



FCC SAR TEST REPORT

Report No.: SET2021-12846

Product: GPS Tracker

Trade Name: Farnear

Model No.: FN01-4GWB

FCC ID: 2A2ZJFN014GWB

Applicant: Farnear Electronics Co., Ltd

Address: 303B, #4, Duocai Tech Park, Pingshan District, 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

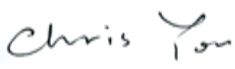
Mail: manager@ccic-set.com **Website:** <http://www.ccic-set.com>

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Test Report

Product.: GPS Tracker
Model No.: FN01-4GWB
Brand Name.....: Farneer
FCC ID.....: 2A2ZJFN014GWB
Applicant.....: Farneer Electronics Co., Ltd
Applicant Address.....: 303B, #4, Duocai Tech Park, Pingshan District, Shenzhen, China
Manufacturer.....: Farneer Electronics Co., Ltd
Manufacturer Address: 303B, #4, Duocai Tech Park, Pingshan District, 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.....: 2021.09.09-2021.09.20
Tested by  2021-09-26

Xinyuan Fang, Test Engineer
Reviewed by.....:  2021-09-26

Chris You, Senior Engineer
Approved by.....:  2021-09-26

Shuangwen Zhang, Manager

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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

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 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: CN1283, valid time is until April 19th, 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 June 30th, 2023.

Test Environment Temperature (°C): 21 °C

Condition: 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: GPS Tracker

Brand Name: Farneer

Model Name: FN01-4GWB

General description:	Support Band	LTE Band 2/4/5/12/13,WIFI 2.4G, BLE
	Test Band	LTE Band 2/4/5/12/13,WIFI 2.4G
	Development Stage	Identical Prototype
	Accessories	Power Supply
	Hotspot	N/A
	Antenna type	Internal Antenna
	Modulation mode	LTE(QPSK,16QAM),WIFI(DSSS)
	DTM mode	Not support
	Hardware Version	FN01-4G V1.7.5
	Software Version	FN01-4G-FN17x-20210825C
	Battery options :	Model No.: 683239
		Capacitance:900mAh
		Rated Voltage:3.7V
		Charge Limit:4.2V
		Manufacturer: Shenzhen Aibod Technology co.,Ltd
	Max. SAR Value	Body: 1.176 W/Kg(Limit:1.6W/Kg, 5mm distance)

NOTE:

- The device have two type 2.4G WIFI antenna.

**EUT testing configuration**

Tested frequency range(s)	Transmitter Frequency Range	Receiver Frequency Range
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 Band12:	698-716 MHz	728-746 MHz
LTE Band13:	777-787 MHz	746-756 MHz
WIFI(tested):	2412-2462 MHz	
Bluetooth:	2402-2480 MHz	
Test channels(low-mid-high):	18700-18900-19100(LTE Band 2 Bandwidth 20M)	
	20050-20175-20300(LTE Band 4 Bandwidth 20M)	
	20450-20525-20600(LTE Band 5 Bandwidth 10M)	
	23060-23095-23130(LTE Band 12 Bandwidth 10M)	
	23230-23230-23230(LTE Band 13 Bandwidth 10M)	
	1-6-11(Wi-Fi 2.4G 802.11b)	
	0-39-78(BLE)	

3. SAR Summary

Highest Standalone SAR Summary

Exposure Position	Frequency Band	Scaled 1g-SAR(W/kg)	Highest Scaled 1g-SAR(W/kg)
Body-Support (5mm Gap)	LTE Band 2	1.176	1.176
	LTE Band 4	0.878	
	LTE Band 5	0.406	
	LTE Band 12	0.291	
	LTE Band 13	0.360	
	WIFI 2.4G 802.11b	0.017	

Highest Simultaneous SAR Summary

Exposure Position	Frequency Band	Highest Scaled 1g-SAR(W/kg)
Body-Support (5mmGap)	WWAN(LTE Band2)&WIFI 2.4G	1.190

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 (ρ). The equation description is as below:

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

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

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

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

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

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

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 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.

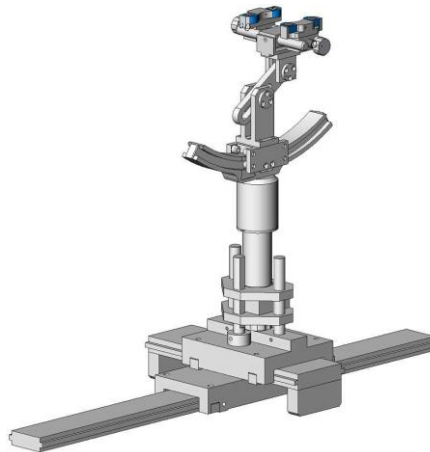


SAM Twin Phantom

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

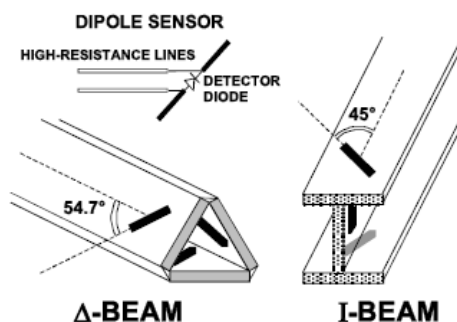


Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	700 MHz to 3 GHz; Linearity: ± 0.5 dB (700 MHz to 3 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 μ W/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 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%			
Sucrose	Sugar, white, refined, 40-60%			
NaCl	Sodium Chloride, 0-6%			
Hydroxyethyl-cellulose	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-methyl-3(2H)-isothiazolone, 0.1-0.7%			
Frequency (MHz)	Head ϵ_r	Head σ (S/m)	Body ϵ_r	Body σ (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	$\sigma(\text{S/m})$	ϵ_r	$\sigma(\text{S/m})$
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:

