FCC SAR TEST REPORT

Report No.：	SET2019-13415
Product：	Industrial tablet
Brand Name:	CHAINWAY
Model No.：	P80
FCC ID：	2AC6AP80B
Applicant：	Shenzhen Chainway Information Technology Co.,Ltd.
Address：	9/F, Building 2, Daqian Industrial Park, Longchang Rd., District 67, Bao'an, Shenzhen, China
Issued by：	CCIC Southern Testing Co., Ltd
Lab Location：	Electronic Testing Building, No. 43 Shahe Road Xili Street, Nanshan District，Shenzhen, Guangdong 518055，China
Tel：	86 755 26627338　　Fax：86 755 26627238
Mail：	manager@ccic-set.com　　Website：http://www.ccic-set.com

Test Report

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Applicant……..:	Shenzhen Chainway Information Technology Co.,Ltd.
Applicant Address…….:	9/F, Building 2, Daqian Industrial Park, Longchang Rd., District 67, Bao'an, Shenzhen, China
Manufacturer……:	Shenzhen Chainway Information Technology Co.,Ltd.
Manufacturer Address:	9/F, Building 2, Daqian Industrial Park, Longchang Rd., District 67, Bao'an, Shenzhen, China
Test Standards…….:	**47CFR §2.1093-** Radiofrequency Radiation Exposure Evaluation: Portable Devices; **ANSI C95.1–1992:** Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.(IEEE Std C95.1-1991) **IEEE 1528–2013:** IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
Test Result……:	Pass
Test Date……:	

Tested by ……..: Mei Chun 2020-01-16

Chun Mei, Test Engineer

Reviewed by…….: Chris You 2020-01-16

You Xingjin, Senior Egineer

Approved by……: Shuangwen Zhang 2020-01-16

Shuangwen Zhang , Manager

Contents

1. Administrative Data

1.1 Testing Laboratory

Test Site:	CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd
Address:	Electronic Testing Building, No. 43 Shahe Road, Xili Jiedao, Nanshan District, Shenzhen, Guangdong, China
NVLAP Lab Code:	CCIC-SET is a third party testing organization accredited by NVLAP according to ISO/IEC 17025. The accreditation certificate number is 201008-0.
FCC Registration:	CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Designation Number: CN5031, valid time is until December 31, 2020.
ISED Registration:	CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on Aug. 04, 2016, valid time is until December 31, 2020
Test Environment Condition:	Temperature (°C): 21°C Relative Humidity (%): 60% Atmospheric Pressure (kPa): 86KPa-106KPa

2. Equipment Under Test (EUT)

Identification of the Equipment under Test

Device Type:	Portable	
Exposure Category:	Population/Uncontrolled	
Sample Name:	Industrial tablet	
Brand Name:	CHAINWAY	
Model Name:	P80	
General description:	Support Band	WCDMA 850MHz/1700MHz/1900MHz, LTE Band2/4/5/7/12/13/17,WIFI 2.4G&5G, BT,NFC,RFID
	Test Band	WCDMA 850MHz/1700MHz/1900MHz, LTE Band2/4/5/7/12/13/17,WIFI 2.4G&5G
	IMEI No.	868727041324368/01,868727041324376/01
	Device Class	Class B
	Development Stage	Identical Prototype
	Accessories	Power Supply
	Hotspot	2.4GHz WLAN support Hotspot mode
	Antenna type	Internal Antenna
	Operation mode	WCDMA / LTE /WIFI
	Modulation mode	UMTS(QPSK),LTE(QPSK,16QAM), WIFI(OFDM/DSSS) ,BT(GFSK/π/4-DQPSK/8-DPSK)
	DTM mode	Not support
	Hardware Version	\
	Software Version	\
	Max. SAR Value	Body: 1.046W/kg(Limit:1.6W/Kg, 0mm distance)

NOTE:

a. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

EUT testing configuration

Tested frequency range(s)	Transmitter Frequency Range	Receiver Frequency Range
UMTS Band II:	1850-1910 MHz	1930-1990 MHz
UMTS Band IV:	1710-1755 MHz	2110-2155 MHz
UMTS Band V:	824-849 MHz	869-894 MHz
LTE Band2:	1850-1910 MHz	1930-1990 MHz
LTE Band4:	1710-1755 MHz	2110-2155 MHz
LTE Band5:	824-849 MHz	869-894 MHz
LTE Band7:	2500-2570 MHz	2620-2690 MHz
LTE Band12:	698-716 MHz	728-746 MHz
LTE Band13:	777-787 MHz	746-756 MHz
LTE Band17:	704-716 MHz	734-746 MHz
WIFI(tested):	2412-2462 MHz	
	5180-5240 MHz	
Bluetooth:	2402-2480 MHz	
NFC:	13.56MHz	
RFID	902-928MHz	
Test channels(low-mid-high):	9262-9400-9538(UMTS Band II)	
	1312-1412-1513(UMTS Band IV)	
	4132-4183-4233(UMTS Band V)	
	18700-18900-19100(LTE Band 2 Bandwidth 20M)	
	20050-20175-20300(LTE Band 4 Bandwidth 20M)	
	20450-20525-20600(LTE Band 5 Bandwidth 10M)	
	20850-21100-21350(LTE Band 7 Bandwidth 20M)	
	23060-23095-23130(LTE Band 12 Bandwidth 10M)	
	23230(LTE Band 13 Bandwidth 10M)	
	23780-23790-23800(LTE Band 17 Bandwidth 10M)	
	1-6-11(Wifi 2.4G 802.11b)	
	5180(Wifi 2.4G 802.11a)	
	0-39-78(BT)	
	1-26-50(RFID)	

3. SAR Summary

Highest Standalone SAR Summary

Exposure Position	Frequency Band	Scaled 1g-SAR(W/kg)	Highest Scaled 1g-SAR(W/kg)
Body-Support (0mm Gap)	WCDMA Band II	0.810	1.046
	WCDMA Band IV	0.978	
	WCDMA Band V	0.345	
	LTE Band 2	0.738	
	LTE Band 4	1.046	
	LTE Band 5	0.358	
	LTE Band 7	1.034	
	LTE Band 12	0.168	
	LTE Band 13	0.240	
	LTE Band 17	0.144	
	WIFI 2.4G 802.11b	0.284	
	WIFI 5G 802.11a	0.079	
	BT	*0.059	
	RFID	0.526	

Highest Simultaneous SAR Summary

Exposure Position	Frequency Band	Highest Scaled 1g-SAR(W/kg)
Body-Support (0mmGap)	WWAN(LTE Band 4)&WIFI 2.4G	1.330

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.

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 (). The equation description is as below:

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

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

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

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

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

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

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.

4.2 Applicable Standards and Limits

4.2.1 Applicable Standards

47CFR §2.1093	Radiofrequency Radiation Exposure Evaluation: Portable Devices
ANSI C95.1–1992	Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz.(IEEE Std C95.1-1991)
IEEE 1528–2013	IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
KDB 248227 D01	v02r02 802.11 Wi-Fi SAR
KDB 447498 D01	v06 General RF Exposure Guidance
KDB 616217 D04	v01r02 SAR for laptop and tablets
KDB 648474 D04	v01r03 Handset SAR
KDB 865664 D01	v01r04 SAR Measurement 100MHz to 6GHz
KDB 865664 D02	v01r02 SAR Exposure Reporting
KDB 941225 D01	v03r01 3G SAR Procedures
KDB 941225 D05	v02r05 SAR for LTE Devices
KDB 941225 D06	v02r01 Hotspot Mode

4.2.2 RF exposure Limits

Human Exposure	**Uncontrolled Environment General Population**
Spatial Peak SAR* (Brain/Body)	**1.60 mW/g**
Spatial Average SAR** (Whole Body)	0.08 mW/g
Spatial Peak SAR*** (Limbs)	4.00 mW/g

The limit applied in this test report is shown in bold letters.

Notes:

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

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

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

4.3 Phantoms

The phantom used for all tests i.e. for both system checks and device testing, was the twin-headed "SAM Phantom", manufactured by SATIMO. The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region, where shell thickness increases to 6mm).

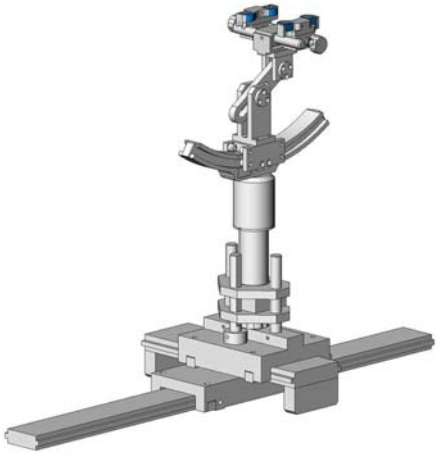
System checking was performed using the flat section, whilst Head SAR tests used the left and right head profile sections. Body SAR testing also used the flat section between the head profiles.

SAM Twin Phantom

4.4 Device Holder

The device was placed in the device holder (illustrated below) that is supplied by SATIMO as an integral part of the COMOSAR test system.

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



Device holder

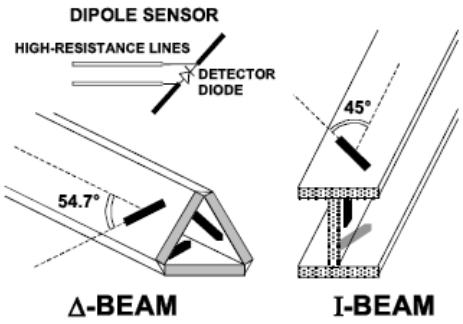
4.5 Probe Specification

Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	700 MHz to 3 GHz; Linearity: ± 0.5 dB (700 MHz to 3 GHz)
Directivity	± 0.25 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	1.5 μW/g to 100 mW/g; Linearity: ± 0.5 dB
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 5 mm Distance from probe tip to dipole centers: <2.7 mm
Application	General dosimetry up to 3 GHz Dosimetry in strong gradient fields Compliance tests of P80 LTE USB Modems
Compatibility	COMOSAR

Isotropic E-Field Probe

The isotropic E-Field probe has been fully calibrated and assessed for isotropicity, and boundary effect within a controlled environment. Depending on the frequency for which the probe is calibrated the method utilized for calibration will change.

