FCC SAR TEST REPORT

Report No.:	SET2021-06048
Product:	Electrocardiograph
Model No.:	NeoECG T180,NeoECG T120, LeECG OT12
FCC ID:	2A3AMSMARTECGT
Applicant:	Shenzhen Carewell Electronics Co., Ltd.
Address:	Floor 4, BLD 9, Baiwangxin High-Tech Industrial Park, Songbai Road, XiliStreet,Nanshan District 518108, Shenzhen, P.R. 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
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Test Report

Product. ……..:	Electrocardiograph
Model No. ……..:	NeoECG T180,NeoECG T120, LeECG OT12
Trade Name……..:	N/A
FCC ID……..……:	2A3AM-SMARTECGT
Applicant……..:	Shenzhen Carewell Electronics Co., Ltd.
Applicant Address…….:	Floor 4, BLD 9, Baiwangxin High-Tech Industrial Park, Songbai Road, XiliStreet,Nanshan District 518108, Shenzhen, P.R. China
Manufacturer……:	Shenzhen Carewell Electronics Co., Ltd.
Manufacturer Address:	Floor 4, BLD 9, Baiwangxin High-Tech Industrial Park, Songbai Road, XiliStreet,Nanshan District 518108, Shenzhen, P.R. 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……:	2021.08.13-2021.08.18

Tested by ……..: Xinyuan Fang 2021-11-10

Xinyuan Fang, Test Engineer

Reviewed by…….: Chris You 2021-11-10

Chris You, Senior Engineer

Approved by……: Shuangwen Zhang 2021-11-10

Shuangwen Zhang, Manager

Contents

1. Administrative Data

1.1 Testing Laboratory

Test Site:	CCIC Southern Testing Co., Ltd.
Address:	Electronic Testing Building, No. 43 Shahe Road Xili Street, Nanshan District，Shenzhen, Guangdong 518055，China
CNAS Lab Code:	CCIC-SET is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L1659.
A2LA Lab Code:	CCIC-SET is a third party testing organization accredited by A2LA according to ISO/IEC 17025. The accreditation certificate number is 5721.01.
FCC Registration:	CCIC Southern Testing 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 April19, 2023.
ISED Registration:	CCIC Southern Testing 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 June30, 2023.
Test Environment Condition:	Temperature (℃): 21℃ 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:	Electrocardiograph	
Trade Name:	N/A	
Model Name:	NeoECG T180,NeoECG T120, LeECG OT12	
General description:	Support Band	LTE Band 5/7/41,WIFI 2.4G&5G
	Test Band	LTE Band 5/7/41,WIFI 2.4G&5G
	Development Stage	Identical Prototype
	Accessories	Power Supply
	Hotspot	2.4GHz WLAN support Hotspot mode
	Antenna type	Internal Antenna
	Operation mode	LTE /WIFI
	Modulation mode	LTE(QPSK,16QAM,64QAM),WIFI(DSSS,OFDM)
	DTM mode	Not support
	Hardware Version	V1.0
	Software Version	V1.0.0.0
	Max. SAR Value	Body: 0.889W/Kg(Limit:1.6W/Kg, 10mm 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
LTE Band5:	824-849 MHz	869-894 MHz
LTE Band7:	2500-2570 MHz	2620-2690 MHz
LTE Band41:	2555-2655 MHz	
WIFI(tested):	2412-2462 MHz	
	5150-5250 MHz	
	5745-5825 MHz	
Test channels(low-mid-high):	20450-20525-20600(LTE Band 5 Bandwidth 10M)	
	20850-21100-21350(LTE Band 7 Bandwidth 10M)	
	40340-40740-41140(LTE Band 41 Bandwidth 20M)	
	1-6-11(Wi-Fi 2.4G 802.11b)	
	5180-5825 (WIFI 5G)	

3. SAR Summary

Highest Standalone SAR Summary

Exposure Position	Frequency Band	Scaled 1g-SAR(W/kg)	Highest Scaled 1g-SAR(W/kg)
Body-Support (10mm Gap)	LTE Band 5	0.820	0.820
	LTE Band 7	0.297	
	LTE Band 41	0.040	
	WIFI 2.4G	0.024	
	WIFI 5G	0.043	

Highest Simultaneous SAR Summary

Exposure Position	Frequency Band	Highest Scaled 1g-SAR(W/kg)
Body-Support (10mmGap)	WWAN(LTE Band5)&WIFI 5G	0.851

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:

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

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

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

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

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

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

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 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 D05A	v01r02 LTE Rel.10 KDB Inquiry Sheet
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).

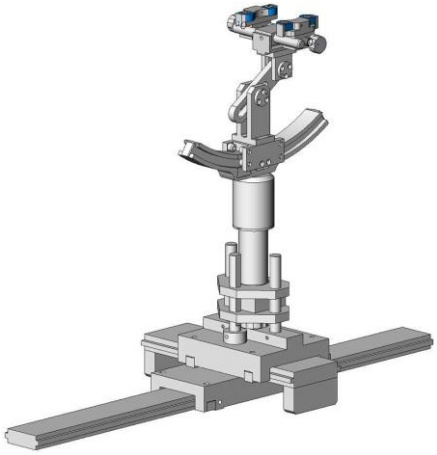
System checking was performed using the flat section, whilst Head SAR tests used the left and right head profile sections. Body SAR testing also used the flat section between the head profiles.