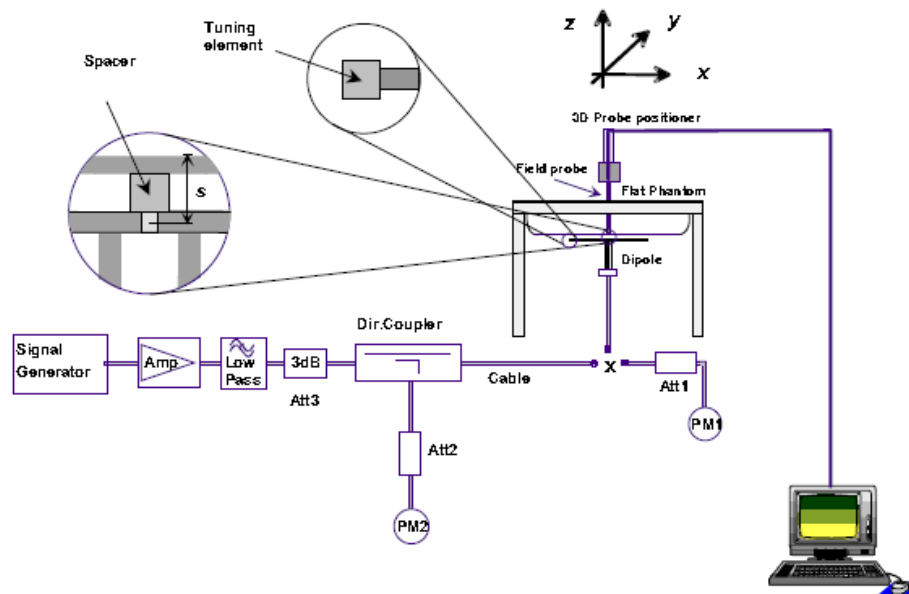
Table 3: Dielectric Performance of Body Tissue Simulating Liquid

Temperature: 23.2 °C; Humidity: 64%;			
/	Frequency	Permittivity ϵ	Conductivity σ (S/m)
Target value	750MHz	55.5 $\pm$ 5%	0.96 $\pm$ 5%
Validation value (2021-09-09)	750MHz	55.53	0.97
Target value	835MHz	55.2 $\pm$ 5%	0.97 $\pm$ 5%
Validation value (2021-09-10)	835MHz	55.18	0.96
Target value	1800MHz	53.3 $\pm$ 5%	1.52 $\pm$ 5%
Validation value (2021-09-13)	1800MHz	53.27	1.51
Target value	1900MHz	53.3 $\pm$ 5%	1.52 $\pm$ 5%
Validation value (2021-09-20)	1900MHz	53.25	1.50
Target value	2450MHz	52.7 $\pm$ 5%	1.95 $\pm$ 5%
Validation value (2021-09-15)	2450MHz	52.75	1.98

SAR System validation

Prior to the assessment, the system validation kit was used to test whether the system was operating within its specifications of $\pm 10\%$. 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)

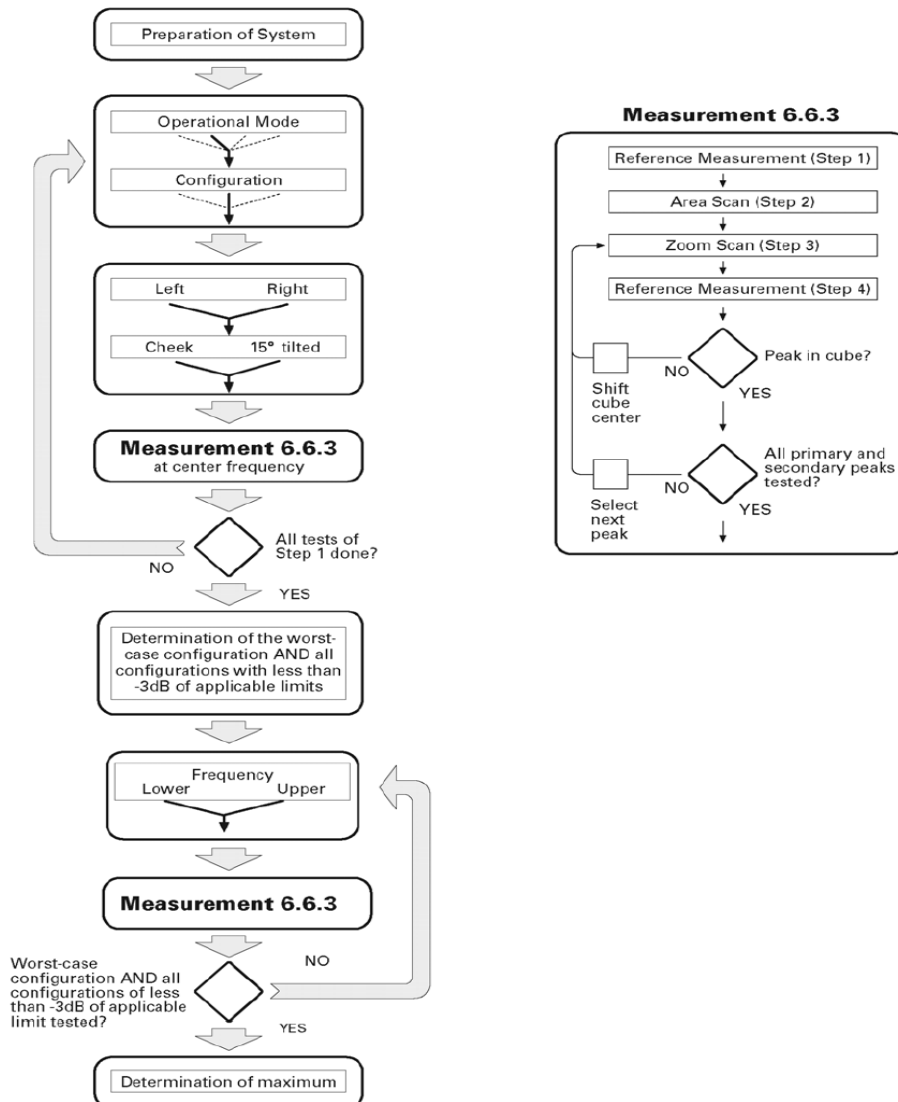
Frequency	Duty cycle	Target value (W/kg)	Test value (W/kg)	
			10 mW	1W
750MHz(2021-09-09)	1:1	8.82 ±10%	0.0896	8.96
835MHz(2021-09-10)	1:1	9.97 ±10%	0.0983	9.83
1800MHz(2021-09-13)	1:1	38.57 ±10%	0.3840	38.40
1900MHz(2021-09-20)	1:1	40.69 ±10%	0.4036	40.36
2450MHz(2021-09-15)	1:1	54.83 ±10%	0.5532	55.32