The E-Field probe utilizes a triangular sensor arrangement as detailed in the diagram below:



5. Tissue check and recommend Dielectric Parameters

5.1 Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness Power drifts in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations described in Reference [12] and extrapolated according to the head parameters specified in P1528.

Table 1: Recommended Dielectric Performance of Tissue

Ingredients (% by weight)	Frequency (MHz)											
	450		835		915		1900		2450		2600	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.46	52.4	41.05	56.0	54.9	40.4	62.7	73.2	55.24	64.49
Salt (Nacl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04	0.5	0.024
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0	0.0	0.0
Triton x-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0	44.45	32.25
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.2	52.5	39.0	52.5
Conductivity (s/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.80	1.78	1.96	2.16

MSL/HSL750 (Body and Head liquid for 650 – 850 MHz)

Item	Head Tissue Simulation Liquid HSL750 Muscle(body)Tissue Simulation Liquid MSL750
H2O	Water, 35 – 58%
Sucrese	Sugar, white, refined, 40-60%
NaCl	Sodium Chloride, 0-6%
Hydroxyethel-cellulsoe	Medium Viscosity (CAS# 9004-62-0), <0.3%
Preventol-D7	Preservative: aqueous preparation, (CAS# 55965-84-9), containing 5-chloro-2-methyl-3(2H)-isothiazolone and 2-methyyl-3(2H)-isothiazolone, 0.1-0.7%

Frequency (MHz)	Head εr	Head σ(S/m)	Body εr	Bodyσ(S/m)
750	41.9	0.89	55.2	0.97

Note: The liquid of 700MHz&2600MHz typical liquid composition is provided by SATIMO.

Table 2 Recommended Tissue Dielectric Parameters

Frequency (MHz)	Head Tissue		Body Tissue	
	ε_r	σ(S/m)	ε_r	σ(S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800-2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

5.2 Simulate liquid

Liquid check results:

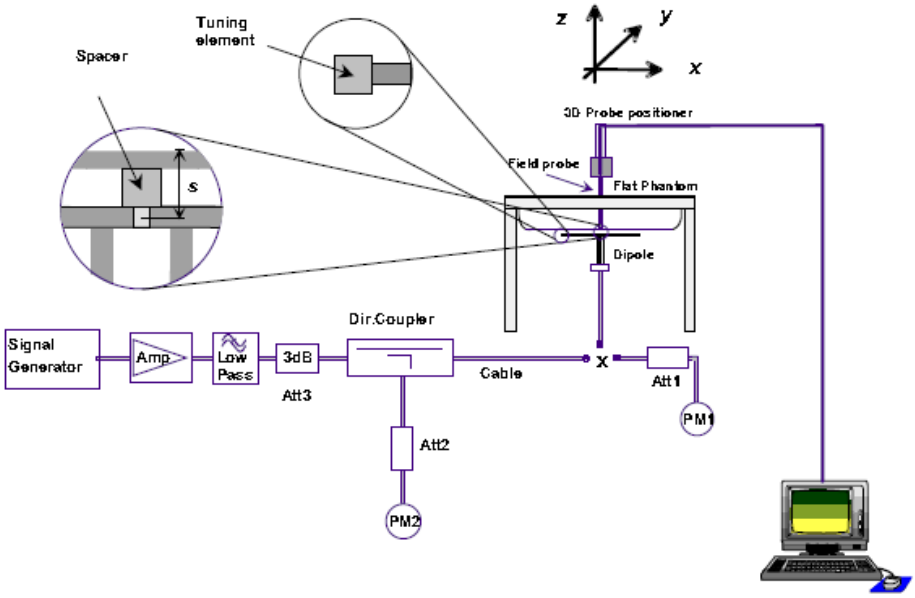
Table 3: Dielectric Performance of Body Tissue Simulating Liquid

Temperature: 23.2°C; Humidity: 64%;			
/	Frequency	Permittivity ε	Conductivity σ (S/m)
Target value	750MHz	55.5±5%	0.96±5%
Validation value (2019-12-15)	750MHz	55.63	0.97
Target value	835MHz	55.2±5%	0.97±5%
Validation value (2019-12-16)	835MHz	55.28	0.98
Target value	1800MHz	53.3±5%	1.52±5%
Validation value (2019-12-17)	1800MHz	53.40	1.51
Target value	1900MHz	53.3±5%	1.52±5%
Validation value (2019-12-18)	1900MHz	53.32	1.53
Target value	2450MHz	52.7±5%	1.95±5%
Validation value (2019-12-19)	2450MHz	52.76	1.96
Target value	2600MHz	52.5±5%	2.16±5%
Validation value (2019-12-20)	2600MHz	52.54	2.15
Target value	5200MHz	49.0±5%	5.30±5%
Validation value (2019-12-21)	5200MHz	49.12	5.30

SAR System validation

Prior to the assessment, the system validation kit was used to test whether the system was operating within its specifications of ±10%. The validation results are tabulated below. And also the corresponding SAR plot is attached as well in the SAR plots files.

The following procedure, recommended for performing validation tests using box phantoms is based on the procedures described in the IEEE standard P1528. Setup according to the setup diagram below:



With the SG and Amp and with directional coupler in place, set up the source signal at the relevant frequency and use a power meter to measure the power at the end of the SMA cable that you intend to connect to the balanced dipole. Adjust the SG to make this, say, 0.01W (10 dBm). If this level is too high to read directly with the power meter sensor, insert a calibrated attenuator (e.g. 10 or 20 dB) and make a suitable correction to the power meter reading.

Note 1: In this method, the directional coupler is used for monitoring rather than setting the exact feed power level. If, however, the directional coupler is used for power measurement, you should check the frequency range and power rating of the coupler and measure the coupling factor (referred to output) at the test frequency using a VNA.

Note 2: Remember that the use of a 3dB attenuator (as shown in Figure 8.1 of P1528) means that you need an RF amplifier of 2 times greater power for the same feed power. The other issue is the cable length. You might get up to 1dB of loss per meter of cable, so the cable length after the coupler needs to be quite short.

Note 3: For the validation testing done using CW signals, most power meters are suitable. However, if you are measuring the output of a modulated signal from either a signal generator or a handset, you must ensure that the power meter correctly reads the modulated signals.

The measured 1-gram averaged SAR values of the device against the phantom are provided in Tables 5 and Table 6. The humidity and ambient temperature of test facility were 64% and 23.2°C respectively. The body phantom were full of the body tissue simulating liquid. The EUT was supplied with full-charged battery for each measurement.

The distance between the back of the EUT and the bottom of the flat phantom is 10 mm (taking into account of the IEEE 1528 and the place of the antenna).

Table 4: Body SAR system validation (1g)

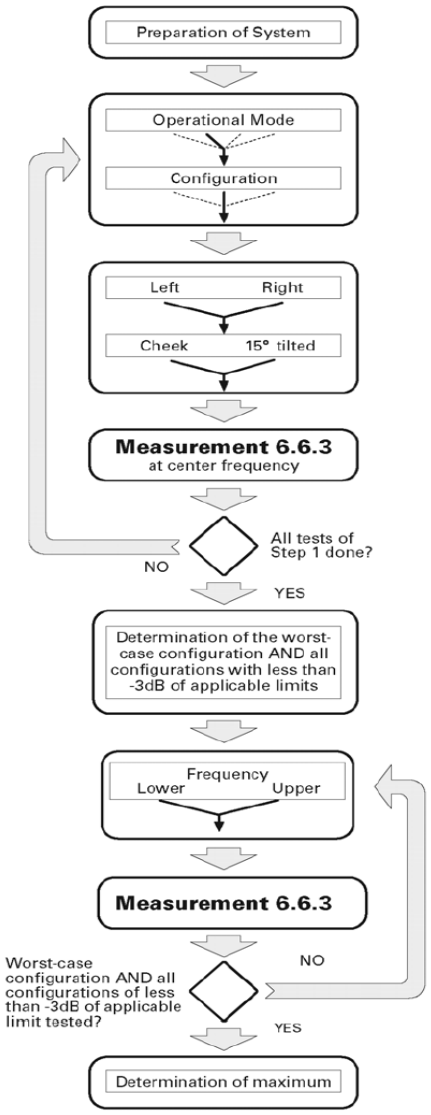
Frequency	Duty cycle	Target value （W/kg）	Test value (W/kg)	
			10 mW	1W
750MHz(2019-12-15)	1:1	8.68±10%	0.0870	8.70
835MHz(2019-12-16)	1:1	9.88±10%	0.1019	10.19
1800MHz(2019-12-17)	1:1	37.68±10%	0.4030	40.30
1900MHz(2019-12-18)	1:1	38.84±10%	0.4087	40.87
2450MHz(2019-12-19)	1:1	51.42±10%	0.5081	50.81
2600MHz(2019-12-20)	1:1	53.45±10%	0.5484	54.84
5200MHz(2019-12-21)	1:1	155.78±10%	1.5548	155.48

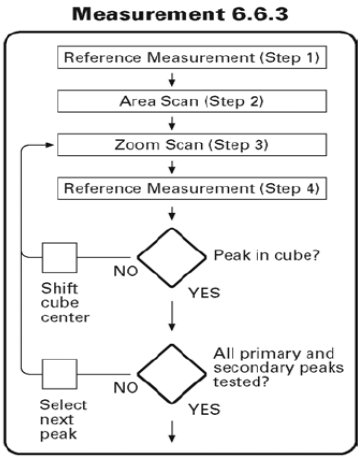
* Note: Target value was referring to the measured value in the calibration certificate of reference dipole.