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

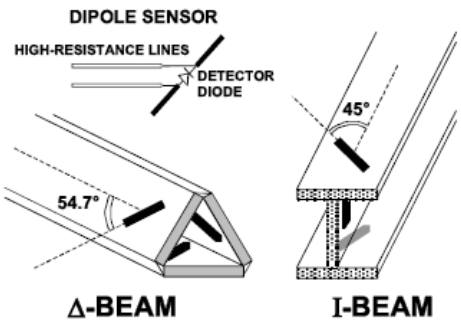
4.5 Probe Specification

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 mobile phones
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 beenincorporated in the following table. These head parameters are derived from planar layer modelssimulating the highest expected SAR for the dielectric properties and tissue thickness Power drifts in ahuman head. Other head and body tissue parameters that have not been specified in P1528 are derivedfrom the tissue dielectric parameters computed from the 4-Cole-Cole equations described inReference [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.

Frequency:5200/5400/5600/5800MHz	
Ingredients	(% by weight)
Water	78
Mineral oil	11
Emulsifiers	9
Additives and Salt	2

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:

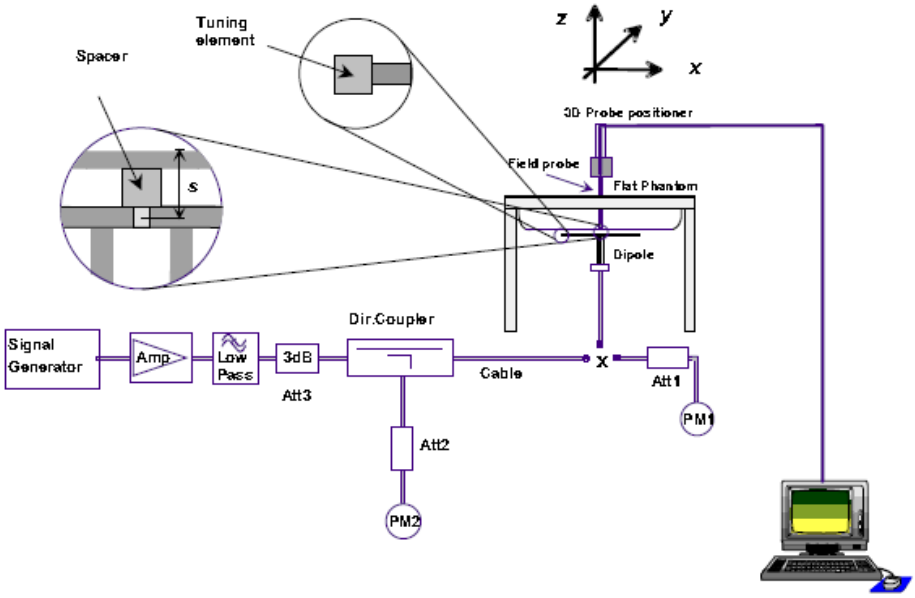
Table 3: Dielectric Performance of Body Tissue Simulating Liquid

Temperature: 23.2 ℃; Humidity: 64%;			
/	Frequency	Permittivity ε	Conductivity σ (S/m)
Target value	835MHz	55.2±5%	0.97±5%
Validation value (2021-08-13)	835MHz	55.28	0.99
Target value	2450MHz	52.7±5%	1.95±5%
Validation value (2021-08-16)	2450MHz	52.74	1.97
Target value	2600MHz	52.5±5%	2.16±5%
Validation value (2021-08-16)	2600MHz	52.52	2.16
Target value	5200MHz	49.0±5%	5.30±5%
Validation value (2021-08-17)	5200MHz	49.05	5.31
Target value	5400MHz	48.7±5%	5.53±5%
Validation value (2021-08-17)	5400MHz	48.61	5.50
Target value	5600MHz	48.5±5%	5.77±5%
Validation value (2021-08-18)	5600MHz	48.49	5.77
Target value	5800MHz	48.2±5%	6.0±5%
Validation value (2021-08-18)	5800MHz	48.12	5.95

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 ℃ 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)