* 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 IEEE p1528 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 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 $\leq 0.8\text{W/kg}$, 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 $> 1.45\text{W/kg}$, 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/Frequency			Tune up
				18607/1850.7	18900/1880	19193/1909.3	
1.4MHz	QPSK	1	0	20.53	20.65	20.36	20.0±1.0
		1	3	20.52	20.62	20.34	
		1	5	20.50	20.60	20.33	
		3	0	19.43	19.50	19.49	18.5±1.0
		3	2	19.42	19.47	19.48	
		3	3	19.39	19.43	19.44	
		6	0	19.30	19.37	19.33	18.5±1.0
	16QAM	1	0	19.71	19.83	19.88	19.0±1.0
		1	3	19.66	19.81	19.85	
		1	5	19.64	19.76	19.84	
		3	0	19.02	19.03	19.08	18.5±1.0
		3	2	19.01	19.04	19.07	
		3	3	19.00	19.01	19.05	
		6	0	18.92	18.91	19.00	18.0±1.0
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				18615/1851.5	18900/1880	19185/1908.5	
3MHz	QPSK	1	0	20.55	20.66	20.37	20.0±1.0
		1	7	20.53	20.62	20.34	
		1	14	20.51	20.60	20.32	
		8	0	19.43	19.50	19.49	18.5±1.0
		8	4	19.42	19.49	19.48	
		8	7	19.39	19.40	19.43	
		15	0	19.30	19.36	19.36	18.5±1.0
	16QAM	1	0	19.70	19.81	19.90	19.0±1.0
		1	7	19.67	19.80	19.88	
		1	14	19.64	19.76	19.86	
		8	0	19.03	19.05	19.10	18.5±1.0
		8	4	19.04	19.04	19.12	
		8	7	19.02	19.03	19.08	
		15	0	18.90	18.92	19.02	18.5±1.0

LTE FDD Band 2				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				18625/1852.5	18900/1880	19175/1907.5	
5MHz	QPSK	1	0	20.56	20.67	20.38	20.0±1.0
		1	13	20.55	20.66	20.37	
		1	24	20.53	20.62	20.34	
		12	0	19.45	19.50	19.50	18.5±1.0
		12	6	19.43	19.50	19.49	
		12	13	19.42	19.49	19.48	
		25	0	19.40	19.43	19.46	18.5±1.0
	16QAM	1	0	19.84	19.87	20.02	19.0±1.0
		1	13	19.70	19.80	19.90	
		1	24	19.70	19.81	19.90	
		12	0	19.01	19.05	19.11	18.5±1.0
		12	6	19.03	19.05	19.10	
		12	13	19.04	19.04	19.12	
		25	0	18.90	18.93	19.00	18.0±1.0
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				18650/1855	18900/1880	19150/1905	
10MHz	QPSK	1	0	20.57	20.68	20.38	20.0±1.0
		1	25	20.55	20.66	20.37	
		1	49	20.53	20.64	20.36	
		25	0	19.45	19.51	19.50	18.5±1.0
		25	13	19.44	19.50	19.49	
		25	25	19.42	19.48	19.48	
		50	0	19.4	19.45	19.46	18.0±1.0
	16QAM	1	0	19.84	19.88	20.02	19.0±1.0
		1	25	19.70	19.80	19.91	
		1	49	19.70	19.81	19.90	
		25	0	19.01	19.04	19.12	18.5±1.0
		25	13	19.03	19.05	19.10	
		25	25	19.04	19.06	19.12	
		50	0	18.90	18.94	19.00	18.0±1.0

LTE FDD Band 2				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				18675/1857.5	18900/1880	19125/1902.5	
15MHz	QPSK	1	0	20.60	20.70	20.40	20.0±1.0
		1	38	20.55	20.67	20.38	
		1	74	20.53	20.65	20.37	
		36	0	19.46	19.52	19.50	19.0±1.0
		36	18	19.44	19.51	19.50	
		36	39	19.41	19.50	19.48	
		75	0	19.40	19.48	19.47	18.5±1.0
	16QAM	1	0	19.85	19.90	20.03	19.0±1.0
		1	38	19.71	19.80	19.92	
		1	74	19.70	19.81	19.90	
		36	0	19.01	19.07	19.12	18.5±1.0
		36	18	19.02	19.06	19.11	
		36	39	19.05	19.08	19.14	
		75	0	18.90	18.96	19.01	18.5±1.0
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				18700/1860	18900/1880	19100/1900	
20MHz	QPSK	1	0	20.61	20.71	20.42	20.0±1.0
		1	50	20.58	20.69	20.41	
		1	99	20.55	20.67	20.41	
		50	0	19.49	19.56	19.54	19.0±1.0
		50	25	19.47	19.55	19.54	
		50	50	19.48	19.53	19.52	
		100	0	19.44	19.50	19.51	19.0±1.0
	16QAM	1	0	19.86	19.91	20.05	19.5±1.0
		1	50	19.73	19.81	19.93	
		1	99	19.75	19.80	19.92	
		50	0	19.03	19.09	19.20	18.5±1.0
		50	25	19.04	19.08	19.17	
		50	50	19.05	19.10	19.18	
		100	0	18.91	18.97	19.07	18.5±1.0