Note: All SAR values are normalized to 1W forward power.

6. SAR measurement procedure

The SAR test against the head phantom was carried out as follow:





Establish a call with the maximum output power with a base station simulator, the connection between the EUT and the base station simulator is established via air interface.

After an area scan has been done at a fixed distance of 2mm from the surface of the phantom on the source side, a 3D scan is set up around the location of the maximum spot SAR. First, a point within the scan area is visited by the probe and a SAR reading taken at the start of testing. At the end of testing, the probe is returned to the same point and a second reading is taken. Comparison between these start and end readings enables the power drift during measurement to be assessed.

Above is the scanning procedure flow chart and table from the IEEEp1528 standard. This is the procedure for which all compliant testing should be carried out to ensure that all variations of the device position and transmission behavior are tested.

7. Conducted RF Output Power

8.1 WCDMA Conducted output Power

UMTS1900 (Band II)		Average Power (dBm)		
		9262CH	9400CH	9538cH
WCDMA	12.2kbps RMC	21.53	21.46	21.18
HSDPA	Subtest 1	21.08	21.03	21.06
	Subtest 2	20.75	20.79	20.71
	Subtest 3	21.04	21.07	21.01
	Subtest 4	20.94	20.91	20.87
HSUPA	Subtest 1	21.48	21.45	21.03
	Subtest 2	21.40	21.45	21.00
	Subtest 3	21.11	21.23	21.57
	Subtest 4	21.00	21.04	21.08
	Subtest 5	21.01	21.04	20.97
UMTS1700 (Band IV)		Average Power (dBm)		
		1313CH	1413CH	1513CH
WCDMA	12.2kbps RMC	23.51	23.66	23.71
HSDPA	Subtest 1	22.72	22.67	22.86
	Subtest 2	22.61	22.63	22.60
	Subtest 3	22.34	22.36	22.33
	Subtest 4	22.26	22.30	22.27
HSUPA	Subtest 1	22.60	22.63	22.59
	Subtest 2	22.46	22.50	22.47
	Subtest 3	22.37	22.40	22.36
	Subtest 4	22.17	22.21	22.20
	Subtest 5	22.14	22.16	22.12
UMTS850 (Band V)		Average Power (dBm)		
		4132CH	4183CH	4233CH
WCDMA	12.2kbps RMC	23.27	23.22	23.09
HSDPA	Subtest 1	22.13	22.20	22.12
	Subtest 2	22.03	22.07	21.97
	Subtest 3	21.25	21.33	21.11
	Subtest 4	20.84	20.88	20.66
HSUPA	Subtest 1	22.16	22.19	22.17
	Subtest 2	21.97	21.08	21.00
	Subtest 3	21.84	21.86	21.73
	Subtest 4	21.92	21.73	21.56
	Subtest 5	21.41	21.35	21.14

Note:

1. WCDMA SAR was tested under PMC 12.2kbps with HSPA Inactive per KDB Publication 941225 D01v03r01.HSPA SAR was not requires since the average output power of the HSPA subtests was not more than 0.25dB higher than the RMC level and SAR was less than 1.2W/kg.
2. It is expected by the manufacturer that MPR for some HSPA subtests may be up to 2dB more than specified by 3GPP, but also as low as 0dB according to the chipset implementation in this model

8.2 LTE Conducted peak output Power

LTE Test Configurations

The CMW500 Wide Band Radio Communication Tester was used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. SAR test were performed with the same number of RB and RB offsets transmitting on all frames.

1) Spectrum Plots for RB configurations

A properly configured base station simulator was used for LTE output power measurements and SAR testing. Therefore, spectrum plots for RB configurations were not required to be included in this report.

2) MPR

When MPR is implemented permanently within the UE, regardless of network requirements, only those RB configurations allowed by 3GPP for the channel bandwidth and modulation combinations may be tested with MPR active. Configurations with RB allocations less than the RB thresholds required by 3GPP must be tested without MPR.

The allowed Maximum Power Reduction(MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101:

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth configuration [RB]						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

3)A-MPR LTE procedures for SAR testing

A-MPR(Additional MPR) has been disabled for all SAR tests by using Network Signaling Value of "NS_01" on the base station simulator.

4)LTE procedures for SAR testing

A) Largest channel bandwidth standalone SAR test

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

1. LTE Band 2 Conducted Power Test Verdict:

LTE FDD Band 2				Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel 18607	Channel 18900	Channel 19193
1.4MHz	QPSK	1	0	22.33	22.45	22.16
		1	3	22.32	22.42	22.14
		1	5	22.30	22.40	22.13
		3	0	21.23	21.30	21.29
		3	2	21.22	21.27	21.28
		3	3	21.19	21.23	21.24
		6	0	21.10	21.17	21.13
	16QAM	1	0	21.51	21.63	21.68
		1	3	21.46	21.61	21.65
		1	5	21.44	21.56	21.64
		3	0	20.82	20.83	20.88
		3	2	20.81	20.84	20.87
		3	3	20.80	20.81	20.85
		6	0	20.72	20.71	20.80
Bandwidth	Modulation	RB size	RB offset	Channel 18615	Channel 18900	Channel 19185
3MHz	QPSK	1	0	22.35	22.46	22.17
		1	7	22.33	22.42	22.14
		1	14	22.31	22.40	22.12
		8	0	21.23	21.30	21.29
		8	4	21.22	21.29	21.28
		8	7	21.19	21.20	21.23
		15	0	21.10	21.16	21.16
	16QAM	1	0	21.50	21.61	21.70
		1	7	21.47	21.60	21.68
		1	14	21.44	21.56	21.66
		8	0	20.83	20.85	20.90
		8	4	20.84	20.84	20.92
		8	7	20.82	20.83	20.88
		15	0	20.70	20.72	20.82

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				18625	18900	19175
5MHz	QPSK	1	0	22.36	22.47	22.18
		1	13	22.35	22.46	22.17
		1	24	22.33	22.42	22.14
		12	0	21.25	21.30	21.30
		12	6	21.23	21.30	21.29
		12	13	21.22	21.29	21.28
		25	0	21.20	21.23	21.26
	16QAM	1	0	21.64	21.67	21.82
		1	13	21.50	21.60	21.70
		1	24	21.50	21.61	21.70
		12	0	20.81	20.85	20.91
		12	6	20.83	20.85	20.90
		12	13	20.84	20.84	20.92
		25	0	20.70	20.73	20.80
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				18650	18900	19150
10MHz	QPSK	1	0	22.37	22.48	22.18
		1	25	22.35	22.46	22.17
		1	49	22.33	22.44	22.16
		25	0	21.25	21.31	21.30
		25	13	21.24	21.30	21.29
		25	25	21.22	21.28	21.28
		50	0	21.20	21.25	21.26
	16QAM	1	0	21.64	21.68	21.82
		1	25	21.50	21.60	21.71
		1	49	21.50	21.61	21.70
		25	0	20.81	20.84	20.92
		25	13	20.83	20.85	20.90
		25	25	20.84	20.86	20.92
		50	0	20.70	20.74	20.80

Bandwidth	Modulation	RB size	RB offset	Channel 18675	Channel 18900	Channel 19125
15MHz	QPSK	1	0	22.40	22.50	22.20
		1	38	22.35	22.47	22.18
		1	74	22.33	22.45	22.17
		36	0	21.26	21.32	21.30
		36	18	21.24	21.31	21.30
		36	39	21.21	21.30	21.28
		75	0	21.20	21.28	21.27
	16QAM	1	0	21.65	21.70	21.83
		1	38	21.51	21.60	21.72
		1	74	21.50	21.61	21.70
		36	0	20.81	20.87	20.92
		36	18	20.82	20.86	20.91
		36	39	20.85	20.88	20.94
		75	0	20.70	20.76	20.81
Bandwidth	Modulation	RB size	RB offset	Channel 18700	Channel 18900	Channel 19100
20MHz	QPSK	1	0	22.41	22.51	22.22
		1	50	22.38	22.49	22.21
		1	99	22.35	22.47	22.21
		50	0	21.29	21.36	21.34
		50	25	21.27	21.35	21.34
		50	50	21.28	21.33	21.32
		100	0	21.24	21.30	21.31
	16QAM	1	0	21.66	21.71	21.85
		1	50	21.53	21.61	21.73
		1	99	21.55	21.6	21.72
		50	0	20.83	20.89	21
		50	25	20.84	20.88	20.97
		50	50	20.85	20.9	20.98
		100	0	20.71	20.77	20.87

2. LTE Band 4 Conducted Power Test Verdict:

LTE FDD Band 4				Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel 19957	Channel 20175	Channel 20393
1.4MHz	QPSK	1	0	21.42	21.51	21.45
		1	3	21.29	21.41	21.33
		1	5	21.31	21.4	21.32
		3	0	20.59	20.69	20.6
		3	2	20.6	20.68	20.57
		3	3	20.61	20.7	20.58
		6	0	20.47	20.57	20.47
	16QAM	1	0	20.29	20.36	20.34
		1	3	20.14	20.25	20.21
		1	5	20.27	20.33	20.33
		3	0	19.36	19.44	19.52
		3	2	19.44	19.54	19.55
		3	3	19.46	19.55	19.49
		6	0	19.34	19.45	19.34
Bandwidth	Modulation	RB size	RB offset	Channel 19965	Channel 20175	Channel 20385
3MHz	QPSK	1	0	21.48	21.66	21.58
		1	7	21.35	21.56	21.46
		1	14	21.37	21.55	21.45
		8	0	20.65	20.84	20.73
		8	4	20.66	20.83	20.7
		8	7	20.67	20.85	20.71
		15	0	20.53	20.72	20.6
	16QAM	1	0	20.35	20.51	20.47
		1	7	20.2	20.4	20.34
		1	14	20.33	20.48	20.46
		8	0	19.42	19.59	19.65
		8	4	19.5	19.69	19.68
		8	7	19.52	19.7	19.62
		15	0	19.4	19.6	19.47