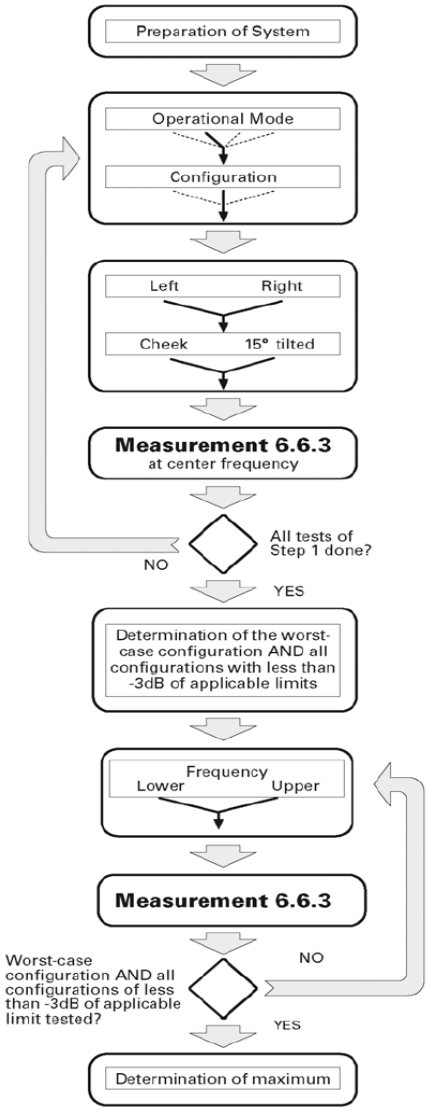
Frequency	Duty cycle	Target value （W/kg）	Test value (W/kg)	
			10 mW	1W
835MHz(2021-08-13)	1:1	9.97±10%	0.1043	10.43
2450MHz(2021-08-16)	1:1	54.83±10%	0.5513	55.13
2600MHz(2021-08-16)	1:1	57.16±10%	0.5727	57.27
5200MHz(2021-08-17)	1:1	150.13±10%	1.5142	151.42
5400MHz(2021-08-17)	1:1	152.16±10%	1.4927	149.27
5600MHz(2021-08-18)	1:1	154.92±10%	1.5471	154.71
5800MHz(2021-08-18)	1:1	158.10±10%	1.5621	156.21

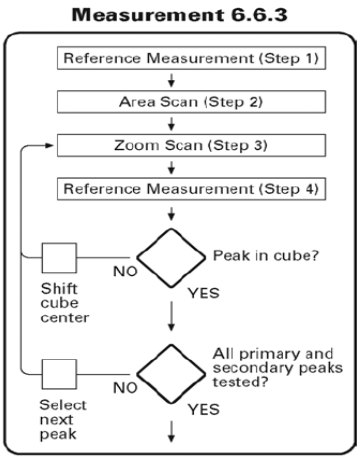
* Note: Target value was referring to the measured value in the calibration certificate of reference dipole.

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

7.1 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 bandwidthstandalone SARtestrequirements

i)QPSK with 1RBallocation

StartwiththelargestchannelbandwidthandmeasureSARfor QPSKwith1RBallocation,usingtheRBoffsetandrequiredtestchannelcombinationwiththehighestmaximumoutputpowerforRB 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 5 Conducted Power Test Verdict:

LTE FDD Band 5				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				20407/824.7	20525/836.5	20643/848.3	
1.4MHz	QPSK	1	0	22.17	22.22	22.22	21.5±1.0
		1	3	22.16	22.02	22.1	
		1	5	22.1	22.13	22.04	
		3	0	21.76	21.65	21.77	21.0±1.0
		3	2	21.76	21.82	21.81	
		3	3	21.7	21.8	21.86	
		6	0	21.54	21.54	21.46	21.0±1.0
	16QAM	1	0	21.19	21.12	21.25	20.5±1.0
		1	3	21.4	21.29	21.13	
		1	5	21.39	21.17	21.24	
		3	0	20.82	20.98	20.9	20.0±1.0
		3	2	20.81	20.92	20.96	
		3	3	20.92	20.83	20.94	
		6	0	20.59	20.64	20.62	20.0±1.0
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				20415/825.5	20525/836.5	20635/847.5	
3MHz	QPSK	1	0	22.24	22.01	22.2	21.5±1.0
		1	7	22.14	22	22.15	
		1	14	22	22.17	22.24	
		8	0	21.87	21.68	21.79	21.0±1.0
		8	4	21.6	21.89	21.68	
		8	7	21.62	21.9	21.66	
		15	0	21.54	21.45	21.45	21.0±1.0
	16QAM	1	0	21.28	21.2	21.4	20.5±1.0
		1	7	21.35	21.2	21.32	
		1	14	21.27	21.15	21.12	
		8	0	20.8	20.81	20.81	20.0±1.0
		8	4	20.89	20.85	20.91	
		8	7	20.9	20.71	20.84	
		15	0	20.57	20.65	20.59	20.0±1.0

LTE FDD Band 5				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				20425/826.5	20525/836.5	20625/846.5	
5MHz	QPSK	1	0	22.03	22.07	22.2	21.5±1.0
		1	13	21.97	21.99	22.02	
		1	24	22.23	22.1	22.17	
		12	0	21.66	21.72	21.82	21.0±1.0
		12	6	21.78	21.85	21.83	
		12	13	21.84	21.89	21.84	
		25	0	21.52	21.45	21.46	21.0±1.0
	16QAM	1	0	21.1	21.13	21.29	20.5±1.0
		1	13	21.17	21.36	21.21	
		1	24	21.14	21.38	21.2	
		12	0	20.84	20.73	20.7	20.0±1.0
		12	6	20.78	20.73	20.71	
		12	13	20.74	20.79	21	
		25	0	20.6	20.64	20.55	20.0±1.0
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				20450/829	20525/836.5	20600/844	
10MHz	QPSK	1	0	22.26	22.3	22.22	21.5±1.0
		1	25	22.16	22.07	22.24	
		1	49	22.16	22.15	22.23	
		25	0	21.64	21.86	21.73	21.0±1.0
		25	13	21.62	21.64	21.8	
		25	25	21.85	21.68	21.71	
		50	0	21.53	21.55	21.47	21.0±1.0
	16QAM	1	0	21.33	21.1	21.37	20.5±1.0
		1	25	21.27	21.37	21.34	
		1	49	21.25	21.34	21.37	
		25	0	20.7	20.86	20.77	20.0±1.0
		25	13	20.96	20.96	20.97	
		25	25	20.79	20.71	20.77	
		50	0	20.64	20.56	20.64	20.0±1.0