2. LTE Band 4 Conducted Power Test Verdict:

LTE FDD Band 4				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				19957/1710.7	20175/1732.5	20393/1754.3	
1.4MHz	QPSK	1	0	20.22	20.31	20.25	19.5±1.0
		1	3	20.09	20.21	20.13	
		1	5	20.11	20.20	20.12	
		3	0	19.39	19.49	19.40	18.5±1.0
		3	2	19.40	19.48	19.37	
		3	3	19.41	19.50	19.38	
		6	0	19.27	19.37	19.27	18.5±1.0
	16QAM	1	0	19.09	19.16	19.14	18.5±1.0
		1	3	18.94	19.05	19.01	
		1	5	19.07	19.13	19.13	
		3	0	18.16	18.24	18.32	17.5±1.0
		3	2	18.24	18.34	18.35	
		3	3	18.26	18.35	18.29	
		6	0	18.14	18.25	18.14	17.5±1.0
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				19965/1711.5	20175/1732.5	20385/1753.5	
3MHz	QPSK	1	0	20.28	20.46	20.38	19.5±1.0
		1	7	20.15	20.36	20.26	
		1	14	20.17	20.35	20.25	
		8	0	19.45	19.64	19.53	19.0±1.0
		8	4	19.46	19.63	19.50	
		8	7	19.47	19.65	19.51	
		15	0	19.33	19.52	19.40	19.0±1.0
	16QAM	1	0	19.15	19.31	19.27	18.5±1.0
		1	7	19.00	19.20	19.14	
		1	14	19.13	19.28	19.26	
		8	0	18.22	18.39	18.45	17.5±1.0
		8	4	18.30	18.49	18.48	
		8	7	18.32	18.50	18.42	
		15	0	18.20	18.40	18.27	17.5±1.0

LTE FDD Band 4				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				19975/1712.5	20175/1732.5	20375/1752.5	
5MHz	QPSK	1	0	20.54	20.46	20.79	20.0±1.0
		1	13	20.41	20.36	20.67	
		1	24	20.43	20.35	20.66	
		12	0	19.71	19.64	19.94	19.0±1.0
		12	6	19.72	19.63	19.91	
		12	13	19.73	19.65	19.92	
		25	0	19.59	19.52	19.81	19.0±1.0
	16QAM	1	0	19.41	19.31	19.68	19.0±1.0
		1	13	19.26	19.20	19.55	
		1	24	19.39	19.28	19.67	
		12	0	18.48	18.39	18.86	18.0±1.0
		12	6	18.56	18.49	18.89	
		12	13	18.58	18.50	18.83	
		25	0	18.46	18.40	18.68	18.0±1.0
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				20000/1715	20175/1732.5	20350/1750	
10MHz	QPSK	1	0	20.95	21.04	20.91	20.5±1.0
		1	25	20.82	20.94	20.79	
		1	49	20.84	20.93	20.78	
		25	0	20.12	20.22	20.06	19.5±1.0
		25	13	20.13	20.21	20.03	
		25	25	20.14	20.23	20.04	
		50	0	20.00	20.10	19.93	19.5±1.0
	16QAM	1	0	19.82	19.89	19.80	19.0±1.0
		1	25	19.67	19.78	19.67	
		1	49	19.80	19.86	19.79	
		25	0	18.89	18.97	18.98	18.5±1.0
		25	13	18.97	19.07	19.01	
		25	25	18.99	19.08	18.95	
		50	0	18.87	18.98	18.80	18.0±1.0

LTE FDD Band 4				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				20025/1717.5	20175/1732.5	20325/1747.5	
15MHz	QPSK	1	0	21.14	21.07	21.11	20.5±1.0
		1	38	21.01	20.97	20.99	
		1	74	21.03	20.96	20.98	
		36	0	20.31	20.25	20.26	19.5±1.0
		36	18	20.32	20.24	20.23	
		36	39	20.33	20.26	20.24	
		75	0	20.19	20.13	20.13	19.5±1.0
	16QAM	1	0	20.01	19.92	20.00	19.5±1.0
		1	38	19.86	19.81	19.87	
		1	74	19.99	19.89	19.99	
		36	0	19.08	19.00	19.18	18.5±1.0
		36	18	19.16	19.10	19.21	
		36	39	19.18	19.11	19.15	
		75	0	19.06	19.01	19.00	18.5±1.0
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				20050/1720	20175/1732.5	20300/1745	
20MHz	QPSK	1	0	21.29	21.27	21.38	20.5±1.0
		1	50	21.16	21.17	21.26	
		1	99	21.18	21.16	21.25	
		50	0	20.13	20.08	20.14	19.5±1.0
		50	25	20.05	19.98	19.91	
		50	50	20.01	19.83	19.88	
		100	0	20.01	19.96	20.01	19.5±1.0
	16QAM	1	0	20.16	20.12	20.27	19.5±1.0
		1	50	20.01	20.01	20.14	
		1	99	20.14	20.09	20.26	
		50	0	19.23	19.20	19.45	18.5±1.0
		50	25	19.31	19.30	19.48	
		50	50	19.33	19.31	19.42	
		100	0	19.21	19.21	19.27	18.5±1.0

