR for 12.2kbps RMC is ≤ 75% of the SAR limit (i.e. 1.2W/Kg 1g) and maximum average output of each RF channel with HSDPA/HSUPA active is less than 1/4 dB higher than that measured without HSDPA/HSUPA using 12.2kbps RMC, according to KDB 941225D01v03r01, SAR is not required for this handset with HSPA capabilities. This module supports 3GPP release R7 HSPA+ using QPSK only without 16QAM in the uplink. So PBA is not required for HSPA+.

4. Scaling Factor calculation

Band	Tune-up power tolerance(dBm)	SAR test channel Power (dBm)	Scaling Factor
GSM 850	PCL = 5, PWR =32.5+-0.5	32.53	1.114
		32.50	1.122
		32.51	1.119
GPRS 850	PCL = 5, PWR =24.5+-0.5(2 slots)	24.67	1.079
		24.36	1.159
		24.38	1.153
GSM 1900	PCL = 0, PWR =27.5+-0.5	27.51	1.119
GPRS1900	PCL = 0, PWR =20.5+-0.5(2 slots)	20.95	1.012
WCDMA 850	Max output power =21.5(+1/-2)	22.25	1.059
WCDMA 1900	Max output power =23(+1/-2)	23.63	1.089
LTE BAND2 (QPSK)	Max output power =23+-0.5(1RB)	23.46	1.009
	Max output power =23+-0.5(50RB)	23.19	1.074
LTE BAND4 (QPSK)	Max output power =22.5+-0.5(1RB)	23.86	1.033
	Max output power =22.5+-0.5(50RB)	23.55	1.109
LTE BAND7 (QPSK)	Max output power =21+-0.5(1RB)	21.06	1.107
		21.12	1.091
		21.18	1.076
	Max output power =23.5+-0.5(50RB)	23.60	1.096
802.11b	Max output power =18+-0.5	18.36	1.033
802.11a	Max output power =11.5+-0.5	11.51	1.119

14. REPEATED SAR MEASUREMENT

In accordance with published RF Exposure KDB procedure 865664 D01 SAR measurement 100 MHz to 6 GHz. These additional measurements are repeated after the completion of all measurements requiring the samehead or body tissue-equivalent medium in a frequency band. The test device should be returned to ambientconditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder forthe repeated measurement(s) to minimize any unexpected variations in the repeated results.

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2)through 4) do not apply.
2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% fromthe 1-g SAR limit).
4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kgand the ratio of largest to smallest SAR for th e original, first and second repeated measurements is > 1.20.

Band	Test Position	Test Channel	Meas.SAR(W/kg)		Largest to Smallest SAR Ratio
			Original	Repeated	
LTE Band 7	Back upward	21100	1.028	1.011	1.017

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15. MULTIPLE TRANSMITTERS EVALUATION

Stand-alone SAR

Test distance: 10mm			
Band	**Highest power(mW) per tune up**	**1-g SAR test threshold**	**Test required?**
WI-FI (2.4G)	70.79	[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] • [√f(GHz)] ≤ 3.0 for 1-g SAR	Yes
BT	5.01		No

The SAR test for BT is not required.
The SAR test for 802.11b(2.4GHz) is required, 802.11g/HT20 is not required, for the maximum average output power is less than 1/4 dB Higher than measured on the corresponding 802.11b channels. As per KDB 248227

The BT stand-alone SAR is not required, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:
(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)]·[√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.
(Max power=5.01 mW; *min. test separation distance*= 5mm for Head; *f*=2.4GHz)
BT estimated Head SAR =0.207W/Kg (1g)
(Max power=5.01 mW; *min. test separation distance*= 10mm for Body; *f*=2.4GHz)
BT estimated Body SAR =0.104W/Kg (1g)

Simultaneous SAR

#	Simultaneous transmission conditions					
	WWAN			WLAN		Sum of WWAN& WLAN
	LTE Data	GSM	UMTS	802.11b/g/n	BT	
1	×			×		×
2		×		×		×
3			×	×		×
4	×				×	×
5		×			×	×
6			×		×	×

Note:

1. When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the Wi-Fi transmitter and another WWAN transmitter. Both transmitter often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions. The "Portable Hotspot" feature on the handset was NOT activated, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal.

2. The hotspot SAR result may overlap with the body-worn accessory SAR requirements, per KDB 941225 D06, the more conservative configurations can be considered, thus excluding some unnecessary body-worn accessory SAR tests.

3. GSM supports voice and data transmission, though not simultaneously. WCDMA supports voice and data transmission simultaneously.

4. Simultaneous Transmission SAR evaluation is not required for BT and Wi-Fi , because the software mechanism have been incorporated to guarantee that the WLAN and Bluetooth transmitters would not simultaneously operate.

5. Per KDB 447498D01v06, Simultaneous Transmission SAR Evaluation procedures is as followed:

   Step 1: If sum of 1 g SAR < 1.6 W/kg, Simultaneous SAR measurement is not required.

   Step 2: If sum of 1 g SAR > 1.6 W/kg, ratio of SAR to peak separation distance for pair of transmitters calculated.

Step 3: If the ratio of SAR to peak separation distance is ≤ 0.04, Simultaneous SAR measurement is not required.

Step 4: If the ratio of SAR to peak separation distance is > 0.04, Simultaneous SAR measurement is required and simultaneous transmission SAR value is calculated.

(The ratio is determined by: $(SAR1 + SAR2)^{1.5}/Ri \le 0.04$,

Ri is the separation distance between the peak SAR locations for the antenna pair in mm)

6. Applicable Multiple Scenario Evaluation

Test Position	Main Ant. SARMax (W/Kg)	Bluetooth SAR(W/Kg)	Wi-Fi SARMax(W/Kg)	∑1-g SARMax(W/Kg)	
				BT&Main Ant	Wi-Fi &Main Ant
Head SAR	0.390	0.207	0.845	0.597	1.235
Body SAR	1.122	0.104	0.378	1.226	1.500

Simultaneous Transmission SAR evaluation is not required for Wi-Fi and WCDMA&GSM&LTE, because the sum of 1g SARMax is **1.500** W/Kg < 1.6W/Kg for Wi-Fi and WCDMA&GSM&LTE.
Simultaneous Transmission SAR evaluation is not required for BT and WCDMA&GSM&LTE, because the sum of 1g SARMax is **1.226** W/Kg < 1.6W/Kg for BT and WCDMA&GSM&LTE.
(According to KDB 447498D01v06, the sum of the Highest *reported*SAR of each antenna does not exceed thelimit, simultaneous transmission SAR evaluation is not required.)