2. LTE Band 7 Conducted Power Test Verdict:

LTE FDD Band 7				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				20775/2502.5	21100/2535	21425/2567.5	
5MHz	QPSK	1	0	20.09	20.17	19.95	19.5±1.0
		1	13	20.13	19.91	19.98	
		1	24	20.03	20.12	20.11	
		12	0	19.8	19.78	19.65	19.0±1.0
		12	6	19.69	19.72	19.78	
		12	13	19.73	19.84	19.84	
		25	0	19.48	19.48	19.49	18.5±1.0
	16QAM	1	0	19.27	19.3	19.1	18.5±1.0
		1	13	19.09	19.09	19.25	
		1	24	19.15	19.22	19.23	
		12	0	18.9	18.96	18.81	18.0±1.0
		12	6	18.92	18.98	18.72	
		12	13	18.9	18.81	18.8	
		25	0	18.56	18.55	18.56	18.0±1.0
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				20800/2505	21100/2535	21400/2565	
10MHz	QPSK	1	0	20.14	19.91	19.98	19.5±1.0
		1	25	20.04	19.97	19.94	
		1	49	20.11	19.94	19.99	
		25	0	19.61	19.84	19.65	19.0±1.0
		25	13	19.7	19.6	19.8	
		25	25	19.68	19.84	19.79	
		50	0	19.46	19.45	19.47	18.5±1.0
	16QAM	1	0	19.15	19.14	19.09	18.5±1.0
		1	25	19.27	19.18	19.33	
		1	49	19.27	19.07	19.07	
		25	0	18.78	18.72	18.79	18.0±1.0
		25	13	18.72	19	18.82	
		25	25	18.95	18.76	18.74	
		50	0	18.64	18.61	18.59	18.0±1.0

LTE FDD Band 7				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				20825/2507.5	21100/2535	21375/2562.5	
15MHz	QPSK	1	0	19.91	20.03	19.99	19.5±1.0
		1	38	19.98	20.13	19.94	
		1	74	20.11	19.97	19.94	
		36	0	19.61	19.56	19.66	19.0±1.0
		36	18	19.76	19.66	19.84	
		36	39	19.57	19.75	19.61	
		75	0	19.49	19.42	19.48	18.5±1.0
	16QAM	1	0	19.26	19.29	19.33	18.5±1.0
		1	38	19.3	19.05	19.14	
		1	74	19.15	19.17	19.32	
		36	0	18.85	18.89	18.81	18.0±1.0
		36	18	18.8	18.82	18.79	
		36	39	18.78	18.99	19	
		75	0	18.61	18.65	18.59	18.0±1.0
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				20850/2510	21100/2535	21350/2560	
20MHz	QPSK	1	0	20.19	20.26	20.21	19.5±1.0
		1	50	20.08	20.02	20.08	
		1	99	20.02	19.94	20	
		50	0	19.78	19.82	19.66	19.0±1.0
		50	25	19.8	19.76	19.64	
		50	50	19.69	19.66	19.65	
		100	0	19.42	19.47	19.43	18.5±1.0
	16QAM	1	0	19.13	19.31	19.26	18.5±1.0
		1	50	19.27	19.23	19.3	
		1	99	19.35	19.28	19.11	
		50	0	19	18.76	18.77	18.0±1.0
		50	25	18.7	18.94	18.73	
		50	50	18.95	18.75	18.95	
		100	0	18.56	18.56	18.62	18.0±1.0

3. LTE Band 41 Conducted Power Test Verdict:

LTE FDD Band 41				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				40265/2557.5	40740/2605	41215/2652.5	
5MHz	QPSK	1	0	21.26	21.34	21.14	20.5±1.0
		1	13	21.15	21.22	21.11	
		1	24	21.31	21.1	21.26	
		12	0	20.75	20.8	20.81	20.0±1.0
		12	6	20.84	20.72	20.94	
		12	13	20.93	20.82	20.75	
		25	0	20.57	20.57	20.65	20.0±1.0
	16QAM	1	0	20.46	20.48	20.43	19.5±1.0
		1	13	20.4	20.36	20.39	
		1	24	20.32	20.32	20.35	
		12	0	20.03	19.93	19.91	19.5±1.0
		12	6	20.03	20.03	20.14	
		12	13	19.96	20.08	19.93	
		25	0	19.75	19.76	19.75	19.0±1.0
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				40290/2560	40740/2605	41190/2650	
10MHz	QPSK	1	0	21.15	21.35	21.39	20.5±1.0
		1	25	21.35	21.18	21.17	
		1	49	21.26	21.32	21.25	
		25	0	20.93	20.7	20.74	20.0±1.0
		25	13	20.85	20.83	20.91	
		25	25	20.95	20.86	20.96	
		50	0	20.65	20.57	20.59	20.0±1.0
	16QAM	1	0	20.2	20.36	20.25	19.5±1.0
		1	25	20.2	20.22	20.48	
		1	49	20.32	20.26	20.21	
		25	0	20.14	20.13	20.13	19.5±1.0
		25	13	19.97	19.97	20.12	
		25	25	20.08	20.06	20.07	
		50	0	19.79	19.71	19.77	19.0±1.0