3. 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	21.55	21.46	21.38	21.0±1.0
		1	3	21.42	21.35	21.27	
		1	5	21.4	21.31	21.24	
		3	0	20.74	20.6	20.52	20.0±1.0
		3	2	20.7	20.63	20.56	
		3	3	20.71	20.62	20.51	
		6	0	20.56	20.43	20.41	20.0±1.0
	16QAM	1	0	20.42	20.34	20.23	19.5±1.0
		1	3	20.31	20.19	20.12	
		1	5	20.4	20.3	20.21	
		3	0	19.51	19.42	19.4	19.0±1.0
		3	2	19.54	19.51	19.46	
		3	3	19.6	19.53	19.37	
		6	0	19.46	19.35	19.16	18.5±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	21.75	21.68	21.61	21.0±1.0
		1	7	21.6	21.54	21.47	
		1	14	21.64	21.55	21.46	
		8	0	20.93	20.83	20.78	20.0±1.0
		8	4	20.94	20.86	20.8	
		8	7	20.95	20.84	20.73	
		15	0	20.77	20.71	20.62	20.0±1.0
	16QAM	1	0	20.63	20.55	20.44	20.0±1.0
		1	7	20.48	20.4	20.29	
		1	14	20.6	20.49	20.41	
		8	0	19.71	19.61	19.63	19.0±1.0
		8	4	19.77	19.73	19.72	
		8	7	19.82	19.71	19.61	
		15	0	19.67	19.55	19.37	19.0±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	22.25	22.45	22.61	22.0±1.0
		1	13	22.1	22.3	22.5	
		1	24	22.12	22.33	22.46	
		12	0	21.43	21.62	21.8	21.0±1.0
		12	6	21.44	21.61	21.77	
		12	13	21.42	21.58	21.76	
		25	0	21.28	21.46	21.61	21.0±1.0
	16QAM	1	0	21.11	21.33	21.45	20.5±1.0
		1	13	20.98	21.19	21.31	
		1	24	21.06	21.31	21.38	
		12	0	20.17	20.41	20.6	20.0±1.0
		12	6	20.3	20.47	20.73	
		12	13	20.29	20.5	20.59	
		25	0	20.14	20.39	20.35	19.5±1.0
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				20450/829	20525/836.5	20600/844	
10MHz	QPSK	1	0	22.8	22.97	22.96	22.0±1.0
		1	25	22.62	22.85	22.81	
		1	49	22.64	22.85	22.85	
		25	0	21.46	21.53	21.55	21.0±1.0
		25	13	21.08	21.33	21.43	
		25	25	21.25	21.14	21.15	
		50	0	21.33	21.4	21.37	20.5±1.0
	16QAM	1	0	21.67	21.82	21.81	21.0±1.0
		1	25	21.56	21.71	21.7	
		1	49	21.62	21.74	21.78	
		25	0	20.76	20.88	20.97	20.0±1.0
		25	13	20.81	20.93	21.05	
		25	25	20.82	20.96	20.93	
		50	0	20.69	20.79	20.71	20.0±1.0

4. LTE Band 12 Conducted Power Test Verdict:

LTE FDD Band 12				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				23017/699.7	23095/707.5	23173/715.3	
1.4MHz	QPSK	1	0	21.33	21.45	21.67	21.0±1.0
		1	3	21.21	21.33	21.55	
		1	5	21.22	21.34	21.54	
		3	0	20.48	20.63	20.85	20.0±1.0
		3	2	20.51	20.6	20.83	
		3	3	20.45	20.64	20.84	
		6	0	20.35	20.5	20.7	20.0±1.0
	16QAM	1	0	20.2	20.3	20.55	20.0±1.0
		1	3	20.09	20.19	20.42	
		1	5	20.18	20.27	20.5	
		3	0	19.25	19.35	19.71	19.0±1.0
		3	2	19.37	19.48	19.82	
		3	3	19.36	19.45	19.74	
		6	0	19.18	19.32	19.52	19.0±1.0
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				23025/700.5	23095/707.5	23165/714.5	
3MHz	QPSK	1	0	21.75	21.84	21.78	21.0±1.0
		1	7	21.63	21.72	21.66	
		1	14	21.64	21.73	21.65	
		8	0	20.9	21.02	20.96	20.5±1.0
		8	4	20.93	20.99	20.94	
		8	7	20.87	21.03	20.95	
		15	0	20.77	20.89	20.81	20.0±1.0
	16QAM	1	0	20.62	20.69	20.66	20.0±1.0
		1	7	20.51	20.58	20.53	
		1	14	20.6	20.66	20.61	
		8	0	19.67	19.74	19.82	19.0±1.0
		8	4	19.79	19.87	19.93	
		8	7	19.78	19.84	19.85	
		15	0	19.6	19.71	19.63	19.0±1.0

LTE FDD Band 12				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				23035/701.5	23095/707.5	23155/713.5	
5MHz	QPSK	1	0	22.25	22.43	22.51	22.0±1.0
		1	13	22.13	22.31	22.39	
		1	24	22.14	22.32	22.38	
		12	0	21.4	21.61	21.69	21.0±1.0
		12	6	21.43	21.58	21.67	
		12	13	21.37	21.62	21.68	
		25	0	21.27	21.48	21.54	21.0±1.0
	16QAM	1	0	21.12	21.28	21.39	20.5±1.0
		1	13	21.01	21.17	21.26	
		1	24	21.1	21.25	21.34	
		12	0	20.17	20.33	20.55	20.0±1.0
		12	6	20.29	20.46	20.66	
		12	13	20.28	20.43	20.58	
		25	0	20.1	20.3	20.36	19.5±1.0
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				23060/704	23095/707.5	23130/711	
10MHz	QPSK	1	0	22.83	22.95	22.94	22.0±1.0
		1	25	22.71	22.83	22.85	
		1	49	22.72	22.84	22.84	
		25	0	21.16	21.27	21.24	20.5±1.0
		25	13	21.05	21.08	21.12	
		25	25	21.01	21	21.09	
		50	0	21.03	21.14	21.09	20.5±1.0
	16QAM	1	0	21.7	21.8	21.85	21.0±1.0
		1	25	21.59	21.69	21.72	
		1	49	21.68	21.77	21.8	
		25	0	20.75	20.85	21.01	20.5±1.0
		25	13	20.87	20.98	21.12	
		25	25	20.86	20.95	21.04	
		50	0	20.68	20.82	20.82	20.0±1.0