Bandwidth	Modulation	RB size	RB offset	Channel 19975	Channel 20175	Channel 20375
5MHz	QPSK	1	0	21.74	21.66	21.99
		1	13	21.61	21.56	21.87
		1	24	21.63	21.55	21.86
		12	0	20.91	20.84	21.14
		12	6	20.92	20.83	21.11
		12	13	20.93	20.85	21.12
		25	0	20.79	20.72	21.01
	16QAM	1	0	20.61	20.51	20.88
		1	13	20.46	20.4	20.75
		1	24	20.59	20.48	20.87
		12	0	19.68	19.59	20.06
		12	6	19.76	19.69	20.09
		12	13	19.78	19.7	20.03
		25	0	19.66	19.6	19.88
Bandwidth	Modulation	RB size	RB offset	Channel 20000	Channel 20175	Channel 20350
10MHz	QPSK	1	0	22.15	22.24	22.11
		1	25	22.02	22.14	21.99
		1	49	22.04	22.13	21.98
		25	0	21.32	21.42	21.26
		25	13	21.33	21.41	21.23
		25	25	21.34	21.43	21.24
		50	0	21.2	21.3	21.13
	16QAM	1	0	21.02	21.09	21
		1	25	20.87	20.98	20.87
		1	49	21	21.06	20.99
		25	0	20.09	20.17	20.18
		25	13	20.17	20.27	20.21
		25	25	20.19	20.28	20.15
		50	0	20.07	20.18	20

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				20025	20175	20325
15MHz	QPSK	1	0	22.34	22.27	22.31
		1	38	22.21	22.17	22.19
		1	74	22.23	22.16	22.18
		36	0	21.51	21.45	21.46
		36	18	21.52	21.44	21.43
		36	39	21.53	21.46	21.44
		75	0	21.39	21.33	21.33
	16QAM	1	0	21.21	21.12	21.2
		1	38	21.06	21.01	21.07
		1	74	21.19	21.09	21.19
		36	0	20.28	20.2	20.38
		36	18	20.36	20.3	20.41
		36	39	20.38	20.31	20.35
		75	0	20.26	20.21	20.2
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				20050	20175	20300
20MHz	QPSK	1	0	22.49	22.47	22.58
		1	50	22.36	22.37	22.46
		1	99	22.38	22.36	22.45
		50	0	21.33	21.28	21.34
		50	25	21.25	21.18	21.11
		50	50	21.21	21.03	21.08
		100	0	21.21	21.16	21.21
	16QAM	1	0	21.36	21.32	21.47
		1	50	21.21	21.21	21.34
		1	99	21.34	21.29	21.46
		50	0	20.43	20.4	20.65
		50	25	20.51	20.5	20.68
		50	50	20.53	20.51	20.62
		100	0	20.41	20.41	20.47

3. LTE Band 5 Conducted Power Test Verdict:

LTE FDD Band 5				Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel 20407	Channel 20525	Channel 20643
1.4MHz	QPSK	1	0	21.55	21.46	21.38
		1	3	21.42	21.35	21.27
		1	5	21.4	21.31	21.24
		3	0	20.74	20.6	20.52
		3	2	20.7	20.63	20.56
		3	3	20.71	20.62	20.51
		6	0	20.56	20.43	20.41
	16QAM	1	0	20.42	20.34	20.23
		1	3	20.31	20.19	20.12
		1	5	20.4	20.3	20.21
		3	0	19.51	19.42	19.4
		3	2	19.54	19.51	19.46
		3	3	19.6	19.53	19.37
		6	0	19.46	19.35	19.16
Bandwidth	Modulation	RB size	RB offset	Channel 20415	Channel 20525	Channel 20635
3MHz	QPSK	1	0	21.75	21.68	21.61
		1	7	21.6	21.54	21.47
		1	14	21.64	21.55	21.46
		8	0	20.93	20.83	20.78
		8	4	20.94	20.86	20.8
		8	7	20.95	20.84	20.73
		15	0	20.77	20.71	20.62
	16QAM	1	0	20.63	20.55	20.44
		1	7	20.48	20.4	20.29
		1	14	20.6	20.49	20.41
		8	0	19.71	19.61	19.63
		8	4	19.77	19.73	19.72
		8	7	19.82	19.71	19.61
		15	0	19.67	19.55	19.37

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				20425	20525	20625
5MHz	QPSK	1	0	22.25	22.45	22.61
		1	13	22.1	22.3	22.5
		1	24	22.12	22.33	22.46
		12	0	21.43	21.62	21.8
		12	6	21.44	21.61	21.77
		12	13	21.42	21.58	21.76
		25	0	21.28	21.46	21.613
	16QAM	1	0	21.11	21.33	21.45
		1	13	20.98	21.19	21.31
		1	24	21.06	21.31	21.38
		12	0	20.17	20.41	20.6
		12	6	20.3	20.47	20.73
		12	13	20.29	20.5	20.59
		25	0	20.14	20.39	20.35
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				20450	20525	20600
10MHz	QPSK	1	0	22.8	22.97	22.96
		1	25	22.62	22.85	22.81
		1	49	22.64	22.85	22.85
		25	0	21.46	21.53	21.55
		25	13	21.08	21.33	21.43
		25	25	21.25	21.14	21.15
		50	0	21.33	21.4	21.37
	16QAM	1	0	21.67	21.82	21.81
		1	25	21.56	21.71	21.7
		1	49	21.62	21.74	21.78
		25	0	20.76	20.88	20.97
		25	13	20.81	20.93	21.05
		25	25	20.82	20.96	20.93
		50	0	20.69	20.79	20.71

4. LTE Band 7 Conducted Power Test Verdict:

LTE FDD Band 7				Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				20775	21100	21425
5MHz	QPSK	1	0	20.85	20.71	20.79
		1	13	20.74	20.56	20.64
		1	24	20.72	20.58	20.68
		12	0	19.97	19.86	19.96
		12	6	20	19.9	19.93
		12	13	20.02	19.88	19.94
		25	0	19.86	19.68	19.85
	16QAM	1	0	19.74	19.59	19.63
		1	13	19.62	19.46	19.52
		1	24	19.69	19.54	19.62
		12	0	18.83	18.61	18.78
		12	6	18.86	18.75	18.87
		12	13	18.88	18.7	18.8
		25	0	18.77	18.55	18.68
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				20800	21100	21400
10MHz	QPSK	1	0	21.01	21.03	20.95
		1	25	20.9	20.88	20.8
		1	49	20.88	20.9	20.84
		25	0	20.13	20.18	20.12
		25	13	20.16	20.22	20.09
		25	25	20.18	20.2	20.1
		50	0	20.02	20	20.01
	16QAM	1	0	19.9	19.91	19.79
		1	25	19.78	19.78	19.68
		1	49	19.85	19.86	19.78
		25	0	18.99	18.93	18.94
		25	13	19.02	19.07	19.03
		25	25	19.04	19.02	18.96
		50	0	18.93	18.87	18.84

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				20825	21100	21375
15MHz	QPSK	1	0	21.05	21.08	21.11
		1	38	20.94	20.93	20.96
		1	74	20.92	20.95	21
		36	0	20.17	20.23	20.28
		36	18	20.2	20.27	20.25
		36	39	20.22	20.25	20.26
		75	0	20.06	20.05	20.17
	16QAM	1	0	19.94	19.96	19.95
		1	38	19.82	19.83	19.84
		1	74	19.89	19.91	19.94
		36	0	19.03	18.98	19.1
		36	18	19.06	19.12	19.19
		36	39	19.08	19.07	19.12
		75	0	18.97	18.92	19
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				20850	21100	21350
20MHz	QPSK	1	0	21.25	21.33	21.18
		1	50	21.14	21.18	21.03
		1	99	21.12	21.2	21.07
		50	0	20.37	20.48	20.35
		50	25	20.4	20.52	20.32
		50	50	20.42	20.5	20.33
		100	0	20.26	20.3	20.24
	16QAM	1	0	20.14	20.21	20.02
		1	50	20.02	20.08	19.91
		1	99	20.09	20.16	20.01
		50	0	19.23	19.23	19.17
		50	25	19.26	19.37	19.26
		50	50	19.28	19.32	19.19
		100	0	19.17	19.17	19.07

5. LTE Band 12 Conducted Power Test Verdict:

LTE FDD Band 12				Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				23017	23095	23173
1.4MHz	QPSK	1	0	21.33	21.45	21.67
		1	3	21.21	21.33	21.55
		1	5	21.22	21.34	21.54
		3	0	20.48	20.63	20.85
		3	2	20.51	20.6	20.83
		3	3	20.45	20.64	20.84
		6	0	20.35	20.5	20.7
	16QAM	1	0	20.2	20.3	20.55
		1	3	20.09	20.19	20.42
		1	5	20.18	20.27	20.5
		3	0	19.25	19.35	19.71
		3	2	19.37	19.48	19.82
		3	3	19.36	19.45	19.74
		6	0	19.18	19.32	19.52
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				23025	23095	23165
3MHz	QPSK	1	0	21.75	21.84	21.78
		1	7	21.63	21.72	21.66
		1	14	21.64	21.73	21.65
		8	0	20.9	21.02	20.96
		8	4	20.93	20.99	20.94
		8	7	20.87	21.03	20.95
		15	0	20.77	20.89	20.81
	16QAM	1	0	20.62	20.69	20.66
		1	7	20.51	20.58	20.53
		1	14	20.6	20.66	20.61
		8	0	19.67	19.74	19.82
		8	4	19.79	19.87	19.93
		8	7	19.78	19.84	19.85
		15	0	19.6	19.71	19.63

Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				23035	23095	23155
5MHz	QPSK	1	0	22.25	22.43	22.51
		1	13	22.13	22.31	22.39
		1	24	22.14	22.32	22.38
		12	0	21.4	21.61	21.69
		12	6	21.43	21.58	21.67
		12	13	21.37	21.62	21.68
		25	0	21.27	21.48	21.54
	16QAM	1	0	21.12	21.28	21.39
		1	13	21.01	21.17	21.26
		1	24	21.1	21.25	21.34
		12	0	20.17	20.33	20.55
		12	6	20.29	20.46	20.66
		12	13	20.28	20.43	20.58
		25	0	20.1	20.3	20.36
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				23060	23095	23130
10MHz	QPSK	1	0	22.83	22.95	22.97
		1	25	22.71	22.83	22.85
		1	49	22.72	22.84	22.84
		25	0	21.16	21.27	21.24
		25	13	21.05	21.08	21.12
		25	25	21.01	21	21.09
		50	0	21.03	21.14	21.09
	16QAM	1	0	21.7	21.8	21.85
		1	25	21.59	21.69	21.72
		1	49	21.68	21.77	21.8
		25	0	20.75	20.85	21.01
		25	13	20.87	20.98	21.12
		25	25	20.86	20.95	21.04
		50	0	20.68	20.82	20.82

6. LTE Band 13 Conducted Power Test Verdict

LTE FDD Band 13				Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				23035	23095	23155
5MHz	QPSK	1	0	22.61	22.75	22.68
		1	13	22.49	22.63	22.56
		1	24	22.5	22.64	22.55
		12	0	21.76	21.93	21.86
		12	6	21.79	21.9	21.84
		12	13	21.73	21.94	21.85
		25	0	21.63	21.8	21.71
	16QAM	1	0	21.48	21.6	21.56
		1	13	21.37	21.49	21.43
		1	24	21.46	21.57	21.51
		12	0	20.53	20.65	20.72
		12	6	20.65	20.78	20.83
		12	13	20.64	20.75	20.75
		25	0	20.46	20.62	20.53
Bandwidth	Modulation	RB size	RB offset	Channel	Channel	Channel
				/	23230	/
10MHz	QPSK	1	0		23.15	
		1	25		23.03	
		1	49		23.04	
		25	0		21.92	
		25	13		21.75	
		25	25		21.87	
		50	0		21.14	
	16QAM	1	0		22	
		1	25		21.89	
		1	49		21.97	
		25	0		21.05	
		25	13		21.18	
		25	25		21.15	
		50	0		21.02	

7. LTE Band 17 Conducted Power Test Verdict

LTE FDD Band 17				Conducted Power(dBm)		
Bandwidth	Modulation	RB size	RB offset	Channel 23755	Channel 23790	Channel 23825
5MHz	QPSK	1	0	22.41	22.38	22.55
		1	13	22.26	22.25	22.4
		1	24	22.23	22.23	22.36
		12	0	21.58	21.54	21.7
		12	6	21.53	21.55	21.66
		12	13	21.52	21.56	21.67
		25	0	21.47	21.39	21.56
	16QAM	1	0	21.29	21.21	21.42
		1	13	21.14	21.08	21.29
		1	24	21.24	21.16	21.34
		12	0	20.33	20.28	20.61
		12	6	20.44	20.17	20.66
		12	13	20.42	20.23	20.57
		25	0	20.29	19.36	20.33
Bandwidth	Modulation	RB size	RB offset	Channel 23780	Channel 23790	Channel 23800
10MHz	QPSK	1	0	22.85	23.16	22.88
		1	25	22.73	23.01	22.75
		1	49	22.71	23.03	22.73
		25	0	21.24	21.32	21.27
		25	13	21.15	21.25	21.18
		25	25	21.05	21.11	21.02
		50	0	21.12	21.2	21.15
	16QAM	1	0	21.72	22.01	21.77
		1	25	21.58	21.9	21.61
		1	49	21.7	21.99	21.72
		25	0	20.78	21.06	20.92
		25	13	20.89	20.98	21.03
		25	25	20.9	21.08	20.95
		50	0	20.79	20.18	20.72

8.3 WLAN 2.4GHz Band Conducted Power

Channel/Freq.(MHz)	Maximum Conducted Out Power (dBm) Average		
	802.11b	802.11g	802.11n(HT20)
1(2412)	16.32	15.18	12.92
6(2437)	14.25	13.74	12.15
11(2462)	15.46	14.61	12.29

Channel/Freq.(MHz)	Maximum Conducted Out Power (dBm) Average
	802.11n40
3(2422)	12.84
6(2437)	12.08
9(2452)	12.51

WLAN 5GHz Band Conducted Power

U-NII-1 AVGSA Output Power		
Mode	Test Frequency (MHz)	Max Conducted Output Power (dBm)
802.11n (20MHz)	5180	12.39
802.11n (20MHz)	5220	13.05
802.11n (20MHz)	5240	12.90
802.11n (40MHz)	5190	12.47
802.11n (40MHz)	5230	12.44
802.11a (20MHz)	5180	13.66
802.11a (20MHz)	5220	13.82
802.11a (20MHz)	5240	13.79

Note:

1. Per KDB248227 D01 v02r02, 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 lowest data rate
3. Per KDB248227 D01 v02r02, 802.11g /11n-HT20/11n-HT40 is not required. . When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤1.2W/Kg. Thus the SAR can be excluded.

8.4 Bluetooth Output Power

Channel	Frequency (MHz)	BT3.0 Output Power(dBm) Average		
		GFSK	π/4-DQPSK	8-DPSK
CH 0	2402	3.88	3.90	4.35
CH 39	2441	2.44	2.42	2.96
CH 78	2480	0.19	0.11	0.63

Channel	Frequency (MHz)	BT4.0 Output Power(dBm)Peak
		GFSK
CH 0	2402	-5.62
CH 20	2442	-6.48
CH 39	2480	-7.90

8.5 NFC Output Power

Frequency (MHz)	Output Power(dBμV/m)
13.56	48.063

8.6 RFID Output Power

Channel	Frequency (MHz)	Measured Output Peak Power (dBm)	Limit (dBm)	Verdict
1	902.75	28.40	30	PASS
26	915.25	27.65		PASS
50	927.25	27.25		PASS

8. SAR test Exclusion and estimate SAR calculation:

Note:

1. Per KDB 447498 D01v06, the 1-g and 10-g SAR test exclusion thresholds for 100MHz to 6GHz at test separation distances ≤ 50mm are determined by:[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] ·[$\sqrt{f}$ (GHz)] ≤3.0 for 1-g SAR and ≤7.5 for 10-g extremity SAR
   (1) f(GHz) is the RF channel transmit frequency in GHz
   (2) Power and distance are round to the nearest mW and mm before calculation
   (3) The result is rounded to one decimal place for comparison
   (4) If the test separation distance(antenna-user) is < 5mm, 5mm is used for excluded SAR calculation
   (5)

BT3.0 Max Power (dBm)	mW	Test Distance (mm)	Frequency(GHz)	Exclusion Thresholds
4.5	2.818	10	2.45	0.441

Per KDB 447498 D01v06 exclusion thresholds is0.441<3, RF exposure evaluation is not required.

BT estimated SAR value=Exclusion Thresholds/7.5=0.441/7.5=**0.059W/Kg**

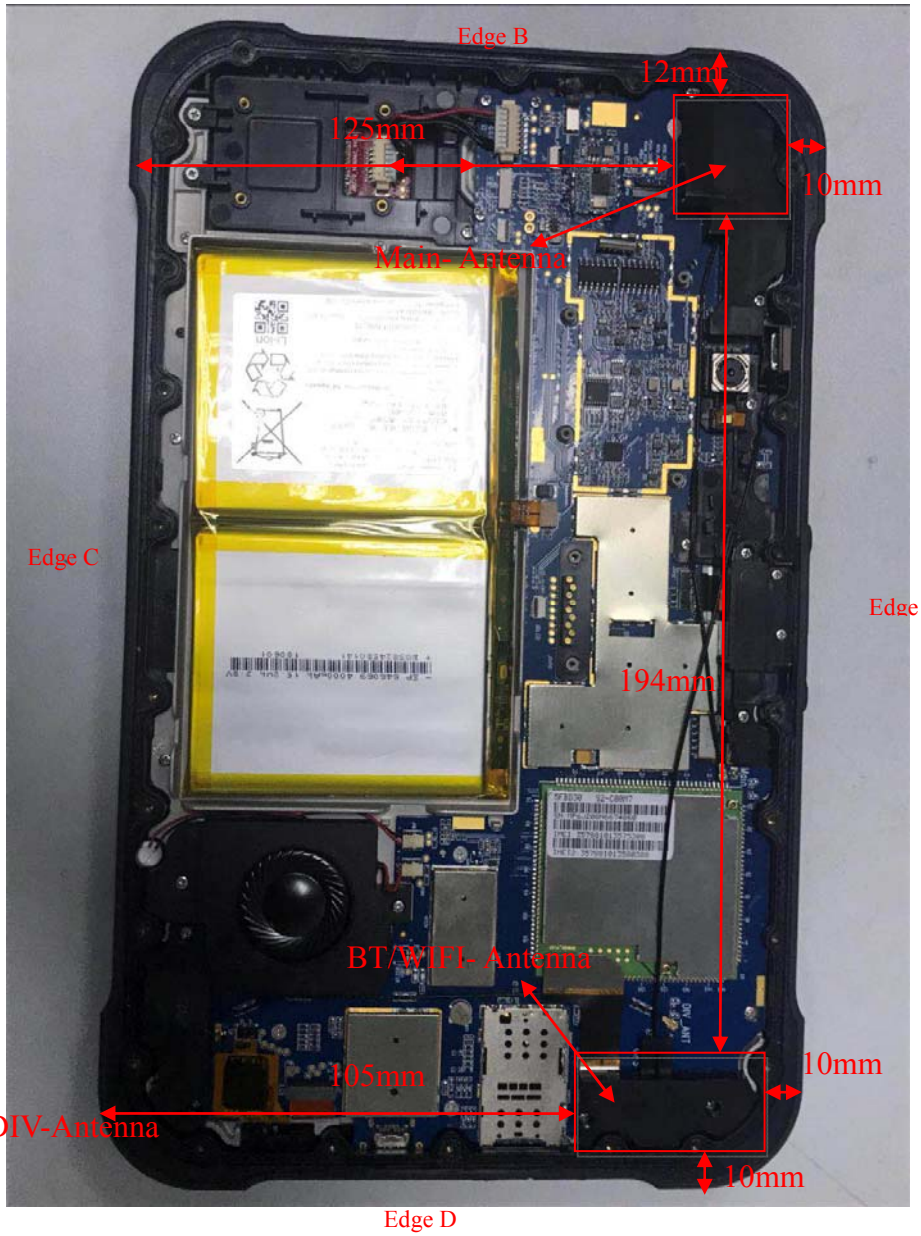
BT4.0 Max Power (dBm)	mW	Test Distance (mm)	Frequency(GHz)	Exclusion Thresholds
-6.9	0.204	10	2.45	0.032

Per KDB 447498 D01v06 exclusion thresholds is0.032<3, RF exposure evaluation is not required.