LTE FDD Band 41				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				40315/2562.5	40740/2605	41165/2647.5	
15MHz	QPSK	1	0	21.34	21.39	21.32	20.5±1.0
		1	38	21.24	21.27	21.31	
		1	74	21.32	21.2	21.16	
		36	0	20.99	20.86	20.75	20.0±1.0
		36	18	20.74	20.83	20.87	
		36	39	20.86	20.72	20.83	
		75	0	20.63	20.65	20.63	20.0±1.0
	16QAM	1	0	20.49	20.32	20.34	19.5±1.0
		1	38	20.5	20.36	20.5	
		1	74	20.22	20.38	20.31	
		36	0	20.03	19.96	19.91	19.5±1.0
		36	18	20.09	20	19.94	
		36	39	20.01	19.88	19.91	
		75	0	19.79	19.8	19.75	19.0±1.0
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				40340/2565	40740/2605	41140/2645	
20MHz	QPSK	1	0	21.41	21.44	21.37	20.5±1.0
		1	50	21.35	21.15	21.3	
		1	99	21.38	21.21	21.22	
		50	0	20.94	20.98	20.76	20.0±1.0
		50	25	20.92	20.81	20.75	
		50	50	20.89	20.9	20.82	
		100	0	20.58	20.6	20.56	20.0±1.0
	16QAM	1	0	20.25	20.21	20.3	19.5±1.0
		1	50	20.2	20.36	20.32	
		1	99	20.26	20.25	20.4	
		50	0	20.01	19.89	19.98	19.5±1.0
		50	25	20.13	19.93	20.11	
		50	50	19.97	20.13	19.88	
		100	0	19.72	19.8	19.8	19.0±1.0

7.2WIFI Conducted Power

WLAN 2.4GHz Band Conducted Power

Channel/Freq.(MHz)	Maximum Conducted Out Power (dBm)		
	802.11b	802.11g	802.11n(HT20)
1(2412)	15.54	14.53	12.70
6(2437)	15.96	14.82	12.82
11(2462)	15.72	14.21	12.36

Channel/Freq.(MHz)	Maximum Conducted Out Power (dBm)
	802.11n(HT40)
3(2422)	12.56
6(2437)	12.62
9(2452)	12.45

WLAN 5GHz Band Conducted Power

U-NII-1 AVGSA Output Power

Mode	Test Frequency (MHz)	Max Conducted Output Power (dBm)
802.11n (20MHz)	5180	11.43
802.11n (20MHz)	5220	11.45
802.11n (20MHz)	5240	11.38
802.11n (40MHz)	5190	11.74
802.11n (40MHz)	5230	11.58
802.11a (20MHz)	5180	12.73
802.11a (20MHz)	5220	12.66
802.11a (20MHz)	5240	12.54
802.11ac (20MHz)	5180	11.58
802.11ac (20MHz)	5220	11.67
802.11ac (20MHz)	5240	11.54
802.11ac (40MHz)	5190	11.87
802.11ac (40MHz)	5230	11.65
802.11ac (80MHz)	5210	11.61

U-NII-2a AVGSA Output Power

Mode	Test Frequency (MHz)	Max Conducted Output Power (dBm)
802.11n (20MHz)	5260	11.56
802.11n (20MHz)	5300	11.73
802.11n (20MHz)	5320	11.39
802.11n (40MHz)	5270	11.45
802.11n (40MHz)	5310	11.31
802.11a (20MHz)	5260	12.59
802.11a (20MHz)	5300	12.53
802.11a (20MHz)	5320	12.48
802.11ac (20MHz)	5260	11.38
802.11ac (20MHz)	5300	11.46
802.11ac (20MHz)	5320	11.23
802.11ac (40MHz)	5270	11.93
802.11ac (40MHz)	5310	11.68
802.11ac (80MHz)	5290	11.38

U-NII-2C AVGSA Output Power

Mode	Test Frequency (MHz)	Max Conducted Output Power (dBm)
802.11n (20MHz)	5500	11.18
802.11n (20MHz)	5600	11.44
802.11n (20MHz)	5700	11.61
802.11n (40MHz)	5510	11.25
802.11n (40MHz)	5670	11.12
802.11a (20MHz)	5500	12.62
802.11a (20MHz)	5600	12.98
802.11a (20MHz)	5700	12.55
802.11ac (20MHz)	5500	11.33
802.11ac (20MHz)	5600	11.65
802.11ac (20MHz)	5700	11.36
802.11ac (40MHz)	5510	11.12
802.11ac (40MHz)	5670	11.47
802.11ac (80MHz)	5530	11.06