5. LTE Band 13 Conducted Power Test Verdict:

LTE FDD Band 13				Conducted Power(dBm)			
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				23035/779.5	23095/782	23155/784.5	
5MHz	QPSK	1	0	22.61	22.75	22.68	22.0±1.0
		1	13	22.49	22.63	22.56	
		1	24	22.5	22.64	22.55	
		12	0	21.76	21.93	21.86	21.0±1.0
		12	6	21.79	21.9	21.84	
		12	13	21.73	21.94	21.85	
		25	0	21.63	21.8	21.71	21.0±1.0
	16QAM	1	0	21.48	21.6	21.56	21.0±1.0
		1	13	21.37	21.49	21.43	
		1	24	21.46	21.57	21.51	
		12	0	20.53	20.65	20.72	20.0±1.0
		12	6	20.65	20.78	20.83	
		12	13	20.64	20.75	20.75	
		25	0	20.46	20.62	20.53	20.0±1.0
Bandwidth	Modulation	RB size	RB offset	Channel/Frequency			Tune up
				23230/782			
10MHz	QPSK	1	0	23.15			22.5±1.0
		1	25	23.03			
		1	49	23.04			
		25	0	21.92			21.0±1.0
		25	13	21.75			
		25	25	21.87			
		50	0	21.14			20.5±1.0
	16QAM	1	0	22			21.0±1.0
		1	25	21.89			
		1	49	21.97			
		25	0	21.05			20.5±1.0
		25	13	21.18			
		25	25	21.15			
		50	0	21.02			20.5±1.0

7.2 WIFI 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)	11.59	10.69	9.26
6(2437)	11.86	10.34	8.48
11(2462)	12.20	10.02	8.43
Channel/Freq.(MHz)	Maximum Conducted Out Power (dBm)		
	802.11n(HT40)		
3(2422)	7.49		
6(2437)	8.50		
9(2452)	8.72		

7.3 Bluetooth Output Power

Channel	Frequency (MHz)	BT4.0 Output Power(dBm)
		GFSK
CH 0	2402	3.401
CH 20	2442	3.671
CH 39	2480	3.994

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 $\leq 1.2\text{W/Kg}$. Thus the SAR can be excluded.

8. SAR test Exclusion and estimate SAR calculation:

Note:

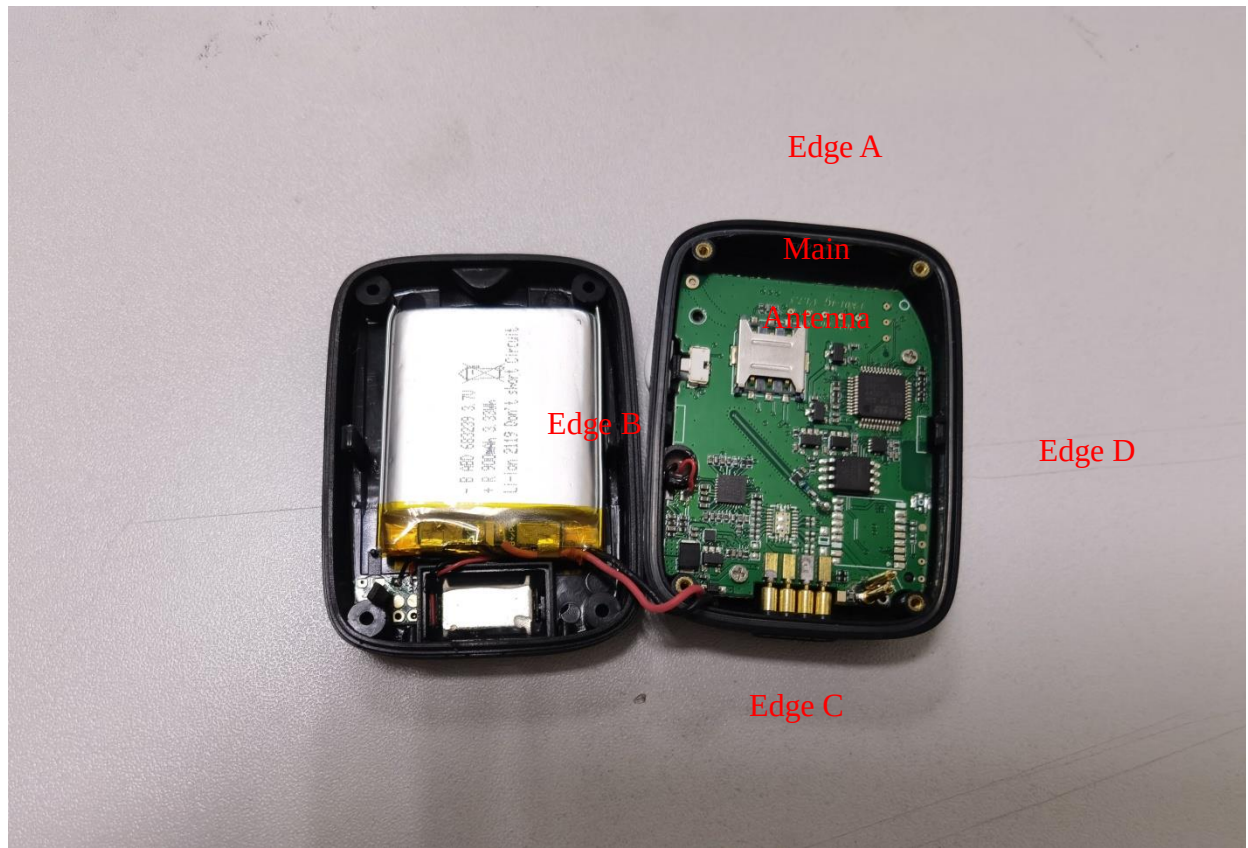
1. Per KDB 447498 D01v06, the 1-g and 10-g SAR test exclusion thresholds for 100MHz to 6GHz at test separation distances $\leq 50\text{mm}$ are determined by: $[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \{ \sqrt{f} \text{ (GHz)} \} \leq 3.0$ for 1-g SAR and ≤ 7.5 for 10-g extremity SAR
 - (1) $f(\text{GHz})$ 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 $< 5\text{mm}$, 5mm is used for excluded SAR calculation
 - (5)