BT estimated SAR value=Exclusion Thresholds/7.5=0.032/7.5=**0.004**W/Kg

The estimated SAR value is used for simultaneous transmission analysis.

Antenna Location:



Antenna-to-User (Edge Side) distance (mm):

Antenna	Front	Back	Edge A	Edge B	Edge C	Edge D
WWAN Main Antenna	12	4	10	12	125	194
WIFI Antenna	12	4	10	149	105	10

Note: The diagonal distance of the overall section is 15cm.

The Body SAR measurement positions of each band are as below:

Antenna	Front	Back	Edge A	Edge B	Edge C	Edge D
WWAN Antenna Body	Yes	Yes	No	No	No	No
WWAN Antenna hotspot	Yes	Yes	Yes	Yes	No	No
WIFI Antenna Body	Yes	Yes	No	No	No	No
WIFI Antenna hotspot	Yes	Yes	Yes	No	No	Yes

Note: According to KDB 941225 D06 v02r01, when antenna-to-edge>2.5cm, SAR is not required.

9. Scaling Factor calculation

Operation Mode	Channel /Frequency	Output Power(dBm)	Tune up Power in tolerance (dBm)	Max. Tune up(dBm)	Scaling Factor
WCDMA850	4132/826.4	23.27	22.5 ± 1.0	23.50	1.054
	4183/836.6	23.22	22.5 ± 1.0	23.50	1.067
	4233/846.6	23.09	22.5 ± 1.0	23.50	1.099
WCDMA1900	9262/1852.4	21.53	21.0 ± 1.0	22.00	1.114
	9400/1880.0	21.46	21.0 ± 1.0	22.00	1.132
	9538/1907.6	21.18	21.0 ± 1.0	22.00	1.208
WCDMA1700	1312/1712.4	23.51	23.0 ± 1.0	24.00	1.119
	1413/1732.6	23.66	23.0 ± 1.0	24.00	1.081
	1513/1752.6	23.71	23.0 ± 1.0	24.00	1.069
LTE B2 20MHz 1RB#0	18700/1860	22.41	22.0 ± 1.0	23.00	1.146
	18900/1880	22.51	22.0 ± 1.0	23.00	1.119
	19100/1900	22.22	22.0 ± 1.0	23.00	1.197
LTE B2 20MHz 50RB#50	18700/1860	21.29	20.5 ± 1.0	21.50	1.050
	18900/1880	21.36	20.5 ± 1.0	21.50	1.033
	19100/1900	21.34	20.5 ± 1.0	21.50	1.038
LTE B4 20MHz 1RB#0	20050/1720	22.49	22.0 ± 1.0	23.00	1.125
	20175/1732.5	22.47	22.0 ± 1.0	23.00	1.130
	20300/1745	22.58	22.0 ± 1.0	23.00	1.102
LTE B4 20MHz 50RB#0	20050/1720	21.33	20.5 ± 1.0	21.50	1.040
	20175/1732.5	21.28	20.5 ± 1.0	21.50	1.052
	20300/1745	21.34	20.5 ± 1.0	21.50	1.038
LTE B5 10MHz 1RB#0	20450/829	22.80	22.0 ± 1.0	23.00	1.047
	20525/836.5	22.97	22.0 ± 1.0	23.00	1.007
	20600/844	22.96	22.0 ± 1.0	23.00	1.009
LTE B5 10MHz 25RB#0	20450/829	21.46	21.0 ± 1.0	22.00	1.132
	20525/836.5	21.53	21.0 ± 1.0	22.00	1.114
	20600/844	21.55	21.0 ± 1.0	22.00	1.109
LTE B7 20MHz 1RB#0	20850/2510	21.25	20.5 ± 1.0	21.50	1.059
	21100/2535	21.33	20.5 ± 1.0	21.50	1.040
	21350/2560	21.18	20.5 ± 1.0	21.50	1.076
LTE B7 20MHz 50RB#25	20850/2510	20.40	20.0 ± 1.0	21.00	1.148
	21100/2535	20.52	20.0 ± 1.0	21.00	1.117
	21350/2560	20.32	20.0 ± 1.0	21.00	1.169
LTE B12 10MHz 1RB#0	23060/704	22.83	22.0 ± 1.0	23.00	1.040
	23095/707.5	22.95	22.0 ± 1.0	23.00	1.012
	23130/711	22.97	22.0 ± 1.0	23.00	1.007

LTE B12 10MHz 25RB#0	23060/704	21.16	20.5 ± 1.0	21.50	1.081
	23095/707.5	21.27	20.5 ± 1.0	21.50	1.054
	23130/711	21.24	20.5 ± 1.0	21.50	1.062
LTE B13 10MHz 1RB#0	23230/782	23.15	22.5 ± 1.0	23.50	1.084
LTE B13 10MHz 50RB#0	23230/782	21.92	21.0 ± 1.0	22.00	1.019
LTE B17 10MHz 1RB#0	23780/709	22.85	22.5 ± 1.0	23.50	1.161
	23790/710	23.16	22.5 ± 1.0	23.50	1.081
	23800/711	22.88	22.5 ± 1.0	23.50	1.153
LTE B17 10MHz 25RB#0	23780/709	21.24	20.5 ± 1.0	21.50	1.062
	23790/710	21.32	20.5 ± 1.0	21.50	1.042
	23800/711	21.27	20.5 ± 1.0	21.50	1.054
WIFI 2.4G 802.11b	1/2412	16.32	15.4 ± 1.2	16.40	1.019
	6/2437	14.25	15.4 ± 1.2	16.40	1.641
	11/2462	15.46	15.4 ± 1.2	16.40	1.242
WIFI 5G BAND I	44/5220	13.82	13.0 ± 1.0	14.00	1.042
RFID	1/902.75	28.40	27.5 ± 1.0	28.50	1.023
	26/915.25	27.65	27.5 ± 1.0	28.50	1.216
	50/927.25	27.25	27.5 ± 1.0	28.50	1.334

Note: for LTE power tolerance, only QPSK modulation mode was provide here.

10. Test Results

Results overview of WCDMA850

Body Support(0mm)	Channel /Frequency	Mode	SAR Value (W/kg)1-g	Power drift(%)	Scaled Factor	Scaled SAR (W/Kg)1-g	SAR Plot.
Back Upward	4132/826.4	RMC	0.209	-2.97	1.054	0.220	/
Edge A	4132/826.4	RMC	**0.327**	-2.27	1.054	**0.345**	Yes
Edge B	4132/826.4	RMC	0.226	-4.29	1.054	0.238	/

Results overview of WCDMA1700

Body Support(0mm)	Channel /Frequency	Mode	SAR Value (W/kg)1-g	Power drift(%)	Scaled Factor	Scaled SAR (W/Kg)1-g	SAR Plot.
Back Upward	1513/1752.6	RMC	0.227	-3.34	1.069	0.243	/
Edge A	1312/1712.4	RMC	0.867	-4.32	1.119	0.970	/
Edge A	1413/1732.6	RMC	0.894	-3.58	1.081	0.966	/
Edge A	1513/1752.6	RMC	**0.915**	-4.09	1.069	**0.978**	Yes
Edge A Repeat	1312/1712.4	RMC	0.778	-3.22	1.119	0.871	/
Edge A Repeat	1413/1732.6	RMC	0.810	-2.91	1.081	0.876	/
Edge A Repeat	1513/1752.6	RMC	0.832	-1.59	1.069	0.889	/
Edge B	1513/1752.6	RMC	0.192	0.84	1.069	0.205	/

Results overview of WCDMA1900

Body Support(0mm)	Channel /Frequency	Mode	SAR Value (W/kg)1-g	Power drift(%)	Scaled Factor	Scaled SAR (W/Kg)1-g	SAR Plot.
Back Upward	9262/1852.4	RMC	0.186	-2.30	1.114	0.207	/
Edge A	9262/1852.4	RMC	**0.727**	0.05	1.114	**0.810**	Yes
Edge A	9400/1880.0	RMC	0.701	1.32	1.132	0.794	/
Edge A	9538/1907.6	RMC	0.664	-0.15	1.208	0.802	/
Edge B	9262/1852.4	RMC	0.084	1.34	1.114	0.094	/

Results overview of FDD LTE Band 2, QPSK, 20MHz Bandwidth

Body Support(0mm)	Channel /Frequency	Mode	SAR Value (W/kg)1-g	Power drift(%)	Scaled Factor	Scaled SAR (W/Kg)1-g	SAR Plot.
1RB#0							
Back Upward	18900/1880	Data	0.182	-3.170	1.119	0.204	/
Edge A	18900/1880	Data	**0.659**	-2.070	1.119	**0.738**	Yes
Edge B	18900/1880	Data	0.086	-4.890	1.119	0.096	/
50%RB#0							
Back Upward	18900/1880	Data	0.150	-1.660	1.033	0.155	/
Edge A	18900/1880	Data	0.603	-2.990	1.033	0.623	/
Edge B	18900/1880	Data	0.062	-4.410	1.033	0.064	/