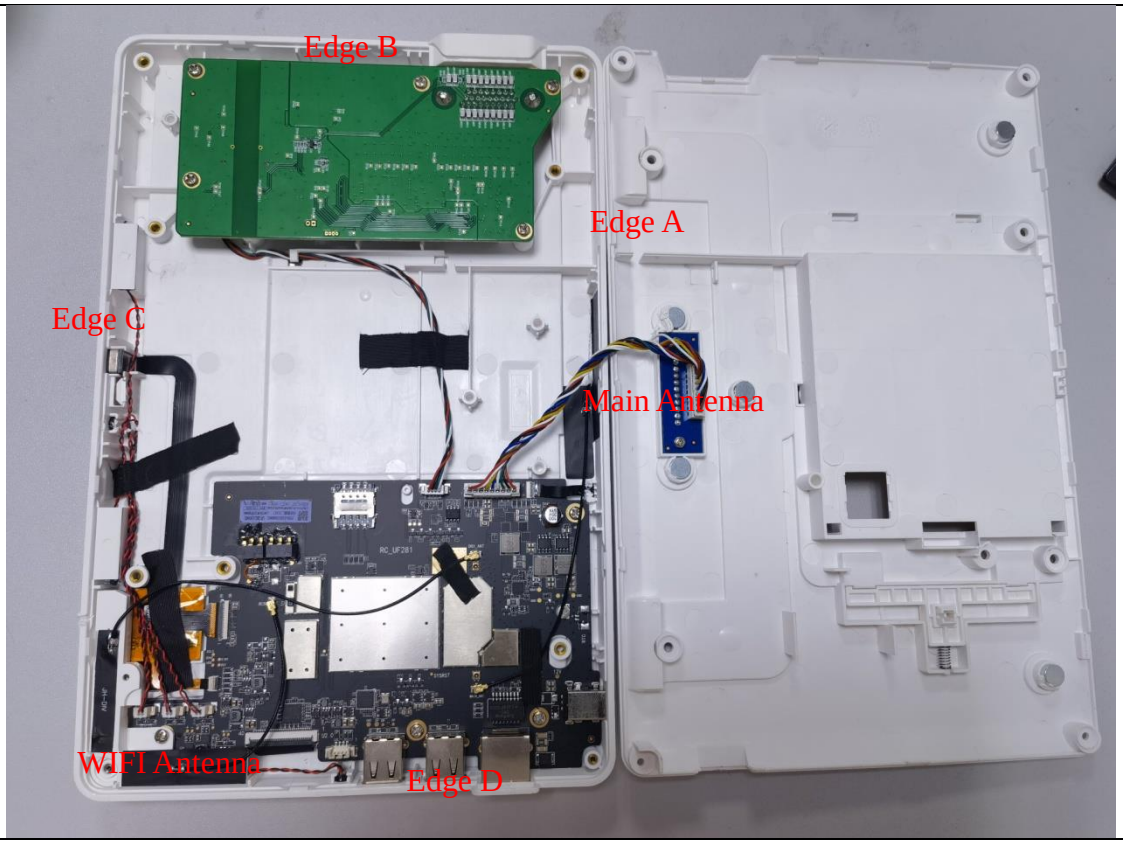
U-NII-3 AVGSA Output Power

Mode	Test Frequency (MHz)	Max Conducted Output Power (dBm)
802.11a (20MHz)	5745	13.47
802.11a (20MHz)	5785	13.21
802.11a (20MHz)	5825	13.27
802.11n (20MHz)	5745	12.46
802.11n (20MHz)	5785	12.30
802.11n (20MHz)	5825	12.33
802.11n (40MHz)	5755	12.71
802.11n (40MHz)	5795	12.49
802.11ac (20MHz)	5745	12.46
802.11ac (20MHz)	5785	12.23
802.11ac (20MHz)	5825	12.39
802.11ac (40MHz)	5755	12.67
802.11ac (40MHz)	5795	12.60
802.11ac (80MHz)	5775	12.30

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.

Antenna Location:



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

Antenna	Front	Back	Edge A	Edge B	Edge C	Edge D
WWAN Main Antenna	5	5	2	112	185	128
WIFI	10	2	126	268	8	2

Note: The diagonal distance of the overall section is 15.5cm.