BT4.0 Max Power (dBm)	mW	Test Distance (mm)	Frequency(GHz)	Exclusion Thresholds
4.0	2.512	5	2.45	0.786

Per KDB 447498 D01v06 exclusion thresholds is $0.786 < 3$, RF exposure evaluation is not required.

BT estimated SAR value = $\text{Exclusion Thresholds} / 7.5 = 0.786 / 7.5 = \mathbf{0.105\text{W/Kg}}$

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	3	9	2	2	54	9
WIFI/BT(FPC)	15	2	6	13	27	2
WIFI/BT (ceramic antenna)	6	12	24	2	32	40

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 Body	Yes	Yes	Yes	Yes	No	Yes
WIFI/BT(FPC)	Yes	Yes	Yes	Yes	No	Yes
WIFI/BT (ceramic antenna)	Yes	Yes	Yes	Yes	No	No

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
LTE B2 20MHz 1RB#50	18700/1860	20.61	20.0 ± 1.0	21.00	1.094
	18900/1880	20.71	20.0 ± 1.0	21.00	1.069
	19100/1900	20.42	20.0 ± 1.0	21.00	1.143
LTE B2 20MHz 50RB#0	18700/1860	19.49	19.0 ± 1.0	20.00	1.125
	18900/1880	19.56	19.0 ± 1.0	20.00	1.107
	19100/1900	19.54	19.0 ± 1.0	20.00	1.112
LTE B4 20MHz 1RB#50	20050/1720	21.29	20.5 ± 1.0	21.50	1.050
	20175/1732.5	21.27	20.5 ± 1.0	21.50	1.054
	20300/1745	21.38	20.5 ± 1.0	21.50	1.028
LTE B4 20MHz 50RB#0	20050/1720	20.13	19.5 ± 1.0	20.50	1.089
	20175/1732.5	20.08	19.5 ± 1.0	20.50	1.102
	20300/1745	20.14	19.5 ± 1.0	20.50	1.086
LTE B5 10MHz 1RB#25	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#25	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 B12 10MHz 1RB#25	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	22.94	22.0 ± 1.0	23.00	1.014
LTE B12 10MHz 25RB#25	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
WIFI 2.4G 802.11b	1/2412	11.59	11.5 ± 1.0	12.50	1.233
	6/2437	11.86	11.5 ± 1.0	12.50	1.159
	11/2462	12.20	11.5 ± 1.0	12.50	1.072

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

10. Test Results

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

Body-Support(5mm)	Channel /Frequency	Mode	SAR Value (W/kg)1-g	Power drift(%)	Scaled Factor	Scaled SAR (W/Kg)1-g	Limit (W/kg)
1RB#50							
Face Upward	18700/1860	Data	0.984	0.43	1.094	1.076	/
Face Upward	18900/1880	Data	1.100	-3.52	1.069	1.176	Yes
Face Upward	19100/1900	Data	0.903	-1.39	1.143	1.032	/
Face Upward (Repeated)	18700/1860	Data	0.882	-1.54	1.094	0.965	/
	18900/1880	Data	0.946	-2.59	1.069	1.011	/
	19100/1900	Data	0.823	-3.78	1.143	0.941	/
Back Upward	18900/1880	Data	1.054	-1.05	1.069	1.127	/
Edge A	18900/1880	Data	0.263	1.63	1.069	0.281	/
Edge B	18900/1880	Data	0.148	-2.27	1.069	0.158	/
Edge D	18900/1880	Data	0.462	-4.39	1.069	0.494	/
50%RB#0							
Face Upward	18700/1860	Data	0.745	-2.99	1.125	0.838	/
Face Upward	18900/1880	Data	0.795	-0.09	1.107	0.880	/
Face Upward	19100/1900	Data	0.757	-1.47	1.112	0.842	/
Back Upward	18900/1880	Data	0.721	4.83	1.107	0.798	/
Edge A	18900/1880	Data	0.202	-4.97	1.107	0.224	/
Edge B	18900/1880	Data	0.078	4.99	1.107	0.086	/
Edge D	18900/1880	Data	0.391	-3.59	1.107	0.433	/