Results overview of FDD LTE Band 4, QPSK, 20MHz Bandwidth

Body Support(0mm)	Channel /Frequency	Mode	SAR Value (W/kg)1-g	Power drift(%)	Scaled Factor	Scaled SAR (W/Kg)1-g	SAR Plot.
1RB#0							
Back Upward	20300/1745	Data	0.294	-2.010	1.102	0.324	/
Edge A	20050/1720	Data	0.921	-1.650	1.125	1.036	/
Edge A	20175/1732.5	Data	0.905	2.170	1.130	1.023	/
Edge A	20300/1745	Data	**0.950**	-0.650	1.102	**1.046**	Yes
Edge A Repeat	20050/1720	Data	0.882	-2.060	1.125	0.992	/
Edge A Repeat	20175/1732.5	Data	0.864	-4.230	1.130	0.976	/
Edge A Repeat	20300/1745	Data	0.906	-3.370	1.102	0.998	/
Edge B	20300/1745	Data	0.257	4.770	1.102	0.283	/
50%RB#0							
Back Upward	20300/1745	Data	0.248	-1.620	1.038	0.257	/
Edge A	20050/1720	Data	0.875	-4.210	1.040	0.910	
Edge A	20175/1732.5	Data	0.868	-3.210	1.052	0.913	
Edge A	20300/1745	Data	0.888	-3.310	1.038	0.921	/
Edge A Repeat	20050/1720	Data	0.822	-1.590	1.040	0.855	
Edge A Repeat	20175/1732.5	Data	0.817	2.640	1.052	0.859	
Edge A Repeat	20300/1745	Data	0.830	0.480	1.038	0.862	
Edge B	20300/1745	Data	0.202	-2.040	1.038	0.210	/

Results overview of FDD LTE Band 5, QPSK, 20MHz Bandwidth

Body Support(0mm)	Channel /Frequency	Mode	SAR Value (W/kg)1-g	Power drift(%)	Scaled Factor	Scaled SAR (W/Kg)1-g	SAR Plot.
1RB#0							
Back Upward	20525/836.5	Data	0.210	-1.860	1.007	0.211	/
Edge A	20525/836.5	Data	**0.356**	-0.500	1.007	**0.358**	Yes
Edge B	20525/836.5	Data	0.208	-4.530	1.007	0.209	/
50%RB#0							
Back Upward	20600/844	Data	0.175	2.140	1.109	0.194	/
Edge A	20600/844	Data	0.304	-1.760	1.109	0.337	/
Edge B	20600/844	Data	0.166	2.300	1.109	0.184	/

Results overview of FDD LTE Band 7, QPSK, 20MHz Bandwidth

Body Support(0mm)	Channel /Frequency	Mode	SAR Value (W/kg)1-g	Power drift(%)	Scaled Factor	Scaled SAR (W/Kg)1-g	SAR Plot.
1RB#0							
Back Upward	21100/2535	Data	0.391	-0.540	1.040	0.407	/
Edge A	20850/2510	Data	0.972	-4.160	1.059	1.029	/
Edge A	21100/2535	Data	**0.994**	-4.710	1.040	**1.034**	Yes
Edge A	21350/2560	Data	0.959	-3.260	1.076	1.032	/
Edge A Repeat	20850/2510	Data	0.922	1.540	1.059	0.976	/
Edge A Repeat	21100/2535	Data	0.942	-2.480	1.040	0.980	/
Edge A Repeat	21350/2560	Data	0.907	-2.090	1.076	0.976	/
Edge B	21100/2535	Data	0.181	-4.400	1.040	0.188	/
50%RB#0							
Back Upward	21100/2535	Data	0.338	-1.650	1.117	0.377	/
Edge A	20850/2510	Data	0.883	-4.160	1.148	1.014	/
Edge A	21100/2535	Data	0.910	-2.330	1.117	1.016	/
Edge A	21350/2560	Data	0.862	-2.590	1.169	1.008	/
Edge A Repeat	20850/2510	Data	0.828	1.360	1.148	0.951	/
Edge A Repeat	21100/2535	Data	0.856	-0.870	1.117	0.956	/
Edge A Repeat	21350/2560	Data	0.810	1.930	1.169	0.947	/
Edge B	21100/2535	Data	0.137	-4.510	1.117	0.153	/

Results overview of FDD LTE Band 12, QPSK, 10MHz Bandwidth

Body Support(0mm)	Channel /Frequency	Mode	SAR Value (W/kg)1-g	Power drift(%)	Scaled Factor	Scaled SAR (W/Kg)1-g	SAR Plot.
1RB#0							
Back Upward	23130/711	Data	0.129	3.010	1.007	0.130	/
Edge A	23130/711	Data	**0.167**	-2.480	1.007	**0.168**	Yes
Edge B	23130/711	Data	0.108	-1.210	1.007	0.109	/
50%RB#0							
Back Upward	23095/707.5	Data	0.101	-1.520	1.054	0.106	/
Edge A	23095/707.5	Data	0.142	-3.460	1.054	0.150	/
Edge B	23095/707.5	Data	0.080	2.190	1.054	0.084	/

Results overview of FDD LTE Band 13, QPSK, 10MHz Bandwidth

Body Support(0mm)	Channel /Frequency	Mode	SAR Value (W/kg)1-g	Power drift(%)	Scaled Factor	Scaled SAR (W/Kg)1-g	SAR Plot.
1RB#0							
Back Upward	23230/782	Data	0.170	-1.560	1.084	0.184	/
Edge A	23230/782	Data	**0.221**	-2.600	1.084	**0.240**	Yes
Edge B	23230/782	Data	0.219	-2.680	1.084	0.237	/
50%RB#0							
Back Upward	23230/782	Data	0.137	-3.420	1.019	0.140	/
Edge A	23230/782	Data	0.193	-4.190	1.019	0.197	/
Edge B	23230/782	Data	0.174	1.270	1.019	0.177	/

Results overview of FDD LTE Band 17, QPSK, 10MHz Bandwidth

Body Support(0mm)	Channel /Frequency	Mode	SAR Value (W/kg)1-g	Power drift(%)	Scaled Factor	Scaled SAR (W/Kg)1-g	SAR Plot.
1RB#0							
Back Upward	23790/710	Data	0.107	2.030	1.081	0.116	/
Edge A	23790/710	Data	**0.133**	-1.650	1.081	**0.144**	Yes
Edge B	23790/710	Data	0.095	-4.350	1.081	0.103	/
50%RB#0							
Back Upward	23790/710	Data	0.065	2.480	1.042	0.068	/
Edge A	23790/710	Data	0.100	1.930	1.042	0.104	/
Edge B	23790/710	Data	0.052	-0.470	1.042	0.054	/

Results overview of WIFI2.4G 802.11b

Body Support(0mm)	Channel /Frequency	Mode	SAR Value (W/kg)1-g	Power drift(%)	Scaled Factor	Scaled SAR (W/Kg)1-g	SAR Plot.
Back Upward	6/2437	DSSS	0.104	2.48	1.641	0.171	/
Edge A	6/2437	DSSS	0.173	-1.24	1.641	0.284	/
Edge D	6/2437	DSSS	**0.196**	-0.81	1.641	**0.322**	Yes

Results overview of 5G WI-FI802.11a-5220

Body Support(0mm)	Channel /Frequency	Mode	SAR Value (W/kg)1-g	Power drift(%)	Scaled Factor	Scaled SAR (W/Kg)1-g	SAR Plot.
Back Upward	44/5220	OFDM	**0.076**	-1.100	1.042	**0.079**	Yes

Results overview of RFID

Body Support(0mm)	Channel /Frequency	Mode	SAR Value (W/kg)1-g	Power drift(%)	Scaled Factor	Scaled SAR (W/Kg)1-g	SAR Plot.
Back Upward	1/902.75	RFID	**0.514**	-1.56	1.023	0.526	Yes

Note:
Per KDB941225 D06 v02r01, When the antenna-to-edge distance is greater than 2.5cm, such position does not need to be tested. As the manufacture requirement the separation distance use 5mm for Hotspot mode.
Per KDB Publication 941225 D01v03r01. RMC 12.2kbps was as primary mode SAR, when the primary mode SAR less than 1.2W/kg, secondary SAR (HSPA) was not requires.
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, when the transmission band is ≤ 100 MHz
• ≤ 0.6 W/kg, when the transmission band is between 100 MHz and 200 MHz
• ≤ 0.4 W/kg, when the transmission band is ≥ 200 MHz

11. Simultaneous Transmissions Analysis

Localized Specific Absorption Rate (SAR) of this portable wireless device has been measured in all cases requested by the relevant standards cited in Clause 6 of this report. Maximum localized SAR is **below** exposure limits specified in the relevant standards.

Simultaneous SAR

No.	Transmitter Combinations	Scenario Supported or not	Supported for Mobile Hotspot or not
1	WCDMA +BT	Yes	No
2	WCDMA +WIFI 2.4G	Yes	Yes
3	LTE+BT	Yes	No
4	LTE+WIFI 2.4G	Yes	Yes
5	WCDMA/LTE+WIFI 5G	Yes	No
6	WIFI+BT	No	No
7	WWAN+RFID	Yes	No

Simultaneous Tx Combination of WCDMA/LTE and BT/WIFI (Body).