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

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

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

8. Scaling Factor calculation

Operation Mode	Channel /Frequency	Output Power(dBm)	Tune up Power in tolerance (dBm)	Max. Tune up(dBm)	Scaling Factor
LTE B5 10MHz 1RB#25	20450/829	22.26	21.5 ±1.0	22.50	1.057
	20525/836.5	22.30	21.5 ±1.0	22.50	1.047
	20600/844	22.22	21.5 ±1.0	22.50	1.067
LTE B5 10MHz 25RB#25	20450/829	21.64	21.0 ±1.0	22.00	1.086
	20525/836.5	21.86	21.0 ±1.0	22.00	1.033
	20600/844	21.73	21.0 ±1.0	22.00	1.064
LTE B7 20MHz 1RB#50	20850/2510	20.19	19.5 ±1.0	20.50	1.074
	21100/2535	20.26	19.5 ±1.0	20.50	1.057
	21350/2560	20.21	19.5 ±1.0	20.50	1.069
LTE B7 20MHz 50RB#25	20850/2510	19.78	19.0±1.0	20.00	1.052
	21100/2535	19.82	19.0±1.0	20.00	1.042
	21350/2560	19.66	19.0±1.0	20.00	1.081
LTE B41 20MHz 1RB#0	40340/2565	21.41	20.5 ±1.0	21.50	1.021
	40740/2605	21.44	20.5 ±1.0	21.50	1.014
	41140/2645	21.37	20.5 ±1.0	21.50	1.030
LTE B41 20MHz 50RB#0	40340/2565	20.94	20.0 ±1.0	21.00	1.014
	40740/2605	20.98	20.0 ±1.0	21.00	1.005
	41140/2645	20.76	20.0 ±1.0	21.00	1.057
WIFI 2.4G 802.11b	1/2412	15.54	15.0 ±1.0	16.00	1.112
	6/2437	15.96	15.0 ±1.0	16.00	1.009
	11/2462	15.72	15.0 ±1.0	16.00	1.067
WIFI 5G BAND I	36/5180	12.73	12.0 ±1.0	13.00	1.064
WIFI 5G BANDII	52/5260	12.59	12.0 ±1.0	13.00	1.099
WIFI5G BANDIII	120/5600	12.98	12.0 ±1.0	13.00	1.005
WIFI5G BANDIV	149/5745	13.47	12.5 ±1.0	13.50	1.007

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

9. Test Results

Results overview of FDD LTE Band 5, QPSK, 10MHz Bandwidth

Body Support(10mm)	Channel /Frequency	Mode	SAR Value (W/kg)1-g	Power drift(%)	Scaled Factor	Scaled SAR (W/Kg)1-g	Limit (W/kg)
1RB#0							
Face Upward	20450/829	Data	0.766	2.61	1.057	0.810	/
Face Upward	20525/836.5	Data	0.783	-1.07	1.047	0.820	/
Face Upward	20600/844	Data	0.751	-3.85	1.067	0.801	/
Back Upward	20525/836.5	Data	0.237	2.60	1.047	0.248	/
Edge A	20450/829	Data	0.821	-1.22	1.057	0.868	/
Edge A	20525/836.5	Data	**0.849**	-0.92	1.047	**0.889**	Yes
Edge A	20600/844	Data	0.806	-1.06	1.067	0.860	/
Edge A (repeated)	20450/829	Data	0.794	-3.33	1.057	0.839	/
	20525/836.5	Data	0.821	-4.51	1.047	0.860	/
	20600/844	Data	0.775	-3.82	1.067	0.827	/
50%RB#0							
Face Upward	20525/836.5	Data	0.730	-3.48	1.033	0.754	/
Back Upward	20525/836.5	Data	0.184	1.75	1.033	0.190	/
Edge A	20525/836.5	Data	0.773	2.03	1.033	0.798	/

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

Body Support(10mm)	Channel /Frequency	Mode	SAR Value (W/kg)1-g	Power drift(%)	Scaled Factor	Scaled SAR (W/Kg)1-g	Limit (W/kg)
1RB#0							
Face Upward	21100/2535	Data	0.281	-1.08	1.057	0.297	/
Back Upward	21100/2535	Data	0.226	-1.24	1.057	0.239	/
Edge A	21100/2535	Data	**0.739**	-1.84	1.057	**0.781**	Yes
50%RB#0							
Face Upward	21100/2535	Data	0.234	1.69	1.042	0.244	/
Back Upward	21100/2535	Data	0.187	4.46	1.042	0.195	/
Edge A	21100/2535	Data	0.686	-0.65	1.042	0.715	/

Results overview of TDD LTE Band 41, QPSK, 20MHz Bandwidth

Body Support(10mm)	Channel /Frequency	Mode	SAR Value (W/kg)1-g	Power drift(%)	Scaled Factor	Scaled SAR (W/Kg)1-g	Limit (W/kg)
1RB#0							
Face Upward	40740/2605	Data	0.022	-3.51	1.014	0.022	/
Back Upward	40740/2605	Data	0.039	-4.50	1.014	0.040	/
Edge A	40740/2605	Data	**0.178**	-3.01	1.014	**0.180**	Yes
50%RB#0							
Face Upward	40740/2605	Data	0.016	0.81	1.005	0.016	/
Back Upward	40740/2605	Data	0.030	-1.24	1.005	0.030	/
Edge A	40740/2605	Data	0.123	1.31	1.005	0.124	/

Results overview of WIFI2.4G 802.11b

Body Support(10mm)	Channel /Frequency	Mode	SAR Value (W/kg)1-g	Power drift(%)	Scaled Factor	Scaled SAR (W/Kg)1-g	SAR Plot.
Face Upward	6/2437	DSSS	0.018	-0.42	1.009	0.018	/
Back Upward	6/2437	DSSS	**0.024**	4.74	1.009	**0.024**	Yes
Edge C	6/2437	DSSS	0.021	2.90	1.009	0.021	/
Edge D	6/2437	DSSS	0.019	0.19	1.009	0.019	/