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

Body-Support(5mm)	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	20050/1720	Data	0.824	-2.35	1.050	0.865	/
Face Upward	20175/1732.5	Data	0.833	-3.89	1.054	0.878	Yes
Face Upward	20300/1745	Data	0.830	2.88	1.028	0.853	/
Face Upward (Repeated)	20050/1720	Data	0.772	-3.32	1.050	0.811	/
	20175/1732.5	Data	0.781	1.52	1.054	0.823	/
	20300/1745	Data	0.778	-0.78	1.028	0.800	/
Back Upward	20175/1732.5	Data	0.720	4.11	1.054	0.759	/
Edge A	20175/1732.5	Data	0.156	-0.24	1.054	0.164	/
Edge B	20175/1732.5	Data	0.066	4.35	1.054	0.070	/
Edge D	20175/1732.5	Data	0.274	-4.50	1.054	0.289	/
50%RB#0							
Face Upward	20175/1732.5	Data	0.725	-3.50	1.102	0.799	/
Back Upward	20175/1732.5	Data	0.613	2.84	1.102	0.675	/
Edge A	20175/1732.5	Data	0.101	0.98	1.102	0.111	/
Edge B	20175/1732.5	Data	0.042	-1.60	1.102	0.046	/
Edge D	20175/1732.5	Data	0.223	-0.59	1.102	0.246	/

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

Body-Support(5mm)	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	20525/836.5	Data	0.403	1.11	1.007	0.406	/
Back Upward	20525/836.5	Data	0.170	0.66	1.007	0.171	/
Edge A	20525/836.5	Data	0.404	-1.83	1.007	0.407	Yes
Edge B	20525/836.5	Data	0.110	1.55	1.007	0.111	/
Edge D	20525/836.5	Data	0.079	2.58	1.007	0.080	/
50%RB#0							
Face Upward	20525/836.5	Data	0.334	-4.45	1.114	0.372	/
Back Upward	20525/836.5	Data	0.112	0.85	1.114	0.125	/
Edge A	20525/836.5	Data	0.337	1.53	1.114	0.376	/
Edge B	20525/836.5	Data	0.080	2.98	1.114	0.089	/
Edge D	20525/836.5	Data	0.041	-2.67	1.114	0.046	/

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

Body-Support(5mm)	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	23095/707.5	Data	0.288	-4.79	1.012	0.291	/
Back Upward	23095/707.5	Data	0.117	0.83	1.012	0.118	/
Edge A	23095/707.5	Data	0.412	-2.74	1.012	0.417	Yes
Edge B	23095/707.5	Data	0.113	-4.82	1.012	0.114	/
Edge D	23095/707.5	Data	0.052	4.20	1.012	0.053	/
50%RB#0							
Face Upward	23095/707.5	Data	0.224	-0.09	1.054	0.236	/
Back Upward	23095/707.5	Data	0.066	-0.79	1.054	0.070	/
Edge A	23095/707.5	Data	0.336	2.53	1.054	0.354	/
Edge B	23095/707.5	Data	0.061	3.03	1.054	0.064	/
Edge D	23095/707.5	Data	0.030	1.89	1.054	0.032	/

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

Body-Support(5mm)	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	23230/782	Data	0.332	-2.36	1.084	0.360	/
Back Upward	23230/782	Data	0.150	4.11	1.084	0.163	/
Edge A	23230/782	Data	0.380	-4.20	1.084	0.412	Yes
Edge B	23230/782	Data	0.139	-4.11	1.084	0.151	/
Edge D	23230/782	Data	0.068	2.42	1.084	0.074	/
50%RB#0							
Face Upward	23230/782	Data	0.266	4.41	1.019	0.271	/
Back Upward	23230/782	Data	0.104	-2.07	1.019	0.106	/
Edge A	23230/782	Data	0.303	0.45	1.019	0.309	
Edge B	23230/782	Data	0.088	-1.12	1.019	0.090	/
Edge D	23230/782	Data	0.041	-3.79	1.019	0.042	/

Results overview of WIFI2.4G 802.11b(FPC antenna)

Body-Support(5mm)	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	0.012	2.08	1.159	0.014	/
Back Upward	6/2437	DSSS	0.015	-3.27	1.159	0.017	Yes
Edge A	6/2437	DSSS	0.011	-3.27	1.159	0.012	/
Edge B	6/2437	DSSS	0.010	-1.51	1.159	0.012	/
Edge D	6/2437	DSSS	0.007	3.53	1.159	0.008	/

Results overview of WIFI2.4G 802.11b(Ceramic antenna)

Body-Support(5mm)	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	0.011	2.08	1.159	0.014	/
Back Upward	6/2437	DSSS	0.010	-3.27	1.159	0.017	/
Edge A	6/2437	DSSS	0.011	-3.27	1.159	0.012	/
Edge B	6/2437	DSSS	0.012	-1.51	1.159	0.012	/

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	LTE+BT	Yes	No
2	LTE+WIFI 2.4G	Yes	Yes
3	WIFI+BT	No	No

Simultaneous Tx Combination of LTE and WIFI (Body).

Test Position/Freq.		FACE	BACK	Edge A	Edge B	Edge C	Edge D
Body MAX 1-g SAR(W/Kg) 5mm distance	LTE Band2	1.176	1.127	/	/	/	/
	LTE Band4	0.878	0.759	/	/	/	/
	LTE Band5	0.406	0.171	/	/	/	/
	LTE Band12	0.291	0.118	/	/	/	/
	LTE Band13	0.360	0.163	/	/	/	/
	WIFI 2.4G	0.014	0.017	/	/	/	/
WIFI Simultaneous Σ 1-g SAR(W/Kg)		1.190	1.144	/	/	/	/

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 (%) $u_i(\%)$	Degree of freedom ν_{eff} or ν_i
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 (%) $u_i(\%)$	Degree of freedom V_{eff} or v_i
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 numerical 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	

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	2020/06/25	2023/06/24
☒	Dipole	SID750	SN 23/15 DIP0G750-378	2020/06/25	2023/06/24
☒	Dipole	SID835	SN 09/13 DIP0G835-217	2020/06/25	2023/06/24
☒	Dipole	SID900	SN 09/13 DIP0G900-215	2020/06/25	2023/06/24
☒	Dipole	SID1800	SN 09/13 DIP1G800-216	2020/06/25	2023/06/24
☒	Dipole	SID2000	SN 09/13 DIP2G000-219	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—