Test Position		Face	Back	Edge A	Edge B	Edge C	Edge D
Body Support(0mm) separation MAX 1-g SAR(W/Kg)	WCDMA 850	/	0.220	0.345	0.238	/	/
	WCDMA 1700	/	0.243	0.978	0.205	/	/
	WCDMA 1900	/	0.207	0.810	0.094	/	/
	LTE Band2	/	0.204	0.738	0.096	/	/
	LTE Band4	/	0.324	1.046	0.283	/	/
	LTE Band5	/	0.211	0.358	0.209	/	/
	LTE Band7	/	0.407	1.034	0.188	/	/
	LTE Band12	/	0.130	0.168	0.109	/	/
	LTE Band13	/	0.184	0.240	0.237	/	/
	LTE Band17	/	0.116	0.144	0.103	/	/
	WIFI 802.11b	/	0.171	0.284	/	/	0.322
	WIFI 802.11a	/	0.079	/	/	/	/
	RFID	/	0.526	/	/	/	/
	BT	/	*0.059	/	/	/	/
WIFI 2.4G Simultaneous ∑1-g SAR(W/Kg)		/	0.578	1.330	/	/	/
WIFI 5G Simultaneous ∑1-g SAR(W/Kg)		/	0.486	/	/	/	/
RFID Simultaneous ∑1-g SAR(W/Kg)		/	0.933	/	/	/	/
BT Simultaneous ∑1-g SAR(W/Kg)		/	0.466	/	/	/	/

Simultaneous Tx Combination of WCDMA/LTE and WIFI (Body).

The estimated SAR value with * Signal

SAR to Peak Location Separation Ratio (SPLSR)

As the Sum of the SAR is not greater than 1.6 W/kg SPLSR assessment is not required

12.Measurement Uncertainty

No.	Uncertainty Component	Type	Uncertainty Value (%)	Probability Distribution	k	ci	Standard Uncertainty (%) ui(%)	Degree of freedom Veff or vi
	Measurement System							
1	- Probe Calibration	B	5.8	N	1	1	5.8	∞
2	- Axial isotropy	B	3.5	R	$\sqrt{3}$	0.5	1.43	∞
3	—Hemispherical Isotropy	B	5.9	R	$\sqrt{3}$	0.5	2.41	∞
4	- Boundary Effect	B	1	R	$\sqrt{3}$	1	0.58	∞
5	- Linearity	B	4.7	R	$\sqrt{3}$	1	2.71	∞
6	- System Detection Limits	B	1.0	R	$\sqrt{3}$	1	0.58	∞
7	Modulation response	B	3	N	1	1	3.00	
8	- Readout Electronics	B	0.5	N	1	1	0.50	∞
9	- Response Time	B	1.4	R	$\sqrt{3}$	1	0.81	∞
10	- Integration Time	B	3.0	R	$\sqrt{3}$	1	1.73	∞
11	- RF Ambient Conditions	B	3.0	R	$\sqrt{3}$	1	1.73	∞
12	- Probe Position Mechanical tolerance	B	1.4	R	$\sqrt{3}$	1	0.81	∞
13	- Probe Position with respect to Phantom Shell	B	1.4	R	$\sqrt{3}$	1	0.81	∞
14	- Extrapolation, Interpolation and Integration Algorithms for Max. SAR evaluation	B	2.3	R	$\sqrt{3}$	1	1.33	∞

	Uncertainties of the DUT							
15	- Position of the DUT	A	2.6	N	$\sqrt{3}$	1	2.6	5
16	- Holder of the DUT	A	3	N	$\sqrt{3}$	1	3.0	5
17	- Output Power Variation –SAR drift measurement	B	5.0	R	$\sqrt{3}$	1	2.89	∞
Phantom and Tissue Parameters								
18	- Phantom Uncertainty(shape and thickness tolerances)	B	4	R	$\sqrt{3}$	1	2.31	∞
19	Uncertainty in SAR correction for deviation(in permittivity and conductivity)	B	2	N	1	1	2.00	
20	- Liquid Conductivity Target –tolerance	B	2.5	R	$\sqrt{3}$	0.6	1.95	∞
21	- Liquid Conductivity –measurement Uncertainty)	B	4	N	$\sqrt{3}$	1	0.92	9
22	- Liquid Permittivity Target tolerance	B	2.5	R	$\sqrt{3}$	0.6	1.95	∞
23	- Liquid Permittivity –measurement uncertainty	B	5	N	$\sqrt{3}$	1	1.15	∞
Combined Standard Uncertainty				RSS			10.63	
Expanded uncertainty (Confidence interval of 95 %)				K=2			21.26	

System Check Uncertainty

No.	Uncertainty Component	Type	Uncertainty Value (%)	Probability Distribution	k	ci	Standard Uncertainty (%) ui(%)	Degree of freedom Veff or vi
	Measurement System							
1	- Probe Calibration	B	5.8	N	1	1	5.8	∞

2	- Axial isotropy	B	3.5	R	$\sqrt{3}$	0.5	1.43	∞
3	—Hemispherical Isotropy	B	5.9	R	$\sqrt{3}$	0.5	2.41	∞
4	- Boundary Effect	B	1	R	$\sqrt{3}$	1	0.58	∞
5	- Linearity	B	4.7	R	$\sqrt{3}$	1	2.71	∞
6	- System Detection Limits	B	1	R	$\sqrt{3}$	1	0.58	∞
7	Modulation response	B	0	N	1	1	0.00	
8	- Readout Electronics	B	0.5	N	1	1	0.50	∞
9	- Response Time	B	0.00	R	$\sqrt{3}$	1	0.00	∞
10	- Integration Time	B	1.4	R	$\sqrt{3}$	1	0.81	∞
11	- RF Ambient Conditions	B	3.0	R	$\sqrt{3}$	1	1.73	∞
12	- Probe Position Mechanical tolerance	B	1.4	R	$\sqrt{3}$	1	0.81	∞
13	- Probe Position with respect to Phantom Shell	B	1.4	R	$\sqrt{3}$	1	0.81	∞
14	- Extrapolation, Interpolation and Integration Algorithms for Max. SAR evaluation	B	2.3	R	$\sqrt{3}$	1	1.33	∞
	Uncertainties of the DUT							
15	Deviation of experimental source from numberical source	A	4	N	1	1	4.00	5
16	Input Power and SAR drift measurement	A	5	R	$\sqrt{3}$	1	2.89	5
17	Dipole Axis to Liquid Distance	B	2	R	$\sqrt{3}$	1	1.2	∞
Phantom and Tissue Parameters								

18	- Phantom Uncertainty(shape and thickness tolerances)	B	4	R	$\sqrt{3}$	1	2.31	∞
19	Uncertainty in SAR correction for deviation(in permittivity and conductivity)	B	2	N	1	1	2.00	
20	- Liquid Conductivity Target –tolerance	B	2.5	R	$\sqrt{3}$	0.6	1.95	∞
21	- Liquid Conductivity –measurement Uncertainty)	B	4	N	$\sqrt{3}$	1	0.92	9
22	- Liquid Permittivity Target tolerance	B	2.5	R	$\sqrt{3}$	0.6	1.95	∞
23	- Liquid Permittivity –measurement uncertainty	B	5	N	$\sqrt{3}$	1	1.15	∞
Combined Standard Uncertainty				RSS			10.15	
Expanded uncertainty (Confidence interval of 95 %)				K=2			20.29	

13. Equipment List

This table is a complete overview of the SAR measurement equipment. Devices used during the test described are marked ☒.

	EQUIPMENT	Model	Serial number	Calibration Date	Due Date
☒	SAR Probe	SSE2	SN27/15 EPGO261	2019/03/04	2020/03/03
☒	Dipole	SID750	SN 23/15 DIP0G750-378	2019/11/27	2020/11/26
☒	Dipole	SID835	SN 09/13 DIP0G835-217	2019/11/27	2020/11/26
☐	Dipole	SID900	SN 09/13 DIP0G900-215	2019/11/27	2020/11/26
☒	Dipole	SID1800	SN 09/13 DIP1G800-216	2019/11/27	2020/11/26
☒	Dipole	SID1900	SN 09/13 DIP2G000-218	2019/11/27	2020/11/26
☐	Dipole	SID2000	SN 09/13 DIP2G000-219	2019/11/27	2020/11/26
☒	Dipole	SID2450	SN_09/13_DIP2G450-220	2019/11/27	2020/11/26
☒	Dipole	SID2600	SN 32/14_DIP2G600-338	2019/11/27	2020/11/26
☒	Dipole	SWG5500	SN15/15 WGA39	2019/11/27	2020/11/26
☒	Multimeter	Keithley-2000	4014020	2019/04/01	2020/04/01
☒	System Simulator(Agilent 8960)	E5515C	GB 47200710	2019/10/21	2020/10/21
☒	System Simulator(R&S)	CMW500	130805	2019/07/30	2020/07/29
☒	KEYSIGHT	E7515A	MY56040357	2019/04/01	2020/04/01
☒	Vector Network Analyzer(R&S)	ZVB8	A0802530	2019/04/17	2020/04/17
☒	PC 3.5 Fixed Match Calibration Kit	ZV-Z32	100571	2019/11/22	2020/11/21
☒	Dielectric Probe Kit	SCLMP	SN 09/13 OCPG51	2019/11/22	2020/11/21
☒	Signal Generator	SMU200A	A140801888	2019/04/01	2020/04/01
☒	Amplifier	Nucletudes	143060	2019/03/26	2020/03/25
☒	Directional Coupler	DC6180A	305827	2019/03/26	2020/03/25
☒	Power Meter	NRP2	A140401673	2019/03/26	2020/03/25
☒	Power Sensor	NPR-Z11	1138.3004.02-114072-nq	2019/03/26	2020/03/25
☒	Power Meter	NRVS	A0802531	2019/03/26	2020/03/25
☒	Power Sensor	NRV-Z4	100069	2019/03/26	2020/03/25

ANNEX A: Appendix A: SAR System performance Check Plots

(Please See Appendix A)

ANNEX B: Appendix B: SAR Measurement results Plots

(Please See Appendix B)

ANNEX C: Appendix C: Calibration reports

(Please See Appendix C)

ANNEX D: Appendix D: SAR Test Setup

(Please See Appendix D)

—End of the Report—