Results overview of 5G WIFI2.4G 802.11a-5180

Body-worn(10mm)	Channel /Frequency	Mode	SAR Value (W/kg)1-g	Power drift(%)	Scaled Factor	Scaled SAR (W/Kg)1-g	SAR Plot.
Back Upward	36/5180	OFDM	0.035	3.90	1.064	0.037	/
Face Upward	36/5180	OFDM	0.023	2.93	1.064	0.024	/
Edge C	36/5180	OFDM	0.030	1.27	1.064	0.032	/
Edge D	36/5180	OFDM	0.027	-0.84	1.064	0.029	/

Results overview of 5G WIFI2.4G 802.11a-5260

Body-worn(10mm)	Channel /Frequency	Mode	SAR Value (W/kg)1-g	Power drift(%)	Scaled Factor	Scaled SAR (W/Kg)1-g	SAR Plot.
Back Upward	52/5260	OFDM	0.030	-0.45	1.099	0.033	/
Face Upward	52/5260	OFDM	0.018	-3.87	1.099	0.020	/
Edge C	52/5260	OFDM	0.024	-1.68	1.099	0.026	/
Edge D	52/5260	OFDM	0.021	-2.05	1.099	0.023	/

Results overview of 5G WIFI2.4G 802.11a-5600

Body-worn(10mm)	Channel /Frequency	Mode	SAR Value (W/kg)1-g	Power drift(%)	Scaled Factor	Scaled SAR (W/Kg)1-g	SAR Plot.
Back Upward	120/5600	OFDM	0.040	-1.04	1.005	0.040	/
Face Upward	120/5600	OFDM	0.026	1.73	1.005	0.026	/
Edge C	120/5600	OFDM	0.034	-2.15	1.005	0.034	/
Edge D	120/5600	OFDM	0.028	-0.49	1.005	0.028	/

Results overview of 5G WIFI2.4G 802.11a-5745

Body-worn(10mm)	Channel /Frequency	Mode	SAR Value (W/kg)1-g	Power drift(%)	Scaled Factor	Scaled SAR (W/Kg)1-g	SAR Plot.
Back Upward	149/5745	OFDM	**0.043**	-1.40	1.007	**0.043**	Yes
Face Upward	149/5745	OFDM	0.031	-0.39	1.007	0.031	/
Edge C	149/5745	OFDM	0.038	1.62	1.007	0.038	/
Edge D	149/5745	OFDM	0.033	-0.84	1.007	0.033	/

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

10. 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	LTE+WIFI 2.4G	Yes	Yes
2	LTE+WIFI 5G	Yes	No
3	WIFI 2.4G +WIFI 5G	No	No

Simultaneous Tx Combination of LTE and WIFI (Body).

Test Position/Freq.		BACK	FACE	Edge A	Edge B	Edge C	Edge D
MAX 1-g SAR(W/Kg) 10mm distance	LTE Band5	0.248	0.820	0.889	/	/	/
	LTE Band7	0.239	0.297	0.781	/	/	/
	LTE Band41	0.040	0.022	0.180	/	/	/
	WIFI 2.4G	0.024	0.018	/	/	0.021	0.019
	WIFI 5G	0.043	0.031	/	/	0.038	0.033
WIFI2.4G Simultaneous ∑1-g SAR(W/Kg)		0.272	0.838	/	/	/	/
WIFI 5G Simultaneous ∑1-g SAR(W/Kg)		0.291	0.851	/	/	/	/

SAR to PeakLocation SeparationRatio (SPLSR)

As the Sum ofthe SAR is not greater than1.6 W/kg SPLSR assessment is not required

11. 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	B	4	R	$\sqrt{3}$	1	2.31	∞

	and thickness tolerances)							
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	

12. 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	SN36/20 EPGO348	2020/12/14	2021/12/13
☒	Dipole	SID835	SN09/13DIP0G835-217	2020/06/25	2023/06/24
☒	Dipole	SID2450	SN_09/13_DIP2G450-220	2020/06/25	2023/06/24
☒	Dipole	SID2600	SN 32/14_DIP2G600-338	2020/06/25	2023/06/24
☒	Dipole	SWG5500	SN15/15 WGA39	2020/06/25	2023/06/24
☒	Multimeter	Keithley-2000	4014020	2021/04/02	2022/04/01
☒	System Simulator(R&S)	CMW500	130805	2021/03/19	2022/03/18
☒	KEYSIGHT	E7515A	MY56040357	2021/04/02	2022/04/01
☒	Vector Network Analyzer(R&S)	ZVB8	A0802530	2021/04/02	2022/04/01
☒	PC 3.5 Fixed Match Calibration Kit	ZV-Z32	100571	2020/11/26	2021/11/25
☒	Dielectric Probe Kit	SCLMP	SN 09/13 OCPG51	2020/11/26	2021/11/25
☒	Signal Generator	SMU200A	A140801888	2021/03/12	2022/03/11
☒	Amplifier	Nucletudes	143060	2021/03/12	2022/03/11
☒	Directional Coupler	DC6180A	305827	2021/03/12	2022/03/11
☒	Power Meter	NRP2	A140401673	2021/03/12	2022/03/11
☒	Power Sensor	NPR-Z11	1138.3004.02-114072-nq	2021/03/12	2022/03/11
☒	Power Meter	NRVS	A0802531	2021/03/12	2022/03/11
☒	Power Sensor	NRV-Z4	100069	2021/03/12	2022/03/11

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—